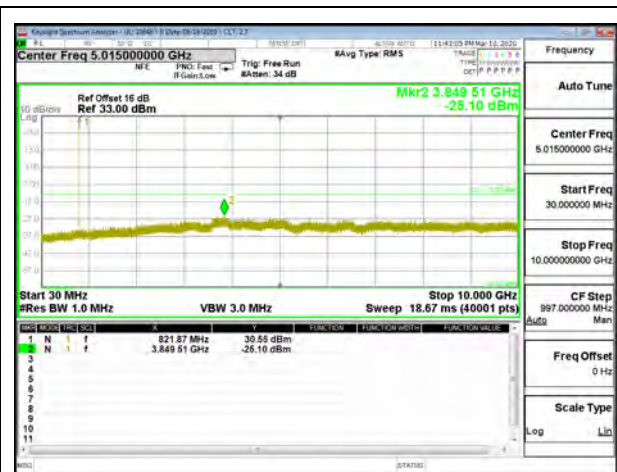
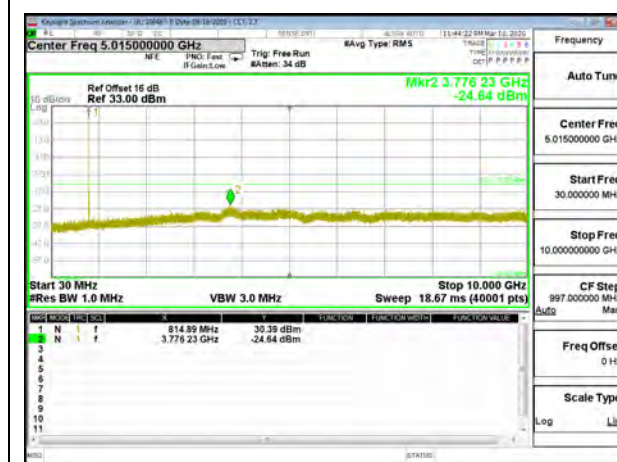




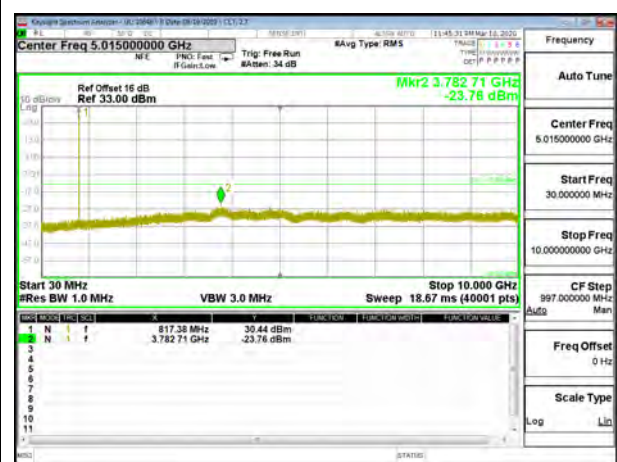
LTE B26 3MHz QPSK Middle Channel RB1-0



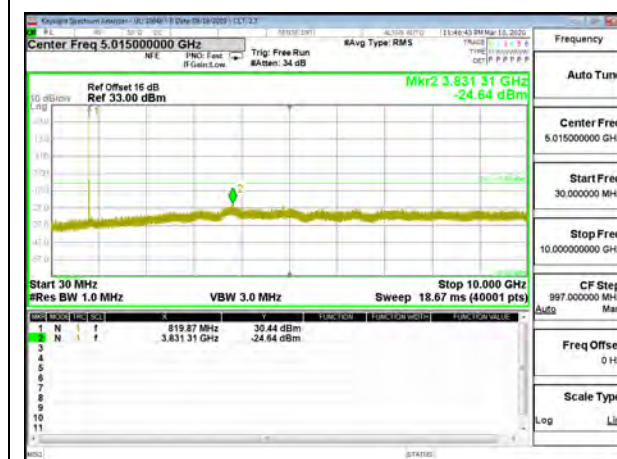
LTE B26 3MHz QPSK High Channel RB1-0



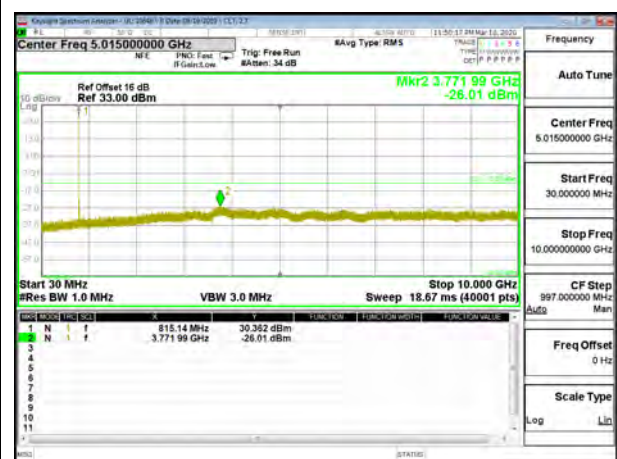
LTE B26 5MHz QPSK Low Channel RB1-0



LTE B26 5MHz QPSK Middle Channel RB1-0



LTE B26 5MHz QPSK High Channel RB1-0



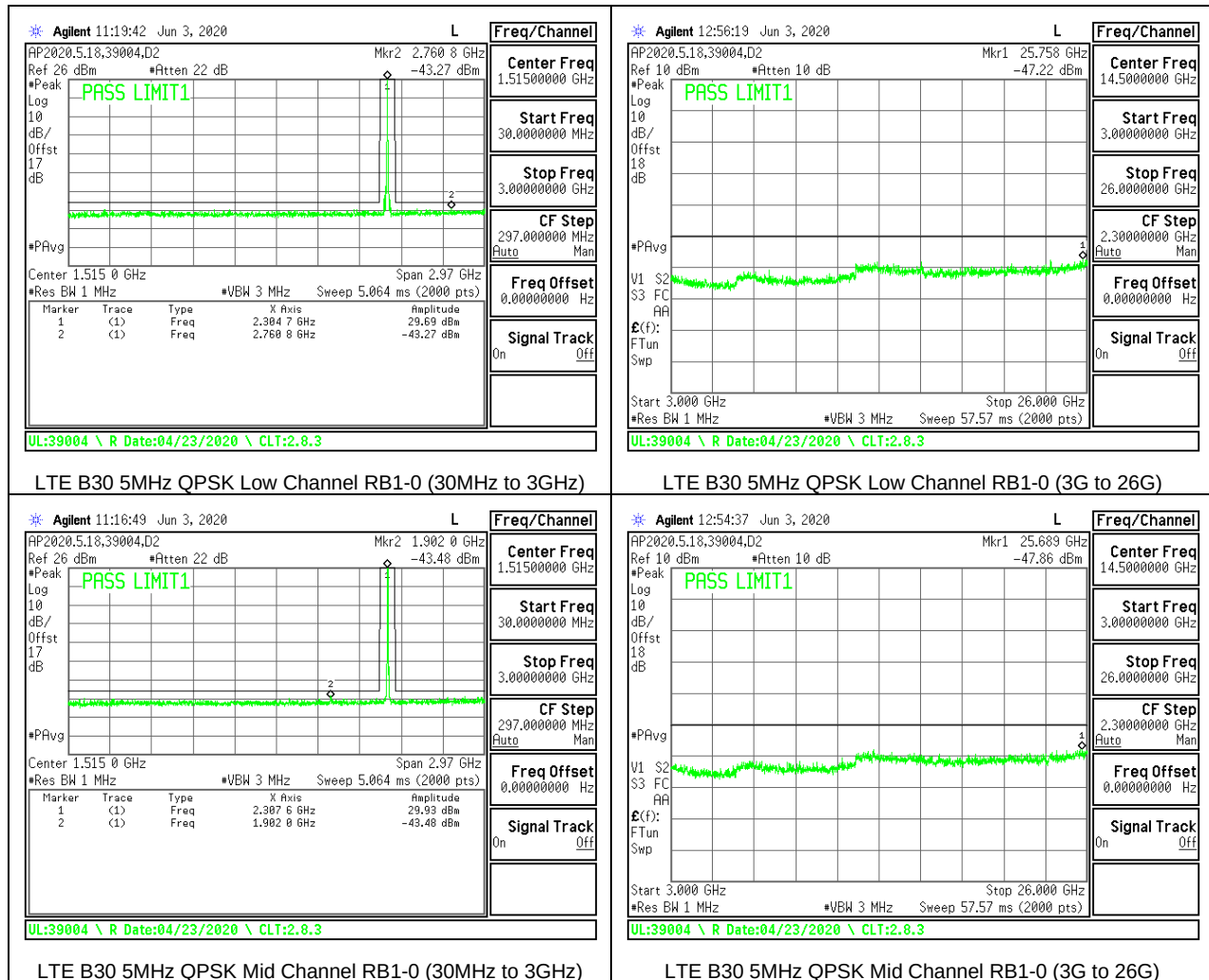
LTE B26 10MHz QPSK Middle Channel RB1-0

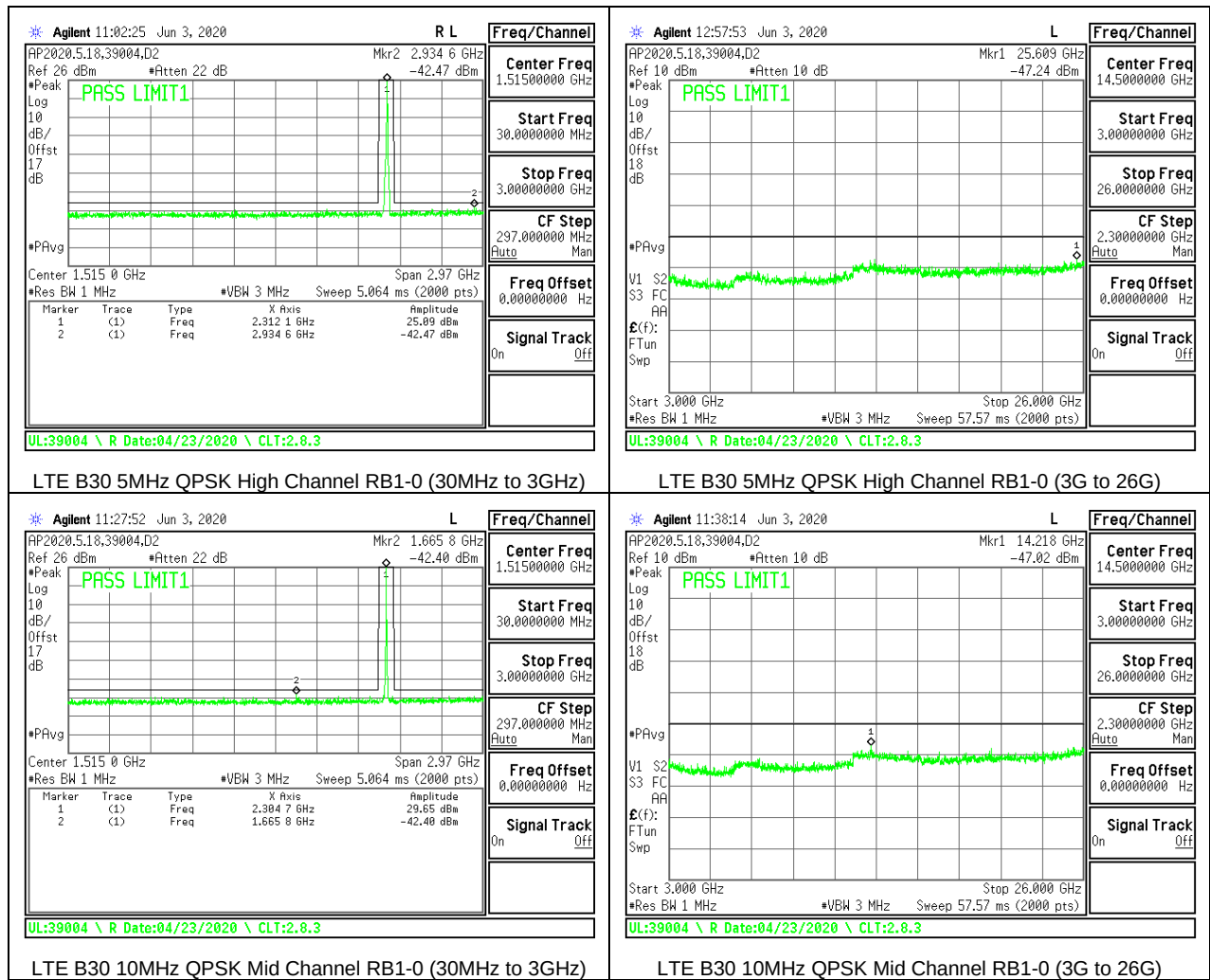
### 8.3.10. LTE BAND 30

#### LIMITS

FCC: §27.53 (a)

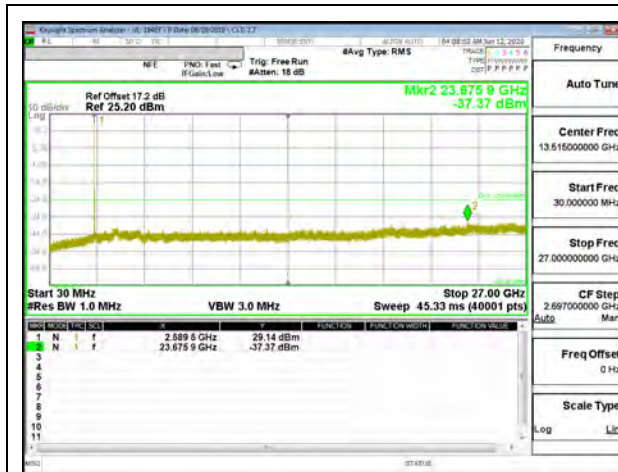
The minimum permissible attenuation level of any spurious emissions is  $70 + 10 \log (P)$  dB where transmitting power (P) in Watts.



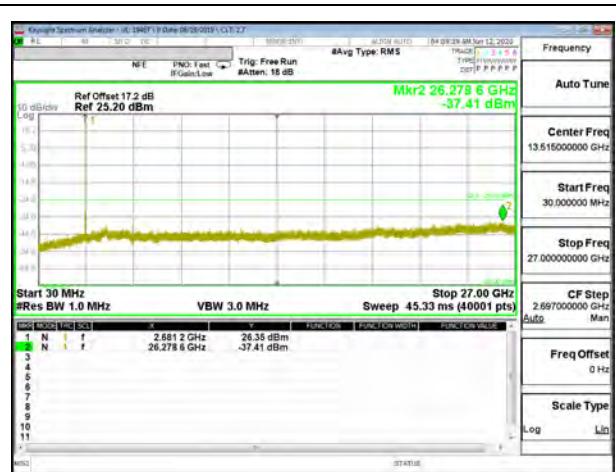




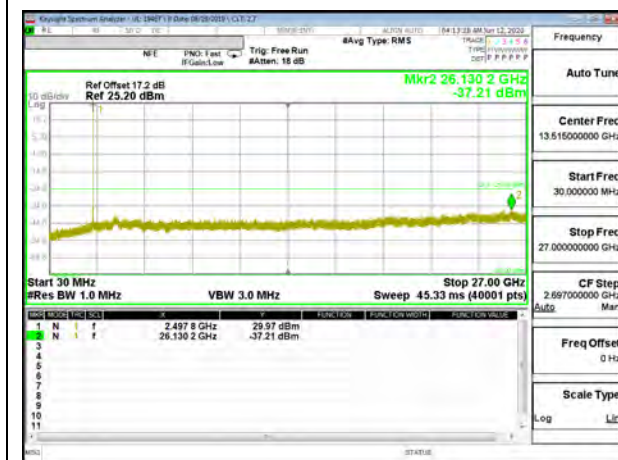




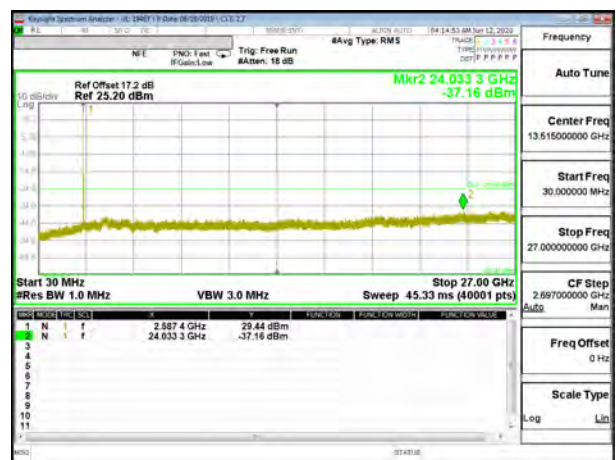
LTE B41 10MHz QPSK Middle Channel RB1-0



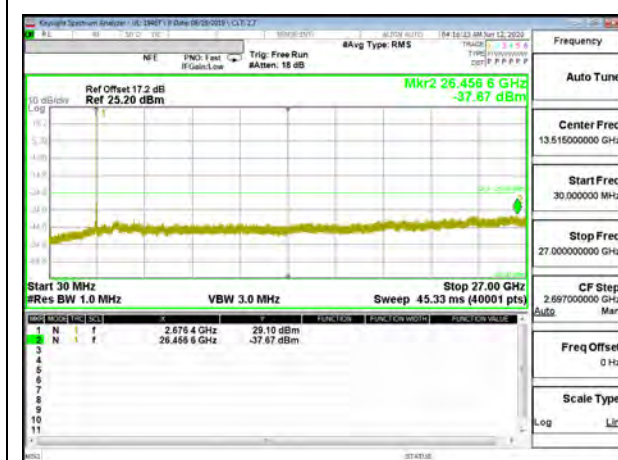
LTE B41 10MHz QPSK High Channel RB1-0



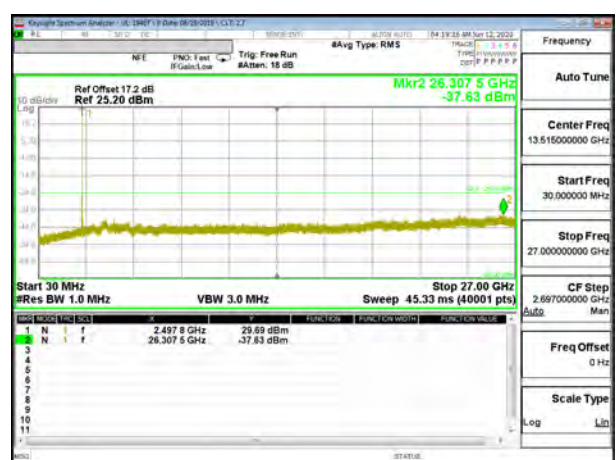
LTE B41 15MHz QPSK Low Channel RB1-0



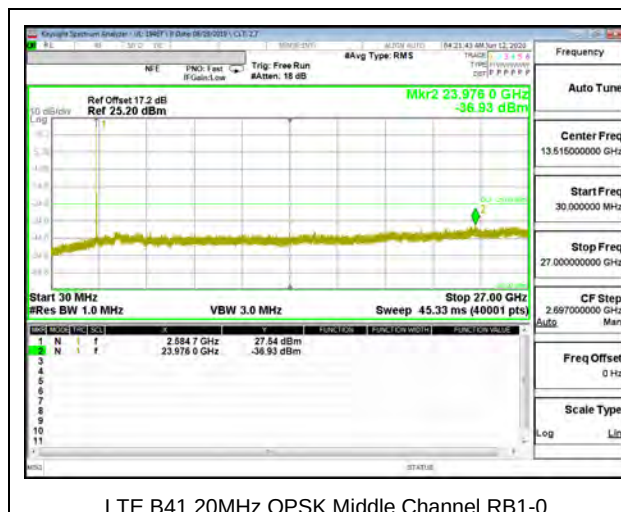
LTE B41 15MHz QPSK Middle Channel RB1-0



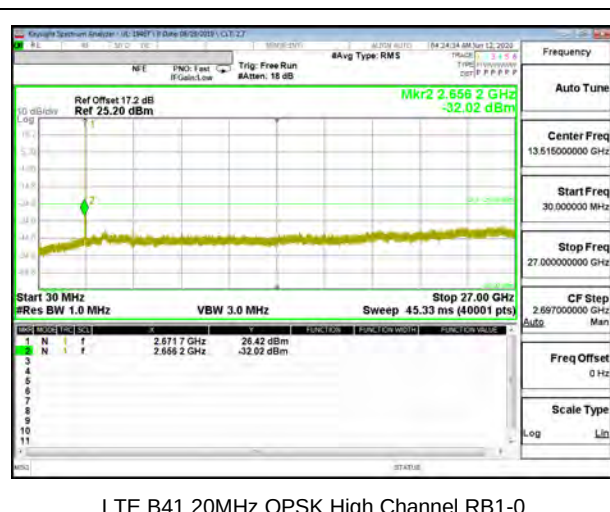
LTE B41 15MHz QPSK High Channel RB1-0



LTE B41 20MHz QPSK Low Channel RB1-0

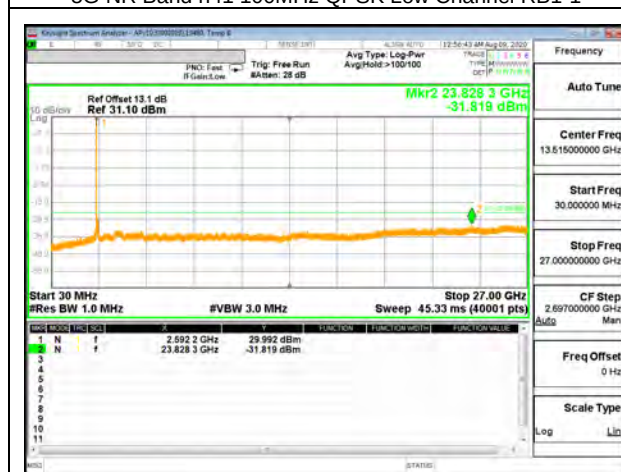
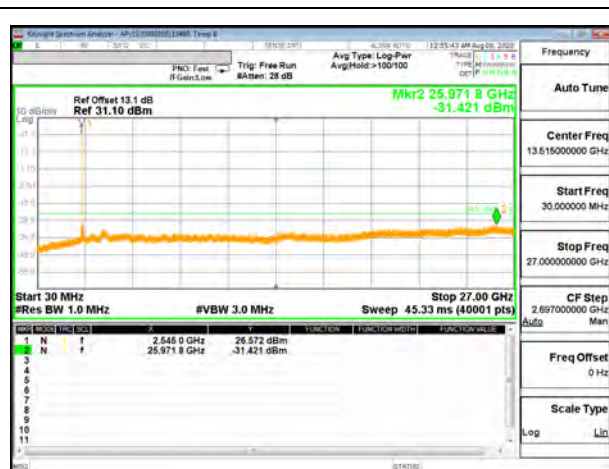


LTE B41 20MHz QPSK Middle Channel RB1-0



LTE B41 20MHz QPSK High Channel RB1-0

## 5G NR Band n41



INTENTIONALLY VOID



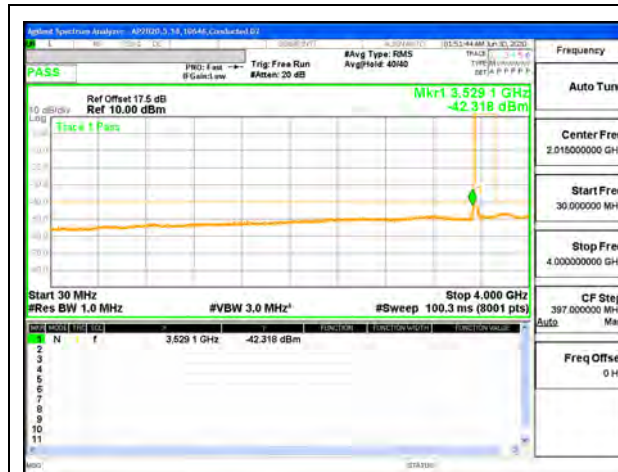
## 8.3.12. LTE BAND 48

### LIMITS

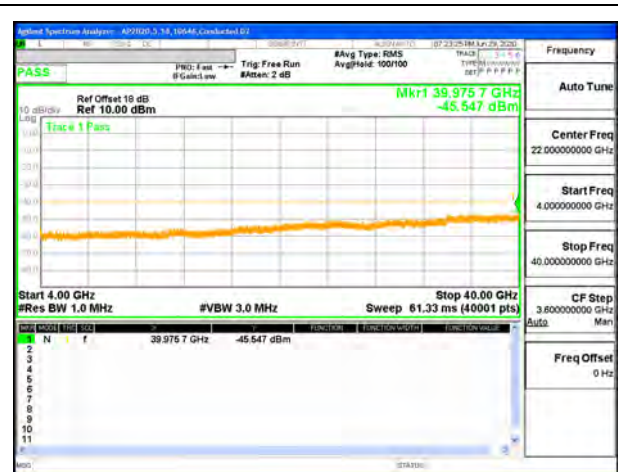
FCC: \$96.41

(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 -40dBm/MHz.



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



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

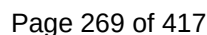


LTE B48 5MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)



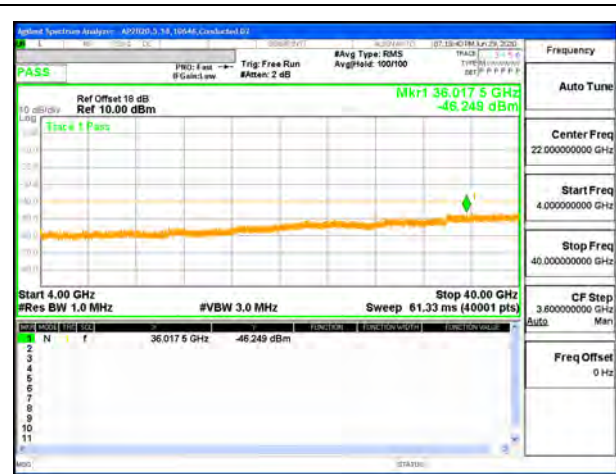
LTE B48 5MHz QPSK Mid Channel RB1-0 (4G to 40G)



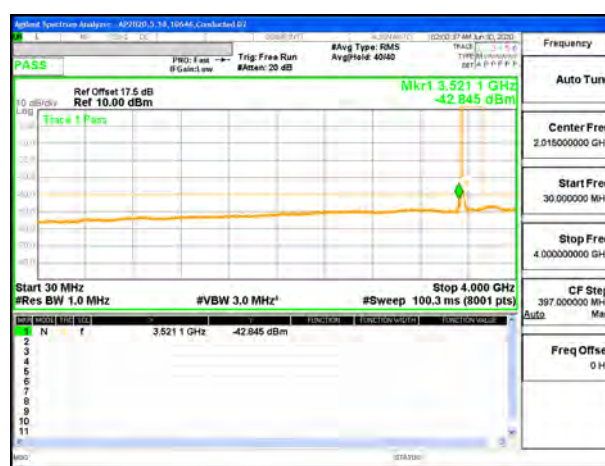




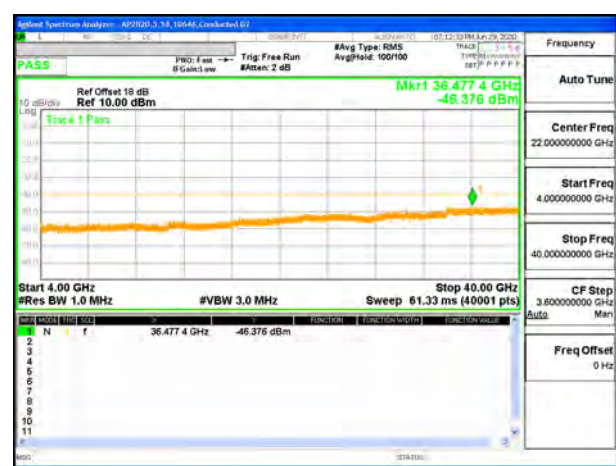
LTE B48 10MHz QPSK High Channel RB1-0 (30MHz to 4GHz)



LTE B48 10MHz QPSK High Channel RB1-0 (4G to 40G)



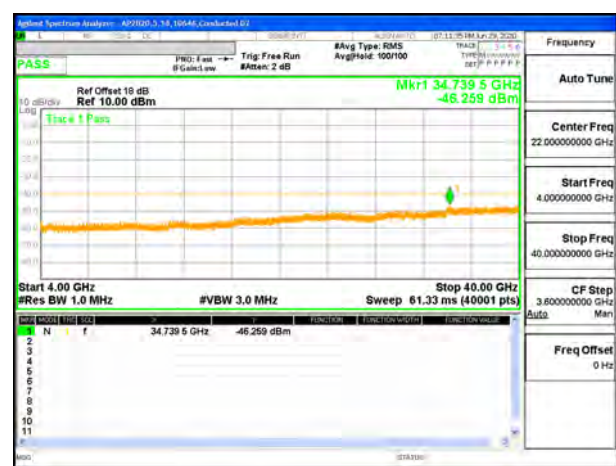
LTE B48 15MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)



LTE B48 15MHz QPSK Low Channel RB1-0 (4G to 40G)



LTE B48 15MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)



LTE B48 15MHz QPSK Mid Channel RB1-0 (4G to 40G)

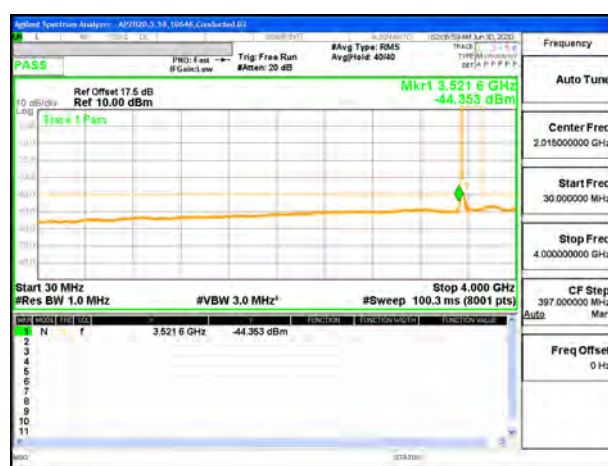




LTE B48 15MHz QPSK High Channel RB1-0 (30MHz to 4GHz)



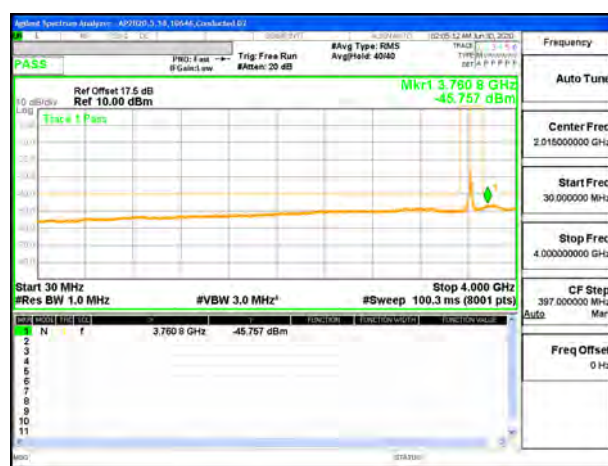
LTE B48 15MHz QPSK High Channel RB1-0 (4G to 40G)



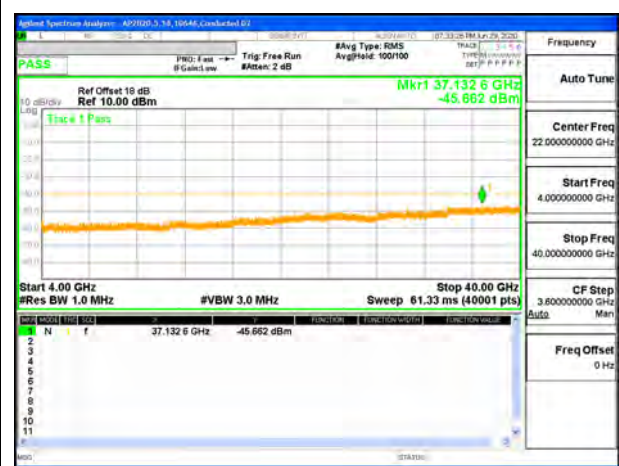
LTE B48 20MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)



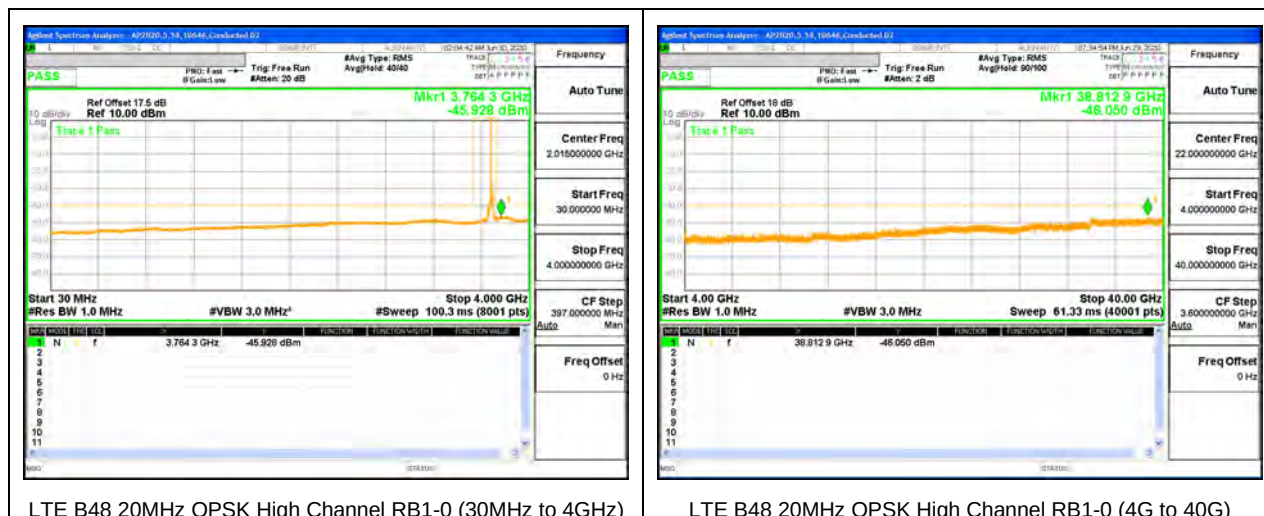
LTE B48 20MHz QPSK Low Channel RB1-0 (4G to 40G)



LTE B48 20MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)



LTE B48 20MHz QPSK Mid Channel RB1-0 (4G to 40G)



