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FCC ID: OJFDMRUG235

Appendix -

Test Data and Result for report

GZCR220900121402



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Guangzhou Branch, EEC Laboratory

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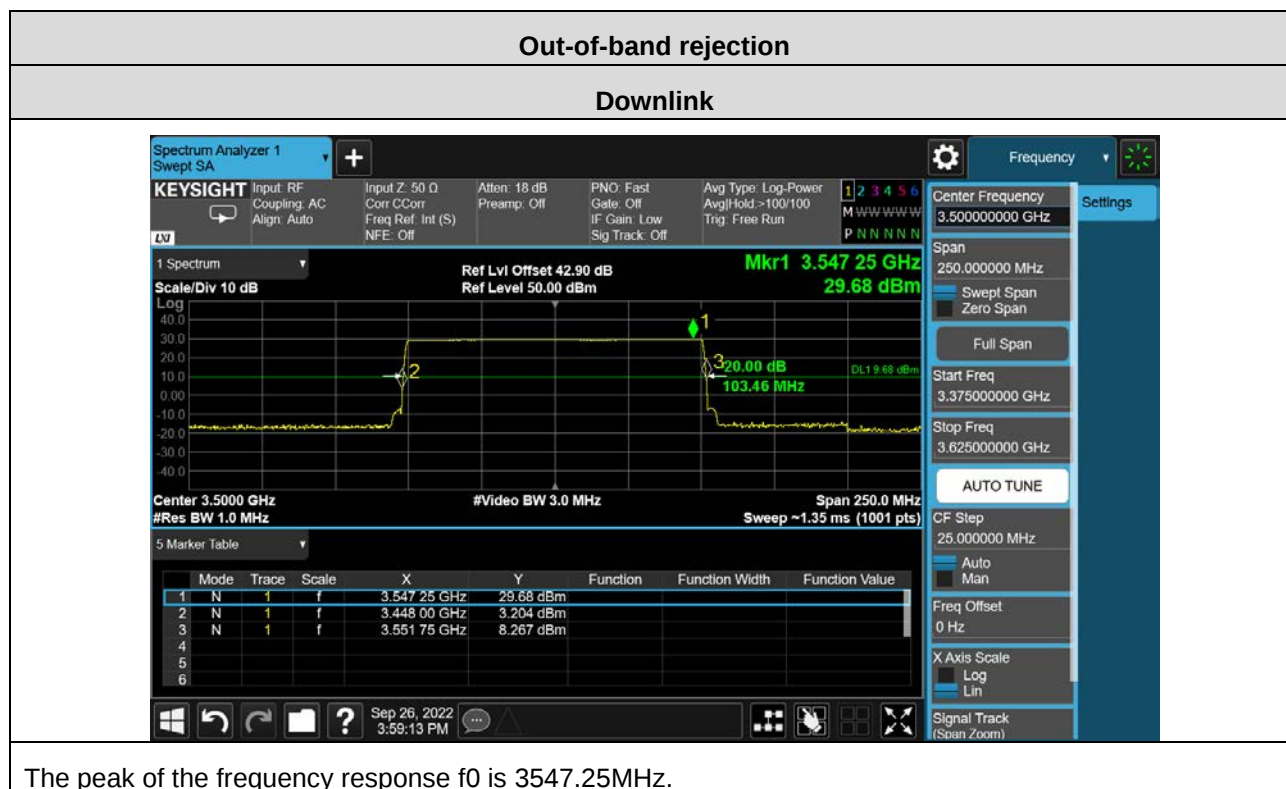


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1 Out-of-band rejection



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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	4.1081	4.0990	PASS
			3dB above AGC	4.1099	4.1001	PASS
	GSM	MCH	Pre-AGC	0.24450	0.24501	PASS
			3dB above AGC	0.24542	0.24468	PASS



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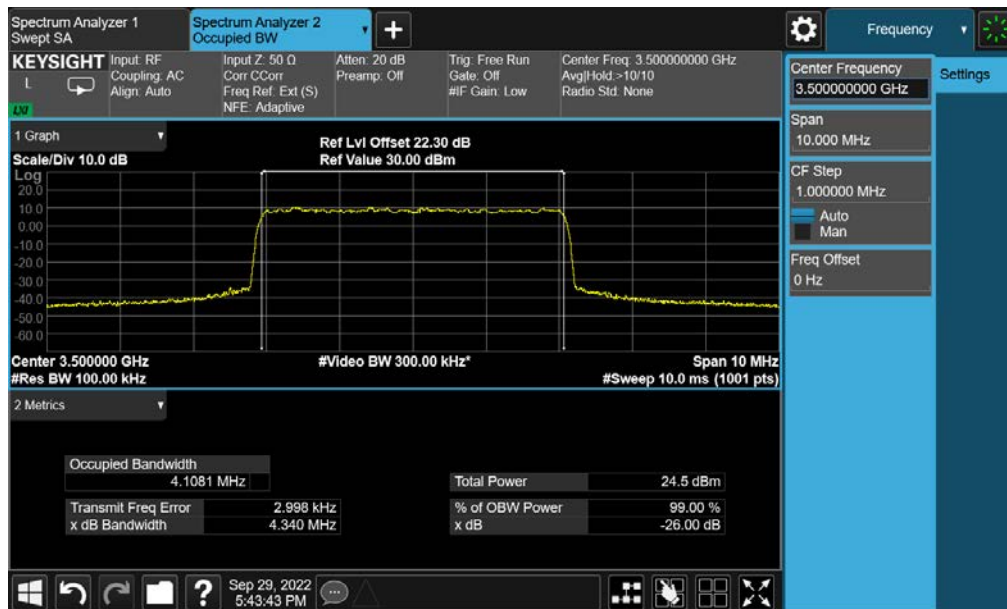
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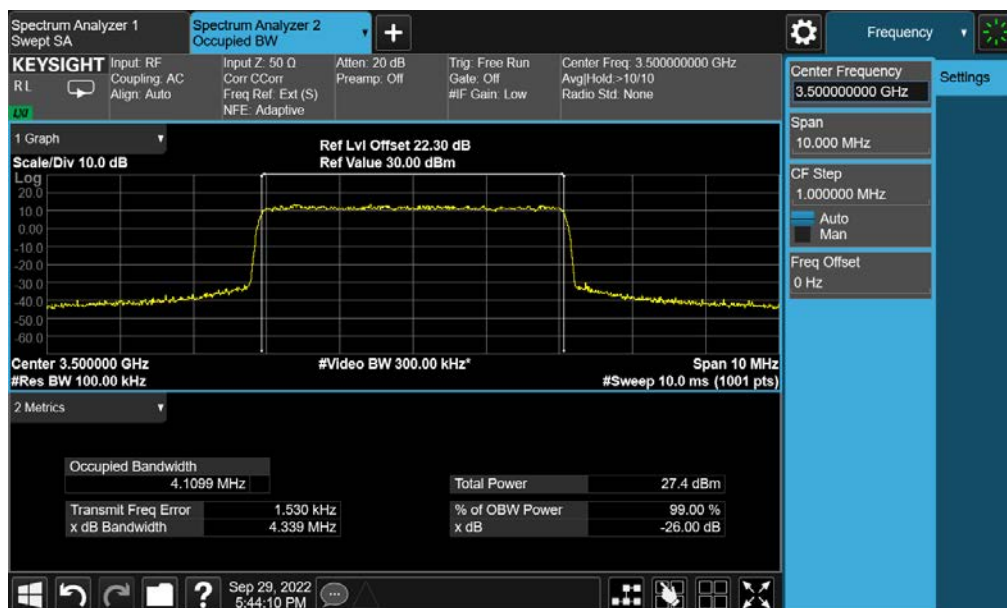
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99% OBW

