## 10.2. BAND EDGE EMISSIONS

**RULE PART(S)**

FCC: §22.359, §24.238, §27. 53 (g)

**LIMITS**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

Part 27.53(g) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

**TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v02r02
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.


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**RESULTS**

**GSM**

| Band | Mode | Side | f [MHz] | Level [dBm] | Limit [dBm] |
|---|---|---|---|---|---|
| GSM850 | GPRS | Lower | 823.999 | -22.80 | -13.00 |
| | | Upper | 849.015 | -23.27 | |
| | EGPRS | Lower | 823.974 | -30.84 | |
| | | Upper | 849.020 | -29.85 | |
| GSM1900 | GPRS | Lower | 1849.985 | -27.35 | |
| | | Upper | 1910.007 | -26.24 | |
| | EGPRS | Lower | 1849.982 | -30.30 | |
| | | Upper | 1910.010 | -31.80 | |

**WCDMA**

| Band | Mode | Side | f [MHz] | Level [dBm] | Limit [dBm] |
|---|---|---|---|---|---|
| Band 5 | REL99 | Lower | 824.000 | -23.93 | -13.00 |
| | | Upper | 849.000 | -26.56 | |
| | HSDPA | Lower | 824.000 | -22.85 | |
| | | Upper | 849.000 | -24.85 | |
| Band 2 | REL99 | Lower | 1850.000 | -25.20 | |
| | | Upper | 1910.000 | -24.31 | |
| | HSDPA | Lower | 1850.000 | -25.94 | |
| | | Upper | 1910.000 | -25.09 | |


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**LTE 41**

| Bandwidth | Mode | f [MHz] | RB Status | Side Trace | Level [dBm] | Limit [dBm] |
|---|---|---|---|---|---|---|
| 20 MHz | QPSK | 2565.0 | 1RB | Lower Trace 1 | -30.85 | -13.00 |
| | | | | Lower Trace 2 | -40.06 | -25.00 |
| | | | FRB | Lower Trace 1 | -30.61 | -13.00 |
| | | | | Lower Trace 2 | -37.60 | -25.00 |
| | | 2645.0 | 1RB | Upper Trace 1 | -42.98 | -10.00 |
| | | | | Upper Trace 2 | -35.78 | -13.00 |
| | | | | Upper Trace 3 | -45.07 | -25.00 |
| | | | FRB | Upper Trace 1 | -26.18 | -10.00 |
| | | | | Upper Trace 2 | -31.59 | -13.00 |
| | | | | Upper Trace 3 | -42.47 | -25.00 |
| | 16QAM | 2565.0 | 1RB | Lower Trace 1 | -33.30 | -13.00 |
| | | | | Lower Trace 2 | -41.93 | -25.00 |
| | | | FRB | Lower Trace 1 | -32.09 | -13.00 |
| | | | | Lower Trace 2 | -37.48 | -25.00 |
| | | 2645.0 | 1RB | Upper Trace 1 | -43.03 | -10.00 |
| | | | | Upper Trace 2 | -36.70 | -13.00 |
| | | | | Upper Trace 3 | -45.14 | -25.00 |
| | | | FRB | Upper Trace 1 | -26.88 | -10.00 |
| | | | | Upper Trace 2 | -31.44 | -13.00 |
| | | | | Upper Trace 3 | -42.57 | -25.00 |
| 15 MHz | QPSK | 2562.5 | 1RB | Lower Trace 1 | -26.40 | -13.00 |
| | | | | Lower Trace 2 | -36.41 | -25.00 |
| | | | FRB | Lower Trace 1 | -28.70 | -13.00 |
| | | | | Lower Trace 2 | -35.11 | -25.00 |
| | | 2647.5 | 1RB | Upper Trace 1 | -41.18 | -10.00 |
| | | | | Upper Trace 2 | -33.15 | -13.00 |
| | | | | Upper Trace 3 | -45.00 | -25.00 |
| | | | FRB | Upper Trace 1 | -25.27 | -10.00 |
| | | | | Upper Trace 2 | -29.69 | -13.00 |
| | | | | Upper Trace 3 | -39.57 | -25.00 |
| | 16QAM | 2562.5 | 1RB | Lower Trace 1 | -26.80 | -13.00 |
| | | | | Lower Trace 2 | -37.81 | -25.00 |
| | | | FRB | Lower Trace 1 | -29.27 | -13.00 |
| | | | | Lower Trace 2 | -36.56 | -25.00 |
| | | 2647.5 | 1RB | Upper Trace 1 | -41.43 | -10.00 |
| | | | | Upper Trace 2 | -33.82 | -13.00 |
| | | | | Upper Trace 3 | -45.14 | -25.00 |
| | | | FRB | Upper Trace 1 | -25.98 | -10.00 |
| | | | | Upper Trace 2 | -29.80 | -13.00 |
| | | | | Upper Trace 3 | -40.42 | -25.00 |


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**LTE 41 (continued)**

| Bandwidth | Mode | f [MHz] | RB Status | Side Trace | Level [dBm] | Limit [dBm] |
|---|---|---|---|---|---|---|
| 10 MHz | QPSK | 2660.0 | 1RB | Lower Trace 1 | -27.20 | -13.00 |
| | | | | Lower Trace 2 | -30.46 | -25.00 |
| | | | FRB | Lower Trace 1 | -26.14 | -13.00 |
| | | | | Lower Trace 2 | -36.78 | -25.00 |
| | | 2650.0 | 1RB | Upper Trace 1 | -39.39 | -10.00 |
| | | | | Upper Trace 2 | -31.20 | -13.00 |
| | | | | Upper Trace 3 | -45.00 | -25.00 |
| | | | FRB | Upper Trace 1 | -23.12 | -10.00 |
| | | | | Upper Trace 2 | -28.61 | -13.00 |
| | | | | Upper Trace 3 | -38.07 | -25.00 |
| | 16QAM | 2660.0 | 1RB | Lower Trace 1 | -28.71 | -13.00 |
| | | | | Lower Trace 2 | -31.49 | -25.00 |
| | | | FRB | Lower Trace 1 | -27.15 | -13.00 |
| | | | | Lower Trace 2 | -38.37 | -25.00 |
| | | 2650.0 | 1RB | Upper Trace 1 | -39.96 | -10.00 |
| | | | | Upper Trace 2 | -31.26 | -13.00 |
| | | | | Upper Trace 3 | -45.00 | -25.00 |
| | | | FRB | Upper Trace 1 | -24.93 | -10.00 |
| | | | | Upper Trace 2 | -29.60 | -13.00 |
| | | | | Upper Trace 3 | -39.41 | -25.00 |
| 5 MHz | QPSK | 2557.5 | 1RB | Lower Trace 1 | -20.75 | -13.00 |
| | | | | Lower Trace 2 | -38.84 | -25.00 |
| | | | FRB | Lower Trace 1 | -19.08 | -13.00 |
| | | | | Lower Trace 2 | -41.68 | -25.00 |
| | | 2652.5 | 1RB | Upper Trace 1 | -31.29 | -10.00 |
| | | | | Upper Trace 2 | -43.79 | -13.00 |
| | | | | Upper Trace 3 | -43.70 | -25.00 |
| | | | FRB | Upper Trace 1 | -19.33 | -10.00 |
| | | | | Upper Trace 2 | -35.49 | -13.00 |
| | | | | Upper Trace 3 | -38.35 | -25.00 |
| | 16QAM | 2557.5 | 1RB | Lower Trace 1 | -20.65 | -13.00 |
| | | | | Lower Trace 2 | -39.30 | -25.00 |
| | | | FRB | Lower Trace 1 | -21.11 | -13.00 |
| | | | | Lower Trace 2 | -42.60 | -25.00 |
| | | 2652.5 | 1RB | Upper Trace 1 | -32.00 | -10.00 |
| | | | | Upper Trace 2 | -43.82 | -13.00 |
| | | | | Upper Trace 3 | -43.89 | -25.00 |
| | | | FRB | Upper Trace 1 | -19.84 | -10.00 |
| | | | | Upper Trace 2 | -36.50 | -13.00 |
| | | | | Upper Trace 3 | -39.10 | -25.00 |


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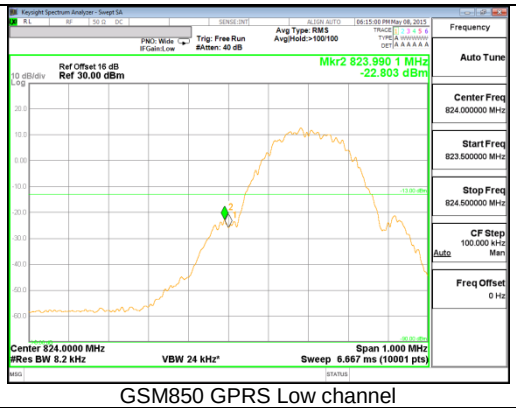
### 10.2.1. BAND EDGE PLOTS

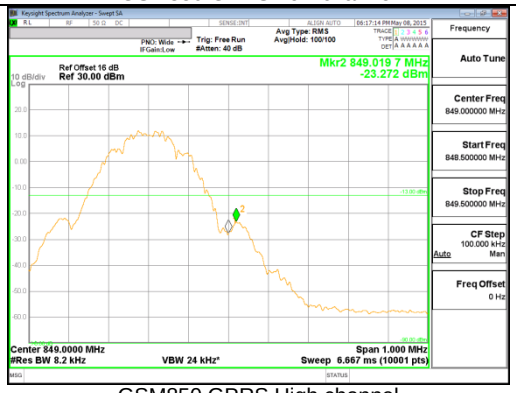
**GSM**

GSM 850




GSM850 GPRS Low channel

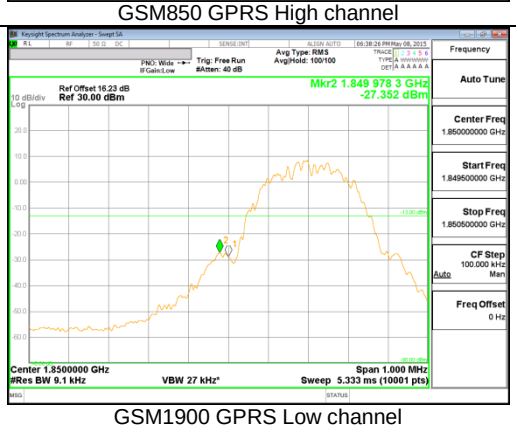
GSM850 EGPRS Low channel



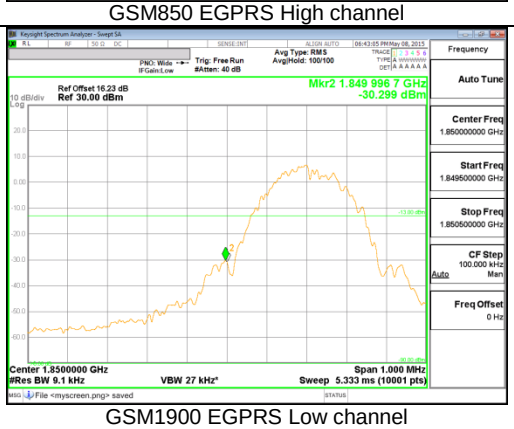

GSM850 GPRS High channel

GSM850 EGPRS High channel

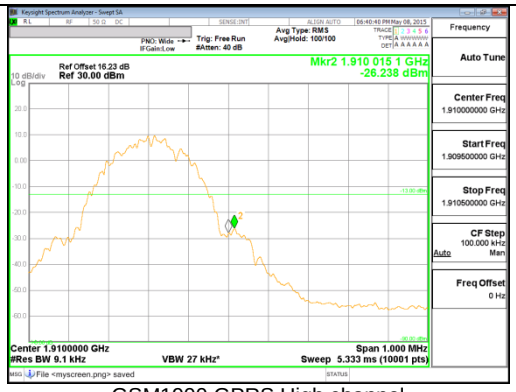
GSM 1900




GSM1900 GPRS Low channel




GSM1900 EGPRS Low channel




GSM1900 GPRS High channel

GSM1900 EGPRS High channel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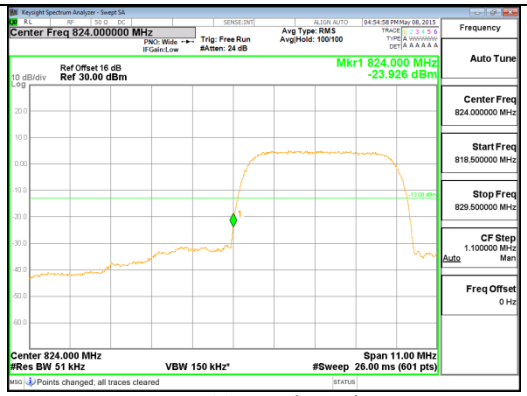
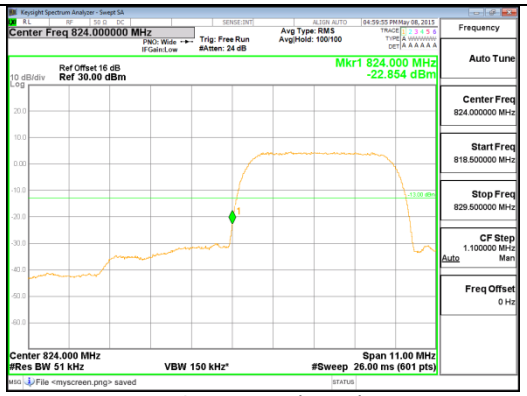
**WCDMA**

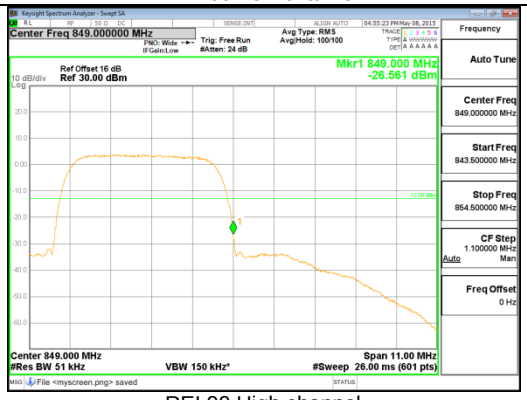
Band 5



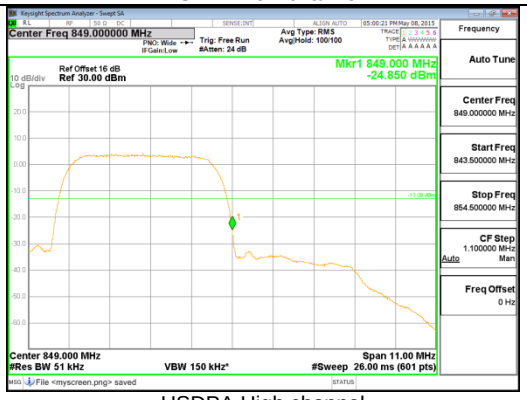

REL99 Low channel




HSDPA Low channel

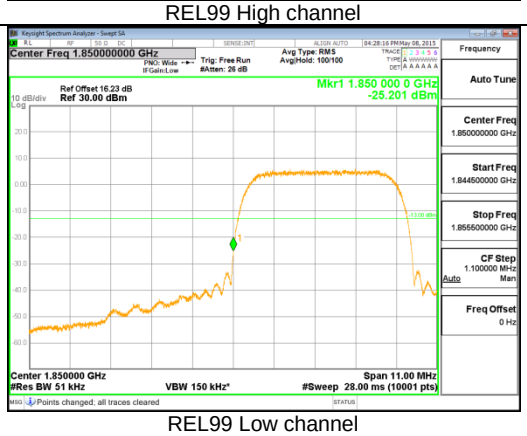



REL99 High channel

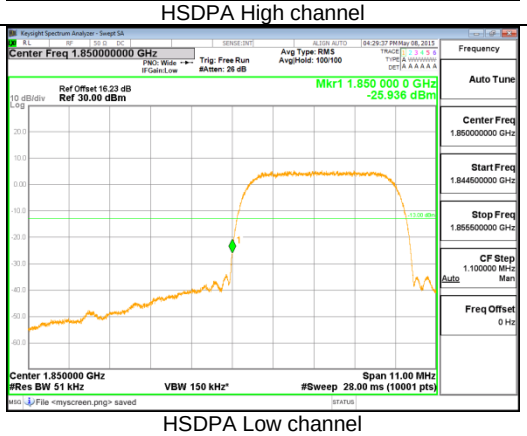



HSDPA High channel

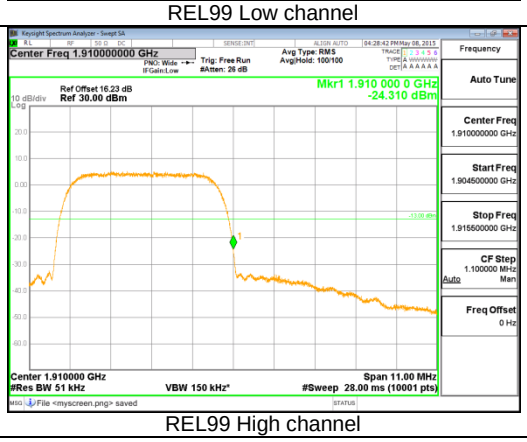
Band 2



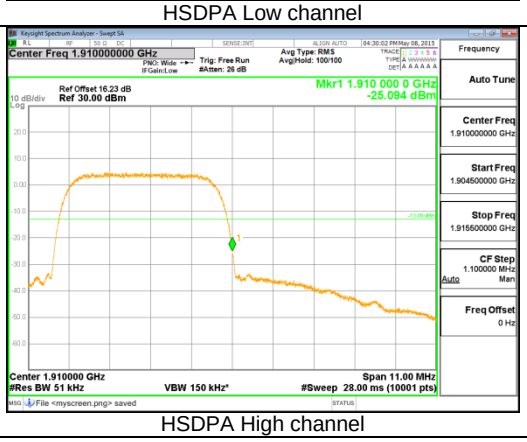

REL99 Low channel




HSDPA Low channel




REL99 High channel




HSDPA High channel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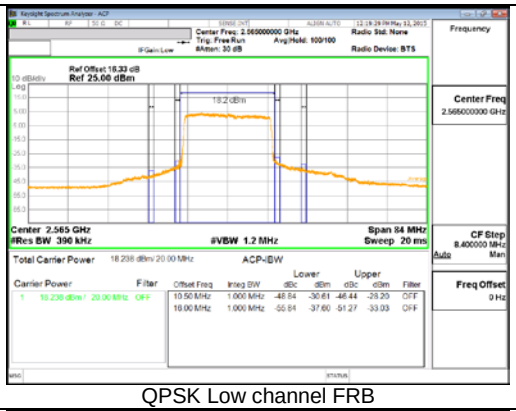
## 10.2.1. EMISSION MASK PLOTS

