



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

EMC-ARF-03 Rev 1.1

Page:

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FCC ID: OJFDHRU-G2-17

Appendix -

Test Data and Result for report

GZCR231100125702

(B)

(Supplement test data for 5G NR with 100 MHz AWGN signal)



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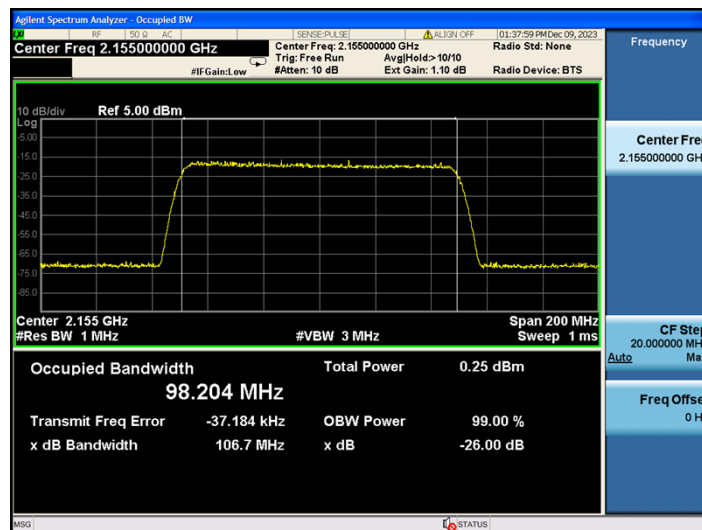
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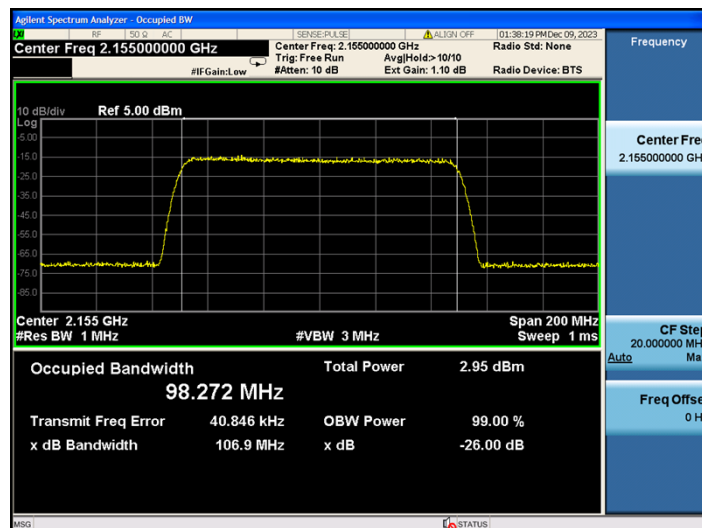
1 AWS-1 & AWS-3 & AWS-4 (only for downlink: 2110-2200MHz)

1.1 Input-versus-output signal comparison

Input_DL_1S_M_AWGN_Pre-AGC_OBW



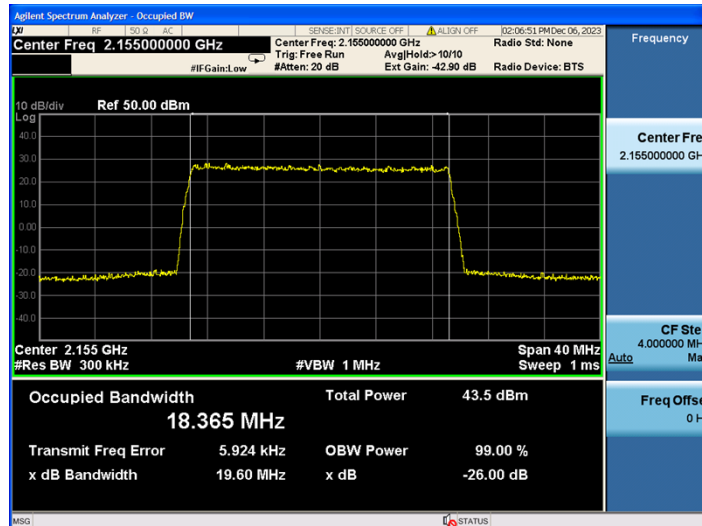
Input_DL_1S_M_AWGN_AGC+3dB_OBW



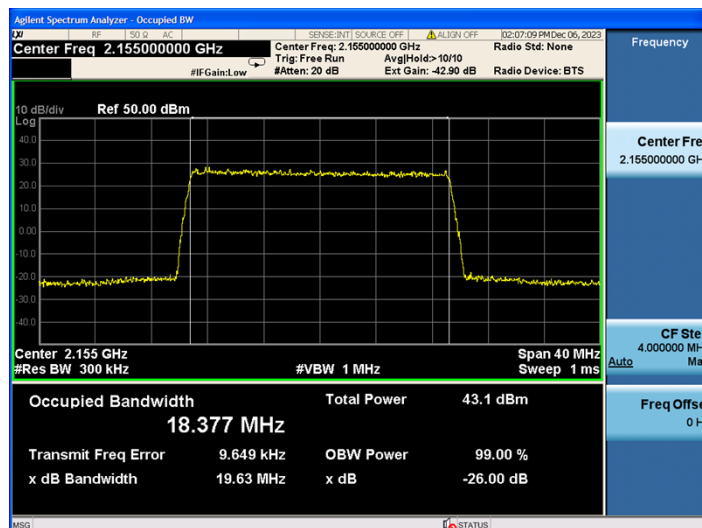
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Output_DL_1S_M_AWGN_Pre-AGC_OBW



Output_DL_1S_M_AWGN_AGC+3dB_OBW



Remark:

1. The band supports maximum channel BW is 20MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN as input signal.
2. Compare the spectral plot of the input signal to the output signal affirm that they are similar (in passband and roll off characteristic features and relative spectral locations). The test result complies with the requirement.



