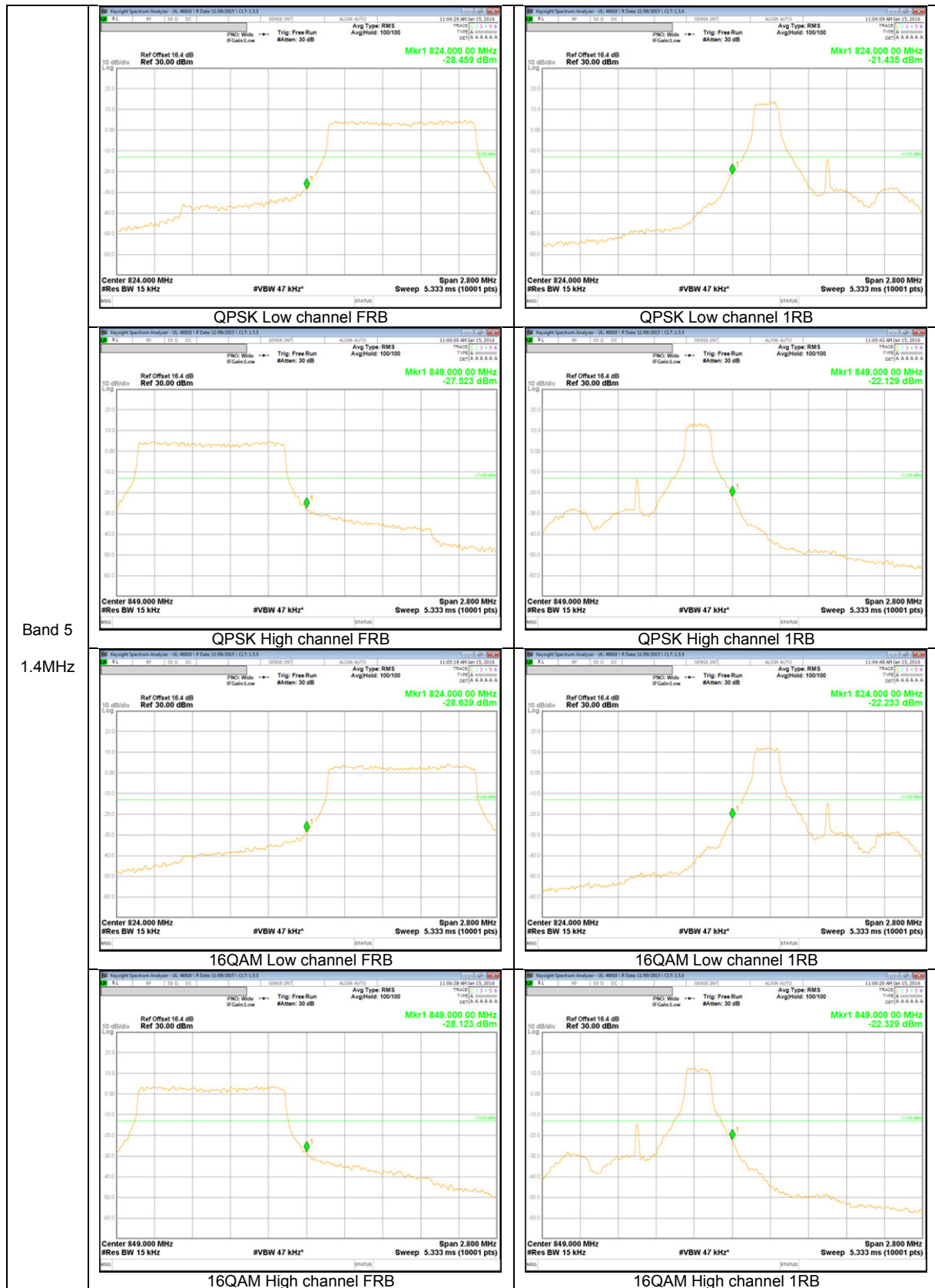


Band 5  
3MHz



### 10.3 OUT OF BAND EMISSIONS

#### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27. 53

#### 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

##### WCDMA

| Band   | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] | Margin [dB] |       |
|--------|-------|---------|----------------|-------------|-------------|-------|
| Band 5 | REL99 | 826.4   | -33.23         | -13.00      | 20.23       |       |
|        |       | 836.6   | -32.82         |             | 19.82       |       |
|        |       | 846.6   | -33.15         |             | 20.15       |       |
|        | HSDPA | 826.4   | -33.38         |             | 20.38       |       |
|        |       | 836.6   | -33.37         |             | 20.37       |       |
|        |       | 846.6   | -33.38         |             | 20.38       |       |
| Band 2 | REL99 | 1852.4  | -32.76         |             | -13.00      | 19.76 |
|        |       | 1880.0  | -33.14         |             |             | 20.14 |
|        |       | 1907.6  | -31.86         |             |             | 18.86 |
|        | HSDPA | 1852.4  | -32.63         | 19.63       |             |       |
|        |       | 1880.0  | -32.73         | 19.73       |             |       |
|        |       | 1907.6  | -32.47         | 19.47       |             |       |

**LTE 17**

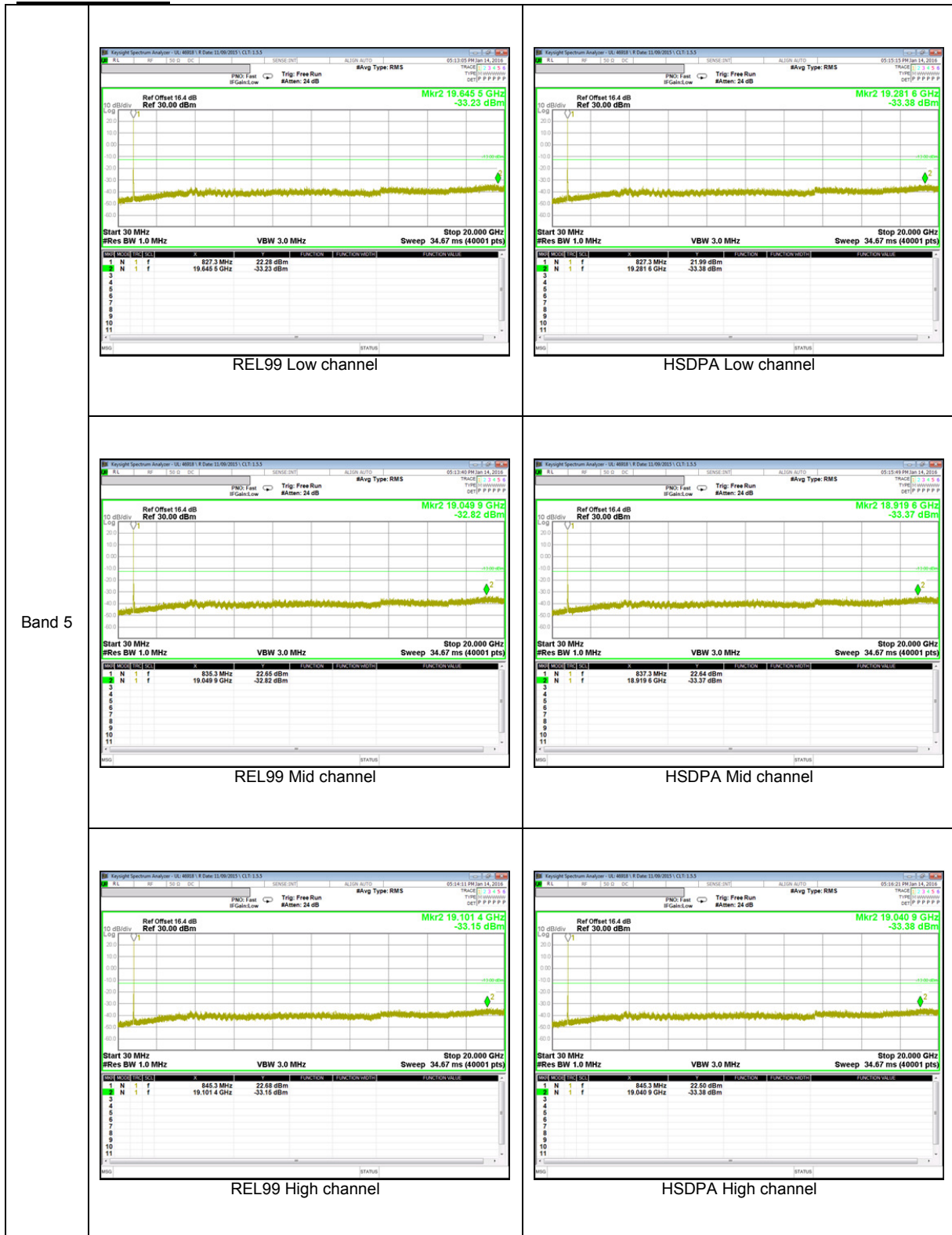
| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] | Margin [dB] |
|-----------|-------|---------|----------------|-------------|-------------|
| 10 MHz    | QPSK  | 709.0   | -28.16         | -13.00      | 15.16       |
|           |       | 710.0   | -27.10         |             | 14.1        |
|           |       | 711.0   | -27.67         |             | 14.67       |
|           | 16QAM | 709.0   | -27.29         |             | 14.29       |
|           |       | 710.0   | -27.25         |             | 14.25       |
|           |       | 711.0   | -27.18         |             | 14.18       |
| 5 MHz     | QPSK  | 706.5   | -26.76         |             | 13.76       |
|           |       | 710.0   | -26.48         |             | 13.48       |
|           |       | 713.5   | -27.35         |             | 14.35       |
|           | 16QAM | 706.5   | -27.27         | 14.27       |             |
|           |       | 710.0   | -27.01         | 14.01       |             |
|           |       | 713.5   | -26.68         | 13.68       |             |