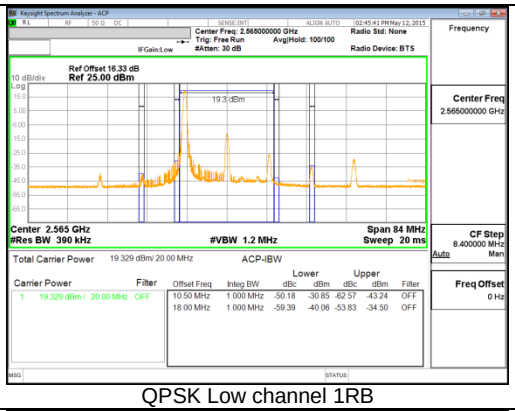
**LTE Band 41**

Band 41

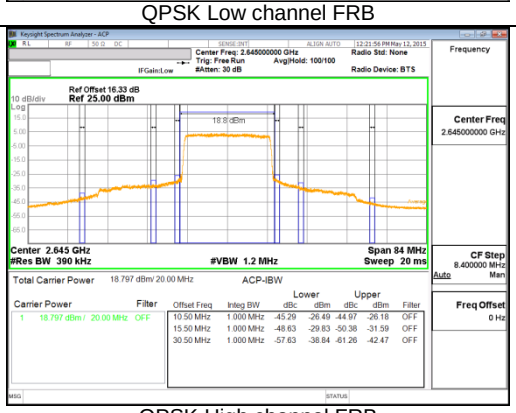
20MHz



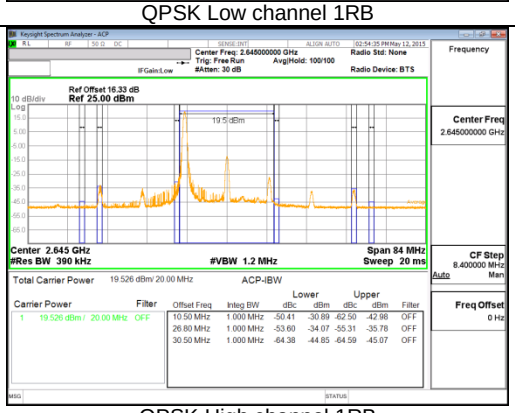

QPSK Low channel FRB



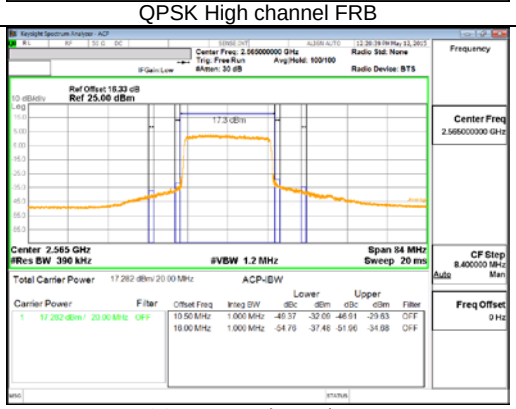

QPSK Low channel 1RB



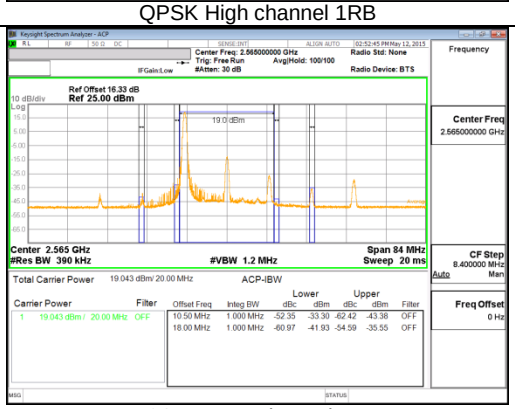

QPSK High channel FRB



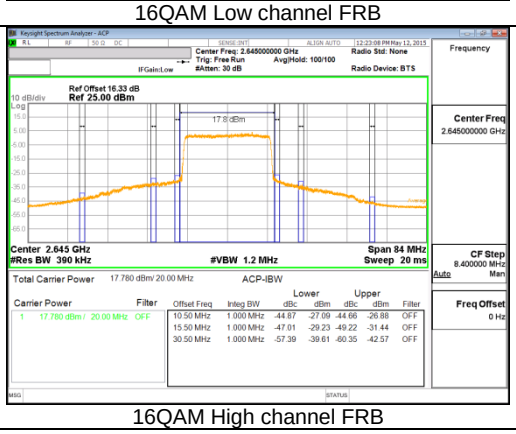

QPSK High channel 1RB



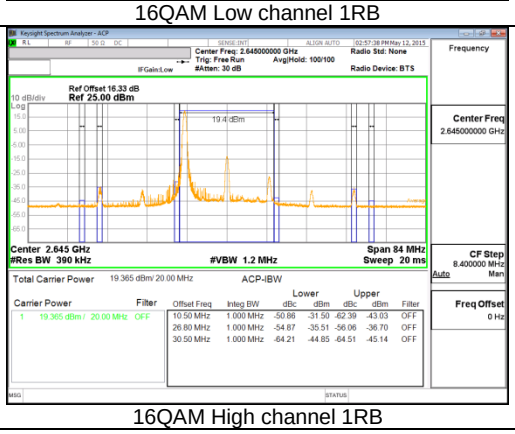

16QAM Low channel FRB




16QAM Low channel 1RB




16QAM High channel FRB




16QAM High channel 1RB



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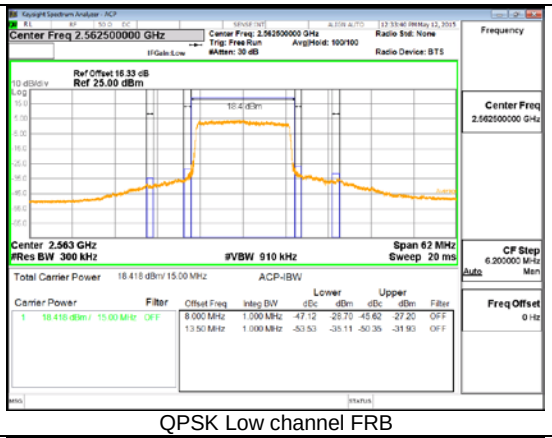
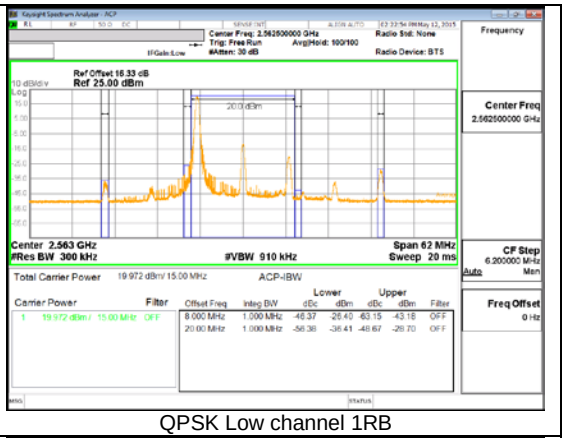
Band 41

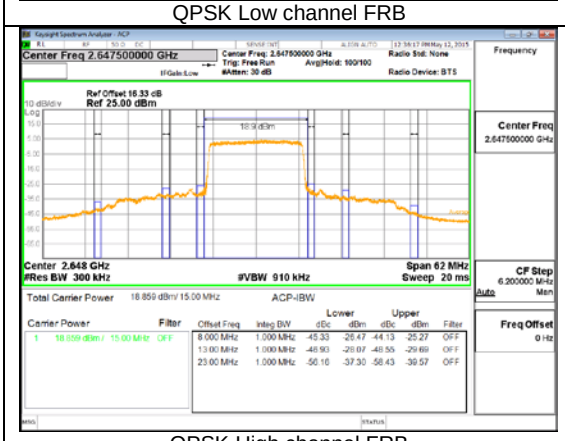
15MHz



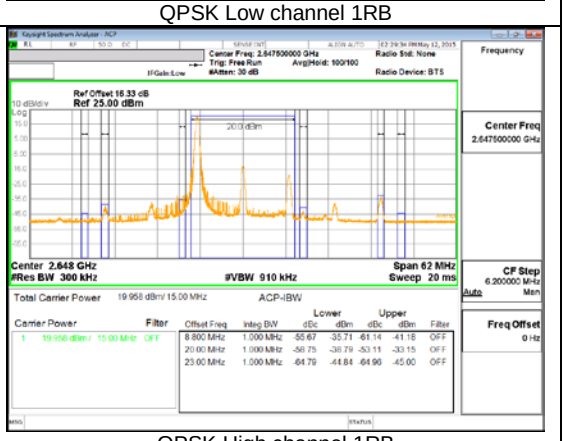

QPSK Low channel FRB



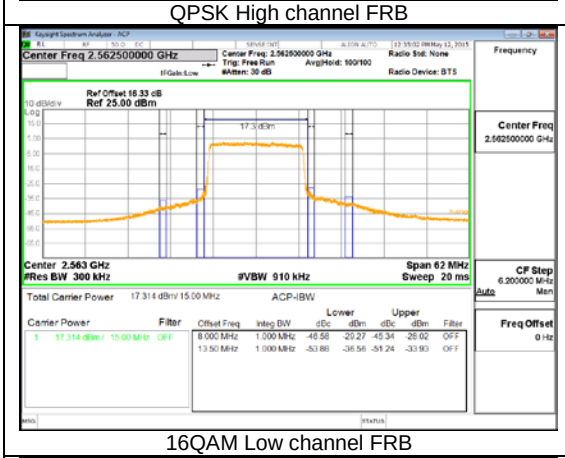

QPSK Low channel 1RB



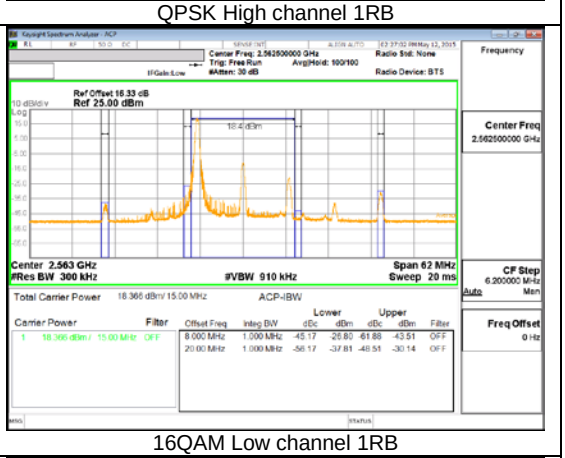

QPSK High channel FRB



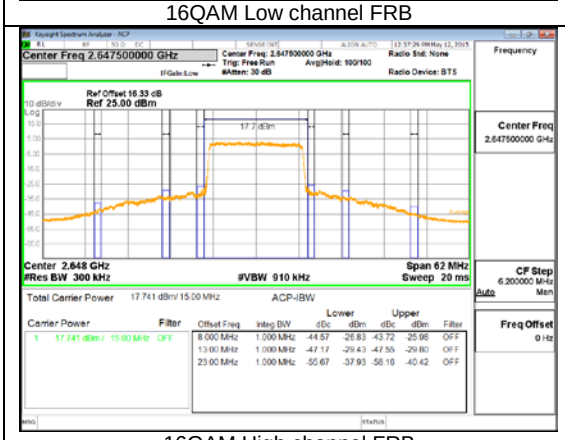

QPSK High channel 1RB



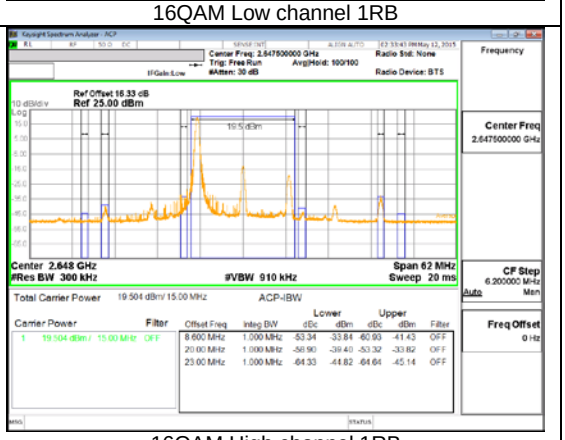

16QAM Low channel FRB




16QAM Low channel 1RB




16QAM High channel FRB




16QAM High channel 1RB



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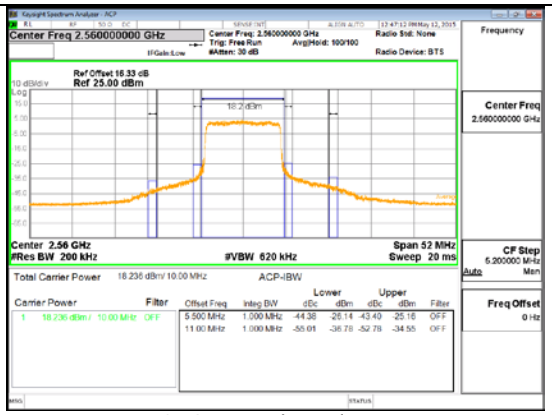
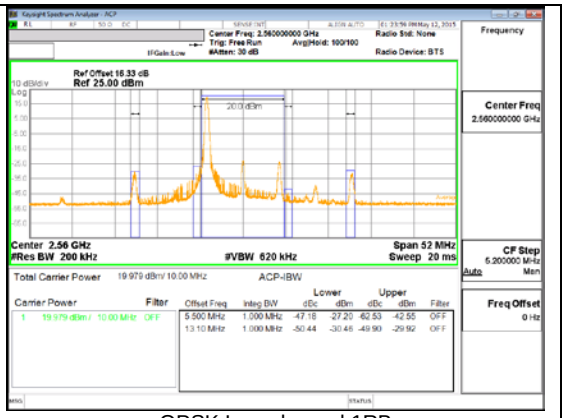
Band 41

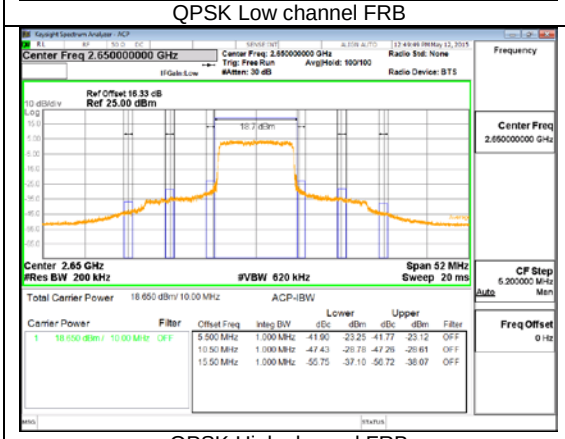
10MHz



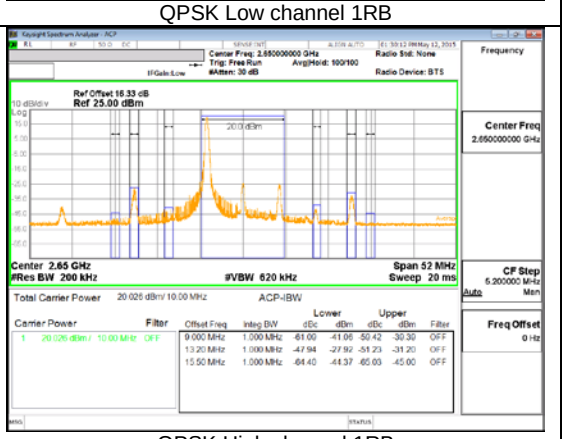

QPSK Low channel FRB



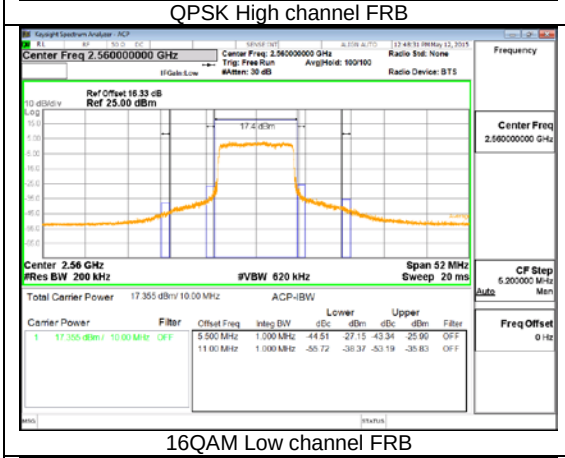

QPSK Low channel 1RB



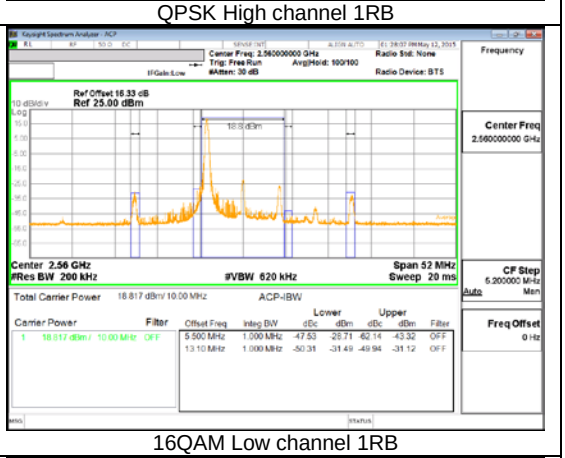

QPSK High channel FRB



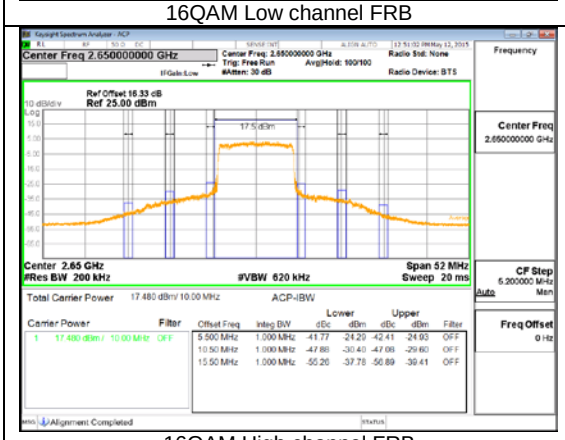

QPSK High channel 1RB



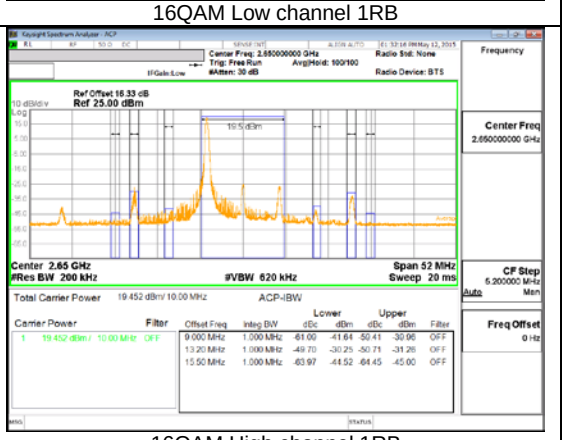

16QAM Low channel FRB




16QAM Low channel 1RB




16QAM High channel FRB




16QAM High channel 1RB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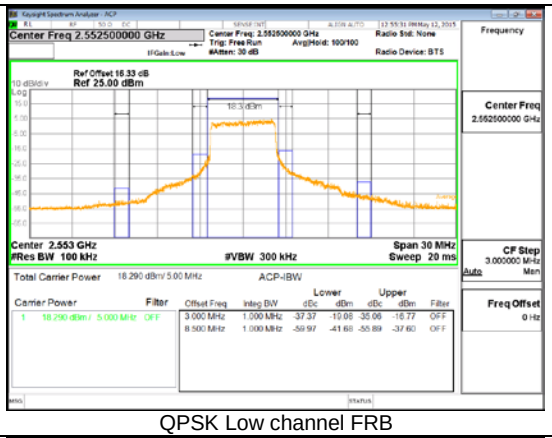
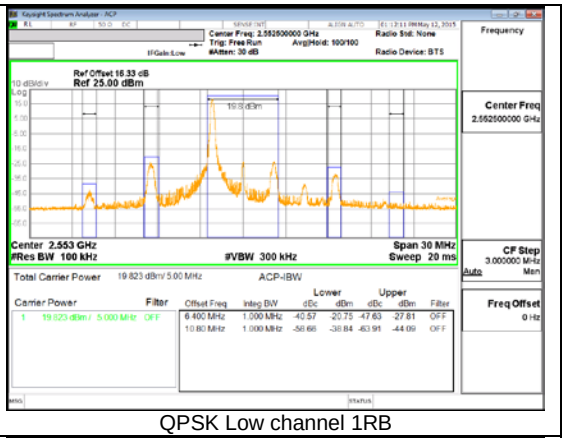
Band 41

