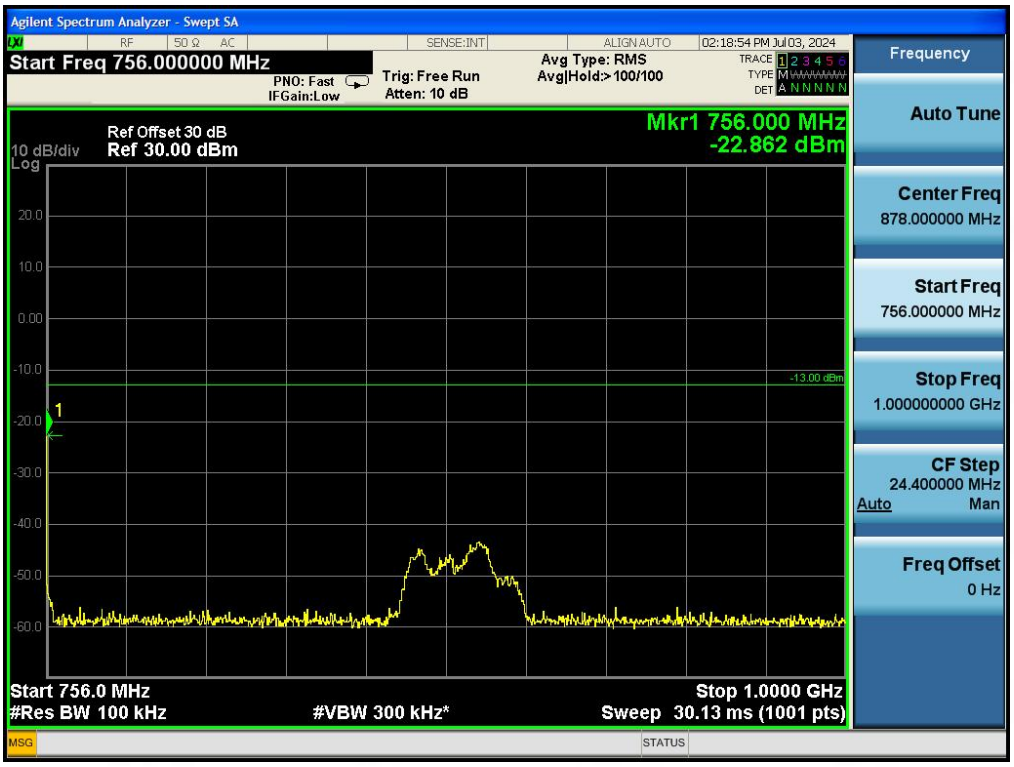

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777-787 MHz Uplink Band

Spurious Frequency Range(MHz)	Measured Frequency (MHz)	Measured Value (dBm)	RBW (KHz)	Final Value(dBm)	Limit (dBm)	Margin (dB)
763-775	774.461	-101.0	6.25	-101.86	-46	-55.86
793-805	797.354	-57.5	6.25	-57.50	-46	-11.50

746-756 MHz Downlink Band

Spurious Frequency Range(MHz)	Measured Frequency (MHz)	Measured Value (dBm)	RBW (KHz)	Final Value(dBm)	Limit (dBm)	Margin (dB)
763-775	768.632	-102.0	6.25	-102.01	-46	-56.01
793-805	797.354	-100.0	6.25	-101.99	-46	-55.99

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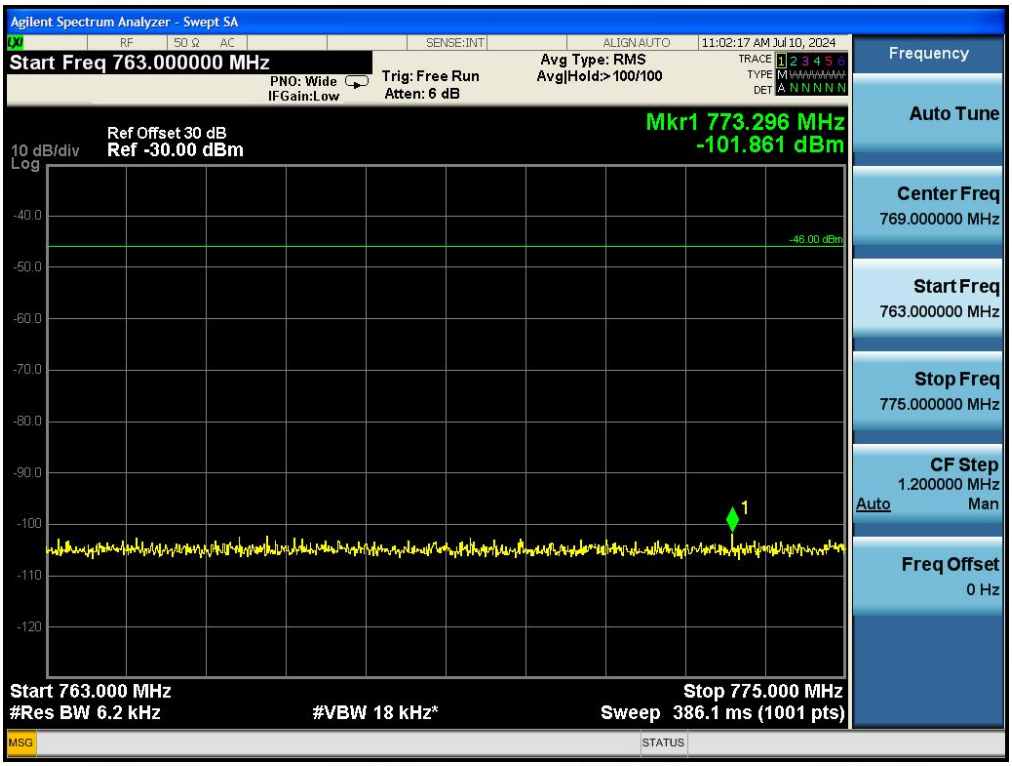
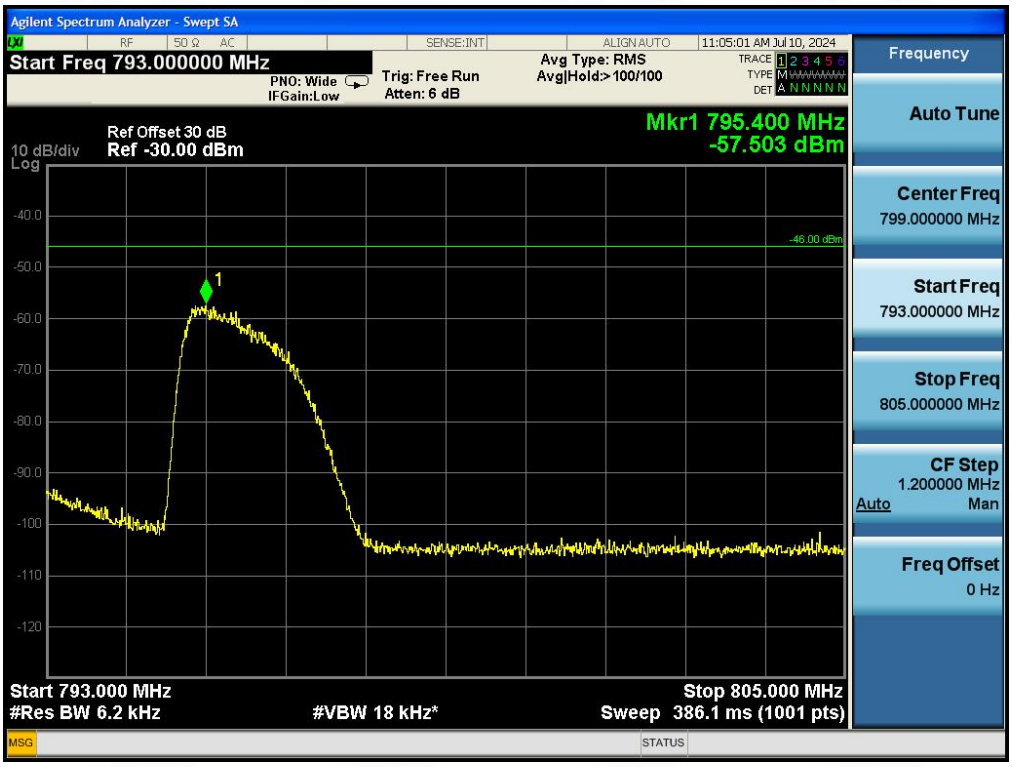
777-787 MHz Uplink Band