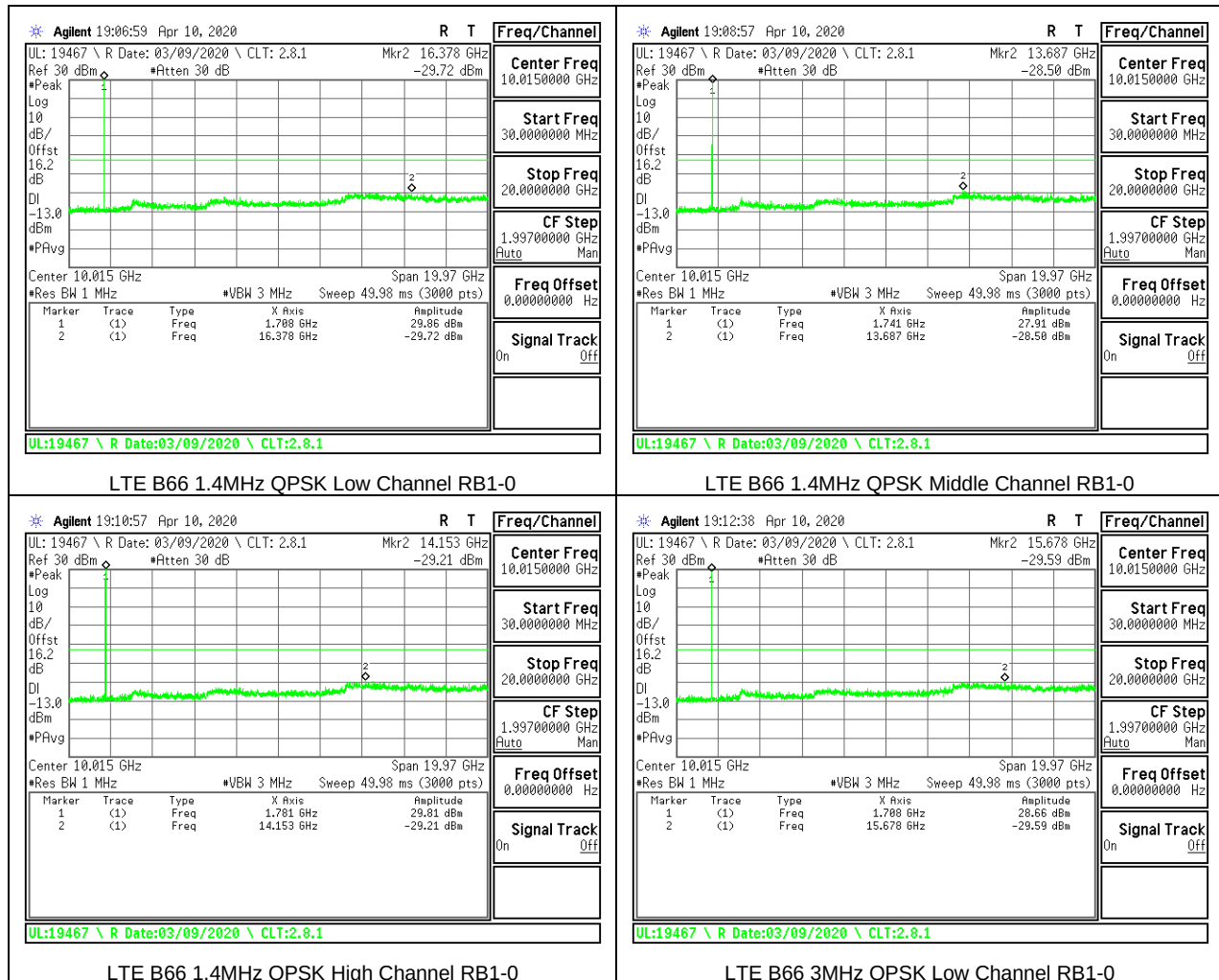


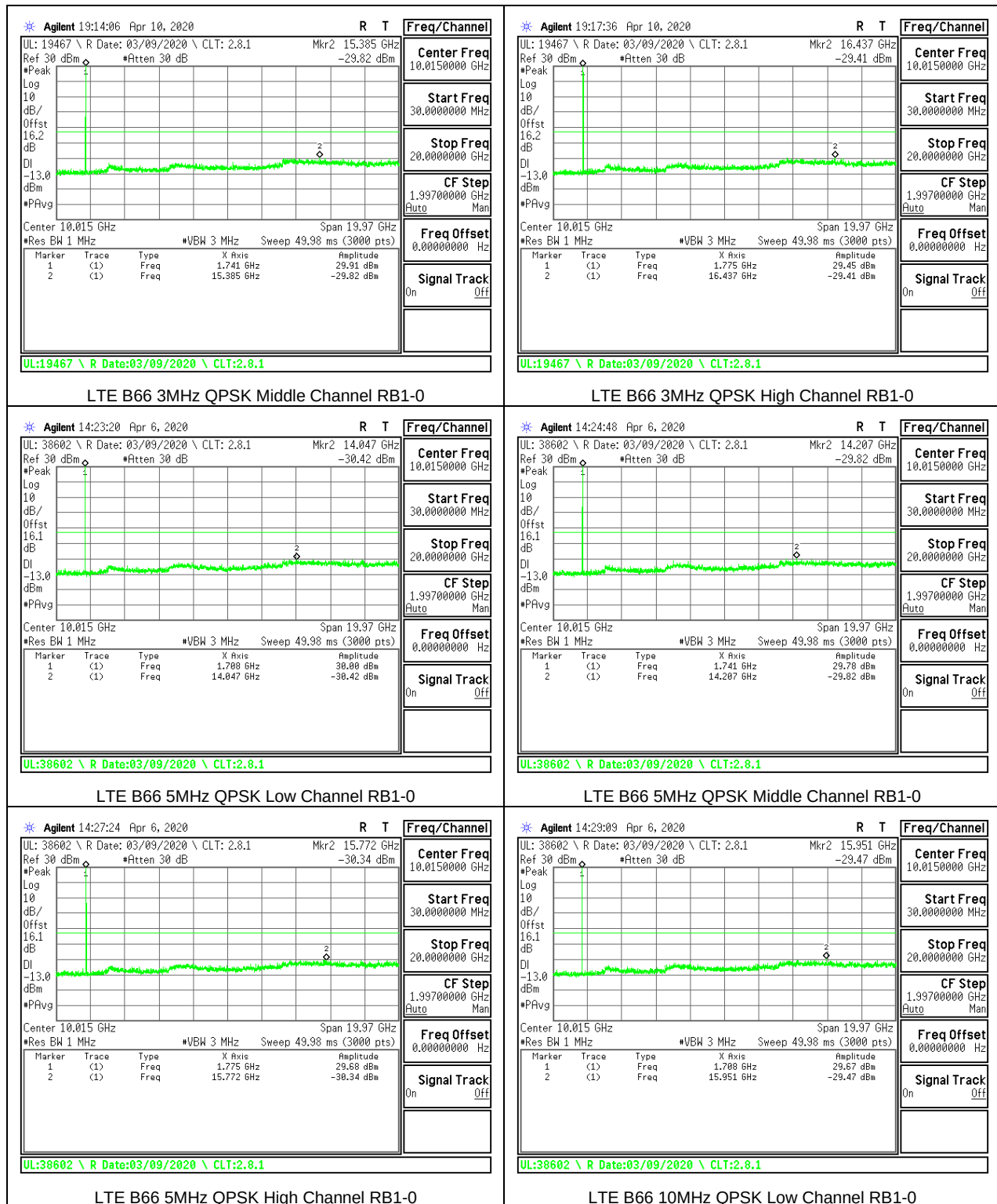
### 8.3.13. LTE BAND 66

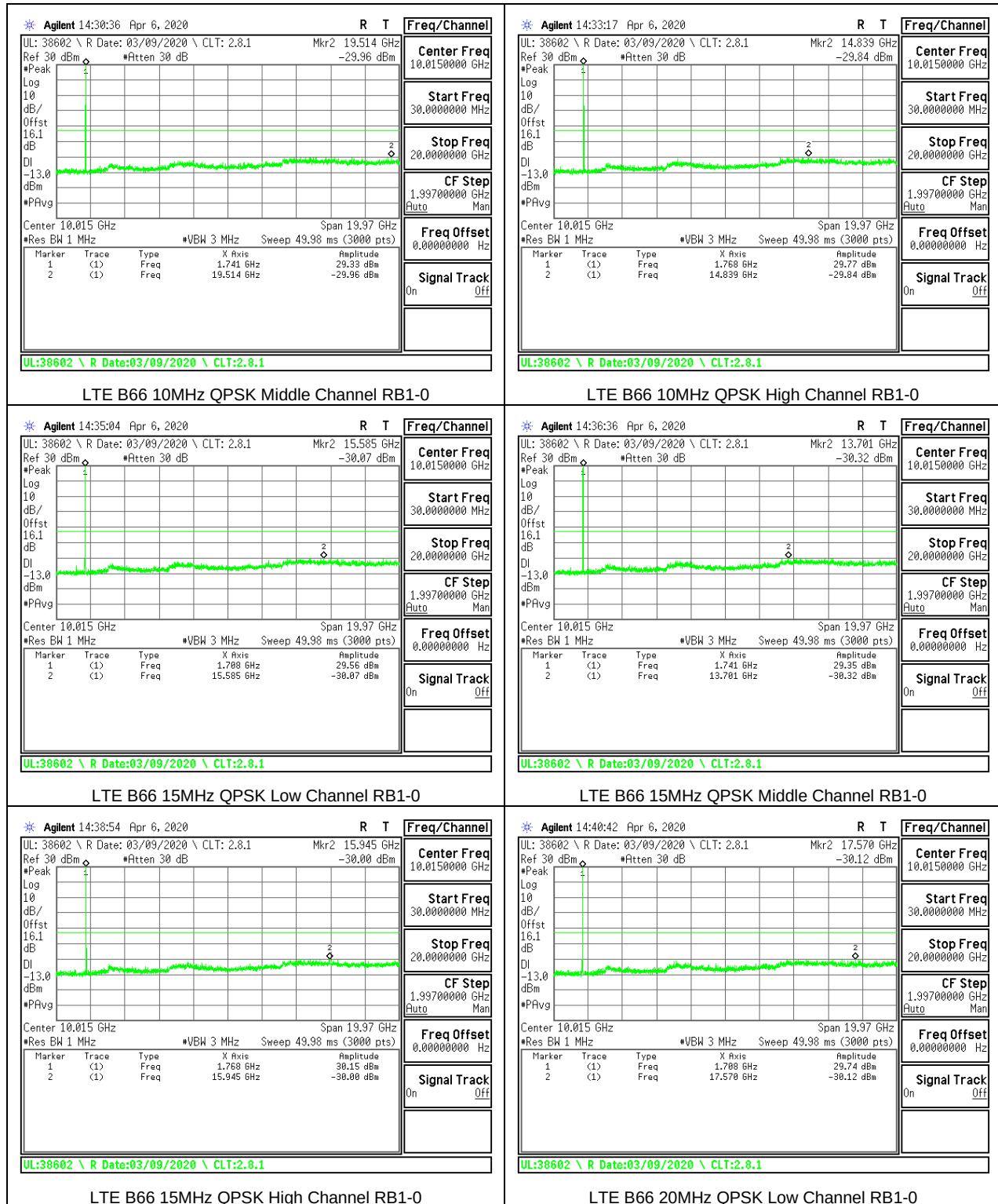
#### LIMITS

FCC: §27.53 (h)

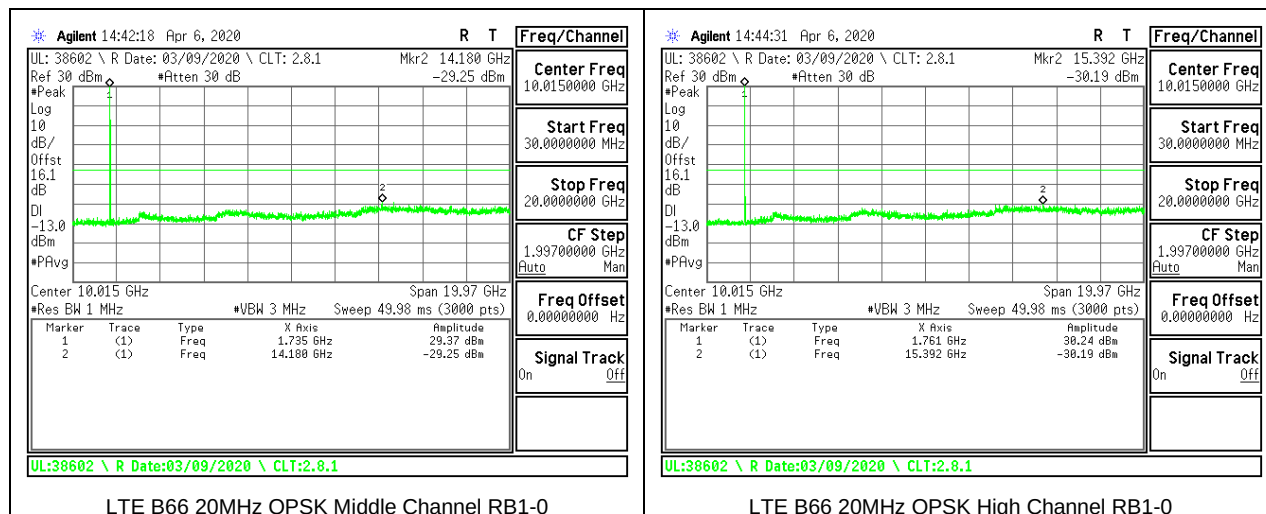
The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.









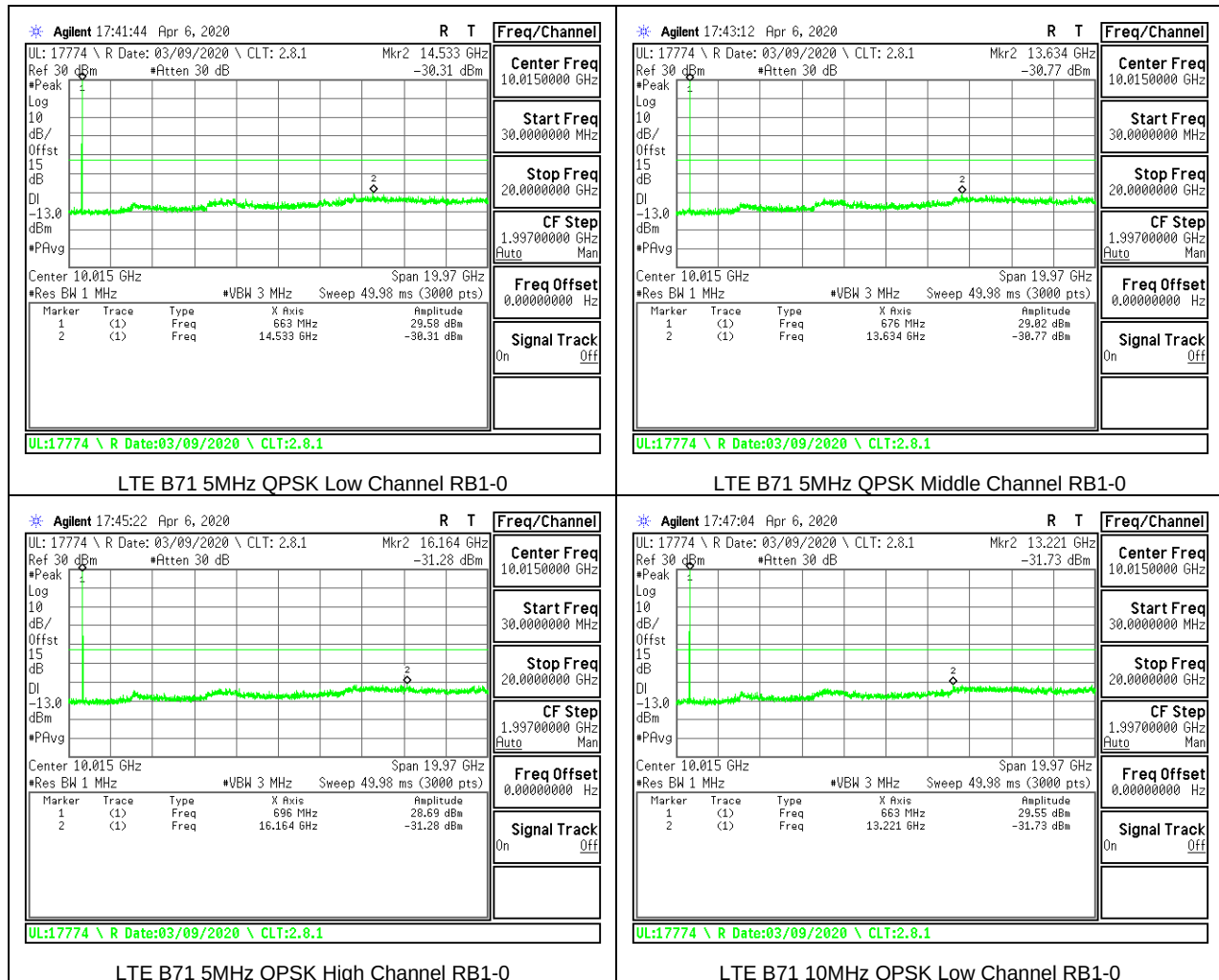


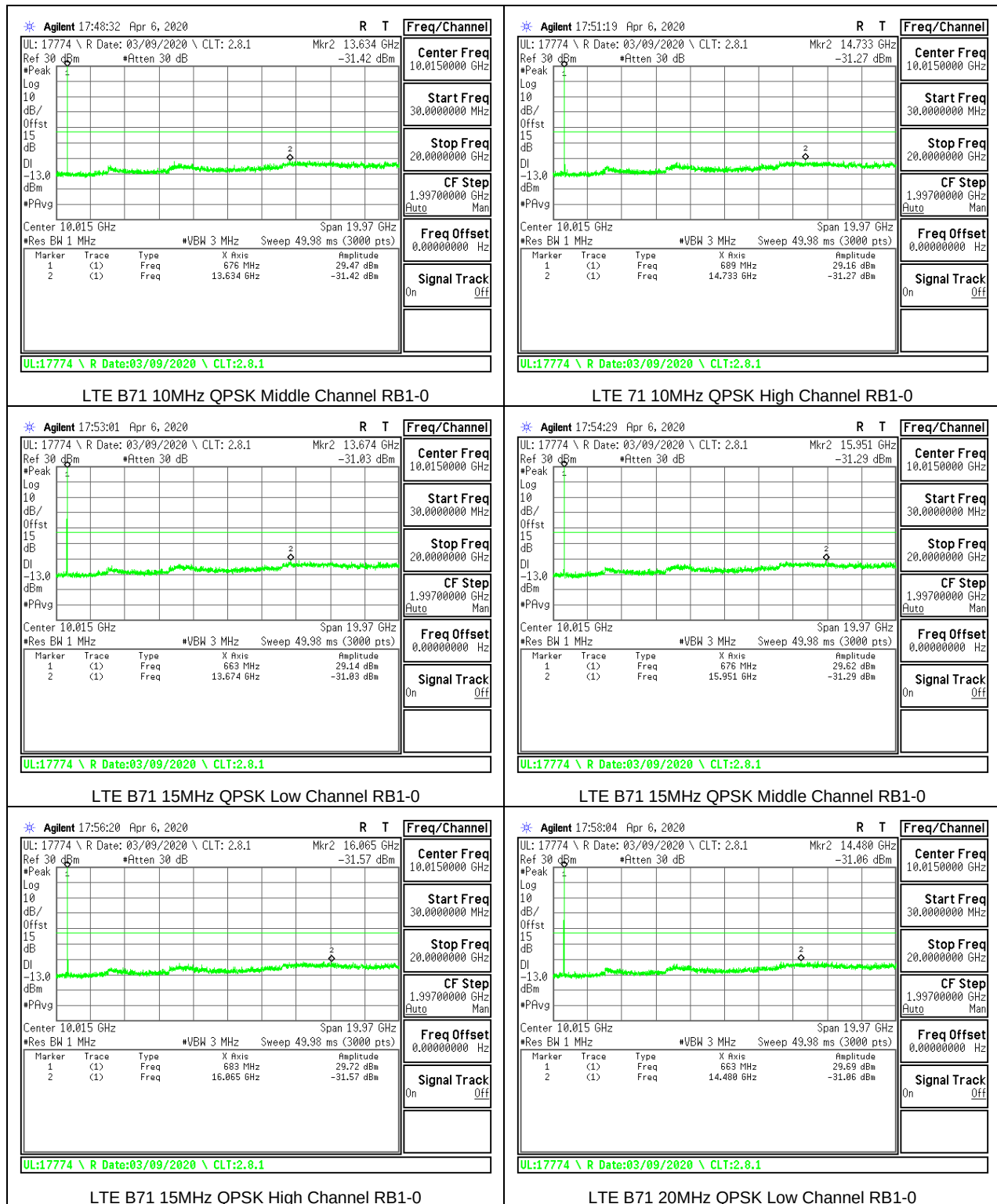
### 8.3.14. LTE BAND 71

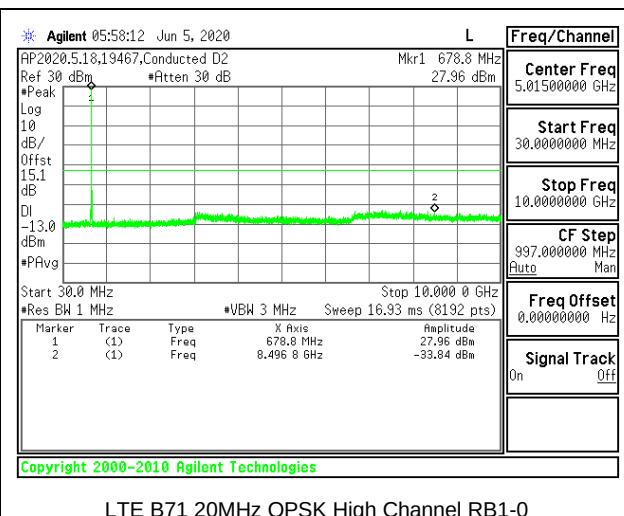
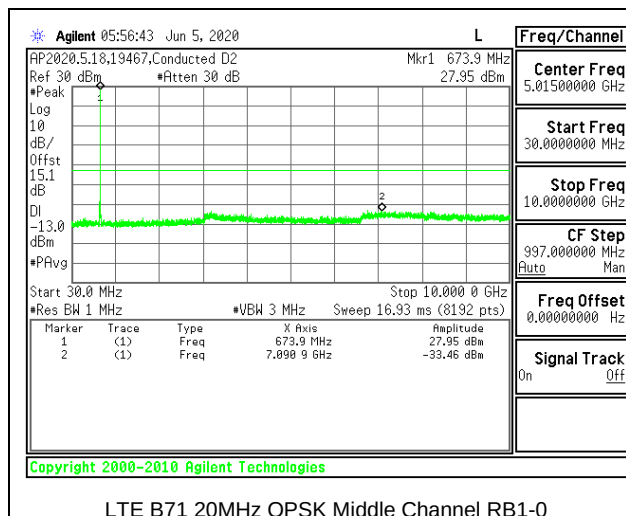
#### LIMITS

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

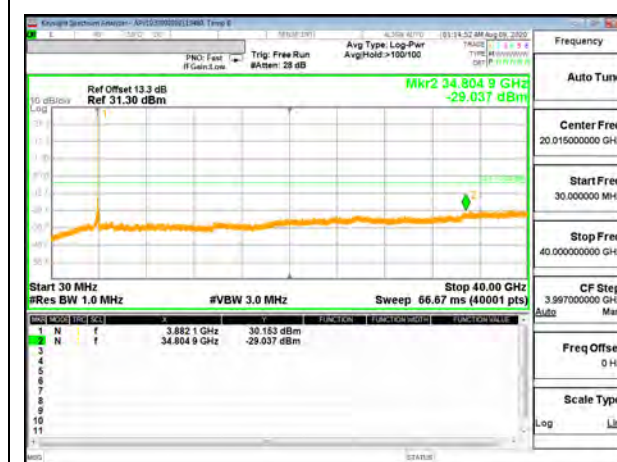
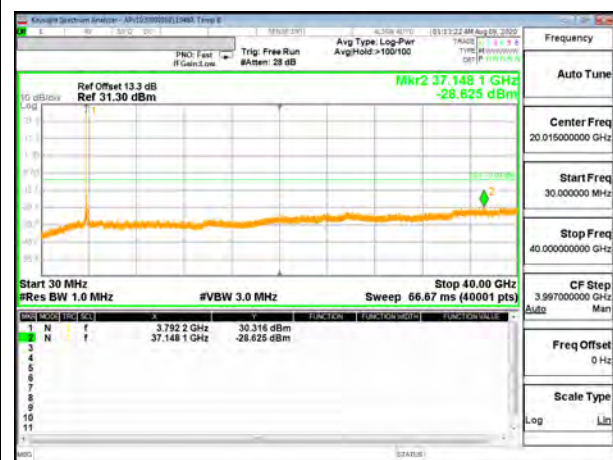
#### LIMITS

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.



## 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: 19178 Test Date: 6/20/2020

### 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    | 1850.9882                  | 1905.9904                   |               |                                 |
| Extreme (50C)  |           | 1850.9882                  | 1905.9904                   | -12.4         | -0.007                          |
| Extreme (40C)  |           | 1850.9882                  | 1905.9904                   | -12.6         | -0.007                          |
| Extreme (30C)  |           | 1850.9882                  | 1905.9904                   | -13.3         | -0.007                          |
| Extreme (10C)  |           | 1850.9882                  | 1905.9904                   | -9.3          | -0.005                          |
| Extreme (0C)   |           | 1850.9882                  | 1905.9904                   | 10.4          | 0.006                           |
| Extreme (-10C) |           | 1850.9882                  | 1905.9904                   | -11.1         | -0.006                          |
| Extreme (-20C) |           | 1850.9882                  | 1905.9904                   | -10.8         | -0.006                          |
| Extreme (-30C) |           | 1850.9882                  | 1905.9904                   | -11.8         | -0.006                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1850.9882                  | 1905.9904                   | -13.0         | -0.007                          |
|                | -15%      | 1850.9882                  | 1905.9904                   | -10.3         | -0.005                          |
|                | End Point | 1850.9882                  | 1905.9904                   | -12.8         | -0.007                          |

## 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: 19178 Test Date: 6/20/2020

### 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    | 824.4908                   | 848.5131                    |               |                                 |
| Extreme (50C)  |           | 824.4908                   | 848.5131                    | -8.0          | -0.010                          |
| Extreme (40C)  |           | 824.4908                   | 848.5131                    | -7.1          | -0.008                          |
| Extreme (30C)  |           | 824.4908                   | 848.5131                    | 6.3           | 0.008                           |
| Extreme (10C)  |           | 824.4908                   | 848.5131                    | 6.4           | 0.008                           |
| Extreme (0C)   |           | 824.4908                   | 848.5131                    | 7.7           | 0.009                           |
| Extreme (-10C) |           | 824.4908                   | 848.5131                    | 7.0           | 0.008                           |
| Extreme (-20C) |           | 824.4908                   | 848.5131                    | -4.0          | -0.005                          |
| Extreme (-30C) |           | 824.4908                   | 848.5131                    | 6.4           | 0.008                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 824.4908                   | 848.5131                    | 6.7           | 0.008                           |
|                | -15%      | 824.4908                   | 848.5131                    | -8.6          | -0.010                          |
|                | End Point | 824.4908                   | 848.5131                    | -5.6          | -0.007                          |



# **5G NR Band n5 QPSK (20MHz 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    | 824.4688                   | 847.4390                    |               |                                 |
| Extreme (50C)  |           | 824.4688                   | 847.4390                    | -11.6         | -0.014                          |
| Extreme (40C)  |           | 824.4688                   | 847.4390                    | -11.6         | -0.014                          |
| Extreme (30C)  |           | 824.4688                   | 847.4390                    | -12.4         | -0.015                          |
| Extreme (10C)  |           | 824.4688                   | 847.4390                    | -10.6         | -0.013                          |
| Extreme (0C)   |           | 824.4688                   | 847.4390                    | -10.4         | -0.012                          |
| Extreme (-10C) |           | 824.4688                   | 847.4390                    | -10.5         | -0.013                          |
| Extreme (-20C) |           | 824.4688                   | 847.4390                    | -10.4         | -0.012                          |
| Extreme (-30C) |           | 824.4688                   | 847.4390                    | -10.4         | -0.012                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 824.4688                   | 847.4390                    | -11.7         | -0.014                          |
|                | -15%      | 824.4688                   | 847.4390                    | -12.0         | -0.014                          |
|                | End Point | 824.4688                   | 847.4390                    | -10.2         | -0.012                          |

### 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: 19178 Test Date: 6/20/2020

#### 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    | 2500.9480                  | 2569.0016                   |               |                                 |
| Extreme (50C)  |           | 2500.9480                  | 2569.0016                   | -12.6         | -0.005                          |
| Extreme (40C)  |           | 2500.9480                  | 2569.0016                   | -14.6         | -0.006                          |
| Extreme (30C)  |           | 2500.9480                  | 2569.0016                   | -14.2         | -0.006                          |
| Extreme (10C)  |           | 2500.9480                  | 2569.0016                   | -13.7         | -0.005                          |
| Extreme (0C)   |           | 2500.9480                  | 2569.0016                   | -13.9         | -0.005                          |
| Extreme (-10C) |           | 2500.9480                  | 2569.0016                   | -15.5         | -0.006                          |
| Extreme (-20C) |           | 2500.9480                  | 2569.0016                   | 14.9          | 0.006                           |
| Extreme (-30C) |           | 2500.9480                  | 2569.0016                   | 14.7          | 0.006                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2500.9480                  | 2569.0016                   | -15.2         | -0.006                          |
|                | -15%      | 2500.9480                  | 2569.0016                   | -14.9         | -0.006                          |
|                | End Point | 2500.9480                  | 2569.0016                   | -13.8         | -0.005                          |

## 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: 19178      Test Date: 6/20/2020

### 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    | 699.4832                   | 715.4926                    |               |                                 |
| Extreme (50C)  |           | 699.4832                   | 715.4926                    | 3.9           | 0.005                           |
| Extreme (40C)  |           | 699.4832                   | 715.4926                    | -8.4          | -0.012                          |
| Extreme (30C)  |           | 699.4832                   | 715.4926                    | -6.7          | -0.009                          |
| Extreme (10C)  |           | 699.4832                   | 715.4926                    | -7.8          | -0.011                          |
| Extreme (0C)   |           | 699.4832                   | 715.4926                    | -6.1          | -0.009                          |
| Extreme (-10C) |           | 699.4832                   | 715.4926                    | 3.5           | 0.005                           |
| Extreme (-20C) |           | 699.4832                   | 715.4926                    | 5.2           | 0.007                           |
| Extreme (-30C) |           | 699.4832                   | 715.4926                    | 5.5           | 0.008                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 699.4832                   | 715.4926                    | -7.7          | -0.011                          |
|                | -15%      | 699.4832                   | 715.4926                    | -5.6          | -0.008                          |
|                | End Point | 699.4832                   | 715.4926                    | -5.8          | -0.008                          |

# **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    | 699.3861                   | 714.8681                    |               |                                 |
| Extreme (50C)  |           | 699.3861                   | 714.8681                    | -14.2         | -0.020                          |
| Extreme (40C)  |           | 699.3861                   | 714.8681                    | -13.9         | -0.020                          |
| Extreme (30C)  |           | 699.3861                   | 714.8681                    | -13.5         | -0.019                          |
| Extreme (10C)  |           | 699.3861                   | 714.8681                    | -12.1         | -0.017                          |
| Extreme (0C)   |           | 699.3861                   | 714.8681                    | -13.6         | -0.019                          |
| Extreme (-10C) |           | 699.3861                   | 714.8681                    | -13.1         | -0.018                          |
| Extreme (-20C) |           | 699.3861                   | 714.8681                    | -13.4         | -0.019                          |
| Extreme (-30C) |           | 699.3861                   | 714.8681                    | -16.3         | -0.023                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 699.3861                   | 714.8681                    | -16.6         | -0.023                          |
|                | -15%      | 699.3861                   | 714.8681                    | -14.2         | -0.020                          |
|                | End Point | 699.3861                   | 714.8681                    | -15.1         | -0.021                          |

## 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: 19178 Test Date: 6/20/2020

### 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    | 777.4813                   | 786.5034                    |               |                                 |
| Extreme (50C)  |           | 777.4813                   | 786.5034                    | 4.3           | 0.005                           |
| Extreme (40C)  |           | 777.4813                   | 786.5034                    | 4.4           | 0.006                           |
| Extreme (30C)  |           | 777.4813                   | 786.5034                    | -6.0          | -0.008                          |
| Extreme (10C)  |           | 777.4813                   | 786.5034                    | -5.9          | -0.008                          |
| Extreme (0C)   |           | 777.4813                   | 786.5034                    | -6.6          | -0.008                          |
| Extreme (-10C) |           | 777.4813                   | 786.5034                    | 6.2           | 0.008                           |
| Extreme (-20C) |           | 777.4813                   | 786.5034                    | -7.9          | -0.010                          |
| Extreme (-30C) |           | 777.4813                   | 786.5034                    | 5.8           | 0.007                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 777.4813                   | 786.5034                    | -6.8          | -0.009                          |
|                | -15%      | 777.4813                   | 786.5034                    | -5.2          | -0.007                          |
|                | End Point | 777.4813                   | 786.5034                    | -6.4          | -0.008                          |



## 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: 19178 Test Date: 6/20/2020

### 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    | 788.3001                   | 797.6981                    |               |                                 |
| Extreme (50C)  |           | 788.3001                   | 797.6981                    | -4.1          | -0.005                          |
| Extreme (40C)  |           | 788.3001                   | 797.6981                    | -4.8          | -0.006                          |
| Extreme (30C)  |           | 788.3001                   | 797.6981                    | -4.8          | -0.006                          |
| Extreme (10C)  |           | 788.3001                   | 797.6981                    | -4.7          | -0.006                          |
| Extreme (0C)   |           | 788.3001                   | 797.6981                    | -2.4          | -0.003                          |
| Extreme (-10C) |           | 788.3001                   | 797.6981                    | 2.1           | 0.003                           |
| Extreme (-20C) |           | 788.3001                   | 797.6981                    | 2.1           | 0.003                           |
| Extreme (-30C) |           | 788.3001                   | 797.6981                    | -2.9          | -0.004                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 788.3001                   | 797.6981                    | -5.0          | -0.006                          |
|                | -15%      | 788.3001                   | 797.6981                    | -3.6          | -0.005                          |
|                | End Point | 788.3001                   | 797.6981                    | -4.1          | -0.005                          |

## 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: 19178 Test Date: 6/20/2020

### 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    | 704.4893                   | 715.5222                    |               |                                 |
| Extreme (50C)  |           | 704.4893                   | 715.5222                    | 3.7           | 0.005                           |
| Extreme (40C)  |           | 704.4893                   | 715.5222                    | -7.3          | -0.010                          |
| Extreme (30C)  |           | 704.4893                   | 715.5222                    | 4.0           | 0.006                           |
| Extreme (10C)  |           | 704.4893                   | 715.5222                    | -7.1          | -0.010                          |
| Extreme (0C)   |           | 704.4893                   | 715.5222                    | -7.7          | -0.011                          |
| Extreme (-10C) |           | 704.4893                   | 715.5222                    | -4.3          | -0.006                          |
| Extreme (-20C) |           | 704.4893                   | 715.5222                    | -4.9          | -0.007                          |
| Extreme (-30C) |           | 704.4893                   | 715.5222                    | 6.1           | 0.009                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 704.4893                   | 715.5222                    | -2.2          | -0.003                          |
|                | -15%      | 704.4893                   | 715.5222                    | -3.4          | -0.005                          |
|                | End Point | 704.4893                   | 715.5222                    | -8.3          | -0.012                          |

## 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: 19178 Test Date: 6/20/2020

### 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    | 1850.9939         | 1913.9905          |               |                                 |
| Extreme (50C)  |           | 1850.9939         | 1913.9905          | 8.0           | 0.004                           |
| Extreme (40C)  |           | 1850.9939         | 1913.9905          | -15.7         | -0.008                          |
| Extreme (30C)  |           | 1850.9939         | 1913.9905          | -14.3         | -0.008                          |
| Extreme (10C)  |           | 1850.9939         | 1913.9905          | -13.5         | -0.007                          |
| Extreme (0C)   |           | 1850.9939         | 1913.9905          | -12.8         | -0.007                          |
| Extreme (-10C) |           | 1850.9939         | 1913.9905          | -13.2         | -0.007                          |
| Extreme (-20C) |           | 1850.9939         | 1913.9905          | -13.4         | -0.007                          |
| Extreme (-30C) |           | 1850.9939         | 1913.9905          | -15.0         | -0.008                          |
|                |           |                   |                    |               |                                 |
| 20C            | 15%       | 1850.9939         | 1913.9905          | -14.0         | -0.007                          |
|                | -15%      | 1850.9939         | 1913.9905          | 7.5           | 0.004                           |
|                | End Point | 1850.9939         | 1913.9905          | -9.4          | -0.005                          |

