



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

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FCC ID: OJFDLRUG235

Appendix -

Test Data and Result for report

GZCR220700091602



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2 Input versus Output comparison

Occupied Bandwidth						
Test Path	Test Signal	Test Channel	Signal Level	99% OBW (MHz)		Verdict
				Input	Output	
Downlink	AWGN	MCH	Pre-AGC	4.0827	4.0953	PASS
			3dB above AGC	4.0894	4.1000	PASS
	GSM	MCH	Pre-AGC	0.24569	0.24365	PASS
			3dB above AGC	0.24501	0.24447	PASS

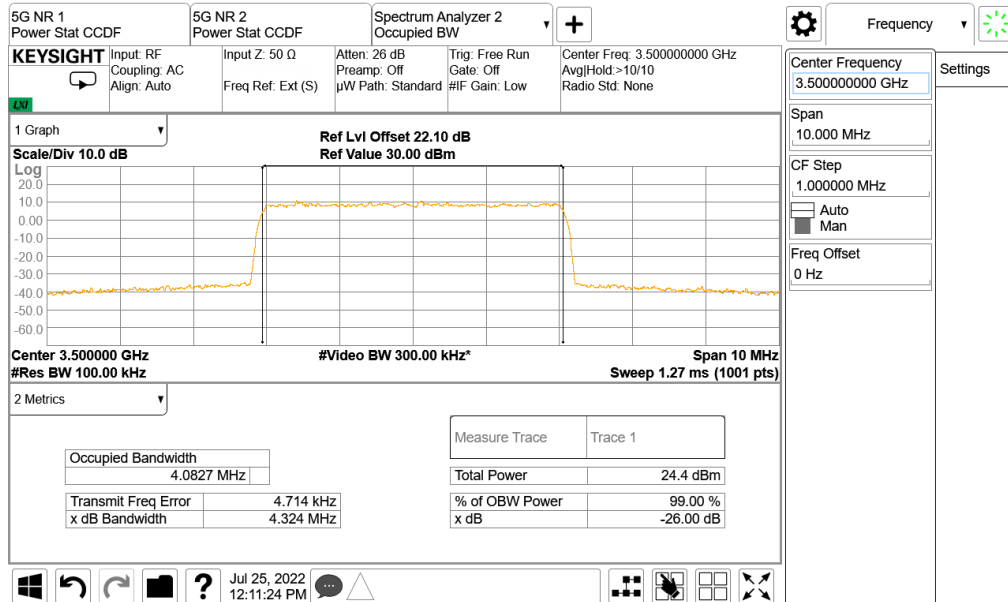


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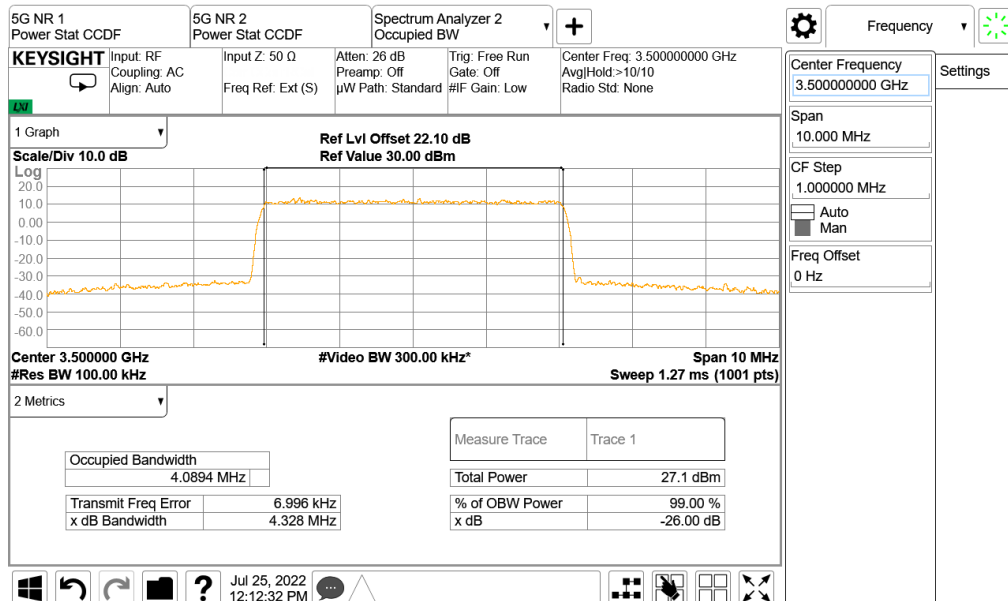
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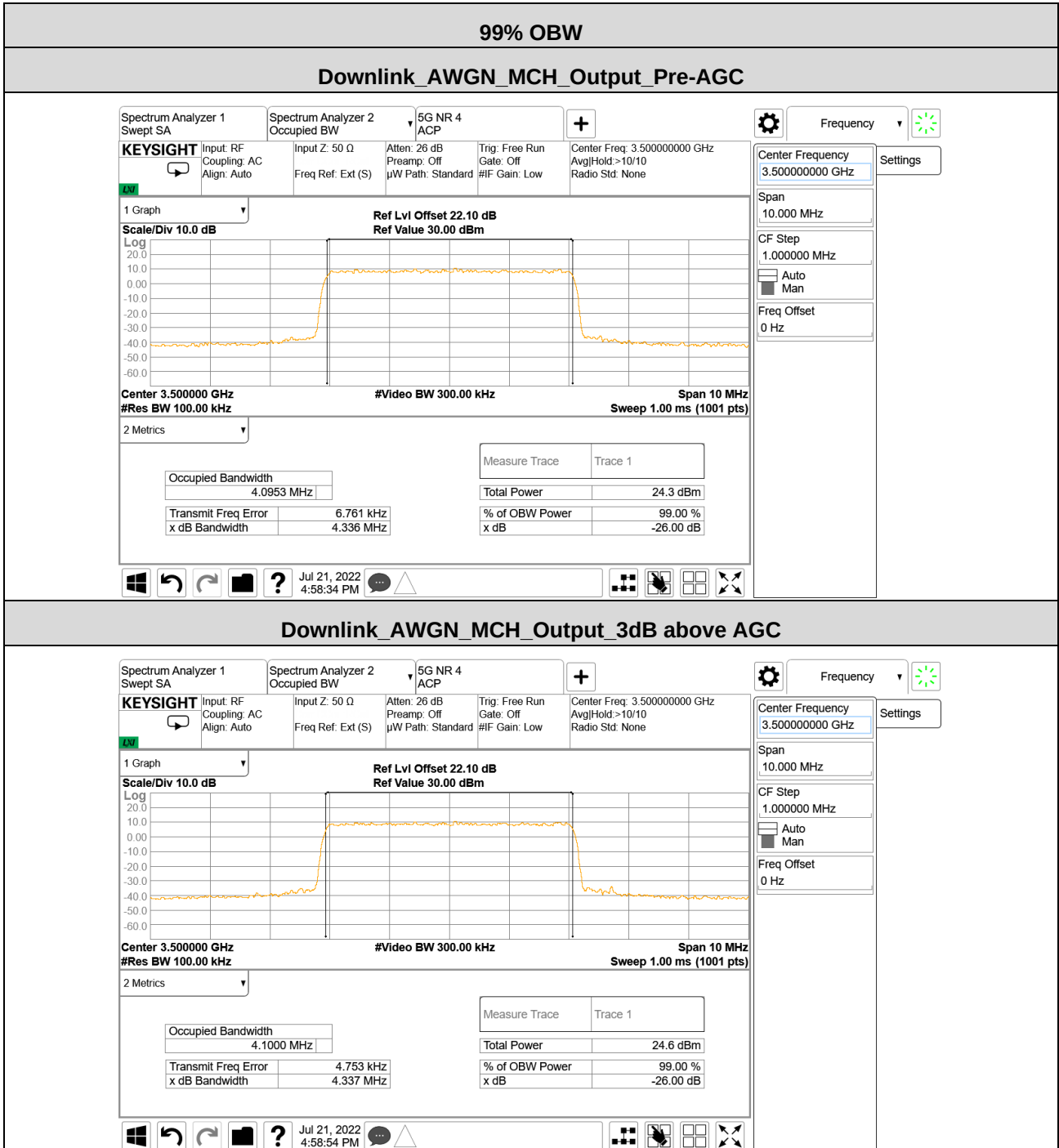
99% OBW

