

### 5.9.1 E.U.T. Operation:

|                        |                |
|------------------------|----------------|
| Operating Environment: |                |
| Temperature:           | -30 °C and +50 |
| Humidity:              | 46.3 %         |
| Atmospheric Pressure:  | 1010 mbar      |

### 5.9.2 Test Data:

| MSCL Calculation      |                 |              |                |                          |                       |                   |           |
|-----------------------|-----------------|--------------|----------------|--------------------------|-----------------------|-------------------|-----------|
| Operation Bands       | Frequency (MHz) | Distance (m) | Path loss (dB) | Indoor Antenna Gain(dBi) | Indoor Cable Loss(dB) | Polarity Loss(dB) | MSCL (dB) |
| Cellular              | 869             | 2            | 37.30          | 9                        | 3                     | 9.03              | 40.33     |
| AWS-1                 | 2110            | 2            | 45.01          | 9                        | 3                     | 9.03              | 48.04     |
| Broadband PCS         | 1930            | 2            | 44.23          | 9                        | 3                     | 9.03              | 47.26     |
| Low A-E Blocks        | 729             | 2            | 35.78          | 9                        | 3                     | 9.03              | 38.81     |
| 700 MHz Upper C Block | 746             | 2            | 35.98          | 9                        | 3                     | 9.03              | 39.01     |

Note : Path loss =  $20\log f + 20\log d - 27.5$

Polarity loss =  $20\log (2/\sin (45\deg))$  dB = 9.03dB

| Variable booster gain |            |                   |                    |                    |       |       |         |
|-----------------------|------------|-------------------|--------------------|--------------------|-------|-------|---------|
| Operation Band        | RSSI (dBm) | Input Power (dBm) | Output Power (dBm) | Measured Gain (dB) | MSCL  | Limit | Results |
| Cellular              | -52        | -41               | 11.89              | 52.89              | 40.33 | 58.33 | PASS    |
|                       | -51        | -41               | 10.47              | 51.47              | 40.33 | 57.33 | PASS    |
|                       | -48        | -41               | 9.98               | 50.98              | 40.33 | 54.33 | PASS    |
|                       | -46        | -41               | 7.85               | 48.85              | 40.33 | 52.33 | PASS    |
|                       | -43        | -41               | 5.58               | 46.58              | 40.33 | 49.33 | PASS    |
|                       | -41        | -41               | 4.75               | 45.75              | 40.33 | 47.33 | PASS    |
| AWS-1                 | -52        | -41               | 11.52              | 52.52              | 48.04 | 66.04 | PASS    |
|                       | -50        | -41               | 10.21              | 51.21              | 48.04 | 64.04 | PASS    |
|                       | -47        | -41               | 9.75               | 50.75              | 48.04 | 61.04 | PASS    |
|                       | -45        | -41               | 8.14               | 49.14              | 48.04 | 59.04 | PASS    |
|                       | -43        | -41               | 7.08               | 48.08              | 48.04 | 57.04 | PASS    |
|                       | -42        | -41               | 6.58               | 47.58              | 48.04 | 56.04 | PASS    |
| Broadband PCS         | -53        | -41               | 10.86              | 51.86              | 47.26 | 66.26 | PASS    |
|                       | -51        | -41               | 9.86               | 50.86              | 47.26 | 64.26 | PASS    |
|                       | -50        | -41               | 7.57               | 48.57              | 47.26 | 63.26 | PASS    |
|                       | -45        | -41               | 6.39               | 47.39              | 47.26 | 58.26 | PASS    |
|                       | -40        | -41               | 5.25               | 46.25              | 47.26 | 53.26 | PASS    |
|                       | -39        | -41               | 4.22               | 45.22              | 47.26 | 52.26 | PASS    |
| Low A-E Blocks        | -52        | -41               | 11.28              | 52.28              | 38.81 | 56.81 | PASS    |
|                       | -50        | -41               | 9.96               | 50.96              | 38.81 | 54.81 | PASS    |
|                       | -49        | -41               | 8.08               | 49.08              | 38.81 | 53.81 | PASS    |
|                       | -46        | -41               | 5.57               | 46.57              | 38.81 | 50.81 | PASS    |
|                       | -40        | -41               | 4.86               | 45.86              | 38.81 | 44.81 | PASS    |
|                       | -38        | -41               | 2.09               | 43.09              | 38.81 | 42.81 | PASS    |
| 700 MHz Upper C Block | -52        | -41               | 11.38              | 52.38              | 39.01 | 57.01 | PASS    |
|                       | -50        | -41               | 9.57               | 50.57              | 39.01 | 55.01 | PASS    |
|                       | -49        | -41               | 8.47               | 49.47              | 39.01 | 54.01 | PASS    |
|                       | -46        | -41               | 6.58               | 47.58              | 39.01 | 51.01 | PASS    |



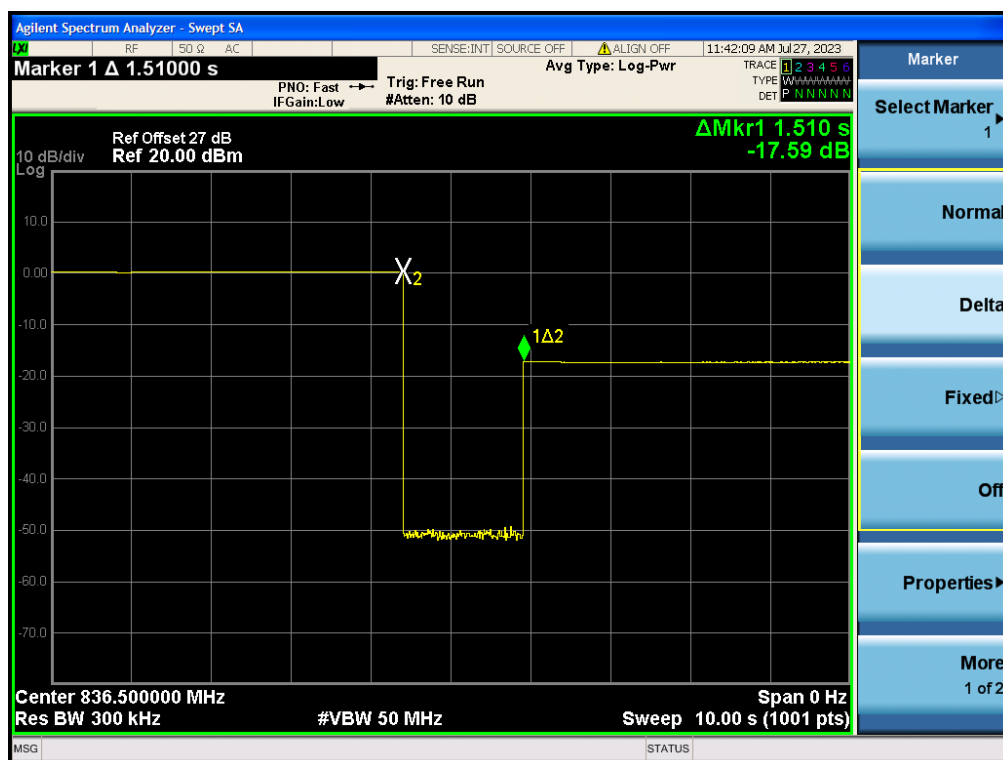
Test Report Number: BTF230802R00501-

|  |     |     |      |       |       |       |      |
|--|-----|-----|------|-------|-------|-------|------|
|  | -40 | -41 | 5.81 | 46.81 | 39.01 | 45.01 | PASS |
|  | -38 | -41 | 3.55 | 44.55 | 39.01 | 43.01 | PASS |

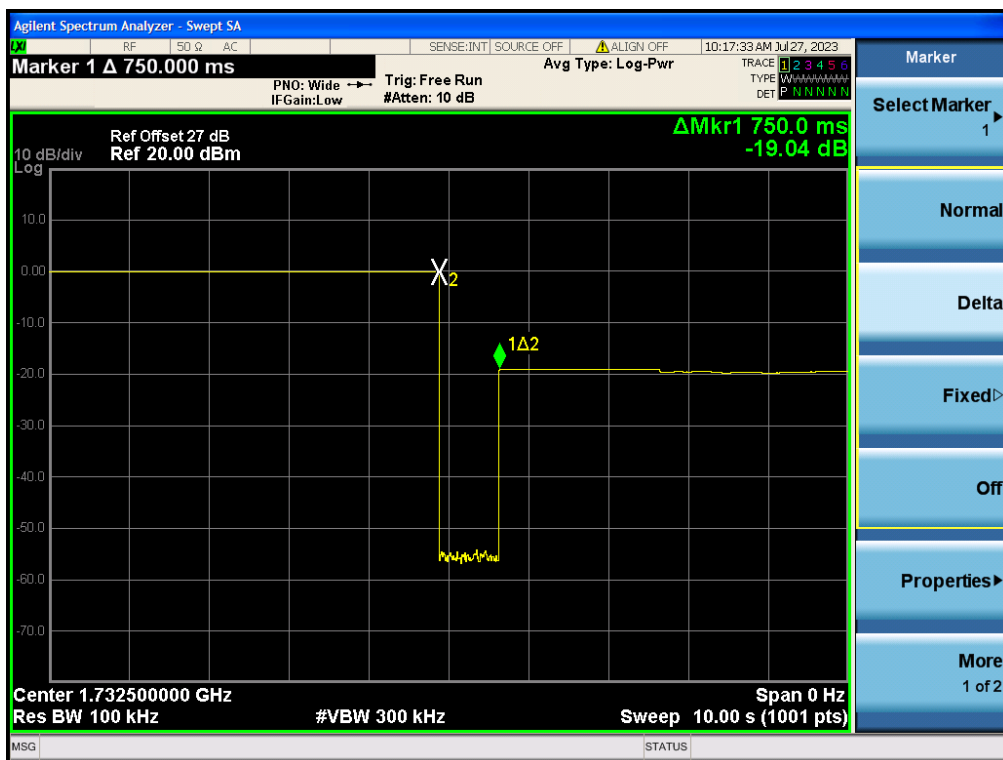
## Variable Uplink Gain Timing

| Variable Uplink Gain Timing |              |           |        |
|-----------------------------|--------------|-----------|--------|
| Operation Band              | Measured Sec | Limit Sec | Result |
| Cellular                    | 1.51         | 3.0       | PASS   |
| AWS-1                       | 0.75         | 3.0       | PASS   |
| Low A-E Blocks              | 1.38         | 3.0       | PASS   |
| 700 MHz Upper C Block       | 1.52         | 3.0       | PASS   |
| Broadband PCS               | 1.25         | 3.0       | PASS   |

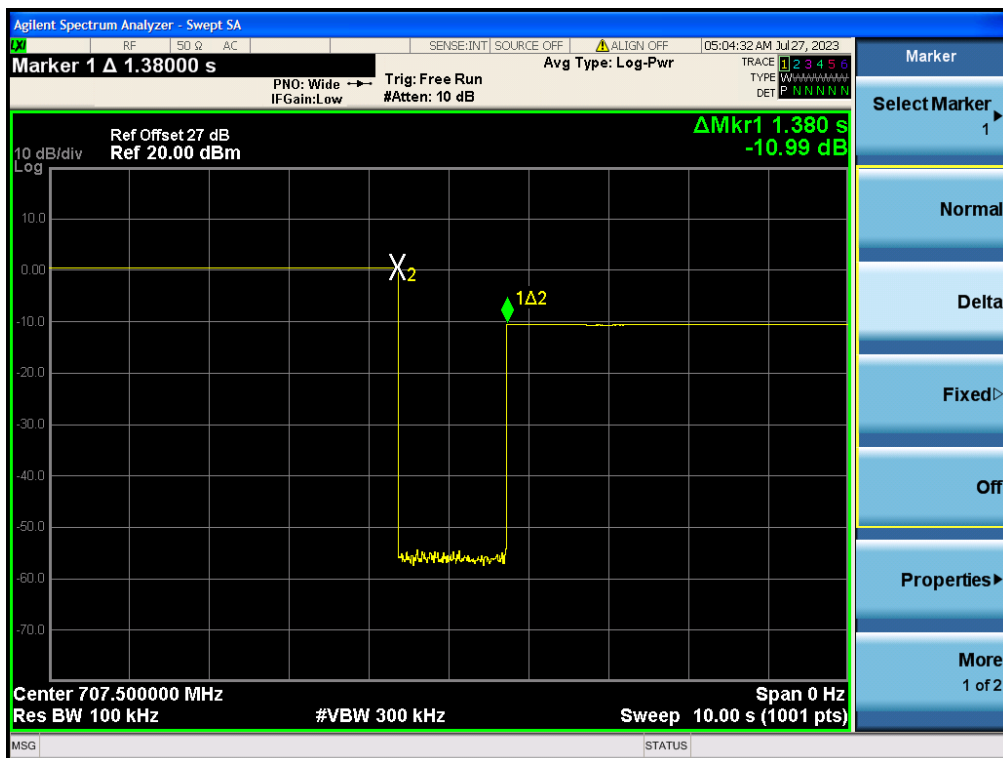
## Cellular



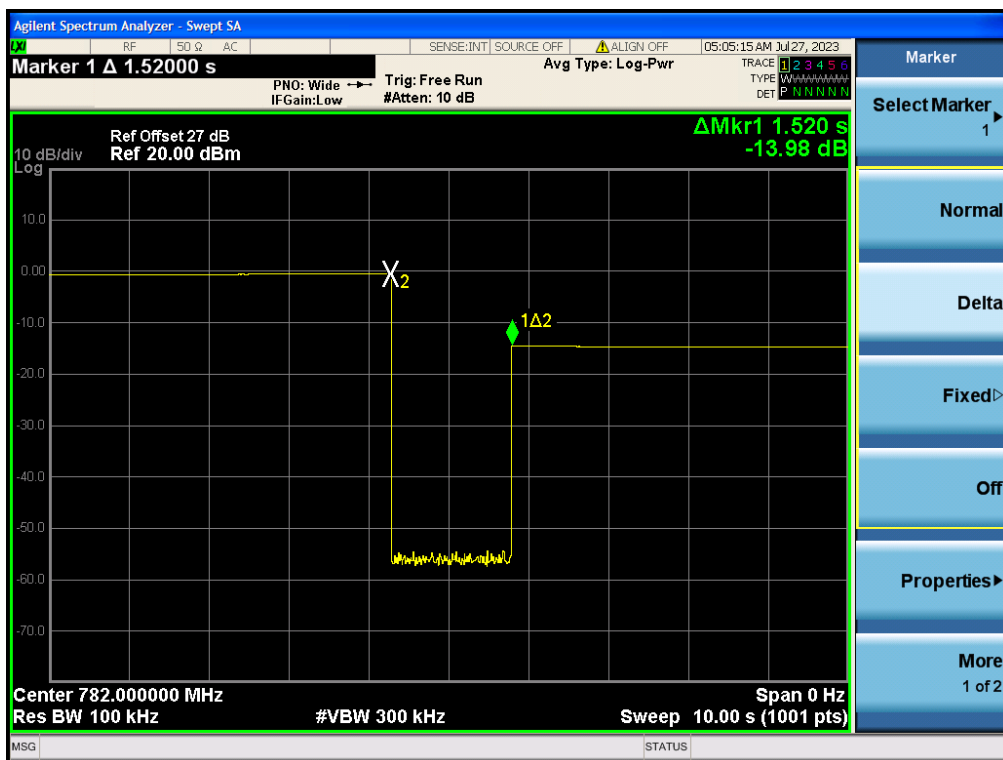
### AWS-1



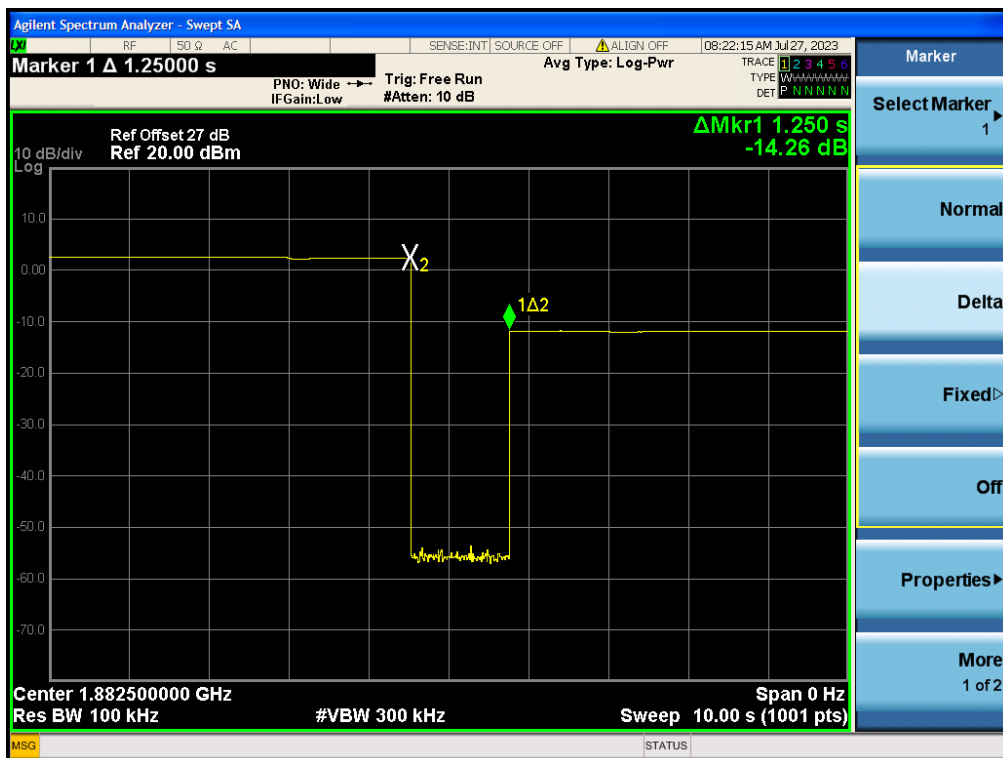
### Low A-E Blocks



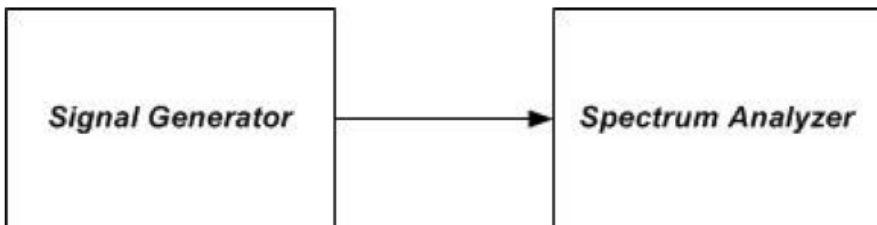
## 700 MHz Upper C Block



## Broadband PCS



## 5.10 Occupied Bandwidth

|                   |  |
|-------------------|--|
| Test Requirement: | This measurement is required to compare the uniformity of the output signal relative to the input signal and to satisfy the requirements of §2.1049.   |
| Test setup:       |  <p><b>Figure 6 – Test setup for measuring characteristics of test signals used for subsequent EUT occupied bandwidth testing</b></p>  |
| Procedure:        | <ul style="list-style-type: none"> <li>a) Connect the test equipment as shown in Figure 7 to measure the characteristics of the test signals produced by the signal generator.</li> <li>b) Set VBW to <math>\geq 3X</math> RBW</li> <li>c) Set the center frequency of the spectrum analyzer to the center of the operational band. The span will be adjusted for each modulation type and occupied bandwidth as necessary for accurately viewing the signals.</li> <li>d) Set the signal generator for power level to match the values obtained in section 7.2.</li> <li>e) Set the signal generator modulation type for GSM with a PBRs pattern and allow the trace on the signal generator to stabilize adjusting the span as necessary.</li> <li>f) Set the spectrum analyzer RBW for 1% to 5% of the emissions bandwidth.</li> <li>g) Capture the spectrum analyzer trace for inclusion in the test report.</li> <li>h) Repeat steps 7.10.3 – 7.10.7 for CDMA and WCDMA modulation adjusting the span as necessary for all uplink and downlink operational bands. [AWGN or LTE may be used in place of WCDMA, as an option]</li> <li>i) Connect the test equipment as shown in Figure 1. Begin with the uplink output connected to the spectrum analyzer</li> <li>j) Repeat steps 7.10.3 – 7.10.8 in this new configuration.</li> </ul> |

