

Appendix -

Test Data and Result for report

GZCR240300025502



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Remark: Manufacture declared the product support 2X2 MIMO with identical PCB layout/component use/Tune up that make sure each antenna port with identical RF output, so the test only performed at one of the antenna ports in this report.

1 Out-of-band rejection

Out-of-band rejection

DL

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.594 00 GHz			36.72 dBm
2	N	1	f	2.494 06 GHz			24.67 dBm
3	N	1	f	2.691 94 GHz			18.81 dBm
4							
5							
6							

The peak of the frequency response f0 is 2594.0MHz.

The frequency point f0 with the highest power level fall in the CMRS band, EUT is compiled the KDB 935210 D05 Signal Booster Measurements v01r04 Out-of-band rejection verification test requirement.



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2 Input versus Output comparison

Occupied Bandwidth				
Test Path	Test Signal	Test Channel	Signal Level	Verdict
DL	4.1MHz AWGN	MCH	Pre-AGC	PASS
			3dB above AGC	PASS
	100MHz AWGN	MCH	Pre-AGC	PASS
			3dB above AGC	PASS
	GSM	MCH	Pre-AGC	PASS
			3dB above AGC	PASS

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.

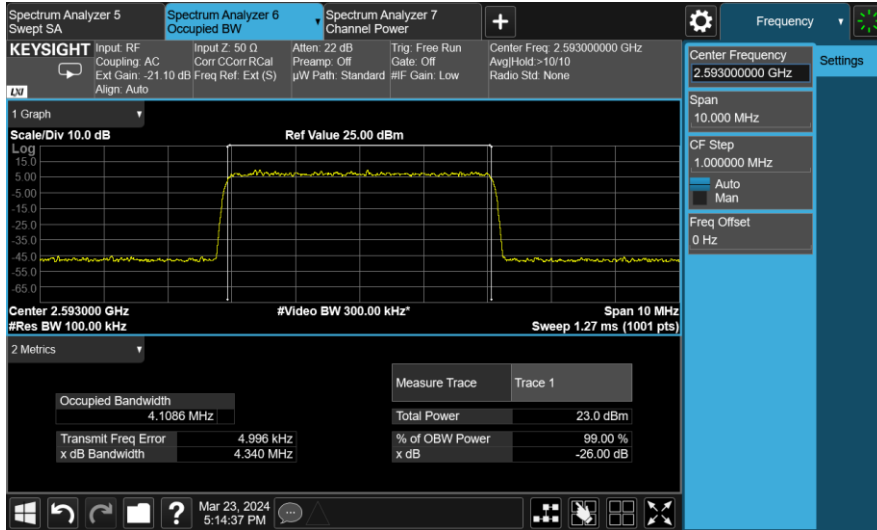


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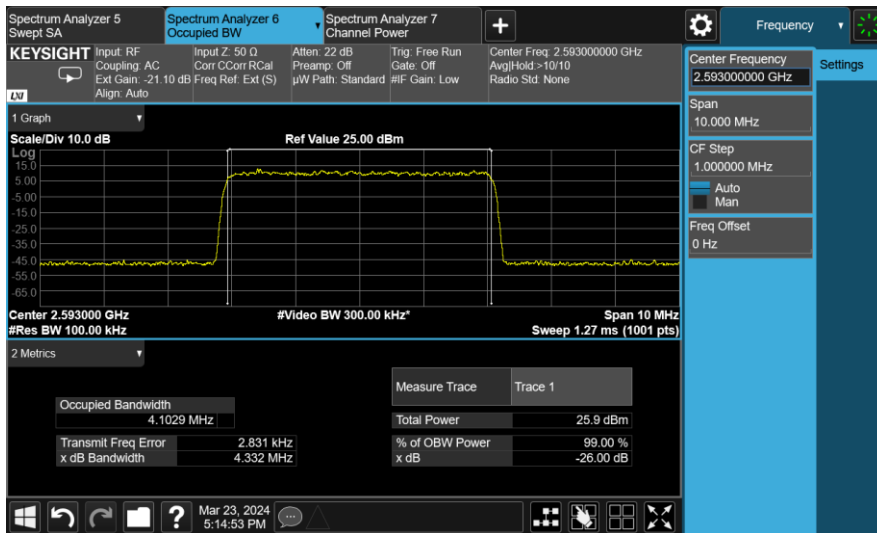
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Guangzhou Branch Test Center EMC Laboratory 中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 sgs.china@sgs.com

99% OBW

DL_4.1MHz AWGN_MCH_Input_Pre-AGC



DL_4.1MHz AWGN_MCH_Input_3dB above AGC

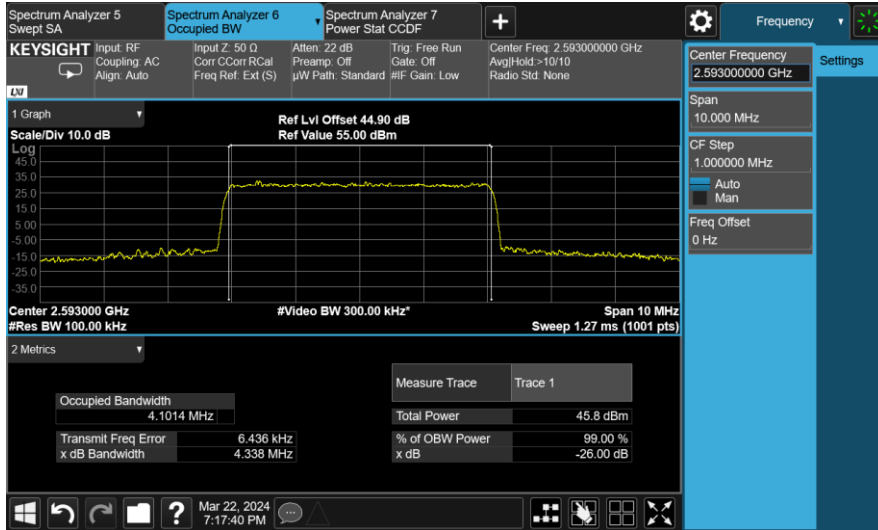


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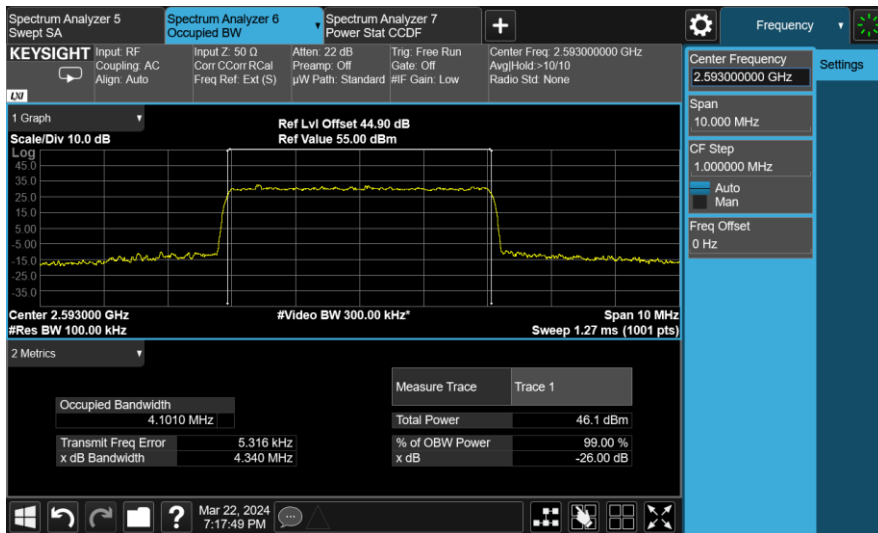
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99% OBW

