



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

198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technological
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Application No.: GZCR2103000016AT
Page: 1 of 36
FCC ID: OJFDHRU-DHPAM-17

Appendix B

Test Data and Result Details of GZCR2103000016AT



SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch Testing Center EEC Laboratory

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中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

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

1.1 AGC threshold level

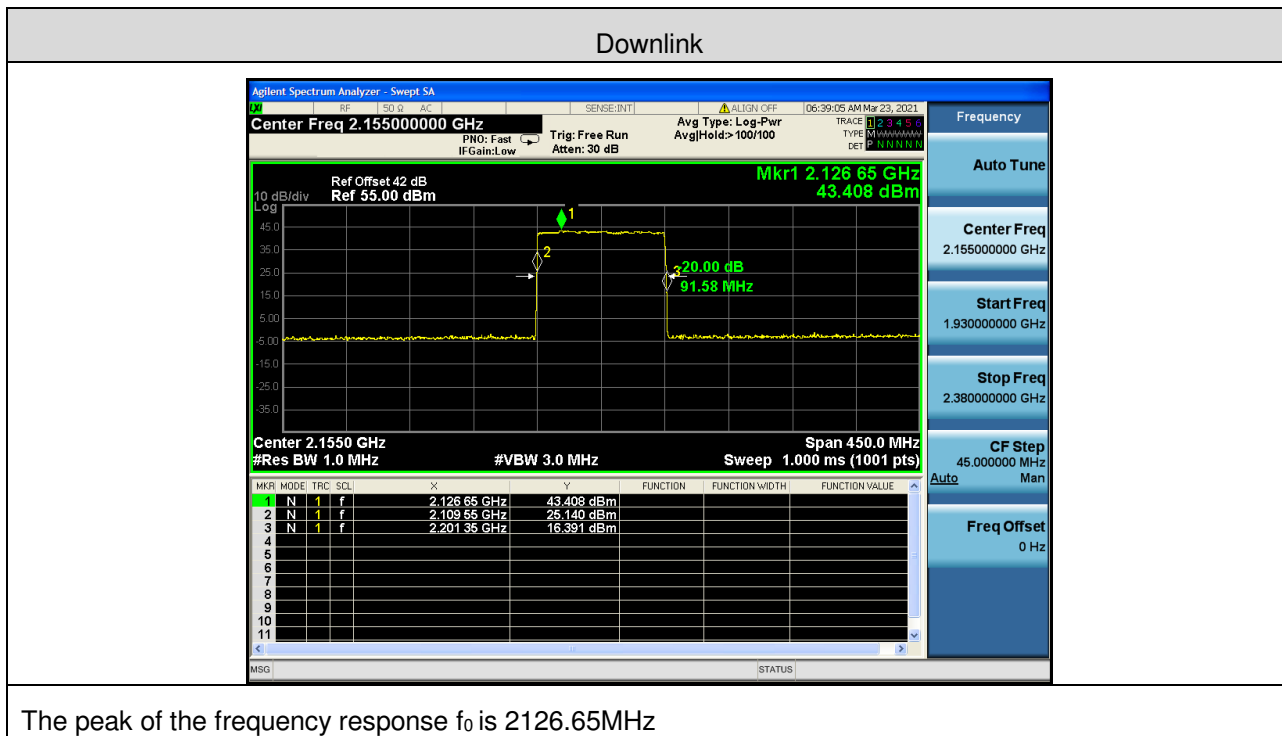
Test Conf.	AGC Threshold level
DL_1S_M_AWGN_AWGN	0.10dBm
DL_1S_M_AWGN_GSM	0.21dBm



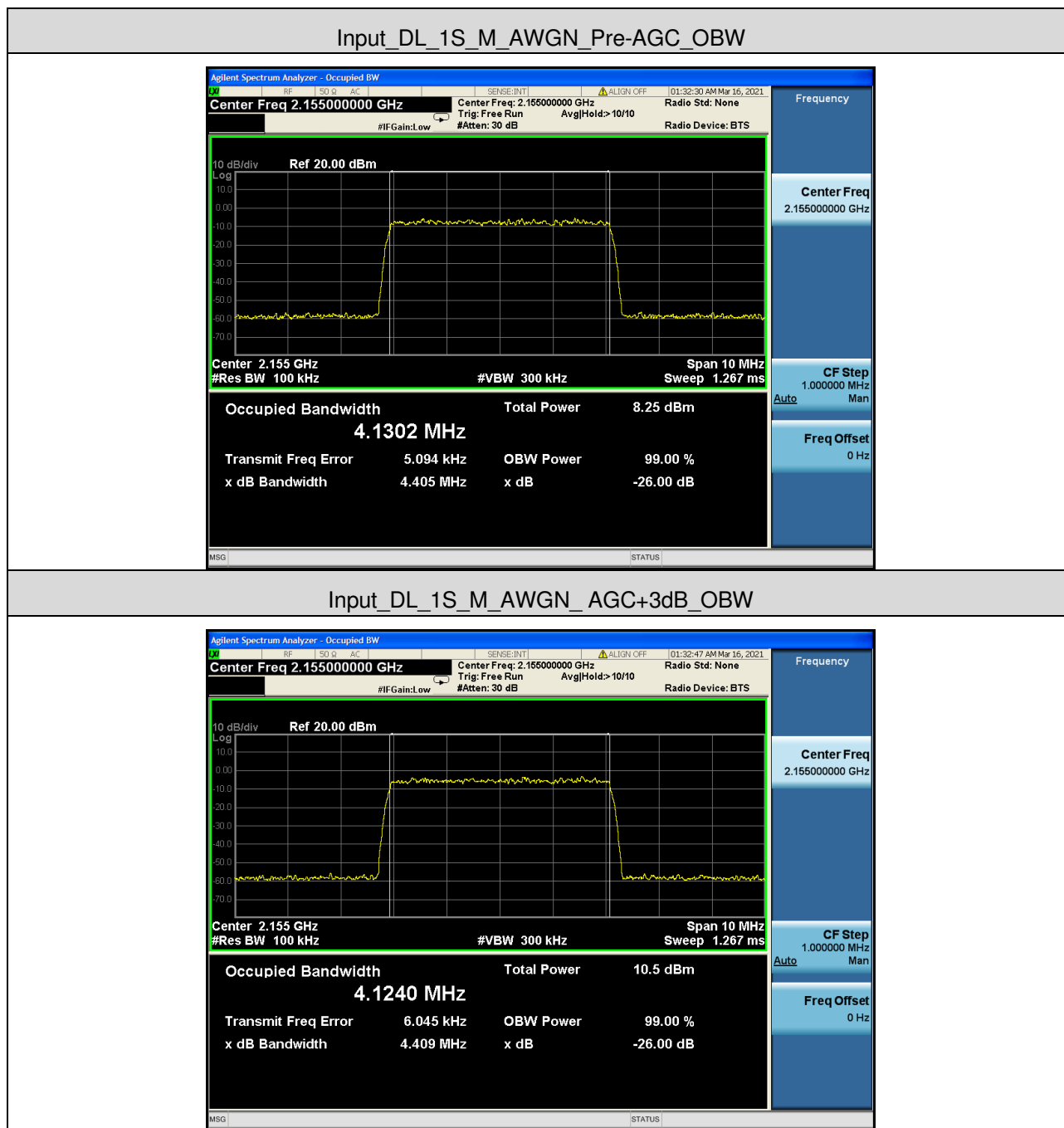
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1.2 Out-of-band rejection



1.3 Input-versus-output signal comparison

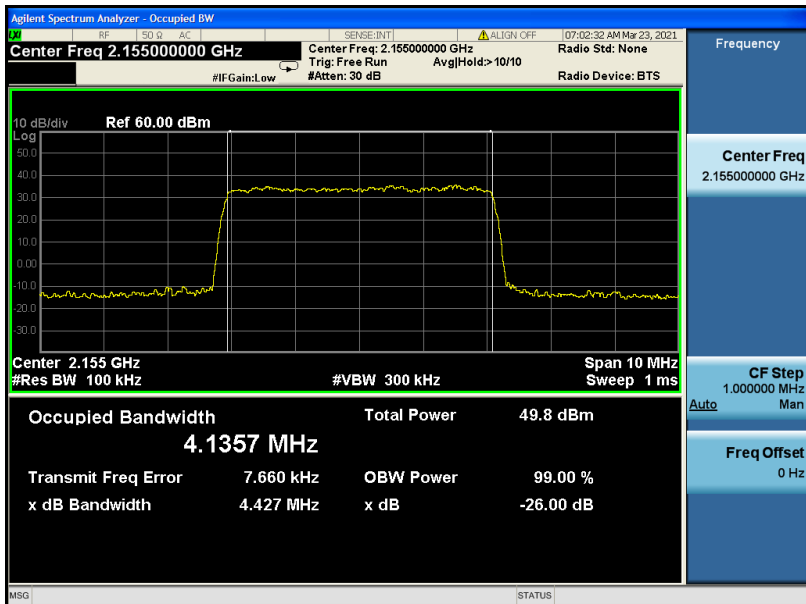


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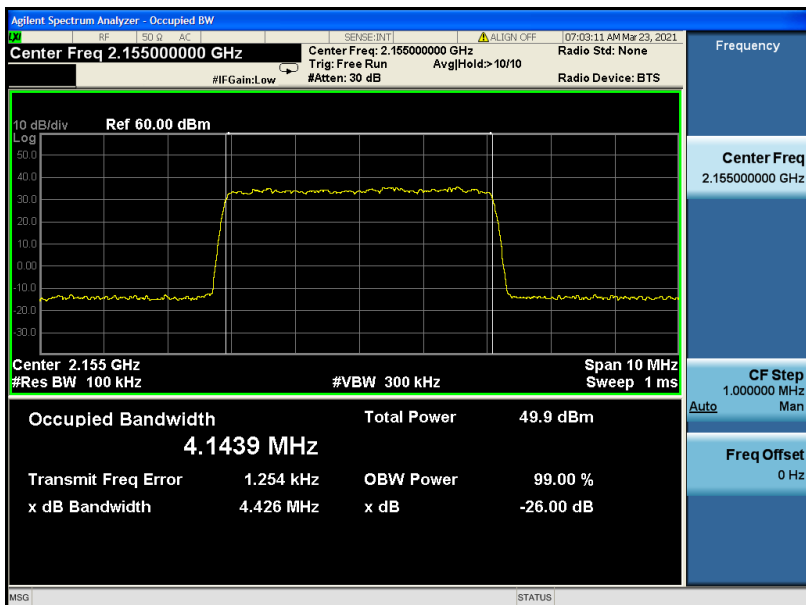
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Output_DL_1S_M_AWGN_Pre-AGC_OBW



