



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	32.9	28.55	38.5	PASS
		MCH	32.97	28.62	38.5	PASS
		HCH	32.96	28.61	38.5	PASS
	GSM/TM2	LCH	25.26	20.91	38.5	PASS
		MCH	25.35	21	38.5	PASS
		HCH	25.43	21.08	38.5	PASS

Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	30.1	27.7	33	PASS
		MCH	30.08	27.68	33	PASS
		HCH	30.01	27.61	33	PASS
	GSM/TM2	LCH	24.4	22	33	PASS
		MCH	24.54	22.14	33	PASS
		HCH	24.59	22.19	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	0.25	13	PASS
		MCH	0.22	13	PASS
		HCH	0.25	13	PASS
	GSM/TM2	LCH	3.14	13	PASS
		MCH	3.24	13	PASS
		HCH	3.1	13	PASS

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM1900	GSM/TM1	LCH	0.28	13	PASS
		MCH	0.26	13	PASS
		HCH	0.24	13	PASS
	GSM/TM2	LCH	3.23	13	PASS
		MCH	3.39	13	PASS
		HCH	3.41	13	PASS

3Appendix_C: Modulation Characteristics

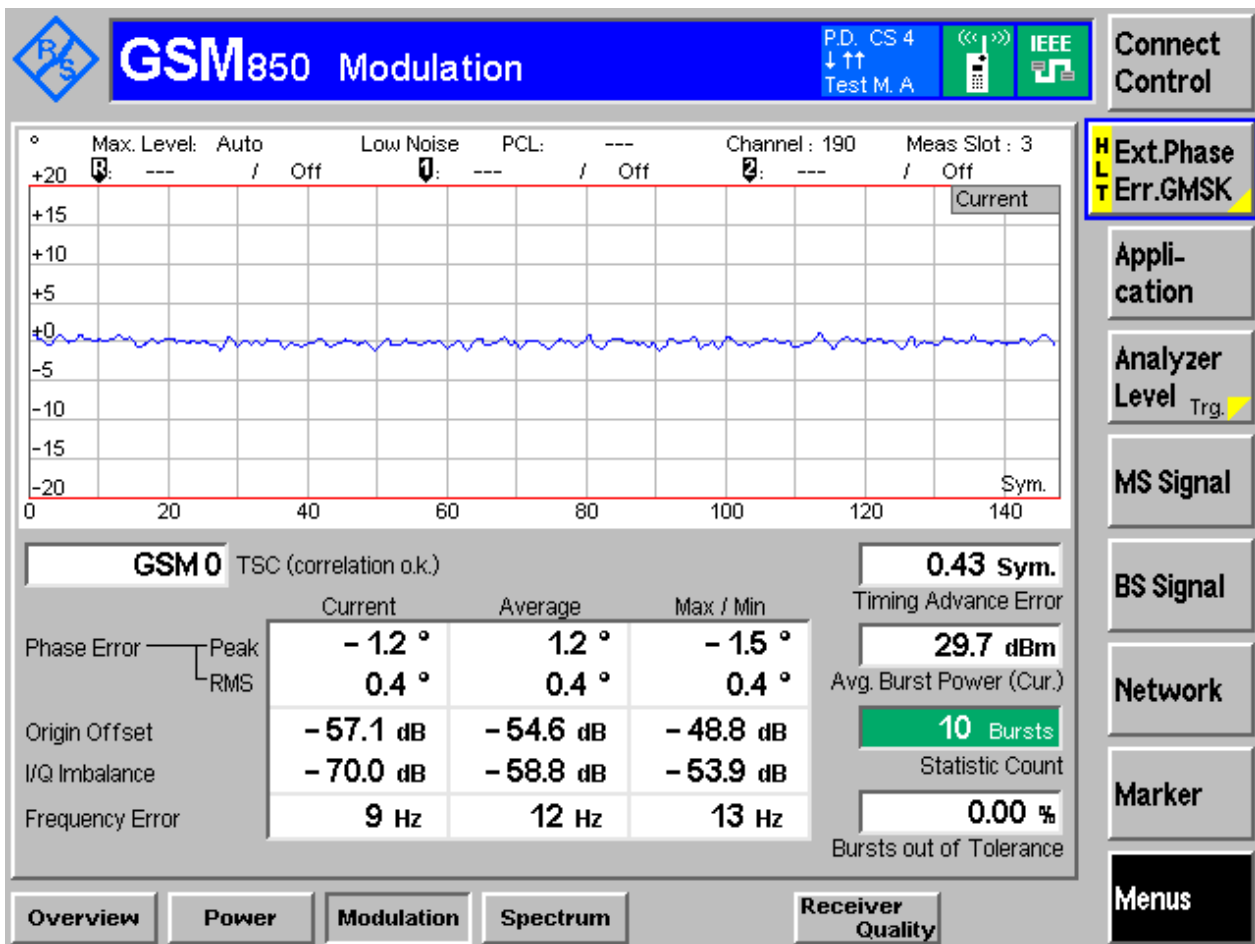
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

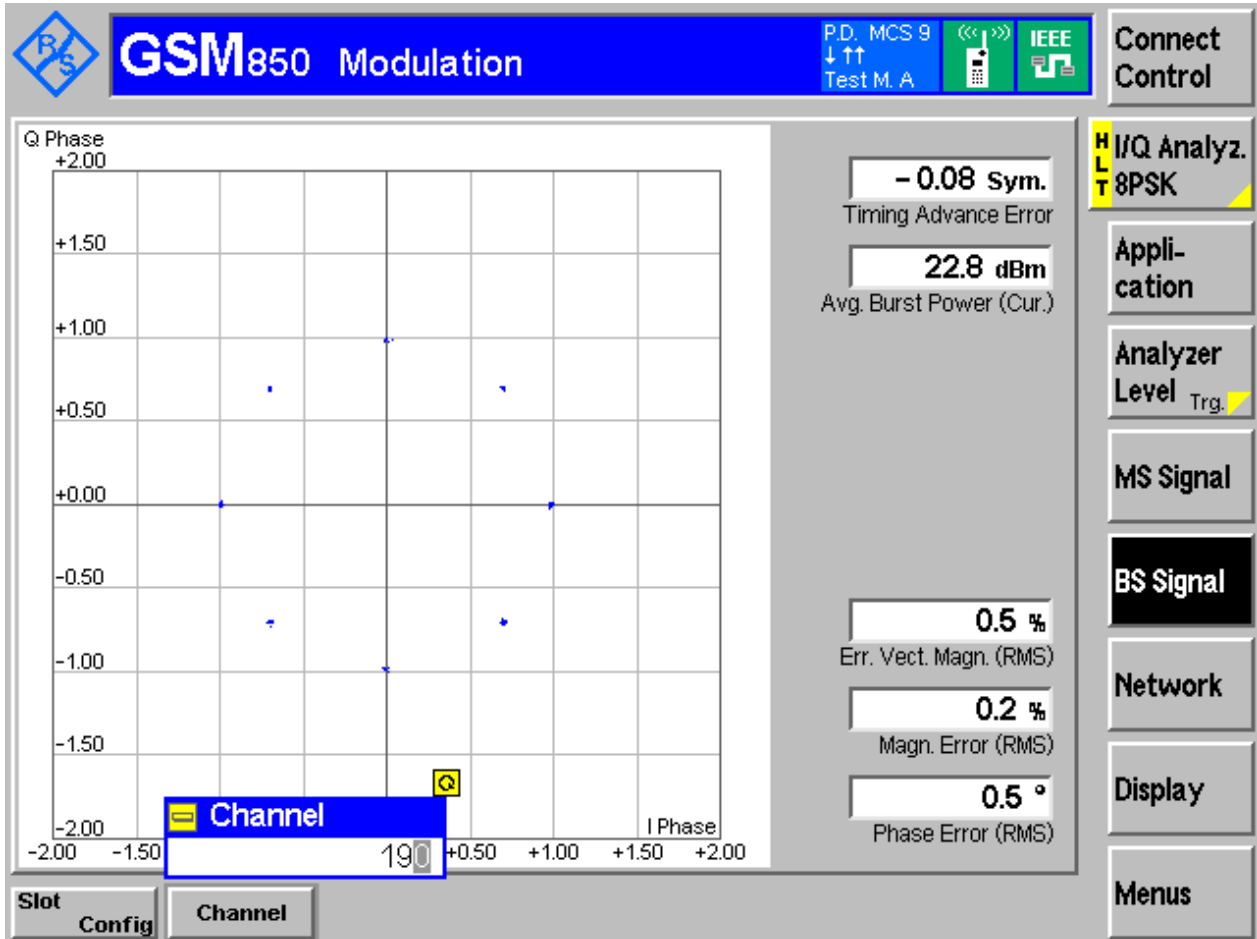
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

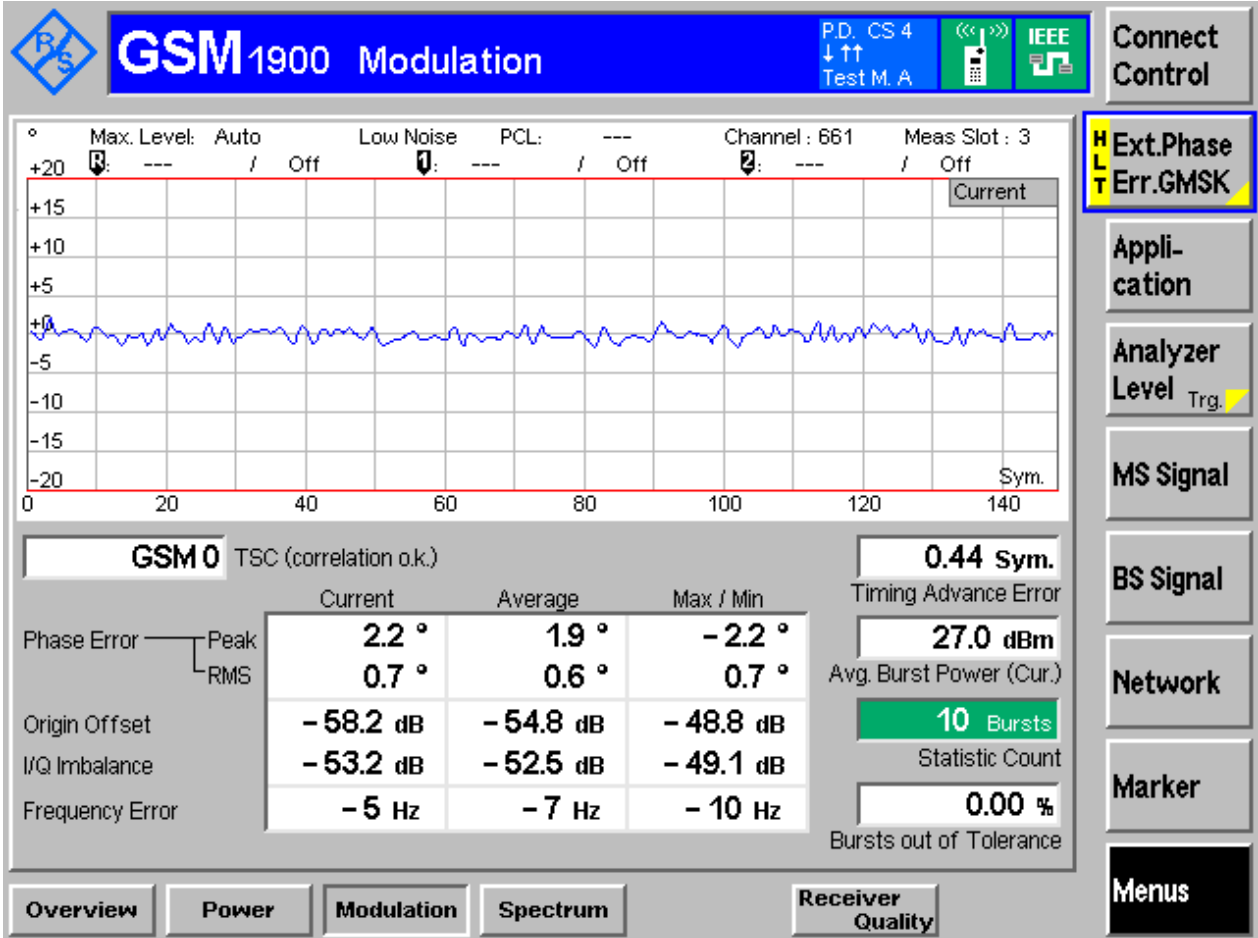
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

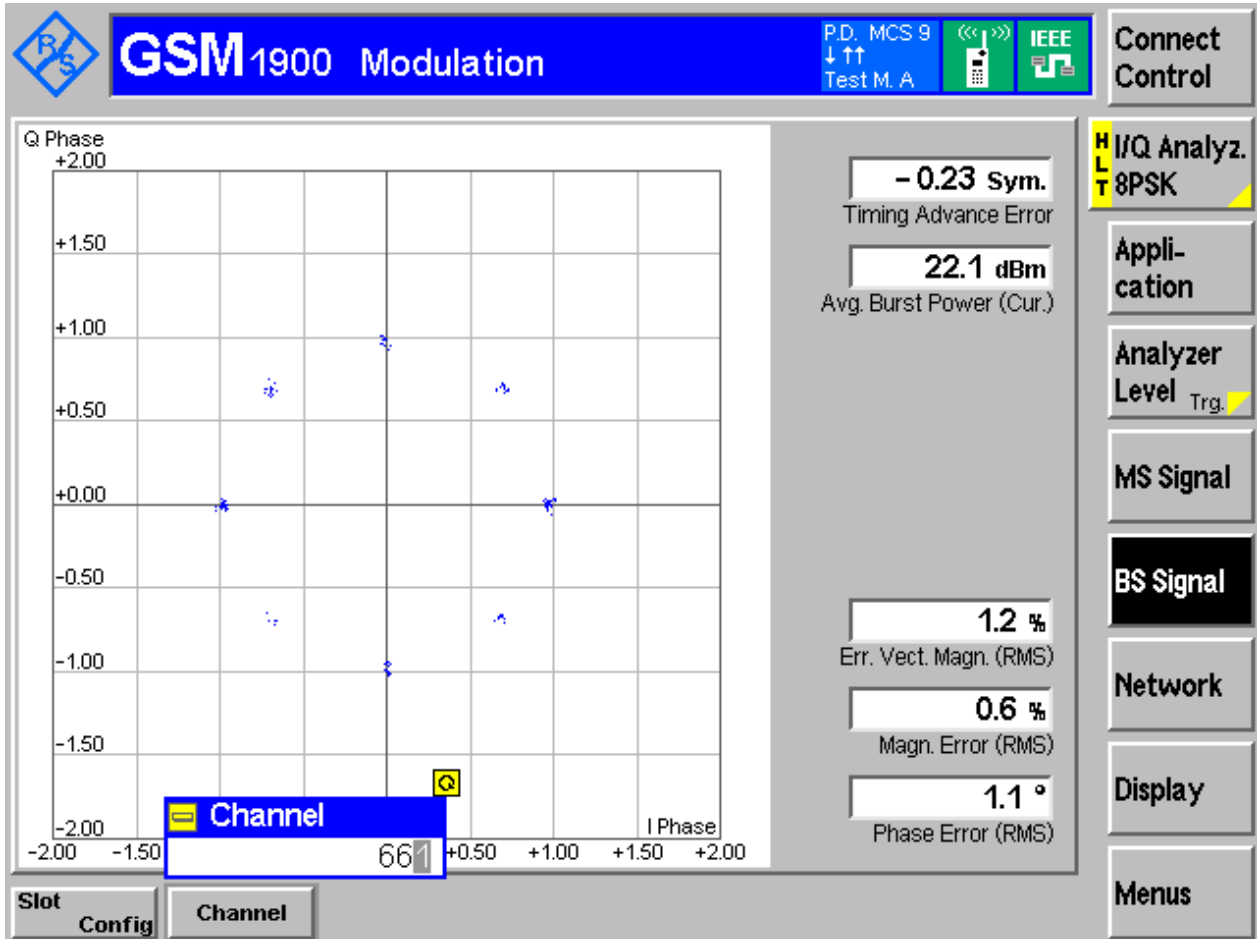
3.1.2.1 Test Mode = GSM/TM1

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	243.53	312.98	Pass
		MCH	242.70	314.57	Pass
		HCH	243.77	310.95	Pass
	GSM/TM2	LCH	250.85	311.72	Pass
		MCH	243.80	311.95	Pass
		HCH	248.96	314.30	Pass
GSM1900	GSM/TM1	LCH	247.64	315.85	Pass
		MCH	243.06	317.59	Pass
		HCH	249.46	316.19	Pass
	GSM/TM2	LCH	241.36	311.65	Pass
		MCH	242.59	306.62	Pass
		HCH	243.83	308.01	Pass



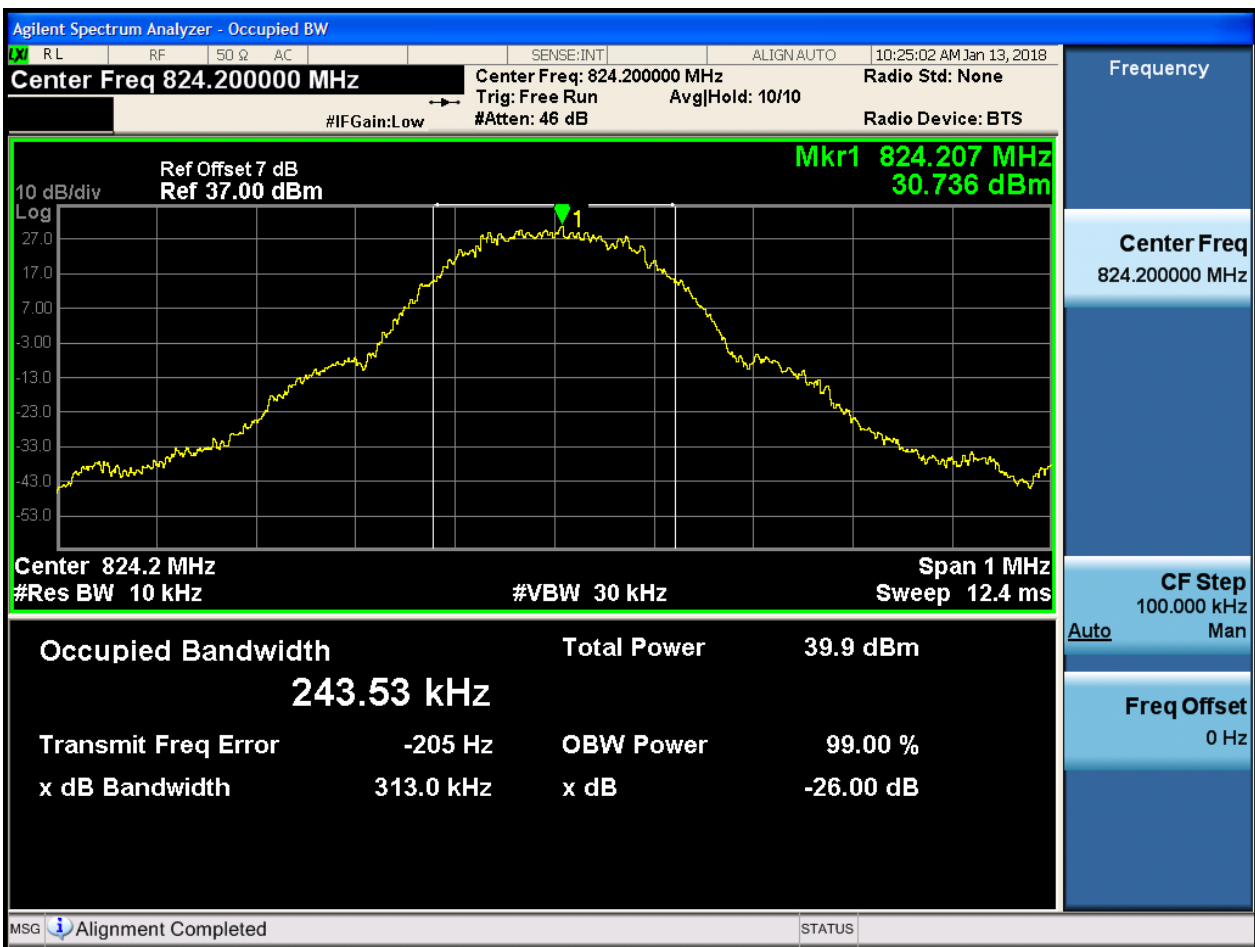
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