## 8.4.9. LTE BAND 26 (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: 19178 Test Date: 6/20/2020

### 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    | 814.4997                   | 823.5121                    |               |                                 |
| Extreme (50C)  |           | 814.4997                   | 823.5121                    | -4.8          | -0.006                          |
| Extreme (40C)  |           | 814.4997                   | 823.5121                    | -7.9          | -0.010                          |
| Extreme (30C)  |           | 814.4997                   | 823.5121                    | -9.2          | -0.011                          |
| Extreme (10C)  |           | 814.4997                   | 823.5121                    | -7.2          | -0.009                          |
| Extreme (0C)   |           | 814.4997                   | 823.5121                    | -4.0          | -0.005                          |
| Extreme (-10C) |           | 814.4997                   | 823.5121                    | -7.9          | -0.010                          |
| Extreme (-20C) |           | 814.4997                   | 823.5121                    | -8.4          | -0.010                          |
| Extreme (-30C) |           | 814.4997                   | 823.5121                    | -8.4          | -0.010                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 814.4997                   | 823.5121                    | -6.8          | -0.008                          |
|                | -15%      | 814.4997                   | 823.5121                    | -9.2          | -0.011                          |
|                | End Point | 814.4997                   | 823.5121                    | -11.6         | -0.014                          |

## 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: 19178      Test Date: 6/20/2020

### 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    | 2305.4975                  | 2314.5289                   |               |                                 |
| Extreme (50C)  |           | 2305.4975                  | 2314.5289                   | -16.4         | -0.007                          |
| Extreme (40C)  |           | 2305.4975                  | 2314.5289                   | -17.2         | -0.007                          |
| Extreme (30C)  |           | 2305.4975                  | 2314.5289                   | -15.2         | -0.007                          |
| Extreme (10C)  |           | 2305.4975                  | 2314.5289                   | -13.7         | -0.006                          |
| Extreme (0C)   |           | 2305.4975                  | 2314.5289                   | -13.2         | -0.006                          |
| Extreme (-10C) |           | 2305.4975                  | 2314.5289                   | -15.2         | -0.007                          |
| Extreme (-20C) |           | 2305.4975                  | 2314.5289                   | 10.9          | 0.005                           |
| Extreme (-30C) |           | 2305.4975                  | 2314.5289                   | -15.5         | -0.007                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2305.4975                  | 2314.5289                   | -17.7         | -0.008                          |
|                | -15%      | 2305.4975                  | 2314.5289                   | 16.5          | 0.007                           |
|                | End Point | 2305.4975                  | 2314.5289                   | -15.3         | -0.007                          |

### 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: 19178 Test Date: 6/20/2020

#### LTE BAND 41 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    | 2496.8828                  | 2689.1939                   |               |                                 |
| Extreme (50C)  |           | 2496.8828                  | 2689.1939                   | -16.2         | -0.006                          |
| Extreme (40C)  |           | 2496.8828                  | 2689.1939                   | -23.8         | -0.009                          |
| Extreme (30C)  |           | 2496.8828                  | 2689.1939                   | -18.3         | -0.007                          |
| Extreme (10C)  |           | 2496.8828                  | 2689.1939                   | -25.0         | -0.010                          |
| Extreme (0C)   |           | 2496.8828                  | 2689.1939                   | -15.3         | -0.006                          |
| Extreme (-10C) |           | 2496.8828                  | 2689.1939                   | -18.6         | -0.007                          |
| Extreme (-20C) |           | 2496.8828                  | 2689.1939                   | -15.8         | -0.006                          |
| Extreme (-30C) |           | 2496.8828                  | 2689.1939                   | -19.9         | -0.008                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2496.8828                  | 2689.1939                   | -22.1         | -0.009                          |
|                | -15%      | 2496.8828                  | 2689.1939                   | -23.5         | -0.009                          |
|                | End Point | 2496.8828                  | 2689.1939                   | -24.1         | -0.009                          |



### 5G NR Band n41 QPSK (100MHz 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    | 2497.0086                  | 2687.9440                   |               |                                 |
| Extreme (50C)  |           | 2497.0086                  | 2687.9440                   | -29.7         | -0.011                          |
| Extreme (40C)  |           | 2497.0086                  | 2687.9440                   | -37.1         | -0.014                          |
| Extreme (30C)  |           | 2497.0086                  | 2687.9440                   | -27.1         | -0.010                          |
| Extreme (10C)  |           | 2497.0086                  | 2687.9440                   | -31.0         | -0.012                          |
| Extreme (0C)   |           | 2497.0086                  | 2687.9440                   | -34.1         | -0.013                          |
| Extreme (-10C) |           | 2497.0086                  | 2687.9440                   | -28.8         | -0.011                          |
| Extreme (-20C) |           | 2497.0086                  | 2687.9440                   | -30.0         | -0.012                          |
| Extreme (-30C) |           | 2497.0086                  | 2687.9440                   | -36.2         | -0.014                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 2497.0086                  | 2687.9440                   | -30.3         | -0.012                          |
|                | -15%      | 2497.0086                  | 2687.9440                   | -31.8         | -0.012                          |
|                | End Point | 2497.0086                  | 2687.9440                   | -34.1         | -0.013                          |

## 8.4.12. LTE BAND 48

Test Engineer ID: 19178 Test Date: 6/20/2020

### QPSK (20MHz BANDWIDTH)

| Limit          |           | 3550                       | 3700                        | 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    | 3550.9327                  | 3699.7246                   |               |                                 |
| Extreme (50C)  |           | 3550.9327                  | 3699.7246                   | -18.5         | -0.005                          |
| Extreme (40C)  |           | 3550.9326                  | 3699.7245                   | -22.4         | -0.006                          |
| Extreme (30C)  |           | 3550.9327                  | 3699.7246                   | -15.6         | -0.004                          |
| Extreme (10C)  |           | 3550.9327                  | 3699.7246                   | -9.7          | -0.003                          |
| Extreme (0C)   |           | 3550.9327                  | 3699.7246                   | -13.5         | -0.004                          |
| Extreme (-10C) |           | 3550.9327                  | 3699.7246                   | -19.3         | -0.005                          |
| Extreme (-20C) |           | 3550.9326                  | 3699.7245                   | -24.1         | -0.007                          |
| Extreme (-30C) |           | 3550.9327                  | 3699.7246                   | -16.4         | -0.005                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 3550.9327                  | 3699.7246                   | 14.4          | 0.004                           |
|                | -15%      | 3550.9327                  | 3699.7246                   | 16.8          | 0.005                           |
|                | End Point | 3550.9326                  | 3699.7245                   | -21.8         | -0.006                          |

### 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: 19178 Test Date: 6/20/2020

#### 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    | 1710.9539                  | 1779.0106                   |               |                                 |
| Extreme (50C)  |           | 1710.9539                  | 1779.0106                   | -7.1          | -0.004                          |
| Extreme (40C)  |           | 1710.9539                  | 1779.0106                   | -12.1         | -0.007                          |
| Extreme (30C)  |           | 1710.9539                  | 1779.0106                   | -12.4         | -0.007                          |
| Extreme (10C)  |           | 1710.9539                  | 1779.0106                   | 8.9           | 0.005                           |
| Extreme (0C)   |           | 1710.9539                  | 1779.0106                   | -11.4         | -0.007                          |
| Extreme (-10C) |           | 1710.9539                  | 1779.0106                   | -14.5         | -0.008                          |
| Extreme (-20C) |           | 1710.9539                  | 1779.0106                   | -10.9         | -0.006                          |
| Extreme (-30C) |           | 1710.9539                  | 1779.0106                   | -12.9         | -0.007                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1710.9539                  | 1779.0106                   | -14.6         | -0.008                          |
|                | -15%      | 1710.9539                  | 1779.0106                   | -11.8         | -0.007                          |
|                | End Point | 1710.9539                  | 1779.0106                   | -10.6         | -0.006                          |

## 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: 19178 Test Date: 6/20/2020

### 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    | 664.0041                   | 696.9964                    |               |                                 |
| Extreme (50C)  |           | 664.0041                   | 696.9964                    | -5.4          | -0.008                          |
| Extreme (40C)  |           | 664.0041                   | 696.9964                    | -4.5          | -0.007                          |
| Extreme (30C)  |           | 664.0041                   | 696.9964                    | 3.9           | 0.006                           |
| Extreme (10C)  |           | 664.0041                   | 696.9964                    | -4.2          | -0.006                          |
| Extreme (0C)   |           | 664.0041                   | 696.9964                    | 4.1           | 0.006                           |
| Extreme (-10C) |           | 664.0041                   | 696.9964                    | 4.7           | 0.007                           |
| Extreme (-20C) |           | 664.0041                   | 696.9964                    | 4.2           | 0.006                           |
| Extreme (-30C) |           | 664.0041                   | 696.9964                    | 5.9           | 0.009                           |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 664.0041                   | 696.9964                    | -3.6          | -0.005                          |
|                | -15%      | 664.0041                   | 696.9964                    | -4.0          | -0.006                          |
|                | End Point | 664.0041                   | 696.9964                    | -4.1          | -0.006                          |

### 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: 19480 Test Date: 8/5/2020

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

| Limit          |           | 3700                       | 3980                        | 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    | 3700.9181                  | 3977.9774                   |               |                                 |
| Extreme (50C)  |           | 3700.9181                  | 3977.9774                   | -31.8         | -0.008                          |
| Extreme (40C)  |           | 3700.9181                  | 3977.9774                   | 30.1          | 0.008                           |
| Extreme (30C)  |           | 3700.9181                  | 3977.9774                   | -34.9         | -0.009                          |
| Extreme (10C)  |           | 3700.9181                  | 3977.9774                   | 29.6          | 0.008                           |
| Extreme (0C)   |           | 3700.9181                  | 3977.9774                   | 34.2          | 0.009                           |
| Extreme (-10C) |           | 3700.9181                  | 3977.9774                   | -34.7         | -0.009                          |
| Extreme (-20C) |           | 3700.9181                  | 3977.9774                   | 31.9          | 0.008                           |
| Extreme (-30C) |           | 3700.9180                  | 3977.9773                   | -53.5         | -0.014                          |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 3700.9181                  | 3977.9774                   | -34.9         | -0.009                          |
|                | -15%      | 3700.9181                  | 3977.9774                   | 42.6          | 0.011                           |
|                | End Point | 3700.9181                  | 3977.9774                   | 33.0          | 0.009                           |

