



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

Page: 1 of 32

FCC ID: OJFDMRUG225

Appendix -

Test Data and Result for report

GZCR220800107402



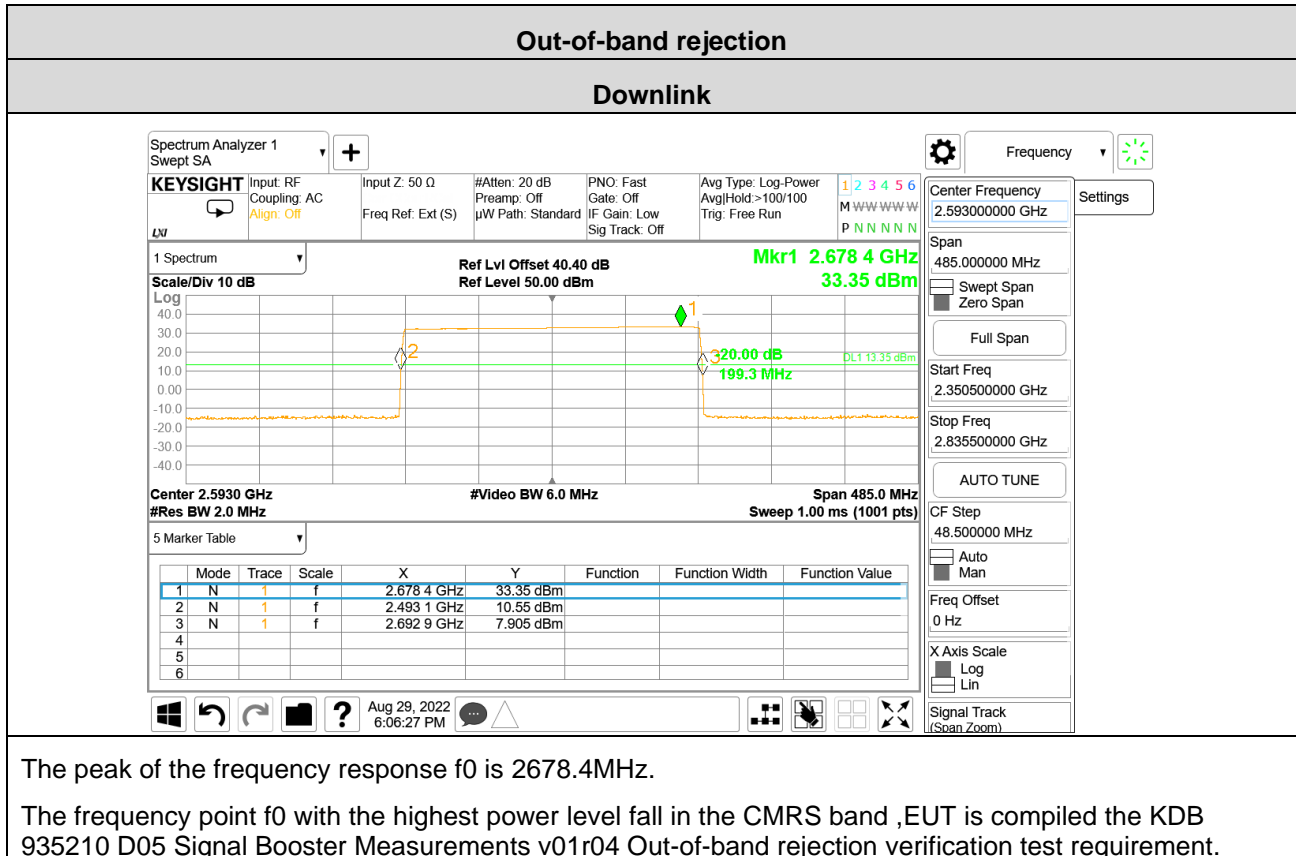
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1 Out-of-band rejection



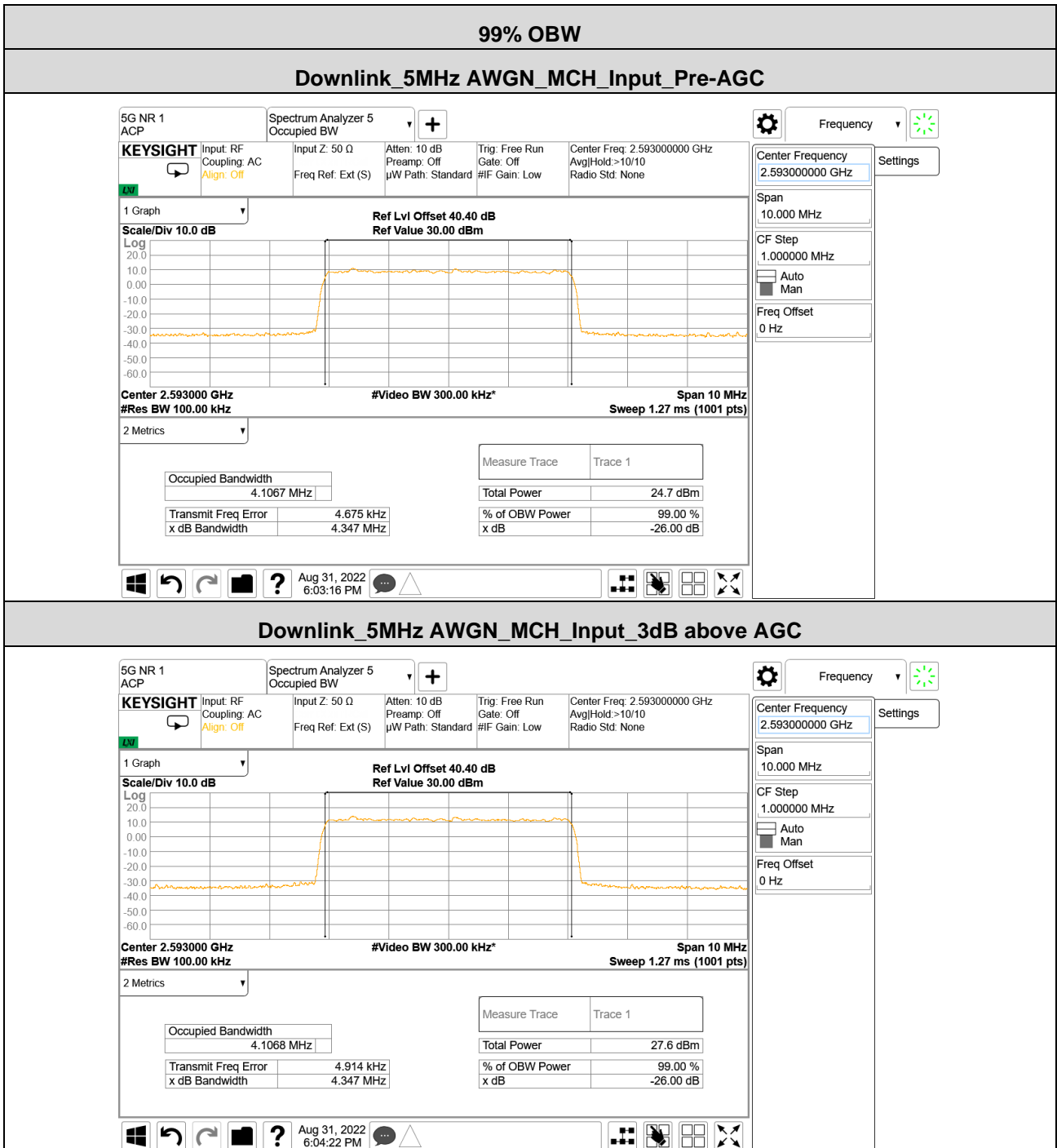
2 Input versus Output comparison

Occupied Bandwidth						
Test Path	Test Signal	Test Channel	Signal Level	99% OBW (MHz)		Verdict
				Input	Output	
Downlink	5MHz AWGN	MCH	Pre-AGC	4.1067	4.1082	PASS
			3dB above AGC	4.1068	4.1078	PASS
	100MHz AWGN	MCH	Pre-AGC	98.253	98.244	PASS
			3dB above AGC	98.272	98.281	PASS
	GSM	MCH	Pre-AGC	0.24534	0.24628	PASS
			3dB above AGC	0.24569	0.24651	PASS

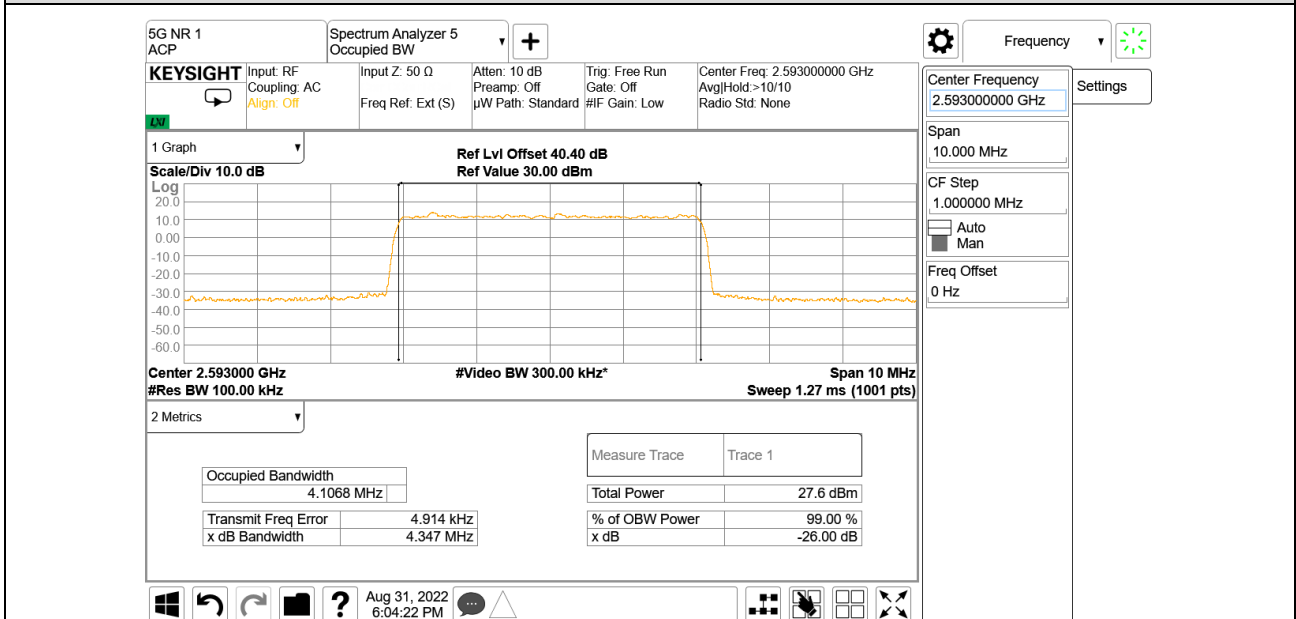


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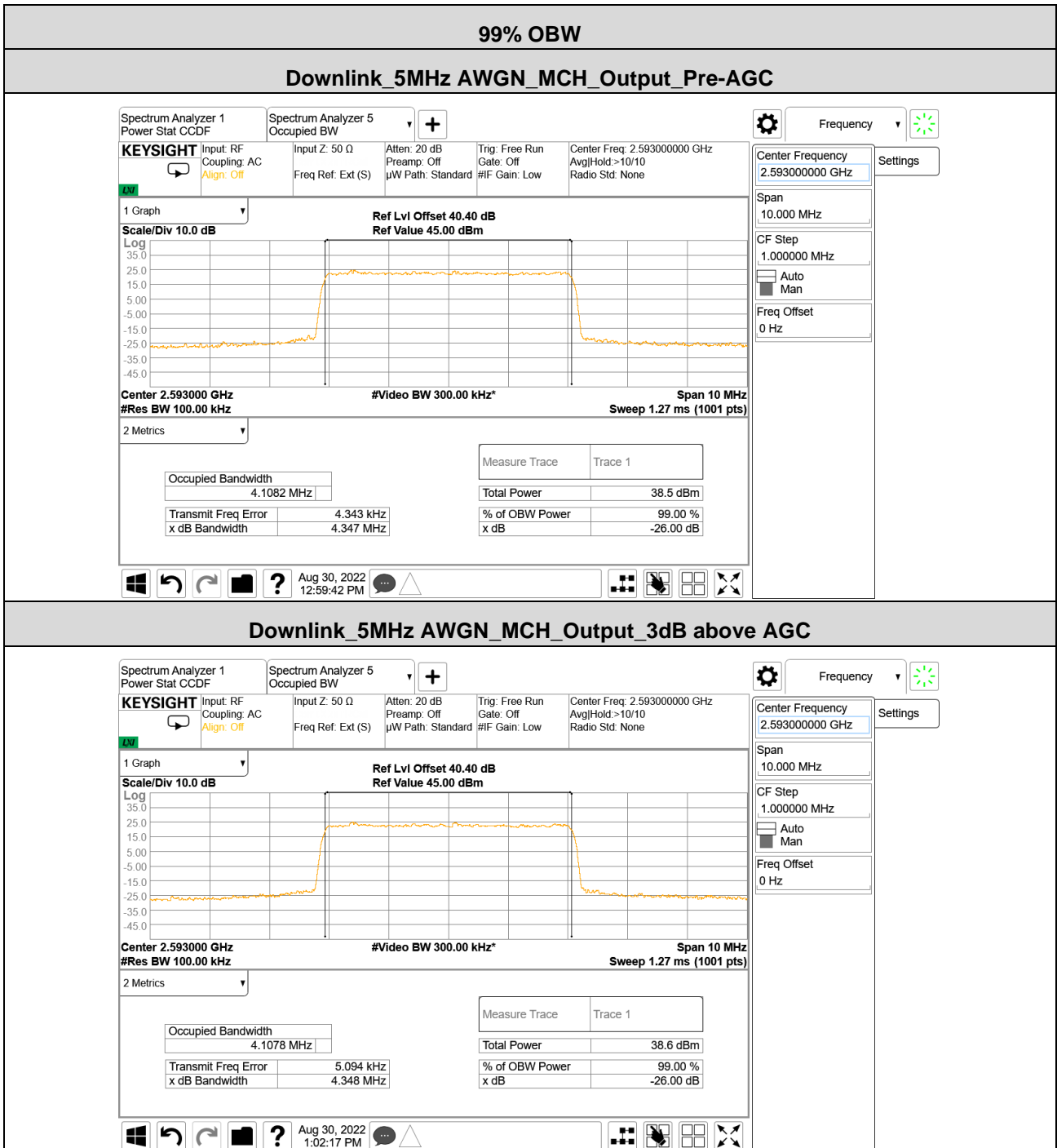


