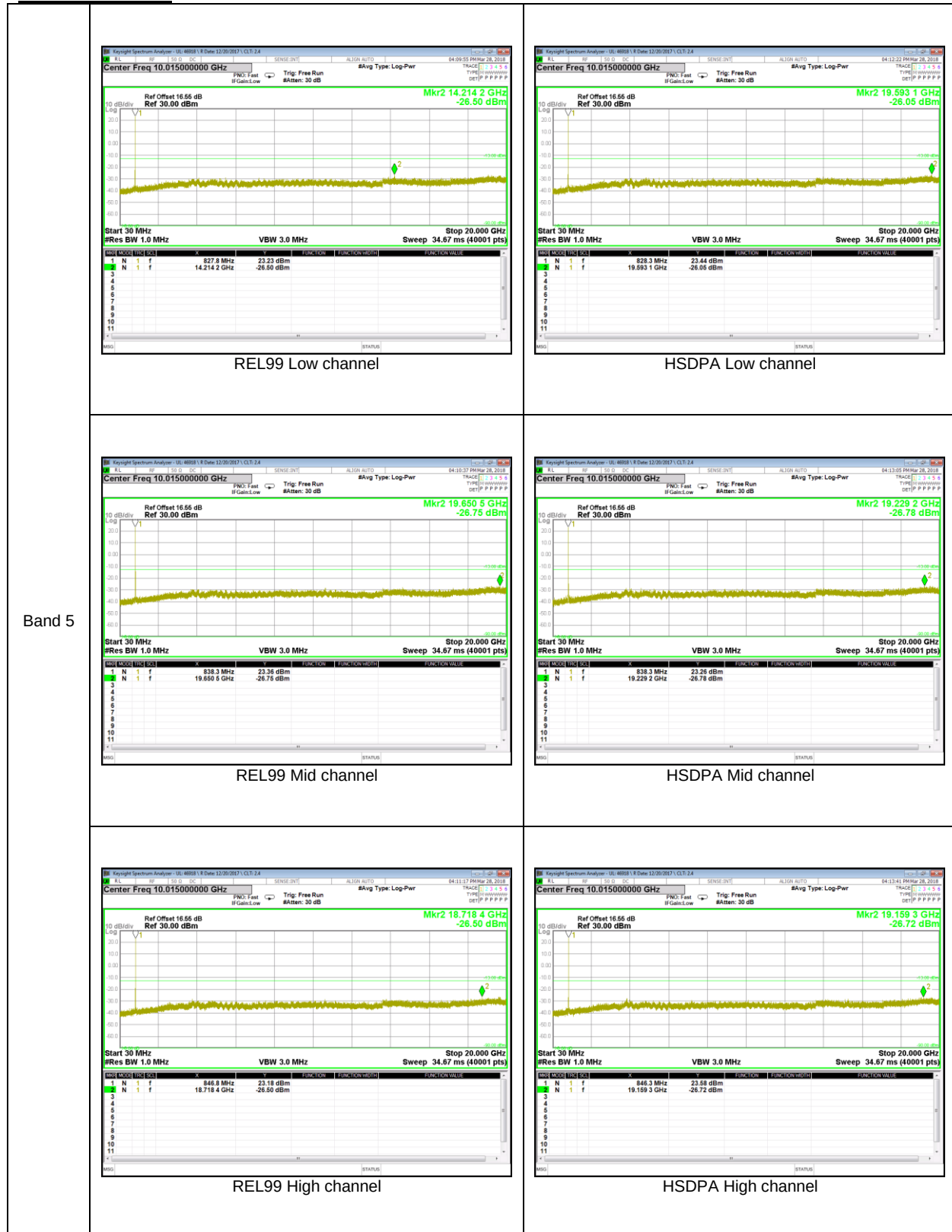
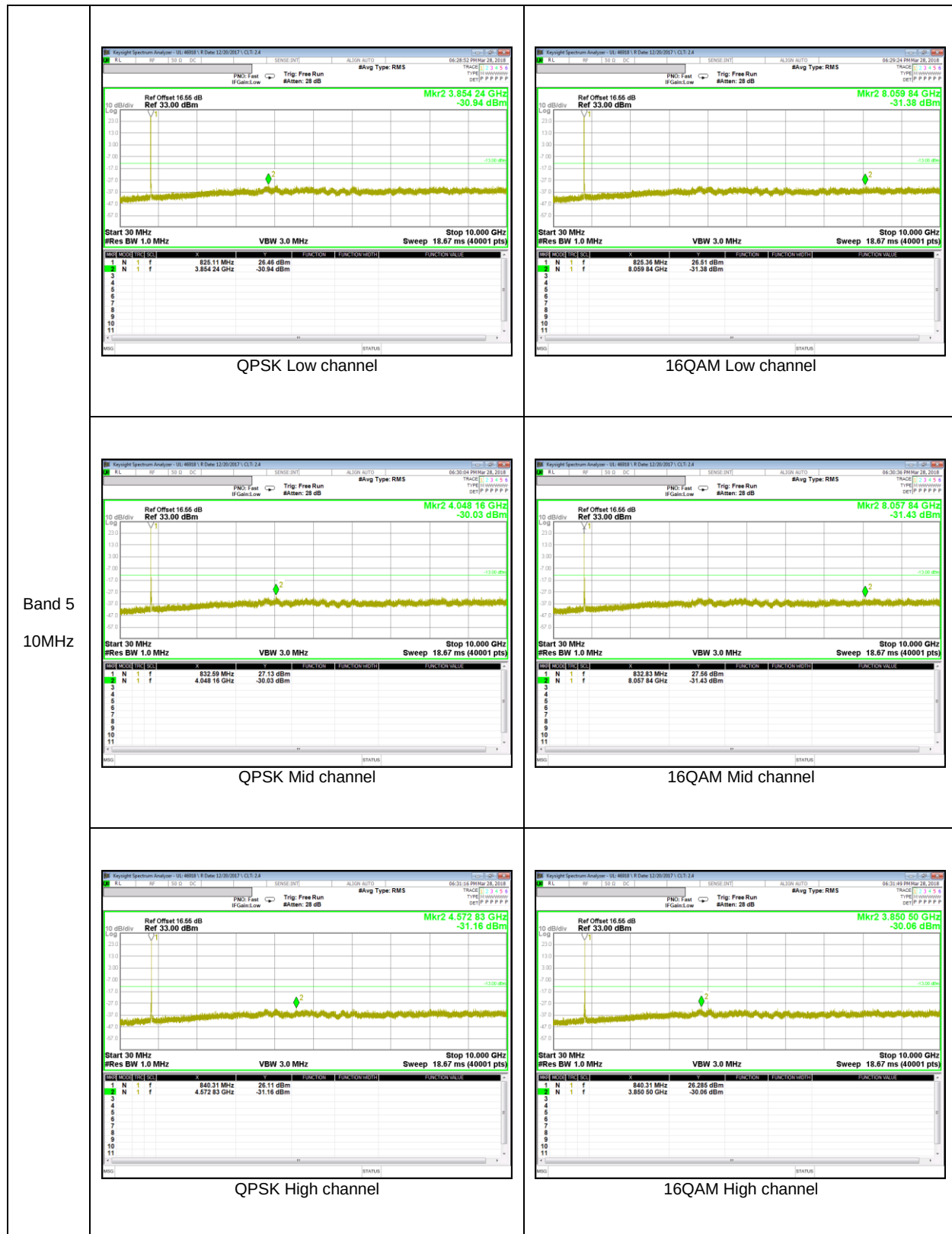
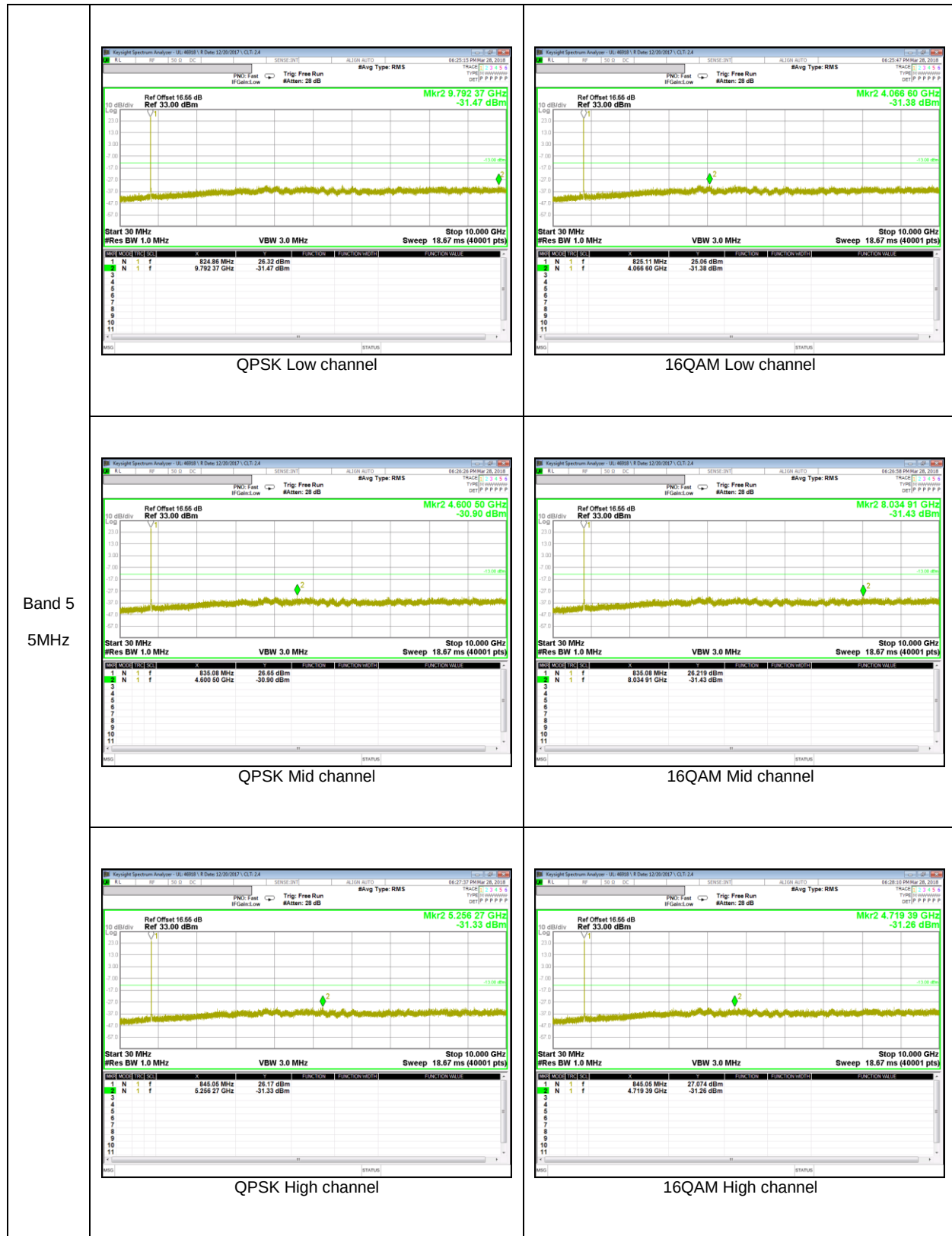


