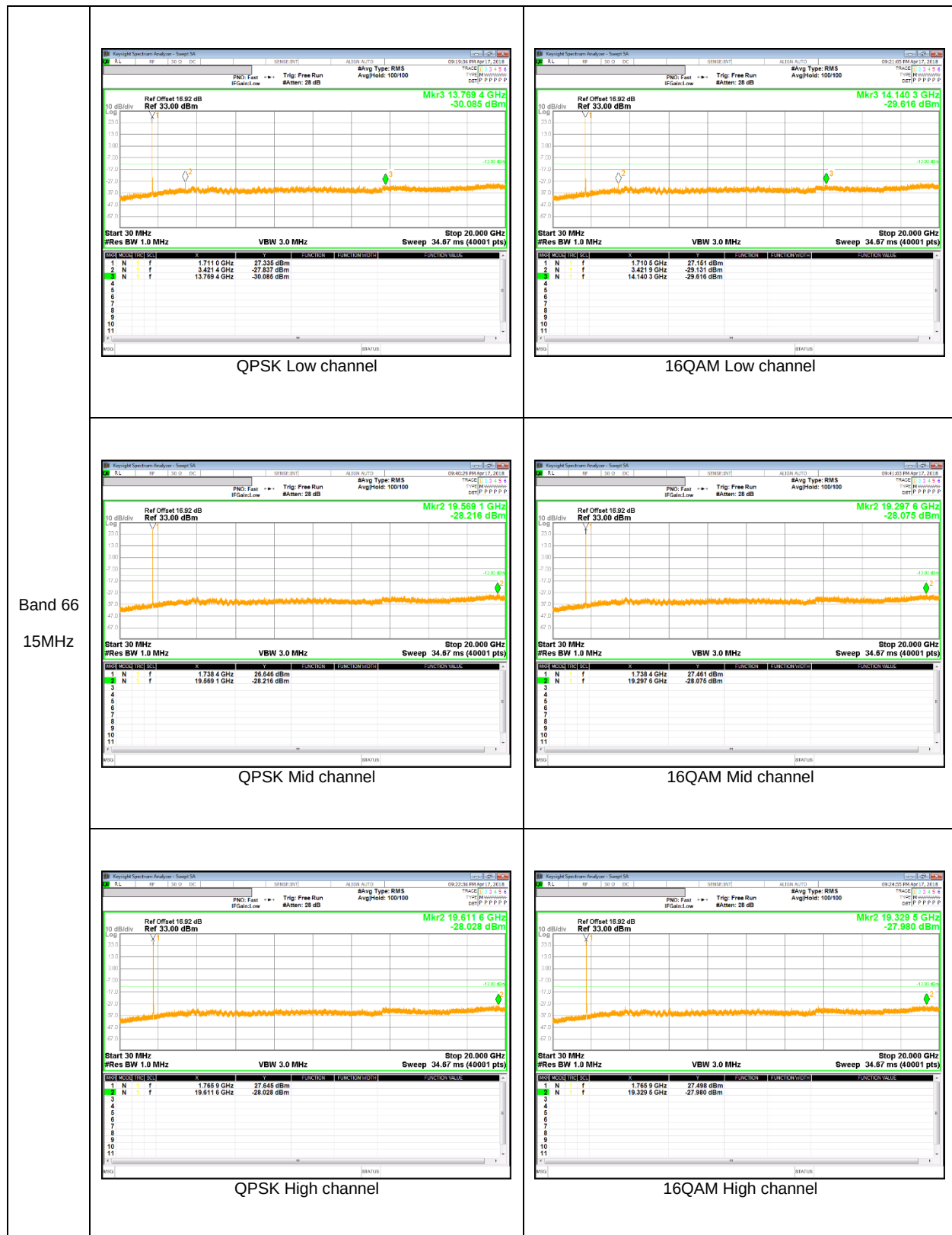
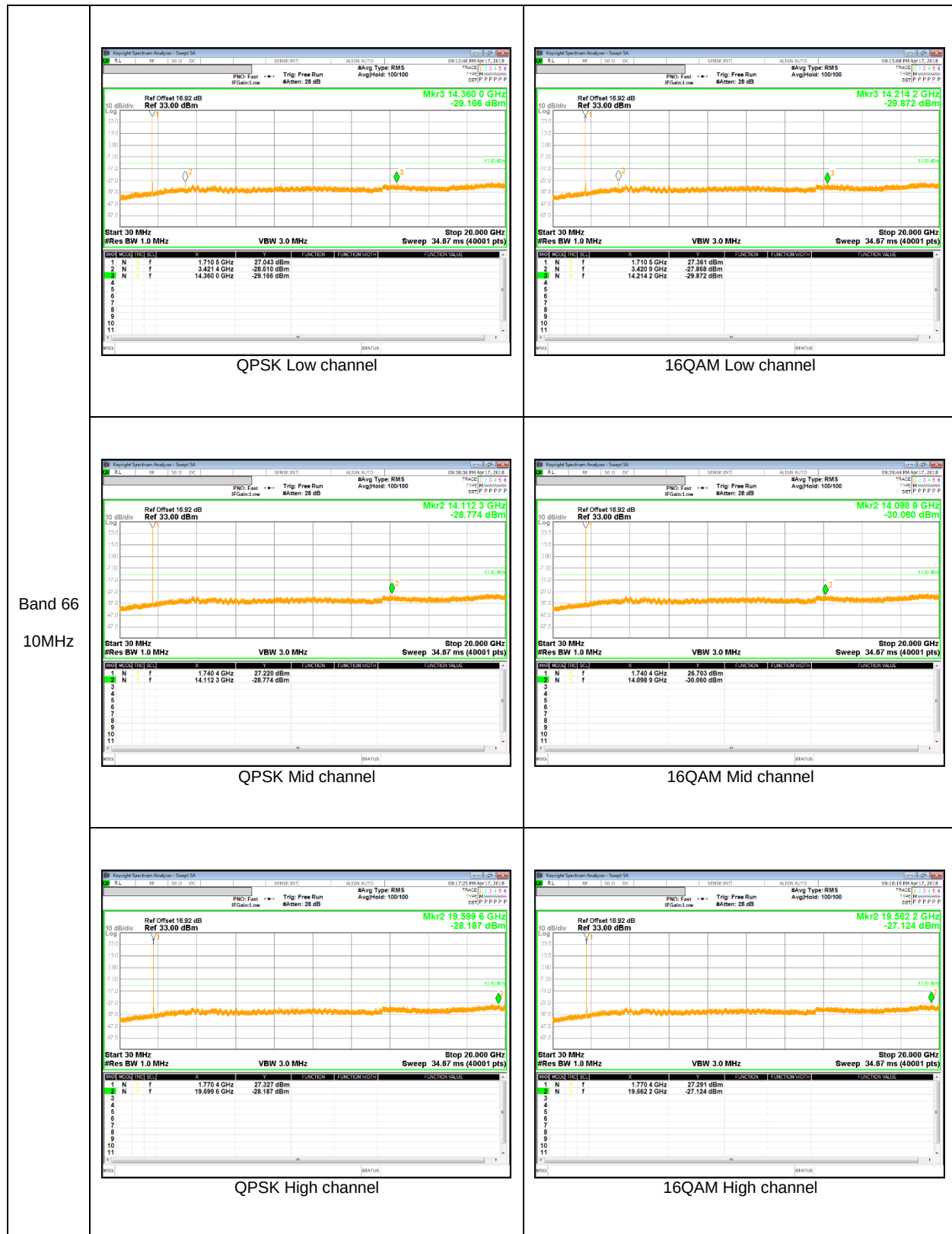
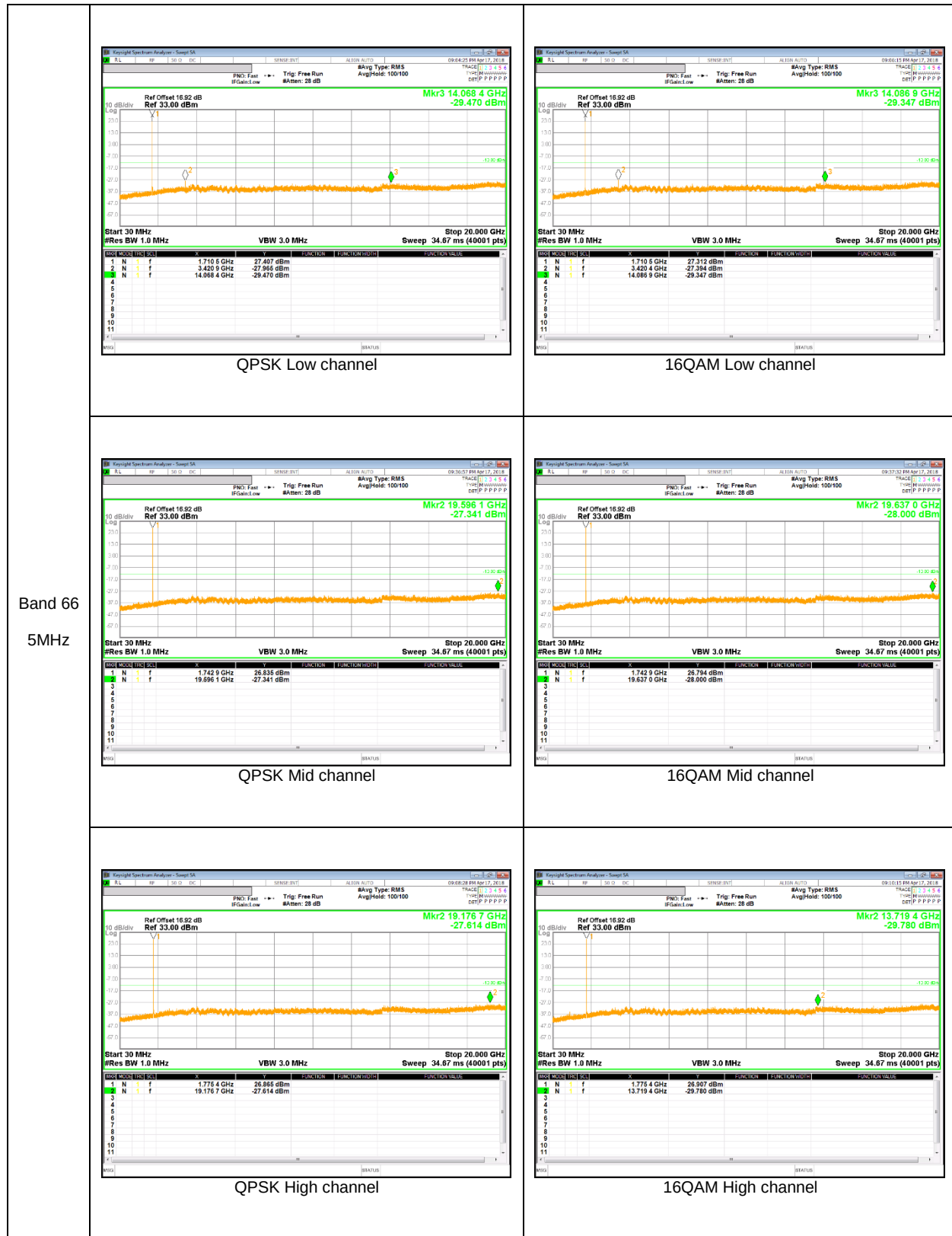
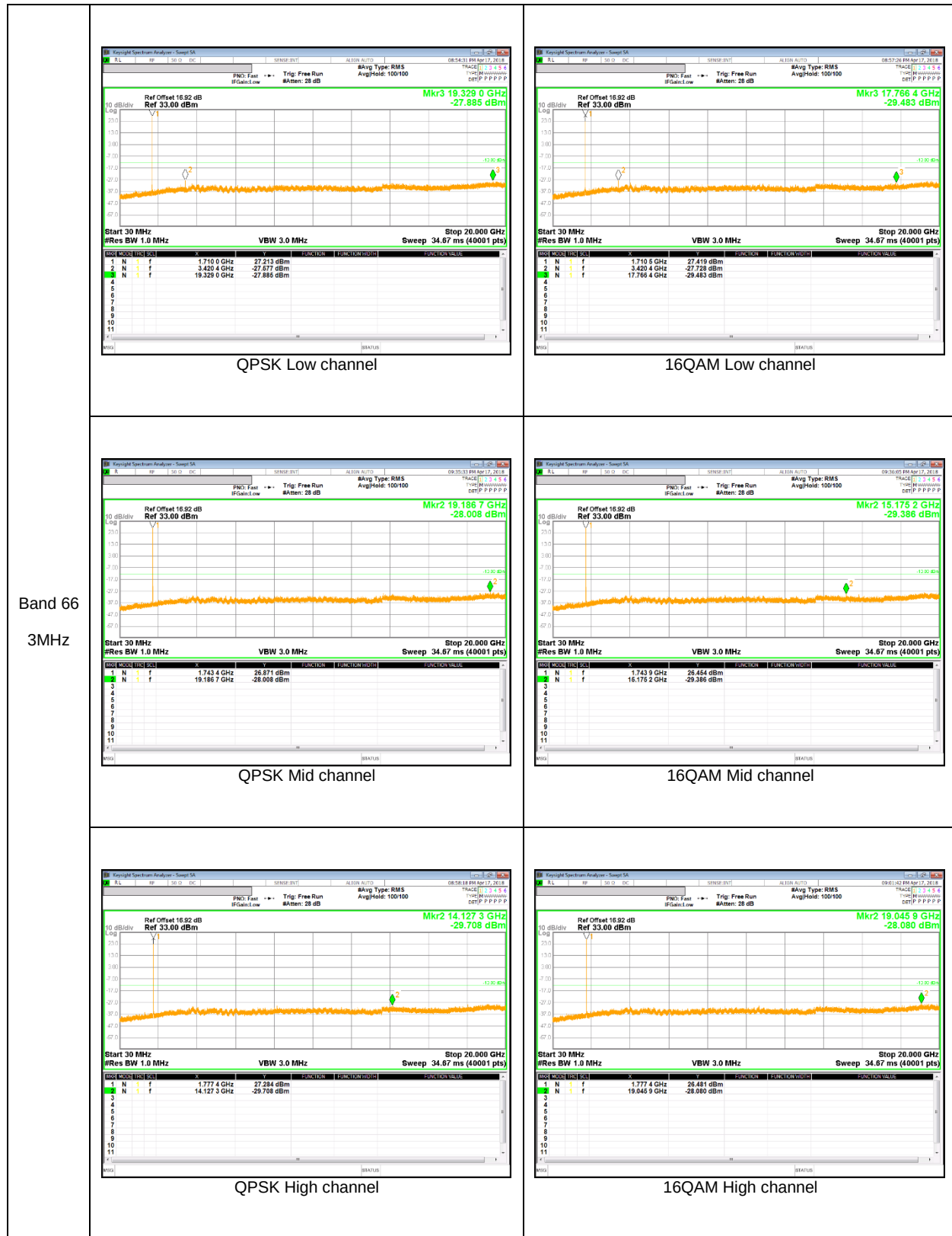
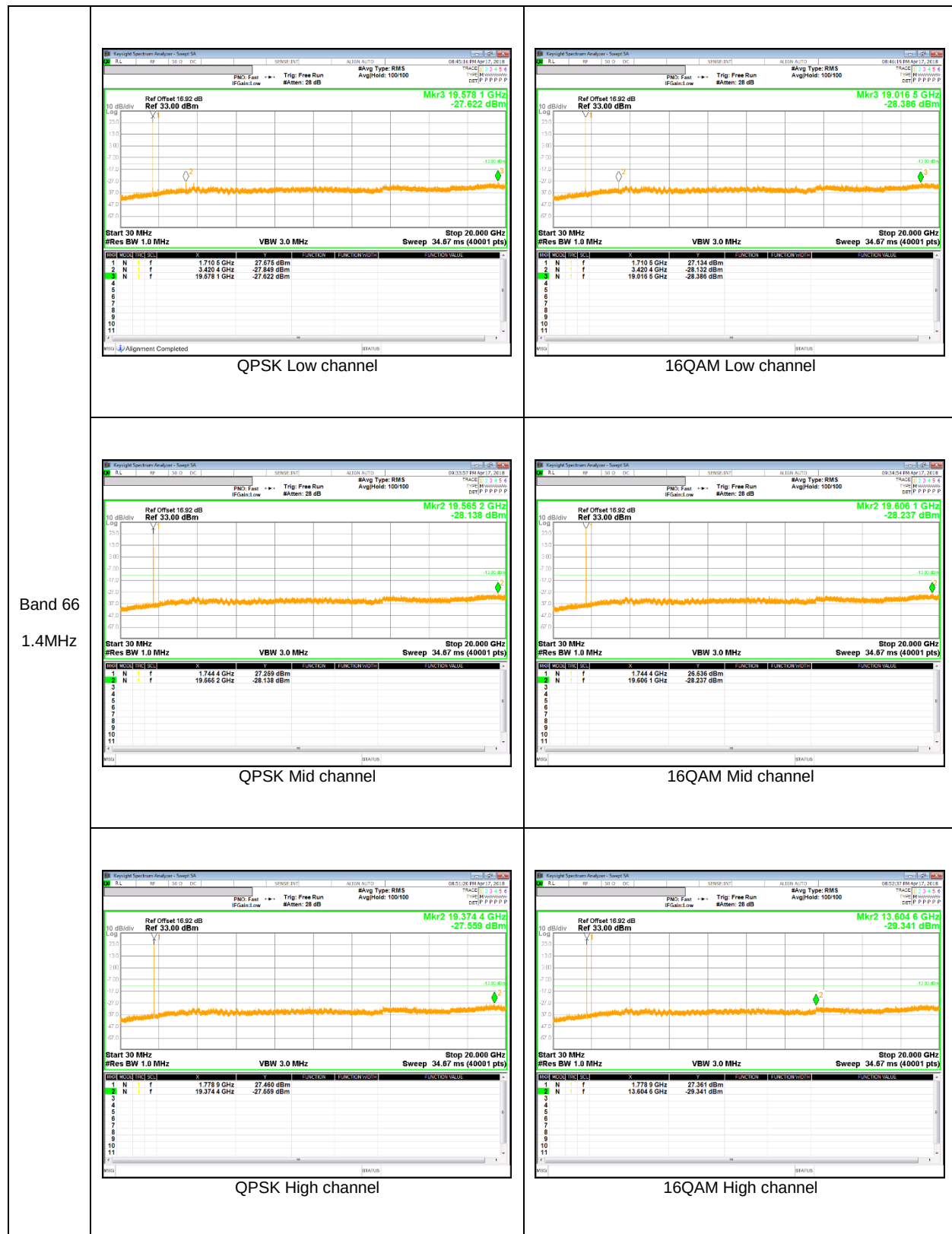












## **9.4. FREQUENCY STABILITY**

### **RULE PART(S)**

FCC: §2.1055, §22.355, §24.235 and §27.54

### **LIMITS**

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### **TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v03

### **RESULTS**

See the following pages.

## 9.4.1. FREQUENCY STABILITY RESULTS

### GSM 850, Low/High Channel, Frequency 824.2 MHz / 848.8 MHz

| Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C |                              |                                               |              |                     |              |             |             |
|------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|---------------------|--------------|-------------|-------------|
| Limit: +- 2.5 ppm =                                                                |                              | Low Channel                                   | 2060.500     | Hz                  | High Channel | 2122.000    | Hz          |
| Power Supply [Vdc]                                                                 | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |              |                     |              |             | Limit [ppm] |
|                                                                                    |                              | Low Channel                                   |              | High Channel        |              | Limit [ppm] |             |
|                                                                                    |                              | [MHz]                                         | Delta [ppm]  | [MHz]               | Delta [ppm]  |             |             |
| 3.85                                                                               | 50                           | 824.19996545                                  | 0.008        | 848.79997152        | 0.004        | 2.5         |             |
| 3.85                                                                               | 40                           | 824.19997282                                  | 0.000        | 848.79997089        | 0.005        | 2.5         |             |
| 3.85                                                                               | 30                           | 824.19996724                                  | 0.006        | 848.79997007        | 0.006        | 2.5         |             |
| <b>3.85</b>                                                                        | <b>20</b>                    | <b>824.19997242</b>                           | <b>0.000</b> | <b>848.79997487</b> | <b>0.000</b> | <b>2.5</b>  |             |
| 3.85                                                                               | 10                           | 824.19996550                                  | 0.008        | 848.79997116        | 0.004        | 2.5         |             |
| 3.85                                                                               | 0                            | 824.19997554                                  | -0.004       | 848.79997232        | 0.003        | 2.5         |             |
| 3.85                                                                               | -10                          | 824.19997281                                  | 0.000        | 848.79997424        | 0.001        | 2.5         |             |
| 3.85                                                                               | -20                          | 824.19997456                                  | -0.003       | 848.79996663        | 0.010        | 2.5         |             |
| 3.85                                                                               | -30                          | 824.19997003                                  | 0.003        | 848.79997203        | 0.003        | 2.5         |             |

| Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C |                                 |                                               |             |              |              |             |    |
|------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|--------------|--------------|-------------|----|
| Limit: +- 2.5 ppm =                                                                |                                 | Low Channel                                   | 2060.500    | Hz           | High Channel | 2122.000    | Hz |
| Power Supply<br>[Vdc]                                                              | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |              |              |             |    |
|                                                                                    |                                 | Low Channel                                   |             | High Channel |              | Limit [ppm] |    |
|                                                                                    |                                 | [MHz]                                         | Delta [ppm] | [MHz]        | Delta [ppm]  |             |    |
| 3.85                                                                               | 20                              | 824.19997242                                  | 0           | 848.79997487 | 0            | 2.5         |    |
| 4.40                                                                               | 20                              | 824.19997404                                  | -0.002      | 848.79996873 | 0.007        | 2.5         |    |
| 3.60                                                                               | 20                              | 824.19997180                                  | 0.001       | 848.79997368 | 0.001        | 2.5         |    |

### GSM 1900, Low/High Channel, Frequency 1850.2 MHz / 1909.8 MHz

| Reference Frequency : GSM1900 Low Channel 1850.2 MHz / High Channel 1909.8 MHz @ 20°C |                              |                                               |              |                      |              |          |             |
|---------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|----------------------|--------------|----------|-------------|
| Limit: +- 2.5 ppm =                                                                   |                              | Low Channel                                   | 4625.500     | Hz                   | High Channel | 4774.500 | Hz          |
| Power Supply [Vdc]                                                                    | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |              |                      |              |          | Limit [ppm] |
|                                                                                       |                              | Low Channel                                   |              | High Channel         |              |          |             |
|                                                                                       |                              | [MHz]                                         | Delta [ppm]  | [MHz]                | Delta [ppm]  |          |             |
| 3.85                                                                                  | 50                           | 1850.19996398                                 | 0.004        | 1909.79997075        | -0.004       |          | 2.5         |
| 3.85                                                                                  | 40                           | 1850.19996996                                 | 0.000        | 1909.79996247        | 0.000        |          | 2.5         |
| 3.85                                                                                  | 30                           | 1850.19996179                                 | 0.005        | 1909.79996344        | -0.001       |          | 2.5         |
| <b>3.85</b>                                                                           | <b>20</b>                    | <b>1850.19997086</b>                          | <b>0.000</b> | <b>1909.79996230</b> | <b>0.000</b> |          | <b>2.5</b>  |
| 3.85                                                                                  | 10                           | 1850.19996957                                 | 0.001        | 1909.79996736        | -0.003       |          | 2.5         |
| 3.85                                                                                  | 0                            | 1850.19997051                                 | 0.000        | 1909.79996853        | -0.003       |          | 2.5         |
| 3.85                                                                                  | -10                          | 1850.19996181                                 | 0.005        | 1909.79996049        | 0.001        |          | 2.5         |
| 3.85                                                                                  | -20                          | 1850.19996130                                 | 0.005        | 1909.79996494        | -0.001       |          | 2.5         |
| 3.85                                                                                  | -30                          | 1850.19996478                                 | 0.003        | 1909.79996834        | -0.003       |          | 2.5         |

| Reference Frequency : GSM1900 Low Channel 1850.2 MHz / High Channel 1909.8 MHz @ 20°C |                                 |                                               |             |               |              |             |    |
|---------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|---------------|--------------|-------------|----|
| Limit: +- 2.5 ppm =                                                                   |                                 | Low Channel                                   | 4625.500    | Hz            | High Channel | 4774.500    | Hz |
| Power Supply<br>[Vdc]                                                                 | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |               |              |             |    |
|                                                                                       |                                 | Low Channel                                   |             | High Channel  |              | Limit [ppm] |    |
|                                                                                       |                                 | [MHz]                                         | Delta [ppm] | [MHz]         | Delta [ppm]  |             |    |
| 3.85                                                                                  | 20                              | 1850.19997086                                 | 0           | 1909.79996230 | 0            | 2.5         |    |
| 4.40                                                                                  | 20                              | 1850.19996654                                 | 0.002       | 1909.79996917 | -0.004       | 2.5         |    |
| 3.60                                                                                  | 20                              | 1850.19996737                                 | 0.002       | 1909.79996528 | -0.002       | 2.5         |    |

### WCDMA Band 5 , Low/High Channel, Frequency 826.4 MHz / 846.6 MHz

| Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C |                              |                                               |             |              |              |             |
|------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|--------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                      |                              | Low Channel                                   | 2066.000    | Hz           | High Channel | 2116.500    |
| Power Supply [Vdc]                                                                       | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |              |              |             |
|                                                                                          |                              | Low Channel                                   |             | High Channel |              | Limit [ppm] |
|                                                                                          |                              | [MHz]                                         | Delta [ppm] | [MHz]        | Delta [ppm]  |             |
| 3.85                                                                                     | 50                           | 826.39997977                                  | 0.004       | 846.59998147 | 0.002        | 2.5         |
| 3.85                                                                                     | 40                           | 826.39997769                                  | 0.007       | 846.59998124 | 0.002        | 2.5         |
| 3.85                                                                                     | 30                           | 826.39997967                                  | 0.004       | 846.59998538 | -0.003       | 2.5         |
| 3.85                                                                                     | 20                           | 826.39998318                                  | 0.000       | 846.59998289 | 0.000        | 2.5         |
| 3.85                                                                                     | 10                           | 826.39997820                                  | 0.006       | 846.59997938 | 0.004        | 2.5         |
| 3.85                                                                                     | 0                            | 826.39998012                                  | 0.004       | 846.59997739 | 0.006        | 2.5         |
| 3.85                                                                                     | -10                          | 826.39998462                                  | -0.002      | 846.59998225 | 0.001        | 2.5         |
| 3.85                                                                                     | -20                          | 826.39998013                                  | 0.004       | 846.59998430 | -0.002       | 2.5         |
| 3.85                                                                                     | -30                          | 826.39998125                                  | 0.002       | 846.59997806 | 0.006        | 2.5         |

| Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C |                              |                                               |             |              |              |             |
|------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|--------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                      |                              | Low Channel                                   | 2066.000    | Hz           | High Channel | 2116.500    |
| Power Supply [Vdc]                                                                       | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |              |              |             |
|                                                                                          |                              | Low Channel                                   |             | High Channel |              | Limit [ppm] |
|                                                                                          |                              | [MHz]                                         | Delta [ppm] | [MHz]        | Delta [ppm]  |             |
| 3.85                                                                                     | 20                           | 826.39998318                                  | 0           | 846.59998289 | 0            | 2.5         |
| 4.40                                                                                     | 20                           | 826.39998164                                  | 0.002       | 846.59998024 | 0.003        | 2.5         |
| 3.60                                                                                     | 20                           | 826.39997549                                  | 0.009       | 846.59997852 | 0.005        | 2.5         |

### WCDMA Band 4, Low/High Channel, Frequency 1712.4 MHz / 1752.6 MHz

| Reference Frequency : WCDMA Band 4 Low Channel 1712.4 MHz / High Channel 1752.6 MHz @ 20°C |                              |                                               |             |               |              |             |
|--------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|---------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                        |                              | Low Channel                                   | 4281.000    | Hz            | High Channel | 4381.500    |
| Power Supply [Vdc]                                                                         | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |               |              |             |
|                                                                                            |                              | Low Channel                                   |             | High Channel  |              | Limit [ppm] |
|                                                                                            |                              | [MHz]                                         | Delta [ppm] | [MHz]         | Delta [ppm]  |             |
| 3.85                                                                                       | 50                           | 1712.39997360                                 | -0.003      | 1752.59996822 | -0.001       | 2.5         |
| 3.85                                                                                       | 40                           | 1712.39996587                                 | 0.002       | 1752.59997153 | -0.002       | 2.5         |
| 3.85                                                                                       | 30                           | 1712.39997061                                 | -0.001      | 1752.59996987 | -0.001       | 2.5         |
| 3.85                                                                                       | 20                           | 1712.39996862                                 | 0.000       | 1752.59996729 | 0.000        | 2.5         |
| 3.85                                                                                       | 10                           | 1712.39996631                                 | 0.001       | 1752.59996750 | 0.000        | 2.5         |
| 3.85                                                                                       | 0                            | 1712.39996823                                 | 0.000       | 1752.59997527 | -0.005       | 2.5         |
| 3.85                                                                                       | -10                          | 1712.39996812                                 | 0.000       | 1752.59997087 | -0.002       | 2.5         |
| 3.85                                                                                       | -20                          | 1712.39996763                                 | 0.001       | 1752.59997562 | -0.005       | 2.5         |
| 3.85                                                                                       | -30                          | 1712.39996509                                 | 0.002       | 1752.59997429 | -0.004       | 2.5         |

| Reference Frequency : WCDMA Band 4 Low Channel 1712.4 MHz / High Channel 1752.6 MHz @ 20°C |                              |                                               |             |               |              |             |
|--------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|---------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                        |                              | Low Channel                                   | 4281.000    | Hz            | High Channel | 4381.500    |
| Power Supply [Vdc]                                                                         | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |               |              |             |
|                                                                                            |                              | Low Channel                                   |             | High Channel  |              | Limit [ppm] |
|                                                                                            |                              | [MHz]                                         | Delta [ppm] | [MHz]         | Delta [ppm]  |             |
| 3.85                                                                                       | 20                           | 1712.39996862                                 | 0           | 1752.59996729 | 0            | 2.5         |
| 4.40                                                                                       | 20                           | 1712.39997588                                 | -0.004      | 1752.59997253 | -0.003       | 2.5         |
| 3.60                                                                                       | 20                           | 1712.39997161                                 | -0.002      | 1752.59997386 | -0.004       | 2.5         |

### WCDMA Band 2 , Low/High Channel, Frequency 1852.4 MHz / 1907.6 MHz

| Reference Frequency : WCDMA Band 2 Low Channel 1852.4 MHz / High Channel 1907.6 MHz @ 20°C |                              |                                               |              |                      |              |             |
|--------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|----------------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                        |                              | Low Channel                                   | 4631.000     | Hz                   | High Channel | 4769.000    |
|                                                                                            |                              | Frequency Deviation Measured with Time Elapse |              |                      |              |             |
| Power Supply [Vdc]                                                                         | Environment Temperature [°C] | Low Channel                                   |              | High Channel         |              | Limit [ppm] |
|                                                                                            |                              | [MHz]                                         | Delta [ppm]  | [MHz]                | Delta [ppm]  |             |
| 3.85                                                                                       | 50                           | 1852.39996687                                 | 0.000        | 1907.59996354        | 0.004        | 2.5         |
| 3.85                                                                                       | 40                           | 1852.39996840                                 | -0.001       | 1907.59997232        | -0.001       | 2.5         |
| 3.85                                                                                       | 30                           | 1852.39996380                                 | 0.002        | 1907.59996832        | 0.001        | 2.5         |
| <b>3.85</b>                                                                                | <b>20</b>                    | <b>1852.39996714</b>                          | <b>0.000</b> | <b>1907.59997032</b> | <b>0.000</b> | <b>2.5</b>  |
| 3.85                                                                                       | 10                           | 1852.39996557                                 | 0.001        | 1907.59996688        | 0.002        | 2.5         |
| 3.85                                                                                       | 0                            | 1852.39996653                                 | 0.000        | 1907.59997037        | 0.000        | 2.5         |
| 3.85                                                                                       | -10                          | 1852.39996749                                 | 0.000        | 1907.59996305        | 0.004        | 2.5         |
| 3.85                                                                                       | -20                          | 1852.39997076                                 | -0.002       | 1907.59996940        | 0.000        | 2.5         |
| 3.85                                                                                       | -30                          | 1852.39997131                                 | -0.002       | 1907.59997109        | 0.000        | 2.5         |

| Reference Frequency : WCDMA Band 2 Low Channel 1852.4 MHz / High Channel 1907.6 MHz @ 20°C |                              |                                               |             |                      |              |             |
|--------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|----------------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                        |                              | Low Channel                                   | 4631.000    | Hz                   | High Channel | 4769.000    |
|                                                                                            |                              | Frequency Deviation Measured with Time Elapse |             |                      |              |             |
| Power Supply [Vdc]                                                                         | Environment Temperature [°C] | Low Channel                                   |             | High Channel         |              | Limit [ppm] |
|                                                                                            |                              | [MHz]                                         | Delta [ppm] | [MHz]                | Delta [ppm]  |             |
| <b>3.85</b>                                                                                | <b>20</b>                    | <b>1852.39996714</b>                          | <b>0</b>    | <b>1907.59997032</b> | <b>0</b>     | <b>2.5</b>  |
| 4.40                                                                                       | 20                           | 1852.39996372                                 | 0.002       | 1907.59997109        | 0.000        | 2.5         |
| 3.60                                                                                       | 20                           | 1852.39996227                                 | 0.003       | 1907.59996366        | 0.003        | 2.5         |

### LTE Band 2, Low/High Channel, Frequency 1850.7 MHz / 1909.3 MHz

| Reference Frequency : LTE Band 2 Low Channel 1850.7 MHz / High Channel 1909.3 MHz @ 20°C |                              |                                               |              |                      |              |             |
|------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|----------------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                      |                              | Low Channel                                   | 4626.750     | Hz                   | High Channel | 4773.250    |
|                                                                                          |                              | Frequency Deviation Measured with Time Elapse |              |                      |              |             |
| Power Supply [Vdc]                                                                       | Environment Temperature [°C] | Low Channel                                   |              | High Channel         |              | Limit [ppm] |
|                                                                                          |                              | [MHz]                                         | Delta [ppm]  | [MHz]                | Delta [ppm]  |             |
| 3.85                                                                                     | 50                           | 1850.69996247                                 | 0.003        | 1909.29997036        | 0.000        | 2.5         |
| 3.85                                                                                     | 40                           | 1850.69996318                                 | 0.002        | 1909.29996681        | 0.002        | 2.5         |
| 3.85                                                                                     | 30                           | 1850.69996607                                 | 0.001        | 1909.29996314        | 0.004        | 2.5         |
| <b>3.85</b>                                                                              | <b>20</b>                    | <b>1850.69996758</b>                          | <b>0.000</b> | <b>1909.29997053</b> | <b>0.000</b> | <b>2.5</b>  |
| 3.85                                                                                     | 10                           | 1850.69996238                                 | 0.003        | 1909.29996062        | 0.005        | 2.5         |
| 3.85                                                                                     | 0                            | 1850.69996510                                 | 0.001        | 1909.29996377        | 0.004        | 2.5         |
| 3.85                                                                                     | -10                          | 1850.69996501                                 | 0.001        | 1909.29996680        | 0.002        | 2.5         |
| 3.85                                                                                     | -20                          | 1850.69996611                                 | 0.001        | 1909.29996314        | 0.004        | 2.5         |
| 3.85                                                                                     | -30                          | 1850.69996486                                 | 0.001        | 1909.29996987        | 0.000        | 2.5         |

| Reference Frequency : LTE Band 2 Low Channel 1850.7 MHz / High Channel 1909.3 MHz @ 20°C |                              |                                               |             |                      |              |             |
|------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|----------------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                      |                              | Low Channel                                   | 4626.750    | Hz                   | High Channel | 4773.250    |
|                                                                                          |                              | Frequency Deviation Measured with Time Elapse |             |                      |              |             |
| Power Supply [Vdc]                                                                       | Environment Temperature [°C] | Low Channel                                   |             | High Channel         |              | Limit [ppm] |
|                                                                                          |                              | [MHz]                                         | Delta [ppm] | [MHz]                | Delta [ppm]  |             |
| <b>3.85</b>                                                                              | <b>20</b>                    | <b>1850.69996758</b>                          | <b>0</b>    | <b>1909.29997053</b> | <b>0</b>     | <b>2.5</b>  |
| 4.40                                                                                     | 20                           | 1850.69996989                                 | -0.001      | 1909.29996643        | 0.002        | 2.5         |
| 3.60                                                                                     | 20                           | 1850.69996221                                 | 0.003       | 1909.29996809        | 0.001        | 2.5         |

### LTE Band 5 , Low/High Channel, Frequency 824.7 MHz / 848.3 MHz

| Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C |                              |                                               |              |                     |              |             |
|----------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|---------------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                    |                              | Low Channel                                   | 2061.750     | Hz                  | High Channel | 2120.750    |
|                                                                                        |                              | Frequency Deviation Measured with Time Elapse |              |                     |              |             |
| Power Supply [Vdc]                                                                     | Environment Temperature [°C] | Low Channel                                   |              | High Channel        |              | Limit [ppm] |
|                                                                                        |                              | [MHz]                                         | Delta [ppm]  | [MHz]               | Delta [ppm]  |             |
| 3.85                                                                                   | 50                           | 824.69998782                                  | 0.000        | 848.29999086        | -0.006       | 2.5         |
| 3.85                                                                                   | 40                           | 824.69998021                                  | 0.010        | 848.29998104        | 0.006        | 2.5         |
| 3.85                                                                                   | 30                           | 824.69998042                                  | 0.009        | 848.29998504        | 0.001        | 2.5         |
| <b>3.85</b>                                                                            | <b>20</b>                    | <b>824.69998820</b>                           | <b>0.000</b> | <b>848.29998611</b> | <b>0.000</b> | <b>2.5</b>  |
| 3.85                                                                                   | 10                           | 824.69998999                                  | -0.002       | 848.29999026        | -0.005       | 2.5         |
| 3.85                                                                                   | 0                            | 824.69999100                                  | -0.003       | 848.29998842        | -0.003       | 2.5         |
| 3.85                                                                                   | -10                          | 824.69998703                                  | 0.001        | 848.29998159        | 0.005        | 2.5         |
| 3.85                                                                                   | -20                          | 824.69998823                                  | 0.000        | 848.29998293        | 0.004        | 2.5         |
| 3.85                                                                                   | -30                          | 824.69999039                                  | -0.003       | 848.29998195        | 0.005        | 2.5         |

| Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C |                              |                                               |             |              |              |             |
|----------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|--------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                    |                              | Low Channel                                   | 2061.750    | Hz           | High Channel | 2120.750    |
|                                                                                        |                              | Frequency Deviation Measured with Time Elapse |             |              |              |             |
| Power Supply [Vdc]                                                                     | Environment Temperature [°C] | Low Channel                                   |             | High Channel |              | Limit [ppm] |
|                                                                                        |                              | [MHz]                                         | Delta [ppm] | [MHz]        | Delta [ppm]  |             |
| 3.85                                                                                   | 20                           | 824.69998820                                  | 0           | 848.29998611 | 0            | 2.5         |
| 4.40                                                                                   | 20                           | 824.69998828                                  | 0.000       | 848.29998686 | -0.001       | 2.5         |
| 3.60                                                                                   | 20                           | 824.69998604                                  | 0.003       | 848.29998713 | -0.001       | 2.5         |

### LTE Band 12, Low/High Channel, Frequency 699.7 MHz / 715.3 MHz

| Reference Frequency : LTE Band 12 Low Channel 699.7 MHz / High Channel 715.3 MHz @ 20°C |                              |                                               |              |                     |              |             |
|-----------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|---------------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                     |                              | Low Channel                                   | 1749.250     | Hz                  | High Channel | 1788.250    |
|                                                                                         |                              | Frequency Deviation Measured with Time Elapse |              |                     |              |             |
| Power Supply [Vdc]                                                                      | Environment Temperature [°C] | Low Channel                                   |              | High Channel        |              | Limit [ppm] |
|                                                                                         |                              | [MHz]                                         | Delta [ppm]  | [MHz]               | Delta [ppm]  |             |
| 3.85                                                                                    | 50                           | 699.69998985                                  | 0.008        | 715.29999375        | -0.008       | 2.5         |
| 3.85                                                                                    | 40                           | 699.69999303                                  | 0.003        | 715.29999110        | -0.004       | 2.5         |
| 3.85                                                                                    | 30                           | 699.69999356                                  | 0.002        | 715.29999053        | -0.003       | 2.5         |
| <b>3.85</b>                                                                             | <b>20</b>                    | <b>699.69999516</b>                           | <b>0.000</b> | <b>715.29998826</b> | <b>0.000</b> | <b>2.5</b>  |
| 3.85                                                                                    | 10                           | 699.69998826                                  | 0.010        | 715.29998531        | 0.004        | 2.5         |
| 3.85                                                                                    | 0                            | 699.69998760                                  | 0.011        | 715.29998582        | 0.003        | 2.5         |
| 3.85                                                                                    | -10                          | 699.69998642                                  | 0.012        | 715.29999284        | -0.006       | 2.5         |
| 3.85                                                                                    | -20                          | 699.69999209                                  | 0.004        | 715.29999561        | -0.010       | 2.5         |
| 3.85                                                                                    | -30                          | 699.69998755                                  | 0.011        | 715.29999042        | -0.003       | 2.5         |

| Reference Frequency : LTE Band 12 Low Channel 699.7 MHz / High Channel 715.3 MHz @ 20°C |                              |                                               |             |              |              |             |
|-----------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|--------------|--------------|-------------|
| Limit: +- 2.5 ppm =                                                                     |                              | Low Channel                                   | 1749.250    | Hz           | High Channel | 1788.250    |
|                                                                                         |                              | Frequency Deviation Measured with Time Elapse |             |              |              |             |
| Power Supply [Vdc]                                                                      | Environment Temperature [°C] | Low Channel                                   |             | High Channel |              | Limit [ppm] |
|                                                                                         |                              | [MHz]                                         | Delta [ppm] | [MHz]        | Delta [ppm]  |             |
| 3.85                                                                                    | 20                           | 699.69999516                                  | 0           | 715.29998826 | 0            | 2.5         |
| 4.40                                                                                    | 20                           | 699.69998962                                  | 0.008       | 715.29999381 | -0.008       | 2.5         |
| 3.60                                                                                    | 20                           | 699.69998540                                  | 0.014       | 715.29998906 | -0.001       | 2.5         |

### LTE Band 13, Low/High Channel, Frequency 779.5 MHz / 784.5 MHz

| Reference Frequency : LTE Band 13 Low Channel 779.5 MHz / High Channel 784.5 MHz @ 20°C |                              |                                               |              |                     |              |             |
|-----------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|---------------------|--------------|-------------|
| Limit: +/- 2.5 ppm =                                                                    |                              | Low Channel                                   | 1948.750     | Hz                  | High Channel | 1961.250    |
|                                                                                         |                              | Frequency Deviation Measured with Time Elapse |              |                     |              |             |
| Power Supply [Vdc]                                                                      | Environment Temperature [°C] | Low Channel                                   |              | High Channel        |              | Limit [ppm] |
|                                                                                         |                              | [MHz]                                         | Delta [ppm]  | [MHz]               | Delta [ppm]  |             |
| 3.85                                                                                    | 50                           | 779.49998312                                  | 0.011        | 784.49999269        | -0.007       | 2.5         |
| 3.85                                                                                    | 40                           | 779.49998870                                  | 0.004        | 784.49998562        | 0.002        | 2.5         |
| 3.85                                                                                    | 30                           | 779.49998900                                  | 0.004        | 784.49999052        | -0.005       | 2.5         |
| <b>3.85</b>                                                                             | <b>20</b>                    | <b>779.49999204</b>                           | <b>0.000</b> | <b>784.49998692</b> | <b>0.000</b> | <b>2.5</b>  |
| 3.85                                                                                    | 10                           | 779.49998707                                  | 0.006        | 784.49999235        | -0.007       | 2.5         |
| 3.85                                                                                    | 0                            | 779.49998960                                  | 0.003        | 784.49998781        | -0.001       | 2.5         |
| 3.85                                                                                    | -10                          | 779.49998334                                  | 0.011        | 784.49998207        | 0.006        | 2.5         |
| 3.85                                                                                    | -20                          | 779.49998422                                  | 0.010        | 784.49998658        | 0.000        | 2.5         |
| 3.85                                                                                    | -30                          | 779.49998333                                  | 0.011        | 784.49999004        | -0.004       | 2.5         |

| Reference Frequency : LTE Band 13 Low Channel 779.5 MHz / High Channel 784.5 MHz @ 20°C |                              |                                               |             |              |              |             |
|-----------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|--------------|--------------|-------------|
| Limit: +/- 2.5 ppm =                                                                    |                              | Low Channel                                   | 1948.750    | Hz           | High Channel | 1961.250    |
|                                                                                         |                              | Frequency Deviation Measured with Time Elapse |             |              |              |             |
| Power Supply [Vdc]                                                                      | Environment Temperature [°C] | Low Channel                                   |             | High Channel |              | Limit [ppm] |
|                                                                                         |                              | [MHz]                                         | Delta [ppm] | [MHz]        | Delta [ppm]  |             |
| 3.85                                                                                    | 20                           | 779.49999204                                  | 0           | 784.49998692 | 0            | 2.5         |
| 4.40                                                                                    | 20                           | 779.49998256                                  | 0.012       | 784.49999186 | -0.006       | 2.5         |
| 3.60                                                                                    | 20                           | 779.49998284                                  | 0.012       | 784.49998423 | 0.003        | 2.5         |

