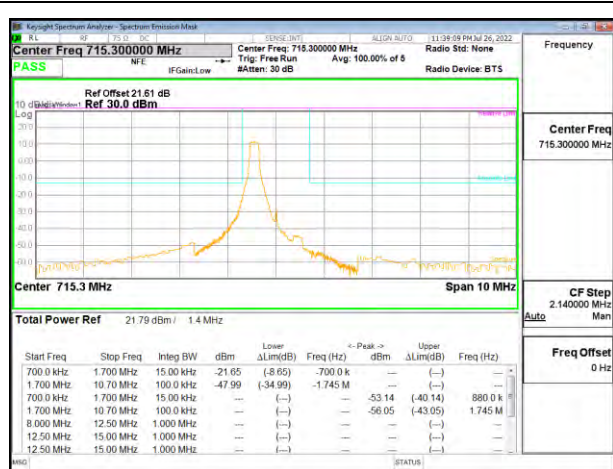
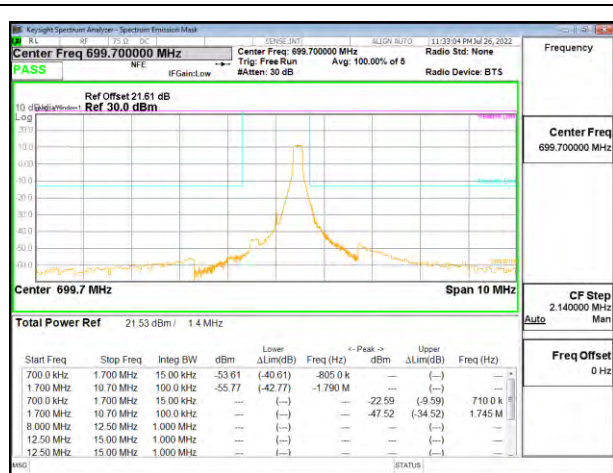
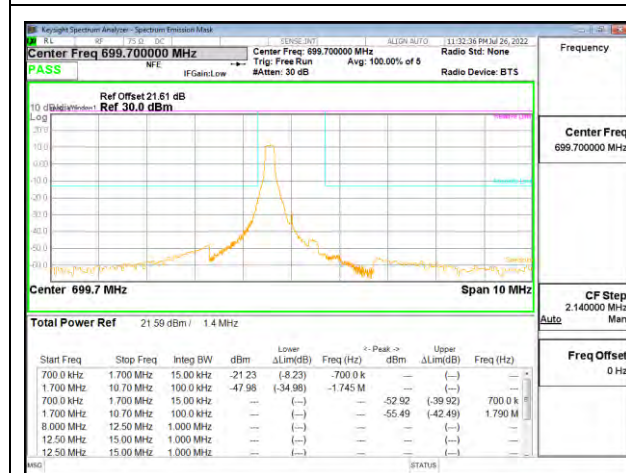
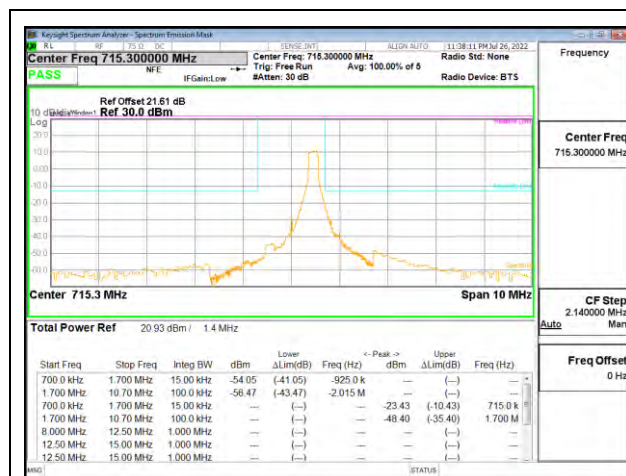
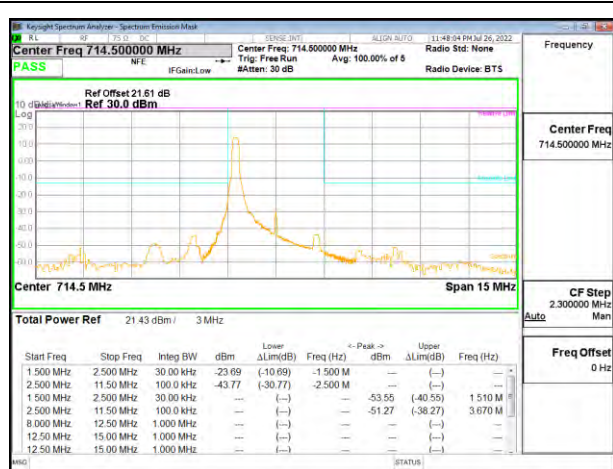
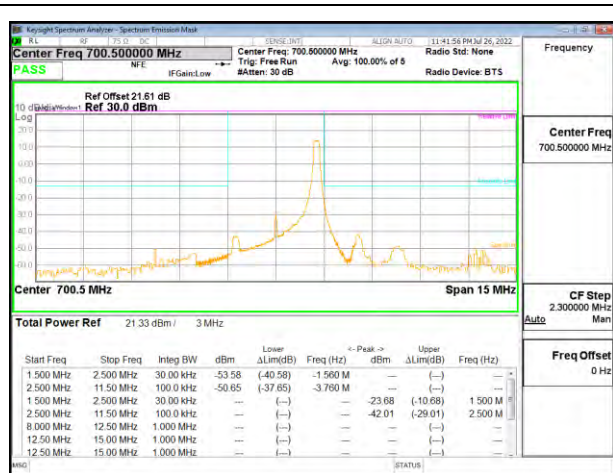
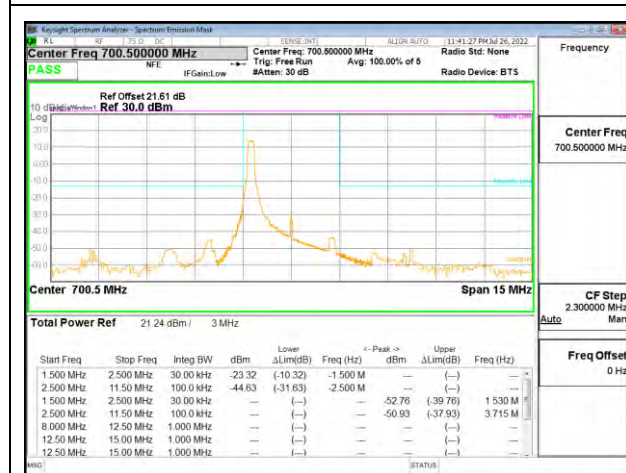
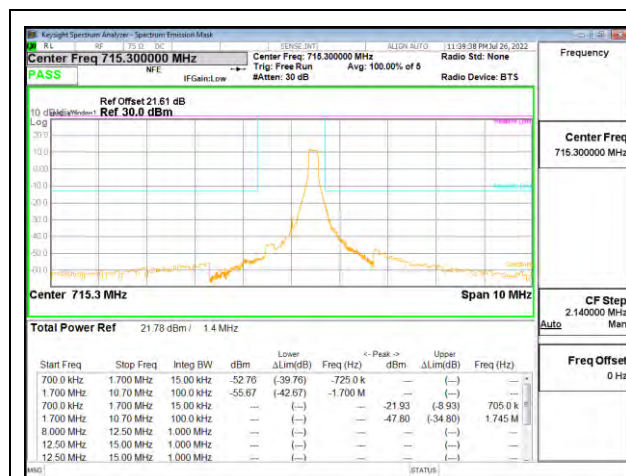
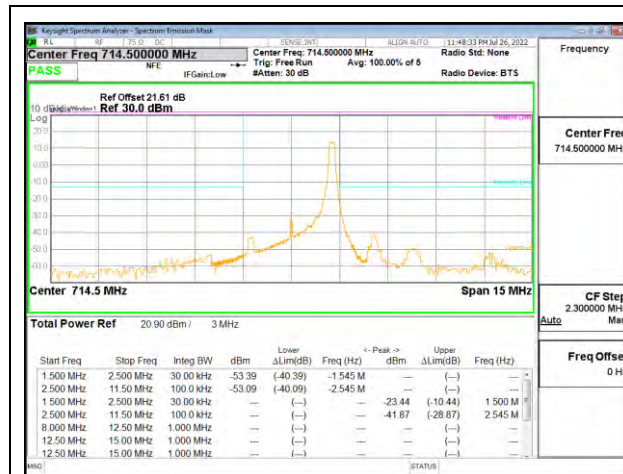