1.2 Mean output power and amplifier/booster gain

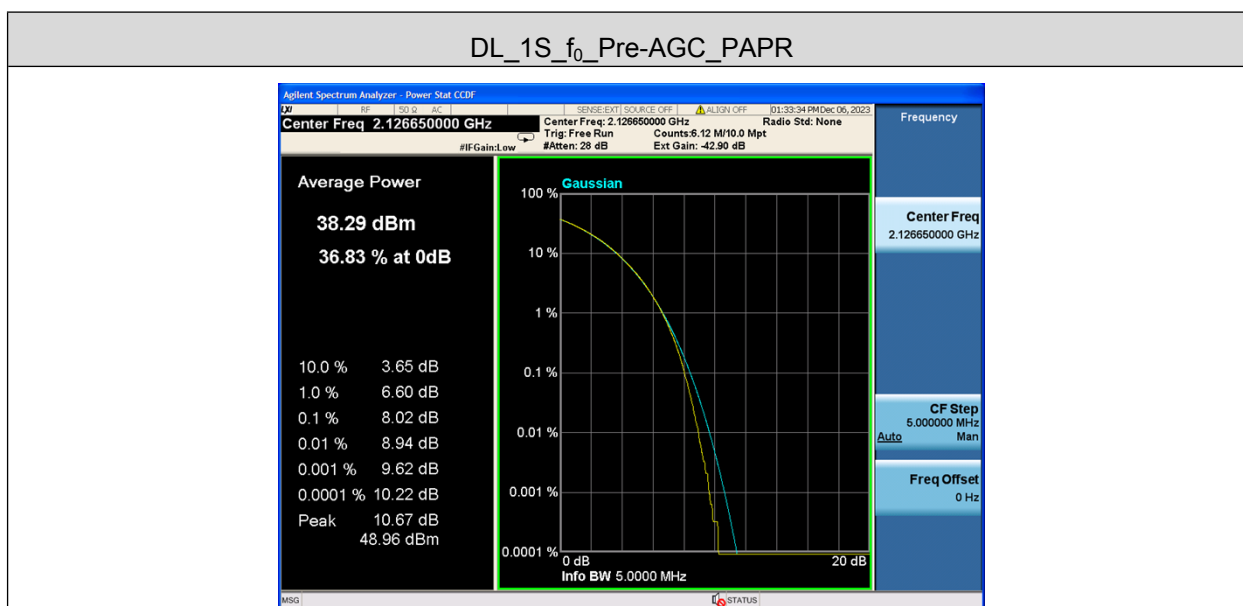
Test Conf.	Test Freq. f_0 (MHz)	Signal Level	Input Power (dBm)	Output Power (dBm)	Gain (dB)	Verdict
DL_1S_AWG N	2126.65	Pre-AGC	-6.00	38.33	42.33	PASS
		AGC+3dB	-3.00	38.10	/	PASS

Remark:

According to the declaration from the applicant, the single antenna gain should not exceed 12.5dBi, the Directional gain = $G_{ANT} + 10 \log (N_{ANT})$ dBi = 12.5dBi+10log (2) dBi= 15.5dBi.

The total maximum EIRP for the EUT is (38.33dBm+38.33dBm) +15.5dBi=56.84dBm (483.1W) which don't exceed the required EIRP limit (1640W/MHz).

Test Conf.	Test Freq. f_0 (MHz)	Signal Level	PAPR (dB)	Limit (dB)	Verdict
DL_1S_AWG N	2126.65	Pre-AGC	8.94	13	PASS



1.3 Out-of-band/out-of-block (including intermodulation) emissions and spurious emissions

Note: The tested max conducted power for single antenna port is 38.33dBm, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB

Here,

$P=38.33\text{dBm}=6.81\text{W}$.

So the limit =

$P(\text{dBm})-[43 + 10\log(6.81\text{W})] = -13\text{dBm}$

The EUT supports 2x2 MIMO and the emissions were measured at one of output port, so the limit line was set to -16.01dBm in following test plots in order to determine the test result conveniently.

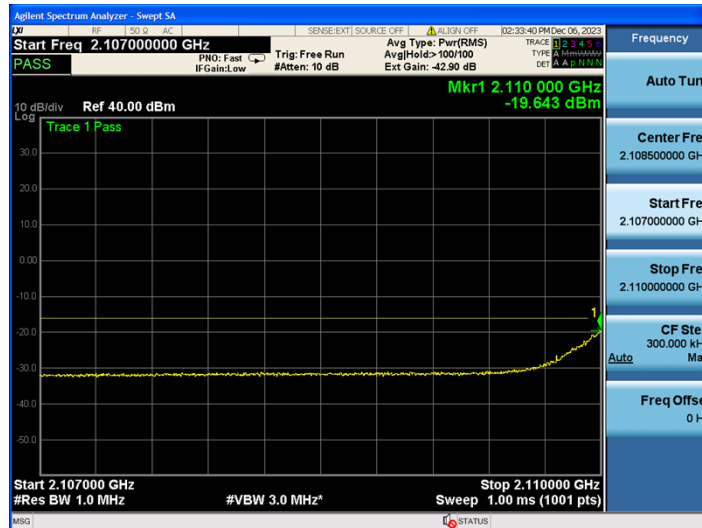
The spurious emissions from 9kHz to 30MHz was very low and 20dB below the limit, therefore, the data was not recorded in the report.



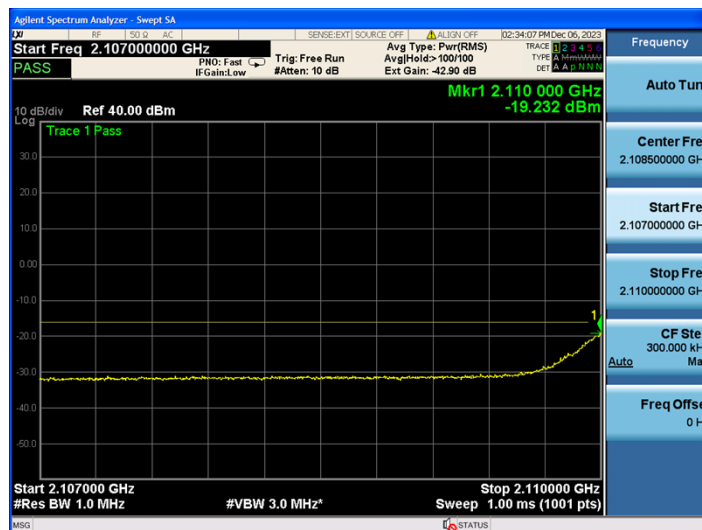
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DL_1S_B_AWGN_Pre-AGC_Out-of-band emission