Downlink_AWGN_MCH_Input_Pre-AGC

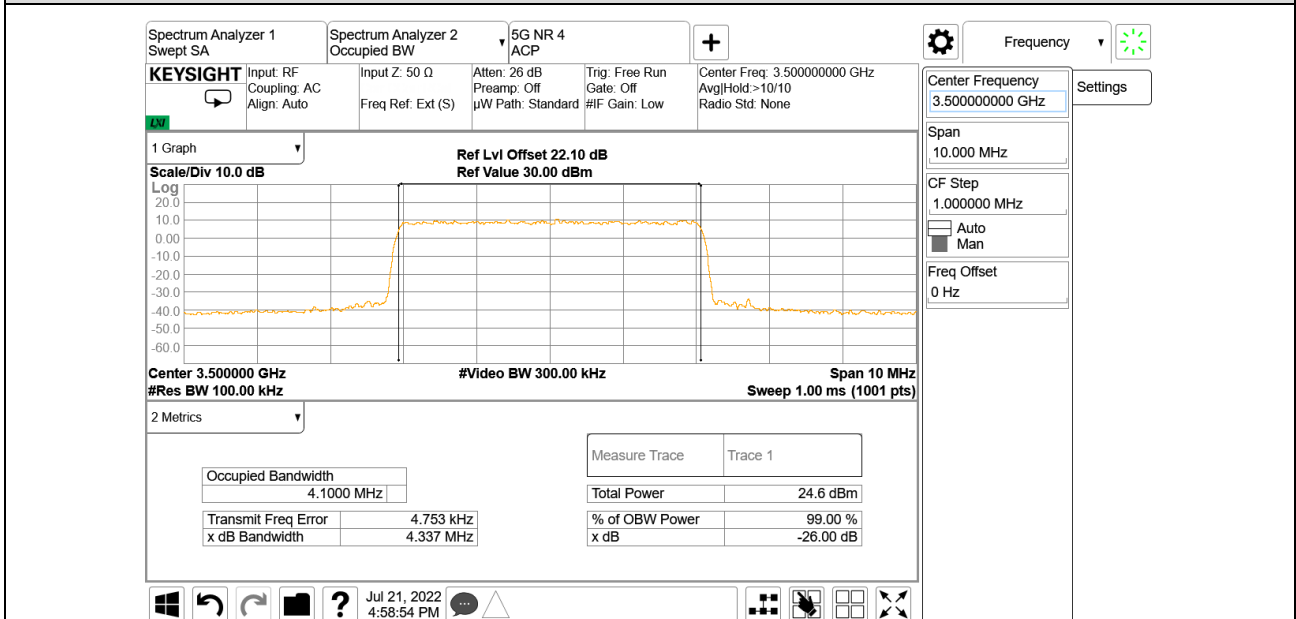


Downlink_AWGN_MCH_Input_3dB above AGC



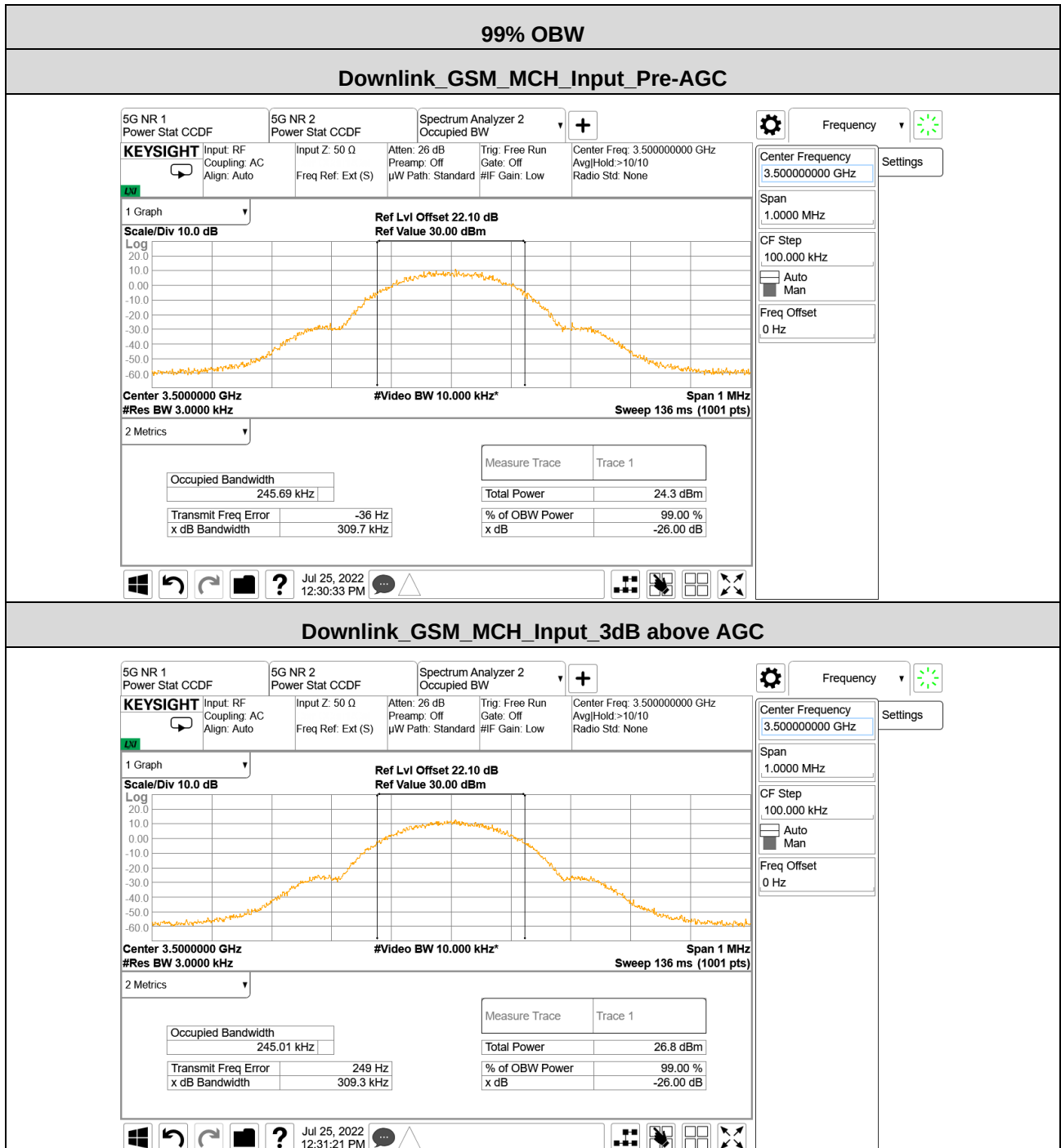


Downlink_AWGN_MCH_Output_3dB above AGC



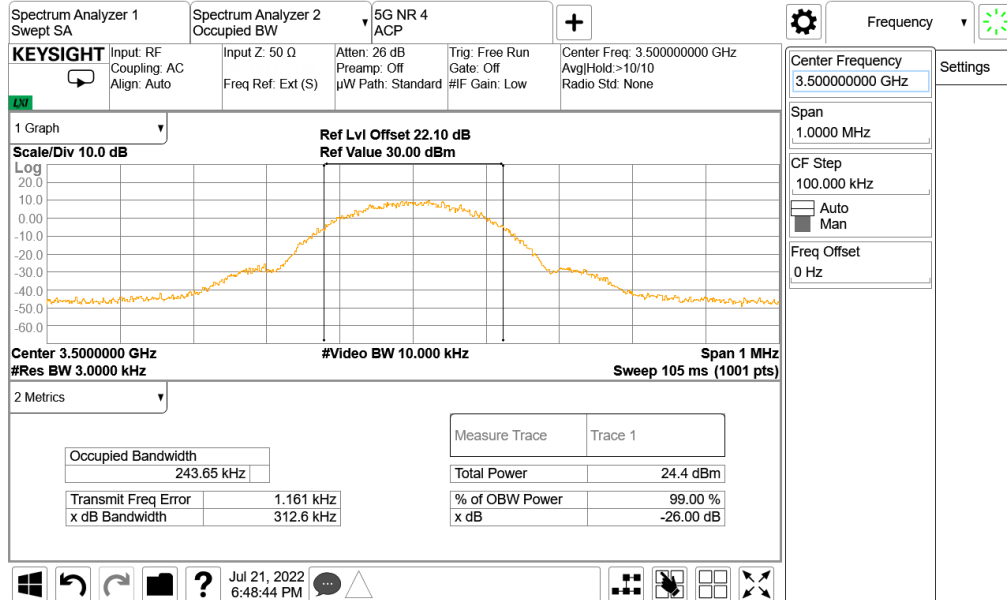
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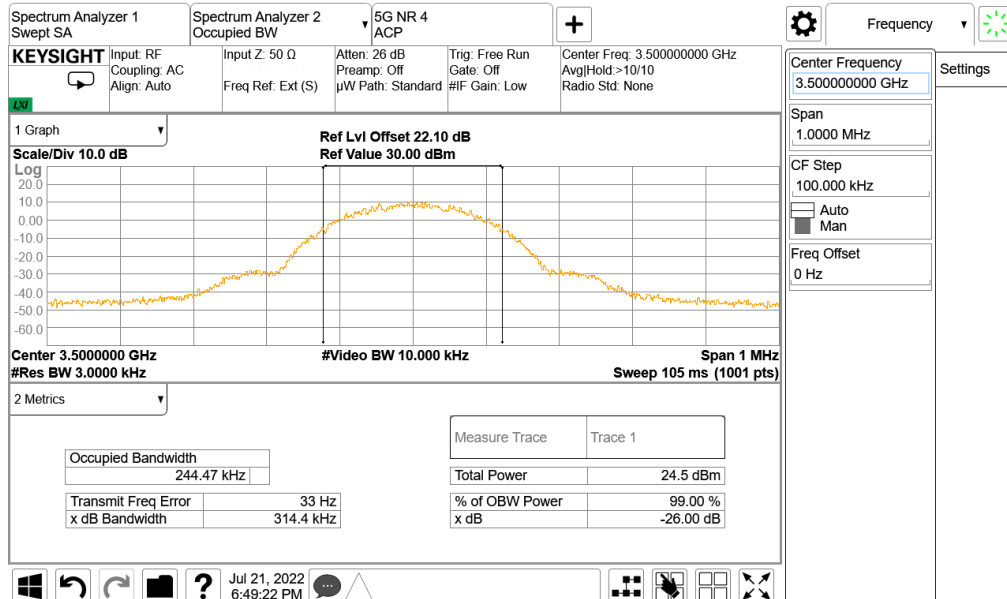


99% OBW

Downlink_GSM_MCH_Output_Pre-AGC



Downlink_GSM_MCH_Output_3dB above AGC



3 Mean 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)	EIRP (W)	Total EIRP (W)	Gain (dB)
Downlink	3528.00	AWGN	Pre-AGC	24.80	24.43	0.278	1.110	-0.37
			3dB above AGC	27.80	24.55	0.286	1.142	/
		GSM	Pre-AGC	24.80	24.32	0.271	1.082	-0.48
			3dB above AGC	27.80	24.18	0.262	1.045	/
Remark:								
1. f0 is from Out-of-band Rejection test in the report.								
2. EIRP= output power (dBm)+ antenna gain (dBi), the antenna gain is 0dBi declared by the manufacturer, the directional gain = $G_{ANT} + 10 \log (N_{ANT})$ dBi = 3dBi								

Mean output power								
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	Input power (dBm/MHz)	Output Power (dBm/MHz)	EIRP (W/MHz)	Total EIRP (W/MHz)	Verdict
Downlink	3528.00	AWGN	Pre-AGC	19.00	18.78	0.076	0.304	PASS
			3dB above AGC	22.00	19.05	0.081	0.324	PASS
		GSM	Pre-AGC	24.80	24.32	0.271	1.082	PASS
			3dB above AGC	27.80	24.18	0.262	1.045	PASS
Remark: 1. f0 is from Out-of-band Rejection test in the report. 2. EIRP= output power (dBm)+ antenna gain (dBi), the antenna gain is 0dBi declared by the manufacturer, the directional gain = $G_{ANT} + 10 \log (N_{ANT})$ dBi = 3dBi. 3. The output power is limited to an EIRP of 1640W/MHz.								



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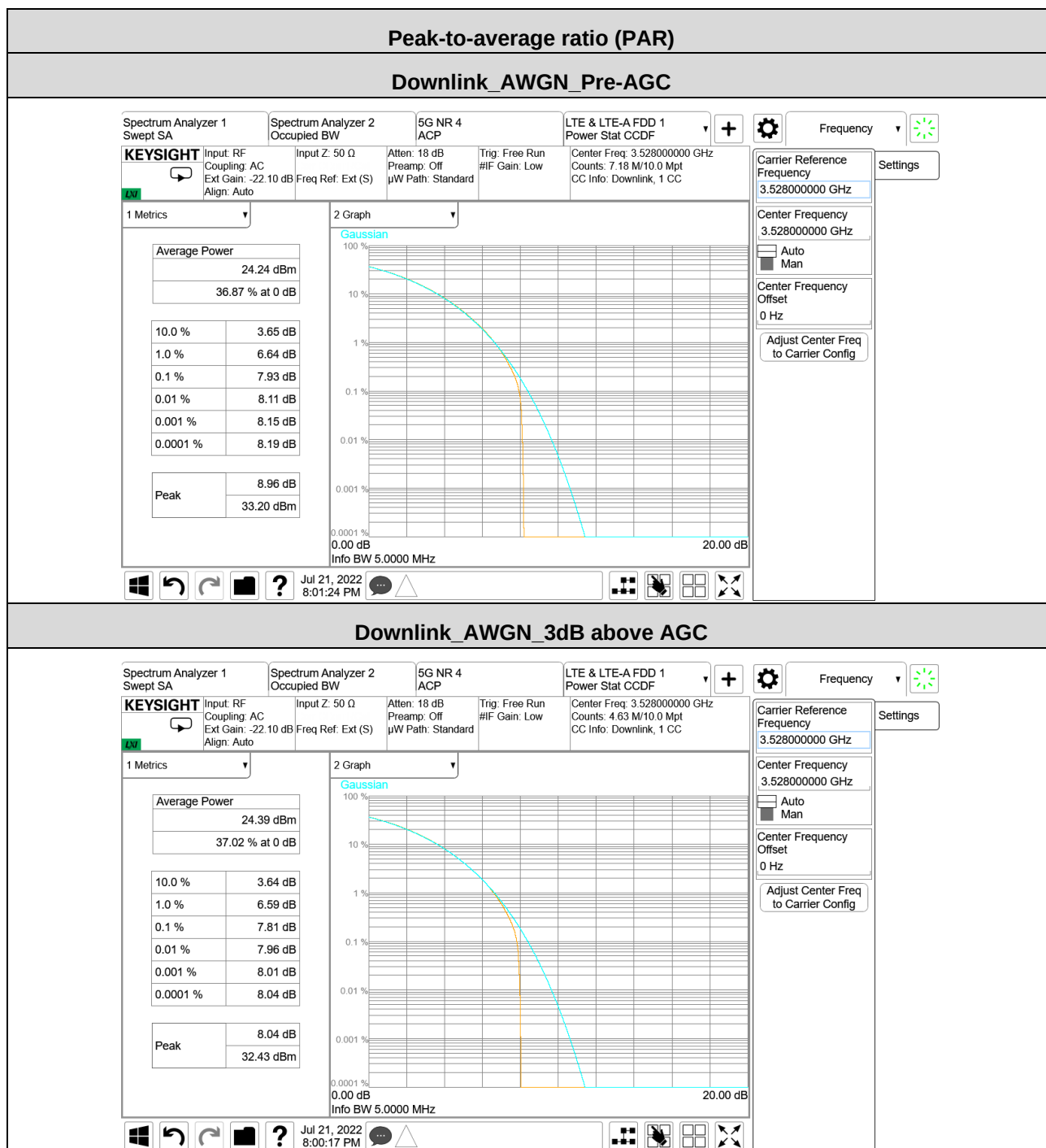
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Peak-to-average ratio (PAR)							
Test path	Test freq. f0 (MHz)	Test Signal	Signal level	Input power (dBm)	PAR (dB)	Limit (dB)	Verdict
Downlink	3528.00	AWGN	Pre-AGC	24.80	7.93	≤13	PASS
			3dB above AGC	27.80	7.81		PASS
		GSM	Pre-AGC	24.80	1.78		PASS
			3dB above AGC	27.80	1.90		PASS



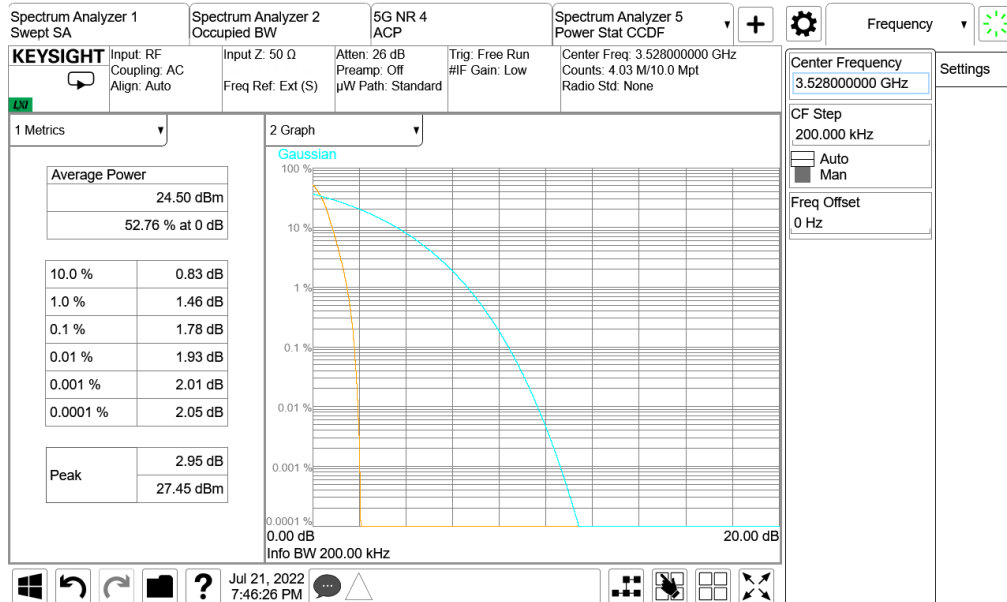
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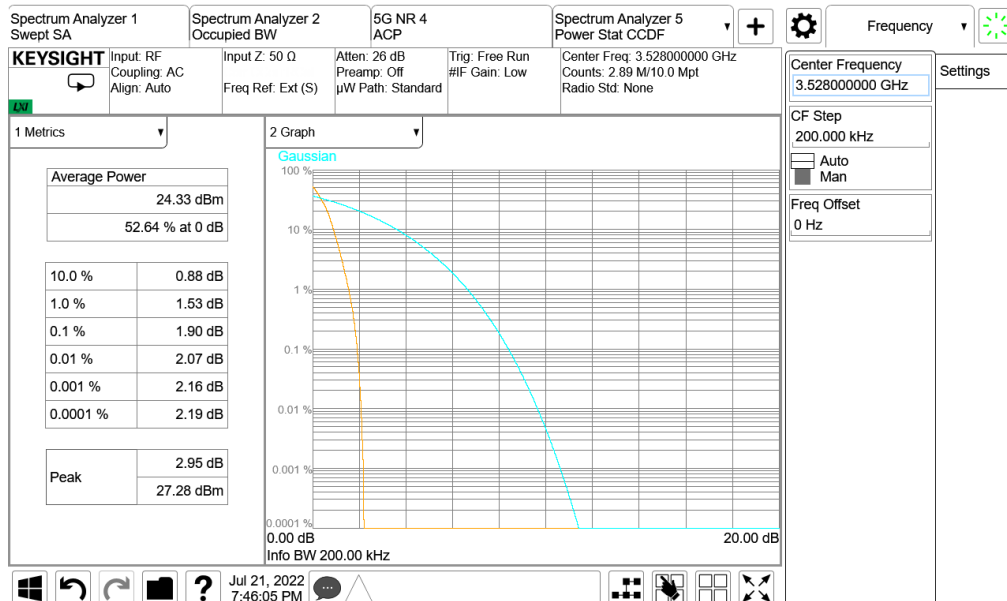


Peak-to-average ratio (PAR)

Downlink_GSM_Pre-AGC



Downlink_GSM_3dB above AGC



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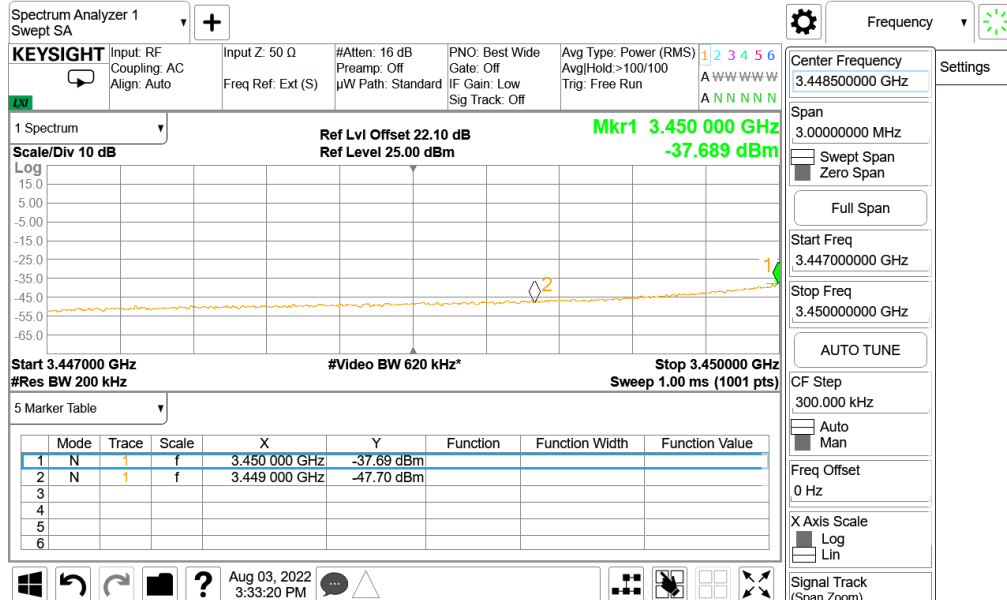
4 Out-of-band/out-of-block (including intermodulation) emissions

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/MHz)	Verdict
					200kHz RBW	1MHz RBW		
Downlink	LCH	AWGN	a single test signal	Pre-AGC	-37.69	-30.70	≤-16	PASS
				3dB above AGC	-39.23	-32.24		PASS
			two adjacent test signals	Pre-AGC	-41.10	-34.11		PASS
				3dB above AGC	-40.37	-33.38		PASS
	HCH		a single test signal	Pre-AGC	-37.88	-30.89		PASS
				3dB above AGC	-39.16	-32.17		PASS
			two adjacent test signals	Pre-AGC	-36.75	-29.75		PASS
				3dB above AGC	-37.50	-30.51		PASS
Remark: 1. The level in 1MHz RBW= the level in 200kHz RBW+ 10lg(1000/200). 2. For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by 10lg(2), so the limit was calculated to show -16dBm/MHz in order to determine the test result conveniently.								