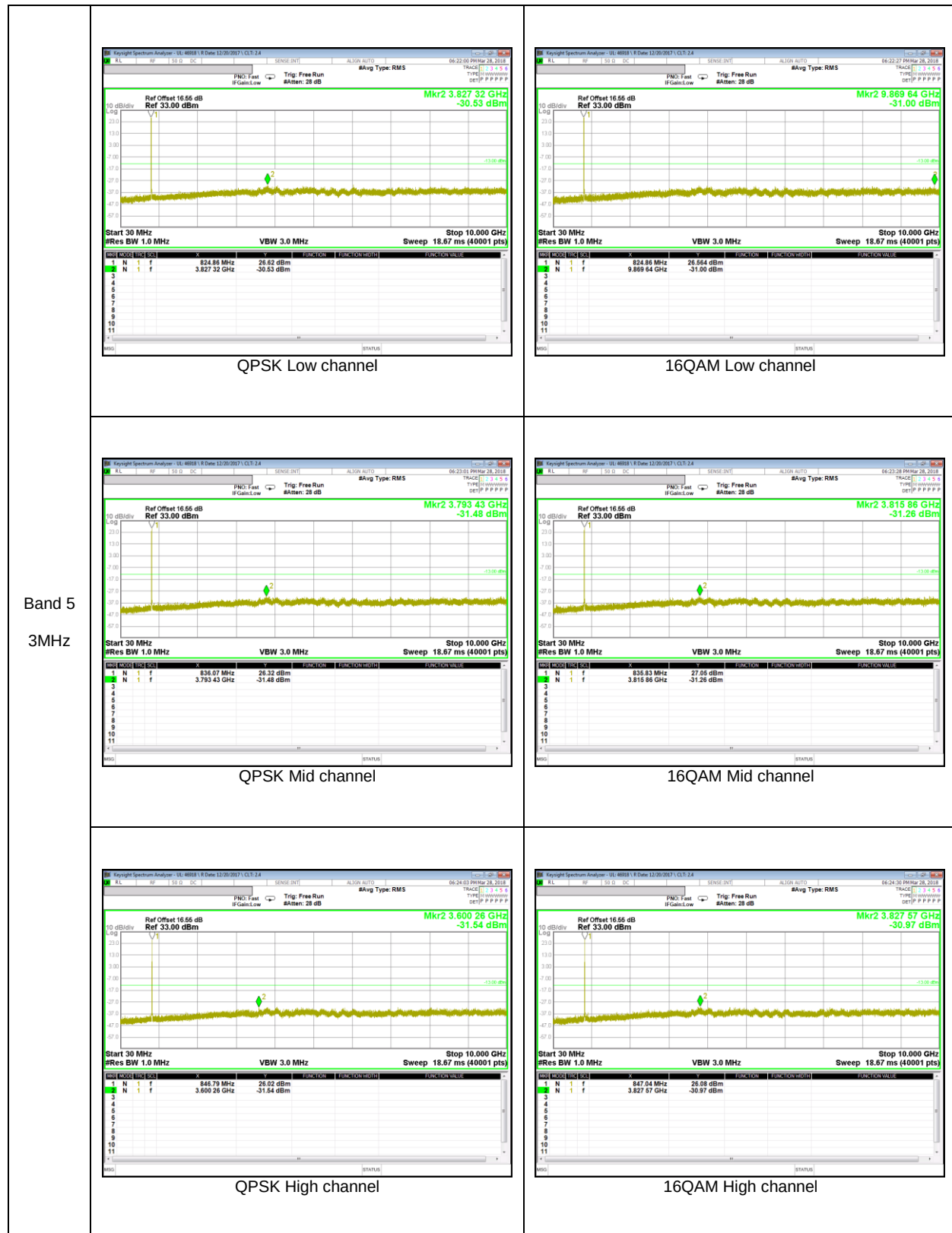
WCDMA Band 5

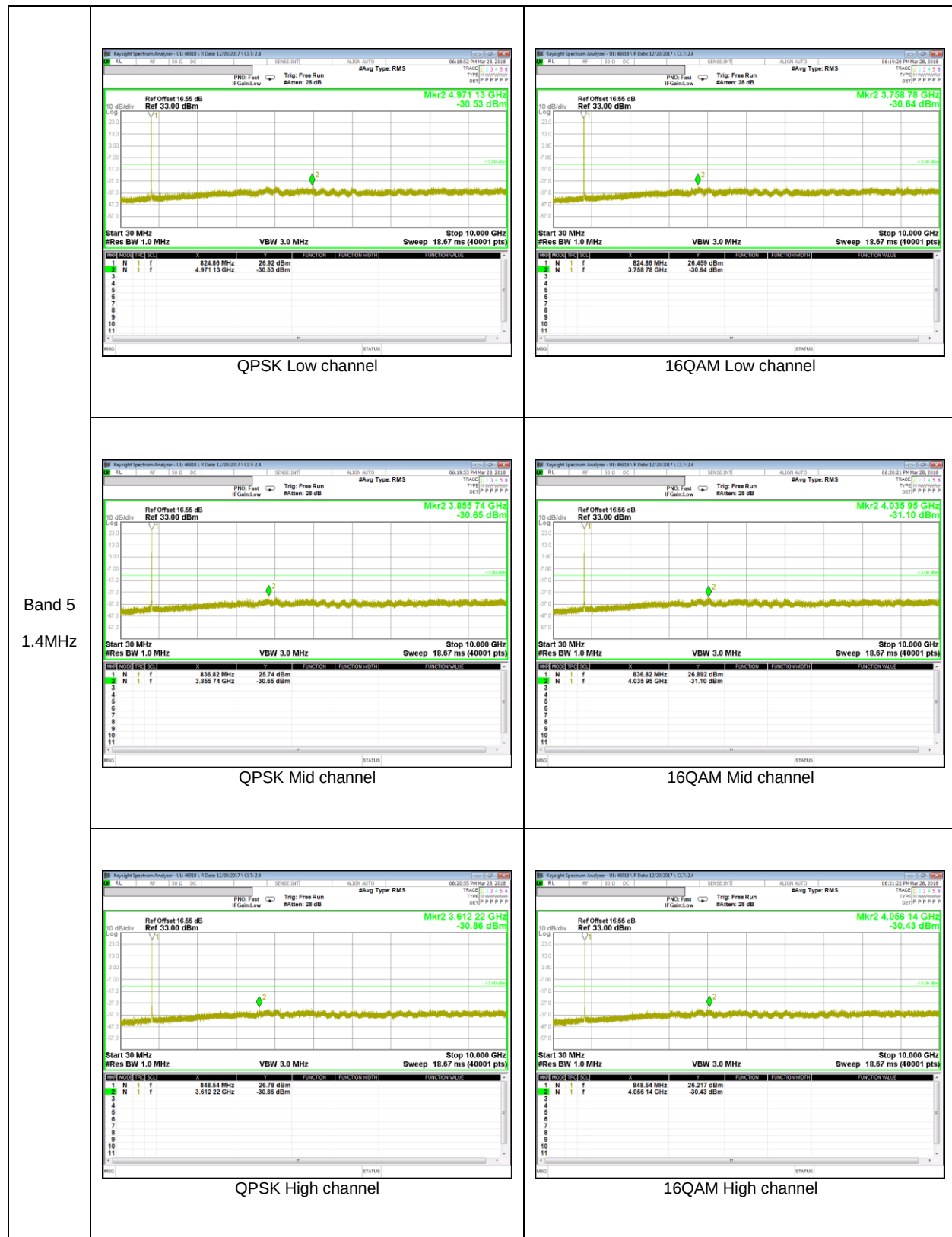


**LTE Band 5**









## **9.4. FREQUENCY STABILITY**

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

FCC: §2.1055, §22.355

### **LIMITS**

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

### **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, Channel 190, Frequency 836.6 MHz

| Reference Frequency : GSM850 Mid Channel 836.6 MHz @ 20°C<br>Limit: +- 2.5 ppm = 2091.500 Hz |                                 |                                               |             |             |
|----------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Power Supply<br>[Vdc]                                                                        | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                                              |                                 | [MHz]                                         | Delta [ppm] | Limit [ppm] |
| 3.85                                                                                         | 50                              | 836.59997103                                  | -0.002      | 2.5         |
| 3.85                                                                                         | 40                              | 836.59997757                                  | -0.010      | 2.5         |
| 3.85                                                                                         | 30                              | 836.59997579                                  | -0.008      | 2.5         |
| <b>3.85</b>                                                                                  | <b>20</b>                       | 836.59996921                                  | <b>0</b>    | <b>2.5</b>  |
| 3.85                                                                                         | 10                              | 836.59997109                                  | -0.002      | 2.5         |
| 3.85                                                                                         | 0                               | 836.59996676                                  | 0.003       | 2.5         |
| 3.85                                                                                         | -10                             | 836.59997363                                  | -0.005      | 2.5         |
| 3.85                                                                                         | -20                             | 836.59996743                                  | 0.002       | 2.5         |
| 3.85                                                                                         | -30                             | 836.59997308                                  | -0.005      | 2.5         |

| Reference Frequency : GSM850 Mid Channel 836.6 MHz @ 20°C<br>Limit: +- 2.5 ppm = 2091.500 Hz |                                 |                                               |             |             |
|----------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Power Supply<br>[Vdc]                                                                        | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                                              |                                 | [MHz]                                         | Delta [ppm] | Limit [ppm] |
| <b>3.85</b>                                                                                  | <b>20</b>                       | <b>836.59996921</b>                           | <b>0</b>    | <b>2.5</b>  |
| 4.40                                                                                         | 20                              | 836.59996737                                  | 0.002       | 2.5         |
| 3.60                                                                                         | 20                              | 836.59997040                                  | -0.001      | 2.5         |

**WCDMA Band 5 , Channel 4183, Frequency 836.6 MHz**

| Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20°C |                                 |                                               |             |             |
|----------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Limit: +- 2.5 ppm = 2091.500 Hz                                |                                 |                                               |             |             |
| Power Supply<br>[Vdc]                                          | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                |                                 | [MHz]                                         | Delta [ppm] | Limit [ppm] |
| 3.85                                                           | 50                              | 836.59998232                                  | 0.006       | 2.5         |
| 3.85                                                           | 40                              | 836.59997993                                  | 0.009       | 2.5         |
| 3.85                                                           | 30                              | 836.59998573                                  | 0.002       | 2.5         |
| <b>3.85</b>                                                    | <b>20</b>                       | 836.59998762                                  | <b>0</b>    | <b>2.5</b>  |
| 3.85                                                           | 10                              | 836.59997710                                  | 0.013       | 2.5         |
| 3.85                                                           | 0                               | 836.59998555                                  | 0.002       | 2.5         |
| 3.85                                                           | -10                             | 836.59998644                                  | 0.001       | 2.5         |
| 3.85                                                           | -20                             | 836.59998488                                  | 0.003       | 2.5         |
| 3.85                                                           | -30                             | 836.59998170                                  | 0.007       | 2.5         |

| Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20°C |                                 |                                               |             |             |
|----------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Limit: +- 2.5 ppm = 2091.500 Hz                                |                                 |                                               |             |             |
| Power Supply<br>[Vdc]                                          | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                |                                 | [MHz]                                         | Delta [ppm] | Limit [ppm] |
| <b>3.85</b>                                                    | <b>20</b>                       | <b>836.59998762</b>                           | <b>0</b>    | <b>2.5</b>  |
| 4.40                                                           | 20                              | 836.59997787                                  | 0.012       | 2.5         |
| 3.60                                                           | 20                              | 836.59998073                                  | 0.008       | 2.5         |

**LTE Band 5 , Channel 20524, Frequency 836.5 MHz**

| Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20°C |                                 |                                               |             |             |
|--------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Limit: +- 2.5 ppm = 2091.250 Hz                              |                                 |                                               |             |             |
| Power Supply<br>[Vdc]                                        | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|                                                              |                                 | [MHz]                                         | Delta [ppm] | Limit [ppm] |
| 3.85                                                         | 50                              | 836.49998294                                  | 0.002       | 2.5         |
| 3.85                                                         | 40                              | 836.49998426                                  | 0.001       | 2.5         |
| 3.85                                                         | 30                              | 836.49998214                                  | 0.003       | 2.5         |
| <b>3.85</b>                                                  | <b>20</b>                       | 836.49998478                                  | <b>0</b>    | <b>2.5</b>  |
| 3.85                                                         | 10                              | 836.49998422                                  | 0.001       | 2.5         |
| 3.85                                                         | 0                               | 836.49998445                                  | 0.000       | 2.5         |
| 3.85                                                         | -10                             | 836.49998355                                  | 0.001       | 2.5         |
| 3.85                                                         | -20                             | 836.49997567                                  | 0.011       | 2.5         |
| 3.85                                                         | -30                             | 836.49997622                                  | 0.010       | 2.5         |

| Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20°C |                                 |                                               |             |             |
|--------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Limit: +- 2.5 ppm = 2091.250 Hz                              |                                 |                                               |             |             |
| Power Supply<br>[Vdc]                                        | Environment<br>Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|                                                              |                                 | [MHz]                                         | Delta [ppm] | Limit [ppm] |
| <b>3.85</b>                                                  | <b>20</b>                       | <b>836.49998478</b>                           | <b>0</b>    | <b>2.5</b>  |
| 4.40                                                         | 20                              | 836.49998256                                  | 0.003       | 2.5         |
| 3.60                                                         | 20                              | 836.49997764                                  | 0.009       | 2.5         |

