



Appendix for test report

1Appendix_A: Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dBm]	ERP [dBm]	Limit [dBm]	Verdict
GSM850	GSM/TM1	LCH	32.55	28.95	38.5	PASS
		MCH	32.72	29.12	38.5	PASS
		HCH	32.81	29.21	38.5	PASS
	GSM/TM2	LCH	24.89	21.29	38.5	PASS
		MCH	24.95	21.35	38.5	PASS
		HCH	24.96	21.36	38.5	PASS

Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	29.61	28.61	33	PASS
		MCH	29.82	28.82	33	PASS
		HCH	29.58	28.58	33	PASS
	GSM/TM2	LCH	23.95	22.95	33	PASS
		MCH	24.06	23.06	33	PASS
		HCH	23.96	22.96	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	0.3	13	PASS
		MCH	0.27	13	PASS
		HCH	0.26	13	PASS
	GSM/TM2	LCH	3.11	13	PASS
		MCH	3.3	13	PASS
		HCH	3.28	13	PASS

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM1900	GSM/TM1	LCH	0.34	13	PASS
		MCH	0.31	13	PASS
		HCH	0.29	13	PASS
	GSM/TM2	LCH	3.17	13	PASS
		MCH	3.37	13	PASS
		HCH	3.12	13	PASS

3Appendix_C: Modulation Characteristics

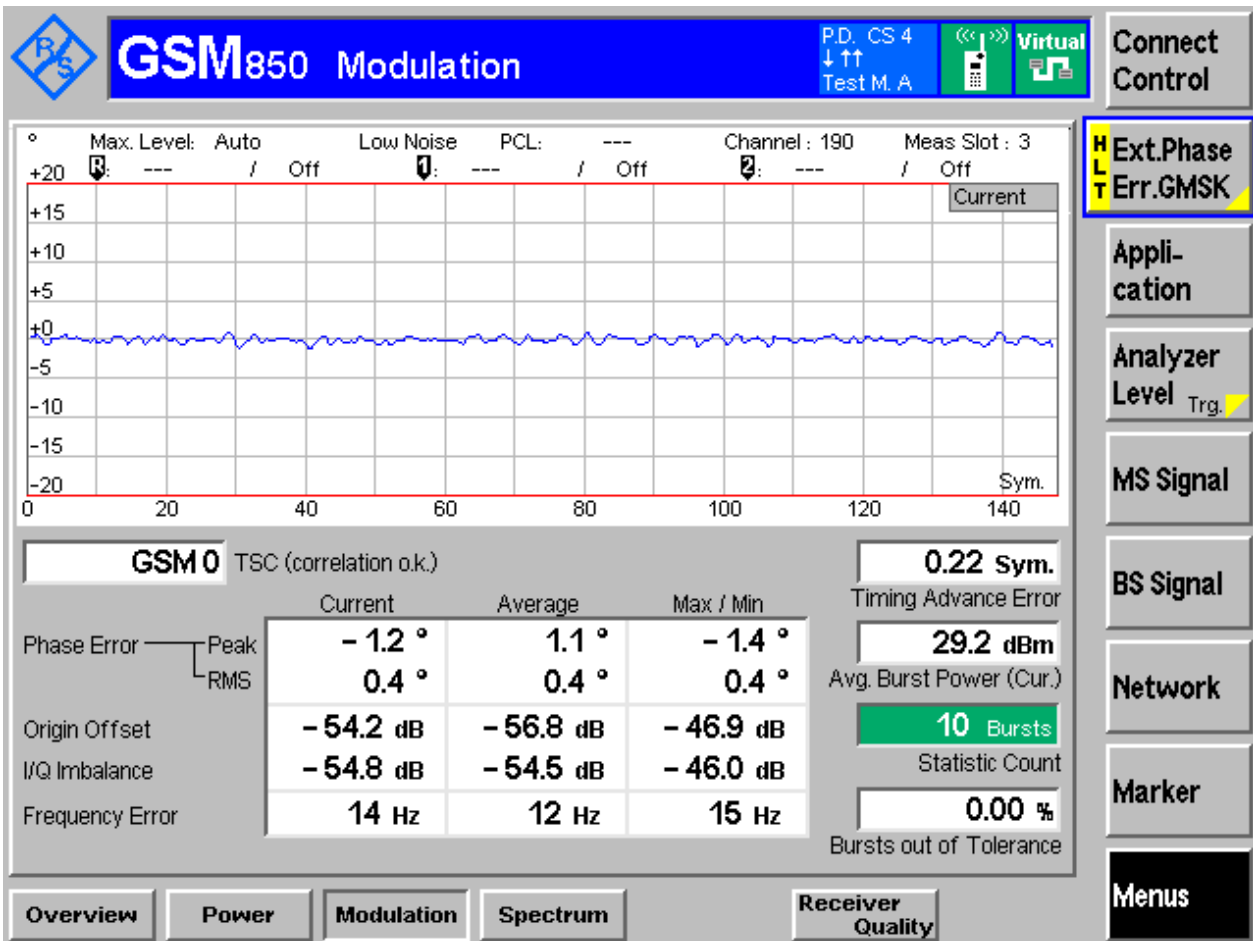
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

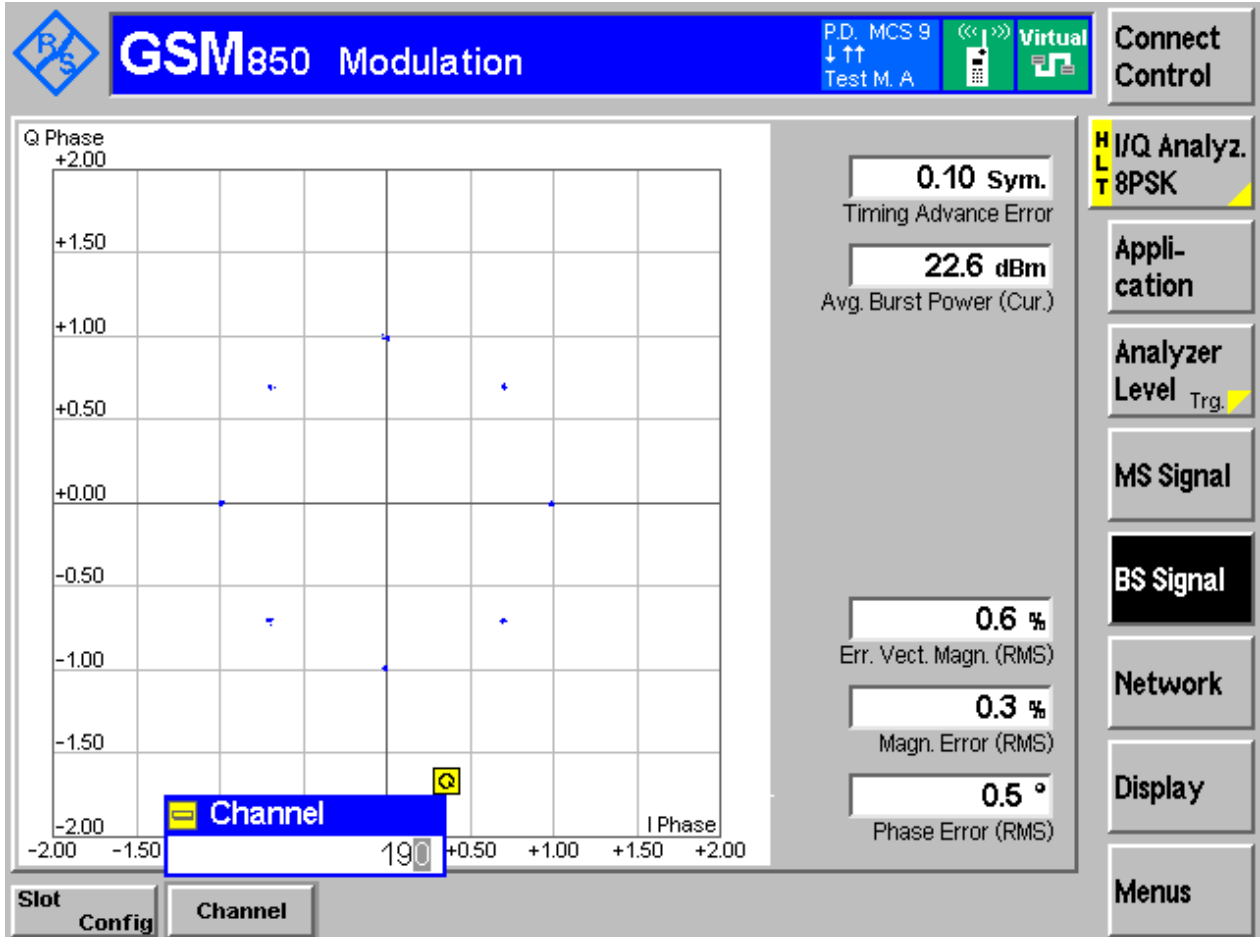
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

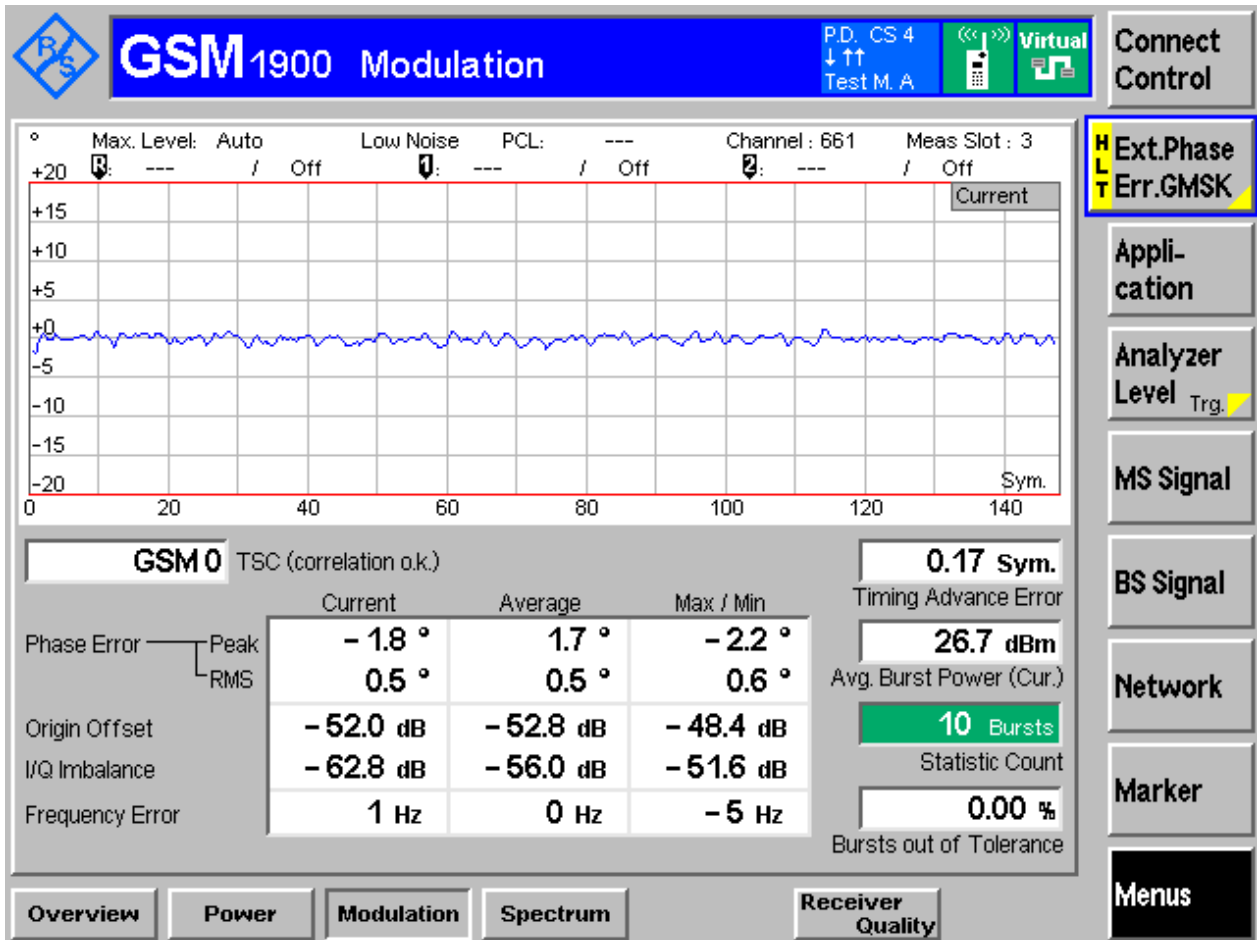
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

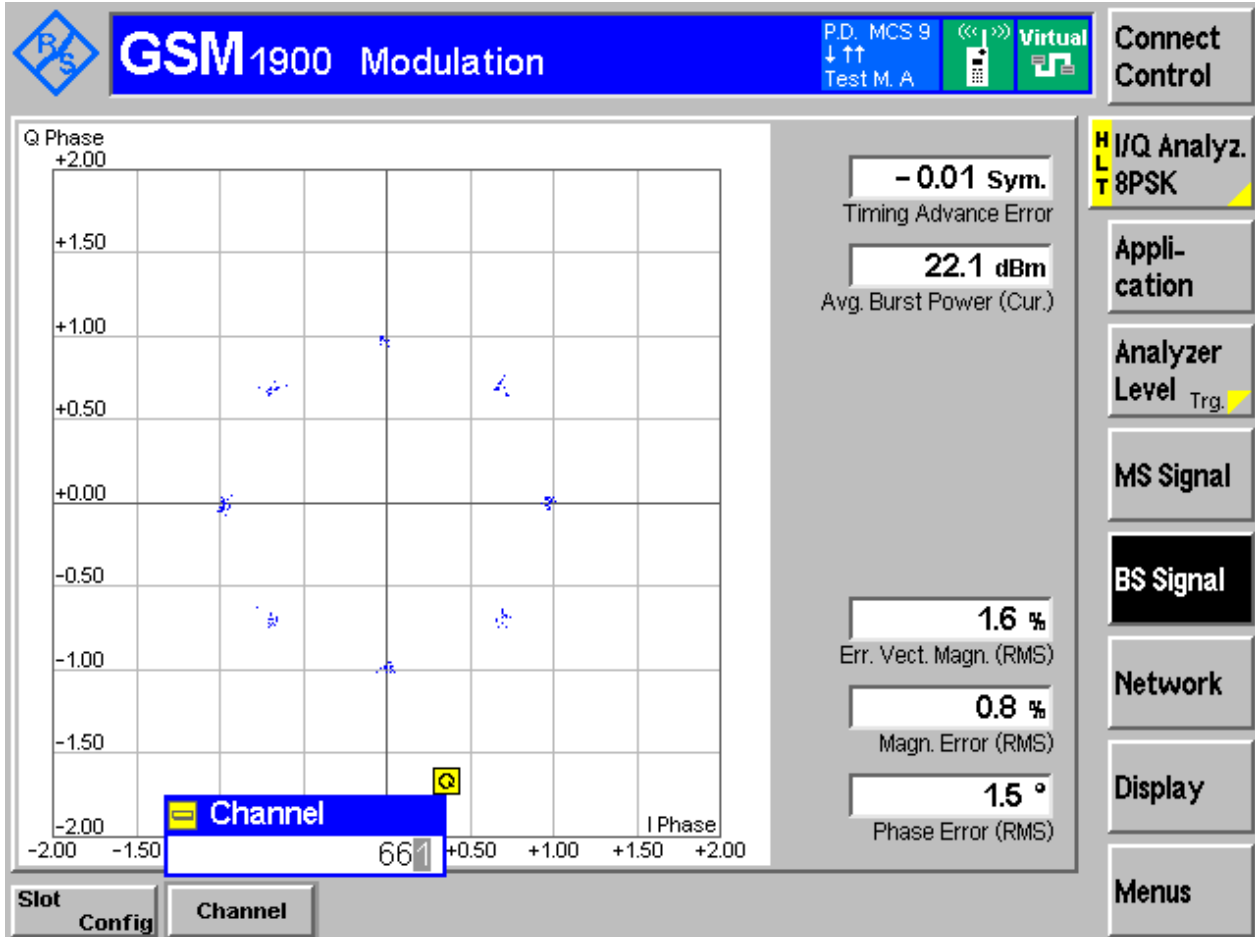
3.1.2.1 Test Mode = GSM/TM1

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	239.08	310.92	Pass
		MCH	242.92	322.11	Pass
		HCH	241.39	321.18	Pass
	GSM/TM2	LCH	241.29	315.25	Pass
		MCH	243.57	307.66	Pass
		HCH	248.24	316.47	Pass
GSM1900	GSM/TM1	LCH	241.35	313.06	Pass
		MCH	246.19	315.68	Pass
		HCH	244.16	317.22	Pass
	GSM/TM2	LCH	249.28	317.24	Pass
		MCH	245.01	318.26	Pass
		HCH	243.62	308.68	Pass



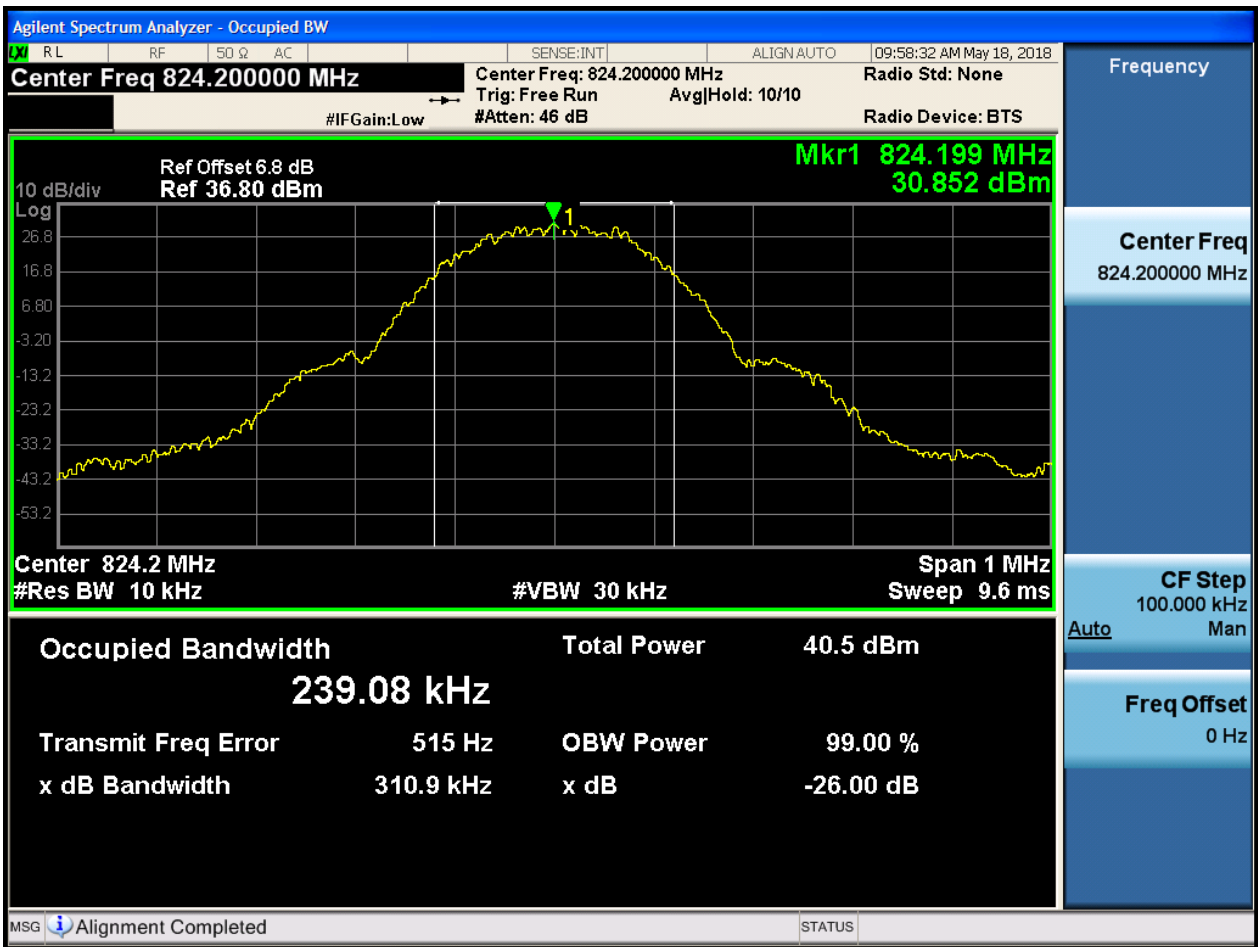
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

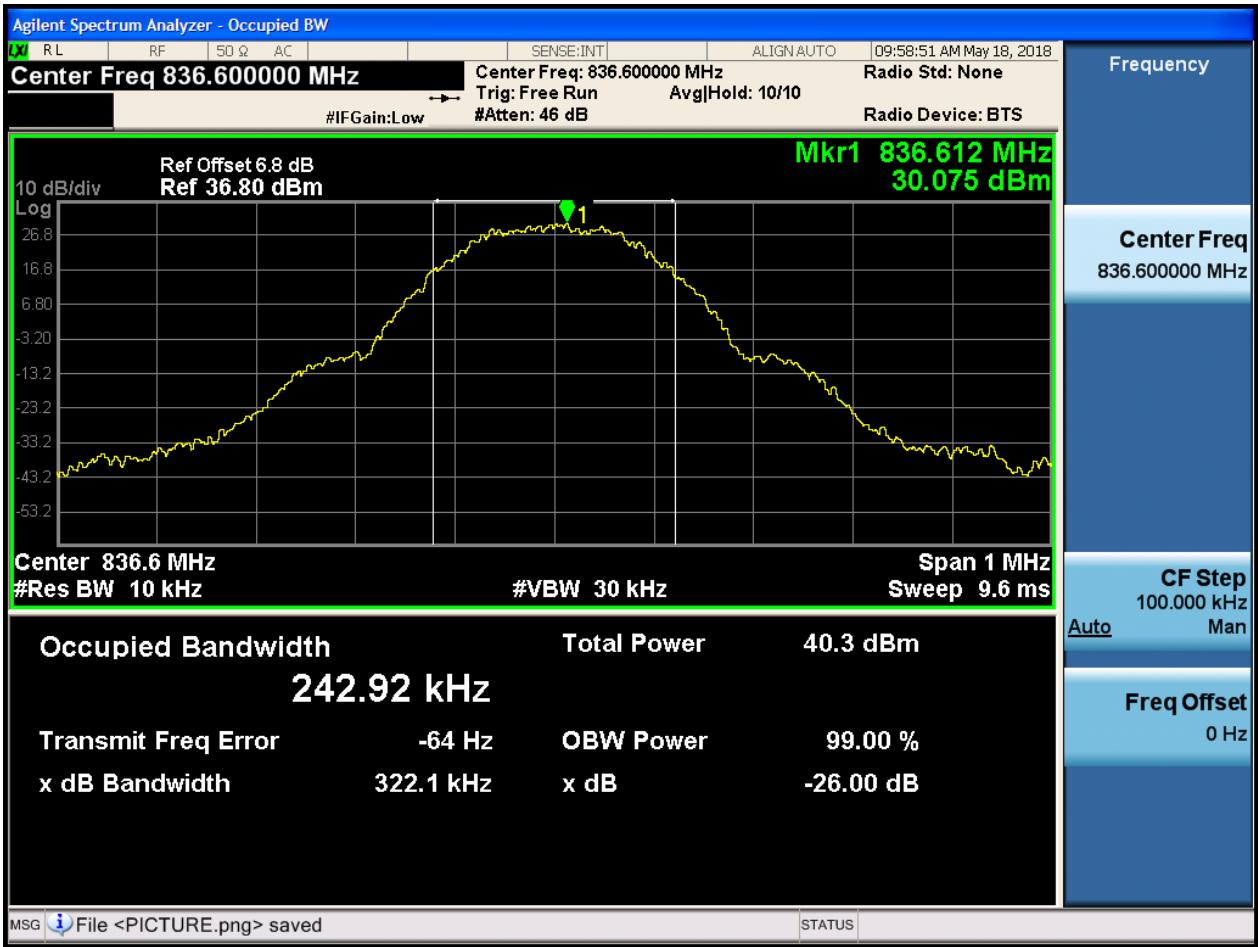
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



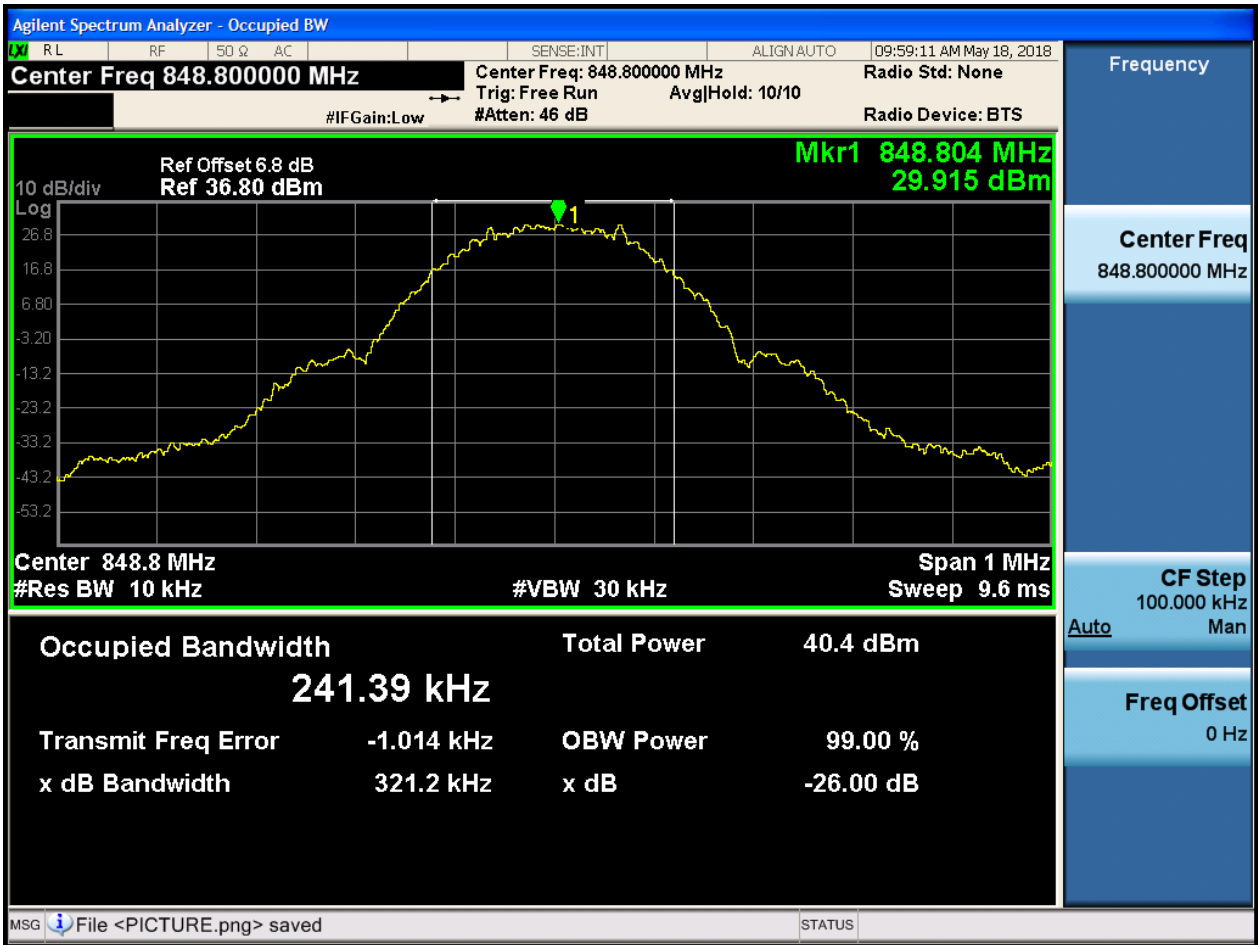


4.1.1.1.2 Test Channel = MCH





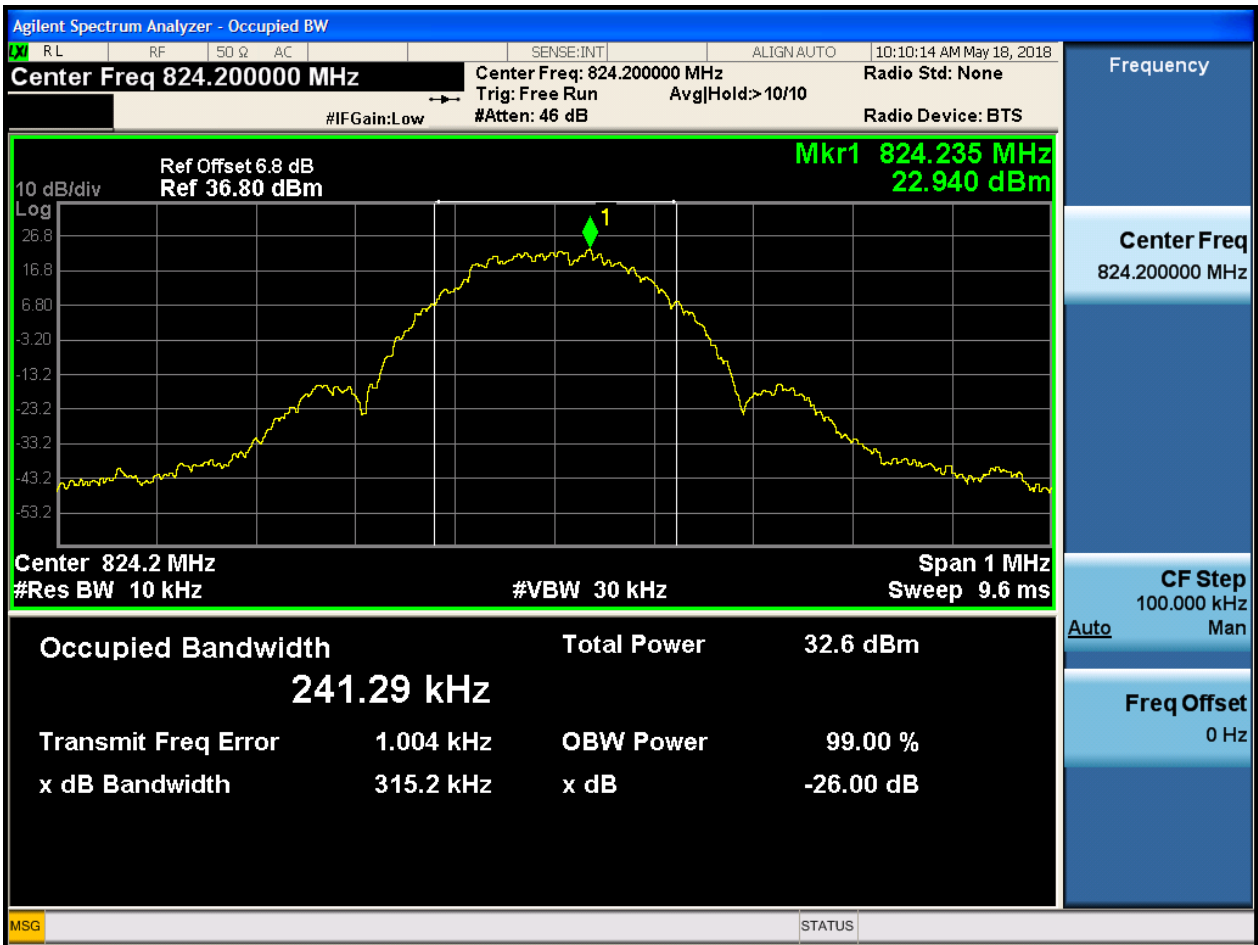
4.1.1.1.3 Test Channel = HCH





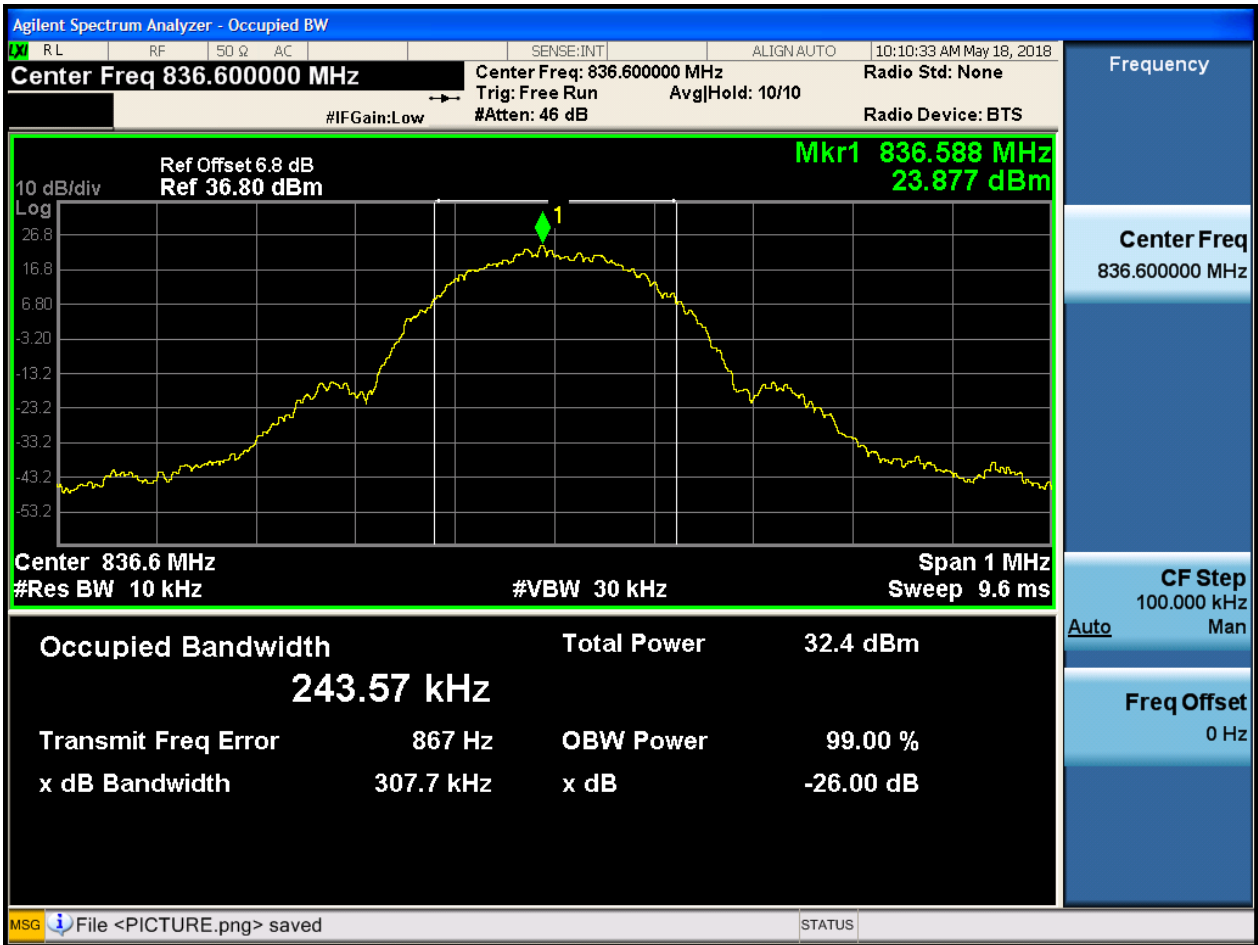
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4.1.1.2.1 Test Channel = LCH