**LTE 5**

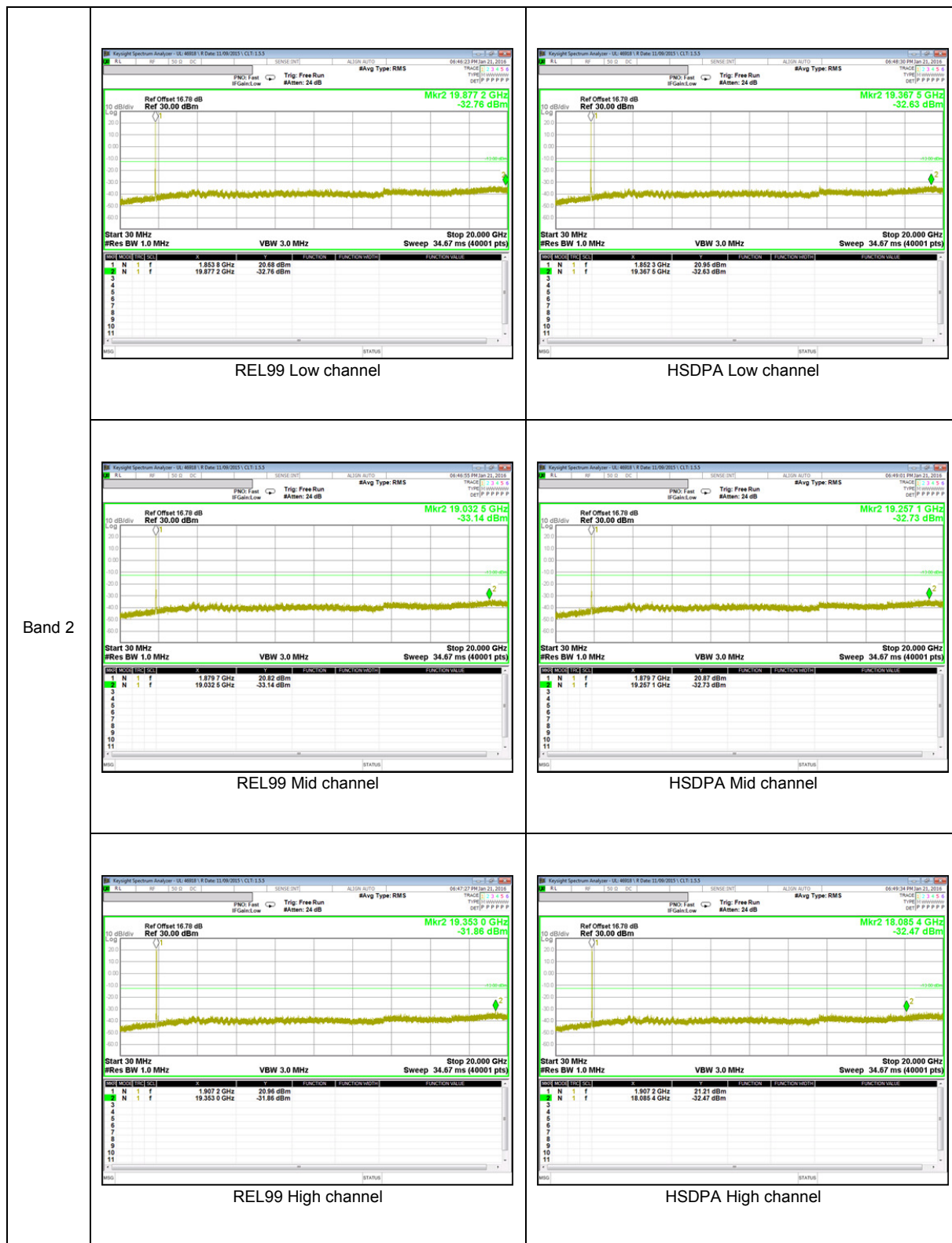
| Bandwidth | Mode  | f [MHz] | Spurious [dBm] | Limit [dBm] | Margin [dB] |
|-----------|-------|---------|----------------|-------------|-------------|
| 10 MHz    | QPSK  | 829.0   | -26.72         | -13.00      | 13.72       |
|           |       | 836.5   | -27.71         |             | 14.71       |
|           |       | 844.0   | -26.80         |             | 13.8        |
|           | 16QAM | 829.0   | -26.71         |             | 13.71       |
|           |       | 836.5   | -26.50         |             | 13.5        |
|           |       | 844.0   | -27.09         |             | 14.09       |
| 5 MHz     | QPSK  | 826.5   | -26.86         |             | 13.86       |
|           |       | 836.5   | -27.75         |             | 14.75       |
|           |       | 846.5   | -27.01         |             | 14.01       |
|           | 16QAM | 826.5   | -27.10         |             | 14.1        |
|           |       | 836.5   | -26.50         |             | 13.5        |
|           |       | 846.5   | -26.93         |             | 13.93       |
| 3 MHz     | QPSK  | 825.5   | -26.41         |             | 13.41       |
|           |       | 836.5   | -26.37         |             | 13.37       |
|           |       | 847.5   | -27.51         |             | 14.51       |
|           | 16QAM | 825.5   | -27.15         |             | 14.15       |
|           |       | 836.5   | -25.83         |             | 12.83       |
|           |       | 847.5   | -27.62         |             | 14.62       |
| 1.4 MHz   | QPSK  | 824.7   | -27.78         | 14.78       |             |
|           |       | 836.5   | -27.60         | 14.6        |             |
|           |       | 848.3   | -26.86         | 13.86       |             |
|           | 16QAM | 824.7   | -27.23         | 14.23       |             |
|           |       | 836.5   | -28.11         | 15.11       |             |
|           |       | 848.3   | -27.29         | 14.29       |             |

