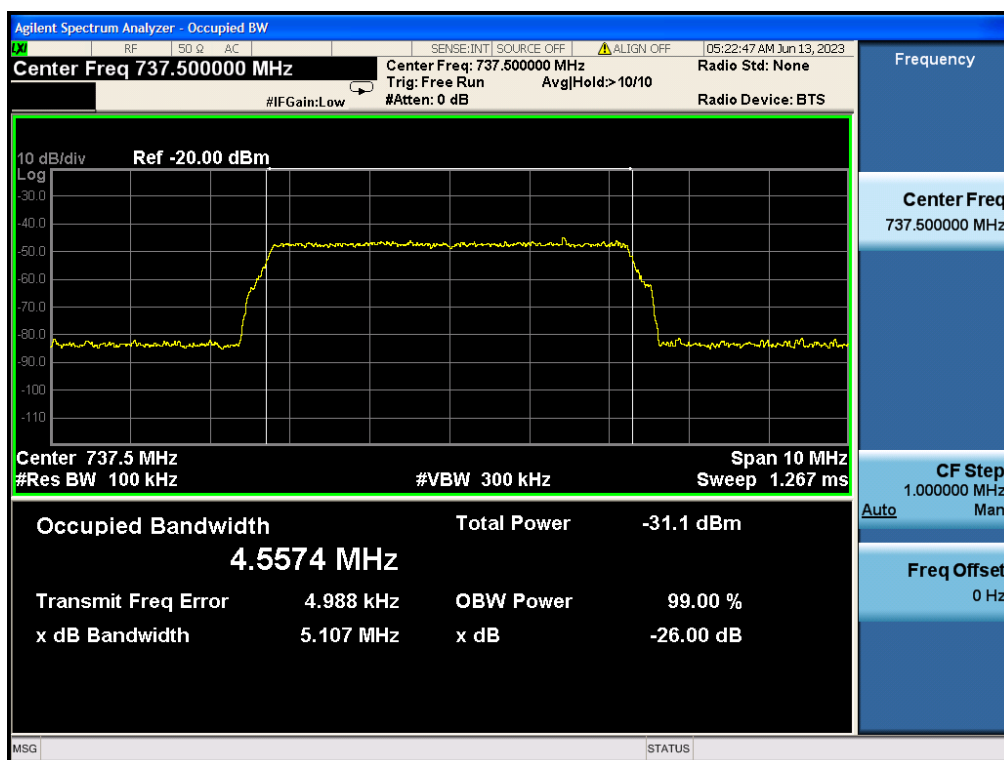
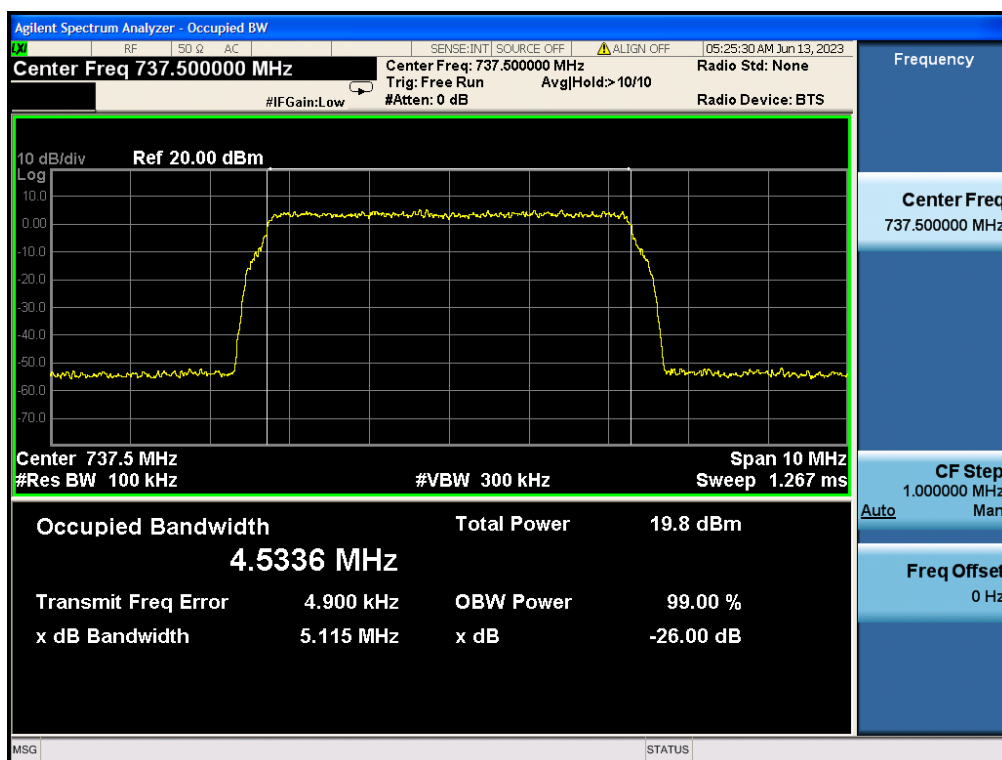


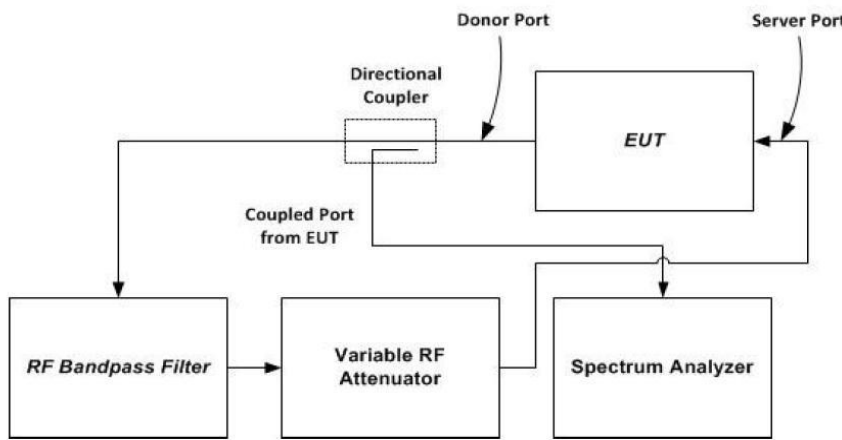
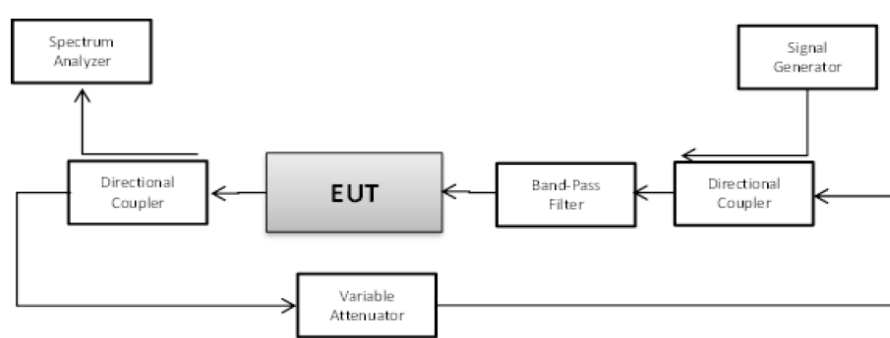
Band 12 DL Input



Band 12 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>Figure 7 – Oscillation detection (7.11.2) test setup</p>  <p>Figure 8 – Oscillation mitigation/shutdown test setup</p>
Procedure:	<ol style="list-style-type: none"> 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. Note: The band pass filter shall provide sufficient out-of-band rejection to prevent oscillations from occurring in bands not under test. Set the oscilloscope for a positive edge trigger and single trigger operation. Set the attenuation as necessary until the oscilloscope triggers and increase the attenuation level to a point 10 dB above that point. Reset the trigger of the oscilloscope and reset the EUT with a power cycle. Force the EUT to oscillate this will trigger the oscilloscope. 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.

	<p>g) Capture the oscilloscope trace for inclusion in the test report.</p> <p>h) Repeat steps 7.11.2 to 7.11.7 for all operational uplink and downlink bands.</p> <p>i) Set the oscilloscope time base for longer than 1 minute and measure the restart 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 \geq 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

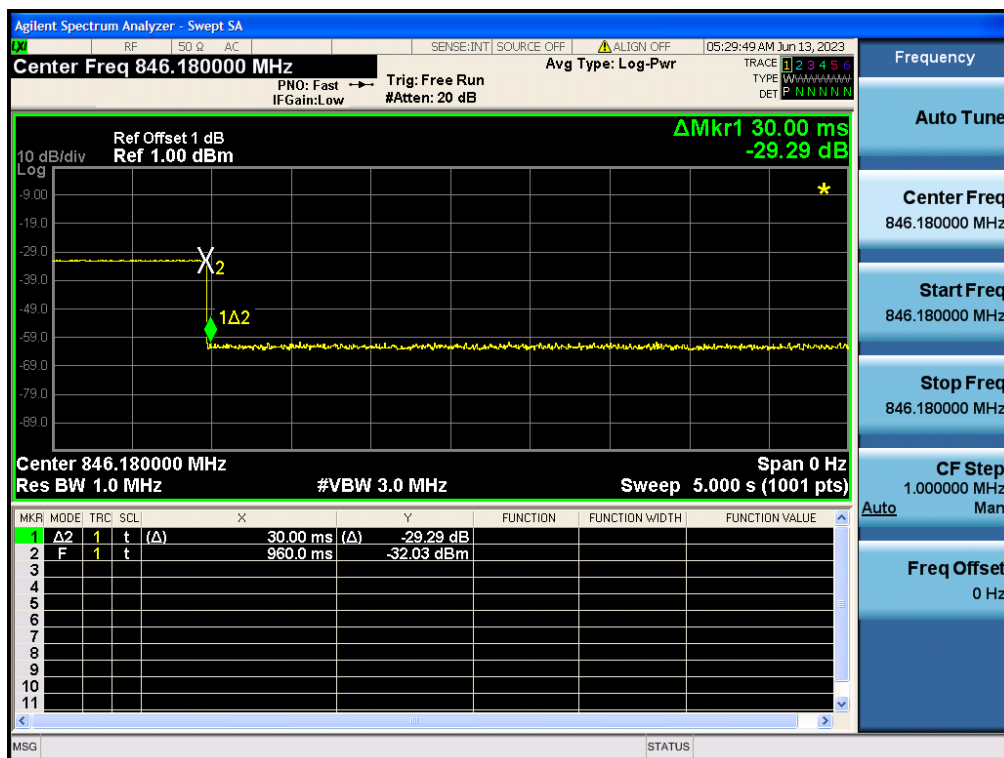
5.11.2 Test Data:

Test results of detection time				
Operation Bands		Detection Time(s)	Limit(s)	Result
Uplink	Band 25	0.030	0.300	PASS
	CDMA	0.030	0.300	PASS
	Band 4	0.035	0.300	PASS
	Band 12	0.040	0.300	PASS
Downlink	Band 25	0.045	1.000	PASS
	CDMA	0.040	1.000	PASS
	Band 4	0.035	1.000	PASS
	Band 12	0.040	1.000	PASS