DL_4.1MHz AWGN_MCH_Output_Pre-AGC



DL_4.1MHz AWGN_MCH_Output_3dB above AGC

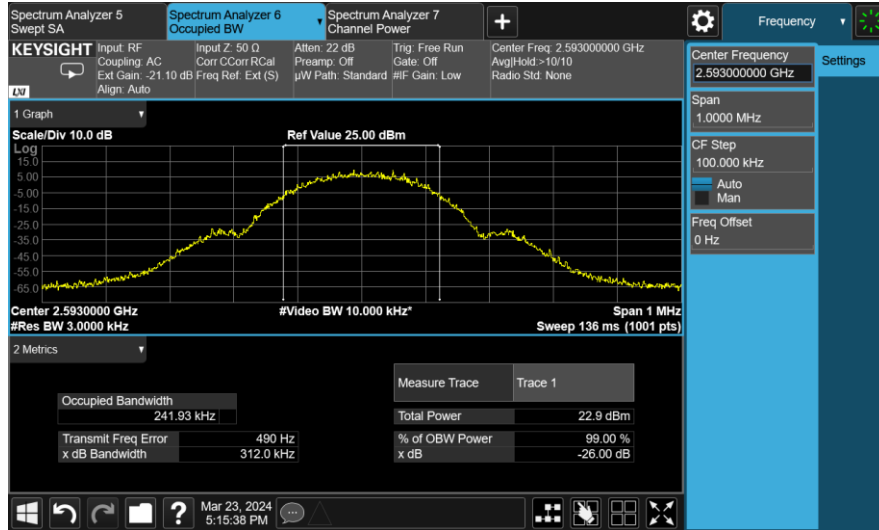


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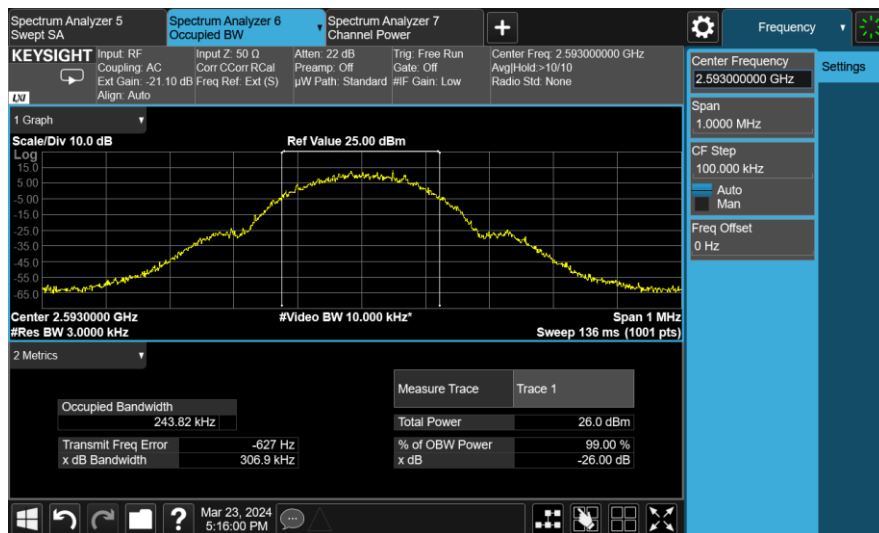
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99% OBW

DL_GSM_MCH_Input_Pre-AGC



DL_GSM_MCH_Input_3dB above AGC

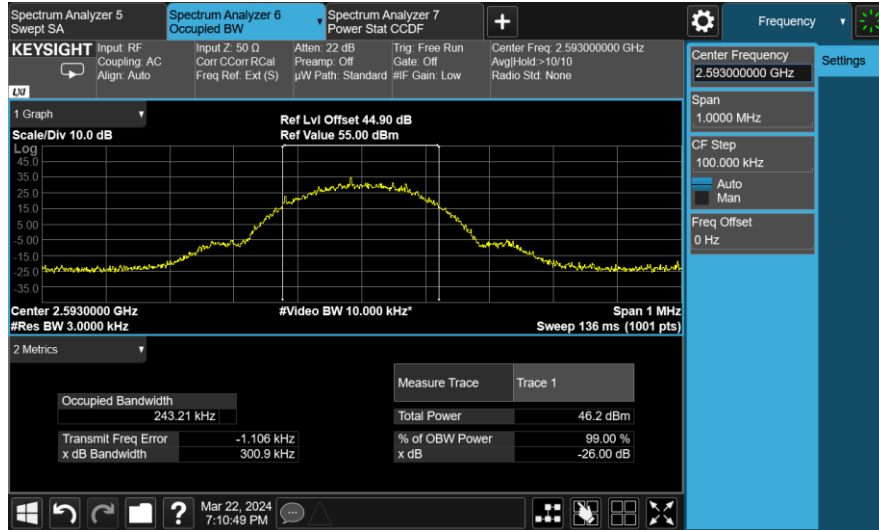


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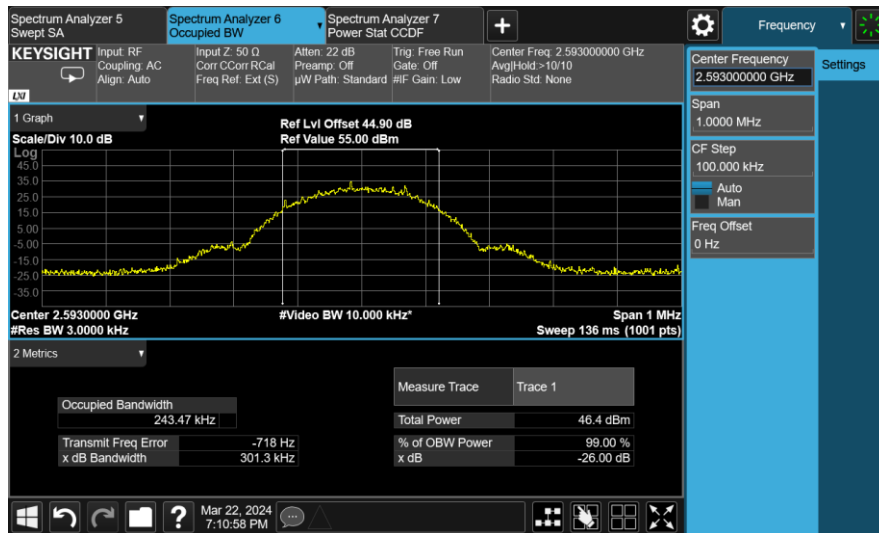
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99% OBW

DL_GSM_MCH_Output_Pre-AGC



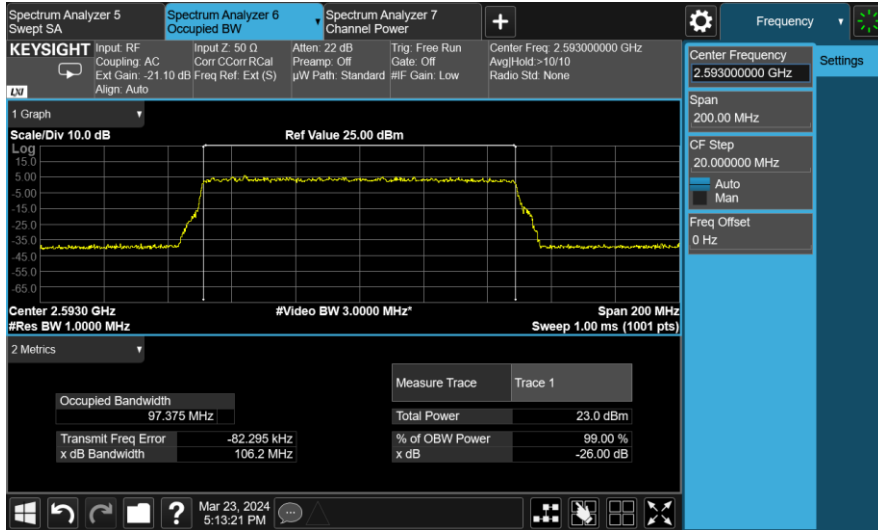
DL_GSM_MCH_Output_3dB above AGC



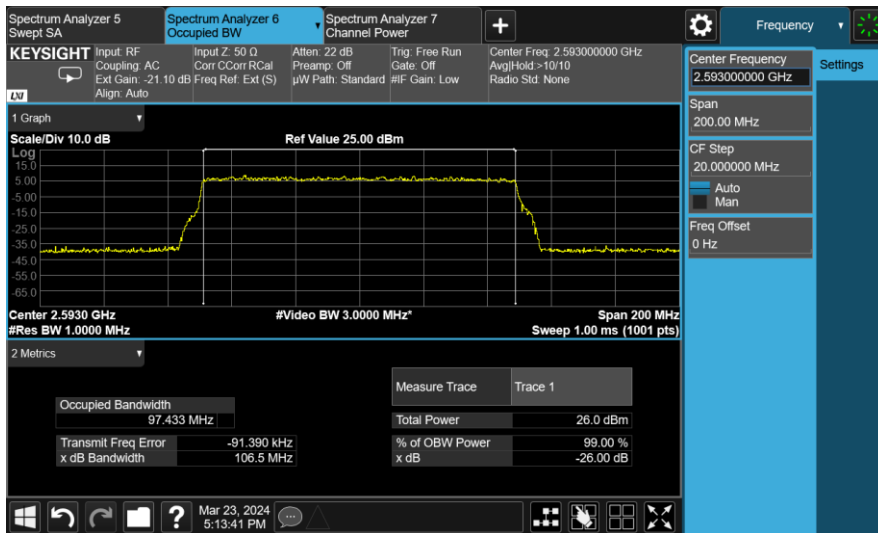
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DL_100MHz AWGN_MCH_Input_Pre-AGC