### 10.3.2. OUT OF BAND EMISSIONS PLOTS

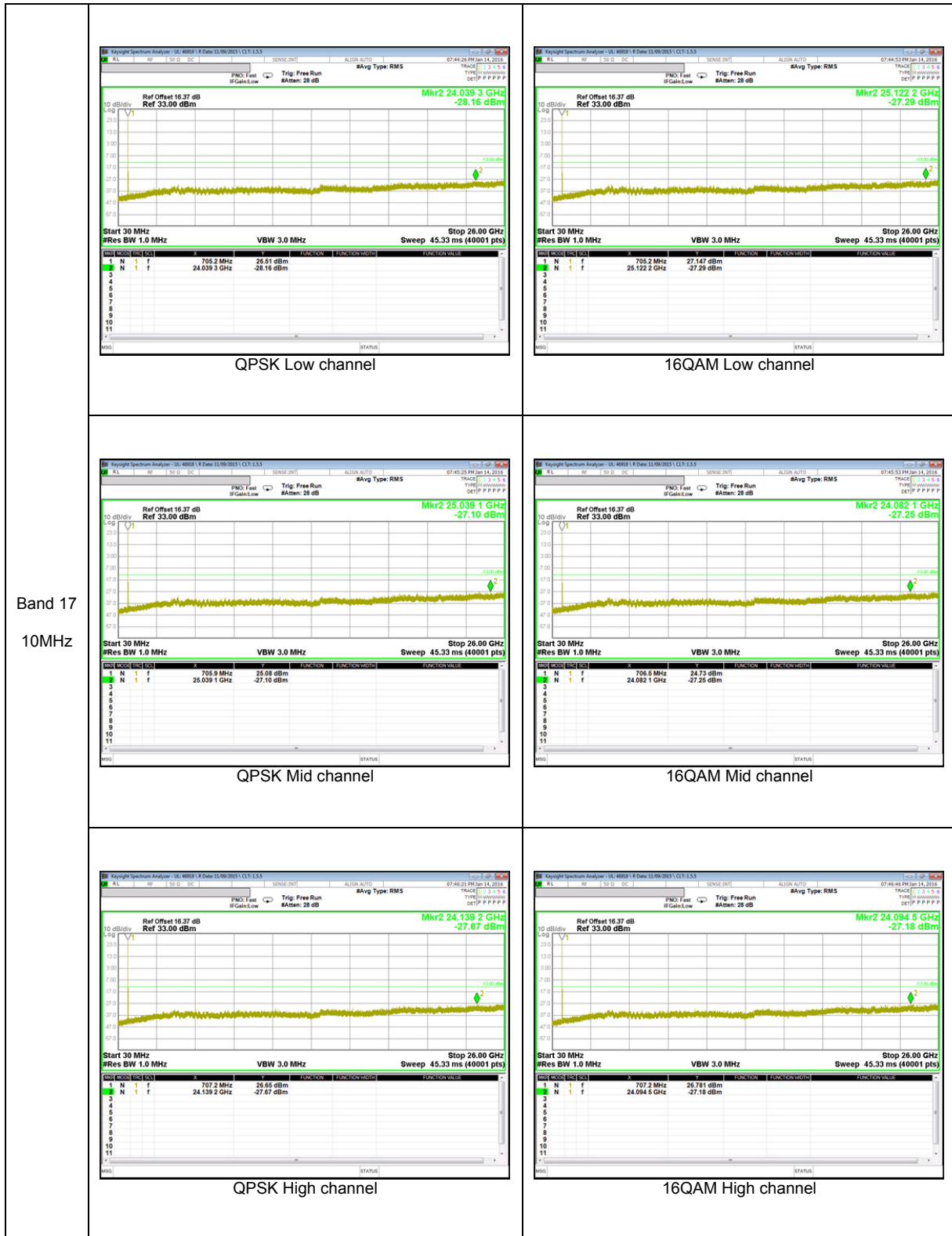
#### WCDMA Band 5



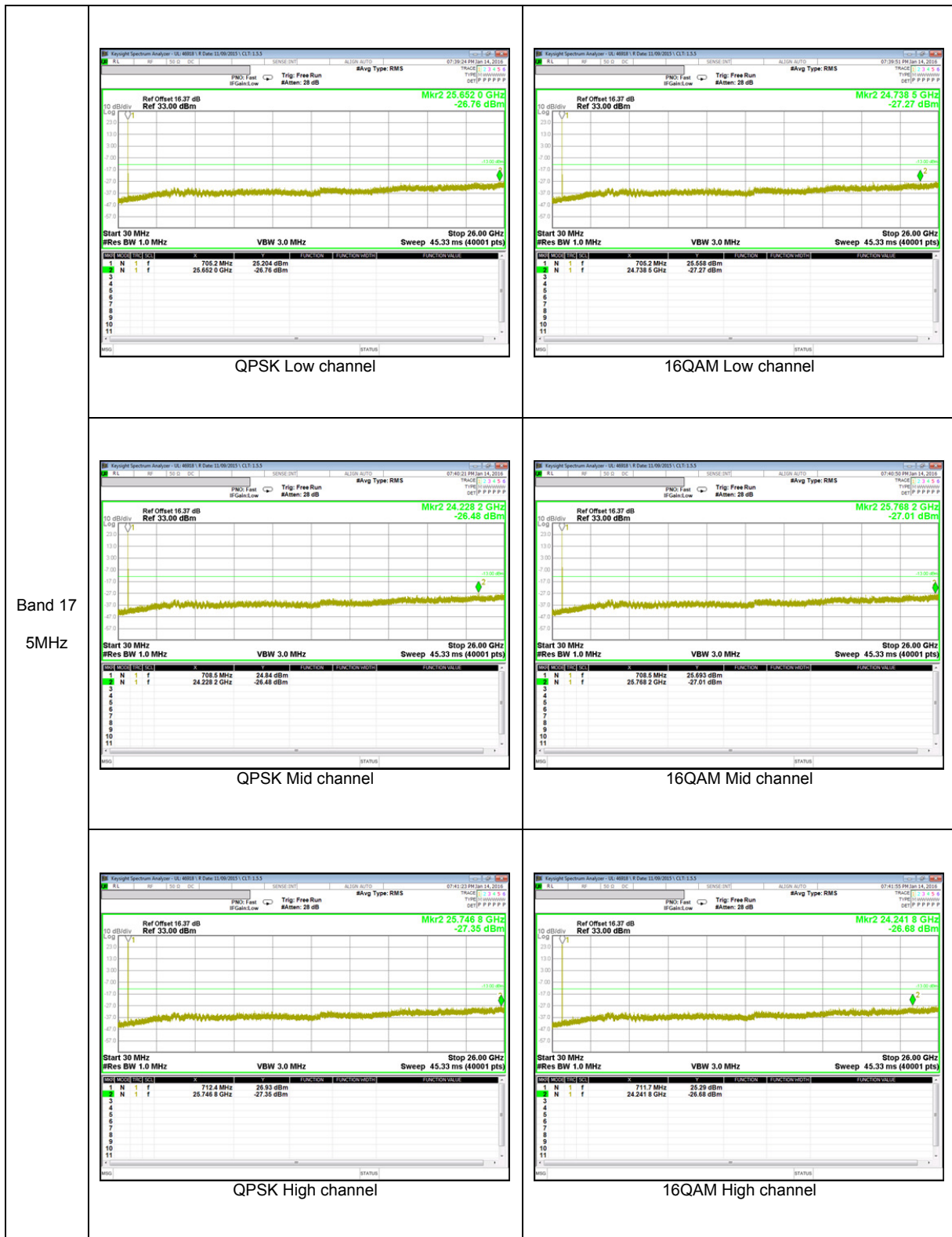
**WCDMA Band 2**



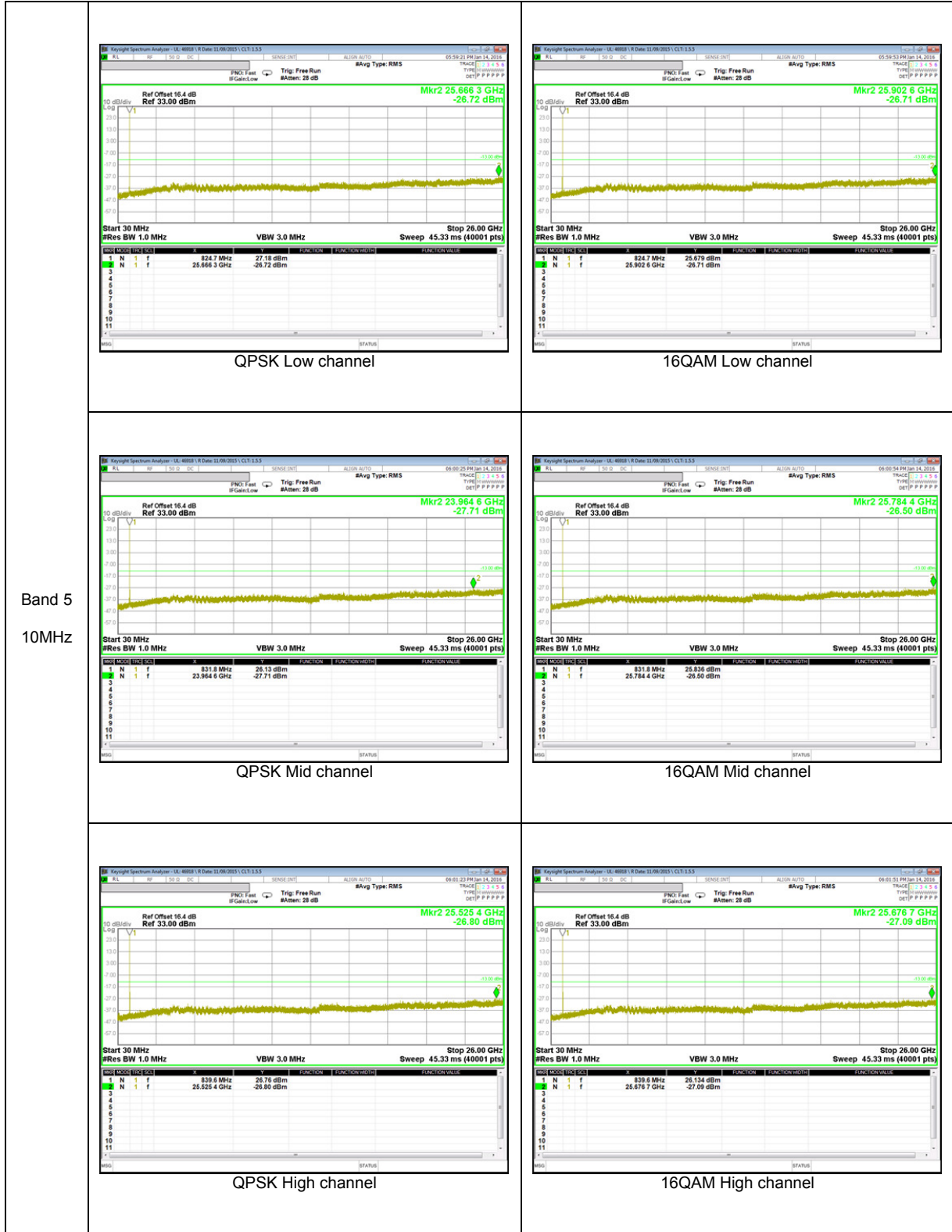
**LTE Band 17**

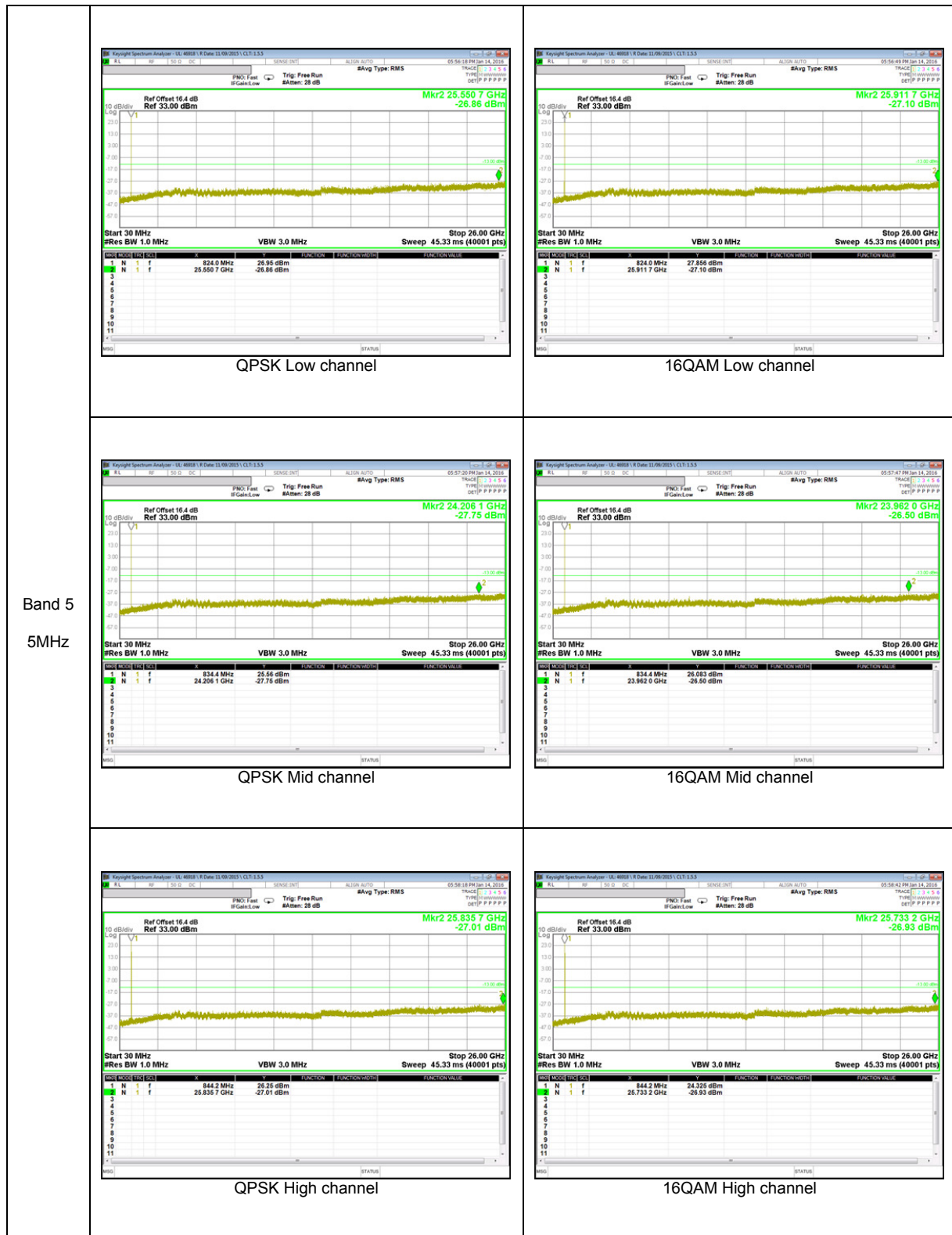


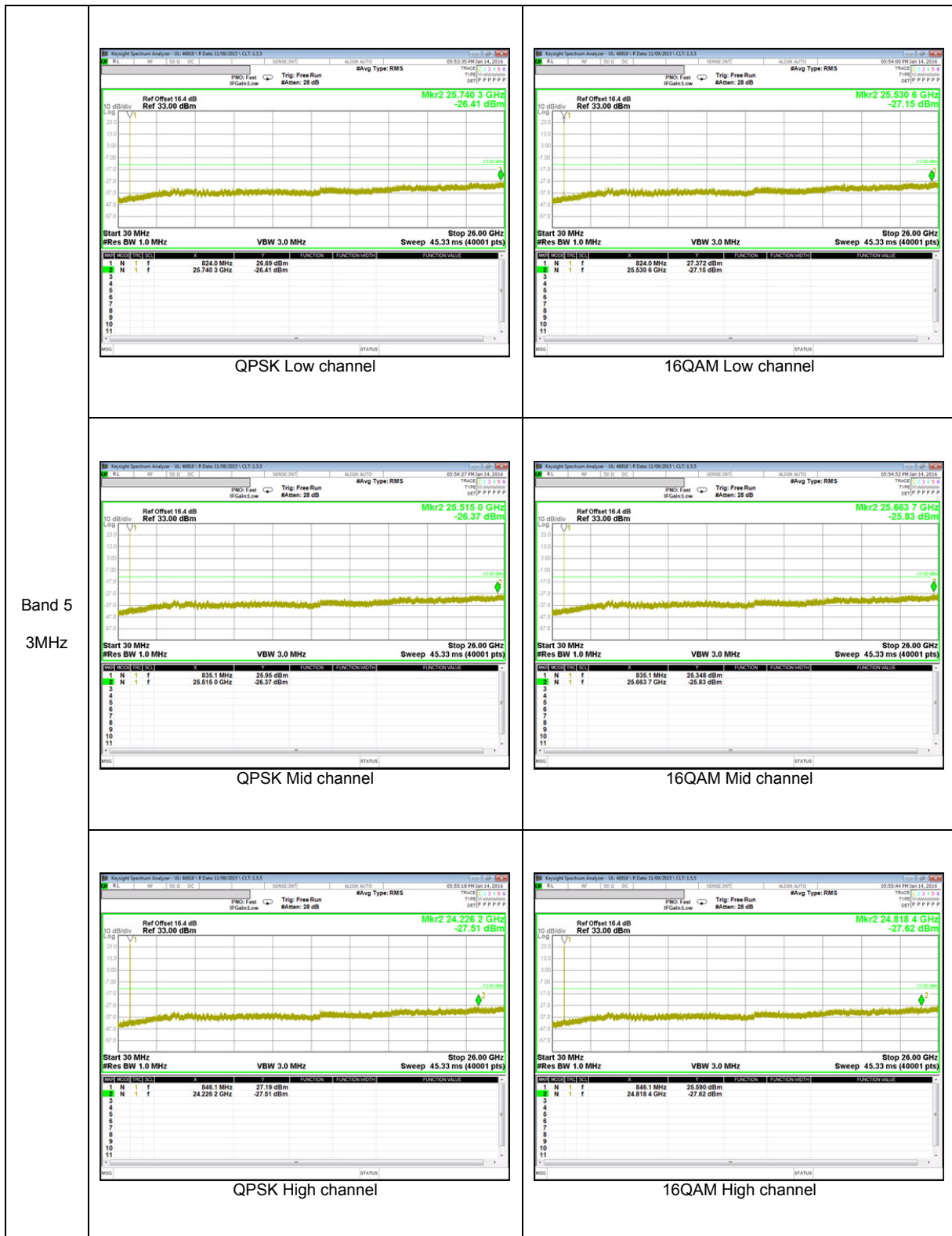
Band 17  
 10MHz

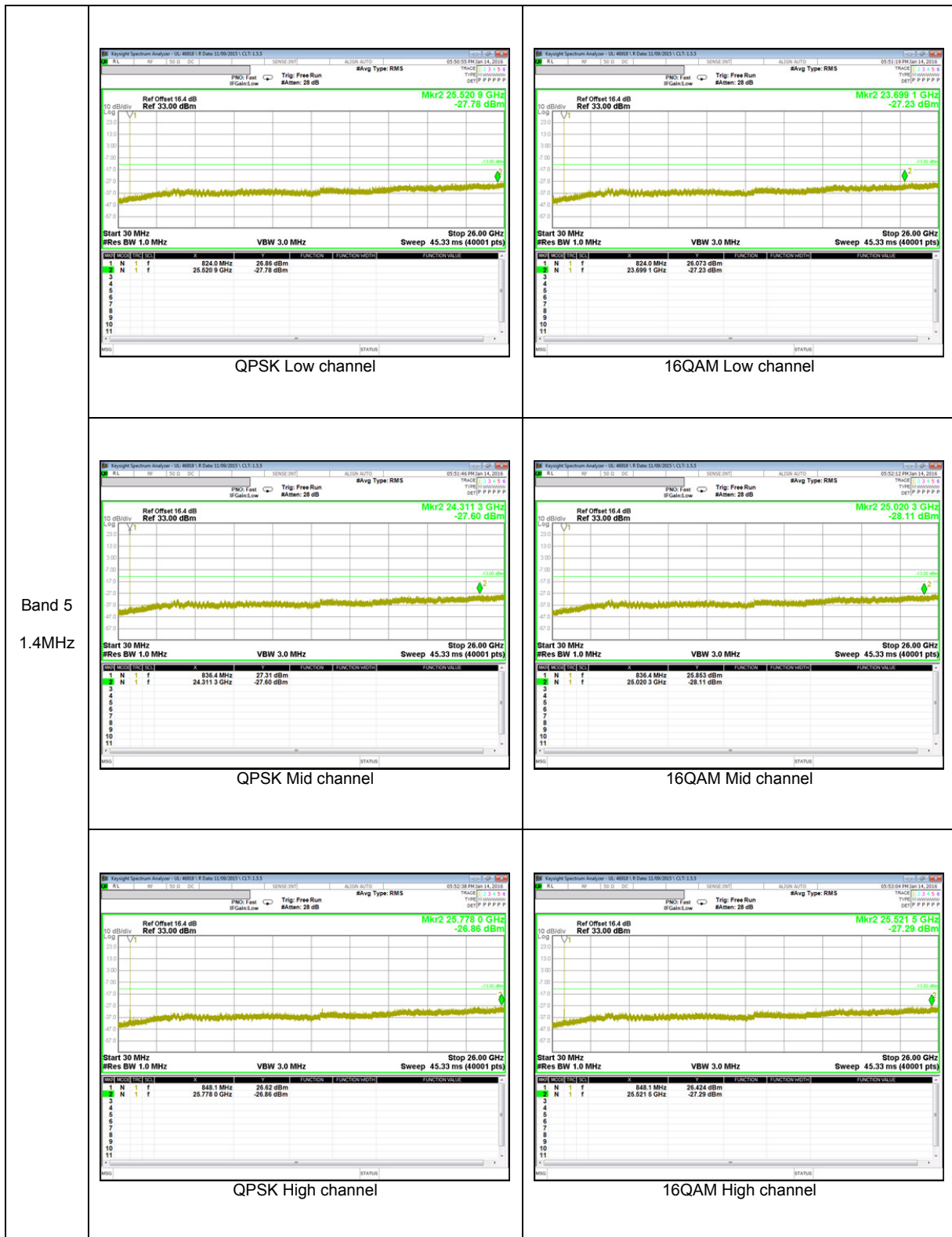


**LTE Band 5**









## **10.4. FREQUENCY STABILITY**

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

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

### **LIMITS**

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

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

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

### **TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v02r02

### **RESULTS**

See the following pages.

### 10.4.1. FREQUENCY STABILITY RESULTS

#### LTE Band 17, Channel 23790, Frequency 710.0 MHz

| Reference Frequency: LTE Band 17 Mid Channel 710.0 MHz @ 20°C |                              |   |             |             |
|---|------------------------------|---|-------------|-------------|