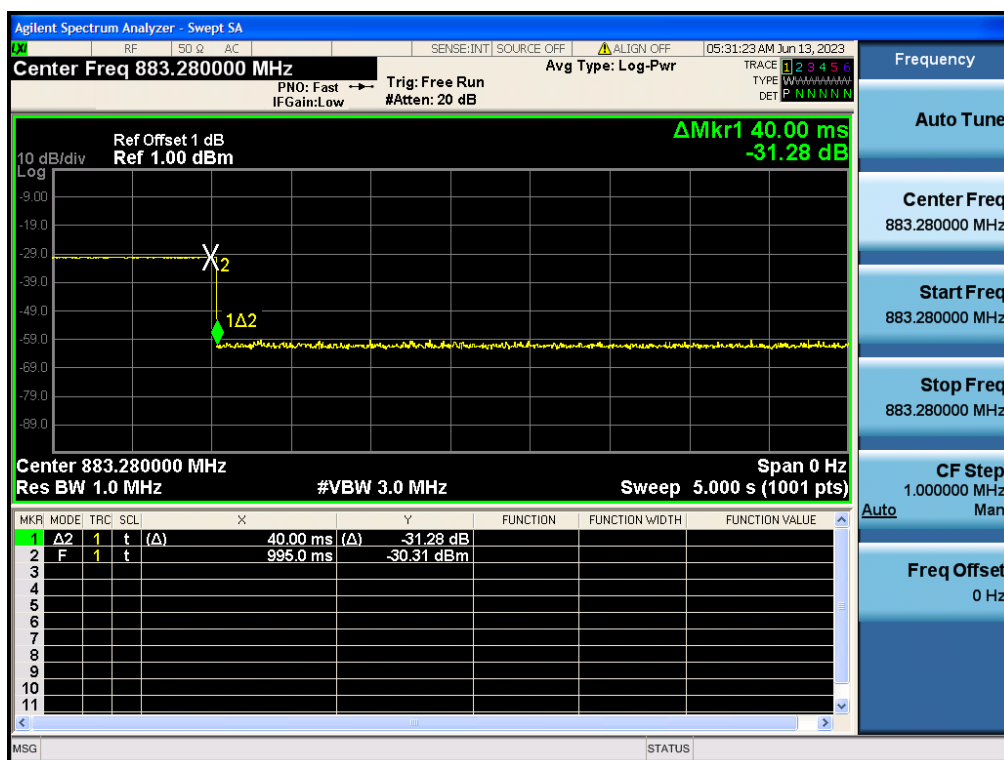
Test results of detection time						
Operation Bands		Restarting Time(s)	Limit(s)	Restarting Counts	Limit	Result
Uplink	Band 25	73.8	60	3	5	PASS
	CDMA	61.0	60	2	5	PASS
	Band 4	61.2	60	2	5	PASS
	Band 12	70.2	60	3	5	PASS
Downlink	Band 25	71.4	60	2	5	PASS
	CDMA	62.8	60	2	5	PASS
	Band 4	60.8	60	2	5	PASS
	Band 12	79.5	60	3	5	PASS