### 5.10.1 E.U.T. Operation:

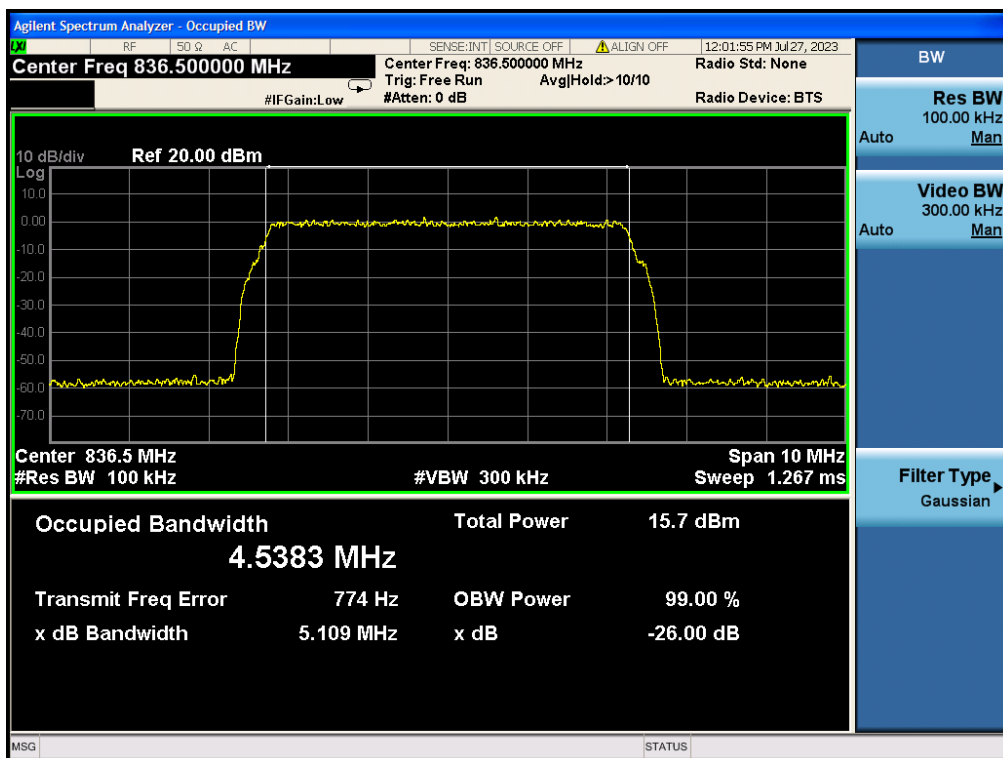
|                        |                |
|------------------------|----------------|
| Operating Environment: |                |
| Temperature:           | -30 °C and +50 |
| Humidity:              | 46.3 %         |
| Atmospheric Pressure:  | 1010 mbar      |

### 5.10.2 Test Data:

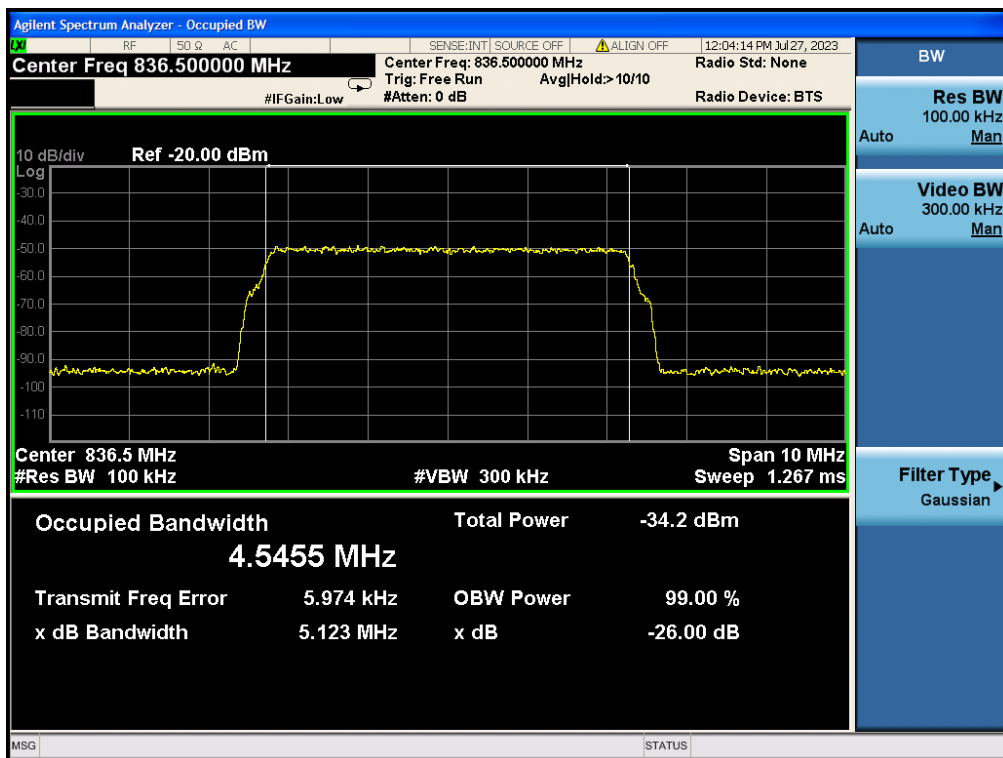
| Operation Band |                       | Signal | Input OBW [MHz] | Output OBW [MHz] | Results |
|----------------|-----------------------|--------|-----------------|------------------|---------|
| Uplink         | Cellular              | AWGN   | 4.5383          | 4.5455           | PASS    |
|                | AWS-1                 | AWGN   | 4.5394          | 4.5455           | PASS    |
|                | Low A-E Blocks        | AWGN   | 4.5399          | 4.5448           | PASS    |
|                | 700 MHz Upper C Block | AWGN   | 4.5456          | 4.5353           | PASS    |
|                | Broadband PCS         | AWGN   | 4.5446          | 4.5344           | PASS    |
| Downlink       | Cellular              | AWGN   | 4.5377          | 4.5494           | PASS    |
|                | AWS-1                 | AWGN   | 4.5404          | 4.5422           | PASS    |
|                | Low A-E Blocks        | AWGN   | 4.5333          | 4.5238           | PASS    |
|                | 700 MHz Upper C Block | AWGN   | 4.5295          | 4.5404           | PASS    |
|                | Broadband PCS         | AWGN   | 4.5284          | 4.5364           | PASS    |