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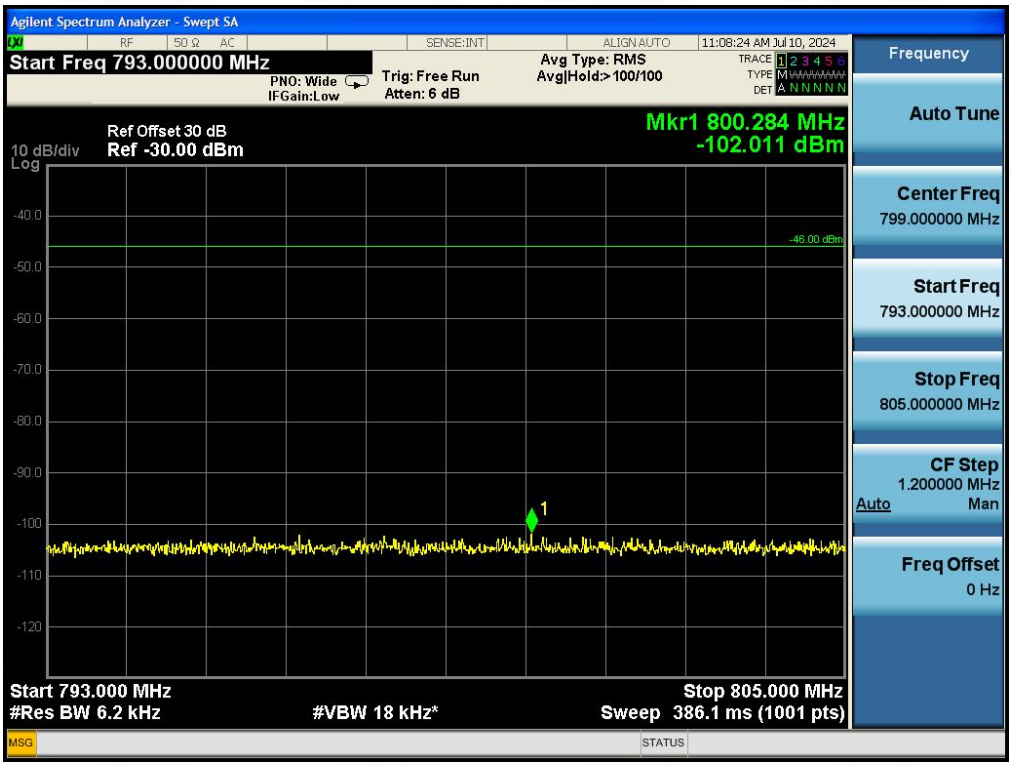
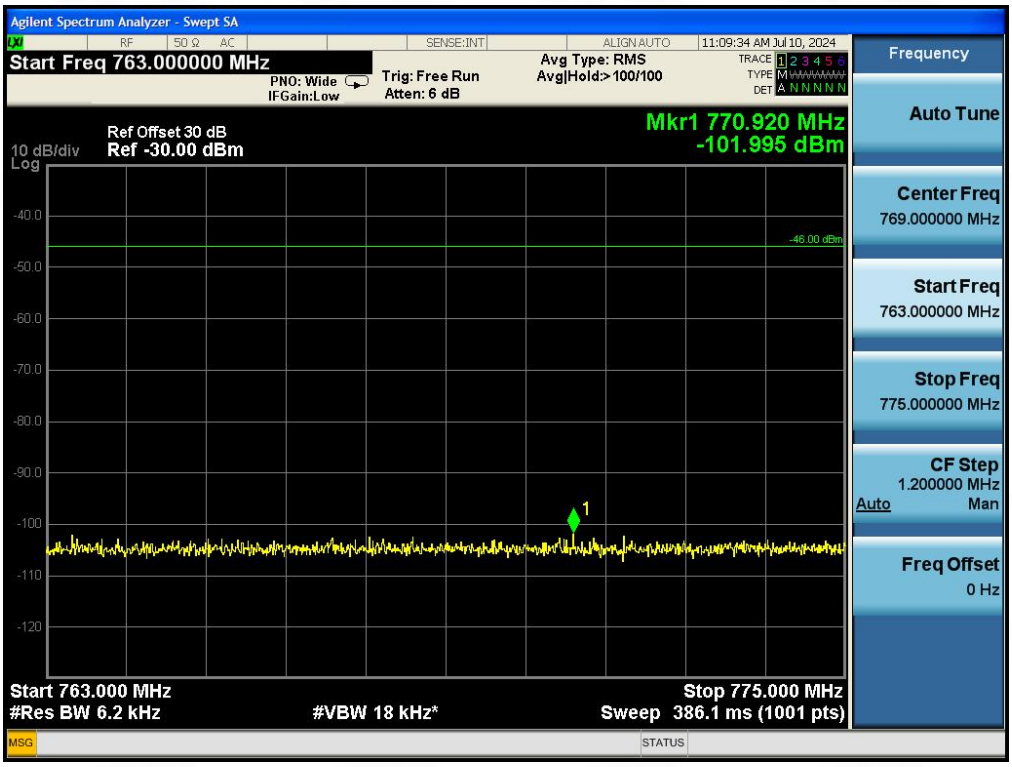
746-756 MHz Downlink Band