DL_100MHz AWGN_MCH_Input_3dB above AGC

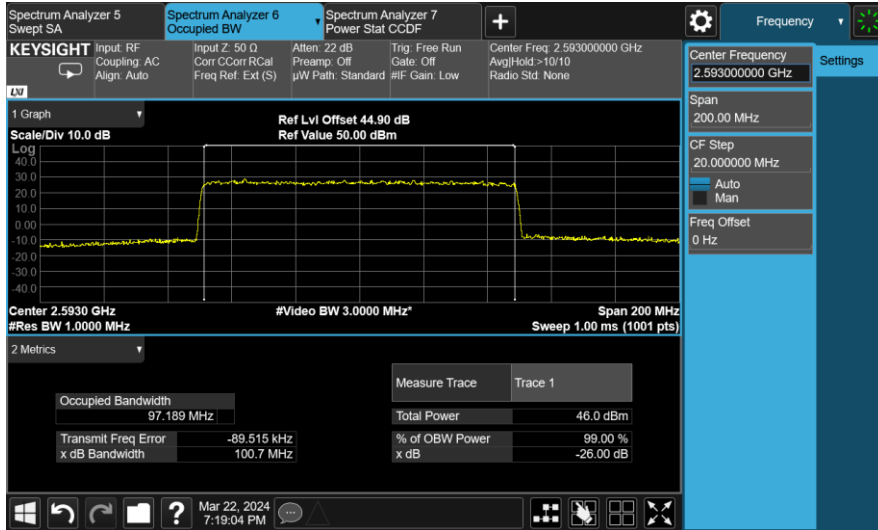


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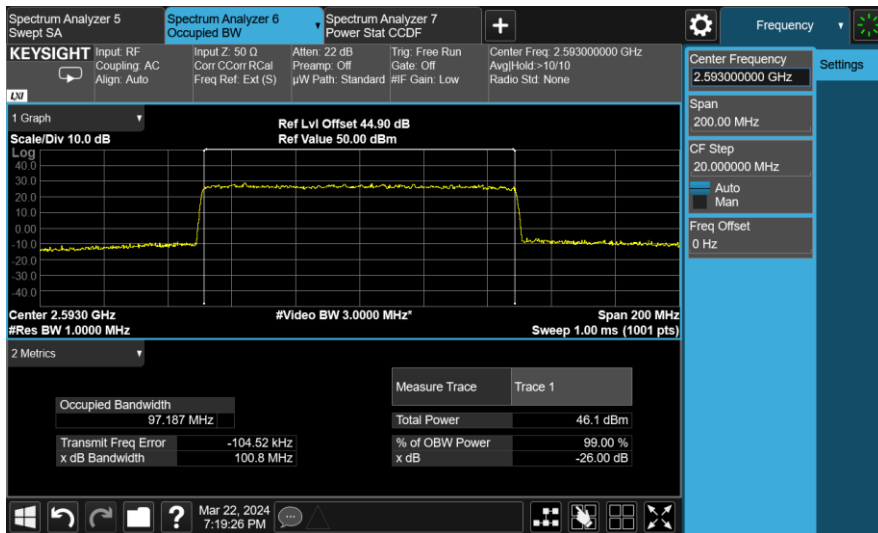
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DL_100MHz AWGN_MCH_Output_Pre-AGC



DL_100MHz AWGN_MCH_Output_3dB above AGC



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3 Output power and amplifier/booster gain

Mean output power and gain									
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	Input power (dBm)	Output Power (dBm)	SISO EIRP (W)	Total EIRP (W)	Gain (dB)	Verdict
DL	2594.0	4.1MHz AWGN	Pre-AGC	23.00	45.96	124.74	498.89	22.96	PASS
			3dB above AGC	26.00	46.34	136.15	544.51	/	PASS
		100MHz AWGN	Pre-AGC	23.00	46.69	147.58	590.21	23.69	PASS
			3dB above AGC	26.00	46.41	138.36	553.36	/	PASS
		GSM	Pre-AGC	23.00	46.54	142.57	570.17	23.54	PASS
			3dB above AGC	26.00	46.13	129.72	518.81	/	PASS

Remark:

- f0 is from Out-of-band Rejection test in the report.
 - EIRP= output power (dBm)+ antenna gain (dBi), the antenna gain is 5dBi declared by the manufacturer, the directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi = 8dBi.
 - For main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern:
 $EIRP \leq 33dBW + 10\lg(X/Y)$ dBW + $10\lg(360/\text{beamwidth})$ dBW = $1995W + 10\lg(X/Y)$ dBW + $10\lg(360/\text{beamwidth})$
 - For other main or booster:
 $EIRP \leq 33dBW + 10\lg(X/Y)$ dBW = $1995W + 10\lg(X/Y)$ dBW
- where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition.
- The conducted test performed at ANT 1 port only due to the two MIMO ports with identical design(Hardware & software) and radio output.



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4 Out-of-band/out-of-block(including intermodulation) emissions

Out-of-band/out-of-block(including intermodulation) emissions							
Test Path	Test Channel	Test Signal	Stimulus Condition	Signal Level	Worst conducted test level (dBm)	Limit (dBm)	Verdict
DL	LCH	4.1MHz AWGN	One signal input	Pre-AGC	-24.78	≤-16	PASS
				3dB above AGC	-22.97		PASS
			Two signals input	Pre-AGC	-28.27		PASS
				3dB above AGC	-29.49		PASS
	HCH		One signal input	Pre-AGC	-23.22		PASS
				3dB above AGC	-24.54		PASS
			Two signals input	Pre-AGC	-26.74		PASS
				3dB above AGC	-26.83		PASS
DL	LCH	100MHz AWGN	One signal input	Pre-AGC	-19.02	≤-16	PASS
				3dB above AGC	-19.51		PASS
			Two signals input	Pre-AGC	-21.11		PASS
				3dB above AGC	-20.22		PASS
	HCH		One signal input	Pre-AGC	-17.09		PASS
				3dB above AGC	-16.90		PASS
			Two signals input	Pre-AGC	-19.95		PASS
				3dB above AGC	-19.38		PASS

Remark:

1. 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, here,

$$P = 46\text{dBm} = 39.82\text{W}$$

$$\text{the limit} = 46\text{dBm} - [43 + 10\log_{10}(39.82\text{W})] \text{ dB} = -13\text{dBm}$$

2. For 2x2 MIMO, ANT1 port was measured and the limit was showed $-13\text{dBm} - 10\lg(2) = -16\text{dBm}$ to determine the test result conveniently.



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Out-of-band/out-of-block(including intermodulation) emissions							
Test Path	Test Channel	Test Signal	Stimulus Condition	Signal Level	Worst conducted test level (dBm)	Limit (dBm)	Verdict
DL	LCH	GSM	One signal input	Pre-AGC	-32.82	≤-16	PASS
				3dB above AGC	-33.03		PASS
			Two signals input	Pre-AGC	-29.97		PASS
				3dB above AGC	-29.62		PASS
	HCH		One signal input	Pre-AGC	-29.61		PASS
				3dB above AGC	-29.77		PASS
			Two signals input	Pre-AGC	-33.13		PASS
				3dB above AGC	-32.96		PASS

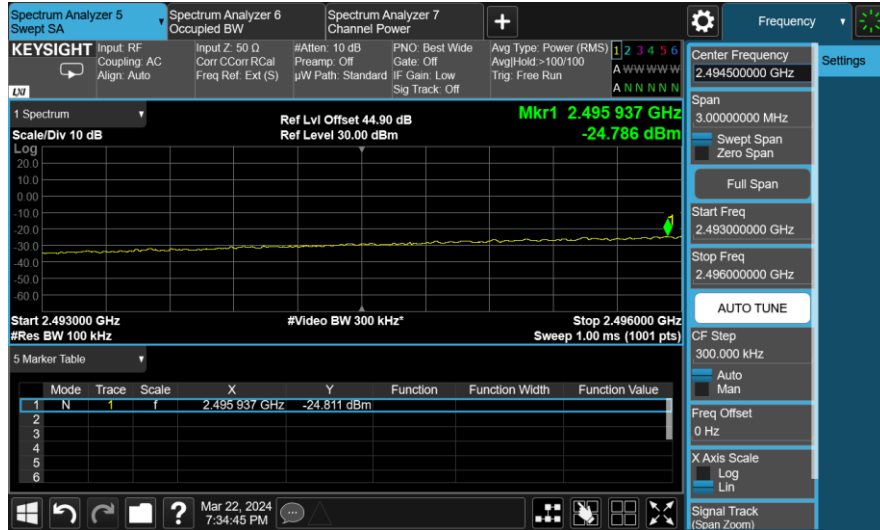
Remark:
 1. The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10log10 (P) dB, here,
 $P = 46\text{dBm} = 39.82\text{W}$
 the limit = 46dBm – [43 + 10 log10 (39.82W)] dB = -13dBm
 2. For 2x2 MIMO, ANT1 port was measured and the limit was showed -13dBm- 10lg(2)= -16dBm to determine the test result conveniently.