DL_1S_B_AWGN_AGC+3_Out-of-band emission



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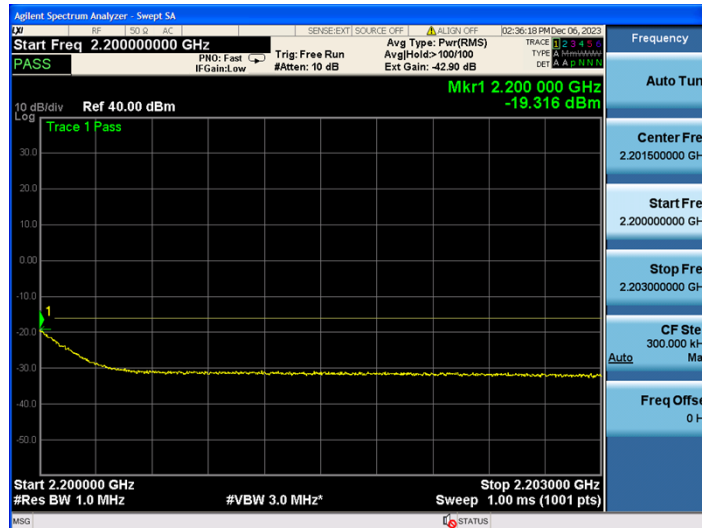
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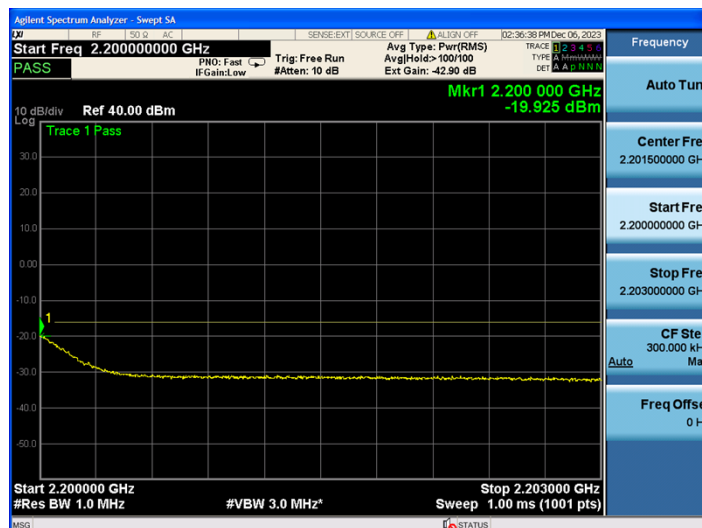
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DL_1S_T_AWGN_Pre-AGC_Out-of-band emission



DL_1S_T_AWGN_AGC+3_Out-of-band emission



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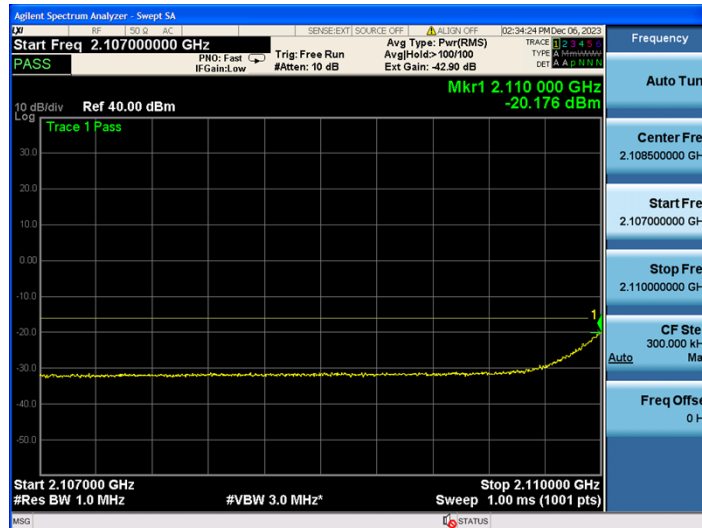
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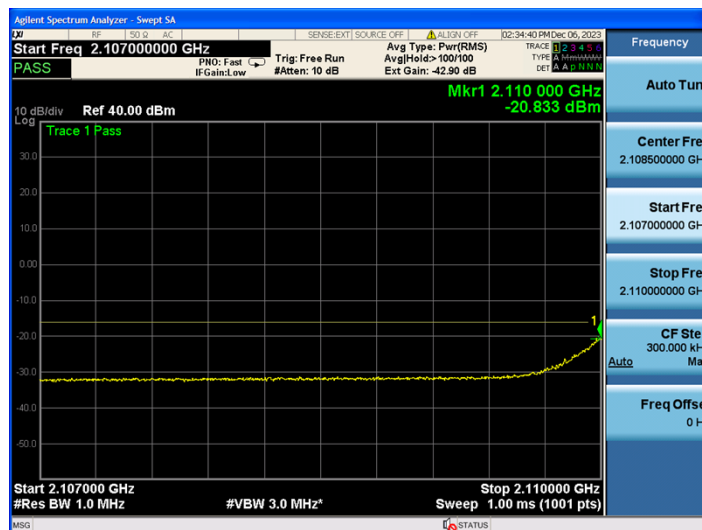
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DL_2S_B_AWGN_Pre-AGC_Out-of-band emission



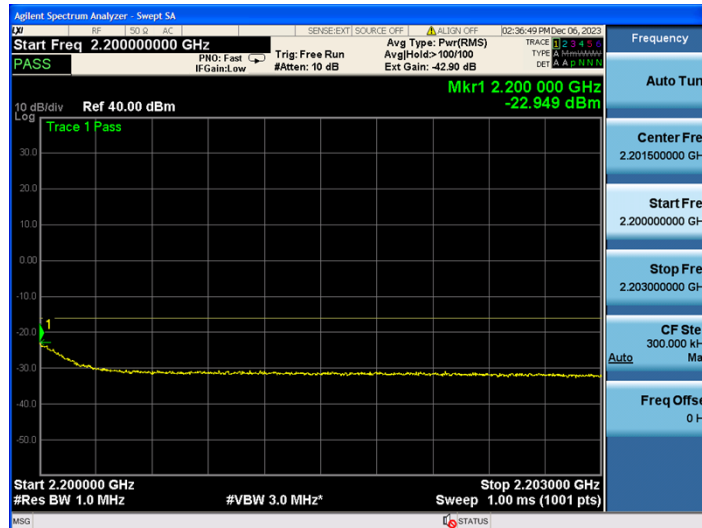
DL_2S_B_AWGN_AGC+3_Out-of-band emission



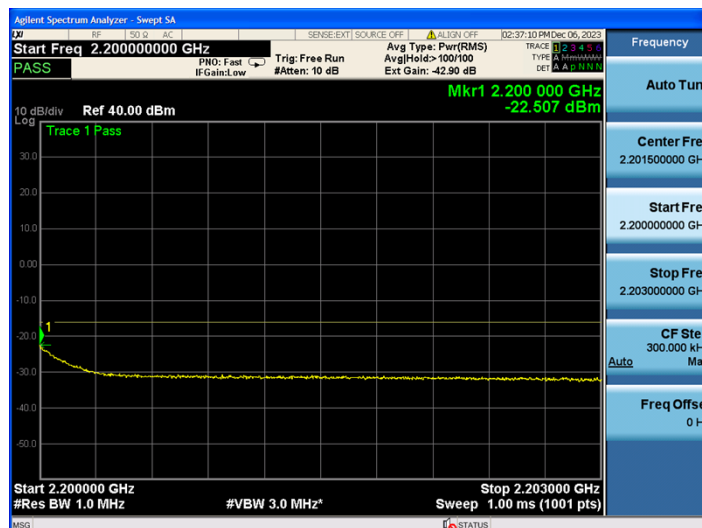
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DL_2S_T_AWGN_AGC+3_Out-of-band emission