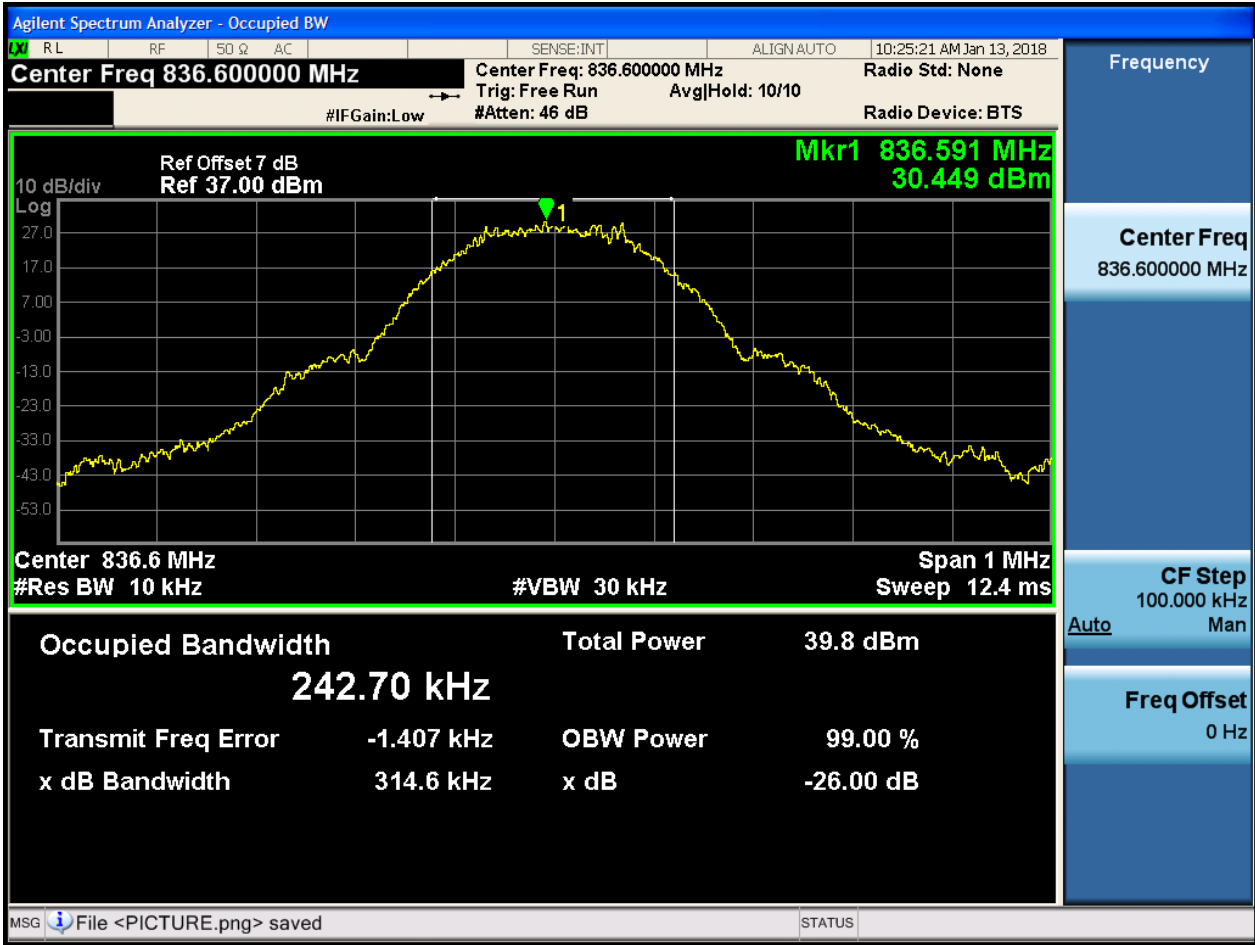
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH





4.1.1.1.2 Test Channel = MCH





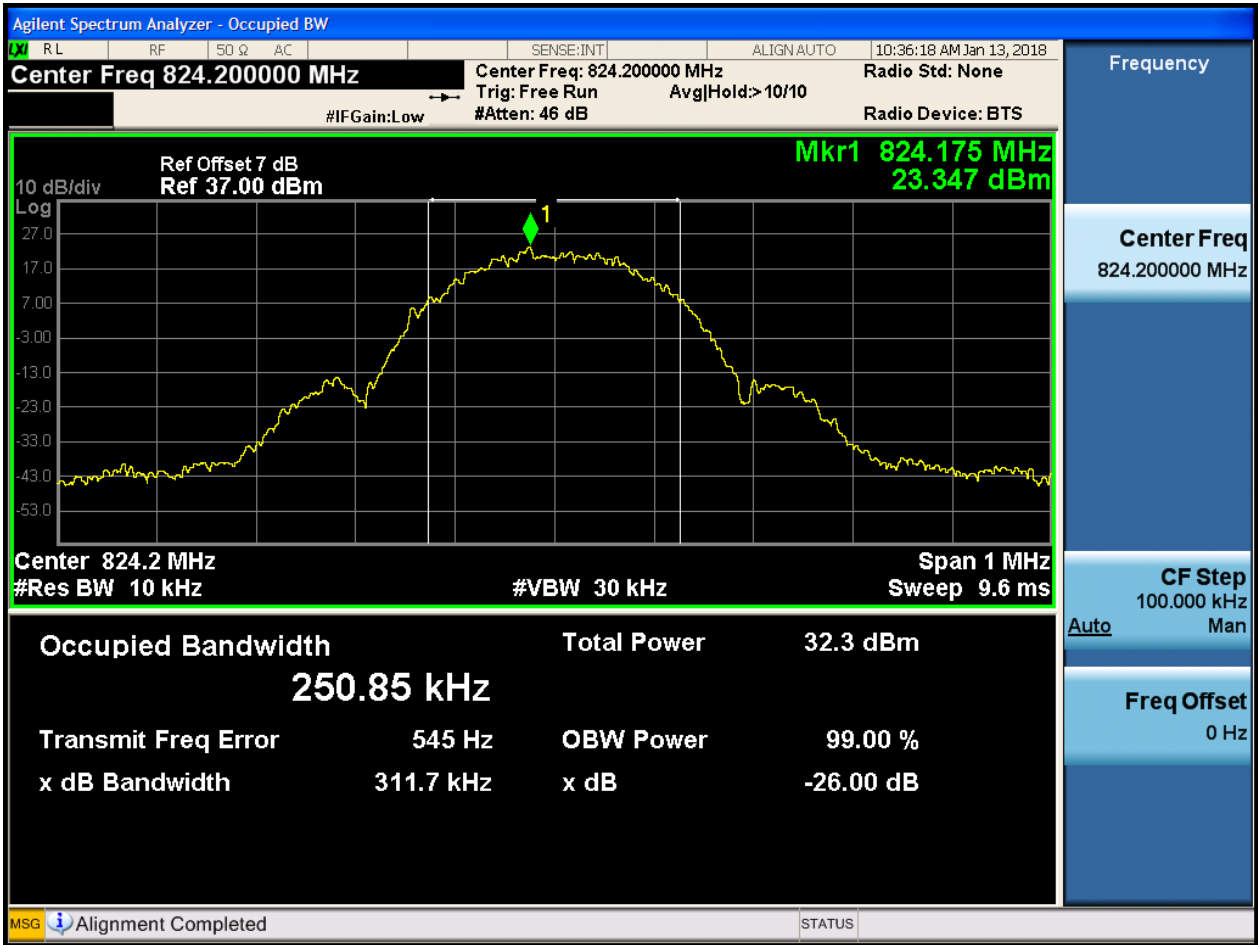
4.1.1.1.3 Test Channel = HCH





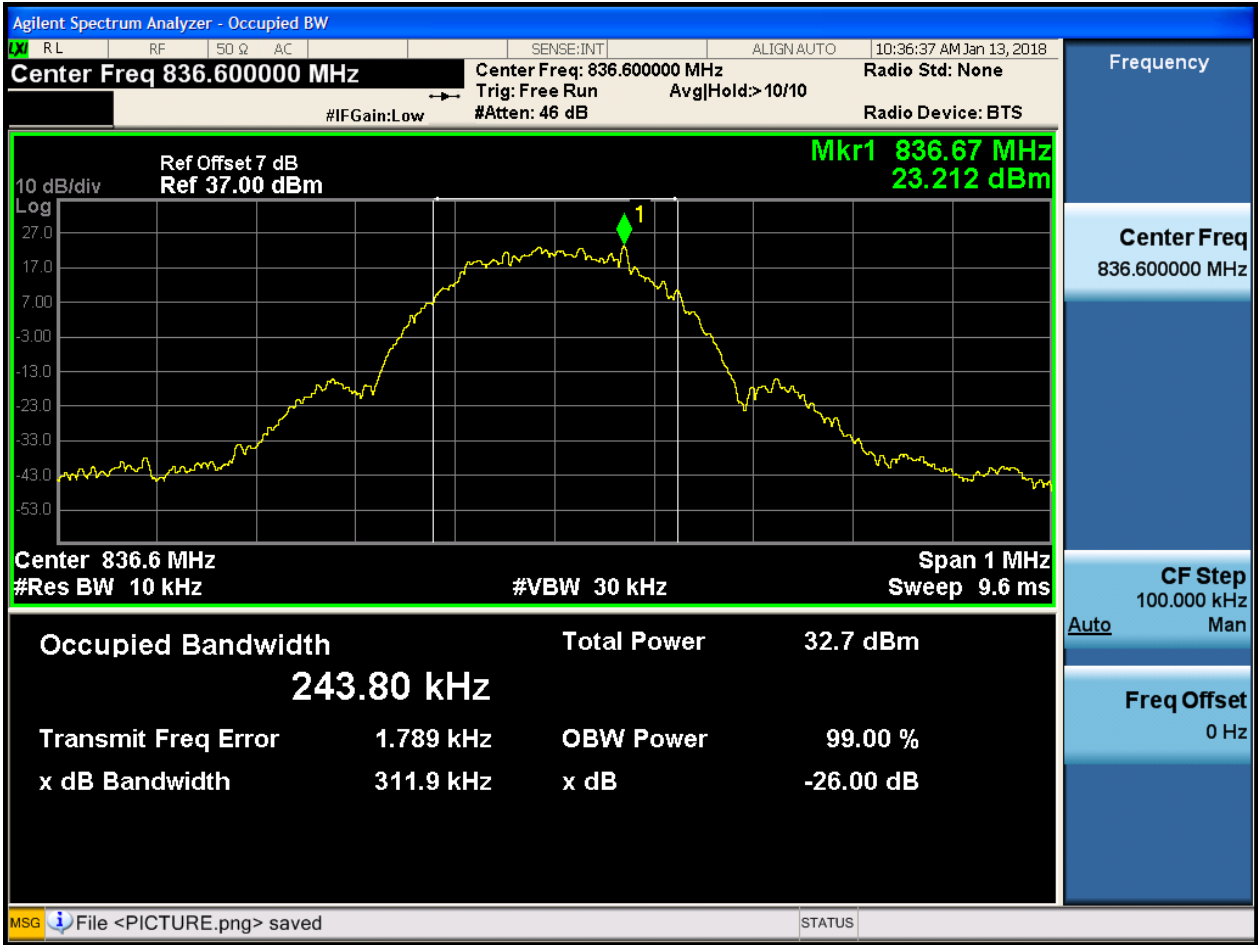
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