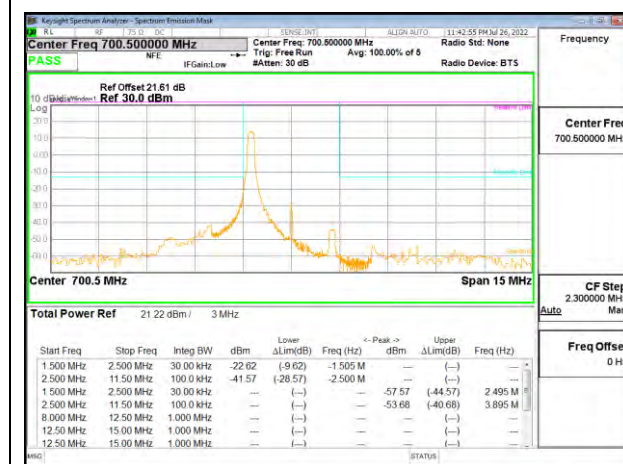




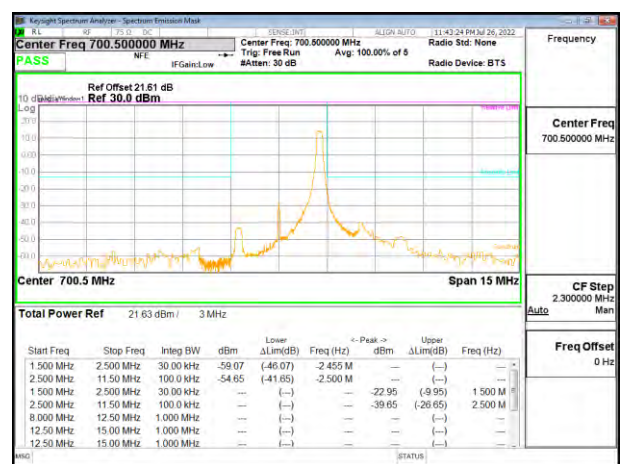
LTE12 3MHz QPSK HIGH Ch RB1-14



LTE12 3MHz QPSK HIGH Ch RB15-0



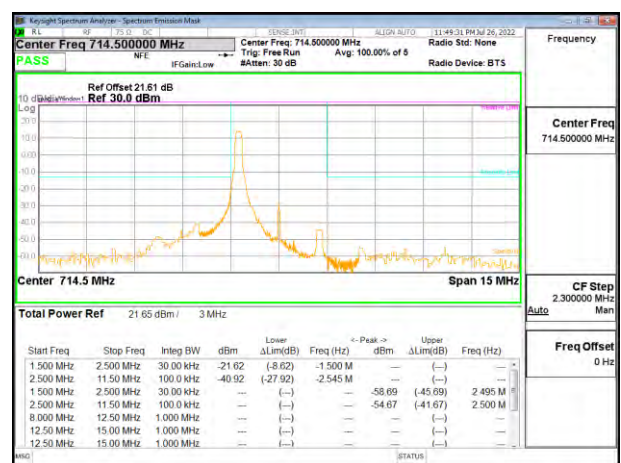
LTE12 3MHz 16QAM LOW Ch RB1-0



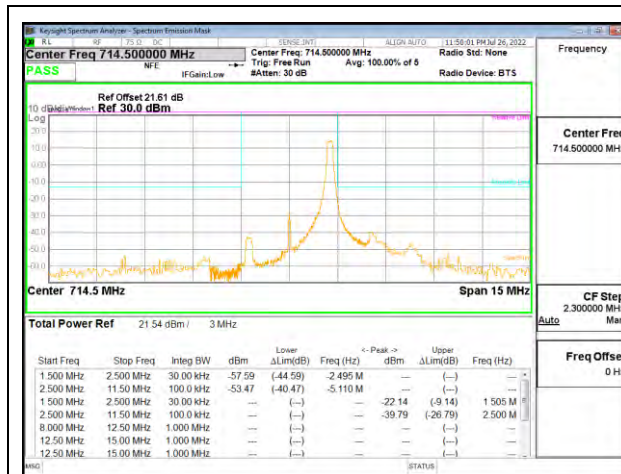
LTE12 3MHz 16QAM LOW Ch RB1-14



LTE12 3MHz 16QAM LOW Ch RB15-0



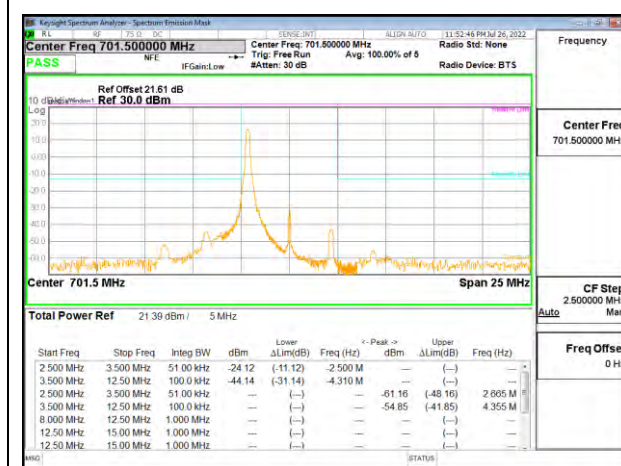
LTE12 3MHz 16QAM HIGH Ch RB1-0



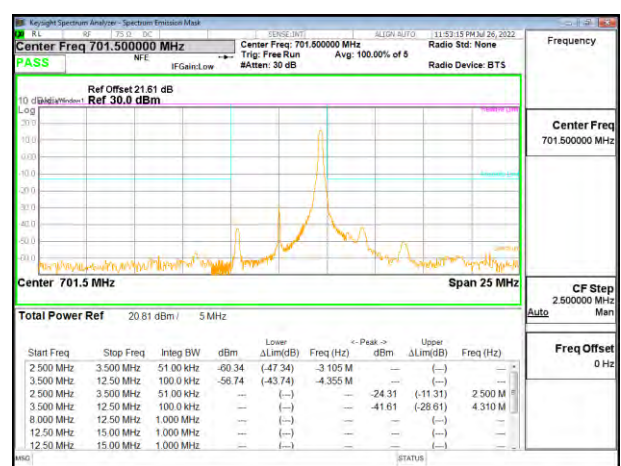
LTE12 3MHz 16QAM HIGH Ch RB1-14



LTE12 3MHz 16QAM HIGH Ch RB15-0



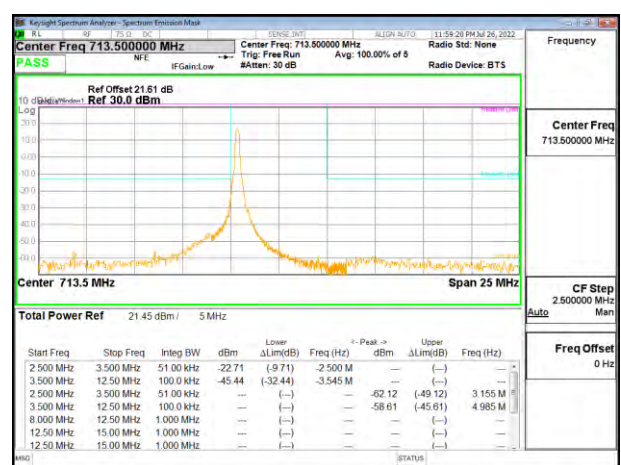
LTE12 5MHz QPSK LOW Ch RB1-0



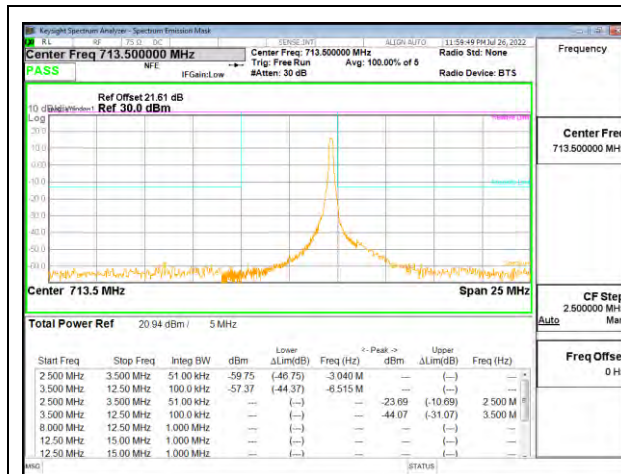
LTE12 5MHz QPSK LOW Ch RB1-24



LTE12 5MHz QPSK LOW Ch RB25-0



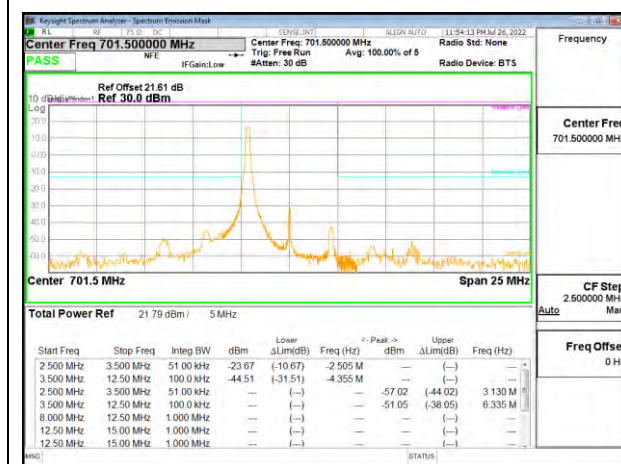
LTE12 5MHz QPSK HIGH Ch RB1-0



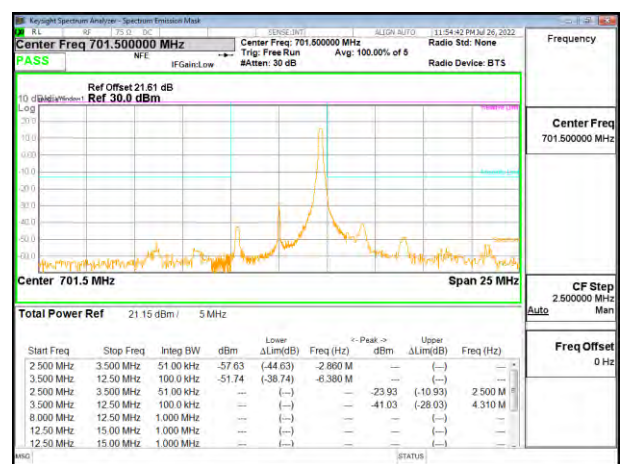
LTE12 5MHz QPSK HIGH Ch RB1-24



LTE12 5MHz QPSK HIGH Ch RB25-0



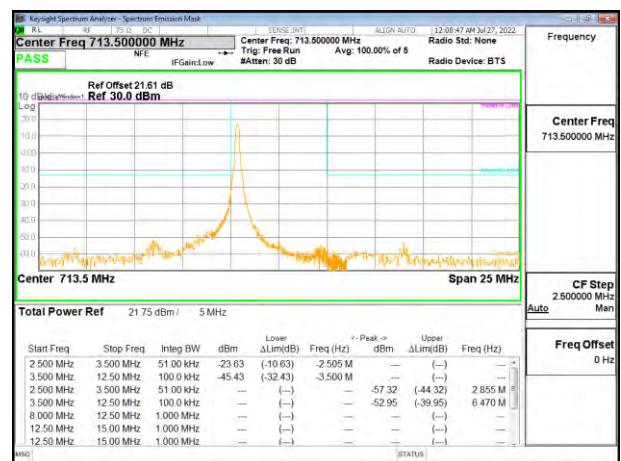
LTE12 5MHz 16QAM LOW Ch RB1-0



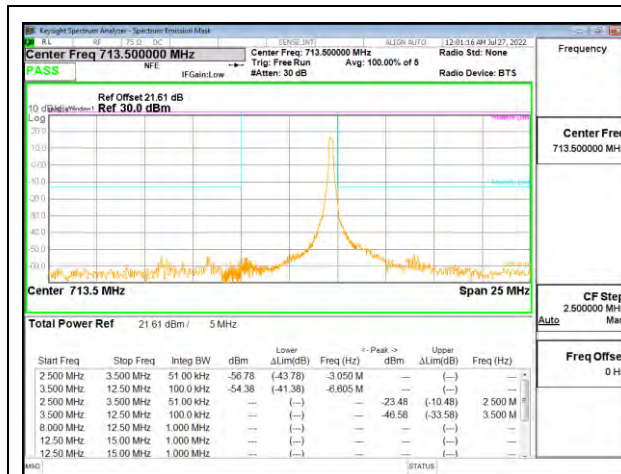
LTE12 5MHz 16QAM LOW Ch RB1-24



LTE12 5MHz 16QAM LOW Ch RB25-0



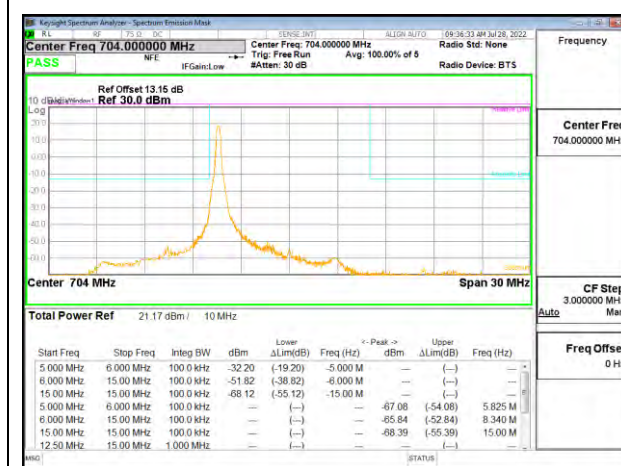
LTE12 5MHz 16QAM HIGH Ch RB1-0



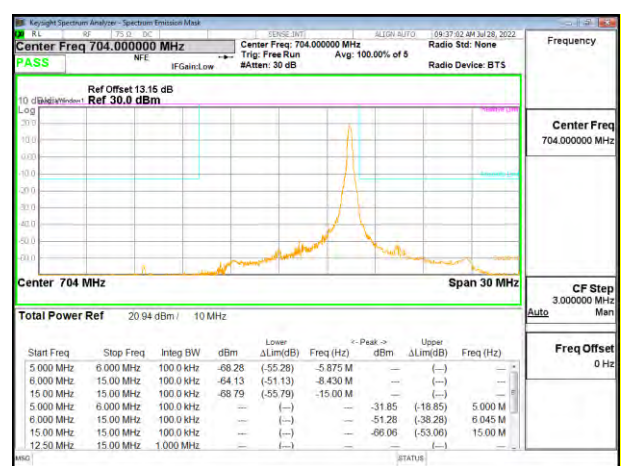
LTE12 5MHz 16QAM HIGH Ch RB1-24



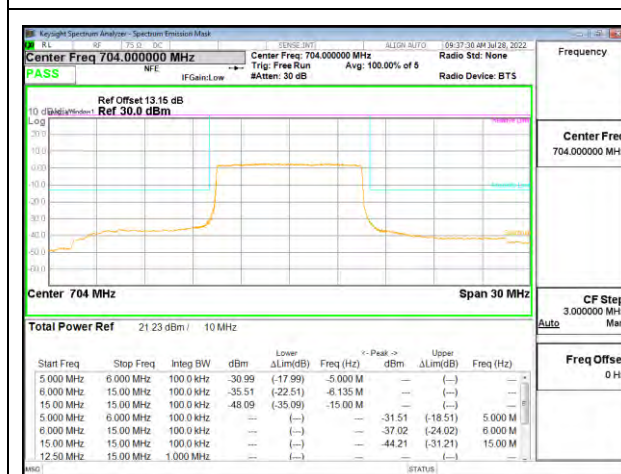
LTE12 5MHz 16QAM HIGH Ch RB25-0



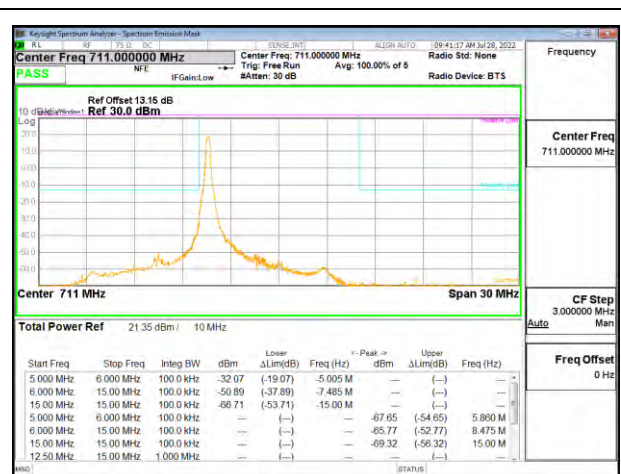
LTE12 10MHz QPSK LOW Ch RB1-0



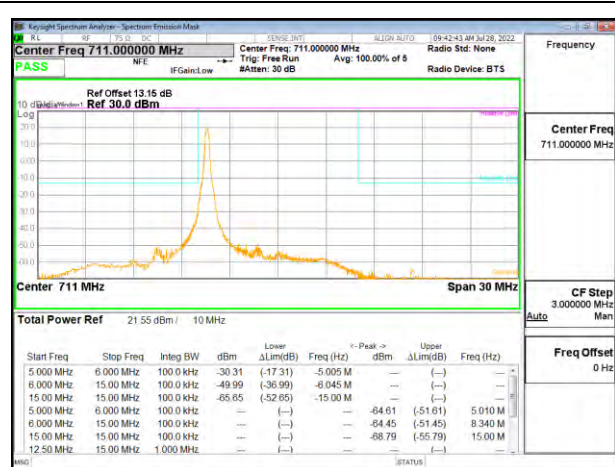
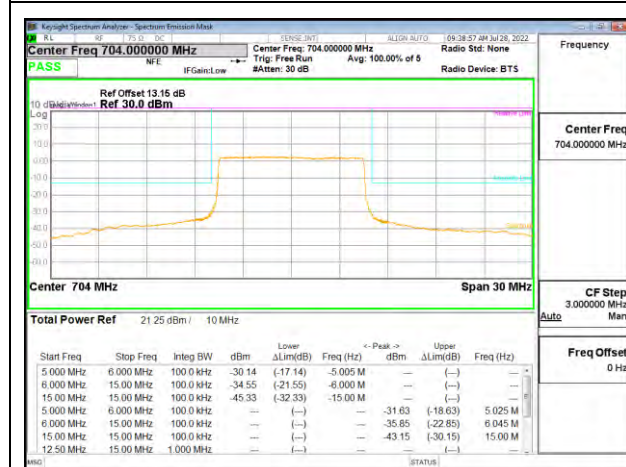
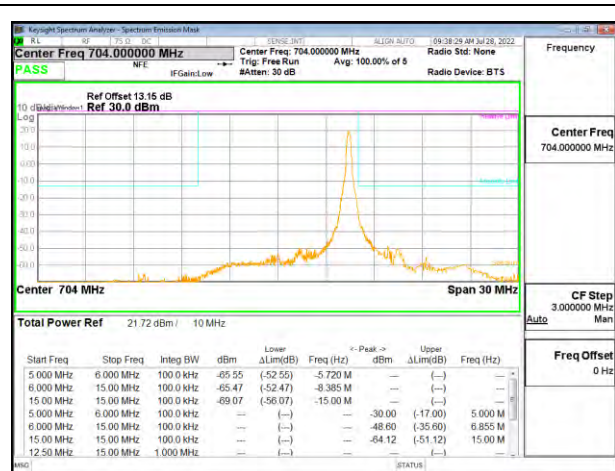
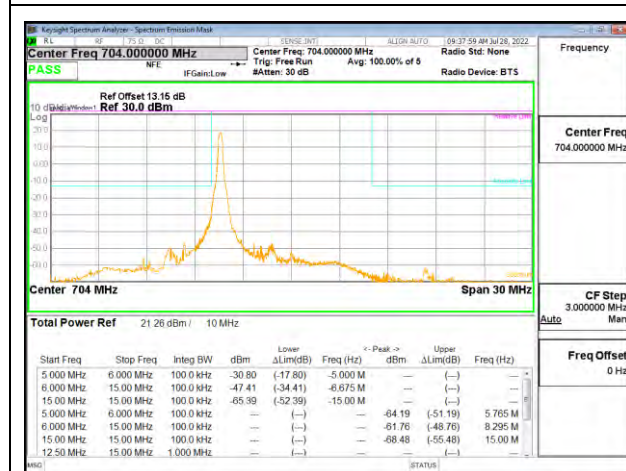
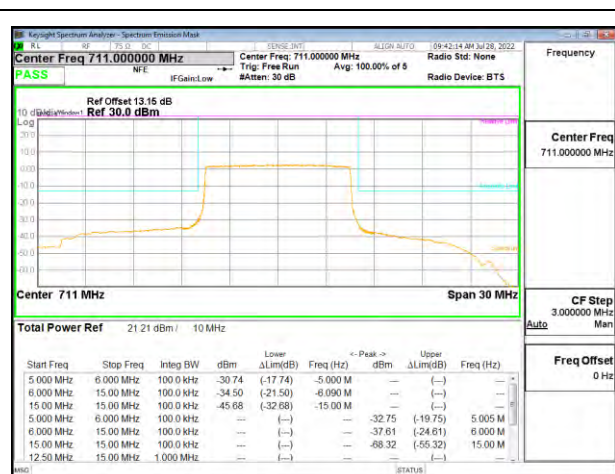
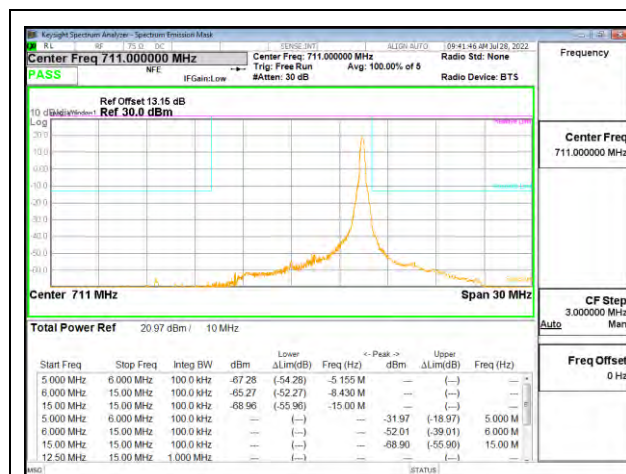
LTE12 10MHz QPSK LOW Ch RB1-49

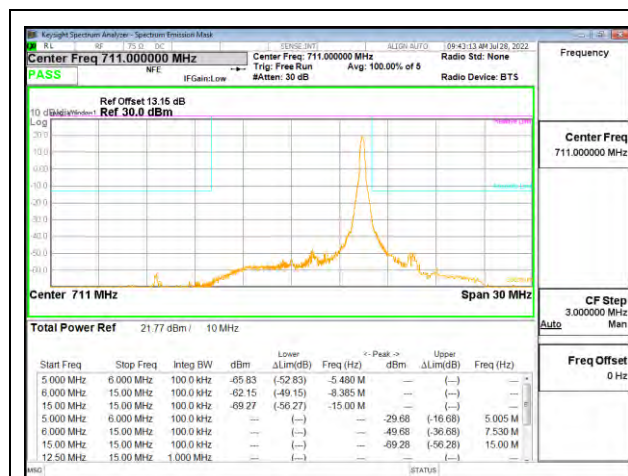


LTE12 10MHz QPSK LOW Ch RB50-0



LTE12 10MHz QPSK HIGH Ch RB1-0





LTE12 10MHz 16QAM HIGH Ch RB1-49



LTE12 10MHz 16QAM HIGH Ch RB50-0

### 9.3. OUT OF BAND EMISSIONS

#### TEST PROCEDURE

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.

For each out of band emissions measurement:

- (v) Set display line at -13 dBm, -25dBm and -40dBm according to the band Limit
- (vi) Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

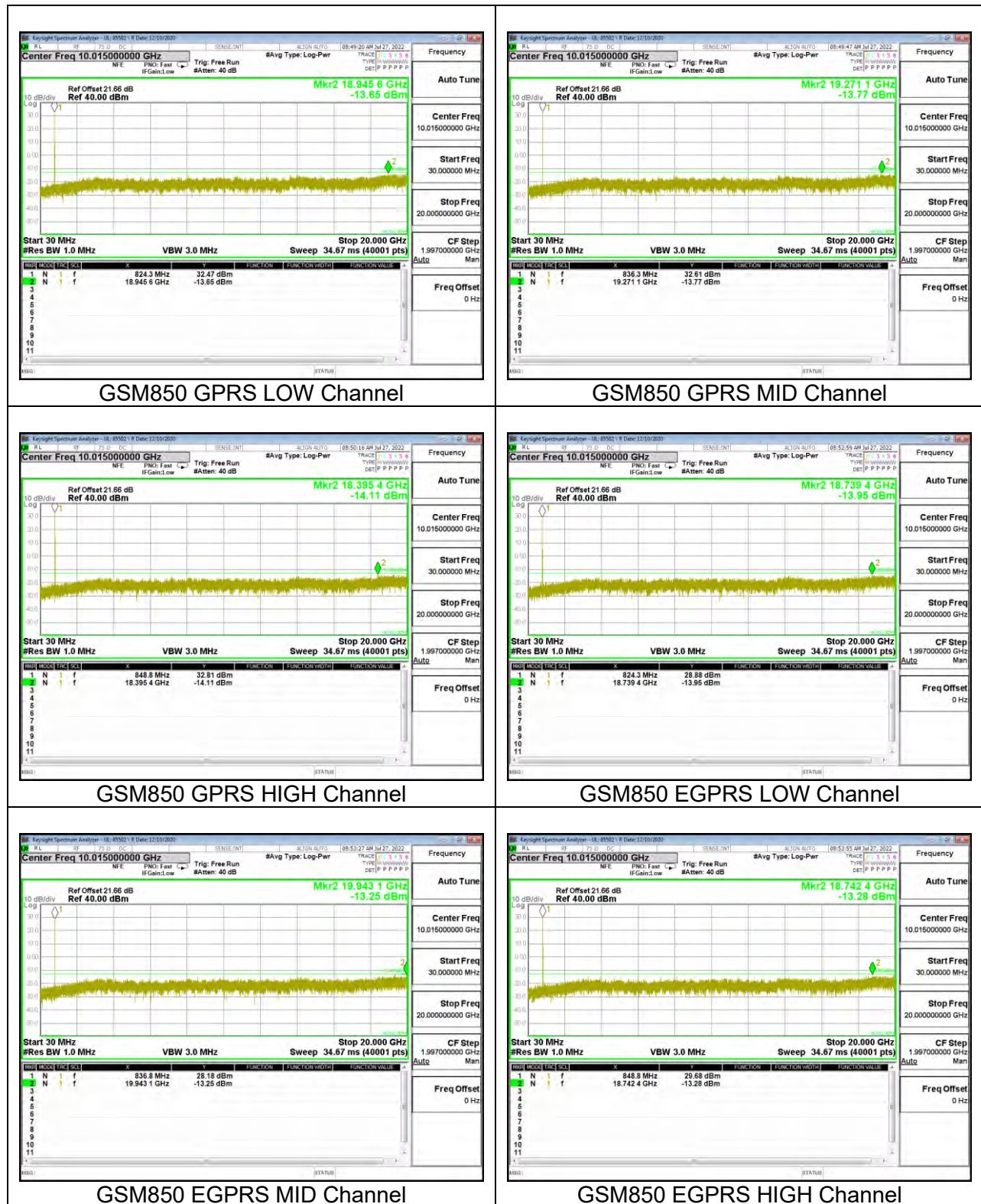
#### RESULTS

### 9.3.1. GSM GSM850

#### LIMITS

FCC: §22.917

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.

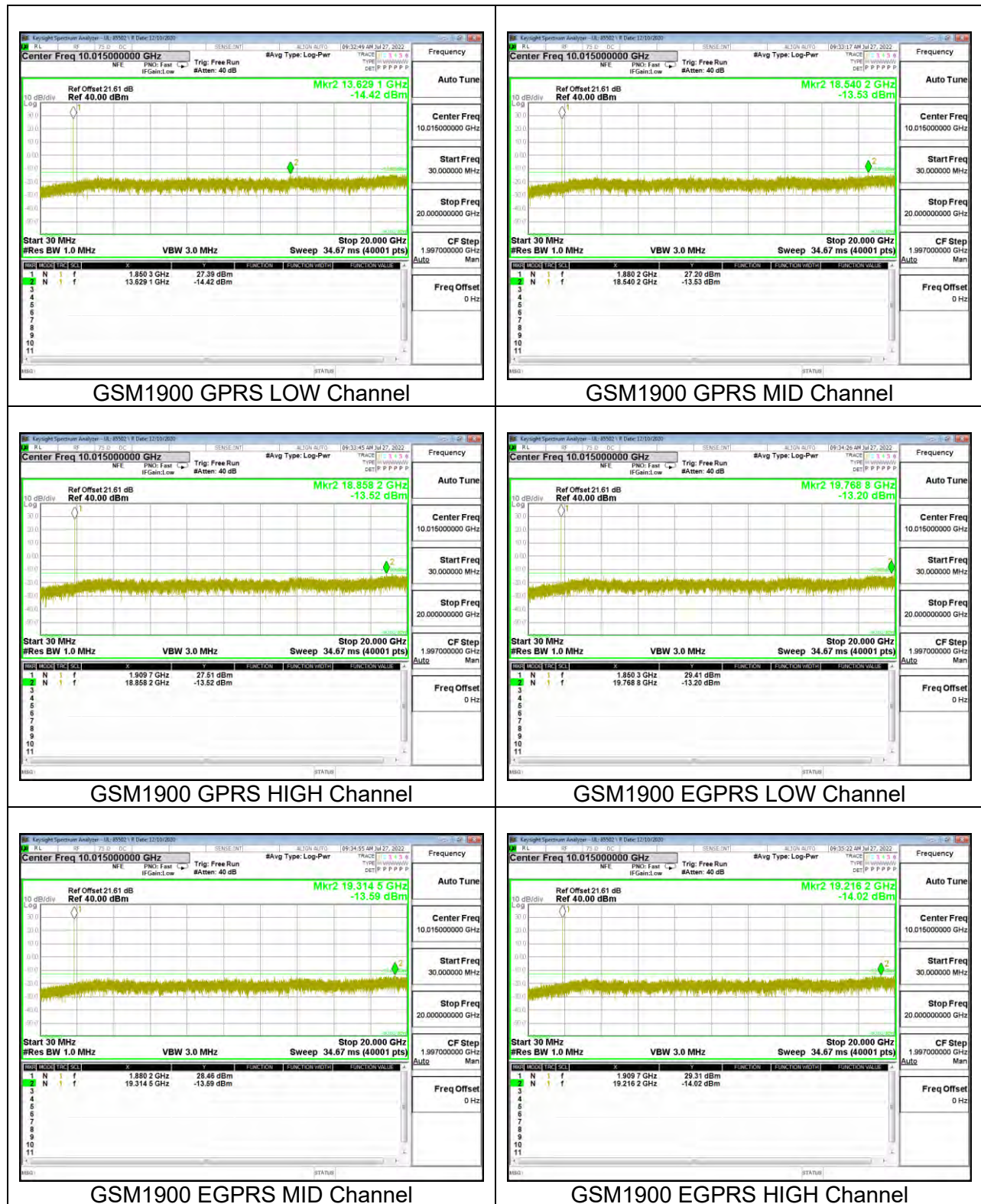


### 9.3.2. GSM GSM1900

#### **LIMITS**

FCC: §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.

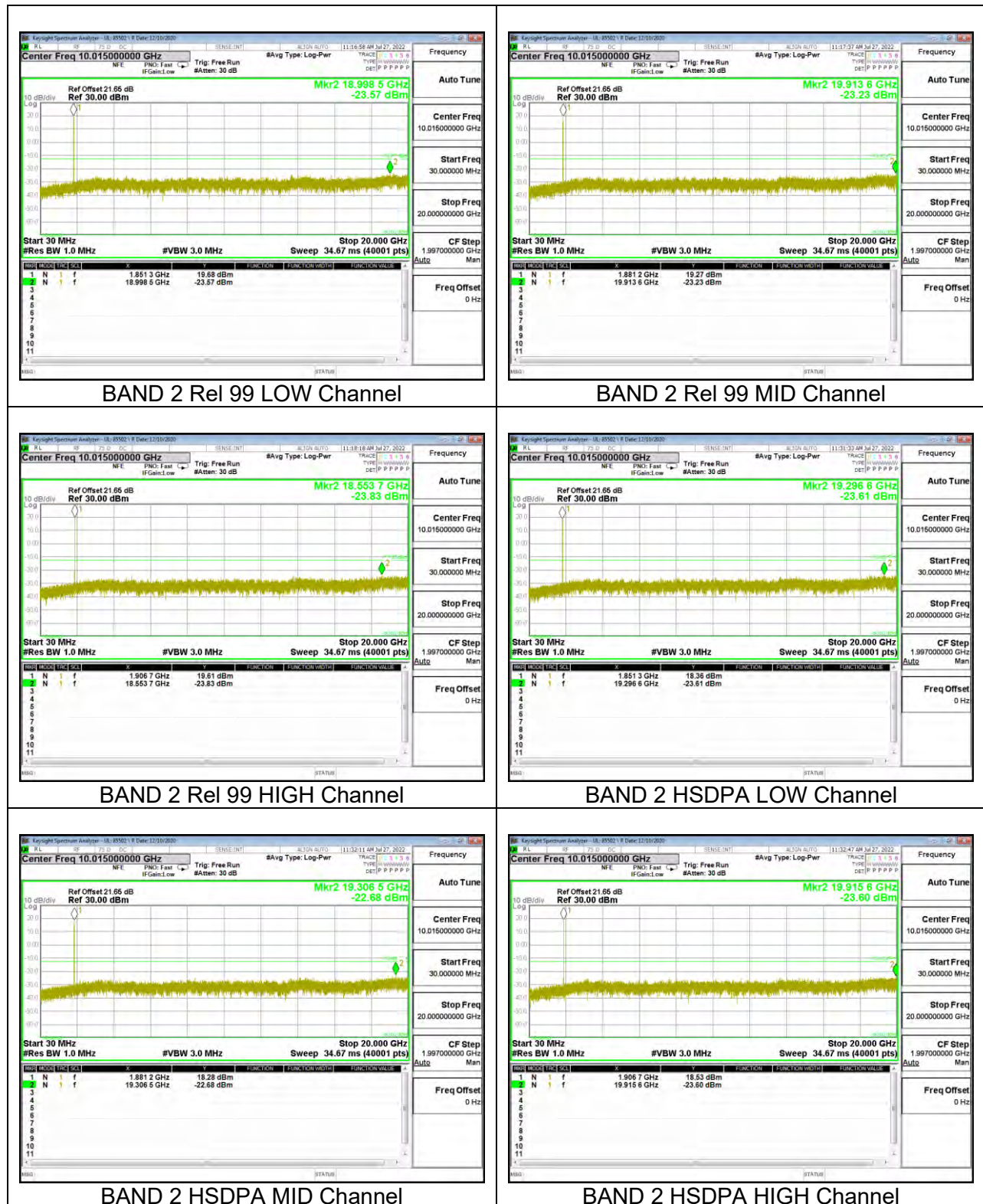


### 9.3.3. WCDMA BAND 2

#### LIMITS

FCC: §24.238

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.

