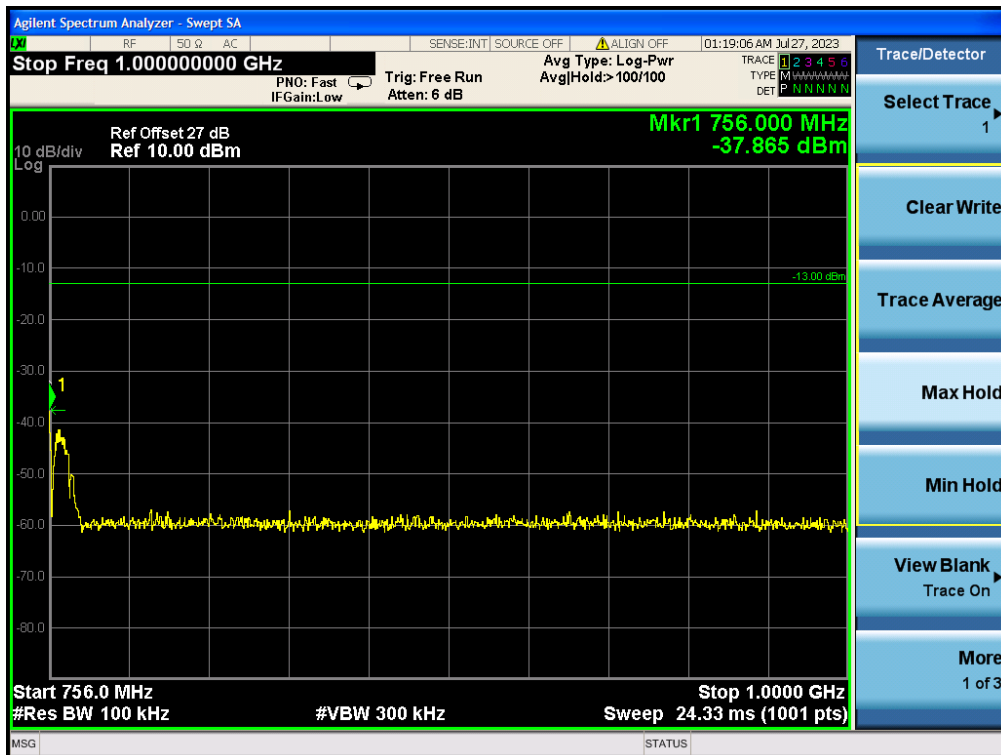
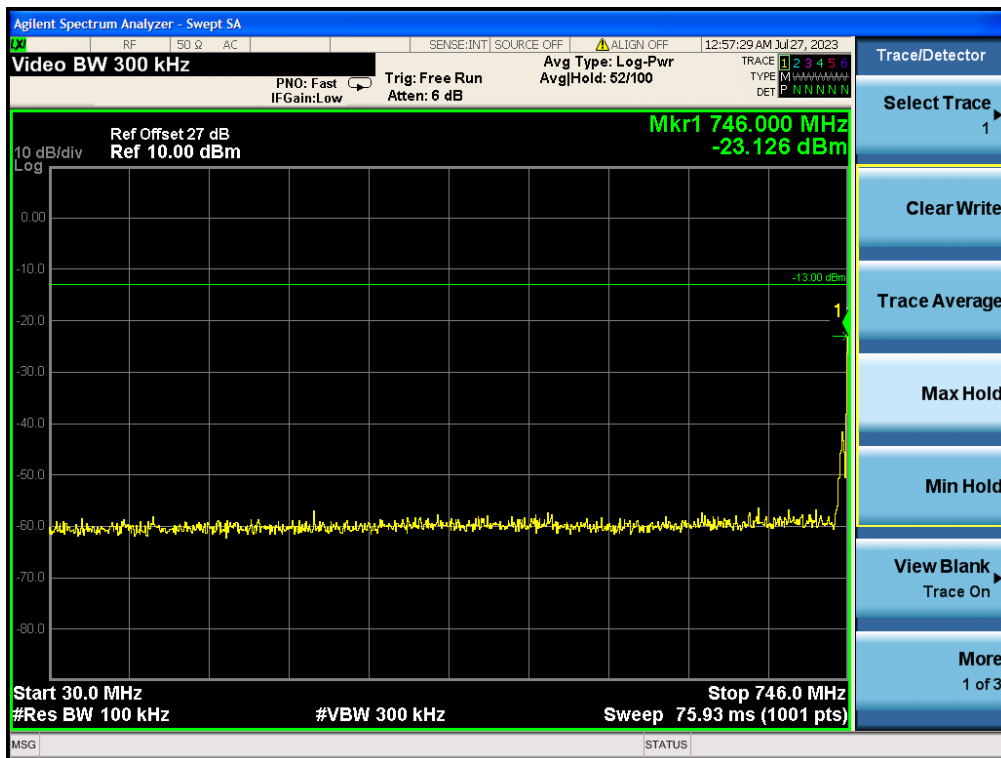
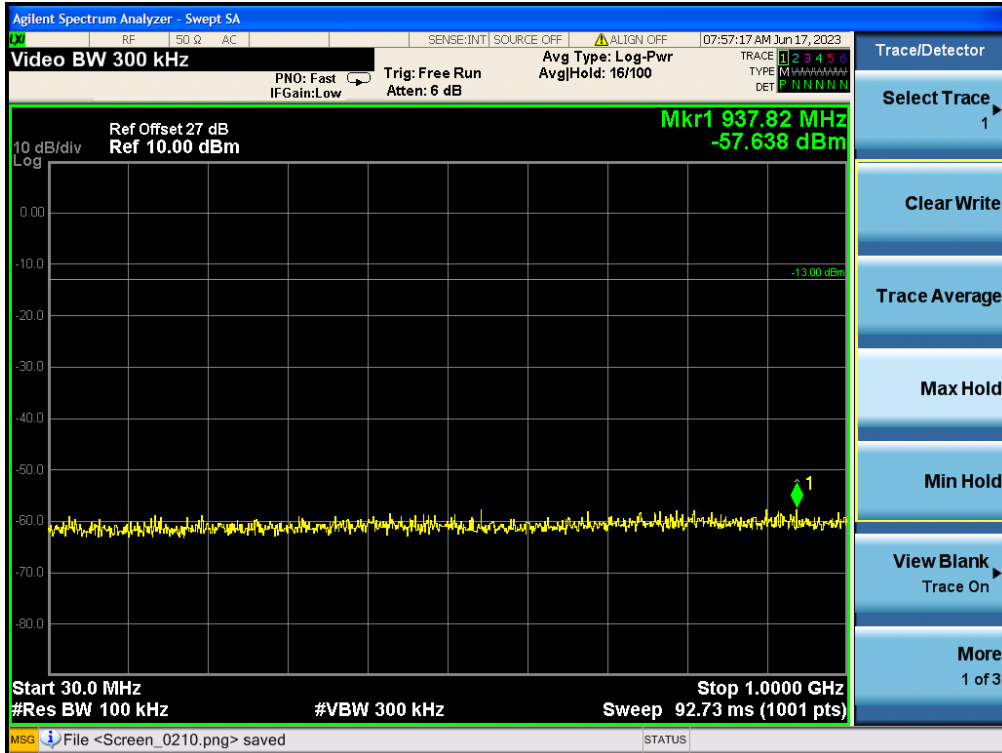


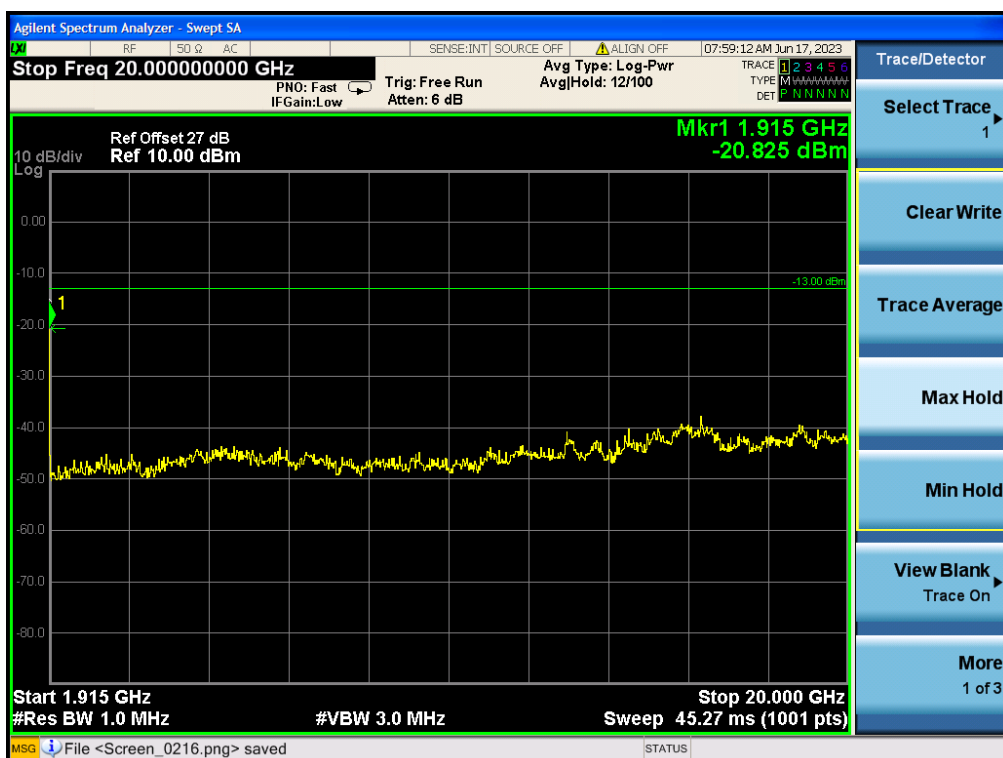
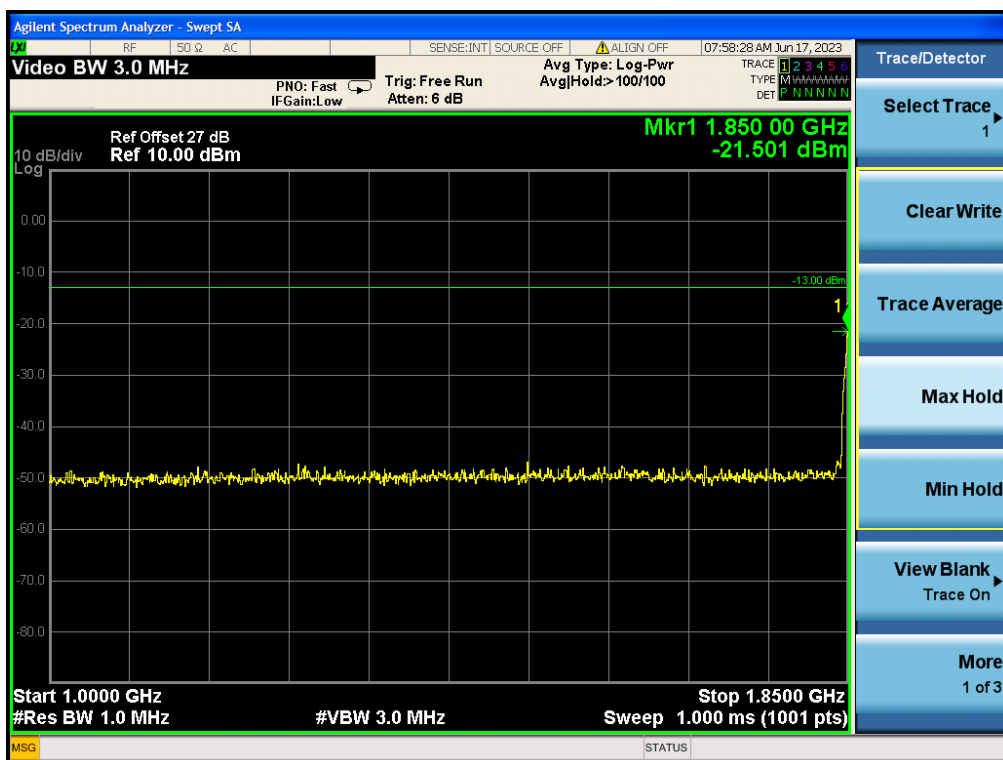
## 700 MHz Upper C Block Downlink



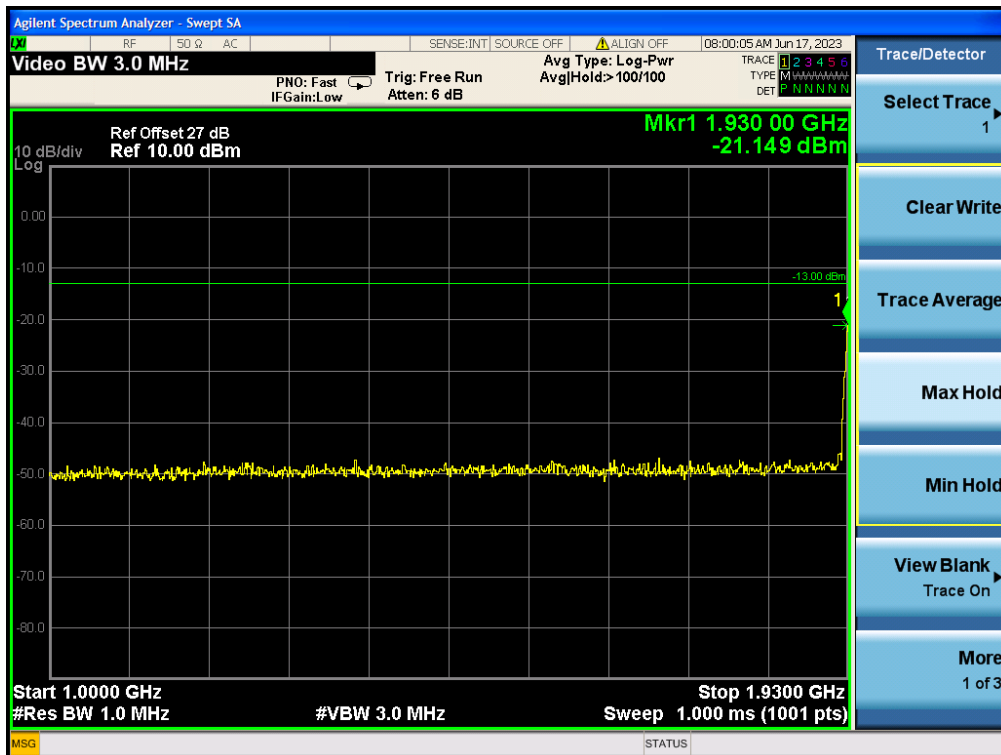
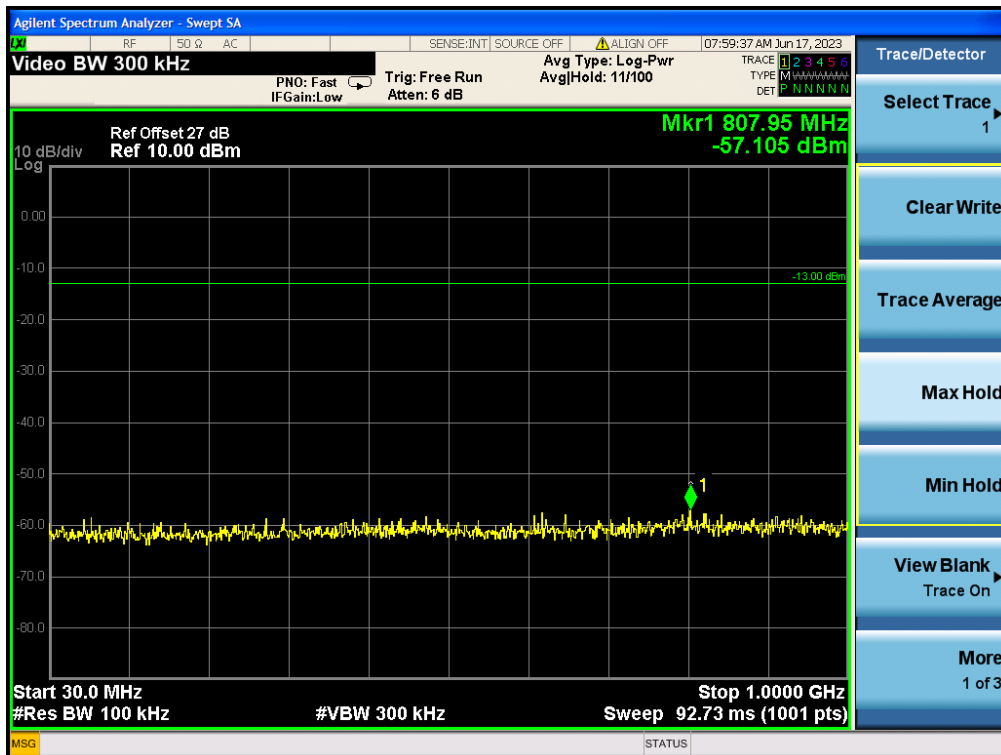


Broadband PCS Uplink



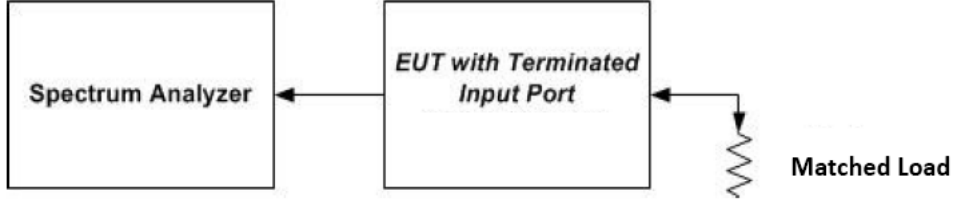
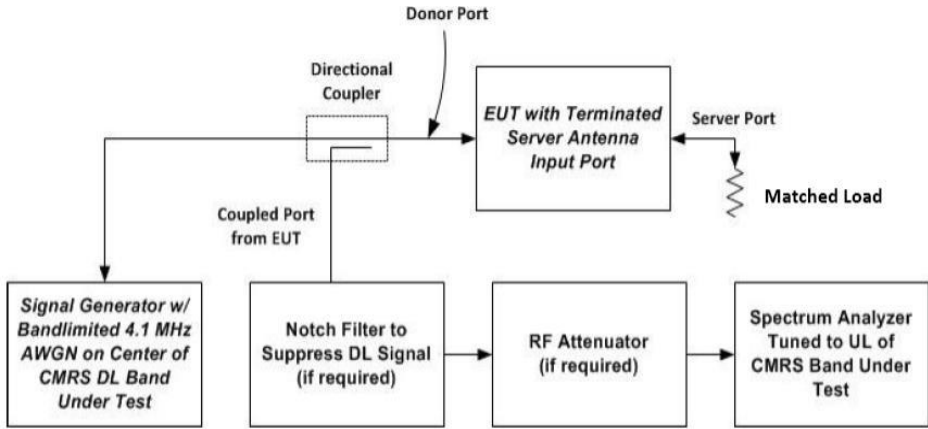


### Broadband PCS Downlink





## 5.7 Noise Limits

Test Requirement:	This procedure provides a measurement methodology for demonstrating compliance to the noise limits specified in §20.21(e)(8)(i)(A) for Wideband Consumer Signal Boosters.
Limit:	not exceed $-103 \text{ dBm/MHz}$ —RSSI. not exceed $-102.5 \text{ dBm/MHz} + 20 \log (F)$ , where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.
Test Setup:	 <p style="text-align: center;"><b>Figure 3 – Noise limit test setup (also used for 7.8)</b></p>  <p style="text-align: center;"><b>Figure 4 – Test setup for uplink noise power measurement in the presence of a downlink signal</b></p>
Procedure:	<ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Figure 3. Begin with the uplink output connected to the spectrum analyzer.</li> <li>Set the spectrum analyzer RBW to 1 MHz with the VBW <math>\geq 3X</math> RBW</li> <li>Select the power averaging (RMS) detector and trace average over at least 100 traces.</li> <li>Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with the span <math>\geq 2X</math> the CMRS band.</li> <li>Measure the maximum Transmitter Noise Power Level.</li> <li>Save the spectrum analyzer plot as necessary for inclusion in the final test report.</li> <li>Repeat steps 7.7.2 to 7.7.6 for all operational uplink and downlink bands.</li> <li>Connect the EUT to the test equipment as shown in Figure 4 for uplink and Figure 5 for downlink. Ensure the coupled path of the RF coupler is connected to the spectrum analyzer.</li> <li>Configure the signal generator for 4.1 MHz AWGN operation for uplink test and 200 kHz 99% OBW AWGN for downlink test.</li> <li>Set the spectrum analyzer RBW for 1 MHz with the VBW <math>\geq 3X</math> the RBW with an</li> </ol>

	<p>RMS AVERAGE detector with at least 100 trace averages.</p> <p>k) Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with the span <math>\geq 2X</math> the CMRS band. This shall include all spectrum blocks in the particular CMRS band under test (see Annex A). For uplink noise measurements, set the spectrum analyzer center frequency for the uplink band under test and tune the signal generator to the center of the paired downlink band. For downlink noise measurements, set the spectrum analyzer to the center of the downlink band and tune the signal generator to the upper or lower band-edge of the same band, ensuring that the maximum noise power is being measured.</p> <p>l) Measure the maximum Transmitter Noise Power Level when varying the downlink signal generator level from -90 to -10 dBm in 1 dB steps inside the RSSI dependent region and 10 dB steps outside the RSSI dependent region, report the six values closest to the limit with at least 2 points within the RSSI dependent region of the limit.</p> <p>m) Repeat 7.7.7 through 7.7.11 for all operational uplink and downlink bands.</p> <p>n) Variable Uplink noise timing is to be measured as follows.</p> <p>o) Set the spectrum analyzer to the uplink frequency to be measured.</p> <p>p) Set the span to 0 Hz with a sweep time of 10 seconds.</p> <p>q) Set the power level of signal generator 1 to the lowest level of the RSSI dependent noise.</p> <p>r) Select MAX HOLD and increase the power level of signal generator 1 by 10 dB for mobile boosters and 20 dB for fixed boosters.</p> <p>s) Ensure that the Uplink noise decrease to the specified levels within 1 second for mobile devices and 3 seconds for fixed devices.</p> <p>t) Repeat 7.7.14 – 7.7.19 for all operational uplink bands</p> <p>Note: Some signal boosters will require a signal generator input as they will not operate unless a signal is received at the input terminals. If this is the case connect a signal generator and cycle the RF output to simulate this function.</p>
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**5.7.1 E.U.T. Operation:**

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

**5.7.2 Test Data:**

Frequency (MHz)	Max Noise Power Measured dBm/MHz	Limit dBm/MHz	Result (dB)
UL 824-849	-49.936	-44.05	PASS
UL699-716	-48.959	-45.51	PASS
UL777-787	-50.885	-44.64	PASS
UL1850-1915	-51.822	-37.00	PASS
DL 869-894	-48.957	-44.05	PASS
DL729-746	-51.033	-45.51	PASS
DL746-756	-50.731	-44.64	PASS
DL1930-1995	-51.916	-37.00	PASS

**Note:** Fixed booster maximum noise power shall not exceed  $-102.5 \text{ dBm/MHz} + 20 \log (F)$ , where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

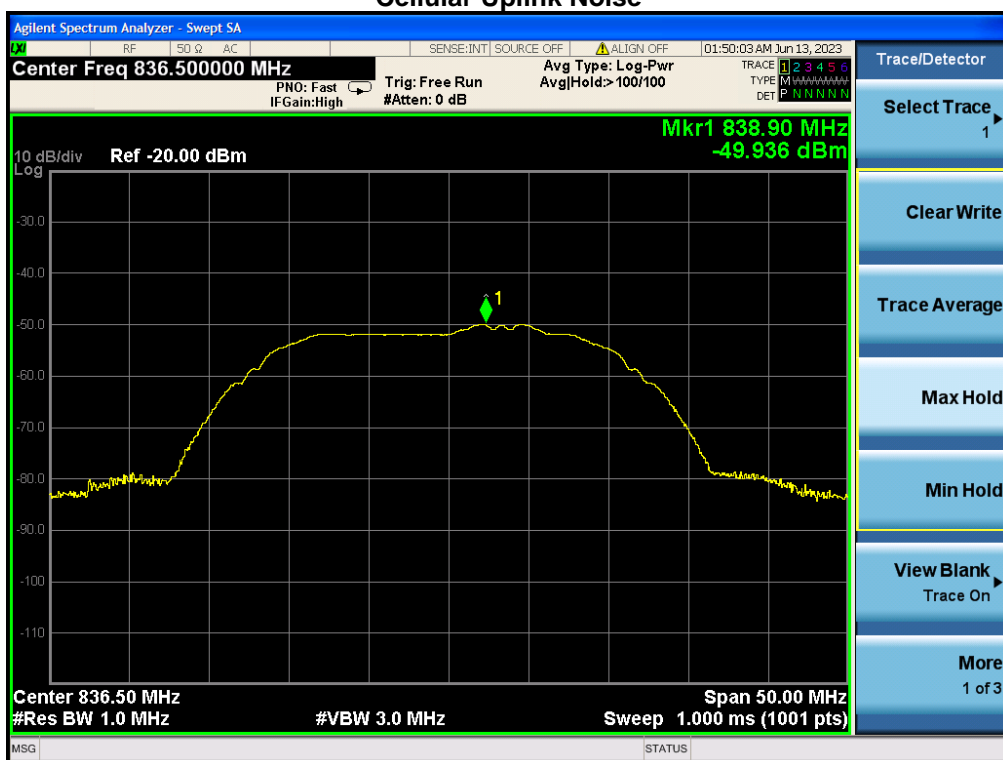
Operation Bands	RSSI dBm	Variable Uplink Noise Measured dBm/MHz	Limit dBm/MHz	Result (dB)
Cellular	-90	-52.75	-44.05	PASS
	-80	-52.47	-44.05	PASS
	-70	-53.08	-44.05	PASS
	-45	-62.86	-58.00	PASS
	-41	-65.57	-62.00	PASS
	-40	-65.45	-63.00	PASS
Low A-E Blocks	-90	-59.75	-45.51	PASS
	-80	-58.38	-45.51	PASS
	-70	-58.02	-45.51	PASS
	-46	-59.18	-57.00	PASS
	-41	-64.86	-62.00	PASS
	-40	-66.04	-63.00	PASS
700 MHz Upper C Block	-90	-52.28	-44.64	PASS
	-80	-55.17	-44.64	PASS
	-70	-56.26	-44.64	PASS
	-45	-59.21	-58.00	PASS
	-41	-64.01	-62.00	PASS
	-40	-66.14	-63.00	PASS
	-40	-66.30	-63.00	PASS
Broadband PCS	-90	-52.69	-37.00	PASS
	-80	-56.47	-37.00	PASS
	-70	-57.14	-37.00	PASS
	-45	-59.39	-58.00	PASS
	-41	-63.15	-62.00	PASS

**Note:** According to the KDB 935210 D03 Signal Booster Measurements v04r04 APPENDIX D, when outside of RSSI Dependent limit (20.21.e.8.1.A.1), fixed booster maximum noise power shall not exceed  $-102.5 \text{ dBm/MHz} + 20 \log (F)$ . RSSI limit not exceed  $-103 \text{ dBm/MHz-RSSI}$ .