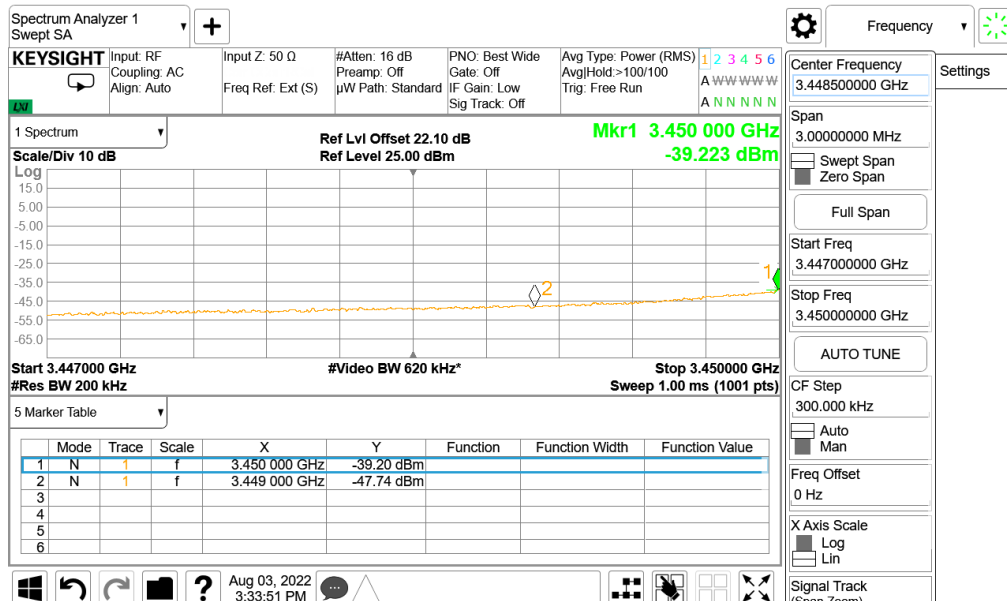
Out-of-band/out-of-block(including intermodulation) emissions								
Test Path	Test Channel	Test Signal	Stimulus Condition	Signal Level	Worst conducted test level (dBm)		Limit (dBm/MHz)	Verdict
					10kHz RBW	1MHz RBW		
Downlink	LCH	GSM	a single test signal	Pre-AGC	-43.97	-23.97	≤-16	PASS
				3dB above AGC	-42.53	-22.53		PASS
			two adjacent test signals	Pre-AGC	-43.52	-23.52		PASS
				3dB above AGC	-43.26	-23.26		PASS
	HCH		a single test signal	Pre-AGC	-39.96	-19.96		PASS
				3dB above AGC	-40.19	-20.19		PASS
			two adjacent test signals	Pre-AGC	-42.64	-22.64		PASS
				3dB above AGC	-43.33	-23.33		PASS
Remark: 1. The level in 1MHz RBW= the level in 10kHz RBW+ 10lg(1000/10). 2. For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by 10lg(2), so the limit was calculated to show -16dBm/MHz in order to determine the test result conveniently.								

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

Downlink_AWGN_LCH_a single test signal_Pre-AGC

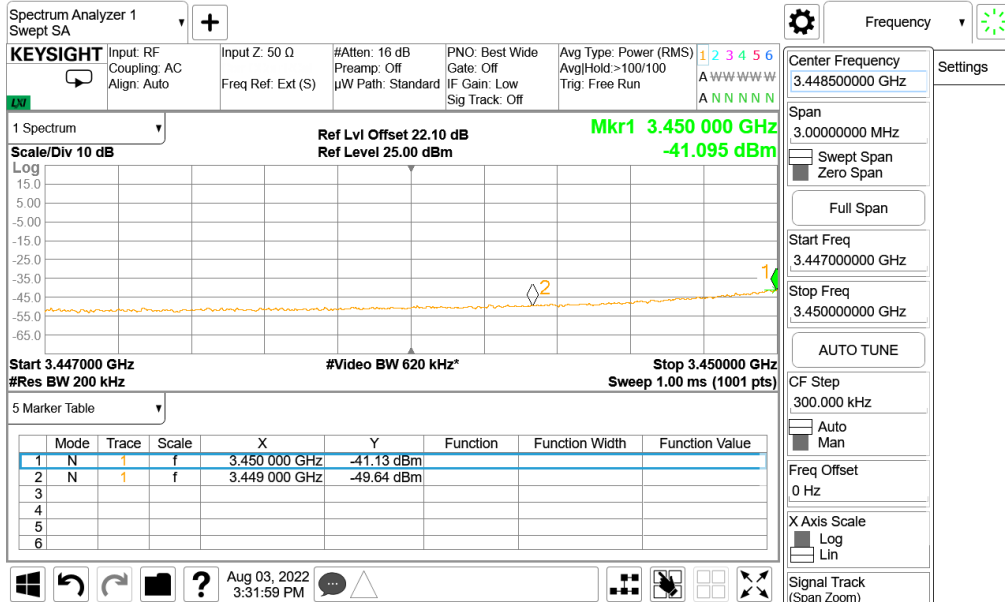


Downlink_AWGN_LCH_a single test signal_3dB above AGC

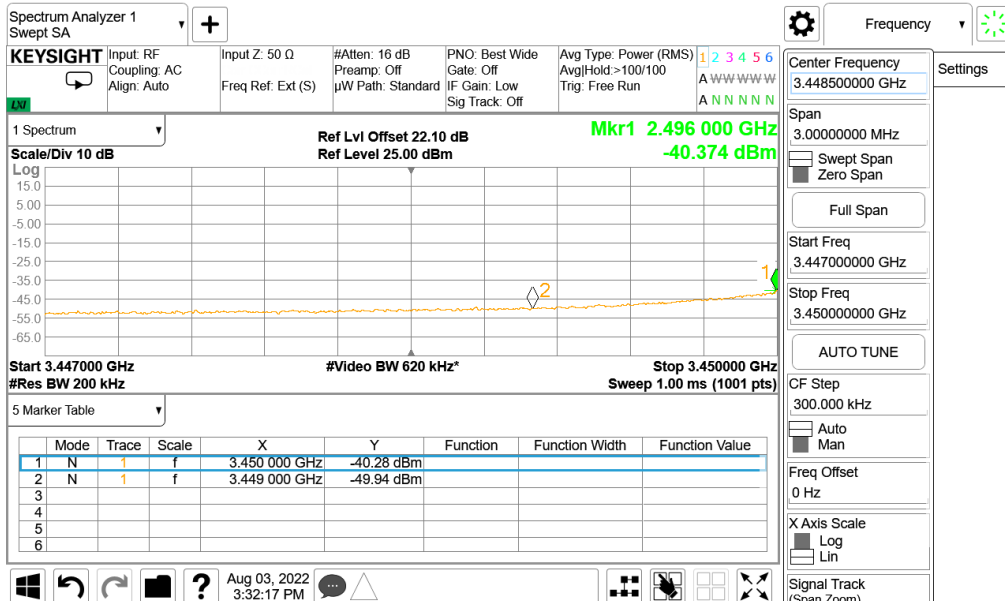


Out-of-band/out-of-block emissions

Downlink_AWGN_LCH_two adjacent test signals_Pre-AGC



Downlink_AWGN_LCH_two adjacent test signals_3dB above AGC

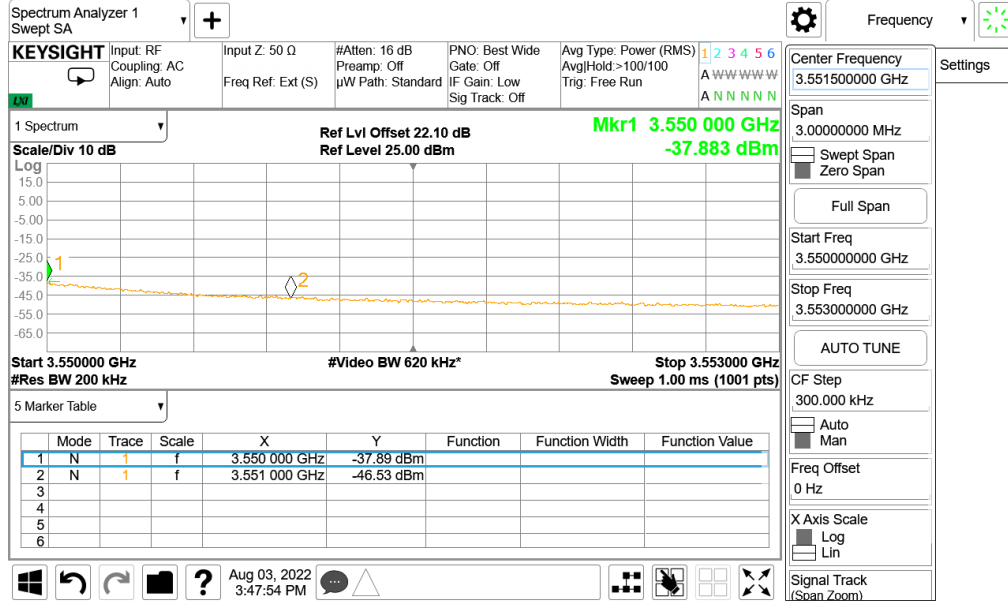


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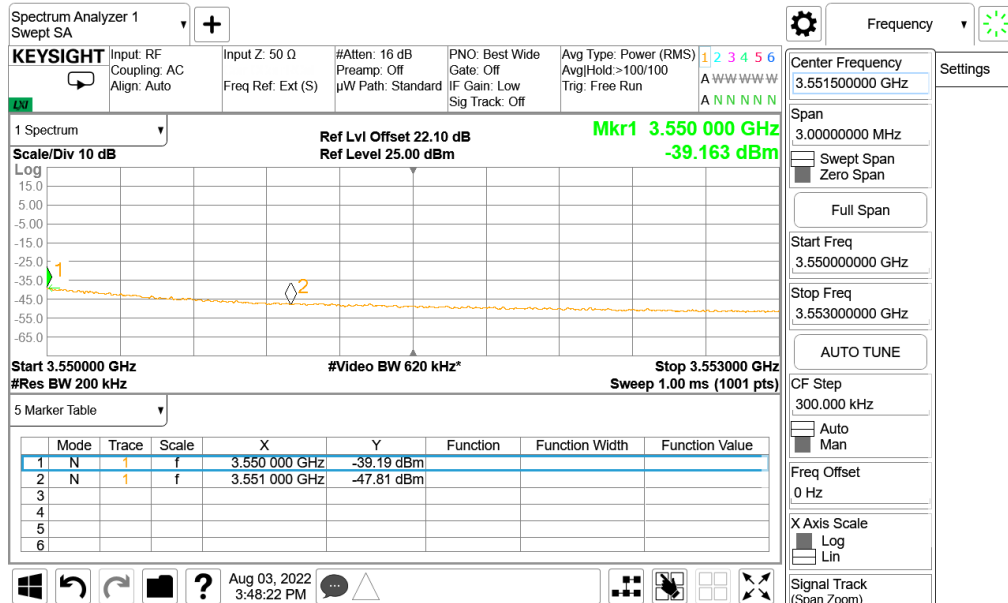
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Out-of-band/out-of-block emissions

Downlink_AWGN_HCH_a single test signal_Pre-AGC



Downlink_AWGN_HCH_a single test signal_3dB above AGC

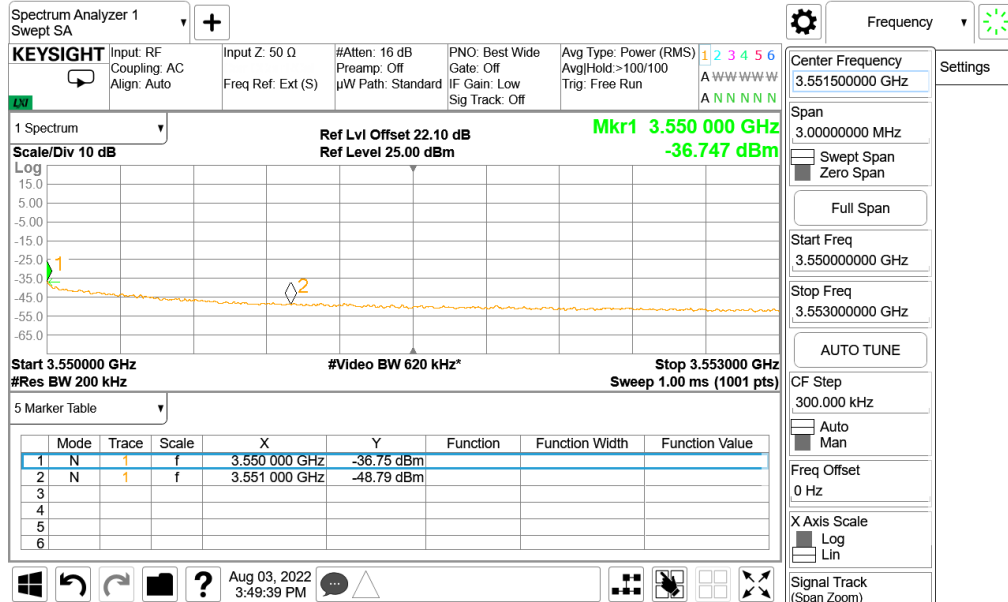


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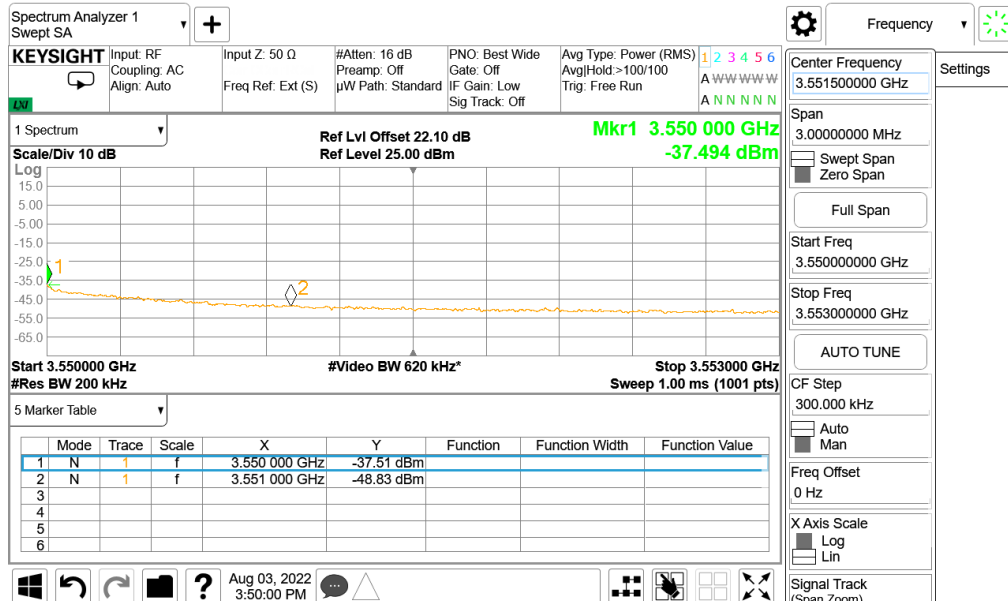
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Out-of-band/out-of-block emissions