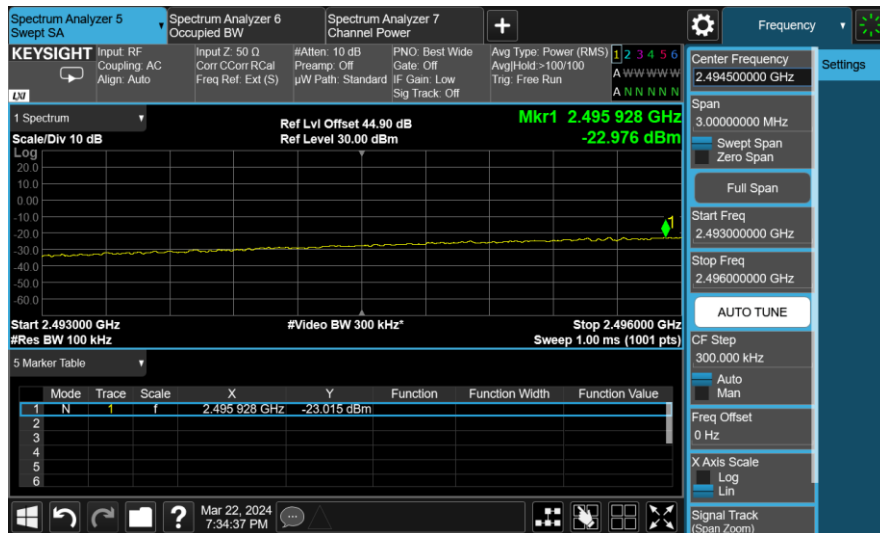
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Out-of-band/out-of-block emissions

DL_4.1MHz AWGN_LCH_a single test signal_Pre-AGC



DL_4.1MHz AWGN_LCH_a single test signal_3dB above AGC

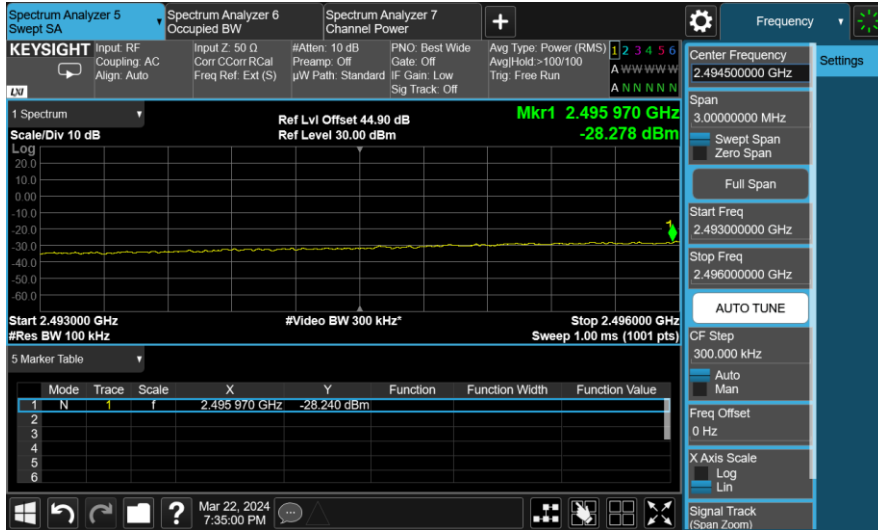


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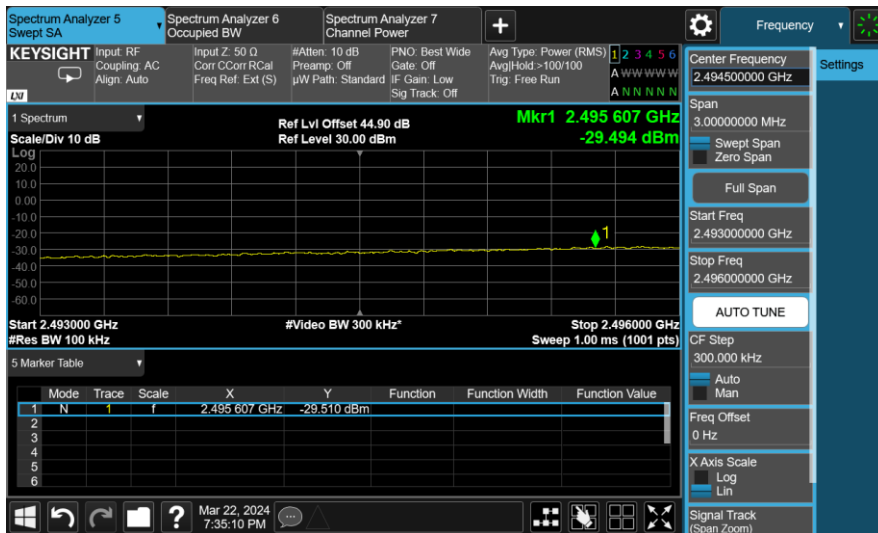
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Out-of-band/out-of-block emissions

DL_4.1MHz AWGN_LCH_two adjacent test signals_Pre-AGC



DL_4.1MHz AWGN_LCH_two adjacent test signals_3dB above AGC

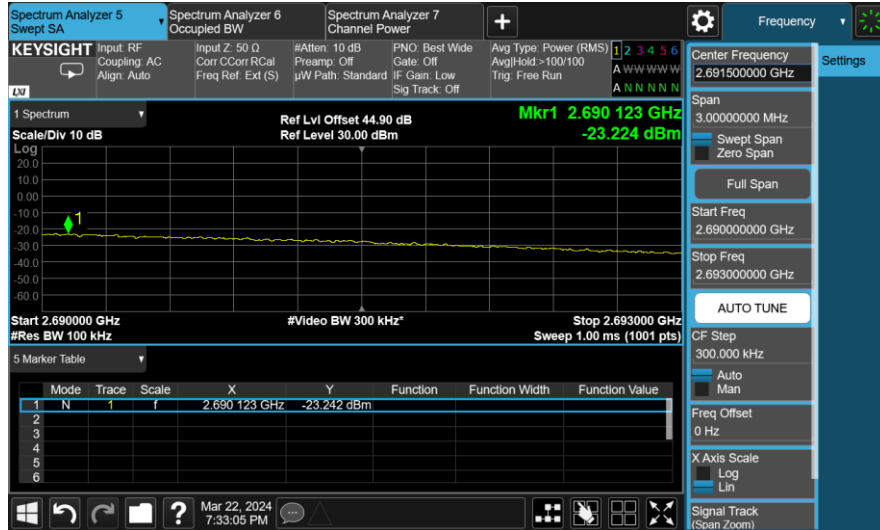


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Out-of-band/out-of-block emissions

DL_4.1MHz AWGN_HCH_a single test signal_Pre-AGC



DL_4.1MHz AWGN_HCH_a single test signal_3dB above AGC

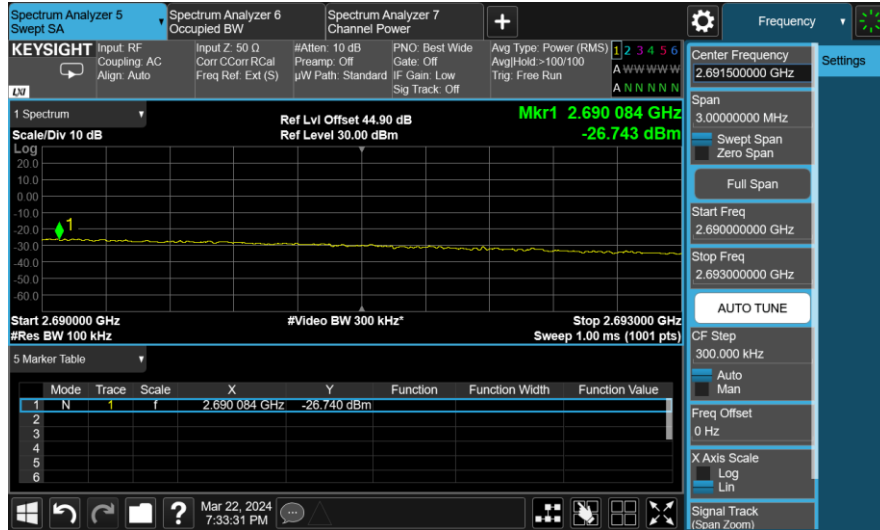


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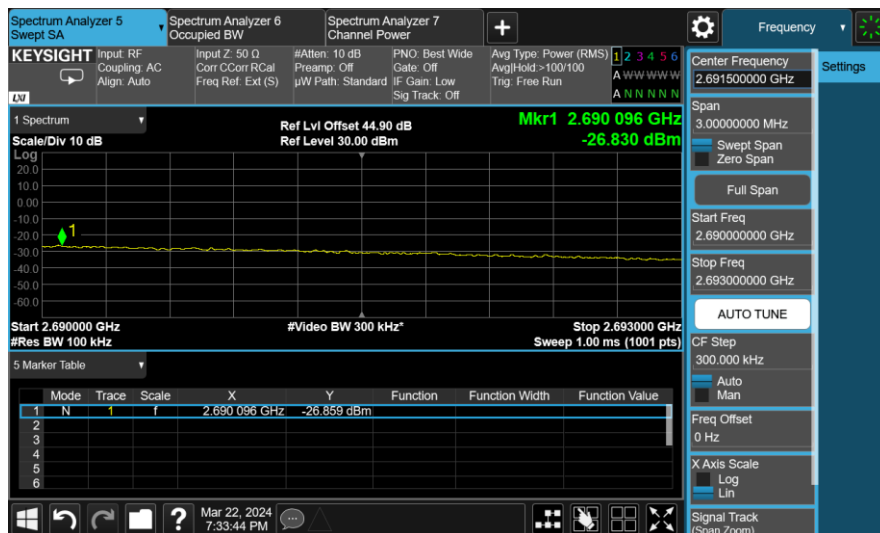
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Out-of-band/out-of-block emissions

