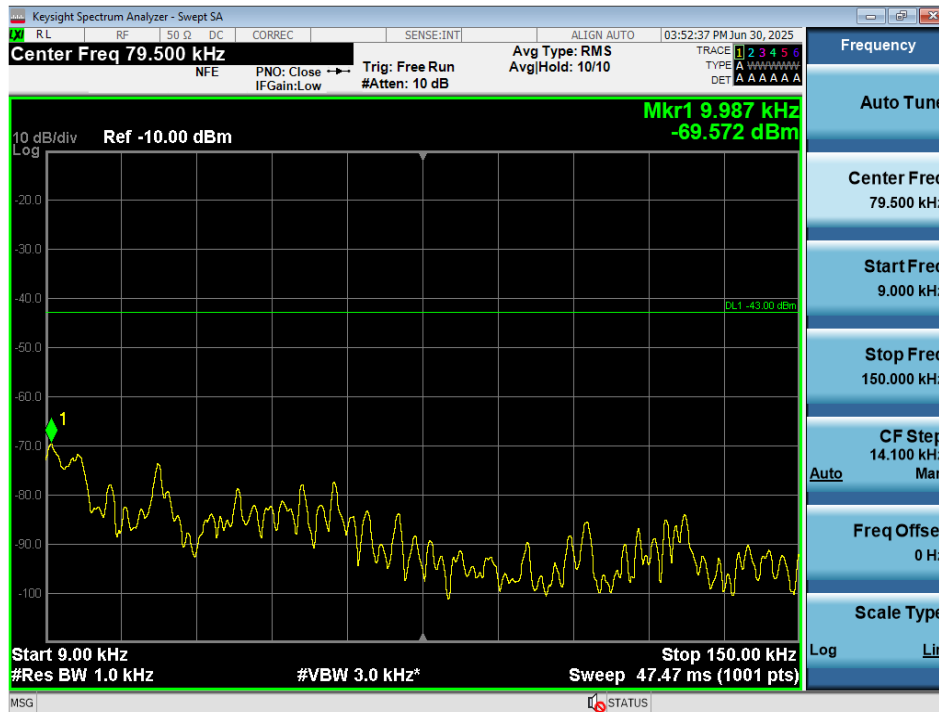
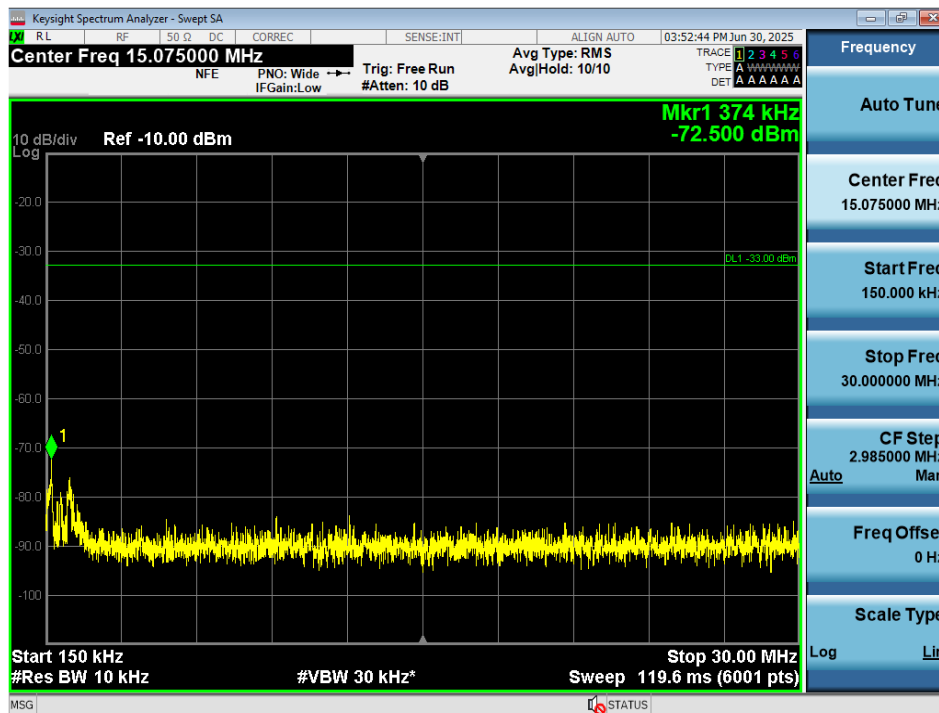


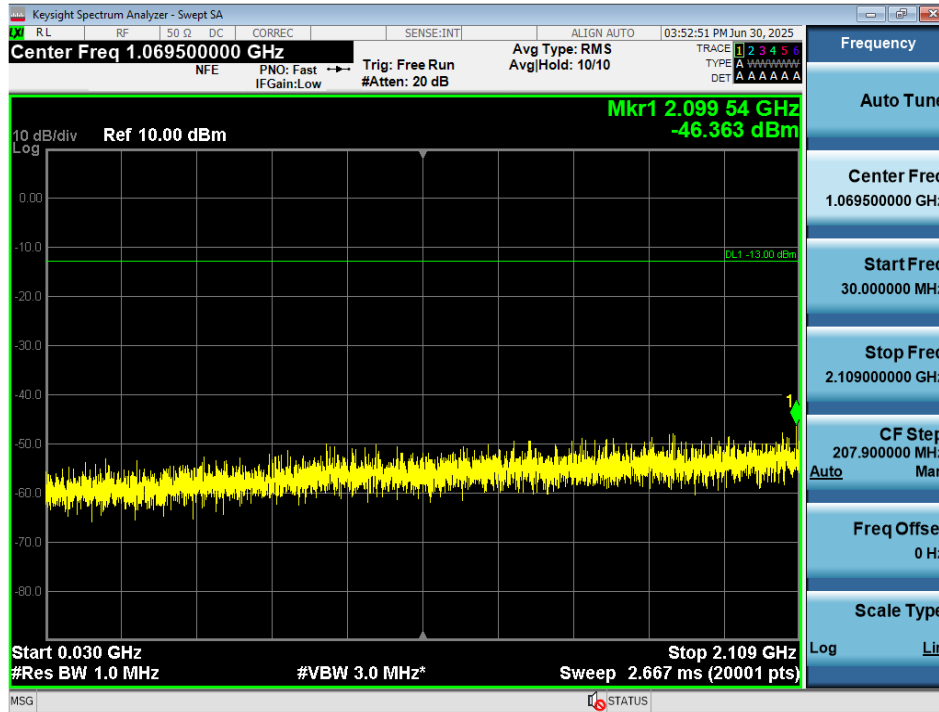
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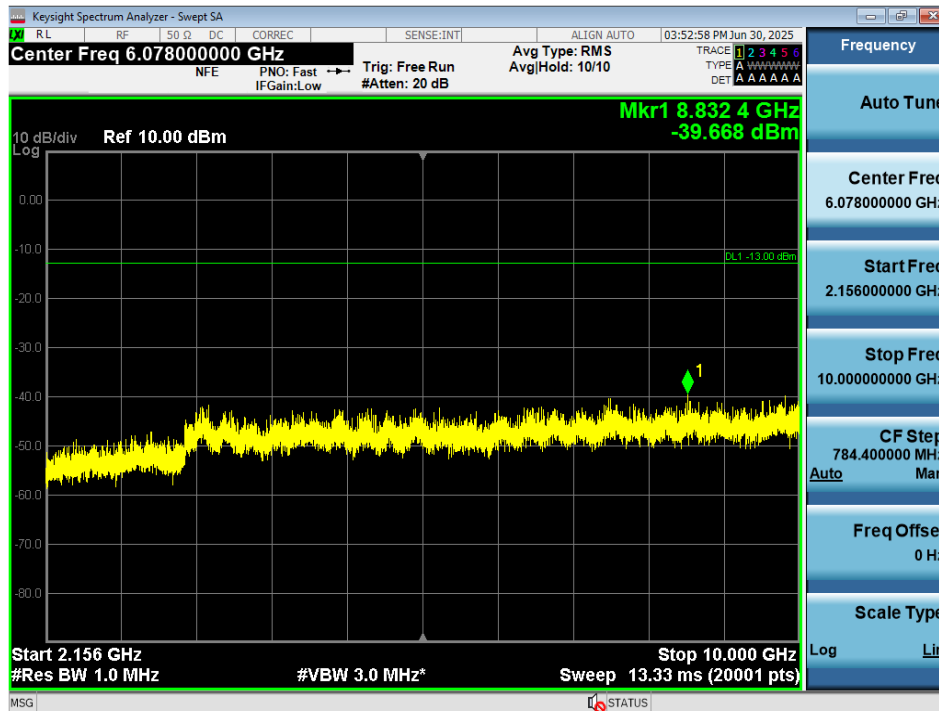
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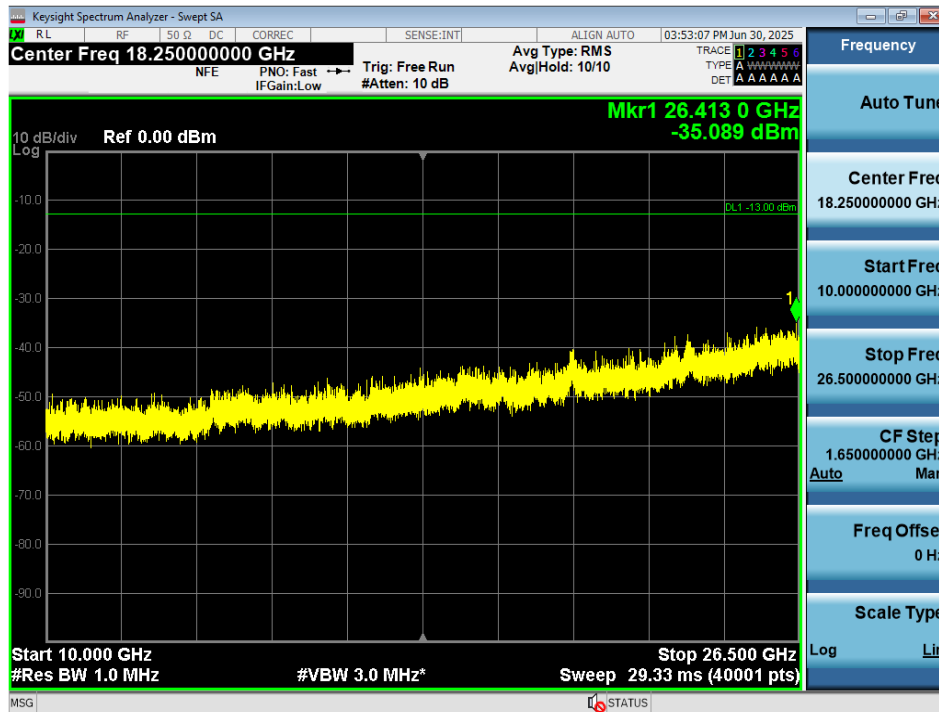
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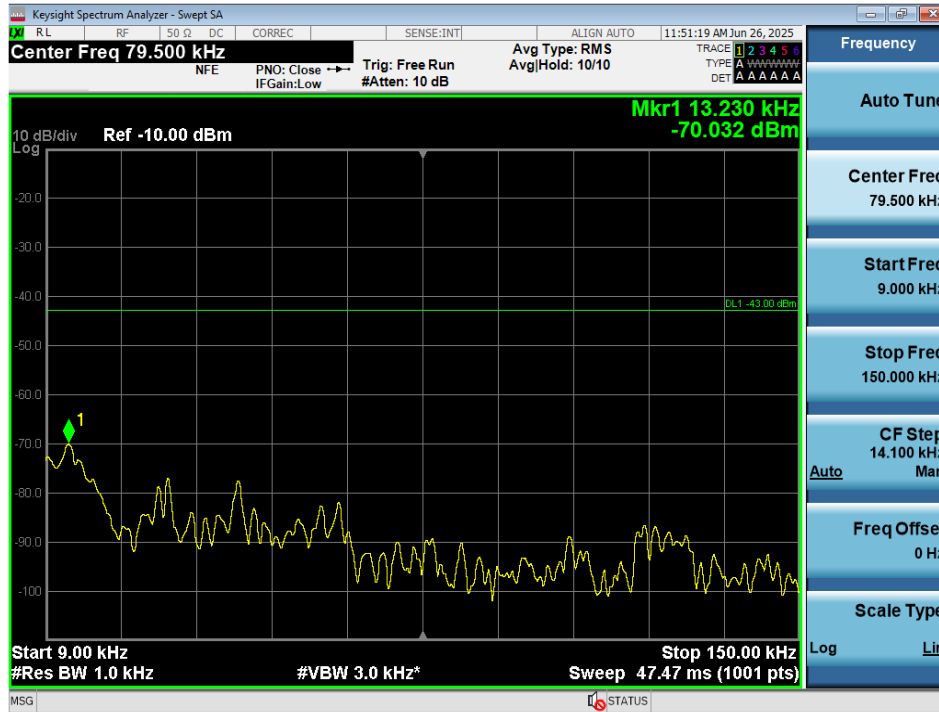
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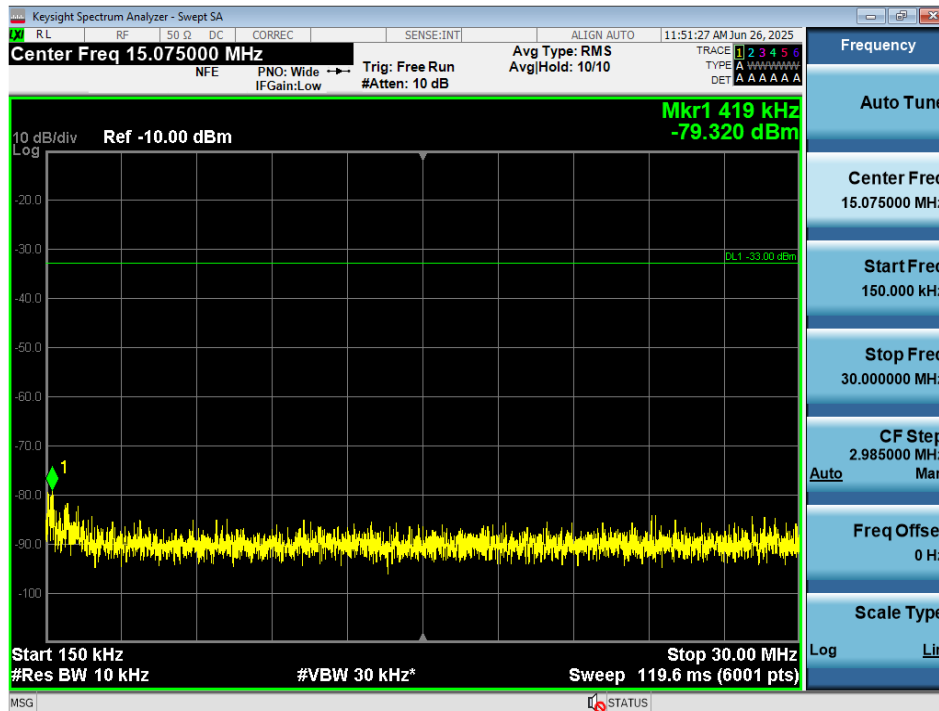
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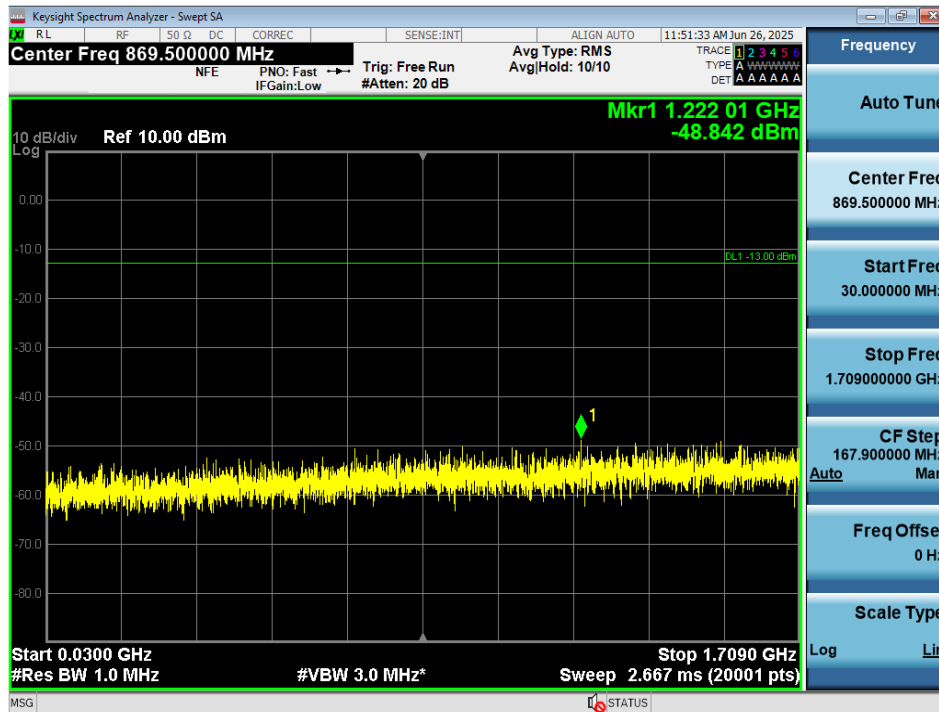
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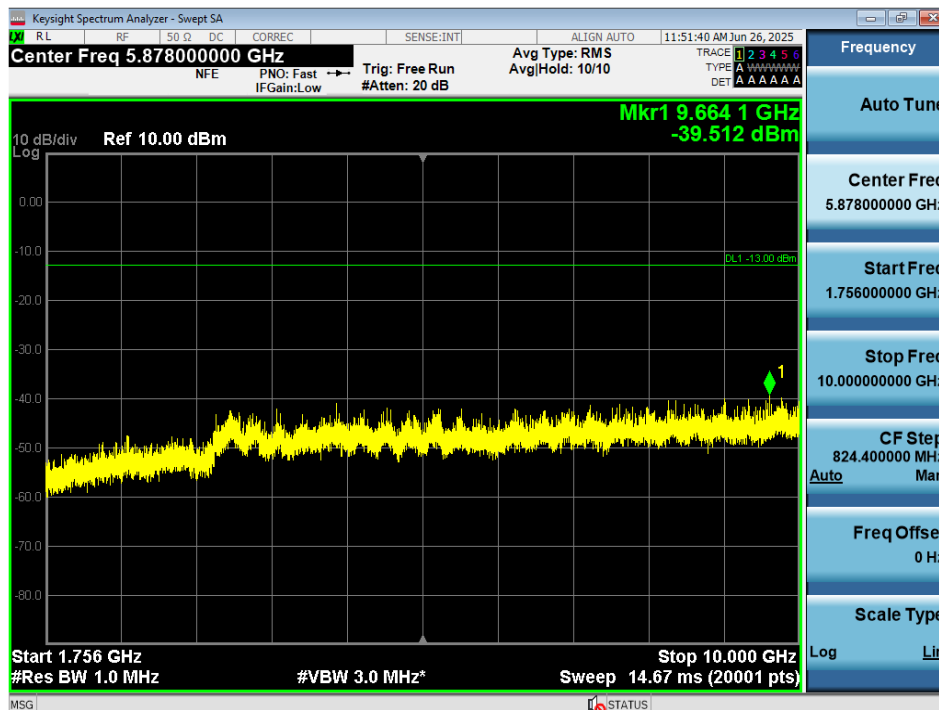
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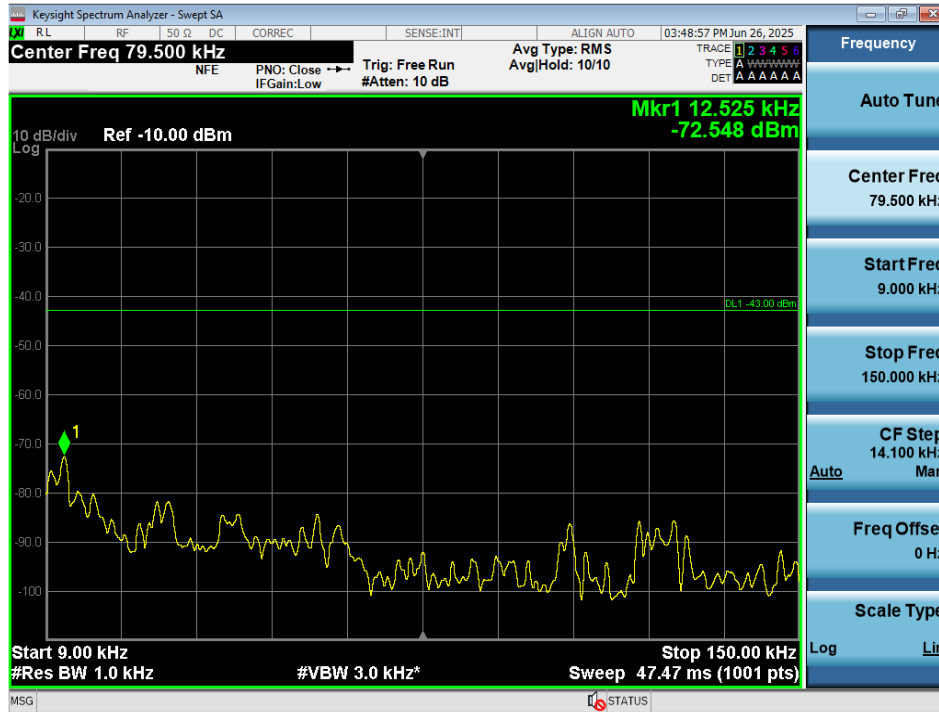
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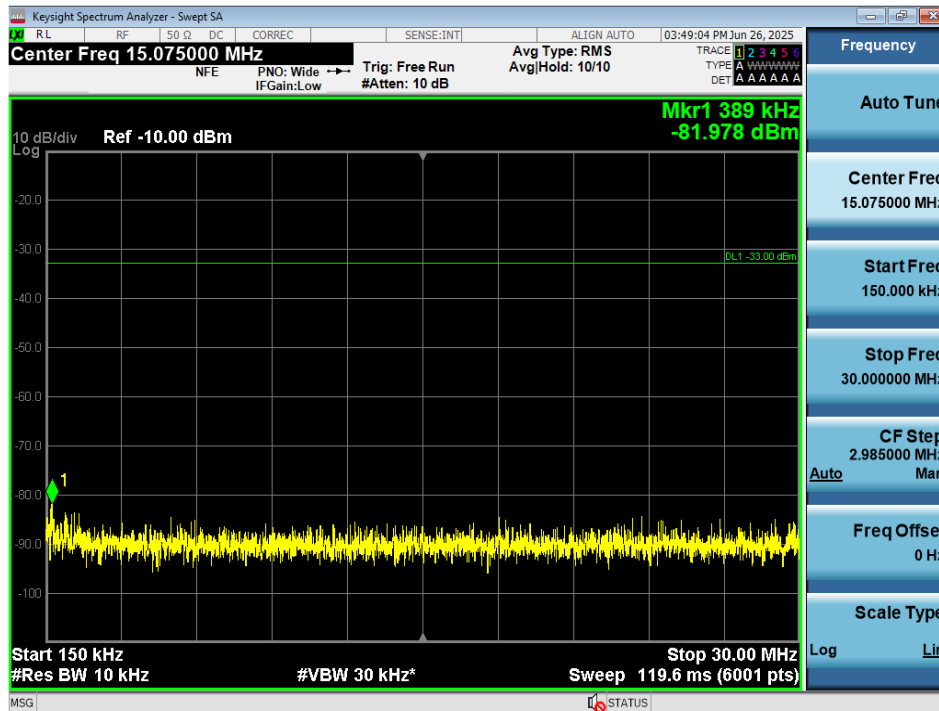
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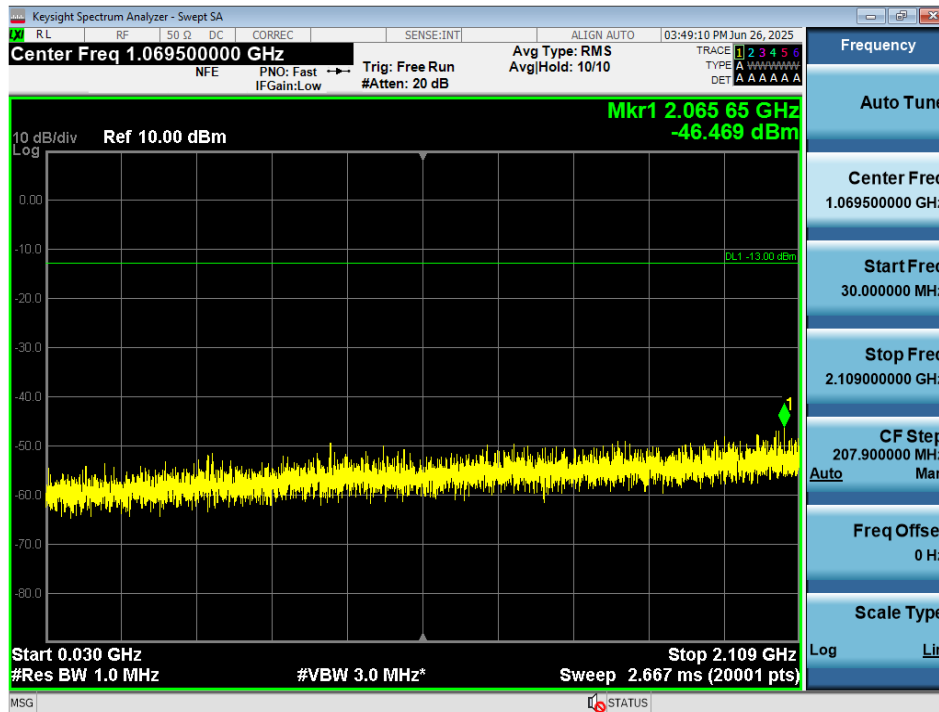
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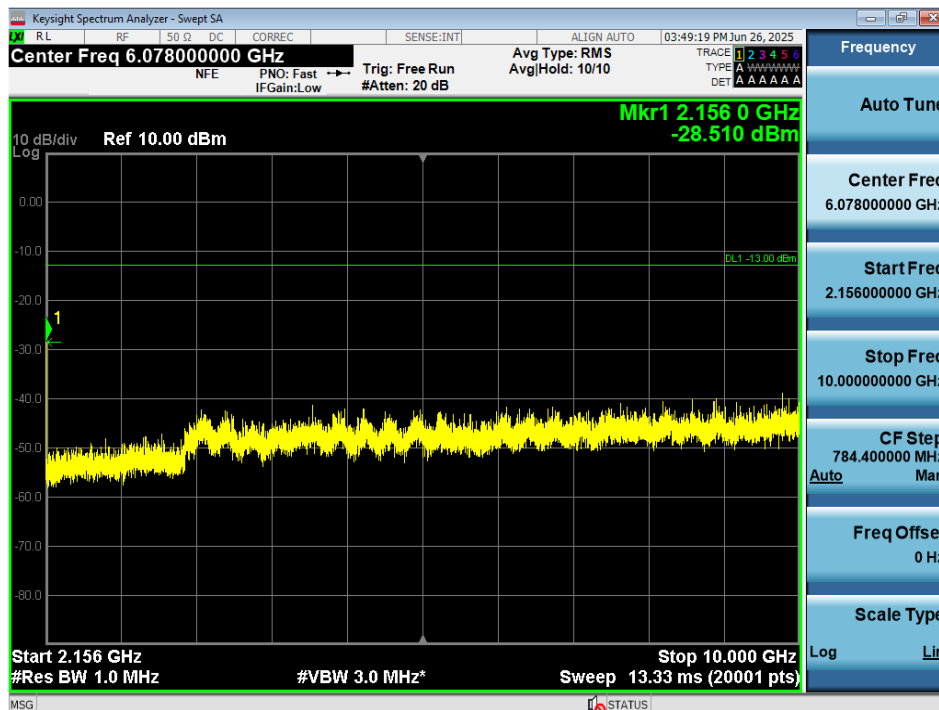
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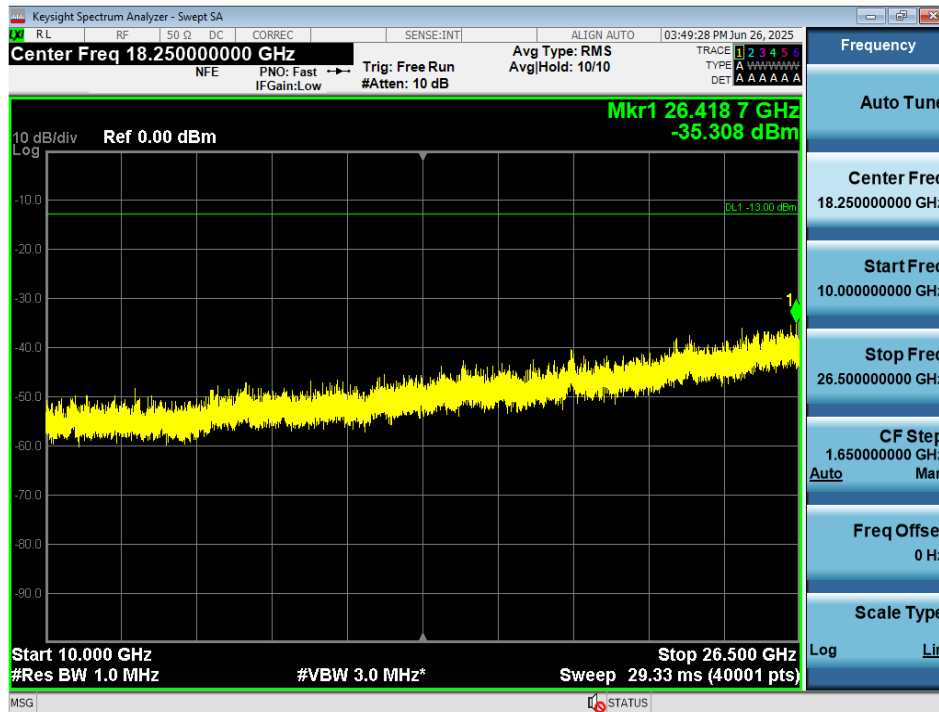
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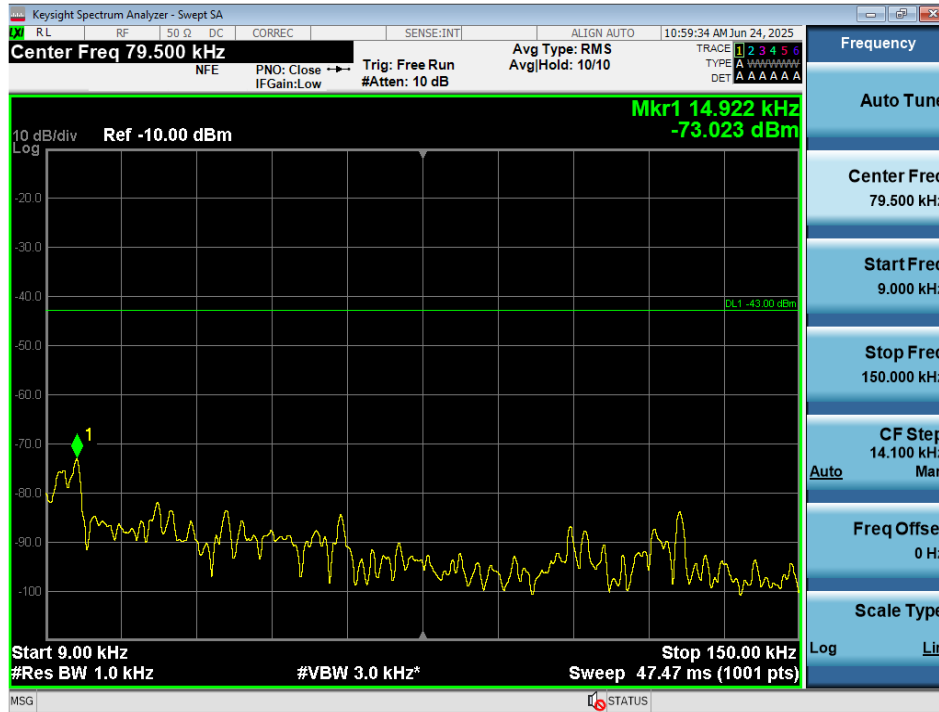
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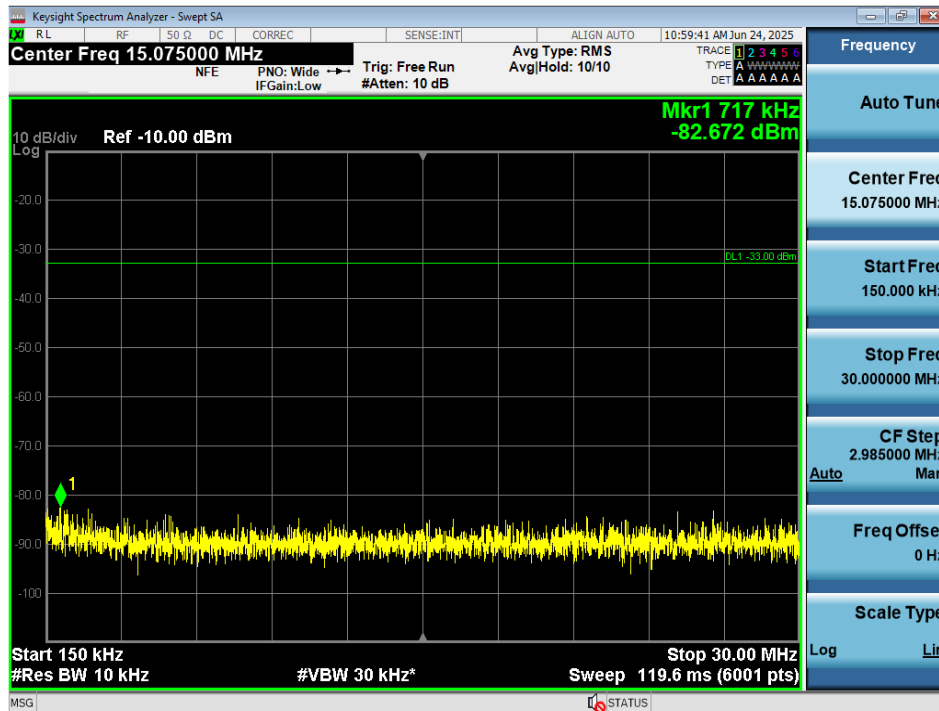
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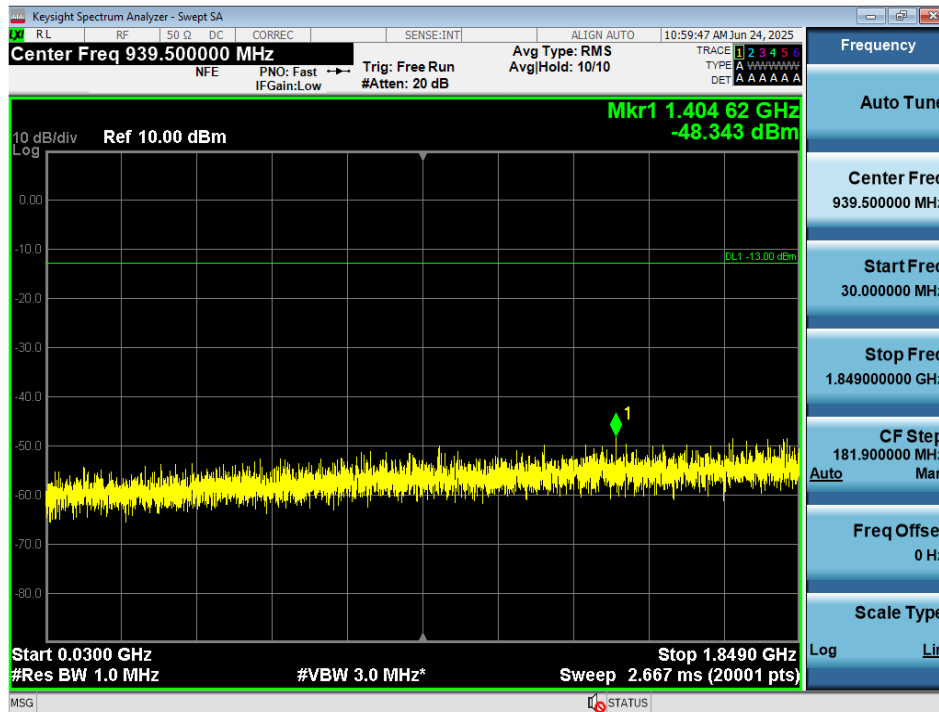
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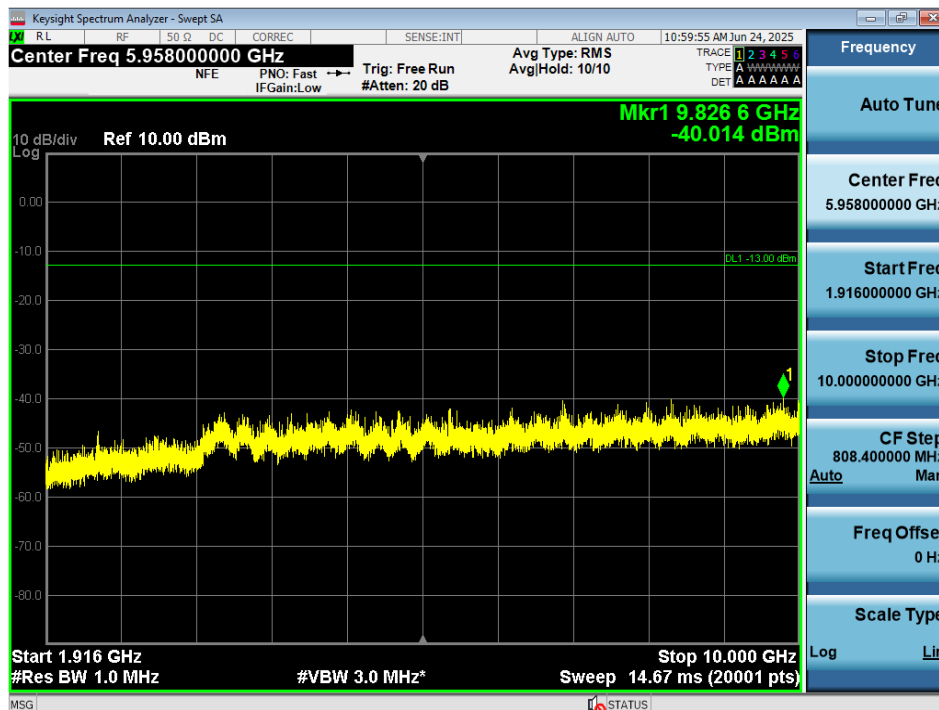
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Conducted Spurious Emissions / Broadband PCS / Uplink / 30 MHz ~ 1.849 GHz / ANT 1