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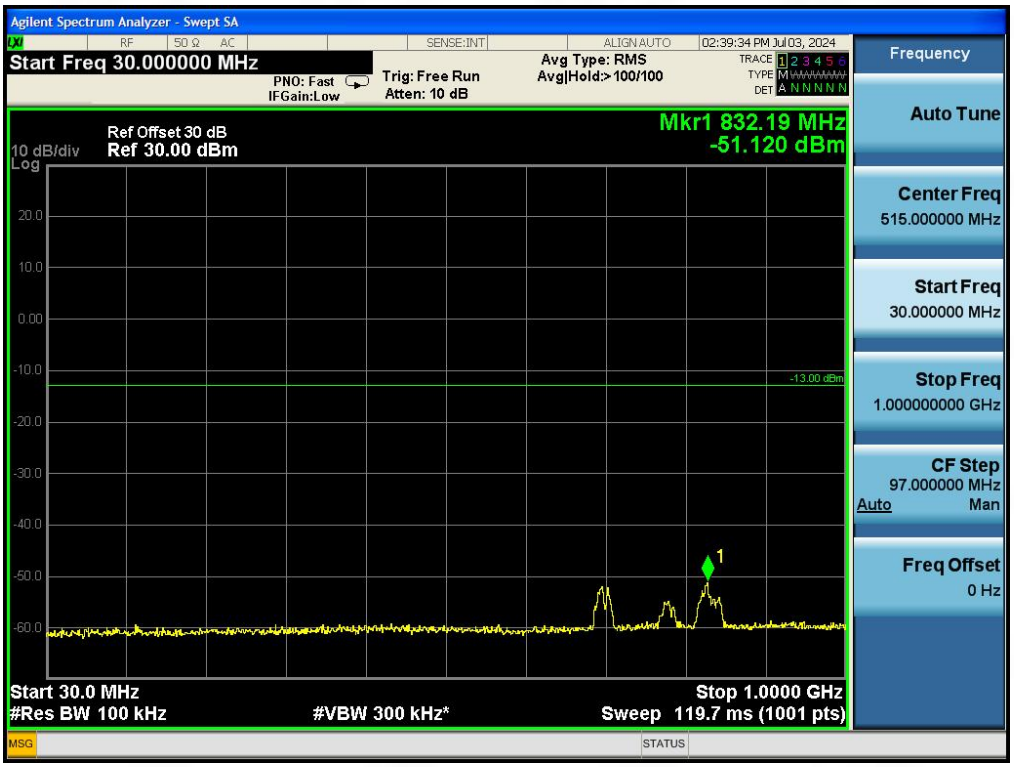
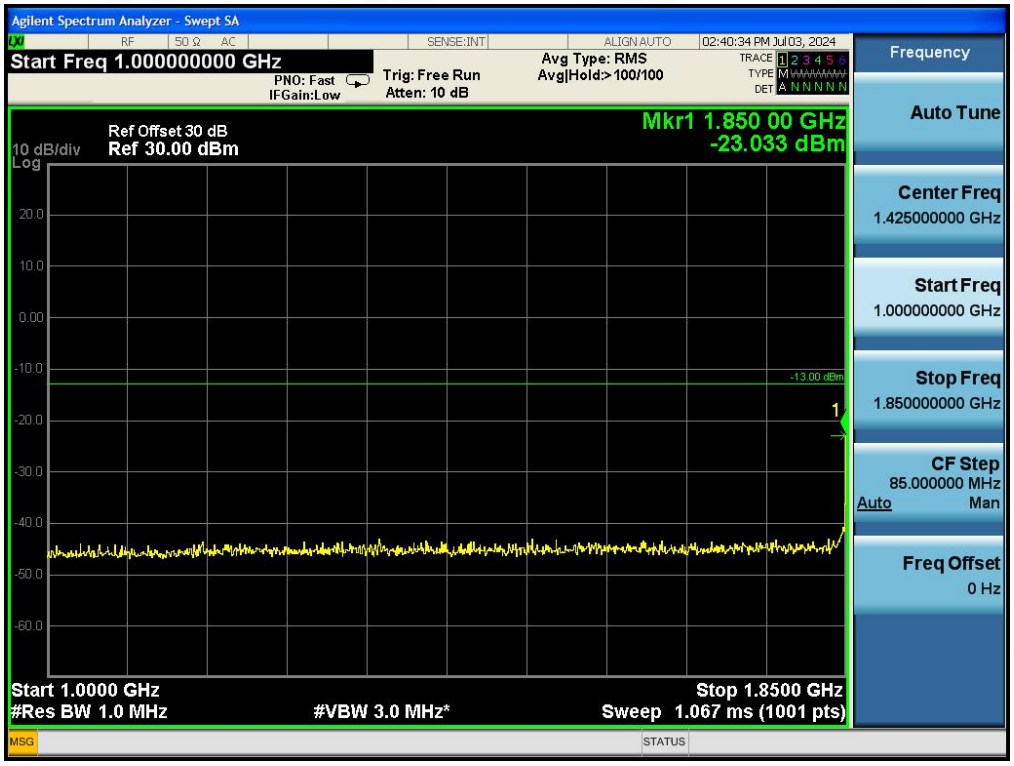
Broadband PCS Uplink





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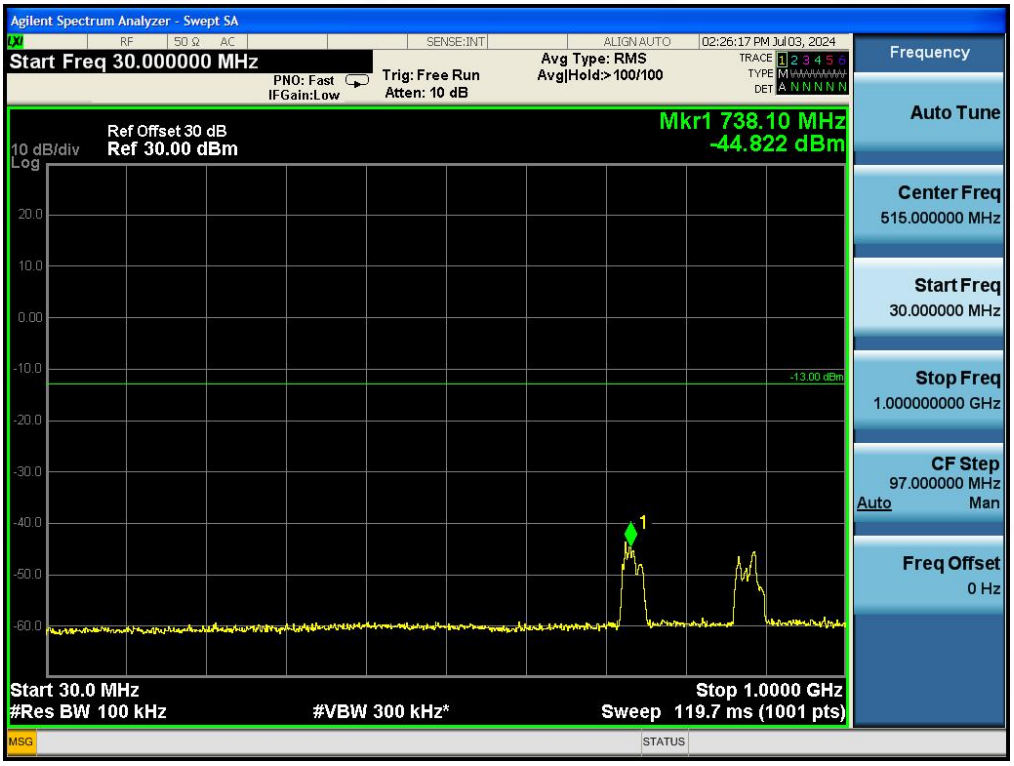
Broadband PCS Downlink