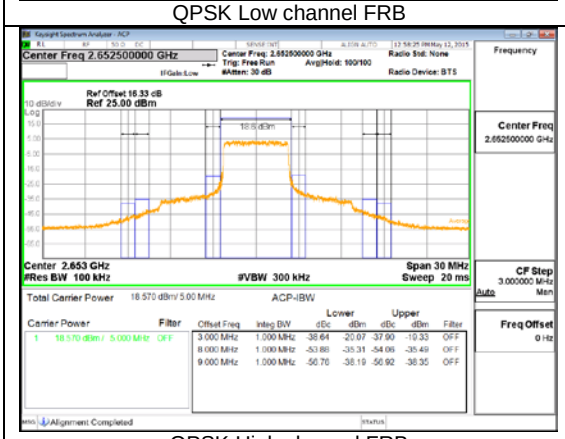
5MHz



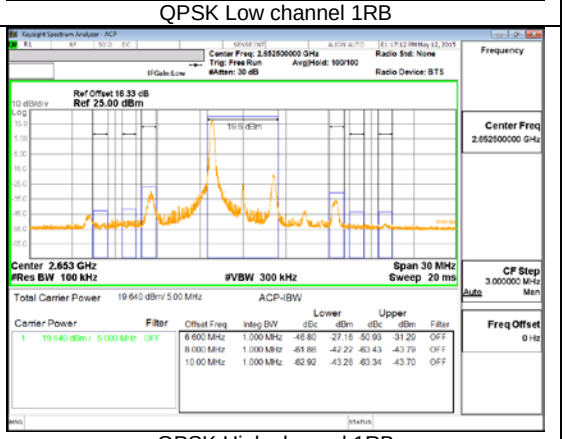

QPSK Low channel FRB



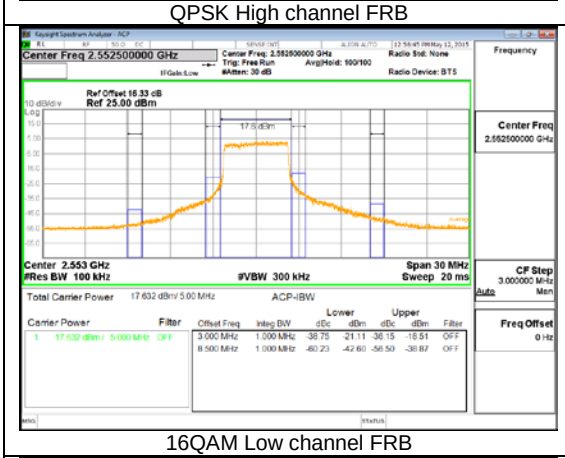

QPSK Low channel 1RB



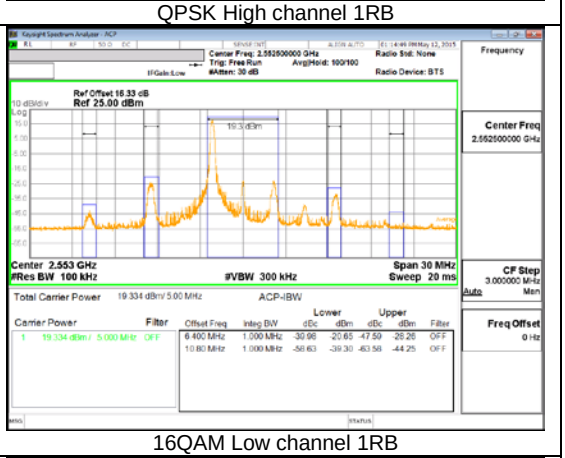

QPSK High channel FRB



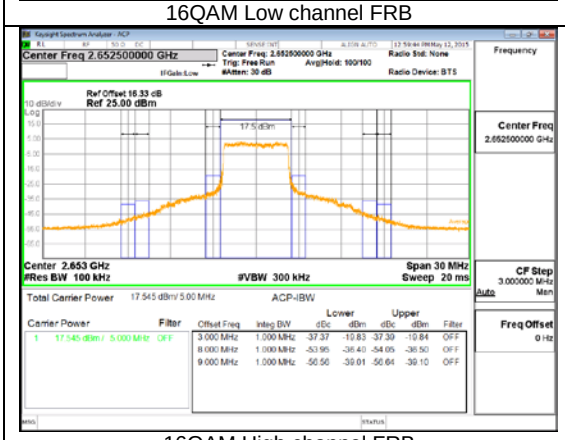

QPSK High channel 1RB



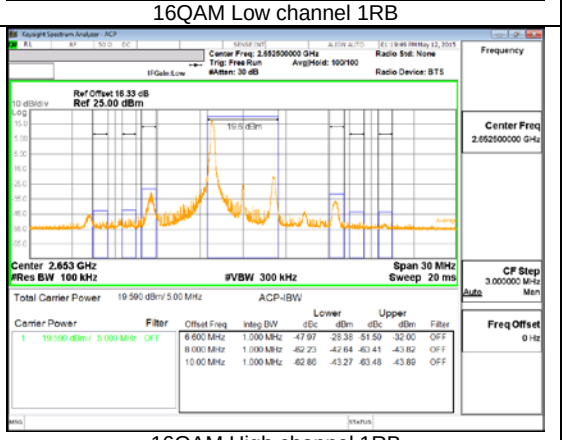

16QAM Low channel FRB




16QAM Low channel 1RB




16QAM High channel FRB




16QAM High channel 1RB



UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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## 10.3. OUT OF BAND EMISSIONS

**RULE PART(S)**

FCC: §2.1051, §22.901, §22.917, §24.238, §27. 53 (g)

**LIMITS**

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**

Per KDB 971168 D01 Power Meas License Digital Systems v02r02
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

**RESULTS**

### 10.3.1. OUT OF BAND EMISSIONS RESULT

**GSM**

| Band | Mode | f [MHz] | Spurious [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|
| GSM850 | GPRS | 824.2 | -22.94 | -13.00 | 9.94 |
| | | 836.6 | -22.99 | | 9.99 |
| | | 848.8 | -22.43 | | 9.43 |
| | EGPRS | 824.2 | -23.43 | | 10.43 |
| | | 836.6 | -23.28 | | 10.28 |
| | | 848.8 | -22.25 | | 9.25 |
| GSM1900 | GPRS | 1850.2 | -22.97 | | 9.97 |
| | | 1880.0 | -23.26 | | 10.26 |
| | | 1909.8 | -23.06 | | 10.06 |
| | EGPRS | 1850.2 | -22.83 | | 9.83 |
| | | 1880.0 | -23.16 | | 10.16 |
| | | 1909.8 | -23.10 | | 10.10 |


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**WCDMA**

| Band | Mode | f [MHz] | Spurious [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|
| Band 5 | REL99 | 826.4 | -33.28 | -13.00 | 20.28 |
| | | 836.6 | -33.68 | | 20.68 |
| | | 846.6 | -32.78 | | 19.78 |
| | HSDPA | 826.4 | -33.42 | | 20.42 |
| | | 836.6 | -33.30 | | 20.30 |
| | | 846.6 | -33.13 | | 20.13 |
| Band 2 | REL99 | 1852.4 | -31.26 | | 18.26 |
| | | 1880.0 | -31.91 | | 18.91 |
| | | 1907.6 | -31.41 | | 18.41 |
| | HSDPA | 1852.4 | -30.80 | | 17.80 |
| | | 1880.0 | -31.31 | | 18.31 |
| | | 1907.6 | -30.44 | | 17.44 |

**LTE 41**

| Bandwidth | Mode | f [MHz] | Spurious [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|
| 20 MHz | QPSK | 2565.0 | -29.23 | -25.00 | 4.23 |
| | | 2593.0 | -29.73 | | 4.73 |
| | | 2645.0 | -29.48 | | 4.48 |
| | 16QAM | 2565.0 | -29.51 | | 4.51 |
| | | 2593.0 | -29.16 | | 4.16 |
| | | 2645.0 | -29.25 | | 4.25 |
| 15 MHz | QPSK | 2562.5 | -28.83 | | 3.83 |
| | | 2593.0 | -29.68 | | 4.68 |
| | | 2647.5 | -30.38 | | 5.38 |
| | 16QAM | 2562.5 | -28.93 | | 3.93 |
| | | 2593.0 | -29.25 | | 4.25 |
| | | 2647.5 | -29.39 | | 4.39 |
| 10 MHz | QPSK | 2560.0 | -29.53 | | 4.53 |
| | | 2593.0 | -29.75 | | 4.75 |
| | | 2650.0 | -29.71 | | 4.71 |
| | 16QAM | 2560.0 | -29.50 | | 4.50 |
| | | 2593.0 | -29.34 | | 4.34 |
| | | 2650.0 | -29.54 | | 4.54 |
| 5 MHz | QPSK | 2552.5 | -29.68 | | 4.68 |
| | | 2593.0 | -31.39 | | 6.39 |
| | | 2652.5 | -29.63 | | 4.63 |
| | 16QAM | 2552.5 | -29.42 | | 4.42 |
| | | 2593.0 | -29.52 | | 4.52 |
| | | 2652.5 | -29.71 | | 4.71 |


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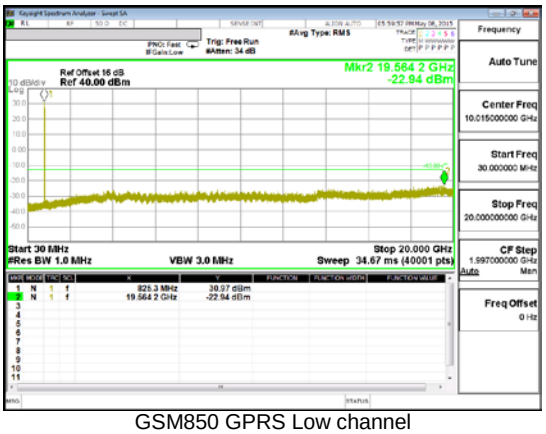
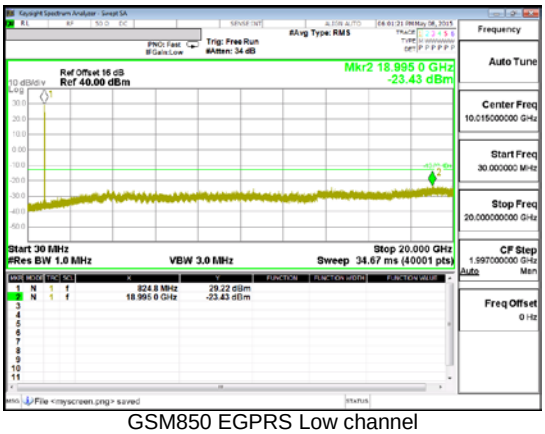
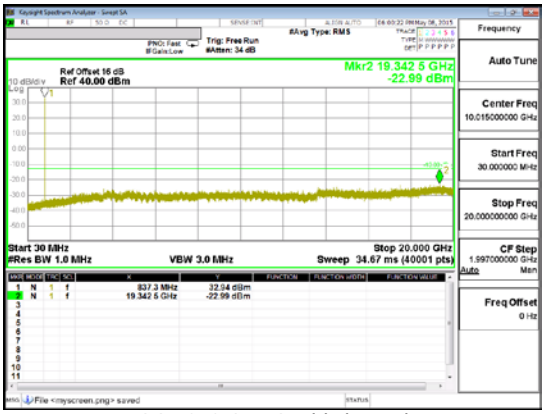
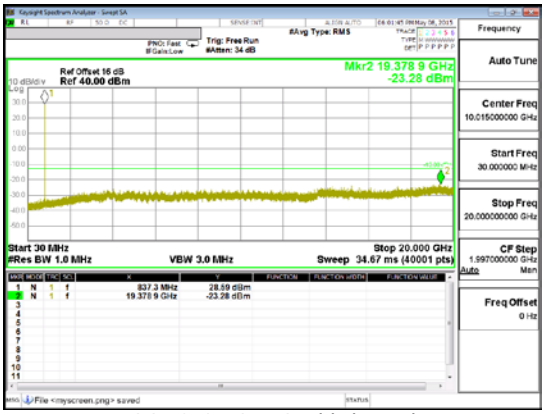
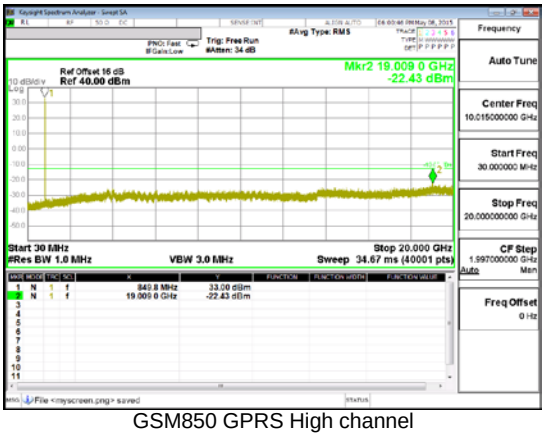
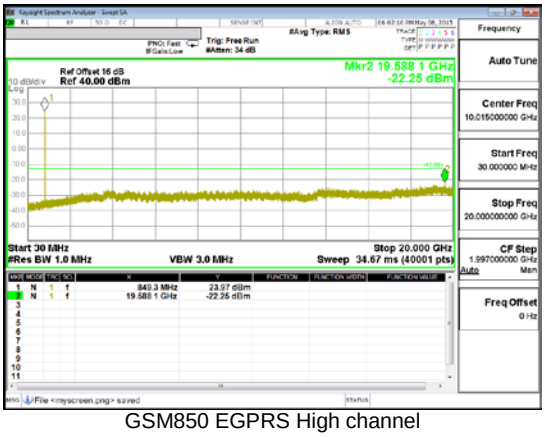
## 10.3.2. OUT OF BAND EMISSIONS PLOTS

**GSM 850**

| | | |
|---|---|---|
| GSM 850 |  <br>GSM850 GPRS Low channel |  <br>GSM850 EGPRS Low channel |
| |  <br>GSM850 GPRS Mid channel |  <br>GSM850 EGPRS Mid channel |
| |  <br>GSM850 GPRS High channel |  <br>GSM850 EGPRS High channel |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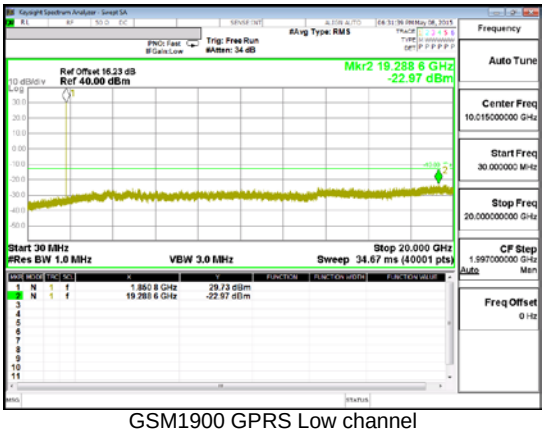
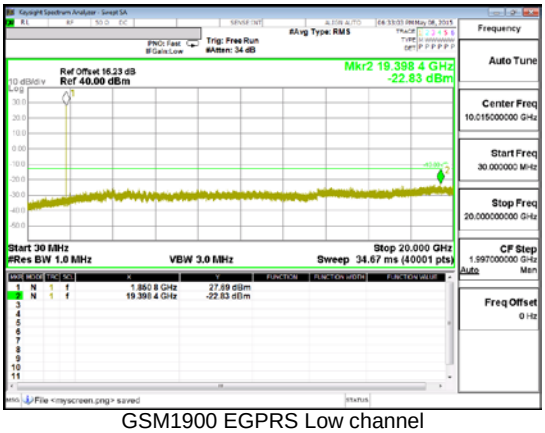
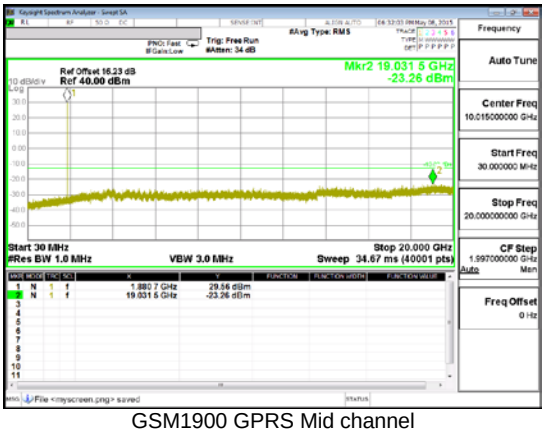
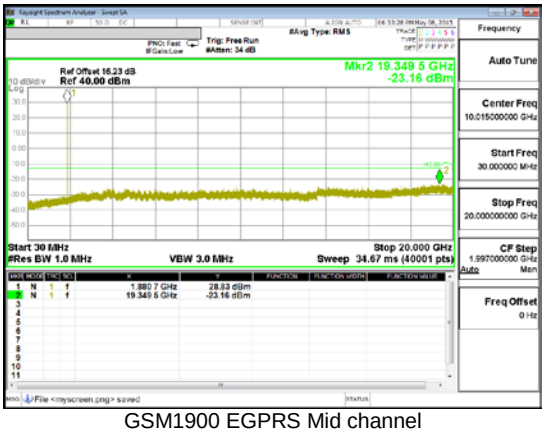
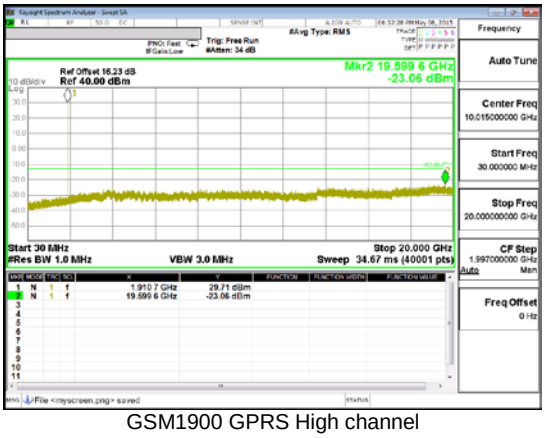
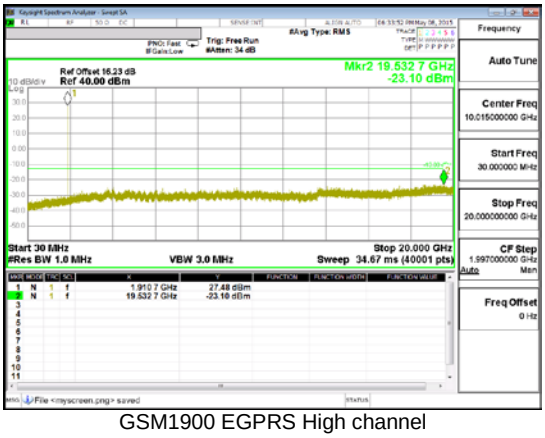
**GSM 1900**