Downlink_AWGN_HCH_two adjacent test signals_Pre-AGC



Downlink_AWGN_HCH_two adjacent test signals_3dB above AGC





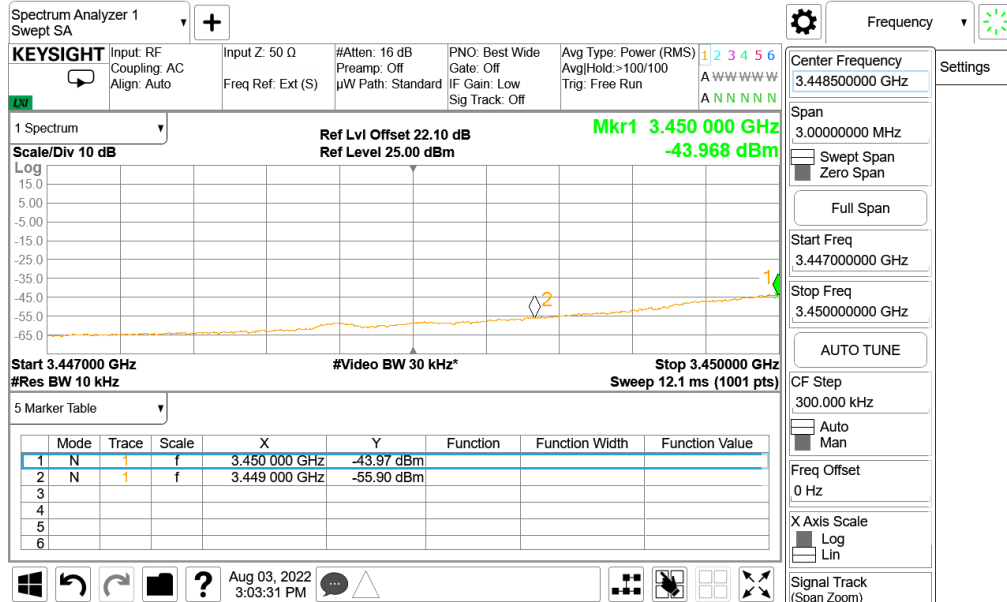
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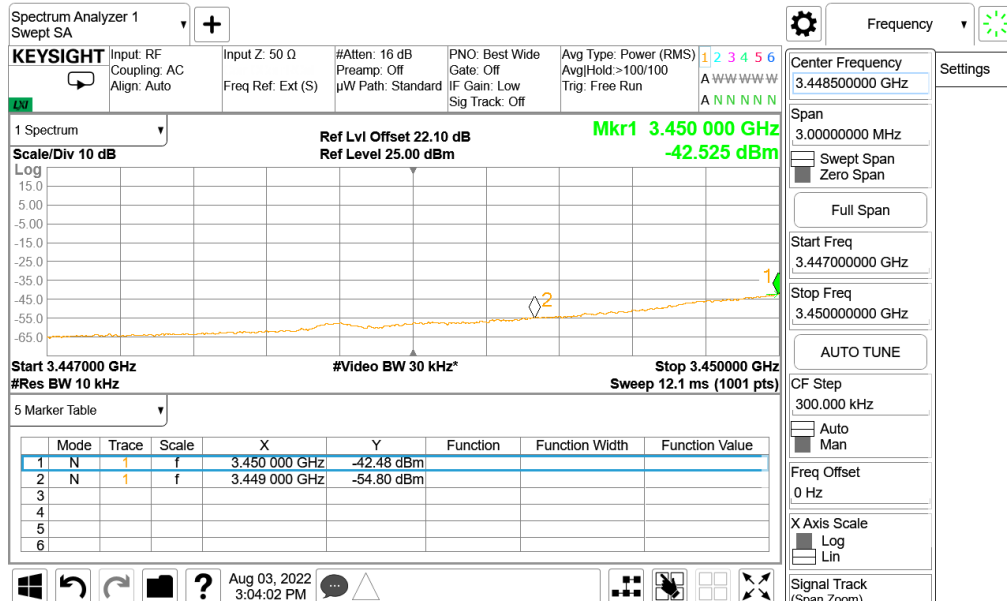
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Out-of-band/out-of-block emissions

Downlink_GSM_LCH_a single test signal_Pre-AGC



Downlink_GSM_LCH_a single test signal_3dB above AGC



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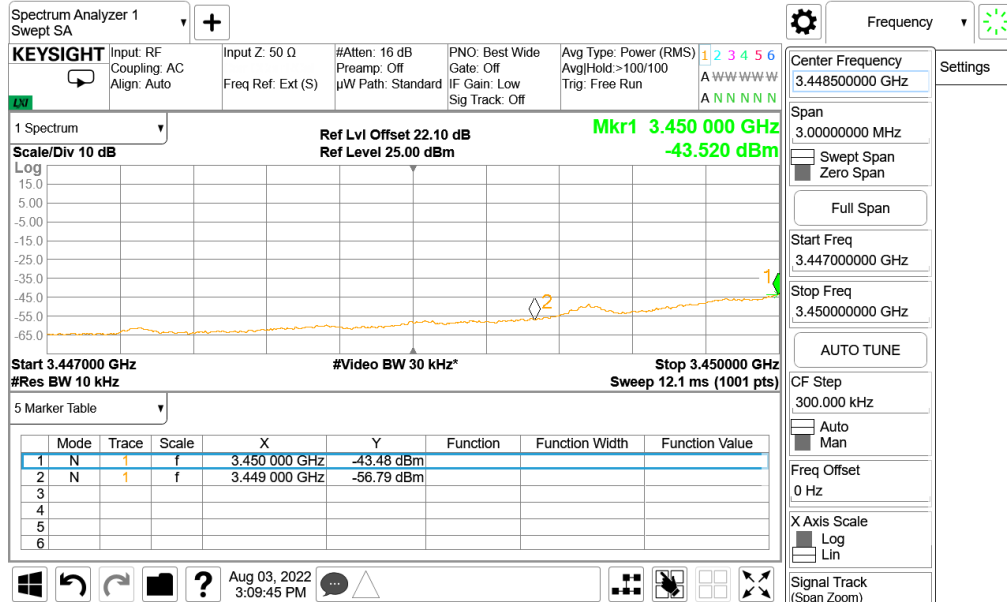
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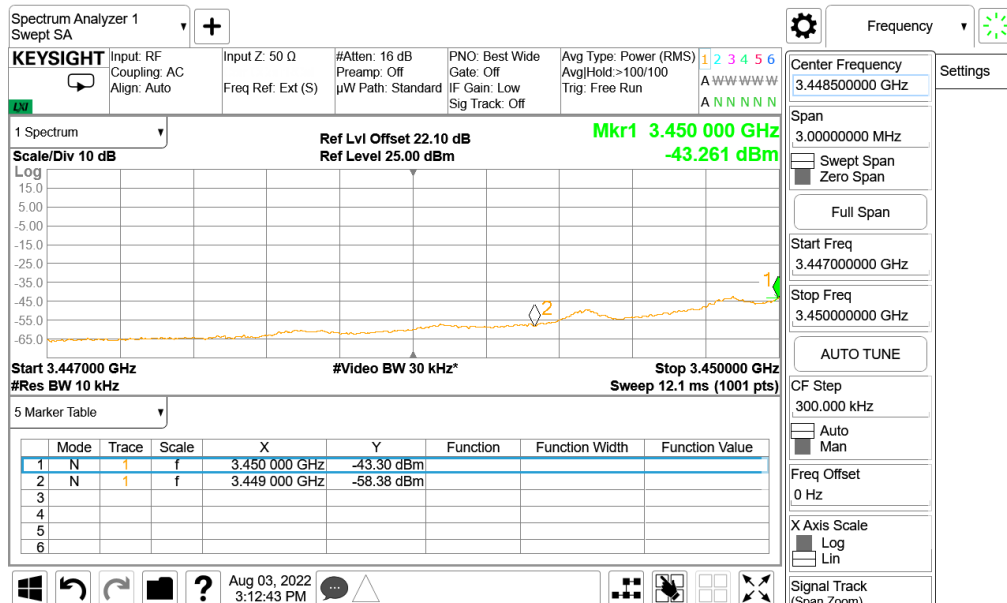
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Out-of-band/out-of-block emissions

Downlink_GSM_LCH_two adjacent test signals_Pre-AGC



Downlink_GSM_LCH_two adjacent test signals_3dB above AGC



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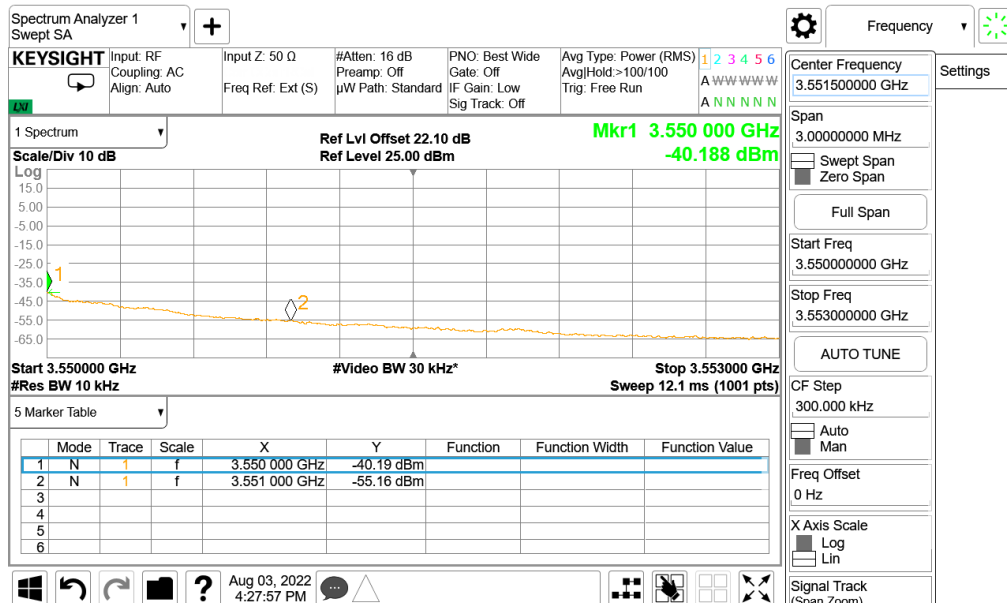
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Out-of-band/out-of-block emissions

Downlink_GSM_HCH_a single test signal_Pre-AGC



Downlink_GSM_HCH_a single test signal_3dB above AGC



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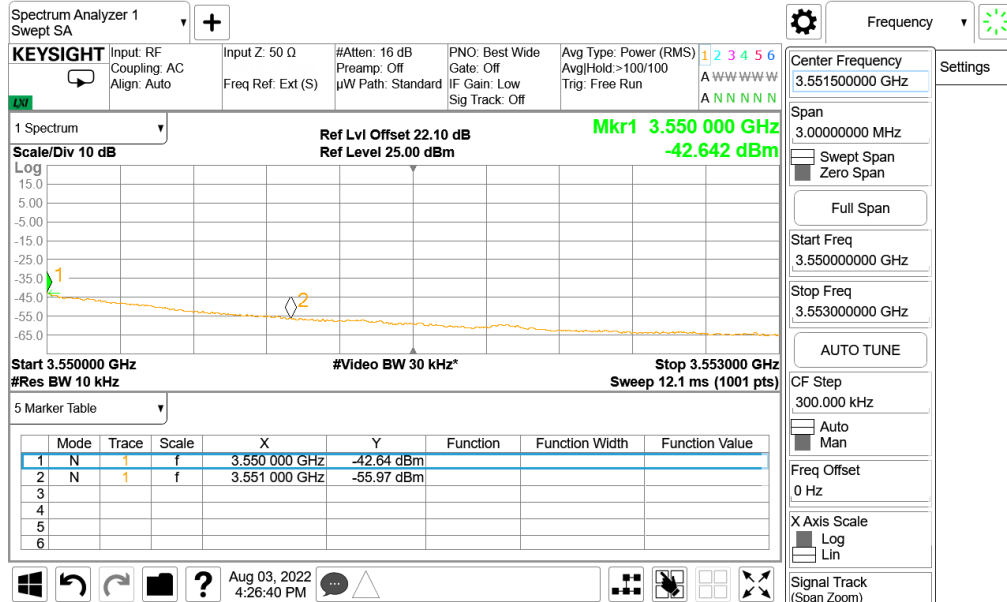
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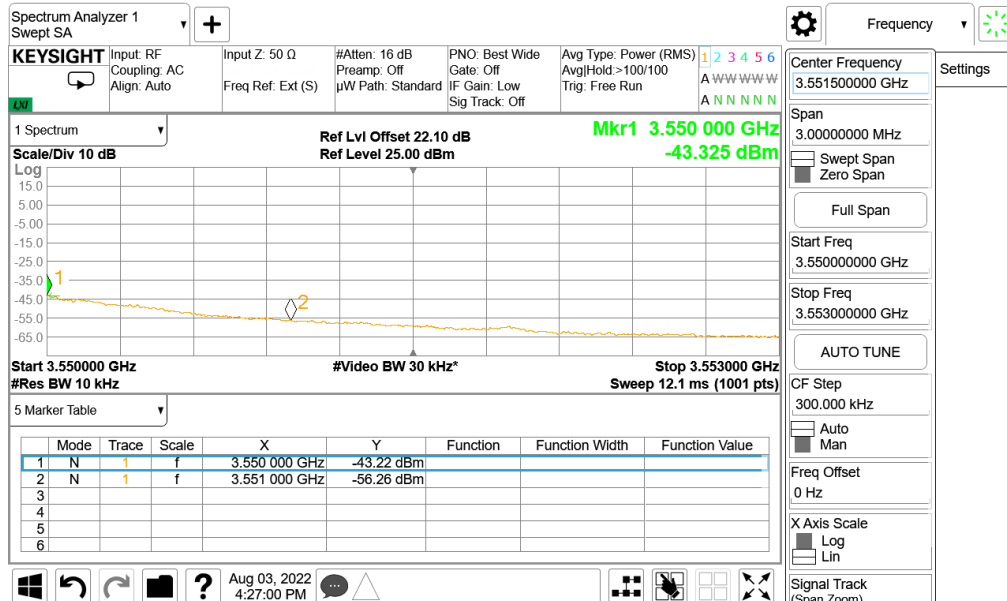
Member of the SGS Group (SGS SA)

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



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5 Conducted Spurious emissions

Conducted spurious emissions							
Test Path	Test Channel	Test Signal	Signal Level	Frequency range (MHz)	Worst test level (dBm/MHz)	Limit (dBm/MHz)	Verdict
Downlink	HCH	AWGN	Pre-AGC	30-1000	-60.40	≤ -43	PASS
				1000-3430	-51.62	≤ -43	PASS
				3430-3440	-50.39	≤ -28	PASS
				3440-3449	-48.85	≤ -16	PASS
				3551-3560	-31.91	≤ -16	PASS
				3560-3570	-45.10	≤ -28	PASS
				3570-40000	-45.70	≤ -43	PASS
	HCH	GSM	Pre-AGC	30-1000	-60.54	≤ -43	PASS
				1000-3430	-51.31	≤ -43	PASS
				3430-3440	-50.12	≤ -28	PASS
				3440-3449	-48.91	≤ -16	PASS
				3551-3560	-30.52	≤ -16	PASS
				3560-3570	-44.74	≤ -28	PASS
				3570-40000	-45.65	≤ -43	PASS
	MCH	AWGN	Pre-AGC	30-1000	-60.62	≤ -43	PASS
				1000-3430	-51.65	≤ -43	PASS
				3430-3440	-50.24	≤ -28	PASS
				3440-3449	-49.09	≤ -16	PASS
				3551-3560	-47.53	≤ -16	PASS
				3560-3570	-47.75	≤ -28	PASS
				3570-40000	-45.43	≤ -43	PASS
Remark: For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by 10lg(2), so the limits were calculated to show -43dBm/MHz, -28dBm/MHz and -16dBm/MHz individually in order to determine the test result conveniently.							