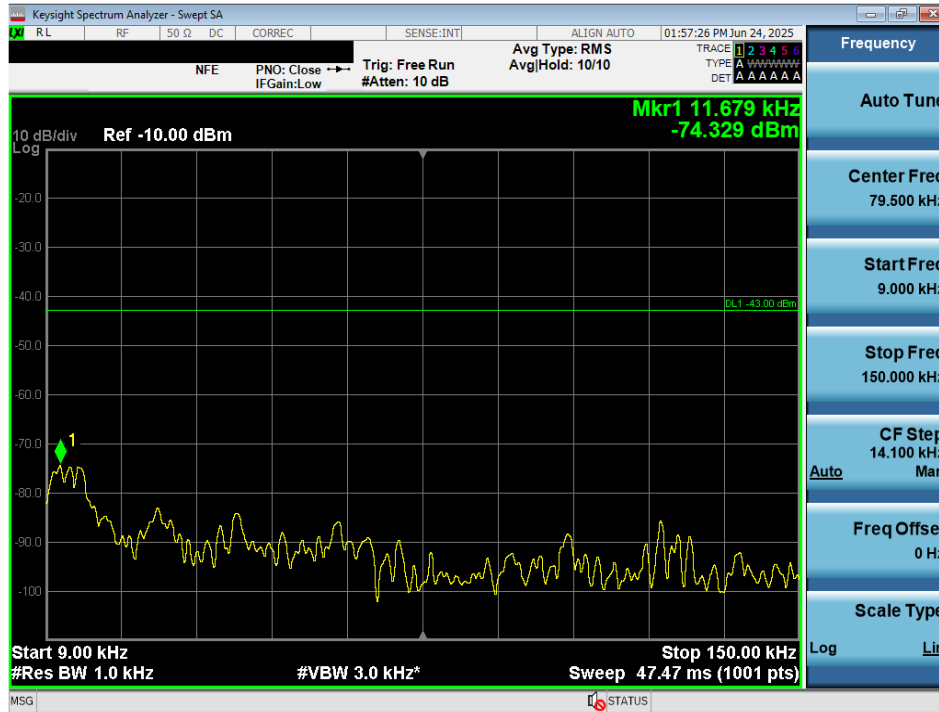
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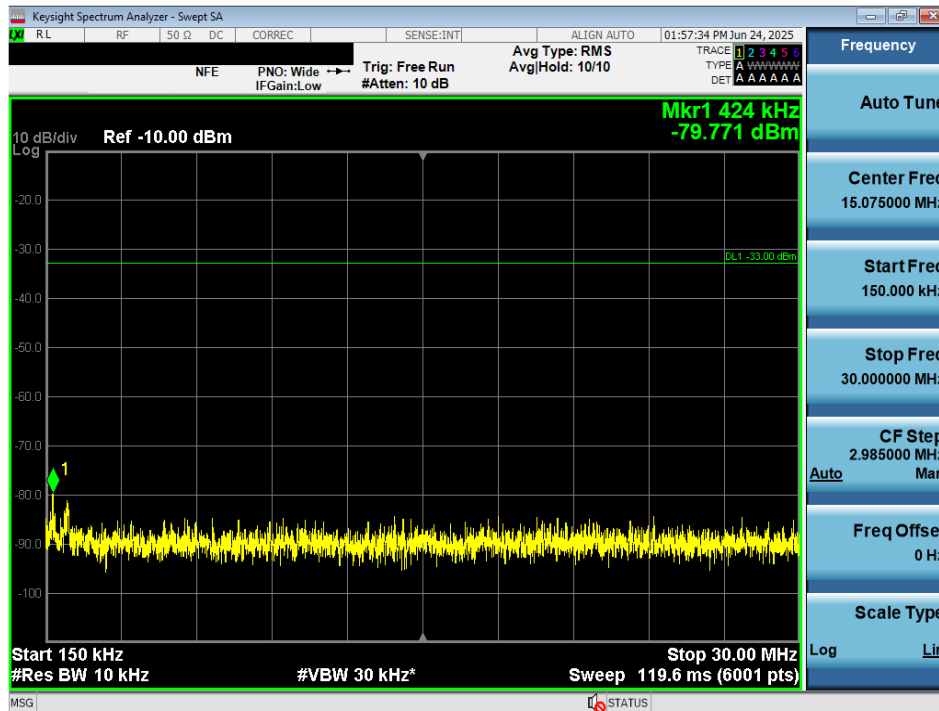
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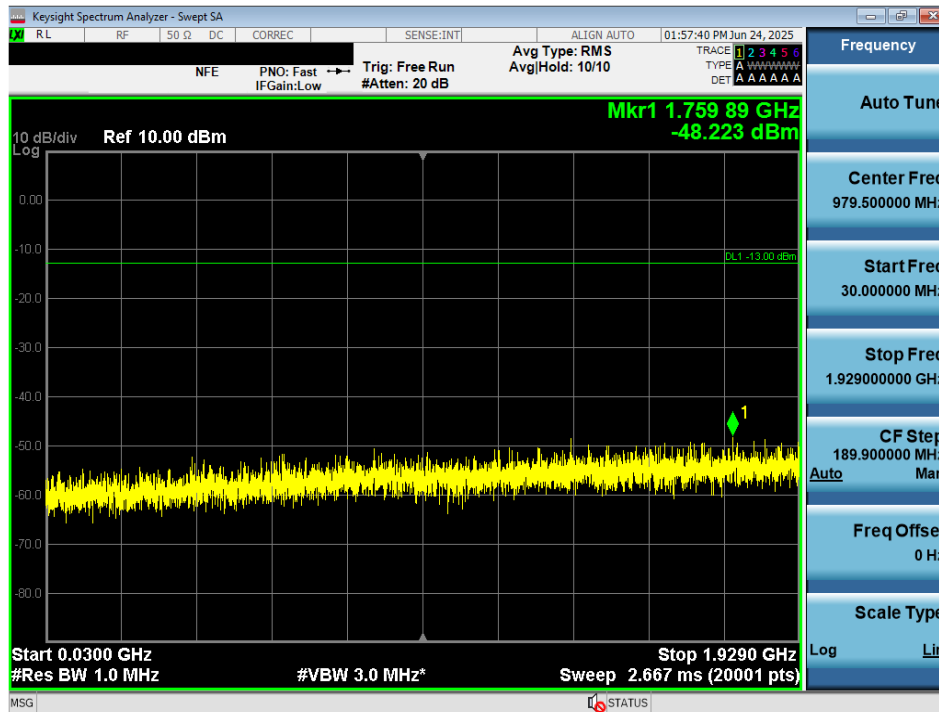
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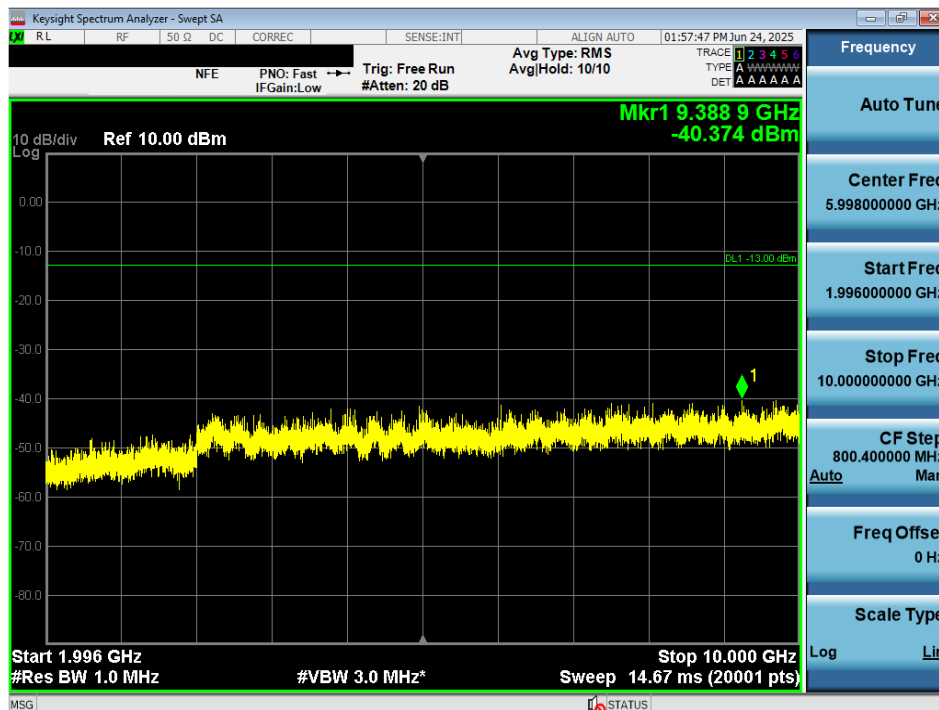
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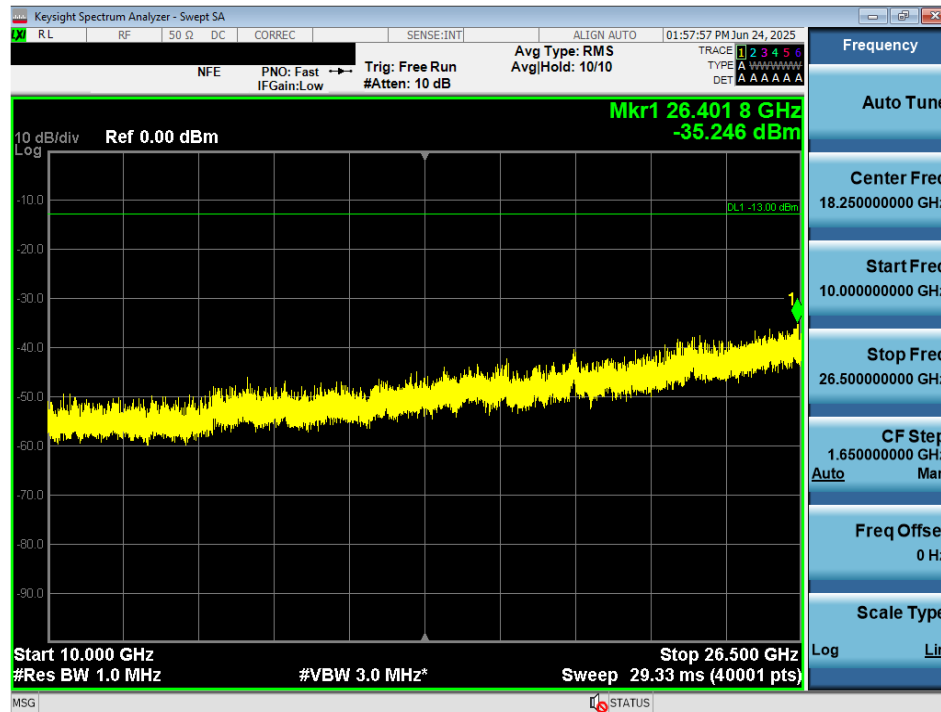
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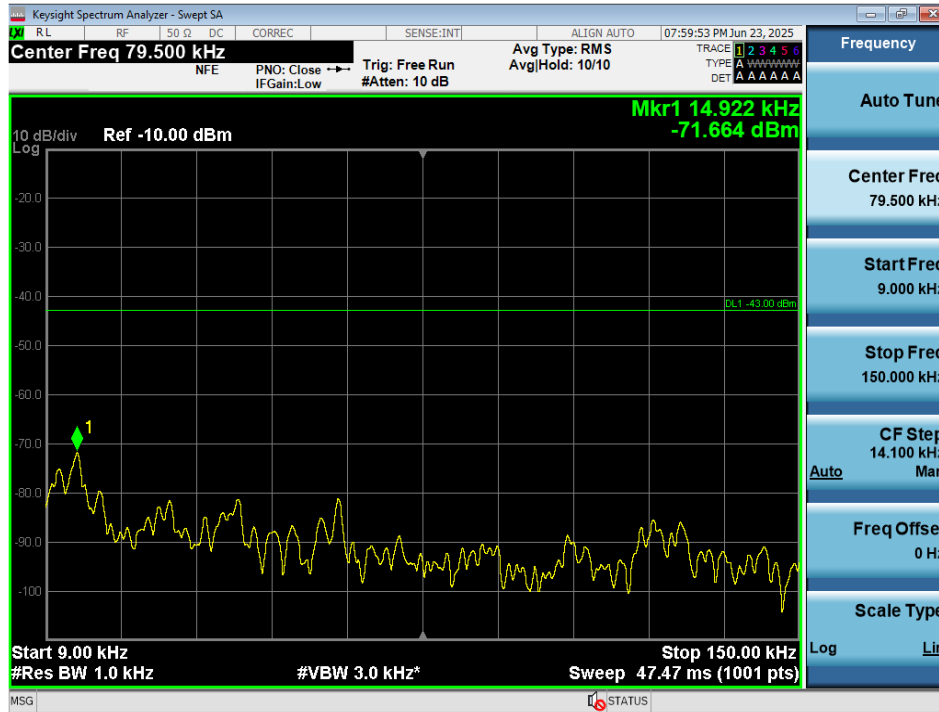
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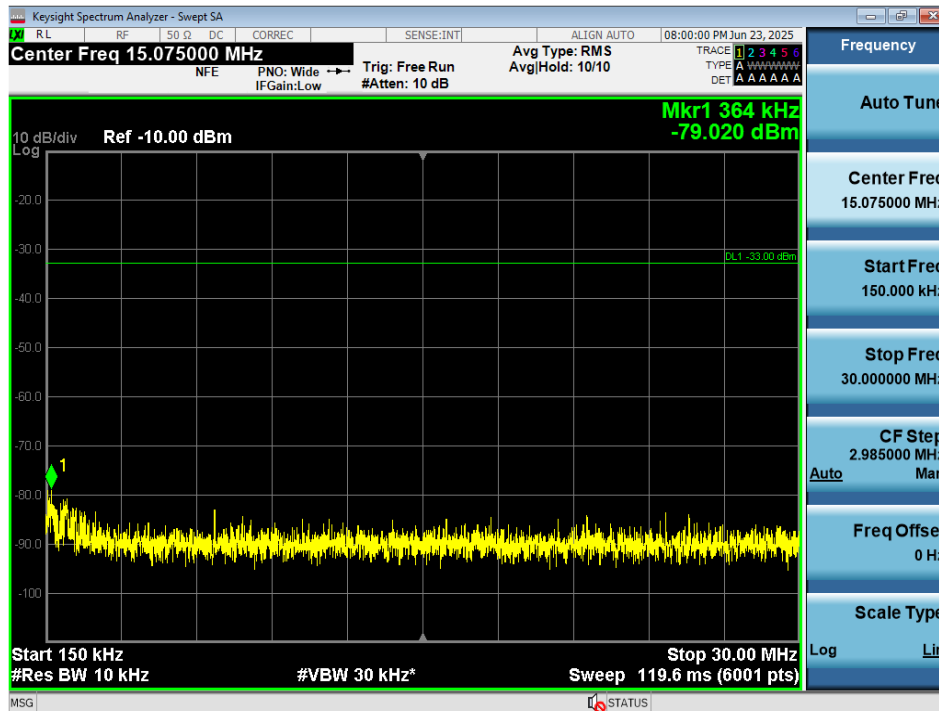
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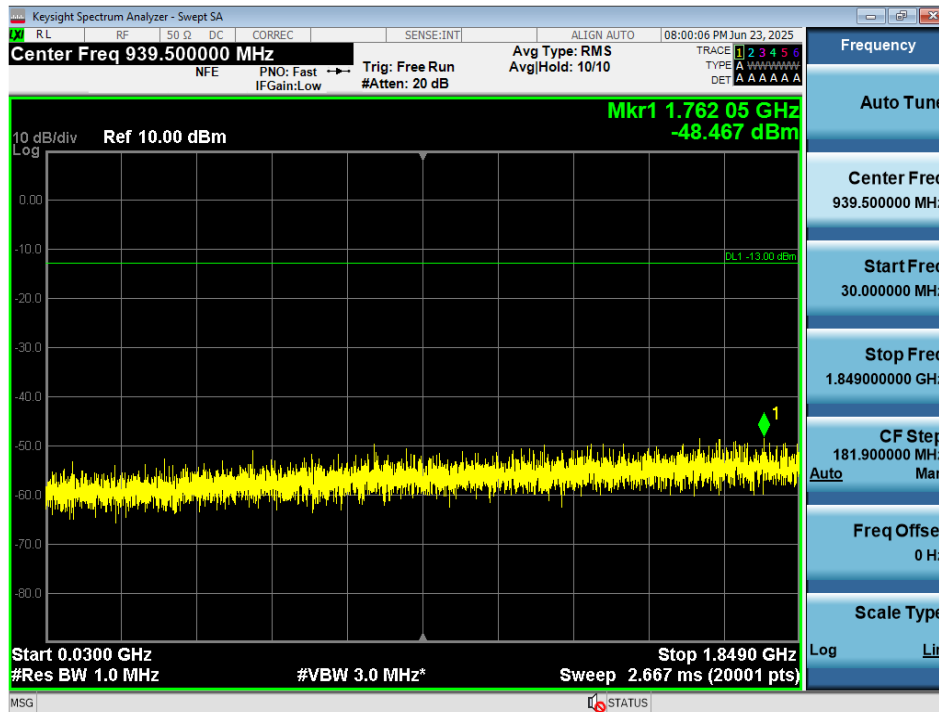
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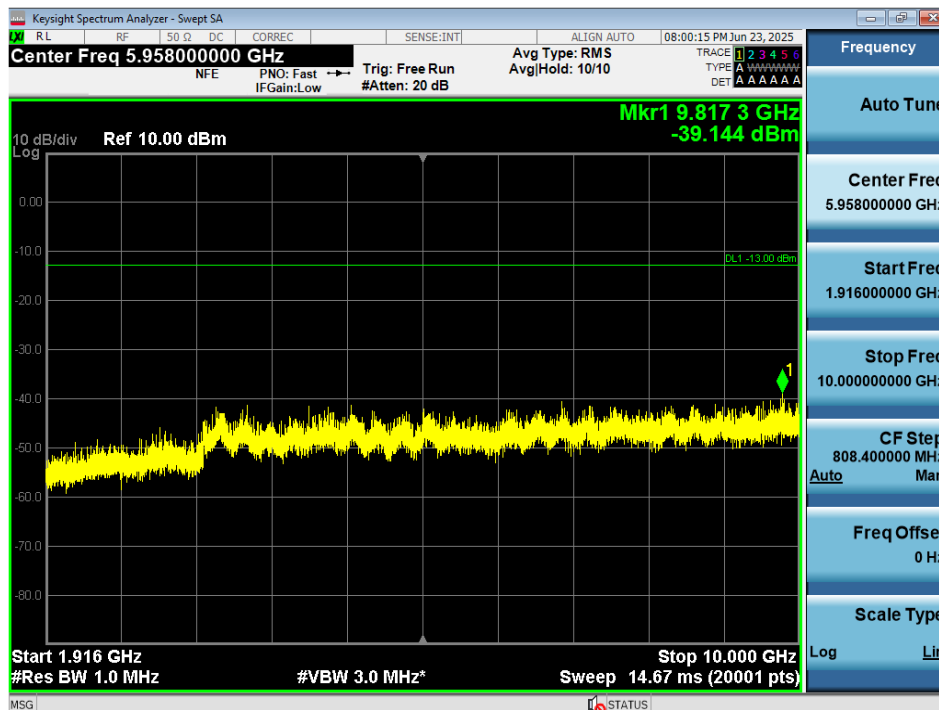
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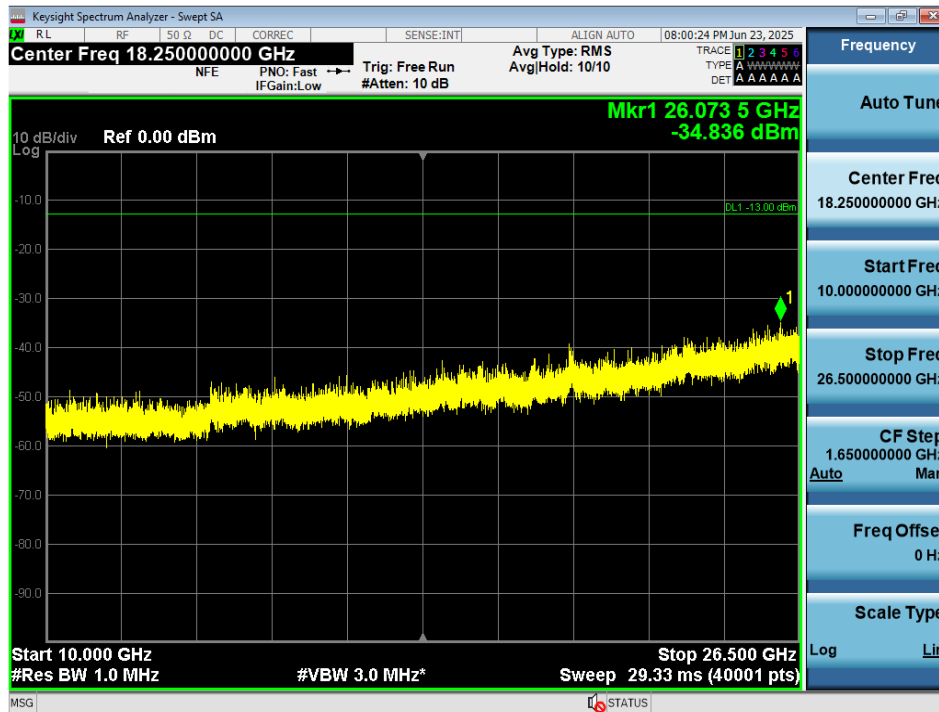
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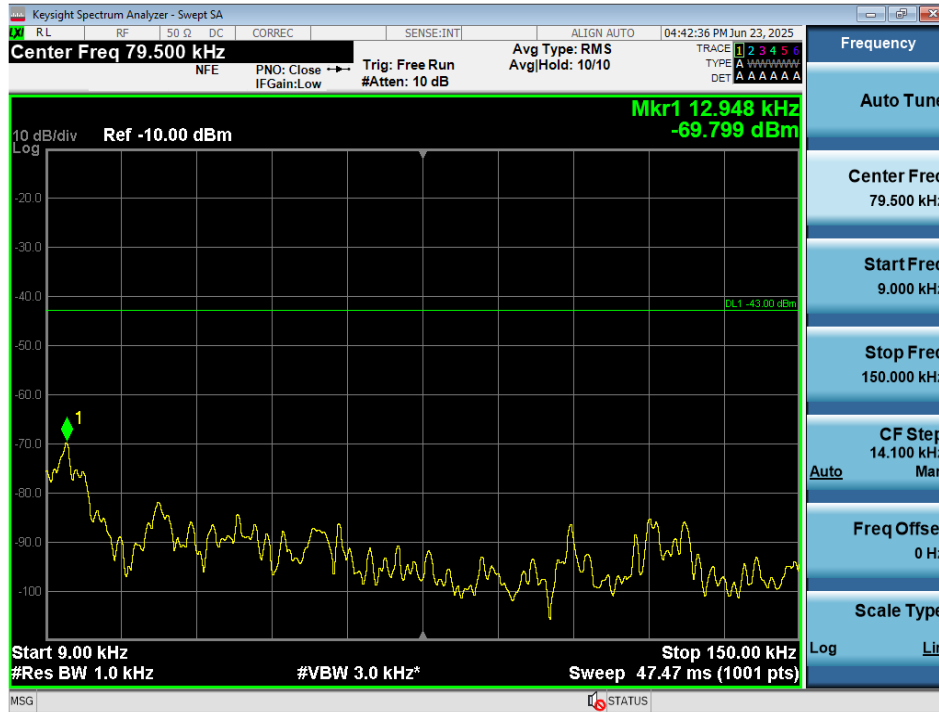
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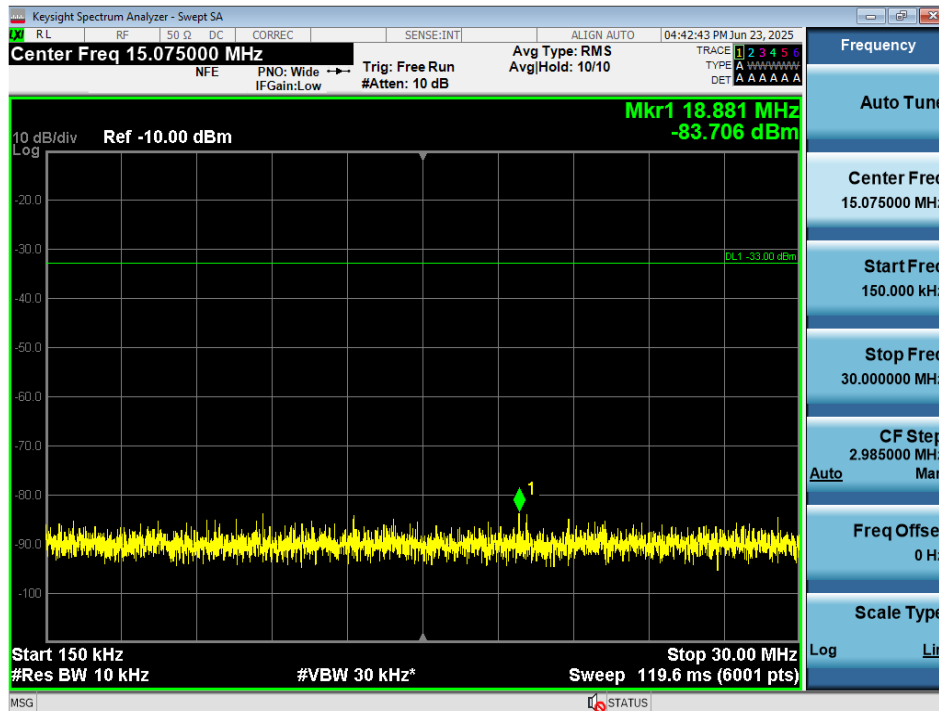
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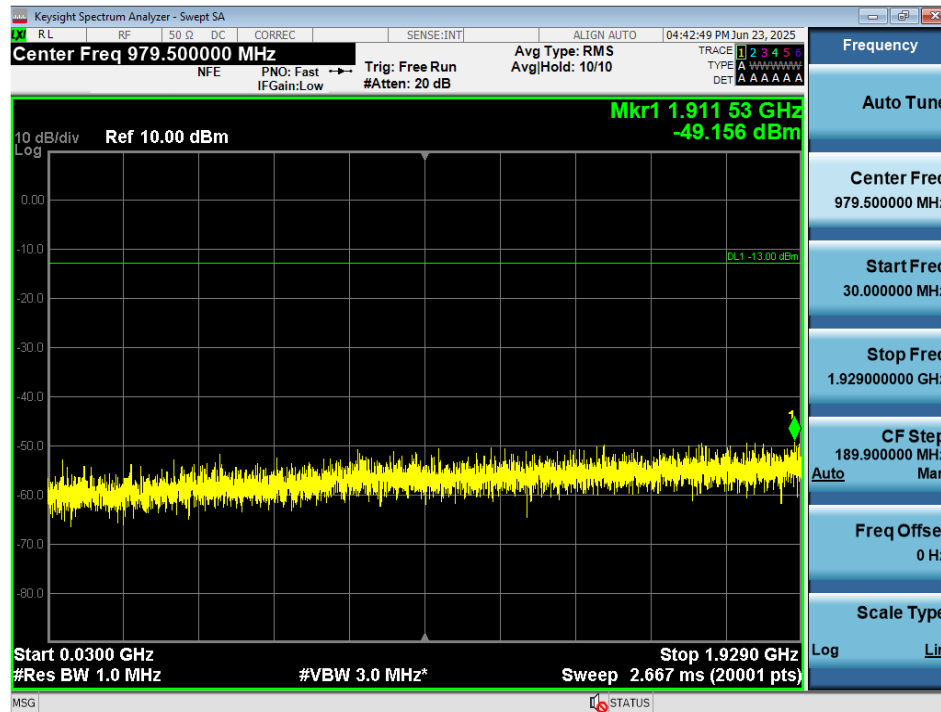
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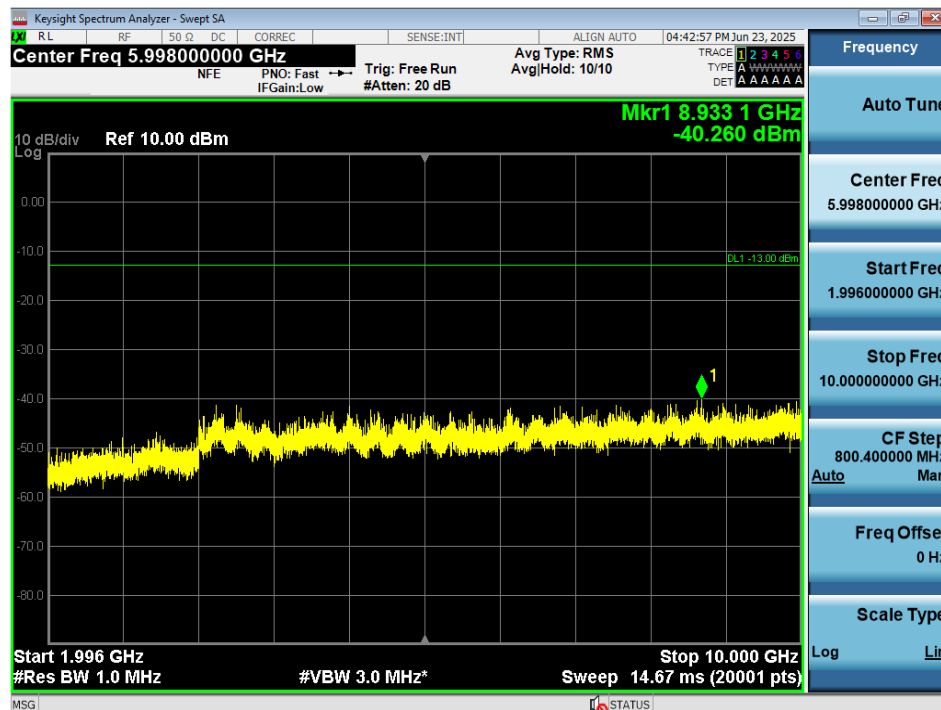
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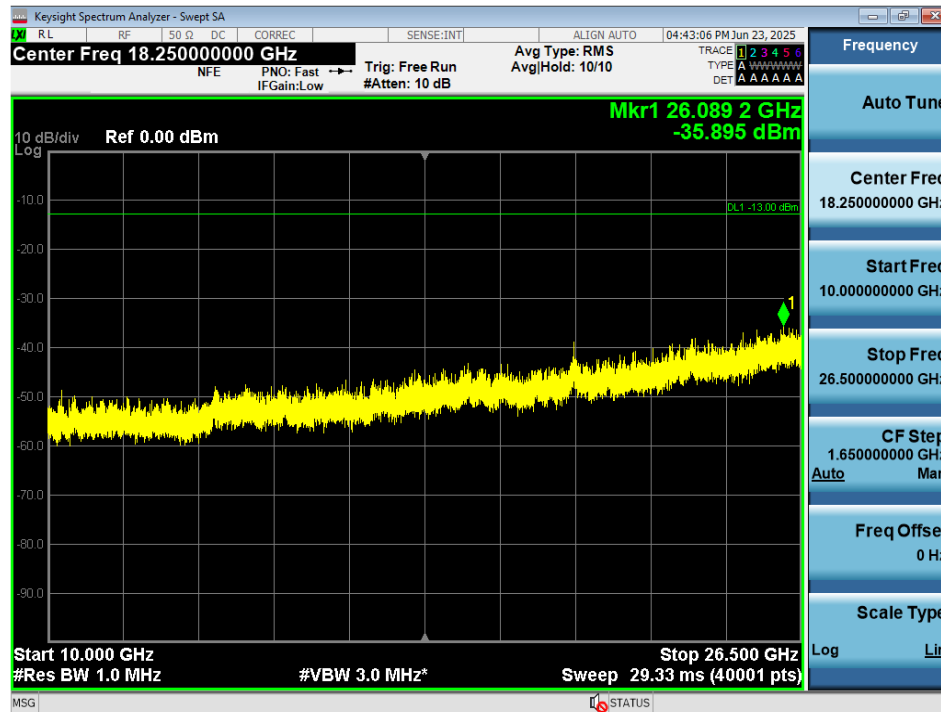
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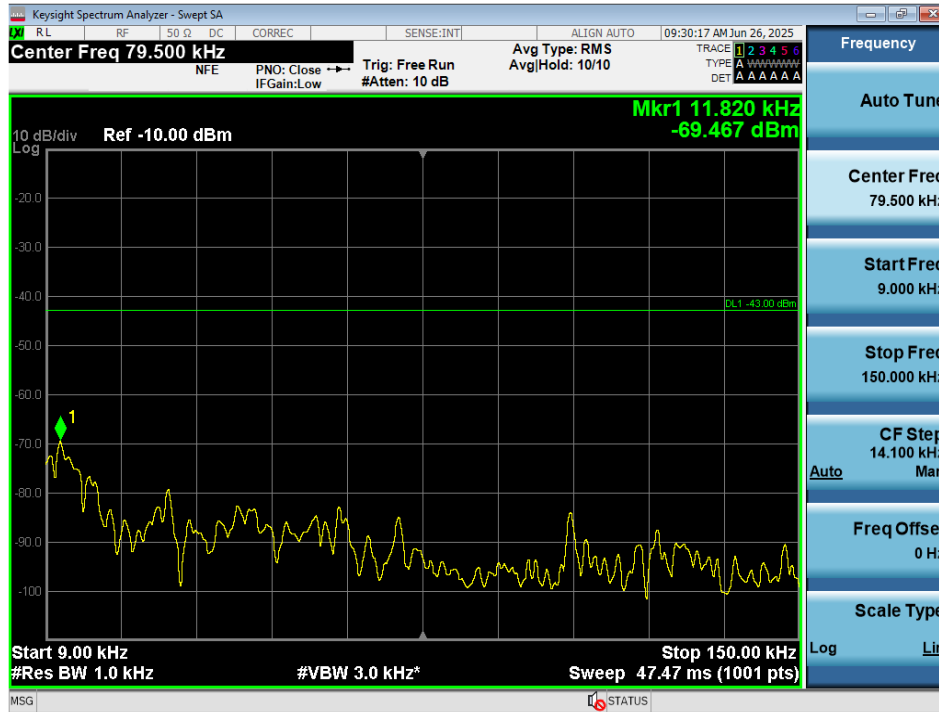
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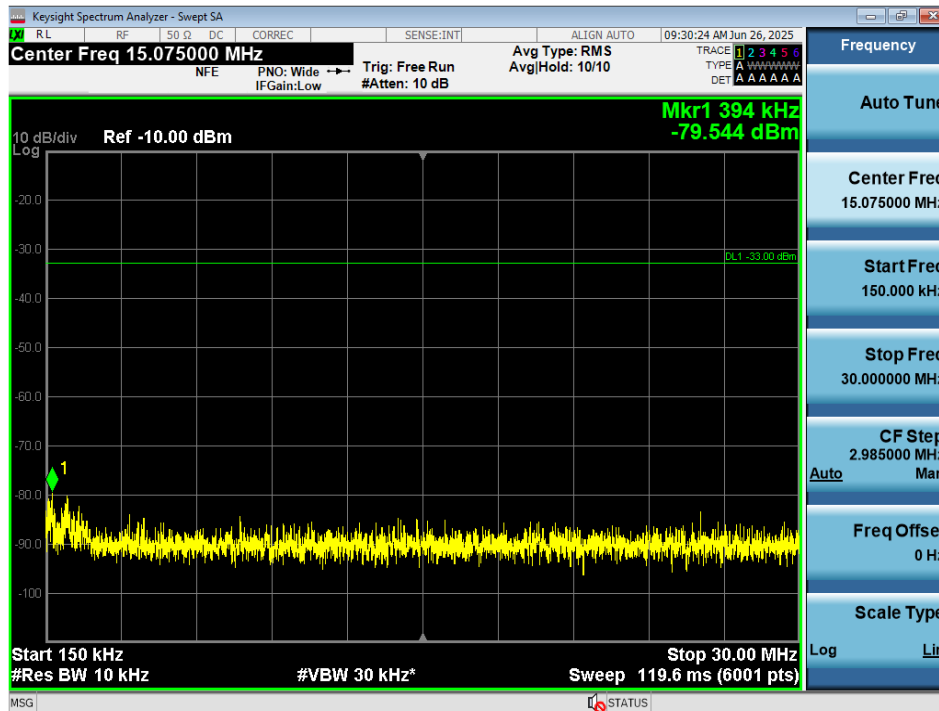
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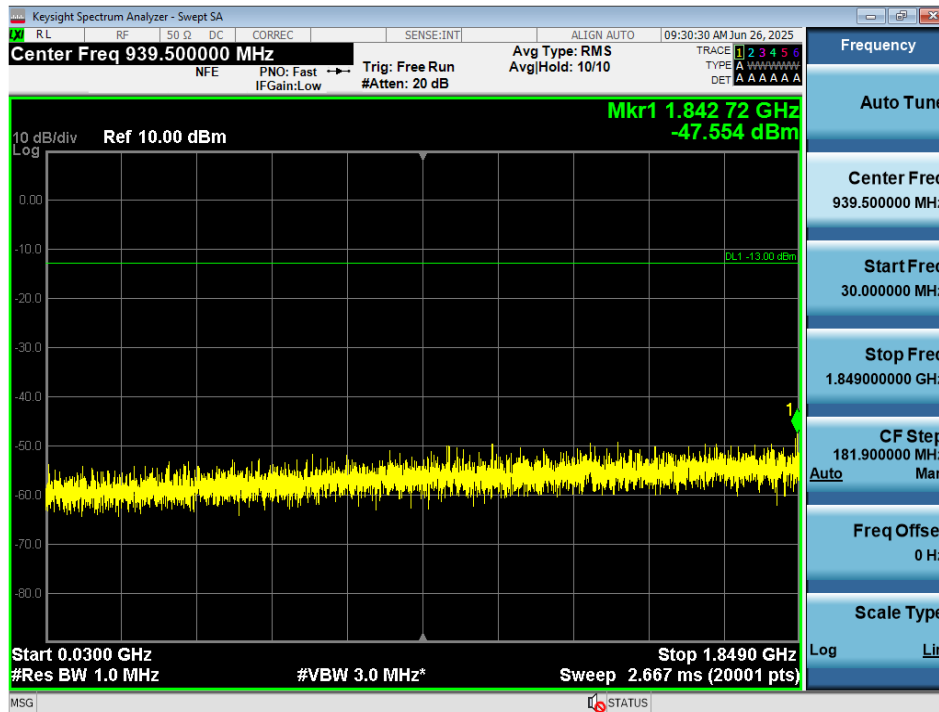
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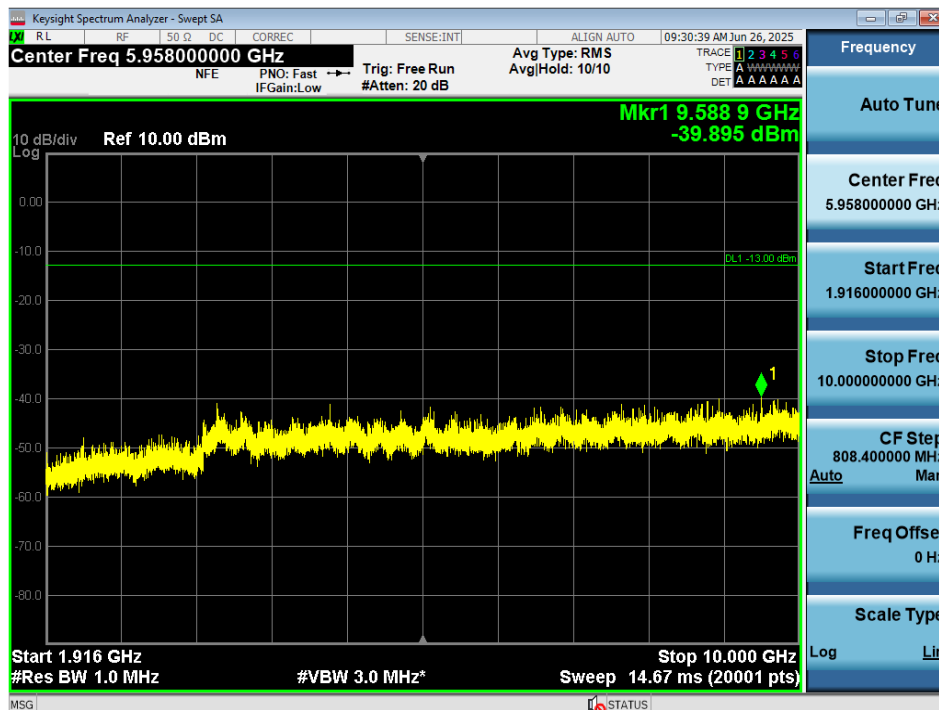
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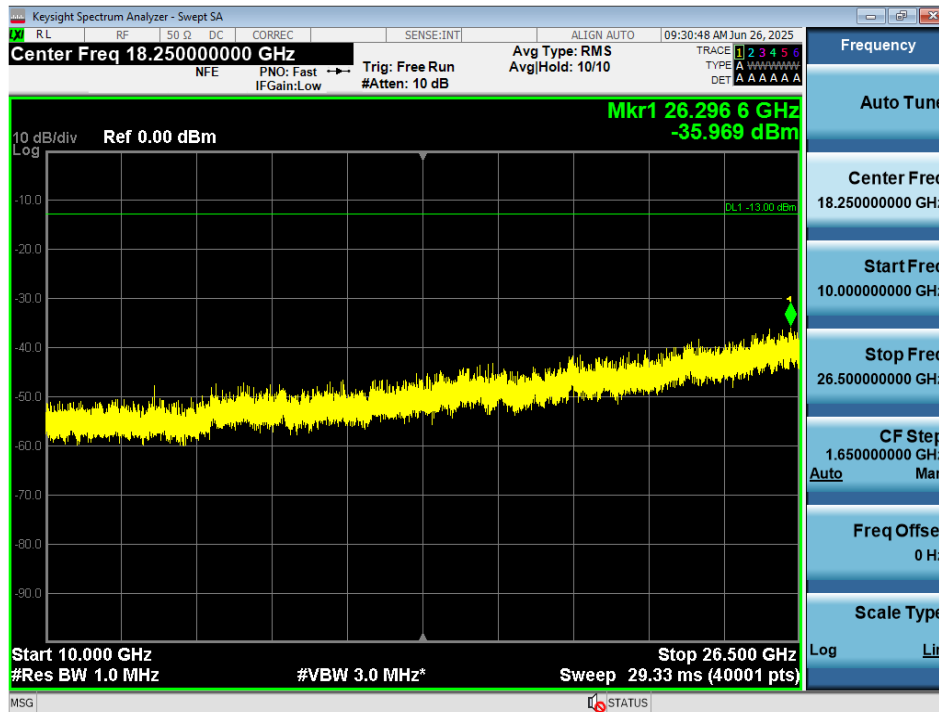
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Conducted Spurious Emissions / Broadband PCS / Uplink / 1.916 GHz ~ 10 GHz / ANT 3