| | | |
|---|---|---|
| GSM 1900 |  <br>GSM1900 GPRS Low channel |  <br>GSM1900 EGPRS Low channel |
| |  <br>GSM1900 GPRS Mid channel |  <br>GSM1900 EGPRS Mid channel |
| |  <br>GSM1900 GPRS High channel |  <br>GSM1900 EGPRS High channel |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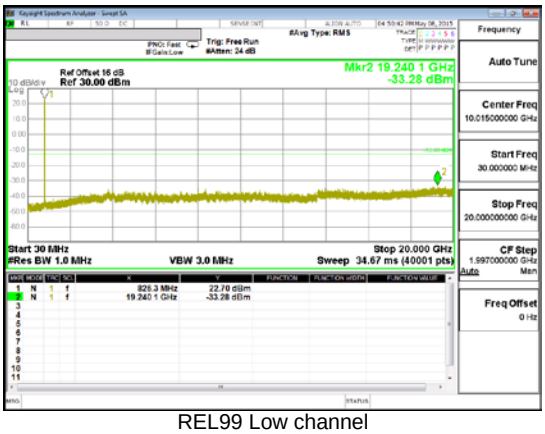
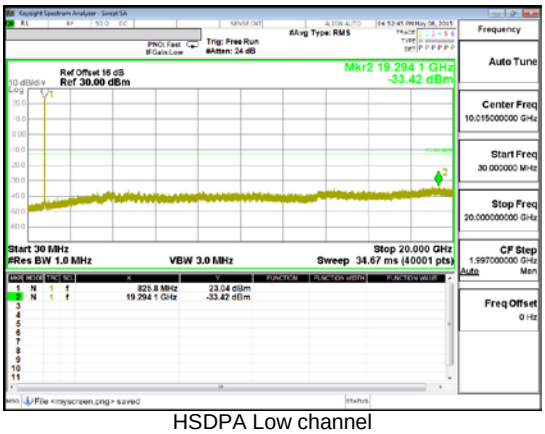
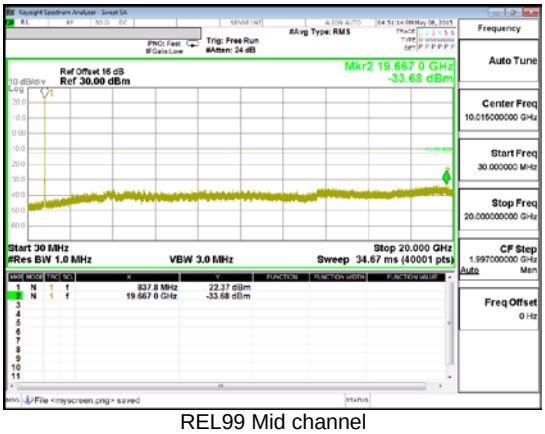
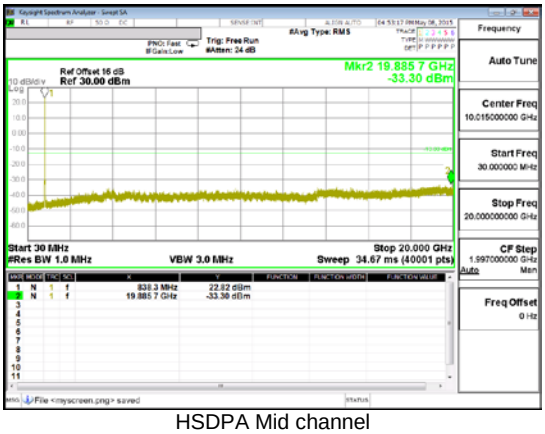
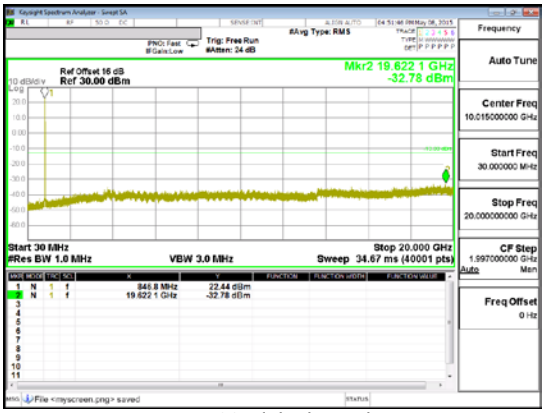
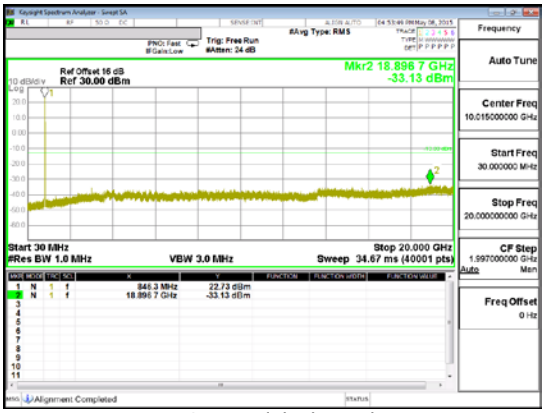
**WCDMA Band 5**

| | | |
|---|---|---|
| Band 5 |  <br>REL99 Low channel |  <br>HSDPA Low channel |
| |  <br>REL99 Mid channel |  <br>HSDPA Mid channel |
| |  <br>REL99 High channel |  <br>HSDPA High channel |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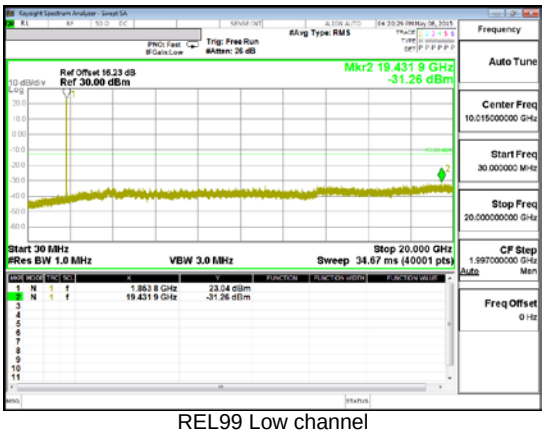
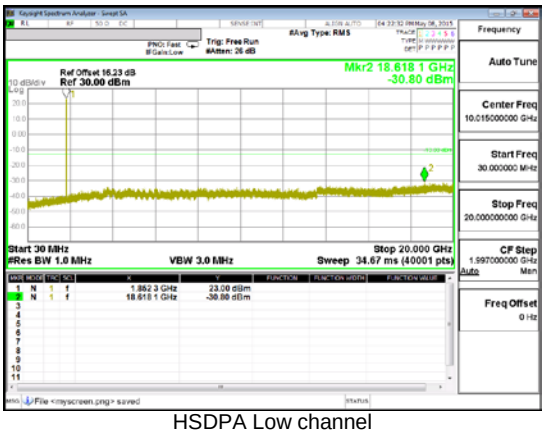
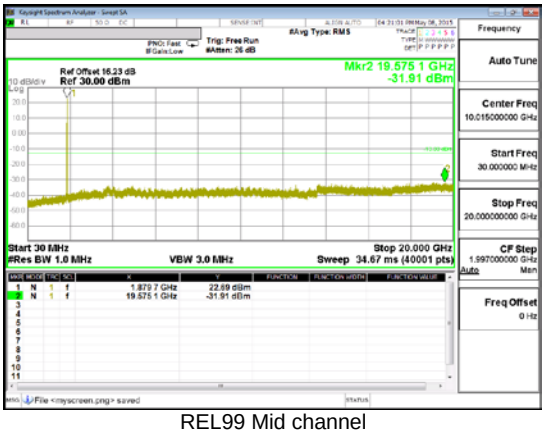
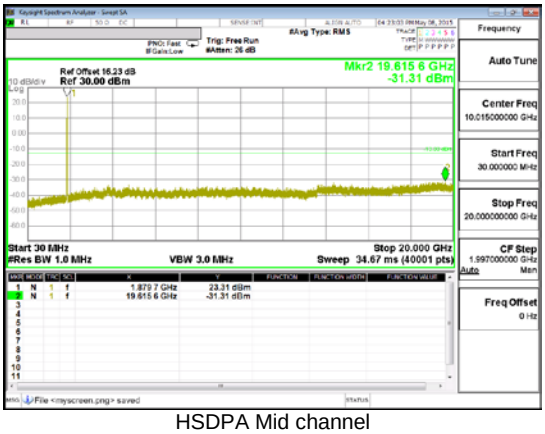
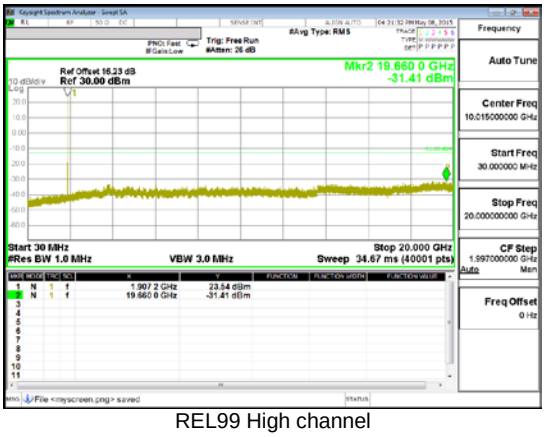
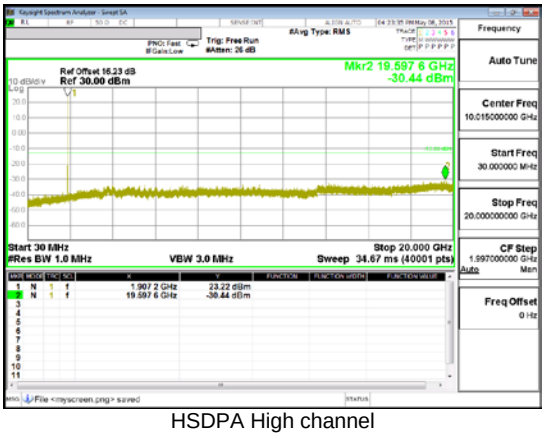
**WCDMA Band 2**

| | | |
|---|---|---|
| Band 2 |  <br>REL99 Low channel |  <br>HSDPA Low channel |
| |  <br>REL99 Mid channel |  <br>HSDPA Mid channel |
| |  <br>REL99 High channel |  <br>HSDPA High channel |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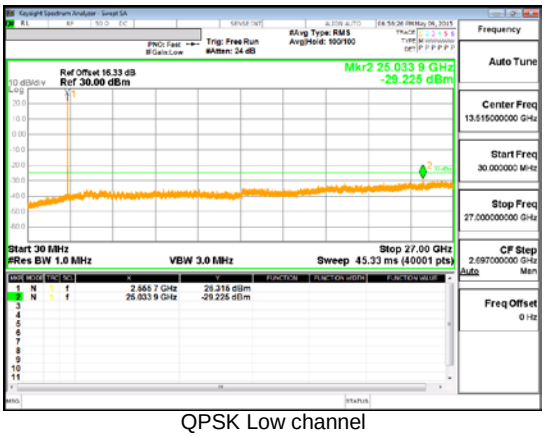
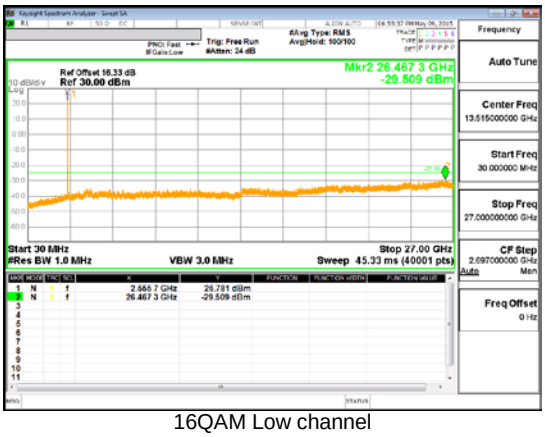
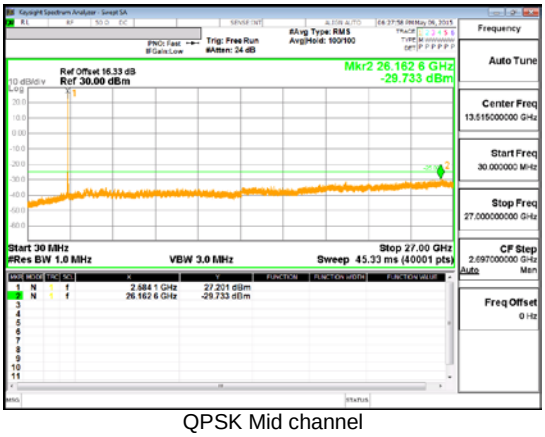
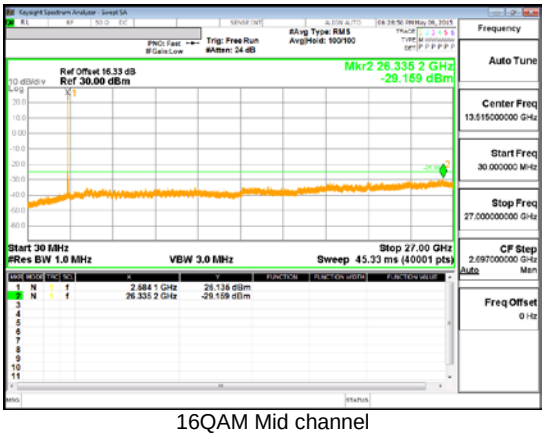
**LTE Band 41**