### LTE Band 66, Low/High Channel, Frequency 1710.7 MHz / 1779.3 MHz

| Reference Frequency : LTE Band 66 Low Channel 1710.7 MHz / High Channel 1779.3 MHz @ 20°C |                              |                                               |              |                      |              |             |
|-------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|--------------|----------------------|--------------|-------------|
| Limit: +/- 2.5 ppm =                                                                      |                              | Low Channel                                   | 4276.750     | Hz                   | High Channel | 4448.250    |
|                                                                                           |                              | Frequency Deviation Measured with Time Elapse |              |                      |              |             |
| Power Supply [Vdc]                                                                        | Environment Temperature [°C] | Low Channel                                   |              | High Channel         |              | Limit [ppm] |
|                                                                                           |                              | [MHz]                                         | Delta [ppm]  | [MHz]                | Delta [ppm]  |             |
| 3.85                                                                                      | 50                           | 1710.69997321                                 | 0.004        | 1779.29998019        | -0.005       | 2.5         |
| 3.85                                                                                      | 40                           | 1710.69997351                                 | 0.003        | 1779.29997393        | -0.002       | 2.5         |
| 3.85                                                                                      | 30                           | 1710.69997780                                 | 0.001        | 1779.29997147        | 0.000        | 2.5         |
| <b>3.85</b>                                                                               | <b>20</b>                    | <b>1710.69997928</b>                          | <b>0.000</b> | <b>1779.29997064</b> | <b>0.000</b> | <b>2.5</b>  |
| 3.85                                                                                      | 10                           | 1710.69997260                                 | 0.004        | 1779.29997607        | -0.003       | 2.5         |
| 3.85                                                                                      | 0                            | 1710.69997961                                 | 0.000        | 1779.29997780        | -0.004       | 2.5         |
| 3.85                                                                                      | -10                          | 1710.69997426                                 | 0.003        | 1779.29997744        | -0.004       | 2.5         |
| 3.85                                                                                      | -20                          | 1710.69997473                                 | 0.003        | 1779.29997418        | -0.002       | 2.5         |
| 3.85                                                                                      | -30                          | 1710.69997879                                 | 0.000        | 1779.29997553        | -0.003       | 2.5         |

| Reference Frequency : LTE Band 66 Low Channel 1710.7 MHz / High Channel 1779.3 MHz @ 20°C |                              |                                               |             |               |              |             |
|-------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------|-------------|---------------|--------------|-------------|
| Limit: +/- 2.5 ppm =                                                                      |                              | Low Channel                                   | 4276.750    | Hz            | High Channel | 4448.250    |
|                                                                                           |                              | Frequency Deviation Measured with Time Elapse |             |               |              |             |
| Power Supply [Vdc]                                                                        | Environment Temperature [°C] | Low Channel                                   |             | High Channel  |              | Limit [ppm] |
|                                                                                           |                              | [MHz]                                         | Delta [ppm] | [MHz]         | Delta [ppm]  |             |
| 3.85                                                                                      | 20                           | 1710.69997928                                 | 0           | 1779.29997064 | 0            | 2.5         |
| 4.40                                                                                      | 20                           | 1710.69997739                                 | 0.001       | 1779.29997765 | -0.004       | 2.5         |
| 3.60                                                                                      | 20                           | 1710.69997844                                 | 0.000       | 1779.29997355 | -0.002       | 2.5         |

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 4**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

## 10. RADIATED TEST RESULTS

### 10.1. RADIATED POWER (ERP & EIRP)

#### RULE PART(S)

FCC: §2.1046, §22.913, §24.232 and §27.50

#### LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50(b) (10) - Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

27.50(c) (10) - Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

27.50(d) - (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.(Band 4)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

#### TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

a) Set the RBW  $\geq$  OBW; b) Set VBW  $\geq 3 \times$  RBW; c) Set span  $\geq 2 \times$  RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points  $\geq$  span/RBW; g) Trace mode = max hold;

For average power measurement with a ESU40:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW  $\geq 3 \times$  RBW; d) Set number of points in sweep  $\geq 2 \times$  span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle  $\geq 98$ ; h) Use trigger to capture bursts If burst duty cycle  $< 98$ ; i) Trace average at least 100 traces in power averaging (i.e., RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function. (RBW/VBW are automatically set for LTE B41)

#### TEST RESULTS

### 10.1.1. ERP/EIRP Results

#### GSM

| Band    | Mode  | Channel | f [MHz] | ERP / EIRP |         |
|---------|-------|---------|---------|------------|---------|
|         |       |         |         | [dBm]      | [mW]    |
| GSM850  | GPRS  | 512     | 824.2   | 30.20      | 1047.13 |
|         |       | 661     | 836.6   | 29.48      | 887.16  |
|         |       | 810     | 848.8   | 28.82      | 762.08  |
|         | EGPRS | 512     | 824.2   | 25.38      | 345.14  |
|         |       | 661     | 836.6   | 24.55      | 285.10  |
|         |       | 810     | 848.8   | 24.74      | 297.85  |
| GSM1900 | GPRS  | 512     | 1850.2  | 28.92      | 779.83  |
|         |       | 661     | 1880.0  | 28.64      | 731.14  |
|         |       | 810     | 1909.8  | 25.74      | 374.97  |
|         | EGPRS | 512     | 1850.2  | 26.28      | 424.62  |
|         |       | 661     | 1880.0  | 25.83      | 382.82  |
|         |       | 810     | 1909.8  | 23.10      | 204.17  |

#### WCDMA

| Band   | Mode  | Channel | f [MHz] | ERP / EIRP |        |
|--------|-------|---------|---------|------------|--------|
|        |       |         |         | [dBm]      | [mW]   |
| Band 5 | REL99 | 4132    | 826.4   | 19.60      | 91.20  |
|        |       | 4183    | 836.6   | 19.18      | 82.79  |
|        |       | 4233    | 846.6   | 18.81      | 76.03  |
|        | HSDPA | 4132    | 826.4   | 19.52      | 89.54  |
|        |       | 4183    | 836.6   | 18.99      | 79.25  |
|        |       | 4233    | 846.6   | 18.54      | 71.45  |
| Band 4 | REL99 | 1312    | 1712.4  | 23.48      | 222.84 |
|        |       | 1413    | 1732.6  | 21.91      | 155.24 |
|        |       | 1513    | 1752.6  | 23.12      | 205.12 |
|        | HSDPA | 1312    | 1712.4  | 23.58      | 228.03 |
|        |       | 1413    | 1732.6  | 22.22      | 166.72 |
|        |       | 1513    | 1752.6  | 23.53      | 225.42 |

**WCDMA**

| Band   | Mode  | Channel | f [MHz] | ERP / EIRP |        |
|--------|-------|---------|---------|------------|--------|
|        |       |         |         | [dBm]      | [mW]   |
| Band 2 | REL99 | 9262    | 1852.4  | 21.94      | 156.31 |
|        |       | 9400    | 1880.0  | 21.79      | 151.01 |
|        |       | 9538    | 1907.6  | 19.78      | 95.06  |
|        | HSDPA | 9262    | 1852.4  | 22.00      | 158.49 |
|        |       | 9400    | 1880.0  | 21.82      | 152.05 |
|        |       | 9538    | 1907.6  | 20.15      | 103.51 |

**LTE Band 2**

| Band   | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |        |
|--------|----------|-------|------------|---------|------------|--------|
|        |          |       | Full RB    |         | [dBm]      | [mW]   |
| Band 2 | 20       | QPSK  | 100/0      | 1860.0  | 20.05      | 101.16 |
|        |          |       | 100/0      | 1880.0  | 20.33      | 107.89 |
|        |          |       | 100/0      | 1900.0  | 20.55      | 113.50 |
|        |          | 16QAM | 100/0      | 1860.0  | 19.04      | 80.17  |
|        |          |       | 100/0      | 1880.0  | 19.33      | 85.70  |
|        |          |       | 100/0      | 1900.0  | 19.57      | 90.57  |
|        | 15       | QPSK  | 75/0       | 1857.5  | 18.71      | 74.30  |
|        |          |       | 75/0       | 1880.0  | 20.35      | 108.39 |
|        |          |       | 75/0       | 1902.5  | 20.12      | 102.80 |
|        |          | 16QAM | 75/0       | 1857.5  | 17.66      | 58.34  |
|        |          |       | 75/0       | 1880.0  | 19.33      | 85.70  |
|        |          |       | 75/0       | 1902.5  | 19.10      | 81.28  |
|        | 10       | QPSK  | 50/0       | 1855.0  | 20.41      | 109.90 |
|        |          |       | 50/0       | 1880.0  | 21.14      | 130.02 |
|        |          |       | 50/0       | 1905.0  | 20.06      | 101.39 |
|        |          | 16QAM | 50/0       | 1855.0  | 19.40      | 87.10  |
|        |          |       | 50/0       | 1880.0  | 20.14      | 103.28 |
|        |          |       | 50/0       | 1905.0  | 19.04      | 80.17  |
|        | 5        | QPSK  | 25/0       | 1852.5  | 19.15      | 82.22  |
|        |          |       | 25/0       | 1880.0  | 20.21      | 104.95 |
|        |          |       | 25/0       | 1907.5  | 19.73      | 93.97  |
|        |          | 16QAM | 25/0       | 1852.5  | 17.68      | 58.61  |
|        |          |       | 25/0       | 1880.0  | 19.22      | 83.56  |
|        |          |       | 25/0       | 1907.5  | 18.69      | 73.96  |

|  |     |       |      |        |       |        |
|--|-----|-------|------|--------|-------|--------|
|  | 3   | QPSK  | 15/0 | 1851.5 | 20.69 | 117.22 |
|  |     |       | 15/0 | 1880.0 | 18.93 | 78.16  |
|  |     |       | 15/0 | 1908.5 | 20.02 | 100.46 |
|  |     | 16QAM | 15/0 | 1851.5 | 19.60 | 91.2   |
|  |     |       | 15/0 | 1880.0 | 17.79 | 60.12  |
|  |     |       | 15/0 | 1908.5 | 18.96 | 78.7   |
|  | 1.4 | QPSK  | 6/0  | 1850.7 | 18.34 | 68.23  |
|  |     |       | 6/0  | 1880.0 | 18.07 | 64.12  |
|  |     |       | 6/0  | 1909.3 | 17.65 | 58.21  |
|  |     | 16QAM | 6/0  | 1850.7 | 17.25 | 53.09  |
|  |     |       | 6/0  | 1880.0 | 17.37 | 54.58  |
|  |     |       | 6/0  | 1909.3 | 16.53 | 44.98  |

**LTE Band 5**

| Band   | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |       |
|--------|----------|-------|------------|---------|------------|-------|
|        |          |       | Full RB    |         | [dBm]      | [mW]  |
| Band 5 | 10       | QPSK  | 50/0       | 829.0   | 16.97      | 49.77 |
|        |          |       | 50/0       | 836.5   | 15.68      | 36.98 |
|        |          |       | 50/0       | 844.0   | 16.32      | 42.85 |
|        |          | 16QAM | 50/0       | 829.0   | 15.95      | 39.36 |
|        |          |       | 50/0       | 836.5   | 14.72      | 29.65 |
|        |          |       | 50/0       | 844.0   | 15.30      | 33.88 |
|        | 5        | QPSK  | 25/0       | 826.5   | 14.77      | 29.99 |
|        |          |       | 25/0       | 836.5   | 13.03      | 20.09 |
|        |          |       | 25/0       | 846.5   | 14.25      | 26.61 |
|        |          | 16QAM | 25/0       | 826.5   | 13.60      | 22.91 |
|        |          |       | 25/0       | 836.5   | 12.04      | 16.00 |
|        |          |       | 25/0       | 846.5   | 13.33      | 21.53 |
|        | 3        | QPSK  | 15/0       | 825.5   | 15.17      | 32.89 |
|        |          |       | 15/0       | 836.5   | 13.45      | 22.13 |
|        |          |       | 15/0       | 847.5   | 14.60      | 28.84 |
|        |          | 16QAM | 15/0       | 825.5   | 14.10      | 25.70 |
|        |          |       | 15/0       | 836.5   | 12.34      | 17.14 |
|        |          |       | 15/0       | 847.5   | 13.45      | 22.13 |
|        | 1.4      | QPSK  | 6/0        | 824.7   | 14.81      | 30.27 |
|        |          |       | 6/0        | 836.5   | 13.12      | 20.51 |
|        |          |       | 6/0        | 848.3   | 13.76      | 23.77 |
|        |          | 16QAM | 6/0        | 824.7   | 13.88      | 24.43 |
|        |          |       | 6/0        | 836.5   | 12.09      | 16.18 |
|        |          |       | 6/0        | 848.3   | 12.67      | 18.49 |

**LTE Band 12**

| Band    | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |       |
|---------|----------|-------|------------|---------|------------|-------|
|         |          |       | Full RB    |         | [dBm]      | [mW]  |
| Band 12 | 10       | QPSK  | 50/0       | 704.0   | 17.68      | 58.61 |
|         |          |       | 50/0       | 707.5   | 17.43      | 55.34 |
|         |          |       | 50/0       | 711.0   | 16.93      | 49.32 |
|         |          | 16QAM | 50/0       | 704.0   | 16.68      | 46.56 |
|         |          |       | 50/0       | 707.5   | 16.43      | 43.95 |
|         |          |       | 50/0       | 711.0   | 15.92      | 39.08 |
|         | 5        | QPSK  | 25/0       | 701.5   | 14.99      | 31.55 |
|         |          |       | 25/0       | 707.5   | 14.29      | 26.85 |
|         |          |       | 25/0       | 713.5   | 14.19      | 26.24 |
|         |          | 16QAM | 25/0       | 701.5   | 13.98      | 25.00 |
|         |          |       | 25/0       | 707.5   | 13.24      | 21.09 |
|         |          |       | 25/0       | 713.5   | 13.16      | 20.70 |
|         | 3        | QPSK  | 15/0       | 700.5   | 15.15      | 32.73 |
|         |          |       | 15/0       | 707.5   | 14.67      | 29.31 |
|         |          |       | 15/0       | 714.5   | 14.43      | 27.73 |
|         |          | 16QAM | 15/0       | 700.5   | 14.18      | 26.18 |
|         |          |       | 15/0       | 707.5   | 13.66      | 23.23 |
|         |          |       | 15/0       | 714.5   | 13.38      | 21.78 |
|         | 1.4      | QPSK  | 6/0        | 699.7   | 15.07      | 32.14 |
|         |          |       | 6/0        | 707.5   | 14.46      | 27.93 |
|         |          |       | 6/0        | 715.3   | 14.03      | 25.29 |
|         |          | 16QAM | 6/0        | 699.7   | 14.00      | 25.12 |
|         |          |       | 6/0        | 707.5   | 13.38      | 21.78 |
|         |          |       | 6/0        | 715.3   | 12.98      | 19.86 |

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 4**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 13**

| Band    | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |       |
|---------|----------|-------|------------|---------|------------|-------|
|         |          |       | Full RB    |         | [dBm]      | [mW]  |
| Band 13 | 10       | QPSK  | 50/0       | 782.0   | 17.20      | 52.48 |
|         |          | 16QAM | 50/0       | 782.0   | 16.22      | 41.88 |
|         | 5        | QPSK  | 25/0       | 779.5   | 16.39      | 43.55 |
|         |          |       | 25/0       | 782.0   | 16.51      | 44.77 |
|         |          |       | 25/0       | 784.5   | 16.83      | 48.19 |
|         |          | 16QAM | 25/0       | 779.5   | 15.40      | 34.67 |
|         |          |       | 25/0       | 782.0   | 15.45      | 35.08 |
|         |          |       | 25/0       | 784.5   | 15.84      | 38.37 |
|         |          |       | 25/0       | 784.5   | 15.84      | 38.37 |

**LTE Band 66**

| Band    | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |        |
|---------|----------|-------|------------|---------|------------|--------|
|         |          |       | Full RB    |         | [dBm]      | [mW]   |
| Band 66 | 20       | QPSK  | 100/0      | 1720.0  | 20.52      | 112.72 |
|         |          |       | 100/0      | 1745.0  | 20.28      | 106.66 |
|         |          |       | 100/0      | 1770.0  | 18.59      | 72.28  |
|         |          | 16QAM | 100/0      | 1720.0  | 19.56      | 90.36  |
|         |          |       | 100/0      | 1745.0  | 19.29      | 84.92  |
|         |          |       | 100/0      | 1770.0  | 17.59      | 57.41  |
|         | 15       | QPSK  | 75/0       | 1717.5  | 20.79      | 119.95 |
|         |          |       | 75/0       | 1745.0  | 19.97      | 99.31  |
|         |          |       | 75/0       | 1772.5  | 18.87      | 77.09  |
|         |          | 16QAM | 75/0       | 1717.5  | 19.77      | 94.84  |
|         |          |       | 75/0       | 1745.0  | 18.96      | 78.70  |
|         |          |       | 75/0       | 1772.5  | 17.87      | 61.24  |
|         | 10       | QPSK  | 50/0       | 1715.0  | 20.78      | 119.67 |
|         |          |       | 50/0       | 1745.0  | 19.83      | 96.16  |
|         |          |       | 50/0       | 1775.0  | 18.49      | 70.63  |
|         |          | 16QAM | 50/0       | 1715.0  | 19.79      | 95.28  |
|         |          |       | 50/0       | 1745.0  | 18.84      | 76.56  |
|         |          |       | 50/0       | 1775.0  | 17.52      | 56.49  |
|         | 5        | QPSK  | 25/0       | 1712.5  | 20.41      | 109.90 |
|         |          |       | 25/0       | 1745.0  | 20.26      | 106.17 |
|         |          |       | 25/0       | 1777.5  | 17.98      | 62.81  |
|         |          | 16QAM | 25/0       | 1712.5  | 19.37      | 86.50  |
|         |          |       | 25/0       | 1745.0  | 19.19      | 82.99  |
|         |          |       | 25/0       | 1777.5  | 16.85      | 48.42  |

|  |     |       |      |        |       |        |
|--|-----|-------|------|--------|-------|--------|
|  | 3   | QPSK  | 15/0 | 1711.5 | 20.35 | 108.39 |
|  |     |       | 15/0 | 1745.0 | 19.66 | 92.47  |
|  |     |       | 15/0 | 1778.5 | 18.09 | 64.42  |
|  |     | 16QAM | 15/0 | 1711.5 | 19.28 | 84.72  |
|  |     |       | 15/0 | 1745.0 | 18.53 | 71.29  |
|  |     |       | 15/0 | 1778.5 | 17.00 | 50.12  |
|  | 1.4 | QPSK  | 6/0  | 1710.7 | 18.05 | 63.83  |
|  |     |       | 6/0  | 1745.0 | 17.73 | 59.29  |
|  |     |       | 6/0  | 1779.3 | 16.32 | 42.85  |
|  |     | 16QAM | 6/0  | 1710.7 | 17.17 | 52.12  |
|  |     |       | 6/0  | 1745.0 | 16.64 | 46.13  |
|  |     |       | 6/0  | 1779.3 | 15.19 | 33.04  |

## 10.1.2. ERP/EIRP DATA

### GSM 850

GSM

GSM850

GPRS

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-16

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: GPRS 850 MHz Fundamentals

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 824.20  | 32.63            | V               | 1.0             | -1.5               | 30.20     | 38.5        | -8.3       |       |
| 824.20  | 19.97            | H               | 1.0             | -1.5               | 17.54     | 38.5        | -21.0      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.60  | 31.86            | V               | 1.0             | -1.4               | 29.48     | 38.5        | -9.0       |       |
| 836.60  | 22.35            | H               | 1.0             | -1.4               | 19.97     | 38.5        | -18.5      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 848.80  | 31.17            | V               | 1.0             | -1.4               | 28.82     | 38.5        | -9.7       |       |
| 848.80  | 22.97            | H               | 1.0             | -1.4               | 20.62     | 38.5        | -17.9      |       |

GSM

GSM850

EGPRS

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-16

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: EGPRS 850 MHz Fundamentals

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 824.20  | 27.81            | V               | 1.0             | -1.5               | 25.38     | 38.5        | -13.1      |       |
| 824.20  | 14.88            | H               | 1.0             | -1.5               | 12.45     | 38.5        | -26.0      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.60  | 26.93            | V               | 1.0             | -1.4               | 24.55     | 38.5        | -13.9      |       |
| 836.60  | 18.08            | H               | 1.0             | -1.4               | 15.70     | 38.5        | -22.8      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 848.80  | 27.09            | V               | 1.0             | -1.4               | 24.74     | 38.5        | -13.8      |       |
| 848.80  | 18.91            | H               | 1.0             | -1.4               | 16.56     | 38.5        | -21.9      |       |

**GSM 1900**

| GSM<br><br>GSM1900<br>GPRS  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-16<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: GPRS 1900 MHz Fundamentals</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1850.20</td><td>20.41</td><td>V</td><td>4.5</td><td>9.5</td><td>25.42</td><td>33.0</td><td>-7.6</td></tr><tr><td>1850.20</td><td>23.91</td><td>H</td><td>4.5</td><td>9.5</td><td>28.92</td><td>33.0</td><td>-4.1</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>18.91</td><td>V</td><td>4.5</td><td>9.2</td><td>23.59</td><td>33.0</td><td>-9.4</td></tr><tr><td>1880.00</td><td>23.96</td><td>H</td><td>4.5</td><td>9.2</td><td>28.64</td><td>33.0</td><td>-4.4</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1909.80</td><td>20.36</td><td>V</td><td>4.6</td><td>8.9</td><td>24.67</td><td>33.0</td><td>-8.3</td></tr><tr><td>1909.80</td><td>21.43</td><td>H</td><td>4.6</td><td>8.9</td><td>25.74</td><td>33.0</td><td>-7.3</td></tr></table>    |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  | 1850.20 | 20.41 | V | 4.5 | 9.5 | 25.42 | 33.0 | -7.6 | 1850.20 | 23.91 | H | 4.5 | 9.5 | 28.92 | 33.0 | -4.1 | Mid Ch |  |  |  |  |  |  |  | 1880.00 | 18.91 | V | 4.5 | 9.2 | 23.59 | 33.0 | -9.4  | 1880.00 | 23.96 | H | 4.5 | 9.2 | 28.64 | 33.0 | -4.4 | High Ch |  |  |  |  |  |  |  | 1909.80 | 20.36 | V | 4.6 | 8.9 | 24.67 | 33.0 | -8.3  | 1909.80 | 21.43 | H | 4.6 | 8.9 | 25.74 | 33.0 | -7.3 |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|------|---------|-------|---|-----|-----|-------|------|------|--------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|------|---------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|------|
|                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1850.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20.41               | V                  | 4.5                | 9.5                   | 25.42         | 33.0           | -7.6          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1850.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 23.91               | H                  | 4.5                | 9.5                   | 28.92         | 33.0           | -4.1          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 18.91               | V                  | 4.5                | 9.2                   | 23.59         | 33.0           | -9.4          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 23.96               | H                  | 4.5                | 9.2                   | 28.64         | 33.0           | -4.4          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1909.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20.36               | V                  | 4.6                | 8.9                   | 24.67         | 33.0           | -8.3          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
| 1909.80                     | 21.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | H                   | 4.6                | 8.9                | 25.74                 | 33.0          | -7.3           |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
| GSM<br><br>GSM1900<br>EGPRS | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-16<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: EGPRS 1900 MHz Fundamentals</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1850.20</td><td>18.61</td><td>V</td><td>4.5</td><td>9.5</td><td>23.62</td><td>33.0</td><td>-9.4</td></tr><tr><td>1850.20</td><td>21.27</td><td>H</td><td>4.5</td><td>9.5</td><td>26.28</td><td>33.0</td><td>-6.7</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>16.10</td><td>V</td><td>4.5</td><td>9.2</td><td>20.78</td><td>33.0</td><td>-12.2</td></tr><tr><td>1880.00</td><td>21.15</td><td>H</td><td>4.5</td><td>9.2</td><td>25.83</td><td>33.0</td><td>-7.2</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1909.80</td><td>17.73</td><td>V</td><td>4.6</td><td>8.9</td><td>22.04</td><td>33.0</td><td>-11.0</td></tr><tr><td>1909.80</td><td>18.79</td><td>H</td><td>4.6</td><td>8.9</td><td>23.10</td><td>33.0</td><td>-9.9</td></tr></table> |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  | 1850.20 | 18.61 | V | 4.5 | 9.5 | 23.62 | 33.0 | -9.4 | 1850.20 | 21.27 | H | 4.5 | 9.5 | 26.28 | 33.0 | -6.7 | Mid Ch |  |  |  |  |  |  |  | 1880.00 | 16.10 | V | 4.5 | 9.2 | 20.78 | 33.0 | -12.2 | 1880.00 | 21.15 | H | 4.5 | 9.2 | 25.83 | 33.0 | -7.2 | High Ch |  |  |  |  |  |  |  | 1909.80 | 17.73 | V | 4.6 | 8.9 | 22.04 | 33.0 | -11.0 | 1909.80 | 18.79 | H | 4.6 | 8.9 | 23.10 | 33.0 | -9.9 |
|                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1850.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 18.61               | V                  | 4.5                | 9.5                   | 23.62         | 33.0           | -9.4          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1850.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 21.27               | H                  | 4.5                | 9.5                   | 26.28         | 33.0           | -6.7          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 16.10               | V                  | 4.5                | 9.2                   | 20.78         | 33.0           | -12.2         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 21.15               | H                  | 4.5                | 9.2                   | 25.83         | 33.0           | -7.2          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
|                             | 1909.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 17.73               | V                  | 4.6                | 8.9                   | 22.04         | 33.0           | -11.0         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |
| 1909.80                     | 18.79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | H                   | 4.6                | 8.9                | 23.10                 | 33.0          | -9.9           |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |      |         |       |   |     |     |       |      |      |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |      |

**WCDMA Band 5**

| WCDMA<br><br>Band 5<br>REL99 | <div><div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div><div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-07<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: Rel99 Band 5 Fundamentals</div><div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div><table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>826.40</td><td>22.02</td><td>V</td><td>1.0</td><td>-1.5</td><td>19.60</td><td>38.5</td><td>-18.9</td><td></td></tr><tr><td>826.40</td><td>11.57</td><td>H</td><td>1.0</td><td>-1.5</td><td>9.15</td><td>38.5</td><td>-29.4</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>836.60</td><td>21.56</td><td>V</td><td>1.0</td><td>-1.4</td><td>19.18</td><td>38.5</td><td>-19.3</td><td></td></tr><tr><td>836.60</td><td>11.77</td><td>H</td><td>1.0</td><td>-1.4</td><td>9.39</td><td>38.5</td><td>-29.1</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>846.60</td><td>21.16</td><td>V</td><td>1.0</td><td>-1.4</td><td>18.81</td><td>38.5</td><td>-19.7</td><td></td></tr><tr><td>846.60</td><td>17.85</td><td>H</td><td>1.0</td><td>-1.4</td><td>15.50</td><td>38.5</td><td>-23.0</td><td></td></tr></table></div> | f<br>MHz            | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBd) | ERP<br>(dBm)   | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 826.40 | 22.02 | V | 1.0 | -1.5 | 19.60 | 38.5 | -18.9 |  | 826.40 | 11.57 | H | 1.0 | -1.5 | 9.15 | 38.5 | -29.4 |  | Mid Ch |  |  |  |  |  |  |  |  | 836.60 | 21.56 | V | 1.0 | -1.4 | 19.18 | 38.5 | -19.3 |  | 836.60 | 11.77 | H | 1.0 | -1.4 | 9.39 | 38.5 | -29.1 |  | High Ch |  |  |  |  |  |  |  |  | 846.60 | 21.16 | V | 1.0 | -1.4 | 18.81 | 38.5 | -19.7 |  | 846.60 | 17.85 | H | 1.0 | -1.4 | 15.50 | 38.5 | -23.0 |  |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|--------------------|-----------------------|-----------------------|----------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|-------|---|-----|------|------|------|-------|--|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|-------|---|-----|------|------|------|-------|--|---------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|-------|---|-----|------|-------|------|-------|--|
|                              | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm)          | Limit<br>(dBm) | Delta<br>(dB)  | Notes         |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 826.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 22.02               | V                   | 1.0                | -1.5                  | 19.60                 | 38.5           | -18.9          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 826.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 11.57               | H                   | 1.0                | -1.5                  | 9.15                  | 38.5           | -29.4          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 21.56               | V                   | 1.0                | -1.4                  | 19.18                 | 38.5           | -19.3          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 11.77               | H                   | 1.0                | -1.4                  | 9.39                  | 38.5           | -29.1          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 846.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 21.16               | V                   | 1.0                | -1.4                  | 18.81                 | 38.5           | -19.7          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 846.60                       | 17.85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                   | 1.0                 | -1.4               | 15.50                 | 38.5                  | -23.0          |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| WCDMA<br><br>Band 5<br>HSDPA | <div><div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div><div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-07<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: HSDPA Band 5 Fundamentals</div><div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div><table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>826.40</td><td>21.94</td><td>V</td><td>1.0</td><td>-1.5</td><td>19.52</td><td>38.5</td><td>-19.0</td><td></td></tr><tr><td>826.40</td><td>11.76</td><td>H</td><td>1.0</td><td>-1.5</td><td>9.34</td><td>38.5</td><td>-29.2</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>836.60</td><td>21.37</td><td>V</td><td>1.0</td><td>-1.4</td><td>18.99</td><td>38.5</td><td>-19.5</td><td></td></tr><tr><td>836.60</td><td>12.02</td><td>H</td><td>1.0</td><td>-1.4</td><td>9.64</td><td>38.5</td><td>-28.9</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>846.60</td><td>20.89</td><td>V</td><td>1.0</td><td>-1.4</td><td>18.54</td><td>38.5</td><td>-20.0</td><td></td></tr><tr><td>846.60</td><td>17.54</td><td>H</td><td>1.0</td><td>-1.4</td><td>15.19</td><td>38.5</td><td>-23.3</td><td></td></tr></table></div> | f<br>MHz            | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBd) | ERP<br>(dBm)   | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 826.40 | 21.94 | V | 1.0 | -1.5 | 19.52 | 38.5 | -19.0 |  | 826.40 | 11.76 | H | 1.0 | -1.5 | 9.34 | 38.5 | -29.2 |  | Mid Ch |  |  |  |  |  |  |  |  | 836.60 | 21.37 | V | 1.0 | -1.4 | 18.99 | 38.5 | -19.5 |  | 836.60 | 12.02 | H | 1.0 | -1.4 | 9.64 | 38.5 | -28.9 |  | High Ch |  |  |  |  |  |  |  |  | 846.60 | 20.89 | V | 1.0 | -1.4 | 18.54 | 38.5 | -20.0 |  | 846.60 | 17.54 | H | 1.0 | -1.4 | 15.19 | 38.5 | -23.3 |  |
|                              | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm)          | Limit<br>(dBm) | Delta<br>(dB)  | Notes         |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 826.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 21.94               | V                   | 1.0                | -1.5                  | 19.52                 | 38.5           | -19.0          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 826.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 11.76               | H                   | 1.0                | -1.5                  | 9.34                  | 38.5           | -29.2          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 21.37               | V                   | 1.0                | -1.4                  | 18.99                 | 38.5           | -19.5          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12.02               | H                   | 1.0                | -1.4                  | 9.64                  | 38.5           | -28.9          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                              | 846.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20.89               | V                   | 1.0                | -1.4                  | 18.54                 | 38.5           | -20.0          |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 846.60                       | 17.54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                   | 1.0                 | -1.4               | 15.19                 | 38.5                  | -23.3          |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |

**WCDMA Band 4**

| WCDMA<br><br>Band 4<br>REL99 | <div><div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div><div><div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: Rel99 Band 4 Fundamentals</div><div><div>Test Equipment:</div><div>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div></div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|--------------------|-----------------------|-----------------------|----------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|------|--|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|------|--|---------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|------|--|
|                              | <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1712.40</td><td>13.93</td><td>V</td><td>4.3</td><td>9.5</td><td>19.08</td><td>30.0</td><td>-10.9</td><td></td></tr><tr><td>1712.40</td><td>18.33</td><td>H</td><td>4.3</td><td>9.5</td><td>23.48</td><td>30.0</td><td>-6.5</td><td></td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1732.60</td><td>13.45</td><td>V</td><td>4.3</td><td>9.5</td><td>18.65</td><td>30.0</td><td>-11.4</td><td></td></tr><tr><td>1732.60</td><td>16.72</td><td>H</td><td>4.3</td><td>9.5</td><td>21.91</td><td>30.0</td><td>-8.1</td><td></td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1752.60</td><td>13.59</td><td>V</td><td>4.4</td><td>9.6</td><td>18.83</td><td>30.0</td><td>-11.2</td><td></td></tr><tr><td>1752.60</td><td>17.88</td><td>H</td><td>4.4</td><td>9.6</td><td>23.12</td><td>30.0</td><td>-6.9</td><td></td></tr></table> | f<br>MHz            | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBi) | EIRP<br>(dBm)  | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1712.40 | 13.93 | V | 4.3 | 9.5 | 19.08 | 30.0 | -10.9 |  | 1712.40 | 18.33 | H | 4.3 | 9.5 | 23.48 | 30.0 | -6.5 |  | Mid Ch |  |  |  |  |  |  |  |  | 1732.60 | 13.45 | V | 4.3 | 9.5 | 18.65 | 30.0 | -11.4 |  | 1732.60 | 16.72 | H | 4.3 | 9.5 | 21.91 | 30.0 | -8.1 |  | High Ch |  |  |  |  |  |  |  |  | 1752.60 | 13.59 | V | 4.4 | 9.6 | 18.83 | 30.0 | -11.2 |  | 1752.60 | 17.88 | H | 4.4 | 9.6 | 23.12 | 30.0 | -6.9 |  |
|                              | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm)         | Limit<br>(dBm) | Delta<br>(dB)  | Notes         |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1712.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.93               | V                   | 4.3                | 9.5                   | 19.08                 | 30.0           | -10.9          |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1712.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 18.33               | H                   | 4.3                | 9.5                   | 23.48                 | 30.0           | -6.5           |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1732.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.45               | V                   | 4.3                | 9.5                   | 18.65                 | 30.0           | -11.4          |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1732.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16.72               | H                   | 4.3                | 9.5                   | 21.91                 | 30.0           | -8.1           |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
| 1752.60                      | 13.59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | V                   | 4.4                 | 9.6                | 18.83                 | 30.0                  | -11.2          |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
| 1752.60                      | 17.88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                   | 4.4                 | 9.6                | 23.12                 | 30.0                  | -6.9           |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
| WCDMA<br><br>Band 4<br>HSDPA | <div><div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div><div><div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: HSDPA Band 4 Fundamentals</div><div><div>Test Equipment:</div><div>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div></div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1712.40</td><td>13.88</td><td>V</td><td>4.3</td><td>9.5</td><td>19.03</td><td>30.0</td><td>-11.0</td><td></td></tr><tr><td>1712.40</td><td>18.43</td><td>H</td><td>4.3</td><td>9.5</td><td>23.58</td><td>30.0</td><td>-6.4</td><td></td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1732.60</td><td>13.66</td><td>V</td><td>4.3</td><td>9.5</td><td>18.86</td><td>30.0</td><td>-11.1</td><td></td></tr><tr><td>1732.60</td><td>17.03</td><td>H</td><td>4.3</td><td>9.5</td><td>22.22</td><td>30.0</td><td>-7.8</td><td></td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1752.60</td><td>13.94</td><td>V</td><td>4.4</td><td>9.6</td><td>19.18</td><td>30.0</td><td>-10.8</td><td></td></tr><tr><td>1752.60</td><td>18.29</td><td>H</td><td>4.4</td><td>9.6</td><td>23.53</td><td>30.0</td><td>-6.5</td><td></td></tr></table> | f<br>MHz            | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBi) | EIRP<br>(dBm)  | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1712.40 | 13.88 | V | 4.3 | 9.5 | 19.03 | 30.0 | -11.0 |  | 1712.40 | 18.43 | H | 4.3 | 9.5 | 23.58 | 30.0 | -6.4 |  | Mid Ch |  |  |  |  |  |  |  |  | 1732.60 | 13.66 | V | 4.3 | 9.5 | 18.86 | 30.0 | -11.1 |  | 1732.60 | 17.03 | H | 4.3 | 9.5 | 22.22 | 30.0 | -7.8 |  | High Ch |  |  |  |  |  |  |  |  | 1752.60 | 13.94 | V | 4.4 | 9.6 | 19.18 | 30.0 | -10.8 |  | 1752.60 | 18.29 | H | 4.4 | 9.6 | 23.53 | 30.0 | -6.5 |  |
|                              | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm)         | Limit<br>(dBm) | Delta<br>(dB)  | Notes         |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1712.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.88               | V                   | 4.3                | 9.5                   | 19.03                 | 30.0           | -11.0          |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1712.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 18.43               | H                   | 4.3                | 9.5                   | 23.58                 | 30.0           | -6.4           |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1732.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.66               | V                   | 4.3                | 9.5                   | 18.86                 | 30.0           | -11.1          |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | 1732.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 17.03               | H                   | 4.3                | 9.5                   | 22.22                 | 30.0           | -7.8           |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
|                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                     |                    |                       |                       |                |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
| 1752.60                      | 13.94                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | V                   | 4.4                 | 9.6                | 19.18                 | 30.0                  | -10.8          |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |
| 1752.60                      | 18.29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                   | 4.4                 | 9.6                | 23.53                 | 30.0                  | -6.5           |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |      |  |

**WCDMA Band 2**

WCDMA  
  
Band 2  
REL99

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsung  
Project #: 4788404110  
Date: 2018-04-15  
Test Engineer: 51072  
Configuration: EUT / X-Position  
Location: Chamber 2  
Mode: Rel99 Band 2 Fundamentals

Test Equipment:  
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables  
Substitution: Horn 3115[00161451], 3m N-type Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |               |                |               |       |
| 1852.40  | 13.71               | V                  | 4.5                | 9.5                   | 18.70         | 33.0           | -14.3         |       |
| 1852.40  | 16.95               | H                  | 4.5                | 9.5                   | 21.94         | 33.0           | -11.1         |       |
| Mid Ch   |                     |                    |                    |                       |               |                |               |       |
| 1880.00  | 13.96               | V                  | 4.5                | 9.2                   | 18.64         | 33.0           | -14.4         |       |
| 1880.00  | 17.11               | H                  | 4.5                | 9.2                   | 21.79         | 33.0           | -11.2         |       |
| High Ch  |                     |                    |                    |                       |               |                |               |       |
| 1907.60  | 12.91               | V                  | 4.6                | 8.9                   | 17.25         | 33.0           | -15.8         |       |
| 1907.60  | 15.44               | H                  | 4.6                | 8.9                   | 19.78         | 33.0           | -13.2         |       |

WCDMA  
  
Band 2  
HSDPA

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsung  
Project #: 4788404110  
Date: 2018-04-15  
Test Engineer: 51072  
Configuration: EUT / X-Position  
Location: Chamber 2  
Mode: HSDPA Band 2 Fundamentals

Test Equipment:  
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables  
Substitution: Horn 3115[00161451], 3m N-type Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |               |                |               |       |
| 1852.40  | 13.92               | V                  | 4.5                | 9.5                   | 18.91         | 33.0           | -14.1         |       |
| 1852.40  | 17.01               | H                  | 4.5                | 9.5                   | 22.00         | 33.0           | -11.0         |       |
| Mid Ch   |                     |                    |                    |                       |               |                |               |       |
| 1880.00  | 13.60               | V                  | 4.5                | 9.2                   | 18.28         | 33.0           | -14.7         |       |
| 1880.00  | 17.14               | H                  | 4.5                | 9.2                   | 21.82         | 33.0           | -11.2         |       |
| High Ch  |                     |                    |                    |                       |               |                |               |       |
| 1907.60  | 13.54               | V                  | 4.6                | 8.9                   | 17.88         | 33.0           | -15.1         |       |
| 1907.60  | 15.81               | H                  | 4.6                | 8.9                   | 20.15         | 33.0           | -12.9         |       |

