



Appendix for test report



1 Appendix_A: Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dBm]	ERP	Limit [dBm]	Verdict
GSM850	GSM/TM1	LCH	32.8	28.83	38.5	PASS
		MCH	32.96	28.99	38.5	PASS
		HCH	32.94	28.97	38.5	PASS
	GSM/TM2	LCH	26.92	22.95	38.5	PASS
		MCH	26.87	22.9	38.5	PASS
		HCH	26.91	22.94	38.5	PASS

Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	30.5	28.68	33	PASS
		MCH	30.53	28.71	33	PASS
		HCH	30.5	28.68	33	PASS
	GSM/TM2	LCH	26.03	24.21	33	PASS
		MCH	26.06	24.24	33	PASS
		HCH	26.08	24.26	33	PASS



Note1:

a, For getting the ERP (Efficient Radiated Power) or EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b, SGP=Signal Generator Level

Note2:

$$\text{SET Span} = 1.5 * \text{OBW}$$

$$\text{SET RBW} = 1\% \text{ of the OBW, not to exceed 1MHz}$$

$$\text{SET VBW} \geq 3 * \text{RBW}$$

SET Sweep time=auto-couple.

Detector:RMS

2Appendix_B: Peak-to-Average Ratio

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM850	GSM/TM1	LCH	0.21	13	PASS
		MCH	0.22	13	PASS
		HCH	0.21	13	PASS
	GSM/TM2	LCH	2.84	13	PASS
		MCH	2.86	13	PASS
		HCH	2.92	13	PASS
GSM1900	GSM/TM1	LCH	0.19	13	PASS
		MCH	0.22	13	PASS
		HCH	0.2	13	PASS
	GSM/TM2	LCH	2.66	13	PASS
		MCH	2.72	13	PASS
		HCH	2.89	13	PASS

3Appendix_C: Modulation Characteristics

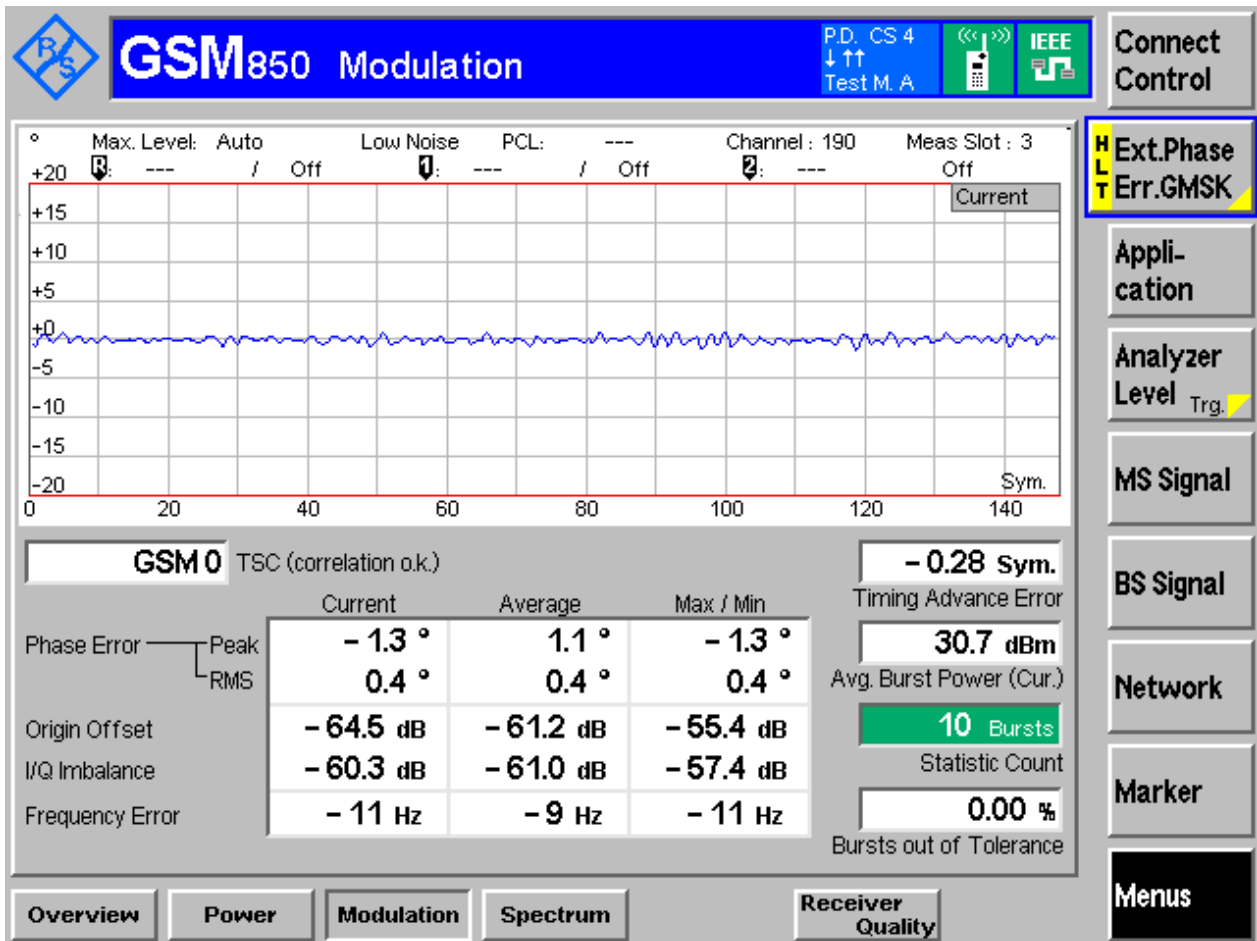
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

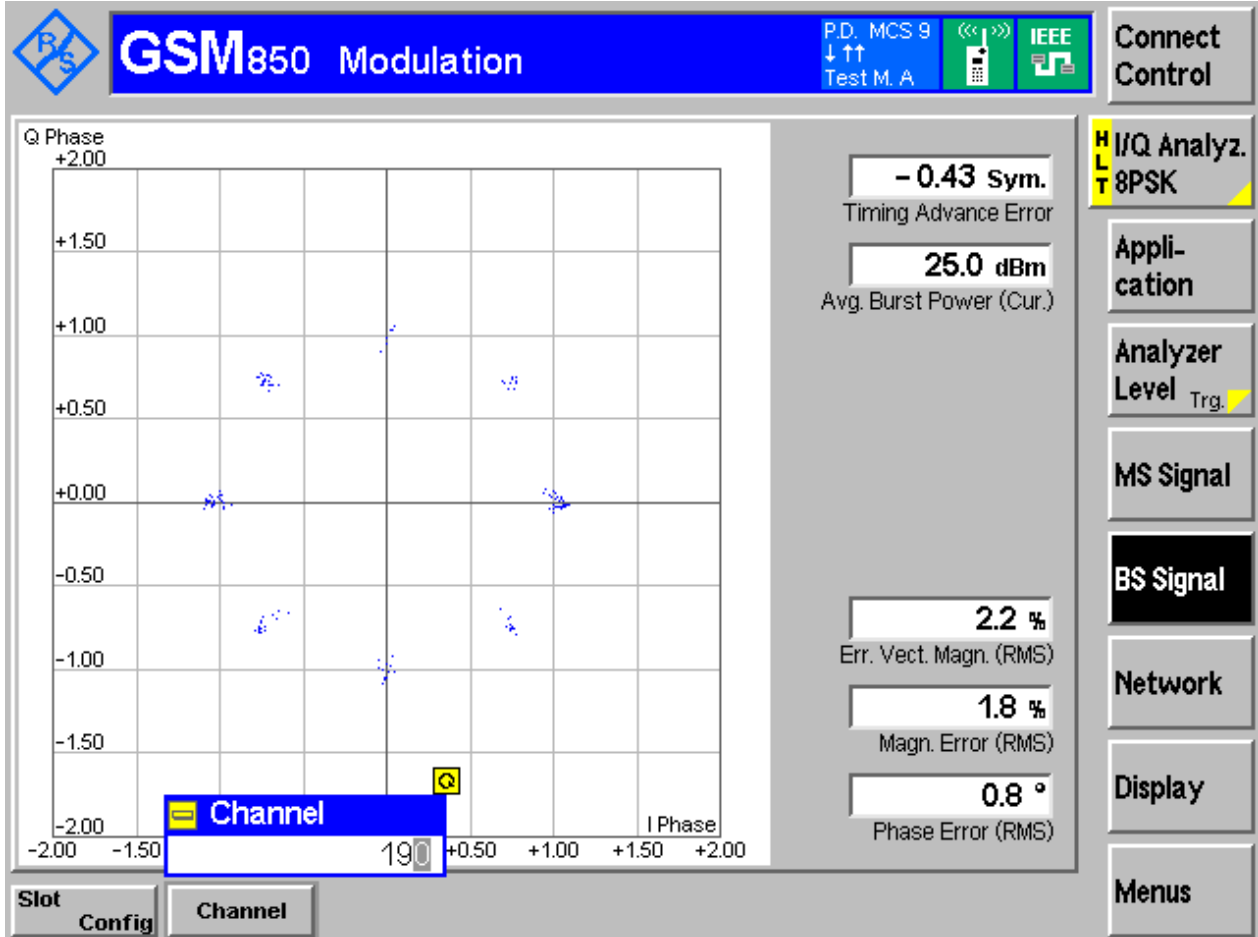
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

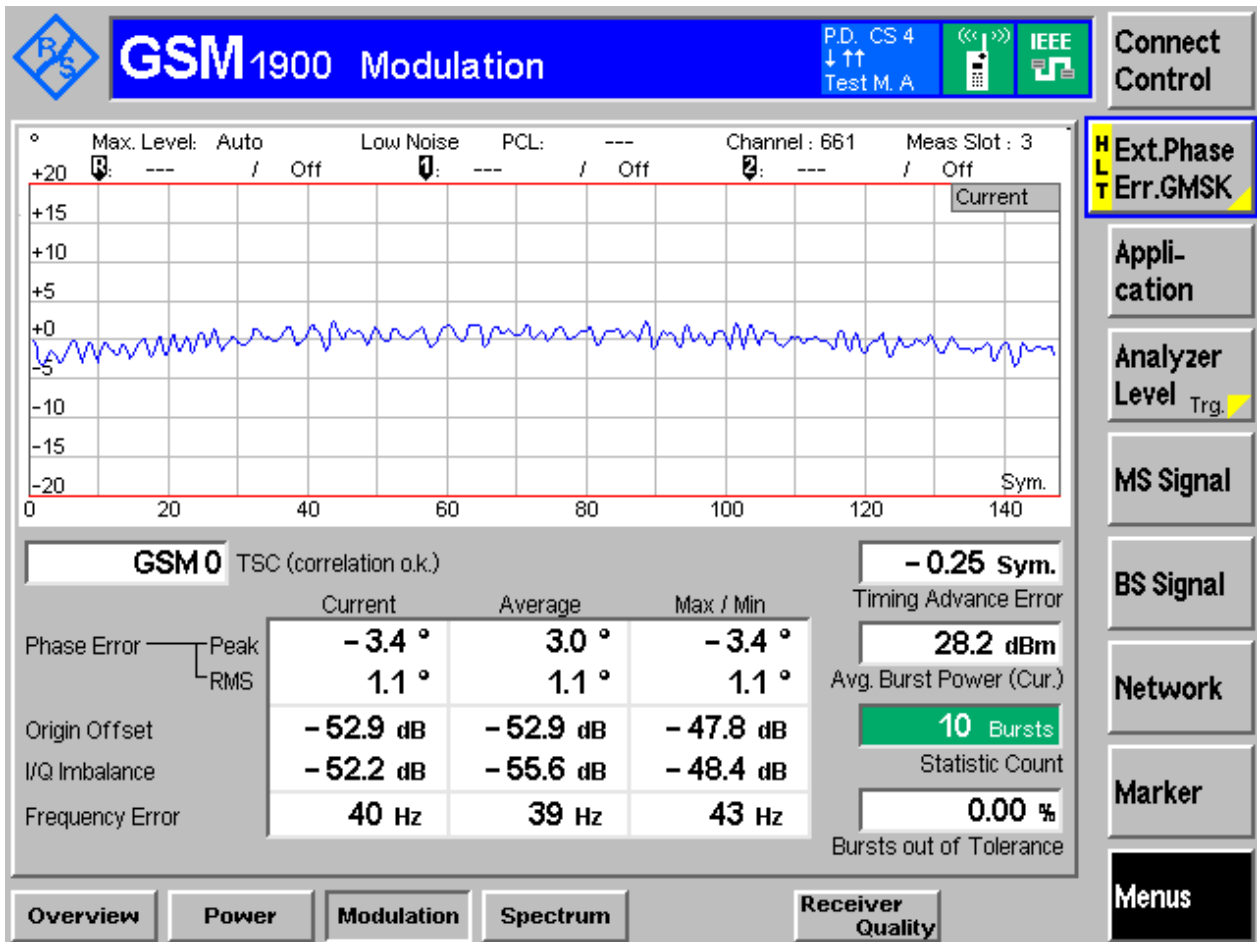
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

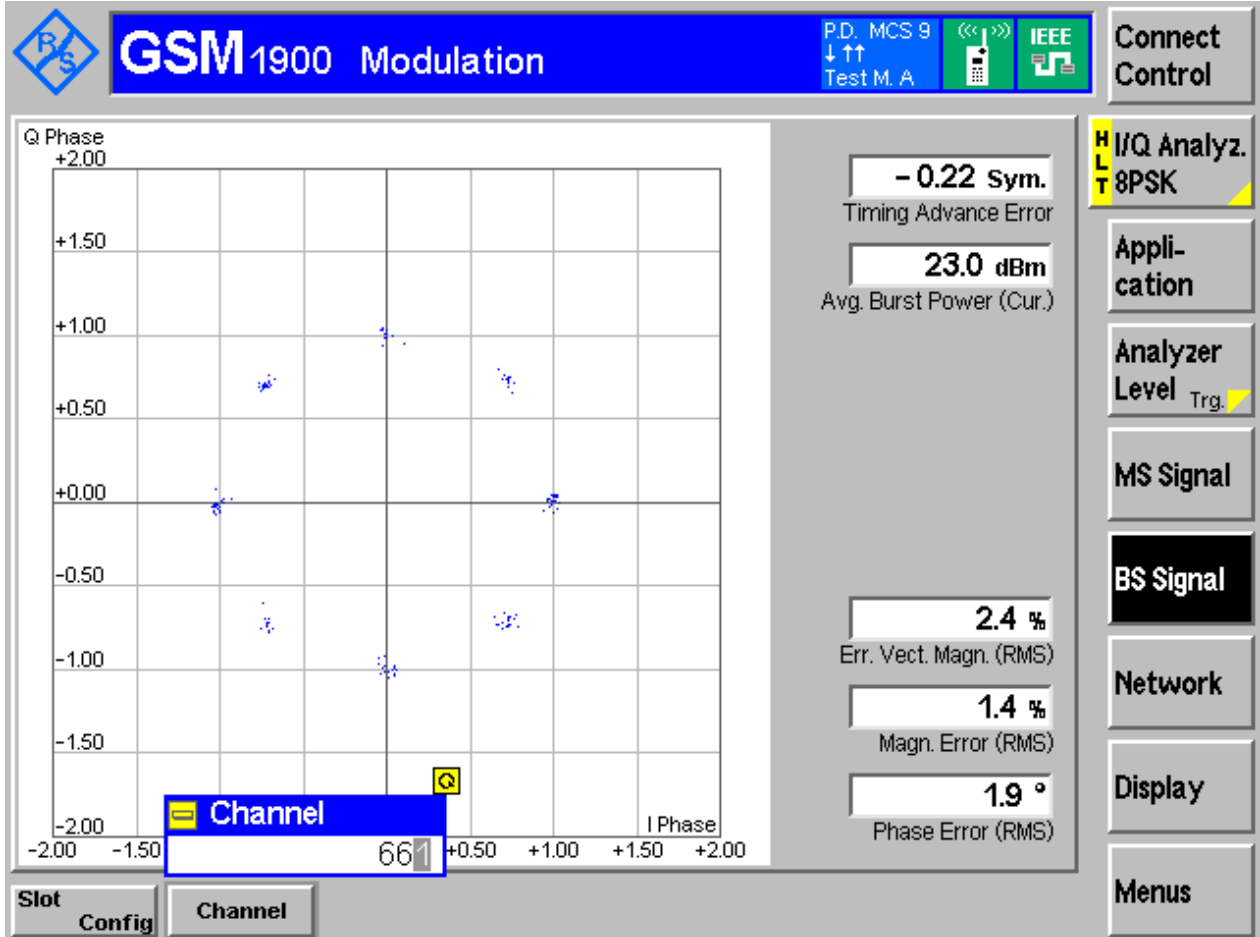
3.1.2.1 Test Mode = GSM/TM1

3.1.2.1.1 Test Channel = MCH



3.1.2.2 Test Mode = GSM/TM2

3.1.2.2.1 Test Channel = MCH



4Appendix_D: Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	248.69	321.44	Pass
		MCH	244.90	318.65	Pass
		HCH	242.53	320.86	Pass
	GSM/TM2	LCH	253.56	325.19	Pass
		MCH	255.42	324.50	Pass
		HCH	255.50	328.31	Pass
GSM1900	GSM/TM1	LCH	243.08	317.33	Pass
		MCH	240.85	315.90	Pass
		HCH	242.14	314.21	Pass
	GSM/TM2	LCH	247.10	318.32	Pass
		MCH	252.89	309.66	Pass
		HCH	249.25	321.15	Pass



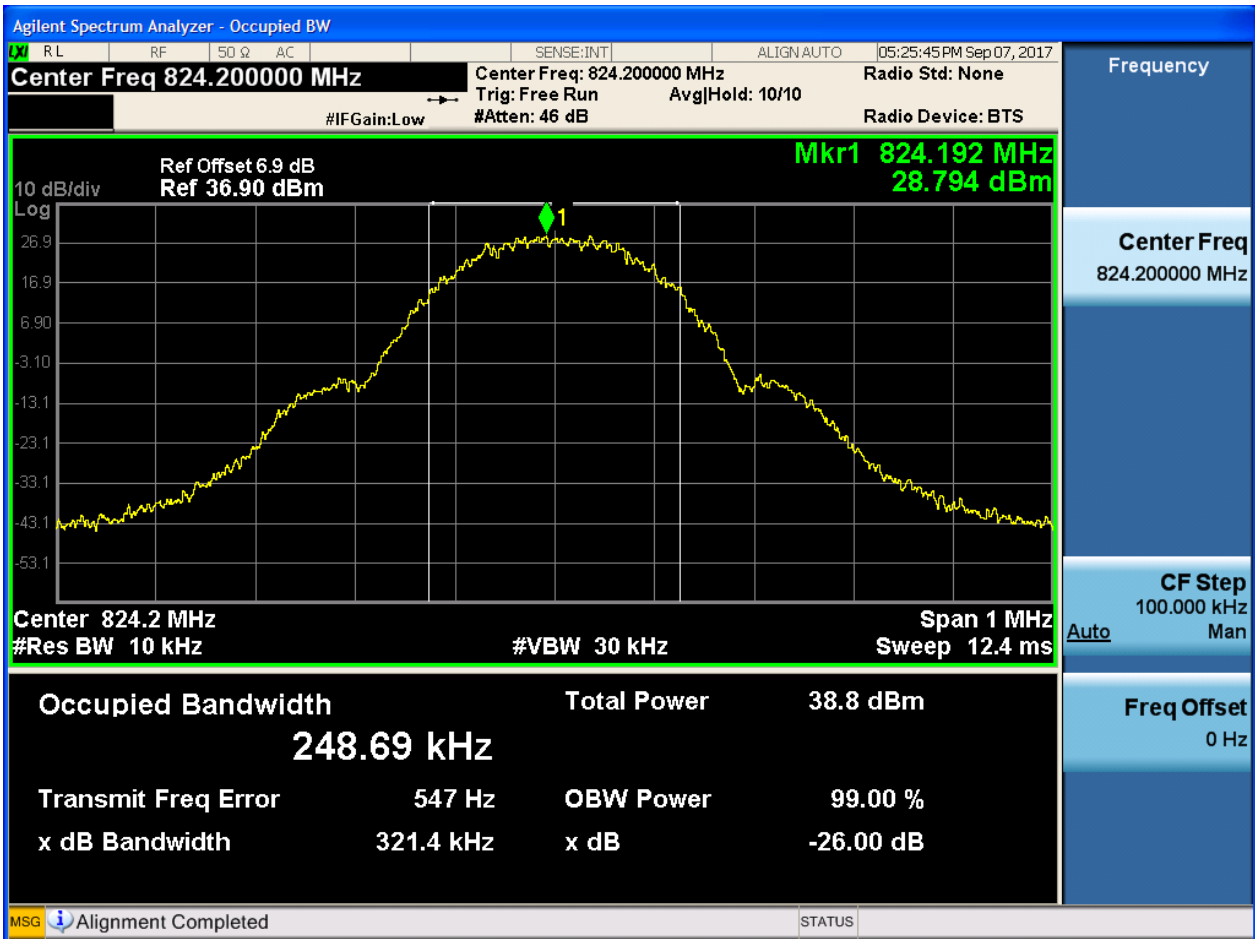
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

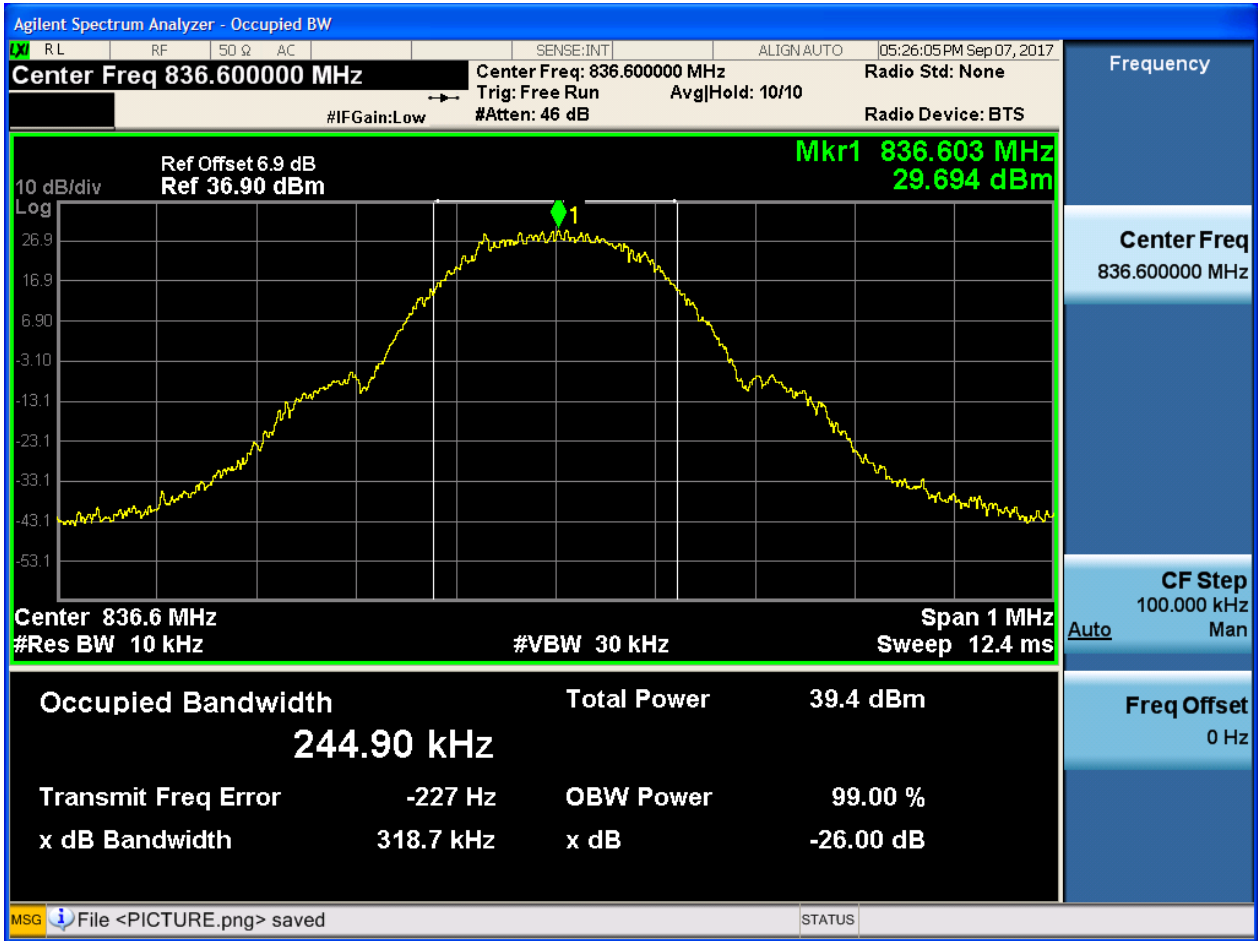
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH

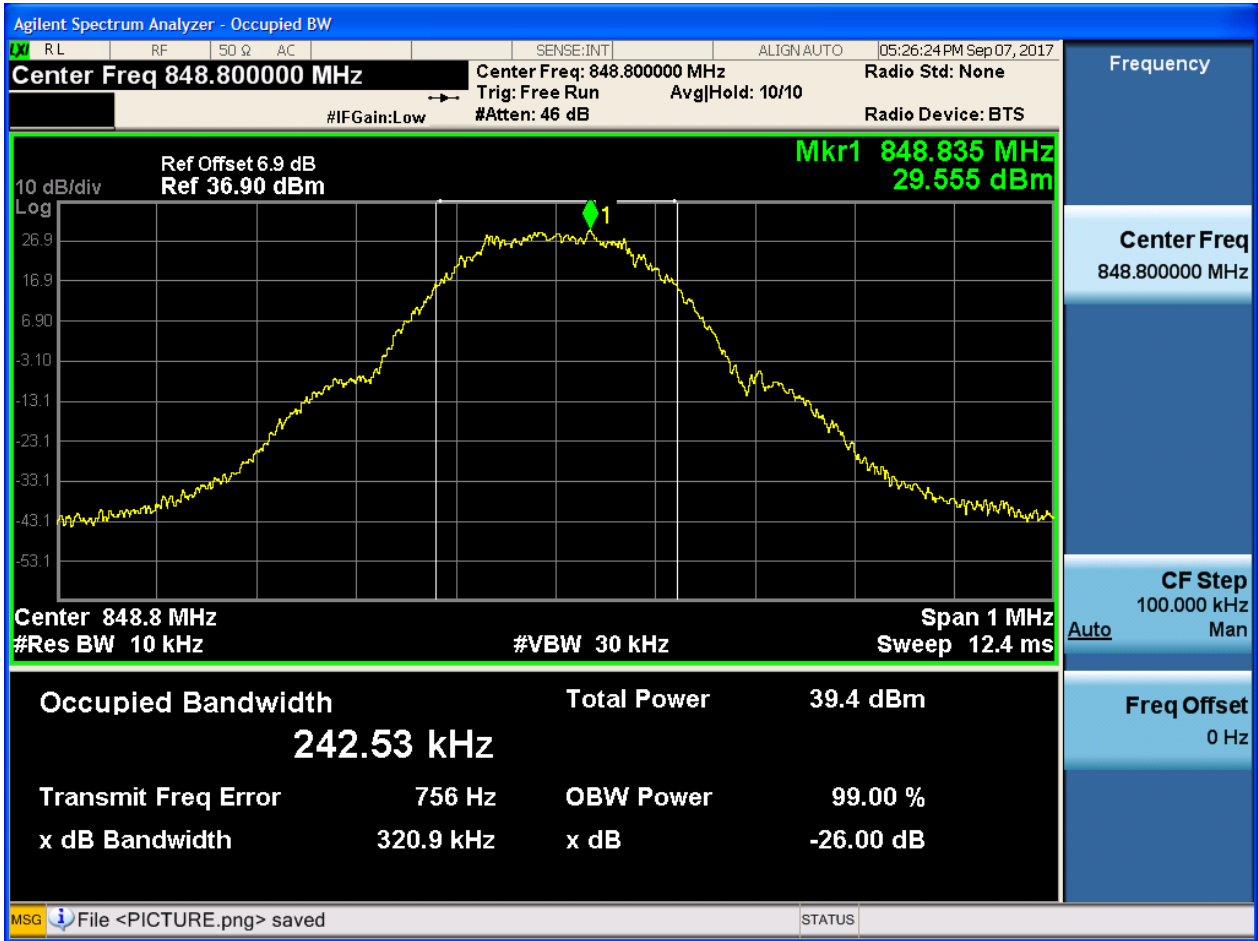




4.1.1.1.2 Test Channel = MCH



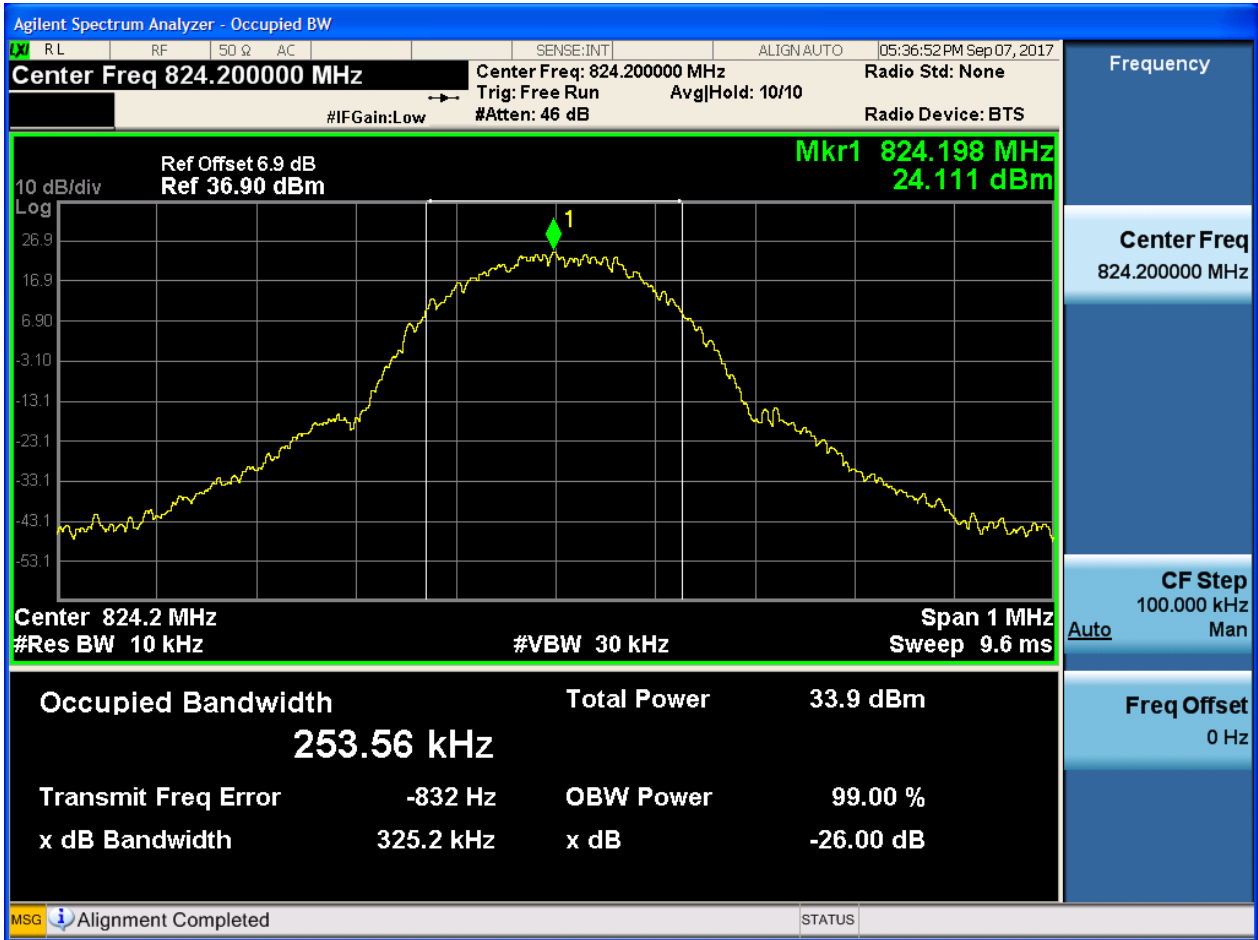
4.1.1.1.3 Test Channel = HCH





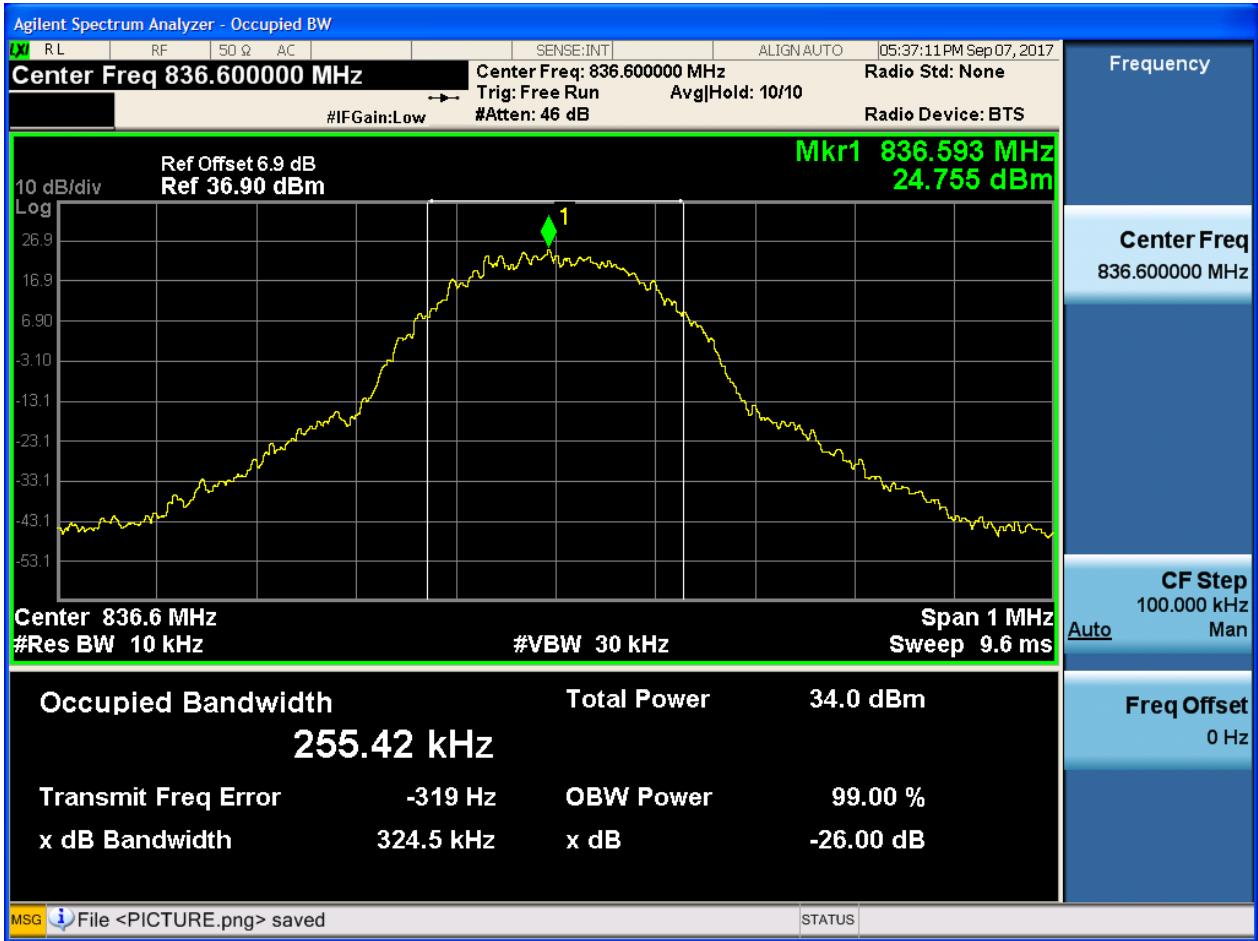
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