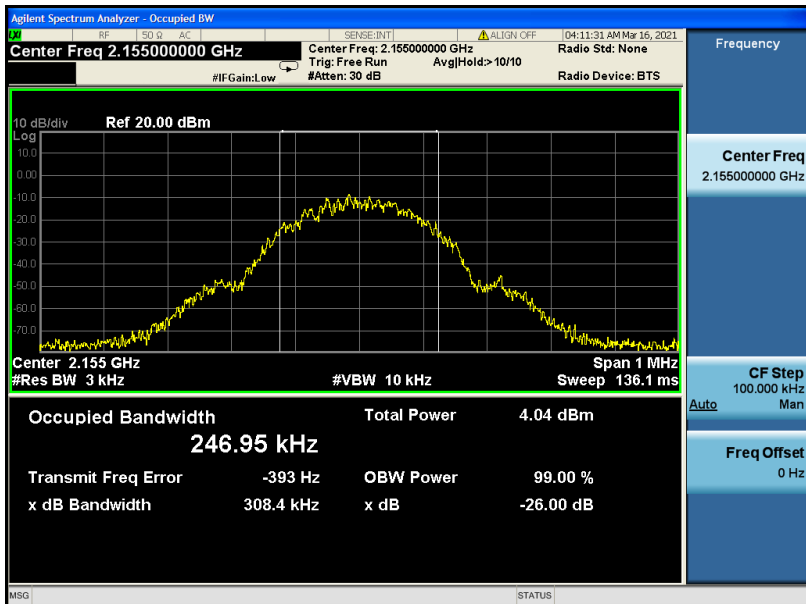
Output_DL_1S_M_AWGN_AGC+3dB_OBW



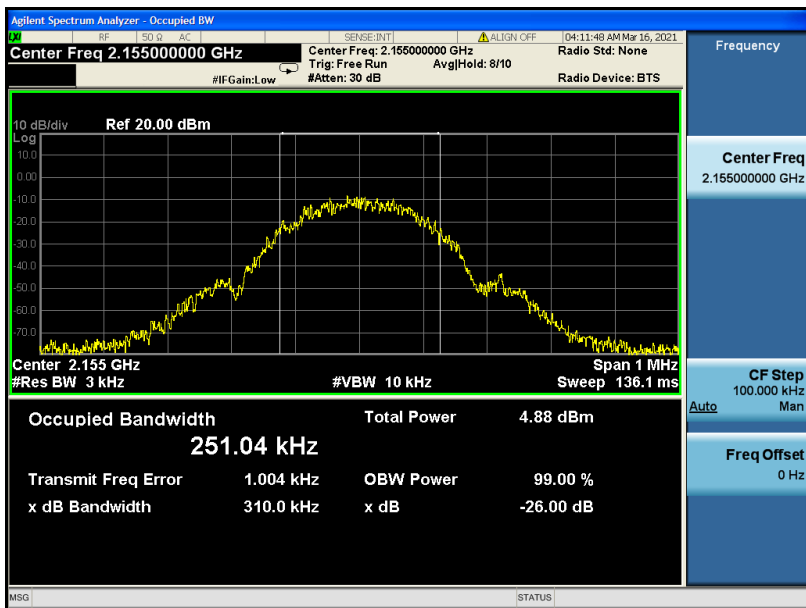
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Input_DL_1S_M_GSM_Pre-AGC_OBW



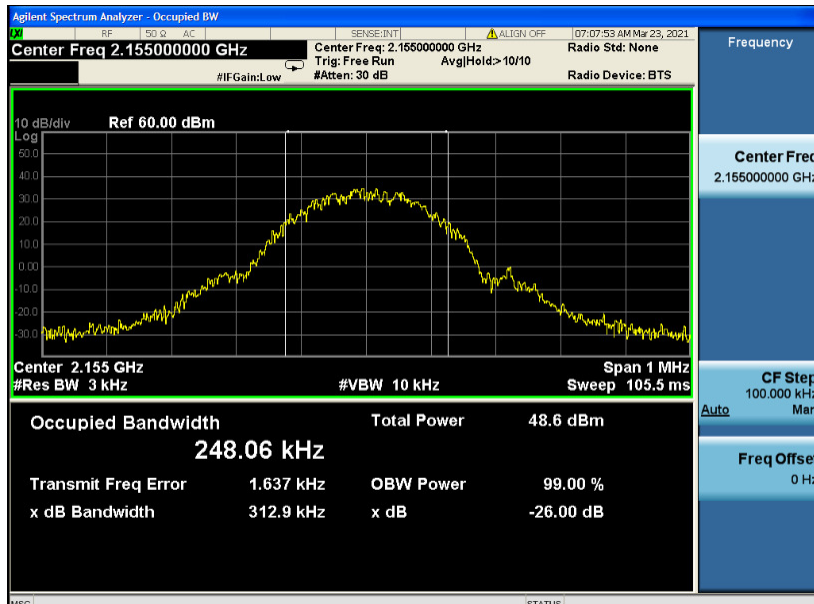
Input_DL_1S_M_GSM_AGC+3dB_OBW



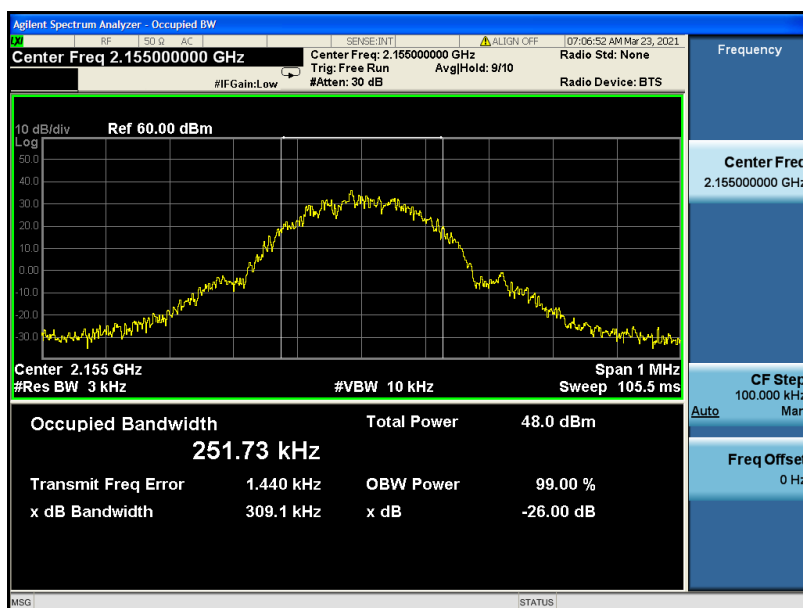
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Output_DL_1S_M_GSM_Pre-AGC_OBW



Output_DL_1S_M_GSM_AGC+3dB_OBW



Remark:

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.



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1.4 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_AWGN	2126.65	Pre-AGC	0.00	42.68	42.68	PASS
		AGC+3dB	3.00	42.87	/	PASS
DL_1S_GSM	2126.65	Pre-AGC	0.11	42.76	42.65	PASS
		AGC+3dB	2.89	43.00	/	PASS

Remark:

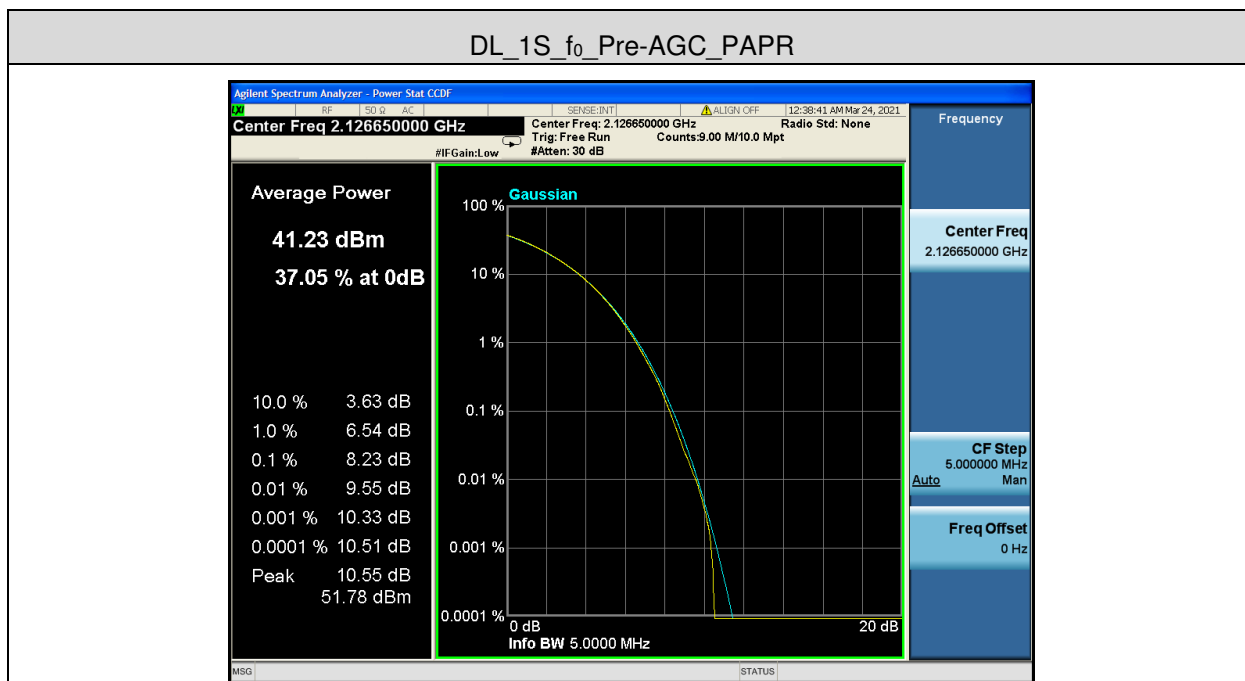
According to the declaration from the applicant, the single antenna gain should not exceed 12.5dBi, the Directional gain = $G_{ANT} + 10 \log (N_{ANT})$ dBi = 12.5dBi+10log (2) dBi= 15.5dBi.

The total maximum EIRP for the EUT is (43.00dBm+43.00dBm) +15.5dBi=61.5dBm (1412.5W) which don't exceed the required EIRP limit (1640W/MHz).



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Test Conf.	Test Freq. f_0 (MHz)	Signal Level	PAPR (dB)	Limit (dB)	Verdict
DL_1S_AWGN	2126.65	Pre-AGC	9.55	13	PASS



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

Note: The tested max conducted power for single antenna port is 43.00dBm, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB

Here,

$$P = 43.00\text{dBm} = 19.95\text{W}.$$

So the limit =

$$P(\text{dBm}) - [43 + 10\log(19.95\text{W})] = -13\text{dBm}$$

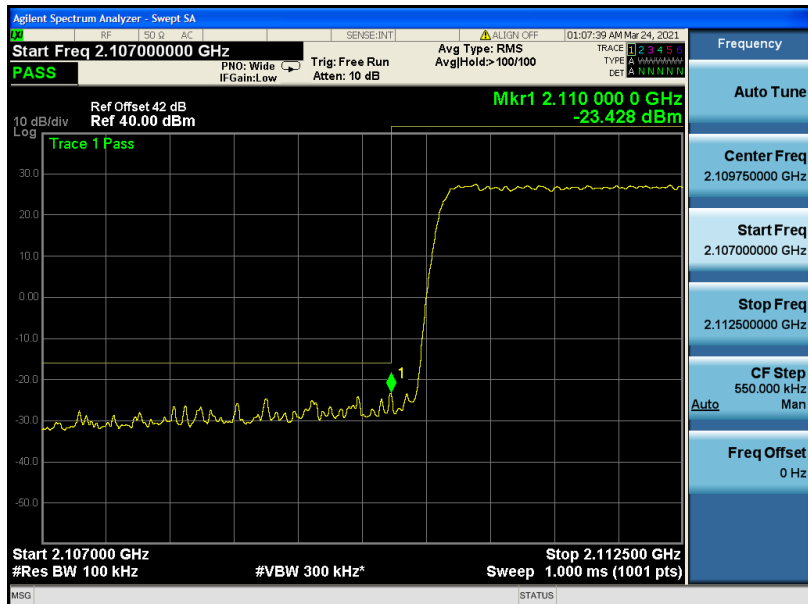
The EUT supports 2x2 MIMO and the emissions were measured at one of output port, so the limit line was set to -16.01dBm in following test plots in order to determine the test result conveniently.