## 10. RADIATED TEST RESULTS

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

#### RULE PART(S)

FCC: §2.1046, §22.913

#### LIMITS

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

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)

#### TEST RESULTS

### 10.1.1. ERP/EIRP Results

#### GSM

| Band   | Mode  | Channel | f [MHz] | ERP / EIRP |        |
|--------|-------|---------|---------|------------|--------|
|        |       |         |         | [dBm]      | [mW]   |
| GSM850 | GPRS  | 512     | 824.2   | 28.87      | 770.90 |
|        |       | 661     | 836.6   | 28.40      | 691.83 |
|        |       | 810     | 848.8   | 27.46      | 557.19 |
|        | EGPRS | 512     | 824.2   | 23.86      | 243.22 |
|        |       | 661     | 836.6   | 23.57      | 227.51 |
|        |       | 810     | 848.8   | 23.55      | 226.46 |

#### WCDMA

| Band   | Mode  | Channel | f [MHz] | ERP / EIRP |       |
|--------|-------|---------|---------|------------|-------|
|        |       |         |         | [dBm]      | [mW]  |
| Band 5 | REL99 | 4132    | 826.4   | 18.30      | 67.61 |
|        |       | 4183    | 836.6   | 17.89      | 61.52 |
|        |       | 4233    | 846.6   | 17.46      | 55.72 |
|        | HSDPA | 4132    | 826.4   | 18.32      | 67.92 |
|        |       | 4183    | 836.6   | 17.70      | 58.88 |
|        |       | 4233    | 846.6   | 17.13      | 51.64 |

**LTE Band 5**

| Band   | BW<br>[MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |       |
|--------|-------------|-------|------------|---------|------------|-------|
|        |             |       | Full RB    |         | [dBm]      | [mW]  |
| Band 5 | 10          | QPSK  | 50/0       | 829.0   | 16.98      | 49.89 |
|        |             |       | 50/0       | 836.5   | 16.36      | 43.25 |
|        |             |       | 50/0       | 844.0   | 16.37      | 43.35 |
|        |             | 16QAM | 50/0       | 829.0   | 15.92      | 39.08 |
|        |             |       | 50/0       | 836.5   | 15.31      | 33.96 |
|        |             |       | 50/0       | 844.0   | 15.34      | 34.20 |
|        | 5           | QPSK  | 25/0       | 826.5   | 16.47      | 44.36 |
|        |             |       | 25/0       | 836.5   | 16.05      | 40.27 |
|        |             |       | 25/0       | 846.5   | 15.94      | 39.26 |
|        |             | 16QAM | 25/0       | 826.5   | 15.43      | 34.91 |
|        |             |       | 25/0       | 836.5   | 15.16      | 32.81 |
|        |             |       | 25/0       | 846.5   | 14.86      | 30.62 |
|        | 3           | QPSK  | 15/0       | 825.5   | 16.71      | 46.88 |
|        |             |       | 15/0       | 836.5   | 15.73      | 37.41 |
|        |             |       | 15/0       | 847.5   | 15.87      | 38.64 |
|        |             | 16QAM | 15/0       | 825.5   | 15.68      | 36.98 |
|        |             |       | 15/0       | 836.5   | 14.66      | 29.24 |
|        |             |       | 15/0       | 847.5   | 14.73      | 29.72 |
|        | 1.4         | QPSK  | 6/0        | 824.7   | 14.37      | 27.35 |
|        |             |       | 6/0        | 836.5   | 13.60      | 22.91 |
|        |             |       | 6/0        | 848.3   | 13.21      | 20.94 |
|        |             | 16QAM | 6/0        | 824.7   | 13.36      | 21.68 |
|        |             |       | 6/0        | 836.5   | 12.54      | 17.95 |
|        |             |       | 6/0        | 848.3   | 12.06      | 16.07 |

## 10.1.2. ERP/EIRP DATA

### GSM 850

|                           |                                                                           |                     |                           |                    |                       |              |                |               |       |
|---------------------------|---------------------------------------------------------------------------|---------------------|---------------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| GSM<br><br>GSM850<br>GPRS | UL Verification Services, Inc.<br>High Frequency Substitution Measurement |                     |                           |                    |                       |              |                |               |       |
|                           | Company:                                                                  |                     | Samsung                   |                    |                       |              |                |               |       |
|                           | Project #:                                                                |                     | 4788404029                |                    |                       |              |                |               |       |
|                           | Date:                                                                     |                     | 2018-04-02                |                    |                       |              |                |               |       |
|                           | Test Engineer:                                                            |                     | 45585                     |                    |                       |              |                |               |       |
|                           | Configuration:                                                            |                     | EUT / Y-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<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                                                                    |                     |                           |                    |                       |              |                |               |       |
|                           | 824.20                                                                    | 25.01               | V                         | 1.0                | -1.5                  | 22.58        | 38.5           | -15.9         |       |
|                           | 824.20                                                                    | 31.30               | H                         | 1.0                | -1.5                  | 28.87        | 38.5           | -9.6          |       |
| Mid Ch                    |                                                                           |                     |                           |                    |                       |              |                |               |       |
| 836.60                    | 24.33                                                                     | V                   | 1.0                       | -1.4               | 21.95                 | 38.5         | -16.5          |               |       |
| 836.60                    | 30.78                                                                     | H                   | 1.0                       | -1.4               | 28.40                 | 38.5         | -10.1          |               |       |
| High Ch                   |                                                                           |                     |                           |                    |                       |              |                |               |       |
| 848.80                    | 25.26                                                                     | V                   | 1.0                       | -1.4               | 22.91                 | 38.5         | -15.6          |               |       |
| 848.80                    | 29.81                                                                     | H                   | 1.0                       | -1.4               | 27.46                 | 38.5         | -11.0          |               |       |
|                           |                                                                           |                     |                           |                    |                       |              |                |               |       |

|                            |                                                                           |                     |                            |                    |                       |              |                |               |       |
|----------------------------|---------------------------------------------------------------------------|---------------------|----------------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| GSM<br><br>GSM850<br>EGPRS | UL Verification Services, Inc.<br>High Frequency Substitution Measurement |                     |                            |                    |                       |              |                |               |       |
|                            | Company:                                                                  |                     | Samsung                    |                    |                       |              |                |               |       |
|                            | Project #:                                                                |                     | 4788404029                 |                    |                       |              |                |               |       |
|                            | Date:                                                                     |                     | 2018-04-02                 |                    |                       |              |                |               |       |
|                            | Test Engineer:                                                            |                     | 45585                      |                    |                       |              |                |               |       |
|                            | Configuration:                                                            |                     | EUT / Y-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<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                                                                    |                     |                            |                    |                       |              |                |               |       |
|                            | 824.20                                                                    | 20.28               | V                          | 1.0                | -1.5                  | 17.85        | 38.5           | -20.6         |       |
|                            | 824.20                                                                    | 26.29               | H                          | 1.0                | -1.5                  | 23.86        | 38.5           | -14.6         |       |
| Mid Ch                     |                                                                           |                     |                            |                    |                       |              |                |               |       |
| 836.60                     | 20.06                                                                     | V                   | 1.0                        | -1.4               | 17.68                 | 38.5         | -20.8          |               |       |
| 836.60                     | 25.95                                                                     | H                   | 1.0                        | -1.4               | 23.57                 | 38.5         | -14.9          |               |       |
| High Ch                    |                                                                           |                     |                            |                    |                       |              |                |               |       |
| 848.80                     | 21.63                                                                     | V                   | 1.0                        | -1.4               | 19.28                 | 38.5         | -19.2          |               |       |
| 848.80                     | 25.90                                                                     | H                   | 1.0                        | -1.4               | 23.55                 | 38.5         | -14.9          |               |       |
|                            |                                                                           |                     |                            |                    |                       |              |                |               |       |

**WCDMA Band 5**

| WCDMA<br><br>Band 5<br>REL99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | UL Verification Services, Inc.<br>High Frequency Substitution Measurement |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------|---------------------------|-----------------------|--------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|-------|---|-----|------|-------|------|-------|--|--------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|-------|---|-----|------|-------|------|-------|--|---------|--|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--|--------|-------|---|-----|------|-------|------|-------|--|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Company:                                                                  |                    | Samsung                   |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Project #:                                                                |                    | 4788404029                |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Date:                                                                     |                    | 2018-04-02                |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Test Engineer:                                                            |                    | 45585                     |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Configuration:                                                            |                    | EUT / Y-Position          |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Location:                                                                 |                    | Chamber 2                 |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Mode:                                                                     |                    | Rel99 Band 5 Fundamentals |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Test Equipment:                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Receiving: VULB9163-749, and Chamber 2 SMA Cables                         |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| Substitution: Dipole 3121_DB4, 3m N-type Cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| <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><td></td></tr><tr><td>826.40</td><td>15.79</td><td>V</td><td>1.0</td><td>-1.5</td><td>13.37</td><td>38.5</td><td>-25.1</td><td></td></tr><tr><td>826.40</td><td>20.72</td><td>H</td><td>1.0</td><td>-1.5</td><td>18.30</td><td>38.5</td><td>-20.2</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>836.60</td><td>14.82</td><td>V</td><td>1.0</td><td>-1.4</td><td>12.44</td><td>38.5</td><td>-26.1</td><td></td></tr><tr><td>836.60</td><td>20.27</td><td>H</td><td>1.0</td><td>-1.4</td><td>17.89</td><td>38.5</td><td>-20.6</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>846.60</td><td>15.22</td><td>V</td><td>1.0</td><td>-1.4</td><td>12.87</td><td>38.5</td><td>-25.6</td><td></td></tr><tr><td>846.60</td><td>19.81</td><td>H</td><td>1.0</td><td>-1.4</td><td>17.46</td><td>38.5</td><td>-21.0</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 |  |  |  |  |  |  |  |  | 826.40 | 15.79 | V | 1.0 | -1.5 | 13.37 | 38.5 | -25.1 |  | 826.40 | 20.72 | H | 1.0 | -1.5 | 18.30 | 38.5 | -20.2 |  | Mid Ch |  |  |  |  |  |  |  |  | 836.60 | 14.82 | V | 1.0 | -1.4 | 12.44 | 38.5 | -26.1 |  | 836.60 | 20.27 | H | 1.0 | -1.4 | 17.89 | 38.5 | -20.6 |  | High Ch |  |  |  |  |  |  |  |  | 846.60 | 15.22 | V | 1.0 | -1.4 | 12.87 | 38.5 | -25.6 |  | 846.60 | 19.81 | H | 1.0 | -1.4 | 17.46 | 38.5 | -21.0 |  |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15.79                                                                     | V                  | 1.0                       | -1.5                  | 13.37        | 38.5           | -25.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 826.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20.72                                                                     | H                  | 1.0                       | -1.5                  | 18.30        | 38.5           | -20.2         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 14.82                                                                     | V                  | 1.0                       | -1.4                  | 12.44        | 38.5           | -26.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20.27                                                                     | H                  | 1.0                       | -1.4                  | 17.89        | 38.5           | -20.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 846.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15.22                                                                     | V                  | 1.0                       | -1.4                  | 12.87        | 38.5           | -25.6         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 846.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 19.81                                                                     | H                  | 1.0                       | -1.4                  | 17.46        | 38.5           | -21.0         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| WCDMA<br><br>Band 5<br>HSDPA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | UL Verification Services, Inc.<br>High Frequency Substitution Measurement |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Company:                                                                  |                    | Samsung                   |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Project #:                                                                |                    | 4788404029                |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Date:                                                                     |                    | 2018-04-02                |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Test Engineer:                                                            |                    | 45585                     |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Configuration:                                                            |                    | EUT / Y-Position          |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Location:                                                                 |                    | Chamber 2                 |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Mode:                                                                     |                    | HSDPA Band 5 Fundamentals |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Test Equipment:                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Receiving: VULB9163-749, and Chamber 2 SMA Cables                         |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| Substitution: Dipole 3121_DB4, 3m N-type Cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| <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><td></td></tr><tr><td>826.40</td><td>15.53</td><td>V</td><td>1.0</td><td>-1.5</td><td>13.11</td><td>38.5</td><td>-25.4</td><td></td></tr><tr><td>826.40</td><td>20.74</td><td>H</td><td>1.0</td><td>-1.5</td><td>18.32</td><td>38.5</td><td>-20.2</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>836.60</td><td>14.91</td><td>V</td><td>1.0</td><td>-1.4</td><td>12.53</td><td>38.5</td><td>-26.0</td><td></td></tr><tr><td>836.60</td><td>20.08</td><td>H</td><td>1.0</td><td>-1.4</td><td>17.70</td><td>38.5</td><td>-20.8</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>846.60</td><td>15.49</td><td>V</td><td>1.0</td><td>-1.4</td><td>13.14</td><td>38.5</td><td>-25.4</td><td></td></tr><tr><td>846.60</td><td>19.48</td><td>H</td><td>1.0</td><td>-1.4</td><td>17.13</td><td>38.5</td><td>-21.4</td><td></td></tr></table> |                                                                           |                    |                           |                       |              |                |               |       | f<br>MHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | ERP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes | Low Ch |  |  |  |  |  |  |  |  | 826.40 | 15.53 | V | 1.0 | -1.5 | 13.11 | 38.5 | -25.4 |  | 826.40 | 20.74 | H | 1.0 | -1.5 | 18.32 | 38.5 | -20.2 |  | Mid Ch |  |  |  |  |  |  |  |  | 836.60 | 14.91 | V | 1.0 | -1.4 | 12.53 | 38.5 | -26.0 |  | 836.60 | 20.08 | H | 1.0 | -1.4 | 17.70 | 38.5 | -20.8 |  | High Ch |  |  |  |  |  |  |  |  | 846.60 | 15.49 | V | 1.0 | -1.4 | 13.14 | 38.5 | -25.4 |  | 846.60 | 19.48 | H | 1.0 | -1.4 | 17.13 | 38.5 | -21.4 |  |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15.53                                                                     | V                  | 1.0                       | -1.5                  | 13.11        | 38.5           | -25.4         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 826.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20.74                                                                     | H                  | 1.0                       | -1.5                  | 18.32        | 38.5           | -20.2         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 14.91                                                                     | V                  | 1.0                       | -1.4                  | 12.53        | 38.5           | -26.0         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 836.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20.08                                                                     | H                  | 1.0                       | -1.4                  | 17.70        | 38.5           | -20.8         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                           |                    |                           |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 846.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15.49                                                                     | V                  | 1.0                       | -1.4                  | 13.14        | 38.5           | -25.4         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |
| 846.60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 19.48                                                                     | H                  | 1.0                       | -1.4                  | 17.13        | 38.5           | -21.4         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |        |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |         |  |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |  |        |       |   |     |      |       |      |       |  |