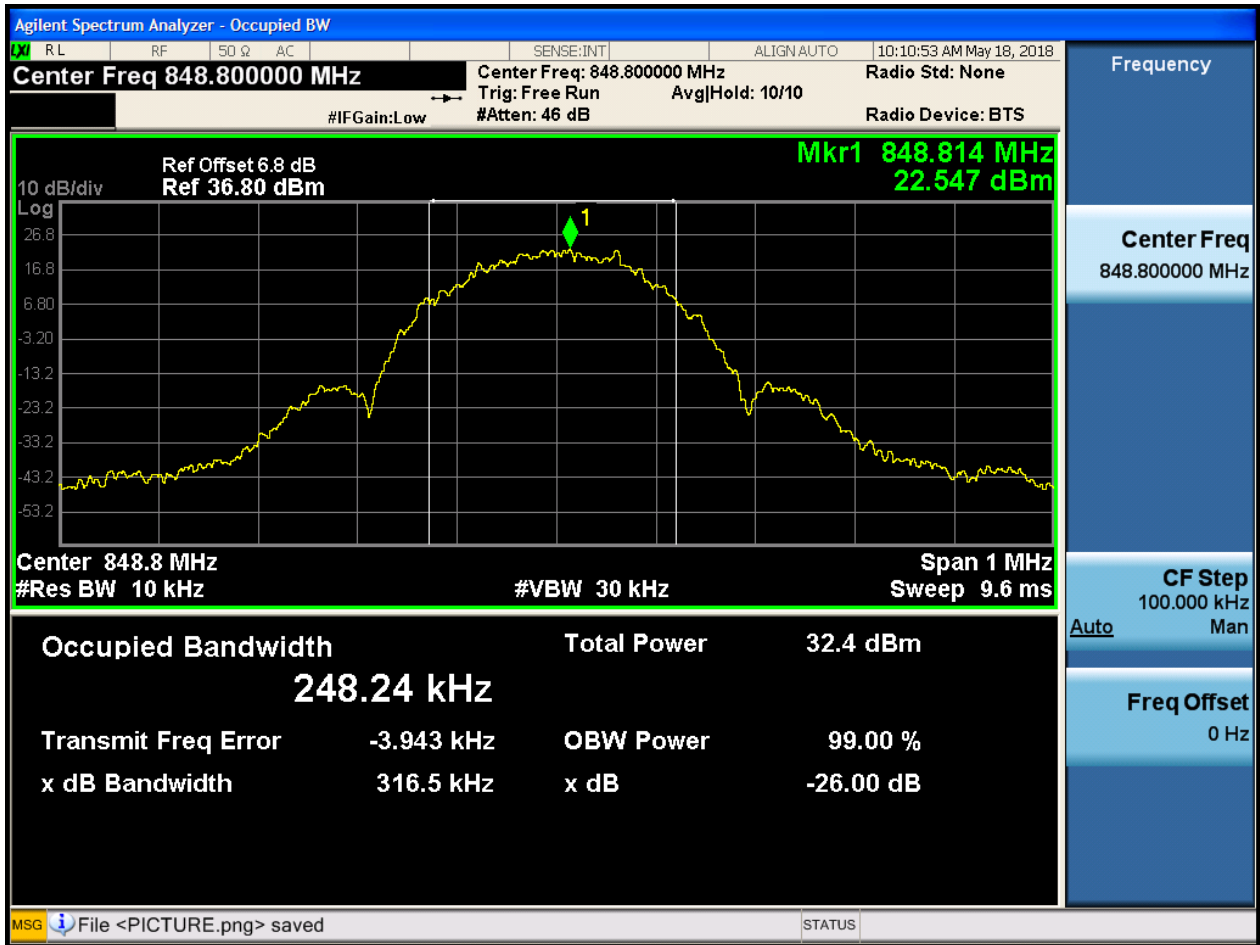


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

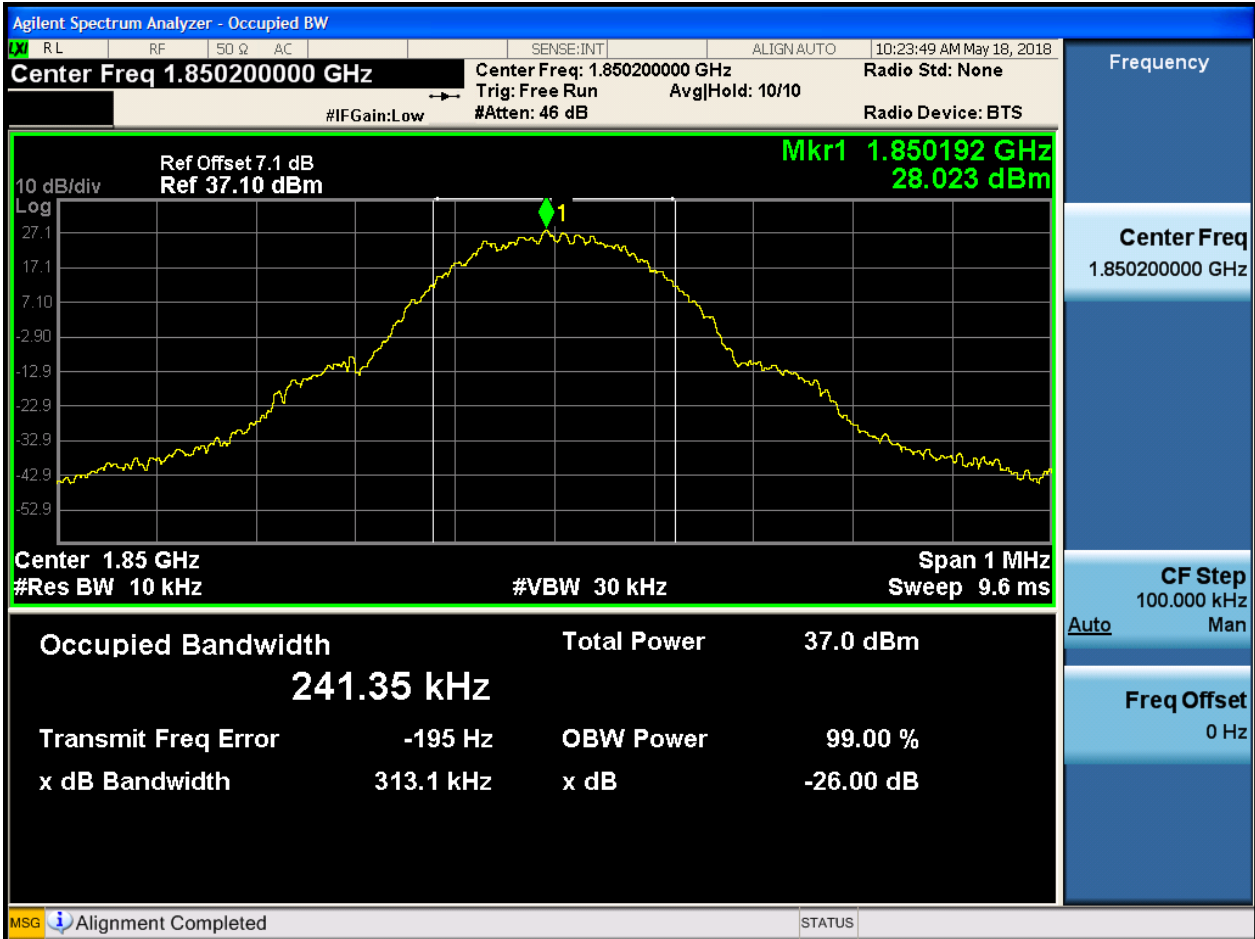




4.1.2 Test Band = GSM1900

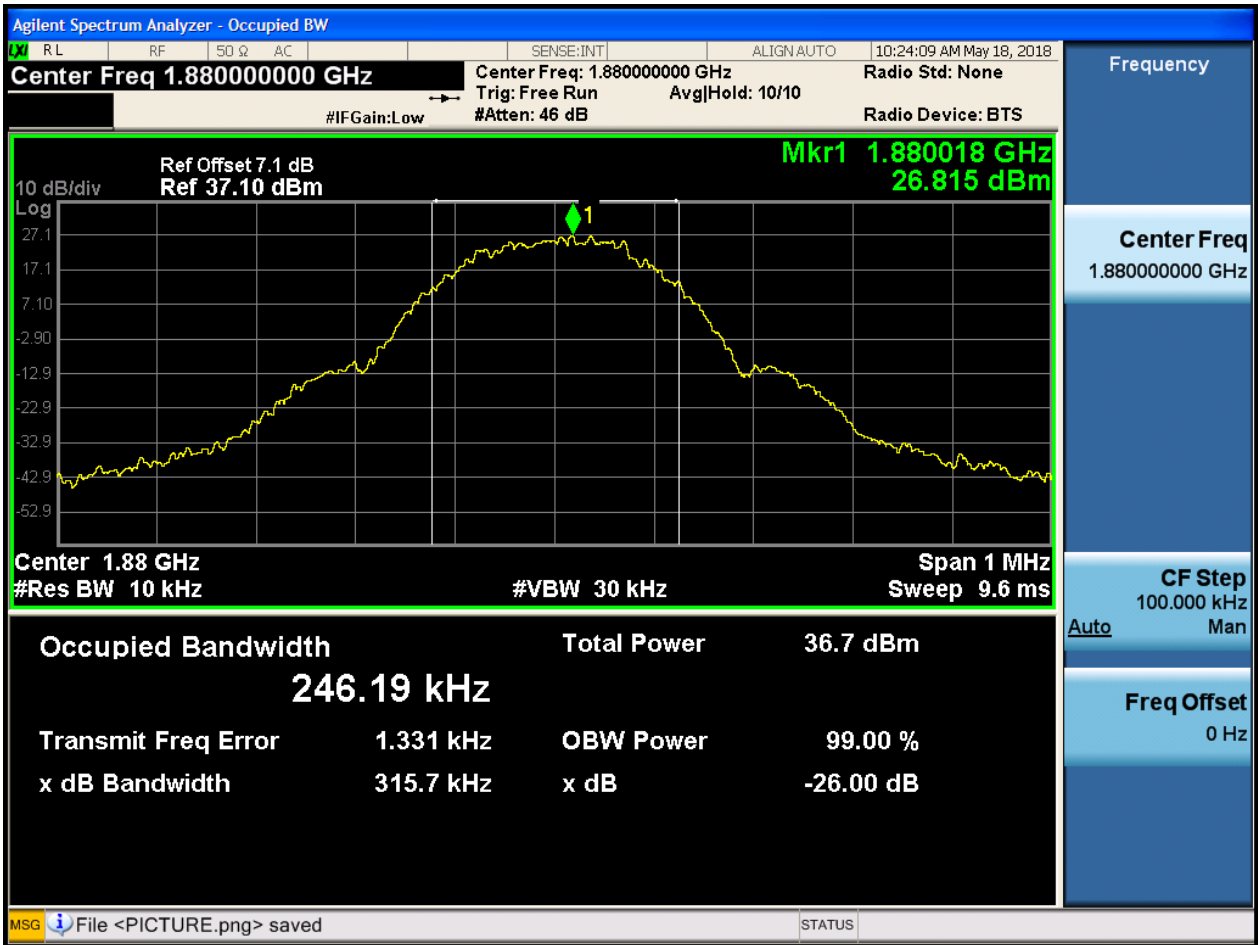
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



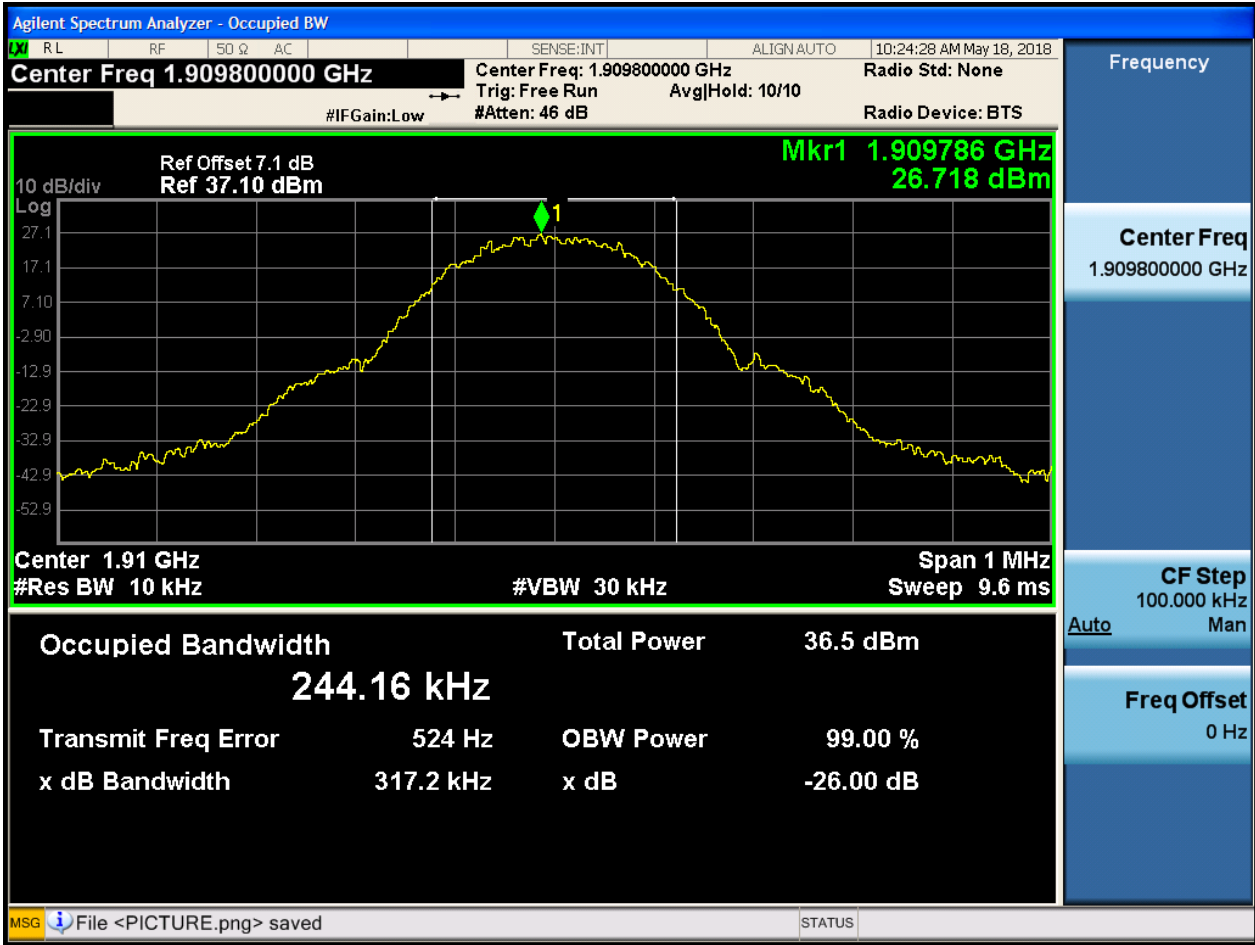


4.1.2.1.2 Test Channel = MCH





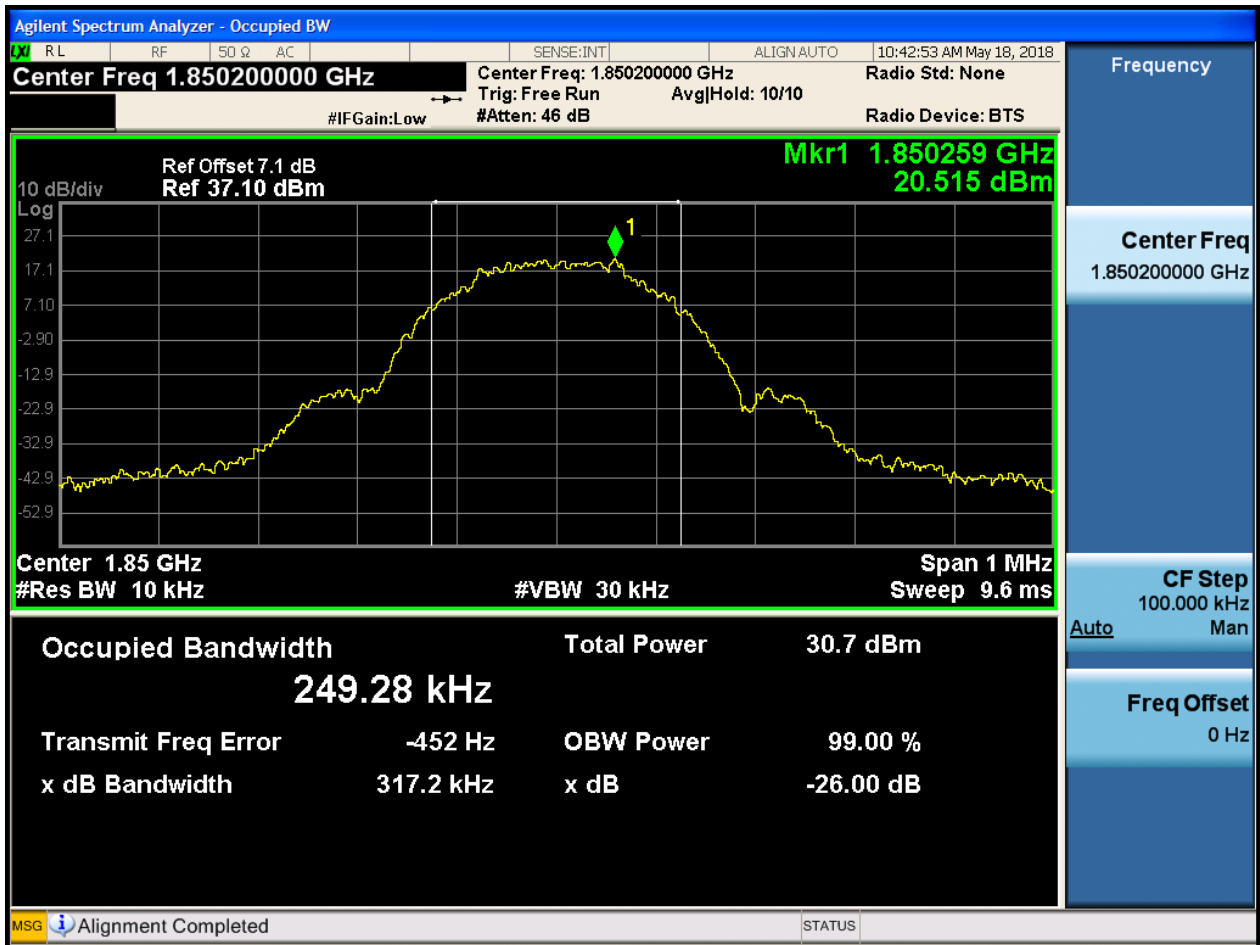
4.1.2.1.3 Test Channel = HCH





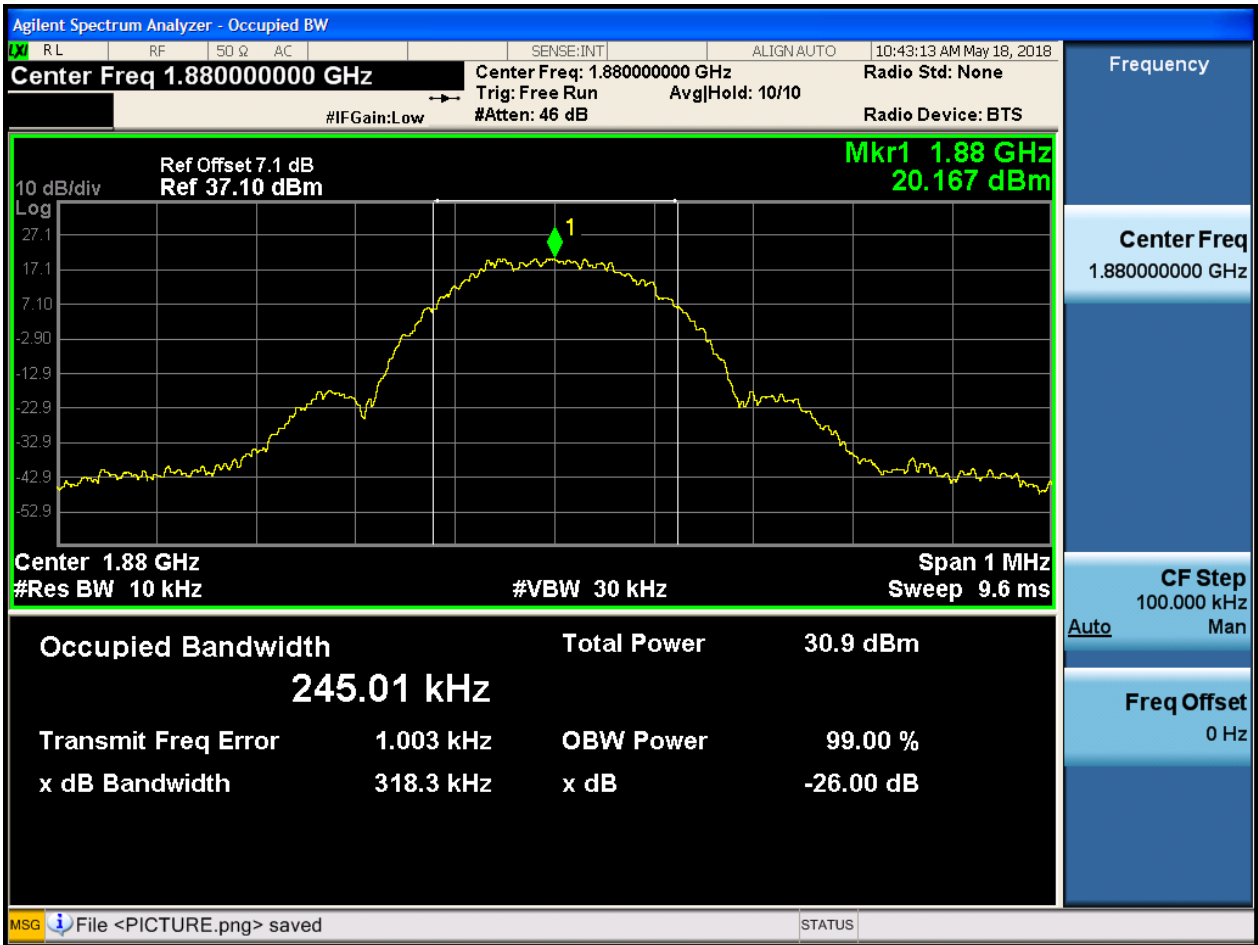
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



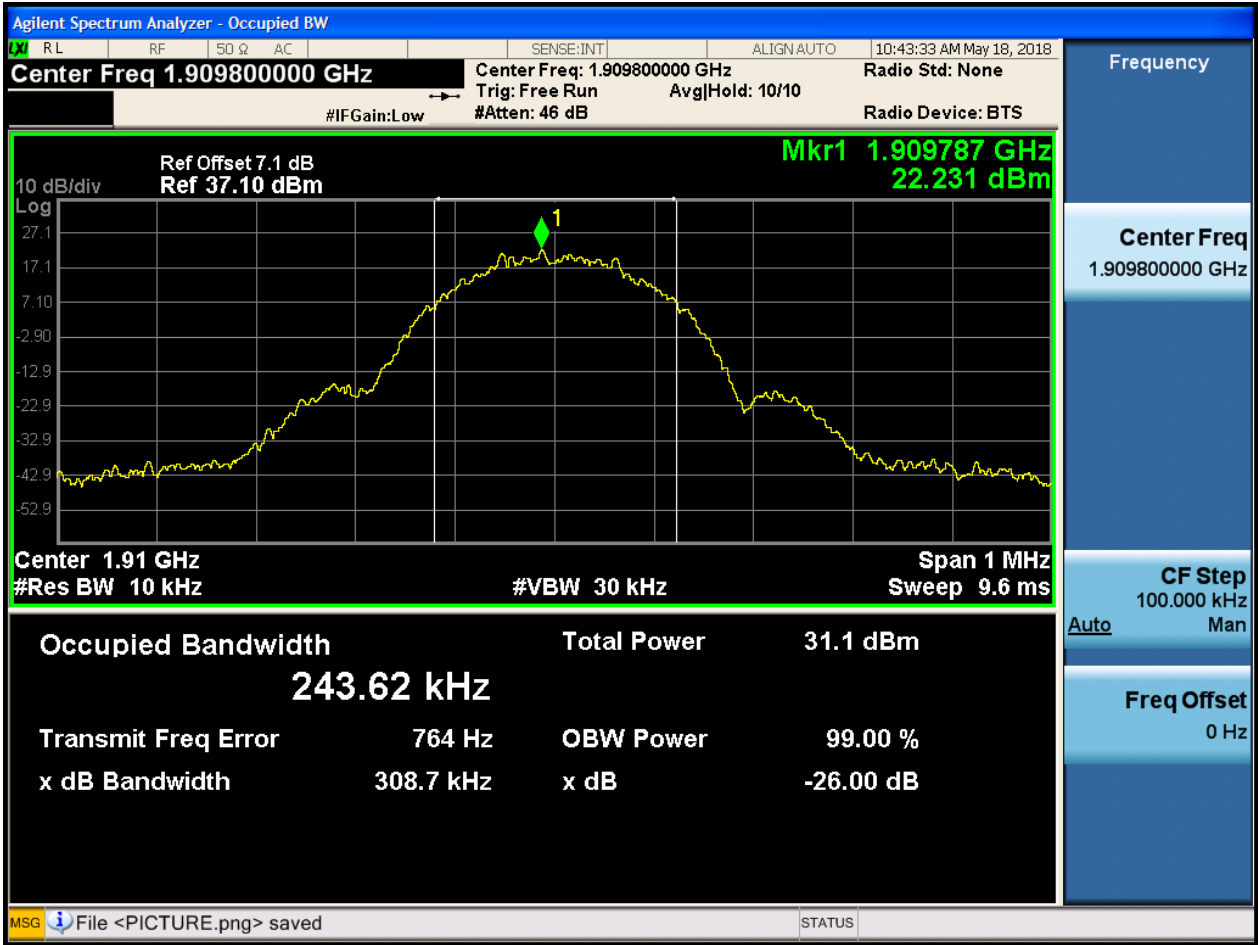


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





5Appendix_E: Band Edges Compliance

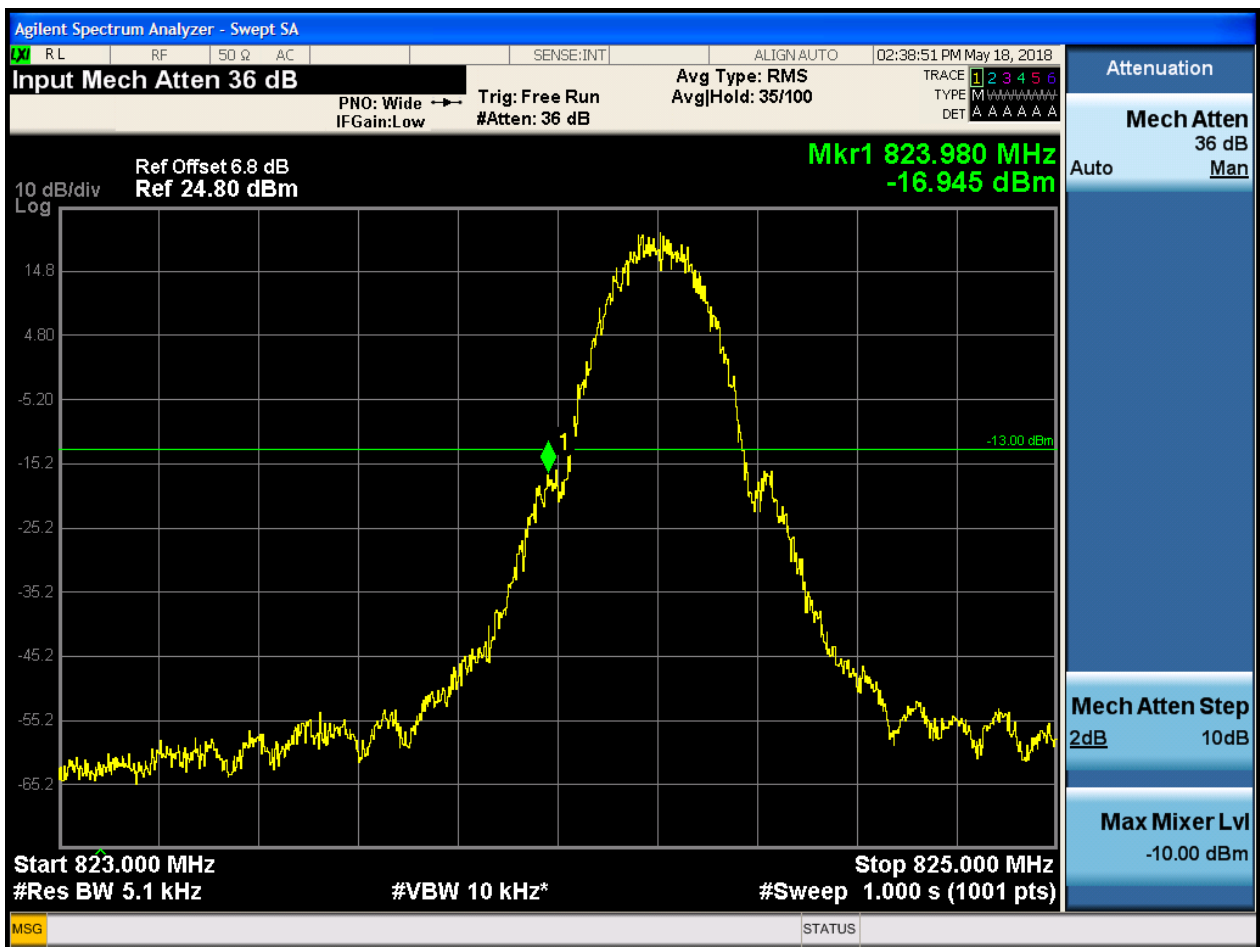
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM850