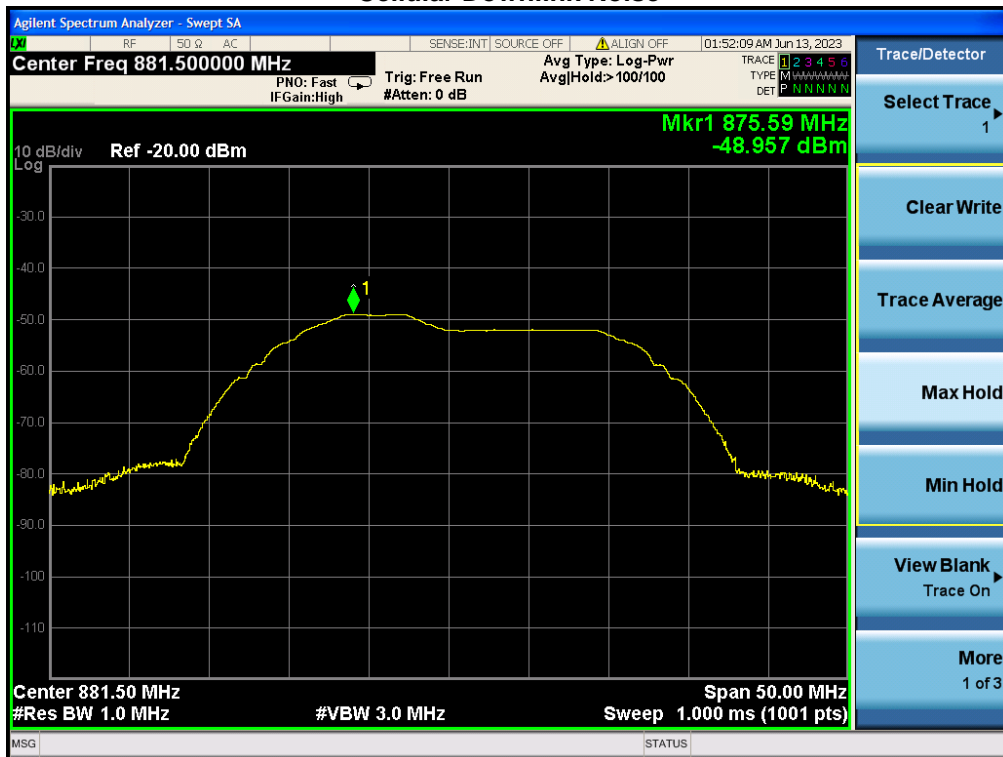
**Variable Uplink Noise Timing**

Operation Bands	Measured Sec	Limit Sec	Results
Cellular	1.28	3	PASS
Low A-E Blocks	1.38	3	PASS
700 MHz Upper C Block	1.52	3	PASS
Broadband PCS	1.56	3	PASS

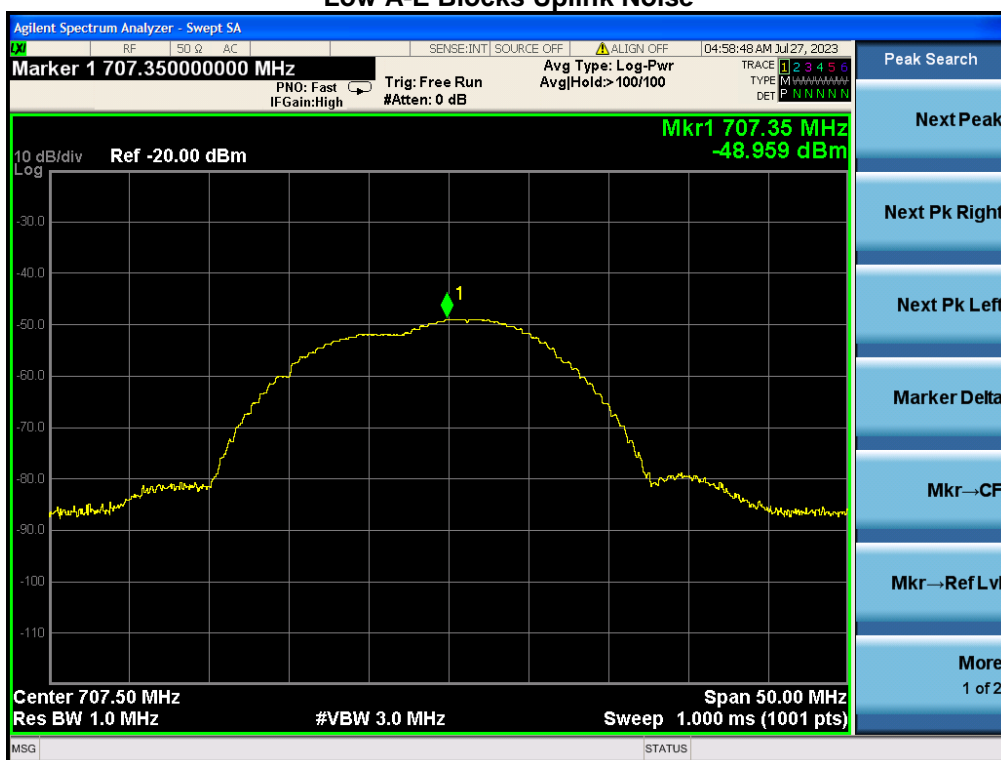
### Cellular Uplink Noise



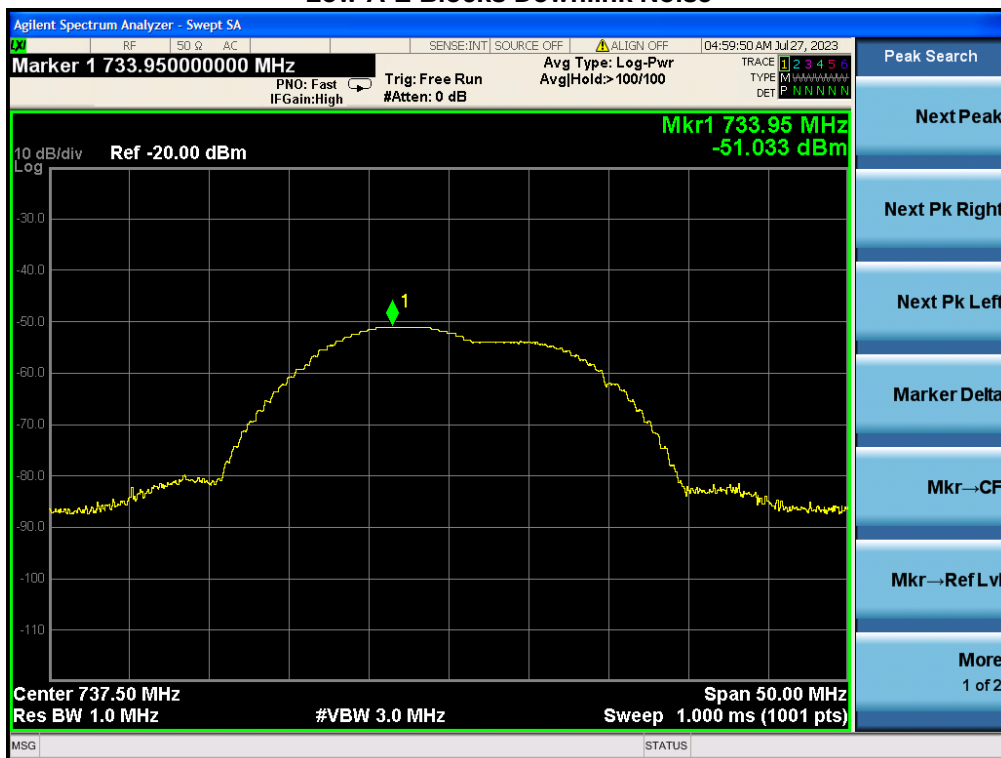
### Cellular Downlink Noise



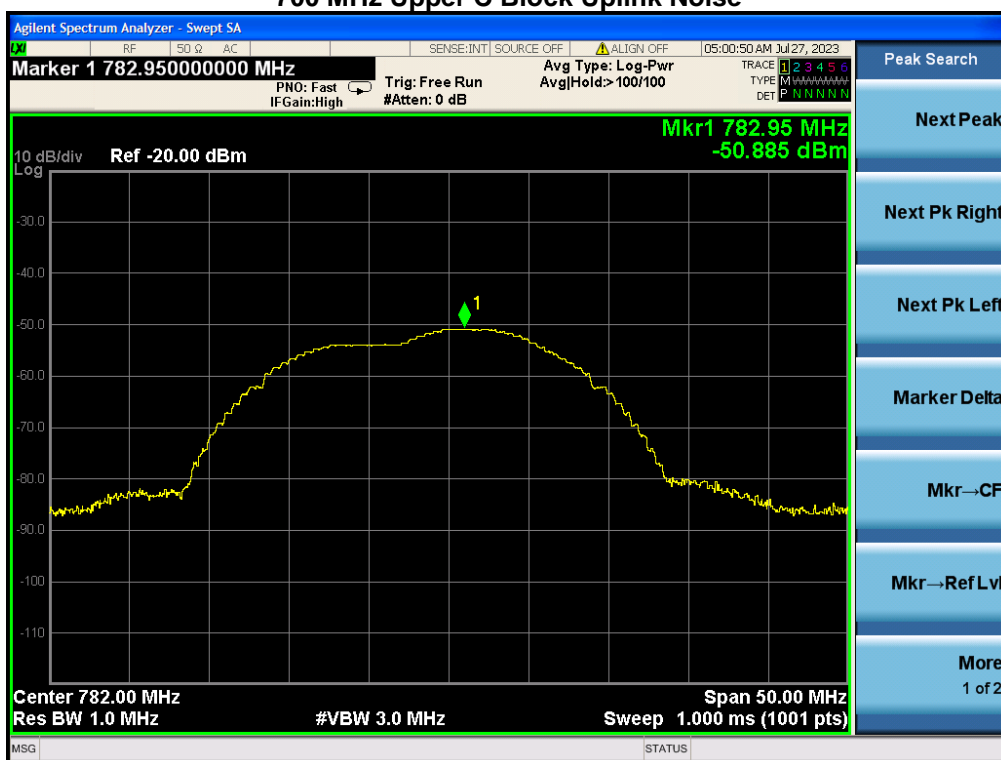
### Low A-E Blocks Uplink Noise



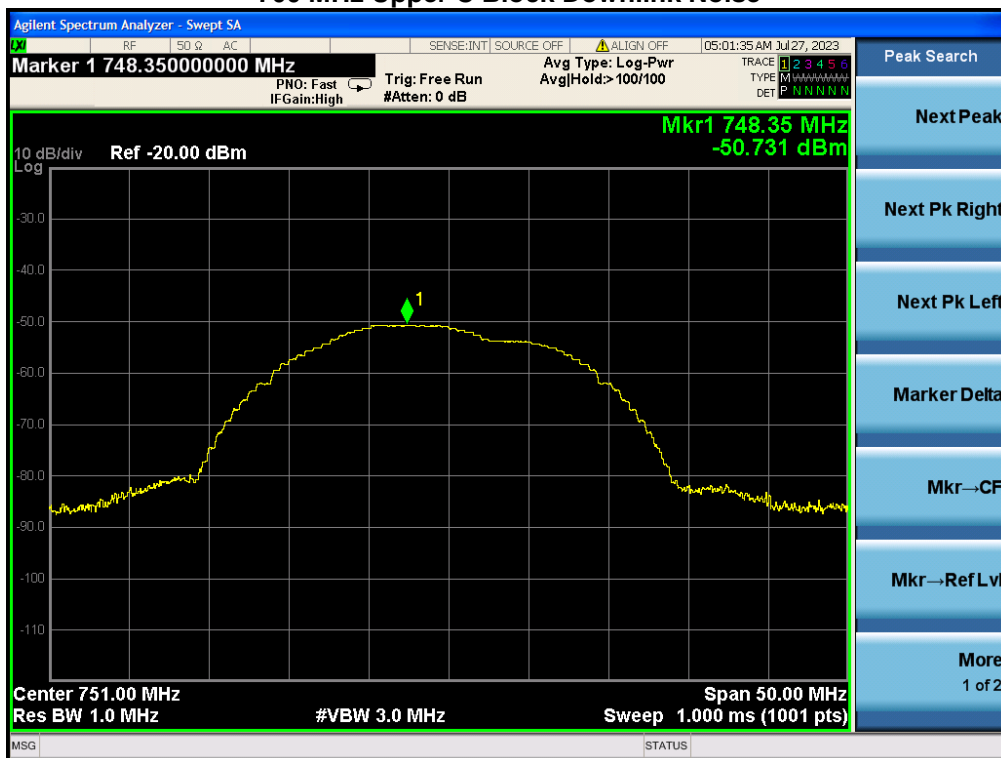
### Low A-E Blocks Downlink Noise



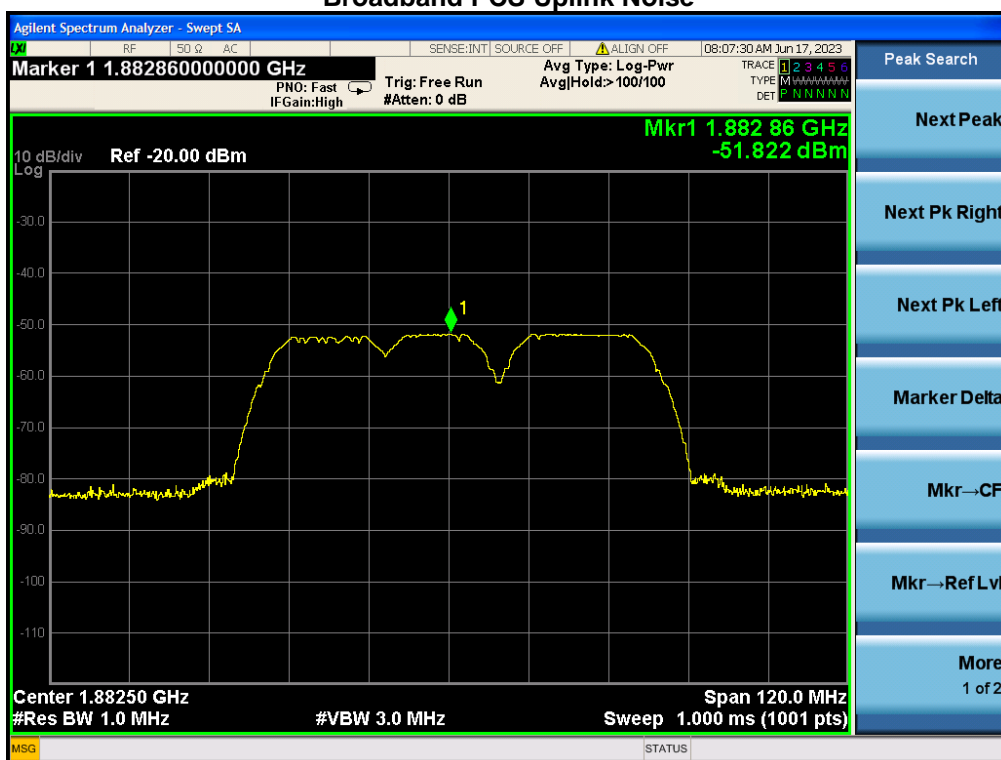
### 700 MHz Upper C Block Uplink Noise



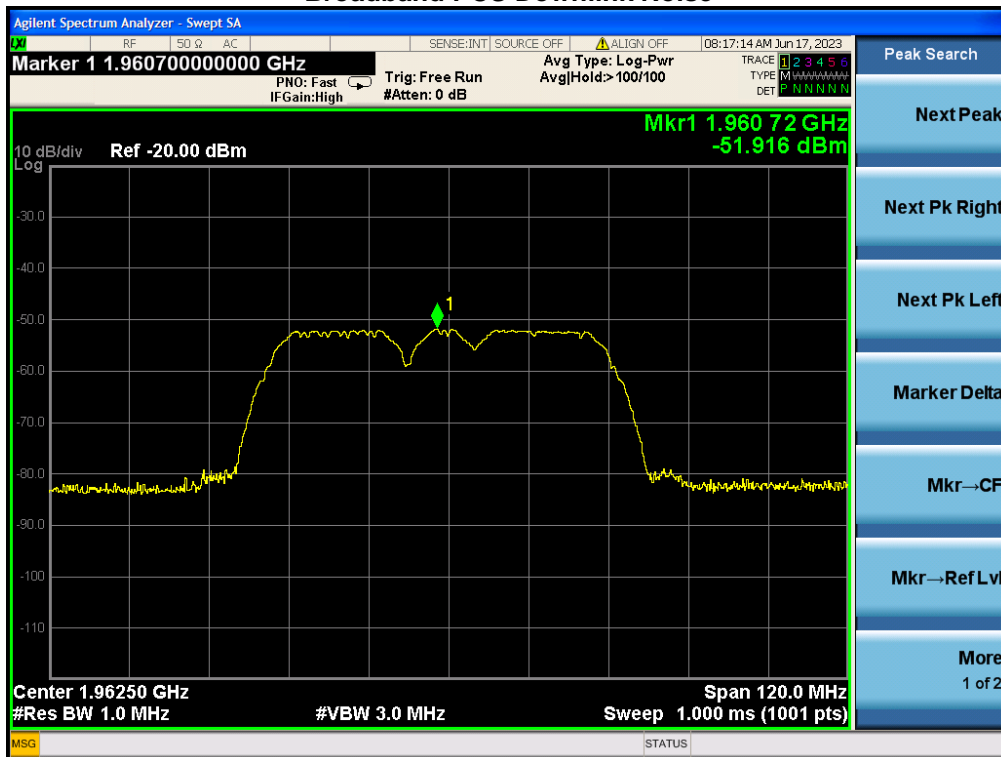
### 700 MHz Upper C Block Downlink Noise