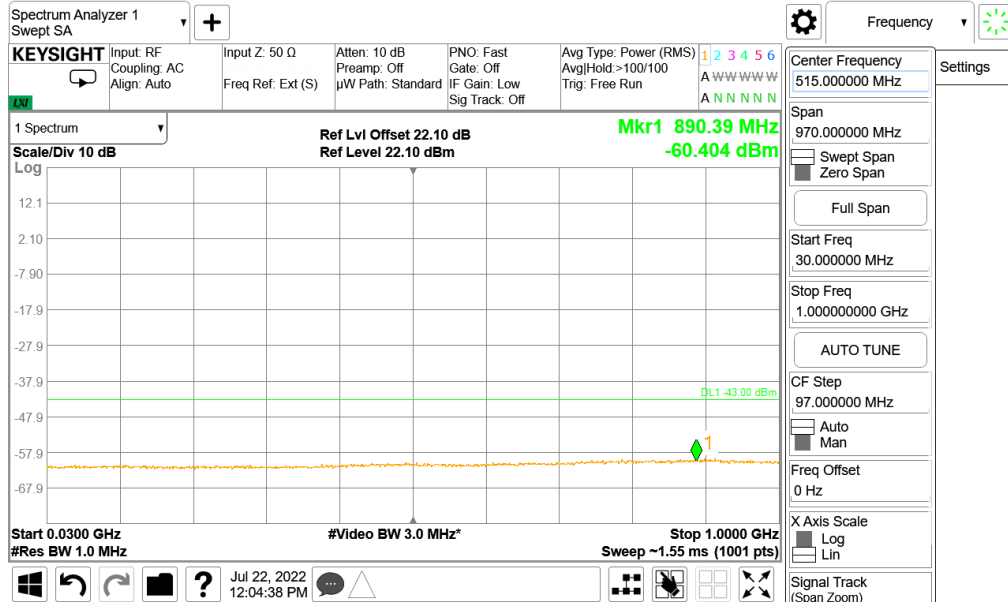


Conducted spurious emissions							
Test Path	Test Channel	Test Signal	Signal Level	Frequency range (MHz)	Worst test level (dBm/MHz)	Limit (dBm/MHz)	Verdict
Downlink	MCH	GSM	Pre-AGC	30-1000	-60.39	≤ -43	PASS
				1000-3430	-51.49	≤ -43	PASS
				3430-3440	-49.86	≤ -28	PASS
				3440-3449	-48.90	≤ -16	PASS
				3551-3560	-47.85	≤ -16	PASS
				3560-3570	-47.63	≤ -28	PASS
				3570-40000	-45.60	≤ -43	PASS
	LCH	AWGN	Pre-AGC	30-1000	-59.94	≤ -43	PASS
				1000-3430	-51.56	≤ -43	PASS
				3430-3440	-47.16	≤ -28	PASS
				3440-3449	-34.62	≤ -16	PASS
				3551-3560	-47.70	≤ -16	PASS
				3560-3570	-47.43	≤ -28	PASS
				3570-40000	-45.57	≤ -43	PASS
	LCH	GSM	Pre-AGC	30-1000	-60.48	≤ -43	PASS
				1000-3430	-51.60	≤ -43	PASS
				3430-3440	-46.95	≤ -28	PASS
				3440-3449	-34.09	≤ -16	PASS
				3551-3560	-47.62	≤ -16	PASS
				3560-3570	-46.96	≤ -28	PASS
				3570-40000	-45.70	≤ -43	PASS

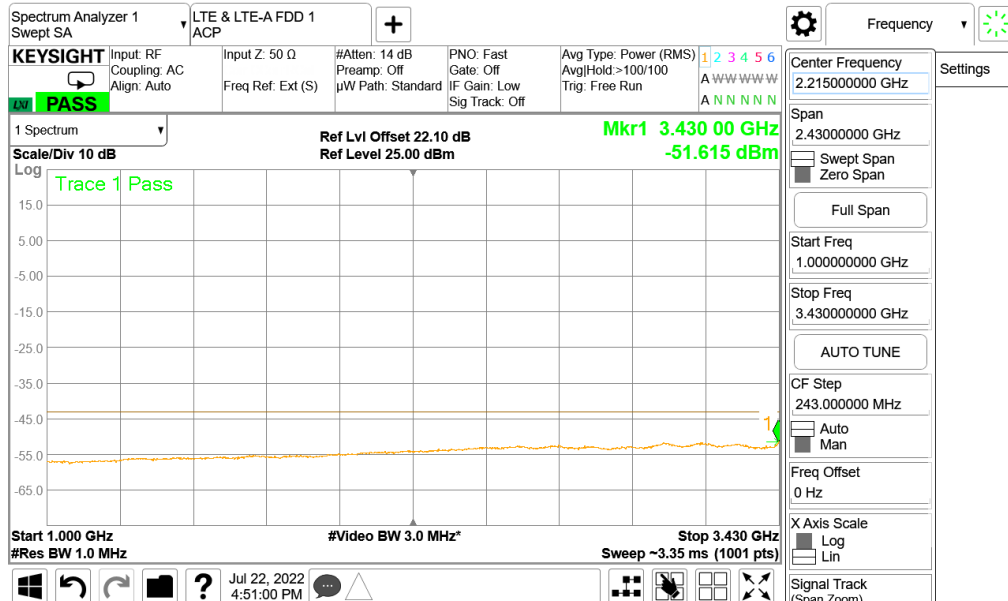
Remark:
For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by 10lg(2), so the limits were calculated to show -43dBm/MHz, -28dBm/MHz and -16dBm/MHz individually in order to determine the test result conveniently.