| Limit: +/- 2.5 ppm = 1775.000 Hz                              |                              |   |             |             |
| Power Supply [Vdc]  | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|   |                              | [MHz]   | Delta [ppm] | Limit [ppm] |
| 7.60  | 50                           | 710.00000791                                  | -0.003      | 2.5         |
| 7.60  | 40                           | 710.00000824                                  | -0.003      | 2.5         |
| 7.60  | 30                           | 709.99999130                                  | 0.021       | 2.5         |
| <b>7.60</b>   | <b>20</b>                    | 710.00000609                                  | <b>0</b>    | <b>2.5</b>  |
| 7.60  | 10                           | 710.00000771                                  | -0.002      | 2.5         |
| 7.60  | 0                            | 710.00000934                                  | -0.005      | 2.5         |
| 7.60  | -10                          | 710.00001340                                  | -0.010      | 2.5         |
| 7.60  | -20                          | 710.00001286                                  | -0.010      | 2.5         |
| 7.60  | -30                          | 709.99998854                                  | 0.025       | 2.5         |

| Reference Frequency: LTE Band 17 Mid Channel 710.0 MHz @ 20°C |                              |   |             |             |
|---|------------------------------|---|-------------|-------------|
| Limit: +/- 2.5 ppm = 1775.000 Hz                              |                              |   |             |             |
| Power Supply [Vdc]  | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|   |                              | [MHz]   | Delta [ppm] | Limit [ppm] |
| <b>7.60</b>   | <b>20</b>                    | <b>710.00000609</b>                           | <b>0</b>    | <b>2.5</b>  |
| 8.70  | 20                           | 709.99999292                                  | 0.019       | 2.5         |
| 7.20  | 20                           | 710.00000865                                  | -0.004      | 2.5         |