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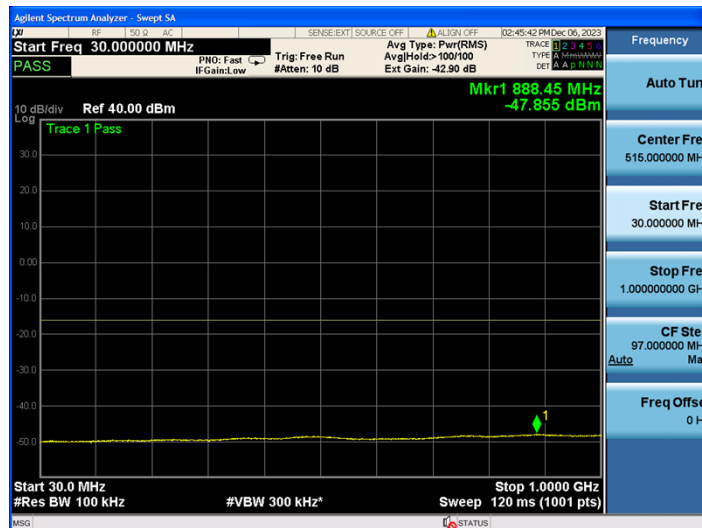
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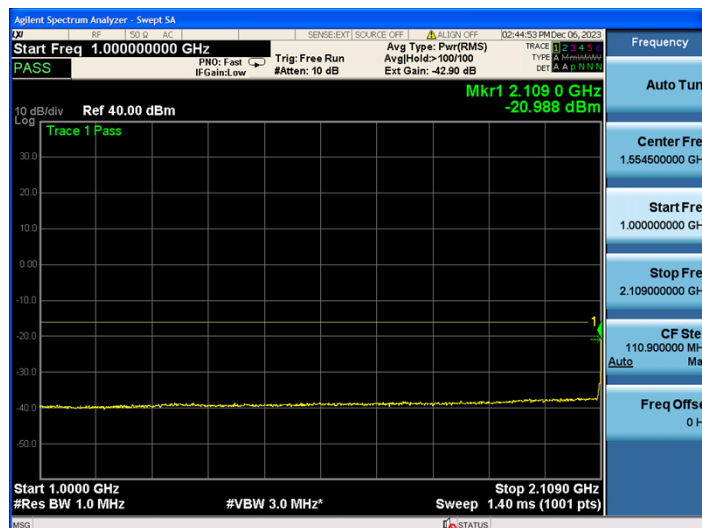
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DL_1S_B_AWGN_Pre-AGC_Spurious emission 2