Downlink_5MHz AWGN_MCH_Input_3dB above AGC

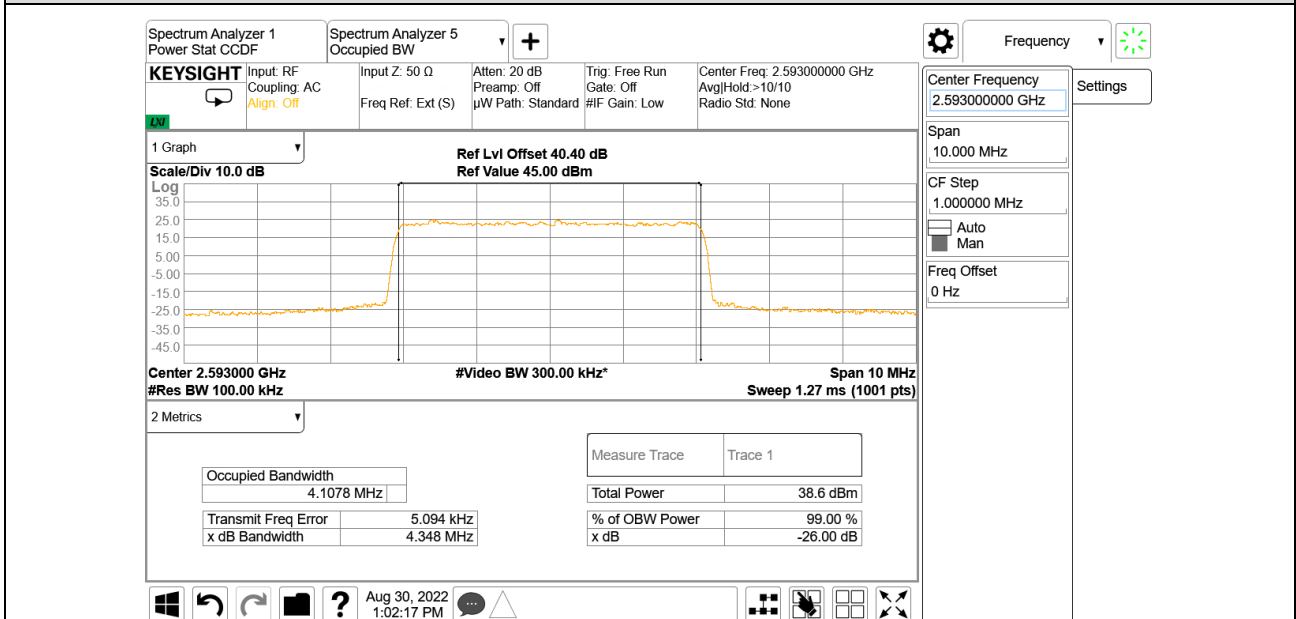


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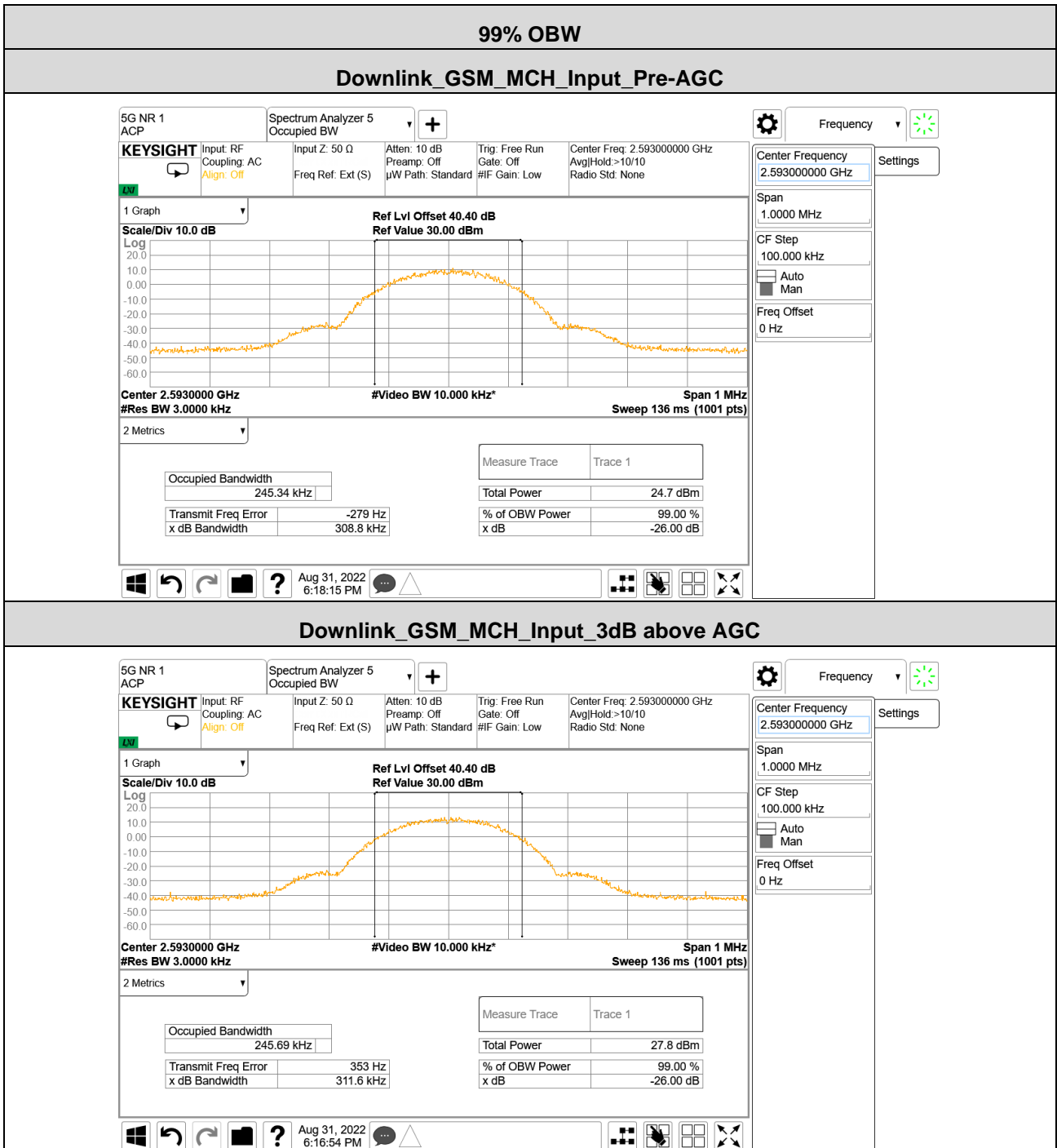


Downlink_5MHz AWGN_MCH_Output_3dB above AGC

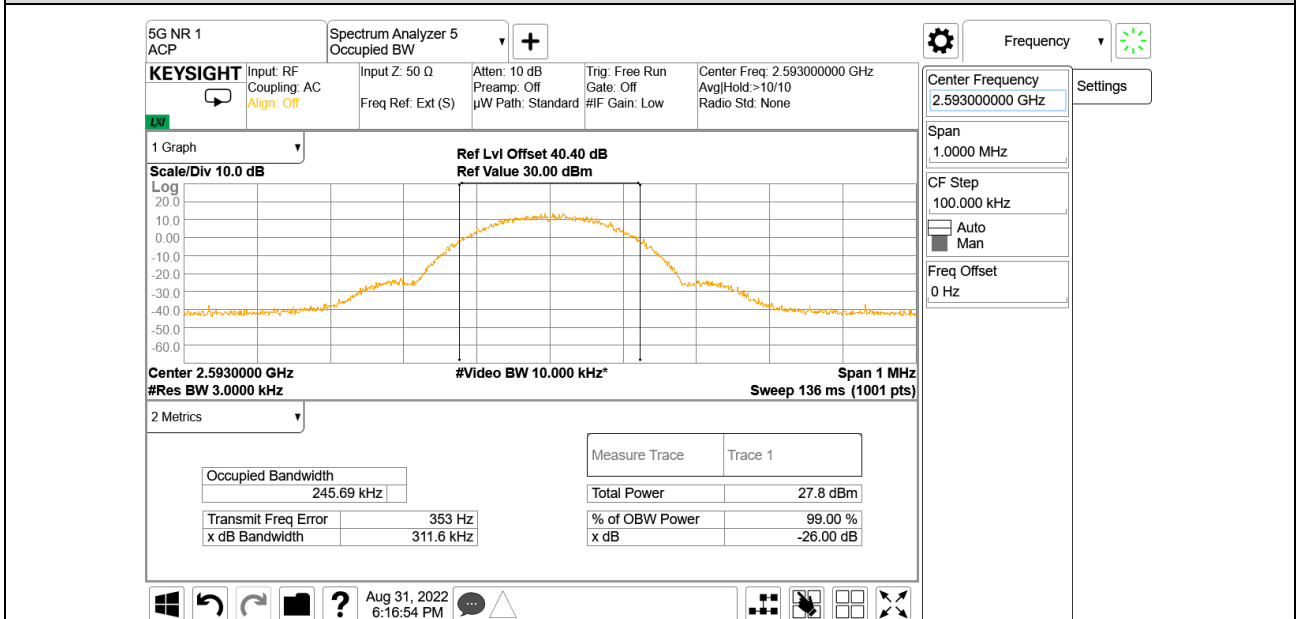


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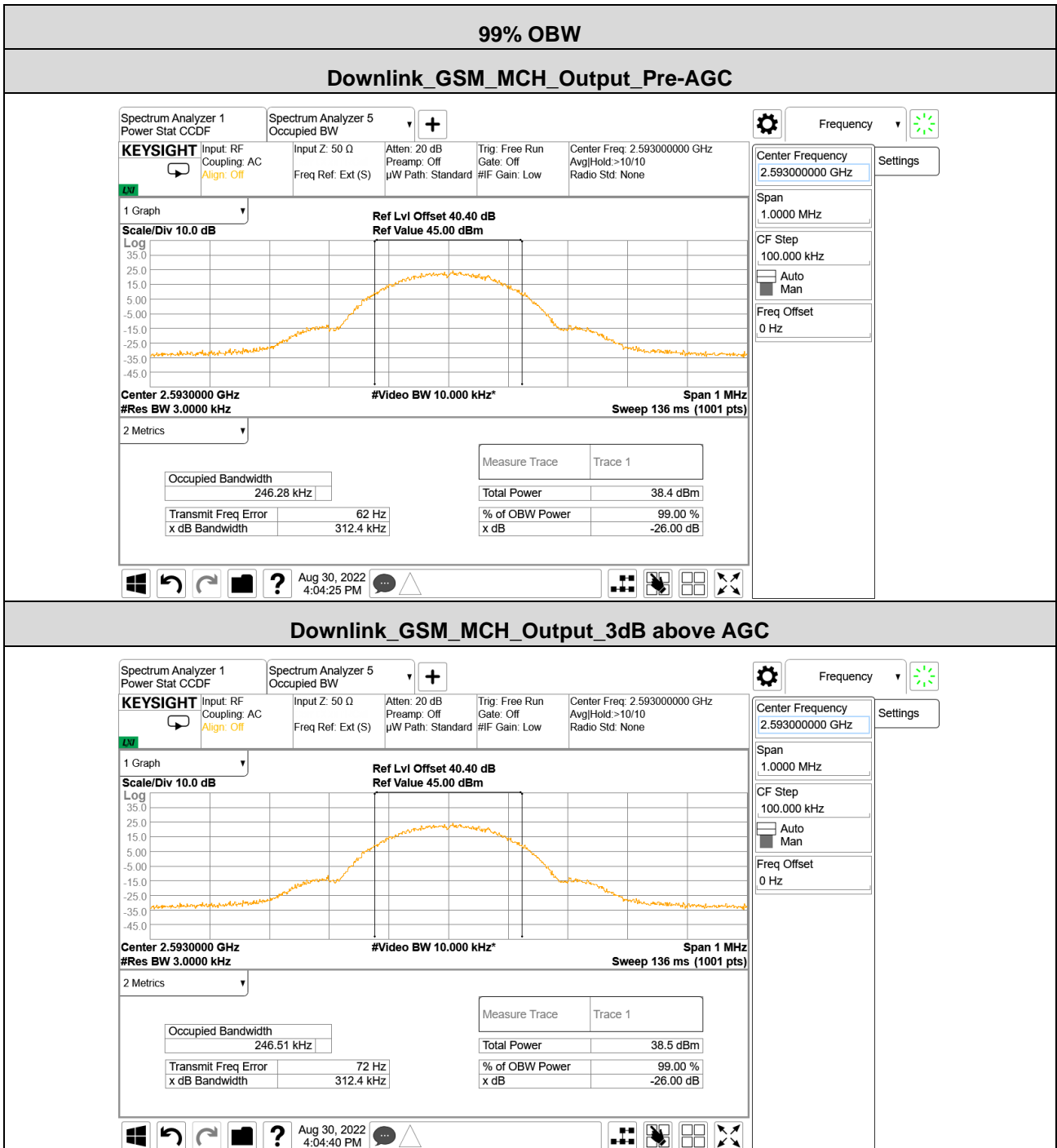