Downlink_AWGN_MCH_Input_Pre-AGC

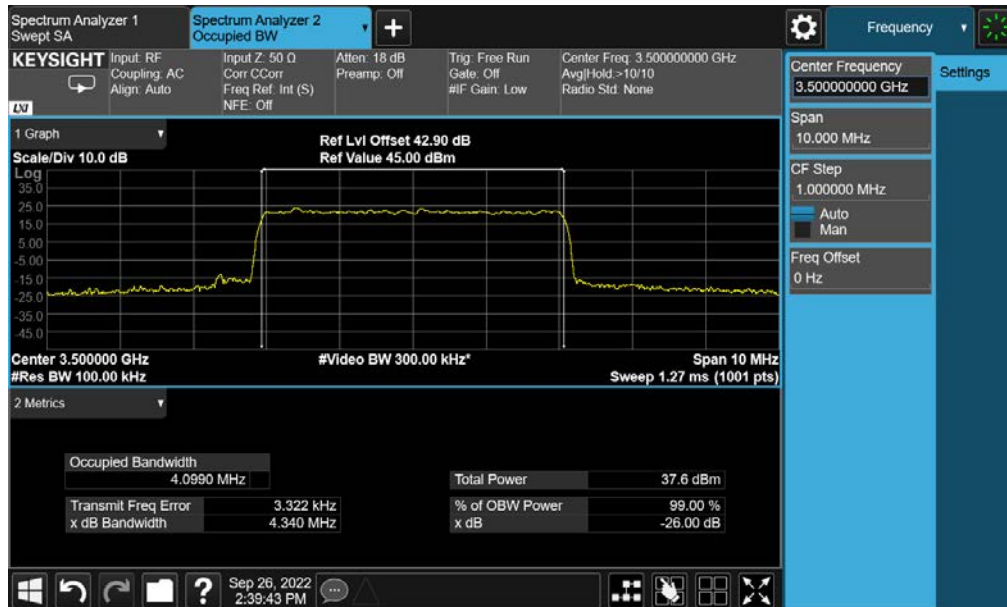


Downlink_AWGN_MCH_Input_3dB above AGC

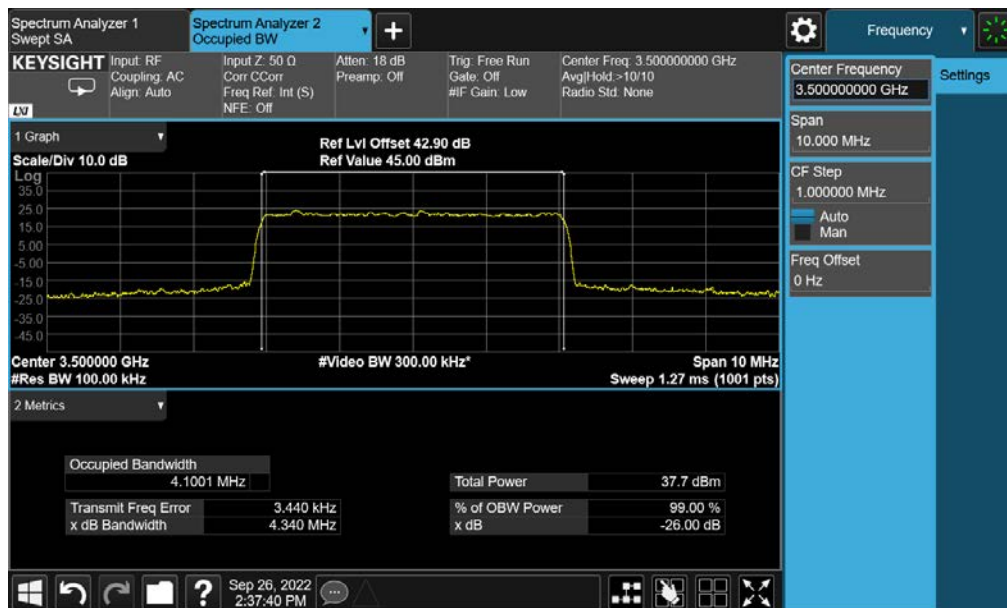


99% OBW

Downlink_AWGN_MCH_Output_Pre-AGC

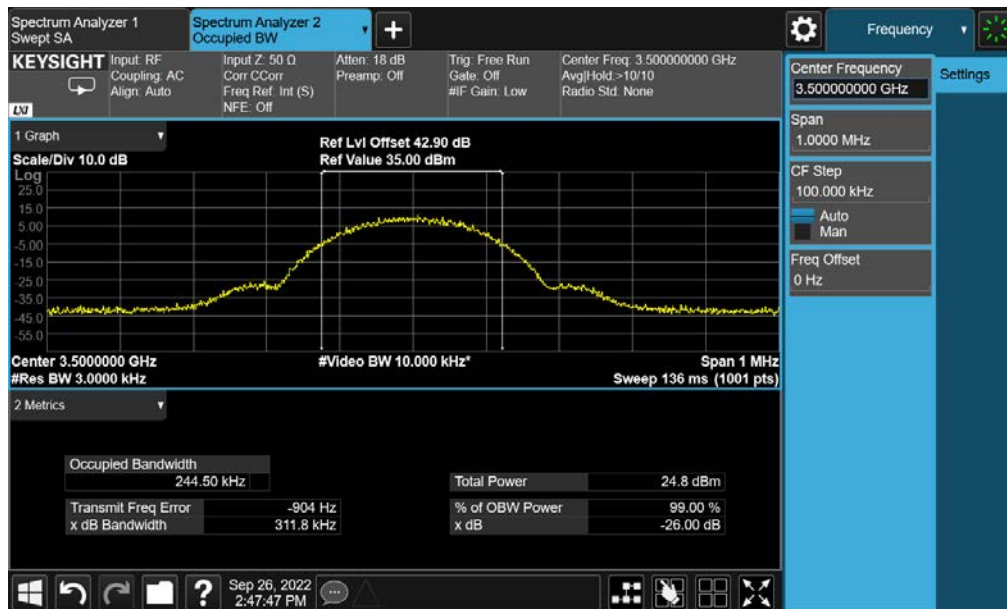


Downlink_AWGN_MCH_Output_3dB above AGC



99% OBW

Downlink_GSM_MCH_Input_Pre-AGC



Downlink_GSM_MCH_Input_3dB above AGC



99% OBW

Downlink_GSM_MCH_Output_Pre-AGC



Downlink_GSM_MCH_Output_3dB above AGC





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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)	SISO EIRP (W)	Total EIRP (W)	Gain (dB)
Downlink	3547.25	AWGN	Pre-AGC	23.50	36.61	14.49	57.68	13.11
			3dB above AGC	26.50	36.54	14.26	56.76	/
		GSM	Pre-AGC	23.80	36.93	15.60	62.09	13.13
			3dB above AGC	26.80	36.92	15.56	61.95	/
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 5dBi declared by the manufacturer, the directional gain = $G_{ANT} + 10 \log (N_{ANT})$ dBi = 8dBi								

Mean output power							
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	Output Power (dBm/MHz)	SISO EIRP (W/MHz)	Total EIRP (W/MHz)	Verdict
Downlink	3547.25	AWGN	Pre-AGC	29.88	3.08	12.25	PASS
			3dB above AGC	30.09	3.23	12.86	PASS
		GSM	Pre-AGC	36.64	14.59	58.08	PASS
			3dB above AGC	36.63	14.56	57.95	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 5dBi declared by the manufacturer, the directional gain = $G_{ANT} + 10 \log (N_{ANT})$ dBi = 8dBi.							
3. The output power is limited to an EIRP of 1640W/MHz.							

Peak-to-average ratio (PAR)						
Test path	Test freq. f0 (MHz)	Test Signal	Signal level	PAR (dB)	Limit (dB)	Verdict
Downlink	3547.25	AWGN	Pre-AGC	8.27	≤13	PASS
			3dB above AGC	8.10		PASS
		GSM	Pre-AGC	0.26		PASS
			3dB above AGC	0.26		PASS



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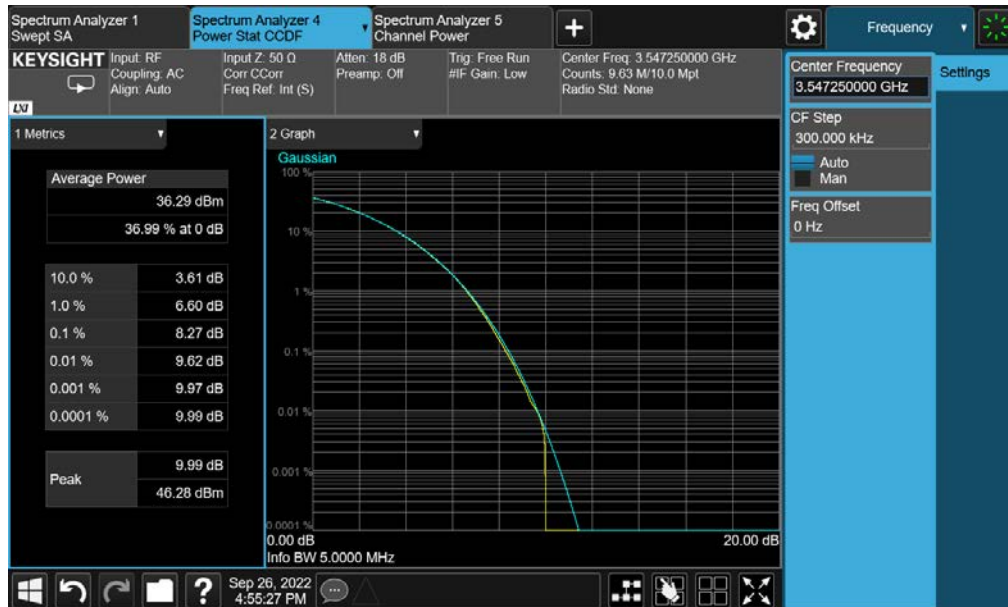
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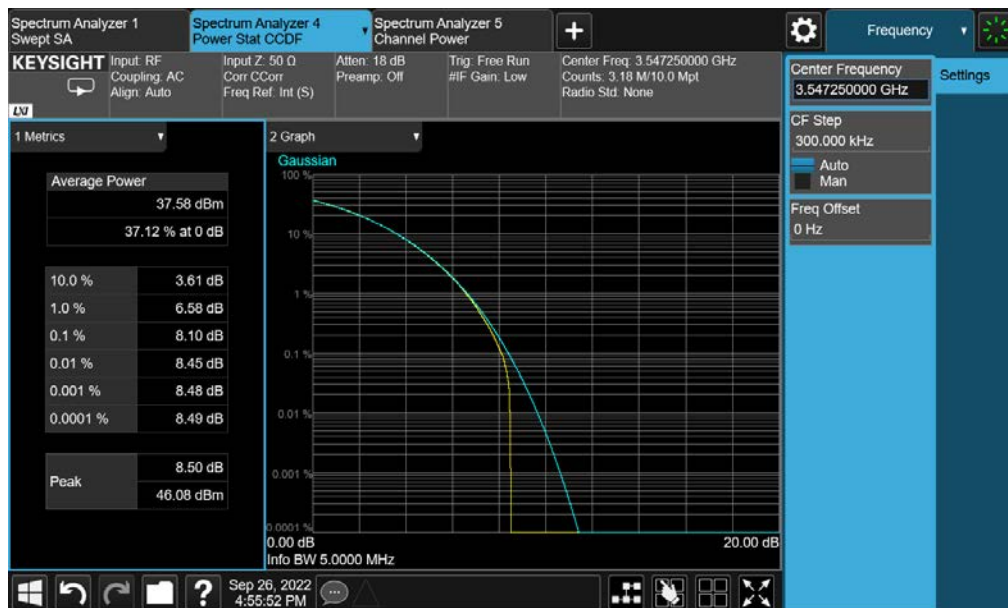
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Peak-to-average ratio (PAR)