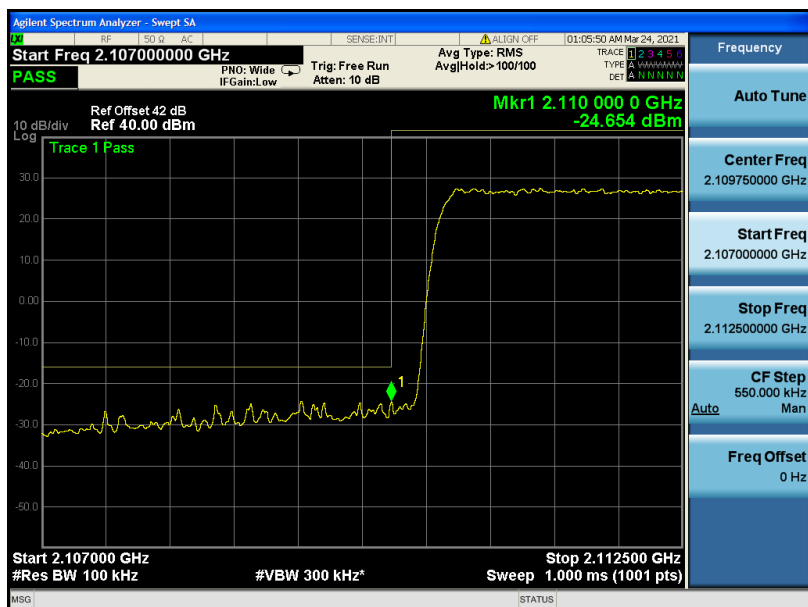
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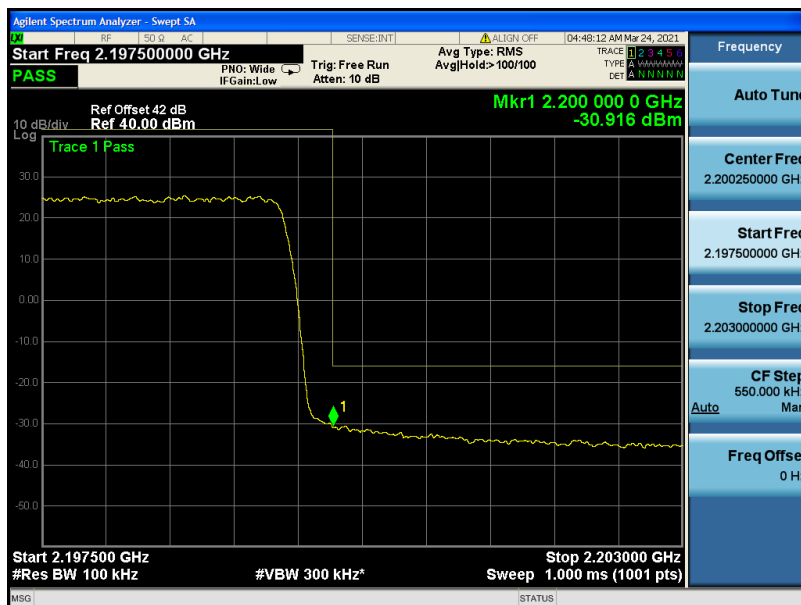
DL_1S_B_AWGN_Pre-AGC_Out-of-band emission



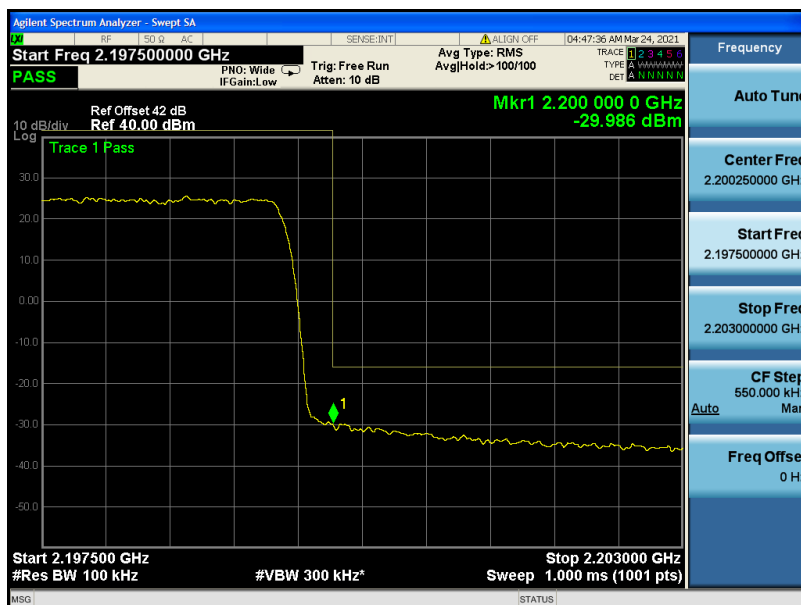
DL_1S_B_AWGN_AGC+3_Out-of-band emission



DL_1S_T_AWGN_Pre-AGC_Out-of-band emission



DL_1S_T_AWGN_AGC+3_Out-of-band emission

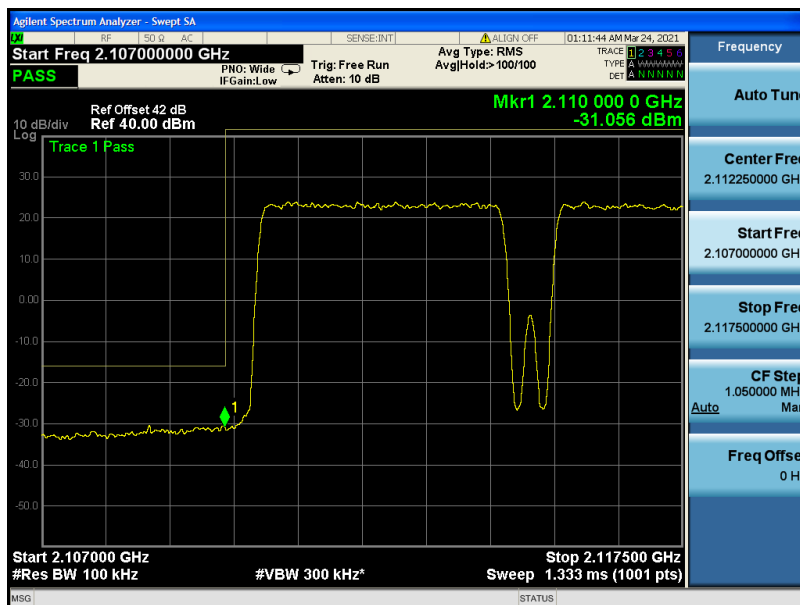


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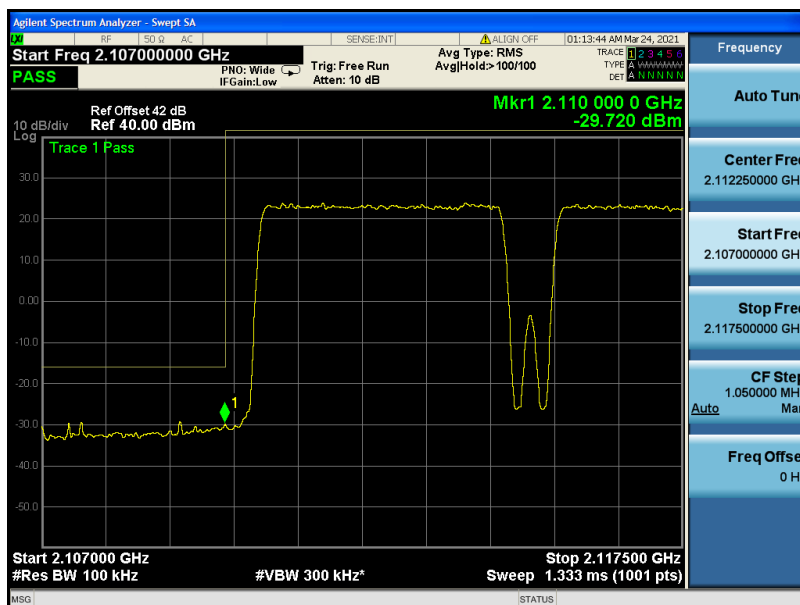
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DL_2S_B_AWGN_Pre-AGC_Out-of-band emission



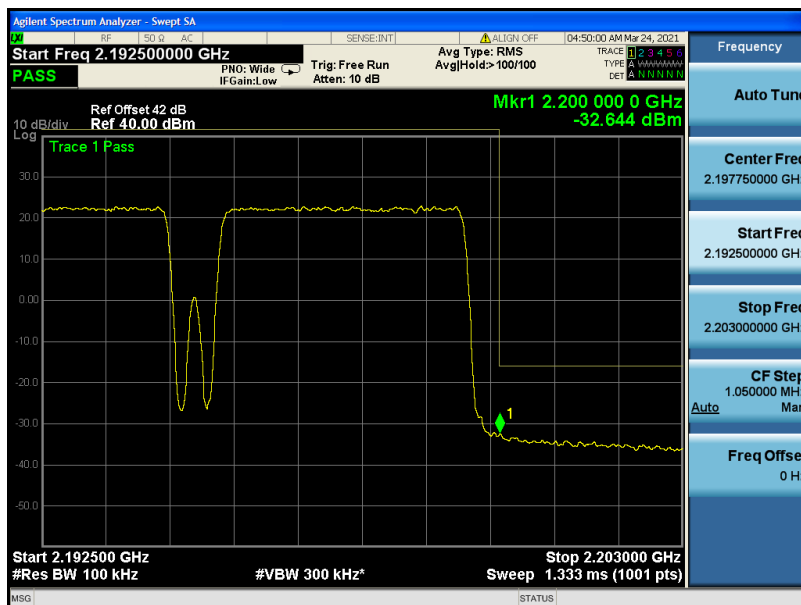
DL_2S_B_AWGN_AGC+3_Out-of-band emission



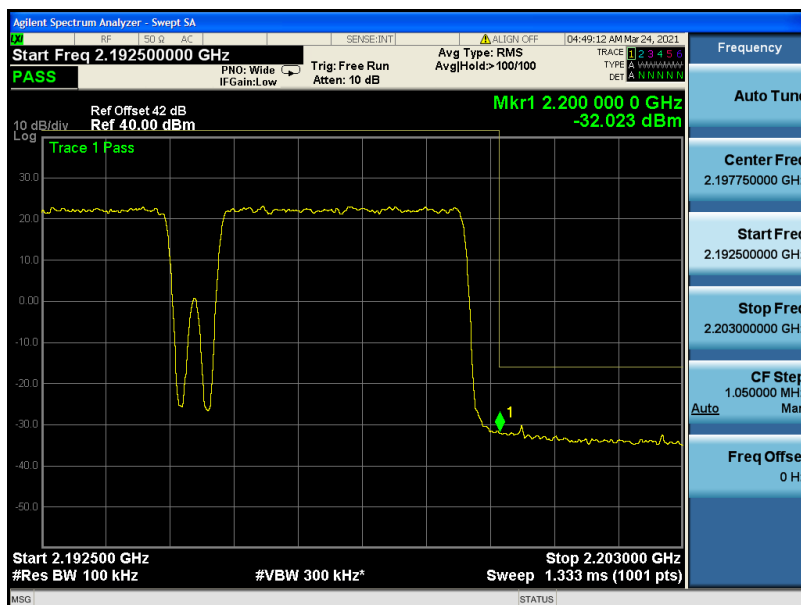
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DL_2S_T_AWGN_Pre-AGC_Out-of-band emission