DL_4.1MHz AWGN_HCH_two adjacent test signals_Pre-AGC



DL_4.1MHz AWGN_HCH_two adjacent test signals_3dB above AGC



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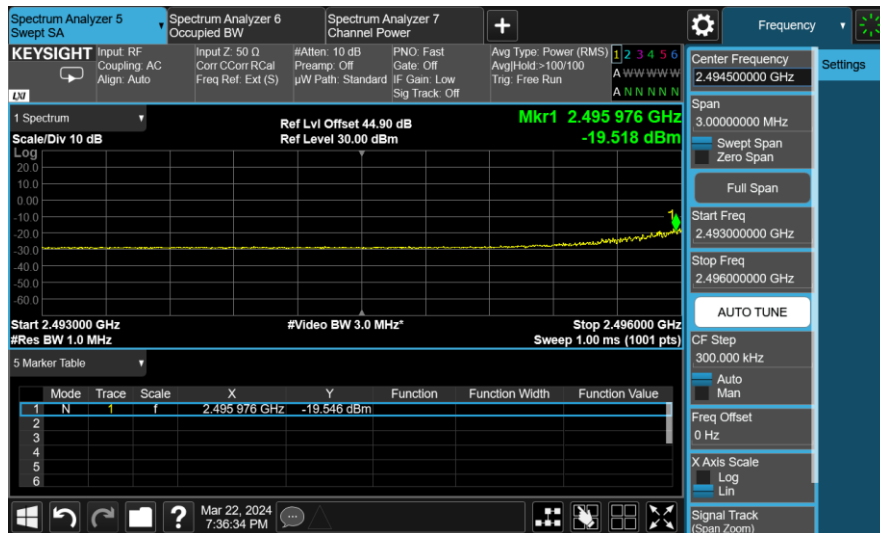
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Out-of-band/out-of-block emissions

DL_100MHz AWGN_LCH_a single test signal_Pre-AGC



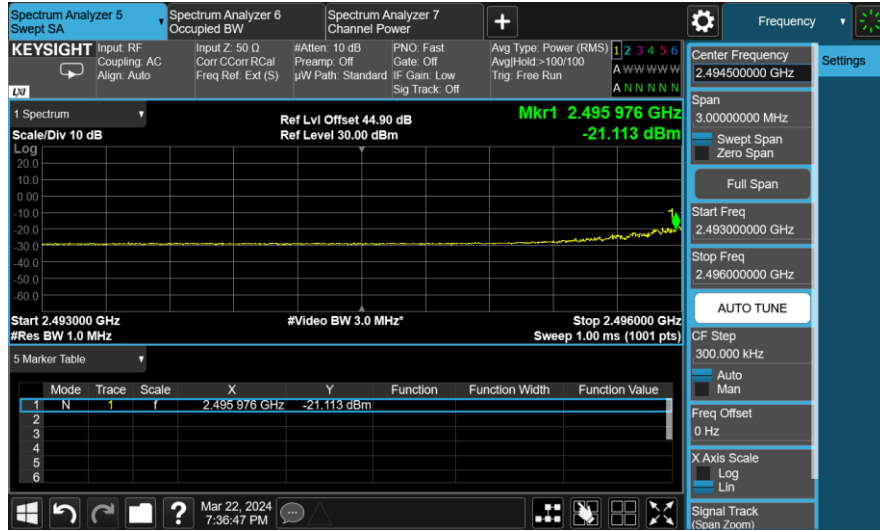
DL_100MHz AWGN_LCH_a single test signal_3dB above AGC



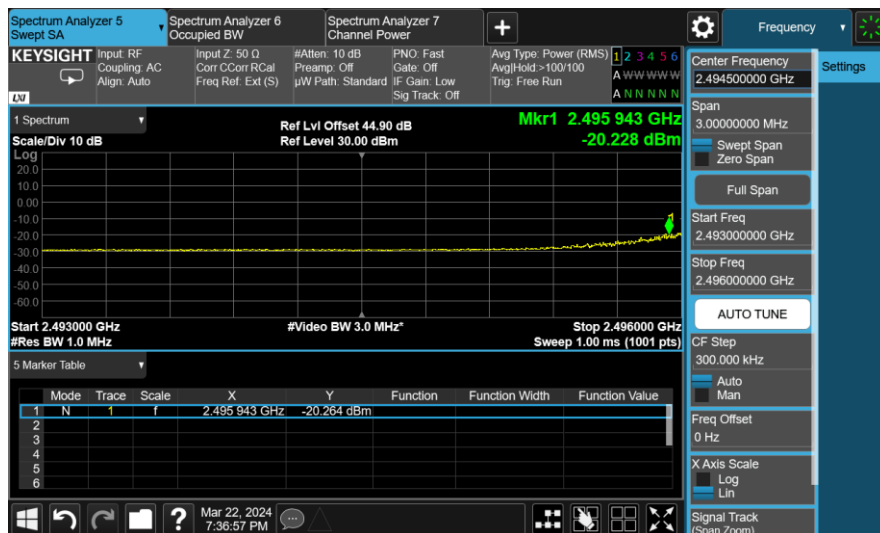
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Out-of-band/out-of-block emissions

DL_100MHz AWGN_LCH_two adjacent test signals_Pre-AGC



DL_100MHz AWGN_LCH_two adjacent test signals_3dB above AGC

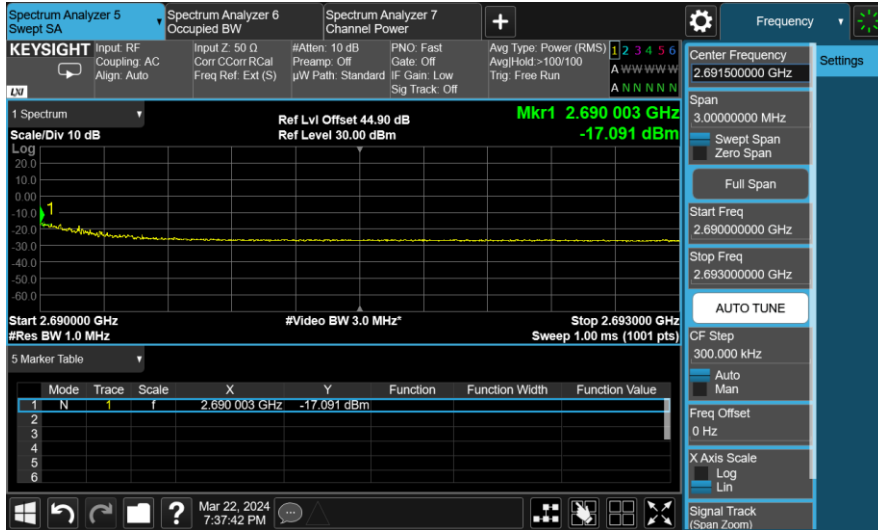


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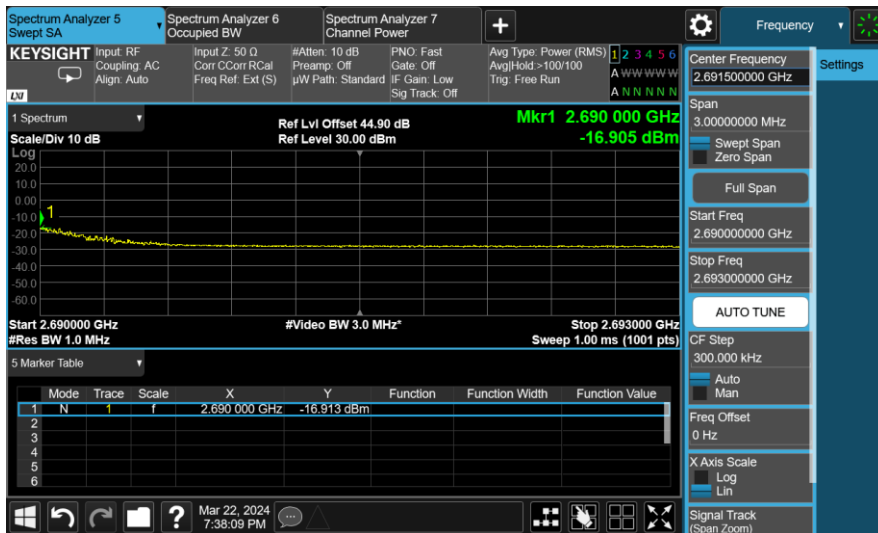
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Out-of-band/out-of-block emissions

DL_100MHz AWGN_HCH_a single test signal_Pre-AGC



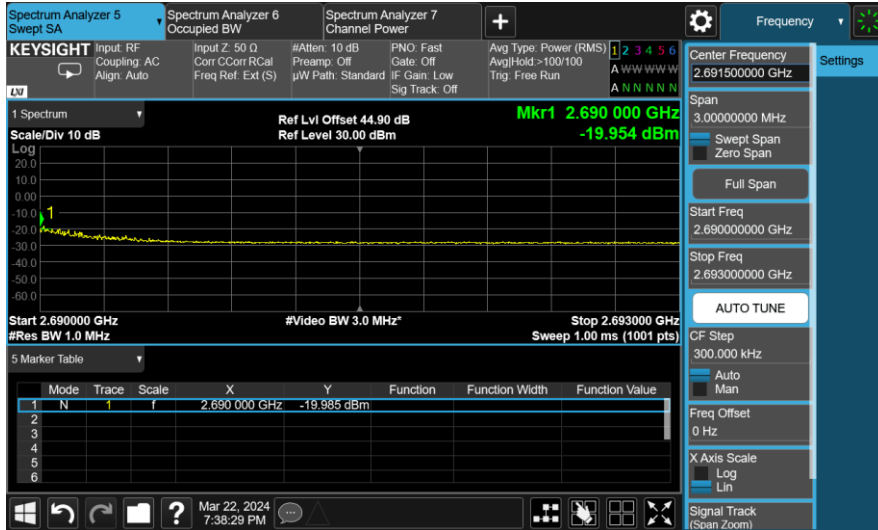
DL_100MHz AWGN_HCH_a single test signal_3dB above AGC