**LTE Band 5**

|                                 |                                                                                                                                                                                                                                                          |                   |                  |                   |                     |              |              |              |              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-------------------|---------------------|--------------|--------------|--------------|--------------|
| LTE<br>Band 5<br>10MHz<br>QPSK  | <b>UL Verification Services, Inc.</b><br><b>High Frequency Substitution Measurement</b>                                                                                                                                                                  |                   |                  |                   |                     |              |              |              |              |
|                                 | <b>Company:</b> Samsung<br><b>Project #:</b> 4788404029<br><b>Date:</b> 2018-03-31<br><b>Test Engineer:</b> 45585<br><b>Configuration:</b> EUT / Y-Position<br><b>Location:</b> Chamber 2<br><b>Mode:</b> LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth  |                   |                  |                   |                     |              |              |              |              |
|                                 | <b>Test Equipment:</b><br>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br>Substitution: Dipole 3121_DB4, 3m N-type Cable                                                                                                                            |                   |                  |                   |                     |              |              |              |              |
|                                 | <b>f</b>                                                                                                                                                                                                                                                 | <b>SG reading</b> | <b>Ant. Pol.</b> | <b>Cable Loss</b> | <b>Antenna Gain</b> | <b>ERP</b>   | <b>Limit</b> | <b>Delta</b> | <b>Notes</b> |
|                                 | <b>MHz</b>                                                                                                                                                                                                                                               | <b>(dBm)</b>      | <b>(H/V)</b>     | <b>(dB)</b>       | <b>(dBd)</b>        | <b>(dBm)</b> | <b>(dBm)</b> | <b>(dB)</b>  |              |
|                                 | Low Ch                                                                                                                                                                                                                                                   |                   |                  |                   |                     |              |              |              |              |
|                                 | 829.00                                                                                                                                                                                                                                                   | 10.36             | V                | 1.0               | -1.5                | 7.95         | 38.5         | -30.5        |              |
|                                 | 829.00                                                                                                                                                                                                                                                   | 19.39             | H                | 1.0               | -1.5                | 16.98        | 38.5         | -21.5        |              |
|                                 | Mid Ch                                                                                                                                                                                                                                                   |                   |                  |                   |                     |              |              |              |              |
|                                 | 836.50                                                                                                                                                                                                                                                   | 13.09             | V                | 1.0               | -1.4                | 10.71        | 38.5         | -27.8        |              |
|                                 | 836.50                                                                                                                                                                                                                                                   | 18.74             | H                | 1.0               | -1.4                | 16.36        | 38.5         | -22.1        |              |
|                                 | High Ch                                                                                                                                                                                                                                                  |                   |                  |                   |                     |              |              |              |              |
|                                 | 844.00                                                                                                                                                                                                                                                   | 13.77             | V                | 1.0               | -1.4                | 11.42        | 38.5         | -27.1        |              |
|                                 | 844.00                                                                                                                                                                                                                                                   | 18.73             | H                | 1.0               | -1.4                | 16.37        | 38.5         | -22.1        |              |
| LTE<br>Band 5<br>10MHz<br>16QAM | <b>UL Verification Services, Inc.</b><br><b>High Frequency Substitution Measurement</b>                                                                                                                                                                  |                   |                  |                   |                     |              |              |              |              |
|                                 | <b>Company:</b> Samsung<br><b>Project #:</b> 4788404029<br><b>Date:</b> 2018-03-31<br><b>Test Engineer:</b> 45585<br><b>Configuration:</b> EUT / Y-Position<br><b>Location:</b> Chamber 2<br><b>Mode:</b> LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth |                   |                  |                   |                     |              |              |              |              |
|                                 | <b>Test Equipment:</b><br>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br>Substitution: Dipole 3121_DB4, 3m N-type Cable                                                                                                                            |                   |                  |                   |                     |              |              |              |              |
|                                 | <b>f</b>                                                                                                                                                                                                                                                 | <b>SG reading</b> | <b>Ant. Pol.</b> | <b>Cable Loss</b> | <b>Antenna Gain</b> | <b>ERP</b>   | <b>Limit</b> | <b>Delta</b> | <b>Notes</b> |
|                                 | <b>MHz</b>                                                                                                                                                                                                                                               | <b>(dBm)</b>      | <b>(H/V)</b>     | <b>(dB)</b>       | <b>(dBd)</b>        | <b>(dBm)</b> | <b>(dBm)</b> | <b>(dB)</b>  |              |
|                                 | Low Ch                                                                                                                                                                                                                                                   |                   |                  |                   |                     |              |              |              |              |
|                                 | 829.00                                                                                                                                                                                                                                                   | 12.69             | V                | 1.0               | -1.5                | 10.28        | 38.5         | -28.2        |              |
|                                 | 829.00                                                                                                                                                                                                                                                   | 18.33             | H                | 1.0               | -1.5                | 15.92        | 38.5         | -22.6        |              |
|                                 | Mid Ch                                                                                                                                                                                                                                                   |                   |                  |                   |                     |              |              |              |              |
|                                 | 836.50                                                                                                                                                                                                                                                   | 12.10             | V                | 1.0               | -1.4                | 9.72         | 38.5         | -28.8        |              |
|                                 | 836.50                                                                                                                                                                                                                                                   | 17.69             | H                | 1.0               | -1.4                | 15.31        | 38.5         | -23.2        |              |
|                                 | High Ch                                                                                                                                                                                                                                                  |                   |                  |                   |                     |              |              |              |              |
|                                 | 844.00                                                                                                                                                                                                                                                   | 12.73             | V                | 1.0               | -1.4                | 10.38        | 38.5         | -28.1        |              |
|                                 | 844.00                                                                                                                                                                                                                                                   | 17.70             | H                | 1.0               | -1.4                | 15.34        | 38.5         | -23.2        |              |

| LTE<br><br>Band 5<br><br>5MHz<br><br>QPSK  | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-03-31<br/>Test Engineer: 45585<br/>Configuration: EUT / Y-Position<br/>Location: Chamber 2<br/>Mode: LTE_QPSK Band 5 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>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>826.50</td><td>12.76</td><td>V</td><td>1.0</td><td>-1.5</td><td>10.34</td><td>38.5</td><td>-28.2</td></tr><tr><td>826.50</td><td>18.89</td><td>H</td><td>1.0</td><td>-1.5</td><td>16.47</td><td>38.5</td><td>-22.0</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>12.78</td><td>V</td><td>1.0</td><td>-1.4</td><td>10.40</td><td>38.5</td><td>-28.1</td></tr><tr><td>836.50</td><td>18.43</td><td>H</td><td>1.0</td><td>-1.4</td><td>16.05</td><td>38.5</td><td>-22.5</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>846.50</td><td>13.79</td><td>V</td><td>1.0</td><td>-1.4</td><td>11.44</td><td>38.5</td><td>-27.1</td></tr><tr><td>846.50</td><td>18.29</td><td>H</td><td>1.0</td><td>-1.4</td><td>15.94</td><td>38.5</td><td>-22.6</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 |  |  |  |  |  |  |  | 826.50 | 12.76 | V | 1.0 | -1.5 | 10.34 | 38.5 | -28.2 | 826.50 | 18.89 | H | 1.0 | -1.5 | 16.47 | 38.5 | -22.0 | Mid Ch |  |  |  |  |  |  |  | 836.50 | 12.78 | V | 1.0 | -1.4 | 10.40 | 38.5 | -28.1 | 836.50 | 18.43 | H | 1.0 | -1.4 | 16.05 | 38.5 | -22.5 | High Ch |  |  |  |  |  |  |  | 846.50 | 13.79 | V | 1.0 | -1.4 | 11.44 | 38.5 | -27.1 | 846.50 | 18.29 | H | 1.0 | -1.4 | 15.94 | 38.5 | -22.6 |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|----------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|--------|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--------|-------|---|-----|------|-------|------|-------|--------|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--------|-------|---|-----|------|-------|------|-------|---------|--|--|--|--|--|--|--|--------|-------|---|-----|------|-------|------|-------|--------|-------|---|-----|------|-------|------|-------|
|                                            | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 826.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12.76               | V                  | 1.0                | -1.5                  | 10.34        | 38.5           | -28.2         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 826.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 18.89               | H                  | 1.0                | -1.5                  | 16.47        | 38.5           | -22.0         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12.78               | V                  | 1.0                | -1.4                  | 10.40        | 38.5           | -28.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 18.43               | H                  | 1.0                | -1.4                  | 16.05        | 38.5           | -22.5         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 846.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 13.79               | V                  | 1.0                | -1.4                  | 11.44        | 38.5           | -27.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
| 846.50                                     | 18.29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                   | 1.0                | -1.4               | 15.94                 | 38.5         | -22.6          |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
| LTE<br><br>Band 5<br><br>5MHz<br><br>16QAM | <div>UL Verification Services, Inc.<br/>High Frequency Substitution Measurement</div> <div>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-03-31<br/>Test Engineer: 45585<br/>Configuration: EUT / Y-Position<br/>Location: Chamber 2<br/>Mode: LTE_16QAM Band 5 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>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>826.50</td><td>11.65</td><td>V</td><td>1.0</td><td>-1.5</td><td>9.23</td><td>38.5</td><td>-29.3</td></tr><tr><td>826.50</td><td>17.85</td><td>H</td><td>1.0</td><td>-1.5</td><td>15.43</td><td>38.5</td><td>-23.1</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>11.72</td><td>V</td><td>1.0</td><td>-1.4</td><td>9.34</td><td>38.5</td><td>-29.2</td></tr><tr><td>836.50</td><td>17.54</td><td>H</td><td>1.0</td><td>-1.4</td><td>15.16</td><td>38.5</td><td>-23.3</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>846.50</td><td>12.71</td><td>V</td><td>1.0</td><td>-1.4</td><td>10.36</td><td>38.5</td><td>-28.1</td></tr><tr><td>846.50</td><td>17.21</td><td>H</td><td>1.0</td><td>-1.4</td><td>14.86</td><td>38.5</td><td>-23.6</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 |  |  |  |  |  |  |  | 826.50 | 11.65 | V | 1.0 | -1.5 | 9.23  | 38.5 | -29.3 | 826.50 | 17.85 | H | 1.0 | -1.5 | 15.43 | 38.5 | -23.1 | Mid Ch |  |  |  |  |  |  |  | 836.50 | 11.72 | V | 1.0 | -1.4 | 9.34  | 38.5 | -29.2 | 836.50 | 17.54 | H | 1.0 | -1.4 | 15.16 | 38.5 | -23.3 | High Ch |  |  |  |  |  |  |  | 846.50 | 12.71 | V | 1.0 | -1.4 | 10.36 | 38.5 | -28.1 | 846.50 | 17.21 | H | 1.0 | -1.4 | 14.86 | 38.5 | -23.6 |
|                                            | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 826.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 11.65               | V                  | 1.0                | -1.5                  | 9.23         | 38.5           | -29.3         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 826.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 17.85               | H                  | 1.0                | -1.5                  | 15.43        | 38.5           | -23.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 11.72               | V                  | 1.0                | -1.4                  | 9.34         | 38.5           | -29.2         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 17.54               | H                  | 1.0                | -1.4                  | 15.16        | 38.5           | -23.3         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                    |                    |                       |              |                |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
|                                            | 846.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12.71               | V                  | 1.0                | -1.4                  | 10.36        | 38.5           | -28.1         |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |
| 846.50                                     | 17.21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                   | 1.0                | -1.4               | 14.86                 | 38.5         | -23.6          |               |       |          |                     |                    |                    |                       |              |                |               |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |        |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |         |  |  |  |  |  |  |  |        |       |   |     |      |       |      |       |        |       |   |     |      |       |      |       |