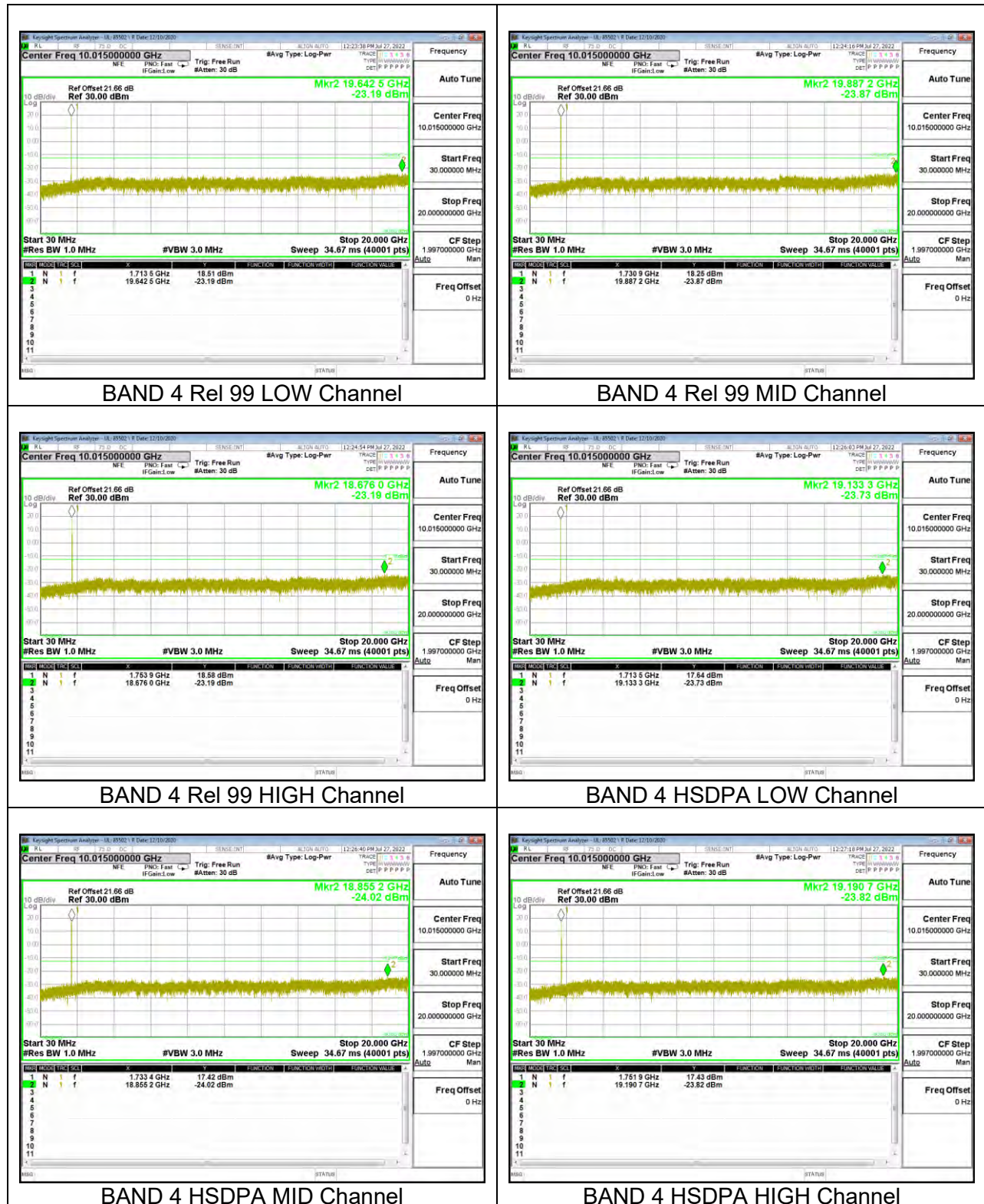


#### 9.3.4. WCDMA BAND 4

##### LIMITS

FCC: §27.53(h)

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.

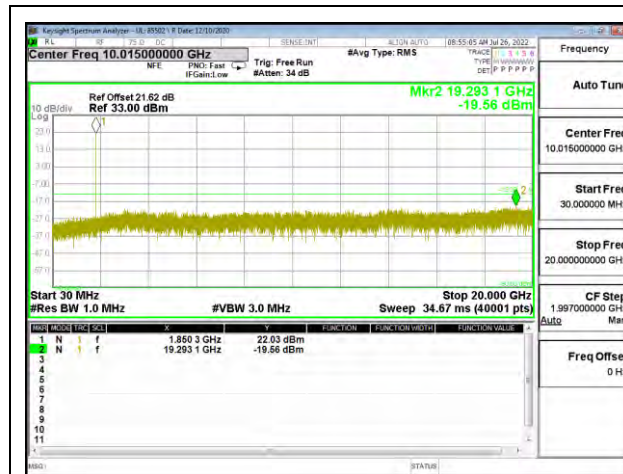


### 9.3.5. LTE BAND 2

#### LIMITS

FCC: §24.238

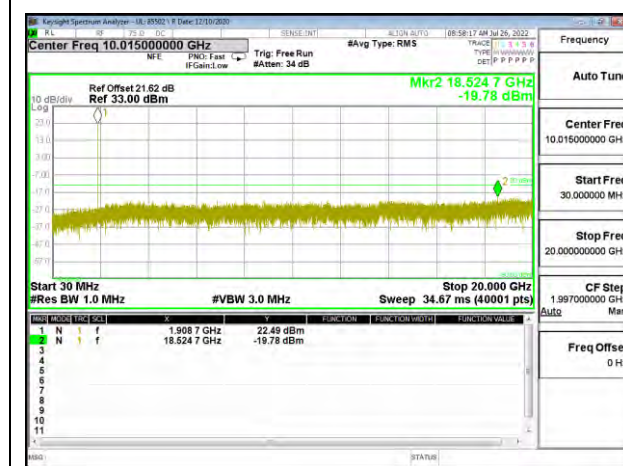
The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.