**LTE Band 2**

| LTE<br>Band 2<br>20MHz<br>QPSK  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1860.00</td><td>13.54</td><td>V</td><td>4.5</td><td>9.4</td><td>18.44</td><td>33.0</td><td>-14.6</td><td></td></tr><tr><td>1860.00</td><td>15.15</td><td>H</td><td>4.5</td><td>9.4</td><td>20.05</td><td>33.0</td><td>-13.0</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1880.00</td><td>13.08</td><td>V</td><td>4.5</td><td>9.2</td><td>17.76</td><td>33.0</td><td>-15.2</td><td></td></tr><tr><td>1880.00</td><td>15.65</td><td>H</td><td>4.5</td><td>9.2</td><td>20.33</td><td>33.0</td><td>-12.7</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1900.00</td><td>13.97</td><td>V</td><td>4.6</td><td>9.0</td><td>18.43</td><td>33.0</td><td>-14.6</td><td></td></tr><tr><td>1900.00</td><td>16.09</td><td>H</td><td>4.6</td><td>9.0</td><td>20.55</td><td>33.0</td><td>-12.5</td><td></td></tr></table>  |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1860.00 | 13.54 | V | 4.5 | 9.4 | 18.44 | 33.0 | -14.6 |  | 1860.00 | 15.15 | H | 4.5 | 9.4 | 20.05 | 33.0 | -13.0 |  | Mid Ch |  |  |  |  |  |  |  |  | 1880.00 | 13.08 | V | 4.5 | 9.2 | 17.76 | 33.0 | -15.2 |  | 1880.00 | 15.65 | H | 4.5 | 9.2 | 20.33 | 33.0 | -12.7 |  | High Ch |  |  |  |  |  |  |  |  | 1900.00 | 13.97 | V | 4.6 | 9.0 | 18.43 | 33.0 | -14.6 |  | 1900.00 | 16.09 | H | 4.6 | 9.0 | 20.55 | 33.0 | -12.5 |  |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|
|                                 | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1860.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 13.54               | V                  | 4.5                | 9.4                   | 18.44         | 33.0           | -14.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1860.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 15.15               | H                  | 4.5                | 9.4                   | 20.05         | 33.0           | -13.0         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 13.08               | V                  | 4.5                | 9.2                   | 17.76         | 33.0           | -15.2         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 15.65               | H                  | 4.5                | 9.2                   | 20.33         | 33.0           | -12.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1900.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 13.97               | V                  | 4.6                | 9.0                   | 18.43         | 33.0           | -14.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1900.00                         | 16.09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 4.6                | 9.0                | 20.55                 | 33.0          | -12.5          |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| LTE<br>Band 2<br>20MHz<br>16QAM | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1860.00</td><td>12.55</td><td>V</td><td>4.5</td><td>9.4</td><td>17.45</td><td>33.0</td><td>-15.6</td><td></td></tr><tr><td>1860.00</td><td>14.14</td><td>H</td><td>4.5</td><td>9.4</td><td>19.04</td><td>33.0</td><td>-14.0</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1880.00</td><td>12.10</td><td>V</td><td>4.5</td><td>9.2</td><td>16.78</td><td>33.0</td><td>-16.2</td><td></td></tr><tr><td>1880.00</td><td>14.65</td><td>H</td><td>4.5</td><td>9.2</td><td>19.33</td><td>33.0</td><td>-13.7</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1900.00</td><td>12.99</td><td>V</td><td>4.6</td><td>9.0</td><td>17.45</td><td>33.0</td><td>-15.6</td><td></td></tr><tr><td>1900.00</td><td>15.11</td><td>H</td><td>4.6</td><td>9.0</td><td>19.57</td><td>33.0</td><td>-13.4</td><td></td></tr></table> |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1860.00 | 12.55 | V | 4.5 | 9.4 | 17.45 | 33.0 | -15.6 |  | 1860.00 | 14.14 | H | 4.5 | 9.4 | 19.04 | 33.0 | -14.0 |  | Mid Ch |  |  |  |  |  |  |  |  | 1880.00 | 12.10 | V | 4.5 | 9.2 | 16.78 | 33.0 | -16.2 |  | 1880.00 | 14.65 | H | 4.5 | 9.2 | 19.33 | 33.0 | -13.7 |  | High Ch |  |  |  |  |  |  |  |  | 1900.00 | 12.99 | V | 4.6 | 9.0 | 17.45 | 33.0 | -15.6 |  | 1900.00 | 15.11 | H | 4.6 | 9.0 | 19.57 | 33.0 | -13.4 |  |
|                                 | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1860.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 12.55               | V                  | 4.5                | 9.4                   | 17.45         | 33.0           | -15.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1860.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 14.14               | H                  | 4.5                | 9.4                   | 19.04         | 33.0           | -14.0         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 12.10               | V                  | 4.5                | 9.2                   | 16.78         | 33.0           | -16.2         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 14.65               | H                  | 4.5                | 9.2                   | 19.33         | 33.0           | -13.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                 | 1900.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 12.99               | V                  | 4.6                | 9.0                   | 17.45         | 33.0           | -15.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1900.00                         | 15.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 4.6                | 9.0                | 19.57                 | 33.0          | -13.4          |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |

| LTE<br><br>Band 2<br><br>15MHz<br><br>QPSK  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 2 Fundamentals, 15MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1857.50</td><td>13.45</td><td>V</td><td>4.5</td><td>9.4</td><td>18.38</td><td>33.0</td><td>-14.6</td></tr><tr><td>1857.50</td><td>13.78</td><td>H</td><td>4.5</td><td>9.4</td><td>18.71</td><td>33.0</td><td>-14.3</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>13.54</td><td>V</td><td>4.5</td><td>9.2</td><td>18.22</td><td>33.0</td><td>-14.8</td></tr><tr><td>1880.00</td><td>15.67</td><td>H</td><td>4.5</td><td>9.2</td><td>20.35</td><td>33.0</td><td>-12.7</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1902.50</td><td>14.44</td><td>V</td><td>4.6</td><td>9.0</td><td>18.86</td><td>33.0</td><td>-14.1</td></tr><tr><td>1902.50</td><td>15.70</td><td>H</td><td>4.6</td><td>9.0</td><td>20.12</td><td>33.0</td><td>-12.9</td></tr></table>  |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  | 1857.50 | 13.45 | V | 4.5 | 9.4 | 18.38 | 33.0 | -14.6 | 1857.50 | 13.78 | H | 4.5 | 9.4 | 18.71 | 33.0 | -14.3 | Mid Ch |  |  |  |  |  |  |  | 1880.00 | 13.54 | V | 4.5 | 9.2 | 18.22 | 33.0 | -14.8 | 1880.00 | 15.67 | H | 4.5 | 9.2 | 20.35 | 33.0 | -12.7 | High Ch |  |  |  |  |  |  |  | 1902.50 | 14.44 | V | 4.6 | 9.0 | 18.86 | 33.0 | -14.1 | 1902.50 | 15.70 | H | 4.6 | 9.0 | 20.12 | 33.0 | -12.9 |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|-------|--------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|-------|---------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|-------|
|                                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1857.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.45               | V                  | 4.5                | 9.4                   | 18.38         | 33.0           | -14.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1857.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.78               | H                  | 4.5                | 9.4                   | 18.71         | 33.0           | -14.3         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.54               | V                  | 4.5                | 9.2                   | 18.22         | 33.0           | -14.8         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15.67               | H                  | 4.5                | 9.2                   | 20.35         | 33.0           | -12.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1902.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.44               | V                  | 4.6                | 9.0                   | 18.86         | 33.0           | -14.1         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
| 1902.50                                     | 15.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                   | 4.6                | 9.0                | 20.12                 | 33.0          | -12.9          |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
| LTE<br><br>Band 2<br><br>15MHz<br><br>16QAM | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 2 Fundamentals, 15MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1857.50</td><td>12.39</td><td>V</td><td>4.5</td><td>9.4</td><td>17.32</td><td>33.0</td><td>-15.7</td></tr><tr><td>1857.50</td><td>12.73</td><td>H</td><td>4.5</td><td>9.4</td><td>17.66</td><td>33.0</td><td>-15.3</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>12.56</td><td>V</td><td>4.5</td><td>9.2</td><td>17.24</td><td>33.0</td><td>-15.8</td></tr><tr><td>1880.00</td><td>14.65</td><td>H</td><td>4.5</td><td>9.2</td><td>19.33</td><td>33.0</td><td>-13.7</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1902.50</td><td>13.42</td><td>V</td><td>4.6</td><td>9.0</td><td>17.84</td><td>33.0</td><td>-15.2</td></tr><tr><td>1902.50</td><td>14.68</td><td>H</td><td>4.6</td><td>9.0</td><td>19.10</td><td>33.0</td><td>-13.9</td></tr></table> |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  | 1857.50 | 12.39 | V | 4.5 | 9.4 | 17.32 | 33.0 | -15.7 | 1857.50 | 12.73 | H | 4.5 | 9.4 | 17.66 | 33.0 | -15.3 | Mid Ch |  |  |  |  |  |  |  | 1880.00 | 12.56 | V | 4.5 | 9.2 | 17.24 | 33.0 | -15.8 | 1880.00 | 14.65 | H | 4.5 | 9.2 | 19.33 | 33.0 | -13.7 | High Ch |  |  |  |  |  |  |  | 1902.50 | 13.42 | V | 4.6 | 9.0 | 17.84 | 33.0 | -15.2 | 1902.50 | 14.68 | H | 4.6 | 9.0 | 19.10 | 33.0 | -13.9 |
|                                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1857.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.39               | V                  | 4.5                | 9.4                   | 17.32         | 33.0           | -15.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1857.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.73               | H                  | 4.5                | 9.4                   | 17.66         | 33.0           | -15.3         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.56               | V                  | 4.5                | 9.2                   | 17.24         | 33.0           | -15.8         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.65               | H                  | 4.5                | 9.2                   | 19.33         | 33.0           | -13.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                             | 1902.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.42               | V                  | 4.6                | 9.0                   | 17.84         | 33.0           | -15.2         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
| 1902.50                                     | 14.68                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                   | 4.6                | 9.0                | 19.10                 | 33.0          | -13.9          |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |

| LTE<br>Band 2<br>10MHz<br>QPSK  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 2 Fundamentals, 10MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1855.00</td><td>13.40</td><td>V</td><td>4.5</td><td>9.5</td><td>18.36</td><td>33.0</td><td>-14.6</td></tr><tr><td>1855.00</td><td>15.46</td><td>H</td><td>4.5</td><td>9.5</td><td>20.41</td><td>33.0</td><td>-12.6</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>13.52</td><td>V</td><td>4.5</td><td>9.2</td><td>18.20</td><td>33.0</td><td>-14.8</td></tr><tr><td>1880.00</td><td>16.46</td><td>H</td><td>4.5</td><td>9.2</td><td>21.14</td><td>33.0</td><td>-11.9</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1905.00</td><td>14.29</td><td>V</td><td>4.6</td><td>8.9</td><td>18.67</td><td>33.0</td><td>-14.3</td></tr><tr><td>1905.00</td><td>15.68</td><td>H</td><td>4.6</td><td>8.9</td><td>20.06</td><td>33.0</td><td>-12.9</td></tr></table>  |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  | 1855.00 | 13.40 | V | 4.5 | 9.5 | 18.36 | 33.0 | -14.6 | 1855.00 | 15.46 | H | 4.5 | 9.5 | 20.41 | 33.0 | -12.6 | Mid Ch |  |  |  |  |  |  |  | 1880.00 | 13.52 | V | 4.5 | 9.2 | 18.20 | 33.0 | -14.8 | 1880.00 | 16.46 | H | 4.5 | 9.2 | 21.14 | 33.0 | -11.9 | High Ch |  |  |  |  |  |  |  | 1905.00 | 14.29 | V | 4.6 | 8.9 | 18.67 | 33.0 | -14.3 | 1905.00 | 15.68 | H | 4.6 | 8.9 | 20.06 | 33.0 | -12.9 |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|-------|--------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|-------|---------|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|---------|-------|---|-----|-----|-------|------|-------|
|                                 | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1855.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.40               | V                  | 4.5                | 9.5                   | 18.36         | 33.0           | -14.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1855.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15.46               | H                  | 4.5                | 9.5                   | 20.41         | 33.0           | -12.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.52               | V                  | 4.5                | 9.2                   | 18.20         | 33.0           | -14.8         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16.46               | H                  | 4.5                | 9.2                   | 21.14         | 33.0           | -11.9         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1905.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.29               | V                  | 4.6                | 8.9                   | 18.67         | 33.0           | -14.3         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1905.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15.68               | H                  | 4.6                | 8.9                   | 20.06         | 33.0           | -12.9         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
| LTE<br>Band 2<br>10MHz<br>16QAM | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-15<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 2 Fundamentals, 10MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1855.00</td><td>12.35</td><td>V</td><td>4.5</td><td>9.5</td><td>17.31</td><td>33.0</td><td>-15.7</td></tr><tr><td>1855.00</td><td>14.45</td><td>H</td><td>4.5</td><td>9.5</td><td>19.40</td><td>33.0</td><td>-13.6</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>12.52</td><td>V</td><td>4.5</td><td>9.2</td><td>17.20</td><td>33.0</td><td>-15.8</td></tr><tr><td>1880.00</td><td>15.46</td><td>H</td><td>4.5</td><td>9.2</td><td>20.14</td><td>33.0</td><td>-12.9</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1905.00</td><td>13.29</td><td>V</td><td>4.6</td><td>8.9</td><td>17.67</td><td>33.0</td><td>-15.3</td></tr><tr><td>1905.00</td><td>14.66</td><td>H</td><td>4.6</td><td>8.9</td><td>19.04</td><td>33.0</td><td>-14.0</td></tr></table> |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  | 1855.00 | 12.35 | V | 4.5 | 9.5 | 17.31 | 33.0 | -15.7 | 1855.00 | 14.45 | H | 4.5 | 9.5 | 19.40 | 33.0 | -13.6 | Mid Ch |  |  |  |  |  |  |  | 1880.00 | 12.52 | V | 4.5 | 9.2 | 17.20 | 33.0 | -15.8 | 1880.00 | 15.46 | H | 4.5 | 9.2 | 20.14 | 33.0 | -12.9 | High Ch |  |  |  |  |  |  |  | 1905.00 | 13.29 | V | 4.6 | 8.9 | 17.67 | 33.0 | -15.3 | 1905.00 | 14.66 | H | 4.6 | 8.9 | 19.04 | 33.0 | -14.0 |
|                                 | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1855.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.35               | V                  | 4.5                | 9.5                   | 17.31         | 33.0           | -15.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1855.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.45               | H                  | 4.5                | 9.5                   | 19.40         | 33.0           | -13.6         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.52               | V                  | 4.5                | 9.2                   | 17.20         | 33.0           | -15.8         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15.46               | H                  | 4.5                | 9.2                   | 20.14         | 33.0           | -12.9         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1905.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.29               | V                  | 4.6                | 8.9                   | 17.67         | 33.0           | -15.3         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |
|                                 | 1905.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.66               | H                  | 4.6                | 8.9                   | 19.04         | 33.0           | -14.0         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |        |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |         |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |         |       |   |     |     |       |      |       |

| LTE<br><br>Band 2<br><br>5MHz<br><br>QPSK  | <div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div><div><div>Company: Samsung</div><div>Project #: 4788404110</div><div>Date: 2018-04-13</div><div>Test Engineer: 51072</div><div>Configuration: EUT / X-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_QPSK Band 2 Fundamentals, 5MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables</div><div>Substitution: Horn 3115[00161451], 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBi)</th><th>EIRP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1852.50</td><td>11.61</td><td>V</td><td>4.5</td><td>9.5</td><td>16.60</td><td>33.0</td><td>-16.4</td><td></td></tr><tr><td>1852.50</td><td>14.16</td><td>H</td><td>4.5</td><td>9.5</td><td>19.15</td><td>33.0</td><td>-13.9</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1880.00</td><td>12.39</td><td>V</td><td>4.5</td><td>9.2</td><td>17.07</td><td>33.0</td><td>-15.9</td><td></td></tr><tr><td>1880.00</td><td>15.53</td><td>H</td><td>4.5</td><td>9.2</td><td>20.21</td><td>33.0</td><td>-12.8</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1907.50</td><td>13.74</td><td>V</td><td>4.6</td><td>8.9</td><td>18.08</td><td>33.0</td><td>-14.9</td><td></td></tr><tr><td>1907.50</td><td>15.39</td><td>H</td><td>4.6</td><td>8.9</td><td>19.73</td><td>33.0</td><td>-13.3</td><td></td></tr></table></div>  |                  |                 |                 |                    |            |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1852.50 | 11.61 | V | 4.5 | 9.5 | 16.60 | 33.0 | -16.4 |  | 1852.50 | 14.16 | H | 4.5 | 9.5 | 19.15 | 33.0 | -13.9 |  | Mid Ch |  |  |  |  |  |  |  |  | 1880.00 | 12.39 | V | 4.5 | 9.2 | 17.07 | 33.0 | -15.9 |  | 1880.00 | 15.53 | H | 4.5 | 9.2 | 20.21 | 33.0 | -12.8 |  | High Ch |  |  |  |  |  |  |  |  | 1907.50 | 13.74 | V | 4.6 | 8.9 | 18.08 | 33.0 | -14.9 |  | 1907.50 | 15.39 | H | 4.6 | 8.9 | 19.73 | 33.0 | -13.3 |  |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|-------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|
|                                            | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1852.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 11.61            | V               | 4.5             | 9.5                | 16.60      | 33.0        | -16.4      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1852.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.16            | H               | 4.5             | 9.5                | 19.15      | 33.0        | -13.9      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.39            | V               | 4.5             | 9.2                | 17.07      | 33.0        | -15.9      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15.53            | H               | 4.5             | 9.2                | 20.21      | 33.0        | -12.8      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1907.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 13.74            | V               | 4.6             | 8.9                | 18.08      | 33.0        | -14.9      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1907.50                                    | 15.39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                | 4.6             | 8.9             | 19.73              | 33.0       | -13.3       |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| LTE<br><br>Band 2<br><br>5MHz<br><br>16QAM | <div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div><div><div>Company: Samsung</div><div>Project #: 4788404110</div><div>Date: 2018-04-13</div><div>Test Engineer: 51072</div><div>Configuration: EUT / X-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_16QAM Band 2 Fundamentals, 5MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables</div><div>Substitution: Horn 3115[00161451], 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBi)</th><th>EIRP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1852.50</td><td>10.47</td><td>V</td><td>4.5</td><td>9.5</td><td>15.46</td><td>33.0</td><td>-17.5</td><td></td></tr><tr><td>1852.50</td><td>12.69</td><td>H</td><td>4.5</td><td>9.5</td><td>17.68</td><td>33.0</td><td>-15.3</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1880.00</td><td>11.40</td><td>V</td><td>4.5</td><td>9.2</td><td>16.08</td><td>33.0</td><td>-16.9</td><td></td></tr><tr><td>1880.00</td><td>14.54</td><td>H</td><td>4.5</td><td>9.2</td><td>19.22</td><td>33.0</td><td>-13.8</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1907.50</td><td>12.54</td><td>V</td><td>4.6</td><td>8.9</td><td>16.88</td><td>33.0</td><td>-16.1</td><td></td></tr><tr><td>1907.50</td><td>14.35</td><td>H</td><td>4.6</td><td>8.9</td><td>18.69</td><td>33.0</td><td>-14.3</td><td></td></tr></table></div> |                  |                 |                 |                    |            |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1852.50 | 10.47 | V | 4.5 | 9.5 | 15.46 | 33.0 | -17.5 |  | 1852.50 | 12.69 | H | 4.5 | 9.5 | 17.68 | 33.0 | -15.3 |  | Mid Ch |  |  |  |  |  |  |  |  | 1880.00 | 11.40 | V | 4.5 | 9.2 | 16.08 | 33.0 | -16.9 |  | 1880.00 | 14.54 | H | 4.5 | 9.2 | 19.22 | 33.0 | -13.8 |  | High Ch |  |  |  |  |  |  |  |  | 1907.50 | 12.54 | V | 4.6 | 8.9 | 16.88 | 33.0 | -16.1 |  | 1907.50 | 14.35 | H | 4.6 | 8.9 | 18.69 | 33.0 | -14.3 |  |
|                                            | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1852.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10.47            | V               | 4.5             | 9.5                | 15.46      | 33.0        | -17.5      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1852.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.69            | H               | 4.5             | 9.5                | 17.68      | 33.0        | -15.3      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 11.40            | V               | 4.5             | 9.2                | 16.08      | 33.0        | -16.9      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1880.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14.54            | H               | 4.5             | 9.2                | 19.22      | 33.0        | -13.8      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                            | 1907.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12.54            | V               | 4.6             | 8.9                | 16.88      | 33.0        | -16.1      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1907.50                                    | 14.35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                | 4.6             | 8.9             | 18.69              | 33.0       | -14.3       |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |

LTE

Band 2

3MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-13

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 2 Fundamentals, 3MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1851.50 | 12.42            | V               | 4.5             | 9.5                | 17.42      | 33.0        | -15.6      |       |
| 1851.50 | 15.69            | H               | 4.5             | 9.5                | 20.69      | 33.0        | -12.3      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1880.00 | 12.29            | V               | 4.5             | 9.2                | 16.97      | 33.0        | -16.0      |       |
| 1880.00 | 14.25            | H               | 4.5             | 9.2                | 18.93      | 33.0        | -14.1      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1908.50 | 13.85            | V               | 4.6             | 8.9                | 18.17      | 33.0        | -14.8      |       |
| 1908.50 | 15.70            | H               | 4.6             | 8.9                | 20.02      | 33.0        | -13.0      |       |

LTE

Band 2

3MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-13

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 2 Fundamentals, 3MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1851.50 | 11.37            | V               | 4.5             | 9.5                | 16.37      | 33.0        | -16.6      |       |
| 1851.50 | 14.60            | H               | 4.5             | 9.5                | 19.60      | 33.0        | -13.4      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1880.00 | 11.18            | V               | 4.5             | 9.2                | 15.86      | 33.0        | -17.1      |       |
| 1880.00 | 13.11            | H               | 4.5             | 9.2                | 17.79      | 33.0        | -15.2      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1908.50 | 12.72            | V               | 4.6             | 8.9                | 17.04      | 33.0        | -16.0      |       |
| 1908.50 | 14.64            | H               | 4.6             | 8.9                | 18.96      | 33.0        | -14.0      |       |

LTE

Band 2

1.4MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-13

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1850.70 | 10.44            | V               | 4.5             | 9.5                | 15.45      | 33.0        | -17.6      |       |
| 1850.70 | 13.34            | H               | 4.5             | 9.5                | 18.34      | 33.0        | -14.7      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1880.00 | 10.12            | V               | 4.5             | 9.2                | 14.80      | 33.0        | -18.2      |       |
| 1880.00 | 13.39            | H               | 4.5             | 9.2                | 18.07      | 33.0        | -14.9      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1909.30 | 11.73            | V               | 4.6             | 8.9                | 16.04      | 33.0        | -17.0      |       |
| 1909.30 | 13.34            | H               | 4.6             | 8.9                | 17.65      | 33.0        | -15.3      |       |

LTE

Band 2

1.4MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-13

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1850.70 | 9.33             | V               | 4.5             | 9.5                | 14.34      | 33.0        | -18.7      |       |
| 1850.70 | 12.25            | H               | 4.5             | 9.5                | 17.25      | 33.0        | -15.7      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1880.00 | 9.16             | V               | 4.5             | 9.2                | 13.84      | 33.0        | -19.2      |       |
| 1880.00 | 12.69            | H               | 4.5             | 9.2                | 17.37      | 33.0        | -15.6      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1909.30 | 10.68            | V               | 4.6             | 8.9                | 14.99      | 33.0        | -18.0      |       |
| 1909.30 | 12.22            | H               | 4.6             | 8.9                | 16.53      | 33.0        | -16.5      |       |

**LTE Band 5**

| LTE<br><br>Band 5<br><br>10MHz<br><br>QPSK | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-07<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>829.00</td><td>19.38</td><td>V</td><td>1.0</td><td>-1.5</td><td>16.97</td><td>38.5</td><td>-21.5</td></tr><tr><td>829.00</td><td>8.90</td><td>H</td><td>1.0</td><td>-1.5</td><td>6.49</td><td>38.5</td><td>-32.0</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>18.06</td><td>V</td><td>1.0</td><td>-1.4</td><td>15.68</td><td>38.5</td><td>-22.8</td></tr><tr><td>836.50</td><td>9.35</td><td>H</td><td>1.0</td><td>-1.4</td><td>6.97</td><td>38.5</td><td>-31.5</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>844.00</td><td>18.67</td><td>V</td><td>1.0</td><td>-1.4</td><td>16.32</td><td>38.5</td><td>-22.2</td></tr><tr><td>844.00</td><td>8.80</td><td>H</td><td>1.0</td><td>-1.4</td><td>6.44</td><td>38.5</td><td>-32.1</td></tr><tr><td colspan="9"></td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm)          | Limit<br>(dBm) | Delta<br>(dB)  | Notes         | Low Ch |        |  |  |  |  |  |  | 829.00 | 19.38  | V     | 1.0 | -1.5 | 16.97 | 38.5  | -21.5 | 829.00 | 8.90   | H    | 1.0 | -1.5 | 6.49 | 38.5 | -32.0 | Mid Ch |        |  |  |  |  |  |  | 836.50 | 18.06  | V     | 1.0 | -1.4 | 15.68 | 38.5  | -22.8 | 836.50 | 9.35   | H    | 1.0 | -1.4 | 6.97 | 38.5 | -31.5 | High Ch |         |  |  |  |  |  |  | 844.00 | 18.67  | V     | 1.0 | -1.4 | 16.32 | 38.5  | -22.2 | 844.00 | 8.80   | H    | 1.0 | -1.4 | 6.44 | 38.5 | -32.1 |       |  |  |  |  |  |  |  |  |  |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------------|-----------------------|----------------|----------------|---------------|----------|---------------------|---------------------|--------------------|-----------------------|-----------------------|----------------|----------------|---------------|--------|--------|--|--|--|--|--|--|--------|--------|-------|-----|------|-------|-------|-------|--------|--------|------|-----|------|------|------|-------|--------|--------|--|--|--|--|--|--|--------|--------|-------|-----|------|-------|-------|-------|--------|--------|------|-----|------|------|------|-------|---------|---------|--|--|--|--|--|--|--------|--------|-------|-----|------|-------|-------|-------|--------|--------|------|-----|------|------|------|-------|-------|--|--|--|--|--|--|--|--|--|
|                                            | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SG reading<br>(dBm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm)          | Limit<br>(dBm) | Delta<br>(dB)  | Notes         |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | 829.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 19.38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | V                   | 1.0                | -1.5                  | 16.97                 | 38.5           | -21.5          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | 829.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 8.90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 1.0                | -1.5                  | 6.49                  | 38.5           | -32.0          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 18.06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | V                   | 1.0                | -1.4                  | 15.68                 | 38.5           | -22.8          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 9.35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 1.0                | -1.4                  | 6.97                  | 38.5           | -31.5          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | 844.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 18.67                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | V                   | 1.0                | -1.4                  | 16.32                 | 38.5           | -22.2          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | 844.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 8.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 1.0                | -1.4                  | 6.44                  | 38.5           | -32.1          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            | LTE<br><br>Band 5<br><br>10MHz<br><br>16QAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-07<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>829.00</td><td>18.36</td><td>V</td><td>1.0</td><td>-1.5</td><td>15.95</td><td>38.5</td><td>-22.5</td></tr><tr><td>829.00</td><td>7.89</td><td>H</td><td>1.0</td><td>-1.5</td><td>5.48</td><td>38.5</td><td>-33.0</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>17.10</td><td>V</td><td>1.0</td><td>-1.4</td><td>14.72</td><td>38.5</td><td>-23.8</td></tr><tr><td>836.50</td><td>8.29</td><td>H</td><td>1.0</td><td>-1.4</td><td>5.91</td><td>38.5</td><td>-32.6</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>844.00</td><td>17.65</td><td>V</td><td>1.0</td><td>-1.4</td><td>15.30</td><td>38.5</td><td>-23.2</td></tr><tr><td>844.00</td><td>7.76</td><td>H</td><td>1.0</td><td>-1.4</td><td>5.40</td><td>38.5</td><td>-33.1</td></tr><tr><td colspan="9"></td></tr></table> |                     |                    |                       |                       |                |                |               |          | f<br>MHz            | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBd) | ERP<br>(dBm)   | Limit<br>(dBm) | Delta<br>(dB) | Notes  | Low Ch |  |  |  |  |  |  |        | 829.00 | 18.36 | V   | 1.0  | -1.5  | 15.95 | 38.5  | -22.5  | 829.00 | 7.89 | H   | 1.0  | -1.5 | 5.48 | 38.5  | -33.0  | Mid Ch |  |  |  |  |  |  |        | 836.50 | 17.10 | V   | 1.0  | -1.4  | 14.72 | 38.5  | -23.8  | 836.50 | 8.29 | H   | 1.0  | -1.4 | 5.91 | 38.5  | -32.6   | High Ch |  |  |  |  |  |  |        | 844.00 | 17.65 | V   | 1.0  | -1.4  | 15.30 | 38.5  | -23.2  | 844.00 | 7.76 | H   | 1.0  | -1.4 | 5.40 | 38.5  | -33.1 |  |  |  |  |  |  |  |  |  |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBd) | ERP<br>(dBm)   | Limit<br>(dBm) | Delta<br>(dB) | Notes    |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| Low Ch                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| 829.00                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 18.36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | V                   | 1.0                | -1.5                  | 15.95                 | 38.5           | -22.5          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| 829.00                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 7.89                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 1.0                | -1.5                  | 5.48                  | 38.5           | -33.0          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| Mid Ch                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| 836.50                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 17.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | V                   | 1.0                | -1.4                  | 14.72                 | 38.5           | -23.8          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| 836.50                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 8.29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 1.0                | -1.4                  | 5.91                  | 38.5           | -32.6          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| High Ch                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| 844.00                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 17.65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | V                   | 1.0                | -1.4                  | 15.30                 | 38.5           | -23.2          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
| 844.00                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 7.76                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H                   | 1.0                | -1.4                  | 5.40                  | 38.5           | -33.1          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |         |         |  |  |  |  |  |  |        |        |       |     |      |       |       |       |        |        |      |     |      |      |      |       |       |  |  |  |  |  |  |  |  |  |

LTE

Band 5

5MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-07

Test Engineer: 51072

Configuration: EUT / Z-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 826.50  | 17.19            | V               | 1.0             | -1.5               | 14.77     | 38.5        | -23.7      |       |
| 826.50  | 6.41             | H               | 1.0             | -1.5               | 3.99      | 38.5        | -34.5      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.50  | 15.41            | V               | 1.0             | -1.4               | 13.03     | 38.5        | -25.5      |       |
| 836.50  | 7.07             | H               | 1.0             | -1.4               | 4.69      | 38.5        | -33.8      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 846.50  | 16.60            | V               | 1.0             | -1.4               | 14.25     | 38.5        | -24.2      |       |
| 846.50  | 6.64             | H               | 1.0             | -1.4               | 4.29      | 38.5        | -34.2      |       |

LTE

Band 5

5MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-07

Test Engineer: 51072

Configuration: EUT / Z-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 826.50  | 16.02            | V               | 1.0             | -1.5               | 13.60     | 38.5        | -24.9      |       |
| 826.50  | 5.30             | H               | 1.0             | -1.5               | 2.88      | 38.5        | -35.6      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.50  | 14.42            | V               | 1.0             | -1.4               | 12.04     | 38.5        | -26.5      |       |
| 836.50  | 6.18             | H               | 1.0             | -1.4               | 3.80      | 38.5        | -34.7      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 846.50  | 15.68            | V               | 1.0             | -1.4               | 13.33     | 38.5        | -25.2      |       |
| 846.50  | 5.66             | H               | 1.0             | -1.4               | 3.31      | 38.5        | -35.2      |       |

LTE

Band 5

3MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-07

Test Engineer: 51072

Configuration: EUT / Z-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 825.50  | 17.59            | V               | 1.0             | -1.5               | 15.17     | 38.5        | -23.3      |       |
| 825.50  | 6.79             | H               | 1.0             | -1.5               | 4.37      | 38.5        | -34.1      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.50  | 15.83            | V               | 1.0             | -1.4               | 13.45     | 38.5        | -25.1      |       |
| 836.50  | 6.75             | H               | 1.0             | -1.4               | 4.37      | 38.5        | -34.1      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 847.50  | 16.94            | V               | 1.0             | -1.4               | 14.60     | 38.5        | -23.9      |       |
| 847.50  | 7.27             | H               | 1.0             | -1.4               | 4.92      | 38.5        | -33.6      |       |

LTE

Band 5

3MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-07

Test Engineer: 51072

Configuration: EUT / Z-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 825.50  | 16.52            | V               | 1.0             | -1.5               | 14.10     | 38.5        | -24.4      |       |
| 825.50  | 5.67             | H               | 1.0             | -1.5               | 3.25      | 38.5        | -35.3      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.50  | 14.72            | V               | 1.0             | -1.4               | 12.34     | 38.5        | -26.2      |       |
| 836.50  | 5.69             | H               | 1.0             | -1.4               | 3.31      | 38.5        | -35.2      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 847.50  | 15.79            | V               | 1.0             | -1.4               | 13.45     | 38.5        | -25.1      |       |
| 847.50  | 6.31             | H               | 1.0             | -1.4               | 3.96      | 38.5        | -34.5      |       |

LTE

Band 5

1.4MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-07

Test Engineer: 51072

Configuration: EUT / Z-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 824.70  | 17.24            | V               | 1.0             | -1.5               | 14.81     | 38.5        | -23.7      |       |
| 824.70  | 6.37             | H               | 1.0             | -1.5               | 3.94      | 38.5        | -34.6      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.50  | 15.50            | V               | 1.0             | -1.4               | 13.12     | 38.5        | -25.4      |       |
| 836.50  | 7.18             | H               | 1.0             | -1.4               | 4.80      | 38.5        | -33.7      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 848.30  | 16.11            | V               | 1.0             | -1.4               | 13.76     | 38.5        | -24.7      |       |
| 848.30  | 6.94             | H               | 1.0             | -1.4               | 4.59      | 38.5        | -33.9      |       |

LTE

Band 5

1.4MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-07

Test Engineer: 51072

Configuration: EUT / Z-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables

Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |           |             |            |       |
| 824.70  | 16.31            | V               | 1.0             | -1.5               | 13.88     | 38.5        | -24.6      |       |
| 824.70  | 5.45             | H               | 1.0             | -1.5               | 3.02      | 38.5        | -35.5      |       |
| Mid Ch  |                  |                 |                 |                    |           |             |            |       |
| 836.50  | 14.47            | V               | 1.0             | -1.4               | 12.09     | 38.5        | -26.4      |       |
| 836.50  | 6.22             | H               | 1.0             | -1.4               | 3.84      | 38.5        | -34.7      |       |
| High Ch |                  |                 |                 |                    |           |             |            |       |
| 848.30  | 15.02            | V               | 1.0             | -1.4               | 12.67     | 38.5        | -25.8      |       |
| 848.30  | 5.91             | H               | 1.0             | -1.4               | 3.56      | 38.5        | -34.9      |       |

**LTE Band 12**

| LTE<br><br>Band 12<br><br>10MHz<br><br>QPSK  | <div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div><div><div>Company: Samsnug</div><div>Project #: 4788404110</div><div>Date: 2018-04-06</div><div>Test Engineer: 51072</div><div>Configuration: EUT / Z-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_QPSK Band 12 Fundamentals, 10MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: VULB9163-749, and Chamber 2 SMA Cables</div><div>Substitution: Dipole 3121_DB4, 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>704.00</td><td>20.15</td><td>V</td><td>0.9</td><td>-1.6</td><td>17.68</td><td>34.8</td><td>-17.1</td><td></td></tr><tr><td>704.00</td><td>7.41</td><td>H</td><td>0.9</td><td>-1.6</td><td>4.95</td><td>34.8</td><td>-29.9</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>707.50</td><td>19.90</td><td>V</td><td>0.9</td><td>-1.6</td><td>17.43</td><td>34.8</td><td>-17.4</td><td></td></tr><tr><td>707.50</td><td>7.48</td><td>H</td><td>0.9</td><td>-1.6</td><td>5.01</td><td>34.8</td><td>-29.8</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>711.00</td><td>19.40</td><td>V</td><td>0.9</td><td>-1.6</td><td>16.93</td><td>34.8</td><td>-17.9</td><td></td></tr><tr><td>711.00</td><td>7.75</td><td>H</td><td>0.9</td><td>-1.6</td><td>5.28</td><td>34.8</td><td>-29.5</td><td></td></tr></table></div>  |                  |                 |                 |                    |           |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 704.00 | 20.15 | V | 0.9 | -1.6 | 17.68 | 34.8 | -17.1 |  | 704.00 | 7.41 | H | 0.9 | -1.6 | 4.95 | 34.8 | -29.9 |  | Mid Ch |  |  |  |  |  |  |  |  | 707.50 | 19.90 | V | 0.9 | -1.6 | 17.43 | 34.8 | -17.4 |  | 707.50 | 7.48 | H | 0.9 | -1.6 | 5.01 | 34.8 | -29.8 |  | High Ch |  |  |  |  |  |  |  |  | 711.00 | 19.40 | V | 0.9 | -1.6 | 16.93 | 34.8 | -17.9 |  | 711.00 | 7.75 | H | 0.9 | -1.6 | 5.28 | 34.8 | -29.5 |  |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|-------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|---------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|
|                                              | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 704.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 20.15            | V               | 0.9             | -1.6               | 17.68     | 34.8        | -17.1      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 704.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 7.41             | H               | 0.9             | -1.6               | 4.95      | 34.8        | -29.9      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 19.90            | V               | 0.9             | -1.6               | 17.43     | 34.8        | -17.4      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 7.48             | H               | 0.9             | -1.6               | 5.01      | 34.8        | -29.8      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 711.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 19.40            | V               | 0.9             | -1.6               | 16.93     | 34.8        | -17.9      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| 711.00                                       | 7.75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | H                | 0.9             | -1.6            | 5.28               | 34.8      | -29.5       |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| LTE<br><br>Band 12<br><br>10MHz<br><br>16QAM | <div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div><div><div>Company: Samsnug</div><div>Project #: 4788404110</div><div>Date: 2018-04-06</div><div>Test Engineer: 51072</div><div>Configuration: EUT / Z-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_16QAM Band 12 Fundamentals, 10MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: VULB9163-749, and Chamber 2 SMA Cables</div><div>Substitution: Dipole 3121_DB4, 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>704.00</td><td>19.15</td><td>V</td><td>0.9</td><td>-1.6</td><td>16.68</td><td>34.8</td><td>-18.1</td><td></td></tr><tr><td>704.00</td><td>6.39</td><td>H</td><td>0.9</td><td>-1.6</td><td>3.93</td><td>34.8</td><td>-30.9</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>707.50</td><td>18.90</td><td>V</td><td>0.9</td><td>-1.6</td><td>16.43</td><td>34.8</td><td>-18.4</td><td></td></tr><tr><td>707.50</td><td>6.48</td><td>H</td><td>0.9</td><td>-1.6</td><td>4.01</td><td>34.8</td><td>-30.8</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>711.00</td><td>18.39</td><td>V</td><td>0.9</td><td>-1.6</td><td>15.92</td><td>34.8</td><td>-18.9</td><td></td></tr><tr><td>711.00</td><td>6.80</td><td>H</td><td>0.9</td><td>-1.6</td><td>4.33</td><td>34.8</td><td>-30.5</td><td></td></tr></table></div> |                  |                 |                 |                    |           |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 704.00 | 19.15 | V | 0.9 | -1.6 | 16.68 | 34.8 | -18.1 |  | 704.00 | 6.39 | H | 0.9 | -1.6 | 3.93 | 34.8 | -30.9 |  | Mid Ch |  |  |  |  |  |  |  |  | 707.50 | 18.90 | V | 0.9 | -1.6 | 16.43 | 34.8 | -18.4 |  | 707.50 | 6.48 | H | 0.9 | -1.6 | 4.01 | 34.8 | -30.8 |  | High Ch |  |  |  |  |  |  |  |  | 711.00 | 18.39 | V | 0.9 | -1.6 | 15.92 | 34.8 | -18.9 |  | 711.00 | 6.80 | H | 0.9 | -1.6 | 4.33 | 34.8 | -30.5 |  |
|                                              | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 704.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 19.15            | V               | 0.9             | -1.6               | 16.68     | 34.8        | -18.1      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 704.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6.39             | H               | 0.9             | -1.6               | 3.93      | 34.8        | -30.9      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18.90            | V               | 0.9             | -1.6               | 16.43     | 34.8        | -18.4      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6.48             | H               | 0.9             | -1.6               | 4.01      | 34.8        | -30.8      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                              | 711.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18.39            | V               | 0.9             | -1.6               | 15.92     | 34.8        | -18.9      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| 711.00                                       | 6.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | H                | 0.9             | -1.6            | 4.33               | 34.8      | -30.5       |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |

| LTE<br><br>Band 12<br><br>5MHz<br><br>QPSK  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-05<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>701.50</td><td>17.46</td><td>V</td><td>0.9</td><td>-1.6</td><td>14.99</td><td>34.8</td><td>-19.8</td><td></td></tr><tr><td>701.50</td><td>4.13</td><td>H</td><td>0.9</td><td>-1.6</td><td>1.66</td><td>34.8</td><td>-33.1</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>707.50</td><td>16.76</td><td>V</td><td>0.9</td><td>-1.6</td><td>14.29</td><td>34.8</td><td>-20.5</td><td></td></tr><tr><td>707.50</td><td>4.69</td><td>H</td><td>0.9</td><td>-1.6</td><td>2.22</td><td>34.8</td><td>-32.6</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>713.50</td><td>16.66</td><td>V</td><td>0.9</td><td>-1.6</td><td>14.19</td><td>34.8</td><td>-20.6</td><td></td></tr><tr><td>713.50</td><td>5.14</td><td>H</td><td>0.9</td><td>-1.6</td><td>2.66</td><td>34.8</td><td>-32.1</td><td></td></tr></table>  |                     |                    |                    |                       |              |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 701.50 | 17.46 | V | 0.9 | -1.6 | 14.99 | 34.8 | -19.8 |  | 701.50 | 4.13 | H | 0.9 | -1.6 | 1.66 | 34.8 | -33.1 |  | Mid Ch |  |  |  |  |  |  |  |  | 707.50 | 16.76 | V | 0.9 | -1.6 | 14.29 | 34.8 | -20.5 |  | 707.50 | 4.69 | H | 0.9 | -1.6 | 2.22 | 34.8 | -32.6 |  | High Ch |  |  |  |  |  |  |  |  | 713.50 | 16.66 | V | 0.9 | -1.6 | 14.19 | 34.8 | -20.6 |  | 713.50 | 5.14 | H | 0.9 | -1.6 | 2.66 | 34.8 | -32.1 |  |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|---------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|
|                                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 701.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 17.46               | V                  | 0.9                | -1.6                  | 14.99        | 34.8           | -19.8         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 701.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.13                | H                  | 0.9                | -1.6                  | 1.66         | 34.8           | -33.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 16.76               | V                  | 0.9                | -1.6                  | 14.29        | 34.8           | -20.5         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.69                | H                  | 0.9                | -1.6                  | 2.22         | 34.8           | -32.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 713.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 16.66               | V                  | 0.9                | -1.6                  | 14.19        | 34.8           | -20.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| 713.50                                      | 5.14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | H                   | 0.9                | -1.6               | 2.66                  | 34.8         | -32.1          |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| LTE<br><br>Band 12<br><br>5MHz<br><br>16QAM | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-05<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>701.50</td><td>16.45</td><td>V</td><td>0.9</td><td>-1.6</td><td>13.98</td><td>34.8</td><td>-20.8</td><td></td></tr><tr><td>701.50</td><td>3.20</td><td>H</td><td>0.9</td><td>-1.6</td><td>0.73</td><td>34.8</td><td>-34.1</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>707.50</td><td>15.71</td><td>V</td><td>0.9</td><td>-1.6</td><td>13.24</td><td>34.8</td><td>-21.6</td><td></td></tr><tr><td>707.50</td><td>3.63</td><td>H</td><td>0.9</td><td>-1.6</td><td>1.16</td><td>34.8</td><td>-33.6</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>713.50</td><td>15.63</td><td>V</td><td>0.9</td><td>-1.6</td><td>13.16</td><td>34.8</td><td>-21.6</td><td></td></tr><tr><td>713.50</td><td>4.12</td><td>H</td><td>0.9</td><td>-1.6</td><td>1.64</td><td>34.8</td><td>-33.2</td><td></td></tr></table> |                     |                    |                    |                       |              |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 701.50 | 16.45 | V | 0.9 | -1.6 | 13.98 | 34.8 | -20.8 |  | 701.50 | 3.20 | H | 0.9 | -1.6 | 0.73 | 34.8 | -34.1 |  | Mid Ch |  |  |  |  |  |  |  |  | 707.50 | 15.71 | V | 0.9 | -1.6 | 13.24 | 34.8 | -21.6 |  | 707.50 | 3.63 | H | 0.9 | -1.6 | 1.16 | 34.8 | -33.6 |  | High Ch |  |  |  |  |  |  |  |  | 713.50 | 15.63 | V | 0.9 | -1.6 | 13.16 | 34.8 | -21.6 |  | 713.50 | 4.12 | H | 0.9 | -1.6 | 1.64 | 34.8 | -33.2 |  |
|                                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 701.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 16.45               | V                  | 0.9                | -1.6                  | 13.98        | 34.8           | -20.8         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 701.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3.20                | H                  | 0.9                | -1.6                  | 0.73         | 34.8           | -34.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 15.71               | V                  | 0.9                | -1.6                  | 13.24        | 34.8           | -21.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3.63                | H                  | 0.9                | -1.6                  | 1.16         | 34.8           | -33.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 713.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 15.63               | V                  | 0.9                | -1.6                  | 13.16        | 34.8           | -21.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| 713.50                                      | 4.12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | H                   | 0.9                | -1.6               | 1.64                  | 34.8         | -33.2          |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |

| LTE<br><br>Band 12<br><br>3MHz<br><br>QPSK  | <div><div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div></div><div><div>Company: Samsung</div><div>Project #: 4788404110</div><div>Date: 2018-04-05</div><div>Test Engineer: 51072</div><div>Configuration: EUT / Z-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: VULB9163-749, and Chamber 2 SMA Cables</div><div>Substitution: Dipole 3121_DB4, 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>700.50</td><td>17.61</td><td>V</td><td>0.9</td><td>-1.6</td><td>15.15</td><td>34.8</td><td>-19.7</td><td></td></tr><tr><td>700.50</td><td>4.38</td><td>H</td><td>0.9</td><td>-1.6</td><td>1.92</td><td>34.8</td><td>-32.9</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>707.50</td><td>17.14</td><td>V</td><td>0.9</td><td>-1.6</td><td>14.67</td><td>34.8</td><td>-20.1</td><td></td></tr><tr><td>707.50</td><td>4.80</td><td>H</td><td>0.9</td><td>-1.6</td><td>2.33</td><td>34.8</td><td>-32.5</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>714.50</td><td>16.91</td><td>V</td><td>0.9</td><td>-1.6</td><td>14.43</td><td>34.8</td><td>-20.4</td><td></td></tr><tr><td>714.50</td><td>5.00</td><td>H</td><td>0.9</td><td>-1.6</td><td>2.52</td><td>34.8</td><td>-32.3</td><td></td></tr></table></div>  |                  |                 |                 |                    |           |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 700.50 | 17.61 | V | 0.9 | -1.6 | 15.15 | 34.8 | -19.7 |  | 700.50 | 4.38 | H | 0.9 | -1.6 | 1.92 | 34.8 | -32.9 |  | Mid Ch |  |  |  |  |  |  |  |  | 707.50 | 17.14 | V | 0.9 | -1.6 | 14.67 | 34.8 | -20.1 |  | 707.50 | 4.80 | H | 0.9 | -1.6 | 2.33 | 34.8 | -32.5 |  | High Ch |  |  |  |  |  |  |  |  | 714.50 | 16.91 | V | 0.9 | -1.6 | 14.43 | 34.8 | -20.4 |  | 714.50 | 5.00 | H | 0.9 | -1.6 | 2.52 | 34.8 | -32.3 |  |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|-------|------------------|-----------------|-----------------|--------------------|-----------|-------------|------------|-------|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|---------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|------|---|-----|------|------|------|-------|--|
|                                             | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 700.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 17.61            | V               | 0.9             | -1.6               | 15.15     | 34.8        | -19.7      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 700.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.38             | H               | 0.9             | -1.6               | 1.92      | 34.8        | -32.9      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 17.14            | V               | 0.9             | -1.6               | 14.67     | 34.8        | -20.1      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.80             | H               | 0.9             | -1.6               | 2.33      | 34.8        | -32.5      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 714.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 16.91            | V               | 0.9             | -1.6               | 14.43     | 34.8        | -20.4      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| 714.50                                      | 5.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | H                | 0.9             | -1.6            | 2.52               | 34.8      | -32.3       |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| LTE<br><br>Band 12<br><br>3MHz<br><br>16QAM | <div><div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div></div><div><div>Company: Samsung</div><div>Project #: 4788404110</div><div>Date: 2018-04-05</div><div>Test Engineer: 51072</div><div>Configuration: EUT / Z-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: VULB9163-749, and Chamber 2 SMA Cables</div><div>Substitution: Dipole 3121_DB4, 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>700.50</td><td>16.64</td><td>V</td><td>0.9</td><td>-1.6</td><td>14.18</td><td>34.8</td><td>-20.6</td><td></td></tr><tr><td>700.50</td><td>3.37</td><td>H</td><td>0.9</td><td>-1.6</td><td>0.91</td><td>34.8</td><td>-33.9</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>707.50</td><td>16.13</td><td>V</td><td>0.9</td><td>-1.6</td><td>13.66</td><td>34.8</td><td>-21.1</td><td></td></tr><tr><td>707.50</td><td>3.71</td><td>H</td><td>0.9</td><td>-1.6</td><td>1.24</td><td>34.8</td><td>-33.6</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>714.50</td><td>15.86</td><td>V</td><td>0.9</td><td>-1.6</td><td>13.38</td><td>34.8</td><td>-21.4</td><td></td></tr><tr><td>714.50</td><td>3.96</td><td>H</td><td>0.9</td><td>-1.6</td><td>1.48</td><td>34.8</td><td>-33.3</td><td></td></tr></table></div> |                  |                 |                 |                    |           |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 700.50 | 16.64 | V | 0.9 | -1.6 | 14.18 | 34.8 | -20.6 |  | 700.50 | 3.37 | H | 0.9 | -1.6 | 0.91 | 34.8 | -33.9 |  | Mid Ch |  |  |  |  |  |  |  |  | 707.50 | 16.13 | V | 0.9 | -1.6 | 13.66 | 34.8 | -21.1 |  | 707.50 | 3.71 | H | 0.9 | -1.6 | 1.24 | 34.8 | -33.6 |  | High Ch |  |  |  |  |  |  |  |  | 714.50 | 15.86 | V | 0.9 | -1.6 | 13.38 | 34.8 | -21.4 |  | 714.50 | 3.96 | H | 0.9 | -1.6 | 1.48 | 34.8 | -33.3 |  |
|                                             | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 700.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 16.64            | V               | 0.9             | -1.6               | 14.18     | 34.8        | -20.6      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 700.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3.37             | H               | 0.9             | -1.6               | 0.91      | 34.8        | -33.9      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 16.13            | V               | 0.9             | -1.6               | 13.66     | 34.8        | -21.1      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 707.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3.71             | H               | 0.9             | -1.6               | 1.24      | 34.8        | -33.6      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                 |                 |                    |           |             |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
|                                             | 714.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 15.86            | V               | 0.9             | -1.6               | 13.38     | 34.8        | -21.4      |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |
| 714.50                                      | 3.96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | H                | 0.9             | -1.6            | 1.48               | 34.8      | -33.3       |            |       |       |                  |                 |                 |                    |           |             |            |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |      |   |     |      |      |      |       |  |

