



SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

EMC-ARF-04 Rev 1.1

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FCC ID: 2AYTR-A01

Appendix -

Test Data and Result for report

GZCR221100149602



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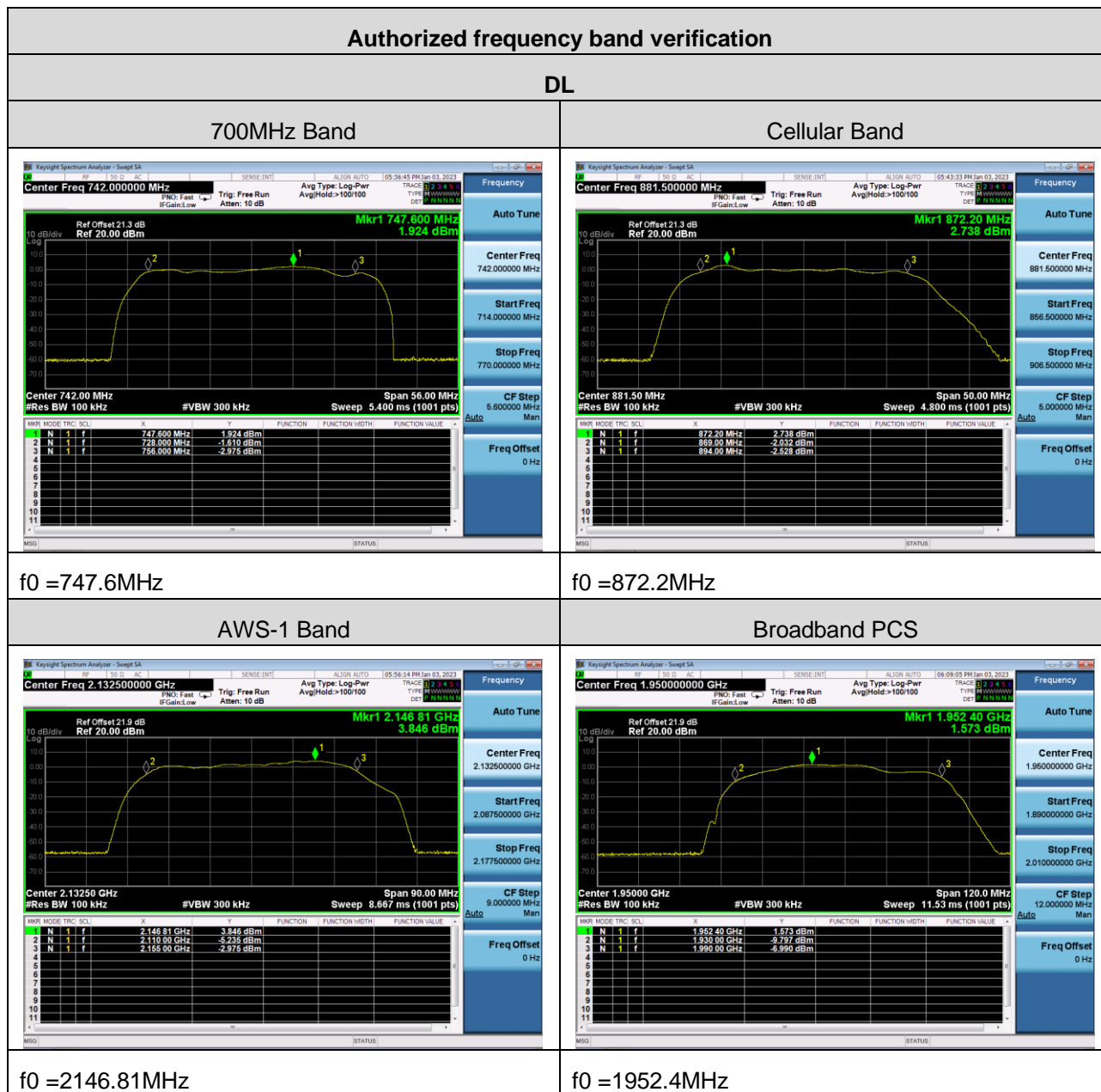
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1 Authorized frequency band verification



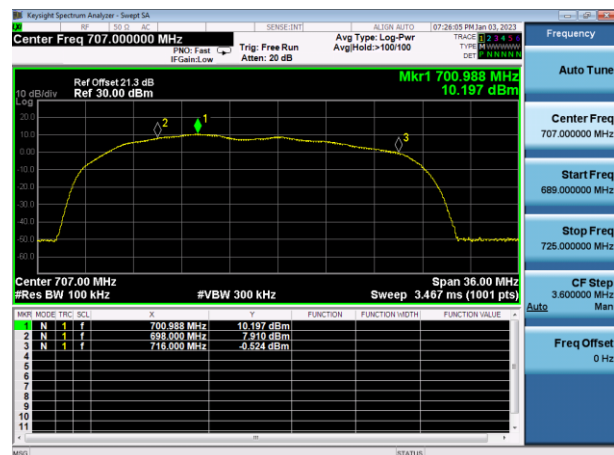
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Authorized frequency band verification

UL

Lower 700MHz Band



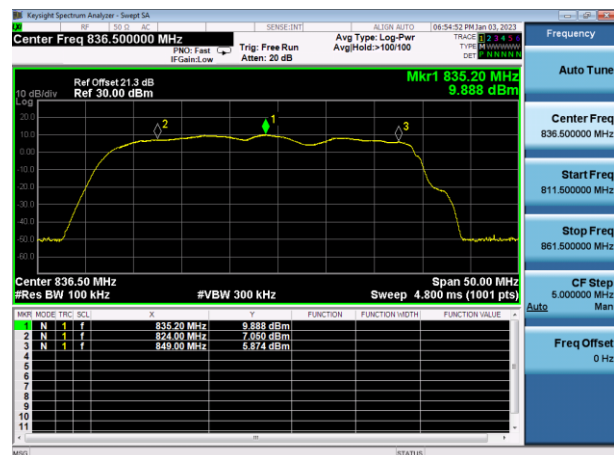
f0 = 700.988MHz

Upper 700MHz Band



f0 = 780.48MHz

Cellular Band



f0 = 835.20MHz

AWS-1 Band




f0 = 1723.77MHz



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Authorized frequency band verification													
UL													
Broad PCS Band	/												
 <table><tr><th>Marker</th><th>Freq (GHz)</th><th>Power (dBm)</th></tr><tr><td>1</td><td>1.867.00</td><td>10.538</td></tr><tr><td>2</td><td>1.860.00</td><td>2.903</td></tr><tr><td>3</td><td>1.910.00</td><td>-5.680</td></tr></table>	Marker	Freq (GHz)	Power (dBm)	1	1.867.00	10.538	2	1.860.00	2.903	3	1.910.00	-5.680	/
Marker	Freq (GHz)	Power (dBm)											
1	1.867.00	10.538											
2	1.860.00	2.903											
3	1.910.00	-5.680											
f0 =1867MHz	/												
<p>Remark:</p> <p>The frequency point f0 with the highest power level fall in the CMRS band under test with reset the spectrum analyser span to 2 × the width of the CMRS band under test and adjust the tuned frequency of the signal generator to sweep 2 × the width of the CMRS band using the sweep function. EUT is compiled the KDB 935210 D03 Signal Booster Measurements v04r04 Authorized frequency band verification test requirement.</p>													