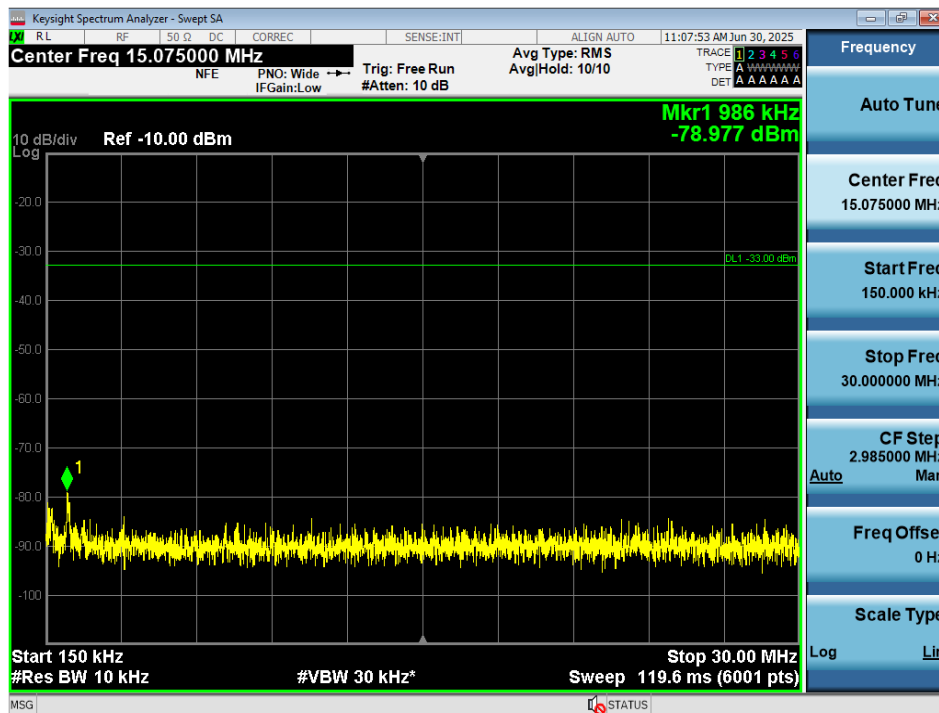
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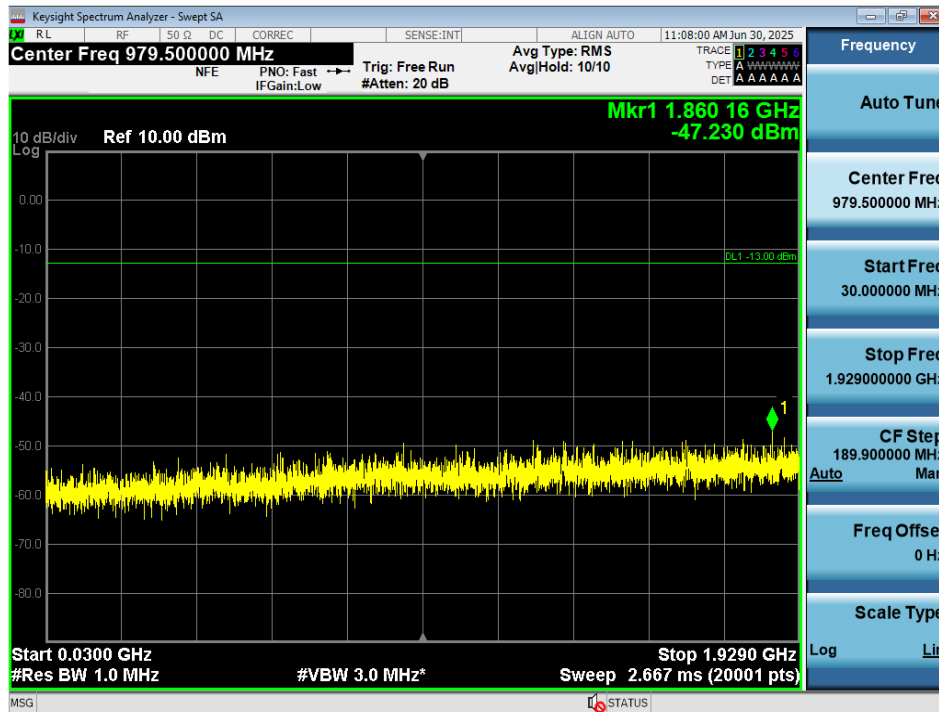
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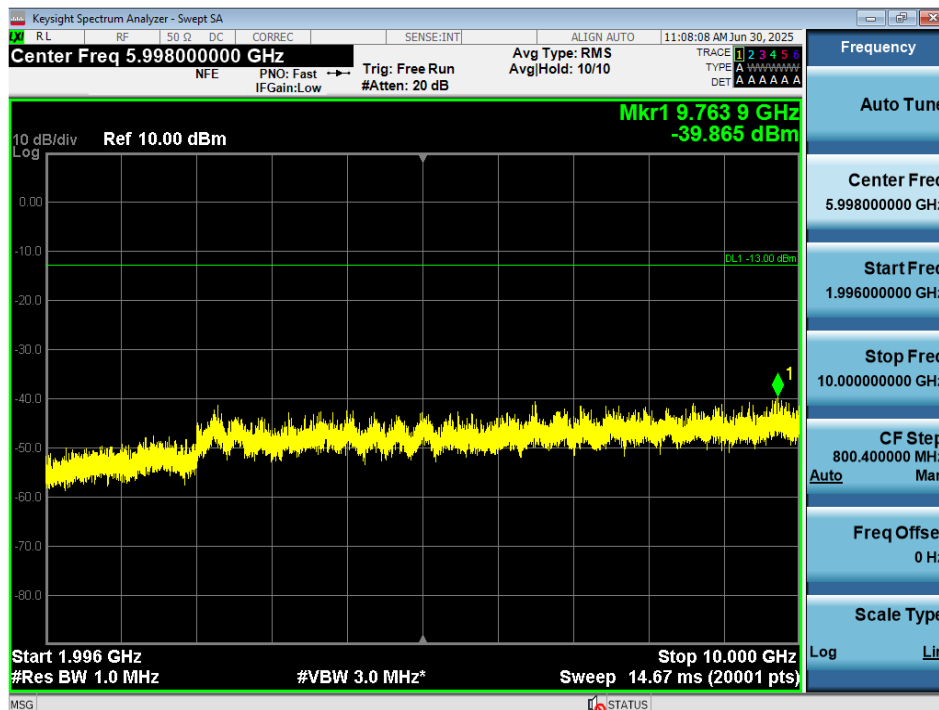
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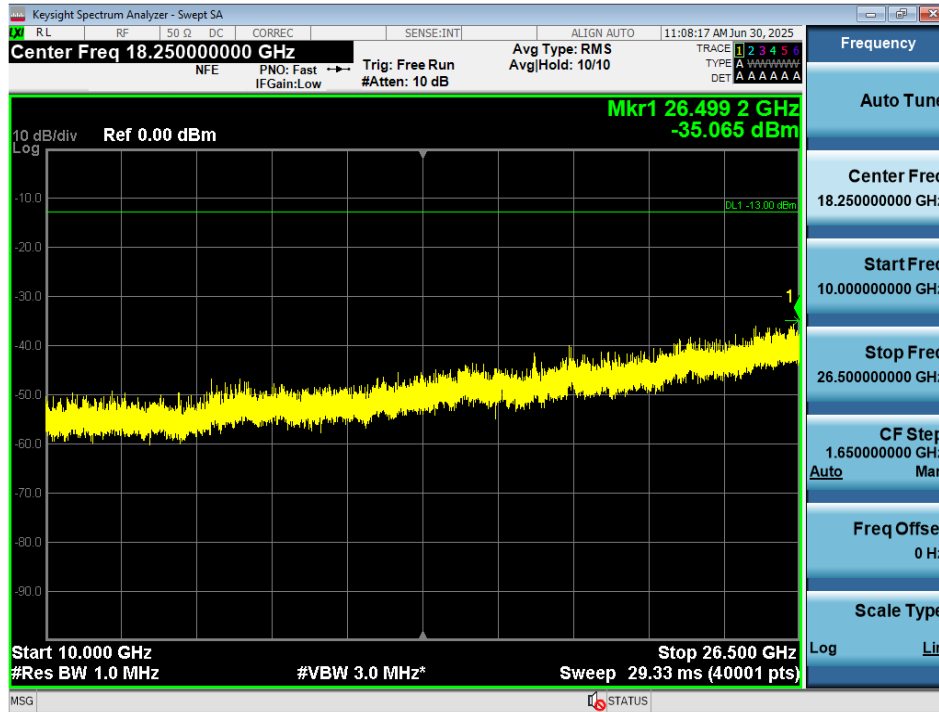
Conducted Spurious Emissions / Broadband PCS / Downlink / 30 MHz ~ 1.929 GHz / ANT 3



Conducted Spurious Emissions / Broadband PCS / Downlink / 1.996 GHz ~ 10 GHz / ANT 3



Conducted Spurious Emissions / Broadband PCS / Downlink / 10 GHz ~ 26.5 GHz / ANT 3



5.8. NOISE LIMITS

Test Requirements:

§ 20.21(e)(9)(i)(A) Noise Limits.

The transmitted noise power in dBm/MHz of frequency selective consumer boosters outside the licensee's spectrum blocks at their uplink and downlink ports shall not exceed the following limits:

- (1) -103 dBm/MHz–RSSI
 - (i) Where RSSI is the downlink composite signal power received in dBm for frequencies in the band of operation outside the licensee's spectrum block as measured after spectrum block filtering is applied and is referenced to the booster's donor port for each band of operation. RSSI is expressed in negative dB units relative to 1 mW.
 - (ii) Boosters with MSCL less than 40 dB, shall reduce the Noise output in (A) by 40 dB–MSCL, where MSCL is the minimum coupling loss in dB between the wireless device and booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.
- (2)
 - (i) Fixed booster maximum downlink noise power shall not exceed -102.5 dBm/MHz + 20 Log₁₀ (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.
 - (ii) Mobile booster maximum noise power shall not exceed -59 dBm/MHz.
 - (iii) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

§ 20.21(e)(9)(i)(I) Transmit Power Off Mode.

When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

Test Procedures:

Measurements were in accordance with the test methods section 7.7 of KDB 935210 D04 v02r04.

7.7.1 Maximum transmitter noise power level

- a) Connect the EUT to the test equipment as shown in Figure 6, and use the test mode to set to maximum gain and minimum passband bandwidth.
- b) Set the spectrum analyzer RBW to 1 MHz with the VBW $\geq$ 3 MHz.
- 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 $\geq$ 2 the CMRS band.
- e) Measure the transmitter noise power spectral density over the CMRS band and use a marker to identify the maximum noise power within the CMRS band but outside of the authorized licensee spectrum block(s).

- f) Save the spectrum analyzer plot as necessary for inclusion in the final test report.
- g) Repeat 7.7b) to 7.7f) for all operational downlink bands.
- h) Connect the EUT to the test equipment as shown in Figure 7 or Figure 8 as appropriate for uplink or downlink directions.
- i) Configure the signal generator for AWGN with a 99% OBW of 4.1 MHz.
- j) Set the spectrum analyzer RBW to 1 MHz with the VBW $\geq$ 3 MHz. Select the power averaging (rms) detector and average over at least 100 traces.
- k) Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with a span setting $\geq 2 \times$ the CMRS band. The span shall include all spectrum blocks in the particular CMRS band under test (see Appendix A).
- l) 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.
- m) 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.
- n) Set the passband of the EUT and the RF filter frequencies to the other edge of the CMRS band. Ensure that the signal generator does not contribute to the in-band noise level of the booster.
 - 1) Filter 1 in Figure 8 should be configured as needed to ensure that no additional noise is present within or outside the passband of the booster at its donor port. Filter 2 should be configured such that an accurate measurement of the noise power outside of the CMRS licensee's block can be made on the spectrum analyzer.
 - 2) Any filter effects that may reduce the measured transmit noise level outside of the CMRS licensee's band of the EUT must be accounted for, to ensure that an accurate noise measurement is taken. The test report shall indicate the type and characteristics of the filters used.
- o) Measure the maximum transmitter noise power level while varying the downlink signal generator output level from -90 dBm to -20 dBm in 1 dB steps within the RSSI-dependent region, and in 10 dB steps outside the RSSI-dependent region. Report the six values closest to the limit, with at least two points included from within the RSSI-dependent region of the limit. See Appendix D for noise limits graphs. The EUT response time shall be less than 3 seconds.
- p) Repeat 7.7h) through 7.7o) for all operational uplink and downlink 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, for the setups shown in Figures 6 to 8 connect a second signal generator in place of the matched load, then cycle the RF output of the second signal generator to simulate this function.