### Broadband PCS Uplink Noise



### Broadband PCS Downlink Noise

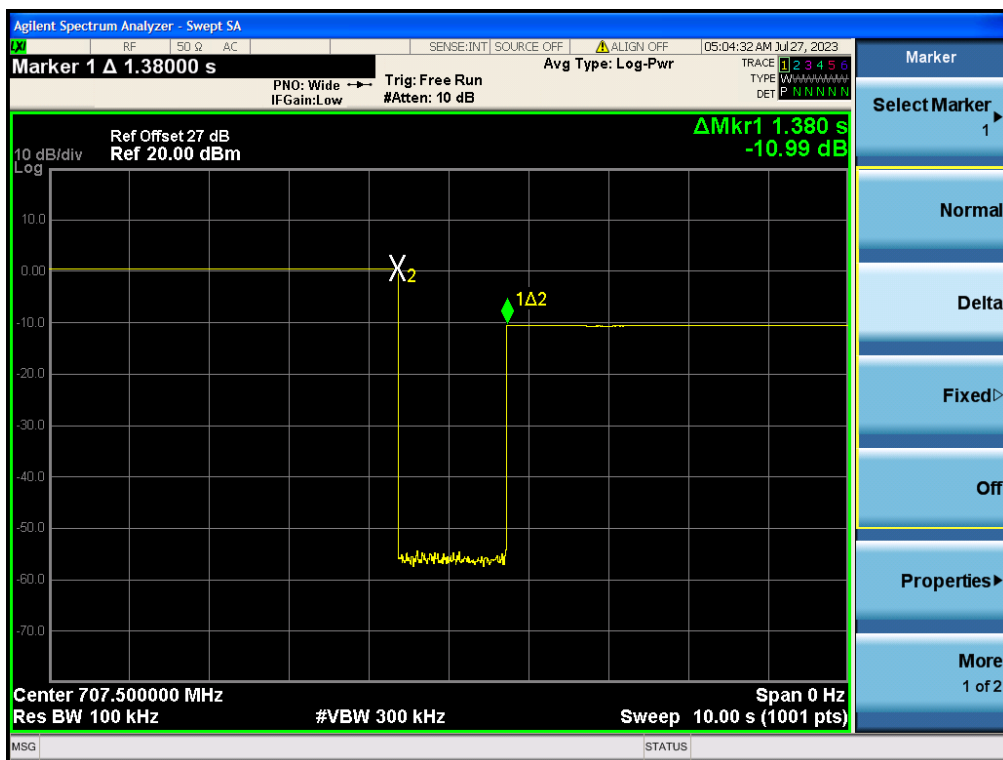


# Variable Noise Timing Test Plots

## Cellular

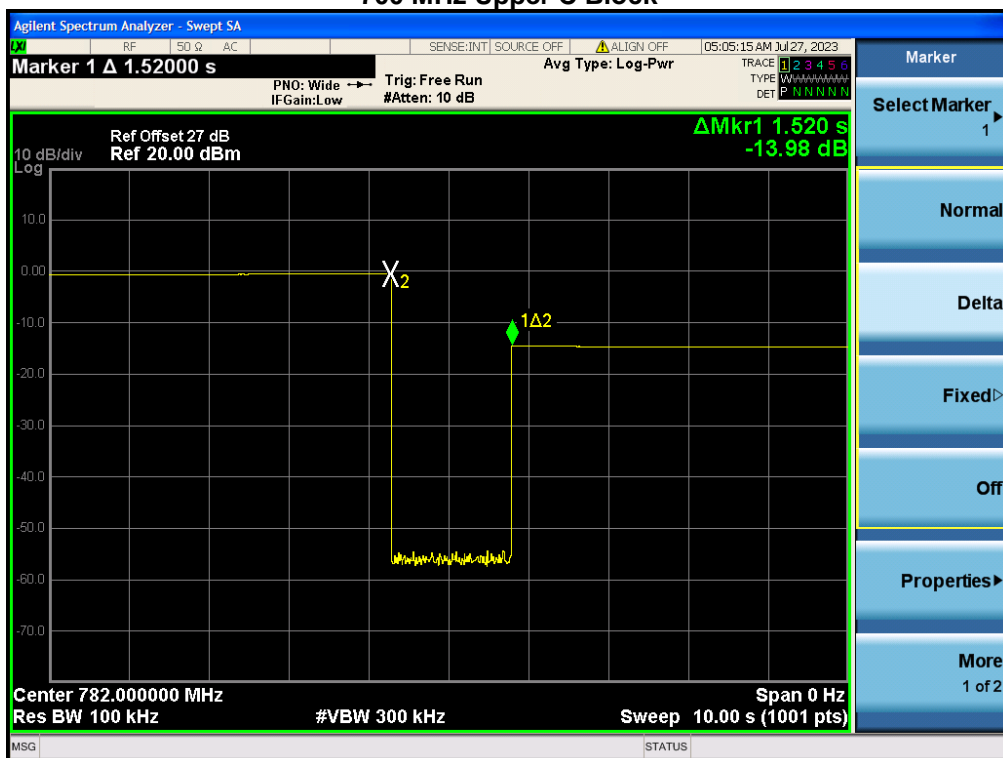


## Low A-E Blocks

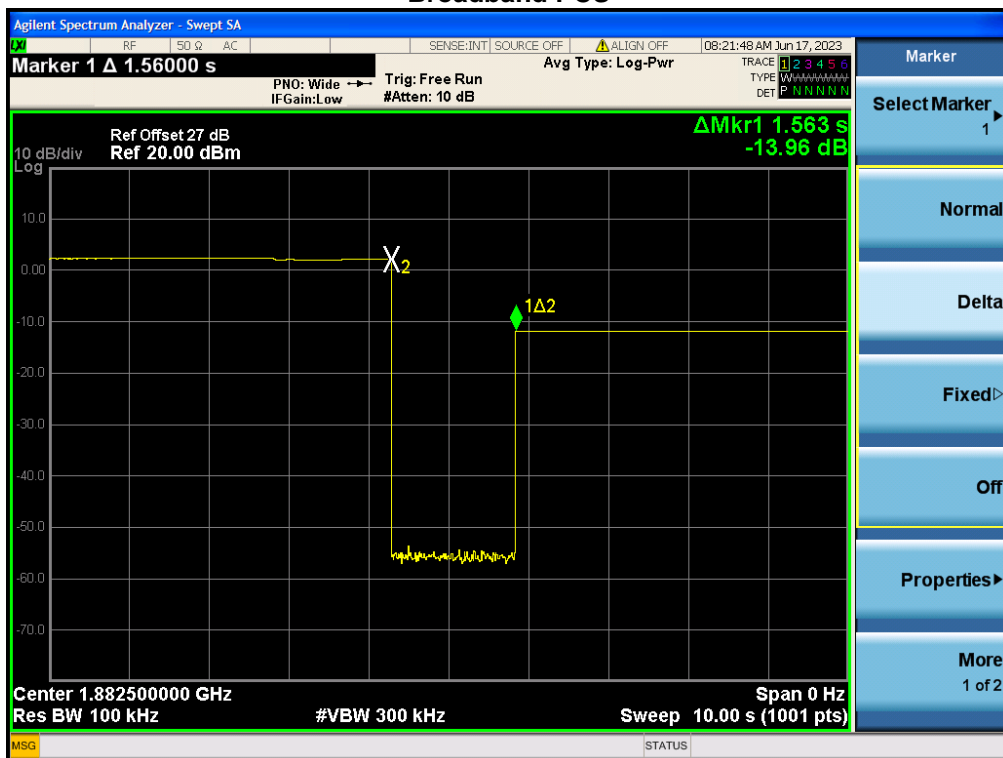




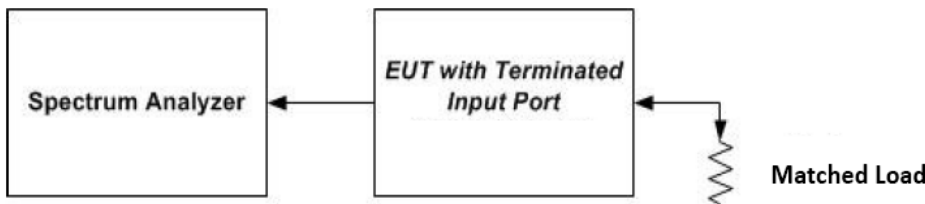
### 700 MHz Upper C Block



### Broadband PCS



## 5.8 Uplink Inactivity

Test Requirement:	This measurement procedure is intended to demonstrate compliance to the uplink inactivity requirements specified for Wideband Consumer Signal Boosters in §20.21(e)(8)(i)(I).
Limit:	20.21(e), When a consumer booster is not serving an active device connection after 5 minutes the uplinknoise power shall not exceed -70 dBm/MHz.
Test Setup:	 <p style="text-align: center;"><b>Figure 3 – Noise limit test setup (also used for 7.8)</b></p>
Procedure:	<ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Figure 3 with the uplink output connected to the spectrum analyzer.</li> <li>Select the RMS power averaging detector.</li> <li>Set the spectrum analyzer RBW for 1 MHz with the VBW <math>\geq</math> 3X RBW.</li> <li>Set the center frequency of the spectrum analyzer to the center of the uplink operational band.</li> <li>Set the span for 0 Hz with a single sweep time for a minimum of 330 seconds.</li> <li>Start to capture a new trace using MAX HOLD.</li> <li>After approximately 15 seconds turn on the EUT power.</li> <li>Once the full spectrum analyzer trace is complete place a MARKER on the leading edge of the pulse and use the DELTA MARKER METHOD to measure the time until the uplink was squelched.</li> <li>Ensure the noise level for the squelched signal is below the uplink inactivity noise power limit, as specified by the rules.</li> <li>Capture the plot for inclusion in the test report.</li> <li>Measure noise using procedures in sections 7.7.1- 7.7.5.</li> <li>Repeat steps 7.8.3 to 7.8.10 for all operational uplink bands.</li> </ol> <p>Note: Some signal boosters will require a signal generator input as they will not operate unless a signal is received at the input terminals. If this is the case connect a signal generator and cycle the RF output to simulate this function.</p>

### 5.8.1 E.U.T. Operation:

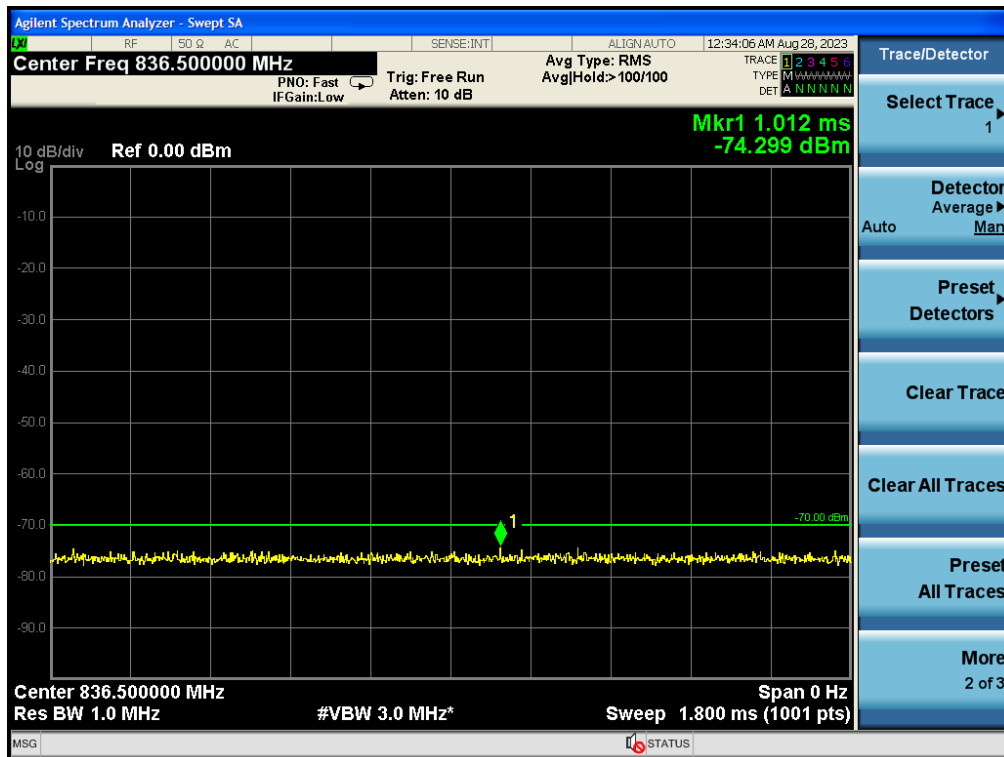
Operating Environment:	
Temperature:	-30 °C and +50
Humidity:	46.3 %
Atmospheric Pressure:	1010 mbar

### 5.8.2 Test Data:

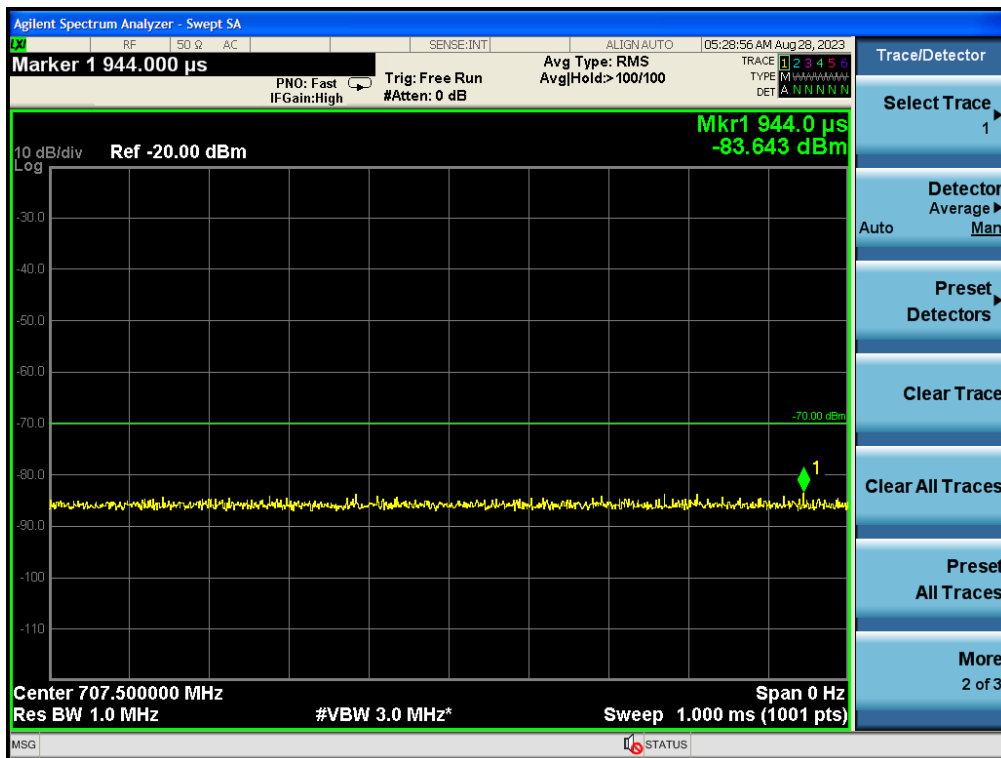
Operation Bands			
	Uplink Inactivity Measured(dBm/MHz)	Limit(dBm/MHz)	Result
Cellular	-74.21	-70.	PASS
Low A-E Blocks	-74.11	-70	PASS
700 MHz Upper C Block	-74.41	-70.	PASS
Broadband PCS	-75.11	-70	PASS

Uplink Inactive Noise:

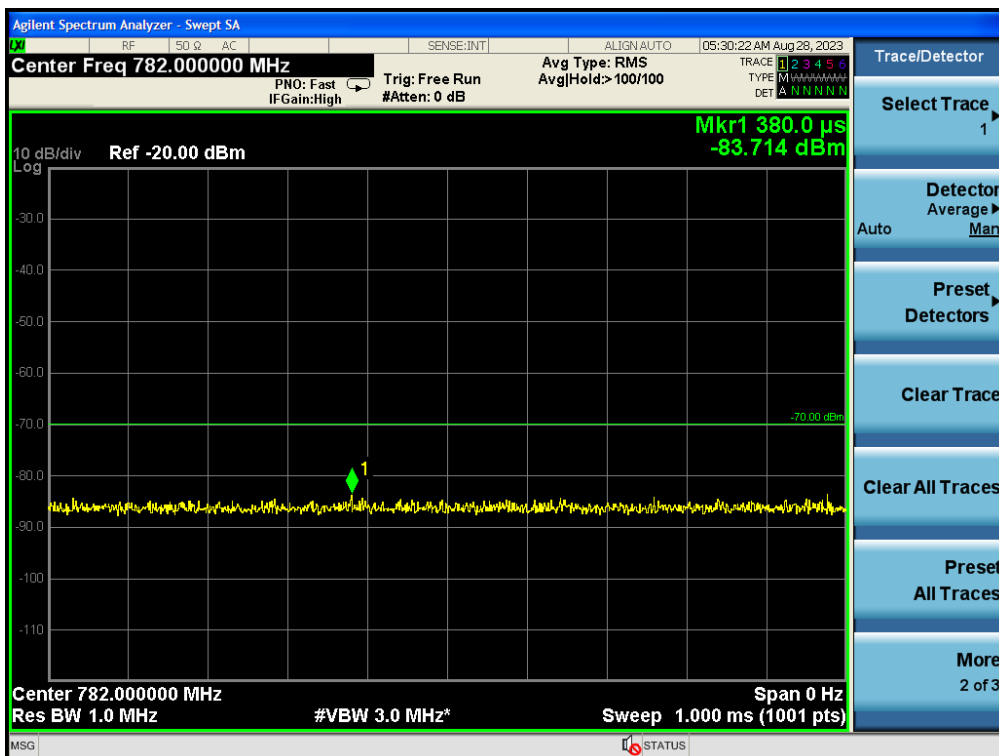
Cellular



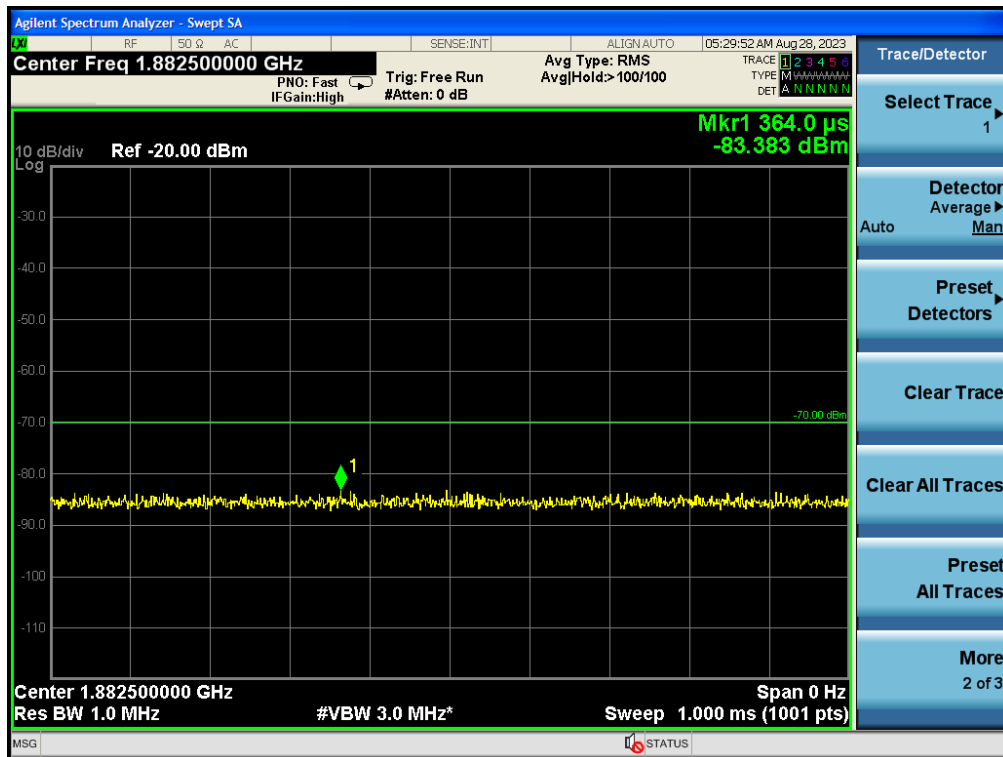
### Low A-E Blocks



### 700 MHz Upper C Block



### Broadband PCS



Uplink Inactivity Measured(s)

Cellular



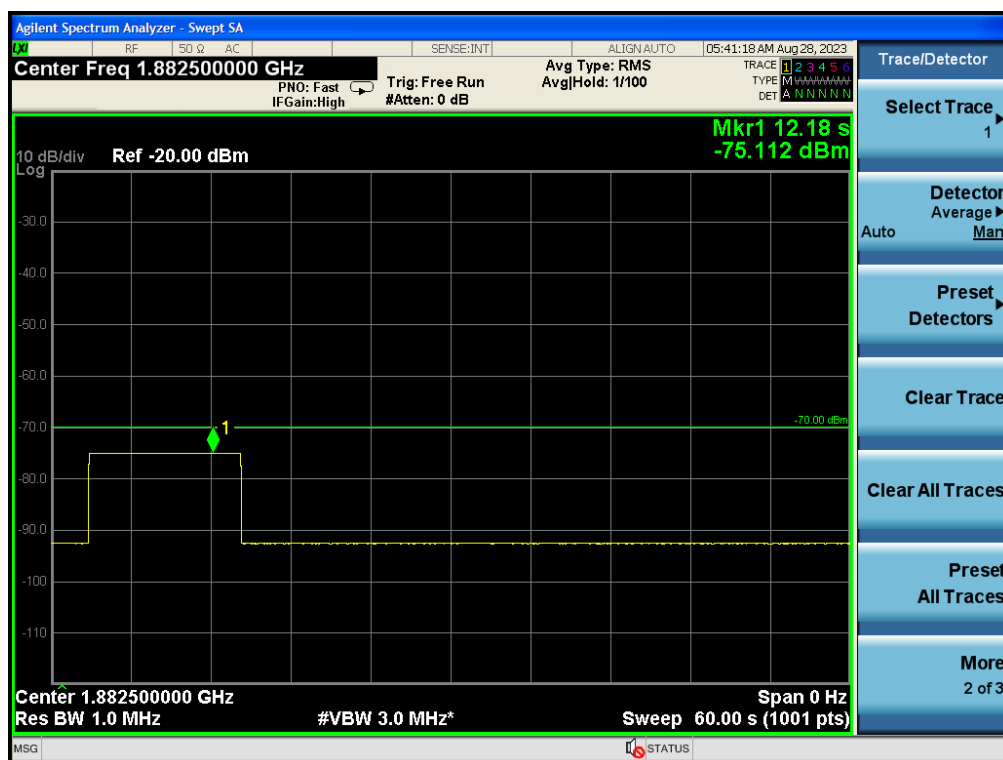
### Low A-E Blocks



### 700 MHz Upper C Block

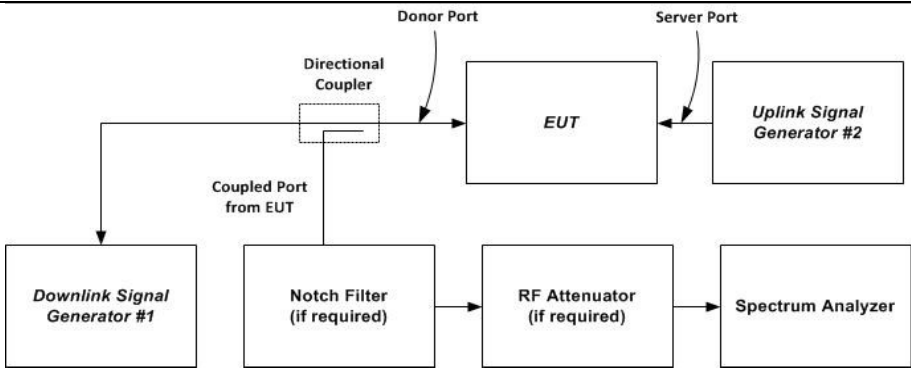


## Broadband PCS





## 5.9 Variable Booster Gain

Test Requirement:	This procedure shall be used to demonstrate compliance to the Booster Gain Limits specified for Wideband Consumer Signal Boosters in §21(e)(8)(i)(C). The variable booster gain limits are expressed as a function of RSSI and MSCL. The RSSI is varied over a range of values as specified within the procedure. Refer to Annex B of this document for guidance with respect to determining the applicable MSCL value.
Limit:	-34 dB -RSSI + MSCL
Test Setup:	
Procedure:	<ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Figure 6 with the uplink output connected to signal generator 1. Ensure the coupled path of the RF coupler is connected to the spectrum analyzer.</li> <li>Configure downlink signal generator #1 for AWGN operation with an 99% occupied bandwidth of 4.1 MHz tuned to the center of the operational band.</li> <li>Set the power level and frequency of signal generator # 2 to a value 5 dB below the AGC level from section 7.2. The signal type is AWGN with a 99% OBW of 4.1 MHz.</li> <li>Set RBW = 100 kHz.</li> <li>Set VBW <math>\geq</math> 300 kHz.</li> <li>Select the CHANNEL POWER measurement tool.</li> <li>Select the RMS (power averaging) detector.</li> <li>Ensure that the number of measurement points per sweep <math>\geq (2 \times \text{span})/\text{RBW}</math>.</li> <li>Sweep time = auto couple or as necessary.</li> <li>Trace average at least 10 traces in power averaging (i.e., RMS) mode.</li> <li>Measure the maximum channel power and compute maximum gain when varying the signal generator 1 to a level from -90 to -10 dBm in 1 dB steps inside the RSSI dependent region and 10 dB steps outside the RSSI dependent region and report the six values closest to the limit, including at least two points from within the RSSI dependent region of operation.</li> <li>Repeat 7.9.3 – 7.9.11 for all operational uplink bands.</li> <li>Variable Uplink gain timing is to be measured as follows.</li> <li>Set the spectrum analyzer to the uplink frequency to be measured.</li> <li>Set the span to 0 Hz with a sweep time of 10 seconds.</li> <li>Set the power level of signal generator 1 to the lowest level of the RSSI dependent gain.</li> <li>Select MAX HOLD and increase the power level of signal generator 1 by 10 dB for mobile booster and 20 dB for fixed indoor boosters.</li> <li>Ensure that the Uplink gain decrease to the specified levels within 1 second for mobile devices and 3 seconds for fixed devices.</li> <li>Repeat 7.9.13 – 7.9.18 for all operational uplink bands.</li> </ol>