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

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

| Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20°C |                              |   |             |             |
|--|------------------------------|---|-------------|-------------|
| Limit: +/- 2.5 ppm = 2091.250 Hz                             |                              |   |             |             |
| Power Supply [Vdc]   | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|  |                              | [MHz]   | Delta [ppm] | Limit [ppm] |
| 7.60   | 50                           | 836.49999102                                  | -0.002      | 2.5         |
| 7.60   | 40                           | 836.50001406                                  | -0.029      | 2.5         |
| 7.60   | 30                           | 836.49998917                                  | 0.001       | 2.5         |
| <b>7.60</b>  | <b>20</b>                    | 836.49998976                                  | <b>0</b>    | <b>2.5</b>  |
| 7.60   | 10                           | 836.50001463                                  | -0.030      | 2.5         |
| 7.60   | 0                            | 836.49999032                                  | -0.001      | 2.5         |
| 7.60   | -10                          | 836.49998841                                  | 0.002       | 2.5         |
| 7.60   | -20                          | 836.49999149                                  | -0.002      | 2.5         |
| 7.60   | -30                          | 836.49998906                                  | 0.001       | 2.5         |

| Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20°C |                              |   |             |             |
|--|------------------------------|---|-------------|-------------|
| Limit: +/- 2.5 ppm = 2091.250 Hz                             |                              |   |             |             |
| Power Supply [Vdc]   | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|  |                              | [MHz]   | Delta [ppm] | Limit [ppm] |
| <b>7.60</b>  | <b>20</b>                    | <b>836.49998976</b>                           | <b>0</b>    | <b>2.5</b>  |
| 8.70   | 20                           | 836.49999129                                  | -0.002      | 2.5         |
| 7.20   | 20                           | 836.50000948                                  | -0.024      | 2.5         |

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

| Reference Frequency: PCS Mid Channel 1880.0 MHz @ 20°C |                              |   |             |             |
|--|------------------------------|---|-------------|-------------|
| Limit: +/- 2.5 ppm = 4700.000 Hz                       |                              |   |             |             |
| Power Supply [Vdc]                                     | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|  |                              | [MHz]   | Delta [ppm] | Limit [ppm] |
| 7.60   | 50                           | 1880.00001443                                 | 0.004       | 2.5         |
| 7.60   | 40                           | 1880.00001204                                 | 0.005       | 2.5         |
| 7.60   | 30                           | 1880.00001143                                 | 0.005       | 2.5         |
| <b>7.60</b>  | <b>20</b>                    | 1880.00002168                                 | <b>0</b>    | <b>2.5</b>  |
| 7.60   | 10                           | 1880.00002189                                 | 0.000       | 2.5         |
| 7.60   | 0                            | 1880.00002214                                 | 0.000       | 2.5         |
| 7.60   | -10                          | 1880.00002112                                 | 0.000       | 2.5         |
| 7.60   | -20                          | 1880.00001809                                 | 0.002       | 2.5         |
| 7.60   | -30                          | 1880.00000863                                 | 0.007       | 2.5         |

| Reference Frequency: PCS Mid Channel 1880.0 MHz @ 20°C |                              |   |             |             |
|--|------------------------------|---|-------------|-------------|
| Limit: +/- 2.5 ppm = 4700.000 Hz                       |                              |   |             |             |
| Power Supply [Vdc]                                     | Environment Temperature [°C] | Frequency Deviation Measured with Time Elapse |             |             |
|  |                              | [MHz]   | Delta [ppm] | Limit [ppm] |
| <b>7.60</b>  | <b>20</b>                    | <b>1880.00002168</b>                          | <b>0</b>    | <b>2.5</b>  |
| 8.70   | 20                           | 1880.00001171                                 | 0.005       | 2.5         |
| 7.20   | 20                           | 1880.00001557                                 | 0.003       | 2.5         |

## 11. RADIATED TEST RESULTS

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

#### RULE PART(S)

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

#### LIMITS

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

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

27.50(c) - (10) Portable stations (hand-held devices) are limited to 3 watts ERP; (LTE B17)

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

For peak power measurement with a MXA:

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

For average power measurement with a 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  $\geq 3 \times$  RBW; d) Set number of points in sweep  $\geq 2 \times$  span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle  $\geq 98$ ; h) Use trigger to capture bursts If burst duty cycle  $< 98$ ; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

#### TEST RESULTS

**11.1.1. ERP/EIRP Results**

**WCDMA**

| Band   | Mode  | Channel | f [MHz] | ERP / EIRP |        |
|--------|-------|---------|---------|------------|--------|
|        |       |         |         | [dBm]      | [mW]   |
| Band 5 | REL99 | 4132    | 826.4   | 20.63      | 115.61 |
|        |       | 4183    | 836.6   | 21.21      | 132.13 |
|        |       | 4233    | 846.6   | 21.18      | 131.22 |
|        | HSDPA | 4132    | 826.4   | 20.67      | 116.68 |
|        |       | 4183    | 836.6   | 21.15      | 130.32 |
|        |       | 4233    | 846.6   | 21.20      | 131.83 |
| Band 2 | REL99 | 9262    | 1852.4  | 17.71      | 59.02  |
|        |       | 9400    | 1880.0  | 15.99      | 39.72  |
|        |       | 9538    | 1907.6  | 16.79      | 47.75  |
|        | HSDPA | 9262    | 1852.4  | 16.56      | 45.29  |
|        |       | 9400    | 1880.0  | 16.14      | 41.11  |
|        |       | 9538    | 1907.6  | 16.06      | 40.36  |

**LTE Band 17**

| Band    | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |       |
|---------|----------|-------|------------|---------|------------|-------|
|         |          |       | Full RB    |         | [dBm]      | [mW]  |
| Band 17 | 10       | QPSK  | 50/0       | 709.0   | 17.83      | 60.67 |
|         |          |       | 50/0       | 710.0   | 17.57      | 57.15 |
|         |          |       | 50/0       | 711.0   | 18.01      | 63.24 |
|         |          | 16QAM | 50/0       | 709.0   | 16.89      | 48.87 |
|         |          |       | 50/0       | 710.0   | 16.64      | 46.13 |
|         |          |       | 50/0       | 711.0   | 17.04      | 50.58 |
|         | 5        | QPSK  | 25/0       | 706.5   | 17.43      | 55.34 |
|         |          |       | 25/0       | 710.0   | 18.03      | 63.53 |
|         |          |       | 25/0       | 713.5   | 18.44      | 69.82 |
|         |          | 16QAM | 25/0       | 706.5   | 16.46      | 44.26 |
|         |          |       | 25/0       | 710.0   | 17.06      | 50.82 |
|         |          |       | 25/0       | 713.5   | 17.50      | 56.23 |

**LTE Band 5**

| Band   | BW [MHz] | Mode  | RB/RB Size | f [MHz] | ERP / EIRP |        |
|--------|----------|-------|------------|---------|------------|--------|
|        |          |       | Full RB    |         | [dBm]      | [mW]   |
| Band 5 | 10       | QPSK  | 50/0       | 829.0   | 19.94      | 98.63  |
|        |          |       | 50/0       | 836.5   | 20.89      | 122.74 |
|        |          |       | 50/0       | 844.0   | 20.83      | 121.06 |
|        |          | 16QAM | 50/0       | 829.0   | 18.80      | 75.86  |
|        |          |       | 50/0       | 836.5   | 19.84      | 96.38  |
|        |          |       | 50/0       | 844.0   | 19.76      | 94.62  |
|        | 5        | QPSK  | 25/0       | 826.5   | 17.55      | 56.89  |
|        |          |       | 25/0       | 836.5   | 20.91      | 123.31 |
|        |          |       | 25/0       | 846.5   | 18.82      | 76.21  |
|        |          | 16QAM | 25/0       | 826.5   | 16.45      | 44.16  |
|        |          |       | 25/0       | 836.5   | 19.93      | 98.40  |
|        |          |       | 25/0       | 846.5   | 18.18      | 65.77  |
|        | 3        | QPSK  | 15/0       | 825.5   | 20.14      | 103.28 |
|        |          |       | 15/0       | 836.5   | 21.06      | 127.64 |
|        |          |       | 15/0       | 847.5   | 20.84      | 121.34 |
|        |          | 16QAM | 15/0       | 825.5   | 18.93      | 78.16  |
|        |          |       | 15/0       | 836.5   | 20.03      | 100.69 |
|        |          |       | 15/0       | 847.5   | 20.24      | 105.68 |
|        | 1.4      | QPSK  | 6/0        | 824.7   | 18.02      | 63.39  |
|        |          |       | 6/0        | 836.5   | 18.19      | 65.92  |
|        |          |       | 6/0        | 848.3   | 17.89      | 61.52  |
| 16QAM  |          | 6/0   | 824.7      | 17.01   | 50.23      |        |
|        |          | 6/0   | 836.5      | 17.09   | 51.17      |        |
|        |          | 6/0   | 848.3      | 17.33   | 54.08      |        |