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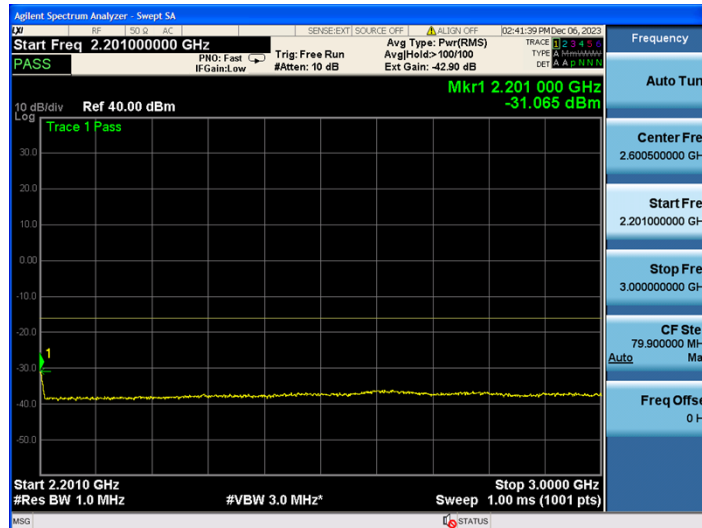
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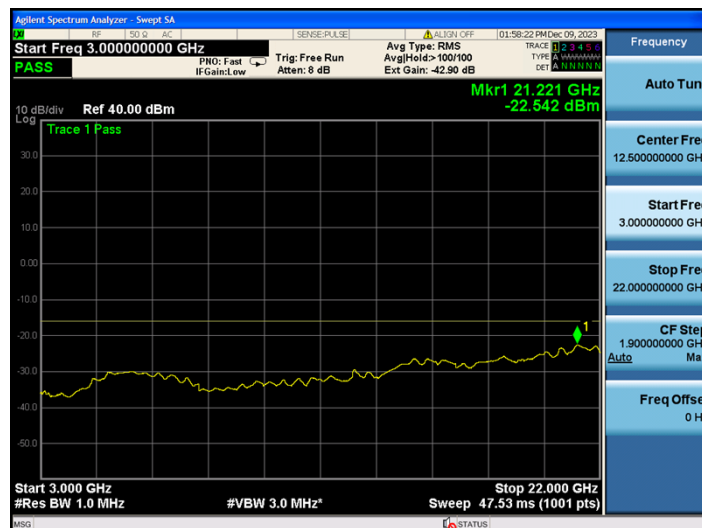
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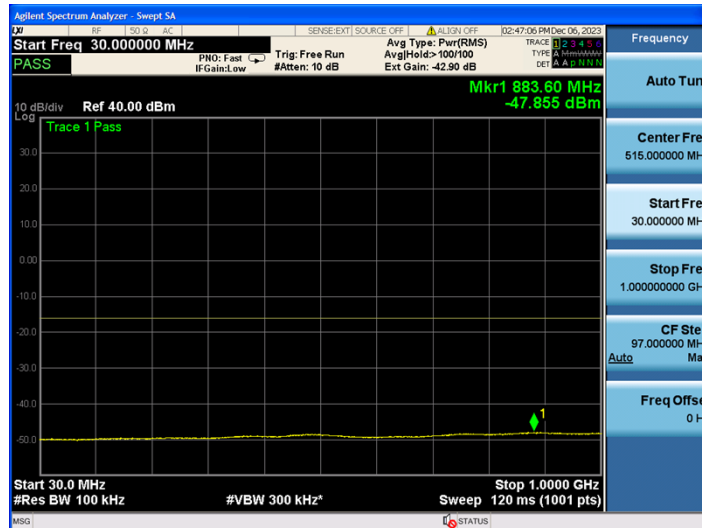
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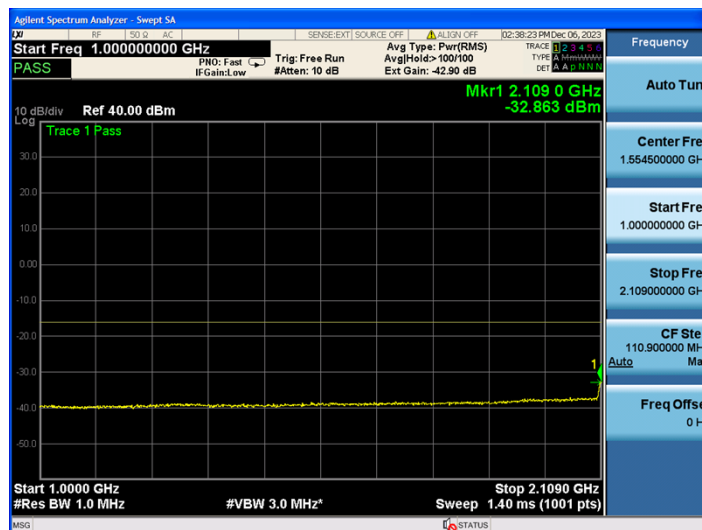
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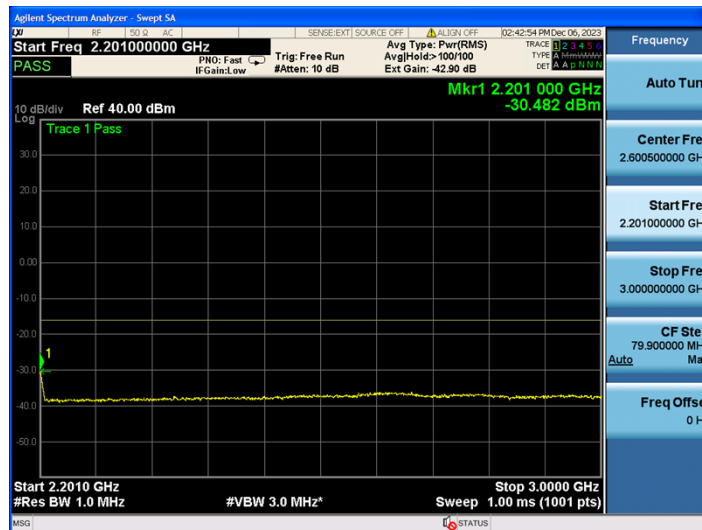
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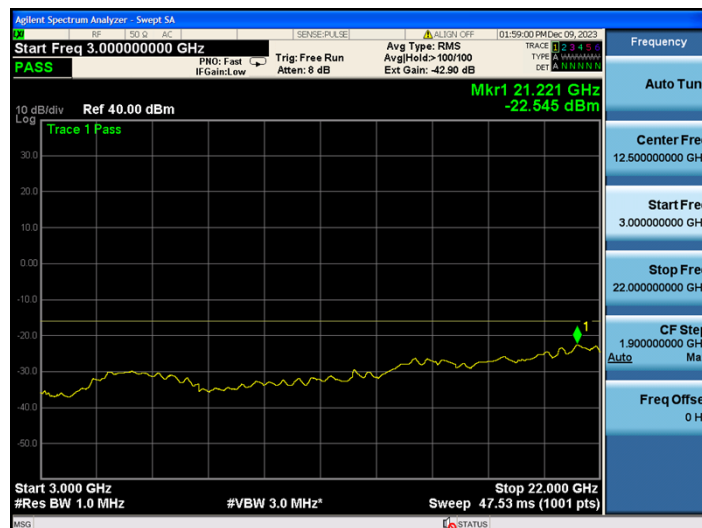
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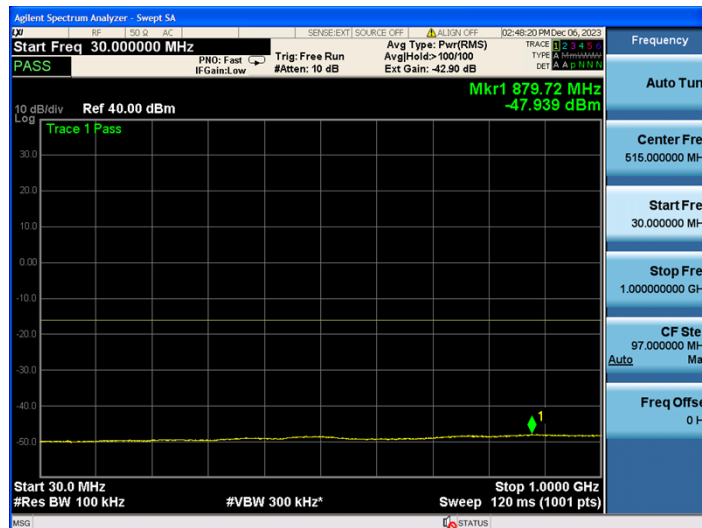
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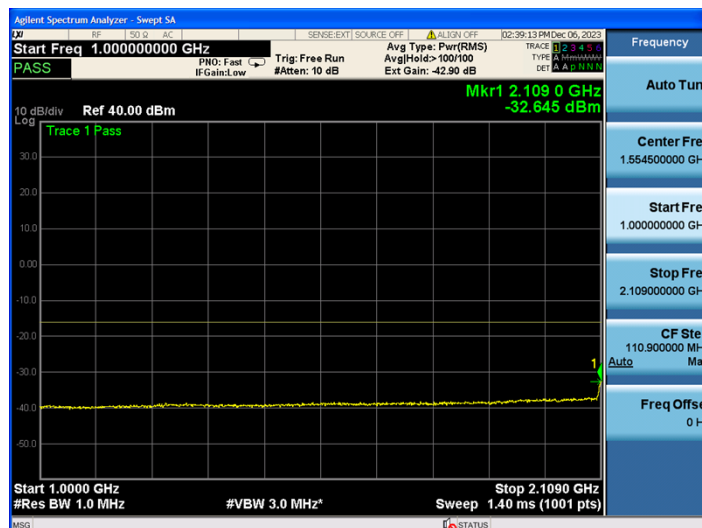
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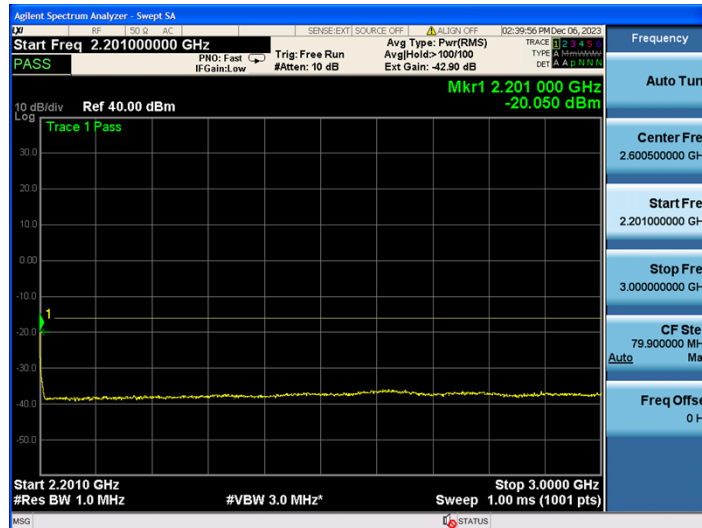
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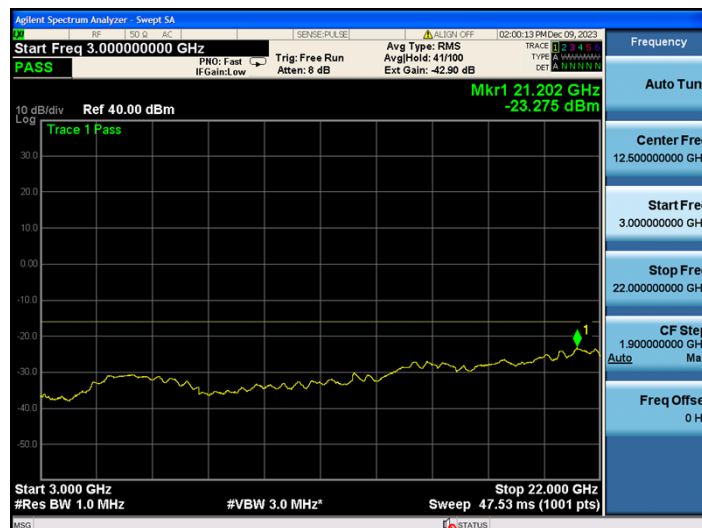
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SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