DL_2S_T_AWGN_AGC+3_Out-of-band emission

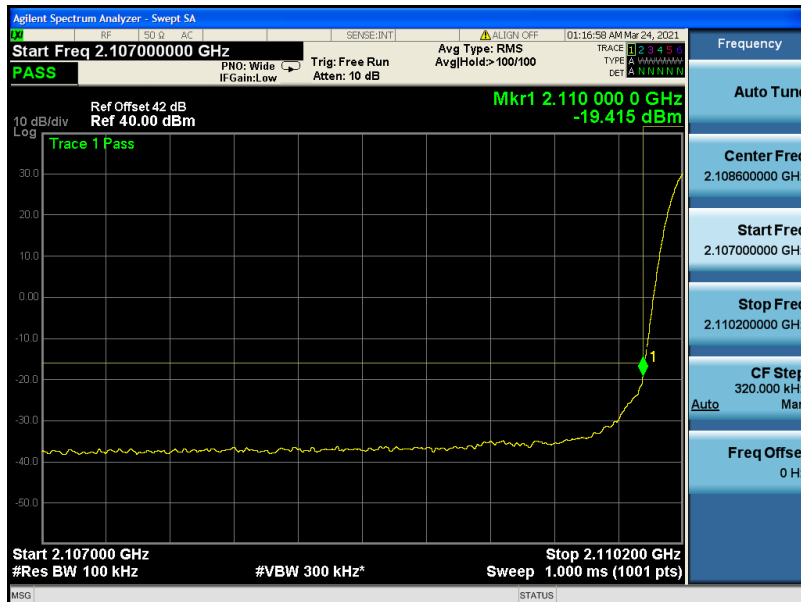


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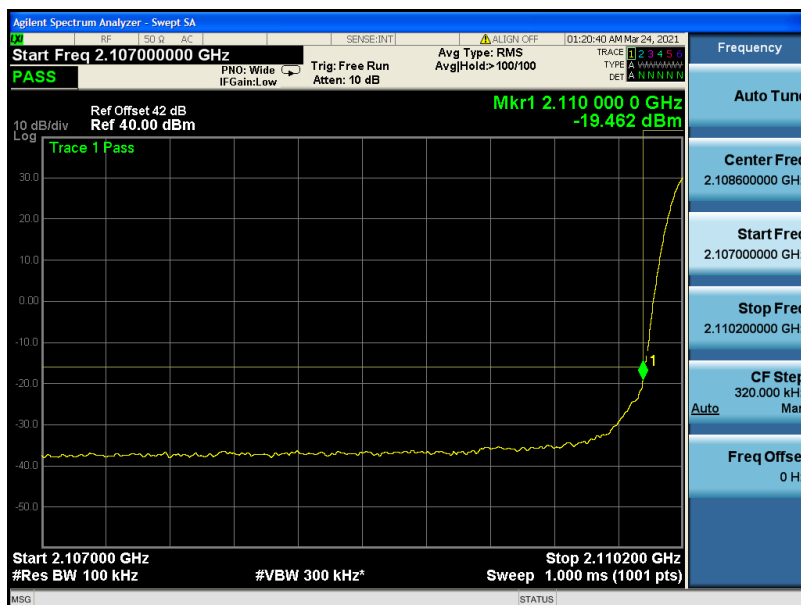
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DL_1S_B_GSM_Pre-AGC_Out-of-band emission



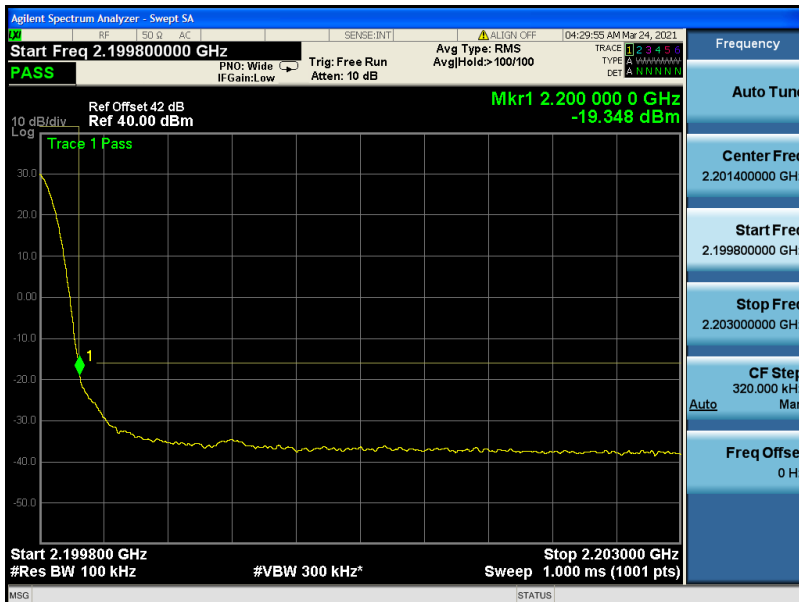
DL_1S_B_GSM_AGC+3_Out-of-band emission



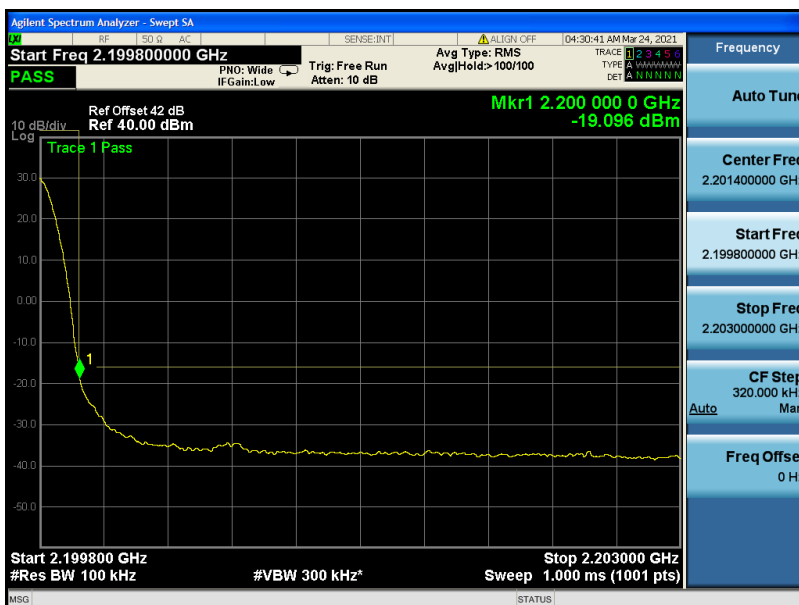
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DL_1S_T_GSM_Pre-AGC_Out-of-band emission



DL_1S_T_GSM_AGC+3_Out-of-band emission

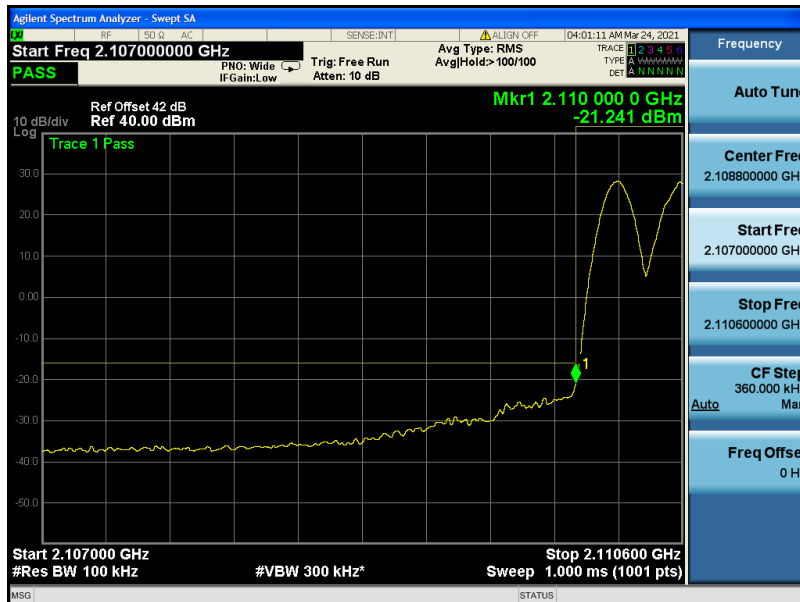


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DL_2S_B_GSM_Pre-AGC_Out-of-band emission



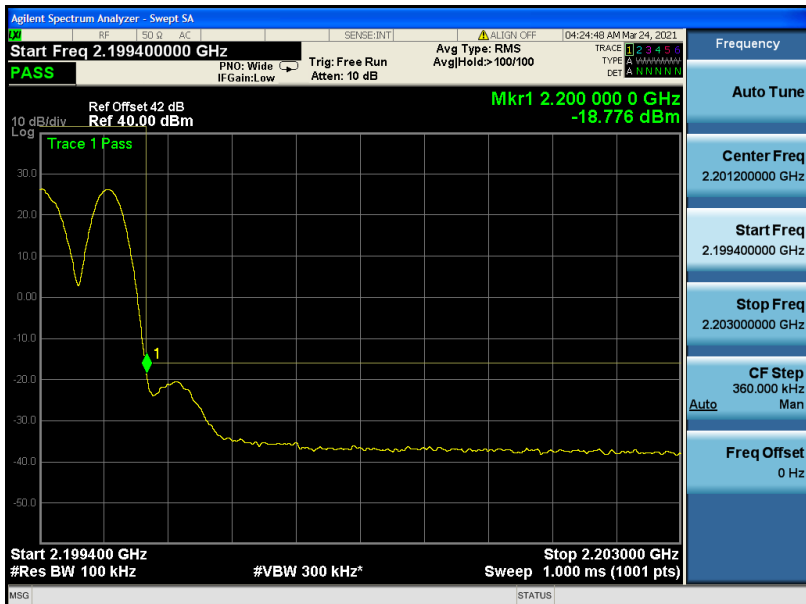
DL_2S_B_GSM_AGC+3_Out-of-band emission



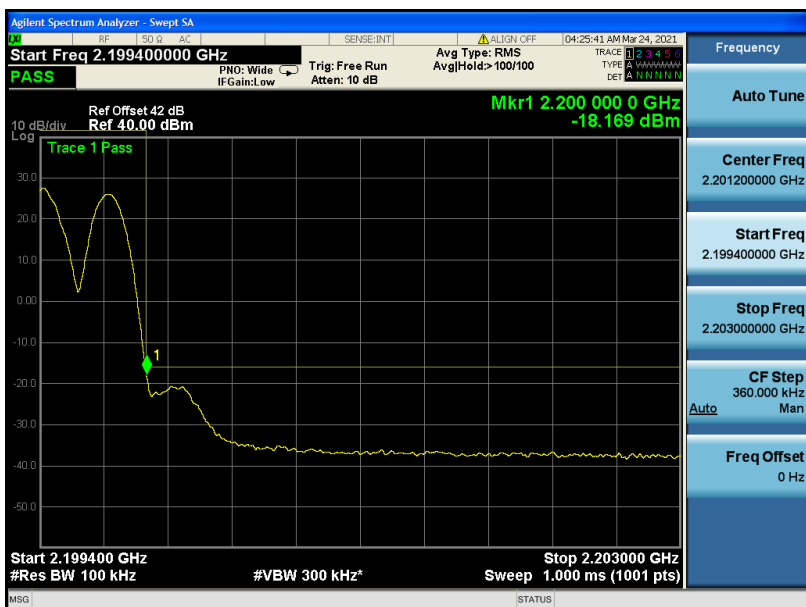
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DL_2S_T_GSM_Pre-AGC_Out-of-band emission