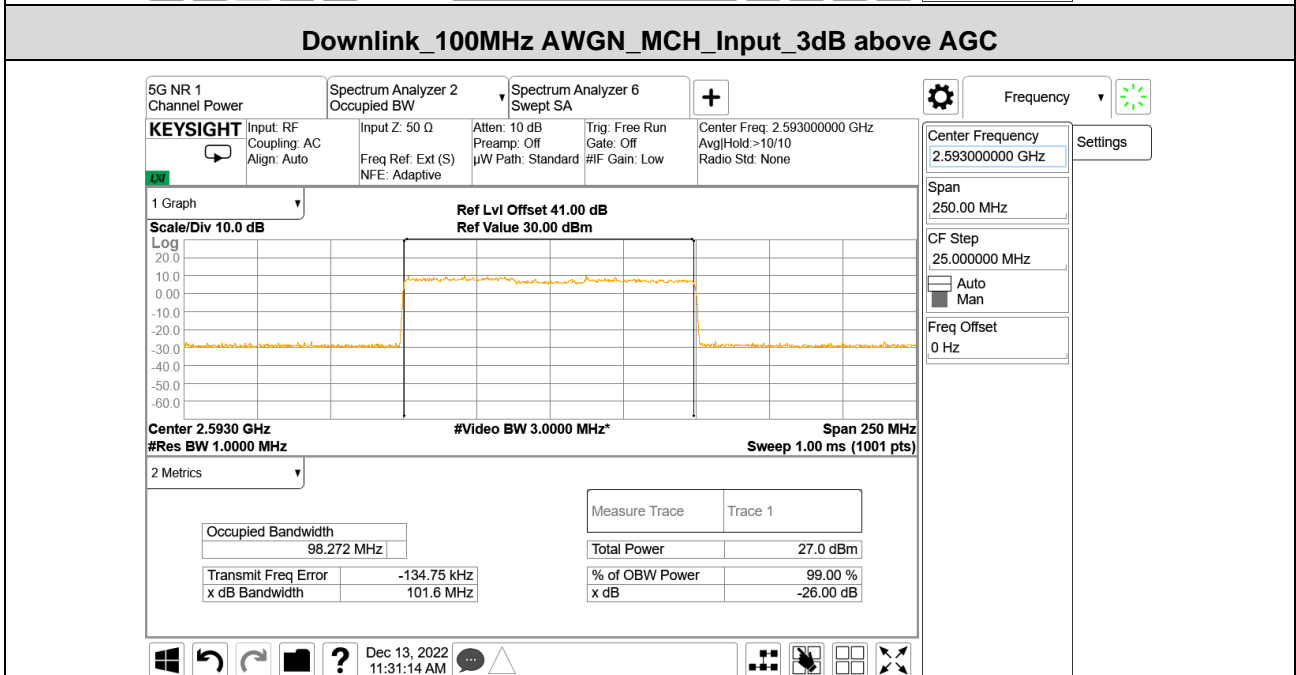
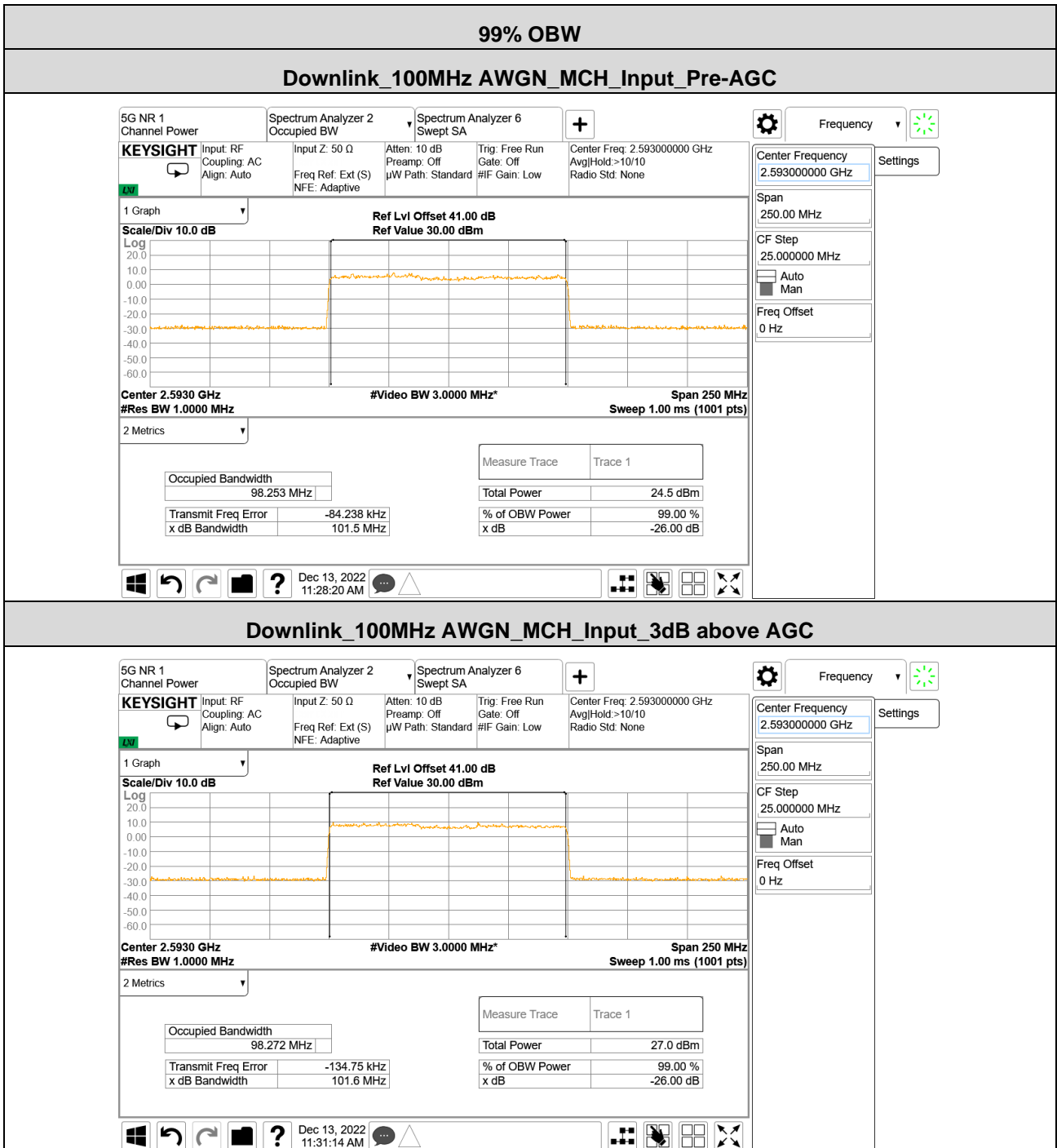
Downlink_GSM_MCH_Input_3dB above AGC



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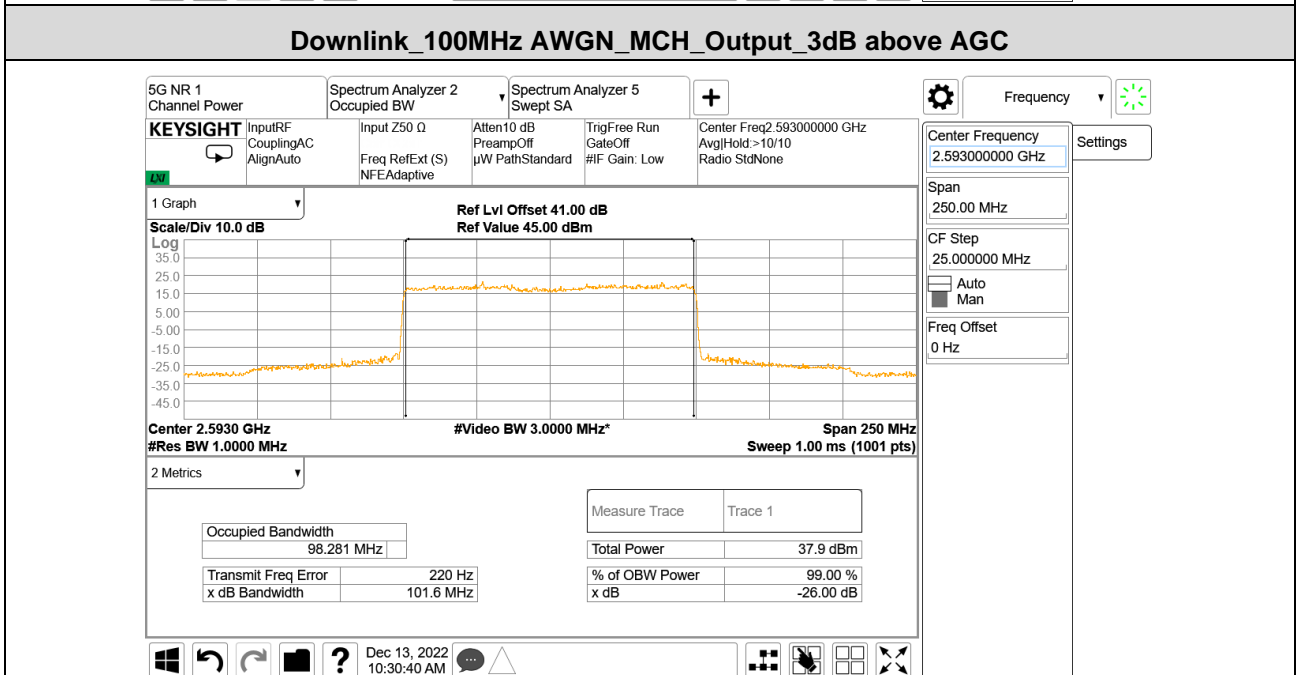
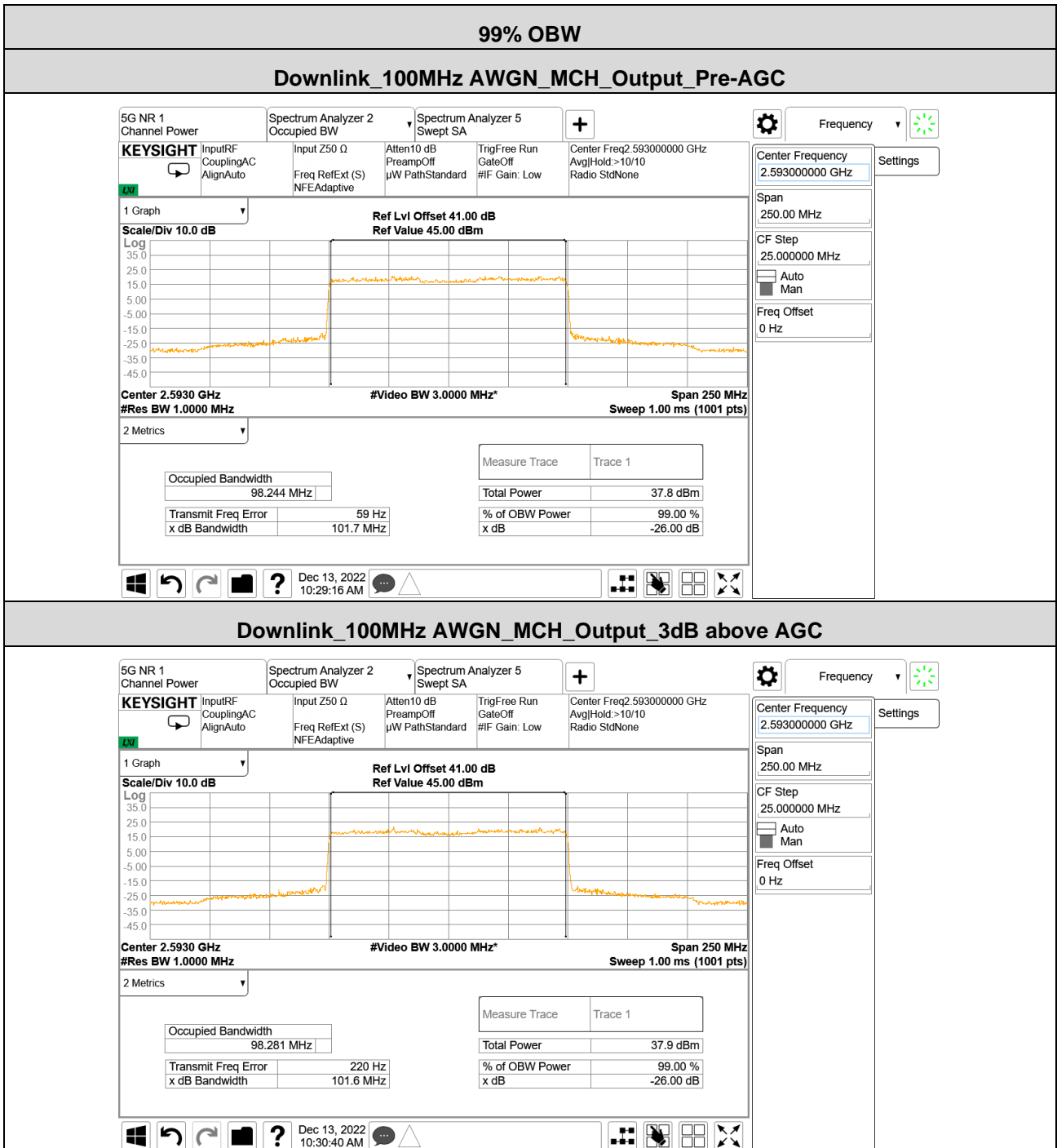
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3 Mean output power and amplifier/booster gain