|                                |                                                                                                                                                                                                        |                     |                    |                    |                       |              |                |               |       |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-----------------------|--------------|----------------|---------------|-------|
| LTE<br>Band 5<br>3MHz<br>QPSK  | UL Verification Services, Inc.<br>High Frequency Substitution Measurement                                                                                                                              |                     |                    |                    |                       |              |                |               |       |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-02<br>Test Engineer: 45585<br>Configuration: EUT / Y-Position<br>Location: Chamber 2<br>Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth  |                     |                    |                    |                       |              |                |               |       |
|                                | Test Equipment:<br>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br>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                                                                                                                                                                                                 |                     |                    |                    |                       |              |                |               |       |
|                                | 825.50                                                                                                                                                                                                 | 13.17               | V                  | 1.0                | -1.5                  | 10.75        | 38.5           | -27.7         |       |
|                                | 825.50                                                                                                                                                                                                 | 19.13               | H                  | 1.0                | -1.5                  | 16.71        | 38.5           | -21.8         |       |
|                                | Mid Ch                                                                                                                                                                                                 |                     |                    |                    |                       |              |                |               |       |
|                                | 836.50                                                                                                                                                                                                 | 12.87               | V                  | 1.0                | -1.4                  | 10.49        | 38.5           | -28.0         |       |
|                                | 836.50                                                                                                                                                                                                 | 18.11               | H                  | 1.0                | -1.4                  | 15.73        | 38.5           | -22.8         |       |
| LTE<br>Band 5<br>3MHz<br>16QAM | UL Verification Services, Inc.<br>High Frequency Substitution Measurement                                                                                                                              |                     |                    |                    |                       |              |                |               |       |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-02<br>Test Engineer: 45585<br>Configuration: EUT / Y-Position<br>Location: Chamber 2<br>Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth |                     |                    |                    |                       |              |                |               |       |
|                                | Test Equipment:<br>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br>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                                                                                                                                                                                                 |                     |                    |                    |                       |              |                |               |       |
|                                | 825.50                                                                                                                                                                                                 | 12.19               | V                  | 1.0                | -1.5                  | 9.77         | 38.5           | -28.7         |       |
|                                | 825.50                                                                                                                                                                                                 | 18.10               | H                  | 1.0                | -1.5                  | 15.68        | 38.5           | -22.8         |       |
|                                | Mid Ch                                                                                                                                                                                                 |                     |                    |                    |                       |              |                |               |       |
|                                | 836.50                                                                                                                                                                                                 | 11.76               | V                  | 1.0                | -1.4                  | 9.38         | 38.5           | -29.1         |       |
|                                | 836.50                                                                                                                                                                                                 | 17.04               | H                  | 1.0                | -1.4                  | 14.66        | 38.5           | -23.8         |       |
| LTE<br>Band 5<br>3MHz<br>16QAM | UL Verification Services, Inc.<br>High Frequency Substitution Measurement                                                                                                                              |                     |                    |                    |                       |              |                |               |       |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-02<br>Test Engineer: 45585<br>Configuration: EUT / Y-Position<br>Location: Chamber 2<br>Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth |                     |                    |                    |                       |              |                |               |       |
|                                | Test Equipment:<br>Receiving: VULB9163-749, and Chamber 2 SMA Cables<br>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                                                                                                                                                                                                 |                     |                    |                    |                       |              |                |               |       |
|                                | 825.50                                                                                                                                                                                                 | 12.19               | V                  | 1.0                | -1.5                  | 9.77         | 38.5           | -28.7         |       |
|                                | 825.50                                                                                                                                                                                                 | 18.10               | H                  | 1.0                | -1.5                  | 15.68        | 38.5           | -22.8         |       |
|                                | Mid Ch                                                                                                                                                                                                 |                     |                    |                    |                       |              |                |               |       |
|                                | 836.50                                                                                                                                                                                                 | 11.76               | V                  | 1.0                | -1.4                  | 9.38         | 38.5           | -29.1         |       |
|                                | 836.50                                                                                                                                                                                                 | 17.04               | H                  | 1.0                | -1.4                  | 14.66        | 38.5           | -23.8         |       |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                  |                   |                     |              |              |              |              |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-------------------|---------------------|--------------|--------------|--------------|--------------|
| LTE<br>Band 5<br>1.4MHz<br>QPSK  | <b>UL Verification Services, Inc.</b><br><b>High Frequency Substitution Measurement</b><br><br><b>Company:</b> Samsung<br><b>Project #:</b> 4788404029<br><b>Date:</b> 2018-04-02<br><b>Test Engineer:</b> 45585<br><b>Configuration:</b> EUT / Y-Position<br><b>Location:</b> Chamber 2<br><b>Mode:</b> LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth<br><br><b>Test Equipment:</b><br><b>Receiving:</b> VULB9163-749, and Chamber 2 SMA Cables<br><b>Substitution:</b> Dipole 3121_DB4, 3m N-type Cable  |                   |                  |                   |                     |              |              |              |              |
|                                  | <b>f</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>SG reading</b> | <b>Ant. Pol.</b> | <b>Cable Loss</b> | <b>Antenna Gain</b> | <b>ERP</b>   | <b>Limit</b> | <b>Delta</b> | <b>Notes</b> |
|                                  | <b>MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>(dBm)</b>      | <b>(H/V)</b>     | <b>(dB)</b>       | <b>(dBd)</b>        | <b>(dBm)</b> | <b>(dBm)</b> | <b>(dB)</b>  |              |
|                                  | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |                  |                   |                     |              |              |              |              |
|                                  | 824.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 11.14             | V                | 1.0               | -1.5                | 8.71         | 38.5         | -29.8        |              |
|                                  | 824.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 16.80             | H                | 1.0               | -1.5                | 14.37        | 38.5         | -24.1        |              |
|                                  | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |                  |                   |                     |              |              |              |              |
|                                  | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10.58             | V                | 1.0               | -1.4                | 8.20         | 38.5         | -30.3        |              |
|                                  | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 15.98             | H                | 1.0               | -1.4                | 13.60        | 38.5         | -24.9        |              |
|                                  | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                  |                   |                     |              |              |              |              |
|                                  | 848.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 11.59             | V                | 1.0               | -1.4                | 9.24         | 38.5         | -29.3        |              |
|                                  | 848.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 15.56             | H                | 1.0               | -1.4                | 13.21        | 38.5         | -25.3        |              |
| LTE<br>Band 5<br>1.4MHz<br>16QAM | <b>UL Verification Services, Inc.</b><br><b>High Frequency Substitution Measurement</b><br><br><b>Company:</b> Samsung<br><b>Project #:</b> 4788404029<br><b>Date:</b> 2018-04-02<br><b>Test Engineer:</b> 45585<br><b>Configuration:</b> EUT / Y-Position<br><b>Location:</b> Chamber 2<br><b>Mode:</b> LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth<br><br><b>Test Equipment:</b><br><b>Receiving:</b> VULB9163-749, and Chamber 2 SMA Cables<br><b>Substitution:</b> Dipole 3121_DB4, 3m N-type Cable |                   |                  |                   |                     |              |              |              |              |
|                                  | <b>f</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>SG reading</b> | <b>Ant. Pol.</b> | <b>Cable Loss</b> | <b>Antenna Gain</b> | <b>ERP</b>   | <b>Limit</b> | <b>Delta</b> | <b>Notes</b> |
|                                  | <b>MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>(dBm)</b>      | <b>(H/V)</b>     | <b>(dB)</b>       | <b>(dBd)</b>        | <b>(dBm)</b> | <b>(dBm)</b> | <b>(dB)</b>  |              |
|                                  | Low Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |                  |                   |                     |              |              |              |              |
|                                  | 824.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10.06             | V                | 1.0               | -1.5                | 7.63         | 38.5         | -30.9        |              |
|                                  | 824.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 15.79             | H                | 1.0               | -1.5                | 13.36        | 38.5         | -25.1        |              |
|                                  | Mid Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |                  |                   |                     |              |              |              |              |
|                                  | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 9.57              | V                | 1.0               | -1.4                | 7.19         | 38.5         | -31.3        |              |
|                                  | 836.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 14.92             | H                | 1.0               | -1.4                | 12.54        | 38.5         | -26.0        |              |
|                                  | High Ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                  |                   |                     |              |              |              |              |
|                                  | 848.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10.47             | V                | 1.0               | -1.4                | 8.12         | 38.5         | -30.4        |              |
|                                  | 848.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 14.41             | H                | 1.0               | -1.4                | 12.06        | 38.5         | -26.4        |              |

## 10.2. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917

### LIMIT

Part 22.917(a) 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.

### 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;
- f) Ensure that the number of measurement points  $\geq$  span/RBW;
- g) Trace mode = max hold;