LTE  
Band 12  
1.4MHz  
QPSK

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsung  
Project #: 4788404110  
Date: 2018-04-05  
Test Engineer: 51072  
Configuration: EUT / Z-Position  
Location: Chamber 2  
Mode: LTE\_QPSK Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables  
Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |              |                |               |       |
| 699.70   | 17.53               | V                  | 0.9                | -1.6                  | 15.07        | 34.8           | -19.7         |       |
| 699.70   | 4.28                | H                  | 0.9                | -1.6                  | 1.81         | 34.8           | -33.0         |       |
| Mid Ch   |                     |                    |                    |                       |              |                |               |       |
| 707.50   | 16.93               | V                  | 0.9                | -1.6                  | 14.46        | 34.8           | -20.3         |       |
| 707.50   | 4.81                | H                  | 0.9                | -1.6                  | 2.34         | 34.8           | -32.5         |       |
| High Ch  |                     |                    |                    |                       |              |                |               |       |
| 715.30   | 16.51               | V                  | 0.9                | -1.6                  | 14.03        | 34.8           | -20.8         |       |
| 715.30   | 5.02                | H                  | 0.9                | -1.6                  | 2.54         | 34.8           | -32.3         |       |

LTE  
Band 12  
1.4MHz  
16QAM

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsung  
Project #: 4788404110  
Date: 2018-04-05  
Test Engineer: 51072  
Configuration: EUT / Z-Position  
Location: Chamber 2  
Mode: LTE\_16QAM Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables  
Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |              |                |               |       |
| 699.70   | 16.46               | V                  | 0.9                | -1.6                  | 14.00        | 34.8           | -20.8         |       |
| 699.70   | 3.27                | H                  | 0.9                | -1.6                  | 0.80         | 34.8           | -34.0         |       |
| Mid Ch   |                     |                    |                    |                       |              |                |               |       |
| 707.50   | 15.85               | V                  | 0.9                | -1.6                  | 13.38        | 34.8           | -21.4         |       |
| 707.50   | 3.74                | H                  | 0.9                | -1.6                  | 1.27         | 34.8           | -33.5         |       |
| High Ch  |                     |                    |                    |                       |              |                |               |       |
| 715.30   | 15.46               | V                  | 0.9                | -1.6                  | 12.98        | 34.8           | -21.8         |       |
| 715.30   | 4.09                | H                  | 0.9                | -1.6                  | 1.61         | 34.8           | -33.2         |       |

**LTE Band 13**

| LTE<br><br>Band 13<br><br>10MHz<br><br>QPSK | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-06<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>782.00</td><td>19.69</td><td>V</td><td>0.9</td><td>-1.6</td><td>17.20</td><td>34.8</td><td>-17.6</td><td></td></tr><tr><td>782.00</td><td>7.57</td><td>H</td><td>0.9</td><td>-1.6</td><td>5.08</td><td>34.8</td><td>-29.7</td><td></td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                    |                       |                       |                |                |               | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm)          | Limit<br>(dBm) | Delta<br>(dB)  | Notes         | Mid Ch |        |  |  |  |  |  |  | 782.00 | 19.69  | V     | 0.9 | -1.6 | 17.20 | 34.8  | -17.6 |       | 782.00 | 7.57   | H    | 0.9 | -1.6 | 5.08 | 34.8 | -29.7 |       |  |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------------|-----------------------|----------------|----------------|---------------|----------|---------------------|---------------------|--------------------|-----------------------|-----------------------|----------------|----------------|---------------|--------|--------|--|--|--|--|--|--|--------|--------|-------|-----|------|-------|-------|-------|-------|--------|--------|------|-----|------|------|------|-------|-------|--|
|                                             | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SG reading<br>(dBm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Ant. Pol.<br>(H/V)  | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm)          | Limit<br>(dBm) | Delta<br>(dB)  | Notes         |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             | 782.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 19.69                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | V                   | 0.9                | -1.6                  | 17.20                 | 34.8           | -17.6          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             | 782.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 7.57                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | H                   | 0.9                | -1.6                  | 5.08                  | 34.8           | -29.7          |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             | LTE<br><br>Band 13<br><br>10MHz<br><br>16QAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-06<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br/>Substitution: Dipole 3121_DB4, 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBd)</th><th>ERP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>782.00</td><td>18.71</td><td>V</td><td>0.9</td><td>-1.6</td><td>16.22</td><td>34.8</td><td>-18.6</td><td></td></tr><tr><td>782.00</td><td>6.52</td><td>H</td><td>0.9</td><td>-1.6</td><td>4.03</td><td>34.8</td><td>-30.7</td><td></td></tr></table> |                     |                    |                       |                       |                |                |               |          | f<br>MHz            | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBd) | ERP<br>(dBm)   | Limit<br>(dBm) | Delta<br>(dB) | Notes  | Mid Ch |  |  |  |  |  |  |        | 782.00 | 18.71 | V   | 0.9  | -1.6  | 16.22 | 34.8  | -18.6 |        | 782.00 | 6.52 | H   | 0.9  | -1.6 | 4.03 | 34.8  | -30.7 |  |
|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)    | Antenna Gain<br>(dBd) | ERP<br>(dBm)   | Limit<br>(dBm) | Delta<br>(dB) | Notes    |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                       |                       |                |                |               |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 782.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 18.71               | V                  | 0.9                   | -1.6                  | 16.22          | 34.8           | -18.6         |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |
|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 782.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 6.52                | H                  | 0.9                   | -1.6                  | 4.03           | 34.8           | -30.7         |          |                     |                     |                    |                       |                       |                |                |               |        |        |  |  |  |  |  |  |        |        |       |     |      |       |       |       |       |        |        |      |     |      |      |      |       |       |  |

LTE  
Band 13  
5MHz  
QPSK

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsung  
Project #: 4788404110  
Date: 2018-04-06  
Test Engineer: 51072  
Configuration: EUT / Z-Position  
Location: Chamber 2  
Mode: LTE\_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables  
Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |              |                |               |       |
| 779.50   | 18.88               | V                  | 0.9                | -1.6                  | 16.39        | 34.8           | -18.4         |       |
| 779.50   | 8.86                | H                  | 0.9                | -1.6                  | 6.36         | 34.8           | -28.4         |       |
| Mid Ch   |                     |                    |                    |                       |              |                |               |       |
| 782.00   | 19.00               | V                  | 0.9                | -1.6                  | 16.51        | 34.8           | -18.3         |       |
| 782.00   | 8.99                | H                  | 0.9                | -1.6                  | 6.50         | 34.8           | -28.3         |       |
| High Ch  |                     |                    |                    |                       |              |                |               |       |
| 784.50   | 19.32               | V                  | 0.9                | -1.6                  | 16.83        | 34.8           | -17.9         |       |
| 784.50   | 9.05                | H                  | 0.9                | -1.6                  | 6.55         | 34.8           | -28.2         |       |

LTE  
Band 13  
5MHz  
16QAM

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsung  
Project #: 4788404110  
Date: 2018-04-06  
Test Engineer: 51072  
Configuration: EUT / Z-Position  
Location: Chamber 2  
Mode: LTE\_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: VULB9163-749, and Chamber 2 SMA Cables  
Substitution: Dipole 3121\_DB4, 3m N-type Cable

| f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |              |                |               |       |
| 779.50   | 17.89               | V                  | 0.9                | -1.6                  | 15.40        | 34.8           | -19.4         |       |
| 779.50   | 7.89                | H                  | 0.9                | -1.6                  | 5.39         | 34.8           | -29.4         |       |
| Mid Ch   |                     |                    |                    |                       |              |                |               |       |
| 782.00   | 17.94               | V                  | 0.9                | -1.6                  | 15.45        | 34.8           | -19.3         |       |
| 782.00   | 7.96                | H                  | 0.9                | -1.6                  | 5.47         | 34.8           | -29.3         |       |
| High Ch  |                     |                    |                    |                       |              |                |               |       |
| 784.50   | 18.33               | V                  | 0.9                | -1.6                  | 15.84        | 34.8           | -18.9         |       |
| 784.50   | 8.06                | H                  | 0.9                | -1.6                  | 5.56         | 34.8           | -29.2         |       |

**LTE Band 66**

| LTE<br><br>Band 66<br><br>20MHz<br><br>QPSK  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-05<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1720.00</td><td>13.06</td><td>V</td><td>4.3</td><td>9.5</td><td>18.23</td><td>30.0</td><td>-11.8</td><td></td></tr><tr><td>1720.00</td><td>15.35</td><td>H</td><td>4.3</td><td>9.5</td><td>20.52</td><td>30.0</td><td>-9.5</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1745.00</td><td>12.33</td><td>V</td><td>4.4</td><td>9.6</td><td>17.55</td><td>30.0</td><td>-12.5</td><td></td></tr><tr><td>1745.00</td><td>15.06</td><td>H</td><td>4.4</td><td>9.6</td><td>20.28</td><td>30.0</td><td>-9.7</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1770.00</td><td>11.49</td><td>V</td><td>4.4</td><td>9.6</td><td>16.72</td><td>30.0</td><td>-13.3</td><td></td></tr><tr><td>1770.00</td><td>13.36</td><td>H</td><td>4.4</td><td>9.6</td><td>18.59</td><td>30.0</td><td>-11.4</td><td></td></tr></table>    |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1720.00 | 13.06 | V | 4.3 | 9.5 | 18.23 | 30.0 | -11.8 |  | 1720.00 | 15.35 | H | 4.3 | 9.5 | 20.52 | 30.0 | -9.5  |  | Mid Ch |  |  |  |  |  |  |  |  | 1745.00 | 12.33 | V | 4.4 | 9.6 | 17.55 | 30.0 | -12.5 |  | 1745.00 | 15.06 | H | 4.4 | 9.6 | 20.28 | 30.0 | -9.7  |  | High Ch |  |  |  |  |  |  |  |  | 1770.00 | 11.49 | V | 4.4 | 9.6 | 16.72 | 30.0 | -13.3 |  | 1770.00 | 13.36 | H | 4.4 | 9.6 | 18.59 | 30.0 | -11.4 |  |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|
|                                              | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1720.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 13.06               | V                  | 4.3                | 9.5                   | 18.23         | 30.0           | -11.8         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1720.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 15.35               | H                  | 4.3                | 9.5                   | 20.52         | 30.0           | -9.5          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12.33               | V                  | 4.4                | 9.6                   | 17.55         | 30.0           | -12.5         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 15.06               | H                  | 4.4                | 9.6                   | 20.28         | 30.0           | -9.7          |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1770.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 11.49               | V                  | 4.4                | 9.6                   | 16.72         | 30.0           | -13.3         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1770.00                                      | 13.36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | H                   | 4.4                | 9.6                | 18.59                 | 30.0          | -11.4          |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| LTE<br><br>Band 66<br><br>20MHz<br><br>16QAM | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-05<br/>Test Engineer: 51072<br/>Configuration: EUT / X-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth</div> <div>Test Equipment:<br/>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables<br/>Substitution: Horn 3115[00161451], 3m N-type Cable</div> <table><tr><th>f<br/>MHz</th><th>SG reading<br/>(dBm)</th><th>Ant. Pol.<br/>(H/V)</th><th>Cable Loss<br/>(dB)</th><th>Antenna Gain<br/>(dBi)</th><th>EIRP<br/>(dBm)</th><th>Limit<br/>(dBm)</th><th>Delta<br/>(dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1720.00</td><td>12.09</td><td>V</td><td>4.3</td><td>9.5</td><td>17.26</td><td>30.0</td><td>-12.7</td><td></td></tr><tr><td>1720.00</td><td>14.39</td><td>H</td><td>4.3</td><td>9.5</td><td>19.56</td><td>30.0</td><td>-10.4</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1745.00</td><td>11.37</td><td>V</td><td>4.4</td><td>9.6</td><td>16.59</td><td>30.0</td><td>-13.4</td><td></td></tr><tr><td>1745.00</td><td>14.07</td><td>H</td><td>4.4</td><td>9.6</td><td>19.29</td><td>30.0</td><td>-10.7</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1770.00</td><td>10.49</td><td>V</td><td>4.4</td><td>9.6</td><td>15.72</td><td>30.0</td><td>-14.3</td><td></td></tr><tr><td>1770.00</td><td>12.36</td><td>H</td><td>4.4</td><td>9.6</td><td>17.59</td><td>30.0</td><td>-12.4</td><td></td></tr></table> |                     |                    |                    |                       |               |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1720.00 | 12.09 | V | 4.3 | 9.5 | 17.26 | 30.0 | -12.7 |  | 1720.00 | 14.39 | H | 4.3 | 9.5 | 19.56 | 30.0 | -10.4 |  | Mid Ch |  |  |  |  |  |  |  |  | 1745.00 | 11.37 | V | 4.4 | 9.6 | 16.59 | 30.0 | -13.4 |  | 1745.00 | 14.07 | H | 4.4 | 9.6 | 19.29 | 30.0 | -10.7 |  | High Ch |  |  |  |  |  |  |  |  | 1770.00 | 10.49 | V | 4.4 | 9.6 | 15.72 | 30.0 | -14.3 |  | 1770.00 | 12.36 | H | 4.4 | 9.6 | 17.59 | 30.0 | -12.4 |  |
|                                              | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1720.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12.09               | V                  | 4.3                | 9.5                   | 17.26         | 30.0           | -12.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1720.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 14.39               | H                  | 4.3                | 9.5                   | 19.56         | 30.0           | -10.4         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 11.37               | V                  | 4.4                | 9.6                   | 16.59         | 30.0           | -13.4         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 14.07               | H                  | 4.4                | 9.6                   | 19.29         | 30.0           | -10.7         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                    |                    |                       |               |                |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                              | 1770.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 10.49               | V                  | 4.4                | 9.6                   | 15.72         | 30.0           | -14.3         |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1770.00                                      | 12.36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | H                   | 4.4                | 9.6                | 17.59                 | 30.0          | -12.4          |               |       |          |                     |                    |                    |                       |               |                |               |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |

LTE  
Band 66  
15MHz  
QPSK

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsnug  
Project #: 4788404110  
Date: 2018-04-04  
Test Engineer: 51072  
Configuration: EUT / X-Position  
Location: Chamber 2  
Mode: LTE\_QPSK Band 66 Fundamentals, 15MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables  
Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1717.50 | 12.89            | V               | 4.3             | 9.5                | 18.06      | 30.0        | -11.9      |       |
| 1717.50 | 15.63            | H               | 4.3             | 9.5                | 20.79      | 30.0        | -9.2       |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 11.96            | V               | 4.4             | 9.6                | 17.18      | 30.0        | -12.8      |       |
| 1745.00 | 14.75            | H               | 4.4             | 9.6                | 19.97      | 30.0        | -10.0      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1772.50 | 11.55            | V               | 4.4             | 9.6                | 16.79      | 30.0        | -13.2      |       |
| 1772.50 | 13.63            | H               | 4.4             | 9.6                | 18.87      | 30.0        | -11.1      |       |

LTE  
Band 66  
15MHz  
16QAM

UL Verification Services, Inc.  
High Frequency Substitution Measurement

Company: Samsnug  
Project #: 4788404110  
Date: 2018-04-04  
Test Engineer: 51072  
Configuration: EUT / X-Position  
Location: Chamber 2  
Mode: LTE\_16QAM Band 66 Fundamentals, 15MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables  
Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1717.50 | 11.29            | V               | 4.3             | 9.5                | 16.46      | 30.0        | -13.5      |       |
| 1717.50 | 14.61            | H               | 4.3             | 9.5                | 19.77      | 30.0        | -10.2      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 10.96            | V               | 4.4             | 9.6                | 16.18      | 30.0        | -13.8      |       |
| 1745.00 | 13.74            | H               | 4.4             | 9.6                | 18.96      | 30.0        | -11.0      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1772.50 | 10.51            | V               | 4.4             | 9.6                | 15.75      | 30.0        | -14.3      |       |
| 1772.50 | 12.63            | H               | 4.4             | 9.6                | 17.87      | 30.0        | -12.1      |       |

LTE

Band 66

10MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-04

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1715.00 | 12.90            | V               | 4.3             | 9.5                | 18.06      | 30.0        | -11.9      |       |
| 1715.00 | 15.62            | H               | 4.3             | 9.5                | 20.78      | 30.0        | -9.2       |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 11.82            | V               | 4.4             | 9.6                | 17.04      | 30.0        | -13.0      |       |
| 1745.00 | 14.61            | H               | 4.4             | 9.6                | 19.83      | 30.0        | -10.2      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1775.00 | 11.71            | V               | 4.4             | 9.6                | 16.95      | 30.0        | -13.0      |       |
| 1775.00 | 13.25            | H               | 4.4             | 9.6                | 18.49      | 30.0        | -11.5      |       |

LTE

Band 66

10MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-04

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1715.00 | 11.90            | V               | 4.3             | 9.5                | 17.06      | 30.0        | -12.9      |       |
| 1715.00 | 14.63            | H               | 4.3             | 9.5                | 19.79      | 30.0        | -10.2      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 10.83            | V               | 4.4             | 9.6                | 16.05      | 30.0        | -14.0      |       |
| 1745.00 | 13.62            | H               | 4.4             | 9.6                | 18.84      | 30.0        | -11.2      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1775.00 | 10.74            | V               | 4.4             | 9.6                | 15.98      | 30.0        | -14.0      |       |
| 1775.00 | 12.28            | H               | 4.4             | 9.6                | 17.52      | 30.0        | -12.5      |       |

LTE

Band 66

5MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-04

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 66 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1712.50 | 12.27            | V               | 4.3             | 9.5                | 17.43      | 30.0        | -12.6      |       |
| 1712.50 | 15.26            | H               | 4.3             | 9.5                | 20.41      | 30.0        | -9.6       |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 11.50            | V               | 4.4             | 9.6                | 16.72      | 30.0        | -13.3      |       |
| 1745.00 | 15.04            | H               | 4.4             | 9.6                | 20.26      | 30.0        | -9.7       |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1777.50 | 11.38            | V               | 4.4             | 9.6                | 16.61      | 30.0        | -13.4      |       |
| 1777.50 | 12.74            | H               | 4.4             | 9.6                | 17.98      | 30.0        | -12.0      |       |

LTE

Band 66

5MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-04

Test Engineer: 51072

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 66 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1712.50 | 11.24            | V               | 4.3             | 9.5                | 16.40      | 30.0        | -13.6      |       |
| 1712.50 | 14.22            | H               | 4.3             | 9.5                | 19.37      | 30.0        | -10.6      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 10.44            | V               | 4.4             | 9.6                | 15.66      | 30.0        | -14.3      |       |
| 1745.00 | 13.97            | H               | 4.4             | 9.6                | 19.19      | 30.0        | -10.8      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1777.50 | 10.35            | V               | 4.4             | 9.6                | 15.58      | 30.0        | -14.4      |       |
| 1777.50 | 11.61            | H               | 4.4             | 9.6                | 16.85      | 30.0        | -13.2      |       |

| LTE<br><br>Band 66<br><br>3MHz<br><br>QPSK  | <div><div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div></div><div><div>Company: Samsnug</div><div>Project #: 4788404110</div><div>Date: 2018-04-04</div><div>Test Engineer: 51072</div><div>Configuration: EUT / X-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_QPSK Band 66 Fundamentals, 3MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables</div><div>Substitution: Horn 3115[00161451], 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBi)</th><th>EIRP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1711.50</td><td>12.33</td><td>V</td><td>4.3</td><td>9.5</td><td>17.48</td><td>30.0</td><td>-12.5</td><td></td></tr><tr><td>1711.50</td><td>15.20</td><td>H</td><td>4.3</td><td>9.5</td><td>20.35</td><td>30.0</td><td>-9.6</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1745.00</td><td>11.35</td><td>V</td><td>4.4</td><td>9.6</td><td>16.57</td><td>30.0</td><td>-13.4</td><td></td></tr><tr><td>1745.00</td><td>14.44</td><td>H</td><td>4.4</td><td>9.6</td><td>19.66</td><td>30.0</td><td>-10.3</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1778.50</td><td>10.12</td><td>V</td><td>4.4</td><td>9.6</td><td>15.36</td><td>30.0</td><td>-14.6</td><td></td></tr><tr><td>1778.50</td><td>12.86</td><td>H</td><td>4.4</td><td>9.6</td><td>18.09</td><td>30.0</td><td>-11.9</td><td></td></tr></table></div>  |                  |                 |                 |                    |            |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1711.50 | 12.33 | V | 4.3 | 9.5 | 17.48 | 30.0 | -12.5 |  | 1711.50 | 15.20 | H | 4.3 | 9.5 | 20.35 | 30.0 | -9.6  |  | Mid Ch |  |  |  |  |  |  |  |  | 1745.00 | 11.35 | V | 4.4 | 9.6 | 16.57 | 30.0 | -13.4 |  | 1745.00 | 14.44 | H | 4.4 | 9.6 | 19.66 | 30.0 | -10.3 |  | High Ch |  |  |  |  |  |  |  |  | 1778.50 | 10.12 | V | 4.4 | 9.6 | 15.36 | 30.0 | -14.6 |  | 1778.50 | 12.86 | H | 4.4 | 9.6 | 18.09 | 30.0 | -11.9 |  |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|-------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|--------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|--|--|--|--|--|--|--|--|---------|-------|---|-----|-----|-------|------|-------|--|---------|-------|---|-----|-----|-------|------|-------|--|
|                                             | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1711.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 12.33            | V               | 4.3             | 9.5                | 17.48      | 30.0        | -12.5      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1711.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 15.20            | H               | 4.3             | 9.5                | 20.35      | 30.0        | -9.6       |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11.35            | V               | 4.4             | 9.6                | 16.57      | 30.0        | -13.4      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 14.44            | H               | 4.4             | 9.6                | 19.66      | 30.0        | -10.3      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1778.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.12            | V               | 4.4             | 9.6                | 15.36      | 30.0        | -14.6      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1778.50                                     | 12.86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | H                | 4.4             | 9.6             | 18.09              | 30.0       | -11.9       |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| LTE<br><br>Band 66<br><br>3MHz<br><br>16QAM | <div><div><div>UL Verification Services, Inc.</div><div>High Frequency Substitution Measurement</div></div><div><div>Company: Samsnug</div><div>Project #: 4788404110</div><div>Date: 2018-04-04</div><div>Test Engineer: 51072</div><div>Configuration: EUT / X-Position</div><div>Location: Chamber 2</div><div>Mode: LTE_16QAM Band 66 Fundamentals, 3MHz Bandwidth</div></div><div><div>Test Equipment:</div><div>Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables</div><div>Substitution: Horn 3115[00161451], 3m N-type Cable</div></div><table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBi)</th><th>EIRP (dBm)</th><th>Limit (dBm)</th><th>Delta (dB)</th><th>Notes</th></tr><tr><td colspan="9">Low Ch</td></tr><tr><td>1711.50</td><td>11.26</td><td>V</td><td>4.3</td><td>9.5</td><td>16.41</td><td>30.0</td><td>-13.6</td><td></td></tr><tr><td>1711.50</td><td>14.13</td><td>H</td><td>4.3</td><td>9.5</td><td>19.28</td><td>30.0</td><td>-10.7</td><td></td></tr><tr><td colspan="9">Mid Ch</td></tr><tr><td>1745.00</td><td>10.25</td><td>V</td><td>4.4</td><td>9.6</td><td>15.47</td><td>30.0</td><td>-14.5</td><td></td></tr><tr><td>1745.00</td><td>13.31</td><td>H</td><td>4.4</td><td>9.6</td><td>18.53</td><td>30.0</td><td>-11.5</td><td></td></tr><tr><td colspan="9">High Ch</td></tr><tr><td>1778.50</td><td>9.07</td><td>V</td><td>4.4</td><td>9.6</td><td>14.31</td><td>30.0</td><td>-15.7</td><td></td></tr><tr><td>1778.50</td><td>11.77</td><td>H</td><td>4.4</td><td>9.6</td><td>17.00</td><td>30.0</td><td>-13.0</td><td></td></tr></table></div> |                  |                 |                 |                    |            |             |            |       | f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 1711.50 | 11.26 | V | 4.3 | 9.5 | 16.41 | 30.0 | -13.6 |  | 1711.50 | 14.13 | H | 4.3 | 9.5 | 19.28 | 30.0 | -10.7 |  | Mid Ch |  |  |  |  |  |  |  |  | 1745.00 | 10.25 | V | 4.4 | 9.6 | 15.47 | 30.0 | -14.5 |  | 1745.00 | 13.31 | H | 4.4 | 9.6 | 18.53 | 30.0 | -11.5 |  | High Ch |  |  |  |  |  |  |  |  | 1778.50 | 9.07  | V | 4.4 | 9.6 | 14.31 | 30.0 | -15.7 |  | 1778.50 | 11.77 | H | 4.4 | 9.6 | 17.00 | 30.0 | -13.0 |  |
|                                             | f MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1711.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11.26            | V               | 4.3             | 9.5                | 16.41      | 30.0        | -13.6      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1711.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 14.13            | H               | 4.3             | 9.5                | 19.28      | 30.0        | -10.7      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10.25            | V               | 4.4             | 9.6                | 15.47      | 30.0        | -14.5      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1745.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 13.31            | H               | 4.4             | 9.6                | 18.53      | 30.0        | -11.5      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                 |                 |                    |            |             |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
|                                             | 1778.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9.07             | V               | 4.4             | 9.6                | 14.31      | 30.0        | -15.7      |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |
| 1778.50                                     | 11.77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | H                | 4.4             | 9.6             | 17.00              | 30.0       | -13.0       |            |       |       |                  |                 |                 |                    |            |             |            |       |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |        |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |         |  |  |  |  |  |  |  |  |         |       |   |     |     |       |      |       |  |         |       |   |     |     |       |      |       |  |

LTE

Band 66

1.4MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-04

Test Engineer: 47989

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_QPSK Band 66 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1710.70 | 9.56             | V               | 4.3             | 9.5                | 14.70      | 30.0        | -15.3      |       |
| 1710.70 | 12.91            | H               | 4.3             | 9.5                | 18.05      | 30.0        | -11.9      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 8.87             | V               | 4.4             | 9.6                | 14.10      | 30.0        | -15.9      |       |
| 1745.00 | 12.51            | H               | 4.4             | 9.6                | 17.73      | 30.0        | -12.3      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1779.30 | 9.62             | V               | 4.4             | 9.6                | 14.86      | 30.0        | -15.1      |       |
| 1779.30 | 11.08            | H               | 4.4             | 9.6                | 16.32      | 30.0        | -13.7      |       |

LTE

Band 66

1.4MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company: Samsung

Project #: 4788404110

Date: 2018-04-04

Test Engineer: 47989

Configuration: EUT / X-Position

Location: Chamber 2

Mode: LTE\_16QAM Band 66 Fundamentals, 1.4MHz Bandwidth

Test Equipment:

Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

| f MHz   | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---------|------------------|-----------------|-----------------|--------------------|------------|-------------|------------|-------|
| Low Ch  |                  |                 |                 |                    |            |             |            |       |
| 1710.70 | 8.67             | V               | 4.3             | 9.5                | 13.81      | 30.0        | -16.2      |       |
| 1710.70 | 12.03            | H               | 4.3             | 9.5                | 17.17      | 30.0        | -12.8      |       |
| Mid Ch  |                  |                 |                 |                    |            |             |            |       |
| 1745.00 | 8.01             | V               | 4.4             | 9.6                | 13.24      | 30.0        | -16.8      |       |
| 1745.00 | 11.42            | H               | 4.4             | 9.6                | 16.64      | 30.0        | -13.4      |       |
| High Ch |                  |                 |                 |                    |            |             |            |       |
| 1779.30 | 8.43             | V               | 4.4             | 9.6                | 13.67      | 30.0        | -16.3      |       |
| 1779.30 | 9.95             | H               | 4.4             | 9.6                | 15.19      | 30.0        | -14.8      |       |

## 10.2. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27. 53

### LIMIT

Part 22.917(a) & Part 24.238(a) & Part 27.53(h) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

Part 27.53(f) - For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Part 27.53(c) (2) - On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB.

Part 27.53 (h) AWS emission limits—the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

### TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

- a) Set the RBW = 100 KHz for emission below 1GHz and 1MHz for emissions above 1GHz
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = auto couple;
- e) Detector = peak(GSM, WCDMA), rms(LTE);
- f) Ensure that the number of measurement points  $\geq$  span/RBW;
- g) Trace mode = max hold(GSM, WCDMA), average (LTE);

NOTE : Radiated spurious emissions were investigated 30MHz – 1GHz and above 1GHz. There were no emissions found on 30MHz – 1GHz.

### RESULTS

## 10.2.1. SPURIOUS RADIATION PLOTS

### GSM 850

|                        | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                    |                     |                    |                 |                      |                |               |                |               |       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------------|----------------|---------------|----------------|---------------|-------|
|                        | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-16<br>Test Engineer: 51072<br>Configuration: EUT / AC Adapter / Earphone , Z-Position<br>Location: Chamber 2<br>Mode: GPRS 850 MHz Harmonics |                     |                    |                 |                      |                |               |                |               |       |
|                        | f<br>MHz                                                                                                                                                                                                | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamplifier<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| GSM<br>GSM850<br>GPRS  | Low Ch, 824.2MHz                                                                                                                                                                                        |                     |                    |                 |                      |                |               |                |               |       |
|                        | 1648.40                                                                                                                                                                                                 | -10.4               | V                  | 3.0             | 38.2                 | 1.0            | -47.6         | -13.0          | -34.6         |       |
|                        | 2472.60                                                                                                                                                                                                 | -9.0                | V                  | 3.0             | 38.8                 | 1.0            | -46.8         | -13.0          | -33.8         |       |
|                        | 3296.80                                                                                                                                                                                                 | -14.2               | V                  | 3.0             | 39.4                 | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                        | 1648.40                                                                                                                                                                                                 | -7.8                | H                  | 3.0             | 38.2                 | 1.0            | -45.0         | -13.0          | -32.0         |       |
|                        | 2472.60                                                                                                                                                                                                 | -8.3                | H                  | 3.0             | 38.8                 | 1.0            | -46.1         | -13.0          | -33.1         |       |
|                        | 3296.80                                                                                                                                                                                                 | -14.3               | H                  | 3.0             | 39.4                 | 1.0            | -52.8         | -13.0          | -39.8         |       |
|                        | Mid Ch, 836.6MHz                                                                                                                                                                                        |                     |                    |                 |                      |                |               |                |               |       |
|                        | 1673.20                                                                                                                                                                                                 | -6.6                | V                  | 3.0             | 38.2                 | 1.0            | -43.9         | -13.0          | -30.9         |       |
|                        | 2509.80                                                                                                                                                                                                 | -8.5                | V                  | 3.0             | 38.8                 | 1.0            | -46.4         | -13.0          | -33.4         |       |
|                        | 3346.40                                                                                                                                                                                                 | -13.7               | V                  | 3.0             | 39.5                 | 1.0            | -52.1         | -13.0          | -39.1         |       |
|                        | 1673.20                                                                                                                                                                                                 | -7.7                | H                  | 3.0             | 38.2                 | 1.0            | -45.0         | -13.0          | -32.0         |       |
|                        | 2509.80                                                                                                                                                                                                 | -9.8                | H                  | 3.0             | 38.8                 | 1.0            | -47.7         | -13.0          | -34.7         |       |
|                        | 3346.40                                                                                                                                                                                                 | -13.1               | H                  | 3.0             | 39.5                 | 1.0            | -51.5         | -13.0          | -38.5         |       |
|                        | High Ch, 848.8MHz                                                                                                                                                                                       |                     |                    |                 |                      |                |               |                |               |       |
|                        | 1697.60                                                                                                                                                                                                 | -8.1                | V                  | 3.0             | 38.2                 | 1.0            | -45.3         | -13.0          | -32.3         |       |
|                        | 2546.40                                                                                                                                                                                                 | -10.8               | V                  | 3.0             | 38.9                 | 1.0            | -48.7         | -13.0          | -35.7         |       |
|                        | 3395.20                                                                                                                                                                                                 | -13.8               | V                  | 3.0             | 39.5                 | 1.0            | -52.3         | -13.0          | -39.3         |       |
|                        | 1697.60                                                                                                                                                                                                 | -10.4               | H                  | 3.0             | 38.2                 | 1.0            | -47.6         | -13.0          | -34.6         |       |
|                        | 2546.40                                                                                                                                                                                                 | -10.8               | H                  | 3.0             | 38.9                 | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                        | 3395.20                                                                                                                                                                                                 | -13.5               | H                  | 3.0             | 39.5                 | 1.0            | -52.0         | -13.0          | -39.0         |       |
|                        |                                                                                                                                                                                                         |                     |                    |                 |                      |                |               |                |               |       |
|                        |                                                                                                                                                                                                         |                     |                    |                 |                      |                |               |                |               |       |
|                        | f<br>MHz                                                                                                                                                                                                | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamplifier<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| GSM<br>GSM850<br>EGPRS | Low Ch, 824.2MHz                                                                                                                                                                                        |                     |                    |                 |                      |                |               |                |               |       |
|                        | 1648.40                                                                                                                                                                                                 | -13.6               | V                  | 3.0             | 38.2                 | 1.0            | -50.8         | -13.0          | -37.8         |       |
|                        | 2472.60                                                                                                                                                                                                 | -14.0               | V                  | 3.0             | 38.8                 | 1.0            | -51.8         | -13.0          | -38.8         |       |
|                        | 3296.80                                                                                                                                                                                                 | -14.2               | V                  | 3.0             | 39.4                 | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                        | 1648.40                                                                                                                                                                                                 | -11.7               | H                  | 3.0             | 38.2                 | 1.0            | -49.0         | -13.0          | -36.0         |       |
|                        | 2472.60                                                                                                                                                                                                 | -12.9               | H                  | 3.0             | 38.8                 | 1.0            | -50.7         | -13.0          | -37.7         |       |
|                        | 3296.80                                                                                                                                                                                                 | -14.5               | H                  | 3.0             | 39.4                 | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                        | Mid Ch, 836.6MHz                                                                                                                                                                                        |                     |                    |                 |                      |                |               |                |               |       |
|                        | 1673.20                                                                                                                                                                                                 | -9.2                | V                  | 3.0             | 38.2                 | 1.0            | -46.4         | -13.0          | -33.4         |       |
|                        | 2509.80                                                                                                                                                                                                 | -12.4               | V                  | 3.0             | 38.8                 | 1.0            | -50.2         | -13.0          | -37.2         |       |
|                        | 3346.40                                                                                                                                                                                                 | -14.2               | V                  | 3.0             | 39.5                 | 1.0            | -52.7         | -13.0          | -39.7         |       |
|                        | 1673.20                                                                                                                                                                                                 | -10.8               | H                  | 3.0             | 38.2                 | 1.0            | -48.1         | -13.0          | -35.1         |       |
|                        | 2509.80                                                                                                                                                                                                 | -13.7               | H                  | 3.0             | 38.8                 | 1.0            | -51.6         | -13.0          | -38.6         |       |
|                        | 3346.40                                                                                                                                                                                                 | -14.2               | H                  | 3.0             | 39.5                 | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                        | High Ch, 848.8MHz                                                                                                                                                                                       |                     |                    |                 |                      |                |               |                |               |       |
|                        | 1697.60                                                                                                                                                                                                 | -12.2               | V                  | 3.0             | 38.2                 | 1.0            | -49.4         | -13.0          | -36.4         |       |
|                        | 2546.40                                                                                                                                                                                                 | -13.2               | V                  | 3.0             | 38.9                 | 1.0            | -51.1         | -13.0          | -38.1         |       |
|                        | 3395.20                                                                                                                                                                                                 | -13.6               | V                  | 3.0             | 39.5                 | 1.0            | -52.1         | -13.0          | -39.1         |       |
|                        | 1697.60                                                                                                                                                                                                 | -12.6               | H                  | 3.0             | 38.2                 | 1.0            | -49.8         | -13.0          | -36.8         |       |
|                        | 2546.40                                                                                                                                                                                                 | -13.8               | H                  | 3.0             | 38.9                 | 1.0            | -51.6         | -13.0          | -38.6         |       |
|                        | 3395.20                                                                                                                                                                                                 | -14.5               | H                  | 3.0             | 39.5                 | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                        |                                                                                                                                                                                                         |                     |                    |                 |                      |                |               |                |               |       |
|                        |                                                                                                                                                                                                         |                     |                    |                 |                      |                |               |                |               |       |

**GSM 1900**

|                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|-----------------------------|--------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| GSM<br><br>GSM1900<br>GPRS  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                             | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                             | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                             | Date: 2018-04-17                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                             | Test Engineer: 51072                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                             | Configuration: EUT / AC Adapter / Earphone , X-Position                              |                     |                    |                 |                |                |               |                |               |       |
|                             | Location: Chamber 2                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                             | Mode: GPRS 1900 MHz Harmonics                                                        |                     |                    |                 |                |                |               |                |               |       |
|                             | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                             | Low Ch, 1850.2MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                             | 3700.40                                                                              | -11.9               | V                  | 3.0             | 39.7           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                             | 5550.60                                                                              | -9.5                | V                  | 3.0             | 39.9           | 1.0            | -48.4         | -13.0          | -35.4         |       |
|                             | 7400.80                                                                              | -8.3                | V                  | 3.0             | 39.4           | 1.0            | -46.7         | -13.0          | -33.7         |       |
|                             | 3700.40                                                                              | -10.1               | H                  | 3.0             | 39.7           | 1.0            | -48.7         | -13.0          | -35.7         |       |
|                             | 5550.60                                                                              | -10.1               | H                  | 3.0             | 39.9           | 1.0            | -49.1         | -13.0          | -36.1         |       |
|                             | 7400.80                                                                              | -8.2                | H                  | 3.0             | 39.4           | 1.0            | -46.7         | -13.0          | -33.7         |       |
|                             | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                             | 3760.00                                                                              | -10.2               | V                  | 3.0             | 39.7           | 1.0            | -48.9         | -13.0          | -35.9         |       |
|                             | 5640.00                                                                              | -9.9                | V                  | 3.0             | 40.0           | 1.0            | -48.9         | -13.0          | -35.9         |       |
|                             | 7520.00                                                                              | -7.2                | V                  | 3.0             | 39.4           | 1.0            | -45.6         | -13.0          | -32.6         |       |
|                             | 3760.00                                                                              | -10.1               | H                  | 3.0             | 39.7           | 1.0            | -48.8         | -13.0          | -35.8         |       |
|                             | 5640.00                                                                              | -9.5                | H                  | 3.0             | 40.0           | 1.0            | -48.4         | -13.0          | -35.4         |       |
|                             | 7520.00                                                                              | -7.6                | H                  | 3.0             | 39.4           | 1.0            | -46.0         | -13.0          | -33.0         |       |
|                             | High Ch, 1909.8MHz                                                                   |                     |                    |                 |                |                |               |                |               |       |
|                             | 3819.60                                                                              | -11.5               | V                  | 3.0             | 39.7           | 1.0            | -50.2         | -13.0          | -37.2         |       |
|                             | 5729.40                                                                              | -9.4                | V                  | 3.0             | 40.0           | 1.0            | -48.4         | -13.0          | -35.4         |       |
| 7639.20                     | -7.8                                                                                 | V                   | 3.0                | 39.3            | 1.0            | -46.1          | -13.0         | -33.1          |               |       |
| 3819.60                     | -11.4                                                                                | H                   | 3.0                | 39.7            | 1.0            | -50.1          | -13.0         | -37.1          |               |       |
| 5729.40                     | -9.7                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -48.7          | -13.0         | -35.7          |               |       |
| 7639.20                     | -7.5                                                                                 | H                   | 3.0                | 39.3            | 1.0            | -45.9          | -13.0         | -32.9          |               |       |
|                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| GSM<br><br>GSM1900<br>EGPRS | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                             | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                             | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                             | Date: 2018-04-17                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                             | Test Engineer: 51072                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                             | Configuration: EUT / AC Adapter / Earphone , X-Position                              |                     |                    |                 |                |                |               |                |               |       |
|                             | Location: Chamber 2                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                             | Mode: EGPRS 1900 MHz Harmonics                                                       |                     |                    |                 |                |                |               |                |               |       |
|                             | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                             | Low Ch, 1850.2MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                             | 3700.40                                                                              | -13.2               | V                  | 3.0             | 39.7           | 1.0            | -51.8         | -13.0          | -38.8         |       |
|                             | 5550.60                                                                              | -10.4               | V                  | 3.0             | 39.9           | 1.0            | -49.3         | -13.0          | -36.3         |       |
|                             | 7400.80                                                                              | -8.4                | V                  | 3.0             | 39.4           | 1.0            | -46.9         | -13.0          | -33.9         |       |
|                             | 3700.40                                                                              | -10.9               | H                  | 3.0             | 39.7           | 1.0            | -49.6         | -13.0          | -36.6         |       |
|                             | 5550.60                                                                              | -10.8               | H                  | 3.0             | 39.9           | 1.0            | -49.8         | -13.0          | -36.8         |       |
|                             | 7400.80                                                                              | -8.3                | H                  | 3.0             | 39.4           | 1.0            | -46.8         | -13.0          | -33.8         |       |
|                             | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                             | 3760.00                                                                              | -11.7               | V                  | 3.0             | 39.7           | 1.0            | -50.4         | -13.0          | -37.4         |       |
|                             | 5640.00                                                                              | -10.2               | V                  | 3.0             | 40.0           | 1.0            | -49.1         | -13.0          | -36.1         |       |
|                             | 7520.00                                                                              | -7.8                | V                  | 3.0             | 39.4           | 1.0            | -46.2         | -13.0          | -33.2         |       |
|                             | 3760.00                                                                              | -10.7               | H                  | 3.0             | 39.7           | 1.0            | -49.4         | -13.0          | -36.4         |       |
|                             | 5640.00                                                                              | -10.1               | H                  | 3.0             | 40.0           | 1.0            | -49.0         | -13.0          | -36.0         |       |
|                             | 7520.00                                                                              | -7.7                | H                  | 3.0             | 39.4           | 1.0            | -46.1         | -13.0          | -33.1         |       |
|                             | High Ch, 1909.8MHz                                                                   |                     |                    |                 |                |                |               |                |               |       |
|                             | 3819.60                                                                              | -11.9               | V                  | 3.0             | 39.7           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                             | 5729.40                                                                              | -10.4               | V                  | 3.0             | 40.0           | 1.0            | -49.4         | -13.0          | -36.4         |       |
| 7639.20                     | -7.9                                                                                 | V                   | 3.0                | 39.3            | 1.0            | -46.2          | -13.0         | -33.2          |               |       |
| 3819.60                     | -11.9                                                                                | H                   | 3.0                | 39.7            | 1.0            | -50.6          | -13.0         | -37.6          |               |       |
| 5729.40                     | -10.6                                                                                | H                   | 3.0                | 40.0            | 1.0            | -49.6          | -13.0         | -36.6          |               |       |
| 7639.20                     | -7.6                                                                                 | H                   | 3.0                | 39.3            | 1.0            | -46.0          | -13.0         | -33.0          |               |       |
|                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |

**WCDMA Band 5**

|                          |                                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| WCDMA<br>Band 5<br>REL99 | <p align="center"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p>Company: Samsung<br/>Project #: 4788404110<br/>Date: 2018-04-08<br/>Test Engineer: 51072<br/>Configuration: EUT / Z-Position<br/>Location: Chamber 2<br/>Mode: Rel99 Band 5 Harmonics</p> |                     |                    |                 |                |                |               |                |               |       |
|                          | f<br>MHz                                                                                                                                                                                                                                                                                                               | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                          | Low Ch, 826.4MHz                                                                                                                                                                                                                                                                                                       |                     |                    |                 |                |                |               |                |               |       |
|                          | 1652.80                                                                                                                                                                                                                                                                                                                | -19.3               | V                  | 3.0             | 38.2           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|                          | 2479.20                                                                                                                                                                                                                                                                                                                | -15.0               | V                  | 3.0             | 38.8           | 1.0            | -52.8         | -13.0          | -39.8         |       |
|                          | 3305.60                                                                                                                                                                                                                                                                                                                | -12.7               | V                  | 3.0             | 39.4           | 1.0            | -51.2         | -13.0          | -38.2         |       |
|                          | 4132.00                                                                                                                                                                                                                                                                                                                | -11.8               | V                  | 3.0             | 39.8           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                          | 4958.40                                                                                                                                                                                                                                                                                                                | -10.7               | V                  | 3.0             | 39.8           | 1.0            | -49.4         | -13.0          | -36.4         |       |
|                          | 1652.80                                                                                                                                                                                                                                                                                                                | -17.3               | H                  | 3.0             | 38.2           | 1.0            | -54.5         | -13.0          | -41.5         |       |
|                          | 2479.20                                                                                                                                                                                                                                                                                                                | -15.1               | H                  | 3.0             | 38.8           | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                          | 3305.60                                                                                                                                                                                                                                                                                                                | -13.1               | H                  | 3.0             | 39.4           | 1.0            | -51.5         | -13.0          | -38.5         |       |
|                          | 4132.00                                                                                                                                                                                                                                                                                                                | -11.7               | H                  | 3.0             | 39.8           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                          | 4958.40                                                                                                                                                                                                                                                                                                                | -10.5               | H                  | 3.0             | 39.8           | 1.0            | -49.2         | -13.0          | -36.2         |       |
|                          | Mid Ch, 836.6MHz                                                                                                                                                                                                                                                                                                       |                     |                    |                 |                |                |               |                |               |       |
|                          | 1673.20                                                                                                                                                                                                                                                                                                                | -19.8               | V                  | 3.0             | 38.2           | 1.0            | -57.0         | -13.0          | -44.0         |       |
|                          | 2509.80                                                                                                                                                                                                                                                                                                                | -15.7               | V                  | 3.0             | 38.8           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                          | 3346.40                                                                                                                                                                                                                                                                                                                | -12.8               | V                  | 3.0             | 39.5           | 1.0            | -51.3         | -13.0          | -38.3         |       |
|                          | 4183.00                                                                                                                                                                                                                                                                                                                | -12.6               | V                  | 3.0             | 39.8           | 1.0            | -51.4         | -13.0          | -38.4         |       |
|                          | 5019.60                                                                                                                                                                                                                                                                                                                | -10.8               | V                  | 3.0             | 39.8           | 1.0            | -49.5         | -13.0          | -36.5         |       |
|                          | 1673.20                                                                                                                                                                                                                                                                                                                | -16.4               | H                  | 3.0             | 38.2           | 1.0            | -53.6         | -13.0          | -40.6         |       |
|                          | 2509.80                                                                                                                                                                                                                                                                                                                | -15.8               | H                  | 3.0             | 38.8           | 1.0            | -53.6         | -13.0          | -40.6         |       |
|                          | 3346.40                                                                                                                                                                                                                                                                                                                | -12.6               | H                  | 3.0             | 39.5           | 1.0            | -51.1         | -13.0          | -38.1         |       |
|                          | 4183.00                                                                                                                                                                                                                                                                                                                | -10.8               | H                  | 3.0             | 39.8           | 1.0            | -49.6         | -13.0          | -36.6         |       |
|                          | 5019.60                                                                                                                                                                                                                                                                                                                | -7.8                | H                  | 3.0             | 39.8           | 1.0            | -46.5         | -13.0          | -33.5         |       |
|                          | High Ch, 846.6MHz                                                                                                                                                                                                                                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                          | 1693.20                                                                                                                                                                                                                                                                                                                | -16.6               | V                  | 3.0             | 38.2           | 1.0            | -53.9         | -13.0          | -40.9         |       |
|                          | 2539.80                                                                                                                                                                                                                                                                                                                | -13.8               | V                  | 3.0             | 38.9           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                          | 3386.40                                                                                                                                                                                                                                                                                                                | -13.2               | V                  | 3.0             | 39.5           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                          | 4233.00                                                                                                                                                                                                                                                                                                                | -10.9               | V                  | 3.0             | 39.8           | 1.0            | -49.7         | -13.0          | -36.7         |       |
|                          | 5079.60                                                                                                                                                                                                                                                                                                                | -10.3               | V                  | 3.0             | 39.8           | 1.0            | -49.1         | -13.0          | -36.1         |       |
|                          | 1693.20                                                                                                                                                                                                                                                                                                                | -17.5               | H                  | 3.0             | 38.2           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                          | 2539.80                                                                                                                                                                                                                                                                                                                | -15.0               | H                  | 3.0             | 38.9           | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                          | 3386.40                                                                                                                                                                                                                                                                                                                | -13.3               | H                  | 3.0             | 39.5           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                          | 4233.00                                                                                                                                                                                                                                                                                                                | -11.6               | H                  | 3.0             | 39.8           | 1.0            | -50.4         | -13.0          | -37.4         |       |
|                          | 5079.60                                                                                                                                                                                                                                                                                                                | -9.4                | H                  | 3.0             | 39.8           | 1.0            | -48.2         | -13.0          | -35.2         |       |

| UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                        |                 |                      |                |               |                |               |       |
|--------------------------------------------------------------------------------------|---------------------|------------------------|-----------------|----------------------|----------------|---------------|----------------|---------------|-------|
| Company:                                                                             |                     | Samsung                |                 |                      |                |               |                |               |       |
| Project #:                                                                           |                     | 4788404110             |                 |                      |                |               |                |               |       |
| Date:                                                                                |                     | 2018-04-08             |                 |                      |                |               |                |               |       |
| Test Engineer:                                                                       |                     | 51072                  |                 |                      |                |               |                |               |       |
| Configuration:                                                                       |                     | EUT / Z-Position       |                 |                      |                |               |                |               |       |
| Location:                                                                            |                     | Chamber 2              |                 |                      |                |               |                |               |       |
| Mode:                                                                                |                     | HSDPA Band 5 Harmonics |                 |                      |                |               |                |               |       |
| f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)     | Distance<br>(m) | Preamplifier<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| Low Ch, 826.4MHz                                                                     |                     |                        |                 |                      |                |               |                |               |       |
| 1652.80                                                                              | -19.7               | V                      | 3.0             | 38.2                 | 1.0            | -56.9         | -13.0          | -43.9         |       |
| 2479.20                                                                              | -15.0               | V                      | 3.0             | 38.8                 | 1.0            | -52.8         | -13.0          | -39.8         |       |
| 3305.60                                                                              | -13.0               | V                      | 3.0             | 39.4                 | 1.0            | -51.5         | -13.0          | -38.5         |       |
| 4132.00                                                                              | -11.8               | V                      | 3.0             | 39.8                 | 1.0            | -50.6         | -13.0          | -37.6         |       |
| 4958.40                                                                              | -10.6               | V                      | 3.0             | 39.8                 | 1.0            | -49.3         | -13.0          | -36.3         |       |
| 1652.80                                                                              | -17.7               | H                      | 3.0             | 38.2                 | 1.0            | -54.9         | -13.0          | -41.9         |       |
| 2479.20                                                                              | -15.3               | H                      | 3.0             | 38.8                 | 1.0            | -53.1         | -13.0          | -40.1         |       |
| 3305.60                                                                              | -13.4               | H                      | 3.0             | 39.4                 | 1.0            | -51.8         | -13.0          | -38.8         |       |
| 4132.00                                                                              | -11.9               | H                      | 3.0             | 39.8                 | 1.0            | -50.7         | -13.0          | -37.7         |       |
| 4958.40                                                                              | -9.6                | H                      | 3.0             | 39.8                 | 1.0            | -48.4         | -13.0          | -35.4         |       |
| Mid Ch, 836.6MHz                                                                     |                     |                        |                 |                      |                |               |                |               |       |
| 1673.20                                                                              | -19.1               | V                      | 3.0             | 38.2                 | 1.0            | -56.3         | -13.0          | -43.3         |       |
| 2509.80                                                                              | -15.2               | V                      | 3.0             | 38.8                 | 1.0            | -53.0         | -13.0          | -40.0         |       |
| 3346.40                                                                              | -13.2               | V                      | 3.0             | 39.5                 | 1.0            | -51.6         | -13.0          | -38.6         |       |
| 4183.00                                                                              | -12.6               | V                      | 3.0             | 39.8                 | 1.0            | -51.4         | -13.0          | -38.4         |       |
| 5019.60                                                                              | -10.9               | V                      | 3.0             | 39.8                 | 1.0            | -49.7         | -13.0          | -36.7         |       |
| 1673.20                                                                              | -17.5               | H                      | 3.0             | 38.2                 | 1.0            | -54.7         | -13.0          | -41.7         |       |
| 2509.80                                                                              | -14.9               | H                      | 3.0             | 38.8                 | 1.0            | -52.7         | -13.0          | -39.7         |       |
| 3346.40                                                                              | -12.6               | H                      | 3.0             | 39.5                 | 1.0            | -51.1         | -13.0          | -38.1         |       |
| 4183.00                                                                              | -12.0               | H                      | 3.0             | 39.8                 | 1.0            | -50.8         | -13.0          | -37.8         |       |
| 5019.60                                                                              | -10.9               | H                      | 3.0             | 39.8                 | 1.0            | -49.7         | -13.0          | -36.7         |       |
| High Ch, 846.6MHz                                                                    |                     |                        |                 |                      |                |               |                |               |       |
| 1693.20                                                                              | -17.3               | V                      | 3.0             | 38.2                 | 1.0            | -54.5         | -13.0          | -41.5         |       |
| 2539.80                                                                              | -14.1               | V                      | 3.0             | 38.9                 | 1.0            | -52.0         | -13.0          | -39.0         |       |
| 3386.40                                                                              | -12.8               | V                      | 3.0             | 39.5                 | 1.0            | -51.3         | -13.0          | -38.3         |       |
| 4233.00                                                                              | -11.1               | V                      | 3.0             | 39.8                 | 1.0            | -49.9         | -13.0          | -36.9         |       |
| 5079.60                                                                              | -10.6               | V                      | 3.0             | 39.8                 | 1.0            | -49.3         | -13.0          | -36.3         |       |
| 1693.20                                                                              | -17.7               | H                      | 3.0             | 38.2                 | 1.0            | -54.9         | -13.0          | -41.9         |       |
| 2539.80                                                                              | -15.6               | H                      | 3.0             | 38.9                 | 1.0            | -53.5         | -13.0          | -40.5         |       |
| 3386.40                                                                              | -13.6               | H                      | 3.0             | 39.5                 | 1.0            | -52.1         | -13.0          | -39.1         |       |
| 4233.00                                                                              | -11.1               | H                      | 3.0             | 39.8                 | 1.0            | -49.9         | -13.0          | -36.9         |       |
| 5079.60                                                                              | -10.8               | H                      | 3.0             | 39.8                 | 1.0            | -49.6         | -13.0          | -36.6         |       |

WCDMA  
Band 5  
HSDPA

**WCDMA Band 4**

|                          |                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| WCDMA<br>Band 4<br>REL99 | <p align="center"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p> <b>Company:</b> Samsung<br/> <b>Project #:</b> 4788404110<br/> <b>Date:</b> 2018-04-19<br/> <b>Test Engineer:</b> 47989<br/> <b>Configuration:</b> EUT / AC Adpater / Earphone, X-Position<br/> <b>Location:</b> Chamber 3<br/> <b>Mode:</b> Rel99 Band 4 Harmonics </p> |                     |                    |                 |                |                |               |                |               |       |
|                          | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                               | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| WCDMA<br>Band 4<br>HSDPA | <p align="center"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p> <b>Company:</b> Samsung<br/> <b>Project #:</b> 4788404110<br/> <b>Date:</b> 2018-04-19<br/> <b>Test Engineer:</b> 47989<br/> <b>Configuration:</b> EUT / AC Adpater / Earphone, X-Position<br/> <b>Location:</b> Chamber 3<br/> <b>Mode:</b> HSDPA Band 4 Harmonics </p> |                     |                    |                 |                |                |               |                |               |       |
|                          | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                               | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |

|                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|------------------------------|--------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| WCDMA<br><br>Band 2<br>REL99 | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                              | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                              | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                              | Date: 2018-04-19                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                              | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                              | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                              | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                              | Mode: Rel99 Band 2 Harmonics                                                         |                     |                    |                 |                |                |               |                |               |       |
|                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                              | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                              | Low Ch, 1852.4MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                              | 3704.80                                                                              | -8.2                | V                  | 3.0             | 40.9           | 1.0            | -48.1         | -13.0          | -35.1         |       |
|                              | 5557.20                                                                              | -13.4               | V                  | 3.0             | 40.1           | 1.0            | -52.4         | -13.0          | -39.4         |       |
|                              | 7409.60                                                                              | -4.1                | V                  | 3.0             | 40.0           | 1.0            | -43.2         | -13.0          | -30.2         |       |
|                              | 3704.80                                                                              | -2.8                | H                  | 3.0             | 40.9           | 1.0            | -42.6         | -13.0          | -29.6         |       |
|                              | 5557.20                                                                              | -13.8               | H                  | 3.0             | 40.1           | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                              | 7409.60                                                                              | -6.3                | H                  | 3.0             | 40.0           | 1.0            | -45.3         | -13.0          | -32.3         |       |
|                              | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                              | 3760.00                                                                              | -9.0                | V                  | 3.0             | 40.8           | 1.0            | -48.8         | -13.0          | -35.8         |       |
|                              | 5640.00                                                                              | -12.6               | V                  | 3.0             | 40.0           | 1.0            | -51.6         | -13.0          | -38.6         |       |
| 7520.00                      | -5.1                                                                                 | V                   | 3.0                | 40.0            | 1.0            | -44.2          | -13.0         | -31.2          |               |       |
| 3760.00                      | -2.5                                                                                 | H                   | 3.0                | 40.8            | 1.0            | -42.4          | -13.0         | -29.4          |               |       |
| 5640.00                      | -13.5                                                                                | H                   | 3.0                | 40.0            | 1.0            | -52.6          | -13.0         | -39.6          |               |       |
| 7520.00                      | -7.0                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -46.0          | -13.0         | -33.0          |               |       |
| High Ch, 1907.6MHz           |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| 3815.20                      | -9.2                                                                                 | V                   | 3.0                | 40.8            | 1.0            | -49.0          | -13.0         | -36.0          |               |       |
| 5722.80                      | -12.9                                                                                | V                   | 3.0                | 40.0            | 1.0            | -51.9          | -13.0         | -38.9          |               |       |
| 7630.40                      | -1.9                                                                                 | V                   | 3.0                | 40.0            | 1.0            | -40.9          | -13.0         | -27.9          |               |       |
| 3815.20                      | -0.1                                                                                 | H                   | 3.0                | 40.8            | 1.0            | -39.9          | -13.0         | -26.9          |               |       |
| 5722.80                      | -13.7                                                                                | H                   | 3.0                | 40.0            | 1.0            | -52.7          | -13.0         | -39.7          |               |       |
| 7630.40                      | -3.9                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -42.9          | -13.0         | -29.9          |               |       |
|                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| WCDMA<br><br>Band 2<br>HSDPA | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                              | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                              | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                              | Date: 2018-04-19                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                              | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                              | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                              | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                              | Mode: HSDPA Band 2 Harmonics                                                         |                     |                    |                 |                |                |               |                |               |       |
|                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                              | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                              | Low Ch, 1852.4MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                              | 3704.80                                                                              | -8.9                | V                  | 3.0             | 40.9           | 1.0            | -48.8         | -13.0          | -35.8         |       |
|                              | 5557.20                                                                              | -13.4               | V                  | 3.0             | 40.1           | 1.0            | -52.5         | -13.0          | -39.5         |       |
|                              | 7409.60                                                                              | -3.9                | V                  | 3.0             | 40.0           | 1.0            | -42.9         | -13.0          | -29.9         |       |
|                              | 3704.80                                                                              | -2.0                | H                  | 3.0             | 40.9           | 1.0            | -41.9         | -13.0          | -28.9         |       |
|                              | 5557.20                                                                              | -14.2               | H                  | 3.0             | 40.1           | 1.0            | -53.3         | -13.0          | -40.3         |       |
|                              | 7409.60                                                                              | -5.5                | H                  | 3.0             | 40.0           | 1.0            | -44.5         | -13.0          | -31.5         |       |
|                              | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                              | 3760.00                                                                              | -10.4               | V                  | 3.0             | 40.8           | 1.0            | -50.2         | -13.0          | -37.2         |       |
|                              | 5640.00                                                                              | -13.6               | V                  | 3.0             | 40.0           | 1.0            | -52.6         | -13.0          | -39.6         |       |
| 7520.00                      | -4.3                                                                                 | V                   | 3.0                | 40.0            | 1.0            | -43.3          | -13.0         | -30.3          |               |       |
| 3760.00                      | -2.5                                                                                 | H                   | 3.0                | 40.8            | 1.0            | -42.3          | -13.0         | -29.3          |               |       |
| 5640.00                      | -13.9                                                                                | H                   | 3.0                | 40.0            | 1.0            | -53.0          | -13.0         | -40.0          |               |       |
| 7520.00                      | -5.0                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -44.0          | -13.0         | -31.0          |               |       |
| High Ch, 1907.6MHz           |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| 3815.20                      | -8.8                                                                                 | V                   | 3.0                | 40.8            | 1.0            | -48.6          | -13.0         | -35.6          |               |       |
| 5722.80                      | -13.0                                                                                | V                   | 3.0                | 40.0            | 1.0            | -52.0          | -13.0         | -39.0          |               |       |
| 7630.40                      | -1.1                                                                                 | V                   | 3.0                | 40.0            | 1.0            | -40.1          | -13.0         | -27.1          |               |       |
| 3815.20                      | -1.6                                                                                 | H                   | 3.0                | 40.8            | 1.0            | -41.4          | -13.0         | -28.4          |               |       |
| 5722.80                      | -13.7                                                                                | H                   | 3.0                | 40.0            | 1.0            | -52.7          | -13.0         | -39.7          |               |       |
| 7630.40                      | -2.8                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -41.9          | -13.0         | -28.9          |               |       |
|                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |

**LTE Band 2**

|                                 |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 2<br>20MHz<br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                 | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 2 Harmonics, 20MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                 | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                 | Low Ch, 1860MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3720.00                                                                                                                                                                                                                     | -12.8               | V                  | 3.0             | 40.9           | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                                 | 5580.00                                                                                                                                                                                                                     | -25.8               | V                  | 3.0             | 40.0           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                 | 7440.00                                                                                                                                                                                                                     | -11.2               | V                  | 3.0             | 40.0           | 1.0            | -50.3         | -13.0          | -37.3         |       |
|                                 | 3720.00                                                                                                                                                                                                                     | -4.0                | H                  | 3.0             | 40.9           | 1.0            | -43.8         | -13.0          | -30.8         |       |
|                                 | 5580.00                                                                                                                                                                                                                     | -26.9               | H                  | 3.0             | 40.0           | 1.0            | -66.0         | -13.0          | -53.0         |       |
|                                 | 7440.00                                                                                                                                                                                                                     | -12.4               | H                  | 3.0             | 40.0           | 1.0            | -51.5         | -13.0          | -38.5         |       |
|                                 | Mid Ch, 1880MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -12.6               | V                  | 3.0             | 40.8           | 1.0            | -52.4         | -13.0          | -39.4         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -26.3               | V                  | 3.0             | 40.0           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -8.6                | V                  | 3.0             | 40.0           | 1.0            | -47.7         | -13.0          | -34.7         |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -4.3                | H                  | 3.0             | 40.8           | 1.0            | -44.2         | -13.0          | -31.2         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -26.1               | H                  | 3.0             | 40.0           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -11.9               | H                  | 3.0             | 40.0           | 1.0            | -51.0         | -13.0          | -38.0         |       |
|                                 | High Ch, 1900MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3800.00                                                                                                                                                                                                                     | -12.5               | V                  | 3.0             | 40.8           | 1.0            | -52.3         | -13.0          | -39.3         |       |
|                                 | 5700.00                                                                                                                                                                                                                     | -26.0               | V                  | 3.0             | 40.0           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                 | 7600.00                                                                                                                                                                                                                     | -8.4                | V                  | 3.0             | 40.0           | 1.0            | -47.5         | -13.0          | -34.5         |       |
|                                 | 3800.00                                                                                                                                                                                                                     | -3.8                | H                  | 3.0             | 40.8           | 1.0            | -43.6         | -13.0          | -30.6         |       |
|                                 | 5700.00                                                                                                                                                                                                                     | -25.9               | H                  | 3.0             | 40.0           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                 | 7600.00                                                                                                                                                                                                                     | -9.0                | H                  | 3.0             | 40.0           | 1.0            | -48.0         | -13.0          | -35.0         |       |
| LTE<br>Band 2<br>20MHz<br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                 | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 2 Harmonics, 20MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                 | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                 | Low Ch, 1860MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3720.00                                                                                                                                                                                                                     | -14.2               | V                  | 3.0             | 40.9           | 1.0            | -54.1         | -13.0          | -41.1         |       |
|                                 | 5580.00                                                                                                                                                                                                                     | -26.7               | V                  | 3.0             | 40.0           | 1.0            | -65.8         | -13.0          | -52.8         |       |
|                                 | 7440.00                                                                                                                                                                                                                     | -12.3               | V                  | 3.0             | 40.0           | 1.0            | -51.3         | -13.0          | -38.3         |       |
|                                 | 3720.00                                                                                                                                                                                                                     | -6.0                | H                  | 3.0             | 40.9           | 1.0            | -45.9         | -13.0          | -32.9         |       |
|                                 | 5580.00                                                                                                                                                                                                                     | -26.9               | H                  | 3.0             | 40.0           | 1.0            | -65.9         | -13.0          | -52.9         |       |
|                                 | 7440.00                                                                                                                                                                                                                     | -13.3               | H                  | 3.0             | 40.0           | 1.0            | -52.3         | -13.0          | -39.3         |       |
|                                 | Mid Ch, 1880MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -16.5               | V                  | 3.0             | 40.8           | 1.0            | -56.3         | -13.0          | -43.3         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -25.9               | V                  | 3.0             | 40.0           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -9.6                | V                  | 3.0             | 40.0           | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -5.0                | H                  | 3.0             | 40.8           | 1.0            | -44.9         | -13.0          | -31.9         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -25.9               | H                  | 3.0             | 40.0           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -12.9               | H                  | 3.0             | 40.0           | 1.0            | -52.0         | -13.0          | -39.0         |       |
|                                 | High Ch, 1900MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3800.00                                                                                                                                                                                                                     | -14.5               | V                  | 3.0             | 40.8           | 1.0            | -54.3         | -13.0          | -41.3         |       |
|                                 | 5700.00                                                                                                                                                                                                                     | -25.5               | V                  | 3.0             | 40.0           | 1.0            | -64.5         | -13.0          | -51.5         |       |
|                                 | 7600.00                                                                                                                                                                                                                     | -9.9                | V                  | 3.0             | 40.0           | 1.0            | -48.9         | -13.0          | -35.9         |       |
|                                 | 3800.00                                                                                                                                                                                                                     | -5.1                | H                  | 3.0             | 40.8           | 1.0            | -44.9         | -13.0          | -31.9         |       |
|                                 | 5700.00                                                                                                                                                                                                                     | -26.4               | H                  | 3.0             | 40.0           | 1.0            | -65.4         | -13.0          | -52.4         |       |
|                                 | 7600.00                                                                                                                                                                                                                     | -9.9                | H                  | 3.0             | 40.0           | 1.0            | -49.0         | -13.0          | -36.0         |       |

|                                 |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 2<br>15MHz<br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                 | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 2 Harmonics, 15MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                 | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                 | Low Ch, 1857.5MHz                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3715.00                                                                                                                                                                                                                     | -12.9               | V                  | 3.0             | 40.9           | 1.0            | -52.8         | -13.0          | -39.8         |       |
|                                 | 5572.50                                                                                                                                                                                                                     | -26.7               | V                  | 3.0             | 40.0           | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                 | 7430.00                                                                                                                                                                                                                     | -9.6                | V                  | 3.0             | 40.0           | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                                 | 3715.00                                                                                                                                                                                                                     | -5.0                | H                  | 3.0             | 40.9           | 1.0            | -44.9         | -13.0          | -31.9         |       |
|                                 | 5572.50                                                                                                                                                                                                                     | -25.7               | H                  | 3.0             | 40.0           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                 | 7430.00                                                                                                                                                                                                                     | -12.6               | H                  | 3.0             | 40.0           | 1.0            | -51.6         | -13.0          | -38.6         |       |
|                                 | Mid Ch, 1880MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -14.5               | V                  | 3.0             | 40.8           | 1.0            | -54.3         | -13.0          | -41.3         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -26.1               | V                  | 3.0             | 40.0           | 1.0            | -65.1         | -13.0          | -52.1         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -7.8                | V                  | 3.0             | 40.0           | 1.0            | -46.9         | -13.0          | -33.9         |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -3.7                | H                  | 3.0             | 40.8           | 1.0            | -43.6         | -13.0          | -30.6         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -26.4               | H                  | 3.0             | 40.0           | 1.0            | -65.4         | -13.0          | -52.4         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -10.5               | H                  | 3.0             | 40.0           | 1.0            | -49.5         | -13.0          | -36.5         |       |
|                                 | High Ch, 1902.5MHz                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3805.00                                                                                                                                                                                                                     | -11.0               | V                  | 3.0             | 40.8           | 1.0            | -50.8         | -13.0          | -37.8         |       |
|                                 | 5707.50                                                                                                                                                                                                                     | -25.8               | V                  | 3.0             | 40.0           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                 | 7610.00                                                                                                                                                                                                                     | -8.0                | V                  | 3.0             | 40.0           | 1.0            | -47.0         | -13.0          | -34.0         |       |
|                                 | 3805.00                                                                                                                                                                                                                     | -3.7                | H                  | 3.0             | 40.8           | 1.0            | -43.5         | -13.0          | -30.5         |       |
|                                 | 5707.50                                                                                                                                                                                                                     | -26.2               | H                  | 3.0             | 40.0           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                 | 7610.00                                                                                                                                                                                                                     | -7.8                | H                  | 3.0             | 40.0           | 1.0            | -46.8         | -13.0          | -33.8         |       |
|                                 |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
| LTE<br>Band 2<br>15MHz<br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                 | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 2 Harmonics, 15MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                 | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                 | Low Ch, 1857.5MHz                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3715.00                                                                                                                                                                                                                     | -13.8               | V                  | 3.0             | 40.9           | 1.0            | -53.6         | -13.0          | -40.6         |       |
|                                 | 5572.50                                                                                                                                                                                                                     | -26.6               | V                  | 3.0             | 40.0           | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                 | 7430.00                                                                                                                                                                                                                     | -10.4               | V                  | 3.0             | 40.0           | 1.0            | -49.4         | -13.0          | -36.4         |       |
|                                 | 3715.00                                                                                                                                                                                                                     | -6.2                | H                  | 3.0             | 40.9           | 1.0            | -46.0         | -13.0          | -33.0         |       |
|                                 | 5572.50                                                                                                                                                                                                                     | -26.2               | H                  | 3.0             | 40.0           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                 | 7430.00                                                                                                                                                                                                                     | -13.5               | H                  | 3.0             | 40.0           | 1.0            | -52.5         | -13.0          | -39.5         |       |
|                                 | Mid Ch, 1880MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -16.6               | V                  | 3.0             | 40.8           | 1.0            | -56.4         | -13.0          | -43.4         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -26.0               | V                  | 3.0             | 40.0           | 1.0            | -65.1         | -13.0          | -52.1         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -9.5                | V                  | 3.0             | 40.0           | 1.0            | -48.5         | -13.0          | -35.5         |       |
|                                 | 3760.00                                                                                                                                                                                                                     | -5.2                | H                  | 3.0             | 40.8           | 1.0            | -45.0         | -13.0          | -32.0         |       |
|                                 | 5640.00                                                                                                                                                                                                                     | -26.4               | H                  | 3.0             | 40.0           | 1.0            | -65.4         | -13.0          | -52.4         |       |
|                                 | 7520.00                                                                                                                                                                                                                     | -12.0               | H                  | 3.0             | 40.0           | 1.0            | -51.1         | -13.0          | -38.1         |       |
|                                 | High Ch, 1902.5MHz                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                                 | 3805.00                                                                                                                                                                                                                     | -12.3               | V                  | 3.0             | 40.8           | 1.0            | -52.1         | -13.0          | -39.1         |       |
|                                 | 5707.50                                                                                                                                                                                                                     | -26.2               | V                  | 3.0             | 40.0           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                 | 7610.00                                                                                                                                                                                                                     | -9.6                | V                  | 3.0             | 40.0           | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                                 | 3805.00                                                                                                                                                                                                                     | -5.5                | H                  | 3.0             | 40.8           | 1.0            | -45.3         | -13.0          | -32.3         |       |
|                                 | 5707.50                                                                                                                                                                                                                     | -26.4               | H                  | 3.0             | 40.0           | 1.0            | -65.4         | -13.0          | -52.4         |       |
|                                 | 7610.00                                                                                                                                                                                                                     | -8.9                | H                  | 3.0             | 40.0           | 1.0            | -47.9         | -13.0          | -34.9         |       |
|                                 |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                 |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |

| LTE<br>Band 2<br>10MHz<br>QPSK | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                      |                |               |                |               |       |
|--------------------------------|--------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------------|----------------|---------------|----------------|---------------|-------|
|                                | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamplifier<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                | Company: Samsung                                                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | Project #: 4788404110                                                                |                     |                    |                 |                      |                |               |                |               |       |
|                                | Date: 2018-04-19                                                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | Test Engineer: 47989                                                                 |                     |                    |                 |                      |                |               |                |               |       |
|                                | Configuration: EUT / AC Adapter / Earphone, X-Position                               |                     |                    |                 |                      |                |               |                |               |       |
|                                | Location: Chamber 3                                                                  |                     |                    |                 |                      |                |               |                |               |       |
|                                | Mode: LTE_QPSK Band 2 Harmonics, 10MHz Bandwidth                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | Low Ch, 1855MHz                                                                      |                     |                    |                 |                      |                |               |                |               |       |
|                                | 3710.00                                                                              | -10.7               | V                  | 3.0             | 40.9                 | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                                | 5565.00                                                                              | -26.0               | V                  | 3.0             | 40.0                 | 1.0            | -65.1         | -13.0          | -52.1         |       |
|                                | 7420.00                                                                              | -8.4                | V                  | 3.0             | 40.0                 | 1.0            | -47.4         | -13.0          | -34.4         |       |
|                                | 3710.00                                                                              | -6.1                | H                  | 3.0             | 40.9                 | 1.0            | -45.9         | -13.0          | -32.9         |       |
|                                | 5565.00                                                                              | -26.7               | H                  | 3.0             | 40.0                 | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                | 7420.00                                                                              | -10.6               | H                  | 3.0             | 40.0                 | 1.0            | -49.6         | -13.0          | -36.6         |       |
|                                | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                      |                |               |                |               |       |
|                                | 3760.00                                                                              | -13.7               | V                  | 3.0             | 40.8                 | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                                | 5640.00                                                                              | -25.0               | V                  | 3.0             | 40.0                 | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                | 7520.00                                                                              | -8.1                | V                  | 3.0             | 40.0                 | 1.0            | -47.1         | -13.0          | -34.1         |       |
|                                | 3760.00                                                                              | -4.3                | H                  | 3.0             | 40.8                 | 1.0            | -44.1         | -13.0          | -31.1         |       |
|                                | 5640.00                                                                              | -26.1               | H                  | 3.0             | 40.0                 | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                | 7520.00                                                                              | -10.4               | H                  | 3.0             | 40.0                 | 1.0            | -49.4         | -13.0          | -36.4         |       |
|                                | High Ch, 1905MHz                                                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | 3810.00                                                                              | -10.9               | V                  | 3.0             | 40.8                 | 1.0            | -50.7         | -13.0          | -37.7         |       |
|                                | 5715.00                                                                              | -26.0               | V                  | 3.0             | 40.0                 | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                | 7620.00                                                                              | -4.9                | V                  | 3.0             | 40.0                 | 1.0            | -43.9         | -13.0          | -30.9         |       |
|                                | 3810.00                                                                              | -3.5                | H                  | 3.0             | 40.8                 | 1.0            | -43.3         | -13.0          | -30.3         |       |
|                                | 5715.00                                                                              | -26.2               | H                  | 3.0             | 40.0                 | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                | 7620.00                                                                              | -6.7                | H                  | 3.0             | 40.0                 | 1.0            | -45.7         | -13.0          | -32.7         |       |
|                                | Company: Samsung                                                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | Project #: 4788404110                                                                |                     |                    |                 |                      |                |               |                |               |       |
|                                | Date: 2018-04-19                                                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | Test Engineer: 47989                                                                 |                     |                    |                 |                      |                |               |                |               |       |
|                                | Configuration: EUT / AC Adapter / Earphone, X-Position                               |                     |                    |                 |                      |                |               |                |               |       |
|                                | Location: Chamber 3                                                                  |                     |                    |                 |                      |                |               |                |               |       |
|                                | Mode: LTE_16QAM Band 2 Harmonics, 10MHz Bandwidth                                    |                     |                    |                 |                      |                |               |                |               |       |
|                                | Low Ch, 1855MHz                                                                      |                     |                    |                 |                      |                |               |                |               |       |
|                                | 3710.00                                                                              | -12.4               | V                  | 3.0             | 40.9                 | 1.0            | -52.2         | -13.0          | -39.2         |       |
|                                | 5565.00                                                                              | -26.6               | V                  | 3.0             | 40.0                 | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                | 7420.00                                                                              | -9.5                | V                  | 3.0             | 40.0                 | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                                | 3710.00                                                                              | -4.8                | H                  | 3.0             | 40.9                 | 1.0            | -44.6         | -13.0          | -31.6         |       |
|                                | 5565.00                                                                              | -27.0               | H                  | 3.0             | 40.0                 | 1.0            | -66.0         | -13.0          | -53.0         |       |
|                                | 7420.00                                                                              | -12.1               | H                  | 3.0             | 40.0                 | 1.0            | -51.2         | -13.0          | -38.2         |       |
|                                | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                      |                |               |                |               |       |
|                                | 3760.00                                                                              | -14.7               | V                  | 3.0             | 40.8                 | 1.0            | -54.5         | -13.0          | -41.5         |       |
|                                | 5640.00                                                                              | -26.3               | V                  | 3.0             | 40.0                 | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                | 7520.00                                                                              | -9.4                | V                  | 3.0             | 40.0                 | 1.0            | -48.5         | -13.0          | -35.5         |       |
|                                | 3760.00                                                                              | -6.1                | H                  | 3.0             | 40.8                 | 1.0            | -45.9         | -13.0          | -32.9         |       |
|                                | 5640.00                                                                              | -26.5               | H                  | 3.0             | 40.0                 | 1.0            | -65.5         | -13.0          | -52.5         |       |
|                                | 7520.00                                                                              | -11.5               | H                  | 3.0             | 40.0                 | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                                | High Ch, 1905MHz                                                                     |                     |                    |                 |                      |                |               |                |               |       |
|                                | 3810.00                                                                              | -12.3               | V                  | 3.0             | 40.8                 | 1.0            | -52.1         | -13.0          | -39.1         |       |
|                                | 5715.00                                                                              | -26.1               | V                  | 3.0             | 40.0                 | 1.0            | -65.1         | -13.0          | -52.1         |       |
|                                | 7620.00                                                                              | -6.8                | V                  | 3.0             | 40.0                 | 1.0            | -45.9         | -13.0          | -32.9         |       |
|                                | 3810.00                                                                              | -5.1                | H                  | 3.0             | 40.8                 | 1.0            | -44.9         | -13.0          | -31.9         |       |
|                                | 5715.00                                                                              | -26.4               | H                  | 3.0             | 40.0                 | 1.0            | -65.4         | -13.0          | -52.4         |       |
|                                | 7620.00                                                                              | -8.3                | H                  | 3.0             | 40.0                 | 1.0            | -47.4         | -13.0          | -34.4         |       |

| LTE<br>Band 2<br>5MHz<br>QPSK | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                       |                     |                    |                 |                |                |               |                |               |       |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
|                               | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 2 Harmonics, 5MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                               | f<br>MHz                                                                                                                                                                                                                   | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                               | Low Ch, 1852.5MHz                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                               | 3705.00                                                                                                                                                                                                                    | -10.7               | V                  | 3.0             | 40.9           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                               | 5557.50                                                                                                                                                                                                                    | -25.5               | V                  | 3.0             | 40.1           | 1.0            | -64.6         | -13.0          | -51.6         |       |
|                               | 7410.00                                                                                                                                                                                                                    | -6.3                | V                  | 3.0             | 40.0           | 1.0            | -45.4         | -13.0          | -32.4         |       |
|                               | 3705.00                                                                                                                                                                                                                    | -4.3                | H                  | 3.0             | 40.9           | 1.0            | -44.2         | -13.0          | -31.2         |       |
|                               | 5557.50                                                                                                                                                                                                                    | -25.6               | H                  | 3.0             | 40.1           | 1.0            | -64.6         | -13.0          | -51.6         |       |
|                               | 7410.00                                                                                                                                                                                                                    | -10.1               | H                  | 3.0             | 40.0           | 1.0            | -49.1         | -13.0          | -36.1         |       |
|                               | Mid Ch, 1880MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                               | 3760.00                                                                                                                                                                                                                    | -14.6               | V                  | 3.0             | 40.8           | 1.0            | -54.5         | -13.0          | -41.5         |       |
|                               | 5640.00                                                                                                                                                                                                                    | -26.1               | V                  | 3.0             | 40.0           | 1.0            | -65.1         | -13.0          | -52.1         |       |
|                               | 7520.00                                                                                                                                                                                                                    | -8.1                | V                  | 3.0             | 40.0           | 1.0            | -47.1         | -13.0          | -34.1         |       |
|                               | 3760.00                                                                                                                                                                                                                    | -3.5                | H                  | 3.0             | 40.8           | 1.0            | -43.3         | -13.0          | -30.3         |       |
|                               | 5640.00                                                                                                                                                                                                                    | -25.9               | H                  | 3.0             | 40.0           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                               | 7520.00                                                                                                                                                                                                                    | -10.7               | H                  | 3.0             | 40.0           | 1.0            | -49.7         | -13.0          | -36.7         |       |
|                               | High Ch, 1907.5MHz                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                               | 3815.00                                                                                                                                                                                                                    | -10.3               | V                  | 3.0             | 40.8           | 1.0            | -50.1         | -13.0          | -37.1         |       |
|                               | 5722.50                                                                                                                                                                                                                    | -25.1               | V                  | 3.0             | 40.0           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                               | 7630.00                                                                                                                                                                                                                    | -4.1                | V                  | 3.0             | 40.0           | 1.0            | -43.1         | -13.0          | -30.1         |       |
|                               | 3815.00                                                                                                                                                                                                                    | -2.5                | H                  | 3.0             | 40.8           | 1.0            | -42.3         | -13.0          | -29.3         |       |
|                               | 5722.50                                                                                                                                                                                                                    | -25.6               | H                  | 3.0             | 40.0           | 1.0            | -64.6         | -13.0          | -51.6         |       |
|                               | 7630.00                                                                                                                                                                                                                    | -5.8                | H                  | 3.0             | 40.0           | 1.0            | -44.8         | -13.0          | -31.8         |       |
|                               | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                       |                     |                    |                 |                |                |               |                |               |       |
|                               | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 2 Harmonics, 5MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                               | f<br>MHz                                                                                                                                                                                                                   | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                               | Low Ch, 1852.5MHz                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                               | 3705.00                                                                                                                                                                                                                    | -12.4               | V                  | 3.0             | 40.9           | 1.0            | -52.2         | -13.0          | -39.2         |       |
|                               | 5557.50                                                                                                                                                                                                                    | -26.4               | V                  | 3.0             | 40.1           | 1.0            | -65.5         | -13.0          | -52.5         |       |
|                               | 7410.00                                                                                                                                                                                                                    | -7.5                | V                  | 3.0             | 40.0           | 1.0            | -46.6         | -13.0          | -33.6         |       |
|                               | 3705.00                                                                                                                                                                                                                    | -5.9                | H                  | 3.0             | 40.9           | 1.0            | -45.8         | -13.0          | -32.8         |       |
|                               | 5557.50                                                                                                                                                                                                                    | -26.2               | H                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                               | 7410.00                                                                                                                                                                                                                    | -11.6               | H                  | 3.0             | 40.0           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                               | Mid Ch, 1880MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                               | 3760.00                                                                                                                                                                                                                    | -16.0               | V                  | 3.0             | 40.8           | 1.0            | -55.8         | -13.0          | -42.8         |       |
|                               | 5640.00                                                                                                                                                                                                                    | -25.9               | V                  | 3.0             | 40.0           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                               | 7520.00                                                                                                                                                                                                                    | -9.4                | V                  | 3.0             | 40.0           | 1.0            | -48.5         | -13.0          | -35.5         |       |
|                               | 3760.00                                                                                                                                                                                                                    | -4.9                | H                  | 3.0             | 40.8           | 1.0            | -44.7         | -13.0          | -31.7         |       |
|                               | 5640.00                                                                                                                                                                                                                    | -26.6               | H                  | 3.0             | 40.0           | 1.0            | -65.6         | -13.0          | -52.6         |       |
|                               | 7520.00                                                                                                                                                                                                                    | -12.1               | H                  | 3.0             | 40.0           | 1.0            | -51.1         | -13.0          | -38.1         |       |
|                               | High Ch, 1907.5MHz                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                               | 3815.00                                                                                                                                                                                                                    | -11.4               | V                  | 3.0             | 40.8           | 1.0            | -51.2         | -13.0          | -38.2         |       |
|                               | 5722.50                                                                                                                                                                                                                    | -25.5               | V                  | 3.0             | 40.0           | 1.0            | -64.5         | -13.0          | -51.5         |       |
|                               | 7630.00                                                                                                                                                                                                                    | -5.8                | V                  | 3.0             | 40.0           | 1.0            | -44.8         | -13.0          | -31.8         |       |
|                               | 3815.00                                                                                                                                                                                                                    | -4.6                | H                  | 3.0             | 40.8           | 1.0            | -44.4         | -13.0          | -31.4         |       |
|                               | 5722.50                                                                                                                                                                                                                    | -26.2               | H                  | 3.0             | 40.0           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                               | 7630.00                                                                                                                                                                                                                    | -7.4                | H                  | 3.0             | 40.0           | 1.0            | -46.5         | -13.0          | -33.5         |       |