Mean conducted output power and gain						
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	Input power (dBm)	Conducted Output Power (dBm)	Gain (dB)
Downlink	2678.4	5MHz AWGN	Pre-AGC	24.50	38.76	14.26
			3dB above AGC	27.50	39.01	/
		100MHz AWGN	Pre-AGC	26.60	35.11	8.51
			3dB above AGC	29.60	35.43	/
		GSM	Pre-AGC	24.80	39.07	14.27
			3dB above AGC	27.80	39.28	/



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EIRP							
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	SISO Conducted Output Power (dBm)	SISO EIRP (W)	Total EIRP (W)	Verdict
Downlink	2678.4	5MHz AWGN	Pre-AGC	38.76	23.77	94.63	PASS
			3dB above AGC	39.01	25.18	100.24	PASS
		100MHz AWGN	Pre-AGC	35.11	10.26	40.84	PASS
			3dB above AGC	35.43	11.05	43.96	PASS
		GSM	Pre-AGC	39.07	25.53	101.63	PASS
			3dB above AGC	39.28	26.80	106.26	PASS

Remark:

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.

Total EIRP= Single antenna port Conducted Output Power+3dB+ directional gain.

For main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern:

$EIRP \leq 33dBW + 10\lg(X/Y) \text{ dBW} + 10\lg(360/\text{beamwidth}) \text{ dBW} = 1995W + 10\lg(X/Y) \text{ dBW} + 10\lg(360/\text{beamwidth})$

For other main or booster:

$EIRP \leq 33dBW + 10\lg(X/Y) \text{ dBW} = 1995W + 10\lg(X/Y) \text{ dBW}$

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



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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
Downlink	LCH	5MHz AWGN	a single test signal	Pre-AGC	-36.50	≤-16	PASS
				3dB above AGC	-35.97		PASS
			two adjacent test signals	Pre-AGC	-37.93		PASS
				3dB above AGC	-37.02		PASS
	HCH		a single test signal	Pre-AGC	-31.40		PASS
				3dB above AGC	-30.26		PASS
			two adjacent test signals	Pre-AGC	-33.02		PASS
				3dB above AGC	-32.73		PASS
Downlink	LCH	100MHz AWGN	a single test signal	Pre-AGC	-39.55	≤-16	PASS
				3dB above AGC	-39.70		PASS
			two adjacent test signals	Pre-AGC	-39.10		PASS
				3dB above AGC	-39.04		PASS
	HCH		a single test signal	Pre-AGC	-27.70		PASS
				3dB above AGC	-26.85		PASS
			two adjacent test signals	Pre-AGC	-27.67		PASS
				3dB above AGC	-26.71		PASS
Downlink	LCH	GSM	a single test signal	Pre-AGC	-25.25	≤-16	PASS
				3dB above AGC	-24.78		PASS
			two adjacent test signals	Pre-AGC	-30.61		PASS
				3dB above AGC	-31.32		PASS
	HCH		a single test signal	Pre-AGC	-22.98		PASS
				3dB above AGC	-23.21		PASS
			two adjacent test signals	Pre-AGC	-31.90		PASS
				3dB above AGC	-29.14		PASS



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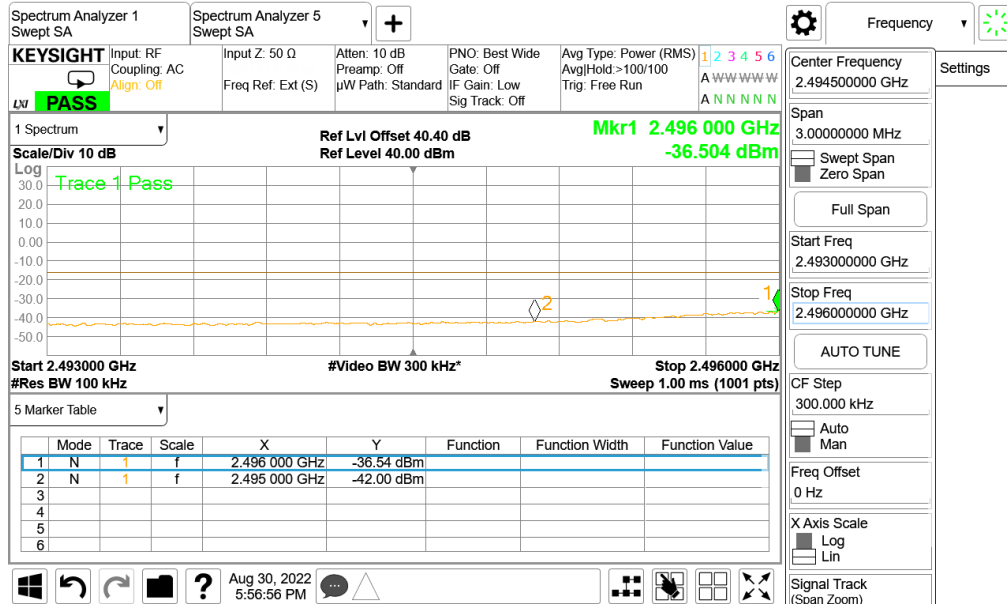
1. The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log_{10}(P)$ dB, here,
 $P = 39\text{dBm} = 7.95\text{W}$, so
the limit = $39\text{dBm} - [43 + 10\log_{10}(7.95\text{W})]$ dB = -13dBm
2. For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by $10\lg(2)$, so the limit was calculated to show -16dBm in order to determine the test result conveniently.



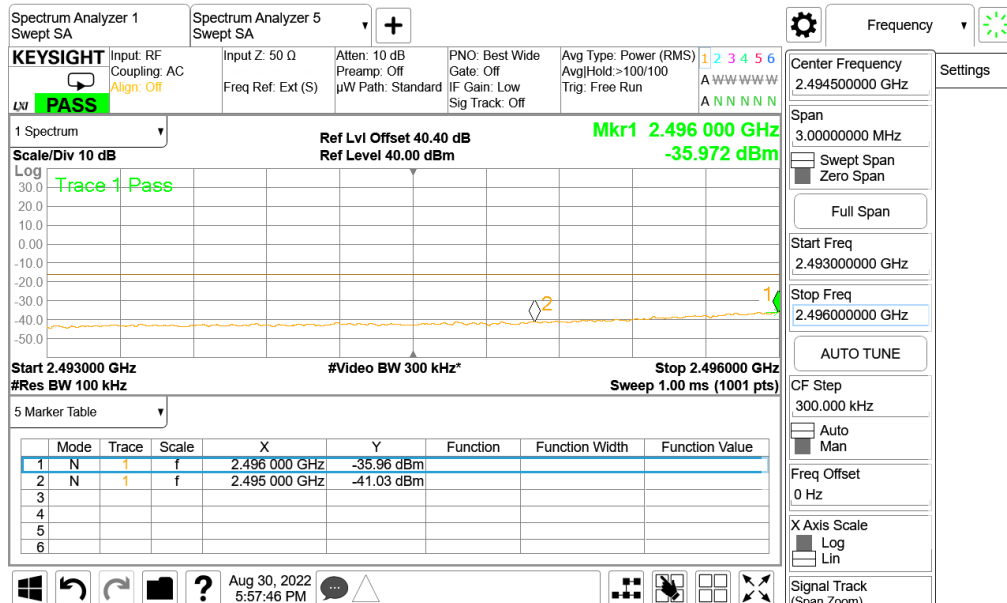
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Out-of-band/out-of-block emissions