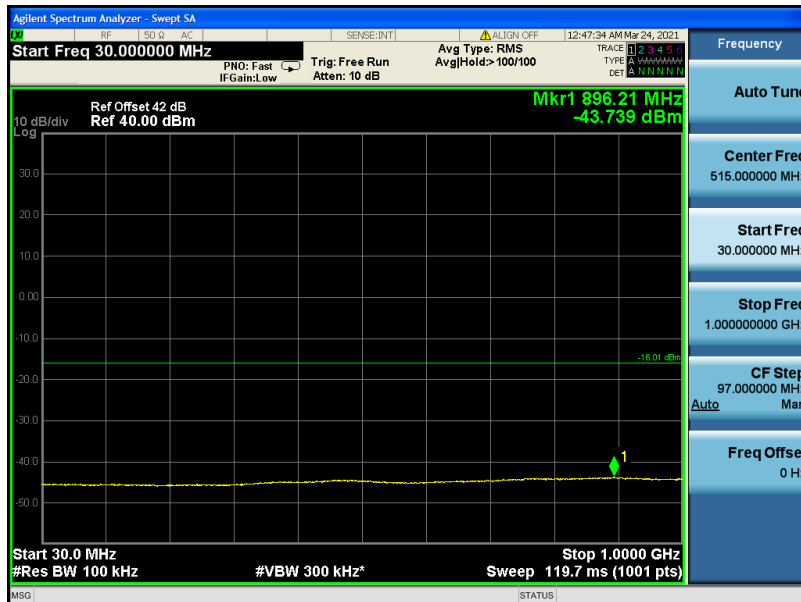
DL_2S_T_GSM_AGC+3_Out-of-band emission



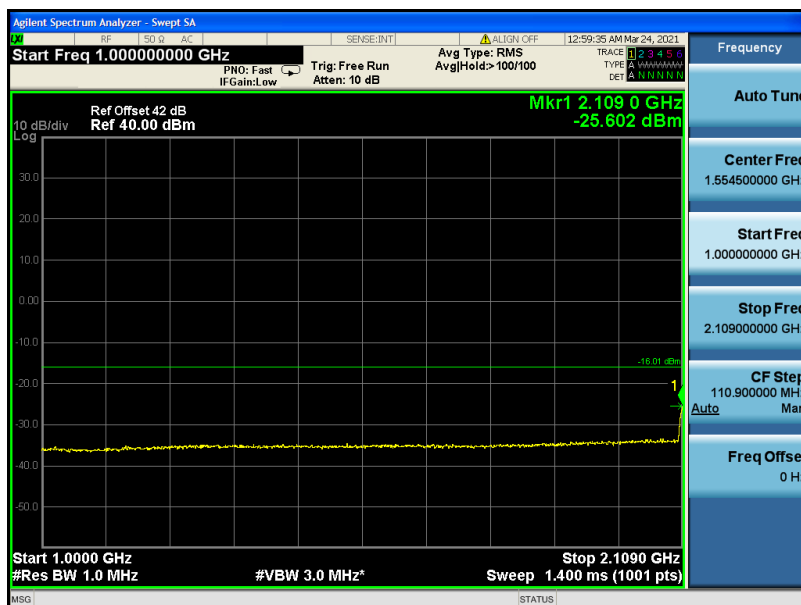
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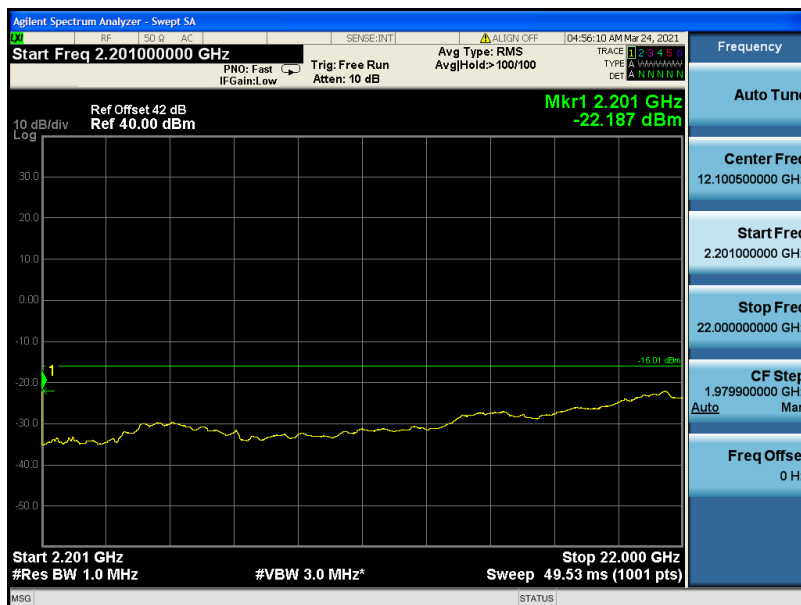
DL_1S_B_AWGN_Pre-AGC_Spurious emission 1



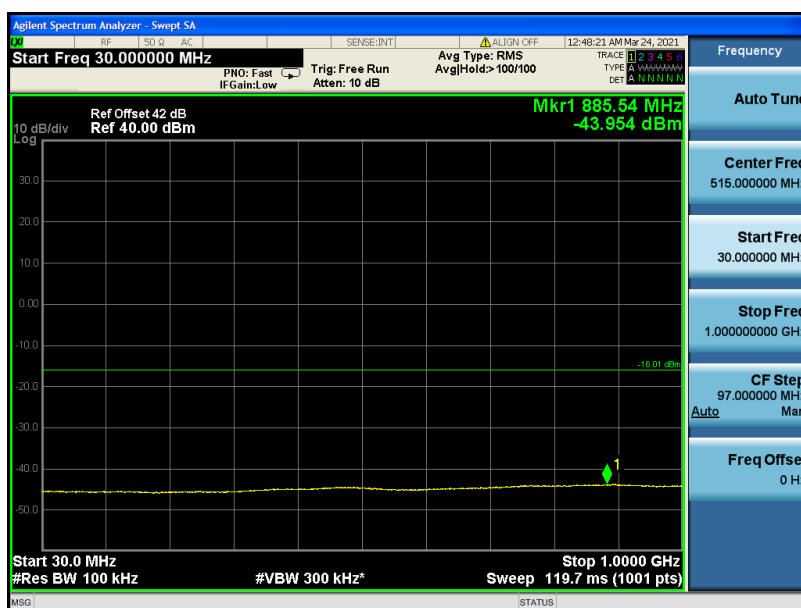
DL_1S_B_AWGN_Pre-AGC_Spurious emission 2



DL_1S_B_AWGN_Pre-AGC_Spurious emission 3



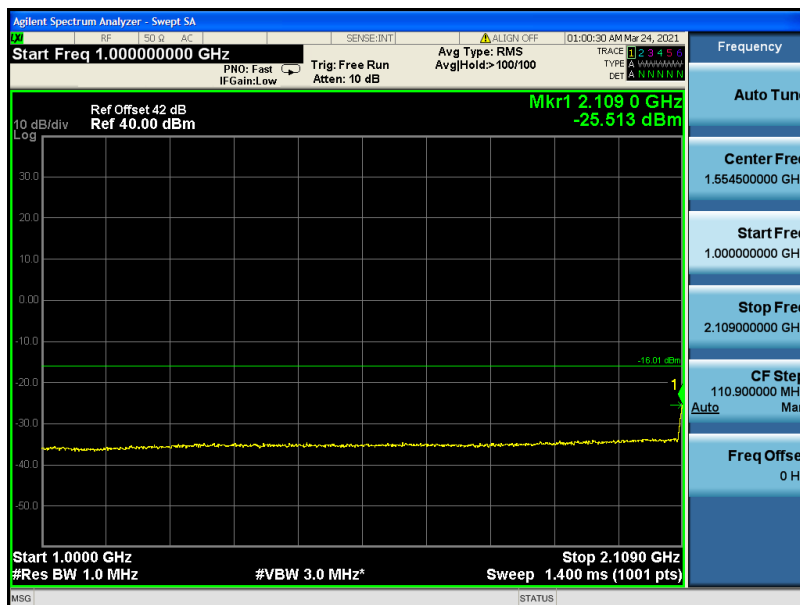
DL_1S_M_AWGN_Pre-AGC_Spurious emission 1



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DL_1S_M_AWGN_Pre-AGC_Spurious emission 2



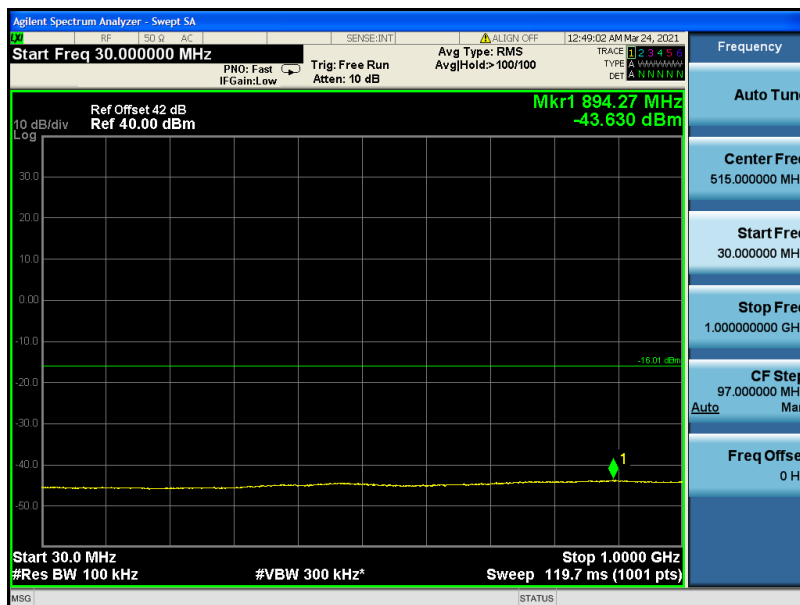
DL_1S_M_AWGN_Pre-AGC_Spurious emission 3



