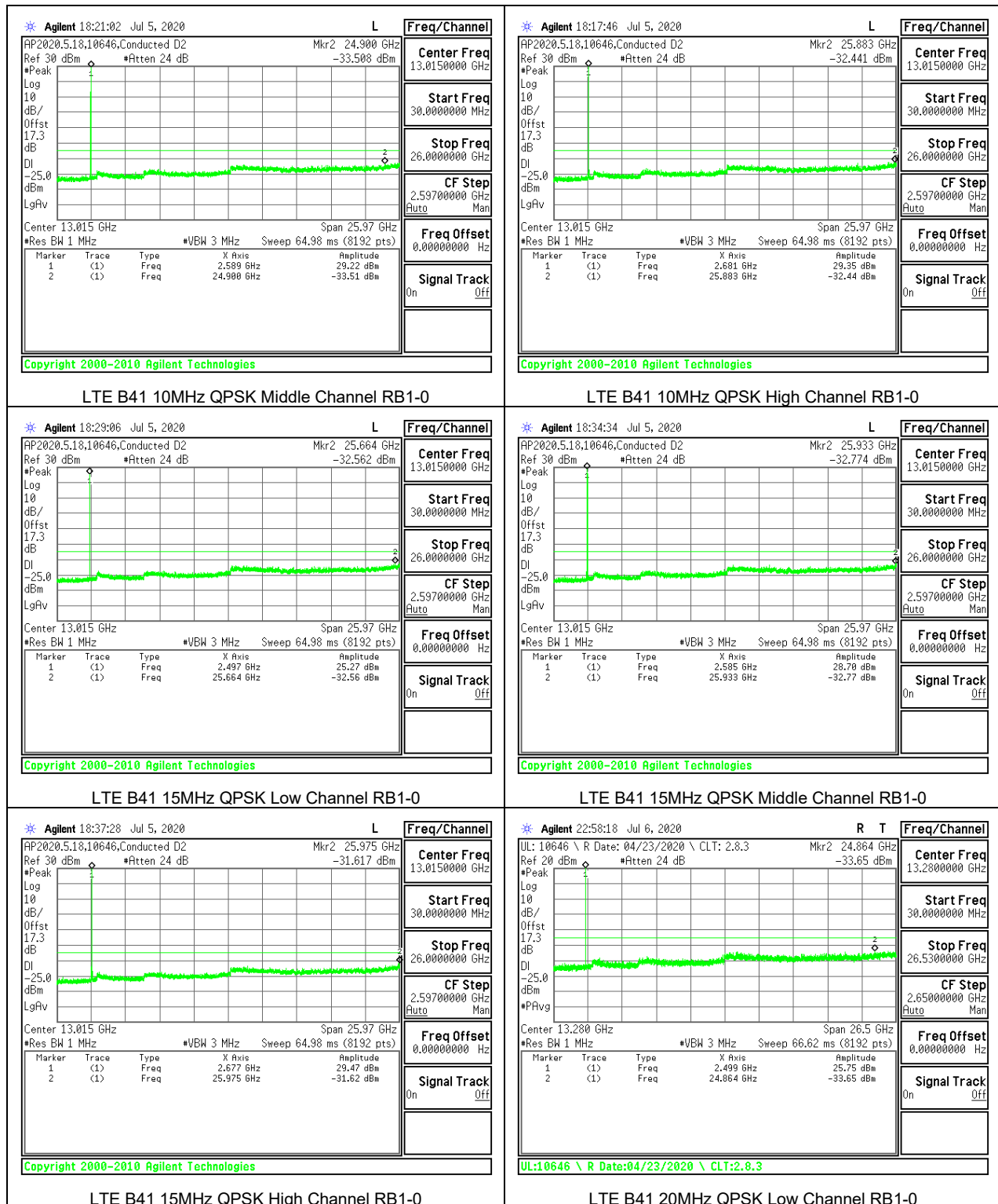
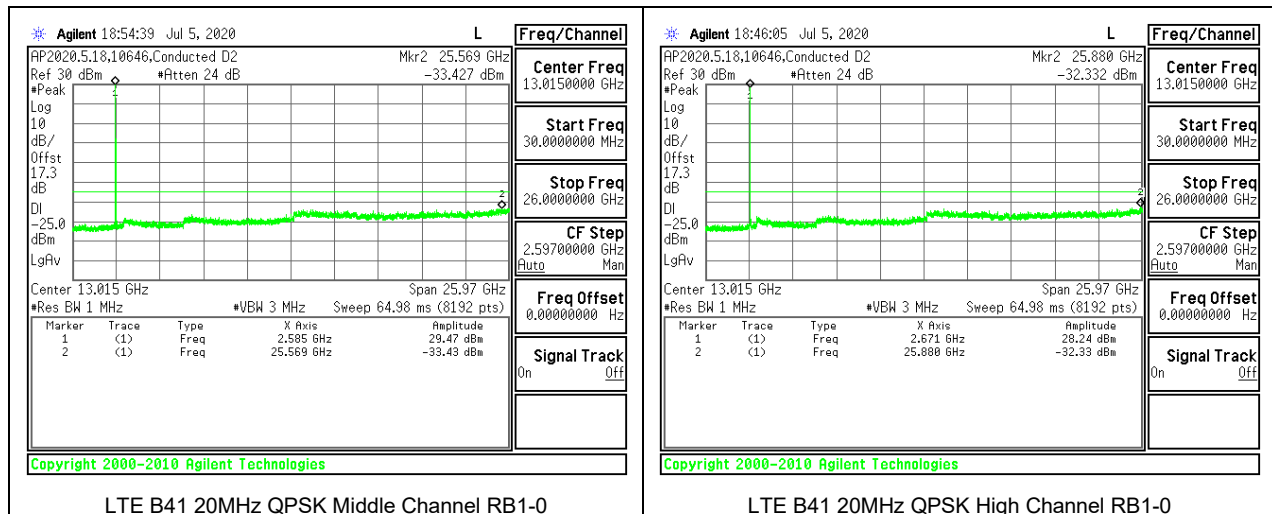
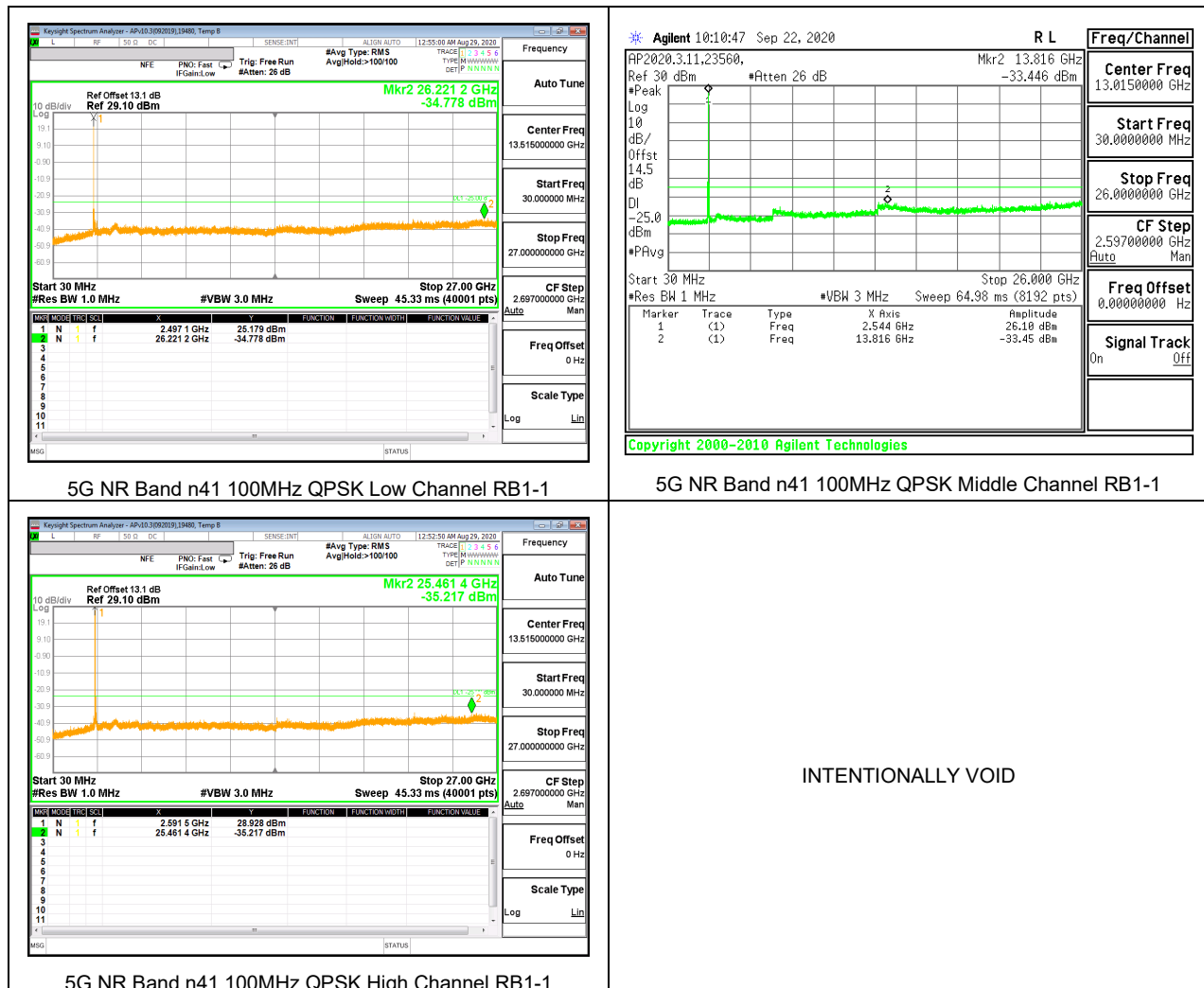






## 5G NR BAND n41



## 8.3.12. LTE BAND 48

### LIMITS

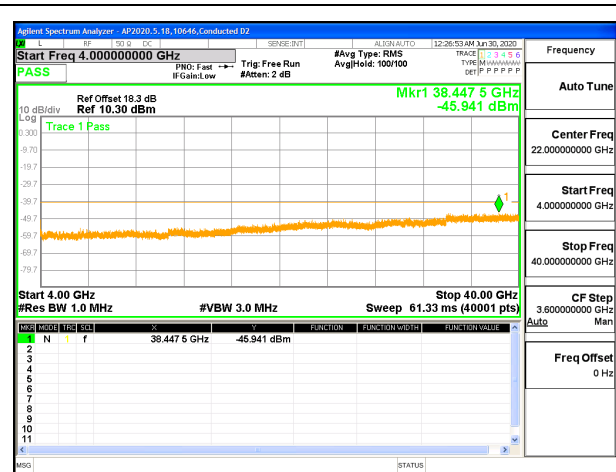
FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed  $-25$  dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed  $-40$  dBm/MHz.



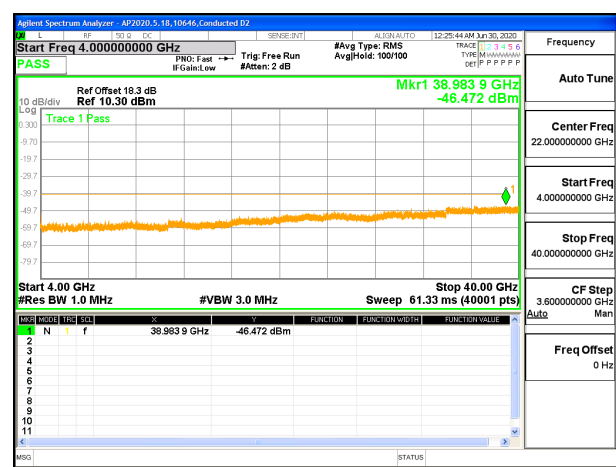
LTE B48 5MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)



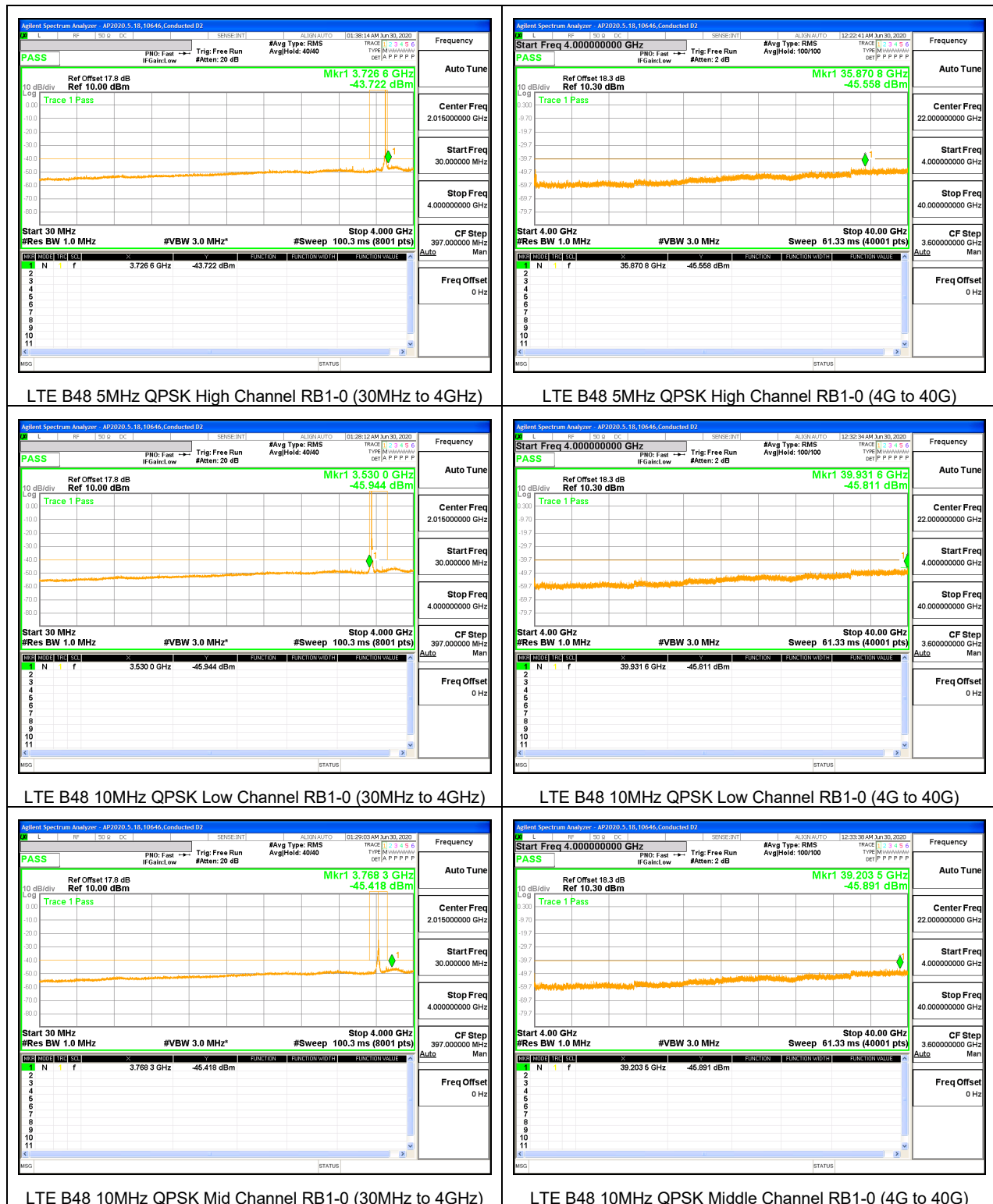
LTE B48 5MHz QPSK Low Channel RB1-0 (4G to 40G)

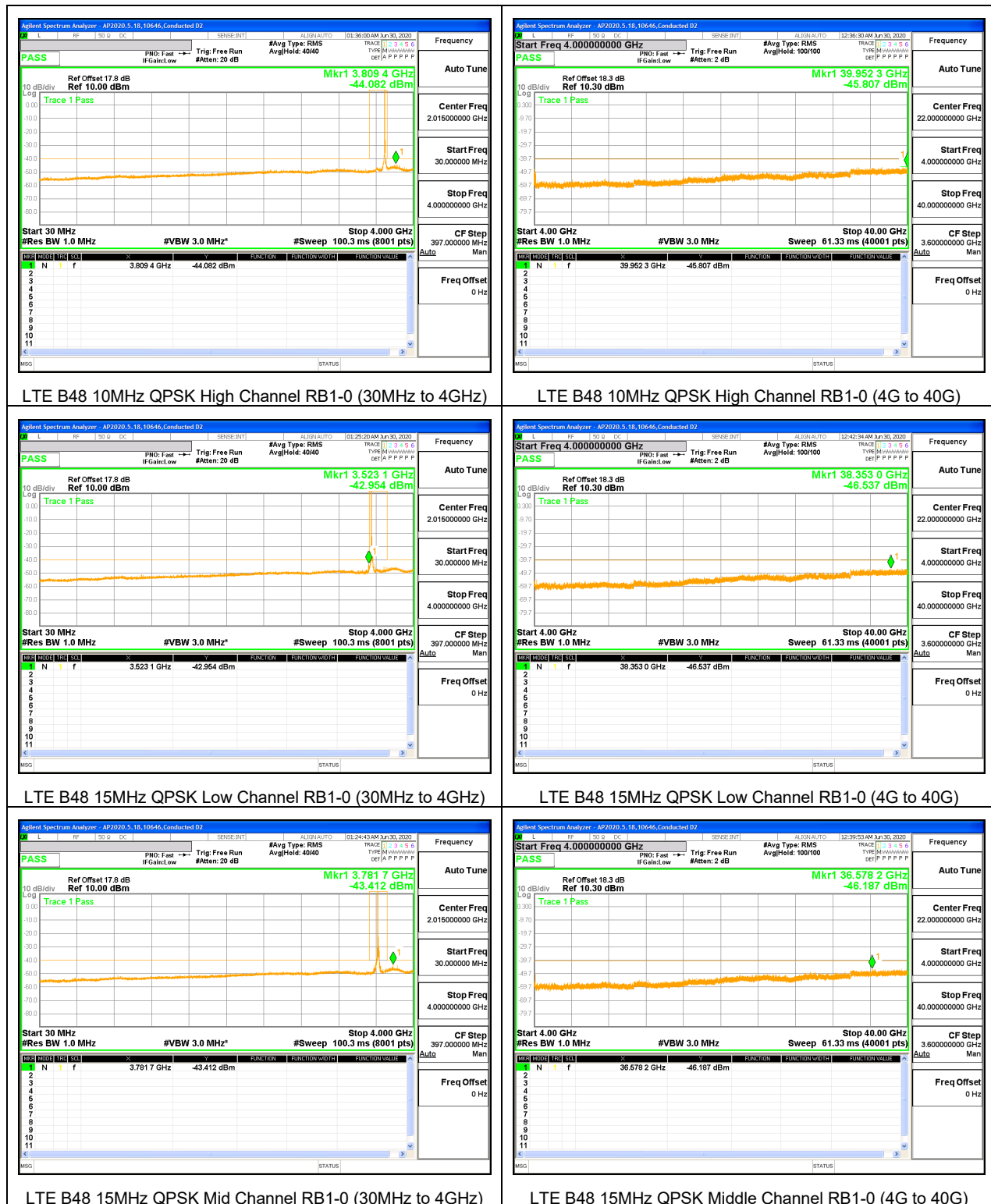


LTE B48 5MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)

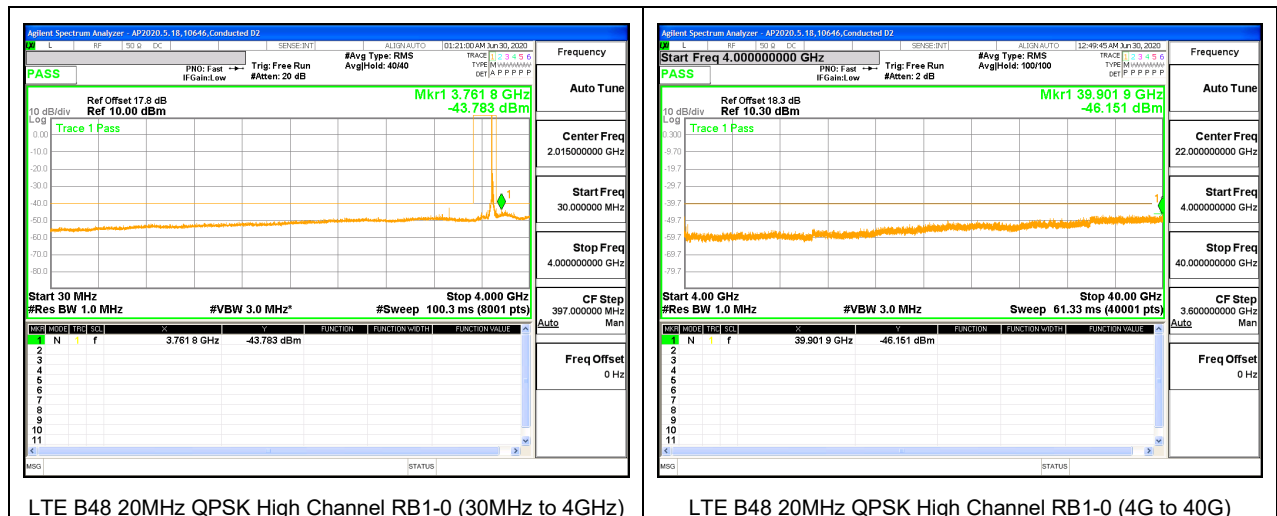


LTE B48 5MHz QPSK Middle Channel RB1-0 (4G to 40G)







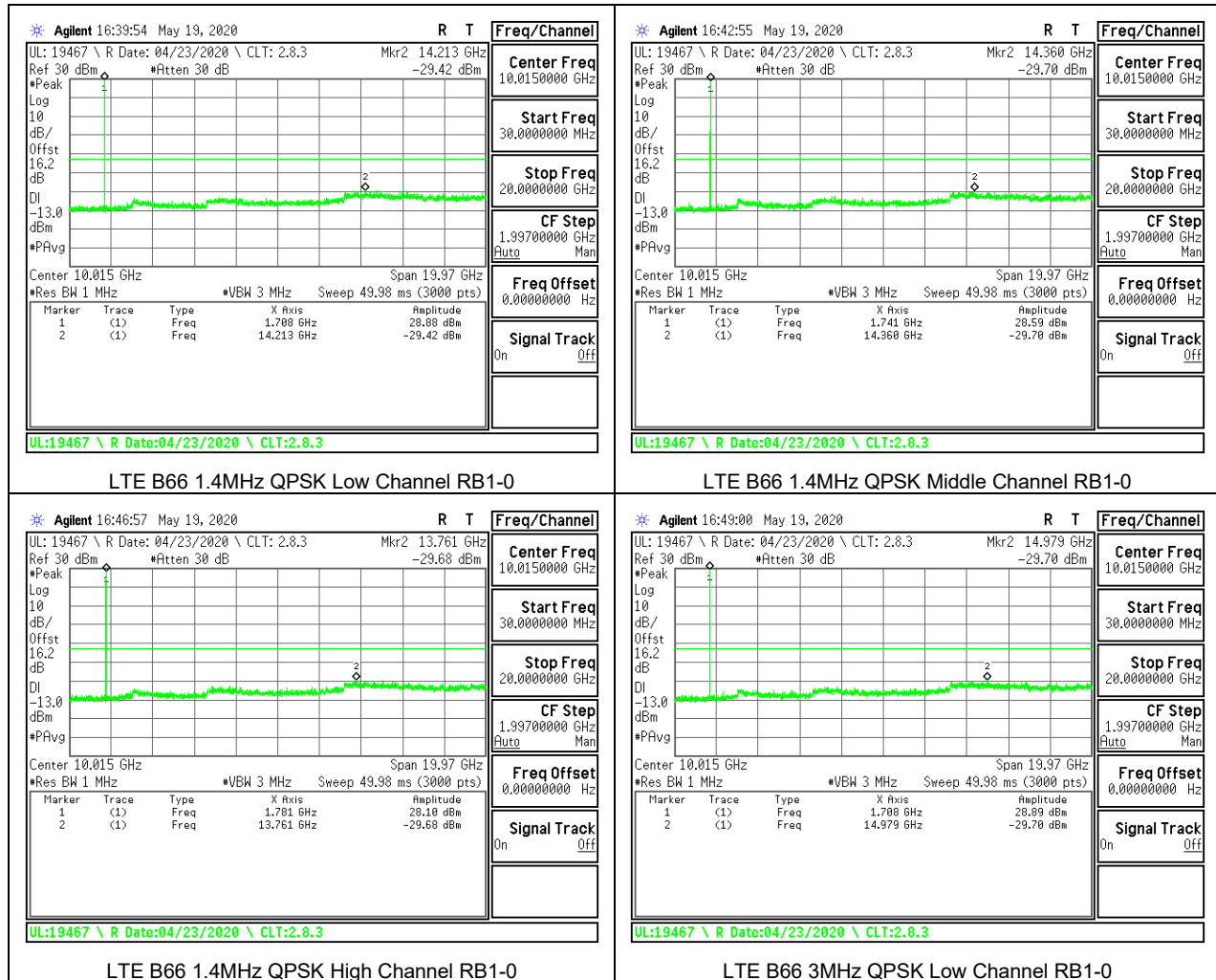


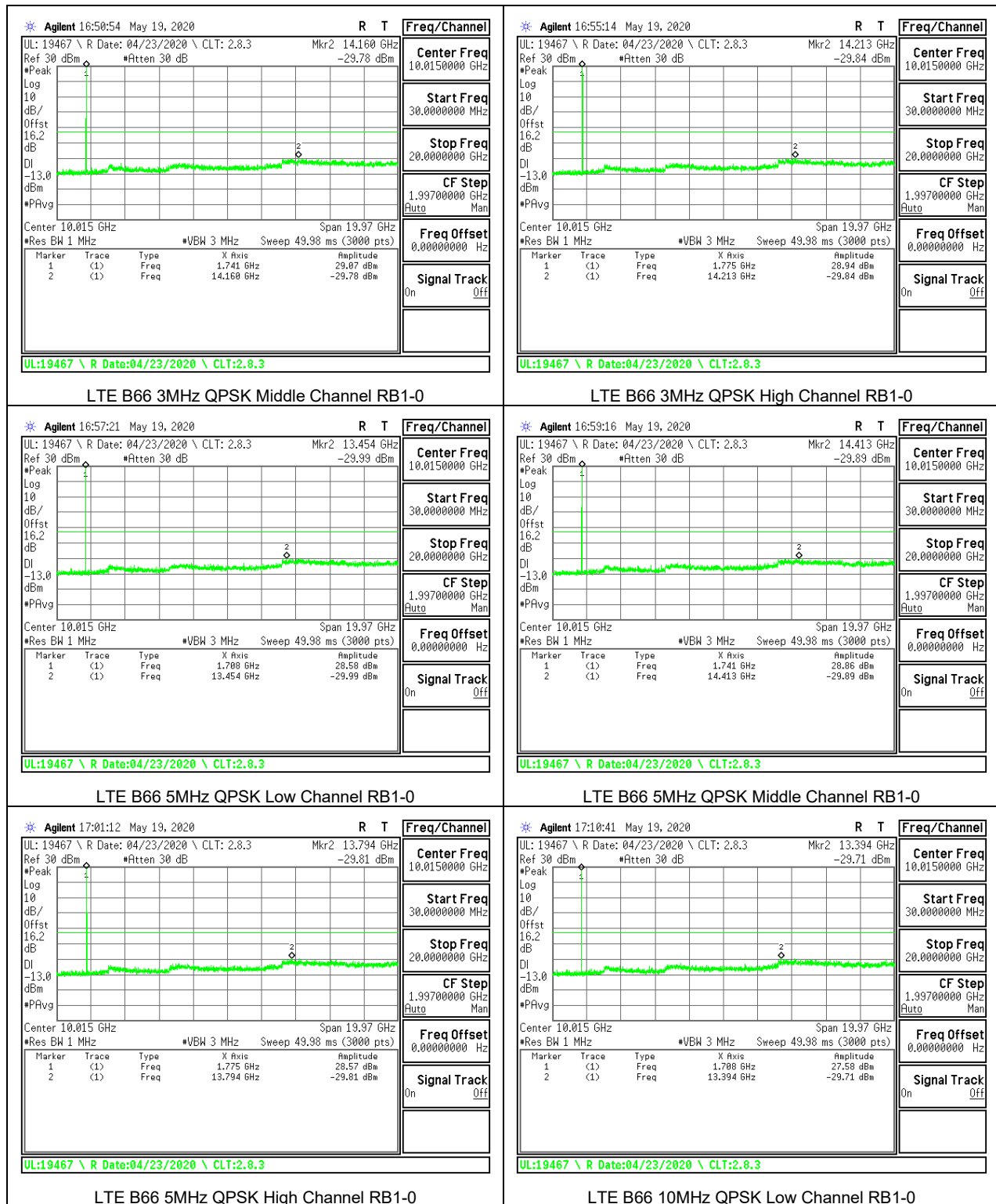
### 8.3.13. LTE BAND 66

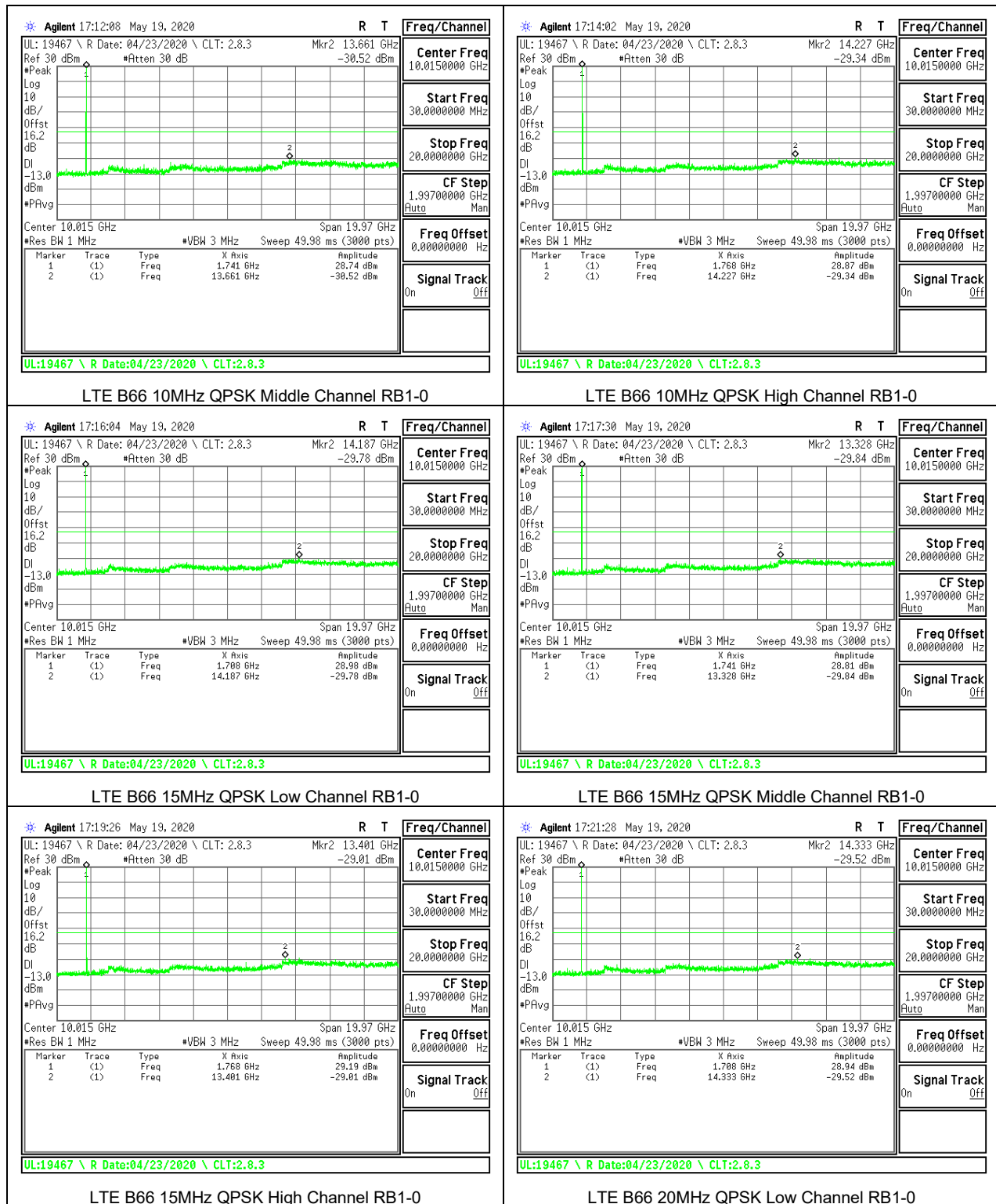
#### LIMITS

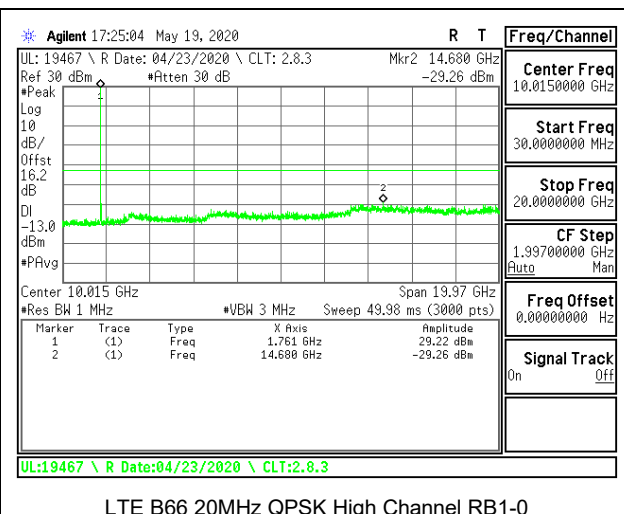
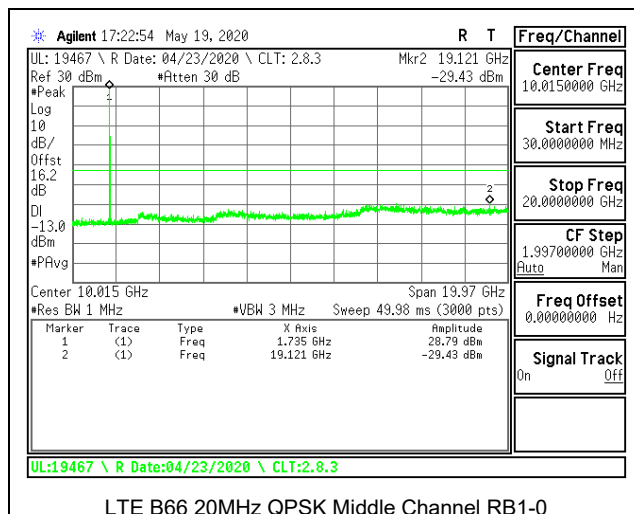
FCC: §27.53 (h)

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







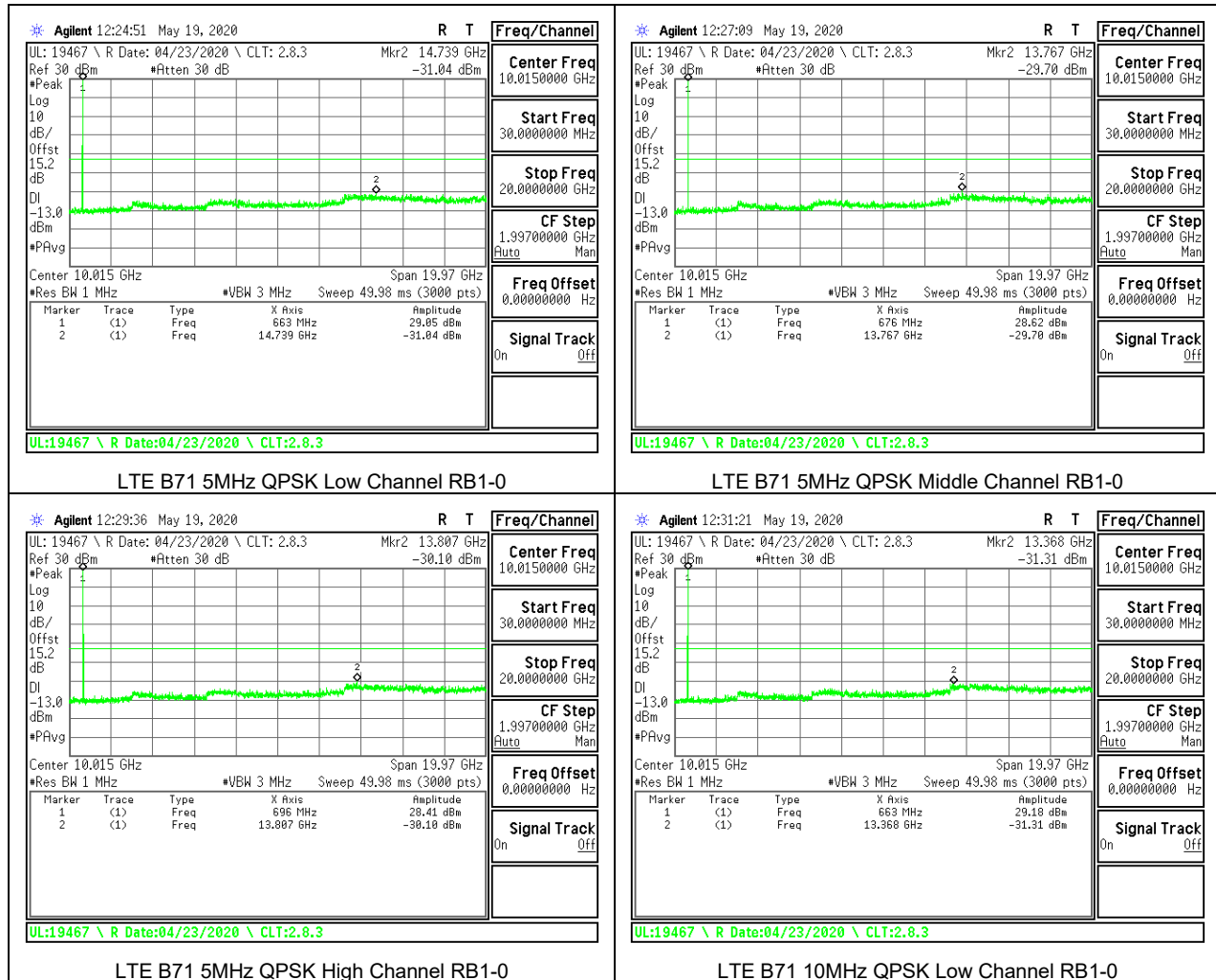


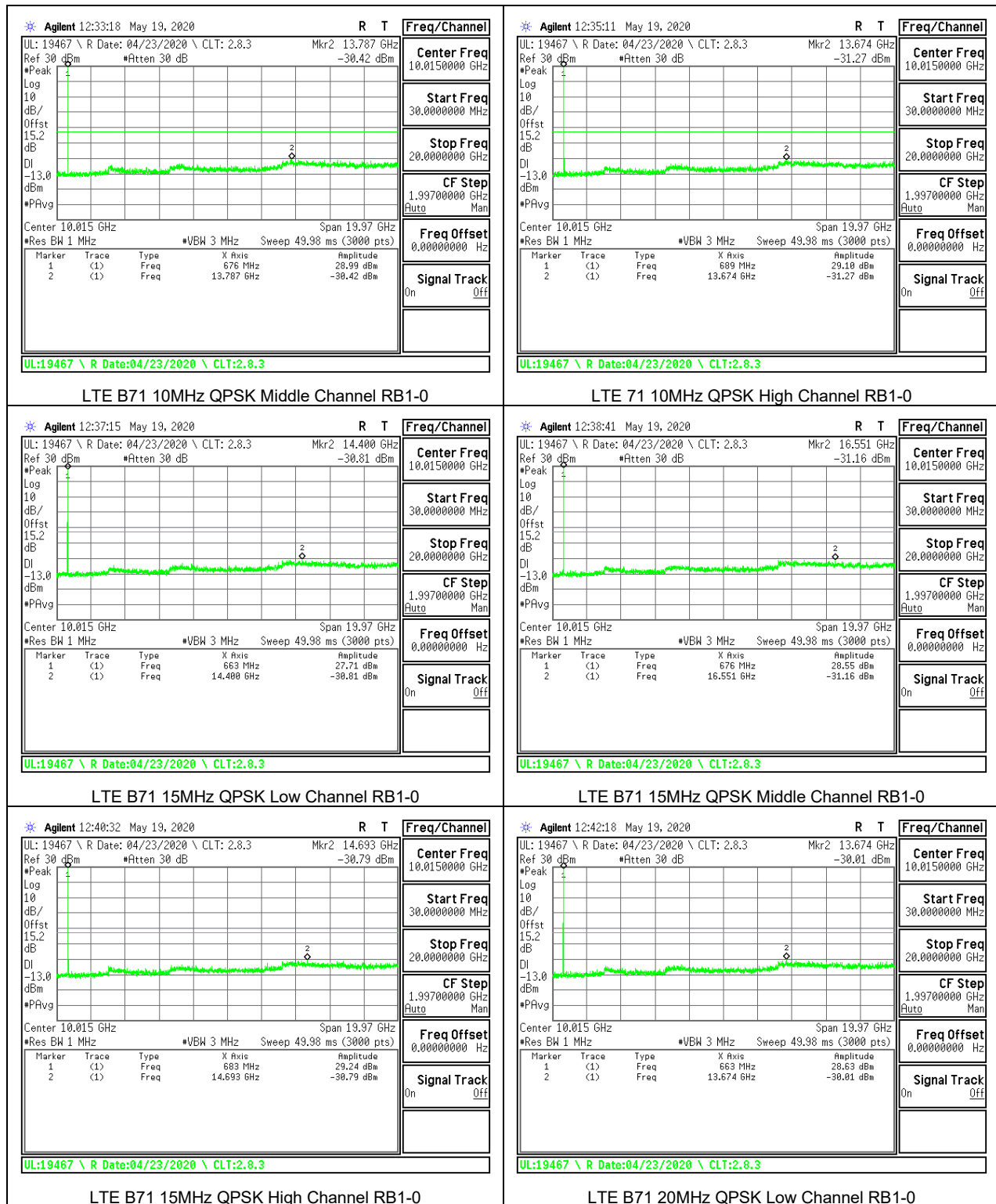
### 8.3.14. LTE BAND 71

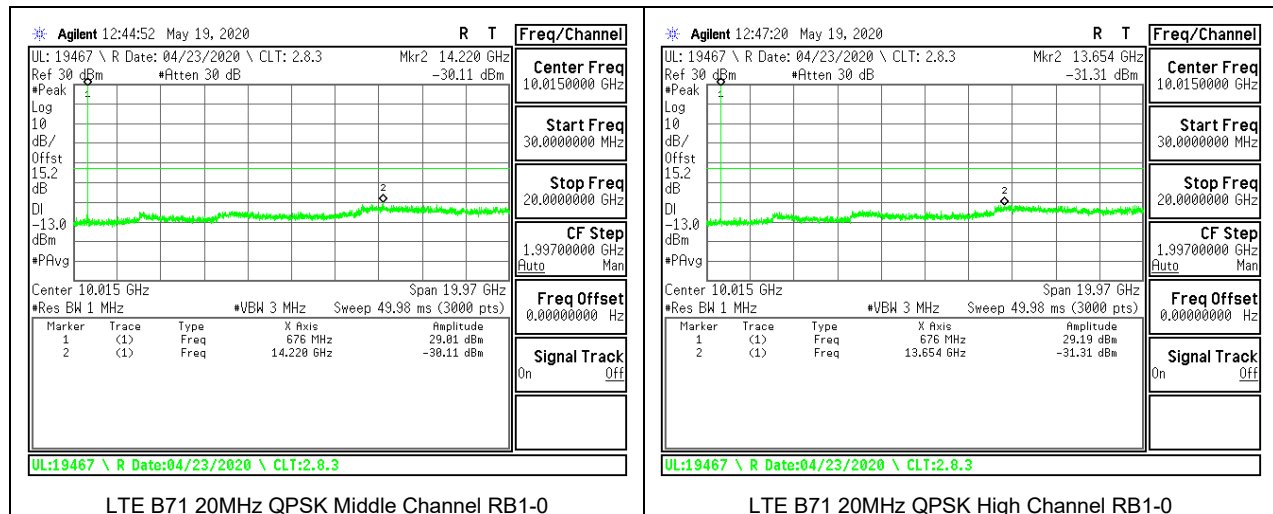
#### LIMITS

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.