Test Test Plots of detection time

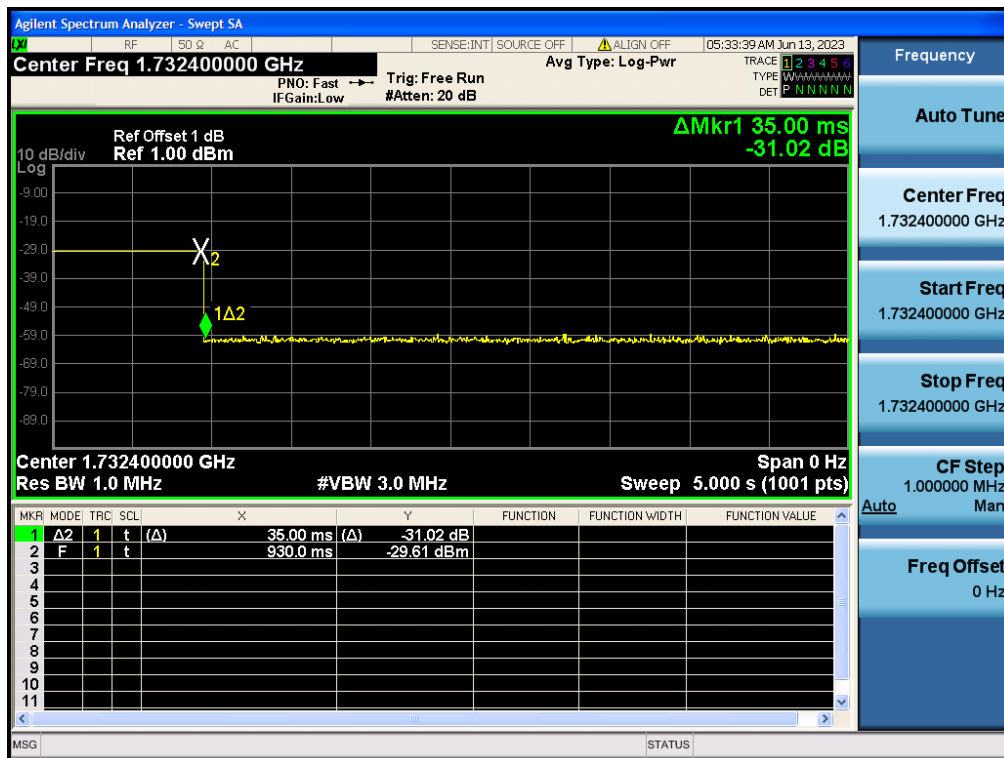
CDMA UL



CDMA DL



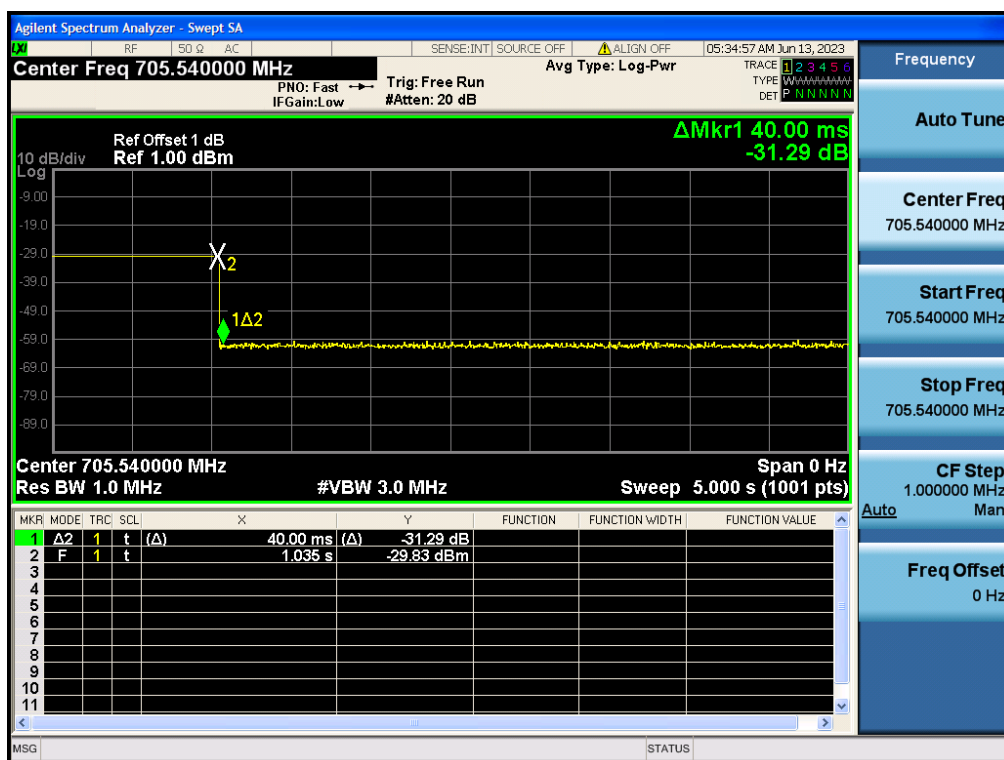
Band 4 UL



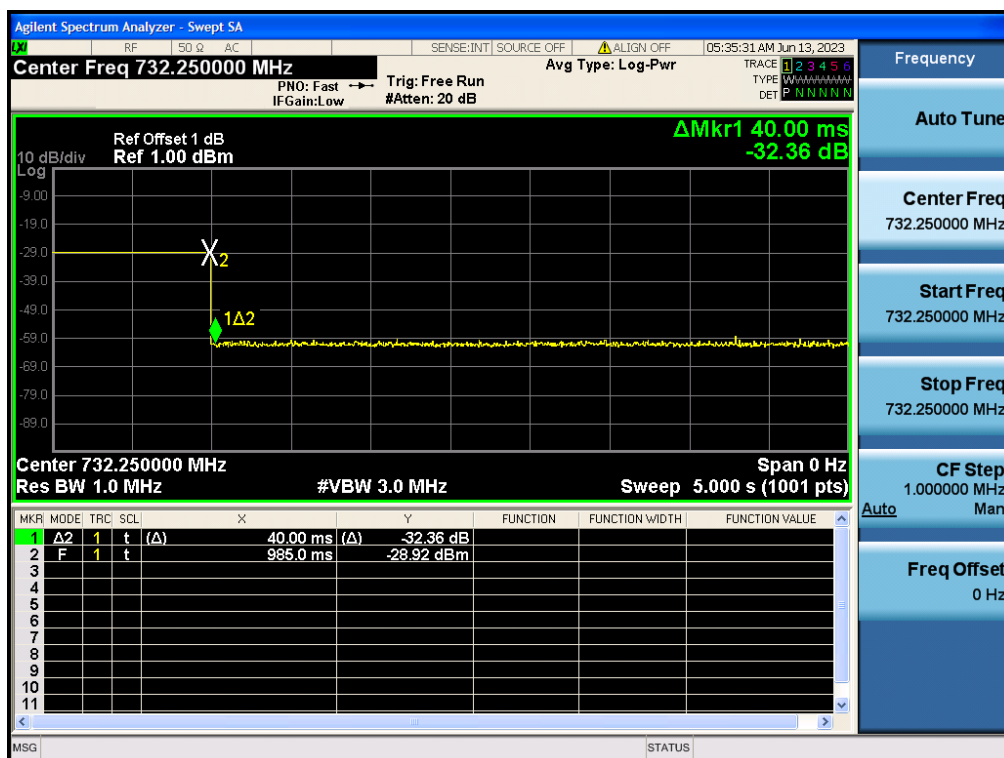
Band 4 DL



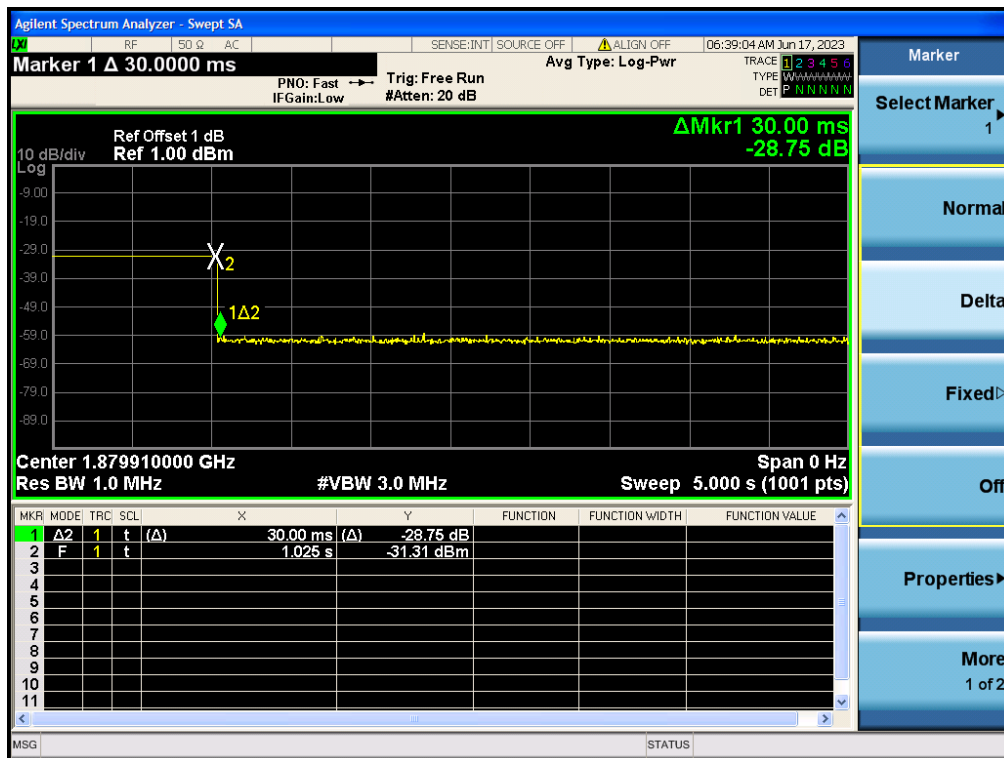
Band 12 UL



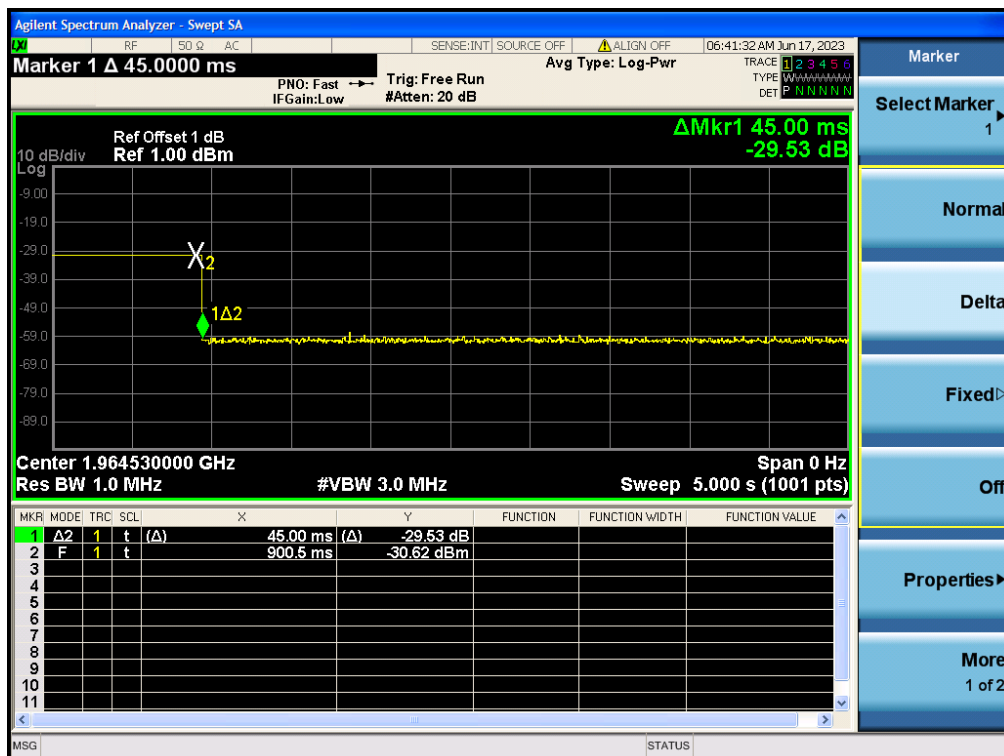
Band 12 DL



Band 25 UL

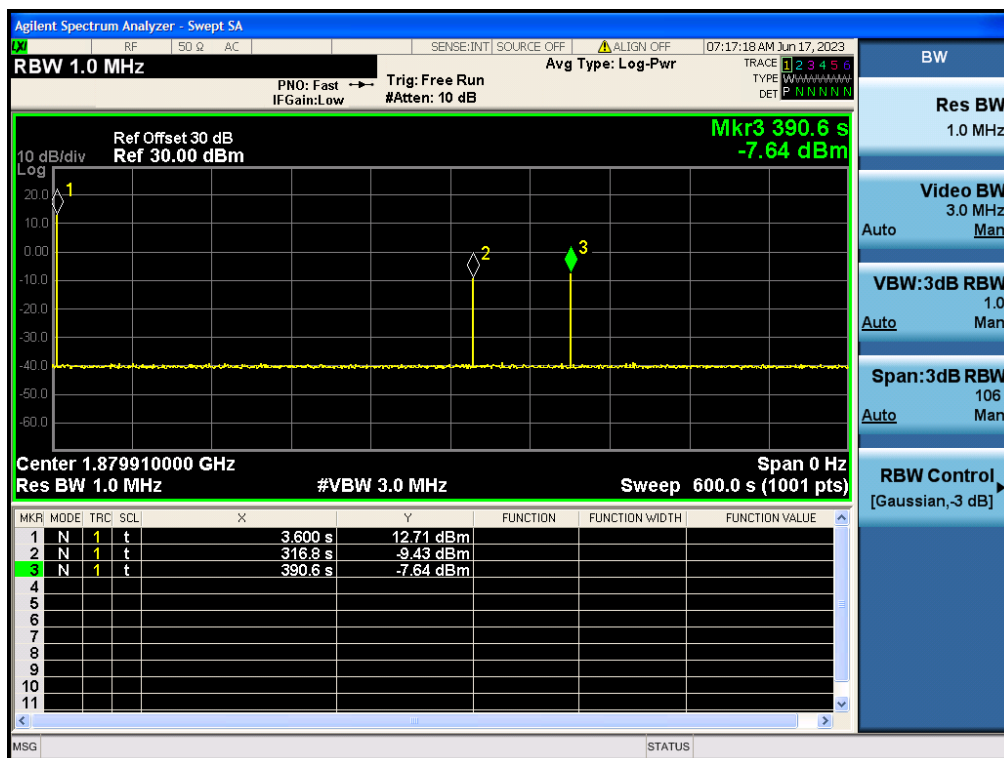


Band 25 DL

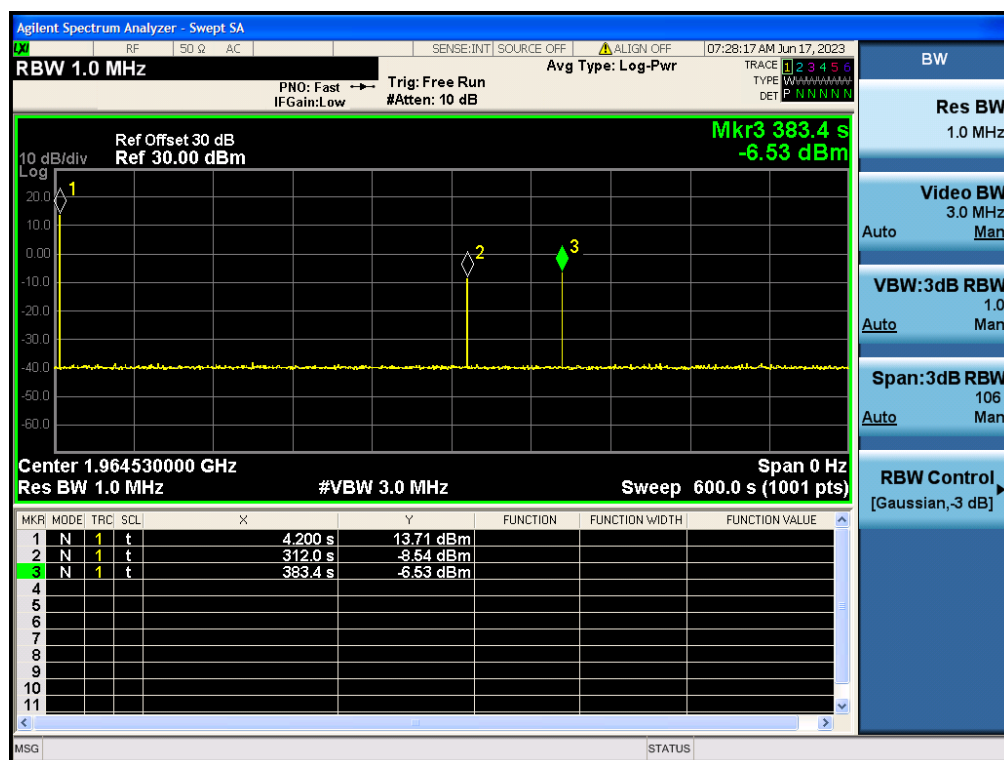


Test Test Plots of restarting time

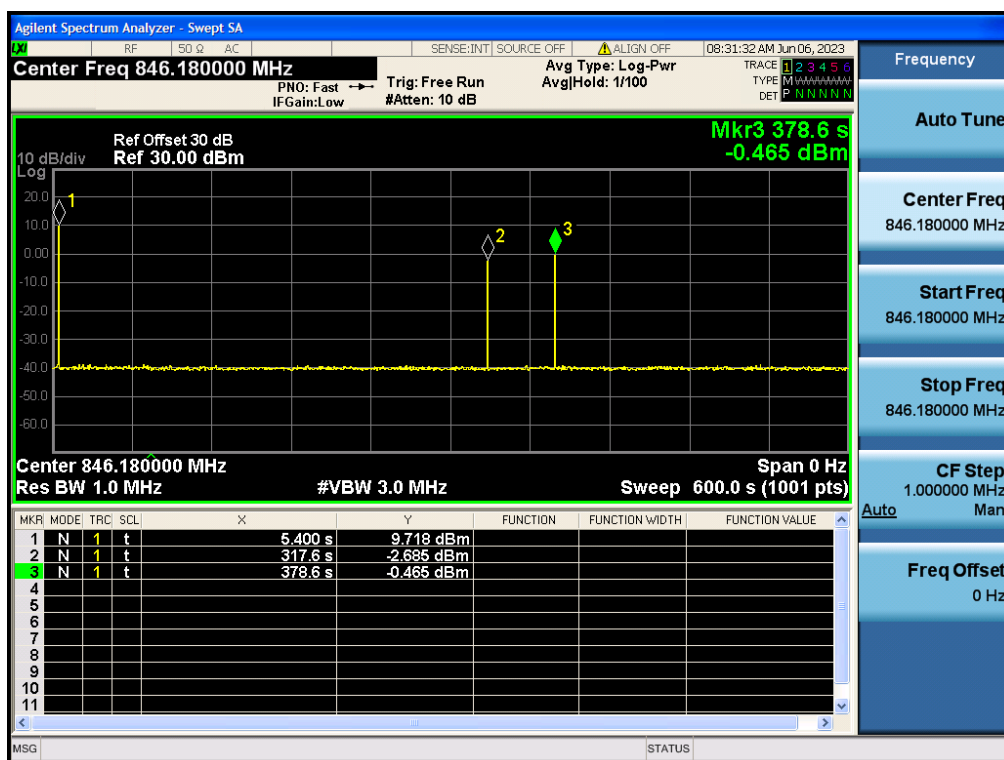
Band 25 UL



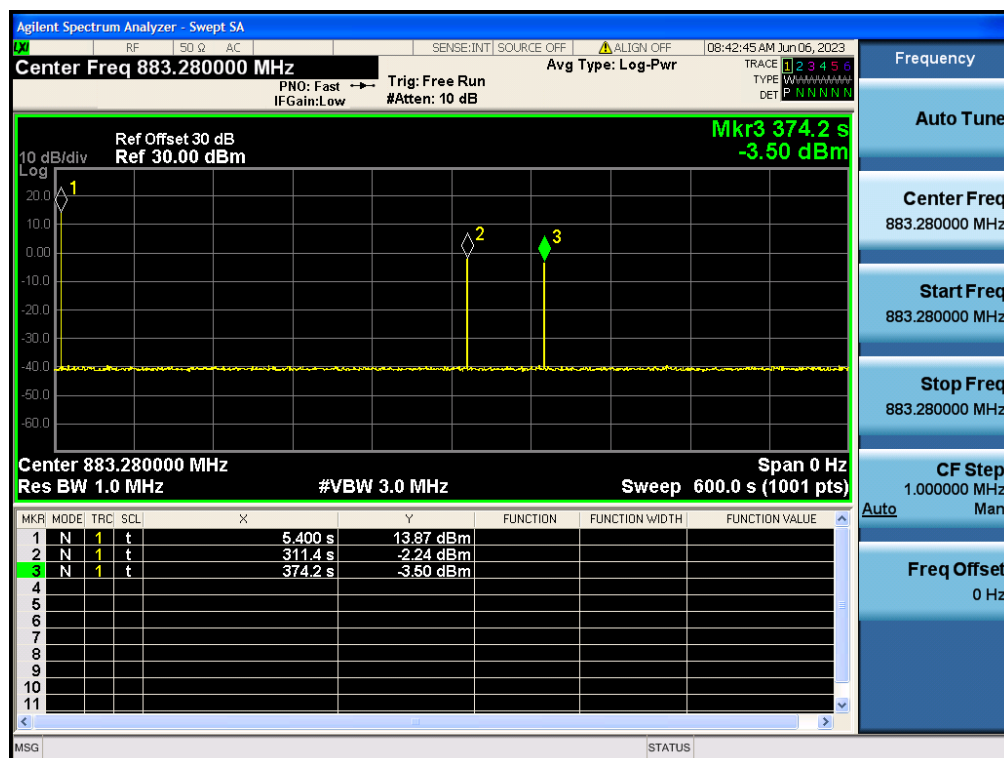
Band 25 DL



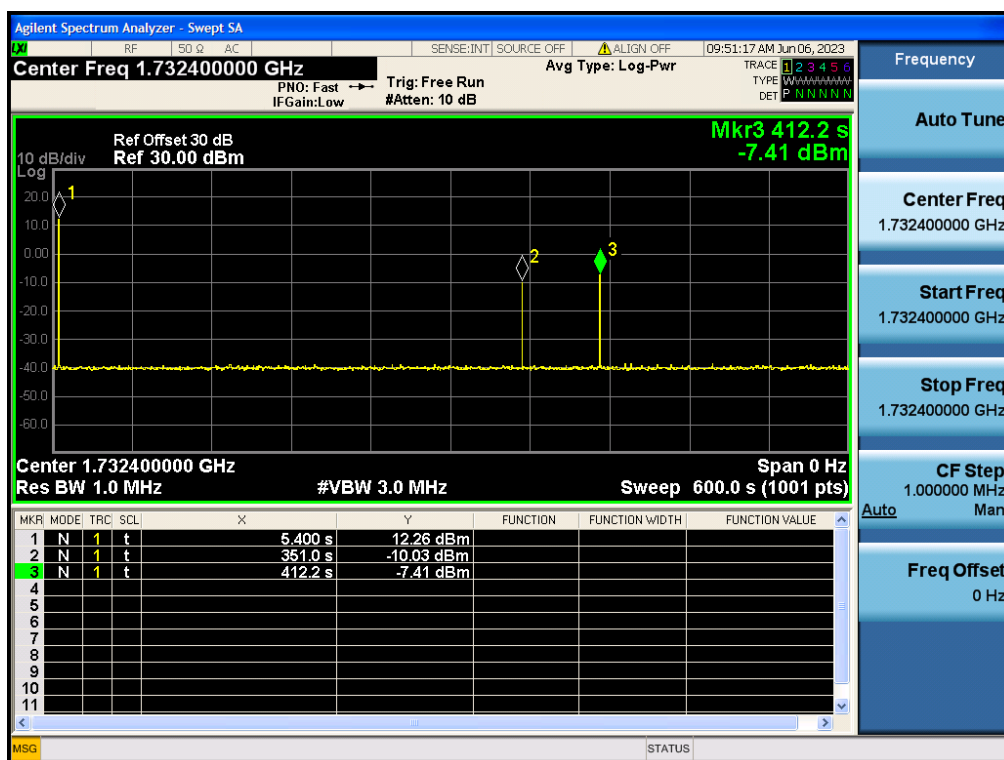
CDMA UL



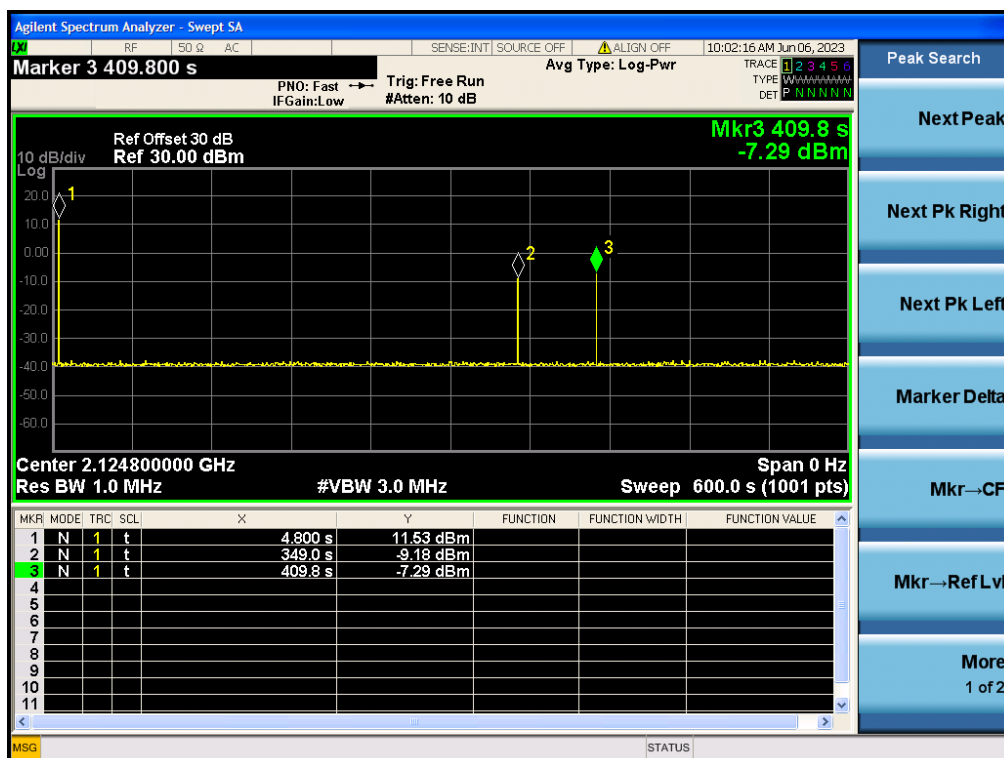
CDMA DL



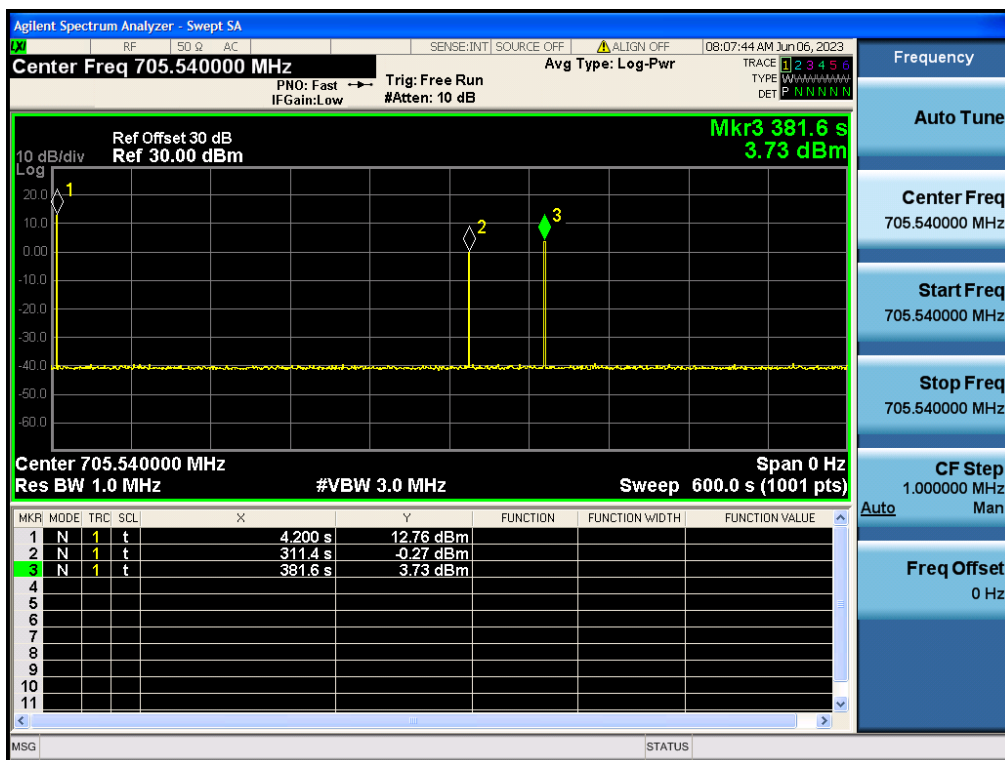
Band 4 UL



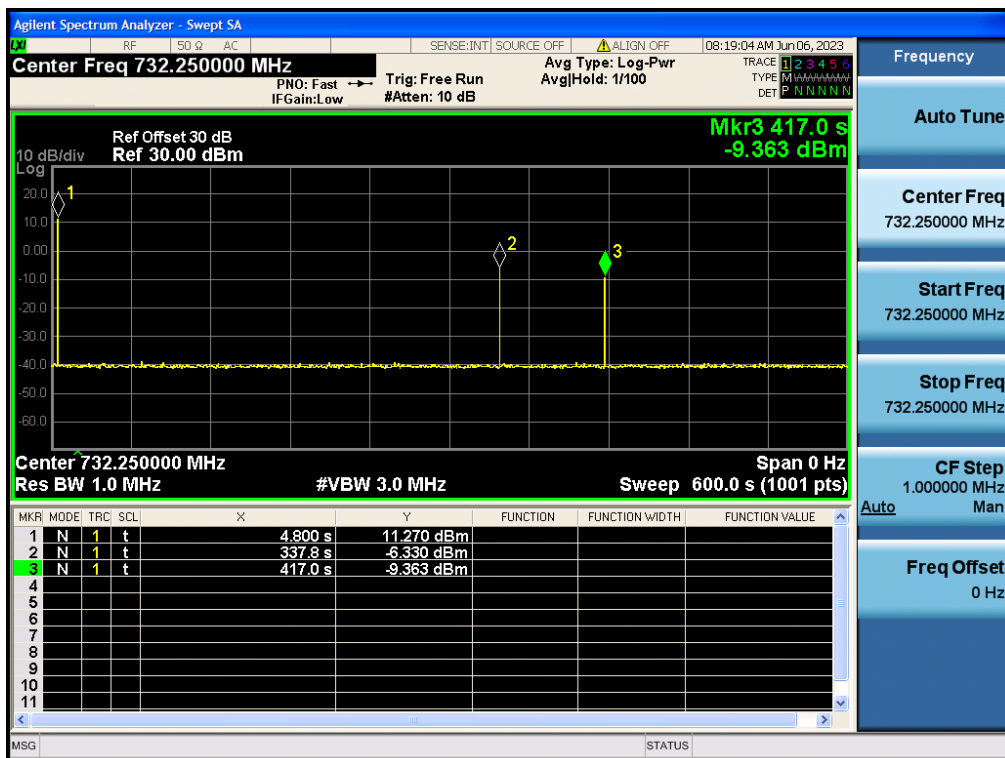
Band 4 DL



Band 12 UL



Band12 DL



Test results of Mitigation or Shutdown:

Band 25	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	1884.5	-58.58	1901.32	-67.01	8.43	<12	PASS
+4	1884.5	-59.47	1901.32	-68.28	8.81	<12	PASS
+3	1884.5	-60.35	1901.32	-69.47	9.12	<12	PASS
+2	1884.5	-61.59	1901.32	-70.36	8.77	<12	PASS
+1	1884.5	-62.26	1901.32	-71.41	9.15	<12	PASS
+0	1884.5	-63.17	1901.32	-72.28	9.11	<12	PASS
-1	1884.5	-64.36	1901.32	-72.37	8.01	<12	PASS
-2	1884.5	-65.28	1901.32	-73.25	7.97	<12	PASS
-3	EUT Shutdown						

Band 25	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	1939.78	-58.54	1948.61	-66.01	7.47	<12	PASS
+4	1939.78	-59.27	1948.61	-67.14	7.87	<12	PASS
+3	1939.78	-60.27	1948.61	-68.26	7.99	<12	PASS
+2	1939.78	-60.01	1948.61	-69.37	9.36	<12	PASS
+1	1939.78	-61.35	1948.61	-70.57	9.22	<12	PASS
+0	1939.78	-62.68	1948.61	-71.04	8.36	<12	PASS
-1	1939.78	-63.15	1948.61	-71.27	8.12	<12	PASS
-2	EUT Shutdown						