| | | |
|---|---|---|
| Band 41<br>20MHz |  <br>QPSK Low channel |  <br>16QAM Low channel |
| |  <br>QPSK Mid channel |  <br>16QAM Mid channel |
| | <br>QPSK High channel | <br>16QAM High channel |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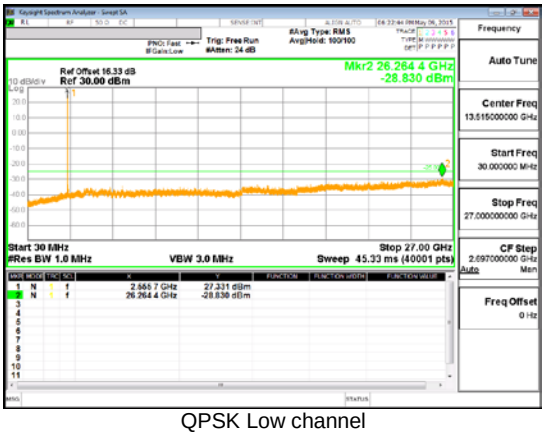
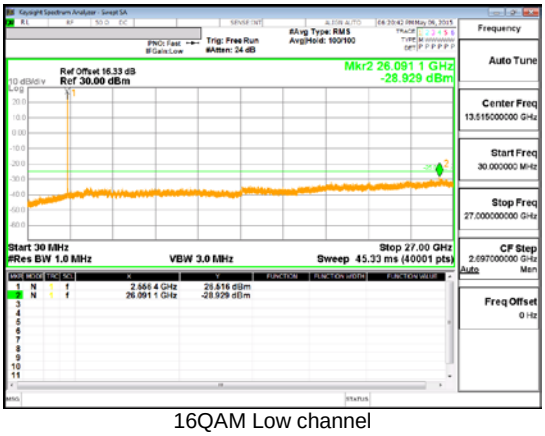
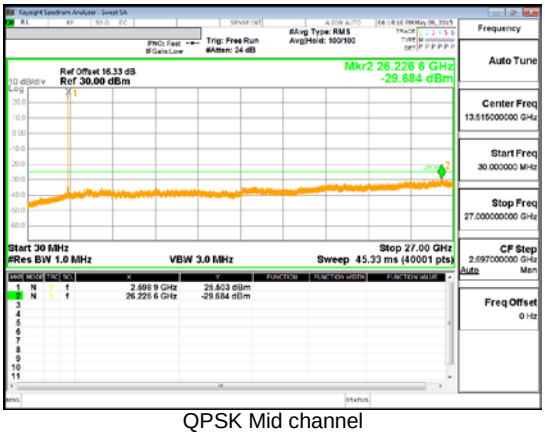
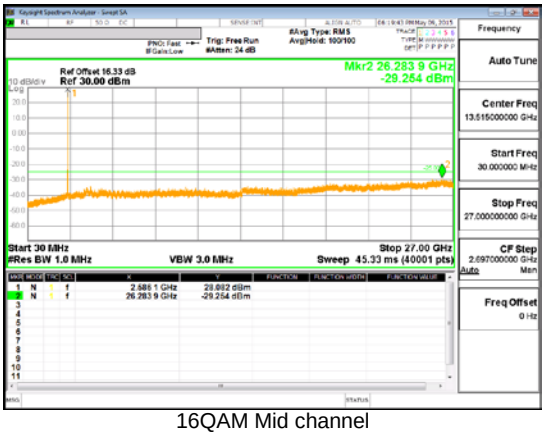
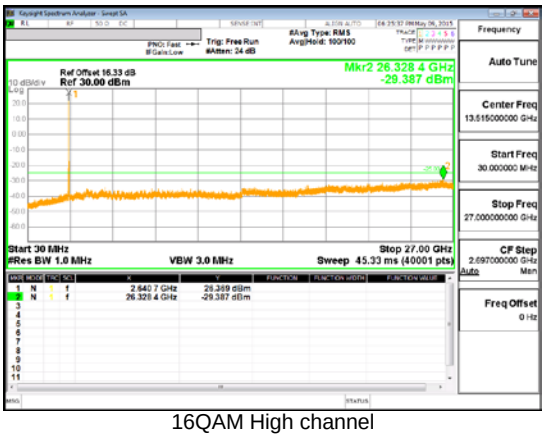
| | | |
|---|---|---|
| Band 41<br><br>15MHz |  <br><br>QPSK Low channel |  <br><br>16QAM Low channel |
| |  <br><br>QPSK Mid channel |  <br><br>16QAM Mid channel |
| | <br><br>QPSK High channel |  <br><br>16QAM High channel |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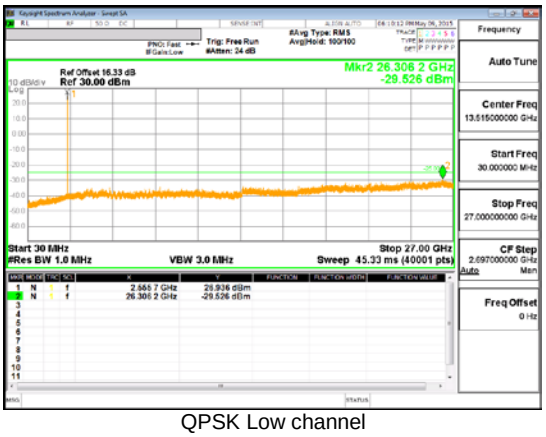
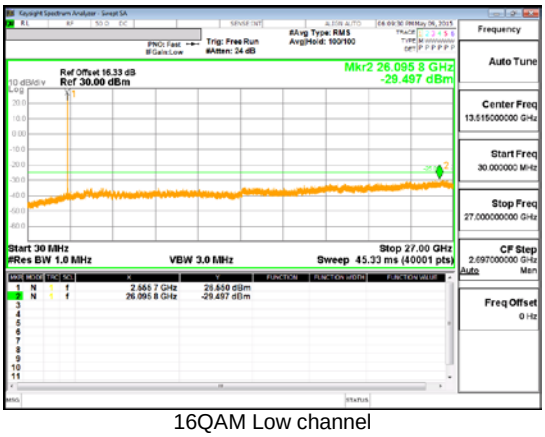
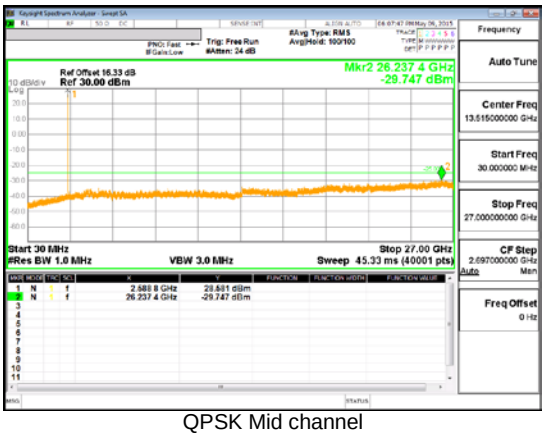
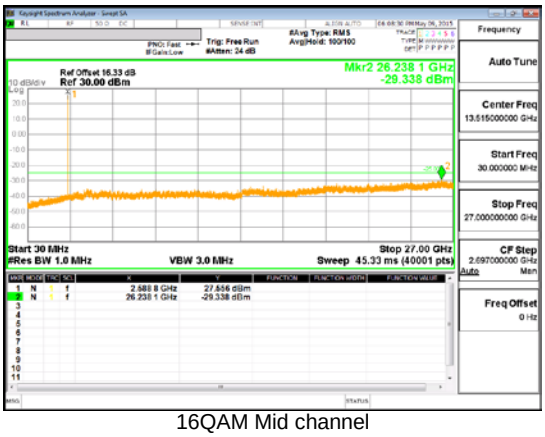
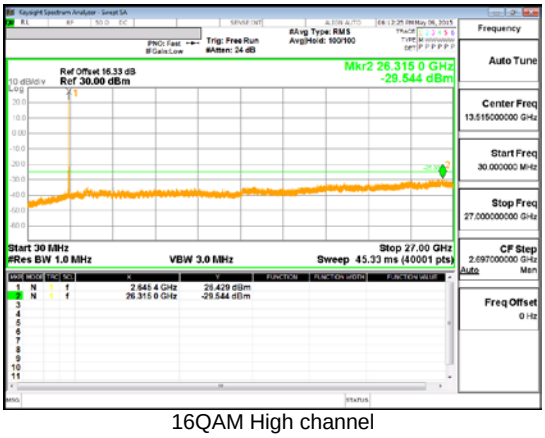
| | | |
|---|---|---|
| Band 41<br><br>10MHz |  <br><br>QPSK Low channel |  <br><br>16QAM Low channel |
| |  <br><br>QPSK Mid channel |  <br><br>16QAM Mid channel |
| | <br><br>QPSK High channel |  <br><br>16QAM High channel |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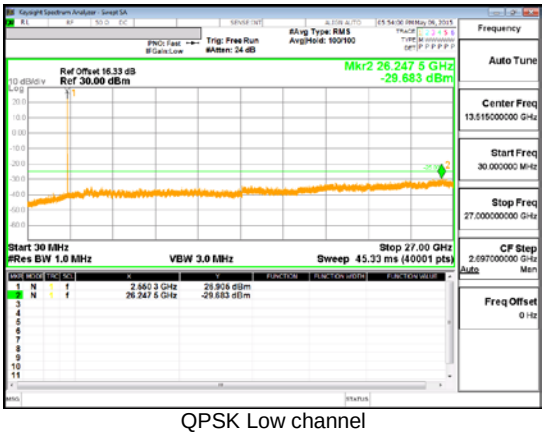
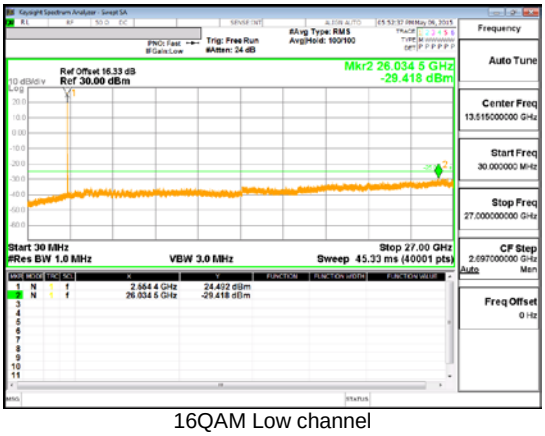
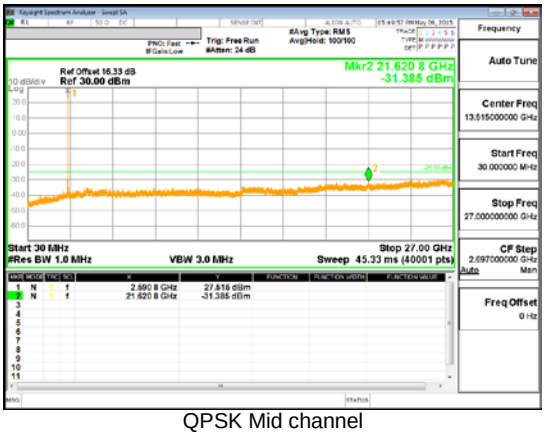
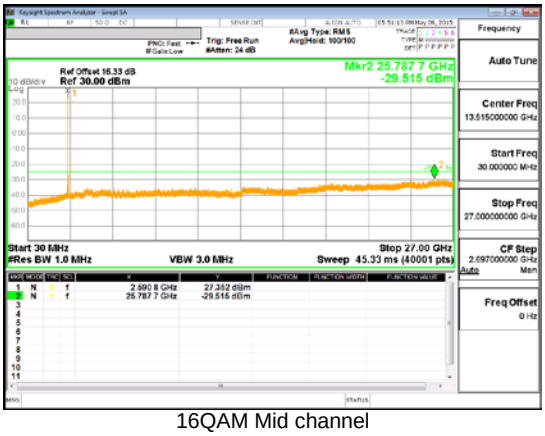
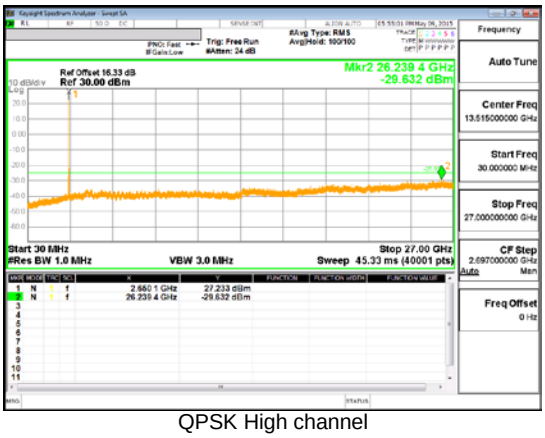
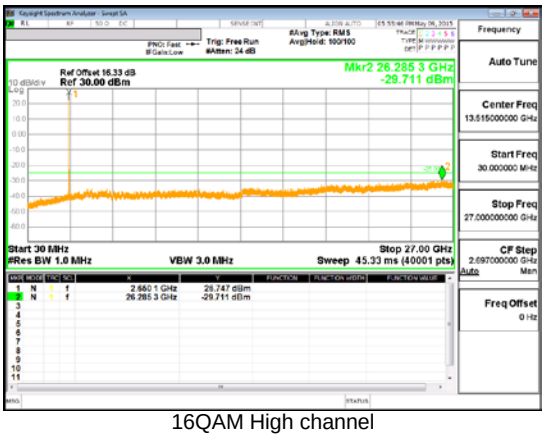
| | | |
|---|---|---|
| Band 41<br><br>5MHz |  <br><br>QPSK Low channel |  <br><br>16QAM Low channel |
| |  <br><br>QPSK Mid channel |  <br><br>16QAM Mid channel |
| |  <br><br>QPSK High channel |  <br><br>16QAM High channel |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## 10.1. FREQUENCY STABILITY

**RULE PART(S)**

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

**LIMITS**

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

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

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

**TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v02r02

**RESULTS**

See the following pages.


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### 10.1.1. FREQUENCY STABILITY RESULTS

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

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

**GSM 850, Channel 190, Frequency 836.6 MHz**

| Reference Frequency: WCDMA Band5 Mid Channel 836.6 MHz @ 20ºC<br>Limit: ± 2.5 ppm = 2091.500 Hz | | | | |
|---|---|---|---|---|
| Power Supply (Vdc) | Environment Temperature (*C) | Frequency Deviation Measureed with Time Elapse (MHz) | Delta (ppm) | Limit (ppm) |
| 3.80 | 50 | 836.59998085 | -0.009 | 2.5 |
| 3.80 | 40 | 836.60001905 | -0.055 | 2.5 |
| 3.80 | 30 | 836.60001853 | -0.054 | 2.5 |
| ***3.80*** | ***20*** | ***836.59997304*** | ***0*** | ***2.5*** |
| 3.80 | 10 | 836.59998102 | -0.010 | 2.5 |
| 3.80 | 0 | 836.59997805 | -0.006 | 2.5 |
| 3.80 | -10 | 836.59998328 | -0.012 | 2.5 |
| 3.80 | -20 | 836.59998276 | -0.012 | 2.5 |
| *3.80* | -30 | 836.59997692 | -0.005 | 2.5 |

| Reference Frequency: WCDMA Band5 Mid Channel 836.6 MHz @ 20ºC<br>Limit: ± 2.5 ppm = 2091.500 Hz | | | | |
|---|---|---|---|---|
| Power Supply (Vdc) | Environment Temperature (*C) | Frequency Deviation Measureed with Time Elapse (MHz) | Delta (ppm) | Limit (ppm) |
| ***3.80*** | ***20*** | ***836.59997304*** | ***0*** | ***2.5*** |
| 4.20 | 20 | 836.59998083 | -0.009 | 2.5 |
| 3.40 | 20 | 836.59997539 | -0.003 | 2.5 |


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**LTE Band 2, Channel 18900, Frequency 1880.0 MHz**

**WCDMA Band 2, Channel 9400, Frequency 1880.0 MHz**

**GSM 1900, Channel 661, Frequency 1880.0 MHz**

| Reference Frequency: WCDMA Band2 Mid Channel 1880 MHz @ 20ºC<br>Limit: ± 2.5 ppm = 4700.000 Hz | | | | |
|---|---|---|---|---|
| **Power Supply (Vdc)** | **Environment Temperature (*C)** | **Frequency Deviation Measureed with Time Elapse** | | |
| | | **(MHz)** | **Delta (ppm)** | **Limit (ppm)** |
| 3.80 | 50 | 1879.99996197 | 0.006 | 2.5 |
| 3.80 | 40 | 1880.00002492 | -0.028 | 2.5 |
| 3.80 | 30 | 1880.00002873 | -0.030 | 2.5 |
| ***3.80*** | ***20*** | **1879.99997298** | ***0*** | ***2.5*** |
| 3.80 | 10 | 1879.99997624 | -0.002 | 2.5 |
| 3.80 | 0 | 1879.99997520 | -0.001 | 2.5 |
| 3.80 | -10 | 1879.99998192 | -0.005 | 2.5 |
| 3.80 | -20 | 1879.99997601 | -0.002 | 2.5 |
| *3.80* | -30 | 1879.99997072 | 0.001 | 2.5 |

| Reference Frequency: WCDMA Band2 Mid Channel 1880 MHz @ 20ºC<br>Limit: ± 2.5 ppm = 4700.000 Hz | | | | |
|---|---|---|---|---|
| **Power Supply (Vdc)** | **Environment Temperature (*C)** | **Frequency Deviation Measureed with Time Elapse** | | |
| | | **(MHz)** | **Delta (ppm)** | **Limit (ppm)** |
| ***3.80*** | ***20*** | **1879.99997298** | ***0*** | ***2.5*** |
| 4.20 | 20 | 1879.99997767 | -0.002 | 2.5 |
| 3.40 | 20 | 1879.99996976 | 0.002 | 2.5 |


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**LTE Band 41, Channel 40620, Frequency 2593.0 MHz**

| Reference Frequency: LTE Band41 Mid Channel 2593 MHz @ 20ºC<br>Limit: ± 2.5 ppm = 6482.500 Hz | | | | |
|---|---|---|---|---|
| **Power Supply (Vdc)** | **Environment Temperature (*C)** | **Frequency Deviation Measureed with Time Elapse** | | |
| | | **(MHz)** | **Delta (ppm)** | **Limit (ppm)** |
| 3.80 | 50 | 2592.99996197 | 0.004 | 2.5 |
| 3.80 | 40 | 2593.00002492 | -0.020 | 2.5 |
| 3.80 | 30 | 2593.00002873 | -0.022 | 2.5 |
| ***3.80*** | ***20*** | **2592.99997298** | ***0*** | ***2.5*** |
| 3.80 | 10 | 2592.99997624 | -0.001 | 2.5 |
| 3.80 | 0 | 2592.99997520 | -0.001 | 2.5 |
| 3.80 | -10 | 2592.99998192 | -0.003 | 2.5 |
| 3.80 | -20 | 2592.99997601 | -0.001 | 2.5 |
| *3.80* | -30 | 2592.99997072 | 0.001 | 2.5 |

| Reference Frequency: LTE Band41 Mid Channel 2593 MHz @ 20ºC<br>Limit: ± 2.5 ppm = 6482.500 Hz | | | | |
|---|---|---|---|---|
| **Power Supply (Vdc)** | **Environment Temperature (*C)** | **Frequency Deviation Measureed with Time Elapse** | | |
| | | **(MHz)** | **Delta (ppm)** | **Limit (ppm)** |
| ***3.80*** | ***20*** | **2592.99997298** | ***0*** | ***2.5*** |
| 4.20 | 20 | 2592.99997767 | -0.002 | 2.5 |
| 3.40 | 20 | 2592.99996976 | 0.001 | 2.5 |


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# 11. RADIATED TEST RESULTS

## 11.1. RADIATED POWER (ERP & EIRP)

**RULE PART(S)**

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

**LIMITS**

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

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

27.50(h) - (2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.(LTE B41)

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 603C Clause 2.2.17; MXA setting reference to 971168 D01 v02r02

For peak power measurement with a MXA:

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

For average power measurement with a MXA:

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 ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 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.