Downlink_5MHz AWGN_LCH_a single test signal_Pre-AGC

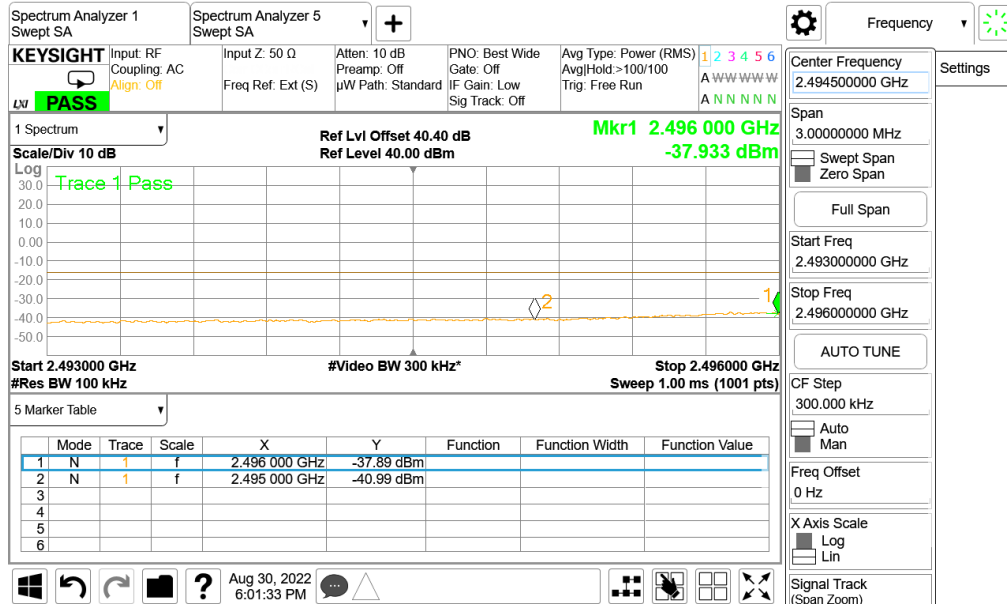


Downlink_5MHz AWGN_LCH_a single test signal_3dB above AGC

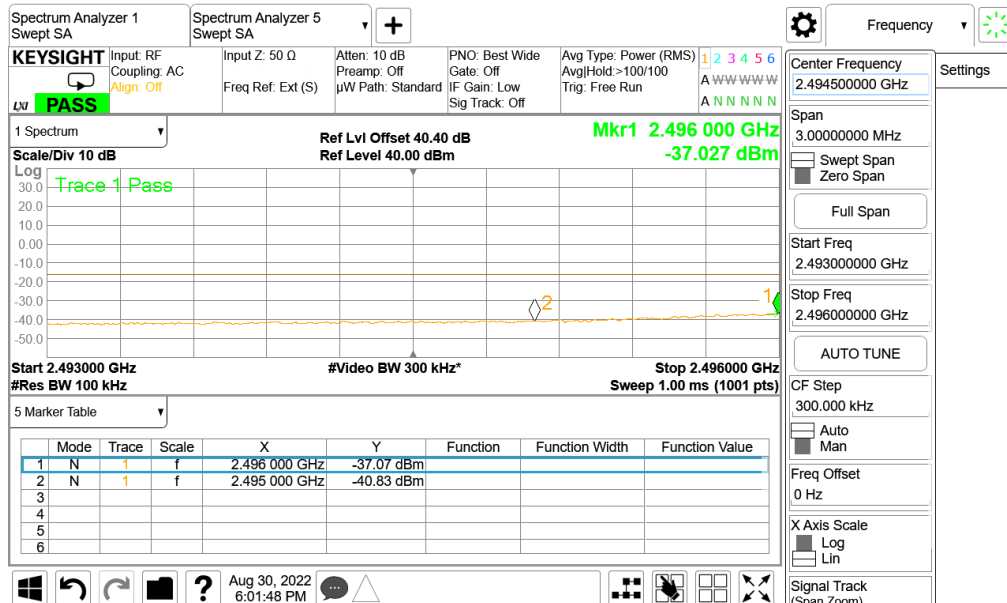


Out-of-band/out-of-block emissions

Downlink_5MHz AWGN_LCH_two adjacent test signals_Pre-AGC

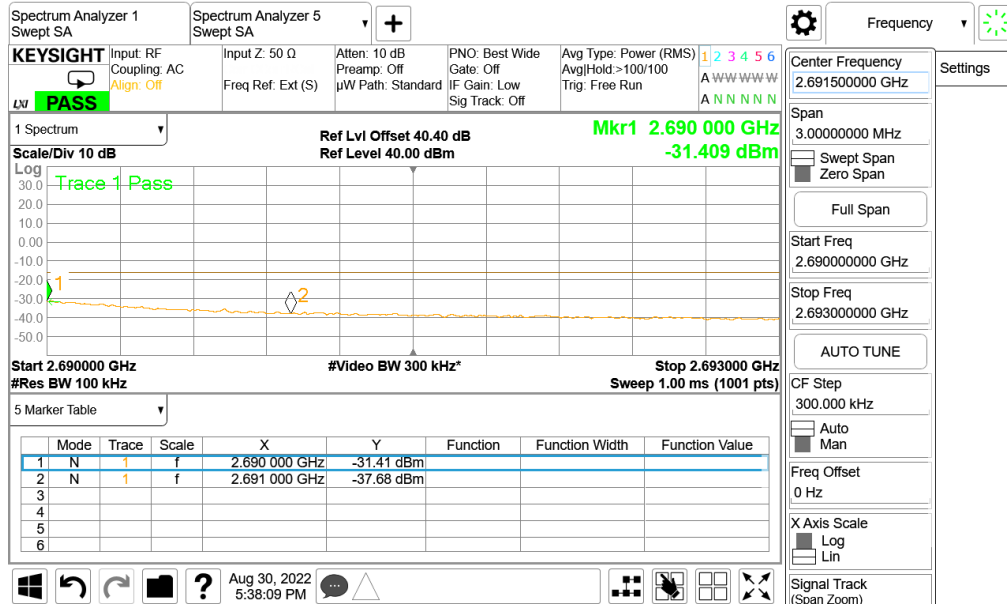


Downlink_5MHz AWGN_LCH_two adjacent test signals_3dB above AGC

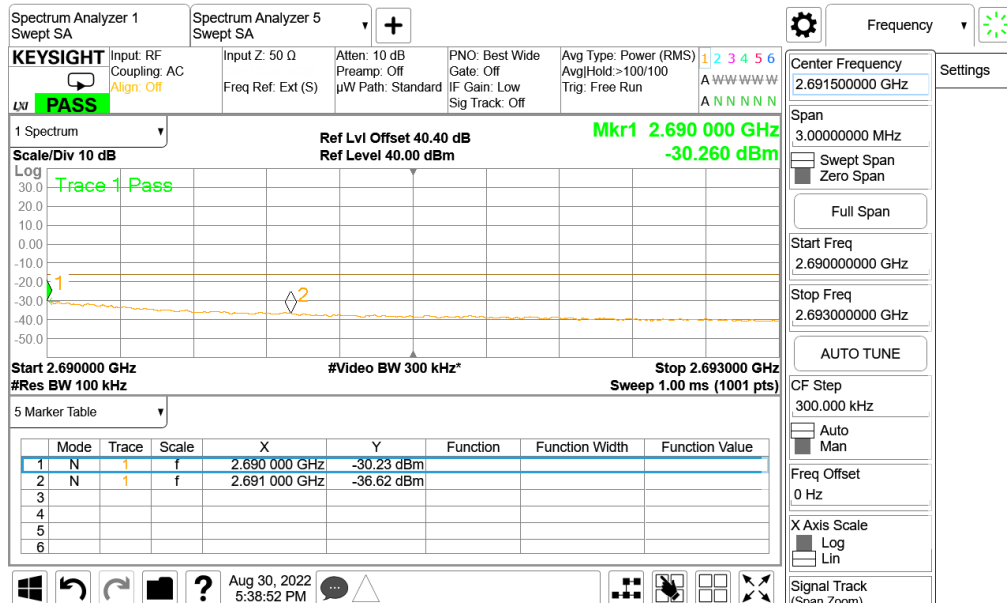


Out-of-band/out-of-block emissions

Downlink_5MHz AWGN_HCH_a single test signal_Pre-AGC

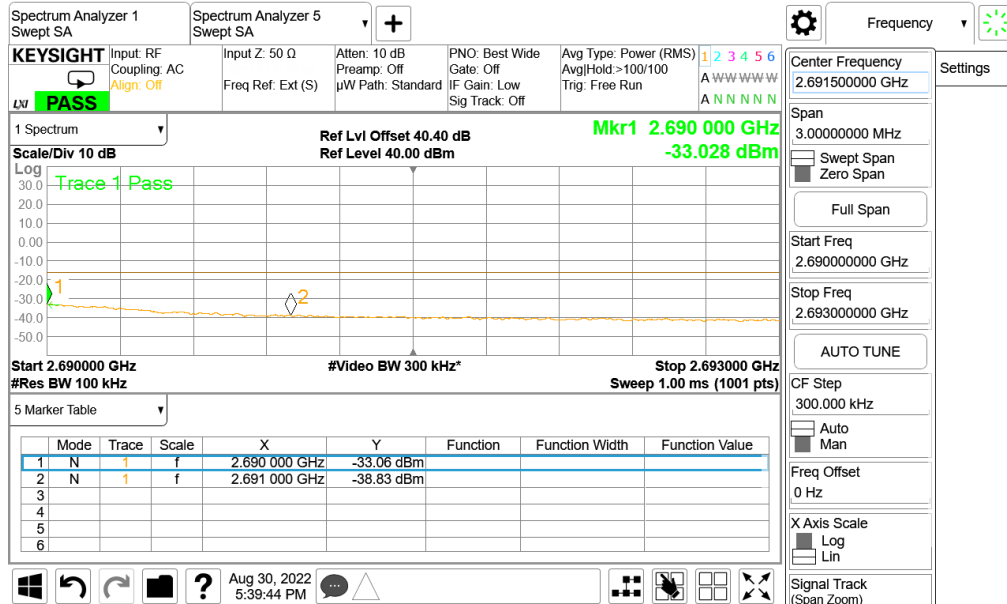


Downlink_5MHz AWGN_HCH_a single test signal_3dB above AGC

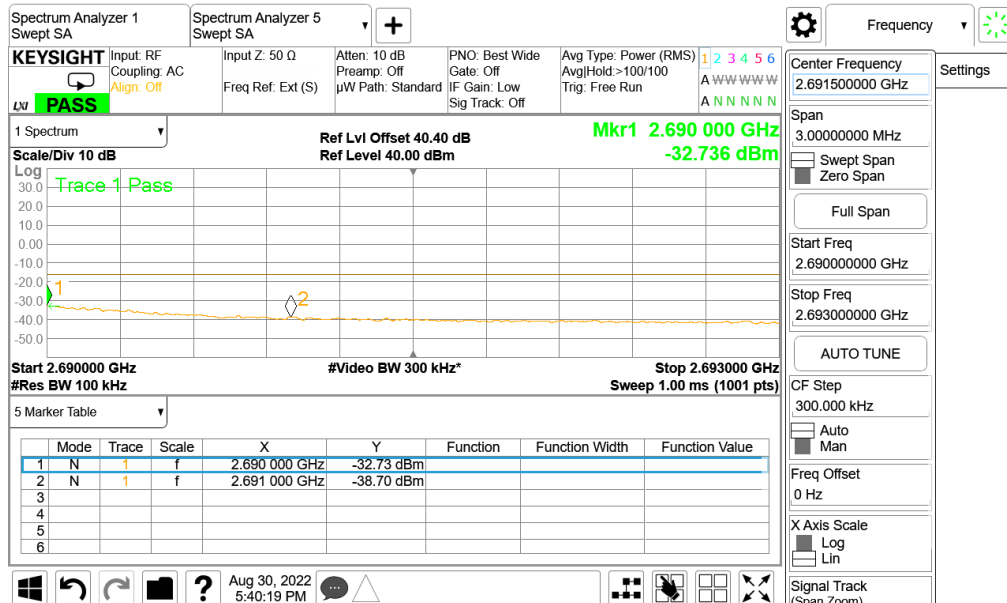


Out-of-band/out-of-block emissions

Downlink_5MHz AWGN_HCH_two adjacent test signals_Pre-AGC



Downlink_5MHz AWGN_HCH_two adjacent test signals_3dB above AGC

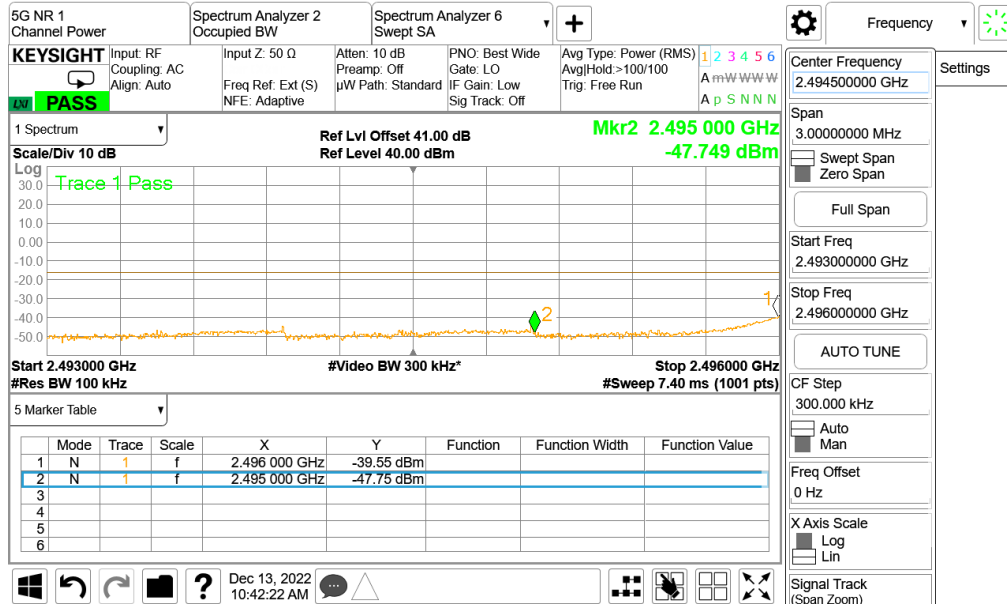


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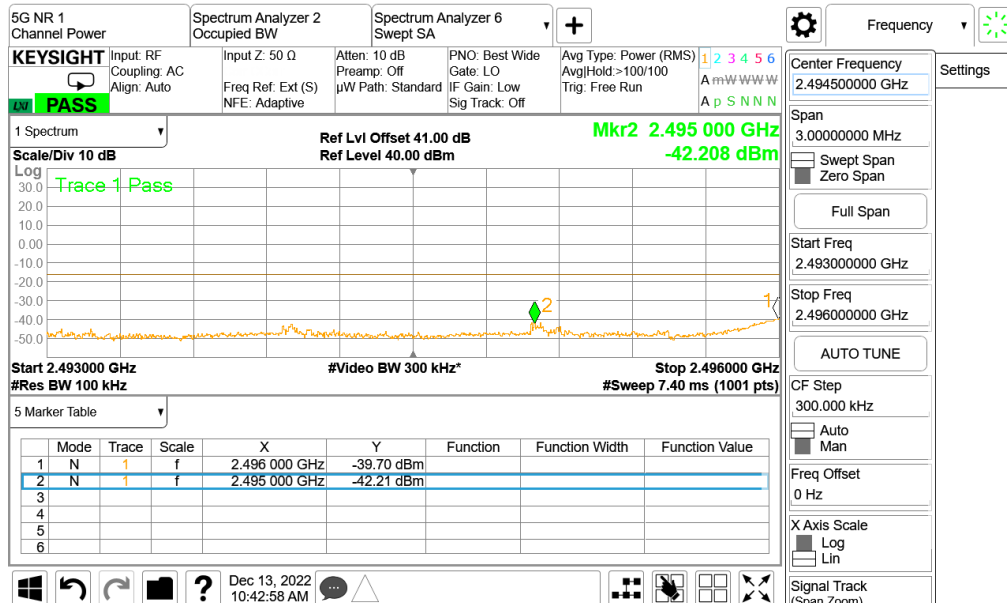
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Out-of-band/out-of-block emissions