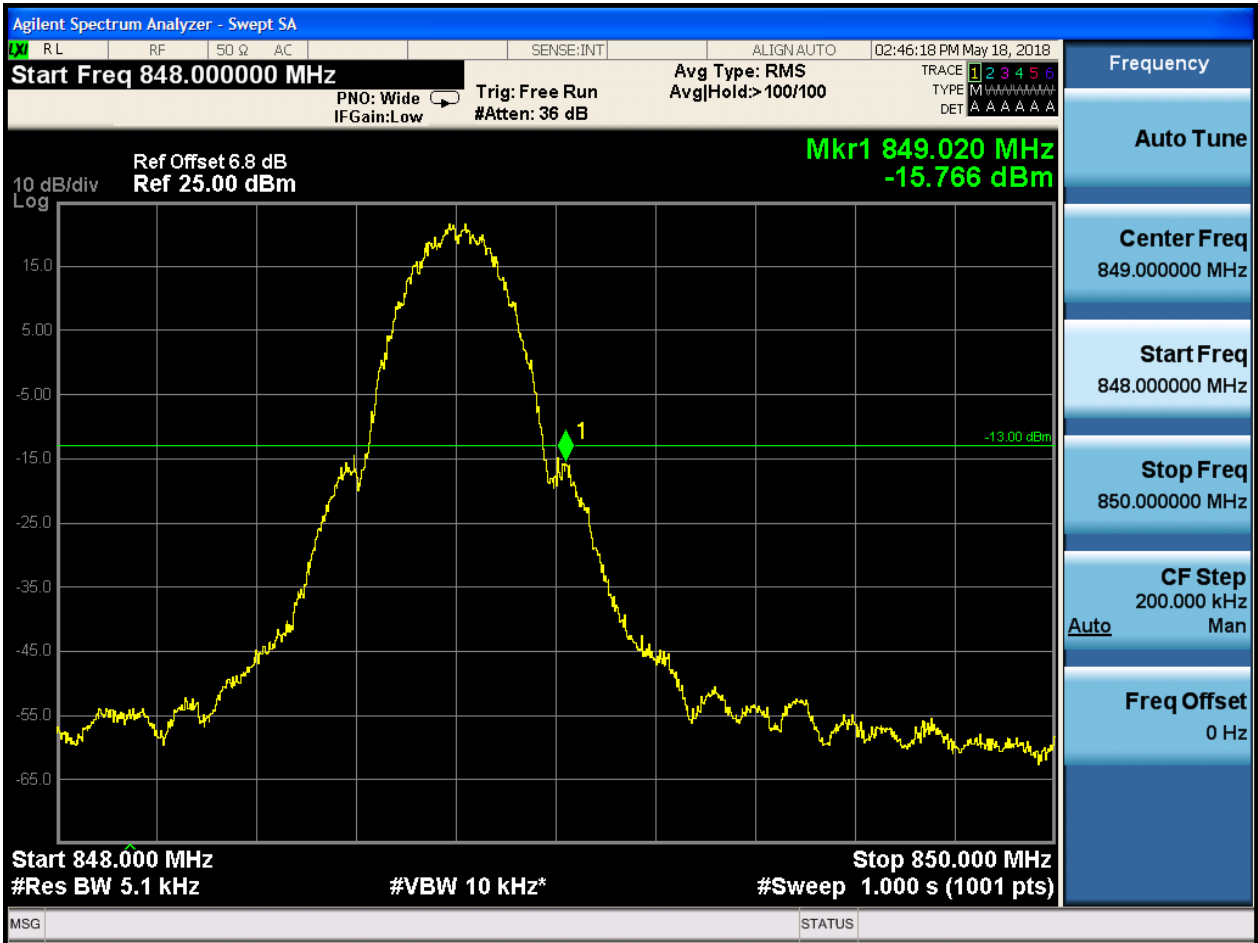
5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH



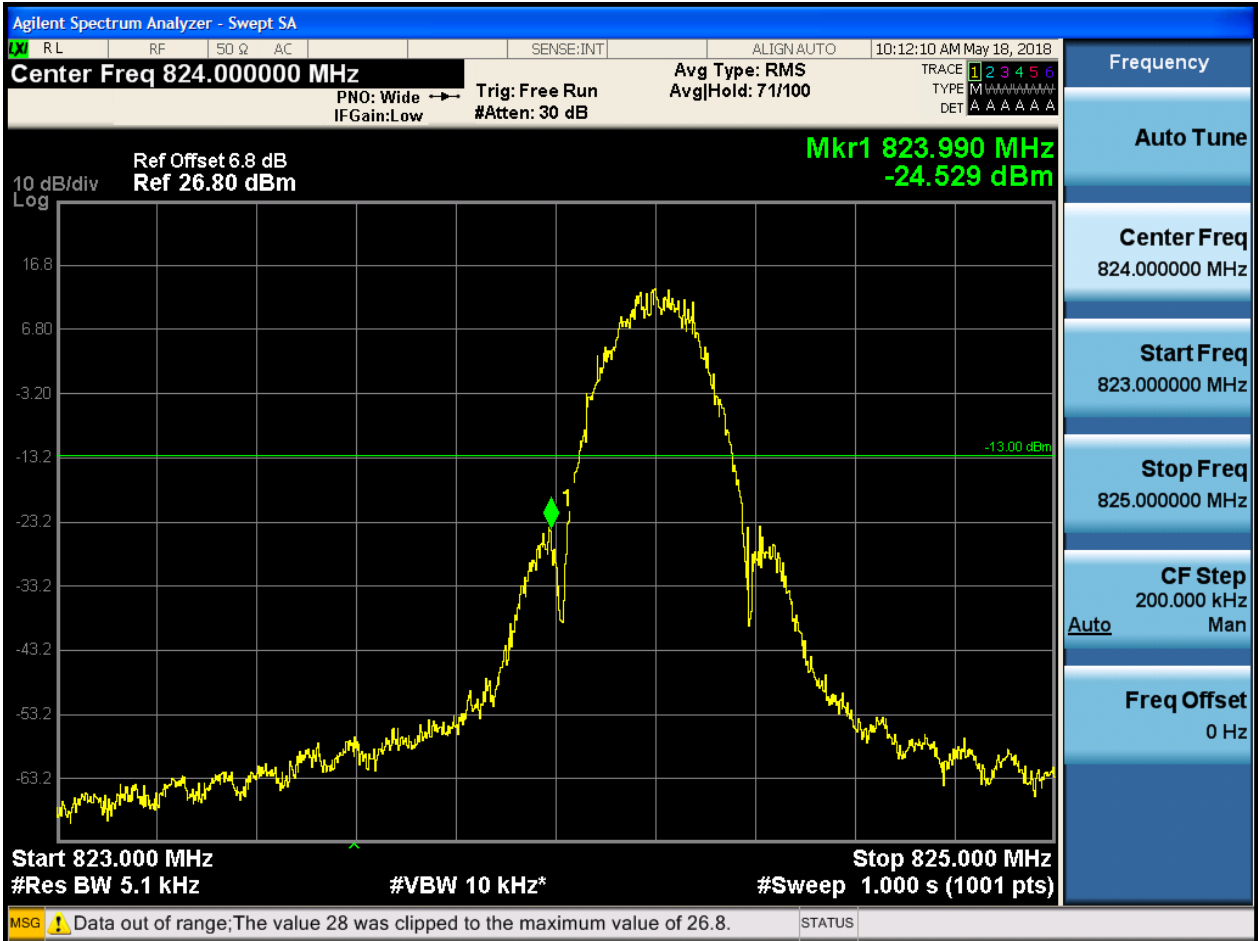


5.1.1.1.2 Test Channel = HCH

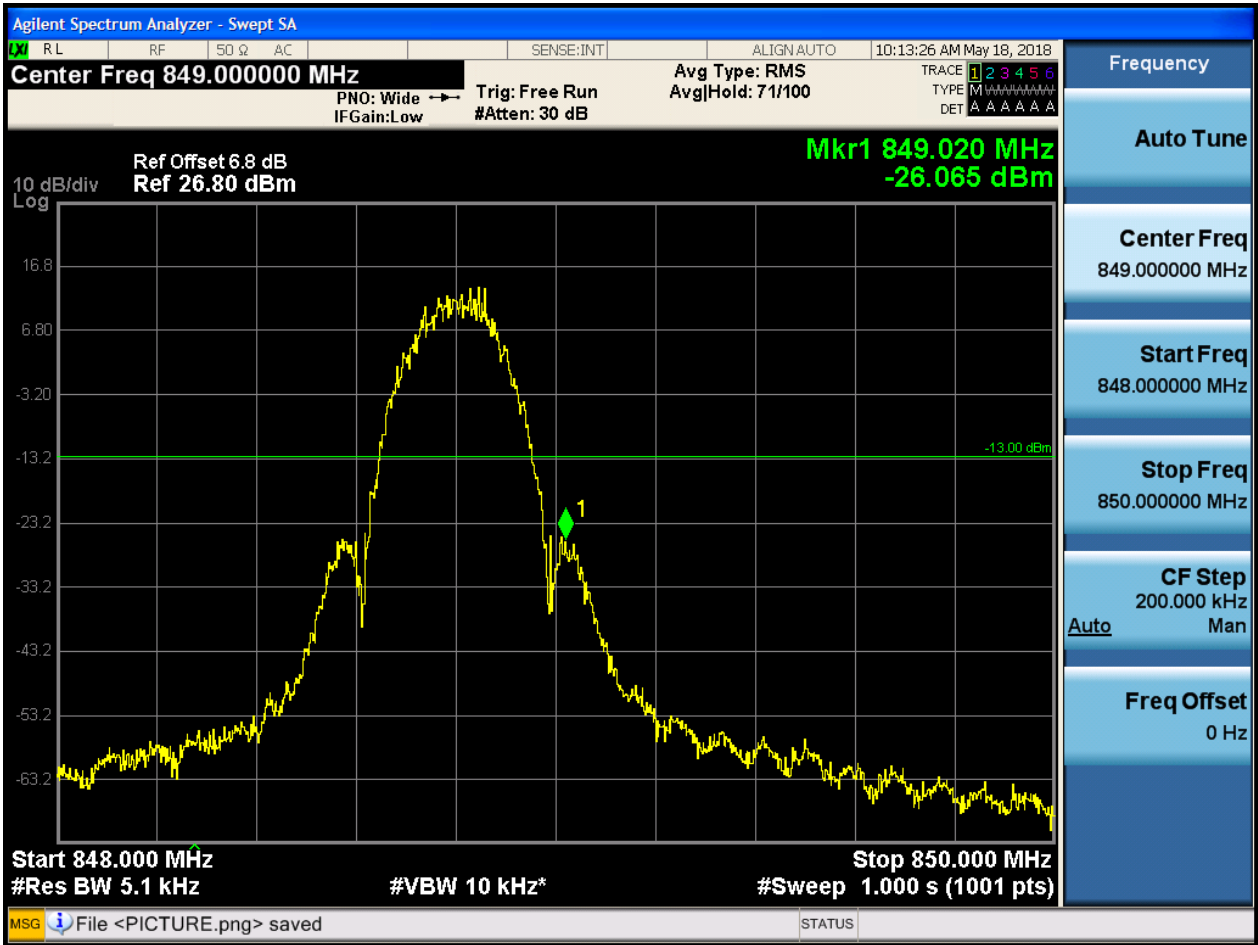


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



5.1.1.2.2 Test Channel = HCH

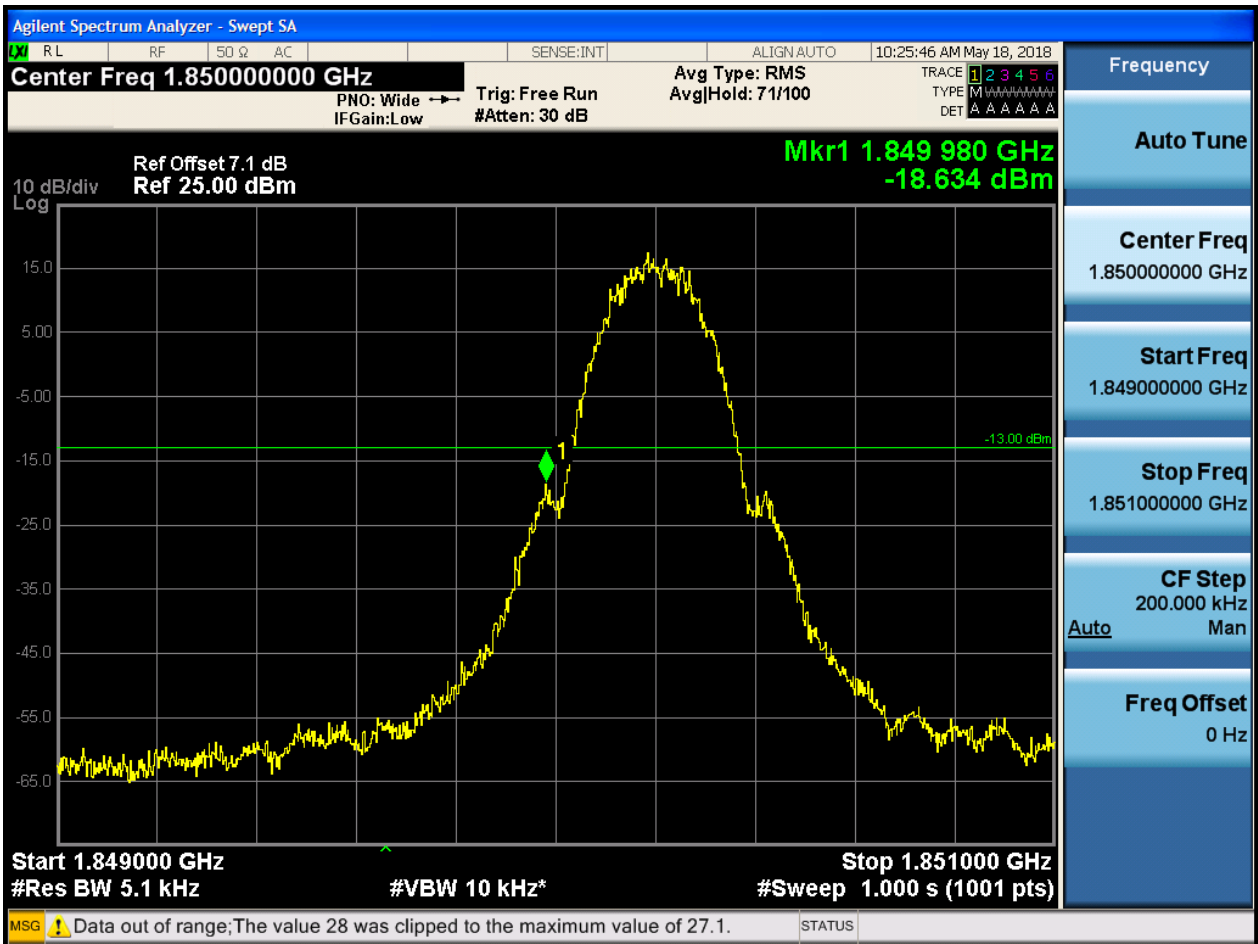




5.1.2 Test Band = GSM1900

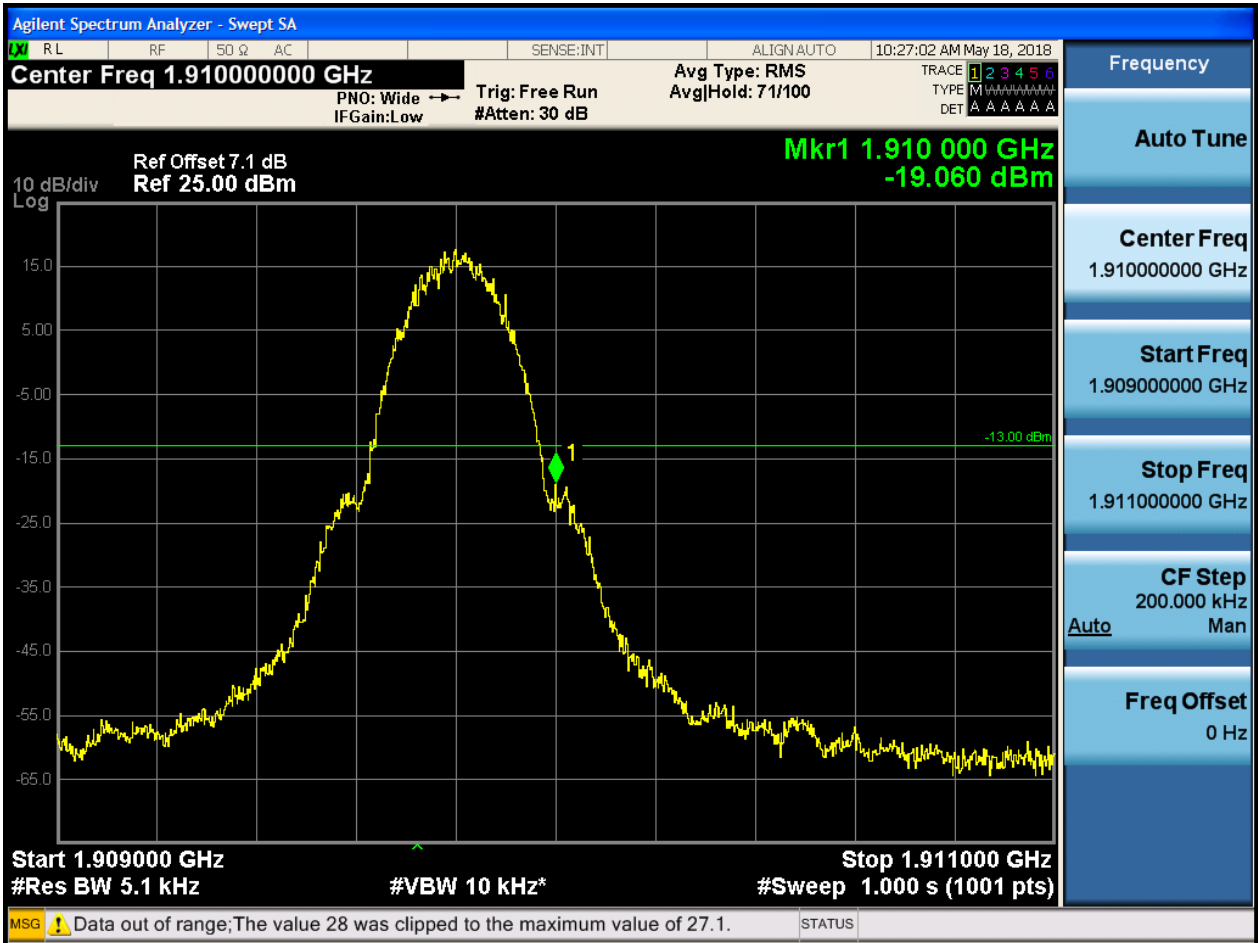
5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH



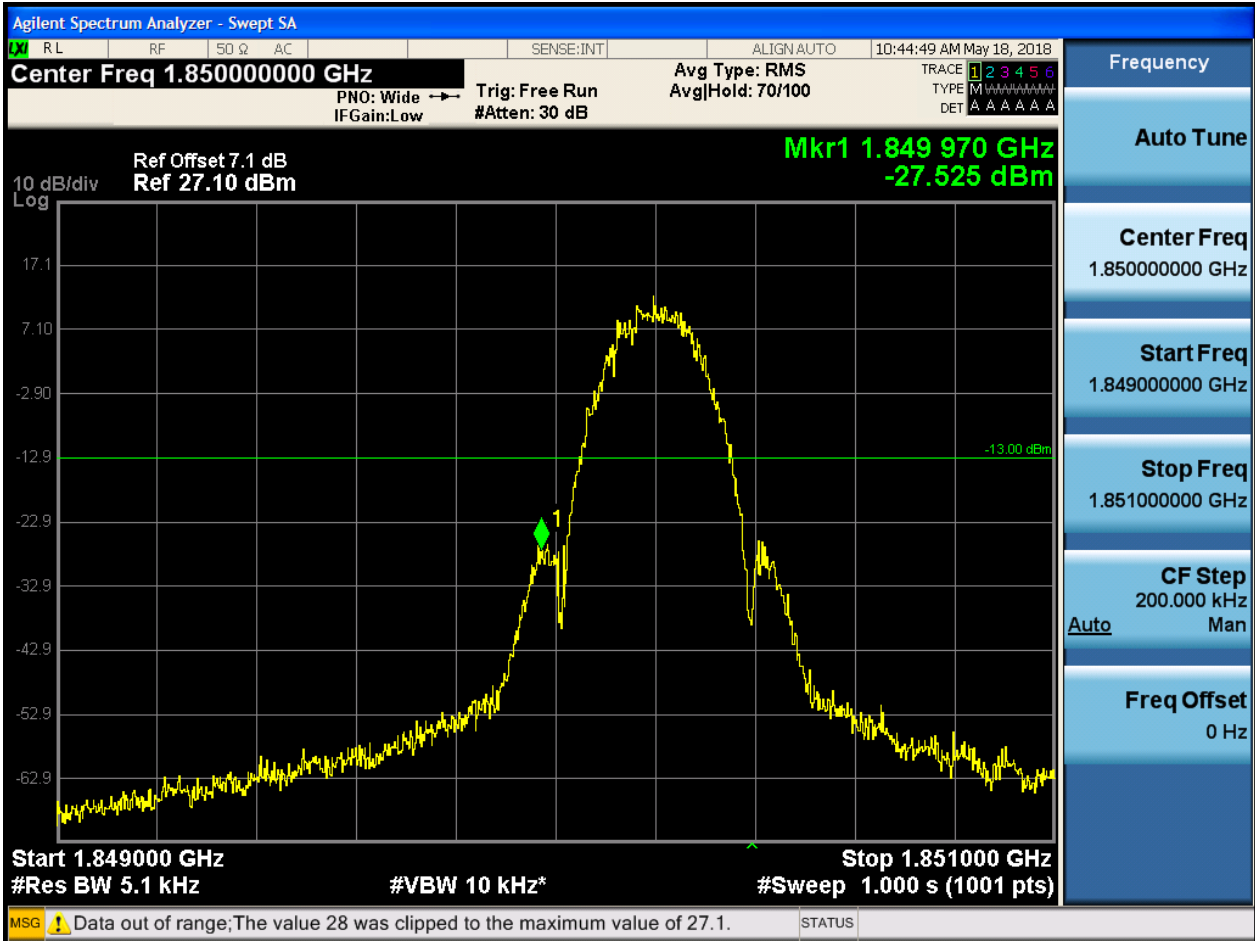


5.1.2.1.2 Test Channel = HCH

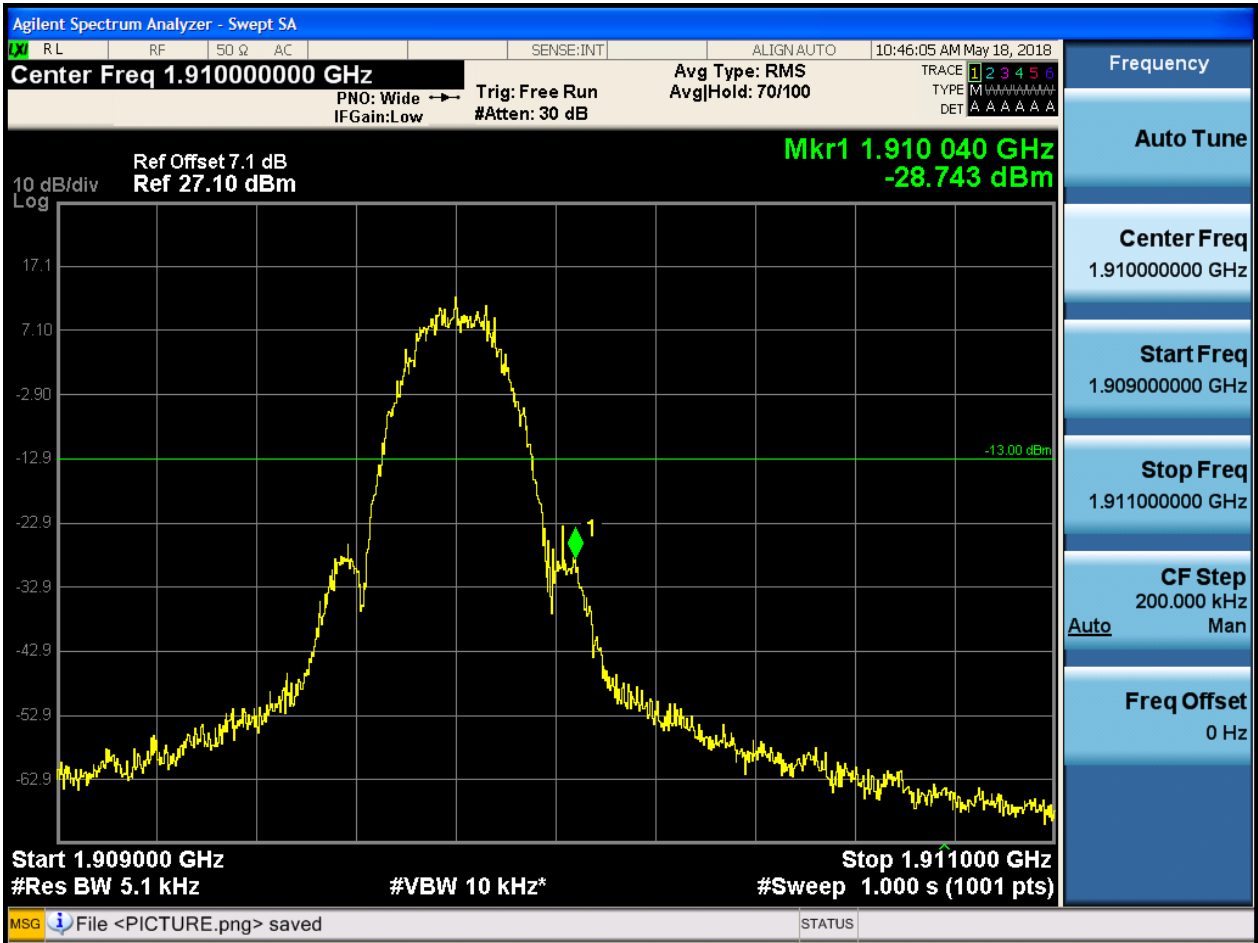


5.1.2.2 Test Mode = GSM/TM2

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.