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2 Maximum power

Maximum Output Power								
Path	Band	Signal Type	Input Signal Level (dBm)		Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
DL	700MHz	AWGN	Pre-AGC	-58.5	4.1	13.1	≤17	PASS
		GSM	Pre-AGC	-56.0	6.7	15.7		PASS
	Cellular	AWGN	Pre-AGC	-58.0	5.8	14.8		PASS
		GSM	Pre-AGC	-56.5	7.6	16.6		PASS
	AWS-1	AWGN	Pre-AGC	-66.0	4.9	13.9		PASS
		GSM	Pre-AGC	-63.5	7.1	16.1		PASS
	Broadband PCS	AWGN	Pre-AGC	-65.0	5.5	14.5		PASS
		GSM	Pre-AGC	-63.5	7.3	16.3		PASS
UL	Lower 700MHz	AWGN	Pre-AGC	-44.5	18.1	27.1	Lower:17 Upper:30	PASS
		GSM	Pre-AGC	-42.5	20.4	29.4		PASS
	Upper 700MHz	AWGN	Pre-AGC	-46.5	17.3	26.3		PASS
		GSM	Pre-AGC	-44.0	19.6	28.6		PASS
	Cellular	AWGN	Pre-AGC	-46.5	17.2	26.2		PASS
		GSM	Pre-AGC	-43.5	20.1	29.1		PASS
	AWS-1	AWGN	Pre-AGC	-53.5	17.3	26.3		PASS
		GSM	Pre-AGC	-51.0	19.8	28.8		PASS
	Broadband PCS	AWGN	Pre-AGC	-53.5	17.3	26.3		PASS
		GSM	Pre-AGC	-50.5	20.4	29.4		PASS

Remark:

1. The test frequency f_0 was determined in Authorized frequency band verification test in this report.
2. EIRP = Conducted Output Power + Antenna Gain – Cable loss, according to the declaration from the manufacturer, the maximum antenna gain is 10dBi and the minimum cable loss is 1dB.



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Maximum transmitter test input levels					
Path	Band	Signal Type	Input Power (dBm)	Conducted output power (dBm)	Verdict
DL	700MHz	AWGN	-29.5	3.8	PASS
		GSM	-28.5	6.1	PASS
	Cellular	AWGN	-28.0	5.1	PASS
		GSM	-27.5	7.0	PASS
	AWS-1	AWGN	-38.0	4.3	PASS
		GSM	-34.5	6.6	PASS
	Broadband PCS	AWGN	-36.5	5.4	PASS
		GSM	-35.0	7.5	PASS
UL	Lower 700MHz	AWGN	-15.5	17.5	PASS
		GSM	-14.0	19.0	PASS
	Upper 700MHz	AWGN	-18.0	17.7	PASS
		GSM	-16.0	20.3	PASS
	Cellular	AWGN	-19.0	16.6	PASS
		GSM	-16.5	19.7	PASS
	AWS-1	AWGN	-27.0	15.3	PASS
		GSM	-22.5	18.9	PASS
	Broadband PCS	AWGN	-26.5	16.6	PASS
		GSM	-23.0	19.7	PASS

Remark:

1. For downlink, the EUT went into shutdown mode at the maximum input level (-20dBm) indicated in 5.5 of KDB 935210 D03. The test data presented on the table is at an input level 1dB less than that found to cause the shutdown, where the input power is much greater than 10dB above AGC.
2. For uplink, the EUT went into shutdown mode at the maximum input level (0dBm) indicated in 5.5 of KDB 935210 D03. The test data presented on the table is at an input level 1dB less than that found to cause the shutdown, where the input power is much greater than 10dB above AGC.



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3 Maximum booster gain computation

Maximum Gain								
Path	Band	Signal Type	Input Signal Level (dBm)		Conducted Output Power (dBm)	Gain (dB)	Limit (dB)	Verdict
DL	700MHz	AWGN	Pre-AGC	-58.5	4.1	62.6	≤63.49	PASS
		GSM	Pre-AGC	-56.0	6.7	62.7		PASS
	Cellular	AWGN	Pre-AGC	-58.0	5.8	63.8	≤64.95	PASS
		GSM	Pre-AGC	-56.5	7.6	64.1		PASS
	AWS-1	AWGN	Pre-AGC	-66.0	4.9	70.9	≤71.27	PASS
		GSM	Pre-AGC	-63.5	7.1	70.6		PASS
	Broadband PCS	AWGN	Pre-AGC	-65.0	5.5	70.5	≤71.98	PASS
		GSM	Pre-AGC	-63.5	7.3	70.8		PASS
UL	Lower 700MHz	AWGN	Pre-AGC	-44.5	18.1	62.6	≤63.49	PASS
		GSM	Pre-AGC	-42.5	20.4	62.9		PASS
	Upper 700MHz	AWGN	Pre-AGC	-46.5	17.3	63.8	≤64.36	PASS
		GSM	Pre-AGC	-44.0	19.6	63.6		PASS
	Cellular	AWGN	Pre-AGC	-46.5	17.2	63.7	≤64.95	PASS
		GSM	Pre-AGC	-43.5	20.1	63.6		PASS
	AWS-1	AWGN	Pre-AGC	-53.5	17.3	70.8	≤71.27	PASS
		GSM	Pre-AGC	-51.0	19.8	70.8		PASS
	Broadband PCS	AWGN	Pre-AGC	-53.5	17.3	70.8	≤71.98	PASS
		GSM	Pre-AGC	-50.5	20.4	70.9		PASS



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Equivalent Uplink and Downlink Gain						
Band	Signal Type	Uplink Gain (dB)	Downlink Gain (dB)	UL vs DL Gain (dB)	Limit (dB)	Verdict
Lower 700MHz	AWGN	62.6	62.6	0.0	≤9	PASS
	GSM	62.9	62.7	0.2		PASS
Upper 700MHz	AWGN	63.8	62.6	1.2		PASS
	GSM	63.6	62.7	0.9		PASS
Cellular	AWGN	63.7	63.8	0.1		PASS
	GSM	63.6	64.1	0.5		PASS
AWS-1	AWGN	70.8	70.9	0.1		PASS
	GSM	70.8	70.6	0.2		PASS
Broadband PCS	AWGN	70.8	70.5	0.3		PASS
	GSM	70.9	70.8	0.1		PASS



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4 Intermodulation product

Intermodulation product						
Path	Band	Input Signal		Worst Test Level (dBm)	Limit (dBm)	Verdict
DL	700MHz	two CW signals	Pre-AGC	-31.58	≤-19	PASS
			10dB above AGC	-31.25		PASS
	Cellular	two CW signals	Pre-AGC	-35.20	≤-19	PASS
			10dB above AGC	-35.22		PASS
	AWS-1	two CW signals	Pre-AGC	-31.12	≤-19	PASS
			10dB above AGC	-30.62		PASS
	Broadband PCS	two CW signals	Pre-AGC	-36.36	≤-19	PASS
			10dB above AGC	-36.47		PASS
UL	Lower 700MHz	two CW signals	Pre-AGC	-22.17	≤-19	PASS
			10dB above AGC	-21.68		PASS
	Upper 700MHz	two CW signals	Pre-AGC	-26.28	≤-19	PASS
			10dB above AGC	-24.95		PASS
	Cellular	two CW signals	Pre-AGC	-31.34	≤-19	PASS
			10dB above AGC	-31.40		PASS
	AWS-1	two CW signals	Pre-AGC	-24.53	≤-19	PASS
			10dB above AGC	-24.29		PASS
	Broadband PCS	two CW signals	Pre-AGC	-31.66	≤-19	PASS
			10dB above AGC	-31.61		PASS



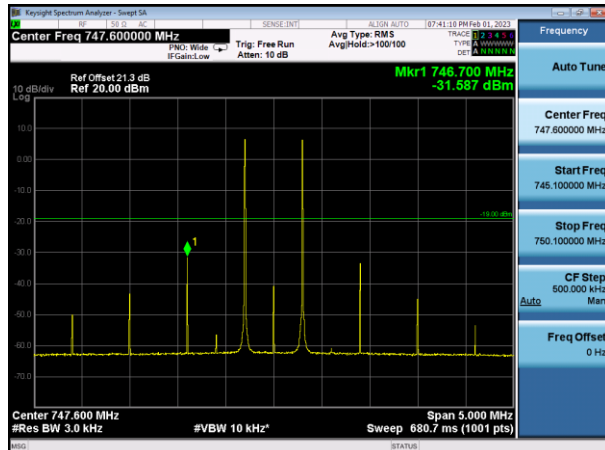
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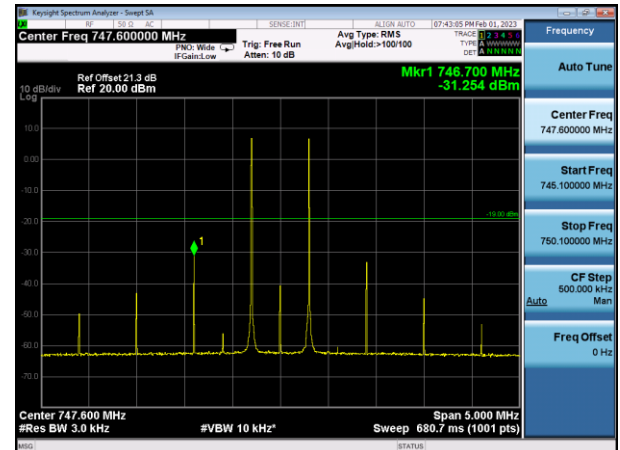
Intermodulation product