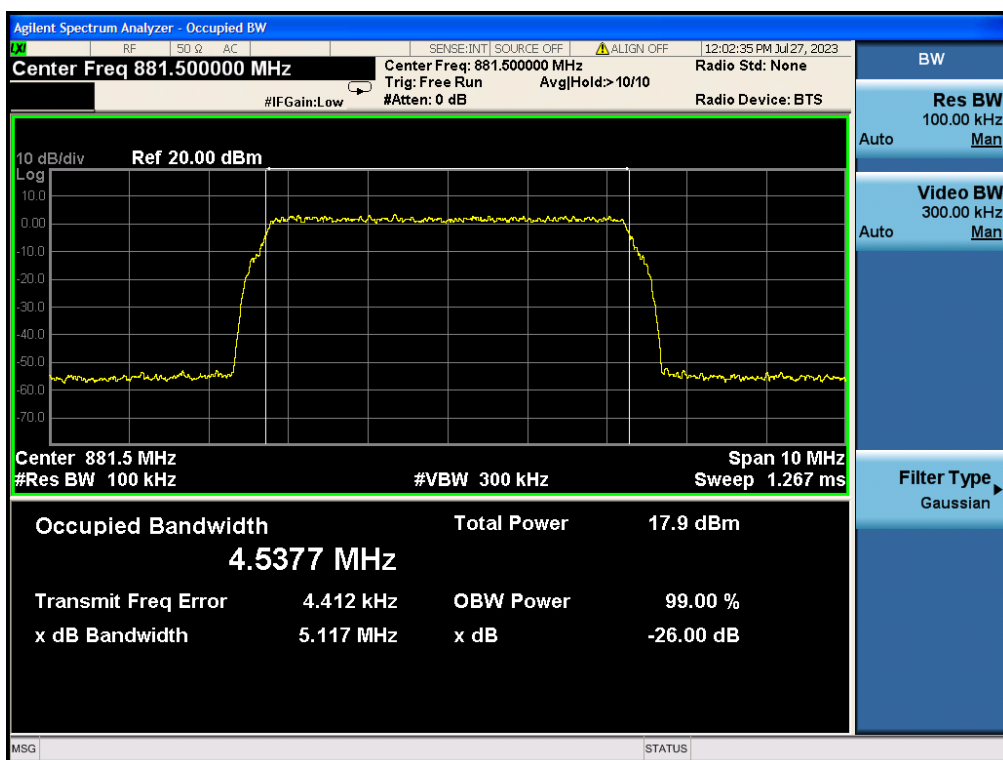
## Cellular AWGN UL Input



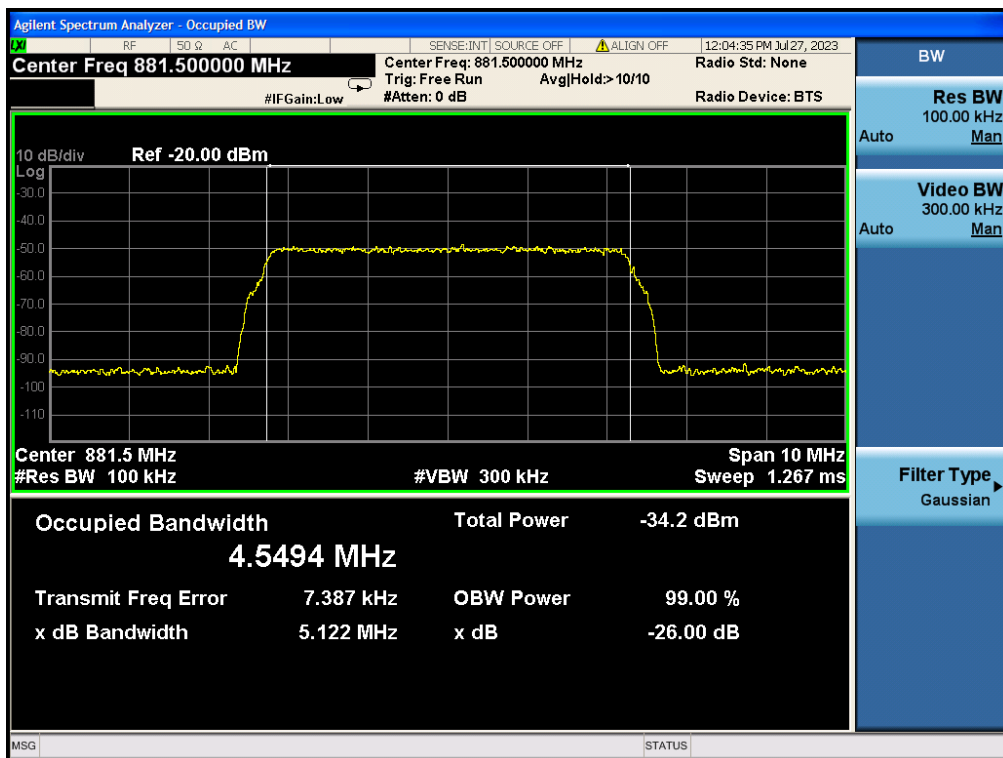
## Cellular AWGN UL output



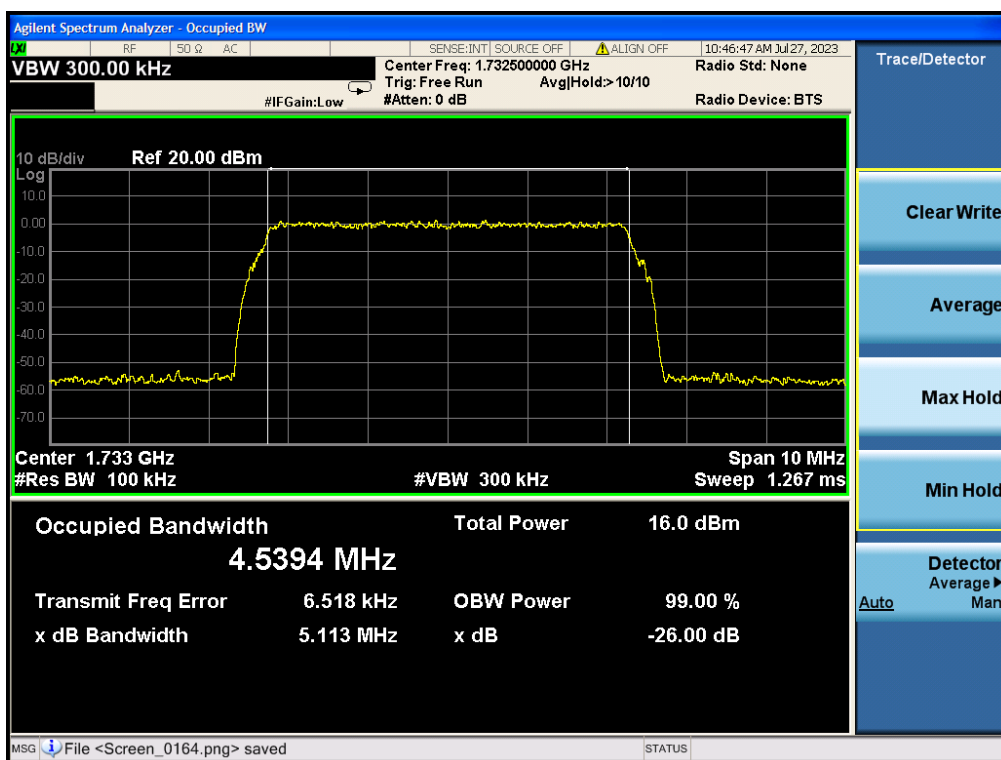
## Cellular AWGN DL Input



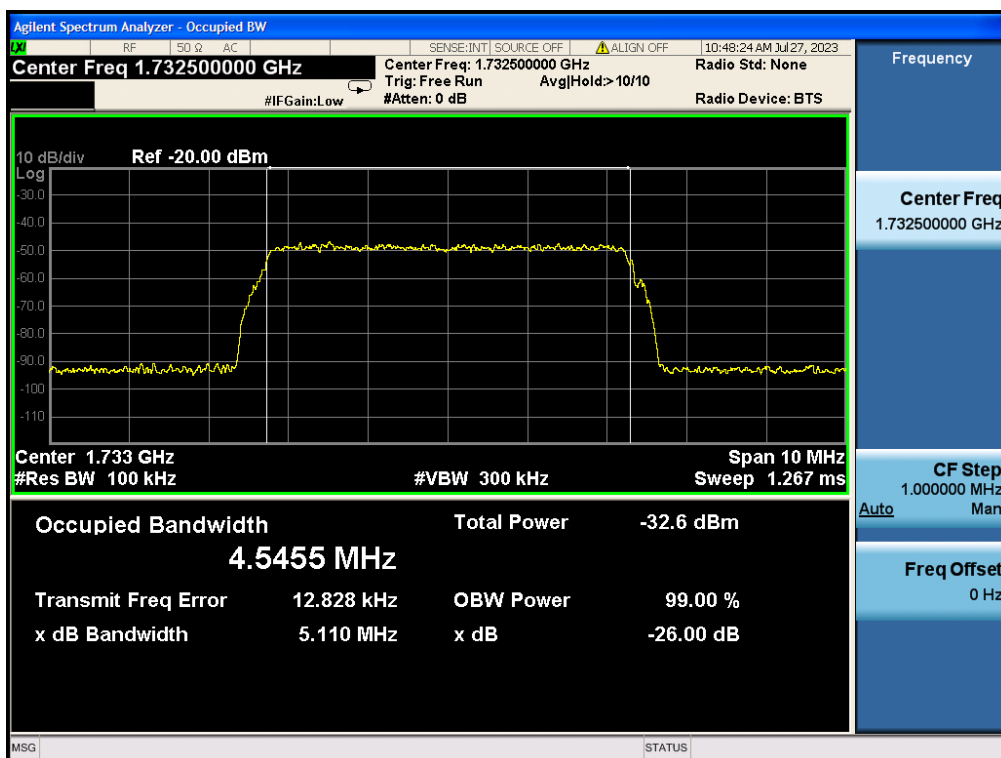
## Cellular AWGN DL output



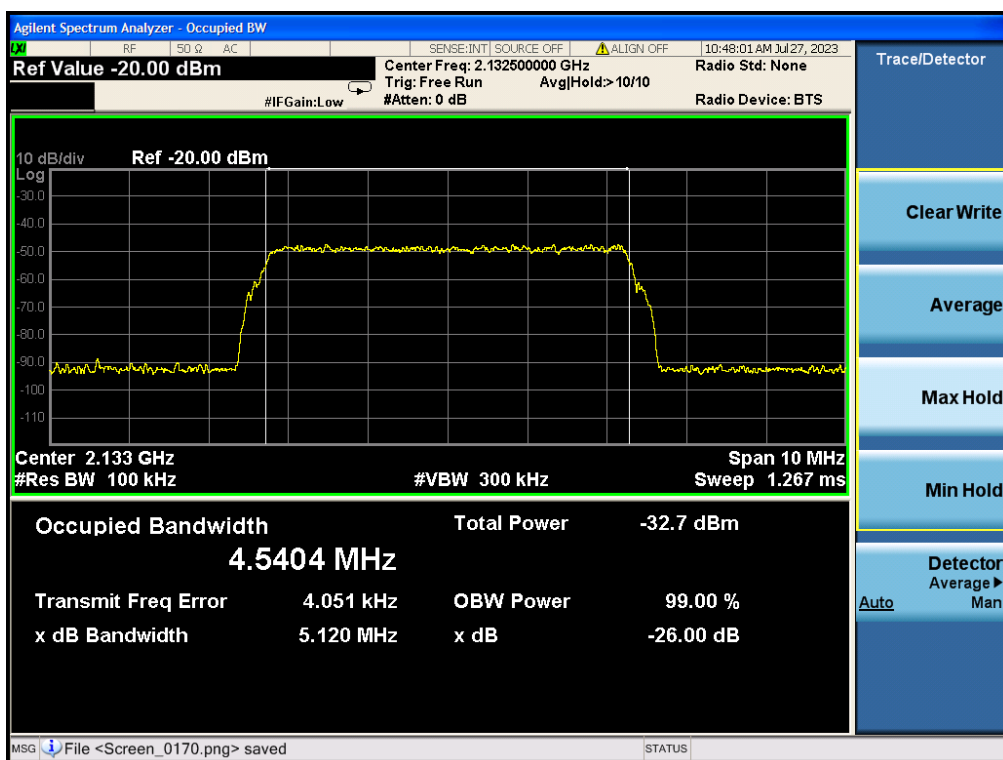
### AWS-1 AWGN UL Input



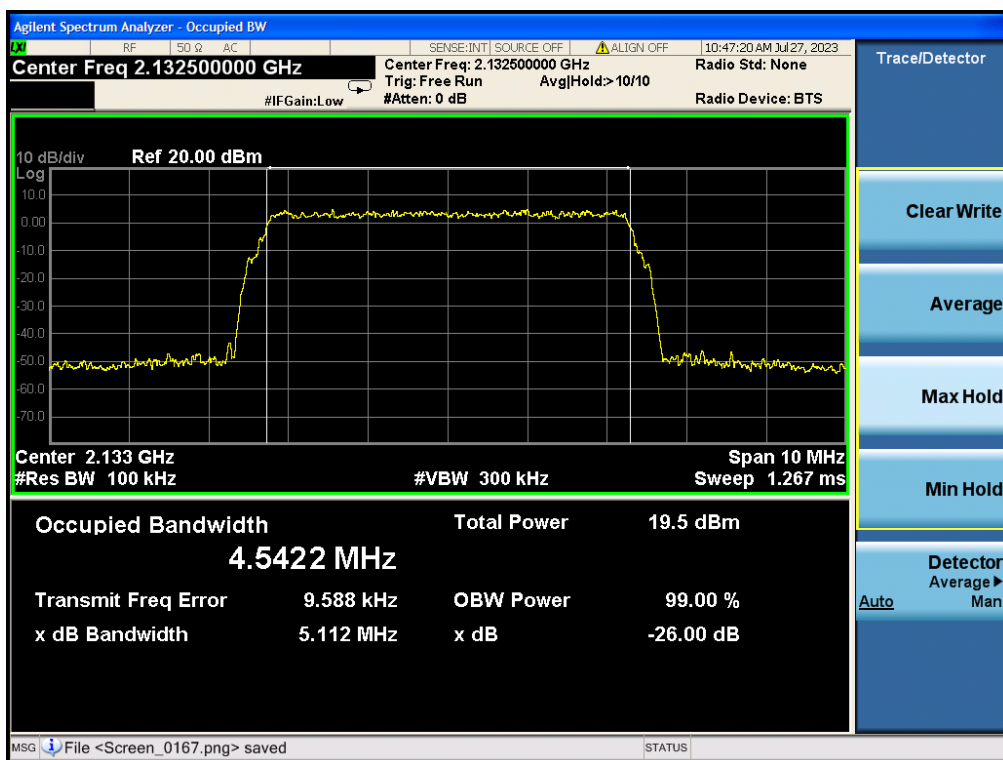
### AWS-1 AWGN UL output



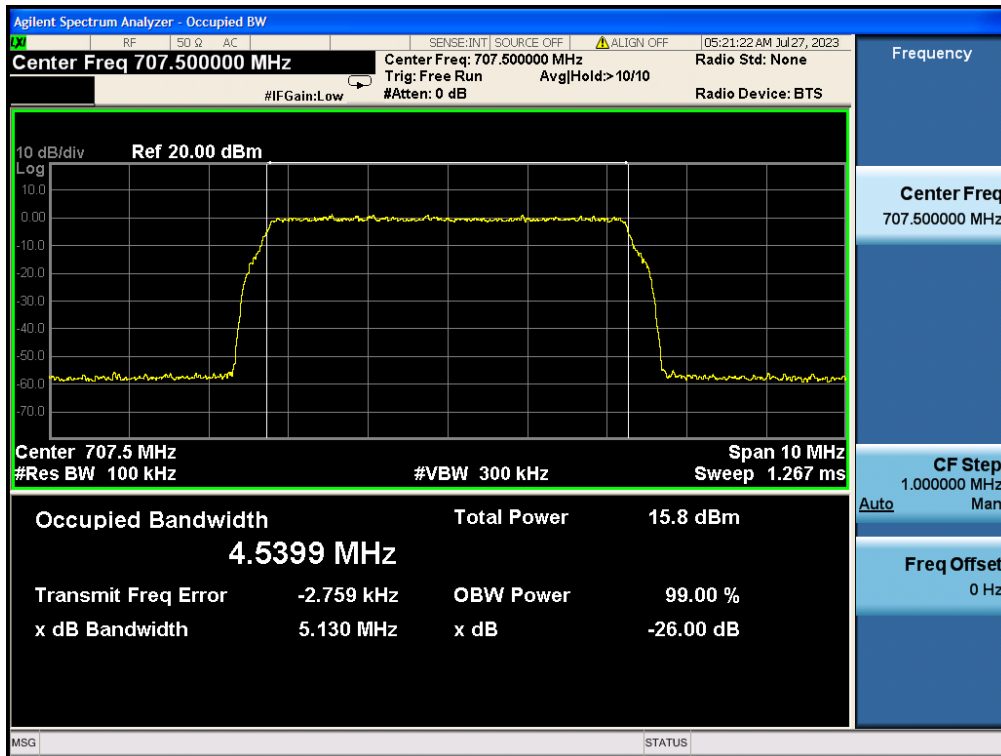
### AWS-1 AWGN DL Input



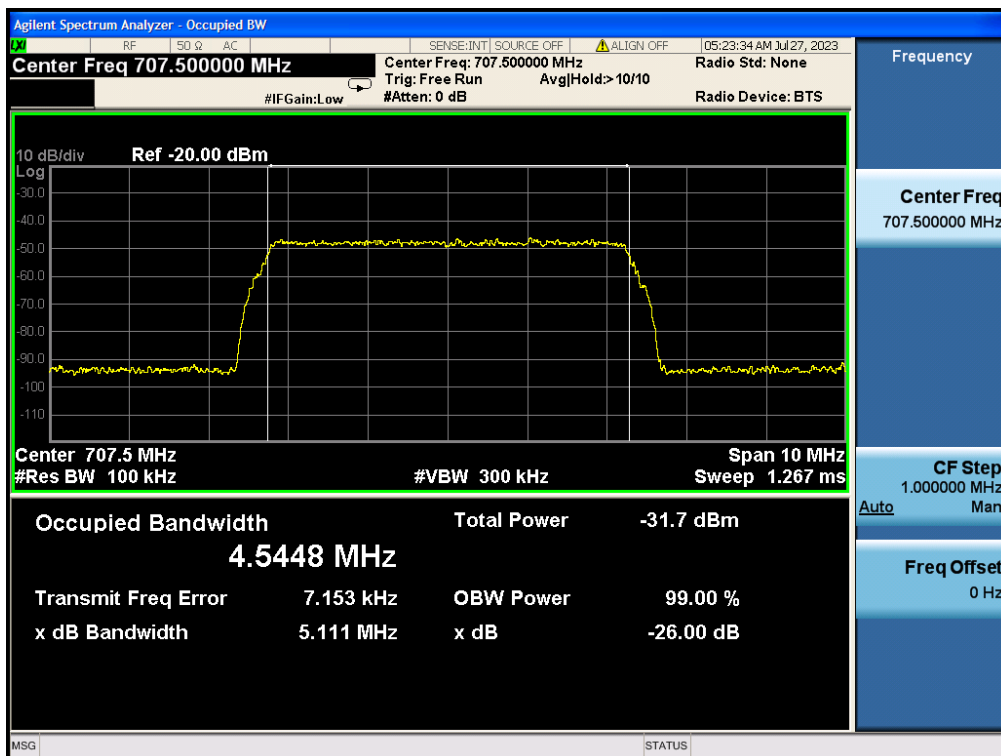
### AWS-1 AWGN DL output



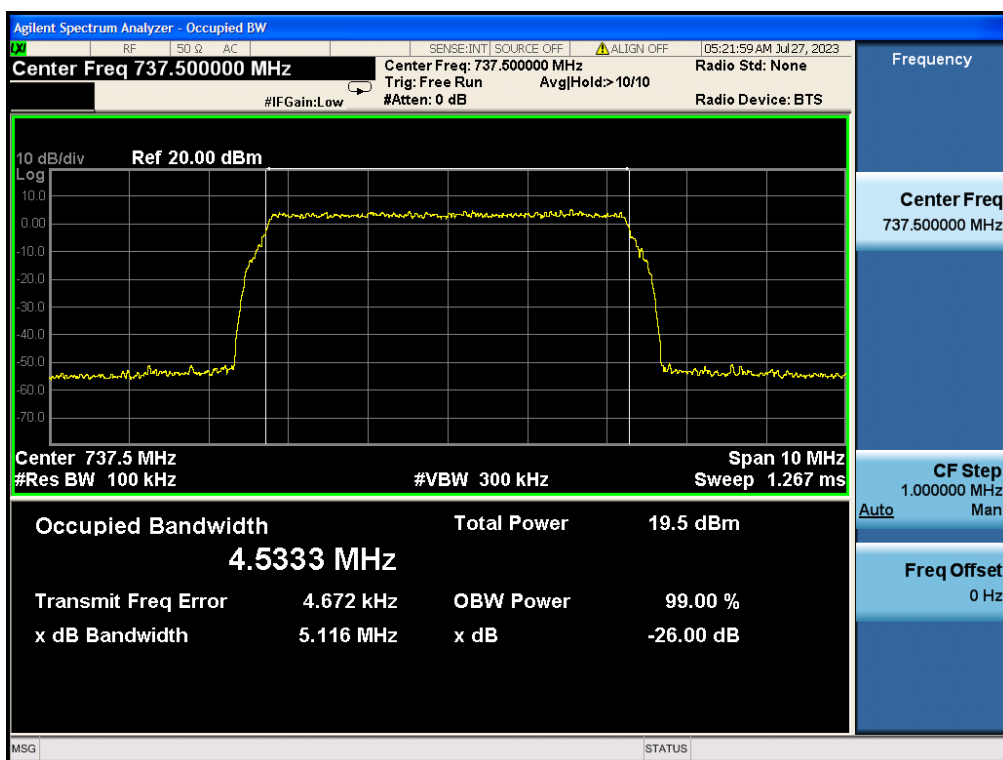
### Low A-E Blocks UL Input



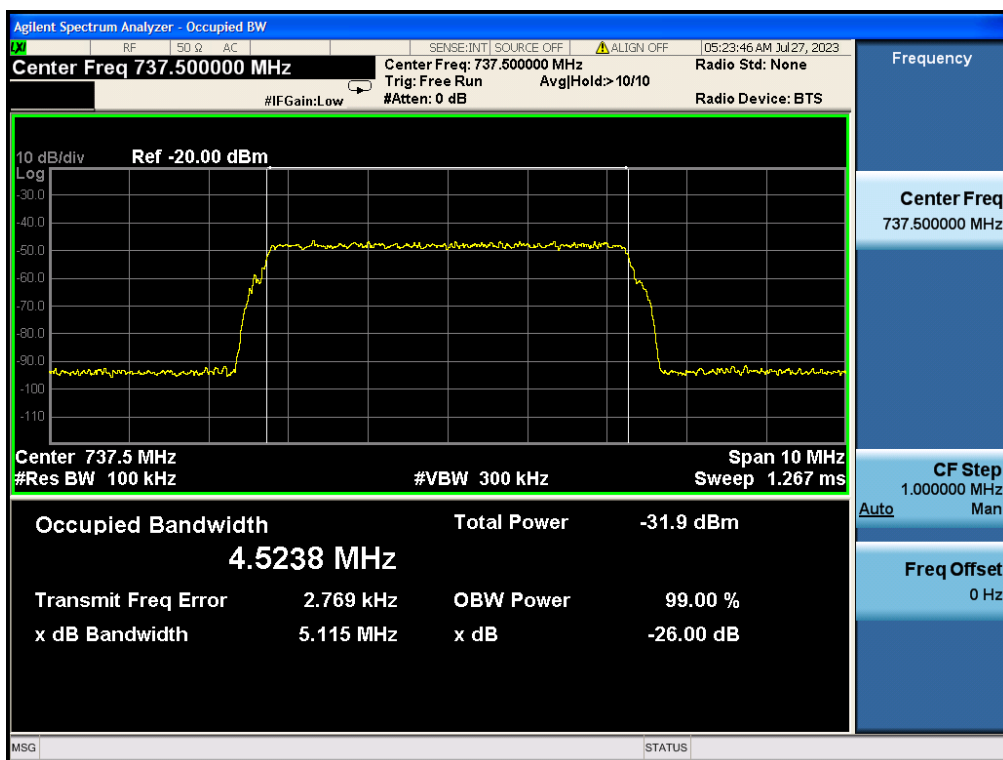
### Low A-E Blocks UL output



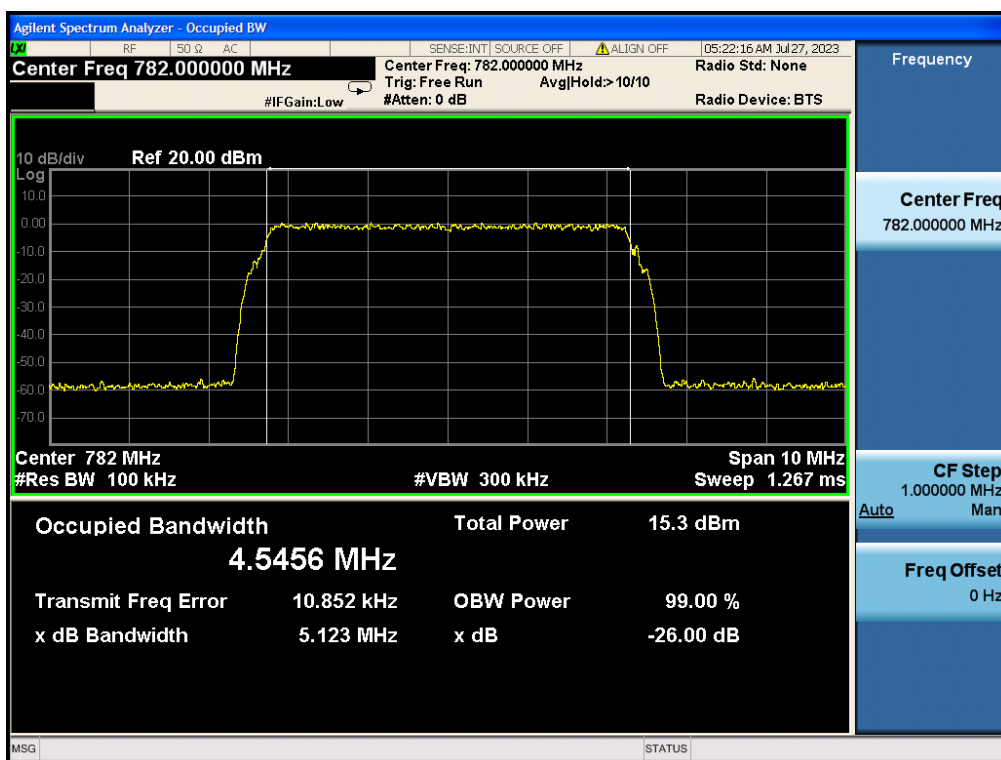
### Low A-E Blocks DL Input



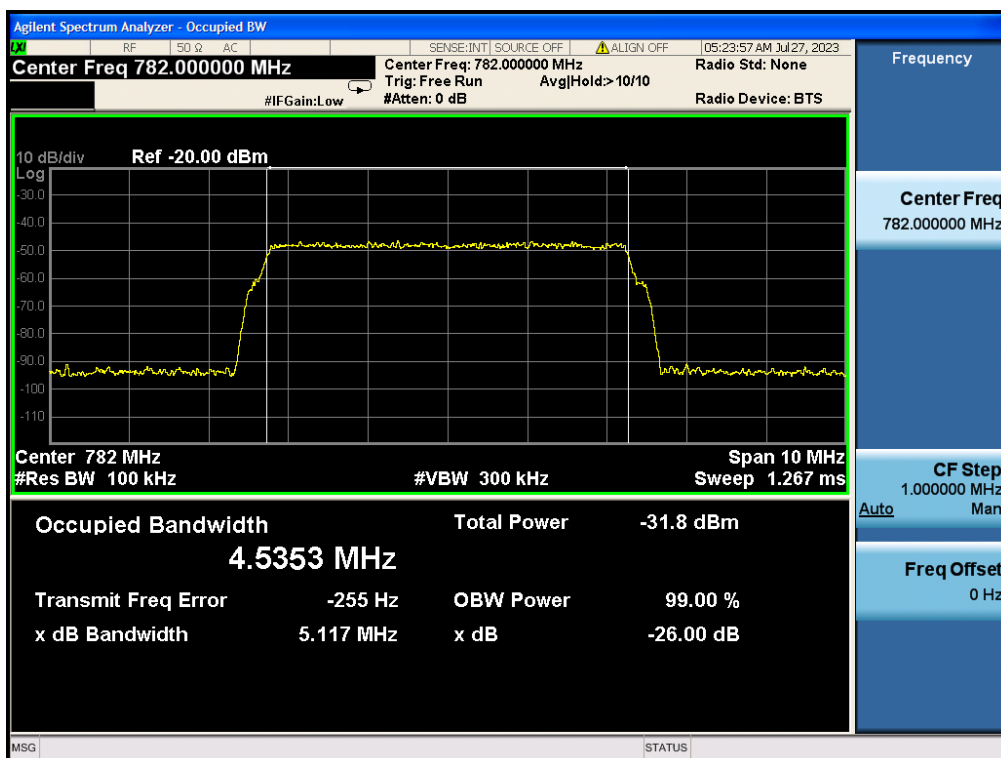
### Low A-E Blocks DL output



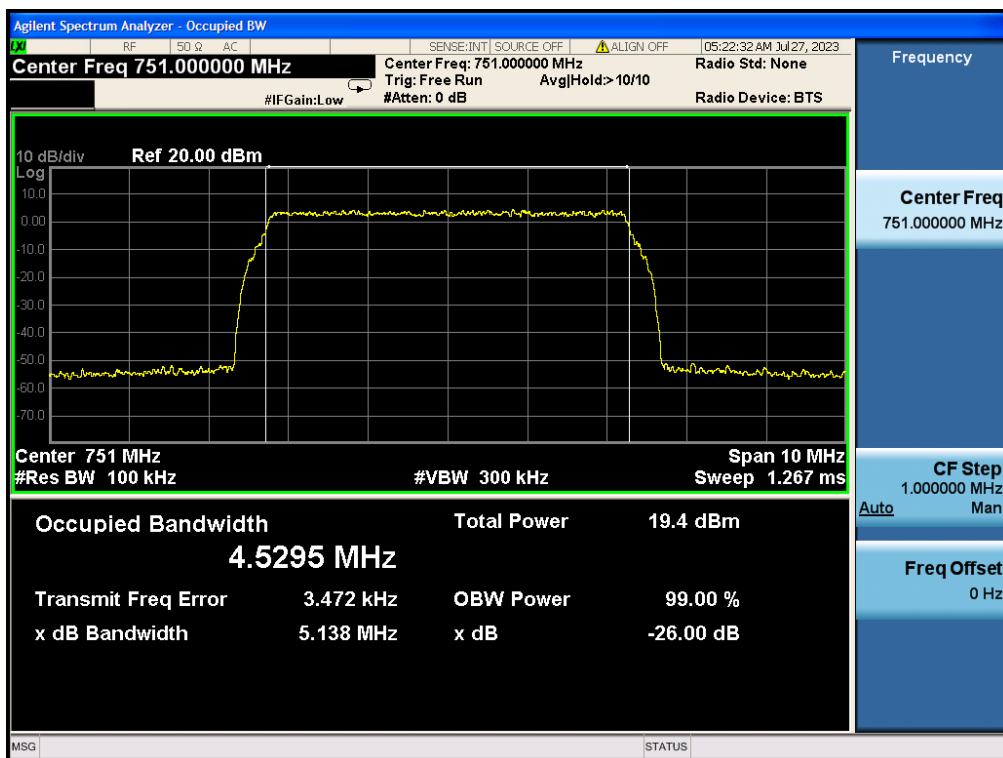
## 700 MHz Upper C Block UL Input



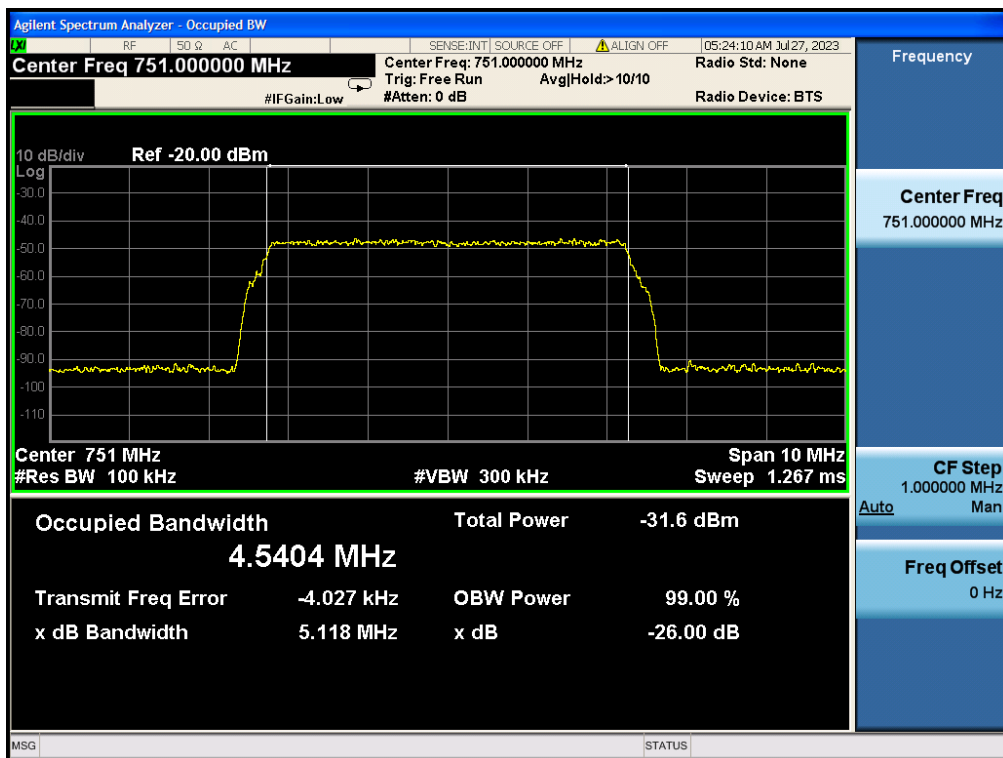
## 700 MHz Upper C Block UL output



## 700 MHz Upper C Block DL Input

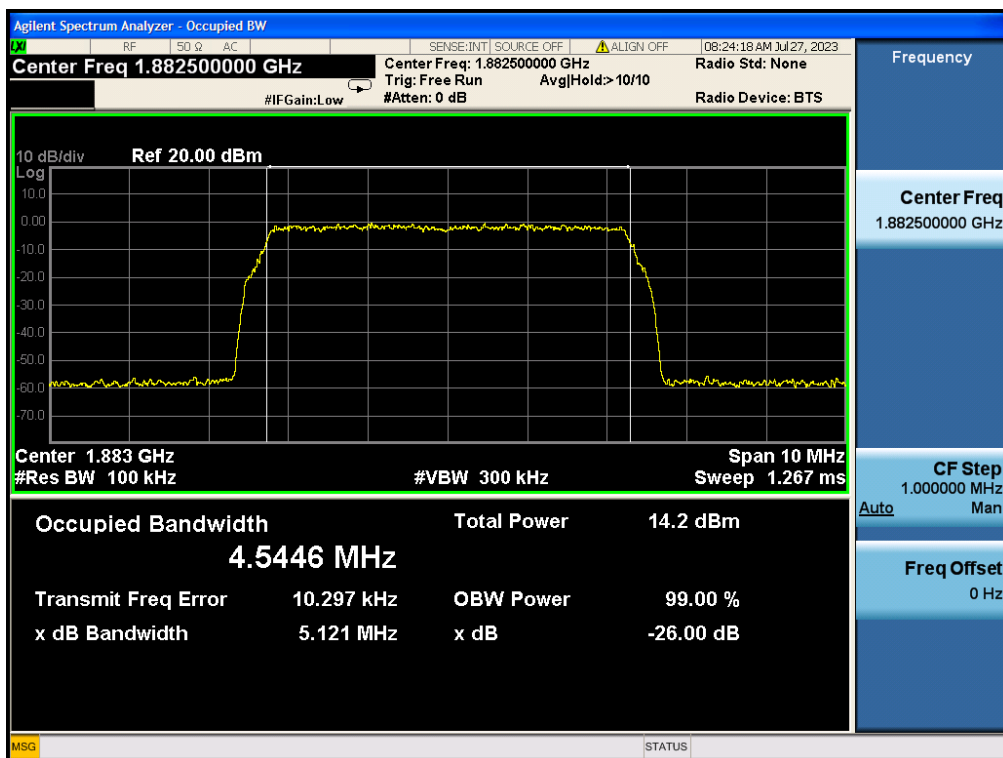


## 700 MHz Upper C Block DL output

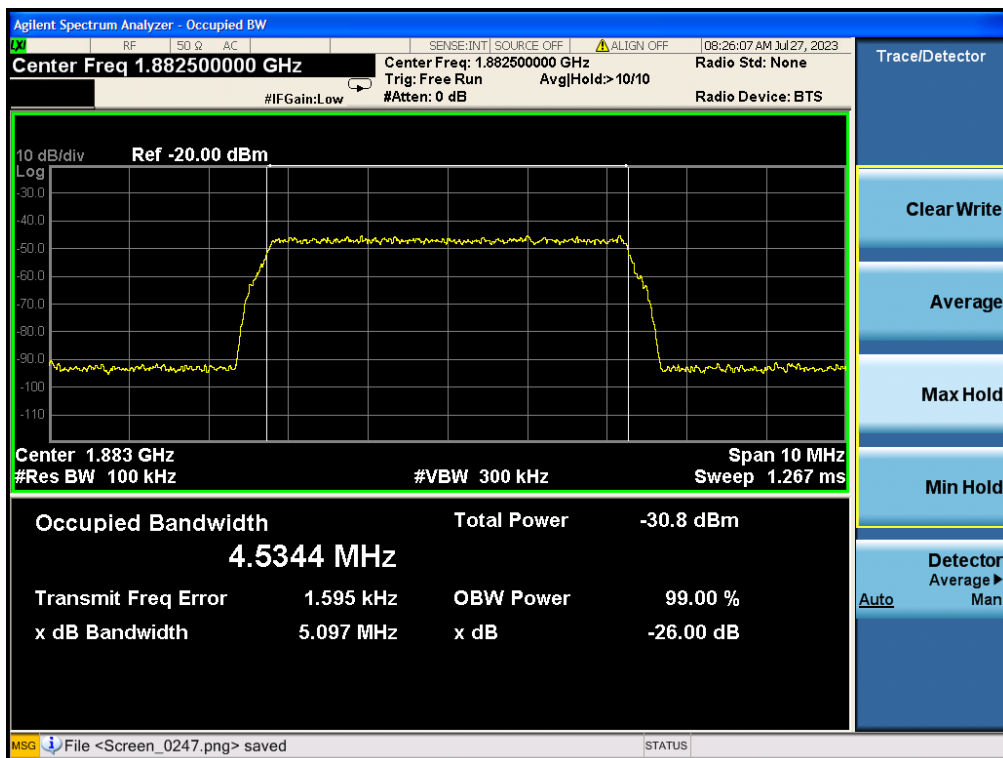




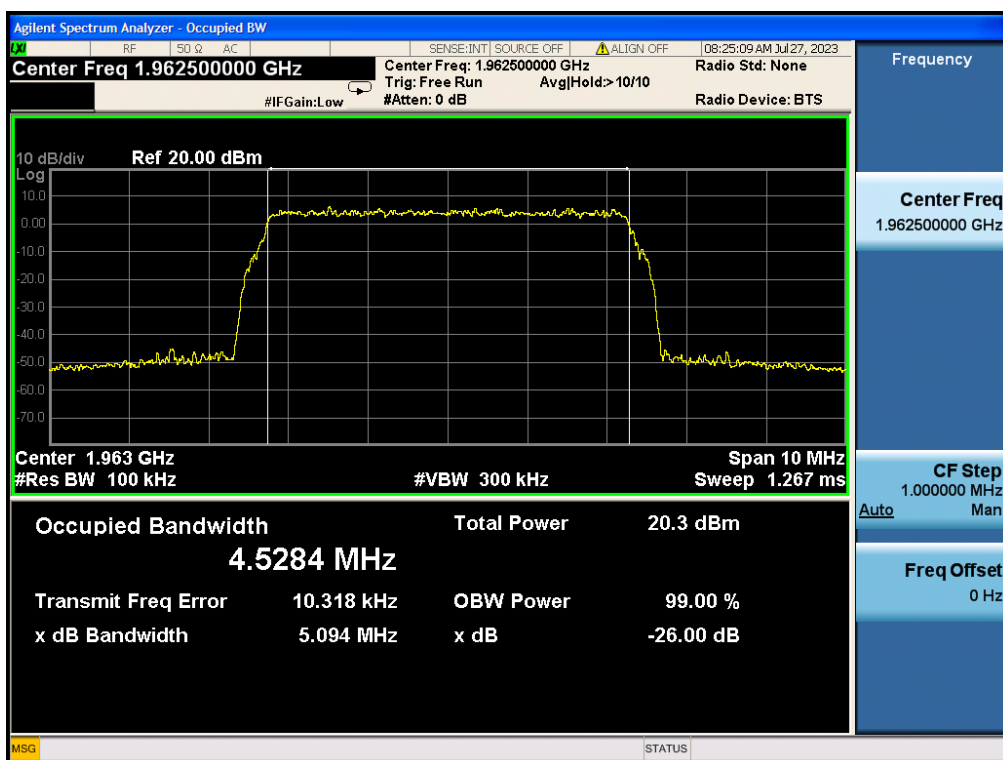
## Broadband PCS UL Input



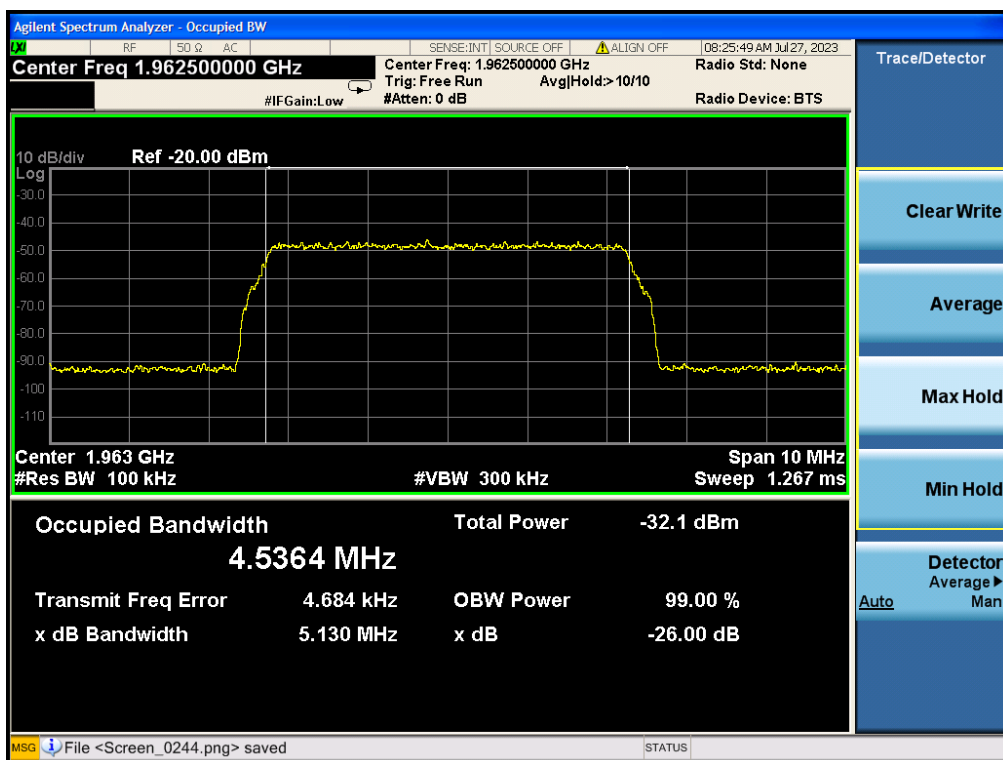
## Broadband PCS UL output



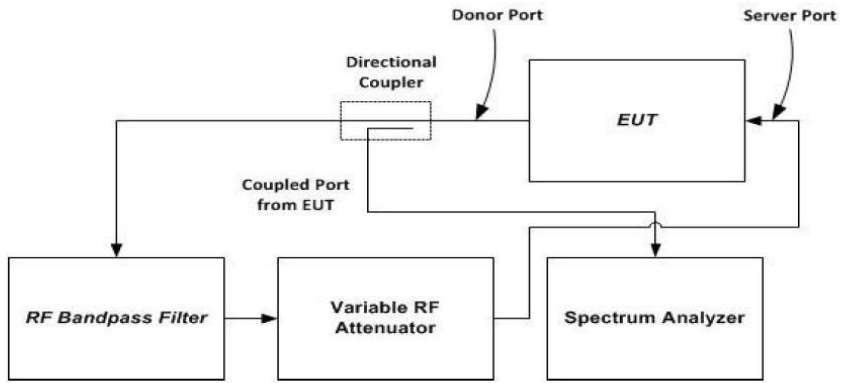
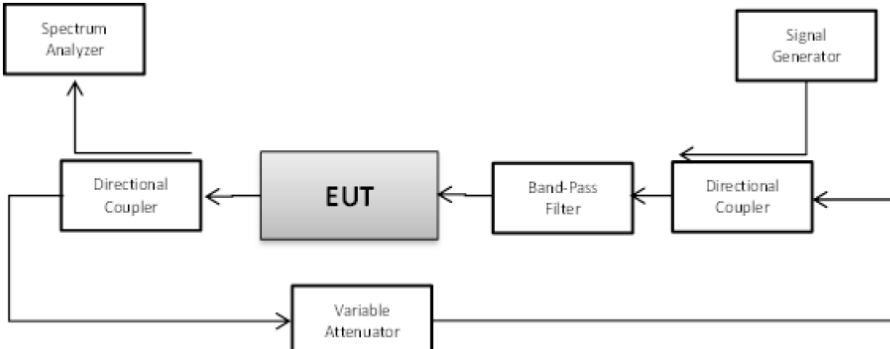
## Broadband PCS DL Input



## Broadband PCS DL output



## 5.11 Oscillation Detection

|                   |  |
|-------------------|--|
| Test Requirement: | <p>This measurement is required to demonstrate compliance to the Anti-Oscillation specification for Wideband Consumer Signal Boosters provided in §20.21(e)(8)(ii)(A)</p> <p>For this measurement two EUTs will be permitted, one operating in a normal mode and the second operating in a test mode that is capable of disabling the uplink inactivity squelching and or a reduction of the time between restarts to 5 seconds. This will greatly decrease the test time required.</p>  |
| Test setup:       |  <p>NOTE—This figure shows the test setup for uplink bands transmission path tests; i.e., signal flow is out from the donor port into the directional coupler. For downlink bands transmission path tests, the feedback signal flow path direction and equipment connections shall be reversed, i.e., signal flow is out from the server port into the directional coupler, and signal flow is into the donor port from the variable RF attenuator.</p> <p><b>Figure 7 – Oscillation detection (7.11.2) test setup</b></p>  <p><b>Figure 8 – Oscillation mitigation/shutdown test setup</b></p>  |
| Procedure:        | <ol style="list-style-type: none"> <li>Connect the EUT set for normal operation to the test equipment as shown in Figure 8 beginning with the RF detector on the uplink output side of the RF path. Ensure that the RF coupled path is connected to the RF detector.</li> <li>Note: The band pass filter shall provide sufficient out-of-band rejection to prevent oscillations from occurring in bands not under test.</li> <li>Set the oscilloscope for a positive edge trigger and single trigger operation.</li> <li>Set the attenuation as necessary until the oscilloscope triggers and increase the attenuation level to a point 10 dB above that point.</li> <li>Reset the trigger of the oscilloscope and reset the EUT with a power cycle.</li> <li>Force the EUT to oscillate this will trigger the oscilloscope.</li> <li>Use the CURSOR function of the oscilloscope to measure the time from the detection of oscillation until the EUT turns off by setting CURSOR 1 on the leading edge of the signal and CURSOR 2 on the trailing edge.</li> <li>Capture the oscilloscope trace for inclusion in the test report.</li> <li>Repeat steps 7.11.2 to 7.11.7 for all operational uplink and downlink bands.</li> <li>Set the oscilloscope time base for longer than 1 minute and measure the restart</li> </ol> |

|  |  |
|--|--|