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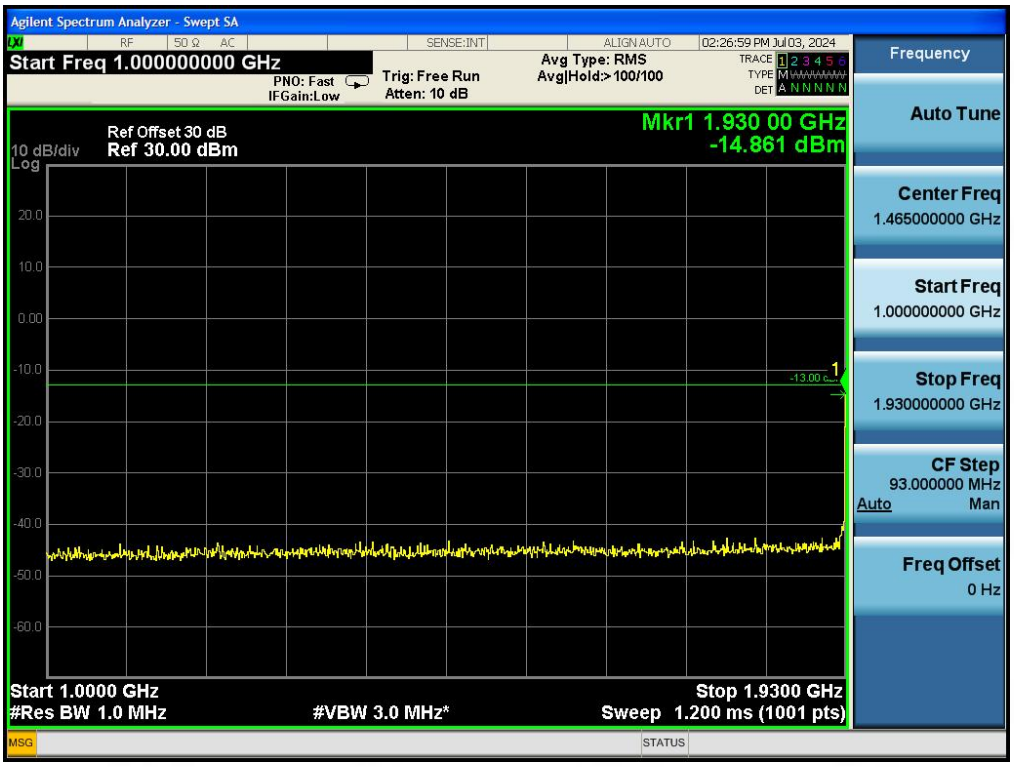

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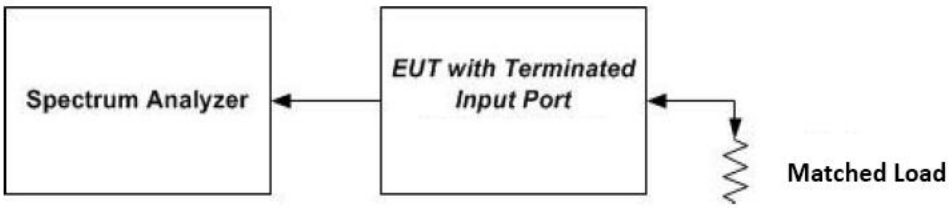
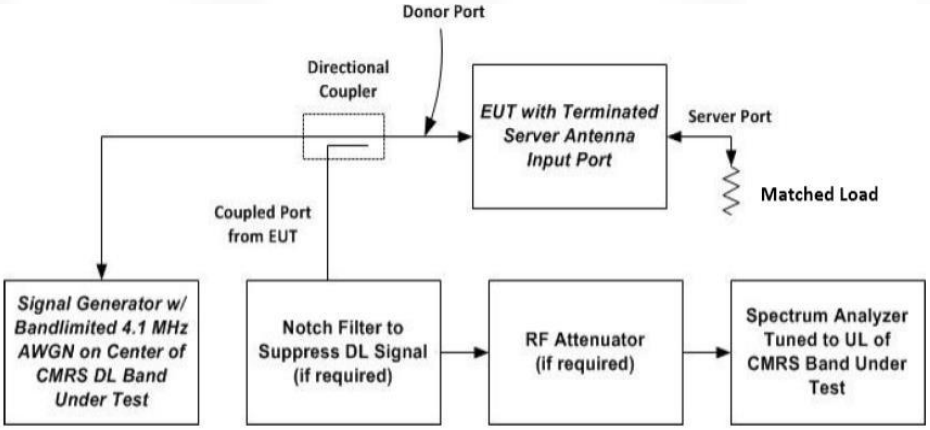
5.7 Noise Limits

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 dBm/MHz—RSSI. not exceed−102.5 dBm/MHz + 20 log (F), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.
Test Setup:	 Figure 3 – Noise limit test setup (also used for 7.8)  Figure 4 – Test setup for uplink noise power measurement in the presence of a downlink signal
Procedure:	a) Connect the EUT to the test equipment as shown in Figure 3. Begin with the uplink output connected to the spectrum analyzer. b) Set the spectrum analyzer RBW to 1 MHz with the VBW ⩾ 3X RBW c) Select the power averaging (RMS) detector and trace average over at least 100 traces. d) Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with the span ⩾ 2X the CMRS band. e) Measure the maximum Transmitter Noise Power Level. f) Save the spectrum analyzer plot as necessary for inclusion in the final test report. g) Repeat steps 7.7.2 to 7.7.6 for all operational uplink and downlink bands. h) 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. i) Configure the signal generator for 4.1 MHz AWGN operation for uplink test and 200 kHz 99% OBW AWGN for downlink test. j) Set the spectrum analyzer RBW for 1 MHz with the VBW ⩾3X the RBW with an

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	RMS AVERAGE detector with at least 100 trace averages. k) Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with the span ⩾ 2X 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. 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. m) Repeat 7.7.7 through 7.7.11 for all operational uplink and downlink bands. n) Variable Uplink noise timing is to be measured as follows. o) Set the spectrum analyzer to the uplink frequency to be measured. p) Set the span to 0 Hz with a sweep time of 10 seconds. q) Set the power level of signal generator 1 to the lowest level of the RSSI dependent noise. 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. s) Ensure that the Uplink noise decrease to the specified levels within 1 second for mobile devices and 3 seconds for fixed devices. t) Repeat 7.7.14 – 7.7.19 for all operational uplink bands 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.

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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)
Cellula UL	-48.706	-44.05	PASS
Lower A-E Blocks UL	-47.646	-45.51	PASS
700MHz Upper C Block UL	-46.442	-44.64	PASS
Broadband PCS UL	-44.197	-37.02	PASS
Cellula DL	-45.549	-44.05	PASS
Lower A-E Blocks DL	-47.116	-45.51	PASS
700MHz Upper C Block DL	-47.394	-44.64	PASS
Broadband PCS DL	-39.164	-37.02	PASS

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

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Operation Bands	RSSI dBm	Variable Uplink Noise Measured dBm/MHz	Limit dBm/MHz	Result (dB)
Cellula	-90	-48.513	-44.05	PASS
	-80	-49.204	-44.05	PASS
	-70	-49.244	-44.05	PASS
	-46	-62.37	-57.00	PASS
	-44	-65.69	-59.00	PASS
	-40	-65.38	-63.00	PASS
Lower A-E Blocks	-90	--46.670	-45.51	PASS
	-80	-48.581	-45.51	PASS
	-70	-47.163	-45.51	PASS
	-47	-59.13	-56.00	PASS
	-45	-64.96	-58.00	PASS
	-42	-66.01	-61.00	PASS
700MHz Upper C Block	-90	-47.141	-44.64	PASS
	-80	-47.684	-44.64	PASS
	-70	--47.913	-44.64	PASS
	-44	-59.64	-59.00	PASS
	-42	-63.54	-61.00	PASS
	-39	-66.74	-64.00	PASS
Broadband PCS	-90	-44.938	-37.02	PASS
	-80	-45.750	-37.02	PASS
	-70	-47.547	-37.02	PASS
	-46	-59.27	-57.00	PASS
	-45	-63.38	-58.00	PASS
	-40	-59.27	-63.00	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 dBm/MHz + 20 log (F).RSSI limit not exceed －103 dBm/MHz-RSSI.