### 8.3.15. 5G NR BAND n77

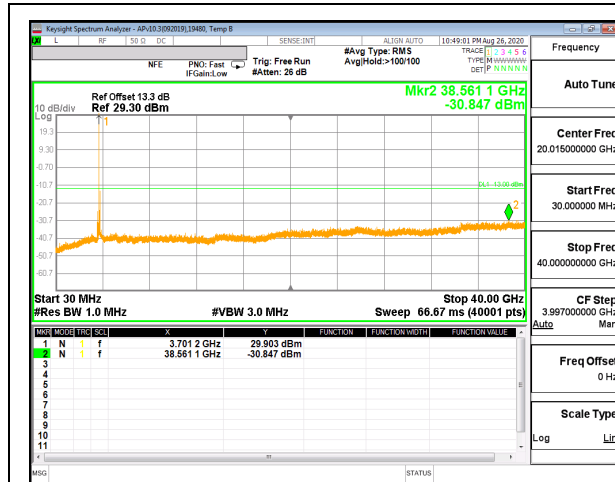
#### LIMITS

FCC: §27.53

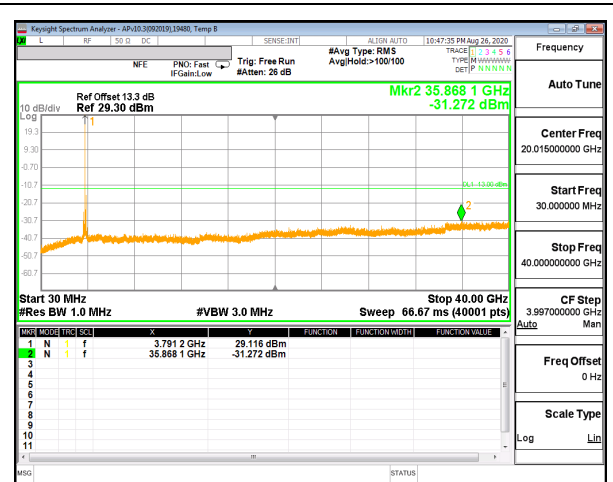
Emission limits

(1) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:

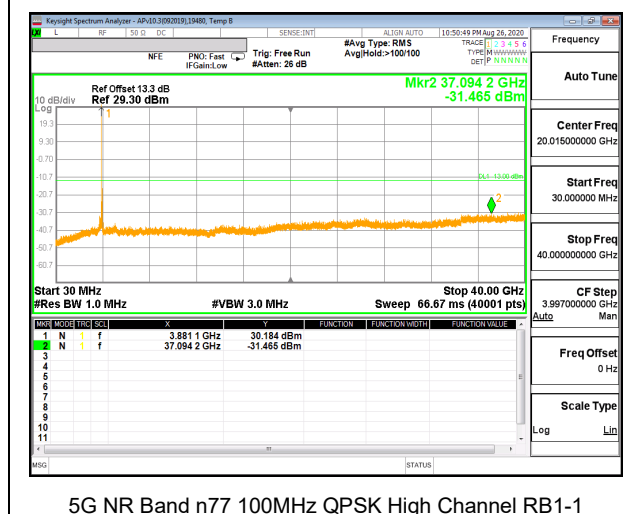
(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.



5G NR Band n77 100MHz QPSK Low Channel RB1-1



5G NR Band n77 100MHz QPSK Mid Channel RB1-1



5G NR Band n77 100MHz QPSK High Channel RB1-1

## 8.4. FREQUENCY STABILITY

### TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = -30°C to +50°C
- Voltage = (85% - 115%)

Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.  
End Voltage, 3.2VDC.

#### **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

See the following pages.

## 8.4.1. 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### QPSK (20MHz BANDWIDTH)

| Limit          |           | 1850                       | 1910                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 1851.0167                  | 1908.9924                   |               |                                 |
| Extreme (50C)  |           | 1851.0167                  | 1908.9924                   | 8.1           | 0.004                           |
| Extreme (40C)  |           | 1851.0167                  | 1908.9924                   | -14.6         | -0.008                          |
| Extreme (30C)  |           | 1851.0167                  | 1908.9924                   | 10.5          | 0.006                           |
| Extreme (10C)  |           | 1851.0167                  | 1908.9924                   | -11.6         | -0.006                          |
| Extreme (0C)   |           | 1851.0167                  | 1908.9924                   | -7.4          | -0.004                          |
| Extreme (-10C) |           | 1851.0167                  | 1908.9924                   | 12.9          | 0.007                           |
| Extreme (-20C) |           | 1851.0167                  | 1908.9924                   | 12.7          | 0.007                           |
| Extreme (-30C) |           | 1851.0167                  | 1908.9924                   | 12.5          | 0.007                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1851.0167                  | 1908.9924                   | -12.1         | -0.006                          |
|                | -15%      | 1851.0167                  | 1908.9924                   | -12.6         | -0.007                          |
|                | End Point | 1851.0167                  | 1908.9924                   | -12.0         | -0.006                          |

## 8.4.2. LTE BAND 5 AND 5G NR BAND n5

### LIMITS

FCC: §22.355

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

|                   |       |            |           |
|-------------------|-------|------------|-----------|
| Test Engineer ID: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### LTE BAND 5 QPSK (10MHz BANDWIDTH)

| Limit          |           | 824                        | 849                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 824.5001                   | 848.4931                    |               |                                 |
| Extreme (50C)  |           | 824.5001                   | 848.4931                    | -7.7          | -0.009                          |
| Extreme (40C)  |           | 824.5001                   | 848.4931                    | -6.6          | -0.008                          |
| Extreme (30C)  |           | 824.5001                   | 848.4931                    | -6.8          | -0.008                          |
| Extreme (10C)  |           | 824.5001                   | 848.4931                    | -6.4          | -0.008                          |
| Extreme (0C)   |           | 824.5001                   | 848.4931                    | 7.0           | 0.008                           |
| Extreme (-10C) |           | 824.5001                   | 848.4931                    | 6.6           | 0.008                           |
| Extreme (-20C) |           | 824.5001                   | 848.4931                    | -7.1          | -0.008                          |
| Extreme (-30C) |           | 824.5001                   | 848.4931                    | -5.5          | -0.007                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 824.5001                   | 848.4931                    | -6.1          | -0.007                          |
|                | -15%      | 824.5001                   | 848.4931                    | -7.4          | -0.009                          |
|                | End Point | 824.5001                   | 848.4931                    | -7.7          | -0.009                          |

**5G NR BAND n5 QPSK (20MHz BANDWIDTH)**

| Limit          |                      | 824               | 849                | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|----------------------|-------------------|--------------------|---------------|---------------------------------|
| Condition      |                      | F low @<br>-13dBm | F high @<br>-13dBm |               |                                 |
| Temperature    | 2.8                  | (MHz)             | (MHz)              |               |                                 |
| Normal (20C)   | Normal               | 824.4696          | 847.4339           |               |                                 |
| Extreme (50C)  |                      | 824.4696          | 847.4339           | -11.5         | -0.014                          |
| Extreme (40C)  |                      | 824.4696          | 847.4339           | -11.0         | -0.013                          |
| Extreme (30C)  |                      | 824.4696          | 847.4339           | -11.5         | -0.014                          |
| Extreme (10C)  |                      | 824.4696          | 847.4339           | -12.1         | -0.015                          |
| Extreme (0C)   |                      | 824.4696          | 847.4339           | -12.4         | -0.015                          |
| Extreme (-10C) |                      | 824.4696          | 847.4339           | -11.6         | -0.014                          |
| Extreme (-20C) |                      | 824.4696          | 847.4339           | -13.0         | -0.016                          |
| Extreme (-30C) |                      | 824.4696          | 847.4339           | -8.1          | -0.010                          |
|                |                      |                   |                    |               |                                 |
| 20C            | 15%                  | 824.4696          | 847.4339           | -14.5         | -0.017                          |
|                | -15%                 | 824.4696          | 847.4339           | -14.4         | -0.017                          |
|                | End Point<br>Voltage | 824.4696          | 847.4339           | -14.4         | -0.017                          |

### 8.4.3. LTE BAND 7

#### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

#### QPSK (20MHz BANDWIDTH)

| Limit          |           | 2500                       | 2570                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 2501.0165                  | 2568.9927                   |               |                                 |
| Extreme (50C)  |           | 2501.0165                  | 2568.9927                   | -12.4         | -0.005                          |
| Extreme (40C)  |           | 2501.0165                  | 2568.9927                   | -11.3         | -0.004                          |
| Extreme (30C)  |           | 2501.0165                  | 2568.9927                   | -14.9         | -0.006                          |
| Extreme (10C)  |           | 2501.0165                  | 2568.9927                   | -14.3         | -0.006                          |
| Extreme (0C)   |           | 2501.0165                  | 2568.9927                   | 11.7          | 0.005                           |
| Extreme (-10C) |           | 2501.0165                  | 2568.9927                   | 11.5          | 0.005                           |
| Extreme (-20C) |           | 2501.0165                  | 2568.9927                   | -13.6         | -0.005                          |
| Extreme (-30C) |           | 2501.0165                  | 2568.9927                   | -15.5         | -0.006                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2501.0165                  | 2568.9927                   | -13.9         | -0.005                          |
|                | -15%      | 2501.0165                  | 2568.9927                   | -14.1         | -0.006                          |
|                | End Point | 2501.0165                  | 2568.9927                   | -15.4         | -0.006                          |

#### 8.4.4. LTE BAND 12 AND 5G NR BAND n12

##### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

##### LTE BAND 12 QPSK (10MHz BANDWIDTH)

| Limit          |           | 699                        | 716                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 699.5110                   | 715.5351                    |               |                                 |
| Extreme (50C)  |           | 699.5110                   | 715.5351                    | -7.4          | -0.010                          |
| Extreme (40C)  |           | 699.5110                   | 715.5351                    | 4.7           | 0.007                           |
| Extreme (30C)  |           | 699.5110                   | 715.5351                    | -6.1          | -0.009                          |
| Extreme (10C)  |           | 699.5110                   | 715.5351                    | -7.6          | -0.011                          |
| Extreme (0C)   |           | 699.5110                   | 715.5351                    | -8.8          | -0.012                          |
| Extreme (-10C) |           | 699.5110                   | 715.5351                    | 6.2           | 0.009                           |
| Extreme (-20C) |           | 699.5110                   | 715.5351                    | -4.1          | -0.006                          |
| Extreme (-30C) |           | 699.5110                   | 715.5351                    | 4.9           | 0.007                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 699.5110                   | 715.5351                    | -8.4          | -0.012                          |
|                | -15%      | 699.5110                   | 715.5351                    | -7.4          | -0.010                          |
|                | End Point | 699.5110                   | 715.5351                    | -7.6          | -0.011                          |

**5G NR BAND n12 QPSK (15MHz BANDWIDTH)**

| Limit          |           | 699                        | 716                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 699.3905                   | 714.8979                    |               |                                 |
| Extreme (50C)  |           | 699.3905                   | 714.8979                    | -14.1         | -0.020                          |
| Extreme (40C)  |           | 699.3905                   | 714.8979                    | -11.3         | -0.016                          |
| Extreme (30C)  |           | 699.3905                   | 714.8979                    | -13.1         | -0.019                          |
| Extreme (10C)  |           | 699.3905                   | 714.8979                    | -13.2         | -0.019                          |
| Extreme (0C)   |           | 699.3905                   | 714.8979                    | -14.1         | -0.020                          |
| Extreme (-10C) |           | 699.3905                   | 714.8979                    | -14.3         | -0.020                          |
| Extreme (-20C) |           | 699.3905                   | 714.8979                    | -12.5         | -0.018                          |
| Extreme (-30C) |           | 699.3905                   | 714.8979                    | -13.2         | -0.019                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 699.3905                   | 714.8979                    | -12.6         | -0.018                          |
|                | -15%      | 699.3905                   | 714.8979                    | -11.3         | -0.016                          |
|                | End Point | 699.3905                   | 714.8979                    | -11.4         | -0.016                          |

## 8.4.5. LTE BAND 13

### 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: | 19179 | Test Date: | 7/7/2020 |
|-------------------|-------|------------|----------|

### QPSK (10MHz BANDWIDTH)

| Limit          |           | 777                        | 787                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 777.4698                   | 786.5190                    |               |                                 |
| Extreme (50C)  |           | 777.4698                   | 786.5190                    | -6.2          | -0.008                          |
| Extreme (40C)  |           | 777.4698                   | 786.5190                    | -4.3          | -0.005                          |
| Extreme (30C)  |           | 777.4698                   | 786.5190                    | -5.4          | -0.007                          |
| Extreme (10C)  |           | 777.4698                   | 786.5190                    | -4.3          | -0.006                          |
| Extreme (0C)   |           | 777.4698                   | 786.5190                    | -6.8          | -0.009                          |
| Extreme (-10C) |           | 777.4698                   | 786.5190                    | -4.9          | -0.006                          |
| Extreme (-20C) |           | 777.4698                   | 786.5190                    | 7.6           | 0.010                           |
| Extreme (-30C) |           | 777.4698                   | 786.5190                    | -8.5          | -0.011                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 777.4698                   | 786.5190                    | -7.6          | -0.010                          |
|                | -15%      | 777.4698                   | 786.5190                    | 4.5           | 0.006                           |
|                | End Point | 777.4698                   | 786.5190                    | -7.8          | -0.010                          |

## 8.4.6. LTE BAND 14

### LIMITS

FCC: §90.539

(e) The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 ppm or better when AFC is locked to a base station, and 5 ppm or better when AFC is not locked.

|                   |       |            |           |
|-------------------|-------|------------|-----------|
| Test Engineer ID: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### QPSK (10MHz BANDWIDTH)

| Limit          |           | 788                        | 798                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 788.2150                   | 797.4875                    |               |                                 |
| Extreme (50C)  |           | 788.2150                   | 797.4875                    | 1.2           | 0.002                           |
| Extreme (40C)  |           | 788.2150                   | 797.4875                    | 1.5           | 0.002                           |
| Extreme (30C)  |           | 788.2150                   | 797.4875                    | 1.3           | 0.002                           |
| Extreme (10C)  |           | 788.2150                   | 797.4875                    | 1.7           | 0.002                           |
| Extreme (0C)   |           | 788.2150                   | 797.4875                    | 1.3           | 0.002                           |
| Extreme (-10C) |           | 788.2150                   | 797.4875                    | 1.8           | 0.002                           |
| Extreme (-20C) |           | 788.2150                   | 797.4875                    | 1.8           | 0.002                           |
| Extreme (-30C) |           | 788.2150                   | 797.4875                    | 1.9           | 0.002                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 788.2150                   | 797.4875                    | 2.0           | 0.003                           |
|                | -15%      | 788.2150                   | 797.4875                    | 1.9           | 0.002                           |
|                | End Point | 788.2150                   | 797.4875                    | -0.6          | -0.001                          |

## 8.4.7. LTE BAND 17

### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### QPSK (10MHz BANDWIDTH)

| Limit          |           | 704                        | 716                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 704.5084                   | 715.5065                    |               |                                 |
| Extreme (50C)  |           | 704.5084                   | 715.5065                    | -9.4          | -0.013                          |
| Extreme (40C)  |           | 704.5084                   | 715.5065                    | -3.1          | -0.004                          |
| Extreme (30C)  |           | 704.5084                   | 715.5065                    | -3.9          | -0.005                          |
| Extreme (10C)  |           | 704.5084                   | 715.5065                    | -7.7          | -0.011                          |
| Extreme (0C)   |           | 704.5084                   | 715.5065                    | 8.6           | 0.012                           |
| Extreme (-10C) |           | 704.5084                   | 715.5065                    | -7.8          | -0.011                          |
| Extreme (-20C) |           | 704.5084                   | 715.5065                    | -5.0          | -0.007                          |
| Extreme (-30C) |           | 704.5084                   | 715.5065                    | -7.8          | -0.011                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 704.5084                   | 715.5065                    | -9.2          | -0.013                          |
|                | -15%      | 704.5084                   | 715.5065                    | -10.7         | -0.015                          |
|                | End Point | 704.5084                   | 715.5065                    | -7.7          | -0.011                          |

## 8.4.8. LTE BAND 25

### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### QPSK (20MHz BANDWIDTH)

| Limit          |           | 1850              | 1915               | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|-------------------|--------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |               |                                 |
| Temperature    | Voltage   | (MHz)             | (MHz)              |               |                                 |
| Normal (20C)   | Normal    | 1851.0119         | 1913.9804          |               |                                 |
| Extreme (50C)  |           | 1851.0119         | 1913.9804          | -13.4         | -0.007                          |
| Extreme (40C)  |           | 1851.0119         | 1913.9804          | 7.9           | 0.004                           |
| Extreme (30C)  |           | 1851.0119         | 1913.9804          | -13.1         | -0.007                          |
| Extreme (10C)  |           | 1851.0119         | 1913.9804          | -14.4         | -0.008                          |
| Extreme (0C)   |           | 1851.0119         | 1913.9804          | -14.5         | -0.008                          |
| Extreme (-10C) |           | 1851.0119         | 1913.9804          | 12.8          | 0.007                           |
| Extreme (-20C) |           | 1851.0119         | 1913.9804          | -11.4         | -0.006                          |
| Extreme (-30C) |           | 1851.0119         | 1913.9804          | -13.8         | -0.007                          |
|                |           |                   |                    |               |                                 |
| 20C            | 15%       | 1851.0119         | 1913.9804          | -15.0         | -0.008                          |
|                | -15%      | 1851.0119         | 1913.9804          | -13.5         | -0.007                          |
|                | End Point | 1851.0119         | 1913.9804          | -15.3         | -0.008                          |

### 8.4.9. LTE BAND 26 (FCC PART 90S)

#### LIMITS

FCC: §90.213

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

|                   |       |            |           |
|-------------------|-------|------------|-----------|
| Test Engineer ID: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

#### QPSK (10MHz BANDWIDTH)

| Limit          |           | 814                        | 824                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 814.4998                   | 823.5100                    |               |                                 |
| Extreme (50C)  |           | 814.4998                   | 823.5100                    | -9.0          | -0.011                          |
| Extreme (40C)  |           | 814.4998                   | 823.5100                    | -5.3          | -0.006                          |
| Extreme (30C)  |           | 814.4998                   | 823.5100                    | -10.2         | -0.012                          |
| Extreme (10C)  |           | 814.4998                   | 823.5100                    | -8.9          | -0.011                          |
| Extreme (0C)   |           | 814.4998                   | 823.5100                    | -6.0          | -0.007                          |
| Extreme (-10C) |           | 814.4998                   | 823.5100                    | -11.0         | -0.013                          |
| Extreme (-20C) |           | 814.4998                   | 823.5100                    | -9.0          | -0.011                          |
| Extreme (-30C) |           | 814.4998                   | 823.5100                    | -5.7          | -0.007                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 814.4998                   | 823.5100                    | -9.0          | -0.011                          |
|                | -15%      | 814.4998                   | 823.5100                    | -9.3          | -0.011                          |
|                | End Point | 814.4998                   | 823.5100                    | -8.8          | -0.011                          |

## 8.4.10. LTE BAND 30

### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### QPSK (10MHz BANDWIDTH)

| Limit          |           | 2305                       | 2315                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 2305.4882                  | 2314.5213                   |               |                                 |
| Extreme (50C)  |           | 2305.4882                  | 2314.5213                   | -15.3         | -0.007                          |
| Extreme (40C)  |           | 2305.4882                  | 2314.5213                   | 11.3          | 0.005                           |
| Extreme (30C)  |           | 2305.4882                  | 2314.5213                   | -13.8         | -0.006                          |
| Extreme (10C)  |           | 2305.4882                  | 2314.5213                   | -15.5         | -0.007                          |
| Extreme (0C)   |           | 2305.4882                  | 2314.5213                   | 11.6          | 0.005                           |
| Extreme (-10C) |           | 2305.4882                  | 2314.5213                   | 12.7          | 0.006                           |
| Extreme (-20C) |           | 2305.4882                  | 2314.5213                   | -9.6          | -0.004                          |
| Extreme (-30C) |           | 2305.4882                  | 2314.5213                   | 12.5          | 0.005                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2305.4882                  | 2314.5213                   | -14.3         | -0.006                          |
|                | -15%      | 2305.4882                  | 2314.5213                   | 14.1          | 0.006                           |
|                | End Point | 2305.4882                  | 2314.5213                   | -13.4         | -0.006                          |

### 8.4.11. LTE BAND 41 AND 5G NR BAND n41

#### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

#### LTE BAND 41 FCC QPSK (20MHz BANDWIDTH)

| Limit          |           | 2496                       | 2690                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 2496.6527                  | 2689.0749                   |               |                                 |
| Extreme (50C)  |           | 2496.6527                  | 2689.0749                   | -24.7         | -0.010                          |
| Extreme (40C)  |           | 2496.6527                  | 2689.0749                   | -22.1         | -0.009                          |
| Extreme (30C)  |           | 2496.6527                  | 2689.0749                   | -23.5         | -0.009                          |
| Extreme (10C)  |           | 2496.6527                  | 2689.0749                   | -21.2         | -0.008                          |
| Extreme (0C)   |           | 2496.6527                  | 2689.0749                   | -22.4         | -0.009                          |
| Extreme (-10C) |           | 2496.6527                  | 2689.0749                   | -21.2         | -0.008                          |
| Extreme (-20C) |           | 2496.6527                  | 2689.0749                   | -18.7         | -0.007                          |
| Extreme (-30C) |           | 2496.6527                  | 2689.0749                   | -21.6         | -0.008                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2496.6527                  | 2689.0749                   | -23.2         | -0.009                          |
|                | -15%      | 2496.6527                  | 2689.0749                   | -21.4         | -0.008                          |
|                | End Point | 2496.6527                  | 2689.0749                   | -19.9         | -0.008                          |

**5G NR BAND n41 QPSK (100MHz BANDWIDTH)**

| Limit          |                      | 2496              | 2690               | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|----------------------|-------------------|--------------------|---------------|---------------------------------|
| Condition      |                      | F low @<br>-13dBm | F high @<br>-13dBm |               |                                 |
| Temperature    | 2.8                  | (MHz)             | (MHz)              |               |                                 |
| Normal (20C)   | Normal               | 2496.9842         | 2688.0618          |               |                                 |
| Extreme (50C)  |                      | 2496.9842         | 2688.0618          | -38.8         | -0.015                          |
| Extreme (40C)  |                      | 2496.9842         | 2688.0618          | -33.8         | -0.013                          |
| Extreme (30C)  |                      | 2496.9842         | 2688.0619          | 34.5          | 0.013                           |
| Extreme (10C)  |                      | 2496.9842         | 2688.0618          | -30.1         | -0.012                          |
| Extreme (0C)   |                      | 2496.9842         | 2688.0618          | -28.6         | -0.011                          |
| Extreme (-10C) |                      | 2496.9842         | 2688.0619          | 28.4          | 0.011                           |
| Extreme (-20C) |                      | 2496.9842         | 2688.0618          | -35.7         | -0.014                          |
| Extreme (-30C) |                      | 2496.9842         | 2688.0618          | -28.8         | -0.011                          |
|                |                      |                   |                    |               |                                 |
| 20C            | 15%                  | 2496.9842         | 2688.0618          | -40.0         | -0.015                          |
|                | -15%                 | 2496.9842         | 2688.0618          | -30.3         | -0.012                          |
|                | End Point<br>Voltage | 2496.9842         | 2688.0618          | -36.8         | -0.014                          |

## 8.4.12. LTE BAND 48

### LIMITS

|                   |       |            |           |
|-------------------|-------|------------|-----------|
| Test Engineer ID: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

### LTE BAND 48 QPSK (20MHz BANDWIDTH)

| Limit          |           | 3550              | 3700               | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|-------------------|--------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |               |                                 |
| Temperature    | Voltage   | (MHz)             | (MHz)              |               |                                 |
| Normal (20C)   | Normal    | 3550.9602         | 3699.0189          |               |                                 |
| Extreme (50C)  |           | 3550.9602         | 3699.0189          | -6.7          | -0.002                          |
| Extreme (40C)  |           | 3550.9602         | 3699.0189          | -5.5          | -0.002                          |
| Extreme (30C)  |           | 3550.9602         | 3699.0189          | -6.3          | -0.002                          |
| Extreme (10C)  |           | 3550.9602         | 3699.0189          | -4.6          | -0.001                          |
| Extreme (0C)   |           | 3550.9602         | 3699.0189          | -3.8          | -0.001                          |
| Extreme (-10C) |           | 3550.9602         | 3699.0189          | 2.2           | 0.001                           |
| Extreme (-20C) |           | 3550.9602         | 3699.0189          | -5.7          | -0.002                          |
| Extreme (-30C) |           | 3550.9602         | 3699.0189          | -6.7          | -0.002                          |
|                |           |                   |                    |               |                                 |
| 20C            | 15%       | 3550.9602         | 3699.0189          | -4.2          | -0.001                          |
|                | -15%      | 3550.9602         | 3699.0189          | -5.7          | -0.002                          |
|                | End Point | 3550.9602         | 3699.0189          | -2.8          | -0.001                          |

### 8.4.13. LTE BAND 66

#### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

#### LTE BAND 66 QPSK (20MHz BANDWIDTH)

| Limit          |           | 1710                       | 1780                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 1711.0181                  | 1778.9932                   |               |                                 |
| Extreme (50C)  |           | 1711.0181                  | 1778.9932                   | -10.0         | -0.006                          |
| Extreme (40C)  |           | 1711.0181                  | 1778.9932                   | -10.6         | -0.006                          |
| Extreme (30C)  |           | 1711.0181                  | 1778.9932                   | -12.9         | -0.007                          |
| Extreme (10C)  |           | 1711.0181                  | 1778.9932                   | -11.7         | -0.007                          |
| Extreme (0C)   |           | 1711.0181                  | 1778.9932                   | -11.3         | -0.006                          |
| Extreme (-10C) |           | 1711.0181                  | 1778.9932                   | 10.9          | 0.006                           |
| Extreme (-20C) |           | 1711.0181                  | 1778.9932                   | -9.0          | -0.005                          |
| Extreme (-30C) |           | 1711.0181                  | 1778.9932                   | -12.9         | -0.007                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1711.0181                  | 1778.9932                   | -13.8         | -0.008                          |
|                | -15%      | 1711.0181                  | 1778.9932                   | -13.2         | -0.008                          |
|                | End Point | 1711.0181                  | 1778.9932                   | -13.5         | -0.008                          |

#### 8.4.14. LTE BAND 71

##### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

##### QPSK (20MHz BANDWIDTH)

| Limit          |           | 663                        | 698                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 664.0116                   | 696.9901                    |               |                                 |
| Extreme (50C)  |           | 664.0116                   | 696.9901                    | -5.8          | -0.009                          |
| Extreme (40C)  |           | 664.0116                   | 696.9901                    | -5.1          | -0.007                          |
| Extreme (30C)  |           | 664.0116                   | 696.9901                    | -4.4          | -0.006                          |
| Extreme (10C)  |           | 664.0116                   | 696.9901                    | -3.9          | -0.006                          |
| Extreme (0C)   |           | 664.0116                   | 696.9901                    | 4.1           | 0.006                           |
| Extreme (-10C) |           | 664.0116                   | 696.9901                    | 5.3           | 0.008                           |
| Extreme (-20C) |           | 664.0116                   | 696.9901                    | 4.9           | 0.007                           |
| Extreme (-30C) |           | 664.0116                   | 696.9901                    | -3.8          | -0.006                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 664.0116                   | 696.9901                    | -3.7          | -0.005                          |
|                | -15%      | 664.0116                   | 696.9901                    | 2.6           | 0.004                           |
|                | End Point | 664.0116                   | 696.9901                    | 3.5           | 0.005                           |

### 8.4.15. 5G NR BAND n77

#### 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: | 19179 | Test Date: | 7/22/2020 |
|-------------------|-------|------------|-----------|

#### 5G NR BAND n77 QPSK (100MHz BANDWIDTH)

| Limit          |           | 3700              | 3980               | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|-------------------|--------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm | F high @<br>-13dBm |               |                                 |
| Temperature    | Voltage   | (MHz)             | (MHz)              |               |                                 |
| Normal (20C)   | Normal    | 3700.8297         | 3978.0063          |               |                                 |
| Extreme (50C)  |           | 3700.8296         | 3978.0062          | -66.7         | -0.017                          |
| Extreme (40C)  |           | 3700.8296         | 3978.0062          | -54.0         | -0.014                          |
| Extreme (30C)  |           | 3700.8297         | 3978.0063          | 32.7          | 0.009                           |
| Extreme (10C)  |           | 3700.8297         | 3978.0063          | -37.8         | -0.010                          |
| Extreme (0C)   |           | 3700.8297         | 3978.0063          | -44.7         | -0.012                          |
| Extreme (-10C) |           | 3700.8297         | 3978.0063          | -47.8         | -0.012                          |
| Extreme (-20C) |           | 3700.8297         | 3978.0063          | -34.9         | -0.009                          |
| Extreme (-30C) |           | 3700.8297         | 3978.0063          | -37.2         | -0.010                          |
|                |           |                   |                    |               |                                 |
| 20C            | 15%       | 3700.8297         | 3978.0063          | -27.4         | -0.007                          |
|                | -15%      | 3700.8297         | 3978.0063          | -29.6         | -0.008                          |
|                | End Point | 3700.8297         | 3978.0063          | -31.3         | -0.008                          |

## 8.5. PEAK-TO-AVERAGE POWER RATIO

### LIMIT

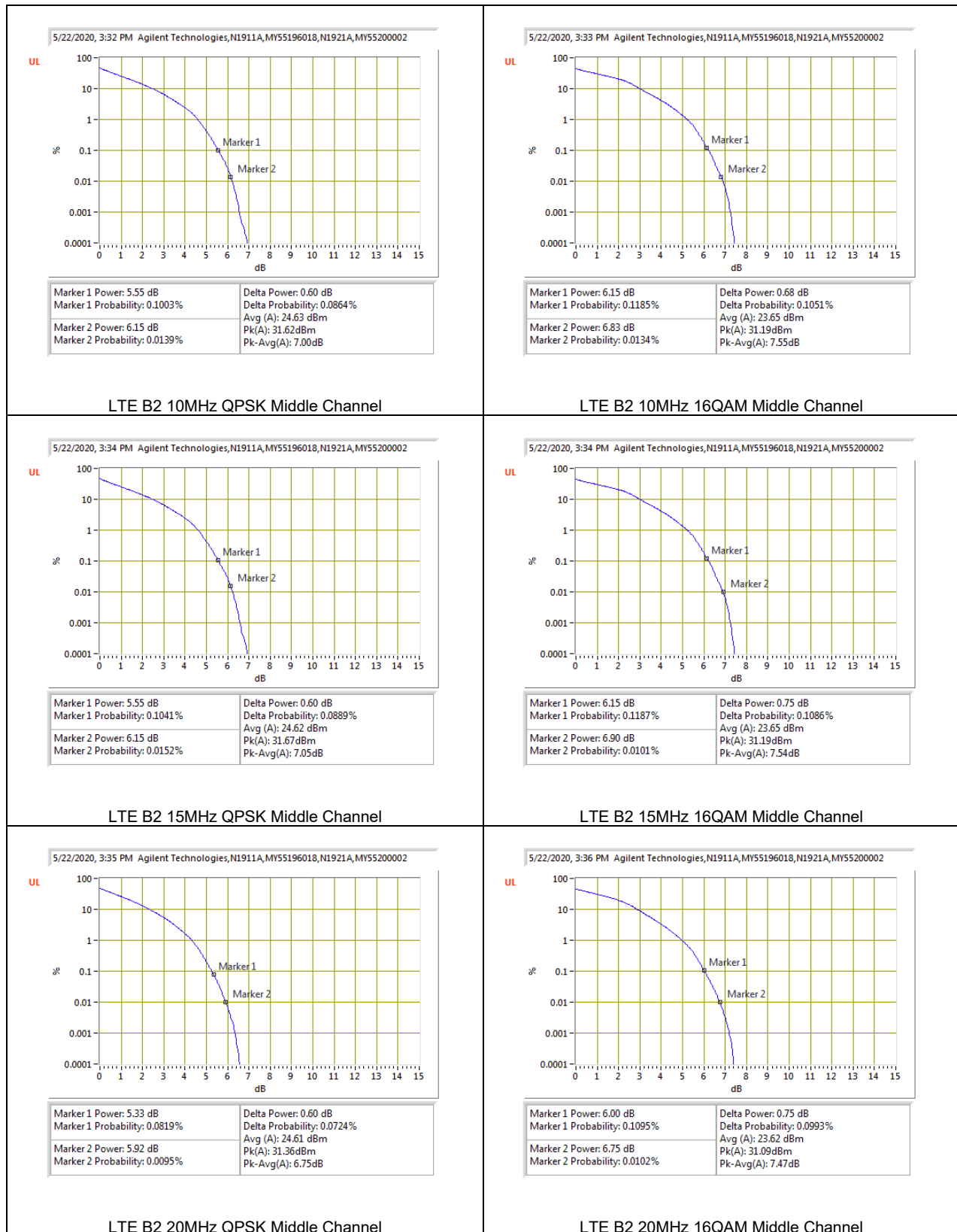
In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

### RESULT

The highest output power antenna port 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.