Downlink_AWGN_Pre-AGC

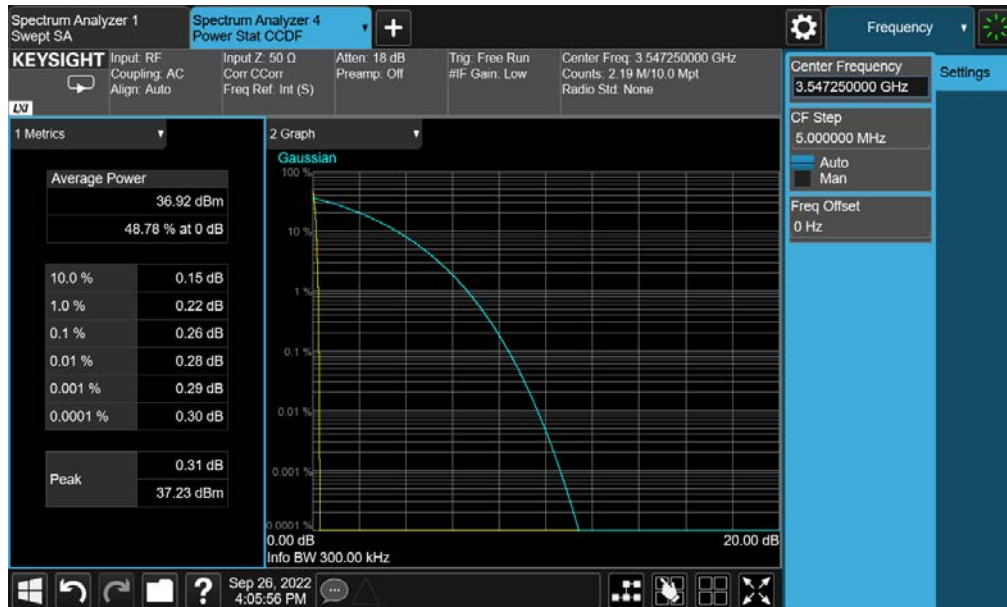


Downlink_AWGN_3dB above AGC

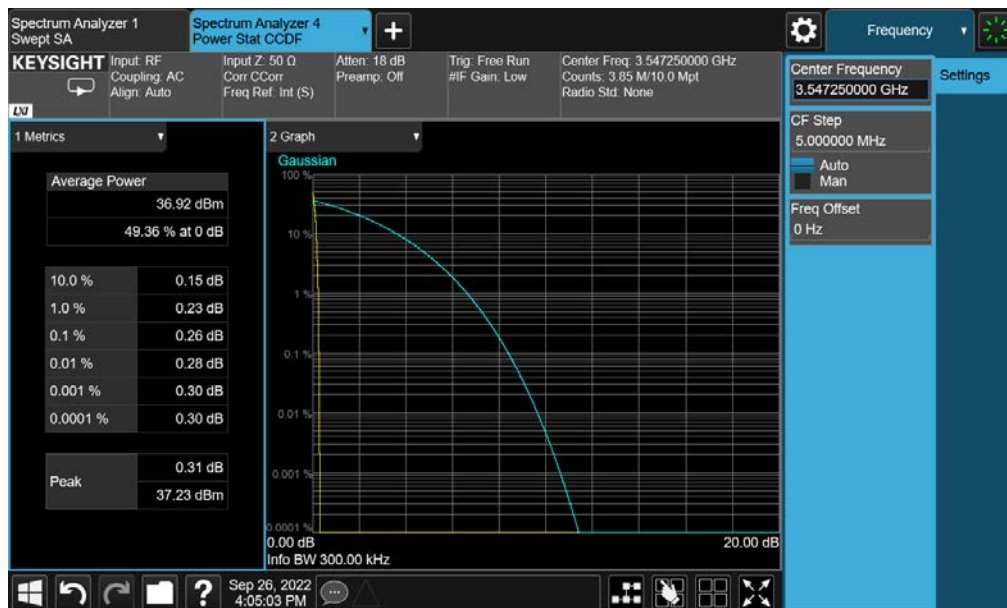


Peak-to-average ratio (PAR)

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	Band Edge	Test Signal	Stimulus Condition	Signal Level	Worst conducted test level (dBm)		Limit (dBm/MHz)	Verdict
					200kHz RBW	1MHz RBW		
Downlink	lower edge	AWGN	a single test signal	Pre-AGC	-28.49	-21.50	≤-16	PASS
				3dB above AGC	-26.57	-19.58		PASS
			two adjacent test signals	Pre-AGC	-28.58	-21.59		PASS
				3dB above AGC	-28.09	-21.10		PASS
	upper edge		a single test signal	Pre-AGC	-25.56	-18.57		PASS
				3dB above AGC	-25.66	-18.67		PASS
			two adjacent test signals	Pre-AGC	-28.44	-21.45		PASS
				3dB above AGC	-28.62	-21.63		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) =3dB, 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	lower edge	GSM	a single test signal	Pre-AGC	-38.34	-18.34	≤-16	PASS
				3dB above AGC	-37.83	-17.83		PASS
			two adjacent test signals	Pre-AGC	-37.53	-17.53		PASS
				3dB above AGC	-38.17	-18.17		PASS
	upper edge		a single test signal	Pre-AGC	-38.41	-18.41		PASS
				3dB above AGC	-38.04	-18.04		PASS
			two adjacent test signals	Pre-AGC	-37.44	-17.44		PASS
				3dB above AGC	-37.22	-17.22		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)= 3dB, so the limit was calculated to show -16dBm/MHz in order to determine the test result conveniently.								



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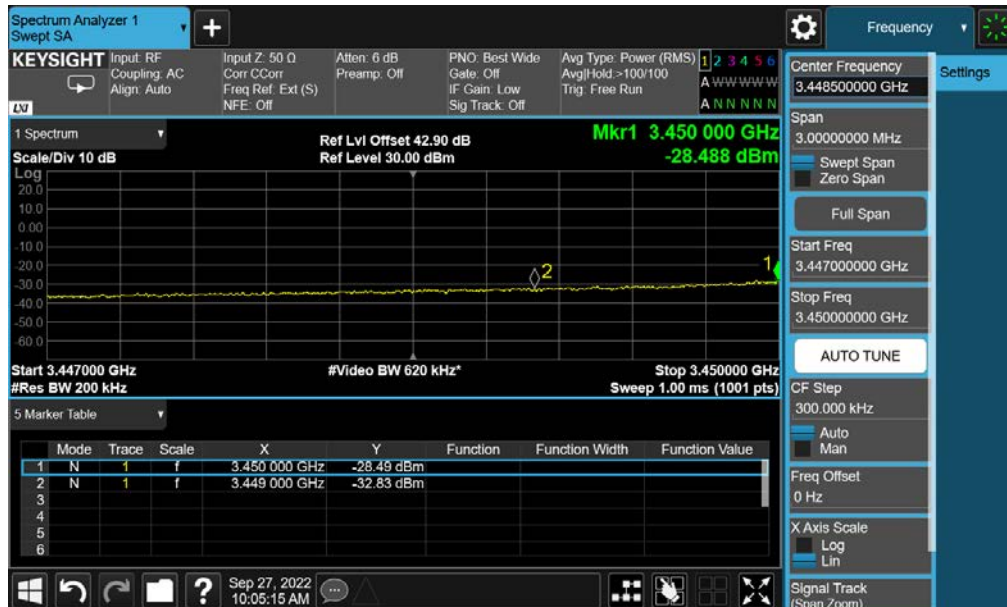
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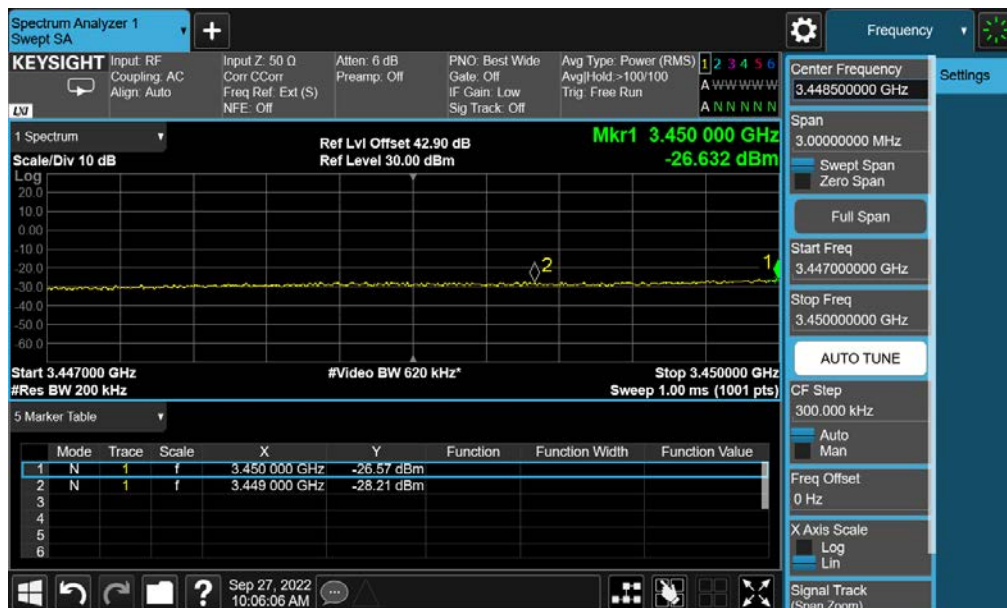
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Out-of-band/out-of-block emissions