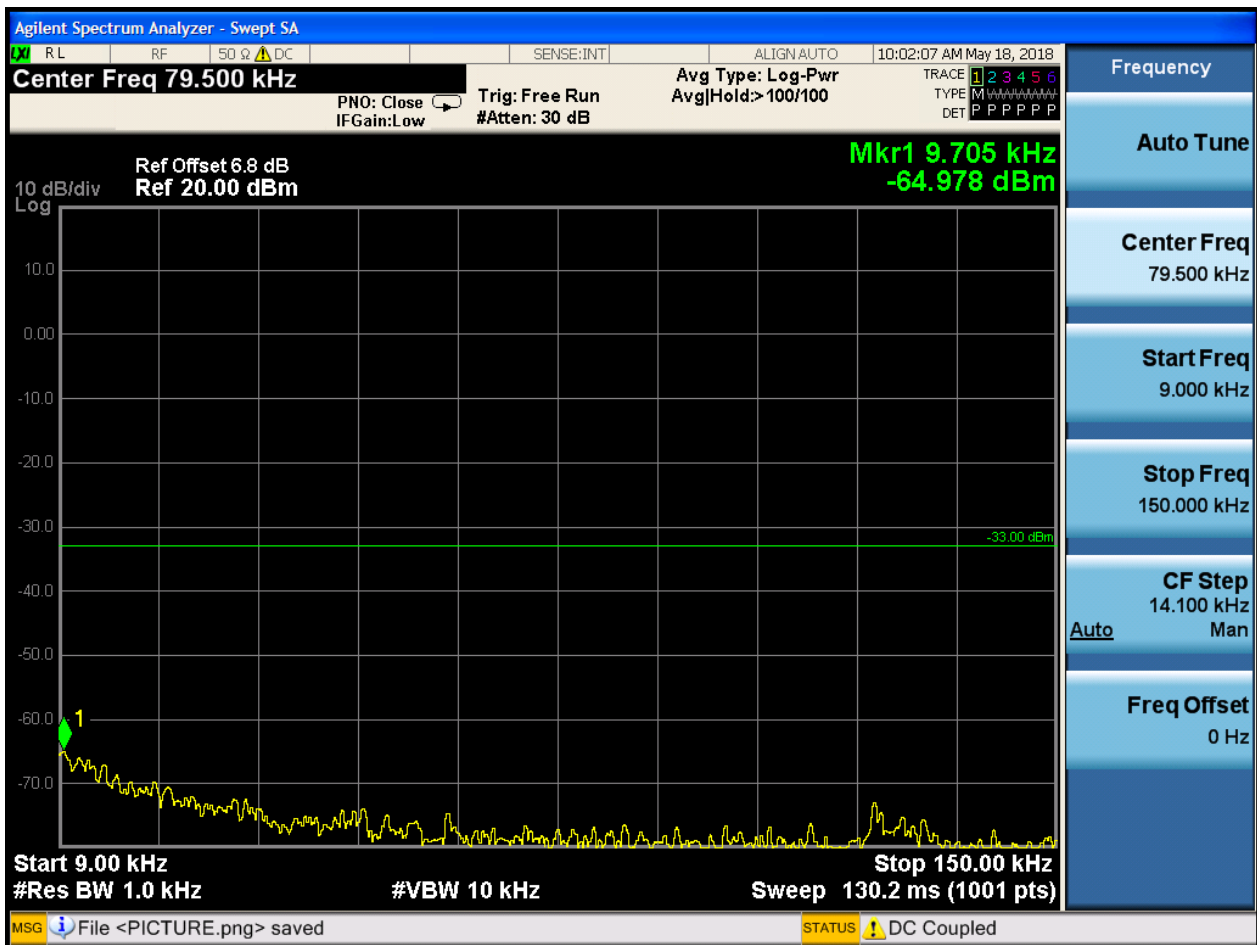
Part I - Test Plots

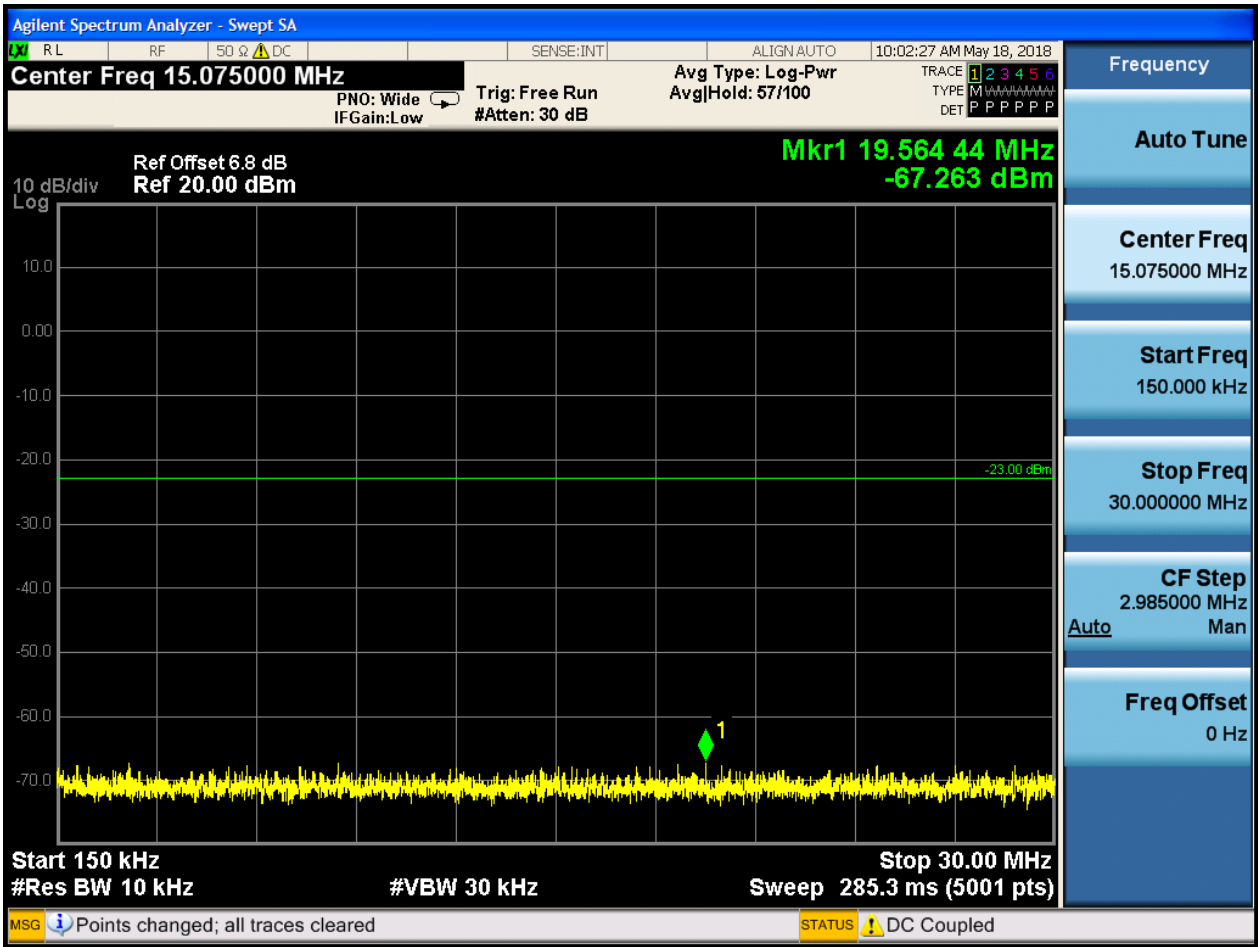
6.1 For GSM

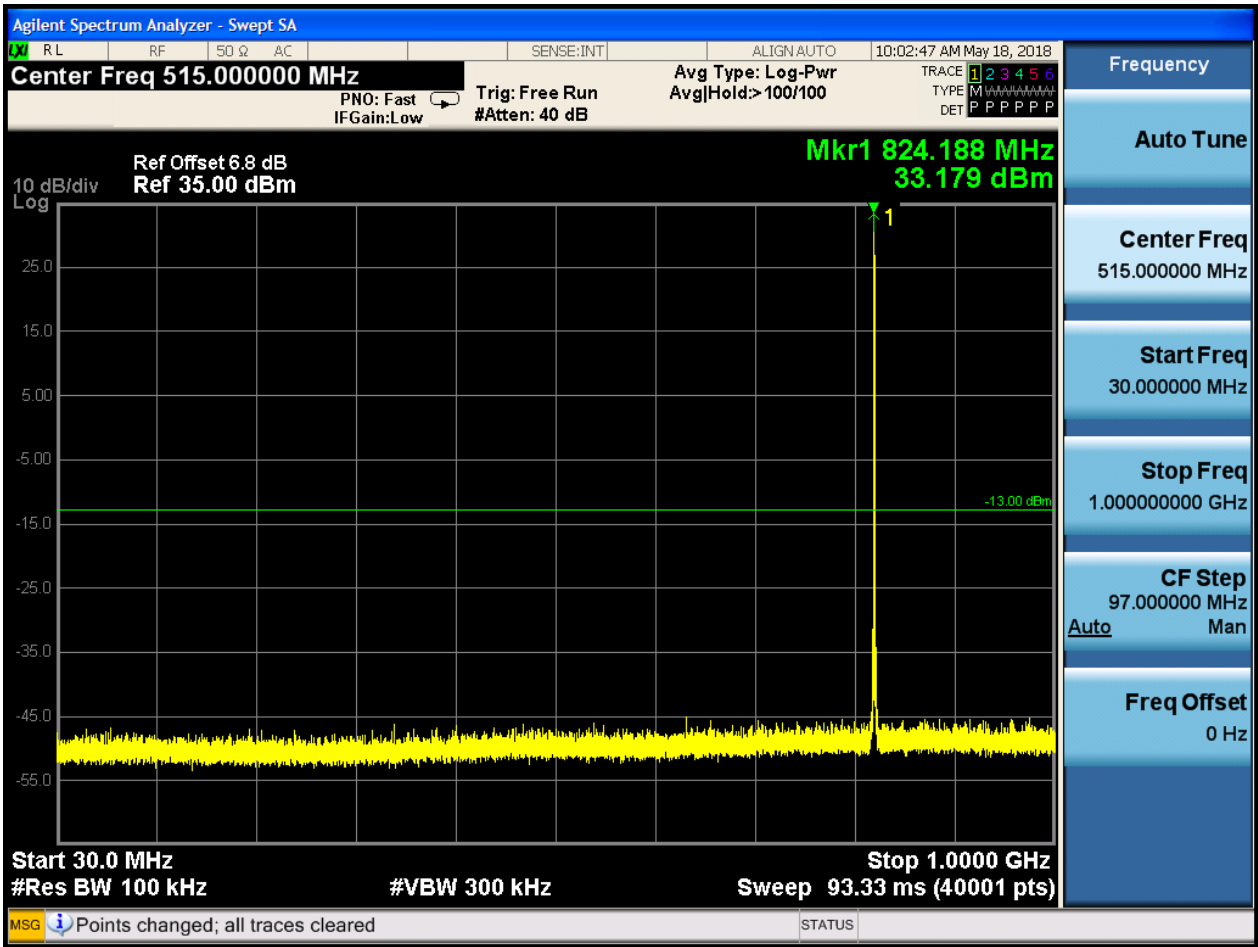
6.1.1 Test Band = GSM850

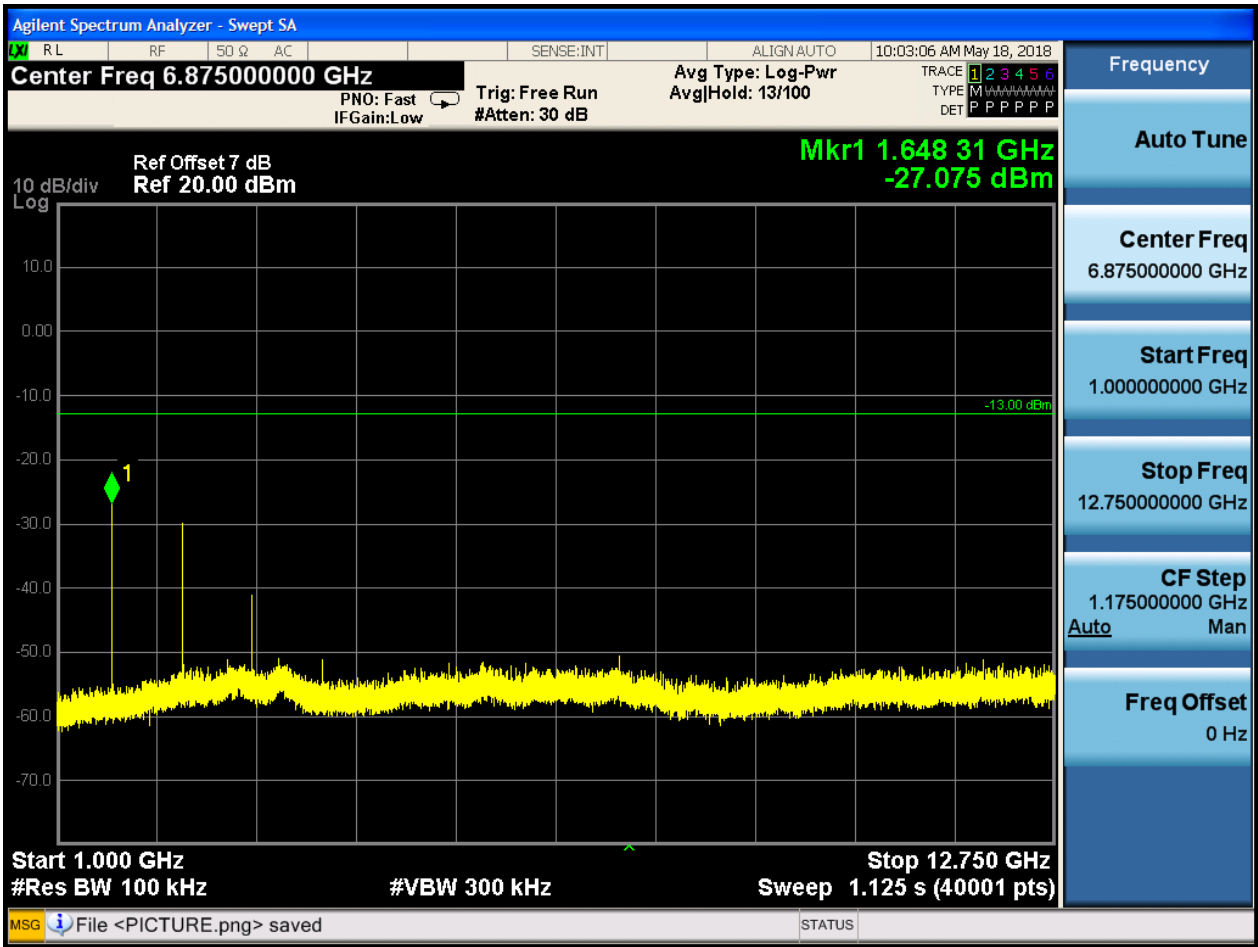
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH

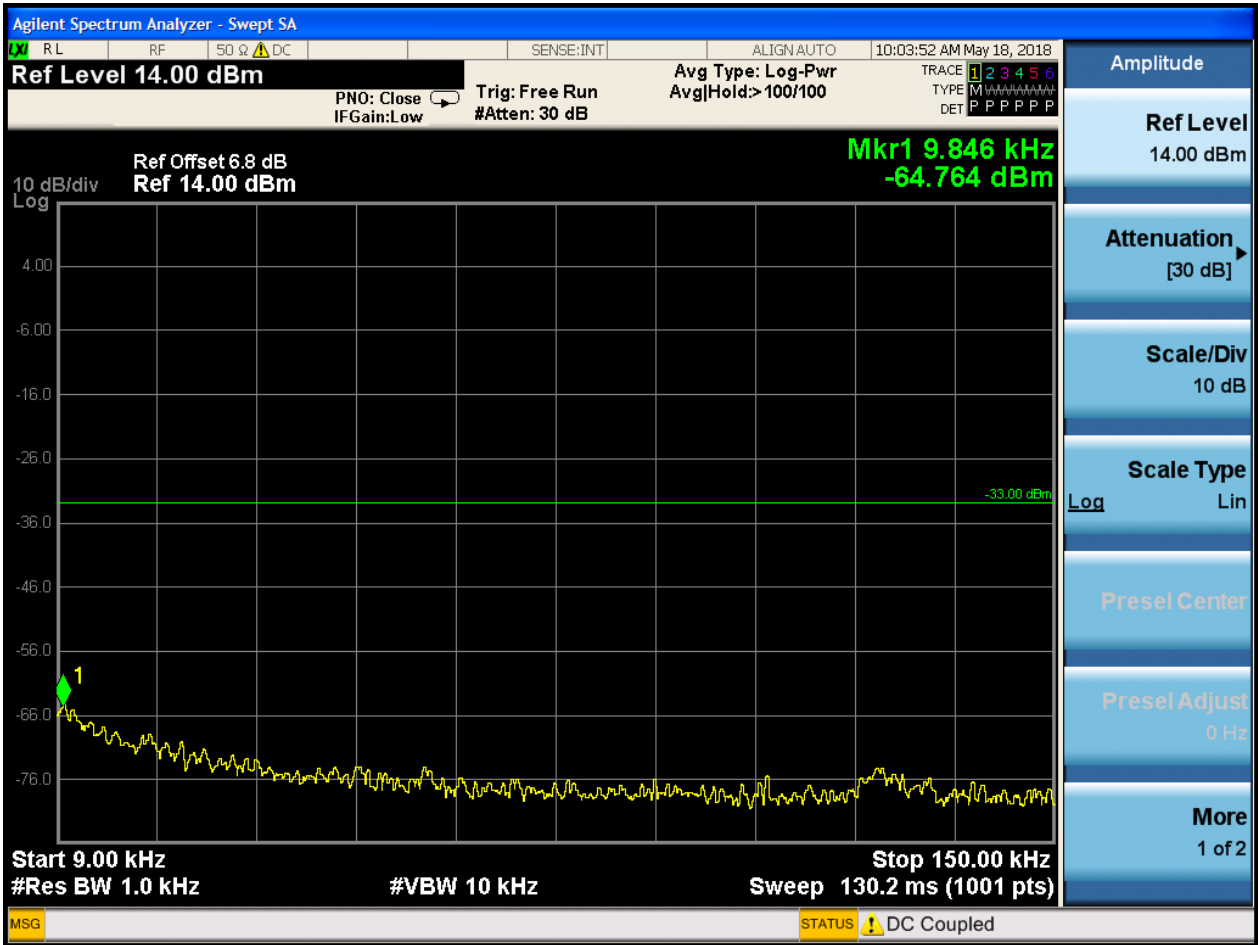


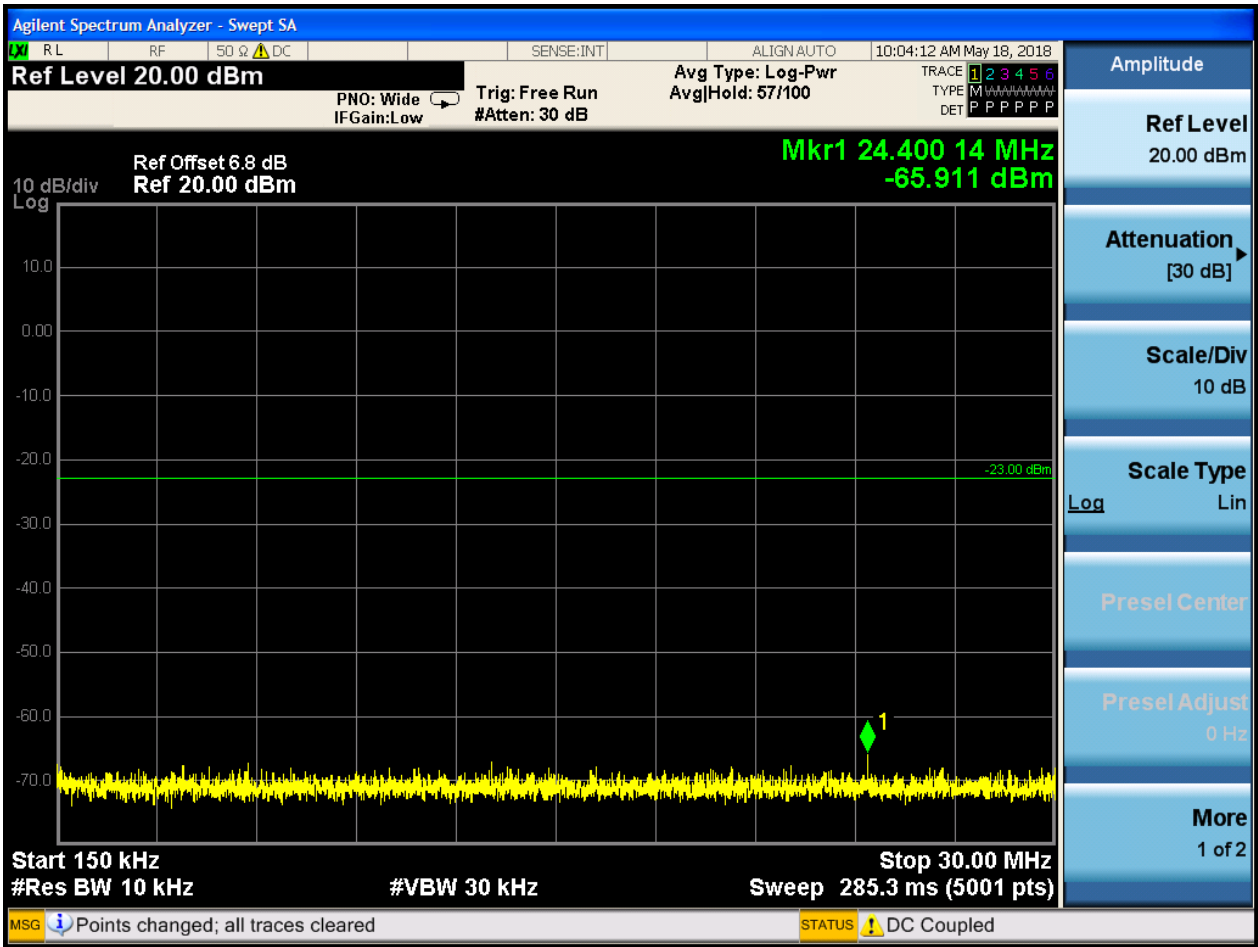


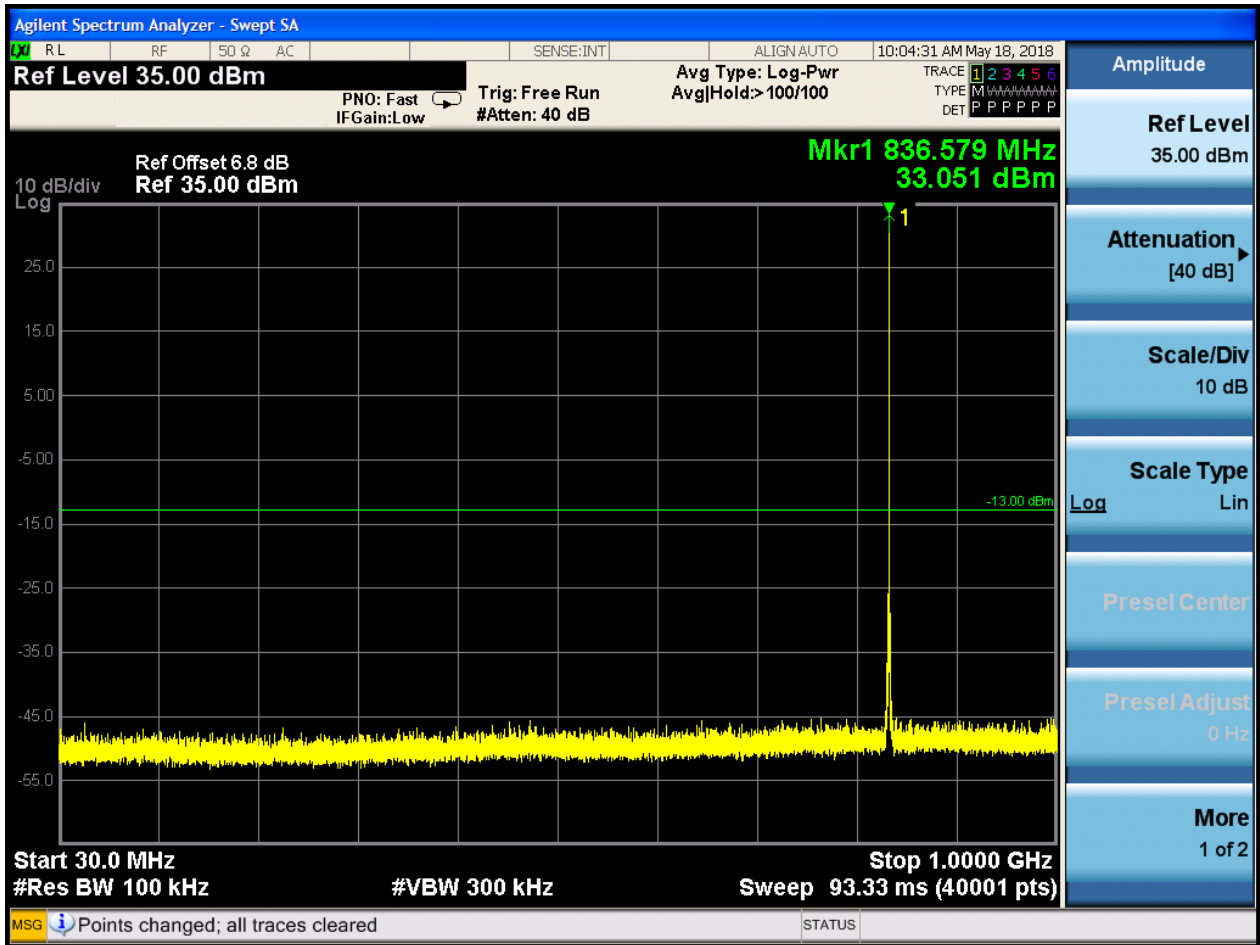




6.1.1.1.2 Test Channel = MCH

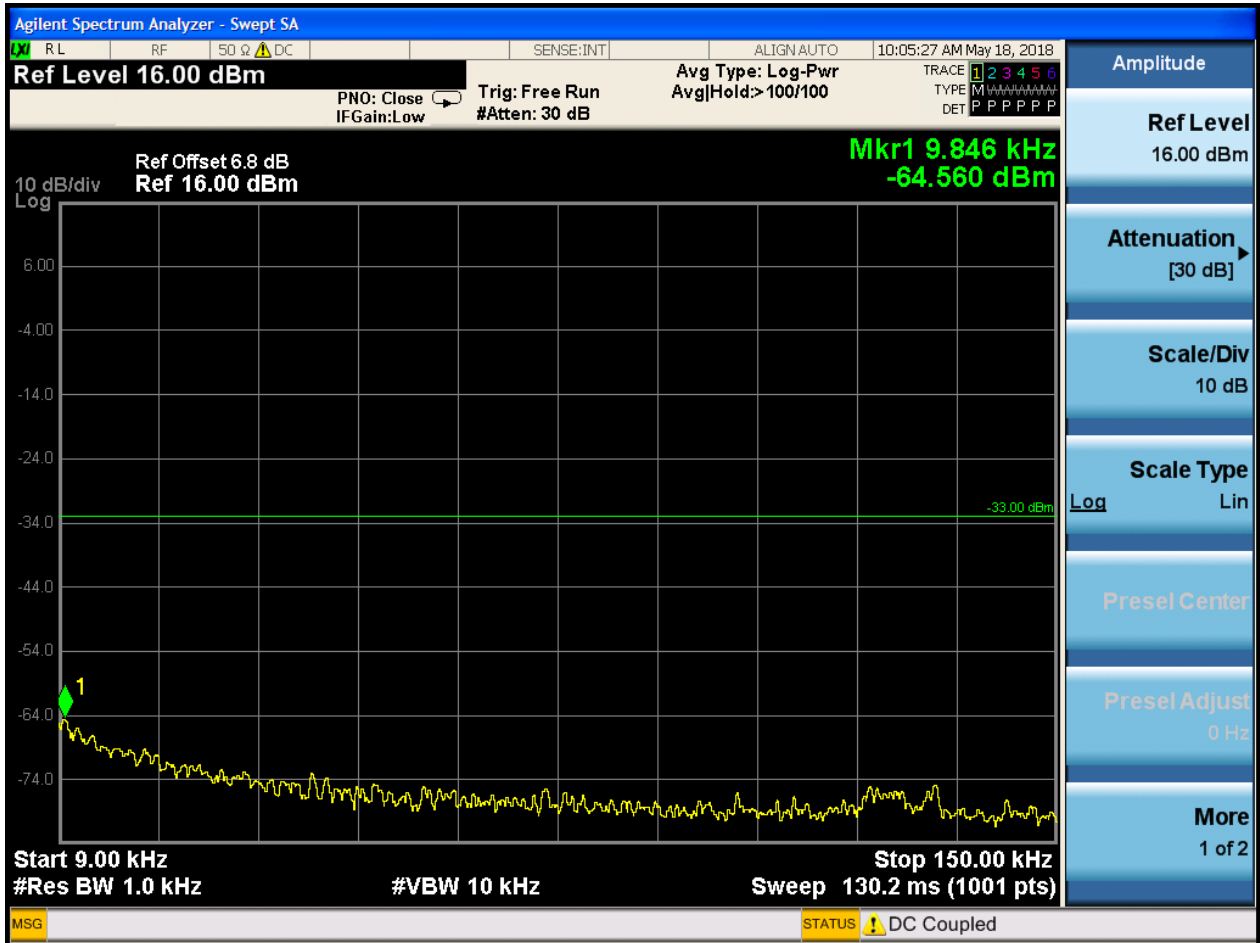


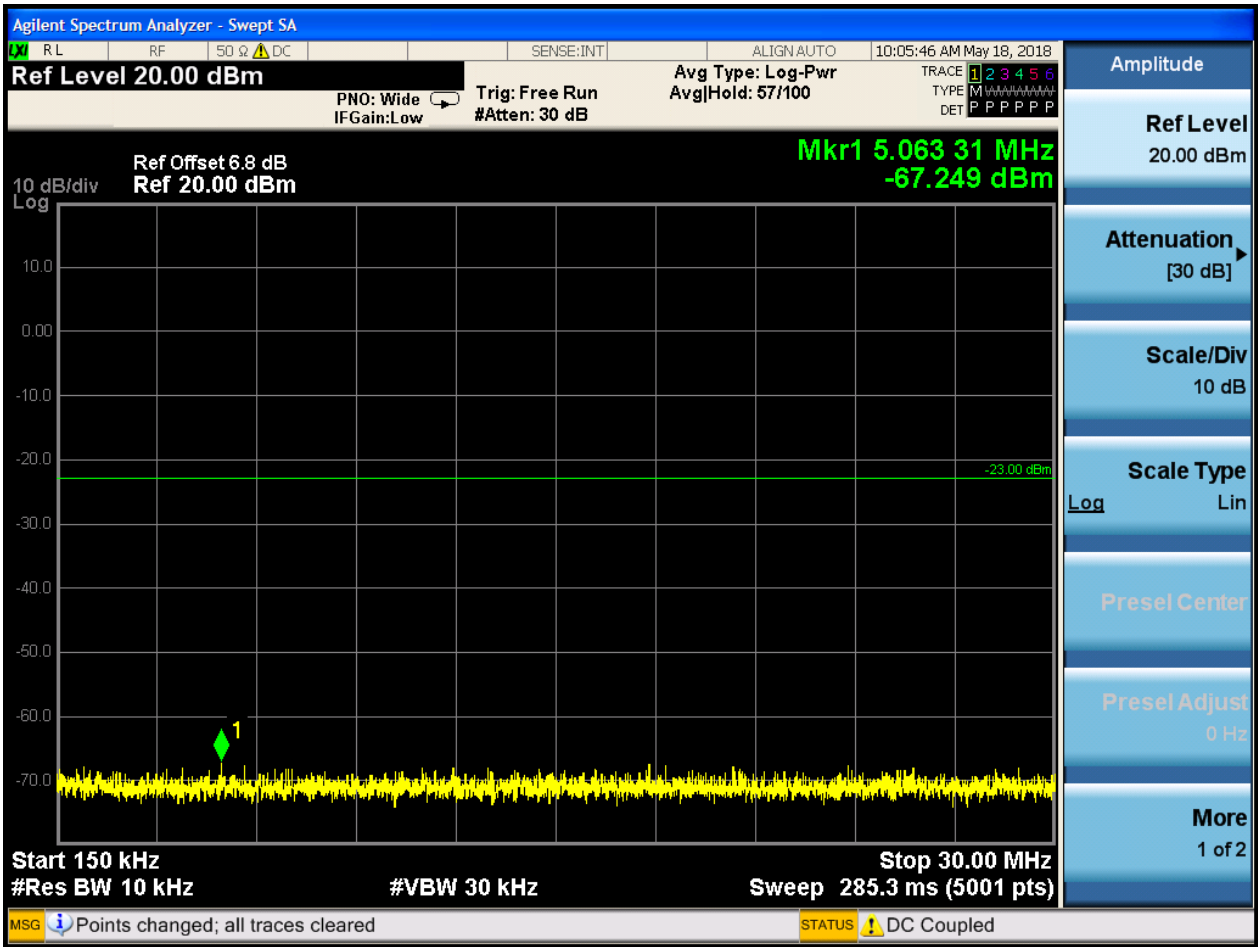


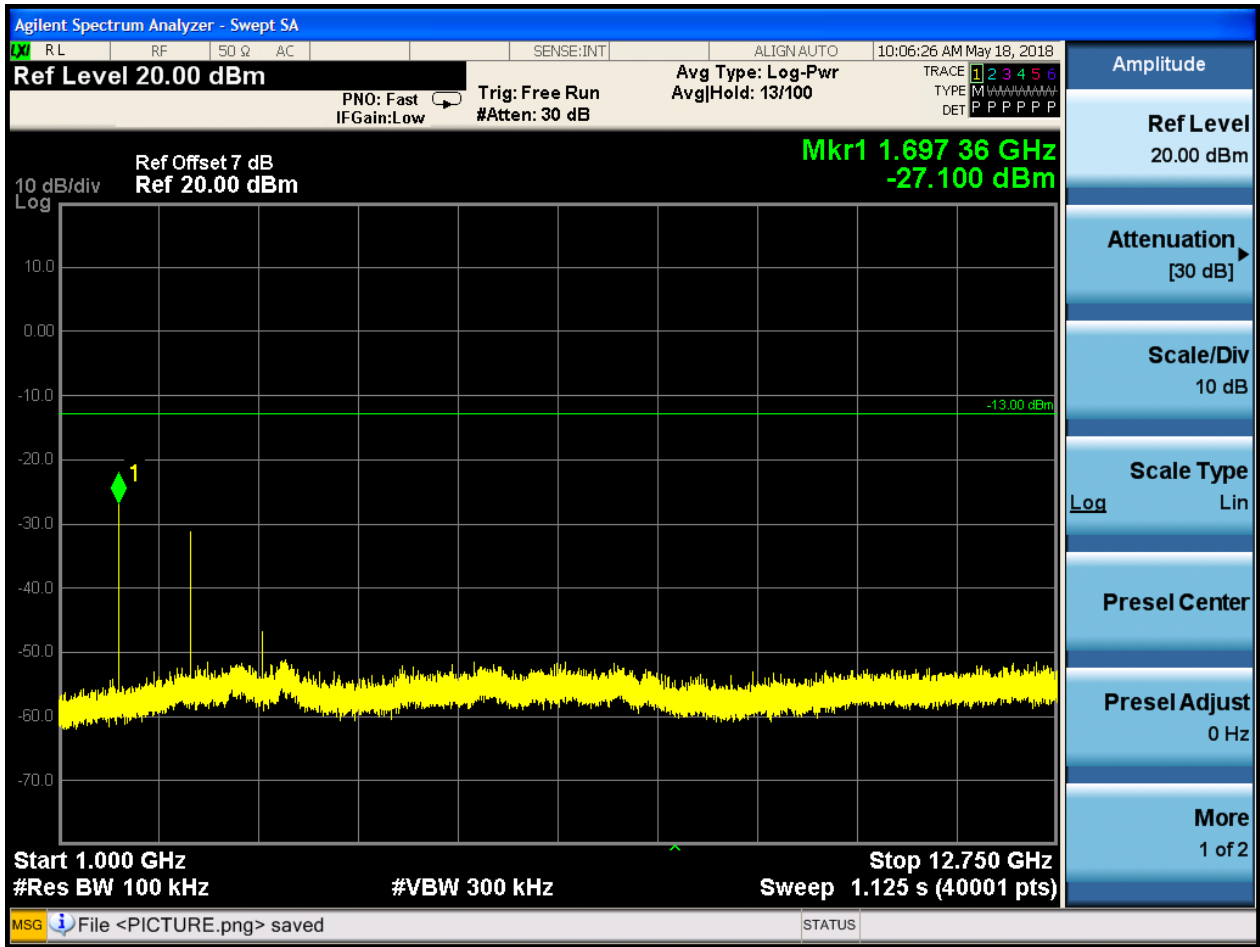




6.1.1.1.3 Test Channel = HCH



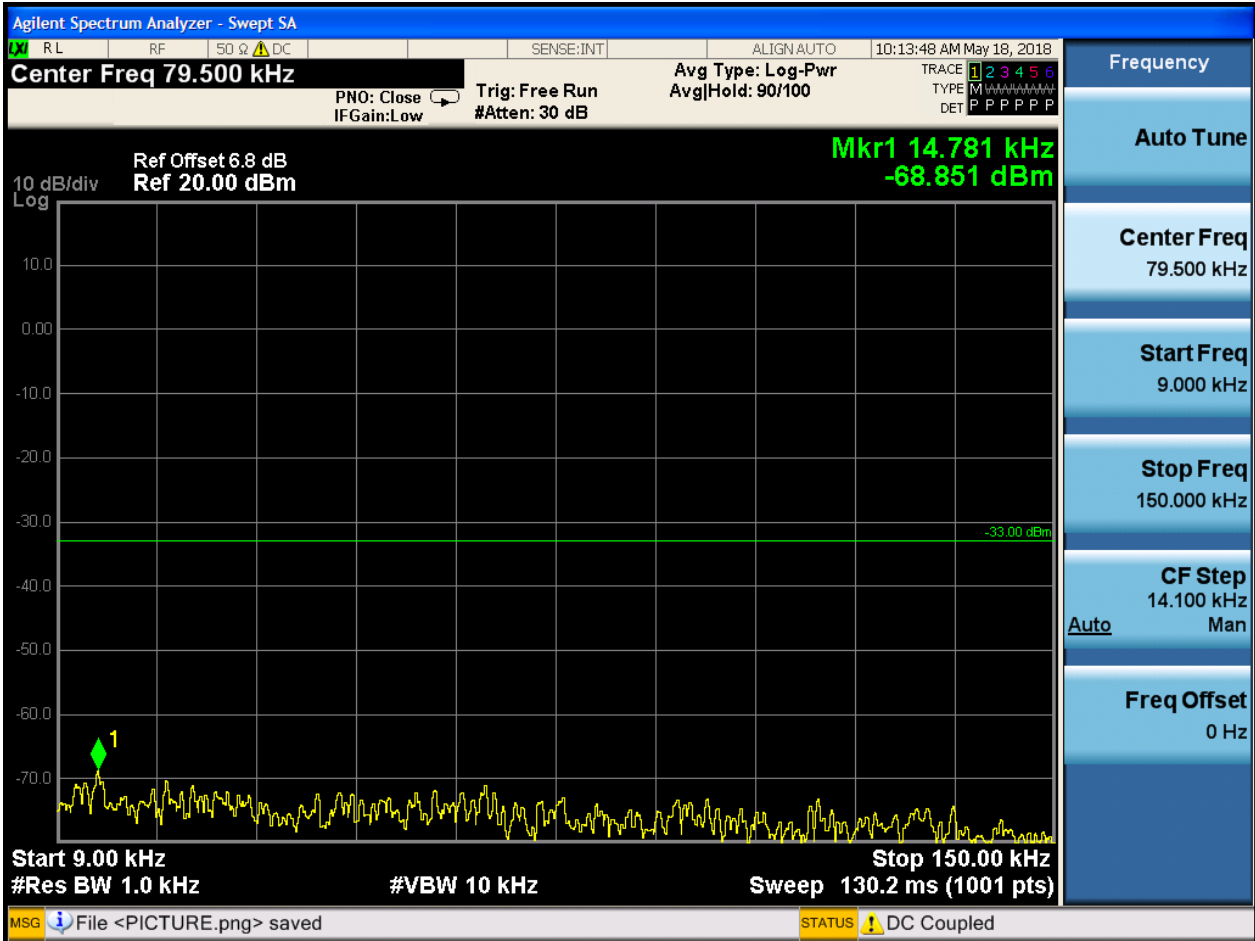


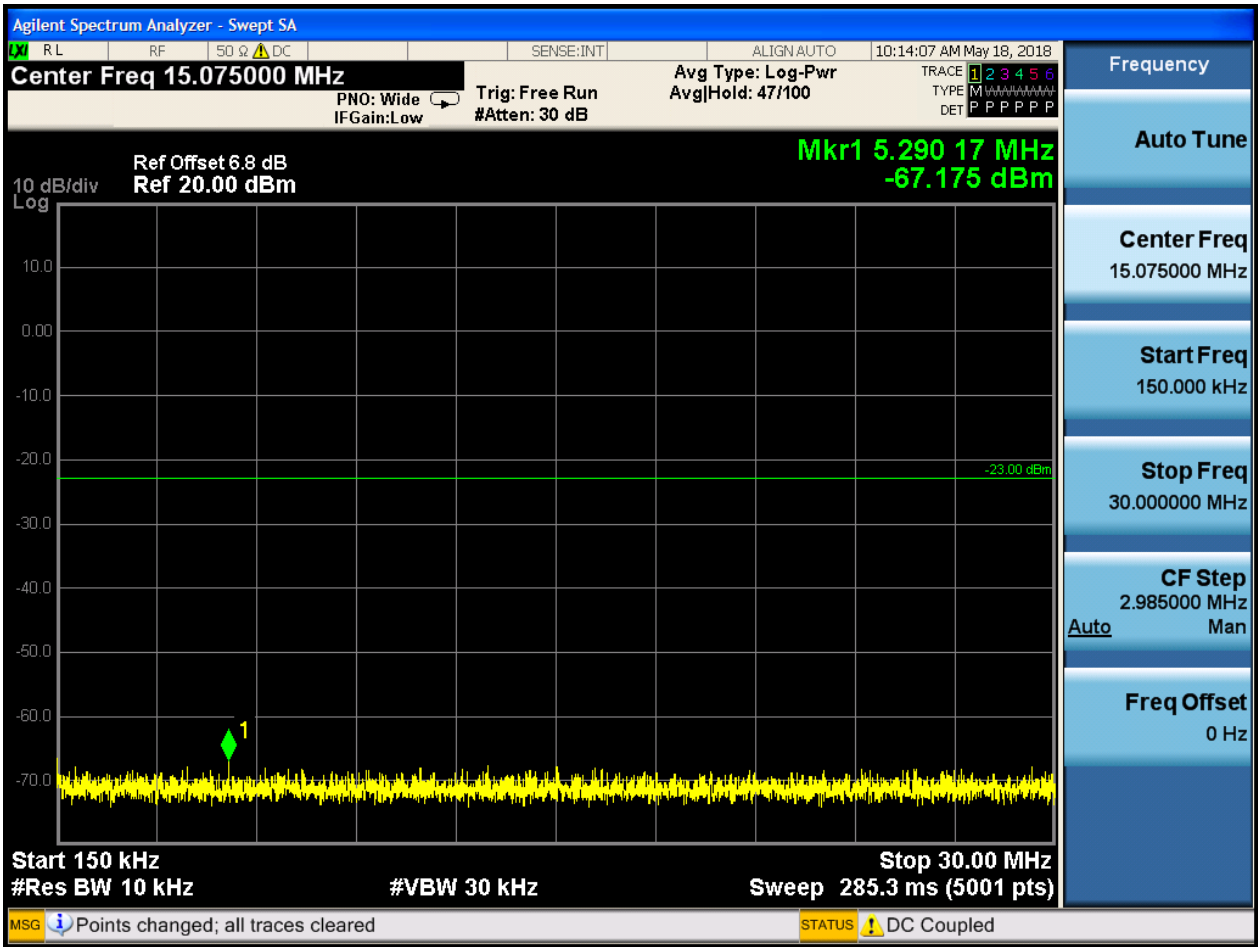


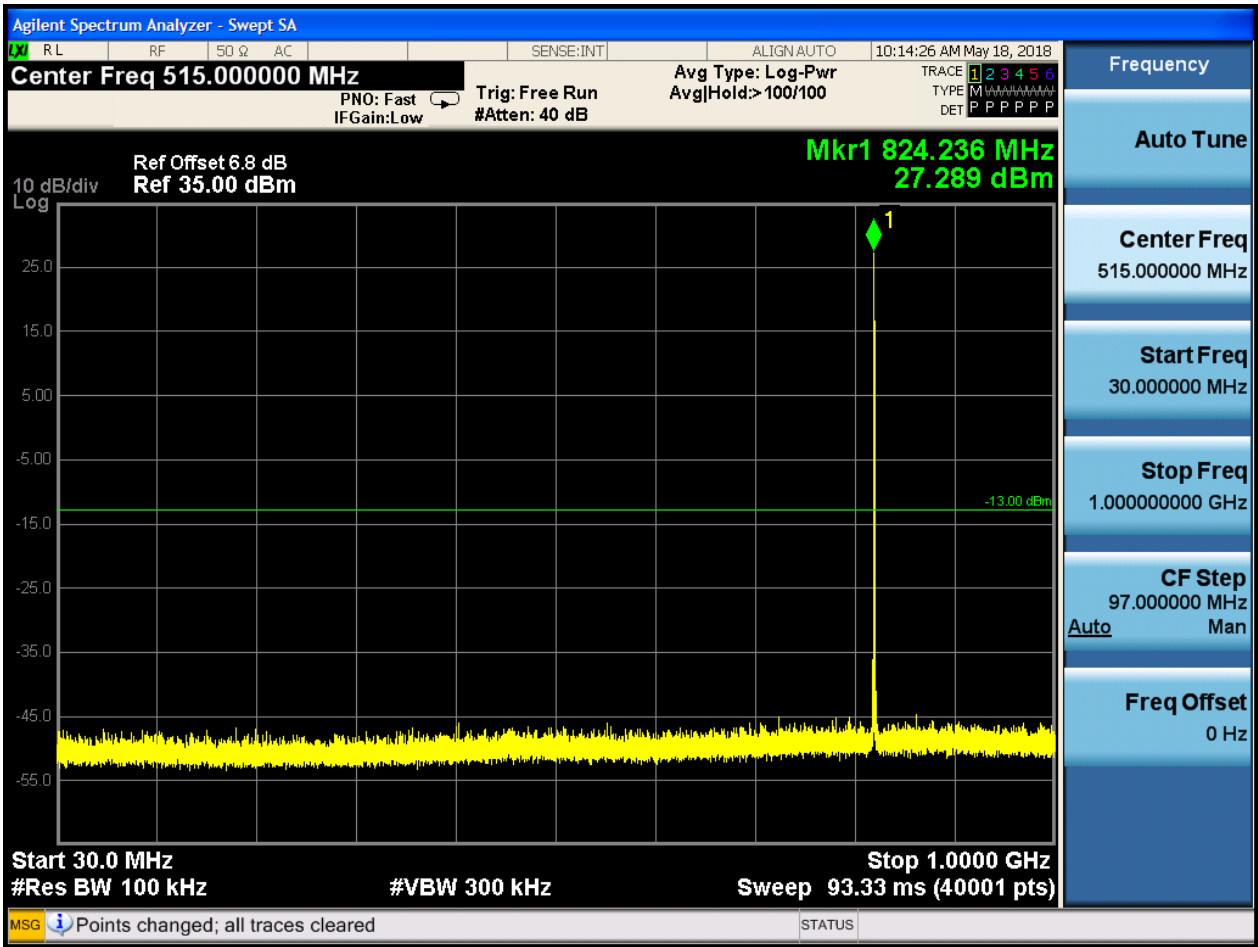


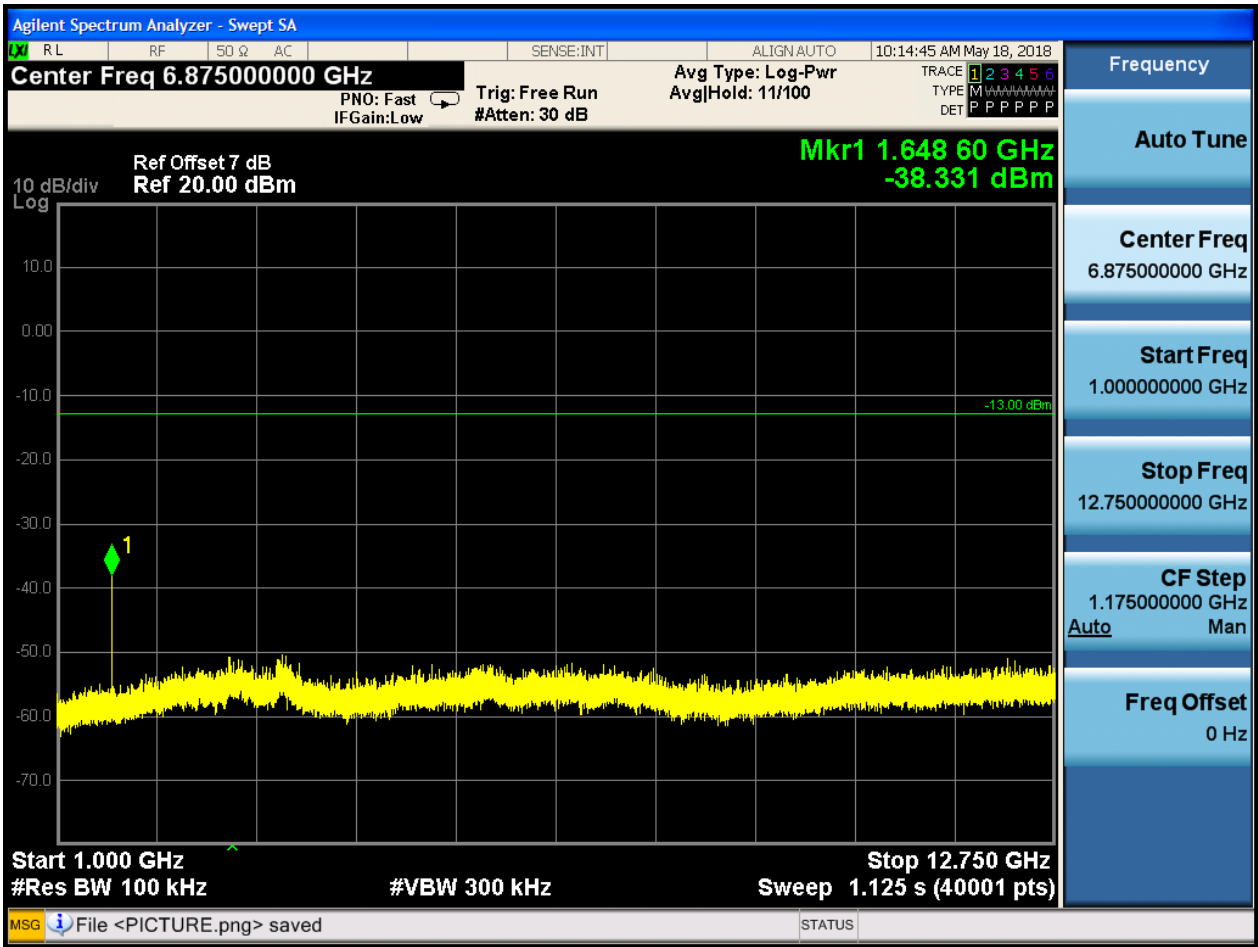
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH



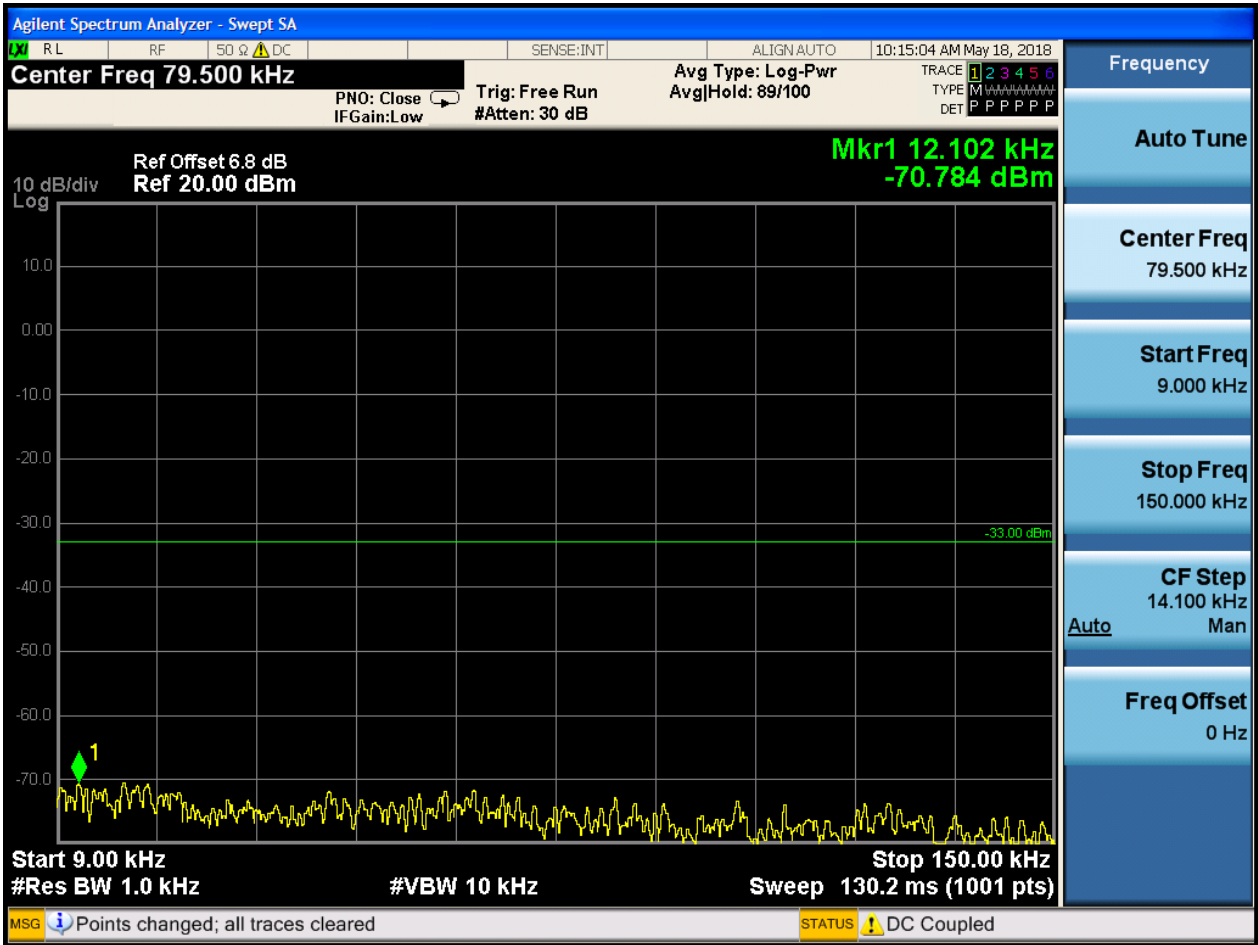


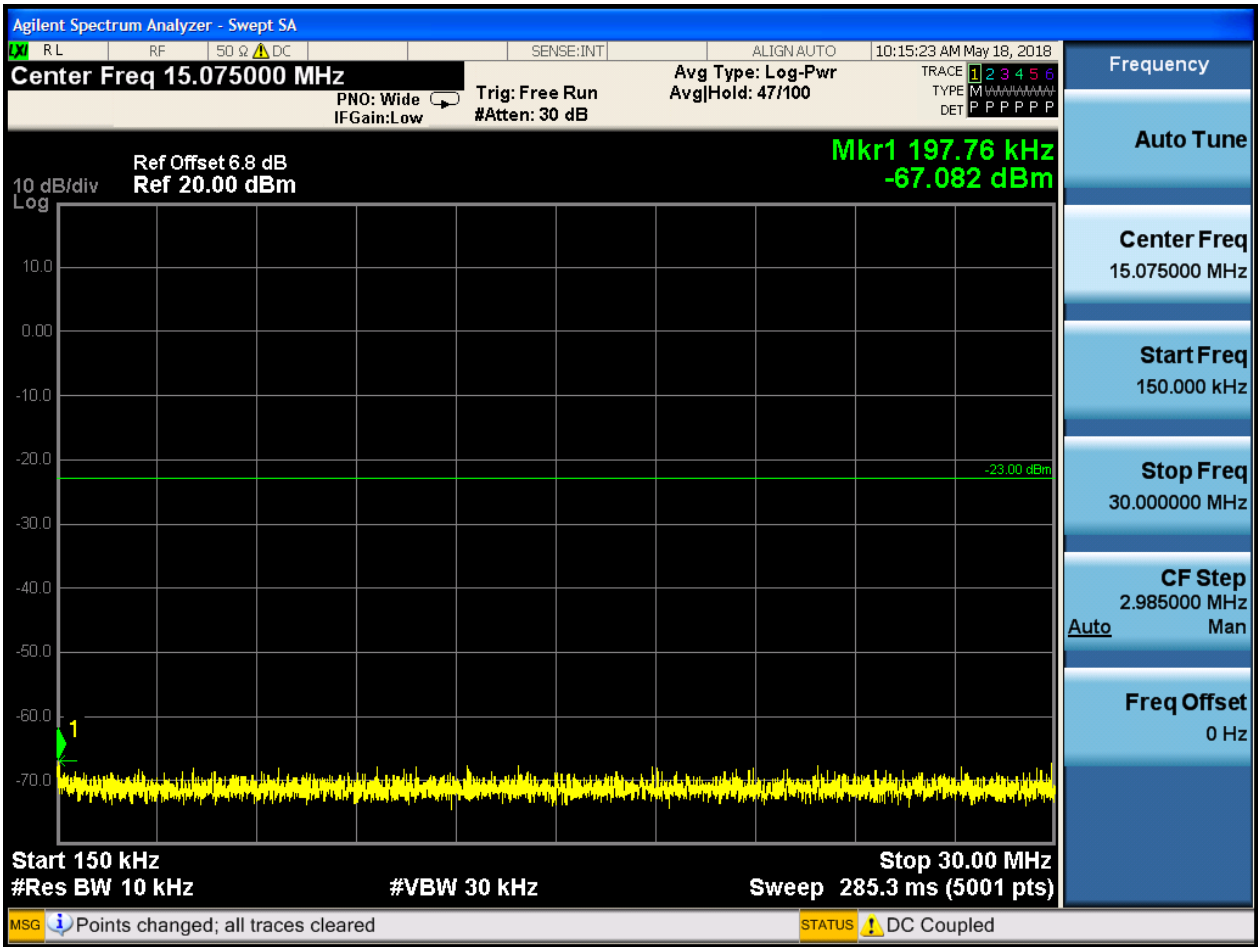


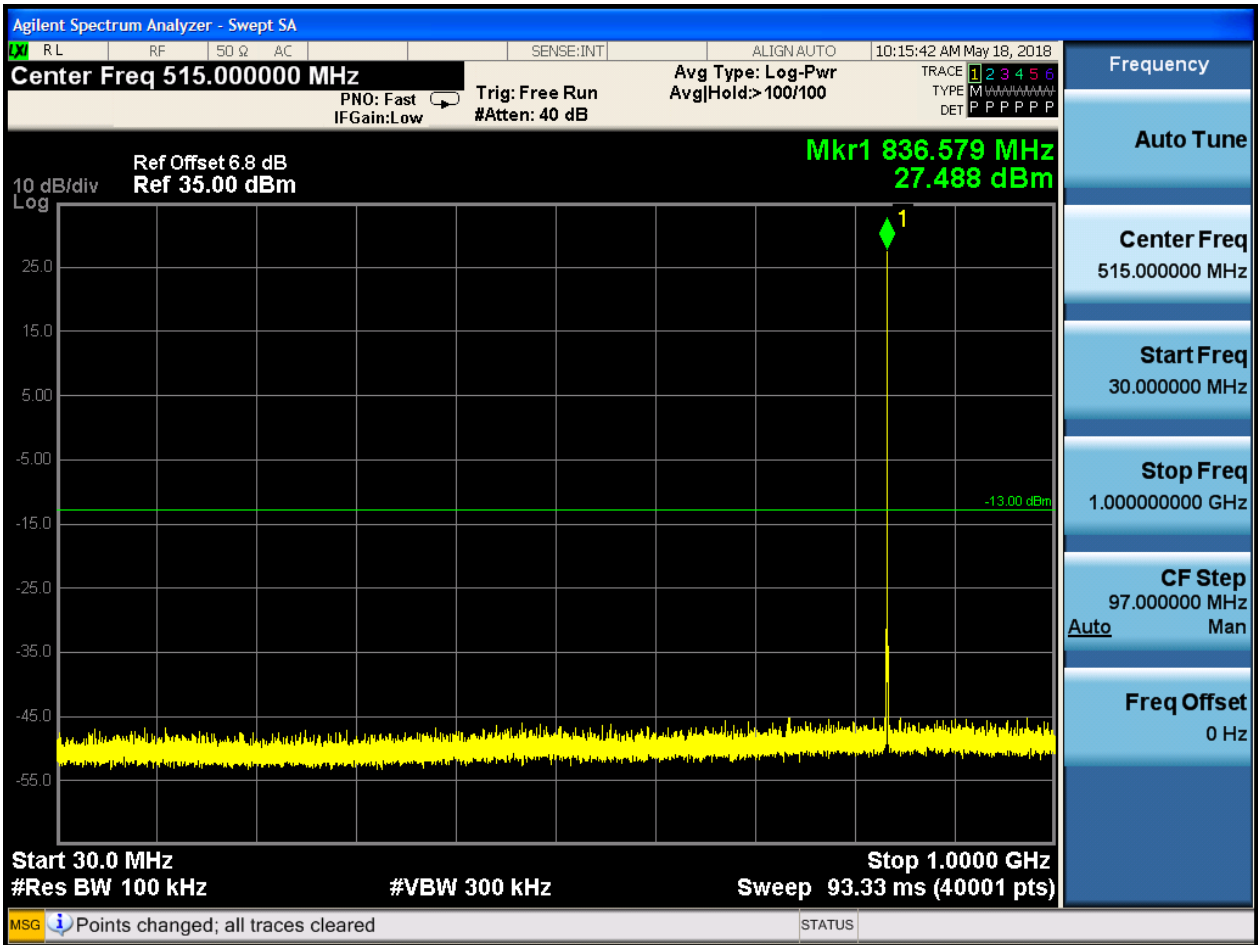


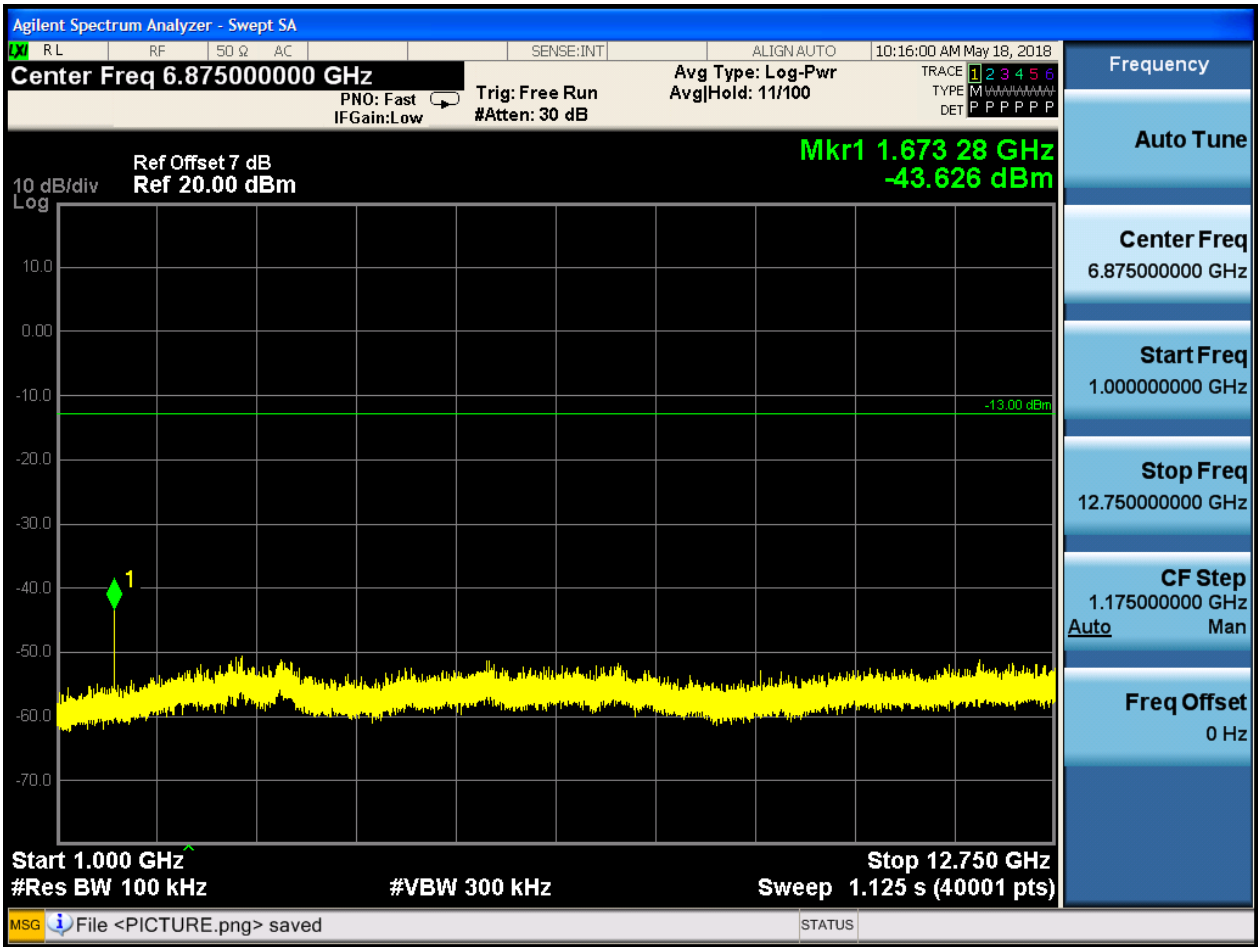


6.1.1.2.2 Test Channel = MCH



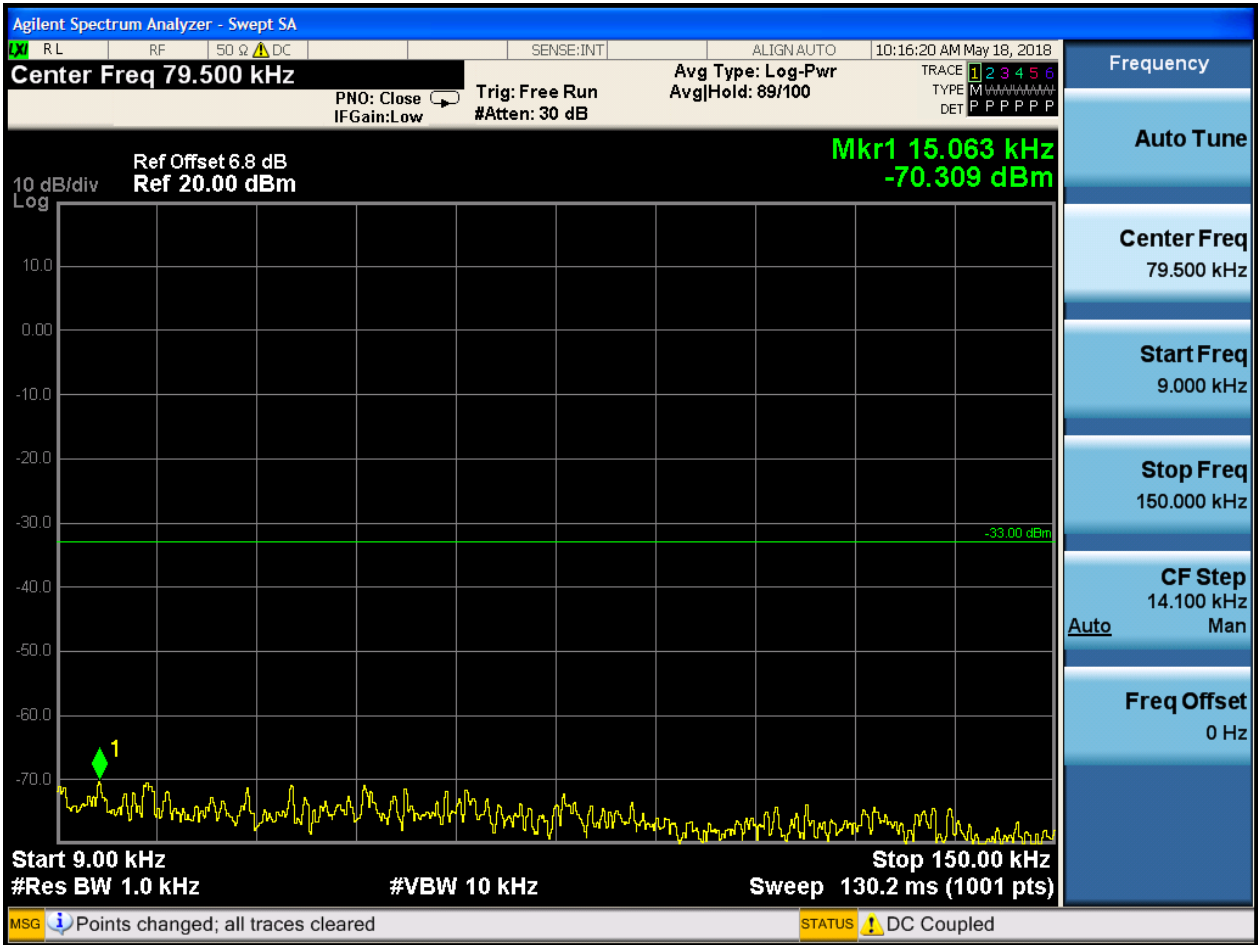


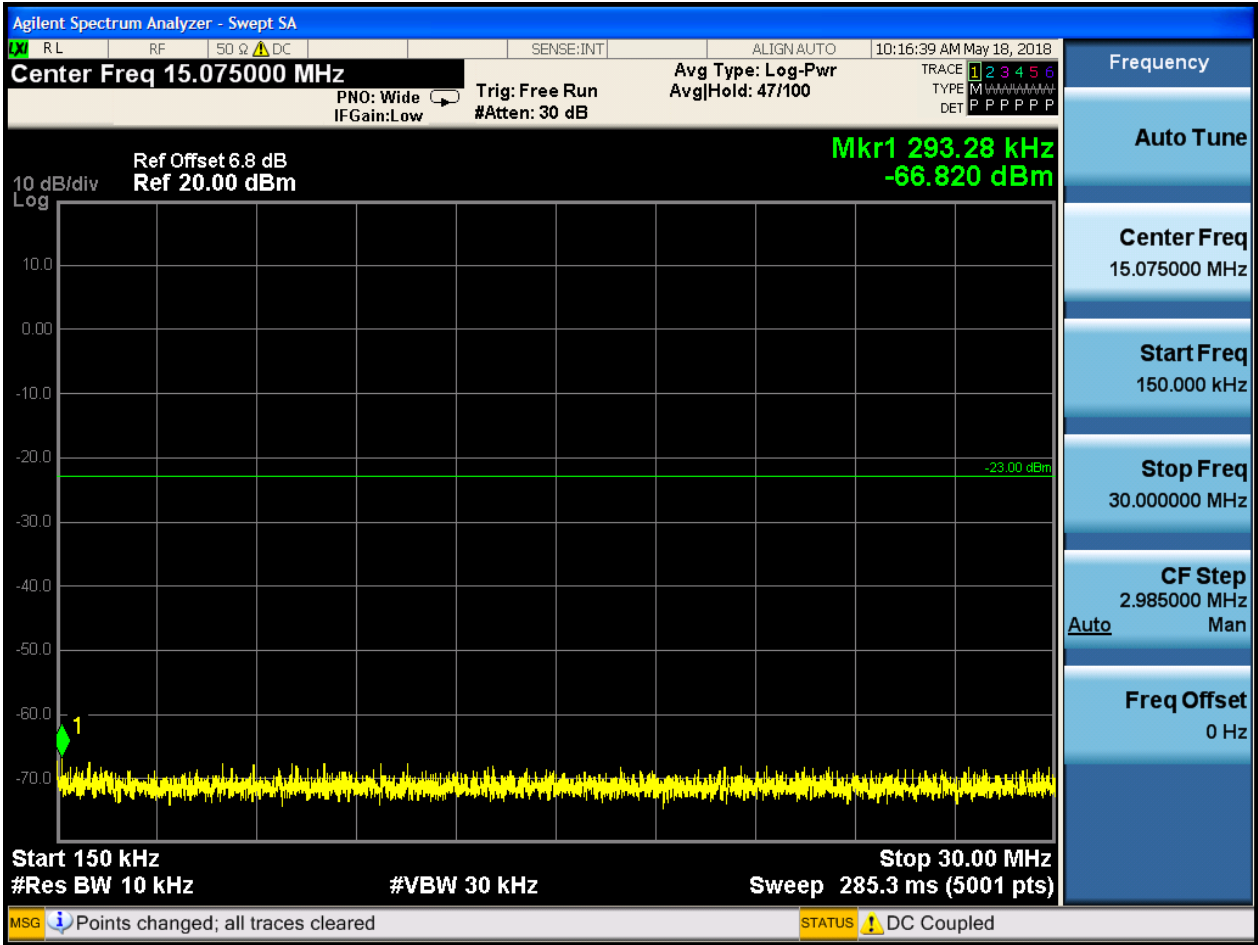


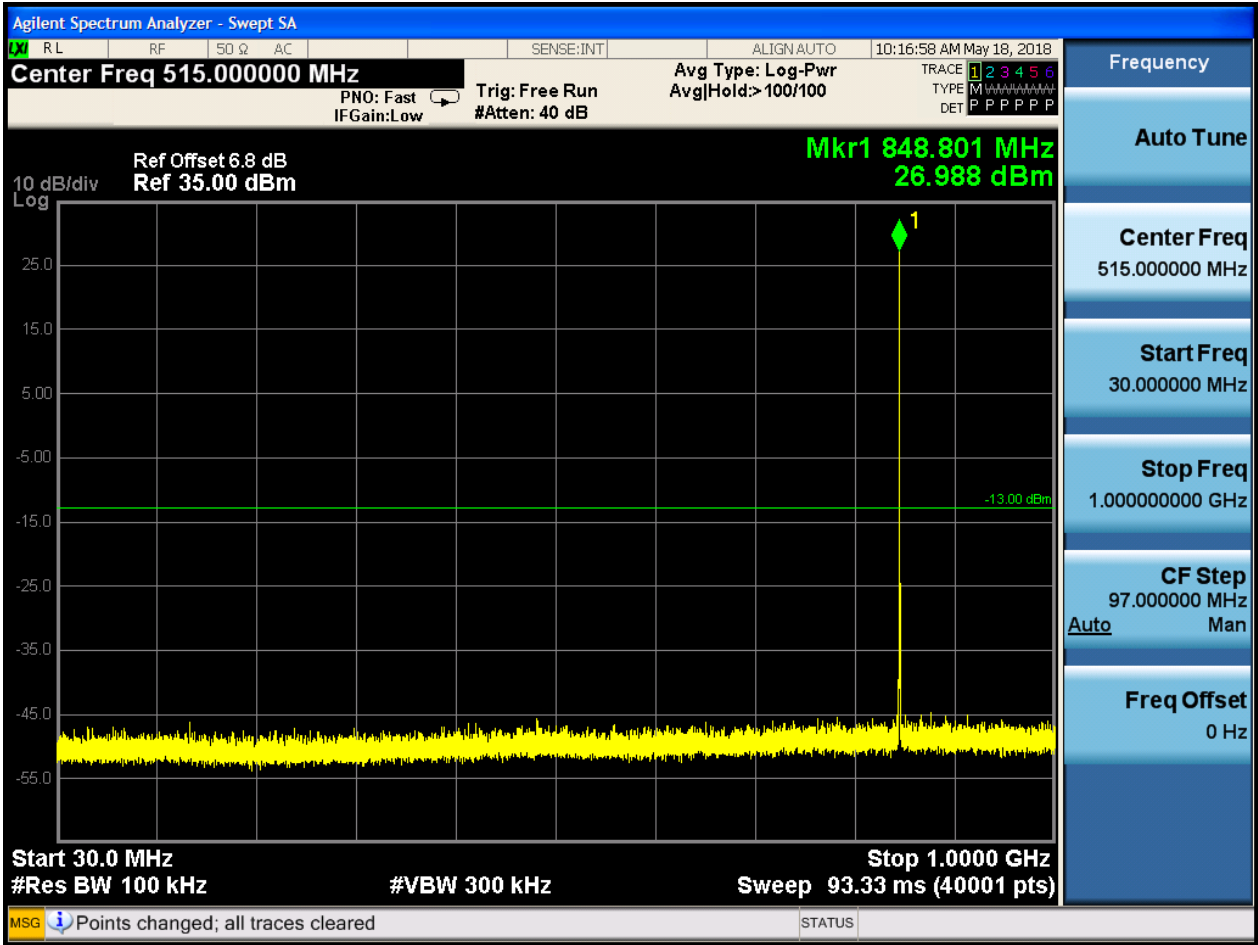


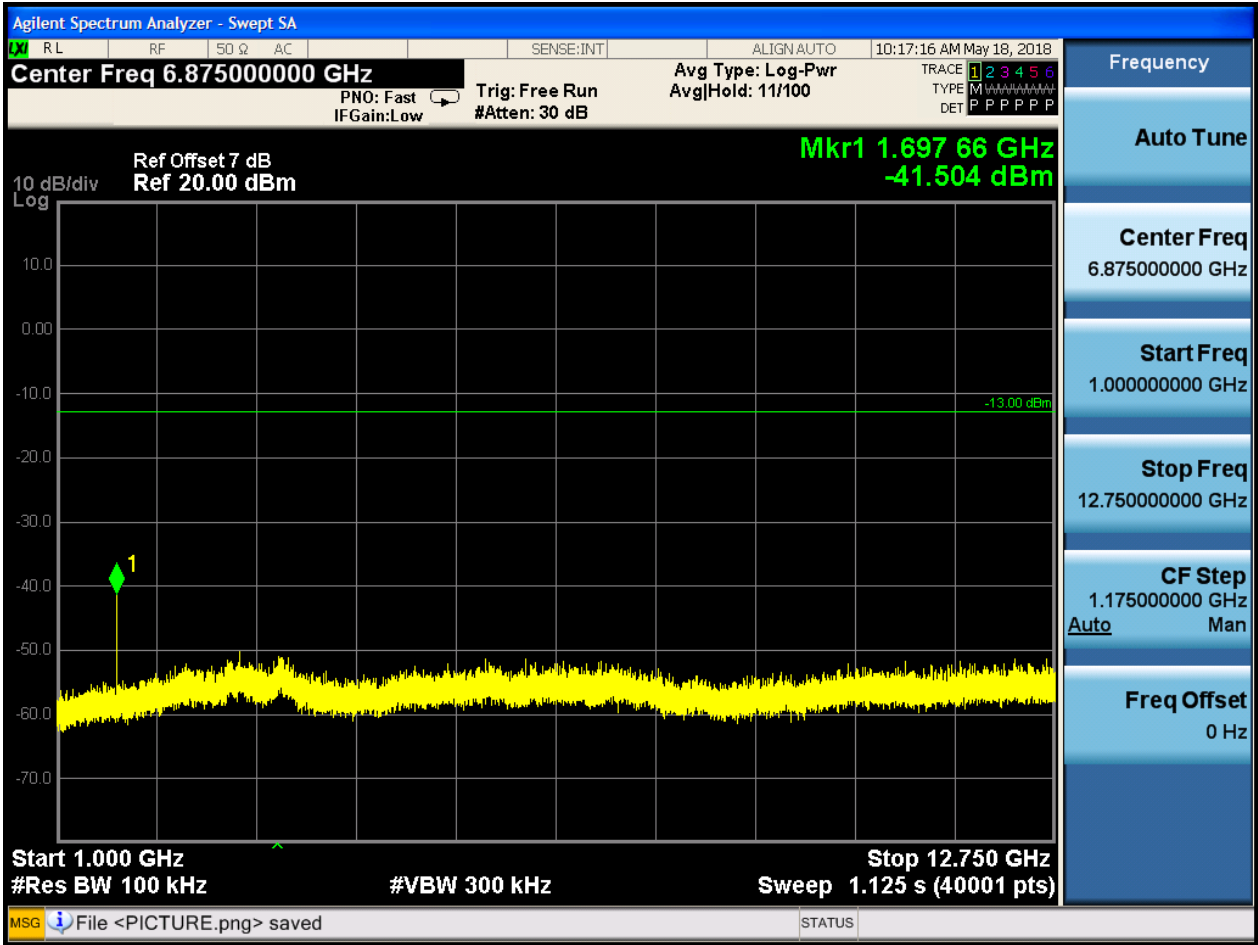


6.1.1.2.3 Test Channel = HCH







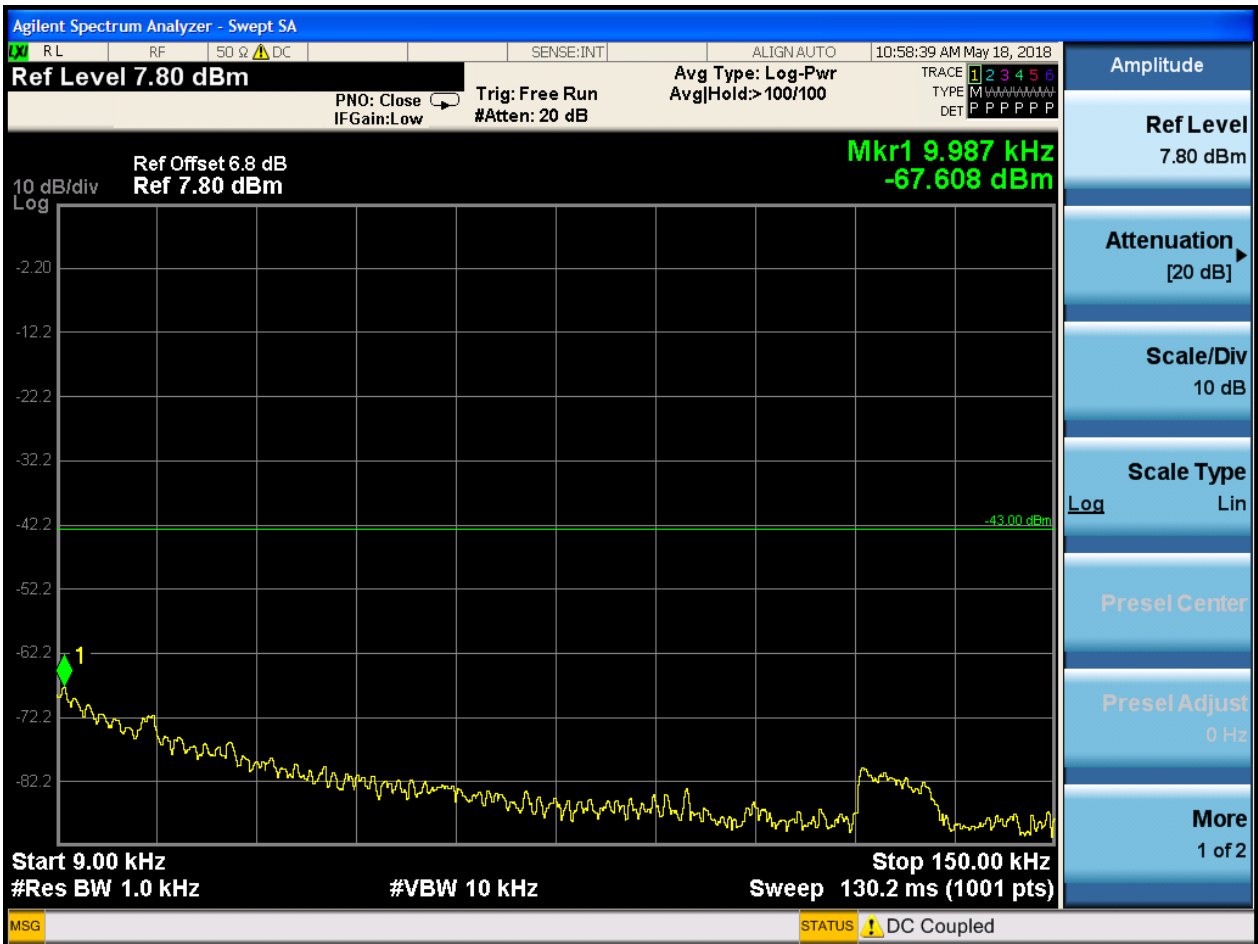


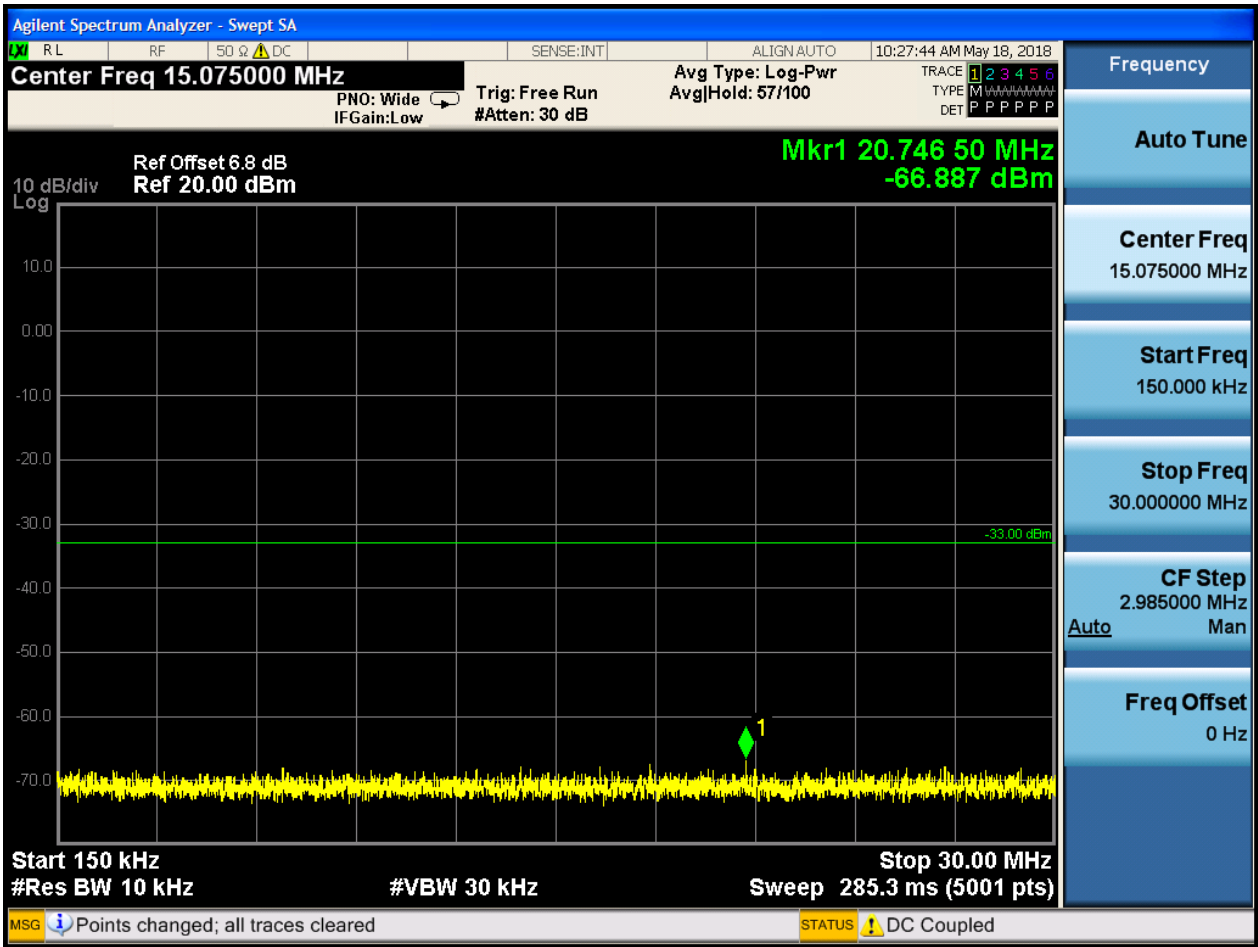


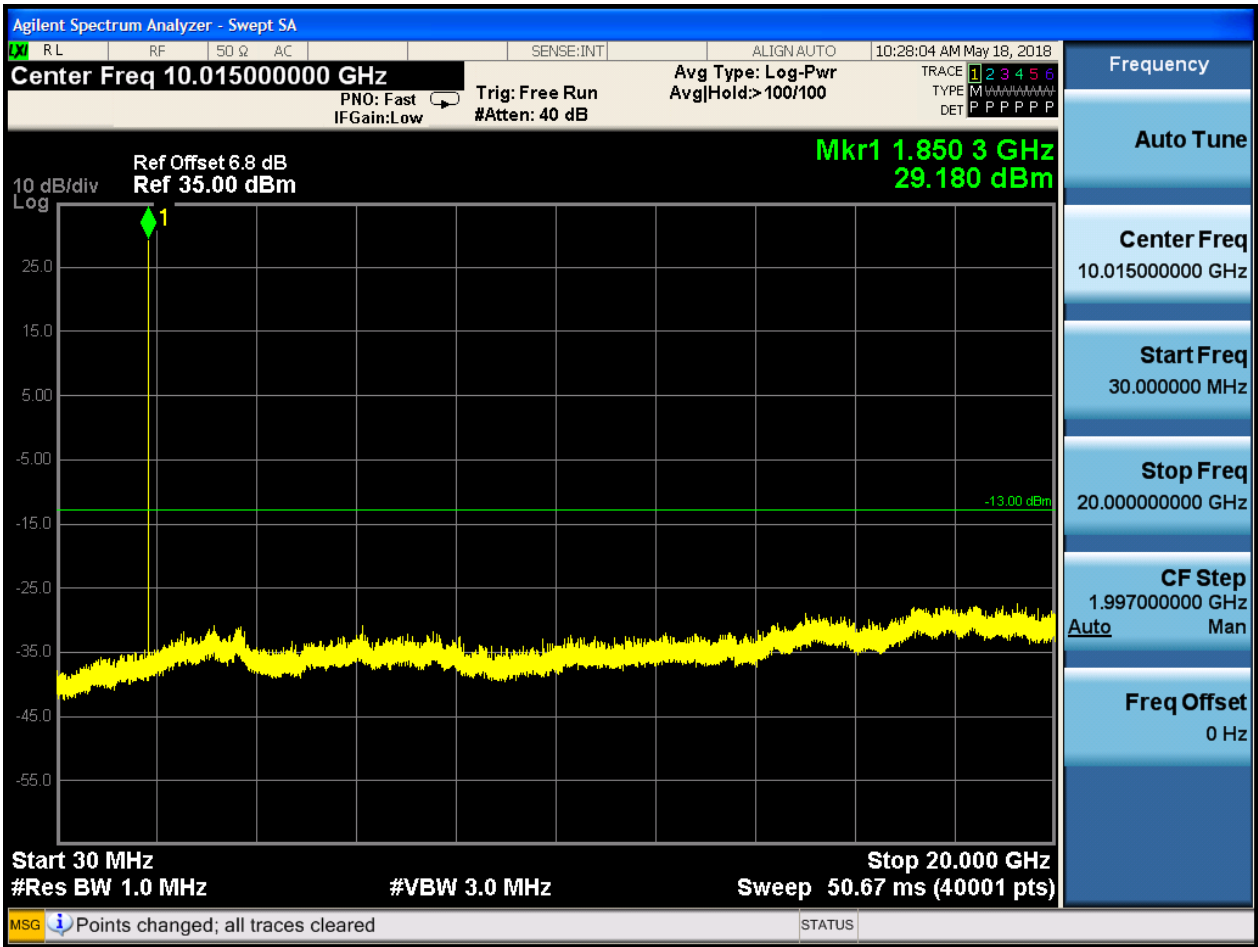
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH

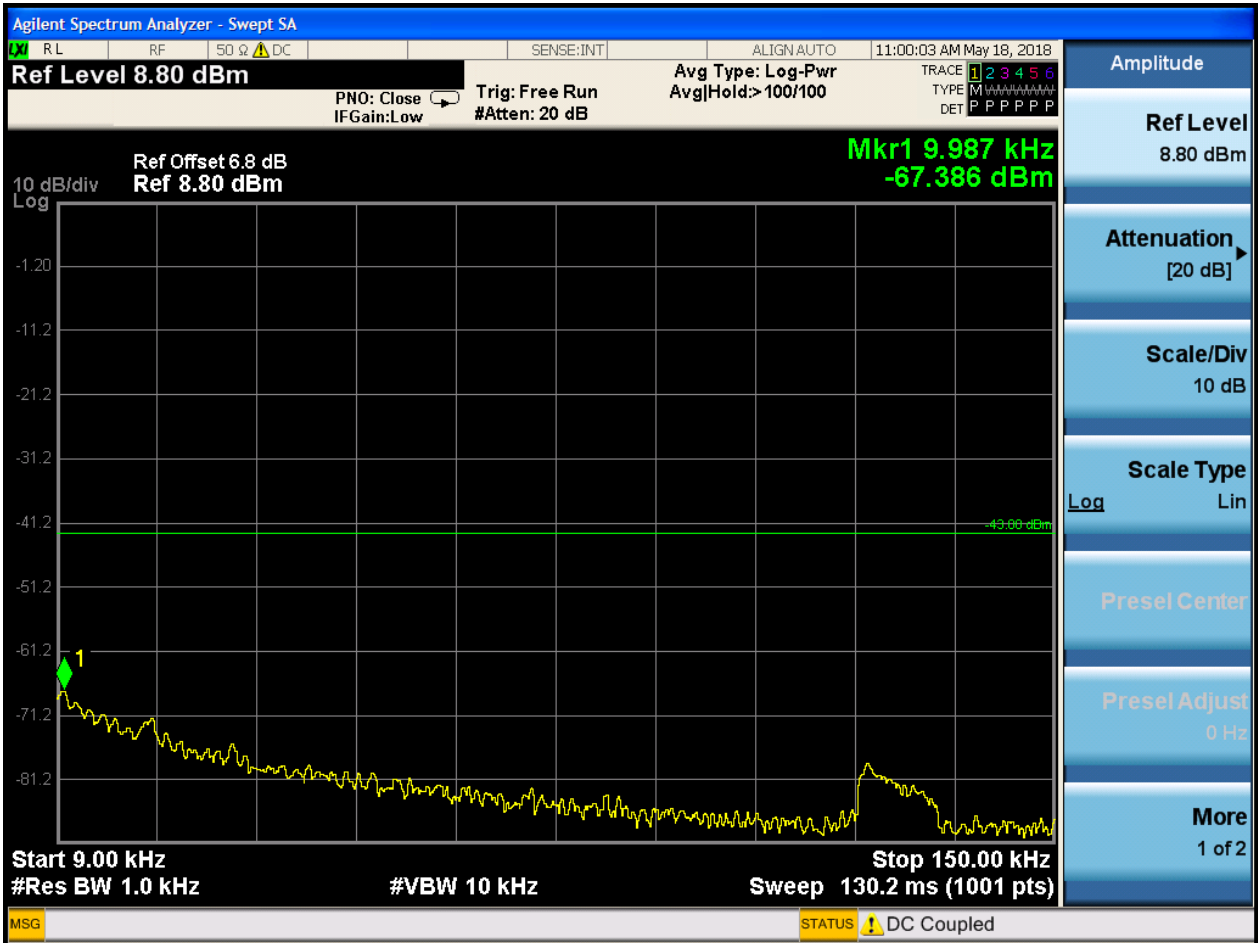


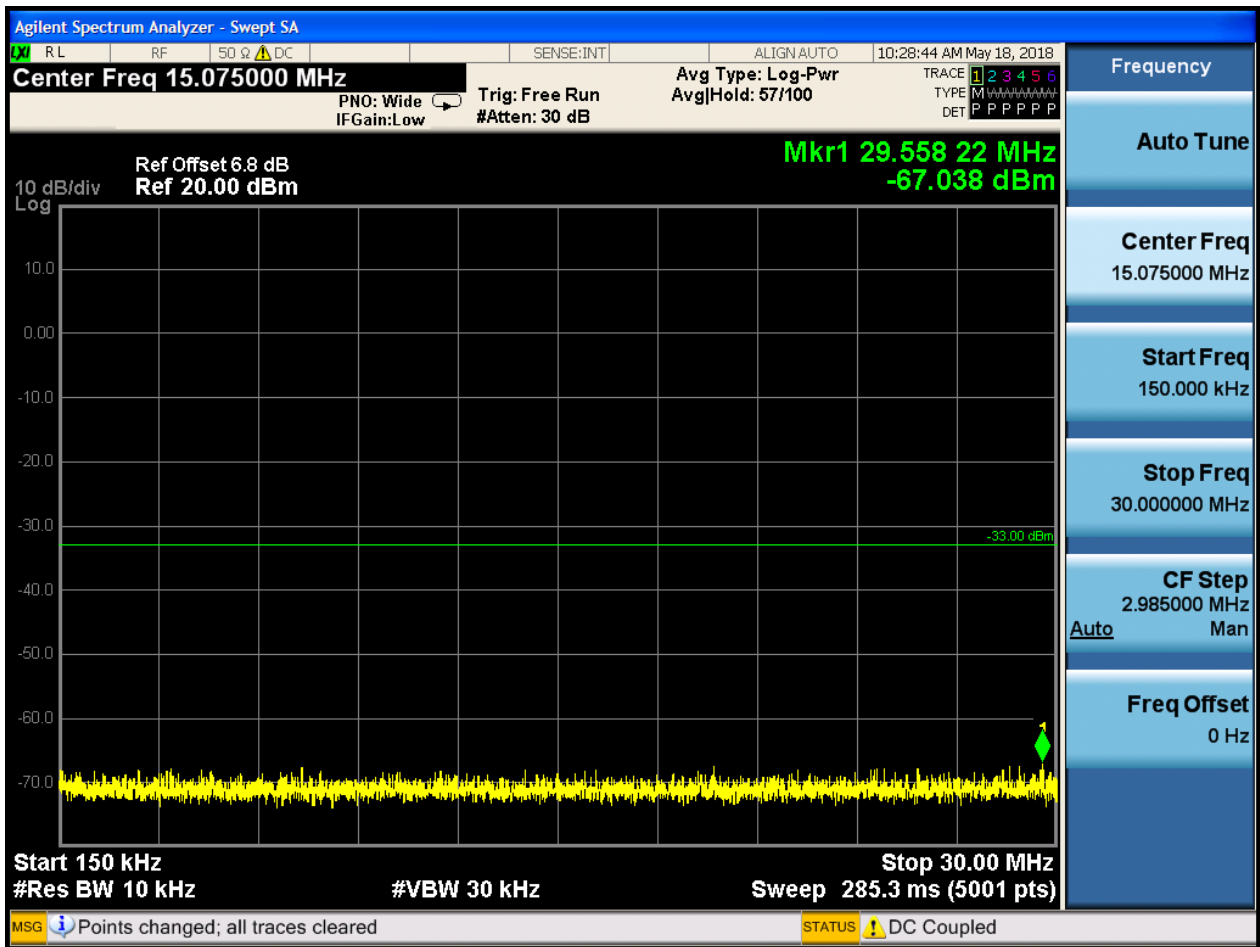






6.1.2.1.2 Test Channel = MCH

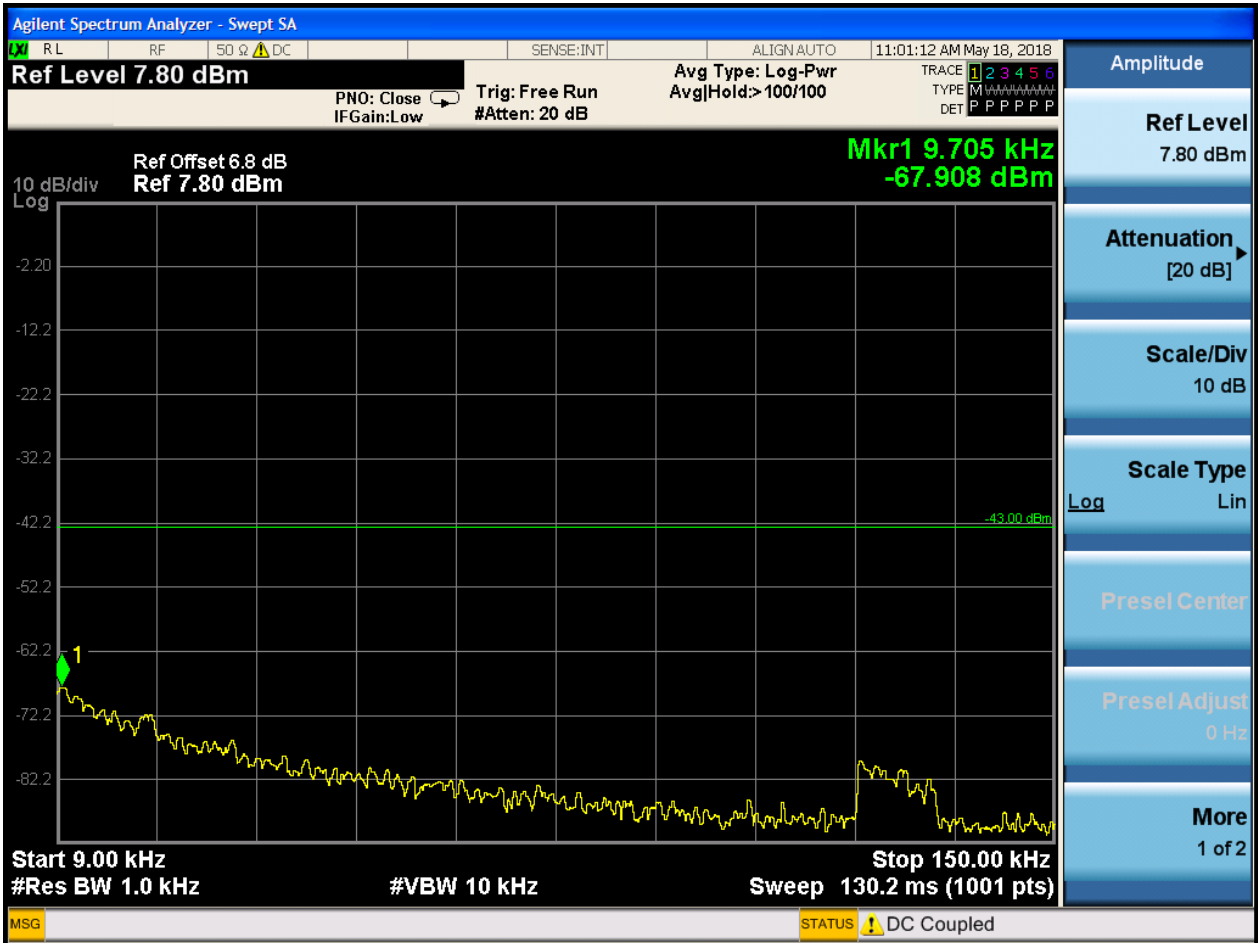


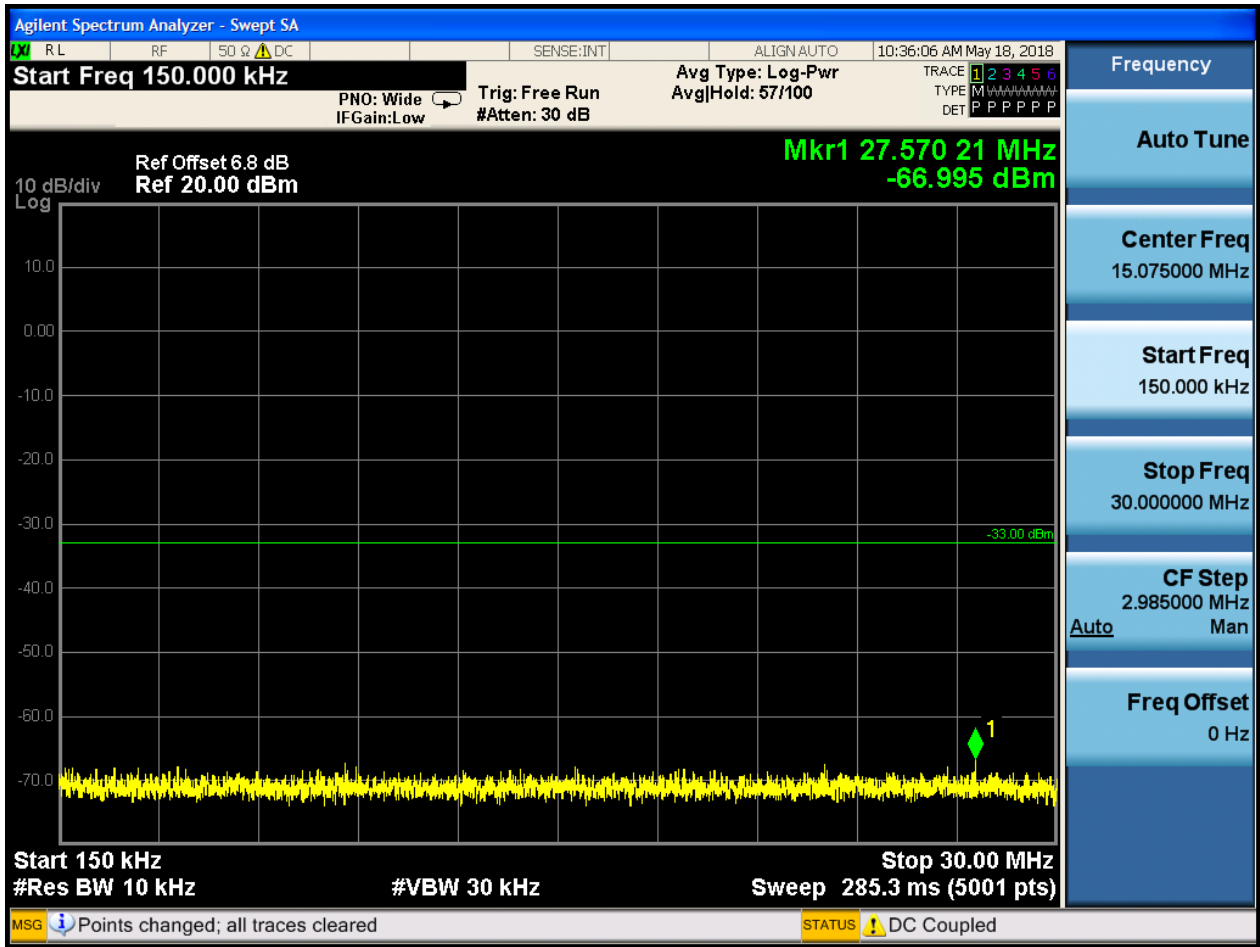


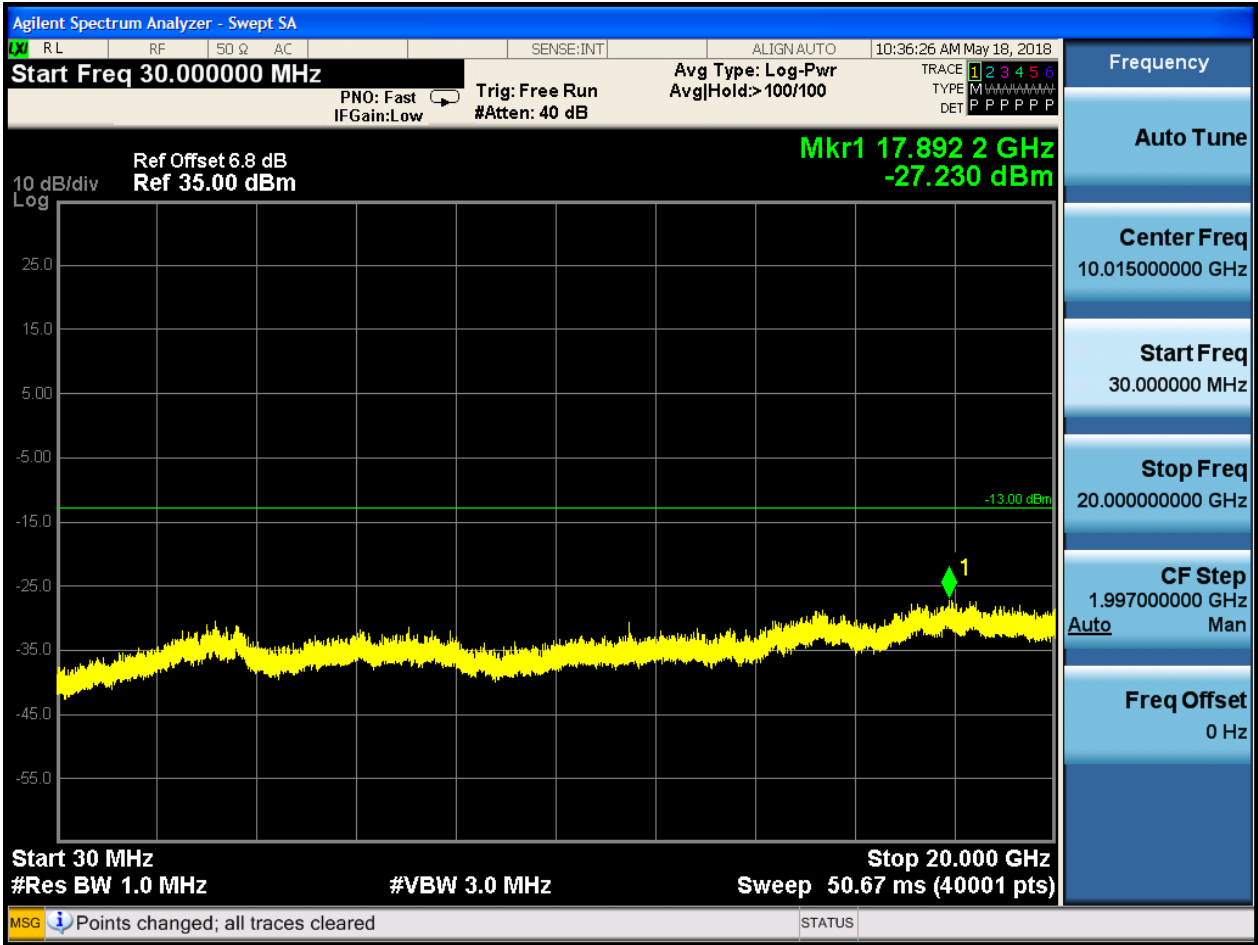




6.1.2.1.3 Test Channel = HCH



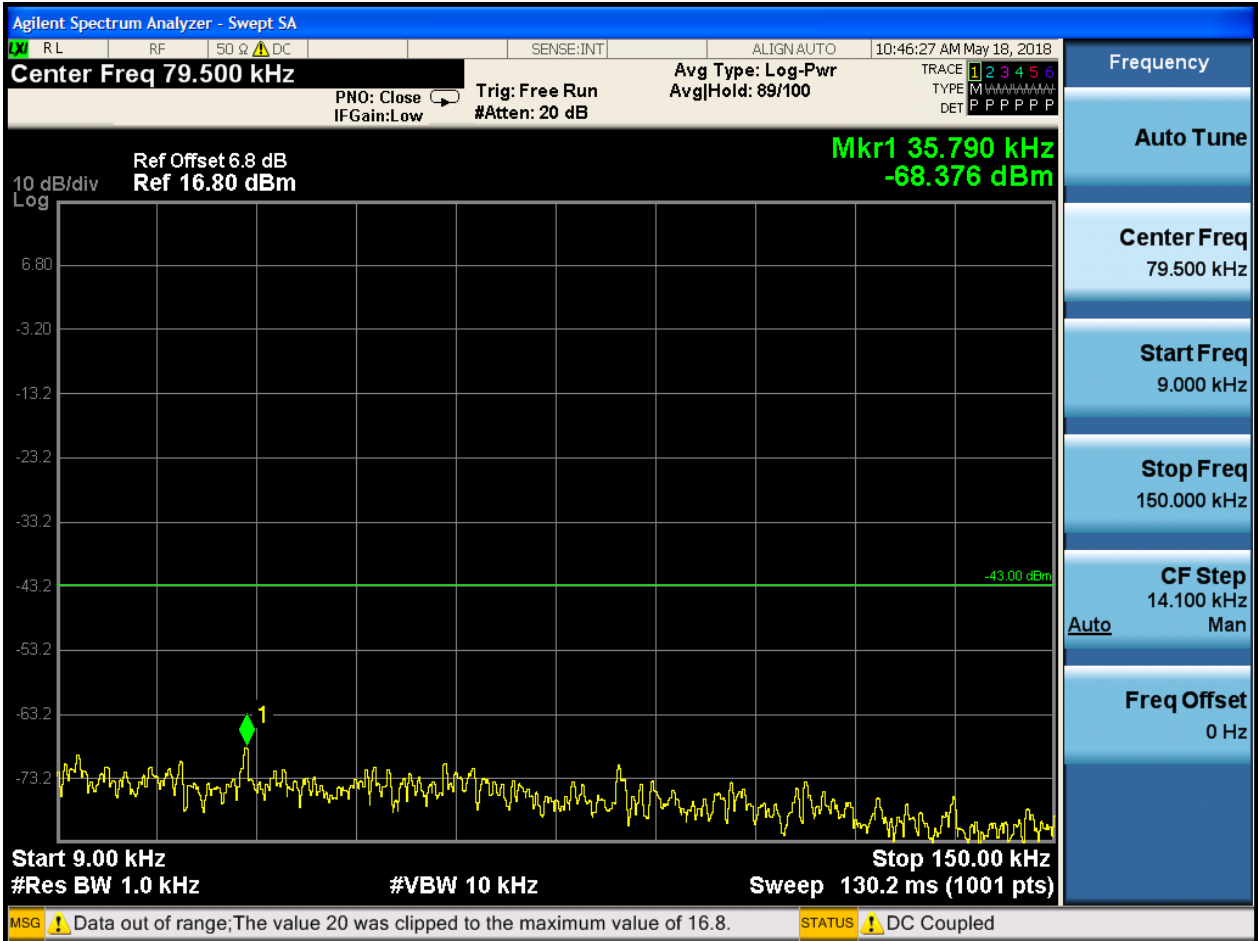


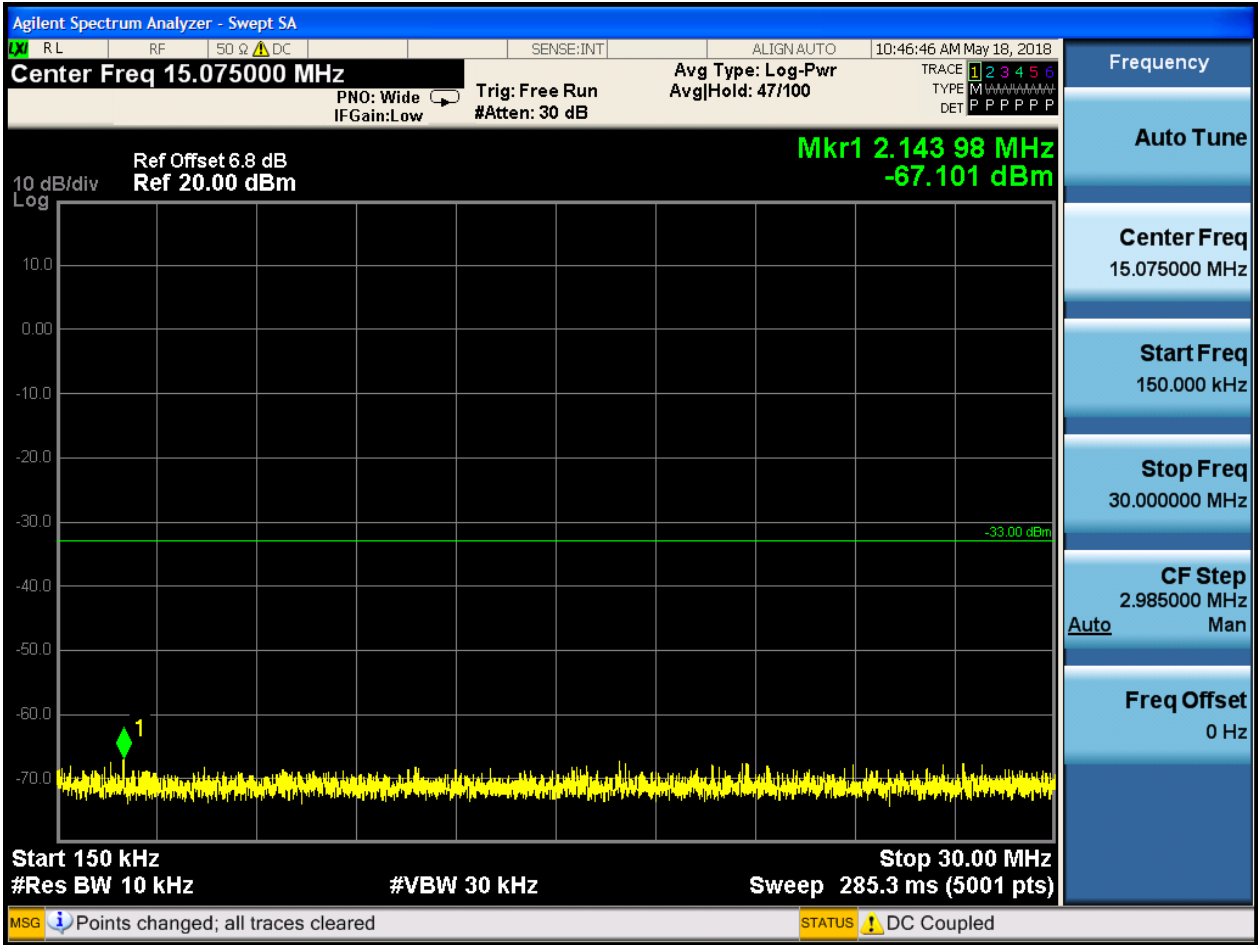


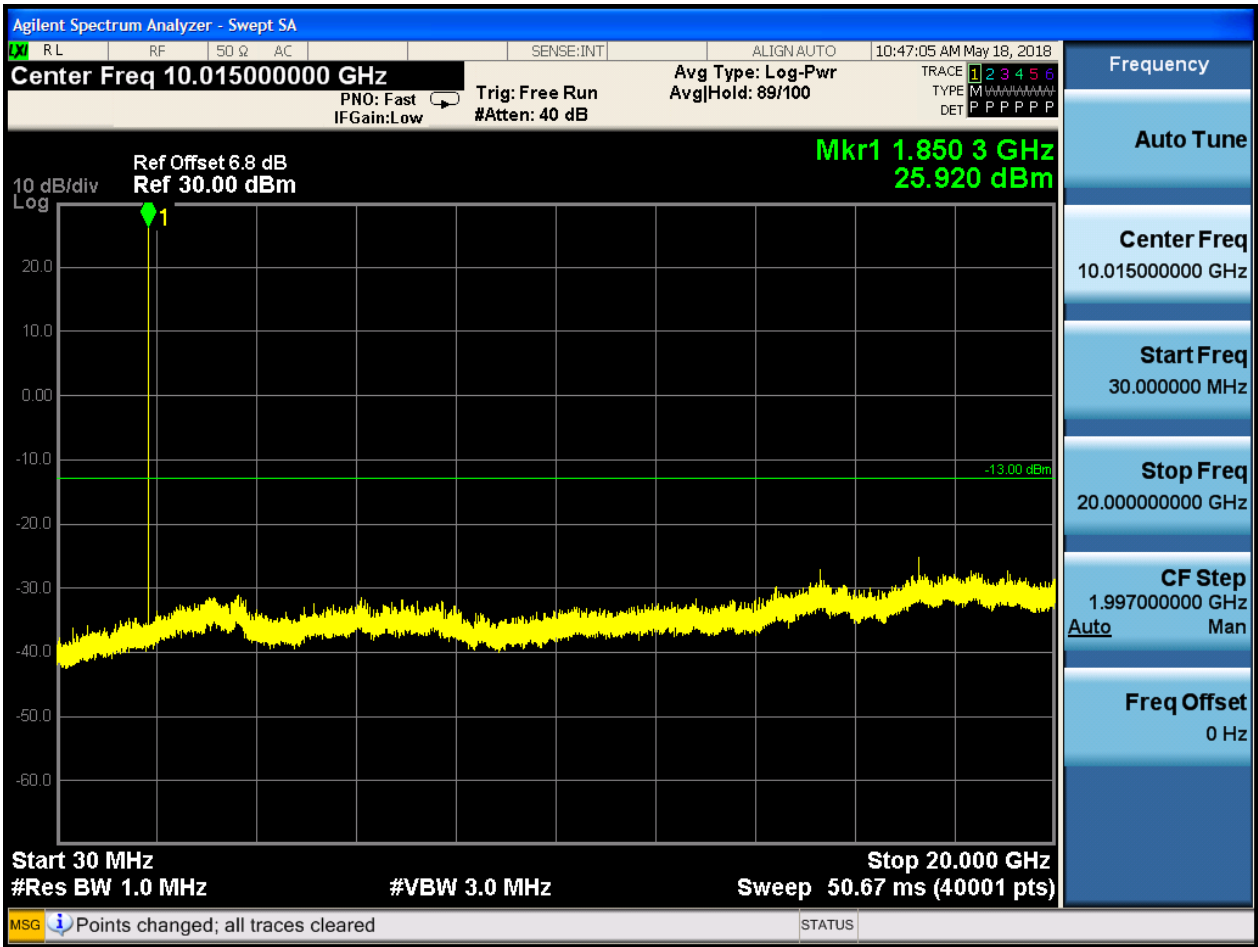


6.1.2.2 Test Mode = GSM/TM2

6.1.2.2.1 Test Channel = LCH

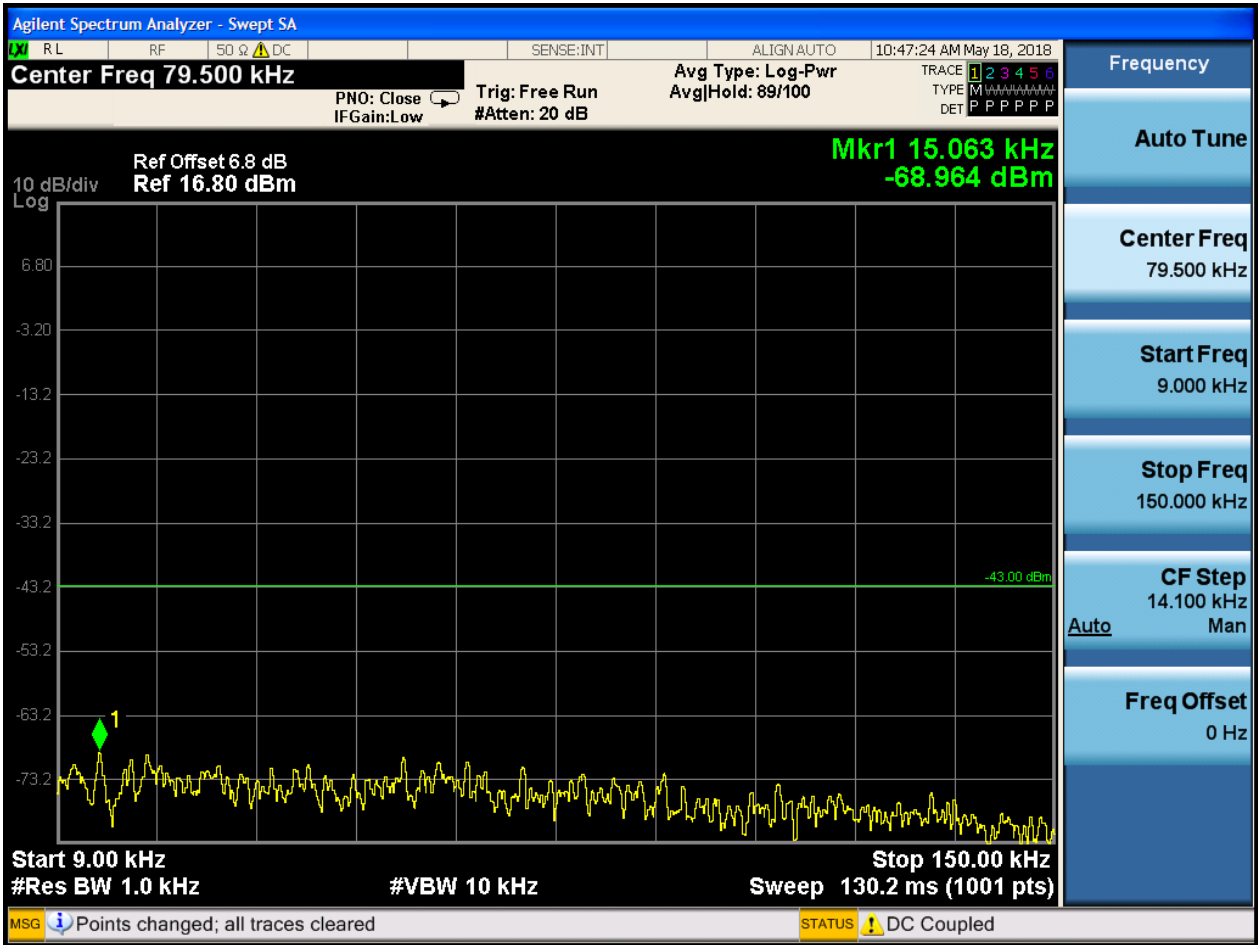


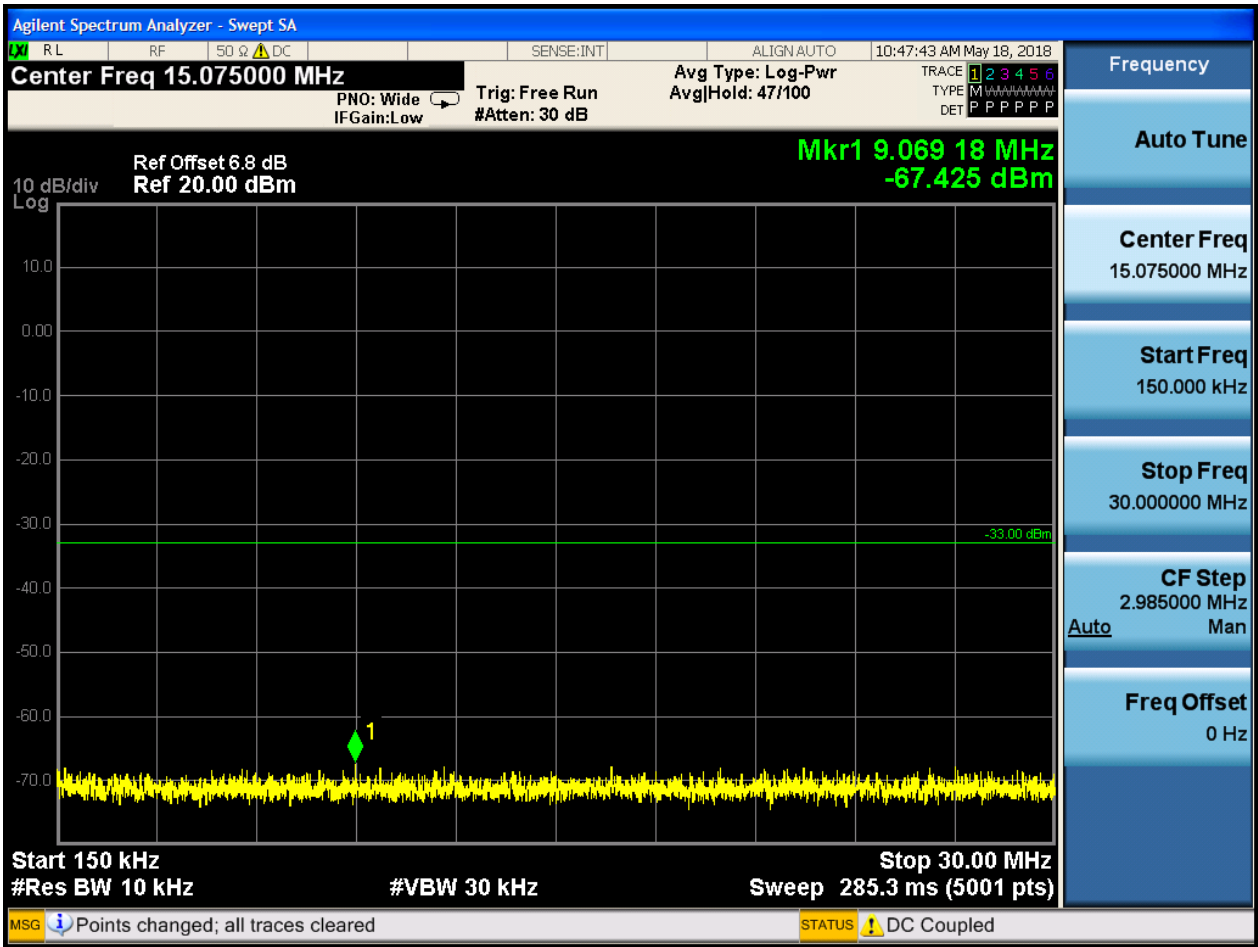


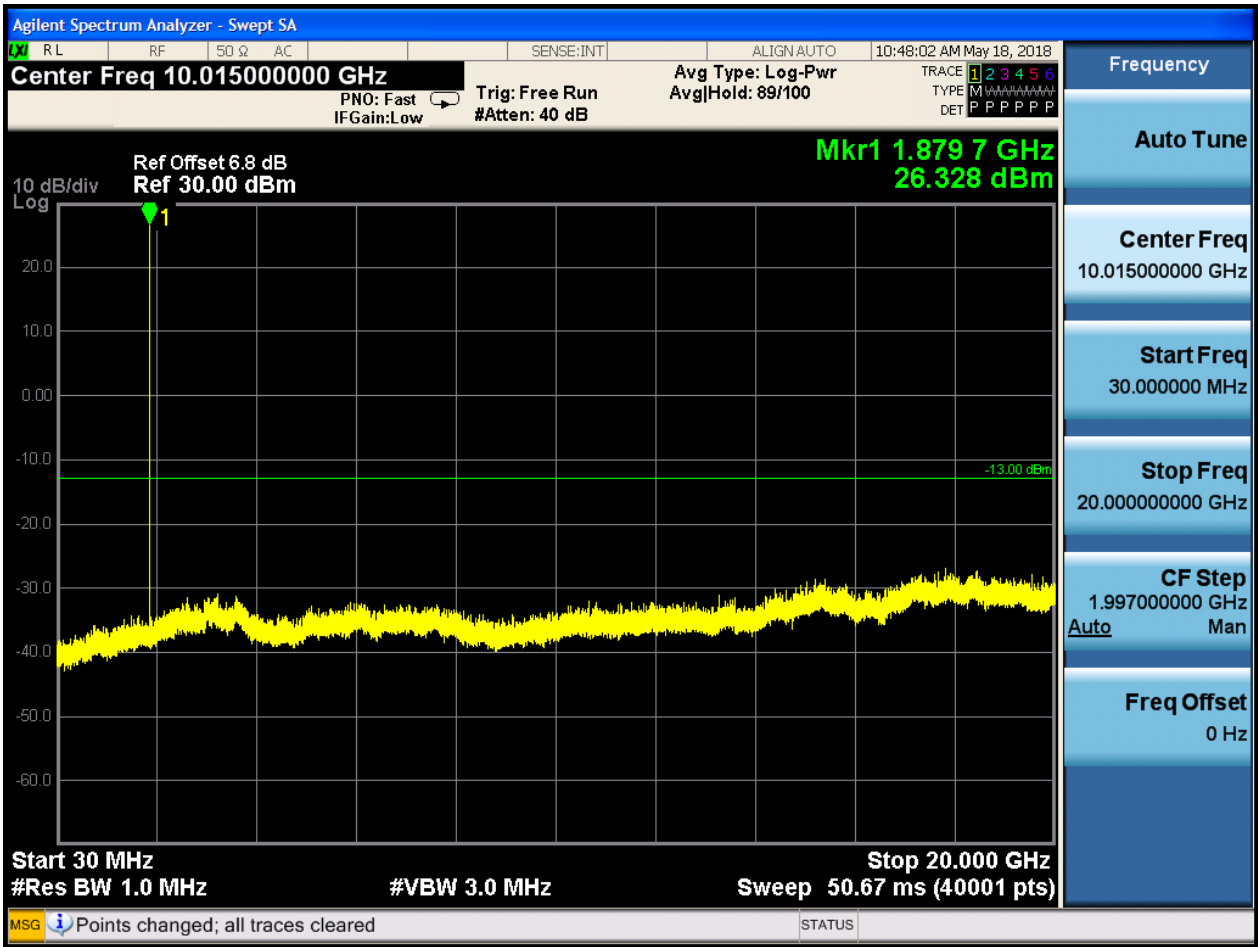




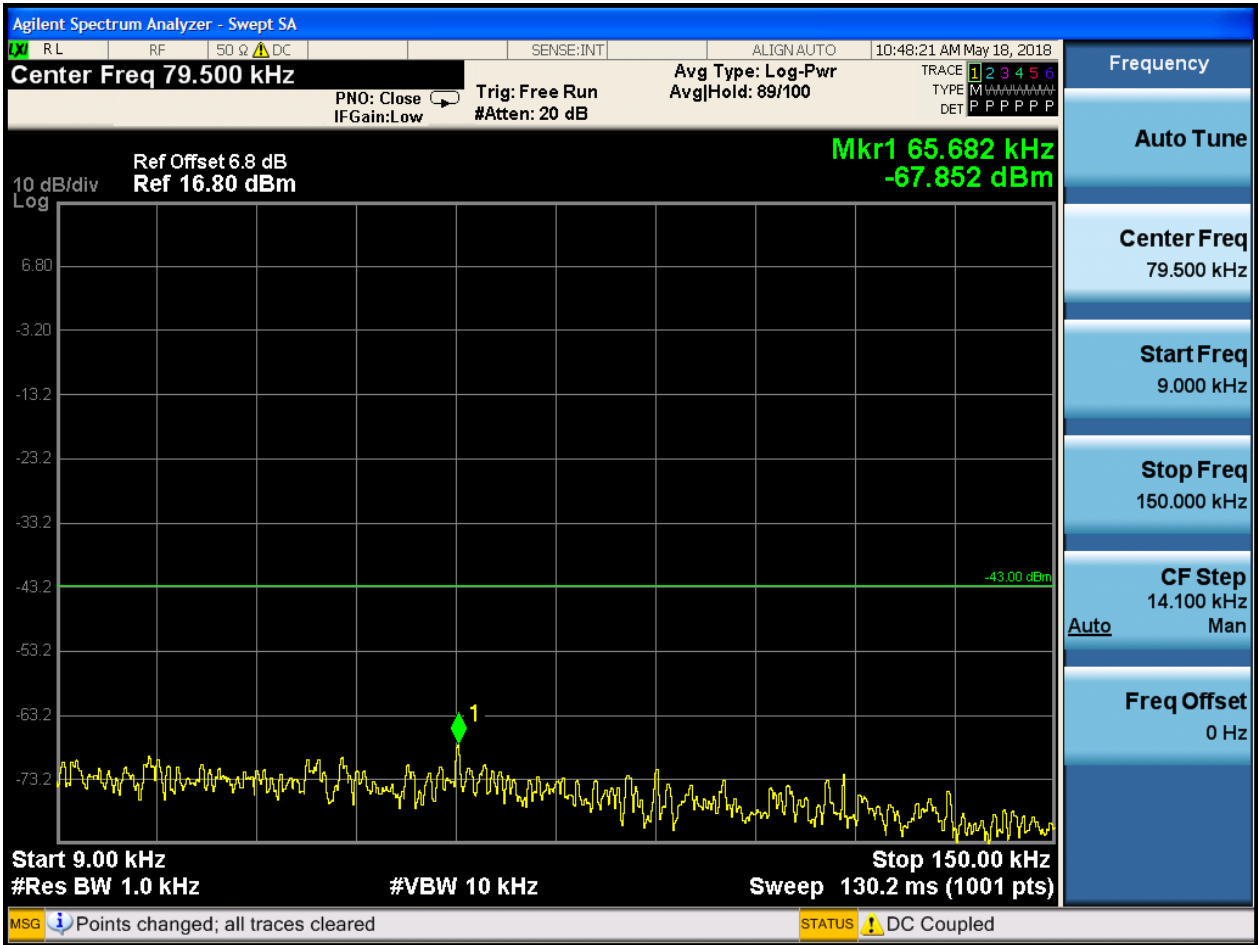
6.1.2.2.2 Test Channel = MCH

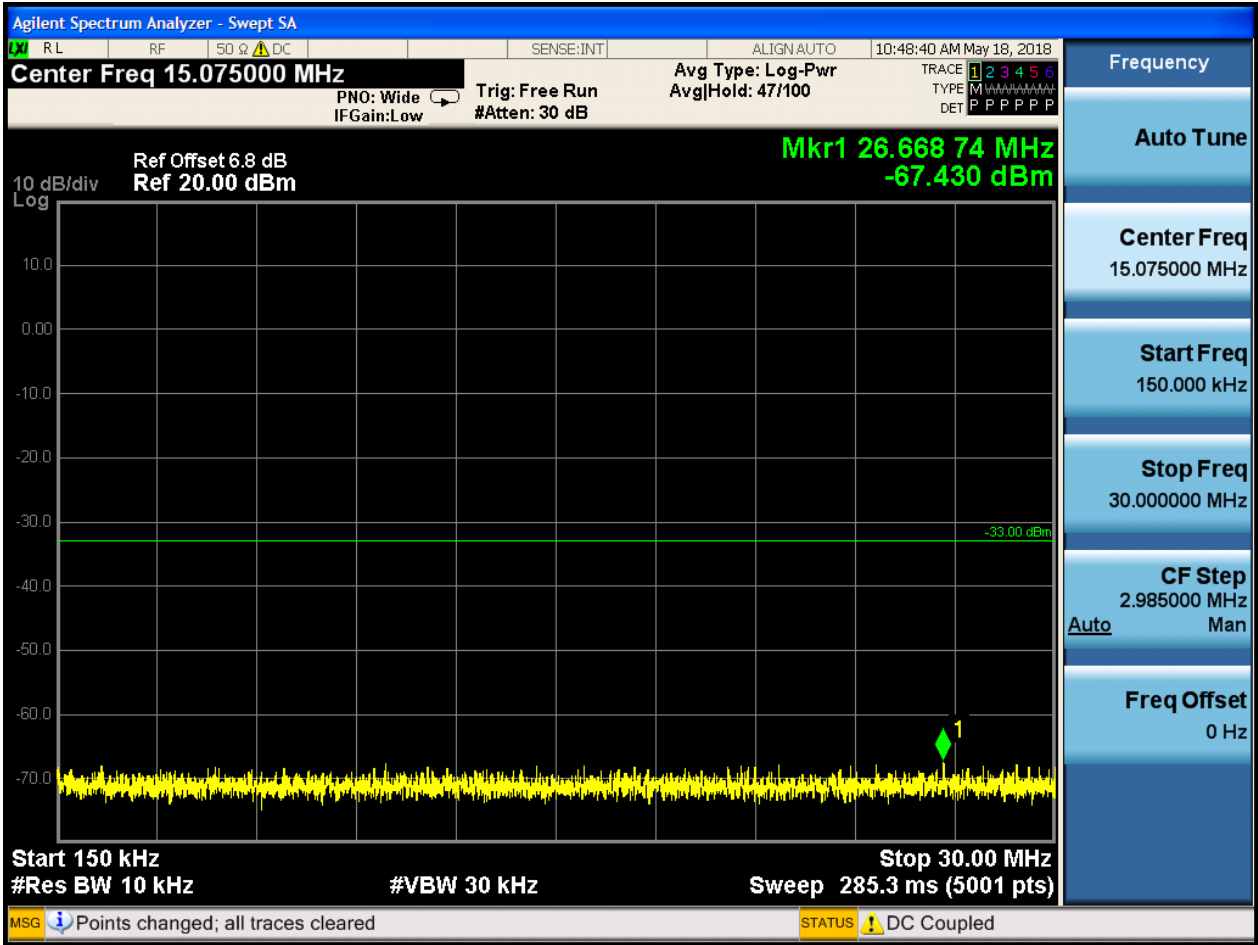


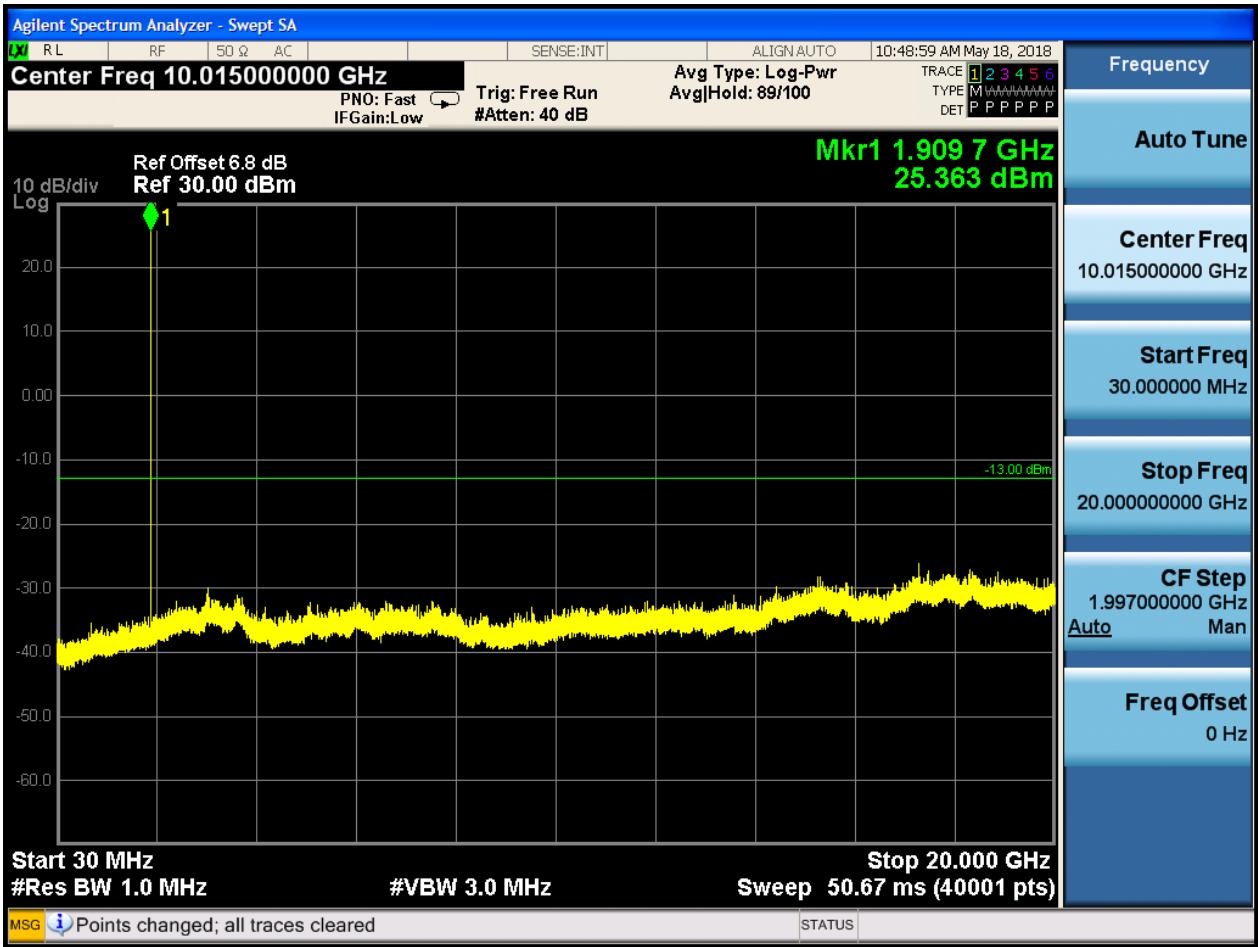




6.1.2.2.3 Test Channel = HCH









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

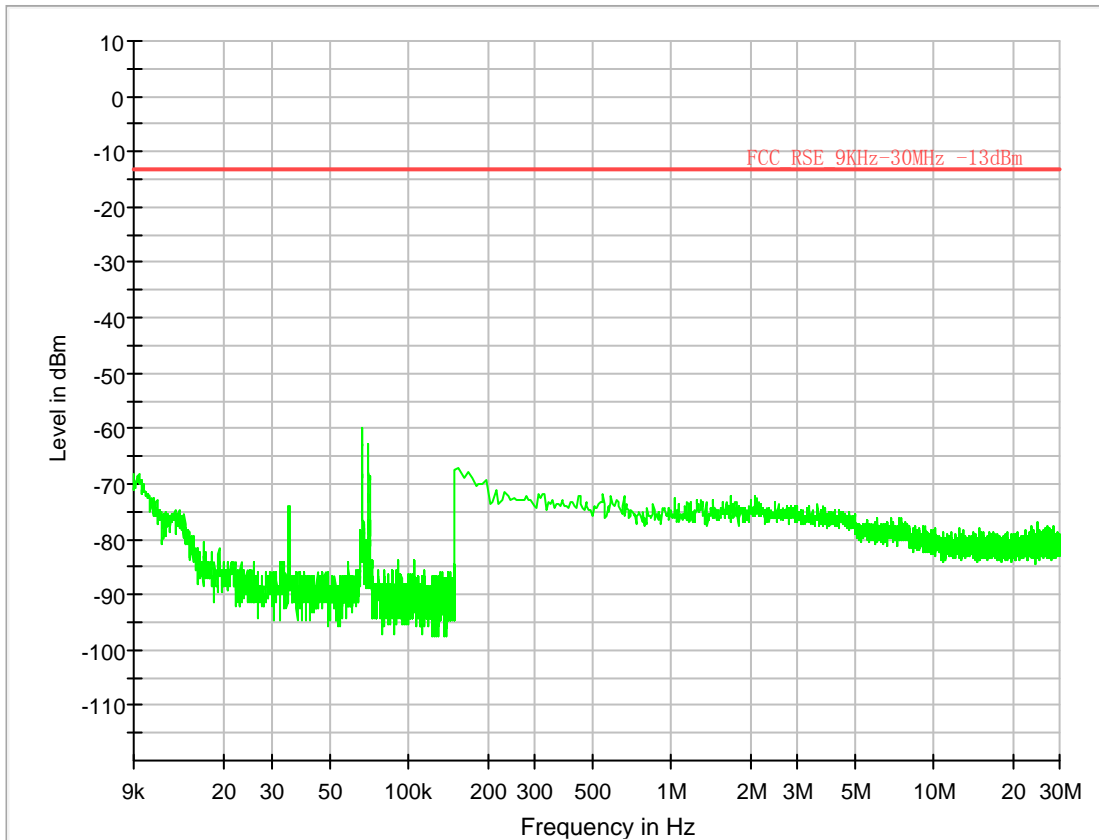
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

Part I - Test Plots

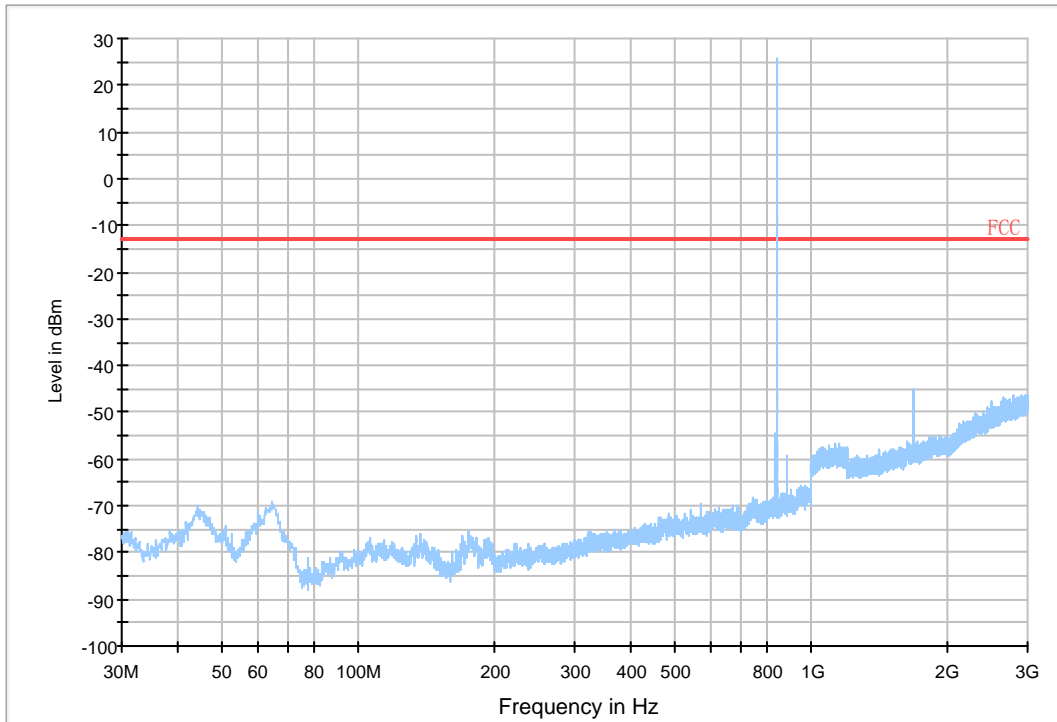
7.1 For GSM

7.1.1 Test Band = GSM850

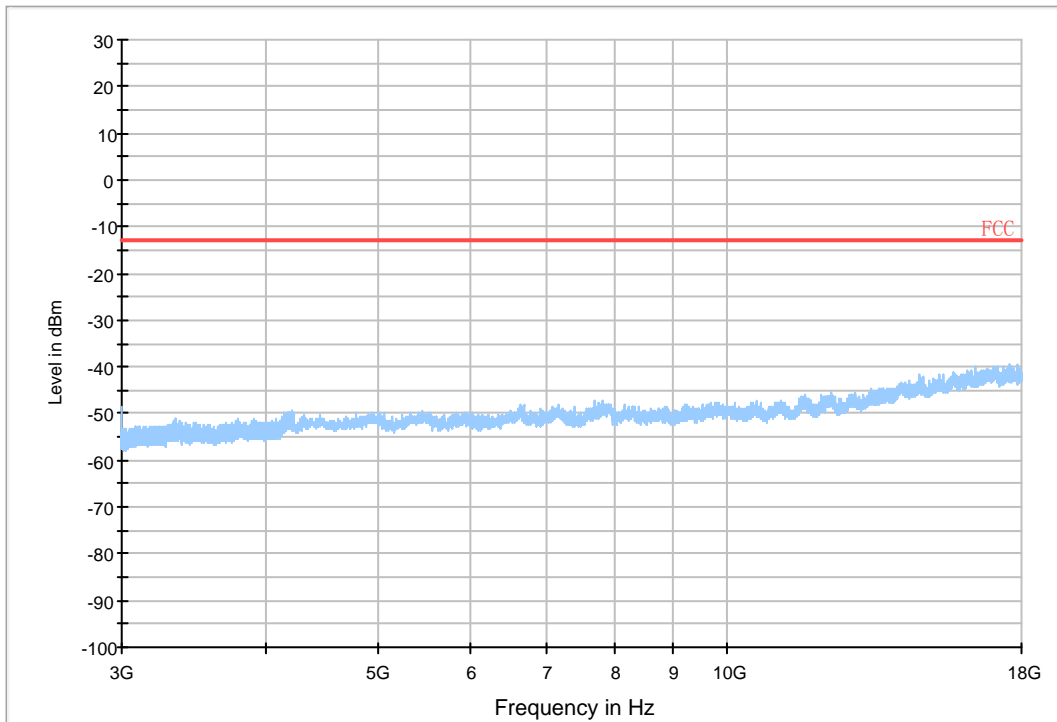
7.1.1.1 Test Mode = GSM/TM1



04 FCC PART22 GSM850_L

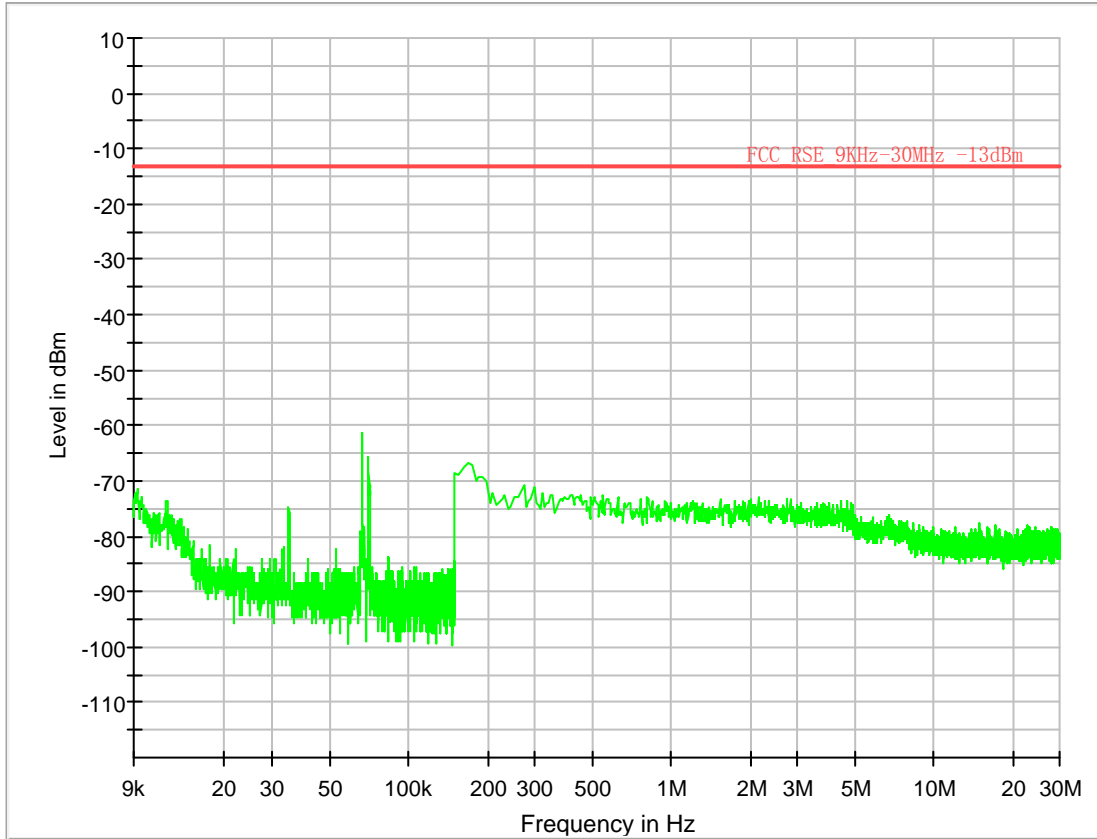


03 FCC PART22 GSM850_H

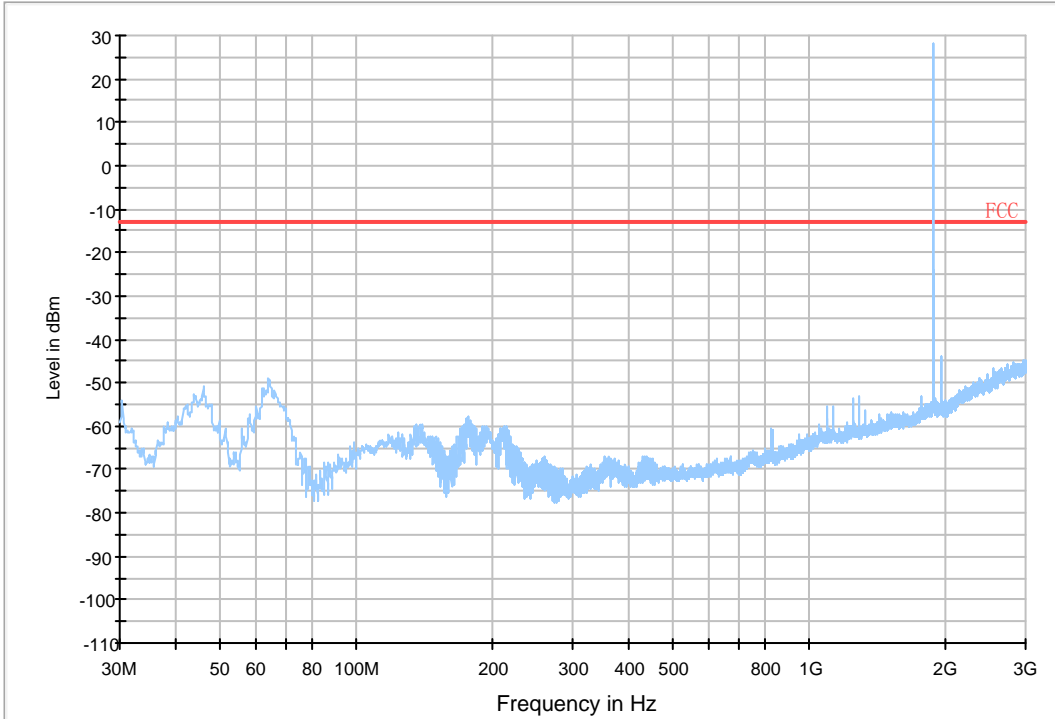


7.1.2 Test Band = GSM1900

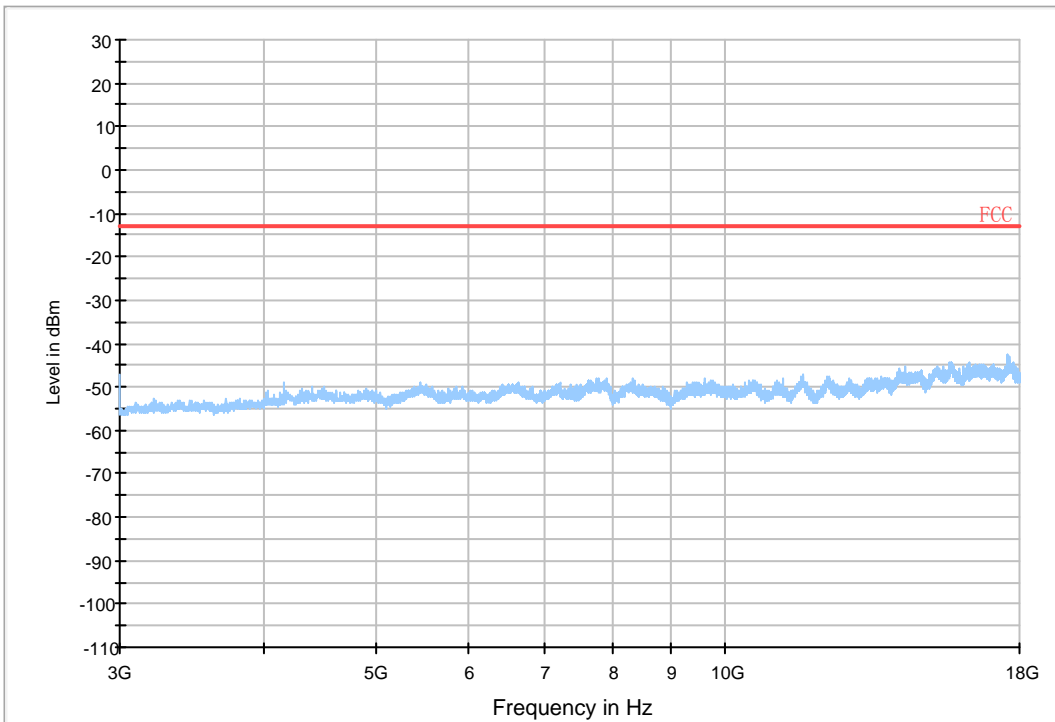
7.1.2.1 Test Mode = GSM/TM1



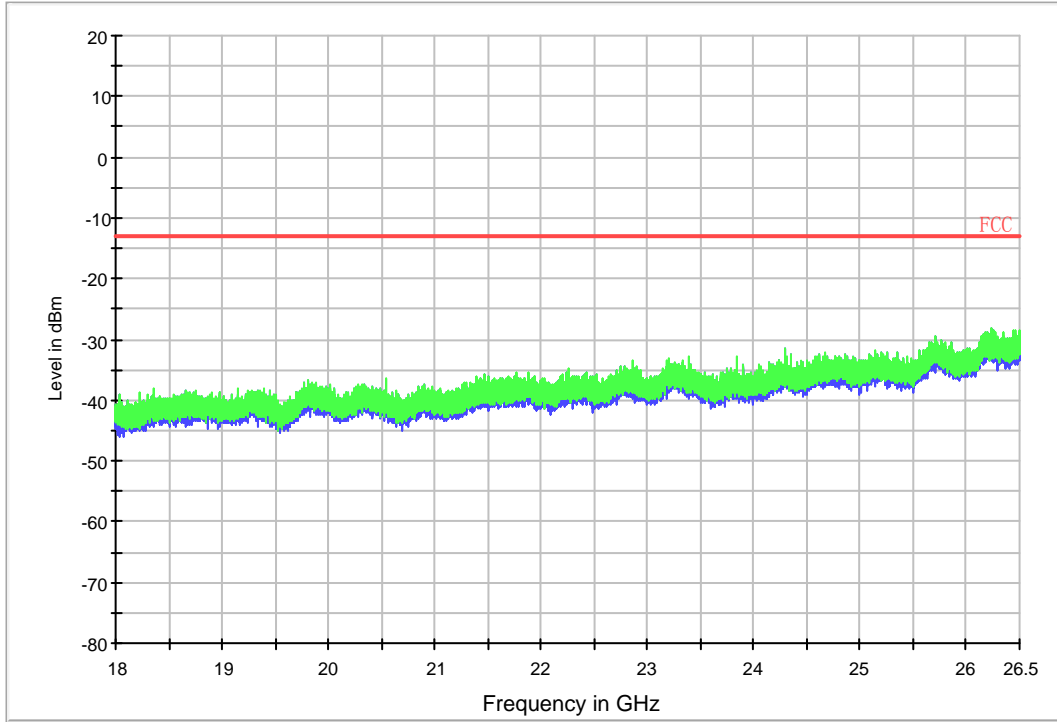
10 FCC PART24 GSM1900_L



09 FCC PART24 GSM1900_H



18G~26.5G RSE-TX-DIRECTOR ABOVE 1.5G PK



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	14.08	0.01708	PASS
				VN	13.56	0.01645	PASS
				VH	16.98	0.0206	PASS
		MCH	TN	VL	11.3	0.01351	PASS
				VN	10.46	0.0125	PASS
				VH	11.82	0.01413	PASS
		HCH	TN	VL	11.75	0.01384	PASS
				VN	9.69	0.01142	PASS
				VH	10.4	0.01225	PASS
	GSM/TM2	LCH	TN	VL	16.53	0.02006	PASS
				VN	17.79	0.02158	PASS
				VH	17.31	0.021	PASS
		MCH	TN	VL	16.11	0.01926	PASS
				VN	15.14	0.0181	PASS
				VH	16.05	0.01918	PASS
		HCH	TN	VL	14.75	0.01738	PASS
				VN	14.27	0.01681	PASS
				VH	14.85	0.0175	PASS
GSM1900	GSM/TM1	LCH	TN	VL	10.33	0.00558	PASS
				VN	2.07	0.00112	PASS
				VH	-1.74	-0.00094	PASS
		MCH	TN	VL	-1.29	-0.00069	PASS
				VN	2.78	0.00148	PASS
				VH	-3.03	-0.00161	PASS
		HCH	TN	VL	2.65	0.00139	PASS
				VN	-1.49	-0.00078	PASS
				VH	-2.52	-0.00132	PASS
	GSM/TM2	LCH	TN	VL	11.2	0.00605	PASS
				VN	14.43	0.0078	PASS
				VH	14.79	0.00799	PASS
		MCH	TN	VL	4.39	0.00234	PASS
				VN	6.33	0.00337	PASS
				VH			

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	10.17	0.00541	PASS
		HCH	TN	VL	9.43	0.00494	PASS
				VN	11.43	0.00598	PASS
				VH	9.65	0.00505	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	13.43	0.01629	PASS
				-20	16.92	0.02053	PASS
				-10	13.24	0.01606	PASS
				0	13.43	0.01629	PASS
				10	15.11	0.01833	PASS
				20	15.05	0.01826	PASS
				30	13.43	0.01629	PASS
				40	10.85	0.01316	PASS
		50	12.4	0.01504	PASS		
		MCH	VN	-30	14.79	0.01768	PASS