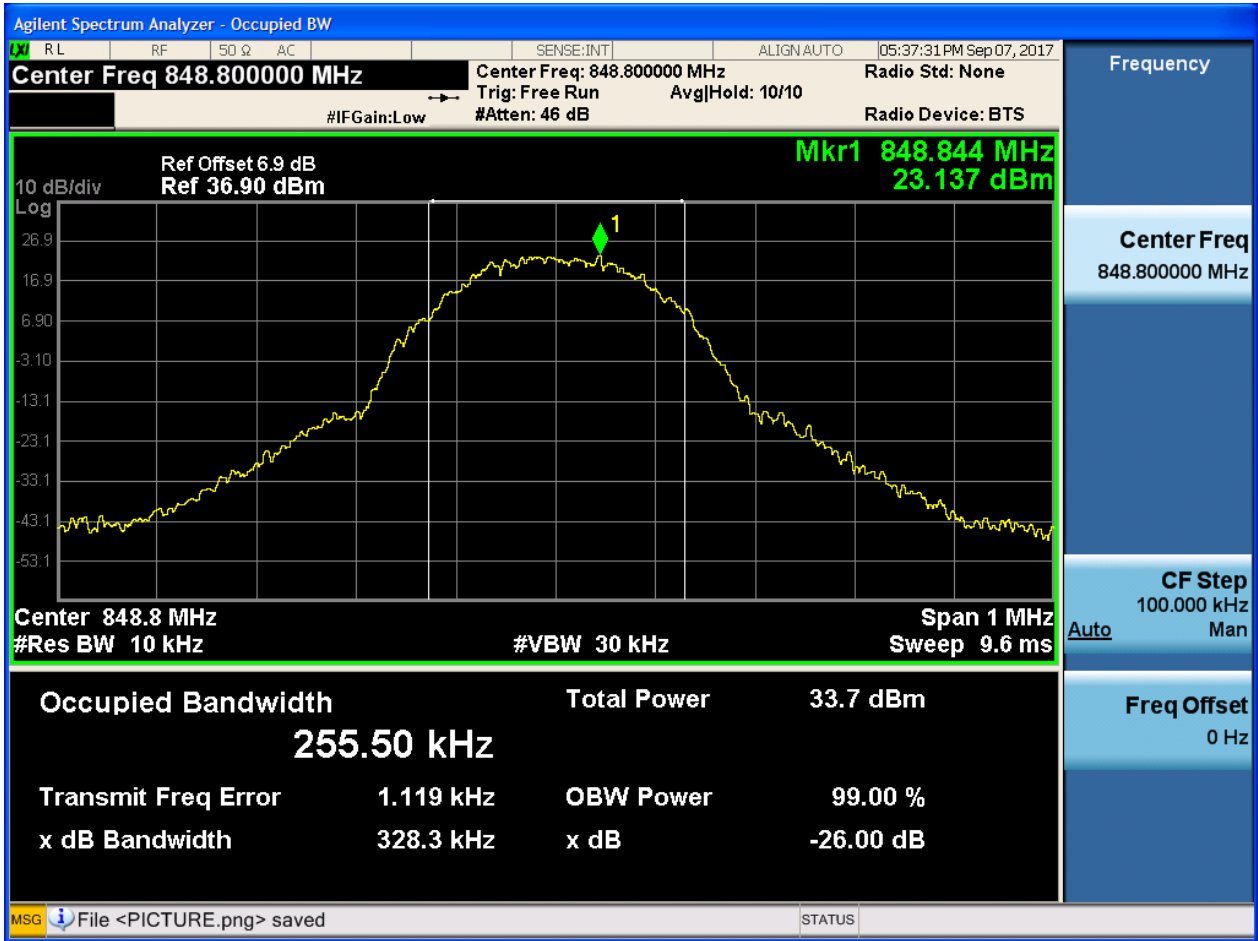


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

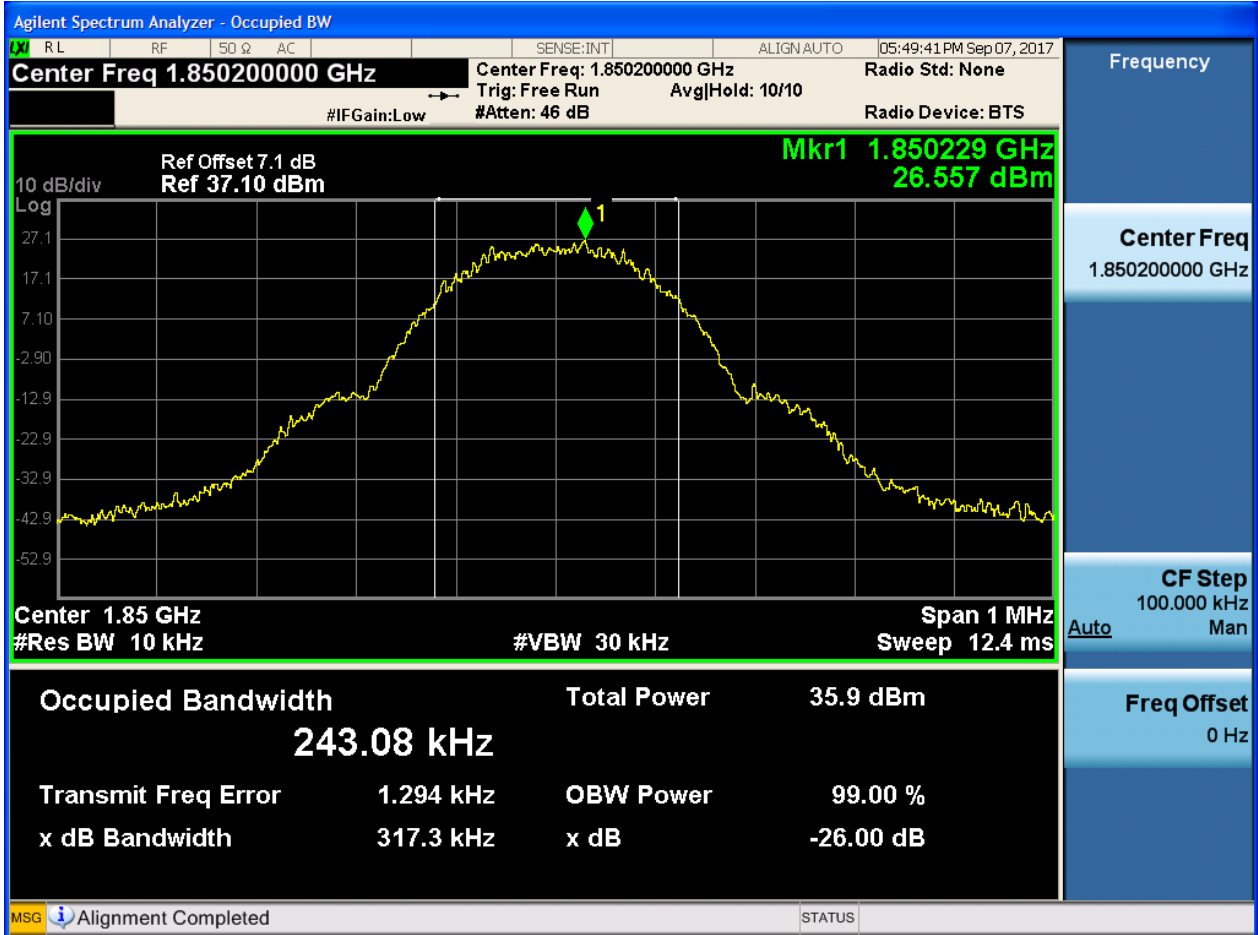




4.1.2 Test Band = GSM1900

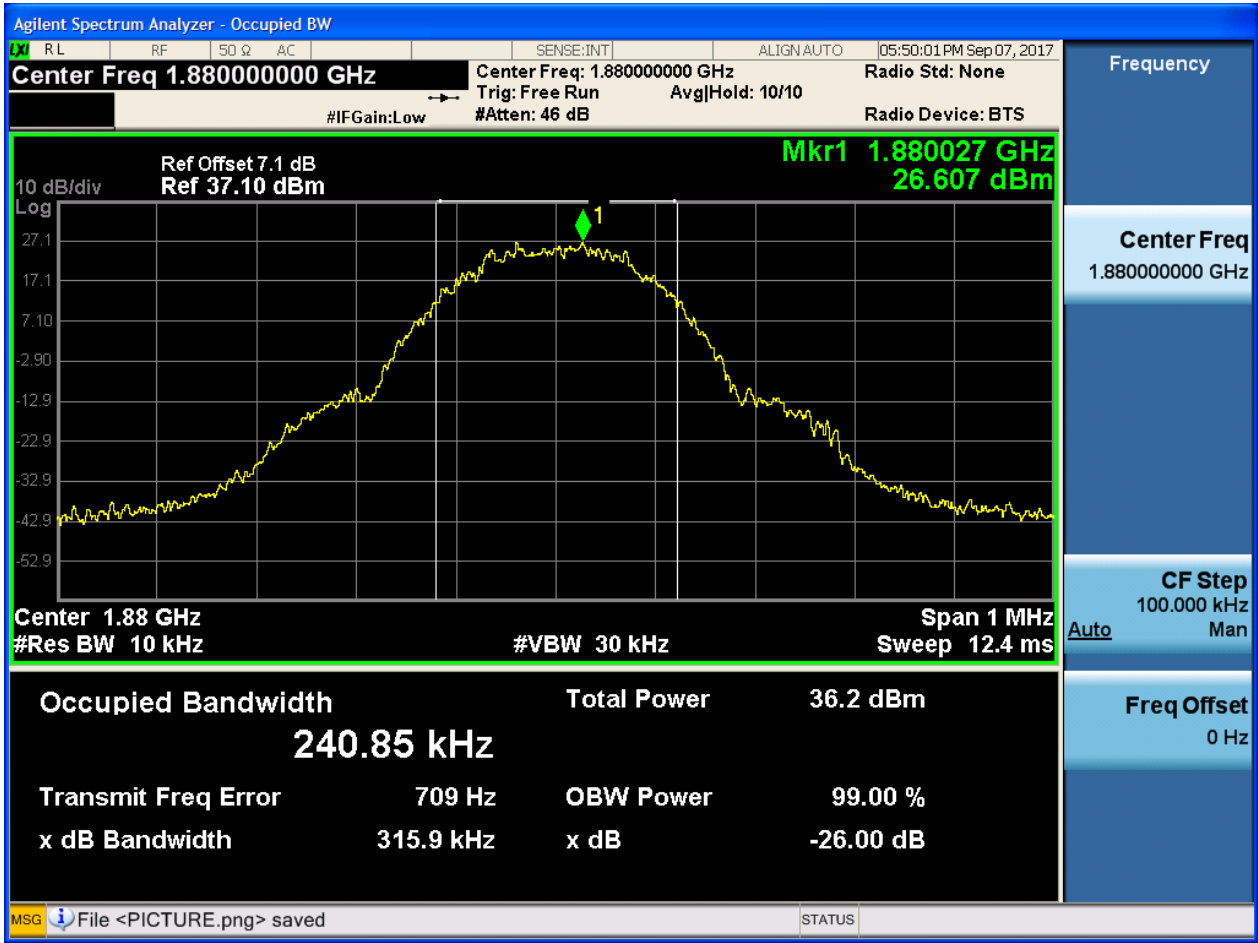
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



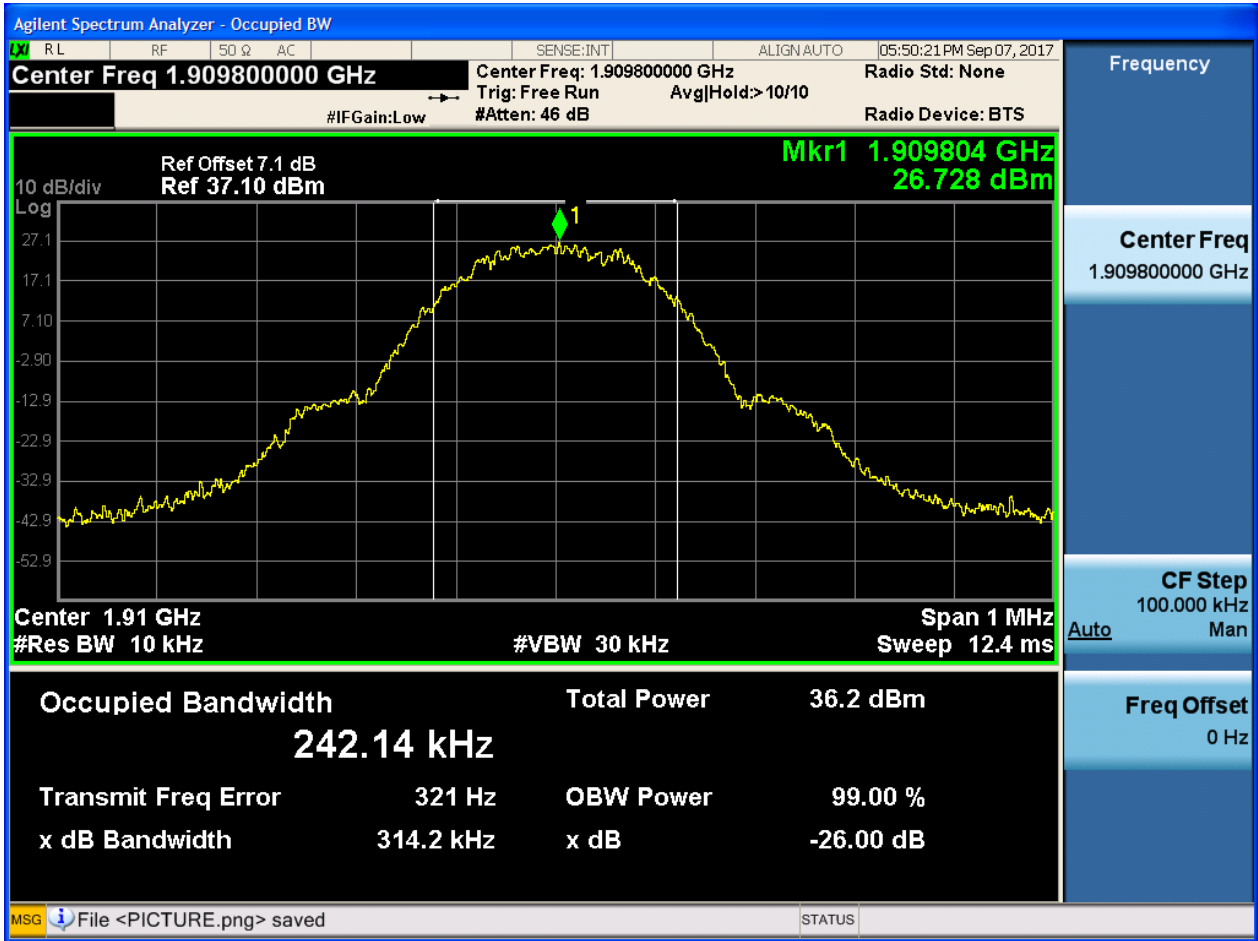


4.1.2.1.2 Test Channel = MCH





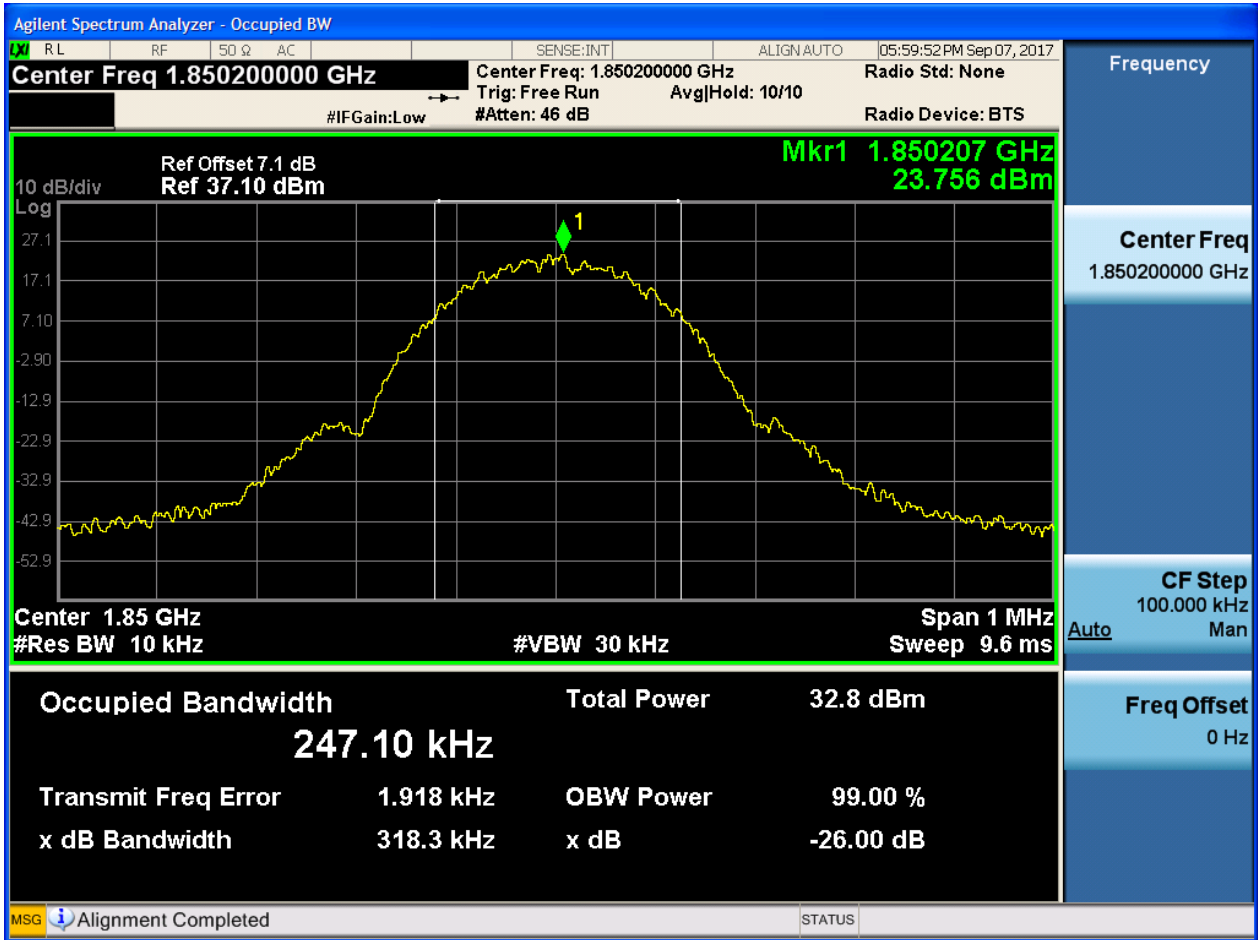
4.1.2.1.3 Test Channel = HCH





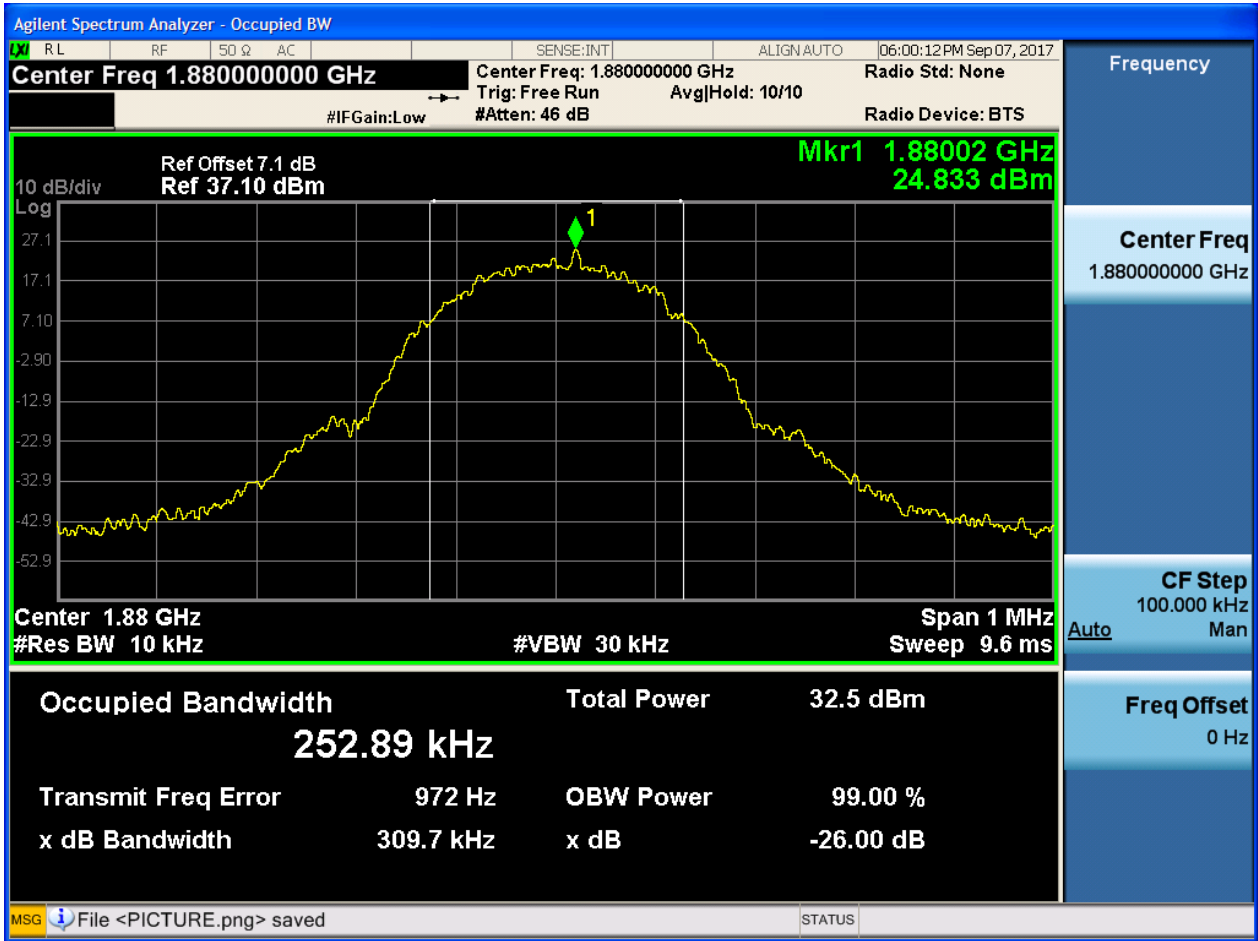
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



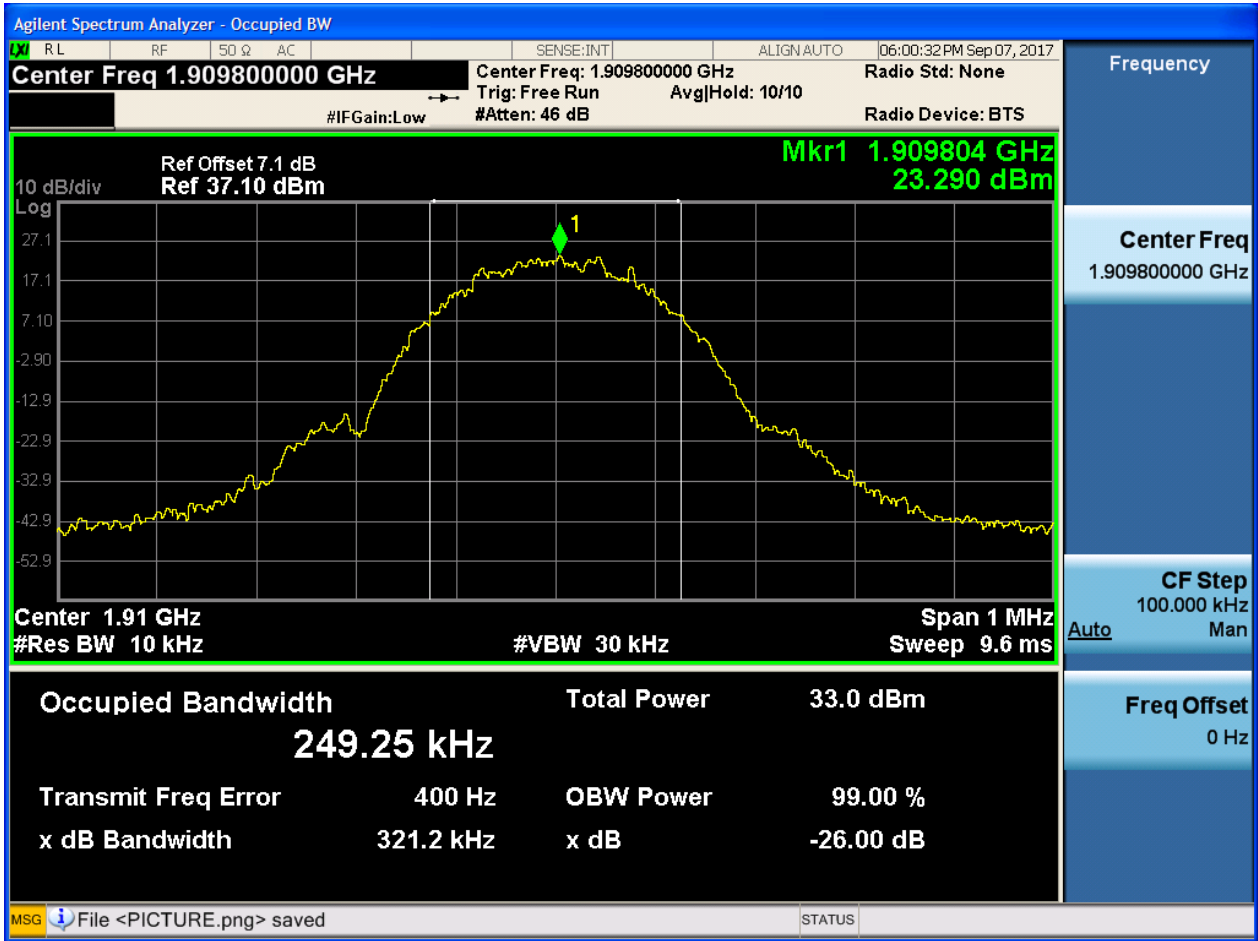


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





5Appendix_E: Band Edges Compliance

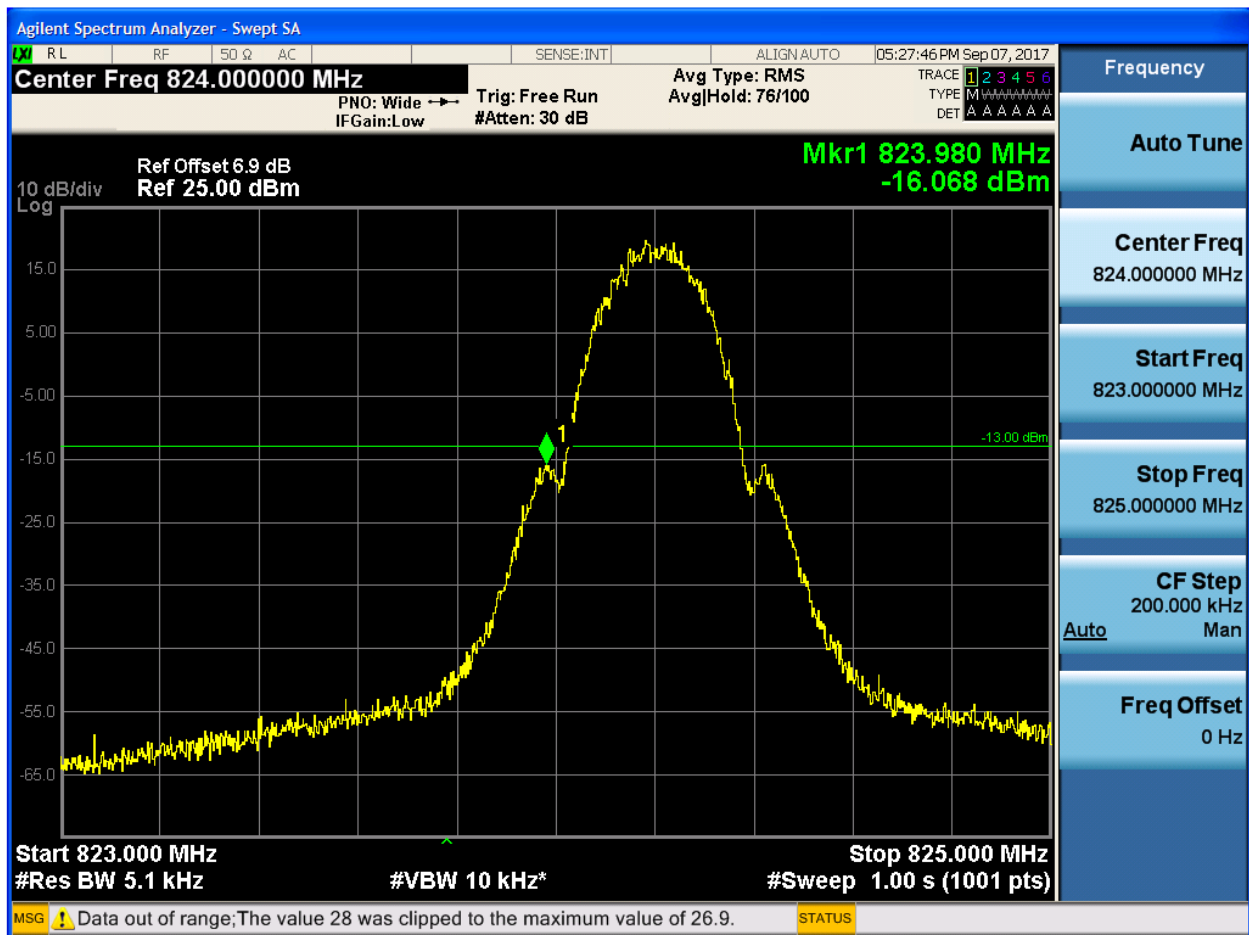
Part I - Test Plots

5.1 For GSM

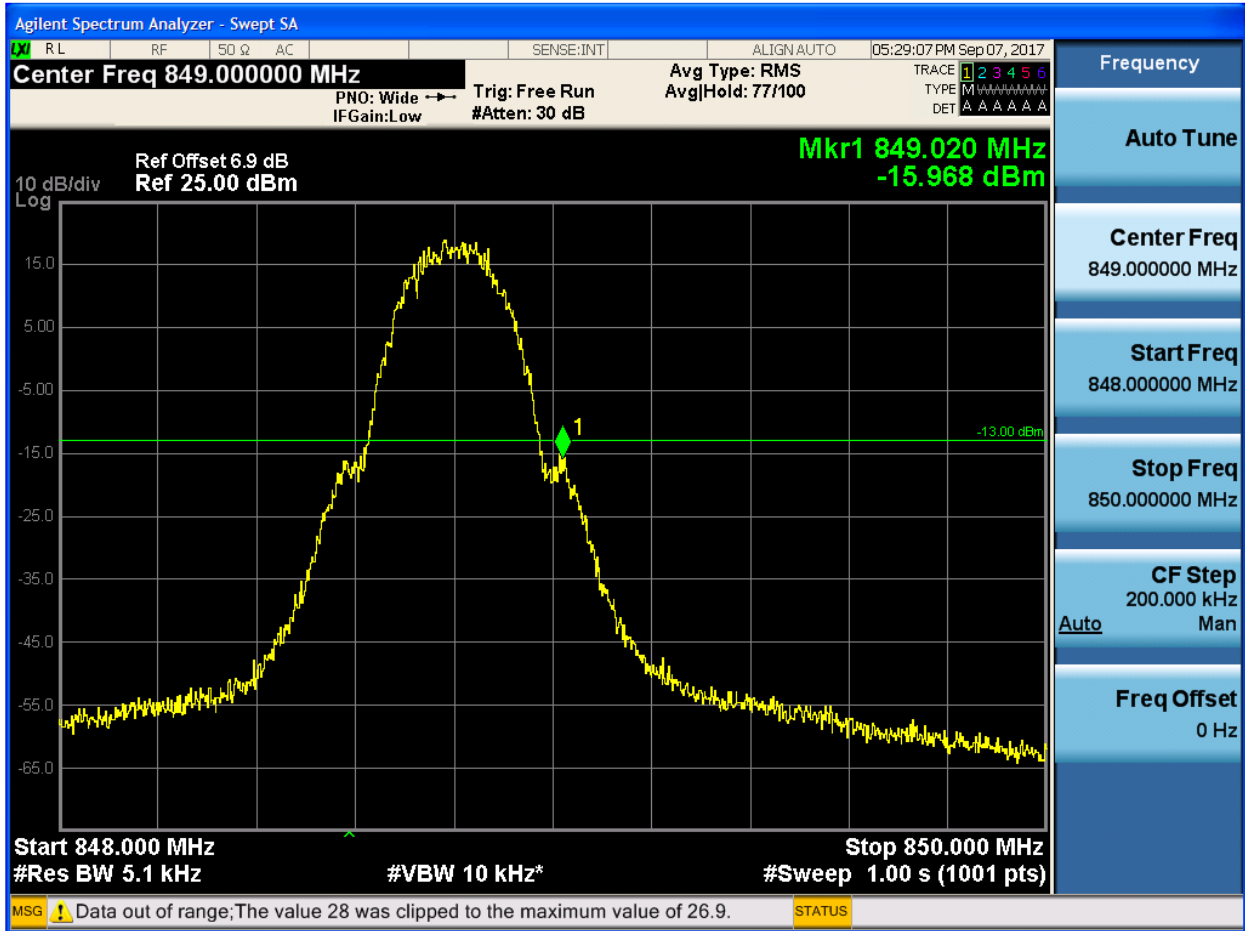
5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH



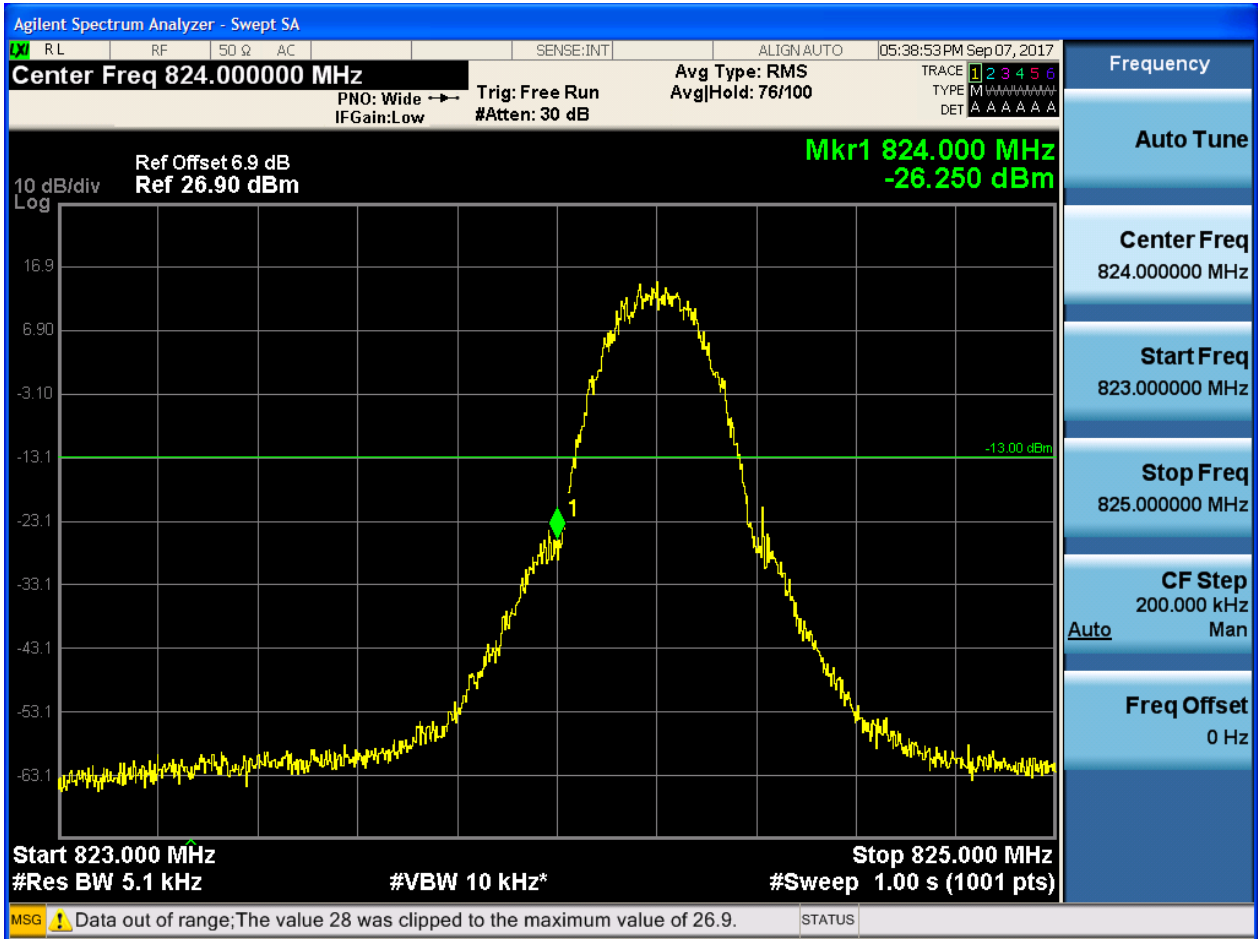
5.1.1.1.2 Test Channel = HCH



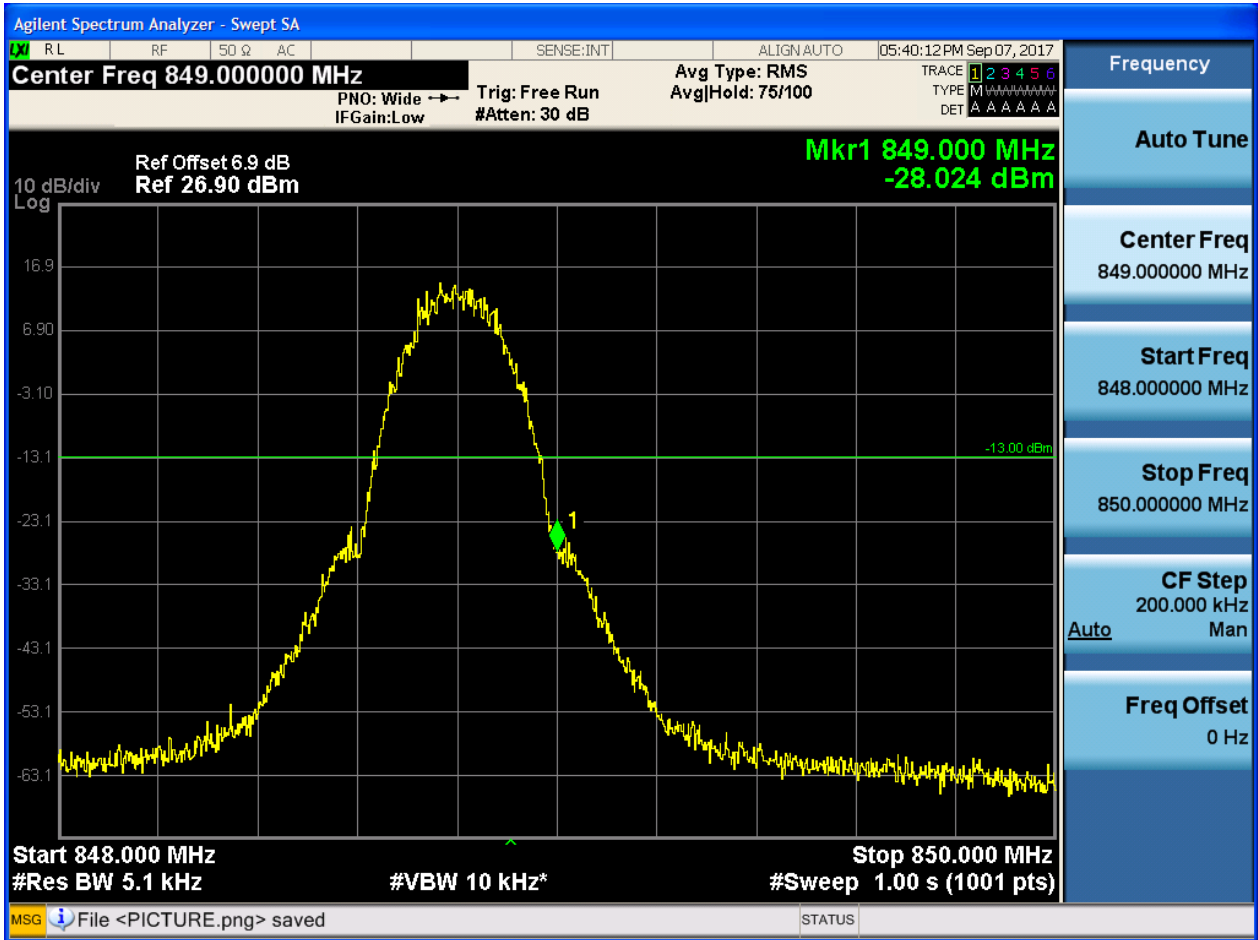


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



5.1.1.2.2 Test Channel = HCH

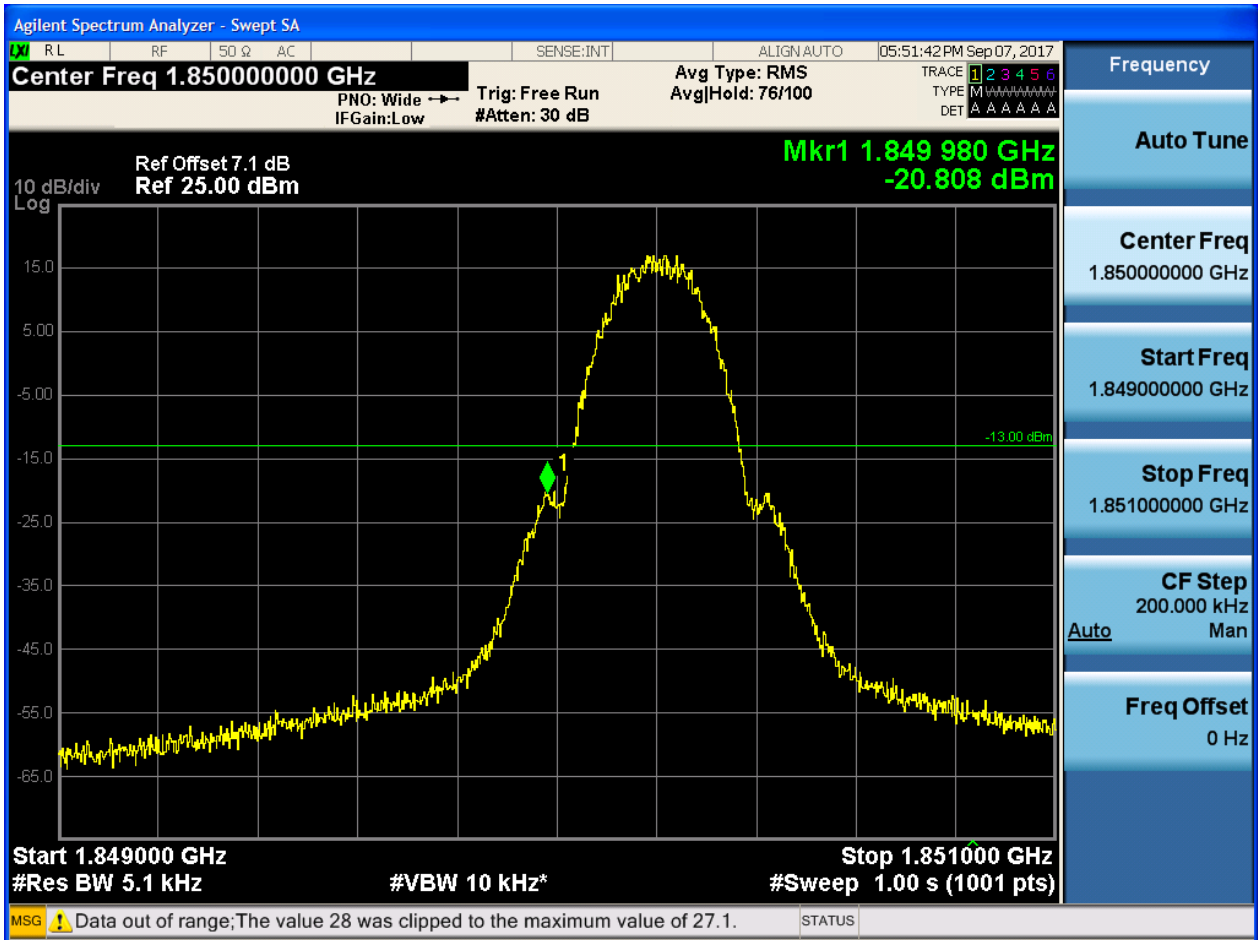




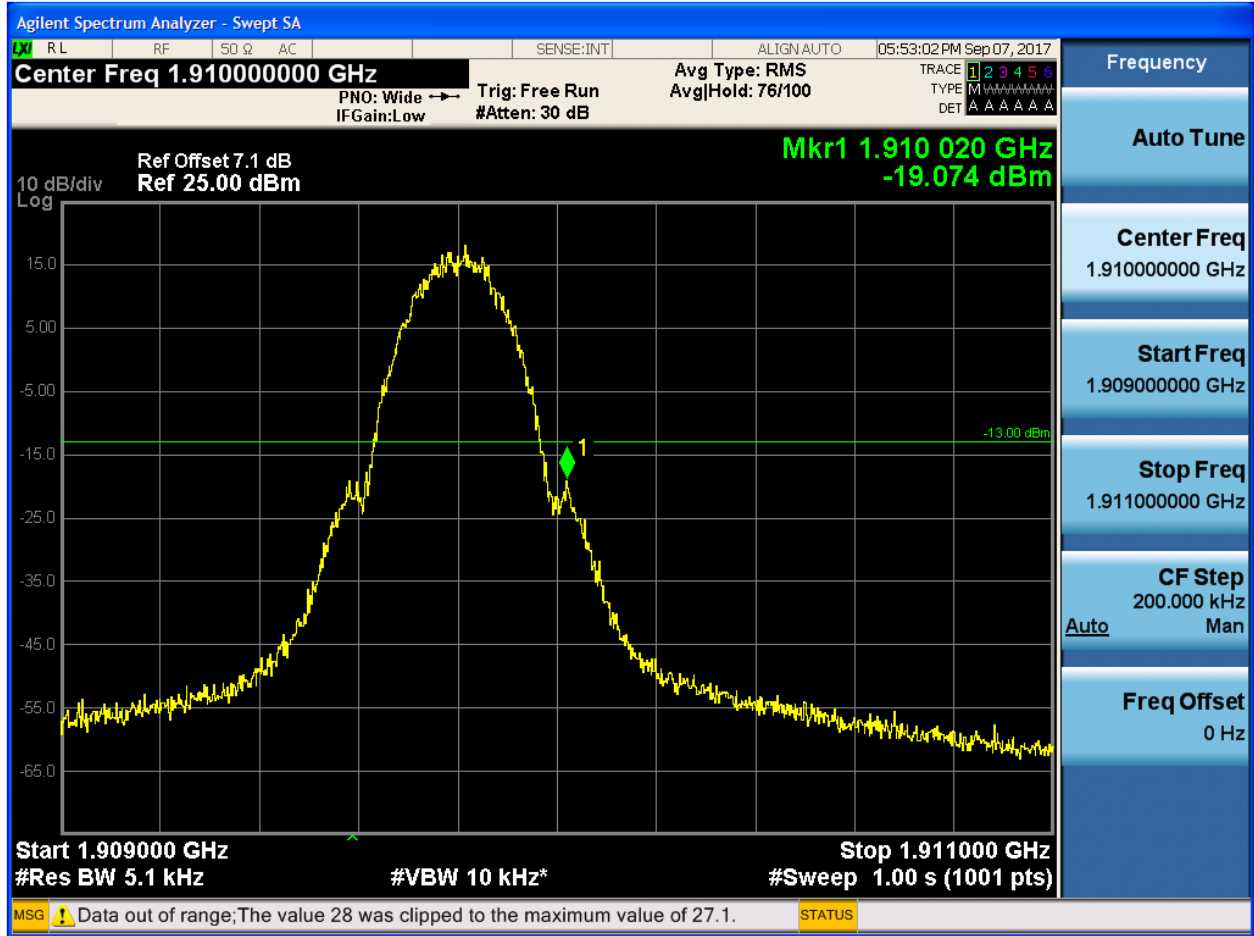
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH



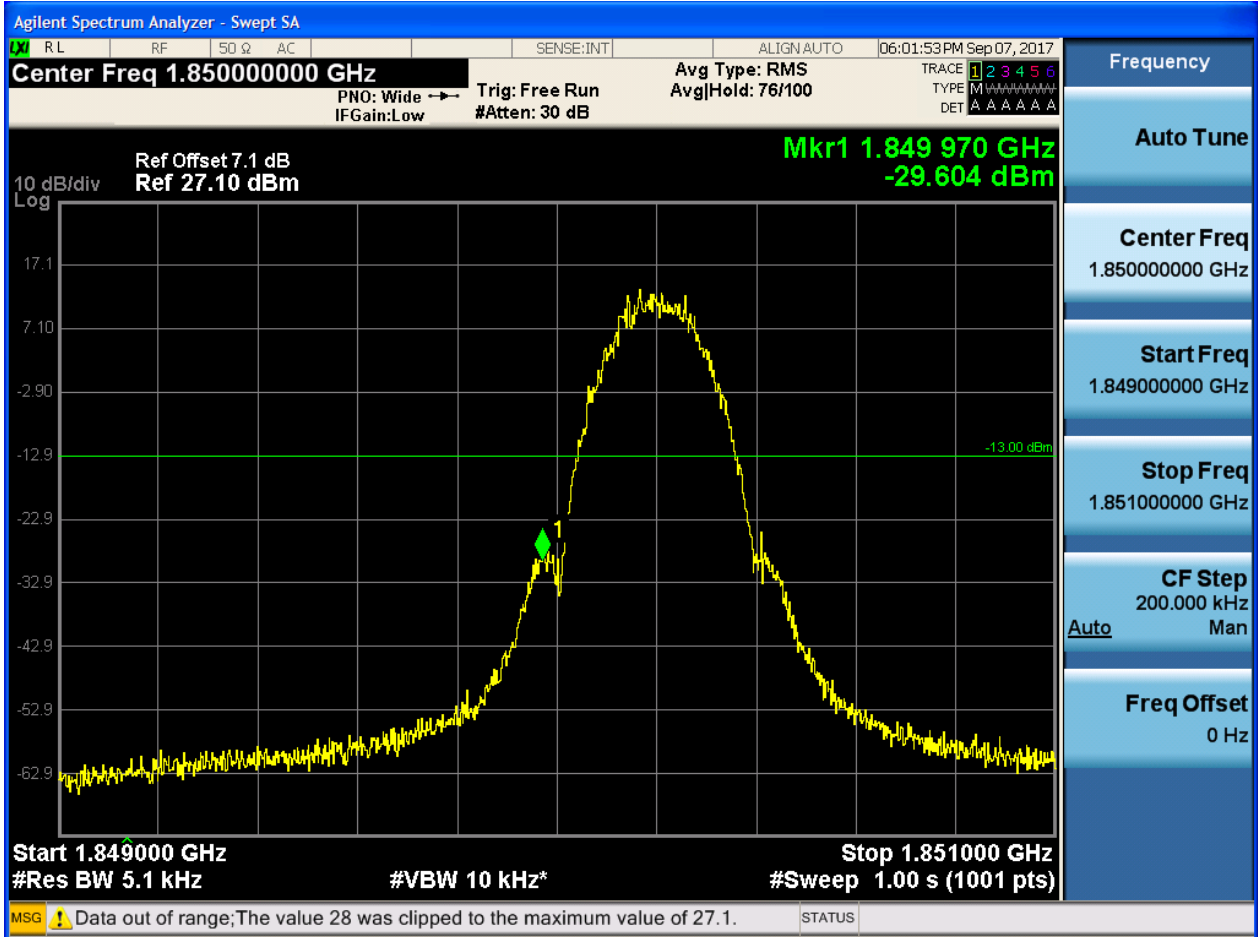
5.1.2.1.2 Test Channel = HCH



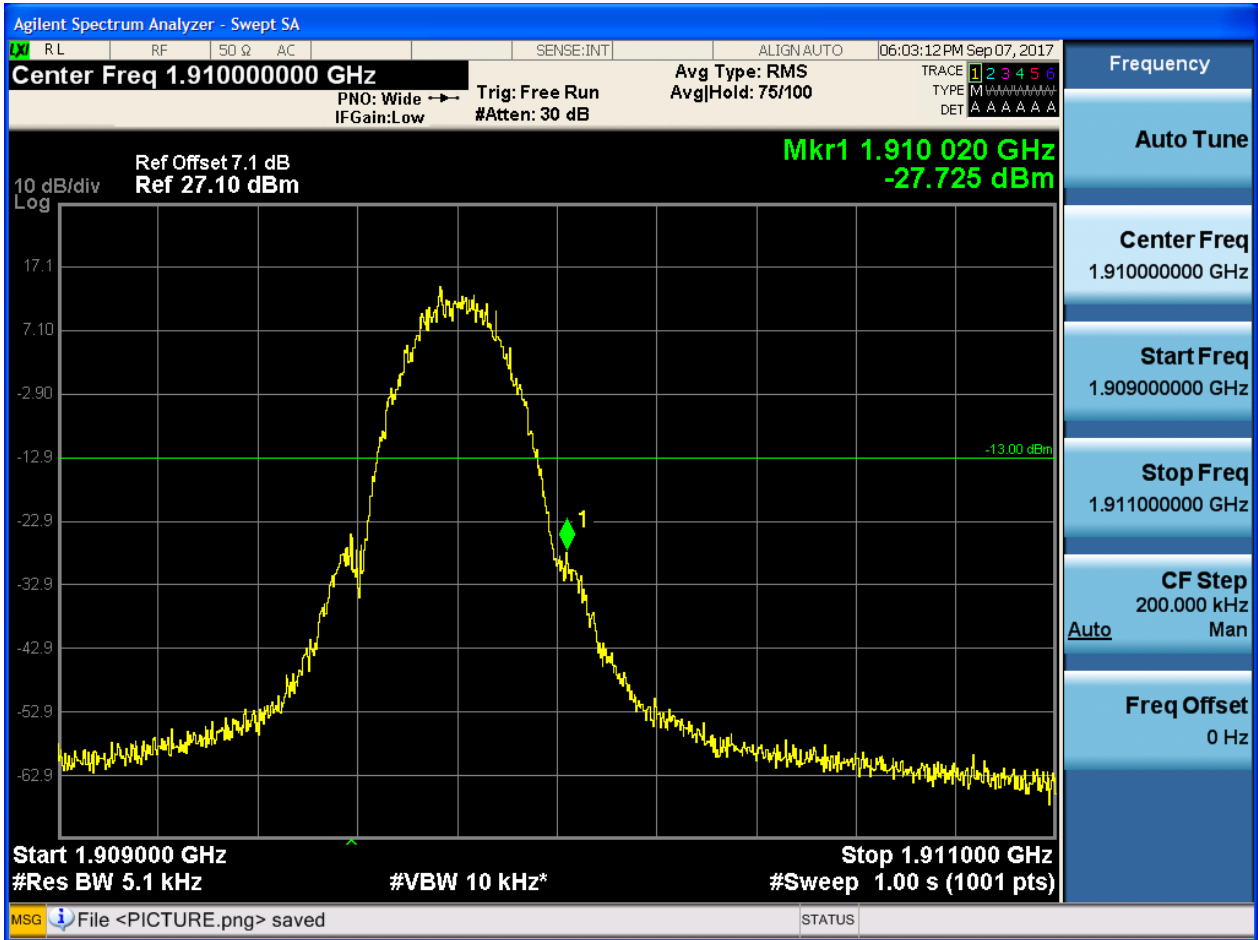


5.1.2.2 Test Mode = GSM/TM2

5.1.2.2.1 Test Channel = LCH



5.1.2.2.2 Test Channel = HCH



6Appendix_F: Spurious Emission at Antenna Terminal

NOTE: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k * (Span / RBW)$ " with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

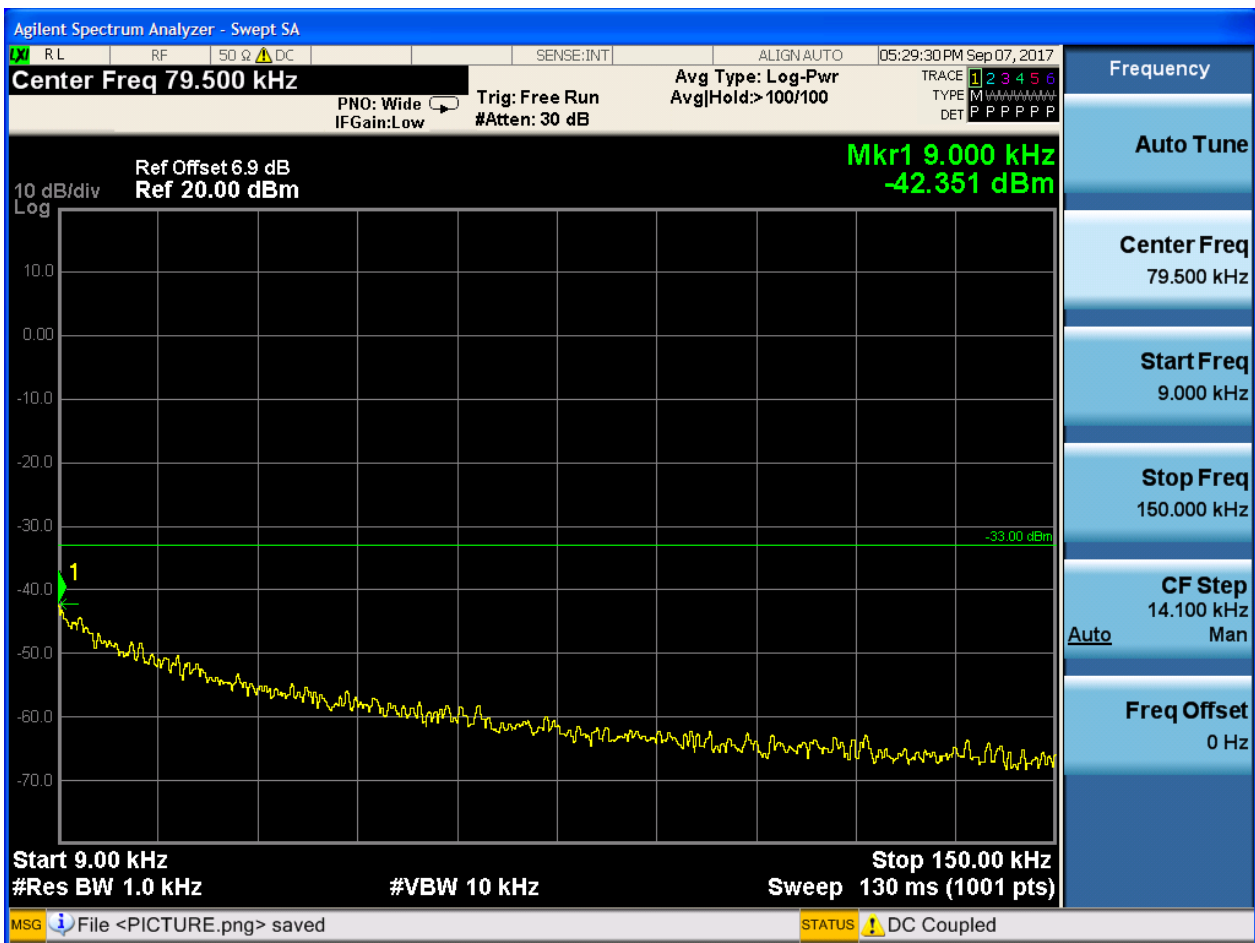
Part I - Test Plots

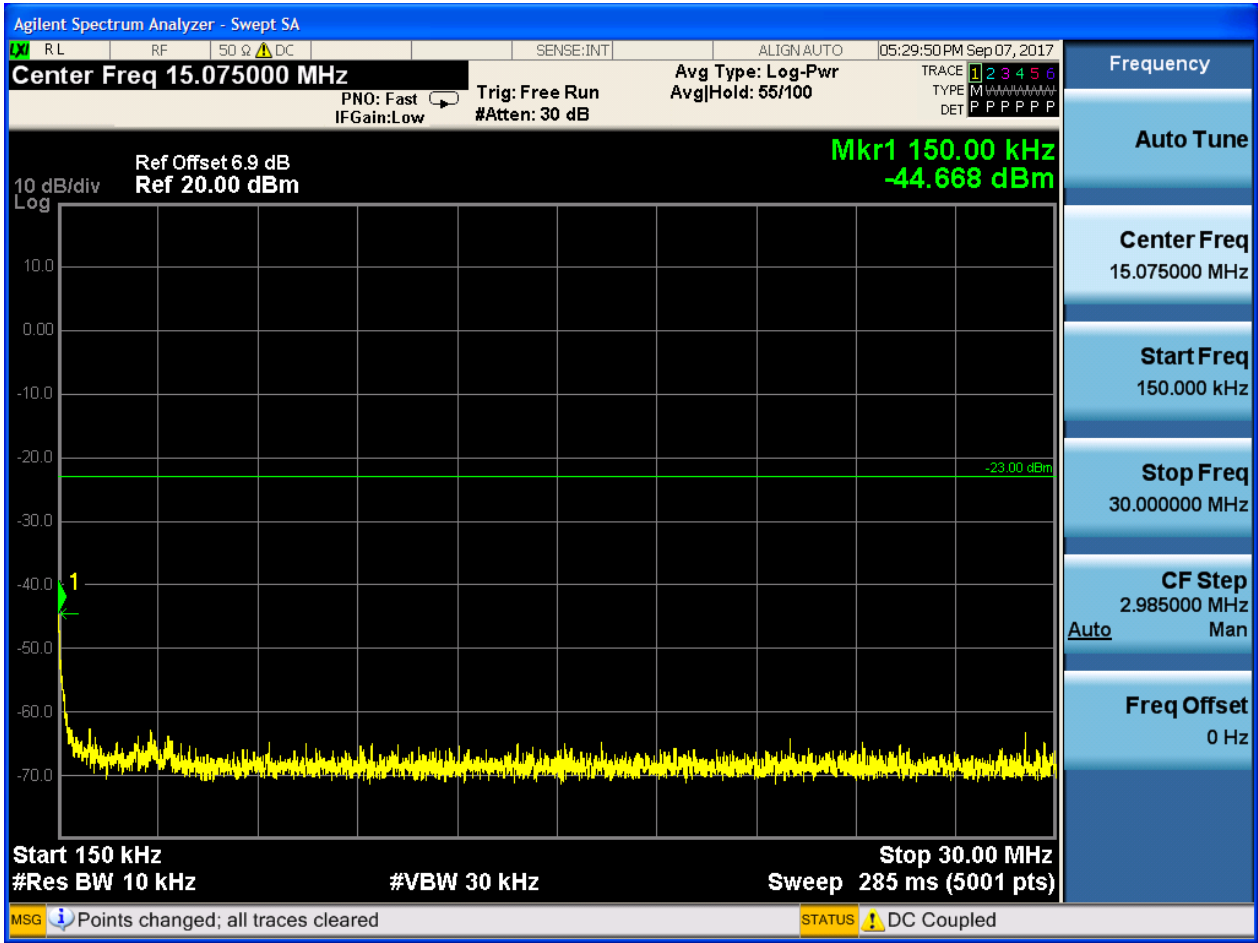
6.1 For GSM

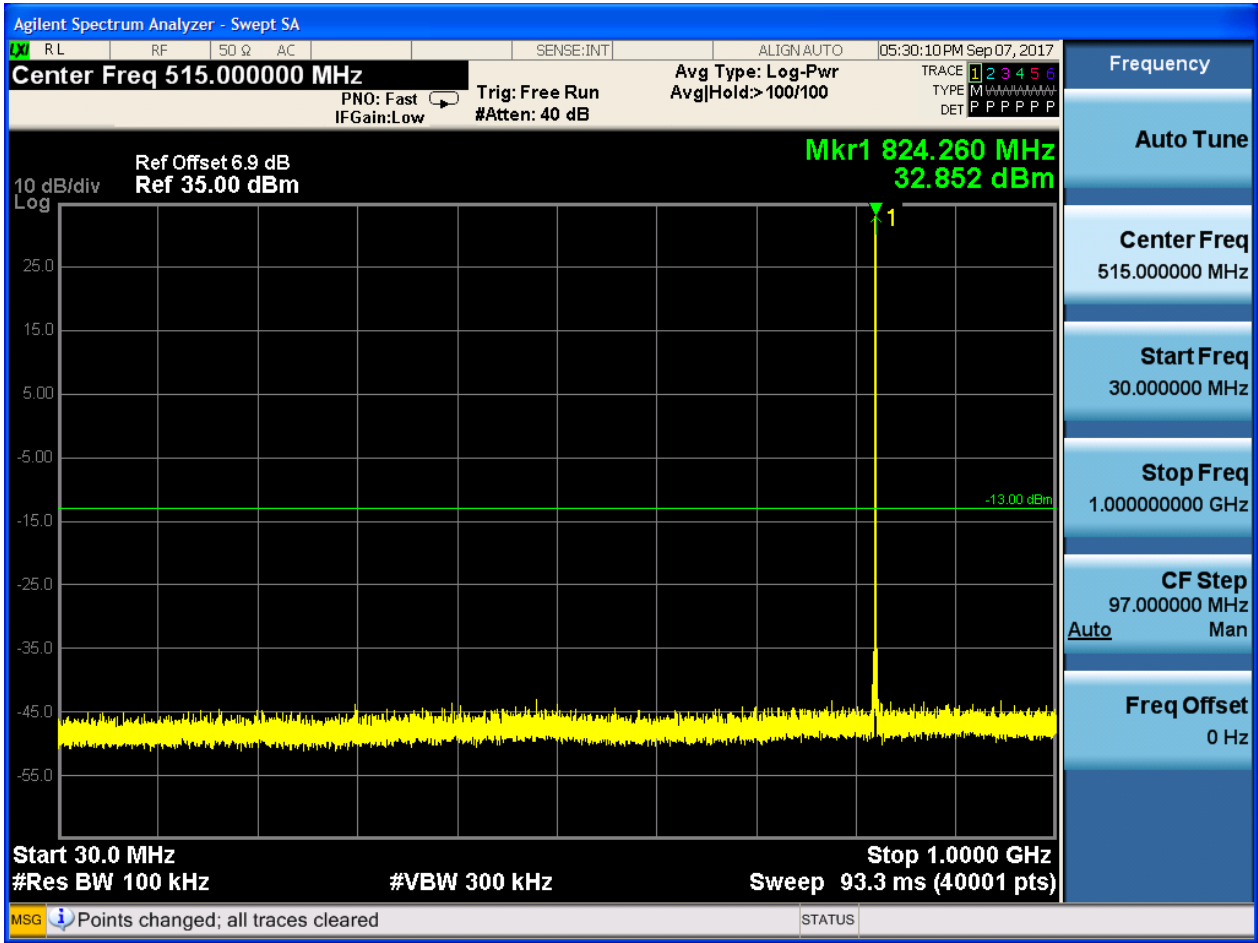
6.1.1 Test Band = GSM850

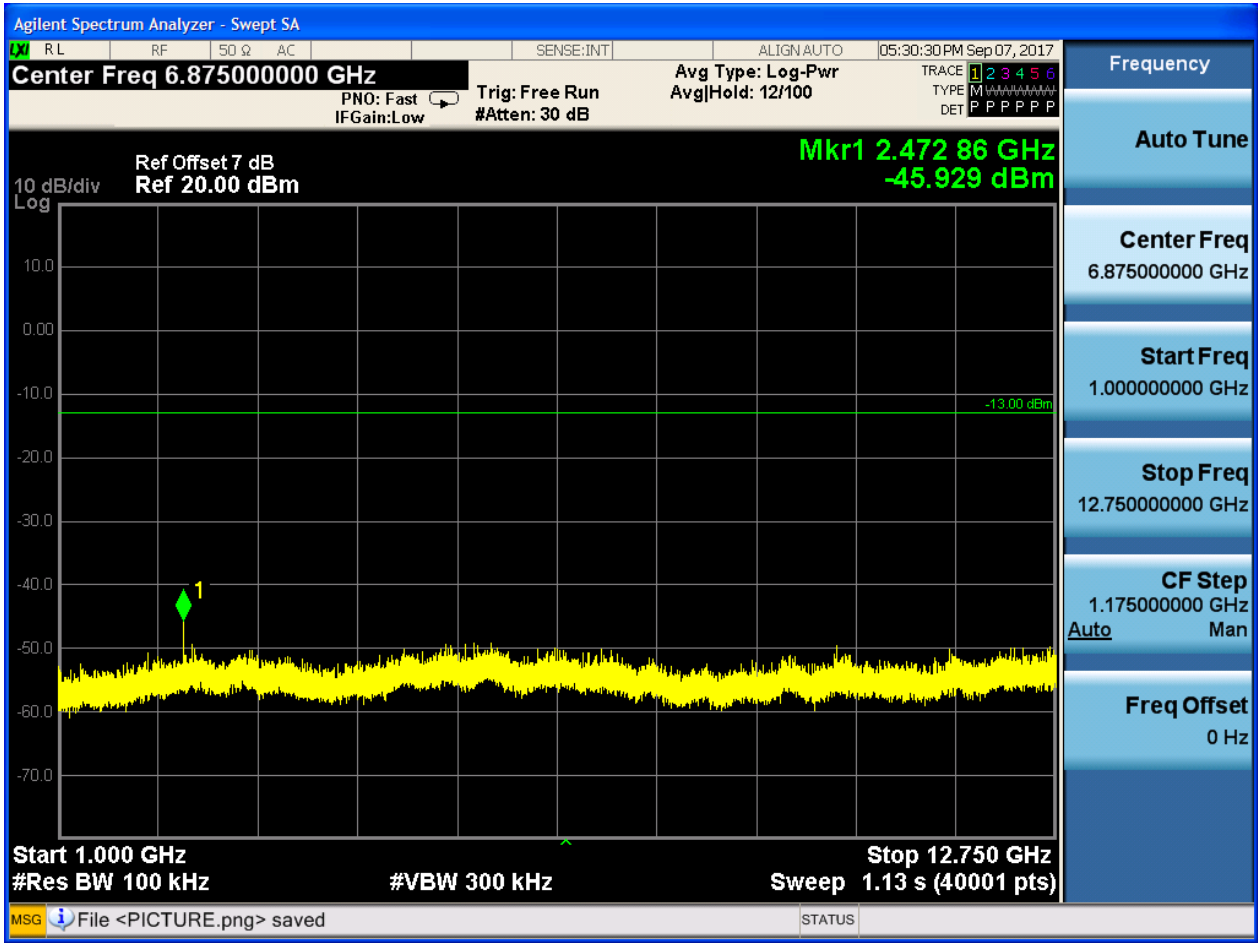
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH

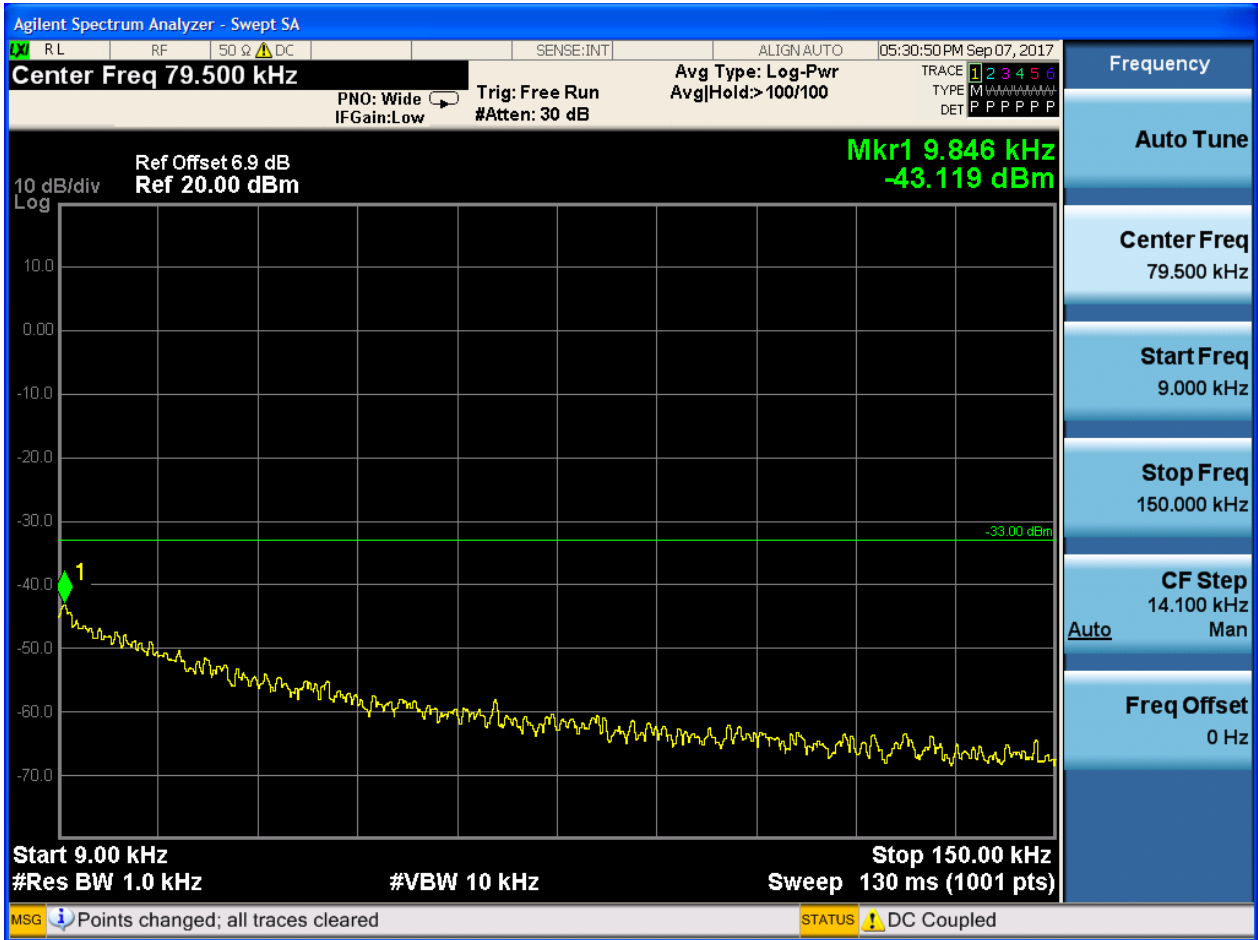


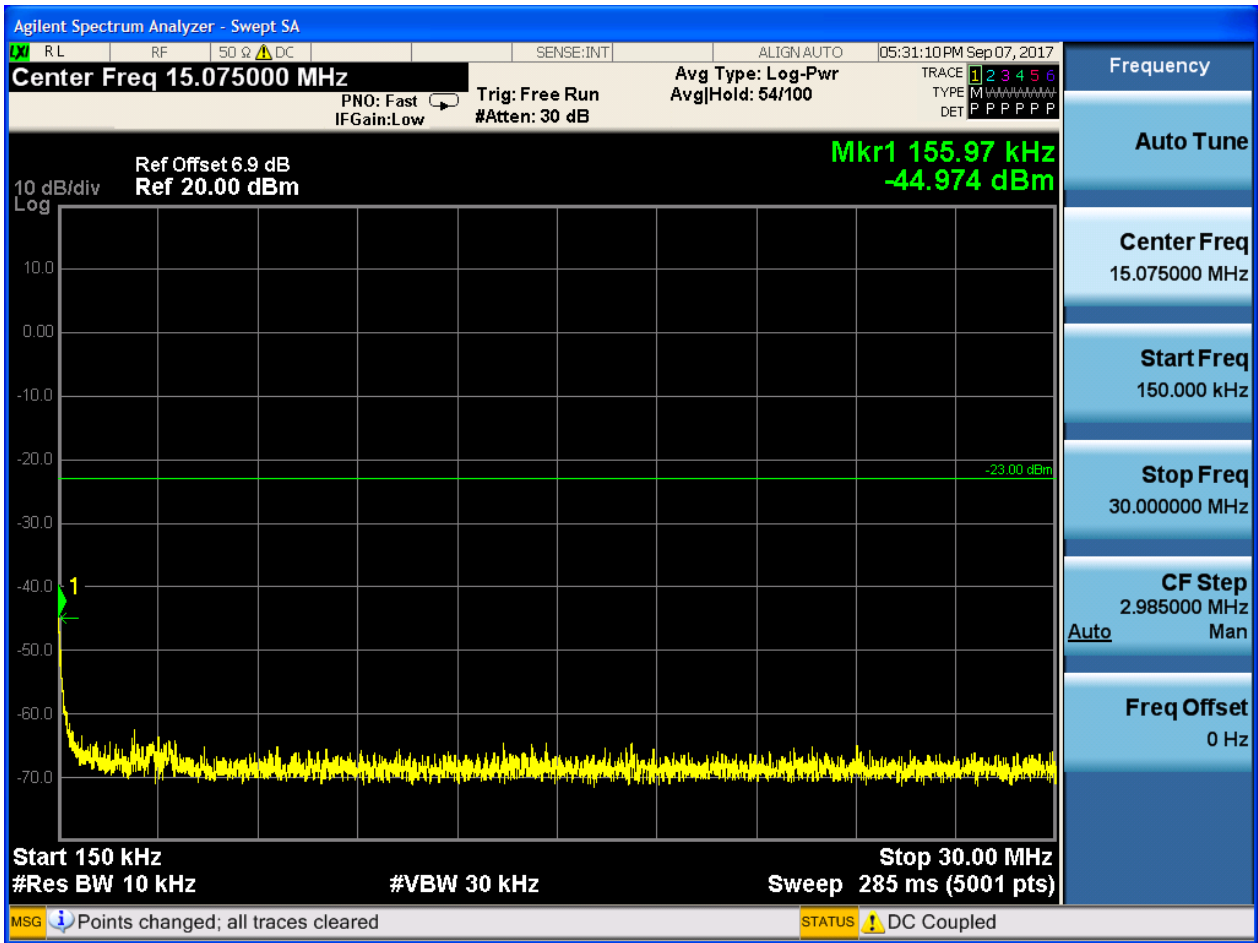


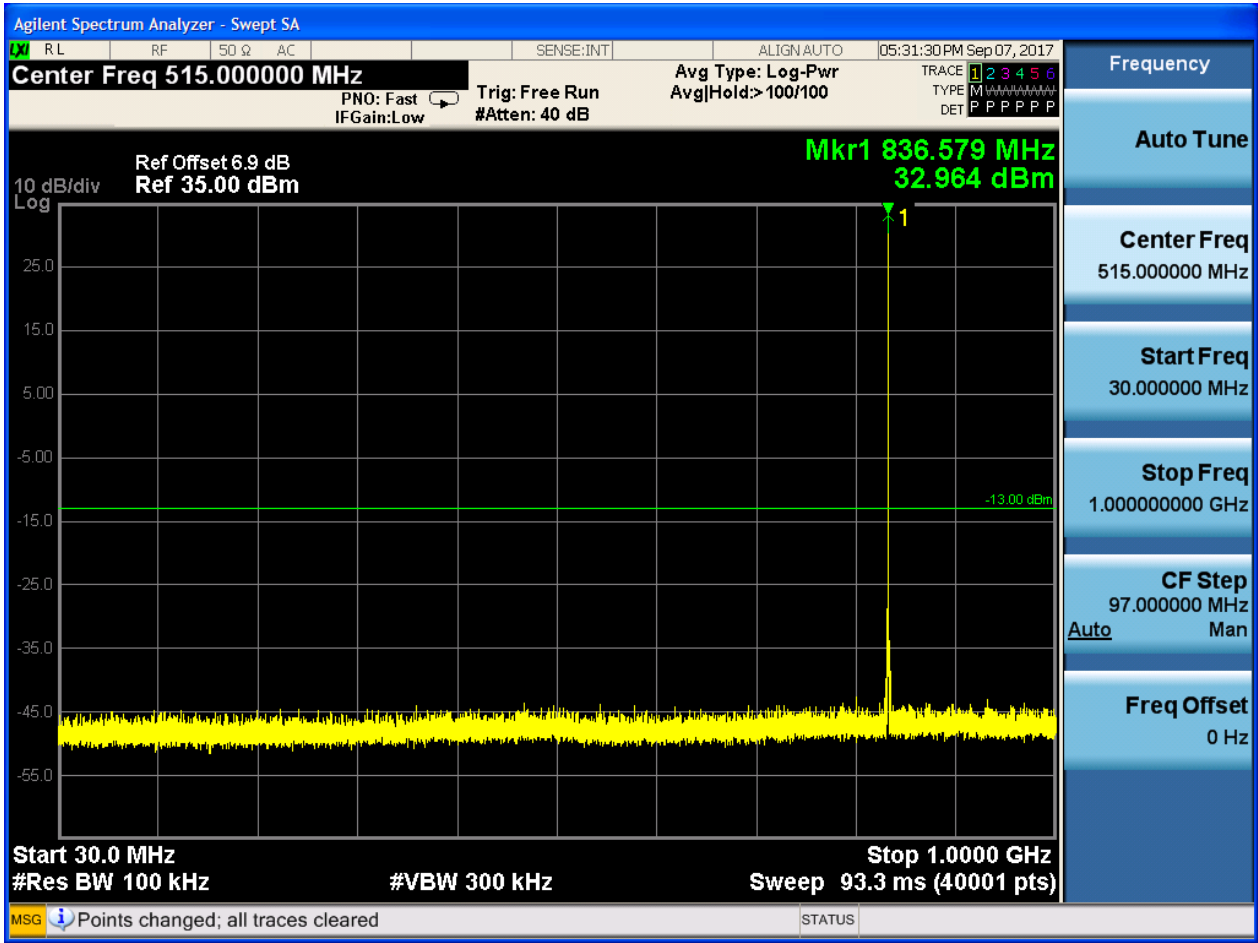


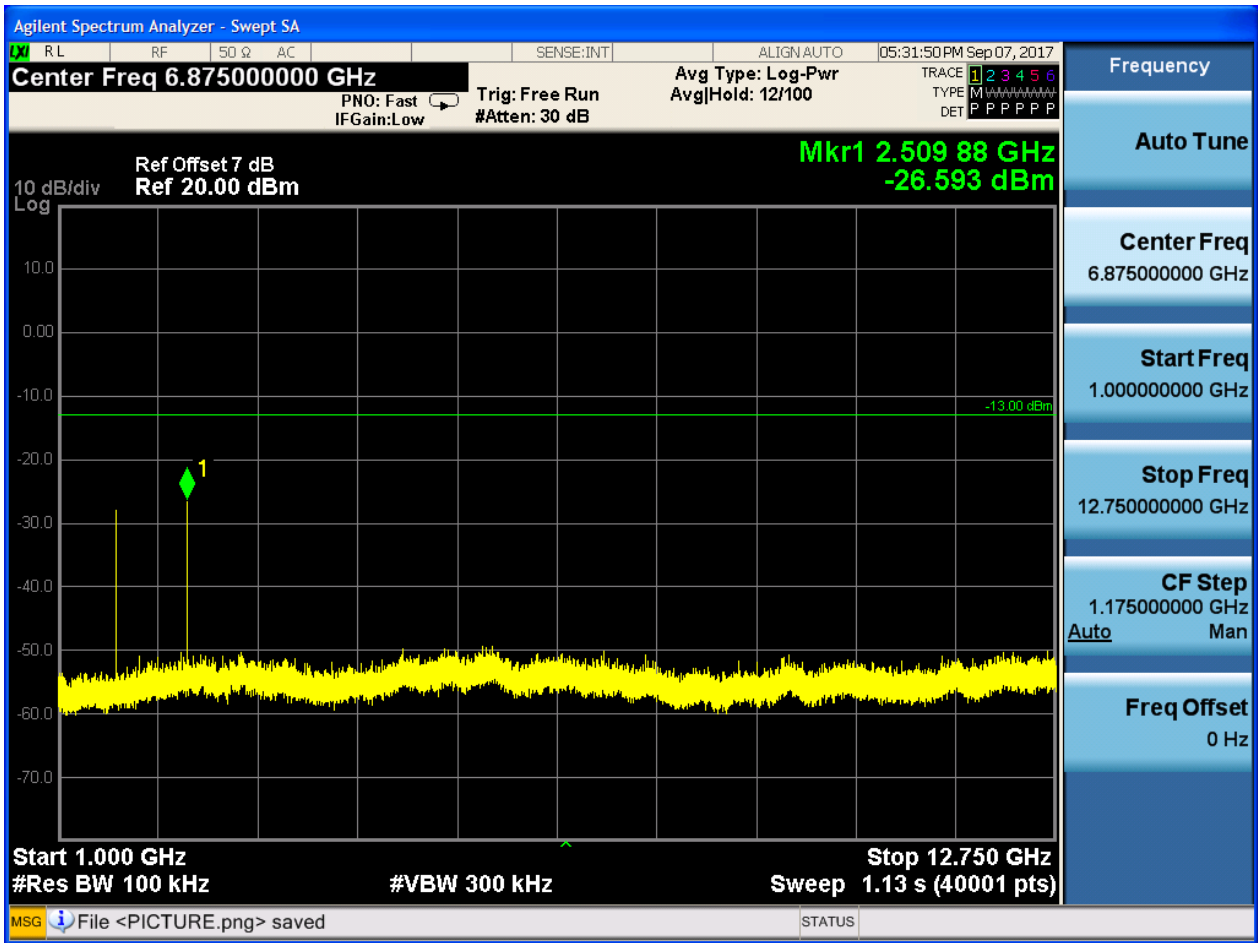


6.1.1.1.2 Test Channel = MCH

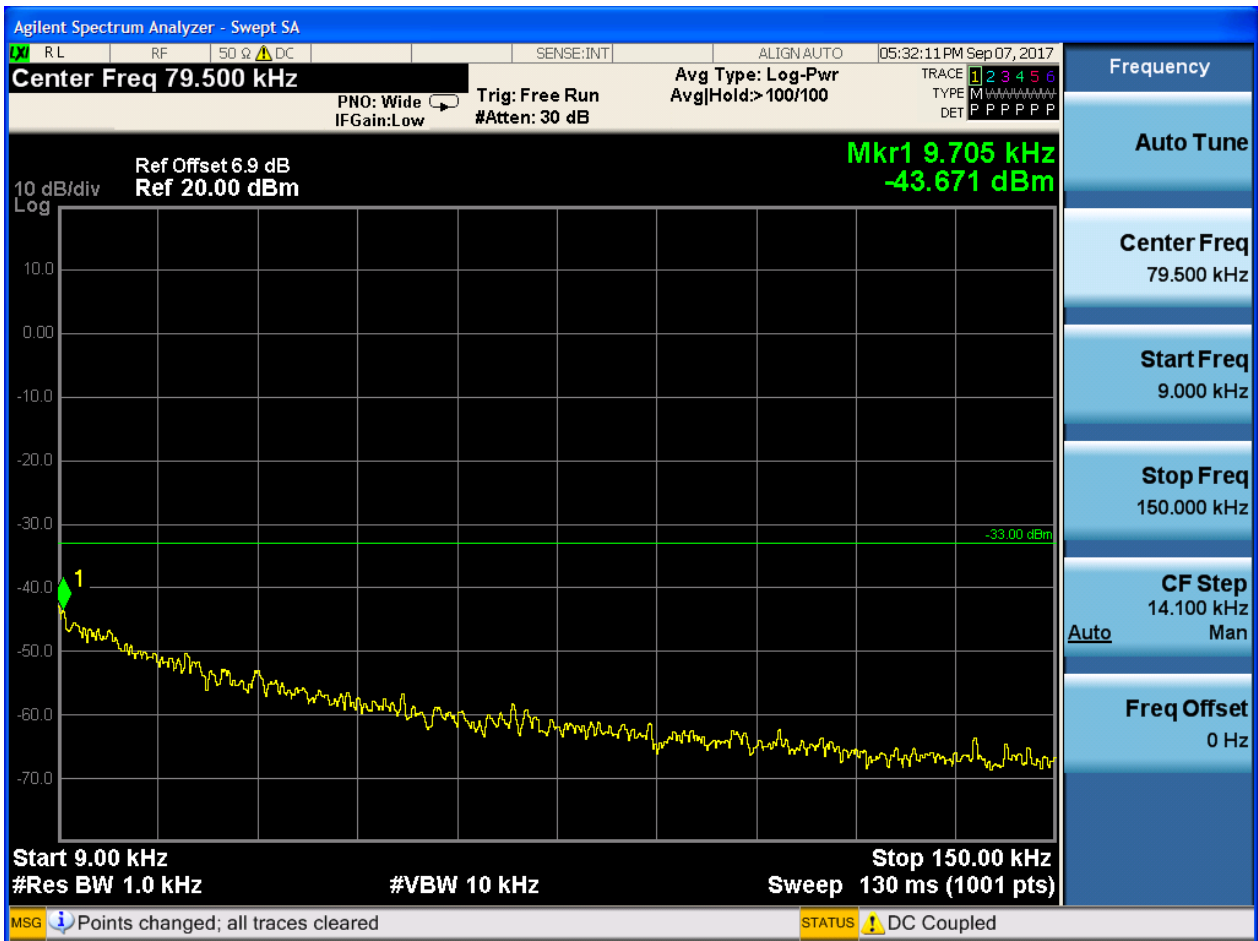


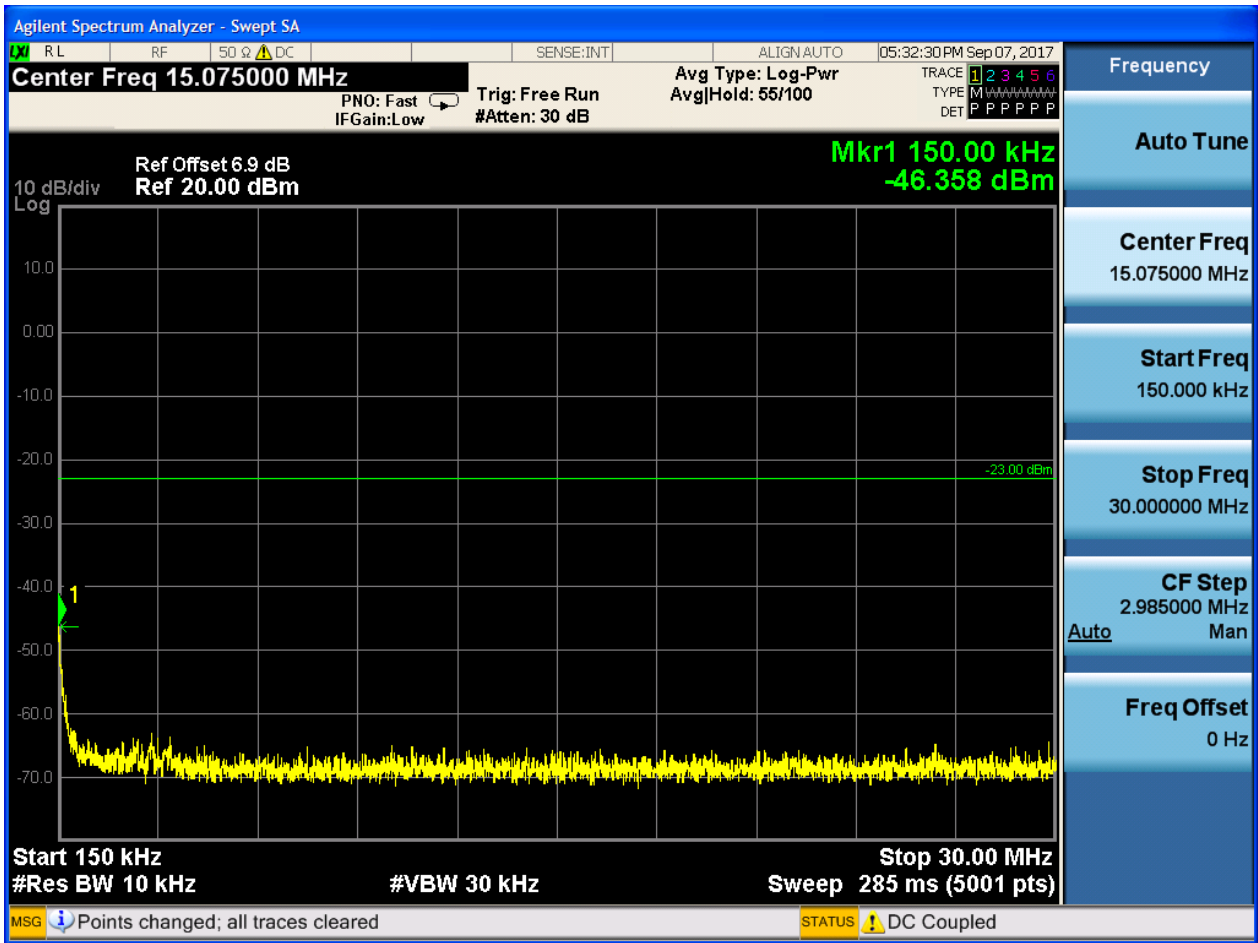


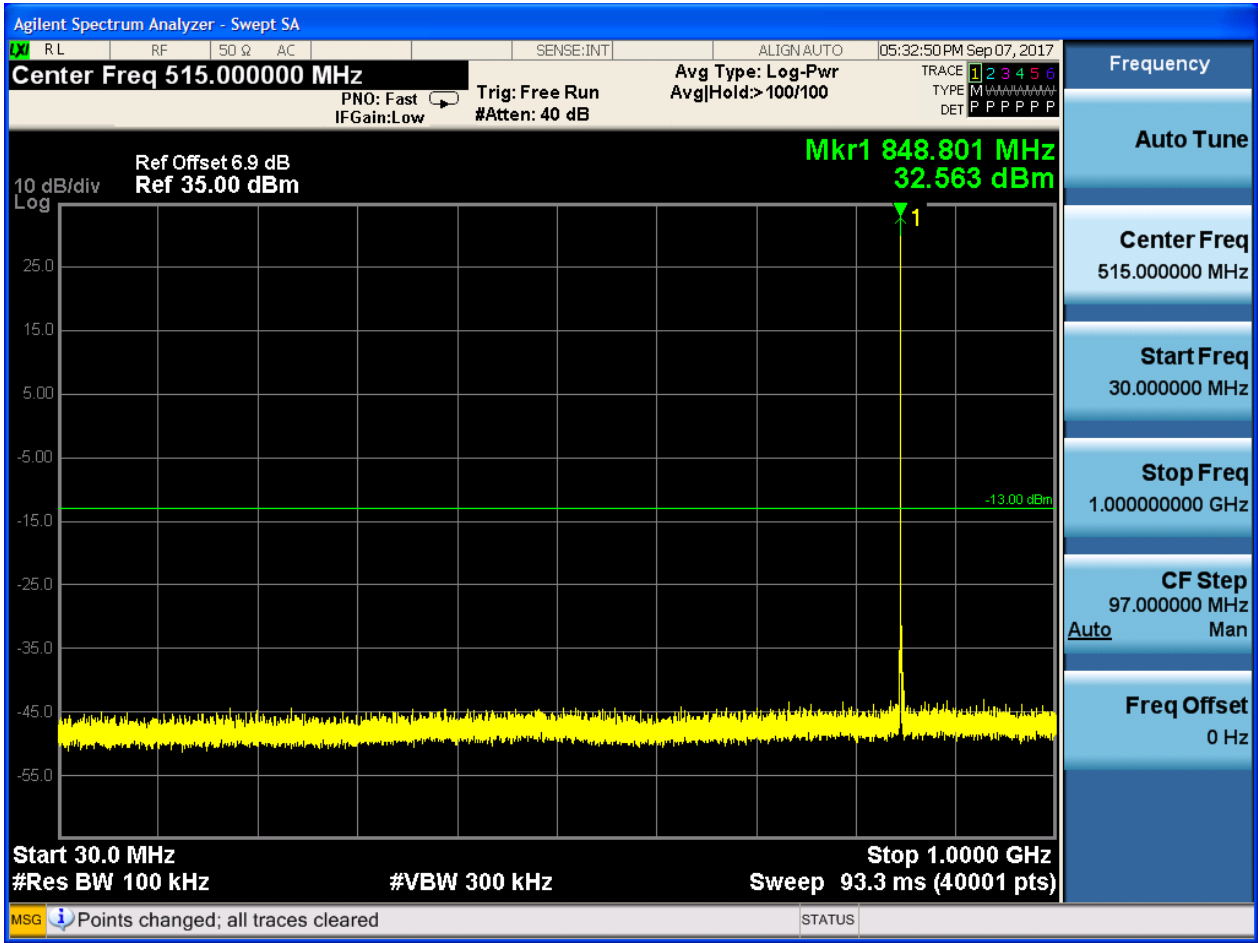


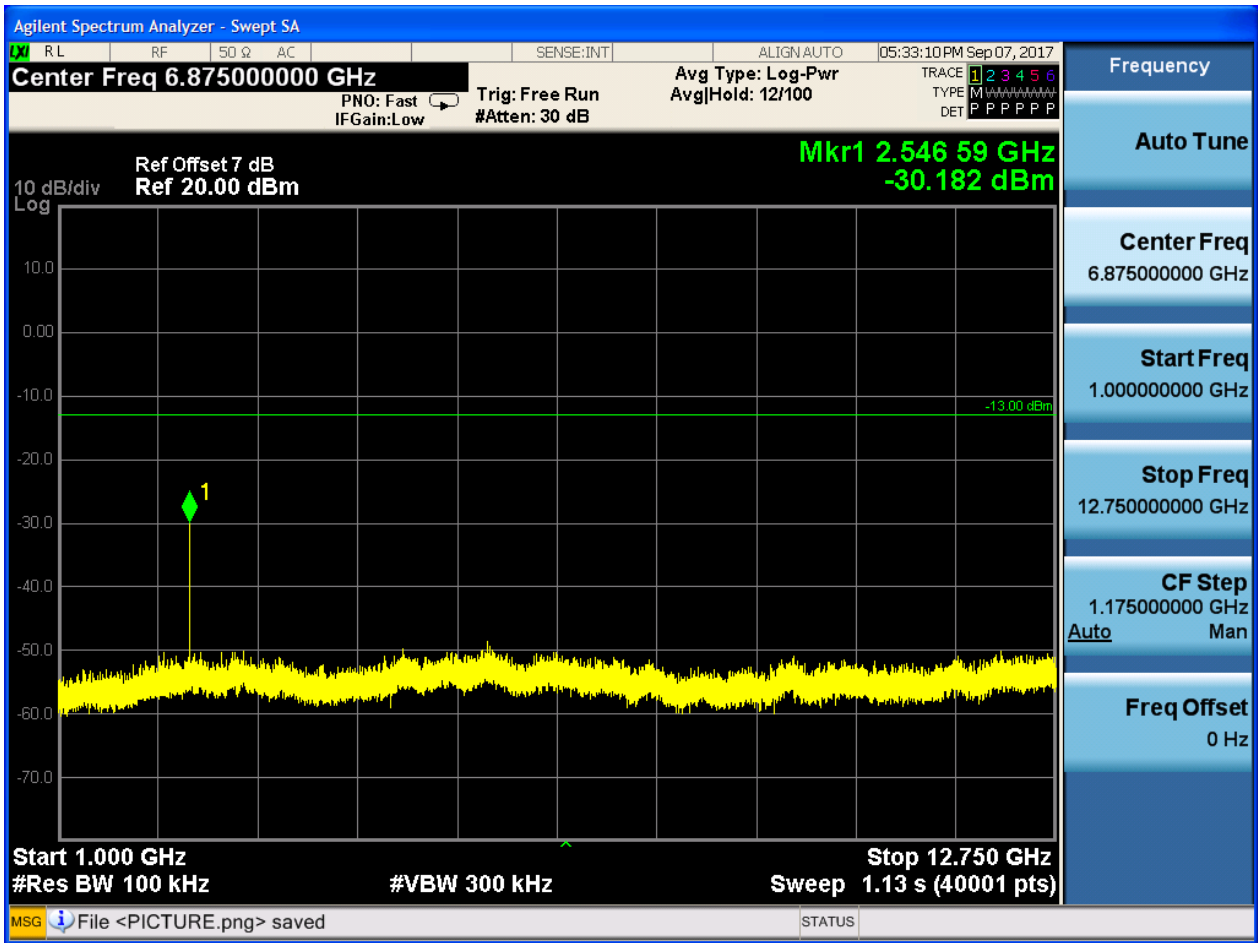


6.1.1.1.3 Test Channel = HCH



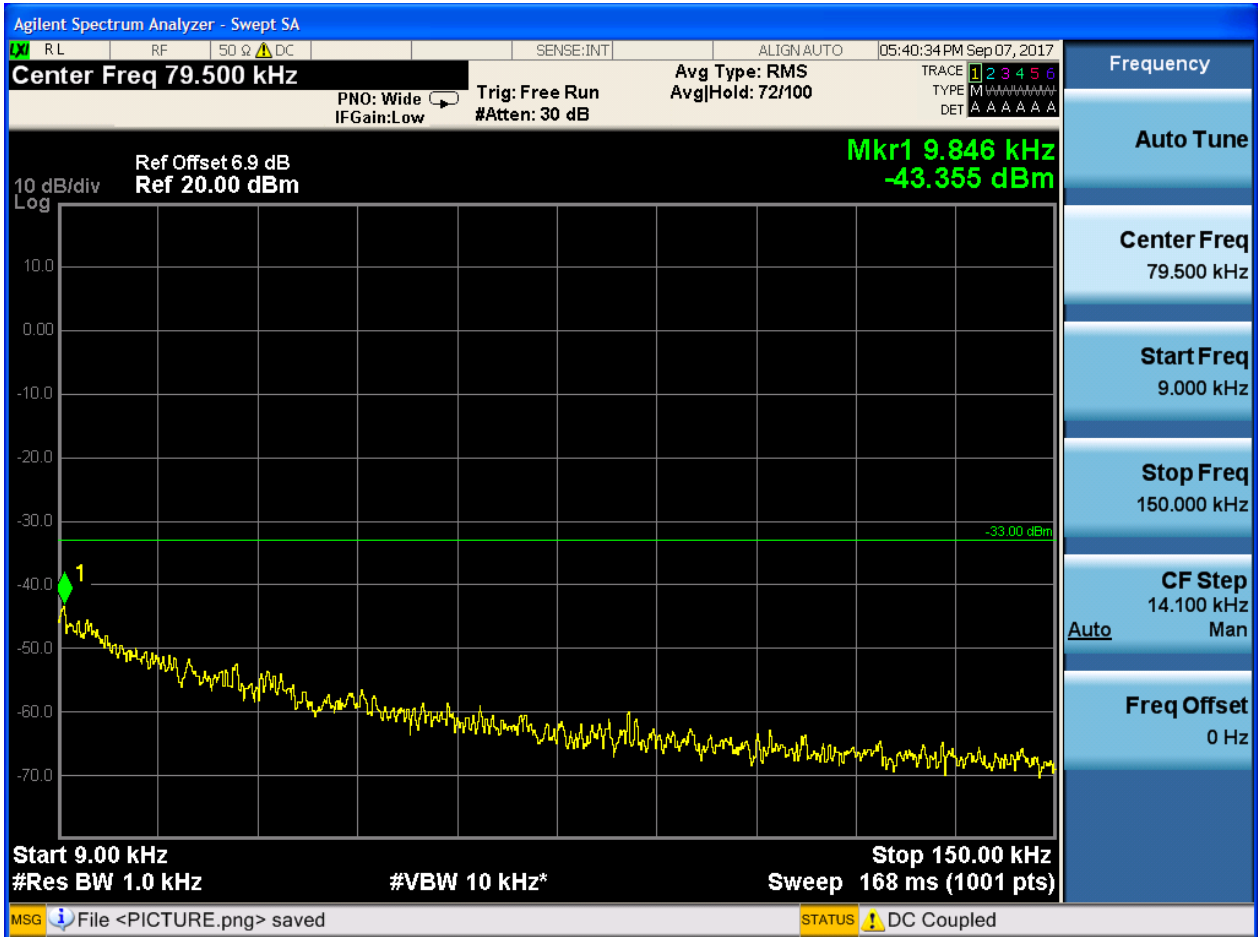


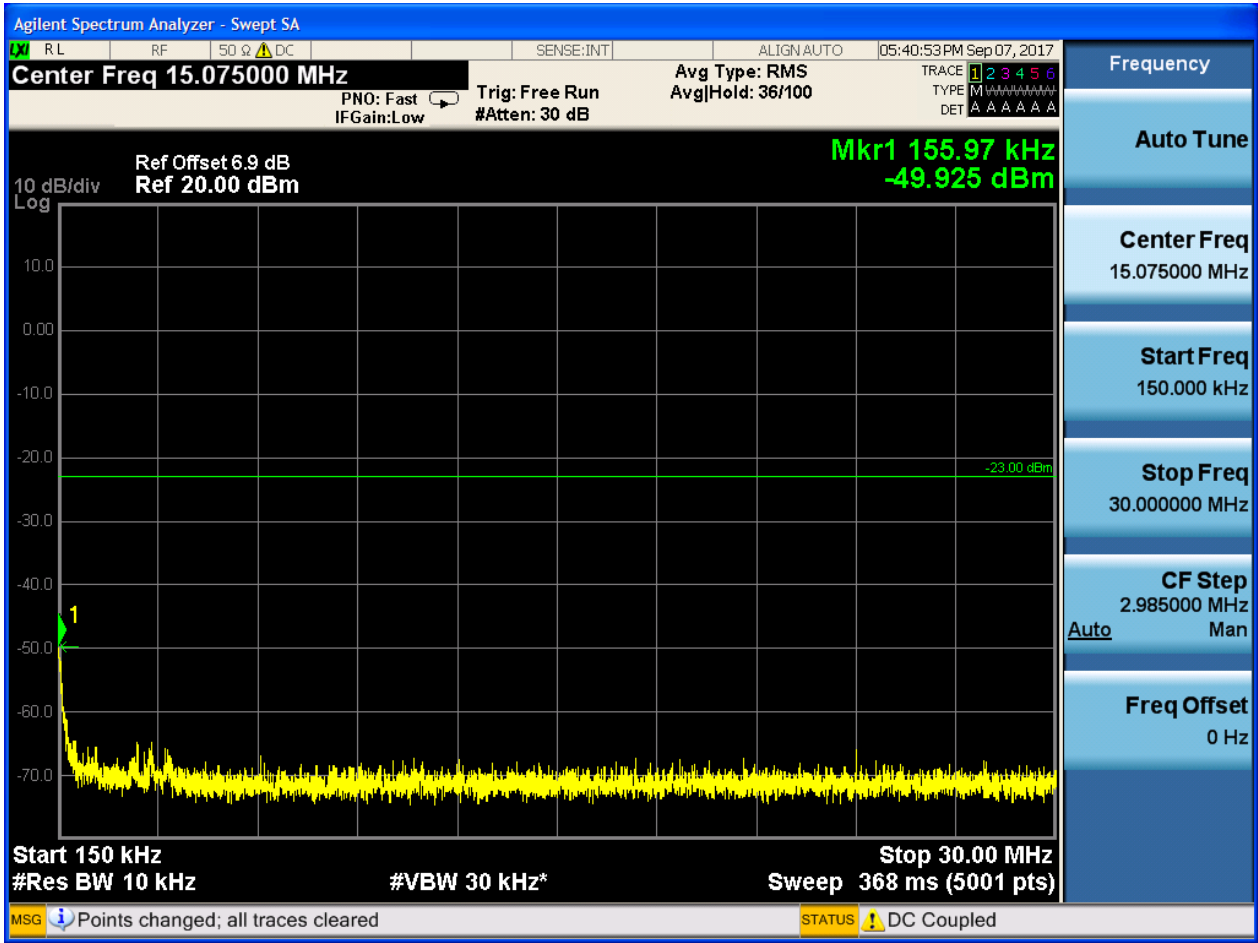


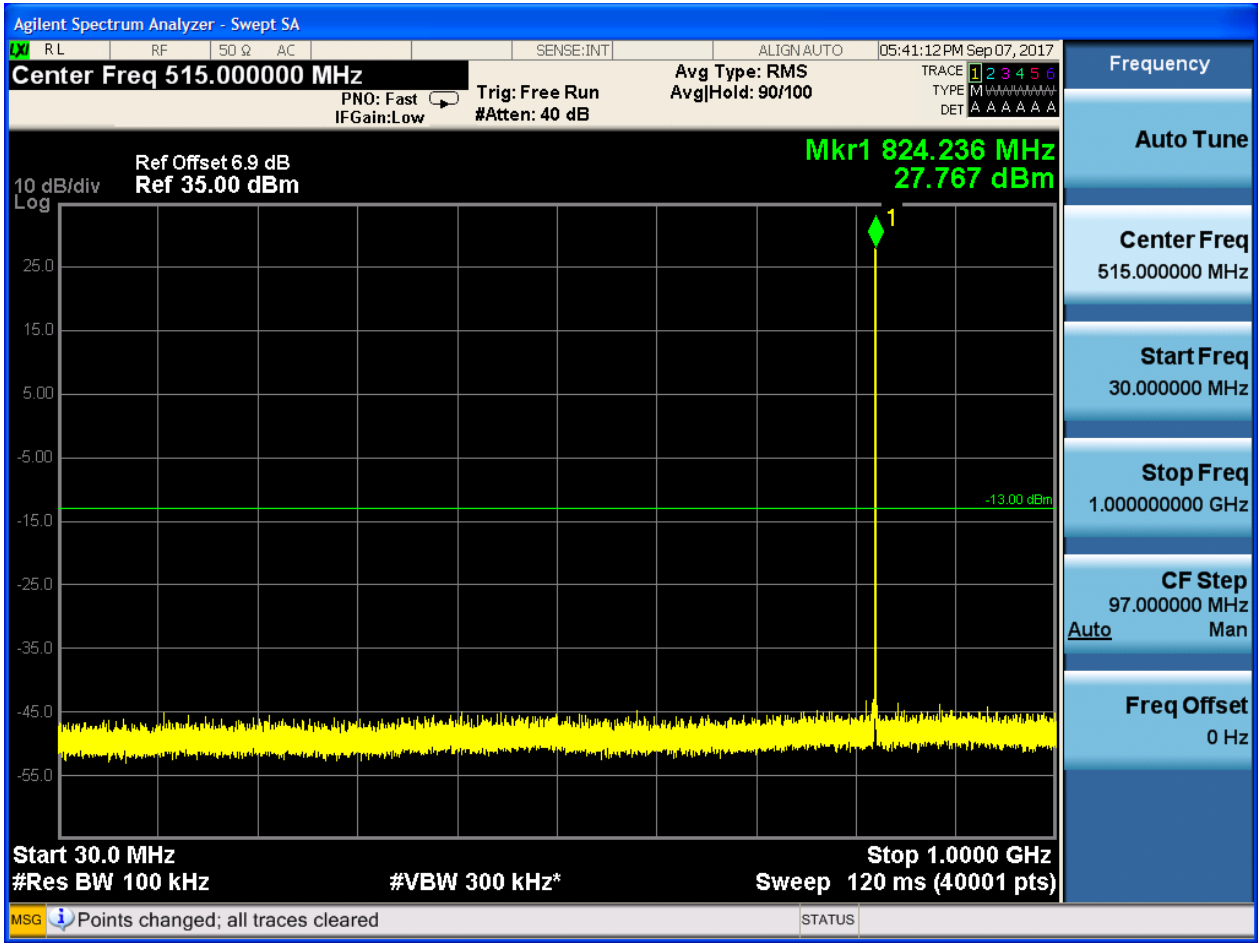


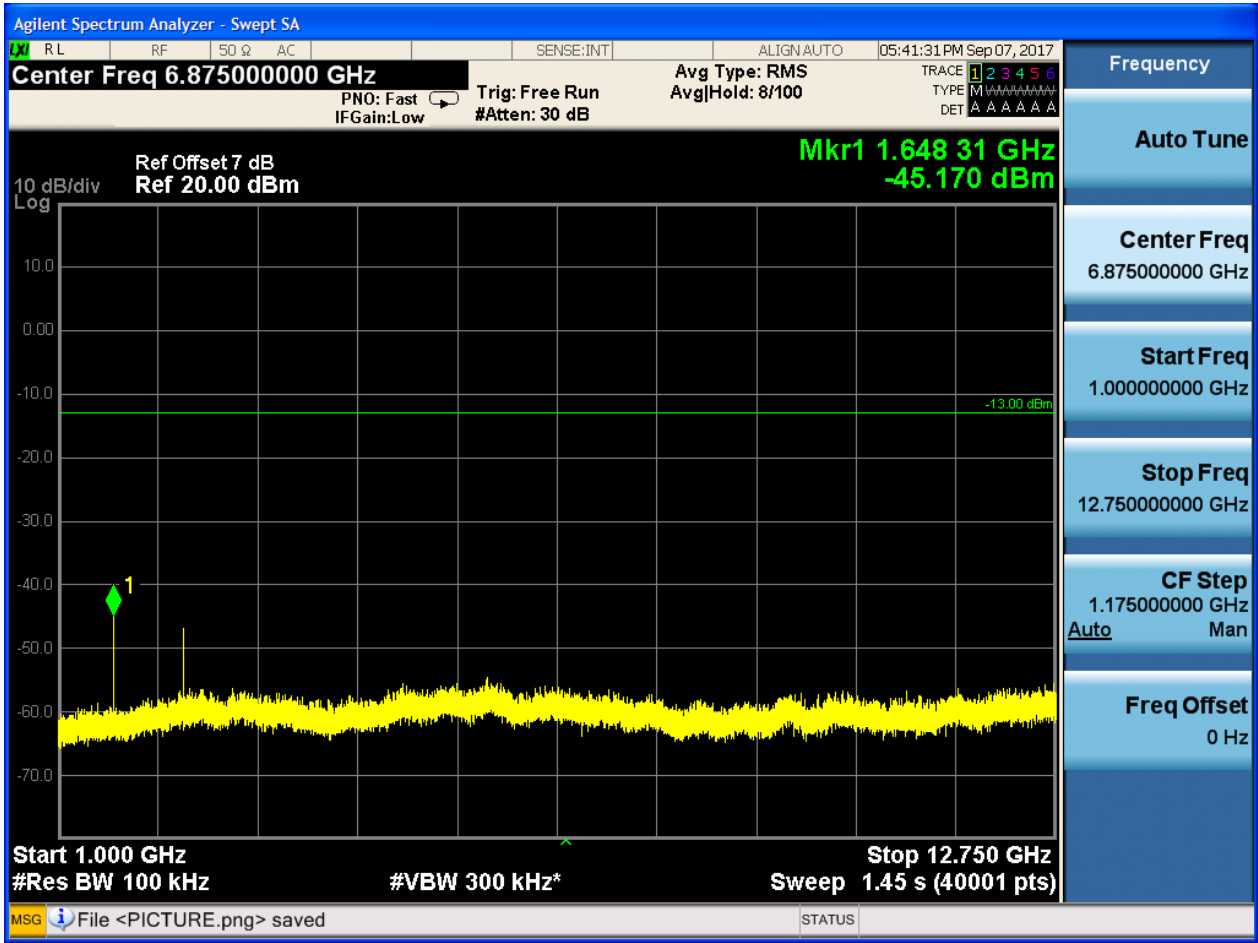
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH

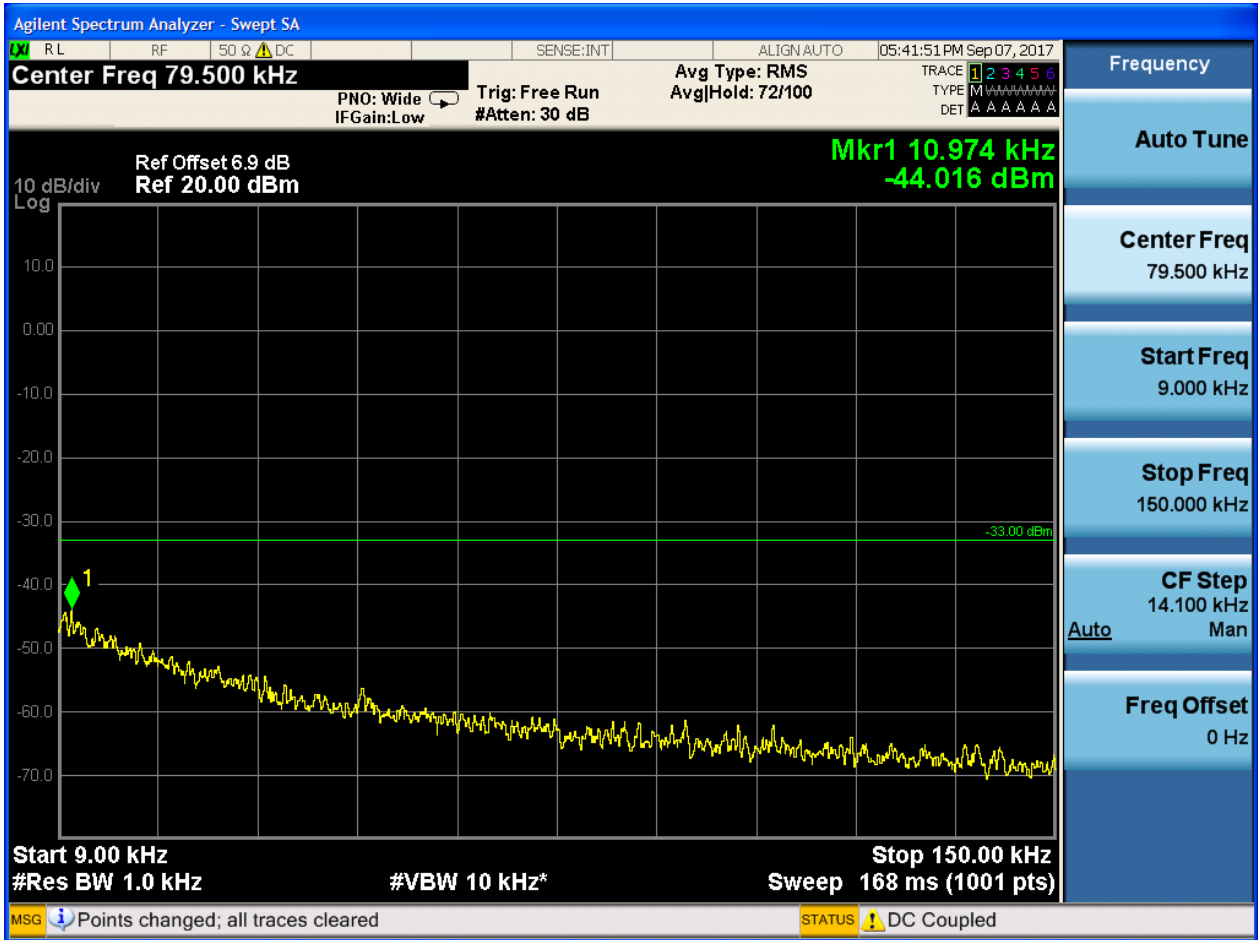


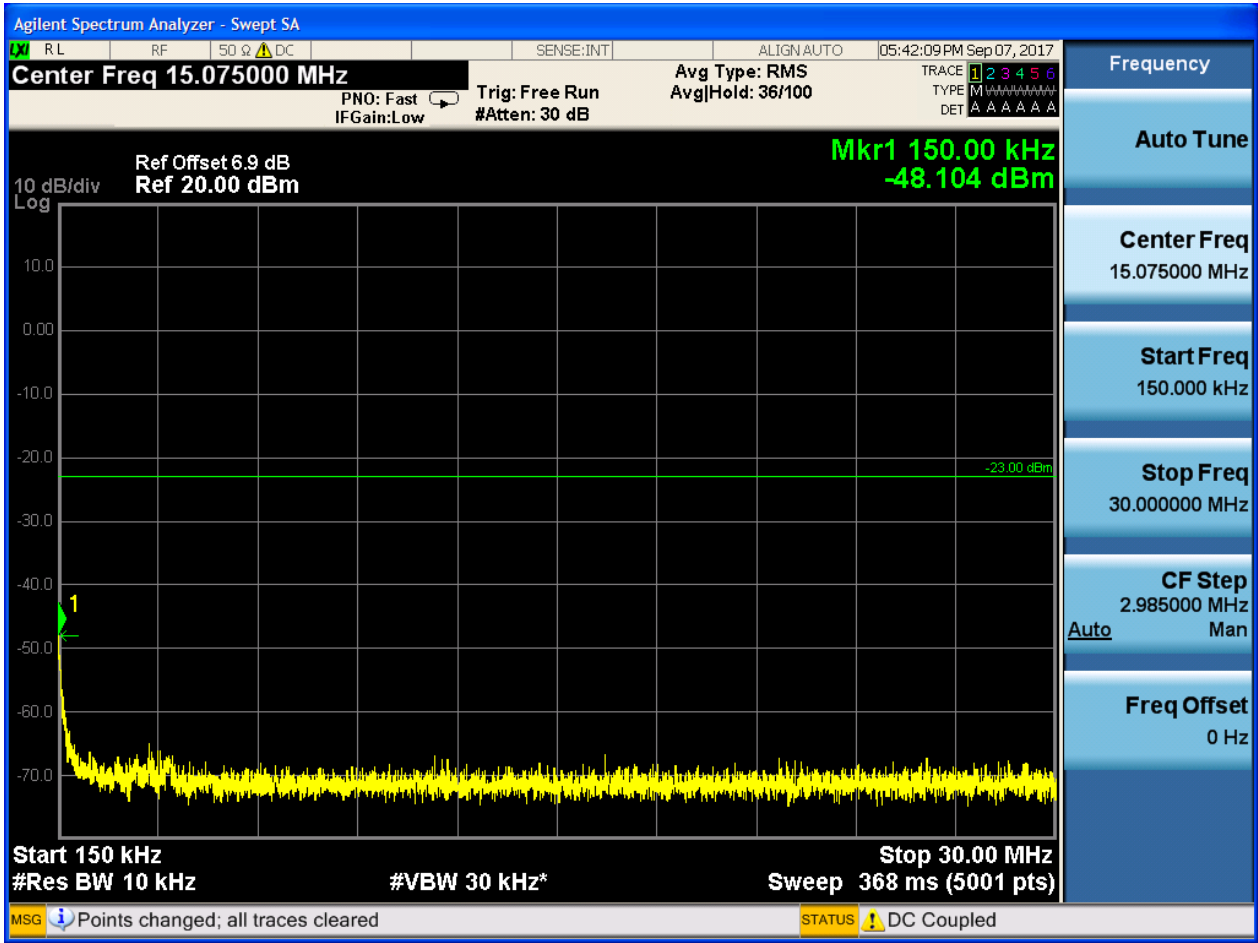


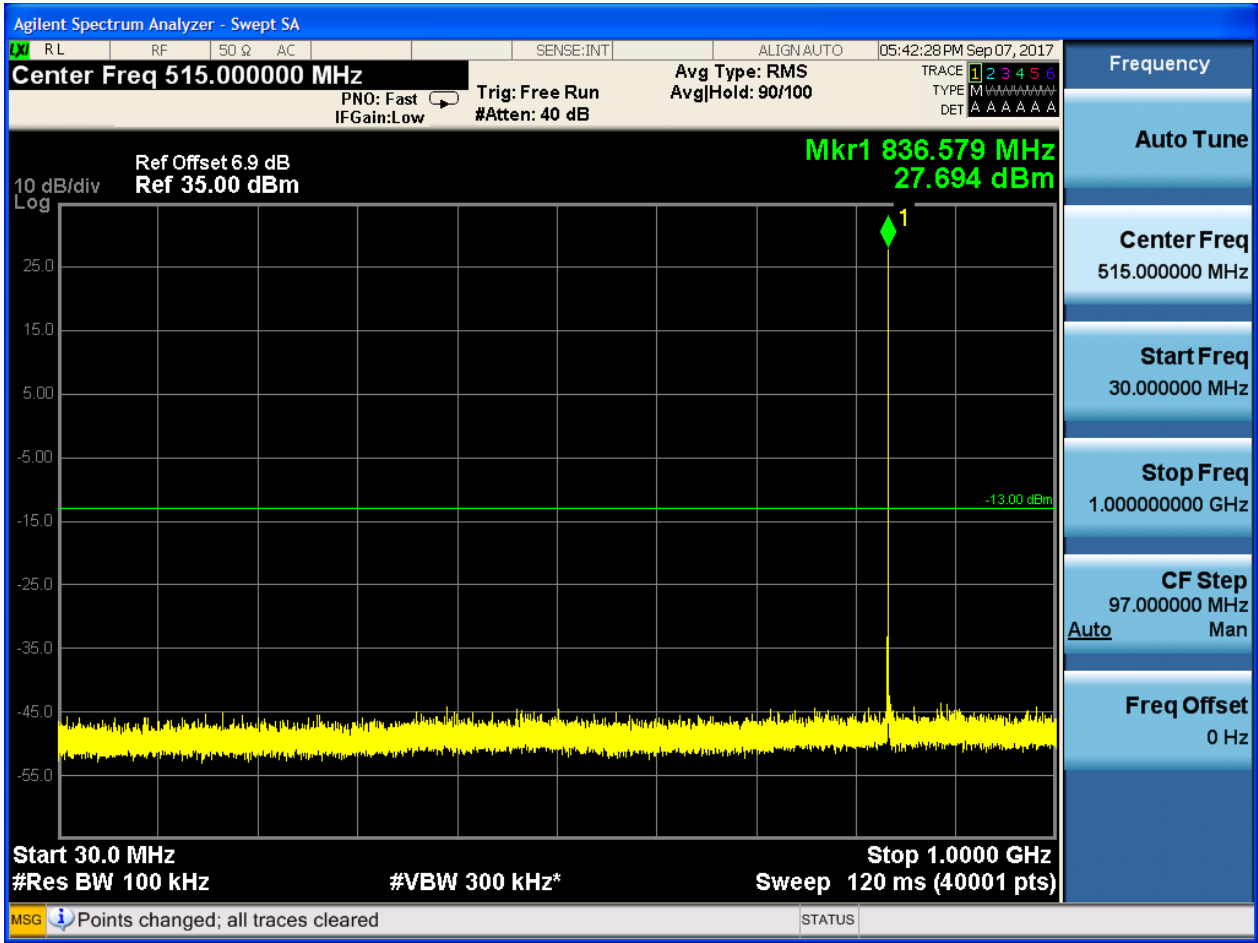


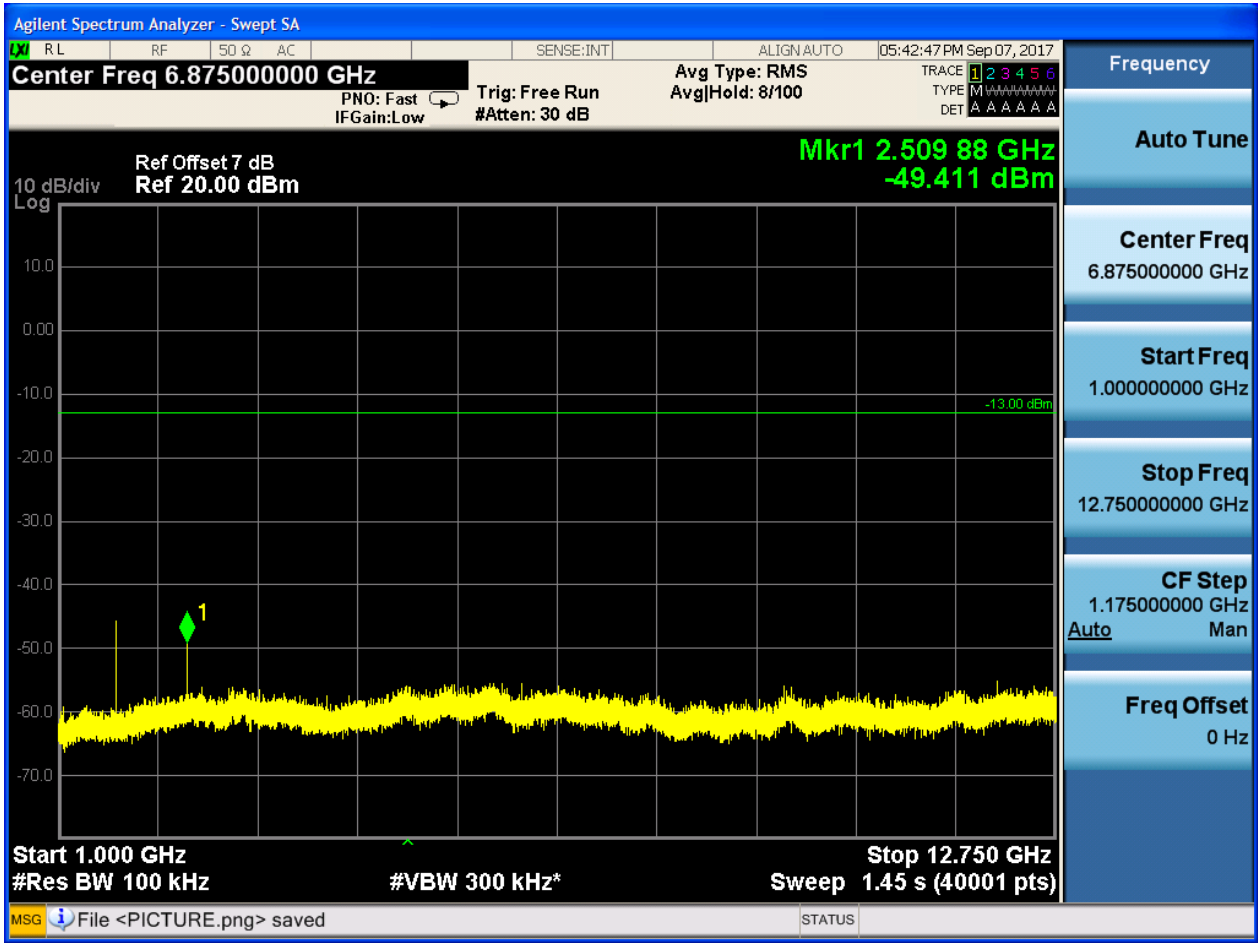


6.1.1.2.2 Test Channel = MCH

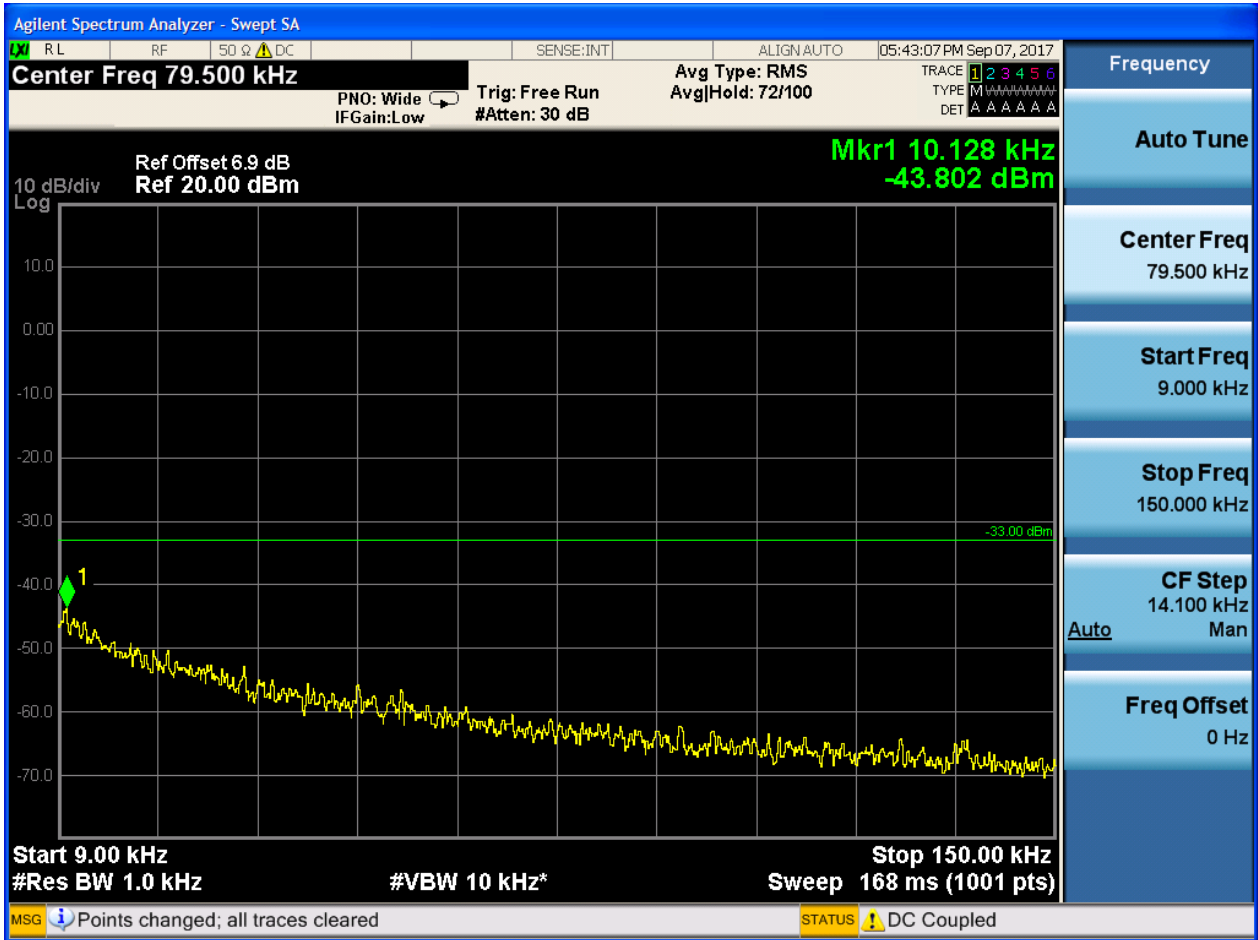


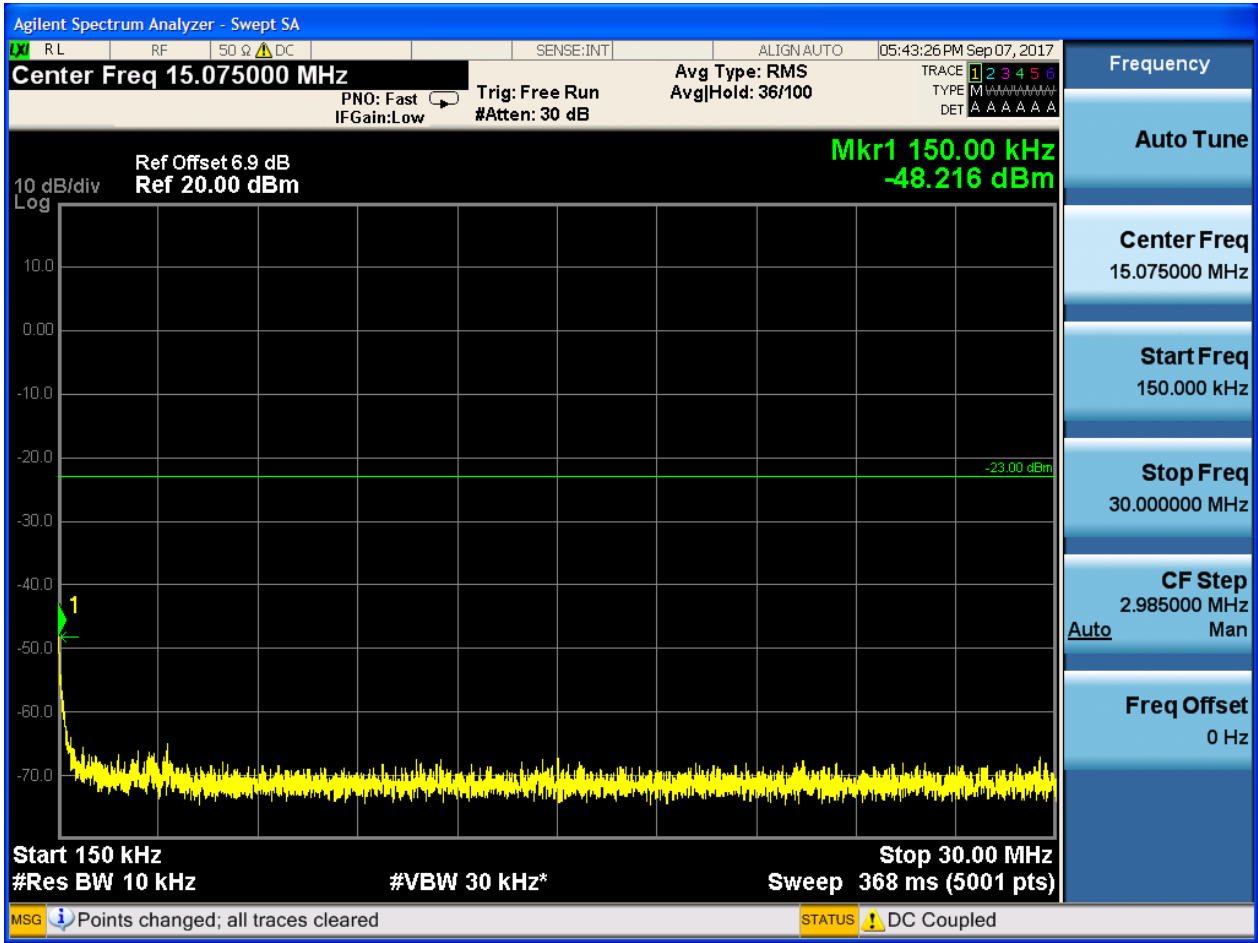


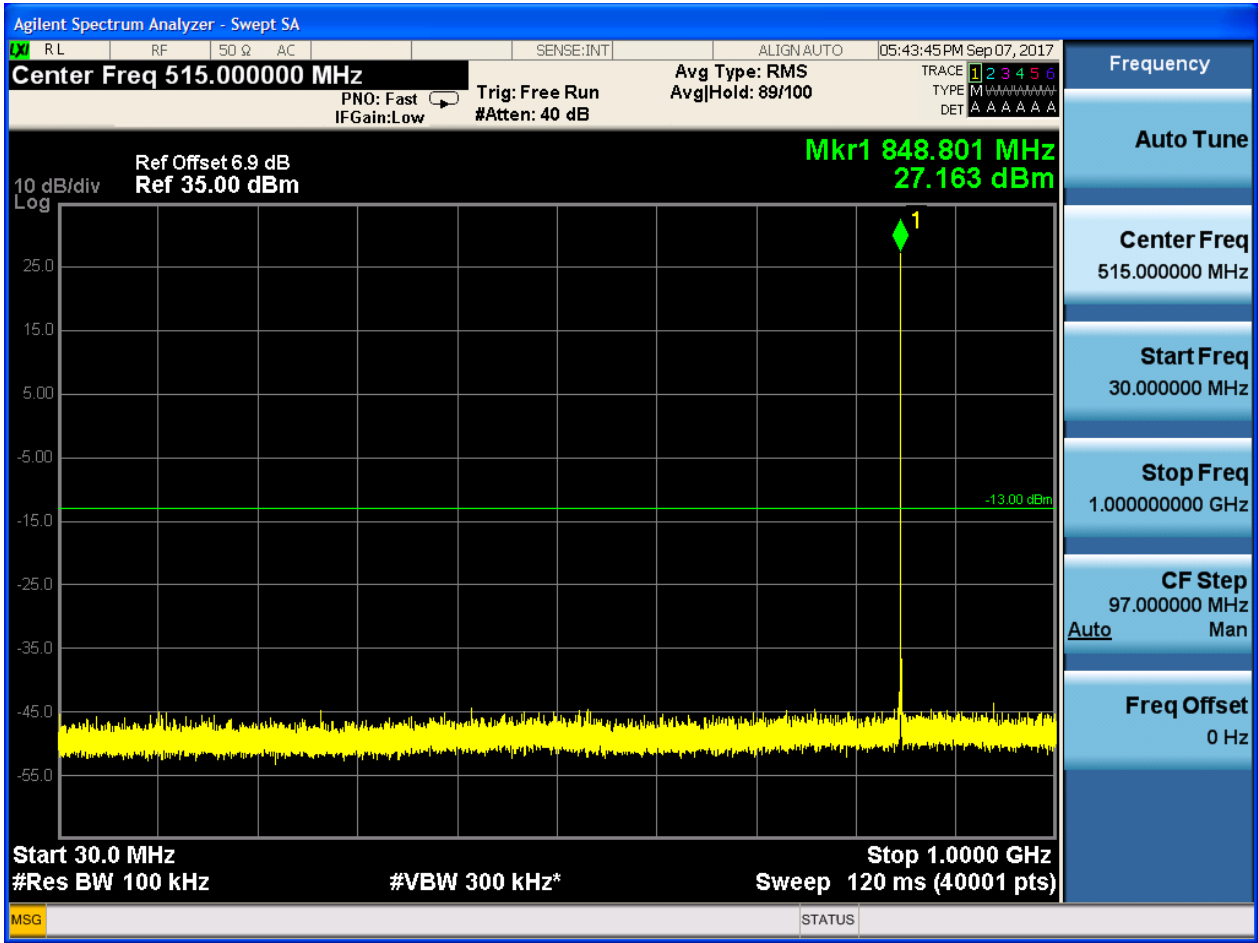


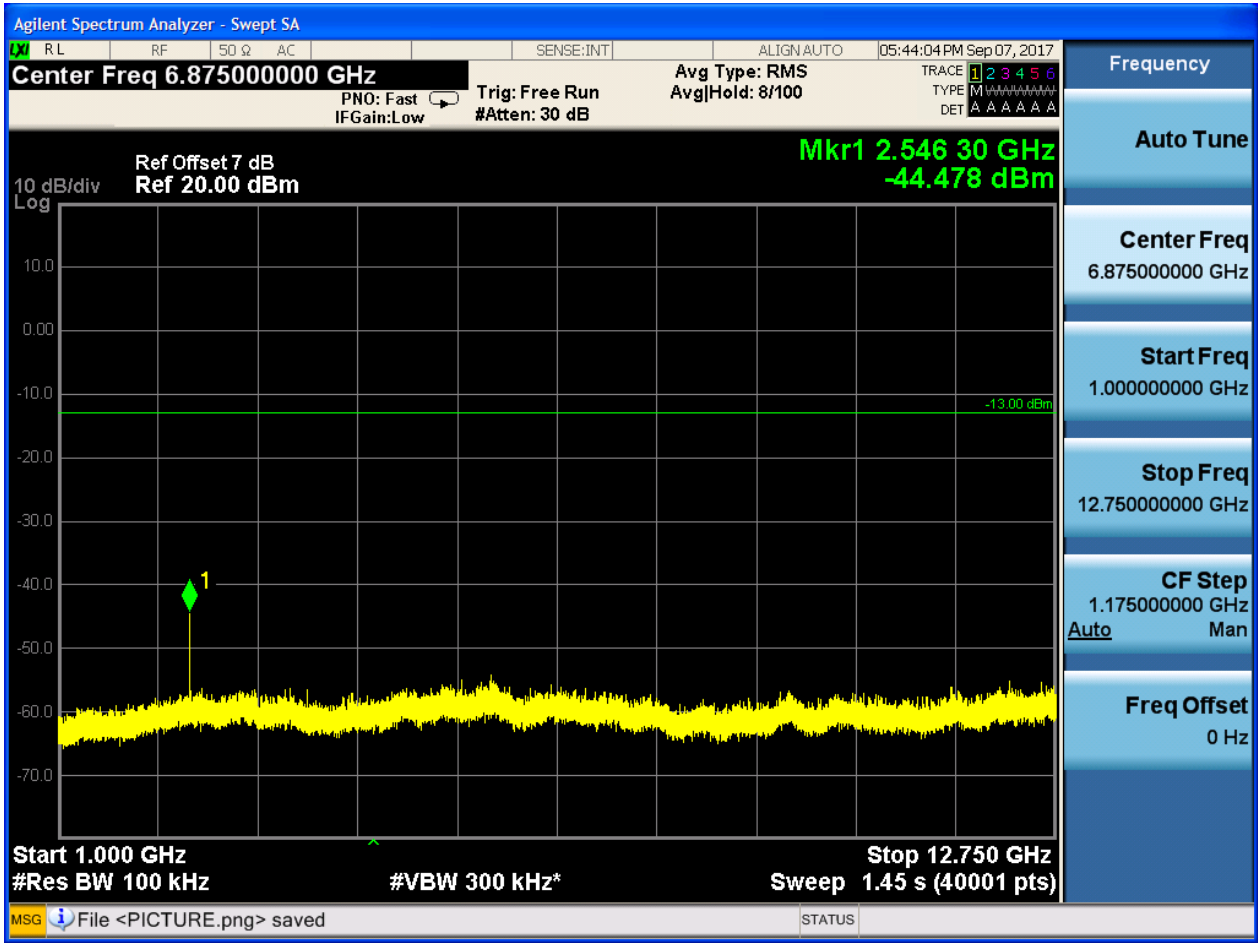


6.1.1.2.3 Test Channel = HCH









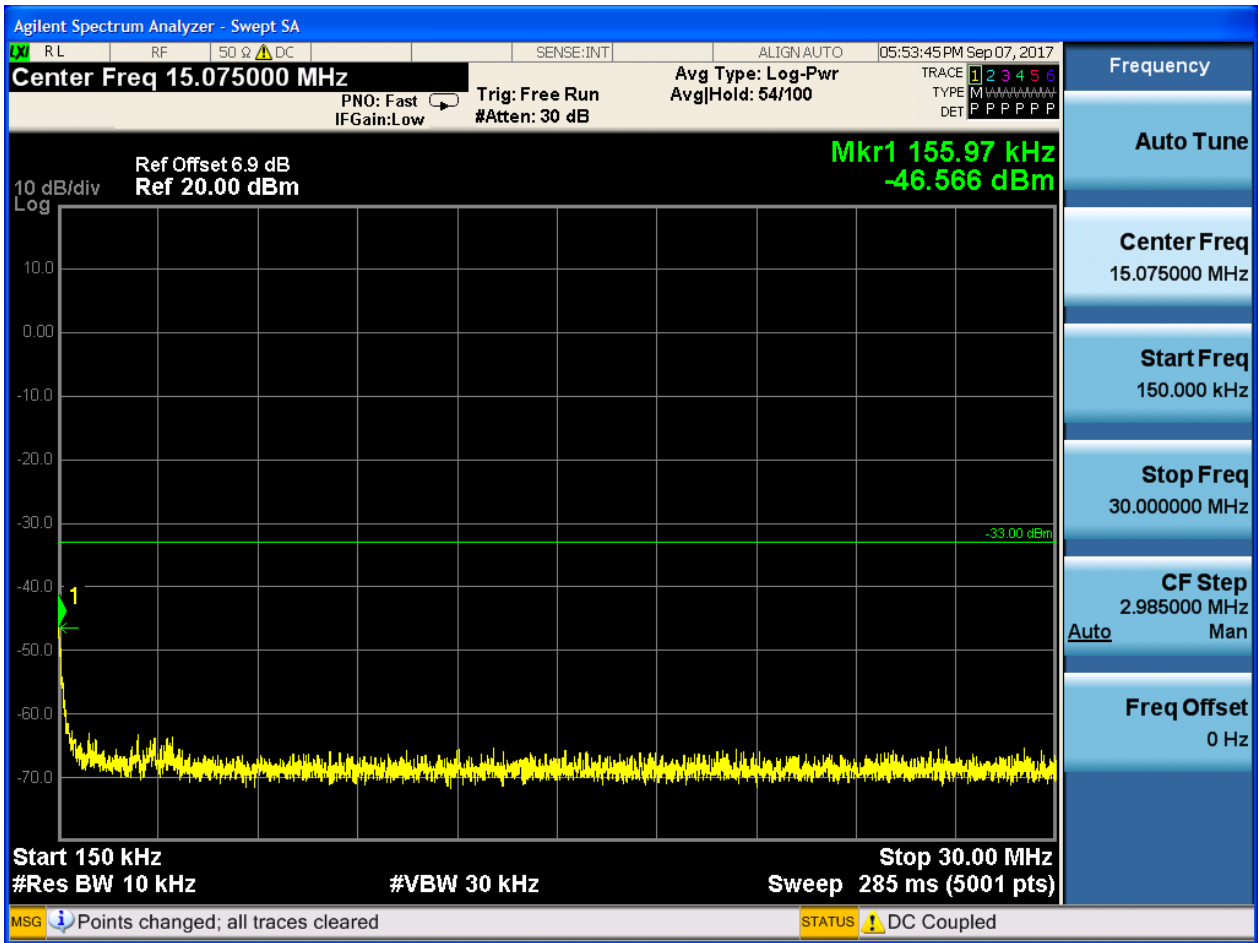


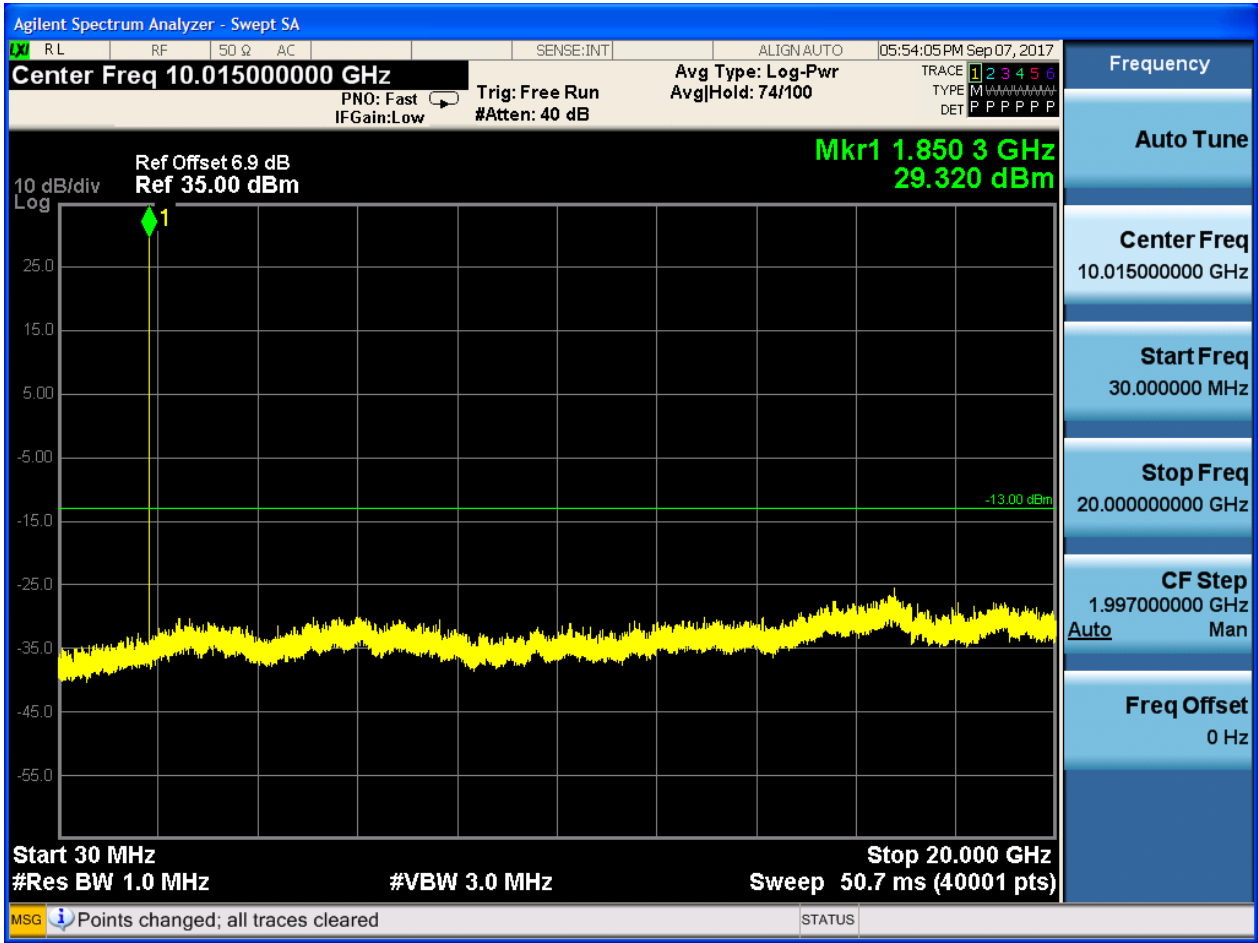
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