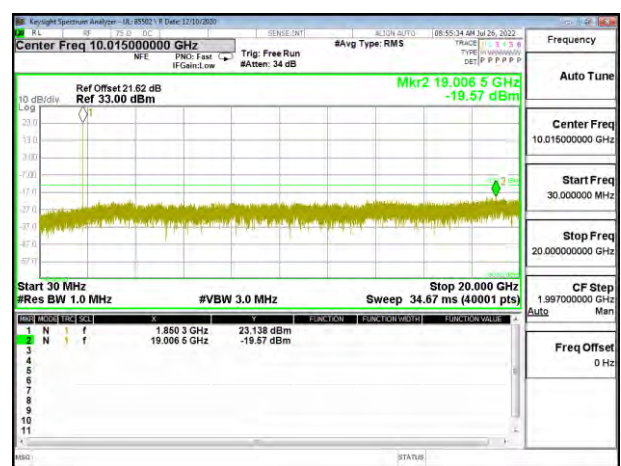
LTE2 1.4MHz QPSK LOW Ch RB1-0



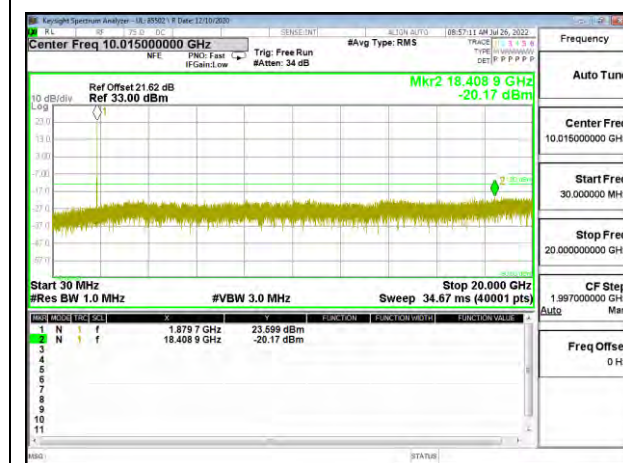
LTE2 1.4MHz QPSK MID Ch RB1-0



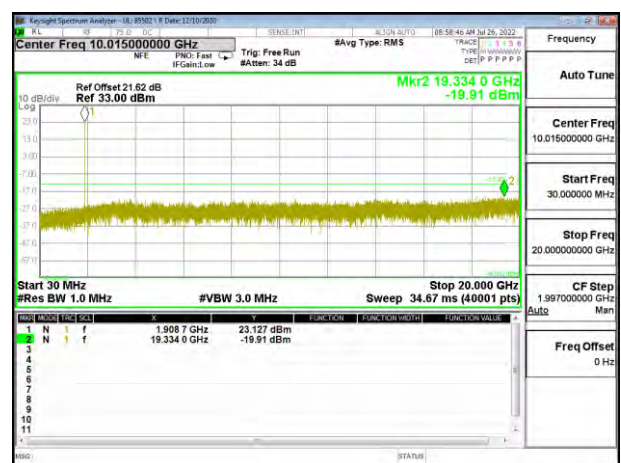
LTE2 1.4MHz QPSK HIGH Ch RB1-0



LTE2 1.4MHz 16QAM LOW Ch RB1-0



LTE2 1.4MHz 16QAM MID Ch RB1-0



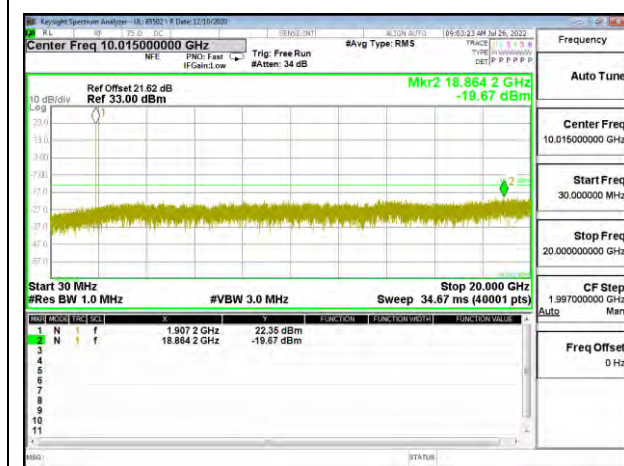
LTE2 1.4MHz 16QAM HIGH Ch RB1-0



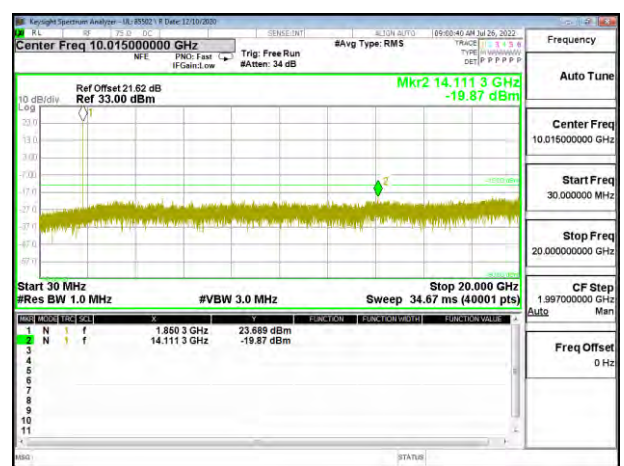
LTE2 3MHz QPSK LOW Ch RB1-0



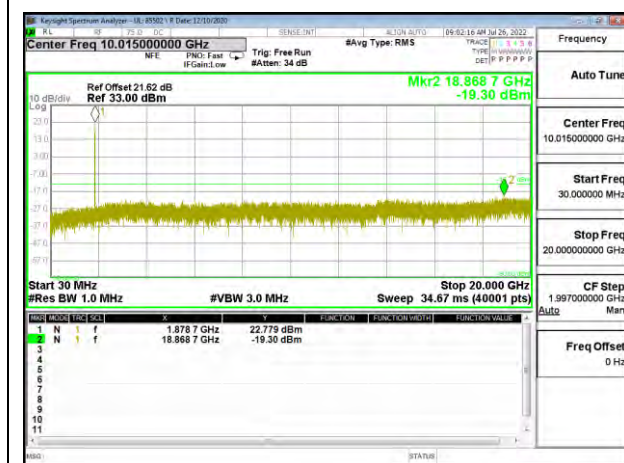
LTE2 3MHz QPSK MID Ch RB1-0



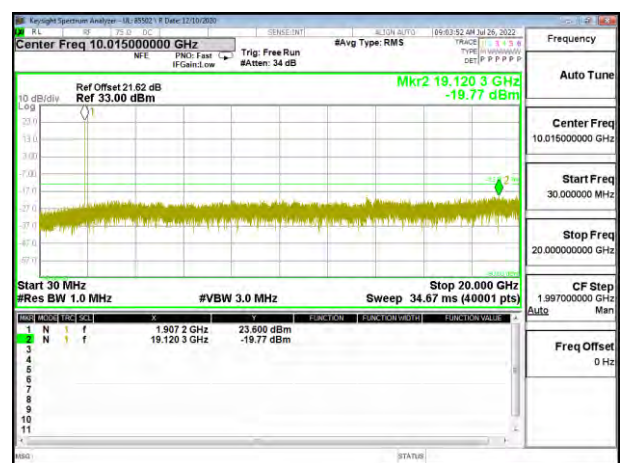
LTE2 3MHz QPSK HIGH Ch RB1-0



LTE2 3MHz 16QAM LOW Ch RB1-0



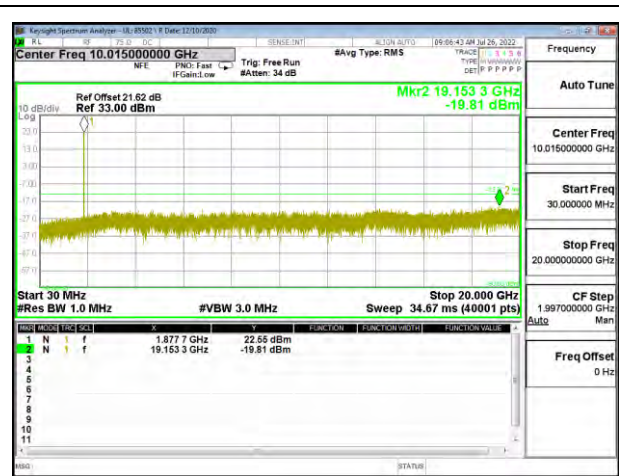
LTE2 3MHz 16QAM MID Ch RB1-0



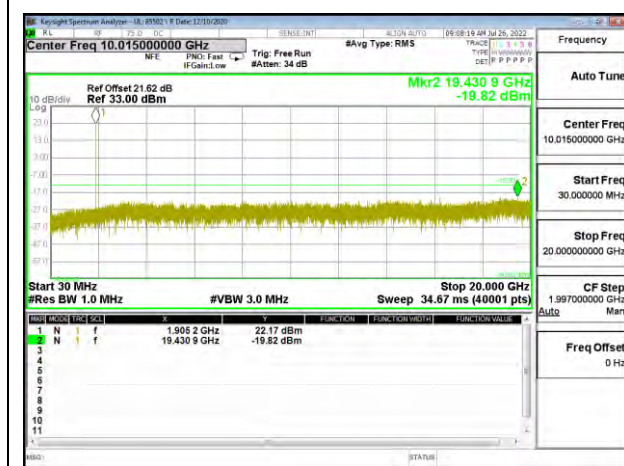
LTE2 3MHz 16QAM HIGH Ch RB1-0



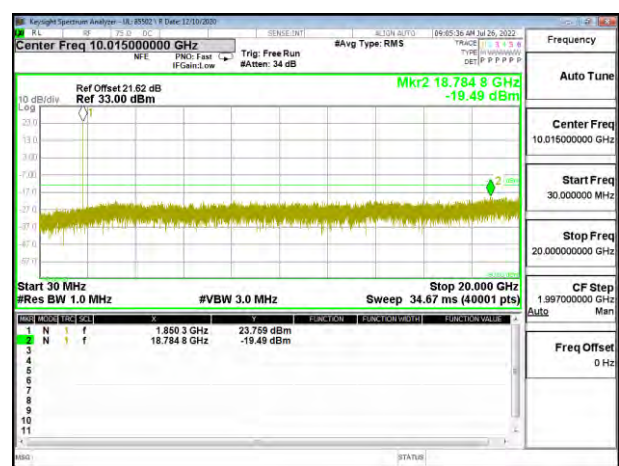
LTE2 5MHz QPSK LOW Ch RB1-0



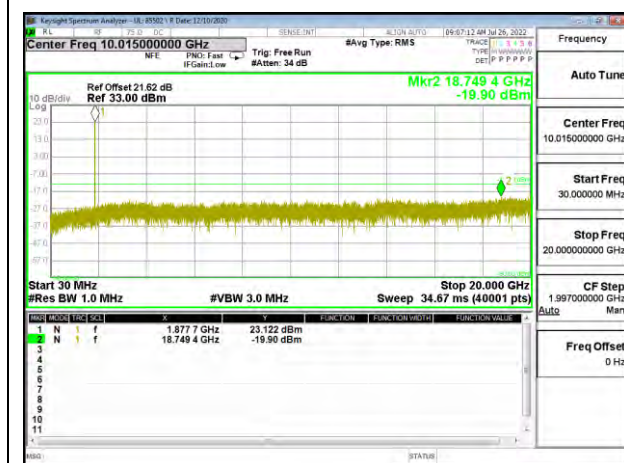
LTE2 5MHz QPSK MID Ch RB1-0



LTE2 5MHz QPSK HIGH Ch RB1-0



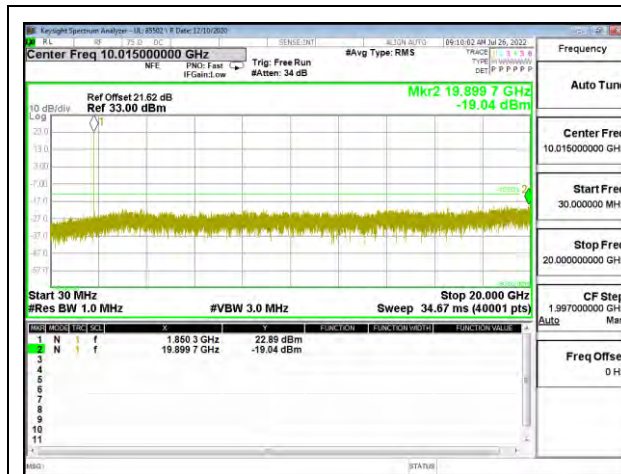
LTE2 5MHz 16QAM LOW Ch RB1-0



LTE2 5MHz 16QAM MID Ch RB1-0



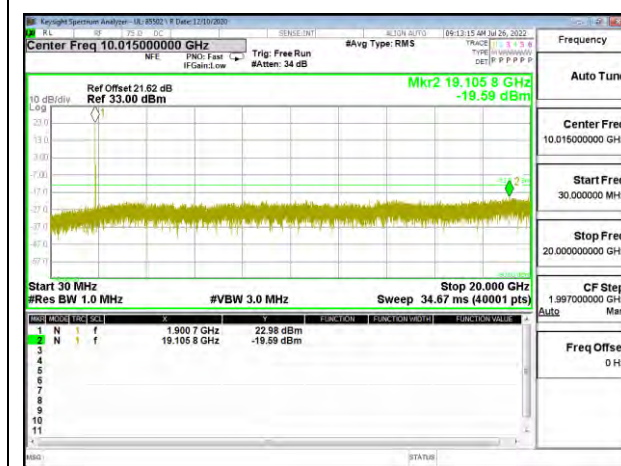
LTE2 5MHz 16QAM HIGH Ch RB1-0



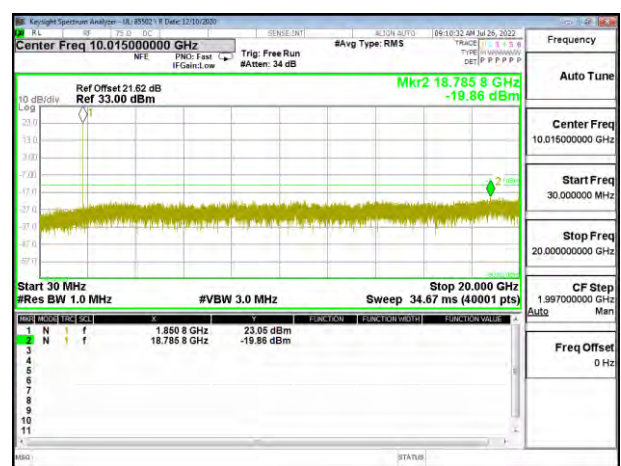
LTE2 10MHz QPSK LOW Ch RB1-0



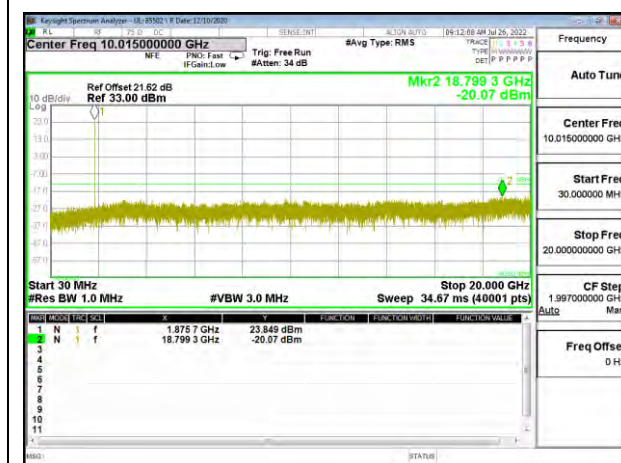
LTE2 10MHz QPSK MID Ch RB1-0



LTE2 10MHz QPSK HIGH Ch RB1-0



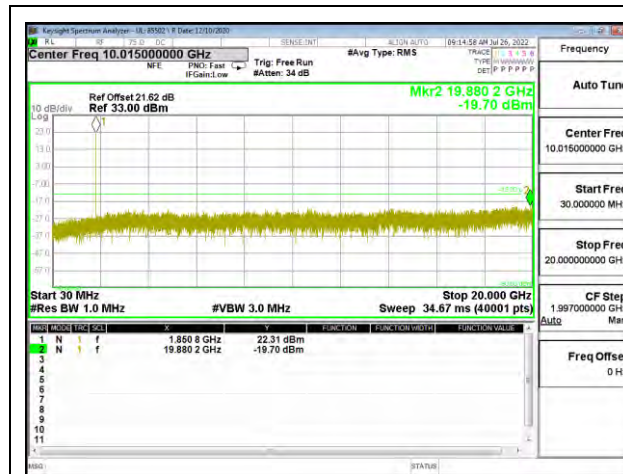
LTE2 10MHz 16QAM LOW Ch RB1-0



LTE2 10MHz 16QAM MID Ch RB1-0



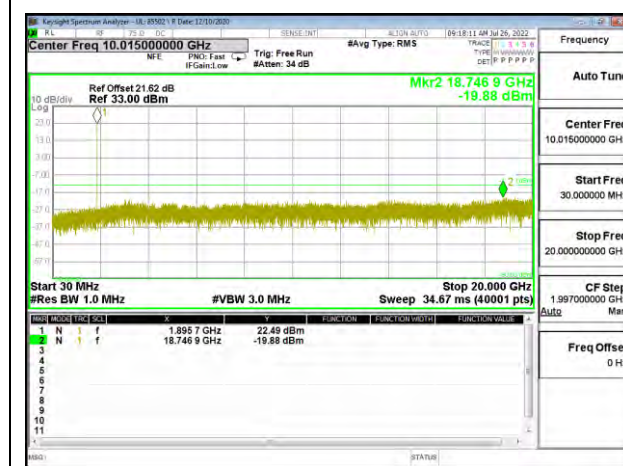
LTE2 10MHz 16QAM HIGH Ch RB1-0



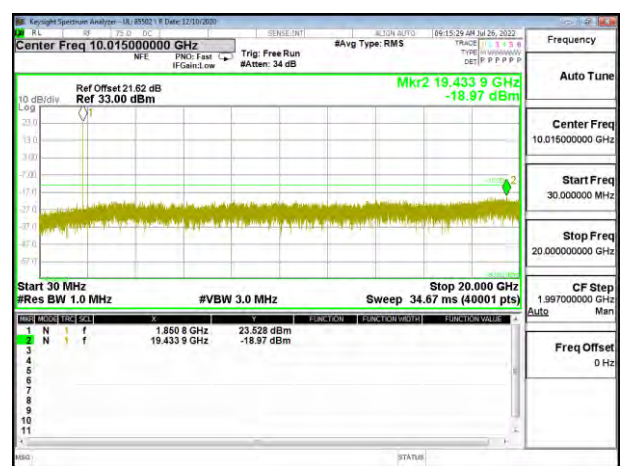
LTE2 15MHz QPSK LOW Ch RB1-0



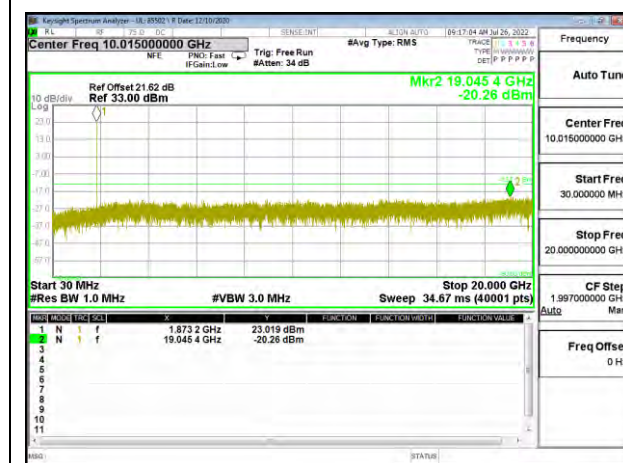
LTE2 15MHz QPSK MID Ch RB1-0



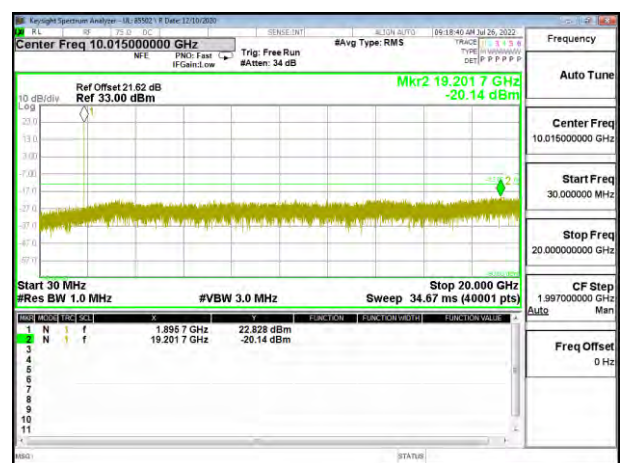
LTE2 15MHz QPSK HIGH Ch RB1-0



LTE2 15MHz 16QAM LOW Ch RB1-0



LTE2 15MHz 16QAM MID Ch RB1-0



LTE2 15MHz 16QAM HIGH Ch RB1-0



LTE2 20MHz QPSK LOW Ch RB1-0



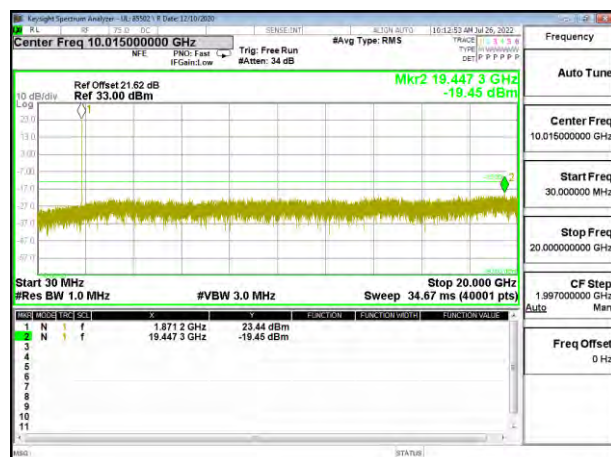
LTE2 20MHz QPSK MID Ch RB1-0



LTE2 20MHz QPSK HIGH Ch RB1-0



LTE2 20MHz 16QAM LOW Ch RB1-0



LTE2 20MHz 16QAM MID Ch RB1-0



LTE2 20MHz 16QAM HIGH Ch RB1-0

### 9.3.6. LTE BAND 4

#### LIMITS

FCC: §27.53(h)

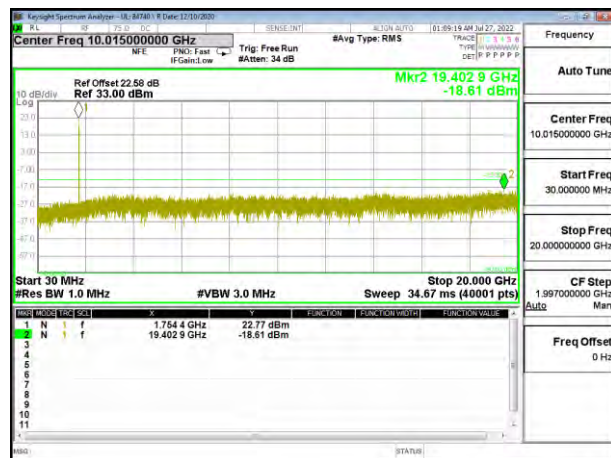
The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.