7.7.2 Variable uplink noise timing

- Set the spectrum analyzer to the uplink frequency to be measured.
- Set the span to 0 Hz with a sweep time of 10 seconds.
- Set the power level of signal generator to the lowest level of the RSSI-dependent noise.
- Select MAX HOLD and increase the power level of signal generator by 20 dB for fixed boosters, and by 10 dB for mobile boosters.
- Affirm that the uplink noise decreases to the specified level within 3 seconds for fixed boosters, and within 1 second for mobile boosters.
- Repeat 7.7.a) through 7.7.e) for all operational uplink and downlink bands.
- Include plots and summary table in test report.

Notes:

- The EUT operated in test mode with the gain set to maximum and the bandwidth set to minimum (5 MHz).
- For Maximum Noise (Frequency-Dependent) testing, the EUT was configured according to Figure 6 of KDB 935210 D04.
- For Maximum Noise (RSSI Dependent and Transmit Power Off Mode) and Noise Response Time tests, the EUT was configured according to Figure 7 or Figure 8 of KDB 935210 D04, as appropriate.
- The timing limit follows the fixed devices 3-second limit specified in Section 7.7.2 of KDB 935210 D04.
- The minimum MSCL value in this test is calculated according to following formula and table.

$$L_p = 20 \times \log f \text{ (Uplink Band the Lowest frequency)} + 20 \times \log (\text{Distance}) - 27.5$$

$$\text{MSCL} = L_p - \text{Antenna gain} + \text{Cable loss}$$

Frequency (MHz)	Server Ant. Gain (dBi)	Sever Cable Loss (dB)	Distance (m)	Lp	MSCL
699	2.0	2.91	2	35.410	36.322
777	2.0	2.93	2	36.329	37.262
824	2.0	3.22	2	36.839	38.056
1 710	5.0	5.09	2	43.181	43.269
1 850	5.0	4.88	2	43.864	43.740

The antenna gain, cable length, and loss are based on the specifications provided by the vendor.

The distance is specified by the manufacturer, and the information is provided in the manual.

6. The test limit is based on the 'Frequency Dependent Limits', 'RSSI Dependent Limits', and 'Transmit Power Off Mode' line in Figure D1 of Note 7.

Category	MSCL	RSSI Range		Transmitter Noise Power Limit
		Downlink	Uplink	
Frequency Dependent Limits (DL Only)	< 40	-90 dBm to -103 dBm/MHz - RSSI - (40 dB - MSCL)	-	-102.5 dBm/MHz + 20 log ₁₀ (f) [#]
	≥ 40	-90 dBm to -103 dBm/MHz - RSSI	-	
RSSI Dependent Limits	< 40	-103 dBm/MHz - RSSI - (40 dB - MSCL) to -33 dBm - (40 dB - MSCL)	-90 dB to -33 dBm - (40 dB - MSCL)	-103 dBm/MHz - RSSI
	≥ 40	-103 dBm/MHz - RSSI to -33 dBm	-90 dB to -33 dBm	-103 dBm/MHz - RSSI - (40 dB - MSCL)
Transmit Power Off Mode	< 40	-33 dBm - (40 dB - MSCL) to -10 dBm		-70 dBm/MHz
	≥ 40	-33 dBm to -10 dBm		

[#] (f) is the uplink mid-band frequency of the operating frequency bands (in MHz).

7. The tests refer to the noise limits specified in Appendix D of KDB 935210 D04 v02r04.

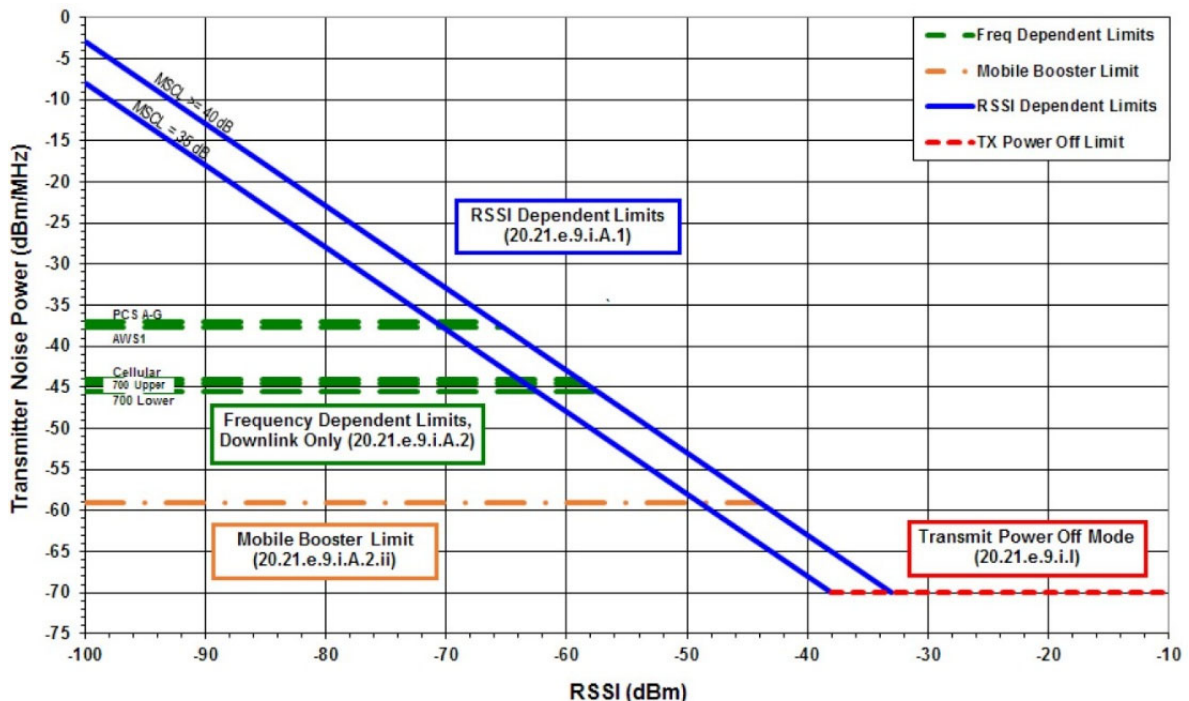


Figure D1 – Provider-specific consumer signal booster variable noise limits

Test Result:

Tabulated Result of Downlink Maximum Transmitter Noise Power Level

ANT	Band	Frequency Range (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
1	Upper 700 MHz	746 ~ 756	-44.64	-56.75
	Cellular	869 ~ 894	-44.05	-58.68
	AWS-1	2 110 ~ 2 155	-37.73	-61.07
	Broadband PCS	1 930 ~ 1 995	-37.01	-58.55
2	Lower 700 MHz	729 ~ 746	-45.51	-56.78
	Cellular	869 ~ 894	-44.05	-58.97
	AWS-1	2 110 ~ 2 155	-37.73	-61.13
	Broadband PCS	1 930 ~ 1 995	-37.01	-58.50
3	Lower 700 MHz	729 ~ 746	-45.51	-56.93
	Cellular	869 ~ 894	-44.05	-58.48
	AWS-1	2 110 ~ 2 155	-37.73	-60.84
	Broadband PCS	1 930 ~ 1 995	-37.01	-58.42

Tabulated Result of Uplink Noise Power

ANT	Band	Frequency Range (MHz)	RSSI (dBm)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
1	Upper 700 MHz	777 ~ 787	-51.00	-54.74	-60.10
			-52.00	-53.74	-60.23
			-53.00	-52.74	-60.18
			-54.00	-51.74	-60.14
			-55.00	-50.74	-60.00
			-56.00	-49.74	-60.03
	Cellular	824 ~ 849	-50.00	-54.94	-60.50
			-51.00	-53.94	-60.35
			-52.00	-52.94	-60.51
			-53.00	-51.94	-60.51
			-54.00	-50.94	-60.28
			-55.00	-49.94	-60.38
	AWS-1	1 710 ~ 1 755	-56.00	-47.00	-60.79
			-57.00	-46.00	-60.59
			-58.00	-45.00	-60.78
			-59.00	-44.00	-60.41
			-60.00	-43.00	-60.58
			-61.00	-42.00	-60.58
	Broadband PCS	1 850 ~ 1 915	-55.00	-48.00	-49.47
			-56.00	-47.00	-49.70
			-57.00	-46.00	-49.54
			-58.00	-45.00	-49.43
			-59.00	-44.00	-49.85
			-60.00	-43.00	-49.55

ANT	Band	Frequeuncy Range (MHz)	RSSI (dBm)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
2	Lower 700 MHz	699 ~ 716	-51.00	-55.68	-59.41
			-52.00	-54.68	-59.01
			-53.00	-53.68	-59.47
			-54.00	-52.68	-59.48
			-55.00	-51.68	-59.27
			-56.00	-50.68	-59.14
	Cellular	824 ~ 849	-50.00	-54.94	-60.25
			-51.00	-53.94	-60.59
			-52.00	-52.94	-60.60
			-53.00	-51.94	-60.47
			-54.00	-50.94	-60.73
			-55.00	-49.94	-60.58
	AWS-1	1 710 ~ 1 755	-50.00	-53.00	-60.95
			-51.00	-52.00	-60.97
			-52.00	-51.00	-60.94
			-53.00	-50.00	-60.91
			-54.00	-49.00	-61.01
			-55.00	-48.00	-61.04
	Broadband PCS	1 850 ~ 1 915	-55.00	-48.00	-54.39
			-56.00	-47.00	-54.50
			-57.00	-46.00	-54.27
			-58.00	-45.00	-54.57
			-59.00	-44.00	-54.20
			-60.00	-43.00	-54.39

ANT	Band	Frequency Range (MHz)	RSSI (dBm)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
3	Lower 700 MHz	699 ~ 716	-51.00	-55.68	-59.92
			-52.00	-54.68	-59.74
			-53.00	-53.68	-59.73
			-54.00	-52.68	-59.84
			-55.00	-51.68	-59.60
			-56.00	-50.68	-59.86
	Cellular	824 ~ 849	-50.00	-54.94	-60.52
			-51.00	-53.94	-60.74
			-52.00	-52.94	-60.64
			-53.00	-51.94	-60.75
			-54.00	-50.94	-60.57
			-55.00	-49.94	-60.75
	AWS-1	1 710 ~ 1 755	-51.00	-52.00	-61.29
			-52.00	-51.00	-60.88
			-53.00	-50.00	-61.05
			-54.00	-49.00	-61.16
			-55.00	-48.00	-61.25
			-56.00	-47.00	-61.22
	Broadband PCS	1 850 ~ 1 915	-50.00	-53.00	-57.86
			-51.00	-52.00	-57.74
			-52.00	-51.00	-57.45
			-53.00	-50.00	-57.52
			-54.00	-49.00	-57.15
			-55.00	-48.00	-57.26

Tabulated Result of Uplink Noise Timing

ANT	Band	Frequency Range (MHz)	Limit (s)	Noise Timing (s)
1	Upper 700 MHz	777 ~ 787	3	0.15
	Cellular	824 ~ 849		0.16
	AWS-1	1 710 ~ 1 755		0.13
	Broadband PCS	1 850 ~ 1 915		0.12
2	Lower 700 MHz	699 ~ 716	3	0.12
	Cellular	824 ~ 849		0.11
	AWS-1	1 710 ~ 1 755		0.11
	Broadband PCS	1 850 ~ 1 915		0.22
3	Lower 700 MHz	707.500	3	0.15
	Cellular	824 ~ 849		0.19
	AWS-1	1 710 ~ 1 755		0.16
	Broadband PCS	1 850 ~ 1 915		0.13

Tabulated Result of Downlink Noise Power

ANT	Band	Frequency Range (MHz)	RSSI (dBm)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
1	Upper 700 MHz	746 ~ 756	-59.10	-46.64	-55.85
			-60.10	-45.64	-55.70
			-70.00	-44.64	-55.75
			-80.00	-44.64	-55.84
			-90.00	-44.64	-56.02
			-61.10	-44.64	-56.05
	Cellular	869 ~ 894	-50.89	-54.05	-58.75
			-51.89	-53.05	-58.52
			-52.89	-52.05	-58.92
			-53.89	-51.05	-58.81
			-54.89	-50.05	-58.77
			-55.89	-49.05	-58.82
	AWS-1	2 110 ~ 2 155	-48.27	-54.73	-61.00
			-49.27	-53.73	-60.87
			-50.27	-52.73	-60.88
			-51.27	-51.73	-60.98
			-52.27	-50.73	-60.71
			-47.27	-55.73	-66.76
	Broadband PCS	1 930 ~ 1 995	-47.99	-55.01	-57.43
			-48.99	-54.01	-57.83
			-49.99	-53.01	-57.68
			-50.99	-52.01	-57.75
			-51.99	-51.01	-57.57
			-52.99	-50.01	-57.81

ANT	Band	Frequency Range (MHz)	RSSI (dBm)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
2	Lower 700 MHz	729 ~ 746	-54.17	-52.51	-55.78
			-55.17	-51.51	-55.62
			-56.17	-50.51	-55.86
			-57.17	-49.51	-55.89
			-58.17	-48.51	-55.77
			-59.17	-47.51	-55.74
	Cellular	869 ~ 894	-50.89	-54.05	-59.00
			-51.89	-53.05	-58.81
			-52.89	-52.05	-58.90
			-53.89	-51.05	-58.60
			-54.89	-50.05	-58.84
			-55.89	-49.05	-58.79
	AWS-1	2 110 ~ 2 155	-46.27	-56.73	-60.50
			-47.27	-55.73	-60.54
			-48.27	-54.73	-60.46
			-49.27	-53.73	-60.74
			-50.27	-52.73	-60.47
			-51.27	-51.73	-60.56
	Broadband PCS	1 930 ~ 1 995	-46.99	-56.01	-57.81
			-47.99	-55.01	-57.85
			-48.99	-54.01	-57.34
			-49.99	-53.01	-57.40
			-50.99	-52.01	-57.57
			-51.99	-51.01	-57.49

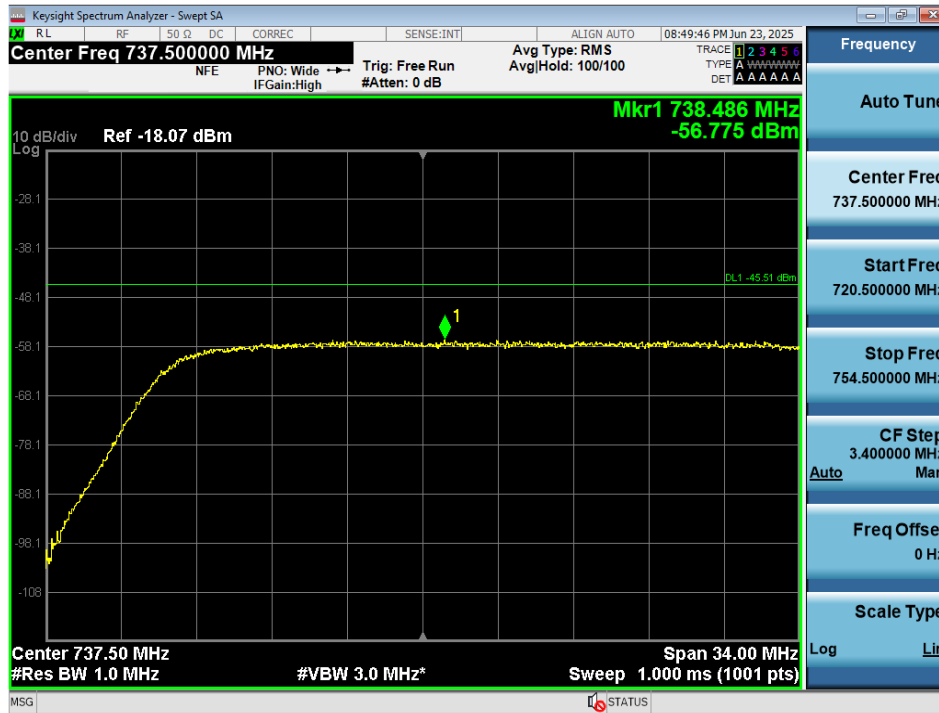
ANT	Band	Frequeuncy Range (MHz)	RSSI (dBm)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
3	Lower 700 MHz	729 ~ 746	-53.17	-53.51	-55.83
			-54.17	-52.51	-55.87
			-55.17	-51.51	-55.72
			-56.17	-50.51	-55.83
			-57.17	-49.51	-55.95
			-58.17	-48.51	-55.65
	Cellular	869 ~ 894	-50.89	-54.05	-58.78
			-51.89	-53.05	-58.66
			-52.89	-52.05	-58.44
			-53.89	-51.05	-58.94
			-54.89	-50.05	-58.57
			-55.89	-49.05	-58.64
	AWS-1	2 110 ~ 2 155	-47.27	-55.73	-60.69
			-48.27	-54.73	-60.13
			-49.27	-53.73	-60.38
			-50.27	-52.73	-60.64
			-51.27	-51.73	-60.46
			-52.27	-50.73	-60.66
	Broadband PCS	1 930 ~ 1 995	-46.99	-56.01	-57.81
			-47.99	-55.01	-57.80
			-48.99	-54.01	-57.85
			-49.99	-53.01	-57.77
			-50.99	-52.01	-57.67
			-51.99	-51.01	-57.83

Tabulated Result of Downlink Noise Timing

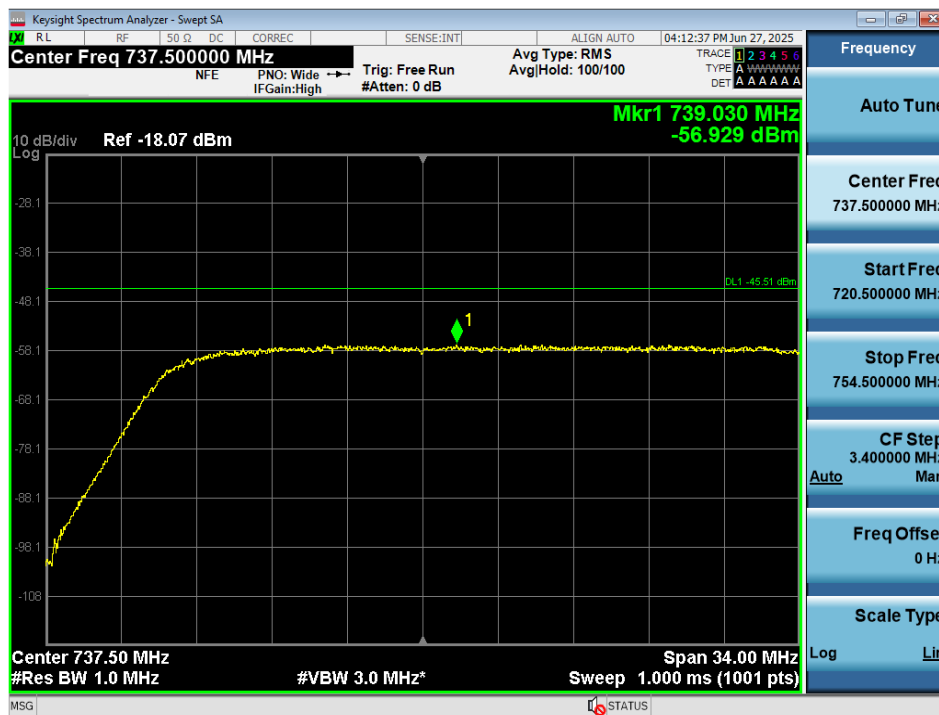
ANT	Band	Frequency Range (MHz)	Limit (s)	Noise Timing (s)
1	Upper 700 MHz	746 ~ 756	3	1.06
	Cellular	869 ~ 894		0.81
	AWS-1	2 110 ~ 2 155		1.11
	Broadband PCS	1 930 ~ 1 995		0.36
2	Lower 700 MHz	729 ~ 746	3	0.72
	Cellular	869 ~ 894		0.84
	AWS-1	2 110 ~ 2 155		0.39
	Broadband PCS	1 930 ~ 1 995		0.64
3	Lower 700 MHz	729 ~ 746	3	0.74
	Cellular	869 ~ 894		1.07
	AWS-1	2 110 ~ 2 155		0.36
	Broadband PCS	1 930 ~ 1 995		0.90

Plot data of Maximum transmitter noise power level

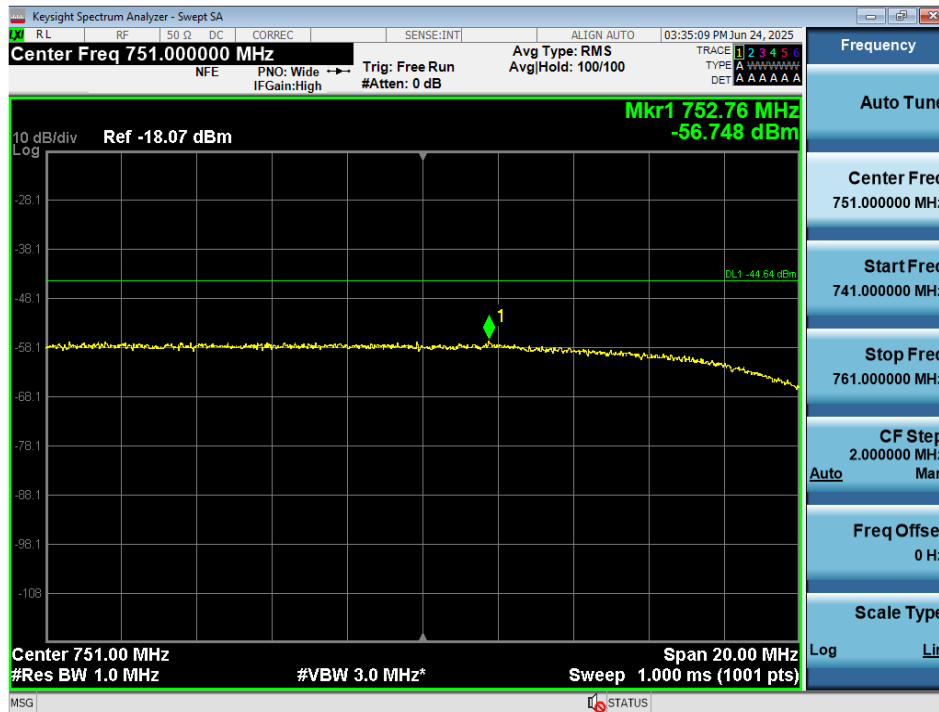
Maximum noise level / Lower 700 MHz / Downlink / ANT 2



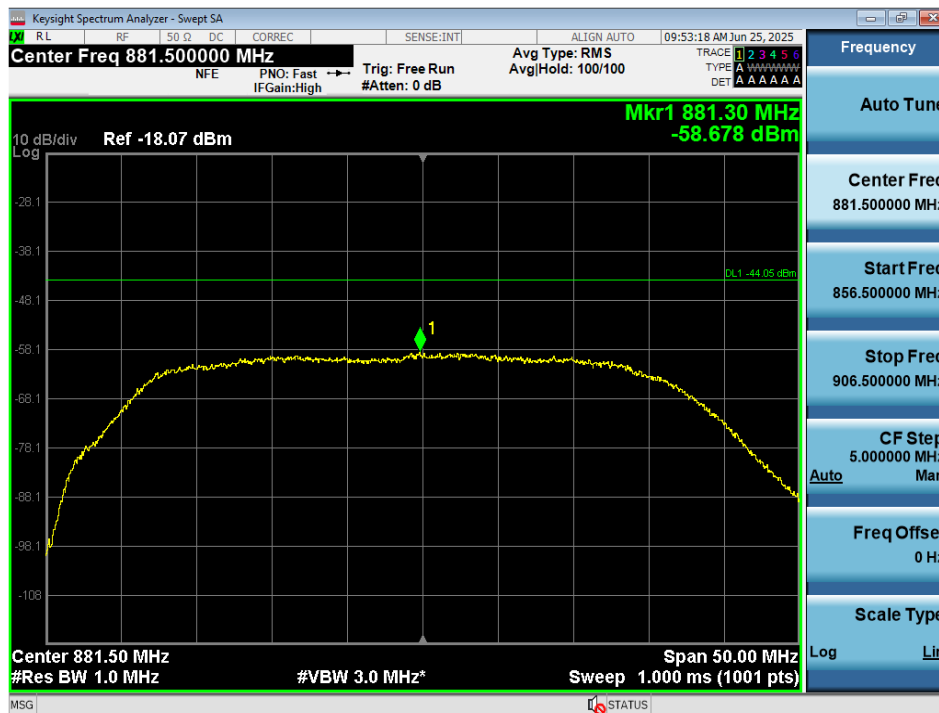
Maximum noise level / Lower 700 MHz / Downlink / ANT 3



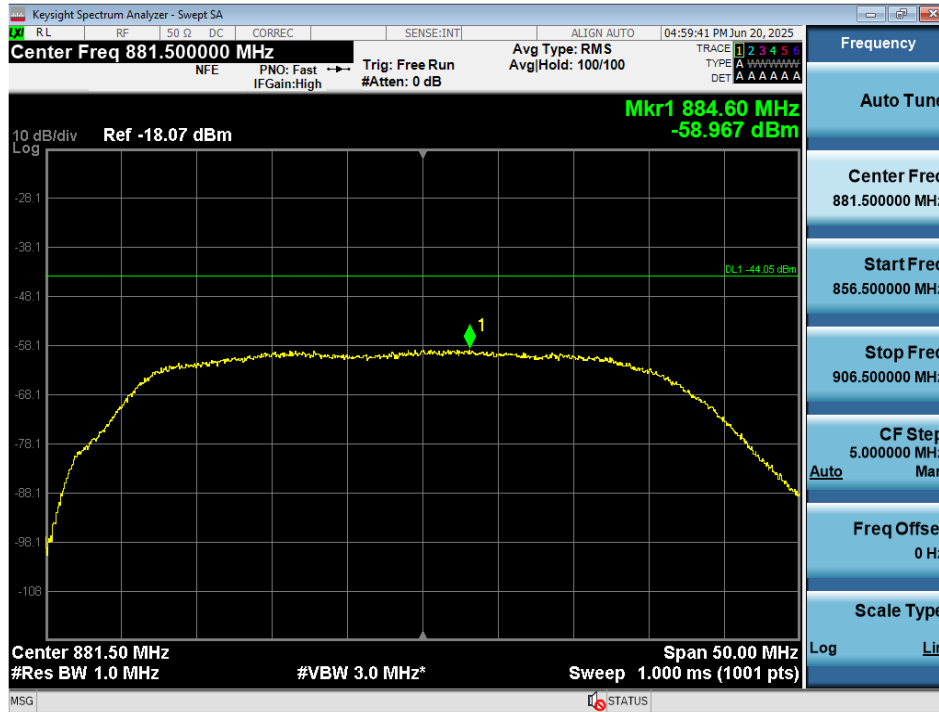
Maximum noise level / Upper 700 MHz / Downlink / ANT 1



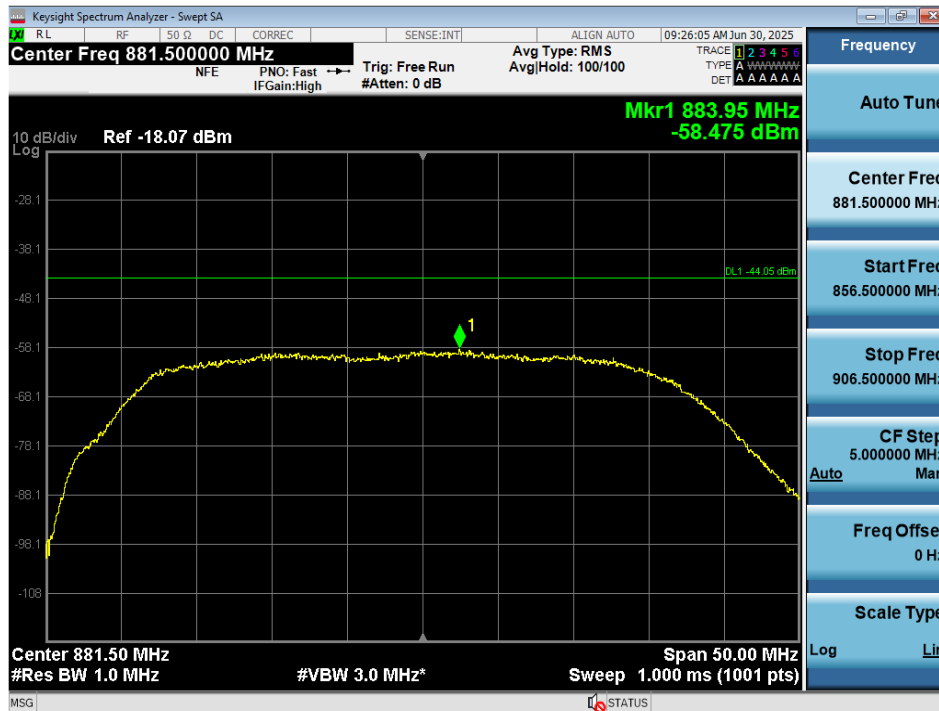
Maximum noise level / Cellular / Downlink / ANT 1



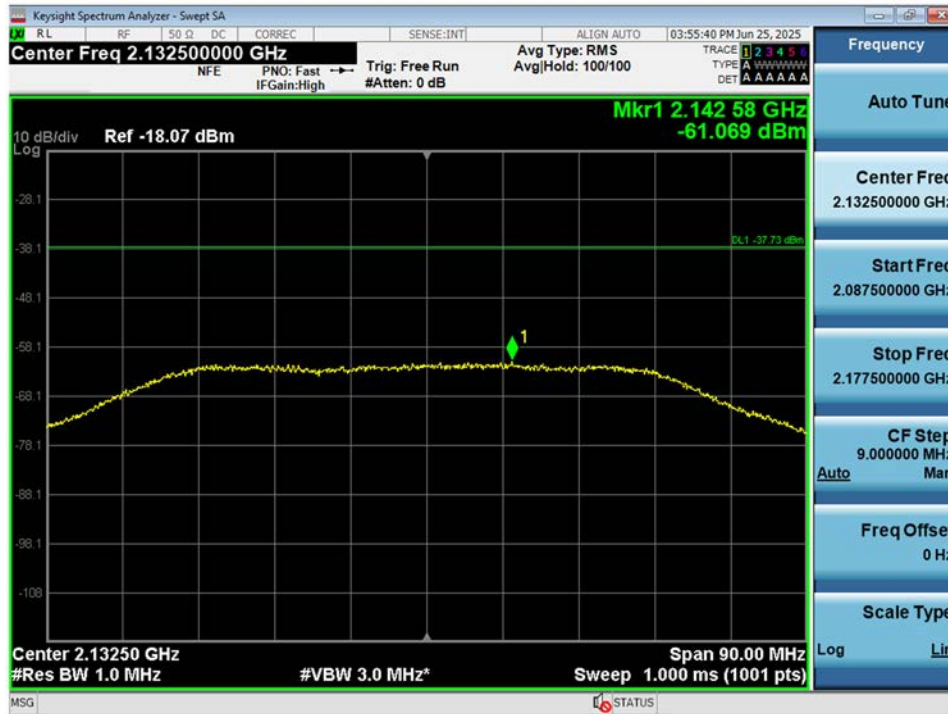
Maximum noise level / Cellular / Downlink / ANT 2