DL

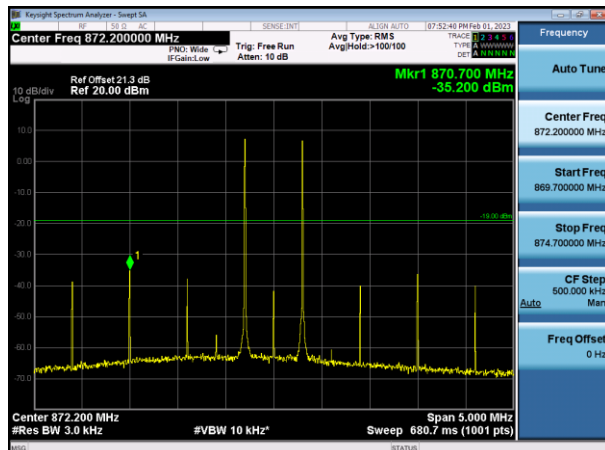
700MHz Band_Pre-AGC



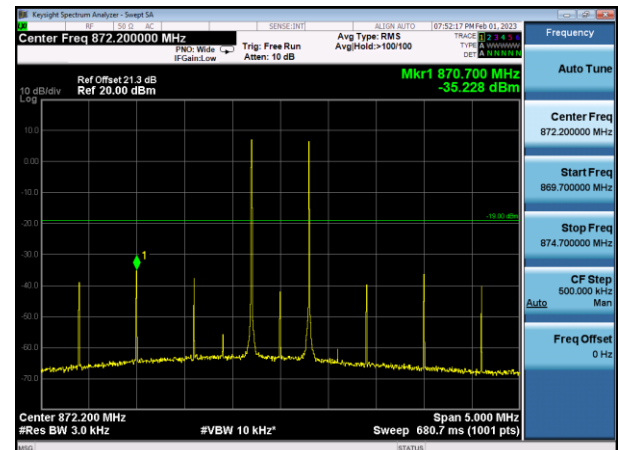
700MHz Band_10dB above AGC



Cellular Band_Pre-AGC



Cellular Band_10dB above AGC



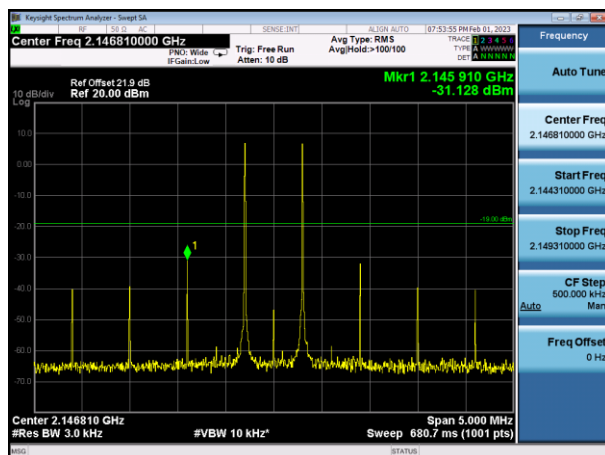
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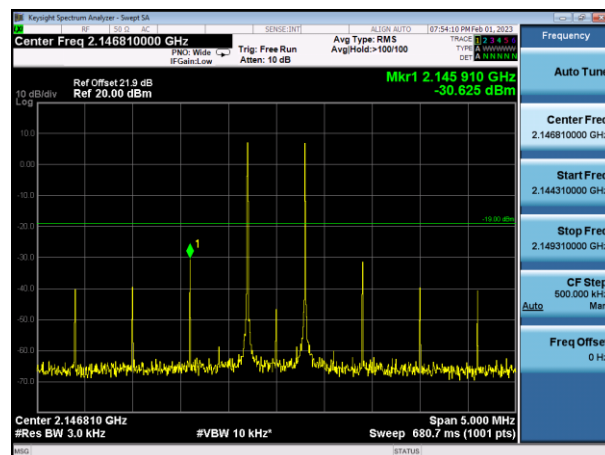
Intermodulation product

DL

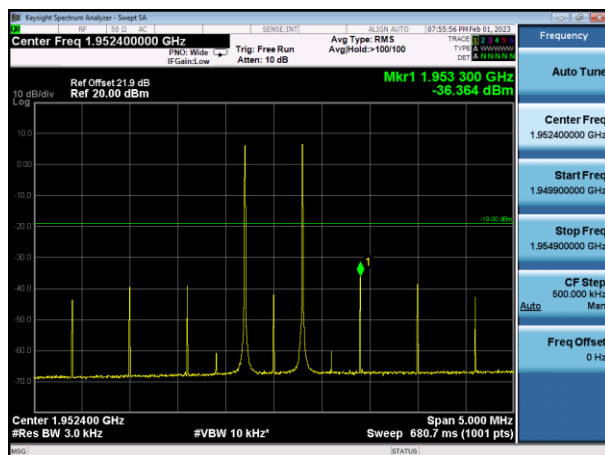
AWS-1_Pre-AGC



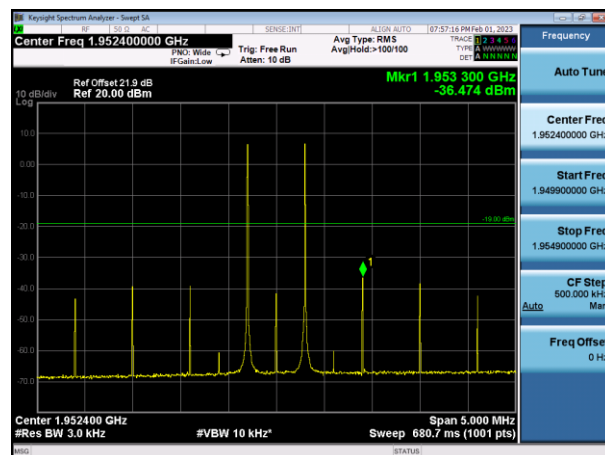
AWS-1_10dB above AGC



Broadband PCS_Pre-AGC



Broadband PCS_10dB above AGC



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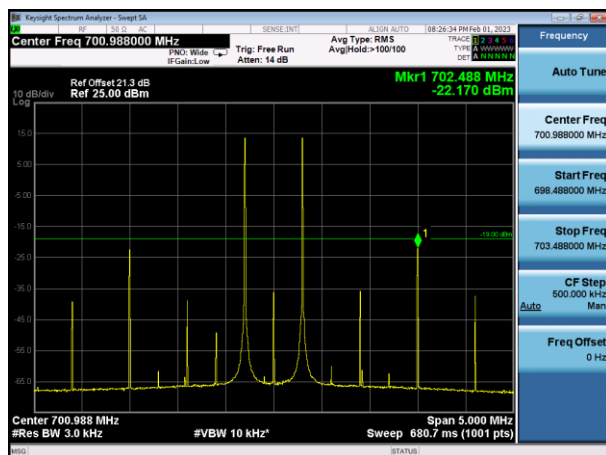
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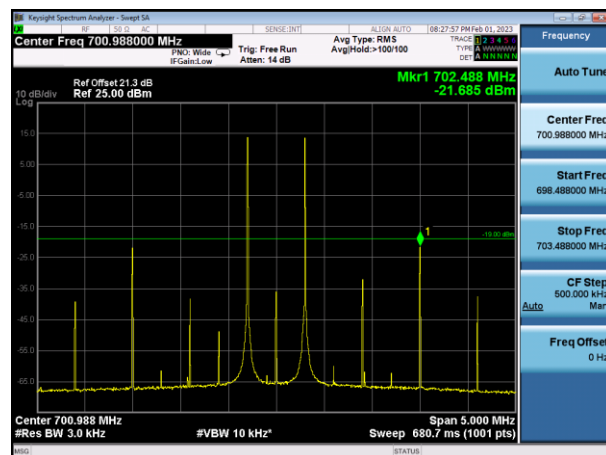
Intermodulation product