EMC-ARF-05 Rev 1.1

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1.4 Frequency Stability

- Note:
1. At 10 °C intervals of temperatures between -30 °C and +50 °C at the manufacturer's rated supply voltage, here the rated supply voltage is AC 110V.
 2. At +20 °C temperature and $\pm 15\%$ supply voltage variations. If a product is specified to operate over a range of input voltage, then the -15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.
 3. The frequency stabilities can be maintained within the authorized bands of operation. Meet the requirement.

Frequency stability vs temperature				
Temperature (°C)	Test Conf.	Frequency Error (Hz)	Tolerance (ppm)	Verdict
50	DL_1S_M_AWG N	85	0.0394	PASS
40		73	0.0339	PASS
30		60	0.0278	PASS
20		79	0.0367	PASS
10		81	0.0376	PASS
0		103	0.0478	PASS
-10		69	0.0320	PASS
-20		101	0.0469	PASS
-30		83	0.0385	PASS

Frequency stability vs voltage				
Voltage (V)	Test Conf.	Frequency Error (Hz)	Tolerance (ppm)	Verdict
AC 93.5	DL_1S_M_AWG N	79	0.0367	PASS
AC 110		79	0.0367	PASS
AC 126.5		79	0.0367	PASS



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1.5 Radiated spurious emissions

Note: 1. The tested max conducted power for single antenna port is 38.33dBm, the 2x2 MIMO total power is 38.33dBm+38.33dBm=13.62W, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB

Here,

$P=13.62W$

So the limit =

$P(\text{dBm}) - [43 + 10\log(13.62W)] = -13\text{dBm}$

In additional, for these AWS-4 operations in the 2180-2200 MHz band, the power of any emissions on all frequencies between 2200 and 2290 MHz shall not exceed an EIRP of $-100.6 \text{ dBW}/4 \text{ kHz} = -70.6 \text{ dBm}/4 \text{ kHz} = -46.6 \text{ dBm}/1 \text{ MHz}$

2. The radiated spurious emissions were performed at bottom / middle / top channel and only the worst-case middle channel test data was recorded in the report.

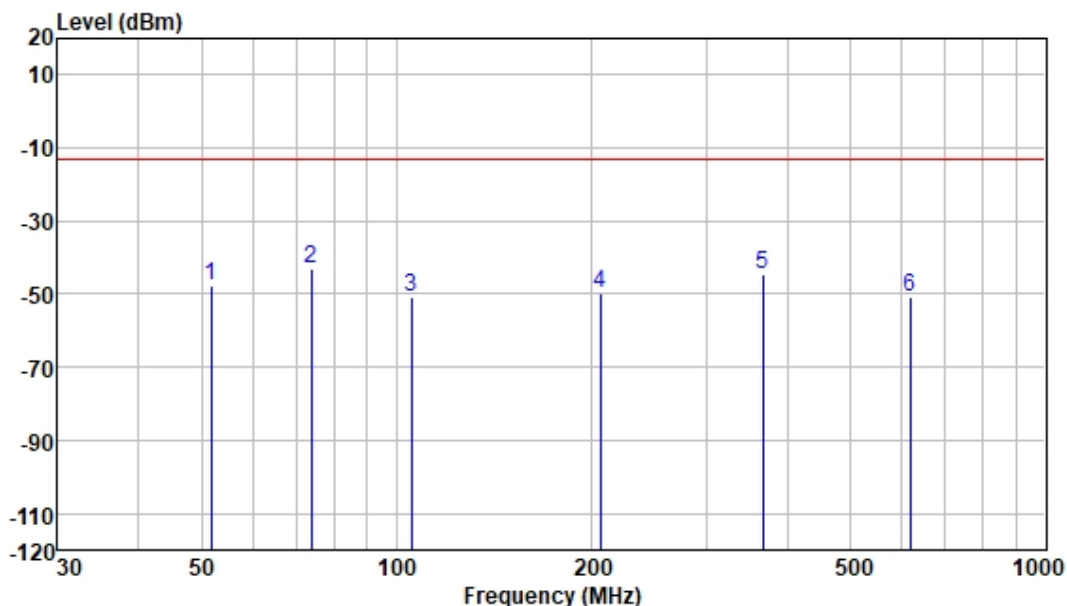
3. The disturbance from 9kHz to 30MHz was very low and 20db below the limit, therefore, the data was not recorded in the report.