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

### RESULTS

## 10.2.1. SPURIOUS RADIATION PLOTS

### GSM 850

|                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |
|----------------------------|--------------------------------------------------------------------------------------|------------------|-----------------|--------------|-------------|-------------|------------|-------------|------------|-------|
| GSM<br><br>GSM850<br>GPRS  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                  |                 |              |             |             |            |             |            |       |
|                            | Company: Samsung                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | Project #: 4788404029                                                                |                  |                 |              |             |             |            |             |            |       |
|                            | Date: 2018-04-07                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | Test Engineer: 47989                                                                 |                  |                 |              |             |             |            |             |            |       |
|                            | Configuration: EUT / AC Adapter / Earphone, Y-Position                               |                  |                 |              |             |             |            |             |            |       |
|                            | Location: Chamber 2                                                                  |                  |                 |              |             |             |            |             |            |       |
|                            | Mode: GPRS 850 MHz Harmonics                                                         |                  |                 |              |             |             |            |             |            |       |
|                            | f MHz                                                                                | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|                            | Low Ch, 824.2MHz                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | 1648.40                                                                              | -7.4             | V               | 3.0          | 38.2        | 1.0         | -44.6      | -13.0       | -31.6      |       |
|                            | 2472.60                                                                              | -8.9             | V               | 3.0          | 38.8        | 1.0         | -46.7      | -13.0       | -33.7      |       |
|                            | 3296.80                                                                              | -14.6            | V               | 3.0          | 39.4        | 1.0         | -53.1      | -13.0       | -40.1      |       |
|                            | 1648.40                                                                              | -6.7             | H               | 3.0          | 38.2        | 1.0         | -43.9      | -13.0       | -30.9      |       |
|                            | 2472.60                                                                              | -7.3             | H               | 3.0          | 38.8        | 1.0         | -45.1      | -13.0       | -32.1      |       |
|                            | 3296.80                                                                              | -14.7            | H               | 3.0          | 39.4        | 1.0         | -53.1      | -13.0       | -40.1      |       |
|                            | Mid Ch, 836.6MHz                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | 1673.20                                                                              | -7.7             | V               | 3.0          | 38.2        | 1.0         | -45.0      | -13.0       | -32.0      |       |
|                            | 2509.80                                                                              | -8.5             | V               | 3.0          | 38.8        | 1.0         | -46.3      | -13.0       | -33.3      |       |
|                            | 3346.40                                                                              | -14.9            | V               | 3.0          | 39.5        | 1.0         | -53.3      | -13.0       | -40.3      |       |
| 1673.20                    | -8.8                                                                                 | H                | 3.0             | 38.2         | 1.0         | -46.1       | -13.0      | -33.1       |            |       |
| 2509.80                    | -8.0                                                                                 | H                | 3.0             | 38.8         | 1.0         | -45.8       | -13.0      | -32.8       |            |       |
| 3346.40                    | -13.5                                                                                | H                | 3.0             | 39.5         | 1.0         | -52.0       | -13.0      | -39.0       |            |       |
| High Ch, 848.8MHz          |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| 1697.60                    | -6.1                                                                                 | V                | 3.0             | 38.2         | 1.0         | -43.4       | -13.0      | -30.4       |            |       |
| 2546.40                    | -9.4                                                                                 | V                | 3.0             | 38.9         | 1.0         | -47.3       | -13.0      | -34.3       |            |       |
| 3395.20                    | -14.2                                                                                | V                | 3.0             | 39.5         | 1.0         | -52.6       | -13.0      | -39.6       |            |       |
| 1697.60                    | -8.3                                                                                 | H                | 3.0             | 38.2         | 1.0         | -45.5       | -13.0      | -32.5       |            |       |
| 2546.40                    | -8.8                                                                                 | H                | 3.0             | 38.9         | 1.0         | -46.7       | -13.0      | -33.7       |            |       |
| 3395.20                    | -14.0                                                                                | H                | 3.0             | 39.5         | 1.0         | -52.5       | -13.0      | -39.5       |            |       |
|                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| GSM<br><br>GSM850<br>EGPRS | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement |                  |                 |              |             |             |            |             |            |       |
|                            | Company: Samsung                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | Project #: 4788404029                                                                |                  |                 |              |             |             |            |             |            |       |
|                            | Date: 2018-04-07                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | Test Engineer: 47989                                                                 |                  |                 |              |             |             |            |             |            |       |
|                            | Configuration: EUT / AC Adapter / Earphone, Y-Position                               |                  |                 |              |             |             |            |             |            |       |
|                            | Location: Chamber 2                                                                  |                  |                 |              |             |             |            |             |            |       |
|                            | Mode: EGPRS 850 MHz Harmonics                                                        |                  |                 |              |             |             |            |             |            |       |
|                            | f MHz                                                                                | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|                            | Low Ch, 824.2MHz                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | 1648.40                                                                              | -11.0            | V               | 3.0          | 38.2        | 1.0         | -48.3      | -13.0       | -35.3      |       |
|                            | 2472.60                                                                              | -13.1            | V               | 3.0          | 38.8        | 1.0         | -50.9      | -13.0       | -37.9      |       |
|                            | 3296.80                                                                              | -13.7            | V               | 3.0          | 39.4        | 1.0         | -52.2      | -13.0       | -39.2      |       |
|                            | 1648.40                                                                              | -11.1            | H               | 3.0          | 38.2        | 1.0         | -48.3      | -13.0       | -35.3      |       |
|                            | 2472.60                                                                              | -11.6            | H               | 3.0          | 38.8        | 1.0         | -49.4      | -13.0       | -36.4      |       |
|                            | 3296.80                                                                              | -15.0            | H               | 3.0          | 39.4        | 1.0         | -53.4      | -13.0       | -40.4      |       |
|                            | Mid Ch, 836.6MHz                                                                     |                  |                 |              |             |             |            |             |            |       |
|                            | 1673.20                                                                              | -10.5            | V               | 3.0          | 38.2        | 1.0         | -47.8      | -13.0       | -34.8      |       |
|                            | 2509.80                                                                              | -12.8            | V               | 3.0          | 38.8        | 1.0         | -50.6      | -13.0       | -37.6      |       |
|                            | 3346.40                                                                              | -14.6            | V               | 3.0          | 39.5        | 1.0         | -53.1      | -13.0       | -40.1      |       |
| 1673.20                    | -11.7                                                                                | H                | 3.0             | 38.2         | 1.0         | -48.9       | -13.0      | -35.9       |            |       |
| 2509.80                    | -11.7                                                                                | H                | 3.0             | 38.8         | 1.0         | -49.5       | -13.0      | -36.5       |            |       |
| 3346.40                    | -14.6                                                                                | H                | 3.0             | 39.5         | 1.0         | -53.0       | -13.0      | -40.0       |            |       |
| High Ch, 848.8MHz          |                                                                                      |                  |                 |              |             |             |            |             |            |       |
| 1697.60                    | -9.0                                                                                 | V                | 3.0             | 38.2         | 1.0         | -46.2       | -13.0      | -33.2       |            |       |
| 2546.40                    | -11.4                                                                                | V                | 3.0             | 38.9         | 1.0         | -49.3       | -13.0      | -36.3       |            |       |
| 3395.20                    | -13.9                                                                                | V                | 3.0             | 39.5         | 1.0         | -52.4       | -13.0      | -39.4       |            |       |
| 1697.60                    | -12.4                                                                                | H                | 3.0             | 38.2         | 1.0         | -49.6       | -13.0      | -36.6       |            |       |
| 2546.40                    | -12.4                                                                                | H                | 3.0             | 38.9         | 1.0         | -50.3       | -13.0      | -37.3       |            |       |
| 3395.20                    | -14.5                                                                                | H                | 3.0             | 39.5         | 1.0         | -52.9       | -13.0      | -39.9       |            |       |
|                            |                                                                                      |                  |                 |              |             |             |            |             |            |       |

**WCDMA Band 5**

|                          |                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                 |                |                |               |                |               |       |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| WCDMA<br>Band 5<br>REL99 | <p style="text-align: center;"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-04-07<br/>Test Engineer: 47989<br/>Configuration: EUT / AC Adapter / Earphone, Y-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 |
| WCDMA<br>Band 5<br>HSDPA | <p style="text-align: center;"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-04-07<br/>Test Engineer: 47989<br/>Configuration: EUT / AC Adapter / Earphone, Y-Position<br/>Location: Chamber 2<br/>Mode: HSDPA 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 |
| WCDMA<br>Band 5<br>HSDPA | <p style="text-align: center;"><b>UL Verification Services, Inc.</b><br/><b>Above 1GHz High Frequency Substitution Measurement</b></p> <p>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-04-07<br/>Test Engineer: 47989<br/>Configuration: EUT / AC Adapter / Earphone, Y-Position<br/>Location: Chamber 2<br/>Mode: HSDPA 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 |

**LTE Band 5**

|                                           |  |                                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|-------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| <p>LTE<br/>Band 5<br/>10MHz<br/>QPSK</p>  |  | <p>UL Verification Services, Inc.<br/>Above 1GHz High Frequency Substitution Measurement</p> <p>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-04-06<br/>Test Engineer: 45585<br/>Configuration: EUT / Adapter / Earphone, Y-Position<br/>Location: Chamber 3<br/>Mode: LTE_QPSK Band 5 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 |
|                                           |  | Low Ch, 829MHz                                                                                                                                                                                                                                                                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                           |  | 1658.00                                                                                                                                                                                                                                                                                                                            | -8.9                | V                  | 3.0             | 41.8           | 1.0            | -49.7         | -13.0          | -36.7         |       |
|                                           |  | 2487.00                                                                                                                                                                                                                                                                                                                            | -14.7               | V                  | 3.0             | 41.7           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                           |  | 3316.00                                                                                                                                                                                                                                                                                                                            | -15.3               | V                  | 3.0             | 41.1           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                           |  | 4145.00                                                                                                                                                                                                                                                                                                                            | -6.8                | V                  | 3.0             | 40.6           | 1.0            | -46.4         | -13.0          | -33.4         |       |
|                                           |  | 1658.00                                                                                                                                                                                                                                                                                                                            | -11.8               | H                  | 3.0             | 41.8           | 1.0            | -52.7         | -13.0          | -39.7         |       |
|                                           |  | 2487.00                                                                                                                                                                                                                                                                                                                            | -13.8               | H                  | 3.0             | 41.7           | 1.0            | -54.5         | -13.0          | -41.5         |       |
|                                           |  | 3316.00                                                                                                                                                                                                                                                                                                                            | -16.3               | H                  | 3.0             | 41.1           | 1.0            | -56.4         | -13.0          | -43.4         |       |
|                                           |  | 4145.00                                                                                                                                                                                                                                                                                                                            | -13.6               | H                  | 3.0             | 40.6           | 1.0            | -53.2         | -13.0          | -40.2         |       |
|                                           |  | Mid Ch, 836.5MHz                                                                                                                                                                                                                                                                                                                   |                     |                    |                 |                |                |               |                |               |       |
|                                           |  | 1673.00                                                                                                                                                                                                                                                                                                                            | -8.8                | V                  | 3.0             | 41.8           | 1.0            | -49.6         | -13.0          | -36.6         |       |
|                                           |  | 2509.50                                                                                                                                                                                                                                                                                                                            | -14.0               | V                  | 3.0             | 41.7           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                                           |  | 3346.00                                                                                                                                                                                                                                                                                                                            | -15.8               | V                  | 3.0             | 41.1           | 1.0            | -55.9         | -13.0          | -42.9         |       |
|                                           |  | 4182.50                                                                                                                                                                                                                                                                                                                            | -7.7                | V                  | 3.0             | 40.6           | 1.0            | -47.3         | -13.0          | -34.3         |       |
|                                           |  | 1673.00                                                                                                                                                                                                                                                                                                                            | -13.0               | H                  | 3.0             | 41.8           | 1.0            | -53.8         | -13.0          | -40.8         |       |
|                                           |  | 2509.50                                                                                                                                                                                                                                                                                                                            | -12.9               | H                  | 3.0             | 41.7           | 1.0            | -53.6         | -13.0          | -40.6         |       |
|                                           |  | 3346.00                                                                                                                                                                                                                                                                                                                            | -10.6               | H                  | 3.0             | 41.1           | 1.0            | -50.7         | -13.0          | -37.7         |       |
|                                           |  | 4182.50                                                                                                                                                                                                                                                                                                                            | -5.3                | H                  | 3.0             | 40.6           | 1.0            | -44.9         | -13.0          | -31.9         |       |
|                                           |  | High Ch, 844MHz                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                           |  | 1688.00                                                                                                                                                                                                                                                                                                                            | -11.1               | V                  | 3.0             | 41.8           | 1.0            | -51.9         | -13.0          | -38.9         |       |
|                                           |  | 2532.00                                                                                                                                                                                                                                                                                                                            | -15.5               | V                  | 3.0             | 41.7           | 1.0            | -56.1         | -13.0          | -43.1         |       |
|                                           |  | 3376.00                                                                                                                                                                                                                                                                                                                            | -15.3               | V                  | 3.0             | 41.1           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                           |  | 4220.00                                                                                                                                                                                                                                                                                                                            | -7.1                | V                  | 3.0             | 40.6           | 1.0            | -46.7         | -13.0          | -33.7         |       |
|                                           |  | 1688.00                                                                                                                                                                                                                                                                                                                            | -11.8               | H                  | 3.0             | 41.8           | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                                           |  | 2532.00                                                                                                                                                                                                                                                                                                                            | -13.9               | H                  | 3.0             | 41.7           | 1.0            | -54.5         | -13.0          | -41.5         |       |
|                                           |  | 3376.00                                                                                                                                                                                                                                                                                                                            | -15.0               | H                  | 3.0             | 41.1           | 1.0            | -55.1         | -13.0          | -42.1         |       |
|                                           |  | 4220.00                                                                                                                                                                                                                                                                                                                            | -5.1                | H                  | 3.0             | 40.6           | 1.0            | -44.7         | -13.0          | -31.7         |       |
|                                           |  |                                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                           |  |                                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
| <p>LTE<br/>Band 5<br/>10MHz<br/>16QAM</p> |  | <p>UL Verification Services, Inc.<br/>Above 1GHz High Frequency Substitution Measurement</p> <p>Company: Samsung<br/>Project #: 4788404029<br/>Date: 2018-04-06<br/>Test Engineer: 45585<br/>Configuration: EUT / Adapter / Earphone, Y-Position<br/>Location: Chamber 3<br/>Mode: LTE_16QAM Band 5 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 |
|                                           |  | Low Ch, 829MHz                                                                                                                                                                                                                                                                                                                     |                     |                    |                 |                |                |               |                |               |       |
|                                           |  | 1658.00                                                                                                                                                                                                                                                                                                                            | -10.8               | V                  | 3.0             | 41.8           | 1.0            | -51.6         | -13.0          | -38.6         |       |
|                                           |  | 2487.00                                                                                                                                                                                                                                                                                                                            | -13.0               | V                  | 3.0             | 41.7           | 1.0            | -53.7         | -13.0          | -40.7         |       |
|                                           |  | 3316.00                                                                                                                                                                                                                                                                                                                            | -14.8               | V                  | 3.0             | 41.1           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                           |  | 4145.00                                                                                                                                                                                                                                                                                                                            | -5.8                | V                  | 3.0             | 40.6           | 1.0            | -45.3         | -13.0          | -32.3         |       |
|                                           |  | 1658.00                                                                                                                                                                                                                                                                                                                            | -14.2               | H                  | 3.0             | 41.8           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                           |  | 2487.00                                                                                                                                                                                                                                                                                                                            | -15.3               | H                  | 3.0             | 41.7           | 1.0            | -56.0         | -13.0          | -43.0         |       |
|                                           |  | 3316.00                                                                                                                                                                                                                                                                                                                            | -15.4               | H                  | 3.0             | 41.1           | 1.0            | -55.5         | -13.0          | -42.5         |       |
|                                           |  | 4145.00                                                                                                                                                                                                                                                                                                                            | -7.8                | H                  | 3.0             | 40.6           | 1.0            | -47.4         | -13.0          | -34.4         |       |
|                                           |  | Mid Ch, 836.5MHz                                                                                                                                                                                                                                                                                                                   |                     |                    |                 |                |                |               |                |               |       |
|                                           |  | 1673.00                                                                                                                                                                                                                                                                                                                            | -11.7               | V                  | 3.0             | 41.8           | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                                           |  | 2509.50                                                                                                                                                                                                                                                                                                                            | -12.9               | V                  | 3.0             | 41.7           | 1.0            | -53.5         | -13.0          | -40.5         |       |
|                                           |  | 3346.00                                                                                                                                                                                                                                                                                                                            | -14.8               | V                  | 3.0             | 41.1           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                           |  | 4182.50                                                                                                                                                                                                                                                                                                                            | -5.4                | V                  | 3.0             | 40.6           | 1.0            | -45.0         | -13.0          | -32.0         |       |
|                                           |  | 1673.00                                                                                                                                                                                                                                                                                                                            | -14.1               | H                  | 3.0             | 41.8           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                           |  | 2509.50                                                                                                                                                                                                                                                                                                                            | -15.4               | H                  | 3.0             | 41.7           | 1.0            | -56.1         | -13.0          | -43.1         |       |
|                                           |  | 3346.00                                                                                                                                                                                                                                                                                                                            | -14.9               | H                  | 3.0             | 41.1           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                           |  | 4182.50                                                                                                                                                                                                                                                                                                                            | -7.5                | H                  | 3.0             | 40.6           | 1.0            | -47.1         | -13.0          | -34.1         |       |
|                                           |  | High Ch, 844MHz                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                           |  | 1688.00                                                                                                                                                                                                                                                                                                                            | -14.3               | V                  | 3.0             | 41.8           | 1.0            | -55.2         | -13.0          | -42.2         |       |
|                                           |  | 2532.00                                                                                                                                                                                                                                                                                                                            | -14.3               | V                  | 3.0             | 41.7           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                           |  | 3376.00                                                                                                                                                                                                                                                                                                                            | -14.2               | V                  | 3.0             | 41.1           | 1.0            | -54.2         | -13.0          | -41.2         |       |
|                                           |  | 4220.00                                                                                                                                                                                                                                                                                                                            | -5.4                | V                  | 3.0             | 40.6           | 1.0            | -45.0         | -13.0          | -32.0         |       |
|                                           |  | 1688.00                                                                                                                                                                                                                                                                                                                            | -14.2               | H                  | 3.0             | 41.8           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                           |  | 2532.00                                                                                                                                                                                                                                                                                                                            | -13.5               | H                  | 3.0             | 41.7           | 1.0            | -54.1         | -13.0          | -41.1         |       |
|                                           |  | 3376.00                                                                                                                                                                                                                                                                                                                            | -14.3               | H                  | 3.0             | 41.1           | 1.0            | -54.4         | -13.0          | -41.4         |       |
|                                           |  | 4220.00                                                                                                                                                                                                                                                                                                                            | -7.5                | H                  | 3.0             | 40.6           | 1.0            | -47.1         | -13.0          | -34.1         |       |
|                                           |  |                                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                           |  |                                                                                                                                                                                                                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |

|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |  |  |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|--|--|
| LTE<br>Band 5<br>5MHz<br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |  |  |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-06<br>Test Engineer: 45585<br>Configuration: EUT / Adapter / Earphone, Y-Position<br>Location: Chamber 3<br>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                                                                                                                                                                                                                 | -11.5               | V                  | 3.0             | 41.8           | 1.0            | -52.3         | -13.0          | -39.3         |       |  |  |
|                                | 2479.50                                                                                                                                                                                                                 | -17.8               | V                  | 3.0             | 41.7           | 1.0            | -58.5         | -13.0          | -45.5         |       |  |  |
|                                | 3306.00                                                                                                                                                                                                                 | -15.4               | V                  | 3.0             | 41.1           | 1.0            | -55.5         | -13.0          | -42.5         |       |  |  |
|                                | 4132.50                                                                                                                                                                                                                 | -5.6                | V                  | 3.0             | 40.6           | 1.0            | -45.2         | -13.0          | -32.2         |       |  |  |
|                                | 1653.00                                                                                                                                                                                                                 | -13.4               | H                  | 3.0             | 41.8           | 1.0            | -54.2         | -13.0          | -41.2         |       |  |  |
|                                | 2479.50                                                                                                                                                                                                                 | -15.1               | H                  | 3.0             | 41.7           | 1.0            | -55.8         | -13.0          | -42.8         |       |  |  |
|                                | 3306.00                                                                                                                                                                                                                 | -16.0               | H                  | 3.0             | 41.1           | 1.0            | -56.1         | -13.0          | -43.1         |       |  |  |
|                                | 4132.50                                                                                                                                                                                                                 | -6.6                | H                  | 3.0             | 40.6           | 1.0            | -46.2         | -13.0          | -33.2         |       |  |  |
|                                | Mid Ch, 836.5MHz                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |  |  |
|                                | 1673.00                                                                                                                                                                                                                 | -12.3               | V                  | 3.0             | 41.8           | 1.0            | -53.1         | -13.0          | -40.1         |       |  |  |
|                                | 2509.50                                                                                                                                                                                                                 | -13.1               | V                  | 3.0             | 41.7           | 1.0            | -53.8         | -13.0          | -40.8         |       |  |  |
|                                | 3346.00                                                                                                                                                                                                                 | -14.9               | V                  | 3.0             | 41.1           | 1.0            | -55.0         | -13.0          | -42.0         |       |  |  |
|                                | 4182.50                                                                                                                                                                                                                 | -5.8                | V                  | 3.0             | 40.6           | 1.0            | -45.4         | -13.0          | -32.4         |       |  |  |
|                                | 1673.00                                                                                                                                                                                                                 | -14.5               | H                  | 3.0             | 41.8           | 1.0            | -55.3         | -13.0          | -42.3         |       |  |  |
|                                | 2509.50                                                                                                                                                                                                                 | -15.8               | H                  | 3.0             | 41.7           | 1.0            | -56.4         | -13.0          | -43.4         |       |  |  |
|                                | 3346.00                                                                                                                                                                                                                 | -15.5               | H                  | 3.0             | 41.1           | 1.0            | -55.6         | -13.0          | -42.6         |       |  |  |
| 4182.50                        | -7.4                                                                                                                                                                                                                    | H                   | 3.0                | 40.6            | 1.0            | -47.0          | -13.0         | -34.0          |               |       |  |  |
| High Ch, 846.5MHz              |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |  |  |
| 1693.00                        | -13.9                                                                                                                                                                                                                   | V                   | 3.0                | 41.8            | 1.0            | -54.7          | -13.0         | -41.7          |               |       |  |  |
| 2539.50                        | -13.7                                                                                                                                                                                                                   | V                   | 3.0                | 41.6            | 1.0            | -54.3          | -13.0         | -41.3          |               |       |  |  |
| 3386.00                        | -14.1                                                                                                                                                                                                                   | V                   | 3.0                | 41.1            | 1.0            | -54.1          | -13.0         | -41.1          |               |       |  |  |
| 4232.50                        | -5.3                                                                                                                                                                                                                    | V                   | 3.0                | 40.5            | 1.0            | -44.9          | -13.0         | -31.9          |               |       |  |  |
| 1693.00                        | -15.4                                                                                                                                                                                                                   | H                   | 3.0                | 41.8            | 1.0            | -56.2          | -13.0         | -43.2          |               |       |  |  |
| 2539.50                        | -15.2                                                                                                                                                                                                                   | H                   | 3.0                | 41.6            | 1.0            | -55.8          | -13.0         | -42.8          |               |       |  |  |
| 3386.00                        | -14.1                                                                                                                                                                                                                   | H                   | 3.0                | 41.1            | 1.0            | -54.2          | -13.0         | -41.2          |               |       |  |  |
| 4232.50                        | -7.2                                                                                                                                                                                                                    | H                   | 3.0                | 40.5            | 1.0            | -46.7          | -13.0         | -33.7          |               |       |  |  |
|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |  |  |
| LTE<br>Band 5<br>5MHz<br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |  |  |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-06<br>Test Engineer: 45585<br>Configuration: EUT / Adapter / Earphone, Y-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM 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                                                                                                                                                                                                                 | -11.6               | V                  | 3.0             | 41.8           | 1.0            | -52.4         | -13.0          | -39.4         |       |  |  |
|                                | 2479.50                                                                                                                                                                                                                 | -13.1               | V                  | 3.0             | 41.7           | 1.0            | -53.8         | -13.0          | -40.8         |       |  |  |
|                                | 3306.00                                                                                                                                                                                                                 | -15.1               | V                  | 3.0             | 41.1           | 1.0            | -55.2         | -13.0          | -42.2         |       |  |  |
|                                | 4132.50                                                                                                                                                                                                                 | -5.9                | V                  | 3.0             | 40.6           | 1.0            | -45.5         | -13.0          | -32.5         |       |  |  |
|                                | 1653.00                                                                                                                                                                                                                 | -13.8               | H                  | 3.0             | 41.8           | 1.0            | -54.6         | -13.0          | -41.6         |       |  |  |
|                                | 2479.50                                                                                                                                                                                                                 | -15.2               | H                  | 3.0             | 41.7           | 1.0            | -55.9         | -13.0          | -42.9         |       |  |  |
|                                | 3306.00                                                                                                                                                                                                                 | -16.0               | H                  | 3.0             | 41.1           | 1.0            | -56.1         | -13.0          | -43.1         |       |  |  |
|                                | 4132.50                                                                                                                                                                                                                 | -7.6                | H                  | 3.0             | 40.6           | 1.0            | -47.2         | -13.0          | -34.2         |       |  |  |
|                                | Mid Ch, 836.5MHz                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |  |  |
|                                | 1673.00                                                                                                                                                                                                                 | -11.8               | V                  | 3.0             | 41.8           | 1.0            | -52.7         | -13.0          | -39.7         |       |  |  |
|                                | 2509.50                                                                                                                                                                                                                 | -13.5               | V                  | 3.0             | 41.7           | 1.0            | -54.2         | -13.0          | -41.2         |       |  |  |
|                                | 3346.00                                                                                                                                                                                                                 | -14.9               | V                  | 3.0             | 41.1           | 1.0            | -55.0         | -13.0          | -42.0         |       |  |  |
|                                | 4182.50                                                                                                                                                                                                                 | -8.9                | V                  | 3.0             | 40.6           | 1.0            | -48.5         | -13.0          | -35.5         |       |  |  |
|                                | 1673.00                                                                                                                                                                                                                 | -14.9               | H                  | 3.0             | 41.8           | 1.0            | -55.8         | -13.0          | -42.8         |       |  |  |
|                                | 2509.50                                                                                                                                                                                                                 | -14.8               | H                  | 3.0             | 41.7           | 1.0            | -55.5         | -13.0          | -42.5         |       |  |  |
|                                | 3346.00                                                                                                                                                                                                                 | -15.3               | H                  | 3.0             | 41.1           | 1.0            | -55.4         | -13.0          | -42.4         |       |  |  |
| 4182.50                        | -7.6                                                                                                                                                                                                                    | H                   | 3.0                | 40.6            | 1.0            | -47.2          | -13.0         | -34.2          |               |       |  |  |
| High Ch, 846.5MHz              |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |  |  |
| 1693.00                        | -18.8                                                                                                                                                                                                                   | V                   | 3.0                | 41.8            | 1.0            | -59.6          | -13.0         | -46.6          |               |       |  |  |
| 2539.50                        | -14.0                                                                                                                                                                                                                   | V                   | 3.0                | 41.6            | 1.0            | -54.7          | -13.0         | -41.7          |               |       |  |  |
| 3386.00                        | -14.0                                                                                                                                                                                                                   | V                   | 3.0                | 41.1            | 1.0            | -54.0          | -13.0         | -41.0          |               |       |  |  |
| 4232.50                        | -4.9                                                                                                                                                                                                                    | V                   | 3.0                | 40.5            | 1.0            | -44.4          | -13.0         | -31.4          |               |       |  |  |
| 1693.00                        | -16.3                                                                                                                                                                                                                   | H                   | 3.0                | 41.8            | 1.0            | -57.1          | -13.0         | -44.1          |               |       |  |  |
| 2539.50                        | -14.5                                                                                                                                                                                                                   | H                   | 3.0                | 41.6            | 1.0            | -55.1          | -13.0         | -42.1          |               |       |  |  |
| 3386.00                        | -14.6                                                                                                                                                                                                                   | H                   | 3.0                | 41.1            | 1.0            | -54.6          | -13.0         | -41.6          |               |       |  |  |
| 4232.50                        | -7.8                                                                                                                                                                                                                    | H                   | 3.0                | 40.5            | 1.0            | -47.3          | -13.0         | -34.3          |               |       |  |  |
|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |  |  |