Variable Uplink Noise Timing

Operation Bands	Measured Sec	Limit Sec	Results
Cellula	1.90	3	PASS
Lower A-E Blocks	2.40	3	PASS
700 MHz Upper C Block	2.40	3	PASS
Broadband PCS	2.50	3	PASS

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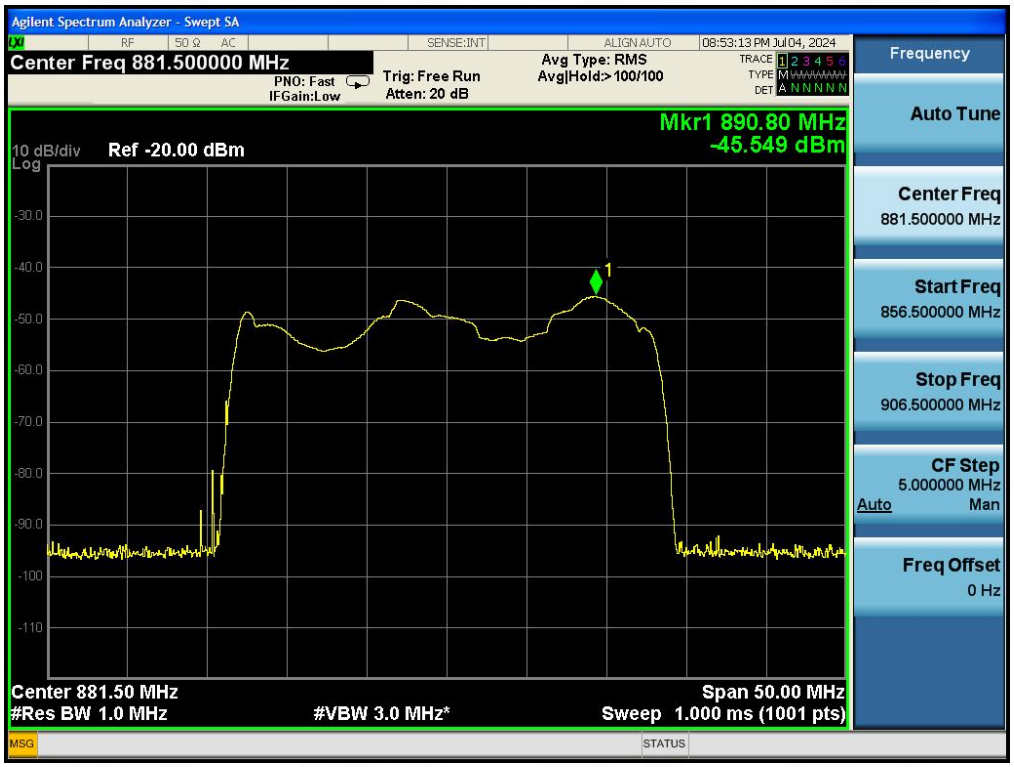
Cellular Uplink Noise

Cellular Downlink Noise



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Lower A-E Blocks Uplink Noise

Lower A-E Blocks Downlink Noise

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700 MHz Upper C Block Uplink Noise

700 MHz Upper C Block Downlink Noise

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Broadband PCS Uplink Noise

Broadband PCS Downlink Noise

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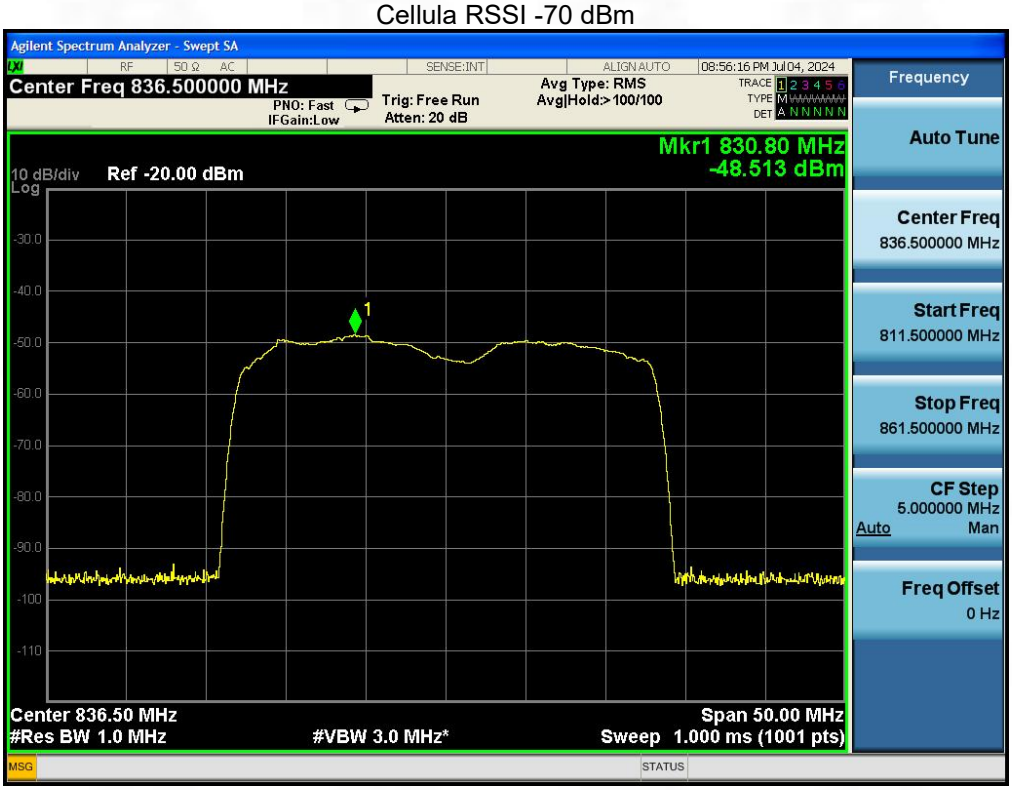
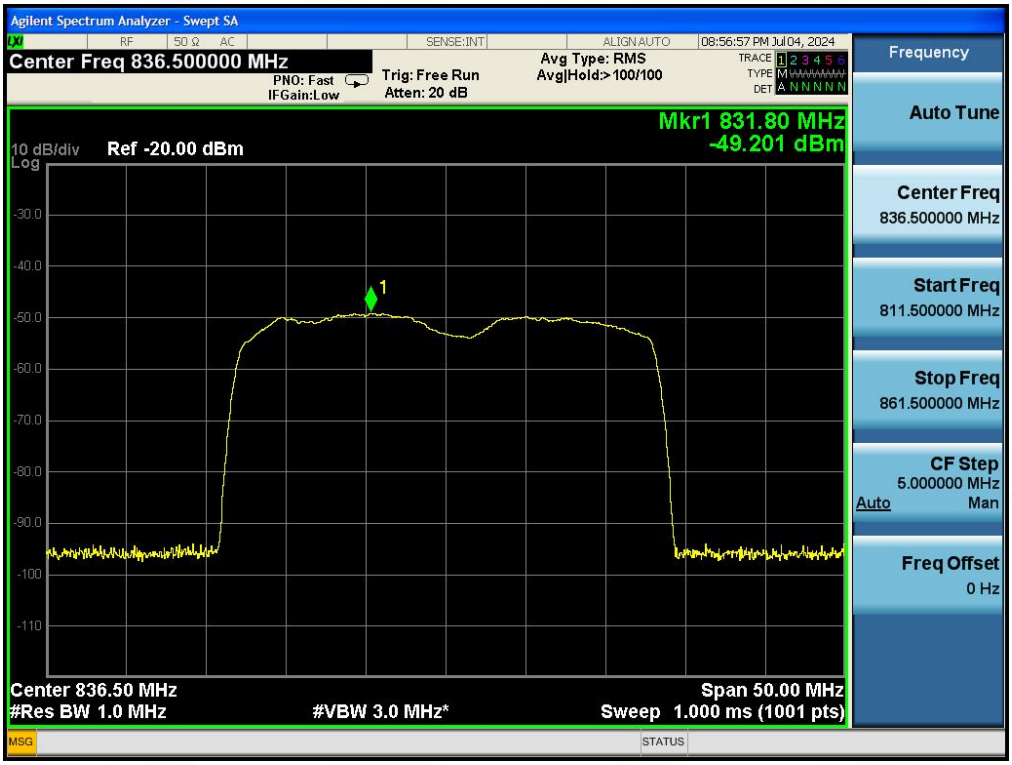
Variable Uplink Noise
Cellula RSSI -70 dBm