Conducted spurious emissions

Downlink_AWGN_HCH

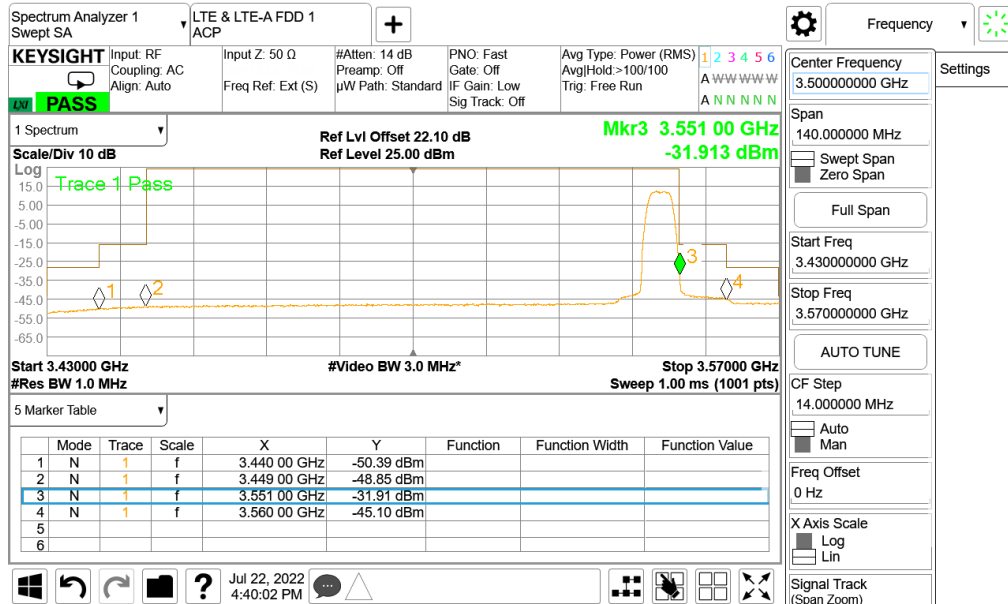


Downlink_AWGN_HCH

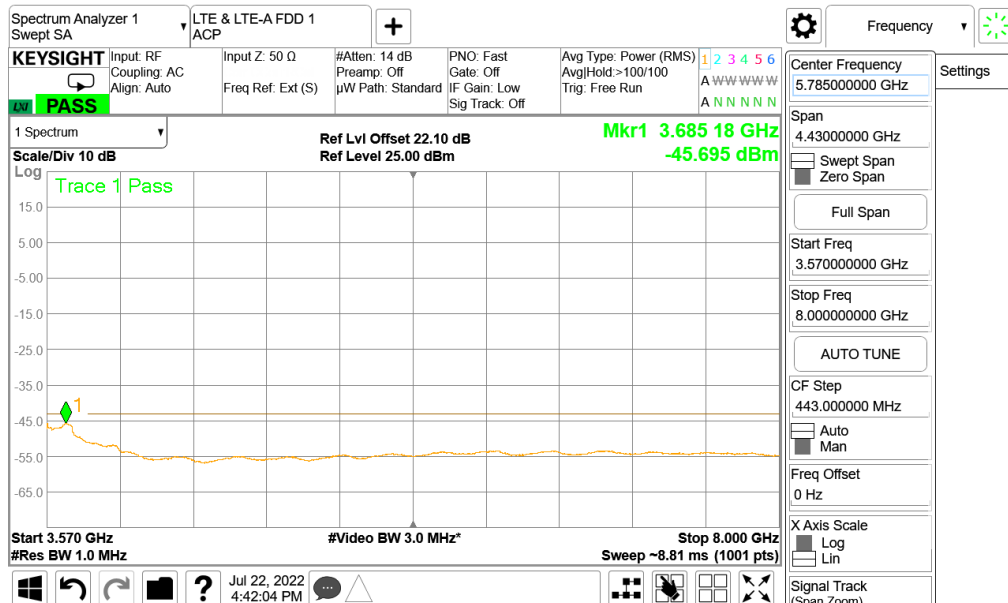


Conducted spurious emissions

Downlink_AWGN_HCH

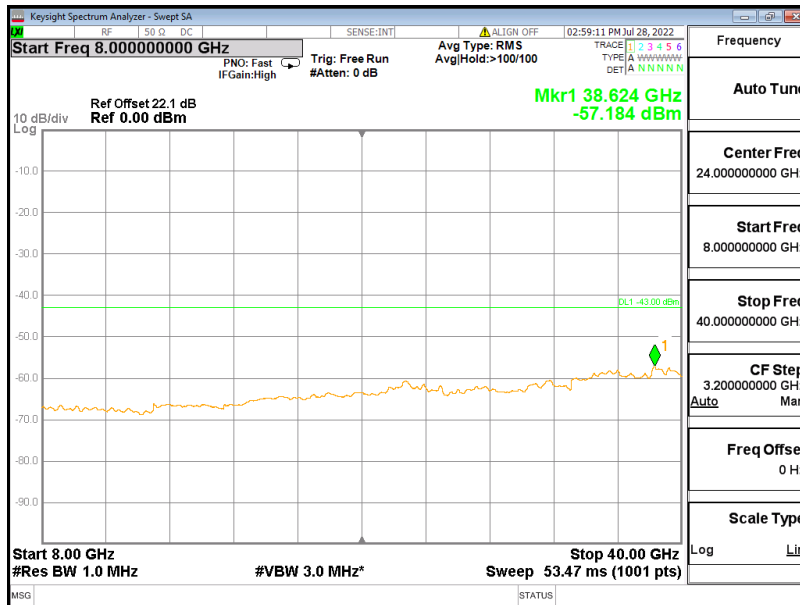


Downlink_AWGN_HCH

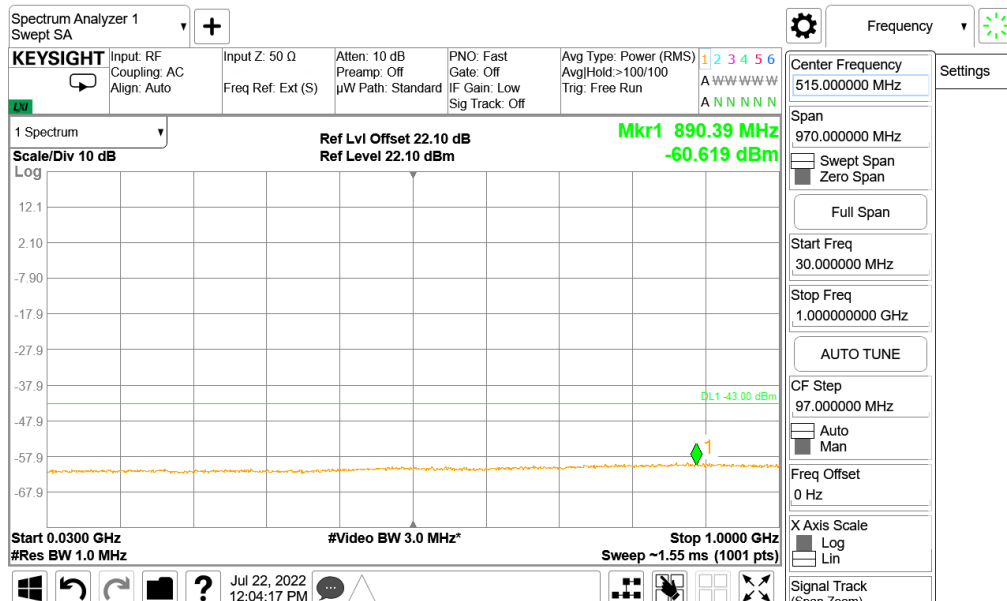


Conducted spurious emissions

Downlink_AWGN_HCH

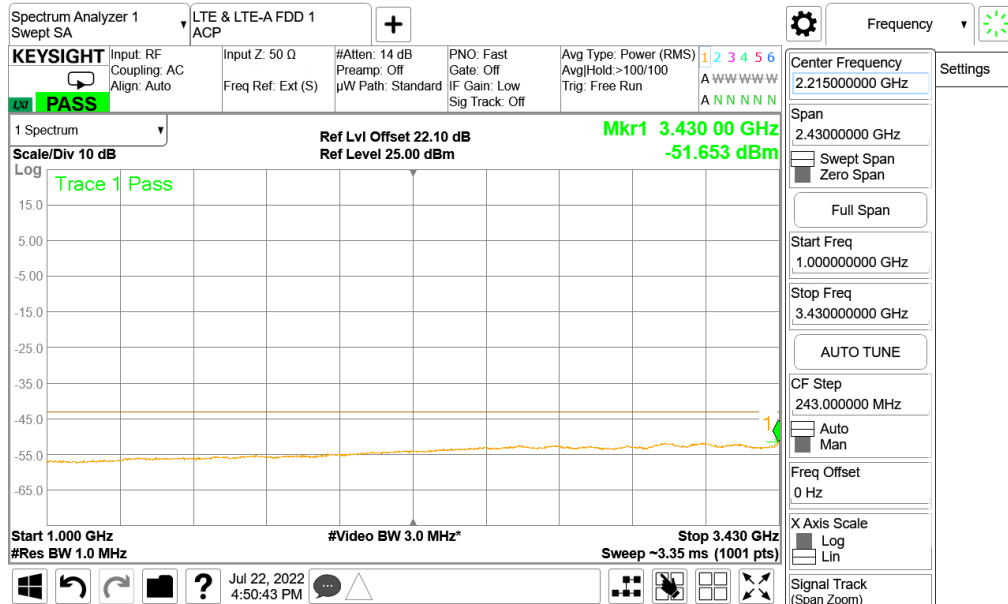


Downlink_AWGN_MCH

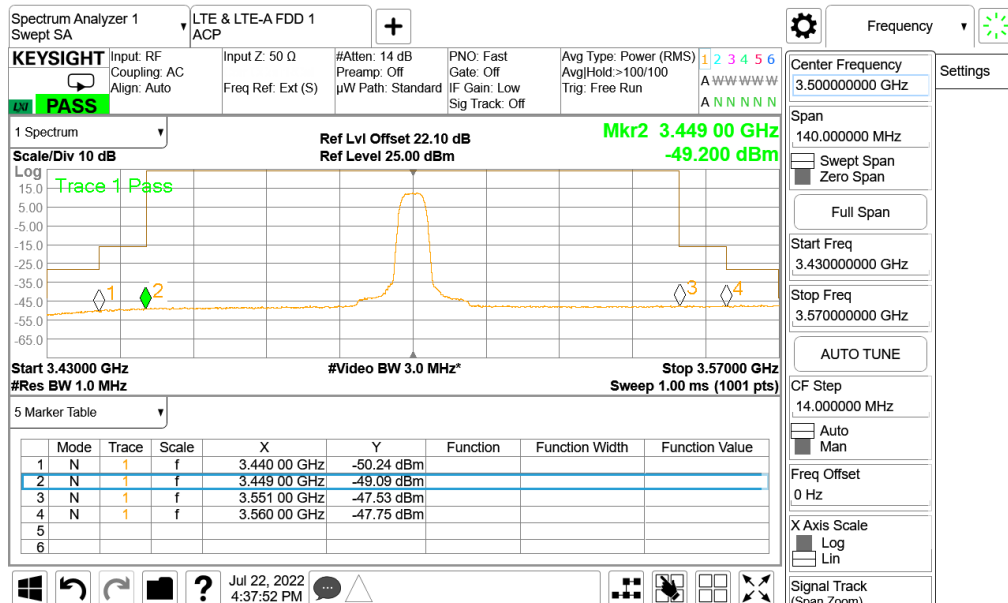


Conducted spurious emissions

Downlink_AWGN_MCH

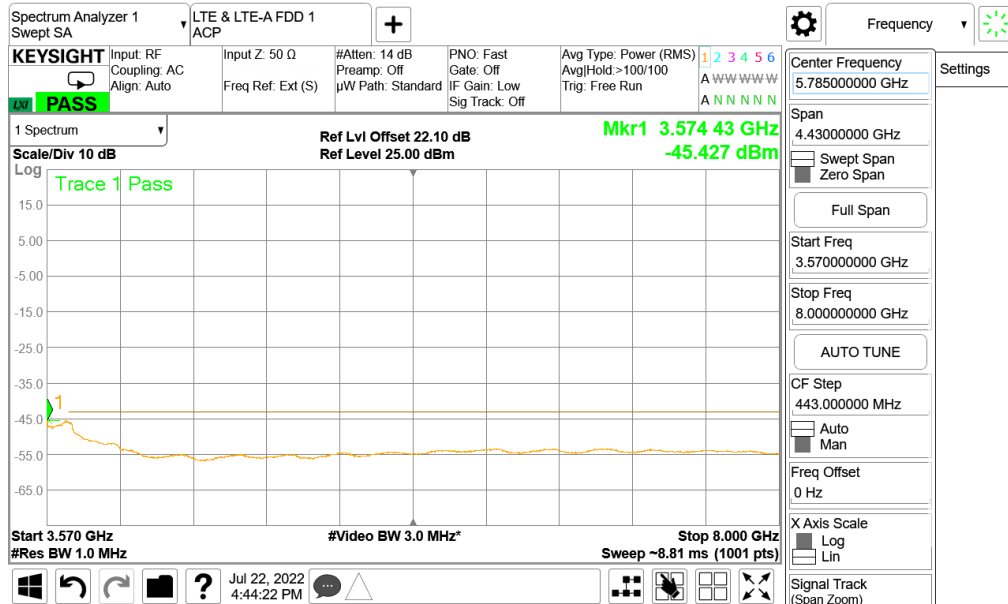


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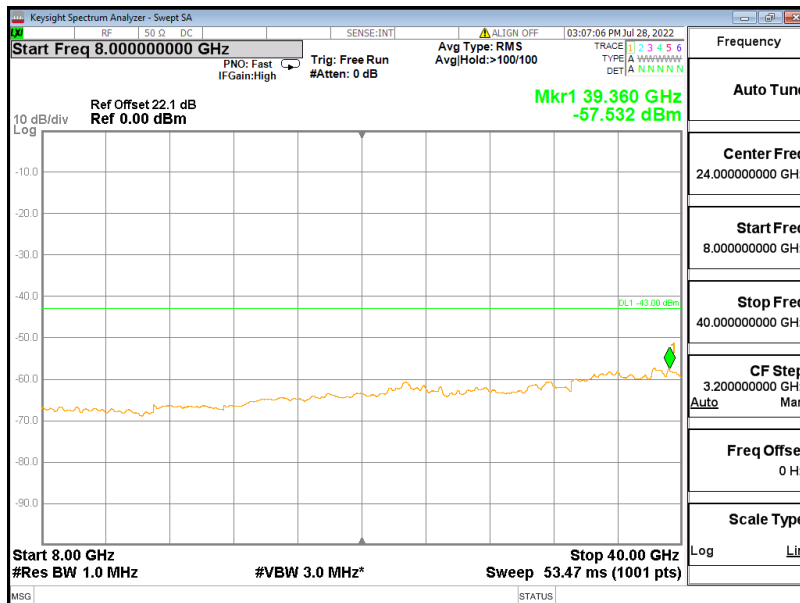


Conducted spurious emissions

Downlink_AWGN_MCH

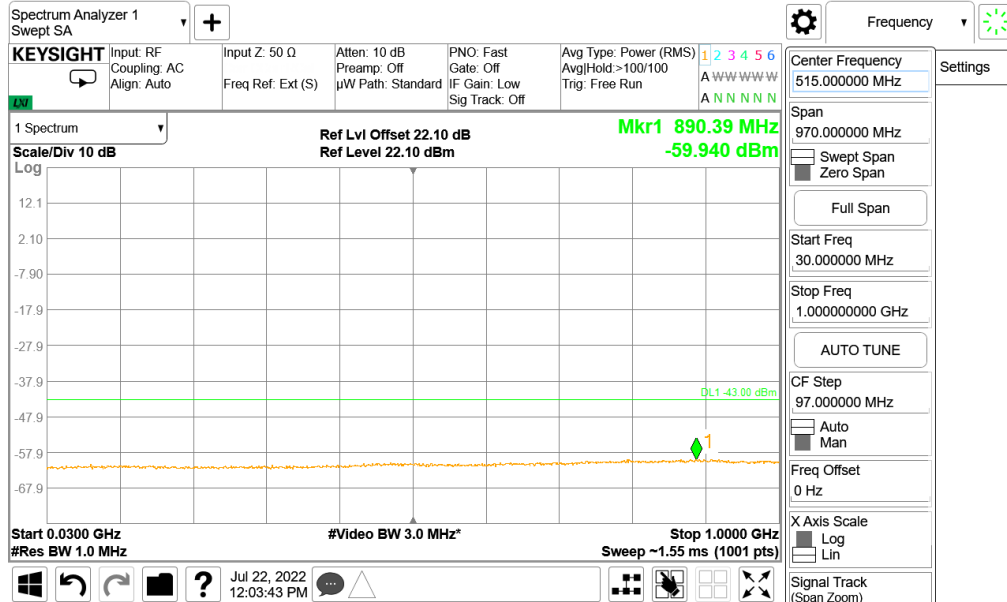


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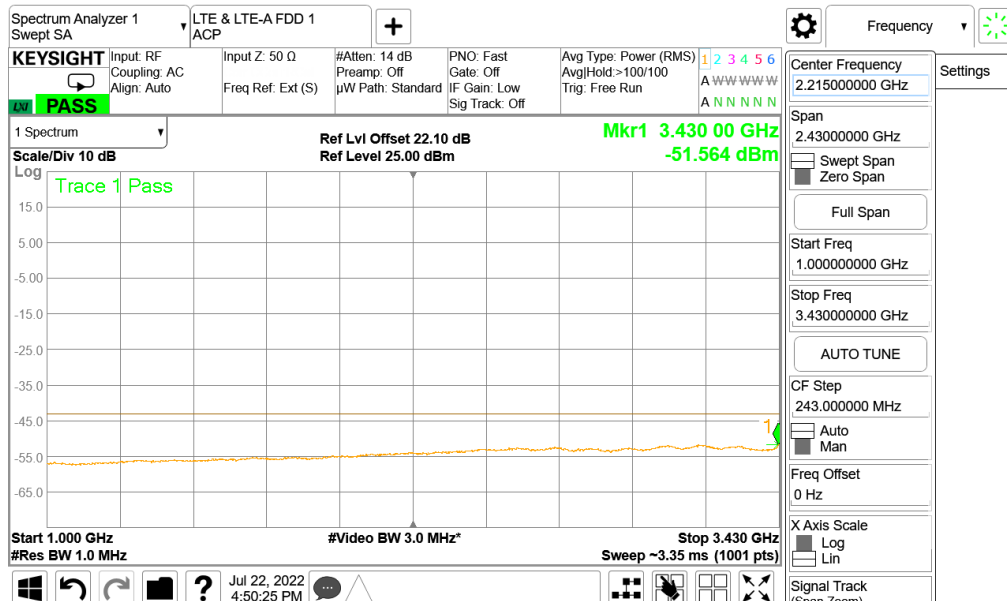


Conducted spurious emissions

Downlink_AWGN_LCH



Downlink_AWGN_LCH

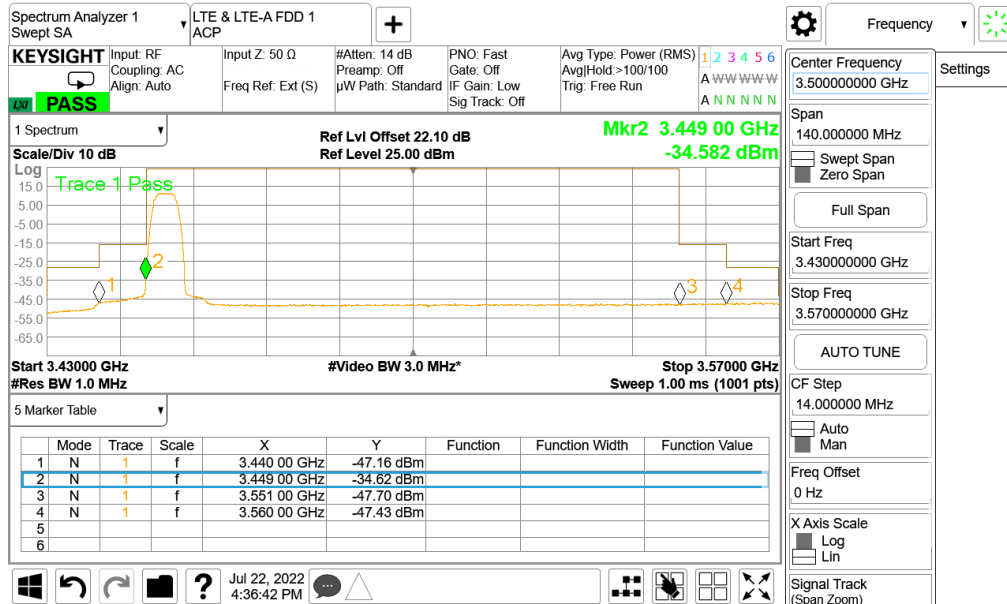


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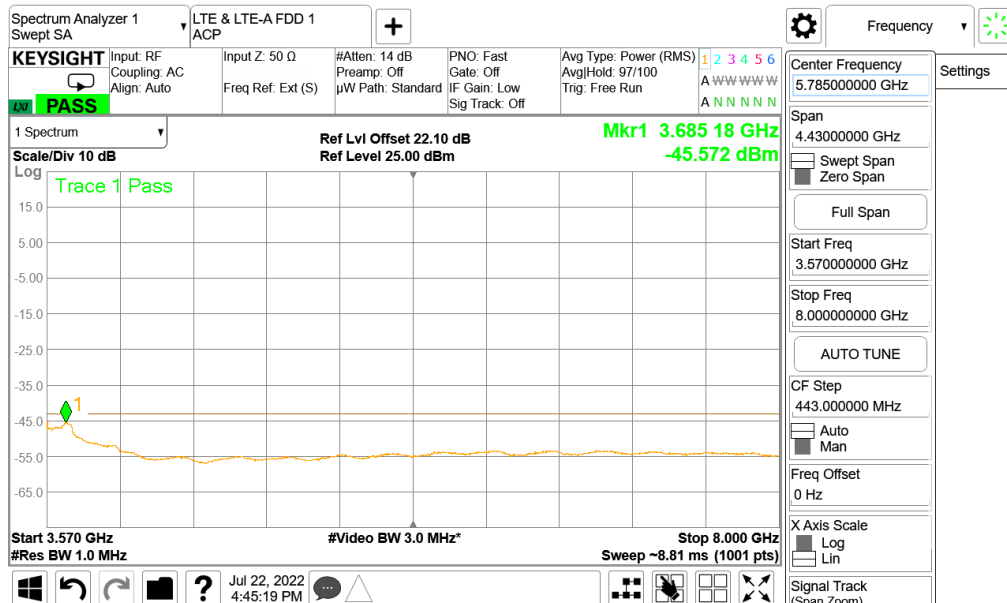
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Conducted spurious emissions