## **8.5. PEAK-TO-AVERAGE POWER RATIO**

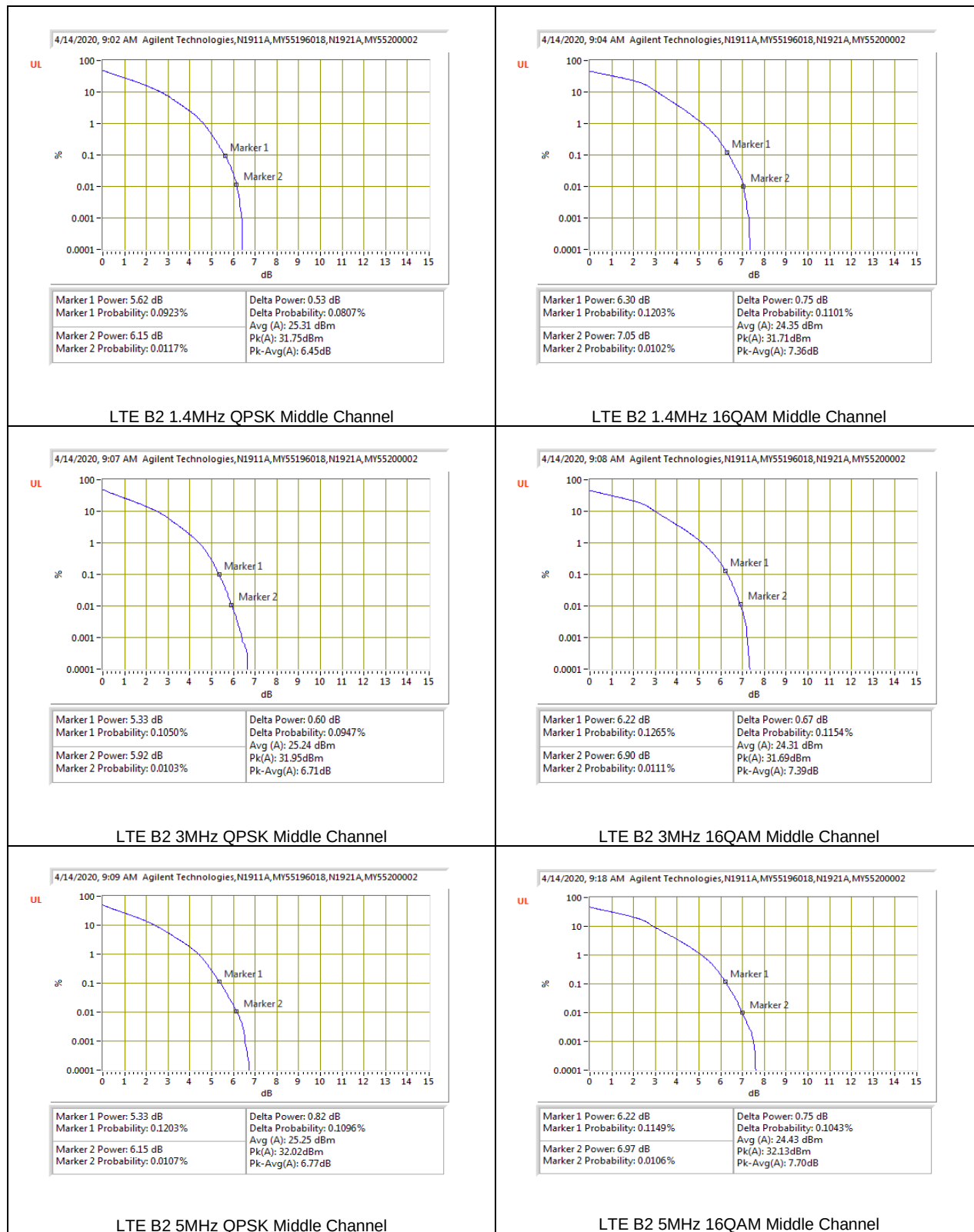
### **LIMIT**

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



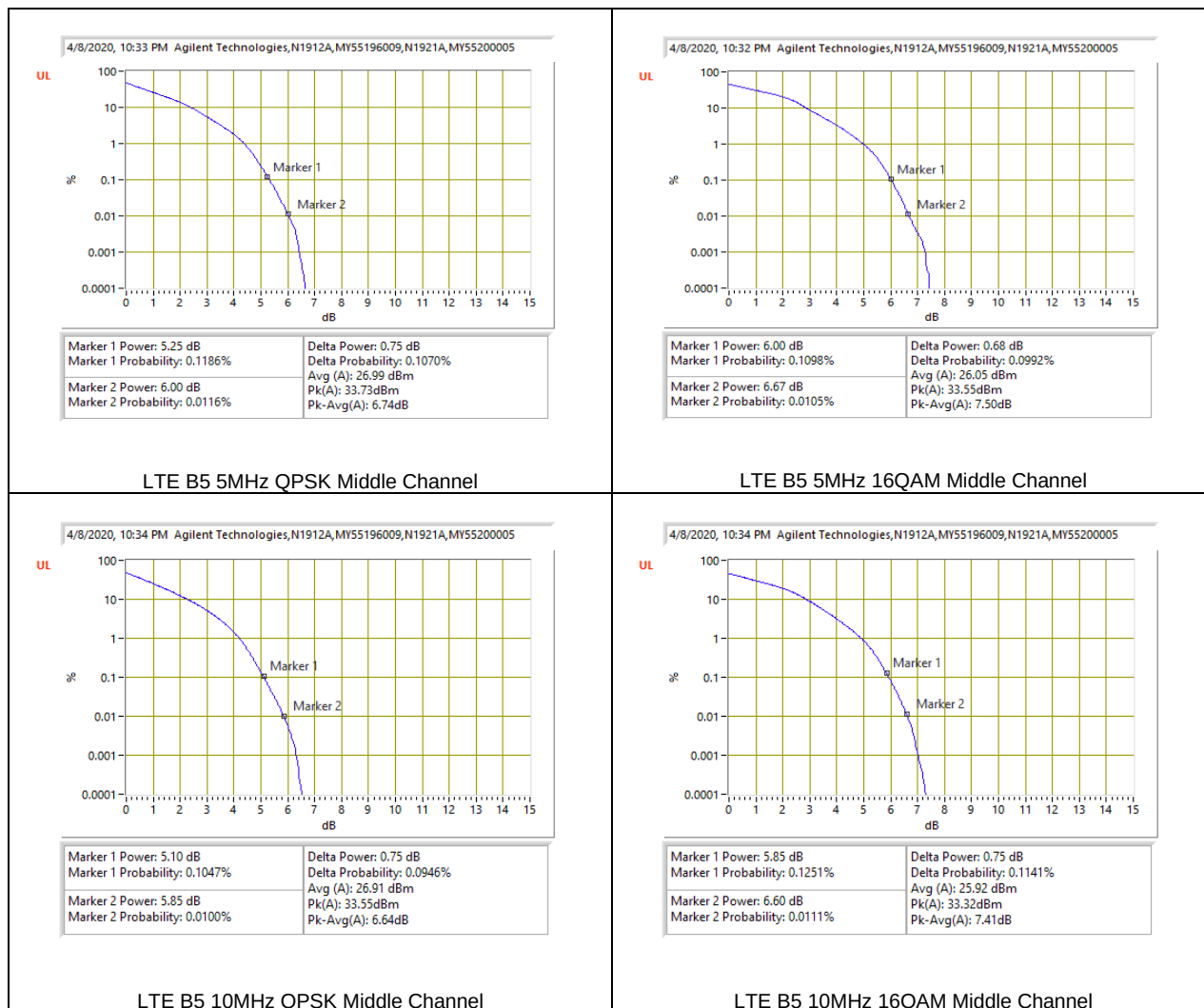




## 8.5.2. LTE BAND 5 AND 5G NR Band n5

### LTE BAND 5

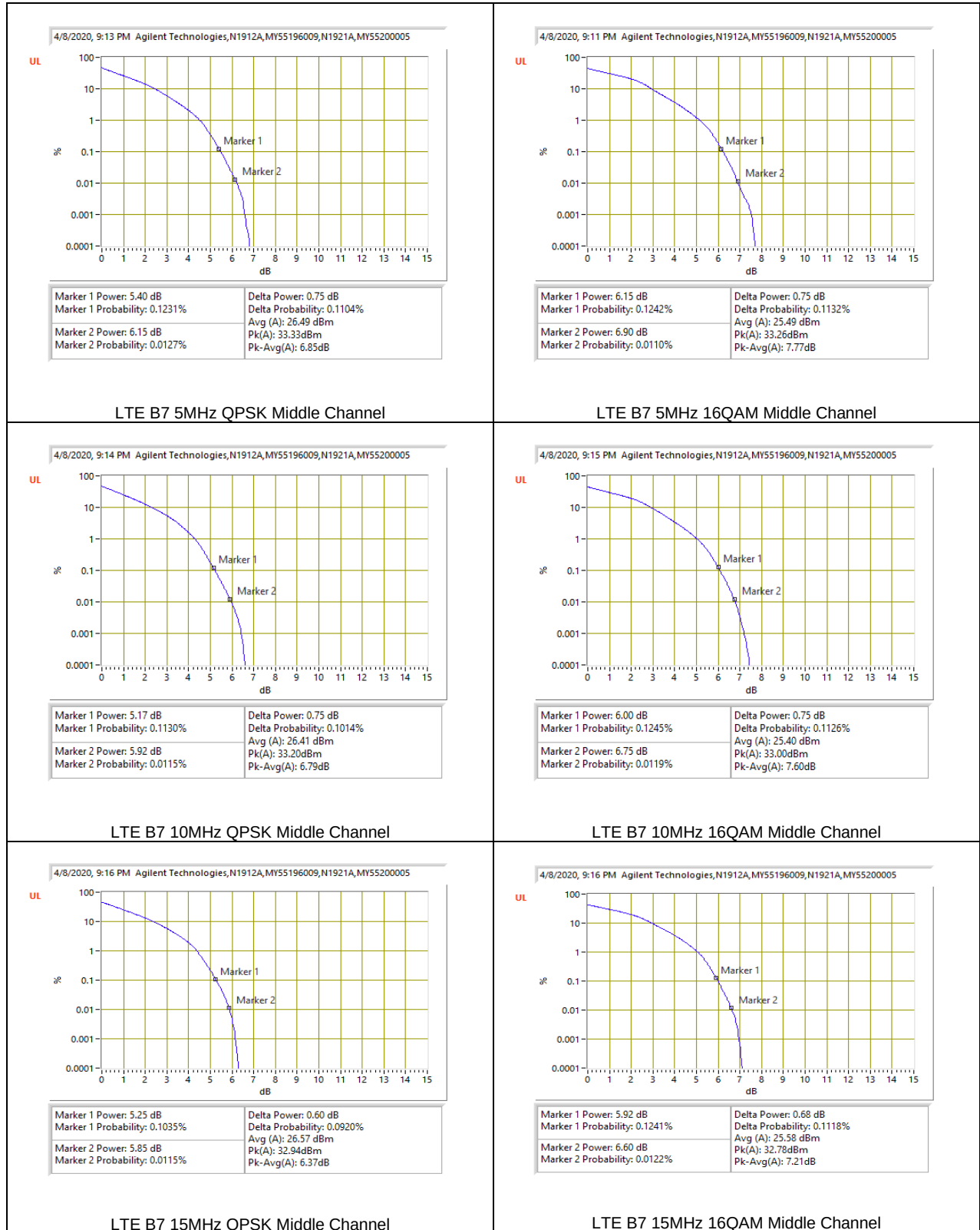


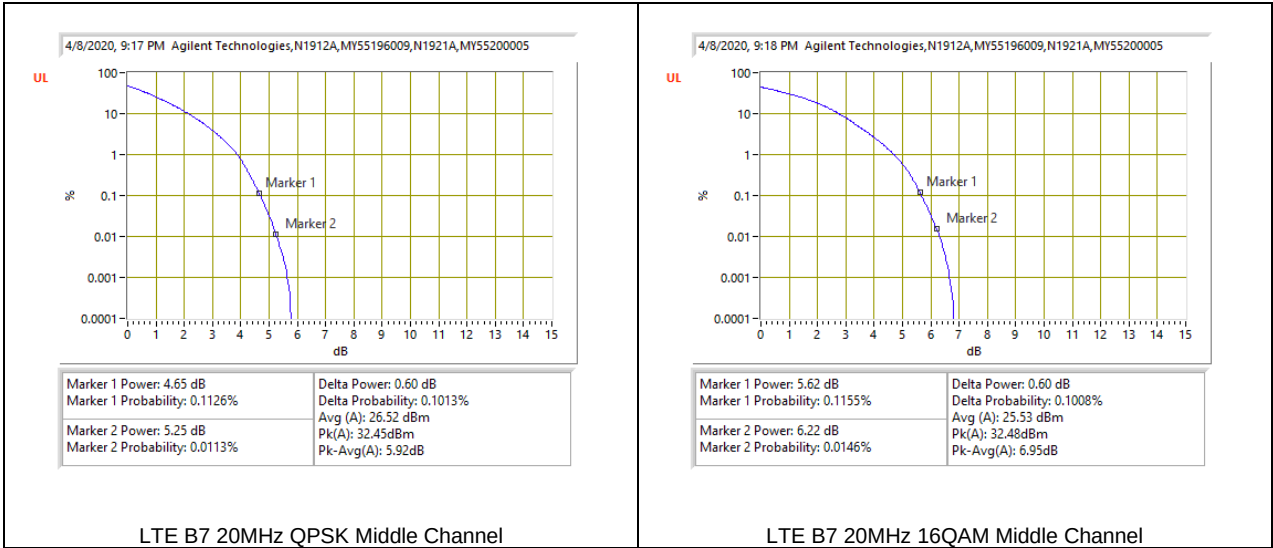


## 5G NR Band n5



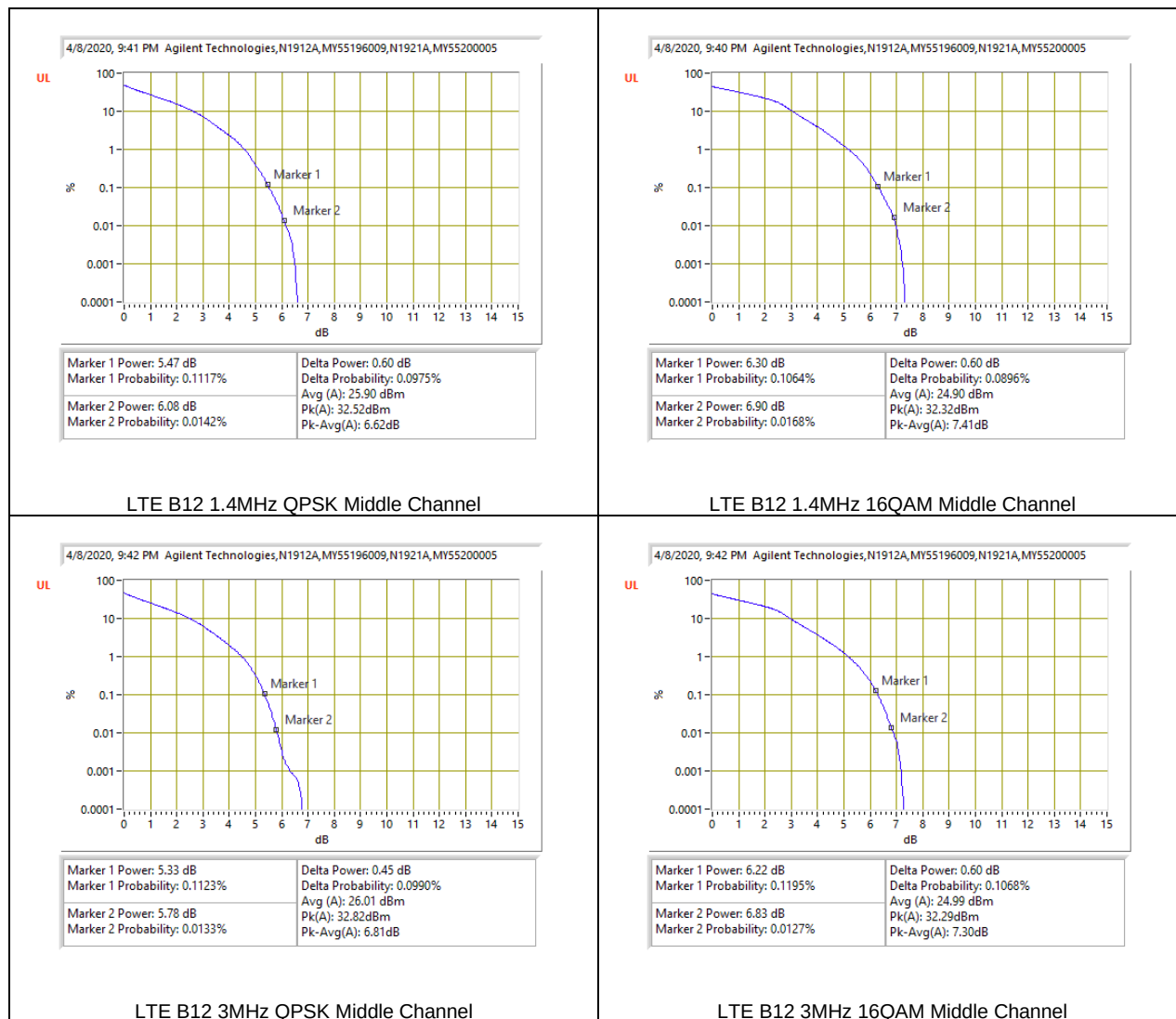
### 8.5.3. LTE BAND 7

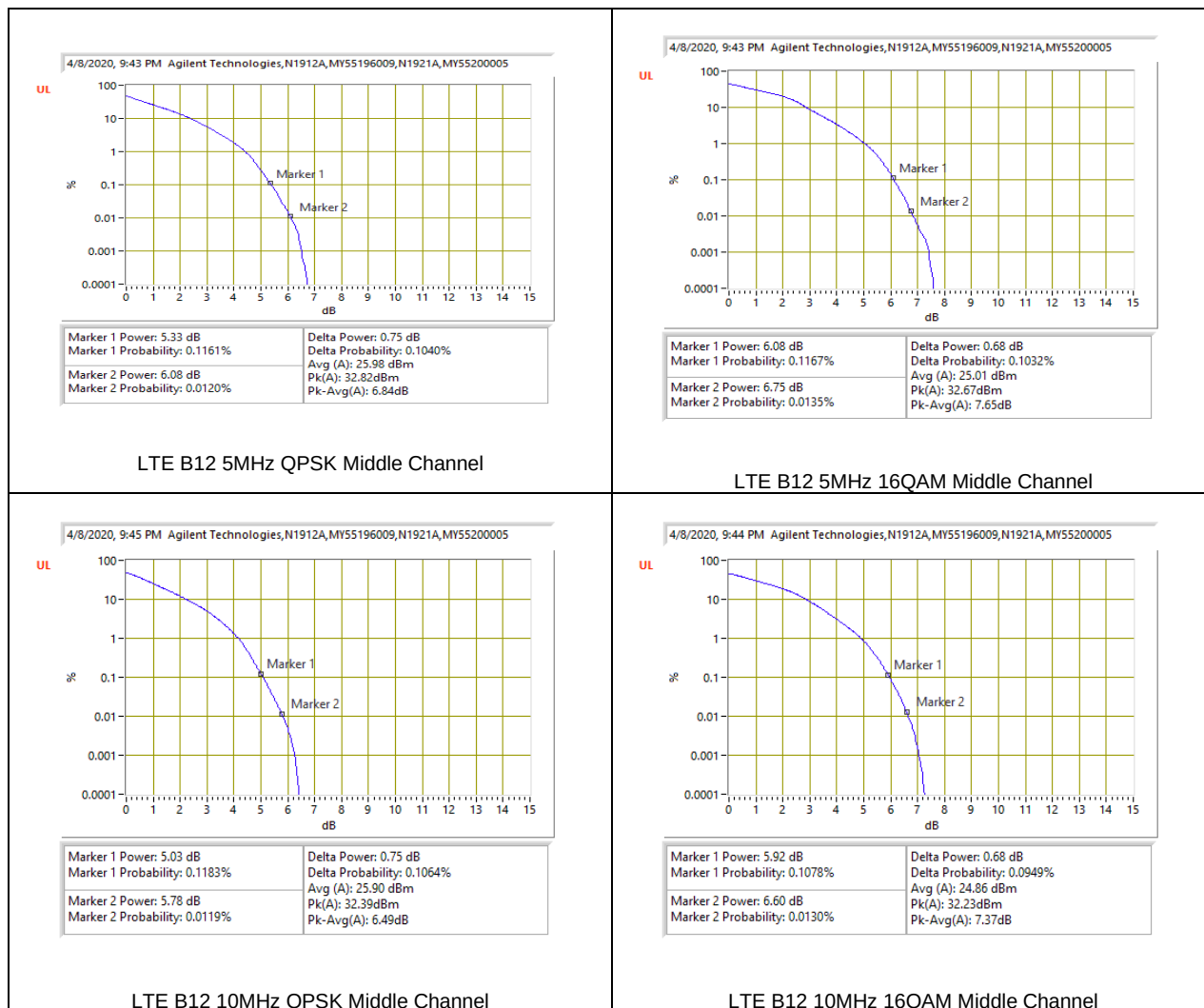




## 8.5.4. LTE BAND 12 AND 5G NR Band n12

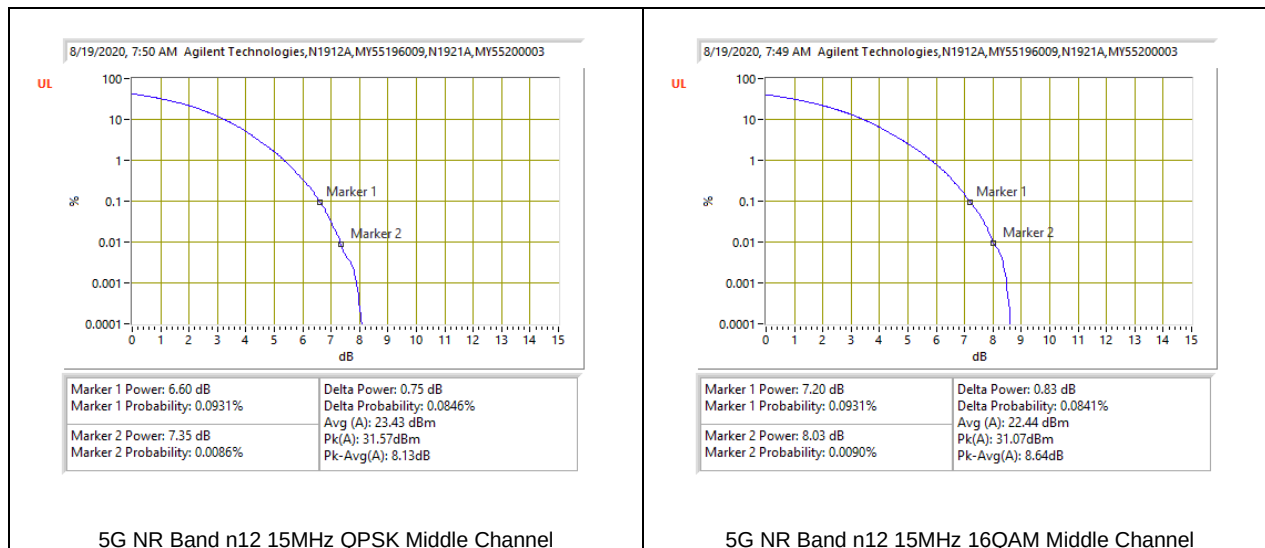
### LTE BAND 12



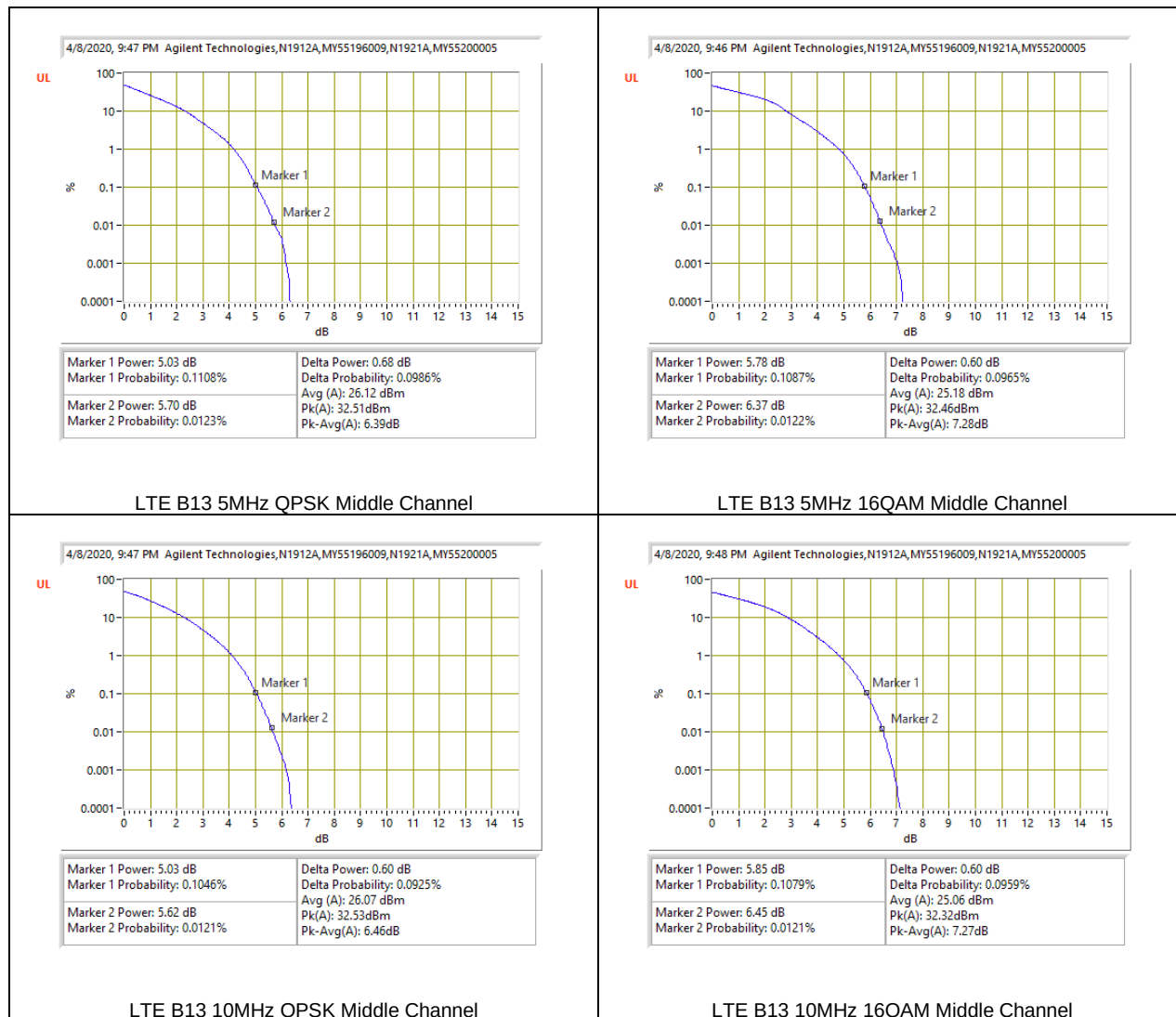




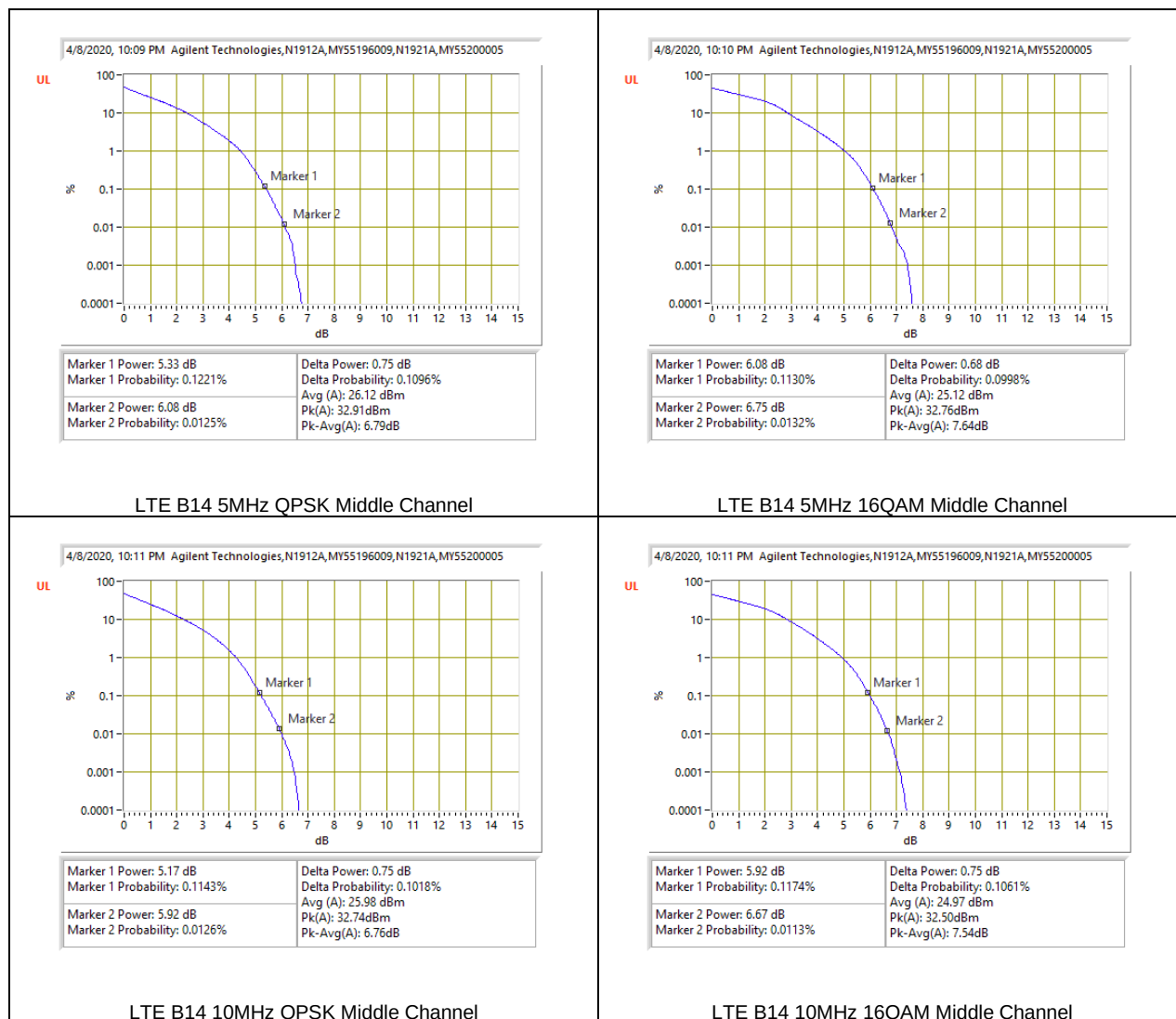
## 5G NR Band n12



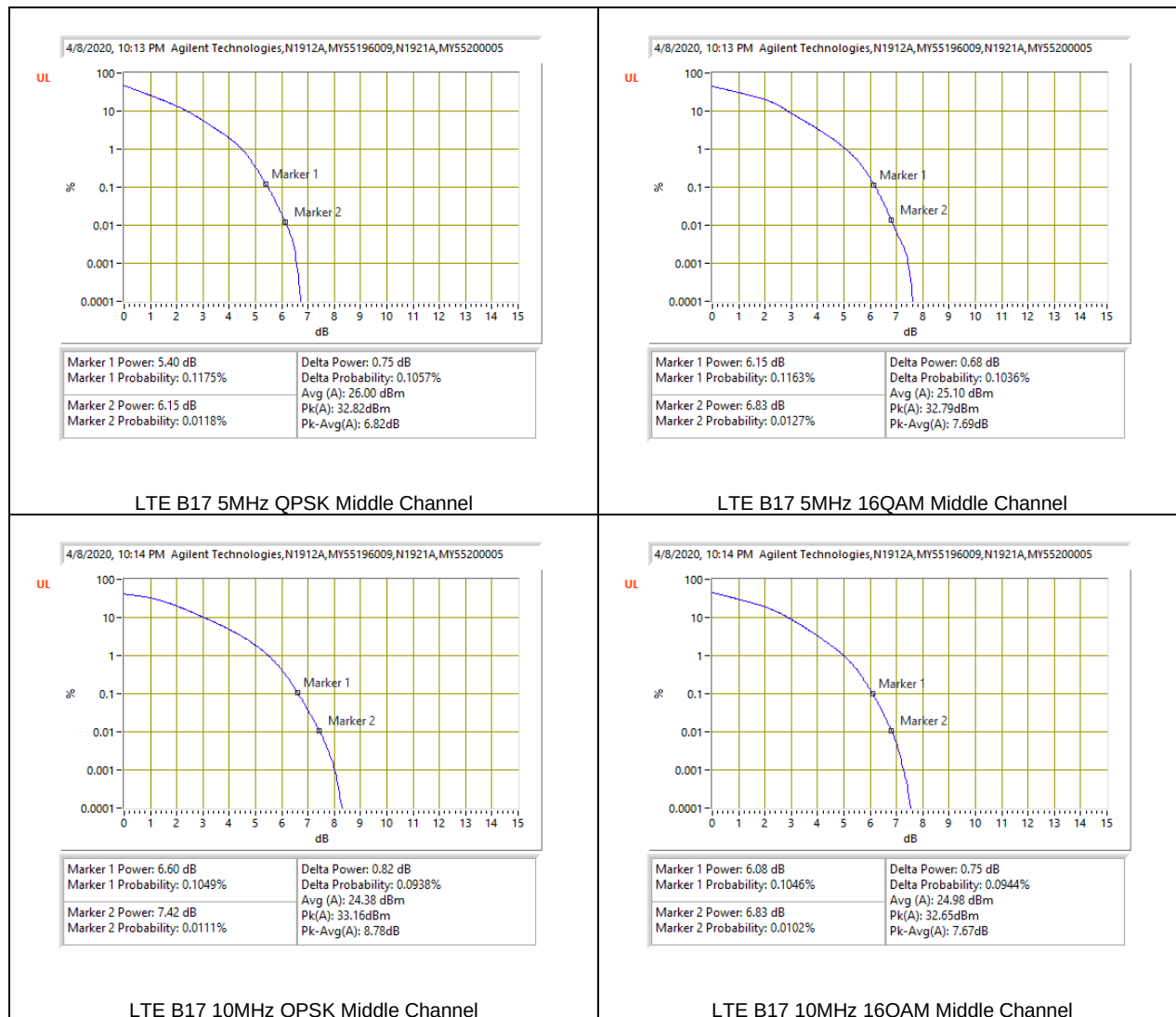
### 8.5.5. LTE BAND 13



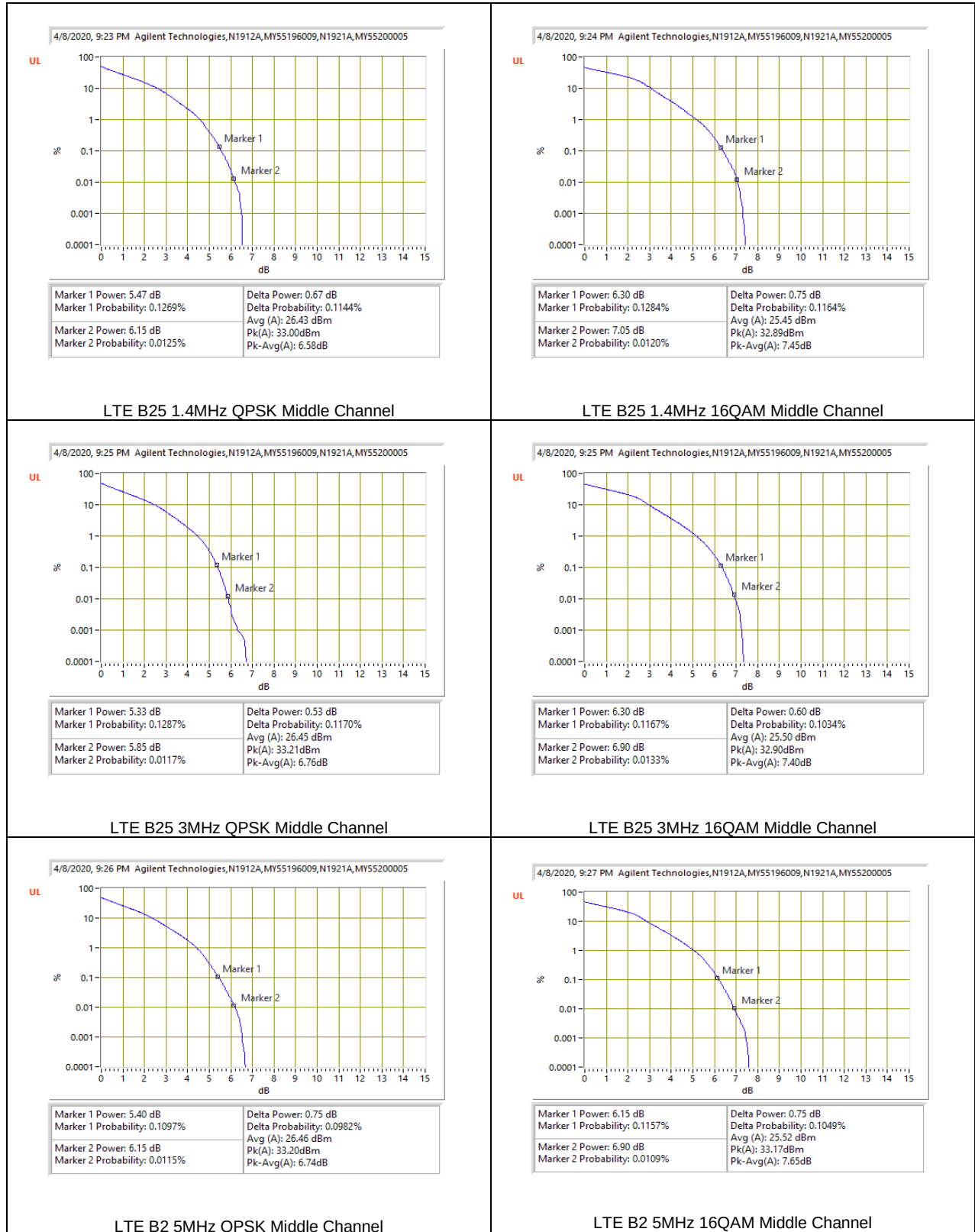
## 8.5.6. LTE BAND 14

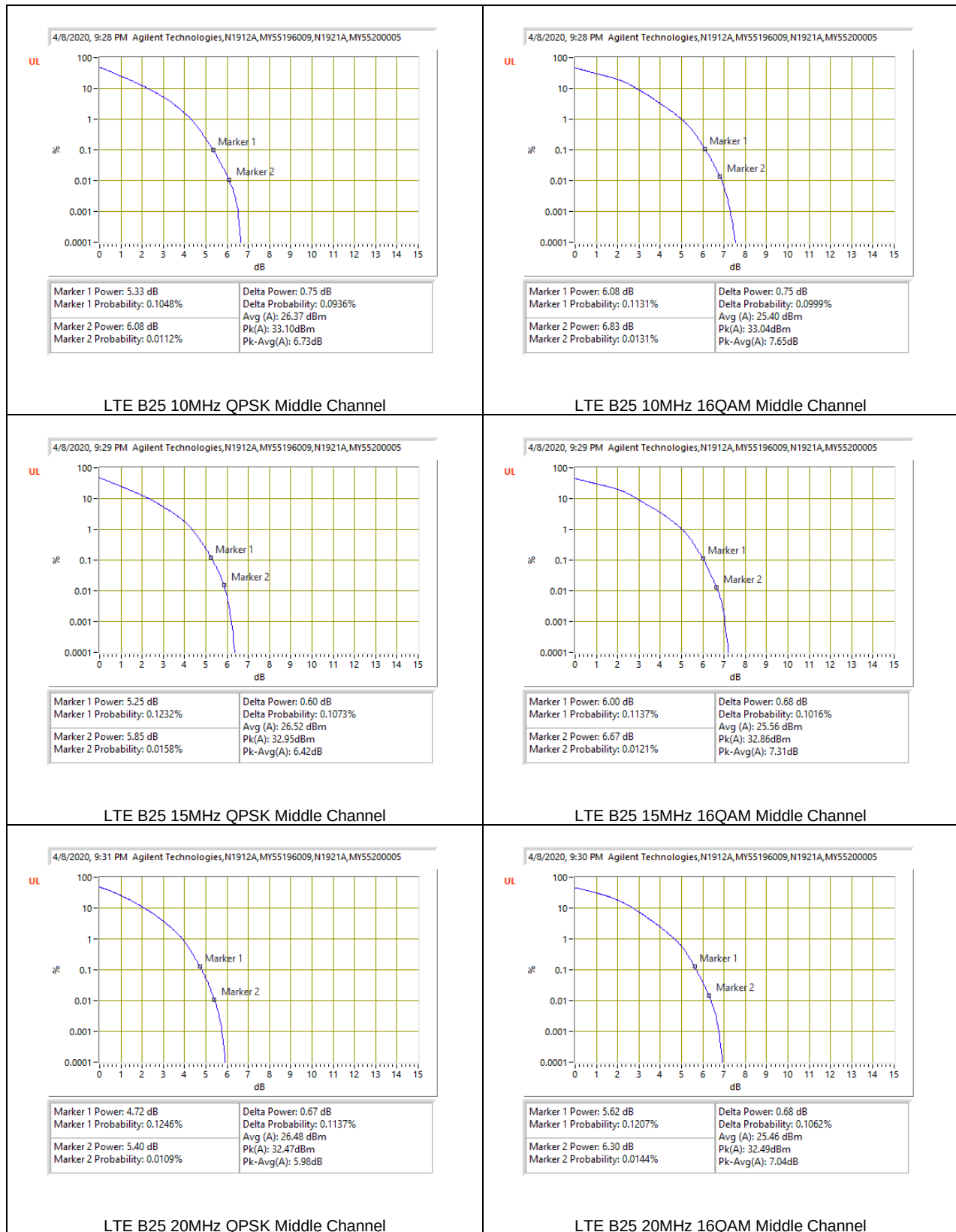


## 8.5.7. LTE BAND 17

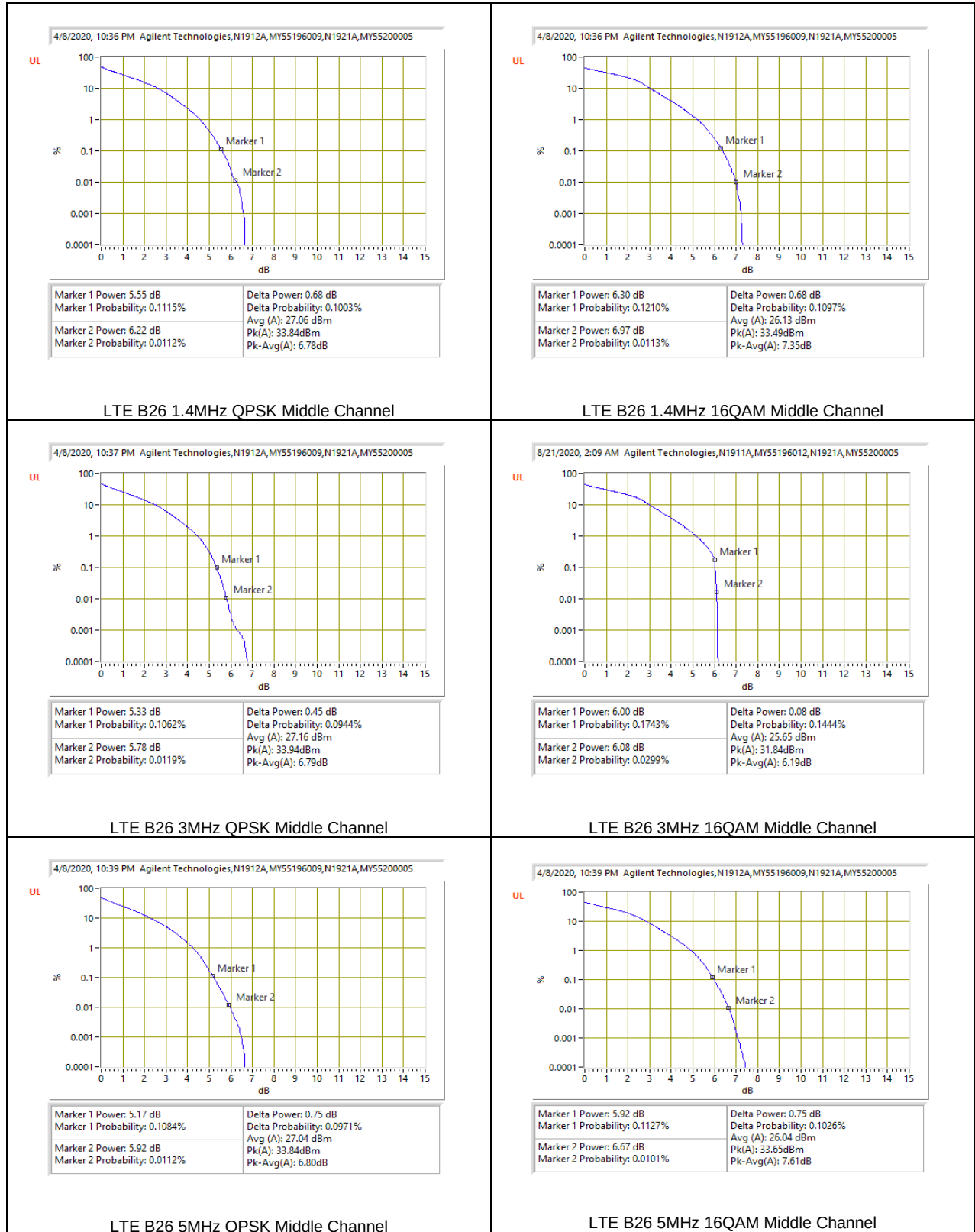


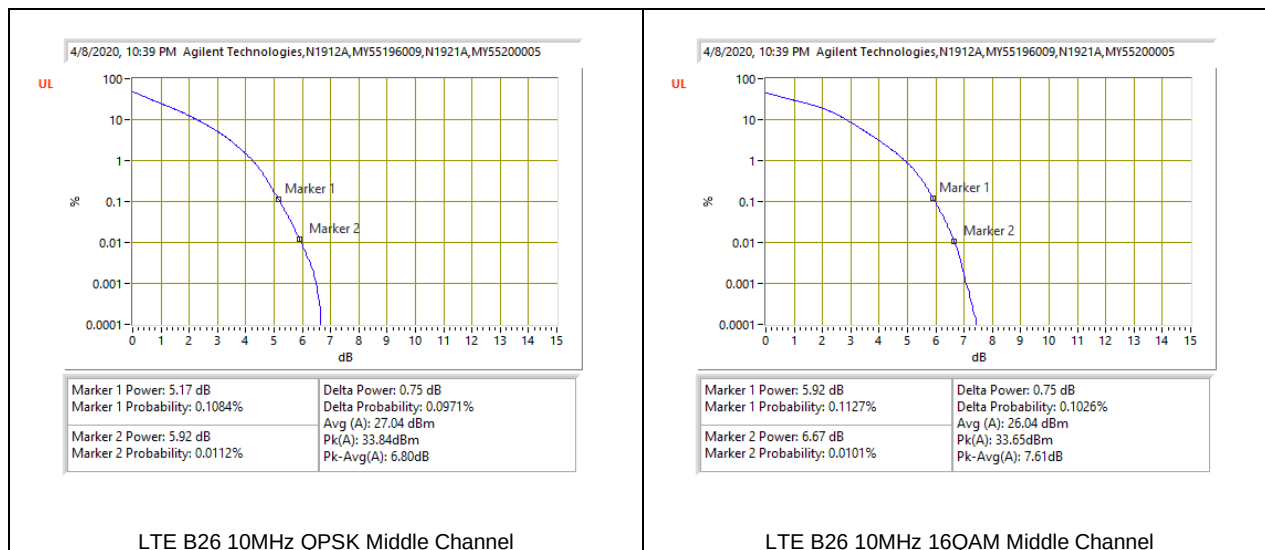
## 8.5.8. LTE BAND 25





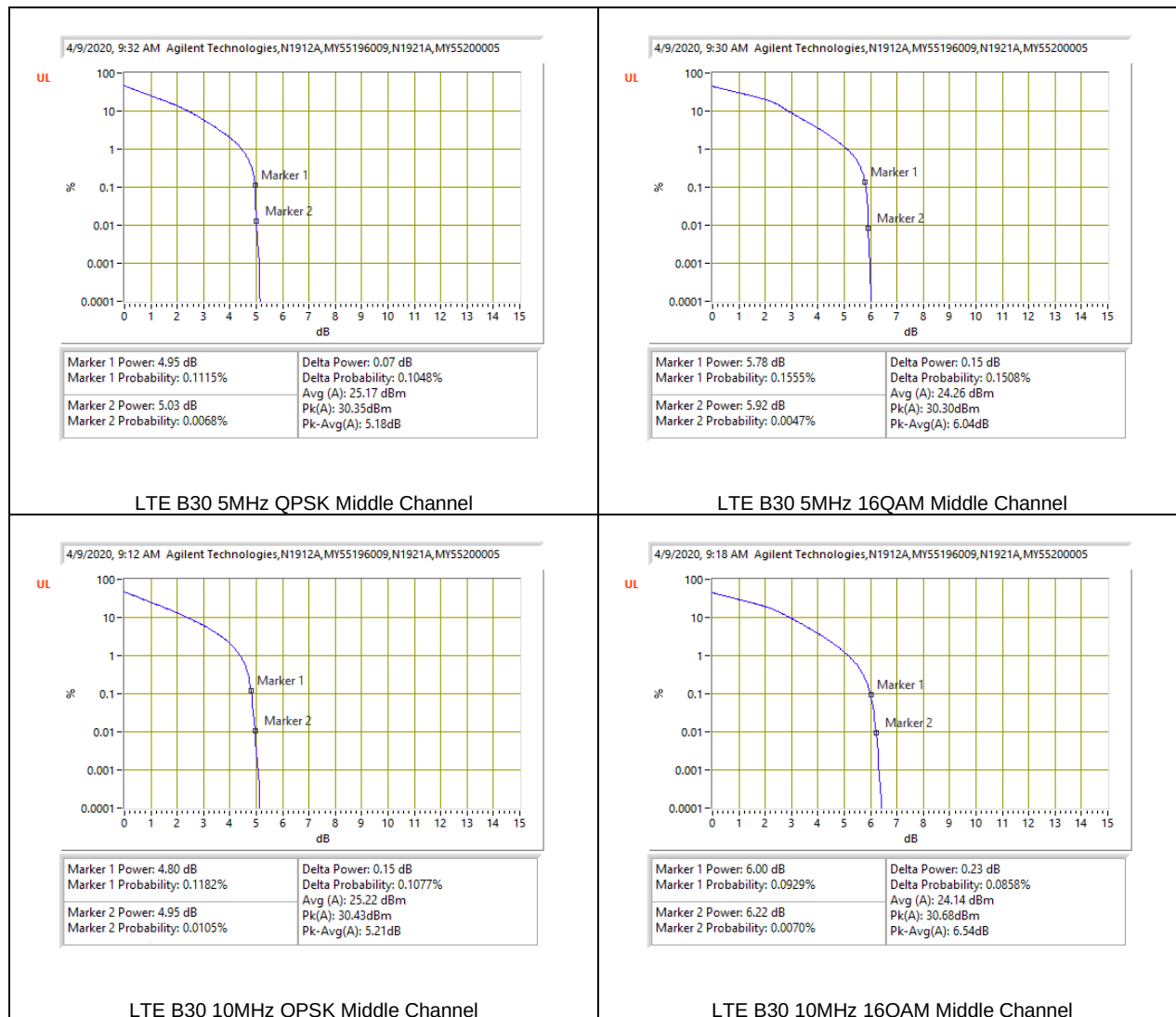
### 8.5.9. LTE BAND 26 (PART 90S)







### 8.5.10. LTE BAND 30



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

Test Engineer ID: 39004 Test Date: 4/9/2020

| Band                                                                                       | Bandwidth (MHz) | Frequency (MHz) | RB Allocation | RB OffSet | Modulation | Conducted Power (dBm) |         | Peak-to-Average Power Ratio (dB) |
|--------------------------------------------------------------------------------------------|-----------------|-----------------|---------------|-----------|------------|-----------------------|---------|----------------------------------|
|                                                                                            |                 |                 |               |           |            | Peak                  | Average |                                  |
| Band 41                                                                                    | 5MHz            | 2593.0          | 25            | 0         | QPSK       | 32.44                 | 26.35   | 6.09                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 32.84                 | 26.34   | 6.50                             |
|                                                                                            | 10MHz           |                 | 50            | 0         | QPSK       | 33.04                 | 26.19   | 6.85                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 33.11                 | 26.32   | 6.79                             |
|                                                                                            | 15MHz           |                 | 75            | 0         | QPSK       | 32.52                 | 26.00   | 6.52                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 32.86                 | 26.22   | 6.64                             |
|                                                                                            | 20MHz           |                 | 100           | 0         | QPSK       | 32.97                 | 26.33   | 6.64                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 33.06                 | 26.47   | 6.59                             |
| Band n41                                                                                   | 40MHz           |                 | 100           | 0         | QPSK       | 32.69                 | 27.83   | 4.86                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 33.16                 | 27.32   | 5.84                             |
|                                                                                            | 50MHz           |                 | 128           | 0         | QPSK       | 32.72                 | 28.05   | 4.67                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 33.22                 | 27.64   | 5.58                             |
|                                                                                            | 60MHz           |                 | 162           | 0         | QPSK       | 32.61                 | 28.13   | 4.48                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 32.92                 | 27.39   | 5.53                             |
|                                                                                            | 80MHz           |                 | 216           | 0         | QPSK       | 32.61                 | 28.53   | 4.08                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 32.95                 | 27.74   | 5.21                             |
| 90MHz                                                                                      | 240             | 0               | QPSK          | 32.41     | 28.44      | 3.97                  |         |                                  |
|                                                                                            |                 |                 | 16QAM         | 32.93     | 27.72      | 5.21                  |         |                                  |
| 100MHz                                                                                     | 270             | 0               | QPSK          | 32.25     | 28.4       | 3.85                  |         |                                  |
|                                                                                            |                 |                 | 16QAM         | 32.72     | 27.61      | 5.11                  |         |                                  |
| Duty Cycle Correction Factor (dB) =                                                        |                 |                 | 6.99          |           |            |                       |         |                                  |
| Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor |                 |                 |               |           |            |                       |         |                                  |

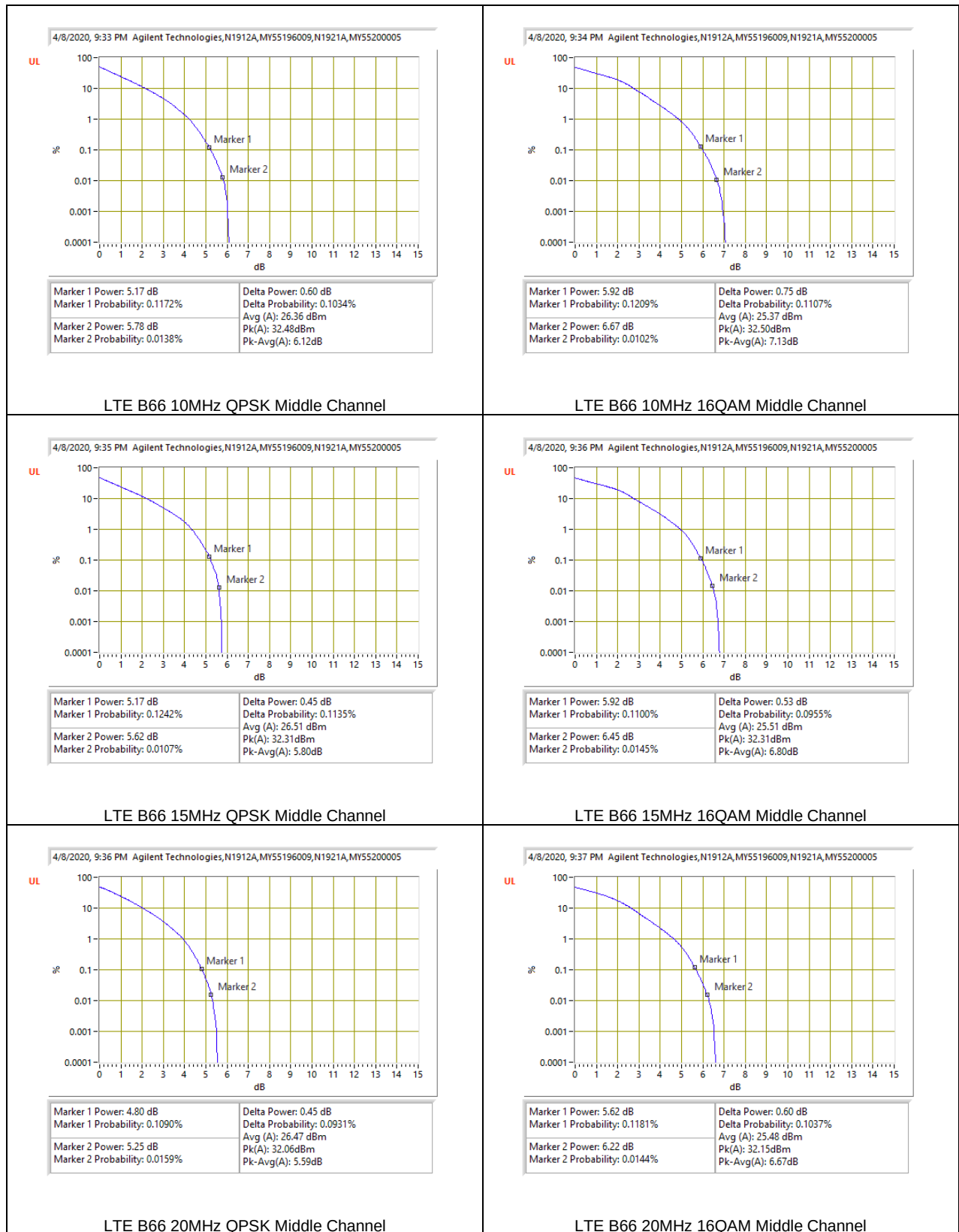
### 8.5.12. LTE BAND 48

Test Engineer ID: 12482 Test Date: 8/2/2020

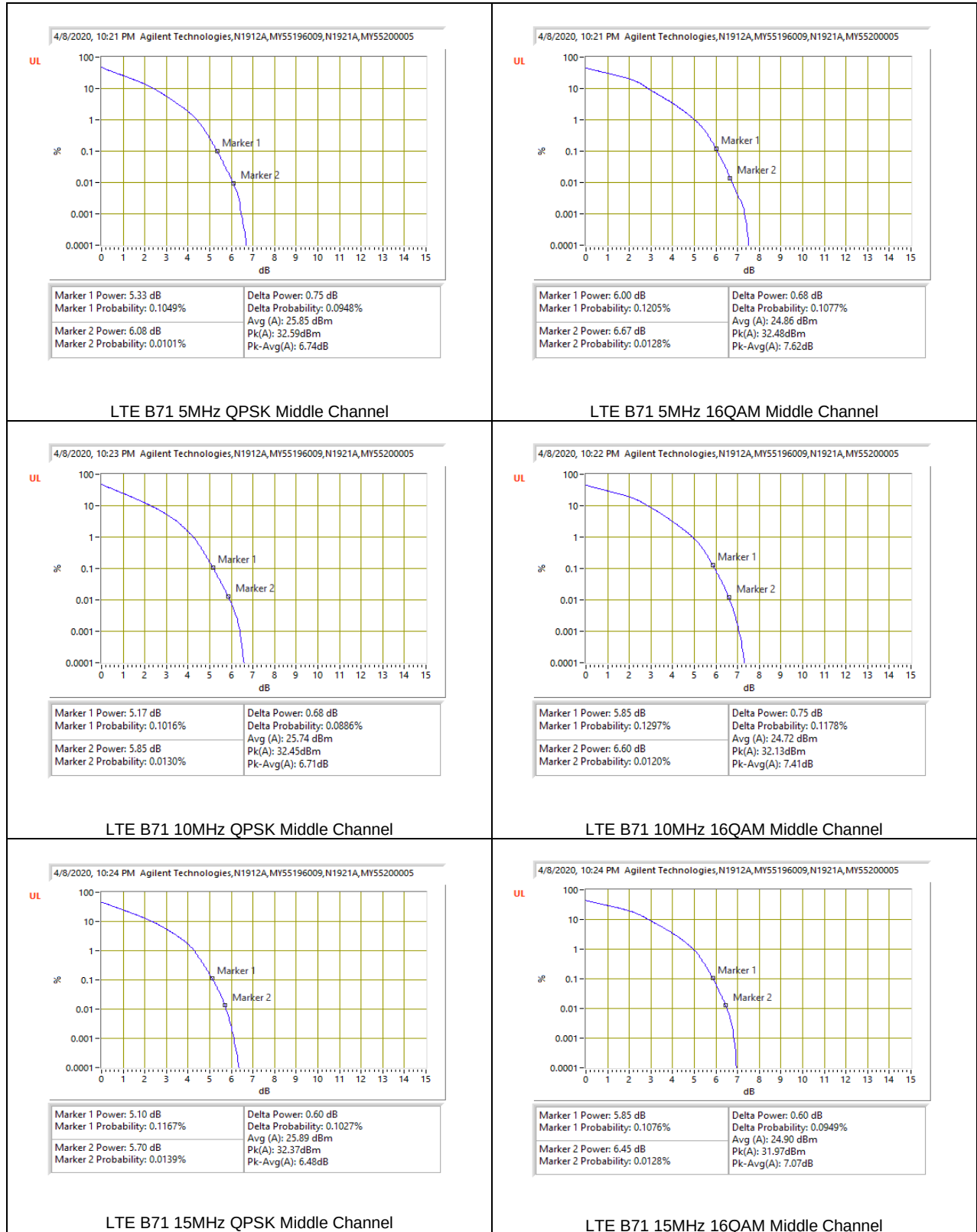
| Band                                                                                       | Bandwidth (MHz) | Frequency (MHz) | RB Allocation | RB OffSet | Modulation | Conducted Power (dBm) |         | Peak-to-Average Power Ratio (dB) |
|--------------------------------------------------------------------------------------------|-----------------|-----------------|---------------|-----------|------------|-----------------------|---------|----------------------------------|
|                                                                                            |                 |                 |               |           |            | Peak                  | Average |                                  |
| Band 48                                                                                    | 5MHz            | 3625.0          | 25            | 0         | QPSK       | 31.16                 | 15.55   | 8.62                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 32.38                 | 17.61   | 7.78                             |
|                                                                                            | 10MHz           |                 | 50            | 0         | QPSK       | 31.45                 | 18.56   | 5.90                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 30.57                 | 17.8    | 5.78                             |
|                                                                                            | 15MHz           |                 | 75            | 0         | QPSK       | 30.86                 | 17.46   | 6.41                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 31.96                 | 17.4    | 7.57                             |
|                                                                                            | 20MHz           |                 | 100           | 0         | QPSK       | 30.65                 | 17.38   | 6.28                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 31.24                 | 17.33   | 6.92                             |
| Duty Cycle Correction Factor (dB) =                                                        |                 |                 | 6.99          |           |            |                       |         |                                  |
| Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor |                 |                 |               |           |            |                       |         |                                  |