Cellula RSSI -80 dBm



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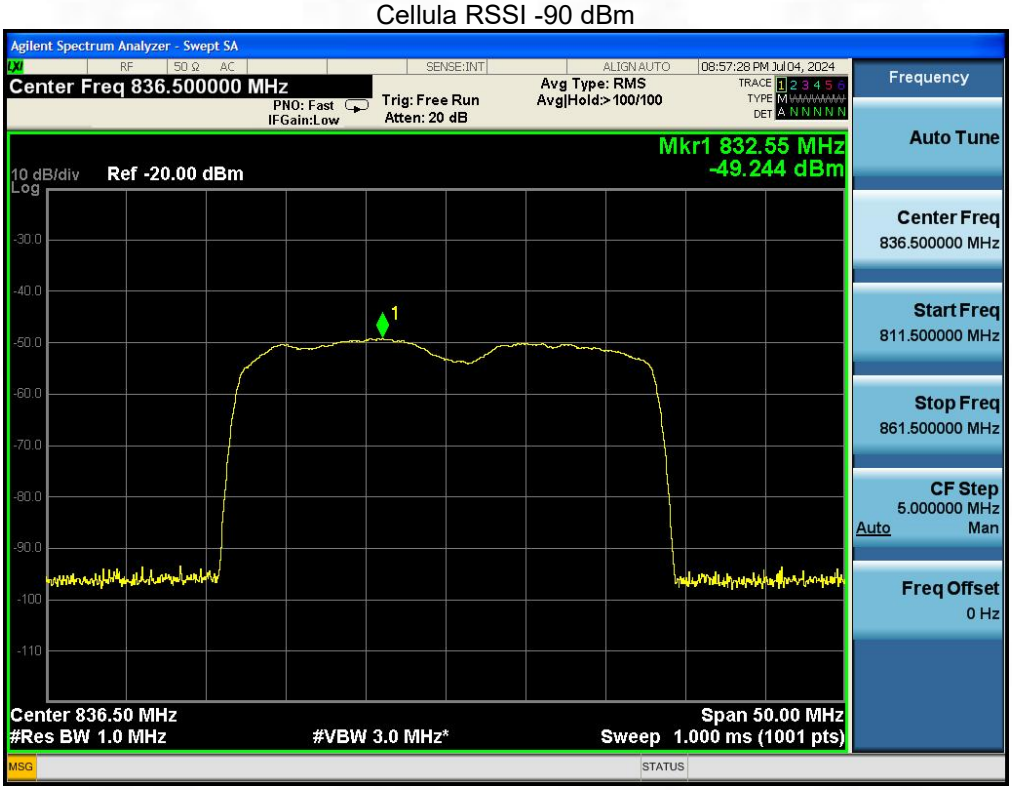
Cellula RSSI -90 dBm



Lower A-E Blocks RSSI -70 dBm

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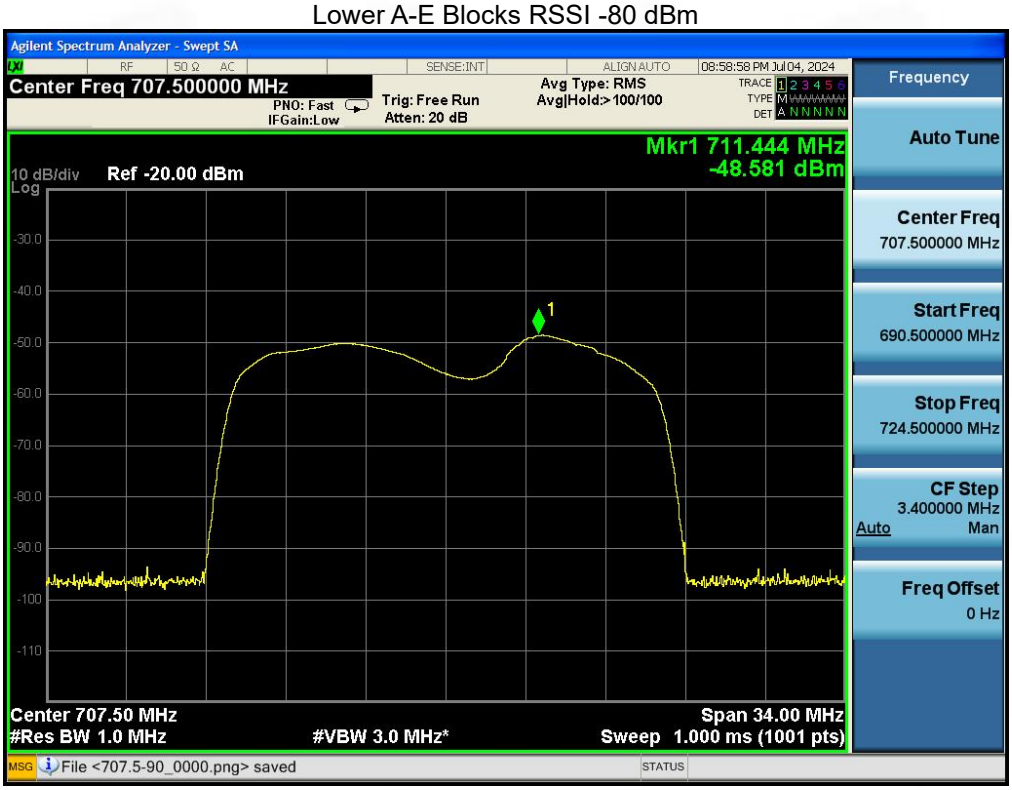
Lower A-E Blocks RSSI -80 dBm