Downlink_AWGN_lower edge_a single test signal_Pre-AGC



Downlink_AWGN_lower edge_a single test signal_3dB above AGC



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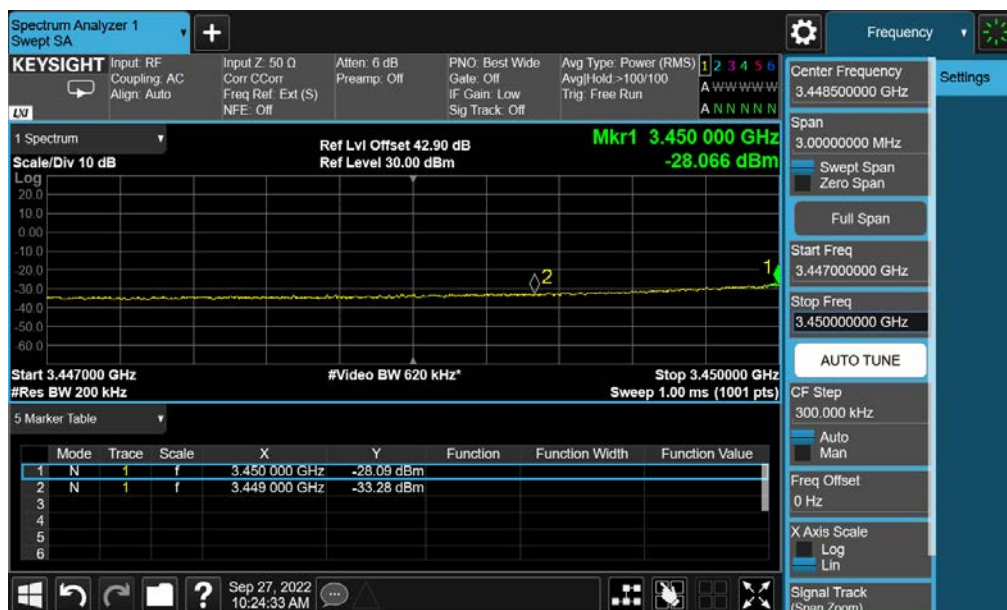
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Out-of-band/out-of-block emissions

Downlink_AWGN_lower edge_two adjacent test signals_Pre-AGC



Downlink_AWGN_lower edge_two adjacent test signals_3dB above AGC



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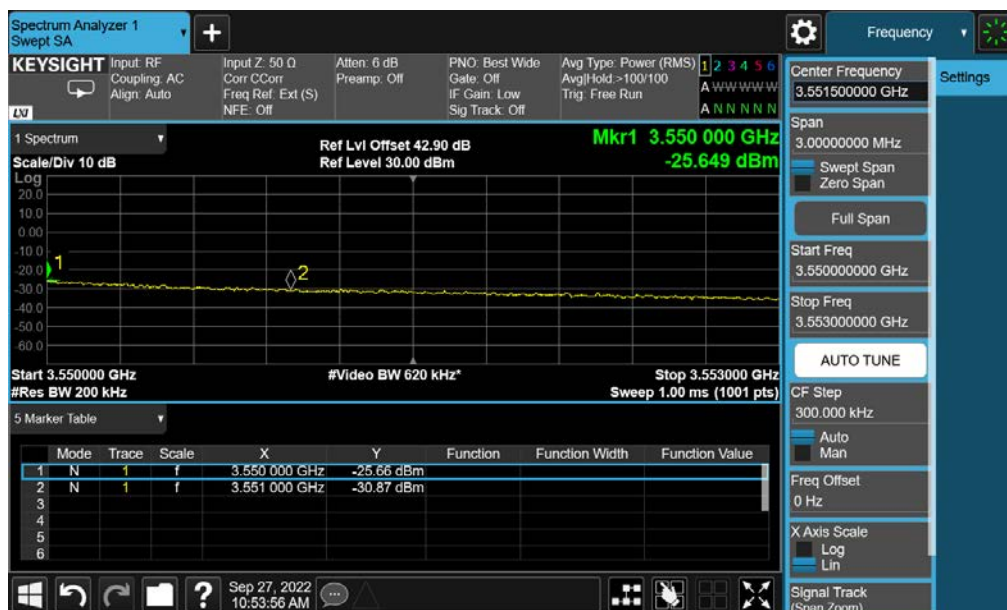
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Out-of-band/out-of-block emissions

Downlink_AWGN_upper edge_a single test signal_Pre-AGC



Downlink_AWGN_upper edge_a single test signal_3dB above AGC

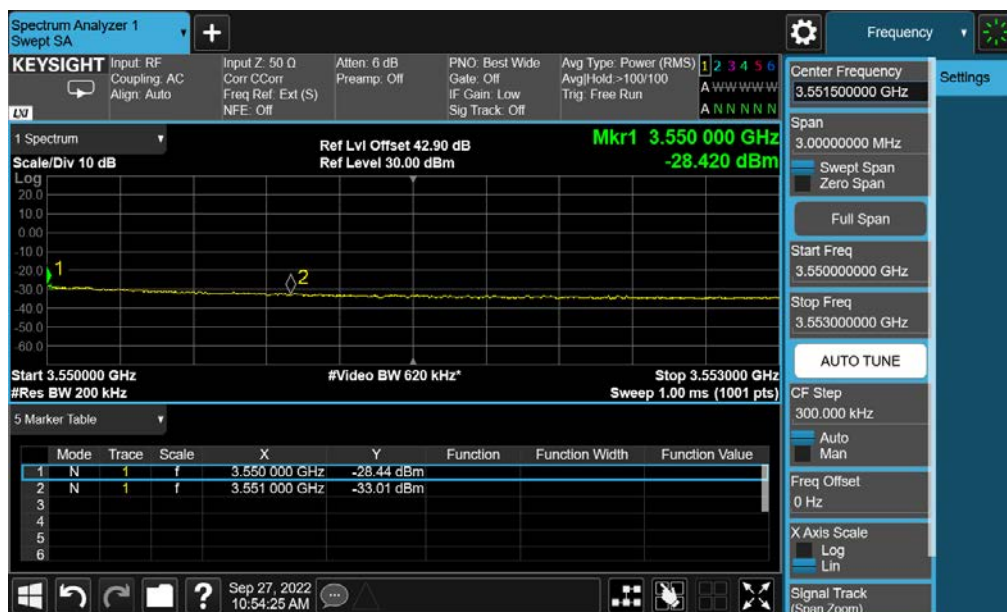


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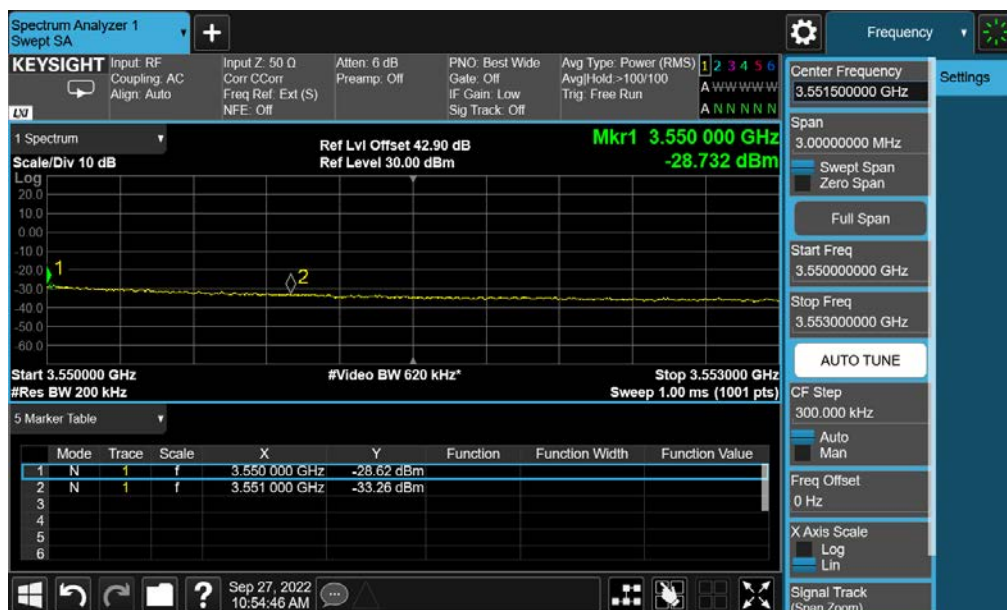
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Out-of-band/out-of-block emissions

Downlink_AWGN_upper edge_two adjacent test signals_Pre-AGC



Downlink_AWGN_upper edge_two adjacent test signals_3dB above AGC



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

Downlink_GSM_lower edge_a single test signal_Pre-AGC



Downlink_GSM_lower edge_a single test signal_3dB above AGC



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

Downlink_GSM_upper edge_a single test signal_Pre-AGC



Downlink_GSM_upper edge_a single test signal_3dB above AGC



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

Downlink_GSM_upper edge_two adjacent test signals_Pre-AGC



Downlink_GSM_upper edge_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	-48.60	≤-43	PASS
				1000-3430	-47.81	≤-43	PASS
				3430-3440	-32.01	≤-28	PASS
				3440-3449	-31.52	≤-16	PASS
				3551-3560	-20.18	≤-16	PASS
				3560-3570	-32.80	≤-28	PASS
				3570-40000	-46.63	≤-43	PASS
	HCH	GSM	Pre-AGC	30-1000	-48.38	≤-43	PASS
				1000-3430	-47.88	≤-43	PASS
				3430-3440	-33.86	≤-28	PASS
				3440-3449	-33.68	≤-16	PASS
				3551-3560	-22.37	≤-16	PASS
				3560-3570	-33.21	≤-28	PASS
				3570-40000	-46.74	≤-43	PASS
	MCH	AWGN	Pre-AGC	30-1000	-48.64	≤-43	PASS
				1000-3430	-47.72	≤-43	PASS
				3430-3440	-33.72	≤-28	PASS
				3440-3449	-33.63	≤-16	PASS
				3551-3560	-33.42	≤-16	PASS
				3560-3570	-33.40	≤-28	PASS
				3570-40000	-46.63	≤-43	PASS
Remark: For 2×2 MIMO, one of ANT ports was measured and the limit shall be reduced by 10lg(2)= 3dB, so the limits were calculated to show -43dBm/MHz, -28dBm/MHz and -16dBm/MHz individually in order to determine the test result conveniently.							