|  | <p>time for each operational uplink and downlink band.</p> <p>j) Replace the normal operating EUT for the EUT with the test mode.</p> <p>k) Set the oscilloscope time base for a minimum 120 seconds with an AUTO Trigger and a single sweep.</p> <p>l) Start the Oscilloscope and a manually force the booster into oscillation.</p> <p>m) When the sweep is complete place cursors between the first two oscillation detections and save the plot for inclusion in the test report. The time between restarts must match the manufacturer's timing for the test mode and there can be no more than 5 restarts.</p> <p>n) Repeat steps 7.11.12 to 7.11.13 for all operational uplink and downlink bands.</p> <p>Note: In lieu of an oscilloscope and RF detector, a spectrum analyzer set for 0 span, can be used to enhance sensitivity, with a center frequency set equal to the center of the operational band for broadband oscillation or a discrete frequency of oscillation. RBW shall be at least 1 MHz with VBW <math>\geq</math> 3 times RBW using a peak detector.</p> |
|--|--|

#### 5.11.1 E.U.T. Operation:

|                        |                |
|------------------------|----------------|
| Operating Environment: |                |
| Temperature:           | -30 °C and +50 |
| Humidity:              | 46.3 %         |
| Atmospheric Pressure:  | 1010 mbar      |

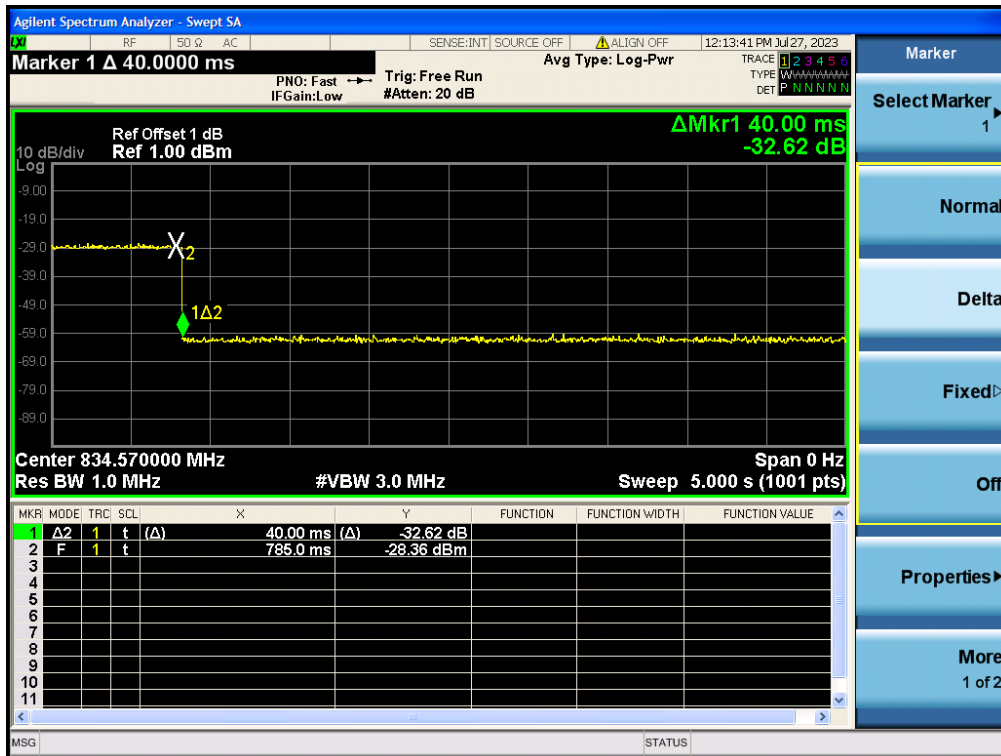
#### 5.11.2 Test Data:

| Test results of detection time |                       |                   |          |        |
|--------------------------------|-----------------------|-------------------|----------|--------|
| Operation Bands                |                       | Detection Time(s) | Limit(s) | Result |
| Uplink                         | Cellular              | 0.040             | 0.300    | PASS   |
|                                | AWS-1                 | 0.040             | 0.300    | PASS   |
|                                | Low A-E Blocks        | 0.030             | 0.300    | PASS   |
|                                | 700 MHz Upper C Block | 0.035             | 0.300    | PASS   |
|                                | Broadband PCS         | 0.040             | 0.300    | PASS   |
| Downlink                       | Cellular              | 0.045             | 0.300    | PASS   |
|                                | AWS-1                 | 0.035             | 0.300    | PASS   |
|                                | Low A-E Blocks        | 0.040             | 0.300    | PASS   |
|                                | 700 MHz Upper C Block | 0.035             | 0.300    | PASS   |
|                                | Broadband PCS         | 0.030             | 0.300    | PASS   |

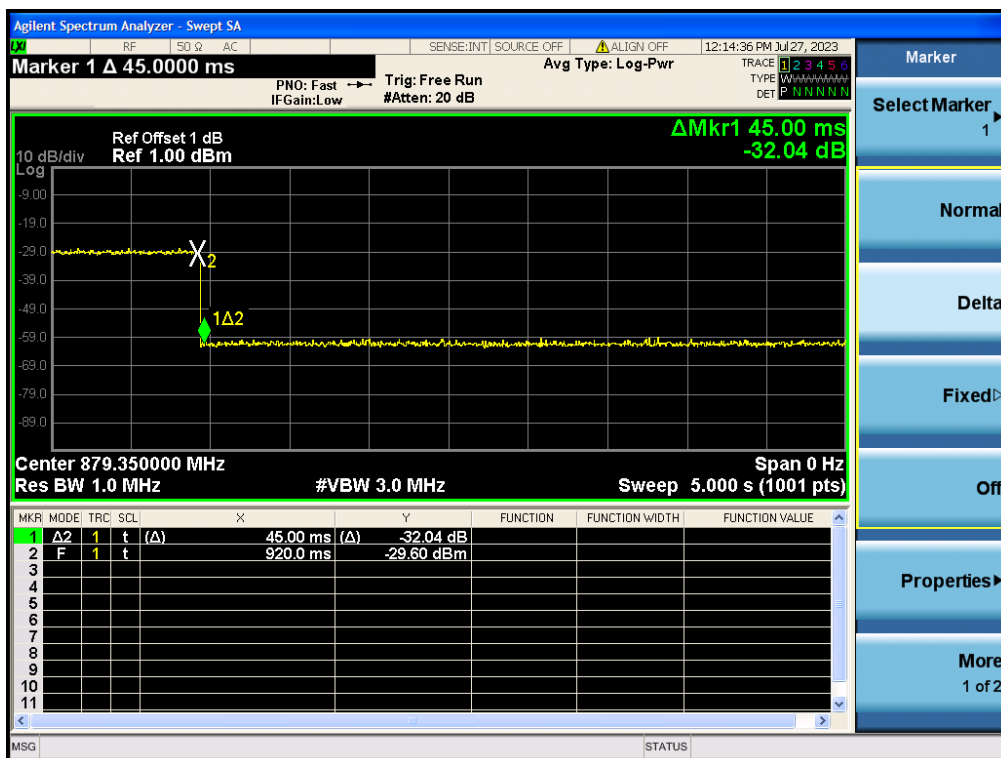
| Test results of detection time |                       |                    |          |                   |       |        |
|--------------------------------|-----------------------|--------------------|----------|-------------------|-------|--------|
| Operation Bands                |                       | Restarting Time(s) | Limit(s) | Restarting Counts | Limit | Result |
| Uplink                         | Cellular              | 65.6               | 60       | 3                 | 5     | PASS   |
|                                | AWS-1                 | 67.3               | 60       | 3                 | 5     | PASS   |
|                                | Low A-E Blocks        | 60.8               | 60       | 2                 | 5     | PASS   |
|                                | 700 MHz Upper C Block | 78.0               | 60       | 2                 | 5     | PASS   |
|                                | Broadband PCS         | 71.4               | 60       | 2                 | 5     | PASS   |
| Downlink                       | Cellular              | 60.1               | 60       | 2                 | 5     | PASS   |
|                                | AWS-1                 | 64.1               | 60       | 2                 | 5     | PASS   |
|                                | Low A-E Blocks        | 71.4               | 60       | 2                 | 5     | PASS   |
|                                | 700 MHz Upper C Block | 64.2               | 60       | 2                 | 5     | PASS   |
|                                | Broadband PCS         | 88.8               | 60       | 2                 | 5     | PASS   |