### 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
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	11.27	52.27	40.33	58.33	PASS
	-51	-41	10.38	51.38	40.33	57.33	PASS
	-48	-41	9.46	50.46	40.33	54.33	PASS
	-46	-41	5.94	46.94	40.33	52.33	PASS
	-43	-41	4.63	45.63	40.33	49.33	PASS
	-41	-41	3.62	44.62	40.33	47.33	PASS
Broadband PCS	-52	-41	11.81	52.81	47.26	65.26	PASS
	-50	-41	8.83	49.83	47.26	63.26	PASS
	-49	-41	7.00	48.00	47.26	62.26	PASS
	-46	-41	4.51	45.51	47.26	59.26	PASS
	-40	-41	2.31	43.31	47.26	53.26	PASS
	-38	-41	1.25	42.25	47.26	51.26	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
	-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	1.28	3.0	PASS
Low A-E Blocks	1.38	3.0	PASS
700 MHz Upper C Block	1.52	3.0	PASS
Broadband PCS	1.58	3.0	PASS

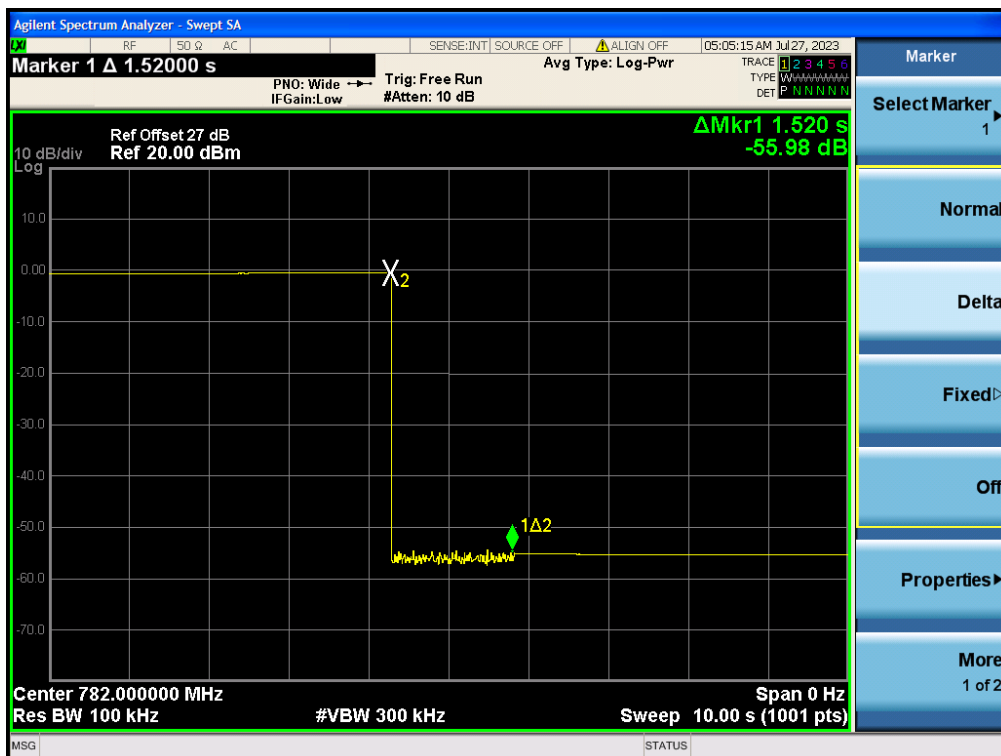
Cellular



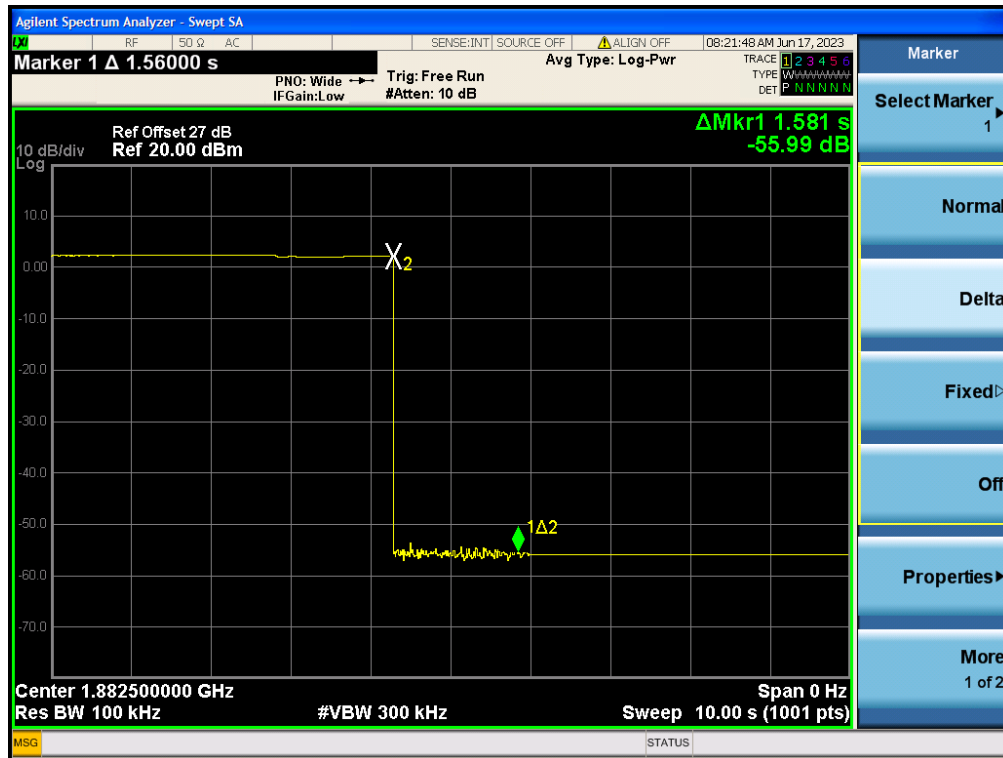
### Low A-E Blocks



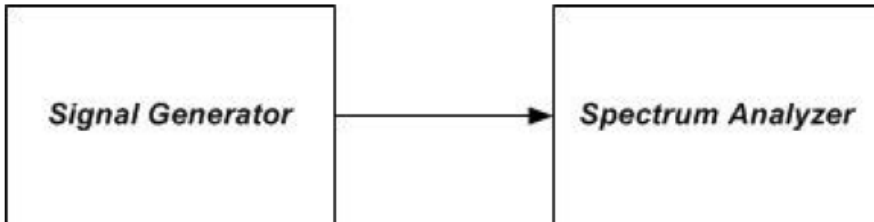
### 700 MHz Upper C Block



## 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:

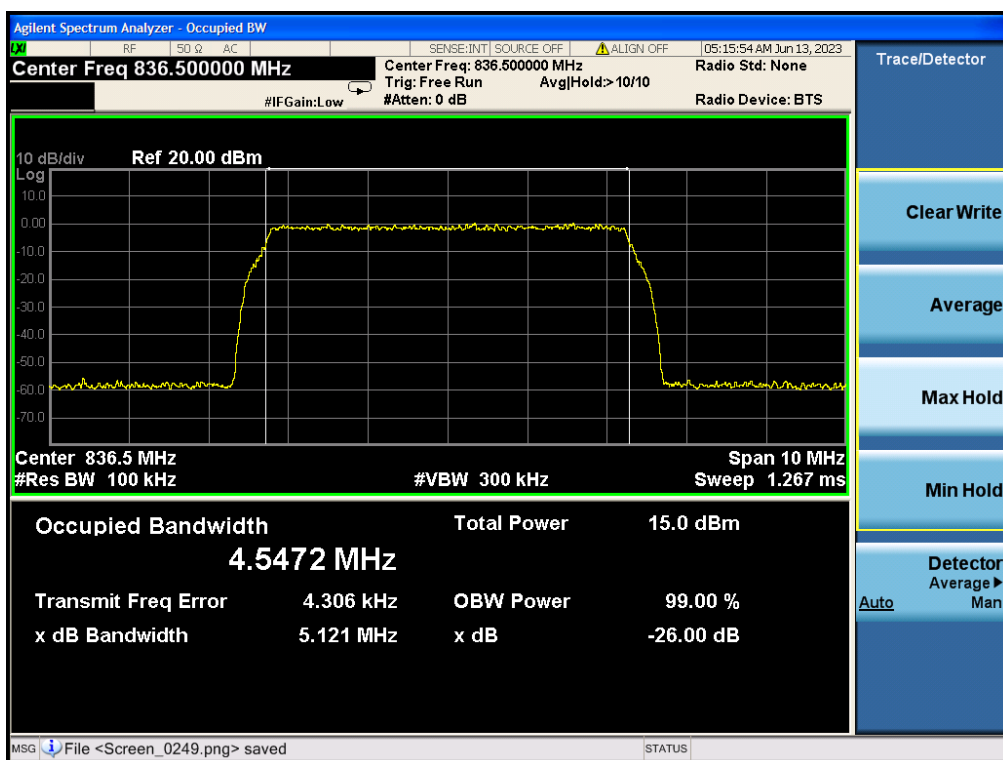
Operating Environment:	
Temperature:	-30 °C and +50
Humidity:	46.3 %
Atmospheric Pressure:	1010 mbar

### 5.10.2 Test Data:

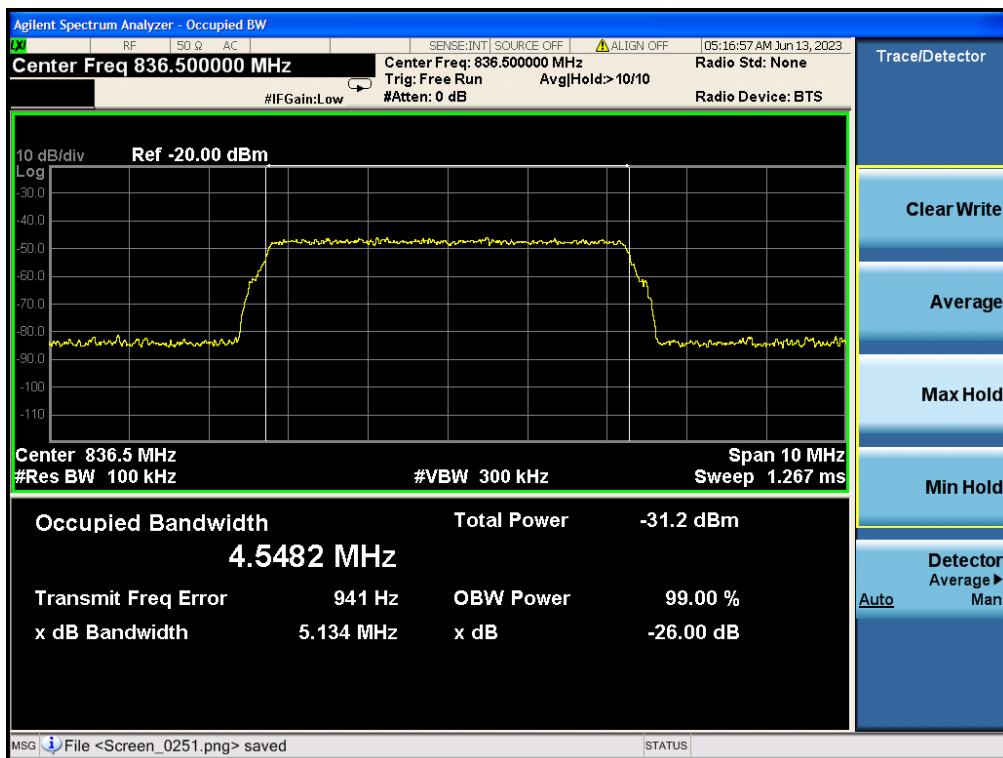
Operation Band		Signal	Input OBW [MHz]	Output OBW [MHz]	Results
Uplink	Cellular	AWGN	4.5472	4.548	PASS
	Low A-E Blocks	AWGN	4.5399	4.5448	PASS
	700 MHz Upper C Block	AWGN	4.5456	4.5353	PASS
	Broadband PCS	AWGN	4.5293	4.5473	PASS
Downlink	Cellular	AWGN	4.5397	4.5383	PASS
	Low A-E Blocks	AWGN	4.5333	4.5238	PASS
	700 MHz Upper C Block	AWGN	4.5295	4.5404	PASS
	Broadband PCS	AWGN	4.5237	4.5571	PASS