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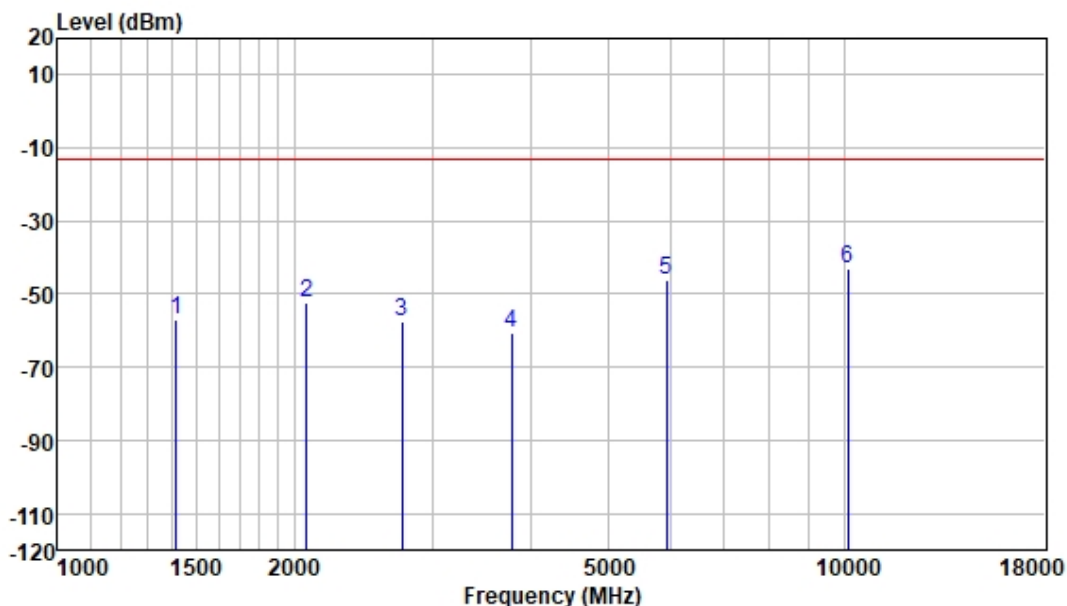
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DL_1S_M_AWGN_Horizontal_30MHz~1GHz



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	51.66	-46.26	-1.40	-47.66	-13.00	-34.66	HORIZONTAL
2	73.88	-35.59	-7.67	-43.26	-13.00	-30.26	HORIZONTAL
3	105.27	-41.28	-9.39	-50.67	-13.00	-37.67	HORIZONTAL
4	205.68	-42.61	-7.11	-49.72	-13.00	-36.72	HORIZONTAL
5	366.82	-43.38	-1.28	-44.66	-13.00	-31.66	HORIZONTAL
6	618.54	-54.33	3.31	-51.02	-13.00	-38.02	HORIZONTAL

DL_1S_M_AWGN_Horizontal_above 1GHz



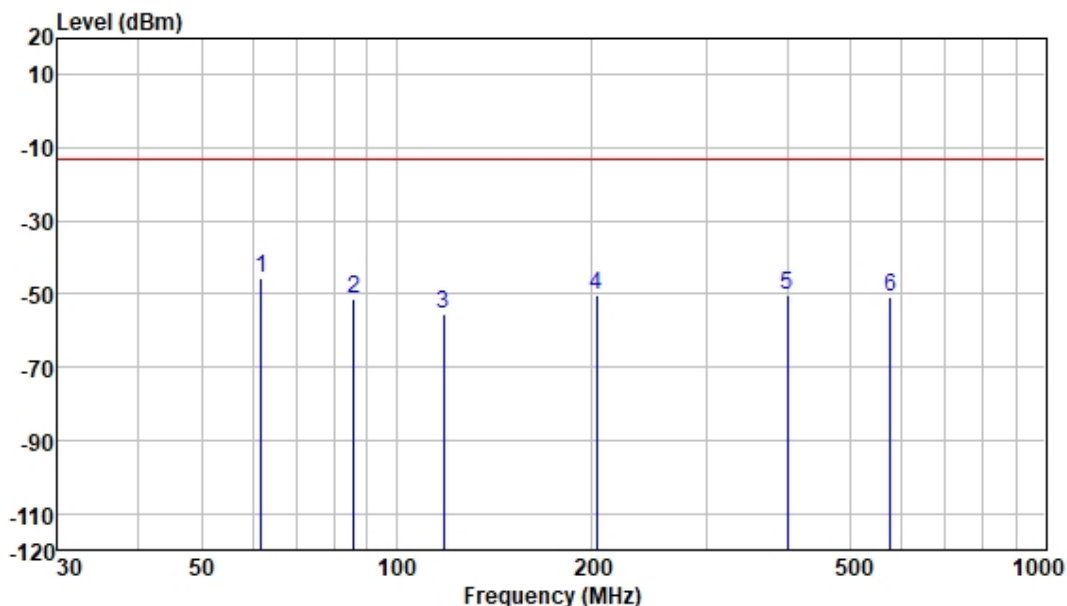
	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1414.60	-61.40	4.62	-56.78	-13.00	-43.78	HORIZONTAL
2	2071.71	-62.22	9.67	-52.55	-13.00	-39.55	HORIZONTAL
3	2734.23	-61.95	4.21	-57.74	-13.00	-44.74	HORIZONTAL
4	3768.51	-63.99	3.38	-60.61	-13.00	-47.61	HORIZONTAL
5	5932.64	-62.87	16.77	-46.10	-13.00	-33.10	HORIZONTAL
6	10097.60	-63.91	20.63	-43.28	-13.00	-30.28	HORIZONTAL



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DL_1S_M_AWGN_Vertical_30MHz~1GHz



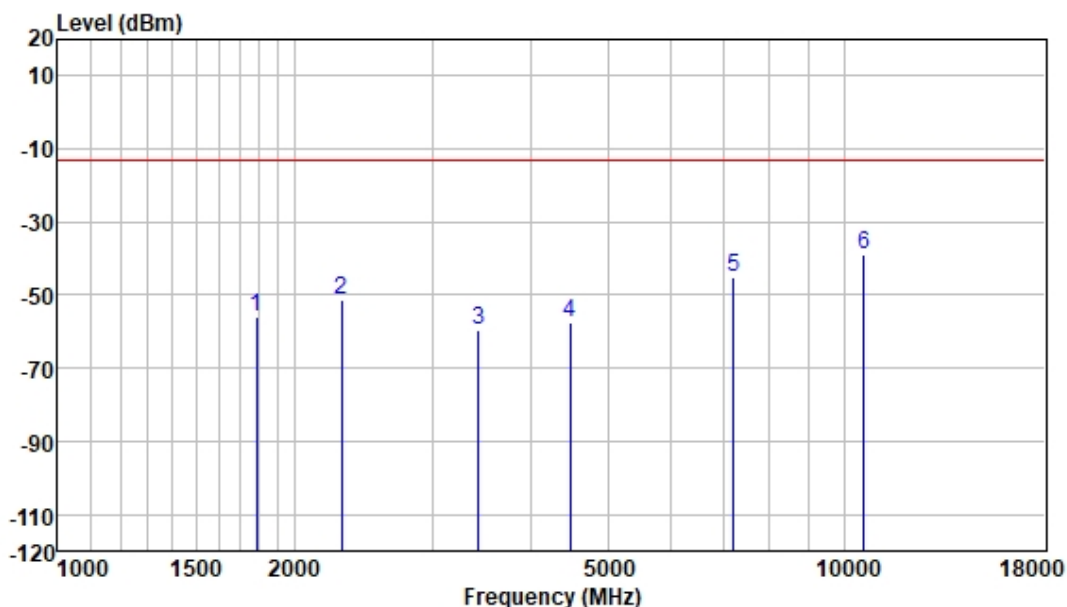
	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	61.78	-42.87	-2.89	-45.76	-13.00	-32.76	VERTICAL
2	85.90	-42.15	-9.17	-51.32	-13.00	-38.32	VERTICAL
3	118.19	-51.44	-3.99	-55.43	-13.00	-42.43	VERTICAL
4	202.81	-45.02	-5.24	-50.26	-13.00	-37.26	VERTICAL
5	400.43	-49.94	-0.25	-50.19	-13.00	-37.19	VERTICAL
6	576.64	-54.03	3.02	-51.01	-13.00	-38.01	VERTICAL