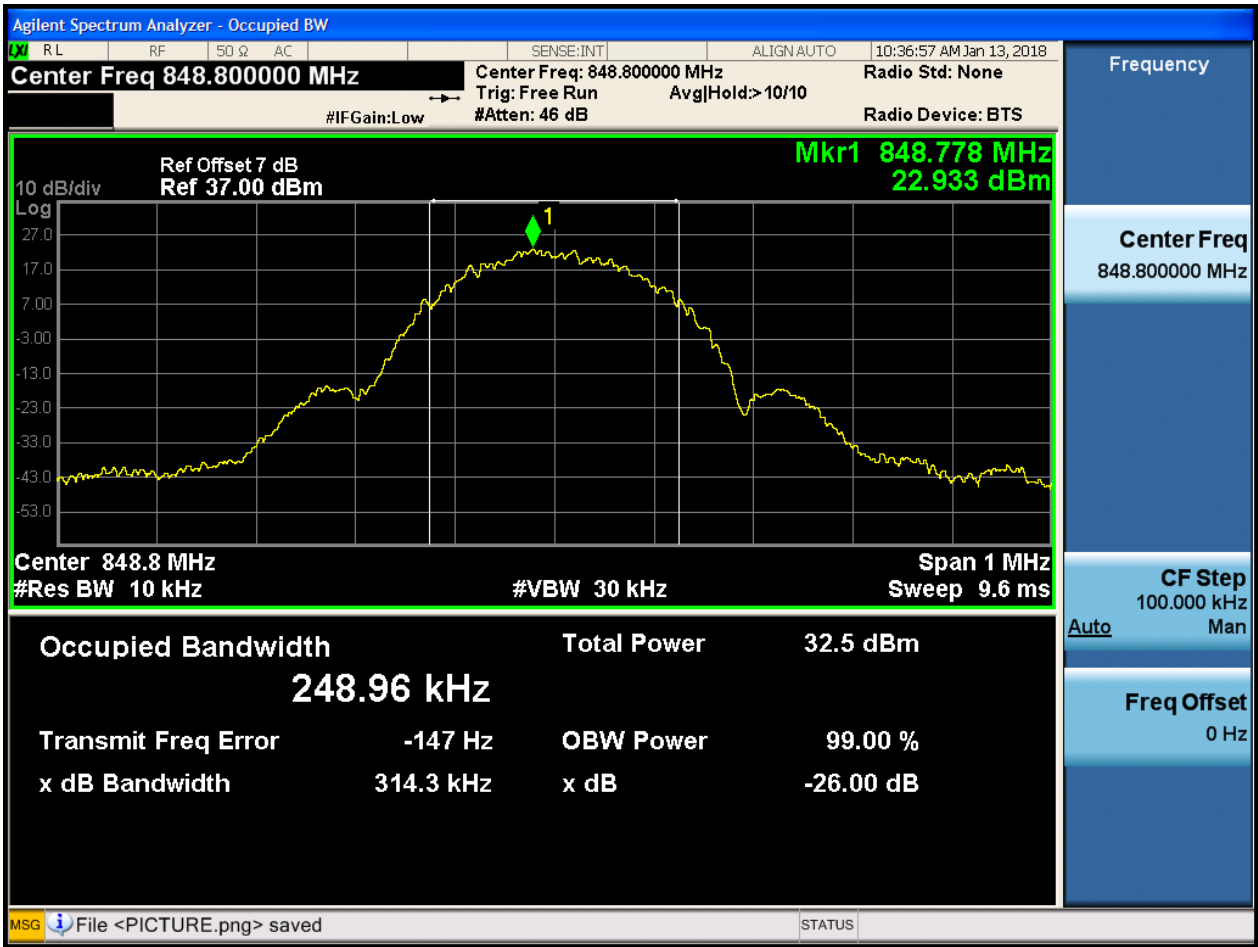


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

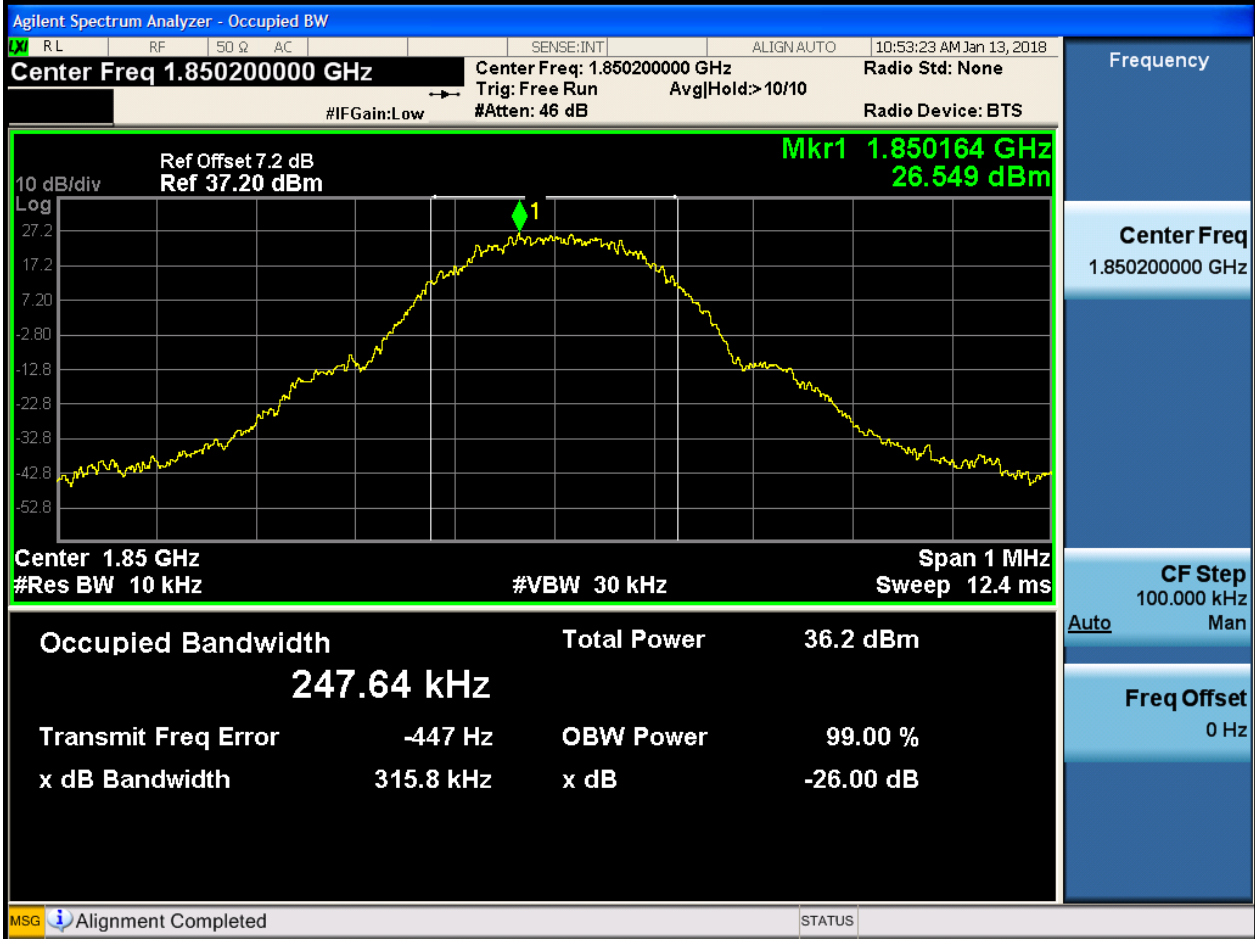




4.1.2 Test Band = GSM1900

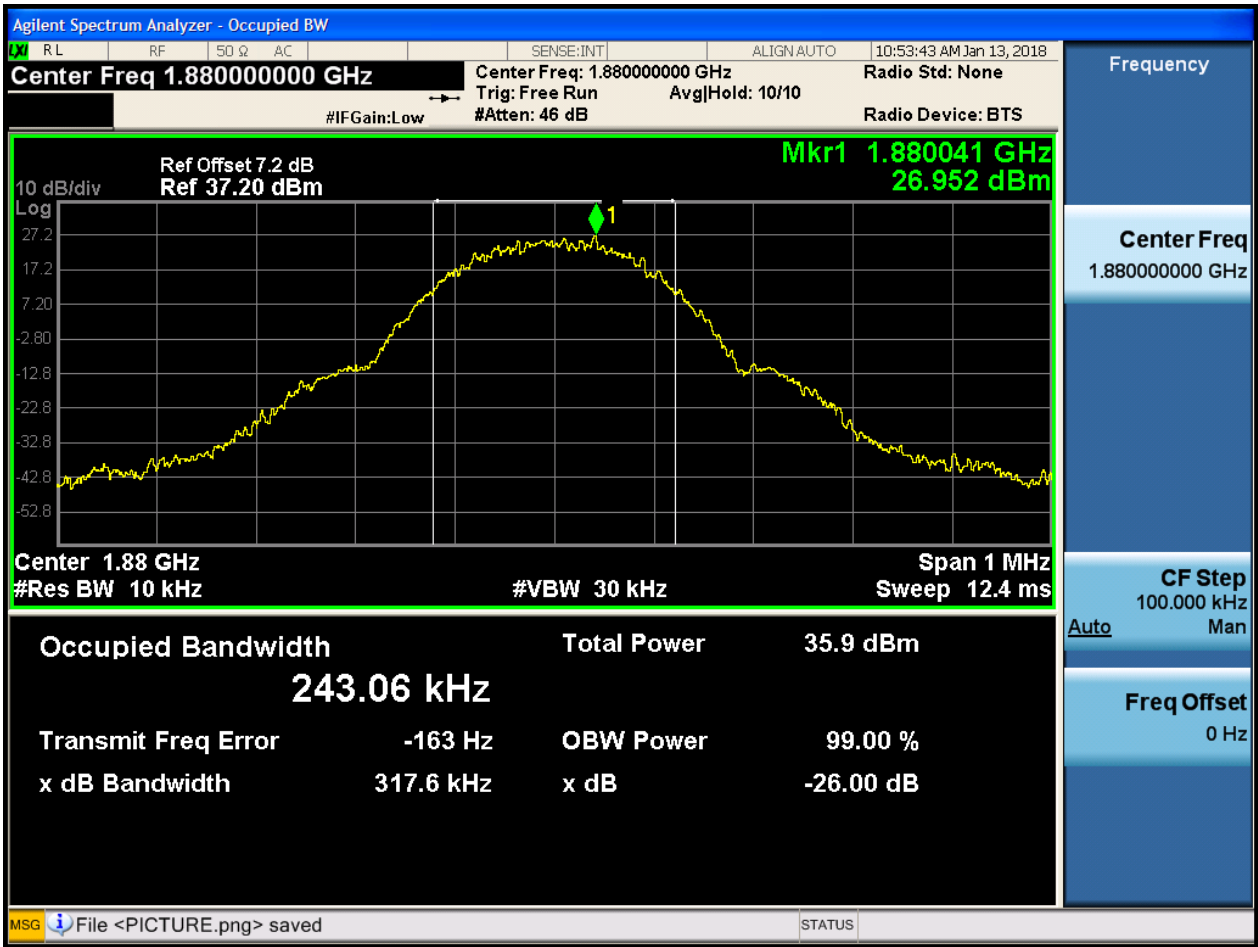
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



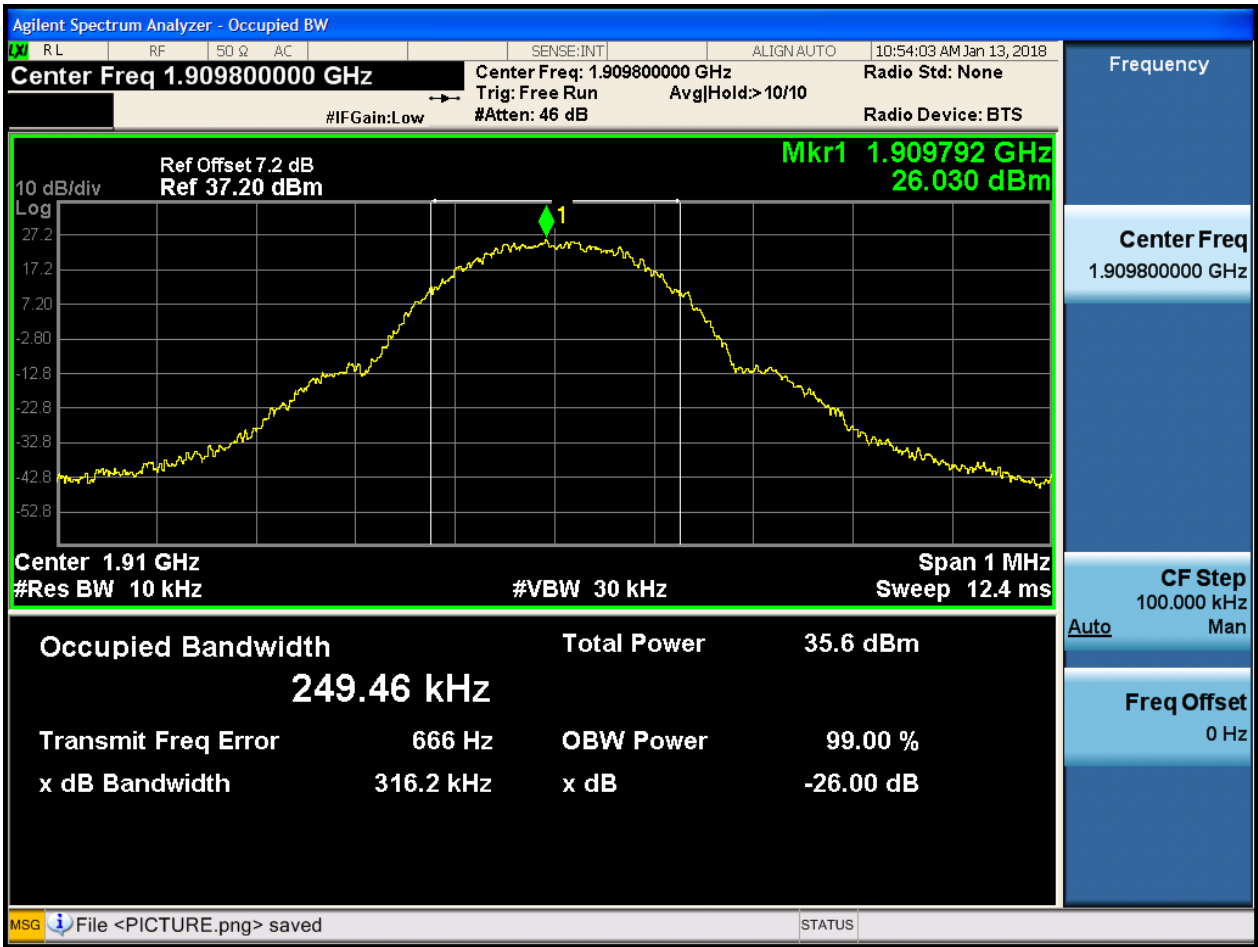


4.1.2.1.2 Test Channel = MCH





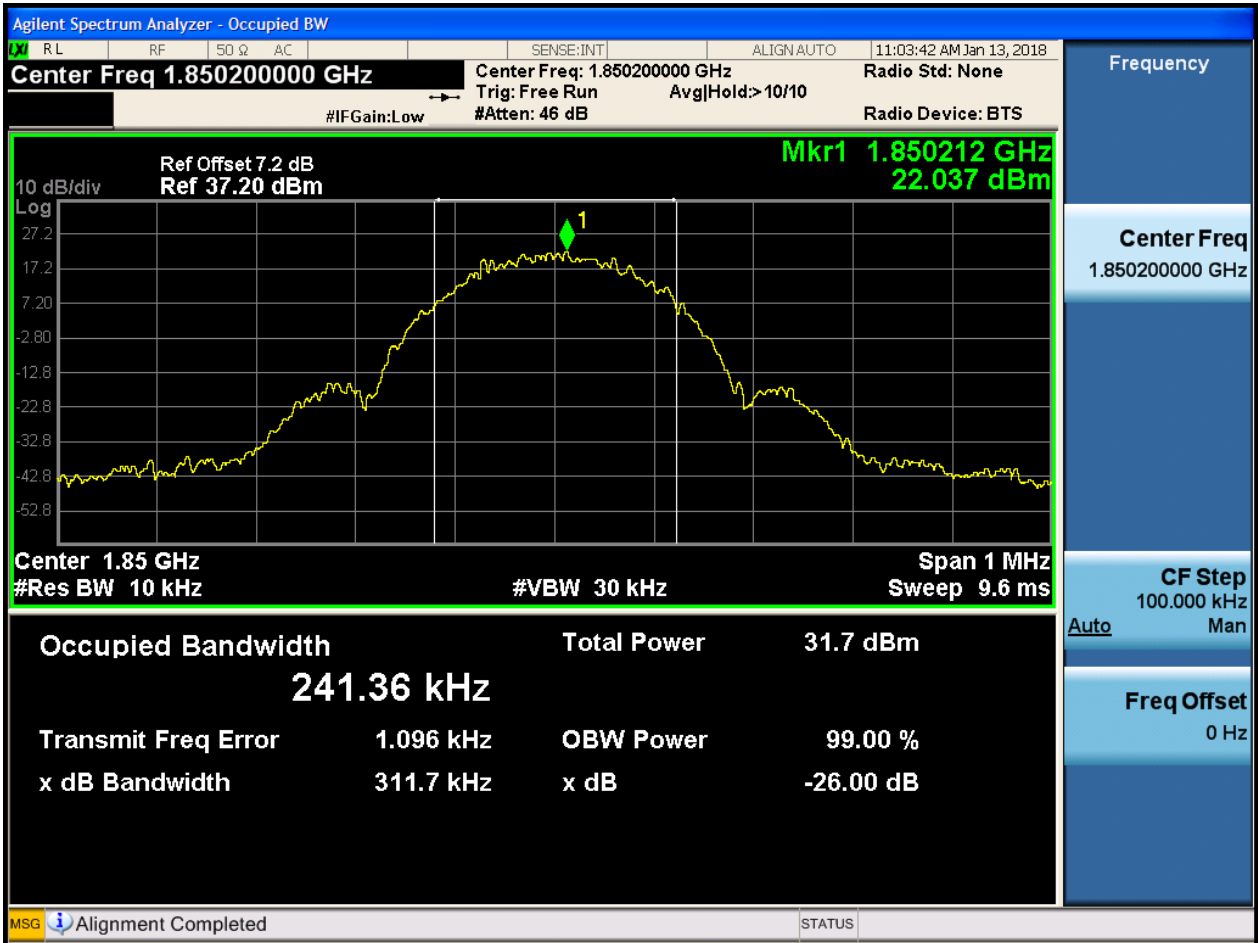
4.1.2.1.3 Test Channel = HCH





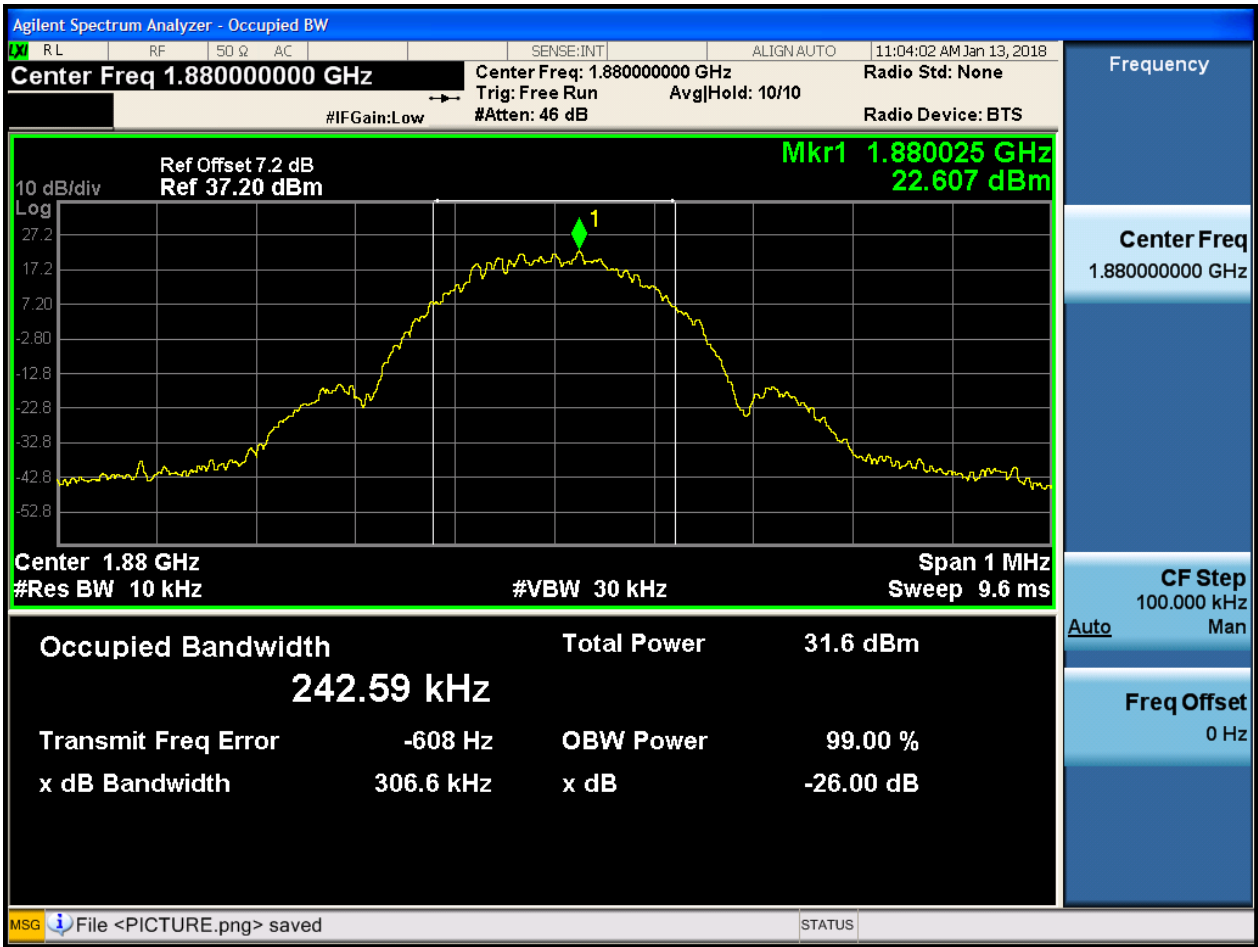
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