## 8.5.1. LTE BAND 2

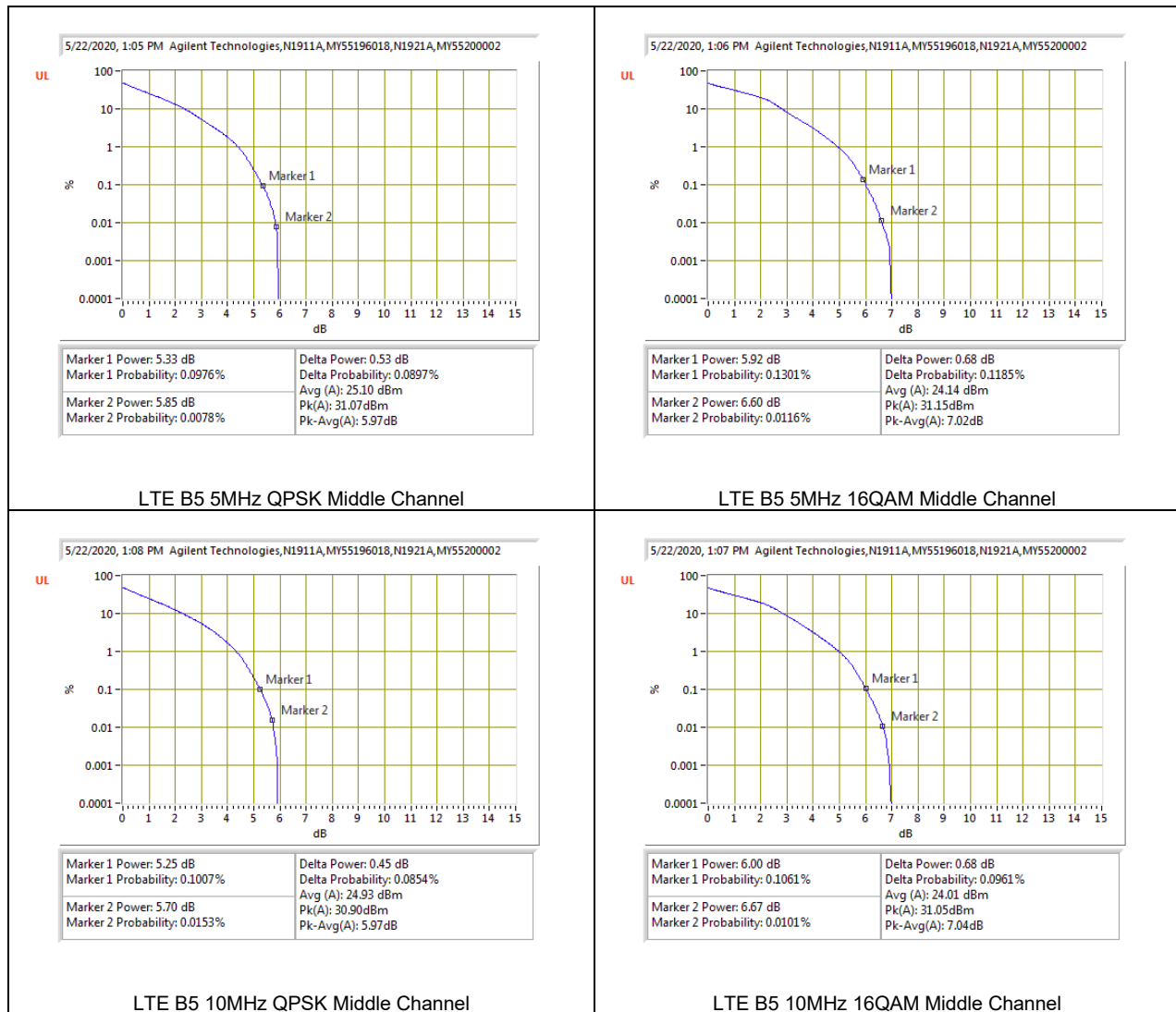




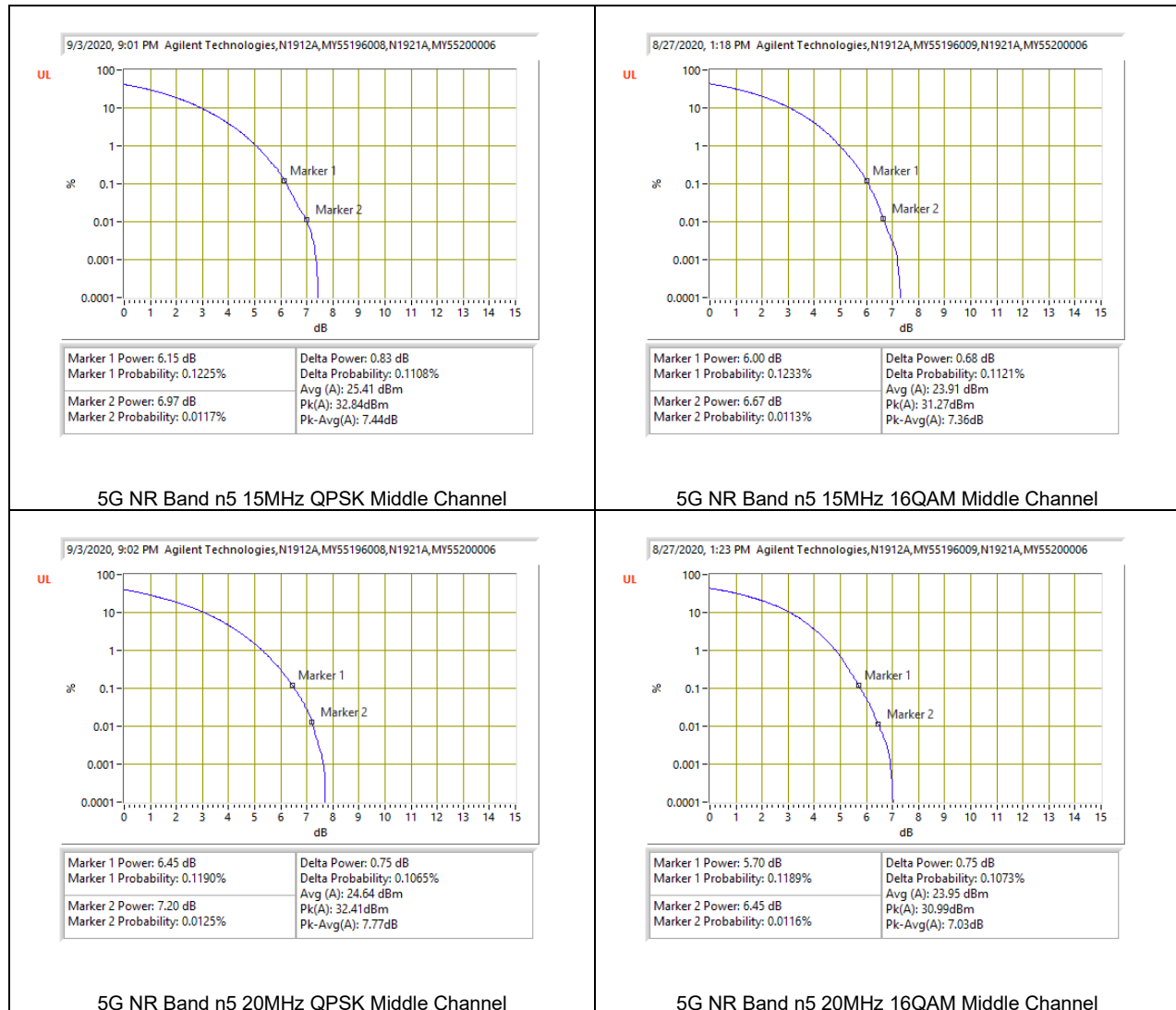
## 8.5.2. LTE BAND 5 AND 5G NR BAND n5

### LTE BAND 5

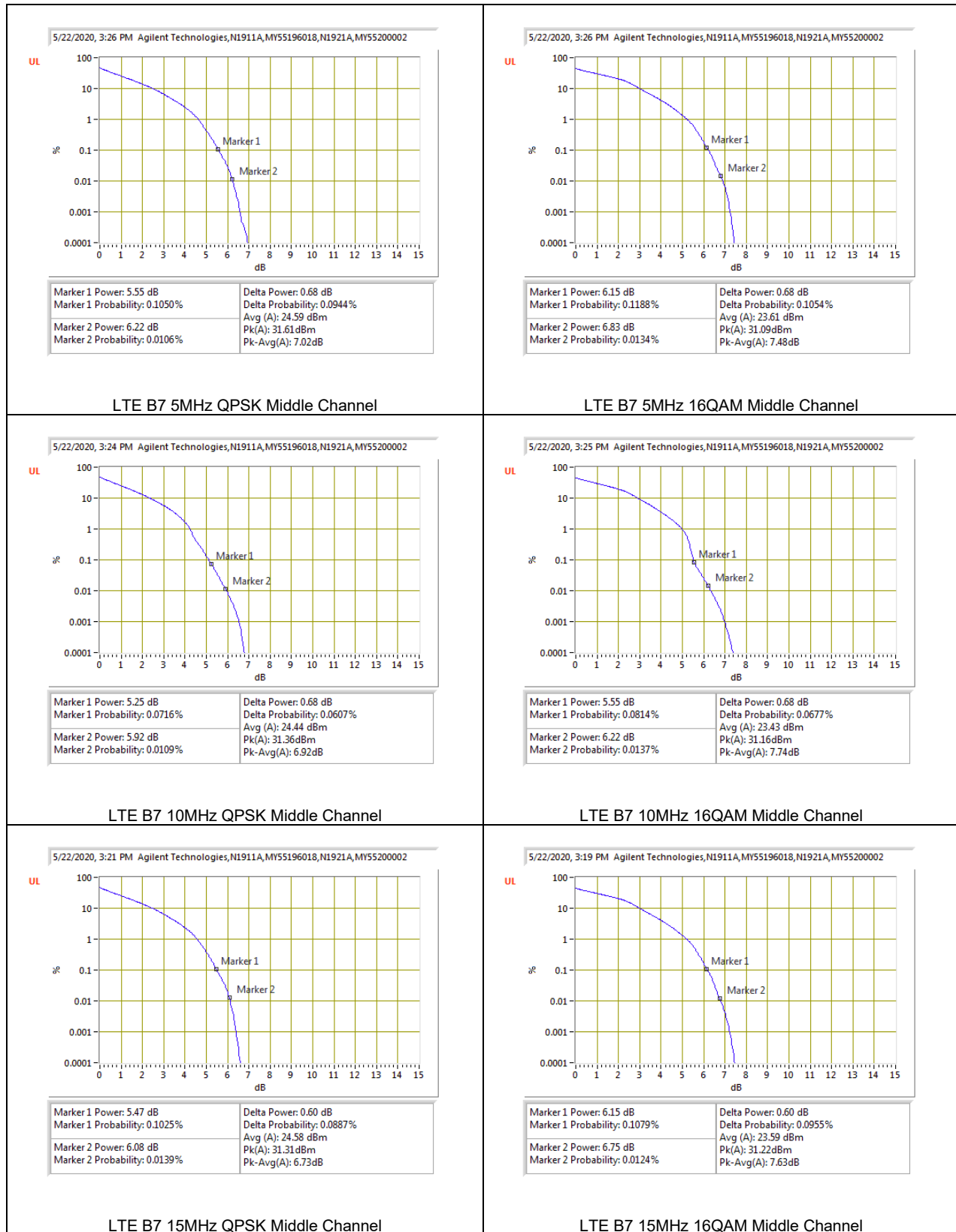


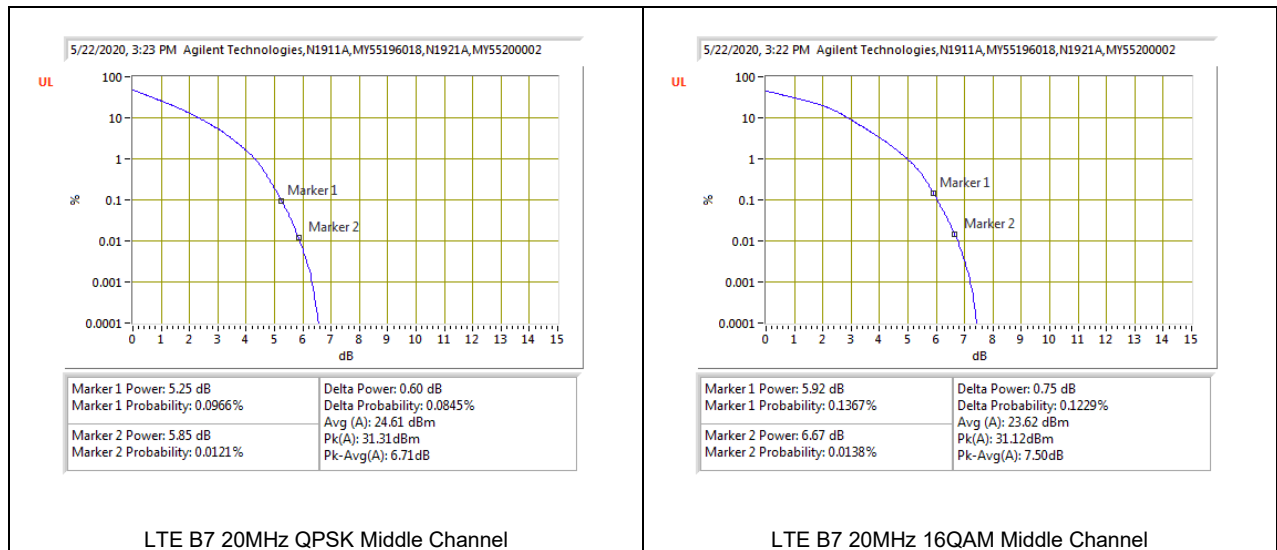


**5G NR BAND n5**



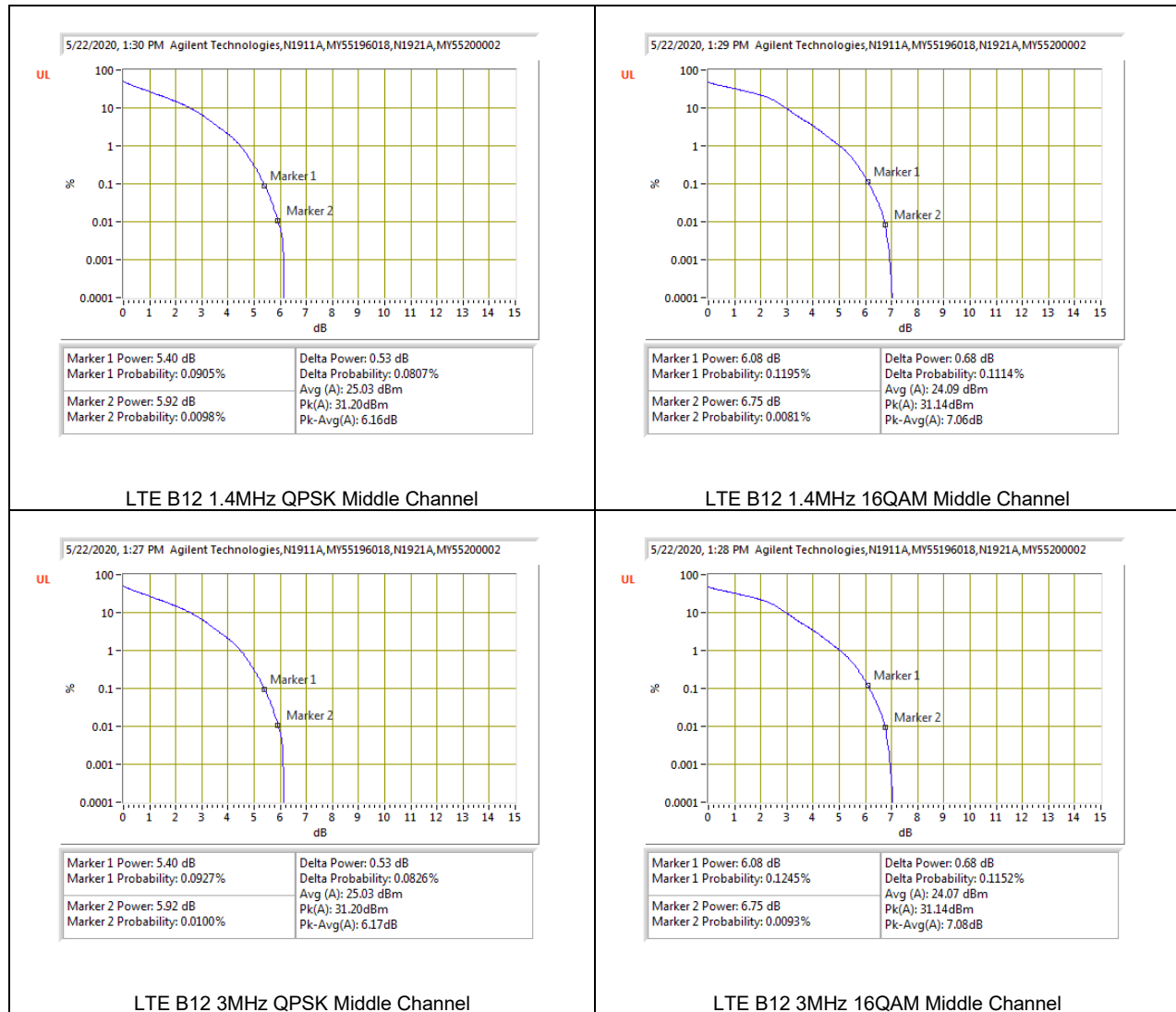
### 8.5.3. LTE BAND 7

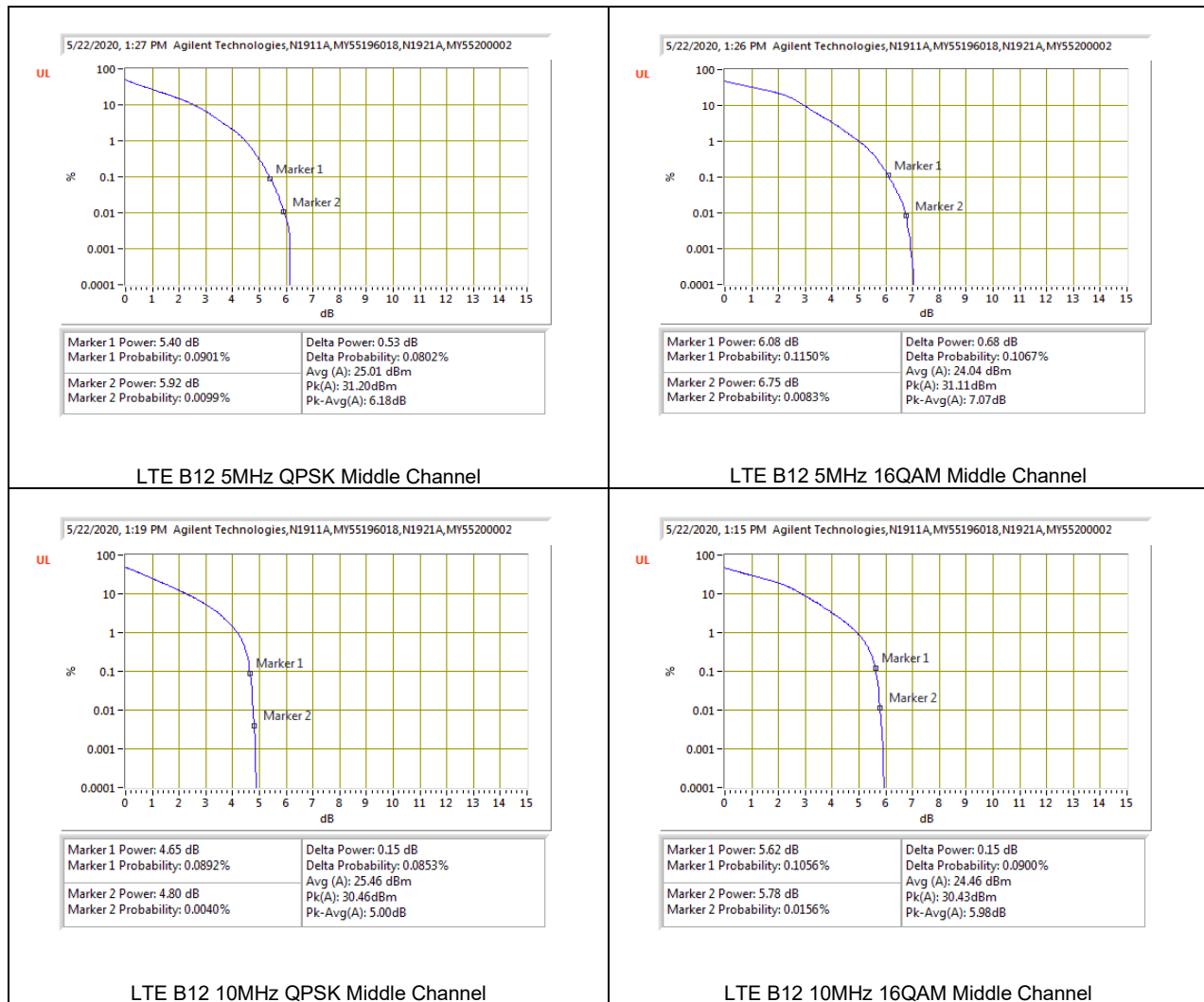




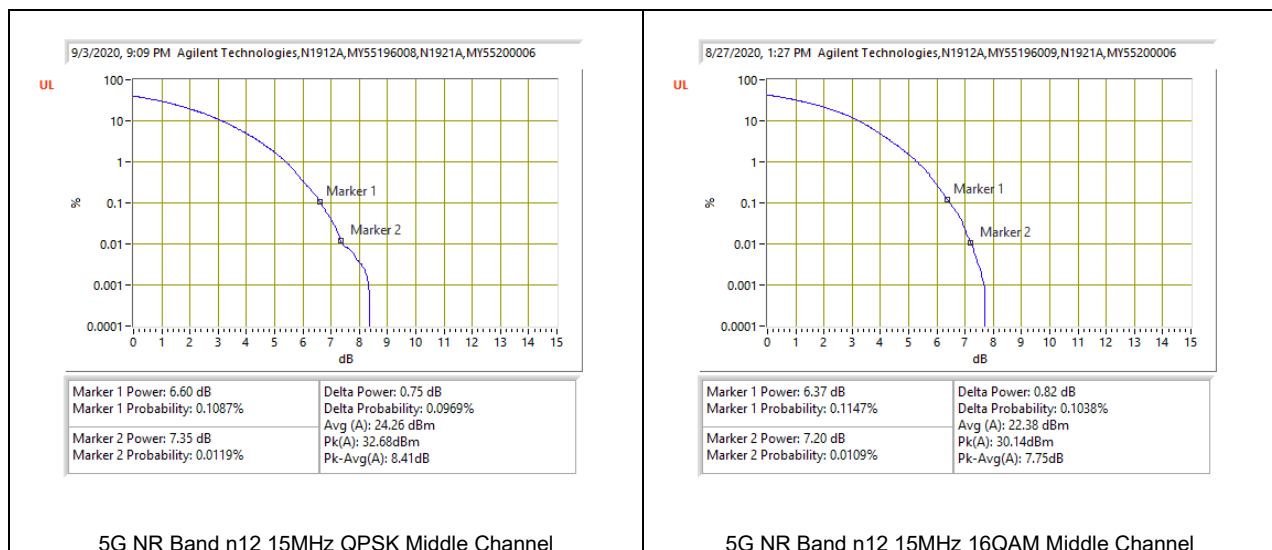
## 8.5.4. LTE BAND 12 AND 5G NR BAND n12

### LTE BAND 12

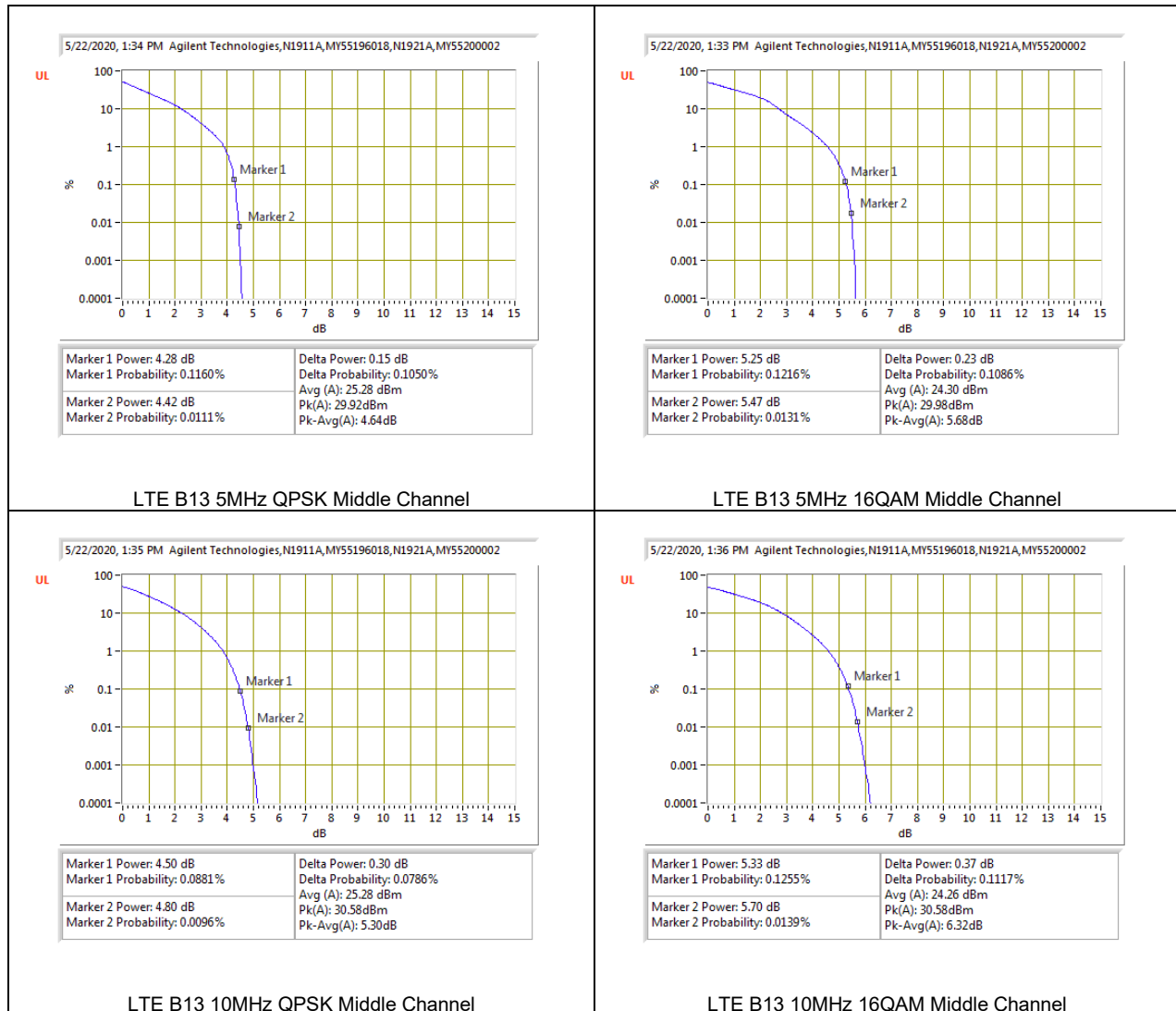




## 5G NR BAND n12



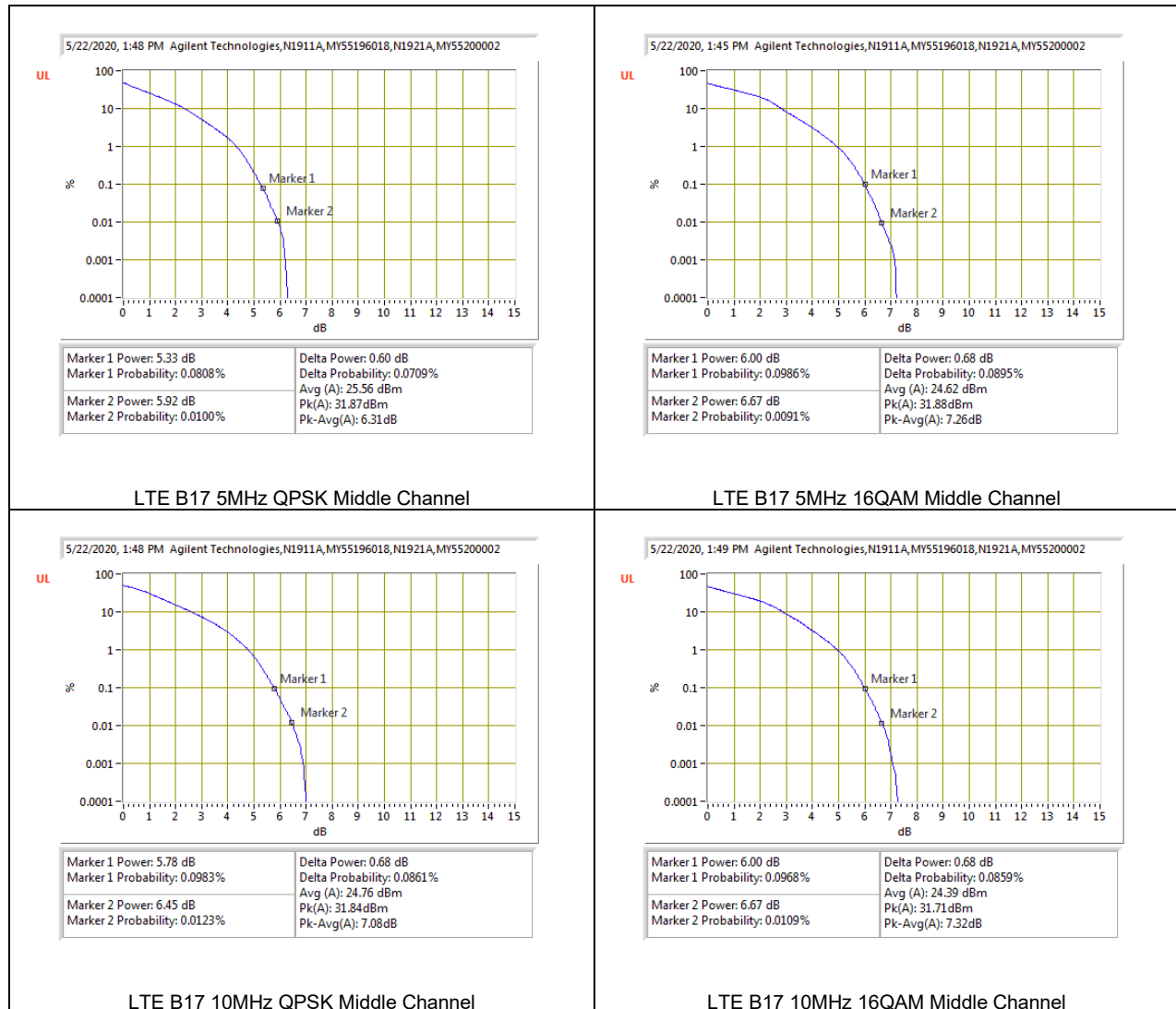
### 8.5.5. LTE BAND 13



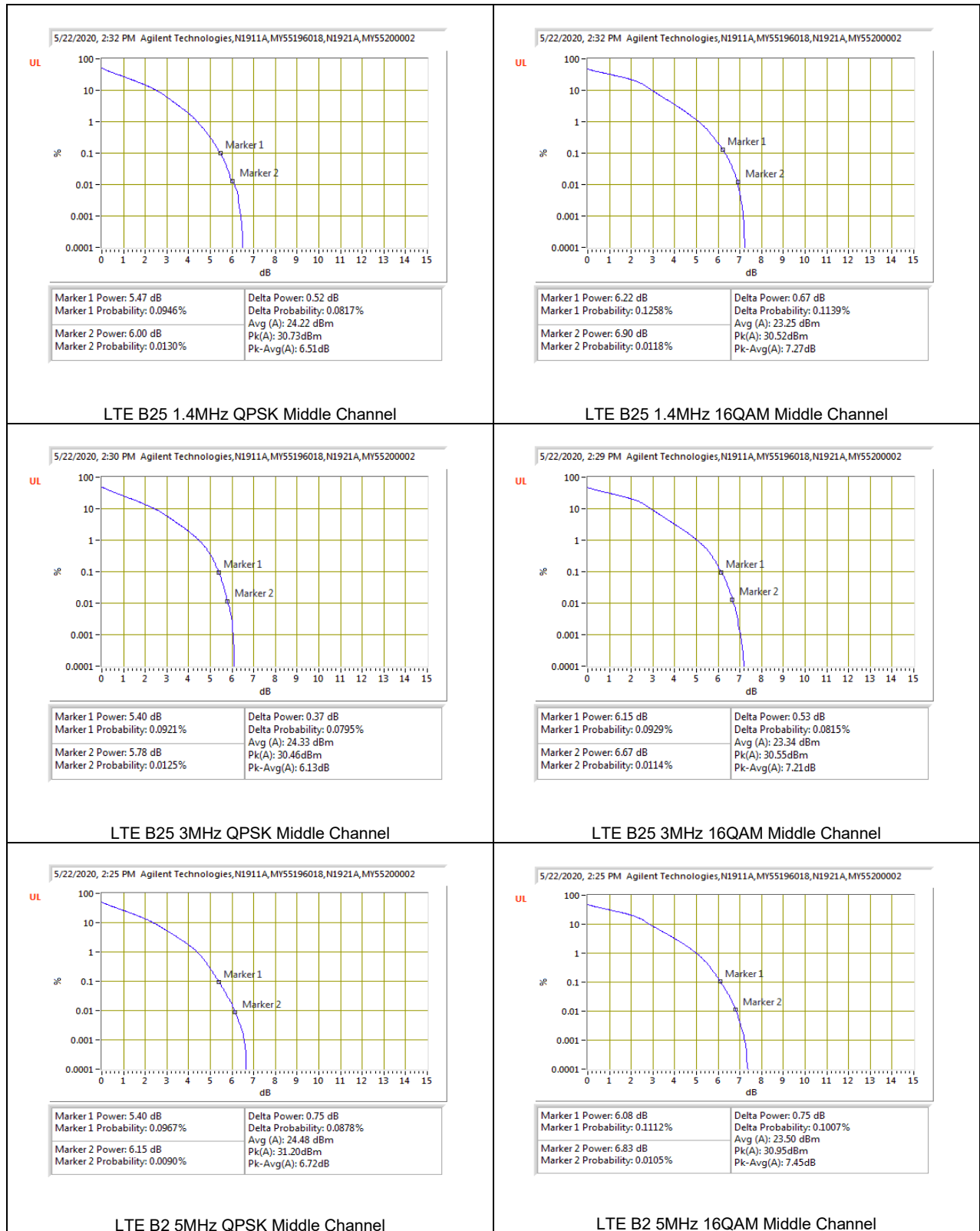
## 8.5.6. LTE BAND 14



## 8.5.7. LTE BAND 17

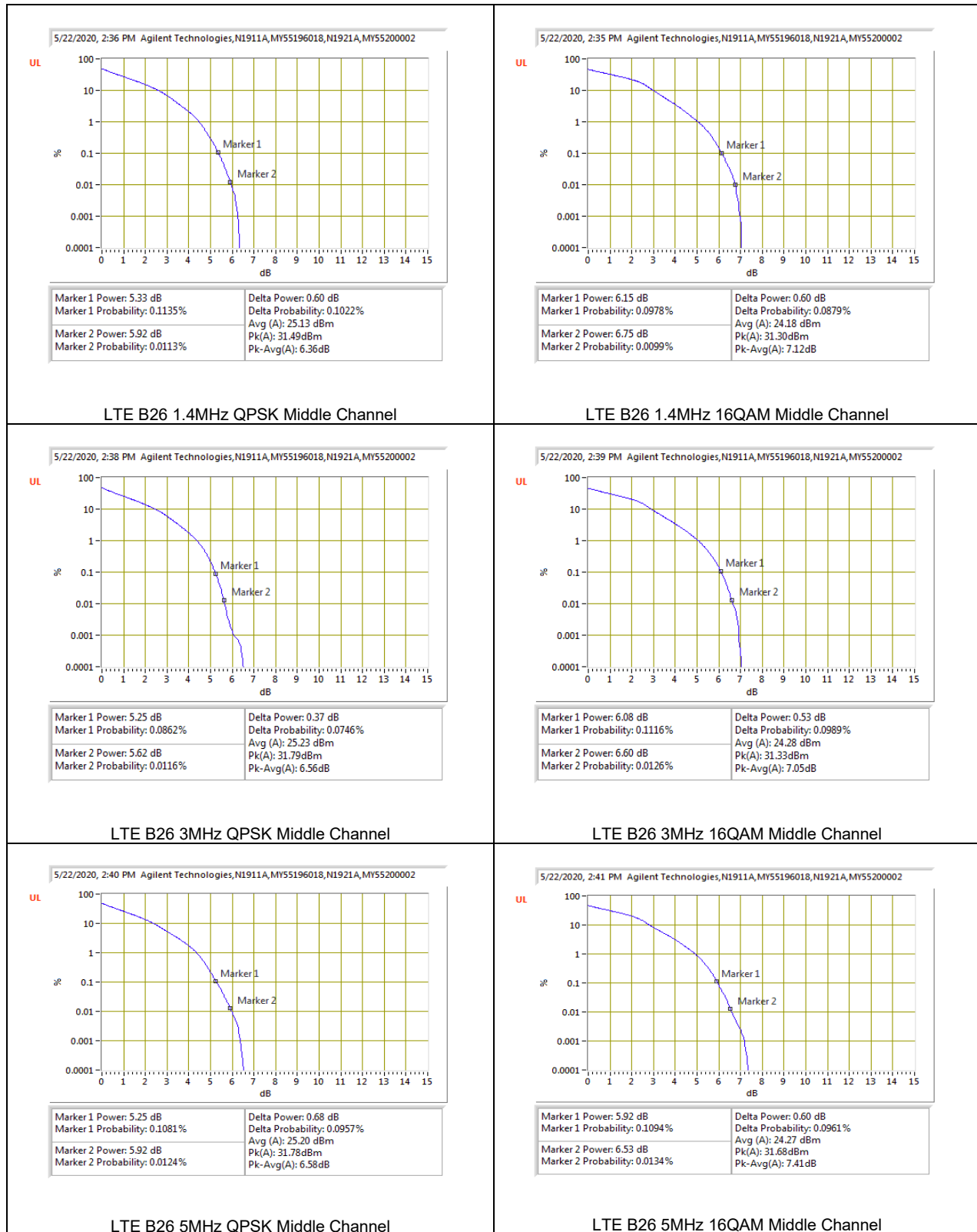


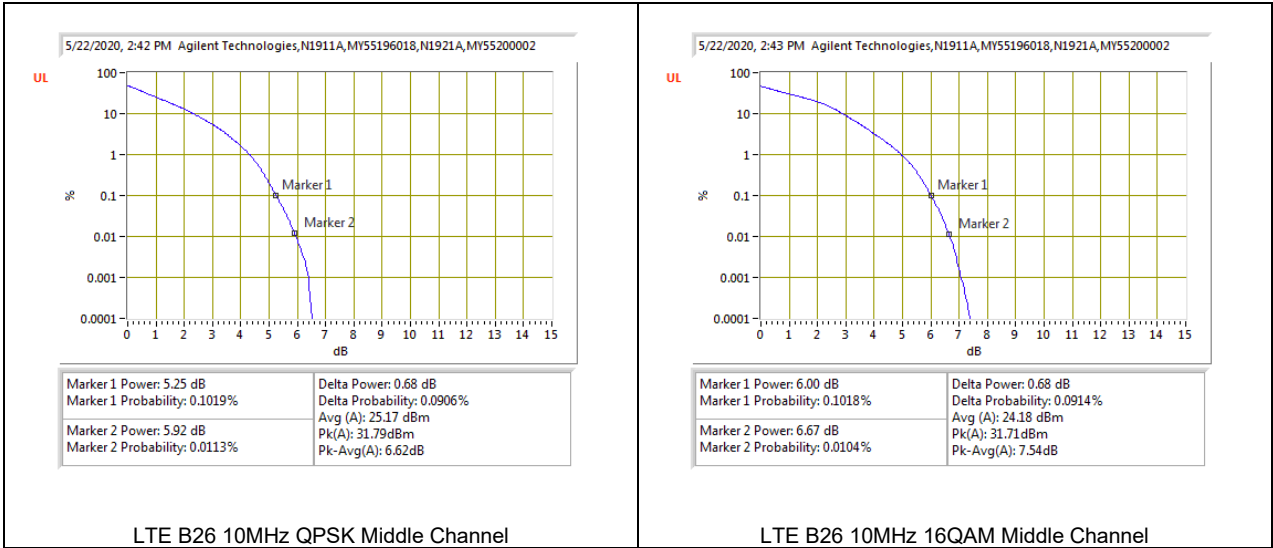
## 8.5.8. LTE BAND 25





### 8.5.9. LTE BAND 26 (FCC PART 90S)





## 8.5.10. LTE BAND 30



### 8.5.11. LTE BAND 41 AND 5G NR BAND n41

|                          |       |                   |           |
|--------------------------|-------|-------------------|-----------|
| <b>Test Engineer ID:</b> | 19179 | <b>Test Date:</b> | 7/22/2020 |
|--------------------------|-------|-------------------|-----------|

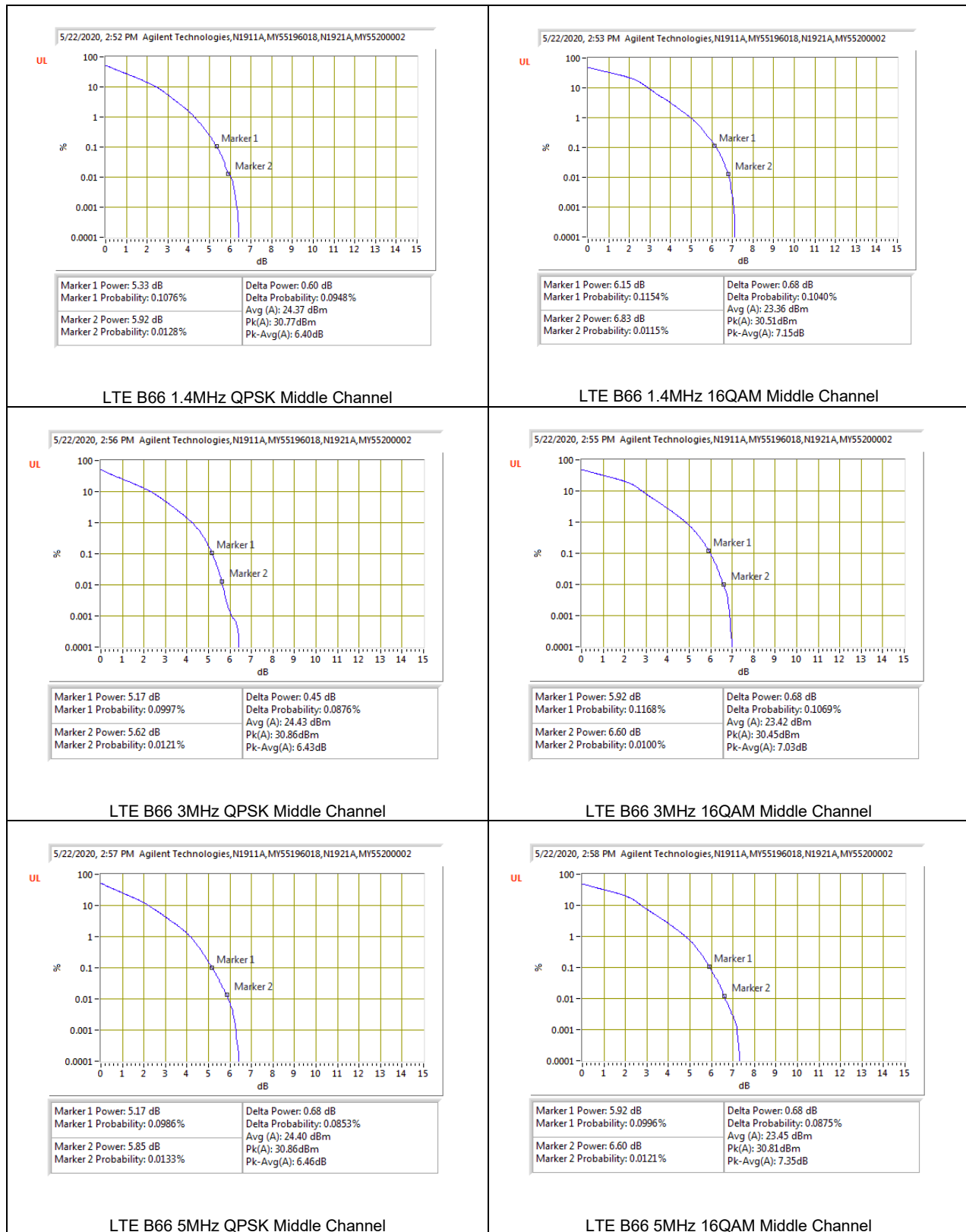
| Band                                | Bandwidth (MHz) | Frequency (MHz) | RB Allocation | RB OffSet | Modulation | Conducted Power (dBm) |         | Peak-to-Average Power Ratio (dB) |
|-------------------------------------|-----------------|-----------------|---------------|-----------|------------|-----------------------|---------|----------------------------------|
|                                     |                 |                 |               |           |            | Peak                  | Average |                                  |
| Band 41                             | 5MHz            | 2595.0          | 25            | 0         | QPSK       | 31.64                 | 18.44   | 6.21                             |
|                                     |                 |                 |               |           | 16QAM      | 31.43                 | 17.44   | 7.00                             |
|                                     | 10MHz           |                 | 50            | 0         | QPSK       | 31.75                 | 18.38   | 6.38                             |
|                                     |                 |                 |               |           | 16QAM      | 31.57                 | 17.36   | 7.22                             |
|                                     | 15MHz           |                 | 75            | 0         | QPSK       | 31.77                 | 18.55   | 6.23                             |
|                                     |                 |                 |               |           | 16QAM      | 31.78                 | 17.55   | 7.24                             |
|                                     | 20MHz           |                 | 100           | 0         | QPSK       | 31.66                 | 18.48   | 6.19                             |
|                                     |                 |                 |               |           | 16QAM      | 31.55                 | 17.47   | 7.09                             |
| 5G NR<br>Band n41                   | 40MHz           |                 | 100           | 0         | QPSK       | 31.40                 | 26.9    | 4.50                             |
|                                     |                 |                 |               |           | 16QAM      | 31.74                 | 26.12   | 5.62                             |
|                                     | 50MHz           | 128             | 0             | QPSK      | 31.76      | 26.98                 | 4.78    |                                  |
|                                     |                 |                 |               | 16QAM     | 31.86      | 26.01                 | 5.85    |                                  |
|                                     | 60MHz           | 162             | 0             | QPSK      | 31.54      | 27.01                 | 4.53    |                                  |
|                                     |                 |                 |               | 16QAM     | 31.79      | 25.95                 | 5.84    |                                  |
|                                     | 80MHz           | 216             | 0             | QPSK      | 31.44      | 26.94                 | 4.50    |                                  |
|                                     |                 |                 |               | 16QAM     | 31.63      | 25.95                 | 5.68    |                                  |
|                                     | 90MHz           | 240             | 0             | QPSK      | 31.12      | 26.98                 | 4.14    |                                  |
|                                     |                 |                 |               | 16QAM     | 31.40      | 25.94                 | 5.46    |                                  |
| 100MHz                              | 270             | 0               | QPSK          | 30.85     | 26.92      | 3.93                  |         |                                  |
|                                     |                 |                 | 16QAM         | 31.31     | 25.89      | 5.42                  |         |                                  |
| Duty Cycle Correction Factor (dB) = |                 |                 | 6.99          |           |            |                       |         |                                  |

### 8.5.12. LTE BAND 48

|                          |       |                   |           |
|--------------------------|-------|-------------------|-----------|
| <b>Test Engineer ID:</b> | 19179 | <b>Test Date:</b> | 7/22/2020 |
|--------------------------|-------|-------------------|-----------|

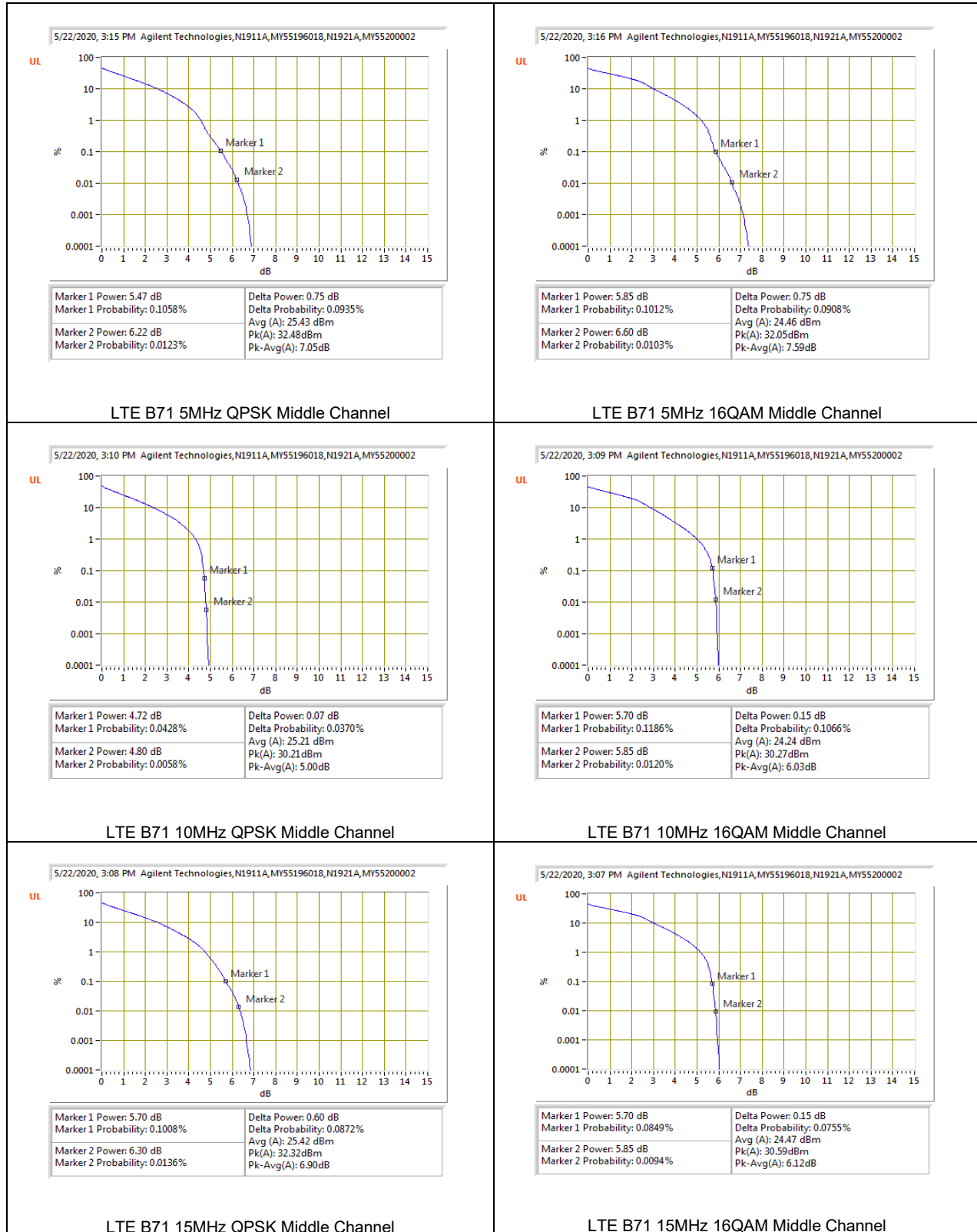
| Band                                                                                       | Bandwidth (MHz) | Frequency (MHz) | RB Allocation | RB OffSet | Modulation | Conducted Power (dBm) |         | Peak-to-Average Power Ratio (dB) |
|--------------------------------------------------------------------------------------------|-----------------|-----------------|---------------|-----------|------------|-----------------------|---------|----------------------------------|
|                                                                                            |                 |                 |               |           |            | Peak                  | Average |                                  |
| Band 48                                                                                    | 5MHz            | 3625.0          | 25            | 0         | QPSK       | 30.00                 | 16.66   | 6.34                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 31.25                 | 16.66   | 7.59                             |
|                                                                                            | 10MHz           |                 | 50            | 0         | QPSK       | 30.49                 | 16.6    | 6.89                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 30.93                 | 16.57   | 7.36                             |
|                                                                                            | 15MHz           |                 | 75            | 0         | QPSK       | 30.46                 | 16.75   | 6.71                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 33.31                 | 16.78   | 9.53                             |
|                                                                                            | 20MHz           |                 | 100           | 0         | QPSK       | 30.55                 | 16.7    | 6.85                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 31.16                 | 16.72   | 7.44                             |
| Duty Cycle Correction Factor (dB) =                                                        |                 |                 | 7.00          |           |            |                       |         |                                  |
| Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor |                 |                 |               |           |            |                       |         |                                  |