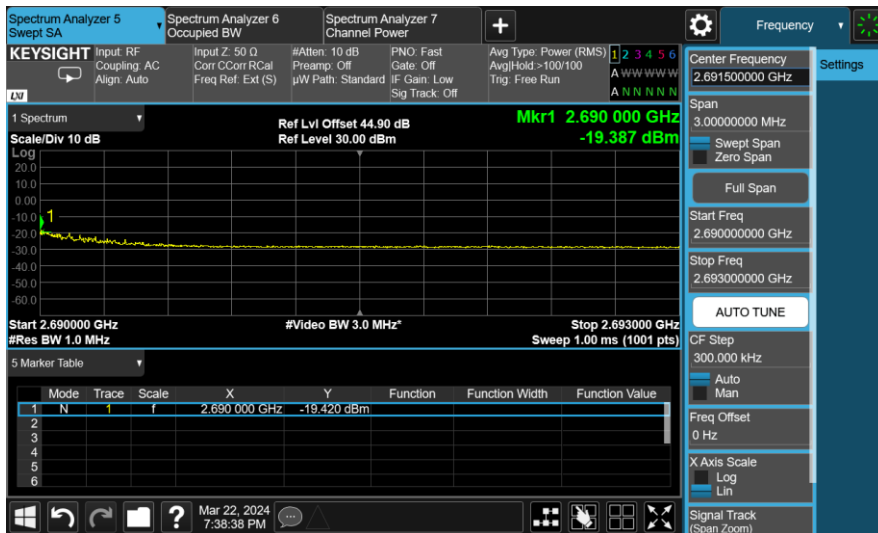
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Out-of-band/out-of-block emissions

DL_100MHz AWGN_HCH_two adjacent test signals_Pre-AGC



DL_100MHz AWGN_HCH_two adjacent test signals_3dB above AGC

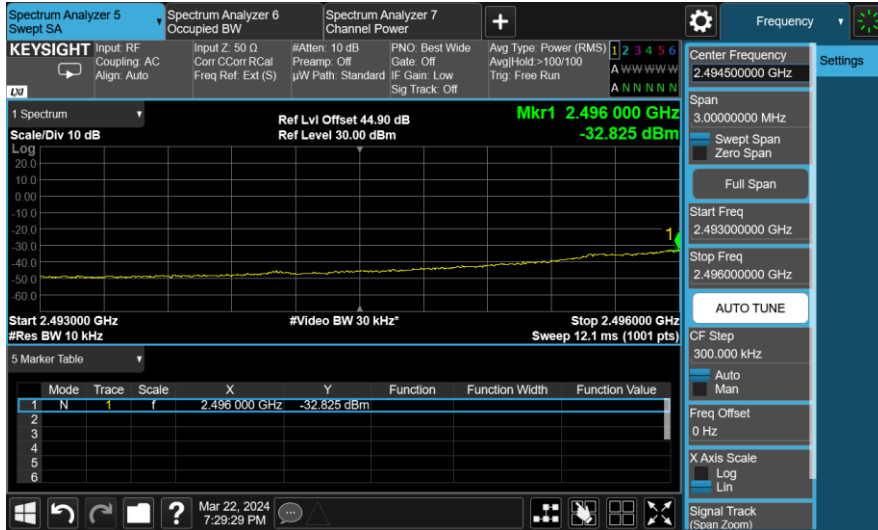


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Out-of-band/out-of-block emissions

DL_GSM_LCH_a single test signal_Pre-AGC



DL_GSM_LCH_a single test signal_3dB above AGC

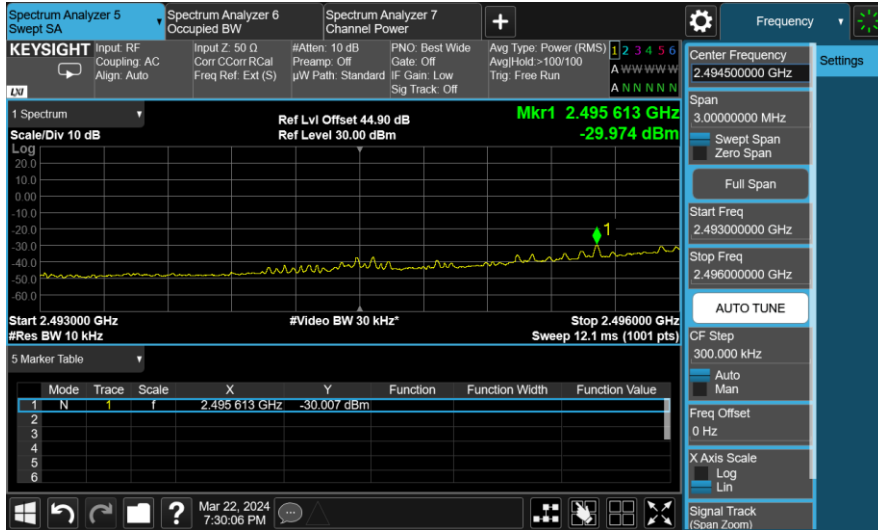


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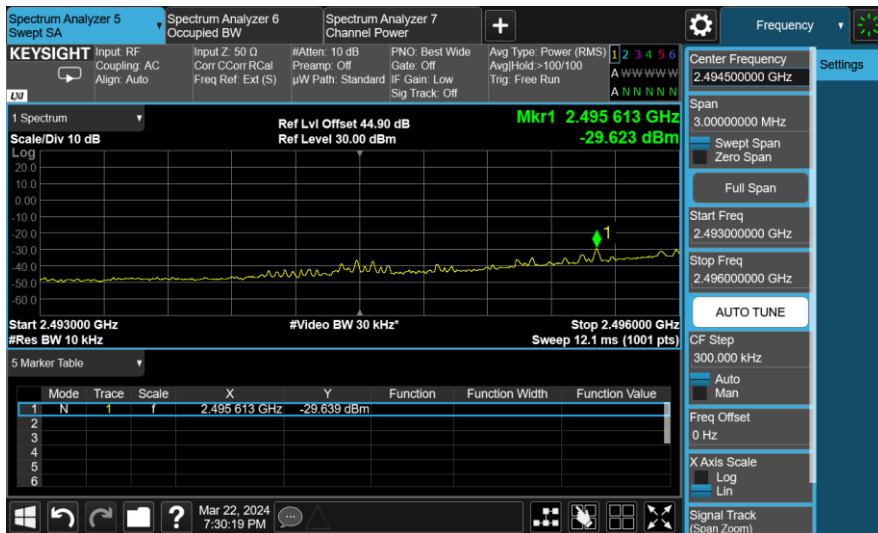
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Out-of-band/out-of-block emissions

DL_GSM_LCH_two adjacent test signals_Pre-AGC



DL_GSM_LCH_two adjacent test signals_3dB above AGC

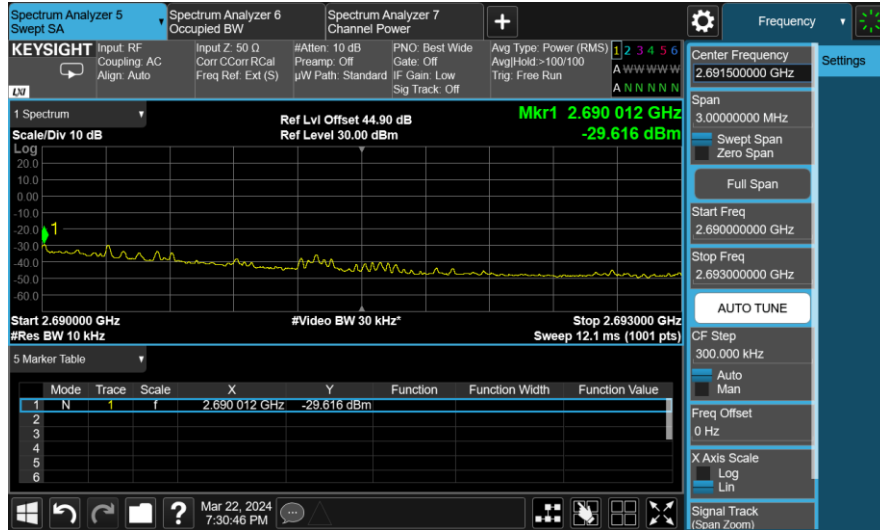


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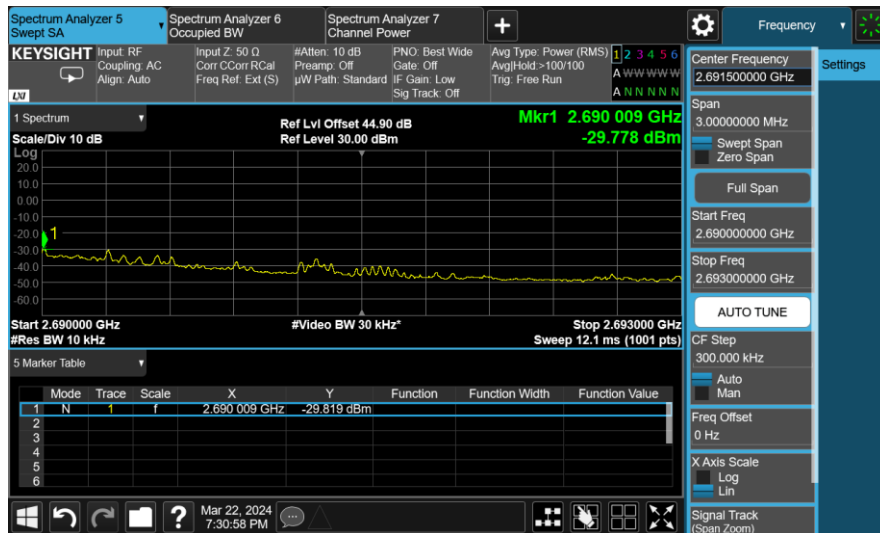
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Out-of-band/out-of-block emissions