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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	-48.65	≤ -43	PASS
				1000-3430	-47.78	≤ -43	PASS
				3430-3440	-33.78	≤ -28	PASS
				3440-3449	-33.69	≤ -16	PASS
				3551-3560	-33.54	≤ -16	PASS
				3560-3570	-33.41	≤ -28	PASS
				3570-40000	-46.73	≤ -43	PASS
	LCH	AWGN	Pre-AGC	30-1000	-48.53	≤ -43	PASS
				1000-3430	-47.84	≤ -43	PASS
				3430-3440	-33.31	≤ -28	PASS
				3440-3449	-20.39	≤ -16	PASS
				3551-3560	-32.97	≤ -16	PASS
				3560-3570	-32.88	≤ -28	PASS
				3570-40000	-46.67	≤ -43	PASS
	LCH	GSM	Pre-AGC	30-1000	-48.69	≤ -43	PASS
				1000-3430	-48.01	≤ -43	PASS
				3430-3440	-33.47	≤ -28	PASS
				3440-3449	-22.49	≤ -16	PASS
				3551-3560	-33.46	≤ -16	PASS
				3560-3570	-33.20	≤ -28	PASS
				3570-40000	-46.72	≤ -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.



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Conducted spurious emissions

Downlink_AWGN_HCH



Downlink_AWGN_HCH

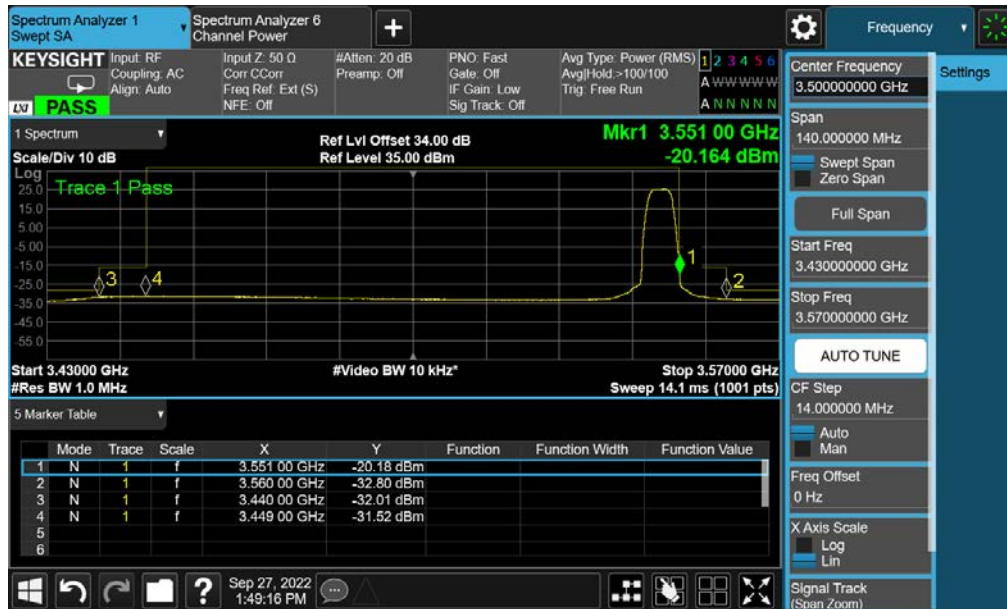


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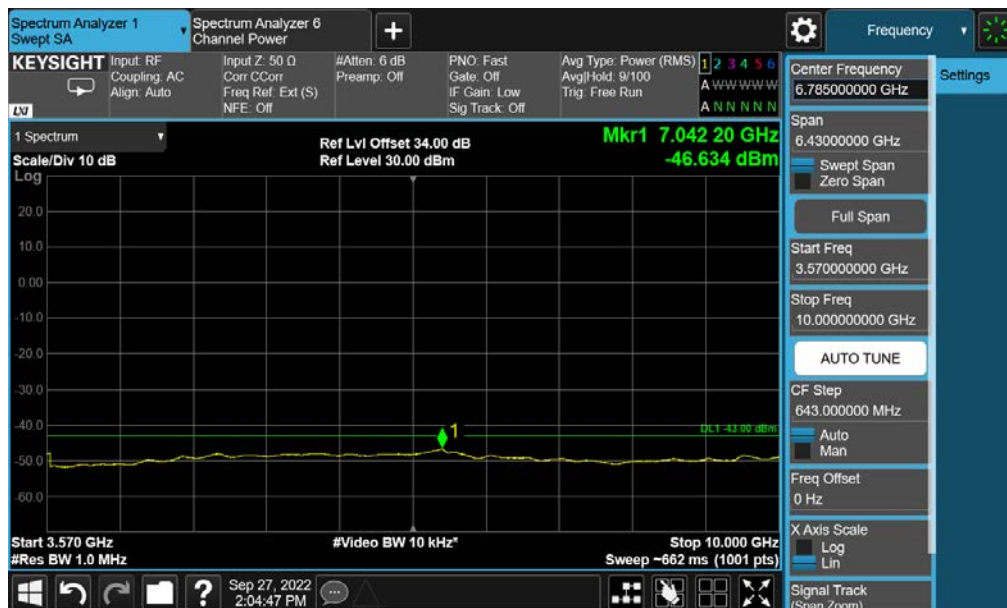
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Conducted spurious emissions

Downlink_AWGN_HCH



Downlink_AWGN_HCH



Conducted spurious emissions

Downlink_AWGN_HCH



Downlink_AWGN_MCH



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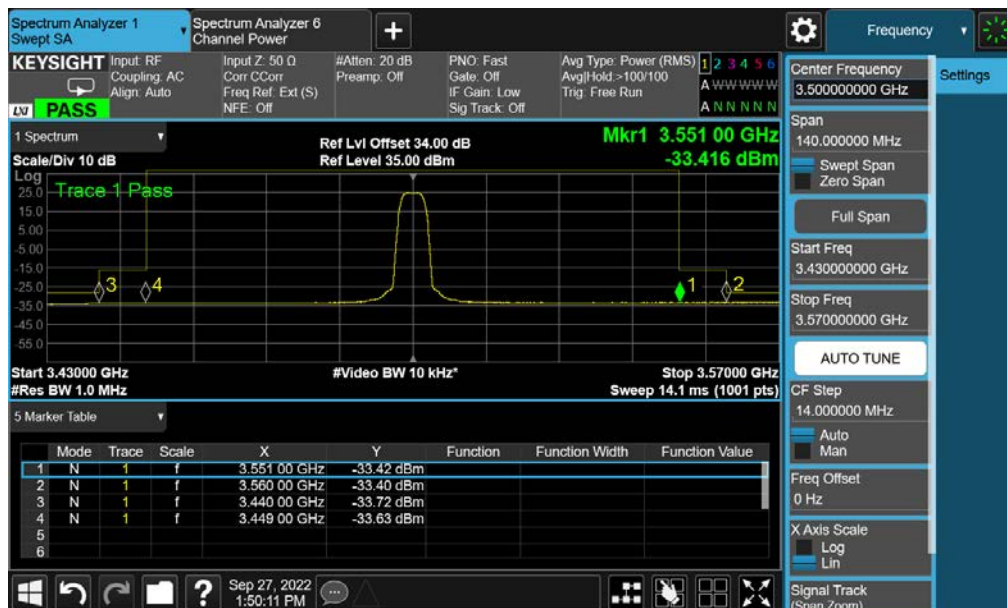
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Conducted spurious emissions