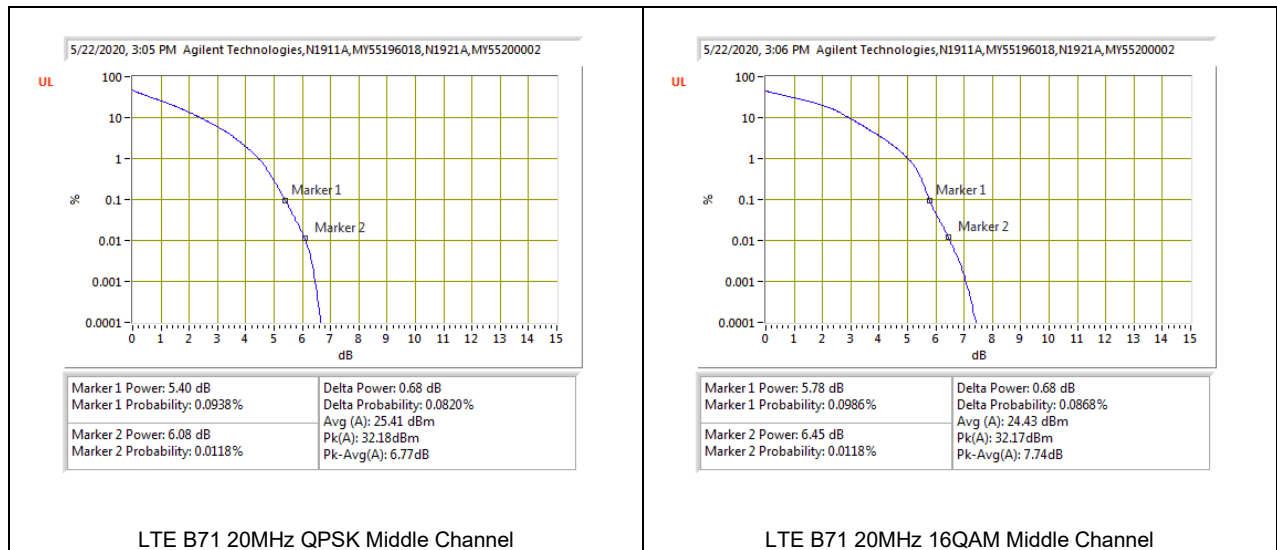
### 8.5.13. LTE BAND 66





## 8.5.14. LTE BAND 71





### 8.5.15. 5G NR BAND n77

|                          |       |                   |          |
|--------------------------|-------|-------------------|----------|
| <b>Test Engineer ID:</b> | 20773 | <b>Test Date:</b> | 9/3/2020 |
|--------------------------|-------|-------------------|----------|

| Band              | Bandwidth (MHz) | Frequency (MHz) | RB Allocation | RB OffSet | Modulation | Conducted Power (dBm) |         | Peak-to-Average Power Ratio (dB) |
|-------------------|-----------------|-----------------|---------------|-----------|------------|-----------------------|---------|----------------------------------|
|                   |                 |                 |               |           |            | Peak                  | Average |                                  |
| 5G NR<br>Band n77 | 40MHz           | 3840.0          | 100           | 0         | QPSK       | 31.70                 | 26.53   | 5.17                             |
|                   |                 |                 |               |           | 16QAM      | 32.43                 | 26.97   | 5.46                             |
|                   | 50MHz           |                 | 128           | 0         | QPSK       | 31.62                 | 26.5    | 5.12                             |
|                   |                 |                 |               |           | 16QAM      | 31.68                 | 26.61   | 5.07                             |
|                   | 60MHz           |                 | 162           | 0         | QPSK       | 30.81                 | 25.87   | 4.94                             |
|                   |                 |                 |               |           | 16QAM      | 31.42                 | 26.59   | 4.83                             |
|                   | 80MHz           |                 | 216           | 0         | QPSK       | 30.24                 | 25.83   | 4.41                             |
|                   |                 |                 |               |           | 16QAM      | 31.05                 | 26.48   | 4.57                             |
|                   | 90MHz           |                 | 240           | 0         | QPSK       | 30.01                 | 25.82   | 4.19                             |
|                   |                 |                 |               |           | 16QAM      | 31.77                 | 26.49   | 5.28                             |
|                   | 100MHz          |                 | 270           | 0         | QPSK       | 29.83                 | 25.8    | 4.03                             |
|                   |                 |                 |               |           | 16QAM      | 30.73                 | 26.42   | 4.31                             |

## 9. RADIATED TEST RESULTS

### Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, We measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

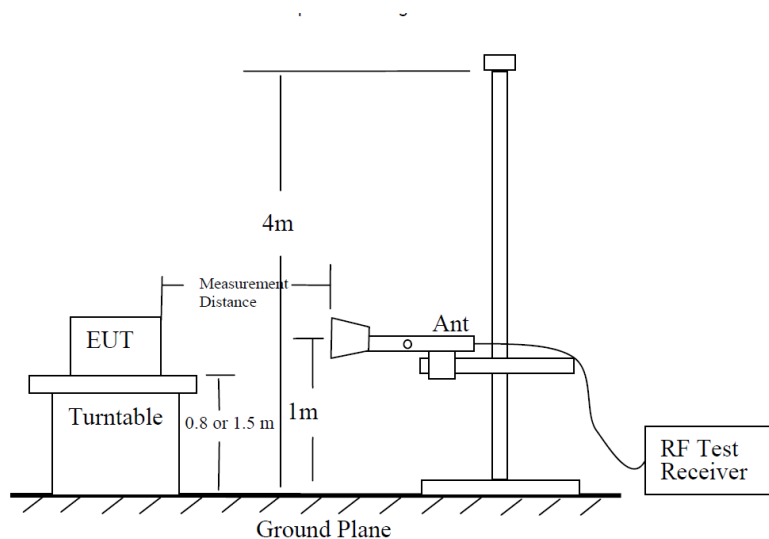


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

### Radiated Power Measurement Calculation According to ANSI C63.26-2015

- a)  $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$
- b)  $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$
- c)  $E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20\log(D) + 104.8$ ; where D is the measurement distance (in the far field region) in m.
- d)  $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.

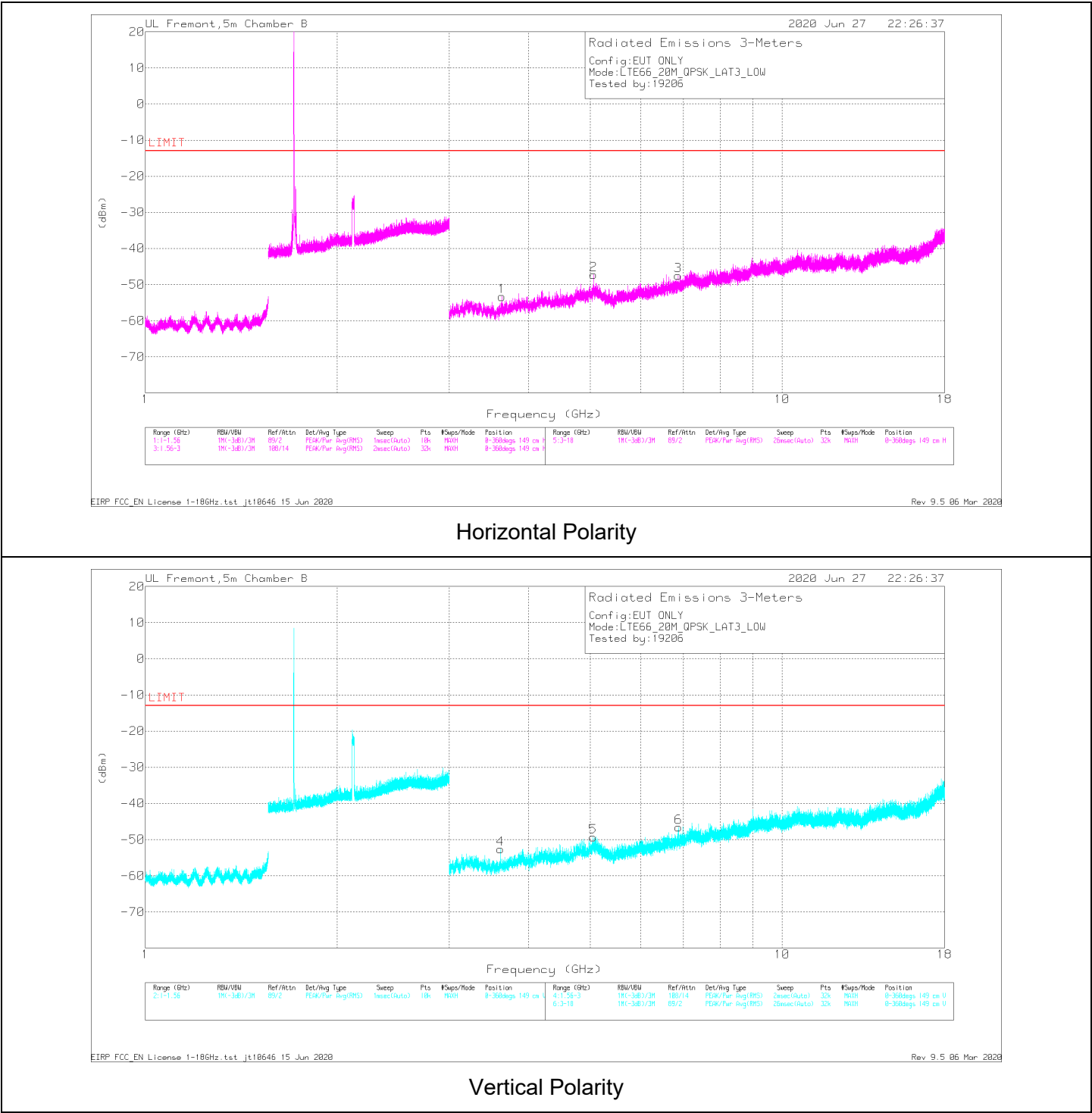
So, from d)

The measuring distance is usually at 3m, then  $20 \cdot \log(3) = 9.5424$

Then,  $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 9.5424 - 104.8 = E \text{ (dB}\mu\text{V/m)} - 95.2576$

Note that: we do confidence check to our chambers every day to see if any degradation from expected/normal reading reference data. Also we do ambient check to all our chambers every month.

9.1. Example Plot



## Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | AF T962 (dB/m) | Amp/Cbl/Filtr/Pad (dB) | EIRP CF | Corrected Reading (dBm) | LIMIT | Margin (dB) | Polarity |
|--------|-----------------|----------------------|-----|----------------|------------------------|---------|-------------------------|-------|-------------|----------|
| 4      | 3.61031         | 39.71                | Pk  | 30             | -27.1                  | -95.2   | -52.59                  | -13   | -39.59      | V        |
| 1      | 3.63094         | 38.95                | Pk  | 30.1           | -27.2                  | -95.2   | -53.35                  | -13   | -40.35      | H        |
| 5      | 5.04656         | 37.02                | Pk  | 33.8           | -24.9                  | -95.2   | -49.28                  | -13   | -36.28      | V        |
| 2      | 5.055           | 38.94                | Pk  | 33.8           | -24.8                  | -95.2   | -47.26                  | -13   | -34.26      | H        |
| 3      | 6.86484         | 35.11                | Pk  | 36.2           | -23.6                  | -95.2   | -47.49                  | -13   | -34.49      | H        |
| 6      | 6.88219         | 36.03                | Pk  | 36.3           | -23.7                  | -95.2   | -46.57                  | -13   | -33.57      | V        |

Pk - Peak detector

## Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | AF T962 (dB/m) | Amp/Cbl/Filtr/Pad (dB) | EIRP CF | Corrected Reading (dBm) | LIMIT | Margin (dB) | Polarity |
|-----------------|----------------------|-----|----------------|------------------------|---------|-------------------------|-------|-------------|----------|
| 3.60697         | 38.52                | Pk  | 30             | -27.2                  | -95.2   | -53.88                  | -13   | -40.88      | V        |
| 3.63416         | 38.89                | Pk  | 30.1           | -27.2                  | -95.2   | -53.41                  | -13   | -40.41      | H        |
| 5.04281         | 37.77                | Pk  | 33.7           | -24.9                  | -95.2   | -48.63                  | -13   | -35.63      | V        |
| 5.0513          | 37.1                 | Pk  | 33.8           | -24.7                  | -95.2   | -49                     | -13   | -36         | H        |
| 6.86762         | 37.12                | Pk  | 36.1           | -23.6                  | -95.2   | -45.58                  | -13   | -32.58      | H        |
| 6.88347         | 36.27                | Pk  | 36.2           | -23.7                  | -95.2   | -46.43                  | -13   | -33.43      | V        |

Pk - Peak detector

EIRP FCC\_EN License 1-18GHz.tst jt10646 15 Jun 2020

Rev 9.5 06 Mar 2020

## **9.2. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 1**

### **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.

All tests above 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

### **RESULTS**

### 9.2.1. LTE BAND 2

#### **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.

**QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 5/14/2020        |
| Test Engineer: | 12491            |
| Configuration: | EUT Only         |
| Mode           | LTE 2 QPSK 20MHz |
| Chamber #:     | Chamber I        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP  | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|-------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1860MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.72091               | 36.37                | Pk  | 32.9           | -25.8        | -95.2 | -51.73                  | -13             | -38.73      | H        |
| 5.58194               | 35.06                | Pk  | 35.2           | -24.1        | -95.2 | -49.04                  | -13             | -36.04      | H        |
| 7.44109               | 32.68                | Pk  | 35.6           | -22.1        | -95.2 | -49.02                  | -13             | -36.02      | H        |
| 3.71963               | 35.69                | Pk  | 32.9           | -25.8        | -95.2 | -52.41                  | -13             | -39.41      | V        |
| 5.57875               | 34.39                | Pk  | 35.2           | -24.1        | -95.2 | -49.71                  | -13             | -36.71      | V        |
| 7.43845               | 33.29                | Pk  | 35.6           | -22.1        | -95.2 | -48.41                  | -13             | -35.41      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.7592                | 34.48                | Pk  | 32.9           | -25.8        | -95.2 | -53.62                  | -13             | -40.62      | H        |
| 5.64114               | 34.63                | Pk  | 35.1           | -24.3        | -95.2 | -49.77                  | -13             | -36.77      | H        |
| 7.51881               | 32.38                | Pk  | 35.5           | -22          | -95.2 | -49.32                  | -13             | -36.32      | H        |
| 3.75973               | 35.23                | Pk  | 32.9           | -25.8        | -95.2 | -52.87                  | -13             | -39.87      | V        |
| 5.64141               | 34.73                | Pk  | 35.1           | -24.3        | -95.2 | -49.67                  | -13             | -36.67      | V        |
| 7.51966               | 32.78                | Pk  | 35.5           | -22          | -95.2 | -48.92                  | -13             | -35.92      | V        |
| High Channel, 1900MHz |                      |     |                |              |       |                         |                 |             |          |
| 3.80034               | 35.5                 | Pk  | 33             | -25.5        | -95.2 | -52.2                   | -13             | -39.2       | H        |
| 5.70076               | 33.15                | Pk  | 35             | -24          | -95.2 | -51.05                  | -13             | -38.05      | H        |
| 7.60025               | 32.92                | Pk  | 35.6           | -21.8        | -95.2 | -48.48                  | -13             | -35.48      | H        |
| 3.79936               | 36.19                | Pk  | 33             | -25.5        | -95.2 | -51.51                  | -13             | -38.51      | V        |
| 5.70183               | 34.5                 | Pk  | 35             | -24          | -95.2 | -49.7                   | -13             | -36.7       | V        |
| 7.60018               | 32.49                | Pk  | 35.6           | -21.8        | -95.2 | -48.91                  | -13             | -35.91      | V        |

### 9.2.2. LTE BAND 5 AND 5G NR BAND n5

#### **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.

**QPSK LTE BAND 5 (10.0MHZ BANDWIDTH)**

|                |                       |
|----------------|-----------------------|
| Project #:     | 13179110              |
| Date:          | 5/13/2020             |
| Test Engineer: | 12491                 |
| Configuration: | EUT Only              |
| Mode           | LTE Band 5 QPSK 10MHz |
| Chamber #:     | Chamber I             |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 829MHz   |                      |     |                |              |         |                         |                 |                |          |
| 1.73831               | -56.03               | Pk  | 29.7           | -29.4        | 11.9    | -43.83                  | -13             | -30.83         | H        |
| 2.31325               | -77.76               | Pk  | 31.4           | -28          | 12.3    | -62.06                  | -13             | -49.06         | H        |
| 3.25185               | -78.59               | Pk  | 32.9           | -26.3        | 11.7    | -60.29                  | -13             | -47.29         | H        |
| 1.74068               | -76.94               | Pk  | 29.7           | -29.3        | 13.5    | -63.04                  | -13             | -50.04         | V        |
| 2.32391               | -77.49               | Pk  | 31.5           | -28          | 11.9    | -62.09                  | -13             | -49.09         | V        |
| 3.27619               | -78.21               | Pk  | 32.8           | -26.2        | 11.9    | -59.71                  | -13             | -46.71         | V        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 1.66343               | 41.02                | Pk  | 28.7           | -29.6        | -95.2   | -55.08                  | -13             | -42.08         | H        |
| 2.53949               | 38.85                | Pk  | 32.2           | -27.3        | -95.2   | -51.45                  | -13             | -38.45         | H        |
| 3.2133                | 37.26                | Pk  | 33.6           | -26.2        | -95.2   | -50.54                  | -13             | -37.54         | H        |
| 1.66696               | 39.89                | Pk  | 28.7           | -29.5        | -95.2   | -56.11                  | -13             | -43.11         | V        |
| 1.65374               | 39.8                 | Pk  | 28.5           | -29.5        | -95.2   | -56.4                   | -13             | -43.4          | V        |
| 3.23434               | 29.05                | Pk  | 33             | -26.3        | -95.2   | -59.45                  | -13             | -46.45         | V        |
| High Channel, 844MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.65588               | 40.72                | Pk  | 28.6           | -29.5        | -95.2   | -55.38                  | -13             | -42.38         | H        |
| 2.28862               | 38.73                | Pk  | 31.4           | -28.1        | -95.2   | -53.17                  | -13             | -40.17         | H        |
| 3.23429               | 38.06                | Pk  | 33             | -26.3        | -95.2   | -50.44                  | -13             | -37.44         | H        |
| 1.64472               | 40.68                | Pk  | 28.5           | -29.5        | -95.2   | -55.52                  | -13             | -42.52         | V        |
| 2.27661               | 39.38                | Pk  | 31.4           | -28.1        | -95.2   | -52.52                  | -13             | -39.52         | V        |
| 3.2231                | 38.88                | Pk  | 33.2           | -26.2        | -95.2   | -49.32                  | -13             | -36.32         | V        |

**QPSK 5G NR BAND n5 (20.0MHZ BANDWIDTH)**

|                |                          |
|----------------|--------------------------|
| Project #:     | 13179110                 |
| Date:          | 7/26/2020                |
| Test Engineer: | 19212                    |
| Configuration: | EUT only                 |
| Mode           | 5G NR Band n5 QPSK 20MHz |
| Chamber #:     | Chamber A                |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 834MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.66752               | 41.31                | Pk  | 28.9           | -32.2        | -95.2   | -56.49                  | -13             | -43.49      | V        |
| 1.66754               | 41.45                | Pk  | 28.9           | -32.2        | -95.2   | -56.35                  | -13             | -43.35      | H        |
| 2.50075               | 40.4                 | Pk  | 33.5           | -31.3        | -95.2   | -52                     | -13             | -39         | H        |
| 2.50435               | 40.56                | Pk  | 33.5           | -31.3        | -95.2   | -51.74                  | -13             | -38.74      | V        |
| 3.33662               | 41.04                | Pk  | 33             | -30.2        | -95.2   | -50.86                  | -13             | -37.86      | V        |
| 3.33741               | 40.52                | Pk  | 33             | -30.2        | -95.2   | -51.38                  | -13             | -38.38      | H        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.67257               | 41.69                | Pk  | 29             | -32.2        | -95.2   | -56.01                  | -13             | -43.01      | V        |
| 1.67448               | 41.51                | Pk  | 29             | -32.2        | -95.2   | -56.19                  | -13             | -43.19      | H        |
| 2.50829               | 40.86                | Pk  | 33.5           | -31.4        | -95.2   | -51.54                  | -13             | -38.54      | V        |
| 2.50894               | 40.66                | Pk  | 33.5           | -31.4        | -95.2   | -51.74                  | -13             | -38.74      | H        |
| 3.34491               | 40.24                | Pk  | 32.9           | -30.2        | -95.2   | -51.76                  | -13             | -38.76      | H        |
| 3.34677               | 39.93                | Pk  | 33             | -30.1        | -95.2   | -51.87                  | -13             | -38.87      | V        |
| High Channel, 839MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.67775               | 41.93                | Pk  | 28.9           | -32.2        | -95.2   | -55.87                  | -13             | -42.87      | V        |
| 1.67777               | 41.18                | Pk  | 28.9           | -32.2        | -95.2   | -56.62                  | -13             | -43.62      | H        |
| 2.517                 | 41.12                | Pk  | 33.5           | -31.4        | -95.2   | -51.28                  | -13             | -38.28      | H        |
| 2.51876               | 40.63                | Pk  | 33.5           | -31.3        | -95.2   | -51.57                  | -13             | -38.57      | V        |
| 3.35433               | 39.9                 | Pk  | 33             | -30.1        | -95.2   | -51.8                   | -13             | -38.8       | V        |
| 3.35594               | 39.57                | Pk  | 33             | -30.1        | -95.2   | -52.13                  | -13             | -39.13      | H        |

### 9.2.3. LTE BAND 7

#### **LIMITS**

FCC: §27.53 (m)

At least  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)**

|                |                       |
|----------------|-----------------------|
| Project #:     | 13179110              |
| Date:          | 5/13/2020             |
| Test Engineer: | 12491                 |
| Configuration: | EUT Only              |
| Mode           | LTE Band 7 QPSK 20MHz |
| Chamber #:     | Chamber I             |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2510MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.01851               | 34.12                | Pk  | 34.3           | -24.2        | -95.2   | -50.98                  | -25             | -25.98         | H        |
| 7.53098               | 33.82                | Pk  | 35.6           | -21.9        | -95.2   | -47.68                  | -25             | -22.68         | H        |
| 10.0377               | 31.53                | Pk  | 37             | -19.5        | -95.2   | -46.17                  | -25             | -21.17         | H        |
| 5.01926               | 35.15                | Pk  | 34.3           | -24.2        | -95.2   | -49.95                  | -25             | -24.95         | V        |
| 7.52914               | 32.76                | Pk  | 35.6           | -21.9        | -95.2   | -48.74                  | -25             | -23.74         | V        |
| 10.03887              | 31.45                | Pk  | 37.1           | -19.5        | -95.2   | -46.15                  | -25             | -21.15         | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.07252               | 33.88                | Pk  | 34.3           | -24.4        | -95.2   | -51.42                  | -25             | -26.42         | H        |
| 7.60434               | 33.67                | Pk  | 35.7           | -21.8        | -95.2   | -47.63                  | -25             | -22.63         | H        |
| 10.13954              | 30.68                | Pk  | 37.1           | -18.8        | -95.2   | -46.22                  | -25             | -21.22         | H        |
| 5.07162               | 35.67                | Pk  | 34.3           | -24.4        | -95.2   | -49.63                  | -25             | -24.63         | V        |
| 7.60513               | 32.66                | Pk  | 35.7           | -21.9        | -95.2   | -48.74                  | -25             | -23.74         | V        |
| 10.13825              | 31.2                 | Pk  | 37.1           | -18.8        | -95.2   | -45.7                   | -25             | -20.7          | V        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.12105               | 34.1                 | Pk  | 34.4           | -24.2        | -95.2   | -50.9                   | -25             | -25.9          | H        |
| 7.68096               | 32.81                | Pk  | 35.7           | -22          | -95.2   | -48.69                  | -25             | -23.69         | H        |
| 10.23989              | 31.09                | Pk  | 37.3           | -19          | -95.2   | -45.81                  | -25             | -20.81         | H        |
| 5.12212               | 35.07                | Pk  | 34.4           | -24.2        | -95.2   | -49.93                  | -25             | -24.93         | V        |
| 7.68015               | 33.17                | Pk  | 35.7           | -22          | -95.2   | -48.33                  | -25             | -23.33         | V        |
| 10.23986              | 31.66                | Pk  | 37.3           | -19          | -95.2   | -45.24                  | -25             | -20.24         | V        |

#### 9.2.4. LTE BAND 12 AND 5G NR BAND n12

##### **LIMITS**

FCC: §27.53 (g)

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.

**QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)**

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/12/2020              |
| Test Engineer: | 39006                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 12 QPSK 10MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 704MHz   |                      |     |                |              |         |                         |                 |                |          |
| 1.42668               | 40.12                | Pk  | 28.6           | -30.1        | -95.2   | -56.58                  | -13             | -43.58         | H        |
| 2.13038               | 39.18                | Pk  | 31.1           | -28.4        | -95.2   | -53.32                  | -13             | -40.32         | H        |
| 2.82243               | 37.52                | Pk  | 32.2           | -27.2        | -95.2   | -52.68                  | -13             | -39.68         | H        |
| 1.4346                | 39.86                | Pk  | 28.4           | -30          | -95.2   | -56.94                  | -13             | -43.94         | V        |
| 2.1091                | 38.54                | Pk  | 31.1           | -28.4        | -95.2   | -53.96                  | -13             | -40.96         | V        |
| 2.82579               | 37.91                | Pk  | 32.2           | -27.2        | -95.2   | -52.29                  | -13             | -39.29         | V        |
| Mid Channel, 707.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 1.42514               | 39.99                | Pk  | 28.6           | -30.1        | -95.2   | -56.71                  | -13             | -43.71         | H        |
| 2.10961               | 41.09                | Pk  | 31.1           | -28.4        | -95.2   | -51.41                  | -13             | -38.41         | H        |
| 2.83137               | 38.17                | Pk  | 32.2           | -27.2        | -95.2   | -52.03                  | -13             | -39.03         | H        |
| 1.43277               | 39.96                | Pk  | 28.4           | -30.1        | -95.2   | -56.94                  | -13             | -43.94         | V        |
| 2.10951               | 39.3                 | Pk  | 31.1           | -28.4        | -95.2   | -53.2                   | -13             | -40.2          | V        |
| 2.81721               | 37.93                | Pk  | 32.2           | -27.2        | -95.2   | -52.27                  | -13             | -39.27         | V        |
| High Channel, 711MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.33025               | 40.83                | Pk  | 29.2           | -30.5        | -95.2   | -55.67                  | -13             | -42.67         | H        |
| 1.84506               | 39.5                 | Pk  | 30.6           | -29.1        | -95.2   | -54.2                   | -13             | -41.2          | H        |
| 2.12013               | 40.07                | Pk  | 31.1           | -28.4        | -95.2   | -52.43                  | -13             | -39.43         | H        |
| 1.32347               | 40.09                | Pk  | 29.4           | -30.5        | -95.2   | -56.21                  | -13             | -43.21         | V        |
| 2.11951               | 38.5                 | Pk  | 31.1           | -28.4        | -95.2   | -54                     | -13             | -41            | V        |
| 2.93161               | 36.66                | Pk  | 31.8           | -26.9        | -95.2   | -53.64                  | -13             | -40.64         | V        |

**QPSK 5G NR BAND n12 (15.0MHZ BANDWIDTH)**

|                |                           |
|----------------|---------------------------|
| Project #:     | 13179110                  |
| Date:          | 9/4/2020                  |
| Test Engineer: | 50822                     |
| Configuration: | EUT only                  |
| Mode           | 5G NR Band n12 QPSK 10MHz |
| Chamber #:     | Chamber B                 |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T962 (dB/m) | Amp/Cbl (dB) | EIRP  | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|-------|-------------------------|-----------------|----------------|----------|
| Low Channel, 706.5MHz |                      |     |                |              |       |                         |                 |                |          |
| 1.4153                | 42.06                | Pk  | 25.3           | -30.7        | -95.2 | -57.64                  | -13             | -44.64         | V        |
| 1.41855               | 41.63                | Pk  | 25.3           | -30.7        | -95.2 | -58.07                  | -13             | -45.07         | H        |
| 2.1081                | 39.35                | Pk  | 26.9           | -29.6        | -95.2 | -58.05                  | -13             | -45.05         | V        |
| 2.1111                | 39.3                 | Pk  | 26.9           | -29.5        | -95.2 | -58                     | -13             | -45            | H        |
| 2.67681               | 39.94                | Pk  | 29.2           | -28.9        | -95.2 | -54.36                  | -13             | -41.36         | H        |
| 2.73331               | 39.33                | Pk  | 29             | -28.9        | -95.2 | -55.17                  | -13             | -42.17         | V        |
| Mid Channel, 707.5    |                      |     |                |              |       |                         |                 |                |          |
| 1.4155                | 43.83                | Pk  | 25.3           | -30.7        | -95.2 | -55.87                  | -13             | -42.87         | H        |
| 1.41595               | 41.94                | Pk  | 25.3           | -30.7        | -95.2 | -57.76                  | -13             | -44.76         | V        |
| 2.04676               | 40.59                | Pk  | 27             | -29.7        | -95.2 | -56.71                  | -13             | -43.71         | V        |
| 2.12587               | 40.06                | Pk  | 26.9           | -29.6        | -95.2 | -57.34                  | -13             | -44.34         | H        |
| 2.95961               | 39.72                | Pk  | 29.6           | -28.7        | -95.2 | -54.08                  | -13             | -41.08         | V        |
| 2.96803               | 39.91                | Pk  | 29.7           | -28.7        | -95.2 | -53.79                  | -13             | -40.79         | H        |
| High Channel, 708.5   |                      |     |                |              |       |                         |                 |                |          |
| 1.51151               | 41.98                | Pk  | 24.8           | -30.6        | -95.2 | -58.22                  | -13             | -45.22         | V        |
| 1.51987               | 42                   | Pk  | 24.8           | -30.6        | -95.2 | -58.2                   | -13             | -45.2          | H        |
| 2.26644               | 40.76                | Pk  | 27.4           | -29.5        | -95.2 | -56.04                  | -13             | -43.04         | H        |
| 2.26828               | 41.23                | Pk  | 27.4           | -29.5        | -95.2 | -55.57                  | -13             | -42.57         | V        |
| 3.2128                | 39.65                | Pk  | 31.4           | -28.4        | -95.2 | -52.05                  | -13             | -39.05         | V        |
| 3.26315               | 39.86                | Pk  | 31.4           | -28.3        | -95.2 | -51.74                  | -13             | -38.74         | H        |

## 9.2.5. LTE BAND 13

### LIMITS

FCC: §27.53

(c) 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.

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

### QPSK LTE BAND 13 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/13/2020              |
| Test Engineer: | 39006                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 13 QPSK 20MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 782MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.52794             | 39.02                | Pk  | 28             | -29.8        | -95.2   | -57.98                  | -40             | -17.98      | H        |
| 2.35264             | 38.16                | Pk  | 31.7           | -28          | -95.2   | -53.34                  | -13             | -40.34      | H        |
| 3.18941             | 36.52                | Pk  | 32.8           | -26.3        | -95.2   | -52.18                  | -13             | -39.18      | H        |
| 1.52782             | 39.2                 | Pk  | 28             | -29.8        | -95.2   | -57.8                   | -40             | -17.8       | V        |
| 2.3359              | 38.08                | Pk  | 31.6           | -28          | -95.2   | -53.52                  | -13             | -40.52      | V        |
| 3.21375             | 36.17                | Pk  | 33.6           | -26.2        | -95.2   | -51.63                  | -13             | -38.63      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

## 9.2.6. LTE BAND 14

### LIMITS

FCC: §90.543 Emission Limitations. (Band 14)

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least  $43 + 10 \log (P)$  dB.

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

### QPSK LTE BAND 14 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/13/2020              |
| Test Engineer: | 39006                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 14 QPSK 20MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 793MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.59384             | 38.89                | Pk  | 28             | -29.6        | -95.2   | -57.91                  | -40             | -17.91      | H        |
| 2.36298             | 37.87                | Pk  | 31.8           | -27.9        | -95.2   | -53.43                  | -13             | -40.43      | H        |
| 3.2029              | 36.82                | Pk  | 33.2           | -26.2        | -95.2   | -51.38                  | -13             | -38.38      | H        |
| 1.5932              | 39.46                | Pk  | 27.9           | -29.6        | -95.2   | -57.44                  | -40             | -17.44      | V        |
| 2.36774             | 37.48                | Pk  | 31.9           | -28          | -95.2   | -53.82                  | -13             | -40.82      | V        |
| 3.19551             | 36.62                | Pk  | 32.9           | -26.2        | -95.2   | -51.88                  | -13             | -38.88      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

## 9.2.7. LTE BAND 17

### LIMITS

FCC: §27.53 (g)

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.

### QPSK LTE BAND 17 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/14/2020              |
| Test Engineer: | 39006                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 17 QPSK 10MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 710MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.41876             | 40.33                | Pk  | 28.7           | -30.2        | -95.2   | -56.37                  | -13             | -43.37      | H        |
| 2.11711             | 39.96                | Pk  | 31.2           | -28.4        | -95.2   | -52.44                  | -13             | -39.44      | H        |
| 2.81928             | 38                   | Pk  | 32.2           | -27.2        | -95.2   | -52.2                   | -13             | -39.2       | H        |
| 2.82396             | 37.28                | Pk  | 32.2           | -27.2        | -95.2   | -52.92                  | -13             | -39.92      | H        |
| 1.43204             | 39.13                | Pk  | 28.5           | -30.1        | -95.2   | -57.67                  | -13             | -44.67      | V        |
| 2.10381             | 38.27                | Pk  | 31.1           | -28.4        | -95.2   | -54.23                  | -13             | -41.23      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

### 9.2.8. LTE BAND 25

#### **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.

**QPSK LTE BAND 25 (20.0MHZ BANDWIDTH)**

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/13/2020              |
| Test Engineer: | 12491                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 25 QPSK 20MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.72144                | 35.29                | Pk  | 32.9           | -25.8        | -95.2   | -52.81                  | -13             | -39.81         | H        |
| 5.58192                | 33.74                | Pk  | 35.2           | -24.1        | -95.2   | -50.36                  | -13             | -37.36         | H        |
| 7.43936                | 33.17                | Pk  | 35.6           | -22.1        | -95.2   | -48.53                  | -13             | -35.53         | H        |
| 3.72206                | 34.11                | Pk  | 32.9           | -25.8        | -95.2   | -53.99                  | -13             | -40.99         | V        |
| 5.58101                | 34.37                | Pk  | 35.2           | -24.1        | -95.2   | -49.73                  | -13             | -36.73         | V        |
| 7.43933                | 32.1                 | Pk  | 35.6           | -22.1        | -95.2   | -49.6                   | -13             | -36.6          | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.76586                | 33.76                | Pk  | 33             | -25.7        | -95.2   | -54.14                  | -13             | -41.14         | H        |
| 5.64619                | 34.46                | Pk  | 35.1           | -24.3        | -95.2   | -49.94                  | -13             | -36.94         | H        |
| 7.52857                | 33.12                | Pk  | 35.6           | -21.9        | -95.2   | -48.38                  | -13             | -35.38         | H        |
| 3.76787                | 34.58                | Pk  | 33             | -25.7        | -95.2   | -53.32                  | -13             | -40.32         | V        |
| 5.64638                | 34.58                | Pk  | 35.1           | -24.3        | -95.2   | -49.82                  | -13             | -36.82         | V        |
| 7.52881                | 32.6                 | Pk  | 35.6           | -21.9        | -95.2   | -48.9                   | -13             | -35.9          | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.81032                | -72.25               | Pk  | 32.9           | -25.5        | 11.7    | -53.15                  | -13             | -40.15         | 181      |
| 5.71981                | -73.66               | Pk  | 35             | -23.9        | 12      | -50.56                  | -13             | -37.56         | 293      |
| 7.61943                | -75.49               | Pk  | 35.6           | -22          | 11.9    | -49.99                  | -13             | -36.99         | 259      |
| 3.8094                 | -72.45               | Pk  | 32.9           | -25.5        | 11.4    | -53.65                  | -13             | -40.65         | 118      |
| 5.70705                | -73.39               | Pk  | 34.9           | -23.9        | 11.8    | -50.59                  | -13             | -37.59         | 158      |
| 7.62015                | -75.07               | Pk  | 35.7           | -22          | 12      | -49.37                  | -13             | -36.37         | 95       |

## 9.2.9. LTE BAND 26 (FCC PART 90S)

### LIMITS

FCC: §90.691

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.

### QPSK LTE BAND 26 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/13/2020              |
| Test Engineer: | 12491                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 26 QPSK 10MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T892 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 819MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.76661             | -67.93               | Pk  | 30.1           | -29.3        | -95.2   | -53.75                  | -13             | -40.93      | H        |
| 2.46214             | -69                  | Pk  | 32.3           | -27.8        | -95.2   | -50.84                  | -13             | -40         | H        |
| 3.20526             | -70.37               | Pk  | 33.4           | -26.2        | -95.2   | -50.24                  | -13             | -38.17      | H        |
| 1.75425             | -68.04               | Pk  | 29.8           | -29.3        | -95.2   | -53.93                  | -13             | -41.24      | V        |
| 2.44708             | -68.62               | Pk  | 32.3           | -27.9        | -95.2   | -51.11                  | -13             | -39.82      | V        |
| 3.17255             | -70.13               | Pk  | 32.7           | -26.4        | -95.2   | -50.42                  | -13             | -38.93      | V        |

## 9.2.10. LTE BAND 30

### LIMITS

FCC: §27.53 (a)

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

### QPSK LTE BAND 30 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 5/14/2020              |
| Test Engineer: | 12491                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 30 QPSK 10MHz |
| Chamber #:     | Chamber I              |

| Frequency (GHz)      | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 2310MHz |                      |     |                |              |         |                         |                 |             |          |
| 4.61028              | 32.17                | Pk  | 33.9           | -24.9        | -95.2   | -54.03                  | -40             | -14.03      | H        |
| 6.91684              | 31.99                | Pk  | 35.6           | -22.8        | -95.2   | -50.41                  | -40             | -10.41      | H        |
| 9.21966              | 30.55                | Pk  | 36.3           | -19.9        | -95.2   | -48.25                  | -40             | -8.25       | H        |
| 4.61087              | 33.78                | Pk  | 33.9           | -24.9        | -95.2   | -52.42                  | -40             | -12.42      | V        |
| 6.91702              | 33.35                | Pk  | 35.6           | -22.8        | -95.2   | -49.05                  | -40             | -9.05       | V        |
| 9.21992              | 30.7                 | Pk  | 36.3           | -19.9        | -95.2   | -48.1                   | -40             | -8.1        | V        |

### 9.2.11. LTE BAND 41 AND 5G NR BAND n41

#### **LIMITS**

FCC: §27.53 (m)

At least  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)**

|                |                     |
|----------------|---------------------|
| Project #:     | 13179110            |
| Date:          | 5/13/2020           |
| Test Engineer: | 12491               |
| Configuration: | EUT Only            |
| Mode           | LTE Band 41FCC QPSK |
| Chamber #:     | Chamber I           |

| Frequency (GHz)       | Meter Reading (dBm) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|---------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2506MHz  |                     |     |                |              |         |                         |                 |                |          |
| 5.00811               | 35.54               | Pk  | 34.3           | -24.3        | -95.2   | -49.66                  | -25             | -24.66         | H        |
| 7.51746               | 33.53               | Pk  | 35.5           | -22          | -95.2   | -48.17                  | -25             | -23.17         | H        |
| 10.02473              | 32.56               | Pk  | 37.1           | -19.4        | -95.2   | -44.94                  | -25             | -19.94         | H        |
| 5.01226               | 35.91               | Pk  | 34.3           | -24.3        | -95.2   | -49.29                  | -25             | -24.29         | V        |
| 7.51822               | 33.56               | Pk  | 35.5           | -22          | -95.2   | -48.14                  | -25             | -23.14         | V        |
| 10.02383              | 31.87               | Pk  | 37.1           | -19.4        | -95.2   | -45.63                  | -25             | -20.63         | V        |
| Mid Channel, 2595MHz  |                     |     |                |              |         |                         |                 |                |          |
| 5.1843                | 36.91               | Pk  | 34.4           | -24.1        | -95.2   | -47.99                  | -25             | -22.99         | H        |
| 7.77858               | 34.22               | Pk  | 35.7           | -21.5        | -95.2   | -46.78                  | -25             | -21.78         | H        |
| 10.37257              | 32.35               | Pk  | 37.4           | -19          | -95.2   | -44.45                  | -25             | -19.45         | H        |
| 5.18511               | 36.66               | Pk  | 34.4           | -24.1        | -95.2   | -48.24                  | -25             | -23.24         | V        |
| 7.78053               | 34.58               | Pk  | 35.6           | -21.5        | -95.2   | -46.52                  | -25             | -21.52         | V        |
| 10.37311              | 32.85               | Pk  | 37.5           | -19          | -95.2   | -43.85                  | -25             | -18.85         | V        |
| High Channel, 2680MHz |                     |     |                |              |         |                         |                 |                |          |
| 5.35933               | 36.18               | Pk  | 34.6           | -23.8        | -95.2   | -48.22                  | -25             | -23.22         | H        |
| 8.03502               | 34.41               | Pk  | 35.7           | -21.3        | -95.2   | -46.39                  | -25             | -21.39         | H        |
| 10.71916              | 31.59               | Pk  | 37.9           | -18.6        | -95.2   | -44.31                  | -25             | -19.31         | H        |
| 5.36056               | 36.44               | Pk  | 34.6           | -23.8        | -95.2   | -47.96                  | -25             | -22.96         | V        |
| 8.03973               | 34.17               | Pk  | 35.7           | -21.2        | -95.2   | -46.53                  | -25             | -21.53         | V        |
| 10.72128              | 31.72               | Pk  | 37.9           | -18.7        | -95.2   | -44.28                  | -25             | -19.28         | V        |

**QPSK 5G NR BAND n41 (100.0MHZ BANDWIDTH)**

|                |                     |
|----------------|---------------------|
| Project #:     | 13179110            |
| Date:          | 7/25/2020           |
| Test Engineer: | 19497               |
| Configuration: | EUT Only            |
| Mode           | 5G NR Band n41 QPSK |
| Chamber #:     | Chamber A           |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | Amp/Cbl (dB) | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|--------------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2546MHz  |                      |     |                |              |              |                         |                 |                |          |
| 5.01741               | 37.59                | Pk  | 33.7           | -26          | -95.2        | -49.11                  | -25             | -24.11         | H        |
| 5.02949               | 38.21                | Pk  | 33.7           | -26          | -95.2        | -48.59                  | -25             | -23.59         | V        |
| 7.27169               | 35.84                | Pk  | 37.2           | -23.4        | -95.2        | -45.16                  | -25             | -20.16         | V        |
| 7.30719               | 35.26                | Pk  | 37.1           | -23.4        | -95.2        | -45.94                  | -25             | -20.94         | H        |
| 10.39571              | 34.09                | Pk  | 39.3           | -19.6        | -95.2        | -40.61                  | -25             | -15.61         | V        |
| 10.4629               | 33.8                 | Pk  | 39.5           | -19.6        | -95.2        | -40.8                   | -25             | -15.8          | H        |
| Mid Channel, 2593MHz  |                      |     |                |              |              |                         |                 |                |          |
| 5.08602               | 38.05                | Pk  | 33.8           | -26.2        | -95.2        | -48.75                  | -25             | -23.75         | H        |
| 5.09892               | 39.24                | Pk  | 33.9           | -26.4        | -95.2        | -47.66                  | -25             | -22.66         | V        |
| 7.03533               | 36.08                | Pk  | 36.6           | -23.7        | -95.2        | -45.72                  | -25             | -20.72         | V        |
| 7.26983               | 36.93                | Pk  | 37.2           | -23.4        | -95.2        | -43.97                  | -25             | -18.97         | H        |
| 10.44314              | 34.85                | Pk  | 39.4           | -19.2        | -95.2        | -39.35                  | -25             | -14.35         | V        |
| 10.45655              | 34.49                | Pk  | 39.5           | -19.4        | -95.2        | -39.91                  | -25             | -14.91         | H        |
| High Channel, 2640MHz |                      |     |                |              |              |                         |                 |                |          |
| 5.27081               | 38.99                | Pk  | 34.7           | -27.9        | -95.2        | -49.11                  | -25             | -24.11         | V        |
| 5.28691               | 40.36                | Pk  | 34.7           | -28          | -95.2        | -47.74                  | -25             | -22.74         | H        |
| 7.89062               | 36.2                 | Pk  | 36.1           | -23.4        | -95.2        | -45.7                   | -25             | -20.7          | V        |
| 7.91018               | 37.22                | Pk  | 36.2           | -23.4        | -95.2        | -44.88                  | -25             | -19.88         | H        |
| 10.49739              | 34.61                | Pk  | 37.8           | -20.6        | -95.2        | -42.79                  | -25             | -17.79         | V        |
| 10.57371              | 35.79                | Pk  | 37.8           | -20.5        | -95.2        | -41.21                  | -25             | -16.21         | H        |

## 9.2.12. LTE BAND 66

### **LIMITS**

FCC: §27.53 (h)

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

**QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 6/27/2020        |
| Test Engineer: | 19206            |
| Configuration: | EUT Only         |
| Mode           | LTE Band 48 QPSK |
| Chamber #:     | Chamber B        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.41246               | 40.1                 | Pk  | 30.6           | -27.6        | -95.2   | -52.1                   | -13             | -39.1          | V        |
| 3.41444               | 38.81                | Pk  | 30.6           | -27.6        | -95.2   | -53.39                  | -13             | -40.39         | H        |
| 5.08042               | 37.49                | Pk  | 33.8           | -24.9        | -95.2   | -48.81                  | -13             | -35.81         | H        |
| 5.09446               | 37.7                 | Pk  | 33.9           | -24.7        | -95.2   | -48.3                   | -13             | -35.3          | V        |
| 6.90702               | 35.65                | Pk  | 36.1           | -23.5        | -95.2   | -46.95                  | -13             | -33.95         | V        |
| 6.91874               | 35.71                | Pk  | 36.3           | -23.3        | -95.2   | -46.49                  | -13             | -33.49         | H        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.41468               | 31.44                | Av  | 30.6           | -27.6        | -95.2   | -60.76                  | -13             | -47.76         | V        |
| 3.47216               | 38.62                | Pk  | 30.3           | -27.3        | -95.2   | -53.58                  | -13             | -40.58         | H        |
| 5.15631               | 37.63                | Pk  | 33.8           | -25.4        | -95.2   | -49.17                  | -13             | -36.17         | H        |
| 5.16206               | 38.31                | Pk  | 33.8           | -25.3        | -95.2   | -48.39                  | -13             | -35.39         | V        |
| 6.27104               | 36.72                | Pk  | 34.5           | -24.2        | -95.2   | -48.18                  | -13             | -35.18         | H        |
| 6.33814               | 36.7                 | Pk  | 34.5           | -23.8        | -95.2   | -47.8                   | -13             | -34.8          | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.51012               | 39.85                | Pk  | 30.2           | -27.2        | -95.2   | -52.35                  | -13             | -39.35         | H        |
| 3.52256               | 38.55                | Pk  | 30.2           | -27.3        | -95.2   | -53.75                  | -13             | -40.75         | V        |
| 5.11837               | 37.74                | Pk  | 33.9           | -24.7        | -95.2   | -48.26                  | -13             | -35.26         | V        |
| 5.16903               | 37.59                | Pk  | 33.7           | -25.4        | -95.2   | -49.31                  | -13             | -36.31         | H        |
| 7.21548               | 35.53                | Pk  | 37.2           | -22.6        | -95.2   | -45.07                  | -13             | -32.07         | V        |
| 7.27982               | 36.53                | Pk  | 37.1           | -23.1        | -95.2   | -44.67                  | -13             | -31.67         | H        |

### 9.2.13. LTE BAND 71

#### **LIMITS**

FCC: §27.53 (g)

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.