UL

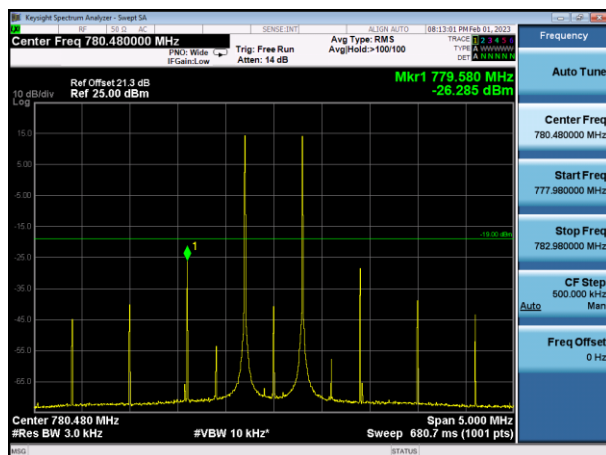
Lower 700MHz Band_Pre-AGC



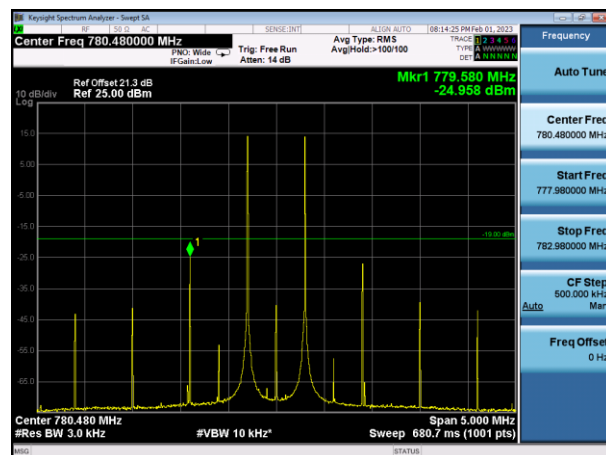
Lower 700MHz Band_10dB above AGC



Upper 700MHz Band_Pre-AGC



Upper 700MHz Band_10dB above AGC



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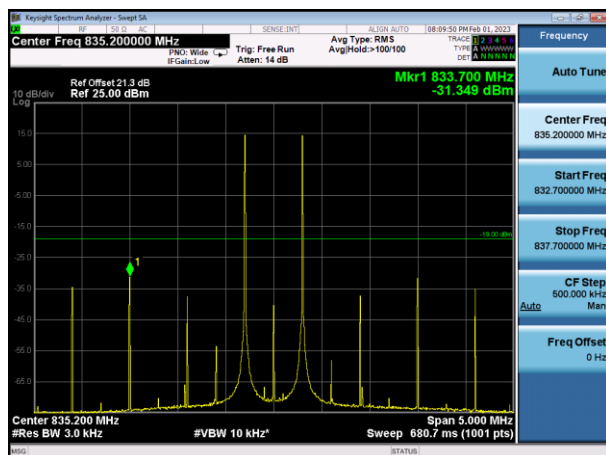
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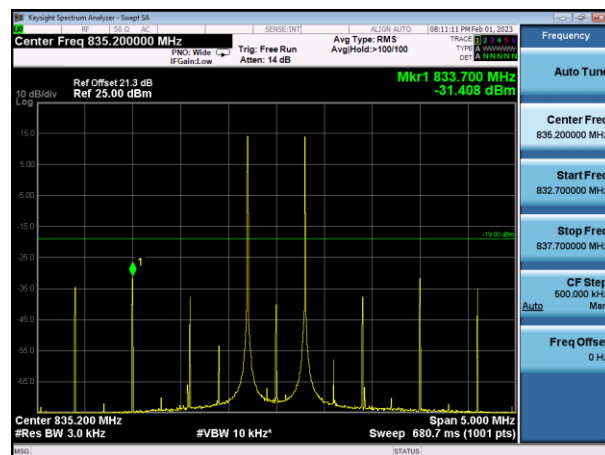
Intermodulation product

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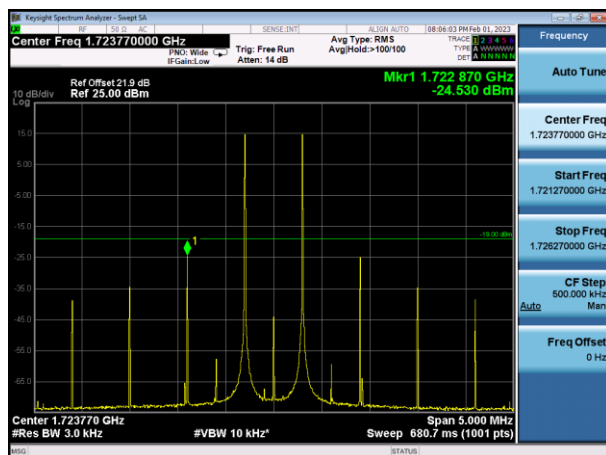
Cellular Band_Pre-AGC