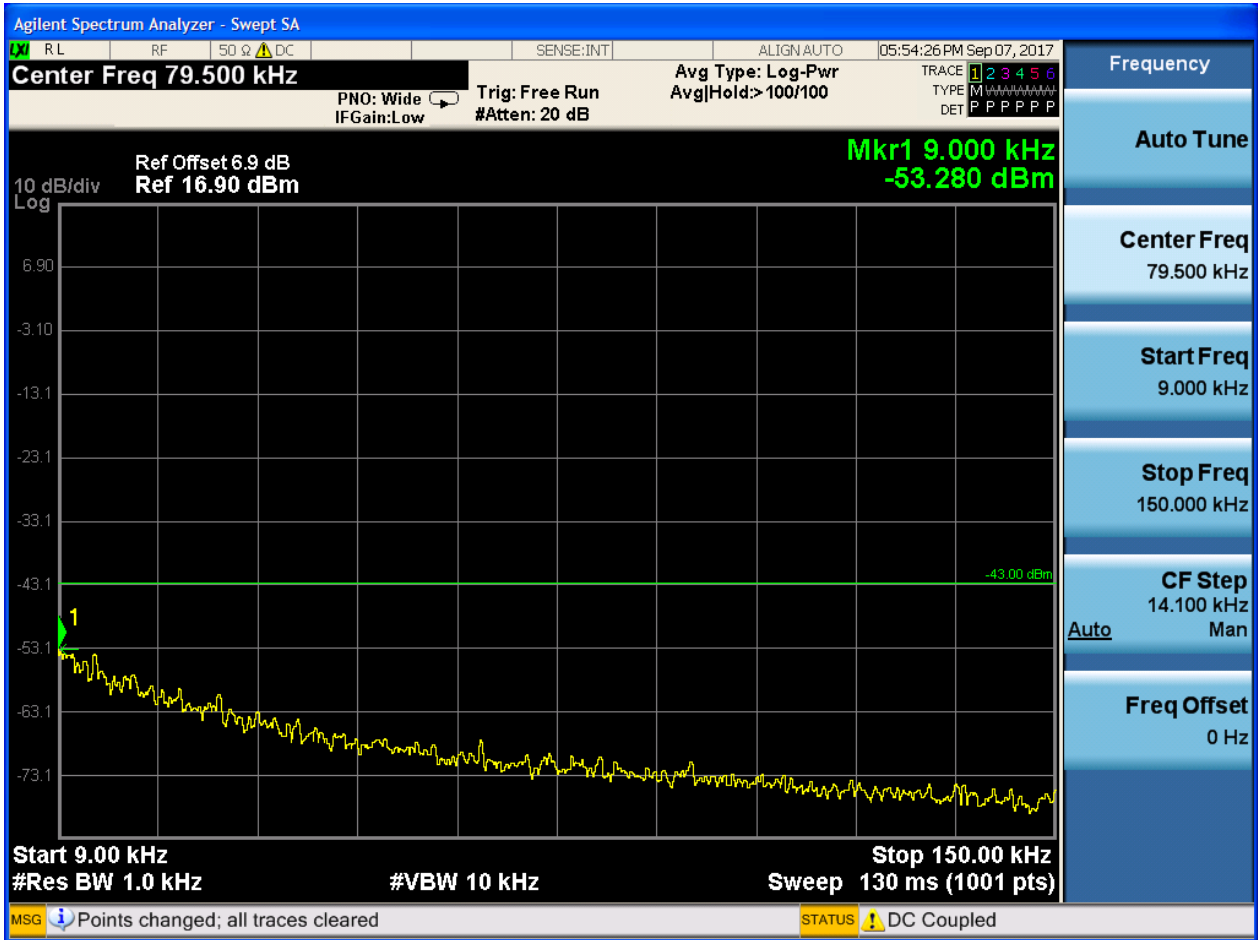
6.1.2.1.1 Test Channel = LCH

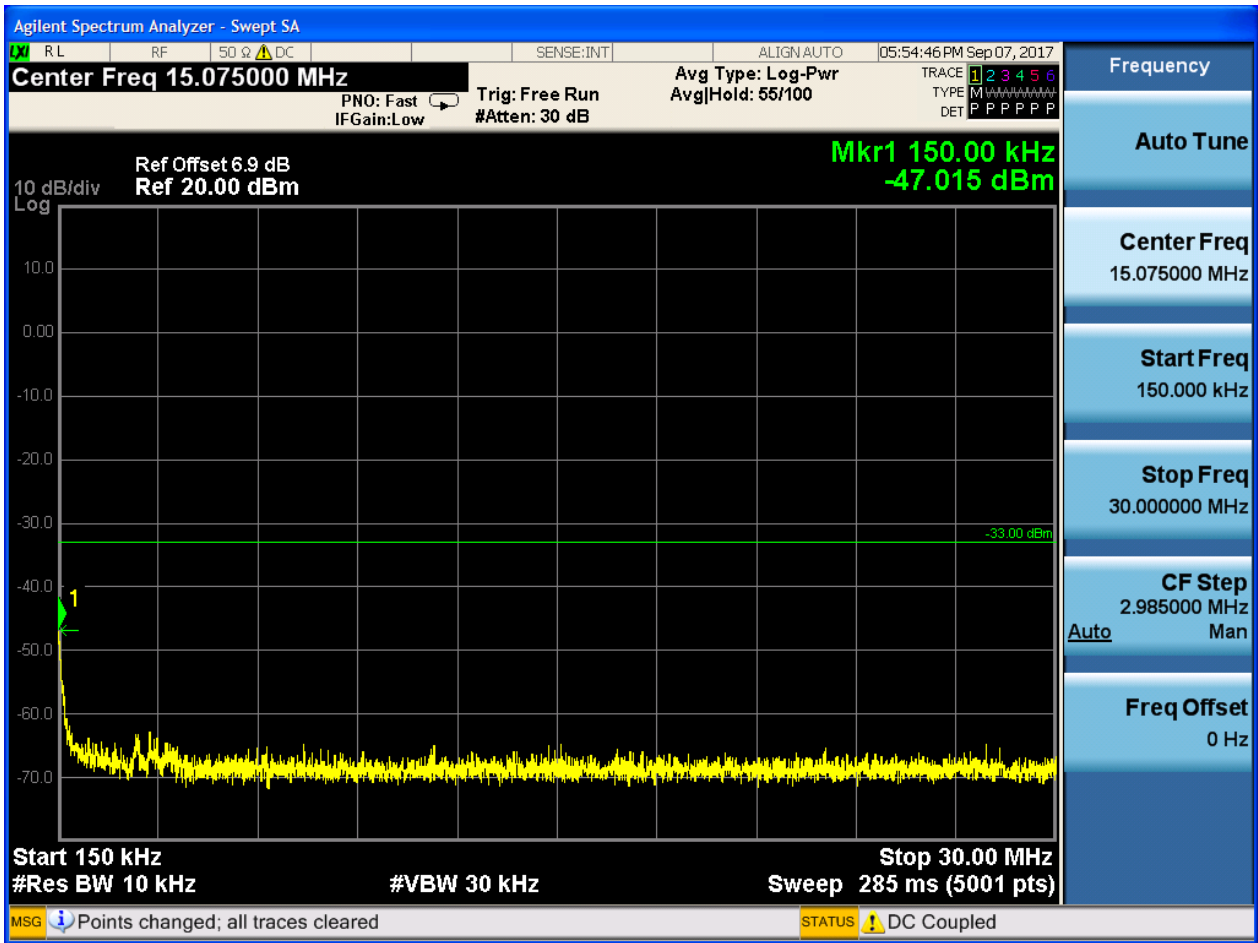


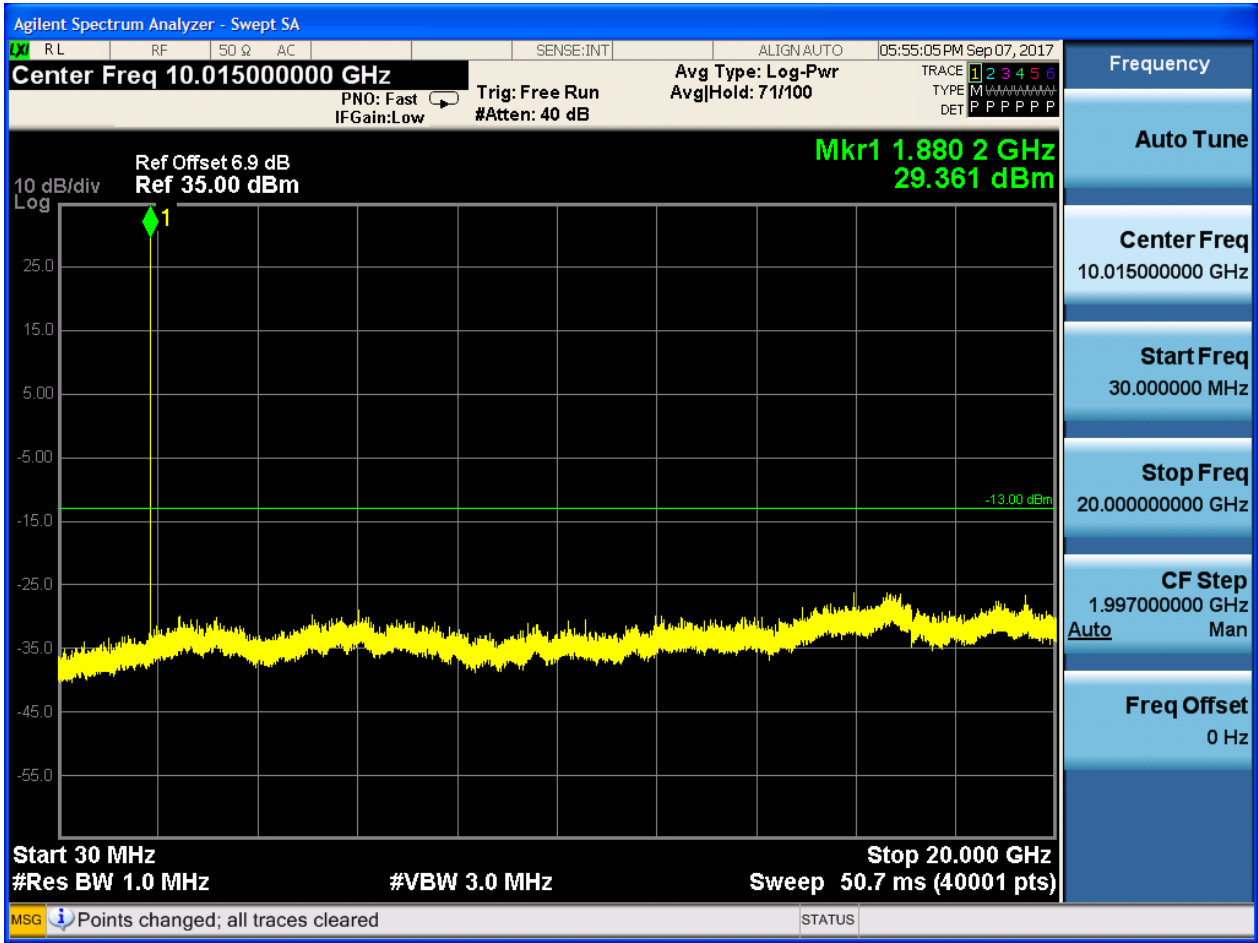




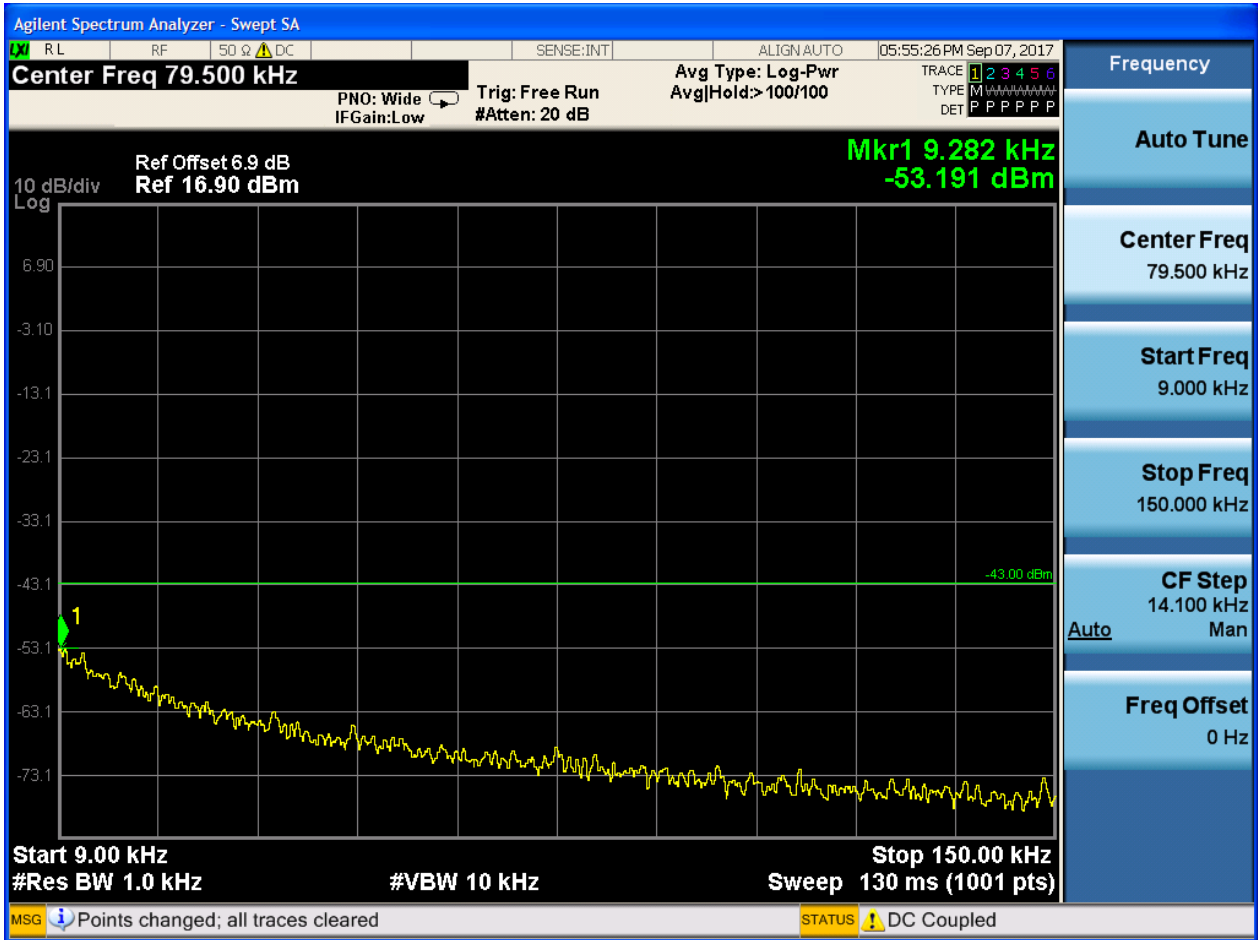
6.1.2.1.2 Test Channel = MCH

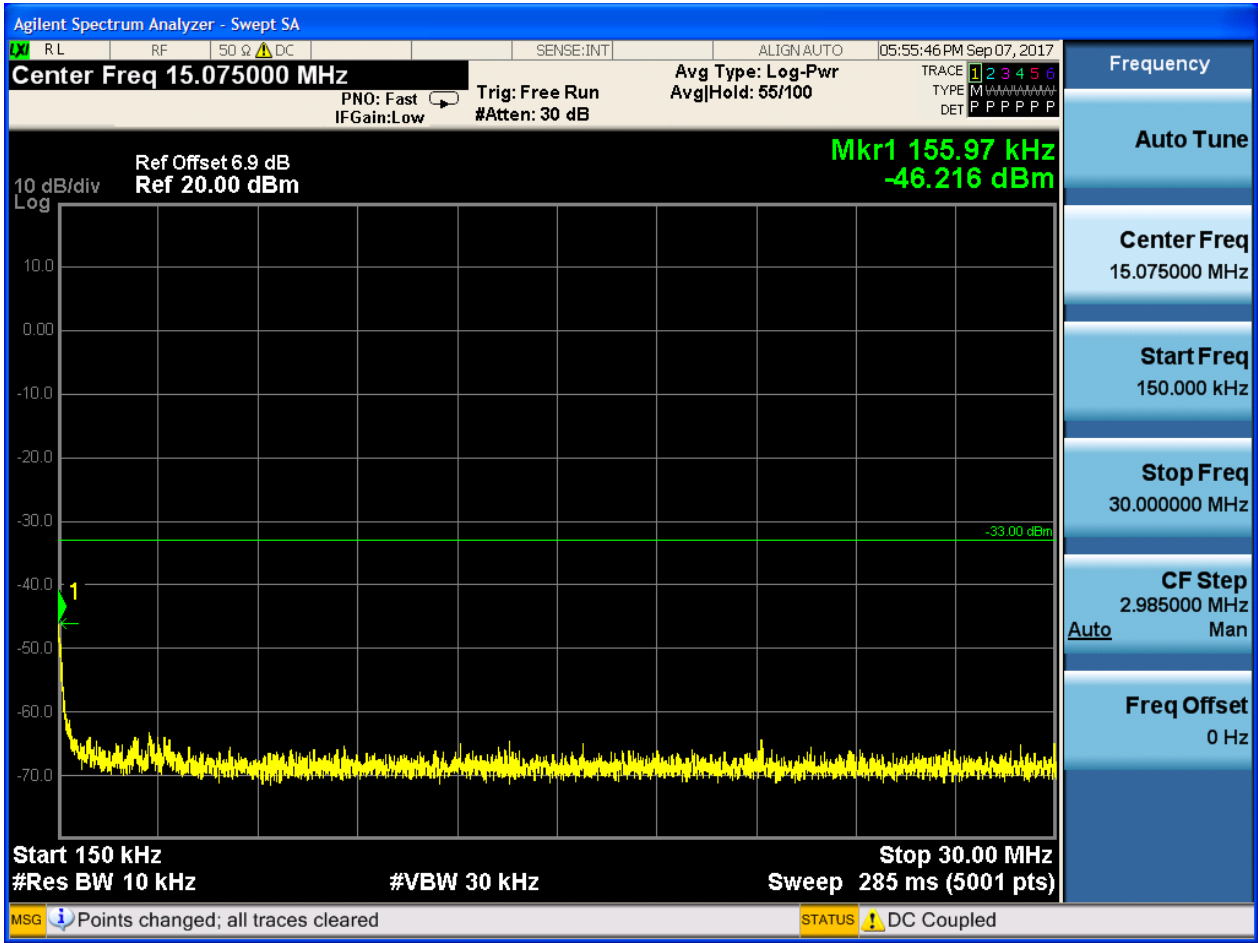


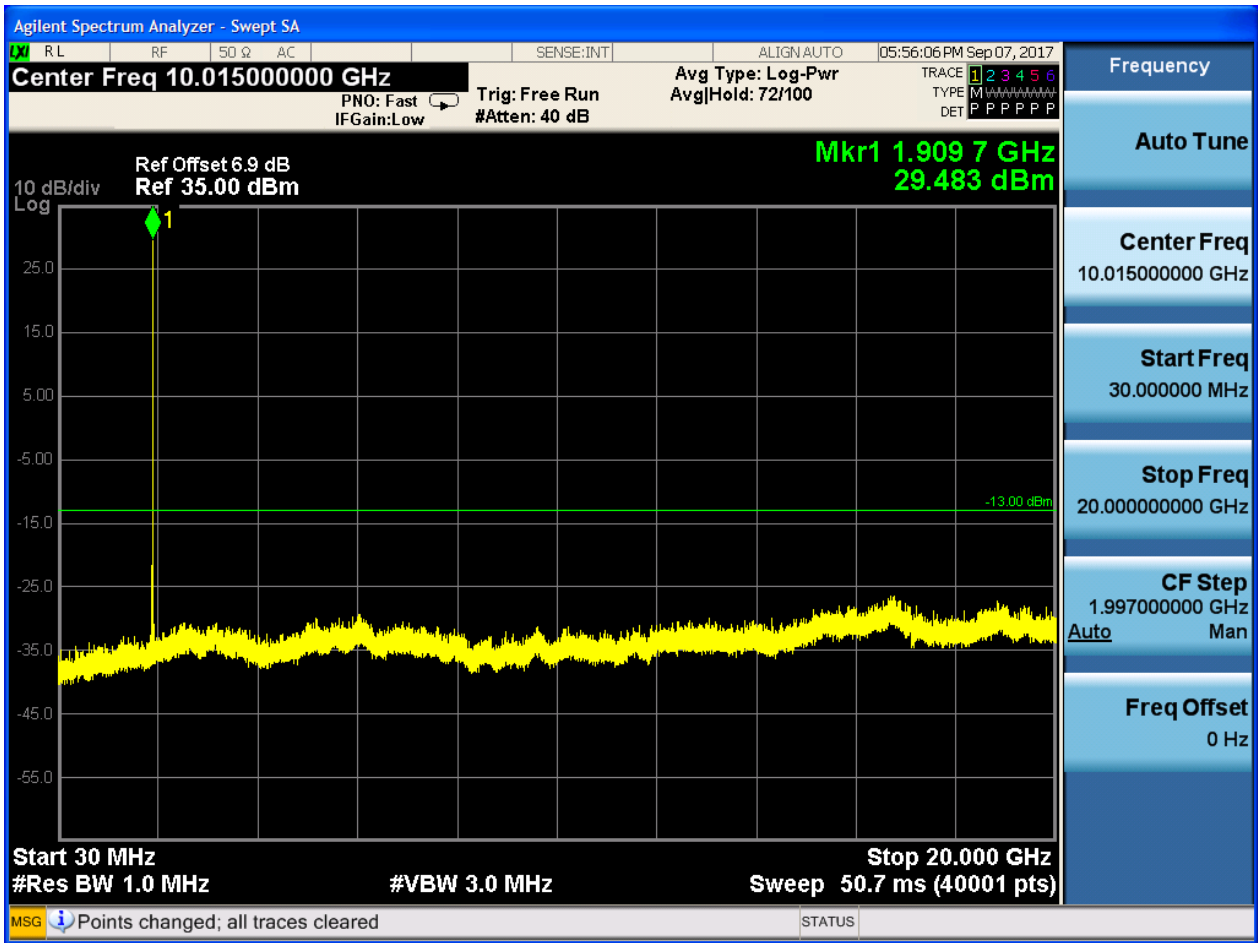




6.1.2.1.3 Test Channel = HCH



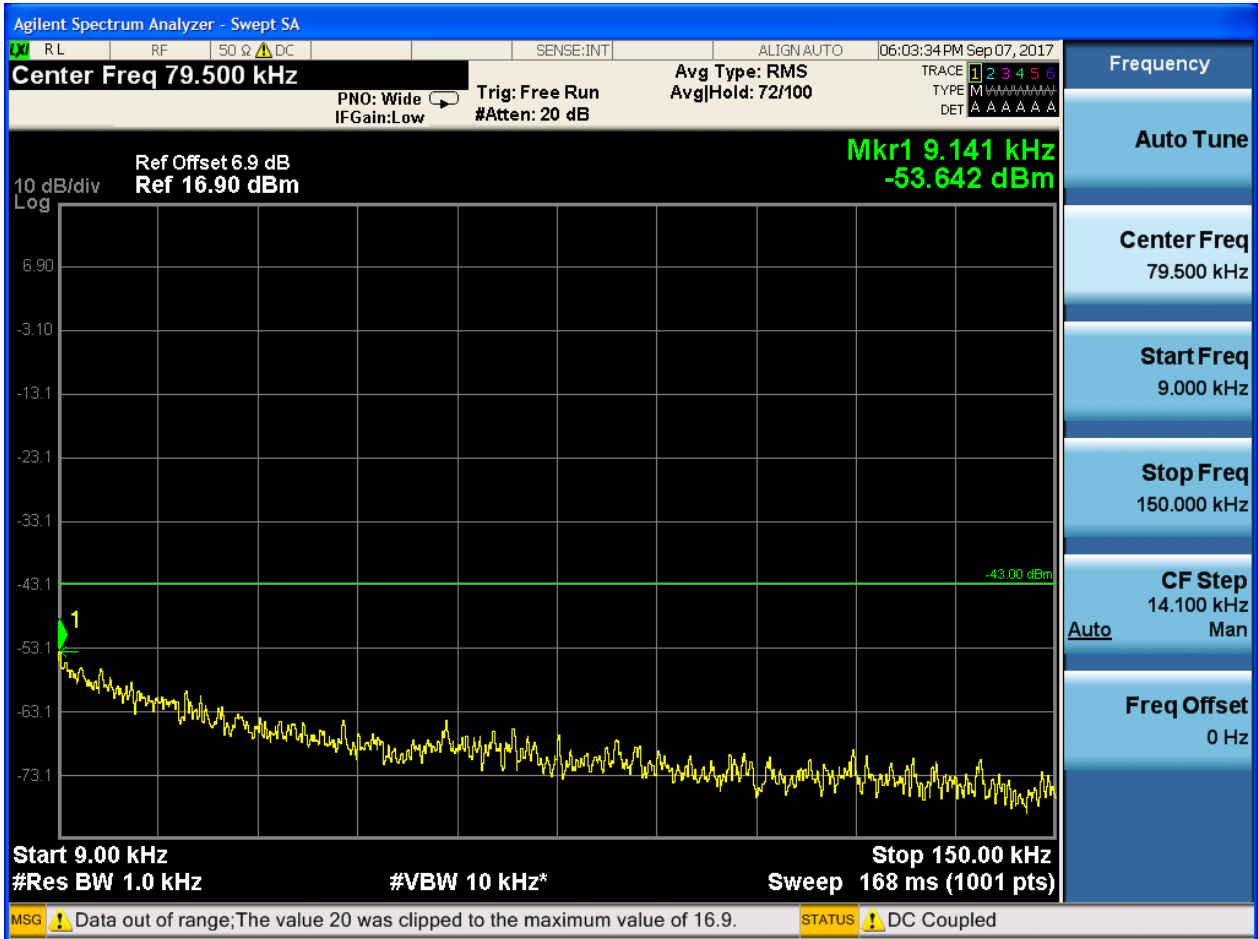


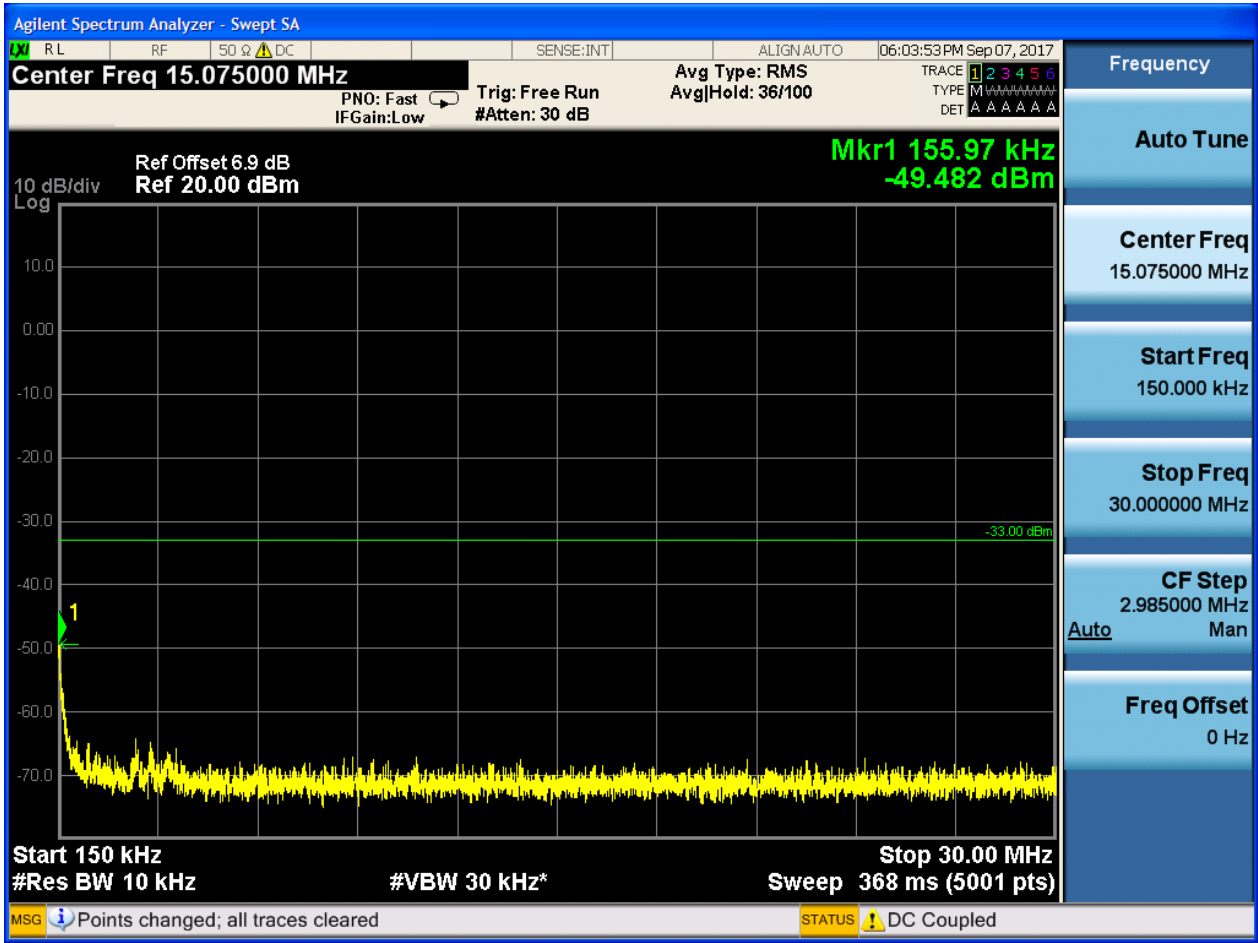


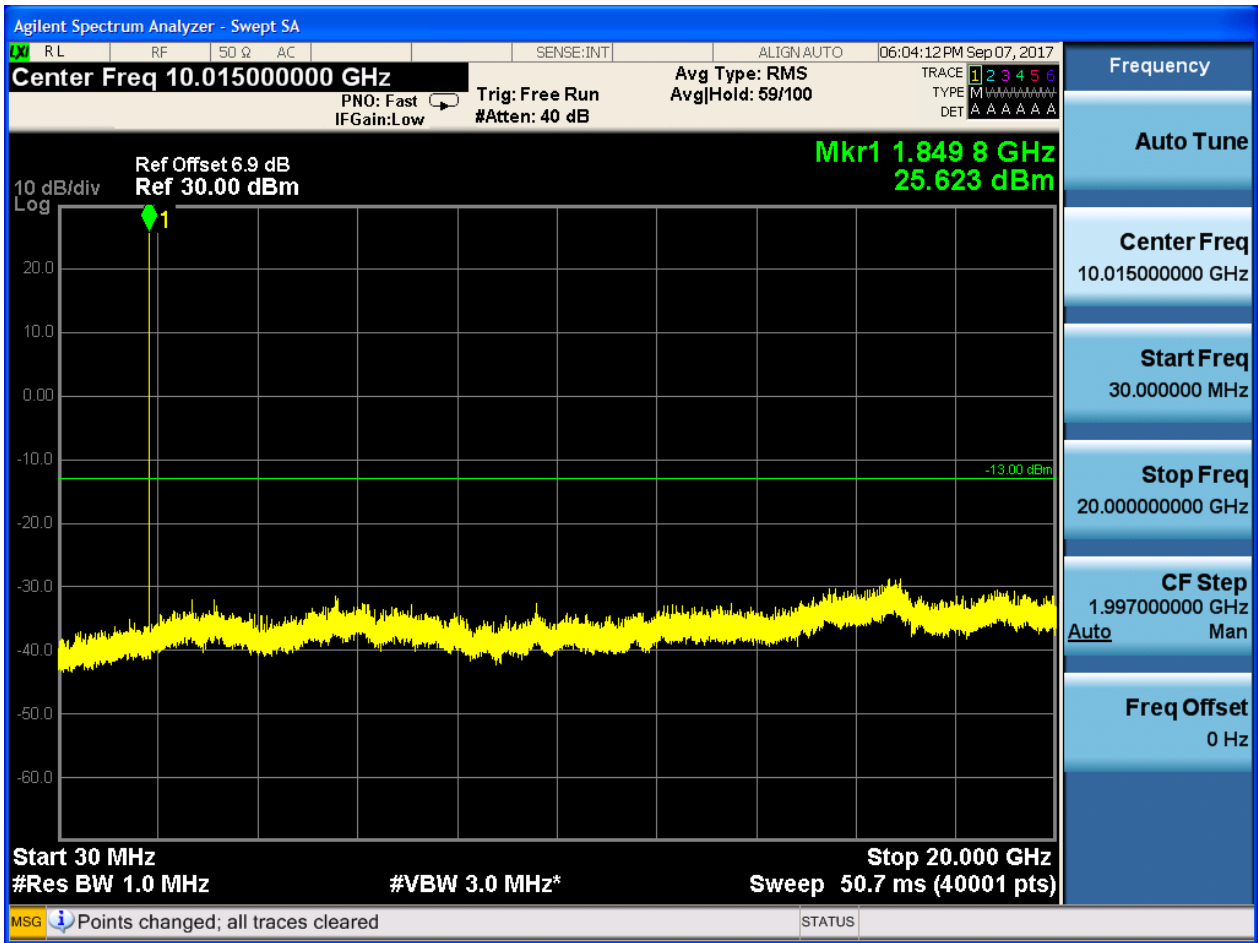


6.1.2.2 Test Mode = GSM/TM2