Band 4	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	1732.7	-59.57	1754.31	-68.14	8.57	<12	PASS
+4	1732.7	-57.01	1754.31	-68.27	11.26	<12	PASS
+3	1732.7	-61.36	1754.31	-70.01	8.65	<12	PASS
+2	1732.7	-60.04	1754.31	-69.07	9.03	<12	PASS
+1	1732.7	-61.24	1754.31	-70.47	9.23	<12	PASS
+0	1732.7	-63.17	1754.31	-72.38	9.21	<12	PASS
-1	1732.7	-65.06	1754.31	-72.11	7.05	<12	PASS
-2	1732.7	-64.29	1754.31	-73.20	8.91	<12	PASS
-3	EUT Shutdown						

Band 4	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	2133.6	-58.89	2154.81	-69.14	10.25	<12	PASS
+4	2136.6	-59.15	2154.81	-68.08	8.93	<12	PASS
+3	2133.6	-60.47	2154.81	-67.07	6.60	<12	PASS
+2	2136.6	-60.01	2154.81	-68.17	8.16	<12	PASS
+1	2133.6	-61.35	2154.81	-71.37	10.02	<12	PASS
+0	2136.6	-61.27	2154.81	-70.41	9.14	<12	PASS
-1	2133.6	-62.38	2154.81	-70.63	8.25	<12	PASS
-2	EUT Shutdown						

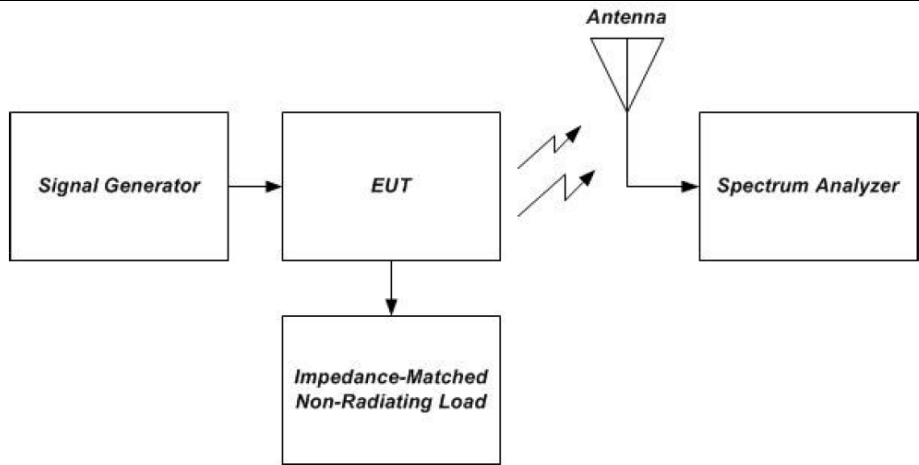
CDMA	Uplink(824-849MHz)						
Signal Type	AWGN						
Isolation	Peak Oscillations		Minimal Level		Difference	Limit	Result
	Freq.	Level	Freq.	Level			
dB	MHz	dBm	MHz	dBm	dB	dB	PASS
+5	826.54	-59.58	848.43	-68.01	8.43	<12	PASS
+4	826.54	-61.05	848.43	-69.14	8.09	<12	PASS
+3	826.54	-62.38	848.43	-70.31	7.93	<12	PASS
+2	826.54	-63.61	848.43	-72.18	8.57	<12	PASS
+1	826.54	-63.05	848.43	-71.75	8.70	<12	PASS
+0	826.54	-63.34	848.43	-72.21	8.87	<12	PASS
-1	826.54	-65.27	848.43	-72.36	7.09	<12	PASS
-2	826.54	-65.31	848.43	-73.01	7.70	<12	PASS
-3	EUT Shutdown						

CDMA	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	870.21	-60.25	890.32	-66.01	5.76	<12	PASS
+4	870.21	-62.01	890.32	-67.36	5.35	<12	PASS
+3	870.21	-62.36	890.32	-68.14	5.78	<12	PASS
+2	870.21	-63.37	890.32	-67.04	3.67	<12	PASS
+1	870.21	-62.25	890.32	-69.58	7.33	<12	PASS