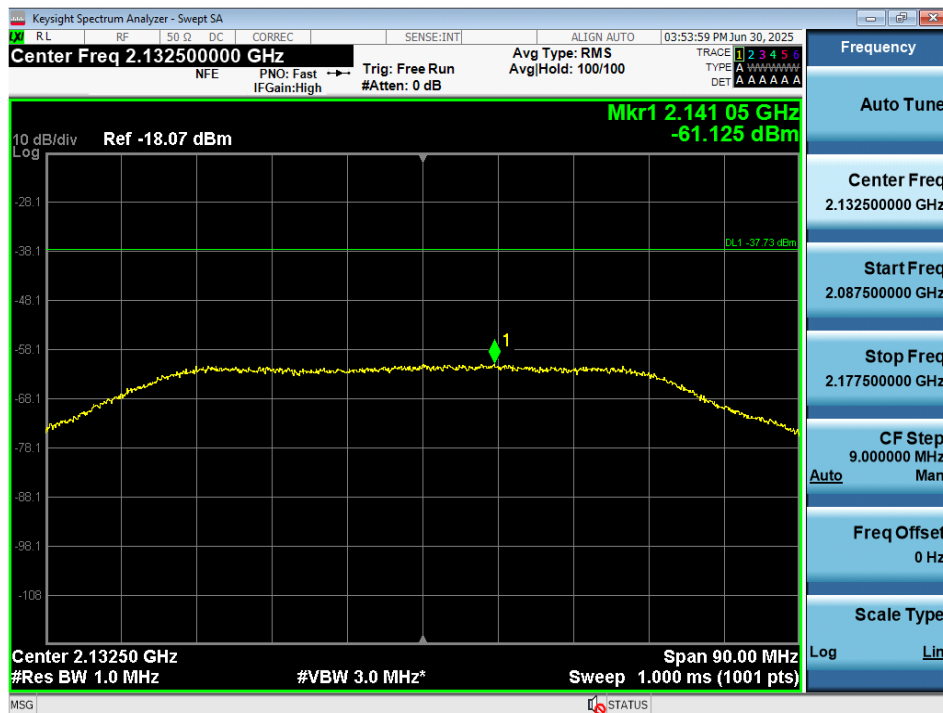
Maximum noise level / Cellular / Downlink / ANT 3



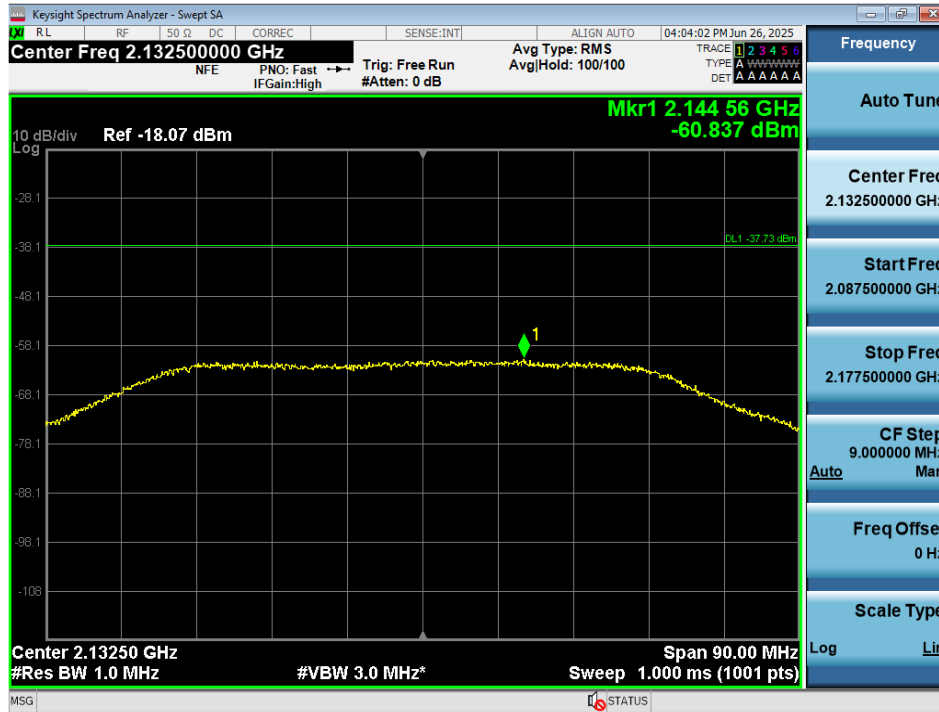
Maximum noise level / AWS-1 / Downlink / ANT 1



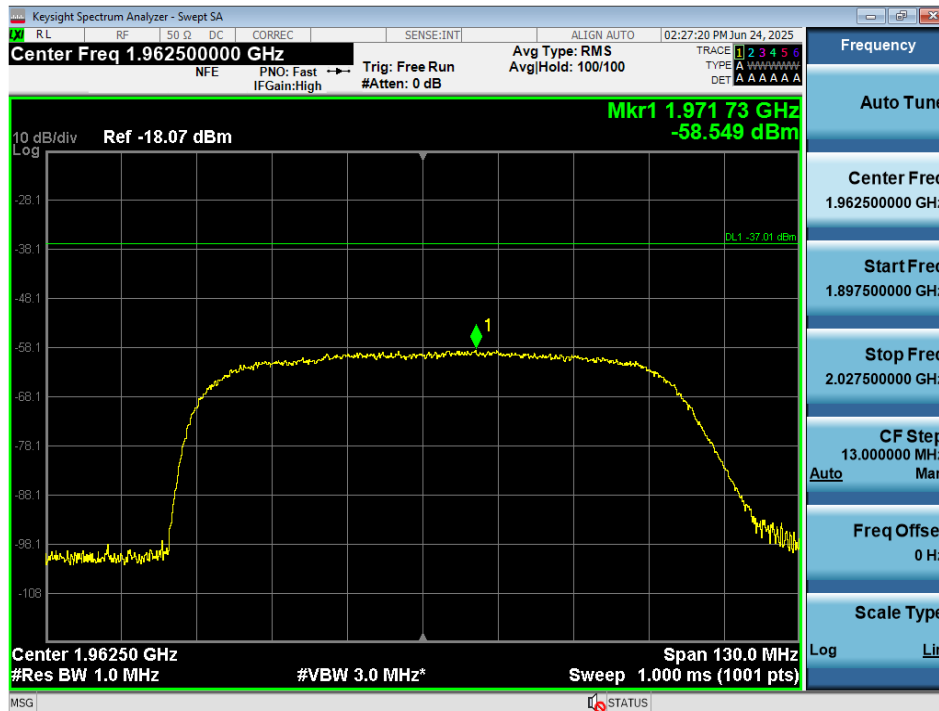
Maximum noise level / AWS-1 / Downlink / ANT 2



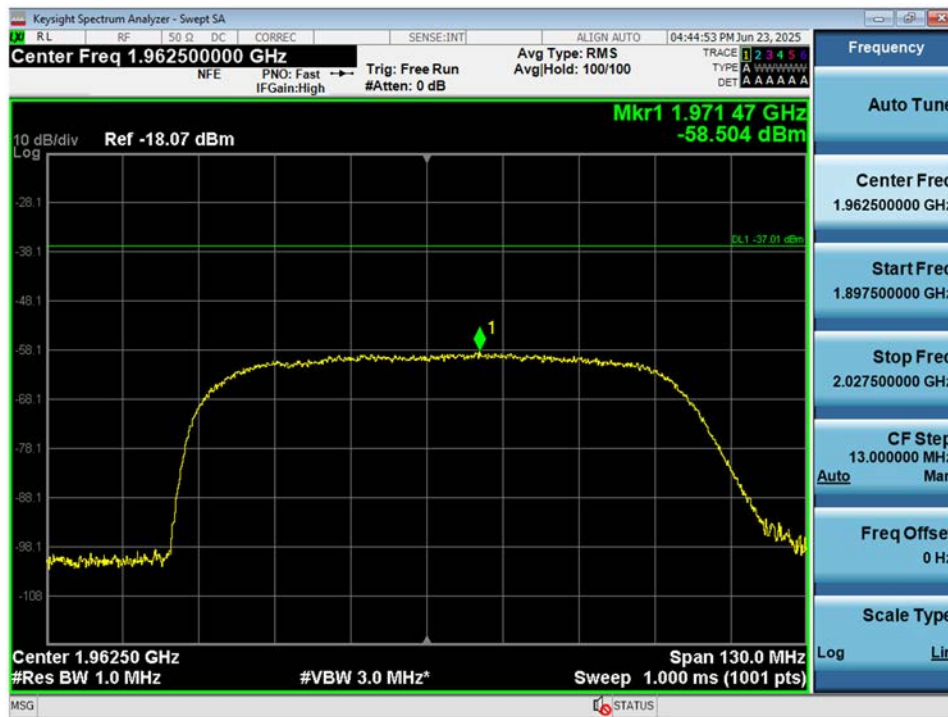
Maximum noise level / AWS-1 / Downlink / ANT 3



Maximum noise level / Broadband PCS / Downlink / ANT 1



Maximum noise level / Broadband PCS / Downlink / ANT 2

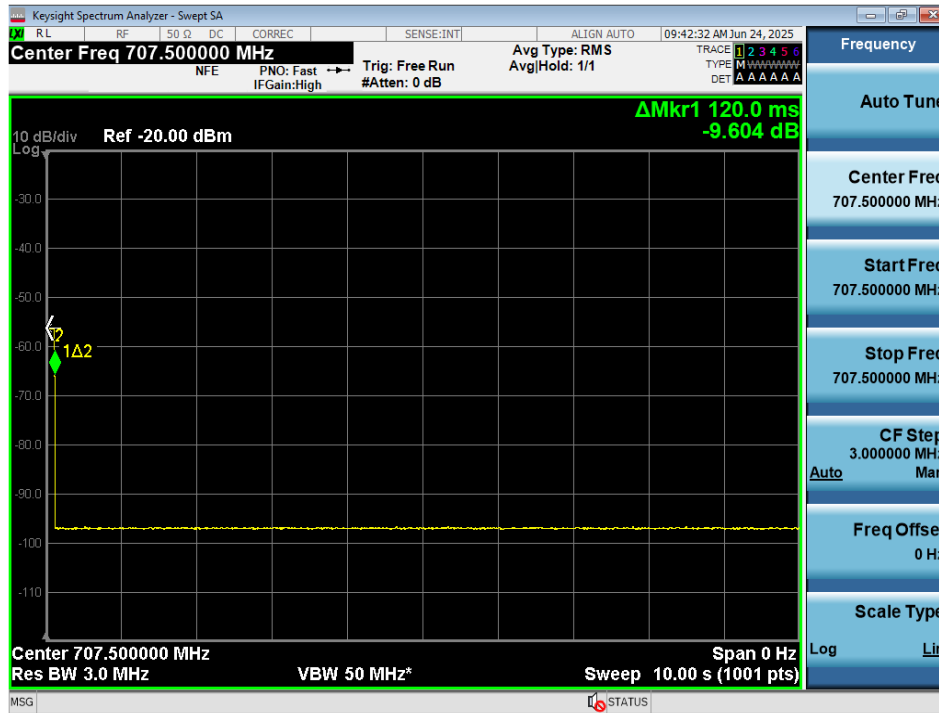


Maximum noise level / Broadband PCS / Downlink / ANT 3



Plot data of Variable Uplink Noise Timing

Uplink Noise Timing / Lower 700 MHz / ANT 2



Uplink Noise Timing / Lower 700 MHz / ANT 3



Uplink Noise Timing / Upper 700 MHz / ANT 1



Uplink Noise Timing / Cellular / ANT 1



Uplink Noise Timing / Cellular / ANT 2



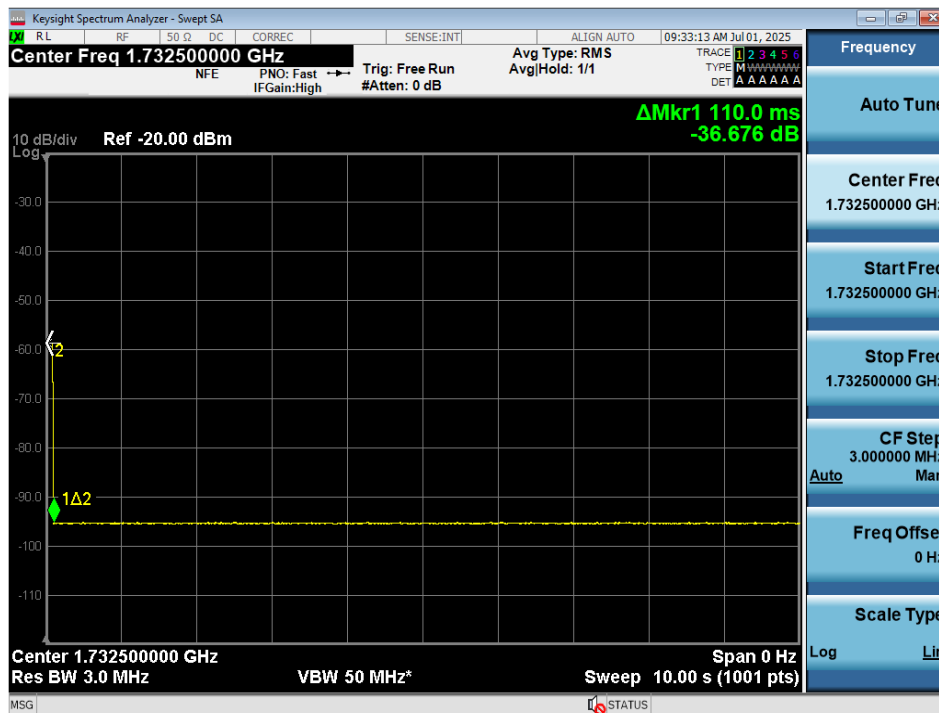
Uplink Noise Timing / Cellular / ANT 3



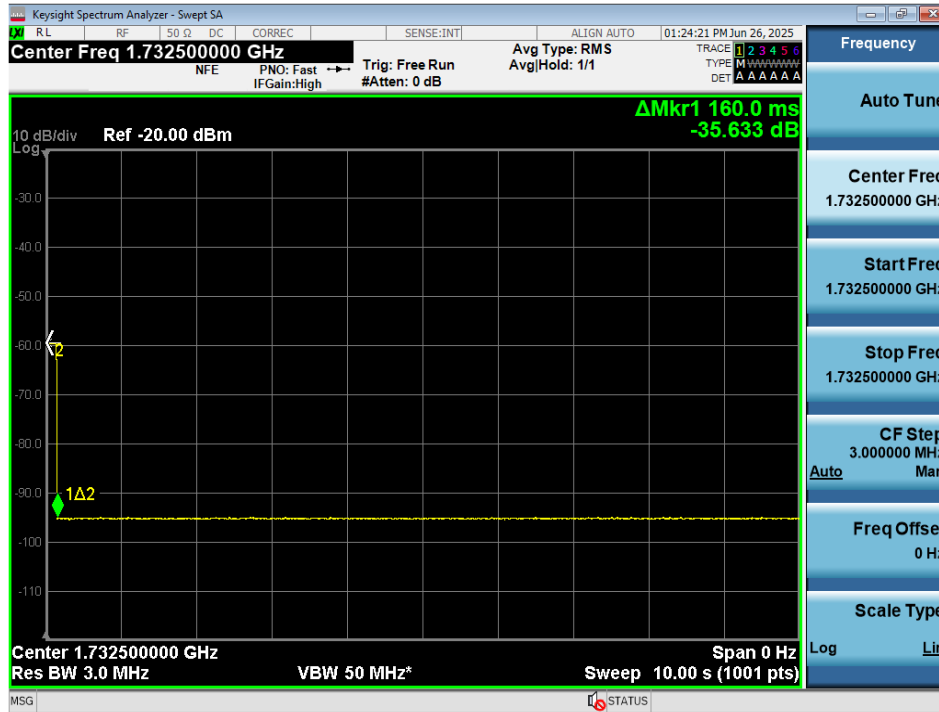
Uplink Noise Timing / AWS-1 / ANT 1



Uplink Noise Timing / AWS-1 / ANT 2



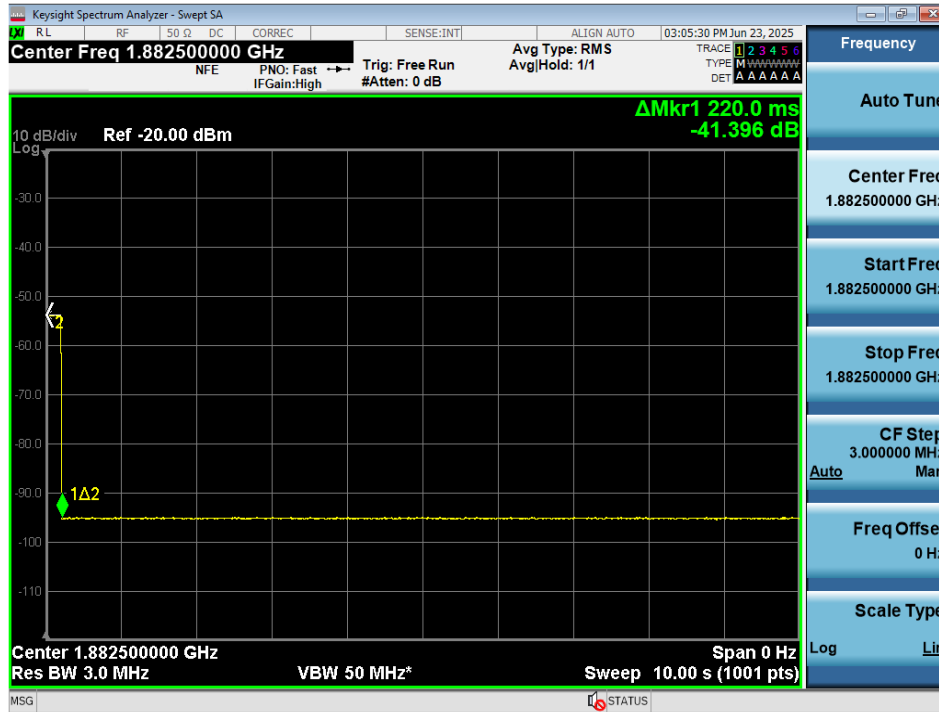
Uplink Noise Timing / AWS-1 / ANT 3



Uplink Noise Timing / Broadband PCS / ANT 1



Uplink Noise Timing / Broadband PCS / ANT 2



Uplink Noise Timing / Broadband PCS / ANT 3



5.9. UPLINK INACTIVITY

Test Requirements:

§ 20.21(e)(9)(i)(J) Uplink Inactivity.

When a consumer booster is not serving an active device connection after 5 seconds the uplink noise power shall not exceed -70 dBm/MHz.

Test Procedures:

Measurements were in accordance with the test methods section 7.8 of KDB 935210 D04 v02r04.

- a) Connect the EUT to the test equipment as shown in Figure 1 (normal operational mode).
- b) Select the power averaging (rms) detector.
- c) Set the spectrum analyzer RBW for 1 MHz with the VBW ≥ 3 MHz.
- d) Set the center frequency of the spectrum analyzer to the center of the uplink operational band.
- e) Set the span for 0 Hz, then initiate a single sweep with a sweep time of at least 30 seconds.
- f) Start to capture a new trace using MAX HOLD.
- g) After approximately 15 seconds, turn on the Signal Generator Output.
- h) After approximately 5 seconds, turn off the Signal Generator Output.
- i) After the full-sweep time-domain trace is complete, place a MARKER on the leading edge of the pulse then use the DELTA MARKER function to determine the elapsed time until the uplink becomes inactive.
- j) Measure the noise power level using the procedures of 7.7.1a) to 7.7.1e), then demonstrate that the results are below the applicable uplink inactivity noise power limit.
- k) Capture the plot for inclusion in the test report.
- l) Repeat 7.8d) to 7.8k) 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 of the signal generator to simulate this function.

Notes:

1. The EUT operated in normal mode and was configured according to Figure 1 of KDB 935210 D04.
2. The test limit is applied to both time (5 seconds) and level (-70 dBm/MHz) in § 20.21(e)(9)(i)(J)

Test Result:

Tabulated Result of Uplink Inactivity

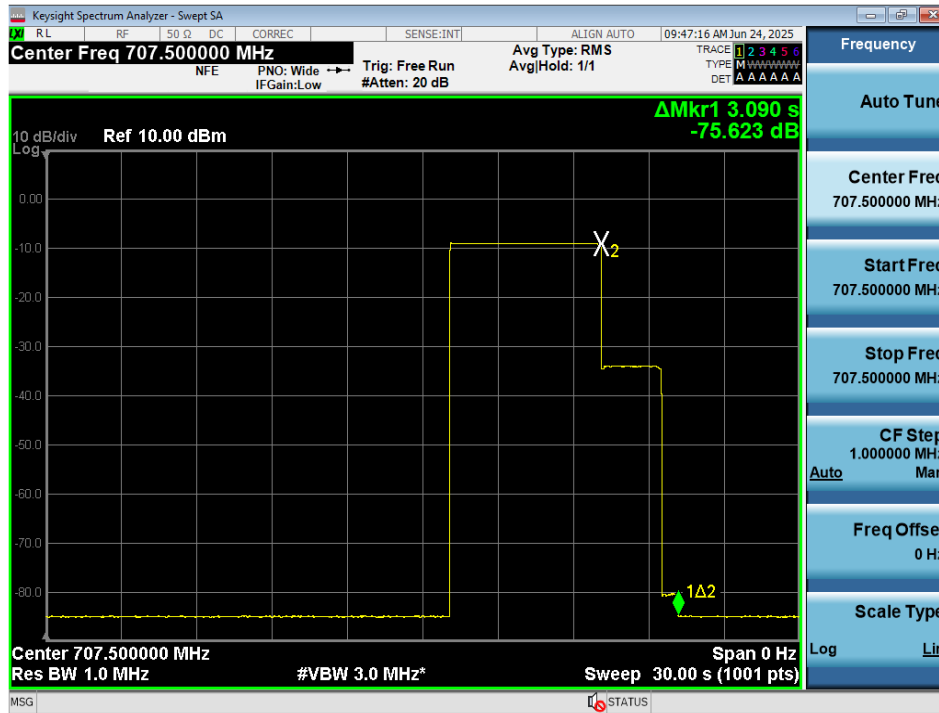
ANT	Band	Frequency (MHz)	Limit (s)	inactivity time (s)
1	Upper 700 MHz	782.00	5	3.57
	Cellular	836.50		3.24
	AWS-1	1 732.50		3.39
	Broadband PCS	1 882.50		2.97
2	Lower 700 MHz	707.50	5	3.09
	Cellular	836.50		2.97
	AWS-1	1 732.50		3.48
	Broadband PCS	1 882.50		2.64
3	Lower 700 MHz	707.50	5	2.88
	Cellular	836.50		1.89
	AWS-1	1 732.50		2.85
	Broadband PCS	1 882.50		3.00

Tabulated Result of Uplink Inactivity Noise

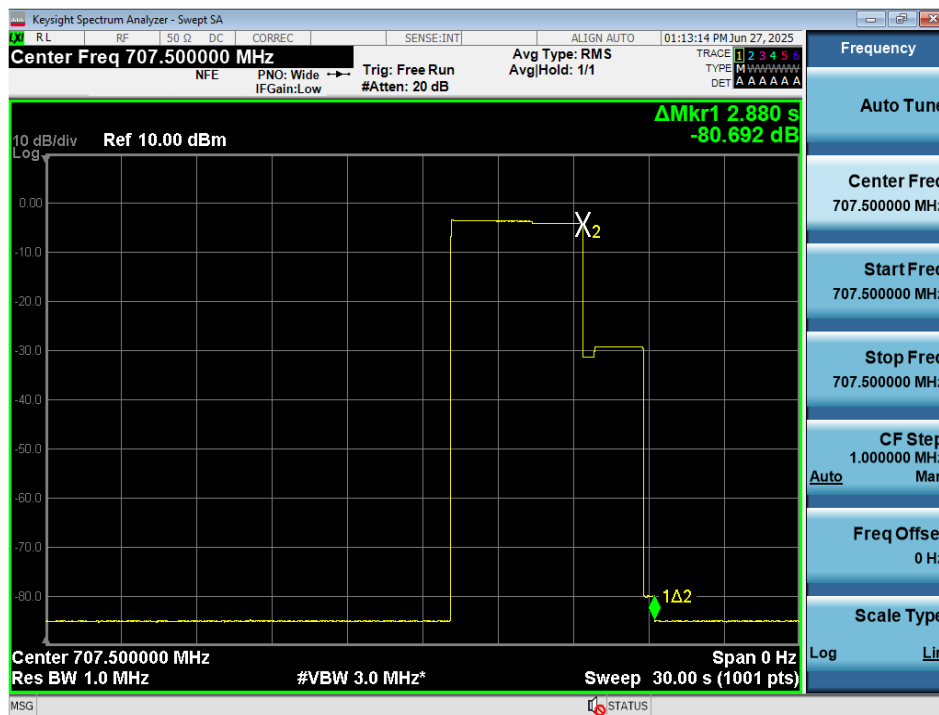
	Band	Frequency (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
1	Upper 700 MHz	788.20	-70	-98.95
	Cellular	842.20		-99.44
	AWS-1	1 746.54		-98.51
	Broadband PCS	1 833.62		-96.98
2	Lower 700 MHz	714.20	-70	-99.22
	Cellular	855.55		-99.44
	AWS-1	1 715.94		-98.28
	Broadband PCS	1 854.42		-97.74
3	Lower 700 MHz	713.45	-70	-99.02
	Cellular	827.80		-98.57
	AWS-1	1 764.63		-98.43
	Broadband PCS	1 897.19		-97.42

Plot data of Inactivity timing

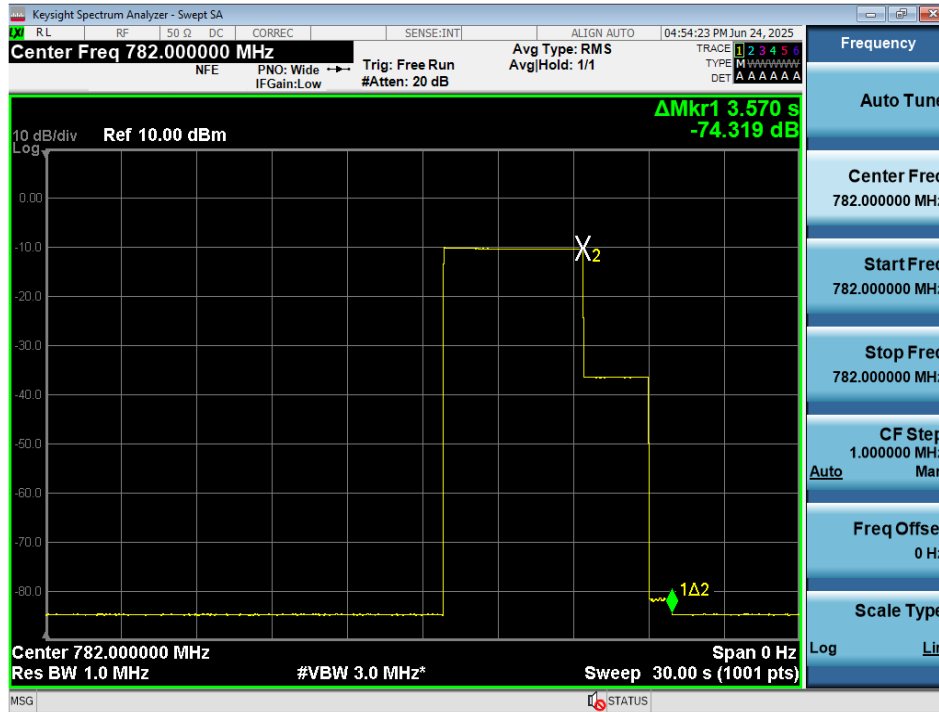
Inactivity Timing / Lower 700 MHz / ANT 2



Inactivity Timing / Lower 700 MHz / ANT 3



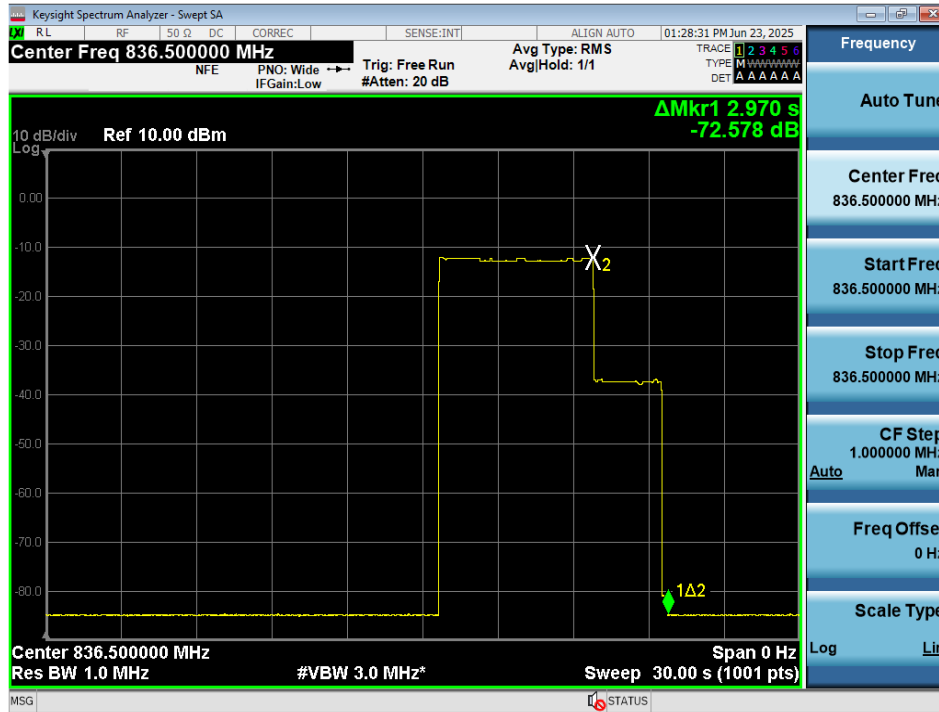
Inactivity Timing / Upper 700 MHz / ANT 1