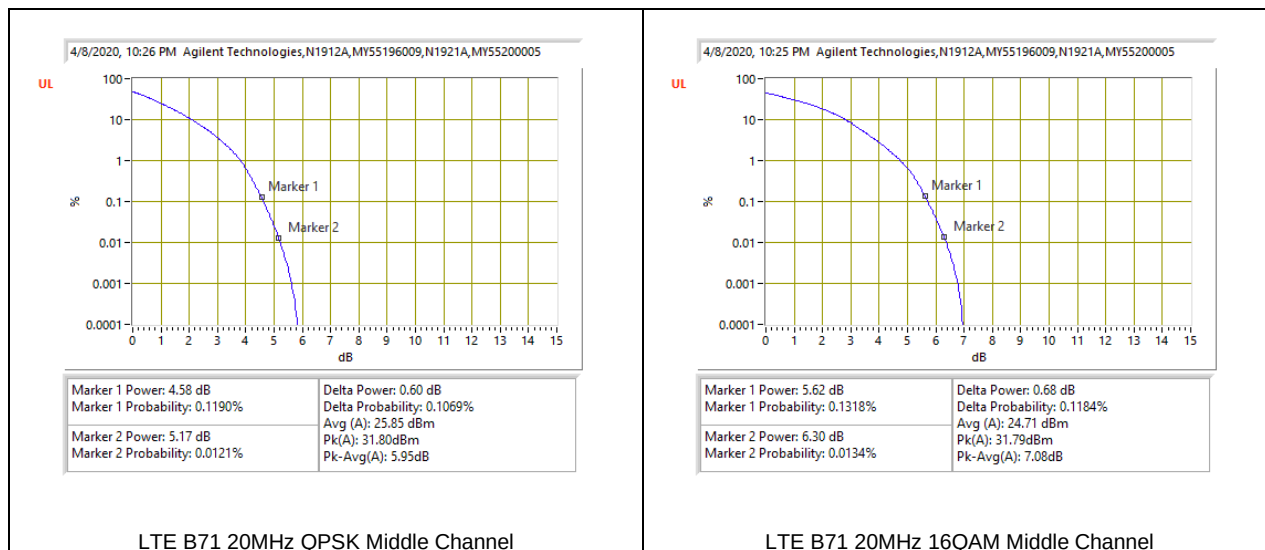
### 8.5.13. LTE BAND 66





## 8.5.14. LTE BAND 71





### 8.5.15. 5G NR Band n77

Test Engineer ID: 19171 Test Date: 8/19/2020

| Band                                                                                       | Bandwidth (MHz) | Frequency (MHz) | RB Allocation | RB OffSet | Modulation | Conducted Power (dBm) |         | Peak-to-Average Power Ratio (dB) |
|--------------------------------------------------------------------------------------------|-----------------|-----------------|---------------|-----------|------------|-----------------------|---------|----------------------------------|
|                                                                                            |                 |                 |               |           |            | Peak                  | Average |                                  |
| n77                                                                                        | 20MHz           | 3840.0          | 50            | 0         | QPSK       | 31.03                 | 24.74   | 6.29                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 31.36                 | 23.96   | 7.40                             |
|                                                                                            | 40MHz           |                 | 100           | 0         | QPSK       | 30.96                 | 24.95   | 6.01                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 30.24                 | 23.63   | 6.61                             |
|                                                                                            | 50MHz           |                 | 128           | 0         | QPSK       | 30.25                 | 25.25   | 5.00                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 30.25                 | 24.15   | 6.10                             |
|                                                                                            | 60MHz           |                 | 162           | 0         | QPSK       | 29.72                 | 24.89   | 4.83                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 30.12                 | 23.89   | 6.23                             |
|                                                                                            | 80MHz           |                 | 216           | 0         | QPSK       | 29.31                 | 24.7    | 4.61                             |
|                                                                                            |                 |                 |               |           | 16QAM      | 29.57                 | 23.65   | 5.92                             |
|                                                                                            | 90MHz           | 240             | 0             | QPSK      | 28.98      | 24.46                 | 4.52    |                                  |
|                                                                                            |                 |                 |               | 16QAM     | 28.94      | 23.42                 | 5.52    |                                  |
|                                                                                            | 100MHz          | 270             | 0             | QPSK      | 28.51      | 24.28                 | 4.23    |                                  |
|                                                                                            |                 |                 |               | 16QAM     | 28.69      | 23.32                 | 5.37    |                                  |
| Duty Cycle Correction Factor (dB) =                                                        |                 |                 |               |           |            |                       |         |                                  |
| Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor |                 |                 |               |           |            |                       |         |                                  |



## 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.

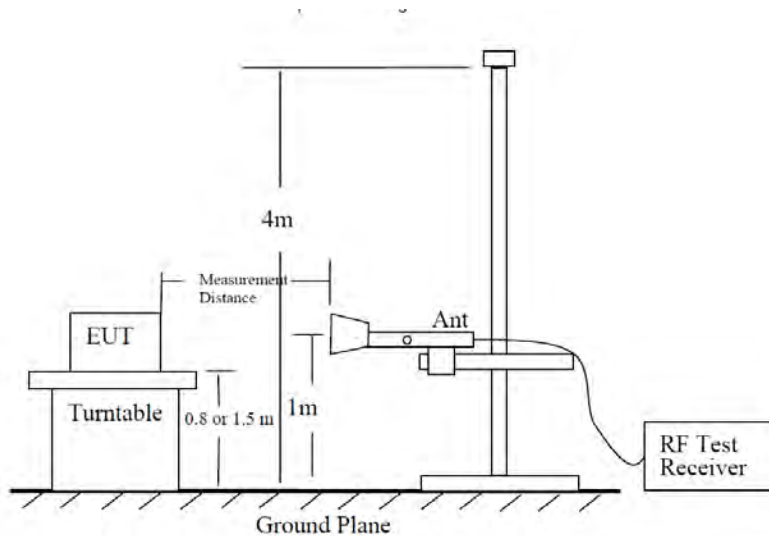


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

### 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.



## Trace Markers

| Marker | Frequency<br>(GHz) | Meter<br>Reading<br>(dBuV) | Det | AF T962 (dB/m) | Amp/Cbl/Filtr/Pad<br>(dB) | EIRP CF | Corrected<br>Reading<br>(dBm) | LIMIT | Margin<br>(dB) | Polarity |
|--------|--------------------|----------------------------|-----|----------------|---------------------------|---------|-------------------------------|-------|----------------|----------|
| 4      | 3.61781            | 37.92                      | Pk  | 30.1           | -27.1                     | -95.2   | -54.28                        | -13   | -41.28         | V        |
| 1      | 3.62531            | 39.45                      | Pk  | 30.1           | -27.2                     | -95.2   | -52.85                        | -13   | -39.85         | H        |
| 5      | 5.12109            | 36.64                      | Pk  | 33.9           | -24.7                     | -95.2   | -49.36                        | -13   | -36.36         | V        |
| 2      | 5.23969            | 38.02                      | Pk  | 33.5           | -26.4                     | -95.2   | -50.08                        | -13   | -37.08         | H        |
| 3      | 7.08797            | 36.42                      | Pk  | 36.7           | -23.1                     | -95.2   | -45.18                        | -13   | -32.18         | H        |
| 6      | 7.82625            | 35.83                      | Pk  | 37.3           | -22.3                     | -95.2   | -44.37                        | -13   | -31.37         | V        |

Pk - Peak detector

## Radiated Emissions

| Frequency<br>(GHz) | Meter<br>Reading<br>(dBuV) | Det | AF T962 (dB/m) | Amp/Cbl/Filtr/Pad<br>(dB) | EIRP CF | Corrected<br>Reading<br>(dBm) | LIMIT | Margin<br>(dB) | Polarity |
|--------------------|----------------------------|-----|----------------|---------------------------|---------|-------------------------------|-------|----------------|----------|
| 3.61468            | 39.27                      | Pk  | 30.1           | -27.2                     | -95.2   | -53.03                        | -13   | -40.03         | V        |
| 3.62443            | 39.05                      | Pk  | 30.1           | -27.2                     | -95.2   | -53.25                        | -13   | -40.25         | H        |
| 5.12547            | 37.13                      | Pk  | 33.8           | -24.8                     | -95.2   | -49.07                        | -13   | -36.07         | V        |
| 5.24135            | 38.07                      | Pk  | 33.5           | -26.4                     | -95.2   | -50.03                        | -13   | -37.03         | H        |
| 7.09205            | 36.44                      | Pk  | 36.6           | -23                       | -95.2   | -45.16                        | -13   | -32.16         | H        |
| 7.83003            | 34.99                      | Pk  | 37.3           | -22.4                     | -95.2   | -45.31                        | -13   | -32.31         | V        |

Pk - Peak detector

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

Rev 9.5 07 Jul 2020

## **9.2. FIELD STRENGTH OF SPURIOUS RADIATION, ANT1**

### **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.

### **RESULTS**

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

### 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 #:     | 13179116        |
| Date:          | 4/23/2020       |
| Test Engineer: | 20792           |
| Configuration: | EUT only        |
| Mode           | LTE2 QPSK 20MHz |
| Chamber #:     | Chamber A       |

| 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  |                      |     |                |              |       |                         |                 |             |          |
| 3.61468               | 39.27                | Pk  | 30.1           | -27.2        | -95.2 | -53.03                  | -13             | -40.03      | V        |
| 3.62443               | 39.05                | Pk  | 30.1           | -27.2        | -95.2 | -53.25                  | -13             | -40.25      | H        |
| 5.12547               | 37.13                | Pk  | 33.8           | -24.8        | -95.2 | -49.07                  | -13             | -36.07      | V        |
| 5.24135               | 38.07                | Pk  | 33.5           | -26.4        | -95.2 | -50.03                  | -13             | -37.03      | H        |
| 7.09205               | 36.44                | Pk  | 36.6           | -23          | -95.2 | -45.16                  | -13             | -32.16      | H        |
| 7.83003               | 34.99                | Pk  | 37.3           | -22.4        | -95.2 | -45.31                  | -13             | -32.31      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |       |                         |                 |             |          |
| 3.72073               | 41.55                | Pk  | 33.3           | -29.9        | -95.2 | -50.25                  | -13             | -37.25      | H        |
| 3.72204               | 41.05                | Pk  | 33.3           | -29.9        | -95.2 | -50.75                  | -13             | -37.75      | V        |
| 5.64009               | 39.11                | Pk  | 34.8           | -28          | -95.2 | -49.29                  | -13             | -36.29      | V        |
| 5.642                 | 39.44                | Pk  | 34.9           | -28          | -95.2 | -48.86                  | -13             | -35.86      | H        |
| 7.51804               | 36.45                | Pk  | 35.7           | -24.4        | -95.2 | -47.45                  | -13             | -34.45      | V        |
| 7.51974               | 36.58                | Pk  | 35.7           | -24.4        | -95.2 | -47.32                  | -13             | -34.32      | H        |
| High Channel, 1900MHz |                      |     |                |              |       |                         |                 |             |          |
| 3.77978               | 40.61                | Pk  | 33.6           | -30.1        | -95.2 | -51.09                  | -13             | -38.09      | V        |
| 3.78032               | 40.97                | Pk  | 33.6           | -30.1        | -95.2 | -50.73                  | -13             | -37.73      | H        |
| 5.6979                | 39.06                | Pk  | 34.8           | -28.3        | -95.2 | -49.64                  | -13             | -36.64      | V        |
| 5.70072               | 40.06                | Pk  | 34.9           | -28.2        | -95.2 | -48.44                  | -13             | -35.44      | H        |
| 7.59882               | 36.64                | Pk  | 35.7           | -24.5        | -95.2 | -47.36                  | -13             | -34.36      | V        |
| 7.60112               | 37.56                | Pk  | 35.8           | -24.6        | -95.2 | -46.44                  | -13             | -33.44      | H        |

### 9.2.3. 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 #:     | 13179116        |
| Date:          | 4/24/2020       |
| Test Engineer: | 20792           |
| Configuration: | EUT only        |
| Mode           | LTE5 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   |                      |     |                |              |         |                         |                 |             |          |
| 1.66442               | 41.81                | Pk  | 28.7           | -32.8        | -95.2   | -57.49                  | -13             | -44.49      | V        |
| 1.66507               | 54.65                | Pk  | 28.7           | -32.8        | -95.2   | -44.65                  | -13             | -31.65      | H        |
| 2.48513               | 41.64                | Pk  | 32.6           | -32          | -95.2   | -52.96                  | -13             | -39.96      | H        |
| 2.49518               | 41.08                | Pk  | 32.6           | -31.9        | -95.2   | -53.42                  | -13             | -40.42      | V        |
| 3.32077               | 40.64                | Pk  | 32.8           | -30.7        | -95.2   | -52.46                  | -13             | -39.46      | V        |
| 3.32088               | 39.59                | Pk  | 32.8           | -30.7        | -95.2   | -53.51                  | -13             | -40.51      | H        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.66835               | 41.7                 | Pk  | 28.8           | -32.8        | -95.2   | -57.5                   | -13             | -44.5       | V        |
| 1.66851               | 56.56                | Pk  | 28.8           | -32.8        | -95.2   | -42.64                  | -13             | -29.64      | H        |
| 2.50243               | 40.18                | Pk  | 32.6           | -31.9        | -95.2   | -54.32                  | -13             | -41.32      | V        |
| 2.50515               | 40.24                | Pk  | 32.7           | -31.8        | -95.2   | -54.06                  | -13             | -41.06      | H        |
| 3.33848               | 40.73                | Pk  | 32.8           | -30.8        | -95.2   | -52.47                  | -13             | -39.47      | H        |
| 3.34802               | 40.96                | Pk  | 32.8           | -30.7        | -95.2   | -52.14                  | -13             | -39.14      | V        |
| High Channel, 844MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.68233               | 41.75                | Pk  | 28.9           | -32.8        | -95.2   | -57.35                  | -13             | -44.35      | V        |
| 1.68343               | 52.47                | Pk  | 28.9           | -32.8        | -95.2   | -46.63                  | -13             | -33.63      | H        |
| 2.52926               | 41.03                | Pk  | 32.6           | -31.8        | -95.2   | -53.37                  | -13             | -40.37      | V        |
| 2.53821               | 41.57                | Pk  | 32.6           | -31.7        | -95.2   | -52.73                  | -13             | -39.73      | H        |
| 3.37479               | 39.77                | Pk  | 32.8           | -30.7        | -95.2   | -53.33                  | -13             | -40.33      | V        |
| 3.3766                | 39.42                | Pk  | 32.8           | -30.7        | -95.2   | -53.68                  | -13             | -40.68      | H        |



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

|                |                          |
|----------------|--------------------------|
| Project #:     | 13179116                 |
| Date:          | 7/22/2020                |
| Test Engineer: | 20792                    |
| 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   |                      |     |                |              |         |                         |                 |             |          |
| 1.66715               | 41.32                | Pk  | 28.9           | -32.2        | -95.2   | -56.48                  | -13             | -43.48      | V        |
| 1.66876               | 41.33                | Pk  | 28.9           | -32.2        | -95.2   | -56.47                  | -13             | -43.47      | H        |
| 2.50165               | 42.81                | Pk  | 33.5           | -31.3        | -95.2   | -49.59                  | -13             | -36.59      | H        |
| 2.50179               | 41.34                | Pk  | 33.5           | -31.3        | -95.2   | -51.06                  | -13             | -38.06      | V        |
| 3.33667               | 39.73                | Pk  | 33             | -30.2        | -95.2   | -52.07                  | -13             | -39.07      | H        |
| 3.33696               | 40.42                | Pk  | 33             | -30.2        | -95.2   | -51.38                  | -13             | -38.38      | V        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.67189               | 41.63                | Pk  | 29             | -32.2        | -95.2   | -56.07                  | -13             | -43.07      | V        |
| 1.67479               | 41.62                | Pk  | 29             | -32.2        | -95.2   | -56.08                  | -13             | -43.08      | H        |
| 2.50945               | 42.4                 | Pk  | 33.5           | -31.4        | -95.2   | -50                     | -13             | -37         | V        |
| 2.50955               | 43.71                | Pk  | 33.5           | -31.4        | -95.2   | -48.69                  | -13             | -35.69      | H        |
| 3.34557               | 39.73                | Pk  | 33             | -30.1        | -95.2   | -51.97                  | -13             | -38.97      | V        |
| 3.34575               | 40.88                | Pk  | 33             | -30.1        | -95.2   | -50.82                  | -13             | -37.82      | H        |
| High Channel, 839MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.6762                | 42.23                | Pk  | 29             | -32.2        | -95.2   | -55.47                  | -13             | -42.47      | V        |
| 1.67833               | 42.12                | Pk  | 28.9           | -32.2        | -95.2   | -55.68                  | -13             | -42.68      | H        |
| 2.51673               | 46.56                | Pk  | 33.5           | -31.4        | -95.2   | -45.74                  | -13             | -32.74      | H        |
| 2.51754               | 41.27                | Pk  | 33.5           | -31.3        | -95.2   | -50.93                  | -13             | -37.93      | V        |
| 3.35616               | 40.13                | Pk  | 33             | -30.1        | -95.2   | -51.57                  | -13             | -38.57      | V        |
| 3.35636               | 40.2                 | Pk  | 33             | -30.1        | -95.2   | -51.5                   | -13             | -38.5       | H        |

## 9.2.4. 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 #:     | 13179116        |
| Date:          | 4/24/2020       |
| Test Engineer: | 50822           |
| Configuration: | EUT only        |
| Mode           | LTE7 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  |                      |     |                |              |         |                         |                 |             |          |
| 5.02753               | 40.01                | Pk  | 34.3           | -28.8        | -95.2   | -49.69                  | -25             | -24.69      | V        |
| 5.03029               | 40.1                 | Pk  | 34.3           | -28.8        | -95.2   | -49.6                   | -25             | -24.6       | H        |
| 7.53056               | 37.13                | Pk  | 35.8           | -24.6        | -95.2   | -46.87                  | -25             | -21.87      | H        |
| 7.53469               | 36.35                | Pk  | 35.8           | -24.6        | -95.2   | -47.65                  | -25             | -22.65      | V        |
| 10.04494              | 34.89                | Pk  | 37.1           | -22.1        | -95.2   | -45.31                  | -25             | -20.31      | H        |
| 10.13111              | 36.2                 | Pk  | 37.2           | -22          | -95.2   | -43.8                   | -25             | -18.8       | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.06923               | 39.41                | Pk  | 34.3           | -28.6        | -95.2   | -50.09                  | -25             | -25.09      | H        |
| 5.08552               | 39.5                 | Pk  | 34.4           | -28.6        | -95.2   | -49.9                   | -25             | -24.9       | V        |
| 7.60605               | 37.17                | Pk  | 35.8           | -24.6        | -95.2   | -46.83                  | -25             | -21.83      | H        |
| 7.66324               | 36.81                | Pk  | 35.8           | -24.3        | -95.2   | -46.89                  | -25             | -21.89      | V        |
| 10.11515              | 36.15                | Pk  | 37.2           | -22.1        | -95.2   | -43.95                  | -25             | -18.95      | V        |
| 10.12988              | 35.67                | Pk  | 37.2           | -22          | -95.2   | -44.33                  | -25             | -19.33      | H        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.11024               | 38.77                | Pk  | 34.4           | -28.7        | -95.2   | -50.73                  | -25             | -25.73      | V        |
| 5.13682               | 39.73                | Pk  | 34.6           | -28.5        | -95.2   | -49.37                  | -25             | -24.37      | H        |
| 7.69142               | 36.03                | Pk  | 35.8           | -23.8        | -95.2   | -47.17                  | -25             | -22.17      | H        |
| 7.74522               | 36.43                | Pk  | 35.9           | -24.1        | -95.2   | -46.97                  | -25             | -21.97      | V        |
| 10.25096              | 35.47                | Pk  | 37.4           | -21.6        | -95.2   | -43.93                  | -25             | -18.93      | H        |
| 10.29732              | 36.07                | Pk  | 37.3           | -21.5        | -95.2   | -43.33                  | -25             | -18.33      | V        |

### 9.2.5. 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 #:     | 13179116         |
| Date:          | 4/24/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT only         |
| Mode           | LTE12 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   |                      |     |                |              |         |                         |                 |             |          |
| 1.40629               | 42.03                | Pk  | 28.8           | -33.1        | -95.2   | -57.47                  | -13             | -44.47      | H        |
| 1.40973               | 42.41                | Pk  | 28.7           | -33.1        | -95.2   | -57.19                  | -13             | -44.19      | V        |
| 2.11334               | 41.27                | Pk  | 31.7           | -32.2        | -95.2   | -54.43                  | -13             | -41.43      | V        |
| 2.11368               | 40.18                | Pk  | 31.7           | -32.2        | -95.2   | -55.52                  | -13             | -42.52      | H        |
| 2.81703               | 40.69                | Pk  | 32.5           | -31.3        | -95.2   | -53.31                  | -13             | -40.31      | H        |
| 2.81713               | 39.88                | Pk  | 32.5           | -31.3        | -95.2   | -54.12                  | -13             | -41.12      | V        |
| Mid Channel, 707.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.41358               | 41.36                | Pk  | 28.7           | -33.1        | -95.2   | -58.24                  | -13             | -45.24      | H        |
| 1.41526               | 43.29                | Pk  | 28.6           | -33.1        | -95.2   | -56.41                  | -13             | -43.41      | V        |
| 2.12337               | 40.35                | Pk  | 31.7           | -32.2        | -95.2   | -55.35                  | -13             | -42.35      | H        |
| 2.12455               | 42.13                | Pk  | 31.7           | -32.2        | -95.2   | -53.57                  | -13             | -40.57      | V        |
| 2.82943               | 41.64                | Pk  | 32.4           | -31.2        | -95.2   | -52.36                  | -13             | -39.36      | H        |
| 2.8315                | 40.56                | Pk  | 32.4           | -31.2        | -95.2   | -53.44                  | -13             | -40.44      | V        |
| High Channel, 711MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.42084               | 44.36                | Pk  | 28.6           | -33          | -95.2   | -55.24                  | -13             | -42.24      | V        |
| 1.42875               | 43.76                | Pk  | 28.5           | -33          | -95.2   | -55.94                  | -13             | -42.94      | H        |
| 2.13463               | 41.3                 | Pk  | 31.7           | -32.1        | -95.2   | -54.3                   | -13             | -41.3       | V        |
| 2.14262               | 40.49                | Pk  | 31.7           | -32          | -95.2   | -55.01                  | -13             | -42.01      | H        |
| 2.83383               | 41.29                | Pk  | 32.4           | -31.2        | -95.2   | -52.71                  | -13             | -39.71      | V        |
| 2.8349                | 40.01                | Pk  | 32.4           | -31.2        | -95.2   | -53.99                  | -13             | -40.99      | H        |

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

|                |                           |
|----------------|---------------------------|
| Project #:     | 13179116                  |
| Date:          | 7/20/2020                 |
| Test Engineer: | 30606                     |
| Configuration: | EUT only                  |
| Mode           | 5G NR Band n12 QPSK 10MHz |
| Chamber #:     | Chamber A                 |

| Frequency (GHz)        | Meter Reading (dBuV) | Det | AF T348 (dB/m) | Amp/Cbl (dB) | HPF 1.2GHz T1737 1- 18GHz | EIRP CF | Corrected Reading (dBm) | Harmonics limit | Margin (dB) | Polarity |
|------------------------|----------------------|-----|----------------|--------------|---------------------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 706.5MHz  |                      |     |                |              |                           |         |                         |                 |             |          |
| 1.42067                | 41.8                 | Pk  | 29             | -32.6        | .9                        | -95.2   | -56.1                   | -13             | -43.1       | H        |
| 1.43191                | 41.49                | Pk  | 29             | -32.5        | .9                        | -95.2   | -56.31                  | -13             | -43.31      | V        |
| 2.09945                | 40.76                | Pk  | 31.9           | -31.8        | .5                        | -95.2   | -53.84                  | -13             | -40.84      | H        |
| 2.10932                | 40.7                 | Pk  | 31.7           | -31.9        | .5                        | -95.2   | -54.2                   | -13             | -41.2       | V        |
| 2.818                  | 40.96                | Pk  | 32.6           | -30.7        | .6                        | -95.2   | -51.74                  | -13             | -38.74      | H        |
| 2.82605                | 40.45                | Pk  | 32.6           | -30.6        | .7                        | -95.2   | -52.05                  | -13             | -39.05      | V        |
| Mid Channel, 707.5MHz  |                      |     |                |              |                           |         |                         |                 |             |          |
| 1.4085                 | 41.65                | Pk  | 29.1           | -32.7        | .9                        | -95.2   | -56.25                  | -13             | -43.25      | H        |
| 1.41462                | 42.67                | Pk  | 29.1           | -32.7        | .9                        | -95.2   | -55.23                  | -13             | -42.23      | V        |
| 2.12027                | 41.52                | Pk  | 31.6           | -31.7        | .5                        | -95.2   | -53.28                  | -13             | -40.28      | H        |
| 2.1289                 | 40.45                | Pk  | 31.5           | -31.5        | .5                        | -95.2   | -54.25                  | -13             | -41.25      | V        |
| 2.83486                | 40.1                 | Pk  | 32.5           | -30.6        | .7                        | -95.2   | -52.5                   | -13             | -39.5       | H        |
| 1.4085                 | 41.65                | Pk  | 29.1           | -32.7        | .9                        | -95.2   | -56.25                  | -13             | -43.25      | V        |
| High Channel, 708.5MHz |                      |     |                |              |                           |         |                         |                 |             |          |
| 1.4148                 | 42.03                | Pk  | 29.1           | -32.7        | .9                        | -95.2   | -55.87                  | -13             | -42.87      | H        |
| 1.41816                | 42.03                | Pk  | 29.1           | -32.6        | .9                        | -95.2   | -55.77                  | -13             | -42.77      | V        |
| 2.11478                | 41.75                | Pk  | 31.7           | -31.8        | .5                        | -95.2   | -53.05                  | -13             | -40.05      | H        |
| 2.11646                | 41.42                | Pk  | 31.7           | -31.8        | .5                        | -95.2   | -53.38                  | -13             | -40.38      | V        |
| 2.83381                | 40.36                | Pk  | 32.5           | -30.6        | .7                        | -95.2   | -52.24                  | -13             | -39.24      | H        |
| 2.83524                | 39.95                | Pk  | 32.5           | -30.6        | .7                        | -95.2   | -52.65                  | -13             | -39.65      | V        |

## 9.2.1. 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 #:     | 13179116          |
| Date:          | 4/24/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 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 |                      |     |                |              |         |                         |                 |             |          |
| 1.56219             | 41.94                | Pk  | 28             | -33          | -95.2   | -58.26                  | -40             | -18.26      | V        |
| 1.56395             | 44.54                | Pk  | 28             | -33          | -95.2   | -55.66                  | -40             | -15.66      | H        |
| 2.34059             | 39.83                | Pk  | 31.8           | -31.9        | -95.2   | -55.47                  | -13             | -42.47      | H        |
| 2.34371             | 41.18                | Pk  | 31.9           | -31.9        | -95.2   | -54.02                  | -13             | -41.02      | V        |
| 3.11919             | 40.26                | Pk  | 33.1           | -31          | -95.2   | -52.84                  | -13             | -39.84      | H        |
| 3.1275              | 39.38                | Pk  | 33.1           | -31          | -95.2   | -53.72                  | -13             | -40.72      | V        |

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

## 9.2.2. 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 #:     | 13179116         |
| Date:          | 4/27/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT Only         |
| Mode           | LTE14 QPSK 10MHz |
| Chamber #:     | Chamber A        |

| 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 |                      |     |                |              |              |                         |                 |             |          |
| 1.5857              | 41.47                | Pk  | 28.1           | -32.9        | -95.2        | -58.53                  | -40             | -18.53      | V        |
| 1.58734             | 41.89                | Pk  | 28.1           | -32.9        | -95.2        | -58.11                  | -40             | -18.11      | H        |
| 2.37501             | 42.18                | Pk  | 32.2           | -31.8        | -95.2        | -52.62                  | -13             | -39.62      | V        |
| 2.37933             | 40.93                | Pk  | 32.2           | -31.8        | -95.2        | -53.87                  | -13             | -40.87      | H        |
| 3.17054             | 40.43                | Pk  | 32.9           | -30.9        | -95.2        | -52.77                  | -13             | -39.77      | H        |
| 3.17059             | 40.7                 | Pk  | 32.9           | -30.9        | -95.2        | -52.5                   | -13             | -39.5       | V        |

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

### 9.2.3. 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 #:     | 13179116          |
| Date:          | 4/27/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 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 |                      |     |                |              |         |                         |                 |             |          |
| 1.42048             | 41.79                | Pk  | 28.6           | -33          | -95.2   | -57.81                  | -13             | -44.81      | H        |
| 1.4217              | 42.27                | Pk  | 28.6           | -33          | -95.2   | -57.33                  | -13             | -44.33      | V        |
| 2.13461             | 42.12                | Pk  | 31.7           | -32.1        | -95.2   | -53.48                  | -13             | -40.48      | V        |
| 2.13582             | 41.94                | Pk  | 31.7           | -32.1        | -95.2   | -53.66                  | -13             | -40.66      | H        |
| 2.83499             | 40.59                | Pk  | 32.4           | -31.2        | -95.2   | -53.41                  | -13             | -40.41      | H        |
| 2.84043             | 40.98                | Pk  | 32.4           | -31.1        | -95.2   | -52.92                  | -13             | -39.92      | V        |

## 9.2.4. 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 #:     | 13179116          |
| Date:          | 4/27/2020         |
| 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   |                      |     |                |              |         |                         |                 |                |          |
| 3.71195                | 40.43                | Pk  | 33.3           | -29.9        | -95.2   | -51.37                  | -13             | -38.37         | V        |
| 3.71478                | 40.99                | Pk  | 33.3           | -29.9        | -95.2   | -50.81                  | -13             | -37.81         | H        |
| 5.55452                | 38.97                | Pk  | 34.8           | -27.8        | -95.2   | -49.23                  | -13             | -36.23         | V        |
| 5.5915                 | 39.28                | Pk  | 34.9           | -28          | -95.2   | -49.02                  | -13             | -36.02         | H        |
| 7.428                  | 37.22                | Pk  | 35.7           | -24.9        | -95.2   | -47.18                  | -13             | -34.18         | V        |
| 7.45362                | 36.27                | Pk  | 35.7           | -24.6        | -95.2   | -47.83                  | -13             | -34.83         | H        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.76124                | 40.38                | Pk  | 33.6           | -30.1        | -95.2   | -51.32                  | -13             | -38.32         | V        |
| 3.77551                | 40.74                | Pk  | 33.6           | -30.1        | -95.2   | -50.96                  | -13             | -37.96         | H        |
| 5.65985                | 38.77                | Pk  | 34.9           | -28          | -95.2   | -49.53                  | -13             | -36.53         | V        |
| 5.66745                | 38.25                | Pk  | 34.8           | -27.9        | -95.2   | -50.05                  | -13             | -37.05         | H        |
| 7.54663                | 36.2                 | Pk  | 35.8           | -24.7        | -95.2   | -47.9                   | -13             | -34.9          | H        |
| 7.57733                | 36.7                 | Pk  | 35.7           | -24.4        | -95.2   | -47.2                   | -13             | -34.2          | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.8216                 | 41.14                | Pk  | 33.7           | -30          | -95.2   | -50.36                  | -13             | -37.36         | V        |
| 3.82193                | 41.3                 | Pk  | 33.7           | -30          | -95.2   | -50.2                   | -13             | -37.2          | H        |
| 5.73836                | 37.92                | Pk  | 34.9           | -28.1        | -95.2   | -50.48                  | -13             | -37.48         | H        |
| 5.76171                | 38.56                | Pk  | 35             | -28.2        | -95.2   | -49.84                  | -13             | -36.84         | V        |
| 7.62675                | 36.41                | Pk  | 35.8           | -24.2        | -95.2   | -47.19                  | -13             | -34.19         | H        |
| 7.64347                | 36.32                | Pk  | 35.8           | -24.1        | -95.2   | -47.18                  | -13             | -34.18         | V        |

## 9.2.5. 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 #:     | 13179116          |
| Date:          | 4/27/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 26 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, 819MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.63948             | 43.07                | Pk  | 28.6           | -32.8        | -95.2   | -56.33                  | -13             | -43.33      | H        |
| 1.63996             | 42.91                | Pk  | 28.6           | -32.8        | -95.2   | -56.49                  | -13             | -43.49      | V        |
| 2.4527              | 41.69                | Pk  | 32.5           | -31.8        | -95.2   | -52.81                  | -13             | -39.81      | H        |
| 2.45778             | 41.11                | Pk  | 32.5           | -31.9        | -95.2   | -53.49                  | -13             | -40.49      | V        |
| 3.27457             | 40.29                | Pk  | 32.9           | -30.7        | -95.2   | -52.71                  | -13             | -39.71      | H        |
| 3.27529             | 40.37                | Pk  | 32.9           | -30.8        | -95.2   | -52.73                  | -13             | -39.73      | V        |