Downlink_AWGN_MCH

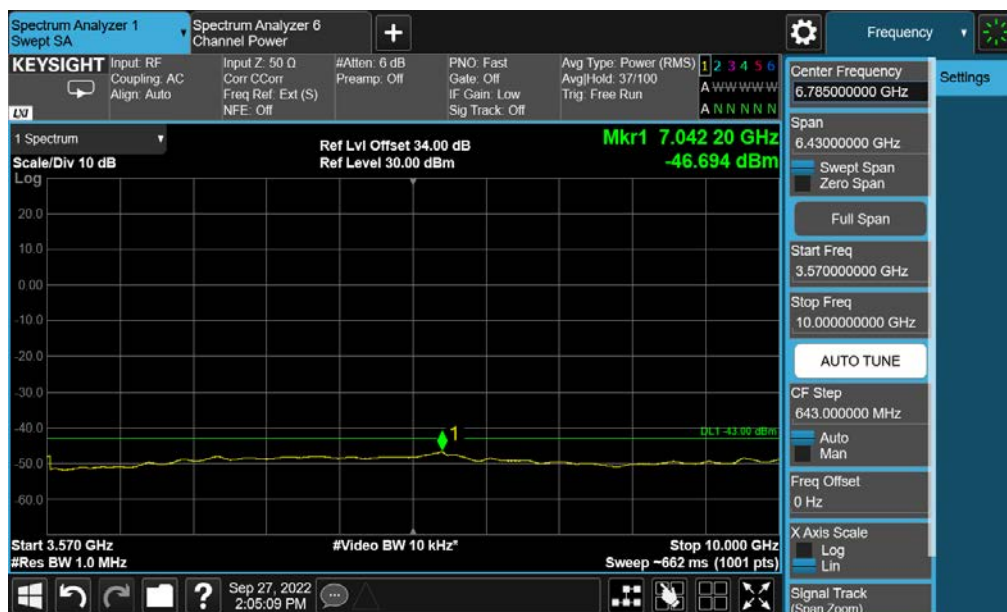


Downlink_AWGN_MCH



Conducted spurious emissions

Downlink_AWGN_MCH



Downlink_AWGN_MCH

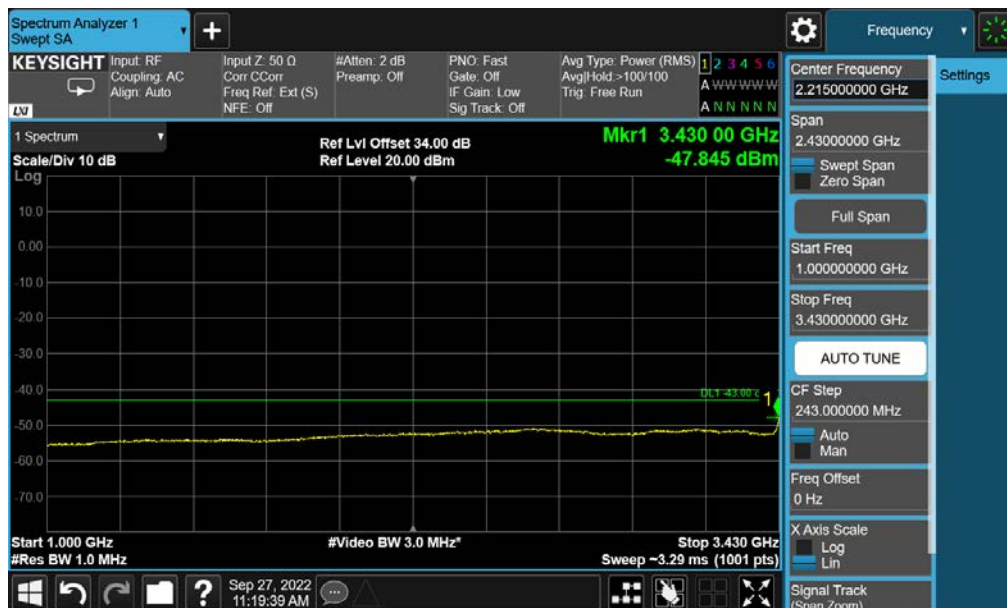


Conducted spurious emissions

Downlink_AWGN_LCH



Downlink_AWGN_LCH

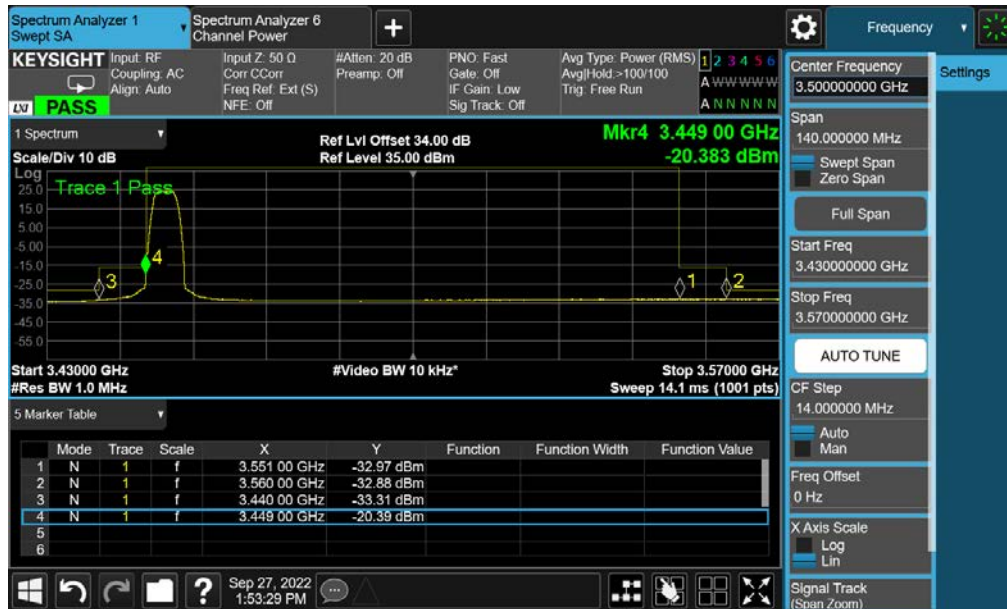


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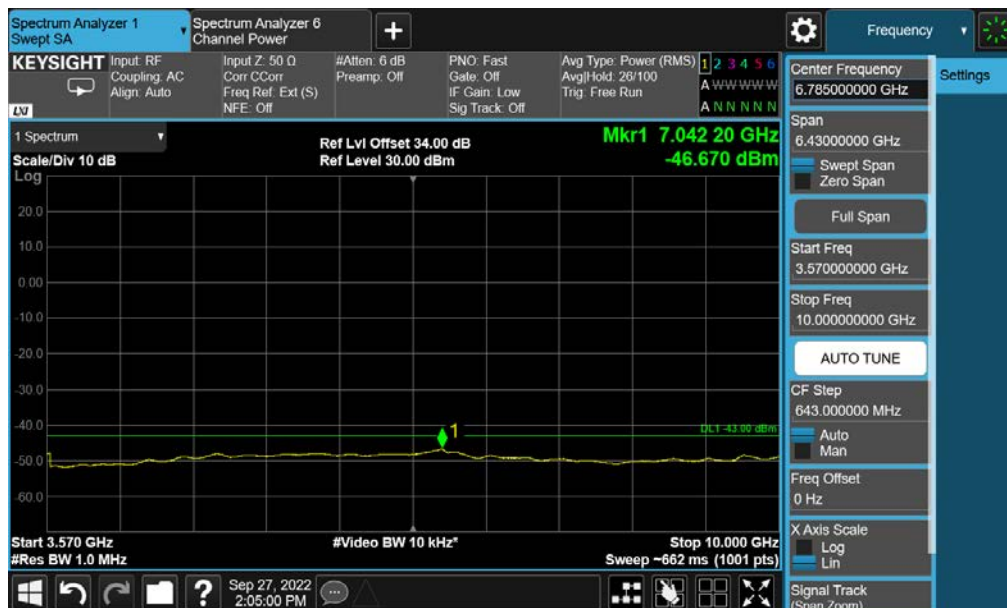
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Conducted spurious emissions