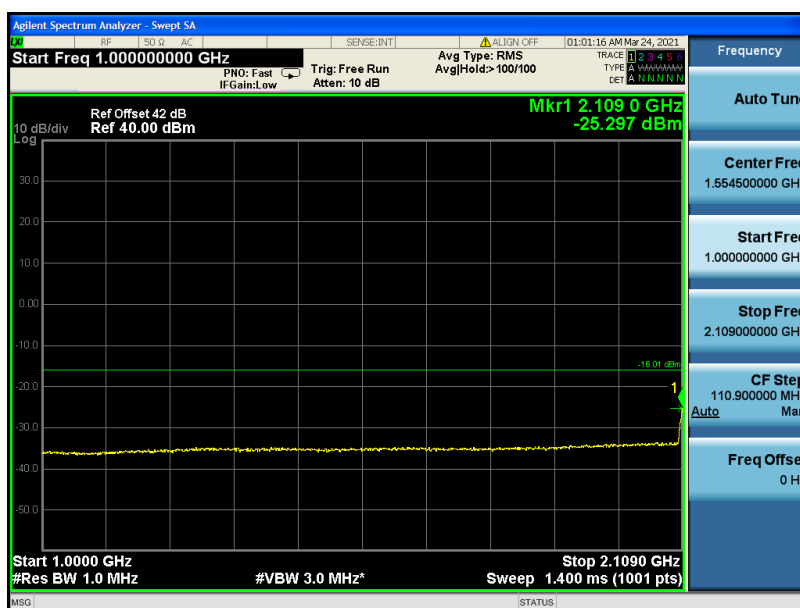
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DL_1S_T_AWGN_Pre-AGC_Spurious emission 1



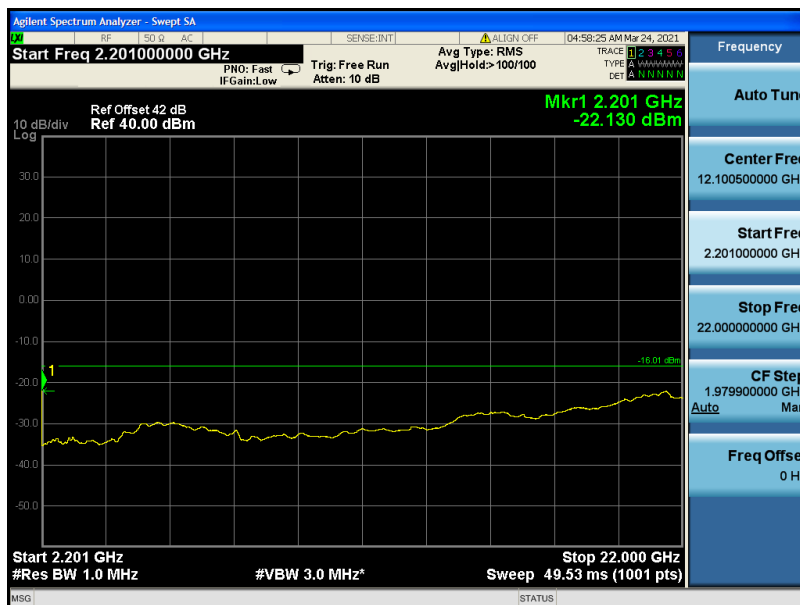
DL_1S_T_AWGN_Pre-AGC_Spurious emission 2



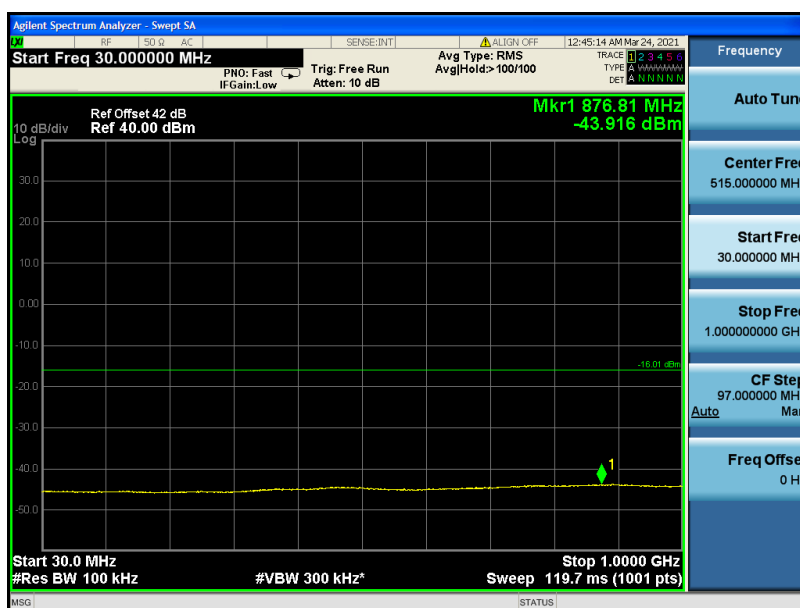
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DL_1S_T_AWGN_Pre-AGC_Spurious emission 3



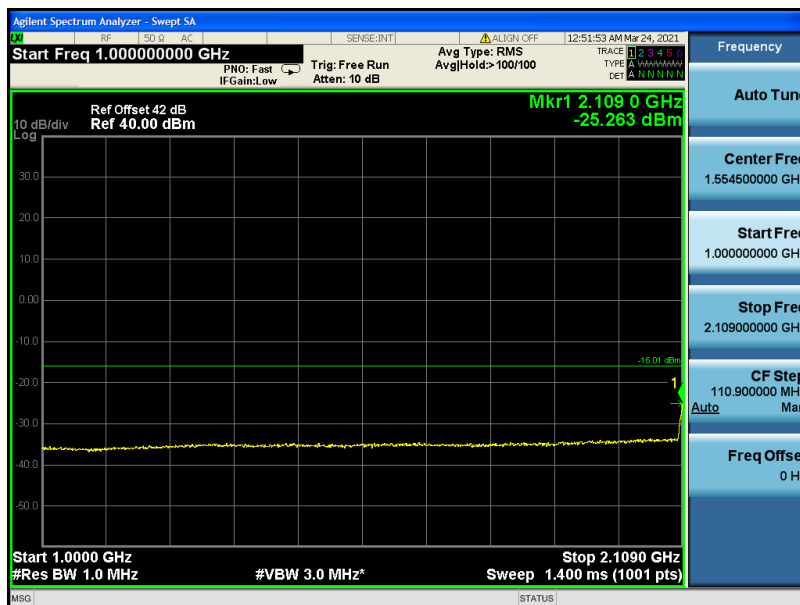
DL_1S_B_GSM_Pre-AGC_Spurious emission 1



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DL_1S_B_GSM_Pre-AGC_Spurious emission 2



DL_1S_B_GSM_Pre-AGC_Spurious emission 3

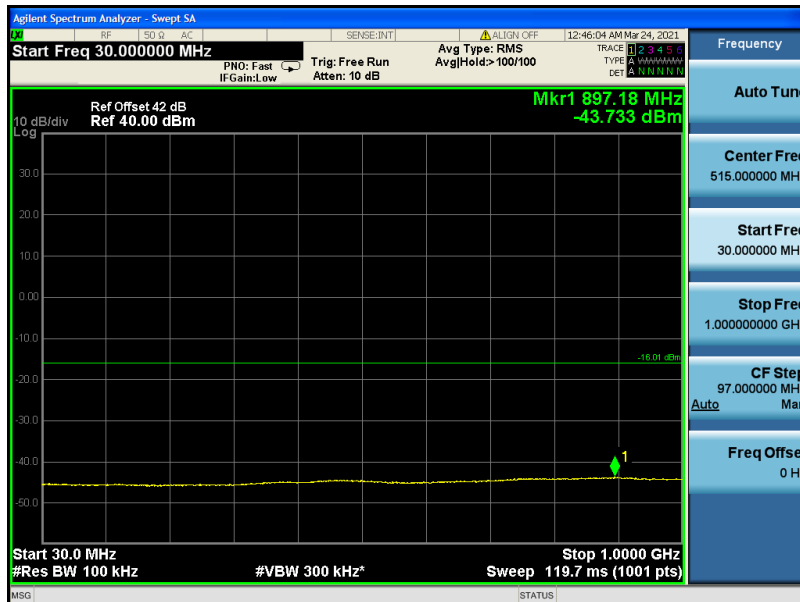


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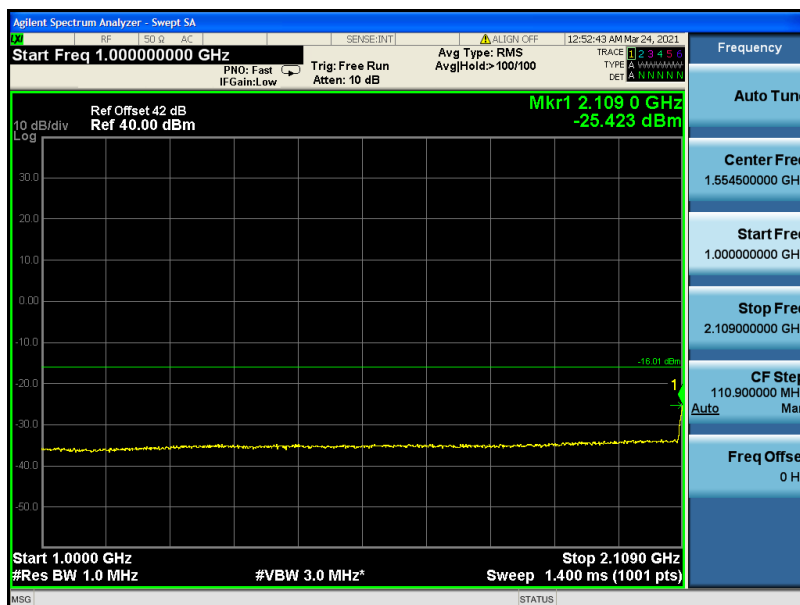
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Guangzhou Branch Technical Services Co., Ltd. EEC Laboratory. | 中国·广州·经济技术开发区科学城科珠路198号 | 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