**QPSK LTE BAND 71 (20.0MHZ BANDWIDTH)**

|                |                 |
|----------------|-----------------|
| Project #:     | 13179110        |
| Date:          | 7/12/2020       |
| Test Engineer: | 12491           |
| Configuration: | EUT Only        |
| Mode           | LTE Band 71QPSK |
| Chamber #:     | Chamber I       |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 673.0MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.32825                | 42.91                | Pk  | 29.3           | -30.5        | -95.2   | -53.49                  | -13             | -40.49         | H        |
| 1.98878                | 36.25                | Pk  | 30.9           | -28.7        | -95.2   | -56.75                  | -13             | -43.75         | H        |
| 2.65162                | 35.28                | Pk  | 32.4           | -27.3        | -95.2   | -54.82                  | -13             | -41.82         | H        |
| 1.32839                | 41.9                 | Pk  | 29.3           | -30.5        | -95.2   | -54.5                   | -13             | -41.5          | V        |
| 1.98811                | 36.84                | Pk  | 30.9           | -28.7        | -95.2   | -56.16                  | -13             | -43.16         | V        |
| 2.65142                | 36.31                | Pk  | 32.4           | -27.3        | -95.2   | -53.79                  | -13             | -40.79         | V        |
| Mid Channel, 680.5MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.36039                | 37.59                | Pk  | 29.6           | -30.3        | -95.2   | -58.31                  | -13             | -45.31         | H        |
| 2.03924                | 35.85                | Pk  | 31.1           | -28.6        | -95.2   | -56.85                  | -13             | -43.85         | H        |
| 2.72216                | 36.3                 | Pk  | 32.5           | -27.3        | -95.2   | -53.7                   | -13             | -40.7          | H        |
| 1.36062                | 37.7                 | Pk  | 29.6           | -30.3        | -95.2   | -58.2                   | -13             | -45.2          | V        |
| 2.04093                | 37.37                | Pk  | 31.1           | -28.6        | -95.2   | -55.33                  | -13             | -42.33         | V        |
| 2.72242                | 36.65                | Pk  | 32.5           | -27.3        | -95.2   | -53.35                  | -13             | -40.35         | V        |
| High Channel, 688.0MHz |                      |     |                |              |         |                         |                 |                |          |
| 1.35792                | 38.42                | Pk  | 29.7           | -30.4        | -95.2   | -57.48                  | -13             | -44.48         | H        |
| 2.03387                | 37.25                | Pk  | 31             | -28.6        | -95.2   | -55.55                  | -13             | -42.55         | H        |
| 2.71342                | 34.87                | Pk  | 32.4           | -27.3        | -95.2   | -55.23                  | -13             | -42.23         | H        |
| 1.35774                | 38.53                | Pk  | 29.7           | -30.4        | -95.2   | -57.37                  | -13             | -44.37         | V        |
| 2.03413                | 36.29                | Pk  | 31             | -28.6        | -95.2   | -56.51                  | -13             | -43.51         | V        |
| 2.71269                | 35.32                | Pk  | 32.4           | -27.3        | -95.2   | -54.78                  | -13             | -41.78         | V        |

### **9.3. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 2**

#### **TEST PROCEDURE**

KDB 971168 D01 v03r01/D02 v02/r01

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

#### **RESULTS**

### 9.3.1. LTE BAND 2

#### **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.

**QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 5/15/2020        |
| Test Engineer: | 12491            |
| Configuration: | EUT Only         |
| Mode           | LTE 2 QPSK 20MHz |
| Chamber #:     | Chamber I        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP  | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|-------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1860MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.70185               | 32.31                | Pk  | 33             | -26          | -95.2 | -55.89                  | -13             | -42.89      | H        |
| 5.55198               | 31.98                | Pk  | 35.1           | -24          | -95.2 | -52.12                  | -13             | -39.12      | H        |
| 7.40184               | 30.66                | Pk  | 35.6           | -21.9        | -95.2 | -50.84                  | -13             | -37.84      | H        |
| 3.7003                | 33.15                | Pk  | 33             | -26          | -95.2 | -55.05                  | -13             | -42.05      | V        |
| 5.54935               | 31.74                | Pk  | 35.1           | -23.9        | -95.2 | -52.26                  | -13             | -39.26      | V        |
| 7.3991                | 32.02                | Pk  | 35.6           | -21.9        | -95.2 | -49.48                  | -13             | -36.48      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.74057               | 32.22                | Pk  | 32.9           | -25.8        | -95.2 | -55.88                  | -13             | -42.88      | H        |
| 5.60833               | 31.35                | Pk  | 35.2           | -24.2        | -95.2 | -52.85                  | -13             | -39.85      | H        |
| 7.48125               | 31.18                | Pk  | 35.5           | -22.1        | -95.2 | -50.62                  | -13             | -37.62      | H        |
| 3.74046               | 32.34                | Pk  | 32.9           | -25.8        | -95.2 | -55.76                  | -13             | -42.76      | V        |
| 5.61153               | 33.18                | Pk  | 35.2           | -24.2        | -95.2 | -51.02                  | -13             | -38.02      | V        |
| 7.47707               | 31.16                | Pk  | 35.6           | -22          | -95.2 | -50.44                  | -13             | -37.44      | V        |
| High Channel, 1900MHz |                      |     |                |              |       |                         |                 |             |          |
| 3.78306               | 34.06                | Pk  | 33             | -25.5        | -95.2 | -53.64                  | -13             | -40.64      | H        |
| 5.67151               | 31.45                | Pk  | 35             | -24.2        | -95.2 | -52.95                  | -13             | -39.95      | H        |
| 7.55973               | 30.28                | Pk  | 35.6           | -22          | -95.2 | -51.32                  | -13             | -38.32      | H        |
| 3.77966               | 32.76                | Pk  | 33             | -25.5        | -95.2 | -54.94                  | -13             | -41.94      | V        |
| 5.66793               | 32.11                | Pk  | 35             | -24.2        | -95.2 | -52.29                  | -13             | -39.29      | V        |
| 7.55968               | 31.11                | Pk  | 35.6           | -22          | -95.2 | -50.49                  | -13             | -37.49      | V        |

### 9.3.2. LTE BAND 5 AND 5G NR BAND n5

#### **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.

**QPSK LTE BAND 5 (10.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 5/14/2020        |
| Test Engineer: | 39006            |
| Configuration: | EUT Only         |
| Mode           | LTE 5 QPSK 10MHz |
| Chamber #:     | Chamber I        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 829MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.67976               | 39.37                | Pk  | 28.9           | -29.5        | -95.2   | -56.43                  | -13             | -43.43      | H        |
| 2.47378               | 41.87                | Pk  | 32.3           | -27.7        | -95.2   | -48.73                  | -13             | -35.73      | H        |
| 3.5878                | 34.8                 | Pk  | 33.1           | -25.9        | -95.2   | -53.2                   | -13             | -40.2       | H        |
| 1.65859               | 38.81                | Pk  | 28.7           | -29.5        | -95.2   | -57.19                  | -13             | -44.19      | V        |
| 2.46191               | 38.72                | Pk  | 32.3           | -27.8        | -95.2   | -51.98                  | -13             | -38.98      | V        |
| 3.54366               | 37.36                | Pk  | 33             | -25.8        | -95.2   | -50.64                  | -13             | -37.64      | V        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.69785               | 39.22                | Pk  | 29.2           | -29.5        | -95.2   | -56.28                  | -13             | -43.28      | H        |
| 2.49623               | 42.36                | Pk  | 32.3           | -27.6        | -95.2   | -48.14                  | -13             | -35.14      | H        |
| 3.3153                | 36.75                | Pk  | 32.7           | -26.5        | -95.2   | -52.25                  | -13             | -39.25      | H        |
| 1.6924                | 39.62                | Pk  | 29.1           | -29.4        | -95.2   | -55.88                  | -13             | -42.88      | V        |
| 2.49595               | 41.87                | Pk  | 32.3           | -27.6        | -95.2   | -48.63                  | -13             | -35.63      | V        |
| 3.54546               | 37.18                | Pk  | 33             | -25.9        | -95.2   | -50.92                  | -13             | -37.92      | V        |
| High Channel, 844MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.67898               | 40.76                | Pk  | 28.9           | -29.5        | -95.2   | -55.04                  | -13             | -42.04      | H        |
| 2.51856               | 39.68                | Pk  | 32.3           | -27.5        | -95.2   | -50.72                  | -13             | -37.72      | H        |
| 3.3789                | 36.92                | Pk  | 32.7           | -26.6        | -95.2   | -52.18                  | -13             | -39.18      | H        |
| 1.68057               | 39.87                | Pk  | 28.9           | -29.5        | -95.2   | -55.93                  | -13             | -42.93      | V        |
| 2.51896               | 40.38                | Pk  | 32.3           | -27.5        | -95.2   | -50.02                  | -13             | -37.02      | V        |
| 3.38438               | 36.55                | Pk  | 32.7           | -26.6        | -95.2   | -52.55                  | -13             | -39.55      | V        |

**QPSK 5G NR BAND n5 (20.0MHZ BANDWIDTH)**

|                |                          |
|----------------|--------------------------|
| Project #:     | 13179110                 |
| Date:          | 7/226/2020               |
| Test Engineer: | 19212                    |
| Configuration: | EUT Only                 |
| Mode           | 5G NR Band n5 QPSK 20MHz |
| Chamber #:     | Chamber A                |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 834MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.66732               | 42.17                | Pk  | 28.9           | -32.2        | -95.2   | -55.63                  | -13             | -42.63      | V        |
| 1.66935               | 41.49                | Pk  | 28.9           | -32.2        | -95.2   | -56.31                  | -13             | -43.31      | H        |
| 2.50076               | 41.01                | Pk  | 33.5           | -31.3        | -95.2   | -51.39                  | -13             | -38.39      | H        |
| 2.50292               | 41.86                | Pk  | 33.5           | -31.3        | -95.2   | -50.54                  | -13             | -37.54      | V        |
| 3.33619               | 40.55                | Pk  | 33             | -30.2        | -95.2   | -51.35                  | -13             | -38.35      | V        |
| 3.33715               | 40.4                 | Pk  | 33             | -30.2        | -95.2   | -51.5                   | -13             | -38.5       | H        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.67276               | 41.94                | Pk  | 29             | -32.2        | -95.2   | -55.76                  | -13             | -42.76      | H        |
| 1.67368               | 41.52                | Pk  | 29             | -32.2        | -95.2   | -56.18                  | -13             | -43.18      | V        |
| 2.50863               | 40.87                | Pk  | 33.5           | -31.4        | -95.2   | -51.53                  | -13             | -38.53      | V        |
| 2.51115               | 41                   | Pk  | 33.5           | -31.4        | -95.2   | -51.4                   | -13             | -38.4       | H        |
| 3.34521               | 40.29                | Pk  | 33             | -30.1        | -95.2   | -51.51                  | -13             | -38.51      | H        |
| 3.34732               | 40.08                | Pk  | 33             | -30.1        | -95.2   | -51.72                  | -13             | -38.72      | V        |
| High Channel, 839MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.67621               | 42.06                | Pk  | 29             | -32.2        | -95.2   | -55.64                  | -13             | -42.64      | H        |
| 1.67976               | 42.06                | Pk  | 28.9           | -32.2        | -95.2   | -55.74                  | -13             | -42.74      | V        |
| 2.51547               | 40.97                | Pk  | 33.5           | -31.4        | -95.2   | -51.43                  | -13             | -38.43      | V        |
| 2.51873               | 41.04                | Pk  | 33.5           | -31.3        | -95.2   | -51.16                  | -13             | -38.16      | H        |
| 3.35477               | 39.98                | Pk  | 33             | -30.1        | -95.2   | -51.72                  | -13             | -38.72      | V        |
| 3.35478               | 39.99                | Pk  | 33             | -30.1        | -95.2   | -51.71                  | -13             | -38.71      | H        |

### 9.3.3. LTE BAND 7

#### **LIMITS**

FCC: §27.53 (m)

At least  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 5/19/2020        |
| Test Engineer: | 12491            |
| Configuration: | EUT Only         |
| Mode           | LTE 7 QPSK 20MHz |
| Chamber #:     | Chamber I        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.00069               | -74.6                | Pk  | 34.3           | -24.3        | 11.5    | -53.1                   | -25             | -28.1       | 249      |
| 7.50224               | -75.44               | Pk  | 35.5           | -22.2        | 12.2    | -49.94                  | -25             | -24.94      | 164      |
| 10.00086              | -76.71               | Pk  | 36.9           | -19.3        | 11.6    | -47.51                  | -25             | -22.51      | 335      |
| 5.00096               | -72.95               | Pk  | 34.3           | -24.3        | 11.8    | -51.15                  | -25             | -26.15      | 102      |
| 7.50102               | -76.48               | Pk  | 35.5           | -22.2        | 12.3    | -50.88                  | -25             | -25.88      | 345      |
| 10.00082              | -76.7                | Pk  | 36.9           | -19.3        | 11.6    | -47.5                   | -25             | -22.5       | 175      |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.05337               | 31.6                 | Pk  | 34.3           | -24.4        | -95.2   | -53.7                   | -25             | -28.7       | H        |
| 7.57071               | 30.09                | Pk  | 35.6           | -21.9        | -95.2   | -51.41                  | -25             | -26.41      | H        |
| 10.10018              | 29.86                | Pk  | 37.1           | -19.3        | -95.2   | -47.54                  | -25             | -22.54      | H        |
| 5.05321               | 33.56                | Pk  | 34.3           | -24.4        | -95.2   | -51.74                  | -25             | -26.74      | V        |
| 7.56964               | 30.5                 | Pk  | 35.6           | -21.9        | -95.2   | -51                     | -25             | -26         | V        |
| 10.10002              | 30.07                | Pk  | 37.1           | -19.3        | -95.2   | -47.33                  | -25             | -22.33      | V        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.09969               | 33.2                 | Pk  | 34.3           | -24.3        | -95.2   | -52                     | -25             | -27         | H        |
| 7.64973               | 30.68                | Pk  | 35.6           | -21.9        | -95.2   | -50.82                  | -25             | -25.82      | H        |
| 10.19983              | 30.35                | Pk  | 37.3           | -18.7        | -95.2   | -46.25                  | -25             | -21.25      | H        |
| 5.10046               | 33.41                | Pk  | 34.4           | -24.3        | -95.2   | -51.69                  | -25             | -26.69      | V        |
| 7.64964               | 30.3                 | Pk  | 35.6           | -21.9        | -95.2   | -51.2                   | -25             | -26.2       | V        |
| 10.2027               | 29.82                | Pk  | 37.3           | -18.7        | -95.2   | -46.78                  | -25             | -21.78      | V        |

### 9.3.4. LTE BAND 12 AND 5G NR Band n12

#### **LIMITS**

FCC: §27.53 (g)

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.

**QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)**

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 7/20/2020         |
| Test Engineer: | 31300             |
| Configuration: | EUT only          |
| Mode           | LTEn12 QPSK 15MHz |
| Chamber #:     | Chamber A         |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 704MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.78086               | 39.25                | Pk  | 30.4           | -29.3        | -95.2   | -54.85                  | -13             | -41.85      | H        |
| 2.29681               | 38.72                | Pk  | 31.4           | -28          | -95.2   | -53.08                  | -13             | -40.08      | H        |
| 3.02673               | 38.48                | Pk  | 32.6           | -26.9        | -95.2   | -51.02                  | -13             | -38.02      | H        |
| 1.76434               | 39.04                | Pk  | 30             | -29.3        | -95.2   | -55.46                  | -13             | -42.46      | V        |
| 2.27176               | 38.54                | Pk  | 31.4           | -28.2        | -95.2   | -53.46                  | -13             | -40.46      | V        |
| 3.0331                | 37.69                | Pk  | 32.6           | -26.9        | -95.2   | -51.81                  | -13             | -38.81      | V        |
| Mid Channel, 707.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.63269               | 39.76                | Pk  | 28.4           | -29.6        | -95.2   | -56.64                  | -13             | -43.64      | H        |
| 2.44166               | 39.23                | Pk  | 32.2           | -27.9        | -95.2   | -51.67                  | -13             | -38.67      | H        |
| 3.23032               | 36.97                | Pk  | 33.1           | -26.3        | -95.2   | -51.43                  | -13             | -38.43      | H        |
| 1.62759               | 39.27                | Pk  | 28.3           | -29.6        | -95.2   | -57.23                  | -13             | -44.23      | V        |
| 2.43382               | 42.64                | Pk  | 32.2           | -27.9        | -95.2   | -48.26                  | -13             | -35.26      | V        |
| 3.2202                | 36.23                | Pk  | 33.3           | -26.2        | -95.2   | -51.87                  | -13             | -38.87      | V        |
| High Channel, 711MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.4342                | -67.4                | Pk  | 28.4           | -30.1        | 11.9    | -57.2                   | -13             | -44.2       | 336      |
| 2.12185               | -68.21               | Pk  | 31.1           | -28.4        | 12.4    | -53.11                  | -13             | -40.11      | 22       |
| 2.81193               | -69.65               | Pk  | 32.2           | -27.2        | 12      | -52.65                  | -13             | -39.65      | 56       |
| 1.42238               | -67.59               | Pk  | 28.6           | -30.1        | 12.4    | -56.69                  | -13             | -43.69      | 78       |
| 2.11265               | -68.13               | Pk  | 31.2           | -28.4        | 11.6    | -53.73                  | -13             | -40.73      | 150      |
| 2.82554               | -68.68               | Pk  | 32.2           | -27.2        | 12      | -51.68                  | -13             | -38.68      | 134      |

**QPSK 5G NR BAND n12 (15.0MHZ BANDWIDTH)**

|                |                           |
|----------------|---------------------------|
| Project #:     | 13179110                  |
| Date:          | 9/4/2020                  |
| Test Engineer: | 50822                     |
| Configuration: | EUT Only                  |
| Mode           | 5G NR Band n12 QPSK 15MHz |
| Chamber #:     | Chamber B                 |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 706.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.46484                | 41.99                | Pk  | 25             | -30.6        | -95.2   | -57.91                  | -13             | -44.91      | H        |
| 1.48735                | 41.25                | Pk  | 24.9           | -30.6        | -95.2   | -58.75                  | -13             | -45.75      | V        |
| 2.20602                | 40.63                | Pk  | 27.3           | -29.6        | -95.2   | -56.27                  | -13             | -43.27      | V        |
| 2.20645                | 41.37                | Pk  | 27.3           | -29.6        | -95.2   | -55.53                  | -13             | -42.53      | H        |
| 2.89755                | 40.11                | Pk  | 29.2           | -28.6        | -95.2   | -53.99                  | -13             | -40.99      | V        |
| 2.96211                | 40.18                | Pk  | 29.6           | -28.6        | -95.2   | -53.52                  | -13             | -40.52      | H        |
| Mid Channel, 707.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.4155                 | 43.83                | Pk  | 25.3           | -30.7        | -95.2   | -55.87                  | -13             | -42.87      | H        |
| 1.41595                | 41.94                | Pk  | 25.3           | -30.7        | -95.2   | -57.76                  | -13             | -44.76      | V        |
| 2.04676                | 40.59                | Pk  | 27             | -29.7        | -95.2   | -56.71                  | -13             | -43.71      | V        |
| 2.12587                | 40.06                | Pk  | 26.9           | -29.6        | -95.2   | -57.34                  | -13             | -44.34      | H        |
| 2.95961                | 39.72                | Pk  | 29.6           | -28.7        | -95.2   | -54.08                  | -13             | -41.08      | V        |
| 2.96803                | 39.91                | Pk  | 29.7           | -28.7        | -95.2   | -53.79                  | -13             | -40.79      | H        |
| High Channel, 708.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.51151                | 41.98                | Pk  | 24.8           | -30.6        | -95.2   | -58.22                  | -13             | -45.22      | V        |
| 1.51987                | 42                   | Pk  | 24.8           | -30.6        | -95.2   | -58.2                   | -13             | -45.2       | H        |
| 2.26644                | 40.76                | Pk  | 27.4           | -29.5        | -95.2   | -56.04                  | -13             | -43.04      | H        |
| 2.26828                | 41.23                | Pk  | 27.4           | -29.5        | -95.2   | -55.57                  | -13             | -42.57      | V        |
| 3.2128                 | 39.65                | Pk  | 31.4           | -28.4        | -95.2   | -52.05                  | -13             | -39.05      | V        |
| 3.26315                | 39.86                | Pk  | 31.4           | -28.3        | -95.2   | -51.74                  | -13             | -38.74      | H        |

### 9.3.5. LTE BAND 13

#### LIMITS

FCC: §27.53

(c) 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.

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

#### QPSK LTE BAND 13 (10.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/14/2020         |
| Test Engineer: | 39006             |
| Configuration: | EUT Only          |
| Mode           | LTE 13 QPSK 15MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 782MHz |                      |     |                |              |         |                         |                 |             |          |
| 2.3162              | 38.26                | Pk  | 31.5           | -28          | -95.2   | -53.44                  | -13             | -40.44      | H        |
| 3.1456              | 36.4                 | Pk  | 32.7           | -26.3        | -95.2   | -52.4                   | -13             | -40.4       | H        |
| 1.54038             | 39.86                | Pk  | 28.1           | -29.8        | -95.2   | -57.04                  | -40             | -17.04      | H        |
| 1.53319             | 40.2                 | Pk  | 28             | -29.7        | -95.2   | -56.7                   | -40             | -16.7       | V        |
| 2.33286             | 40.26                | Pk  | 31.5           | -28          | -95.2   | -51.44                  | -13             | -38.44      | V        |
| 2.43213             | 42.08                | Pk  | 32.2           | -27.9        | -95.2   | -48.82                  | -13             | -35.82      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

### 9.3.6. LTE BAND 14

#### LIMITS

FCC: §90.543 Emission Limitations. (Band 14)

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least  $43 + 10 \log (P)$  dB.

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

#### QPSK LTE BAND 14 (10.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 6/15/2020         |
| Test Engineer: | 39006             |
| Configuration: | EUT Only          |
| Mode           | LTE 14 QPSK 10MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | Amp/Cbl (dB) | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|--------------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 793MHz |                      |     |                |              |              |                         |                 |             |          |
| 1.59974             | 41.05                | Pk  | 28             | -29.6        | -95.2        | -55.75                  | -40             | -15.75      | H        |
| 2.36551             | 39.71                | Pk  | 31.8           | -28          | -95.2        | -51.69                  | -13             | -38.69      | H        |
| 3.17317             | 38.25                | Pk  | 32.7           | -26.4        | -95.2        | -50.65                  | -13             | -37.65      | H        |
| 1.58449             | 40.75                | Pk  | 27.9           | -29.6        | -95.2        | -56.15                  | -40             | -16.15      | V        |
| 2.36201             | 39.31                | Pk  | 31.8           | -27.9        | -95.2        | -51.99                  | -13             | -38.99      | V        |
| 3.16682             | 38.69                | Pk  | 32.7           | -26.4        | -95.2        | -50.21                  | -13             | -37.21      | V        |

**\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.**

### 9.3.7. LTE BAND 17

#### LIMITS

FCC: §27.53 (g)

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.

#### QPSK LTE BAND 17 (10.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/15/2020         |
| Test Engineer: | 39006             |
| Configuration: | EUT Only          |
| Mode           | LTE 17 QPSK 10MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 793MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.31344             | 39.58                | Pk  | 29.3           | -30.5        | -95.2   | -56.82                  | -13             | -43.82      | H        |
| 2.11683             | 41.74                | Pk  | 31.2           | -28.4        | -95.2   | -50.66                  | -13             | -37.66      | H        |
| 2.851               | 36.8                 | Pk  | 32.1           | -27.2        | -95.2   | -53.5                   | -13             | -40.5       | H        |
| 1.30619             | 39.19                | Pk  | 29.3           | -30.5        | -95.2   | -57.21                  | -13             | -44.21      | V        |
| 2.11664             | 40.1                 | Pk  | 31.2           | -28.4        | -95.2   | -52.3                   | -13             | -39.3       | V        |
| 2.83861             | 34.29                | Pk  | 32.2           | -27.2        | -95.2   | -55.91                  | -13             | -42.91      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

### 9.3.8. LTE BAND 25

#### **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.

**QPSK LTE BAND 25 (20.0MHZ BANDWIDTH)**

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/15/2020         |
| Test Engineer: | 12491             |
| Configuration: | EUT Only          |
| Mode           | LTE 25 QPSK 20MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.70185                | 33.13                | Pk  | 33             | -26          | -95.2   | -55.07                  | -13             | -42.07         | H        |
| 5.5479                 | 31.69                | Pk  | 35.1           | -23.9        | -95.2   | -52.31                  | -13             | -39.31         | H        |
| 7.40119                | 30.19                | Pk  | 35.6           | -21.9        | -95.2   | -51.31                  | -13             | -38.31         | H        |
| 3.70389                | 33.75                | Pk  | 33             | -26          | -95.2   | -54.45                  | -13             | -41.45         | V        |
| 5.54899                | 31.88                | Pk  | 35.1           | -23.9        | -95.2   | -52.12                  | -13             | -39.12         | V        |
| 7.39966                | 31.58                | Pk  | 35.6           | -21.9        | -95.2   | -49.92                  | -13             | -36.92         | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.7438                 | 32.52                | Pk  | 32.9           | -25.8        | -95.2   | -55.58                  | -13             | -42.58         | H        |
| 5.61856                | 32.19                | Pk  | 35.1           | -24.3        | -95.2   | -52.21                  | -13             | -39.21         | H        |
| 7.49433                | 30.89                | Pk  | 35.6           | -22.2        | -95.2   | -50.91                  | -13             | -37.91         | H        |
| 3.74616                | 34.15                | Pk  | 32.9           | -25.8        | -95.2   | -53.95                  | -13             | -40.95         | V        |
| 5.61894                | 33.66                | Pk  | 35.1           | -24.3        | -95.2   | -50.74                  | -13             | -37.74         | V        |
| 7.49224                | 32.09                | Pk  | 35.6           | -22.2        | -95.2   | -49.71                  | -13             | -36.71         | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.7916                 | 31.48                | Pk  | 32.9           | -25.4        | -95.2   | -56.22                  | -13             | -43.22         | H        |
| 5.68497                | 31.82                | Pk  | 35             | -24.1        | -95.2   | -52.48                  | -13             | -39.48         | H        |
| 7.58007                | 30.92                | Pk  | 35.5           | -21.9        | -95.2   | -50.68                  | -13             | -37.68         | H        |
| 3.78973                | 34.5                 | Pk  | 32.9           | -25.5        | -95.2   | -53.3                   | -13             | -40.3          | V        |
| 5.68429                | 33.07                | Pk  | 35             | -24.1        | -95.2   | -51.23                  | -13             | -38.23         | V        |
| 7.57979                | 32.37                | Pk  | 35.5           | -21.9        | -95.2   | -49.23                  | -13             | -36.23         | V        |

### 9.3.9. LTE BAND 26 (FCC PART 90S)

#### LIMITS

FCC: §90.691

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.

#### QPSK LTE BAND 26 (10.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/15/2020         |
| Test Engineer: | 12491             |
| Configuration: | EUT Only          |
| Mode           | LTE 26 QPSK 10MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 819MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.63996             | 35.43                | Pk  | 28.4           | -29.5        | -95.2   | -60.87                  | -13             | -47.87      | H        |
| 2.45851             | 35.55                | Pk  | 32.3           | -27.8        | -95.2   | -55.15                  | -13             | -42.15      | H        |
| 3.27579             | 32.68                | Pk  | 32.8           | -26.2        | -95.2   | -55.92                  | -13             | -42.92      | H        |
| 1.6379              | 36.13                | Pk  | 28.4           | -29.6        | -95.2   | -60.27                  | -13             | -47.27      | V        |
| 2.45637             | 33.32                | Pk  | 32.3           | -27.9        | -95.2   | -57.48                  | -13             | -44.48      | V        |
| 3.27598             | 31.56                | Pk  | 32.8           | -26.2        | -95.2   | -57.04                  | -13             | -44.04      | V        |

### 9.3.10. LTE BAND 30

#### LIMITS

FCC: §27.53 (a)

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

#### QPSK LTE BAND 30 (10.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/15/2020         |
| Test Engineer: | 12491             |
| Configuration: | EUT Only          |
| Mode           | LTE 26 QPSK 15MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)      | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 2310MHz |                      |     |                |              |         |                         |                 |             |          |
| 4.60946              | 32.58                | Pk  | 33.9           | -24.9        | -95.2   | -53.62                  | -40             | -13.62      | H        |
| 6.91763              | 30.86                | Pk  | 35.6           | -22.8        | -95.2   | -51.54                  | -40             | -11.54      | H        |
| 9.21847              | 30.28                | Pk  | 36.3           | -19.9        | -95.2   | -48.52                  | -40             | -8.52       | H        |
| 4.61057              | 33.76                | Pk  | 33.9           | -24.9        | -95.2   | -52.44                  | -40             | -12.44      | V        |
| 6.91476              | 32.8                 | Pk  | 35.6           | -22.8        | -95.2   | -49.6                   | -40             | -9.6        | V        |
| 9.2224               | 31.38                | Pk  | 36.3           | -19.9        | -95.2   | -47.42                  | -40             | -7.42       | V        |

### 9.3.11. LTE BAND 41 AND 5G NR BAND n41

#### LIMITS

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

#### QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 113179110         |
| Date:          | 5/14/2020         |
| Test Engineer: | 12491             |
| Configuration: | EUT Only          |
| Mode           | LTE 41 QPSK 20MHz |
| Chamber #:     | Chamber I         |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 4.99187               | 34.89                | Pk  | 34.2           | -24.2        | -95.2   | -50.31                  | -25             | -25.31         | H        |
| 7.48774               | 33.47                | Pk  | 35.5           | -22.1        | -95.2   | -48.33                  | -25             | -23.33         | H        |
| 9.98398               | 31.94                | Pk  | 36.9           | -19.4        | -95.2   | -45.76                  | -25             | -20.76         | H        |
| 4.99205               | 35.23                | Pk  | 34.2           | -24.2        | -95.2   | -49.97                  | -25             | -24.97         | V        |
| 7.48743               | 32.97                | Pk  | 35.5           | -22.1        | -95.2   | -48.83                  | -25             | -23.83         | V        |
| 9.98386               | 31.25                | Pk  | 36.9           | -19.4        | -95.2   | -46.45                  | -25             | -21.45         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.16691               | 35.98                | Pk  | 34.4           | -24          | -95.2   | -48.82                  | -25             | -23.82         | H        |
| 7.74871               | 33.22                | Pk  | 35.7           | -21.7        | -95.2   | -47.98                  | -25             | -22.98         | H        |
| 10.3323               | 31.35                | Pk  | 37.4           | -18.7        | -95.2   | -45.15                  | -25             | -20.15         | H        |
| 5.16637               | 35.76                | Pk  | 34.4           | -24          | -95.2   | -49.04                  | -25             | -24.04         | V        |
| 7.74999               | 33.14                | Pk  | 35.7           | -21.7        | -95.2   | -48.06                  | -25             | -23.06         | V        |
| 10.33165              | 31.36                | Pk  | 37.4           | -18.7        | -95.2   | -45.14                  | -25             | -20.14         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.34047               | 33.55                | Pk  | 34.6           | -23.9        | -95.2   | -50.95                  | -25             | -25.95         | H        |
| 8.00829               | 33.37                | Pk  | 35.7           | -21.4        | -95.2   | -47.53                  | -25             | -22.53         | H        |
| 10.67869              | 32.02                | Pk  | 37.9           | -19.1        | -95.2   | -44.38                  | -25             | -19.38         | H        |
| 5.3411                | 34.45                | Pk  | 34.6           | -23.9        | -95.2   | -50.05                  | -25             | -25.05         | V        |
| 8.00956               | 32.07                | Pk  | 35.7           | -21.4        | -95.2   | -48.83                  | -25             | -23.83         | V        |
| 10.68244              | 31.64                | Pk  | 37.9           | -19.1        | -95.2   | -44.76                  | -25             | -19.76         | V        |

**QPSK 5G NR BAND n41 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179110                   |
| Date:          | 7/26/2020                  |
| Test Engineer: | 19479                      |
| Configuration: | EUT Only                   |
| Mode           | 5G NR Band n41 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2546MHz  |                      |     |                |              |         |                         |                 |                |          |
| 4.99956               | 39.93                | Pk  | 34.1           | -28.4        | -95.2   | -48.77                  | -25             | -23.77         | V        |
| 5.04177               | 39.07                | Pk  | 34.2           | -28          | -95.2   | -49.33                  | -25             | -24.33         | H        |
| 7.61765               | 36.43                | Pk  | 35.8           | -23.5        | -95.2   | -46.07                  | -25             | -21.07         | V        |
| 7.64337               | 37.18                | Pk  | 35.9           | -23.6        | -95.2   | -45.32                  | -25             | -20.32         | H        |
| 10.17931              | 36.39                | Pk  | 37.5           | -20.9        | -95.2   | -41.61                  | -25             | -16.61         | V        |
| 10.18635              | 35.72                | Pk  | 37.5           | -20.9        | -95.2   | -42.18                  | -25             | -17.18         | H        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.16613               | 39.65                | Pk  | 34.5           | -27.7        | -95.2   | -48.05                  | -25             | -23.05         | V        |
| 5.19207               | 39.56                | Pk  | 34.7           | -27.6        | -95.2   | -47.74                  | -25             | -22.74         | H        |
| 7.77916               | 36.12                | Pk  | 35.9           | -23.4        | -95.2   | -46.28                  | -25             | -21.28         | V        |
| 7.78764               | 36.91                | Pk  | 36             | -23.4        | -95.2   | -45.29                  | -25             | -20.29         | H        |
| 10.36092              | 35.65                | Pk  | 37.7           | -20.2        | -95.2   | -41.25                  | -25             | -16.25         | H        |
| 10.41026              | 34.4                 | Pk  | 37.7           | -20.2        | -95.2   | -42.5                   | -25             | -17.5          | V        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.2753                | 38.3                 | Pk  | 34.7           | -27.9        | -95.2   | -49.8                   | -25             | -24.8          | V        |
| 5.27805               | 39.43                | Pk  | 34.7           | -27.9        | -95.2   | -48.67                  | -25             | -23.67         | H        |
| 7.88162               | 37.34                | Pk  | 36.1           | -23.5        | -95.2   | -44.76                  | -25             | -19.76         | V        |
| 7.912                 | 37.31                | Pk  | 36.1           | -23.4        | -95.2   | -44.89                  | -25             | -19.89         | H        |
| 10.54373              | 35.84                | Pk  | 37.8           | -20.4        | -95.2   | -41.46                  | -25             | -16.46         | H        |
| 10.57665              | 35.79                | Pk  | 37.8           | -20.5        | -95.2   | -41.21                  | -25             | -16.21         | V        |

### 9.3.12. LTE BAND 66

#### **LIMITS**

FCC: §27.53 (h)

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

**QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)**

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 7/27/2020         |
| Test Engineer: | 19206             |
| Configuration: | EUT Only          |
| Mode           | LTE 66 QPSK 20MHz |
| Chamber #:     | Chamber B         |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.51656               | 37.81                | Pk  | 30.1           | -27.3        | -95.2   | -54.59                  | -13             | -41.59         | H        |
| 3.52078               | 37.12                | Pk  | 30.2           | -27.3        | -95.2   | -55.18                  | -13             | -42.18         | V        |
| 5.18484               | 38.02                | Pk  | 33.6           | -25.6        | -95.2   | -49.18                  | -13             | -36.18         | V        |
| 5.38406               | 37.57                | Pk  | 33             | -25.3        | -95.2   | -49.93                  | -13             | -36.93         | H        |
| 7.21828               | 34.15                | Pk  | 37.2           | -22.6        | -95.2   | -46.45                  | -13             | -33.45         | H        |
| 7.21828               | 35.39                | Pk  | 37.2           | -22.6        | -95.2   | -45.21                  | -13             | -32.21         | V        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.47015               | 31.54                | Pk  | 32.8           | -26.1        | -95.2   | -56.96                  | -13             | -43.96         | H        |
| 5.20497               | 32.87                | Pk  | 34.3           | -24.1        | -95.2   | -52.13                  | -13             | -39.13         | H        |
| 6.93896               | 30.91                | Pk  | 35.6           | -22.8        | -95.2   | -51.49                  | -13             | -38.49         | H        |
| 3.47473               | 34.39                | Pk  | 32.8           | -26.1        | -95.2   | -54.11                  | -13             | -41.11         | V        |
| 5.20392               | 32.53                | Pk  | 34.3           | -24.1        | -95.2   | -52.47                  | -13             | -39.47         | V        |
| 6.93887               | 31.72                | Pk  | 35.6           | -22.8        | -95.2   | -50.68                  | -13             | -37.68         | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.5101                | 39.05                | Pk  | 30.2           | -27.2        | -95.2   | -53.15                  | -13             | -40.15         | V        |
| 3.56506               | 39.07                | Pk  | 30.1           | -27.5        | -95.2   | -53.53                  | -13             | -40.53         | H        |
| 5.07633               | 37.1                 | Pk  | 33.8           | -24.9        | -95.2   | -49.2                   | -13             | -36.2          | H        |
| 5.12701               | 37.17                | Pk  | 33.8           | -24.8        | -95.2   | -49.03                  | -13             | -36.03         | V        |
| 7.22084               | 36.28                | Pk  | 37.1           | -22.6        | -95.2   | -44.42                  | -13             | -31.42         | V        |
| 7.25449               | 35.92                | Pk  | 37.2           | -23.1        | -95.2   | -45.18                  | -13             | -32.18         | H        |

### 9.3.13. LTE BAND 71

#### **LIMITS**

FCC: §27.53 (g)

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.