+0	870.21	-64.04	890.32	-69.46	5.42	<12	PASS
-1	870.21	-64.36	890.32	-71.41	7.05	<12	PASS
-2	870.21	-65.25	890.32	-71.52	6.27	<12	PASS
-3	EUT Shutdown						

Band 12	Uplink(698-716MHz)						
Signal Type	AWGN						
Isolation	Peak Oscillations		Minimal Level		Difference	Limit	Result
	Freq.	Level	Freq.	Level			
dB	MHz	dBm	MHz	dBm	dB	dB	PASS
+5	701.25	-59.01	715.27	-68.12	9.11	<12	PASS
+4	701.25	-60.25	715.27	-69.35	9.10	<12	PASS
+3	701.25	-61.05	715.27	-70.27	9.22	<12	PASS
+2	701.25	-62.35	715.27	-72.11	9.76	<12	PASS
+1	701.25	-63.75	715.27	-71.36	7.61	<12	PASS
+0	701.25	-62.31	715.27	-72.01	9.70	<12	PASS
-1	701.25	-64.08	715.27	-72.17	8.09	<12	PASS
-2	701.25	-65.04	715.27	-73.35	8.31	<12	PASS
-3	EUT Shutdown						

Band 12	Downlink(728-746MHz)						
Signal Type	AWGN						
Isolation	Peak Oscillations		Minimal Level		Difference	Limit	Result
	Freq.	Level	Freq.	Level			
dB	MHz	dBm	MHz	dBm	dB	dB	PASS
+5	731.56	-61.37	745.21	-66.35	4.98	<12	PASS
+4	731.56	-62.47	745.21	-67.47	5.00	<12	PASS
+3	731.56	-63.01	745.21	-68.04	5.03	<12	PASS
+2	731.56	-63.58	745.21	-67.04	3.46	<12	PASS
+1	731.56	-62.04	745.21	-69.69	7.65	<12	PASS
+0	731.56	-63.28	745.21	-69.17	5.89	<12	PASS
-1	731.56	-64.17	745.21	-71.28	7.11	<12	PASS
-2	731.56	-65.54	745.21	-71.01	5.47	<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"> Place the EUT on an OATS or Anechoic chamber turntable 3m from the receiving antenna. Connect the EUT to the test equipment as shown in Figure 9 beginning with the uplink output 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. 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. 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. Repeat steps 7.12.3 to 7.12.5 for all operational bands.