Downlink_100MHz AWGN_LCH_a single test signal_Pre-AGC



Downlink_100MHz AWGN_LCH_a single test signal_3dB above AGC

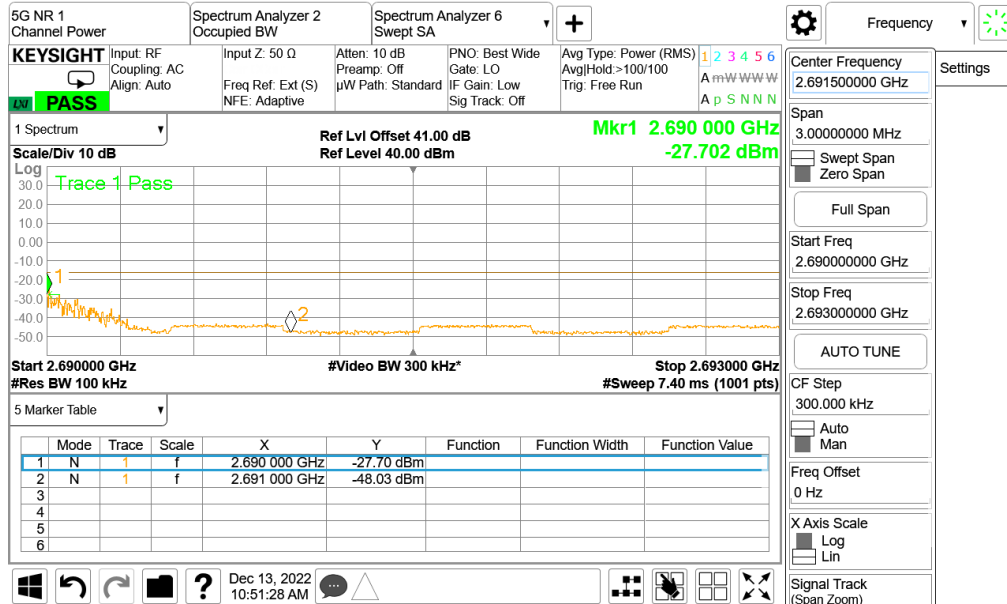


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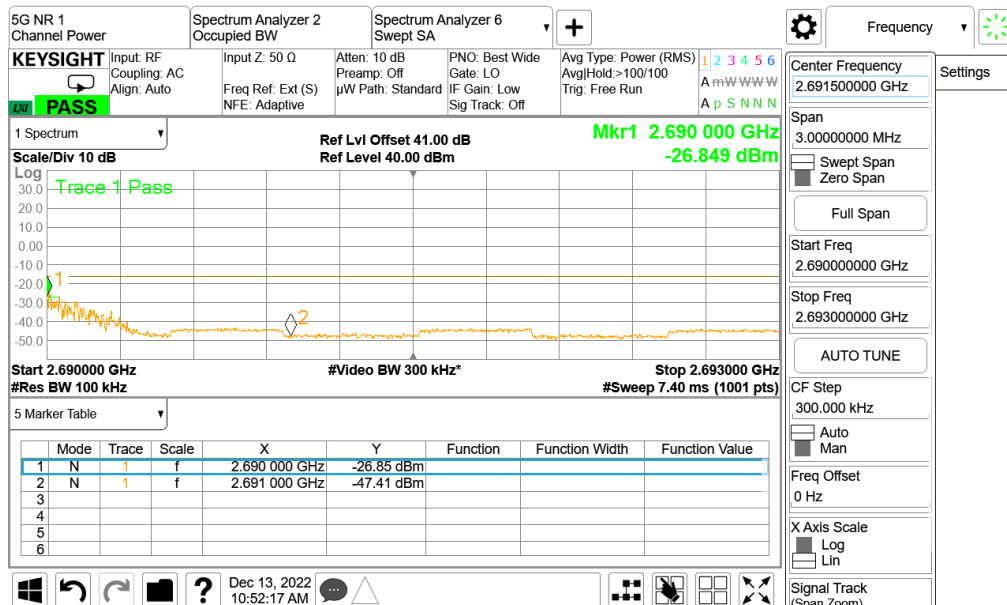
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Out-of-band/out-of-block emissions