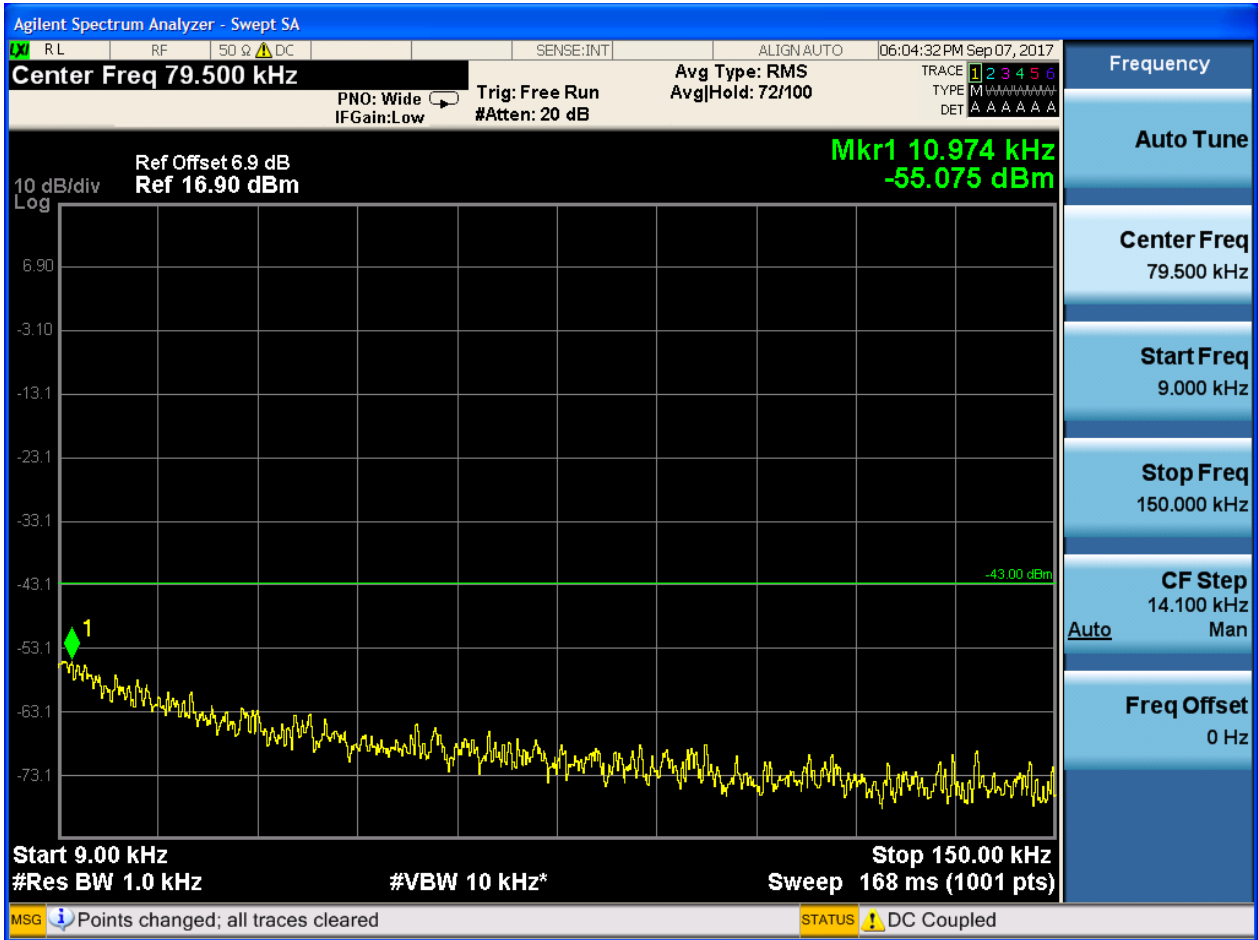
6.1.2.2.1 Test Channel = LCH

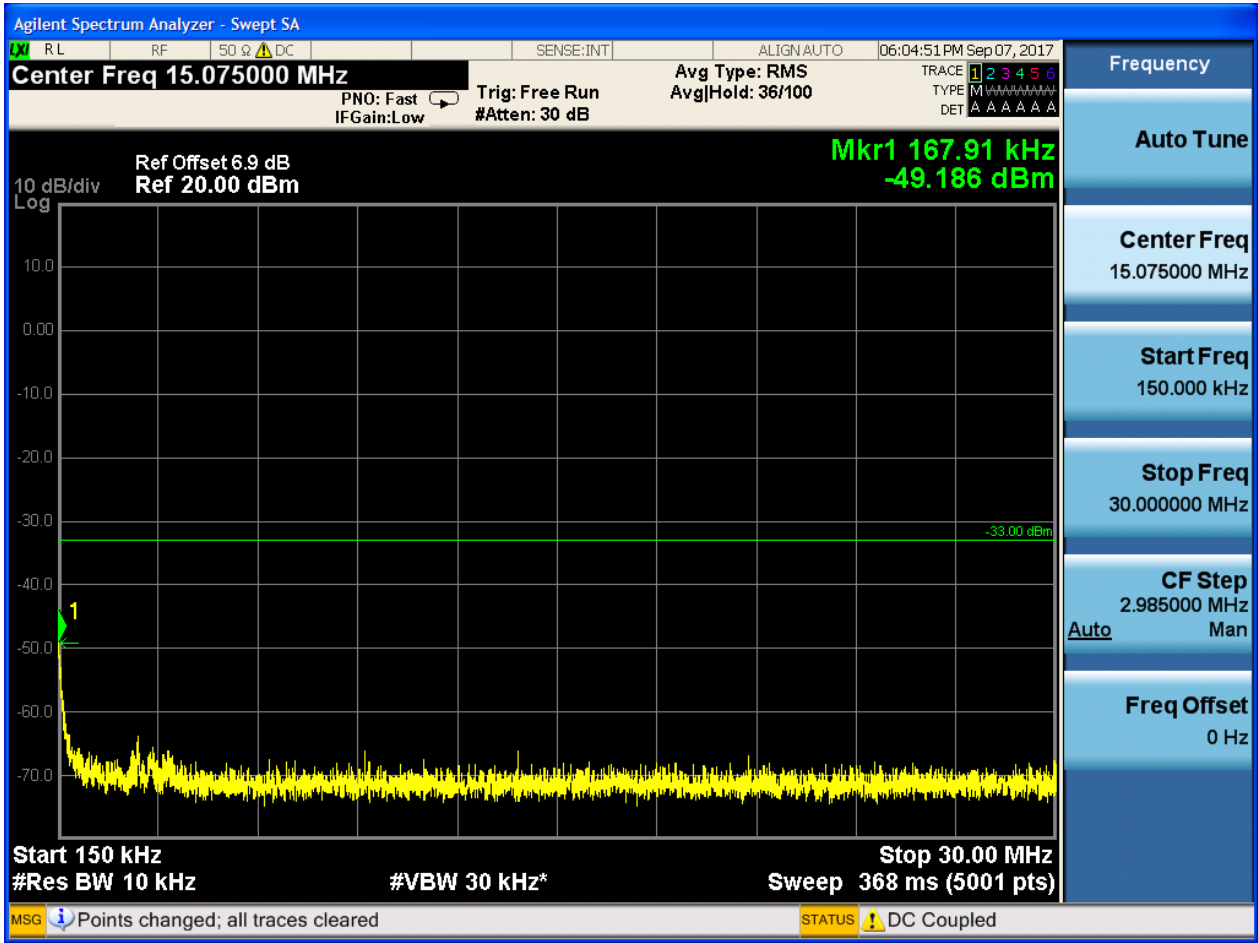


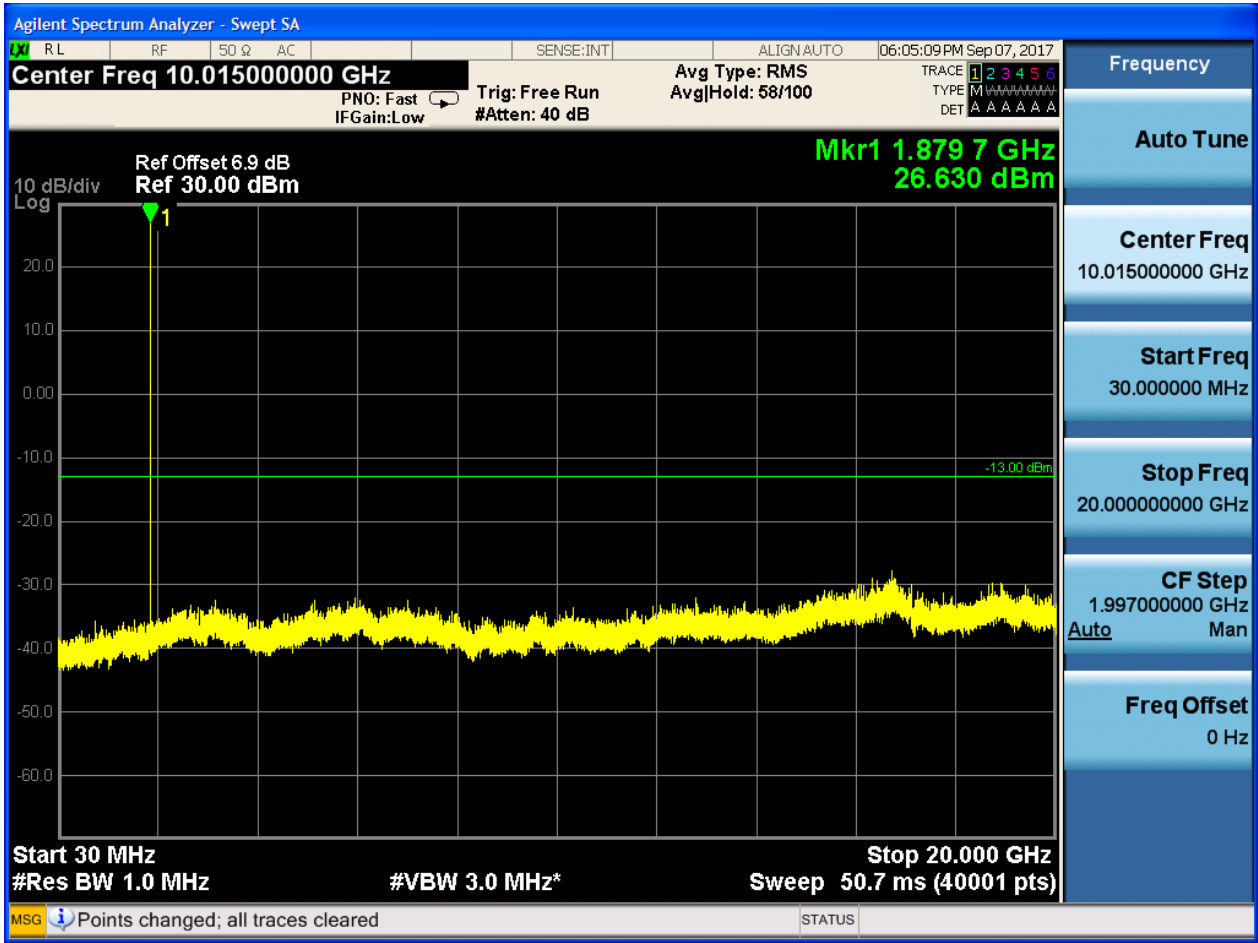




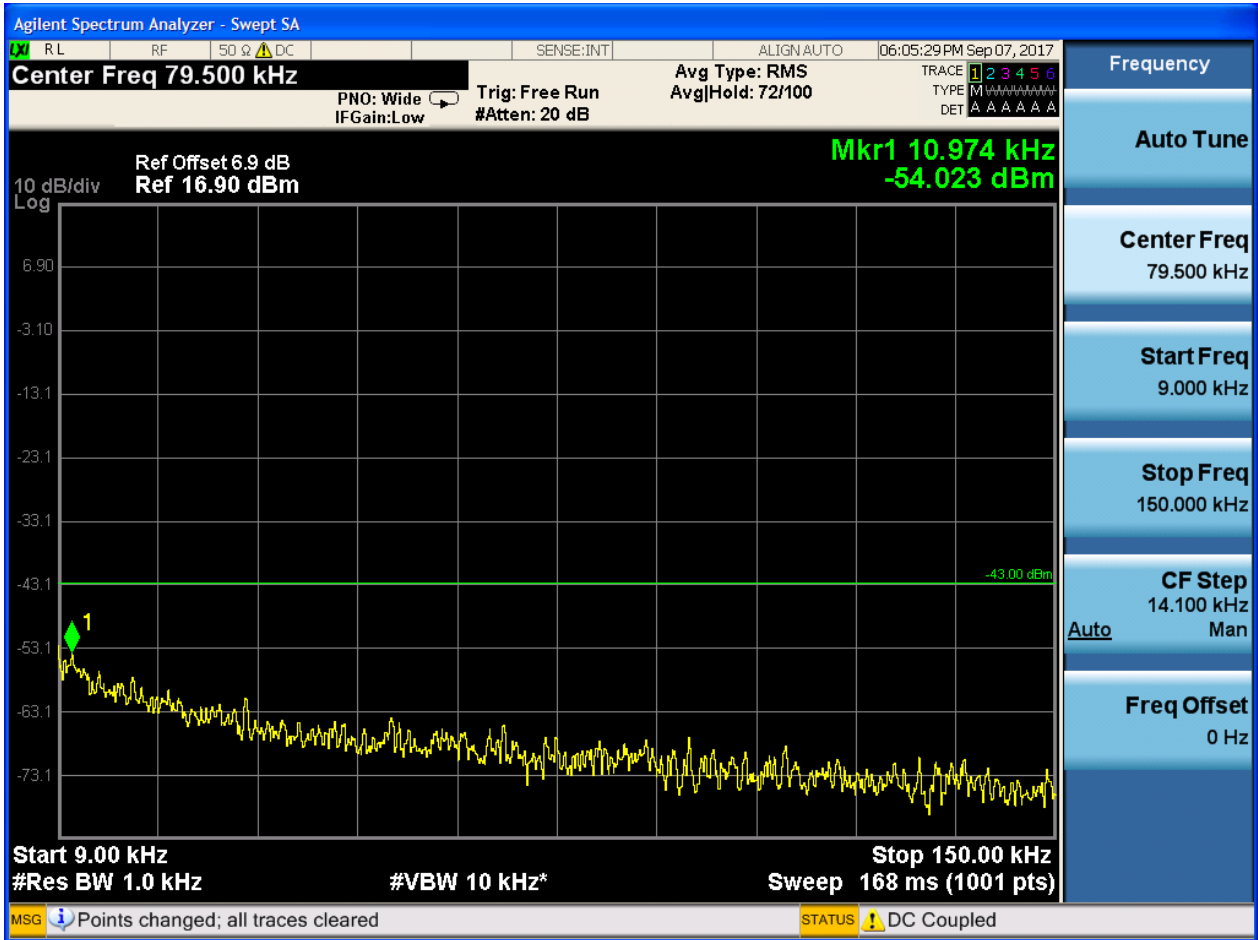
6.1.2.2.2 Test Channel = MCH

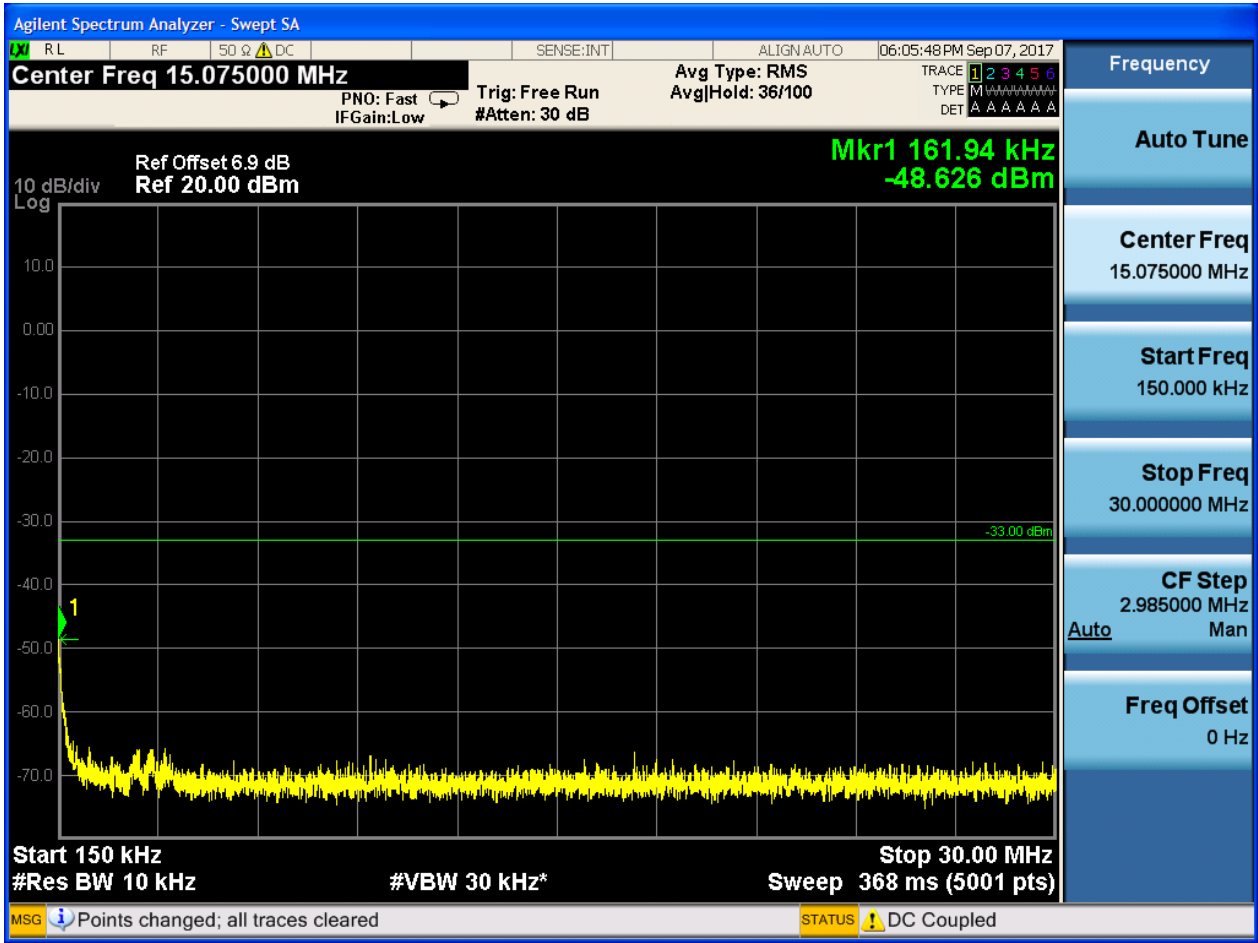


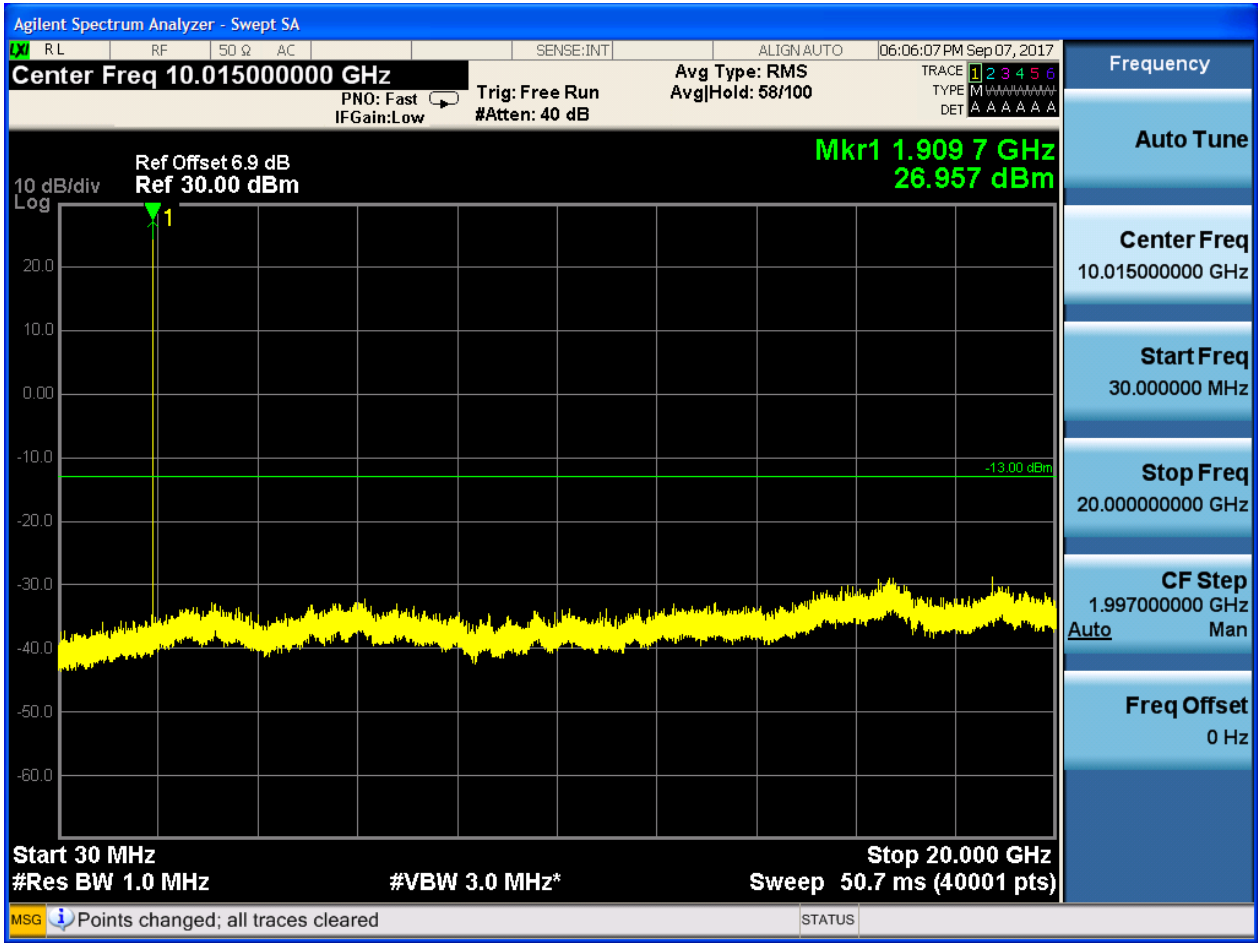




6.1.2.2.3 Test Channel = HCH







7Appendix_G: Field Strength of Spurious Radiation

Note: We tested all modes, but the data presented below is the worst case.