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:

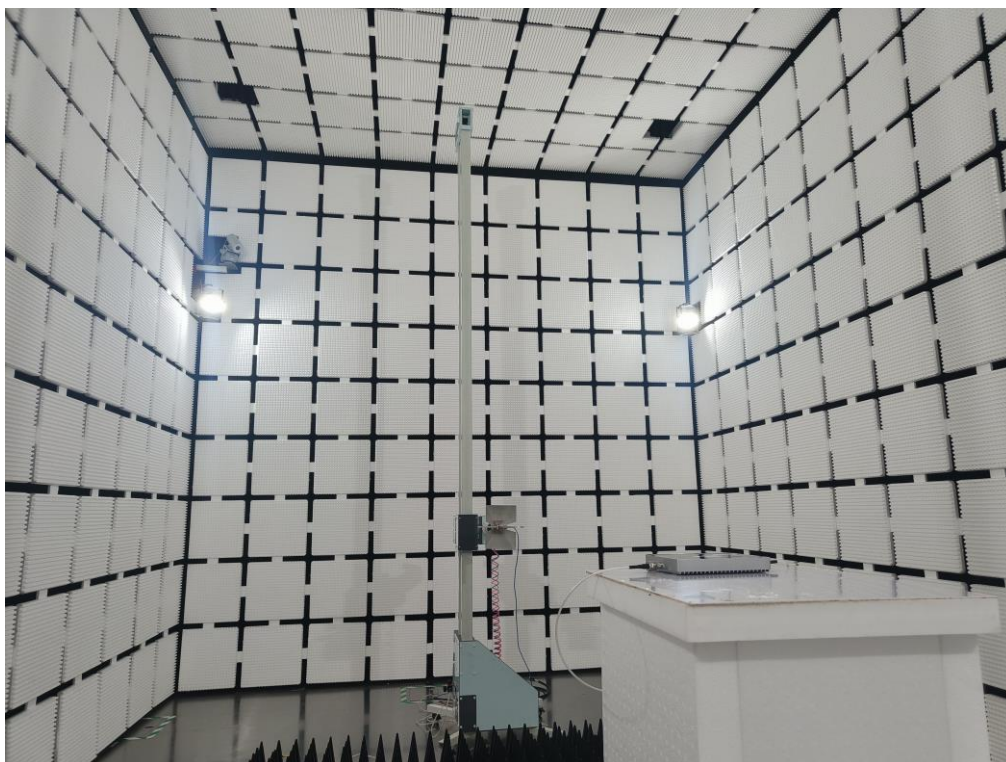
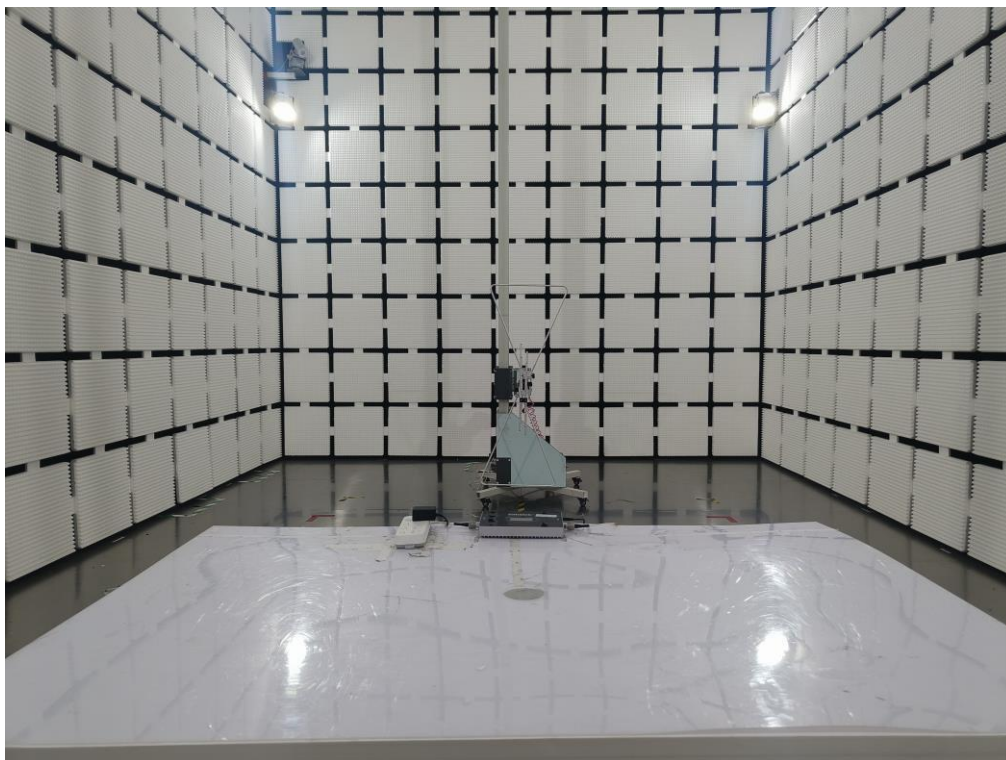
Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
Band25 Uplink				
942.0	V	-44.04	-13.00	31.04
942.0	H	-43.35		30.35
3765.0	V	-42.31		29.31
3765.0	H	-41.27		28.27
-	-	-	-	-
Band25 Downlink				
981.3	V	-51.01	-13.00	38.01
981.3	H	-52.35		39.35
3925.0	V	-51.14		38.14
3925.0	H	-52.08		39.08
-	-	-	-	-

Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
CDMA Uplink				
837	V	-45.35	-13.00	32.35
837	H	-45.48		32.48
1674	V	-44.01		31.01
1674	H	-43.28		30.28
-	-	-	-	-
CDMA Downlink				
881.5	V	-52.01	-13.00	39.01
881.5	H	-51.38		38.38
1763.0	V	-49.27		36.27
1763.0	H	-50.01		37.01
-	-	-	-	-

Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
Band 4 Uplink				
860	V	-46.38	-13.00	33.38
860	H	-44.27		31.27
2530	V	-46.01		33.01
2530	H	-44.35		31.35
-	-	-	-	-
Band 4 Downlink				
920	V	-50.27	-13.00	37.27
920	H	-51.31		38.31
3821	V	-48.02		35.02
3821	H	-51.57		38.57
-	-	-	-	-

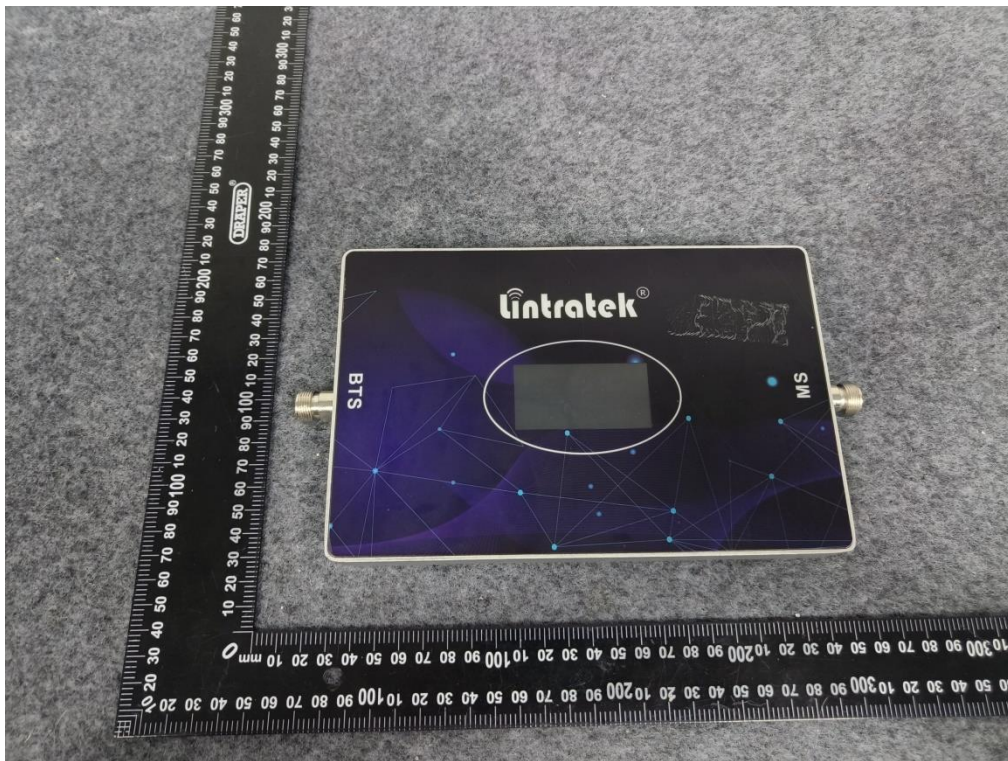
Frequency [MHz]	Antenna polarity [H/V]	Level [dBm]	Limit [dBm]	Margin [dB]
Band12 Uplink				
968.2	V	-40.58	-13.00	27.58
968.2	H	-41.21		28.21
1698.3	V	-42.58		29.58
1689.3	H	-41.01		28.01
-	-	-	-	-
Band12 Downlink				
964.1	V	-50.38	-13.00	37.38
964.1	H	-51.01		38.01
1864.5	V	-50.28		37.28
1864.5	H	-50.04		37.04
-	-	-	-	-

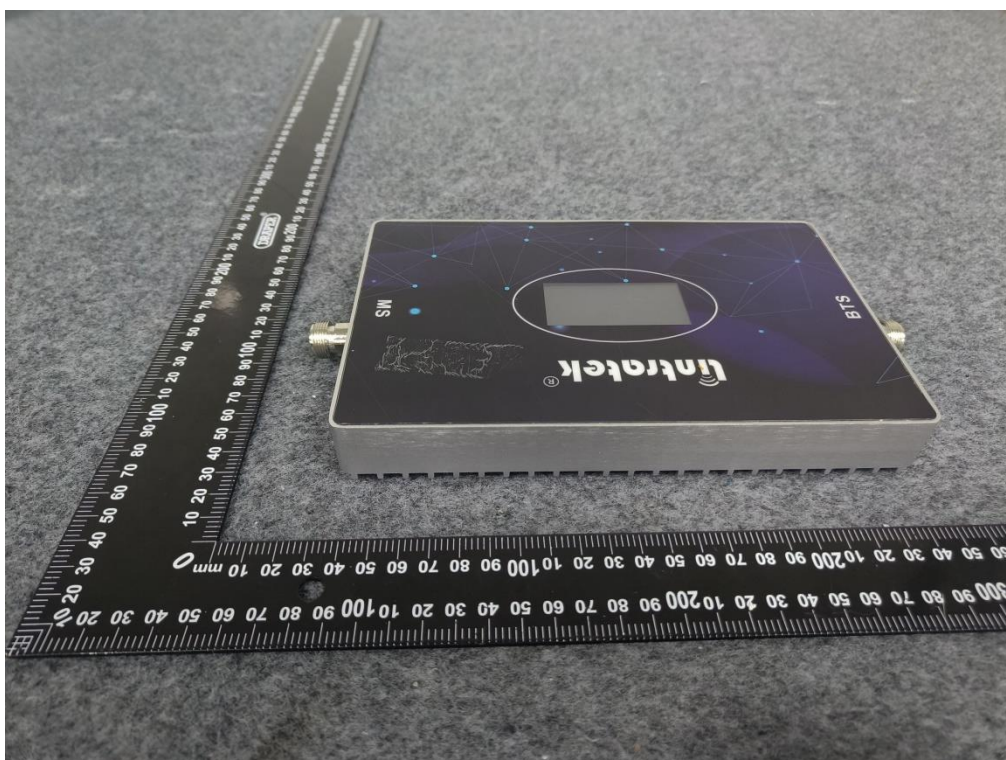
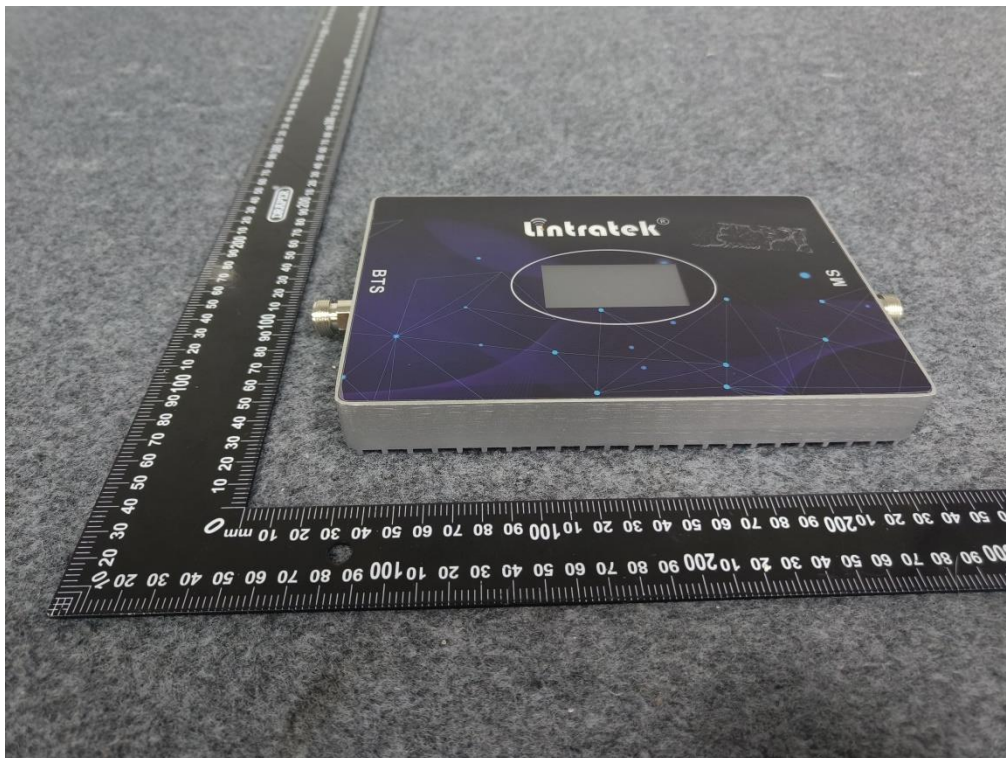
6 Test Setup Photos