Downlink_AWGN_LCH



Downlink_AWGN_LCH



Conducted spurious emissions

Downlink_AWGN_LCH



Downlink_GSM_HCH

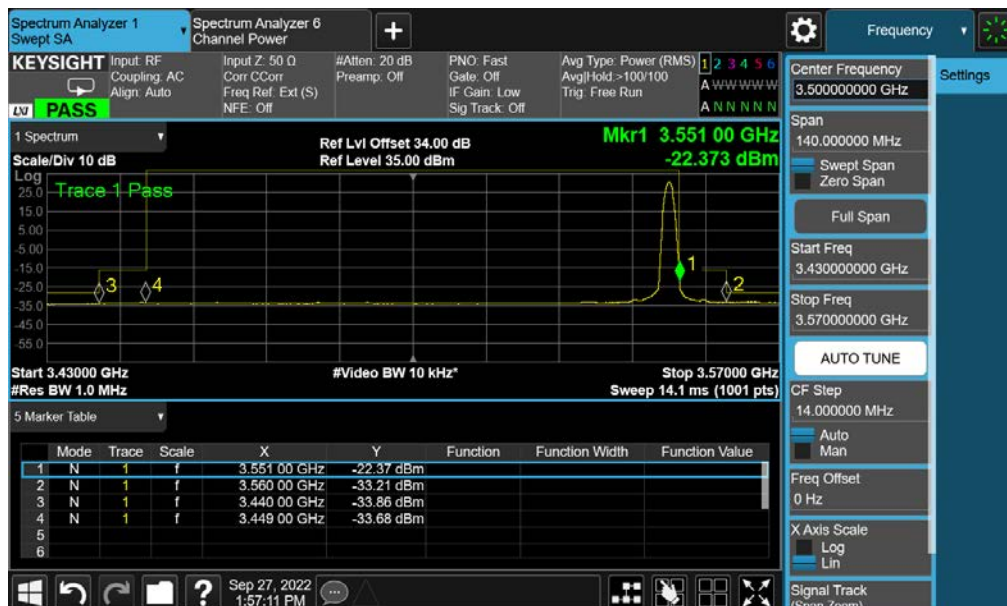


Conducted spurious emissions

Downlink_GSM_HCH

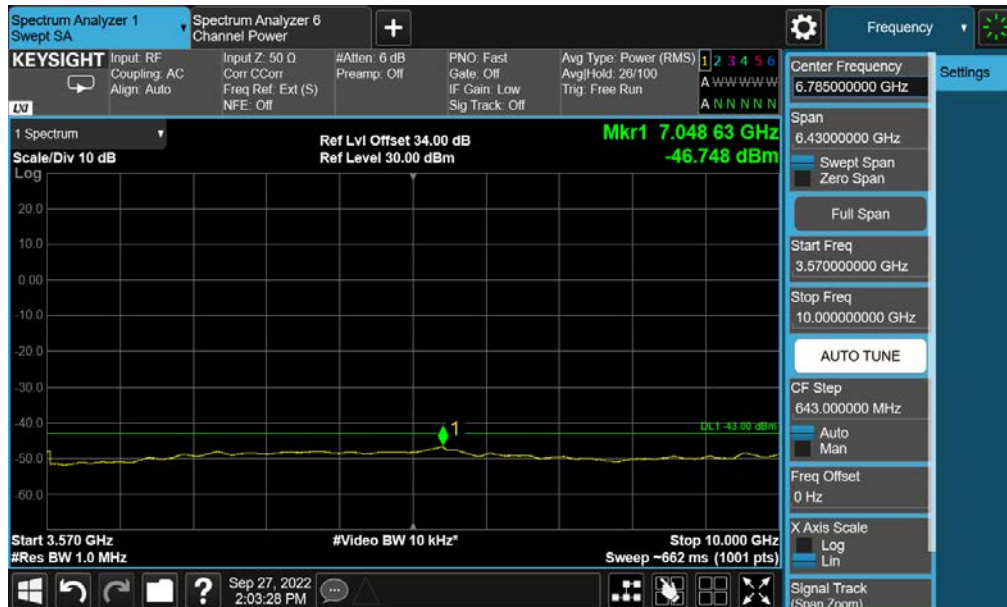


Downlink_GSM_HCH



Conducted spurious emissions

Downlink_GSM_HCH



Downlink_GSM_HCH



Conducted spurious emissions

Downlink_GSM_MCH



Downlink_GSM_MCH

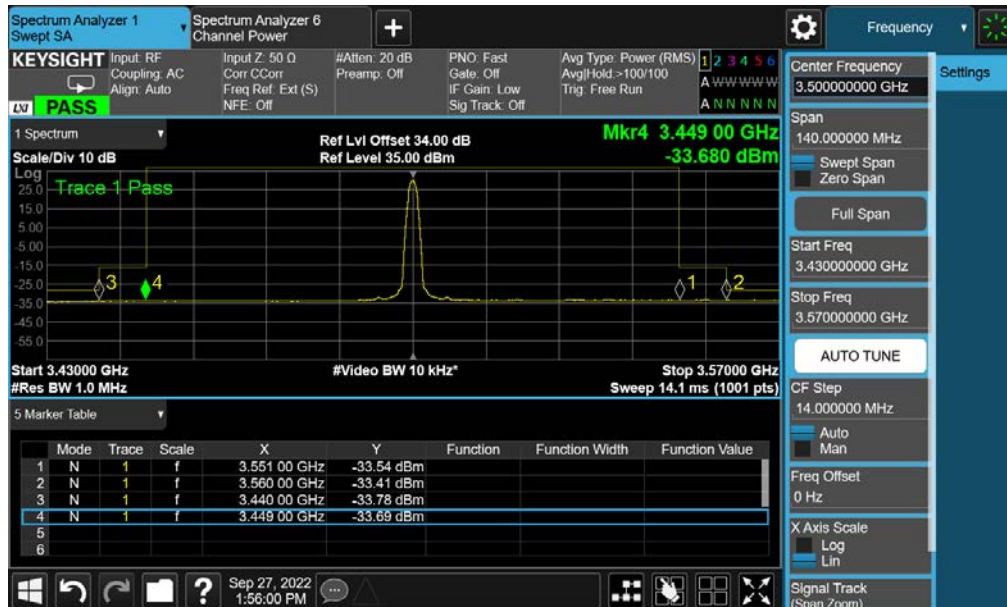


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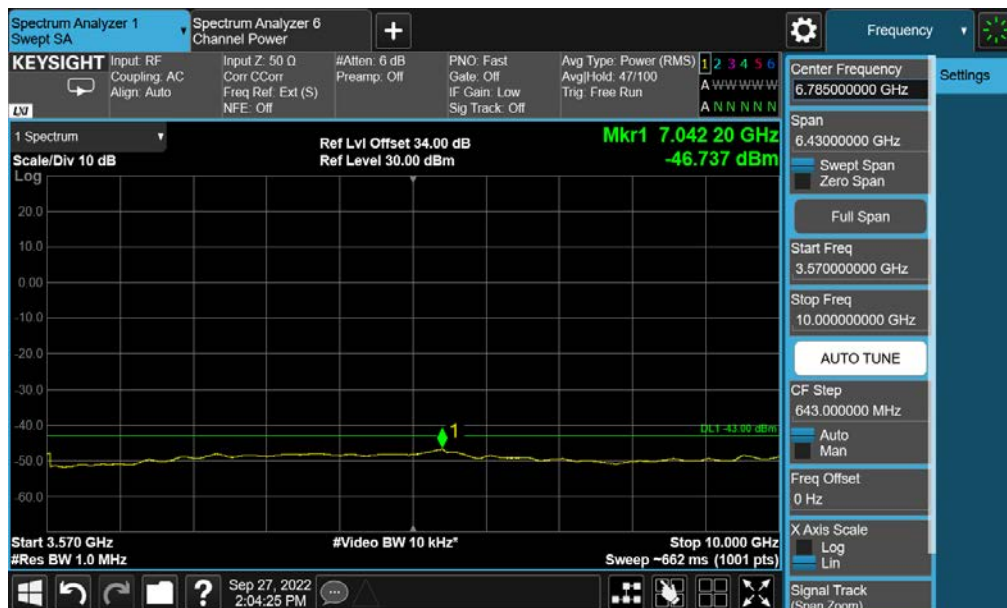
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Conducted spurious emissions

Downlink_GSM_MCH



Downlink_GSM_MCH



Conducted spurious emissions

Downlink_GSM_MCH



Downlink_GSM_LCH

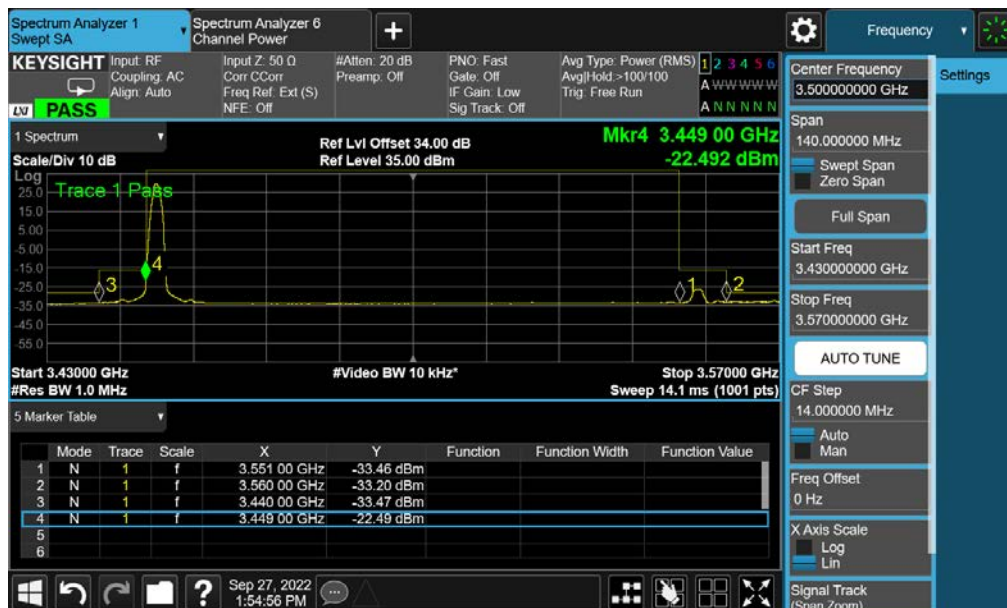


Conducted spurious emissions

Downlink_GSM_LCH

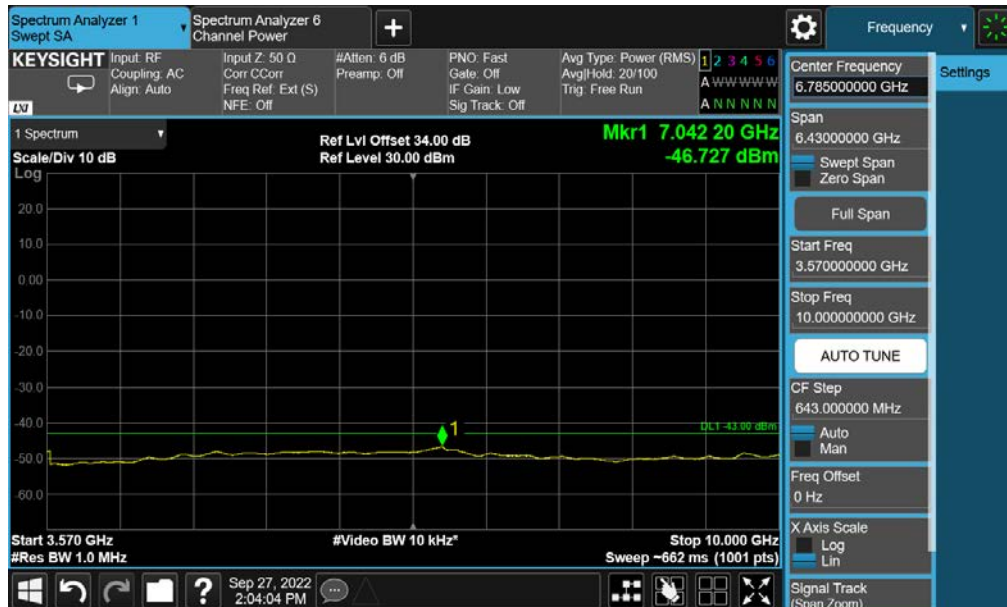


Downlink_GSM_LCH



Conducted spurious emissions

Downlink_GSM_LCH



Downlink_GSM_LCH





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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	MCH	AWGN	+50	48	43	0.012	PASS
			+40	48	56	0.016	PASS
			+30	48	37	0.011	PASS
			+20	48	25	0.007	PASS
			+10	48	19	0.005	PASS
			0	48	33	0.009	PASS
			-10	48	40	0.011	PASS
			-20	48	27	0.008	PASS
			-30	48	33	0.009	PASS
	MCH	GSM	+50	48	50	0.014	PASS
			+40	48	41	0.012	PASS
			+30	48	34	0.010	PASS
			+20	48	28	0.008	PASS
			+10	48	47	0.013	PASS
			0	48	18	0.005	PASS
			-10	48	23	0.007	PASS
			-20	48	11	0.003	PASS
			-30	48	42	0.012	PASS