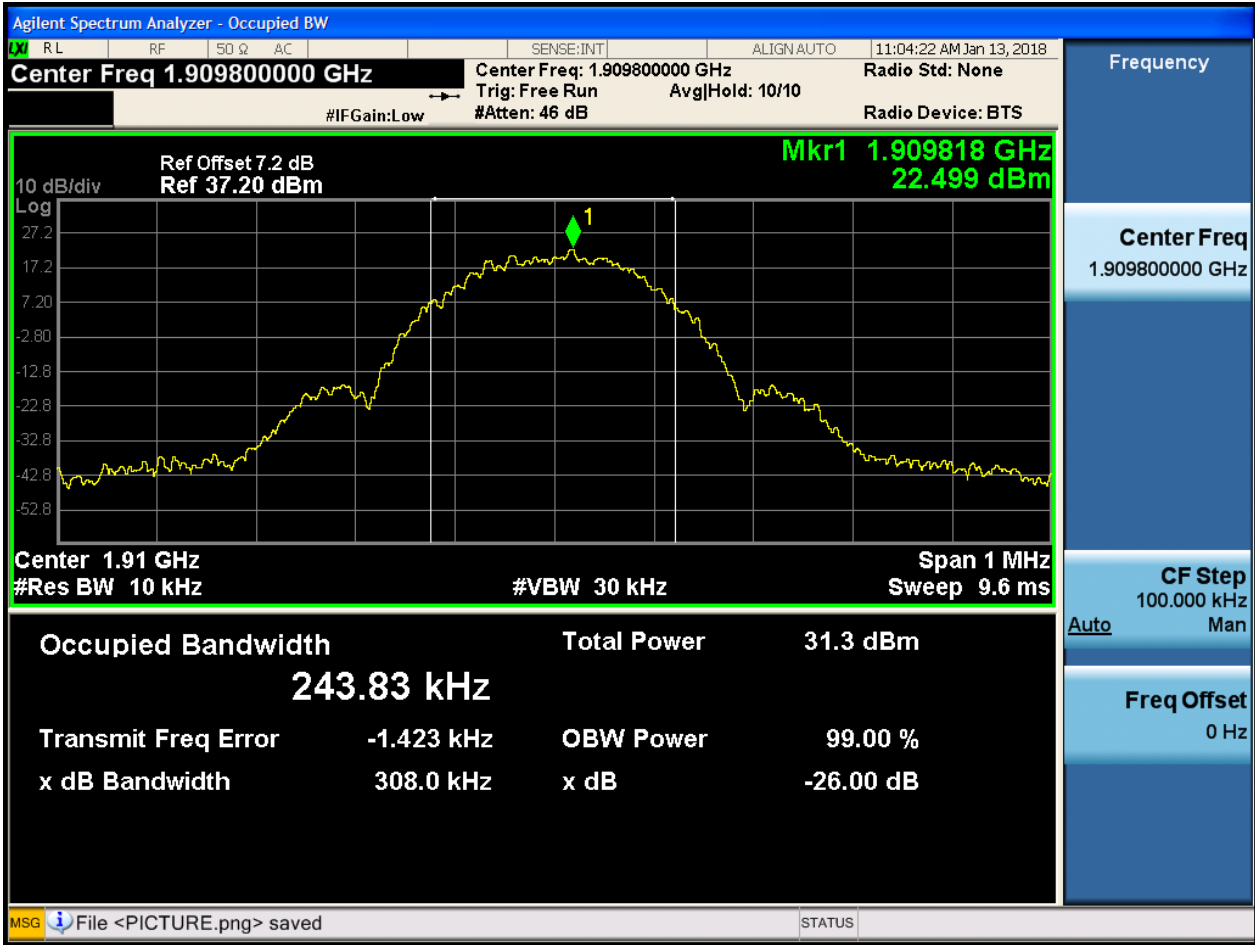


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





5Appendix_E: Band Edges Compliance

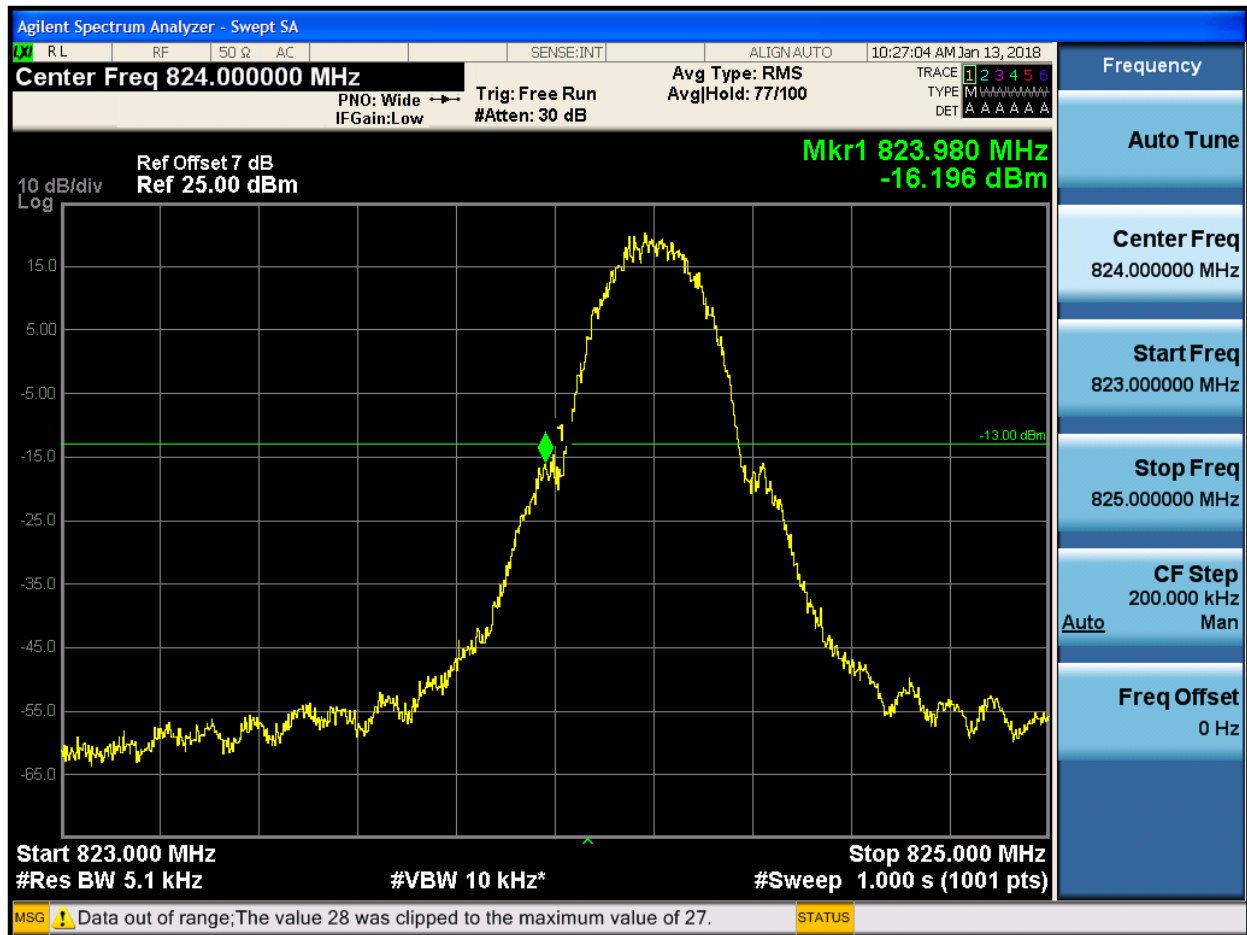
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM850

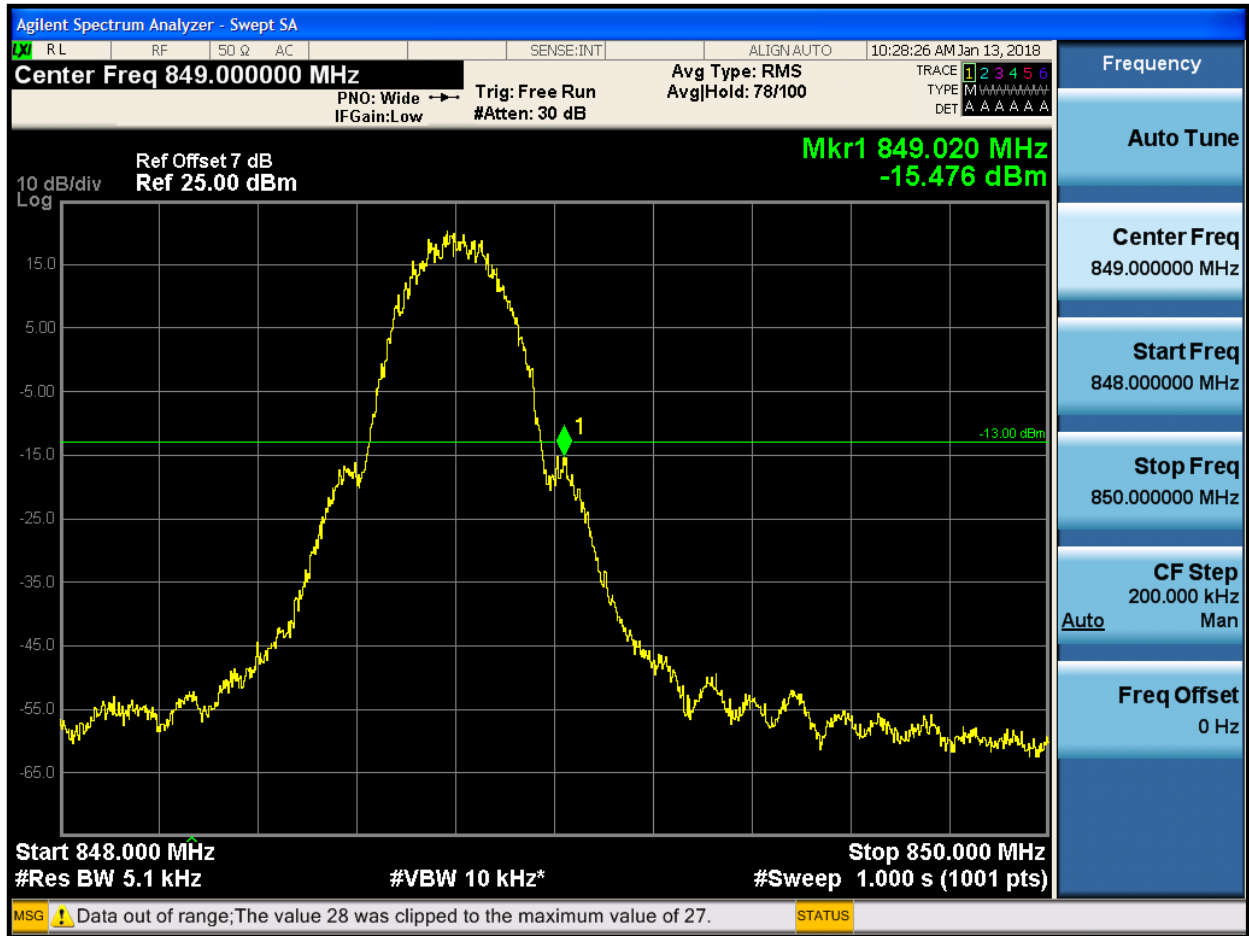
5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH





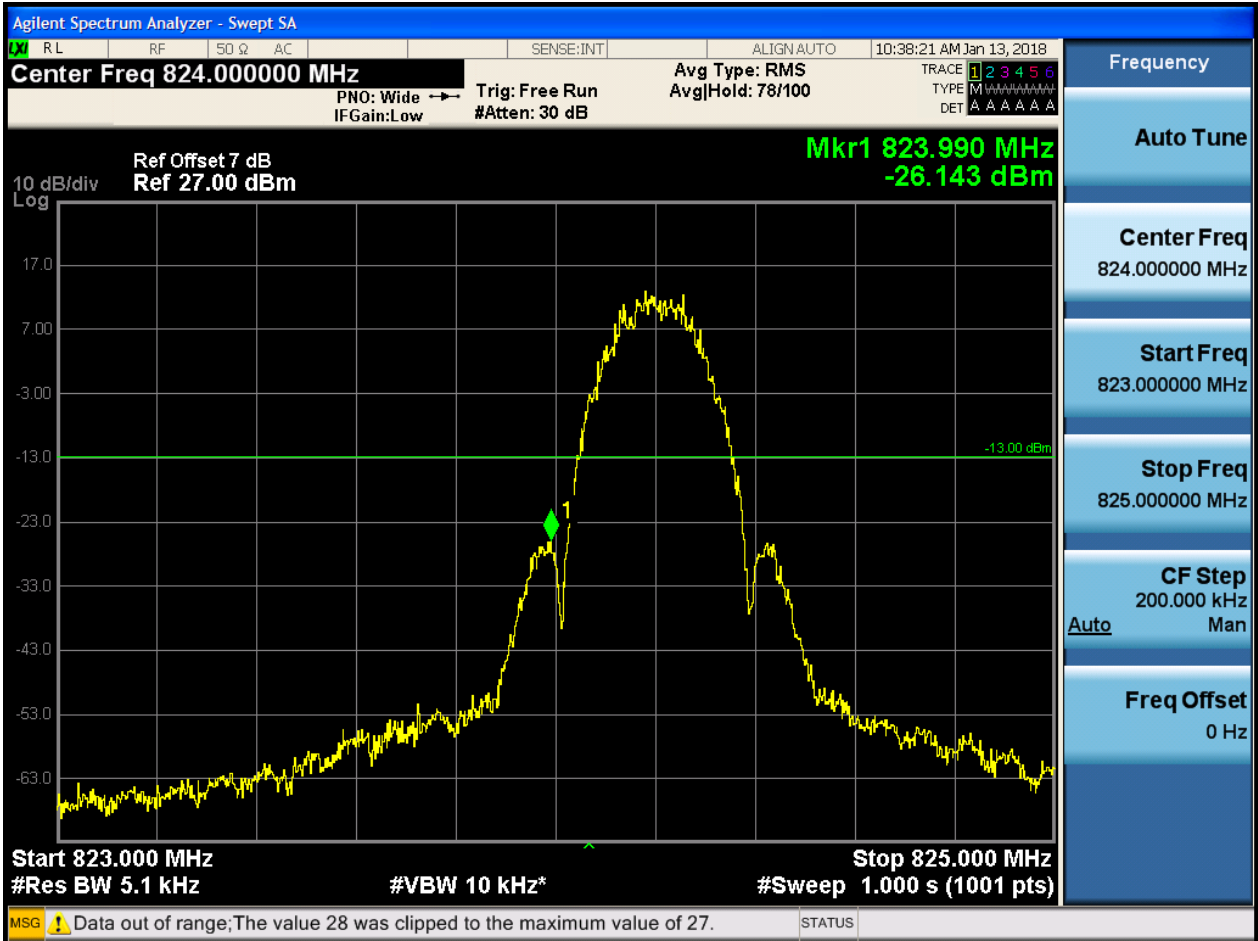
5.1.1.1.2 Test Channel = HCH



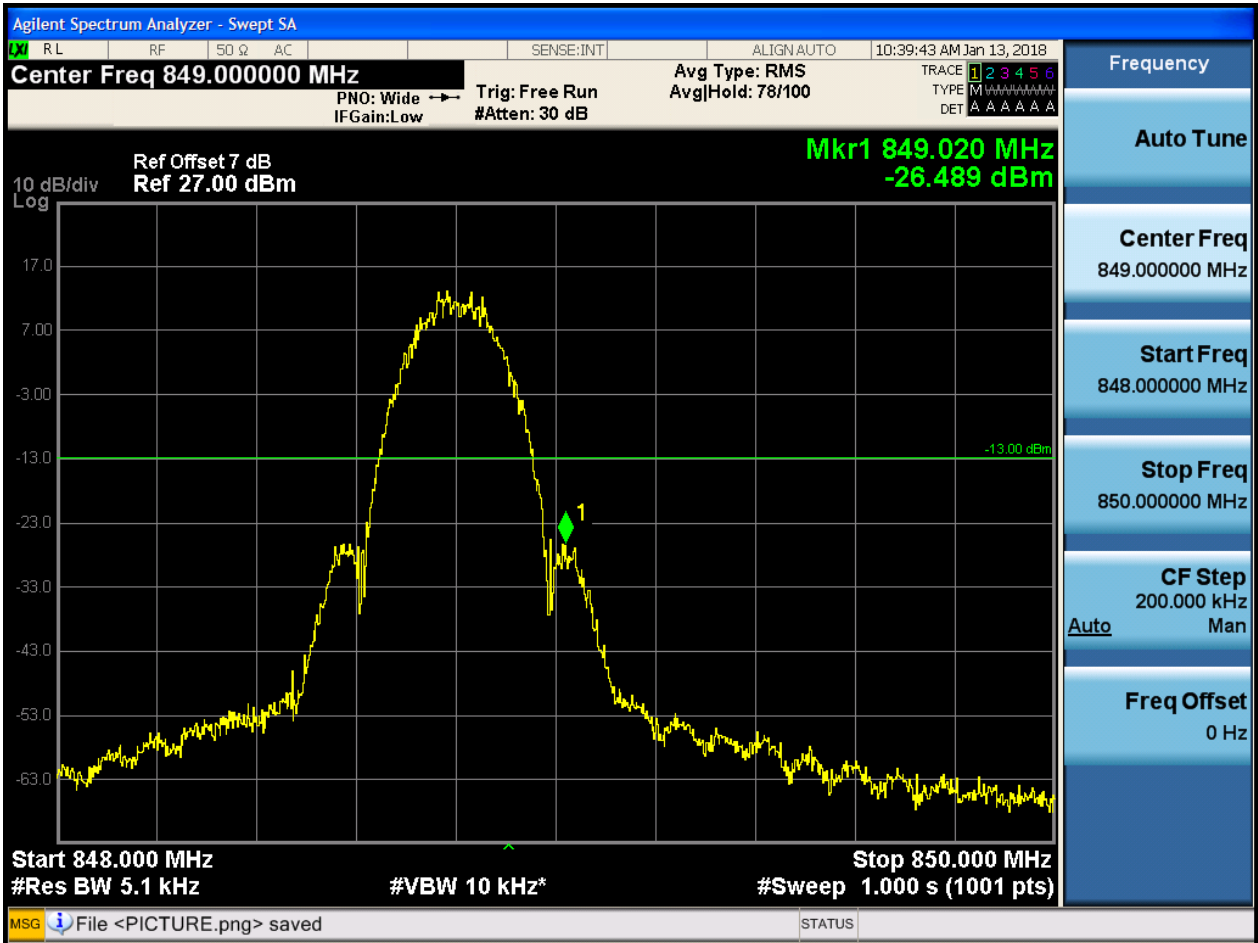


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



5.1.1.2.2 Test Channel = HCH

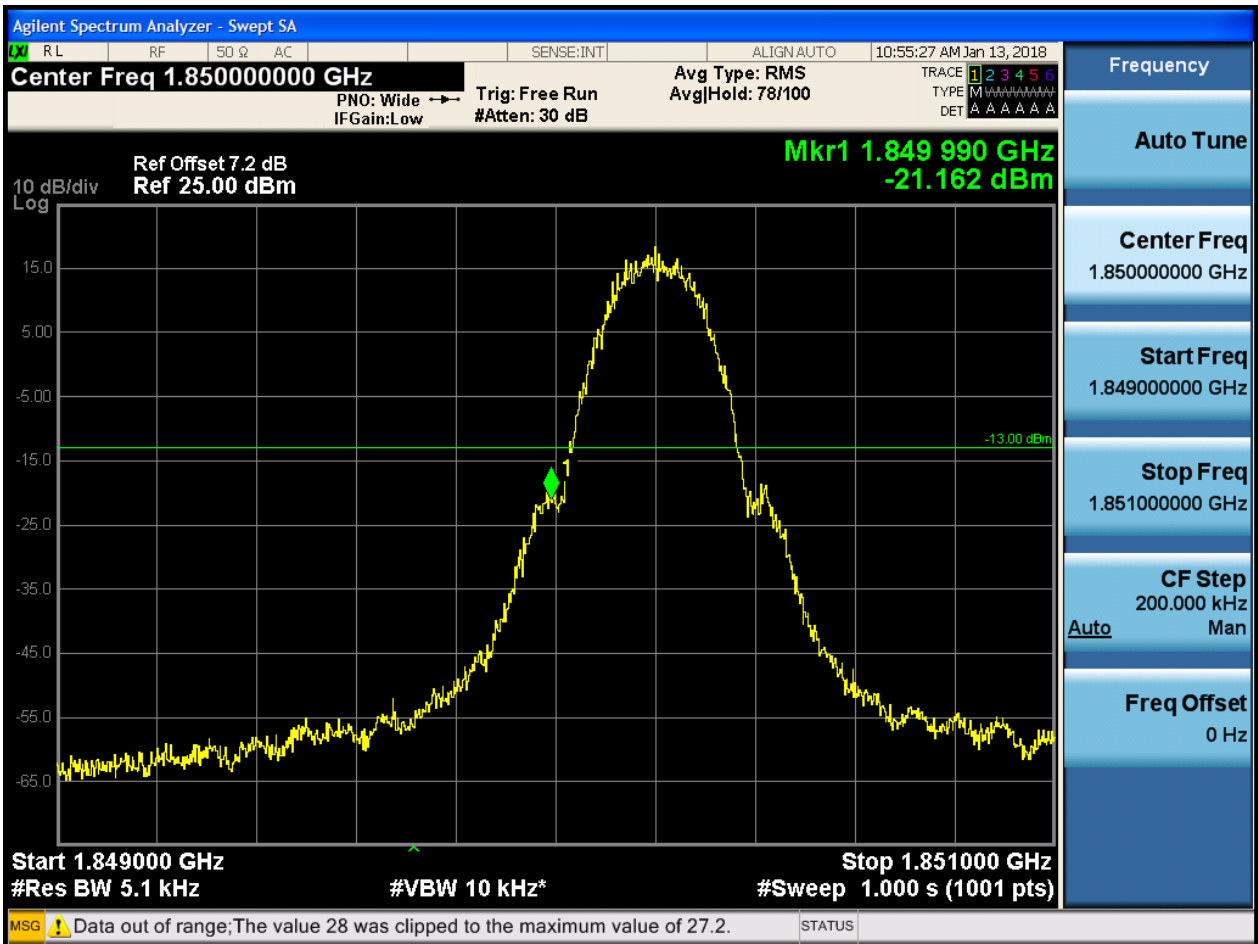




5.1.2 Test Band = GSM1900

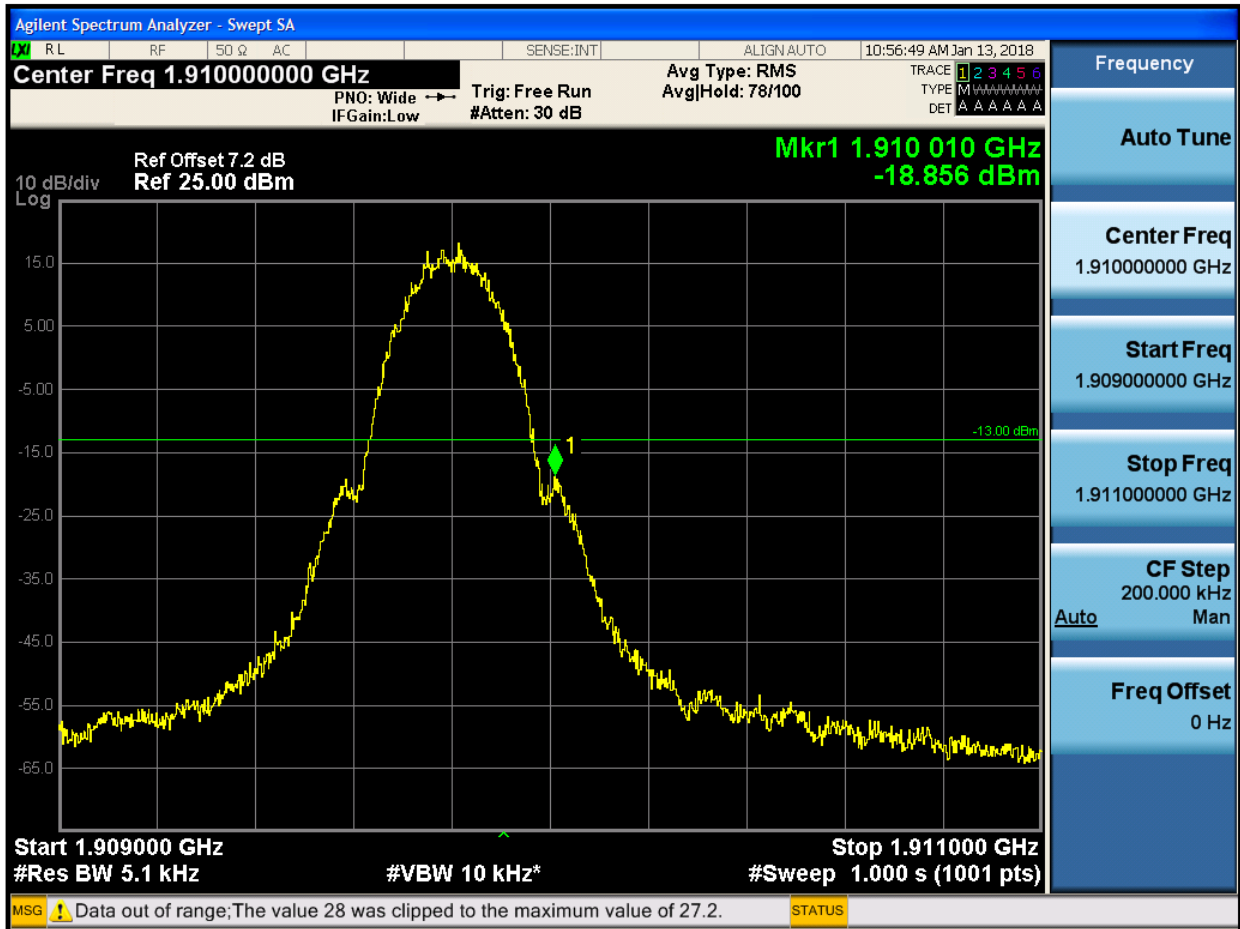
5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH



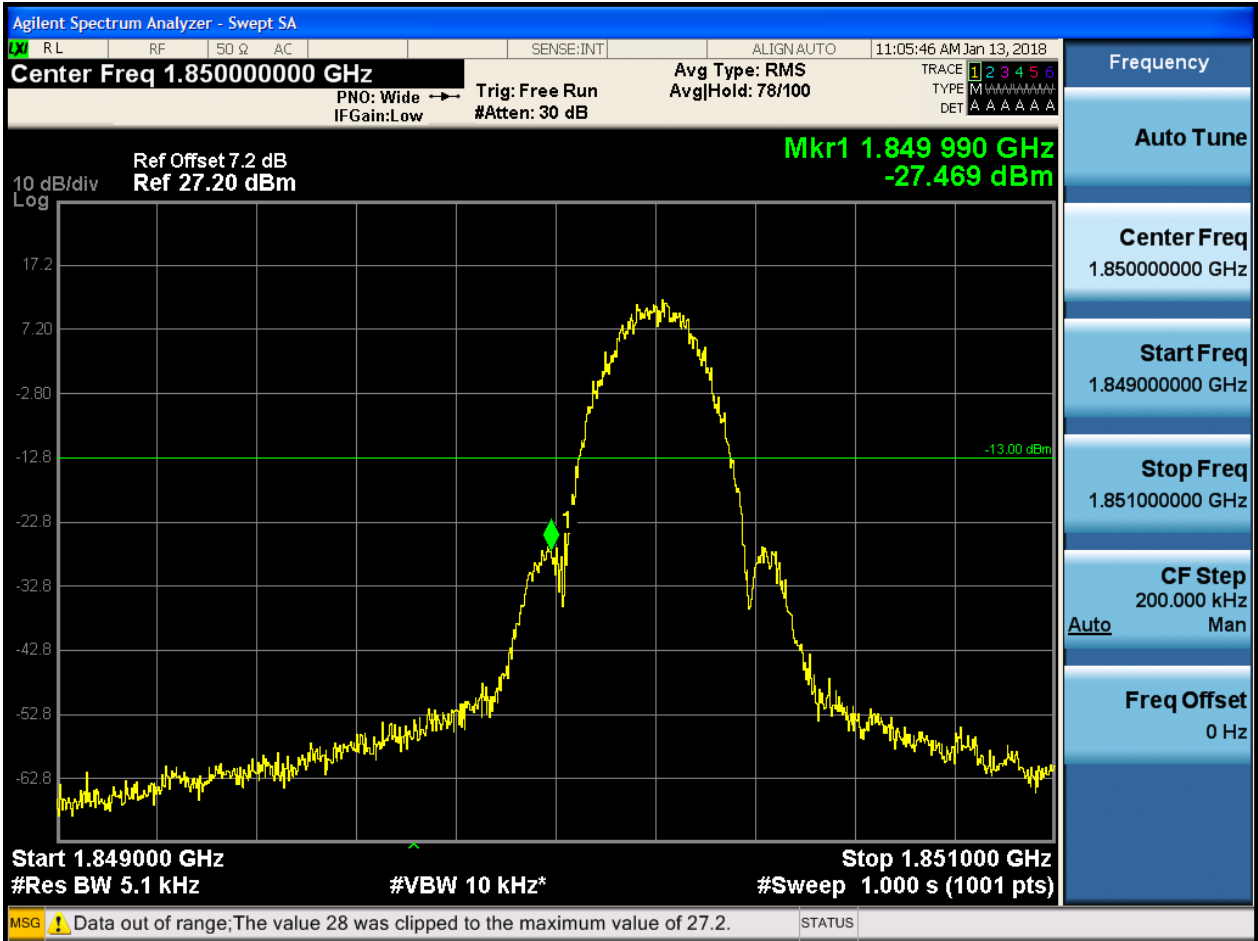


5.1.2.1.2 Test Channel = HCH

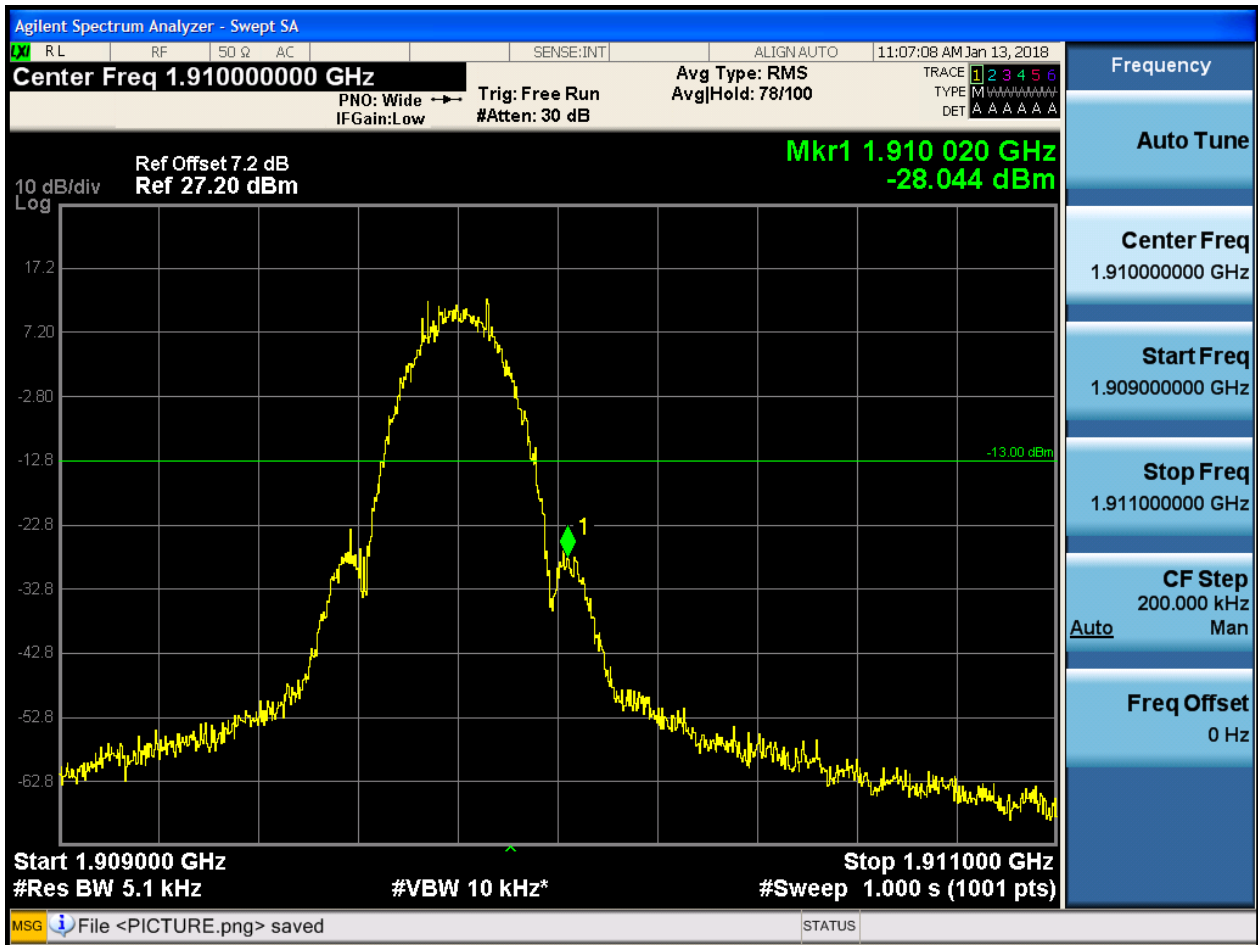


5.1.2.2 Test Mode = GSM/TM2

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.