DL_GSM_HCH_a single test signal_Pre-AGC



DL_GSM_HCH_a single test signal_3dB above AGC

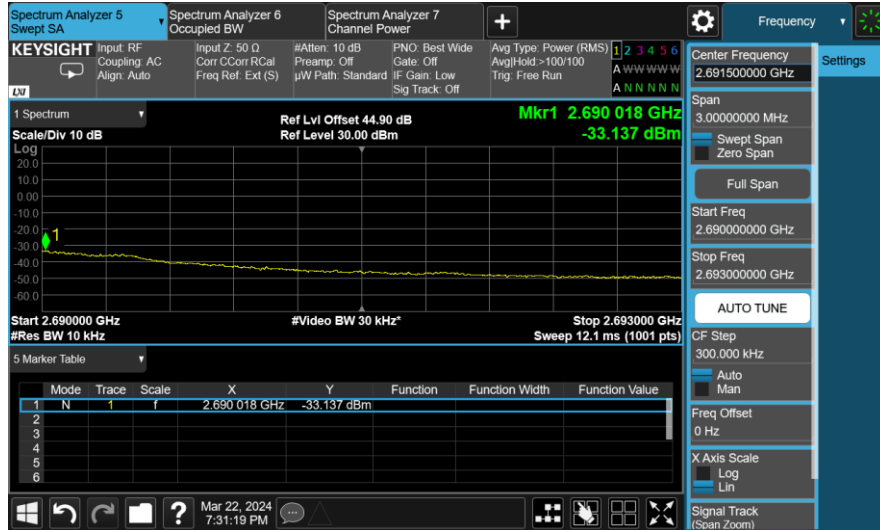


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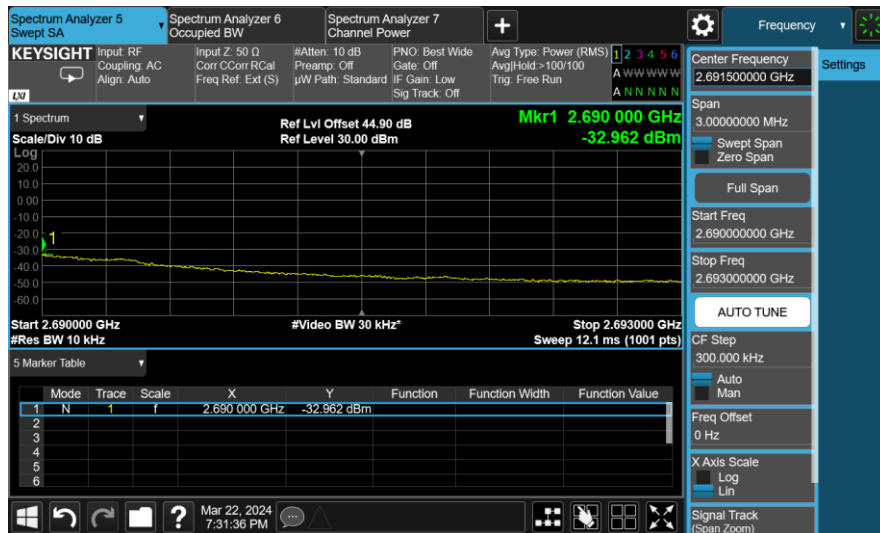
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Out-of-band/out-of-block emissions

DL_GSM_HCH_two adjacent test signals_Pre-AGC



DL_GSM_HCH_two adjacent test signals_3dB above AGC



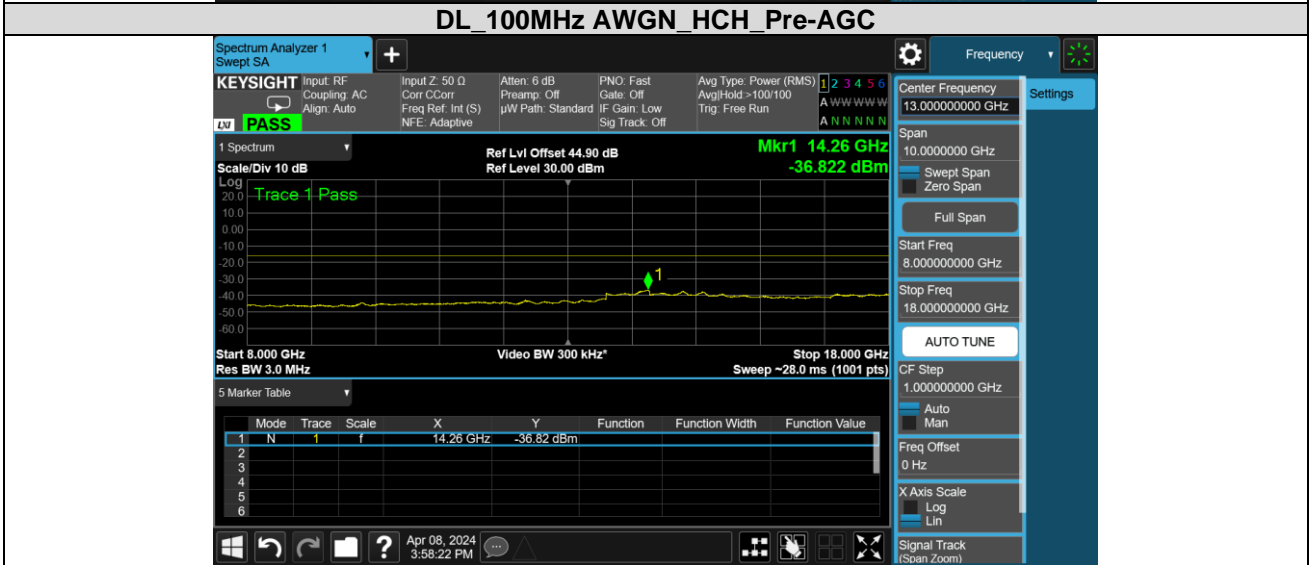
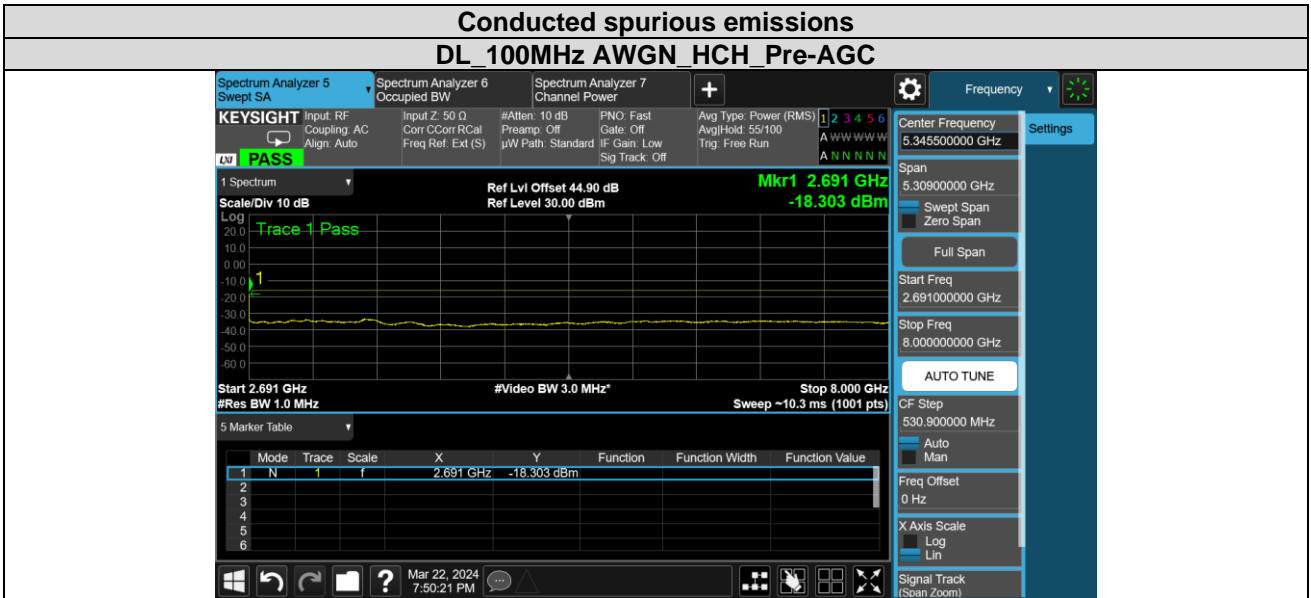
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5 Conducted Spurious emissions



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Remark:

- 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, here,
 $P = 46\text{dBm} = 39.82\text{W}$
the limit = $46\text{dBm} - [43 + 10\log_{10}(39.82\text{W})] \text{dB} = -13\text{dBm}$
- For 2x2 MIMO, ANT1 port was measured and the limit was showed $-13\text{dBm} - 10\lg(2) = -16\text{dBm}$ to determine the test result conveniently.
- The spurious emissions 9kHz to 30MHz and above 18GHz were very low and not displayed in this report.
- All modes (LCH/MCH/HCH, with GSM signal/ with 4.1MHz AWGN signal/ with 100MHz AWGN signal) had been tested, only show the worst-case in this report.