**QPSK LTE BAND 71 (20.0MHZ BANDWIDTH)**

|                |                 |
|----------------|-----------------|
| Project #:     | 13179110        |
| Date:          | 7/18/2020       |
| Test Engineer: | 12491           |
| Configuration: | EUT Only        |
| Mode           | LTE Band 71QPSK |
| Chamber #:     | Chamber I       |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 673.0MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.326                  | 37.28                | Pk  | 29.3           | -30.5        | -95.2   | -59.12                  | -13             | -46.12         | H        |
| 1.99237                | 40.57                | Pk  | 30.9           | -28.7        | -95.2   | -52.43                  | -13             | -39.43         | H        |
| 2.65241                | 34.92                | Pk  | 32.4           | -27.3        | -95.2   | -55.18                  | -13             | -42.18         | H        |
| 1.32638                | 38.88                | Pk  | 29.3           | -30.5        | -95.2   | -57.52                  | -13             | -44.52         | V        |
| 1.99227                | 40.9                 | Pk  | 30.9           | -28.7        | -95.2   | -52.1                   | -13             | -39.1          | V        |
| 2.65147                | 35.12                | Pk  | 32.4           | -27.3        | -95.2   | -54.98                  | -13             | -41.98         | V        |
| Mid Channel, 680.5MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.34134                | 35.25                | Pk  | 29.5           | -30.5        | -95.2   | -60.95                  | -13             | -47.95         | H        |
| 2.0117                 | 33.89                | Pk  | 30.9           | -28.7        | -95.2   | -59.11                  | -13             | -46.11         | H        |
| 2.68079                | 32.22                | Pk  | 32.4           | -27.2        | -95.2   | -57.78                  | -13             | -44.78         | H        |
| 1.33872                | 36.85                | Pk  | 29.5           | -30.5        | -95.2   | -59.35                  | -13             | -46.35         | V        |
| 2.0132                 | 34.25                | Pk  | 30.9           | -28.7        | -95.2   | -58.75                  | -13             | -45.75         | V        |
| 2.68428                | 32.55                | Pk  | 32.4           | -27.2        | -95.2   | -57.45                  | -13             | -44.45         | V        |
| High Channel, 688.0MHz |                      |     |                |              |         |                         |                 |                |          |
| 1.35918                | 38.47                | Pk  | 29.6           | -30.4        | -95.2   | -57.53                  | -13             | -44.53         | H        |
| 2.0342                 | 35.88                | Pk  | 31             | -28.6        | -95.2   | -56.92                  | -13             | -43.92         | H        |
| 2.71265                | 34.93                | Pk  | 32.4           | -27.3        | -95.2   | -55.17                  | -13             | -42.17         | H        |
| 1.35937                | 37.36                | Pk  | 29.6           | -30.3        | -95.2   | -58.54                  | -13             | -45.54         | V        |
| 2.03434                | 37.01                | Pk  | 31             | -28.6        | -95.2   | -55.79                  | -13             | -42.79         | V        |
| 2.71257                | 35.35                | Pk  | 32.4           | -27.3        | -95.2   | -54.75                  | -13             | -41.75         | V        |

## **9.4. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 3**

### **TEST PROCEDURE**

KDB 971168 D01 v03r01/D02 v02/r01

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

### **RESULTS**

### 9.4.1. LTE BAND 2

#### **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.

**QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 5/19/2020        |
| Test Engineer: | 39006            |
| Configuration: | EUT Only         |
| Mode           | LTE 2 QPSK 20MHz |
| Chamber #:     | Chamber I        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP  | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|-------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1860MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.6274                | 36.88                | Pk  | 33             | -26          | -95.2 | -51.32                  | -13             | -38.32      | H        |
| 5.65475               | 35.28                | Pk  | 35             | -24.3        | -95.2 | -49.22                  | -13             | -36.22      | H        |
| 7.33714               | 33.34                | Pk  | 35.5           | -22          | -95.2 | -48.36                  | -13             | -35.36      | H        |
| 3.67255               | 36.52                | Pk  | 32.9           | -25.9        | -95.2 | -51.68                  | -13             | -38.68      | V        |
| 5.64557               | 35.48                | Pk  | 35.1           | -24.3        | -95.2 | -48.92                  | -13             | -35.92      | V        |
| 7.29963               | 33.75                | Pk  | 35.5           | -22.3        | -95.2 | -48.25                  | -13             | -35.25      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.77387               | 36.81                | Pk  | 33             | -25.6        | -95.2 | -50.99                  | -13             | -37.99      | H        |
| 5.58755               | 35.06                | Pk  | 35.2           | -24.2        | -95.2 | -49.14                  | -13             | -36.14      | H        |
| 7.66254               | 33.76                | Pk  | 35.7           | -21.9        | -95.2 | -47.64                  | -13             | -34.64      | H        |
| 3.7428                | 36.83                | Pk  | 32.9           | -25.8        | -95.2 | -51.27                  | -13             | -38.27      | V        |
| 5.61313               | 37.11                | Pk  | 35.2           | -24.3        | -95.2 | -47.19                  | -13             | -34.19      | V        |
| 7.67869               | 33.38                | Pk  | 35.7           | -22          | -95.2 | -48.12                  | -13             | -35.12      | V        |
| High Channel, 1900MHz |                      |     |                |              |       |                         |                 |             |          |
| 3.80744               | 36.52                | Pk  | 32.9           | -25.5        | -95.2 | -51.28                  | -13             | -38.28      | H        |
| 5.67054               | 35.27                | Pk  | 35             | -24.2        | -95.2 | -49.13                  | -13             | -36.13      | H        |
| 7.59887               | 33.56                | Pk  | 35.6           | -21.8        | -95.2 | -47.84                  | -13             | -34.84      | H        |
| 3.80248               | 37.16                | Pk  | 32.9           | -25.5        | -95.2 | -50.64                  | -13             | -37.64      | V        |
| 4.45132               | 36.47                | Pk  | 33.7           | -24.8        | -95.2 | -49.83                  | -13             | -36.83      | V        |
| 5.65209               | 35.31                | Pk  | 35             | -24.3        | -95.2 | -49.19                  | -13             | -36.19      | V        |

## 9.4.2. LTE BAND 7

### LIMITS

FCC: §27.53 (m)

At least  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)**

|                |                  |
|----------------|------------------|
| Project #:     | 13179110         |
| Date:          | 5/21/2020        |
| Test Engineer: | 50822            |
| Configuration: | EUT Only         |
| Mode           | LTE 7 QPSK 20MHz |
| Chamber #:     | Chamber A        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.01536               | 40.41                | Pk  | 34.4           | -28.3        | -95.2   | -48.69                  | -25             | -23.69      | H        |
| 5.02701               | 39.22                | Pk  | 34.3           | -28.1        | -95.2   | -49.78                  | -25             | -24.78      | V        |
| 7.49702               | 36.25                | Pk  | 35.7           | -23.8        | -95.2   | -47.05                  | -25             | -22.05      | V        |
| 7.54798               | 36.9                 | Pk  | 35.8           | -23.8        | -95.2   | -46.3                   | -25             | -21.3       | H        |
| 10.29087              | 34.92                | Pk  | 37.4           | -20.6        | -95.2   | -43.48                  | -25             | -18.48      | V        |
| 10.36643              | 35.27                | Pk  | 37.4           | -20.2        | -95.2   | -42.73                  | -25             | -17.73      | H        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.05662               | 39.53                | Pk  | 34.3           | -28          | -95.2   | -49.37                  | -25             | -24.37      | H        |
| 5.05746               | 39.68                | Pk  | 34.3           | -28          | -95.2   | -49.22                  | -25             | -24.22      | V        |
| 7.61055               | 36.05                | Pk  | 35.8           | -23.6        | -95.2   | -46.95                  | -25             | -21.95      | H        |
| 7.63493               | 36.26                | Pk  | 35.8           | -23.6        | -95.2   | -46.74                  | -25             | -21.74      | V        |
| 10.15451              | 36                   | Pk  | 37.2           | -21.1        | -95.2   | -43.1                   | -25             | -18.1       | H        |
| 10.17512              | 36.25                | Pk  | 37.2           | -20.9        | -95.2   | -42.65                  | -25             | -17.65      | V        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.09209               | 38.7                 | Pk  | 34.4           | -27.8        | -95.2   | -49.9                   | -25             | -24.9       | V        |
| 5.11704               | 39.88                | Pk  | 34.5           | -27.9        | -95.2   | -48.72                  | -25             | -23.72      | H        |
| 7.68149               | 36                   | Pk  | 35.8           | -23.3        | -95.2   | -46.7                   | -25             | -21.7       | H        |
| 7.70592               | 36.62                | Pk  | 35.8           | -23.5        | -95.2   | -46.28                  | -25             | -21.28      | V        |
| 10.23251              | 35.36                | Pk  | 37.3           | -20.6        | -95.2   | -43.14                  | -25             | -18.14      | H        |
| 10.25632              | 36.13                | Pk  | 37.3           | -20.6        | -95.2   | -42.37                  | -25             | -17.37      | V        |

### 9.4.3. LTE BAND 25

#### **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.

**QPSK LTE BAND 25 (20.0MHZ BANDWIDTH)**

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/21/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 25 QPSK 20MHz |
| Chamber #:     | Chamber A         |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.852                  | 36.42                | Pk  | 33             | -25.3        | -95.2   | -51.08                  | -13             | -38.08         | H        |
| 5.83519                | 34.87                | Pk  | 35.1           | -23.8        | -95.2   | -49.03                  | -13             | -36.03         | H        |
| 7.35568                | 33.38                | Pk  | 35.6           | -22.1        | -95.2   | -48.32                  | -13             | -35.32         | H        |
| 3.83862                | 36.1                 | Pk  | 33             | -25.4        | -95.2   | -51.5                   | -13             | -38.5          | V        |
| 5.79404                | 34.7                 | Pk  | 35.1           | -23.7        | -95.2   | -49.1                   | -13             | -36.1          | V        |
| 7.35384                | 33.33                | Pk  | 35.5           | -22.1        | -95.2   | -48.47                  | -13             | -35.47         | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.76363                | 40.81                | Pk  | 33.6           | -29.6        | -95.2   | -50.39                  | -13             | -37.39         | H        |
| 3.78942                | 40.78                | Pk  | 33.6           | -29.5        | -95.2   | -50.32                  | -13             | -37.32         | V        |
| 5.62131                | 38.55                | Pk  | 34.8           | -27.1        | -95.2   | -48.95                  | -13             | -35.95         | V        |
| 5.64836                | 38.18                | Pk  | 34.8           | -27.1        | -95.2   | -49.32                  | -13             | -36.32         | H        |
| 7.54581                | 37.13                | Pk  | 35.8           | -23.9        | -95.2   | -46.17                  | -13             | -33.17         | H        |
| 7.58687                | 37.71                | Pk  | 35.8           | -23.8        | -95.2   | -45.49                  | -13             | -32.49         | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.8062                 | 40.85                | Pk  | 33.7           | -29.5        | -95.2   | -50.15                  | -13             | -37.15         | V        |
| 3.82266                | 40.8                 | Pk  | 33.7           | -29.5        | -95.2   | -50.2                   | -13             | -37.2          | H        |
| 5.69171                | 38.74                | Pk  | 34.8           | -27.3        | -95.2   | -48.96                  | -13             | -35.96         | V        |
| 5.73992                | 38.65                | Pk  | 34.9           | -27.4        | -95.2   | -49.05                  | -13             | -36.05         | H        |
| 7.62422                | 36.46                | Pk  | 35.8           | -23.5        | -95.2   | -46.44                  | -13             | -33.44         | H        |
| 7.66024                | 36.27                | Pk  | 35.8           | -23.4        | -95.2   | -46.53                  | -13             | -33.53         | V        |

#### 9.4.4. LTE BAND 30

##### LIMITS

FCC: §27.53 (a)

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

##### QPSK LTE BAND 30 (10.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 9/21/2020         |
| Test Engineer: | 30606             |
| Configuration: | EUT Only          |
| Mode           | LTE 30 QPSK 10MHz |
| Chamber #:     | Chamber A         |

| Frequency (GHz)      | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 2310MHz |                      |     |                |              |         |                         |                 |             |          |
| 2.68459              | 39.86                | Pk  | 33             | -29.5        | -95.2   | -51.84                  | -40             | -11.84      | V        |
| 3.48884              | 39.37                | Pk  | 33.1           | -28.1        | -95.2   | -50.83                  | -40             | -10.83      | H        |
| 3.87987              | 38.24                | Pk  | 33.8           | -27.3        | -95.2   | -50.46                  | -40             | -10.46      | V        |
| 5.15976              | 36.89                | Pk  | 34.5           | -26.4        | -95.2   | -50.21                  | -40             | -10.21      | H        |
| 7.44115              | 34.76                | Pk  | 36.2           | -22.8        | -95.2   | -47.04                  | -40             | -7.04       | V        |
| 8.12626              | 34.67                | Pk  | 36.1           | -22          | -95.2   | -46.43                  | -40             | -6.43       | H        |

## 9.4.5. LTE BAND 41 AND 5G NR BAND n41

### LIMITS

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

### QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 5/21/2020         |
| Test Engineer: | 45258             |
| Configuration: | EUT Only          |
| Mode           | LTE 41 QPSK 20MHz |
| Chamber #:     | Chamber A         |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.01068               | 39.56                | Pk  | 34.3           | -28.3        | -95.2   | -49.64                  | -25             | -24.64         | H        |
| 5.01145               | 39.82                | Pk  | 34.3           | -28.3        | -95.2   | -49.38                  | -25             | -24.38         | V        |
| 7.51848               | 36.77                | Pk  | 35.7           | -23.9        | -95.2   | -46.63                  | -25             | -21.63         | V        |
| 7.51952               | 36.57                | Pk  | 35.7           | -23.9        | -95.2   | -46.83                  | -25             | -21.83         | H        |
| 10.02372              | 35.49                | Pk  | 37.1           | -21          | -95.2   | -43.61                  | -25             | -18.61         | V        |
| 10.02581              | 35.12                | Pk  | 37.1           | -21.1        | -95.2   | -44.08                  | -25             | -19.08         | H        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.18598               | 39.12                | Pk  | 34.6           | -27.7        | -95.2   | -49.18                  | -25             | -24.18         | V        |
| 5.18757               | 39.01                | Pk  | 34.6           | -27.7        | -95.2   | -49.29                  | -25             | -24.29         | H        |
| 7.78103               | 36.32                | Pk  | 35.8           | -23.4        | -95.2   | -46.48                  | -25             | -21.48         | H        |
| 7.78149               | 36.28                | Pk  | 35.8           | -23.4        | -95.2   | -46.52                  | -25             | -21.52         | V        |
| 10.36973              | 34.82                | Pk  | 37.4           | -20.2        | -95.2   | -43.18                  | -25             | -18.18         | H        |
| 10.37206              | 34.85                | Pk  | 37.4           | -20.2        | -95.2   | -43.15                  | -25             | -18.15         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.36017               | 39.6                 | Pk  | 35             | -27.9        | -95.2   | -48.5                   | -25             | -23.5          | H        |
| 5.36162               | 39.16                | Pk  | 35             | -27.9        | -95.2   | -48.94                  | -25             | -23.94         | V        |
| 8.04184               | 36.94                | Pk  | 35.8           | -23.1        | -95.2   | -45.56                  | -25             | -20.56         | V        |
| 8.04228               | 36.53                | Pk  | 35.8           | -23.1        | -95.2   | -45.97                  | -25             | -20.97         | H        |
| 10.72064              | 35.52                | Pk  | 37.9           | -20.2        | -95.2   | -41.98                  | -25             | -16.98         | H        |
| 10.72191              | 35.49                | Pk  | 37.9           | -20.2        | -95.2   | -42.01                  | -25             | -17.01         | V        |

**QPSK 5G NR BAND n41 (100.0MHZ BANDWIDTH)**

|                |                     |
|----------------|---------------------|
| Project #:     | 13179110            |
| Date:          | 7/26/2020           |
| Test Engineer: | 19479               |
| Configuration: | EUT Only            |
| Mode           | LTE n41 QPSK 100MHz |
| Chamber #:     | Chamber A           |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2546MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.07839               | 39.97                | Pk  | 34.4           | -27.8        | -95.2   | -47.93                  | -25             | -22.93         | V        |
| 5.08988               | 39.61                | Pk  | 34.4           | -27.8        | -95.2   | -48.19                  | -25             | -23.19         | H        |
| 7.63109               | 37.26                | Pk  | 35.9           | -23.6        | -95.2   | -45.24                  | -25             | -20.24         | H        |
| 7.63293               | 36.69                | Pk  | 35.9           | -23.6        | -95.2   | -45.81                  | -25             | -20.81         | V        |
| 10.20638              | 35.13                | Pk  | 37.5           | -20.9        | -95.2   | -42.67                  | -25             | -17.67         | H        |
| 10.21048              | 35.36                | Pk  | 37.6           | -20.9        | -95.2   | -42.24                  | -25             | -17.24         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.17832               | 38.47                | Pk  | 34.6           | -27.8        | -95.2   | -49.23                  | -25             | -24.23         | H        |
| 5.17932               | 39.46                | Pk  | 34.6           | -27.8        | -95.2   | -48.24                  | -25             | -23.24         | V        |
| 7.78072               | 36.39                | Pk  | 35.9           | -23.4        | -95.2   | -46.01                  | -25             | -21.01         | H        |
| 7.78228               | 37.83                | Pk  | 35.9           | -23.4        | -95.2   | -44.57                  | -25             | -19.57         | V        |
| 10.37913              | 35.55                | Pk  | 37.7           | -20.3        | -95.2   | -41.45                  | -25             | -16.45         | H        |
| 10.4011               | 35.52                | Pk  | 37.7           | -20.3        | -95.2   | -41.48                  | -25             | -16.48         | V        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.27085               | 39.36                | Pk  | 34.7           | -27.9        | -95.2   | -48.74                  | -25             | -23.74         | H        |
| 5.27809               | 38.25                | Pk  | 34.7           | -27.9        | -95.2   | -49.85                  | -25             | -24.85         | V        |
| 7.91453               | 35.78                | Pk  | 36.2           | -23.4        | -95.2   | -46.32                  | -25             | -21.32         | H        |
| 7.94292               | 37.18                | Pk  | 36.1           | -23.5        | -95.2   | -45.22                  | -25             | -20.22         | V        |
| 10.52274              | 34.68                | Pk  | 37.7           | -20.6        | -95.2   | -42.92                  | -25             | -17.92         | V        |
| 10.59568              | 34.95                | Pk  | 37.8           | -20.1        | -95.2   | -41.65                  | -25             | -16.65         | H        |

#### 9.4.6. LTE BAND 66

##### **LIMITS**

FCC: §27.53 (h)

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

**QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)**

|                |                   |
|----------------|-------------------|
| Project #:     | 13179110          |
| Date:          | 8/11/2020         |
| Test Engineer: | 30606             |
| Configuration: | EUT Only          |
| Mode           | LTE 66 QPSK 20MHz |
| Chamber #:     | Chamber A         |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.60697               | 38.52                | Pk  | 30             | -27.2        | -95.2   | -53.88                  | -13             | -40.88         | V        |
| 3.63416               | 38.89                | Pk  | 30.1           | -27.2        | -95.2   | -53.41                  | -13             | -40.41         | H        |
| 5.04281               | 37.77                | Pk  | 33.7           | -24.9        | -95.2   | -48.63                  | -13             | -35.63         | V        |
| 5.0513                | 37.1                 | Pk  | 33.8           | -24.7        | -95.2   | -49                     | -13             | -36            | H        |
| 6.86762               | 37.12                | Pk  | 36.1           | -23.6        | -95.2   | -45.58                  | -13             | -32.58         | H        |
| 6.88347               | 36.27                | Pk  | 36.2           | -23.7        | -95.2   | -46.43                  | -13             | -33.43         | V        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.50211               | 39.89                | Pk  | 34.2           | -29.7        | -95.2   | -50.81                  | -13             | -37.81         | V        |
| 3.50742               | 40.57                | Pk  | 33.9           | -29.7        | -95.2   | -50.43                  | -13             | -37.43         | H        |
| 5.255                 | 38.5                 | Pk  | 34.8           | -27.9        | -95.2   | -49.8                   | -13             | -36.8          | H        |
| 5.27369               | 39.3                 | Pk  | 34.9           | -27.9        | -95.2   | -48.9                   | -13             | -35.9          | V        |
| 7.00526               | 36.63                | Pk  | 35.9           | -24.6        | -95.2   | -47.27                  | -13             | -34.27         | V        |
| 7.01024               | 36.77                | Pk  | 35.9           | -24.5        | -95.2   | -47.03                  | -13             | -34.03         | H        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.4573                | 39.26                | Pk  | 30.3           | -27.3        | -95.2   | -52.94                  | -13             | -39.94         | V        |
| 3.52196               | 39.19                | Pk  | 30.2           | -27.3        | -95.2   | -53.11                  | -13             | -40.11         | H        |
| 5.0531                | 38.3                 | Pk  | 33.8           | -24.7        | -95.2   | -47.8                   | -13             | -34.8          | V        |
| 5.18486               | 37.78                | Pk  | 33.6           | -25.6        | -95.2   | -49.42                  | -13             | -36.42         | H        |
| 7.20713               | 36.05                | Pk  | 37             | -22.7        | -95.2   | -44.85                  | -13             | -31.85         | V        |
| 7.26137               | 36.32                | Pk  | 37.1           | -23.1        | -95.2   | -44.88                  | -13             | -31.88         | H        |

## **9.5. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 4**

### **TEST PROCEDURE**

KDB 971168 D01 v03r01/D02 v02/r01

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

### **RESULTS**

Both QPSK and 16QAM modes are tested, widest QPSK bandwidths results are reported as worst case

### 9.5.1. LTE BAND 2

#### **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.

**QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)**

|                |                       |
|----------------|-----------------------|
| Project #:     | 13179110              |
| Date:          | 6/28/2020             |
| Test Engineer: | 19206                 |
| Configuration: | EUT Only              |
| Mode:          | LTE Band 2 QPSK 20MHz |
| Chamber #:     | Chamber B             |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP  | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|-------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1860MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.67089               | 39.22                | Pk  | 30.2           | -27          | -95.2 | -52.78                  | -13             | -39.78      | V        |
| 3.70283               | 39                   | Pk  | 30.3           | -27.4        | -95.2 | -53.3                   | -13             | -40.3       | H        |
| 5.55317               | 43.8                 | Pk  | 33.3           | -25.9        | -95.2 | -44                     | -13             | -31         | H        |
| 5.55348               | 41.16                | Pk  | 33.3           | -25.9        | -95.2 | -46.64                  | -13             | -33.64      | V        |
| 7.21164               | 35.63                | Pk  | 37.1           | -22.6        | -95.2 | -45.07                  | -13             | -32.07      | H        |
| 7.22313               | 35.48                | Pk  | 37.1           | -22.5        | -95.2 | -45.12                  | -13             | -32.12      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.74212               | 39.14                | Pk  | 30.5           | -27.5        | -95.2 | -53.06                  | -13             | -40.06      | H        |
| 3.75842               | 38.78                | Pk  | 30.6           | -27.5        | -95.2 | -53.32                  | -13             | -40.32      | V        |
| 5.50837               | 37.91                | Pk  | 33.2           | -26          | -95.2 | -50.09                  | -13             | -37.09      | V        |
| 5.51169               | 37.24                | Pk  | 33.2           | -26          | -95.2 | -50.76                  | -13             | -37.76      | H        |
| 7.27784               | 36.58                | Pk  | 37.1           | -23.1        | -95.2 | -44.62                  | -13             | -31.62      | V        |
| 7.35903               | 35.89                | Pk  | 37             | -23.7        | -95.2 | -46.01                  | -13             | -33.01      | H        |
| High Channel, 1900MHz |                      |     |                |              |       |                         |                 |             |          |
| 3.90048               | 38.49                | Pk  | 31.4           | -26.7        | -95.2 | -52.01                  | -13             | -39.01      | H        |
| 3.9071                | 38.68                | Pk  | 31.4           | -26.8        | -95.2 | -51.92                  | -13             | -38.92      | V        |
| 5.56742               | 37.34                | Pk  | 33.3           | -25.8        | -95.2 | -50.36                  | -13             | -37.36      | H        |
| 5.67344               | 39.72                | Pk  | 33             | -24.4        | -95.2 | -46.88                  | -13             | -33.88      | V        |
| 7.63994               | 36.38                | Pk  | 37             | -23.6        | -95.2 | -45.42                  | -13             | -32.42      | H        |
| 7.64597               | 35.8                 | Pk  | 37             | -23.6        | -95.2 | -46                     | -13             | -33         | V        |

## 9.5.2. LTE BAND 7

### **LIMITS**

FCC: §27.53 (m)

At least  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)**

|                |                       |
|----------------|-----------------------|
| Project #:     | 13179110              |
| Date:          | 6/28/2020             |
| Test Engineer: | 19206                 |
| Configuration: | EUT Only              |
| Mode           | LTE Band 7 QPSK 20MHz |
| Chamber #:     | Chamber B             |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.08303               | 37.87                | Pk  | 33.8           | -26.2        | -95.2   | -48.93                  | -25             | -23.93      | H        |
| 5.08567               | 37.54                | Pk  | 33.8           | -26.2        | -95.2   | -49.26                  | -25             | -24.26      | V        |
| 7.21489               | 36.23                | Pk  | 37.2           | -23.6        | -95.2   | -44.97                  | -25             | -19.97      | H        |
| 7.26515               | 36.83                | Pk  | 37.1           | -23.4        | -95.2   | -44.17                  | -25             | -19.17      | V        |
| 9.93098               | 34.36                | Pk  | 38.4           | -19.8        | -95.2   | -41.54                  | -25             | -16.54      | H        |
| 9.97466               | 34.35                | Pk  | 38.3           | -19.8        | -95.2   | -41.85                  | -25             | -16.85      | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.01709               | 37.68                | Pk  | 33.8           | -26          | -95.2   | -48.92                  | -25             | -23.92      | H        |
| 5.03483               | 38.01                | Pk  | 33.7           | -26.1        | -95.2   | -48.89                  | -25             | -23.89      | V        |
| 7.26271               | 36.23                | Pk  | 37.1           | -23.5        | -95.2   | -44.87                  | -25             | -19.87      | V        |
| 7.32938               | 35.88                | Pk  | 37             | -23.7        | -95.2   | -45.72                  | -25             | -20.72      | H        |
| 10.24581              | 33.7                 | Pk  | 38.8           | -19.4        | -95.2   | -41.3                   | -25             | -16.3       | V        |
| 10.26317              | 33.85                | Pk  | 38.9           | -19.7        | -95.2   | -41.45                  | -25             | -16.45      | H        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.06579               | 37.28                | Pk  | 33.8           | -26.2        | -95.2   | -49.72                  | -25             | -24.72      | V        |
| 5.0786                | 37.58                | Pk  | 33.8           | -26.1        | -95.2   | -49.22                  | -25             | -24.22      | H        |
| 7.64803               | 35.44                | Pk  | 36.9           | -23.5        | -95.2   | -45.96                  | -25             | -20.96      | H        |
| 7.6664                | 36.56                | Pk  | 36.9           | -23.4        | -95.2   | -44.84                  | -25             | -19.84      | V        |
| 9.68335               | 35.3                 | Pk  | 38.7           | -20.1        | -95.2   | -40.5                   | -25             | -15.5       | V        |
| 10.11208              | 34.68                | Pk  | 38.4           | -19.9        | -95.2   | -41.32                  | -25             | -16.32      | H        |

### 9.5.3. LTE BAND 25

#### **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.

**QPSK LTE BAND 25 (20.0MHZ BANDWIDTH)**

|                |                        |
|----------------|------------------------|
| Project #:     | 1379110                |
| Date:          | 6/28/2020              |
| Test Engineer: | 19206                  |
| Configuration: | EUT Only               |
| Mode:          | LTE Band 25 QPSK 20MHz |
| Chamber #:     | Chamber B              |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.7924                 | 39.21                | Pk  | 30.8           | -27.3        | -95.2   | -52.49                  | -13             | -39.49         | H        |
| 3.84163                | 38.86                | Pk  | 31.1           | -27.2        | -95.2   | -52.44                  | -13             | -39.44         | V        |
| 5.55331                | 40.49                | Pk  | 33.3           | -25.9        | -95.2   | -47.31                  | -13             | -34.31         | H        |
| 5.58742                | 37.61                | Pk  | 33.2           | -25.5        | -95.2   | -49.89                  | -13             | -36.89         | V        |
| 7.1994                 | 35.79                | Pk  | 37.1           | -22.8        | -95.2   | -45.11                  | -13             | -32.11         | H        |
| 7.26441                | 36.08                | Pk  | 37.1           | -23.1        | -95.2   | -45.12                  | -13             | -32.12         | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.72629                | 39.77                | Pk  | 30.4           | -27.4        | -95.2   | -52.43                  | -13             | -39.43         | V        |
| 3.74299                | 40.15                | Pk  | 30.5           | -27.5        | -95.2   | -52.05                  | -13             | -39.05         | H        |
| 5.62082                | 41.68                | Pk  | 33.1           | -25.1        | -95.2   | -45.52                  | -13             | -32.52         | V        |
| 5.62102                | 40.21                | Pk  | 33.1           | -25.1        | -95.2   | -46.99                  | -13             | -33.99         | H        |
| 7.51021                | 36.12                | Pk  | 36.8           | -23.1        | -95.2   | -45.38                  | -13             | -32.38         | V        |
| 7.51395                | 36.21                | Pk  | 36.8           | -23.1        | -95.2   | -45.29                  | -13             | -32.29         | H        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.86342                | 38.94                | Pk  | 31.2           | -27.1        | -95.2   | -52.16                  | -13             | -39.16         | V        |
| 3.88129                | 38.21                | Pk  | 31.3           | -27          | -95.2   | -52.69                  | -13             | -39.69         | H        |
| 5.68818                | 41.51                | Pk  | 33.1           | -24.1        | -95.2   | -44.69                  | -13             | -31.69         | V        |
| 5.82594                | 37.7                 | Pk  | 33.5           | -25.5        | -95.2   | -49.5                   | -13             | -36.5          | H        |
| 7.71637                | 35.35                | Pk  | 37.1           | -22.2        | -95.2   | -44.95                  | -13             | -31.95         | H        |
| 7.72828                | 35.58                | Pk  | 37.1           | -21.8        | -95.2   | -44.32                  | -13             | -31.32         | V        |

## 9.5.4. LTE BAND 30

### LIMITS

FCC: §27.53 (a)

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

### QPSK LTE BAND 30 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 9/15/2020              |
| Test Engineer: | 30606                  |
| Configuration: | EUT Only               |
| Mode:          | LTE Band 30 QPSK 20MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)      | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 2310MHz |                      |     |                |              |         |                         |                 |             |          |
| 4.34212              | 37.39                | Pk  | 33.6           | -26.8        | -95.2   | -51.01                  | -40             | -11.01      | H        |
| 4.5544               | 38.47                | Pk  | 34             | -27.2        | -95.2   | -49.93                  | -40             | -9.93       | V        |
| 6.3984               | 36.04                | Pk  | 36.3           | -24.1        | -95.2   | -46.96                  | -40             | -6.96       | V        |
| 6.44276              | 35.63                | Pk  | 36.4           | -23.8        | -95.2   | -46.97                  | -40             | -6.97       | H        |
| 9.06678              | 34.42                | Pk  | 36.4           | -20.9        | -95.2   | -45.28                  | -40             | -5.28       | V        |
| 9.12596              | 34.31                | Pk  | 36.5           | -21          | -95.2   | -45.39                  | -40             | -5.39       | H        |

## 9.5.5. LTE BAND 41 AND 5G NR BAND n41

### LIMITS

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

### QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

|                |                           |
|----------------|---------------------------|
| Project #:     | 13179110                  |
| Date:          | 5/22/2020                 |
| Test Engineer: | 20792                     |
| Configuration: | EUT Only                  |
| Mode:          | LTE Band 41FCC QPSK 20MHz |
| Chamber #:     | Chamber A                 |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.01317               | 39.35                | Pk  | 34.3           | -28.3        | -95.2   | -49.85                  | -25             | -24.85         | H        |
| 5.01331               | 38.26                | Pk  | 34.3           | -28.3        | -95.2   | -50.94                  | -25             | -25.94         | V        |
| 7.517                 | 35.52                | Pk  | 35.7           | -23.9        | -95.2   | -47.88                  | -25             | -22.88         | V        |
| 7.5193                | 35.37                | Pk  | 35.7           | -23.9        | -95.2   | -48.03                  | -25             | -23.03         | H        |
| 10.02399              | 34.34                | Pk  | 37.1           | -21.1        | -95.2   | -44.86                  | -25             | -19.86         | V        |
| 10.02599              | 34.31                | Pk  | 37.1           | -21.1        | -95.2   | -44.89                  | -25             | -19.89         | H        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.18588               | 39.27                | Pk  | 34.6           | -27.7        | -95.2   | -49.03                  | -25             | -24.03         | H        |
| 5.18712               | 39.13                | Pk  | 34.6           | -27.7        | -95.2   | -49.17                  | -25             | -24.17         | V        |
| 7.7799                | 36.33                | Pk  | 35.8           | -23.4        | -95.2   | -46.47                  | -25             | -21.47         | V        |
| 7.78045               | 35.96                | Pk  | 35.8           | -23.4        | -95.2   | -46.84                  | -25             | -21.84         | H        |
| 10.37178              | 34.08                | Pk  | 37.4           | -20.2        | -95.2   | -43.92                  | -25             | -18.92         | V        |
| 10.37243              | 33.8                 | Pk  | 37.4           | -20.2        | -95.2   | -44.2                   | -25             | -19.2          | H        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.3601                | 37.92                | Pk  | 35             | -27.9        | -95.2   | -50.18                  | -25             | -25.18         | H        |
| 5.36067               | 37.32                | Pk  | 35             | -27.9        | -95.2   | -50.78                  | -25             | -25.78         | V        |
| 8.03909               | 35.4                 | Pk  | 35.8           | -23.1        | -95.2   | -47.1                   | -25             | -22.1          | H        |
| 8.03959               | 35.98                | Pk  | 35.8           | -23.1        | -95.2   | -46.52                  | -25             | -21.52         | V        |
| 10.71955              | 34.78                | Pk  | 37.9           | -20.2        | -95.2   | -42.72                  | -25             | -17.72         | V        |
| 10.72216              | 34.45                | Pk  | 37.9           | -20.2        | -95.2   | -43.05                  | -25             | -18.05         | H        |

**QPSK 5G NR BAND n41 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179110                   |
| Date:          | 7/26/2020                  |
| Test Engineer: | 19497                      |
| Configuration: | EUT Only                   |
| Mode:          | 5G NR Band n41 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2546MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.05535               | 39.69                | Pk  | 34.3           | -28          | -95.2   | -48.61                  | -25             | -23.61         | V        |
| 5.08758               | 40.05                | Pk  | 34.4           | -27.8        | -95.2   | -47.75                  | -25             | -22.75         | H        |
| 7.61751               | 36.39                | Pk  | 35.8           | -23.5        | -95.2   | -46.11                  | -25             | -21.11         | V        |
| 7.63629               | 37.5                 | Pk  | 35.9           | -23.6        | -95.2   | -45                     | -25             | -20            | H        |
| 10.16111              | 36.23                | Pk  | 37.5           | -21          | -95.2   | -41.97                  | -25             | -16.97         | H        |
| 10.17403              | 35.2                 | Pk  | 37.5           | -20.9        | -95.2   | -42.8                   | -25             | -17.8          | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.17655               | 39.63                | Pk  | 34.6           | -27.8        | -95.2   | -48.07                  | -25             | -23.07         | H        |
| 5.18082               | 38.65                | Pk  | 34.6           | -27.7        | -95.2   | -48.95                  | -25             | -23.95         | V        |
| 7.74069               | 36.13                | Pk  | 35.9           | -23.4        | -95.2   | -46.27                  | -25             | -21.27         | V        |
| 7.78145               | 35.98                | Pk  | 35.9           | -23.4        | -95.2   | -46.42                  | -25             | -21.42         | H        |
| 10.35927              | 34.73                | Pk  | 37.7           | -20.2        | -95.2   | -42.17                  | -25             | -17.17         | V        |
| 10.37437              | 33.67                | Pk  | 37.7           | -20.2        | -95.2   | -43.23                  | -25             | -18.23         | H        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.27663               | 37.95                | Pk  | 34.7           | -27.9        | -95.2   | -50.15                  | -25             | -25.15         | V        |
| 5.27918               | 38.6                 | Pk  | 34.7           | -27.9        | -95.2   | -49.5                   | -25             | -24.5          | H        |
| 7.91426               | 37.61                | Pk  | 36.2           | -23.4        | -95.2   | -44.49                  | -25             | -19.49         | V        |
| 7.92075               | 36.07                | Pk  | 36.2           | -23.4        | -95.2   | -46.13                  | -25             | -21.13         | H        |
| 10.56155              | 35.58                | Pk  | 37.8           | -20.5        | -95.2   | -41.62                  | -25             | -16.62         | H        |
| 10.56703              | 35.53                | Pk  | 37.8           | -20.5        | -95.2   | -41.57                  | -25             | -16.57         | V        |

## 9.5.6. LTE BAND 48

### LIMITS

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

### QPSK LTE BAND 48 (20.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 9/13/2020              |
| Test Engineer: | 30606                  |
| Configuration: | EUT Only               |
| Mode:          | LTE Band 48 QPSK 20MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 3560MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.51189               | 26.3                 | RMS | 35             | -25.5        | -95.2   | -58.8                   | -40             | -18.8          | H        |
| 5.67706               | 24.94                | RMS | 35.2           | -25.4        | -95.2   | -59.96                  | -40             | -19.96         | V        |
| 7.06728               | 24.33                | RMS | 36.1           | -23.5        | -95.2   | -57.57                  | -40             | -17.57         | H        |
| 7.30151               | 24.31                | RMS | 36.1           | -22.6        | -95.2   | -56.79                  | -40             | -16.79         | V        |
| 8.6339                | 23.33                | RMS | 36.1           | -21.5        | -95.2   | -56.37                  | -40             | -16.37         | H        |
| 9.05018               | 22.94                | RMS | 36.4           | -21.2        | -95.2   | -56.16                  | -40             | -16.16         | V        |
| Mid Channel, 3625MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.56748               | 25.72                | RMS | 35             | -25.5        | -95.2   | -59.68                  | -40             | -19.68         | H        |
| 5.62292               | 25.37                | RMS | 35.1           | -25.5        | -95.2   | -59.73                  | -40             | -19.73         | V        |
| 6.83627               | 24.35                | RMS | 36.4           | -23.4        | -95.2   | -57.35                  | -40             | -17.35         | V        |
| 6.84149               | 23.97                | RMS | 36.5           | -23.3        | -95.2   | -57.53                  | -40             | -17.53         | H        |
| 7.88115               | 23.63                | RMS | 36.1           | -22.5        | -95.2   | -56.97                  | -40             | -16.97         | V        |
| 8.5175                | 23.72                | RMS | 36.1           | -22          | -95.2   | -56.68                  | -40             | -16.68         | H        |
| High Channel, 3690MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.57589               | 26.24                | RMS | 35             | -25.6        | -95.2   | -59.26                  | -40             | -19.26         | H        |
| 5.91654               | 25.46                | RMS | 35.7           | -25          | -95.2   | -58.54                  | -40             | -18.54         | V        |
| 6.83949               | 24.15                | RMS | 36.5           | -23.3        | -95.2   | -57.35                  | -40             | -17.35         | H        |
| 7.69405               | 23.27                | RMS | 35.9           | -22.1        | -95.2   | -57.23                  | -40             | -17.23         | V        |
| 9.66376               | 22.53                | RMS | 37             | -21          | -95.2   | -56.07                  | -40             | -16.07         | H        |
| 10.64359              | 22.47                | RMS | 37.8           | -19.6        | -95.2   | -53.93                  | -40             | -13.93         | V        |

### 9.5.7. LTE BAND 66

#### **LIMITS**

FCC: §27.53 (h)

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

**QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)**

|                |                        |
|----------------|------------------------|
| Project #:     | 13179110               |
| Date:          | 6/28/2020              |
| Test Engineer: | 19410                  |
| Configuration: | EUT Only               |
| Mode:          | LTE Band 66 QPSK 20MHz |
| Chamber #:     | Chamber B              |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T344 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.44055               | 37.9                 | Pk  | 30.4           | -27.3        | -95.2   | -54.2                   | -13             | -41.2          | V        |
| 3.44171               | 38.34                | Pk  | 30.4           | -27.3        | -95.2   | -53.76                  | -13             | -40.76         | H        |
| 5.15911               | 37.57                | Pk  | 33.8           | -25.3        | -95.2   | -49.13                  | -13             | -36.13         | H        |
| 5.16165               | 37.81                | Pk  | 33.8           | -25.3        | -95.2   | -48.89                  | -13             | -35.89         | V        |
| 6.87956               | 36.13                | Pk  | 36.3           | -23.6        | -95.2   | -46.37                  | -13             | -33.37         | V        |
| 6.87964               | 35.62                | Pk  | 36.3           | -23.6        | -95.2   | -46.88                  | -13             | -33.88         | H        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.48936               | 37.65                | Pk  | 30.2           | -27.2        | -95.2   | -54.55                  | -13             | -41.55         | H        |
| 3.49107               | 37.92                | Pk  | 30.2           | -27.2        | -95.2   | -54.28                  | -13             | -41.28         | V        |
| 5.23445               | 38.48                | Pk  | 33.5           | -26.4        | -95.2   | -49.62                  | -13             | -36.62         | H        |
| 5.23467               | 37.64                | Pk  | 33.5           | -26.4        | -95.2   | -50.46                  | -13             | -37.46         | V        |
| 6.9789                | 36.12                | Pk  | 36.4           | -23.8        | -95.2   | -46.48                  | -13             | -33.48         | V        |
| 6.97982               | 36.93                | Pk  | 36.4           | -23.8        | -95.2   | -45.67                  | -13             | -32.67         | H        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.5399                | 38.3                 | Pk  | 30.2           | -27.4        | -95.2   | -54.1                   | -13             | -41.1          | V        |
| 3.5402                | 38.03                | Pk  | 30.2           | -27.4        | -95.2   | -54.37                  | -13             | -41.37         | H        |
| 5.30965               | 36.63                | Pk  | 33.3           | -25.9        | -95.2   | -51.17                  | -13             | -38.17         | V        |
| 5.3105                | 37.66                | Pk  | 33.2           | -25.8        | -95.2   | -50.14                  | -13             | -37.14         | H        |
| 7.07924               | 35.79                | Pk  | 36.6           | -23.3        | -95.2   | -46.11                  | -13             | -33.11         | V        |
| 7.081                 | 35.95                | Pk  | 36.7           | -23.3        | -95.2   | -45.85                  | -13             | -32.85         | H        |

### 9.5.8. 5G NR BAND n77

#### **LIMITS**

FCC: §27.53

(1) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:

(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

**QPSK 5G NR BAND n77 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179116                   |
| Date:          | 7/25/2020                  |
| Test Engineer: | 19169                      |
| Configuration: | EUT Only                   |
| Mode           | 5G NR Band n77 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 3750MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.49772               | 36.25                | Pk  | 36             | -23.1        | -95.2   | -46.05                  | -13             | -33.05         | V        |
| 7.50109               | 36.31                | Pk  | 36             | -23.2        | -95.2   | -46.09                  | -13             | -33.09         | H        |
| 11.24888              | 34.29                | Pk  | 38             | -19.6        | -95.2   | -42.51                  | -13             | -29.51         | H        |
| 11.24889              | 34.84                | Pk  | 38             | -19.6        | -95.2   | -41.96                  | -13             | -28.96         | V        |
| 14.99855              | 34.18                | Pk  | 39.9           | -19.5        | -95.2   | -40.62                  | -13             | -27.62         | H        |
| 15.00095              | 35.14                | Pk  | 39.9           | -19.5        | -95.2   | -39.66                  | -13             | -26.66         | V        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.6783                | 36.54                | Pk  | 35.9           | -22.9        | -95.2   | -45.66                  | -13             | -32.66         | H        |
| 7.67952               | 36.23                | Pk  | 35.9           | -22.9        | -95.2   | -45.97                  | -13             | -32.97         | V        |
| 11.51816              | 34.68                | Pk  | 38.4           | -19.6        | -95.2   | -41.72                  | -13             | -28.72         | V        |
| 11.51935              | 34.71                | Pk  | 38.4           | -19.6        | -95.2   | -41.69                  | -13             | -28.69         | H        |
| 15.55958              | 35.3                 | Pk  | 40.9           | -19.8        | -95.2   | -38.8                   | -13             | -25.8          | V        |
| 15.56189              | 34.54                | Pk  | 40.9           | -19.9        | -95.2   | -39.66                  | -13             | -26.66         | H        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.85935               | 36.47                | Pk  | 36             | -23.6        | -95.2   | -46.33                  | -13             | -33.33         | V        |
| 7.86043               | 36.04                | Pk  | 36             | -23.6        | -95.2   | -46.76                  | -13             | -33.76         | H        |
| 11.78825              | 34.76                | Pk  | 38.8           | -19.4        | -95.2   | -41.04                  | -13             | -28.04         | V        |
| 11.78959              | 34.01                | Pk  | 38.8           | -19.4        | -95.2   | -41.79                  | -13             | -28.79         | H        |
| 15.71803              | 34.17                | Pk  | 40.7           | -18.7        | -95.2   | -39.03                  | -13             | -26.03         | H        |
| 15.71836              | 34.54                | Pk  | 40.7           | -18.8        | -95.2   | -38.76                  | -13             | -25.76         | V        |

## **9.6. FIELD STRENGTH OF SPURIOUS RADIATION, ANT7**

### **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.

All tests below 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

## 9.6.1. LTE BAND 48

### LIMITS

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

### QPSK LTE BAND 48 (20.0MHZ BANDWIDTH)

|                |                   |
|----------------|-------------------|
| Project #:     | 13179116          |
| Date:          | 9/13/2020         |
| Test Engineer: | 30606             |
| Configuration: | EUT Only          |
| Mode           | LTE 48 QPSK 20MHz |
| Chamber #:     | Chamber A         |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T346(dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|---------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 3560MHz  |                      |     |               |              |         |                         |                 |                |          |
| 5.75178               | 25.78                | RMS | 35.3          | -26          | -95.2   | -59.72                  | -40             | -19.72         | V        |
| 5.91891               | 25.27                | RMS | 35.7          | -25          | -95.2   | -58.73                  | -40             | -18.73         | H        |
| 6.77887               | 24.44                | RMS | 36.6          | -23.9        | -95.2   | -57.56                  | -40             | -17.56         | V        |
| 7.18565               | 24.21                | RMS | 36            | -23          | -95.2   | -57.39                  | -40             | -17.39         | H        |
| 8.23153               | 23.43                | RMS | 36.1          | -21.9        | -95.2   | -57.07                  | -40             | -17.07         | V        |
| 8.41059               | 23.24                | RMS | 36.1          | -22.2        | -95.2   | -57.16                  | -40             | -17.16         | H        |
| Mid Channel, 3625MHz  |                      |     |               |              |         |                         |                 |                |          |
| 5.17095               | 26.84                | RMS | 34.6          | -26.3        | -95.2   | -59.56                  | -40             | -19.56         | V        |
| 5.56995               | 26.52                | RMS | 35            | -25.5        | -95.2   | -58.88                  | -40             | -18.88         | H        |
| 6.43598               | 25.15                | RMS | 36.4          | -23.9        | -95.2   | -57.05                  | -40             | -17.05         | V        |
| 7.12895               | 24.16                | RMS | 36            | -23.3        | -95.2   | -57.84                  | -40             | -17.84         | H        |
| 8.6312                | 23.26                | RMS | 36.1          | -21.5        | -95.2   | -56.44                  | -40             | -16.44         | V        |
| 8.86243               | 23.76                | RMS | 36.3          | -21.9        | -95.2   | -56.34                  | -40             | -16.34         | H        |
| High Channel, 3690MHz |                      |     |               |              |         |                         |                 |                |          |
| 6.50049               | 24.47                | RMS | 36.5          | -24.3        | -95.2   | -58.13                  | -40             | -18.13         | V        |
| 6.77577               | 24.57                | RMS | 36.6          | -23.9        | -95.2   | -57.43                  | -40             | -17.43         | H        |
| 8.05026               | 24.13                | RMS | 36.1          | -22.2        | -95.2   | -56.37                  | -40             | -16.37         | V        |
| 8.2833                | 23.3                 | RMS | 36.1          | -21.8        | -95.2   | -57                     | -40             | -17            | H        |
| 9.78174               | 22.87                | RMS | 37.2          | -21          | -95.2   | -55.23                  | -40             | -15.23         | V        |
| 10.23953              | 22.7                 | RMS | 37.6          | -20.1        | -95.2   | -54.4                   | -40             | -14.4          | H        |

## 9.6.2. 5G NR BAND n77

### **LIMITS**

FCC: §27.53

(1) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:

(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

**QPSK 5G NR BAND n77 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179116                   |
| Date:          | 7/25/2020                  |
| Test Engineer: | 19169                      |
| Configuration: | EUT Only                   |
| Mode           | 5G NR Band n77 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 3750MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.49988               | 36.02                | Pk  | 36             | -23.2        | -95.2   | -46.38                  | -13             | -33.38         | H        |
| 7.50186               | 35.97                | Pk  | 36             | -23.2        | -95.2   | -46.43                  | -13             | -33.43         | V        |
| 11.24797              | 34.24                | Pk  | 38             | -19.6        | -95.2   | -42.56                  | -13             | -29.56         | H        |
| 11.24918              | 27.69                | Pk  | 38             | -19.6        | -95.2   | -49.11                  | -13             | -36.11         | V        |
| 15.0001               | 35.27                | Pk  | 39.9           | -19.5        | -95.2   | -39.53                  | -13             | -26.53         | V        |
| 15.00193              | 34.44                | Pk  | 39.9           | -19.5        | -95.2   | -40.36                  | -13             | -27.36         | H        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.68103               | 36.39                | Pk  | 35.9           | -22.9        | -95.2   | -45.81                  | -13             | -32.81         | V        |
| 7.68196               | 36.64                | Pk  | 35.9           | -22.8        | -95.2   | -45.46                  | -13             | -32.46         | H        |
| 11.52064              | 34.77                | Pk  | 38.4           | -19.6        | -95.2   | -41.63                  | -13             | -28.63         | H        |
| 11.52082              | 35                   | Pk  | 38.4           | -19.6        | -95.2   | -41.4                   | -13             | -28.4          | V        |
| 15.36099              | 35.1                 | Pk  | 41             | -20.1        | -95.2   | -39.2                   | -13             | -26.2          | V        |
| 15.36159              | 35.36                | Pk  | 41             | -20.1        | -95.2   | -38.94                  | -13             | -25.94         | H        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.8606                | 35.97                | Pk  | 36             | -23.6        | -95.2   | -46.83                  | -13             | -33.83         | H        |
| 7.86149               | 36.64                | Pk  | 36             | -23.6        | -95.2   | -46.16                  | -13             | -33.16         | V        |
| 11.79033              | 33.37                | Pk  | 38.8           | -19.4        | -95.2   | -42.43                  | -13             | -29.43         | H        |
| 11.79189              | 35.06                | Pk  | 38.8           | -19.4        | -95.2   | -40.74                  | -13             | -27.74         | V        |
| 15.71819              | 33.87                | Pk  | 40.7           | -18.8        | -95.2   | -39.43                  | -13             | -26.43         | V        |
| 15.71966              | 34.73                | Pk  | 40.7           | -18.8        | -95.2   | -38.57                  | -13             | -25.57         | H        |

## **9.7. FIELD STRENGTH OF SPURIOUS RADIATION, ANT8**

### **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.

All tests below 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

## 9.7.1. LTE BAND 48

### LIMITS

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

### QPSK LTE BAND 48 (20.0MHZ BANDWIDTH)

|                |                  |
|----------------|------------------|
| Project #:     | 13179116         |
| Date:          | 9/15/2020        |
| Test Engineer: | 30606            |
| Configuration: | EUT Only         |
| Mode:          | LTE48 QPSK 20MHz |
| Chamber #:     | Chamber A        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 3560MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.80273               | 26.16                | RMS | 35.4           | -25.3        | -95.2   | -58.44                  | -40             | -18.44      | H        |
| 5.86128               | 25.57                | RMS | 35.5           | -25.4        | -95.2   | -58.93                  | -40             | -18.93      | V        |
| 7.18386               | 24.55                | RMS | 36             | -23          | -95.2   | -57.05                  | -40             | -17.05      | H        |
| 7.70171               | 23.97                | RMS | 35.8           | -22.2        | -95.2   | -56.83                  | -40             | -16.83      | V        |
| 9.62                  | 23.34                | RMS | 37             | -21          | -95.2   | -55.26                  | -40             | -15.26      | V        |
| 9.84635               | 23.19                | RMS | 37.3           | -20.7        | -95.2   | -54.81                  | -40             | -14.81      | H        |
| Mid Channel, 3625MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.97297               | 25.72                | RMS | 35.7           | -24.5        | -95.2   | -57.88                  | -40             | -17.88      | H        |
| 6.43495               | 25.19                | RMS | 36.3           | -23.9        | -95.2   | -57.11                  | -40             | -17.11      | V        |
| 7.87745               | 23.69                | RMS | 36.1           | -22.4        | -95.2   | -56.81                  | -40             | -16.81      | H        |
| 8.50612               | 23.23                | RMS | 36.1           | -22          | -95.2   | -57.07                  | -40             | -17.07      | V        |
| 9.20863               | 23.25                | RMS | 36.4           | -21.7        | -95.2   | -56.55                  | -40             | -16.55      | H        |
| 9.77844               | 22.89                | RMS | 37.2           | -20.9        | -95.2   | -55.11                  | -40             | -15.11      | V        |
| High Channel, 3690MHz |                      |     |                |              |         |                         |                 |             |          |
| 6.37449               | 25.56                | RMS | 36.4           | -24.4        | -95.2   | -57.04                  | -40             | -17.04      | H        |
| 6.37465               | 25.51                | RMS | 36.4           | -24.4        | -95.2   | -57.09                  | -40             | -17.09      | V        |
| 8.11663               | 23.94                | RMS | 36.1           | -22.2        | -95.2   | -56.76                  | -40             | -16.76      | V        |
| 8.22664               | 22.62                | RMS | 36.1           | -22          | -95.2   | -57.88                  | -40             | -17.88      | H        |
| 9.96276               | 22.52                | RMS | 37.3           | -20          | -95.2   | -54.68                  | -40             | -14.68      | V        |
| 9.96382               | 22.75                | RMS | 37.3           | -20          | -95.2   | -54.45                  | -40             | -14.45      | H        |

### 9.7.2. 5G NR BAND n77

#### **LIMITS**

FCC: §27.53

(1) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:

(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

**QPSK 5G NR BAND n77 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179116                   |
| Date:          | 7/25/2020                  |
| Test Engineer: | 19169                      |
| Configuration: | EUT Only                   |
| Mode           | 5G NR Band n77 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 3750MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.49975               | 36.12                | Pk  | 36             | -23.2        | -95.2   | -46.28                  | -13             | -33.28         | H        |
| 7.50011               | 35.88                | Pk  | 36             | -23.2        | -95.2   | -46.52                  | -13             | -33.52         | V        |
| 11.25119              | 34                   | Pk  | 38             | -19.6        | -95.2   | -42.8                   | -13             | -29.8          | H        |
| 11.25126              | 34.66                | Pk  | 38             | -19.6        | -95.2   | -42.14                  | -13             | -29.14         | V        |
| 14.99881              | 34.77                | Pk  | 39.9           | -19.5        | -95.2   | -40.03                  | -13             | -27.03         | H        |
| 15.00067              | 34.75                | Pk  | 39.9           | -19.5        | -95.2   | -40.05                  | -13             | -27.05         | V        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.67883               | 37.01                | Pk  | 35.9           | -22.9        | -95.2   | -45.19                  | -13             | -32.19         | H        |
| 7.67999               | 36.66                | Pk  | 35.9           | -22.9        | -95.2   | -45.54                  | -13             | -32.54         | V        |
| 11.51901              | 34.36                | Pk  | 38.4           | -19.6        | -95.2   | -42.04                  | -13             | -29.04         | H        |
| 11.52159              | 34.94                | Pk  | 38.4           | -19.6        | -95.2   | -41.46                  | -13             | -28.46         | V        |
| 15.35784              | 35.79                | Pk  | 41             | -20.1        | -95.2   | -38.51                  | -13             | -25.51         | V        |
| 15.36084              | 34.78                | Pk  | 41             | -20.1        | -95.2   | -39.52                  | -13             | -26.52         | H        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.85961               | 36.65                | Pk  | 36             | -23.6        | -95.2   | -46.15                  | -13             | -33.15         | V        |
| 7.8603                | 36.34                | Pk  | 36             | -23.6        | -95.2   | -46.46                  | -13             | -33.46         | H        |
| 11.78822              | 34.34                | Pk  | 38.8           | -19.4        | -95.2   | -41.46                  | -13             | -28.46         | V        |
| 11.79137              | 34.16                | Pk  | 38.8           | -19.4        | -95.2   | -41.64                  | -13             | -28.64         | H        |
| 15.71825              | 34.9                 | Pk  | 40.7           | -18.8        | -95.2   | -38.4                   | -13             | -25.4          | V        |
| 15.71877              | 34.02                | Pk  | 40.7           | -18.8        | -95.2   | -39.28                  | -13             | -26.28         | H        |

## **9.8. FIELD STRENGTH OF SPURIOUS RADIATION, ANT9**

### **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.

All tests below 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

## 9.8.1. LTE BAND 48

### LIMITS

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

### QPSK LTE BAND 48 (20.0MHZ BANDWIDTH)

|                |                  |
|----------------|------------------|
| Project #:     | 13179116         |
| Date:          | 9/14/2020        |
| Test Engineer: | 30606            |
| Configuration: | EUT Only         |
| Mode:          | LTE48 QPSK 20MHz |
| Chamber #:     | Chamber A        |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 3560MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.69045               | 26.02                | RMS | 35.2           | -25.6        | -95.2   | -59.08                  | -40             | -19.08      | H        |
| 6.15696               | 24.34                | RMS | 35.9           | -24.8        | -95.2   | -59.26                  | -40             | -19.26      | V        |
| 6.82767               | 23.68                | RMS | 36.5           | -23.6        | -95.2   | -58.12                  | -40             | -18.12      | H        |
| 7.69703               | 23.77                | RMS | 35.9           | -22.2        | -95.2   | -56.93                  | -40             | -16.93      | V        |
| 8.79991               | 23.53                | RMS | 36.3           | -22          | -95.2   | -56.67                  | -40             | -16.67      | H        |
| 9.49534               | 22.99                | RMS | 36.8           | -20.5        | -95.2   | -55.31                  | -40             | -15.31      | V        |
| Mid Channel, 3625MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.74395               | 26.13                | RMS | 35.2           | -26          | -95.2   | -59.47                  | -40             | -19.47      | H        |
| 6.42997               | 25.09                | RMS | 36.4           | -24          | -95.2   | -57.21                  | -40             | -17.21      | V        |
| 7.36866               | 23.52                | RMS | 36.1           | -22.9        | -95.2   | -57.88                  | -40             | -17.88      | H        |
| 8.16879               | 23.98                | RMS | 36.1           | -21.9        | -95.2   | -56.42                  | -40             | -16.42      | V        |
| 9.51635               | 22.33                | RMS | 36.9           | -20.4        | -95.2   | -55.87                  | -40             | -15.87      | H        |
| 10.41579              | 22.21                | RMS | 37.7           | -19.5        | -95.2   | -54.19                  | -40             | -14.19      | V        |
| High Channel, 3690MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.39874               | 25.93                | RMS | 34.9           | -26.3        | -95.2   | -60.17                  | -40             | -20.17      | V        |
| 5.51529               | 26.24                | RMS | 35             | -25.6        | -95.2   | -58.86                  | -40             | -18.86      | H        |
| 6.43683               | 25.02                | RMS | 36.4           | -23.9        | -95.2   | -57.18                  | -40             | -17.18      | H        |
| 6.43908               | 24.92                | RMS | 36.3           | -23.9        | -95.2   | -57.38                  | -40             | -17.38      | V        |
| 8.80221               | 23.4                 | RMS | 36.3           | -22          | -95.2   | -56.8                   | -40             | -16.8       | H        |
| 8.81212               | 23.82                | RMS | 36.3           | -21.9        | -95.2   | -56.28                  | -40             | -16.28      | V        |

### 9.8.2. 5G NR BAND n77

#### **LIMITS**

FCC: §27.53

(1) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:

(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

**QPSK 5G NR BAND n77 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179116                   |
| Date:          | 7/25/2020                  |
| Test Engineer: | 19169                      |
| Configuration: | EUT Only                   |
| Mode           | 5G NR Band n77 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 3750MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.49903               | 36.32                | Pk  | 36             | -23.1        | -95.2   | -45.98                  | -13             | -32.98         | V        |
| 7.50139               | 36.03                | Pk  | 36             | -23.2        | -95.2   | -46.37                  | -13             | -33.37         | H        |
| 11.24865              | 34.58                | Pk  | 38             | -19.6        | -95.2   | -42.22                  | -13             | -29.22         | H        |
| 11.25072              | 34.71                | Pk  | 38             | -19.6        | -95.2   | -42.09                  | -13             | -29.09         | V        |
| 14.99867              | 34.94                | Pk  | 39.9           | -19.5        | -95.2   | -39.86                  | -13             | -26.86         | V        |
| 15.00149              | 34.21                | Pk  | 39.9           | -19.5        | -95.2   | -40.59                  | -13             | -27.59         | H        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.68011               | 36.61                | Pk  | 35.9           | -22.9        | -95.2   | -45.59                  | -13             | -32.59         | H        |
| 7.68141               | 36.61                | Pk  | 35.9           | -22.9        | -95.2   | -45.59                  | -13             | -32.59         | V        |
| 11.51829              | 34.99                | Pk  | 38.4           | -19.6        | -95.2   | -41.41                  | -13             | -28.41         | H        |
| 11.51909              | 34.87                | Pk  | 38.4           | -19.6        | -95.2   | -41.53                  | -13             | -28.53         | V        |
| 15.62951              | 35                   | Pk  | 40.9           | -20          | -95.2   | -39.3                   | -13             | -26.3          | V        |
| 15.63104              | 34.46                | Pk  | 40.9           | -19.9        | -95.2   | -39.74                  | -13             | -26.74         | H        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.85945               | 37                   | Pk  | 36             | -23.6        | -95.2   | -45.8                   | -13             | -32.8          | V        |
| 7.86176               | 36.44                | Pk  | 36             | -23.6        | -95.2   | -46.36                  | -13             | -33.36         | H        |
| 11.78805              | 34.99                | Pk  | 38.8           | -19.4        | -95.2   | -40.81                  | -13             | -27.81         | V        |
| 11.78866              | 35.18                | Pk  | 38.8           | -19.4        | -95.2   | -40.62                  | -13             | -27.62         | H        |
| 15.71819              | 34.26                | Pk  | 40.7           | -18.8        | -95.2   | -39.04                  | -13             | -26.04         | V        |
| 15.72013              | 34.24                | Pk  | 40.7           | -18.8        | -95.2   | -39.06                  | -13             | -26.06         | H        |

## 10. SETUP PHOTOS

Please refer to 13179110-EP1V1 for setup photos

**END OF REPORT**

## **Appendix B – Reference Test Report**

Attached is the test report (13190901-E8) containing the reference data from the parent model as detailed in section 5.5.



# **TEST REPORT**

**Report Number:** 13190901-E8V3

**Applicant :** APPLE, INC  
1 APPLE PARK WAY  
CUPERTINO, CA 95014, U.S.A.

**Model :** A2398

**FCC ID :** BCG-E3540A

**EUT Description :** SMARTPHONE

**Test Standard(s) :** FCC CFR47 PART 22H, 24E, 27, 90S, 90R, AND 96

**Date Of Issue:**  
OCTOBER 04, 2020

**Prepared by:**  
UL Verification Services Inc.  
47173 Benicia Street  
Fremont, CA 94538, U.S.A.  
TEL: (510) 319-4000  
FAX: (510) 661-0888



NVLAP Lab code: 200065-0

Revision History

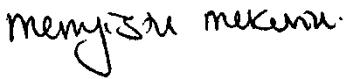
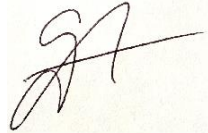
| Rev. | Issue Date | Revisions                                           | Revised By        |
|------|------------|-----------------------------------------------------|-------------------|
| V1   | 9/25/2020  | Initial Review                                      | Mengistu Mekuria  |
| V2   | 10/2/2020  | Address TCB Feedback                                | Sintia Andrean    |
| V3   | 10/4/2020  | Updated 5G NR Band n41 EIRP Data at at Section 5.6. | Mengisitu Mekuria |

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## 1. ATTESTATION OF TEST RESULTS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Applicant Name and Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | APPLE, INC<br>1 APPLE PARK WAY<br>CUPERTINO, CA 95014, U.S.A.                       |                                                                                       |
| Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A2398                                                                               |                                                                                       |
| FCC ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | BCG-E3540A                                                                          |                                                                                       |
| EUT Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SMARTPHONE                                                                          |                                                                                       |
| Serial Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | MODEL (A2398): C74033300DAP54Y5R (CONDUCTED) AND C7CCT01HQ91K (RADIATED)            |                                                                                       |
| Date Tested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | APRIL 21, 2020 to SEPTEMBER 24, 2020                                                |                                                                                       |
| Applicable Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | FCC CFR47 22H, 24E, 27, 90S, 90R, AND 96                                            |                                                                                       |
| Test Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | COMPLIES                                                                            |                                                                                       |
| <p>UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p>The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.</p> <p>This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.</p> |                                                                                     |                                                                                       |
| Approved & Released By:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Reviewed By:                                                                        | Prepared By:                                                                          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |
| Mengistu Mekuria<br>Lead Test Engineer<br>UL Verification Services Inc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Glenn Escano<br>Project Engineer<br>UL Verification Services Inc.                   | Sintia Andrian<br>Laboratory Engineer<br>UL Verification Services Inc.                |

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC CFR 47 Part 2, Part 22, Part 24, Part 27, Part 90, and Part 96
- [FCC KDB 971168 D01 v03r01](#): Power Meas License Digital Systems
- [FCC KDB 971168 D02 v02r01](#): Misc Rev Approv License Devices
- [FCC KDB 412172 D01 v01r01](#): Determining ERP and EIRP

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 47173 Benicia Street                                       | 47266 Benicia Street                            | 47658 Kato Rd.                                   |
|------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> Chamber A (IC:2324B-1) | <input type="checkbox"/> Chamber D (IC:22541-1) | <input type="checkbox"/> Chamber I (IC: 2324A-5) |
| <input checked="" type="checkbox"/> Chamber B (IC:2324B-2) | <input type="checkbox"/> Chamber E (IC:22541-2) | <input type="checkbox"/> Chamber J (IC: 2324A-6) |
| <input type="checkbox"/> Chamber C (IC:2324B-3)            | <input type="checkbox"/> Chamber F (IC:22541-3) | <input type="checkbox"/> Chamber K (IC: 2324A-1) |
|                                                            | <input type="checkbox"/> Chamber G (IC:22541-4) | <input type="checkbox"/> Chamber L (IC: 2324A-3) |
|                                                            | <input type="checkbox"/> Chamber H (IC:22541-5) | <input type="checkbox"/> Chamber M (IC: 2324A-2) |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code: 2324A.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

## 4. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

### 4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                                           | U <sub>Lab</sub> |
|-----------------------------------------------------|------------------|
| Worst Case Conducted Disturbance, 9KHz to 0.15 MHz  | 3.39 dB          |
| Worst Case Conducted Disturbance, 0.15 to 30 MHz    | 3.07 dB          |
| Worst Case Radiated Disturbance, 9KHz to 30 MHz     | 2.52 dB          |
| Worst Case Radiated Disturbance, 30 to 1000 MHz     | 4.88 dB          |
| Worst Case Radiated Disturbance, 1000 to 18000 MHz  | 4.24 dB          |
| Worst Case Radiated Disturbance, 18000 to 26000 MHz | 4.37 dB          |
| Worst Case Radiated Disturbance, 26000 to 40000 MHz | 5.17 dB          |
| Occupied Channel Bandwidth                          | ±0.39 %          |
| Temperature                                         | ±0.9 °C          |
| Supply voltages                                     | ±0.45 %          |
| Time                                                | ±0.02 %          |

Uncertainty figures are valid to a confidence level of 95%.

### 4.4. SAMPLE CALCULATION

#### RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)  
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

#### MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.  
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

## 5. INTRODUCTION OF TEST DATA REUSE

### 5.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

### 5.2. INTRODUCTION

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID BCG-E3539A to cover variant model FCC ID BCG-E3540A. The major difference between the parent/reference model and the variant model is the depopulation in the variant model of the mmWave transmitter. All other circuitry and features are identical. The data reuse test plan was approved via manufacturer KDB inquiry.

### 5.3. MODEL DIFFERENCES

The manufacturer hereby declares the following for models A2176 and A2398.

A2176 and A2398 are highly similar, with the only difference being the supported cellular bands.

They have the same PCB layout, design, common components, antennas, antenna locations and housing cases.

More specifically, their cellular modem, Wi-Fi, BT, NFC, WPT and UWB transmitters are identical, and removal of cellular bands is done by software and depopulation of band-specific components associated with the removed bands.

Spot check verification and additional full radiated spurious emission test on ANT2 have been done on model A2398 in accordance with the test plan approved via KDB inquiry. Comparison of the models, upper deviation is within 3dB range and all tests are under FCC Technical Limits. The results documented for model A2176 may be applied as representative to model A2398.

## 5.4. SPOT CHECK VERIFICATION RESULTS SUMMARY

| A2398 SPOT CHECK RESULTS |                   |              |         |                 |                       |                    |            |                   |
|--------------------------|-------------------|--------------|---------|-----------------|-----------------------|--------------------|------------|-------------------|
| Technology               | Worst Mode        | Test Item    | Channel | Measured        | Original Model: A2176 | Sub Model: A2398   | Delta (dB) | Remarks           |
|                          |                   |              |         | Frequency (MHz) | FCC ID: BCG-E3539A    | FCC ID: BCG-E3540A |            |                   |
| LTE<br>BAND 2            | QPSK @ 20 MHz BW  | EIRP         | High    | 1900            | 24.7 dBm              | 24.7 dBm           | 0          |                   |
|                          | QPSK @ highest BW | RSE          | Low     | 7438.45         | -48.41 dBm            | -46.01 dBm         | 2.4        | Noise Floor Level |
| LTE<br>BAND 5            | QPSK @ 10 MHz BW  | ERP          | Mid     | 836.5           | 19.95 dBm             | 19.95 dBm          | 0          |                   |
|                          | QPSK @ highest BW | RSE          | Low     | 1738.31         | -43.83 dBm            | -55.13 dBm         | -11.3      | Noise Floor Level |
| 5G NR<br>BAND N5         | QPSK @ 20 MHz BW  | ERP          | Mid     | 836.5           | 19.95 dBm             | 19.95 dBm          | 0          |                   |
|                          | QPSK @ highest BW | RSE          | Low     | 3336.62         | -50.86 dBm            | -51.76 dBm         | -0.9       | Noise Floor Level |
| LTE<br>BAND 7            | QPSK @ 20 MHz BW  | EIRP         | Low     | 2510            | 24 dBm                | 24 dBm             | 0          |                   |
|                          | QPSK @ highest BW | RSE          | High    | 10239.86        | -45.24 dBm            | -43.11 dBm         | 2.13       | Noise Floor Level |
| LTE<br>BAND 12           | QPSK @ 10 MHz BW  | ERP          | Mid     | 707.5           | 17.35 dBm             | 17.35 dBm          | 0          |                   |
| 5G NR<br>BAND N12        | QPSK @ 15 MHz BW  | ERP          | Mid     | 707.5           | 17.35 dBm             | 17.35 dBm          | 0          |                   |
| LTE<br>BAND 13           | QPSK @ 10 MHz BW  | ERP          | Mid     | 782             | 18.35 dBm             | 18.35 dBm          | 0          |                   |
| LTE<br>BAND 14           | QPSK @ 10 MHz BW  | ERP          | Mid     | 793             | 18.35 dBm             | 18.35 dBm          | 0          |                   |
| LTE<br>BAND 17           | QPSK @ 10 MHz BW  | ERP          | Mid     | 710             | 17.35 dBm             | 17.35 dBm          | 0          |                   |
| LTE<br>BAND 25           | QPSK @ 20 MHz BW  | EIRP         | High    | 1905            | 24.7 dBm              | 24.7 dBm           | 0          |                   |
| LTE<br>BAND 26 (90S)     | QPSK @ 10 MHz BW  | ERP          | Mid     | 819             | 19.95 dBm             | 19.95 dBm          | 0          |                   |
| LTE<br>BAND 30 (NS1)     | QPSK @ 10 MHz BW  | EIRP         | Mid     | 2310            | 22 dBm                | 22 dBm             | 0          |                   |
| LTE<br>BAND 41           | QPSK @ 20 MHz BW  | EIRP         | Low     | 2506            | 28.3 dBm              | 28.3 dBm           | 0          |                   |
| 5G NR<br>BAND N41        | QPSK @ 100 MHz BW | Output Power | High    | 2640            | 27.5 dBm              | 27.5 dBm           | 0          |                   |
| LTE<br>BAND 48           | QPSK @ 20 MHz BW  | EIRP         | Mid     | 3625            | 22.8 dBm              | 22.8 dBm           | 0          |                   |
| LTE<br>BAND 66           | QPSK @ 20 MHz BW  | EIRP         | Mid     | 1745            | 25.1 dBm              | 25.1 dBm           | 0          |                   |
| LTE<br>BAND 71           | QPSK @ 20MHz BW   | ERP          | Low     | 673             | 16.55 dBm             | 16.55 dBm          | 0          |                   |
| 5G NR<br>BAND N77        | QPSK @ 100 MHz BW | EIRP         | Low     | 3750            | 25.0 dBm              | 25.0 dBm           | 0          |                   |

## 5.5. REFERENCE DETAIL

Reference application that contains the reused reference data.

| Equipment Class | Reference FCC ID | Reference Application | Report Title/Section                                                                                   |
|-----------------|------------------|-----------------------|--------------------------------------------------------------------------------------------------------|
| PCE, CBE        | BCG-E3539A       | 13179110-E8           | FCC LTE Report/ All Sections except Radiated spurious emission on ANT2 and 5G NR Band n41 EIRP results |

## 5.6. MAXIMUM OUTPUT POWER

### EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015  
KDB 971168 D01 Section 5.6

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT} - \text{LC}$$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

### 5G NR BAND n41

| Part 27            |            |                     |                       |                         |                    |                  |              |                     |
|--------------------|------------|---------------------|-----------------------|-------------------------|--------------------|------------------|--------------|---------------------|
| EIRP Limit (W)     |            | 2.00                |                       |                         |                    |                  |              |                     |
| Antenna Gain (dBi) |            | 1.70                |                       |                         |                    |                  |              |                     |
| Bandwidth (MHz)    | Modulation | Low Frequency (MHz) | Upper Frequency (MHz) | Conducted Average (dBm) | EIRP Average (dBm) | EIRP Average (W) | 99% BW (kHz) | Emission Designator |
| 20.0               | QPSK       | 2506.0              | 2680.0                | 27.5                    | 29.20              | 0.832            | 17916        | 17M9G7W             |
|                    | 16QAM      |                     |                       | 26.7                    | 28.40              | 0.692            | 17895        | 17M9D7W             |
| 40.0               | QPSK       | 2516.0              | 2670.0                | 27.5                    | 29.20              | 0.832            | 35582        | 35M6G7W             |
|                    | 16QAM      |                     |                       | 26.4                    | 28.10              | 0.646            | 35566        | 35M6D7W             |
| 50.0               | BPSK       | 2521.0              | 2665                  | 27.5                    | 29.20              | 0.832            | 45577        | 45M6G7W             |
|                    | 16QAM      |                     |                       | 26.1                    | 27.80              | 0.603            | 45687        | 45M7D7W             |
| 60.0               | BPSK       | 2526.0              | 2660.0                | 27.5                    | 29.20              | 0.832            | 57740        | 57M7G7W             |
|                    | 16QAM      |                     |                       | 26.7                    | 28.40              | 0.692            | 57728        | 57M7D7W             |
| 80.0               | QPSK       | 2536.0              | 2650.0                | 27.5                    | 29.20              | 0.832            | 76822        | 76M8G7W             |
|                    | 16QAM      |                     |                       | 26.4                    | 28.10              | 0.646            | 76997        | 77M0D7W             |
| 90.0               | QPSK       | 2541.0              | 2645.0                | 27.5                    | 29.20              | 0.832            | 85339        | 85M3G7W             |
|                    | 16QAM      |                     |                       | 26.6                    | 28.30              | 0.676            | 85407        | 85M4D7W             |
| 100.0              | QPSK       | 2546.0              | 2640.0                | 27.5                    | 29.20              | 0.832            | 96157        | 96M2G7W             |
|                    | 16QAM      |                     |                       | 26.5                    | 28.20              | 0.661            | 95894        | 95M9D7W             |

## 5.7. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.28.03-1

## 5.8. MAXIMUM ANTENNA GAIN

Please see table below:

| Bands                              | Antenna Gain (dBi) |       |       |       |       |       |       |
|------------------------------------|--------------------|-------|-------|-------|-------|-------|-------|
|                                    | ANT 1              | ANT 2 | ANT 3 | ANT 4 | ANT 7 | ANT 8 | ANT 9 |
| Band 71, 663 – 698 MHz             | -7.0               | -6.9  | NA    | NA    | NA    | NA    | NA    |
| Band 12, 699 – 716 MHz             | -6.2               | -7.7  | NA    | NA    | NA    | NA    | NA    |
| Band 17, 704 – 716 MHz             | -6.2               | -7.7  | NA    | NA    | NA    | NA    | NA    |
| Band 13, 777 – 787 MHz             | -5.2               | -5.1  | NA    | NA    | NA    | NA    | NA    |
| Band 14, 788 – 798 MHz             | -5.2               | -5.3  | NA    | NA    | NA    | NA    | NA    |
| Band 26, 814 – 824 MHz (Part 90S ) | -3.6               | -5.2  | NA    | NA    | NA    | NA    | NA    |
| Band 5, 824 – 849 MHz              | -3.6               | -4.2  | NA    | NA    | NA    | NA    | NA    |
| Band 66, 1710 – 1780 MHz           | -1.0               | -4.4  | 0.1   | -2.2  | NA    | NA    | NA    |
| Band 2, 1850 – 1910 MHz            | -1.2               | -4.2  | -0.3  | -2.5  | NA    | NA    | NA    |
| Band 25, 1850 – 1915 MHz           | -1.2               | -4.2  | -0.3  | -2.5  | NA    | NA    | NA    |
| Band 30, 2305 – 2315 MHz           | -5.4               | -1.3  | -3    | -2.4  | NA    | NA    | NA    |
| Band 7, 2500 – 2570 MHz            | -2.2               | -0.7  | -1    | -3.3  | NA    | NA    | NA    |
| Band 41, 2496 – 2690 MHz           | -0.1               | 1.7   | 1.3   | -1.7  | NA    | NA    | NA    |
| Band n77, 3300 – 3980 MHz          | NA                 | NA    | NA    | -2.1  | -0.7  | -3.5  | -2.6  |
| Band 48, 3550 – 3700 MHz           | NA                 | NA    | NA    | -2.1  | -0.7  | 0     | -2.2  |

## 5.9. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following LTE and 5G NR Bands:

Band 2, Band 4, Band 5, Band 7, Band 12, Band 13, Band 14, Band 17, Band 25, Band 26, Band 30, Band 41, Band 48, Band 66, Band 71, 5G NR Band n2, 5G NR Band n5, 5G NR Band n12, 5G NR Band n25, 5G NR n41, 5G NR Band n66, 5G NR Band n71 and 5G NR n77.

For 5G NR Band n2, 5G NR Band n5, 5G NR Band n12, 5G NR Band n25, 5G NR Band n41, 5G NR Band n66, and 5G NR Band n71 having the same operations bandwidth and Power are covered by LTE bands of Band 2, Band5, Band12, Band 25, Band 41, Band 66, and Band 71. Additional tests for 5G NR with Higher BW modes than LTE Bands as 5G NR Band n5, 5G NR Band n12, and 5G NR Band n41 were performed.

LTE Band 4 (1710-1755MHz, 5/10/15/20MHz bandwidth) is covered by LTE Band 66 because it is a subset of LTE band 66 and they have same output power.

FCC rule Part 22.905 of LTE Band 26 (824-849MHz) is covered by LTE Band 5 of same rule since they have the same output power and supported bandwidths.

For 5G NR bands, conducted spurious emission tests were conducted on wider bandwidth with inner 1RB since this is the worst bandwidth and the highest output power.

BPSK modulation applied only for 5G NR band frequencies and has the same tune up power as QPSK modulations.

The DFT-s-OFDM and CP-OFDM waveforms were investigated, and DFT-s-OFDM was found to be the worst case.

The worst-case scenario for all measurements is based on an engineering evaluation and QPSK was observed as the worst one and set for all conducted and radiated. Output power measurements were measured on QPSK, 16QAM, 64QAM, 256QAM, and BPSK, modulations. Conducted tests were performed on the worst case antenna because it has the highest conducted power. ANT1 is the worst case for all bands except Band 48, 5G NR Band n41, and 5G NR Band n77. For 5G NR Band n41 ANT2 is the worst case antenna. For band 48 ANT8 is the worst case antenna and 5G NR Band n77 ANT9 is the worst case antenna.

For 5G NR Band n41 20MHz BW, antenna 2 and antenna 4 powers are higher than LTE band 41. Therefore, additional power measurements and occupied bandwidth tests were performed on antenna 2 and antenna 4 for 20MHz BW. Since LTE antenna 1 the highest output power of all (LTE band 41 and 5G NR Band n41) antennas, all other conducted tests for 20MHz BW were performed only on LTE antenna 1.

The EUT was investigated in three orthogonal orientations X/Y/Z on all ANT 1, ANT2, ANT3, ANT4, ANT7, ANT8 and ANT 9 antennas to determine the worst case orientation. The following table exhibit the worst case orientation for different frequency bands. The full tests of the EUT have made upon the orientations that shown in the table below.

| Freq Bands      | ANT1 | ANT2 | ANT3 | ANT4 | ANT7 | ANT8 | ANT9 |
|-----------------|------|------|------|------|------|------|------|
| 663 – 849 MHz   | Y    | X    | N/A  | N/A  | N/A  | N/A  | N/A  |
| 1710 – 1915 MHz | X    | X    | X    | X    | N/A  | N/A  | N/A  |
| 2300 – 2700 MHz | Y    | Y    | Y    | X    | N/A  | N/A  | N/A  |
| 3300 – 3980 MHz | N/A  | N/A  | N/A  | X    | Y    | X    | Y    |

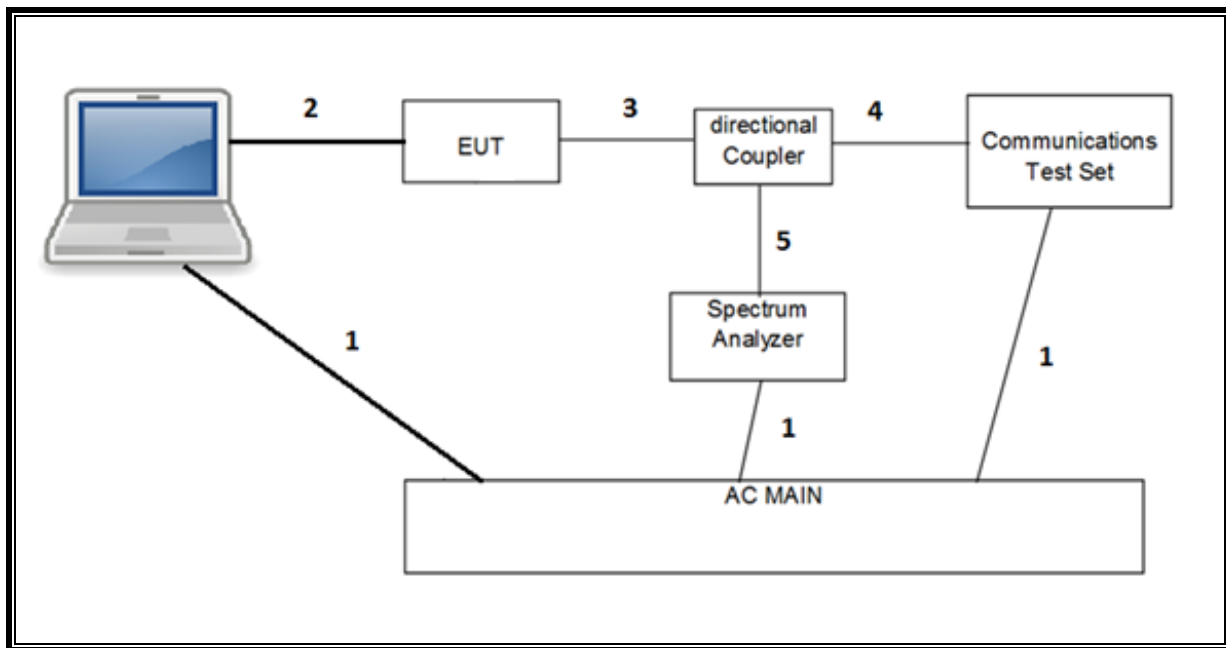
Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 9kHz to 1GHz.