DL_1S_M_GSM_Pre-AGC_Spurious emission 1



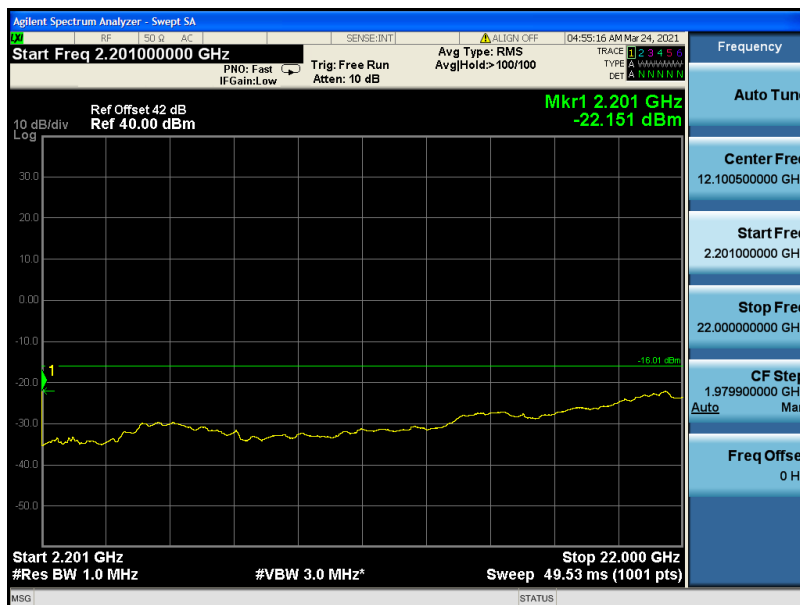
DL_1S_M_GSM_Pre-AGC_Spurious emission 2



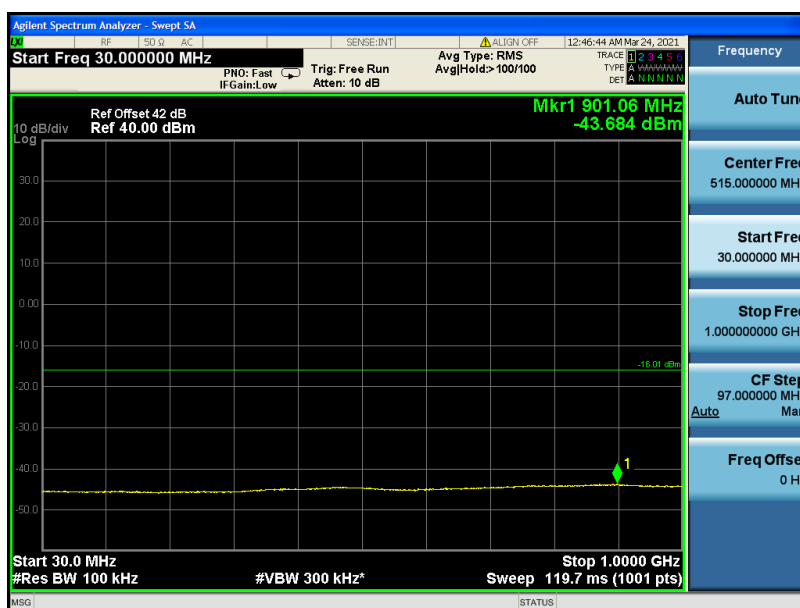
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DL_1S_M_GSM_Pre-AGC_Spurious emission 3



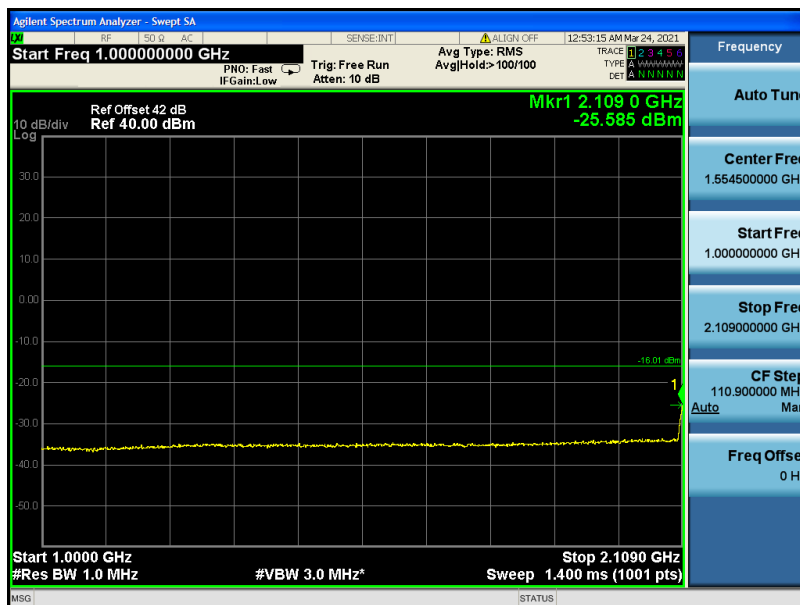
DL_1S_T_GSM_Pre-AGC_Spurious emission 1



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DL_1S_T_GSM_Pre-AGC_Spurious emission 2



DL_1S_T_GSM_Pre-AGC_Spurious emission 3



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Guangzhou Branch Testing Center EEC Laboratory, 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

1.6 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 ±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.
 4. Frequency stability has been tested using an AWGN test signal and a GSM-TDMA test signal, only the worst-case was recorded in this report.



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Frequency stability vs temperature				
Temperature (°C)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict
50	DL_1S_M_AWGN	2155.001937	-0.75	PASS
40		2155.002937	-0.28	PASS
30		2155.003048	-0.23	PASS
20		2155.003547	Reference	PASS
10		2155.002364	-0.55	PASS
0		2155.001246	-0.11	PASS
-10		2155.002739	-0.37	PASS
-20		2155.001842	-0.79	PASS
-30		2155.002713	-0.39	PASS

Frequency stability vs voltage				
Voltage (V)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict
AC 93.5	DL_1S_M_AWGN	2155.003748	0.09	PASS
AC 110		2155.003547	Reference	PASS
AC 126.5		2155.003864	0.15	PASS



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1.7 Radiated spurious emissions

Note: 1. The tested max conducted power for single antenna port is 43.34dBm, the 2x2 MIMO total power is 43.00dBm+43.00dBm=39.9W, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB

Here,

$P=39.9W$

So the limit =

$P(\text{dBm}) - [43 + 10\log(39.9W)] = -13\text{dBm}$

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 dBW/4 kHz ,

$-100.6 \text{ dBW/4 kHz} = -70.6 \text{ dBm/4 kHz} = -46.6 \text{ dBm/1 MHz}$

2. The radiated test performed at bottom / middle / top channel, the data with more than 20db margin, therefore, only the worst-case middle channel test data was recorded in the report.

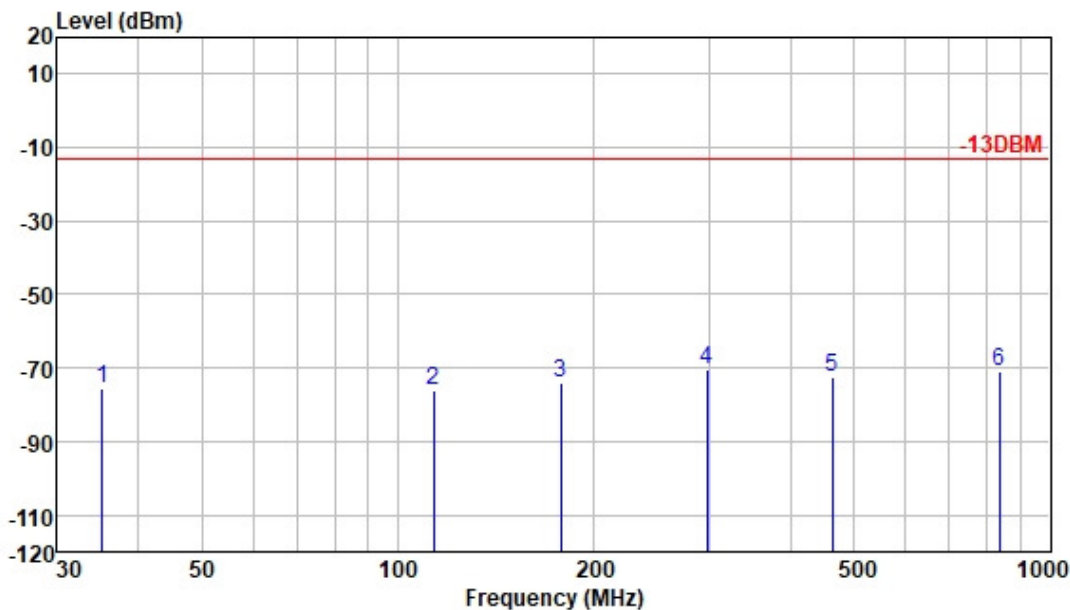
3. The disturbance from 9kHz to 30MHz was very low and 20db below the limit, therefore, the data was not recorded in the report.



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DL_1S_M_AWGN_Horizontal_30MHz~1GHz

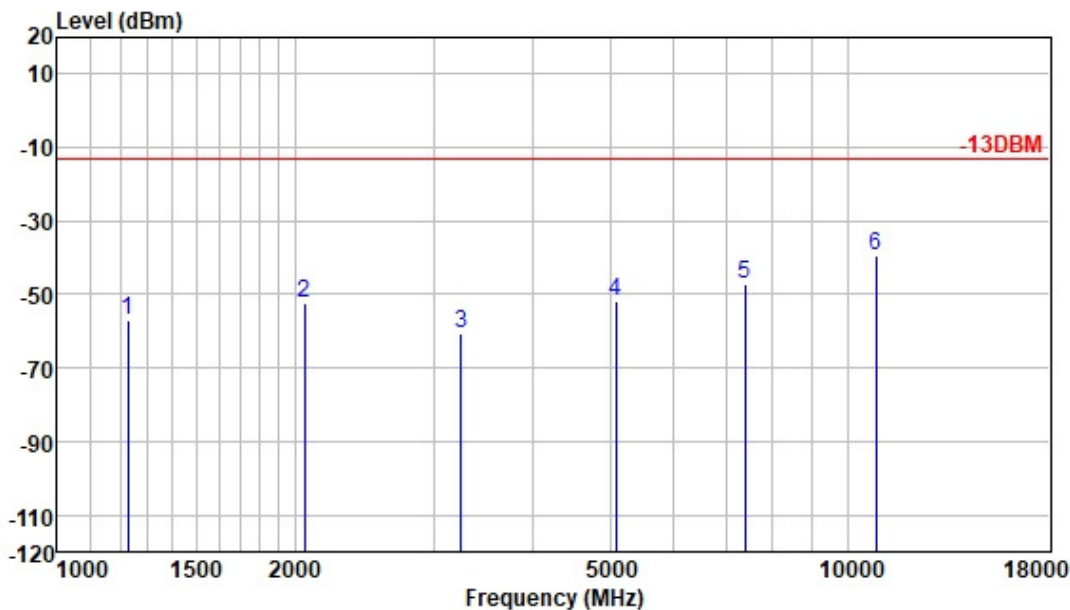


	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	35.13	-78.35	2.85	-75.50	-12.99	-62.51	HORIZONTAL
2	113.32	-67.45	-8.75	-76.20	-12.99	-63.21	HORIZONTAL
3	177.51	-67.79	-6.05	-73.84	-12.99	-60.85	HORIZONTAL
4	297.22	-67.10	-3.07	-70.17	-12.99	-57.18	HORIZONTAL
5	463.97	-72.92	0.31	-72.61	-12.99	-59.62	HORIZONTAL
6	836.24	-78.05	7.17	-70.88	-12.99	-57.89	HORIZONTAL



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DL_1S_M_AWGN_Horizontal_above 1GHz