LTE4 1.4MHz QPSK LOW Ch RB1-0



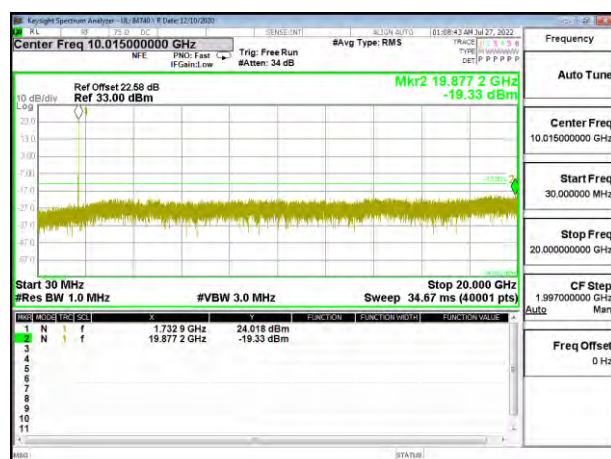
LTE4 1.4MHz QPSK MID Ch RB1-0



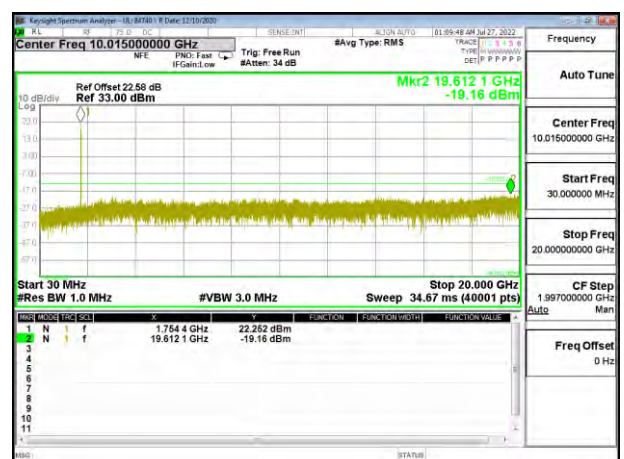
LTE4 1.4MHz QPSK HIGH Ch RB1-0



LTE4 1.4MHz 16QAM LOW Ch RB1-0



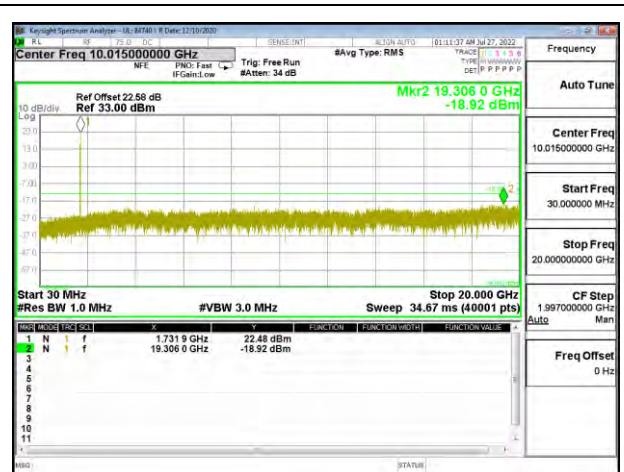
LTE4 1.4MHz 16QAM MID Ch RB1-0



LTE4 1.4MHz 16QAM HIGH Ch RB1-0



LTE4 3MHz QPSK LOW Ch RB1-0



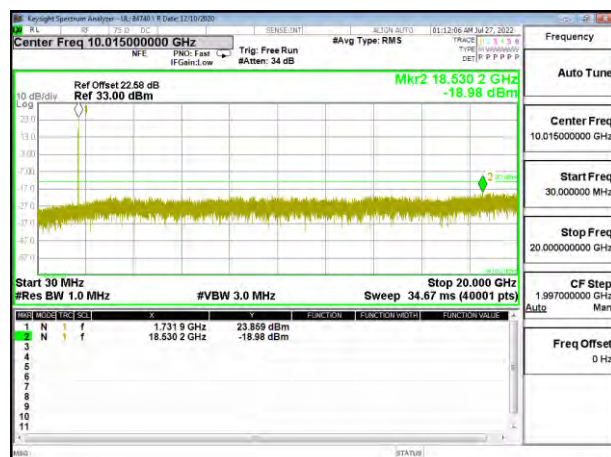
LTE4 3MHz QPSK MID Ch RB1-0



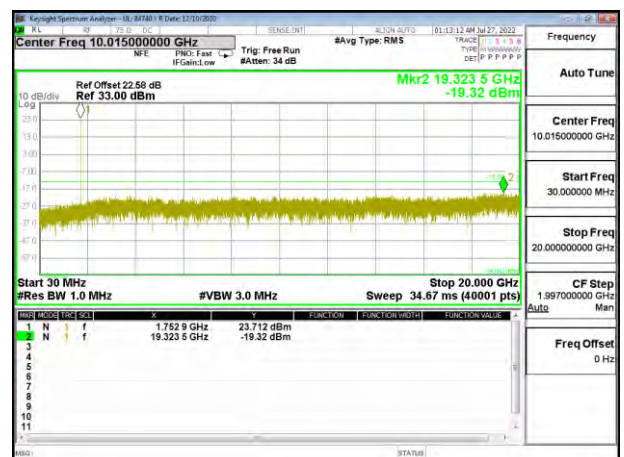
LTE4 3MHz QPSK HIGH Ch RB1-0



LTE4 3MHz 16QAM LOW Ch RB1-0



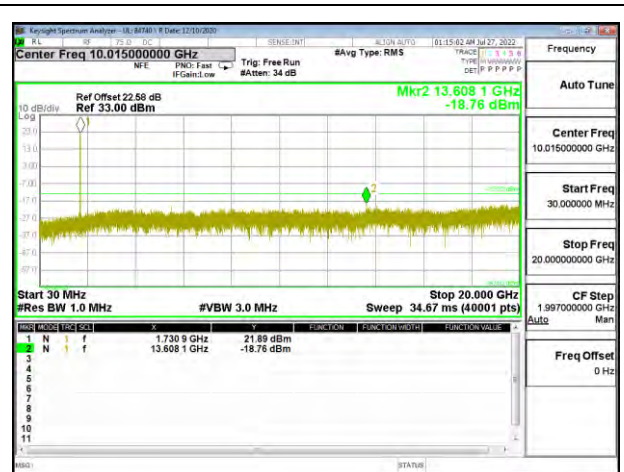
LTE4 3MHz 16QAM MID Ch RB1-0



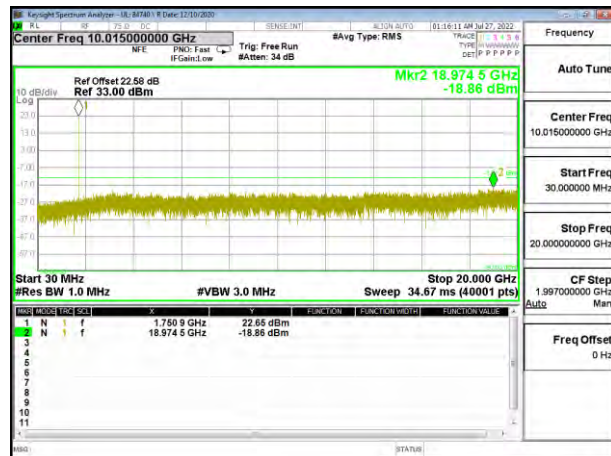
LTE4 3MHz 16QAM HIGH Ch RB1-0



LTE4 5MHz QPSK LOW Ch RB1-0



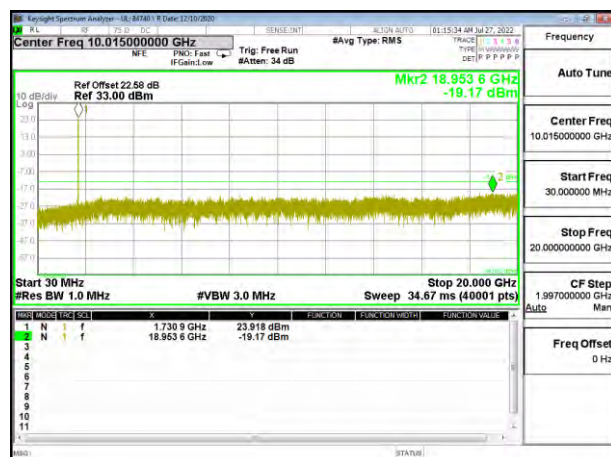
LTE4 5MHz QPSK MID Ch RB1-0



LTE4 5MHz QPSK HIGH Ch RB1-0



LTE4 5MHz 16QAM LOW Ch RB1-0



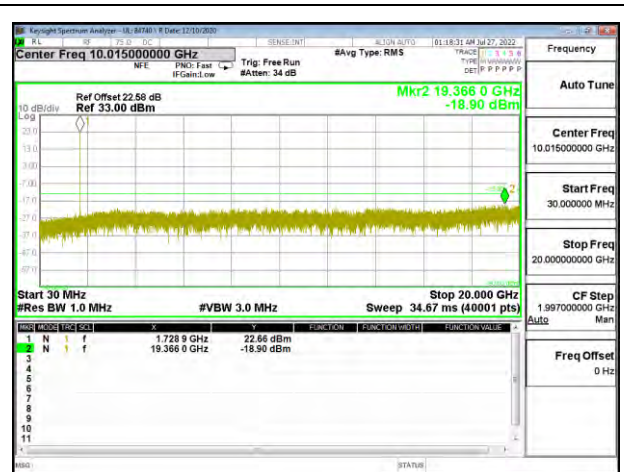
LTE4 5MHz 16QAM MID Ch RB1-0



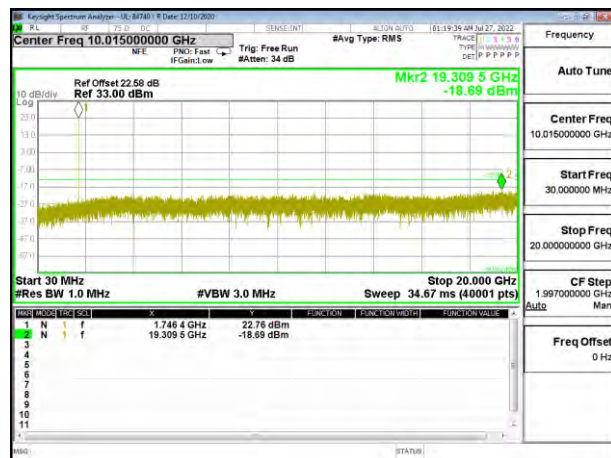
LTE4 5MHz 16QAM HIGH Ch RB1-0



LTE4 10MHz QPSK LOW Ch RB1-0



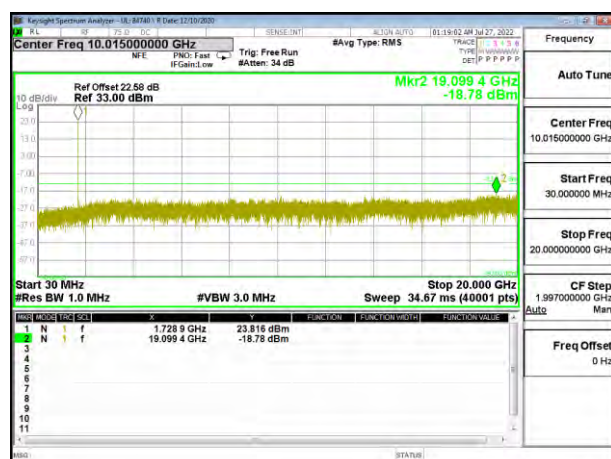
LTE4 10MHz QPSK MID Ch RB1-0



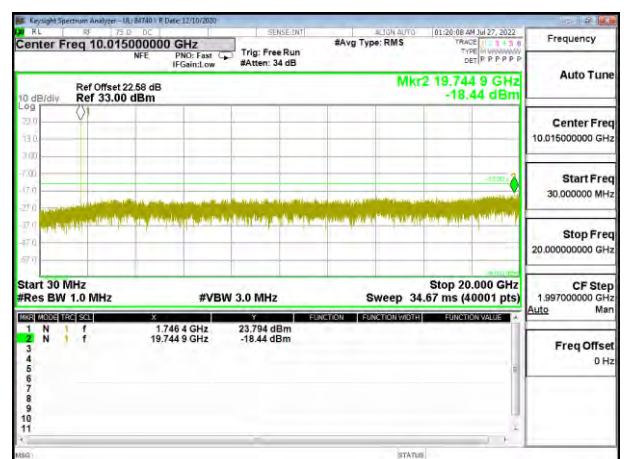
LTE4 10MHz QPSK HIGH Ch RB1-0



LTE4 10MHz 16QAM LOW Ch RB1-0



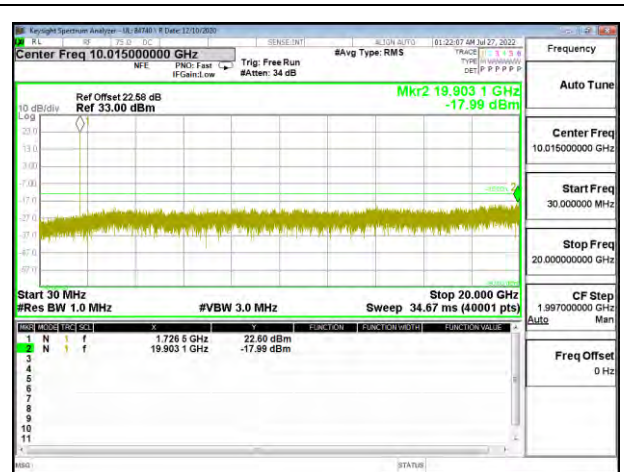
LTE4 10MHz 16QAM MID Ch RB1-0



LTE4 10MHz 16QAM HIGH Ch RB1-0



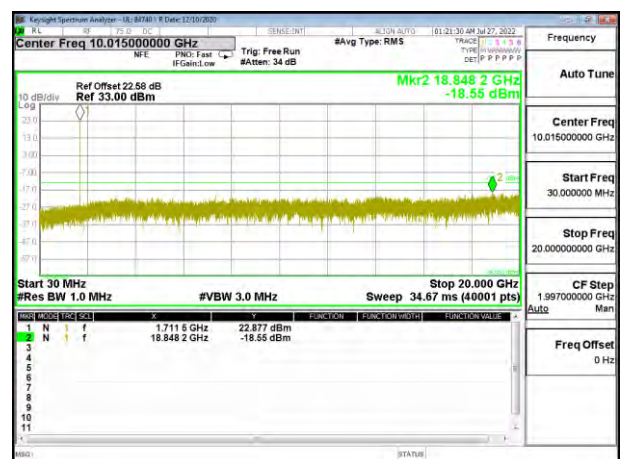
LTE4 15MHz QPSK LOW Ch RB1-0



LTE4 15MHz QPSK MID Ch RB1-0



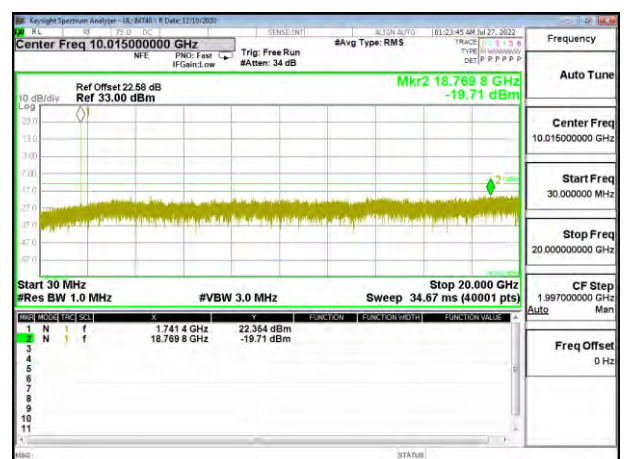
LTE4 15MHz QPSK HIGH Ch RB1-0



LTE4 15MHz 16QAM LOW Ch RB1-0



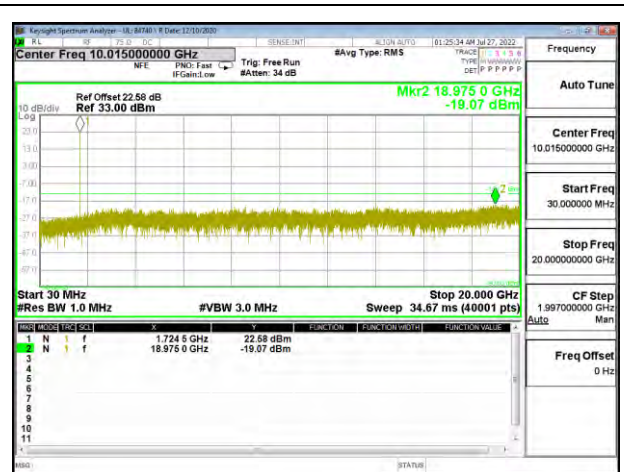
LTE4 15MHz 16QAM MID Ch RB1-0



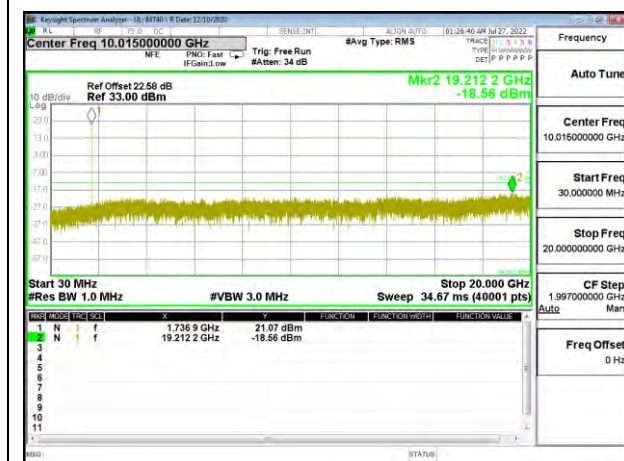
LTE4 15MHz 16QAM HIGH Ch RB1-0



LTE4 20MHz QPSK LOW Ch RB1-0



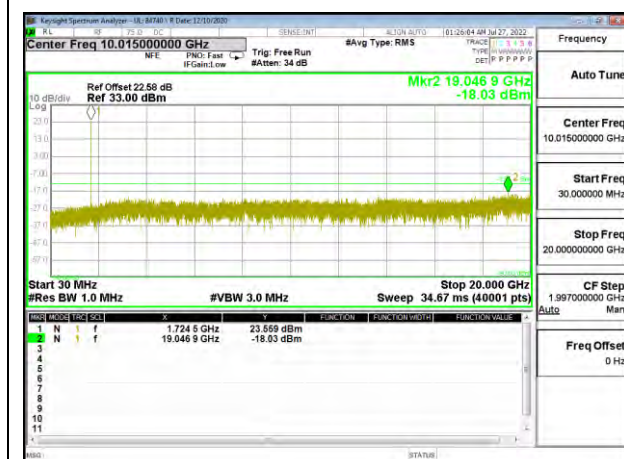
LTE4 20MHz QPSK MID Ch RB1-0



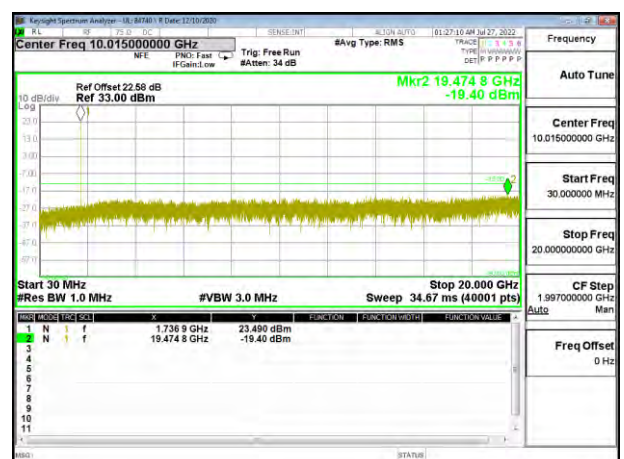
LTE4 20MHz QPSK HIGH Ch RB1-0



LTE4 20MHz 16QAM LOW Ch RB1-0



LTE4 20MHz 16QAM MID Ch RB1-0



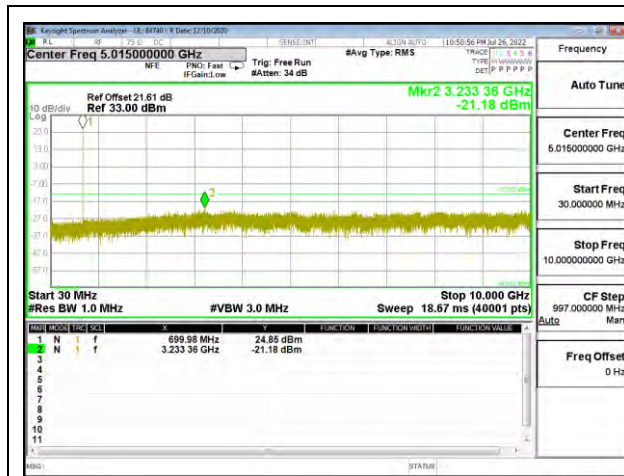
LTE4 20MHz 16QAM HIGH Ch RB1-0

### 9.3.7. LTE BAND 12

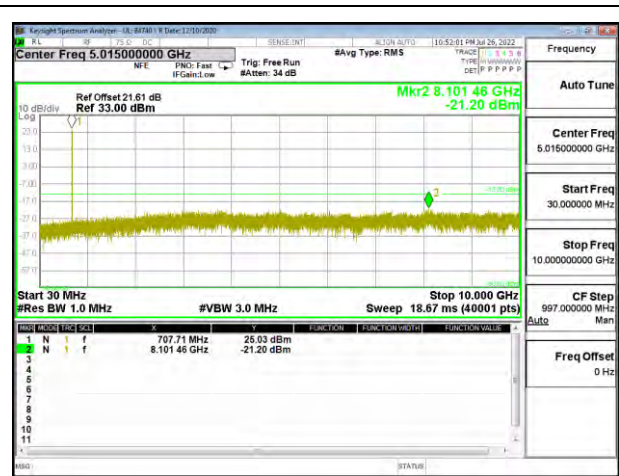
#### LIMITS

FCC: §27.53 (g)

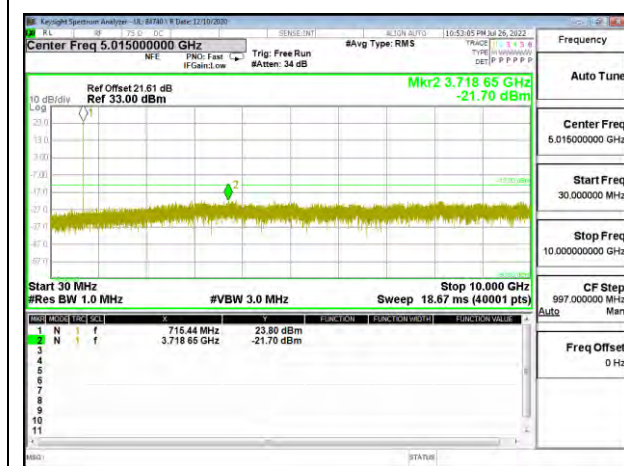
The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.



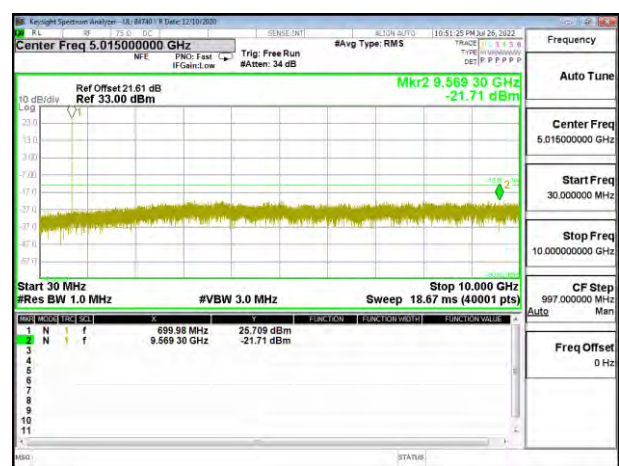
LTE12 1.4MHz QPSK LOW Ch RB1-0



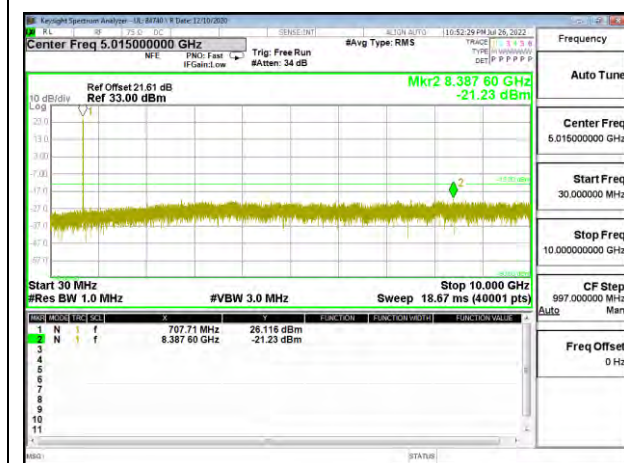
LTE12 1.4MHz QPSK MID Ch RB1-0



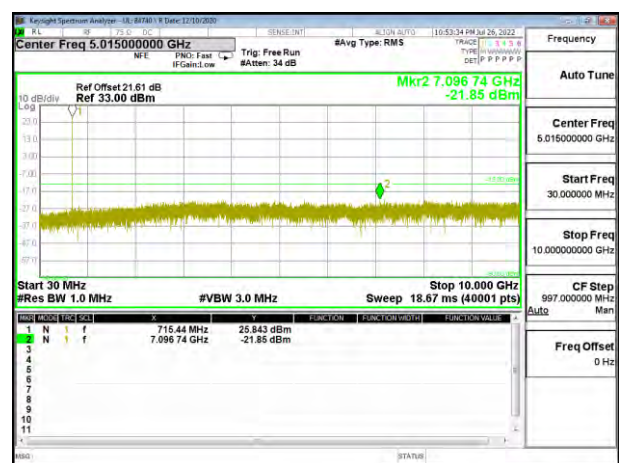
LTE12 1.4MHz QPSK HIGH Ch RB1-0



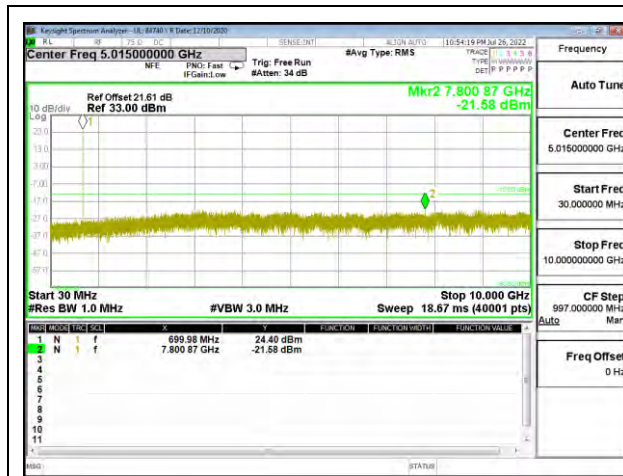
LTE12 1.4MHz 16QAM LOW Ch RB1-0



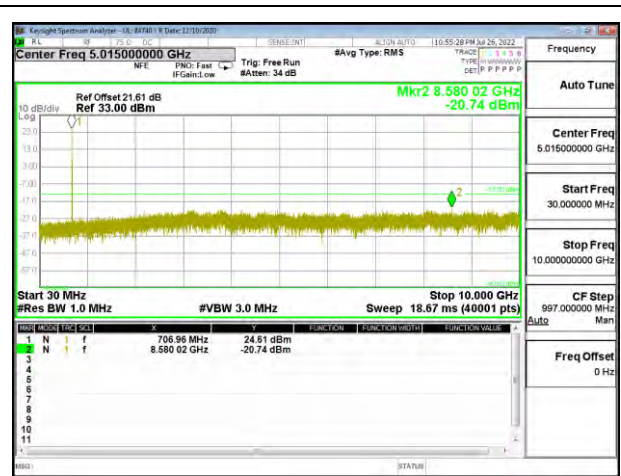
LTE12 1.4MHz 16QAM MID Ch RB1-0



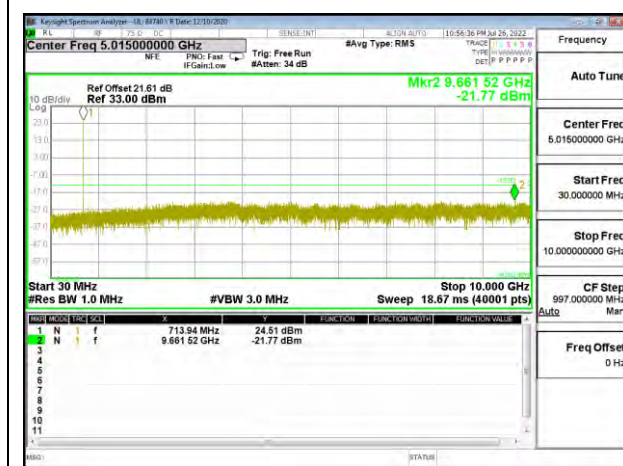
LTE12 1.4MHz 16QAM HIGH Ch RB1-0



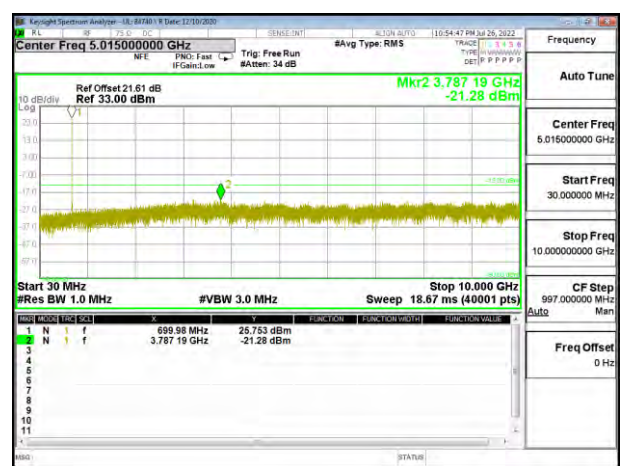
LTE12 3MHz QPSK LOW Ch RB1-0



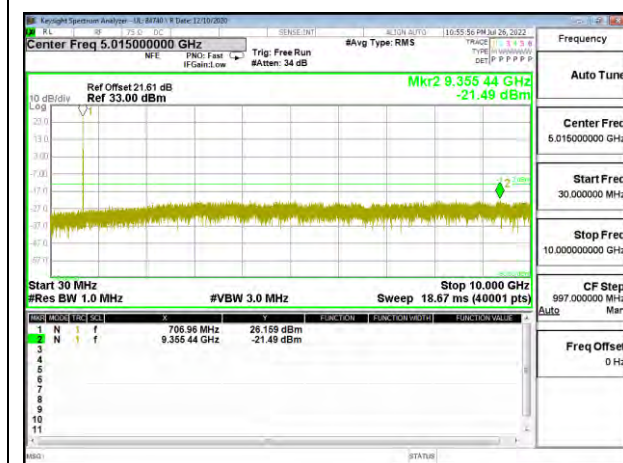
LTE12 3MHz QPSK MID Ch RB1-0



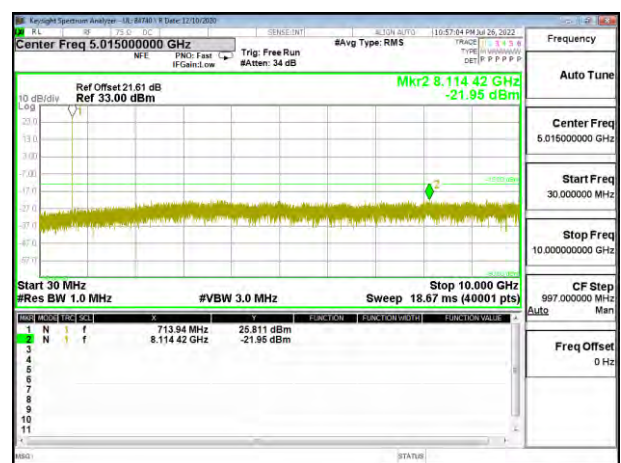
LTE12 3MHz QPSK HIGH Ch RB1-0



LTE12 3MHz 16QAM LOW Ch RB1-0



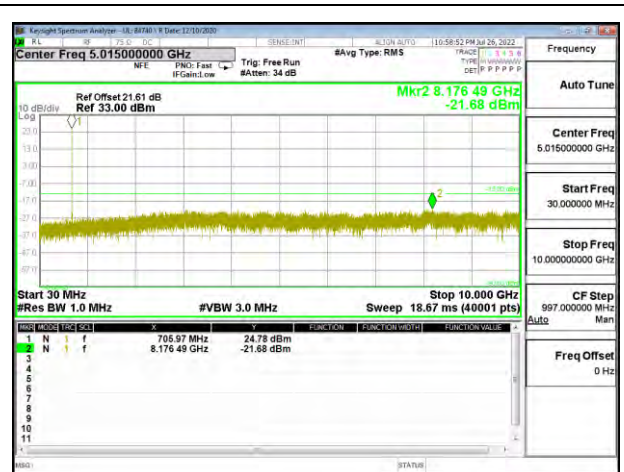
LTE12 3MHz 16QAM MID Ch RB1-0



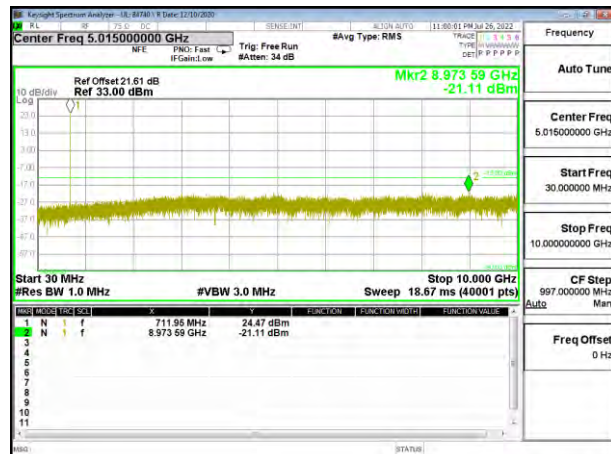
LTE12 3MHz 16QAM HIGH Ch RB1-0



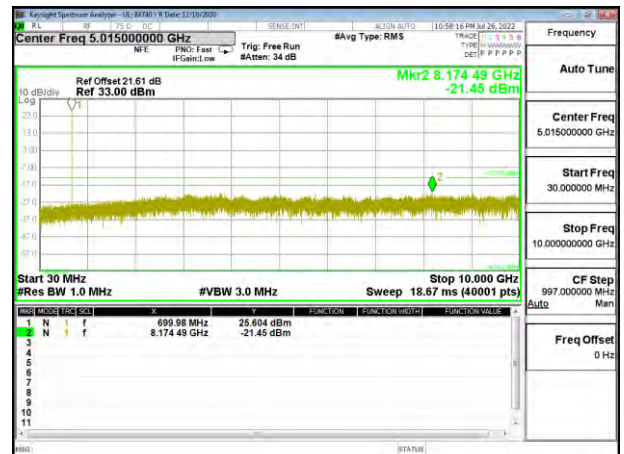
LTE12 5MHz QPSK LOW Ch RB1-0



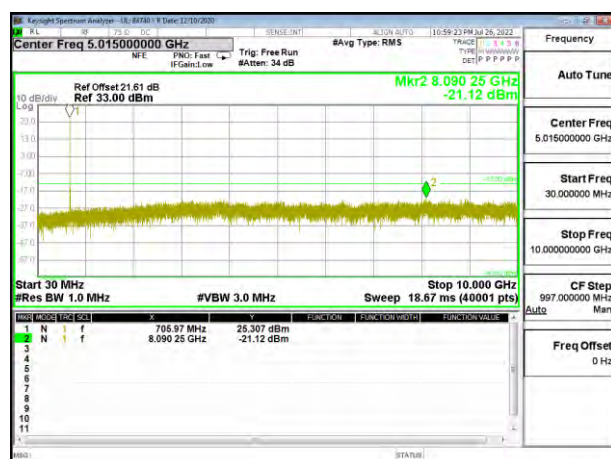
LTE12 5MHz QPSK MID Ch RB1-0



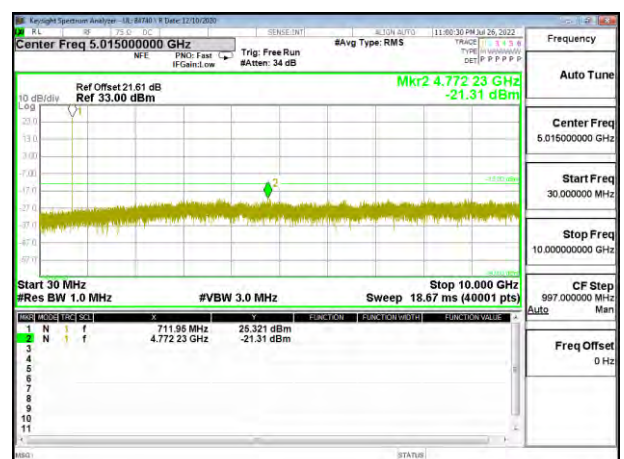
LTE12 5MHz QPSK HIGH Ch RB1-0



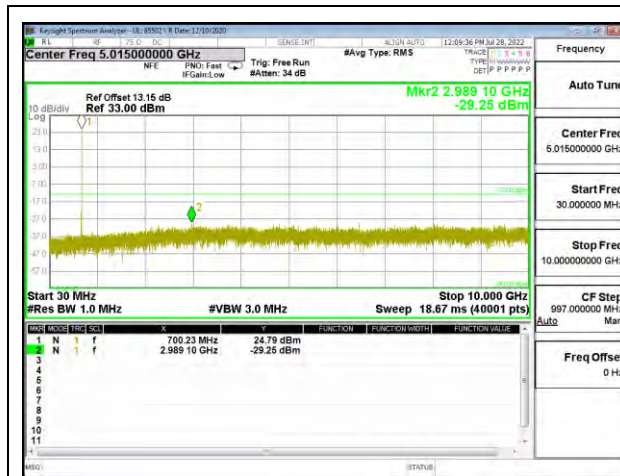
LTE12 5MHz 16QAM LOW Ch RB1-0



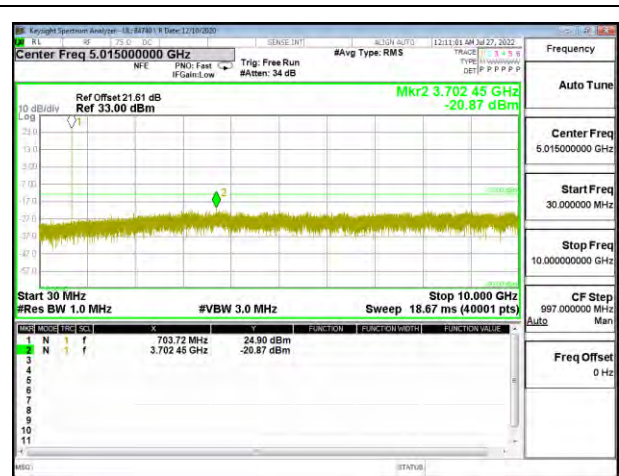
LTE12 5MHz 16QAM MID Ch RB1-0



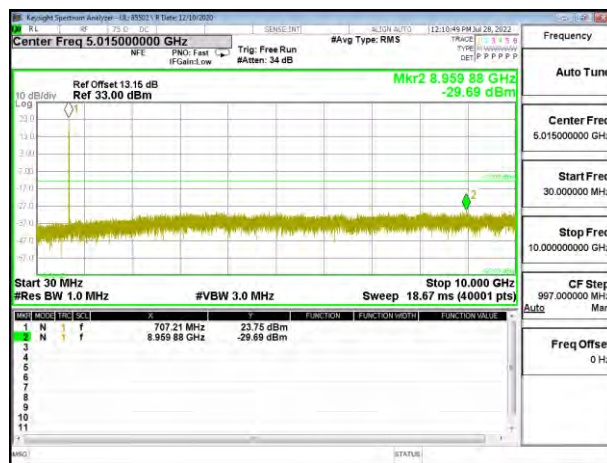
LTE12 5MHz 16QAM HIGH Ch RB1-0



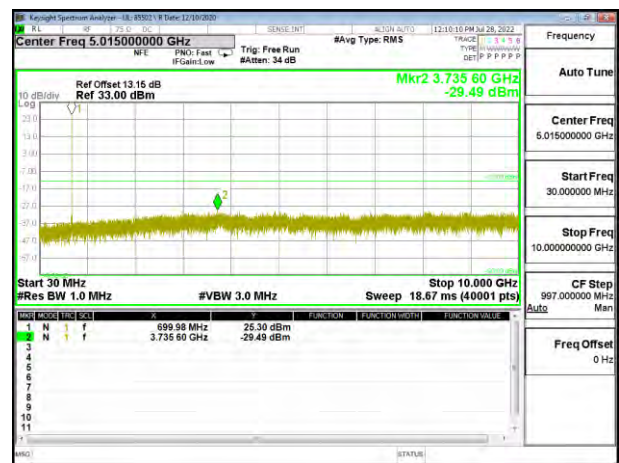
LTE12 10MHz QPSK LOW Ch RB1-0



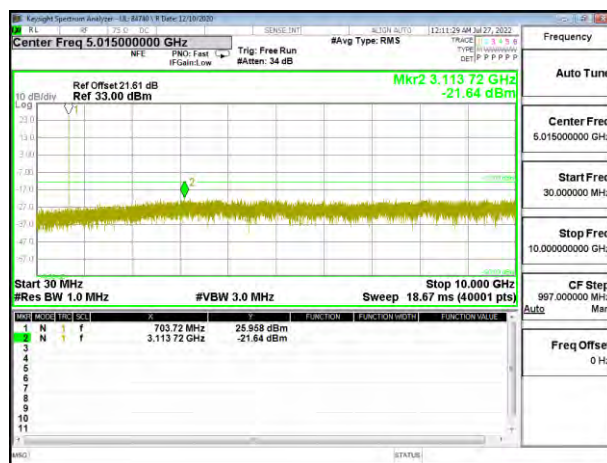
LTE12 10MHz QPSK MID Ch RB1-0



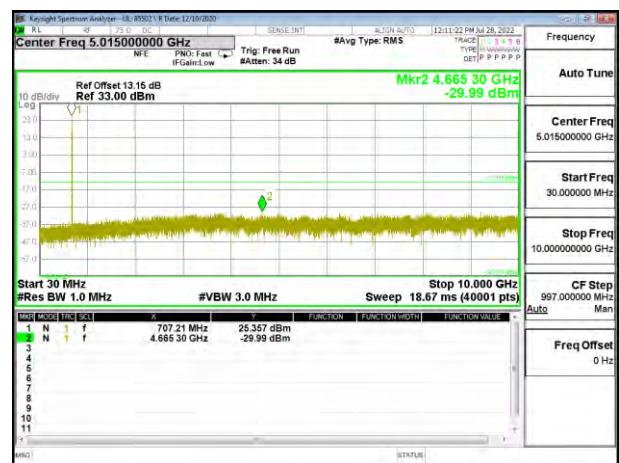
LTE12 10MHz QPSK HIGH Ch RB1-0



LTE12 10MHz 16QAM LOW Ch RB1-0



LTE12 10MHz 16QAM MID Ch RB1-0



LTE12 10MHz 16QAM HIGH Ch RB1-0

## 9.4. FREQUENCY STABILITY

### **TEST PROCEDURE**

Use CMW 500 with Frequency Error measurement capability.