|                                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|--------------------------------------------|--------------------------------------------------------------------------------------|------------------|-----------------|--------------|-------------|-------------|------------|-------------|------------|-------|
| LTE<br><br>Band 2<br><br>3MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                  |                 |              |             |             |            |             |            |       |
|                                            | Company: Samsung                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                            | Project #: 4788404110                                                                |                  |                 |              |             |             |            |             |            |       |
|                                            | Date: 2018-04-19                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                            | Test Engineer: 47989                                                                 |                  |                 |              |             |             |            |             |            |       |
|                                            | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                  |                 |              |             |             |            |             |            |       |
|                                            | Location: Chamber 3                                                                  |                  |                 |              |             |             |            |             |            |       |
|                                            | Mode: LTE_QPSK Band 2 Harmonics, 3MHz Bandwidth                                      |                  |                 |              |             |             |            |             |            |       |
|                                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                            | f MHz                                                                                | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|                                            | Low Ch, 1851.5MHz                                                                    |                  |                 |              |             |             |            |             |            |       |
|                                            | 3703.00                                                                              | -11.5            | V               | 3.0          | 40.9        | 1.0         | -51.4      | -13.0       | -38.4      |       |
|                                            | 5554.50                                                                              | -25.9            | V               | 3.0          | 40.1        | 1.0         | -65.0      | -13.0       | -52.0      |       |
|                                            | 7406.00                                                                              | -7.2             | V               | 3.0          | 40.0        | 1.0         | -46.3      | -13.0       | -33.3      |       |
|                                            | 3703.00                                                                              | -4.3             | H               | 3.0          | 40.9        | 1.0         | -44.2      | -13.0       | -31.2      |       |
|                                            | 5554.50                                                                              | -25.5            | H               | 3.0          | 40.1        | 1.0         | -64.5      | -13.0       | -51.5      |       |
|                                            | 7406.00                                                                              | -11.1            | H               | 3.0          | 40.0        | 1.0         | -50.2      | -13.0       | -37.2      |       |
|                                            | Mid Ch, 1880MHz                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                            | 3760.00                                                                              | -14.0            | V               | 3.0          | 40.8        | 1.0         | -53.9      | -13.0       | -40.9      |       |
|                                            | 5640.00                                                                              | -24.9            | V               | 3.0          | 40.0        | 1.0         | -64.0      | -13.0       | -51.0      |       |
| 7520.00                                    | -6.9                                                                                 | V                | 3.0             | 40.0         | 1.0         | -45.9       | -13.0      | -32.9       |            |       |
| 3760.00                                    | -4.2                                                                                 | H                | 3.0             | 40.8         | 1.0         | -44.0       | -13.0      | -31.0       |            |       |
| 5640.00                                    | -25.5                                                                                | H                | 3.0             | 40.0         | 1.0         | -64.5       | -13.0      | -51.5       |            |       |
| 7520.00                                    | -10.6                                                                                | H                | 3.0             | 40.0         | 1.0         | -49.6       | -13.0      | -36.6       |            |       |
| High Ch, 1908.5MHz                         |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| 3817.00                                    | -11.0                                                                                | V                | 3.0             | 40.8         | 1.0         | -50.7       | -13.0      | -37.7       |            |       |
| 5725.50                                    | -25.5                                                                                | V                | 3.0             | 40.0         | 1.0         | -64.5       | -13.0      | -51.5       |            |       |
| 7634.00                                    | -2.0                                                                                 | V                | 3.0             | 40.0         | 1.0         | -41.1       | -13.0      | -28.1       |            |       |
| 3817.00                                    | -0.9                                                                                 | H                | 3.0             | 40.8         | 1.0         | -40.7       | -13.0      | -27.7       |            |       |
| 5725.50                                    | -25.1                                                                                | H                | 3.0             | 40.0         | 1.0         | -64.2       | -13.0      | -51.2       |            |       |
| 7634.00                                    | -9.1                                                                                 | H                | 3.0             | 40.0         | 1.0         | -48.1       | -13.0      | -35.1       |            |       |
|                                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| LTE<br><br>Band 2<br><br>3MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                  |                 |              |             |             |            |             |            |       |
|                                            | Company: Samsung                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                            | Project #: 4788404110                                                                |                  |                 |              |             |             |            |             |            |       |
|                                            | Date: 2018-04-19                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                            | Test Engineer: 47989                                                                 |                  |                 |              |             |             |            |             |            |       |
|                                            | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                  |                 |              |             |             |            |             |            |       |
|                                            | Location: Chamber 3                                                                  |                  |                 |              |             |             |            |             |            |       |
|                                            | Mode: LTE_16QAM Band 2 Harmonics, 3MHz Bandwidth                                     |                  |                 |              |             |             |            |             |            |       |
|                                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                            | f MHz                                                                                | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|                                            | Low Ch, 1851.5MHz                                                                    |                  |                 |              |             |             |            |             |            |       |
|                                            | 3703.00                                                                              | -13.3            | V               | 3.0          | 40.9        | 1.0         | -53.2      | -13.0       | -40.2      |       |
|                                            | 5554.50                                                                              | -25.4            | V               | 3.0          | 40.1        | 1.0         | -64.5      | -13.0       | -51.5      |       |
|                                            | 7406.00                                                                              | -7.8             | V               | 3.0          | 40.0        | 1.0         | -46.9      | -13.0       | -33.9      |       |
|                                            | 3703.00                                                                              | -5.3             | H               | 3.0          | 40.9        | 1.0         | -45.2      | -13.0       | -32.2      |       |
|                                            | 5554.50                                                                              | -26.5            | H               | 3.0          | 40.1        | 1.0         | -65.6      | -13.0       | -52.6      |       |
|                                            | 7406.00                                                                              | -11.8            | H               | 3.0          | 40.0        | 1.0         | -50.8      | -13.0       | -37.8      |       |
|                                            | Mid Ch, 1880MHz                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                            | 3760.00                                                                              | -15.5            | V               | 3.0          | 40.8        | 1.0         | -55.3      | -13.0       | -42.3      |       |
|                                            | 5640.00                                                                              | -25.6            | V               | 3.0          | 40.0        | 1.0         | -64.7      | -13.0       | -51.7      |       |
| 7520.00                                    | -8.2                                                                                 | V                | 3.0             | 40.0         | 1.0         | -47.2       | -13.0      | -34.2       |            |       |
| 3760.00                                    | -6.1                                                                                 | H                | 3.0             | 40.8         | 1.0         | -45.9       | -13.0      | -32.9       |            |       |
| 5640.00                                    | -26.5                                                                                | H                | 3.0             | 40.0         | 1.0         | -65.6       | -13.0      | -52.6       |            |       |
| 7520.00                                    | -11.9                                                                                | H                | 3.0             | 40.0         | 1.0         | -50.9       | -13.0      | -37.9       |            |       |
| High Ch, 1908.5MHz                         |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| 3817.00                                    | -12.1                                                                                | V                | 3.0             | 40.8         | 1.0         | -51.9       | -13.0      | -38.9       |            |       |
| 5725.50                                    | -25.8                                                                                | V                | 3.0             | 40.0         | 1.0         | -64.8       | -13.0      | -51.8       |            |       |
| 7634.00                                    | -3.8                                                                                 | V                | 3.0             | 40.0         | 1.0         | -42.8       | -13.0      | -29.8       |            |       |
| 3817.00                                    | -2.1                                                                                 | H                | 3.0             | 40.8         | 1.0         | -41.9       | -13.0      | -28.9       |            |       |
| 5725.50                                    | -26.1                                                                                | H                | 3.0             | 40.0         | 1.0         | -65.1       | -13.0      | -52.1       |            |       |
| 7634.00                                    | -10.3                                                                                | H                | 3.0             | 40.0         | 1.0         | -49.3       | -13.0      | -36.3       |            |       |
|                                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |

|                                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|----------------------------------------------|--------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br><br>Band 2<br><br>1.4MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                                              | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                              | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                                              | Date: 2018-04-19                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                              | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                                              | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                                              | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                                              | Mode: LTE_QPSK Band 2 Harmonics, 1.4MHz Bandwidth                                    |                     |                    |                 |                |                |               |                |               |       |
|                                              | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                              | Low Ch, 1850.7MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                              | 3701.40                                                                              | -11.9               | V                  | 3.0             | 40.9           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                                              | 5552.10                                                                              | -25.9               | V                  | 3.0             | 40.1           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                              | 7402.80                                                                              | -8.3                | V                  | 3.0             | 40.0           | 1.0            | -47.4         | -13.0          | -34.4         |       |
|                                              | 3701.40                                                                              | -3.9                | H                  | 3.0             | 40.9           | 1.0            | -43.8         | -13.0          | -30.8         |       |
|                                              | 5552.10                                                                              | -26.6               | H                  | 3.0             | 40.1           | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                              | 7402.80                                                                              | -11.6               | H                  | 3.0             | 40.0           | 1.0            | -50.7         | -13.0          | -37.7         |       |
|                                              | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                              | 3760.00                                                                              | -13.6               | V                  | 3.0             | 40.8           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                                              | 5640.00                                                                              | -26.0               | V                  | 3.0             | 40.0           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                              | 7520.00                                                                              | -8.9                | V                  | 3.0             | 40.0           | 1.0            | -48.0         | -13.0          | -35.0         |       |
|                                              | 3760.00                                                                              | -4.3                | H                  | 3.0             | 40.8           | 1.0            | -44.1         | -13.0          | -31.1         |       |
|                                              | 5640.00                                                                              | -26.5               | H                  | 3.0             | 40.0           | 1.0            | -65.6         | -13.0          | -52.6         |       |
|                                              | 7520.00                                                                              | -10.6               | H                  | 3.0             | 40.0           | 1.0            | -49.6         | -13.0          | -36.6         |       |
|                                              | High Ch, 1909.3MHz                                                                   |                     |                    |                 |                |                |               |                |               |       |
|                                              | 3818.60                                                                              | -9.6                | V                  | 3.0             | 40.8           | 1.0            | -49.4         | -13.0          | -36.4         |       |
| 5727.90                                      | -25.5                                                                                | V                   | 3.0                | 40.0            | 1.0            | -64.5          | -13.0         | -51.5          |               |       |
| 7637.20                                      | -1.6                                                                                 | V                   | 3.0                | 40.0            | 1.0            | -40.6          | -13.0         | -27.6          |               |       |
| 3818.60                                      | -0.4                                                                                 | H                   | 3.0                | 40.8            | 1.0            | -40.2          | -13.0         | -27.2          |               |       |
| 5727.90                                      | -25.4                                                                                | H                   | 3.0                | 40.0            | 1.0            | -64.4          | -13.0         | -51.4          |               |       |
| 7637.20                                      | -7.1                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -46.1          | -13.0         | -33.1          |               |       |
|                                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| LTE<br><br>Band 2<br><br>1.4MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                                              | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                              | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                                              | Date: 2018-04-19                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                              | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                                              | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                                              | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                                              | Mode: LTE_16QAM Band 2 Harmonics, 1.4MHz Bandwidth                                   |                     |                    |                 |                |                |               |                |               |       |
|                                              | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                              | Low Ch, 1850.7MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                              | 3701.40                                                                              | -13.1               | V                  | 3.0             | 40.9           | 1.0            | -53.0         | -13.0          | -40.0         |       |
|                                              | 5552.10                                                                              | -26.6               | V                  | 3.0             | 40.1           | 1.0            | -65.6         | -13.0          | -52.6         |       |
|                                              | 7402.80                                                                              | -9.7                | V                  | 3.0             | 40.0           | 1.0            | -48.8         | -13.0          | -35.8         |       |
|                                              | 3701.40                                                                              | -5.2                | H                  | 3.0             | 40.9           | 1.0            | -45.1         | -13.0          | -32.1         |       |
|                                              | 5552.10                                                                              | -26.9               | H                  | 3.0             | 40.1           | 1.0            | -66.0         | -13.0          | -53.0         |       |
|                                              | 7402.80                                                                              | -12.6               | H                  | 3.0             | 40.0           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                                              | Mid Ch, 1880MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                              | 3760.00                                                                              | -15.1               | V                  | 3.0             | 40.8           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                              | 5640.00                                                                              | -26.0               | V                  | 3.0             | 40.0           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                              | 7520.00                                                                              | -9.5                | V                  | 3.0             | 40.0           | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                                              | 3760.00                                                                              | -5.8                | H                  | 3.0             | 40.8           | 1.0            | -45.6         | -13.0          | -32.6         |       |
|                                              | 5640.00                                                                              | -25.7               | H                  | 3.0             | 40.0           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                              | 7520.00                                                                              | -11.7               | H                  | 3.0             | 40.0           | 1.0            | -50.8         | -13.0          | -37.8         |       |
|                                              | High Ch, 1909.3MHz                                                                   |                     |                    |                 |                |                |               |                |               |       |
|                                              | 3818.60                                                                              | -11.7               | V                  | 3.0             | 40.8           | 1.0            | -51.4         | -13.0          | -38.4         |       |
| 5727.90                                      | -26.0                                                                                | V                   | 3.0                | 40.0            | 1.0            | -65.0          | -13.0         | -52.0          |               |       |
| 7637.20                                      | -2.7                                                                                 | V                   | 3.0                | 40.0            | 1.0            | -41.7          | -13.0         | -28.7          |               |       |
| 3818.60                                      | -1.6                                                                                 | H                   | 3.0                | 40.8            | 1.0            | -41.4          | -13.0         | -28.4          |               |       |
| 5727.90                                      | -26.3                                                                                | H                   | 3.0                | 40.0            | 1.0            | -65.3          | -13.0         | -52.3          |               |       |
| 7637.20                                      | -8.4                                                                                 | H                   | 3.0                | 40.0            | 1.0            | -47.4          | -13.0         | -34.4          |               |       |
|                                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                              |                                                                                      |                     |                    |                 |                |                |               |                |               |       |

**LTE Band 5**

| UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                                            |                 |                |                |               |                |               |       |
|--------------------------------------------------------------------------------------|---------------------|--------------------------------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| Company:                                                                             |                     | Samsung                                    |                 |                |                |               |                |               |       |
| Project #:                                                                           |                     | 4788404110                                 |                 |                |                |               |                |               |       |
| Date:                                                                                |                     | 2018-04-16                                 |                 |                |                |               |                |               |       |
| Test Engineer:                                                                       |                     | 47989                                      |                 |                |                |               |                |               |       |
| Configuration:                                                                       |                     | EUT / AC Adapter / Earphone, Z-Position    |                 |                |                |               |                |               |       |
| Location:                                                                            |                     | Chamber 3                                  |                 |                |                |               |                |               |       |
| Mode:                                                                                |                     | LTE_QPSK Band 5 Harmonics, 10MHz Bandwidth |                 |                |                |               |                |               |       |
| f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)                         | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| Low Ch, 829MHz                                                                       |                     |                                            |                 |                |                |               |                |               |       |
| 1658.00                                                                              | -28.1               | V                                          | 3.0             | 41.8           | 1.0            | -68.9         | -13.0          | -55.9         |       |
| 2487.00                                                                              | -28.8               | V                                          | 3.0             | 41.7           | 1.0            | -69.5         | -13.0          | -56.5         |       |
| 3316.00                                                                              | -26.7               | V                                          | 3.0             | 41.1           | 1.0            | -66.8         | -13.0          | -53.8         |       |
| 4145.00                                                                              | -23.9               | V                                          | 3.0             | 40.6           | 1.0            | -63.5         | -13.0          | -50.5         |       |
| 1658.00                                                                              | -29.1               | H                                          | 3.0             | 41.8           | 1.0            | -69.9         | -13.0          | -56.9         |       |
| 2487.00                                                                              | -30.1               | H                                          | 3.0             | 41.7           | 1.0            | -70.7         | -13.0          | -57.7         |       |
| 3316.00                                                                              | -28.7               | H                                          | 3.0             | 41.1           | 1.0            | -68.9         | -13.0          | -55.9         |       |
| 4145.00                                                                              | -23.9               | H                                          | 3.0             | 40.6           | 1.0            | -63.5         | -13.0          | -50.5         |       |
| Mid Ch, 836.5MHz                                                                     |                     |                                            |                 |                |                |               |                |               |       |
| 1673.00                                                                              | -27.6               | V                                          | 3.0             | 41.8           | 1.0            | -68.4         | -13.0          | -55.4         |       |
| 2509.50                                                                              | -29.1               | V                                          | 3.0             | 41.7           | 1.0            | -69.7         | -13.0          | -56.7         |       |
| 3346.00                                                                              | -25.6               | V                                          | 3.0             | 41.1           | 1.0            | -65.7         | -13.0          | -52.7         |       |
| 4182.50                                                                              | -24.7               | V                                          | 3.0             | 40.6           | 1.0            | -64.2         | -13.0          | -51.2         |       |
| 1673.00                                                                              | -29.0               | H                                          | 3.0             | 41.8           | 1.0            | -69.8         | -13.0          | -56.8         |       |
| 2509.50                                                                              | -28.9               | H                                          | 3.0             | 41.7           | 1.0            | -69.6         | -13.0          | -56.6         |       |
| 3346.00                                                                              | -29.0               | H                                          | 3.0             | 41.1           | 1.0            | -69.1         | -13.0          | -56.1         |       |
| 4182.50                                                                              | -23.6               | H                                          | 3.0             | 40.6           | 1.0            | -63.2         | -13.0          | -50.2         |       |
| High Ch, 844MHz                                                                      |                     |                                            |                 |                |                |               |                |               |       |
| 1688.00                                                                              | -28.5               | V                                          | 3.0             | 41.8           | 1.0            | -69.4         | -13.0          | -56.4         |       |
| 2532.00                                                                              | -28.4               | V                                          | 3.0             | 41.7           | 1.0            | -69.1         | -13.0          | -56.1         |       |
| 3376.00                                                                              | -26.3               | V                                          | 3.0             | 41.1           | 1.0            | -66.4         | -13.0          | -53.4         |       |
| 4220.00                                                                              | -23.3               | V                                          | 3.0             | 40.6           | 1.0            | -62.8         | -13.0          | -49.8         |       |
| 1688.00                                                                              | -31.9               | H                                          | 3.0             | 41.8           | 1.0            | -72.7         | -13.0          | -59.7         |       |
| 2532.00                                                                              | -28.7               | H                                          | 3.0             | 41.7           | 1.0            | -69.4         | -13.0          | -56.4         |       |
| 3376.00                                                                              | -26.4               | H                                          | 3.0             | 41.1           | 1.0            | -66.5         | -13.0          | -53.5         |       |
| 4220.00                                                                              | -23.5               | H                                          | 3.0             | 40.6           | 1.0            | -63.0         | -13.0          | -50.0         |       |
|                                                                                      |                     |                                            |                 |                |                |               |                |               |       |
|                                                                                      |                     |                                            |                 |                |                |               |                |               |       |

| UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                                             |                 |                |                |               |                |               |       |
|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| Company:                                                                             |                     | Samsung                                     |                 |                |                |               |                |               |       |
| Project #:                                                                           |                     | 4788404110                                  |                 |                |                |               |                |               |       |
| Date:                                                                                |                     | 2018-04-16                                  |                 |                |                |               |                |               |       |
| Test Engineer:                                                                       |                     | 47989                                       |                 |                |                |               |                |               |       |
| Configuration:                                                                       |                     | EUT / AC Adapter / Earphone, Z-Position     |                 |                |                |               |                |               |       |
| Location:                                                                            |                     | Chamber 3                                   |                 |                |                |               |                |               |       |
| Mode:                                                                                |                     | LTE_16QAM Band 5 Harmonics, 10MHz Bandwidth |                 |                |                |               |                |               |       |
| f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)                          | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| Low Ch, 829MHz                                                                       |                     |                                             |                 |                |                |               |                |               |       |
| 1658.00                                                                              | -29.3               | V                                           | 3.0             | 41.8           | 1.0            | -70.1         | -13.0          | -57.1         |       |
| 2487.00                                                                              | -18.2               | V                                           | 3.0             | 41.7           | 1.0            | -58.8         | -13.0          | -45.8         |       |
| 3316.00                                                                              | -27.1               | V                                           | 3.0             | 41.1           | 1.0            | -67.2         | -13.0          | -54.2         |       |
| 4145.00                                                                              | -24.0               | V                                           | 3.0             | 40.6           | 1.0            | -63.6         | -13.0          | -50.6         |       |
| 1658.00                                                                              | -29.2               | H                                           | 3.0             | 41.8           | 1.0            | -70.0         | -13.0          | -57.0         |       |
| 2487.00                                                                              | -30.6               | H                                           | 3.0             | 41.7           | 1.0            | -71.3         | -13.0          | -58.3         |       |
| 3316.00                                                                              | -28.8               | H                                           | 3.0             | 41.1           | 1.0            | -68.9         | -13.0          | -55.9         |       |
| 4145.00                                                                              | -24.3               | H                                           | 3.0             | 40.6           | 1.0            | -63.9         | -13.0          | -50.9         |       |
| Mid Ch, 836.5MHz                                                                     |                     |                                             |                 |                |                |               |                |               |       |
| 1673.00                                                                              | -29.3               | V                                           | 3.0             | 41.8           | 1.0            | -70.2         | -13.0          | -57.2         |       |
| 2509.50                                                                              | -30.1               | V                                           | 3.0             | 41.7           | 1.0            | -70.8         | -13.0          | -57.8         |       |
| 3346.00                                                                              | -27.1               | V                                           | 3.0             | 41.1           | 1.0            | -67.2         | -13.0          | -54.2         |       |
| 4182.50                                                                              | -24.3               | V                                           | 3.0             | 40.6           | 1.0            | -63.9         | -13.0          | -50.9         |       |
| 1673.00                                                                              | -29.1               | H                                           | 3.0             | 41.8           | 1.0            | -69.9         | -13.0          | -56.9         |       |
| 2509.50                                                                              | -29.9               | H                                           | 3.0             | 41.7           | 1.0            | -70.5         | -13.0          | -57.5         |       |
| 3346.00                                                                              | -28.8               | H                                           | 3.0             | 41.1           | 1.0            | -68.9         | -13.0          | -55.9         |       |
| 4182.50                                                                              | -24.5               | H                                           | 3.0             | 40.6           | 1.0            | -64.1         | -13.0          | -51.1         |       |
| High Ch, 844MHz                                                                      |                     |                                             |                 |                |                |               |                |               |       |
| 1688.00                                                                              | -30.5               | V                                           | 3.0             | 41.8           | 1.0            | -71.3         | -13.0          | -58.3         |       |
| 2532.00                                                                              | -28.9               | V                                           | 3.0             | 41.7           | 1.0            | -69.5         | -13.0          | -56.5         |       |
| 3376.00                                                                              | -26.5               | V                                           | 3.0             | 41.1           | 1.0            | -66.6         | -13.0          | -53.6         |       |
| 4220.00                                                                              | -23.8               | V                                           | 3.0             | 40.6           | 1.0            | -63.3         | -13.0          | -50.3         |       |
| 1688.00                                                                              | -30.4               | H                                           | 3.0             | 41.8           | 1.0            | -71.3         | -13.0          | -58.3         |       |
| 2532.00                                                                              | -29.3               | H                                           | 3.0             | 41.7           | 1.0            | -69.9         | -13.0          | -56.9         |       |
| 3376.00                                                                              | -28.7               | H                                           | 3.0             | 41.1           | 1.0            | -68.8         | -13.0          | -55.8         |       |
| 4220.00                                                                              | -23.8               | H                                           | 3.0             | 40.6           | 1.0            | -63.4         | -13.0          | -50.4         |       |
|                                                                                      |                     |                                             |                 |                |                |               |                |               |       |
|                                                                                      |                     |                                             |                 |                |                |               |                |               |       |

|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|-------------------------------------------|--------------------------------------------------------------------------------------|--|-------------------------------------------|--|--------------------|--|-----------------|--|----------------|--|----------------|--|---------------|--|----------------|--|---------------|--|-------|--|
| LTE<br><br>Band 5<br><br>5MHz<br><br>QPSK | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Company:                                                                             |  | Samsung                                   |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Project #:                                                                           |  | 4788404110                                |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Date:                                                                                |  | 2018-04-16                                |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Test Engineer:                                                                       |  | 47989                                     |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Configuration:                                                                       |  | EUT / AC Adapter / Earphone, Z-Position   |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Location:                                                                            |  | Chamber 3                                 |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | Mode:                                                                                |  | LTE_QPSK Band 5 Harmonics, 5MHz Bandwidth |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | f<br>MHz                                                                             |  | SG reading<br>(dBm)                       |  | Ant. Pol.<br>(H/V) |  | Distance<br>(m) |  | Preamp<br>(dB) |  | Filter<br>(dB) |  | EIRP<br>(dBm) |  | Limit<br>(dBm) |  | Delta<br>(dB) |  | Notes |  |
|                                           | Low Ch, 826.5MHz                                                                     |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | 1653.00                                                                              |  | -27.1                                     |  | V                  |  | 3.0             |  | 41.8           |  | 1.0            |  | -68.0         |  | -13.0          |  | -55.0         |  |       |  |
|                                           | 2479.50                                                                              |  | -29.0                                     |  | V                  |  | 3.0             |  | 41.7           |  | 1.0            |  | -69.6         |  | -13.0          |  | -56.6         |  |       |  |
|                                           | 3306.00                                                                              |  | -26.9                                     |  | V                  |  | 3.0             |  | 41.1           |  | 1.0            |  | -67.0         |  | -13.0          |  | -54.0         |  |       |  |
|                                           | 4132.50                                                                              |  | -24.2                                     |  | V                  |  | 3.0             |  | 40.6           |  | 1.0            |  | -63.8         |  | -13.0          |  | -50.8         |  |       |  |
|                                           | 1653.00                                                                              |  | -28.3                                     |  | H                  |  | 3.0             |  | 41.8           |  | 1.0            |  | -69.1         |  | -13.0          |  | -56.1         |  |       |  |
|                                           | 2479.50                                                                              |  | -28.7                                     |  | H                  |  | 3.0             |  | 41.7           |  | 1.0            |  | -69.4         |  | -13.0          |  | -56.4         |  |       |  |
|                                           | 3306.00                                                                              |  | -28.6                                     |  | H                  |  | 3.0             |  | 41.1           |  | 1.0            |  | -68.8         |  | -13.0          |  | -55.8         |  |       |  |
|                                           | 4132.50                                                                              |  | -23.7                                     |  | H                  |  | 3.0             |  | 40.6           |  | 1.0            |  | -63.3         |  | -13.0          |  | -50.3         |  |       |  |
|                                           | Mid Ch, 836.5MHz                                                                     |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | 1673.00                                                                              |  | -28.1                                     |  | V                  |  | 3.0             |  | 41.8           |  | 1.0            |  | -68.9         |  | -13.0          |  | -55.9         |  |       |  |
|                                           | 2509.50                                                                              |  | -28.9                                     |  | V                  |  | 3.0             |  | 41.7           |  | 1.0            |  | -69.6         |  | -13.0          |  | -56.6         |  |       |  |
|                                           | 3346.00                                                                              |  | -26.6                                     |  | V                  |  | 3.0             |  | 41.1           |  | 1.0            |  | -66.7         |  | -13.0          |  | -53.7         |  |       |  |
|                                           | 4182.50                                                                              |  | -24.1                                     |  | V                  |  | 3.0             |  | 40.6           |  | 1.0            |  | -63.6         |  | -13.0          |  | -50.6         |  |       |  |
|                                           | 1673.00                                                                              |  | -29.1                                     |  | H                  |  | 3.0             |  | 41.8           |  | 1.0            |  | -69.9         |  | -13.0          |  | -56.9         |  |       |  |
|                                           | 2509.50                                                                              |  | -29.3                                     |  | H                  |  | 3.0             |  | 41.7           |  | 1.0            |  | -69.9         |  | -13.0          |  | -56.9         |  |       |  |
|                                           | 3346.00                                                                              |  | -28.8                                     |  | H                  |  | 3.0             |  | 41.1           |  | 1.0            |  | -68.9         |  | -13.0          |  | -55.9         |  |       |  |
|                                           | 4182.50                                                                              |  | -23.9                                     |  | H                  |  | 3.0             |  | 40.6           |  | 1.0            |  | -63.5         |  | -13.0          |  | -50.5         |  |       |  |
|                                           | High Ch, 846.5MHz                                                                    |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           | 1693.00                                                                              |  | -28.3                                     |  | V                  |  | 3.0             |  | 41.8           |  | 1.0            |  | -69.2         |  | -13.0          |  | -56.2         |  |       |  |
|                                           | 2539.50                                                                              |  | -28.9                                     |  | V                  |  | 3.0             |  | 41.6           |  | 1.0            |  | -69.5         |  | -13.0          |  | -56.5         |  |       |  |
|                                           | 3386.00                                                                              |  | -25.9                                     |  | V                  |  | 3.0             |  | 41.1           |  | 1.0            |  | -66.0         |  | -13.0          |  | -53.0         |  |       |  |
|                                           | 4232.50                                                                              |  | -23.3                                     |  | V                  |  | 3.0             |  | 40.5           |  | 1.0            |  | -62.9         |  | -13.0          |  | -49.9         |  |       |  |
|                                           | 1693.00                                                                              |  | -30.1                                     |  | H                  |  | 3.0             |  | 41.8           |  | 1.0            |  | -71.0         |  | -13.0          |  | -58.0         |  |       |  |
|                                           | 2539.50                                                                              |  | -28.0                                     |  | H                  |  | 3.0             |  | 41.6           |  | 1.0            |  | -68.7         |  | -13.0          |  | -55.7         |  |       |  |
|                                           | 3386.00                                                                              |  | -28.6                                     |  | H                  |  | 3.0             |  | 41.1           |  | 1.0            |  | -68.6         |  | -13.0          |  | -55.6         |  |       |  |
|                                           | 4232.50                                                                              |  | -23.2                                     |  | H                  |  | 3.0             |  | 40.5           |  | 1.0            |  | -62.7         |  | -13.0          |  | -49.7         |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |
|                                           |                                                                                      |  |                                           |  |                    |  |                 |  |                |  |                |  |               |  |                |  |               |  |       |  |

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|                                              |                                                                                      |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|----------------------------------------------|--------------------------------------------------------------------------------------|-------|----------------------------------------------|---|--------------------|-----|-----------------|------|----------------|-----|----------------|-------|---------------|-------|----------------|-------|---------------|--|-------|--|
| LTE<br><br>Band 5<br><br>1.4MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Company:                                                                             |       | Samsung                                      |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Project #:                                                                           |       | 4788404110                                   |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Date:                                                                                |       | 2018-04-16                                   |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Test Engineer:                                                                       |       | 47989                                        |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Configuration:                                                                       |       | EUT / AC Adapter / Earphone, Z-Position      |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Location:                                                                            |       | Chamber 3                                    |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Mode:                                                                                |       | LTE_QPSK Band 5 Harmonics, 1.4MHz Bandwidth  |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | f<br>MHz                                                                             |       | SG reading<br>(dBm)                          |   | Ant. Pol.<br>(H/V) |     | Distance<br>(m) |      | Preamp<br>(dB) |     | Filter<br>(dB) |       | EIRP<br>(dBm) |       | Limit<br>(dBm) |       | Delta<br>(dB) |  | Notes |  |
|                                              | Low Ch, 824.7MHz                                                                     |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | 1649.40                                                                              |       | -24.6                                        |   | V                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -65.4         |       | -13.0          |       | -52.4         |  |       |  |
|                                              | 2474.10                                                                              |       | -28.2                                        |   | V                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -68.9         |       | -13.0          |       | -55.9         |  |       |  |
|                                              | 3298.80                                                                              |       | -27.0                                        |   | V                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -67.1         |       | -13.0          |       | -54.1         |  |       |  |
|                                              | 4123.50                                                                              |       | -24.0                                        |   | V                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -63.6         |       | -13.0          |       | -50.6         |  |       |  |
|                                              | 1649.40                                                                              |       | -31.7                                        |   | H                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -72.5         |       | -13.0          |       | -59.5         |  |       |  |
|                                              | 2474.10                                                                              |       | -28.3                                        |   | H                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -69.0         |       | -13.0          |       | -56.0         |  |       |  |
|                                              | 3298.80                                                                              |       | -28.1                                        |   | H                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -68.3         |       | -13.0          |       | -55.3         |  |       |  |
|                                              | 4123.50                                                                              |       | -24.5                                        |   | H                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -64.1         |       | -13.0          |       | -51.1         |  |       |  |
|                                              | Mid Ch, 836.5MHz                                                                     |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | 1673.00                                                                              |       | -26.5                                        |   | V                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -67.3         |       | -13.0          |       | -54.3         |  |       |  |
|                                              | 2509.50                                                                              |       | -27.7                                        |   | V                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -68.3         |       | -13.0          |       | -55.3         |  |       |  |
|                                              | 3346.00                                                                              |       | -26.2                                        |   | V                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -66.3         |       | -13.0          |       | -53.3         |  |       |  |
|                                              | 4182.50                                                                              |       | -25.4                                        |   | V                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -65.0         |       | -13.0          |       | -52.0         |  |       |  |
|                                              | 1673.00                                                                              |       | -31.2                                        |   | H                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -72.1         |       | -13.0          |       | -59.1         |  |       |  |
|                                              | 2509.50                                                                              |       | -27.3                                        |   | H                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -67.9         |       | -13.0          |       | -54.9         |  |       |  |
|                                              | 3346.00                                                                              |       | -28.4                                        |   | H                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -68.5         |       | -13.0          |       | -55.5         |  |       |  |
|                                              | 4182.50                                                                              |       | -23.9                                        |   | H                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -63.5         |       | -13.0          |       | -50.5         |  |       |  |
|                                              | High Ch, 848.3MHz                                                                    |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | 1696.60                                                                              |       | -28.6                                        |   | V                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -69.5         |       | -13.0          |       | -56.5         |  |       |  |
|                                              | 2544.90                                                                              |       | -28.6                                        |   | V                  |     | 3.0             |      | 41.6           |     | 1.0            |       | -69.3         |       | -13.0          |       | -56.3         |  |       |  |
| 3393.20                                      |                                                                                      | -26.2 |                                              | V |                    | 3.0 |                 | 41.1 |                | 1.0 |                | -66.3 |               | -13.0 |                | -53.3 |               |  |       |  |
| 4241.50                                      |                                                                                      | -23.8 |                                              | V |                    | 3.0 |                 | 40.5 |                | 1.0 |                | -63.4 |               | -13.0 |                | -50.4 |               |  |       |  |
| 1696.60                                      |                                                                                      | -29.8 |                                              | H |                    | 3.0 |                 | 41.8 |                | 1.0 |                | -70.6 |               | -13.0 |                | -57.6 |               |  |       |  |
| 2544.90                                      |                                                                                      | -28.0 |                                              | H |                    | 3.0 |                 | 41.6 |                | 1.0 |                | -68.7 |               | -13.0 |                | -55.7 |               |  |       |  |
| 3393.20                                      |                                                                                      | -27.3 |                                              | H |                    | 3.0 |                 | 41.1 |                | 1.0 |                | -67.4 |               | -13.0 |                | -54.4 |               |  |       |  |
| 4241.50                                      |                                                                                      | -23.1 |                                              | H |                    | 3.0 |                 | 40.5 |                | 1.0 |                | -62.7 |               | -13.0 |                | -49.7 |               |  |       |  |
|                                              |                                                                                      |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
| LTE<br><br>Band 5<br><br>1.4MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Company:                                                                             |       | Samsung                                      |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Project #:                                                                           |       | 4788404110                                   |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Date:                                                                                |       | 2018-04-16                                   |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Test Engineer:                                                                       |       | 47989                                        |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Configuration:                                                                       |       | EUT / AC Adapter / Earphone, Z-Position      |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Location:                                                                            |       | Chamber 3                                    |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | Mode:                                                                                |       | LTE_16QAM Band 5 Harmonics, 1.4MHz Bandwidth |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | f<br>MHz                                                                             |       | SG reading<br>(dBm)                          |   | Ant. Pol.<br>(H/V) |     | Distance<br>(m) |      | Preamp<br>(dB) |     | Filter<br>(dB) |       | EIRP<br>(dBm) |       | Limit<br>(dBm) |       | Delta<br>(dB) |  | Notes |  |
|                                              | Low Ch, 824.7MHz                                                                     |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | 1649.40                                                                              |       | -26.8                                        |   | V                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -67.6         |       | -13.0          |       | -54.6         |  |       |  |
|                                              | 2474.10                                                                              |       | -28.8                                        |   | V                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -69.5         |       | -13.0          |       | -56.5         |  |       |  |
|                                              | 3298.80                                                                              |       | -28.2                                        |   | V                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -68.3         |       | -13.0          |       | -55.3         |  |       |  |
|                                              | 4123.50                                                                              |       | -24.5                                        |   | V                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -64.1         |       | -13.0          |       | -51.1         |  |       |  |
|                                              | 1649.40                                                                              |       | -29.9                                        |   | H                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -70.7         |       | -13.0          |       | -57.7         |  |       |  |
|                                              | 2474.10                                                                              |       | -30.3                                        |   | H                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -70.9         |       | -13.0          |       | -57.9         |  |       |  |
|                                              | 3298.80                                                                              |       | -28.1                                        |   | H                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -68.2         |       | -13.0          |       | -55.2         |  |       |  |
|                                              | 4123.50                                                                              |       | -24.9                                        |   | H                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -64.5         |       | -13.0          |       | -51.5         |  |       |  |
|                                              | Mid Ch, 836.5MHz                                                                     |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | 1673.00                                                                              |       | -28.6                                        |   | V                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -69.5         |       | -13.0          |       | -56.5         |  |       |  |
|                                              | 2509.50                                                                              |       | -28.0                                        |   | V                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -68.6         |       | -13.0          |       | -55.6         |  |       |  |
|                                              | 3346.00                                                                              |       | -27.8                                        |   | V                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -67.9         |       | -13.0          |       | -54.9         |  |       |  |
|                                              | 4182.50                                                                              |       | -26.6                                        |   | V                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -66.2         |       | -13.0          |       | -53.2         |  |       |  |
|                                              | 1673.00                                                                              |       | -29.0                                        |   | H                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -69.8         |       | -13.0          |       | -56.8         |  |       |  |
|                                              | 2509.50                                                                              |       | -28.8                                        |   | H                  |     | 3.0             |      | 41.7           |     | 1.0            |       | -69.5         |       | -13.0          |       | -56.5         |  |       |  |
|                                              | 3346.00                                                                              |       | -29.9                                        |   | H                  |     | 3.0             |      | 41.1           |     | 1.0            |       | -70.0         |       | -13.0          |       | -57.0         |  |       |  |
|                                              | 4182.50                                                                              |       | -24.0                                        |   | H                  |     | 3.0             |      | 40.6           |     | 1.0            |       | -63.6         |       | -13.0          |       | -50.6         |  |       |  |
|                                              | High Ch, 848.3MHz                                                                    |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |
|                                              | 1696.60                                                                              |       | -30.6                                        |   | V                  |     | 3.0             |      | 41.8           |     | 1.0            |       | -71.5         |       | -13.0          |       | -58.5         |  |       |  |
|                                              | 2544.90                                                                              |       | -29.4                                        |   | V                  |     | 3.0             |      | 41.6           |     | 1.0            |       | -70.1         |       | -13.0          |       | -57.1         |  |       |  |
| 3393.20                                      |                                                                                      | -26.8 |                                              | V |                    | 3.0 |                 | 41.1 |                | 1.0 |                | -66.9 |               | -13.0 |                | -53.9 |               |  |       |  |
| 4241.50                                      |                                                                                      | -24.8 |                                              | V |                    | 3.0 |                 | 40.5 |                | 1.0 |                | -64.3 |               | -13.0 |                | -51.3 |               |  |       |  |
| 1696.60                                      |                                                                                      | -29.2 |                                              | H |                    | 3.0 |                 | 41.8 |                | 1.0 |                | -70.0 |               | -13.0 |                | -57.0 |               |  |       |  |
| 2544.90                                      |                                                                                      | -29.4 |                                              | H |                    | 3.0 |                 | 41.6 |                | 1.0 |                | -70.0 |               | -13.0 |                | -57.0 |               |  |       |  |
| 3393.20                                      |                                                                                      | -28.0 |                                              | H |                    | 3.0 |                 | 41.1 |                | 1.0 |                | -68.0 |               | -13.0 |                | -55.0 |               |  |       |  |
| 4241.50                                      |                                                                                      | -23.8 |                                              | H |                    | 3.0 |                 | 40.5 |                | 1.0 |                | -63.3 |               | -13.0 |                | -50.3 |               |  |       |  |
|                                              |                                                                                      |       |                                              |   |                    |     |                 |      |                |     |                |       |               |       |                |       |               |  |       |  |