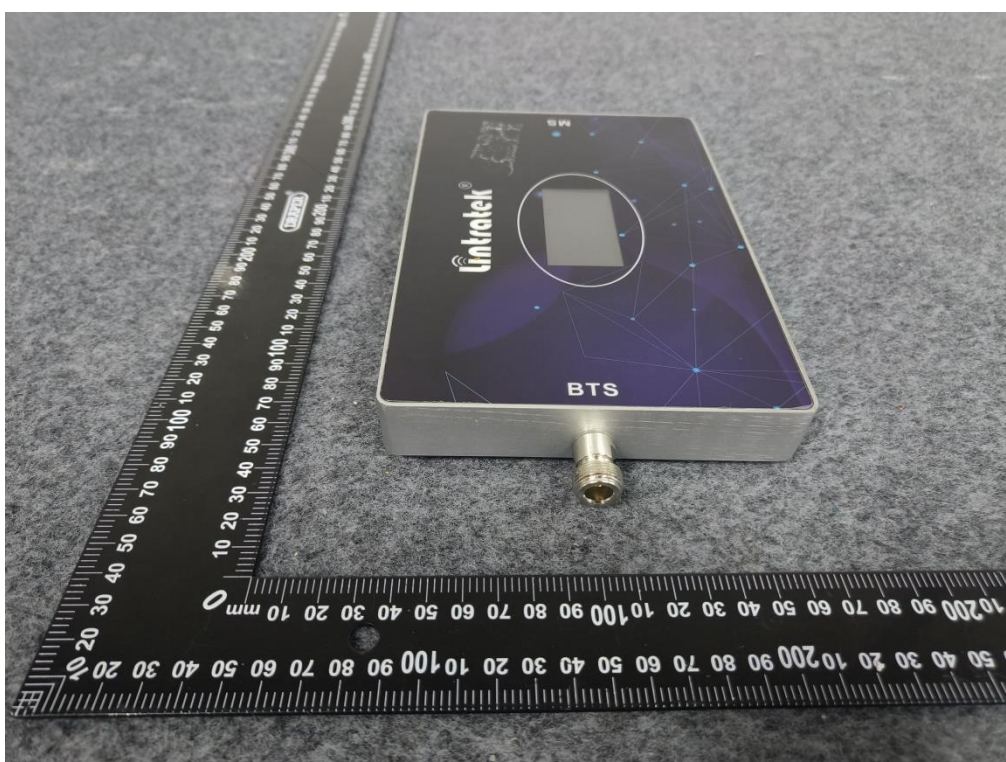
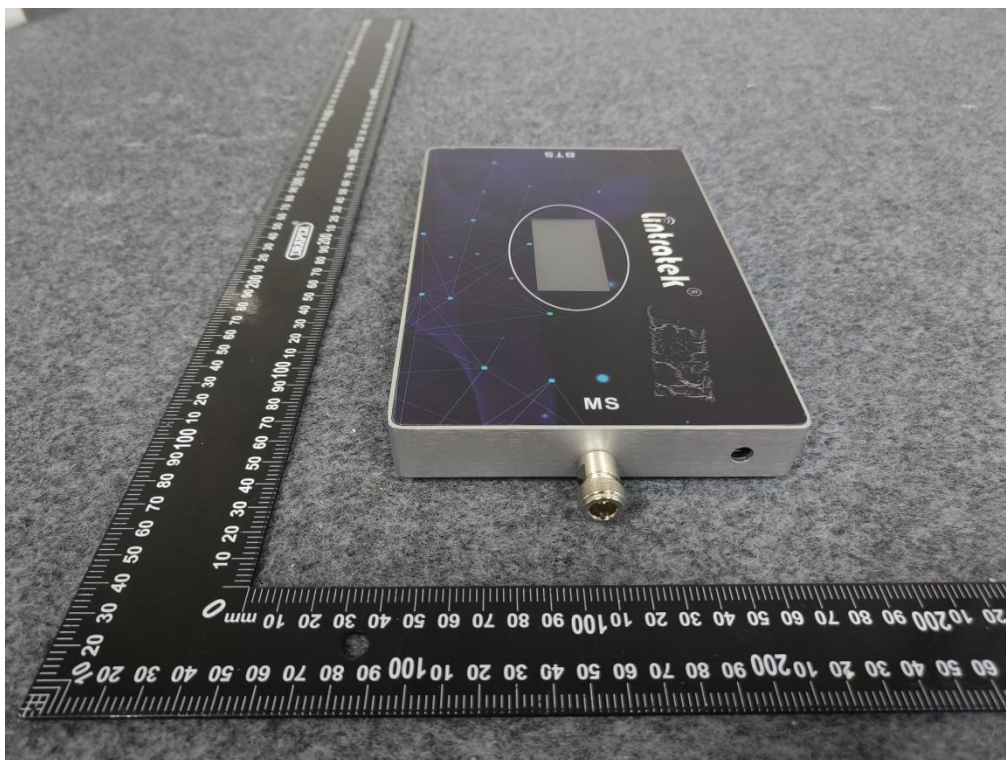


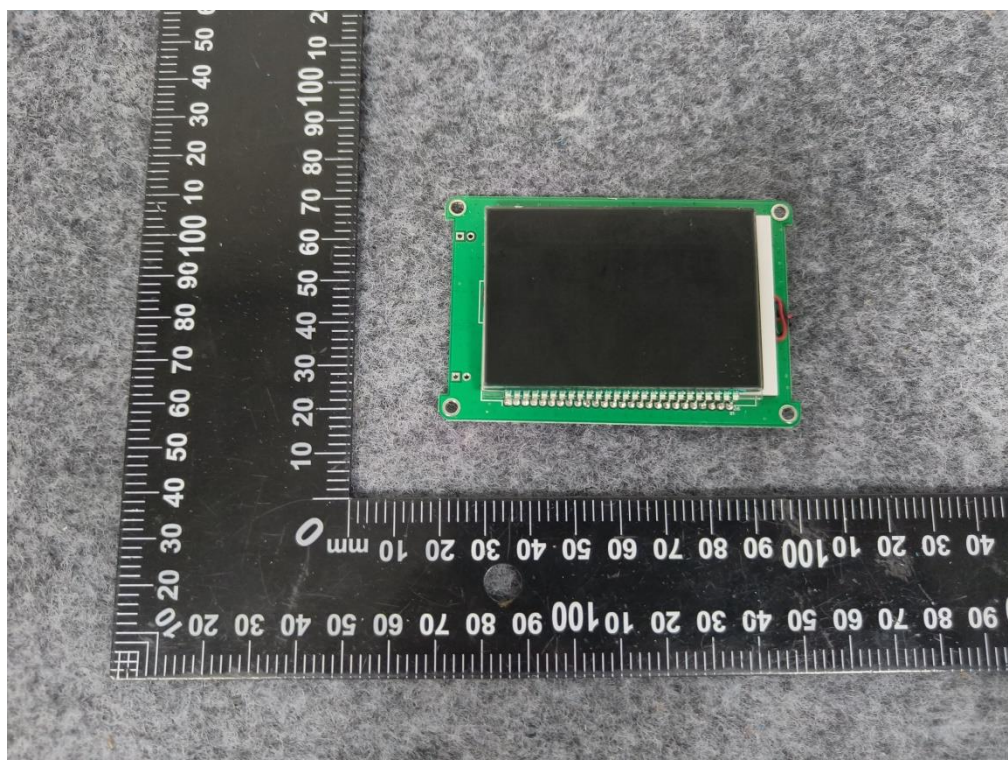
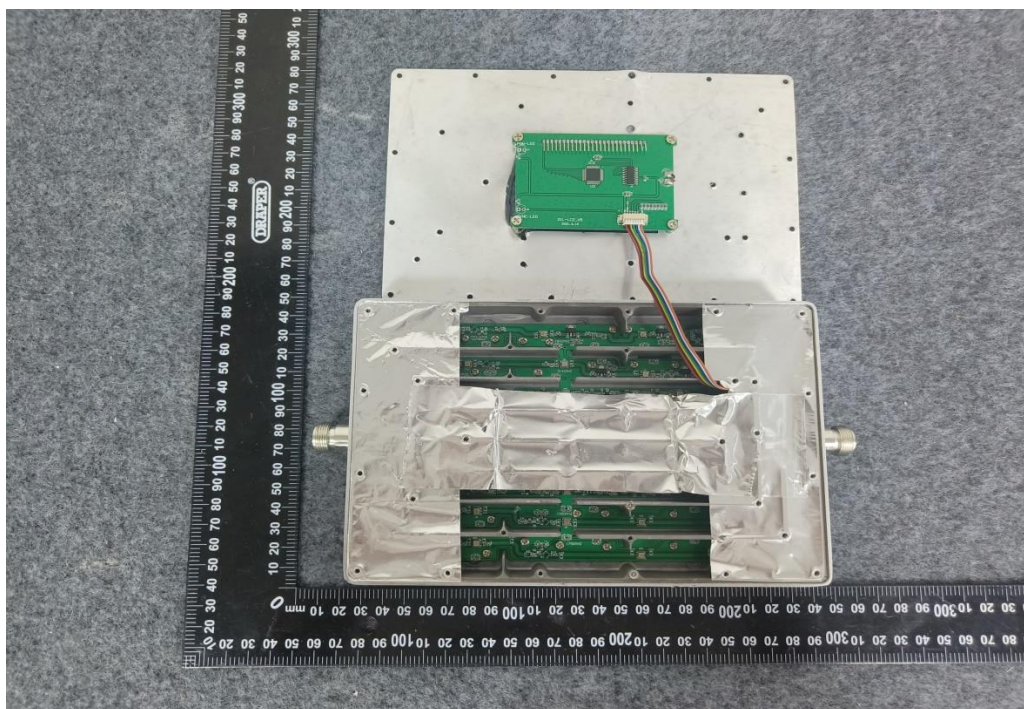
7 EUT Photos