				-20	10.78	0.01289	PASS
				-10	11.62	0.01389	PASS
				0	14.79	0.01768	PASS
				10	12.98	0.01552	PASS
				20	11.36	0.01358	PASS
				30	13.56	0.01621	PASS
				40	17.43	0.02083	PASS
		50	12.4	0.01482	PASS		
		HCH	VN	-30	13.62	0.01605	PASS
				-20	7.75	0.00913	PASS
				-10	14.33	0.01688	PASS
				0	14.53	0.01712	PASS
				10	14.46	0.01704	PASS
				20	14.98	0.01765	PASS
	30			15.37	0.01811	PASS	
	40			15.56	0.01833	PASS	
	50	11.75	0.01384	PASS			
	GSM/TM2	LCH	VN	-30	17.24	0.02092	PASS
				-20	16.4	0.0199	PASS
				-10	15.21	0.01845	PASS
				0	18.5	0.02245	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict						
				10	14.56	0.01767	PASS						
				20	15.53	0.01884	PASS						
				30	14.01	0.017	PASS						
				40	16.05	0.01947	PASS						
				50	14.37	0.01744	PASS						
		MCH	VN			-30	15.63	0.01868	PASS				
						-20	15.21	0.01818	PASS				
						-10	14.98	0.01791	PASS				
						0	14.82	0.01771	PASS				
						10	15.05	0.01799	PASS				
						20	20.08	0.024	PASS				
						30	15.66	0.01872	PASS				
						40	17.24	0.02061	PASS				
						50	14.69	0.01756	PASS				
						HCH	VN			-30	16.3	0.0192	PASS
		-20	17.27	0.02035	PASS								
		-10	14.14	0.01666	PASS								
		0	14.04	0.01654	PASS								
		10	13.11	0.01545	PASS								
		20	14.59	0.01719	PASS								
		30	16.59	0.01955	PASS								
		40	16.85	0.01985	PASS								
		50	15.24	0.01795	PASS								
		GSM1900	GSM/TM1	LCH	VN					-30	12.01	0.00649	PASS
										-20	-1.61	-0.00087	PASS
										-10	-9.69	-0.00524	PASS
										0	0.52	0.00028	PASS
10	-1.16									-0.00063	PASS		
20	-1.1									-0.00059	PASS		
30	0.32									0.00017	PASS		
40	-5.94									-0.00321	PASS		
50	6.07									0.00328	PASS		
MCH	VN									-30	2.84	0.00151	PASS
										-20	-3.62	-0.00193	PASS
										-10	4.2	0.00223	PASS
										0	-0.71	-0.00038	PASS
										10	1.81	0.00096	PASS
										20	4.58	0.00244	PASS
										30	-0.9	-0.00048	PASS
										40	-1.81	-0.00096	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	-2.78	-0.00148	PASS
				-30	-0.84	-0.00044	PASS
				-20	-2.65	-0.00139	PASS
				-10	-1.49	-0.00078	PASS
				0	0.13	0.00007	PASS
				10	-0.39	-0.0002	PASS
				20	-2.32	-0.00121	PASS
				30	-2.45	-0.00128	PASS
				40	-0.52	-0.00027	PASS
				50	-3.55	-0.00186	PASS
	GSM/TM2	LCH	VN	-30	17.11	0.00925	PASS
				-20	14.92	0.00806	PASS
				-10	7.01	0.00379	PASS
				0	8.23	0.00445	PASS
				10	7.3	0.00395	PASS
				20	15.76	0.00852	PASS
				30	9.43	0.0051	PASS
				40	13.04	0.00705	PASS
				50	11.2	0.00605	PASS
				MCH	VN	-30	9.43
		-20	7.43			0.00395	PASS
		-10	12.37			0.00658	PASS
		0	11.27			0.00599	PASS
		10	11.27			0.00599	PASS
		20	4.75			0.00253	PASS
		30	9.3			0.00495	PASS
		40	11.07			0.00589	PASS
		50	9.33			0.00496	PASS
		HCH	VN			-30	6.72
				-20	4.75	0.00249	PASS
				-10	6.39	0.00335	PASS
				0	9.78	0.00512	PASS
10	5.1			0.00267	PASS		
20	3.49			0.00183	PASS		
30	7.97			0.00417	PASS		
40	1.94			0.00102	PASS		
50	4.55	0.00238	PASS				

END