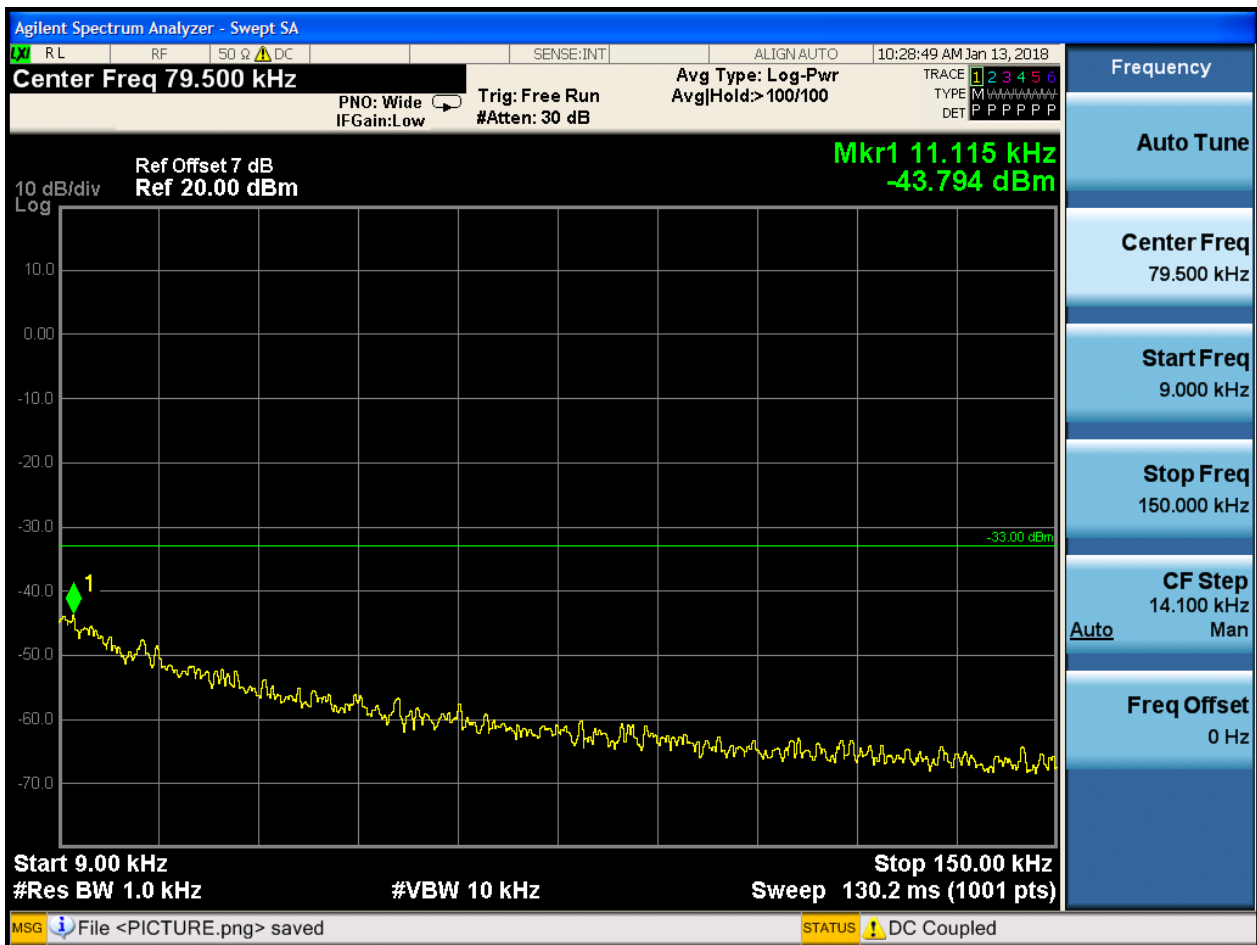
Part I - Test Plots

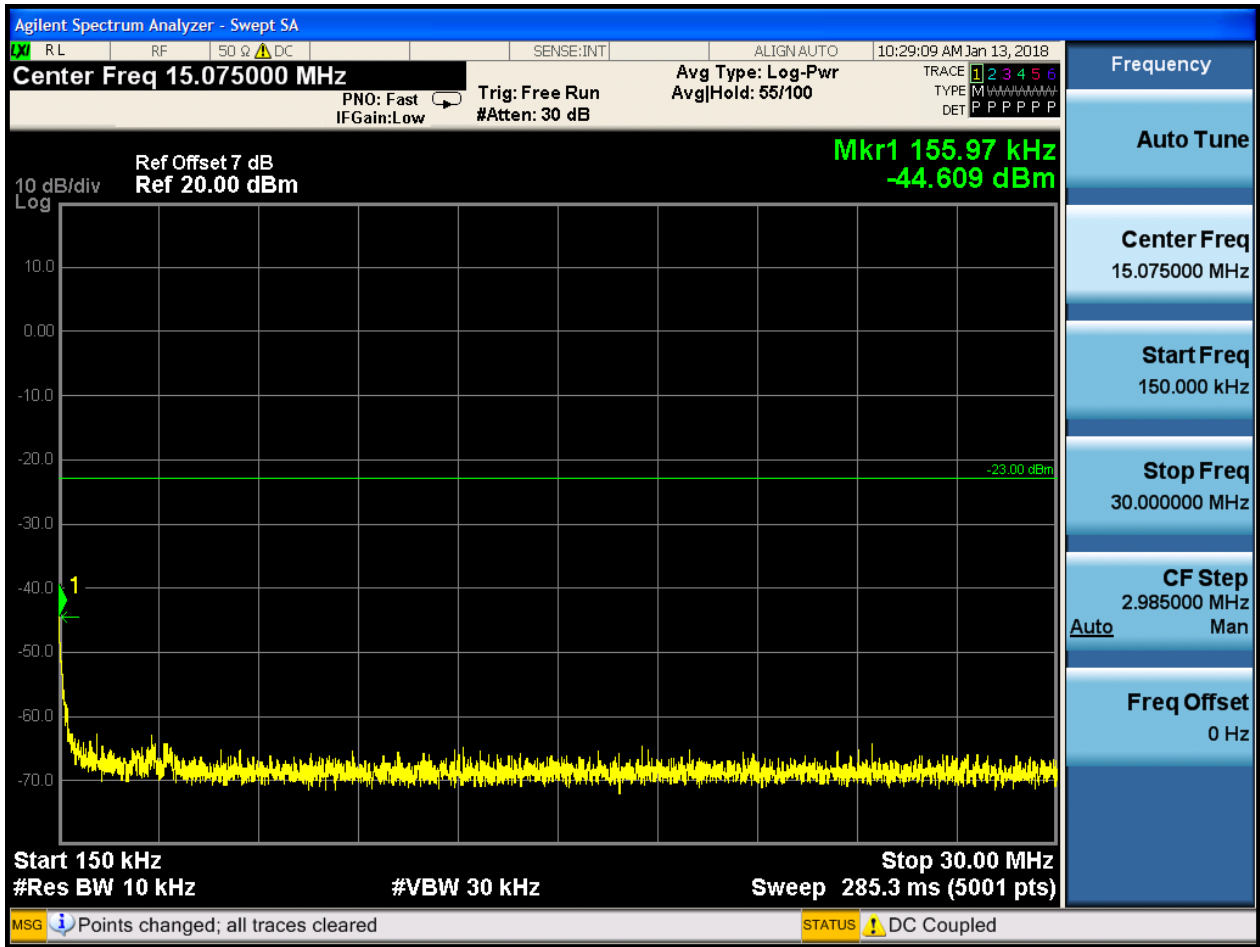
6.1 For GSM

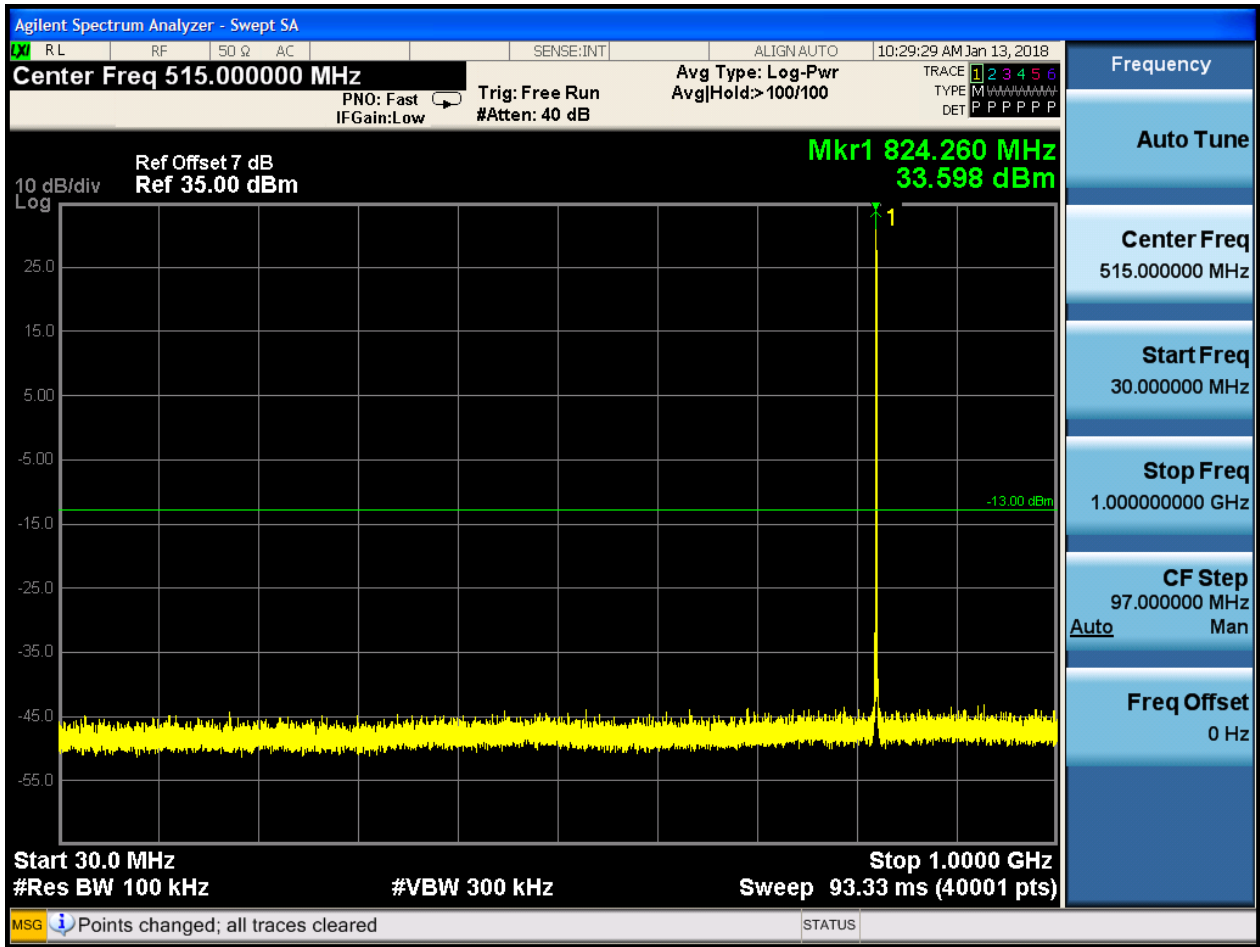
6.1.1 Test Band = GSM850

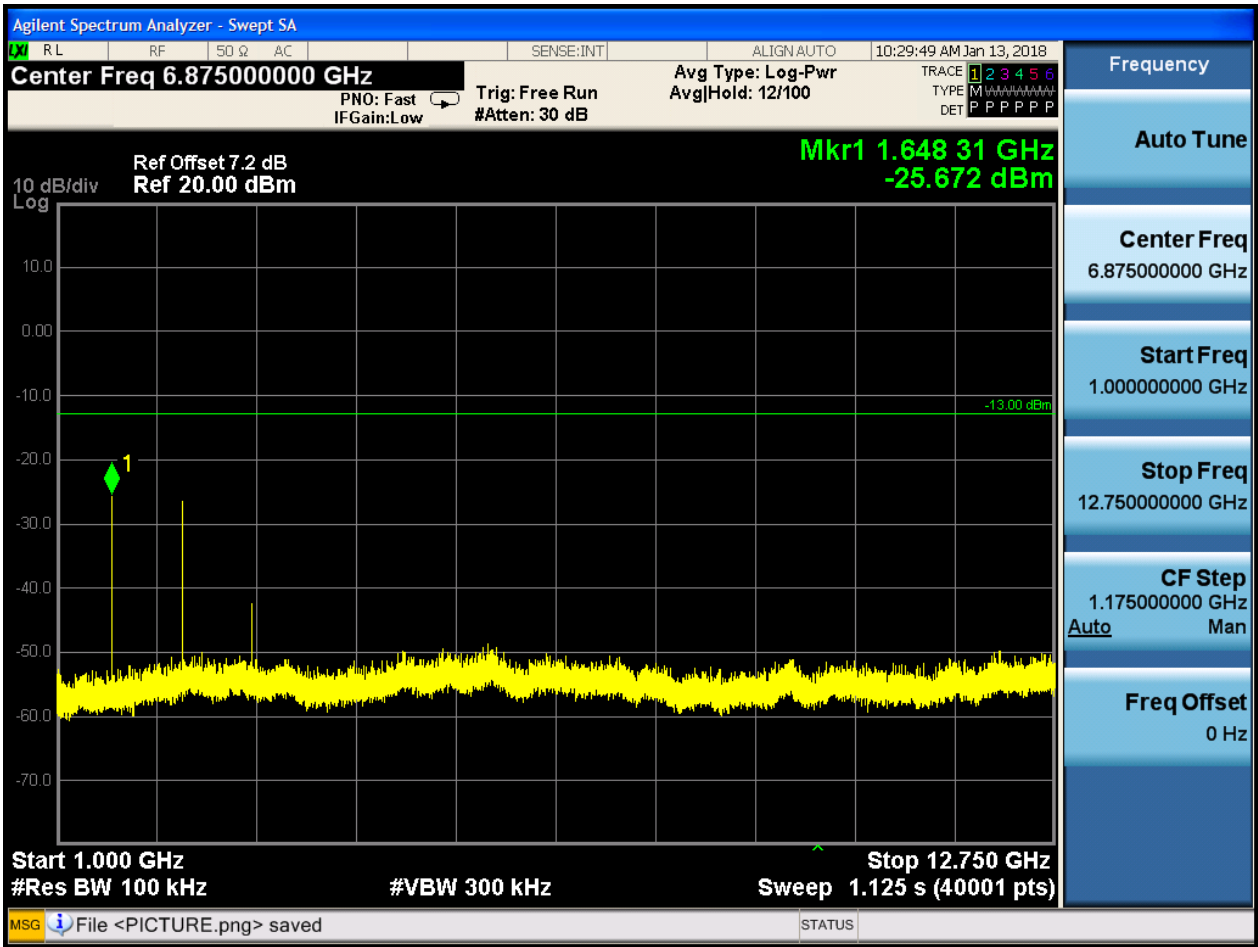
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH



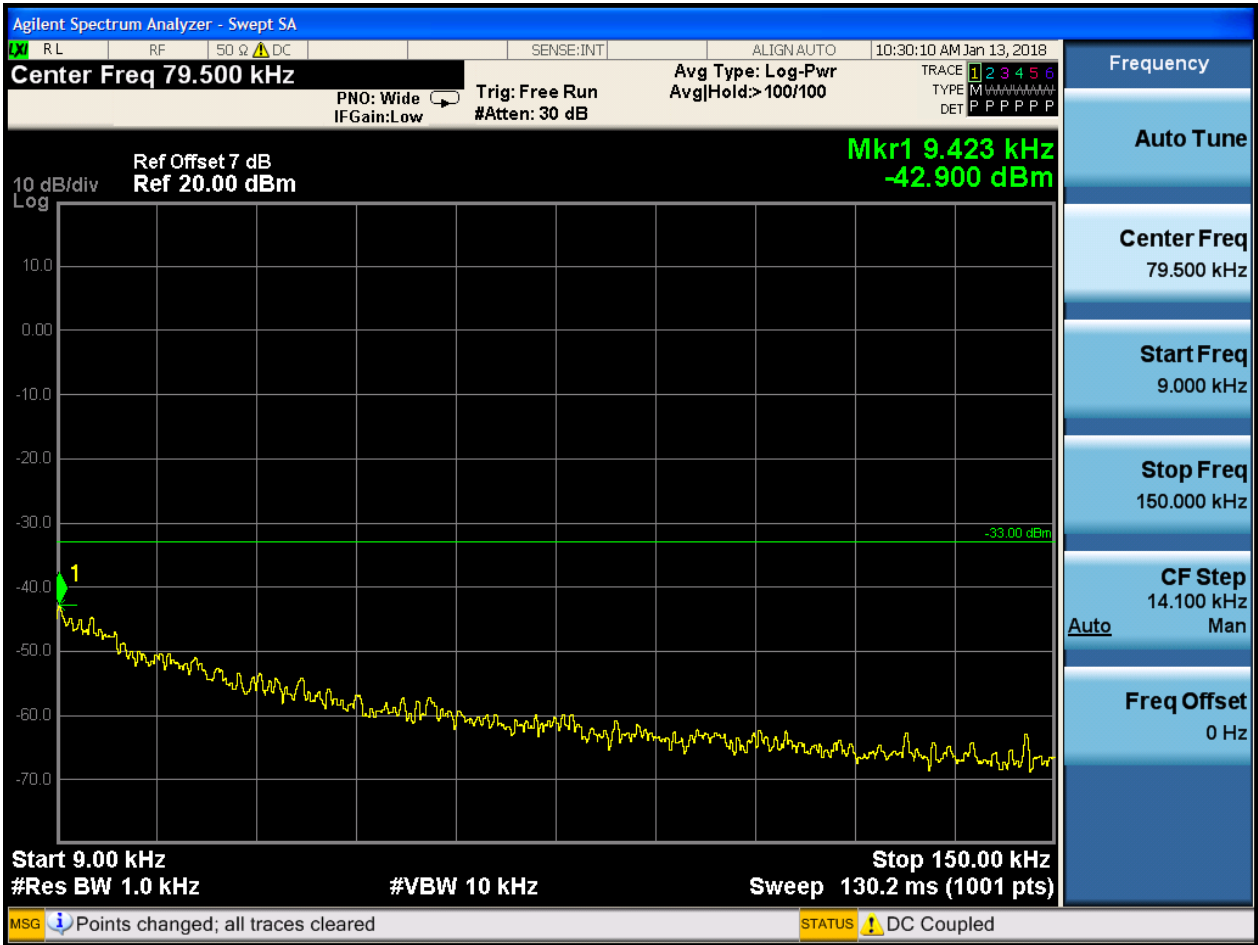


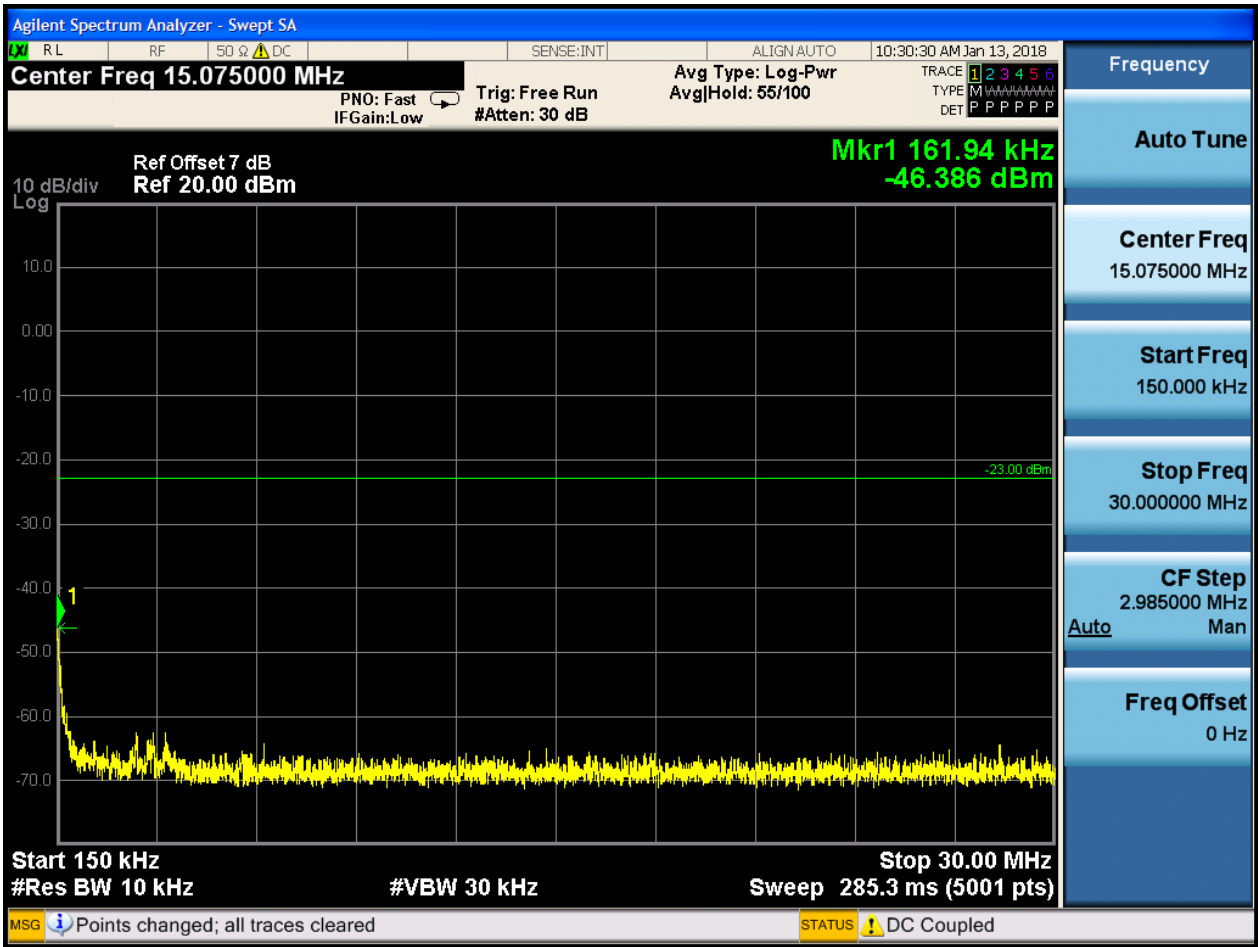


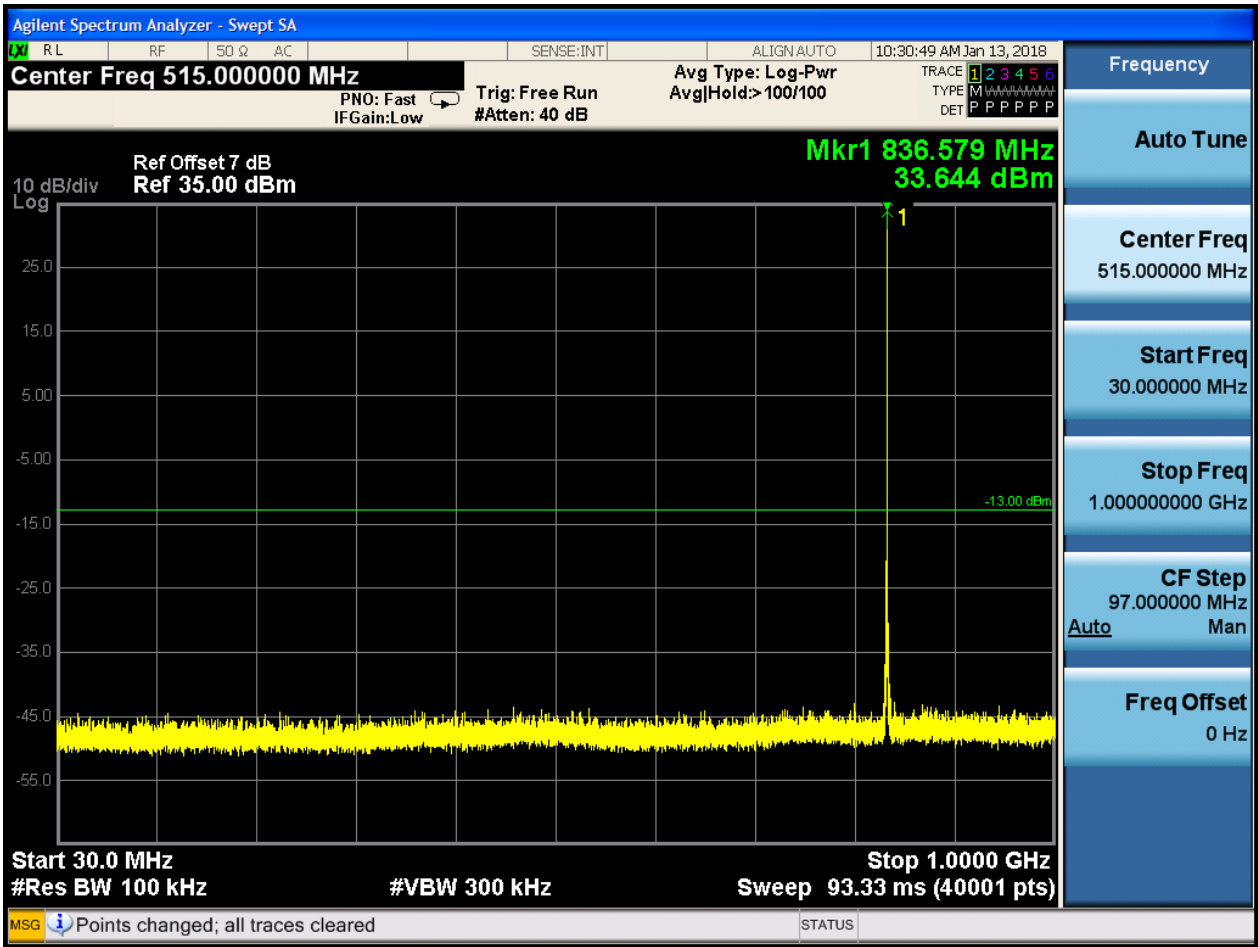


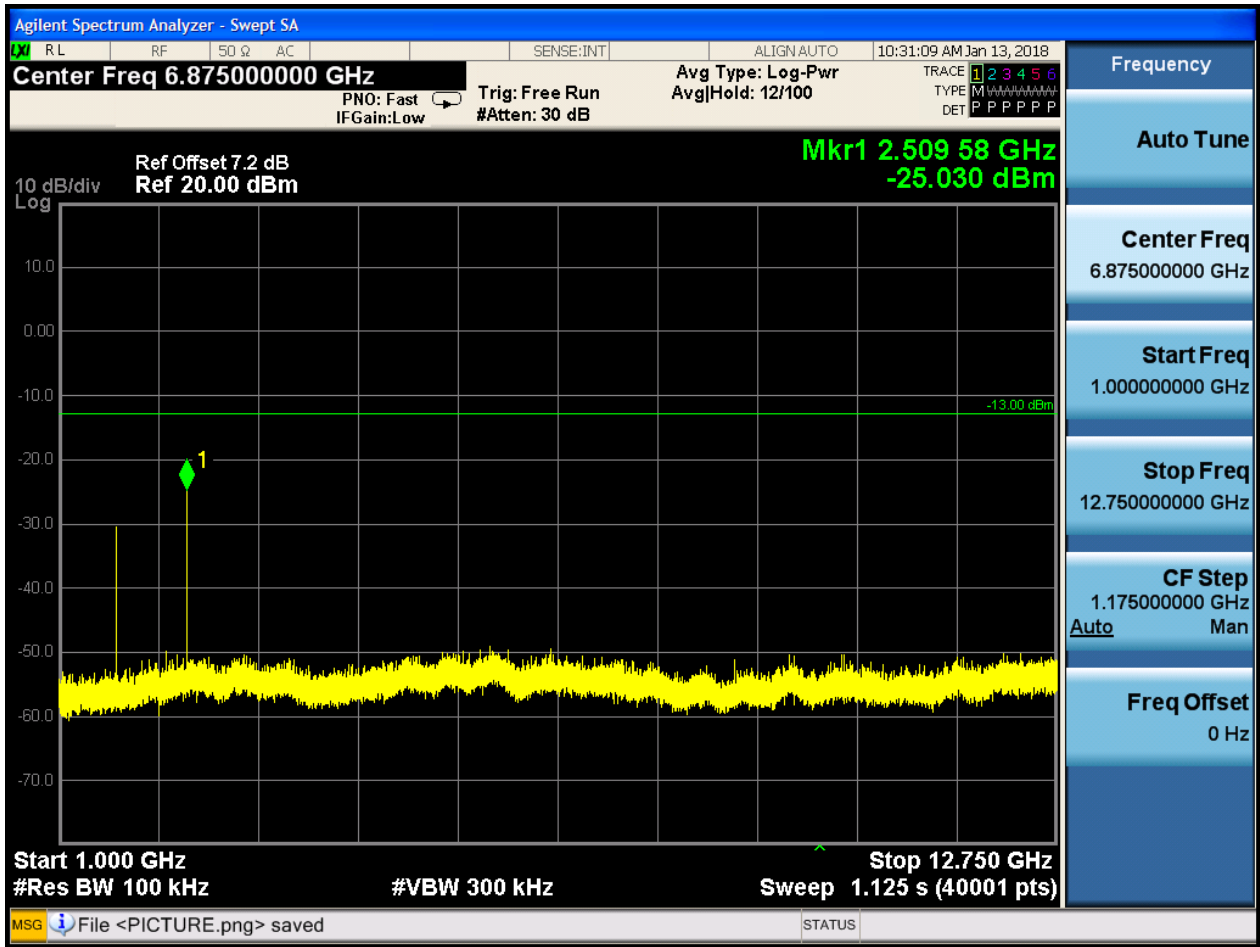


6.1.1.1.2 Test Channel = MCH



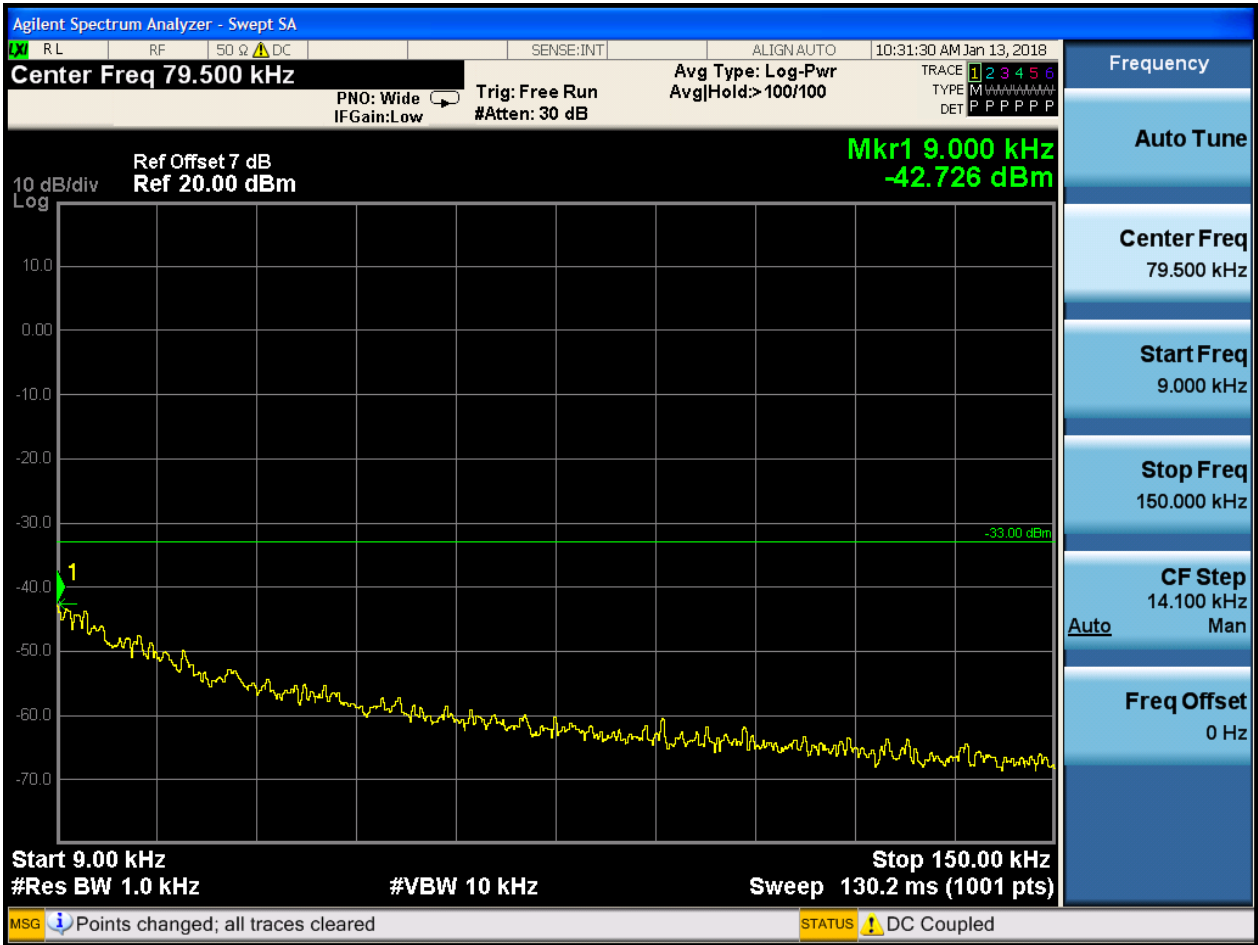


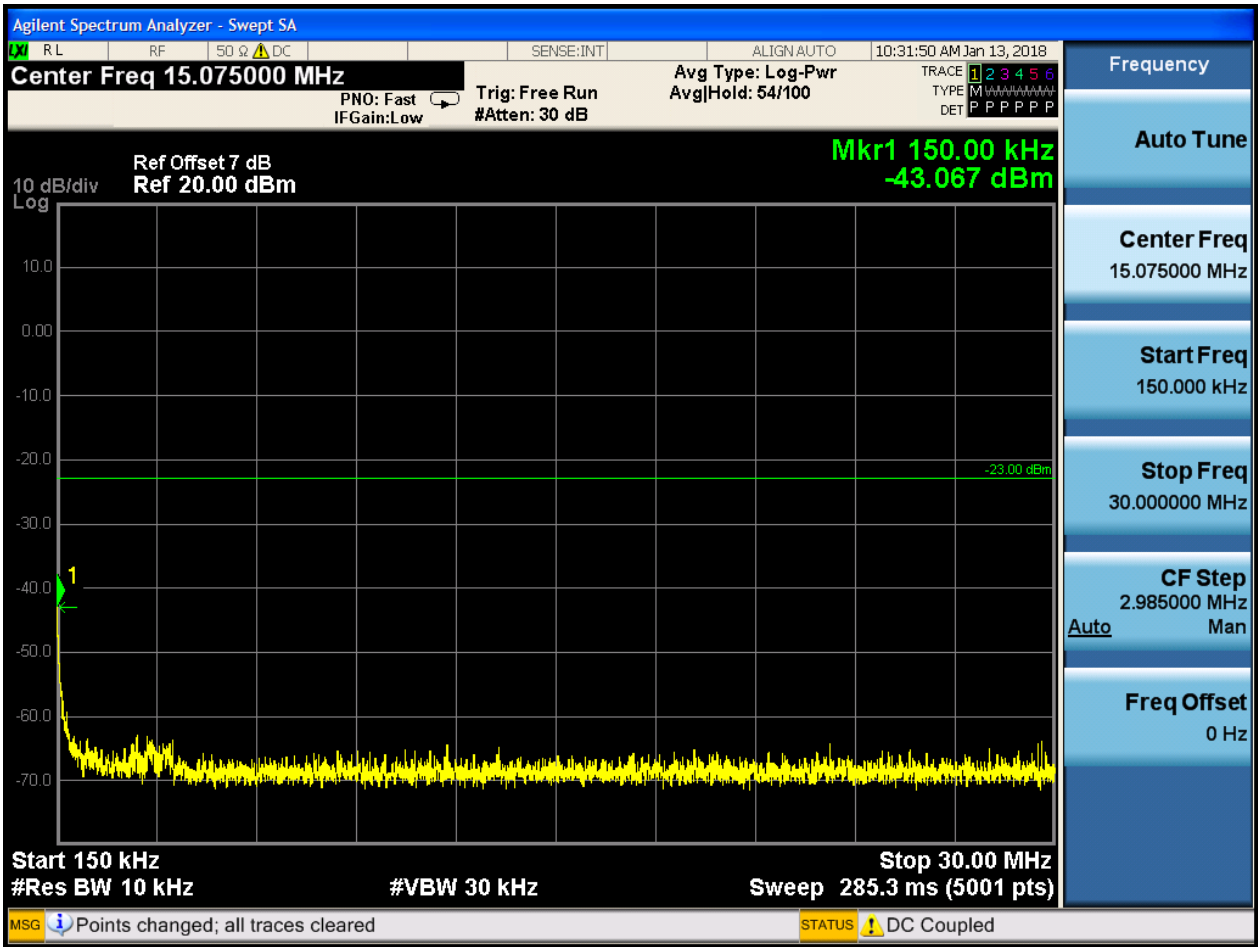


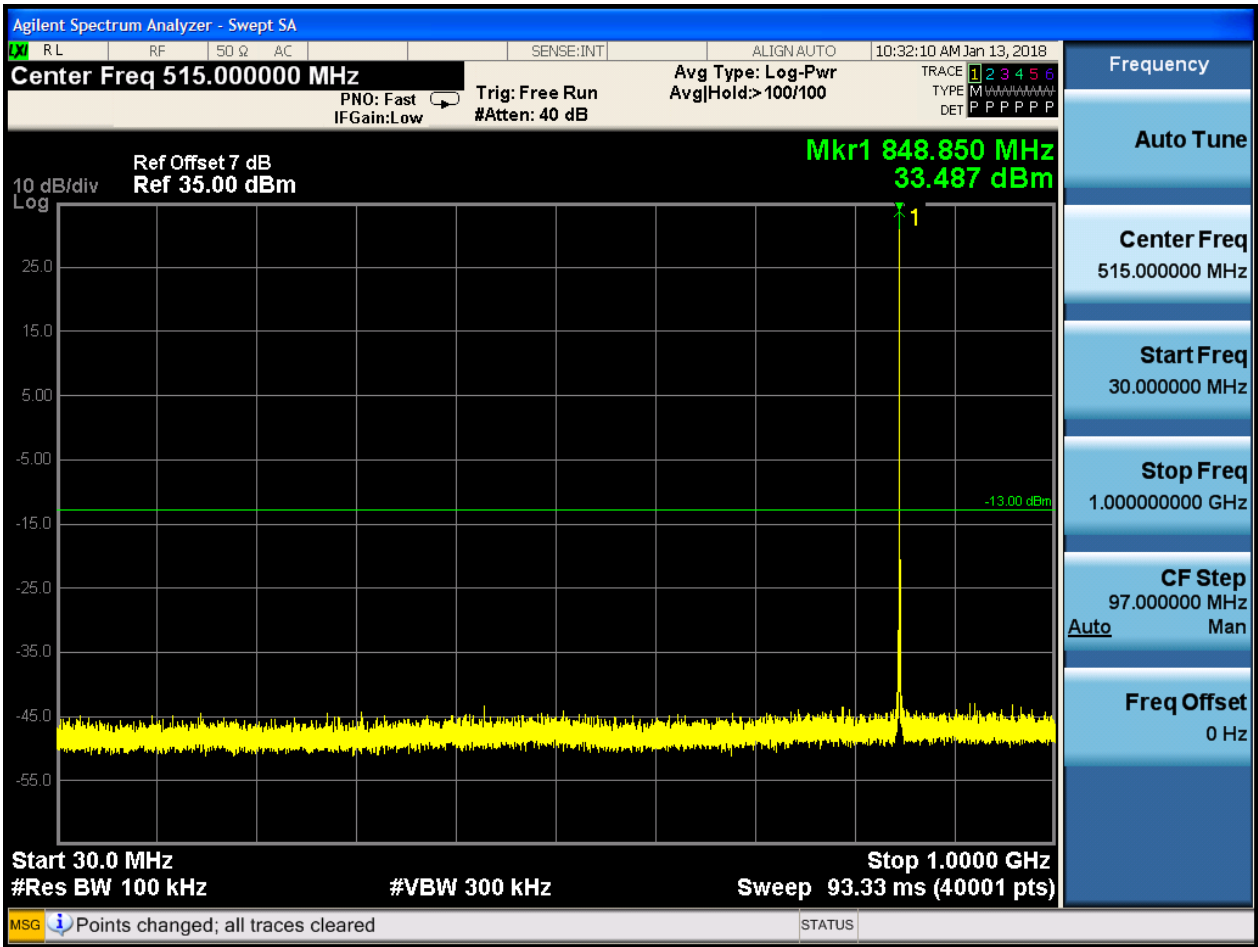


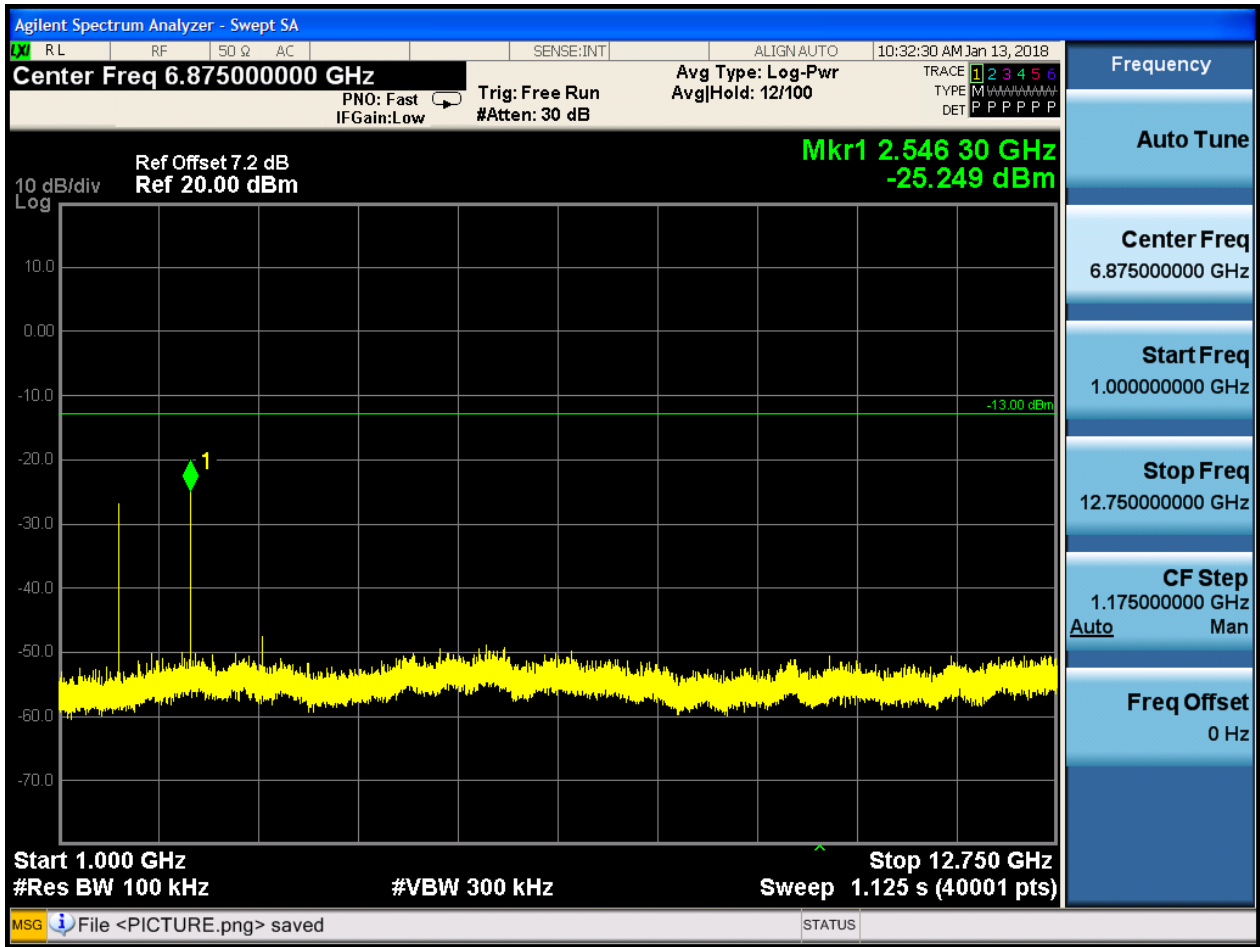