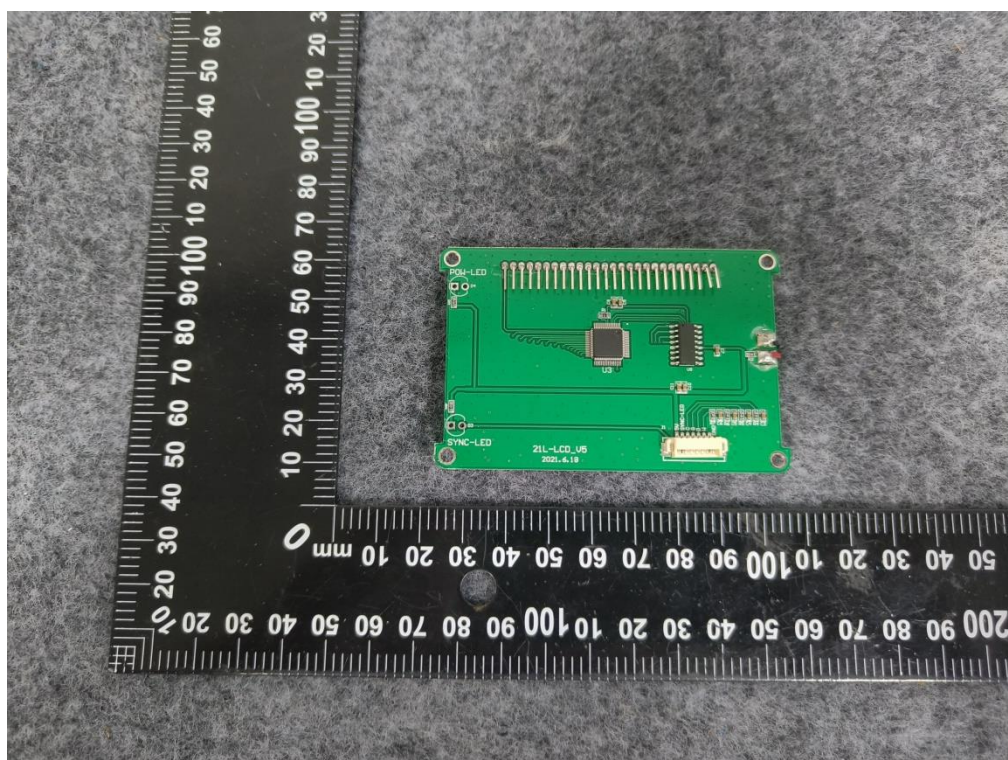
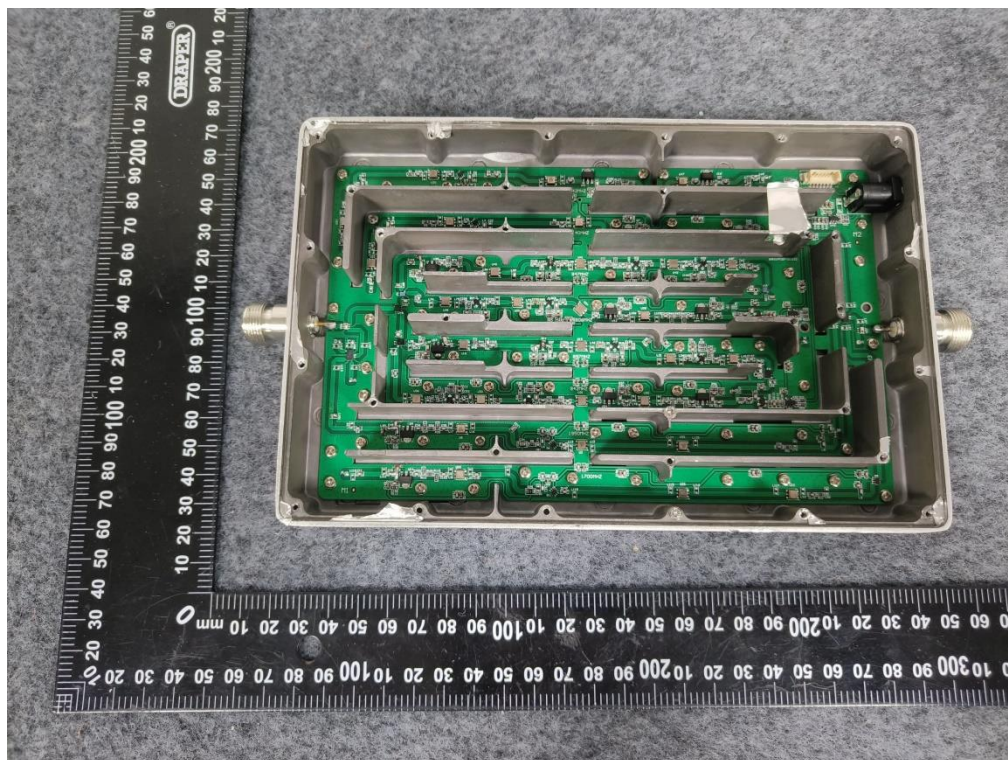


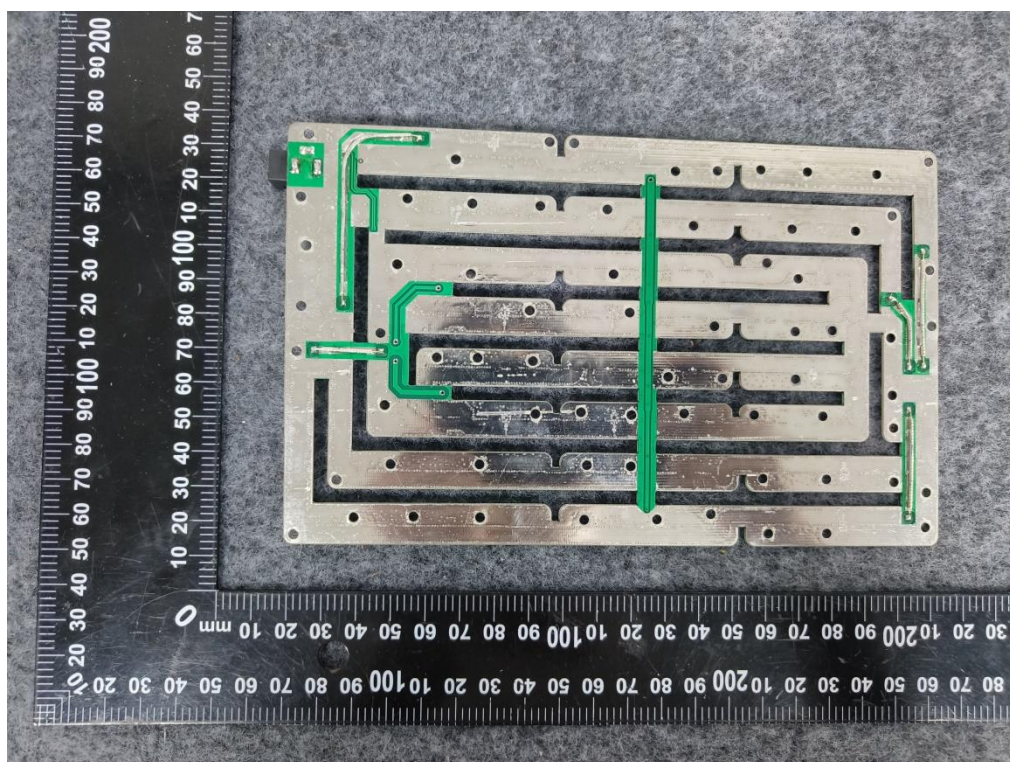
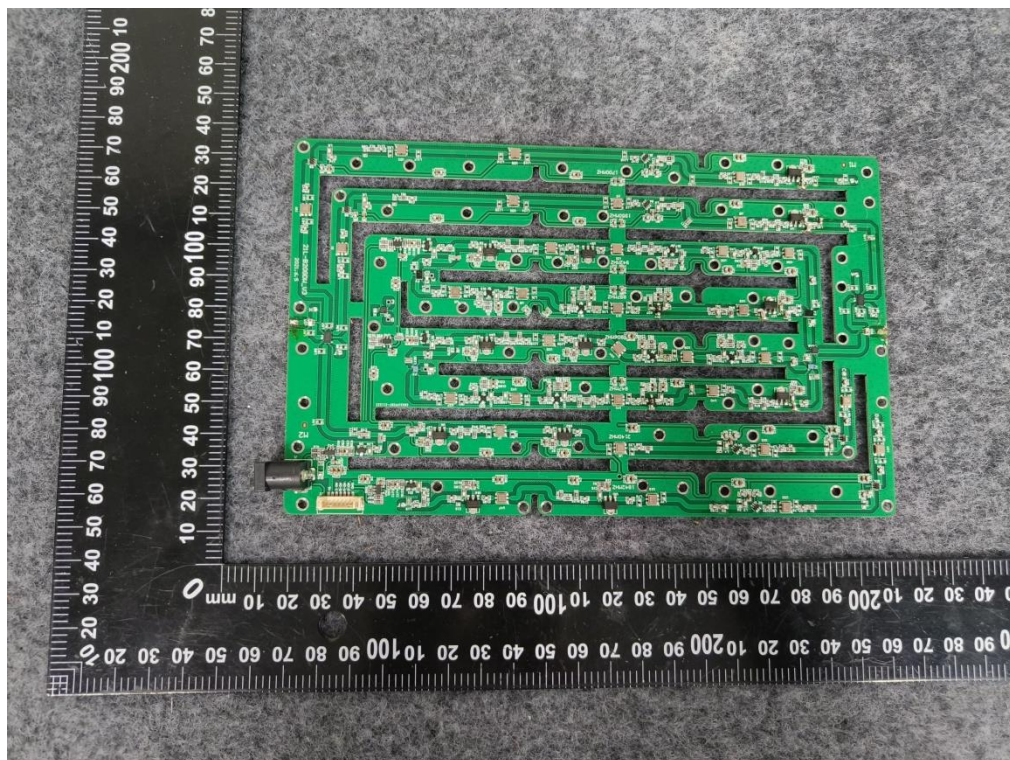














Test Report Number: BTF230627R00101



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-- END OF REPORT --