**TEST RESULTS**


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### 11.1.1. ERP/EIRP Results

**GSM**

| Band | Mode | Channel | f [MHz] | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | [dBm] | [mW] |
| GSM850 | GPRS | 128 | 824.2 | 26.51 | 447.7 |
| | | 190 | 836.6 | 27.78 | 599.8 |
| | | 251 | 848.8 | 26.30 | 426.6 |
| | EGPRS | 128 | 824.2 | 20.31 | 107.4 |
| | | 190 | 836.6 | 21.93 | 156.0 |
| | | 251 | 848.8 | 20.56 | 133.8 |
| GSM1900 | GPRS | 512 | 1850.2 | 26.48 | 444.4 |
| | | 661 | 1880.0 | 31.11 | 1291.2 |
| | | 810 | 1909.8 | 29.79 | 953.5 |
| | EGPRS | 512 | 1850.2 | 23.03 | 200.8 |
| | | 661 | 1880.0 | 28.68 | 737.9 |
| | | 810 | 1909.8 | 26.40 | 436.8 |

**WCDMA**

| Band | Mode | Channel | f [MHz] | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | [dBm] | [mW] |
| Band 5 | REL99 | 4132 | 826.4 | 14.06 | 25.4 |
| | | 4183 | 836.6 | 14.47 | 28.0 |
| | | 4233 | 846.6 | 14.72 | 29.6 |
| | HSDPA | 4132 | 826.4 | 13.65 | 23.1 |
| | | 4183 | 836.6 | 14.02 | 25.2 |
| | | 4233 | 846.6 | 13.71 | 23.5 |
| Band 2 | REL99 | 9262 | 1852.4 | 21.45 | 139.6 |
| | | 9400 | 1880.0 | 23.58 | 228.0 |
| | | 9538 | 1907.6 | 22.88 | 194.2 |
| | HSDPA | 9262 | 1852.4 | 20.35 | 108.3 |
| | | 9400 | 1880.0 | 22.82 | 191.4 |
| | | 9538 | 1907.6 | 21.30 | 135.0 |


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**LTE Band 41**

| Band | BW [MHz] | Mode | RB/RB Size | f [MHz] | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | Full RB | | [dBm] | [mW] |
| Band 41 | 20 | QPSK | 100/0 | 2565.0 | 17.21 | 52.6 |
| | | | 100/0 | 2593.0 | 17.96 | 62.4 |
| | | | 100/0 | 2645.0 | 19.39 | 87.0 |
| | | 16QAM | 100/0 | 2565.0 | 16.18 | 41.5 |
| | | | 100/0 | 2593.0 | 17.40 | 54.9 |
| | | | 100/0 | 2645.0 | 18.39 | 69.1 |
| | 15 | QPSK | 75/0 | 2562.5 | 16.00 | 39.8 |
| | | | 75/0 | 2593.0 | 17.46 | 55.7 |
| | | | 75/0 | 2647.5 | 18.59 | 72.3 |
| | | 16QAM | 75/0 | 2562.5 | 14.88 | 30.7 |
| | | | 75/0 | 2593.0 | 16.41 | 43.7 |
| | | | 75/0 | 2647.5 | 17.54 | 56.8 |
| | 10 | QPSK | 50/0 | 2560.0 | 17.11 | 51.4 |
| | | | 50/0 | 2593.0 | 18.41 | 69.3 |
| | | | 50/0 | 2650.0 | 18.98 | 79.1 |
| | | 16QAM | 50/0 | 2560.0 | 15.86 | 38.5 |
| | | | 50/0 | 2593.0 | 16.69 | 46.6 |
| | | | 50/0 | 2650.0 | 18.06 | 64.0 |
| | 5 | QPSK | 25/0 | 2552.5 | 16.02 | 40.0 |
| | | | 25/0 | 2593.0 | 17.44 | 55.4 |
| | | | 25/0 | 2652.5 | 18.88 | 77.3 |
| | | 16QAM | 25/0 | 2552.5 | 15.00 | 31.6 |
| | | | 25/0 | 2593.0 | 16.53 | 44.9 |
| | | | 25/0 | 2652.5 | 17.20 | 52.5 |


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## 11.1.2. ERP/EIRP DATA

**GSM 850**

GSM

GSM850
GPRS

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Y Position
**Mode:** GPRS 850 MHz

**Test Equipment:**
**Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 824.20 | 29.13 | V | 1.1 | -1.6 | 26.51 | 38.5 | -11.9 | |
| 824.20 | 23.28 | H | 1.1 | -1.6 | 20.66 | 38.5 | -17.8 | |
| Mid Ch | | | | | | | | |
| 836.60 | 30.27 | V | 1.1 | -1.4 | 27.78 | 38.5 | -10.7 | |
| 836.60 | 21.75 | H | 1.1 | -1.4 | 19.26 | 38.5 | -19.2 | |
| High Ch | | | | | | | | |
| 848.80 | 28.66 | V | 1.1 | -1.3 | 26.30 | 38.5 | -12.2 | |
| 848.80 | 20.43 | H | 1.1 | -1.3 | 18.07 | 38.5 | -20.4 | |

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

GSM

GSM850
EGPRS

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Y Position
**Mode:** EGPRS 850 MHz

**Test Equipment:**
**Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 824.20 | 22.93 | V | 1.1 | -1.6 | 20.31 | 38.5 | -18.1 | |
| 824.20 | 17.68 | H | 1.1 | -1.6 | 15.06 | 38.5 | -23.4 | |
| Mid Ch | | | | | | | | |
| 836.60 | 24.42 | V | 1.1 | -1.4 | 21.93 | 38.5 | -16.5 | |
| 836.60 | 16.50 | H | 1.1 | -1.4 | 14.01 | 38.5 | -24.4 | |
| High Ch | | | | | | | | |
| 848.80 | 22.92 | V | 1.1 | -1.3 | 20.56 | 38.5 | -17.9 | |
| 848.80 | 15.38 | H | 1.1 | -1.3 | 13.02 | 38.5 | -25.4 | |

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm


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## GSM 1900

GSM

GSM1900
GPRS

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Z Position
**Mode:** GPRS 1900MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1850.20 | 14.1 | V | 1.60 | 9.12 | 21.60 | 33.0 | -11.4 | |
| 1850.20 | 19.0 | H | 1.60 | 9.12 | 26.48 | 33.0 | -6.5 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 16.8 | V | 1.62 | 8.98 | 24.18 | 33.0 | -8.8 | |
| 1880.00 | 23.8 | H | 1.62 | 8.98 | 31.11 | 33.0 | -1.9 | |
| High Ch | | | | | | | | |
| 1909.80 | 18.3 | V | 1.63 | 8.83 | 25.53 | 33.0 | -7.5 | |
| 1909.80 | 22.6 | H | 1.63 | 8.83 | 29.79 | 33.0 | -3.2 | |

Rev. 3.17.11

GSM

GSM1900
EGPRS

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Z Position
**Mode:** EGPRS 1900MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1850.20 | 10.8 | V | 1.60 | 9.12 | 18.29 | 33.0 | -14.7 | |
| 1850.20 | 15.5 | H | 1.60 | 9.12 | 23.03 | 33.0 | -10.0 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 14.0 | V | 1.62 | 8.98 | 21.40 | 33.0 | -11.6 | |
| 1880.00 | 21.3 | H | 1.62 | 8.98 | 28.68 | 33.0 | -4.3 | |
| High Ch | | | | | | | | |
| 1909.80 | 15.0 | V | 1.63 | 8.83 | 22.17 | 33.0 | -10.8 | |
| 1909.80 | 19.2 | H | 1.63 | 8.83 | 26.40 | 33.0 | -6.6 | |

Rev. 3.17.11


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## WCDMA Band 5

WCDMA

Band 5
REL99

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Y Position
**Mode:** Rel 99_850 MHz

**Test Equipment:**
**Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 826.40 | 16.67 | V | 1.1 | -1.5 | 14.06 | 38.5 | -24.4 | |
| 826.40 | 9.91 | H | 1.1 | -1.5 | 7.30 | 38.5 | -31.2 | |
| Mid Ch | | | | | | | | |
| 836.60 | 16.96 | V | 1.1 | -1.4 | 14.47 | 38.5 | -24.0 | |
| 836.60 | 10.85 | H | 1.1 | -1.4 | 8.36 | 38.5 | -30.1 | |
| High Ch | | | | | | | | |
| 846.60 | 17.10 | V | 1.1 | -1.3 | 14.72 | 38.5 | -23.7 | |
| 846.60 | 11.59 | H | 1.1 | -1.3 | 9.21 | 38.5 | -29.2 | |

Rev. 3.17.11

WCDMA

Band 5
HSDPA

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Y Position
**Mode:** HSDPA_850 MHz

**Test Equipment:**
**Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 826.40 | 16.26 | V | 1.1 | -1.5 | 13.65 | 38.5 | -24.8 | |
| 826.40 | 9.16 | H | 1.1 | -1.5 | 6.55 | 38.5 | -31.9 | |
| Mid Ch | | | | | | | | |
| 836.60 | 16.51 | V | 1.1 | -1.4 | 14.02 | 38.5 | -24.4 | |
| 836.60 | 9.84 | H | 1.1 | -1.4 | 7.35 | 38.5 | -31.1 | |
| High Ch | | | | | | | | |
| 846.60 | 16.09 | V | 1.1 | -1.3 | 13.71 | 38.5 | -24.7 | |
| 846.60 | 9.86 | H | 1.1 | -1.3 | 7.48 | 38.5 | -31.0 | |

Rev. 3.17.11


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## WCDMA Band 2

WCDMA

Band 2
REL99

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Z Position
**Mode:** REL99_1900 MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1852.40 | 5.03 | V | 1.60 | 9.12 | 12.55 | 33.0 | -20.5 | |
| 1852.40 | 13.93 | H | 1.60 | 9.12 | 21.45 | 33.0 | -11.6 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 7.68 | V | 1.62 | 8.98 | 15.04 | 33.0 | -18.0 | |
| 1880.00 | 16.22 | H | 1.62 | 8.98 | 23.58 | 33.0 | -9.4 | |
| High Ch | | | | | | | | |
| 1907.60 | 6.85 | V | 1.63 | 8.83 | 14.05 | 33.0 | -18.9 | |
| 1907.60 | 15.68 | H | 1.63 | 8.83 | 22.88 | 33.0 | -10.1 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

WCDMA

Band 2
HSDPA

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT ONLY, Z Position
**Mode:** HSDPA_1900 MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1852.40 | 4.65 | V | 1.60 | 9.12 | 12.17 | 33.0 | -20.8 | |
| 1852.40 | 12.83 | H | 1.60 | 9.12 | 20.35 | 33.0 | -12.7 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 7.27 | V | 1.62 | 8.98 | 14.63 | 33.0 | -18.4 | |
| 1880.00 | 15.46 | H | 1.62 | 8.98 | 22.82 | 33.0 | -10.2 | |
| High Ch | | | | | | | | |
| 1907.60 | 6.22 | V | 1.63 | 8.83 | 13.42 | 33.0 | -19.6 | |
| 1907.60 | 14.10 | H | 1.63 | 8.83 | 21.30 | 33.0 | -11.7 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm


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## LTE Band 41

LTE Band 41 20MHz QPSK

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41, QPSK, 20MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2565.00 | 4.54 | V | 1.9 | 10.3 | 12.98 | 33.0 | -20.0 | |
| 2565.00 | 8.77 | H | 1.9 | 10.3 | 17.21 | 33.0 | -15.8 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 5.78 | V | 1.9 | 10.3 | 14.21 | 33.0 | -18.8 | |
| 2593.00 | 9.53 | H | 1.9 | 10.3 | 17.96 | 33.0 | -15.0 | |
| High Ch | | | | | | | | |
| 2645.00 | 7.42 | V | 1.9 | 10.3 | 15.83 | 33.0 | -17.2 | |
| 2645.00 | 10.98 | H | 1.9 | 10.3 | 19.39 | 33.0 | -13.6 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 41 20MHz 16QAM

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41, 16QAM, 20MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2565.00 | 3.24 | V | 1.9 | 10.3 | 11.68 | 33.0 | -21.3 | |
| 2565.00 | 7.74 | H | 1.9 | 10.3 | 16.18 | 33.0 | -16.8 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 4.90 | V | 1.9 | 10.3 | 13.33 | 33.0 | -19.7 | |
| 2593.00 | 8.97 | H | 1.9 | 10.3 | 17.40 | 33.0 | -15.6 | |
| High Ch | | | | | | | | |
| 2645.00 | 6.38 | V | 1.9 | 10.3 | 14.79 | 33.0 | -18.2 | |
| 2645.00 | 9.98 | H | 1.9 | 10.3 | 18.39 | 33.0 | -14.6 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm


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LTE
Band 41
15MHz
QPSK

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41, QPSK, 15MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2562.50 | 3.94 | V | 1.9 | 10.3 | 12.38 | 33.0 | -20.6 | |
| 2562.50 | 7.56 | H | 1.9 | 10.3 | 16.00 | 33.0 | -17.0 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 5.18 | V | 1.9 | 10.3 | 13.61 | 33.0 | -19.4 | |
| 2593.00 | 9.03 | H | 1.9 | 10.3 | 17.46 | 33.0 | -15.5 | |
| High Ch | | | | | | | | |
| 2647.50 | 7.35 | V | 1.9 | 10.3 | 15.76 | 33.0 | -17.2 | |
| 2647.50 | 10.18 | H | 1.9 | 10.3 | 18.59 | 33.0 | -14.4 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE
Band 41
15MHz
16QAM

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41, 16QAM, 15MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2562.50 | 2.96 | V | 1.9 | 10.3 | 11.40 | 33.0 | -21.6 | |
| 2562.50 | 6.44 | H | 1.9 | 10.3 | 14.88 | 33.0 | -18.1 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 4.04 | V | 1.9 | 10.3 | 12.47 | 33.0 | -20.5 | |
| 2593.00 | 7.98 | H | 1.9 | 10.3 | 16.41 | 33.0 | -16.6 | |
| High Ch | | | | | | | | |
| 2647.50 | 6.07 | V | 1.9 | 10.3 | 14.48 | 33.0 | -18.5 | |
| 2647.50 | 9.13 | H | 1.9 | 10.3 | 17.54 | 33.0 | -15.5 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm


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LTE
Band 41
10MHz
QPSK

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41, QPSK, 10MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2560.00 | 4.79 | V | 1.9 | 10.3 | 13.23 | 33.0 | -19.8 | |
| 2560.00 | 8.67 | H | 1.9 | 10.3 | 17.11 | 33.0 | -15.9 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 5.52 | V | 1.9 | 10.3 | 13.95 | 33.0 | -19.1 | |
| 2593.00 | 9.98 | H | 1.9 | 10.3 | 18.41 | 33.0 | -14.6 | |
| High Ch | | | | | | | | |
| 2650.00 | 7.42 | V | 1.9 | 10.3 | 15.83 | 33.0 | -17.2 | |
| 2650.00 | 10.57 | H | 1.9 | 10.3 | 18.98 | 33.0 | -14.0 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE
Band 41
10MHz
16QAM

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41 16QAM, 10MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2560.00 | 3.79 | V | 1.9 | 10.3 | 12.23 | 33.0 | -20.8 | |
| 2560.00 | 7.42 | H | 1.9 | 10.3 | 15.86 | 33.0 | -17.1 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 4.33 | V | 1.9 | 10.3 | 12.76 | 33.0 | -20.2 | |
| 2593.00 | 8.26 | H | 1.9 | 10.3 | 16.69 | 33.0 | -16.3 | |
| High Ch | | | | | | | | |
| 2650.00 | 6.40 | V | 1.9 | 10.3 | 14.81 | 33.0 | -18.2 | |
| 2650.00 | 9.65 | H | 1.9 | 10.3 | 18.06 | 33.0 | -14.9 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm


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LTE Band 41 5MHz QPSK

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41, QPSK , 5MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2552.50 | 3.07 | V | 1.9 | 10.3 | 11.51 | 33.0 | -21.5 | |
| 2552.50 | 7.58 | H | 1.9 | 10.3 | 16.02 | 33.0 | -17.0 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 4.58 | V | 1.9 | 10.3 | 13.01 | 33.0 | -20.0 | |
| 2593.00 | 9.01 | H | 1.9 | 10.3 | 17.44 | 33.0 | -15.6 | |
| High Ch | | | | | | | | |
| 2652.50 | 7.26 | V | 1.9 | 10.3 | 15.67 | 33.0 | -17.3 | |
| 2652.50 | 10.47 | H | 1.9 | 10.3 | 18.88 | 33.0 | -14.1 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 41 5MHz 16QAM

**High Frequency Substitution Measurement**
**UL Korea, Ltd. Suwon Laboratory Chamber 1**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / Z-Position
**Mode:** LTE Band 41 16QAM, 5MHz

**Test Equipment:**
**Receiving: 3117, and Chamber 1 SMA Cables**
**Substitution: 3115 Substitution, 3m SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2552.50 | 2.09 | V | 1.9 | 10.3 | 10.53 | 33.0 | -22.5 | |
| 2552.50 | 6.56 | H | 1.9 | 10.3 | 15.00 | 33.0 | -18.0 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 3.96 | V | 1.9 | 10.3 | 12.39 | 33.0 | -20.6 | |
| 2593.00 | 8.10 | H | 1.9 | 10.3 | 16.53 | 33.0 | -16.5 | |
| High Ch | | | | | | | | |
| 2652.50 | 6.23 | V | 1.9 | 10.3 | 14.64 | 33.0 | -18.4 | |
| 2652.50 | 8.79 | H | 1.9 | 10.3 | 17.20 | 33.0 | -15.8 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm


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## 11.2. FIELD STRENGTH OF SPURIOUS RADIATION

**RULE PART(S)**

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

**LIMIT**

Part 22.917(a) & Part 24.238(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.

Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

**TEST PROCEDURE**

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**RESULTS**


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## 11.2.1. SPURIOUS RADIATION PLOTS

**GSM 850**

GSM

GSM850
GPRS

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone, Y Position
**Mode:** GPRS 850 MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 22 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.2MHz | | | | | | | | | |
| 1.6484 | -6.0 | V | 3.0 | 40.2 | 1.0 | -45.2 | -13.0 | -32.2 | |
| 2.4726 | -11.4 | V | 3.0 | 40.1 | 1.0 | -50.4 | -13.0 | -37.4 | |
| 3.2968 | -25.6 | V | 3.0 | 39.6 | 1.0 | -64.2 | -13.0 | -51.2 | |
| 1.6484 | -3.5 | H | 3.0 | 40.2 | 1.0 | -42.7 | -13.0 | -29.7 | |
| 2.4726 | -5.4 | H | 3.0 | 40.1 | 1.0 | -44.4 | -13.0 | -31.4 | |
| 3.2968 | -24.9 | H | 3.0 | 39.6 | 1.0 | -63.5 | -13.0 | -50.5 | |
| Mid_Ch, 836.6MHz | | | | | | | | | |
| 1.6730 | 6.4 | V | 3.0 | 40.2 | 1.0 | -32.8 | -13.0 | -19.8 | |
| 2.5098 | -9.8 | V | 3.0 | 40.1 | 1.0 | -48.8 | -13.0 | -35.8 | |
| 3.3464 | -23.8 | V | 3.0 | 39.6 | 1.0 | -62.4 | -13.0 | -49.4 | |
| 1.6730 | -2.8 | H | 3.0 | 40.2 | 1.0 | -42.0 | -13.0 | -29.0 | |
| 2.5098 | -6.6 | H | 3.0 | 40.1 | 1.0 | -45.7 | -13.0 | -32.7 | |
| 3.3464 | -22.9 | H | 3.0 | 39.6 | 1.0 | -61.5 | -13.0 | -48.5 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.6976 | -6.5 | V | 3.0 | 40.2 | 1.0 | -45.7 | -13.0 | -32.7 | |
| 2.5466 | -13.3 | V | 3.0 | 40.1 | 1.0 | -52.4 | -13.0 | -39.4 | |
| 3.3952 | -22.6 | V | 3.0 | 39.5 | 1.0 | -61.1 | -13.0 | -48.1 | |
| 1.6976 | -4.6 | H | 3.0 | 40.2 | 1.0 | -43.8 | -13.0 | -30.8 | |
| 2.5466 | -3.8 | H | 3.0 | 40.1 | 1.0 | -42.9 | -13.0 | -29.9 | |
| 3.3952 | -21.6 | H | 3.0 | 39.5 | 1.0 | -60.1 | -13.0 | -47.1 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