## 9.2.6. 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 #:     | 13179116         |
| Date:          | 4/28/2020        |
| Test Engineer: | 50822            |
| Configuration: | EUT Only         |
| Mode           | LTE30 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 |                      |     |                |              |         |                         |                 |             |          |
| 4.63954              | 36.99                | Pk  | 33.9           | -27.7        | -95.2   | -52.01                  | -40             | -12.01      | H        |
| 6.92984              | 34.59                | Pk  | 35.6           | -24.7        | -95.2   | -49.71                  | -40             | -9.71       | H        |
| 9.24662              | 33.42                | Pk  | 36.3           | -21.7        | -95.2   | -47.18                  | -40             | -7.18       | H        |
| 4.63433              | 38.01                | Pk  | 33.9           | -27.7        | -95.2   | -50.99                  | -40             | -10.99      | V        |
| 6.92065              | 35.69                | Pk  | 35.5           | -24.8        | -95.2   | -48.81                  | -40             | -8.81       | V        |
| 9.25982              | 33.21                | Pk  | 36.4           | -21.7        | -95.2   | -47.29                  | -40             | -7.29       | V        |

## 9.2.7. 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 #:     | 13179116          |
| Date:          | 4/23/2020         |
| Test Engineer: | 50822             |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 4.91664               | 40.08                | Pk  | 34.2           | -29.3        | -95.2   | -50.22                  | -25             | -25.22         | H        |
| 4.94594               | 39.17                | Pk  | 34.2           | -29.2        | -95.2   | -51.03                  | -25             | -26.03         | V        |
| 7.53158               | 36.07                | Pk  | 35.8           | -24.6        | -95.2   | -47.93                  | -25             | -22.93         | H        |
| 7.5671                | 36.67                | Pk  | 35.8           | -24.5        | -95.2   | -47.23                  | -25             | -22.23         | V        |
| 10.0046               | 35.13                | Pk  | 37             | -21.8        | -95.2   | -44.87                  | -25             | -19.87         | H        |
| 10.01808              | 35.4                 | Pk  | 37             | -21.9        | -95.2   | -44.7                   | -25             | -19.7          | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 4.79886               | 40.47                | Pk  | 34.3           | -29.2        | -95.2   | -49.63                  | -25             | -24.63         | V        |
| 4.80355               | 40.39                | Pk  | 34.3           | -29.2        | -95.2   | -49.71                  | -25             | -24.71         | H        |
| 7.15859               | 36.33                | Pk  | 36.2           | -24.9        | -95.2   | -47.57                  | -25             | -22.57         | V        |
| 7.16623               | 36.82                | Pk  | 36             | -24.7        | -95.2   | -47.08                  | -25             | -22.08         | H        |
| 10.30264              | 34.83                | Pk  | 37.4           | -21.6        | -95.2   | -44.57                  | -25             | -19.57         | H        |
| 10.31578              | 35.25                | Pk  | 37.4           | -21.7        | -95.2   | -44.25                  | -25             | -19.25         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.37313               | 39                   | Pk  | 34.9           | -28.7        | -95.2   | -50                     | -25             | -25            | H        |
| 5.39029               | 38.58                | Pk  | 34.9           | -28.8        | -95.2   | -50.52                  | -25             | -25.52         | V        |
| 8.01666               | 36.77                | Pk  | 35.8           | -24.1        | -95.2   | -46.73                  | -25             | -21.73         | V        |
| 8.06625               | 36.71                | Pk  | 35.8           | -24          | -95.2   | -46.69                  | -25             | -21.69         | H        |
| 10.70939              | 35.26                | Pk  | 37.9           | -21.3        | -95.2   | -43.34                  | -25             | -18.34         | V        |
| 10.72021              | 35.03                | Pk  | 37.9           | -21.4        | -95.2   | -43.67                  | -25             | -18.67         | H        |

# QPSK 5G NR Band n41 (100.0MHZ BANDWIDTH)

|                |                            |
|----------------|----------------------------|
| Project #:     | 13179116                   |
| Date:          | 07/23/2020                 |
| Test Engineer: | 30606                      |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 5.17145               | 39.25                | Pk  | 34.6           | -27.8        | -95.2   | -48.45                  | -25             | -23.45         | V        |
| 5.17448               | 39.77                | Pk  | 34.6           | -27.8        | -95.2   | -47.93                  | -25             | -22.93         | H        |
| 7.76937               | 35.8                 | Pk  | 35.9           | -23.5        | -95.2   | -46.7                   | -25             | -21.7          | V        |
| 7.79543               | 35.59                | Pk  | 36             | -23.4        | -95.2   | -46.61                  | -25             | -21.61         | H        |
| 10.36382              | 35.44                | Pk  | 37.7           | -20.2        | -95.2   | -41.46                  | -25             | -16.46         | H        |
| 10.37375              | 34.92                | Pk  | 37.7           | -20.2        | -95.2   | -41.98                  | -25             | -16.98         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.07884               | 39.5                 | Pk  | 34.4           | -27.8        | -95.2   | -48.4                   | -25             | -23.4          | H        |
| 5.10783               | 38.96                | Pk  | 34.5           | -27.8        | -95.2   | -48.74                  | -25             | -23.74         | V        |
| 7.6202                | 36.91                | Pk  | 35.9           | -23.5        | -95.2   | -45.49                  | -25             | -20.49         | V        |
| 7.65557               | 36.81                | Pk  | 35.8           | -23.5        | -95.2   | -45.79                  | -25             | -20.79         | H        |
| 10.17815              | 35.31                | Pk  | 37.5           | -20.9        | -95.2   | -42.69                  | -25             | -17.69         | H        |
| 10.17907              | 35.78                | Pk  | 37.5           | -20.9        | -95.2   | -42.22                  | -25             | -17.22         | V        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.28017               | 39.12                | Pk  | 34.7           | -27.9        | -95.2   | -48.98                  | -25             | -23.98         | V        |
| 5.28198               | 39.17                | Pk  | 34.7           | -28          | -95.2   | -49.03                  | -25             | -24.03         | H        |
| 7.91885               | 36.29                | Pk  | 36.2           | -23.4        | -95.2   | -45.91                  | -25             | -20.91         | V        |
| 7.91976               | 36.41                | Pk  | 36.2           | -23.4        | -95.2   | -45.79                  | -25             | -20.79         | H        |
| 10.55898              | 35.42                | Pk  | 37.7           | -20.5        | -95.2   | -41.88                  | -25             | -16.88         | H        |
| 10.55936              | 35.41                | Pk  | 37.7           | -20.5        | -95.2   | -41.89                  | -25             | -16.89         | V        |



### 9.2.8. 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 #:     | 13179116          |
| Date:          | 4/27/2020         |
| Test Engineer: | 50822             |
| Configuration: | EUT Only          |
| Mode           | LTE 66 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, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.42585               | 37.66                | Pk  | 32.7           | -29.3        | -95.2   | -54.14                  | -13             | -41.14         | H        |
| 5.12649               | 36.55                | Pk  | 34.4           | -27.1        | -95.2   | -51.35                  | -13             | -38.35         | H        |
| 6.84248               | 34.79                | Pk  | 35.6           | -25.3        | -95.2   | -50.11                  | -13             | -37.11         | H        |
| 3.43295               | 37.98                | Pk  | 32.7           | -29.3        | -95.2   | -53.82                  | -13             | -40.82         | V        |
| 5.18397               | 36.74                | Pk  | 34.4           | -27          | -95.2   | -51.06                  | -13             | -38.06         | V        |
| 6.88821               | 34.74                | Pk  | 35.5           | -24.9        | -95.2   | -49.86                  | -13             | -36.86         | V        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.49168               | 37.45                | Pk  | 32.9           | -28.9        | -95.2   | -53.75                  | -13             | -40.75         | H        |
| 5.24543               | 36.19                | Pk  | 34.5           | -26.9        | -95.2   | -51.41                  | -13             | -38.41         | H        |
| 6.98658               | 35.13                | Pk  | 35.6           | -24.8        | -95.2   | -49.27                  | -13             | -36.27         | H        |
| 3.46012               | 38.28                | Pk  | 32.8           | -29.2        | -95.2   | -53.32                  | -13             | -40.32         | V        |
| 5.23206               | 36.12                | Pk  | 34.5           | -26.7        | -95.2   | -51.28                  | -13             | -38.28         | V        |
| 6.9806                | 34.7                 | Pk  | 35.6           | -24.9        | -95.2   | -49.8                   | -13             | -36.8          | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.57048               | -69.06               | Pk  | 33             | -28.5        | 11.2    | -53.36                  | -13             | -40.36         | H        |
| 5.36534               | -70.84               | Pk  | 34.6           | -26.8        | 12.2    | -50.84                  | -13             | -37.84         | H        |
| 7.1404                | -72.56               | Pk  | 35.7           | -24.5        | 11.7    | -49.66                  | -13             | -36.66         | H        |
| 3.57762               | -69.18               | Pk  | 33.1           | -28.5        | 11.5    | -53.08                  | -13             | -40.08         | V        |
| 5.34559               | -69.93               | Pk  | 34.6           | -26.7        | 12      | -50.03                  | -13             | -37.03         | V        |
| 7.19184               | -72.29               | Pk  | 35.6           | -24.7        | 11.6    | -49.79                  | -13             | -36.79         | V        |

## 9.2.9. 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 #:     | 13179116          |
| Date:          | 4/27/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 71 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, 673.0MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.34537                | 41.26                | Pk  | 29.3           | -33.2        | -95.2   | -57.84                  | -13             | -44.84         | H        |
| 1.35413                | 41.42                | Pk  | 29.6           | -33.1        | -95.2   | -57.28                  | -13             | -44.28         | V        |
| 2.02101                | 43.35                | Pk  | 31.7           | -32.4        | -95.2   | -52.55                  | -13             | -39.55         | V        |
| 2.0232                 | 42.93                | Pk  | 31.7           | -32.3        | -95.2   | -52.87                  | -13             | -39.87         | H        |
| 2.69067                | 41.41                | Pk  | 32.4           | -31.6        | -95.2   | -52.99                  | -13             | -39.99         | H        |
| 2.69553                | 41.17                | Pk  | 32.4           | -31.6        | -95.2   | -53.23                  | -13             | -40.23         | V        |
| Mid Channel, 680.5MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.3727                 | 42.71                | Pk  | 29.4           | -33.2        | -95.2   | -56.29                  | -13             | -43.29         | V        |
| 1.38281                | 42.14                | Pk  | 29.3           | -33.2        | -95.2   | -56.96                  | -13             | -43.96         | H        |
| 2.06153                | 40.94                | Pk  | 31.6           | -32.4        | -95.2   | -55.06                  | -13             | -42.06         | V        |
| 2.06998                | 41.1                 | Pk  | 31.7           | -32.4        | -95.2   | -54.8                   | -13             | -41.8          | H        |
| 2.74571                | 40.56                | Pk  | 32.4           | -31.4        | -95.2   | -53.64                  | -13             | -40.64         | H        |
| 2.75395                | 40.36                | Pk  | 32.5           | -31.4        | -95.2   | -53.74                  | -13             | -40.74         | V        |
| High Channel, 688.0MHz |                      |     |                |              |         |                         |                 |                |          |
| 1.37054                | 42.42                | Pk  | 29.5           | -33.1        | -95.2   | -56.38                  | -13             | -43.38         | V        |
| 1.37263                | 42.15                | Pk  | 29.4           | -33.2        | -95.2   | -56.85                  | -13             | -43.85         | H        |
| 2.06787                | 41.83                | Pk  | 31.7           | -32.4        | -95.2   | -54.07                  | -13             | -41.07         | V        |
| 2.06879                | 41.41                | Pk  | 31.7           | -32.4        | -95.2   | -54.49                  | -13             | -41.49         | H        |
| 2.74603                | 40.05                | Pk  | 32.4           | -31.4        | -95.2   | -54.15                  | -13             | -41.15         | V        |
| 2.74949                | 40.32                | Pk  | 32.4           | -31.4        | -95.2   | -53.88                  | -13             | -40.88         | H        |

## FIELD STRENGTH OF SPURIOUS RADIATION, 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**

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

## 9.2.10. 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 #:     | 13179116        |
| Date:          | 4/27/2020       |
| Test Engineer: | 50822           |
| Configuration: | EUT only        |
| Mode           | LTE2 QPSK 20MHz |
| 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, 1860MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.71617               | 37.53                | Pk  | 33             | -28.5        | -95.2   | -53.17                  | -13             | -40.17      | H        |
| 5.58556               | 36.47                | Pk  | 35.2           | -26.7        | -95.2   | -50.23                  | -13             | -37.23      | H        |
| 7.44266               | 34.5                 | Pk  | 35.6           | -24.3        | -95.2   | -49.4                   | -13             | -36.4       | H        |
| 3.70899               | 38.18                | Pk  | 33             | -28.5        | -95.2   | -52.52                  | -13             | -39.52      | V        |
| 5.60255               | 36.56                | Pk  | 35.2           | -26.8        | -95.2   | -50.24                  | -13             | -37.24      | V        |
| 7.43765               | 34.76                | Pk  | 35.6           | -24.3        | -95.2   | -49.14                  | -13             | -36.14      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.75315               | 38.36                | Pk  | 32.9           | -28.4        | -95.2   | -52.34                  | -13             | -39.34      | H        |
| 5.65759               | 36.63                | Pk  | 35.1           | -26.8        | -95.2   | -50.27                  | -13             | -37.27      | H        |
| 7.52782               | 35.14                | Pk  | 35.6           | -23.9        | -95.2   | -48.36                  | -13             | -35.36      | H        |
| 3.75832               | 37.44                | Pk  | 32.9           | -28.4        | -95.2   | -53.26                  | -13             | -40.26      | V        |
| 5.56194               | 36.36                | Pk  | 35.1           | -26.7        | -95.2   | -50.44                  | -13             | -37.44      | V        |
| 7.55901               | 33.87                | Pk  | 35.6           | -23.8        | -95.2   | -49.53                  | -13             | -36.53      | V        |
| High Channel, 1900MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.84824               | 37.48                | Pk  | 33             | -28.4        | -95.2   | -53.12                  | -13             | -40.12      | H        |
| 5.69362               | 36.3                 | Pk  | 34.9           | -26.5        | -95.2   | -50.5                   | -13             | -37.5       | H        |
| 7.65136               | 34.73                | Pk  | 35.6           | -24.1        | -95.2   | -48.97                  | -13             | -35.97      | H        |
| 3.85188               | 38.02                | Pk  | 33             | -28.3        | -95.2   | -52.48                  | -13             | -39.48      | V        |
| 5.72022               | 36.71                | Pk  | 35             | -26.7        | -95.2   | -50.19                  | -13             | -37.19      | V        |
| 7.68796               | 34.51                | Pk  | 35.6           | -23.8        | -95.2   | -48.89                  | -13             | -35.89      | V        |

## 9.2.12. 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 #:     | 13179116        |
| Date:          | 4/27/2020       |
| Test Engineer: | 20792           |
| Configuration: | EUT only        |
| Mode           | LTE5 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   |                      |     |                |              |         |                         |                 |             |          |
| 1.65982               | 38.97                | Pk  | 28.7           | -31.6        | -95.2   | -59.13                  | -13             | -46.13      | H        |
| 2.48359               | 39.16                | Pk  | 32.4           | -30.5        | -95.2   | -54.14                  | -13             | -41.14      | H        |
| 3.31175               | 37.18                | Pk  | 32.7           | -29.3        | -95.2   | -54.62                  | -13             | -41.62      | H        |
| 1.65941               | 39.65                | Pk  | 28.7           | -31.6        | -95.2   | -58.45                  | -13             | -45.45      | V        |
| 2.48289               | 38.43                | Pk  | 32.4           | -30.5        | -95.2   | -54.87                  | -13             | -41.87      | V        |
| 3.31159               | 38.47                | Pk  | 32.7           | -29.3        | -95.2   | -53.33                  | -13             | -40.33      | V        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.6769                | 39.39                | Pk  | 28.9           | -31.6        | -95.2   | -58.51                  | -13             | -45.51      | H        |
| 2.50995               | 39.26                | Pk  | 32.3           | -30.1        | -95.2   | -53.74                  | -13             | -40.74      | H        |
| 3.34007               | 38.28                | Pk  | 32.7           | -29.2        | -95.2   | -53.42                  | -13             | -40.42      | H        |
| 1.66766               | 40.95                | Pk  | 28.7           | -31.6        | -95.2   | -57.15                  | -13             | -44.15      | V        |
| 2.51247               | 38.68                | Pk  | 32.3           | -30.1        | -95.2   | -54.32                  | -13             | -41.32      | V        |
| 3.3487                | 38.53                | Pk  | 32.7           | -29.2        | -95.2   | -53.17                  | -13             | -40.17      | V        |
| High Channel, 844MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.68745               | 40.3                 | Pk  | 29.1           | -31.6        | -95.2   | -57.4                   | -13             | -44.4       | H        |
| 2.53228               | 39.62                | Pk  | 32.2           | -30.1        | -95.2   | -53.48                  | -13             | -40.48      | H        |
| 3.37577               | 38.53                | Pk  | 32.7           | -29.2        | -95.2   | -53.17                  | -13             | -40.17      | H        |
| 1.68974               | 40.75                | Pk  | 29.2           | -31.6        | -95.2   | -56.85                  | -13             | -43.85      | V        |
| 2.53229               | 38.26                | Pk  | 32.2           | -30.1        | -95.2   | -54.84                  | -13             | -41.84      | V        |
| 3.37658               | 37.95                | Pk  | 32.7           | -29.3        | -95.2   | -53.85                  | -13             | -40.85      | V        |



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

|                |                          |
|----------------|--------------------------|
| Project #:     | 13179116                 |
| Date:          | 7/18/2020                |
| Test Engineer: | 19169                    |
| Configuration: | EUT only                 |
| Mode           | 5G NR Band n5 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, 834MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.64434               | 41.75                | Pk  | 29.1           | -32.5        | -95.2   | -56.15                  | -13             | -43.15      | H        |
| 1.64479               | 41.66                | Pk  | 29.1           | -32.5        | -95.2   | -56.24                  | -13             | -43.24      | V        |
| 2.46737               | 41.22                | Pk  | 33.3           | -31.4        | -95.2   | -51.58                  | -13             | -38.58      | V        |
| 2.46931               | 40.99                | Pk  | 33.3           | -31.4        | -95.2   | -51.81                  | -13             | -38.81      | H        |
| 3.29077               | 40.03                | Pk  | 33             | -30.1        | -95.2   | -51.47                  | -13             | -38.47      | V        |
| 3.29079               | 40.34                | Pk  | 33             | -30.1        | -95.2   | -51.16                  | -13             | -38.16      | H        |
| Mid Channel, 836.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.673                 | 41.78                | Pk  | 29             | -32.2        | -95.2   | -55.92                  | -13             | -42.92      | V        |
| 1.67494               | 41.49                | Pk  | 29             | -32.2        | -95.2   | -56.21                  | -13             | -43.21      | H        |
| 2.50877               | 40.37                | Pk  | 33.5           | -31.4        | -95.2   | -52.03                  | -13             | -39.03      | H        |
| 2.50957               | 40.61                | Pk  | 33.5           | -31.4        | -95.2   | -51.79                  | -13             | -38.79      | V        |
| 3.34611               | 40.56                | Pk  | 33             | -30.1        | -95.2   | -51.14                  | -13             | -38.14      | H        |
| 3.34697               | 39.9                 | Pk  | 33             | -30.1        | -95.2   | -51.8                   | -13             | -38.8       | V        |
| High Channel, 839MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.6763                | 41.66                | Pk  | 29             | -32.2        | -95.2   | -56.04                  | -13             | -43.04      | H        |
| 1.67937               | 41.49                | Pk  | 28.9           | -32.2        | -95.2   | -56.31                  | -13             | -43.31      | V        |
| 2.51684               | 40.26                | Pk  | 33.5           | -31.4        | -95.2   | -52.04                  | -13             | -39.04      | V        |
| 2.51821               | 40.55                | Pk  | 33.5           | -31.3        | -95.2   | -51.65                  | -13             | -38.65      | H        |
| 3.35562               | 39.81                | Pk  | 33             | -30.1        | -95.2   | -51.89                  | -13             | -38.89      | H        |
| 3.35689               | 40.09                | Pk  | 33             | -30.1        | -95.2   | -51.61                  | -13             | -38.61      | V        |

### 9.2.13. 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 #:     | 13179116        |
| Date:          | 4/27/2020       |
| Test Engineer: | 50822           |
| Configuration: | EUT only        |
| Mode           | LTE7 QPSK 20MHz |
| 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, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.11202               | 36.76                | Pk  | 34.3           | -26.9        | -95.2   | -51.04                  | -25             | -26.04      | H        |
| 7.66114               | 34.46                | Pk  | 35.7           | -23.9        | -95.2   | -48.94                  | -25             | -23.94      | H        |
| 10.26015              | 31.97                | Pk  | 37.3           | -20.3        | -95.2   | -46.23                  | -25             | -21.23      | H        |
| 5.1364                | 38.1                 | Pk  | 34.5           | -27          | -95.2   | -49.6                   | -25             | -24.6       | V        |
| 7.7019                | 34.5                 | Pk  | 35.7           | -23.8        | -95.2   | -48.8                   | -25             | -23.8       | V        |
| 10.33179              | 33.04                | Pk  | 37.4           | -20.2        | -95.2   | -44.96                  | -25             | -19.96      | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.08182               | 36.65                | Pk  | 34.4           | -27          | -95.2   | -51.15                  | -25             | -26.15      | H        |
| 7.60624               | 35.38                | Pk  | 35.7           | -24.1        | -95.2   | -48.22                  | -25             | -23.22      | H        |
| 10.14846              | 31.89                | Pk  | 37.1           | -20.2        | -95.2   | -46.41                  | -25             | -21.41      | H        |
| 5.11738               | 36.29                | Pk  | 34.4           | -27.1        | -95.2   | -51.61                  | -25             | -26.61      | V        |
| 7.64603               | 34.36                | Pk  | 35.6           | -24.1        | -95.2   | -49.34                  | -25             | -24.34      | V        |
| 10.24602              | 31.99                | Pk  | 37.3           | -20.3        | -95.2   | -46.21                  | -25             | -21.21      | V        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.12861               | 36.37                | Pk  | 34.4           | -27.1        | -95.2   | -51.53                  | -25             | -26.53      | H        |
| 7.69192               | 33.76                | Pk  | 35.7           | -23.8        | -95.2   | -49.54                  | -25             | -24.54      | H        |
| 10.25154              | 32.01                | Pk  | 37.4           | -20.4        | -95.2   | -46.19                  | -25             | -21.19      | H        |
| 5.12461               | 36.89                | Pk  | 34.4           | -27          | -95.2   | -50.91                  | -25             | -25.91      | V        |
| 7.6909                | 34.71                | Pk  | 35.6           | -23.8        | -95.2   | -48.69                  | -25             | -23.69      | V        |
| 10.26956              | 32.39                | Pk  | 37.4           | -20.5        | -95.2   | -45.91                  | -25             | -20.91      | V        |

#### 9.2.14. 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 #:     | 13179116                  |
| Date:          | 7/29/2020                 |
| Test Engineer: | 50820                     |
| Configuration: | EUT only                  |
| Mode           | 5G NR Band n12 QPSK 15MHz |
| 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, 704MHz   |                      |     |                |              |         |                         |                 |             |          |
| 1.40566               | 40.62                | Pk  | 28.8           | -32.2        | -95.2   | -57.98                  | -13             | -44.98      | H        |
| 2.11267               | 40.7                 | Pk  | 31.2           | -30.9        | -95.2   | -54.2                   | -13             | -41.2       | H        |
| 2.81469               | 38.91                | Pk  | 32.2           | -29.8        | -95.2   | -53.89                  | -13             | -40.89      | H        |
| 1.39702               | 40.62                | Pk  | 28.9           | -32.3        | -95.2   | -57.98                  | -13             | -44.98      | V        |
| 2.10424               | 40.22                | Pk  | 31.1           | -30.8        | -95.2   | -54.68                  | -13             | -41.68      | V        |
| 2.82081               | 38.77                | Pk  | 32.2           | -29.8        | -95.2   | -54.03                  | -13             | -41.03      | V        |
| Mid Channel, 707.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.41728               | 40.77                | Pk  | 28.7           | -32.1        | -95.2   | -57.83                  | -13             | -44.83      | H        |
| 2.1233                | 39.61                | Pk  | 31.1           | -31          | -95.2   | -55.49                  | -13             | -42.49      | H        |
| 2.85544               | 39.16                | Pk  | 32.1           | -29.8        | -95.2   | -53.74                  | -13             | -40.74      | H        |
| 1.40861               | 40.26                | Pk  | 28.8           | -32.2        | -95.2   | -58.34                  | -13             | -45.34      | V        |
| 2.10832               | 40.21                | Pk  | 31.1           | -30.9        | -95.2   | -54.79                  | -13             | -41.79      | V        |
| 2.82877               | 39.45                | Pk  | 32.2           | -29.9        | -95.2   | -53.45                  | -13             | -40.45      | V        |
| High Channel, 711MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.41822               | 40.82                | Pk  | 28.7           | -32.1        | -95.2   | -57.78                  | -13             | -44.78      | H        |
| 2.13779               | 39.58                | Pk  | 31.1           | -30.8        | -95.2   | -55.32                  | -13             | -42.32      | H        |
| 2.83099               | 39.12                | Pk  | 32.2           | -30          | -95.2   | -53.88                  | -13             | -40.88      | H        |
| 1.41268               | 41.07                | Pk  | 28.8           | -32.2        | -95.2   | -57.53                  | -13             | -44.53      | V        |
| 2.11972               | 40.33                | Pk  | 31.1           | -31          | -95.2   | -54.77                  | -13             | -41.77      | V        |
| 2.82339               | 38.96                | Pk  | 32.2           | -29.9        | -95.2   | -53.94                  | -13             | -40.94      | V        |

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

|                |                           |
|----------------|---------------------------|
| Project #:     | 13179116                  |
| Date:          | 7/28/2020                 |
| Test Engineer: | 30606                     |
| Configuration: | EUT only                  |
| Mode           | 5G NR Band n12 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 |
|------------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 706.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.4082                 | 42.16                | Pk  | 29.1           | -32.7        | -95.2   | -55.74                  | -13             | -42.74      | V        |
| 1.42017                | 41.62                | Pk  | 29.1           | -32.6        | -95.2   | -56.18                  | -13             | -43.18      | H        |
| 2.10735                | 40.78                | Pk  | 31.7           | -31.9        | -95.2   | -54.12                  | -13             | -41.12      | H        |
| 2.11386                | 41.53                | Pk  | 31.7           | -31.8        | -95.2   | -53.27                  | -13             | -40.27      | V        |
| 2.8188                 | 40.13                | Pk  | 32.6           | -30.7        | -95.2   | -52.57                  | -13             | -39.57      | H        |
| 2.82818                | 41.11                | Pk  | 32.5           | -30.6        | -95.2   | -51.49                  | -13             | -38.49      | V        |
| Mid Channel, 707.5MHz  |                      |     |                |              |         |                         |                 |             |          |
| 1.41186                | 41.52                | Pk  | 29.1           | -32.7        | -95.2   | -56.38                  | -13             | -43.38      | H        |
| 1.41807                | 41.34                | Pk  | 29.1           | -32.6        | -95.2   | -56.46                  | -13             | -43.46      | V        |
| 2.12295                | 45.98                | Pk  | 31.6           | -31.7        | -95.2   | -48.82                  | -13             | -35.82      | H        |
| 2.12365                | 42.4                 | Pk  | 31.6           | -31.7        | -95.2   | -52.4                   | -13             | -39.4       | V        |
| 2.83107                | 40.87                | Pk  | 32.5           | -30.6        | -95.2   | -51.73                  | -13             | -38.73      | H        |
| 2.83331                | 40.01                | Pk  | 32.5           | -30.6        | -95.2   | -52.59                  | -13             | -39.59      | V        |
| High Channel, 708.5MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.40809                | 41.54                | Pk  | 29.1           | -32.7        | -95.2   | -56.36                  | -13             | -43.36      | V        |
| 1.40985                | 41.6                 | Pk  | 29.1           | -32.7        | -95.2   | -56.3                   | -13             | -43.3       | H        |
| 2.1096                 | 41.03                | Pk  | 31.7           | -31.9        | -95.2   | -53.87                  | -13             | -40.87      | V        |
| 2.11382                | 40.58                | Pk  | 31.7           | -31.8        | -95.2   | -54.22                  | -13             | -41.22      | H        |
| 2.82644                | 42.32                | Pk  | 32.6           | -30.6        | -95.2   | -50.18                  | -13             | -37.18      | V        |
| 2.8388                 | 40.2                 | Pk  | 32.5           | -30.6        | -95.2   | -52.4                   | -13             | -39.4       | H        |

## 9.2.15. 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.

1

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

|                |                  |
|----------------|------------------|
| Project #:     | 13179116         |
| Date:          | 4/28/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT only         |
| Mode           | LTE13 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, 782MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.56389             | 44.12                | Pk  | 27.9           | -31.7        | -95.2   | -54.88                  | -40             | -14.88      | H        |
| 2.34834             | 39.47                | Pk  | 31.7           | -30.7        | -95.2   | -54.73                  | -13             | -41.73      | H        |
| 3.13217             | 38.02                | Pk  | 32.7           | -29.3        | -95.2   | -53.78                  | -13             | -40.78      | H        |
| 1.56377             | 46.04                | Pk  | 27.9           | -31.7        | -95.2   | -52.96                  | -40             | -12.96      | V        |
| 2.34402             | 39.27                | Pk  | 31.7           | -30.6        | -95.2   | -54.83                  | -13             | -41.83      | V        |
| 3.12358             | 37.31                | Pk  | 32.7           | -29.3        | -95.2   | -54.49                  | -13             | -41.49      | V        |

## 9.2.16. 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 #:     | 13179116         |
| Date:          | 4/28/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT only         |
| Mode           | LTE14 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 |                      |     |                |              |         |                         |                 |             |          |
| 1.59051             | 39.57                | Pk  | 27.9           | -31.8        | -95.2   | -59.53                  | -40             | -19.53      | H        |
| 2.37146             | 27.81                | Pk  | 31.9           | -30.7        | -95.2   | -66.19                  | -13             | -53.19      | H        |
| 3.1717              | 37.43                | Pk  | 32.7           | -28.9        | -95.2   | -53.97                  | -13             | -40.97      | H        |
| 1.58604             | 42.15                | Pk  | 27.9           | -31.8        | -95.2   | -56.95                  | -40             | -16.95      | V        |
| 2.37324             | 38.82                | Pk  | 31.9           | -30.5        | -95.2   | -54.98                  | -13             | -41.98      | V        |
| 3.16322             | 37.1                 | Pk  | 32.7           | -28.9        | -95.2   | -54.3                   | -13             | -41.3       | V        |



## 9.2.17. 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 #:     | 13179116         |
| Date:          | 4/28/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT only         |
| Mode           | LTE17 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, 710MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.42337             | 40.13                | Pk  | 28.6           | -32.1        | -95.2   | -58.57                  | -13             | -45.57      | H        |
| 2.1361              | 39.64                | Pk  | 31.1           | -30.8        | -95.2   | -55.26                  | -13             | -42.26      | H        |
| 2.83937             | 39.05                | Pk  | 32.2           | -30          | -95.2   | -53.95                  | -13             | -40.95      | H        |
| 1.42117             | 41                   | Pk  | 28.6           | -32.1        | -95.2   | -57.7                   | -13             | -44.7       | V        |
| 2.12772             | 38.21                | Pk  | 31.2           | -30.9        | -95.2   | -56.69                  | -13             | -43.69      | V        |
| 2.83711             | 38.47                | Pk  | 32.2           | -30.1        | -95.2   | -54.63                  | -13             | -41.63      | V        |

## 9.2.18. 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 #:     | 13179116         |
| Date:          | 4/27/2020        |
| Test Engineer: | 50822            |
| Configuration: | EUT only         |
| Mode           | LTE25 QPSK 20MHz |
| 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, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.72539                | 38.59                | Pk  | 32.9           | -28.5        | -95.2   | -52.21                  | -13             | -39.21         | H        |
| 5.58674                | 37.08                | Pk  | 35.2           | -26.7        | -95.2   | -49.62                  | -13             | -36.62         | H        |
| 7.44095                | 34.92                | Pk  | 35.6           | -24.3        | -95.2   | -48.98                  | -13             | -35.98         | H        |
| 3.70149                | 38.31                | Pk  | 33             | -28.7        | -95.2   | -52.59                  | -13             | -39.59         | V        |
| 5.55508                | 36.4                 | Pk  | 35.1           | -26.7        | -95.2   | -50.4                   | -13             | -37.4          | V        |
| 7.4159                 | 35.26                | Pk  | 35.6           | -24.4        | -95.2   | -48.74                  | -13             | -35.74         | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.76834                | 37.82                | Pk  | 33             | -28.2        | -95.2   | -52.58                  | -13             | -39.58         | H        |
| 5.64729                | 36.46                | Pk  | 35.1           | -26.5        | -95.2   | -50.14                  | -13             | -37.14         | H        |
| 7.53946                | 35.14                | Pk  | 35.5           | -24          | -95.2   | -48.56                  | -13             | -35.56         | H        |
| 3.77554                | 37.89                | Pk  | 33             | -28.3        | -95.2   | -52.61                  | -13             | -39.61         | V        |
| 5.67115                | 36.88                | Pk  | 35             | -26.7        | -95.2   | -50.02                  | -13             | -37.02         | V        |
| 7.58126                | 34.99                | Pk  | 35.5           | -24.2        | -95.2   | -48.91                  | -13             | -35.91         | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.81522                | 37.81                | Pk  | 32.9           | -28.4        | -95.2   | -52.89                  | -13             | -39.89         | H        |
| 5.72448                | 36.36                | Pk  | 34.9           | -26.7        | -95.2   | -50.64                  | -13             | -37.64         | H        |
| 7.62499                | 34.61                | Pk  | 35.7           | -24.1        | -95.2   | -48.99                  | -13             | -35.99         | H        |
| 3.84399                | 38                   | Pk  | 33             | -28.4        | -95.2   | -52.6                   | -13             | -39.6          | V        |
| 5.72848                | 36.35                | Pk  | 34.9           | -26.6        | -95.2   | -50.55                  | -13             | -37.55         | V        |
| 7.64014                | 35.03                | Pk  | 35.6           | -24.1        | -95.2   | -48.67                  | -13             | -35.67         | V        |

## 9.2.19. 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 #:     | 13179116          |
| Date:          | 4/27/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 26 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, 819MHz |                      |     |                |              |         |                         |                 |             |          |
| 1.63548             | 41.61                | Pk  | 28.5           | -32.8        | -95.2   | -57.89                  | -13             | -44.89      | V        |
| 1.63814             | 44.05                | Pk  | 28.5           | -32.8        | -95.2   | -55.45                  | -13             | -42.45      | H        |
| 2.45311             | 40.96                | Pk  | 32.5           | -31.8        | -95.2   | -53.54                  | -13             | -40.54      | V        |
| 2.46012             | 41.48                | Pk  | 32.6           | -31.9        | -95.2   | -53.02                  | -13             | -40.02      | H        |
| 3.26842             | 40.54                | Pk  | 33             | -30.7        | -95.2   | -52.36                  | -13             | -39.36      | V        |
| 3.27361             | 40.46                | Pk  | 32.9           | -30.7        | -95.2   | -52.54                  | -13             | -39.54      | H        |