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	43	0.012	PASS
			55.2	20	45	0.013	PASS
	MCH	GSM	40.8	20	29	0.008	PASS
			55.2	20	26	0.007	PASS



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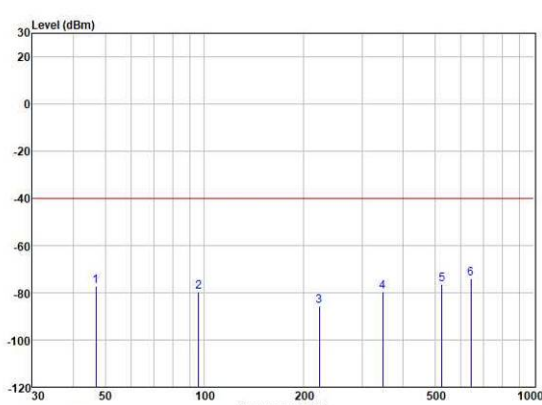
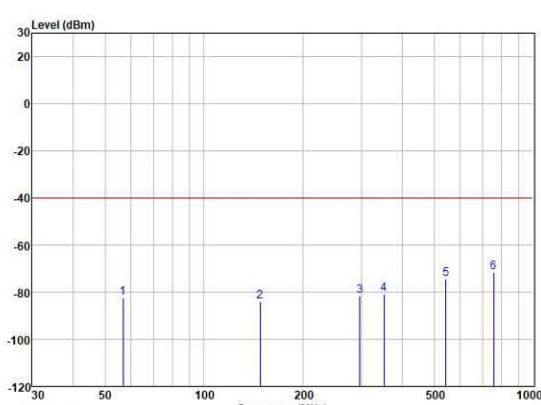
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7 Radiated Spurious emissions

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
46.83	-77.18	-40	-37.18	Horizontal	PASS
96.099	-79.48	-40	-39.48	Horizontal	PASS
222.95	-85.74	-40	-45.74	Horizontal	PASS
348.027	-79.79	-40	-39.79	Horizontal	PASS
526.397	-76.55	-40	-36.55	Horizontal	PASS
642.861	-74.12	-40	-34.12	Horizontal	PASS
Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
56.792	-82.58	-40	-42.58	Vertical	PASS
147.921	-83.85	-40	-43.85	Vertical	PASS
297.224	-81.72	-40	-41.72	Vertical	PASS
351.708	-80.86	-40	-40.86	Vertical	PASS
543.274	-74.52	-40	-34.52	Vertical	PASS
758.041	-71.49	-40	-31.49	Vertical	PASS



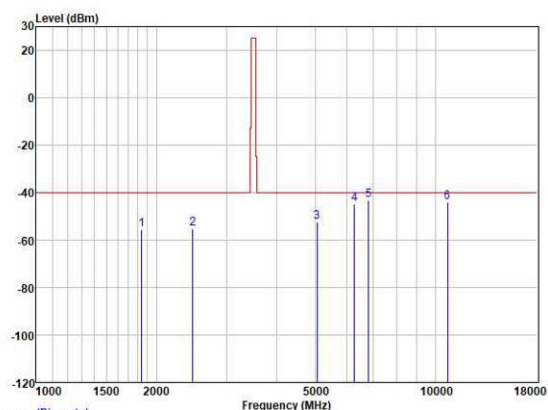
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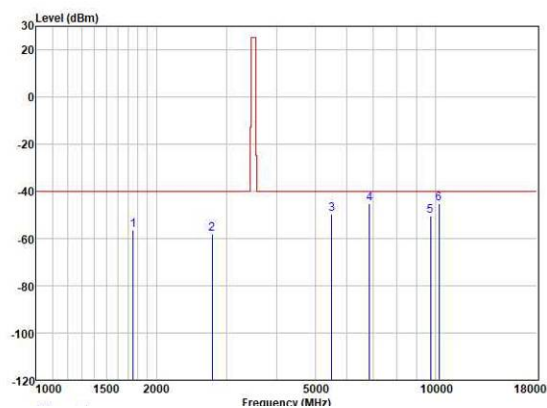
Radiated Spurious emissions

AWGN_MCH_1GHz-18GHz_Horizontal



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
1840.189	-55.58	-40	-15.58	Horizontal	PASS
2471.157	-55.31	-40	-15.31	Horizontal	PASS
5060.668	-52.4	-40	-12.4	Horizontal	PASS
6267.553	-44.89	-40	-4.89	Horizontal	PASS
6815.551	-43.28	-40	-3.28	Horizontal	PASS
10729.48	-43.94	-40	-3.94	Horizontal	PASS

AWGN_MCH_1GHz-18GHz_Vertical



Freq. (MHz)	Level (dBm)	Limit (dBm)	Over limit (dBm)	Pol	Verdict
1751.955	-56.2	-40	-16.2	Vertical	PASS
2758.041	-57.98	-40	-17.98	Vertical	PASS
5503.143	-49.43	-40	-9.43	Vertical	PASS
6855.063	-45.37	-40	-5.37	Vertical	PASS
9725.221	-50.4	-40	-10.4	Vertical	PASS
10215.02	-45.32	-40	-5.32	Vertical	PASS

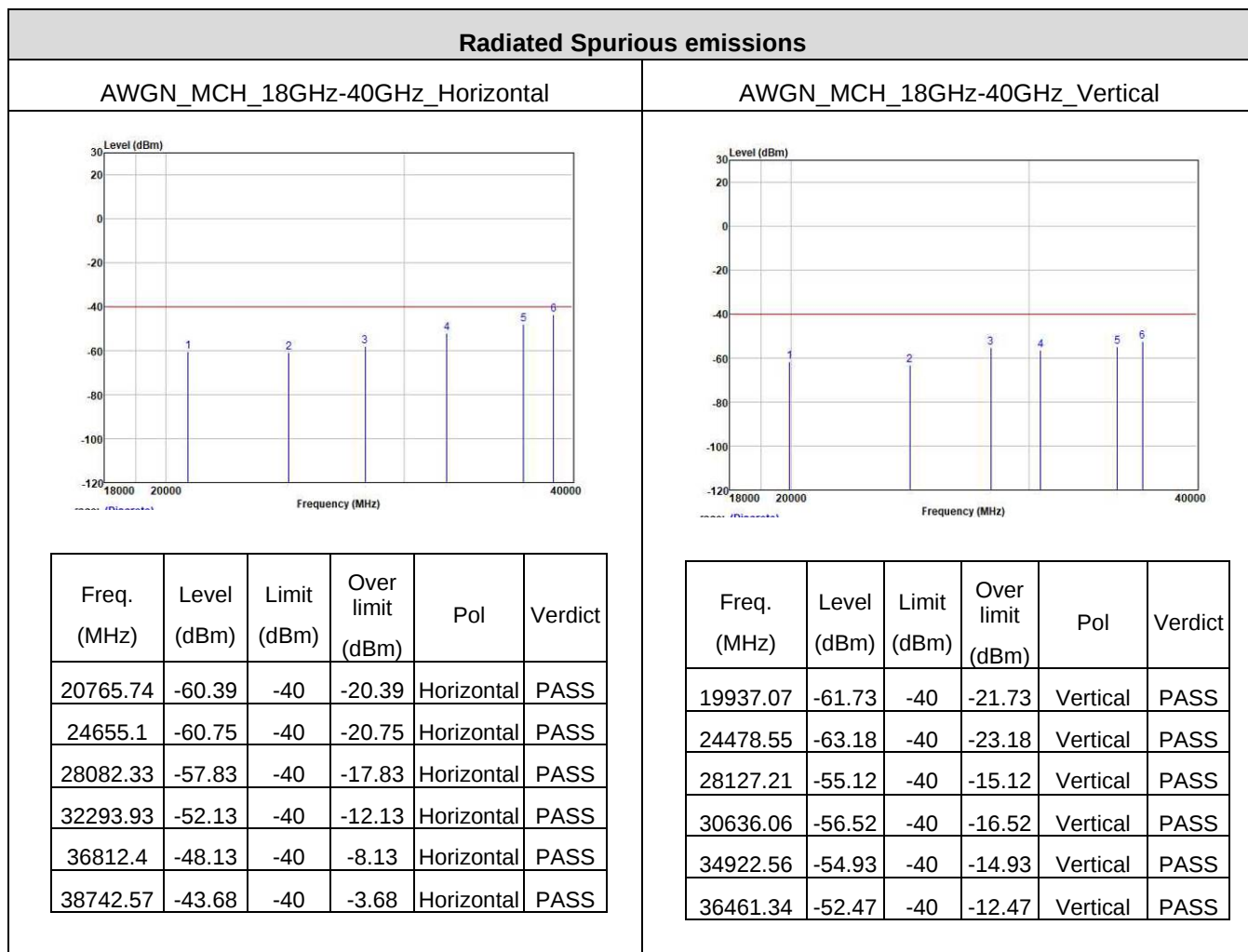


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--End of Appendix--