GSM

GSM850
EGPRS

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone, Y Position
**Mode:** EGPRS 850 MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 22 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.2MHz | | | | | | | | | |
| 1.6484 | -11.4 | V | 3.0 | 40.2 | 1.0 | -50.6 | -13.0 | -37.6 | |
| 2.4726 | -17.1 | V | 3.0 | 40.1 | 1.0 | -56.1 | -13.0 | -43.1 | |
| 3.2968 | -26.6 | V | 3.0 | 39.6 | 1.0 | -65.2 | -13.0 | -52.2 | |
| 1.6484 | -8.4 | H | 3.0 | 40.2 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 2.4726 | -8.6 | H | 3.0 | 40.1 | 1.0 | -47.7 | -13.0 | -34.7 | |
| 3.2968 | -26.7 | H | 3.0 | 39.6 | 1.0 | -65.4 | -13.0 | -52.4 | |
| Mid_Ch, 836.6MHz | | | | | | | | | |
| 1.6730 | 1.4 | V | 3.0 | 40.2 | 1.0 | -37.8 | -13.0 | -24.8 | |
| 2.5098 | -6.5 | V | 3.0 | 40.1 | 1.0 | -45.6 | -13.0 | -32.6 | |
| 3.3464 | -26.1 | V | 3.0 | 39.6 | 1.0 | -64.6 | -13.0 | -51.6 | |
| 1.6730 | -7.9 | H | 3.0 | 40.2 | 1.0 | -47.0 | -13.0 | -34.0 | |
| 2.5098 | -12.9 | H | 3.0 | 40.1 | 1.0 | -51.9 | -13.0 | -38.9 | |
| 3.3464 | -26.3 | H | 3.0 | 39.6 | 1.0 | -64.8 | -13.0 | -51.8 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.6976 | -11.8 | V | 3.0 | 40.2 | 1.0 | -51.0 | -13.0 | -38.0 | |
| 2.5466 | -18.2 | V | 3.0 | 40.1 | 1.0 | -57.2 | -13.0 | -44.2 | |
| 3.3952 | -25.3 | V | 3.0 | 39.5 | 1.0 | -63.8 | -13.0 | -50.8 | |
| 1.6976 | -11.0 | H | 3.0 | 40.2 | 1.0 | -50.1 | -13.0 | -37.1 | |
| 2.5466 | -8.7 | H | 3.0 | 40.1 | 1.0 | -47.7 | -13.0 | -34.7 | |
| 3.3952 | -25.7 | H | 3.0 | 39.5 | 1.0 | -64.2 | -13.0 | -51.2 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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## GSM 1900

GSM

GSM1900
GPRS

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone, Z Position
**Mode:** GPRS 1900

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 24 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1850.2MHz | | | | | | | | | |
| 3.7004 | -10.2 | V | 3.0 | 39.2 | 1.0 | -48.4 | -13.0 | -35.4 | |
| 5.5506 | -6.9 | V | 3.0 | 40.0 | 1.0 | -45.9 | -13.0 | -32.9 | |
| 7.4008 | -4.2 | V | 3.0 | 39.2 | 1.0 | -42.4 | -13.0 | -29.4 | |
| 3.7000 | -13.8 | H | 3.0 | 39.2 | 1.0 | -51.9 | -13.0 | -38.9 | |
| 5.5506 | -7.4 | H | 3.0 | 40.0 | 1.0 | -46.4 | -13.0 | -33.4 | |
| 7.4008 | -5.6 | H | 3.0 | 39.2 | 1.0 | -43.8 | -13.0 | -30.8 | |
| Mid Ch, 1880.0MHz | | | | | | | | | |
| 3.7600 | -5.2 | V | 3.0 | 39.1 | 1.0 | -43.3 | -13.0 | -30.3 | |
| 5.6400 | -6.7 | V | 3.0 | 39.9 | 1.0 | -45.6 | -13.0 | -32.6 | |
| 7.5200 | -0.3 | V | 3.0 | 39.1 | 1.0 | -38.4 | -13.0 | -25.4 | |
| 3.7600 | -7.0 | H | 3.0 | 39.1 | 1.0 | -45.1 | -13.0 | -32.1 | |
| 5.6400 | -9.8 | H | 3.0 | 39.9 | 1.0 | -48.7 | -13.0 | -35.7 | |
| 7.5200 | 3.3 | H | 3.0 | 39.1 | 1.0 | -34.8 | -13.0 | -21.8 | |
| High Ch, 1909.8 MHz | | | | | | | | | |
| 3.8196 | -4.4 | V | 3.0 | 39.0 | 1.0 | -42.5 | -13.0 | -29.5 | |
| 5.7294 | -6.2 | V | 3.0 | 39.9 | 1.0 | -45.1 | -13.0 | -32.1 | |
| 7.6392 | 3.3 | V | 3.0 | 39.1 | 1.0 | -34.8 | -13.0 | -21.8 | |
| 3.8196 | -2.3 | H | 3.0 | 39.0 | 1.0 | -40.3 | -13.0 | -27.3 | |
| 5.7294 | -7.8 | H | 3.0 | 39.9 | 1.0 | -46.7 | -13.0 | -33.7 | |
| 7.6392 | 1.1 | H | 3.0 | 39.1 | 1.0 | -37.0 | -13.0 | -24.0 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

GSM

GSM1900
EGPRS

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone, Z Position
**Mode:** EGPRS 1900 MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 24 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1850.2MHz | | | | | | | | | |
| 3.7004 | -14.5 | V | 3.0 | 39.2 | 1.0 | -52.6 | -13.0 | -39.6 | |
| 5.5506 | -10.8 | V | 3.0 | 40.0 | 1.0 | -49.7 | -13.0 | -36.7 | |
| 7.4008 | -8.5 | V | 3.0 | 39.2 | 1.0 | -46.7 | -13.0 | -33.7 | |
| 3.7000 | -17.7 | H | 3.0 | 39.2 | 1.0 | -55.9 | -13.0 | -42.9 | |
| 5.5500 | -11.0 | H | 3.0 | 40.0 | 1.0 | -49.9 | -13.0 | -36.9 | |
| 7.4000 | -9.5 | H | 3.0 | 39.2 | 1.0 | -47.6 | -13.0 | -34.6 | |
| Mid Ch, 1880.0MHz | | | | | | | | | |
| 3.7600 | -8.8 | V | 3.0 | 39.1 | 1.0 | -46.9 | -13.0 | -33.9 | |
| 5.6400 | -10.8 | V | 3.0 | 39.9 | 1.0 | -49.7 | -13.0 | -36.7 | |
| 7.5200 | -4.3 | V | 3.0 | 39.1 | 1.0 | -42.4 | -13.0 | -29.4 | |
| 3.7600 | -11.6 | H | 3.0 | 39.1 | 1.0 | -49.7 | -13.0 | -36.7 | |
| 5.6400 | -14.0 | H | 3.0 | 39.9 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 7.5200 | -1.3 | H | 3.0 | 39.1 | 1.0 | -39.5 | -13.0 | -26.5 | |
| High Ch, 1909.8 MHz | | | | | | | | | |
| 3.8196 | -8.3 | V | 3.0 | 39.0 | 1.0 | -46.3 | -13.0 | -33.3 | |
| 5.7294 | -10.5 | V | 3.0 | 39.9 | 1.0 | -49.4 | -13.0 | -36.4 | |
| 7.6392 | -1.3 | V | 3.0 | 39.1 | 1.0 | -39.4 | -13.0 | -26.4 | |
| 3.8196 | -6.4 | H | 3.0 | 39.0 | 1.0 | -44.5 | -13.0 | -31.5 | |
| 5.7294 | -11.2 | H | 3.0 | 39.9 | 1.0 | -50.1 | -13.0 | -37.1 | |
| 7.6392 | -2.6 | H | 3.0 | 39.1 | 1.0 | -40.7 | -13.0 | -27.7 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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## WCDMA Band 5

WCDMA

Band 5
REL99

UL Korea, Ltd Suwon Laboratory
Above 1GHz High Frequency Substitution Measurement

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone / Y Position
**Mode:** Tx, REL99,850MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 22 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 826.40MHz | | | | | | | | | |
| 1.6520 | -20.5 | V | 3.0 | 40.2 | 1.0 | -59.7 | -13.0 | -46.7 | |
| 2.4790 | -19.7 | V | 3.0 | 40.1 | 1.0 | -58.8 | -13.0 | -45.8 | |
| 3.3056 | -22.1 | V | 3.0 | 39.6 | 1.0 | -60.7 | -13.0 | -47.7 | |
| 1.6520 | -18.5 | H | 3.0 | 40.2 | 1.0 | -57.7 | -13.0 | -44.7 | |
| 2.4790 | -20.2 | H | 3.0 | 40.1 | 1.0 | -59.3 | -13.0 | -46.3 | |
| 3.3056 | -22.6 | H | 3.0 | 39.6 | 1.0 | -61.2 | -13.0 | -48.2 | |
| Mid_Ch, 836.6MHz | | | | | | | | | |
| 1.6732 | -19.8 | V | 3.0 | 40.2 | 1.0 | -59.0 | -13.0 | -46.0 | |
| 2.5098 | -19.7 | V | 3.0 | 40.1 | 1.0 | -58.8 | -13.0 | -45.8 | |
| 3.3464 | -21.7 | V | 3.0 | 39.6 | 1.0 | -60.3 | -13.0 | -47.3 | |
| 1.6732 | -14.6 | H | 3.0 | 40.2 | 1.0 | -53.8 | -13.0 | -40.8 | |
| 2.5098 | -20.9 | H | 3.0 | 40.1 | 1.0 | -60.0 | -13.0 | -47.0 | |
| 3.3464 | -21.4 | H | 3.0 | 39.6 | 1.0 | -60.0 | -13.0 | -47.0 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.6932 | -18.0 | V | 3.0 | 40.2 | 1.0 | -57.2 | -13.0 | -44.2 | |
| 2.5390 | -19.9 | V | 3.0 | 40.1 | 1.0 | -59.0 | -13.0 | -46.0 | |
| 3.3860 | -21.3 | V | 3.0 | 39.5 | 1.0 | -59.9 | -13.0 | -46.9 | |
| 1.6932 | -15.9 | H | 3.0 | 40.2 | 1.0 | -55.1 | -13.0 | -42.1 | |
| 2.5390 | -20.7 | H | 3.0 | 40.1 | 1.0 | -59.7 | -13.0 | -46.7 | |
| 3.3860 | -22.0 | H | 3.0 | 39.5 | 1.0 | -60.5 | -13.0 | -47.5 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

WCDMA

Band 5
HSDPA

UL Korea, Ltd Suwon Laboratory
Above 1GHz High Frequency Substitution Measurement

**Company:** Samsung
**Project #:**
**Date:**
**Test Engineer:**
**Configuration:** EUT / AC Adapter / Earphone / X Position
**Mode:** Tx, HSDPA,850MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 826.40MHz | | | | | | | | | |
| 1.6520 | | V | 3.0 | 40.2 | 1.0 | -39.2 | -13.0 | -26.2 | |
| 2.4790 | | V | 3.0 | 40.1 | 1.0 | -39.1 | -13.0 | -26.1 | |
| 3.3056 | | V | 3.0 | 39.6 | 1.0 | -38.6 | -13.0 | -25.6 | |
| 1.6520 | | H | 3.0 | 40.2 | 1.0 | -39.2 | -13.0 | -26.2 | |
| 2.4790 | | H | 3.0 | 40.1 | 1.0 | -39.1 | -13.0 | -26.1 | |
| 3.3056 | | H | 3.0 | 39.6 | 1.0 | -38.6 | -13.0 | -25.6 | |
| Mid_Ch, 836.6MHz | | | | | | | | | |
| 1.6732 | | V | 3.0 | 40.2 | 1.0 | -39.2 | -13.0 | -26.2 | |
| 2.5098 | | V | 3.0 | 40.1 | 1.0 | -39.1 | -13.0 | -26.1 | |
| 3.3464 | | V | 3.0 | 39.6 | 1.0 | -38.6 | -13.0 | -25.6 | |
| 1.6732 | | H | 3.0 | 40.2 | 1.0 | -39.2 | -13.0 | -26.2 | |
| 2.5098 | | H | 3.0 | 40.1 | 1.0 | -39.1 | -13.0 | -26.1 | |
| 3.3464 | | H | 3.0 | 39.6 | 1.0 | -38.6 | -13.0 | -25.6 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.6932 | | V | 3.0 | 40.2 | 1.0 | -39.2 | -13.0 | -26.2 | |
| 2.5390 | | V | 3.0 | 40.1 | 1.0 | -39.1 | -13.0 | -26.1 | |
| 3.3860 | | V | 3.0 | 39.5 | 1.0 | -38.5 | -13.0 | -25.5 | |
| 1.6932 | | H | 3.0 | 40.2 | 1.0 | -39.2 | -13.0 | -26.2 | |
| 2.5390 | | H | 3.0 | 40.1 | 1.0 | -39.1 | -13.0 | -26.1 | |
| 3.3860 | | H | 3.0 | 39.5 | 1.0 | -38.5 | -13.0 | -25.5 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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## WCDMA Band 2

WCDMA

Band 2
REL99

UL Korea, Ltd Suwon Laboratory
Above 1GHz High Frequency Substitution Measurement

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone / Z Position
**Mode:** Tx, REL99,1900MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 24 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1852.4MHz | | | | | | | | | |
| 3.7048 | -16.3 | V | 3.0 | 39.2 | 1.0 | -54.5 | -13.0 | -41.5 | |
| 5.5572 | -11.8 | V | 3.0 | 40.0 | 1.0 | -50.8 | -13.0 | -37.8 | |
| 7.4096 | -9.6 | V | 3.0 | 39.2 | 1.0 | -47.8 | -13.0 | -34.8 | |
| 3.7048 | -9.4 | H | 3.0 | 39.2 | 1.0 | -47.5 | -13.0 | -34.5 | |
| 5.5572 | -11.1 | H | 3.0 | 40.0 | 1.0 | -50.1 | -13.0 | -37.1 | |
| 7.4096 | -9.5 | H | 3.0 | 39.2 | 1.0 | -47.7 | -13.0 | -34.7 | |
| Mid_Ch, 1880MHz | | | | | | | | | |
| 3.7600 | -13.0 | V | 3.0 | 39.1 | 1.0 | -51.1 | -13.0 | -38.1 | |
| 5.6400 | -13.0 | V | 3.0 | 39.9 | 1.0 | -51.9 | -13.0 | -38.9 | |
| 7.5200 | -9.1 | V | 3.0 | 39.1 | 1.0 | -47.2 | -13.0 | -34.2 | |
| 3.7600 | -2.8 | H | 3.0 | 39.1 | 1.0 | -40.9 | -13.0 | -27.9 | |
| 5.6400 | -11.8 | H | 3.0 | 39.9 | 1.0 | -50.7 | -13.0 | -37.7 | |
| 7.5200 | -8.4 | H | 3.0 | 39.1 | 1.0 | -46.6 | -13.0 | -33.6 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.8152 | -10.1 | V | 3.0 | 39.0 | 1.0 | -48.2 | -13.0 | -35.2 | |
| 5.7228 | -12.9 | V | 3.0 | 39.9 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 7.6304 | -9.0 | V | 3.0 | 39.1 | 1.0 | -47.2 | -13.0 | -34.2 | |
| 3.8152 | -1.3 | H | 3.0 | 39.0 | 1.0 | -39.3 | -13.0 | -26.3 | |
| 5.7228 | -12.2 | H | 3.0 | 39.9 | 1.0 | -51.1 | -13.0 | -38.1 | |
| 7.6304 | -7.9 | H | 3.0 | 39.1 | 1.0 | -46.0 | -13.0 | -33.0 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

WCDMA

Band 2
HSDPA

UL Korea, Ltd Suwon Laboratory
Above 1GHz High Frequency Substitution Measurement

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Earphone / Z Position
**Mode:** Tx, HSDPA,1900MHz

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | Part 24 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1852.4MHz | | | | | | | | | |
| 3.7048 | -17.3 | V | 3.0 | 39.2 | 1.0 | -55.5 | -13.0 | -42.5 | |
| 5.5572 | -13.3 | V | 3.0 | 40.0 | 1.0 | -52.2 | -13.0 | -39.2 | |
| 7.4096 | -10.6 | V | 3.0 | 39.2 | 1.0 | -48.8 | -13.0 | -35.8 | |
| 3.7048 | -11.2 | H | 3.0 | 39.2 | 1.0 | -49.3 | -13.0 | -36.3 | |
| 5.5572 | -12.5 | H | 3.0 | 40.0 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 7.4096 | -9.9 | H | 3.0 | 39.2 | 1.0 | -48.1 | -13.0 | -35.1 | |
| Mid_Ch, 1880MHz | | | | | | | | | |
| 3.7600 | -13.8 | V | 3.0 | 39.1 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 5.6400 | -13.9 | V | 3.0 | 39.9 | 1.0 | -52.8 | -13.0 | -39.8 | |
| 7.5200 | -10.6 | V | 3.0 | 39.1 | 1.0 | -48.8 | -13.0 | -35.8 | |
| 3.7600 | -3.9 | H | 3.0 | 39.1 | 1.0 | -42.0 | -13.0 | -29.0 | |
| 5.6400 | -13.2 | H | 3.0 | 39.9 | 1.0 | -52.1 | -13.0 | -39.1 | |
| 7.5200 | -9.4 | H | 3.0 | 39.1 | 1.0 | -47.5 | -13.0 | -34.5 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.8152 | -10.2 | V | 3.0 | 39.0 | 1.0 | -48.2 | -13.0 | -35.2 | |
| 5.7228 | -13.2 | V | 3.0 | 39.9 | 1.0 | -52.1 | -13.0 | -39.1 | |
| 7.6304 | -10.4 | V | 3.0 | 39.1 | 1.0 | -48.5 | -13.0 | -35.5 | |
| 3.8152 | -2.4 | H | 3.0 | 39.0 | 1.0 | -40.4 | -13.0 | -27.4 | |
| 5.7228 | -13.2 | H | 3.0 | 39.9 | 1.0 | -52.1 | -13.0 | -39.1 | |
| 7.6304 | -9.1 | H | 3.0 | 39.1 | 1.0 | -47.2 | -13.0 | -34.2 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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## LTE Band 41

LTE Band 41 20MHz QPSK

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 20MHz BW, QPSK

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2565 MHz) | | | | | | | | | |
| 5.1300 | -1.4 | V | 3.0 | 40.0 | 1.0 | -40.4 | -25.0 | -15.4 | |
| 7.6950 | 4.2 | V | 3.0 | 39.1 | 1.0 | -33.9 | -25.0 | -8.9 | |
| 10.2600 | -12.8 | V | 3.0 | 38.5 | 1.0 | -50.3 | -25.0 | -25.3 | |
| 5.1300 | 4.7 | H | 3.0 | 40.0 | 1.0 | -34.4 | -25.0 | -9.4 | |
| 7.6950 | 9.3 | H | 3.0 | 39.1 | 1.0 | -28.8 | -25.0 | -3.8 | |
| 10.2600 | -12.7 | H | 3.0 | 38.5 | 1.0 | -50.2 | -25.0 | -25.2 | |
| Mid_Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 0.7 | V | 3.0 | 40.1 | 1.0 | -38.4 | -25.0 | -13.4 | |
| 7.7790 | 7.2 | V | 3.0 | 39.1 | 1.0 | -30.8 | -25.0 | -5.8 | |
| 10.3720 | -12.6 | V | 3.0 | 38.6 | 1.0 | -50.2 | -25.0 | -25.2 | |
| 5.1860 | 5.1 | H | 3.0 | 40.1 | 1.0 | -34.0 | -25.0 | -9.0 | |
| 7.7790 | 9.9 | H | 3.0 | 39.1 | 1.0 | -28.2 | -25.0 | -3.2 | |
| 10.3720 | -11.4 | H | 3.0 | 38.6 | 1.0 | -49.0 | -25.0 | -24.0 | |
| High Ch, (2645 MHz) | | | | | | | | | |
| 5.2900 | 4.2 | V | 3.0 | 40.1 | 1.0 | -34.9 | -25.0 | -9.9 | |
| 7.9350 | 8.4 | V | 3.0 | 39.0 | 1.0 | -29.6 | -25.0 | -4.6 | |
| 10.5800 | -11.2 | V | 3.0 | 38.7 | 1.0 | -49.0 | -25.0 | -24.0 | |
| 5.2900 | 6.9 | H | 3.0 | 40.1 | 1.0 | -32.2 | -25.0 | -7.2 | |
| 7.9350 | 8.6 | H | 3.0 | 39.0 | 1.0 | -29.4 | -25.0 | -4.4 | |
| 10.5800 | -12.4 | H | 3.0 | 38.7 | 1.0 | -50.1 | -25.0 | -25.1 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