(vii) Temp. = -30°C to +50°C

(viii) Voltage = (85% - 115%)

Normal, 3.89VDC.

End Voltage, 3.69VDC.

### **Frequency Stability vs Temperature:**

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

### **Frequency Stability vs Voltage:**

The peak frequency error is recorded (worst-case).

### **RESULTS**

### 9.4.1. GSM

|                   |             |            |            |
|-------------------|-------------|------------|------------|
| Test Engineer ID: | 84740/44389 | Test Date: | 2022-07-28 |
|-------------------|-------------|------------|------------|

#### GSM850

| Limit          |           | 824            | 849             | Delta (Hz) LOW | Delta (Hz) HIGH | Frequency Stability (ppm) LOW | Frequency Stability (ppm) HIGH |
|----------------|-----------|----------------|-----------------|----------------|-----------------|-------------------------------|--------------------------------|
| Condition      |           | F low @ -13dBm | F high @ -13dBm |                |                 |                               |                                |
| Temperature    | Voltage   | (MHz)          | (MHz)           |                |                 |                               |                                |
| Normal (20C)   | Normal    | 824.2000       | 848.0000        |                |                 |                               |                                |
| Extreme (50C)  |           | 824.2000       | 848.0000        | 22.5           | 24.2            | 0.05                          | 0.06                           |
| Extreme (40C)  |           | 824.2000       | 848.0000        | 23.8           | 25.4            | 0.06                          | 0.06                           |
| Extreme (30C)  |           | 824.2000       | 848.0000        | 25.1           | 23.3            | 0.06                          | 0.05                           |
| Extreme (10C)  |           | 824.2000       | 848.0000        | 23.3           | 23.7            | 0.06                          | 0.06                           |
| Extreme (0C)   |           | 824.2001       | 848.0000        | 31.7           | 25.4            | 0.08                          | 0.06                           |
| Extreme (-10C) |           | 824.2001       | 848.0001        | 29.4           | 26.1            | 0.07                          | 0.06                           |
| Extreme (-20C) |           | 824.2000       | 848.0000        | 26.7           | 24.6            | 0.06                          | 0.06                           |
| Extreme (-30C) |           | 824.2000       | 848.0001        | 27.1           | 27.6            | 0.07                          | 0.06                           |
| 20C            | End Point | 824.2000       | 848.0001        | 26.3           | 27.3            | 0.06                          | 0.06                           |

#### GSM1900

| Limit          |           | 1850           | 1910            | Delta (Hz) LOW | Delta (Hz) HIGH | Frequency Stability (ppm) LOW | Frequency Stability (ppm) HIGH |
|----------------|-----------|----------------|-----------------|----------------|-----------------|-------------------------------|--------------------------------|
| Condition      |           | F low @ -13dBm | F high @ -13dBm |                |                 |                               |                                |
| Temperature    | Voltage   | (MHz)          | (MHz)           |                |                 |                               |                                |
| Normal (20C)   | Normal    | 1850.2000      | 1909.8000       |                |                 |                               |                                |
| Extreme (50C)  |           | 1850.2000      | 1909.8000       | 19.9           | 18.5            | 0.02                          | 0.02                           |
| Extreme (40C)  |           | 1850.2000      | 1909.8000       | 17.9           | 18.3            | 0.02                          | 0.02                           |
| Extreme (30C)  |           | 1850.2000      | 1909.8000       | 19.5           | 16.9            | 0.02                          | 0.02                           |
| Extreme (10C)  |           | 1850.2000      | 1909.8000       | 17.8           | 16.7            | 0.02                          | 0.02                           |
| Extreme (0C)   |           | 1850.2000      | 1909.8000       | 16.3           | 16.7            | 0.02                          | 0.02                           |
| Extreme (-10C) |           | 1850.2000      | 1909.8000       | 15.5           | 15.9            | 0.02                          | 0.02                           |
| Extreme (-20C) |           | 1850.2000      | 1909.8000       | 14.9           | 14.5            | 0.02                          | 0.02                           |
| Extreme (-30C) |           | 1850.2000      | 1909.8000       | 13.6           | 13.9            | 0.01                          | 0.01                           |
| 20C            | End Point | 1850.2000      | 1909.8000       | 13.5           | 14.7            | 0.01                          | 0.02                           |

## 9.4.2. WCDMA

|                   |             |            |            |
|-------------------|-------------|------------|------------|
| Test Engineer ID: | 27465/44389 | Test Date: | 2022-07-28 |
|-------------------|-------------|------------|------------|

### BAND 2

| Limit          |           | 1850              | 1910               | Delta<br>(Hz)<br>LOW | Delta<br>(Hz)<br>HIGH | Frequency<br>Stability<br>(ppm)<br>LOW | Frequency<br>Stability<br>(ppm)<br>HIGH |
|----------------|-----------|-------------------|--------------------|----------------------|-----------------------|----------------------------------------|-----------------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |                      |                       |                                        |                                         |
| Temperature    | Voltage   | (MHz)             | (MHz)              |                      |                       |                                        |                                         |
| Normal (20C)   | Normal    | 1852.4000         | 1907.6000          |                      |                       |                                        |                                         |
| Extreme (50C)  |           | 1852.4000         | 1907.6000          | 5.0                  | -1.7                  | 0.01                                   | 0.00                                    |
| Extreme (40C)  |           | 1852.4000         | 1907.6000          | 1.8                  | -0.3                  | 0.00                                   | 0.00                                    |
| Extreme (30C)  |           | 1852.4000         | 1907.6000          | -0.5                 | 1.4                   | 0.00                                   | 0.00                                    |
| Extreme (10C)  |           | 1852.4000         | 1907.6000          | 0.6                  | 7.4                   | 0.00                                   | 0.01                                    |
| Extreme (0C)   |           | 1852.4000         | 1907.6000          | -2.2                 | 9.5                   | 0.00                                   | 0.01                                    |
| Extreme (-10C) |           | 1852.4000         | 1907.6000          | -1.9                 | 9.3                   | 0.00                                   | 0.01                                    |
| Extreme (-20C) |           | 1852.4000         | 1907.6000          | -1.6                 | 8.5                   | 0.00                                   | 0.01                                    |
| Extreme (-30C) |           | 1852.4000         | 1907.6000          | 0.5                  | 6.0                   | 0.00                                   | 0.01                                    |
|                |           |                   |                    |                      |                       |                                        |                                         |
| 20C            | End Point | 1852.4000         | 1907.6000          | 2.6                  | 1.8                   | 0.00                                   | 0.00                                    |

### BAND 4

| Limit          |           | 1710              | 1755               | Delta<br>(Hz)<br>LOW | Delta<br>(Hz)<br>HIGH | Frequency<br>Stability<br>(ppm)<br>LOW | Frequency<br>Stability<br>(ppm)<br>HIGH |
|----------------|-----------|-------------------|--------------------|----------------------|-----------------------|----------------------------------------|-----------------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |                      |                       |                                        |                                         |
| Temperature    | Voltage   | (MHz)             | (MHz)              |                      |                       |                                        |                                         |
| Normal (20C)   | Normal    | 1712.4000         | 1752.5000          |                      |                       |                                        |                                         |
| Extreme (50C)  |           | 1712.4000         | 1752.5000          | 13.9                 | -12.5                 | 0.02                                   | -0.01                                   |
| Extreme (40C)  |           | 1712.4000         | 1752.5000          | 8.0                  | -5.0                  | 0.01                                   | -0.01                                   |
| Extreme (30C)  |           | 1712.4000         | 1752.5000          | -2.9                 | 2.7                   | 0.00                                   | 0.00                                    |
| Extreme (10C)  |           | 1712.4000         | 1752.5000          | -13.7                | 18.9                  | -0.02                                  | 0.02                                    |
| Extreme (0C)   |           | 1712.4000         | 1752.5000          | -20.0                | 25.8                  | -0.02                                  | 0.03                                    |
| Extreme (-10C) |           | 1712.4000         | 1752.5000          | -20.4                | 27.7                  | -0.02                                  | 0.03                                    |
| Extreme (-20C) |           | 1712.4000         | 1752.5000          | -17.9                | 24.3                  | -0.02                                  | 0.03                                    |
| Extreme (-30C) |           | 1712.4000         | 1752.5000          | -14.6                | 19.6                  | -0.02                                  | 0.02                                    |
|                |           |                   |                    |                      |                       |                                        |                                         |
| 20C            | End Point | 1712.4000         | 1752.5000          | 7.5                  | -4.3                  | 0.01                                   | 0.00                                    |

### 9.4.3. LTE BAND 2

#### LIMITS

FCC: §24.235

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

|                   |             |            |            |
|-------------------|-------------|------------|------------|
| Test Engineer ID: | 27465/44389 | Test Date: | 2022-07-27 |
|-------------------|-------------|------------|------------|

#### QPSK (20MHz)

| Limit          |           | 1850              | 1910               | Delta<br>(Hz)<br>LOW | Delta<br>(Hz)<br>HIGH | Frequency<br>Stability<br>(ppm)<br>LOW | Frequency<br>Stability<br>(ppm)<br>HIGH |
|----------------|-----------|-------------------|--------------------|----------------------|-----------------------|----------------------------------------|-----------------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |                      |                       |                                        |                                         |
| Temperature    | Voltage   | (MHz)             | (MHz)              |                      |                       |                                        |                                         |
| Normal (20C)   | Normal    | 1860.0000         | 1900.0000          |                      |                       |                                        |                                         |
| Extreme (50C)  |           | 1860.0000         | 1900.0000          | 0.4                  | -0.2                  | 0.00                                   | 0.00                                    |
| Extreme (40C)  |           | 1860.0000         | 1900.0000          | 0.0                  | 0.2                   | 0.00                                   | 0.00                                    |
| Extreme (30C)  |           | 1860.0000         | 1900.0000          | 0.6                  | 0.3                   | 0.00                                   | 0.00                                    |
| Extreme (10C)  |           | 1860.0000         | 1900.0000          | -0.8                 | -0.5                  | 0.00                                   | 0.00                                    |
| Extreme (0C)   |           | 1860.0000         | 1900.0000          | 1.0                  | -0.7                  | 0.00                                   | 0.00                                    |
| Extreme (-10C) |           | 1860.0000         | 1900.0000          | -1.0                 | 0.8                   | 0.00                                   | 0.00                                    |
| Extreme (-20C) |           | 1860.0000         | 1900.0000          | 0.0                  | -1.0                  | 0.00                                   | 0.00                                    |
| Extreme (-30C) |           | 1860.0000         | 1900.0000          | 0.1                  | -0.5                  | 0.00                                   | 0.00                                    |
| 20C            | End Point | 1860.0000         | 1900.0000          | -0.9                 | 1.0                   | 0.00                                   | 0.00                                    |

#### 9.4.4. LTE BAND 4

##### LIMITS

FCC: §27.54

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

|                   |             |            |            |
|-------------------|-------------|------------|------------|
| Test Engineer ID: | 27465/44389 | Test Date: | 2022-07-27 |
|-------------------|-------------|------------|------------|

##### QPSK (20MHz)

| Limit          |           | 1710              | 1755               | Delta<br>(Hz)<br>LOW | Delta<br>(Hz)<br>HIGH | Frequency<br>Stability<br>(ppm)<br>LOW | Frequency<br>Stability<br>(ppm)<br>HIGH |
|----------------|-----------|-------------------|--------------------|----------------------|-----------------------|----------------------------------------|-----------------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |                      |                       |                                        |                                         |
| Temperature    | Voltage   | (MHz)             | (MHz)              |                      |                       |                                        |                                         |
| Normal (20C)   | Normal    | 1720.0000         | 1745.0000          |                      |                       |                                        |                                         |
| Extreme (50C)  |           | 1720.0000         | 1745.0000          | -0.8                 | 0.9                   | 0.00                                   | 0.00                                    |
| Extreme (40C)  |           | 1720.0000         | 1745.0000          | 0.4                  | -0.3                  | 0.00                                   | 0.00                                    |
| Extreme (30C)  |           | 1720.0000         | 1745.0000          | -1.0                 | -0.9                  | 0.00                                   | 0.00                                    |
| Extreme (10C)  |           | 1720.0000         | 1745.0000          | 0.5                  | 0.8                   | 0.00                                   | 0.00                                    |
| Extreme (0C)   |           | 1720.0000         | 1745.0000          | 0.3                  | -0.3                  | 0.00                                   | 0.00                                    |
| Extreme (-10C) |           | 1720.0000         | 1745.0000          | 0.4                  | 0.8                   | 0.00                                   | 0.00                                    |
| Extreme (-20C) |           | 1720.0000         | 1745.0000          | -0.6                 | 0.4                   | 0.00                                   | 0.00                                    |
| Extreme (-30C) |           | 1720.0000         | 1745.0000          | -0.2                 | 0.4                   | 0.00                                   | 0.00                                    |
| 20C            | End Point | 1720.0000         | 1745.0000          | -0.3                 | -0.4                  | 0.00                                   | 0.00                                    |

## 9.4.5. LTE BAND 12

### LIMITS

FCC: §27.54

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

|                   |             |            |            |
|-------------------|-------------|------------|------------|
| Test Engineer ID: | 84740/44389 | Test Date: | 2022-07-27 |
|-------------------|-------------|------------|------------|

### QPSK (10MHz)

| Limit          |           | 699               | 716                | Delta<br>(Hz)<br>LOW | Delta<br>(Hz)<br>HIGH | Frequency<br>Stability<br>(ppm)<br>LOW | Frequency<br>Stability<br>(ppm)<br>HIGH |
|----------------|-----------|-------------------|--------------------|----------------------|-----------------------|----------------------------------------|-----------------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |                      |                       |                                        |                                         |
| Temperature    | Voltage   | (MHz)             | (MHz)              |                      |                       |                                        |                                         |
| Normal (20C)   | Normal    | 704.0000          | 711.0000           |                      |                       |                                        |                                         |
| Extreme (50C)  |           | 704.0000          | 711.0000           | 0.6                  | -0.8                  | 0.00                                   | 0.00                                    |
| Extreme (40C)  |           | 704.0000          | 711.0000           | 0.8                  | -1.0                  | 0.00                                   | 0.00                                    |
| Extreme (30C)  |           | 704.0000          | 711.0000           | 0.5                  | -2.0                  | 0.00                                   | -0.01                                   |
| Extreme (10C)  |           | 704.0000          | 711.0000           | 1.1                  | -0.9                  | 0.00                                   | 0.00                                    |
| Extreme (0C)   |           | 704.0000          | 711.0000           | 1.0                  | -0.1                  | 0.00                                   | 0.00                                    |
| Extreme (-10C) |           | 704.0000          | 711.0000           | 0.1                  | 0.0                   | 0.00                                   | 0.00                                    |
| Extreme (-20C) |           | 704.0000          | 711.0000           | 1.3                  | -0.1                  | 0.00                                   | 0.00                                    |
| Extreme (-30C) |           | 704.0000          | 711.0000           | 1.1                  | -0.8                  | 0.00                                   | 0.00                                    |
| 20C            | End Point | 704.0000          | 711.0000           | 0.0                  | -0.5                  | 0.00                                   | 0.00                                    |

## 9.5. PEAK TO AVERAGE RATIO

### LIMIT

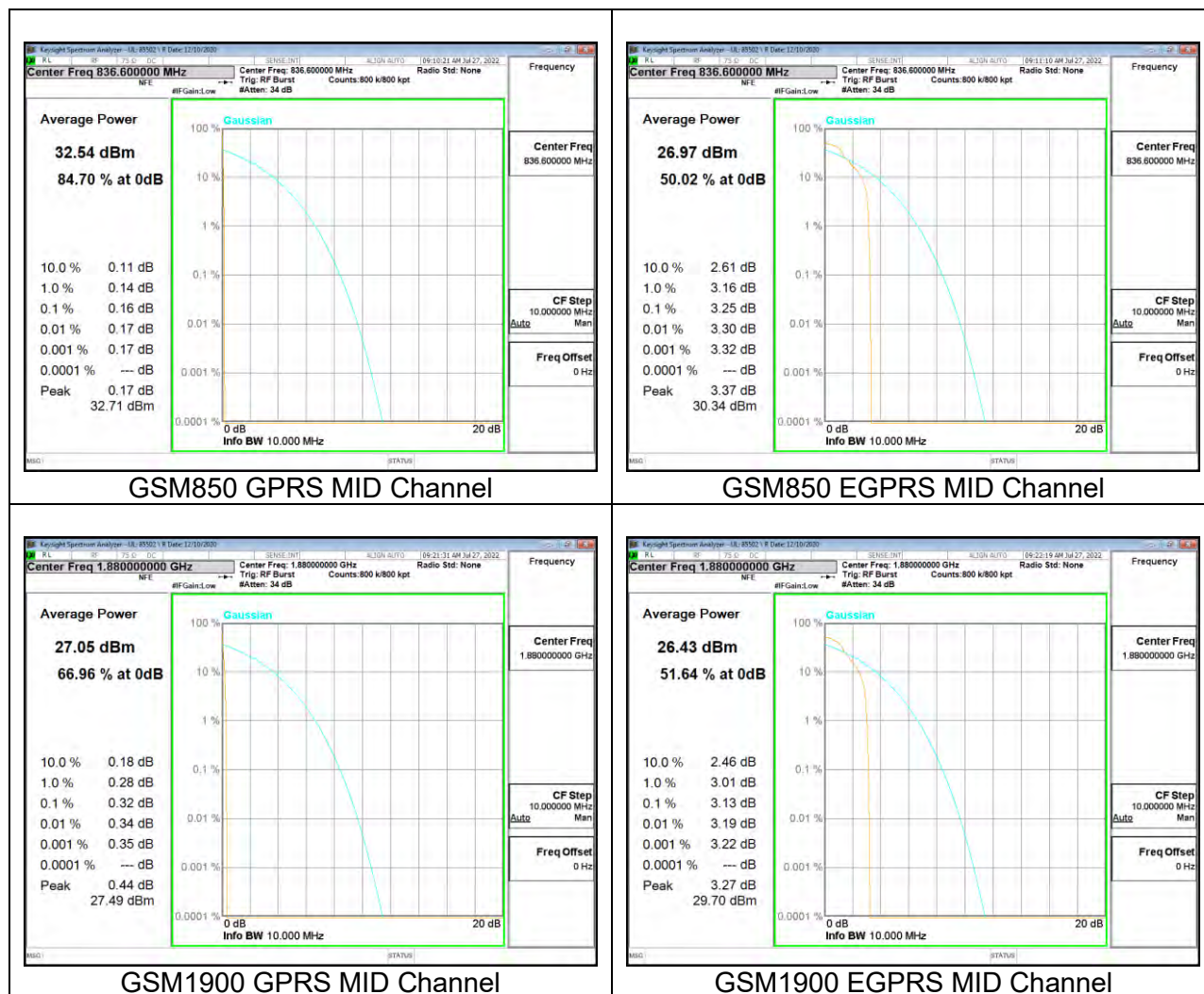
FCC 22.913 (d), 24.232 (d), 27.50 (d) (5), 27.50 (j) (4)

In addition, the peak to average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