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6 Frequency Stability

Frequency stability vs voltage							
Test path	Test Freq. (MHz)	Test Signal	Temperature	Voltage	Freq. error (Hz)	Tolerance (ppm)	Verdict
DL	2593	4.1MHz AWGN	TN	VL	17	0.0066	PASS
			TN	VH	20	0.0077	PASS
		100MHz AWGN	TN	VL	18	0.0069	PASS
			TN	VH	17	0.0066	PASS
		GSM	TN	VL	13	0.0050	PASS
			TN	VH	10	0.0039	PASS



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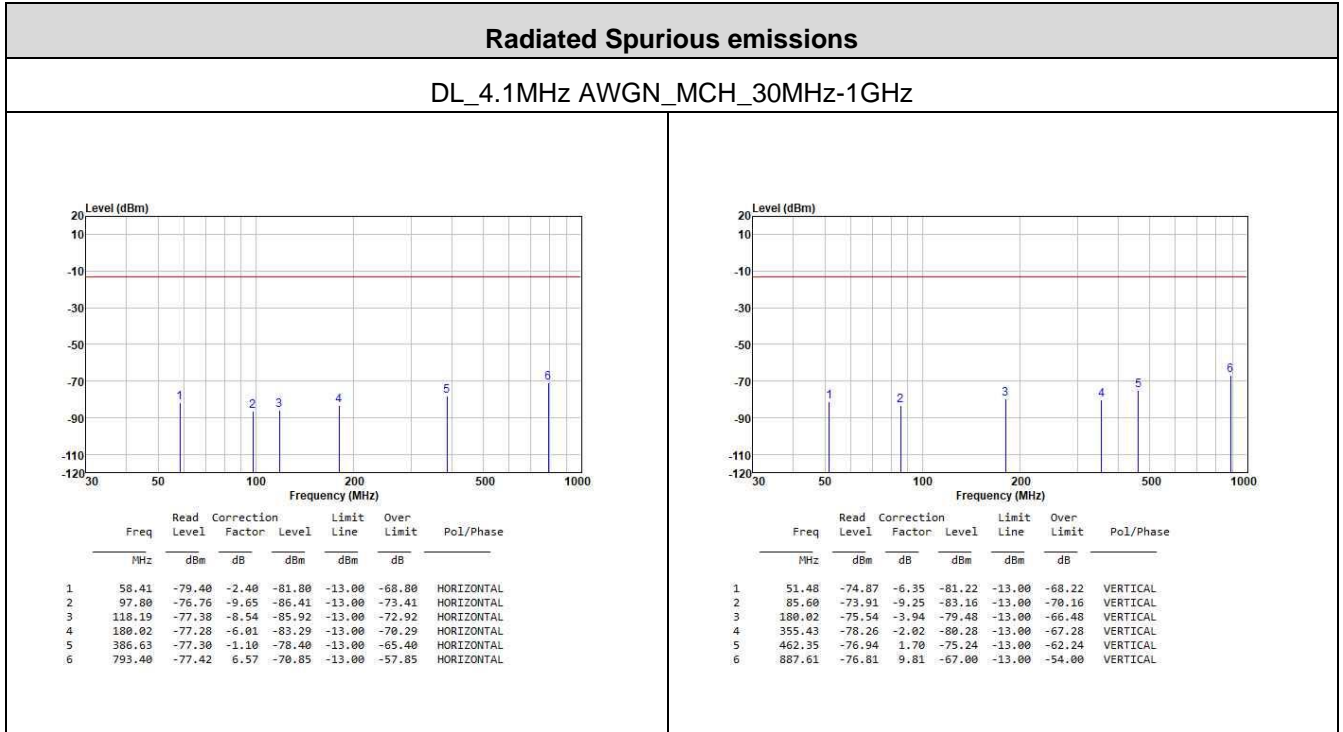
Frequency stability vs temperature							
Test Path	Test Freq. (MHz)	Test Signal	Voltage	Temperature (°C)	Freq. error (Hz)	Tolerance (ppm)	Verdict
DL	2593	4.1MHz AWGN	VN	+50	18	0.0069	PASS
			VN	+40	16	0.0062	PASS
			VN	+30	19	0.0073	PASS
			VN	+20	20	0.0077	PASS
			VN	+10	21	0.0081	PASS
			VN	0	17	0.0066	PASS
			VN	-10	17	0.0066	PASS
			VN	-20	19	0.0073	PASS
			VN	-30	16	0.0062	PASS
	2593	100MHz AWGN	VN	+50	21	0.0081	PASS
			VN	+40	18	0.0069	PASS
			VN	+30	19	0.0073	PASS
			VN	+20	22	0.0085	PASS
			VN	+10	16	0.0062	PASS
			VN	0	18	0.0069	PASS
			VN	-10	17	0.0066	PASS
			VN	-20	20	0.0077	PASS
			VN	-30	19	0.0073	PASS
	2593	GSM	VN	+50	11	0.0042	PASS
			VN	+40	14	0.0054	PASS
			VN	+30	13	0.0050	PASS
			VN	+20	11	0.0042	PASS
			VN	+10	12	0.0046	PASS
			VN	0	14	0.0054	PASS
			VN	-10	10	0.0039	PASS
			VN	-20	15	0.0058	PASS
			VN	-30	9	0.0035	PASS



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7 Radiated Spurious emissions

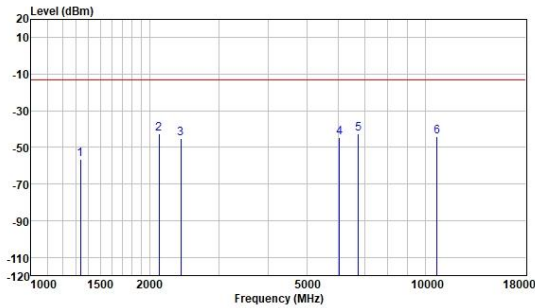


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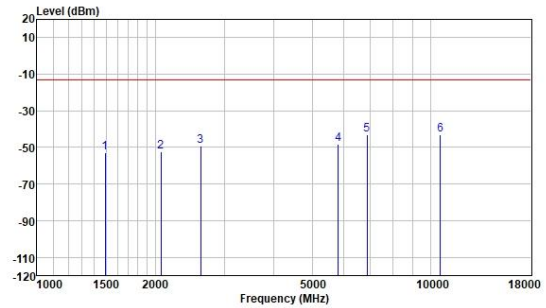
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Radiated Spurious emissions

DL_4.1MHz AWGN_MCH_above 1GHz



	Freq	Read Level	Correction Factor	Level	Limit	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1335.14	-60.55	4.12	-56.43	-13.00	-43.43	HORIZONTAL
2	2114.05	-51.97	9.47	-42.50	-13.00	-29.50	HORIZONTAL
3	2490.75	-54.81	9.50	-45.31	-13.00	-32.31	HORIZONTAL
4	6053.89	-63.89	19.15	-44.74	-13.00	-31.74	HORIZONTAL
5	6756.71	-63.01	20.38	-42.63	-13.00	-29.63	HORIZONTAL
6	10698.51	-67.91	23.84	-44.07	-13.00	-31.07	HORIZONTAL



	Freq	Read Level	Correction Factor	Level	Limit	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1490.14	-59.45	6.79	-52.66	-13.00	-39.66	VERTICAL
2	2065.73	-60.91	8.04	-52.87	-13.00	-39.87	VERTICAL
3	2693.13	-54.70	5.69	-49.01	-13.00	-36.01	VERTICAL
4	5813.81	-64.25	15.99	-48.26	-13.00	-35.26	VERTICAL
5	6894.81	-63.47	20.61	-42.86	-13.00	-29.86	VERTICAL
6	10575.54	-67.67	24.78	-42.89	-13.00	-29.89	VERTICAL

Remark:

Pre-test was performed for all modes (LCH/MCH/HCH, with GSM signal/ with 4.1MHz AWGN signals/ with 100MHz AWGN signals). The spurious emissions 9kHz to 30MHz and above 18GHz were very low and not displayed in this report. Therefore, only show the worst-case data in this report.

--End of Appendix--



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