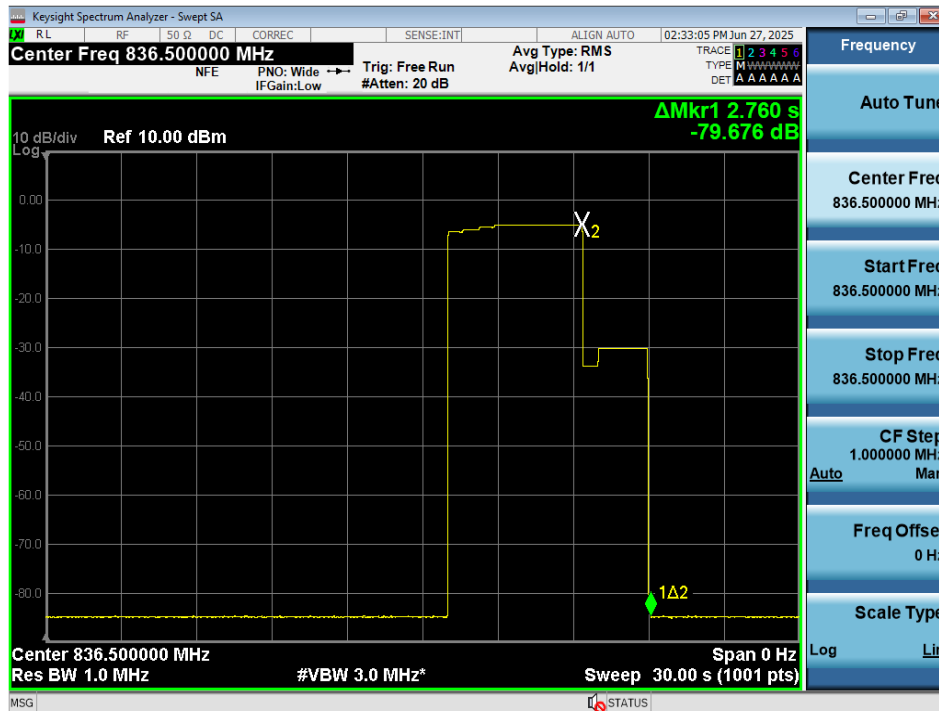
Inactivity Timing / Cellular / ANT 1



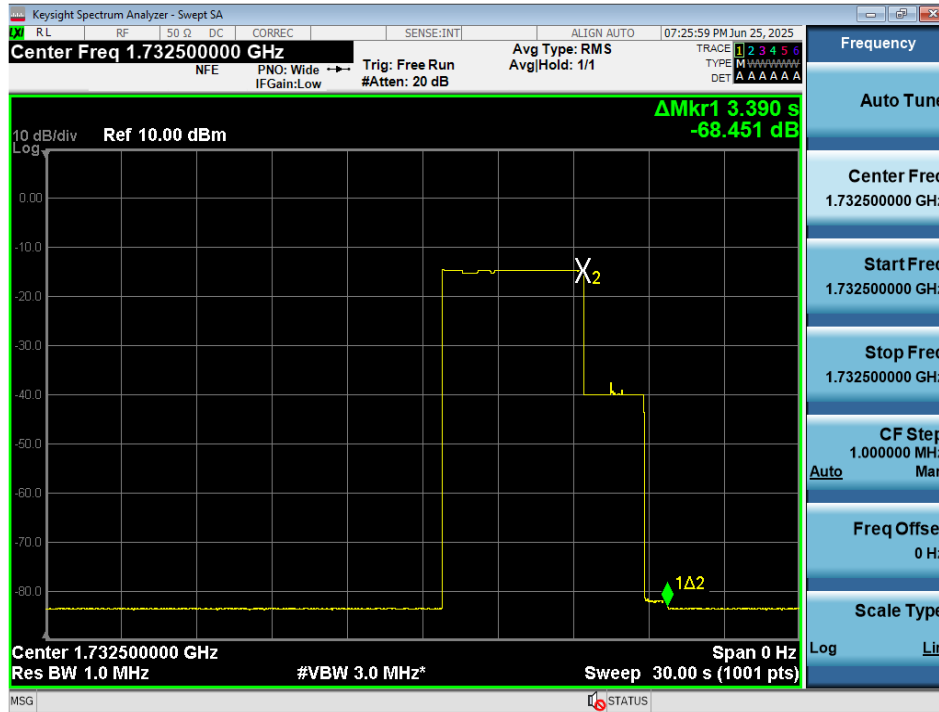
Inactivity Timing / Cellular / ANT 2



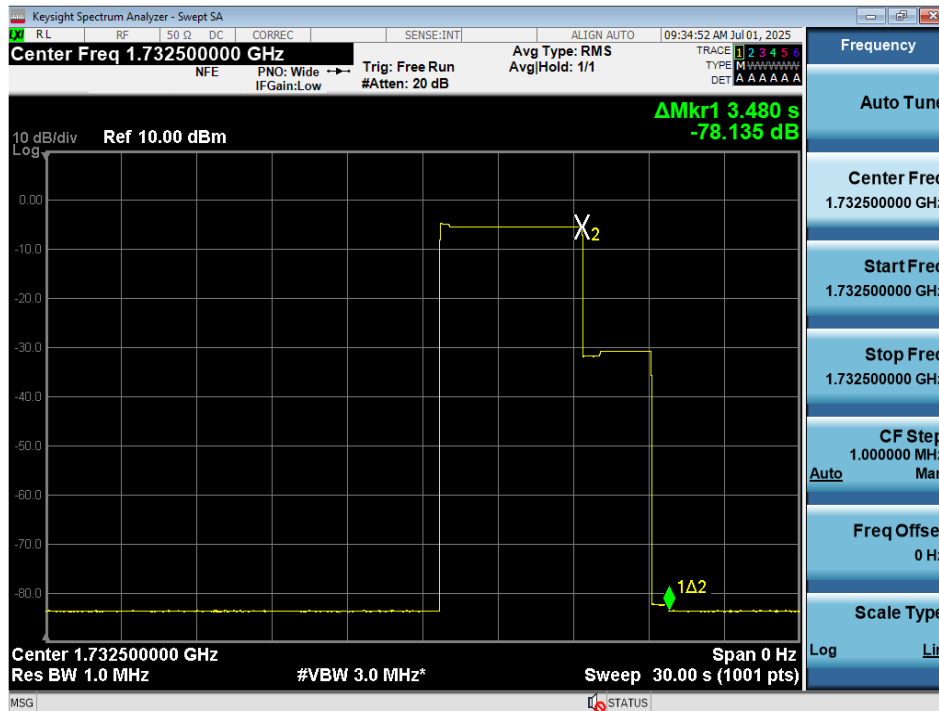
Inactivity Timing / Cellular / ANT 3



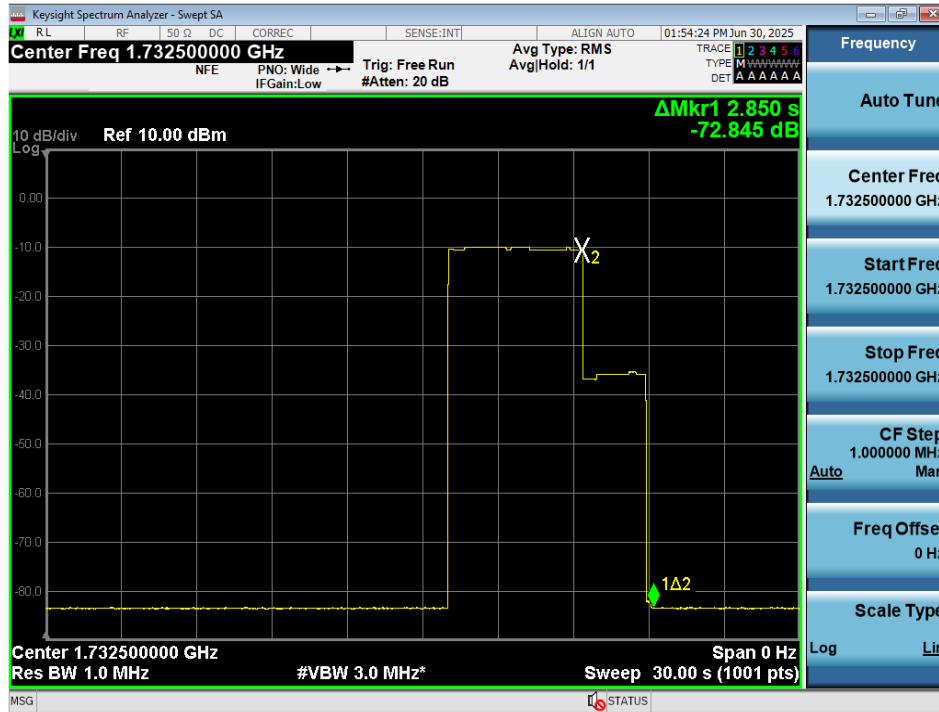
Inactivity Timing / AWS-1 / ANT 1



Inactivity Timing / AWS-1 / ANT 2



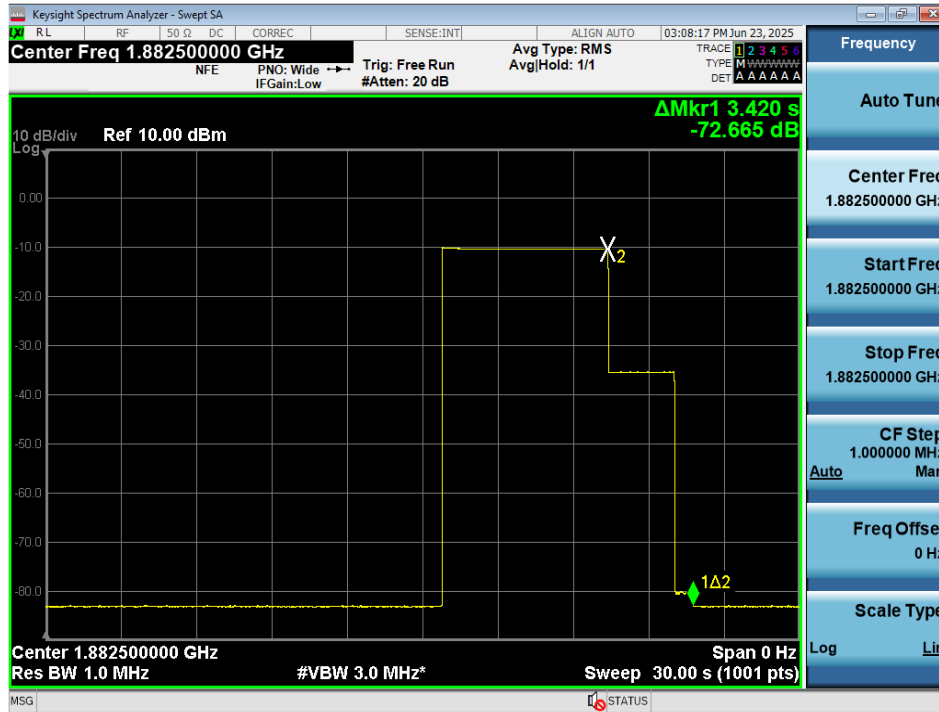
Inactivity Timing / AWS-1 / ANT 3



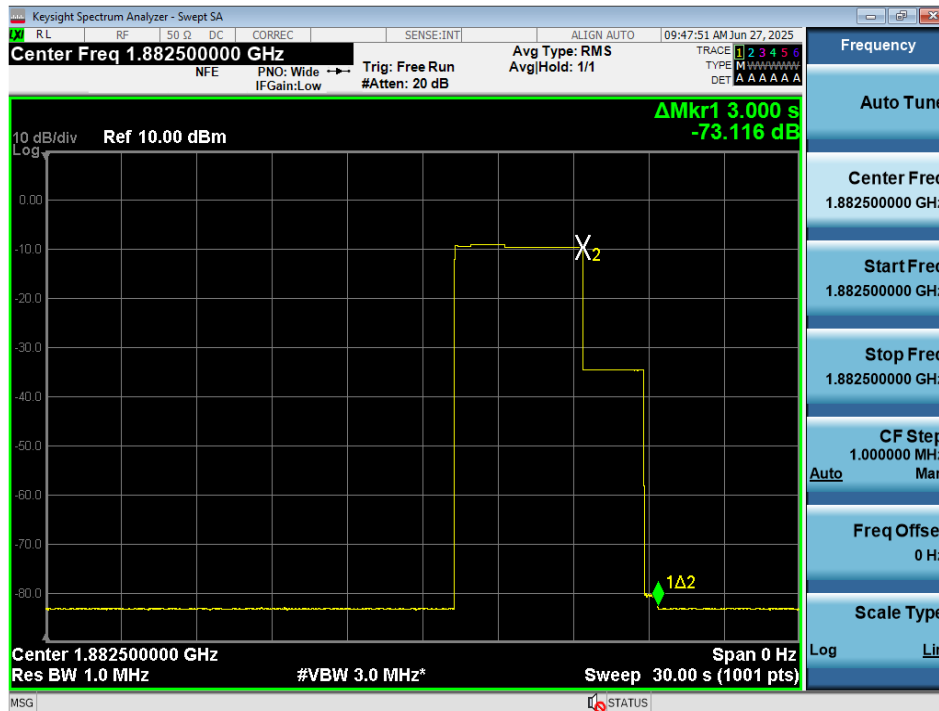
Inactivity Timing / Broadband PCS / ANT 1



Inactivity Timing / Broadband PCS / ANT 2

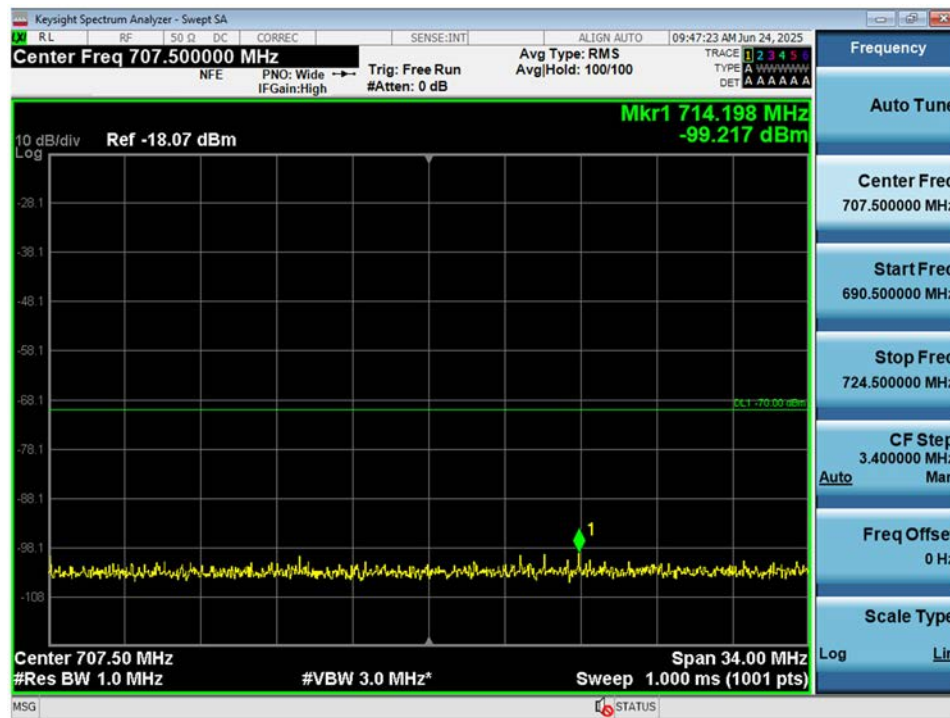


Inactivity Timing / Broadband PCS / ANT 3

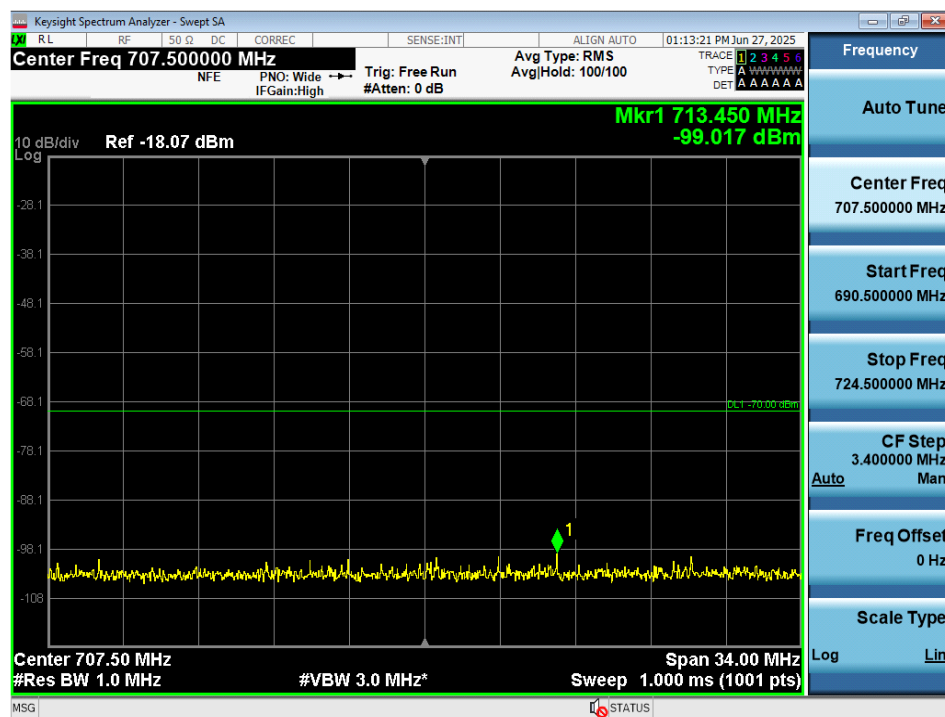


Plot data of Inactivity Noise Level

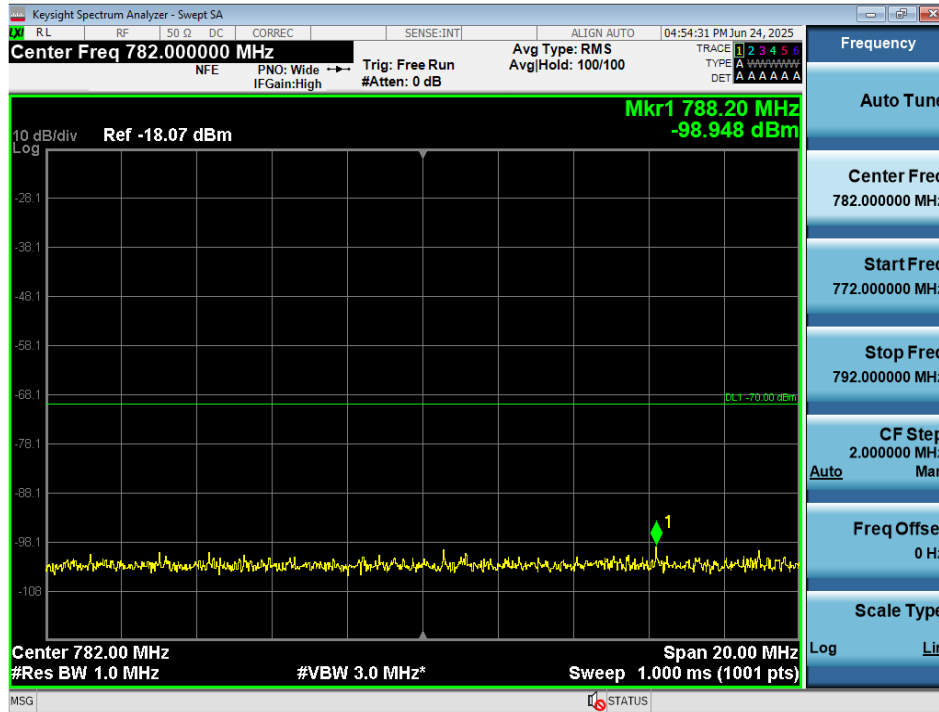
Inactivity Noise Level / Lower 700 MHz / ANT 2



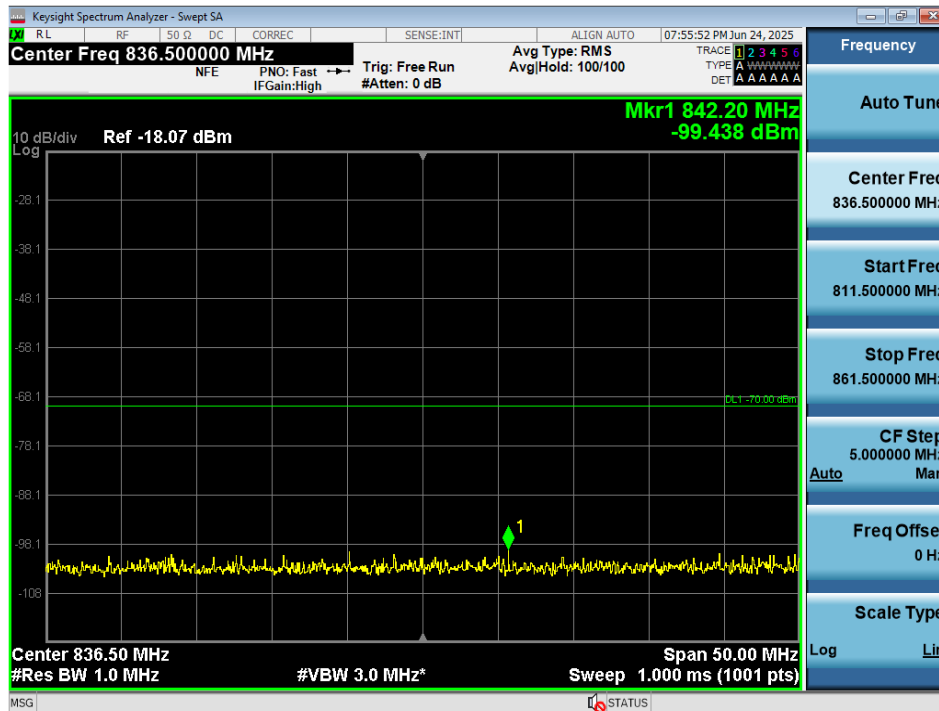
Inactivity Noise Level / Lower 700 MHz / ANT 3



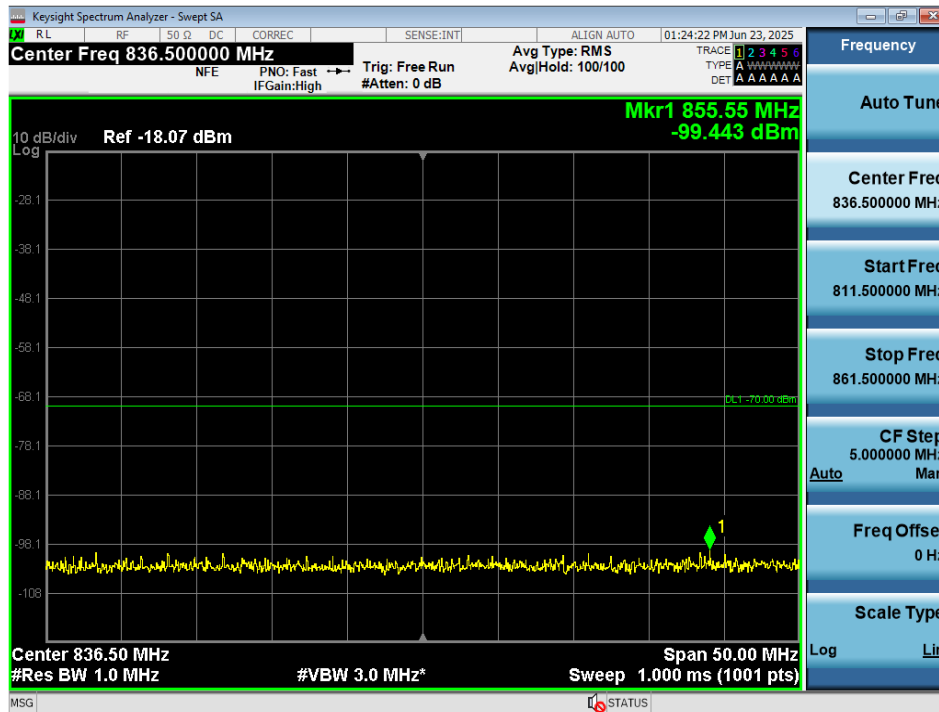
Inactivity Noise Level / Upper 700 MHz / ANT 1



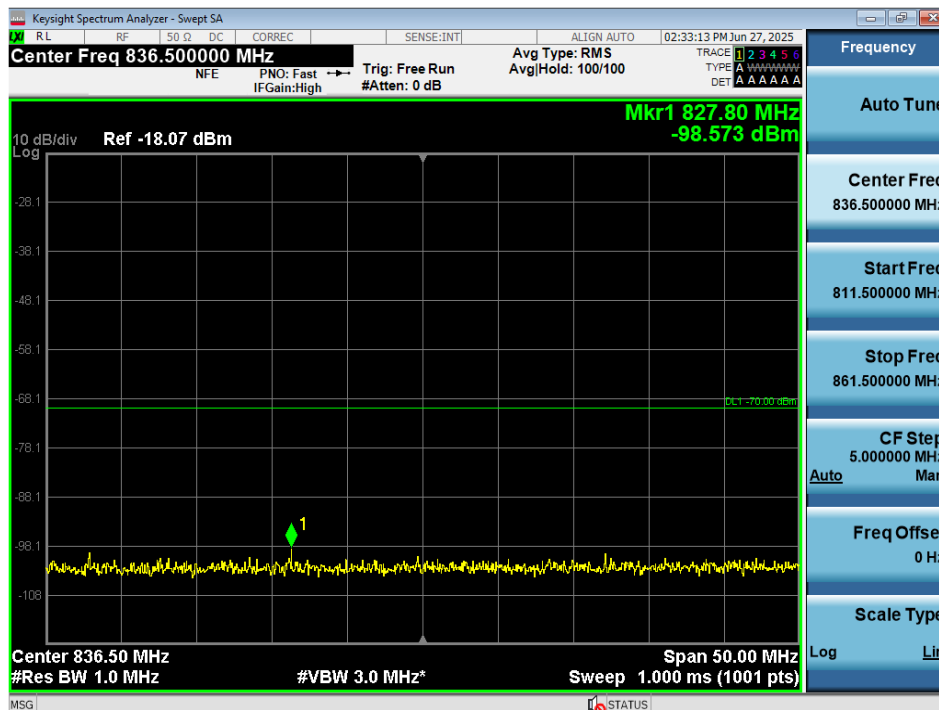
Inactivity Noise Level / Cellular / ANT 1



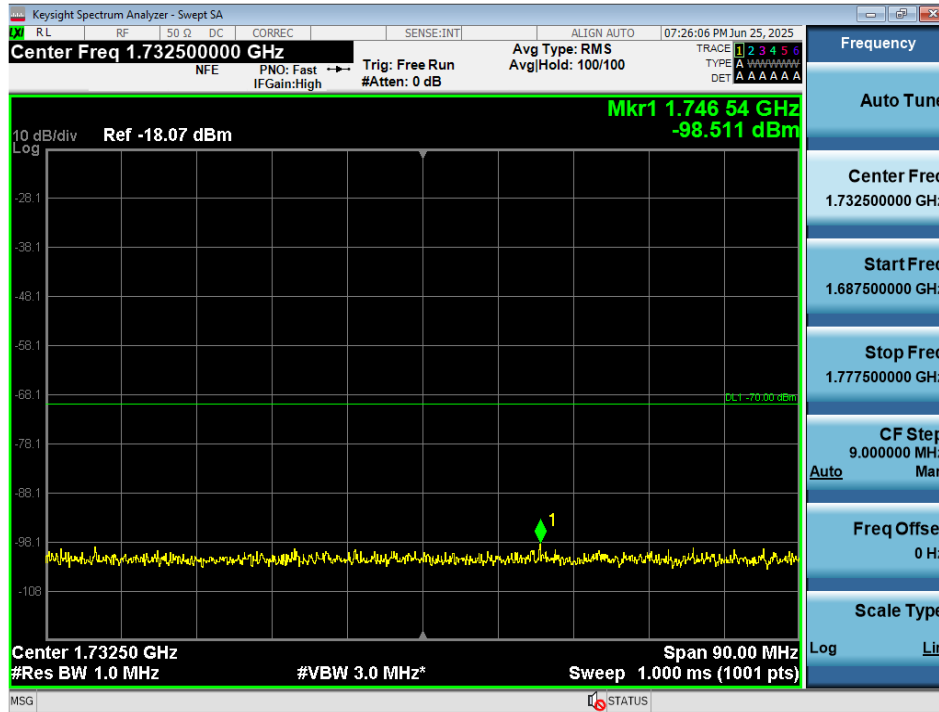
Inactivity Noise Level / Cellular / ANT 2



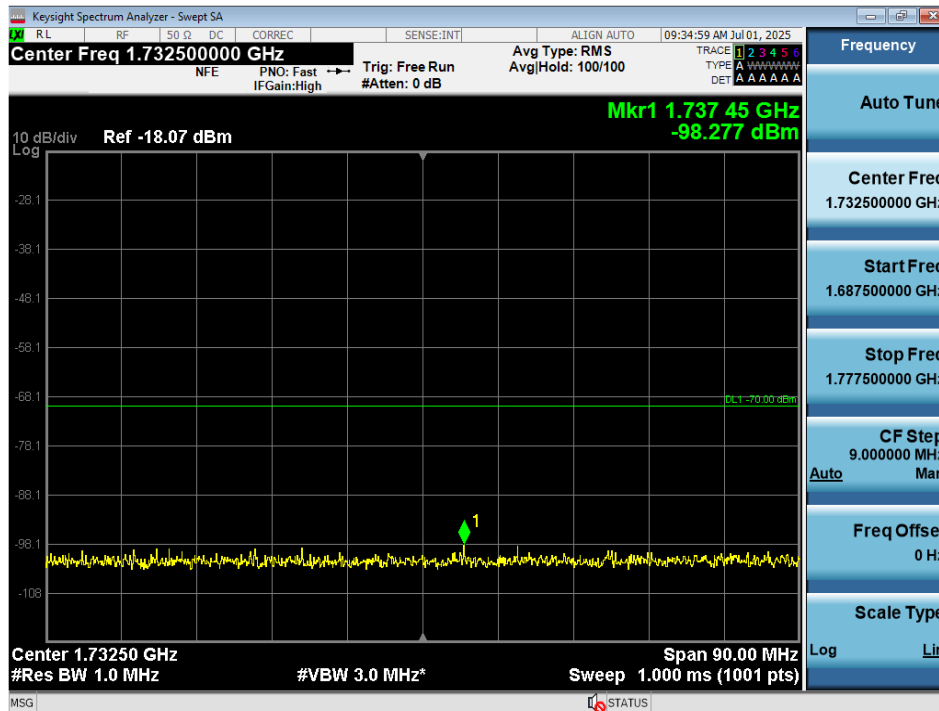
Inactivity Noise Level / Cellular / ANT 3