## Test Test Plots of detection time

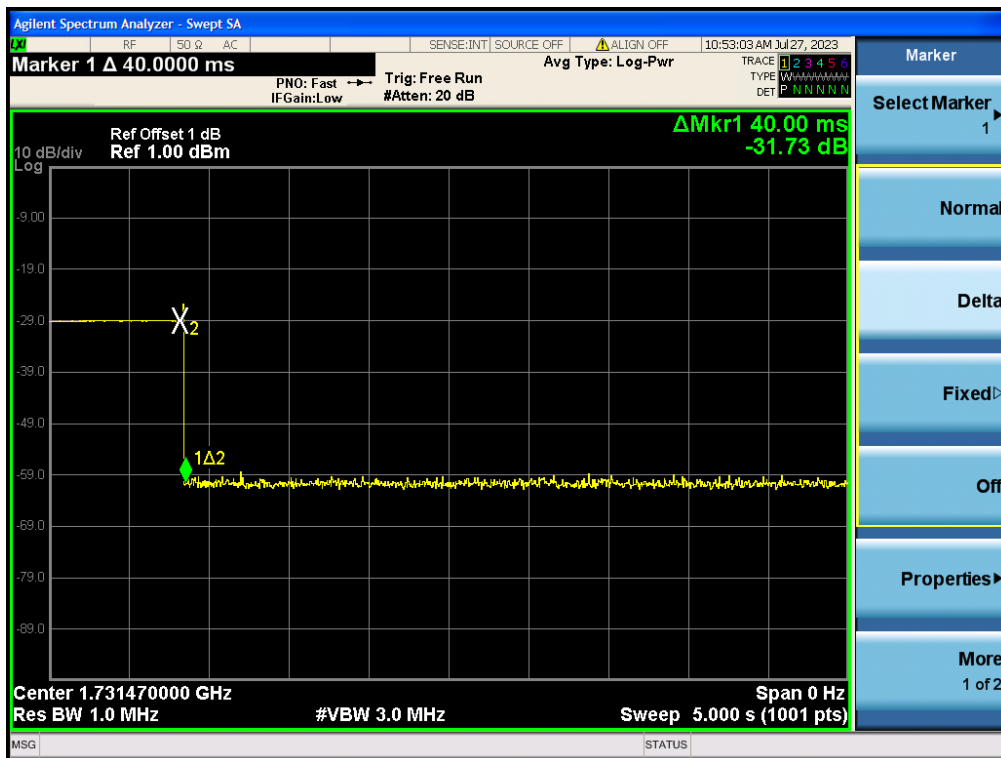
## Cellular UL



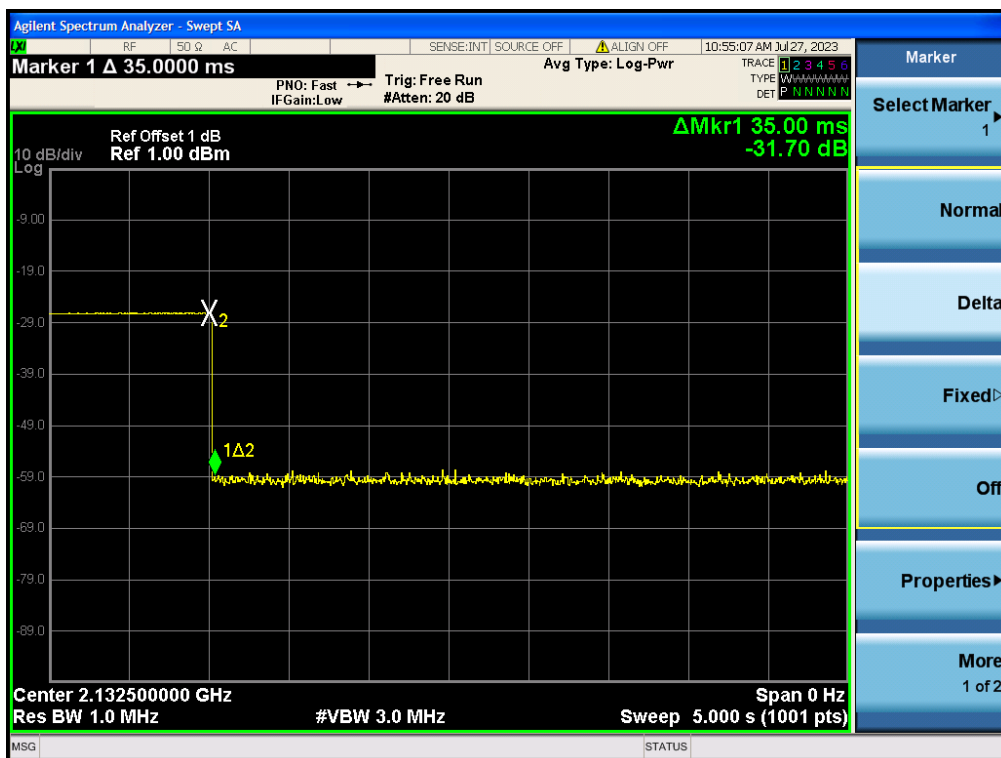
## Cellular DL



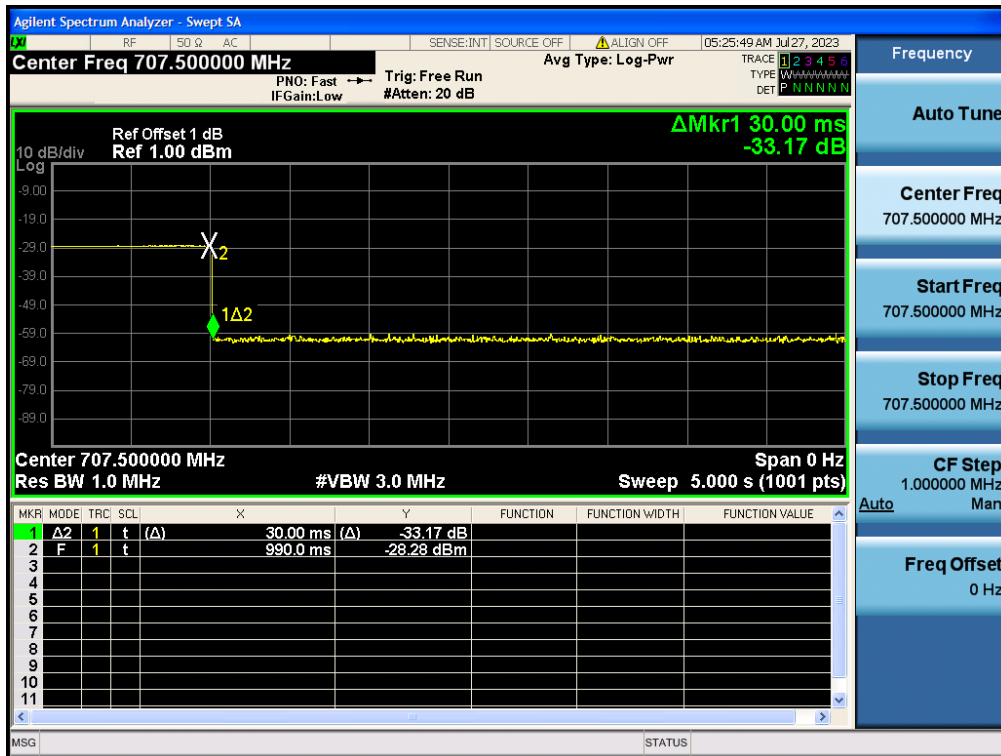
## AWS-1 UL



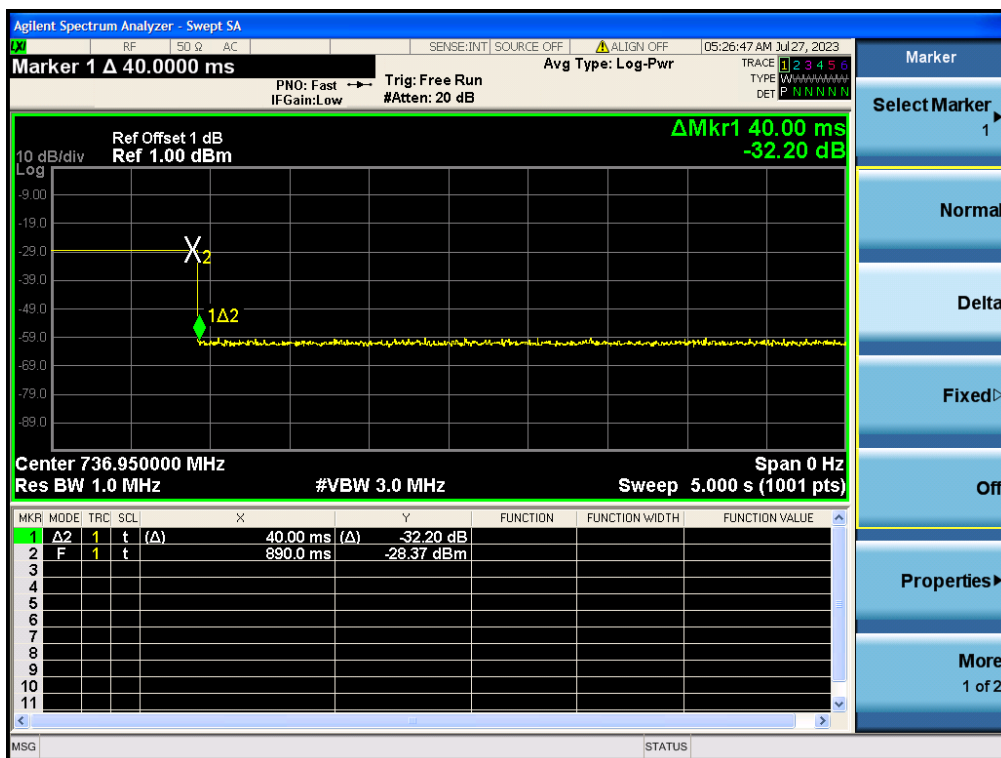
## AWS-1 DL



### Low A-E Blocks UL

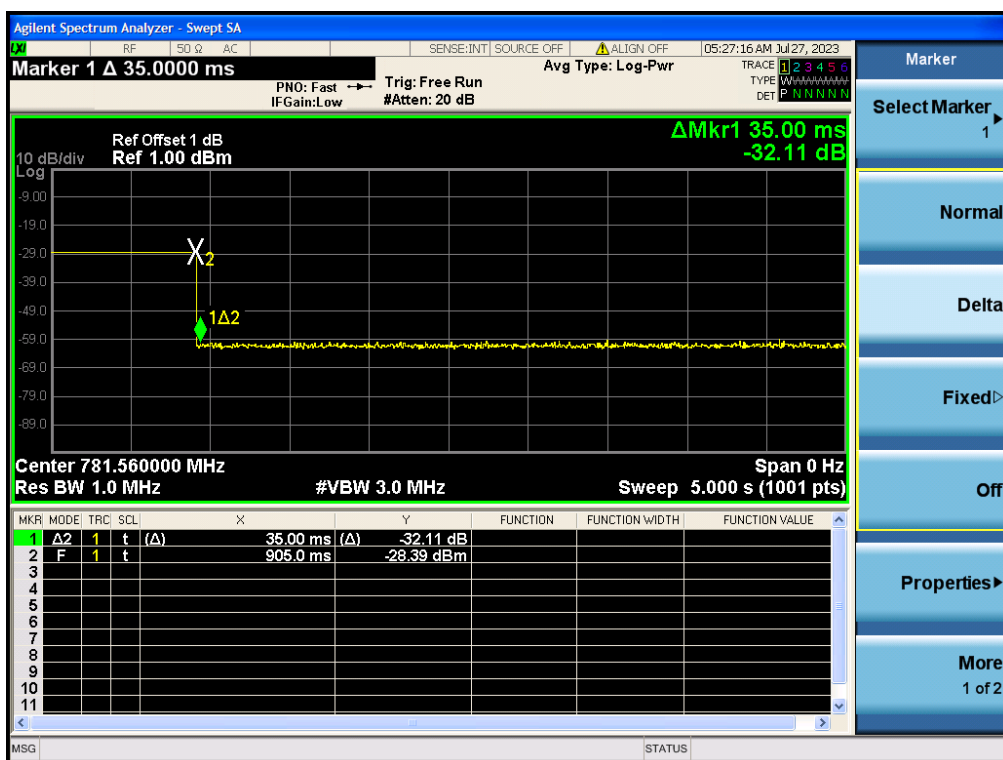


### Low A-E Blocks DL

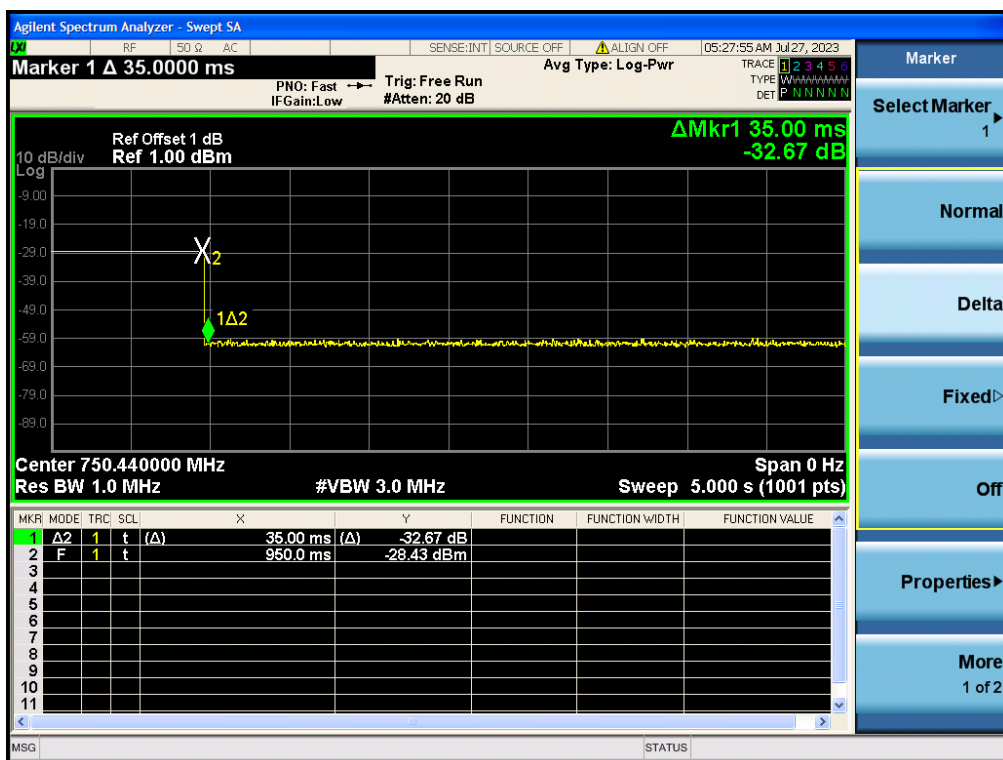




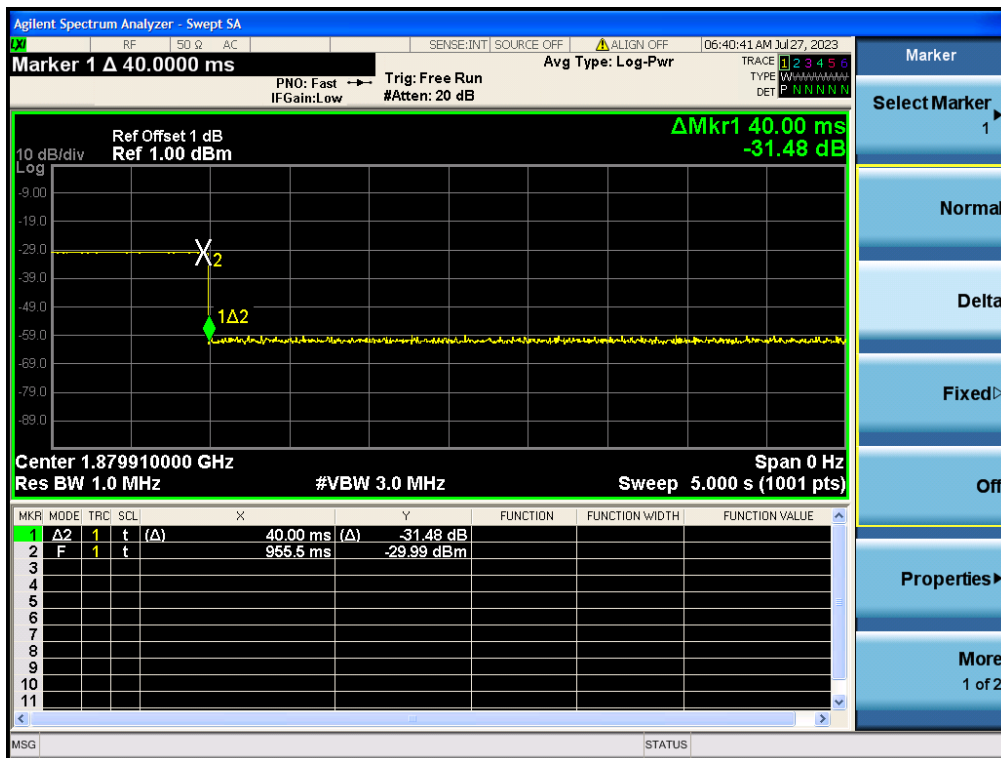
## 700 MHz Upper C Block UL



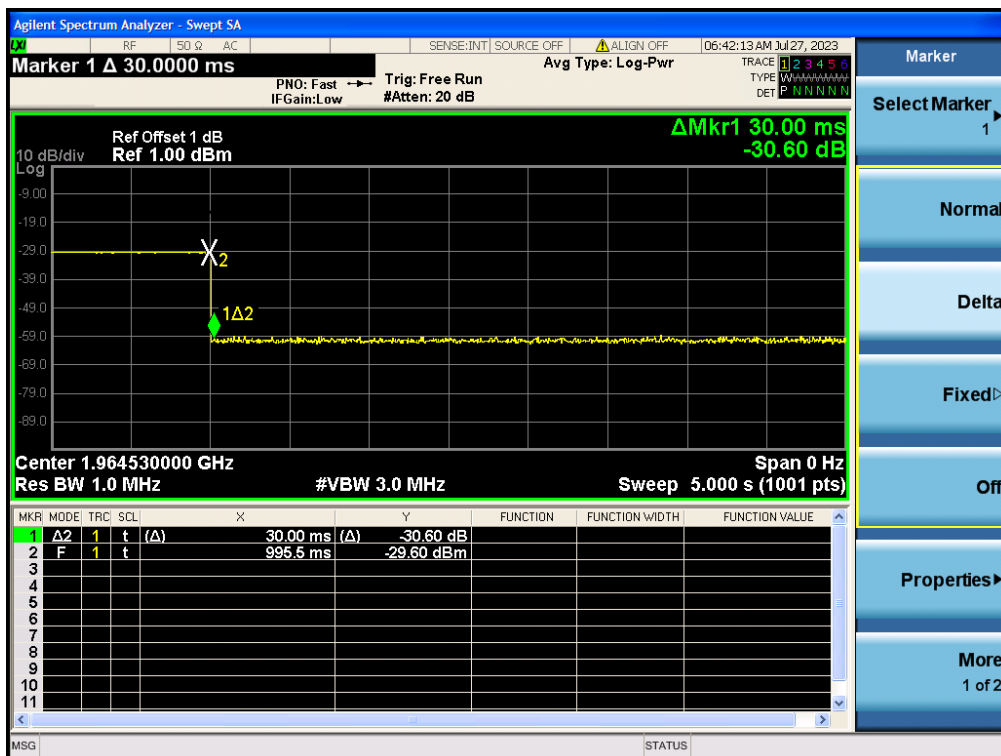
## 700 MHz Upper C Block DL



## Broadband PCS UL

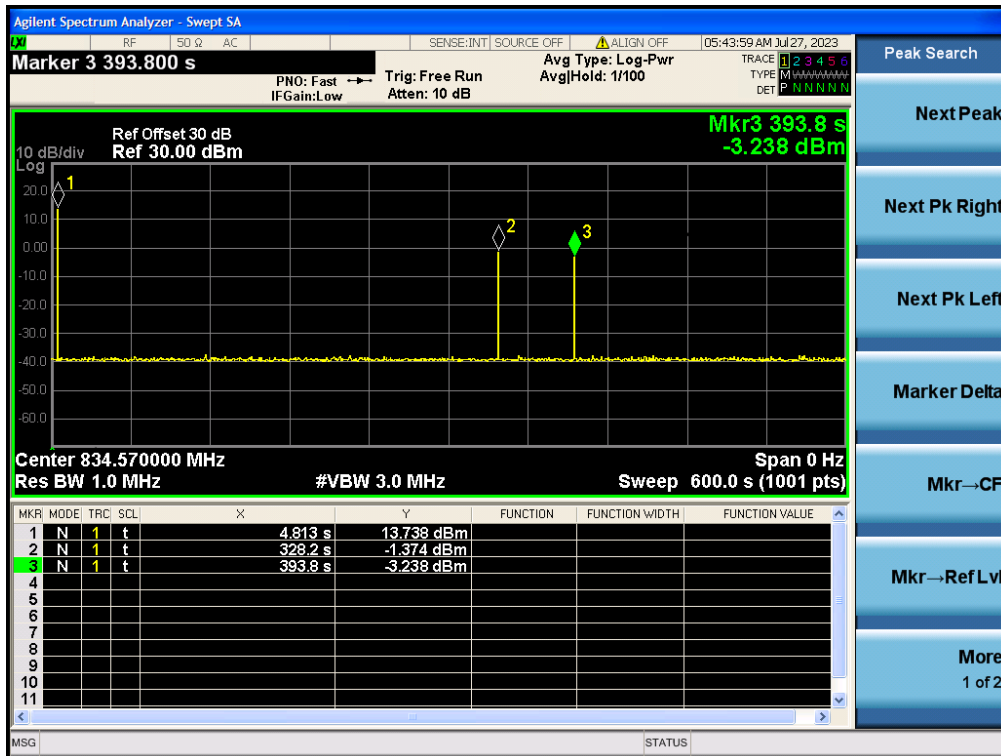


## Broadband PCS DL

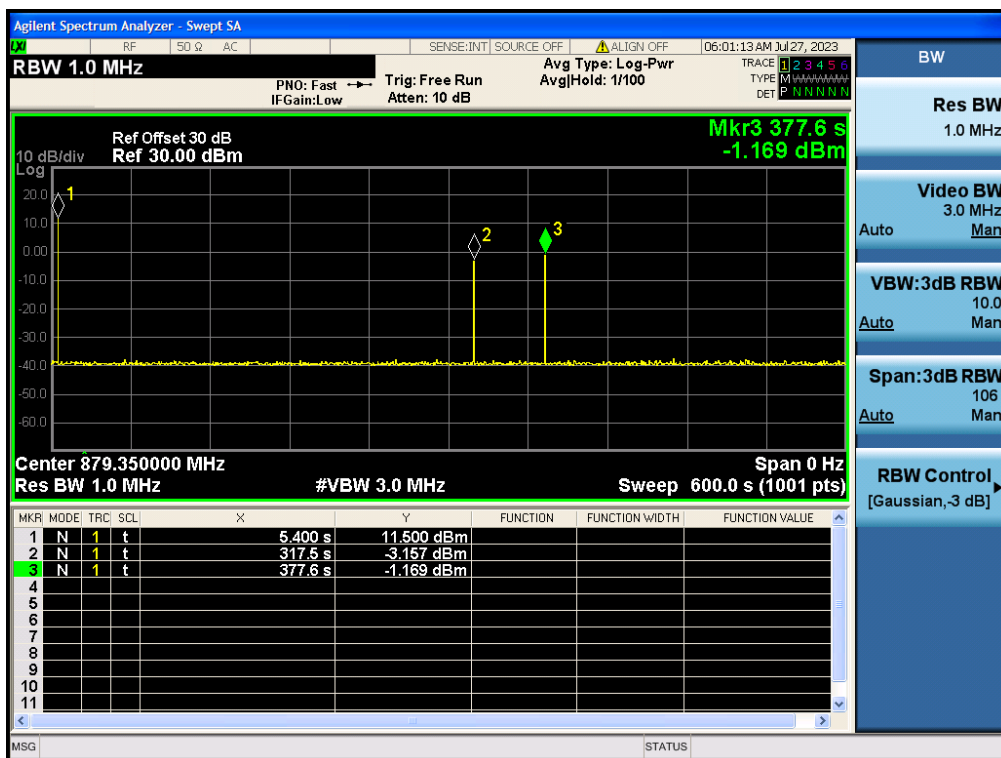