**11.1.2. ERP/EIRP DATA**

**WCDMA Band 5**

|                          |                        | High Frequency Substitution Measurement<br>UL Korea, Ltd. Suwon Laboratory Chamber 2 |  |                 |                    |           |             |             |       |  |
|--------------------------|------------------------|--|--|-----------------|--------------------|-----------|-------------|-------------|-------|--|
| WCDMA<br>Band 5<br>REL99 | Company:               | Samsung  |  |                 |                    |           |             |             |       |  |
|                          | Project #:             | 15K22598   |  |                 |                    |           |             |             |       |  |
|                          | Date:                  | 01-15-16   |  |                 |                    |           |             |             |       |  |
|                          | Test Engineer:         | Steven.Kim   |  |                 |                    |           |             |             |       |  |
|                          | Configuration:         | EUT ONLY, X Position   |  |                 |                    |           |             |             |       |  |
|                          | Mode:                  | Rel 99_850 MHz   |  |                 |                    |           |             |             |       |  |
|                          | <b>Test Equipment:</b> |  | Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)<br>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                 | 14.94  | V  | 1.1             | -1.5               | 12.33     | 38.5        | -26.1       |       |  |
|                          | 826.40                 | 23.24  | H  | 1.1             | -1.5               | 20.63     | 38.5        | -17.8       |       |  |
|                          | Mid Ch                 |  |  |                 |                    |           |             |             |       |  |
|                          | 836.60                 | 14.12  | V  | 1.1             | -1.4               | 11.63     | 38.5        | -26.8       |       |  |
|                          | 836.60                 | 23.70  | H  | 1.1             | -1.4               | 21.21     | 38.5        | -17.2       |       |  |
|                          | High Ch                |  |  |                 |                    |           |             |             |       |  |
| 846.60                   | 13.59                  | V  | 1.1  | -1.3            | 11.21              | 38.5      | -27.2       |             |       |  |
| 846.60                   | 23.56                  | H  | 1.1  | -1.3            | 21.18              | 38.5      | -17.3       |             |       |  |
| Rev. 3.17.11             |                        |  |  |                 |                    |           |             |             |       |  |
| WCDMA<br>Band 5<br>HSDPA |                        |  | High Frequency Substitution Measurement<br>UL Korea, Ltd. Suwon Laboratory Chamber 2   |                 |                    |           |             |             |       |  |
|                          | Company:               | Samsung  |  |                 |                    |           |             |             |       |  |
|                          | Project #:             | 15K22598   |  |                 |                    |           |             |             |       |  |
|                          | Date:                  | 01-15-16   |  |                 |                    |           |             |             |       |  |
|                          | Test Engineer:         | Steven.Kim   |  |                 |                    |           |             |             |       |  |
|                          | Configuration:         | EUT ONLY, X Position   |  |                 |                    |           |             |             |       |  |
|                          | Mode:                  | HSDPA_850 MHz  |  |                 |                    |           |             |             |       |  |
|                          | <b>Test Equipment:</b> |  | Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)<br>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                 | 14.92  | V  | 1.1             | -1.5               | 12.31     | 38.5        | -26.1       |       |  |
|                          | 826.40                 | 23.28  | H  | 1.1             | -1.5               | 20.67     | 38.5        | -17.8       |       |  |
|                          | Mid Ch                 |  |  |                 |                    |           |             |             |       |  |
|                          | 836.60                 | 13.79  | V  | 1.1             | -1.4               | 11.30     | 38.5        | -27.2       |       |  |
|                          | 836.60                 | 23.64  | H  | 1.1             | -1.4               | 21.15     | 38.5        | -17.3       |       |  |
| High Ch                  |                        |  |  |                 |                    |           |             |             |       |  |
| 846.60                   | 13.43                  | V  | 1.1  | -1.3            | 11.05              | 38.5      | -27.4       |             |       |  |
| 846.60                   | 23.58                  | H  | 1.1  | -1.3            | 21.20              | 38.5      | -17.3       |             |       |  |
| Rev. 3.17.11             |                        |  |  |                 |                    |           |             |             |       |  |

**WCDMA Band 2**

|  |  | High Frequency Substitution Measurement<br>UL Korea, Ltd. Suwon Laboratory Chamber 2 |                 |                 |                    |            |             |             |       |
|--|--|--|-----------------|-----------------|--------------------|------------|-------------|-------------|-------|
| WCDMA<br>Band 2<br>REL99                             | Company:   | Samsung  |                 |                 |                    |            |             |             |       |
|  | Project #:   | 16K22598   |                 |                 |                    |            |             |             |       |
|  | Date:  | 01-21-16   |                 |                 |                    |            |             |             |       |
|  | Test Engineer:   | Steven.Kim   |                 |                 |                    |            |             |             |       |
|  | Configuration:   | EUT ONLY, X Position   |                 |                 |                    |            |             |             |       |
|  | Mode:  | REL99_1900 MHz   |                 |                 |                    |            |             |             |       |
|  | <b>Test Equipment:</b>   |  |                 |                 |                    |            |             |             |       |
|  | Receiving: 3117[00168724] and Chamber 1 SMA Cables                                   |  |                 |                 |                    |            |             |             |       |
|  | Substitution: 3115[00161451] 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  | 5.75   | V               | 1.60            | 8.79               | 12.94      | 33.0        | -20.1       |       |
|  | 1852.40  | 10.52  | H               | 1.60            | 8.79               | 17.71      | 33.0        | -15.3       |       |
|  | Mid Ch   |  |                 |                 |                    |            |             |             |       |
|  | 1880.00  | -0.18  | V               | 1.62            | 8.62               | 6.82       | 33.0        | -26.2       |       |
| 1880.00  | 8.99   | H  | 1.62            | 8.62            | 15.99              | 33.0       | -17.0       |             |       |
| High Ch  |  |  |                 |                 |                    |            |             |             |       |
| 1907.60  | 5.40   | V  | 1.63            | 8.45            | 12.22              | 33.0       | -20.8       |             |       |
| 1907.60  | 9.97   | H  | 1.63            | 8.45            | 16.79              | 33.0       | -16.2       |             |       |
| Rev. 3.17.11<br>Note: For Band 4 EIRP limit is 30dBm |  |  |                 |                 |                    |            |             |             |       |
| WCDMA<br>Band 2<br>HSDPA                             | High Frequency Substitution Measurement<br>UL Korea, Ltd. Suwon Laboratory Chamber 2 |  |                 |                 |                    |            |             |             |       |
|  | Company:   | Samsung  |                 |                 |                    |            |             |             |       |
|  | Project #:   | 16K22598   |                 |                 |                    |            |             |             |       |
|  | Date:  | 01-21-16   |                 |                 |                    |            |             |             |       |
|  | Test Engineer:   | Steven.Kim   |                 |                 |                    |            |             |             |       |
|  | Configuration:   | EUT ONLY, X Position   |                 |                 |                    |            |             |             |       |
|  | Mode:  | HSDPA_1900 MHz   |                 |                 |                    |            |             |             |       |
|  | <b>Test Equipment:</b>   |  |                 |                 |                    |            |             |             |       |
|  | Receiving: 3117[00168724] and Chamber 1 SMA Cables                                   |  |                 |                 |                    |            |             |             |       |
|  | Substitution: 3115[00161451] 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  | 4.14   | V               | 1.60            | 8.79               | 11.33      | 33.0        | -21.7       |       |
|  | 1852.40  | 9.37   | H               | 1.60            | 8.79               | 16.56      | 33.0        | -16.4       |       |
|  | Mid Ch   |  |                 |                 |                    |            |             |             |       |
| 1880.00  | -4.70  | V  | 1.62            | 8.62            | 2.30               | 33.0       | -30.7       |             |       |
| 1880.00  | 9.14   | H  | 1.62            | 8.62            | 16.14              | 33.0       | -16.9       |             |       |
| High Ch  |  |  |                 |                 |                    |            |             |             |       |
| 1907.60  | 5.20   | V  | 1.63            | 8.45            | 12.02              | 33.0       | -21.0       |             |       |
| 1907.60  | 9.24   | H  | 1.63            | 8.45            | 16.06              | 33.0       | -16.9       |             |       |
| Rev. 3.17.11<br>Note: For Band 4 EIRP limit is 30dBm |  |  |                 |                 |                    |            |             |             |       |