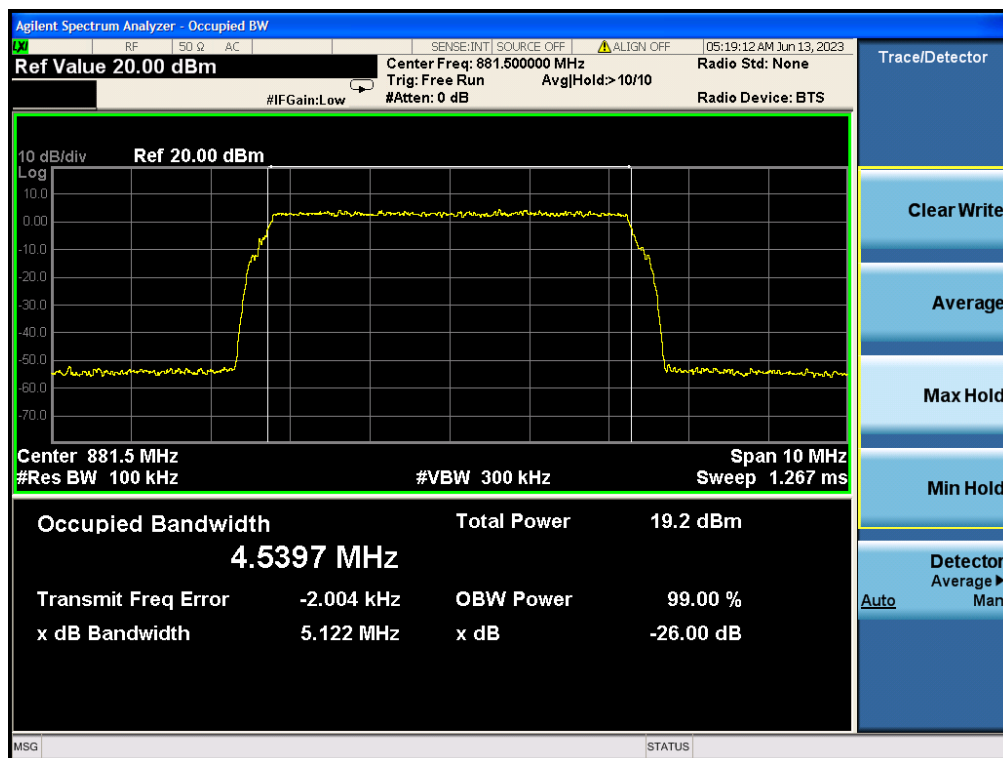
## Cellular AWGN UL Input



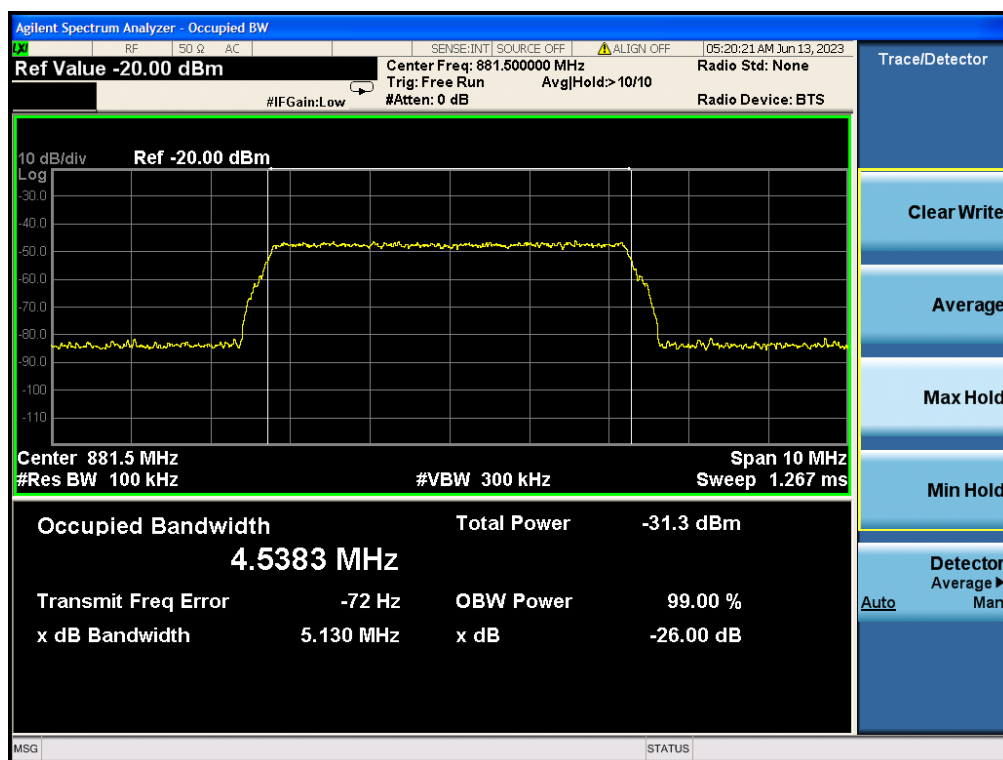
## Cellular AWGN UL output



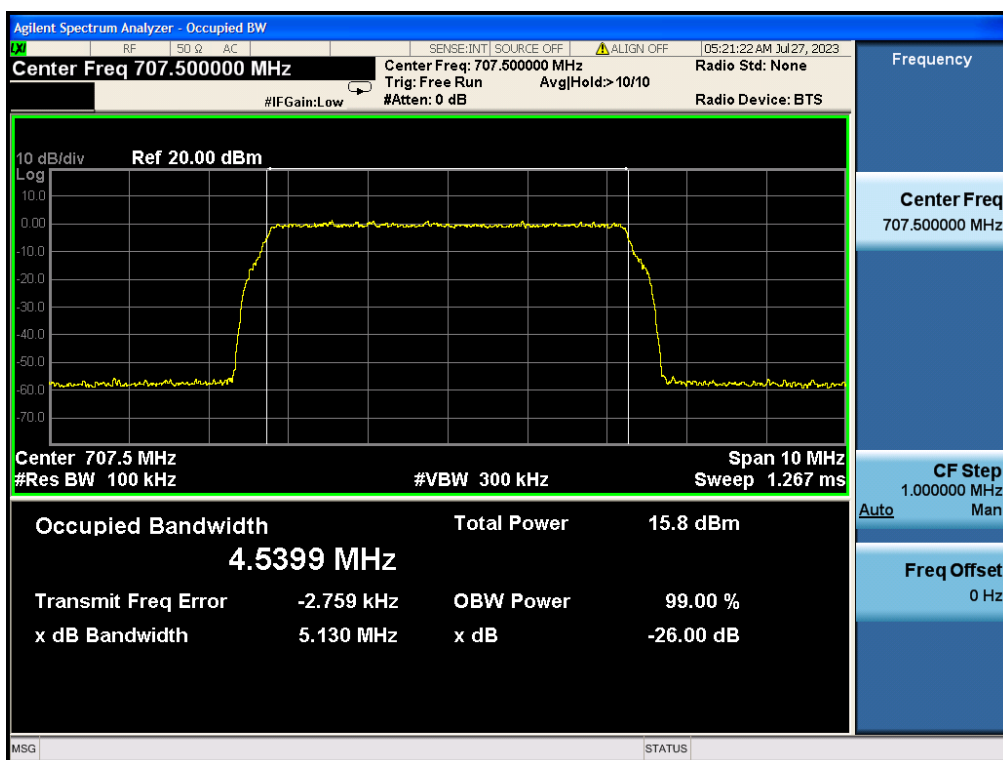
## Cellular AWGN DL Input



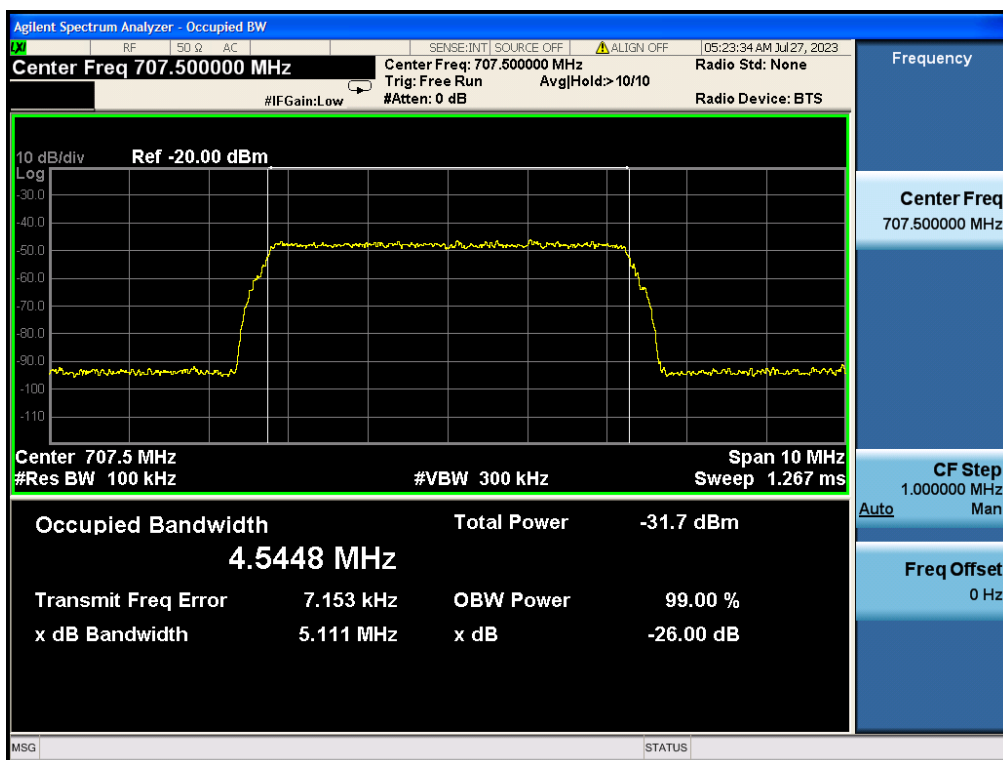
## Cellular AWGN DL output



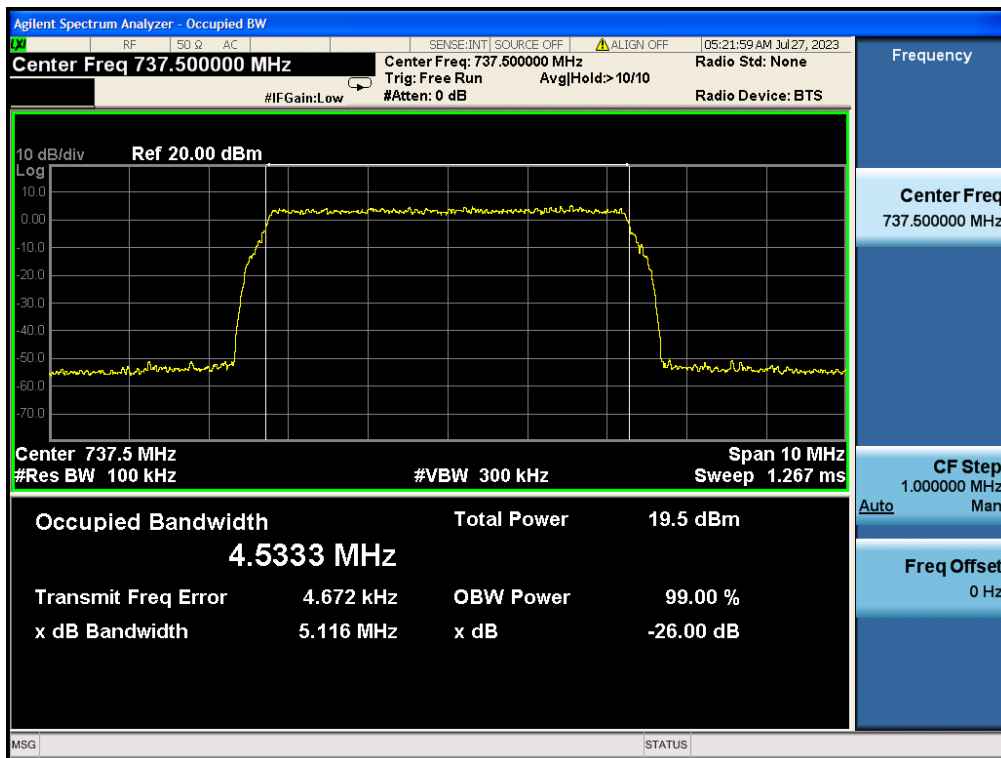
### Low A-E Blocks UL Input



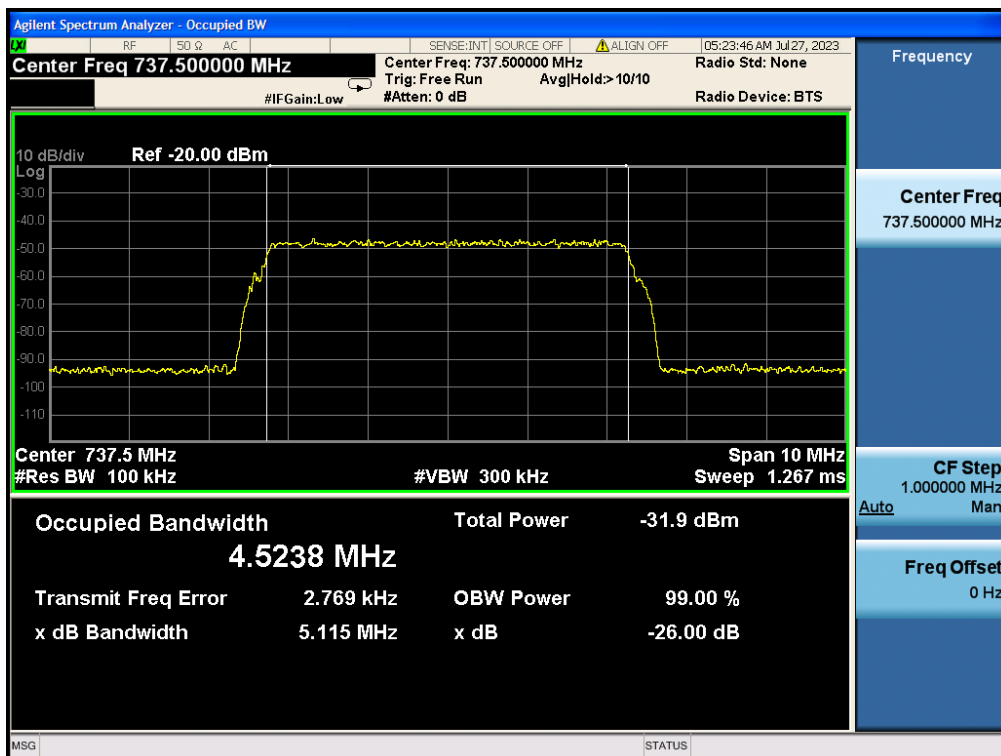
### Low A-E Blocks UL output



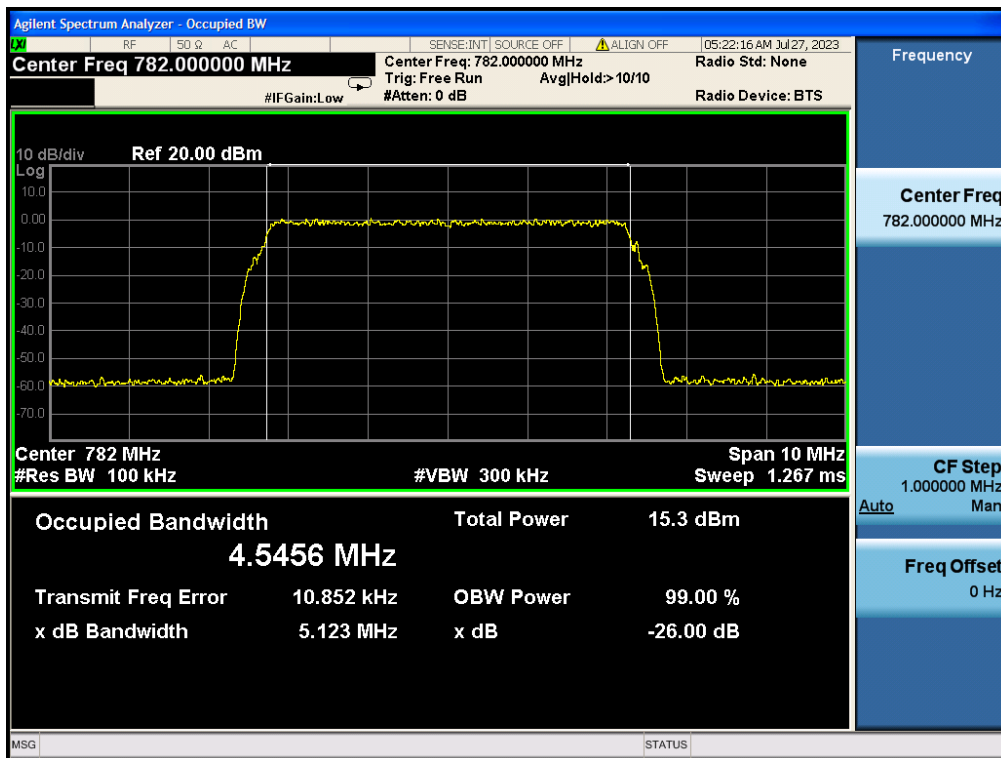
### Low A-E Blocks DL Input



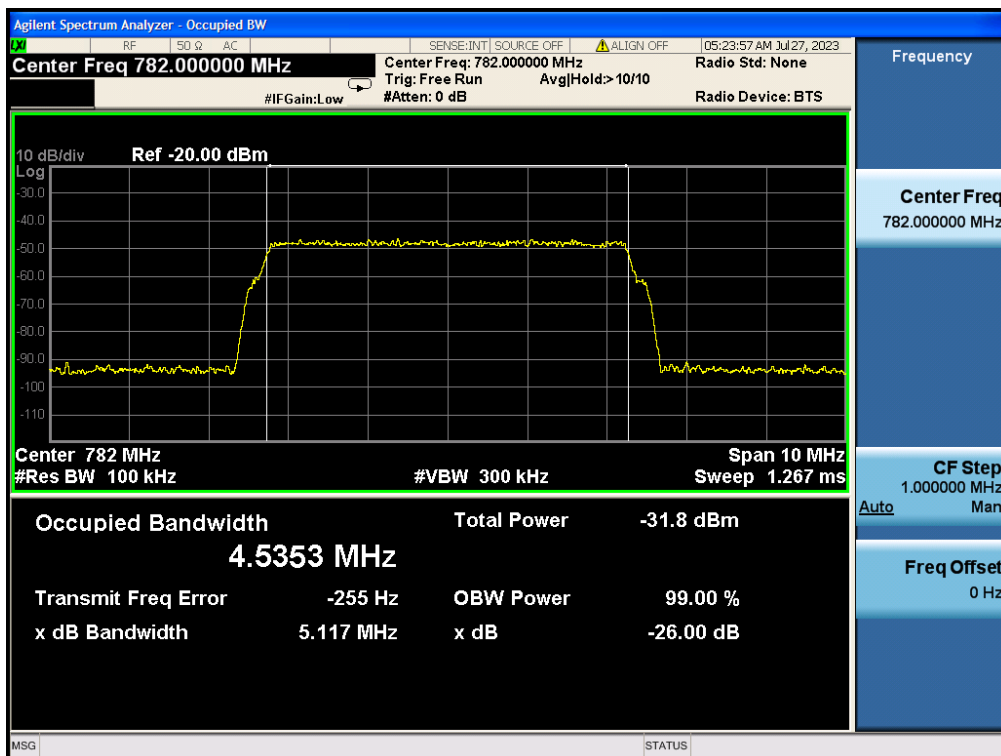
### Low A-E Blocks DL output



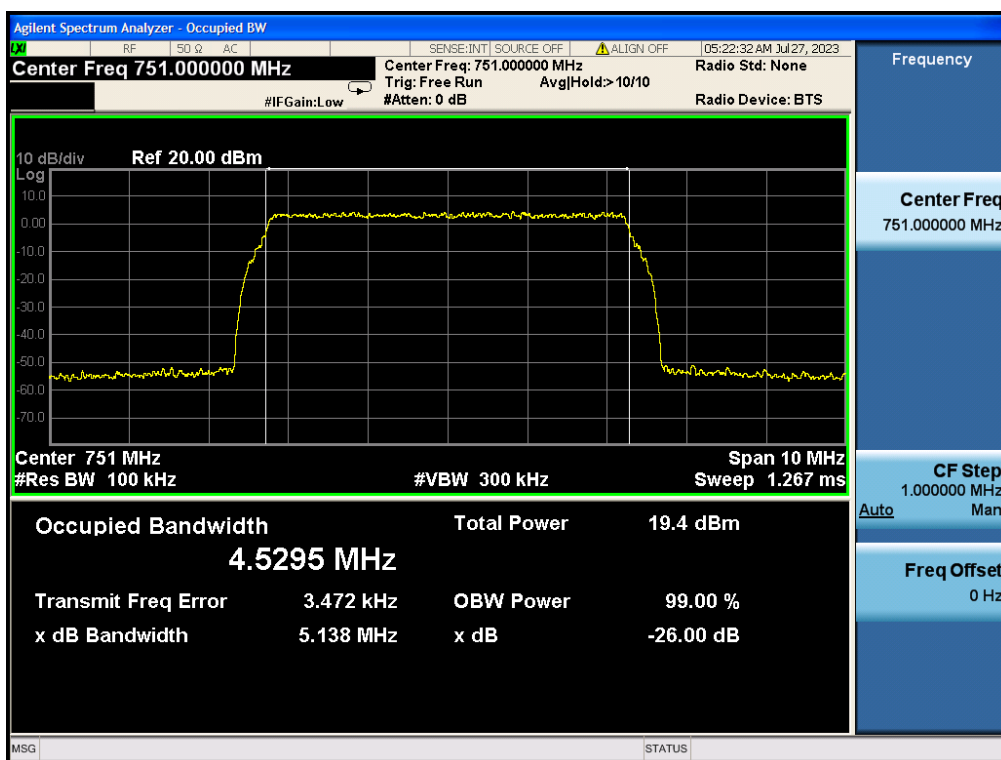
## 700 MHz Upper C Block UL Input



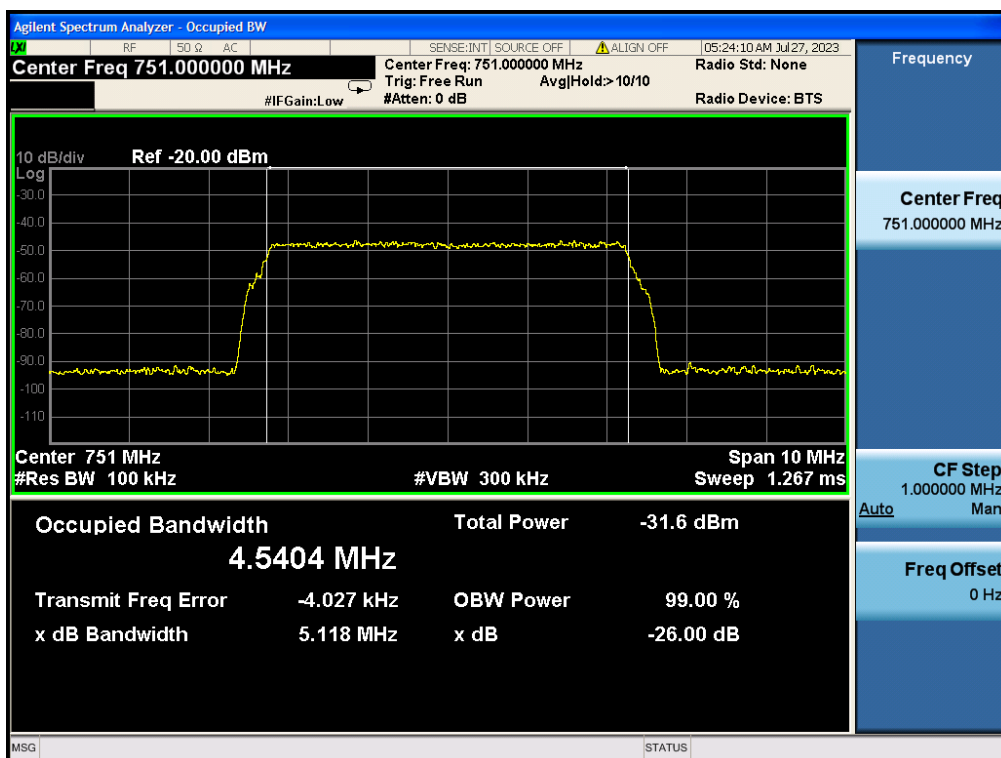
## 700 MHz Upper C Block UL output



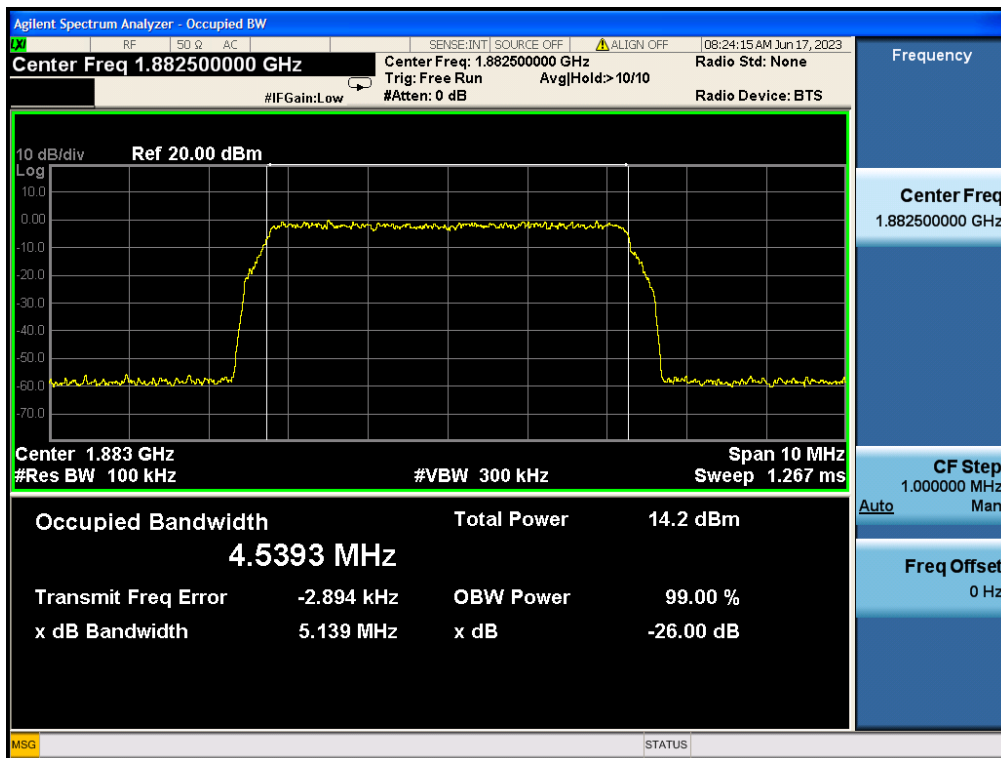
## 700 MHz Upper C Block DL Input



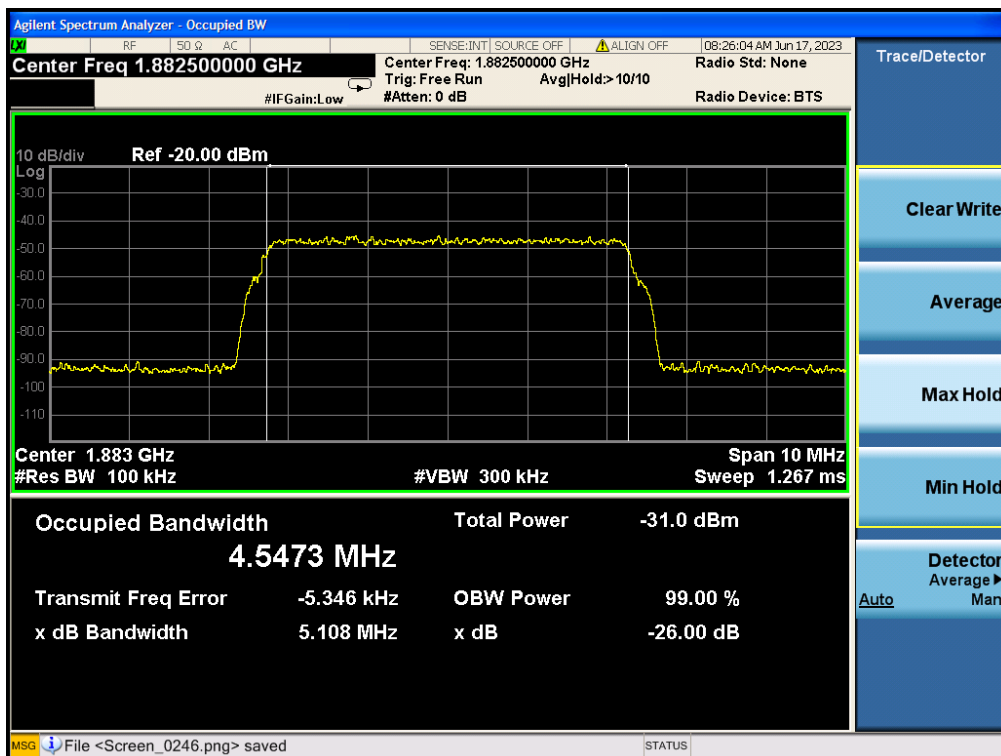
## 700 MHz Upper C Block DL output



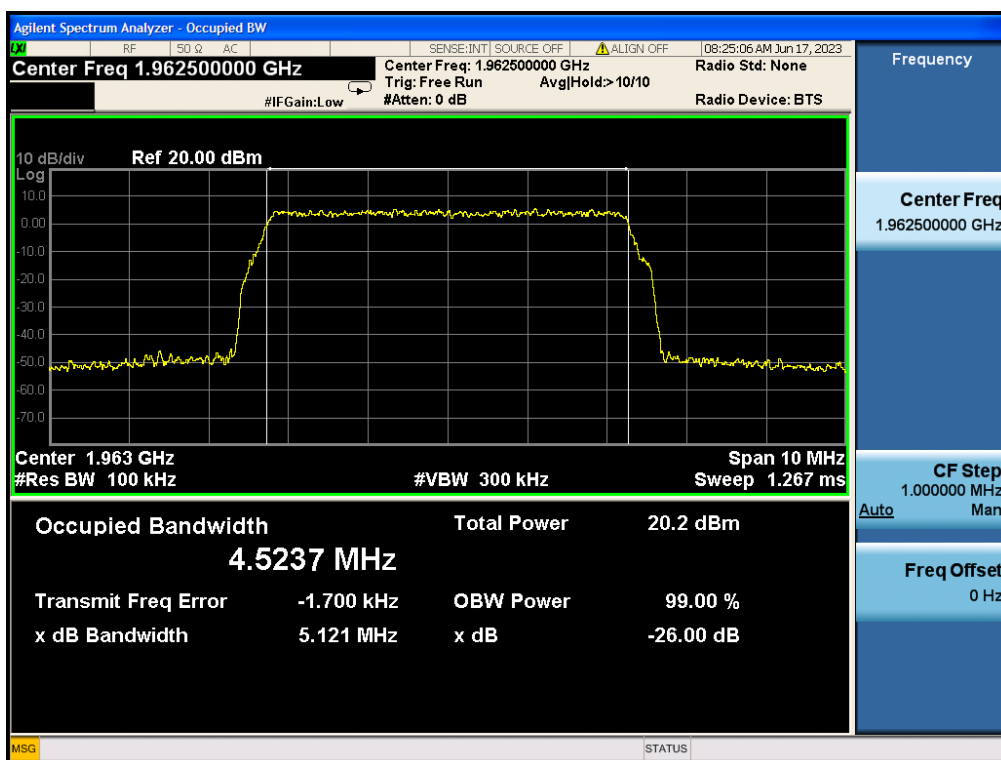
## Broadband PCS UL Input



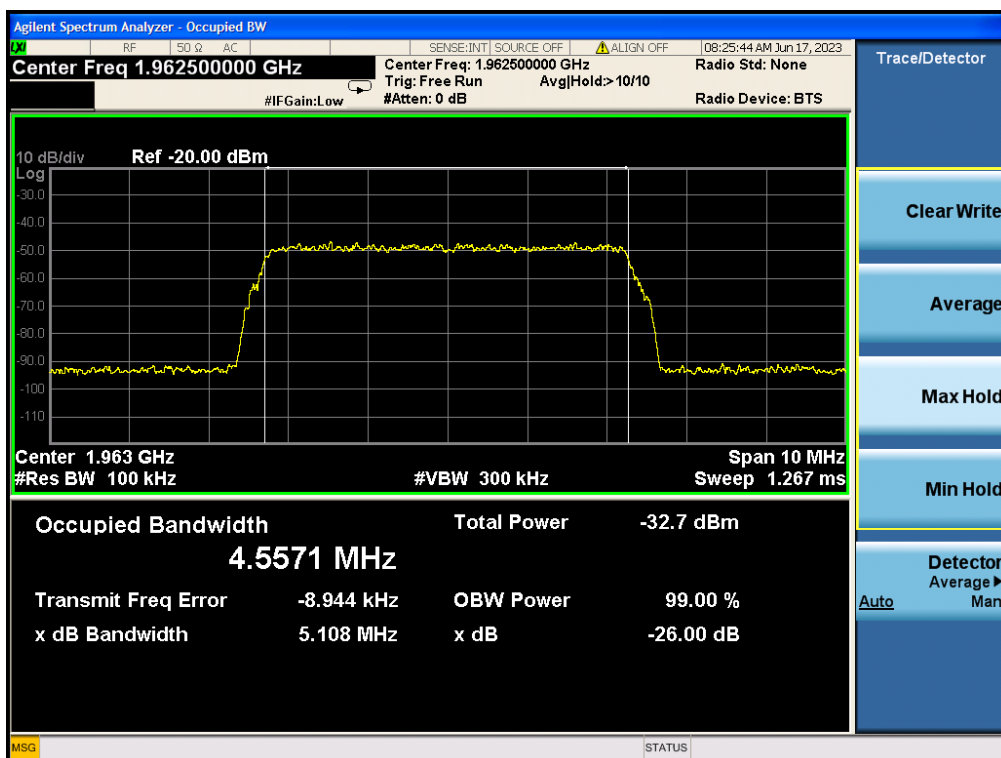
## Broadband PCS UL output



## Broadband PCS DL Input

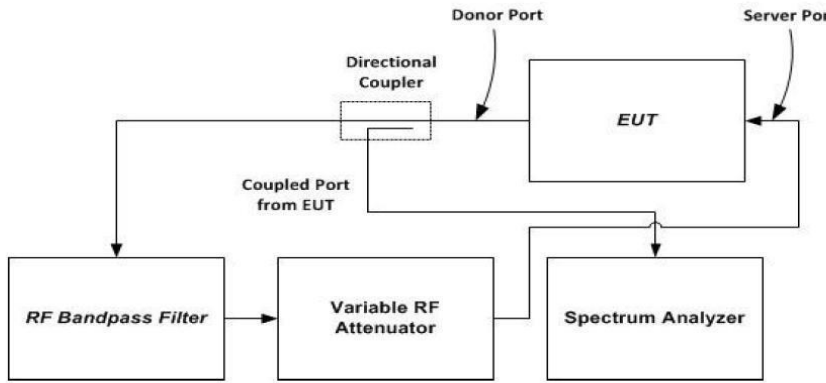
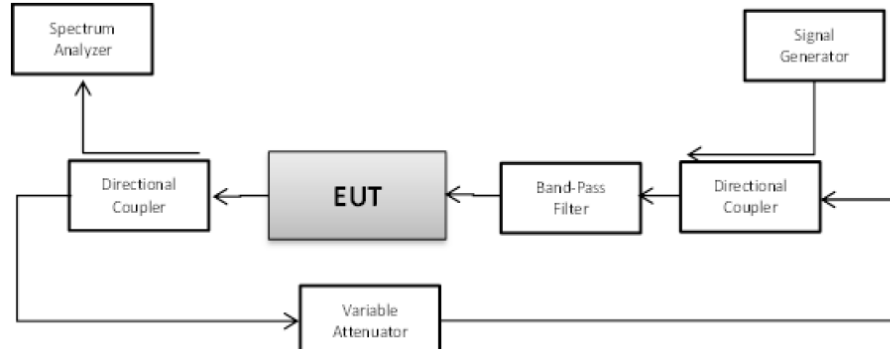