|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| LTE<br>Band 5<br>3MHz<br>QPSK  | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-06<br>Test Engineer: 45585<br>Configuration: EUT / Adapter / Earphone, Y-Position<br>Location: Chamber 3<br>Mode: LTE_QPSK Band 5 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, 825.5MHz                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                | 1651.00                                                                                                                                                                                                                 | -13.0               | V                  | 3.0             | 41.8           | 1.0            | -53.8         | -13.0          | -40.8         |       |
|                                | 2476.50                                                                                                                                                                                                                 | -13.5               | V                  | 3.0             | 41.7           | 1.0            | -54.2         | -13.0          | -41.2         |       |
|                                | 3302.00                                                                                                                                                                                                                 | -14.6               | V                  | 3.0             | 41.1           | 1.0            | -54.8         | -13.0          | -41.8         |       |
|                                | 4127.50                                                                                                                                                                                                                 | -4.3                | V                  | 3.0             | 40.6           | 1.0            | -43.9         | -13.0          | -30.9         |       |
|                                | 1651.00                                                                                                                                                                                                                 | -15.2               | H                  | 3.0             | 41.8           | 1.0            | -56.1         | -13.0          | -43.1         |       |
|                                | 2476.50                                                                                                                                                                                                                 | -15.5               | H                  | 3.0             | 41.7           | 1.0            | -56.2         | -13.0          | -43.2         |       |
|                                | 3302.00                                                                                                                                                                                                                 | -15.9               | H                  | 3.0             | 41.1           | 1.0            | -56.0         | -13.0          | -43.0         |       |
|                                | 4127.50                                                                                                                                                                                                                 | -6.8                | H                  | 3.0             | 40.6           | 1.0            | -46.4         | -13.0          | -33.4         |       |
|                                | Mid Ch, 836.5MHz                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                | 1673.00                                                                                                                                                                                                                 | -12.9               | V                  | 3.0             | 41.8           | 1.0            | -53.7         | -13.0          | -40.7         |       |
|                                | 2509.50                                                                                                                                                                                                                 | -13.3               | V                  | 3.0             | 41.7           | 1.0            | -54.0         | -13.0          | -41.0         |       |
|                                | 3346.00                                                                                                                                                                                                                 | -15.0               | V                  | 3.0             | 41.1           | 1.0            | -55.1         | -13.0          | -42.1         |       |
|                                | 4182.50                                                                                                                                                                                                                 | -5.7                | V                  | 3.0             | 40.6           | 1.0            | -45.3         | -13.0          | -32.3         |       |
|                                | 1673.00                                                                                                                                                                                                                 | -14.6               | H                  | 3.0             | 41.8           | 1.0            | -55.5         | -13.0          | -42.5         |       |
|                                | 2509.50                                                                                                                                                                                                                 | -15.6               | H                  | 3.0             | 41.7           | 1.0            | -56.2         | -13.0          | -43.2         |       |
|                                | 3346.00                                                                                                                                                                                                                 | -14.9               | H                  | 3.0             | 41.1           | 1.0            | -55.0         | -13.0          | -42.0         |       |
| 4182.50                        | -7.5                                                                                                                                                                                                                    | H                   | 3.0                | 40.6            | 1.0            | -47.1          | -13.0         | -34.1          |               |       |
| High Ch, 847.5MHz              |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
| 1695.00                        | -13.8                                                                                                                                                                                                                   | V                   | 3.0                | 41.8            | 1.0            | -54.7          | -13.0         | -41.7          |               |       |
| 2542.50                        | -14.7                                                                                                                                                                                                                   | V                   | 3.0                | 41.6            | 1.0            | -55.3          | -13.0         | -42.3          |               |       |
| 3390.00                        | -13.2                                                                                                                                                                                                                   | V                   | 3.0                | 41.1            | 1.0            | -53.2          | -13.0         | -40.2          |               |       |
| 4237.50                        | -5.6                                                                                                                                                                                                                    | V                   | 3.0                | 40.5            | 1.0            | -45.2          | -13.0         | -32.2          |               |       |
| 1695.00                        | -14.9                                                                                                                                                                                                                   | H                   | 3.0                | 41.8            | 1.0            | -55.8          | -13.0         | -42.8          |               |       |
| 2542.50                        | -15.4                                                                                                                                                                                                                   | H                   | 3.0                | 41.6            | 1.0            | -56.1          | -13.0         | -43.1          |               |       |
| 3390.00                        | -14.1                                                                                                                                                                                                                   | H                   | 3.0                | 41.1            | 1.0            | -54.2          | -13.0         | -41.2          |               |       |
| 4237.50                        | -7.2                                                                                                                                                                                                                    | H                   | 3.0                | 40.5            | 1.0            | -46.8          | -13.0         | -33.8          |               |       |
|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
| LTE<br>Band 5<br>3MHz<br>16QAM | UL Verification Services, Inc.<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                    |                     |                    |                 |                |                |               |                |               |       |
|                                | Company: Samsung<br>Project #: 4788404029<br>Date: 2018-04-06<br>Test Engineer: 45585<br>Configuration: EUT / Adapter / Earphone, Y-Position<br>Location: Chamber 3<br>Mode: LTE_16QAM Band 5 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, 825.5MHz                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                | 1651.00                                                                                                                                                                                                                 | -14.1               | V                  | 3.0             | 41.8           | 1.0            | -54.9         | -13.0          | -41.9         |       |
|                                | 2476.50                                                                                                                                                                                                                 | -14.3               | V                  | 3.0             | 41.7           | 1.0            | -55.0         | -13.0          | -42.0         |       |
|                                | 3302.00                                                                                                                                                                                                                 | -15.1               | V                  | 3.0             | 41.1           | 1.0            | -55.3         | -13.0          | -42.3         |       |
|                                | 4127.50                                                                                                                                                                                                                 | -5.5                | V                  | 3.0             | 40.6           | 1.0            | -45.1         | -13.0          | -32.1         |       |
|                                | 1651.00                                                                                                                                                                                                                 | -17.7               | H                  | 3.0             | 41.8           | 1.0            | -58.6         | -13.0          | -45.6         |       |
|                                | 2476.50                                                                                                                                                                                                                 | -15.9               | H                  | 3.0             | 41.7           | 1.0            | -56.6         | -13.0          | -43.6         |       |
|                                | 3302.00                                                                                                                                                                                                                 | -15.8               | H                  | 3.0             | 41.1           | 1.0            | -55.9         | -13.0          | -42.9         |       |
|                                | 4127.50                                                                                                                                                                                                                 | -6.2                | H                  | 3.0             | 40.6           | 1.0            | -45.8         | -13.0          | -32.8         |       |
|                                | Mid Ch, 836.5MHz                                                                                                                                                                                                        |                     |                    |                 |                |                |               |                |               |       |
|                                | 1673.00                                                                                                                                                                                                                 | -13.9               | V                  | 3.0             | 41.8           | 1.0            | -54.7         | -13.0          | -41.7         |       |
|                                | 2509.50                                                                                                                                                                                                                 | -14.0               | V                  | 3.0             | 41.7           | 1.0            | -54.6         | -13.0          | -41.6         |       |
|                                | 3346.00                                                                                                                                                                                                                 | -15.0               | V                  | 3.0             | 41.1           | 1.0            | -55.1         | -13.0          | -42.1         |       |
|                                | 4182.50                                                                                                                                                                                                                 | -5.9                | V                  | 3.0             | 40.6           | 1.0            | -45.5         | -13.0          | -32.5         |       |
|                                | 1673.00                                                                                                                                                                                                                 | -15.7               | H                  | 3.0             | 41.8           | 1.0            | -56.6         | -13.0          | -43.6         |       |
|                                | 2509.50                                                                                                                                                                                                                 | -15.0               | H                  | 3.0             | 41.7           | 1.0            | -55.7         | -13.0          | -42.7         |       |
|                                | 3346.00                                                                                                                                                                                                                 | -15.8               | H                  | 3.0             | 41.1           | 1.0            | -55.9         | -13.0          | -42.9         |       |
| 4182.50                        | -7.0                                                                                                                                                                                                                    | H                   | 3.0                | 40.6            | 1.0            | -46.5          | -13.0         | -33.5          |               |       |
| High Ch, 847.5MHz              |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
| 1695.00                        | -13.9                                                                                                                                                                                                                   | V                   | 3.0                | 41.8            | 1.0            | -54.7          | -13.0         | -41.7          |               |       |
| 2542.50                        | -14.9                                                                                                                                                                                                                   | V                   | 3.0                | 41.6            | 1.0            | -55.6          | -13.0         | -42.6          |               |       |
| 3390.00                        | -14.6                                                                                                                                                                                                                   | V                   | 3.0                | 41.1            | 1.0            | -54.7          | -13.0         | -41.7          |               |       |
| 4237.50                        | -5.8                                                                                                                                                                                                                    | V                   | 3.0                | 40.5            | 1.0            | -45.4          | -13.0         | -32.4          |               |       |
| 1695.00                        | -15.4                                                                                                                                                                                                                   | H                   | 3.0                | 41.8            | 1.0            | -56.3          | -13.0         | -43.3          |               |       |
| 2542.50                        | -16.5                                                                                                                                                                                                                   | H                   | 3.0                | 41.6            | 1.0            | -57.1          | -13.0         | -44.1          |               |       |
| 3390.00                        | -14.4                                                                                                                                                                                                                   | H                   | 3.0                | 41.1            | 1.0            | -54.5          | -13.0         | -41.5          |               |       |
| 4237.50                        | -8.0                                                                                                                                                                                                                    | H                   | 3.0                | 40.5            | 1.0            | -47.5          | -13.0         | -34.5          |               |       |
|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |
|                                |                                                                                                                                                                                                                         |                     |                    |                 |                |                |               |                |               |       |