**LTE Band 17**

|  |   | <b>High Frequency Substitution Measurement<br/>UL Korea, Ltd. Suwon Laboratory Chamber 2</b>  |                 |                 |                    |            |             |             |       |  |
|--|---|---|-----------------|-----------------|--------------------|------------|-------------|-------------|-------|--|
| LTE<br>Band 17<br>10MHz<br>QPSK  | <b>Company:</b> Samsung<br><b>Project #:</b> 16K22598<br><b>Date:</b> 01-18-16<br><b>Test Engineer:</b> Steven.Kim<br><b>Configuration:</b> EUT / X-Position<br><b>Mode:</b> LTE Band 17, QPSK, 10MHz |   |                 |                 |                    |            |             |             |       |  |
|  | <b>Test Equipment:</b><br>Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)<br>Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.                        |   |                 |                 |                    |            |             |             |       |  |
|  | f MHz   | SG reading (dBm)  | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |  |
|  | Low Ch  |   |                 |                 |                    |            |             |             |       |  |
|  | 709.00  | 14.07   | V               | 1.0             | -1.6               | 11.47      | 34.8        | -23.3       |       |  |
|  | 709.00  | 20.43   | H               | 1.0             | -1.6               | 17.83      | 34.8        | -16.9       |       |  |
|  | Mid Ch  |   |                 |                 |                    |            |             |             |       |  |
|  | 710.00  | 13.30   | V               | 1.0             | -1.6               | 10.70      | 34.8        | -24.1       |       |  |
|  | 710.00  | 20.17   | H               | 1.0             | -1.6               | 17.57      | 34.8        | -17.2       |       |  |
|  | High Ch   |   |                 |                 |                    |            |             |             |       |  |
|  | 711.00  | 13.84   | V               | 1.0             | -1.6               | 11.24      | 34.8        | -23.5       |       |  |
|  | 711.00  | 20.61   | H               | 1.0             | -1.6               | 18.01      | 34.8        | -16.8       |       |  |
|  | Rev. 3.17.11<br>Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm  |   |                 |                 |                    |            |             |             |       |  |
|  | LTE<br>Band 17<br>10MHz<br>16QAM  | <b>Company:</b> Samsung<br><b>Project #:</b> 16K22598<br><b>Date:</b> 01-18-16<br><b>Test Engineer:</b> Steven.Kim<br><b>Configuration:</b> EUT / X-Position<br><b>Mode:</b> LTE Band 17 16QAM, 10MHz |                 |                 |                    |            |             |             |       |  |
|  |   | <b>Test Equipment:</b><br>Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)<br>Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.                        |                 |                 |                    |            |             |             |       |  |
| f MHz  |   | SG reading (dBm)  | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |  |
| Low Ch   |   |   |                 |                 |                    |            |             |             |       |  |
| 709.00   |   | 13.13   | V               | 1.0             | -1.6               | 10.53      | 34.8        | -24.2       |       |  |
| 709.00   |   | 19.49   | H               | 1.0             | -1.6               | 16.89      | 34.8        | -17.9       |       |  |
| Mid Ch   |   |   |                 |                 |                    |            |             |             |       |  |
| 710.00   |   | 12.37   | V               | 1.0             | -1.6               | 9.77       | 34.8        | -25.0       |       |  |
| 710.00   |   | 19.24   | H               | 1.0             | -1.6               | 16.64      | 34.8        | -18.1       |       |  |
| High Ch  |   |   |                 |                 |                    |            |             |             |       |  |
| 711.00   |   | 12.86   | V               | 1.0             | -1.6               | 10.26      | 34.8        | -24.5       |       |  |
| 711.00   |   | 19.64   | H               | 1.0             | -1.6               | 17.04      | 34.8        | -17.7       |       |  |
| Rev. 3.17.11<br>Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm |   |   |                 |                 |                    |            |             |             |       |  |

|                                 |   | High Frequency Substitution Measurement<br>UL Korea, Ltd. Suwon Laboratory Chamber 2 |                    |                    |                       |               |                |                |       |
|---------------------------------|---|--|--------------------|--------------------|-----------------------|---------------|----------------|----------------|-------|
| LTE<br>Band 17<br>5MHz<br>QPSK  | <b>Company:</b> Samsung<br><b>Project #:</b> 16K22598<br><b>Date:</b> 01-18-16<br><b>Test Engineer:</b> Steven.Kim<br><b>Configuration:</b> EUT / X-Position<br><b>Mode:</b> LTE Band 17, QPSK , 5MHz<br><br><b>Test Equipment:</b><br>Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)<br>Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse. |  |                    |                    |                       |               |                |                |       |
|                                 | f<br>MHz  | SG reading<br>(dBm)  | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
|                                 | Low Ch  |  |                    |                    |                       |               |                |                |       |
|                                 | 706.50  | 13.53  | V                  | 1.0                | -1.6                  | 10.93         | 34.8           | -23.8          |       |
|                                 | 706.50  | 20.03  | H                  | 1.0                | -1.6                  | 17.43         | 34.8           | -17.3          |       |
|                                 | Mid Ch  |  |                    |                    |                       |               |                |                |       |
|                                 | 710.00  | 13.41  | V                  | 1.0                | -1.6                  | 10.81         | 34.8           | -24.0          |       |
|                                 | 710.00  | 20.63  | H                  | 1.0                | -1.6                  | 18.03         | 34.8           | -16.7          |       |
|                                 | High Ch   |  |                    |                    |                       |               |                |                |       |
|                                 | 713.50  | 13.39  | V                  | 1.0                | -1.6                  | 10.79         | 34.8           | -24.0          |       |
|                                 | 713.50  | 21.04  | H                  | 1.0                | -1.6                  | 18.44         | 34.8           | -16.3          |       |
|                                 | Rev. 3.17.11<br>Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm  |  |                    |                    |                       |               |                |                |       |
| LTE<br>Band 17<br>5MHz<br>16QAM | <b>Company:</b> Samsung<br><b>Project #:</b> 16K22598<br><b>Date:</b> 01-18-16<br><b>Test Engineer:</b> Steven.Kim<br><b>Configuration:</b> EUT / X-Position<br><b>Mode:</b> LTE Band 17 16QAM, 5MHz<br><br><b>Test Equipment:</b><br>Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT)<br>Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.  |  |                    |                    |                       |               |                |                |       |
|                                 | f<br>MHz  | SG reading<br>(dBm)  | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBd) | EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Notes |
|                                 | Low Ch  |  |                    |                    |                       |               |                |                |       |
|                                 | 706.50  | 12.60  | V                  | 1.0                | -1.6                  | 10.00         | 34.8           | -24.8          |       |
|                                 | 706.50  | 19.06  | H                  | 1.0                | -1.6                  | 16.46         | 34.8           | -18.3          |       |
|                                 | Mid Ch  |  |                    |                    |                       |               |                |                |       |
|                                 | 710.00  | 12.54  | V                  | 1.0                | -1.6                  | 9.94          | 34.8           | -24.8          |       |
|                                 | 710.00  | 19.66  | H                  | 1.0                | -1.6                  | 17.06         | 34.8           | -17.7          |       |
|                                 | High Ch   |  |                    |                    |                       |               |                |                |       |
|                                 | 713.50  | 12.42  | V                  | 1.0                | -1.6                  | 9.82          | 34.8           | -25.0          |       |
|                                 | 713.50  | 20.10  | H                  | 1.0                | -1.6                  | 17.50         | 34.8           | -17.3          |       |
|                                 | Rev. 3.17.11<br>Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm  |  |                    |                    |                       |               |                |                |       |