Downlink_AWGN_LCH

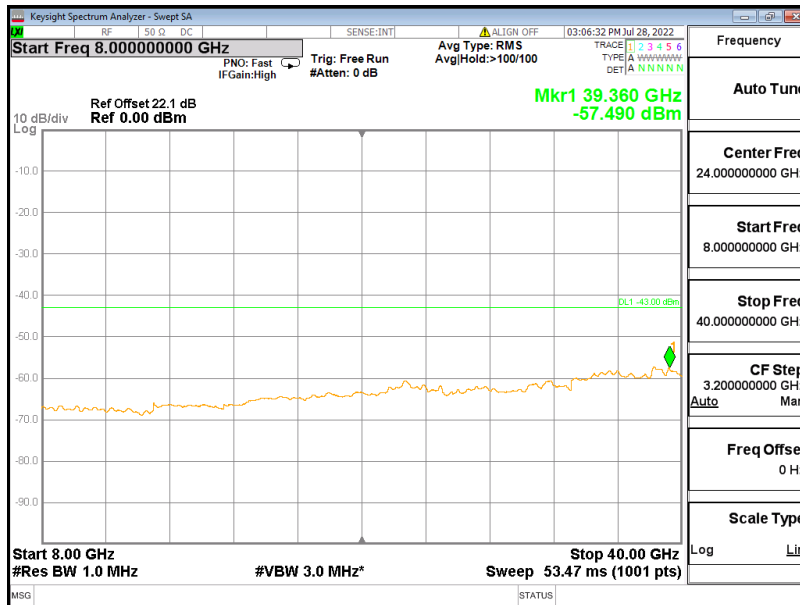


Downlink_AWGN_LCH

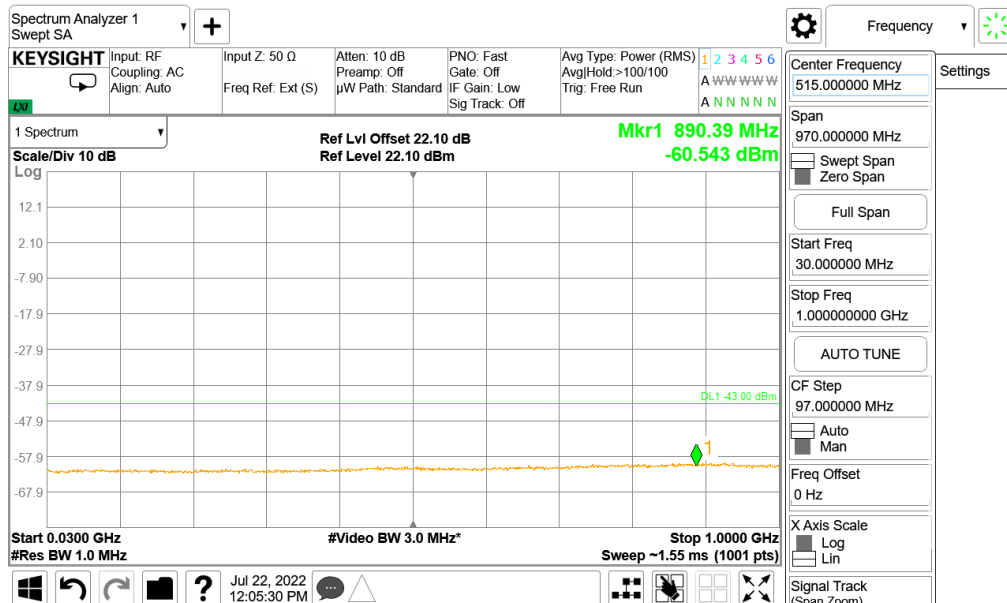


Conducted spurious emissions

Downlink_AWGN_LCH

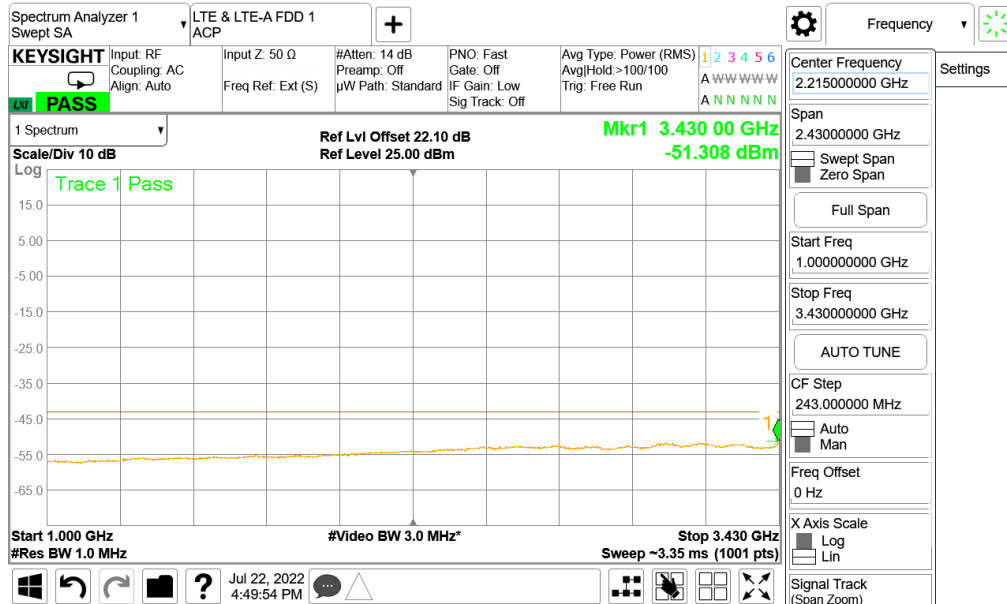


Downlink_GSM_HCH

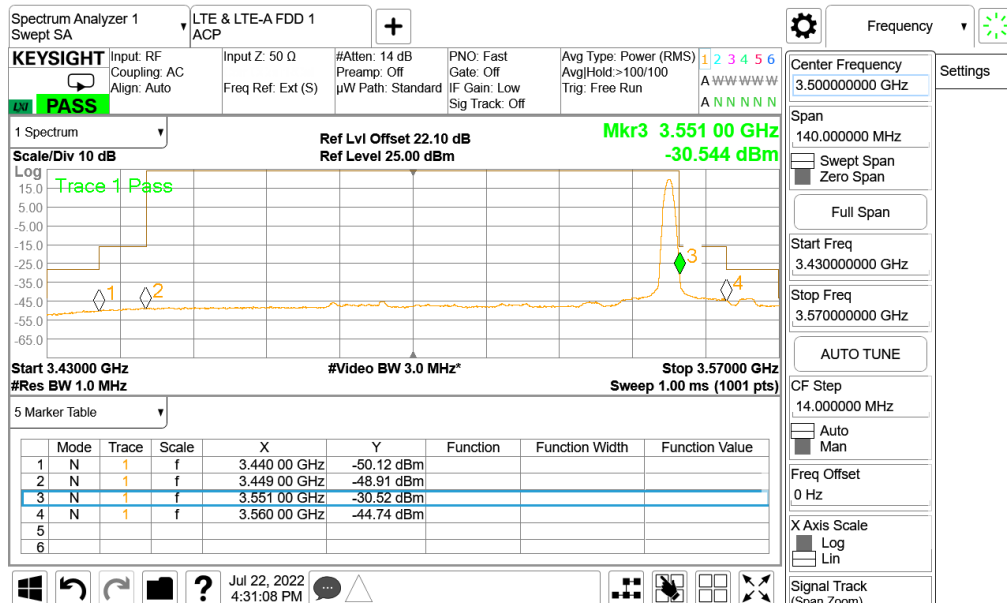


Conducted spurious emissions

Downlink_GSM_HCH



Downlink_GSM_HCH

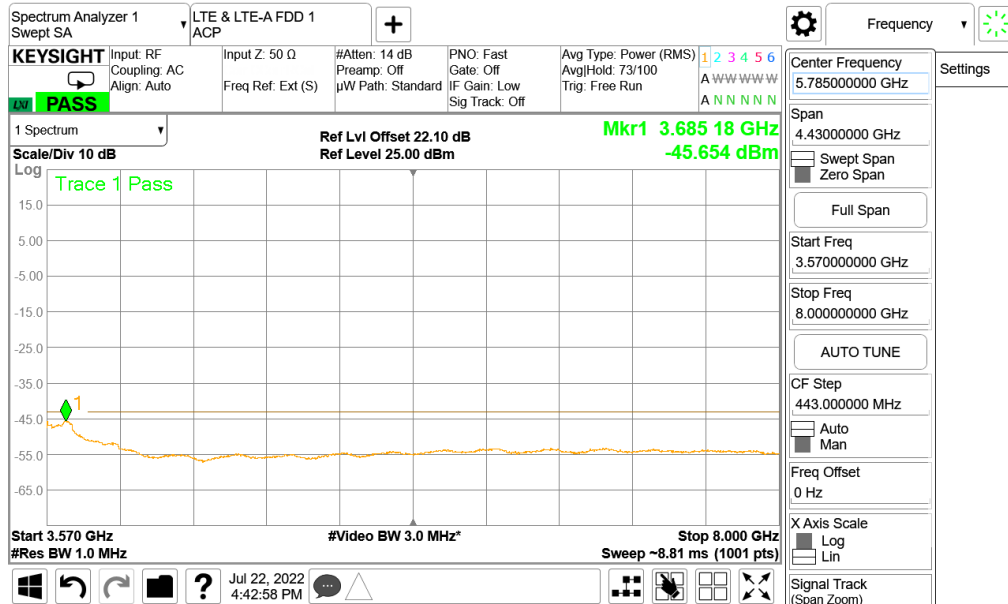


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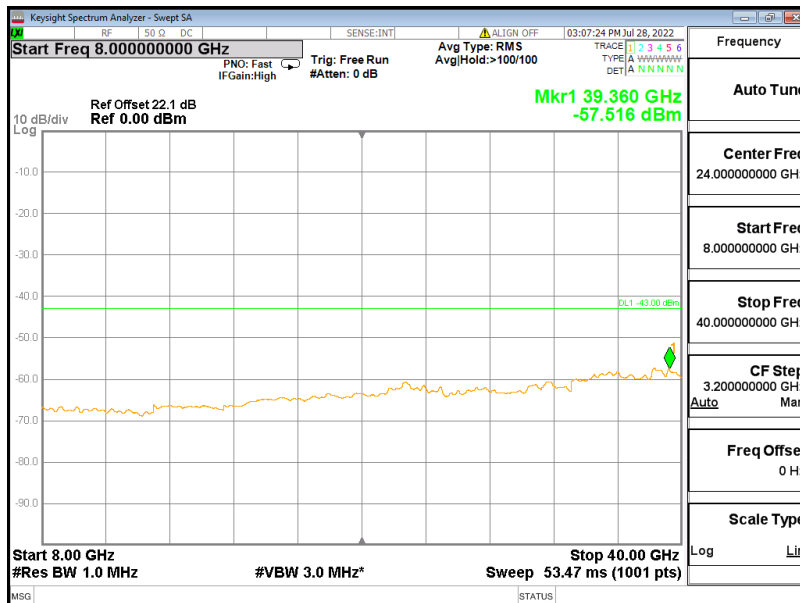
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Conducted spurious emissions

Downlink_GSM_HCH

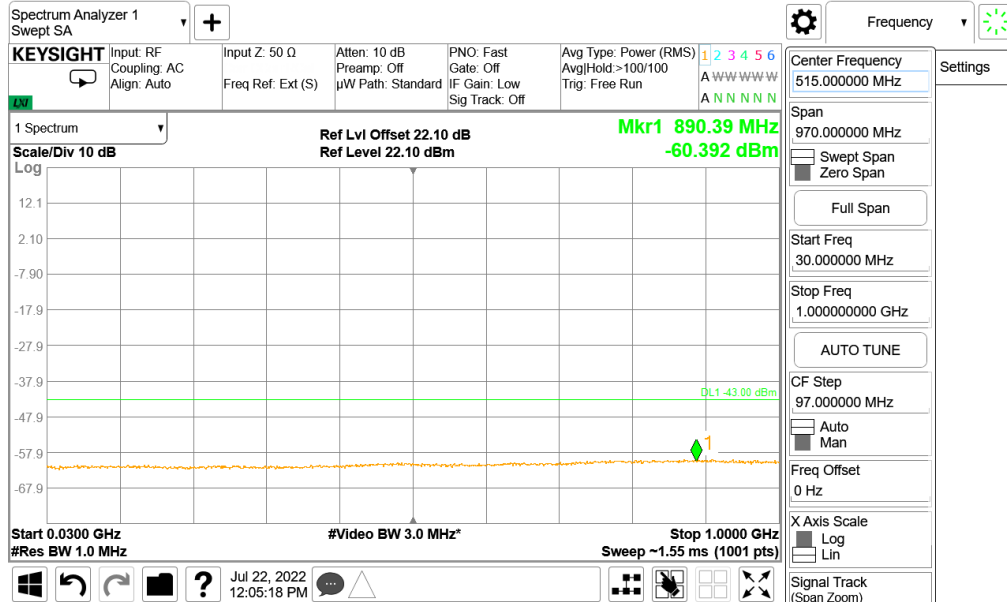


Downlink_GSM_HCH

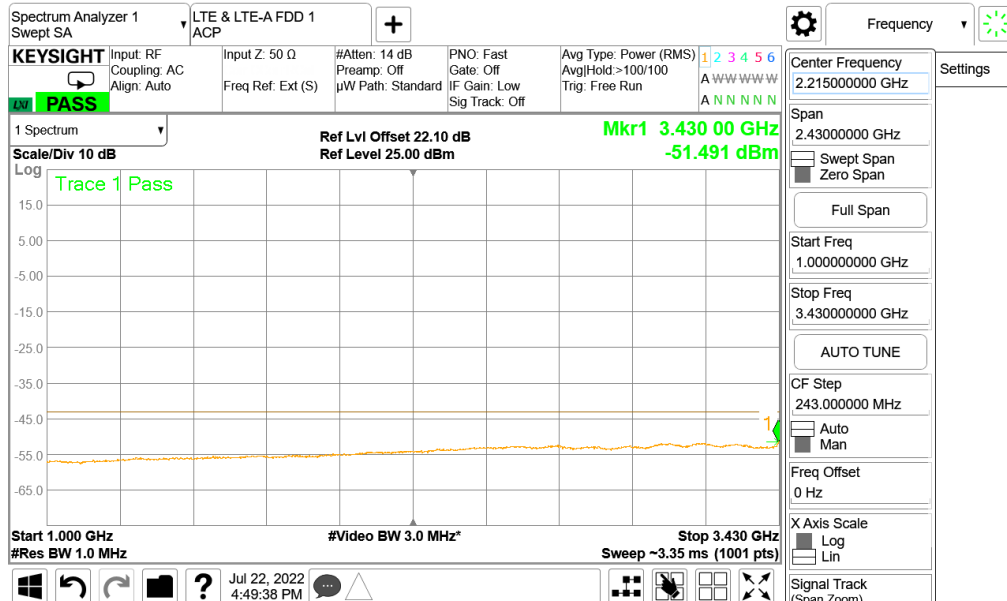


Conducted spurious emissions

Downlink_GSM_MCH

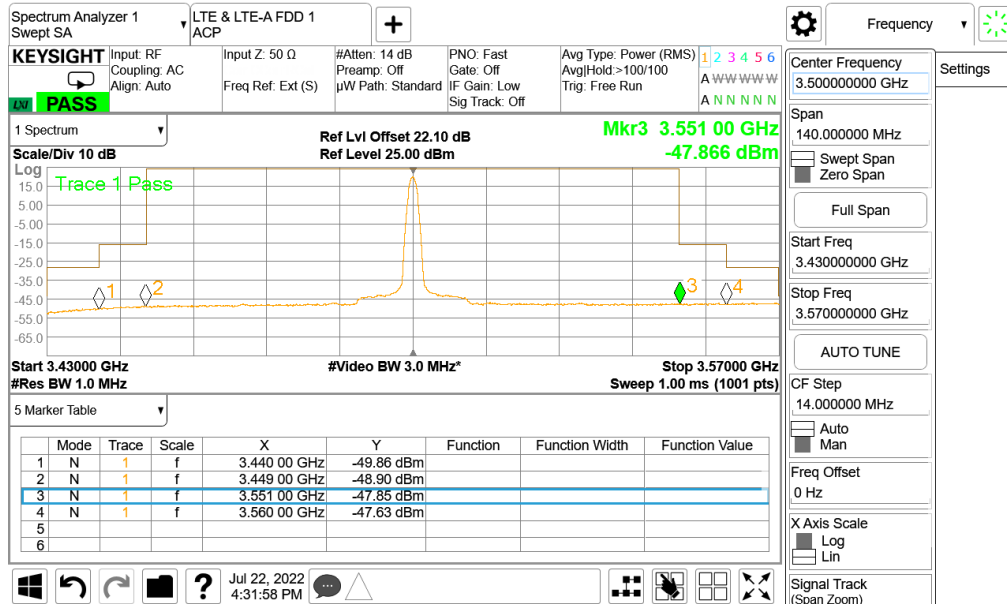


Downlink_GSM_MCH

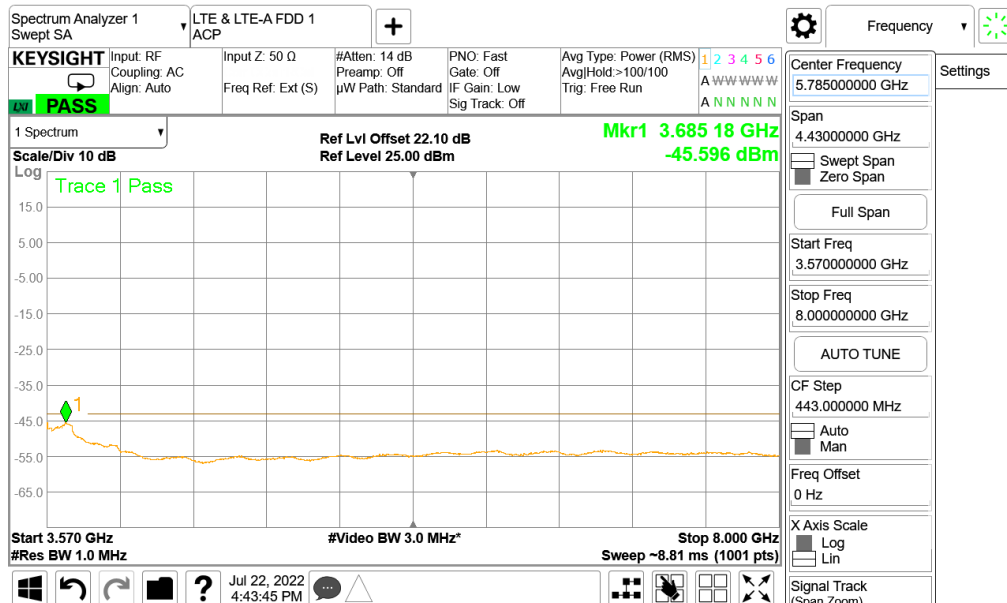


Conducted spurious emissions

Downlink_GSM_MCH

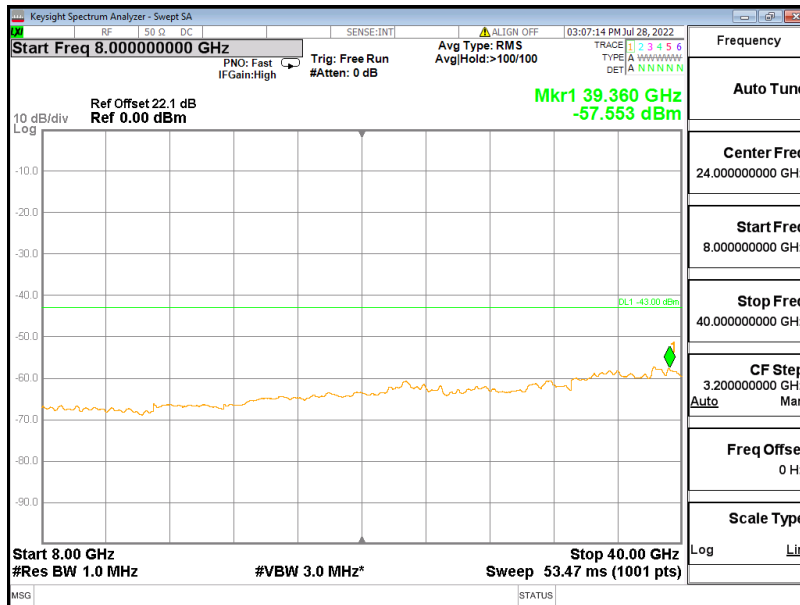


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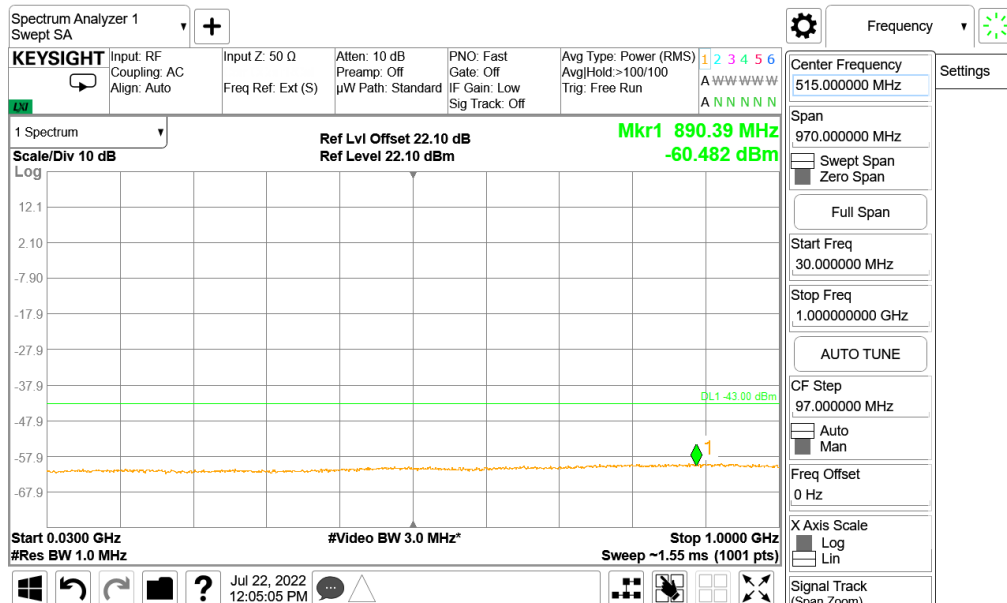