## Broadband PCS DL output





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

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

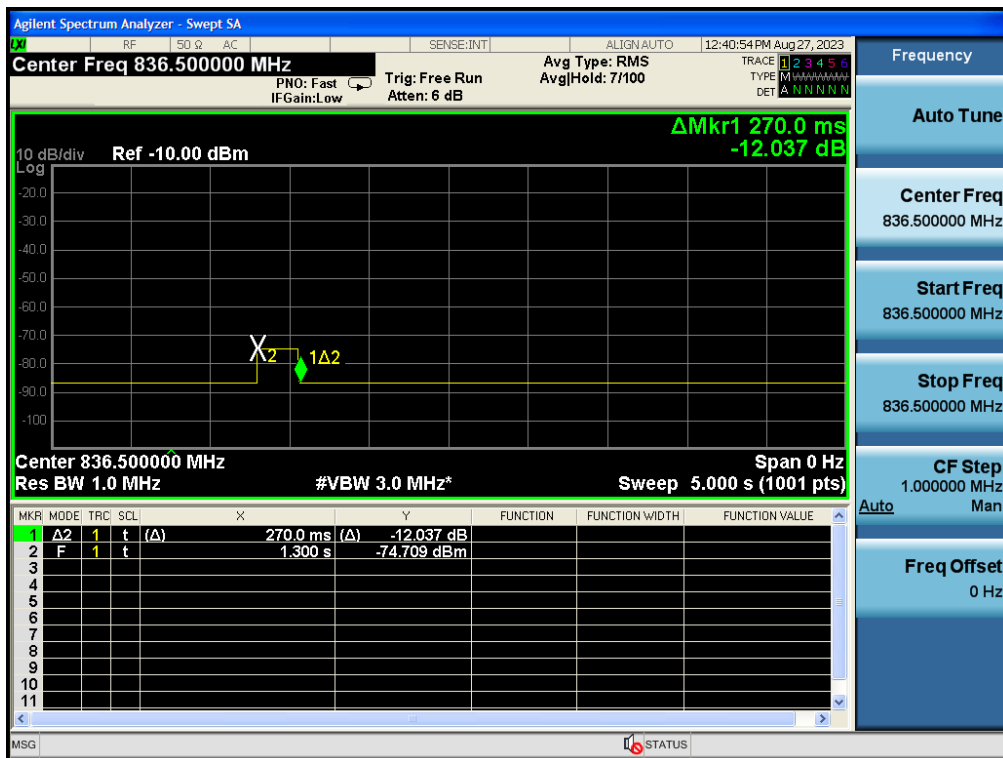
**5.11.2 Test Data:**

Test results of detection time				
Operation Bands		Detection Time(s)	Limit(s)	Result
Uplink	Cellular	0.040	0.300	PASS
	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	1.000	PASS
	Low A-E Blocks	0.040	1.000	PASS
	700 MHz Upper C Block	0.035	1.000	PASS
	Broadband PCS	0.030	1.000	PASS

Test results of detection time						
Operation Bands		Restarting Time(s)	Limit(s)	Restarting Counts	Limit	Result
Uplink	Cellular	140.5	60	3	5	PASS
	Low A-E Blocks	102.8	60	2	5	PASS
	700 MHz Upper C Block	105.0	60	2	5	PASS
	Broadband PCS	177.5	60	2	5	PASS
Downlink	Cellular	98.2	60	2	5	PASS
	Low A-E Blocks	121.4	60	2	5	PASS
	700 MHz Upper C Block	123.2	60	2	5	PASS
	Broadband PCS	112.4	60	2	5	PASS