9kHz~150kHz, RBW = 200Hz, VBW = 600 Hz, Detector: PK

150kHz~30MHz, RBW = 9kHz, VBW = 30k Hz, Detector: PK

30MHz~1GHz, RBW = 100 kHz, VBW = 300 kHz. Detector: PK

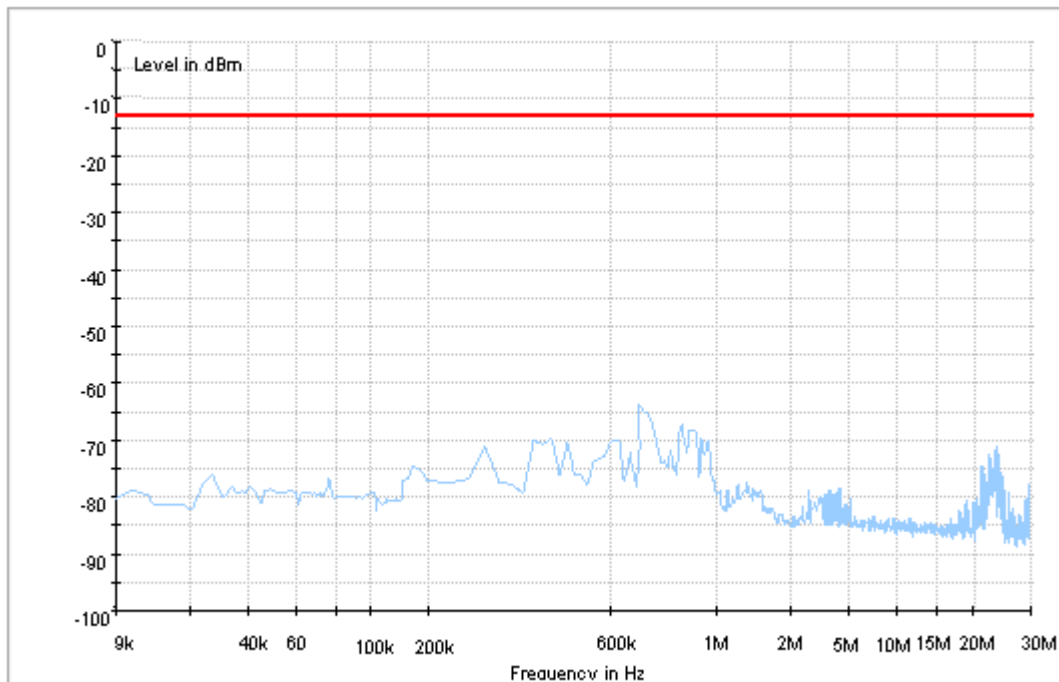
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

Part I - Test Plots

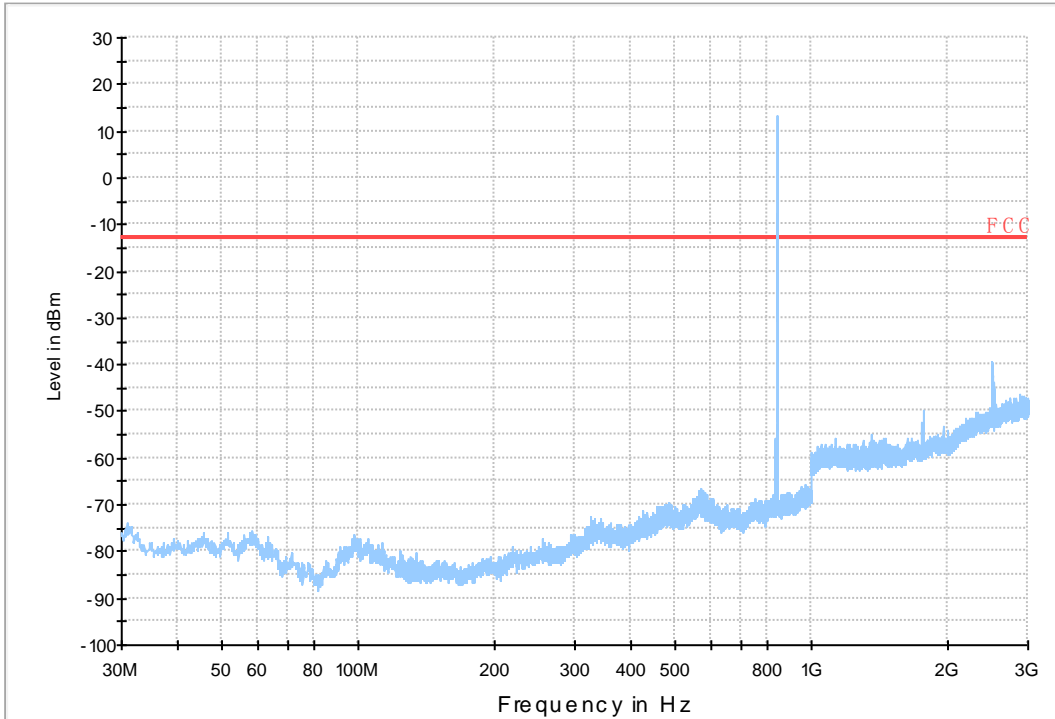
7.1 For GSM

7.1.1 Test Band = GSM850_ANT1

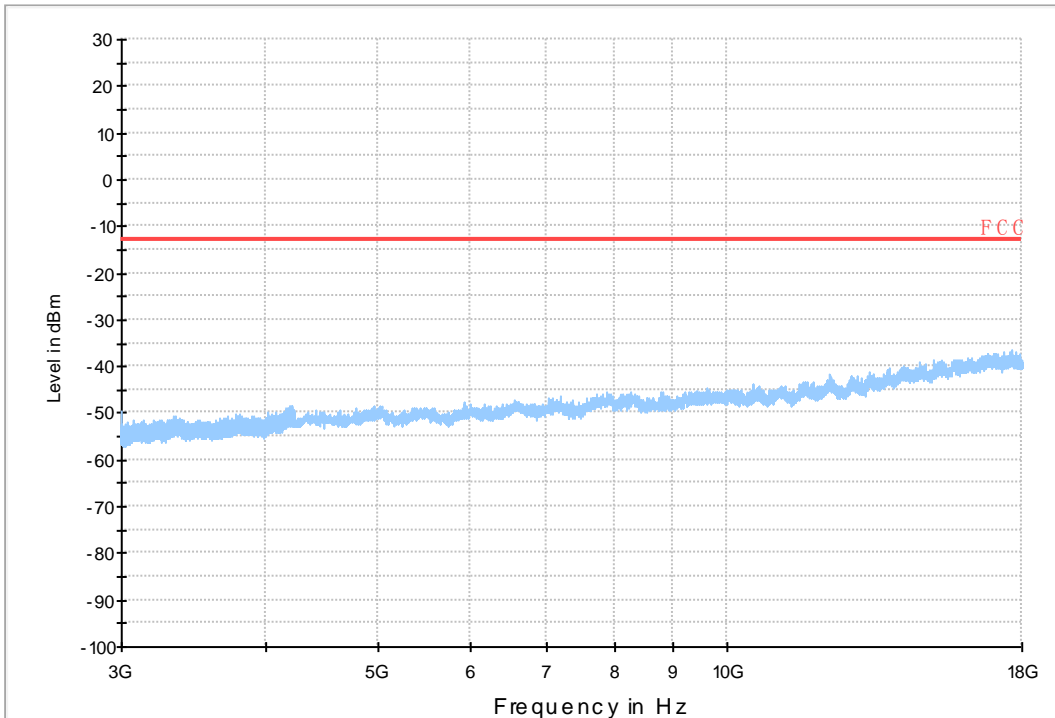
7.1.1.1 Test Mode = GSM/TM1



Copy of FCC PART22 GSM850_L

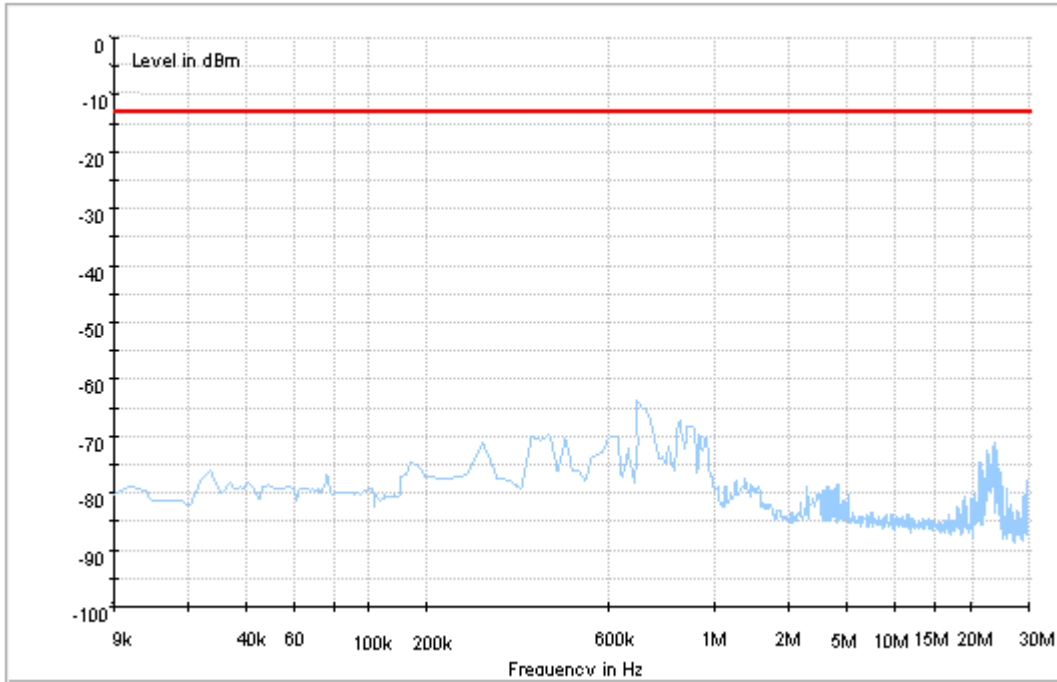


Copy of FCC PART22 GSM850_H

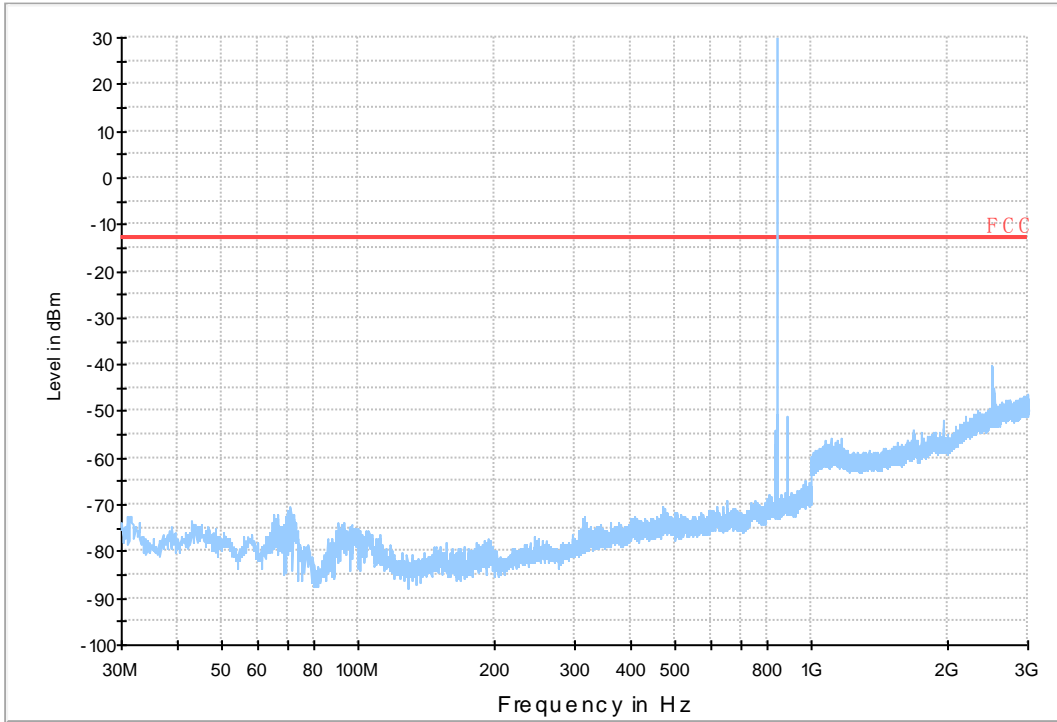


7.1.2 Test Band = GSM850_ANT2

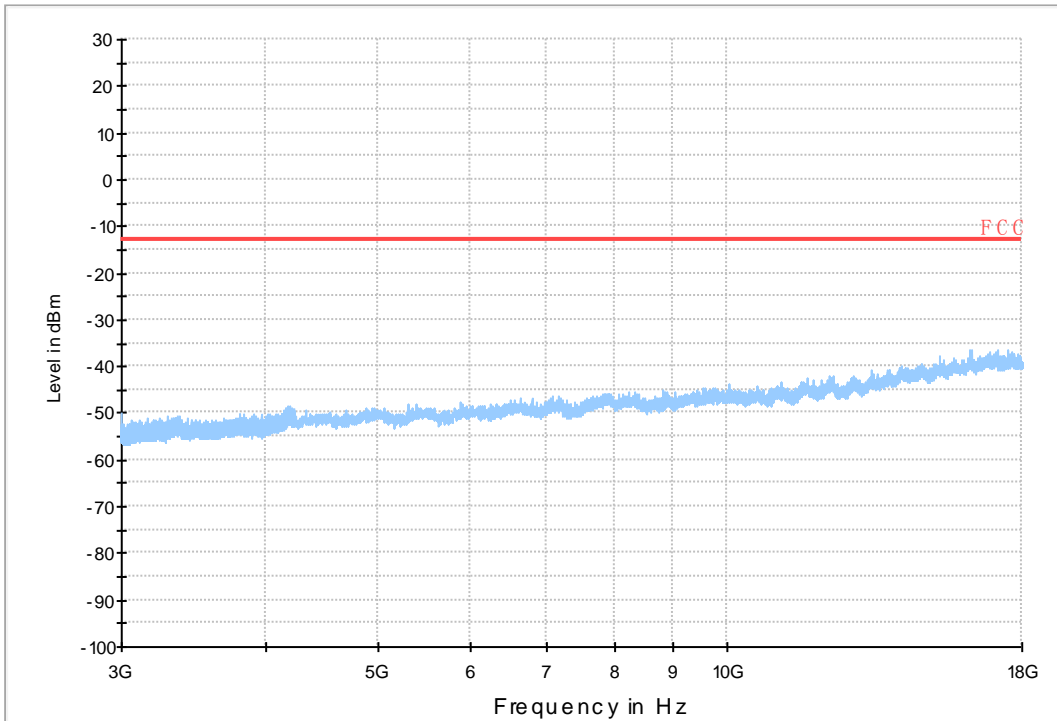
7.1.2.1 Test Mode = GSM/TM1



Copy of FCC PART22 GSM850_L

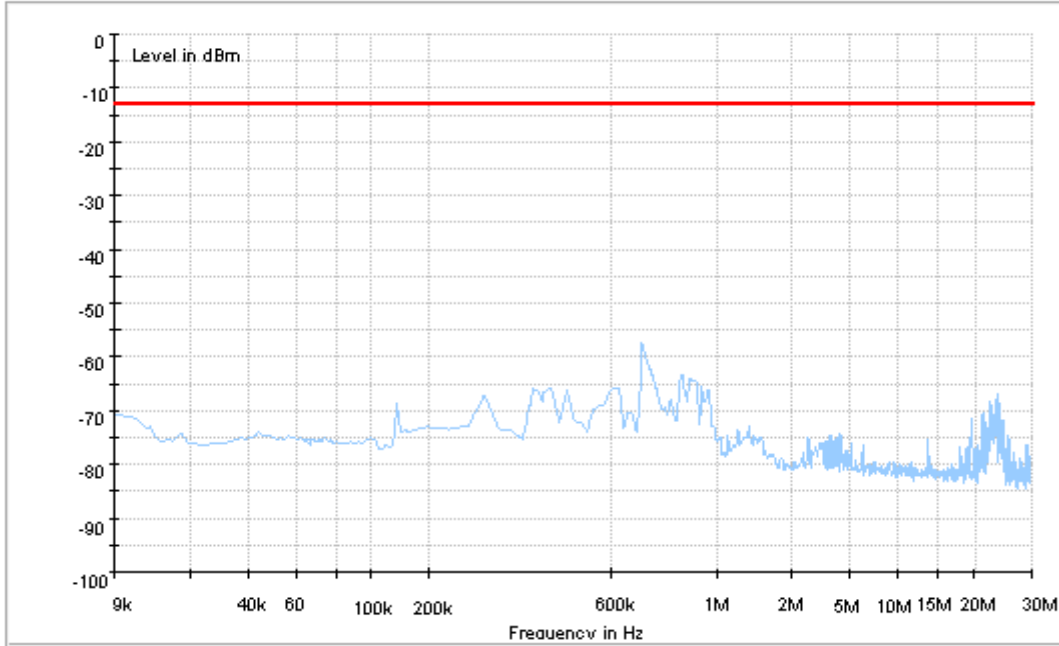


Copy of FCC PART22 GSM850_H

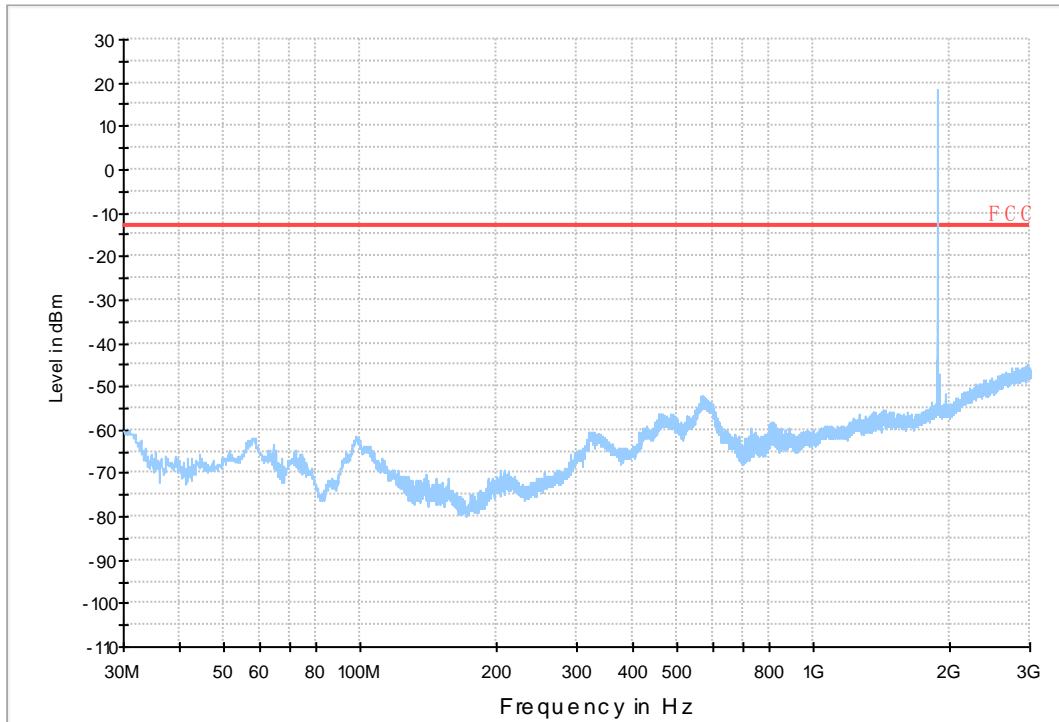


7.1.3 Test Band = GSM1900_ANT1

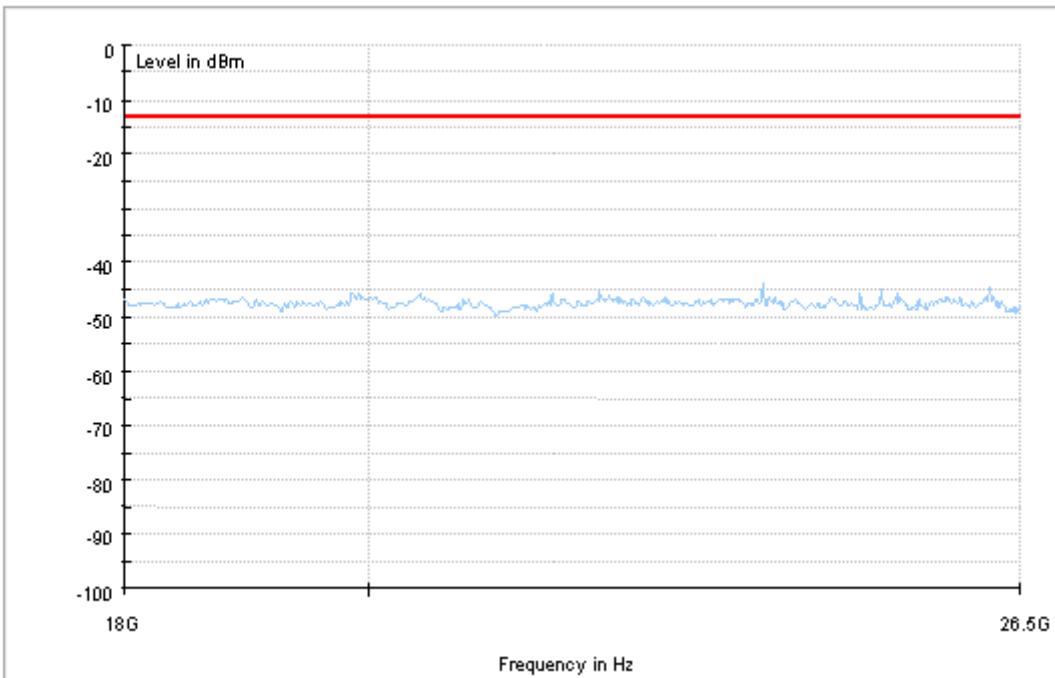
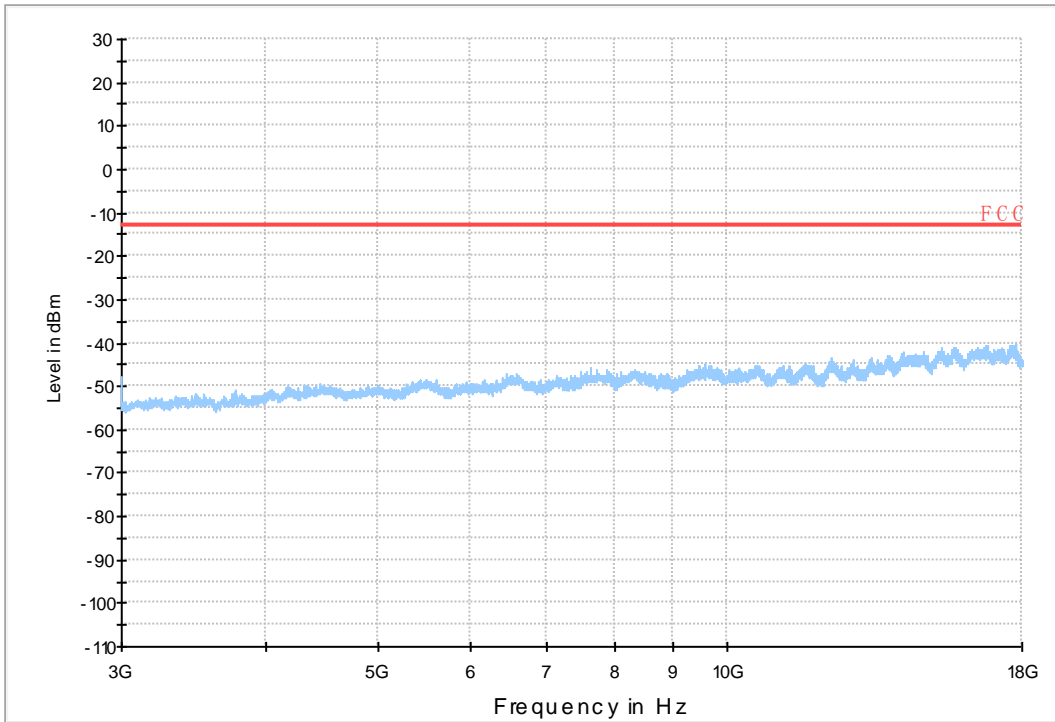
7.1.3.1 Test Mode = GSM/TM1



Copy of FCC PART24 GSM 1900_L

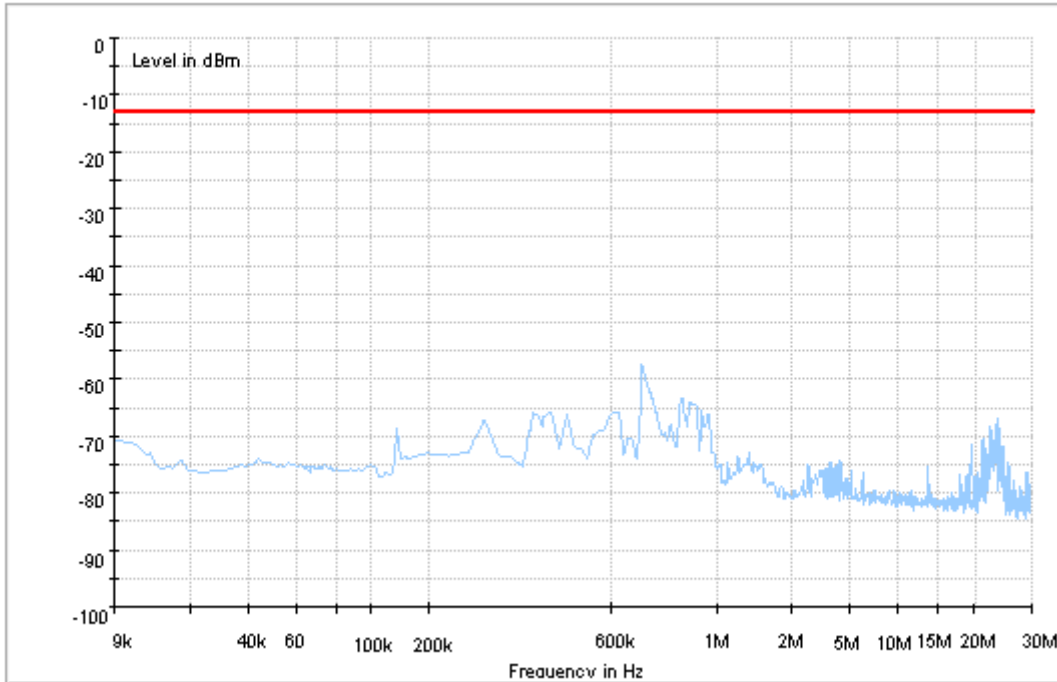


Copy of FCC PART24 GSM 1900_H

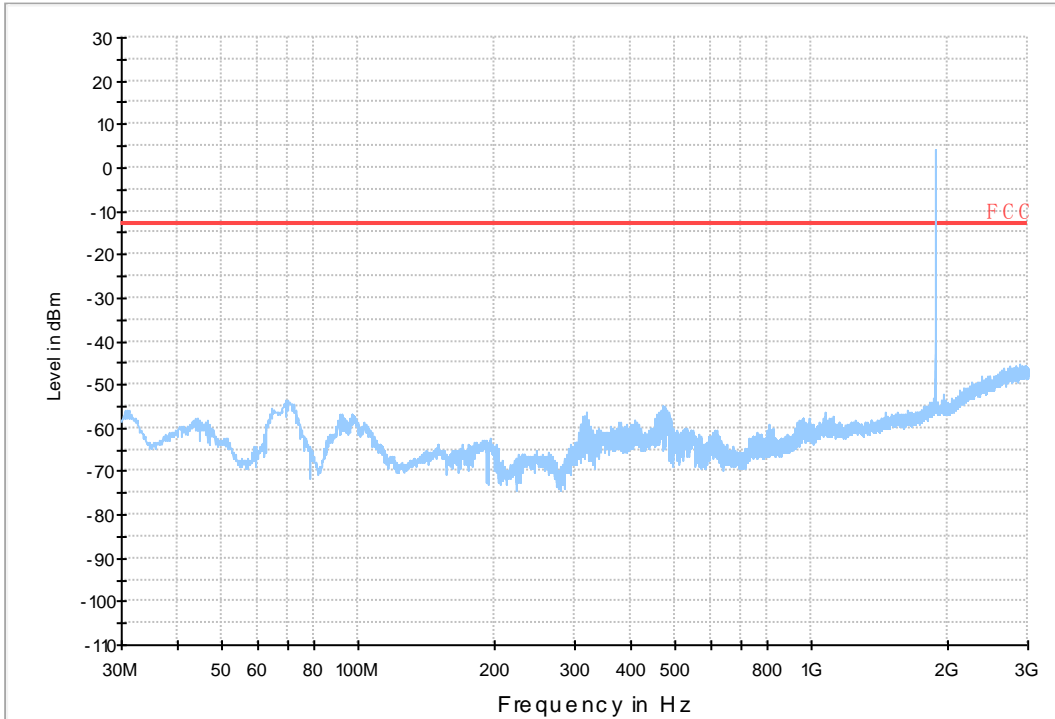


7.1.4 Test Band = GSM1900_ANT2

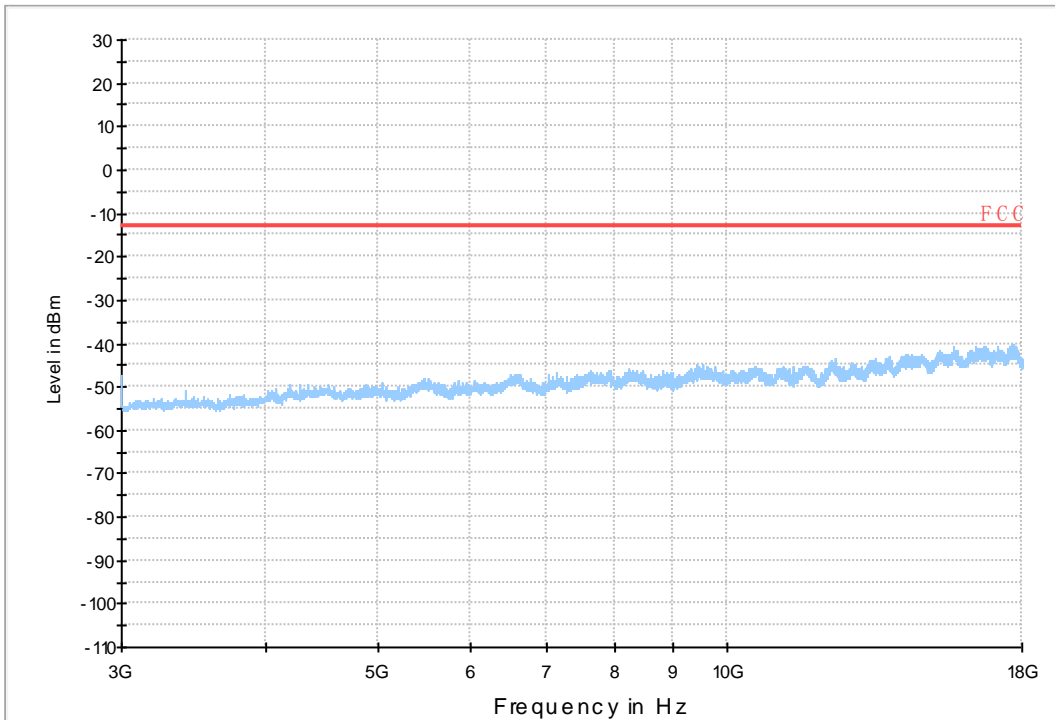
7.1.4.1 Test Mode = GSM/TM1

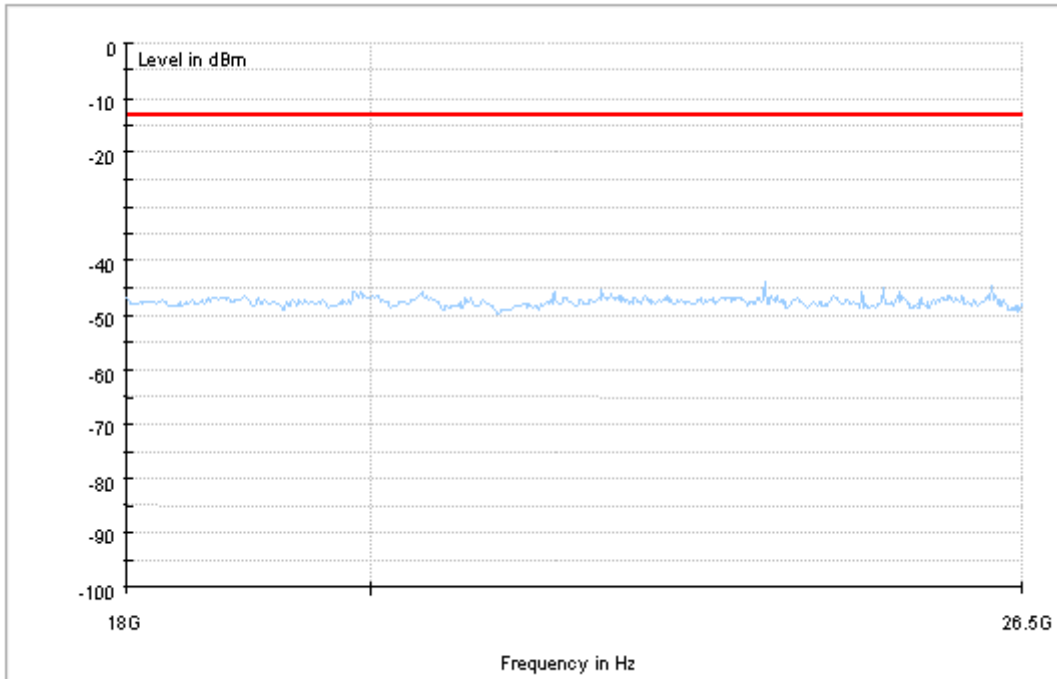


Copy of FCC PART24 GSM 1900_L



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8Appendix_H: Frequency Stability

8.1 For GSM

8.1.1 Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM850	GSM/TM1	LCH	TN	VL	-4.71	-0.00571	PASS
				VN	-2.78	-0.00337	PASS
				VH	-3.16	-0.00383	PASS
		MCH	TN	VL	-10.4	-0.01243	PASS
				VN	-8.65	-0.01034	PASS
				VH	-10.85	-0.01297	PASS
		HCH	TN	VL	-0.97	-0.00114	PASS
				VN	3.62	0.00426	PASS
				VH	-0.84	-0.00099	PASS
	GSM/TM2	LCH	TN	VL	-3.65	-0.00443	PASS
				VN	-0.71	-0.00086	PASS
				VH	-0.42	-0.00051	PASS
		MCH	TN	VL	-4.39	-0.00525	PASS
				VN	-5.75	-0.00687	PASS
				VH	-5.78	-0.00691	PASS
		HCH	TN	VL	4.36	0.00514	PASS
				VN	-0.13	-0.00015	PASS
				VH	0.19	0.00022	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-3.23	-0.00175	PASS
				VN	-10.4	-0.00562	PASS
				VH	-7.49	-0.00405	PASS
		MCH	TN	VL	30.67	0.01631	PASS
				VN	45.2	0.02404	PASS
				VH	39.26	0.02088	PASS
		HCH	TN	VL	27.25	0.01427	PASS
				VN	30.09	0.01576	PASS
				VH	32.93	0.01724	PASS
	GSM/TM2	LCH	TN	VL	18.47	0.00998	PASS
				VN	11.01	0.00595	PASS
				VH	9.69	0.00524	PASS
		MCH	TN	VL	52.56	0.02796	PASS
				VN	57.44	0.03055	PASS
				VH			

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	61.34	0.03263	PASS
		HCH	TN	VL	45.68	0.02392	PASS
				VN	41.49	0.02172	PASS
				VH	48.3	0.02529	PASS

8.1.2 Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM850	GSM/TM1	LCH	VN	-30	-5.49	-0.00666	PASS
				-20	-5.55	-0.00673	PASS
				-10	-4.84	-0.00587	PASS
				0	-4.07	-0.00494	PASS
				10	-6.01	-0.00729	PASS
				20	-4.39	-0.00533	PASS
				30	-4.33	-0.00525	PASS
				40	-4.46	-0.00541	PASS
		50	-5.36	-0.0065	PASS		
		MCH	VN	-30	-11.11	-0.01328	PASS
				-20	-10.33	-0.01235	PASS
				-10	-10.53	-0.01259	PASS
				0	-12.14	-0.01451	PASS
				10	-9.88	-0.01181	PASS
				20	-11.17	-0.01335	PASS
				30	-8.78	-0.01049	PASS
				40	-10.72	-0.01281	PASS
		50	-11.36	-0.01358	PASS		
		HCH	VN	-30	-2.65	-0.00312	PASS
				-20	-0.52	-0.00061	PASS
				-10	0	0	PASS
				0	-0.58	-0.00068	PASS
				10	-1.03	-0.00121	PASS
				20	-1.81	-0.00213	PASS
	30			-0.65	-0.00077	PASS	
	40			-0.77	-0.00091	PASS	
	50	2.65	0.00312	PASS			
	GSM/TM2	LCH	VN	-30	0.61	0.00074	PASS
				-20	-1.61	-0.00195	PASS
				-10	-1.39	-0.00169	PASS
				0	1.52	0.00184	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				10	2.65	0.00322	PASS
				20	0.52	0.00063	PASS
				30	0.77	0.00093	PASS
				40	-3.42	-0.00415	PASS
				50	-3.78	-0.00459	PASS
		MCH	VN	-30	-6.88	-0.00822	PASS
				-20	-8.04	-0.00961	PASS
				-10	-1.74	-0.00208	PASS
				0	-4.04	-0.00483	PASS
				10	-6.84	-0.00818	PASS
				20	-4.97	-0.00594	PASS
				30	-5.26	-0.00629	PASS
				40	-6.91	-0.00826	PASS
				50	-0.48	-0.00057	PASS
				HCH	VN	-30	-0.48
		-20	5.97			0.00703	PASS
		-10	6.04			0.00712	PASS
		0	-0.74			-0.00087	PASS
		10	4.78			0.00563	PASS
		20	5.59			0.00659	PASS
		30	-5.52			-0.0065	PASS
		40	6.52			0.00768	PASS
		50	3.16	0.00372	PASS		
		GSM1900	GSM/TM1	LCH	VN	-30	-0.26
-20	-12.53					-0.00677	PASS
-10	-7.1					-0.00384	PASS
0	-6.59					-0.00356	PASS
10	-13.56					-0.00733	PASS
20	-9.75					-0.00527	PASS
30	-17.5					-0.00946	PASS
40	-11.75					-0.00635	PASS
50	-6.39					-0.00345	PASS
MCH	VN			-30	39.58	0.02105	PASS
				-20	42.94	0.02284	PASS
				-10	44.17	0.02349	PASS
				0	42.17	0.02243	PASS
				10	45.26	0.02407	PASS
				20	41.46	0.02205	PASS
				30	43.07	0.02291	PASS
				40	34.68	0.01845	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	37.19	0.01978	PASS
				-30	38.23	0.02002	PASS
				-20	41.65	0.02181	PASS
				-10	33.84	0.01772	PASS
				0	36.29	0.019	PASS
				10	33	0.01728	PASS
				20	36.74	0.01924	PASS
				30	25.51	0.01336	PASS
				40	42.55	0.02228	PASS
				50	27.7	0.0145	PASS
	GSM/TM2	LCH	VN	-30	18.63	0.01007	PASS
				-20	11.24	0.00608	PASS
				-10	11.33	0.00612	PASS
				0	11.75	0.00635	PASS
				10	19.95	0.01078	PASS
				20	17.4	0.0094	PASS
				30	13.14	0.0071	PASS
				40	25.73	0.01391	PASS
				50	7.94	0.00429	PASS
				MCH	VN	-30	49.78
		-20	53.95			0.0287	PASS
		-10	46.36			0.02466	PASS
		0	52.59			0.02797	PASS
		10	54.89			0.0292	PASS
		20	52.95			0.02816	PASS
		30	41.46			0.02205	PASS
		40	57.44			0.03055	PASS
		50	49.59			0.02638	PASS
		HCH	VN			-30	41.58
				-20	39.52	0.02069	PASS
				-10	50.08	0.02622	PASS
				0	45.98	0.02408	PASS
				10	52.14	0.0273	PASS
				20	41.2	0.02157	PASS
				30	55.37	0.02899	PASS
				40	53.76	0.02815	PASS
				50	41.68	0.02182	PASS

END