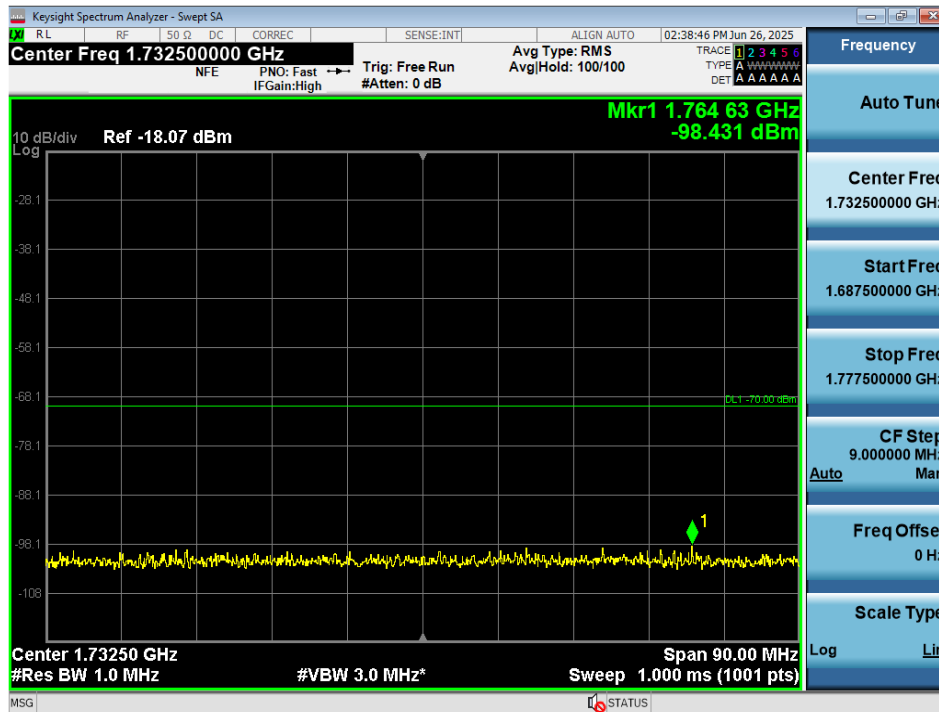
Inactivity Noise Level / AWS-1 / ANT 1



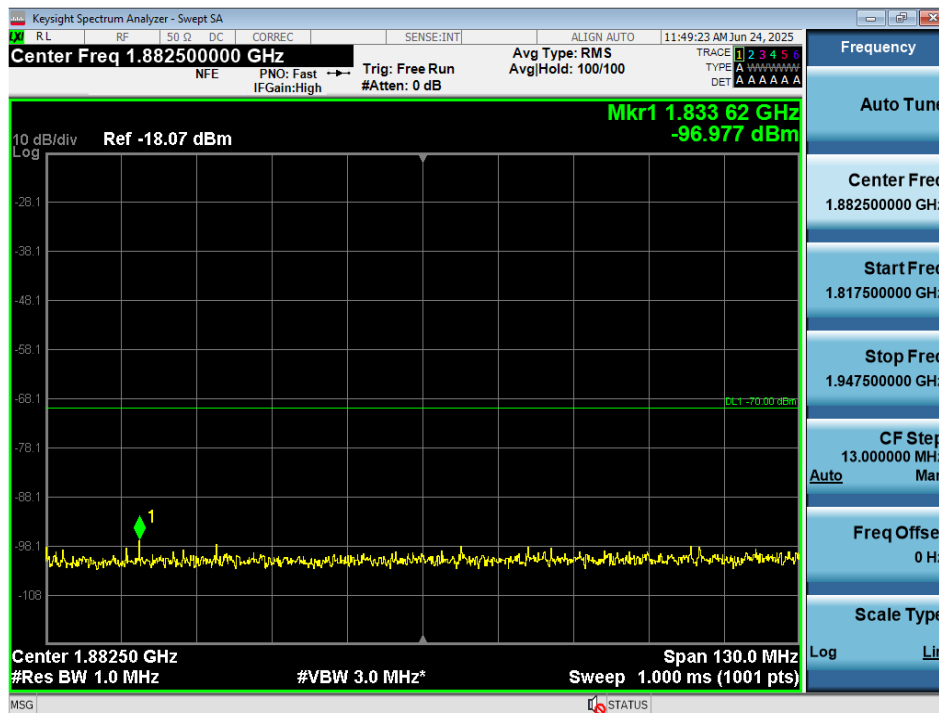
Inactivity Noise Level / AWS-1 / ANT 2



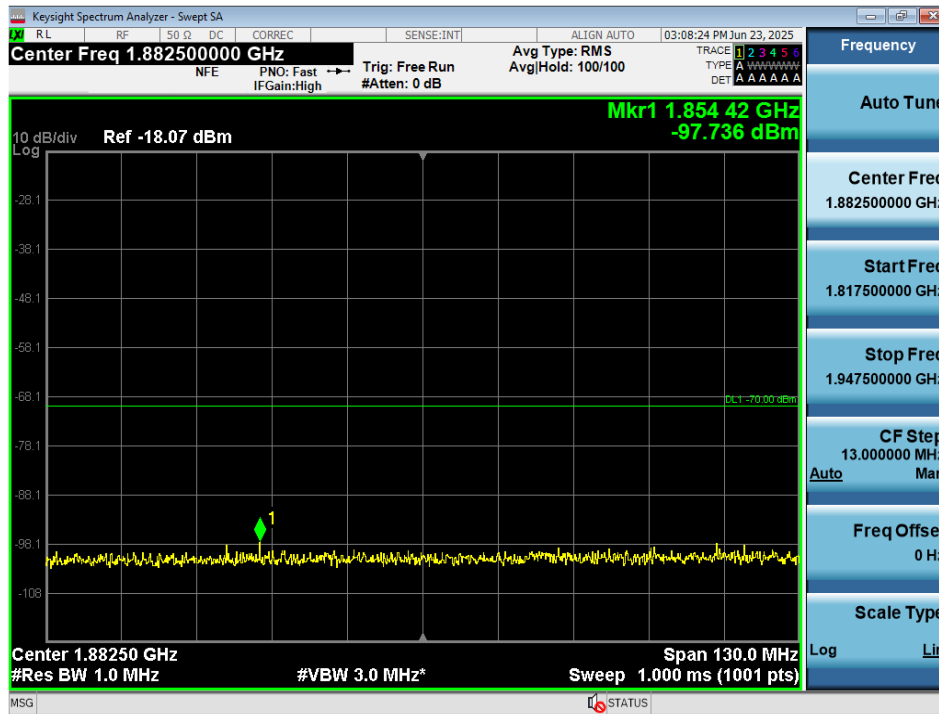
Inactivity Noise Level / AWS-1 / ANT 3



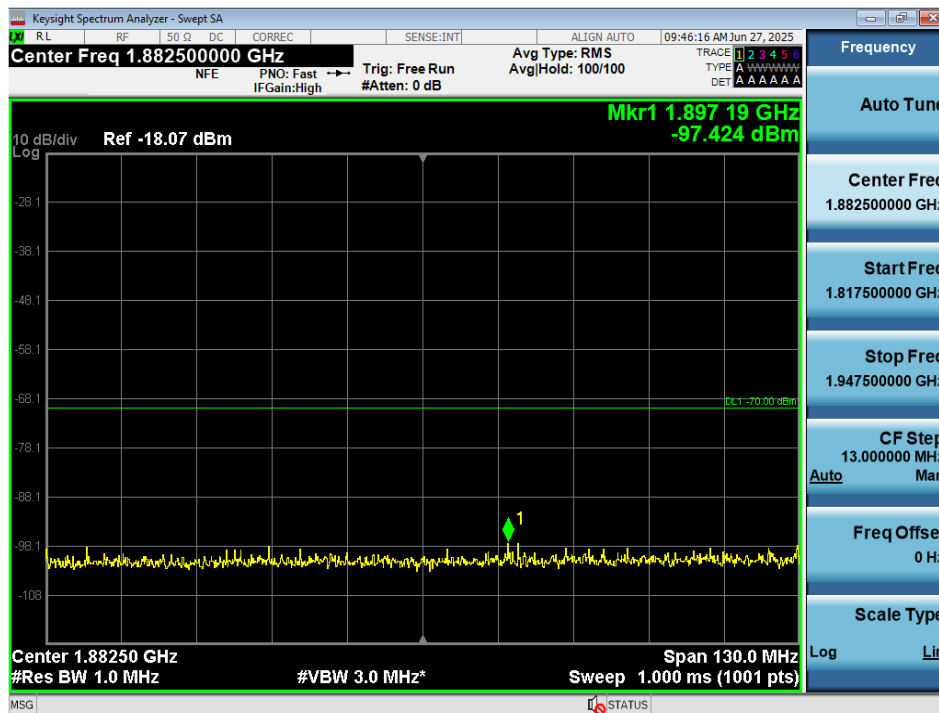
Inactivity Noise Level / Broadband PCS / ANT 1



Inactivity Noise Level / Broadband PCS / ANT 2



Inactivity Noise Level / Broadband PCS / ANT 3



5.10. VARIABLE BOOSTER GAIN

Test Requirements:

§ 20.21(e)(9)(i)(C)(1) Booster Gain Limits.

The gain of the frequency selective consumer booster shall meet the limits below.

- (1) The uplink and downlink gain in dB of a frequency selective consumer booster referenced to its input and output ports shall not exceed $BSCL - 28 \text{ dB} - (40 \text{ dB} - MSCL)$.
 - (i) Where BSCL is the coupling loss between the booster's donor port and the base station's input port, and MSCL is the minimum coupling loss in dB between the wireless device and the booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.
 - (ii) In order of preference, BSCL is determined as follows: determine path loss between the base station and the booster; such measurement shall be based on measuring the received forward pilot/control channel power at the booster and reading the pilot/control channel transmit power from the base station as defined in the system information messages sent by the base station; estimate BSCL by assuming that the base station is transmitting at a level of +25 dBm per channel (assume a small, lightly loaded cell) and measuring the total received signal power level within the channel in dBm (RPCH) received at the booster input port. BSCL is then calculated as $25 - RPCH$; or assume that the BSCL is 70 dB without performing any measurement.

§ 20.21(e)(9)(i)(I) Transmit Power Off Mode.

When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power OFF Mode." In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

Test Procedures:

Measurements were in accordance with the test methods section 7.9 of KDB 935210 D04 v02r04.

7.9.1 Variable gain

- a) Connect the EUT to the test equipment as shown in Figure 1 (normal operational mode).
- b) Configure the base station simulator for the transmission of a valid base station signal for the standard being tested (e.g., W-CDMA or LTE), and set the base station forward pilot/control channel TX power to a fixed value that is able to achieve the dynamic range indicated in the following procedure.
- c) Set the power level and frequency of the signal generator to a value 5 dB below the AGC threshold level as determined in 7.2.2 with the booster operating at maximum gain. The uplink signal type is AWGN with a 99% OBW of 4.1 MHz.
- d) Set RBW = 100 kHz on the donor and server port spectrum analyzers.
- e) Set VBW $\geq 300 \text{ kHz}$ on the donor and server port spectrum analyzers.
- f) Select the CHANNEL POWER measurement mode on the donor and server port spectrum analyzers.
- g) Select the power averaging (rms) detector on the donor and server port spectrum analyzers.

- h) Set number of measurement points per sweep $\geq (2 \times \text{span})/\text{RBW}$.
- i) Sweep time = auto couple or as necessary (but no less than auto couple value).
- j) Trace average at least 10 traces in power averaging (rms) mode.
- k) Measure the maximum channel power in the uplink and downlink directions, and compute maximum gain, when varying the variable attenuator to achieve a received signal channel power level (RPCH) at the booster port of from -90 dBm to -20 dBm, in 1 dB steps inside the RPCH dependent region, and in 10 dB steps outside the RPCH dependent region. Report the six values closest to the limit, including at least two points from within the RPCH dependent region of operation. See gain limit charts in Appendix D.

NOTE 1–The RPCH is the total signal power level in the downlink channel in dBm, referenced to the booster donor port (i.e., downlink signal level at the booster donor port), which is greater than the received pilot power level.

NOTE 2–For provider-specific boosters with maximum gain greater than 85 dB, which have automatic gain adjustment based on antenna isolation per the gain limits requirements, the starting value for RPCH shall be -100 dBm, rather than -90 dBm as specified in the preceding procedure.

- l) Repeat 7.9.1a) to 7.9.1k) for all uplink and downlink bands.

7.9.2 Variable uplink gain timing

- a) Set the spectrum analyzer to the uplink frequency to be measured.
- b) Set the span to 0 Hz with a sweep time of 10 seconds.
- c) Set the BSCL to obtain the maximum booster gain within the BSCL dependent gain region.
- d) Select MAX HOLD and decrease the BSCL by decreasing the variable attenuator in 20 dB steps for fixed boosters, and in 10 dB steps for mobile boosters. The signal generator output power remains fixed at the level determined in 7.9.1c).
- e) Ensure that the uplink gain decreases to the specified levels within 3 seconds for fixed boosters, and within 1 second for mobile boosters.
- f) Repeat 7.9.2a) to 7.9.2e) for all operational uplink bands.

Notes:

1. The EUT operated in normal mode and was configured according to Figure 1 of KDB 935210 D04.
2. The timing limit follows the fixed devices 3-second limit specified in Section 7.9.2 of KDB 935210 D04.
3. The minimum MSCL value in this test is calculated according to following formula and table.

$$L_p = 20 \times \log f (\text{Uplink Band the Lowest frequency}) + 20 \times \log (\text{Distance}) - 27.5$$

$$\text{MSCL} = L_p - \text{Antenna gain} + \text{Cable loss}$$

Frequency (MHz)	Server Ant. Gain (dBi)	Sever Cable Loss (dB)	Distance (m)	Lp	MSCL
699	2.0	2.91	2	35.410	36.322
777	2.0	2.93	2	36.329	37.262
824	2.0	3.22	2	36.839	38.056
1 710	5.0	5.09	2	43.181	43.269
1 850	5.0	4.88	2	43.864	43.740

The antenna gain, cable length, and loss are based on the specifications provided by the vendor.

The distance is specified by the manufacturer, and the information is provided in the manual.

4. The test limit is based on the 'Auto Gain Adjust (Max Gain)', 'RPCH Dependent Limits', and 'Transmit Power Off Mode' line in Figure D2 and Figure D3 of Note 5.

Category	RPCH Range	Gain Limit
	Downlink and Uplink	
Auto Gain Adjust (Max Gain)	-100 dBm	BSCL - 28 - (40 - MSCL)
RSSI Dependent Limits	-100 dBm to 25 - (Gain - (-28 dB - (40 dB - MSCL))	
Transmit Power Off Mode	25 - (23 dB - (-28 dB - (40 dB - MSCL)) to -20 dBm	23 dB

BSCL = 25 - RPCH

RPCH = 25 - BSCL

Gain ≤ BSCL - 28 - (40 - MSCL)

BSCL ≤ Gain - 28 - (40 - MSCL)

RPCH ≤ 25 - (Gain - 28 - (40 - MSCL))

5. The tests refer to the variable gain limits specified in Appendix D of KDB 935210 D04 v02r04.

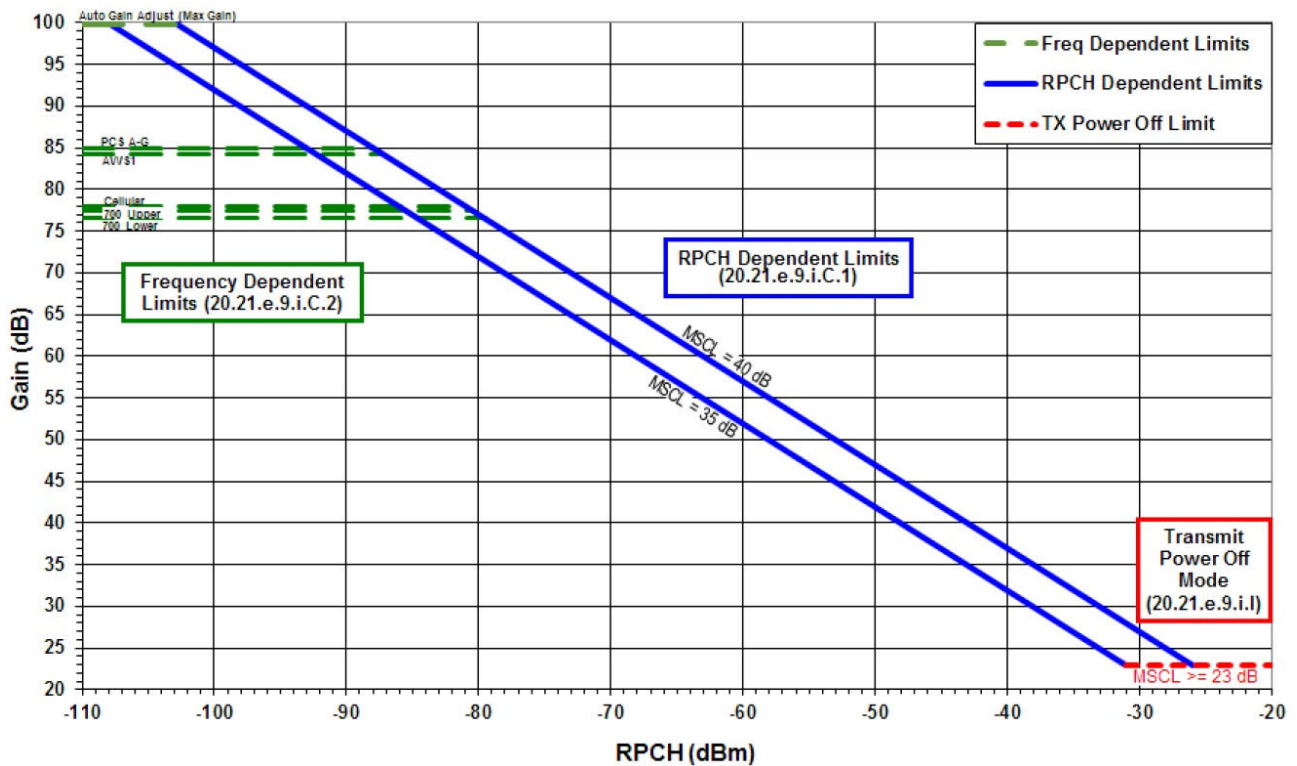


Figure D2 – Provider-specific consumer signal booster variable gain limits

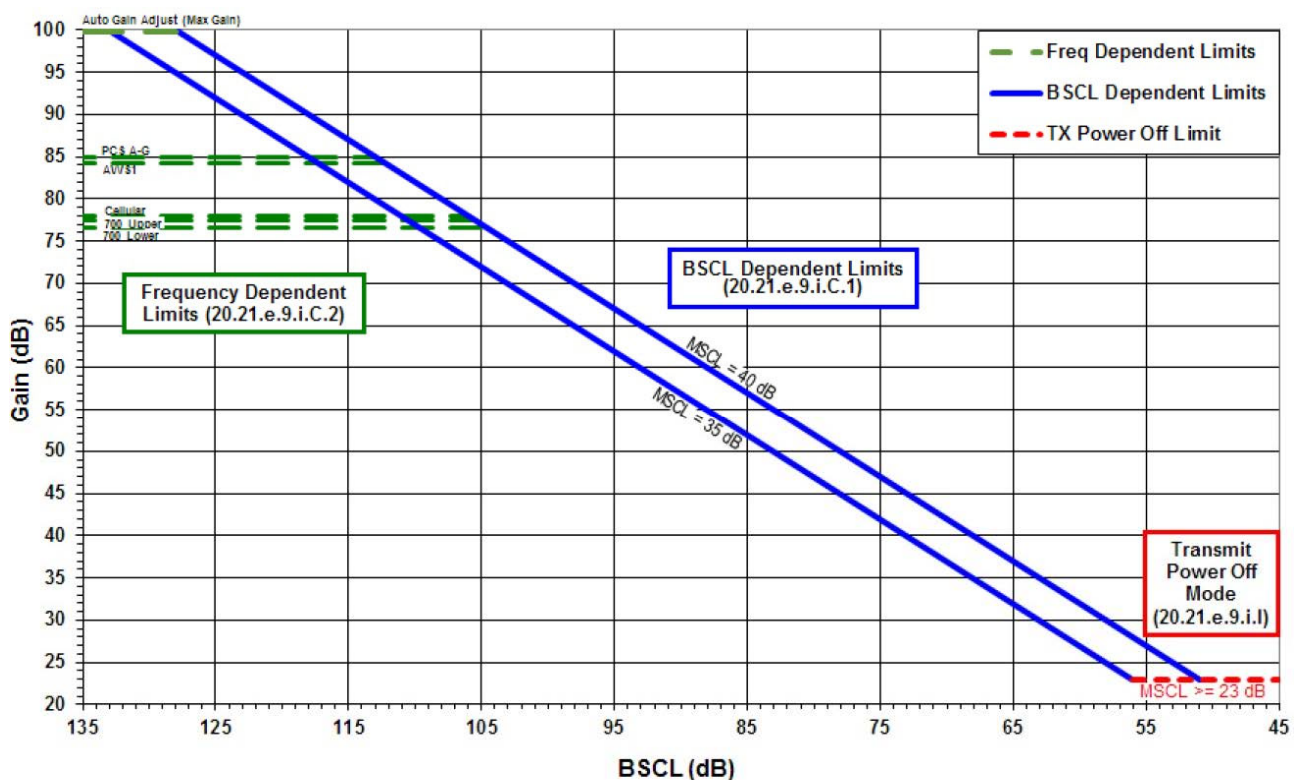


Figure D3 – Provider-specific consumer signal booster variable gain limits

Test Result:

Tabulated Result of Uplink Variable Booster Gain

ANT	Band	MSCL	RPCH (dBm)	BSCL (dB)	Measured Power (dBm)	Limit (dB)	Variable Gain (dB)
1	Upper 700 MHz	37.262	-91.00	116.00	0.30	85.26	81.56
			-93.00	118.00	2.24	87.26	83.50
			-90.00	115.00	-0.79	84.26	80.47
			-92.00	117.00	1.20	86.26	82.46
			-86.00	111.00	-4.81	80.26	76.45
			-89.00	114.00	-1.84	83.26	79.42
	Cellular	38.056	-88.00	113.00	-3.89	83.06	77.35
			-86.00	111.00	-5.93	81.06	75.31
			-83.00	108.00	-8.95	78.06	72.29
			-81.00	106.00	-10.99	76.06	70.25
			-85.00	110.00	-7.05	80.06	74.19
			-80.00	105.00	-12.13	75.06	69.11
	AWS-1	43.269	-67.00	92.00	-28.27	67.27	51.49
			-64.00	89.00	-31.41	64.27	48.35
			-60.00	85.00	-35.54	60.27	44.22
			-61.00	86.00	-34.56	61.27	45.20
			-53.00	78.00	-42.57	53.27	37.19
			-49.00	74.00	-46.59	49.27	33.17
	Broadband PCS	43.740	-61.00	86.00	-24.36	61.74	54.78
			-59.00	84.00	-26.47	59.74	52.67
			-57.00	82.00	-28.54	57.74	50.60
			-58.00	83.00	-27.56	58.74	51.58
			-60.00	85.00	-25.58	60.74	53.56
			-55.00	80.00	-30.60	55.74	48.54

ANT	Band	MSCL	RPCH (dBm)	BSCL (dB)	Measured Power (dBm)	Limit (dB)	Variable Gain (dB)
2	Lower 700 MHz	36.322	-48.00	73.00	-42.24	41.32	39.39
			-55.00	80.00	-35.33	48.32	46.30
			-47.00	72.00	-43.34	40.32	38.29
			-58.00	83.00	-32.36	51.32	49.27
			-44.00	69.00	-46.72	37.32	34.91
			-51.00	76.00	-39.78	44.32	41.85
	Cellular	38.056	-44.00	69.00	-45.64	39.06	35.40
			-48.00	73.00	-42.01	43.06	39.03
			-52.00	77.00	-38.06	47.06	42.98
			-55.00	80.00	-35.07	50.06	45.97
			-56.00	81.00	-34.08	51.06	46.96
			-51.00	76.00	-39.12	46.06	41.92
	AWS-1	43.269	-54.00	79.00	-34.08	54.27	47.28
			-55.00	80.00	-33.08	55.27	48.28
			-56.00	81.00	-32.17	56.27	49.19
			-49.00	74.00	-39.19	49.27	42.17
			-53.00	78.00	-35.19	53.27	46.17
			-50.00	75.00	-38.23	50.27	43.13
	Broadband PCS	43.740	-50.00	75.00	-33.11	50.74	48.32
			-46.00	71.00	-37.16	46.74	44.27
			-47.00	72.00	-36.19	47.74	45.24
			-58.00	83.00	-25.46	58.74	55.97
			-55.00	80.00	-28.51	55.74	52.92
			-60.00	85.00	-23.51	60.74	57.92

ANT	Band	MSCL	RPCH (dBm)	BSCL (dB)	Measured Power (dBm)	Limit (dB)	Variable Gain (dB)
3	Lower 700 MHz	36.322	-88.00	113.00	-2.18	81.32	78.32
			-90.00	115.00	-0.18	83.32	80.32
			-89.00	114.00	-1.20	82.32	79.30
			-87.00	112.00	-3.24	80.32	77.26
			-86.00	111.00	-4.24	79.32	76.26
			-85.00	110.00	-5.29	78.32	75.21
	Cellular	38.056	-49.00	74.00	-42.76	44.06	38.78
			-55.00	80.00	-36.79	50.06	44.75
			-46.00	71.00	-45.80	41.06	35.74
			-47.00	72.00	-44.83	42.06	36.71
			-52.00	77.00	-39.85	47.06	41.69
			-61.00	86.00	-31.17	56.06	50.37
	AWS-1	43.269	-59.00	84.00	-30.40	59.27	49.76
			-61.00	86.00	-28.47	61.27	51.69
			-58.00	83.00	-31.64	58.27	48.52
			-55.00	80.00	-34.66	55.27	45.50
			-57.00	82.00	-32.69	57.27	47.47
			-54.00	79.00	-35.70	54.27	44.46
	Broadband PCS	43.740	-58.00	83.00	-26.37	58.74	55.06
			-57.00	82.00	-27.37	57.74	54.06
			-61.00	86.00	-23.43	61.74	58.00
			-59.00	84.00	-25.44	59.74	55.99
			-60.00	85.00	-24.44	60.74	56.99
			-56.00	81.00	-28.50	56.74	52.93

Tabulated Result of Uplink Variable Gain Timing

ANT	Band	Frequency (MHz)	Limit (s)	Gain Timing (s)
1	Upper 700 MHz	782.0	3	0.78
	Cellular	836.5		0.87
	AWS-1	1 732.5		0.63
	Broadband PCS	1 882.5		0.85
2	Lower 700 MHz	707.5	3	0.84
	Cellular	836.5		0.81
	AWS-1	1 732.5		0.77
	Broadband PCS	1 882.5		0.83
3	Lower 700 MHz	707.0	3	0.90
	Cellular	836.5		0.84
	AWS-1	1 732.5		0.88
	Broadband PCS	1 882.5		0.86

Tabulated Result of Downlink Variable Booster Gain

ANT	Band	MSCL	RPCH (dBm)	BSCL (dB)	Measured Power (dBm)	Limit (dB)	Variable Gain (dB)
1	Upper 700 MHz	37.262	-38.00	63.00	-6.73	32.26	31.27
			-39.00	64.00	-7.66	33.26	31.34
			-48.00	73.00	-8.40	42.26	39.60
			-63.00	88.00	-8.41	57.26	54.59
			-44.00	69.00	-8.42	38.26	35.58
			-47.00	72.00	-8.45	41.26	38.55
	Cellular	38.056	-52.00	77.00	-8.34	47.06	43.66
			-50.00	75.00	-8.35	45.06	41.65
			-47.00	72.00	-8.37	42.06	38.63
			-54.00	79.00	-8.39	49.06	45.61
			-64.00	89.00	-8.40	59.06	55.60
			-85.00	110.00	-8.41	80.06	76.59
	AWS-1	43.269	-45.00	70.00	-9.40	45.27	35.60
			-46.00	71.00	-9.44	46.27	36.56
			-49.00	74.00	-9.45	49.27	39.55
			-75.00	100.00	-9.45	75.27	65.55
			-78.00	103.00	-9.52	78.27	68.48
			-57.00	82.00	-9.54	57.27	47.46
	Broadband PCS	43.740	-64.00	89.00	-8.36	64.74	55.64
			-51.00	76.00	-8.40	51.74	42.60
			-44.00	69.00	-8.43	44.74	35.57
			-78.00	103.00	-8.44	78.74	69.56
			-87.00	112.00	-8.45	87.74	78.55
			-96.00	121.00	-8.45	96.74	87.55

ANT	Band	MSCL	RPCH (dBm)	BSCL (dB)	Measured Power (dBm)	Limit (dB)	Variable Gain (dB)
2	Lower 700 MHz	36.322	-68.00	93.00	-9.51	61.32	58.49
			-62.00	87.00	-9.65	55.32	52.35
			-73.00	98.00	-9.66	66.32	63.34
			-49.00	74.00	-9.68	42.32	39.32
			-67.00	92.00	-9.69	60.32	57.31
			-54.00	79.00	-9.69	47.32	44.31
	Cellular	38.056	-74.00	99.00	-8.18	69.06	65.82
			-55.00	80.00	-8.22	50.06	46.78
			-45.00	70.00	-8.26	40.06	36.74
			-86.00	111.00	-8.26	81.06	77.74
			-54.00	79.00	-8.27	49.06	45.73
			-89.00	114.00	-8.31	84.06	80.69
	AWS-1	43.269	-58.00	83.00	-8.56	58.27	49.44
			-63.00	88.00	-8.57	63.27	54.43
			-66.00	91.00	-8.60	66.27	57.40
			-60.00	85.00	-8.62	60.27	51.38
			-50.00	75.00	-8.62	50.27	41.38
			-95.00	120.00	-8.65	95.27	86.35
	Broadband PCS	43.740	-55.00	80.00	-8.38	55.74	46.62
			-45.00	70.00	-8.38	45.74	36.62
			-44.00	69.00	-8.39	44.74	35.61
			-54.00	79.00	-8.40	54.74	45.60
			-51.00	76.00	-8.43	51.74	42.57
			-60.00	85.00	-8.43	60.74	51.57

ANT	Band	MSCL	RPCH (dBm)	BSCL (dB)	Measured Power (dBm)	Limit (dB)	Variable Gain (dB)
3	Lower 700 MHz	36.322	-53.00	78.00	-9.34	46.32	43.66
			-64.00	89.00	-9.36	57.32	54.64
			-52.00	77.00	-9.37	45.32	42.63
			-74.00	99.00	-9.40	67.32	64.60
			-63.00	88.00	-9.41	56.32	53.59
			-68.00	93.00	-9.42	61.32	58.58
	Cellular	38.056	-47.00	72.00	-8.06	42.06	38.94
			-87.00	112.00	-8.11	82.06	78.89
			-67.00	92.00	-8.14	62.06	58.86
			-86.00	111.00	-8.15	81.06	77.85
			-73.00	98.00	-8.16	68.06	64.84
			-58.00	83.00	-8.17	53.06	49.83
	AWS-1	43.269	-58.00	83.00	-8.62	58.27	49.38
			-64.00	89.00	-8.73	64.27	55.27
			-53.00	78.00	-8.75	53.27	44.25
			-67.00	92.00	-8.78	67.27	58.22
			-80.00	105.00	-8.79	80.27	71.21
			-81.00	106.00	-8.79	81.27	72.21
	Broadband PCS	43.740	-65.00	90.00	-8.60	65.74	56.40
			-44.00	69.00	-8.60	44.74	35.40
			-61.00	86.00	-8.62	61.74	52.38
			-74.00	99.00	-8.62	74.74	65.38
			-88.00	113.00	-8.64	88.74	79.36
			-93.00	118.00	-8.69	93.74	84.31

Plot data of Variable Gain Timing

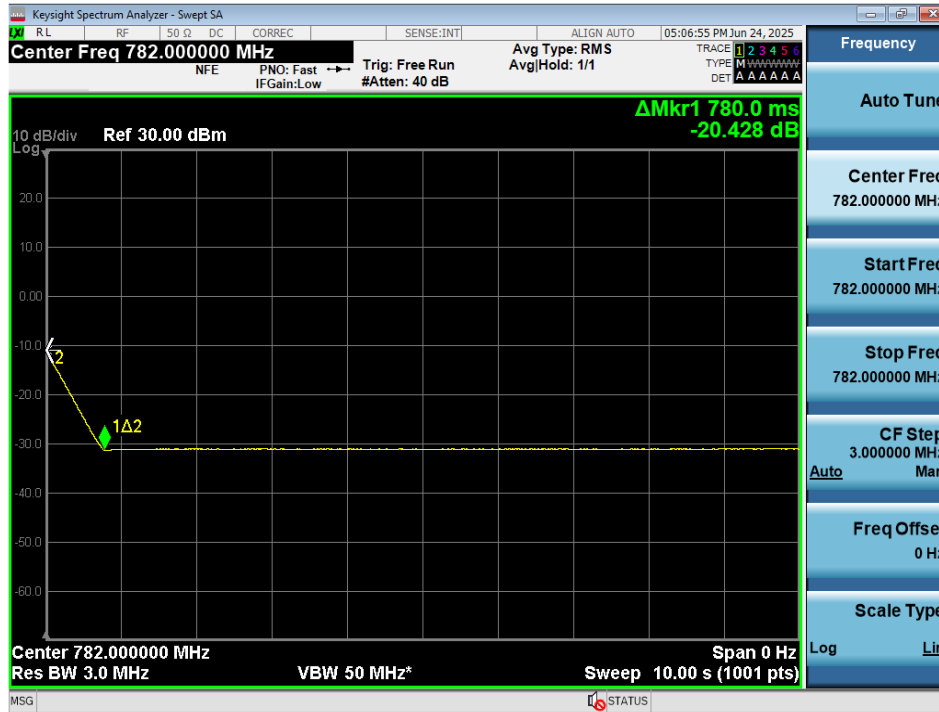
Variable Gain Timing / Lower 700 MHz / ANT 2



Variable Gain Timing / Lower 700 MHz / ANT 3



Variable Gain Timing / Upper 700 MHz / ANT 1



Variable Gain Timing / Cellular / ANT 1



Variable Gain Timing / Cellular / ANT 2



Variable Gain Timing / Cellular / ANT 3



Variable Gain Timing / AWS-1 / ANT 1



Variable Gain Timing / AWS-1 / ANT 2



Variable Gain Timing / AWS-1 / ANT 3



Variable Gain Timing / Broadband PCS / ANT 1



Variable Gain Timing / Broadband PCS / ANT 2



Variable Gain Timing / Broadband PCS / ANT 3



5.11. OCCUPIED BANDWIDTH

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

Measurements were in accordance with the test methods section 7.10 of KDB 935210 D04 v02r04.