Downlink_100MHz AWGN_HCH_a single test signal_Pre-AGC

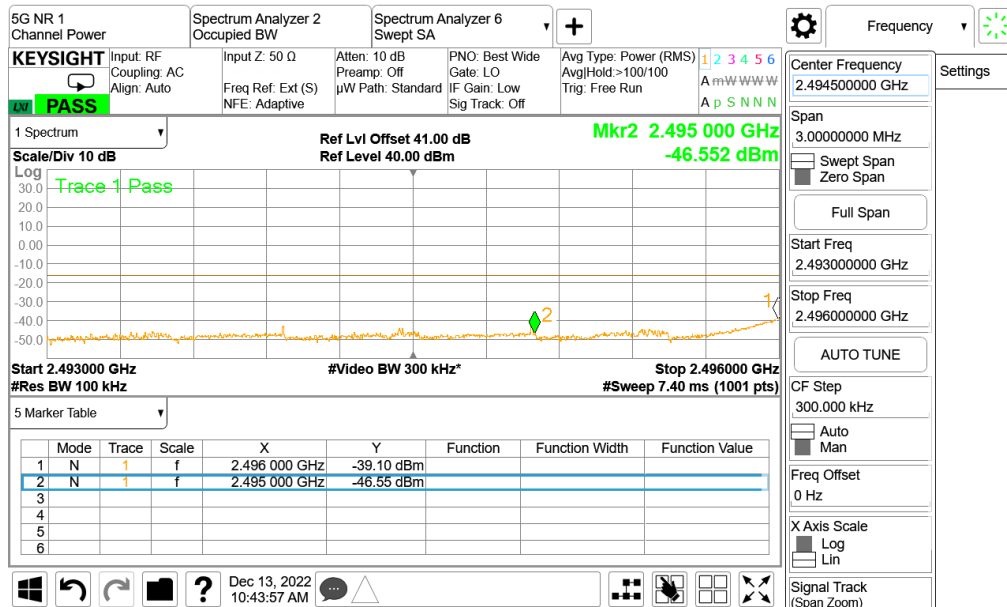


Downlink_100MHz AWGN_HCH_a single test signal_3dB above AGC

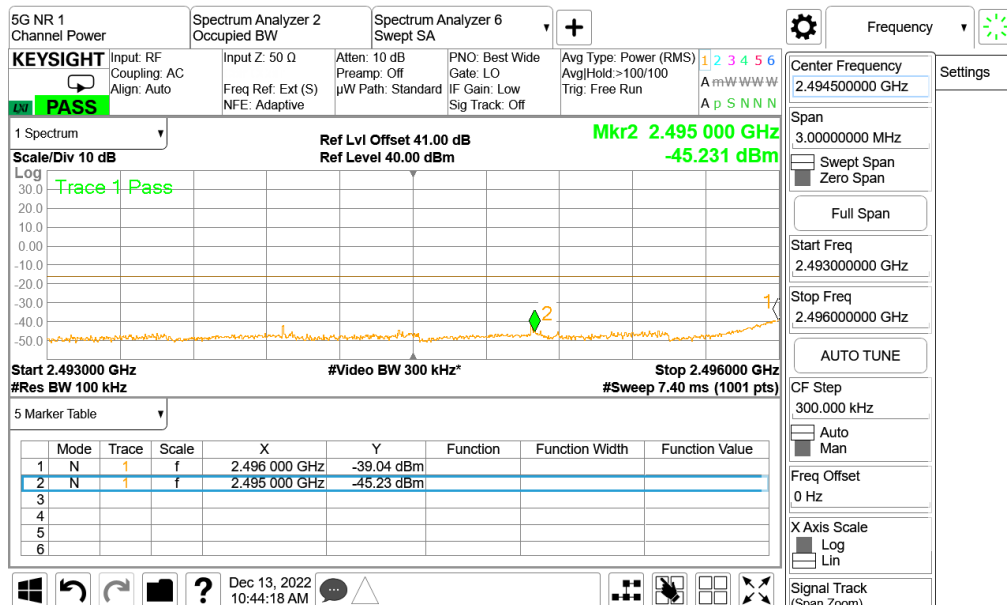


Out-of-band/out-of-block emissions

Downlink_100MHz AWGN_LCH_two adjacent test signals_Pre-AGC

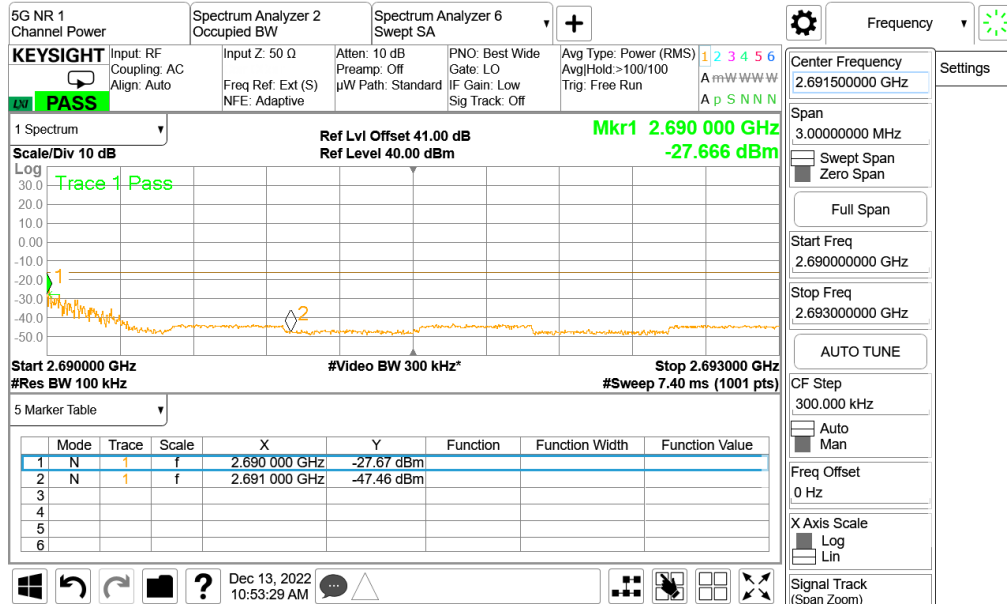


Downlink_100MHz AWGN_LCH_two adjacent test signals_3dB above AGC

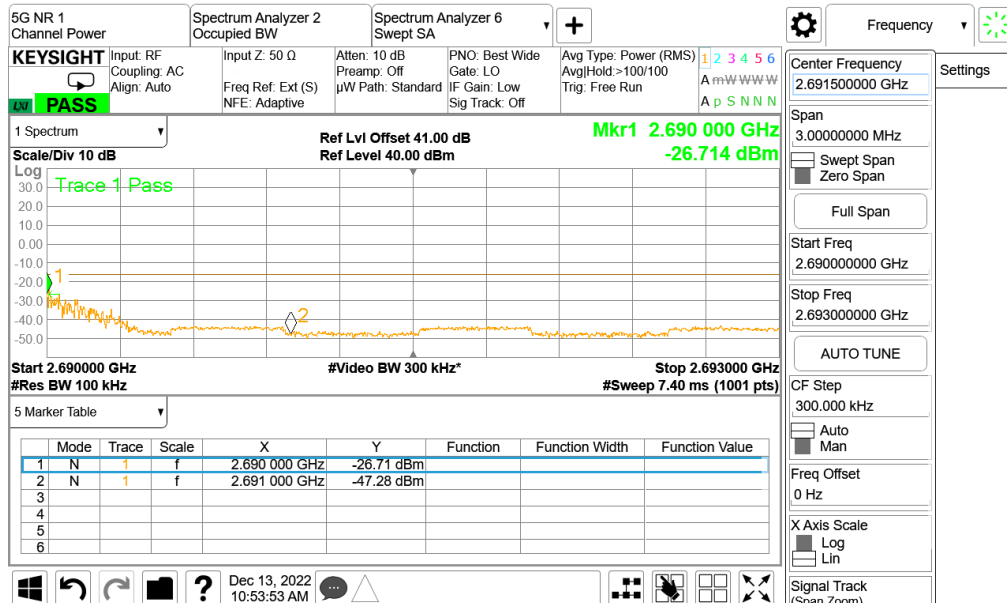


Out-of-band/out-of-block emissions

Downlink_100MHz AWGN_HCH_two adjacent test signals_Pre-AGC

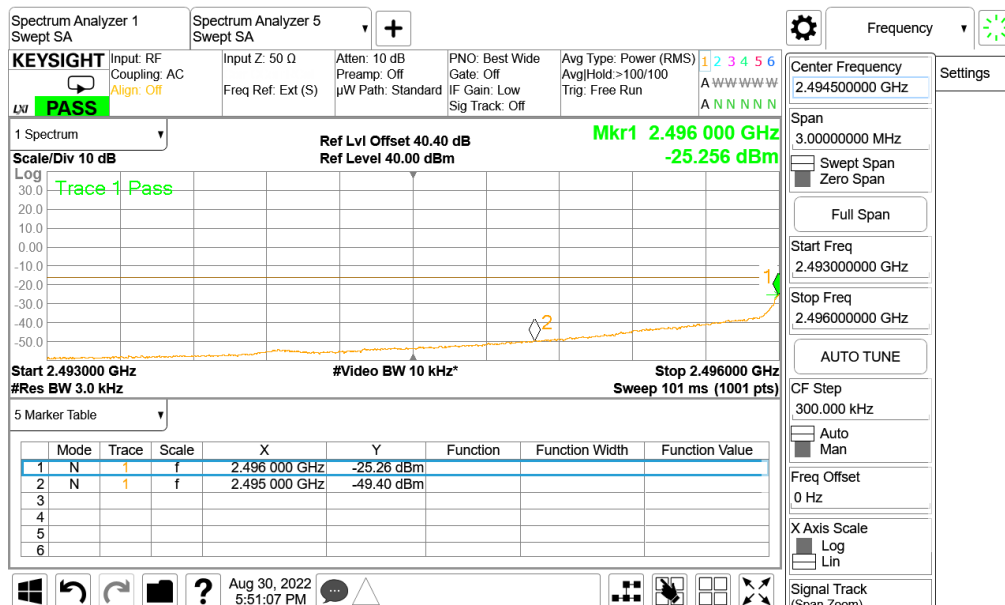


Downlink_100MHz AWGN_HCH_two adjacent test signals_3dB above AGC

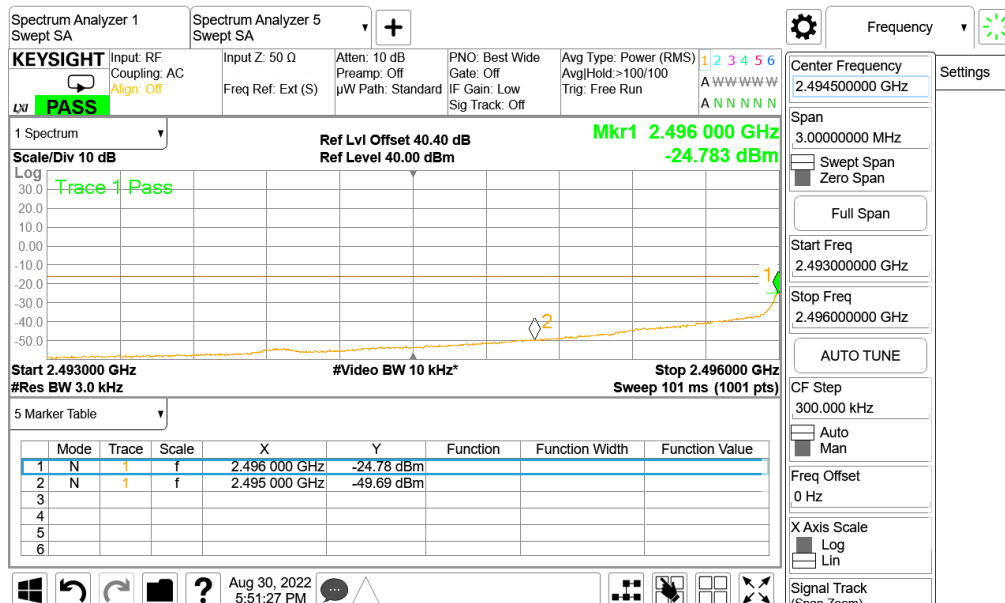


Out-of-band/out-of-block emissions

Downlink GSM LCH a single test signal Pre-AGC



Downlink GSM_LCH_a single test signal_3dB above AGC



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

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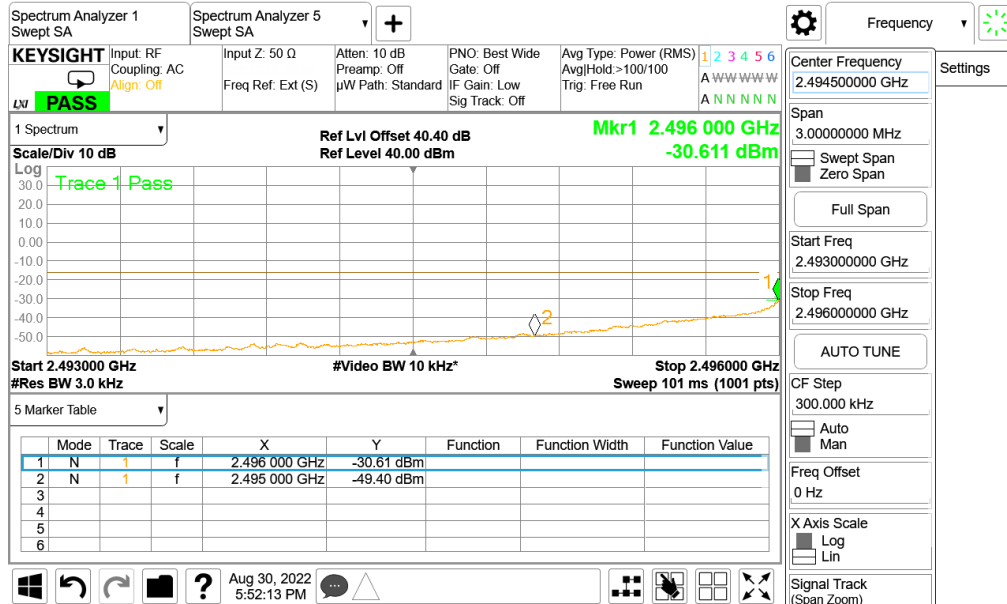
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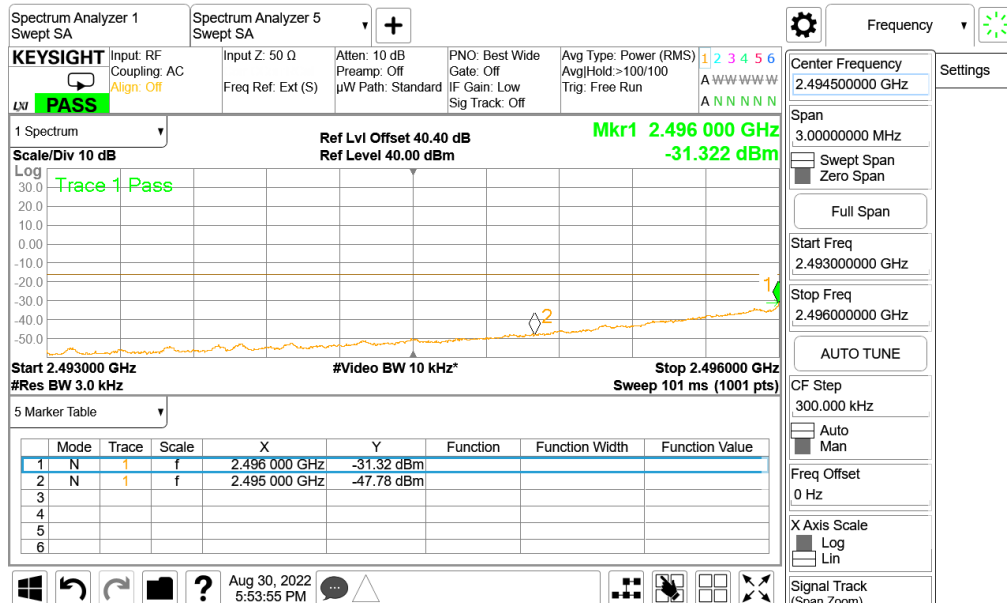
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Out-of-band/out-of-block emissions