## Test Test Plots of detection time

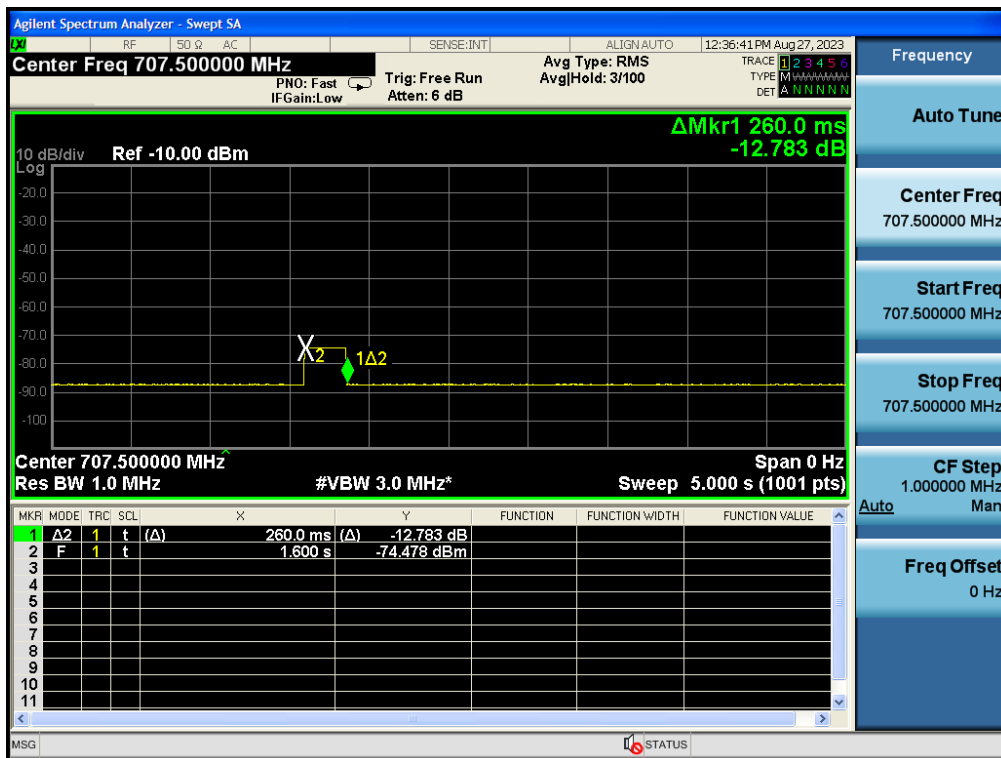
## Cellular UL



## Cellular DL



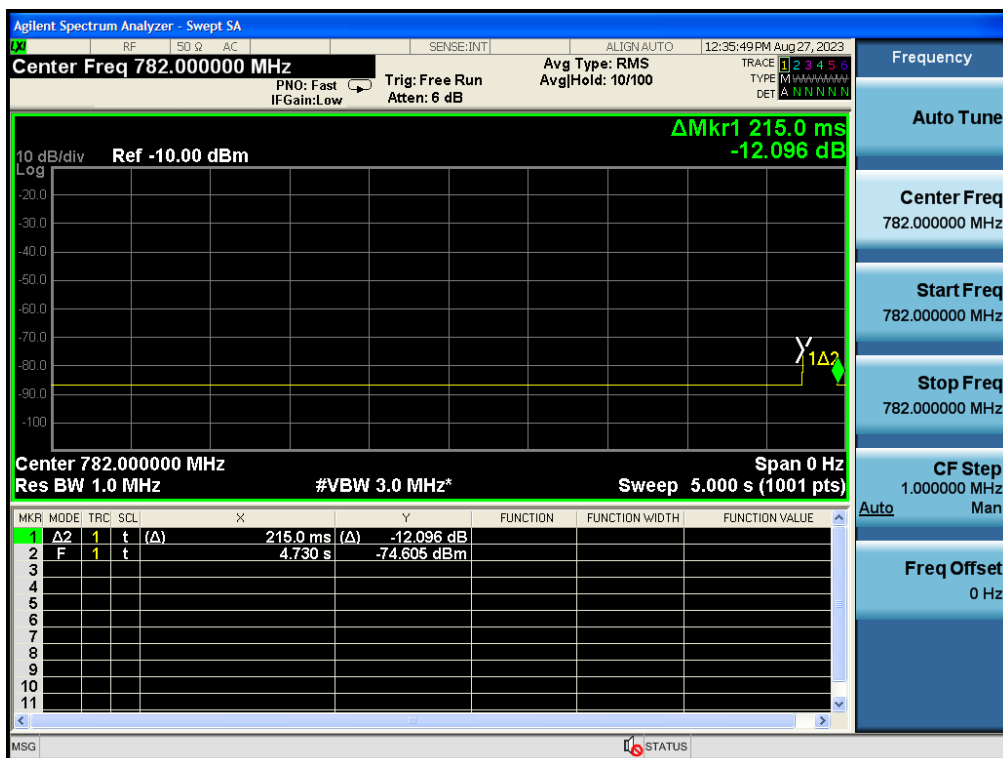
### Low A-E Blocks UL



### Low A-E Blocks DL



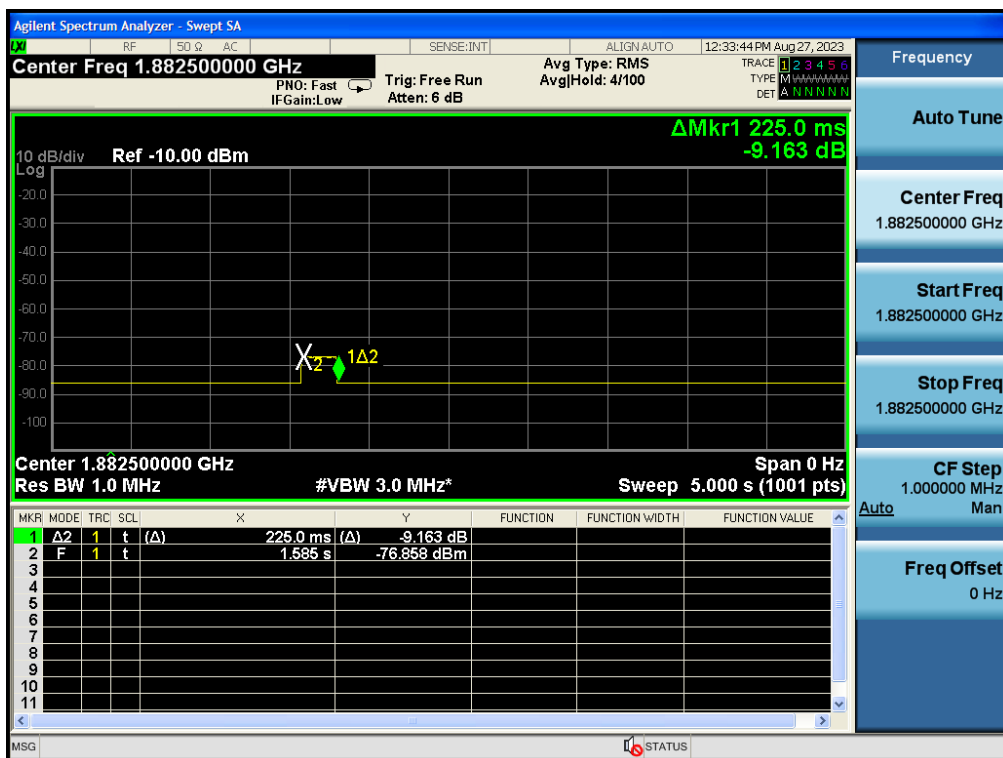
## 700 MHz Upper C Block UL



## 700 MHz Upper C Block DL



## Broadband PCS UL

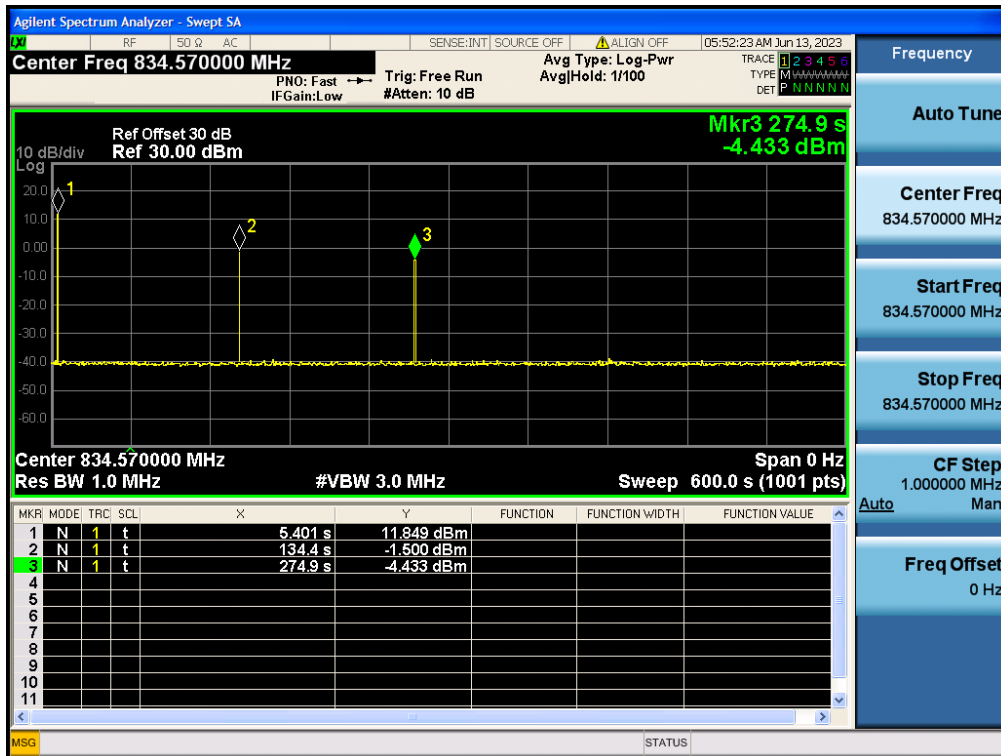


## Broadband PCS DL

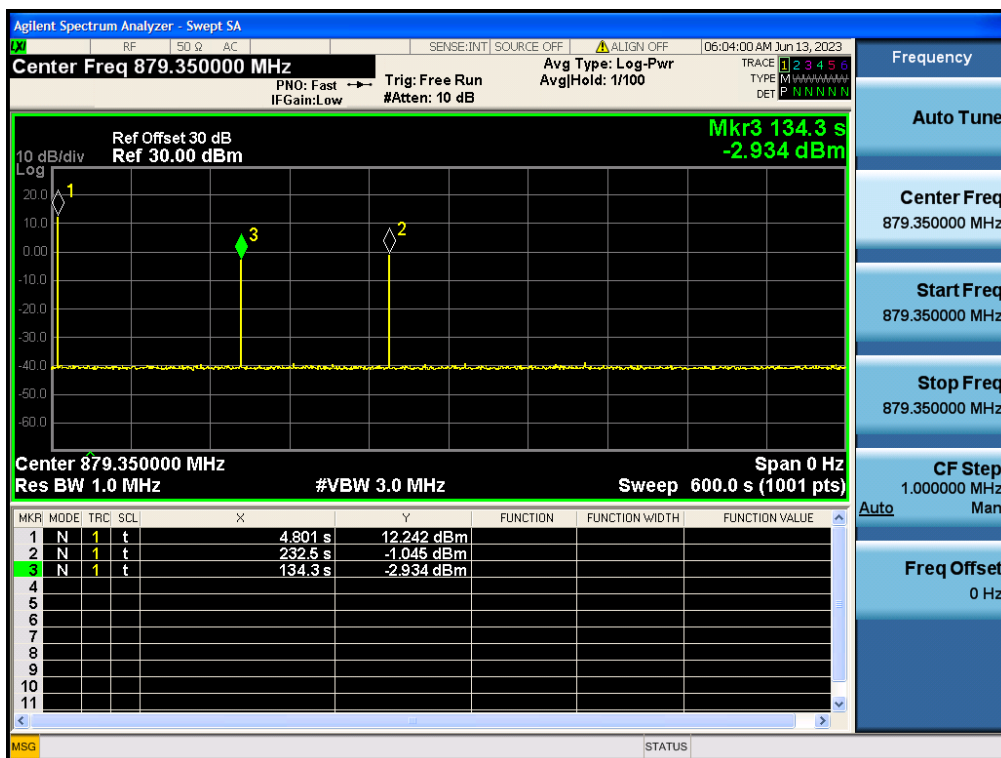


## Test Test Plots of restarting time

## Cellular UL

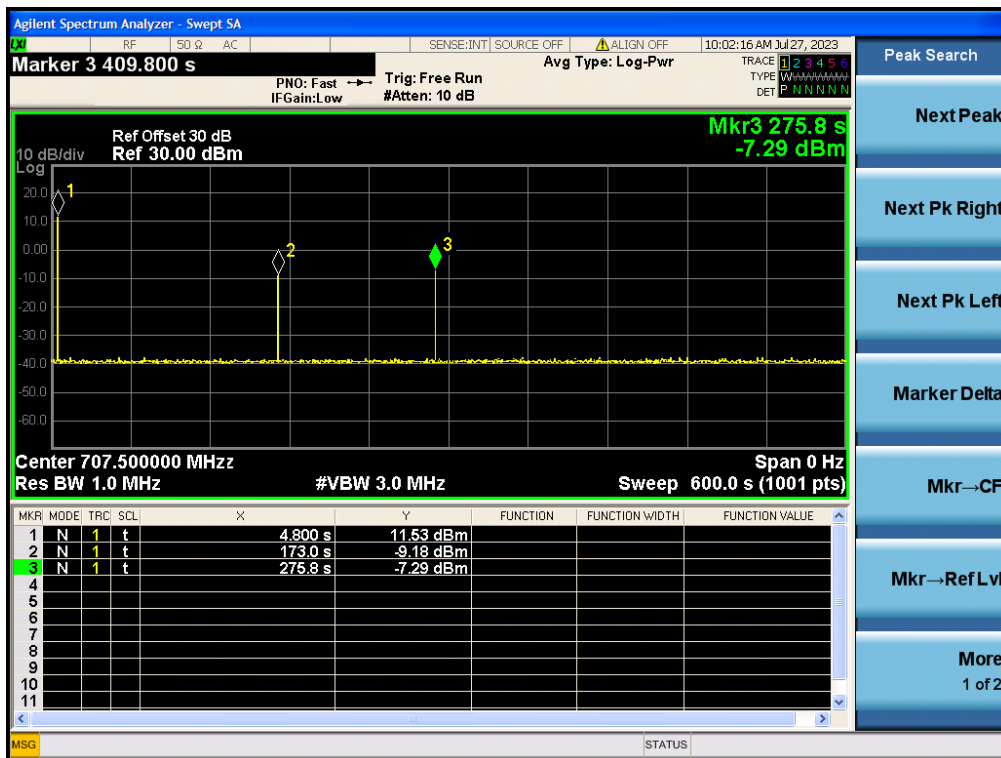


## Cellular DL

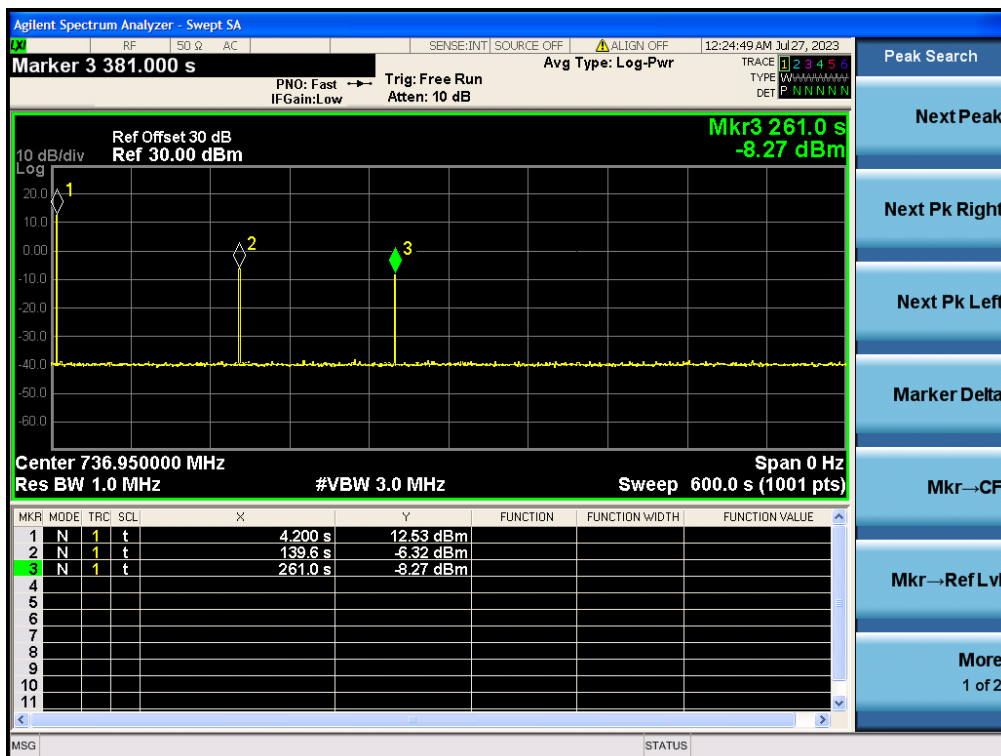




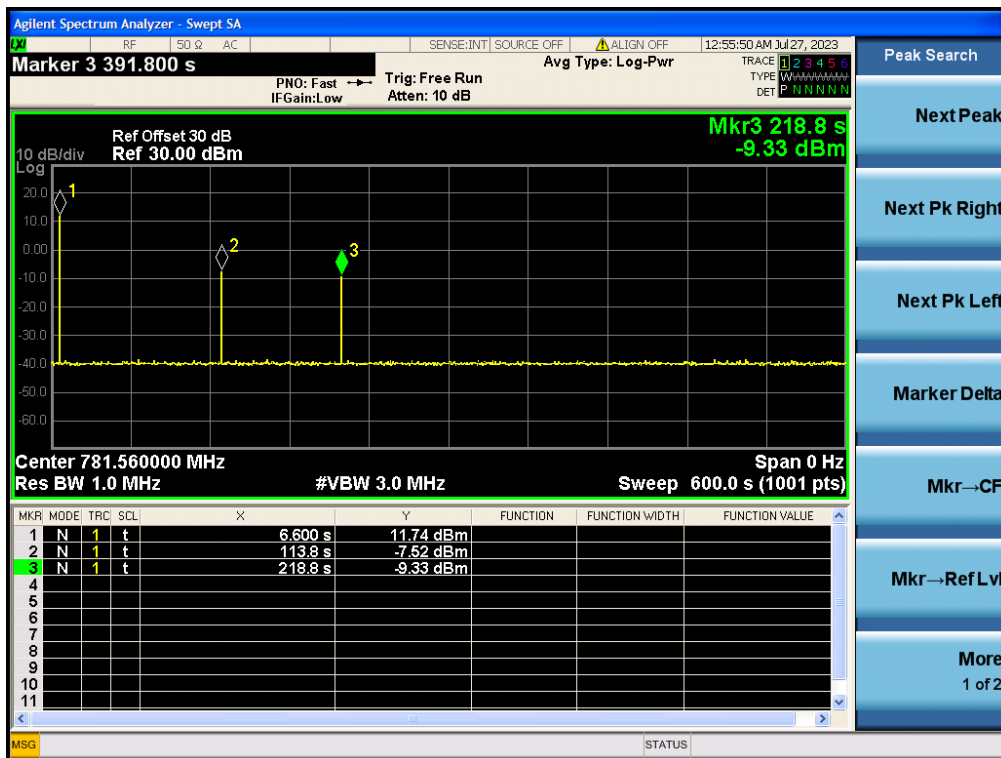
### Low A-E Blocks UL



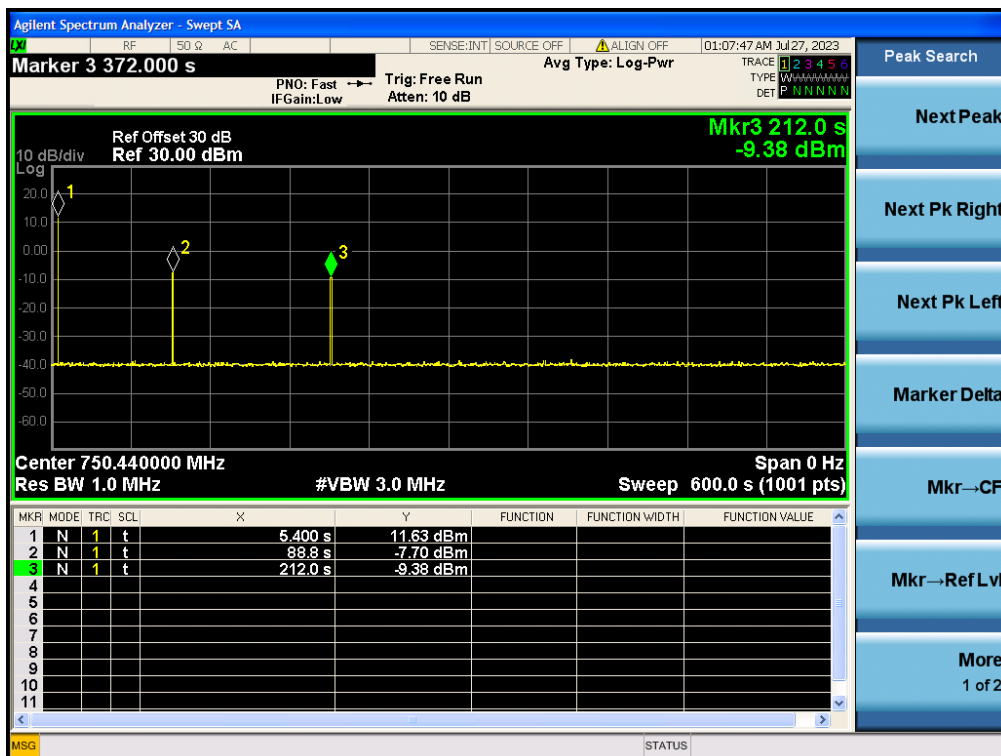
### Low A-E Blocks DL



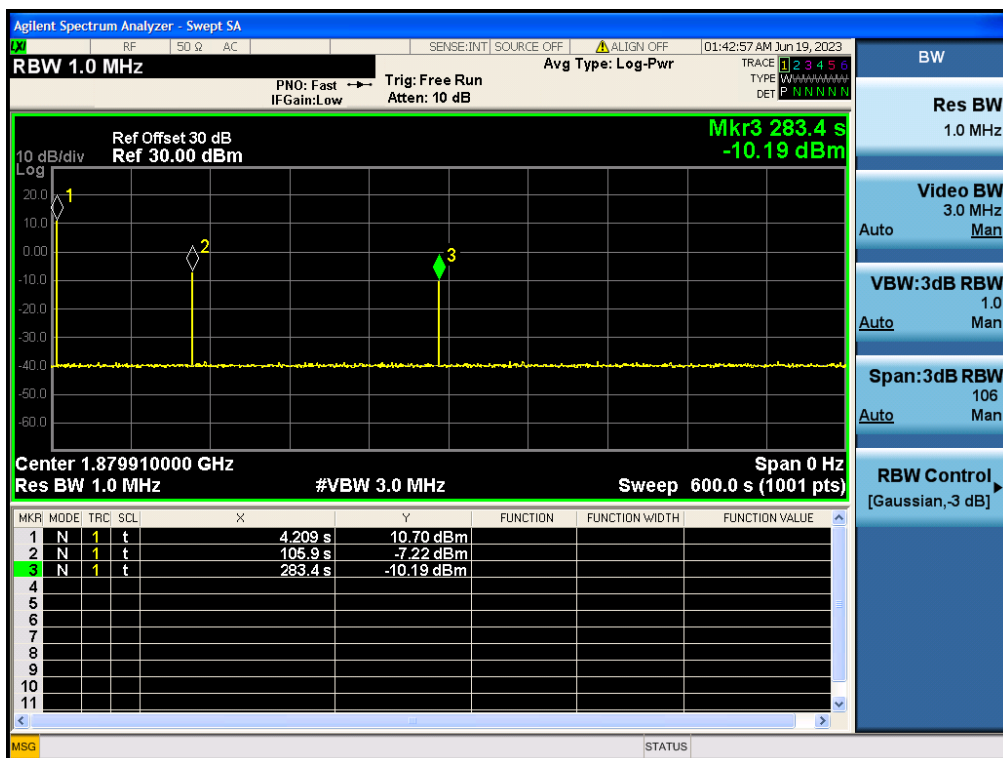
## 700 MHz Upper C Block UL



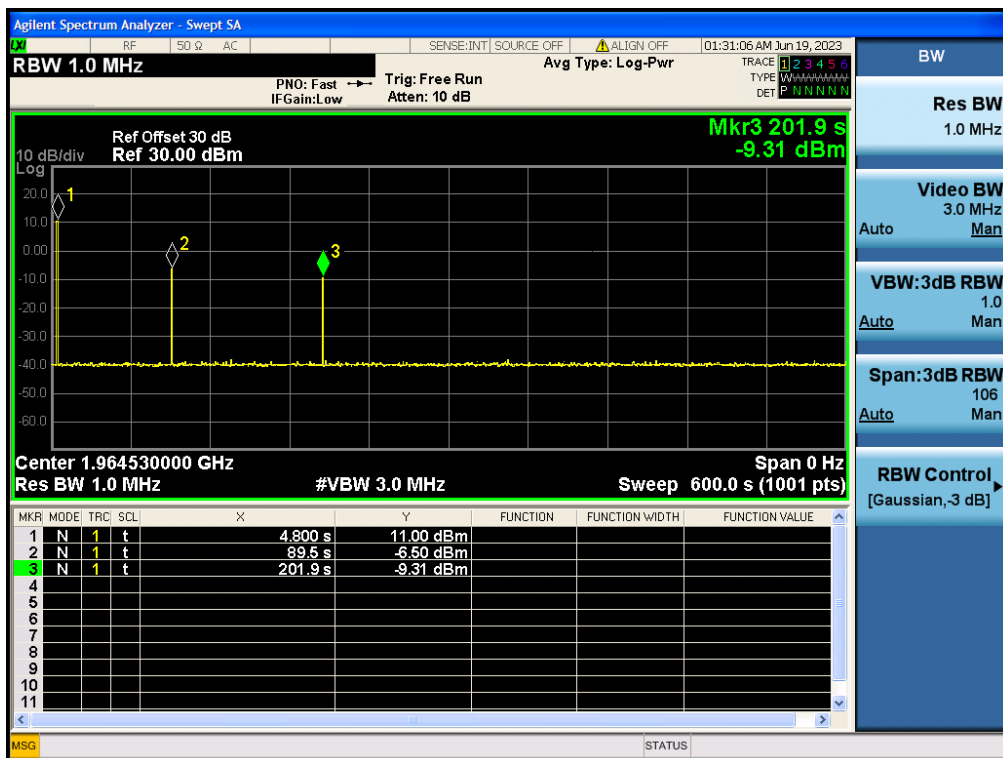
## 700 MHz Upper C Block DL



## 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	845.15	-56.31	838.51	-64.28	7.97	<12	PASS
+4	845.15	-54.25	838.51	-65.46	11.21	<12	PASS
+3	845.15	-58.35	838.51	-65.32	6.97	<12	PASS
+2	845.15	-59.41	838.51	-67.01	7.60	<12	PASS
+1	845.15	-60.32	838.51	-68.36	8.04	<12	PASS
+0	845.15	-60.10	838.51	-70.23	10.13	<12	PASS
-1	/	/	/	/	/	/	/
-2	/	/	/	/	/	/	/
-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	883.36	-57.47	889.61	-65.23	7.76	<12	PASS
+4	883.36	-58.15	889.61	-66.75	8.60	<12	PASS
+3	883.36	-59.85	889.61	-66.04	6.19	<12	PASS
+2	883.36	-60.24	889.61	-67.47	7.23	<12	PASS
+1	883.36	-59.42	889.61	-68.28	8.86	<12	PASS
+0	883.36	-60.01	889.61	-69.17	9.16	<12	PASS
-1	/	/	/	/	/	/	/
-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	1873.5	-58.14	1841.78	-67.36	9.22	<12	PASS
+4	1873.5	-58.86	1841.78	-68.14	9.28	<12	PASS
+3	1873.5	-60.75	1841.78	-68.47	7.72	<12	PASS
+2	1873.5	-61.14	1841.78	-70.76	9.62	<12	PASS
+1	1873.5	-62.01	1841.78	-71.83	9.82	<12	PASS
+0	1873.5	-62.75	1841.78	-72.01	9.26	<12	PASS
-1	/	/	/	/	/	/	/
-2	/	/	/	/	/	/	/
-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	1939.86	-58.94	1947.24	-65.86	6.92	<12	PASS
+4	1939.86	-59.25	1947.24	-66.47	7.22	<12	PASS
+3	1939.86	-60.14	1947.24	-67.31	7.17	<12	PASS
+2	1939.86	-61.28	1947.24	-68.31	7.03	<12	PASS
+1	1939.86	-62.85	1947.24	-70.29	7.44	<12	PASS
+0	1939.86	-63.10	1947.24	-71.38	8.28	<12	PASS
-1	/	/	/	/	/	/	/
-2	EUT Shutdown						

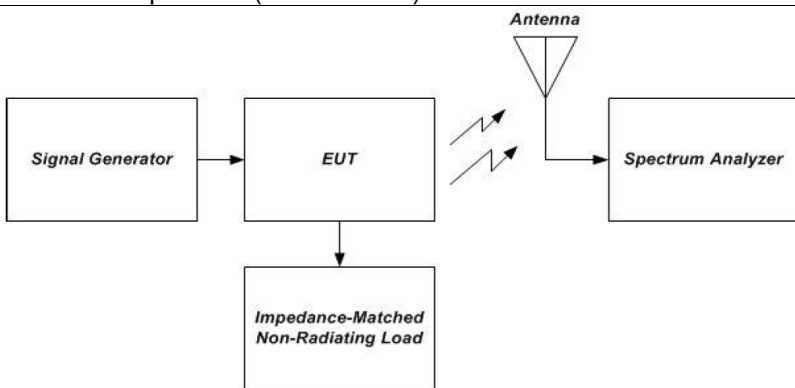
Low A-E Blocks	Uplink(699-716MHz)						
Signal Type	AWGN						
Isolation	Peak Oscillations		Minimal Level		Difference	Limit	Result
	Freq.	Level	Freq.	Level			
dB	MHz	dBm	MHz	dBm	dB	dB	PASS
+5	701.28	-59.08	705.13	-68.28	9.2	<12	PASS
+4	701.28	-60.14	705.13	-69.47	9.33	<12	PASS
+3	701.28	-61.85	705.13	-70.36	8.51	<12	PASS
+2	701.28	-62.73	705.13	-71.75	9.02	<12	PASS
+1	701.28	-63.29	705.13	-72.34	9.05	<12	PASS
+0	701.28	-62.31	705.13	-72.05	9.74	<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	738.45	-66.47	6.42	<12	PASS
+4	730.24	-61.17	738.45	-67.01	5.84	<12	PASS
+3	730.24	-62.29	738.45	-68.63	6.34	<12	PASS
+2	730.24	-63.05	738.45	-68.17	5.12	<12	PASS
+1	730.24	-64.36	738.45	-69.28	4.92	<12	PASS
+0	730.24	-64.47	738.45	-69.43	4.96	<12	PASS
-1	/	/	/	/	/	/	/
-2	/	/	/	/	/	/	/
-3	EUT Shutdown						

700 MHz Upper C 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	783.75	-65.78	8.76	<12	PASS
+4	778.86	-58.14	783.75	-66.01	7.87	<12	PASS
+3	778.86	-60.31	783.75	-68.42	8.11	<12	PASS
+2	778.86	-61.28	783.75	-69.01	7.73	<12	PASS
+1	778.86	-62.71	783.75	-70.36	7.65	<12	PASS
+0	778.86	-63.18	783.75	-71.27	8.09	<12	PASS
-1	/	/	/	/	/	/	/
-2	/	/	/	/	/	/	/
-3	EUT Shutdown						

700 MHz Upper C 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	746.83	-59.02	750.12	-66.83	7.81	<12	PASS
+4	746.83	-60.34	750.12	-68.14	7.8	<12	PASS
+3	746.83	-60.24	750.12	-68.02	7.78	<12	PASS
+2	746.83	-61.43	750.12	-67.14	5.71	<12	PASS
+1	746.83	-62.47	750.12	-68.83	6.36	<12	PASS
+0	746.83	-63.29	750.12	-69.25	5.96	<12	PASS
-1	/	/	/	/	/	/	/
-2	/	/	/	/	/	/	/
-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:



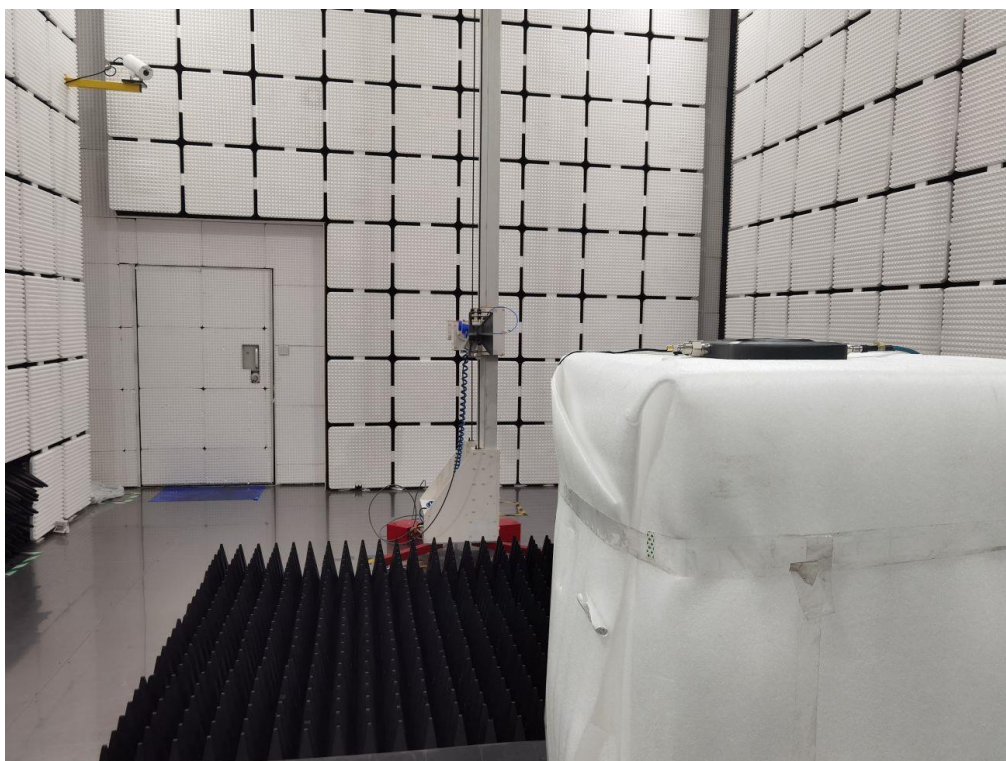
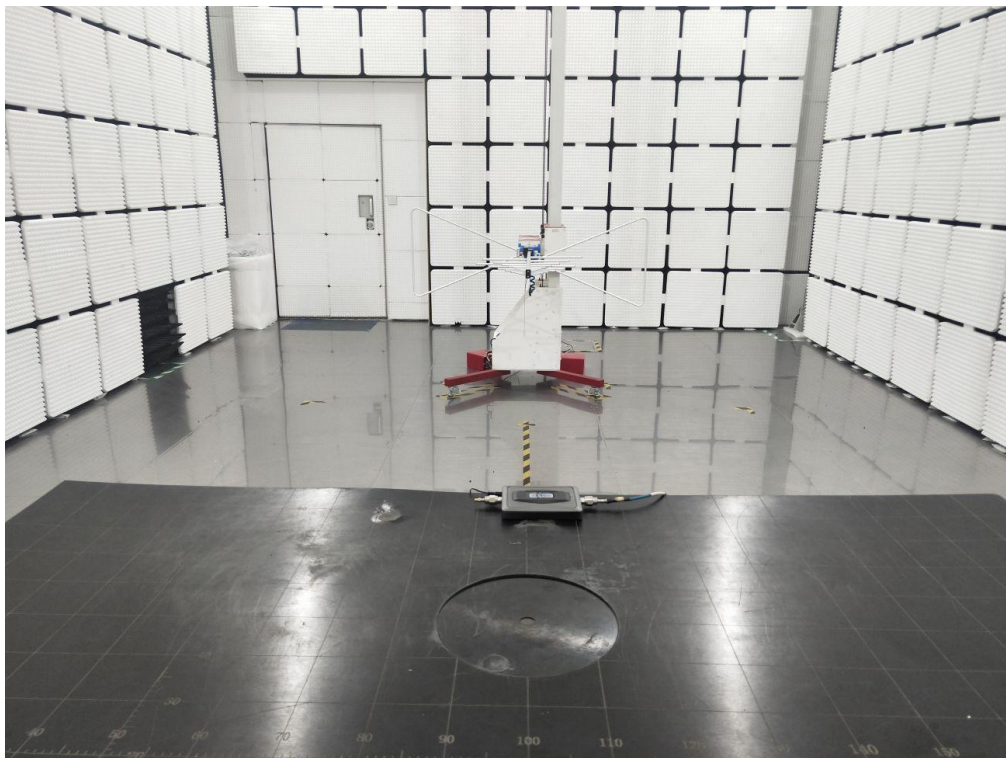
Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
Cellular Uplink				
860.2	V	-39.75	- 13.00	26.75
860.2	H	-41.73		28.73
1757.1	V	-38.05		25.05
1757.1	H	-40.75		27.75
-	-	-	-	-
Cellular Downlink				
886.1	V	-49.12	- 13.00	36.12
886.3	H	-48.05		35.05
1795.8	V	-50.28		37.28
1795.8	H	-51.28		38.28
-	-	-	-	-

Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
Broadband PCS Uplink				
949.1	V	-38.86	- 13.00	25.86
949.1	H	-40.15		27.15
3786.3	V	-40.76		27.76
3786.3	H	-39.25		26.25
-	-	-	-	-
Broadband PCS Downlink				
983.8	V	-48.83	- 13.00	35.83
983.8	H	-51.02		38.02
3946.1	V	-49.58		36.58
3946.1	H	-50.28		37.28

Frequency [MHz]	Antenna 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
-	-	-	-	-

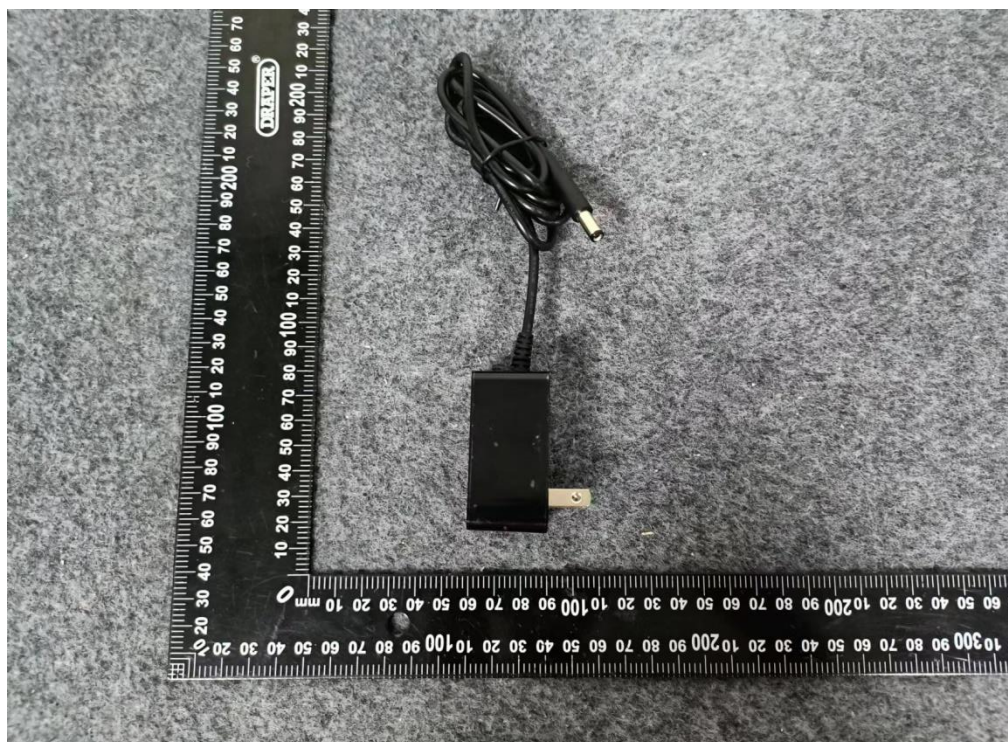
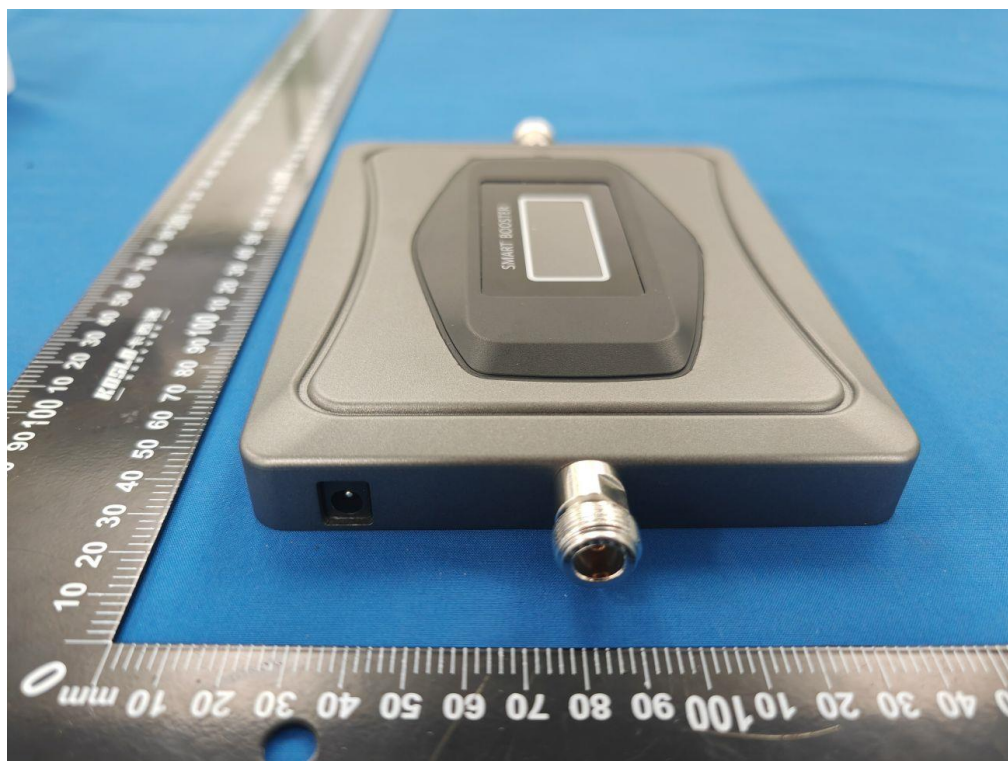
Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
700 MHz Upper C Block Uplink				
968.1	V	-45.76	-13.00	32.76
968.1	H	-43.08		30.08
1886.4	V	-43.28		30.28
1886.4	H	-42.14		29.14
-	-	-	-	-
700 MHz Upper C Block Downlink				
947.1	V	-47.86	-13.00	34.86
947.1	H	-49.24		36.24
1885.2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