**LTE Band 12**

|                                              |                                                                                      |       |                                              |                    |                 |                |                |               |                |               |       |
|----------------------------------------------|--------------------------------------------------------------------------------------|-------|----------------------------------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br><br>Band 12<br><br>10MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | Company:                                                                             |       | Samsung                                      |                    |                 |                |                |               |                |               |       |
|                                              | Project #:                                                                           |       | 4788404110                                   |                    |                 |                |                |               |                |               |       |
|                                              | Date:                                                                                |       | 2018-04-17                                   |                    |                 |                |                |               |                |               |       |
|                                              | Test Engineer:                                                                       |       | 47989                                        |                    |                 |                |                |               |                |               |       |
|                                              | Configuration:                                                                       |       | EUT / AC Adapter / Earphone, Z-Position      |                    |                 |                |                |               |                |               |       |
|                                              | Location:                                                                            |       | Chamber 3                                    |                    |                 |                |                |               |                |               |       |
|                                              | Mode:                                                                                |       | LTE_QPSK Band 12 Harmonics, 10MHz Bandwidth  |                    |                 |                |                |               |                |               |       |
|                                              | f<br>MHz                                                                             |       | SG reading<br>(dBm)                          | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                              | Low Ch, 704MHz                                                                       |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | 1408.00                                                                              |       | -12.9                                        | V                  | 3.0             | 41.7           | 1.0            | -53.6         | -13.0          | -40.6         |       |
|                                              | 2112.00                                                                              |       | -24.2                                        | V                  | 3.0             | 42.0           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                              | 2816.00                                                                              |       | -20.5                                        | V                  | 3.0             | 41.5           | 1.0            | -60.9         | -13.0          | -47.9         |       |
|                                              | 3520.00                                                                              |       | -16.5                                        | V                  | 3.0             | 41.0           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|                                              | 4224.00                                                                              |       | -20.4                                        | V                  | 3.0             | 40.6           | 1.0            | -59.9         | -13.0          | -46.9         |       |
|                                              | 1408.00                                                                              |       | -16.9                                        | H                  | 3.0             | 41.7           | 1.0            | -57.6         | -13.0          | -44.6         |       |
|                                              | 2112.00                                                                              |       | -20.4                                        | H                  | 3.0             | 42.0           | 1.0            | -61.4         | -13.0          | -48.4         |       |
|                                              | 2816.00                                                                              |       | -16.9                                        | H                  | 3.0             | 41.5           | 1.0            | -57.4         | -13.0          | -44.4         |       |
|                                              | 3520.00                                                                              |       | -14.9                                        | H                  | 3.0             | 41.0           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                              | 4224.00                                                                              |       | -19.3                                        | H                  | 3.0             | 40.6           | 1.0            | -58.8         | -13.0          | -45.8         |       |
|                                              | Mid Ch, 707.5MHz                                                                     |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | 1415.00                                                                              |       | -10.4                                        | V                  | 3.0             | 41.7           | 1.0            | -51.0         | -13.0          | -38.0         |       |
|                                              | 2122.50                                                                              |       | -21.6                                        | V                  | 3.0             | 41.9           | 1.0            | -62.6         | -13.0          | -49.6         |       |
|                                              | 2830.00                                                                              |       | -17.4                                        | V                  | 3.0             | 41.4           | 1.0            | -57.8         | -13.0          | -44.8         |       |
|                                              | 3537.50                                                                              |       | -12.9                                        | V                  | 3.0             | 41.0           | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                                              | 4245.00                                                                              |       | -18.8                                        | V                  | 3.0             | 40.5           | 1.0            | -58.4         | -13.0          | -45.4         |       |
|                                              | 1415.00                                                                              |       | -15.6                                        | H                  | 3.0             | 41.7           | 1.0            | -56.3         | -13.0          | -43.3         |       |
|                                              | 2122.50                                                                              |       | -19.3                                        | H                  | 3.0             | 41.9           | 1.0            | -60.2         | -13.0          | -47.2         |       |
|                                              | 2830.00                                                                              |       | -14.6                                        | H                  | 3.0             | 41.4           | 1.0            | -55.1         | -13.0          | -42.1         |       |
|                                              | 3537.50                                                                              |       | -11.7                                        | H                  | 3.0             | 41.0           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                                              | 4245.00                                                                              |       | -17.2                                        | H                  | 3.0             | 40.5           | 1.0            | -56.8         | -13.0          | -43.8         |       |
|                                              | High Ch, 711MHz                                                                      |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | 1422.00                                                                              |       | -12.7                                        | V                  | 3.0             | 41.7           | 1.0            | -53.4         | -13.0          | -40.4         |       |
|                                              | 2133.00                                                                              |       | -23.2                                        | V                  | 3.0             | 41.9           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                              | 2844.00                                                                              |       | -17.8                                        | V                  | 3.0             | 41.4           | 1.0            | -58.3         | -13.0          | -45.3         |       |
| 3555.00                                      |                                                                                      | -13.0 | V                                            | 3.0                | 41.0            | 1.0            | -53.0          | -13.0         | -40.0          |               |       |
| 4266.00                                      |                                                                                      | -20.1 | V                                            | 3.0                | 40.5            | 1.0            | -59.6          | -13.0         | -46.6          |               |       |
| 1422.00                                      |                                                                                      | -19.1 | H                                            | 3.0                | 41.7            | 1.0            | -59.8          | -13.0         | -46.8          |               |       |
| 2133.00                                      |                                                                                      | -20.7 | H                                            | 3.0                | 41.9            | 1.0            | -61.6          | -13.0         | -48.6          |               |       |
| 2844.00                                      |                                                                                      | -15.3 | H                                            | 3.0                | 41.4            | 1.0            | -55.8          | -13.0         | -42.8          |               |       |
| 3555.00                                      |                                                                                      | -11.4 | H                                            | 3.0                | 41.0            | 1.0            | -51.4          | -13.0         | -38.4          |               |       |
| 4266.00                                      |                                                                                      | -18.4 | H                                            | 3.0                | 40.5            | 1.0            | -58.0          | -13.0         | -45.0          |               |       |
| LTE<br><br>Band 12<br><br>10MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | Company:                                                                             |       | Samsung                                      |                    |                 |                |                |               |                |               |       |
|                                              | Project #:                                                                           |       | 4788404110                                   |                    |                 |                |                |               |                |               |       |
|                                              | Date:                                                                                |       | 2018-04-17                                   |                    |                 |                |                |               |                |               |       |
|                                              | Test Engineer:                                                                       |       | 47989                                        |                    |                 |                |                |               |                |               |       |
|                                              | Configuration:                                                                       |       | EUT / AC Adapter / Earphone, Z-Position      |                    |                 |                |                |               |                |               |       |
|                                              | Location:                                                                            |       | Chamber 3                                    |                    |                 |                |                |               |                |               |       |
|                                              | Mode:                                                                                |       | LTE_16QAM Band 12 Harmonics, 10MHz Bandwidth |                    |                 |                |                |               |                |               |       |
|                                              | f<br>MHz                                                                             |       | SG reading<br>(dBm)                          | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                              | Low Ch, 704MHz                                                                       |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | 1408.00                                                                              |       | -16.6                                        | V                  | 3.0             | 41.7           | 1.0            | -57.2         | -13.0          | -44.2         |       |
|                                              | 2112.00                                                                              |       | -24.0                                        | V                  | 3.0             | 42.0           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                              | 2816.00                                                                              |       | -20.9                                        | V                  | 3.0             | 41.5           | 1.0            | -61.4         | -13.0          | -48.4         |       |
|                                              | 3520.00                                                                              |       | -18.2                                        | V                  | 3.0             | 41.0           | 1.0            | -58.2         | -13.0          | -45.2         |       |
|                                              | 4224.00                                                                              |       | -25.1                                        | V                  | 3.0             | 40.6           | 1.0            | -64.7         | -13.0          | -51.7         |       |
|                                              | 1408.00                                                                              |       | -20.3                                        | H                  | 3.0             | 41.7           | 1.0            | -60.9         | -13.0          | -47.9         |       |
|                                              | 2112.00                                                                              |       | -21.8                                        | H                  | 3.0             | 42.0           | 1.0            | -62.8         | -13.0          | -49.8         |       |
|                                              | 2816.00                                                                              |       | -21.5                                        | H                  | 3.0             | 41.5           | 1.0            | -62.0         | -13.0          | -49.0         |       |
|                                              | 3520.00                                                                              |       | -17.5                                        | H                  | 3.0             | 41.0           | 1.0            | -57.5         | -13.0          | -44.5         |       |
|                                              | 4224.00                                                                              |       | -21.0                                        | H                  | 3.0             | 40.6           | 1.0            | -60.6         | -13.0          | -47.6         |       |
|                                              | Mid Ch, 707.5MHz                                                                     |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | 1415.00                                                                              |       | -13.4                                        | V                  | 3.0             | 41.7           | 1.0            | -54.1         | -13.0          | -41.1         |       |
|                                              | 2122.50                                                                              |       | -23.9                                        | V                  | 3.0             | 41.9           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                              | 2830.00                                                                              |       | -19.1                                        | V                  | 3.0             | 41.4           | 1.0            | -59.5         | -13.0          | -46.5         |       |
|                                              | 3537.50                                                                              |       | -14.9                                        | V                  | 3.0             | 41.0           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                              | 4245.00                                                                              |       | -20.5                                        | V                  | 3.0             | 40.5           | 1.0            | -60.0         | -13.0          | -47.0         |       |
|                                              | 1415.00                                                                              |       | -18.4                                        | H                  | 3.0             | 41.7           | 1.0            | -59.1         | -13.0          | -46.1         |       |
|                                              | 2122.50                                                                              |       | -21.5                                        | H                  | 3.0             | 41.9           | 1.0            | -62.5         | -13.0          | -49.5         |       |
|                                              | 2830.00                                                                              |       | -16.6                                        | H                  | 3.0             | 41.4           | 1.0            | -57.0         | -13.0          | -44.0         |       |
|                                              | 3537.50                                                                              |       | -13.2                                        | H                  | 3.0             | 41.0           | 1.0            | -53.2         | -13.0          | -40.2         |       |
|                                              | 4245.00                                                                              |       | -19.2                                        | H                  | 3.0             | 40.5           | 1.0            | -58.7         | -13.0          | -45.7         |       |
|                                              | High Ch, 711MHz                                                                      |       |                                              |                    |                 |                |                |               |                |               |       |
|                                              | 1422.00                                                                              |       | -16.1                                        | V                  | 3.0             | 41.7           | 1.0            | -56.8         | -13.0          | -43.8         |       |
|                                              | 2133.00                                                                              |       | -24.4                                        | V                  | 3.0             | 41.9           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                              | 2844.00                                                                              |       | -18.2                                        | V                  | 3.0             | 41.4           | 1.0            | -58.6         | -13.0          | -45.6         |       |
| 3555.00                                      |                                                                                      | -15.9 | V                                            | 3.0                | 41.0            | 1.0            | -55.8          | -13.0         | -42.8          |               |       |
| 4266.00                                      |                                                                                      | -21.9 | V                                            | 3.0                | 40.5            | 1.0            | -61.4          | -13.0         | -48.4          |               |       |
| 1422.00                                      |                                                                                      | -22.5 | H                                            | 3.0                | 41.7            | 1.0            | -63.1          | -13.0         | -50.1          |               |       |
| 2133.00                                      |                                                                                      | -23.5 | H                                            | 3.0                | 41.9            | 1.0            | -64.4          | -13.0         | -51.4          |               |       |
| 2844.00                                      |                                                                                      | -17.3 | H                                            | 3.0                | 41.4            | 1.0            | -57.7          | -13.0         | -44.7          |               |       |
| 3555.00                                      |                                                                                      | -15.2 | H                                            | 3.0                | 41.0            | 1.0            | -55.2          | -13.0         | -42.2          |               |       |
| 4266.00                                      |                                                                                      | -20.7 | H                                            | 3.0                | 40.5            | 1.0            | -60.2          | -13.0         | -47.2          |               |       |

|                                 |  |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|---------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 12<br>5MHz<br>QPSK  |  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-17<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, Z-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 12 Harmonics, 5MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                 |  | Low Ch, 701.5MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | 1403.00                                                                                                                                                                                                                     | -15.8               | V                  | 3.0             | 41.7           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|                                 |  | 2104.50                                                                                                                                                                                                                     | -23.3               | V                  | 3.0             | 42.0           | 1.0            | -64.3         | -13.0          | -51.3         |       |
|                                 |  | 2806.00                                                                                                                                                                                                                     | -18.5               | V                  | 3.0             | 41.5           | 1.0            | -59.0         | -13.0          | -46.0         |       |
|                                 |  | 3507.50                                                                                                                                                                                                                     | -13.8               | V                  | 3.0             | 41.0           | 1.0            | -53.8         | -13.0          | -40.8         |       |
|                                 |  | 4209.00                                                                                                                                                                                                                     | -20.6               | V                  | 3.0             | 40.6           | 1.0            | -60.1         | -13.0          | -47.1         |       |
|                                 |  | 1403.00                                                                                                                                                                                                                     | -19.9               | H                  | 3.0             | 41.7           | 1.0            | -60.5         | -13.0          | -47.5         |       |
|                                 |  | 2104.50                                                                                                                                                                                                                     | -20.6               | H                  | 3.0             | 42.0           | 1.0            | -61.5         | -13.0          | -48.5         |       |
|                                 |  | 2806.00                                                                                                                                                                                                                     | -15.3               | H                  | 3.0             | 41.5           | 1.0            | -55.8         | -13.0          | -42.8         |       |
|                                 |  | 3507.50                                                                                                                                                                                                                     | -12.2               | H                  | 3.0             | 41.0           | 1.0            | -52.2         | -13.0          | -39.2         |       |
|                                 |  | 4209.00                                                                                                                                                                                                                     | -18.4               | H                  | 3.0             | 40.6           | 1.0            | -58.0         | -13.0          | -45.0         |       |
|                                 |  | Mid Ch, 707.5MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | 1415.00                                                                                                                                                                                                                     | -10.0               | V                  | 3.0             | 41.7           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                                 |  | 2122.50                                                                                                                                                                                                                     | -22.8               | V                  | 3.0             | 41.9           | 1.0            | -63.7         | -13.0          | -50.7         |       |
|                                 |  | 2830.00                                                                                                                                                                                                                     | -17.7               | V                  | 3.0             | 41.4           | 1.0            | -58.2         | -13.0          | -45.2         |       |
|                                 |  | 3537.50                                                                                                                                                                                                                     | -13.5               | V                  | 3.0             | 41.0           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                                 |  | 4245.00                                                                                                                                                                                                                     | -18.6               | V                  | 3.0             | 40.5           | 1.0            | -58.1         | -13.0          | -45.1         |       |
|                                 |  | 1415.00                                                                                                                                                                                                                     | -15.1               | H                  | 3.0             | 41.7           | 1.0            | -55.8         | -13.0          | -42.8         |       |
|                                 |  | 2122.50                                                                                                                                                                                                                     | -19.1               | H                  | 3.0             | 41.9           | 1.0            | -60.0         | -13.0          | -47.0         |       |
|                                 |  | 2830.00                                                                                                                                                                                                                     | -14.6               | H                  | 3.0             | 41.4           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                 |  | 3537.50                                                                                                                                                                                                                     | -11.4               | H                  | 3.0             | 41.0           | 1.0            | -51.4         | -13.0          | -38.4         |       |
|                                 |  | 4245.00                                                                                                                                                                                                                     | -17.0               | H                  | 3.0             | 40.5           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|                                 |  | High Ch, 713.5MHz                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | 1427.00                                                                                                                                                                                                                     | -13.7               | V                  | 3.0             | 41.7           | 1.0            | -54.4         | -13.0          | -41.4         |       |
|                                 |  | 2140.50                                                                                                                                                                                                                     | -23.4               | V                  | 3.0             | 41.9           | 1.0            | -64.4         | -13.0          | -51.4         |       |
|                                 |  | 2854.00                                                                                                                                                                                                                     | -19.5               | V                  | 3.0             | 41.4           | 1.0            | -60.0         | -13.0          | -47.0         |       |
|                                 |  | 3567.50                                                                                                                                                                                                                     | -13.2               | V                  | 3.0             | 41.0           | 1.0            | -53.1         | -13.0          | -40.1         |       |
|                                 |  | 4281.00                                                                                                                                                                                                                     | -19.5               | V                  | 3.0             | 40.5           | 1.0            | -59.0         | -13.0          | -46.0         |       |
|                                 |  | 1427.00                                                                                                                                                                                                                     | -19.2               | H                  | 3.0             | 41.7           | 1.0            | -59.9         | -13.0          | -46.9         |       |
|                                 |  | 2140.50                                                                                                                                                                                                                     | -20.7               | H                  | 3.0             | 41.9           | 1.0            | -61.7         | -13.0          | -48.7         |       |
|                                 |  | 2854.00                                                                                                                                                                                                                     | -16.9               | H                  | 3.0             | 41.4           | 1.0            | -57.3         | -13.0          | -44.3         |       |
|                                 |  | 3567.50                                                                                                                                                                                                                     | -11.2               | H                  | 3.0             | 41.0           | 1.0            | -51.2         | -13.0          | -38.2         |       |
|                                 |  | 4281.00                                                                                                                                                                                                                     | -18.7               | H                  | 3.0             | 40.5           | 1.0            | -58.2         | -13.0          | -45.2         |       |
| LTE<br>Band 12<br>5MHz<br>16QAM |  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-17<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, Z-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 12 Harmonics, 5MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                 |  | Low Ch, 701.5MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | 1403.00                                                                                                                                                                                                                     | -19.2               | V                  | 3.0             | 41.7           | 1.0            | -59.8         | -13.0          | -46.8         |       |
|                                 |  | 2104.50                                                                                                                                                                                                                     | -25.7               | V                  | 3.0             | 42.0           | 1.0            | -66.7         | -13.0          | -53.7         |       |
|                                 |  | 2806.00                                                                                                                                                                                                                     | -19.3               | V                  | 3.0             | 41.5           | 1.0            | -59.7         | -13.0          | -46.7         |       |
|                                 |  | 3507.50                                                                                                                                                                                                                     | -15.8               | V                  | 3.0             | 41.0           | 1.0            | -55.8         | -13.0          | -42.8         |       |
|                                 |  | 4209.00                                                                                                                                                                                                                     | -22.6               | V                  | 3.0             | 40.6           | 1.0            | -62.1         | -13.0          | -49.1         |       |
|                                 |  | 1403.00                                                                                                                                                                                                                     | -23.1               | H                  | 3.0             | 41.7           | 1.0            | -63.7         | -13.0          | -50.7         |       |
|                                 |  | 2104.50                                                                                                                                                                                                                     | -21.9               | H                  | 3.0             | 42.0           | 1.0            | -62.9         | -13.0          | -49.9         |       |
|                                 |  | 2806.00                                                                                                                                                                                                                     | -17.5               | H                  | 3.0             | 41.5           | 1.0            | -57.9         | -13.0          | -44.9         |       |
|                                 |  | 3507.50                                                                                                                                                                                                                     | -14.5               | H                  | 3.0             | 41.0           | 1.0            | -54.5         | -13.0          | -41.5         |       |
|                                 |  | 4209.00                                                                                                                                                                                                                     | -20.7               | H                  | 3.0             | 40.6           | 1.0            | -60.3         | -13.0          | -47.3         |       |
|                                 |  | Mid Ch, 707.5MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | 1415.00                                                                                                                                                                                                                     | -12.8               | V                  | 3.0             | 41.7           | 1.0            | -53.4         | -13.0          | -40.4         |       |
|                                 |  | 2122.50                                                                                                                                                                                                                     | -23.5               | V                  | 3.0             | 41.9           | 1.0            | -64.4         | -13.0          | -51.4         |       |
|                                 |  | 2830.00                                                                                                                                                                                                                     | -18.6               | V                  | 3.0             | 41.4           | 1.0            | -59.1         | -13.0          | -46.1         |       |
|                                 |  | 3537.50                                                                                                                                                                                                                     | -16.3               | V                  | 3.0             | 41.0           | 1.0            | -56.2         | -13.0          | -43.2         |       |
|                                 |  | 4245.00                                                                                                                                                                                                                     | -20.3               | V                  | 3.0             | 40.5           | 1.0            | -59.8         | -13.0          | -46.8         |       |
|                                 |  | 1415.00                                                                                                                                                                                                                     | -18.7               | H                  | 3.0             | 41.7           | 1.0            | -59.4         | -13.0          | -46.4         |       |
|                                 |  | 2122.50                                                                                                                                                                                                                     | -21.2               | H                  | 3.0             | 41.9           | 1.0            | -62.1         | -13.0          | -49.1         |       |
|                                 |  | 2830.00                                                                                                                                                                                                                     | -16.8               | H                  | 3.0             | 41.4           | 1.0            | -57.3         | -13.0          | -44.3         |       |
|                                 |  | 3537.50                                                                                                                                                                                                                     | -14.6               | H                  | 3.0             | 41.0           | 1.0            | -54.6         | -13.0          | -41.6         |       |
|                                 |  | 4245.00                                                                                                                                                                                                                     | -19.1               | H                  | 3.0             | 40.5           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|                                 |  | High Ch, 713.5MHz                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|                                 |  | 1427.00                                                                                                                                                                                                                     | -17.6               | V                  | 3.0             | 41.7           | 1.0            | -58.3         | -13.0          | -45.3         |       |
|                                 |  | 2140.50                                                                                                                                                                                                                     | -24.8               | V                  | 3.0             | 41.9           | 1.0            | -65.8         | -13.0          | -52.8         |       |
|                                 |  | 2854.00                                                                                                                                                                                                                     | -20.6               | V                  | 3.0             | 41.4           | 1.0            | -61.0         | -13.0          | -48.0         |       |
|                                 |  | 3567.50                                                                                                                                                                                                                     | -15.5               | V                  | 3.0             | 41.0           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                 |  | 4281.00                                                                                                                                                                                                                     | -21.7               | V                  | 3.0             | 40.5           | 1.0            | -61.3         | -13.0          | -48.3         |       |
|                                 |  | 1427.00                                                                                                                                                                                                                     | -21.7               | H                  | 3.0             | 41.7           | 1.0            | -62.4         | -13.0          | -49.4         |       |
|                                 |  | 2140.50                                                                                                                                                                                                                     | -22.8               | H                  | 3.0             | 41.9           | 1.0            | -63.7         | -13.0          | -50.7         |       |
|                                 |  | 2854.00                                                                                                                                                                                                                     | -18.7               | H                  | 3.0             | 41.4           | 1.0            | -59.2         | -13.0          | -46.2         |       |
|                                 |  | 3567.50                                                                                                                                                                                                                     | -14.5               | H                  | 3.0             | 41.0           | 1.0            | -54.4         | -13.0          | -41.4         |       |
|                                 |  | 4281.00                                                                                                                                                                                                                     | -21.0               | H                  | 3.0             | 40.5           | 1.0            | -60.5         | -13.0          | -47.5         |       |

|                                         |  |                                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|-----------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 12<br><br>3MHz<br><br>QPSK  |  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement<br><br>Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-17<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, Z-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 12 Harmonics, 3MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | f<br>MHz                                                                                                                                                                                                                                                                                                                | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                         |  | Low Ch, 700.5MHz                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | 1401.00                                                                                                                                                                                                                                                                                                                 | -19.1               | V                  | 3.0             | 41.7           | 1.0            | -59.8         | -13.0          | -46.8         |       |
|                                         |  | 2101.50                                                                                                                                                                                                                                                                                                                 | -20.8               | V                  | 3.0             | 42.0           | 1.0            | -61.8         | -13.0          | -48.8         |       |
|                                         |  | 2802.00                                                                                                                                                                                                                                                                                                                 | -16.8               | V                  | 3.0             | 41.5           | 1.0            | -57.3         | -13.0          | -44.3         |       |
|                                         |  | 3502.50                                                                                                                                                                                                                                                                                                                 | -12.8               | V                  | 3.0             | 41.0           | 1.0            | -52.8         | -13.0          | -39.8         |       |
|                                         |  | 4203.00                                                                                                                                                                                                                                                                                                                 | -19.6               | V                  | 3.0             | 40.6           | 1.0            | -59.1         | -13.0          | -46.1         |       |
|                                         |  | 1401.00                                                                                                                                                                                                                                                                                                                 | -24.3               | H                  | 3.0             | 41.7           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                         |  | 2101.50                                                                                                                                                                                                                                                                                                                 | -17.7               | H                  | 3.0             | 42.0           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|                                         |  | 2802.00                                                                                                                                                                                                                                                                                                                 | -13.7               | H                  | 3.0             | 41.5           | 1.0            | -54.2         | -13.0          | -41.2         |       |
|                                         |  | 3502.50                                                                                                                                                                                                                                                                                                                 | -12.8               | H                  | 3.0             | 41.0           | 1.0            | -52.8         | -13.0          | -39.8         |       |
|                                         |  | 4203.00                                                                                                                                                                                                                                                                                                                 | -17.9               | H                  | 3.0             | 40.6           | 1.0            | -57.5         | -13.0          | -44.5         |       |
|                                         |  | Mid Ch, 707.5MHz                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | 1415.00                                                                                                                                                                                                                                                                                                                 | -10.7               | V                  | 3.0             | 41.7           | 1.0            | -51.4         | -13.0          | -38.4         |       |
|                                         |  | 2122.50                                                                                                                                                                                                                                                                                                                 | -19.3               | V                  | 3.0             | 41.9           | 1.0            | -60.2         | -13.0          | -47.2         |       |
|                                         |  | 2830.00                                                                                                                                                                                                                                                                                                                 | -16.8               | V                  | 3.0             | 41.4           | 1.0            | -57.2         | -13.0          | -44.2         |       |
|                                         |  | 3537.50                                                                                                                                                                                                                                                                                                                 | -11.4               | V                  | 3.0             | 41.0           | 1.0            | -51.4         | -13.0          | -38.4         |       |
|                                         |  | 4245.00                                                                                                                                                                                                                                                                                                                 | -17.7               | V                  | 3.0             | 40.5           | 1.0            | -57.2         | -13.0          | -44.2         |       |
|                                         |  | 1415.00                                                                                                                                                                                                                                                                                                                 | -15.6               | H                  | 3.0             | 41.7           | 1.0            | -56.3         | -13.0          | -43.3         |       |
|                                         |  | 2122.50                                                                                                                                                                                                                                                                                                                 | -14.5               | H                  | 3.0             | 41.9           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                         |  | 2830.00                                                                                                                                                                                                                                                                                                                 | -13.6               | H                  | 3.0             | 41.4           | 1.0            | -54.0         | -13.0          | -41.0         |       |
|                                         |  | 3537.50                                                                                                                                                                                                                                                                                                                 | -12.7               | H                  | 3.0             | 41.0           | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                                         |  | 4245.00                                                                                                                                                                                                                                                                                                                 | -17.1               | H                  | 3.0             | 40.5           | 1.0            | -56.7         | -13.0          | -43.7         |       |
|                                         |  | High Ch, 714.5MHz                                                                                                                                                                                                                                                                                                       |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | 1429.00                                                                                                                                                                                                                                                                                                                 | -13.3               | V                  | 3.0             | 41.7           | 1.0            | -54.0         | -13.0          | -41.0         |       |
|                                         |  | 2143.50                                                                                                                                                                                                                                                                                                                 | -21.3               | V                  | 3.0             | 41.9           | 1.0            | -62.2         | -13.0          | -49.2         |       |
|                                         |  | 2858.00                                                                                                                                                                                                                                                                                                                 | -15.7               | V                  | 3.0             | 41.4           | 1.0            | -56.1         | -13.0          | -43.1         |       |
|                                         |  | 3572.50                                                                                                                                                                                                                                                                                                                 | -12.5               | V                  | 3.0             | 40.9           | 1.0            | -52.5         | -13.0          | -39.5         |       |
|                                         |  | 4287.00                                                                                                                                                                                                                                                                                                                 | -18.7               | V                  | 3.0             | 40.5           | 1.0            | -58.2         | -13.0          | -45.2         |       |
|                                         |  | 1429.00                                                                                                                                                                                                                                                                                                                 | -17.1               | H                  | 3.0             | 41.7           | 1.0            | -57.7         | -13.0          | -44.7         |       |
|                                         |  | 2143.50                                                                                                                                                                                                                                                                                                                 | -19.1               | H                  | 3.0             | 41.9           | 1.0            | -60.0         | -13.0          | -47.0         |       |
|                                         |  | 2858.00                                                                                                                                                                                                                                                                                                                 | -16.1               | H                  | 3.0             | 41.4           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|                                         |  | 3572.50                                                                                                                                                                                                                                                                                                                 | -13.3               | H                  | 3.0             | 40.9           | 1.0            | -53.2         | -13.0          | -40.2         |       |
|                                         |  | 4287.00                                                                                                                                                                                                                                                                                                                 | -21.9               | H                  | 3.0             | 40.5           | 1.0            | -61.4         | -13.0          | -48.4         |       |
|                                         |  |                                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                                         |  |                                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
| LTE<br>Band 12<br><br>3MHz<br><br>16QAM |  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement<br><br>Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-17<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, Z-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 12 Harmonics, 3MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | f<br>MHz                                                                                                                                                                                                                                                                                                                | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                         |  | Low Ch, 700.5MHz                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | 1401.00                                                                                                                                                                                                                                                                                                                 | -21.4               | V                  | 3.0             | 41.7           | 1.0            | -62.1         | -13.0          | -49.1         |       |
|                                         |  | 2101.50                                                                                                                                                                                                                                                                                                                 | -23.5               | V                  | 3.0             | 42.0           | 1.0            | -64.4         | -13.0          | -51.4         |       |
|                                         |  | 2802.00                                                                                                                                                                                                                                                                                                                 | -19.1               | V                  | 3.0             | 41.5           | 1.0            | -59.6         | -13.0          | -46.6         |       |
|                                         |  | 3502.50                                                                                                                                                                                                                                                                                                                 | -15.3               | V                  | 3.0             | 41.0           | 1.0            | -55.3         | -13.0          | -42.3         |       |
|                                         |  | 4203.00                                                                                                                                                                                                                                                                                                                 | -21.1               | V                  | 3.0             | 40.6           | 1.0            | -60.7         | -13.0          | -47.7         |       |
|                                         |  | 1401.00                                                                                                                                                                                                                                                                                                                 | -26.6               | H                  | 3.0             | 41.7           | 1.0            | -67.3         | -13.0          | -54.3         |       |
|                                         |  | 2101.50                                                                                                                                                                                                                                                                                                                 | -20.1               | H                  | 3.0             | 42.0           | 1.0            | -61.1         | -13.0          | -48.1         |       |
|                                         |  | 2802.00                                                                                                                                                                                                                                                                                                                 | -16.4               | H                  | 3.0             | 41.5           | 1.0            | -56.8         | -13.0          | -43.8         |       |
|                                         |  | 3502.50                                                                                                                                                                                                                                                                                                                 | -14.7               | H                  | 3.0             | 41.0           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                                         |  | 4203.00                                                                                                                                                                                                                                                                                                                 | -19.9               | H                  | 3.0             | 40.6           | 1.0            | -59.5         | -13.0          | -46.5         |       |
|                                         |  | Mid Ch, 707.5MHz                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | 1415.00                                                                                                                                                                                                                                                                                                                 | -12.7               | V                  | 3.0             | 41.7           | 1.0            | -53.3         | -13.0          | -40.3         |       |
|                                         |  | 2122.50                                                                                                                                                                                                                                                                                                                 | -23.7               | V                  | 3.0             | 41.9           | 1.0            | -64.6         | -13.0          | -51.6         |       |
|                                         |  | 2830.00                                                                                                                                                                                                                                                                                                                 | -17.6               | V                  | 3.0             | 41.4           | 1.0            | -58.1         | -13.0          | -45.1         |       |
|                                         |  | 3537.50                                                                                                                                                                                                                                                                                                                 | -14.1               | V                  | 3.0             | 41.0           | 1.0            | -54.1         | -13.0          | -41.1         |       |
|                                         |  | 4245.00                                                                                                                                                                                                                                                                                                                 | -19.6               | V                  | 3.0             | 40.5           | 1.0            | -59.1         | -13.0          | -46.1         |       |
|                                         |  | 1415.00                                                                                                                                                                                                                                                                                                                 | -18.9               | H                  | 3.0             | 41.7           | 1.0            | -59.5         | -13.0          | -46.5         |       |
|                                         |  | 2122.50                                                                                                                                                                                                                                                                                                                 | -20.5               | H                  | 3.0             | 41.9           | 1.0            | -61.4         | -13.0          | -48.4         |       |
|                                         |  | 2830.00                                                                                                                                                                                                                                                                                                                 | -15.9               | H                  | 3.0             | 41.4           | 1.0            | -56.4         | -13.0          | -43.4         |       |
|                                         |  | 3537.50                                                                                                                                                                                                                                                                                                                 | -15.6               | H                  | 3.0             | 41.0           | 1.0            | -55.6         | -13.0          | -42.6         |       |
|                                         |  | 4245.00                                                                                                                                                                                                                                                                                                                 | -19.0               | H                  | 3.0             | 40.5           | 1.0            | -58.5         | -13.0          | -45.5         |       |
|                                         |  | High Ch, 714.5MHz                                                                                                                                                                                                                                                                                                       |                     |                    |                 |                |                |               |                |               |       |
|                                         |  | 1429.00                                                                                                                                                                                                                                                                                                                 | -16.0               | V                  | 3.0             | 41.7           | 1.0            | -56.7         | -13.0          | -43.7         |       |
|                                         |  | 2143.50                                                                                                                                                                                                                                                                                                                 | -24.1               | V                  | 3.0             | 41.9           | 1.0            | -65.1         | -13.0          | -52.1         |       |
|                                         |  | 2858.00                                                                                                                                                                                                                                                                                                                 | -18.2               | V                  | 3.0             | 41.4           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|                                         |  | 3572.50                                                                                                                                                                                                                                                                                                                 | -13.5               | V                  | 3.0             | 40.9           | 1.0            | -53.4         | -13.0          | -40.4         |       |
|                                         |  | 4287.00                                                                                                                                                                                                                                                                                                                 | -21.5               | V                  | 3.0             | 40.5           | 1.0            | -61.0         | -13.0          | -48.0         |       |
|                                         |  | 1429.00                                                                                                                                                                                                                                                                                                                 | -19.2               | H                  | 3.0             | 41.7           | 1.0            | -59.9         | -13.0          | -46.9         |       |
|                                         |  | 2143.50                                                                                                                                                                                                                                                                                                                 | -21.7               | H                  | 3.0             | 41.9           | 1.0            | -62.7         | -13.0          | -49.7         |       |
|                                         |  | 2858.00                                                                                                                                                                                                                                                                                                                 | -18.5               | H                  | 3.0             | 41.4           | 1.0            | -58.9         | -13.0          | -45.9         |       |
|                                         |  | 3572.50                                                                                                                                                                                                                                                                                                                 | -15.4               | H                  | 3.0             | 40.9           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                         |  | 4287.00                                                                                                                                                                                                                                                                                                                 | -23.5               | H                  | 3.0             | 40.5           | 1.0            | -63.0         | -13.0          | -50.0         |       |
|                                         |  |                                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                                         |  |                                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |

|     |         |        |      |                                                                                                                                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|-----|---------|--------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE | Band 12 | 1.4MHz | QPSK | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement<br><br>Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-17<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, Z-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 12 Harmonics, 1.4MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      | f<br>MHz                                                                                                                                                                                                                                                                                                                 | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|     |         |        |      | Low Ch, 699.7MHz                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      | 1399.40                                                                                                                                                                                                                                                                                                                  | -17.5               | V                  | 3.0             | 41.7           | 1.0            | -58.2         | -13.0          | -45.2         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 2099.10                                                                                                                                                                                                                                                                                                                  | -22.6               | V                  | 3.0             | 42.0           | 1.0            | -63.6         | -13.0          | -50.6         |       |
|     |         |        |      | 2798.80                                                                                                                                                                                                                                                                                                                  | -16.0               | V                  | 3.0             | 41.5           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|     |         |        |      | 3498.50                                                                                                                                                                                                                                                                                                                  | -13.5               | V                  | 3.0             | 41.0           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|     |         |        |      | 4198.20                                                                                                                                                                                                                                                                                                                  | -20.3               | V                  | 3.0             | 40.6           | 1.0            | -59.9         | -13.0          | -46.9         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 1399.40                                                                                                                                                                                                                                                                                                                  | -22.7               | H                  | 3.0             | 41.7           | 1.0            | -63.4         | -13.0          | -50.4         |       |
|     |         |        |      | 2099.10                                                                                                                                                                                                                                                                                                                  | -18.3               | H                  | 3.0             | 42.0           | 1.0            | -59.3         | -13.0          | -46.3         |       |
|     |         |        |      | 2798.80                                                                                                                                                                                                                                                                                                                  | -13.1               | H                  | 3.0             | 41.5           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|     |         |        |      | 3498.50                                                                                                                                                                                                                                                                                                                  | -12.9               | H                  | 3.0             | 41.0           | 1.0            | -52.9         | -13.0          | -39.9         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 4198.20                                                                                                                                                                                                                                                                                                                  | -20.5               | H                  | 3.0             | 40.6           | 1.0            | -60.1         | -13.0          | -47.1         |       |
|     |         |        |      | Mid Ch, 707.5MHz                                                                                                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      | 1415.00                                                                                                                                                                                                                                                                                                                  | -9.1                | V                  | 3.0             | 41.7           | 1.0            | -49.8         | -13.0          | -36.8         |       |
|     |         |        |      | 2122.50                                                                                                                                                                                                                                                                                                                  | -22.0               | V                  | 3.0             | 41.9           | 1.0            | -62.9         | -13.0          | -49.9         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 2830.00                                                                                                                                                                                                                                                                                                                  | -16.3               | V                  | 3.0             | 41.4           | 1.0            | -56.8         | -13.0          | -43.8         |       |
|     |         |        |      | 3537.50                                                                                                                                                                                                                                                                                                                  | -11.8               | V                  | 3.0             | 41.0           | 1.0            | -51.8         | -13.0          | -38.8         |       |
|     |         |        |      | 4245.00                                                                                                                                                                                                                                                                                                                  | -19.1               | V                  | 3.0             | 40.5           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|     |         |        |      | 1415.00                                                                                                                                                                                                                                                                                                                  | -15.3               | H                  | 3.0             | 41.7           | 1.0            | -56.0         | -13.0          | -43.0         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 2122.50                                                                                                                                                                                                                                                                                                                  | -13.1               | H                  | 3.0             | 41.9           | 1.0            | -54.1         | -13.0          | -41.1         |       |
|     |         |        |      | 2830.00                                                                                                                                                                                                                                                                                                                  | -15.1               | H                  | 3.0             | 41.4           | 1.0            | -55.5         | -13.0          | -42.5         |       |
|     |         |        |      | 3537.50                                                                                                                                                                                                                                                                                                                  | -12.8               | H                  | 3.0             | 41.0           | 1.0            | -52.8         | -13.0          | -39.8         |       |
|     |         |        |      | 4245.00                                                                                                                                                                                                                                                                                                                  | -17.9               | H                  | 3.0             | 40.5           | 1.0            | -57.4         | -13.0          | -44.4         |       |
| LTE | Band 12 | 1.4MHz | QPSK | High Ch, 715.3MHz                                                                                                                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      | 1430.60                                                                                                                                                                                                                                                                                                                  | -11.7               | V                  | 3.0             | 41.7           | 1.0            | -52.4         | -13.0          | -39.4         |       |
|     |         |        |      | 2145.90                                                                                                                                                                                                                                                                                                                  | -21.3               | V                  | 3.0             | 41.9           | 1.0            | -62.2         | -13.0          | -49.2         |       |
|     |         |        |      | 2861.20                                                                                                                                                                                                                                                                                                                  | -14.9               | V                  | 3.0             | 41.4           | 1.0            | -55.3         | -13.0          | -42.3         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 3576.50                                                                                                                                                                                                                                                                                                                  | -10.8               | V                  | 3.0             | 40.9           | 1.0            | -50.7         | -13.0          | -37.7         |       |
|     |         |        |      | 4291.80                                                                                                                                                                                                                                                                                                                  | -17.6               | V                  | 3.0             | 40.5           | 1.0            | -57.1         | -13.0          | -44.1         |       |
|     |         |        |      | 1430.60                                                                                                                                                                                                                                                                                                                  | -15.5               | H                  | 3.0             | 41.7           | 1.0            | -56.1         | -13.0          | -43.1         |       |
|     |         |        |      | 2145.90                                                                                                                                                                                                                                                                                                                  | -18.2               | H                  | 3.0             | 41.9           | 1.0            | -59.1         | -13.0          | -46.1         |       |
| LTE | Band 12 | 1.4MHz | QPSK | 2861.20                                                                                                                                                                                                                                                                                                                  | -13.4               | H                  | 3.0             | 41.4           | 1.0            | -53.9         | -13.0          | -40.9         |       |
|     |         |        |      | 3576.50                                                                                                                                                                                                                                                                                                                  | -14.2               | H                  | 3.0             | 40.9           | 1.0            | -54.2         | -13.0          | -41.2         |       |
|     |         |        |      | 4291.80                                                                                                                                                                                                                                                                                                                  | -18.3               | H                  | 3.0             | 40.5           | 1.0            | -57.8         | -13.0          | -44.8         |       |
| LTE | Band 12 | 1.4MHz | QPSK |                                                                                                                                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      |                                                                                                                                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      |                                                                                                                                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|     |         |        |      |                                                                                                                                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |

**LTE Band 13**

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| <p>LTE<br/>Band 13<br/>10MHz<br/>QPSK</p>  | <p style="text-align: center;"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p> <b>Company:</b> Samsung<br/> <b>Project #:</b> 4788404110<br/> <b>Date:</b> 2018-04-17<br/> <b>Test Engineer:</b> 47989<br/> <b>Configuration:</b> EUT / AC Adapter / Earphone, Z-Position<br/> <b>Location:</b> Chamber 2<br/> <b>Mode:</b> LTE_QPSK Band 13 Harmonics, 10MHz Bandwidth </p>  |                     |                    |                 |                |                |               |                |               |       |
|                                            | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                  | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                            | Mid Ch, 782MHz                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                            | 1564.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -7.5                | V                  | 3.0             | 38.2           | 1.0            | -44.7         | -40.0          | -4.7          |       |
|                                            | 2346.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -23.4               | V                  | 3.0             | 38.7           | 1.0            | -61.1         | -13.0          | -48.1         |       |
|                                            | 3128.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -28.6               | V                  | 3.0             | 39.3           | 1.0            | -66.9         | -13.0          | -53.9         |       |
|                                            | 3910.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -26.4               | V                  | 3.0             | 39.8           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                            | 1564.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -8.5                | H                  | 3.0             | 38.2           | 1.0            | -45.7         | -40.0          | -5.7          |       |
|                                            | 2346.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -24.3               | H                  | 3.0             | 38.7           | 1.0            | -62.0         | -13.0          | -49.0         |       |
|                                            | 3128.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -27.8               | H                  | 3.0             | 39.3           | 1.0            | -66.2         | -13.0          | -53.2         |       |
|                                            | 3910.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -26.3               | H                  | 3.0             | 39.8           | 1.0            | -65.1         | -13.0          | -52.1         |       |
| <p>LTE<br/>Band 13<br/>10MHz<br/>16QAM</p> | <p style="text-align: center;"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p> <b>Company:</b> Samsung<br/> <b>Project #:</b> 4788404110<br/> <b>Date:</b> 2018-04-17<br/> <b>Test Engineer:</b> 47989<br/> <b>Configuration:</b> EUT / AC Adapter / Earphone, Z-Position<br/> <b>Location:</b> Chamber 2<br/> <b>Mode:</b> LTE_16QAM Band 13 Harmonics, 10MHz Bandwidth </p> |                     |                    |                 |                |                |               |                |               |       |
|                                            | f<br>MHz                                                                                                                                                                                                                                                                                                                                                                                                                                  | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                            | Mid Ch, 782MHz                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                            | 1564.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -8.9                | V                  | 3.0             | 38.2           | 1.0            | -46.1         | -40.0          | -6.1          |       |
|                                            | 2346.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -24.6               | V                  | 3.0             | 38.7           | 1.0            | -62.3         | -13.0          | -49.3         |       |
|                                            | 3128.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -28.9               | V                  | 3.0             | 39.3           | 1.0            | -67.2         | -13.0          | -54.2         |       |
|                                            | 3910.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -26.9               | V                  | 3.0             | 39.8           | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                            | 1564.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -10.1               | H                  | 3.0             | 38.2           | 1.0            | -47.3         | -40.0          | -7.3          |       |
|                                            | 2346.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -25.4               | H                  | 3.0             | 38.7           | 1.0            | -63.1         | -13.0          | -50.1         |       |
|                                            | 3128.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -28.3               | H                  | 3.0             | 39.3           | 1.0            | -66.6         | -13.0          | -53.6         |       |
|                                            | 3910.00                                                                                                                                                                                                                                                                                                                                                                                                                                   | -26.7               | H                  | 3.0             | 39.8           | 1.0            | -65.5         | -13.0          | -52.5         |       |

| UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                                             |                 |                |                |               |                |               |       |
|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| Company:                                                                             |                     | Samsung                                     |                 |                |                |               |                |               |       |
| Project #:                                                                           |                     | 4788404110                                  |                 |                |                |               |                |               |       |
| Date:                                                                                |                     | 2018-04-17                                  |                 |                |                |               |                |               |       |
| Test Engineer:                                                                       |                     | 47989                                       |                 |                |                |               |                |               |       |
| Configuration:                                                                       |                     | EUT / AC Adapter / Earphone, Z-Position     |                 |                |                |               |                |               |       |
| Location:                                                                            |                     | Chamber 2                                   |                 |                |                |               |                |               |       |
| Mode:                                                                                |                     | LTE_QPSK Band 13 Harmonics, 5MHz Bandwidth  |                 |                |                |               |                |               |       |
| f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)                          | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| Low Ch, 779.5MHz                                                                     |                     |                                             |                 |                |                |               |                |               |       |
| 1559.00                                                                              | -7.5                | V                                           | 3.0             | 38.2           | 1.0            | -44.7         | -40.0          | -4.7          |       |
| 2338.50                                                                              | -24.3               | V                                           | 3.0             | 38.7           | 1.0            | -62.0         | -13.0          | -49.0         |       |
| 3118.00                                                                              | -29.4               | V                                           | 3.0             | 39.3           | 1.0            | -67.7         | -13.0          | -54.7         |       |
| 3897.50                                                                              | -26.1               | V                                           | 3.0             | 39.8           | 1.0            | -64.9         | -13.0          | -51.9         |       |
| 1559.00                                                                              | -8.0                | H                                           | 3.0             | 38.2           | 1.0            | -45.2         | -40.0          | -5.2          |       |
| 2338.50                                                                              | -27.5               | H                                           | 3.0             | 38.7           | 1.0            | -65.2         | -13.0          | -52.2         |       |
| 3118.00                                                                              | -28.5               | H                                           | 3.0             | 39.3           | 1.0            | -66.8         | -13.0          | -53.8         |       |
| 3897.50                                                                              | -25.6               | H                                           | 3.0             | 39.8           | 1.0            | -64.4         | -13.0          | -51.4         |       |
| Mid Ch, 782MHz                                                                       |                     |                                             |                 |                |                |               |                |               |       |
| 1564.00                                                                              | -7.8                | V                                           | 3.0             | 38.2           | 1.0            | -45.0         | -40.0          | -5.0          |       |
| 2346.00                                                                              | -23.9               | V                                           | 3.0             | 38.7           | 1.0            | -61.6         | -13.0          | -48.6         |       |
| 3128.00                                                                              | -28.8               | V                                           | 3.0             | 39.3           | 1.0            | -67.1         | -13.0          | -54.1         |       |
| 3910.00                                                                              | -26.7               | V                                           | 3.0             | 39.8           | 1.0            | -65.5         | -13.0          | -52.5         |       |
| 1564.00                                                                              | -8.0                | H                                           | 3.0             | 38.2           | 1.0            | -45.2         | -40.0          | -5.2          |       |
| 2346.00                                                                              | -23.9               | H                                           | 3.0             | 38.7           | 1.0            | -61.6         | -13.0          | -48.6         |       |
| 3128.00                                                                              | -28.4               | H                                           | 3.0             | 39.3           | 1.0            | -66.7         | -13.0          | -53.7         |       |
| 3910.00                                                                              | -26.3               | H                                           | 3.0             | 39.8           | 1.0            | -65.1         | -13.0          | -52.1         |       |
| High Ch, 784.5MHz                                                                    |                     |                                             |                 |                |                |               |                |               |       |
| 1569.00                                                                              | -7.2                | V                                           | 3.0             | 38.2           | 1.0            | -44.4         | -40.0          | -4.4          |       |
| 2353.50                                                                              | -26.1               | V                                           | 3.0             | 38.7           | 1.0            | -63.8         | -13.0          | -50.8         |       |
| 3138.00                                                                              | -28.4               | V                                           | 3.0             | 39.3           | 1.0            | -66.8         | -13.0          | -53.8         |       |
| 3922.50                                                                              | -26.8               | V                                           | 3.0             | 39.8           | 1.0            | -65.6         | -13.0          | -52.6         |       |
| 1569.00                                                                              | -7.5                | H                                           | 3.0             | 38.2           | 1.0            | -44.7         | -40.0          | -4.7          |       |
| 2353.50                                                                              | -24.7               | H                                           | 3.0             | 38.7           | 1.0            | -62.4         | -13.0          | -49.4         |       |
| 3138.00                                                                              | -27.2               | H                                           | 3.0             | 39.3           | 1.0            | -65.5         | -13.0          | -52.5         |       |
| 3922.50                                                                              | -25.8               | H                                           | 3.0             | 39.8           | 1.0            | -64.6         | -13.0          | -51.6         |       |
| UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                                             |                 |                |                |               |                |               |       |
| Company:                                                                             |                     | Samsung                                     |                 |                |                |               |                |               |       |
| Project #:                                                                           |                     | 4788404110                                  |                 |                |                |               |                |               |       |
| Date:                                                                                |                     | 2018-04-17                                  |                 |                |                |               |                |               |       |
| Test Engineer:                                                                       |                     | 47989                                       |                 |                |                |               |                |               |       |
| Configuration:                                                                       |                     | EUT / AC Adapter / Earphone, Z-Position     |                 |                |                |               |                |               |       |
| Location:                                                                            |                     | Chamber 2                                   |                 |                |                |               |                |               |       |
| Mode:                                                                                |                     | LTE_16QAM Band 13 Harmonics, 5MHz Bandwidth |                 |                |                |               |                |               |       |
| f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)                          | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| Low Ch, 779.5MHz                                                                     |                     |                                             |                 |                |                |               |                |               |       |
| 1559.00                                                                              | -9.2                | V                                           | 3.0             | 38.2           | 1.0            | -46.4         | -40.0          | -6.4          |       |
| 2338.50                                                                              | -25.5               | V                                           | 3.0             | 38.7           | 1.0            | -63.2         | -13.0          | -50.2         |       |
| 3118.00                                                                              | -29.9               | V                                           | 3.0             | 39.3           | 1.0            | -68.2         | -13.0          | -55.2         |       |
| 3897.50                                                                              | -26.5               | V                                           | 3.0             | 39.8           | 1.0            | -65.2         | -13.0          | -52.2         |       |
| 1559.00                                                                              | -9.7                | H                                           | 3.0             | 38.2           | 1.0            | -46.9         | -40.0          | -6.9          |       |
| 2338.50                                                                              | -28.4               | H                                           | 3.0             | 38.7           | 1.0            | -66.1         | -13.0          | -53.1         |       |
| 3118.00                                                                              | -29.6               | H                                           | 3.0             | 39.3           | 1.0            | -67.9         | -13.0          | -54.9         |       |
| 3897.50                                                                              | -26.3               | H                                           | 3.0             | 39.8           | 1.0            | -65.1         | -13.0          | -52.1         |       |
| Mid Ch, 782MHz                                                                       |                     |                                             |                 |                |                |               |                |               |       |
| 1564.00                                                                              | -9.5                | V                                           | 3.0             | 38.2           | 1.0            | -46.6         | -40.0          | -6.6          |       |
| 2346.00                                                                              | -25.3               | V                                           | 3.0             | 38.7           | 1.0            | -63.0         | -13.0          | -50.0         |       |
| 3128.00                                                                              | -28.9               | V                                           | 3.0             | 39.3           | 1.0            | -67.2         | -13.0          | -54.2         |       |
| 3910.00                                                                              | -27.3               | V                                           | 3.0             | 39.8           | 1.0            | -66.0         | -13.0          | -53.0         |       |
| 1564.00                                                                              | -9.6                | H                                           | 3.0             | 38.2           | 1.0            | -46.8         | -40.0          | -6.8          |       |
| 2346.00                                                                              | -25.3               | H                                           | 3.0             | 38.7           | 1.0            | -63.0         | -13.0          | -50.0         |       |
| 3128.00                                                                              | -28.7               | H                                           | 3.0             | 39.3           | 1.0            | -67.0         | -13.0          | -54.0         |       |
| 3910.00                                                                              | -26.9               | H                                           | 3.0             | 39.8           | 1.0            | -65.7         | -13.0          | -52.7         |       |
| High Ch, 784.5MHz                                                                    |                     |                                             |                 |                |                |               |                |               |       |
| 1569.00                                                                              | -9.0                | V                                           | 3.0             | 38.2           | 1.0            | -46.2         | -40.0          | -6.2          |       |
| 2353.50                                                                              | -27.5               | V                                           | 3.0             | 38.7           | 1.0            | -65.2         | -13.0          | -52.2         |       |
| 3138.00                                                                              | -28.6               | V                                           | 3.0             | 39.3           | 1.0            | -67.0         | -13.0          | -54.0         |       |
| 3922.50                                                                              | -27.1               | V                                           | 3.0             | 39.8           | 1.0            | -65.8         | -13.0          | -52.8         |       |
| 1569.00                                                                              | -9.1                | H                                           | 3.0             | 38.2           | 1.0            | -46.3         | -40.0          | -6.3          |       |
| 2353.50                                                                              | -26.4               | H                                           | 3.0             | 38.7           | 1.0            | -64.1         | -13.0          | -51.1         |       |
| 3138.00                                                                              | -27.7               | H                                           | 3.0             | 39.3           | 1.0            | -66.0         | -13.0          | -53.0         |       |
| 3922.50                                                                              | -26.4               | H                                           | 3.0             | 39.8           | 1.0            | -65.2         | -13.0          | -52.2         |       |