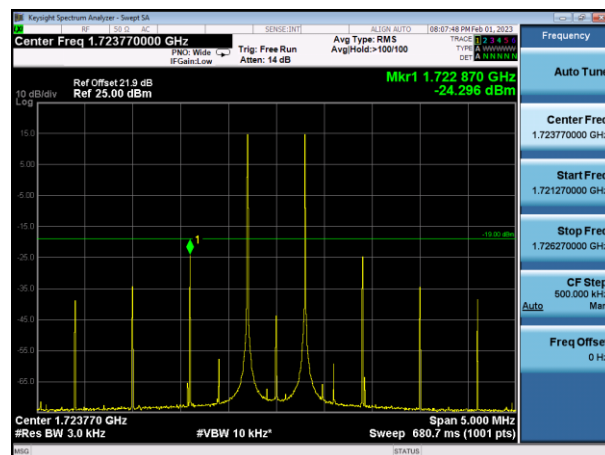
Cellular Band_10dB above AGC



AWS-1 Band_Pre-AGC

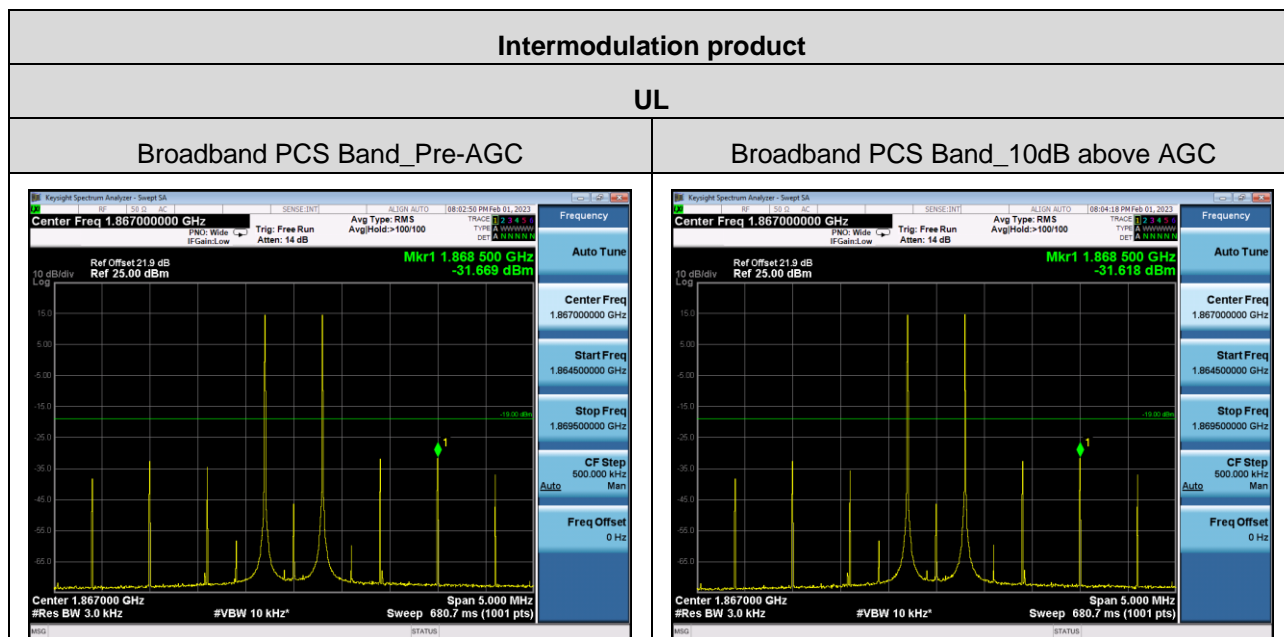


AWS-1 Band_10dB above AGC



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5 Out-of-band emissions

Out-of-band emissions							
Path	Band	Input Signal			Worst Test Level (dBm)	Limit (dBm)	Verdict
DL	700MHz	GSM	Lower Edge	Pre-AGC	-29.98	≤-19	PASS
				10dB above AGC	-30.62		PASS
			Upper Edge	Pre-AGC	-30.53		PASS
				10dB above AGC	-30.68		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-38.74	≤-19	PASS
				10dB above AGC	-38.69		PASS
			Upper Edge	Pre-AGC	-42.44		PASS
				10dB above AGC	-42.68		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-38.48	≤-19	PASS
				10dB above AGC	-38.02		PASS
			Upper Edge	Pre-AGC	-43.04		PASS
				10dB above AGC	-42.05		PASS
	Cellular	GSM	Lower Edge	Pre-AGC	-29.06	≤-19	PASS
				10dB above AGC	-29.25		PASS
			Upper Edge	Pre-AGC	-30.05		PASS
				10dB above AGC	-29.61		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-35.48	≤-19	PASS
				10dB above AGC	-34.25		PASS
			Upper Edge	Pre-AGC	-40.20		PASS
				10dB above AGC	-39.80		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-37.30	≤-19	PASS
				10dB above AGC	-36.35		PASS
			Upper Edge	Pre-AGC	-39.98		PASS
				10dB above AGC	-39.54		PASS



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Out-of-band emissions							
Path	Band	Input Signal			Worst Test Level (dBm)	Limit (dBm)	Verdict
DL	AWS-1	GSM	Lower Edge	Pre-AGC	-32.34	≤-29 ¹	PASS
				10dB above AGC	-32.75		PASS
			Upper Edge	Pre-AGC	-33.44		PASS
				10dB above AGC	-33.26		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-24.61	≤-19	PASS
				10dB above AGC	-25.42		PASS
			Upper Edge	Pre-AGC	-24.41		PASS
				10dB above AGC	-24.81		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-21.60	≤-19	PASS
				10dB above AGC	-22.14		PASS
			Upper Edge	Pre-AGC	-21.24		PASS
				10dB above AGC	-20.57		PASS
	Broadband PCS	GSM	Lower Edge	Pre-AGC	-32.75	≤-29 ¹	PASS
				10dB above AGC	-32.88		PASS
			Upper Edge	Pre-AGC	-33.34		PASS
				10dB above AGC	-33.32		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-26.93	≤-19	PASS
				10dB above AGC	-27.15		PASS
			Upper Edge	Pre-AGC	-24.67		PASS
				10dB above AGC	-24.13		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-24.83	≤-19	PASS
				10dB above AGC	-24.44		PASS
			Upper Edge	Pre-AGC	-22.83		PASS
				10dB above AGC	-23.54		PASS



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Out-of-band emissions							
Path	Band	Input Signal			Worst Test Level (dBm)	Limit (dBm)	Verdict
UL	Lower 700MHz	GSM	Lower Edge	Pre-AGC	-26.46	≤-19	PASS
				10dB above AGC	-26.71		PASS
			Upper Edge	Pre-AGC	-27.17		PASS
				10dB above AGC	-26.76		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-28.33	≤-19	PASS
				10dB above AGC	-27.96		PASS
			Upper Edge	Pre-AGC	-26.32		PASS
				10dB above AGC	-27.28		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-24.03	≤-19	PASS
				10dB above AGC	-24.39		PASS
			Upper Edge	Pre-AGC	-30.71		PASS
				10dB above AGC	-30.10		PASS
	Upper 700MHz	GSM	Lower Edge	Pre-AGC	-32.00	≤-19	PASS
				10dB above AGC	-31.84		PASS
			Upper Edge	Pre-AGC	-32.01		PASS
				10dB above AGC	-32.40		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-46.35	≤-19	PASS
				10dB above AGC	-47.20		PASS
			Upper Edge	Pre-AGC	-24.97		PASS
				10dB above AGC	-24.42		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-39.70	≤-19	PASS
				10dB above AGC	-39.95		PASS
			Upper Edge	Pre-AGC	-42.56		PASS
				10dB above AGC	-42.36		PASS



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Out-of-band emissions							
Path	Band	Input Signal			Worst Test Level (dBm)	Limit (dBm)	Verdict
UL	Cellular	GSM	Lower Edge	Pre-AGC	-30.03	≤-19	PASS
				10dB above AGC	-29.57		PASS
			Upper Edge	Pre-AGC	-30.65		PASS
				10dB above AGC	-29.87		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-29.82	≤-19	PASS
				10dB above AGC	-31.09		PASS
			Upper Edge	Pre-AGC	-27.59		PASS
				10dB above AGC	-28.18		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-41.23	≤-19	PASS
				10dB above AGC	-40.89		PASS
			Upper Edge	Pre-AGC	-40.11		PASS
				10dB above AGC	-39.96		PASS
	AWS-1	GSM	Lower Edge	Pre-AGC	-32.67	≤-29 ¹	PASS
				10dB above AGC	-32.32		PASS
			Upper Edge	Pre-AGC	-33.10		PASS
				10dB above AGC	-32.32		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-20.96	≤-19	PASS
				10dB above AGC	-20.04		PASS
			Upper Edge	Pre-AGC	-21.12		PASS
				10dB above AGC	-20.62		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-23.06	≤-19	PASS
				10dB above AGC	-22.69		PASS
			Upper Edge	Pre-AGC	-20.98		PASS
				10dB above AGC	-20.43		PASS



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Out-of-band emissions							
Path	Band	Input Signal			Worst Test Level (dBm)	Limit (dBm)	Verdict
UL	Broadband PCS	GSM	Lower Edge	Pre-AGC	-32.50	≤-29 ¹	PASS
				10dB above AGC	-32.28		PASS
			Upper Edge	Pre-AGC	-34.31		PASS
				10dB above AGC	-33.82		PASS
		1.25MHz AWGN	Lower Edge	Pre-AGC	-23.42	≤-19	PASS
				10dB above AGC	-22.72		PASS
			Upper Edge	Pre-AGC	-22.08		PASS
				10dB above AGC	-22.57		PASS
		4.1MHz AWGN	Lower Edge	Pre-AGC	-20.99	≤-19	PASS
				10dB above AGC	-21.58		PASS
			Upper Edge	Pre-AGC	-22.20		PASS
				10dB above AGC	-21.58		PASS

Remark:

¹ To improve measurement accuracy, sensitivity and efficiency, the measured RBW (= 100kHz) is different from the reference RBW (= 1MHz, stated in KDB 935210), the measured value shall be increased by $10\lg(1000/100) = 10\text{dB}$. The limit was calculated to show -29dBm to determine the test result conveniently.

² 20.21(e)(8)(i)(E) Out of Band Emission Limits:

Booster out of band emissions (OOBE) shall be at least 6 dB below the FCC's mobile emission limits for the supported bands of operation.