Lower A-E Blocks RSSI -90 dBm

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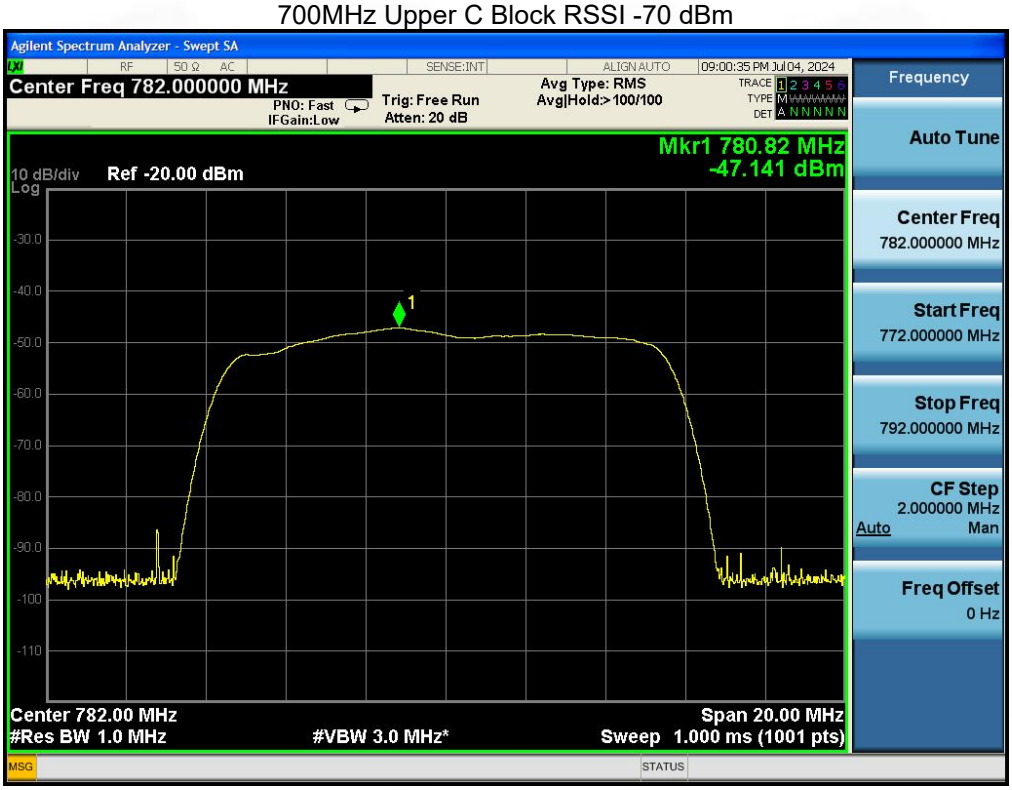
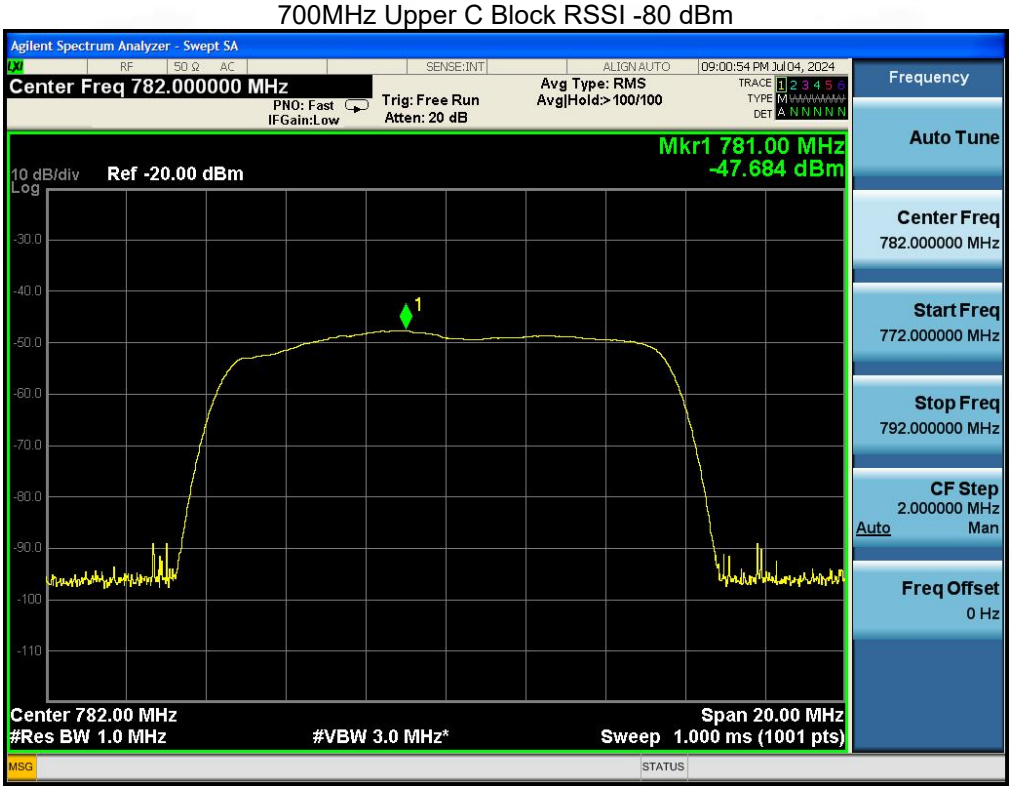
700MHz Upper C Block RSSI -70 dBm



700MHz Upper C Block RSSI -80 dBm



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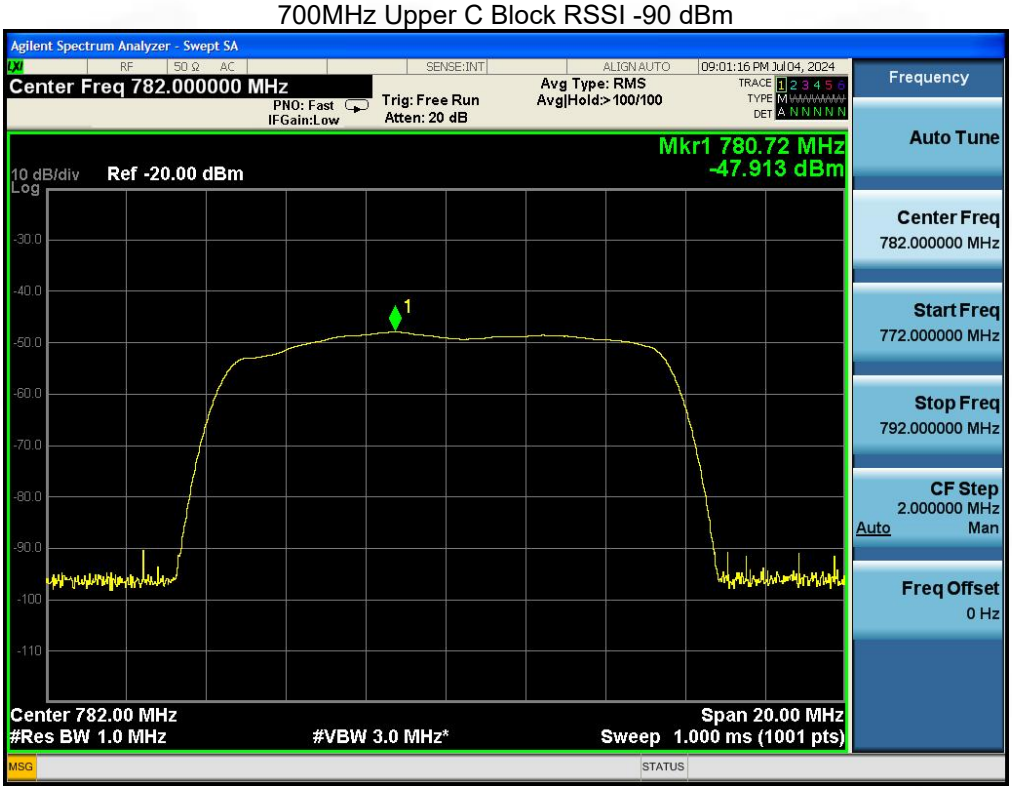
700MHz Upper C Block RSSI -90 dBm