- a) Connect the test equipment as shown in Figure 9 to firstly measure the characteristics of the test signals produced by the signal generator.
- b) 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 OBW as necessary for accurately viewing the signals.
- c) Set the signal generator for power level to match the values obtained from the tests of 7.2.
- d) Set the signal generator modulation type for GSM with a PRBS pattern, and allow the trace on the signal generator to stabilize, adjusting the span as necessary.
- e) Set the spectrum analyzer RBW for 1% to 5% of the EBW.
- f) Set VBW $\geq 3 \times$ RBW.
- g) Capture the spectrum analyzer trace for inclusion in the test report.
- h) Repeat 7.10c) to 7.10g) for CDMA and W-CDMA modulation, adjusting the span as necessary, for all uplink and downlink operational bands. AWGN or LTE may be used in place of W-CDMA, as an option.
- i) Connect the test equipment as shown in Figure 1 (normal operational mode).
- j) Repeat 7.10c) to 7.10h) in this new configuration using signal types as appropriate for the signal type being transmitted in a specific CMRS band.

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 of the signal generator to simulate this function.

Notes:

1. The EUT was connected to the test equipment as shown in Figure 9 of KDB 935210 D04 to measure the characteristics of the test signal generated by the signal generator, and then measurements were performed in normal mode as shown in Figure 1.
2. When the output power of the signal generator was set to match the value obtained from the test in Section 5.3 of the this report, there were cases where the OBW was not sufficiently measured to cover the full bandwidth. Therefore, for some measurements, the output power of the signal generator was increased to ensure accurate measurement.

Test Result:

Tabulated Result of Uplink Occupied Bandwidth (-26 dB OBW)

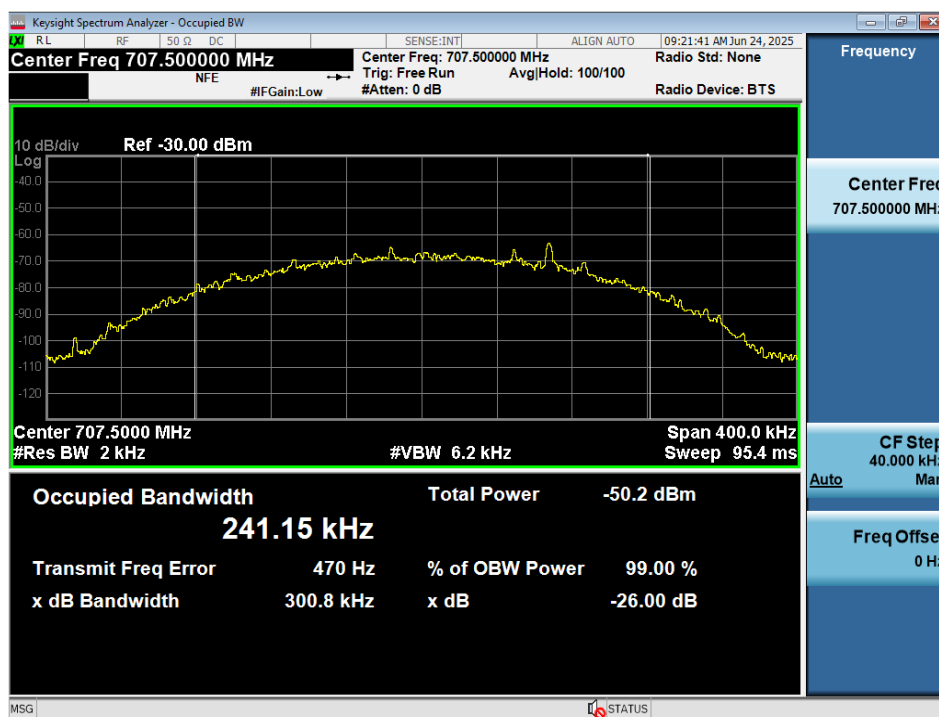
ANT	Band	Signal	Freqeuncy (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
1	Upper 700 MHz	GSM	782.0	241.94	244.02	0.86
	Cellular		836.5	241.12	244.73	1.50
	AWS-1		1 732.5	241.93	244.48	1.05
	Broadband PCS		1 882.5	240.64	244.91	1.77
	Band	Signal	Freqeuncy (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
	Upper 700 MHz	CDMA	782.0	1.2407	1.2424	0.13
	Cellular		836.5	1.2357	1.2430	0.59
	AWS-1		1 732.5	1.2404	1.2437	0.26
	Broadband PCS		1 882.5	1.2387	1.2504	0.95
	Upper 700 MHz	WCDMA	782.0	4.2083	4.1878	-0.49
	Cellular		836.5	4.1923	4.1778	-0.35
	AWS-1		1 732.5	4.2023	4.2000	-0.06
	Broadband PCS		1 882.5	4.2165	4.2103	-0.15
ANT	Band	Signal	Freqeuncy (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
2	Lower 700 MHz	GSM	707.5	241.15	243.59	1.01
	Cellular		836.5	241.49	244.03	1.05
	AWS-1		1 732.5	241.49	244.68	1.32
	Broadband PCS		1 882.5	241.95	243.92	0.81
	Band	Signal	Freqeuncy (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
	Lower 700 MHz	CDMA	707.5	1.2406	1.2441	0.28
	Cellular		836.5	1.2413	1.2427	0.11
	AWS-1		1 732.5	1.2400	1.2414	0.12
	Broadband PCS		1 882.5	1.2398	1.2501	0.83
	Lower 700 MHz	WCDMA	707.5	4.2052	4.1790	-0.62
	Cellular		836.5	4.1841	4.1998	0.38
	AWS-1		1 732.5	4.2044	4.1912	-0.32
	Broadband PCS		1 882.5	4.2175	4.1791	-0.91
ANT	Band	Signal	Freqeuncy (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
3	Lower 700 MHz	GSM	707.5	240.90	245.00	1.70
	Cellular		836.5	241.78	245.02	1.34
	AWS-1		1 732.5	243.48	244.98	0.62
	Broadband PCS		1 882.5	242.32	246.23	1.61
	Band	Signal	Freqeuncy (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
	Lower 700 MHz	CDMA	707.5	1.2403	1.2428	0.20
	Cellular		836.5	1.2419	1.2457	0.30
	AWS-1		1 732.5	1.2412	1.2478	0.53
	Broadband PCS		1 882.5	1.2374	1.2500	1.02
	Lower 700 MHz	WCDMA	707.5	4.1860	4.1958	0.24
	Cellular		836.5	4.1902	4.1905	0.01
	AWS-1		1 732.5	4.2164	4.1832	-0.79
	Broadband PCS		1 882.5	4.2104	4.2024	-0.19

Tabulated Result of Downlink Occupied Bandwidth (-26 dB OBW)

ANT	Band	Signal	Frequency (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
1	Upper 700 MHz	GSM	751.0	242.06	243.49	0.59
	Cellular		881.5	241.94	244.34	0.99
	AWS-1		2 132.5	241.66	248.61	2.88
	Broadband PCS		1 962.5	241.84	244.08	0.93
	Band	Signal	Frequency (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
	Upper 700 MHz	CDMA	751.0	1.2392	1.2679	2.31
	Cellular		881.5	1.2417	1.2529	0.90
	AWS-1		2 132.5	1.2377	1.2383	0.05
	Broadband PCS		1 962.5	1.2398	1.2495	0.78
	Upper 700 MHz	WCDMA	751.0	4.2371	4.2181	-0.45
	Cellular		881.5	4.2322	4.2180	-0.34
	AWS-1		2 132.5	4.2277	4.2204	-0.17
	Broadband PCS		1 962.5	4.2176	4.2076	-0.24
ANT	Band	Signal	Frequency (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
2	Lower 700 MHz	GSM	737.5	246.31	255.02	3.53
	Cellular		881.5	245.85	250.94	2.07
	AWS-1		2 132.5	242.17	247.46	2.18
	Broadband PCS		1 962.5	247.22	245.87	-0.55
	Band	Signal	Frequency (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
	Lower 700 MHz	CDMA	737.5	1.2478	1.2577	0.80
	Cellular		881.5	1.2652	1.2655	0.03
	AWS-1		2 132.5	1.2433	1.2598	1.32
	Broadband PCS		1 962.5	1.2405	1.2605	1.61
	Lower 700 MHz	WCDMA	737.5	4.3313	4.3454	0.33
	Cellular		881.5	4.2950	4.3519	1.33
	AWS-1		2 132.5	4.2504	4.2319	-0.44
	Broadband PCS		1 962.5	4.2715	4.4491	4.16
ANT	Band	Signal	Frequency (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
3	Lower 700 MHz	GSM	737.5	242.76	243.94	0.48
	Cellular		881.5	242.71	244.79	0.86
	AWS-1		2 132.5	241.43	244.59	1.31
	Broadband PCS		1 962.5	242.08	244.86	1.15
	Band	Signal	Frequency (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
	Lower 700 MHz	CDMA	737.5	1.2396	1.2565	1.36
	Cellular		881.5	1.2427	1.2534	0.86
	AWS-1		2 132.5	1.2420	1.2563	1.15
	Broadband PCS		1 962.5	1.2380	1.2555	1.42
	Lower 700 MHz	WCDMA	737.5	4.2394	4.2109	-0.67
	Cellular		881.5	4.2352	4.2321	-0.07
	AWS-1		2 132.5	4.2457	4.2146	-0.73
	Broadband PCS		1 962.5	4.2634	4.2208	-1.00

Plot data of Occupied Bandwidth

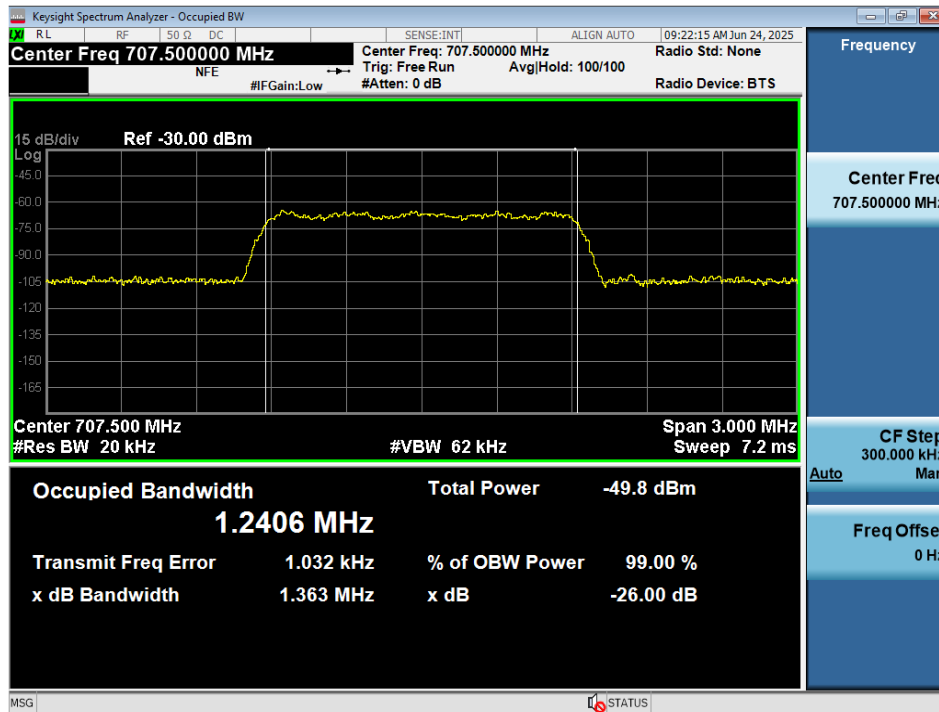
Occupied Bandwidth / Lower 700 MHz / Uplink / GSM / Input / ANT 2



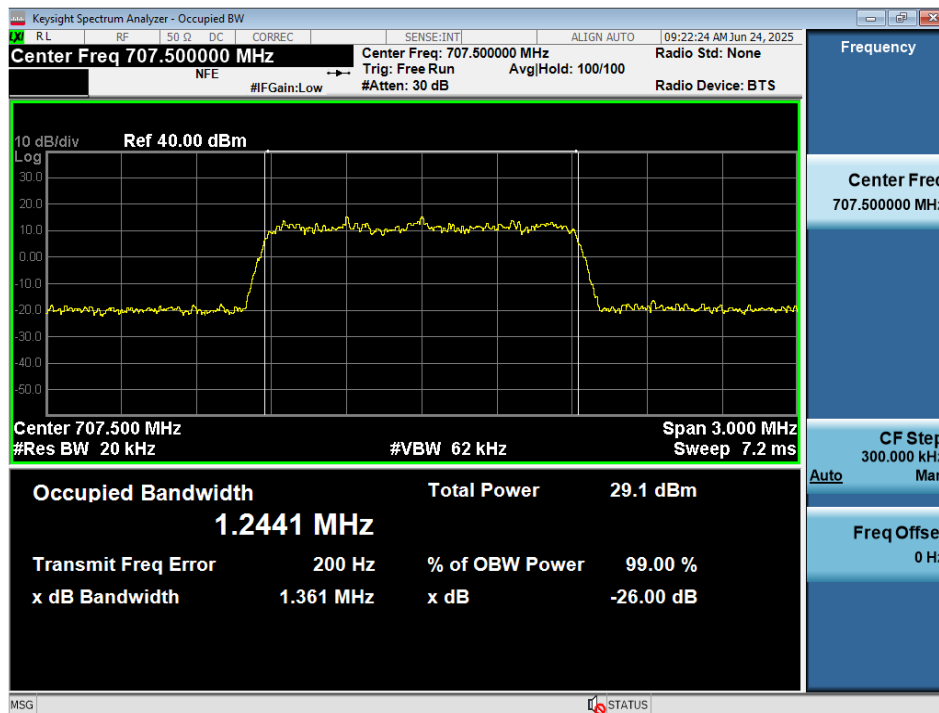
Occupied Bandwidth / Lower 700 MHz / Uplink / GSM / Output / ANT 2



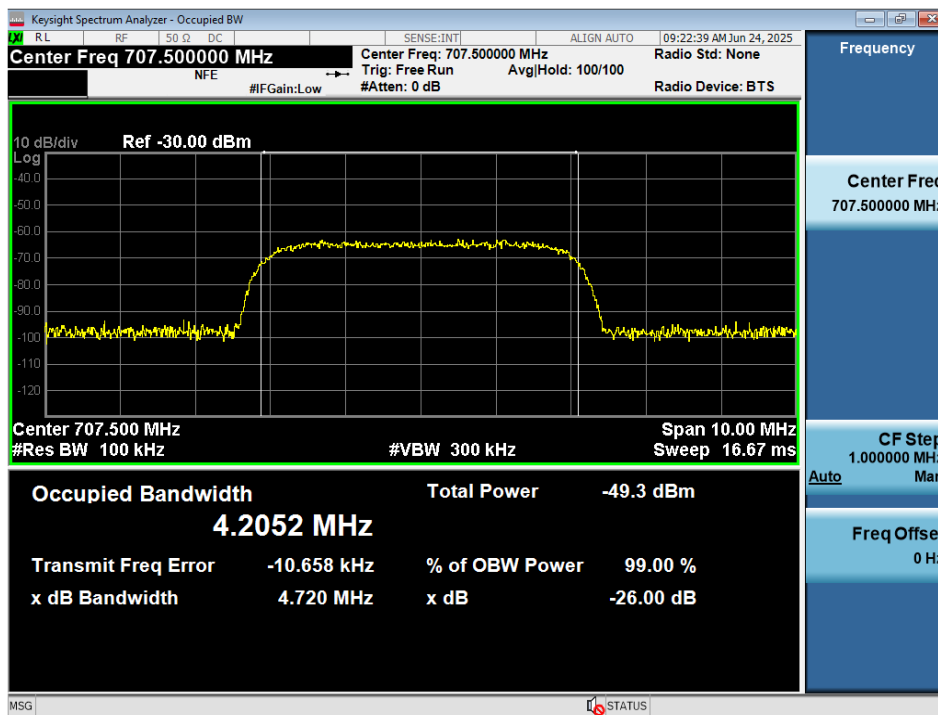
Occupied Bandwidth / Lower 700 MHz / Uplink / CDMA / Input / ANT 2



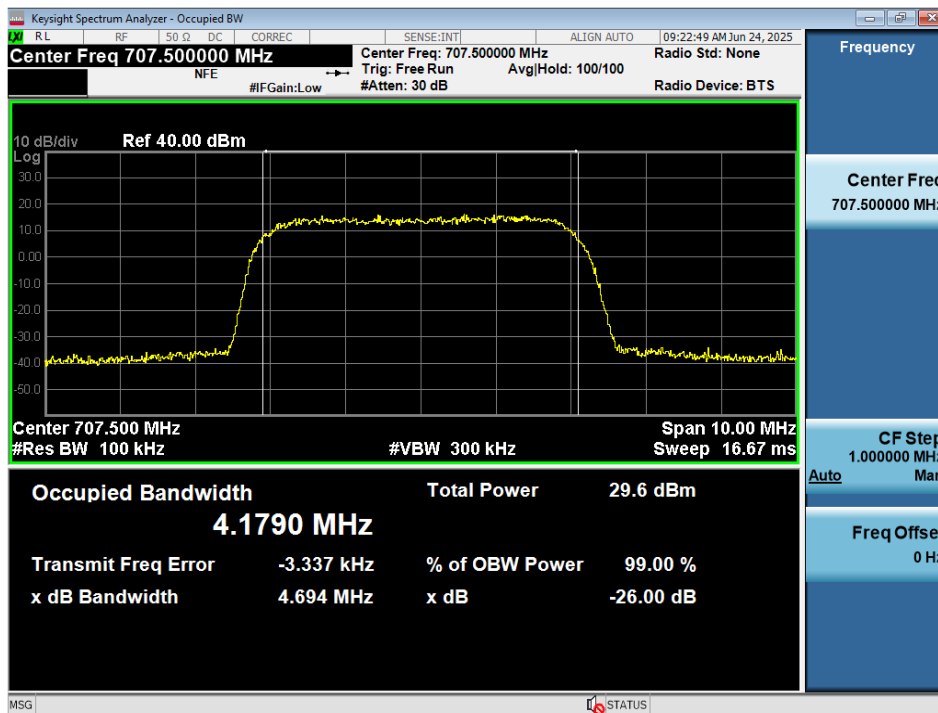
Occupied Bandwidth / Lower 700 MHz / Uplink / CDMA / Output / ANT 2



Occupied Bandwidth / Lower 700 MHz / Uplink / WCDMA/ Input / ANT 2



Occupied Bandwidth / Lower 700 MHz / Uplink / WCDMA / Output / ANT 2



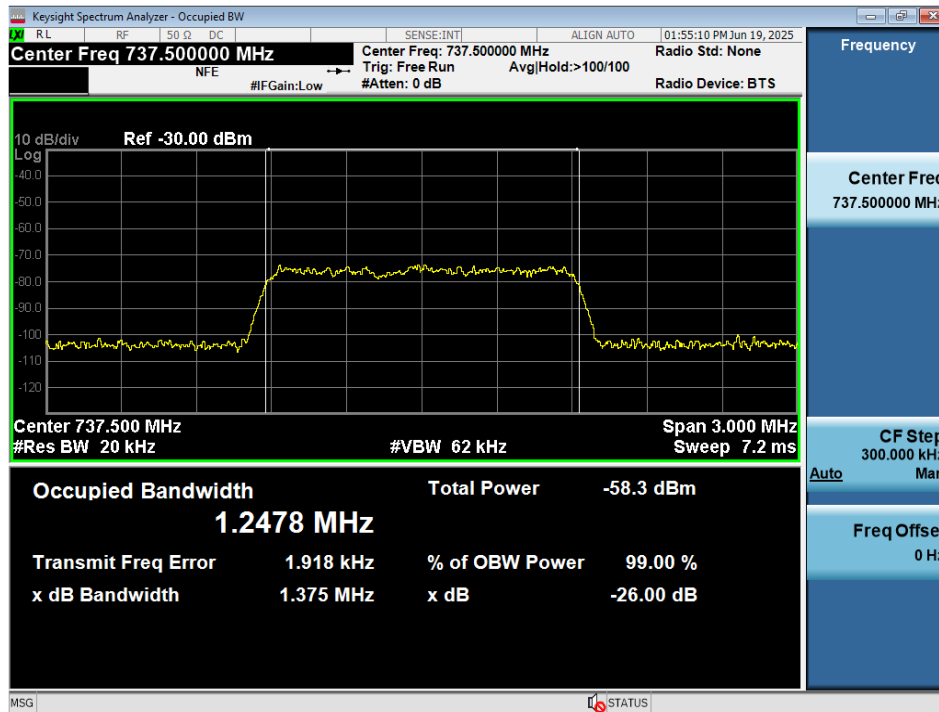
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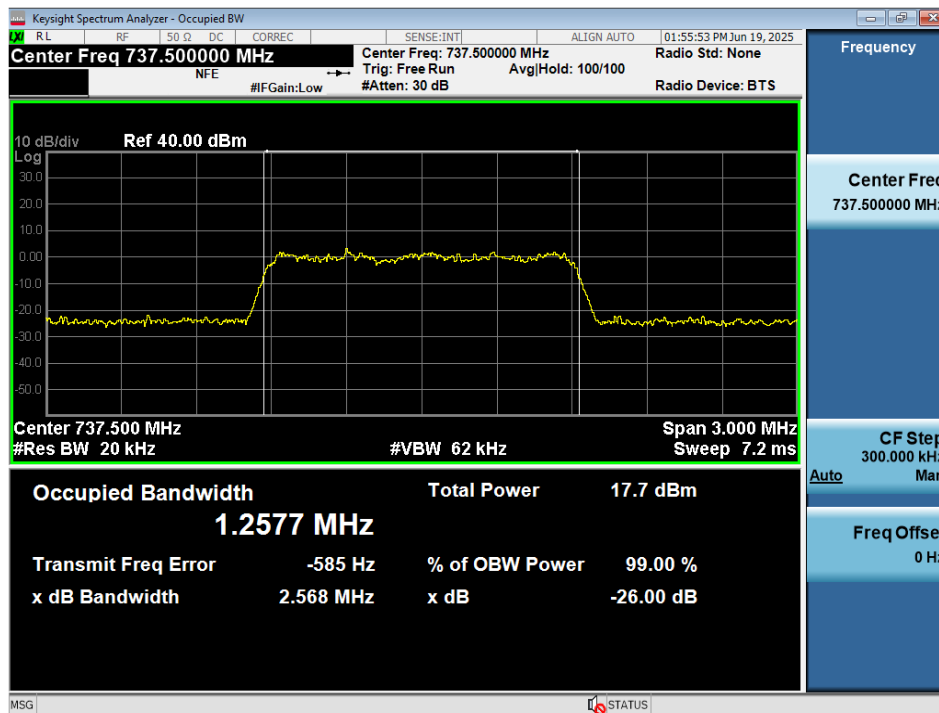
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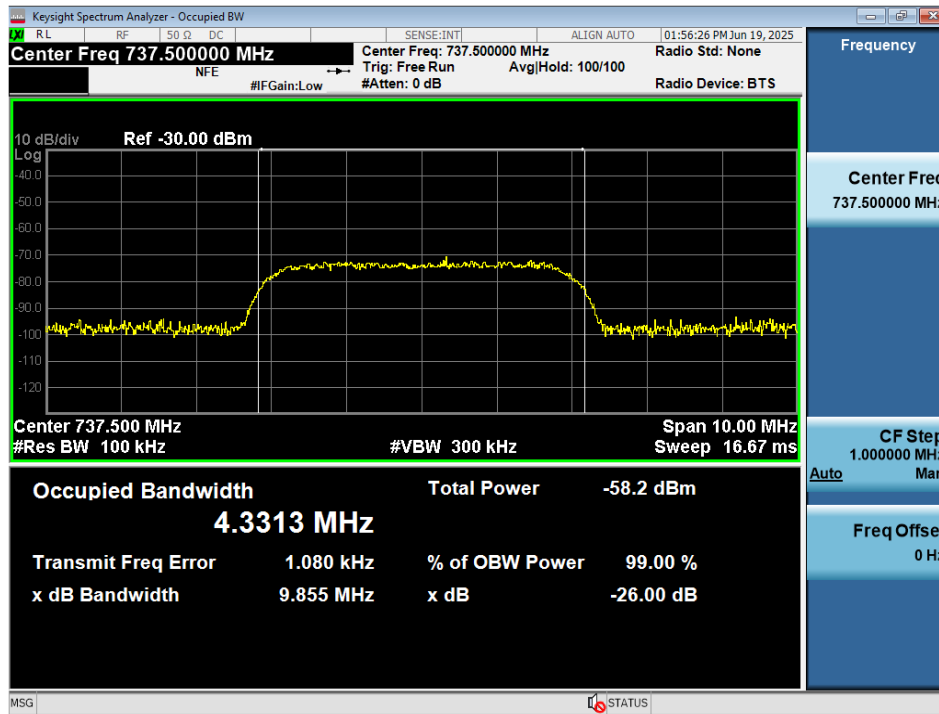
Occupied Bandwidth / Lower 700 MHz / Downlink / CDMA/ Input / ANT 2



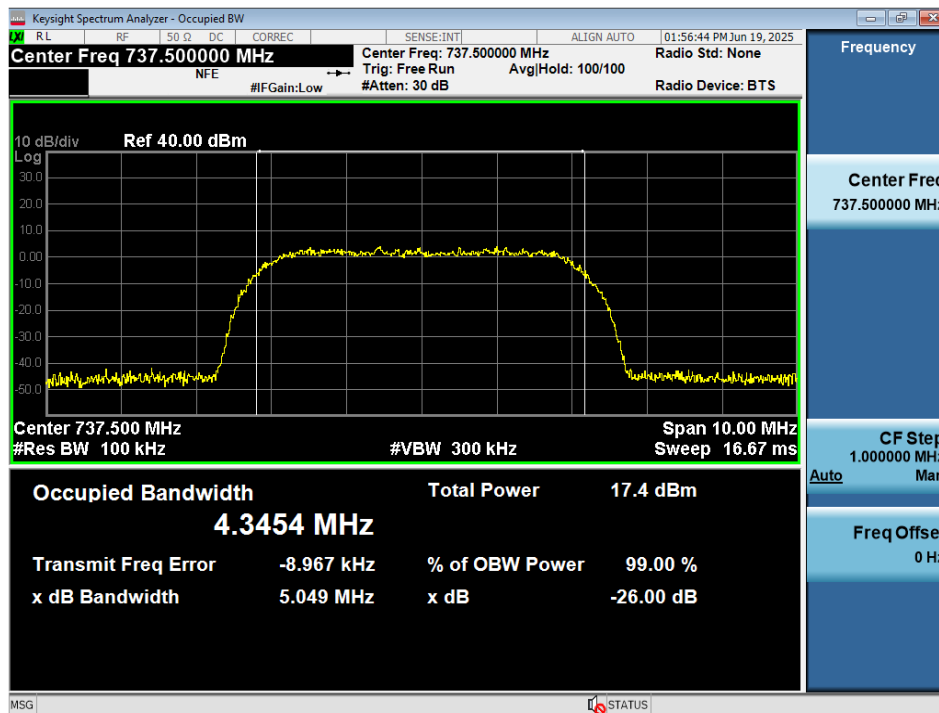
Occupied Bandwidth / Lower 700 MHz / Downlink / CDMA / Output / ANT 2



Occupied Bandwidth / Lower 700 MHz / Downlink / WCDMA/ Input / ANT 2



Occupied Bandwidth / Lower 700 MHz / Downlink / WCDMA / Output / ANT 2



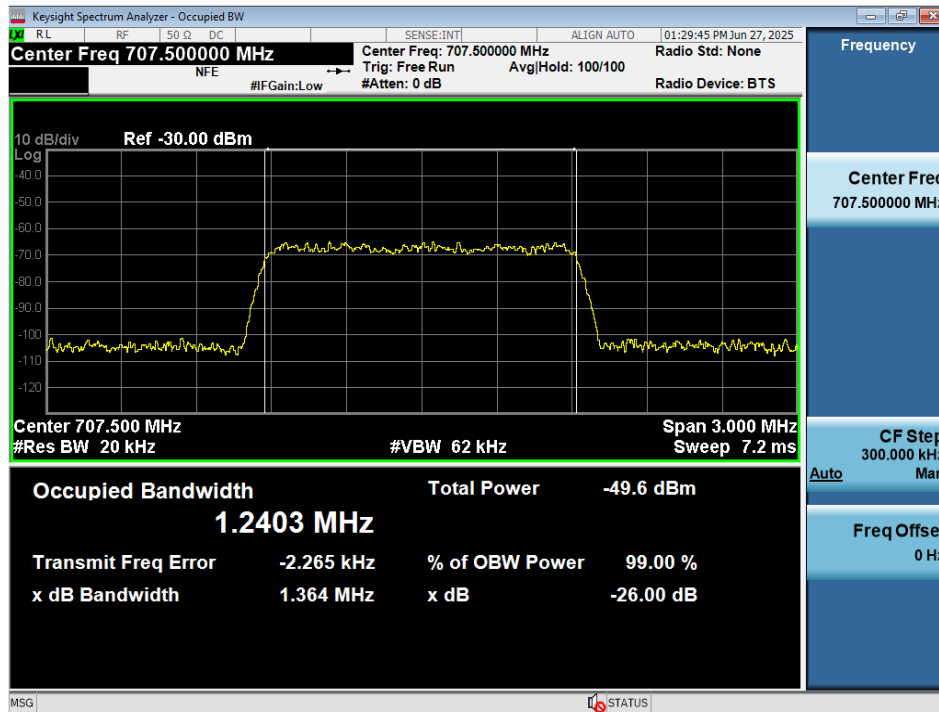
Occupied Bandwidth / Lower 700 MHz / Uplink / GSM / Input / ANT 3



Occupied Bandwidth / Lower 700 MHz / Uplink / GSM / Output / ANT 3



Occupied Bandwidth / Lower 700 MHz / Uplink / CDMA / Input / ANT 3



Occupied Bandwidth / Lower 700 MHz / Uplink / CDMA / Output / ANT 3