27.53(c)

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

So, the limit = $\{P - [43 + 10 \log(P)]\} - 6\text{dB} = -19\text{dBm}$

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

So, the limit = $\{P - [43 + 10 \log(P)]\} - 6\text{dB} = -19\text{dBm}$

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations.

So, the limit = $\{P - [76 + 10 \log(P)]\} - 6\text{dB} = -52\text{dBm}$



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27.53(g)

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB.

So, the limit = $\{P - [43 + 10 \log (P)]\} - 6\text{dB} = -19\text{dBm}$

27.53(h)

the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

So, the limit = $\{P - [43 + 10 \log (P)]\} - 6\text{dB} = -19\text{dBm}$

22.917

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

So, the limit = $\{P - [43 + 10 \log (P)]\} - 6\text{dB} = -19\text{dBm}$

24.238

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

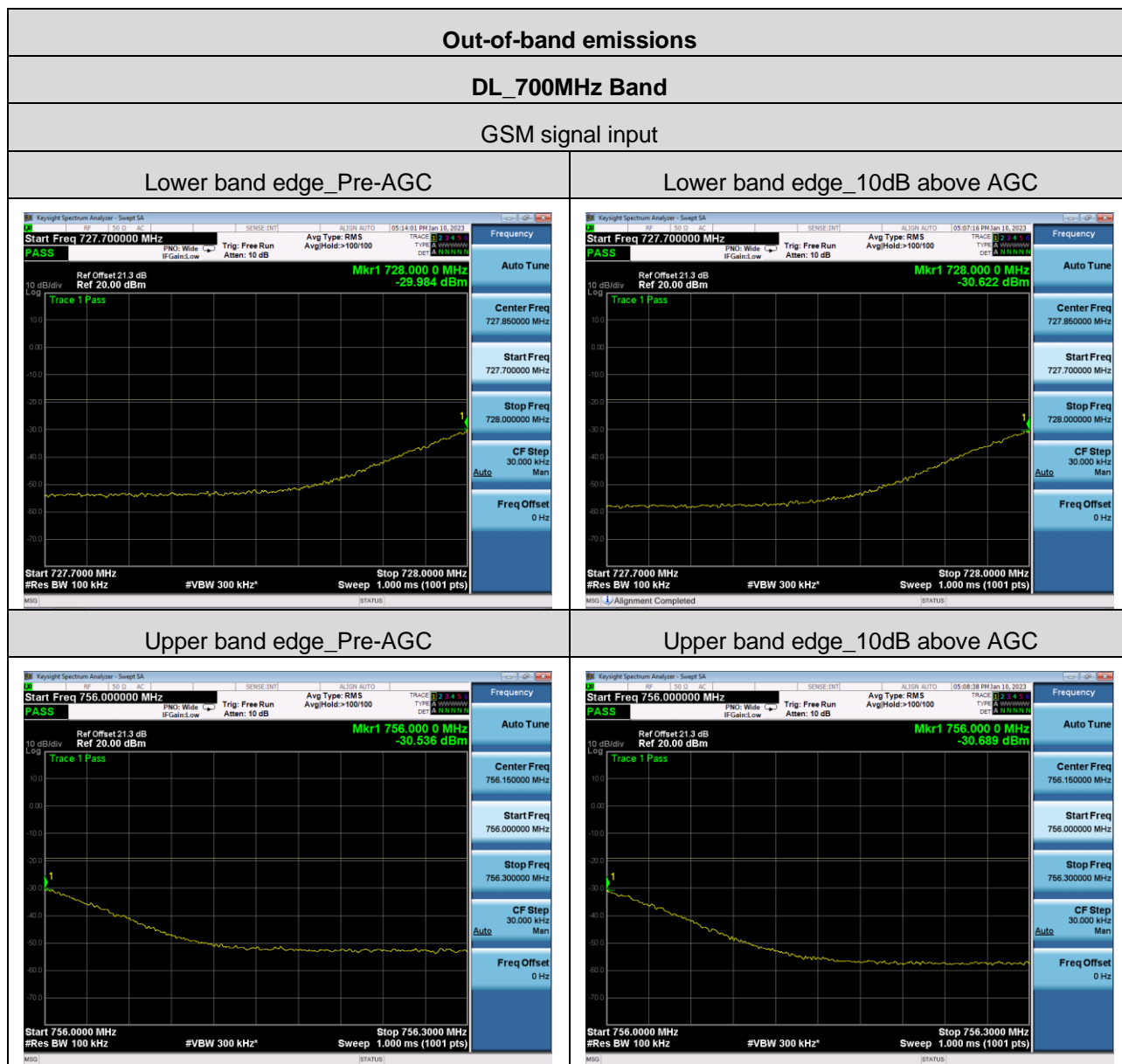
So, the limit = $\{P - [43 + 10 \log (P)]\} - 6\text{dB} = -19\text{dBm}$



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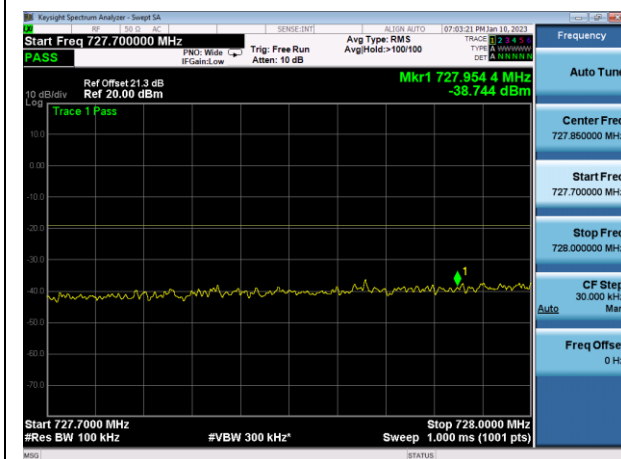
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Out-of-band emissions