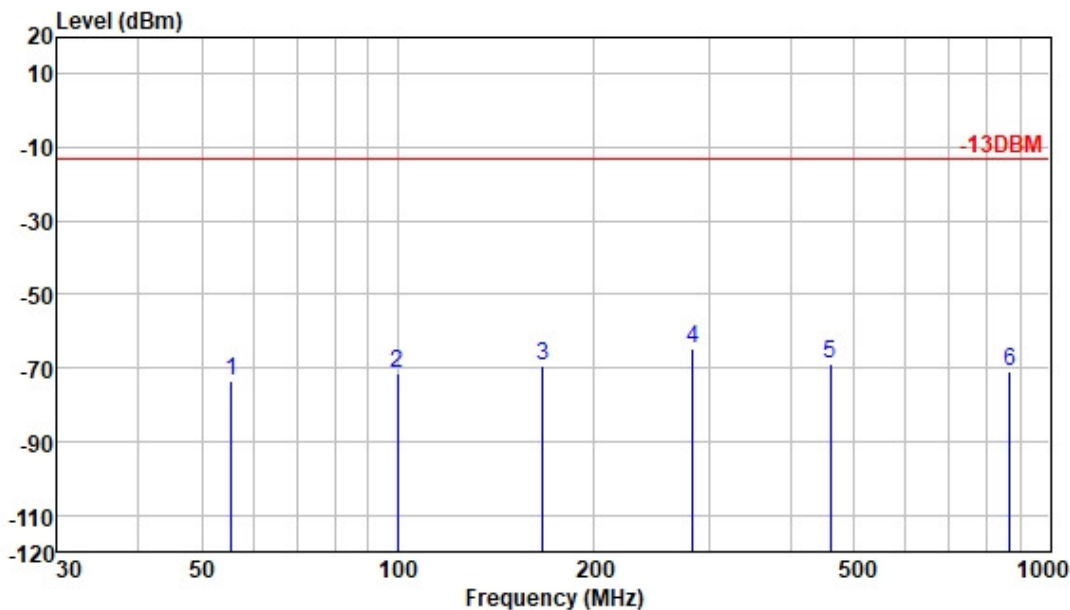
	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1227.79	-60.37	3.64	-56.73	-12.99	-43.74	HORIZONTAL
2	2053.82	-62.30	9.74	-52.56	-12.99	-39.57	HORIZONTAL
3	3242.62	-62.76	2.23	-60.53	-12.99	-47.54	HORIZONTAL
4	5090.01	-63.87	11.82	-52.05	-12.99	-39.06	HORIZONTAL
5	7411.46	-63.66	16.43	-47.23	-12.99	-34.24	HORIZONTAL
6	10854.25	-63.28	23.98	-39.30	-12.99	-26.31	HORIZONTAL



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DL_1S_M_AWGN_Vertical_30MHz~1GHz



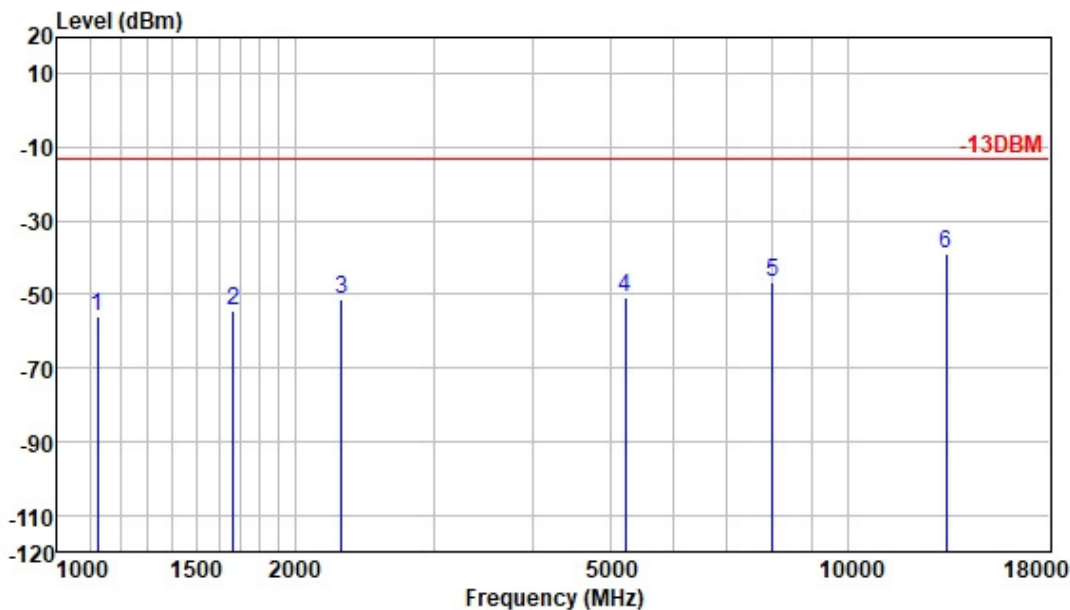
	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	55.41	-69.76	-3.97	-73.73	-12.99	-60.74	VERTICAL
2	99.88	-66.20	-5.14	-71.34	-12.99	-58.35	VERTICAL
3	166.65	-65.58	-3.94	-69.52	-12.99	-56.53	VERTICAL
4	282.99	-62.13	-2.70	-64.83	-12.99	-51.84	VERTICAL
5	460.73	-70.32	1.67	-68.65	-12.99	-55.66	VERTICAL
6	866.09	-78.98	8.24	-70.74	-12.99	-57.75	VERTICAL



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DL_1S_M_AWGN_Vertical_above 1GHz

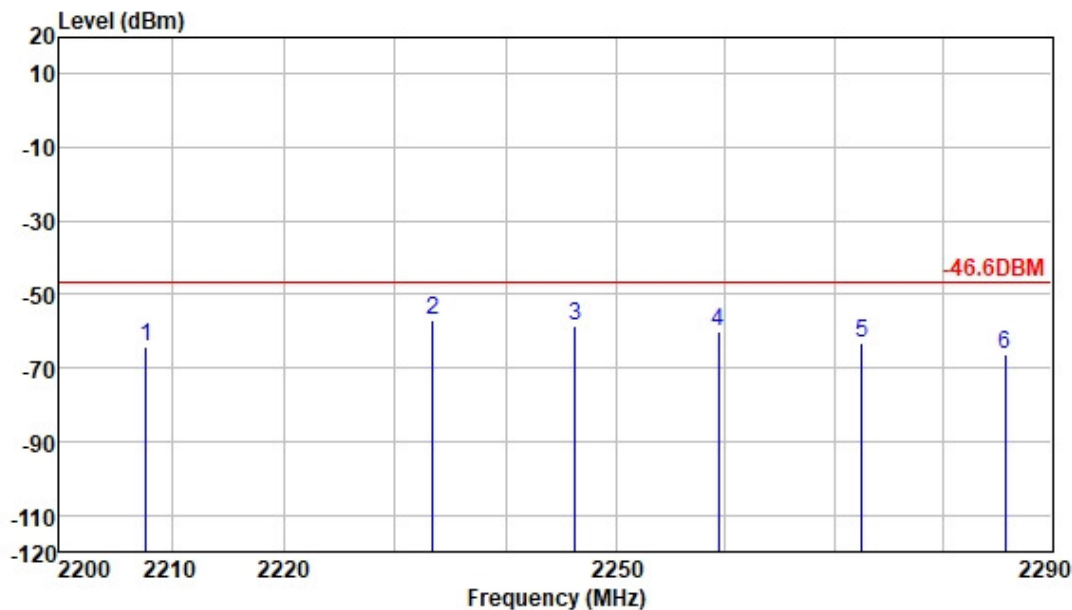


	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1125.81	-59.45	3.39	-56.06	-12.99	-43.07	VERTICAL
2	1667.95	-59.59	5.39	-54.20	-12.99	-41.21	VERTICAL
3	2285.64	-61.03	9.56	-51.47	-12.99	-38.48	VERTICAL
4	5224.15	-63.45	12.64	-50.81	-12.99	-37.82	VERTICAL
5	8013.02	-63.04	16.19	-46.85	-12.99	-33.86	VERTICAL
6	13288.28	-64.76	25.76	-39.00	-12.99	-26.01	VERTICAL



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DL_1S_M_AWGN_Horizontal_2200MHz~2290MHz



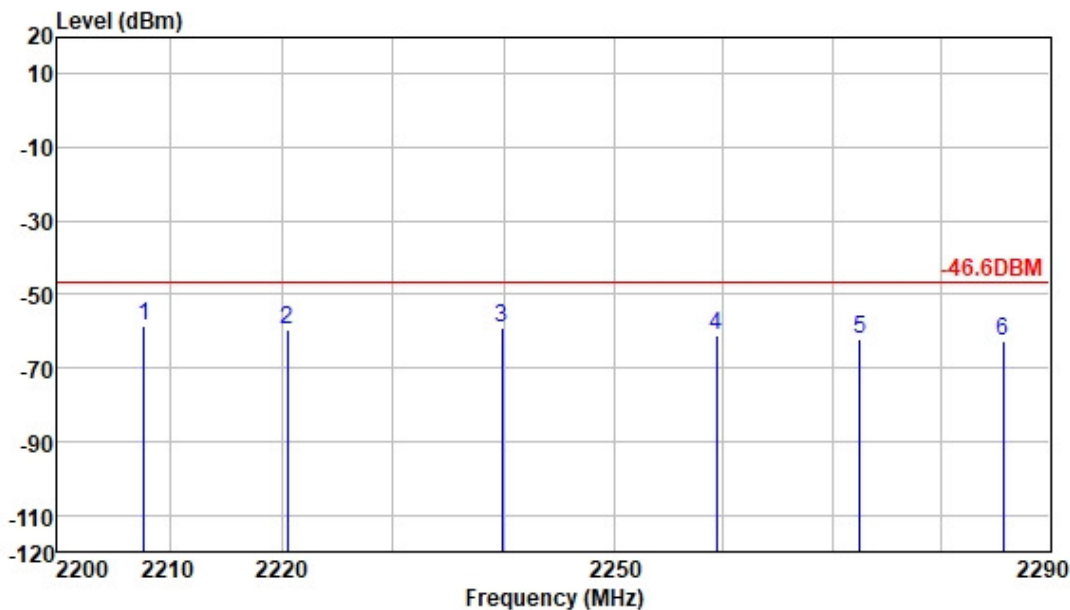
	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	2207.72	-73.48	9.25	-64.23	-46.60	-17.63	HORIZONTAL
2	2233.40	-66.11	9.35	-56.76	-46.60	-10.16	HORIZONTAL
3	2246.34	-67.91	9.41	-58.50	-46.60	-11.90	HORIZONTAL
4	2259.37	-69.71	9.47	-60.24	-46.60	-13.64	HORIZONTAL
5	2272.47	-72.80	9.51	-63.29	-46.60	-16.69	HORIZONTAL
6	2285.64	-75.90	9.55	-66.35	-46.60	-19.75	HORIZONTAL



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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	2207.72	-67.99	9.43	-58.56	-46.60	-11.96	VERTICAL
2	2220.52	-69.05	9.45	-59.60	-46.60	-13.00	VERTICAL
3	2239.86	-68.56	9.49	-59.07	-46.60	-12.47	VERTICAL
4	2259.37	-70.77	9.52	-61.25	-46.60	-14.65	VERTICAL
5	2272.47	-71.63	9.55	-62.08	-46.60	-15.48	VERTICAL
6	2285.64	-72.47	9.56	-62.91	-46.60	-16.31	VERTICAL

--End of Appendix B--



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