LTE Band 41 20MHz 16QAM

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 20MHz BW,16QAM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2565 MHz) | | | | | | | | | |
| 5.1300 | -2.3 | V | 3.0 | 40.0 | 1.0 | -41.3 | -25.0 | -16.3 | |
| 7.6950 | 3.3 | V | 3.0 | 39.1 | 1.0 | -34.8 | -25.0 | -9.8 | |
| 10.2600 | -13.0 | V | 3.0 | 38.5 | 1.0 | -50.5 | -25.0 | -25.5 | |
| 5.1300 | 3.5 | H | 3.0 | 40.0 | 1.0 | -35.6 | -25.0 | -10.6 | |
| 7.6950 | 8.6 | H | 3.0 | 39.1 | 1.0 | -29.5 | -25.0 | -4.5 | |
| 10.2600 | -12.5 | H | 3.0 | 38.5 | 1.0 | -50.0 | -25.0 | -25.0 | |
| Mid_Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 1.7 | V | 3.0 | 40.1 | 1.0 | -37.4 | -25.0 | -12.4 | |
| 7.7790 | 6.3 | V | 3.0 | 39.1 | 1.0 | -31.7 | -25.0 | -6.7 | |
| 10.3720 | -13.4 | V | 3.0 | 38.6 | 1.0 | -51.0 | -25.0 | -26.0 | |
| 5.1860 | 4.5 | H | 3.0 | 40.1 | 1.0 | -34.6 | -25.0 | -9.6 | |
| 7.7790 | 9.3 | H | 3.0 | 39.1 | 1.0 | -28.8 | -25.0 | -3.8 | |
| 10.3720 | -12.5 | H | 3.0 | 38.6 | 1.0 | -50.0 | -25.0 | -25.0 | |
| High Ch, (2645 MHz) | | | | | | | | | |
| 5.2900 | 2.6 | V | 3.0 | 40.1 | 1.0 | -36.5 | -25.0 | -11.5 | |
| 7.9350 | 7.6 | V | 3.0 | 39.0 | 1.0 | -30.4 | -25.0 | -5.4 | |
| 10.5800 | -12.0 | V | 3.0 | 38.7 | 1.0 | -49.7 | -25.0 | -24.7 | |
| 5.2900 | 5.4 | H | 3.0 | 40.1 | 1.0 | -33.7 | -25.0 | -8.7 | |
| 7.9350 | 7.8 | H | 3.0 | 39.0 | 1.0 | -30.2 | -25.0 | -5.2 | |
| 10.5800 | -13.4 | H | 3.0 | 38.7 | 1.0 | -51.1 | -25.0 | -26.1 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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LTE
Band 41
15MHz
QPSK

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 15MHz BW,QPSK

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2562.5 MHz) | | | | | | | | | |
| 5.1250 | 0.9 | V | 3.0 | 40.0 | 1.0 | -38.2 | -25.0 | -13.2 | |
| 7.6875 | 6.2 | V | 3.0 | 39.1 | 1.0 | -31.9 | -25.0 | -6.9 | |
| 10.2500 | -12.5 | V | 3.0 | 38.5 | 1.0 | -50.0 | -25.0 | -25.0 | |
| 5.1250 | 6.5 | H | 3.0 | 40.0 | 1.0 | -32.5 | -25.0 | -7.5 | |
| 7.6875 | 9.8 | H | 3.0 | 39.1 | 1.0 | -28.2 | -25.0 | -3.2 | |
| 10.2500 | -11.1 | H | 3.0 | 38.5 | 1.0 | -48.5 | -25.0 | -23.5 | |
| Mid_Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 3.5 | V | 3.0 | 40.1 | 1.0 | -35.6 | -25.0 | -10.6 | |
| 7.7790 | 8.4 | V | 3.0 | 39.1 | 1.0 | -29.6 | -25.0 | -4.6 | |
| 10.3720 | -12.1 | V | 3.0 | 38.6 | 1.0 | -49.7 | -25.0 | -24.7 | |
| 5.1860 | 6.6 | H | 3.0 | 40.1 | 1.0 | -32.5 | -25.0 | -7.5 | |
| 7.7790 | 9.4 | H | 3.0 | 39.1 | 1.0 | -28.6 | -25.0 | -3.6 | |
| 10.3720 | -12.0 | H | 3.0 | 38.6 | 1.0 | -49.6 | -25.0 | -24.6 | |
| High Ch, (2647.5 MHz) | | | | | | | | | |
| 5.2950 | 5.1 | V | 3.0 | 40.1 | 1.0 | -34.0 | -25.0 | -9.0 | |
| 7.9425 | 8.7 | V | 3.0 | 39.0 | 1.0 | -29.3 | -25.0 | -4.3 | |
| 10.5900 | -12.2 | V | 3.0 | 38.7 | 1.0 | -50.0 | -25.0 | -25.0 | |
| 5.2950 | 6.3 | H | 3.0 | 40.1 | 1.0 | -32.8 | -25.0 | -7.8 | |
| 7.9425 | 8.8 | H | 3.0 | 39.0 | 1.0 | -29.2 | -25.0 | -4.2 | |
| 10.5900 | -13.0 | H | 3.0 | 38.7 | 1.0 | -50.7 | -25.0 | -25.7 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

LTE
Band 41
15MHz
16QAM

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 15MHz BW,16QAM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2562.5 MHz) | | | | | | | | | |
| 5.1250 | -0.1 | V | 3.0 | 40.0 | 1.0 | -39.2 | -25.0 | -14.2 | |
| 7.6875 | 4.9 | V | 3.0 | 39.1 | 1.0 | -33.2 | -25.0 | -8.2 | |
| 10.2500 | -13.1 | V | 3.0 | 38.5 | 1.0 | -50.6 | -25.0 | -25.6 | |
| 5.1250 | 5.8 | H | 3.0 | 40.0 | 1.0 | -33.2 | -25.0 | -8.2 | |
| 7.6875 | 9.1 | H | 3.0 | 39.1 | 1.0 | -29.0 | -25.0 | -4.0 | |
| 10.2500 | -11.1 | H | 3.0 | 38.5 | 1.0 | -48.5 | -25.0 | -23.5 | |
| Mid_Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 3.0 | V | 3.0 | 40.1 | 1.0 | -36.1 | -25.0 | -11.1 | |
| 7.7790 | 7.4 | V | 3.0 | 39.1 | 1.0 | -30.7 | -25.0 | -5.7 | |
| 10.3720 | -12.8 | V | 3.0 | 38.6 | 1.0 | -50.4 | -25.0 | -25.4 | |
| 5.1860 | 5.4 | H | 3.0 | 40.1 | 1.0 | -33.7 | -25.0 | -8.7 | |
| 7.7790 | 9.1 | H | 3.0 | 39.1 | 1.0 | -28.9 | -25.0 | -3.9 | |
| 10.3720 | -12.4 | H | 3.0 | 38.6 | 1.0 | -50.0 | -25.0 | -25.0 | |
| High Ch, (2647.5 MHz) | | | | | | | | | |
| 5.2950 | 4.3 | V | 3.0 | 40.1 | 1.0 | -34.8 | -25.0 | -9.8 | |
| 7.9425 | 7.8 | V | 3.0 | 39.0 | 1.0 | -30.2 | -25.0 | -5.2 | |
| 10.5900 | -12.6 | V | 3.0 | 38.7 | 1.0 | -50.3 | -25.0 | -25.3 | |
| 5.2950 | 5.4 | H | 3.0 | 40.1 | 1.0 | -33.7 | -25.0 | -8.7 | |
| 7.9425 | 8.1 | H | 3.0 | 39.0 | 1.0 | -29.9 | -25.0 | -4.9 | |
| 10.5900 | -13.4 | H | 3.0 | 38.7 | 1.0 | -51.1 | -25.0 | -26.1 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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LTE
Band 41
10MHz
QPSK

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 10MHz BW, QPSK

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2560 MHz) | | | | | | | | | |
| 5.1200 | -2.4 | V | 3.0 | 40.0 | 1.0 | -41.4 | -25.0 | -16.4 | |
| 7.6800 | 4.1 | V | 3.0 | 39.1 | 1.0 | -34.0 | -25.0 | -9.0 | |
| 10.2400 | -12.5 | V | 3.0 | 38.5 | 1.0 | -50.0 | -25.0 | -25.0 | |
| 5.1200 | 4.0 | H | 3.0 | 40.0 | 1.0 | -35.1 | -25.0 | -10.1 | |
| 7.6800 | 9.3 | H | 3.0 | 39.1 | 1.0 | -28.8 | -25.0 | -3.8 | |
| 10.2400 | -12.3 | H | 3.0 | 38.5 | 1.0 | -49.8 | -25.0 | -24.8 | |
| Mid_Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 1.3 | V | 3.0 | 40.1 | 1.0 | -37.8 | -25.0 | -12.8 | |
| 7.7790 | 7.2 | V | 3.0 | 39.1 | 1.0 | -30.8 | -25.0 | -5.8 | |
| 10.3720 | -11.6 | V | 3.0 | 38.6 | 1.0 | -49.2 | -25.0 | -24.2 | |
| 5.1860 | 3.2 | H | 3.0 | 40.1 | 1.0 | -35.9 | -25.0 | -10.9 | |
| 7.7790 | 7.1 | H | 3.0 | 39.1 | 1.0 | -30.9 | -25.0 | -5.9 | |
| 10.3720 | -11.4 | H | 3.0 | 38.6 | 1.0 | -49.0 | -25.0 | -24.0 | |
| High Ch, (2650 MHz) | | | | | | | | | |
| 5.3000 | 3.8 | V | 3.0 | 40.1 | 1.0 | -35.2 | -25.0 | -10.2 | |
| 7.9500 | 7.6 | V | 3.0 | 39.0 | 1.0 | -30.4 | -25.0 | -5.4 | |
| 10.6000 | -12.1 | V | 3.0 | 38.7 | 1.0 | -49.8 | -25.0 | -24.8 | |
| 5.3000 | 5.7 | H | 3.0 | 40.1 | 1.0 | -33.4 | -25.0 | -8.4 | |
| 7.9500 | 9.3 | H | 3.0 | 39.0 | 1.0 | -28.7 | -25.0 | -3.7 | |
| 10.6000 | -12.1 | H | 3.0 | 38.7 | 1.0 | -49.8 | -25.0 | -24.8 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

LTE
Band 41
10MHz
16QAM

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 10MHz BW,16QAM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2560 MHz) | | | | | | | | | |
| 5.1200 | -3.0 | V | 3.0 | 40.0 | 1.0 | -42.1 | -25.0 | -17.1 | |
| 7.6800 | 3.3 | V | 3.0 | 39.1 | 1.0 | -34.8 | -25.0 | -9.8 | |
| 10.2400 | -12.9 | V | 3.0 | 38.5 | 1.0 | -50.3 | -25.0 | -25.3 | |
| 5.1200 | 3.5 | H | 3.0 | 40.0 | 1.0 | -35.6 | -25.0 | -10.6 | |
| 7.6800 | 8.2 | H | 3.0 | 39.1 | 1.0 | -29.8 | -25.0 | -4.8 | |
| 10.2400 | -12.6 | H | 3.0 | 38.5 | 1.0 | -50.1 | -25.0 | -25.1 | |
| Mid_Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 0.4 | V | 3.0 | 40.1 | 1.0 | -38.7 | -25.0 | -13.7 | |
| 7.7790 | 6.1 | V | 3.0 | 39.1 | 1.0 | -31.9 | -25.0 | -6.9 | |
| 10.3720 | -12.9 | V | 3.0 | 38.6 | 1.0 | -50.5 | -25.0 | -25.5 | |
| 5.1860 | 2.7 | H | 3.0 | 40.1 | 1.0 | -36.4 | -25.0 | -11.4 | |
| 7.7790 | 6.4 | H | 3.0 | 39.1 | 1.0 | -31.6 | -25.0 | -6.6 | |
| 10.3720 | -12.7 | H | 3.0 | 38.6 | 1.0 | -50.3 | -25.0 | -25.3 | |
| High Ch, (2650 MHz) | | | | | | | | | |
| 5.3000 | 3.1 | V | 3.0 | 40.1 | 1.0 | -36.0 | -25.0 | -11.0 | |
| 7.9500 | 6.3 | V | 3.0 | 39.0 | 1.0 | -31.7 | -25.0 | -6.7 | |
| 10.6000 | -12.2 | V | 3.0 | 38.7 | 1.0 | -50.0 | -25.0 | -25.0 | |
| 5.3000 | 5.0 | H | 3.0 | 40.1 | 1.0 | -34.1 | -25.0 | -9.1 | |
| 7.9500 | 8.8 | H | 3.0 | 39.0 | 1.0 | -29.2 | -25.0 | -4.2 | |
| 10.6000 | -13.3 | H | 3.0 | 38.7 | 1.0 | -51.0 | -25.0 | -26.0 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
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LTE
Band 41
5MHz
QPSK

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 5MHz BW, QPSK

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2552.5 MHz) | | | | | | | | | |
| 5.1050 | -0.1 | V | 3.0 | 40.0 | 1.0 | -39.1 | -25.0 | -14.1 | |
| 7.6575 | 5.2 | V | 3.0 | 39.1 | 1.0 | -32.9 | -25.0 | -7.9 | |
| 10.2100 | -11.9 | V | 3.0 | 38.4 | 1.0 | -49.4 | -25.0 | -24.4 | |
| 5.1050 | 5.7 | H | 3.0 | 40.0 | 1.0 | -33.3 | -25.0 | -8.3 | |
| 7.6575 | 9.6 | H | 3.0 | 39.1 | 1.0 | -28.5 | -25.0 | -3.5 | |
| 10.2100 | -10.9 | H | 3.0 | 38.4 | 1.0 | -48.4 | -25.0 | -23.4 | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 3.7 | V | 3.0 | 40.1 | 1.0 | -35.4 | -25.0 | -10.4 | |
| 7.7790 | 8.4 | V | 3.0 | 39.1 | 1.0 | -29.6 | -25.0 | -4.6 | |
| 10.3720 | 9.4 | V | 3.0 | 38.6 | 1.0 | -28.2 | -25.0 | -3.2 | |
| 5.1860 | 6.4 | H | 3.0 | 40.1 | 1.0 | -32.7 | -25.0 | -7.7 | |
| 7.7790 | 8.4 | H | 3.0 | 39.1 | 1.0 | -29.6 | -25.0 | -4.6 | |
| 10.3720 | -14.5 | H | 3.0 | 38.6 | 1.0 | -52.0 | -25.0 | -27.0 | |
| High Ch, (2652.5 MHz) | | | | | | | | | |
| 5.3050 | 5.1 | V | 3.0 | 40.1 | 1.0 | -34.0 | -25.0 | -9.0 | |
| 7.9575 | 8.0 | V | 3.0 | 39.0 | 1.0 | -29.9 | -25.0 | -4.9 | |
| 10.6100 | -11.3 | V | 3.0 | 38.7 | 1.0 | -49.1 | -25.0 | -24.1 | |
| 5.3050 | 5.0 | H | 3.0 | 40.1 | 1.0 | -34.1 | -25.0 | -9.1 | |
| 7.9575 | 9.5 | H | 3.0 | 39.0 | 1.0 | -28.5 | -25.0 | -3.5 | |
| 10.6100 | -13.9 | H | 3.0 | 38.7 | 1.0 | -51.6 | -25.0 | -26.6 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

LTE
Band 41
5MHz
16QAM

**UL Korea, Ltd Suwon Laboratory**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 15K20542
**Date:** 05-10-15
**Test Engineer:** Steven.Kim
**Configuration:** EUT / AC Adapter / Ear Phone / Y Position
**Mode:** TX, LTE BAND 41, 5MHz BW,16QAM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| Chamber 1 | AFS42 | Filter 1 | FCC Part 27 |

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | ERP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2552.5 MHz) | | | | | | | | | |
| 5.1050 | -1.0 | V | 3.0 | 40.0 | 1.0 | -40.0 | -25.0 | -15.0 | |
| 7.6575 | 3.7 | V | 3.0 | 39.1 | 1.0 | -34.4 | -25.0 | -9.4 | |
| 10.2100 | -12.9 | V | 3.0 | 38.4 | 1.0 | -50.3 | -25.0 | -25.3 | |
| 5.1050 | 4.3 | H | 3.0 | 40.0 | 1.0 | -34.7 | -25.0 | -9.7 | |
| 7.6575 | 9.4 | H | 3.0 | 39.1 | 1.0 | -28.7 | -25.0 | -3.7 | |
| 10.2100 | -12.3 | H | 3.0 | 38.4 | 1.0 | -49.7 | -25.0 | -24.7 | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.1860 | 3.0 | V | 3.0 | 40.1 | 1.0 | -36.1 | -25.0 | -11.1 | |
| 7.7790 | 6.7 | V | 3.0 | 39.1 | 1.0 | -31.4 | -25.0 | -6.4 | |
| 10.3720 | -12.6 | V | 3.0 | 38.6 | 1.0 | -50.2 | -25.0 | -25.2 | |
| 5.1860 | 5.3 | H | 3.0 | 40.1 | 1.0 | -33.8 | -25.0 | -8.8 | |
| 7.7790 | 7.3 | H | 3.0 | 39.1 | 1.0 | -30.8 | -25.0 | -5.8 | |
| 10.3720 | -15.4 | H | 3.0 | 38.6 | 1.0 | -53.0 | -25.0 | -28.0 | |
| High Ch, (2652.5 MHz) | | | | | | | | | |
| 5.3050 | 4.2 | V | 3.0 | 40.1 | 1.0 | -34.9 | -25.0 | -9.9 | |
| 7.9575 | 7.4 | V | 3.0 | 39.0 | 1.0 | -30.6 | -25.0 | -5.6 | |
| 10.6100 | -12.5 | V | 3.0 | 38.7 | 1.0 | -50.2 | -25.0 | -25.2 | |
| 5.3050 | 6.3 | H | 3.0 | 40.1 | 1.0 | -32.7 | -25.0 | -7.7 | |
| 7.9575 | 8.4 | H | 3.0 | 39.0 | 1.0 | -29.6 | -25.0 | -4.6 | |
| 10.6100 | -14.1 | H | 3.0 | 38.7 | 1.0 | -51.8 | -25.0 | -26.8 | |

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.


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