## Test Test Plots of restarting time

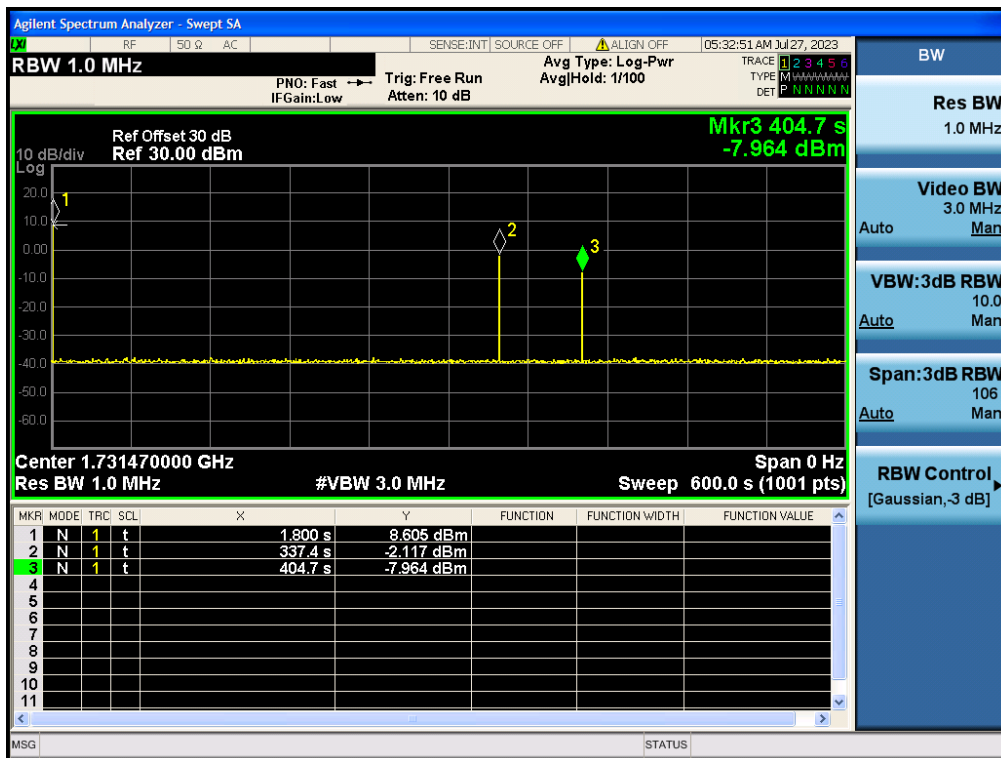
## Cellular UL



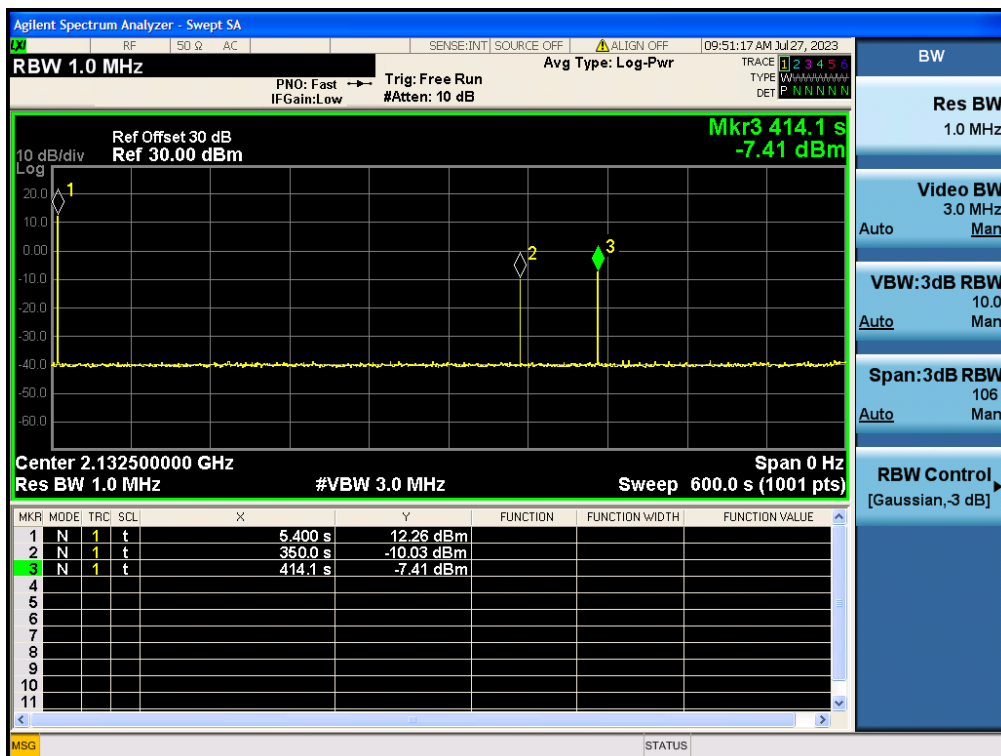
## Cellular DL



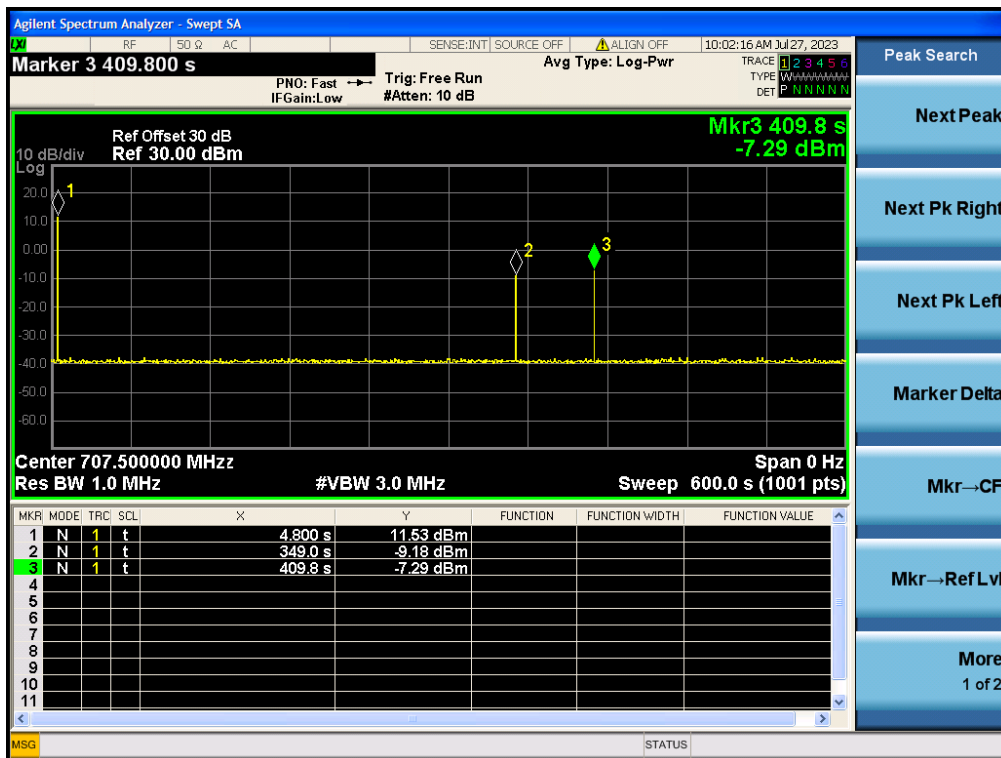
## AWS-1 UL



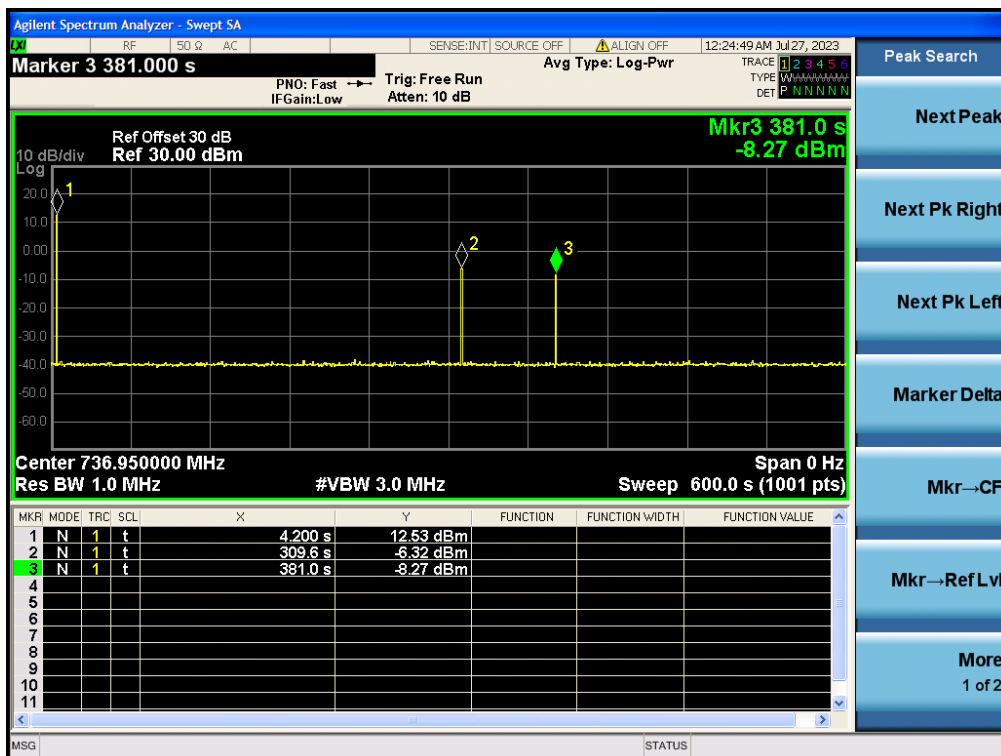
## AWS-1 DL



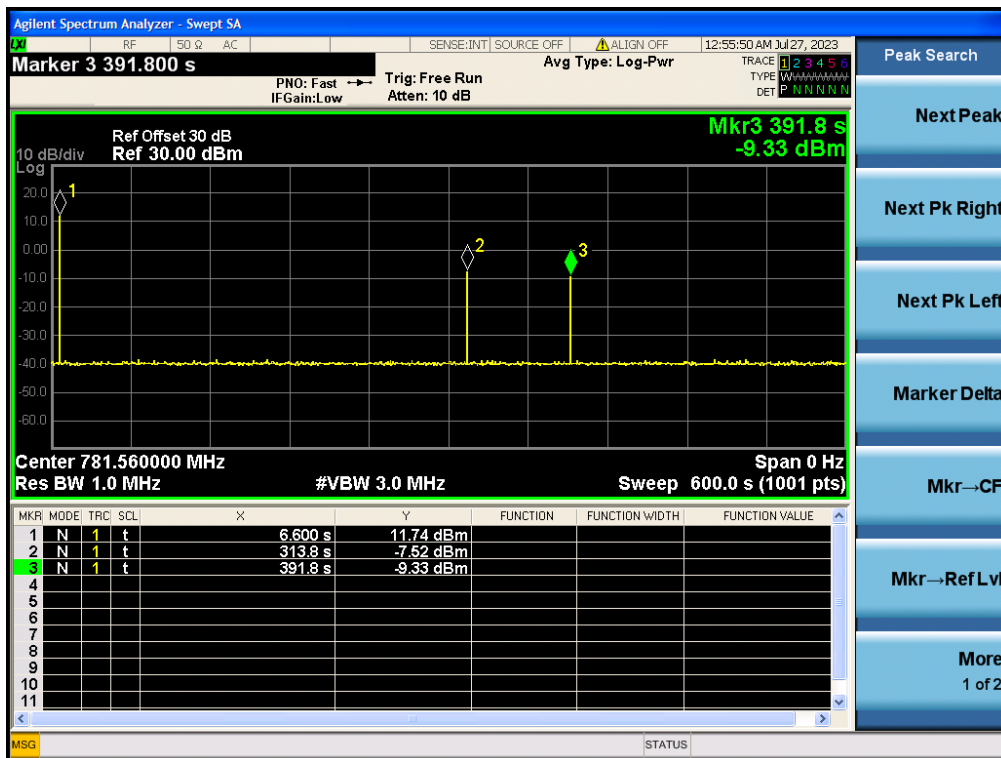
### Low A-E Blocks UL



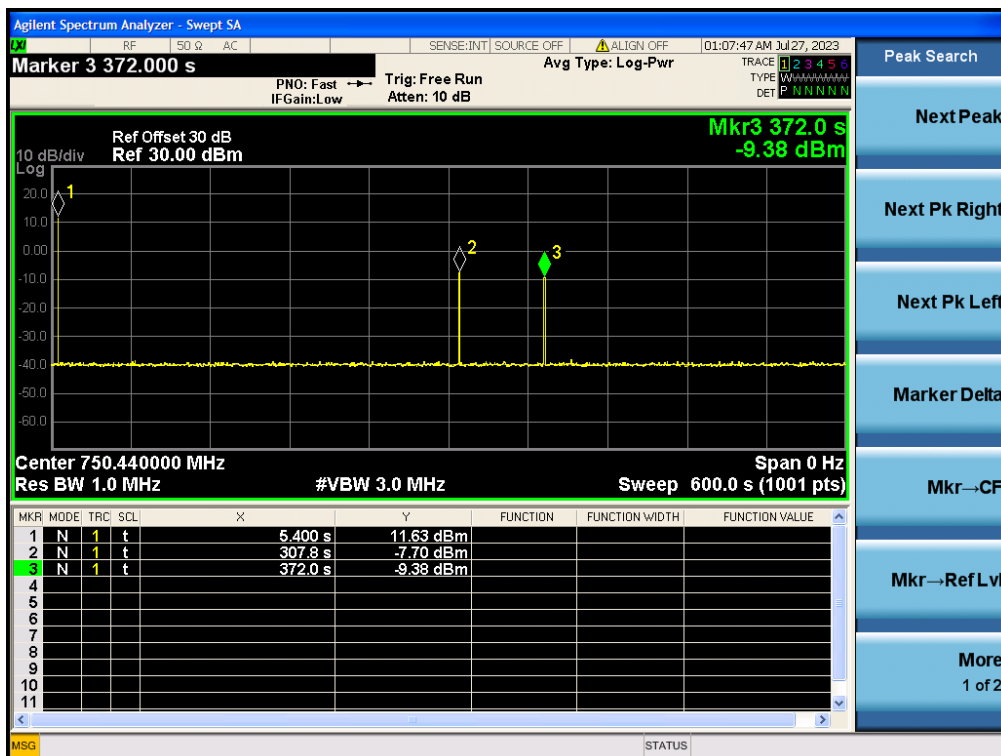
### Low A-E Blocks DL



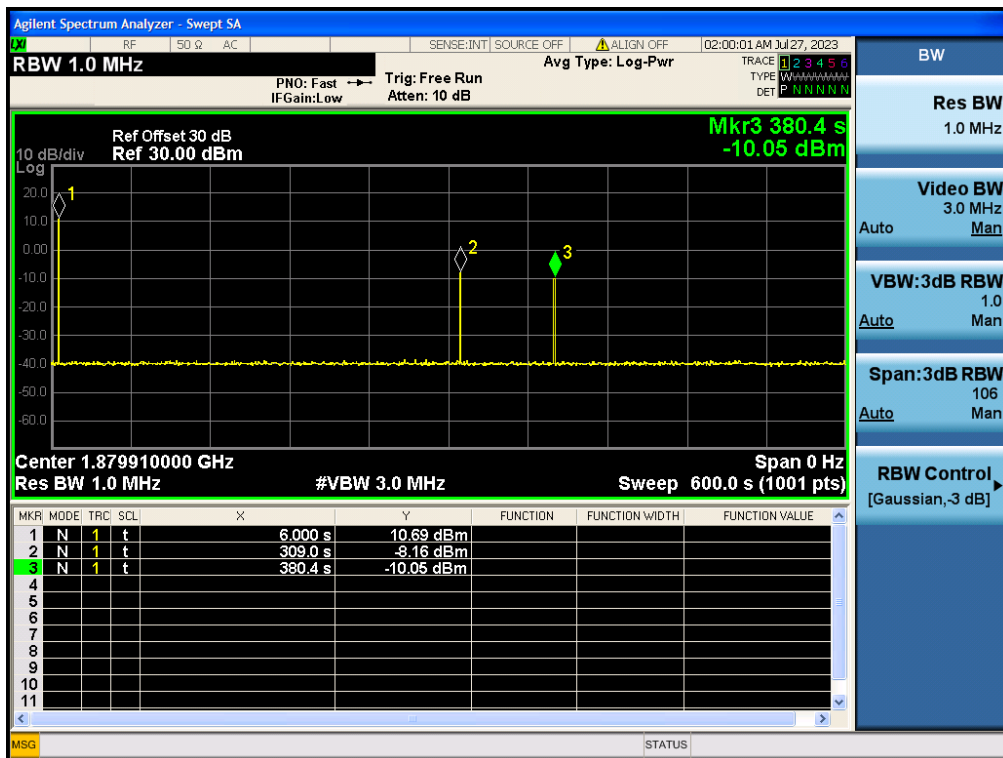
## 700 MHz Upper C Block UL



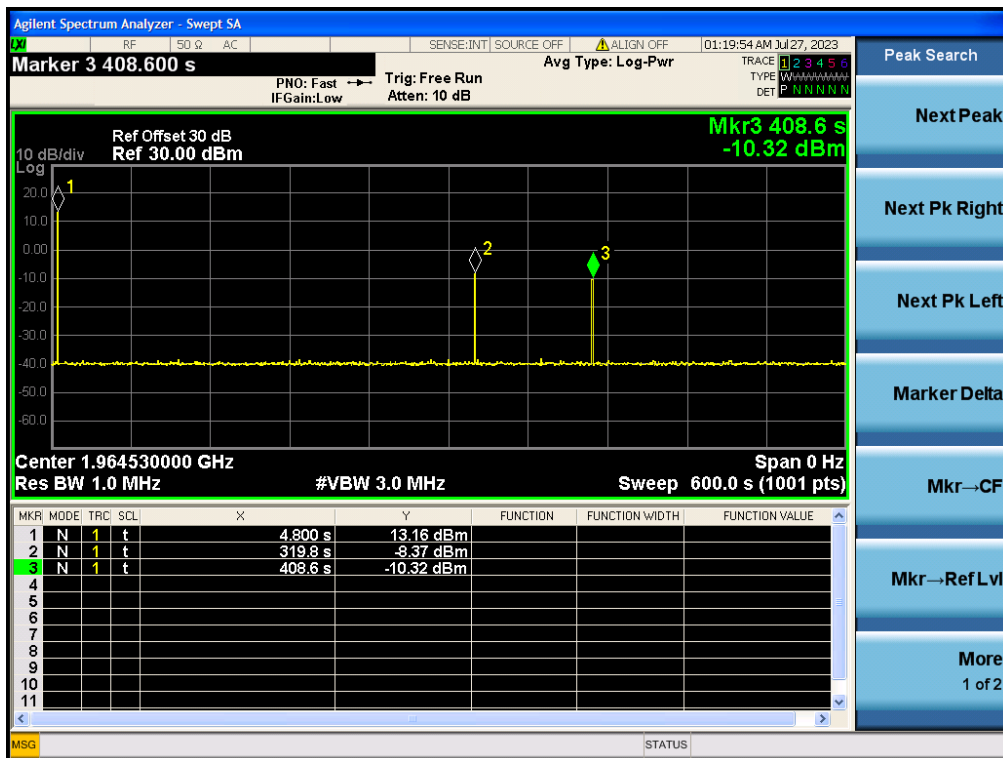
## 700 MHz Upper C Block DL



## Broadband PCS UL



## Broadband PCS DL



Test results of Mitigation or Shutdown:

| Cellular    | Uplink(824-849MHz) |        |               |        |            |       |        |
|-------------|--------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type | AWGN               |        |               |        |            |       |        |
| Isolation   | Peak Oscillations  |        | Minimal Level |        | Difference | Limit | Result |
|             | Freq.              | Level  | Freq.         | Level  |            |       |        |
| dB          | MHz                | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5          | 825.42             | -57.25 | 848.79        | -65.86 | 8.61       | <12   | PASS   |
| +4          | 825.42             | -58.17 | 848.79        | -66.44 | 8.27       | <12   | PASS   |
| +3          | 825.42             | -59.84 | 848.79        | -67.18 | 7.34       | <12   | PASS   |
| +2          | 825.42             | -60.04 | 848.79        | -68.26 | 8.22       | <12   | PASS   |
| +1          | 825.42             | -61.21 | 848.79        | -69.38 | 8.17       | <12   | PASS   |
| +0          | 825.42             | -62.36 | 848.79        | -70.24 | 7.88       | <12   | PASS   |
| -1          | 825.42             | -63.21 | 848.79        | -71.86 | 8.65       | <12   | PASS   |
| -2          | 825.42             | -64.34 | 848.79        | -72.17 | 7.83       | <12   | PASS   |
| -3          | EUT Shutdown       |        |               |        |            |       |        |

| Cellular    | Downlink(869-894MHz) |        |               |        |            |       |        |
|-------------|----------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type | AWGN                 |        |               |        |            |       |        |
| Isolation   | Peak Oscillations    |        | Minimal Level |        | Difference | Limit | Result |
|             | Freq.                | Level  | Freq.         | Level  |            |       |        |
| dB          | MHz                  | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5          | 870.93               | -57.47 | 893.17        | -66.25 | 8.78       | <12   | PASS   |
| +4          | 870.93               | -58.24 | 893.17        | -66.18 | 7.94       | <12   | PASS   |
| +3          | 870.93               | -59.04 | 893.17        | -67.29 | 8.25       | <12   | PASS   |
| +2          | 870.93               | -60.96 | 893.17        | -68.02 | 7.06       | <12   | PASS   |
| +1          | 870.93               | -61.35 | 893.17        | -69.75 | 8.4        | <12   | PASS   |
| +0          | 870.93               | -62.28 | 893.17        | -70.93 | 8.65       | <12   | PASS   |
| -1          | 870.93               | -63.14 | 893.17        | -70.04 | 6.9        | <12   | PASS   |
| -2          | EUT Shutdown         |        |               |        |            |       |        |



| Broadband PCS | Uplink(1850-1915MHz) |        |               |        |            |       |        |
|---------------|----------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type   | AWGN                 |        |               |        |            |       |        |
| Isolation     | Peak Oscillations    |        | Minimal Level |        | Difference | Limit | Result |
|               | Freq.                | Level  | Freq.         | Level  |            |       |        |
| dB            | MHz                  | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5            | 1884.78              | -58.38 | 1914.83       | -67.78 | 9.4        | <12   | PASS   |
| +4            | 1884.78              | -59.27 | 1914.83       | -68.07 | 8.8        | <12   | PASS   |
| +3            | 1884.78              | -60.75 | 1914.83       | -69.17 | 8.42       | <12   | PASS   |
| +2            | 1884.78              | -61.36 | 1914.83       | -70.86 | 9.5        | <12   | PASS   |
| +1            | 1884.78              | -62.29 | 1914.83       | -71.31 | 9.02       | <12   | PASS   |
| +0            | 1884.78              | -62.75 | 1914.83       | -72.17 | 9.42       | <12   | PASS   |
| -1            | 1884.78              | -63.34 | 1914.83       | -73.28 | 9.94       | <12   | PASS   |
| -2            | 1884.78              | -64.85 | 1914.83       | -73.86 | 9.01       | <12   | PASS   |
| -3            | EUT Shutdown         |        |               |        |            |       |        |

| Broadband PCS | Downlink(1930-1995MHz) |        |               |        |            |       |        |
|---------------|------------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type   | AWGN                   |        |               |        |            |       |        |
| Isolation     | Peak Oscillations      |        | Minimal Level |        | Difference | Limit | Result |
|               | Freq.                  | Level  | Freq.         | Level  |            |       |        |
| dB            | MHz                    | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5            | 1935.56                | -57.86 | 1953.86       | -65.75 | 7.89       | <12   | PASS   |
| +4            | 1935.56                | -58.14 | 1953.86       | -66.48 | 8.34       | <12   | PASS   |
| +3            | 1935.56                | -59.96 | 1953.86       | -67.24 | 7.28       | <12   | PASS   |
| +2            | 1935.56                | -60.75 | 1953.86       | -68.31 | 7.56       | <12   | PASS   |
| +1            | 1935.56                | -61.35 | 1953.86       | -69.47 | 8.12       | <12   | PASS   |
| +0            | 1935.56                | -62.51 | 1953.86       | -70.17 | 7.66       | <12   | PASS   |
| -1            | 1935.56                | -63.23 | 1953.86       | -70.28 | 7.05       | <12   | PASS   |
| -2            | EUT Shutdown           |        |               |        |            |       |        |

| AWS-1       | Uplink(1710-1755MHz) |        |               |        |            |       |        |
|-------------|----------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type | AWGN                 |        |               |        |            |       |        |
| Isolation   | Peak Oscillations    |        | Minimal Level |        | Difference | Limit | Result |
|             | Freq.                | Level  | Freq.         | Level  |            |       |        |
| dB          | MHz                  | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5          | 1732.93              | -59.86 | 1754.91       | -68.36 | 8.5        | <12   | PASS   |
| +4          | 1732.93              | -58.18 | 1754.91       | -68.74 | 10.56      | <12   | PASS   |
| +3          | 1732.93              | -60.38 | 1754.91       | -70.05 | 9.67       | <12   | PASS   |
| +2          | 1732.93              | -61.71 | 1754.91       | -69.27 | 7.56       | <12   | PASS   |
| +1          | 1732.93              | -62.28 | 1754.91       | -70.33 | 8.05       | <12   | PASS   |
| +0          | 1732.93              | -63.19 | 1754.91       | -71.15 | 7.96       | <12   | PASS   |
| -1          | 1732.93              | -64.53 | 1754.91       | -72.17 | 7.64       | <12   | PASS   |
| -2          | 1732.93              | -65.27 | 1754.91       | -73.05 | 7.78       | <12   | PASS   |
| -3          | EUT Shutdown         |        |               |        |            |       |        |

| AWS-1       | Downlink(2110-2155MHz) |        |               |        |            |       |        |
|-------------|------------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type | AWGN                   |        |               |        |            |       |        |
| Isolation   | Peak Oscillations      |        | Minimal Level |        | Difference | Limit | Result |
|             | Freq.                  | Level  | Freq.         | Level  |            |       |        |
| dB          | MHz                    | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5          | 2112.25                | -58.47 | 2154.83       | -68.26 | 9.79       | <12   | PASS   |
| +4          | 2112.25                | -59.32 | 2154.83       | -68.26 | 8.94       | <12   | PASS   |
| +3          | 2112.25                | -60.01 | 2154.83       | -67.01 | 7          | <12   | PASS   |
| +2          | 2112.25                | -60.47 | 2154.83       | -68.36 | 7.89       | <12   | PASS   |
| +1          | 2112.25                | -61.29 | 2154.83       | -70.75 | 9.46       | <12   | PASS   |
| +0          | 2112.25                | -61.04 | 2154.83       | -70.18 | 9.14       | <12   | PASS   |
| -1          | 2112.25                | -62.38 | 2154.83       | -71.52 | 9.14       | <12   | PASS   |
| -2          | EUT Shutdown           |        |               |        |            |       |        |

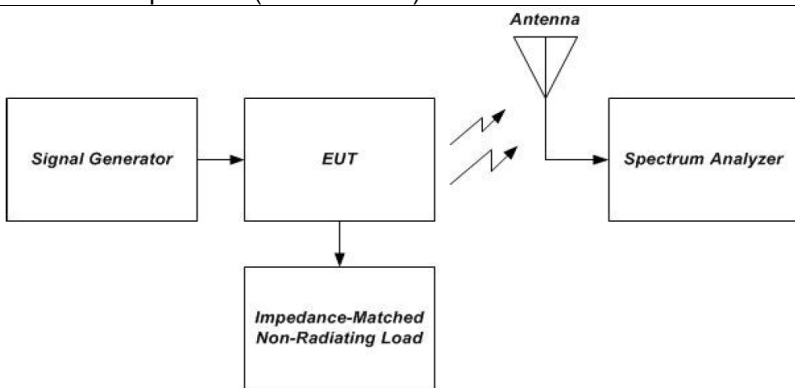
| Low A-E Blocks | Uplink(699-716MHz) |        |               |        |            |       |        |
|----------------|--------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type    | AWGN               |        |               |        |            |       |        |
| Isolation      | Peak Oscillations  |        | Minimal Level |        | Difference | Limit | Result |
|                | Freq.              | Level  | Freq.         | Level  |            |       |        |
| dB             | MHz                | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5             | 701.28             | -59.08 | 715.41        | -68.28 | 9.2        | <12   | PASS   |
| +4             | 701.28             | -60.14 | 715.41        | -69.47 | 9.33       | <12   | PASS   |
| +3             | 701.28             | -61.85 | 715.41        | -70.36 | 8.51       | <12   | PASS   |
| +2             | 701.28             | -62.73 | 715.41        | -71.75 | 9.02       | <12   | PASS   |
| +1             | 701.28             | -63.29 | 715.41        | -72.34 | 9.05       | <12   | PASS   |
| +0             | 701.28             | -62.31 | 715.41        | -72.05 | 9.74       | <12   | PASS   |
| -1             | 701.28             | -63.48 | 715.41        | -73.28 | 9.8        | <12   | PASS   |
| -2             | 701.28             | -64.31 | 715.41        | -73.19 | 8.88       | <12   | PASS   |
| -3             | EUT Shutdown       |        |               |        |            |       |        |

| Low A-E Blocks | Downlink(729-746MHz) |        |               |        |            |       |        |
|----------------|----------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type    | AWGN                 |        |               |        |            |       |        |
| Isolation      | Peak Oscillations    |        | Minimal Level |        | Difference | Limit | Result |
|                | Freq.                | Level  | Freq.         | Level  |            |       |        |
| dB             | MHz                  | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5             | 730.24               | -60.05 | 745.85        | -66.47 | 6.42       | <12   | PASS   |
| +4             | 730.24               | -61.17 | 745.85        | -67.01 | 5.84       | <12   | PASS   |
| +3             | 730.24               | -62.29 | 745.85        | -68.63 | 6.34       | <12   | PASS   |
| +2             | 730.24               | -63.05 | 745.85        | -68.17 | 5.12       | <12   | PASS   |
| +1             | 730.24               | -64.36 | 745.85        | -69.28 | 4.92       | <12   | PASS   |
| +0             | 730.24               | -64.47 | 745.85        | -69.43 | 4.96       | <12   | PASS   |
| -1             | 730.24               | -65.25 | 745.85        | -70.01 | 4.76       | <12   | PASS   |
| -2             | 730.24               | -65.01 | 745.85        | -71.39 | 6.38       | <12   | PASS   |
| -3             | EUT Shutdown         |        |               |        |            |       |        |

| 700 MHz<br>Upper C<br>Block | Uplink(777-787MHz) |        |               |        |            |       |        |
|-----------------------------|--------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type                 | AWGN               |        |               |        |            |       |        |
| Isolation                   | Peak Oscillations  |        | Minimal Level |        | Difference | Limit | Result |
|                             | Freq.              | Level  | Freq.         | Level  |            |       |        |
| dB                          | MHz                | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5                          | 778.86             | -57.02 | 786.24        | -65.78 | 8.76       | <12   | PASS   |
| +4                          | 778.86             | -58.14 | 786.24        | -66.01 | 7.87       | <12   | PASS   |
| +3                          | 778.86             | -60.31 | 786.24        | -68.42 | 8.11       | <12   | PASS   |
| +2                          | 778.86             | -61.28 | 786.24        | -69.01 | 7.73       | <12   | PASS   |
| +1                          | 778.86             | -62.71 | 786.24        | -70.36 | 7.65       | <12   | PASS   |
| +0                          | 778.86             | -63.18 | 786.24        | -71.27 | 8.09       | <12   | PASS   |
| -1                          | 778.86             | -64.03 | 786.24        | -71.18 | 7.15       | <12   | PASS   |
| -2                          | 778.86             | -65.08 | 786.24        | -72.28 | 7.2        | <12   | PASS   |
| -3                          | EUT Shutdown       |        |               |        |            |       |        |

| 700 MHz<br>Upper C<br>Block | Downlink(746-756MHz) |        |               |        |            |       |        |
|-----------------------------|----------------------|--------|---------------|--------|------------|-------|--------|
| Signal Type                 | AWGN                 |        |               |        |            |       |        |
| Isolation                   | Peak Oscillations    |        | Minimal Level |        | Difference | Limit | Result |
|                             | Freq.                | Level  | Freq.         | Level  |            |       |        |
| dB                          | MHz                  | dBm    | MHz           | dBm    | dB         | dB    | PASS   |
| +5                          | 746.86               | -59.02 | 755.76        | -66.83 | 7.81       | <12   | PASS   |
| +4                          | 746.86               | -60.34 | 755.76        | -68.14 | 7.8        | <12   | PASS   |
| +3                          | 746.86               | -60.24 | 755.76        | -68.02 | 7.78       | <12   | PASS   |
| +2                          | 746.86               | -61.43 | 755.76        | -67.14 | 5.71       | <12   | PASS   |
| +1                          | 746.86               | -62.47 | 755.76        | -68.83 | 6.36       | <12   | PASS   |
| +0                          | 746.86               | -63.29 | 755.76        | -69.25 | 5.96       | <12   | PASS   |
| -1                          | 746.86               | -63.43 | 755.76        | -70.43 | 7          | <12   | PASS   |
| -2                          | 746.86               | -63.51 | 755.76        | -70.34 | 6.83       | <12   | PASS   |
| -3                          | EUT Shutdown         |        |               |        |            |       |        |

## 5.12 Radiated Spurious Emissions

|                   |  |
|-------------------|--|
| Test Requirement: | This procedure is intended to satisfy the requirements specified in §2.1053. The applicable limits are those specified for mobile emissions in the rule part applicable to the band of operation (see Annex A).  |
| Test setup:       |  <p style="text-align: center;">Figure 10 – Radiated spurious emissions test and instrumentation setup</p>   |
| Procedure:        | <ol style="list-style-type: none"> <li>Place the EUT on an OATS or Anechoic chamber turntable 3m from the receiving antenna.</li> <li>Connect the EUT to the test equipment as shown in Figure 9 beginning with the uplink output</li> <li>Set the signal generator for the center frequency of the operational band under test with the power level set at PIN from section 7.2 with CW signal.</li> <li>Measure the radiated spurious emissions from the EUT from lowest to the highest frequencies as specified in §2.1057. Maximize the radiated emissions by utilizing the procedures described in C63.4.</li> <li>Capture the peak emissions plots using a peak detector with max-Hold for inclusion in the test report. Tabular data is acceptable in lieu of spectrum analyzer plots.</li> <li>Repeat steps 7.12.3 to 7.12.5 for all operational bands.</li> </ol> |

### 5.12.1 E.U.T. Operation:

|                        |                |
|------------------------|----------------|
| Operating Environment: |                |
| Temperature:           | –30 °C and +50 |
| Humidity:              | 46.3 %         |
| Atmospheric Pressure:  | 1010 mbar      |

### 5.12.2 Test Data:

| Frequency [MHz]   | Antenna<br>polarity [H/V] | Level [dBm] | Limit [dBm] | Margin [dB] |
|-------------------|---------------------------|-------------|-------------|-------------|
| Cellular Uplink   |                           |             |             |             |
| 861.6             | V                         | -38.64      | -13.00      | 25.64       |
| 861.6             | H                         | -39.89      |             | 26.89       |
| 1768.0            | V                         | -38.07      |             | 25.07       |
| 1768.0            | H                         | -40.25      |             | 27.25       |
| -                 | -                         | -           | -           | -           |
| Cellular Downlink |                           |             |             |             |
| 880.2             | V                         | -48.86      | -13.00      | 35.86       |
| 880.2             | H                         | -49.48      |             | 36.48       |
| 1726.0            | V                         | -48.76      |             | 35.76       |
| 1726.0            | H                         | -49.08      |             | 36.08       |
| -                 | -                         | -           | -           | -           |

| Frequency [MHz]        | Antenna<br>polarity [H/V] | Level [dBm] | Limit [dBm] | Margin [dB] |
|------------------------|---------------------------|-------------|-------------|-------------|
| Broadband PCS Uplink   |                           |             |             |             |
| 948.2                  | V                         | -38.75      | -13.00      | 25.75       |
| 948.2                  | H                         | -40.81      |             | 27.81       |
| 3771.0                 | V                         | -39.83      |             | 26.83       |
| 3771.0                 | H                         | -37.29      |             | 24.29       |
| -                      | -                         | -           | -           | -           |
| Broadband PCS Downlink |                           |             |             |             |
| 979.3                  | V                         | -48.75      | -13.00      | 35.75       |
| 979.3                  | H                         | -49.04      |             | 36.04       |
| 3975.5                 | V                         | -51.38      |             | 38.38       |
| 3975.5                 | H                         | -50.21      |             | 37.21       |

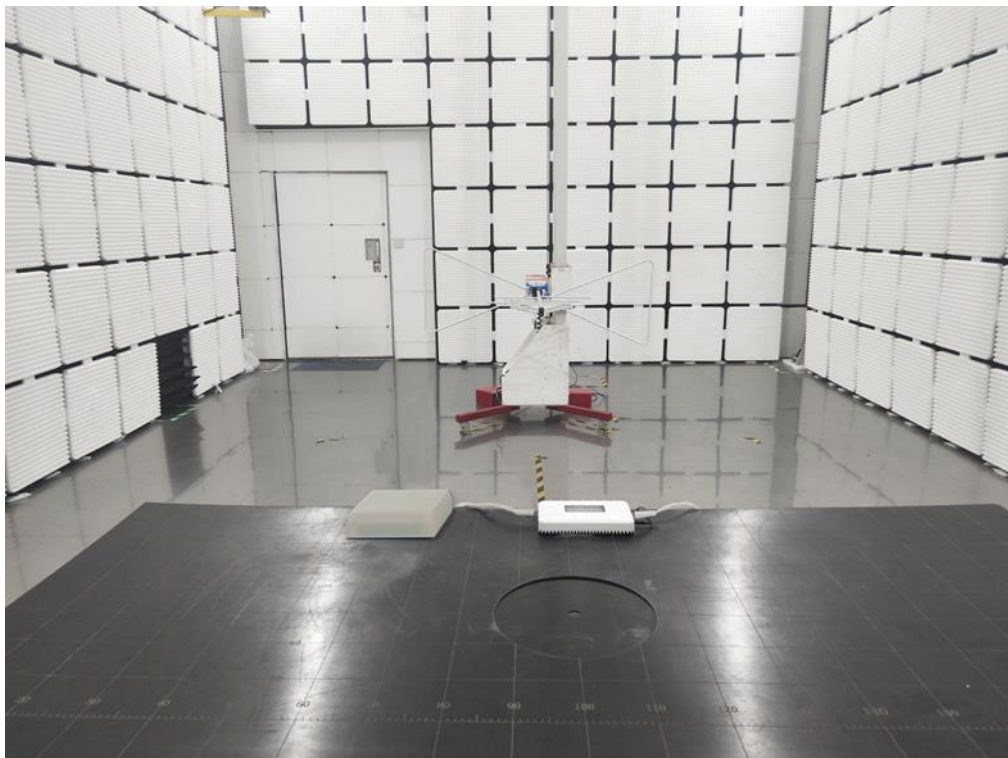
| Frequency [MHz] | Antenna<br>polarity [H/V] | Level [dBm] | Limit [dBm] | Margin [dB] |
|-----------------|---------------------------|-------------|-------------|-------------|
| AWS-1 Uplink    |                           |             |             |             |
| 860.7           | V                         | -45.75      | -13.00      | 32.75       |
| 860.7           | H                         | -43.35      |             | 30.35       |
| 2547.3          | V                         | -42.01      |             | 29.01       |
| 2547.3          | H                         | -43.76      |             | 30.76       |
| -               | -                         | -           | -           | -           |
| AWS-1 Downlink  |                           |             |             |             |
| 926.7           | V                         | -49.42      | -13.00      | 36.42       |
| 926.7           | H                         | -50.86      |             | 37.86       |
| 3885.6          | V                         | -49.27      |             | 36.27       |
| 3885.6          | H                         | -50.27      |             | 37.27       |
| -               | -                         | -           | -           | -           |

| Frequency [MHz]         | Antenna<br>polarity [H/V] | Level [dBm] | Limit [dBm] | Margin [dB] |
|-------------------------|---------------------------|-------------|-------------|-------------|
| Low A-E Blocks Uplink   |                           |             |             |             |
| 978.3                   | V                         | -39.76      | -13.00      | 26.76       |
| 978.3                   | H                         | -41.09      |             | 28.09       |
| 1687.7                  | V                         | -40.78      |             | 27.78       |
| 1687.7                  | H                         | -39.27      |             | 26.27       |
| -                       | -                         | -           | -           | -           |
| Low A-E Blocks Downlink |                           |             |             |             |
| 974.1                   | V                         | -50.76      | -13.00      | 37.76       |
| 974.1                   | H                         | -49.31      |             | 36.31       |
| 1878.7                  | V                         | -49.28      |             | 36.28       |
| 1878.7                  | H                         | -51.47      |             | 38.47       |
| -                       | -                         | -           | -           | -           |

| Frequency [MHz]                | Antenna<br>polarity [H/V] | Level [dBm] | Limit [dBm] | Margin [dB] |
|--------------------------------|---------------------------|-------------|-------------|-------------|
| 700 MHz Upper C Block Uplink   |                           |             |             |             |
| 968.1                          | V                         | -45.76      | -13.00      | 32.76       |
| 968.1                          | H                         | -43.08      |             | 30.08       |
| 1886.4                         | V                         | -43.28      |             | 30.28       |
| 1886.4                         | H                         | -42.14      |             | 29.14       |
| -                              | -                         | -           | -           | -           |
| 700 MHz Upper C Block Downlink |                           |             |             |             |
| 947.1                          | V                         | -47.86      | -13.00      | 34.86       |
| 947.1                          | H                         | -49.24      |             | 36.24       |
| 1885.2                         | V                         | -49.05      |             | 36.05       |
| 1885.2                         | H                         | -50.18      |             | 37.18       |
| -                              | -                         | -           | -           | -           |