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DL_1S_M_AWGN_Vertical_above 1GHz



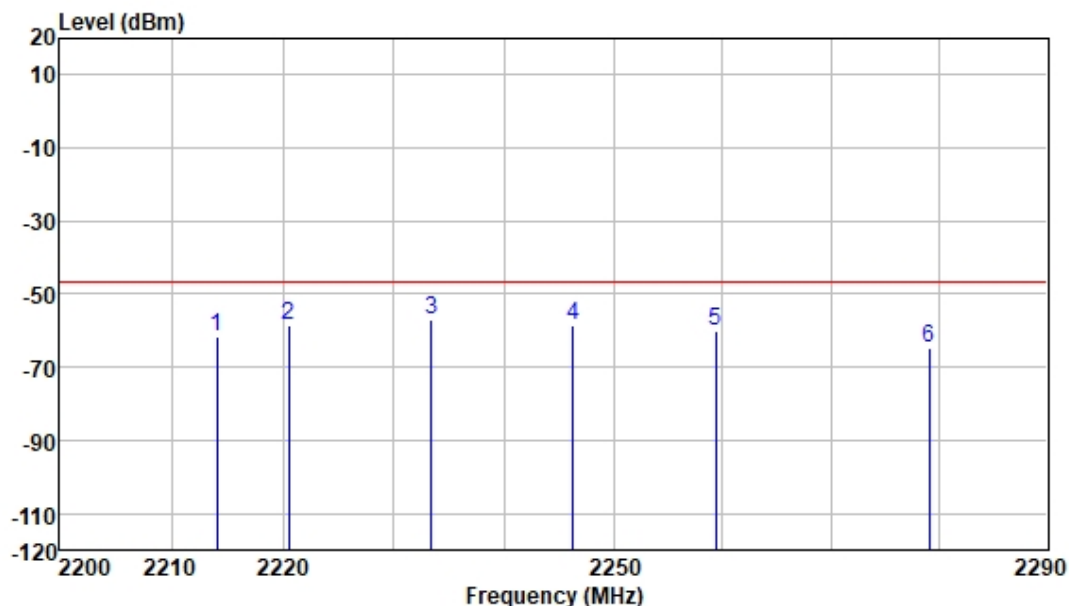
	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1787.76	-61.76	5.75	-56.01	-13.00	-43.01	VERTICAL
2	2292.26	-61.03	9.57	-51.46	-13.00	-38.46	VERTICAL
3	3425.68	-62.79	3.31	-59.48	-13.00	-46.48	VERTICAL
4	4482.15	-63.33	5.68	-57.65	-13.00	-44.65	VERTICAL
5	7221.15	-63.82	18.86	-44.96	-13.00	-31.96	VERTICAL
6	10575.54	-63.60	24.78	-38.82	-13.00	-25.82	VERTICAL



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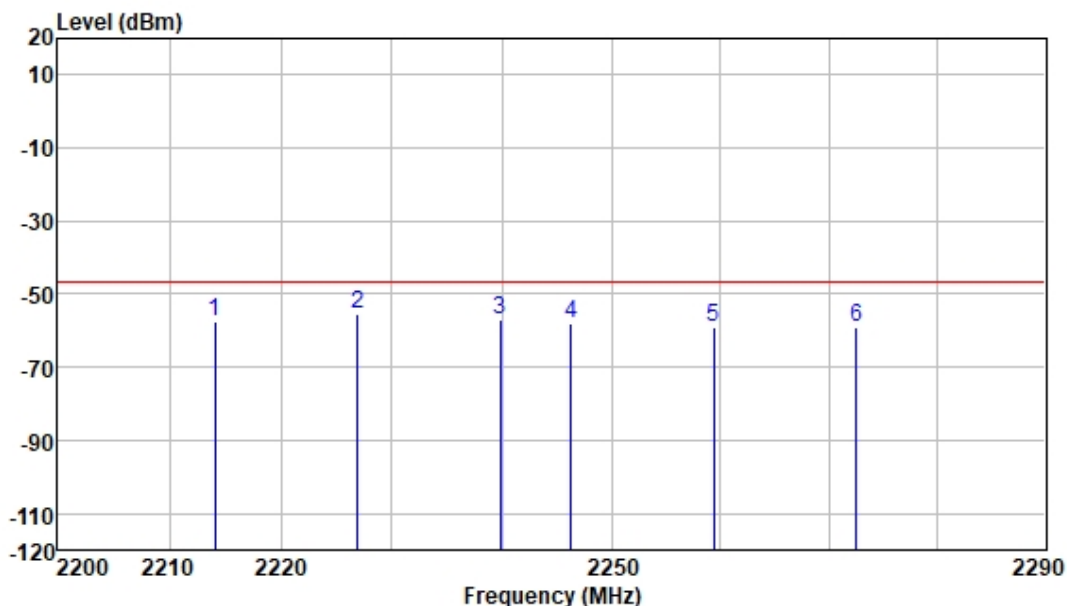
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DL_1S_M_AWGN_Horizontal_2200MHz~2290MHz



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	2214.11	-70.72	9.27	-61.45	-46.60	-14.85	HORIZONTAL
2	2220.52	-67.97	9.30	-58.67	-46.60	-12.07	HORIZONTAL
3	2233.40	-66.11	9.35	-56.76	-46.60	-10.16	HORIZONTAL
4	2246.34	-67.91	9.41	-58.50	-46.60	-11.90	HORIZONTAL
5	2259.37	-69.71	9.47	-60.24	-46.60	-13.64	HORIZONTAL
6	2279.04	-74.35	9.53	-64.82	-46.60	-18.22	HORIZONTAL

DL_1S_M_AWGN_Vertical_2200MHz~2290MHz



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	2214.11	-67.02	9.44	-57.58	-46.60	-10.98	VERTICAL
2	2226.95	-65.08	9.46	-55.62	-46.60	-9.02	VERTICAL
3	2239.86	-66.56	9.49	-57.07	-46.60	-10.47	VERTICAL
4	2246.34	-67.30	9.50	-57.80	-46.60	-11.20	VERTICAL
5	2259.37	-68.77	9.52	-59.25	-46.60	-12.65	VERTICAL
6	2272.47	-68.63	9.55	-59.08	-46.60	-12.48	VERTICAL

--End of Appendix--