## 9.2.20. 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 #:     | 13179116         |
| Date:          | 4/28/2020        |
| Test Engineer: | 50822            |
| Configuration: | EUT Only         |
| Mode:          | LTE30 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 |                      |     |                |              |         |                         |                 |             |          |
| 3.51419              | 39.57                | Pk  | 32.8           | -28.7        | -95.2   | -51.53                  | -40             | -11.53      | H        |
| 5.24563              | 36.7                 | Pk  | 34.5           | -26.9        | -95.2   | -50.9                   | -40             | -10.9       | H        |
| 6.98985              | 35.86                | Pk  | 35.7           | -24.8        | -95.2   | -48.44                  | -40             | -8.44       | H        |
| 3.49171              | 37.43                | Pk  | 32.9           | -28.9        | -95.2   | -53.77                  | -40             | -13.77      | V        |
| 5.23179              | 37.92                | Pk  | 34.5           | -26.7        | -95.2   | -49.48                  | -40             | -9.48       | V        |
| 6.96457              | 36.08                | Pk  | 35.7           | -24.8        | -95.2   | -48.22                  | -40             | -8.22       | V        |

## 9.2.21. 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 #:     | 13179116          |
| Date:          | 4/28/2020         |
| Test Engineer: | 50822             |
| Configuration: | EUT Only          |
| Mode           | LTE 41 QPSK 20MHz |
| 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, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.02098               | 36.8                 | Pk  | 34.2           | -27.1        | -95.2   | -51.3                   | -25             | -26.3          | H        |
| 7.51802               | 34.45                | Pk  | 35.5           | -23.9        | -95.2   | -49.15                  | -25             | -24.15         | H        |
| 10.19117              | 31.34                | Pk  | 37.2           | -20.1        | -95.2   | -46.76                  | -25             | -21.76         | H        |
| 5.04987               | 36.26                | Pk  | 34.4           | -27          | -95.2   | -51.54                  | -25             | -26.54         | V        |
| 7.52966               | 34.52                | Pk  | 35.6           | -23.9        | -95.2   | -48.98                  | -25             | -23.98         | V        |
| 10.20796              | 32.24                | Pk  | 37.3           | -20.2        | -95.2   | -45.86                  | -25             | -20.86         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 4.51218               | 37.53                | Pk  | 33.7           | -27.5        | -95.2   | -51.47                  | -25             | -26.47         | H        |
| 7.77855               | 34.67                | Pk  | 35.7           | -23.8        | -95.2   | -48.63                  | -25             | -23.63         | H        |
| 10.37418              | 31.71                | Pk  | 37.5           | -20          | -95.2   | -45.99                  | -25             | -20.99         | H        |
| 4.50485               | 37.32                | Pk  | 33.7           | -27.4        | -95.2   | -51.58                  | -25             | -26.58         | V        |
| 7.79486               | 34.49                | Pk  | 35.7           | -23.6        | -95.2   | -48.61                  | -25             | -23.61         | V        |
| 10.37654              | 31.65                | Pk  | 37.5           | -20          | -95.2   | -46.05                  | -25             | -21.05         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.36397               | 37.27                | Pk  | 34.6           | -26.8        | -95.2   | -50.13                  | -25             | -25.13         | H        |
| 8.02934               | 34.14                | Pk  | 35.8           | -23          | -95.2   | -48.26                  | -25             | -23.26         | H        |
| 10.7293               | 32.23                | Pk  | 37.9           | -19.7        | -95.2   | -44.77                  | -25             | -19.77         | H        |
| 5.38784               | 36.45                | Pk  | 34.6           | -26.5        | -95.2   | -50.65                  | -25             | -25.65         | V        |
| 8.00997               | 34.32                | Pk  | 35.8           | -23.6        | -95.2   | -48.68                  | -25             | -23.68         | V        |
| 10.85192              | 31.8                 | Pk  | 37.9           | -20.2        | -95.2   | -45.7                   | -25             | -20.7          | V        |

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

|                |                                |
|----------------|--------------------------------|
| Project #:     | 13179116                       |
| Date:          | 7/23/202                       |
| Test Engineer: | 30606                          |
| Configuration: | EUT Only                       |
| Mode           | 5G NR Band n41 FCC QPSK 100MHz |
| Chamber #:     | Chamber A                      |

| Frequency (GHz)       | Meter Reading (dBm) | Det | AF T862 (dB/m) | Amp/Cbl (dB) | Amp/Cbl (dB) | Corrected Reading (dBm) | Harmonics limit | PK Margin (dB) | Polarity |
|-----------------------|---------------------|-----|----------------|--------------|--------------|-------------------------|-----------------|----------------|----------|
| Low Channel, 2546MHz  |                     |     |                |              |              |                         |                 |                |          |
| 5.07884               | 39.5                | Pk  | 34.4           | -27.8        | -95.2        | -48.4                   | -25             | -23.4          | H        |
| 5.10783               | 38.96               | Pk  | 34.5           | -27.8        | -95.2        | -48.74                  | -25             | -23.74         | V        |
| 7.6202                | 36.91               | Pk  | 35.9           | -23.5        | -95.2        | -45.49                  | -25             | -20.49         | V        |
| 7.65557               | 36.81               | Pk  | 35.8           | -23.5        | -95.2        | -45.79                  | -25             | -20.79         | H        |
| 10.17815              | 35.31               | Pk  | 37.5           | -20.9        | -95.2        | -42.69                  | -25             | -17.69         | H        |
| 10.17907              | 35.78               | Pk  | 37.5           | -20.9        | -95.2        | -42.22                  | -25             | -17.22         | V        |
| Mid Channel, 2593MHz  |                     |     |                |              |              |                         |                 |                |          |
| 5.17145               | 39.25               | Pk  | 34.6           | -27.8        | -95.2        | -48.45                  | -25             | -23.45         | V        |
| 5.17448               | 39.77               | Pk  | 34.6           | -27.8        | -95.2        | -47.93                  | -25             | -22.93         | H        |
| 7.76937               | 35.8                | Pk  | 35.9           | -23.5        | -95.2        | -46.7                   | -25             | -21.7          | V        |
| 7.79543               | 35.59               | Pk  | 36             | -23.4        | -95.2        | -46.61                  | -25             | -21.61         | H        |
| 10.36382              | 35.44               | Pk  | 37.7           | -20.2        | -95.2        | -41.46                  | -25             | -16.46         | H        |
| 10.37375              | 34.92               | Pk  | 37.7           | -20.2        | -95.2        | -41.98                  | -25             | -16.98         | V        |
| High Channel, 2640MHz |                     |     |                |              |              |                         |                 |                |          |
| 5.28017               | 39.12               | Pk  | 34.7           | -27.9        | -95.2        | -48.98                  | -25             | -23.98         | V        |
| 5.28198               | 39.17               | Pk  | 34.7           | -28          | -95.2        | -49.03                  | -25             | -24.03         | H        |
| 7.91885               | 36.29               | Pk  | 36.2           | -23.4        | -95.2        | -45.91                  | -25             | -20.91         | V        |
| 7.91976               | 36.41               | Pk  | 36.2           | -23.4        | -95.2        | -45.79                  | -25             | -20.79         | H        |
| 10.55898              | 35.42               | Pk  | 37.7           | -20.5        | -95.2        | -41.88                  | -25             | -16.88         | H        |
| 10.55936              | 35.41               | Pk  | 37.7           | -20.5        | -95.2        | -41.89                  | -25             | -16.89         | V        |

## 9.2.22. 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 #:     | 13179116          |
| Date:          | 4/28/2020         |
| Test Engineer: | 50822             |
| Configuration: | EUT Only          |
| Mode           | LTE 66 QPSK 20MHz |
| 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, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.42372               | 39.08                | Pk  | 32.7           | -29.2        | -95.2   | -52.62                  | -13             | -39.62         | H        |
| 5.18541               | 37.06                | Pk  | 34.4           | -27          | -95.2   | -50.74                  | -13             | -37.74         | H        |
| 6.81666               | 36.76                | Pk  | 35.5           | -25.1        | -95.2   | -48.04                  | -13             | -35.04         | H        |
| 3.4115                | 39.27                | Pk  | 32.7           | -29.3        | -95.2   | -52.53                  | -13             | -39.53         | V        |
| 5.19668               | 37.25                | Pk  | 34.4           | -27          | -95.2   | -50.55                  | -13             | -37.55         | V        |
| 6.78737               | 35.63                | Pk  | 35.6           | -25          | -95.2   | -48.97                  | -13             | -35.97         | V        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.75396               | 38.49                | Pk  | 32.9           | -28.3        | -95.2   | -52.11                  | -13             | -39.11         | H        |
| 5.34742               | 37.27                | Pk  | 34.6           | -26.7        | -95.2   | -50.03                  | -13             | -37.03         | H        |
| 7.49108               | 35                   | Pk  | 35.6           | -24          | -95.2   | -48.6                   | -13             | -35.6          | H        |
| 3.75964               | 38.52                | Pk  | 32.9           | -28.4        | -95.2   | -52.18                  | -13             | -39.18         | V        |
| 5.34076               | 37.73                | Pk  | 34.6           | -26.7        | -95.2   | -49.57                  | -13             | -36.57         | V        |
| 7.54843               | 34.63                | Pk  | 35.6           | -23.9        | -95.2   | -48.87                  | -13             | -35.87         | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.55215               | 38.6                 | Pk  | 33             | -28.4        | -95.2   | -52                     | -13             | -39            | H        |
| 5.35045               | 38.26                | Pk  | 34.6           | -26.7        | -95.2   | -49.04                  | -13             | -36.04         | H        |
| 7.1331                | 35.36                | Pk  | 35.6           | -24.5        | -95.2   | -48.74                  | -13             | -35.74         | H        |
| 3.56241               | 38.08                | Pk  | 33             | -28.5        | -95.2   | -52.62                  | -13             | -39.62         | V        |
| 5.33595               | 37.07                | Pk  | 34.6           | -26.7        | -95.2   | -50.23                  | -13             | -37.23         | V        |
| 7.18777               | 35.56                | Pk  | 35.6           | -24.6        | -95.2   | -48.64                  | -13             | -35.64         | V        |

### 9.2.23. 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 #:     | 13179116          |
| Date:          | 4/28/2020         |
| Test Engineer: | 20792             |
| Configuration: | EUT Only          |
| Mode           | LTE 71 QPSK 20MHz |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 1.3452                 | 40.16                | Pk  | 29.5           | -32.3        | -95.2   | -57.84                  | -13             | -44.84         | H        |
| 2.02012                | 38.7                 | Pk  | 30.9           | -30.9        | -95.2   | -56.5                   | -13             | -43.5          | H        |
| 2.69329                | 38.25                | Pk  | 32.4           | -29.9        | -95.2   | -54.45                  | -13             | -41.45         | H        |
| 1.34695                | 40.07                | Pk  | 29.5           | -32.3        | -95.2   | -57.93                  | -13             | -44.93         | V        |
| 2.01908                | 39.48                | Pk  | 30.9           | -31          | -95.2   | -55.82                  | -13             | -42.82         | V        |
| 2.69006                | 38.92                | Pk  | 32.4           | -30          | -95.2   | -53.88                  | -13             | -40.88         | V        |
| Mid Channel, 680.5MHz  |                      |     |                |              |         |                         |                 |                |          |
| 1.36245                | 39.21                | Pk  | 29.6           | -32.2        | -95.2   | -58.59                  | -13             | -45.59         | H        |
| 2.04165                | 38.86                | Pk  | 31             | -30.9        | -95.2   | -56.24                  | -13             | -43.24         | H        |
| 2.72418                | 38.46                | Pk  | 32.5           | -30          | -95.2   | -54.24                  | -13             | -41.24         | H        |
| 1.36012                | 39.15                | Pk  | 29.6           | -32.3        | -95.2   | -58.75                  | -13             | -45.75         | V        |
| 2.04277                | 39.7                 | Pk  | 31             | -30.9        | -95.2   | -55.4                   | -13             | -42.4          | V        |
| 2.72374                | 36.6                 | Pk  | 32.5           | -30.1        | -95.2   | -56.2                   | -13             | -43.2          | V        |
| High Channel, 688.0MHz |                      |     |                |              |         |                         |                 |                |          |
| 1.37457                | 40.38                | Pk  | 29.3           | -32.3        | -95.2   | -57.82                  | -13             | -44.82         | H        |
| 2.06349                | 39.16                | Pk  | 31.1           | -31          | -95.2   | -55.94                  | -13             | -42.94         | H        |
| 2.75142                | 36.63                | Pk  | 32.5           | -30          | -95.2   | -56.07                  | -13             | -43.07         | H        |
| 1.37777                | 40                   | Pk  | 29.2           | -32.3        | -95.2   | -58.3                   | -13             | -45.3          | V        |
| 2.06631                | 38.65                | Pk  | 31.1           | -31          | -95.2   | -56.45                  | -13             | -43.45         | V        |
| 2.75385                | 38.84                | Pk  | 32.5           | -30          | -95.2   | -53.86                  | -13             | -40.86         | V        |

### **9.3. FIELD STRENGTH OF SPURIOUS RADIATION, ANT3**

#### **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**

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

### 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 #:     | 13179116        |
| Date:          | 4/30/2020       |
| Test Engineer: | 20792           |
| Configuration: | EUT only        |
| Mode           | LTE2 QPSK 20MHz |
| 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, 1860MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.72006               | 36.81                | Pk  | 32.9           | -28.4        | -95.2   | -53.89                  | -13             | -40.89      | H        |
| 5.58143               | 34.64                | Pk  | 35.2           | -26.7        | -95.2   | -52.06                  | -13             | -39.06      | H        |
| 7.44153               | 34.46                | Pk  | 35.6           | -24.3        | -95.2   | -49.44                  | -13             | -36.44      | H        |
| 3.72067               | 36.78                | Pk  | 32.9           | -28.4        | -95.2   | -53.92                  | -13             | -40.92      | V        |
| 5.57909               | 35.58                | Pk  | 35.2           | -26.7        | -95.2   | -51.12                  | -13             | -38.12      | V        |
| 7.43931               | 32.53                | Pk  | 35.6           | -24.3        | -95.2   | -51.37                  | -13             | -38.37      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.7613                | 37.18                | Pk  | 33             | -28.3        | -95.2   | -53.32                  | -13             | -40.32      | H        |
| 5.63969               | 36.02                | Pk  | 35.1           | -26.6        | -95.2   | -50.68                  | -13             | -37.68      | H        |
| 7.51915               | 33.22                | Pk  | 35.5           | -23.9        | -95.2   | -50.38                  | -13             | -37.38      | H        |
| 3.76138               | 36.81                | Pk  | 33             | -28.3        | -95.2   | -53.69                  | -13             | -40.69      | V        |
| 5.64031               | 35.7                 | Pk  | 35.1           | -26.7        | -95.2   | -51.1                   | -13             | -38.1       | V        |
| 7.51888               | 33.51                | Pk  | 35.5           | -23.9        | -95.2   | -50.09                  | -13             | -37.09      | V        |
| High Channel, 1900MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.79896               | 36.56                | Pk  | 33             | -28.3        | -95.2   | -53.94                  | -13             | -40.94      | H        |
| 5.69896               | 34.43                | Pk  | 35             | -26.6        | -95.2   | -52.37                  | -13             | -39.37      | H        |
| 7.60026               | 33.24                | Pk  | 35.6           | -24.1        | -95.2   | -50.46                  | -13             | -37.46      | H        |
| 3.80177               | 38.29                | Pk  | 32.9           | -28.3        | -95.2   | -52.31                  | -13             | -39.31      | V        |
| 5.69976               | 35.82                | Pk  | 35             | -26.6        | -95.2   | -50.98                  | -13             | -37.98      | V        |
| 7.59949               | 34.81                | Pk  | 35.6           | -24.1        | -95.2   | -48.89                  | -13             | -35.89      | V        |

### 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 #:     | 13179116        |
| Date:          | 4/30/2020       |
| Test Engineer: | 50822           |
| Configuration: | EUT only        |
| Mode           | LTE7 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 | Margin (dB) | Polarity |
|-----------------------|----------------------|-----|----------------|--------------|---------|-------------------------|-----------------|-------------|----------|
| Low Channel, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.02791               | 36.09                | Pk  | 34.3           | -27          | -95.2   | -51.81                  | -25             | -26.81      | H        |
| 7.54374               | 33.77                | Pk  | 35.6           | -23.9        | -95.2   | -49.73                  | -25             | -24.73      | H        |
| 10.41617              | 31.97                | Pk  | 37.6           | -20.8        | -95.2   | -46.43                  | -25             | -21.43      | H        |
| 5.02454               | 36.95                | Pk  | 34.2           | -27          | -95.2   | -51.05                  | -25             | -26.05      | V        |
| 7.54952               | 33.78                | Pk  | 35.6           | -23.8        | -95.2   | -49.62                  | -25             | -24.62      | V        |
| 10.48594              | 32.6                 | Pk  | 37.7           | -20.6        | -95.2   | -45.5                   | -25             | -20.5       | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.07004               | 35.89                | Pk  | 34.3           | -27.1        | -95.2   | -52.11                  | -25             | -27.11      | H        |
| 7.16077               | 34.29                | Pk  | 35.7           | -24.5        | -95.2   | -49.71                  | -25             | -24.71      | H        |
| 11.42963              | 31.09                | Pk  | 38.1           | -20.3        | -95.2   | -46.31                  | -25             | -21.31      | H        |
| 5.03978               | 36.21                | Pk  | 34.3           | -26.8        | -95.2   | -51.49                  | -25             | -26.49      | V        |
| 7.21227               | 34.49                | Pk  | 35.6           | -24.8        | -95.2   | -49.91                  | -25             | -24.91      | V        |
| 11.47822              | 32.15                | Pk  | 38.1           | -20.3        | -95.2   | -45.25                  | -25             | -20.25      | V        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.1297                | 35.93                | Pk  | 34.4           | -27.1        | -95.2   | -51.97                  | -25             | -26.97      | H        |
| 7.67378               | 33.93                | Pk  | 35.6           | -23.9        | -95.2   | -49.57                  | -25             | -24.57      | H        |
| 10.27626              | 31.63                | Pk  | 37.3           | -20.5        | -95.2   | -46.77                  | -25             | -21.77      | H        |
| 5.10013               | 35.54                | Pk  | 34.4           | -26.8        | -95.2   | -52.06                  | -25             | -27.06      | V        |
| 7.70277               | 34.13                | Pk  | 35.7           | -23.8        | -95.2   | -49.17                  | -25             | -24.17      | V        |
| 10.32803              | 31.72                | Pk  | 37.4           | -20.1        | -95.2   | -46.18                  | -25             | -21.18      | V        |



### 9.3.4. 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 #:     | 13179116         |
| Date:          | 4/30/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT only         |
| Mode           | LTE25 QPSK 20MHz |
| 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, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.71988                | 37.35                | Pk  | 32.9           | -28.4        | -95.2   | -53.35                  | -13             | -40.35         | H        |
| 5.58222                | 36.29                | Pk  | 35.2           | -26.7        | -95.2   | -50.41                  | -13             | -37.41         | H        |
| 7.44286                | 34.27                | Pk  | 35.6           | -24.3        | -95.2   | -49.63                  | -13             | -36.63         | H        |
| 3.71962                | 36.92                | Pk  | 32.9           | -28.4        | -95.2   | -53.78                  | -13             | -40.78         | V        |
| 5.57876                | 36.42                | Pk  | 35.2           | -26.7        | -95.2   | -50.28                  | -13             | -37.28         | V        |
| 7.44222                | 33.98                | Pk  | 35.6           | -24.3        | -95.2   | -49.92                  | -13             | -36.92         | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.71988                | 37.35                | Pk  | 32.9           | -28.4        | -95.2   | -53.35                  | -13             | -40.35         | H        |
| 5.58222                | 36.29                | Pk  | 35.2           | -26.7        | -95.2   | -50.41                  | -13             | -37.41         | H        |
| 7.44286                | 34.27                | Pk  | 35.6           | -24.3        | -95.2   | -49.63                  | -13             | -36.63         | H        |
| 3.71962                | 36.92                | Pk  | 32.9           | -28.4        | -95.2   | -53.78                  | -13             | -40.78         | V        |
| 5.57876                | 36.42                | Pk  | 35.2           | -26.7        | -95.2   | -50.28                  | -13             | -37.28         | V        |
| 7.44222                | 33.98                | Pk  | 35.6           | -24.3        | -95.2   | -49.92                  | -13             | -36.92         | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.80984                | 36.51                | Pk  | 32.9           | -28.4        | -95.2   | -54.19                  | -13             | -41.19         | H        |
| 5.71695                | 35.59                | Pk  | 35             | -26.7        | -95.2   | -51.31                  | -13             | -38.31         | H        |
| 7.62053                | 33.08                | Pk  | 35.7           | -24.1        | -95.2   | -50.52                  | -13             | -37.52         | H        |
| 3.81078                | 37.47                | Pk  | 32.9           | -28.4        | -95.2   | -53.23                  | -13             | -40.23         | V        |
| 5.71722                | 37.22                | Pk  | 35             | -26.7        | -95.2   | -49.68                  | -13             | -36.68         | V        |
| 7.61953                | 33.78                | Pk  | 35.6           | -24.1        | -95.2   | -49.92                  | -13             | -36.92         | V        |

### 9.3.5. 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 #:     | 13179116         |
| Date:          | 4/30/2020        |
| Test Engineer: | 20792            |
| Configuration: | EUT Only         |
| Mode:          | LTE30 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 |                      |     |                |              |         |                         |                 |             |          |
| 4.62009              | 36.52                | Pk  | 33.9           | -27.6        | -95.2   | -52.38                  | -40             | -12.38      | H        |
| 6.93015              | 34.88                | Pk  | 35.6           | -24.7        | -95.2   | -49.42                  | -40             | -9.42       | H        |
| 9.23919              | 33.09                | Pk  | 36.4           | -21.6        | -95.2   | -47.31                  | -40             | -7.31       | H        |
| 4.61922              | 36.97                | Pk  | 33.9           | -27.7        | -95.2   | -52.03                  | -40             | -12.03      | V        |
| 6.92928              | 35.62                | Pk  | 35.6           | -24.7        | -95.2   | -48.68                  | -40             | -8.68       | V        |
| 9.24045              | 33.12                | Pk  | 36.3           | -21.6        | -95.2   | -47.38                  | -40             | -7.38       | V        |

### 9.3.6. 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 #:     | 13179116            |
| Date:          | 4/30/2020           |
| Test Engineer: | 20792               |
| Configuration: | EUT Only            |
| Mode:          | LTE41FCC QPSK 20MHz |
| 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, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.01343               | 35.95                | Pk  | 34.3           | -27.1        | -95.2   | -52.05                  | -25             | -27.05         | H        |
| 7.51767               | 33.52                | Pk  | 35.5           | -23.9        | -95.2   | -50.08                  | -25             | -25.08         | H        |
| 10.02316              | 33.06                | Pk  | 37.1           | -20.8        | -95.2   | -45.84                  | -25             | -20.84         | H        |
| 5.01037               | 35.8                 | Pk  | 34.3           | -27.2        | -95.2   | -52.3                   | -25             | -27.3          | V        |
| 7.51943               | 33.52                | Pk  | 35.5           | -23.9        | -95.2   | -50.08                  | -25             | -25.08         | V        |
| 10.02383              | 31.77                | Pk  | 37.1           | -20.7        | -95.2   | -47.03                  | -25             | -22.03         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.18607               | 35.48                | Pk  | 34.4           | -27          | -95.2   | -52.32                  | -25             | -27.32         | H        |
| 7.77994               | 32.84                | Pk  | 35.7           | -23.8        | -95.2   | -50.46                  | -25             | -25.46         | H        |
| 10.37209              | 31.6                 | Pk  | 37.4           | -20          | -95.2   | -46.2                   | -25             | -21.2          | H        |
| 5.1849                | 35.86                | Pk  | 34.4           | -27          | -95.2   | -51.94                  | -25             | -26.94         | V        |
| 7.77739               | 33.39                | Pk  | 35.7           | -23.7        | -95.2   | -49.81                  | -25             | -24.81         | V        |
| 10.37095              | 31.52                | Pk  | 37.4           | -20.1        | -95.2   | -46.38                  | -25             | -21.38         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.36157               | 34.78                | Pk  | 34.6           | -26.8        | -95.2   | -52.62                  | -25             | -27.62         | H        |
| 8.03934               | 33.21                | Pk  | 35.7           | -22.9        | -95.2   | -49.19                  | -25             | -24.19         | H        |
| 10.72136              | 31.45                | Pk  | 37.9           | -19.8        | -95.2   | -45.65                  | -25             | -20.65         | H        |
| 5.35862               | 36.7                 | Pk  | 34.6           | -26.8        | -95.2   | -50.7                   | -25             | -25.7          | V        |
| 8.03999               | 33.69                | Pk  | 35.7           | -23          | -95.2   | -48.81                  | -25             | -23.81         | V        |
| 10.71968              | 32.24                | Pk  | 37.9           | -19.7        | -95.2   | -44.76                  | -25             | -19.76         | V        |

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

|                |                                |
|----------------|--------------------------------|
| Project #:     | 13179116                       |
| Date:          | 7/17/2020                      |
| Test Engineer: | 19169                          |
| Configuration: | EUT Only                       |
| Mode           | 5G NR Band n41 FCC QPSK 100MHz |
| Chamber #:     | Chamber A                      |

| 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, 2546MHz  |                      |     |                |              |         |                         |                 |                |          |
| 4.99274               | 39.22                | Pk  | 34.1           | -28.4        | -95.2   | -50.28                  | -25             | -25.28         | H        |
| 4.99374               | 39.28                | Pk  | 34.1           | -28.4        | -95.2   | -50.22                  | -25             | -25.22         | V        |
| 7.45751               | 36.76                | Pk  | 36.2           | -24          | -95.2   | -46.24                  | -25             | -21.24         | V        |
| 7.45931               | 36.53                | Pk  | 36.2           | -24          | -95.2   | -46.47                  | -25             | -21.47         | H        |
| 9.9843                | 35.01                | Pk  | 37.2           | -20.9        | -95.2   | -43.89                  | -25             | -18.89         | H        |
| 9.98464               | 35.72                | Pk  | 37.2           | -20.9        | -95.2   | -43.18                  | -25             | -18.18         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.18442               | 38.71                | Pk  | 34.6           | -27.7        | -95.2   | -49.59                  | -25             | -24.59         | V        |
| 5.18708               | 38.36                | Pk  | 34.6           | -27.7        | -95.2   | -49.94                  | -25             | -24.94         | H        |
| 7.77909               | 35.88                | Pk  | 35.9           | -23.4        | -95.2   | -46.82                  | -25             | -21.82         | H        |
| 7.7792                | 36.46                | Pk  | 35.9           | -23.4        | -95.2   | -46.24                  | -25             | -21.24         | V        |
| 10.36982              | 34.58                | Pk  | 37.7           | -20.2        | -95.2   | -43.12                  | -25             | -18.12         | H        |
| 10.37104              | 34.49                | Pk  | 37.7           | -20.2        | -95.2   | -43.21                  | -25             | -18.21         | V        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.37942               | -67.99               | Pk  | 34.8           | -27.8        | 10.5    | -50.49                  | -25             | -25.49         | 197      |
| 5.38203               | -68.4                | Pk  | 34.8           | -27.8        | 10.6    | -50.8                   | -25             | -25.8          | 12       |
| 8.06898               | -70.85               | Pk  | 36.2           | -23.2        | 11.2    | -46.65                  | -25             | -21.65         | 324      |
| 8.0694                | -70.06               | Pk  | 36.2           | -23.2        | 11.4    | -45.66                  | -25             | -20.66         | 212      |
| 10.76057              | -71.62               | Pk  | 37.8           | -20.2        | 10.3    | -43.72                  | -25             | -18.72         | 204      |
| 10.76138              | -71.3                | Pk  | 37.8           | -20.2        | 10.6    | -43.1                   | -25             | -18.1          | 40       |

### 9.3.7. 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 #:     | 13179116          |
| Date:          | 4/28/2020         |
| Test Engineer: | 50822             |
| Configuration: | EUT Only          |
| Mode           | LTE 66 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, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.42372               | 39.08                | Pk  | 32.7           | -29.2        | -95.2   | -52.62                  | -13             | -39.62         | H        |
| 5.18541               | 37.06                | Pk  | 34.4           | -27          | -95.2   | -50.74                  | -13             | -37.74         | H        |
| 6.81666               | 36.76                | Pk  | 35.5           | -25.1        | -95.2   | -48.04                  | -13             | -35.04         | H        |
| 3.4115                | 39.27                | Pk  | 32.7           | -29.3        | -95.2   | -52.53                  | -13             | -39.53         | V        |
| 5.19668               | 37.25                | Pk  | 34.4           | -27          | -95.2   | -50.55                  | -13             | -37.55         | V        |
| 6.78737               | 35.63                | Pk  | 35.6           | -25          | -95.2   | -48.97                  | -13             | -35.97         | V        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.75396               | 38.49                | Pk  | 32.9           | -28.3        | -95.2   | -52.11                  | -13             | -39.11         | H        |
| 5.34742               | 37.27                | Pk  | 34.6           | -26.7        | -95.2   | -50.03                  | -13             | -37.03         | H        |
| 7.49108               | 35                   | Pk  | 35.6           | -24          | -95.2   | -48.6                   | -13             | -35.6          | H        |
| 3.76052               | 38.5                 | Pk  | 33             | -28.4        | -95.2   | -52.1                   | -13             | -39.1          | V        |
| 5.34076               | 37.73                | Pk  | 34.6           | -26.7        | -95.2   | -49.57                  | -13             | -36.57         | V        |
| 7.54843               | 34.63                | Pk  | 35.6           | -23.9        | -95.2   | -48.87                  | -13             | -35.87         | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.55215               | 38.6                 | Pk  | 33             | -28.4        | -95.2   | -52                     | -13             | -39            | H        |
| 5.35045               | 38.26                | Pk  | 34.6           | -26.7        | -95.2   | -49.04                  | -13             | -36.04         | H        |
| 7.1331                | 35.36                | Pk  | 35.6           | -24.5        | -95.2   | -48.74                  | -13             | -35.74         | H        |
| 3.56241               | 38.08                | Pk  | 33             | -28.5        | -95.2   | -52.62                  | -13             | -39.62         | V        |
| 5.33595               | 37.07                | Pk  | 34.6           | -26.7        | -95.2   | -50.23                  | -13             | -37.23         | V        |
| 7.18777               | 35.56                | Pk  | 35.6           | -24.6        | -95.2   | -48.64                  | -13             | -35.64         | V        |

## **9.4. FIELD STRENGTH OF SPURIOUS RADIATION, ANT4**

### **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**

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



### 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 #:     | 13179116        |
| Date:          | 4/30/2020       |
| Test Engineer: | 50822           |
| Configuration: | EUT only        |
| Mode           | LTE2 QPSK 20MHz |
| 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, 1860MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.73168               | 37.24                | Pk  | 32.9           | -28.4        | -95.2   | -53.46                  | -13             | -40.46      | H        |
| 5.5532                | 38.52                | Pk  | 35.1           | -26.8        | -95.2   | -48.38                  | -13             | -35.38      | H        |
| 7.45559               | 33.85                | Pk  | 35.6           | -24.2        | -95.2   | -49.95                  | -13             | -36.95      | H        |
| 3.75151               | 37.32                | Pk  | 33             | -28.4        | -95.2   | -53.28                  | -13             | -40.28      | V        |
| 5.54852               | 36.2                 | Pk  | 35.1           | -26.8        | -95.2   | -50.7                   | -13             | -37.7       | V        |
| 7.53359               | 33.98                | Pk  | 35.6           | -23.9        | -95.2   | -49.52                  | -13             | -36.52      | V        |
| Mid Channel, 1880MHz  |                      |     |                |              |         |                         |                 |             |          |
| 3.74822               | 37.45                | Pk  | 33             | -28.3        | -95.2   | -53.05                  | -13             | -40.05      | H        |
| 5.65376               | 35.73                | Pk  | 35             | -26.8        | -95.2   | -51.27                  | -13             | -38.27      | H        |
| 7.5313                | 33.89                | Pk  | 35.6           | -23.9        | -95.2   | -49.61                  | -13             | -36.61      | H        |
| 3.74329               | 37.62                | Pk  | 32.9           | -28.3        | -95.2   | -52.98                  | -13             | -39.98      | V        |
| 5.64142               | 36.13                | Pk  | 35.1           | -26.6        | -95.2   | -50.57                  | -13             | -37.57      | V        |
| 7.52552               | 33.92                | Pk  | 35.6           | -23.9        | -95.2   | -49.58                  | -13             | -36.58      | V        |
| High Channel, 1900MHz |                      |     |                |              |         |                         |                 |             |          |
| 3.80702               | 37.51                | Pk  | 32.9           | -28.3        | -95.2   | -53.09                  | -13             | -40.09      | H        |
| 5.67331               | 39.99                | Pk  | 35             | -26.8        | -95.2   | -47.01                  | -13             | -34.01      | H        |
| 7.59364               | 34.46                | Pk  | 35.6           | -24.3        | -95.2   | -49.44                  | -13             | -36.44      | H        |
| 3.80658               | 37.48                | Pk  | 32.9           | -28.3        | -95.2   | -53.12                  | -13             | -40.12      | V        |
| 5.67293               | 36.71                | Pk  | 35             | -26.8        | -95.2   | -50.29                  | -13             | -37.29      | V        |
| 7.63948               | 34.03                | Pk  | 35.6           | -24.1        | -95.2   | -49.67                  | -13             | -36.67      | V        |

### 9.4.3. 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 #:     | 13179116        |
| Date:          | 4/30/2020       |
| Test Engineer: | 50822           |
| Configuration: | EUT only        |
| Mode           | LTE7 QPSK 20MHz |
| 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, 2510MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.02847               | 36.72                | Pk  | 34.3           | -27          | -95.2   | -51.18                  | -25             | -26.18      | H        |
| 7.49819               | 34.55                | Pk  | 35.5           | -23.9        | -95.2   | -49.05                  | -25             | -24.05      | H        |
| 10.07136              | 31.92                | Pk  | 37             | -20.9        | -95.2   | -47.18                  | -25             | -22.18      | H        |
| 5.0227                | 36.12                | Pk  | 34.2           | -27          | -95.2   | -51.88                  | -25             | -26.88      | V        |
| 7.52843               | 34.17                | Pk  | 35.6           | -23.9        | -95.2   | -49.33                  | -25             | -24.33      | V        |
| 10.07886              | 32.39                | Pk  | 37.1           | -20.8        | -95.2   | -46.51                  | -25             | -21.51      | V        |
| Mid Channel, 2535MHz  |                      |     |                |              |         |                         |                 |             |          |
| 5.06499               | 36.29                | Pk  | 34.3           | -27          | -95.2   | -51.61                  | -25             | -26.61      | H        |
| 7.639                 | 33.72                | Pk  | 35.6           | -24          | -95.2   | -49.88                  | -25             | -24.88      | H        |
| 10.17801              | 31.26                | Pk  | 37.2           | -20.2        | -95.2   | -46.94                  | -25             | -21.94      | H        |
| 5.04595               | 36.36                | Pk  | 34.4           | -26.9        | -95.2   | -51.34                  | -25             | -26.34      | V        |
| 7.63871               | 34.38                | Pk  | 35.6           | -24.1        | -95.2   | -49.32                  | -25             | -24.32      | V        |
| 10.15161              | 31.43                | Pk  | 37.1           | -20.3        | -95.2   | -46.97                  | -25             | -21.97      | V        |
| High Channel, 2560MHz |                      |     |                |              |         |                         |                 |             |          |
| 5.11911               | 36.13                | Pk  | 34.4           | -27          | -95.2   | -51.67                  | -25             | -26.67      | H        |
| 7.69246               | 33.78                | Pk  | 35.7           | -23.7        | -95.2   | -49.42                  | -25             | -24.42      | H        |
| 10.27163              | 31.82                | Pk  | 37.4           | -20.5        | -95.2   | -46.48                  | -25             | -21.48      | H        |
| 5.13875               | 37.15                | Pk  | 34.5           | -27.1        | -95.2   | -50.65                  | -25             | -25.65      | V        |
| 7.70879               | 34.72                | Pk  | 35.6           | -23.8        | -95.2   | -48.68                  | -25             | -23.68      | V        |
| 10.2839               | 31.83                | Pk  | 37.4           | -20.6        | -95.2   | -46.57                  | -25             | -21.57      | V        |