For simultaneous transmission of multiple channels in the 2.4GHz/5GH WLAN, UWB, and Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

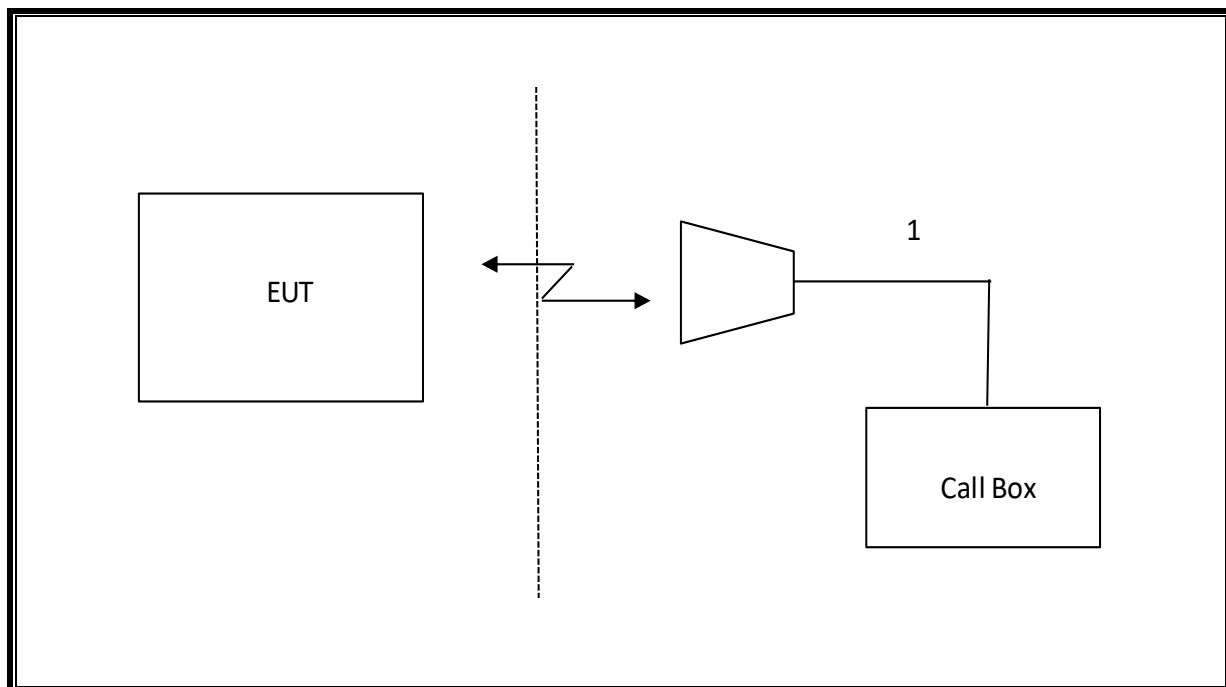
## 5.10. DESCRIPTION OF TEST SETUP

| SUPPORT TEST EQUIPMENT         |           |                      |                        |                   |                  |             |
|--------------------------------|-----------|----------------------|------------------------|-------------------|------------------|-------------|
| Description                    |           | Manufacturer         | Model                  | Serial Number     |                  | FCC ID/ DoC |
| Laptop AC/DC adapter           |           | Apple                | 85W MagSafe 2          | C0651730MMMG6P4AL |                  |             |
| Laptop                         |           | Apple                | Macbook Pro            | C02PM012G3QD      |                  |             |
| Laptop                         |           | Apple                | Macbook Pro            | C02P52HGG085      |                  |             |
| I/O CABLES (RF CONDUCTED TEST) |           |                      |                        |                   |                  |             |
| Cable No.                      | Port      | # of Identical Ports | Connector Type         | Cable Type        | Cable Length (m) | Remarks     |
| 1                              | AC        | 3                    | US 115V                | Un-shielded       | 2.0              | N/A         |
| 2                              | USB       | 1                    | DC                     | Un-shielded       | 1.0              | N/A         |
| 3                              | RF In/Out | 1                    | EUT                    | Shielded          | 0.6              | N/A         |
| 4                              | RF In/Out | 1                    | Communication Test Set | Shielded          | 1.2              | N/A         |
| 5                              | RF In/Out | 1                    | Barrel                 | N/A               | N/A              | N/A         |
| I/O CABLES (RF RADIATED TEST)  |           |                      |                        |                   |                  |             |
| Cable No.                      | Port      | # of Identical Ports | Connector Type         | Cable Type        | Cable Length (m) | Remarks     |
| 1                              | RF In/Out | 1                    | Antenna                | Shielded          | 5.0              | N/A         |

## CONDUCTED SETUP



## RADIATED SETUP



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST                         |                      |                        |                            |            |
|---------------------------------------------|----------------------|------------------------|----------------------------|------------|
| Description                                 | Manufacturer         | Model                  | Asset                      | Cal Due    |
| Antenna, Horn 1-18GHz                       | A.H. Systems, Inc.   | SAS-571                | T961                       | 01/25/2021 |
| Antenna, Horn 1-18GHz                       | ETS Lindgren         | 3117                   | T136                       | 07/07/2021 |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz | Sunol Sciences Corp. | JB3                    | T407                       | 05/20/2021 |
| Amplifier, 1 to 18GHz                       | MITEQ                | AFS42-00101800-25-S-42 | T931                       | 05/11/2021 |
| Amplifier, 1 to 18GHz                       | MITEQ                | AFS42-00101800-25-S-42 | T1165                      | 08/10/2021 |
| Amplifier, 9KHz to 1GHz, 32dB               | SONOMA INSTRUMENT    | 310                    | PRE0180176                 | 07/14/2021 |
| Filter, BRF 2495 to 2690MHz                 | MICRO-TRONICS        | BRM50709-02            | T1790                      | 06/23/2021 |
| Filter, BRF 1850 – 1910 MHz                 | Micro-Tronics        | BRM50714-02            | T1796                      | 06/23/2021 |
| Filter, BRF 824 – 848 MHz                   | Micro-Tronics        | BRM20025               | PRE0191180                 | 06/23/2021 |
| *Directional Coupler                        | KRYTAR               | 152610                 | T1161                      | 08/14/2020 |
| Spectrum Analyzer, PXA 3Hz to 44GHZ         | Keysight             | N9030A                 | T340                       | 01/22/2021 |
| Spectrum Analyzer, PXA 3Hz to 44GHZ         | Keysight             | N9030A                 | T907                       | 01/22/2021 |
| Wideband Communication Test Set, Call Box   | R&S GmbH & Co. KG    | CMW500                 | T260                       | 02/19/2021 |
| Wideband Communication Test Set, Call Box   | R&S GmbH & Co. KG    | CMW500                 | T959                       | 02/19/2021 |
| Wideband Communication Test Set, Call Box   | R&S GmbH & Co. KG    | CMW500                 | T1871                      | 02/25/2021 |
| Power Meter, P-series single channel        | Keysight             | N1912A                 | T1245                      | 01/22/2021 |
| Power Sensor                                | Keysight             | N1921A                 | T1225                      | 02/23/2021 |
| UL AUTOMATION SOFTWARE                      |                      |                        |                            |            |
| CLT Software                                | UL                   | UL RF                  | Ver 7.6, November 11, 2017 |            |
| Power Measurement Software                  | UL                   | UL RF                  | Ver 2.7, 2019              |            |
| Radiated test software                      | UL                   | UL RF                  | Ver 9.5 June 15, 2019      |            |

### NOTES:

\* Testing is completed before equipment expiration date.

## 7. RADIATED TEST RESULTS

### 7.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT2

#### **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**

## 7.1.1. LTE BAND 2

### 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.

### QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)

|                |                       |
|----------------|-----------------------|
| Project #:     | 13190901              |
| Date:          | 8/15/2020             |
| Test Engineer: | 19497                 |
| Configuration: | EUT Only              |
| Mode           | LTE Band 2 QPSK 20MHz |
| Chamber #:     | Chamber A             |

| Frequency (GHz)      | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1860MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.72031              | 38.12                | Pk  | 33.4           | -26.9        | -95.2   | -50.58                  | -13             | -37.58      | V        |
| 3.72189              | 38.06                | Pk  | 33.4           | -26.9        | -95.2   | -50.64                  | -13             | -37.64      | H        |
| 5.58003              | 36.68                | Pk  | 35             | -24.7        | -95.2   | -48.22                  | -13             | -35.22      | H        |
| 5.58117              | 35.94                | Pk  | 35             | -24.8        | -95.2   | -49.06                  | -13             | -36.06      | V        |
| 7.43875              | 36.19                | Pk  | 36.2           | -22.8        | -95.2   | -45.61                  | -13             | -32.61      | V        |
| 7.4422               | 34.15                | Pk  | 36.2           | -22.8        | -95.2   | -47.65                  | -13             | -34.65      | H        |
| Mid Channel, 1880MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.75889              | 39.05                | Pk  | 33.6           | -27          | -95.2   | -49.55                  | -13             | -36.55      | H        |
| 3.77137              | 38.86                | Pk  | 33.6           | -26.9        | -95.2   | -49.64                  | -13             | -36.64      | V        |
| 5.63467              | 37.22                | Pk  | 35.1           | -24.3        | -95.2   | -47.18                  | -13             | -34.18      | H        |
| 5.63479              | 36.53                | Pk  | 35.1           | -24.3        | -95.2   | -47.87                  | -13             | -34.87      | V        |
| 7.51102              | 33.98                | Pk  | 36             | -22.3        | -95.2   | -47.52                  | -13             | -34.52      | H        |
| 7.51209              | 35.34                | Pk  | 36.1           | -22.3        | -95.2   | -46.06                  | -13             | -33.06      | V        |
| Mid Channel, 1900MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.79997              | 37.86                | Pk  | 33.7           | -27.3        | -95.2   | -50.94                  | -13             | -37.94      | V        |
| 3.80038              | 38.11                | Pk  | 33.7           | -27.3        | -95.2   | -50.69                  | -13             | -37.69      | H        |
| 5.69899              | 36.02                | Pk  | 35.3           | -25.1        | -95.2   | -48.98                  | -13             | -35.98      | V        |
| 5.70177              | 37.33                | Pk  | 35.3           | -25.2        | -95.2   | -47.77                  | -13             | -34.77      | H        |
| 7.6016               | 34.65                | Pk  | 35.9           | -21.3        | -95.2   | -45.95                  | -13             | -32.95      | V        |
| 7.60163              | 34.21                | Pk  | 35.9           | -21.3        | -95.2   | -46.39                  | -13             | -33.39      | H        |

## 7.1.2. LTE BAND 5 AND 5G NR Band n5

### 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.

### QPSK LTE BAND 5 (10.0MHZ BANDWIDTH)

|                |                       |
|----------------|-----------------------|
| Project #:     | 13190901              |
| Date:          | 9/11/2020             |
| Test Engineer: | 20792                 |
| Configuration: | EUT Only              |
| Mode:          | LTE Band 5 QPSK 10MHz |
| Chamber #:     | Chamber A             |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 829MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.65769               | 41.02                | Pk  | 29             | -30.7        | -95.2   | -55.08                  | -13             | -42.08      | H        |
| 1.65915               | 40.4                 | Pk  | 29             | -30.7        | -95.2   | -55.7                   | -13             | -42.7       | V        |
| 2.48607               | 38.99                | Pk  | 33.4           | -29.8        | -95.2   | -52.11                  | -13             | -39.11      | V        |
| 2.48865               | 38.79                | Pk  | 33.4           | -29.8        | -95.2   | -52.31                  | -13             | -39.31      | H        |
| 3.31498               | 38.04                | Pk  | 32.9           | -28.7        | -95.2   | -52.36                  | -13             | -39.36      | V        |
| 3.31608               | 38.21                | Pk  | 33             | -28.7        | -95.2   | -52.09                  | -13             | -39.09      | H        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.67294               | 40.77                | Pk  | 29             | -30.6        | -95.2   | -55.33                  | -13             | -42.33      | V        |
| 1.6736                | 41.23                | Pk  | 29             | -30.6        | -95.2   | -54.87                  | -13             | -41.87      | H        |
| 2.50213               | 39.77                | Pk  | 33.5           | -29.8        | -95.2   | -51.13                  | -13             | -38.13      | V        |
| 2.50936               | 40.19                | Pk  | 33.5           | -29.7        | -95.2   | -50.51                  | -13             | -37.51      | H        |
| 3.34584               | 38.13                | Pk  | 33             | -28.5        | -95.2   | -52.07                  | -13             | -39.07      | H        |
| 3.352                 | 39.53                | Pk  | 33             | -28.5        | -95.2   | -50.57                  | -13             | -37.57      | V        |
| High Channel, 844MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.68778               | 40.13                | Pk  | 29.1           | -30.6        | -95.2   | -55.87                  | -13             | -42.87      | V        |
| 1.68801               | 49.31                | Pk  | 29.1           | -30.6        | -95.2   | -46.69                  | -13             | -33.69      | H        |
| 2.53171               | 38.9                 | Pk  | 33.4           | -29.4        | -95.2   | -51.6                   | -13             | -38.6       | V        |
| 2.53305               | 38.86                | Pk  | 33.3           | -29.3        | -95.2   | -51.64                  | -13             | -38.64      | H        |
| 3.37492               | 38.1                 | Pk  | 33             | -28.6        | -95.2   | -52.1                   | -13             | -39.1       | H        |
| 3.37605               | 38.36                | Pk  | 33             | -28.6        | -95.2   | -51.84                  | -13             | -38.84      | V        |

## **QPSK 5G NR Band n5 (20.0MHZ BANDWIDTH)**

|                |                          |
|----------------|--------------------------|
| Project #:     | 13190901                 |
| Date:          | 9/1/220                  |
| Test Engineer: | 50820                    |
| Configuration: | EUT Only                 |
| Mode           | 5G NR Band n5 QPSK 20MHz |
| Chamber #:     | Chamber A                |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 834MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.69202               | 38.45                | Pk  | 25             | -30.4        | -95.2   | -61.45                  | -13             | -48.45      | V        |
| 1.70101               | 38.92                | Pk  | 25.1           | -30.4        | -95.2   | -60.88                  | -13             | -47.88      | H        |
| 2.54019               | 38.51                | Pk  | 29.3           | -29.3        | -95.2   | -55.99                  | -13             | -42.99      | H        |
| 2.54421               | 38.81                | Pk  | 29.2           | -29.2        | -95.2   | -55.69                  | -13             | -42.69      | V        |
| 3.51392               | 37.54                | Pk  | 30.1           | -27.8        | -95.2   | -54.66                  | -13             | -41.66      | H        |
| 3.52358               | 37.57                | Pk  | 30.2           | -27.8        | -95.2   | -54.63                  | -13             | -41.63      | V        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.771                 | 39.45                | Pk  | 25.8           | -30.3        | -95.2   | -59.65                  | -13             | -46.65      | H        |
| 1.77687               | 38.72                | Pk  | 25.9           | -30.2        | -95.2   | -60.18                  | -13             | -47.18      | V        |
| 2.66203               | 38.41                | Pk  | 29.2           | -28.9        | -95.2   | -55.99                  | -13             | -42.99      | H        |
| 2.66362               | 38.03                | Pk  | 29.2           | -29          | -95.2   | -56.47                  | -13             | -43.47      | V        |
| 3.74725               | 37.42                | Pk  | 30.6           | -27.7        | -95.2   | -54.48                  | -13             | -41.48      | H        |
| 3.75281               | 38.28                | Pk  | 30.6           | -27.7        | -95.2   | -53.62                  | -13             | -40.62      | V        |
| High Channel, 839MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.80628               | 38.41                | Pk  | 25.9           | -30.2        | -95.2   | -60.49                  | -13             | -47.49      | V        |
| 1.81131               | 38.79                | Pk  | 25.9           | -30.2        | -95.2   | -60.11                  | -13             | -47.11      | H        |
| 2.83197               | 37.78                | Pk  | 28.8           | -28.7        | -95.2   | -56.62                  | -13             | -43.62      | V        |
| 2.84206               | 37.45                | Pk  | 28.8           | -28.7        | -95.2   | -56.95                  | -13             | -43.95      | H        |
| 3.91498               | 37.11                | Pk  | 31.5           | -27.7        | -95.2   | -53.69                  | -13             | -40.69      | H        |
| 3.92438               | 37.72                | Pk  | 31.4           | -27.6        | -95.2   | -53.08                  | -13             | -40.08      | V        |

### 7.1.3. LTE BAND 7

#### LIMITS

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

#### QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)

|                |                       |
|----------------|-----------------------|
| Project #:     | 13190901              |
| Date:          | 8/15/2020             |
| Test Engineer: | 19497                 |
| Configuration: | EUT Only              |
| Mode           | LTE Band 7 QPSK 20MHz |
| Chamber #:     | Chamber A             |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.02009               | 41.18                | Pk  | 34.2           | -26.5        | -95.2   | -45.52                  | -25             | -20.52      | H        |
| 5.02174               | 36.63                | Pk  | 34.2           | -26.5        | -95.2   | -50.17                  | -25             | -25.17      | V        |
| 7.52996               | 33.98                | Pk  | 36             | -22.8        | -95.2   | -47.72                  | -25             | -22.72      | H        |
| 7.53043               | 33.83                | Pk  | 36             | -22.8        | -95.2   | -47.87                  | -25             | -22.87      | V        |
| 10.03818              | 33.51                | Pk  | 37.3           | -20.6        | -95.2   | -44.29                  | -25             | -19.29      | H        |
| 10.03918              | 33.35                | Pk  | 37.3           | -20.6        | -95.2   | -44.45                  | -25             | -19.45      | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.07864               | 37.93                | Pk  | 34.4           | -25.9        | -95.2   | -48.07                  | -25             | -23.07      | H        |
| 5.08421               | 38.18                | Pk  | 34.4           | -26          | -95.2   | -47.82                  | -25             | -22.82      | V        |
| 7.60939               | 34.51                | Pk  | 35.9           | -22.6        | -95.2   | -46.99                  | -25             | -21.99      | H        |
| 7.64548               | 34.73                | Pk  | 35.9           | -22.4        | -95.2   | -46.57                  | -25             | -21.57      | V        |
| 10.07848              | 34.57                | Pk  | 37.4           | -20.7        | -95.2   | -43.23                  | -25             | -18.23      | V        |
| 10.13089              | 34.41                | Pk  | 37.5           | -20.4        | -95.2   | -42.99                  | -25             | -17.99      | H        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.11945               | 37.83                | Pk  | 34.6           | -26.4        | -95.2   | -48.37                  | -25             | -23.37      | V        |
| 5.1197                | 41.07                | Pk  | 34.6           | -26.4        | -95.2   | -45.13                  | -25             | -20.13      | H        |
| 7.68151               | 33.98                | Pk  | 35.9           | -22          | -95.2   | -46.82                  | -25             | -21.82      | H        |
| 7.68268               | 34.4                 | Pk  | 35.9           | -22          | -95.2   | -46.4                   | -25             | -21.4       | V        |
| 10.241                | 34.82                | Pk  | 37.6           | -20.1        | -95.2   | -42.08                  | -25             | -17.08      | V        |
| 10.24136              | 32.84                | Pk  | 37.6           | -20.1        | -95.2   | -44.06                  | -25             | -19.06      | H        |

## 7.1.4. LTE BAND 12 AND 5G NR Band n12

### LIMITS

FCC: §27.53 (g)

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.

### QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 9/1/2020               |
| Test Engineer: | 50820                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 12 QPSK 10MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 704MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.40653               | 40.53                | Pk  | 29.1           | -31          | -95.2   | -55.67                  | -13             | -42.67      | H        |
| 1.40889               | 40.6                 | Pk  | 29.2           | -31          | -95.2   | -55.5                   | -13             | -42.5       | V        |
| 2.11123               | 39.46                | Pk  | 31.7           | -30.1        | -95.2   | -53.64                  | -13             | -40.64      | V        |
| 2.11244               | 40.69                | Pk  | 31.7           | -30.1        | -95.2   | -52.41                  | -13             | -39.41      | H        |
| 2.81737               | 39.57                | Pk  | 32.6           | -29          | -95.2   | -51.43                  | -13             | -38.43      | V        |
| 2.81798               | 38.06                | Pk  | 32.6           | -28.9        | -95.2   | -52.84                  | -13             | -39.84      | H        |
| Mid Channel, 707.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.41577               | 40.9                 | Pk  | 29.1           | -31          | -95.2   | -55.3                   | -13             | -42.3       | H        |
| 1.41994               | 40.4                 | Pk  | 29.1           | -30.9        | -95.2   | -55.7                   | -13             | -42.7       | V        |
| 2.1212                | 39.61                | Pk  | 31.6           | -30          | -95.2   | -53.49                  | -13             | -40.49      | H        |
| 2.12428               | 38.99                | Pk  | 31.6           | -30          | -95.2   | -54.11                  | -13             | -41.11      | V        |
| 2.83097               | 37.66                | Pk  | 32.5           | -28.9        | -95.2   | -53.24                  | -13             | -40.24      | H        |
| 2.83147               | 38.72                | Pk  | 32.5           | -28.9        | -95.2   | -52.18                  | -13             | -39.18      | V        |
| High Channel, 711MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.42212               | 43.66                | Pk  | 29             | -30.9        | -95.2   | -52.54                  | -13             | -39.54      | H        |
| 1.42229               | 42.05                | Pk  | 29             | -30.9        | -95.2   | -54.15                  | -13             | -41.15      | V        |
| 2.1316                | 39.12                | Pk  | 31.5           | -29.9        | -95.2   | -53.98                  | -13             | -40.98      | V        |
| 2.13307               | 40.03                | Pk  | 31.5           | -29.9        | -95.2   | -53.07                  | -13             | -40.07      | H        |
| 2.84237               | 38.71                | Pk  | 32.5           | -29.1        | -95.2   | -52.39                  | -13             | -39.39      | V        |
| 2.84461               | 38.67                | Pk  | 32.5           | -29.1        | -95.2   | -52.43                  | -13             | -39.43      | H        |

# QPSK 5G NR Band n12 (15.0MHZ BANDWIDTH)

|                |                           |
|----------------|---------------------------|
| Project #:     | 13190901                  |
| Date:          | 9/3/2020                  |
| Test Engineer: | 50822                     |
| Configuration: | EUT Only                  |
| Mode           | 5G NR Band n12 15MHz QPSK |
| Chamber #:     | Chamber B                 |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 706.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.46252                | 41.54                | Pk  | 25             | -30.6        | -95.2   | -58.36                  | -13             | -45.36      | H        |
| 1.46253                | 41.87                | Pk  | 25             | -30.6        | -95.2   | -58.03                  | -13             | -45.03      | V        |
| 2.0819                 | 40.53                | Pk  | 27             | -29.5        | -95.2   | -56.67                  | -13             | -43.67      | V        |
| 2.09926                | 43.3                 | Pk  | 26.9           | -29.6        | -95.2   | -54.1                   | -13             | -41.1       | H        |
| 3.2484                 | 39.51                | Pk  | 31.4           | -28.2        | -95.2   | -52.09                  | -13             | -39.09      | V        |
| 3.26305                | 39.54                | Pk  | 31.4           | -28.3        | -95.2   | -52.06                  | -13             | -39.06      | H        |
| Mid Channel, 707.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.50485                | 42.03                | Pk  | 24.8           | -30.6        | -95.2   | -58.17                  | -13             | -45.17      | H        |
| 1.51726                | 41.57                | Pk  | 24.8           | -30.6        | -95.2   | -58.63                  | -13             | -45.63      | V        |
| 2.18966                | 40.08                | Pk  | 27.2           | -29.7        | -95.2   | -57.02                  | -13             | -44.02      | H        |
| 2.20857                | 40.09                | Pk  | 27.2           | -29.6        | -95.2   | -56.91                  | -13             | -43.91      | V        |
| 3.01874                | 39.45                | Pk  | 30.1           | -28.7        | -95.2   | -53.85                  | -13             | -40.85      | H        |
| 3.0201                 | 39.67                | Pk  | 30.1           | -28.7        | -95.2   | -53.63                  | -13             | -40.63      | V        |
| High Channel, 708.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.51212                | 41.24                | Pk  | 24.8           | -30.6        | -95.2   | -58.96                  | -13             | -45.96      | V        |
| 1.51422                | 41.07                | Pk  | 24.8           | -30.6        | -95.2   | -59.13                  | -13             | -46.13      | H        |
| 2.49751                | 40.82                | Pk  | 29             | -29.2        | -95.2   | -53.98                  | -13             | -40.98      | V        |
| 2.50312                | 41.29                | Pk  | 29             | -29.3        | -95.2   | -53.61                  | -13             | -40.61      | H        |
| 3.72669                | 39.28                | Pk  | 30.5           | -27.8        | -95.2   | -52.72                  | -13             | -39.72      | H        |
| 3.72851                | 38.85                | Pk  | 30.5           | -27.8        | -95.2   | -53.15                  | -13             | -40.15      | V        |

## 7.1.5. LTE BAND 13

### LIMITS

FCC: §27.53

(c) 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.

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

### QPSK LTE BAND 13 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 8/17/2020              |
| Test Engineer: | 30606                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 13 QPSK 10MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 782MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.5529              | 40.35                | Pk  | 28.5           | -30.8        | -95.2   | -56.35                  | -40             | -16.35      | H        |
| 1.58863             | 39.75                | Pk  | 28.5           | -30.9        | -95.2   | -57.05                  | -40             | -17.05      | V        |
| 2.34932             | 39.43                | Pk  | 32.3           | -29.6        | -95.2   | -52.57                  | -13             | -39.57      | V        |
| 2.35431             | 39.42                | Pk  | 32.4           | -29.6        | -95.2   | -52.48                  | -13             | -39.48      | H        |
| 3.05478             | 38.54                | Pk  | 33             | -28.4        | -95.2   | -51.56                  | -13             | -38.56      | H        |
| 3.1053              | 39.14                | Pk  | 32.9           | -28.7        | -95.2   | -51.16                  | -13             | -38.16      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

### 7.1.6. LTE BAND 14

#### LIMITS

FCC: §90.543 Emission Limitations. (Band 14)

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least  $43 + 10 \log (P)$  dB.

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

#### QPSK LTE BAND 14 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 8/18/2020              |
| Test Engineer: | 19212                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 14 QPSK 10MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 793MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.58581             | 40.78                | Pk  | 28.5           | -30.8        | -95.2   | -55.92                  | -40             | -15.92      | V        |
| 1.58713             | 40.98                | Pk  | 28.5           | -30.9        | -95.2   | -55.82                  | -40             | -15.82      | H        |
| 2.37829             | 39.69                | Pk  | 32.5           | -29.7        | -95.2   | -52.21                  | -13             | -39.21      | V        |
| 2.37963             | 39.26                | Pk  | 32.6           | -29.7        | -95.2   | -52.54                  | -13             | -39.54      | H        |
| 3.17245             | 39.44                | Pk  | 32.6           | -28.6        | -95.2   | -51.26                  | -13             | -38.26      | H        |
| 3.17273             | 39.15                | Pk  | 32.6           | -28.6        | -95.2   | -51.55                  | -13             | -38.55      | V        |

\* Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.

## 7.1.7. LTE BAND 17

### LIMITS

FCC: §27.53 (g)

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.

### QPSK LTE BAND 17 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 8/14/2020              |
| Test Engineer: | 19497                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 17 QPSK 10MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 710MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.40827             | 41.65                | Pk  | 29.1           | -31          | -95.2   | -54.55                  | -13             | -41.55      | V        |
| 1.418               | 40.98                | Pk  | 29.1           | -31          | -95.2   | -55.22                  | -13             | -42.22      | H        |
| 2.13382             | 39.7                 | Pk  | 31.5           | -29.9        | -95.2   | -53.4                   | -13             | -40.4       | H        |
| 2.13557             | 40.54                | Pk  | 31.6           | -29.9        | -95.2   | -52.46                  | -13             | -39.46      | V        |
| 2.8384              | 40.12                | Pk  | 32.5           | -29          | -95.2   | -50.88                  | -13             | -37.88      | H        |
| 2.84432             | 39.2                 | Pk  | 32.5           | -29.1        | -95.2   | -51.9                   | -13             | -38.9       | V        |

## 7.1.8. LTE BAND 25

### 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.

### QPSK LTE BAND 25 (20.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 8/18/2020              |
| Test Engineer: | 30606                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 25 QPSK 20MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1860MHz   |                      |     |                |              |         |                         |                 |             |          |
| 3.71969                | 37.87                | Pk  | 33.4           | -26.9        | -95.2   | -50.83                  | -13             | -37.83      | H        |
| 3.72124                | 38.08                | Pk  | 33.4           | -26.9        | -95.2   | -50.62                  | -13             | -37.62      | V        |
| 5.57902                | 36.27                | Pk  | 35             | -24.7        | -95.2   | -48.63                  | -13             | -35.63      | H        |
| 5.58166                | 35.57                | Pk  | 35.1           | -24.7        | -95.2   | -49.23                  | -13             | -36.23      | V        |
| 7.43812                | 34.23                | Pk  | 36.2           | -22.8        | -95.2   | -47.57                  | -13             | -34.57      | H        |
| 7.43844                | 33.77                | Pk  | 36.2           | -22.8        | -95.2   | -48.03                  | -13             | -35.03      | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.78791                | 38.66                | Pk  | 33.6           | -27          | -95.2   | -49.94                  | -13             | -36.94      | V        |
| 3.8082                 | 39.21                | Pk  | 33.6           | -27.4        | -95.2   | -49.79                  | -13             | -36.79      | H        |
| 5.62393                | 36.8                 | Pk  | 35.1           | -24.1        | -95.2   | -47.4                   | -13             | -34.4       | H        |
| 5.78398                | 36.51                | Pk  | 35.3           | -25.2        | -95.2   | -48.59                  | -13             | -35.59      | V        |
| 7.53038                | 34.78                | Pk  | 36             | -22.2        | -95.2   | -46.62                  | -13             | -33.62      | H        |
| 8.18385                | 35.39                | Pk  | 36.1           | -20.4        | -95.2   | -44.11                  | -13             | -31.11      | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.8082                 | 38.31                | Pk  | 33.6           | -27.4        | -95.2   | -50.69                  | -13             | -37.69      | V        |
| 3.81003                | 38.69                | Pk  | 33.7           | -27.4        | -95.2   | -50.21                  | -13             | -37.21      | H        |
| 5.71595                | 36.97                | Pk  | 35.3           | -25.5        | -95.2   | -48.43                  | -13             | -35.43      | V        |
| 5.71686                | 35.58                | Pk  | 35.3           | -25.5        | -95.2   | -49.82                  | -13             | -36.82      | H        |
| 7.61828                | 33.68                | Pk  | 35.8           | -21.1        | -95.2   | -46.82                  | -13             | -33.82      | H        |
| 7.61952                | 34.43                | Pk  | 35.9           | -21.1        | -95.2   | -45.97                  | -13             | -32.97      | V        |

### 7.1.9. LTE BAND 26 (PART 90S)

#### LIMITS

FCC: §90.691

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.

#### QPSK LTE BAND 26 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 8/18/2020              |
| Test Engineer: | 30606                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 26 QPSK 10MHz |
| Chamber #:     | Chamber B              |

| Frequency (GHz)     | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|---------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 819MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.61153             | 39.88                | Pk  | 28.9           | -30.8        | -95.2   | -56.52                  | -13             | -43.52      | H        |
| 1.65083             | 39.86                | Pk  | 29             | -30.7        | -95.2   | -56.24                  | -13             | -43.24      | V        |
| 2.45999             | 40.24                | Pk  | 33.1           | -29.8        | -95.2   | -51.16                  | -13             | -38.16      | V        |
| 2.48553             | 38.57                | Pk  | 33.4           | -29.8        | -95.2   | -52.53                  | -13             | -39.53      | H        |
| 3.21426             | 39.16                | Pk  | 32.9           | -28.5        | -95.2   | -51.14                  | -13             | -38.14      | V        |
| 3.29368             | 38.73                | Pk  | 33             | -28.3        | -95.2   | -50.97                  | -13             | -37.97      | H        |

## 7.1.10. LTE BAND 30

### LIMITS

FCC: §27.53 (a)

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

### QPSK LTE BAND 30 (10.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 9/21/2020              |
| Test Engineer: | 30606                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 30 QPSK 10MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)      | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Mid Channel, 2310MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.0248               | 36.59                | Pk  | 32.9           | -28.7        | -95.2   | -54.41                  | -40             | -14.41      | V        |
| 3.53993              | 37.31                | Pk  | 33.4           | -28          | -95.2   | -52.49                  | -40             | -12.49      | H        |
| 4.84219              | 35.81                | Pk  | 34.2           | -27.1        | -95.2   | -52.29                  | -40             | -12.29      | V        |
| 5.18306              | 35.7                 | Pk  | 34.6           | -26.1        | -95.2   | -51                     | -40             | -11         | H        |
| 7.32432              | 33.28                | Pk  | 36.1           | -22.5        | -95.2   | -48.32                  | -40             | -8.32       | V        |
| 8.16416              | 32.89                | Pk  | 36.1           | -22          | -95.2   | -48.21                  | -40             | -8.21       | H        |

## 7.1.11. LTE BAND 41 AND 5G NR BAND n41

### LIMITS

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

### QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 8/16/2020              |
| Test Engineer: | 19497                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 41 QPSK 20MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T962 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.01143               | 38.21                | Pk  | 34.2           | -26.7        | -95.2   | -48.69                  | -25             | -23.69         | H        |
| 5.02283               | 38.08                | Pk  | 34.2           | -26.4        | -95.2   | -48.62                  | -25             | -23.62         | V        |
| 7.50041               | 35.77                | Pk  | 36             | -22.6        | -95.2   | -45.63                  | -25             | -20.63         | H        |
| 7.52122               | 34.92                | Pk  | 36             | -22.7        | -95.2   | -46.68                  | -25             | -21.68         | V        |
| 10.01447              | 33.89                | Pk  | 37.3           | -20.1        | -95.2   | -43.51                  | -25             | -18.51         | H        |
| 10.03223              | 33.92                | Pk  | 37.3           | -20.5        | -95.2   | -43.78                  | -25             | -18.78         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.19918               | 38                   | Pk  | 34.6           | -25.8        | -95.2   | -47.5                   | -25             | -22.5          | H        |
| 5.20796               | 36.86                | Pk  | 34.6           | -25.8        | -95.2   | -48.54                  | -25             | -23.54         | V        |
| 7.77289               | 35.49                | Pk  | 35.9           | -22.5        | -95.2   | -46.01                  | -25             | -21.01         | H        |
| 7.7911                | 35.28                | Pk  | 36             | -22.4        | -95.2   | -45.92                  | -25             | -20.92         | V        |
| 10.37959              | 34.67                | Pk  | 37.7           | -19.9        | -95.2   | -41.93                  | -25             | -16.93         | H        |
| 10.41994              | 34.33                | Pk  | 37.7           | -19.5        | -95.2   | -41.87                  | -25             | -16.87         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.33911               | 36.54                | Pk  | 34.8           | -26.5        | -95.2   | -49.76                  | -25             | -24.76         | V        |
| 5.37998               | 36.92                | Pk  | 34.8           | -26          | -95.2   | -48.88                  | -25             | -23.88         | H        |
| 8.02471               | 35.87                | Pk  | 36.1           | -22.2        | -95.2   | -45.13                  | -25             | -20.13         | H        |
| 8.04315               | 36.47                | Pk  | 36.2           | -22.2        | -95.2   | -44.33                  | -25             | -19.33         | V        |
| 10.71221              | 34.7                 | Pk  | 37.8           | -19.7        | -95.2   | -41.9                   | -25             | -16.9          | H        |
| 10.7219               | 34.7                 | Pk  | 37.8           | -19.8        | -95.2   | -41.9                   | -25             | -16.9          | V        |

# **QPSK 5G NR BAND n41 (100.0MHZ BANDWIDTH)**

|                |                            |
|----------------|----------------------------|
| Project #:     | 13190901                   |
| Date:          | 8/20/2020                  |
| Test Engineer: | 50820                      |
| Configuration: | EUT only                   |
| Mode           | 5G NR Band n41 QPSK 100MHz |
| Chamber #:     | Chamber A                  |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 2546MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.08642               | 37.55                | Pk  | 34.4           | -26          | -95.2   | -48.45                  | -25             | -23.45      | V        |
| 5.11102               | 36.5                 | Pk  | 34.4           | -26.4        | -95.2   | -49.9                   | -25             | -24.9       | H        |
| 7.64087               | 34.23                | Pk  | 35.9           | -22.4        | -95.2   | -47.07                  | -25             | -22.07      | V        |
| 7.64242               | 34.15                | Pk  | 35.9           | -22.4        | -95.2   | -47.15                  | -25             | -22.15      | H        |
| 10.18116              | 33.6                 | Pk  | 37.5           | -20.3        | -95.2   | -43.8                   | -25             | -18.8       | V        |
| 10.18503              | 33.9                 | Pk  | 37.5           | -20.4        | -95.2   | -43.6                   | -25             | -18.6       | H        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.18651               | 37.16                | Pk  | 34.6           | -26          | -95.2   | -48.64                  | -25             | -23.64      | H        |
| 5.19906               | 36.93                | Pk  | 34.6           | -25.8        | -95.2   | -48.57                  | -25             | -23.57      | V        |
| 7.77373               | 35.06                | Pk  | 35.9           | -22.5        | -95.2   | -46.44                  | -25             | -21.44      | V        |
| 7.79437               | 34.9                 | Pk  | 36             | -22.3        | -95.2   | -46.2                   | -25             | -21.2       | H        |
| 10.37156              | 33.65                | Pk  | 37.7           | -19.9        | -95.2   | -42.95                  | -25             | -17.95      | H        |
| 10.37748              | 33.94                | Pk  | 37.7           | -19.9        | -95.2   | -42.66                  | -25             | -17.66      | V        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.27573               | 36.34                | Pk  | 34.7           | -26.5        | -95.2   | -50.36                  | -25             | -25.36      | V        |
| 5.29187               | 36.37                | Pk  | 34.7           | -26.8        | -95.2   | -50.53                  | -25             | -25.53      | H        |
| 7.92304               | 35.81                | Pk  | 36.2           | -22.4        | -95.2   | -45.39                  | -25             | -20.39      | V        |
| 7.9255                | 33.98                | Pk  | 36.2           | -22.4        | -95.2   | -47.32                  | -25             | -22.32      | H        |
| 10.60413              | 33.18                | Pk  | 37.8           | -19.7        | -95.2   | -43.12                  | -25             | -18.12      | H        |
| 10.60758              | 32.74                | Pk  | 37.8           | -19.7        | -95.2   | -43.56                  | -25             | -18.56      | V        |

## 7.1.12. LTE BAND 66

### LIMITS

FCC: §27.53 (h)

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

### QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 9/19/2020              |
| Test Engineer: | 20792                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 66 QPSK 20MHz |
| Chamber #:     | Chamber A              |

| Frequency (GHz)       | Meter Reading (dBuV) | Det | AF T136 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 1720MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.43847               | 38.2                 | Pk  | 33.1           | -28.1        | -95.2   | -52                     | -13             | -39         | H        |
| 3.44154               | 38.25                | Pk  | 33.1           | -28.1        | -95.2   | -51.95                  | -13             | -38.95      | V        |
| 5.1591                | 37.63                | Pk  | 34.6           | -26.1        | -95.2   | -49.07                  | -13             | -36.07      | H        |
| 5.15922               | 37.96                | Pk  | 34.6           | -26.1        | -95.2   | -48.74                  | -13             | -35.74      | V        |
| 6.87866               | 35.55                | Pk  | 36.4           | -23.4        | -95.2   | -46.65                  | -13             | -33.65      | V        |
| 6.87981               | 35.17                | Pk  | 36.4           | -23.4        | -95.2   | -47.03                  | -13             | -34.03      | H        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.49173               | 38.6                 | Pk  | 33.1           | -27.5        | -95.2   | -51                     | -13             | -38         | H        |
| 3.49225               | 39.15                | Pk  | 33.1           | -27.6        | -95.2   | -50.55                  | -13             | -37.55      | V        |
| 5.23363               | 36.87                | Pk  | 34.6           | -26.2        | -95.2   | -49.93                  | -13             | -36.93      | V        |
| 5.23458               | 38.16                | Pk  | 34.6           | -26.2        | -95.2   | -48.64                  | -13             | -35.64      | H        |
| 6.97871               | 35.55                | Pk  | 36.1           | -22.7        | -95.2   | -46.25                  | -13             | -33.25      | H        |
| 6.97973               | 34.86                | Pk  | 36.1           | -22.7        | -95.2   | -46.94                  | -13             | -33.94      | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.53936               | 38.28                | Pk  | 33.3           | -27.1        | -95.2   | -50.72                  | -13             | -37.72      | H        |
| 3.54099               | 37.93                | Pk  | 33.3           | -27.1        | -95.2   | -51.07                  | -13             | -38.07      | V        |
| 5.30932               | 36.97                | Pk  | 34.8           | -25.5        | -95.2   | -48.93                  | -13             | -35.93      | V        |
| 5.31136               | 36.8                 | Pk  | 34.7           | -25.4        | -95.2   | -49.1                   | -13             | -36.1       | H        |
| 7.0785                | 34.81                | Pk  | 36             | -22.4        | -95.2   | -46.79                  | -13             | -33.79      | V        |
| 7.08145               | 35.08                | Pk  | 36             | -22.6        | -95.2   | -46.72                  | -13             | -33.72      | H        |

### 7.1.13. LTE BAND 71

#### LIMITS

FCC: §27.53 (g)

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.

#### QPSK LTE BAND 71 (20.0MHZ BANDWIDTH)

|                |                        |
|----------------|------------------------|
| Project #:     | 13190901               |
| Date:          | 9/24/2020              |
| Test Engineer: | 50822                  |
| Configuration: | EUT Only               |
| Mode           | LTE Band 71 QPSK 20MHz |
| Chamber #:     | Chamber B              |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T962 (dB/m) | Amp/Cbl (dB) | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 673.0MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.35434                | 41.15                | Pk  | 25.3           | -30.8        | -95.2   | -59.55                  | -13             | -46.55      | H        |
| 1.36006                | 42.2                 | Pk  | 25.3           | -30.8        | -95.2   | -58.5                   | -13             | -45.5       | V        |
| 2.01356                | 40.13                | Pk  | 27.2           | -29.7        | -95.2   | -57.57                  | -13             | -44.57      | V        |
| 2.01754                | 40.24                | Pk  | 27.2           | -29.8        | -95.2   | -57.56                  | -13             | -44.56      | H        |
| 2.70625                | 38.7                 | Pk  | 29.1           | -28.9        | -95.2   | -56.3                   | -13             | -43.3       | H        |
| 2.72251                | 39.59                | Pk  | 29             | -28.9        | -95.2   | -55.51                  | -13             | -42.51      | V        |
| Mid Channel, 680.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.3573                 | 42.11                | Pk  | 25.3           | -30.8        | -95.2   | -58.59                  | -13             | -45.59      | V        |
| 1.36452                | 42.15                | Pk  | 25.4           | -30.8        | -95.2   | -58.45                  | -13             | -45.45      | H        |
| 2.04145                | 40.31                | Pk  | 27             | -29.7        | -95.2   | -57.59                  | -13             | -44.59      | H        |
| 2.05989                | 40.85                | Pk  | 27             | -29.7        | -95.2   | -57.05                  | -13             | -44.05      | V        |
| 2.77711                | 39.59                | Pk  | 28.9           | -28.8        | -95.2   | -55.51                  | -13             | -42.51      | H        |
| 2.79682                | 39.62                | Pk  | 28.9           | -28.7        | -95.2   | -55.38                  | -13             | -42.38      | V        |
| High Channel, 688.0MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.39102                | 40.88                | Pk  | 25.5           | -30.8        | -95.2   | -59.62                  | -13             | -46.62      | H        |
| 1.39354                | 40.98                | Pk  | 25.5           | -30.8        | -95.2   | -59.52                  | -13             | -46.52      | V        |
| 2.06888                | 39.8                 | Pk  | 27             | -29.6        | -95.2   | -58                     | -13             | -45         | H        |
| 2.07067                | 40.14                | Pk  | 27             | -29.6        | -95.2   | -57.66                  | -13             | -44.66      | V        |
| 2.73269                | 39.62                | Pk  | 29             | -28.9        | -95.2   | -55.48                  | -13             | -42.48      | V        |
| 2.74828                | 39.22                | Pk  | 29             | -28.9        | -95.2   | -55.88                  | -13             | -42.88      | H        |

## 8. SETUP PHOTOS

Please refer to 13179110-EP1V1 for setup photos

**End of the report**