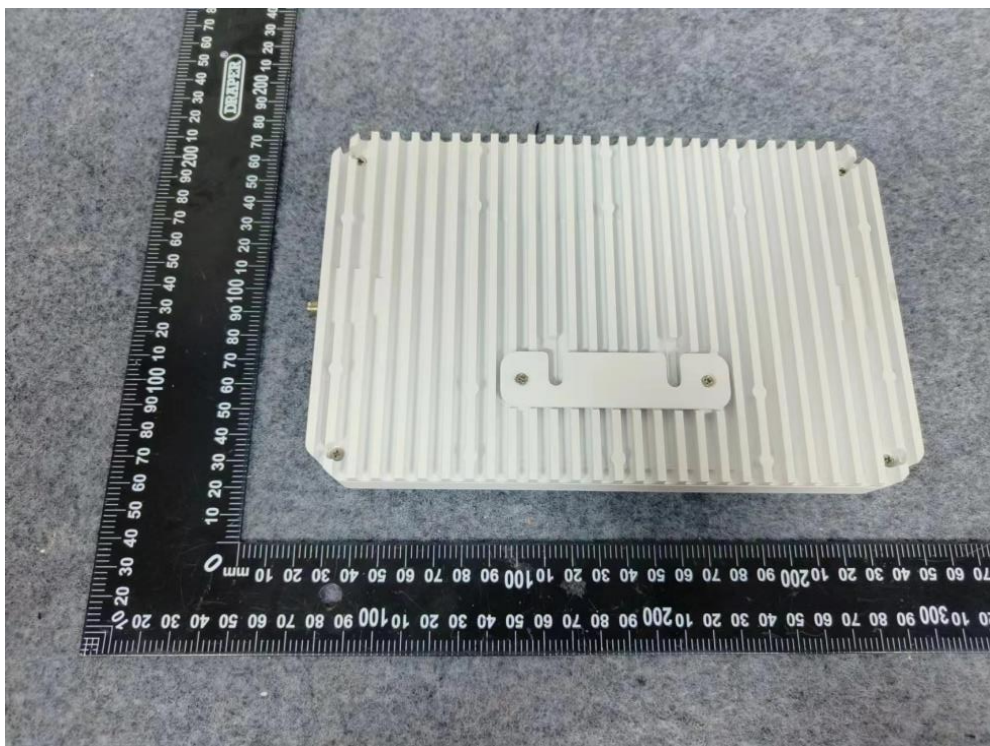
## 6 Test Setup Photos

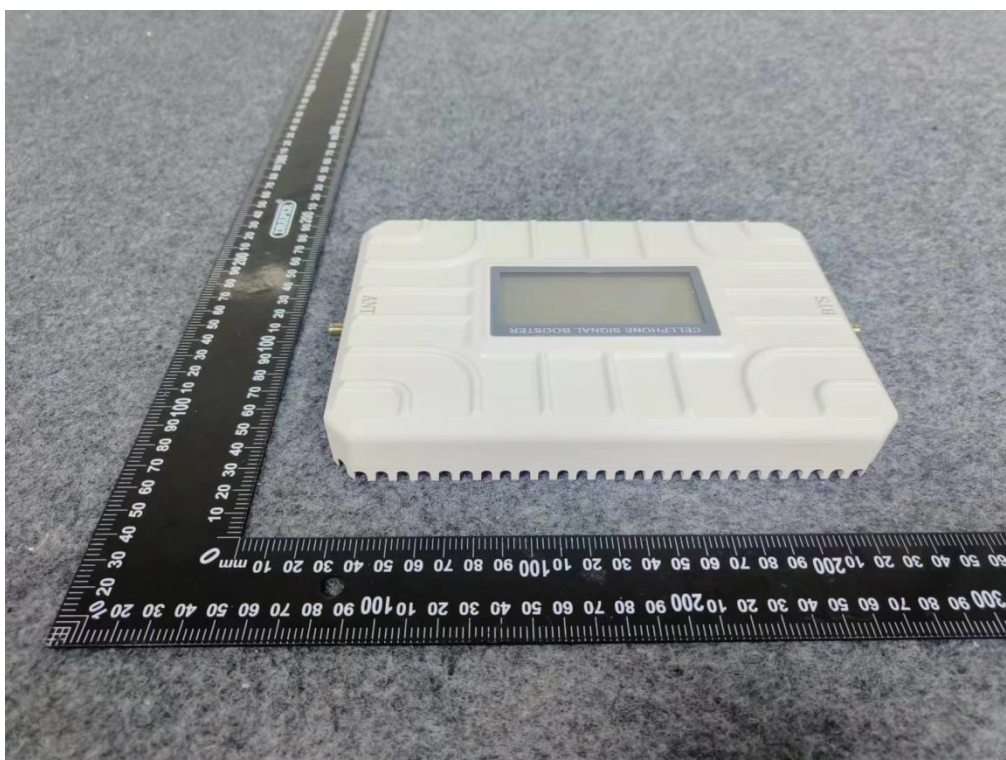


## 7 EUT Photos





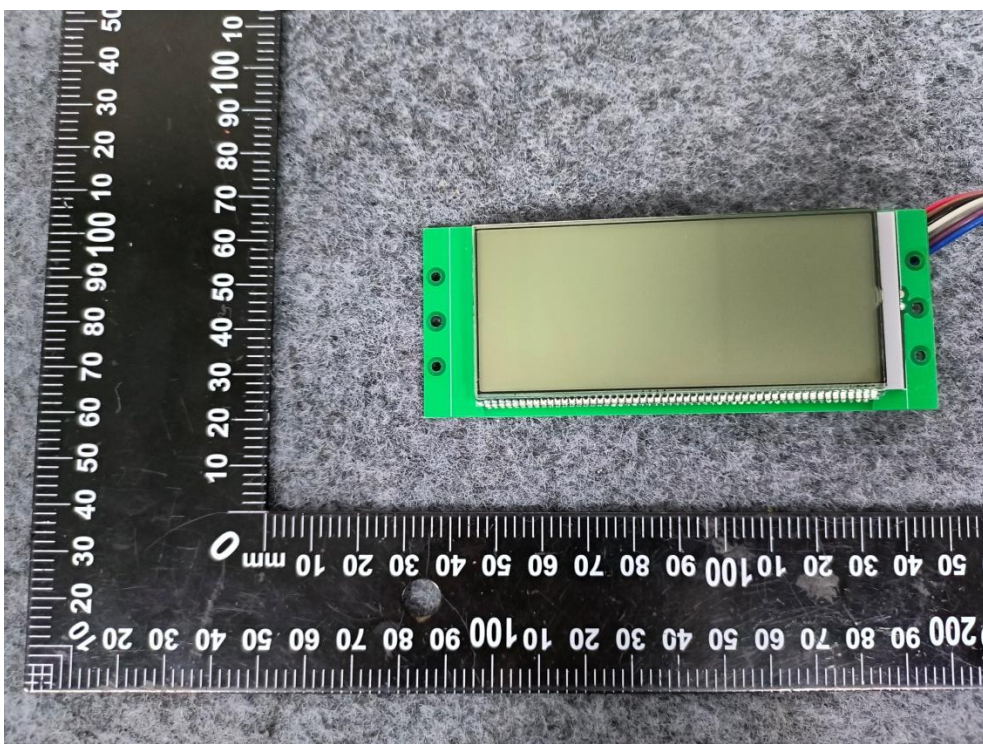
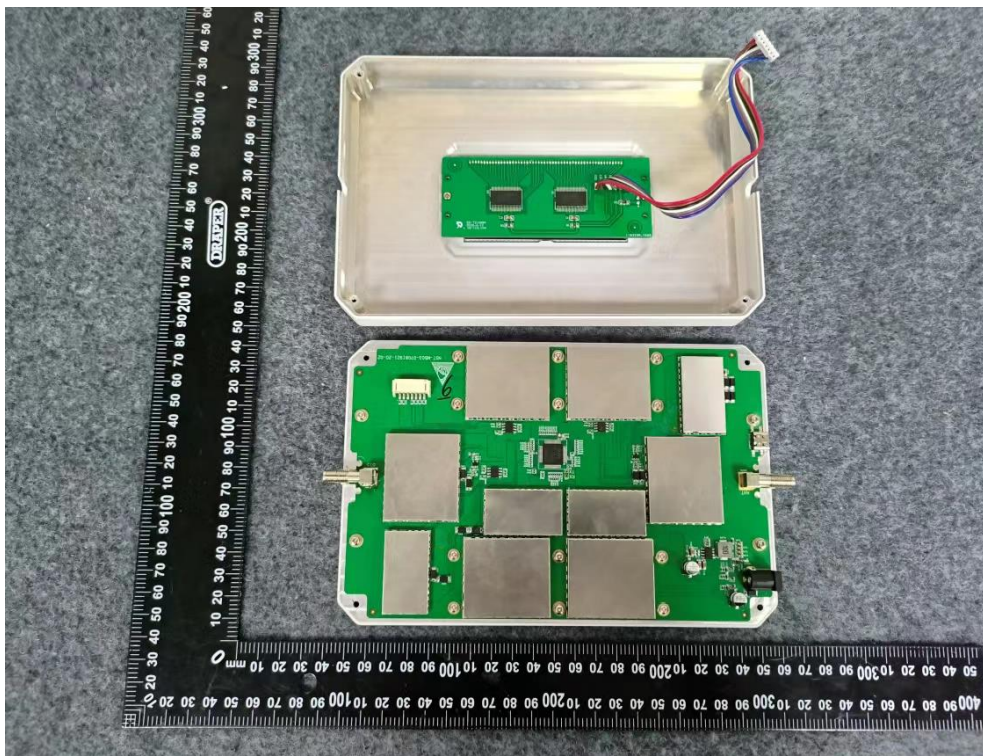




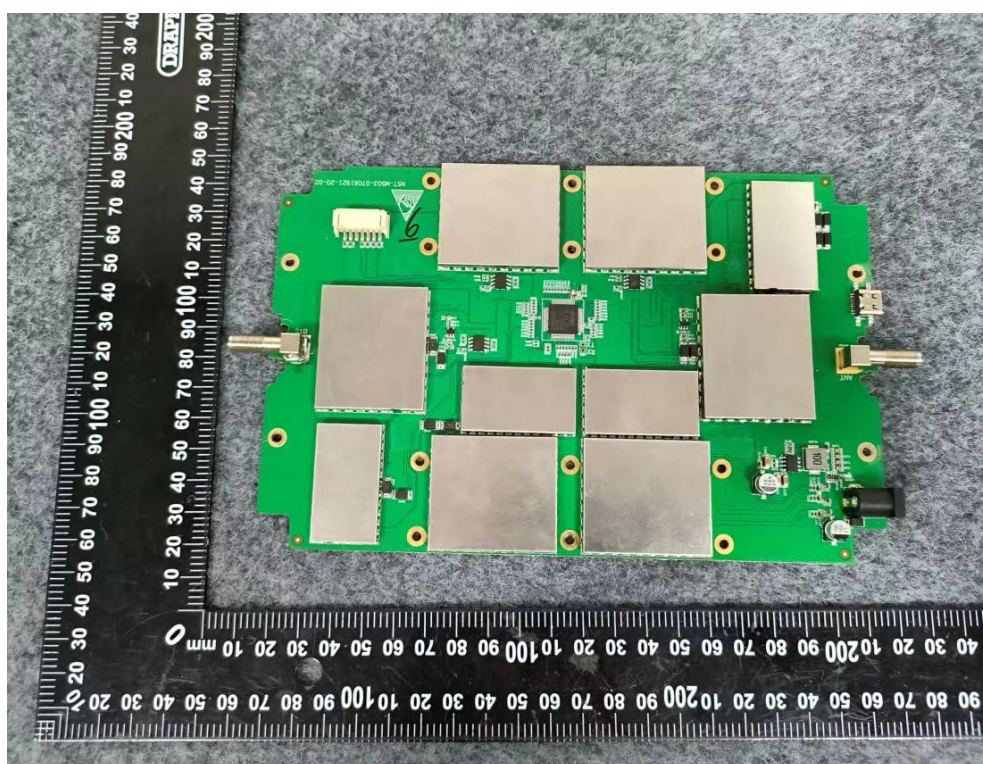
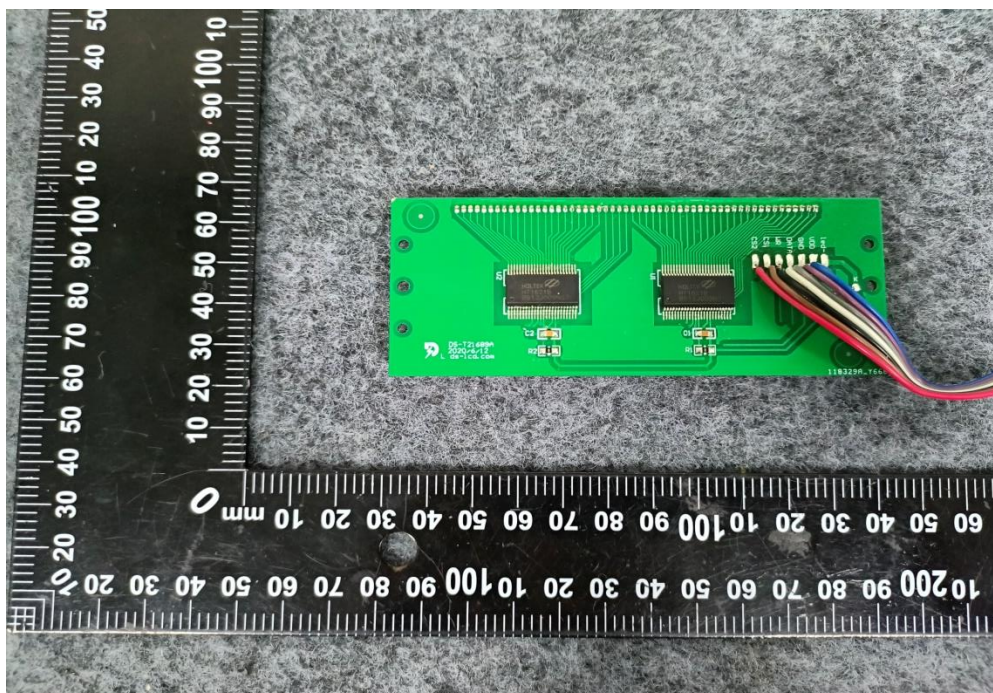




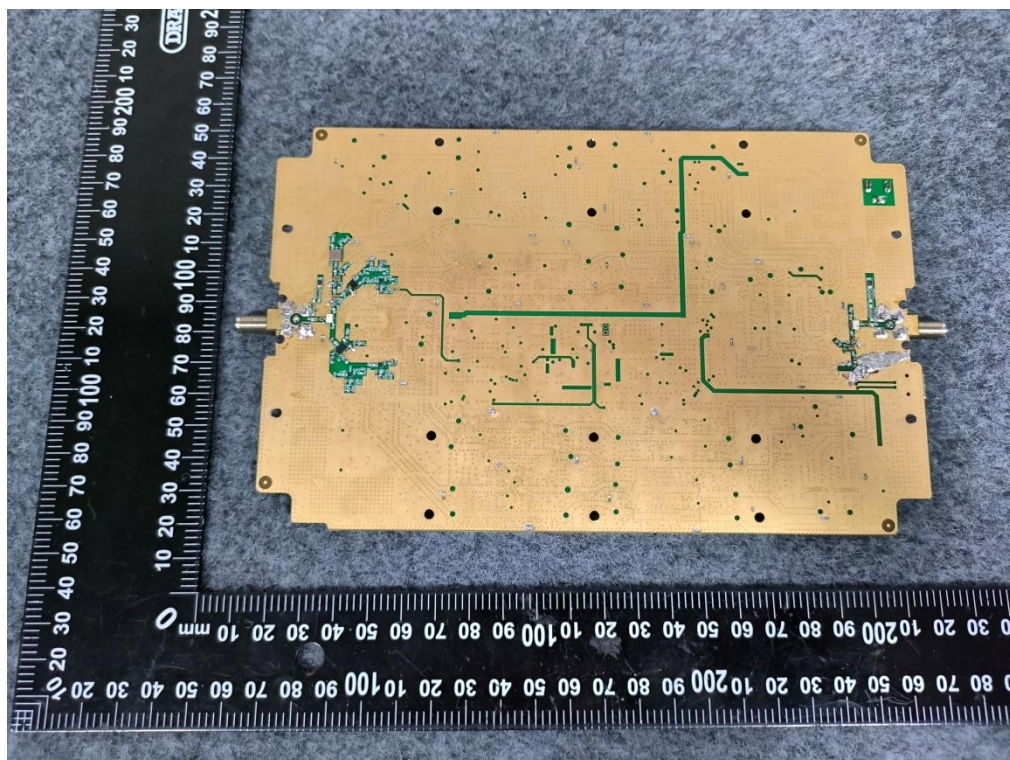
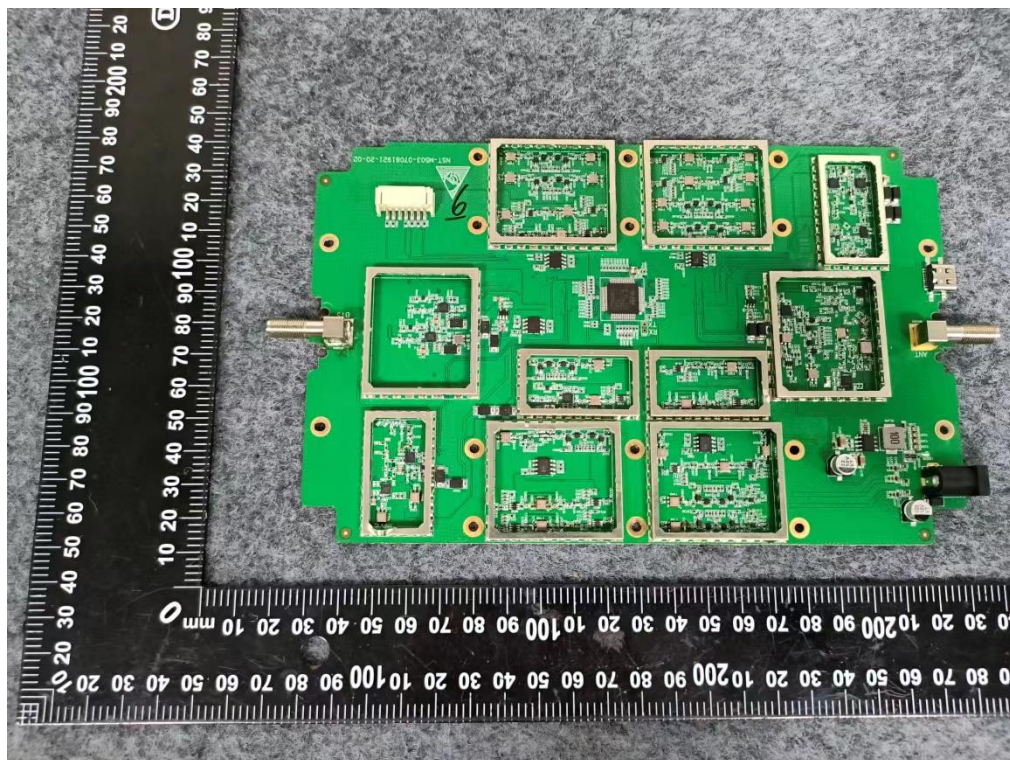
















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