#### 9.4.4. 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 #:     | 13179116         |
| Date:          | 4/30/2020        |
| Test Engineer: | 50822            |
| Configuration: | EUT only         |
| Mode           | LTE25 QPSK 20MHz |
| 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, 1860MHz   |                      |     |                |              |         |                         |                 |                |          |
| 3.7233                 | 37.21                | Pk  | 32.9           | -28.5        | -95.2   | -53.59                  | -13             | -40.59         | H        |
| 5.55317                | 38.58                | Pk  | 35.1           | -26.8        | -95.2   | -48.32                  | -13             | -35.32         | H        |
| 7.45443                | 34.41                | Pk  | 35.6           | -24.3        | -95.2   | -49.49                  | -13             | -36.49         | H        |
| 3.74592                | 37.7                 | Pk  | 32.9           | -28.4        | -95.2   | -53                     | -13             | -40            | V        |
| 5.55381                | 36.43                | Pk  | 35.1           | -26.8        | -95.2   | -50.47                  | -13             | -37.47         | V        |
| 7.50174                | 33.76                | Pk  | 35.5           | -23.9        | -95.2   | -49.84                  | -13             | -36.84         | V        |
| Mid Channel, 1882.5MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.80698                | 37.23                | Pk  | 32.9           | -28.3        | -95.2   | -53.37                  | -13             | -40.37         | H        |
| 5.62086                | 39.4                 | Pk  | 35.1           | -26.7        | -95.2   | -47.4                   | -13             | -34.4          | H        |
| 7.62596                | 33.91                | Pk  | 35.7           | -24.2        | -95.2   | -49.79                  | -13             | -36.79         | H        |
| 3.80208                | 37.29                | Pk  | 32.9           | -28.3        | -95.2   | -53.31                  | -13             | -40.31         | V        |
| 5.64924                | 35.64                | Pk  | 35             | -26.6        | -95.2   | -51.16                  | -13             | -38.16         | V        |
| 7.61013                | 33.97                | Pk  | 35.7           | -24.1        | -95.2   | -49.63                  | -13             | -36.63         | V        |
| High Channel, 1905MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.80636                | 37.83                | Pk  | 32.9           | -28.3        | -95.2   | -52.77                  | -13             | -39.77         | H        |
| 5.68827                | 40.55                | Pk  | 35             | -26.6        | -95.2   | -46.25                  | -13             | -33.25         | H        |
| 7.63206                | 34.02                | Pk  | 35.6           | -24          | -95.2   | -49.58                  | -13             | -36.58         | H        |
| 3.79633                | 37.68                | Pk  | 33             | -28.3        | -95.2   | -52.82                  | -13             | -39.82         | V        |
| 5.7313                 | 35.8                 | Pk  | 34.9           | -26.5        | -95.2   | -51                     | -13             | -38            | V        |
| 7.64218                | 34.25                | Pk  | 35.6           | -24.1        | -95.2   | -49.45                  | -13             | -36.45         | V        |

## 9.4.5. 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 #:     | 13179116         |
| Date:          | 4/30/2020        |
| Test Engineer: | 50822            |
| Configuration: | EUT Only         |
| Mode:          | LTE30 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 |                      |     |                |              |         |                         |                 |             |          |
| 4.62493              | 37.72                | Pk  | 33.9           | -27.6        | -95.2   | -51.18                  | -40             | -12.18      | H        |
| 6.94715              | 34.37                | Pk  | 35.6           | -24.5        | -95.2   | -49.73                  | -40             | -9.73       | H        |
| 9.27023              | 32.28                | Pk  | 36.4           | -21.7        | -95.2   | -48.22                  | -40             | -8.22       | H        |
| 4.60662              | 36.69                | Pk  | 33.9           | -27.7        | -95.2   | -52.31                  | -40             | -12.31      | V        |
| 6.97284              | 34.48                | Pk  | 35.7           | -24.9        | -95.2   | -49.92                  | -40             | -9.92       | V        |
| 9.35786              | 32.71                | Pk  | 36.4           | -21.4        | -95.2   | -47.49                  | -40             | -7.49       | V        |

## 9.4.6. 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 #:     | 13179116             |
| Date:          | 5/1/2020             |
| Test Engineer: | 50822                |
| Configuration: | EUT Only             |
| Mode:          | LTE41 FCC QPSK 20MHz |
| 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, 2506MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.02465               | 37.34                | Pk  | 34.2           | -27          | -95.2   | -50.66                  | -25             | -25.66         | H        |
| 7.52572               | 33.46                | Pk  | 35.6           | -24          | -95.2   | -50.14                  | -25             | -25.14         | H        |
| 10.01261              | 31.57                | Pk  | 37             | -20.8        | -95.2   | -47.43                  | -25             | -22.43         | H        |
| 5.0277                | 36.37                | Pk  | 34.3           | -27          | -95.2   | -51.53                  | -25             | -26.53         | V        |
| 7.46427               | 34.07                | Pk  | 35.5           | -24.2        | -95.2   | -49.83                  | -25             | -24.83         | V        |
| 10.02746              | 31.92                | Pk  | 37             | -20.9        | -95.2   | -47.18                  | -25             | -22.18         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.19146               | 36.57                | Pk  | 34.4           | -27          | -95.2   | -51.23                  | -25             | -26.23         | H        |
| 7.79298               | 33.34                | Pk  | 35.7           | -23.6        | -95.2   | -49.76                  | -25             | -24.76         | H        |
| 10.36107              | 31.37                | Pk  | 37.5           | -20.2        | -95.2   | -46.53                  | -25             | -21.53         | H        |
| 5.20535               | 35.49                | Pk  | 34.3           | -26.8        | -95.2   | -52.21                  | -25             | -27.21         | V        |
| 7.79456               | 33.69                | Pk  | 35.7           | -23.6        | -95.2   | -49.41                  | -25             | -24.41         | V        |
| 10.35677              | 31.92                | Pk  | 37.5           | -20.2        | -95.2   | -45.98                  | -25             | -20.98         | V        |
| High Channel, 2680MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.3574                | 35.98                | Pk  | 34.6           | -26.8        | -95.2   | -51.42                  | -25             | -26.42         | H        |
| 8.032                 | 33.44                | Pk  | 35.7           | -23          | -95.2   | -49.06                  | -25             | -24.06         | H        |
| 10.72739              | 31.48                | Pk  | 37.9           | -19.7        | -95.2   | -45.52                  | -25             | -20.52         | H        |
| 5.36414               | 36.17                | Pk  | 34.6           | -26.8        | -95.2   | -51.23                  | -25             | -26.23         | V        |
| 8.03505               | 33.64                | Pk  | 35.7           | -23          | -95.2   | -48.86                  | -25             | -23.86         | V        |
| 10.72802              | 31.45                | Pk  | 37.9           | -19.8        | -95.2   | -45.65                  | -25             | -20.65         | V        |



### QPSK 5G NR Band n41 (100.0MHZ BANDWIDTH)

|                |                                |
|----------------|--------------------------------|
| Project #:     | 13179116                       |
| Date:          | 7/23/202                       |
| Test Engineer: | 19169                          |
| Configuration: | EUT Only                       |
| Mode           | 5G NR Band n41 FCC QPSK 100MHz |
| Chamber #:     | Chamber A                      |

| 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, 2546MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.08018               | 40.32                | Pk  | 34.4           | -27.8        | -95.2   | -47.58                  | -25             | -22.58         | H        |
| 5.08393               | 39.47                | Pk  | 34.4           | -27.8        | -95.2   | -48.33                  | -25             | -23.33         | V        |
| 7.64304               | 30.12                | Pk  | 35.9           | -23.6        | -95.2   | -52.38                  | -25             | -27.38         | V        |
| 7.64629               | 37.36                | Pk  | 35.9           | -23.6        | -95.2   | -45.14                  | -25             | -20.14         | H        |
| 10.16924              | 36.52                | Pk  | 37.5           | -20.9        | -95.2   | -41.58                  | -25             | -16.58         | H        |
| 10.17985              | 28.94                | Pk  | 37.5           | -20.9        | -95.2   | -49.06                  | -25             | -24.06         | V        |
| Mid Channel, 2593MHz  |                      |     |                |              |         |                         |                 |                |          |
| 5.1994                | 31.96                | Pk  | 34.6           | -27.5        | -95.2   | -55.24                  | -25             | -30.24         | V        |
| 5.20041               | 39.97                | Pk  | 34.6           | -27.5        | -95.2   | -47.23                  | -25             | -22.23         | H        |
| 7.78136               | 36.99                | Pk  | 35.9           | -23.4        | -95.2   | -45.41                  | -25             | -20.41         | H        |
| 7.787                 | 29.82                | Pk  | 36             | -23.4        | -95.2   | -52.38                  | -25             | -27.38         | V        |
| 10.39194              | 35.24                | Pk  | 37.7           | -20.3        | -95.2   | -41.76                  | -25             | -16.76         | H        |
| 10.41178              | 28.28                | Pk  | 37.7           | -20.1        | -95.2   | -48.52                  | -25             | -23.52         | V        |
| High Channel, 2640MHz |                      |     |                |              |         |                         |                 |                |          |
| 5.27962               | 38.94                | Pk  | 34.7           | -27.9        | -95.2   | -49.16                  | -25             | -24.16         | V        |
| 5.27992               | 38.52                | Pk  | 34.7           | -27.9        | -95.2   | -49.58                  | -25             | -24.58         | H        |
| 7.91801               | 36.58                | Pk  | 36.2           | -23.4        | -95.2   | -45.62                  | -25             | -20.62         | V        |
| 7.92194               | 36.49                | Pk  | 36.2           | -23.4        | -95.2   | -45.71                  | -25             | -20.71         | H        |
| 10.55879              | 35.15                | Pk  | 37.7           | -20.5        | -95.2   | -42.15                  | -25             | -17.15         | V        |
| 10.56008              | 34.93                | Pk  | 37.7           | -20.5        | -95.2   | -42.37                  | -25             | -17.37         | H        |

### 9.4.7. 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  $-40\text{dBm/MHz}$ .

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

|                |                  |
|----------------|------------------|
| Project #:     | 13179116         |
| Date:          | 5/6/2020         |
| Test Engineer: | 50822            |
| Configuration: | EUT Only         |
| Mode:          | LTE48 QPSK 20MHz |
| 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, 3560MHz  |                      |     |                |              |         |                         |                 |             |          |
| 7.12085               | 33.07                | Pk  | 35.7           | -22.5        | -95.2   | -48.93                  | -40             | -8.93       | H        |
| 10.67967              | 31.45                | Pk  | 37.9           | -19.1        | -95.2   | -44.95                  | -40             | -4.95       | H        |
| 14.24215              | 31.99                | Pk  | 39.4           | -20.6        | -95.2   | -44.41                  | -40             | -4.41       | H        |
| 7.11852               | 33.74                | Pk  | 35.7           | -22.5        | -95.2   | -48.26                  | -40             | -8.26       | V        |
| 10.67944              | 31.55                | Pk  | 37.9           | -19.1        | -95.2   | -44.85                  | -40             | -4.85       | V        |
| 14.24178              | 31.31                | Pk  | 39.4           | -20.6        | -95.2   | -45.09                  | -40             | -5.09       | V        |
| Mid Channel, 3625MHz  |                      |     |                |              |         |                         |                 |             |          |
| 7.24873               | 32.65                | Pk  | 35.6           | -22.3        | -95.2   | -49.25                  | -40             | -9.25       | H        |
| 10.87653              | 30.34                | Pk  | 37.8           | -18.9        | -95.2   | -45.96                  | -40             | -5.96       | H        |
| 14.49891              | 32.61                | Pk  | 39.7           | -20          | -95.2   | -42.89                  | -40             | -2.89       | H        |
| 7.24894               | 32.84                | Pk  | 35.6           | -22.3        | -95.2   | -49.06                  | -40             | -9.06       | V        |
| 10.8774               | 30.34                | Pk  | 37.8           | -18.9        | -95.2   | -45.96                  | -40             | -5.96       | V        |
| 14.50171              | 31.4                 | Pk  | 39.8           | -20          | -95.2   | -44.00                  | -40             | -4.00       | V        |
| High Channel, 3690MHz |                      |     |                |              |         |                         |                 |             |          |
| 7.38                  | 33.13                | Pk  | 35.6           | -22          | -95.2   | -48.47                  | -40             | -8.47       | H        |
| 11.07016              | 31.83                | Pk  | 37.9           | -19.3        | -95.2   | -44.77                  | -40             | -4.77       | H        |
| 14.76078              | 30.89                | Pk  | 39.9           | -20.5        | -95.2   | -44.91                  | -40             | -4.91       | H        |
| 7.37974               | 32.34                | Pk  | 35.6           | -22          | -95.2   | -49.26                  | -40             | -9.26       | V        |
| 11.06903              | 30.88                | Pk  | 37.9           | -19.3        | -95.2   | -45.72                  | -40             | -5.72       | V        |
| 14.76069              | 30.48                | Pk  | 39.9           | -20.5        | -95.2   | -45.32                  | -40             | -5.32       | V        |

#### 9.4.8. 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 #:     | 13179116          |
| Date:          | 4/29/2020         |
| Test Engineer: | 50822             |
| Configuration: | EUT Only          |
| Mode           | LTE 66 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, 1720MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.43388               | 37.6                 | Pk  | 32.7           | -29.3        | -95.2   | -54.2                   | -13             | -41.2          | H        |
| 5.13328               | 37.75                | Pk  | 34.4           | -26.9        | -95.2   | -49.95                  | -13             | -36.95         | H        |
| 6.85813               | 35.2                 | Pk  | 35.6           | -25.2        | -95.2   | -49.6                   | -13             | -36.6          | H        |
| 3.42705               | 37.49                | Pk  | 32.7           | -29.3        | -95.2   | -54.31                  | -13             | -41.31         | V        |
| 5.10801               | 36.02                | Pk  | 34.4           | -26.8        | -95.2   | -51.58                  | -13             | -38.58         | V        |
| 6.92874               | 34.71                | Pk  | 35.6           | -24.7        | -95.2   | -49.59                  | -13             | -36.59         | V        |
| Mid Channel, 1745MHz  |                      |     |                |              |         |                         |                 |                |          |
| 3.51303               | 27.86                | Pk  | 32.8           | -28.7        | -95.2   | -63.24                  | -13             | -50.24         | H        |
| 5.24525               | 35.87                | Pk  | 34.5           | -26.8        | -95.2   | -51.63                  | -13             | -38.63         | H        |
| 6.99634               | 34.98                | Pk  | 35.6           | -24.8        | -95.2   | -49.42                  | -13             | -36.42         | H        |
| 3.55531               | 36.71                | Pk  | 33             | -28.5        | -95.2   | -53.99                  | -13             | -40.99         | V        |
| 5.20861               | 36.11                | Pk  | 34.4           | -26.8        | -95.2   | -51.49                  | -13             | -38.49         | V        |
| 6.92853               | 34.47                | Pk  | 35.6           | -24.7        | -95.2   | -49.83                  | -13             | -36.83         | V        |
| High Channel, 1770MHz |                      |     |                |              |         |                         |                 |                |          |
| 3.53841               | 38.08                | Pk  | 30.2           | -27.8        | -95.2   | -54.72                  | -13             | -41.72         | H        |
| 3.54105               | 38.65                | Pk  | 30.2           | -27.8        | -95.2   | -54.15                  | -13             | -41.15         | V        |
| 5.31087               | 37.78                | Pk  | 33.2           | -26.5        | -95.2   | -50.72                  | -13             | -37.72         | V        |
| 5.31104               | 37.74                | Pk  | 33.2           | -26.5        | -95.2   | -50.76                  | -13             | -37.76         | H        |
| 7.07909               | 36.19                | Pk  | 36.6           | -23.7        | -95.2   | -46.11                  | -13             | -33.11         | V        |
| 7.07917               | 36                   | Pk  | 36.6           | -23.7        | -95.2   | -46.3                   | -13             | -33.3          | H        |

#### 9.4.18. 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:          | 7/22/2020                  |
| Test Engineer: | 30606                      |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 7.50349               | 36.29                | Pk  | 36             | -23.2        | -95.2   | -46.11                  | -13             | -33.11         | V        |
| 7.52728               | 35.98                | Pk  | 36             | -23.3        | -95.2   | -46.52                  | -13             | -33.52         | H        |
| 11.23494              | 33.61                | Pk  | 38             | -19.4        | -95.2   | -42.99                  | -13             | -29.99         | H        |
| 11.2582               | 33.92                | Pk  | 38             | -19.7        | -95.2   | -42.98                  | -13             | -29.98         | V        |
| 14.99592              | 34.26                | Pk  | 39.8           | -19.6        | -95.2   | -40.74                  | -13             | -27.74         | V        |
| 15.00918              | 34.78                | Pk  | 39.9           | -19.7        | -95.2   | -40.22                  | -13             | -27.22         | H        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.6714                | 19.09                | Av  | 35.9           | -23.1        | -95.2   | -63.31                  | -13             | -50.31         | H        |
| 7.6841                | 18.98                | Av  | 35.9           | -22.8        | -95.2   | -63.12                  | -13             | -50.12         | V        |
| 11.50966              | 15.79                | Av  | 38.4           | -19.6        | -95.2   | -60.61                  | -13             | -47.61         | H        |
| 11.53507              | 15.77                | Av  | 38.4           | -19.8        | -95.2   | -60.83                  | -13             | -47.83         | V        |
| 15.35961              | 16.28                | Av  | 41             | -20.1        | -95.2   | -58.02                  | -13             | -45.02         | H        |
| 15.3629               | 16.02                | Av  | 41             | -20          | -95.2   | -58.18                  | -13             | -45.18         | V        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.85926               | 36.11                | Pk  | 36             | -23.6        | -95.2   | -46.69                  | -13             | -33.69         | V        |
| 7.86116               | 37.2                 | Pk  | 36             | -23.6        | -95.2   | -45.6                   | -13             | -32.6          | H        |
| 11.74278              | 33.86                | Pk  | 38.7           | -19.7        | -95.2   | -42.34                  | -13             | -29.34         | H        |
| 11.78452              | 33.98                | Pk  | 38.8           | -19.6        | -95.2   | -42.02                  | -13             | -29.02         | V        |
| 15.72361              | 34.66                | Pk  | 40.7           | -18.6        | -95.2   | -38.44                  | -13             | -25.44         | H        |
| 15.72963              | 34.28                | Pk  | 40.7           | -18.6        | -95.2   | -38.82                  | -13             | -25.82         | V        |

## **9.5. 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.



## 9.5.1. 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:          | 7/28/2020         |
| Test Engineer: | 50822             |
| Configuration: | EUT Only          |
| Mode           | LTE 48 QPSK 20MHz |
| Chamber #:     | Chamber B         |

| 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  |                      |     |               |              |         |                         |                 |                |          |
| 5.07056               | 37.45                | Pk  | 34.3          | -28.6        | -95.2   | -52.05                  | -40             | -12.05         | H        |
| 5.17788               | 37.11                | Pk  | 34.6          | -28.6        | -95.2   | -52.09                  | -40             | -12.09         | V        |
| 6.76415               | 35.76                | Pk  | 36            | -25.6        | -95.2   | -49.04                  | -40             | -9.04          | V        |
| 6.81179               | 35.34                | Pk  | 35.8          | -25.4        | -95.2   | -49.46                  | -40             | -9.46          | H        |
| 9.4779                | 33.46                | Pk  | 36.6          | -22          | -95.2   | -47.14                  | -40             | -7.14          | H        |
| 9.48312               | 33.37                | Pk  | 36.6          | -22          | -95.2   | -47.23                  | -40             | -7.23          | V        |
| Mid Channel, 3625MHz  |                      |     |               |              |         |                         |                 |                |          |
| 4.80004               | 37.06                | Pk  | 34.3          | -29.2        | -95.2   | -53.04                  | -40             | -13.04         | H        |
| 4.81125               | 37.5                 | Pk  | 34.3          | -29.3        | -95.2   | -52.7                   | -40             | -12.7          | V        |
| 6.18785               | 36.14                | Pk  | 35.7          | -27.1        | -95.2   | -50.46                  | -40             | -10.46         | H        |
| 6.50658               | 36.34                | Pk  | 35.8          | -26.3        | -95.2   | -49.36                  | -40             | -9.36          | V        |
| 8.27822               | 34.64                | Pk  | 35.9          | -23.6        | -95.2   | -48.26                  | -40             | -8.26          | V        |
| 8.58355               | 34.22                | Pk  | 35.9          | -23.6        | -95.2   | -48.68                  | -40             | -8.68          | H        |
| High Channel, 3690MHz |                      |     |               |              |         |                         |                 |                |          |
| 5.21638               | 35.53                | Pk  | 34.6          | -28.5        | -95.2   | -53.57                  | -40             | -13.57         | V        |
| 5.22058               | 35.31                | Pk  | 34.6          | -28.5        | -95.2   | -53.79                  | -40             | -13.79         | H        |
| 6.48596               | 34.73                | Pk  | 35.9          | -26          | -95.2   | -50.57                  | -40             | -10.57         | V        |
| 6.87786               | 35.56                | Pk  | 35.9          | -25.1        | -95.2   | -48.84                  | -40             | -8.84          | H        |
| 9.47517               | 33.17                | Pk  | 36.6          | -22          | -95.2   | -47.43                  | -40             | -7.43          | V        |
| 9.5192                | 33.76                | Pk  | 36.6          | -22.4        | -95.2   | -47.24                  | -40             | -7.24          | H        |

### 9.5.2. 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:          | 7/22/2020                  |
| Test Engineer: | 30606                      |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 7.50308               | 18.36                | Av  | 36             | -23.2        | -95.2   | -64.04                  | -13             | -51.04         | V        |
| 7.51459               | 18.69                | Av  | 36             | -23.3        | -95.2   | -63.81                  | -13             | -50.81         | H        |
| 11.24769              | 14.33                | Av  | 38             | -19.5        | -95.2   | -62.37                  | -13             | -49.37         | H        |
| 11.26752              | 14.45                | Av  | 38             | -19.7        | -95.2   | -62.45                  | -13             | -49.45         | V        |
| 15.01015              | 14.15                | Av  | 39.9           | -19.7        | -95.2   | -60.85                  | -13             | -47.85         | H        |
| 15.02952              | 13.95                | Av  | 39.9           | -19.6        | -95.2   | -60.95                  | -13             | -47.95         | V        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.68089               | 18.81                | Av  | 35.9           | -22.9        | -95.2   | -63.39                  | -13             | -50.39         | H        |
| 7.68882               | 18.77                | Av  | 35.8           | -22.7        | -95.2   | -63.33                  | -13             | -50.33         | V        |
| 11.51613              | 15.53                | Av  | 38.4           | -19.6        | -95.2   | -60.87                  | -13             | -47.87         | H        |
| 11.52466              | 15.74                | Av  | 38.4           | -19.7        | -95.2   | -60.76                  | -13             | -47.76         | V        |
| 15.3503               | 16.6                 | Av  | 40.9           | -20          | -95.2   | -57.7                   | -13             | -44.7          | V        |
| 15.38793              | 15.57                | Av  | 41             | -19.8        | -95.2   | -58.43                  | -13             | -45.43         | H        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.85173               | 35.68                | Pk  | 36             | -23.7        | -95.2   | -47.22                  | -13             | -34.22         | V        |
| 7.8738                | 35.96                | Pk  | 36.1           | -23.5        | -95.2   | -46.64                  | -13             | -33.64         | H        |
| 11.72249              | 33.89                | Pk  | 38.7           | -19.9        | -95.2   | -42.51                  | -13             | -29.51         | H        |
| 11.80882              | 33.96                | Pk  | 38.9           | -19.3        | -95.2   | -41.64                  | -13             | -28.64         | V        |
| 15.69921              | 34.48                | Pk  | 40.7           | -19.2        | -95.2   | -39.22                  | -13             | -26.22         | H        |
| 15.70885              | 33.87                | Pk  | 40.7           | -19          | -95.2   | -39.63                  | -13             | -26.63         | V        |

## **9.6. 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.

## 9.6.1. 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:          | 5/6/2020         |
| Test Engineer: | 20792            |
| Configuration: | EUT Only         |
| Mode:          | LTE48 QPSK 20MHz |
| 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, 3560MHz  |                      |     |                |              |         |                         |                 |             |          |
| 7.1184                | 32.77                | Pk  | 35.7           | -22.5        | -95.2   | -49.23                  | -40             | -9.23       | H        |
| 10.67951              | 31.02                | Pk  | 37.9           | -19.1        | -95.2   | -45.38                  | -40             | -5.38       | H        |
| 14.2406               | 31.09                | Pk  | 39.4           | -20.6        | -95.2   | -45.31                  | -40             | -5.31       | H        |
| 7.11949               | 32.3                 | Pk  | 35.7           | -22.5        | -95.2   | -49.7                   | -40             | -9.7        | V        |
| 10.67883              | 31.22                | Pk  | 37.9           | -19.1        | -95.2   | -45.18                  | -40             | -5.18       | V        |
| 14.23953              | 30.62                | Pk  | 39.4           | -20.6        | -95.2   | -45.78                  | -40             | -5.78       | V        |
| Mid Channel, 3625MHz  |                      |     |                |              |         |                         |                 |             |          |
| 7.25118               | 32.58                | Pk  | 35.6           | -22.3        | -95.2   | -49.32                  | -40             | -9.32       | H        |
| 10.87503              | 30.5                 | Pk  | 37.8           | -18.9        | -95.2   | -45.8                   | -40             | -5.8        | H        |
| 14.50034              | 31.55                | Pk  | 39.7           | -20          | -95.2   | -43.95                  | -40             | -3.95       | H        |
| 7.249                 | 32.96                | Pk  | 35.6           | -22.3        | -95.2   | -48.94                  | -40             | -8.94       | V        |
| 10.8756               | 30.11                | Pk  | 37.8           | -18.9        | -95.2   | -46.19                  | -40             | -6.19       | V        |
| 14.50027              | 31.79                | Pk  | 39.7           | -20          | -95.2   | -43.71                  | -40             | -3.71       | V        |
| High Channel, 3690MHz |                      |     |                |              |         |                         |                 |             |          |
| 7.37929               | 32.42                | Pk  | 35.6           | -22          | -95.2   | -49.18                  | -40             | -9.18       | H        |
| 11.06848              | 31.69                | Pk  | 37.9           | -19.3        | -95.2   | -44.91                  | -40             | -4.91       | H        |
| 14.76174              | 30.57                | Pk  | 39.9           | -20.5        | -95.2   | -45.23                  | -40             | -5.23       | H        |
| 7.38024               | 32.84                | Pk  | 35.6           | -22          | -95.2   | -48.76                  | -40             | -8.76       | V        |
| 11.07041              | 31.46                | Pk  | 37.9           | -19.3        | -95.2   | -45.14                  | -40             | -5.14       | V        |
| 14.76035              | 30.49                | Pk  | 39.9           | -20.5        | -95.2   | -45.31                  | -40             | -5.31       | V        |

### 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:          | 7/23/2020                  |
| Test Engineer: | 30606                      |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 7.49777               | 35.48                | Pk  | 36             | -23.1        | -95.2   | -46.82                  | -13             | -33.82         | V        |
| 7.51047               | 35.91                | Pk  | 36             | -23.3        | -95.2   | -46.59                  | -13             | -33.59         | H        |
| 11.22566              | 26.33                | Pk  | 38             | -19.4        | -95.2   | -50.27                  | -13             | -37.27         | H        |
| 11.27719              | 34.16                | Pk  | 38             | -19.5        | -95.2   | -42.54                  | -13             | -29.54         | V        |
| 15.00917              | 35.11                | Pk  | 39.9           | -19.7        | -95.2   | -39.89                  | -13             | -26.89         | V        |
| 15.06425              | 34.22                | Pk  | 40             | -19.5        | -95.2   | -40.48                  | -13             | -27.48         | H        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.68005               | 35.78                | Pk  | 35.9           | -22.9        | -95.2   | -46.42                  | -13             | -33.42         | V        |
| 7.68245               | 35.97                | Pk  | 35.9           | -22.8        | -95.2   | -46.13                  | -13             | -33.13         | H        |
| 11.51976              | 34.82                | Pk  | 38.4           | -19.6        | -95.2   | -41.58                  | -13             | -28.58         | V        |
| 11.52006              | 34.24                | Pk  | 38.4           | -19.6        | -95.2   | -42.16                  | -13             | -29.16         | H        |
| 15.35811              | 34.85                | Pk  | 41             | -20.1        | -95.2   | -39.45                  | -13             | -26.45         | V        |
| 15.36055              | 35.48                | Pk  | 41             | -20.1        | -95.2   | -38.82                  | -13             | -25.82         | H        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.8471                | 35.92                | Pk  | 36             | -23.7        | -95.2   | -46.98                  | -13             | -33.98         | H        |
| 7.8702                | 35.96                | Pk  | 36.1           | -23.5        | -95.2   | -46.64                  | -13             | -33.64         | V        |
| 11.80285              | 33.94                | Pk  | 38.8           | -19.3        | -95.2   | -41.76                  | -13             | -28.76         | H        |
| 11.82308              | 34.61                | Pk  | 38.8           | -19.6        | -95.2   | -41.39                  | -13             | -28.39         | V        |
| 15.72951              | 35.24                | Pk  | 40.7           | -18.6        | -95.2   | -37.86                  | -13             | -24.86         | V        |
| 15.75636              | 36.46                | Pk  | 40.7           | -19.5        | -95.2   | -37.54                  | -13             | -24.54         | H        |

## **9.7. 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.



## 9.7.1. 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:          | 5/6/2020         |
| Test Engineer: | 50822            |
| Configuration: | EUT Only         |
| Mode:          | LTE48 QPSK 20MHz |
| 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, 3560MHz  |                      |     |                |              |         |                         |                 |             |          |
| 7.12943               | 34.09                | Pk  | 35.6           | -22.4        | -95.2   | -47.91                  | -40             | -7.91       | H        |
| 10.65014              | 31.51                | Pk  | 37.9           | -19          | -95.2   | -44.79                  | -40             | -4.79       | H        |
| 14.21584              | 31.65                | Pk  | 39.3           | -20.6        | -95.2   | -44.85                  | -40             | -4.85       | H        |
| 7.13029               | 33.9                 | Pk  | 35.6           | -22.4        | -95.2   | -48.1                   | -40             | -8.1        | V        |
| 10.70698              | 31.41                | Pk  | 37.8           | -18.7        | -95.2   | -44.69                  | -40             | -4.69       | V        |
| 14.19554              | 32.1                 | Pk  | 39.3           | -20.7        | -95.2   | -44.5                   | -40             | -4.5        | V        |
| Mid Channel, 3625MHz  |                      |     |                |              |         |                         |                 |             |          |
| 7.24873               | 32.65                | Pk  | 35.6           | -22.3        | -95.2   | -49.25                  | -40             | -9.25       | H        |
| 10.87653              | 30.34                | Pk  | 37.8           | -18.9        | -95.2   | -45.96                  | -40             | -5.96       | H        |
| 14.49891              | 32.61                | Pk  | 39.7           | -20          | -95.2   | -42.89                  | -40             | -2.89       | H        |
| 7.24894               | 32.84                | Pk  | 35.6           | -22.3        | -95.2   | -49.06                  | -40             | -9.06       | V        |
| 10.8774               | 30.34                | Pk  | 37.8           | -18.9        | -95.2   | -45.96                  | -40             | -5.96       | V        |
| 14.50171              | 31.4                 | Pk  | 39.8           | -20          | -95.2   | -44                     | -40             | -4          | V        |
| High Channel, 3690MHz |                      |     |                |              |         |                         |                 |             |          |
| 7.38                  | 33.13                | Pk  | 35.6           | -22          | -95.2   | -48.47                  | -40             | -8.47       | H        |
| 11.07016              | 31.83                | Pk  | 37.9           | -19.3        | -95.2   | -44.77                  | -40             | -4.77       | H        |
| 14.76078              | 30.89                | Pk  | 39.9           | -20.5        | -95.2   | -44.91                  | -40             | -4.91       | H        |
| 7.37974               | 32.34                | Pk  | 35.6           | -22          | -95.2   | -49.26                  | -40             | -9.26       | V        |
| 11.06903              | 30.88                | Pk  | 37.9           | -19.3        | -95.2   | -45.72                  | -40             | -5.72       | V        |
| 14.76069              | 30.48                | Pk  | 39.9           | -20.5        | -95.2   | -45.32                  | -40             | -5.32       | V        |

### 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:          | 7/22/2020                  |
| Test Engineer: | 30606                      |
| 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  |                      |     |                |              |         |                         |                 |                |          |
| 7.51433               | 35.64                | Pk  | 36             | -23.3        | -95.2   | -46.86                  | -13             | -33.86         | H        |
| 7.518                 | 35.97                | Pk  | 36             | -23.3        | -95.2   | -46.53                  | -13             | -33.53         | V        |
| 11.23577              | 34.1                 | Pk  | 38             | -19.4        | -95.2   | -42.5                   | -13             | -29.5          | H        |
| 11.24686              | 34.32                | Pk  | 38             | -19.5        | -95.2   | -42.38                  | -13             | -29.38         | V        |
| 14.98928              | 35.67                | Pk  | 39.8           | -19.5        | -95.2   | -39.23                  | -13             | -26.23         | V        |
| 14.99152              | 34.68                | Pk  | 39.8           | -19.5        | -95.2   | -40.22                  | -13             | -27.22         | H        |
| Mid Channel, 3840MHz  |                      |     |                |              |         |                         |                 |                |          |
| 7.67354               | 19.22                | Av  | 35.9           | -23          | -95.2   | -63.08                  | -13             | -50.08         | H        |
| 11.5309               | 16.35                | Av  | 38.5           | -19.8        | -95.2   | -60.15                  | -13             | -47.15         | H        |
| 15.35512              | 16.25                | Av  | 40.9           | -20.1        | -95.2   | -58.15                  | -13             | -45.15         | H        |
| 7.69056               | 19.02                | Av  | 35.8           | -22.7        | -95.2   | -63.08                  | -13             | -50.08         | V        |
| 11.52662              | 16.31                | Av  | 38.4           | -19.7        | -95.2   | -60.19                  | -13             | -47.19         | V        |
| 15.32202              | 15.81                | Av  | 40.9           | -19.8        | -95.2   | -58.29                  | -13             | -45.29         | V        |
| High Channel, 3930MHz |                      |     |                |              |         |                         |                 |                |          |
| 7.84651               | 36.78                | Pk  | 36             | -23.7        | -95.2   | -46.12                  | -13             | -33.12         | H        |
| 7.86841               | 36.34                | Pk  | 36.1           | -23.5        | -95.2   | -46.26                  | -13             | -33.26         | V        |
| 11.68335              | 34.7                 | Pk  | 38.7           | -19.7        | -95.2   | -41.5                   | -13             | -28.5          | V        |
| 11.75936              | 34.35                | Pk  | 38.8           | -19.7        | -95.2   | -41.75                  | -13             | -28.75         | H        |
| 15.68075              | 34.57                | Pk  | 40.7           | -19.4        | -95.2   | -39.33                  | -13             | -26.33         | H        |
| 15.69912              | 34.22                | Pk  | 40.7           | -19.2        | -95.2   | -39.48                  | -13             | -26.48         | V        |

## 10. SETUP PHOTOS

Please refer to 13179116-EP1V1 for setup photos

**END OF REPORT**