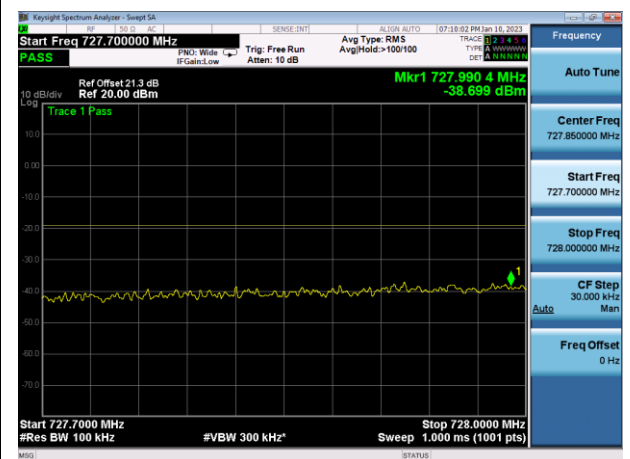
DL_700MHz Band

1.25MHz AWGN signal input

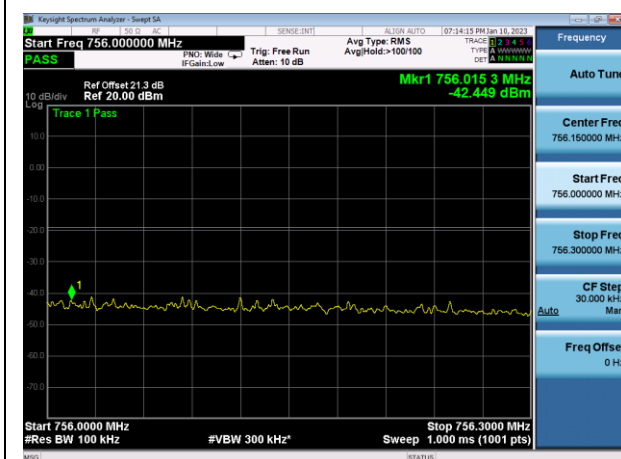
Lower band edge_Pre-AGC



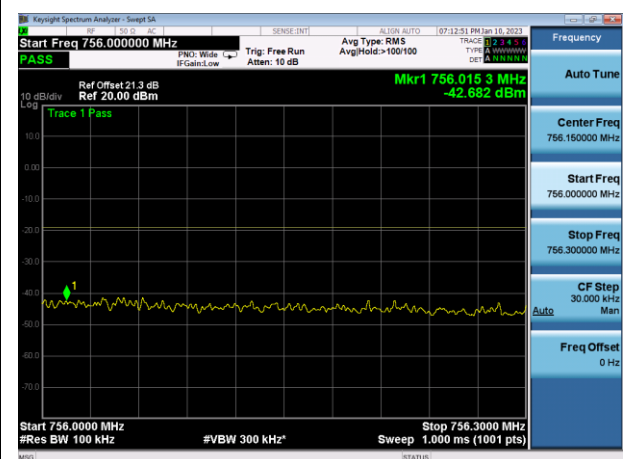
Lower band edge_10dB above AGC



Upper band edge_Pre-AGC



Upper band edge_10dB above AGC

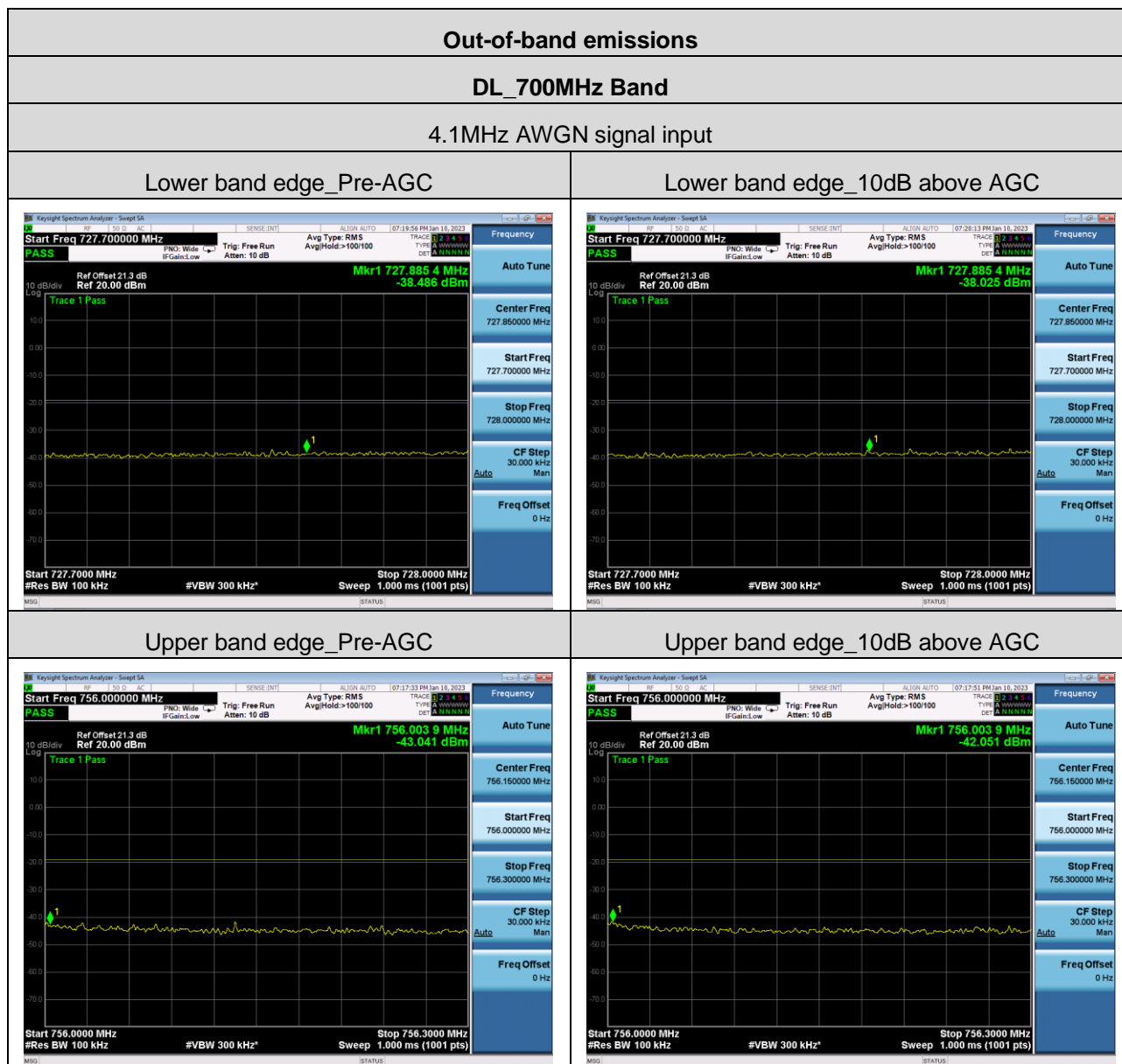


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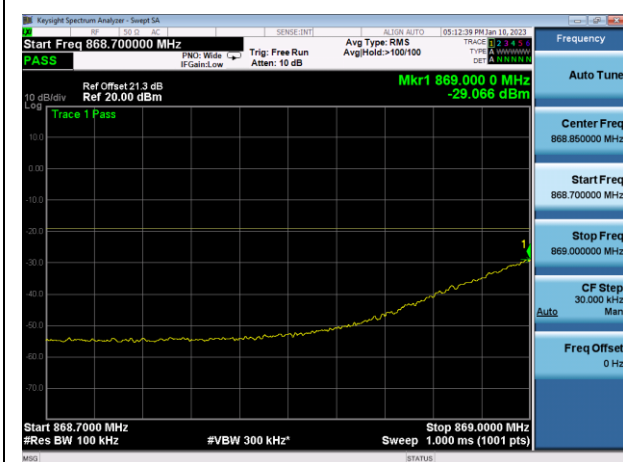
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Out-of-band emissions

DL_Cellular Band

GSM signal input

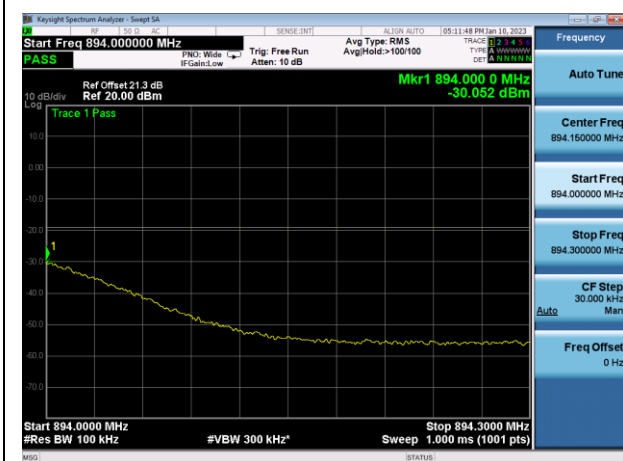
Lower band edge_Pre-AGC



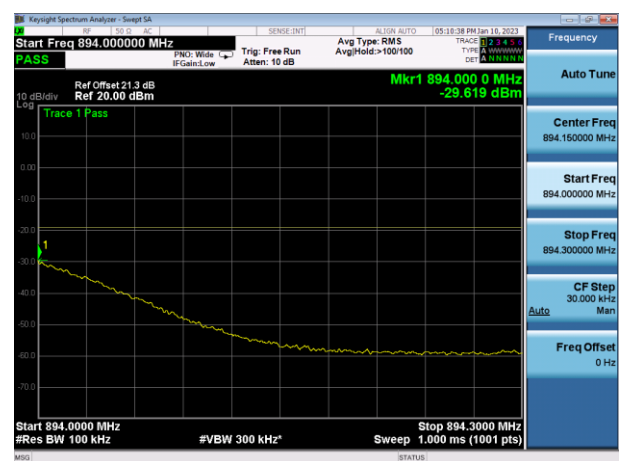
Lower band edge_10dB above AGC



Upper band edge_Pre-AGC



Upper band edge_10dB above AGC



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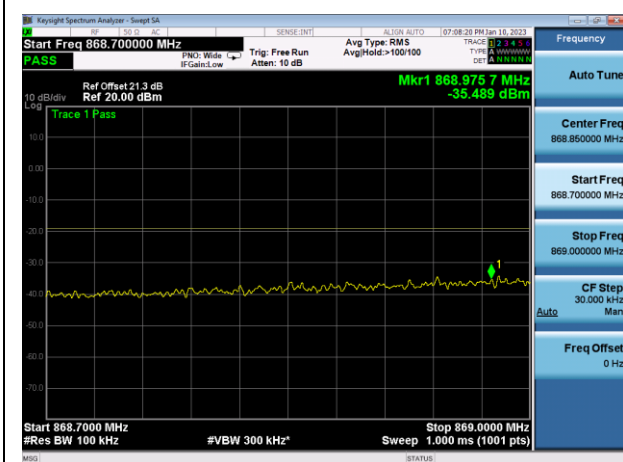
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Out-of-band emissions