Broadband PCS RSSI -70 dBm

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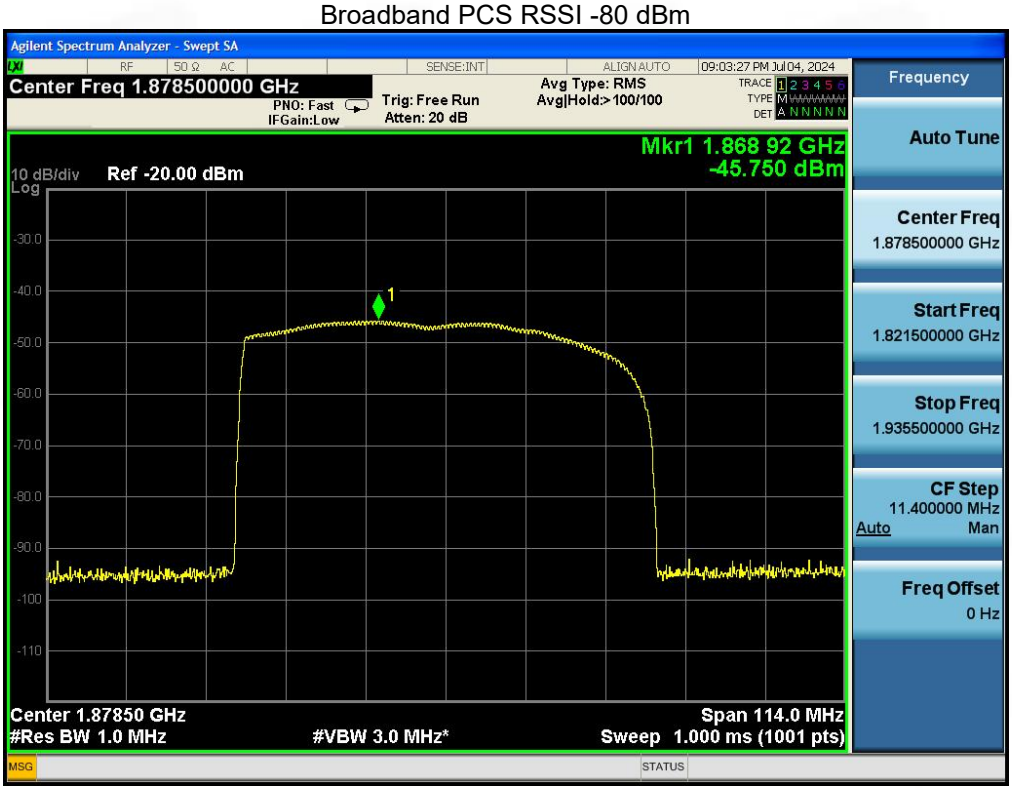
Broadband PCS RSSI -80 dBm



Broadband PCS RSSI -90 dBm

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Variable Noise Timing Test Plots

Cellular

Lower A-E Blocks

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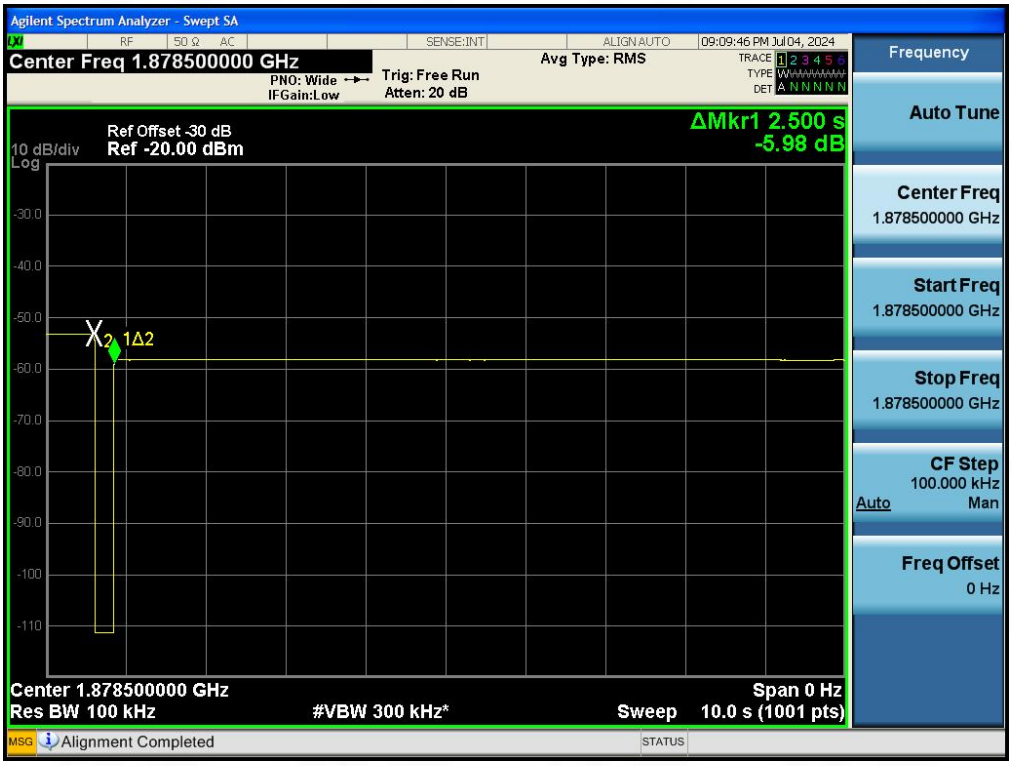
700 MHz Upper C Block

Broadband PCS



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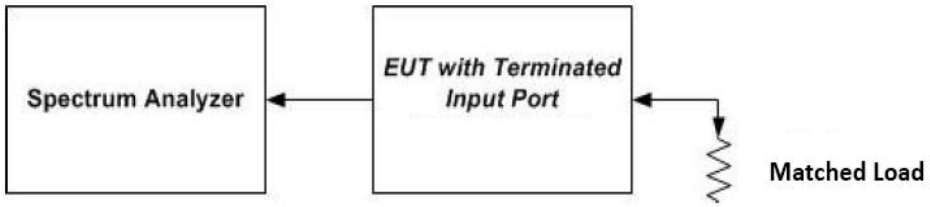
5.8 Uplink Inactivity

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:	 Figure 3 – Noise limit test setup (also used for 7.8)
Procedure:	a) Connect the EUT to the test equipment as shown in Figure 3 with the uplink output connected to the spectrum analyzer. b) Select the RMS power averaging detector. c) Set the spectrum analyzer RBW for 1 MHz with the VBW ⩾ 3X RBW. d) Set the center frequency of the spectrum analyzer to the center of the uplink operational band. e) Set the span for 0 Hz with a single sweep time for a minimum of 330 seconds. f) Start to capture a new trace using MAX HOLD. g) After approximately 15 seconds turn on the EUT power. h) 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. i) Ensure the noise level for the squelched signal is below the uplink inactivity noise power limit, as specified by the rules. j) Capture the plot for inclusion in the test report. k) Measure noise using procedures in sections 7.7.1- 7.7.5. l) Repeat steps 7.8.3 to 7.8.10 for all operational uplink bands. 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.

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:

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Operation Bands			
	Uplink Inactivity Measured(s)	Limit(s)	Result
Cellula	280.5	300.0	PASS
Lower A-E Blocks	274.9	300.0	PASS
700 MHz Upper C Block	279.5	300.0	PASS
Broadband PCS	283.1	300.0	PASS

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