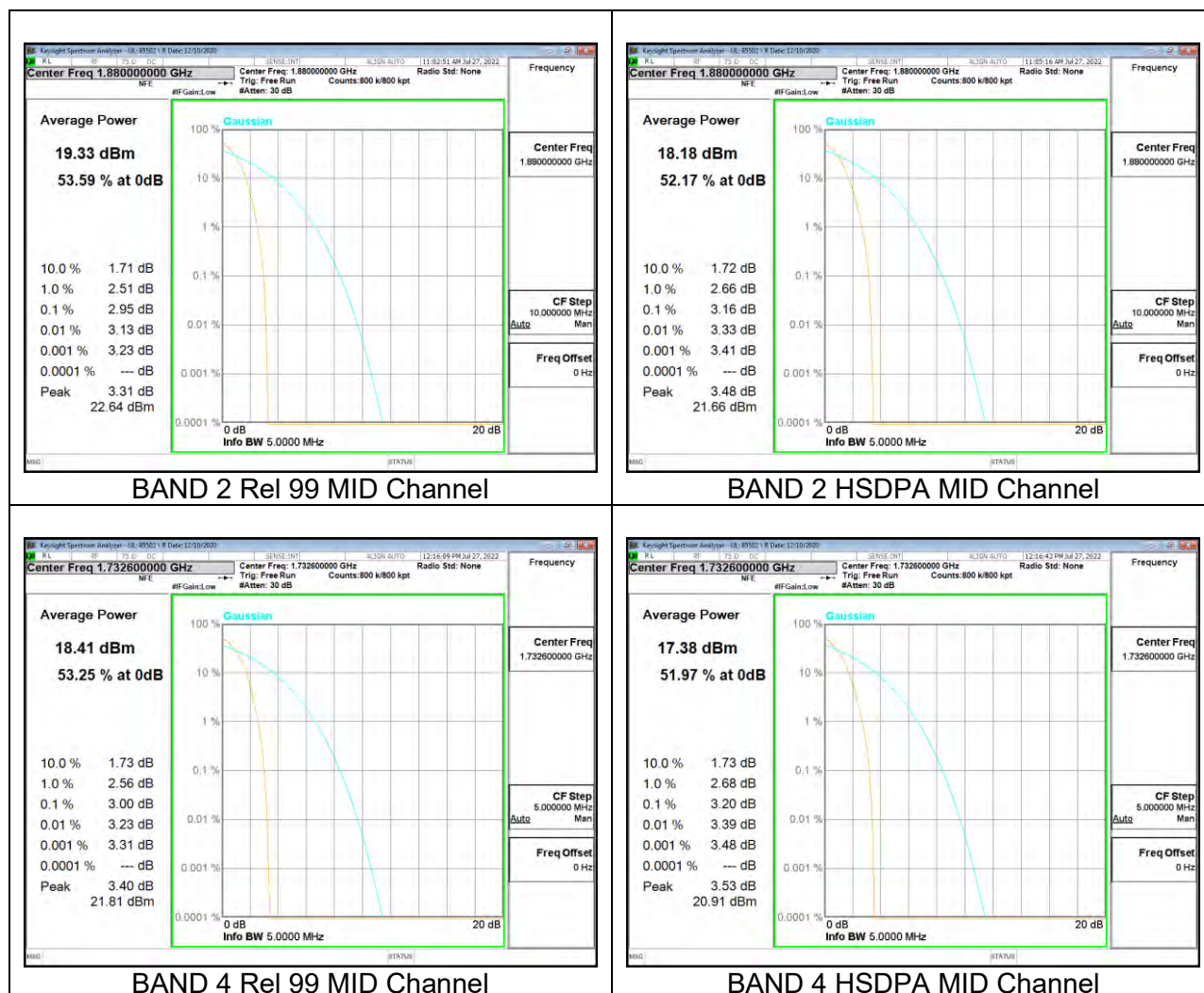
### RESULTS

Antenna 1 was used to measure as the worst case; full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

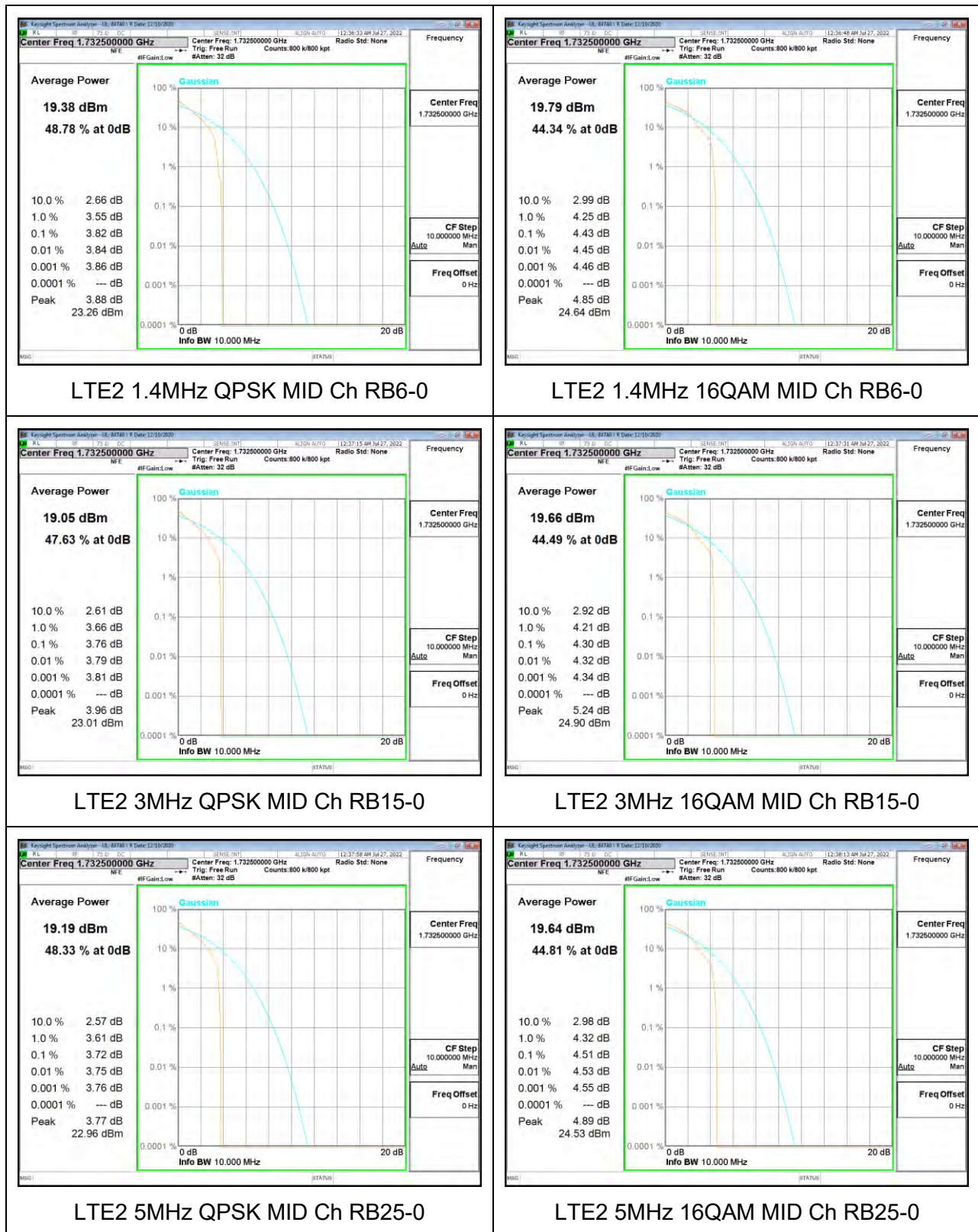
## 9.5.1. GSM

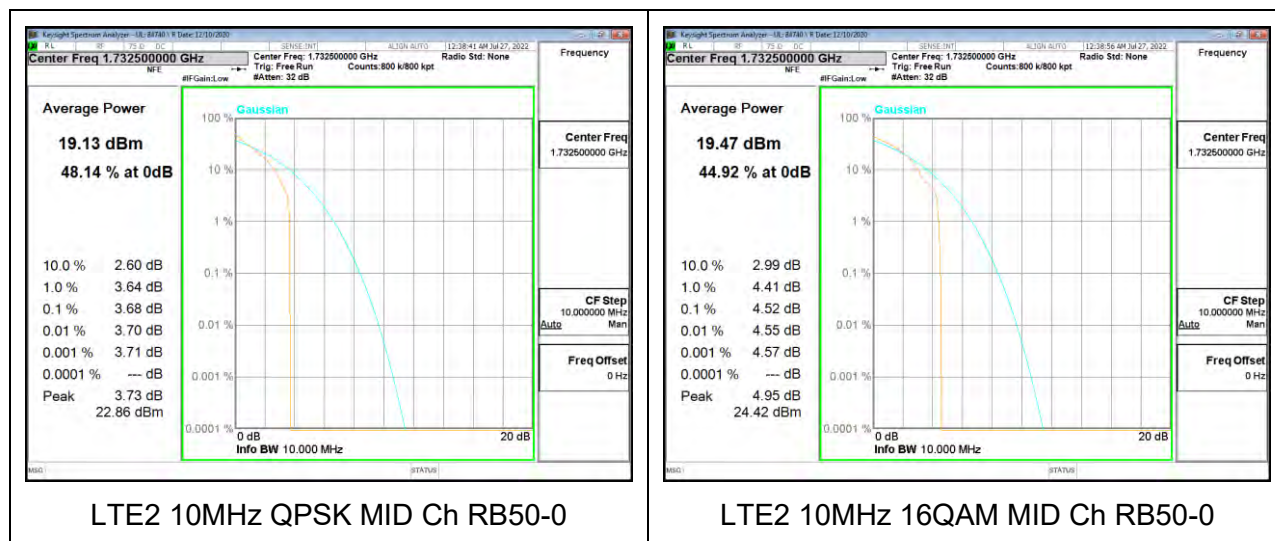


## 9.5.2. WCDMA



### 9.5.3. LTE BAND 2

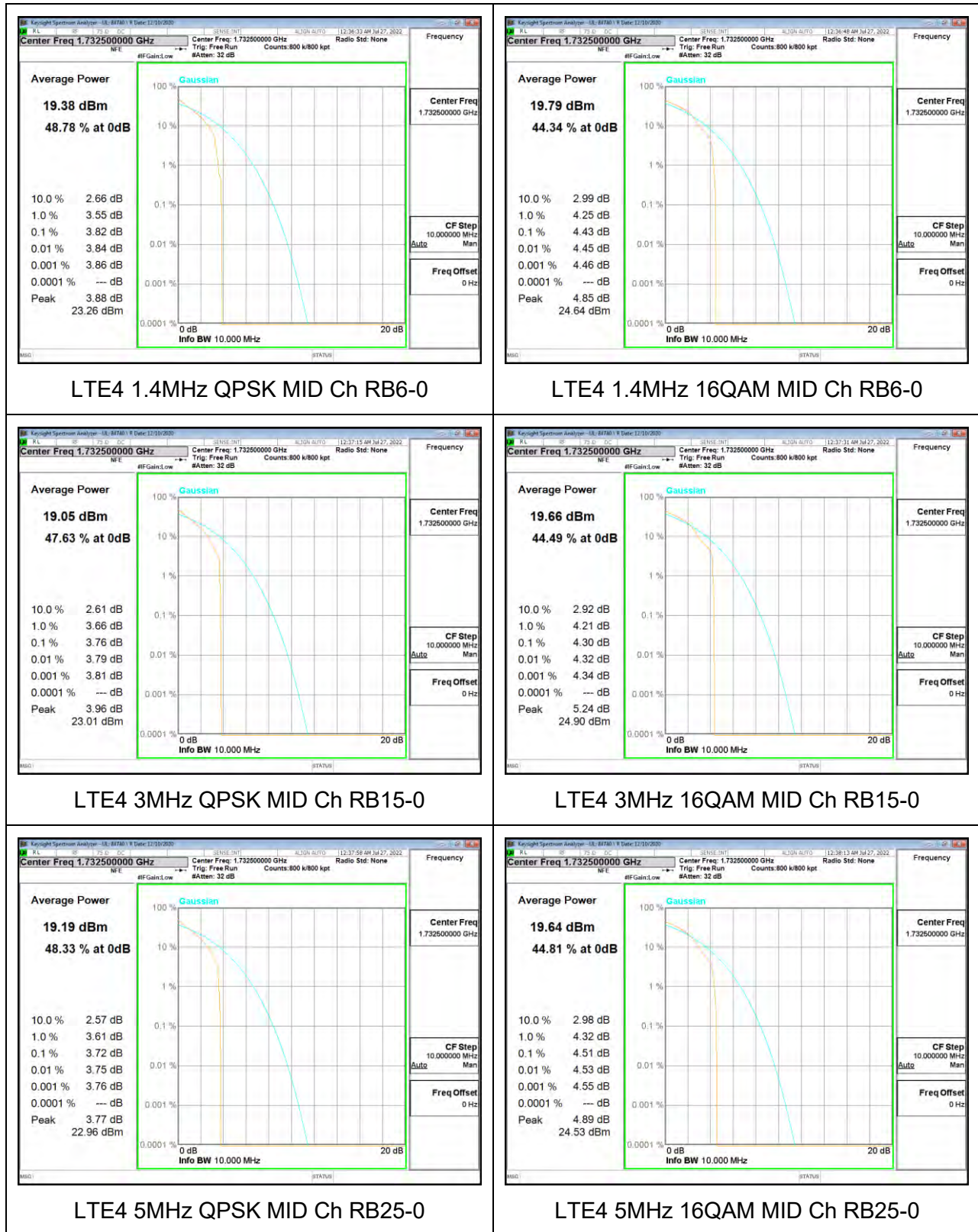


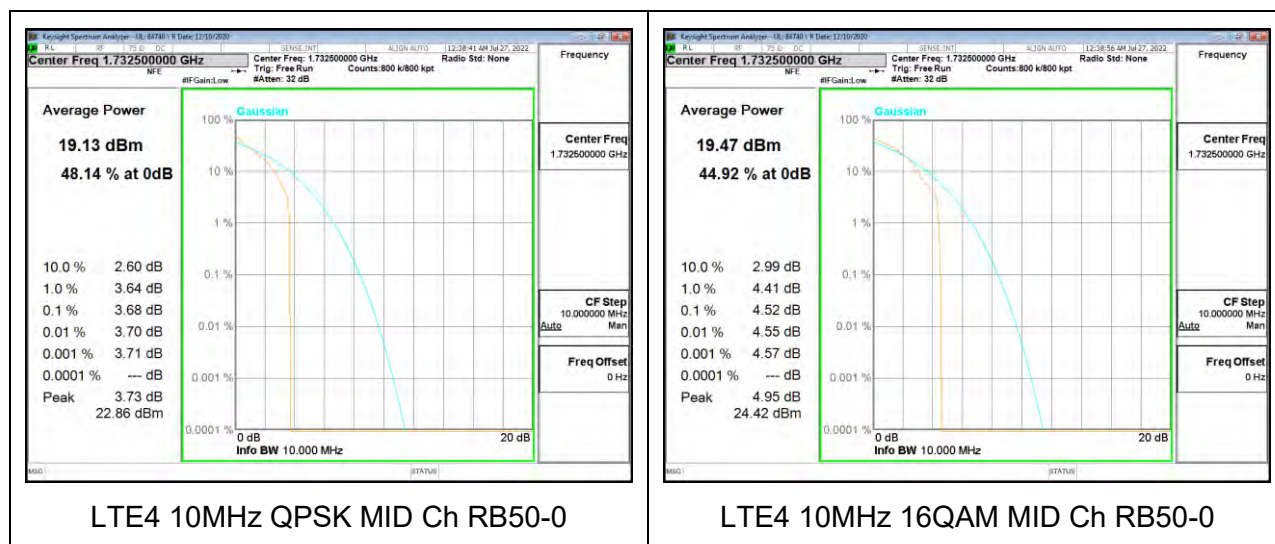


| LTE Band and BW: | QPSK Mid Channel(dBm): | 16QAM Mid Channel(dBm): |
|------------------|------------------------|-------------------------|
| Band 2 15MHz     | 24.3 – 19.0 = 5.30     | 25.4 – 19.0 = 6.40      |
| Band 2 20MHz     | 24.32– 19.02 = 5.30    | 25.30 – 19.10 = 6.20    |

Note: Due to limitations of the test equipment PAR testing of frequencies with BWs greater than or equal to 10MHz were done with a Wideband power meter. Testing was performed in accordance with ANCI:C63.26-2015, where  $PAPR (dB) = P_{pk} (Meas. Peak Power) - P_{avg} (Meas. Avg Power)$ .

## 9.5.4. LTE BAND 4

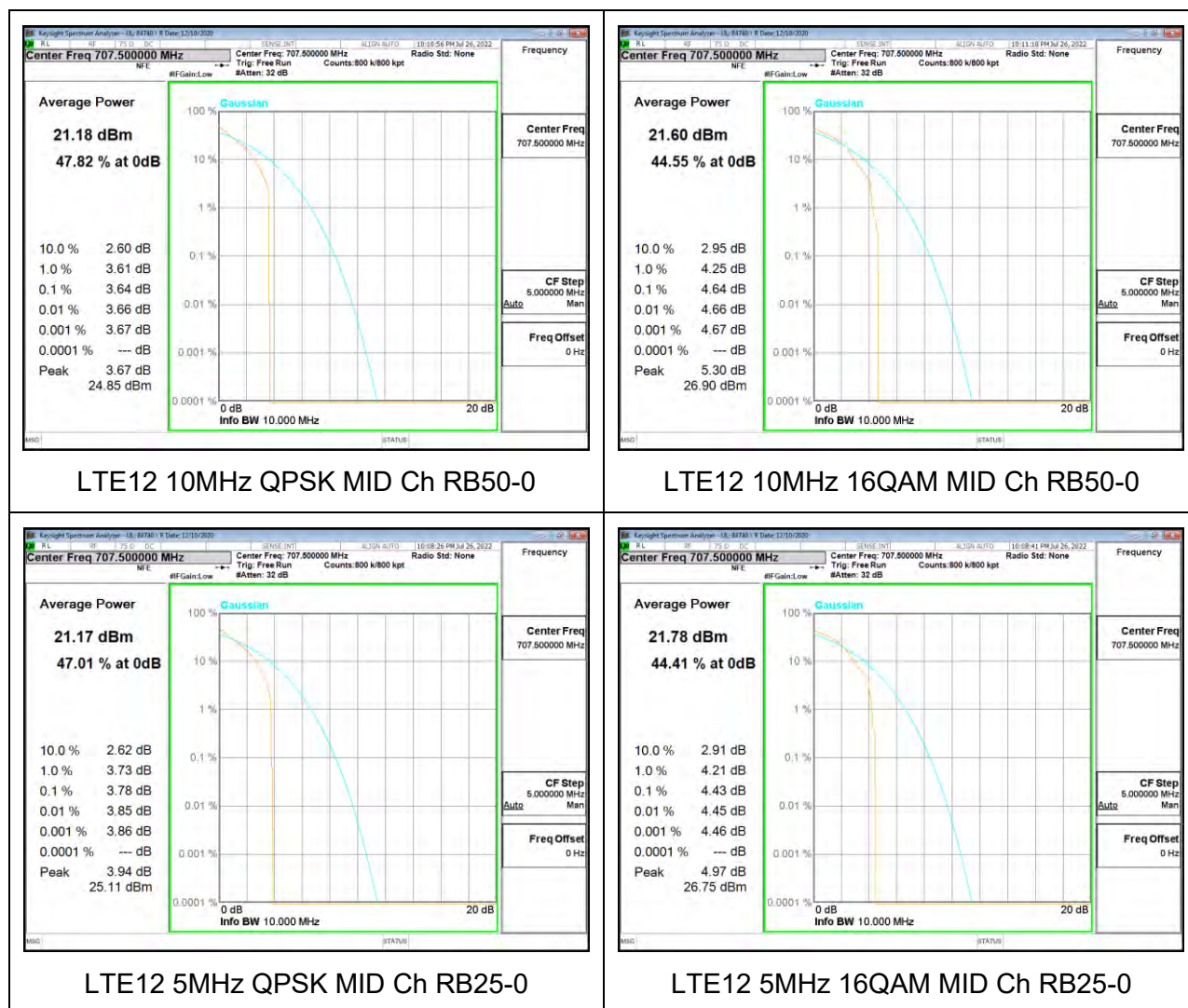


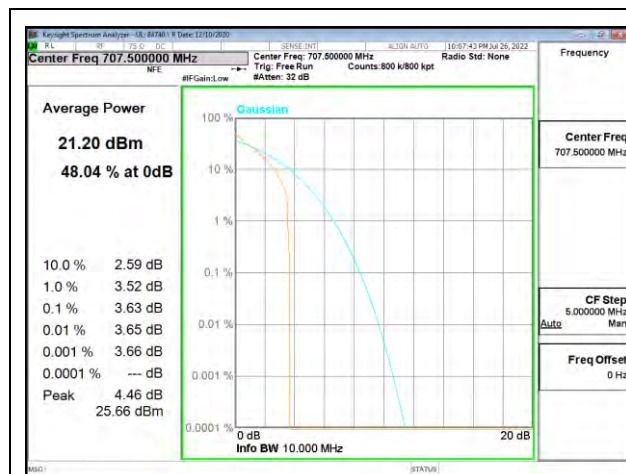


| LTE Band and BW: | QPSK Mid Channel(dBm): | 16QAM Mid Channel(dBm): |
|------------------|------------------------|-------------------------|
| Band 4 15MHz     | 23.15 – 17.89 = 5.26   | 24.24 – 17.91 = 6.33    |
| Band 4 20MHz     | 23.12 – 17.90 = 5.22   | 24.18 – 17.94 = 6.24    |

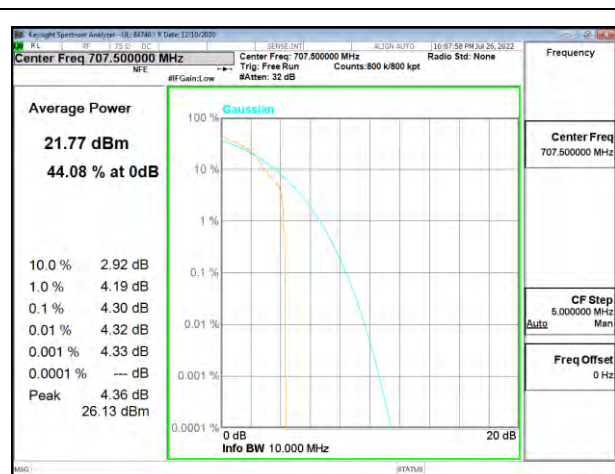
Note: Due to limitations of the test equipment PAR testing of frequencies with BWs greater than or equal to 10MHz were done with a Wideband power meter. Testing was performed in accordance with ANCI:C63.26-2015, where  $PAPR (dB) = P_{pk} (Meas. Peak Power) - P_{avg} (Meas. Avg Power)$ .