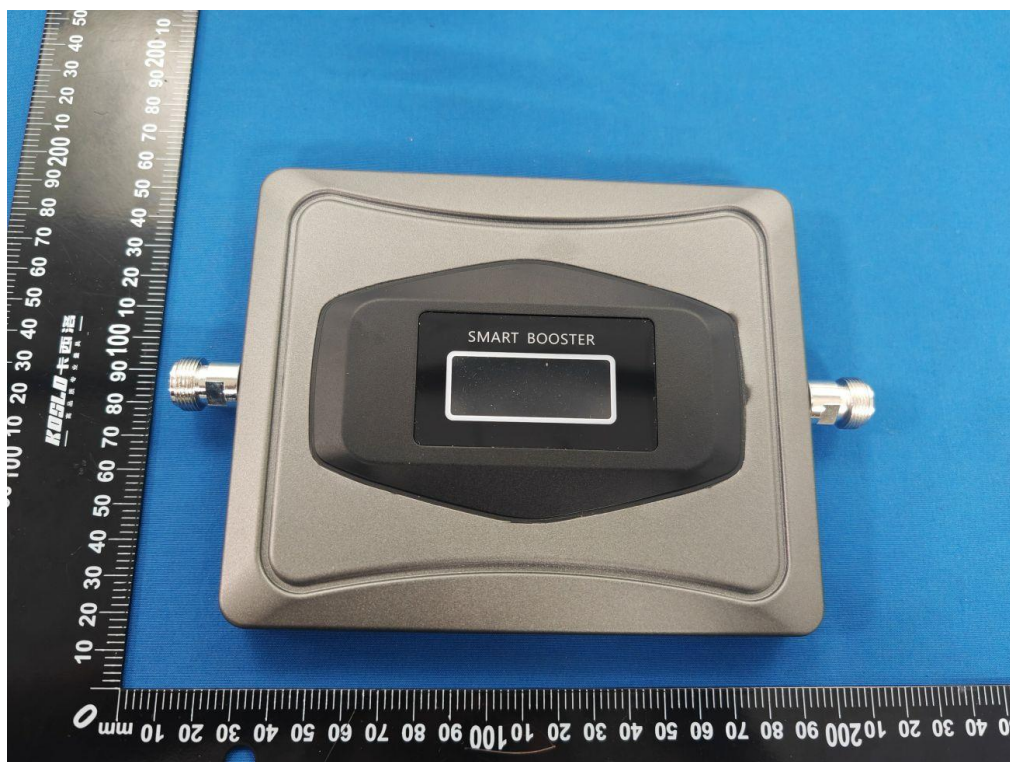
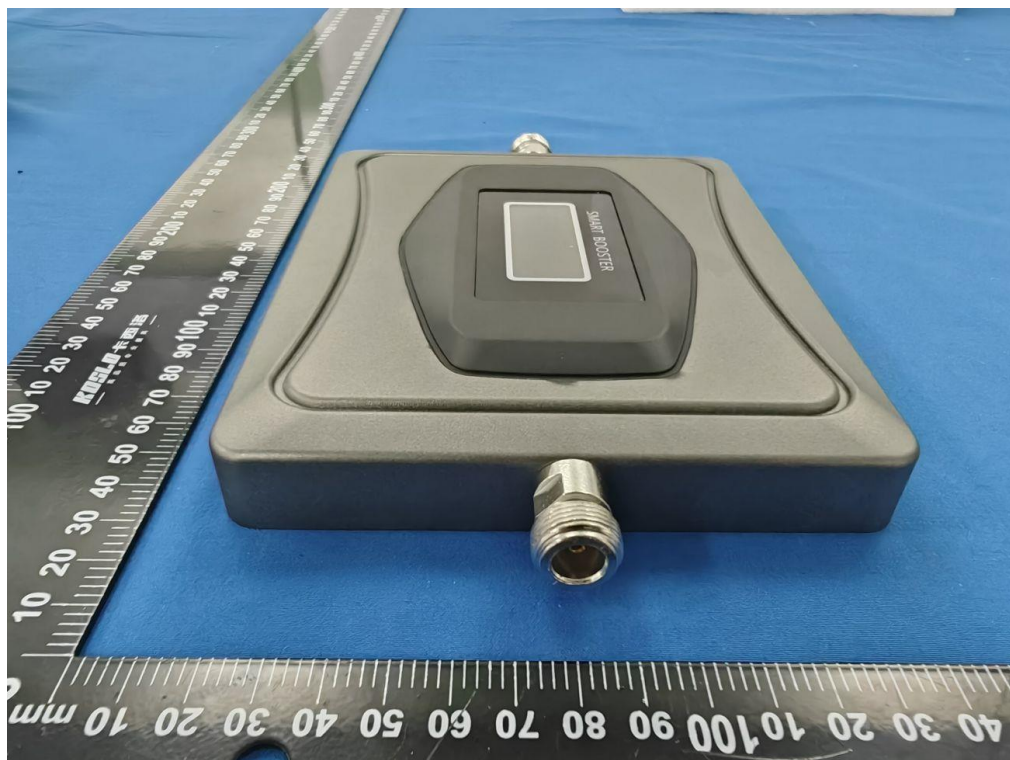
## 6 Test Setup Photos



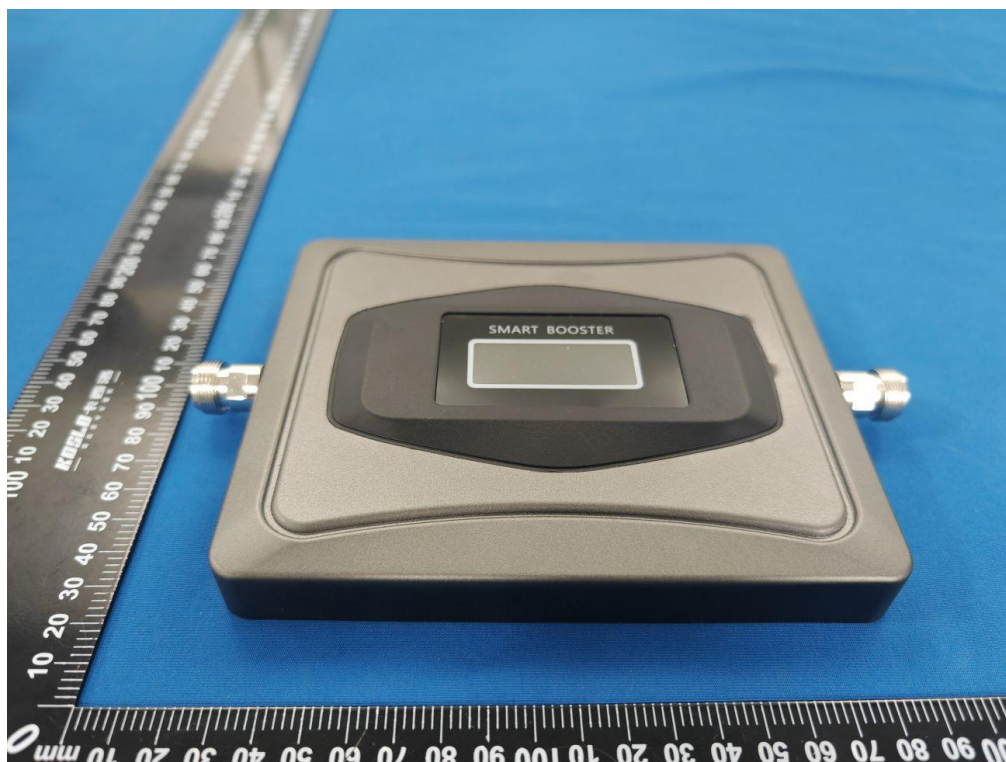
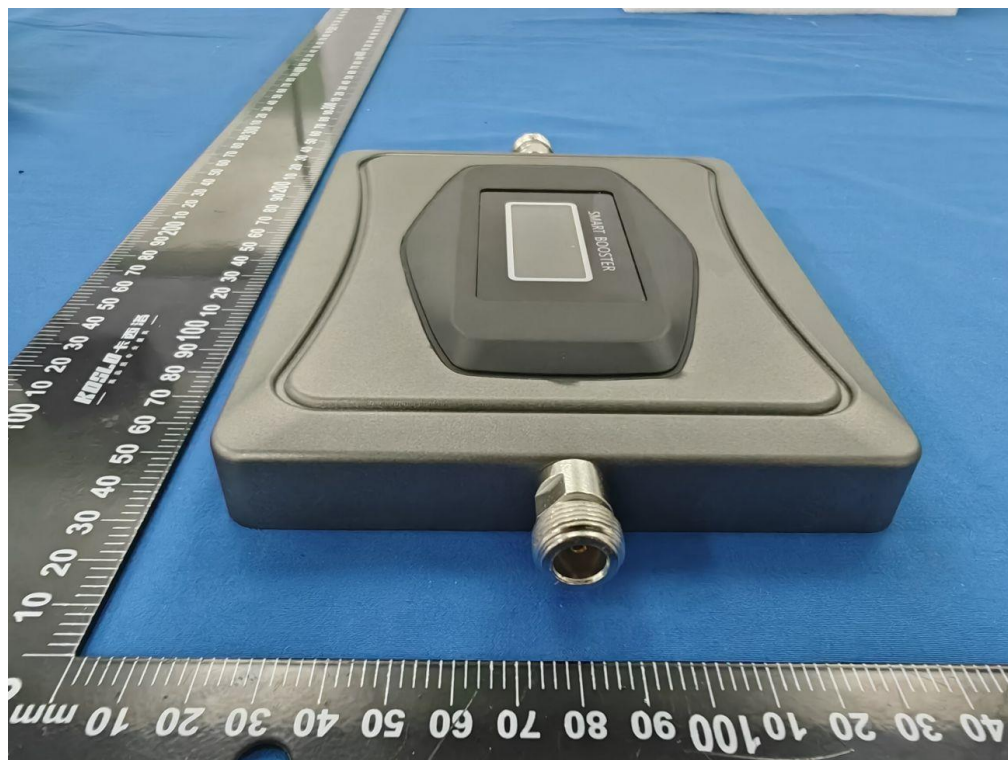


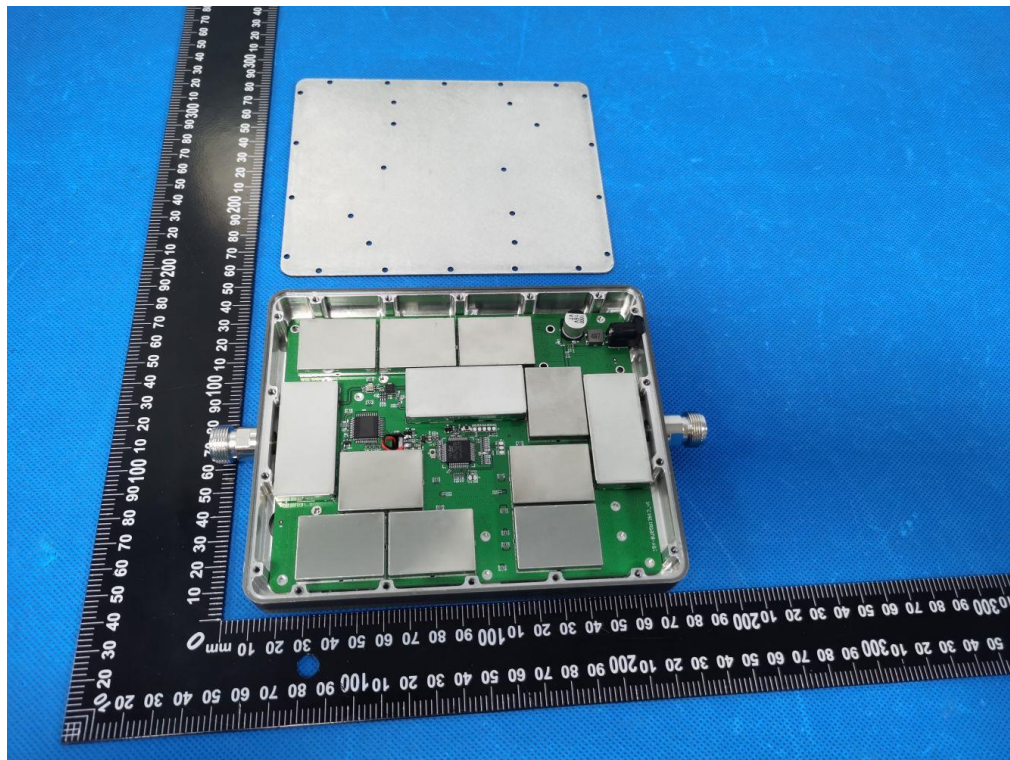
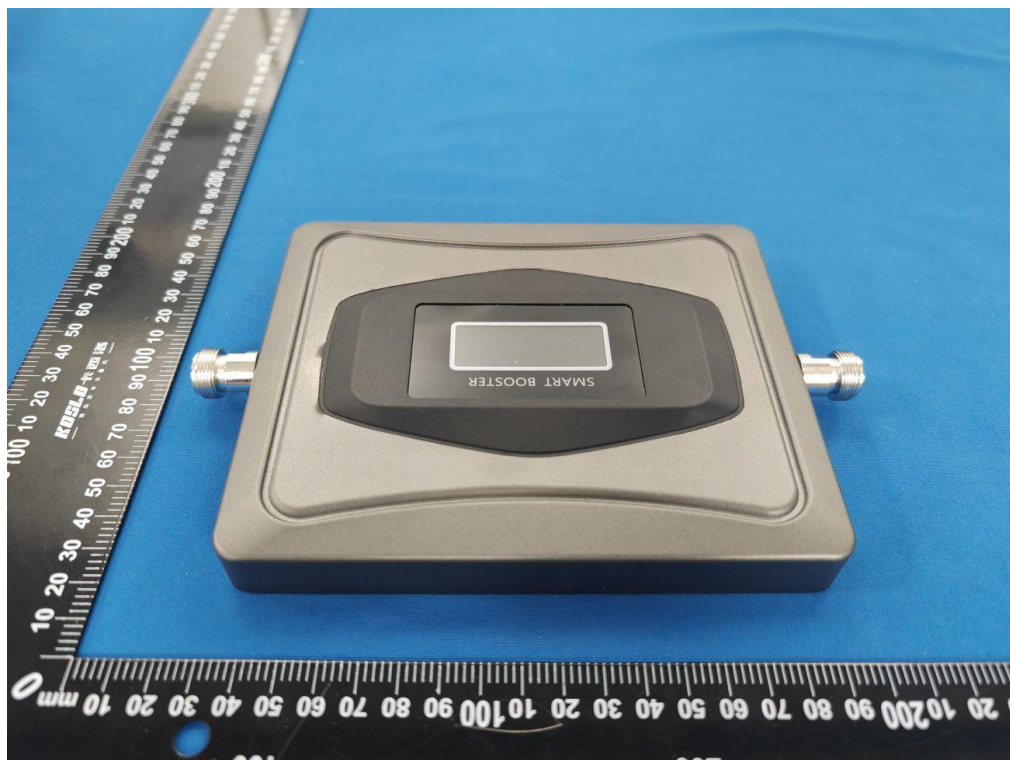
## 7 EUT Photos



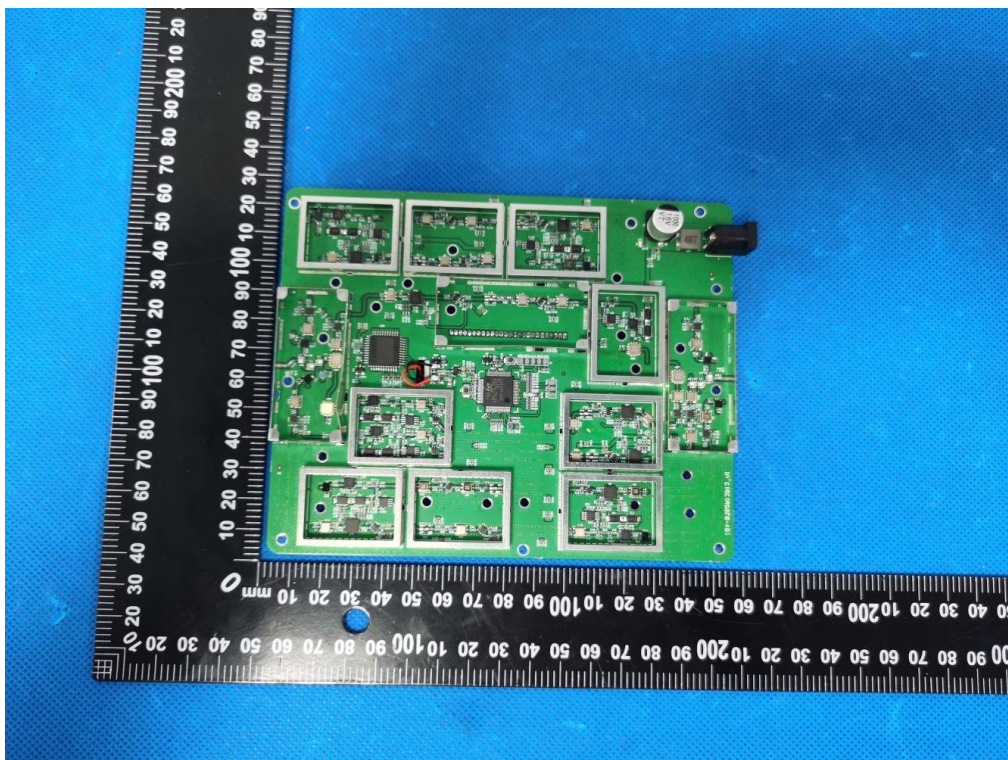
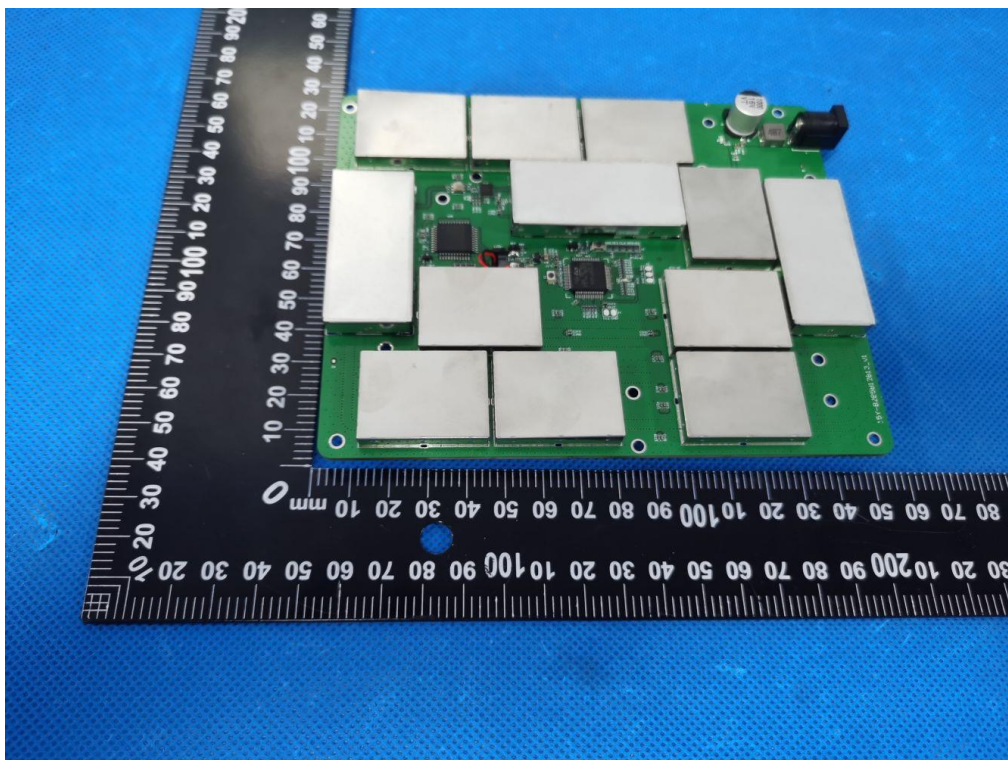




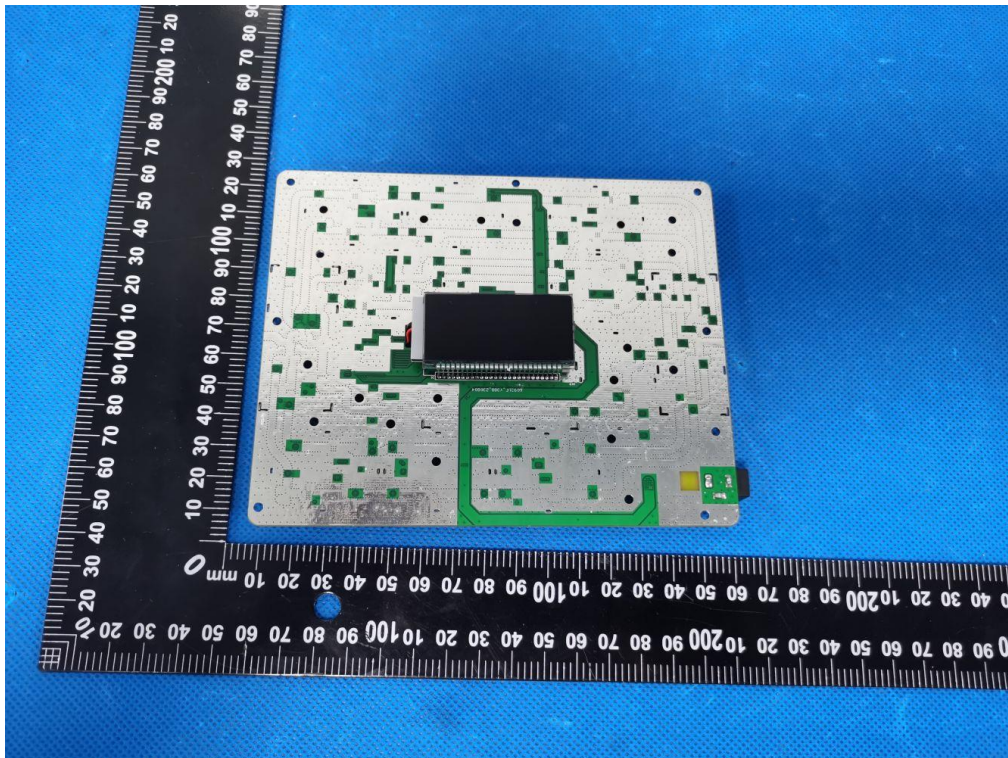














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BTF Testing Lab (Shenzhen) Co., Ltd.

F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street,  
Bao'an District, Shenzhen, China

[www.btf-lab.com](http://www.btf-lab.com)

**-- END OF REPORT --**