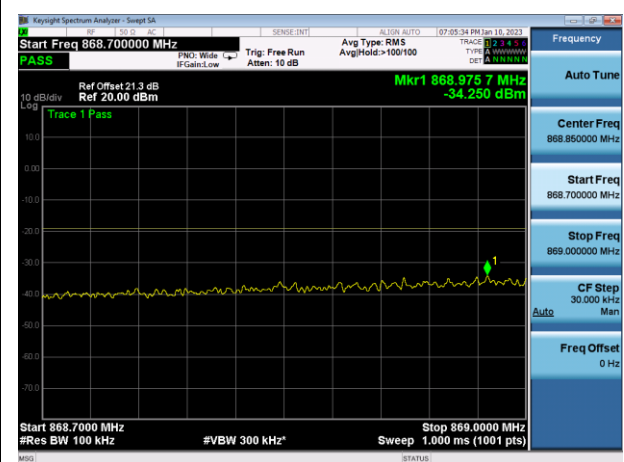
DL_Cellular Band

1.25MHz AWGN signal input

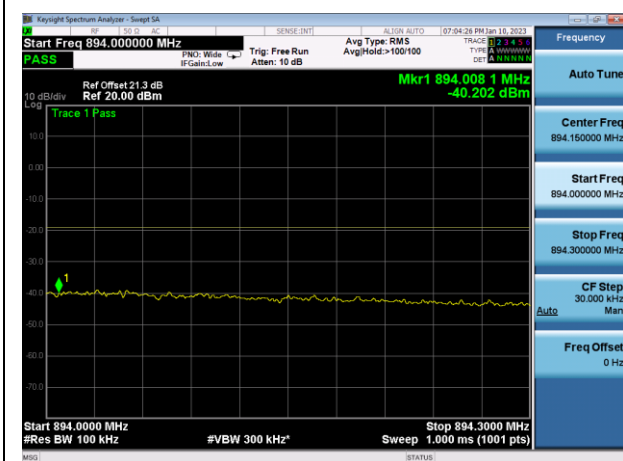
Lower band edge_Pre-AGC



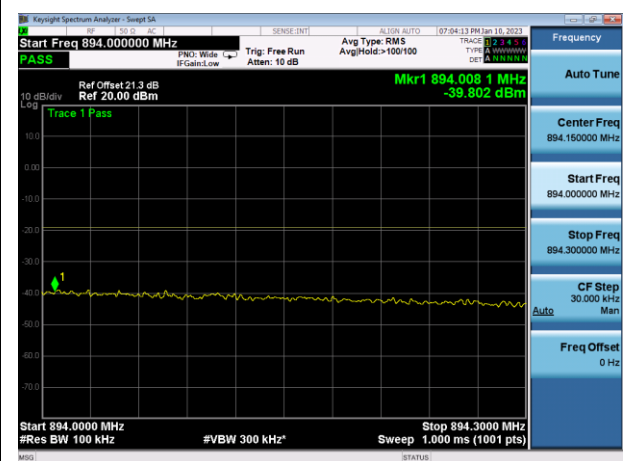
Lower band edge_10dB above AGC



Upper band edge_Pre-AGC



Upper band edge_10dB above AGC



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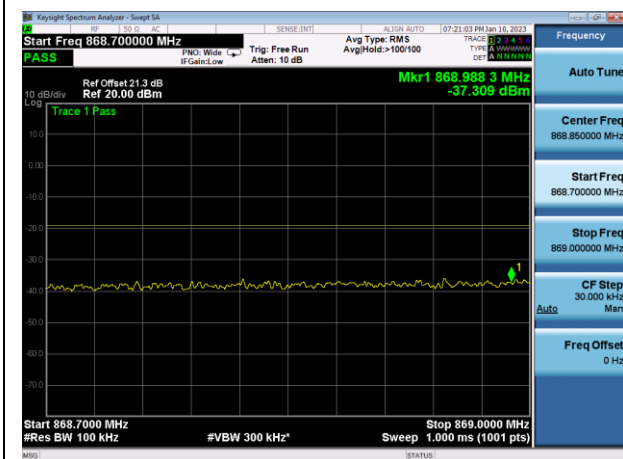
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Out-of-band emissions

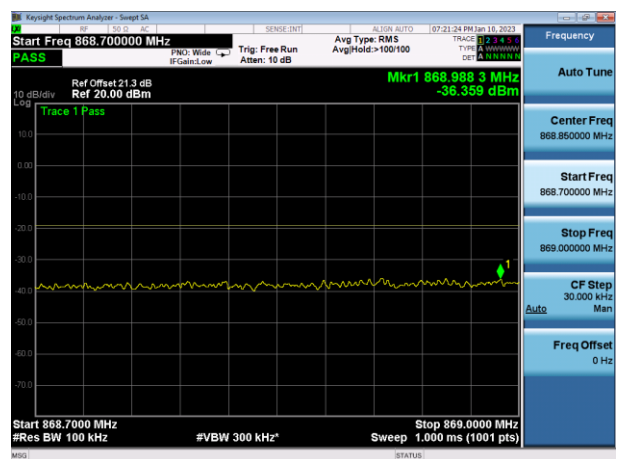
DL_Cellular Band

4.1MHz AWGN signal input

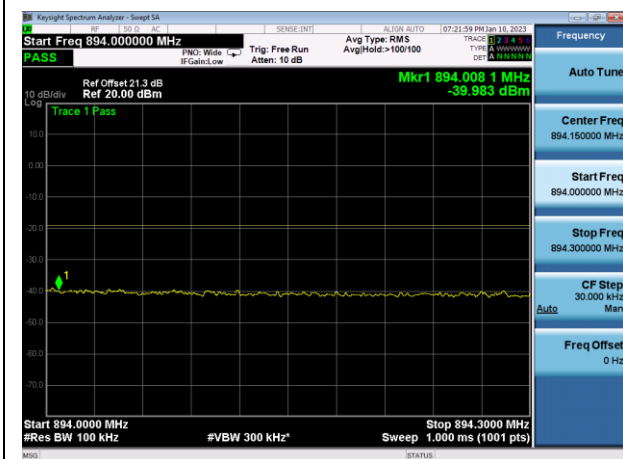
Lower band edge_Pre-AGC



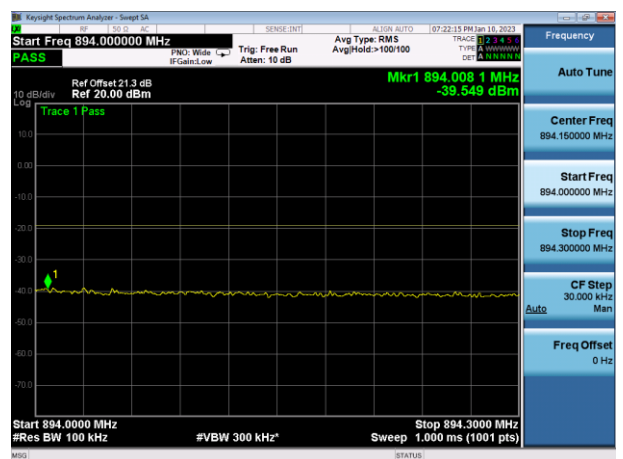
Lower band edge_10dB above AGC



Upper band edge_Pre-AGC



Upper band edge_10dB above AGC



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