Downlink_GSM_LCH_two adjacent test signals_Pre-AGC

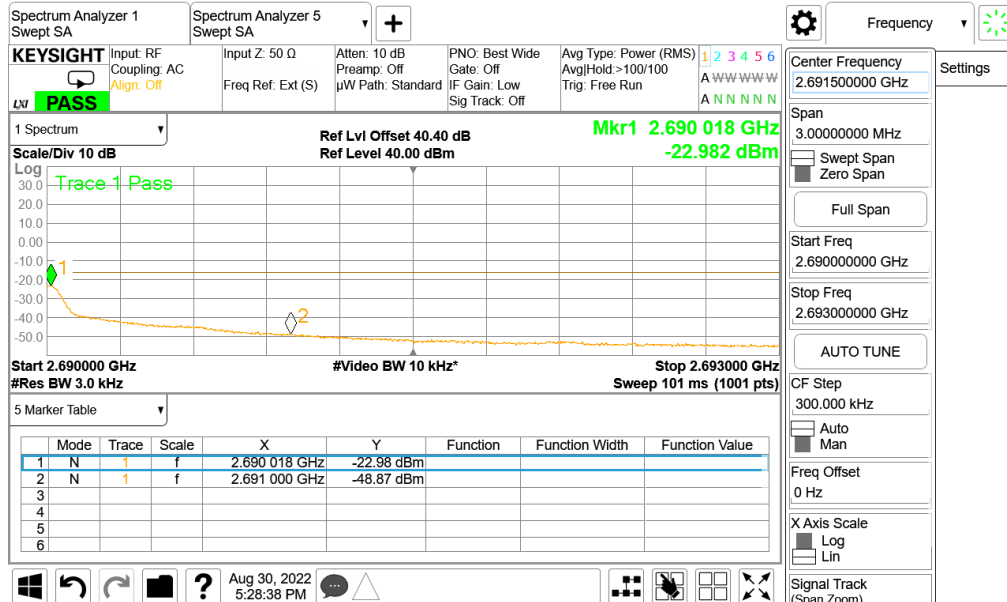


Downlink_GSM_LCH_two adjacent test signals_3dB above AGC

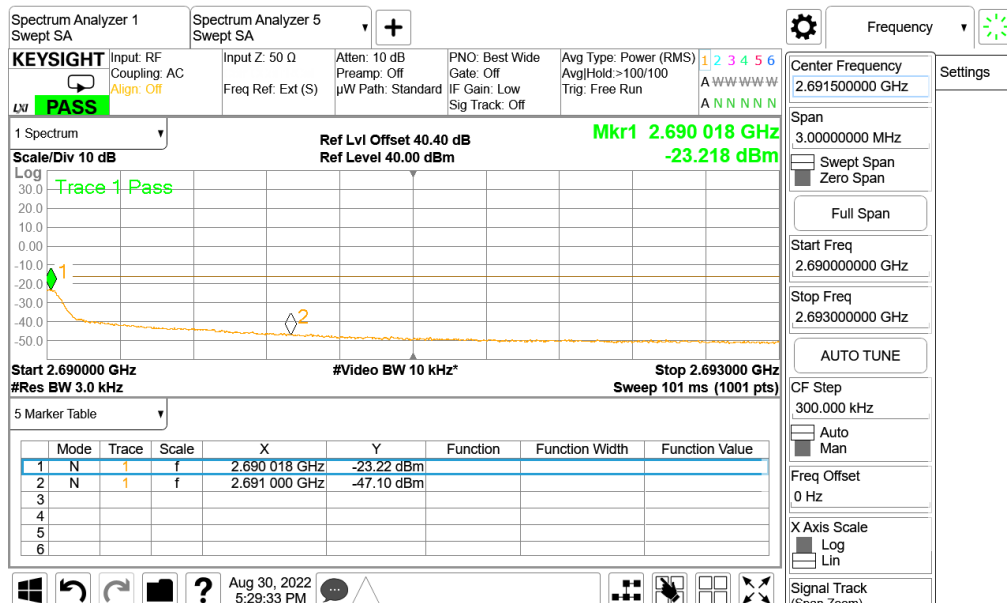


Out-of-band/out-of-block emissions

Downlink_GSM_HCH_a single test signal_Pre-AGC

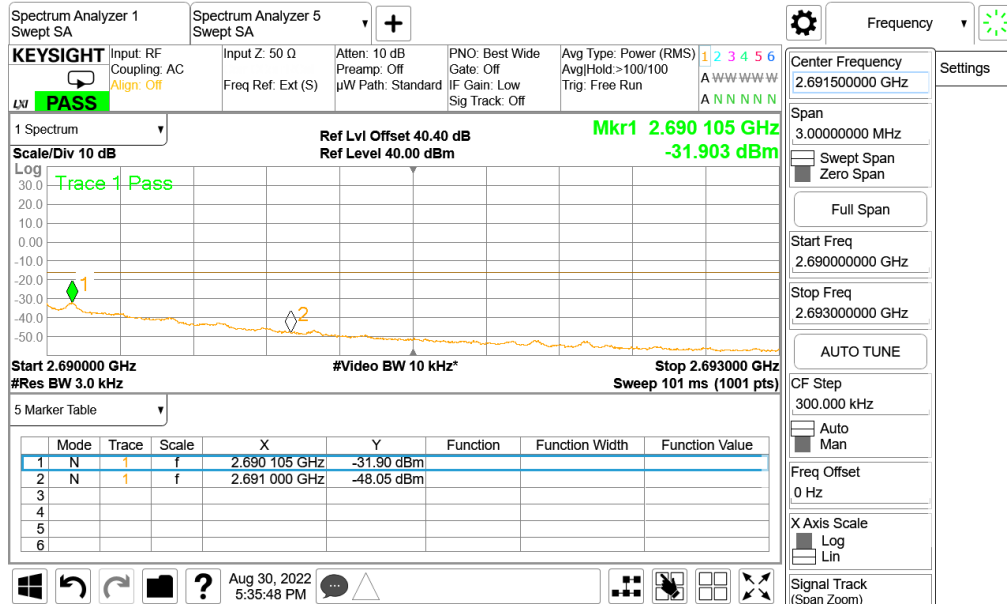


Downlink_GSM_HCH_a single test signal_3dB above AGC

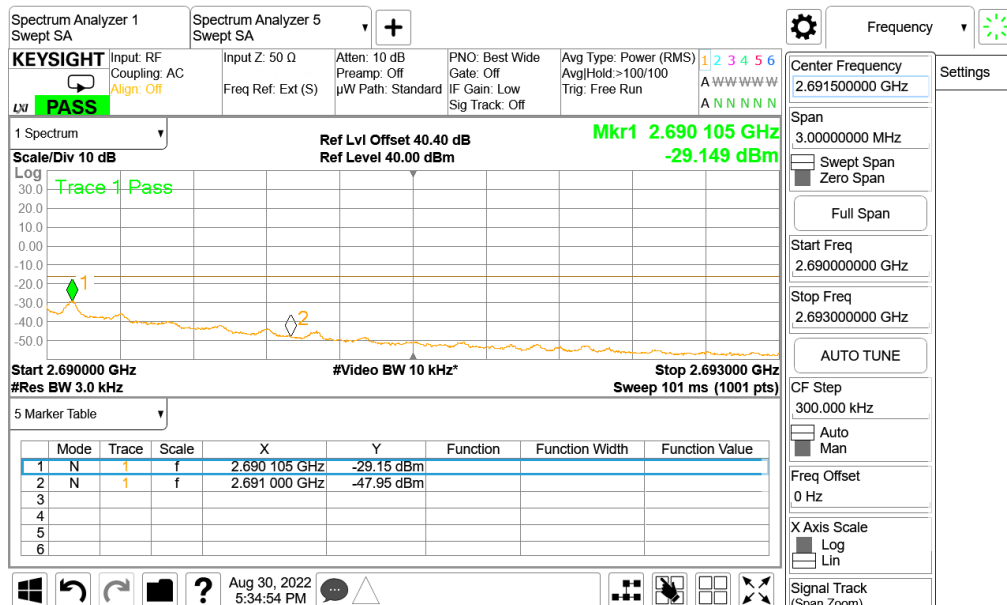


Out-of-band/out-of-block emissions

Downlink_GSM_HCH_two adjacent test signals_Pre-AGC



Downlink_GSM_HCH_two adjacent test signals_3dB above AGC



5 Conducted Spurious emissions

Conducted spurious emissions							
Test Path	Test Channel	Test Signal	Signal Level	Frequency range (MHz)	Worst test level (dBm)	Limit (dBm)	Verdict
Downlink	LCH	5MHz AWGN	Pre-AGC	30-1000	-46.02	≤-16	PASS
				1000-2495	-25.68		PASS
				2691-27000	-29.54		PASS
		100MHz AWGN	Pre-AGC	30-1000	-44.7		PASS
				1000-2495	-27.9		PASS
				2691-27000	-28.3		PASS
		GSM	Pre-AGC	30-1000	-45.86		PASS
				1000-2495	-22.28		PASS
				2691-27000	-31.58		PASS
	MCH	5MHz AWGN	Pre-AGC	30-1000	-46.43		PASS
				1000-2495	-33.05		PASS
				2691-27000	-29.19		PASS
		100MHz AWGN	Pre-AGC	30-1000	-47.2		PASS
				1000-2495	-32.8		PASS
				2691-27000	-28.6		PASS
		GSM	Pre-AGC	30-1000	-46.52		PASS
				1000-2495	-27.19		PASS
				2691-27000	-30.21		PASS
	HCH	5MHz AWGN	Pre-AGC	30-1000	-46.25		PASS
				1000-2495	-32.99		PASS
				2691-27000	-30.32		PASS
		100MHz AWGN	Pre-AGC	30-1000	-45.5		PASS
				1000-2495	-31.4		PASS
				2691-27000	-29.6		PASS



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Downlink	HCH	GSM	Pre-AGC	30-1000	-46.63	≤ -16	PASS
				1000-2495	-33.44		PASS
				2691-27000	-21.04		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,
 $P = 39\text{dBm} = 7.95\text{W}$, so
the limit = $39\text{dBm} - [43 + 10\log_{10}(7.95\text{W})]$ dB = -13dBm
2. For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by $10\lg(2)$, so the limit was calculated to show -16dBm in order to determine the test result conveniently.
3. The lowest RF signal generated in the equipment is higher than 30M, Therefore the test performed from 30MHz as start frequency.



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6 Frequency Stability

Frequency stability vs voltage							
Test path	Test Channel	Test Signal	Voltage (V AC)	Temperature (°C)	Frequency error (Hz)	Tolerance (ppm)	Verdict
Downlink	MCH	5MHz AWGN	93.5	20	7	0.0027	PASS
			126.5	20	11	0.0042	PASS
	MCH	100MHz AWGN	93.5	20	3	0.0012	PASS
			126.5	20	5	0.0019	PASS
	MCH	GSM	93.5	20	16	0.0062	PASS
			126.5	20	14	0.0054	PASS



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Frequency stability vs temperature							
Test Path	Test Channel	Test Signal	Temperature (°C)	Voltage (V AC)	Frequency error (Hz)	Tolerance (ppm)	Verdict
Downlink	MCH	5MHz AWGN	+50	110	34	0.0131	PASS
			+40	110	30	0.0116	PASS
			+30	110	26	0.0100	PASS
			+20	110	15	0.0058	PASS
			+10	110	-21	-0.0081	PASS
			0	110	-8	-0.0031	PASS
			-10	110	-13	-0.0050	PASS
			-20	110	5	0.0019	PASS
			-30	110	14	0.0054	PASS
	MCH	100MHz AWGN	+50	110	23	0.0089	PASS
			+40	110	19	0.0073	PASS
			+30	110	26	0.0100	PASS
			+20	110	-12	-0.0046	PASS
			+10	110	-21	-0.0081	PASS
			0	110	-15	-0.0058	PASS
			-10	110	-8	-0.0031	PASS
			-20	110	16	0.0062	PASS
			-30	110	11	0.0042	PASS
	MCH	GSM	+50	110	25	0.0096	PASS
			+40	110	21	0.0081	PASS
			+30	110	18	0.0069	PASS
			+20	110	30	0.0116	PASS
			+10	110	-13	-0.0050	PASS
			0	110	-17	-0.0066	PASS
			-10	110	6	0.0023	PASS
			-20	110	-11	-0.0042	PASS
			-30	110	15	0.0058	PASS



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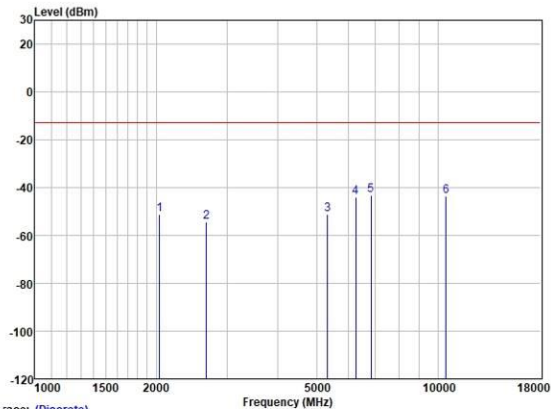
7 Radiated Spurious emissions

Radiated Spurious emissions					
MCH_30MHz-1GHz_Horizontal			MCH_30MHz-1GHz_Vertical		
Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
51.662	-55.35	-13	-42.35	Horizontal	PASS
103.806	-87.08	-13	-74.08	Horizontal	PASS
229.293	-85.63	-13	-72.63	Horizontal	PASS
352.943	-80.3	-13	-67.3	Horizontal	PASS
564.639	-75.46	-13	-62.46	Horizontal	PASS
721.726	-74.76	-13	-61.76	Horizontal	PASS

Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
51.121	-56.53	-13	-43.53	Vertical	PASS
99.528	-81.94	-13	-68.94	Vertical	PASS
185.138	-82.82	-13	-69.82	Vertical	PASS
303.544	-81.93	-13	-68.93	Vertical	PASS
601.427	-72.95	-13	-59.95	Vertical	PASS
726.805	-74	-13	-61	Vertical	PASS

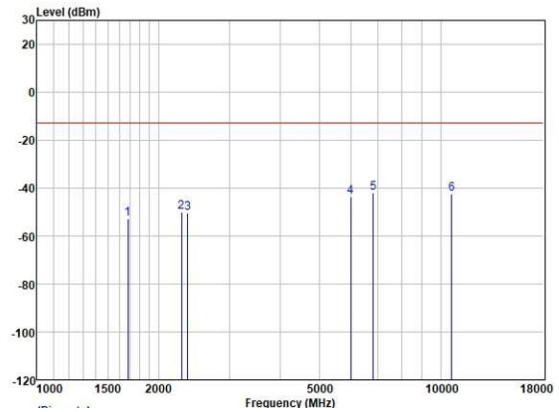
Radiated Spurious emissions

MCH_1GHz-18GHz_Horizontal



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
2041.984	-51.05	-13	-38.05	Horizontal	PASS
2664.019	-54.36	-13	-41.36	Horizontal	PASS
5330.928	-51.04	-13	-38.04	Horizontal	PASS
6249.464	-44.16	-13	-31.16	Horizontal	PASS
6835.278	-43.08	-13	-30.08	Horizontal	PASS
10484.23	-43.47	-13	-30.47	Horizontal	PASS

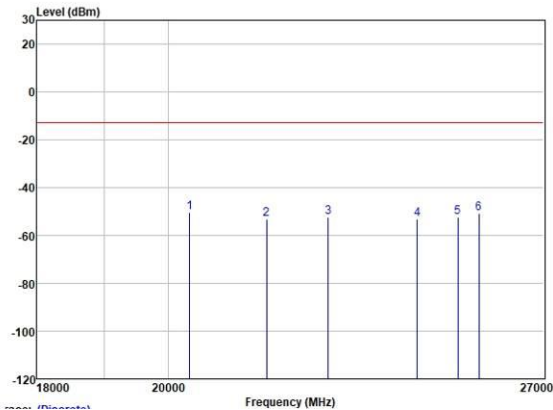
MCH_1GHz-18GHz_Vertical



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
1682.477	-52.74	-13	-39.74	Vertical	PASS
2279.044	-49.88	-13	-36.88	Vertical	PASS
2366.308	-50.43	-13	-37.43	Vertical	PASS
5984.305	-43.74	-13	-30.74	Vertical	PASS
6815.551	-42.01	-13	-29.01	Vertical	PASS
10636.85	-42.37	-13	-29.37	Vertical	PASS

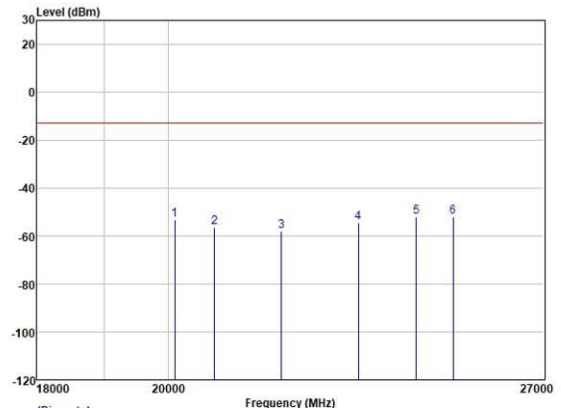
Radiated Spurious emissions

MCH_18GHz-27GHz_Horizontal



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
20339.06	-50.59	-13	-37.59	Horizontal	PASS
21628.86	-53.13	-13	-40.13	Horizontal	PASS
22726.6	-52.26	-13	-39.26	Horizontal	PASS
24400.49	-53.03	-13	-40.03	Horizontal	PASS
25212.55	-52.35	-13	-39.35	Horizontal	PASS
25638.9	-50.9	-13	-37.9	Horizontal	PASS

MCH_18GHz-27GHz_Vertical



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
20096.9	-53.18	-13	-40.18	Vertical	PASS
20749.17	-56.27	-13	-43.27	Vertical	PASS
21889.48	-57.88	-13	-44.88	Vertical	PASS
23277.59	-54.43	-13	-41.43	Vertical	PASS
24381.01	-52.11	-13	-39.11	Vertical	PASS
25112.09	-51.83	-13	-38.83	Vertical	PASS

Remark:

Pre-test was performed for all modes (LCH/MCH/HCH, with GSM signal/ with 5MHz AWGN signals/ with 100MHz AWGN signals), only the worst case with 5MHz AWGN signals in middle channel was found and recorded in this report.

--End of Appendix--



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