**LTE Band 66**

|                                  |                                                                                                                                                                                                                              |                     |                    |                 |                |                |               |                |               |       |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 66<br>20MHz<br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                                  | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 66 Harmonics, 20MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                  | f<br>MHz                                                                                                                                                                                                                     | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                  | Low Ch, 1720MHz                                                                                                                                                                                                              |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3440.00                                                                                                                                                                                                                      | -13.4               | V                  | 3.0             | 41.0           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                                  | 5160.00                                                                                                                                                                                                                      | -26.1               | V                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                  | 6880.00                                                                                                                                                                                                                      | -14.5               | V                  | 3.0             | 40.0           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                                  | 3440.00                                                                                                                                                                                                                      | -5.1                | H                  | 3.0             | 41.0           | 1.0            | -45.2         | -13.0          | -32.2         |       |
|                                  | 5160.00                                                                                                                                                                                                                      | -25.7               | H                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                  | 6880.00                                                                                                                                                                                                                      | -18.7               | H                  | 3.0             | 40.0           | 1.0            | -57.7         | -13.0          | -44.7         |       |
|                                  | Mid Ch, 1745MHz                                                                                                                                                                                                              |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3490.00                                                                                                                                                                                                                      | -18.5               | V                  | 3.0             | 41.0           | 1.0            | -58.5         | -13.0          | -45.5         |       |
|                                  | 5235.00                                                                                                                                                                                                                      | -25.0               | V                  | 3.0             | 40.1           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                  | 6980.00                                                                                                                                                                                                                      | -17.6               | V                  | 3.0             | 40.0           | 1.0            | -56.6         | -13.0          | -43.6         |       |
|                                  | 3490.00                                                                                                                                                                                                                      | -13.8               | H                  | 3.0             | 41.0           | 1.0            | -53.8         | -13.0          | -40.8         |       |
|                                  | 5235.00                                                                                                                                                                                                                      | -24.9               | H                  | 3.0             | 40.1           | 1.0            | -64.0         | -13.0          | -51.0         |       |
|                                  | 6980.00                                                                                                                                                                                                                      | -18.7               | H                  | 3.0             | 40.0           | 1.0            | -57.7         | -13.0          | -44.7         |       |
|                                  | High Ch, 1770MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3540.00                                                                                                                                                                                                                      | -18.6               | V                  | 3.0             | 41.0           | 1.0            | -58.5         | -13.0          | -45.5         |       |
|                                  | 5310.00                                                                                                                                                                                                                      | -25.3               | V                  | 3.0             | 40.1           | 1.0            | -64.3         | -13.0          | -51.3         |       |
|                                  | 7080.00                                                                                                                                                                                                                      | -12.5               | V                  | 3.0             | 40.0           | 1.0            | -51.6         | -13.0          | -38.6         |       |
|                                  | 3540.00                                                                                                                                                                                                                      | -8.3                | H                  | 3.0             | 41.0           | 1.0            | -48.3         | -13.0          | -35.3         |       |
|                                  | 5310.00                                                                                                                                                                                                                      | -25.1               | H                  | 3.0             | 40.1           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                  | 7080.00                                                                                                                                                                                                                      | -18.4               | H                  | 3.0             | 40.0           | 1.0            | -57.5         | -13.0          | -44.5         |       |
| LTE<br>Band 66<br>20MHz<br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                                  | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-19<br>Test Engineer: 47989<br>Configuration: EUT / AC Adapter / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 66 Harmonics, 20MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                  | f<br>MHz                                                                                                                                                                                                                     | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                  | Low Ch, 1720MHz                                                                                                                                                                                                              |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3440.00                                                                                                                                                                                                                      | -15.4               | V                  | 3.0             | 41.0           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                  | 5160.00                                                                                                                                                                                                                      | -26.6               | V                  | 3.0             | 40.1           | 1.0            | -65.7         | -13.0          | -52.7         |       |
|                                  | 6880.00                                                                                                                                                                                                                      | -16.0               | V                  | 3.0             | 40.0           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                  | 3440.00                                                                                                                                                                                                                      | -7.4                | H                  | 3.0             | 41.0           | 1.0            | -47.4         | -13.0          | -34.4         |       |
|                                  | 5160.00                                                                                                                                                                                                                      | -26.2               | H                  | 3.0             | 40.1           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                  | 6880.00                                                                                                                                                                                                                      | -21.0               | H                  | 3.0             | 40.0           | 1.0            | -60.0         | -13.0          | -47.0         |       |
|                                  | Mid Ch, 1745MHz                                                                                                                                                                                                              |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3490.00                                                                                                                                                                                                                      | -19.5               | V                  | 3.0             | 41.0           | 1.0            | -59.5         | -13.0          | -46.5         |       |
|                                  | 5235.00                                                                                                                                                                                                                      | -26.1               | V                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                  | 6980.00                                                                                                                                                                                                                      | -19.4               | V                  | 3.0             | 40.0           | 1.0            | -58.5         | -13.0          | -45.5         |       |
|                                  | 3490.00                                                                                                                                                                                                                      | -15.4               | H                  | 3.0             | 41.0           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                  | 5235.00                                                                                                                                                                                                                      | -25.9               | H                  | 3.0             | 40.1           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                  | 6980.00                                                                                                                                                                                                                      | -19.9               | H                  | 3.0             | 40.0           | 1.0            | -59.0         | -13.0          | -46.0         |       |
|                                  | High Ch, 1770MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3540.00                                                                                                                                                                                                                      | -19.8               | V                  | 3.0             | 41.0           | 1.0            | -59.8         | -13.0          | -46.8         |       |
|                                  | 5310.00                                                                                                                                                                                                                      | -26.4               | V                  | 3.0             | 40.1           | 1.0            | -65.5         | -13.0          | -52.5         |       |
|                                  | 7080.00                                                                                                                                                                                                                      | -13.8               | V                  | 3.0             | 40.0           | 1.0            | -52.8         | -13.0          | -39.8         |       |
|                                  | 3540.00                                                                                                                                                                                                                      | -10.3               | H                  | 3.0             | 41.0           | 1.0            | -50.2         | -13.0          | -37.2         |       |
|                                  | 5310.00                                                                                                                                                                                                                      | -26.1               | H                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                  | 7080.00                                                                                                                                                                                                                      | -19.2               | H                  | 3.0             | 40.0           | 1.0            | -58.2         | -13.0          | -45.2         |       |

|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|----------------------------------|--------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 66<br>15MHz<br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                                  | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                  | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                                  | Date: 2018-04-18                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                  | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                                  | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                                  | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                                  | Mode: LTE_QPSK Band 66 Harmonics, 15MHz Bandwidth                                    |                     |                    |                 |                |                |               |                |               |       |
|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                  | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                  | Low Ch, 1717.5MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3435.00                                                                              | -13.8               | V                  | 3.0             | 41.0           | 1.0            | -53.8         | -13.0          | -40.8         |       |
|                                  | 5152.50                                                                              | -26.0               | V                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                  | 6870.00                                                                              | -12.9               | V                  | 3.0             | 40.0           | 1.0            | -52.0         | -13.0          | -39.0         |       |
|                                  | 3435.00                                                                              | -4.9                | H                  | 3.0             | 41.0           | 1.0            | -44.9         | -13.0          | -31.9         |       |
|                                  | 5152.50                                                                              | -25.1               | H                  | 3.0             | 40.1           | 1.0            | -64.2         | -13.0          | -51.2         |       |
|                                  | 6870.00                                                                              | -18.3               | H                  | 3.0             | 40.0           | 1.0            | -57.3         | -13.0          | -44.3         |       |
|                                  | Mid Ch, 1745MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3490.00                                                                              | -18.6               | V                  | 3.0             | 41.0           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|                                  | 5235.00                                                                              | -25.3               | V                  | 3.0             | 40.1           | 1.0            | -64.4         | -13.0          | -51.4         |       |
|                                  | 6980.00                                                                              | -18.1               | V                  | 3.0             | 40.0           | 1.0            | -57.2         | -13.0          | -44.2         |       |
|                                  | 3490.00                                                                              | -13.0               | H                  | 3.0             | 41.0           | 1.0            | -53.0         | -13.0          | -40.0         |       |
|                                  | 5235.00                                                                              | -25.0               | H                  | 3.0             | 40.1           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                  | 6980.00                                                                              | -20.6               | H                  | 3.0             | 40.0           | 1.0            | -59.6         | -13.0          | -46.6         |       |
|                                  | High Ch, 1772.5MHz                                                                   |                     |                    |                 |                |                |               |                |               |       |
| 3545.00                          | -17.6                                                                                | V                   | 3.0                | 41.0            | 1.0            | -57.6          | -13.0         | -44.6          |               |       |
| 5317.50                          | -25.0                                                                                | V                   | 3.0                | 40.1            | 1.0            | -64.1          | -13.0         | -51.1          |               |       |
| 7090.00                          | -15.7                                                                                | V                   | 3.0                | 40.0            | 1.0            | -54.8          | -13.0         | -41.8          |               |       |
| 3545.00                          | -12.1                                                                                | H                   | 3.0                | 41.0            | 1.0            | -52.0          | -13.0         | -39.0          |               |       |
| 5317.50                          | -25.9                                                                                | H                   | 3.0                | 40.1            | 1.0            | -64.9          | -13.0         | -51.9          |               |       |
| 7090.00                          | -18.7                                                                                | H                   | 3.0                | 40.0            | 1.0            | -57.7          | -13.0         | -44.7          |               |       |
|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| LTE<br>Band 66<br>15MHz<br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                                  | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                  | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                                  | Date: 2018-04-18                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                  | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                                  | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                                  | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                                  | Mode: LTE_16QAM Band 66 Harmonics, 15MHz Bandwidth                                   |                     |                    |                 |                |                |               |                |               |       |
|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                  | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                  | Low Ch, 1717.5MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3435.00                                                                              | -15.2               | V                  | 3.0             | 41.0           | 1.0            | -55.2         | -13.0          | -42.2         |       |
|                                  | 5152.50                                                                              | -26.2               | V                  | 3.0             | 40.1           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                  | 6870.00                                                                              | -14.1               | V                  | 3.0             | 40.0           | 1.0            | -53.2         | -13.0          | -40.2         |       |
|                                  | 3435.00                                                                              | -6.2                | H                  | 3.0             | 41.0           | 1.0            | -46.2         | -13.0          | -33.2         |       |
|                                  | 5152.50                                                                              | -25.7               | H                  | 3.0             | 40.1           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                  | 6870.00                                                                              | -19.1               | H                  | 3.0             | 40.0           | 1.0            | -58.1         | -13.0          | -45.1         |       |
|                                  | Mid Ch, 1745MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                  | 3490.00                                                                              | -20.0               | V                  | 3.0             | 41.0           | 1.0            | -60.0         | -13.0          | -47.0         |       |
|                                  | 5235.00                                                                              | -25.8               | V                  | 3.0             | 40.1           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                  | 6980.00                                                                              | -19.5               | V                  | 3.0             | 40.0           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|                                  | 3490.00                                                                              | -13.9               | H                  | 3.0             | 41.0           | 1.0            | -53.9         | -13.0          | -40.9         |       |
|                                  | 5235.00                                                                              | -25.7               | H                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                  | 6980.00                                                                              | -20.8               | H                  | 3.0             | 40.0           | 1.0            | -59.9         | -13.0          | -46.9         |       |
|                                  | High Ch, 1772.5MHz                                                                   |                     |                    |                 |                |                |               |                |               |       |
| 3545.00                          | -18.6                                                                                | V                   | 3.0                | 41.0            | 1.0            | -58.6          | -13.0         | -45.6          |               |       |
| 5317.50                          | -25.9                                                                                | V                   | 3.0                | 40.1            | 1.0            | -65.0          | -13.0         | -52.0          |               |       |
| 7090.00                          | -16.6                                                                                | V                   | 3.0                | 40.0            | 1.0            | -55.7          | -13.0         | -42.7          |               |       |
| 3545.00                          | -12.2                                                                                | H                   | 3.0                | 41.0            | 1.0            | -52.1          | -13.0         | -39.1          |               |       |
| 5317.50                          | -26.4                                                                                | H                   | 3.0                | 40.1            | 1.0            | -65.4          | -13.0         | -52.4          |               |       |
| 7090.00                          | -19.9                                                                                | H                   | 3.0                | 40.0            | 1.0            | -58.9          | -13.0         | -45.9          |               |       |
|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                  |                                                                                      |                     |                    |                 |                |                |               |                |               |       |

|                                              |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|----------------------------------------------|--------------------------------------------------------------------------------------|------------------|-----------------|--------------|-------------|-------------|------------|-------------|------------|-------|
| LTE<br><br>Band 66<br><br>10MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                  |                 |              |             |             |            |             |            |       |
|                                              | Company: Samsung                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                              | Project #: 4788404110                                                                |                  |                 |              |             |             |            |             |            |       |
|                                              | Date: 2018-04-18                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                              | Test Engineer: 47989                                                                 |                  |                 |              |             |             |            |             |            |       |
|                                              | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                  |                 |              |             |             |            |             |            |       |
|                                              | Location: Chamber 3                                                                  |                  |                 |              |             |             |            |             |            |       |
|                                              | Mode: LTE_QPSK Band 66 Harmonics, 10MHz Bandwidth                                    |                  |                 |              |             |             |            |             |            |       |
|                                              |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                              | f MHz                                                                                | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|                                              | Low Ch, 1715MHz                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                              | 3430.00                                                                              | -13.5            | V               | 3.0          | 41.0        | 1.0         | -53.6      | -13.0       | -40.6      |       |
|                                              | 5145.00                                                                              | -25.5            | V               | 3.0          | 40.1        | 1.0         | -64.6      | -13.0       | -51.6      |       |
|                                              | 6860.00                                                                              | -11.8            | V               | 3.0          | 40.0        | 1.0         | -50.8      | -13.0       | -37.8      |       |
|                                              | 3430.00                                                                              | -4.6             | H               | 3.0          | 41.0        | 1.0         | -44.7      | -13.0       | -31.7      |       |
|                                              | 5145.00                                                                              | -24.8            | H               | 3.0          | 40.1        | 1.0         | -63.9      | -13.0       | -50.9      |       |
|                                              | 6860.00                                                                              | -15.4            | H               | 3.0          | 40.0        | 1.0         | -54.5      | -13.0       | -41.5      |       |
|                                              | Mid Ch, 1745MHz                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                              | 3490.00                                                                              | -18.3            | V               | 3.0          | 41.0        | 1.0         | -58.3      | -13.0       | -45.3      |       |
|                                              | 5235.00                                                                              | -24.9            | V               | 3.0          | 40.1        | 1.0         | -64.0      | -13.0       | -51.0      |       |
|                                              | 6980.00                                                                              | -18.3            | V               | 3.0          | 40.0        | 1.0         | -57.3      | -13.0       | -44.3      |       |
|                                              | 3490.00                                                                              | -13.9            | H               | 3.0          | 41.0        | 1.0         | -53.9      | -13.0       | -40.9      |       |
|                                              | 5235.00                                                                              | -25.1            | H               | 3.0          | 40.1        | 1.0         | -64.2      | -13.0       | -51.2      |       |
|                                              | 6980.00                                                                              | -18.8            | H               | 3.0          | 40.0        | 1.0         | -57.8      | -13.0       | -44.8      |       |
|                                              | High Ch, 1775MHz                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                              | 3550.00                                                                              | -18.8            | V               | 3.0          | 41.0        | 1.0         | -58.7      | -13.0       | -45.7      |       |
| 5325.00                                      | -24.9                                                                                | V                | 3.0             | 40.1         | 1.0         | -64.0       | -13.0      | -51.0       |            |       |
| 7100.00                                      | -17.1                                                                                | V                | 3.0             | 40.0         | 1.0         | -56.1       | -13.0      | -43.1       |            |       |
| 3550.00                                      | -12.1                                                                                | H                | 3.0             | 41.0         | 1.0         | -52.1       | -13.0      | -39.1       |            |       |
| 5325.00                                      | -25.9                                                                                | H                | 3.0             | 40.1         | 1.0         | -65.0       | -13.0      | -52.0       |            |       |
| 7100.00                                      | -18.1                                                                                | H                | 3.0             | 40.0         | 1.0         | -57.2       | -13.0      | -44.2       |            |       |
|                                              |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| LTE<br><br>Band 66<br><br>10MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                  |                 |              |             |             |            |             |            |       |
|                                              | Company: Samsung                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                              | Project #: 4788404110                                                                |                  |                 |              |             |             |            |             |            |       |
|                                              | Date: 2018-04-18                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                              | Test Engineer: 47989                                                                 |                  |                 |              |             |             |            |             |            |       |
|                                              | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                  |                 |              |             |             |            |             |            |       |
|                                              | Location: Chamber 3                                                                  |                  |                 |              |             |             |            |             |            |       |
|                                              | Mode: LTE_16QAM Band 66 Harmonics, 10MHz Bandwidth                                   |                  |                 |              |             |             |            |             |            |       |
|                                              |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                              | f MHz                                                                                | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|                                              | Low Ch, 1715MHz                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                              | 3430.00                                                                              | -14.8            | V               | 3.0          | 41.0        | 1.0         | -54.8      | -13.0       | -41.8      |       |
|                                              | 5145.00                                                                              | -25.6            | V               | 3.0          | 40.1        | 1.0         | -64.7      | -13.0       | -51.7      |       |
|                                              | 6860.00                                                                              | -13.8            | V               | 3.0          | 40.0        | 1.0         | -52.8      | -13.0       | -39.8      |       |
|                                              | 3430.00                                                                              | -6.1             | H               | 3.0          | 41.0        | 1.0         | -46.1      | -13.0       | -33.1      |       |
|                                              | 5145.00                                                                              | -25.8            | H               | 3.0          | 40.1        | 1.0         | -64.9      | -13.0       | -51.9      |       |
|                                              | 6860.00                                                                              | -17.4            | H               | 3.0          | 40.0        | 1.0         | -56.4      | -13.0       | -43.4      |       |
|                                              | Mid Ch, 1745MHz                                                                      |                  |                 |              |             |             |            |             |            |       |
|                                              | 3490.00                                                                              | -20.0            | V               | 3.0          | 41.0        | 1.0         | -60.0      | -13.0       | -47.0      |       |
|                                              | 5235.00                                                                              | -25.8            | V               | 3.0          | 40.1        | 1.0         | -64.9      | -13.0       | -51.9      |       |
|                                              | 6980.00                                                                              | -19.4            | V               | 3.0          | 40.0        | 1.0         | -58.5      | -13.0       | -45.5      |       |
|                                              | 3490.00                                                                              | -15.2            | H               | 3.0          | 41.0        | 1.0         | -55.3      | -13.0       | -42.3      |       |
|                                              | 5235.00                                                                              | -25.9            | H               | 3.0          | 40.1        | 1.0         | -65.0      | -13.0       | -52.0      |       |
|                                              | 6980.00                                                                              | -19.6            | H               | 3.0          | 40.0        | 1.0         | -58.7      | -13.0       | -45.7      |       |
|                                              | High Ch, 1775MHz                                                                     |                  |                 |              |             |             |            |             |            |       |
|                                              | 3550.00                                                                              | -20.1            | V               | 3.0          | 41.0        | 1.0         | -60.1      | -13.0       | -47.1      |       |
| 5325.00                                      | -25.5                                                                                | V                | 3.0             | 40.1         | 1.0         | -64.6       | -13.0      | -51.6       |            |       |
| 7100.00                                      | -18.6                                                                                | V                | 3.0             | 40.0         | 1.0         | -57.6       | -13.0      | -44.6       |            |       |
| 3550.00                                      | -13.3                                                                                | H                | 3.0             | 41.0         | 1.0         | -53.2       | -13.0      | -40.2       |            |       |
| 5325.00                                      | -26.2                                                                                | H                | 3.0             | 40.1         | 1.0         | -65.3       | -13.0      | -52.3       |            |       |
| 7100.00                                      | -19.0                                                                                | H                | 3.0             | 40.0         | 1.0         | -58.1       | -13.0      | -45.1       |            |       |
|                                              |                                                                                      |                  |                 |              |             |             |            |             |            |       |

|                                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|---------------------------------------------|--------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br><br>Band 66<br><br>5MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                                             | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                             | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                                             | Date: 2018-04-18                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                             | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                                             | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                                             | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                                             | Mode: LTE_QPSK Band 66 Harmonics, 5MHz Bandwidth                                     |                     |                    |                 |                |                |               |                |               |       |
|                                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                             | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                             | Low Ch, 1712.5MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3425.00                                                                              | -13.3               | V                  | 3.0             | 41.0           | 1.0            | -53.4         | -13.0          | -40.4         |       |
|                                             | 5137.50                                                                              | -25.6               | V                  | 3.0             | 40.1           | 1.0            | -64.7         | -13.0          | -51.7         |       |
|                                             | 6850.00                                                                              | -13.0               | V                  | 3.0             | 40.0           | 1.0            | -52.0         | -13.0          | -39.0         |       |
|                                             | 3425.00                                                                              | -5.9                | H                  | 3.0             | 41.0           | 1.0            | -45.9         | -13.0          | -32.9         |       |
|                                             | 5137.50                                                                              | -25.7               | H                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                             | 6850.00                                                                              | -15.9               | H                  | 3.0             | 40.0           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                             | Mid Ch, 1745MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3490.00                                                                              | -19.0               | V                  | 3.0             | 41.0           | 1.0            | -59.0         | -13.0          | -46.0         |       |
|                                             | 5235.00                                                                              | -25.7               | V                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
| 6980.00                                     | -19.5                                                                                | V                   | 3.0                | 40.0            | 1.0            | -58.5          | -13.0         | -45.5          |               |       |
| 3490.00                                     | -13.7                                                                                | H                   | 3.0                | 41.0            | 1.0            | -53.7          | -13.0         | -40.7          |               |       |
| 5235.00                                     | -25.5                                                                                | H                   | 3.0                | 40.1            | 1.0            | -64.6          | -13.0         | -51.6          |               |       |
| 6980.00                                     | -18.9                                                                                | H                   | 3.0                | 40.0            | 1.0            | -57.9          | -13.0         | -44.9          |               |       |
| High Ch, 1777.5MHz                          |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| 3555.00                                     | -19.8                                                                                | V                   | 3.0                | 41.0            | 1.0            | -59.8          | -13.0         | -46.8          |               |       |
| 5332.50                                     | -25.7                                                                                | V                   | 3.0                | 40.1            | 1.0            | -64.7          | -13.0         | -51.7          |               |       |
| 7110.00                                     | -18.6                                                                                | V                   | 3.0                | 40.0            | 1.0            | -57.6          | -13.0         | -44.6          |               |       |
| 3555.00                                     | -13.8                                                                                | H                   | 3.0                | 41.0            | 1.0            | -53.8          | -13.0         | -40.8          |               |       |
| 5332.50                                     | -25.9                                                                                | H                   | 3.0                | 40.1            | 1.0            | -65.0          | -13.0         | -52.0          |               |       |
| 7110.00                                     | -18.1                                                                                | H                   | 3.0                | 40.0            | 1.0            | -57.2          | -13.0         | -44.2          |               |       |
|                                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| LTE<br><br>Band 66<br><br>5MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                     |                    |                 |                |                |               |                |               |       |
|                                             | Company: Samsung                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                             | Project #: 4788404110                                                                |                     |                    |                 |                |                |               |                |               |       |
|                                             | Date: 2018-04-18                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                             | Test Engineer: 47989                                                                 |                     |                    |                 |                |                |               |                |               |       |
|                                             | Configuration: EUT / AC Adpater / Earphone, X-Position                               |                     |                    |                 |                |                |               |                |               |       |
|                                             | Location: Chamber 3                                                                  |                     |                    |                 |                |                |               |                |               |       |
|                                             | Mode: LTE_16QAM Band 66 Harmonics, 5MHz Bandwidth                                    |                     |                    |                 |                |                |               |                |               |       |
|                                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                             | f<br>MHz                                                                             | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                             | Low Ch, 1712.5MHz                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3425.00                                                                              | -14.7               | V                  | 3.0             | 41.0           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                                             | 5137.50                                                                              | -26.1               | V                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                             | 6850.00                                                                              | -14.0               | V                  | 3.0             | 40.0           | 1.0            | -53.1         | -13.0          | -40.1         |       |
|                                             | 3425.00                                                                              | -7.4                | H                  | 3.0             | 41.0           | 1.0            | -47.5         | -13.0          | -34.5         |       |
|                                             | 5137.50                                                                              | -25.9               | H                  | 3.0             | 40.1           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                             | 6850.00                                                                              | -17.1               | H                  | 3.0             | 40.0           | 1.0            | -56.1         | -13.0          | -43.1         |       |
|                                             | Mid Ch, 1745MHz                                                                      |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3490.00                                                                              | -20.2               | V                  | 3.0             | 41.0           | 1.0            | -60.2         | -13.0          | -47.2         |       |
|                                             | 5235.00                                                                              | -26.3               | V                  | 3.0             | 40.1           | 1.0            | -65.4         | -13.0          | -52.4         |       |
| 6980.00                                     | -20.3                                                                                | V                   | 3.0                | 40.0            | 1.0            | -59.4          | -13.0         | -46.4          |               |       |
| 3490.00                                     | -15.0                                                                                | H                   | 3.0                | 41.0            | 1.0            | -55.0          | -13.0         | -42.0          |               |       |
| 5235.00                                     | -25.3                                                                                | H                   | 3.0                | 40.1            | 1.0            | -64.4          | -13.0         | -51.4          |               |       |
| 6980.00                                     | -19.9                                                                                | H                   | 3.0                | 40.0            | 1.0            | -58.9          | -13.0         | -45.9          |               |       |
| High Ch, 1777.5MHz                          |                                                                                      |                     |                    |                 |                |                |               |                |               |       |
| 3555.00                                     | -20.9                                                                                | V                   | 3.0                | 41.0            | 1.0            | -60.8          | -13.0         | -47.8          |               |       |
| 5332.50                                     | -26.1                                                                                | V                   | 3.0                | 40.1            | 1.0            | -65.2          | -13.0         | -52.2          |               |       |
| 7110.00                                     | -17.6                                                                                | V                   | 3.0                | 40.0            | 1.0            | -56.6          | -13.0         | -43.6          |               |       |
| 3555.00                                     | -15.2                                                                                | H                   | 3.0                | 41.0            | 1.0            | -55.1          | -13.0         | -42.1          |               |       |
| 5332.50                                     | -26.2                                                                                | H                   | 3.0                | 40.1            | 1.0            | -65.3          | -13.0         | -52.3          |               |       |
| 7110.00                                     | -18.9                                                                                | H                   | 3.0                | 40.0            | 1.0            | -57.9          | -13.0         | -44.9          |               |       |
|                                             |                                                                                      |                     |                    |                 |                |                |               |                |               |       |

|                                             |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br><br>Band 66<br><br>3MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                             | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-18<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 66 Harmonics, 3MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                             | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                             | Low Ch, 1711.5MHz                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3423.00                                                                                                                                                                                                                     | -10.5               | V                  | 3.0             | 41.0           | 1.0            | -50.6         | -13.0          | -37.6         |       |
|                                             | 5134.50                                                                                                                                                                                                                     | -24.6               | V                  | 3.0             | 40.1           | 1.0            | -63.7         | -13.0          | -50.7         |       |
|                                             | 6846.00                                                                                                                                                                                                                     | -14.4               | V                  | 3.0             | 40.0           | 1.0            | -53.4         | -13.0          | -40.4         |       |
|                                             | 3423.00                                                                                                                                                                                                                     | -6.5                | H                  | 3.0             | 41.0           | 1.0            | -46.6         | -13.0          | -33.6         |       |
|                                             | 5134.50                                                                                                                                                                                                                     | -24.4               | H                  | 3.0             | 40.1           | 1.0            | -63.5         | -13.0          | -50.5         |       |
|                                             | 6846.00                                                                                                                                                                                                                     | -16.4               | H                  | 3.0             | 40.0           | 1.0            | -55.5         | -13.0          | -42.5         |       |
|                                             | Mid Ch, 1745MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3490.00                                                                                                                                                                                                                     | -18.9               | V                  | 3.0             | 41.0           | 1.0            | -58.9         | -13.0          | -45.9         |       |
|                                             | 5235.00                                                                                                                                                                                                                     | -25.0               | V                  | 3.0             | 40.1           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                             | 6980.00                                                                                                                                                                                                                     | -17.3               | V                  | 3.0             | 40.0           | 1.0            | -56.3         | -13.0          | -43.3         |       |
|                                             | 3490.00                                                                                                                                                                                                                     | -12.9               | H                  | 3.0             | 41.0           | 1.0            | -52.9         | -13.0          | -39.9         |       |
|                                             | 5235.00                                                                                                                                                                                                                     | -25.2               | H                  | 3.0             | 40.1           | 1.0            | -64.3         | -13.0          | -51.3         |       |
|                                             | 6980.00                                                                                                                                                                                                                     | -18.7               | H                  | 3.0             | 40.0           | 1.0            | -57.7         | -13.0          | -44.7         |       |
|                                             | High Ch, 1778.5MHz                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3557.00                                                                                                                                                                                                                     | -19.3               | V                  | 3.0             | 41.0           | 1.0            | -59.3         | -13.0          | -46.3         |       |
|                                             | 5335.50                                                                                                                                                                                                                     | -25.4               | V                  | 3.0             | 40.1           | 1.0            | -64.5         | -13.0          | -51.5         |       |
|                                             | 7114.00                                                                                                                                                                                                                     | -14.7               | V                  | 3.0             | 40.0           | 1.0            | -53.7         | -13.0          | -40.7         |       |
|                                             | 3557.00                                                                                                                                                                                                                     | -11.4               | H                  | 3.0             | 41.0           | 1.0            | -51.4         | -13.0          | -38.4         |       |
|                                             | 5335.50                                                                                                                                                                                                                     | -26.1               | H                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                             | 7114.00                                                                                                                                                                                                                     | -18.5               | H                  | 3.0             | 40.0           | 1.0            | -57.5         | -13.0          | -44.5         |       |
|                                             |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
| LTE<br><br>Band 66<br><br>3MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                             | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-18<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 66 Harmonics, 3MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                             | f<br>MHz                                                                                                                                                                                                                    | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                             | Low Ch, 1711.5MHz                                                                                                                                                                                                           |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3423.00                                                                                                                                                                                                                     | -12.3               | V                  | 3.0             | 41.0           | 1.0            | -52.4         | -13.0          | -39.4         |       |
|                                             | 5134.50                                                                                                                                                                                                                     | -25.6               | V                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                             | 6846.00                                                                                                                                                                                                                     | -15.8               | V                  | 3.0             | 40.0           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                             | 3423.00                                                                                                                                                                                                                     | -8.5                | H                  | 3.0             | 41.0           | 1.0            | -48.6         | -13.0          | -35.6         |       |
|                                             | 5134.50                                                                                                                                                                                                                     | -25.8               | H                  | 3.0             | 40.1           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                             | 6846.00                                                                                                                                                                                                                     | -17.7               | H                  | 3.0             | 40.0           | 1.0            | -56.7         | -13.0          | -43.7         |       |
|                                             | Mid Ch, 1745MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3490.00                                                                                                                                                                                                                     | -20.3               | V                  | 3.0             | 41.0           | 1.0            | -60.3         | -13.0          | -47.3         |       |
|                                             | 5235.00                                                                                                                                                                                                                     | -26.2               | V                  | 3.0             | 40.1           | 1.0            | -65.3         | -13.0          | -52.3         |       |
|                                             | 6980.00                                                                                                                                                                                                                     | -19.0               | V                  | 3.0             | 40.0           | 1.0            | -58.0         | -13.0          | -45.0         |       |
|                                             | 3490.00                                                                                                                                                                                                                     | -14.7               | H                  | 3.0             | 41.0           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                                             | 5235.00                                                                                                                                                                                                                     | -25.8               | H                  | 3.0             | 40.1           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                             | 6980.00                                                                                                                                                                                                                     | -19.9               | H                  | 3.0             | 40.0           | 1.0            | -58.9         | -13.0          | -45.9         |       |
|                                             | High Ch, 1778.5MHz                                                                                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                                             | 3557.00                                                                                                                                                                                                                     | -20.5               | V                  | 3.0             | 41.0           | 1.0            | -60.5         | -13.0          | -47.5         |       |
|                                             | 5335.50                                                                                                                                                                                                                     | -25.8               | V                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                             | 7114.00                                                                                                                                                                                                                     | -15.8               | V                  | 3.0             | 40.0           | 1.0            | -54.8         | -13.0          | -41.8         |       |
|                                             | 3557.00                                                                                                                                                                                                                     | -13.0               | H                  | 3.0             | 41.0           | 1.0            | -53.0         | -13.0          | -40.0         |       |
|                                             | 5335.50                                                                                                                                                                                                                     | -26.4               | H                  | 3.0             | 40.1           | 1.0            | -65.5         | -13.0          | -52.5         |       |
|                                             | 7114.00                                                                                                                                                                                                                     | -19.1               | H                  | 3.0             | 40.0           | 1.0            | -58.1         | -13.0          | -45.1         |       |
|                                             |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                             |                                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |

|                                               |                                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br><br>Band 66<br><br>1.4MHz<br><br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                                               | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-18<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 66 Harmonics, 1.4MHz Bandwidth  |                     |                    |                 |                |                |               |                |               |       |
|                                               | f<br>MHz                                                                                                                                                                                                                      | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                               | Low Ch, 1710.7MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                               | 3421.40                                                                                                                                                                                                                       | -10.9               | V                  | 3.0             | 41.0           | 1.0            | -50.9         | -13.0          | -37.9         |       |
|                                               | 5132.10                                                                                                                                                                                                                       | -25.9               | V                  | 3.0             | 40.1           | 1.0            | -65.0         | -13.0          | -52.0         |       |
|                                               | 6842.80                                                                                                                                                                                                                       | -14.1               | V                  | 3.0             | 40.0           | 1.0            | -53.1         | -13.0          | -40.1         |       |
|                                               | 3421.40                                                                                                                                                                                                                       | -5.9                | H                  | 3.0             | 41.0           | 1.0            | -46.0         | -13.0          | -33.0         |       |
|                                               | 5132.10                                                                                                                                                                                                                       | -23.8               | H                  | 3.0             | 40.1           | 1.0            | -62.9         | -13.0          | -49.9         |       |
|                                               | 6842.80                                                                                                                                                                                                                       | -15.9               | H                  | 3.0             | 40.0           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                               | Mid Ch, 1745MHz                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |
|                                               | 3490.00                                                                                                                                                                                                                       | -18.8               | V                  | 3.0             | 41.0           | 1.0            | -58.8         | -13.0          | -45.8         |       |
|                                               | 5235.00                                                                                                                                                                                                                       | -24.6               | V                  | 3.0             | 40.1           | 1.0            | -63.7         | -13.0          | -50.7         |       |
|                                               | 6980.00                                                                                                                                                                                                                       | -16.9               | V                  | 3.0             | 40.0           | 1.0            | -56.0         | -13.0          | -43.0         |       |
|                                               | 3490.00                                                                                                                                                                                                                       | -13.0               | H                  | 3.0             | 41.0           | 1.0            | -53.0         | -13.0          | -40.0         |       |
|                                               | 5235.00                                                                                                                                                                                                                       | -25.8               | H                  | 3.0             | 40.1           | 1.0            | -64.9         | -13.0          | -51.9         |       |
|                                               | 6980.00                                                                                                                                                                                                                       | -18.6               | H                  | 3.0             | 40.0           | 1.0            | -57.6         | -13.0          | -44.6         |       |
|                                               | High Ch, 1779.3MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                               | 3558.60                                                                                                                                                                                                                       | -17.7               | V                  | 3.0             | 41.0           | 1.0            | -57.6         | -13.0          | -44.6         |       |
|                                               | 5337.90                                                                                                                                                                                                                       | -25.1               | V                  | 3.0             | 40.1           | 1.0            | -64.2         | -13.0          | -51.2         |       |
|                                               | 7117.20                                                                                                                                                                                                                       | -14.7               | V                  | 3.0             | 40.0           | 1.0            | -53.7         | -13.0          | -40.7         |       |
|                                               | 3558.60                                                                                                                                                                                                                       | -9.9                | H                  | 3.0             | 41.0           | 1.0            | -49.9         | -13.0          | -36.9         |       |
|                                               | 5337.90                                                                                                                                                                                                                       | -25.3               | H                  | 3.0             | 40.1           | 1.0            | -64.4         | -13.0          | -51.4         |       |
|                                               | 7117.20                                                                                                                                                                                                                       | -18.1               | H                  | 3.0             | 40.0           | 1.0            | -57.2         | -13.0          | -44.2         |       |
|                                               |                                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |
|                                               |                                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |
| LTE<br><br>Band 66<br><br>1.4MHz<br><br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                          |                     |                    |                 |                |                |               |                |               |       |
|                                               | Company: Samsung<br>Project #: 4788404110<br>Date: 2018-04-18<br>Test Engineer: 47989<br>Configuration: EUT / AC Adpater / Earphone, X-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 66 Harmonics, 1.4MHz Bandwidth |                     |                    |                 |                |                |               |                |               |       |
|                                               | f<br>MHz                                                                                                                                                                                                                      | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|                                               | Low Ch, 1710.7MHz                                                                                                                                                                                                             |                     |                    |                 |                |                |               |                |               |       |
|                                               | 3421.40                                                                                                                                                                                                                       | -12.3               | V                  | 3.0             | 41.0           | 1.0            | -52.3         | -13.0          | -39.3         |       |
|                                               | 5132.10                                                                                                                                                                                                                       | -25.7               | V                  | 3.0             | 40.1           | 1.0            | -64.8         | -13.0          | -51.8         |       |
|                                               | 6842.80                                                                                                                                                                                                                       | -14.7               | V                  | 3.0             | 40.0           | 1.0            | -53.7         | -13.0          | -40.7         |       |
|                                               | 3421.40                                                                                                                                                                                                                       | -7.6                | H                  | 3.0             | 41.0           | 1.0            | -47.6         | -13.0          | -34.6         |       |
|                                               | 5132.10                                                                                                                                                                                                                       | -25.0               | H                  | 3.0             | 40.1           | 1.0            | -64.1         | -13.0          | -51.1         |       |
|                                               | 6842.80                                                                                                                                                                                                                       | -17.5               | H                  | 3.0             | 40.0           | 1.0            | -56.5         | -13.0          | -43.5         |       |
|                                               | Mid Ch, 1745MHz                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |
|                                               | 3490.00                                                                                                                                                                                                                       | -20.2               | V                  | 3.0             | 41.0           | 1.0            | -60.2         | -13.0          | -47.2         |       |
|                                               | 5235.00                                                                                                                                                                                                                       | -25.4               | V                  | 3.0             | 40.1           | 1.0            | -64.5         | -13.0          | -51.5         |       |
|                                               | 6980.00                                                                                                                                                                                                                       | -18.4               | V                  | 3.0             | 40.0           | 1.0            | -57.4         | -13.0          | -44.4         |       |
|                                               | 3490.00                                                                                                                                                                                                                       | -14.7               | H                  | 3.0             | 41.0           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                                               | 5235.00                                                                                                                                                                                                                       | -26.1               | H                  | 3.0             | 40.1           | 1.0            | -65.2         | -13.0          | -52.2         |       |
|                                               | 6980.00                                                                                                                                                                                                                       | -19.2               | H                  | 3.0             | 40.0           | 1.0            | -58.2         | -13.0          | -45.2         |       |
|                                               | High Ch, 1779.3MHz                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|                                               | 3558.60                                                                                                                                                                                                                       | -19.7               | V                  | 3.0             | 41.0           | 1.0            | -59.6         | -13.0          | -46.6         |       |
|                                               | 5337.90                                                                                                                                                                                                                       | -25.4               | V                  | 3.0             | 40.1           | 1.0            | -64.5         | -13.0          | -51.5         |       |
|                                               | 7117.20                                                                                                                                                                                                                       | -15.9               | V                  | 3.0             | 40.0           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                               | 3558.60                                                                                                                                                                                                                       | -11.7               | H                  | 3.0             | 41.0           | 1.0            | -51.7         | -13.0          | -38.7         |       |
|                                               | 5337.90                                                                                                                                                                                                                       | -26.4               | H                  | 3.0             | 40.1           | 1.0            | -65.5         | -13.0          | -52.5         |       |
|                                               | 7117.20                                                                                                                                                                                                                       | -19.0               | H                  | 3.0             | 40.0           | 1.0            | -58.1         | -13.0          | -45.1         |       |
|                                               |                                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |
|                                               |                                                                                                                                                                                                                               |                     |                    |                 |                |                |               |                |               |       |