Conducted spurious emissions

Downlink_GSM_MCH

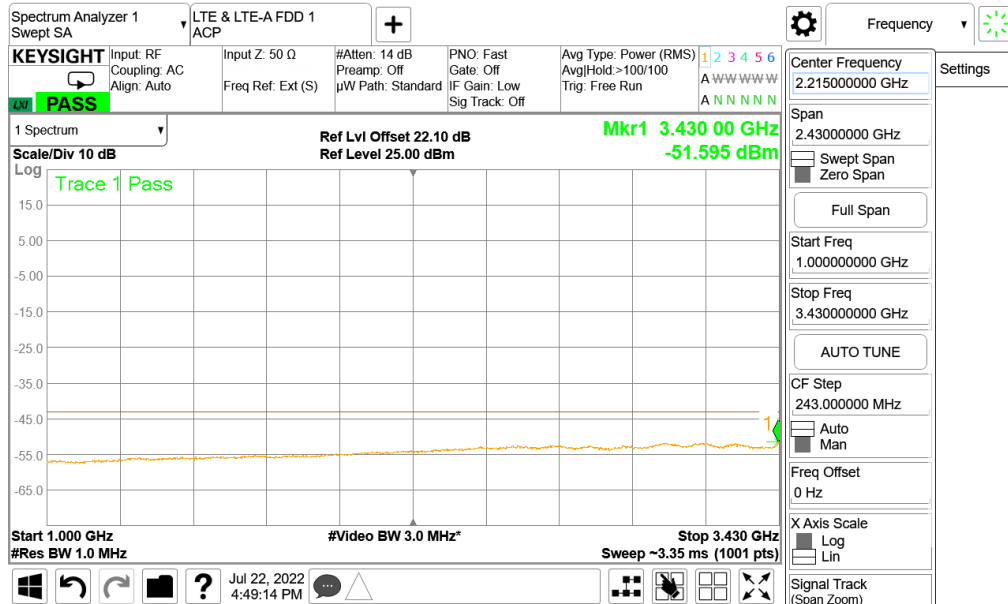


Downlink_GSM_LCH

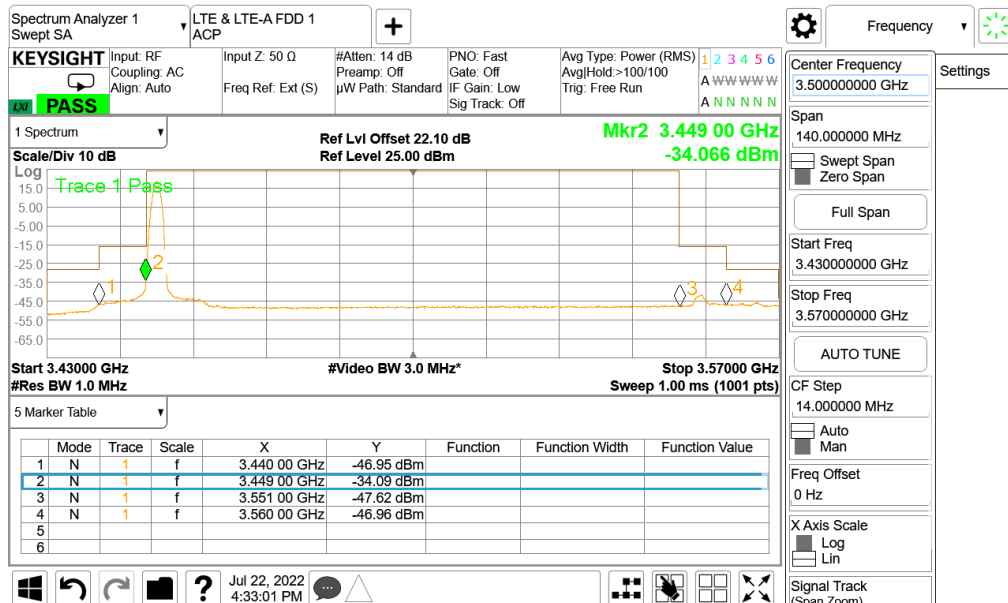


Conducted spurious emissions

Downlink_GSM_LCH

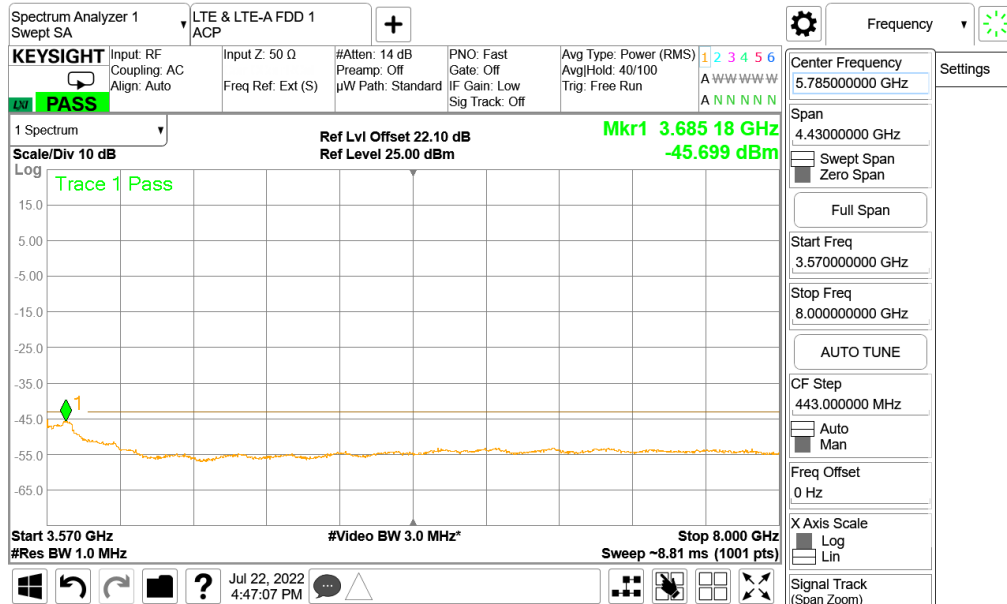


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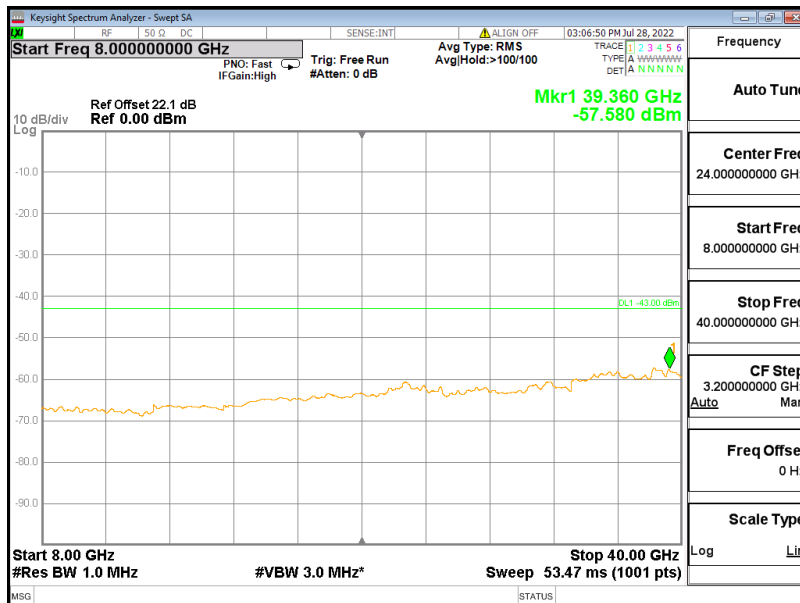


Conducted spurious emissions

Downlink_GSM_LCH



Downlink_GSM_LCH



6 Frequency Stability

Frequency stability vs temperature							
Test Path	Test Channel	Test Signal	Temperature (°C)	Voltage (V DC)	Frequency error (Hz)	Tolerance (ppm)	Verdict
Downlink	AWGN	MCH	+50	48	64	0.018	PASS
			+40	48	72	0.021	PASS
			+30	48	57	0.016	PASS
			+20	48	34	0.010	PASS
			+10	48	65	0.019	PASS
			0	48	32	0.009	PASS
			-10	48	38	0.011	PASS
			-20	48	45	0.013	PASS
			-30	48	57	0.016	PASS
	GSM	MCH	+50	48	32	0.009	PASS
			+40	48	44	0.013	PASS
			+30	48	28	0.008	PASS
			+20	48	37	0.011	PASS
			+10	48	43	0.012	PASS
			0	48	29	0.008	PASS
			-10	48	37	0.011	PASS
			-20	48	44	0.013	PASS
			-30	48	29	0.008	PASS



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Frequency stability vs voltage							
Test path	Test Channel	Test Signal	Voltage (V DC)	Temperature (°C)	Frequency error (Hz)	Tolerance (ppm)	Verdict
Downlink	MCH	AWGN	40.8	20	66	0.019	PASS
			48	20	72	0.021	PASS
			55.2	20	48	0.014	PASS
	MCH	GSM	40.8	20	53	0.015	PASS
			48	20	71	0.020	PASS
			55.2	20	67	0.019	PASS



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7 Radiated Spurious emissions

All modes have been tested and only the worst test result was recorded in this report.

Radiated Spurious emissions					
AWGN_MCH_30MHz-1GHz_Horizontal			AWGN_MCH_30MHz-1GHz_Vertical		
Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
50.764	-57.98	-40	-17.98	Horizontal	PASS
60.492	-73.39	-40	-33.39	Horizontal	PASS
159.784	-83.27	-40	-43.27	Horizontal	PASS
283.979	-77.26	-40	-37.26	Horizontal	PASS
495.934	-75.65	-40	-35.65	Horizontal	PASS
793.396	-71.15	-40	-31.15	Horizontal	PASS

Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
50.764	-54.25	-40	-14.25	Vertical	PASS
58.819	-64.66	-40	-24.66	Vertical	PASS
78.689	-68.85	-40	-28.85	Vertical	PASS
147.921	-79.48	-40	-39.48	Vertical	PASS
411.824	-75.48	-40	-35.48	Vertical	PASS
793.396	-70.03	-40	-30.03	Vertical	PASS

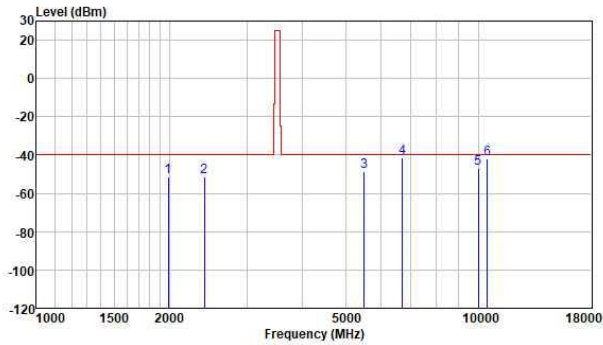


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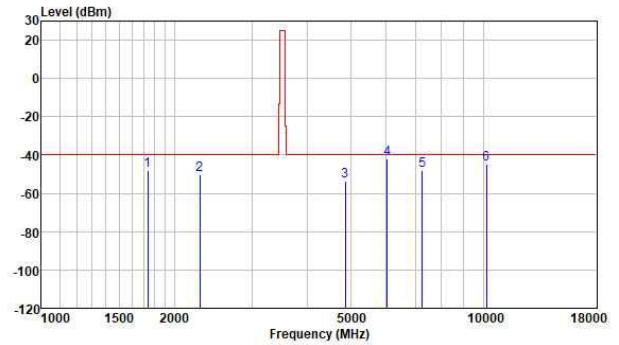
Radiated Spurious emissions

AWGN_MCH_1GHz-18GHz_Horizontal



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
1989.55	-51.29	-40	-11.29	Horizontal	PASS
2400.753	-51.11	-40	-11.11	Horizontal	PASS
5503.143	-48.63	-40	-8.63	Horizontal	PASS
6717.762	-41.24	-40	-1.24	Horizontal	PASS
9981.525	-46.68	-40	-6.68	Horizontal	PASS
10453.97	-42.22	-40	-2.22	Horizontal	PASS

AWGN_MCH_1GHz-18GHz_Vertical



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
1741.856	-48.11	-40	-8.11	Vertical	PASS
2279.044	-50.53	-40	-10.53	Vertical	PASS
4859.975	-53.36	-40	-13.36	Vertical	PASS
6053.894	-42.22	-40	-2.22	Vertical	PASS
7263.015	-48.16	-40	-8.16	Vertical	PASS
10156.14	-44.93	-40	-4.93	Vertical	PASS

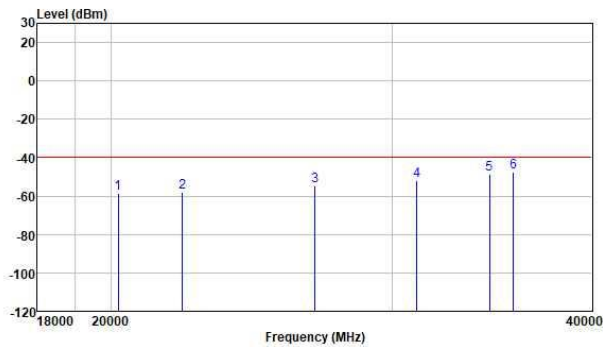


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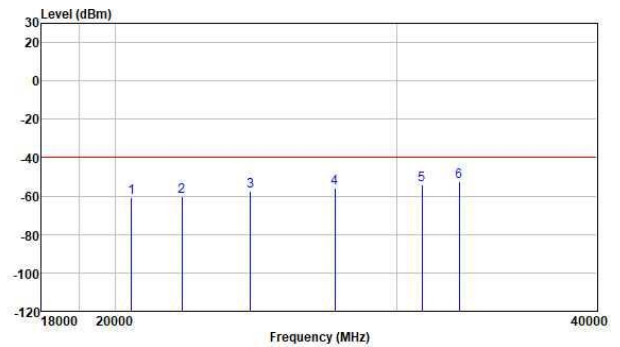
Radiated Spurious emissions

AWGN_MCH_18GHz-40GHz_Horizontal



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
20225.7	-58.32	-40	-18.32	Horizontal	PASS
22170.94	-58.04	-40	-18.04	Horizontal	PASS
26832.82	-54.45	-40	-14.45	Horizontal	PASS
31079.58	-51.91	-40	-11.91	Horizontal	PASS
34506.77	-48.62	-40	-8.62	Horizontal	PASS
35712.16	-47.55	-40	-7.55	Horizontal	PASS

AWGN_MCH_18GHz-40GHz_Vertical



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
20485.76	-60.67	-40	-20.67	Vertical	PASS
22029.76	-60.22	-40	-20.22	Vertical	PASS
24303.26	-57.51	-40	-17.51	Vertical	PASS
27439.51	-55.61	-40	-15.61	Vertical	PASS
31104.41	-53.95	-40	-13.95	Vertical	PASS
32813.81	-52.73	-40	-12.73	Vertical	PASS

--End of Appendix--