## 9.5.5. LTE BAND 12





LTE12 3MHz QPSK MID Ch RB15-0



LTE12 3MHz 16QAM MID Ch RB15-0



LTE12 1.4MHz QPSK MID Ch RB6-0



LTE12 1.4MHz 16QAM MID Ch RB6-0

## 10. RADIATED TEST RESULTS

### 10.1. FIELD STRENGTH OF SPURIOUS RADIATION ABOVE 1GHz

#### TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz.

#### RESULTS

### 10.1.1. GSM850

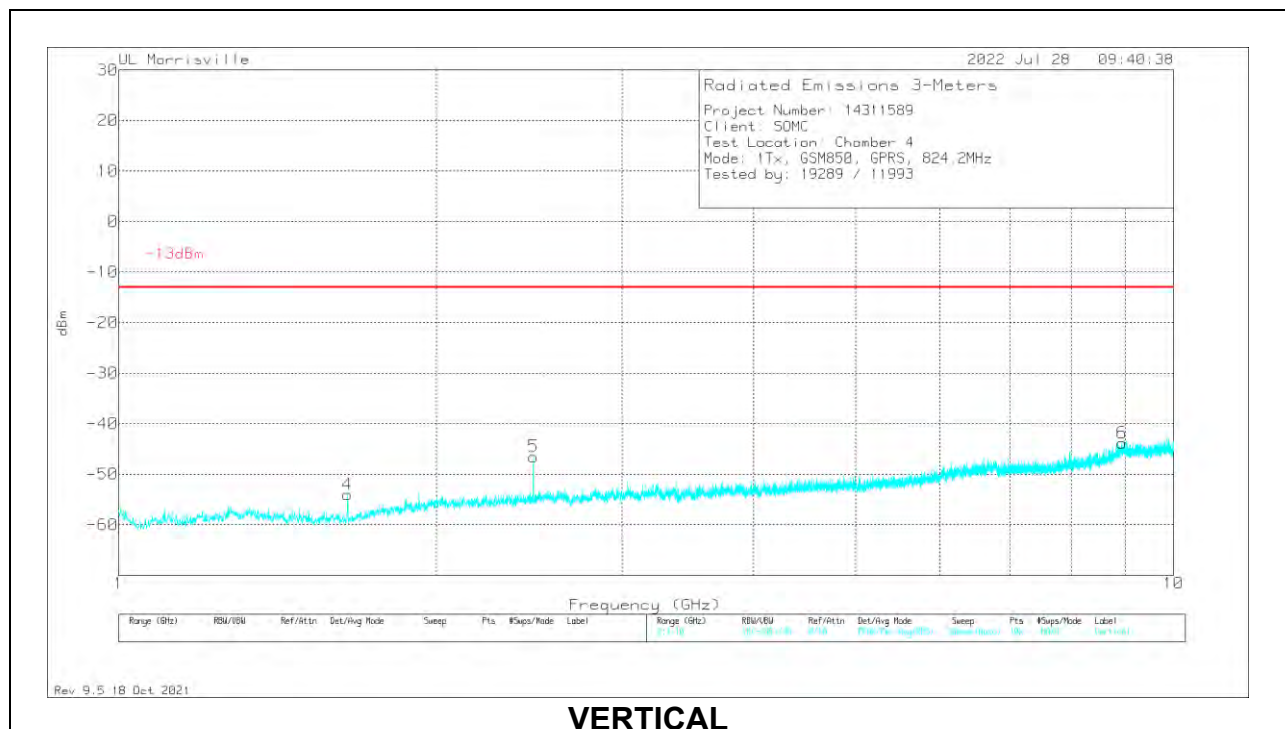
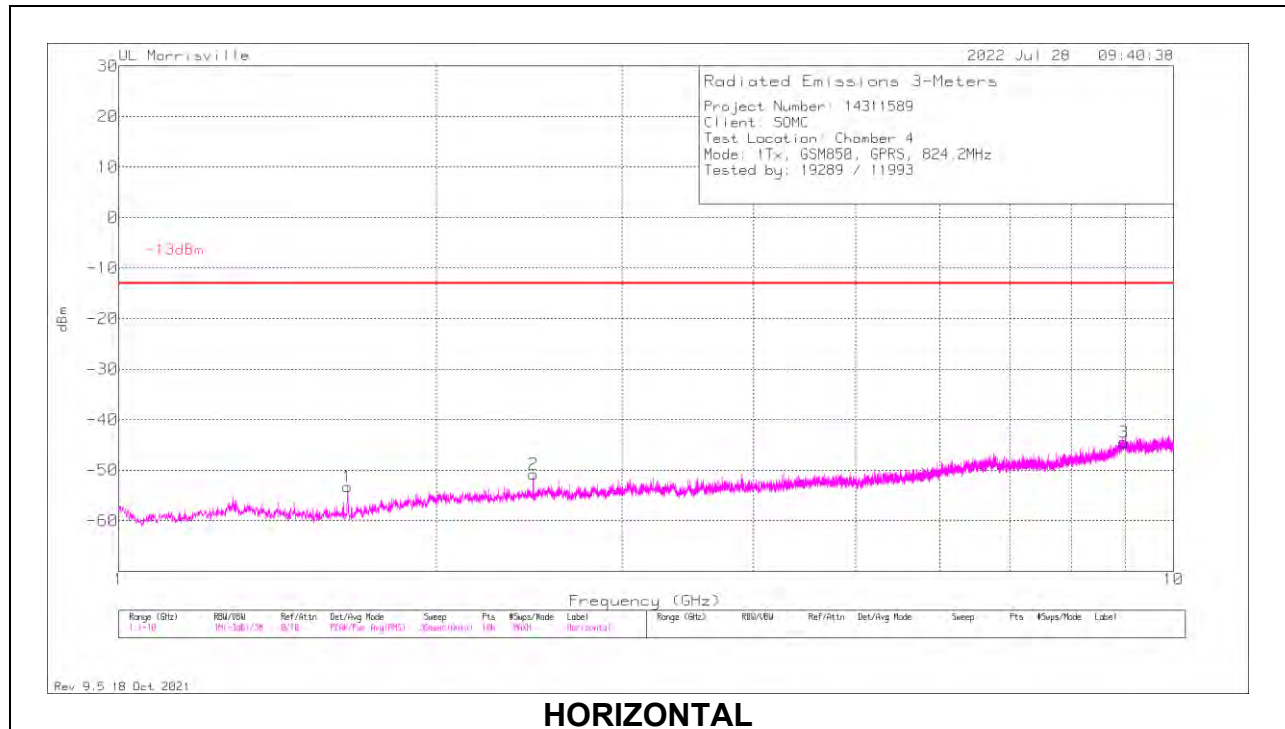
#### LIMITS

FCC: §22.917 (a)

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

**GPRS**

**LOW CHANNEL RESULTS**

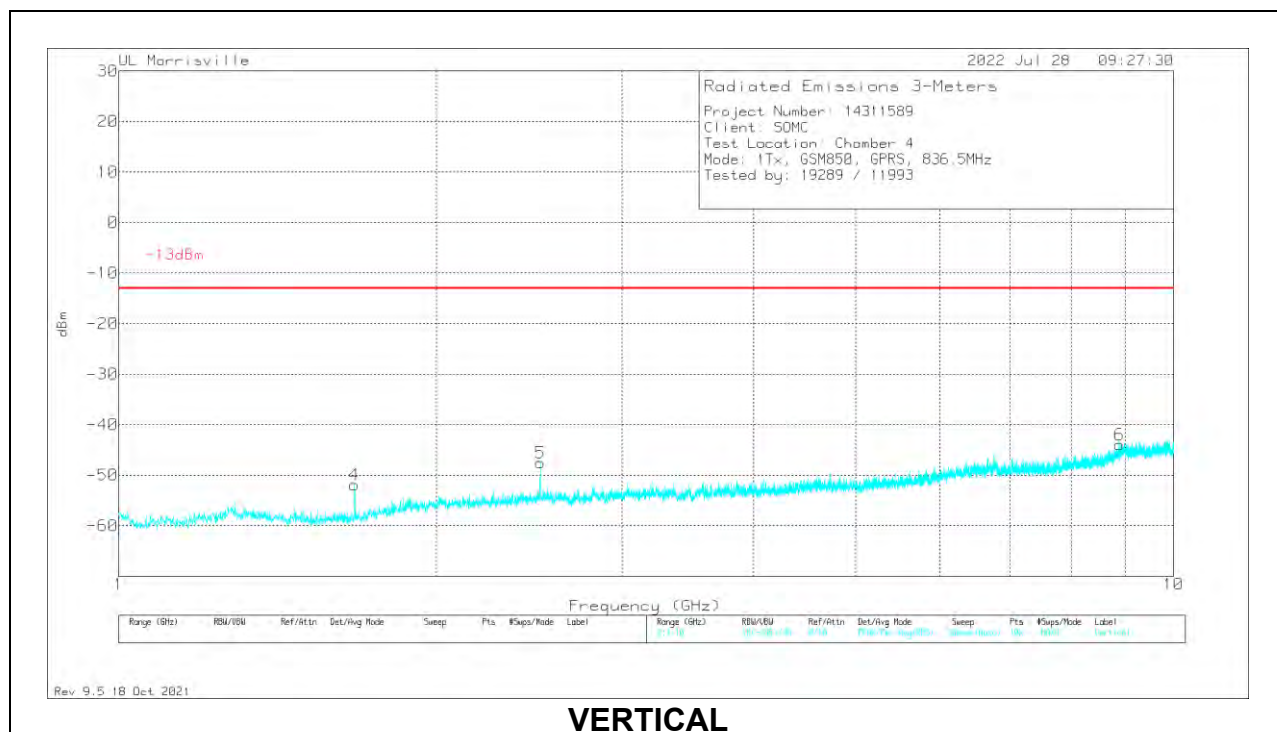
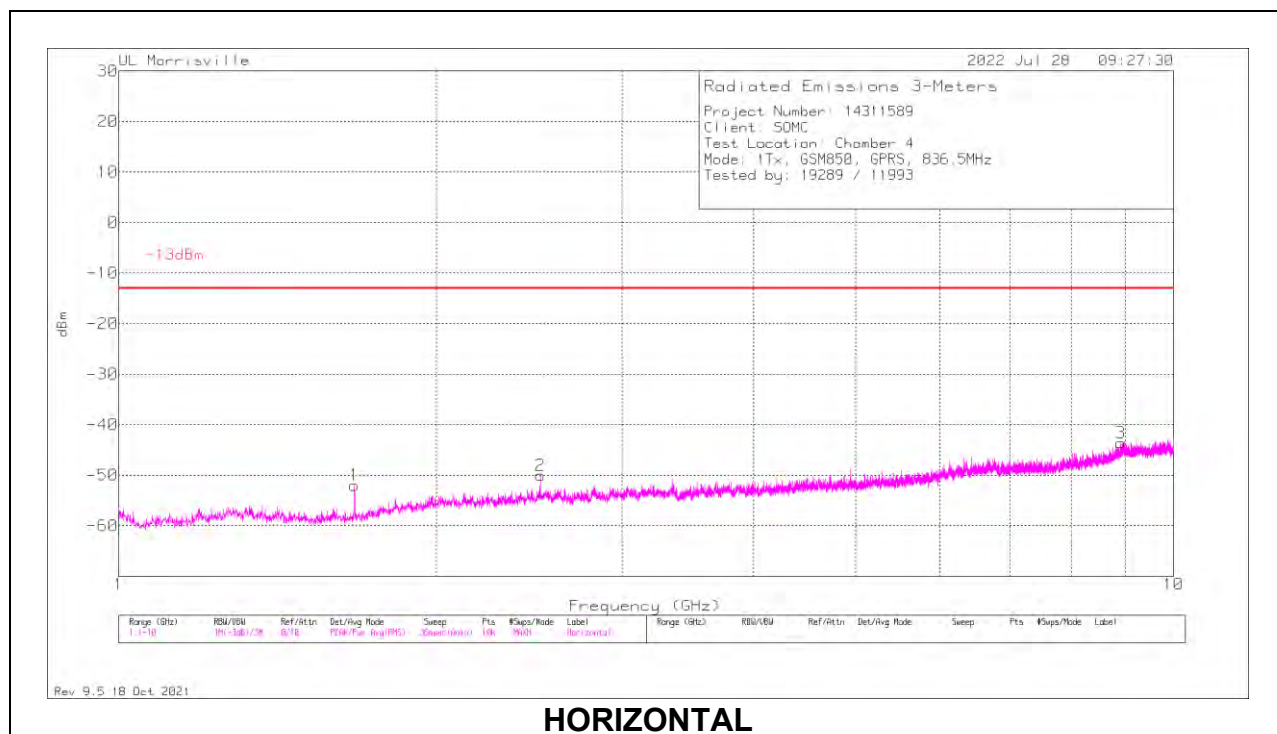


**RADIATED EMISSIONS**

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AT0067 (dB/m) | Gain/Loss (dB) | Filter (dB) | CF (dB) | Corrected Reading dBm | -13dBm | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|---------------------|-----|---------------|----------------|-------------|---------|-----------------------|--------|-------------|----------------|-------------|----------|
| 1      | 1.648           | -57.92              | Pk  | 28.8          | -36.4          | .5          | 11.8    | -53.22                | -13    | -40.22      | 0-360          | 100         | H        |
| 4      | 1.648           | -58.7               | Pk  | 28.8          | -36.4          | .5          | 11.8    | -54                   | -13    | -41         | 0-360          | 200         | V        |
| 2      | 2.4724          | -59.45              | Pk  | 32.6          | -36.1          | .4          | 11.8    | -50.75                | -13    | -37.75      | 0-360          | 100         | H        |
| 5      | 2.4724          | -55.21              | Pk  | 32.6          | -36.1          | .4          | 11.8    | -46.51                | -13    | -33.51      | 0-360          | 300         | V        |
| 6      | 8.9335          | -65.78              | Pk  | 36.1          | -26.5          | .6          | 11.8    | -43.78                | -13    | -30.78      | 0-360          | 300         | V        |
| 3      | 8.9722          | -66.66              | Pk  | 36.1          | -26.2          | .5          | 11.8    | -44.46                | -13    | -31.46      | 0-360          | 100         | H        |

Pk - Peak detector

## MID CHANNEL RESULTS

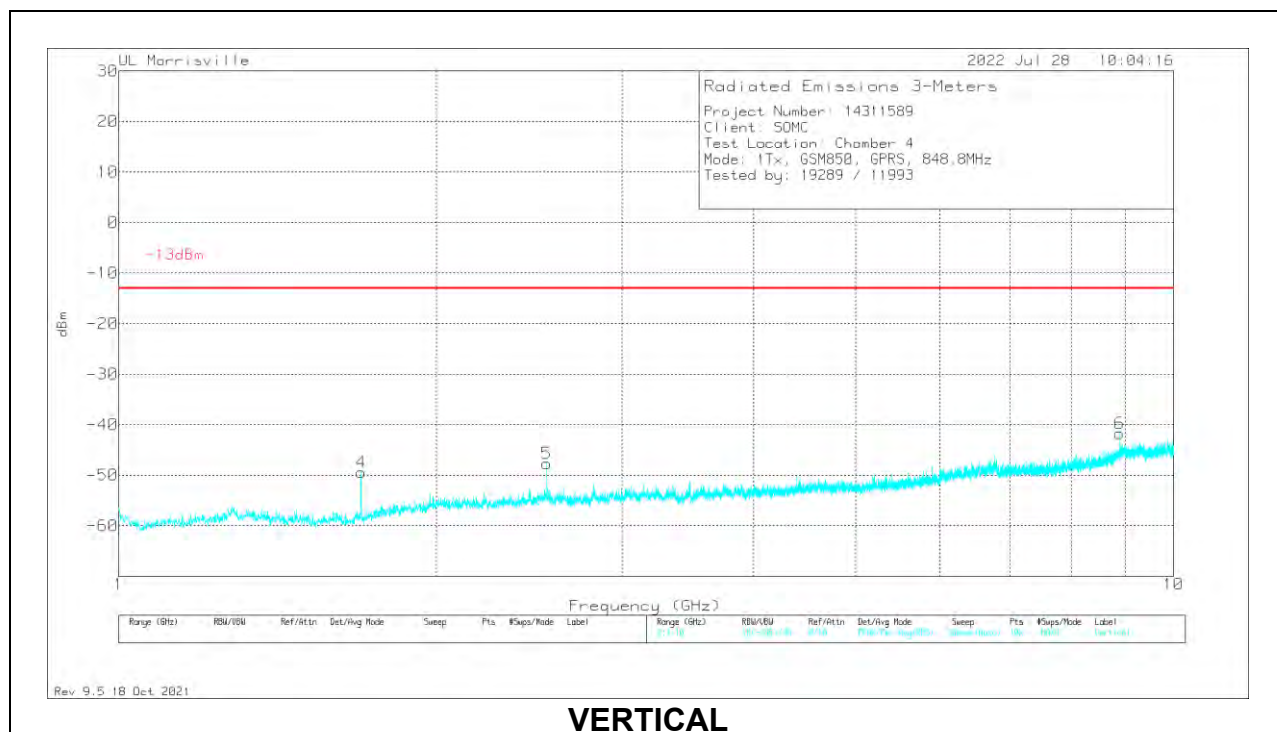
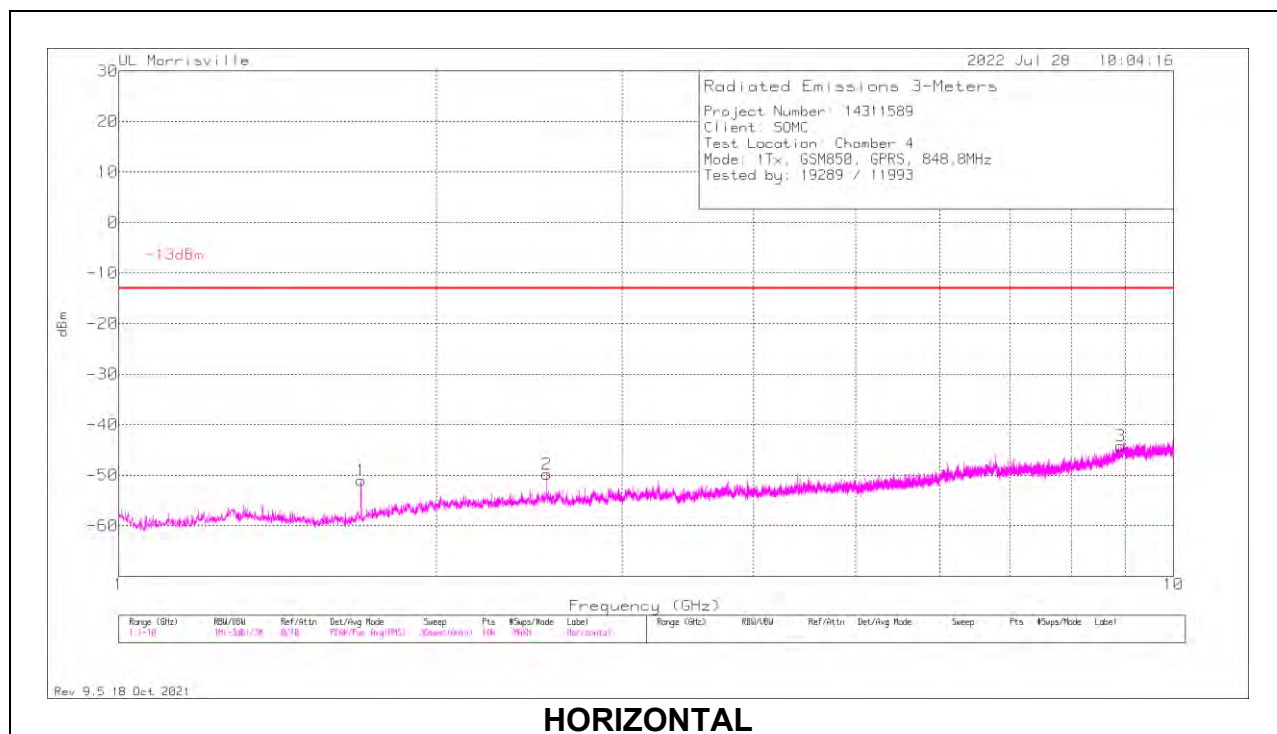


**RADIATED EMISSIONS**

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AT0067 (dB/m) | Gain/Loss (dB) | Filter (dB) | CF (dB) | Corrected Reading dBm | -13dBm | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|---------------------|-----|---------------|----------------|-------------|---------|-----------------------|--------|-------------|----------------|-------------|----------|
| 1      | 1.6723          | -56.97              | Pk  | 28.9          | -36.2          | .5          | 11.8    | -51.97                | -13    | -38.97      | 0-360          | 100         | H        |
| 4      | 1.6732          | -56.88              | Pk  | 28.9          | -36.2          | .5          | 11.8    | -51.88                | -13    | -38.88      | 0-360          | 200         | V        |
| 2      | 2.5093          | -58.63              | Pk  | 32.7          | -36.3          | .4          | 11.8    | -50.03                | -13    | -37.03      | 0-360          | 100         | H        |
| 5      | 2.5102          | -56.2               | Pk  | 32.7          | -36.3          | .4          | 11.8    | -47.6                 | -13    | -34.6       | 0-360          | 200         | V        |
| 6      | 8.8921          | -65.82              | Pk  | 36.1          | -26.5          | .5          | 11.8    | -43.92                | -13    | -30.92      | 0-360          | 200         | V        |
| 3      | 8.911           | -65.6               | Pk  | 36.1          | -26.4          | .5          | 11.8    | -43.6                 | -13    | -30.6       | 0-360          | 100         | H        |

Pk - Peak detector

## HIGH CHANNEL RESULTS



**RADIATED EMISSIONS**

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | AT0067 (dB/m) | Gain/Loss (dB) | Filter (dB) | CF (dB) | Corrected Reading dBm | -13dBm | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|---------------------|-----|---------------|----------------|-------------|---------|-----------------------|--------|-------------|----------------|-------------|----------|
| 1      | 1.6975          | -56.09              | Pk  | 29.1          | -36.3          | .5          | 11.8    | -50.99                | -13    | -37.99      | 0-360          | 200         | H        |
| 4      | 1.6975          | -54.5               | Pk  | 29.1          | -36.3          | .5          | 11.8    | -49.4                 | -13    | -36.4       | 0-360          | 300         | V        |
| 2      | 2.5462          | -58.65              | Pk  | 32.8          | -36.3          | .5          | 11.8    | -49.85                | -13    | -36.85      | 0-360          | 100         | H        |
| 5      | 2.5462          | -56.53              | Pk  | 32.8          | -36.3          | .5          | 11.8    | -47.73                | -13    | -34.73      | 0-360          | 300         | V        |
| 6      | 8.8867          | -63.4               | Pk  | 36.1          | -26.6          | .4          | 11.8    | -41.7                 | -13    | -28.7       | 0-360          | 200         | V        |
| 3      | 8.9182          | -66.31              | Pk  | 36.1          | -26.4          | .6          | 11.8    | -44.21                | -13    | -31.21      | 0-360          | 200         | H        |

Pk - Peak detector

**EGPRS**

**LOW CHANNEL RESULTS**