6.1.1.1.3 Test Channel = HCH





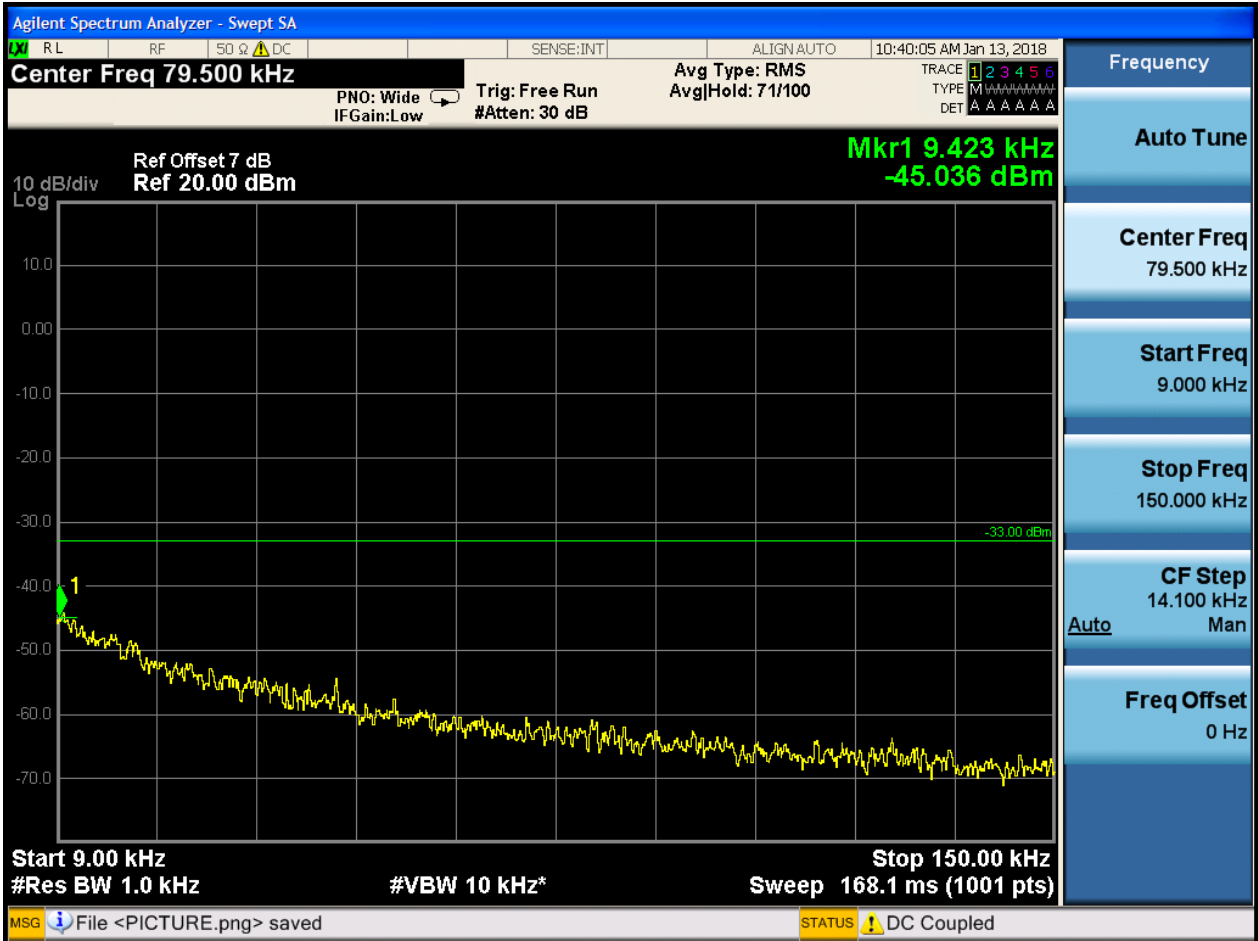


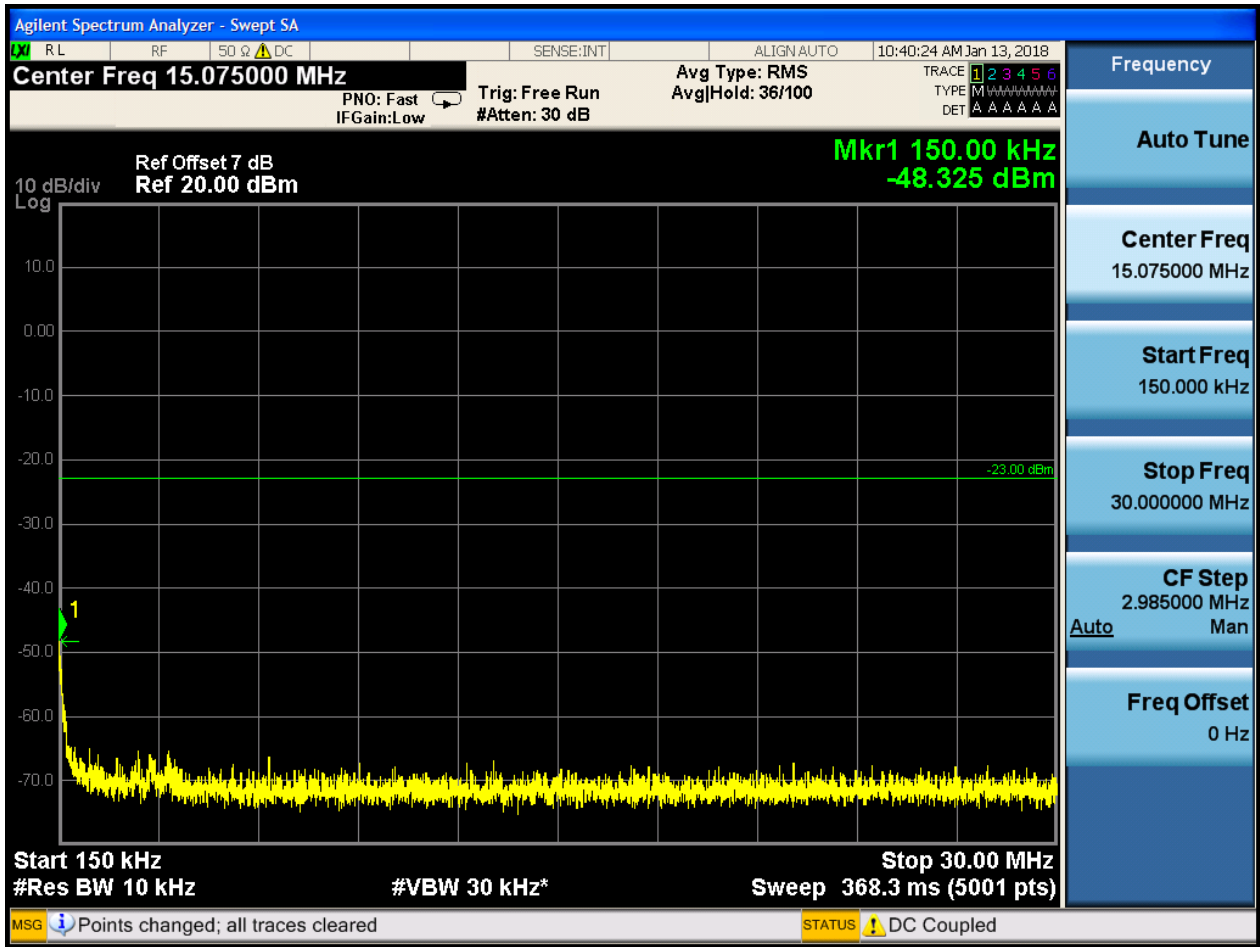


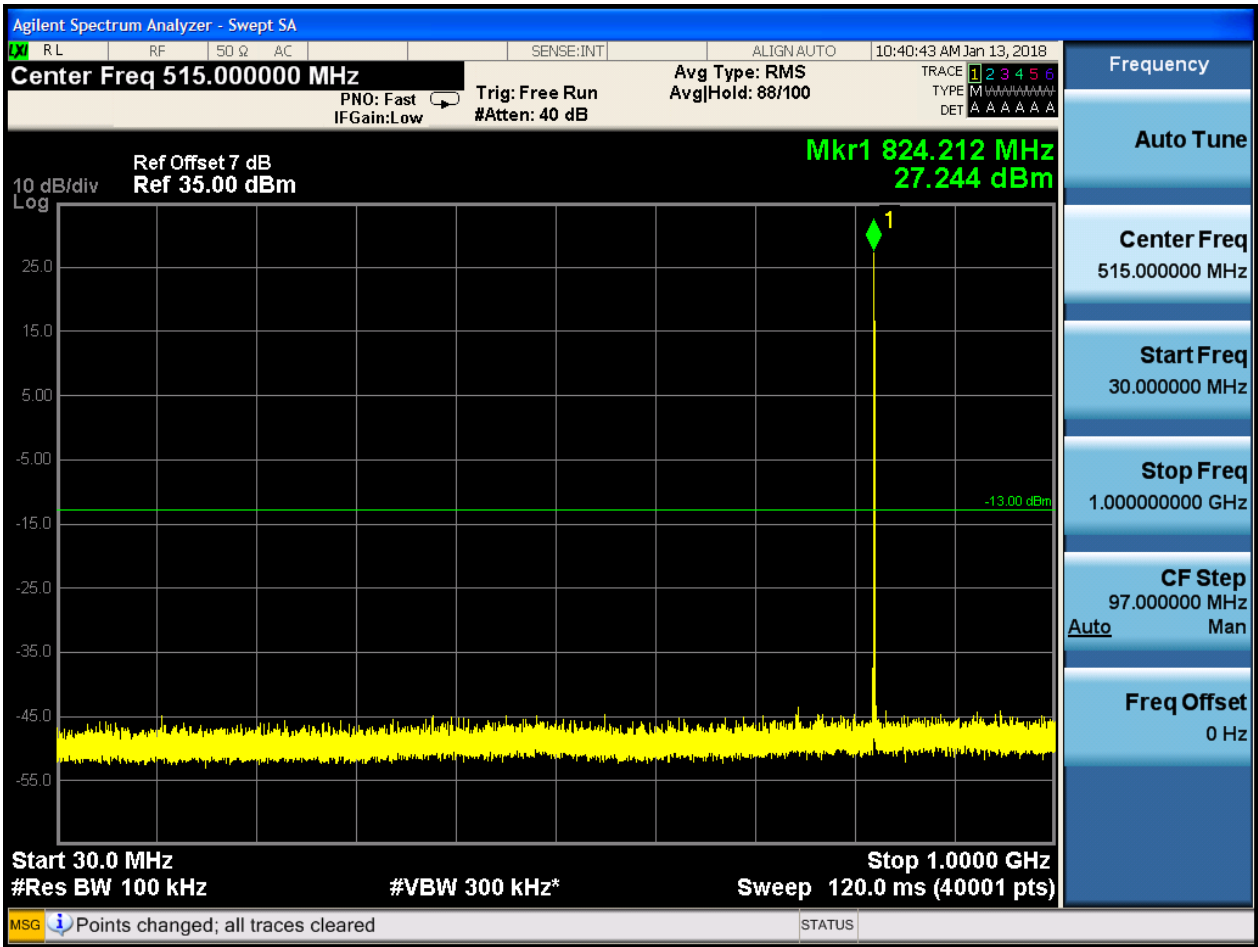


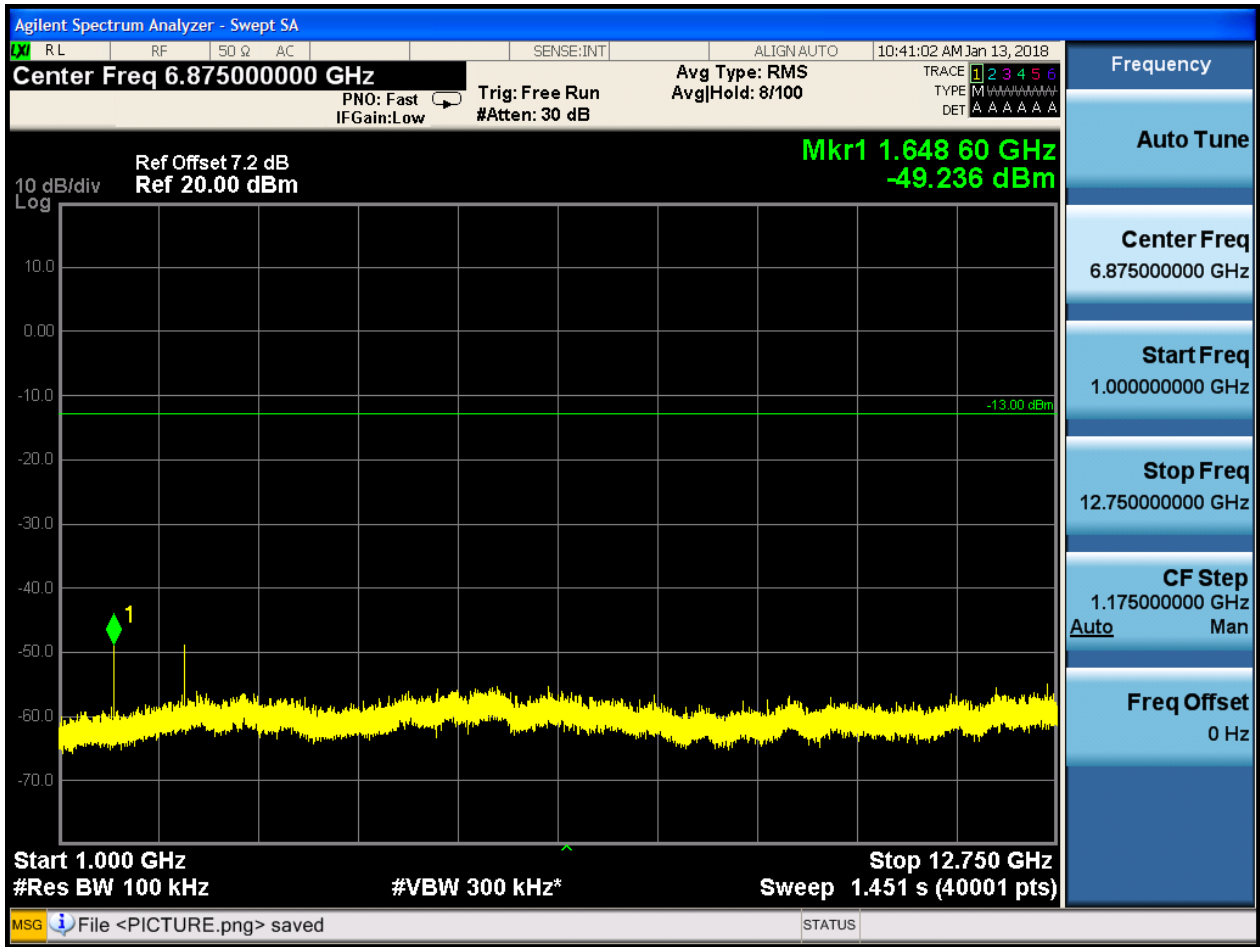
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH



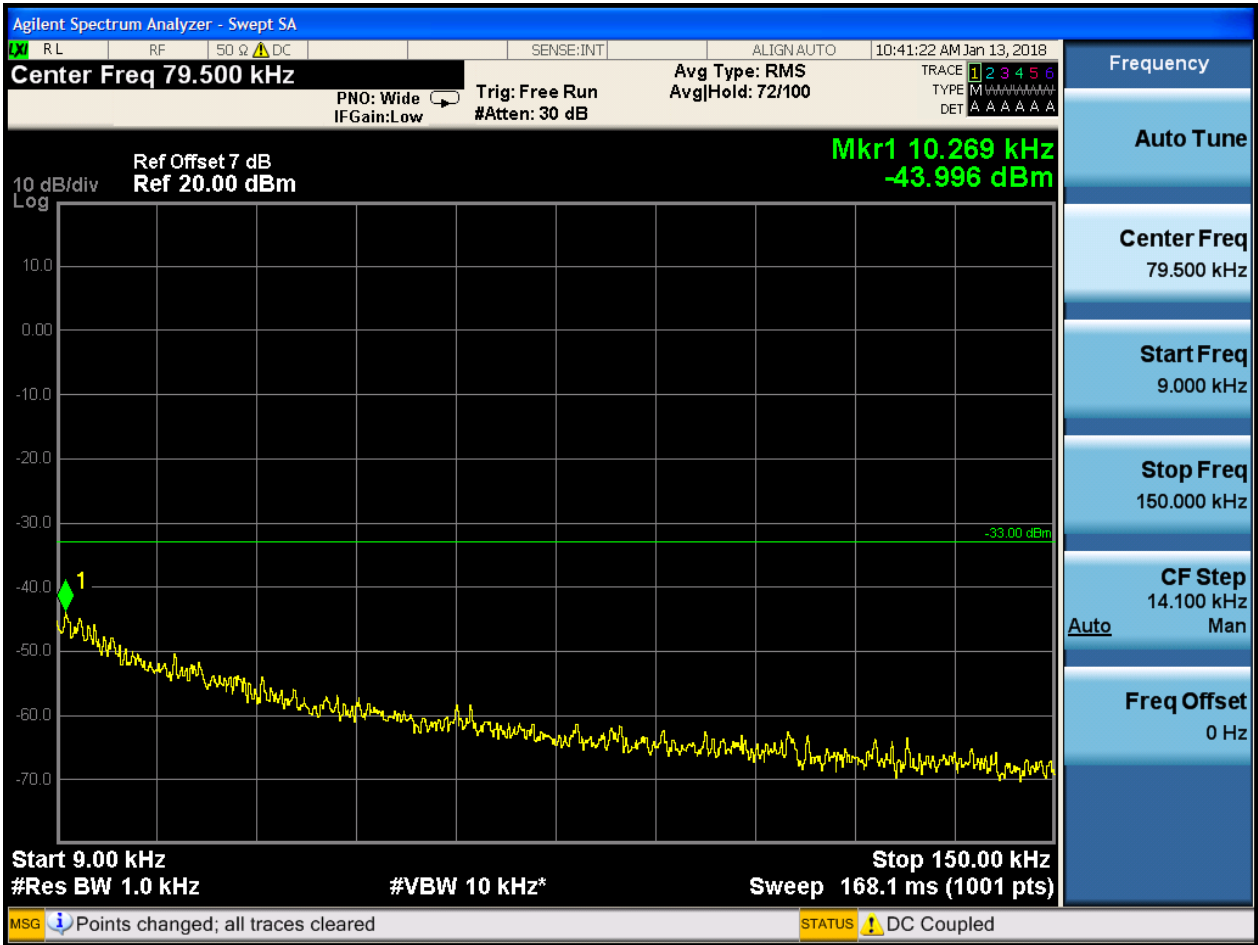


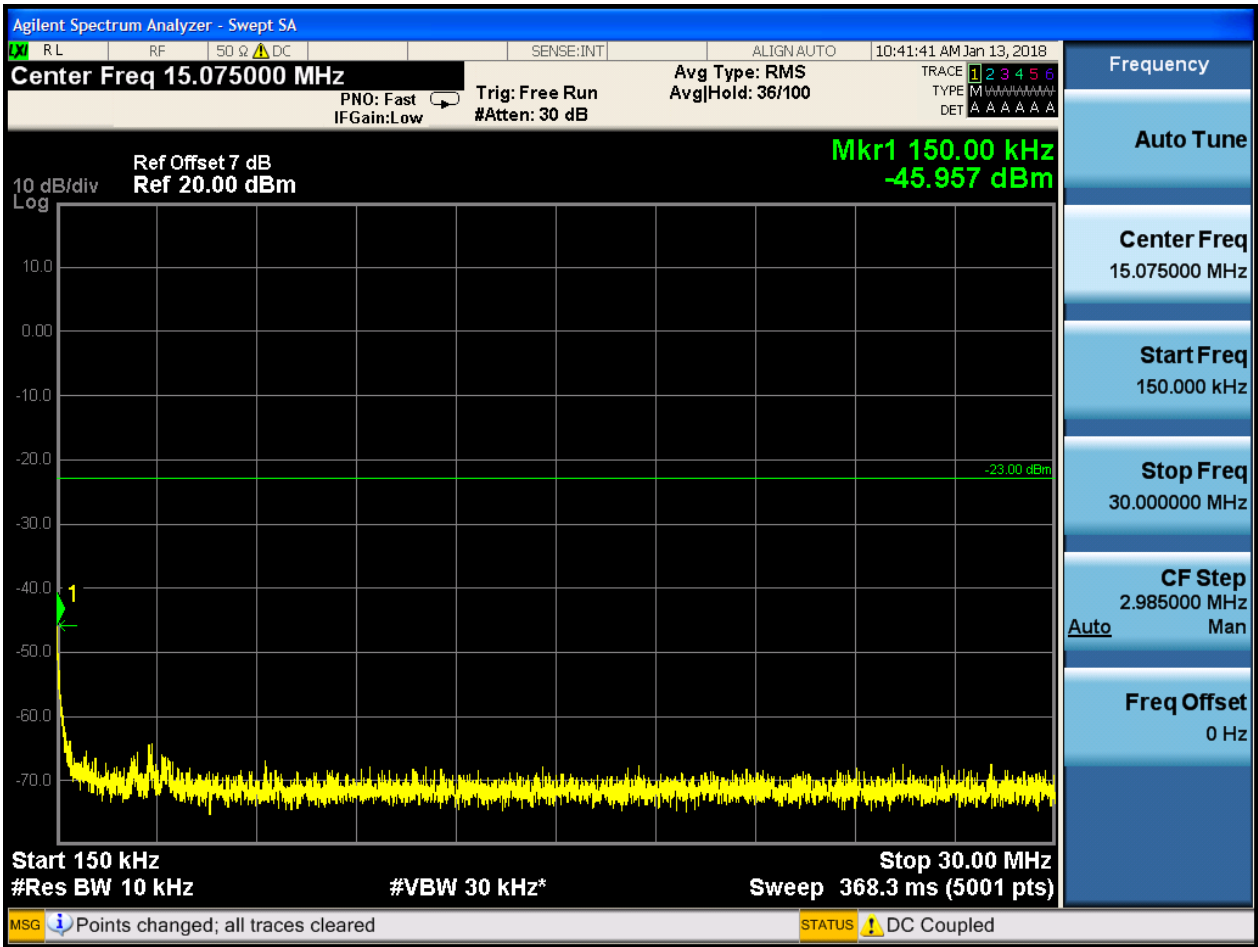


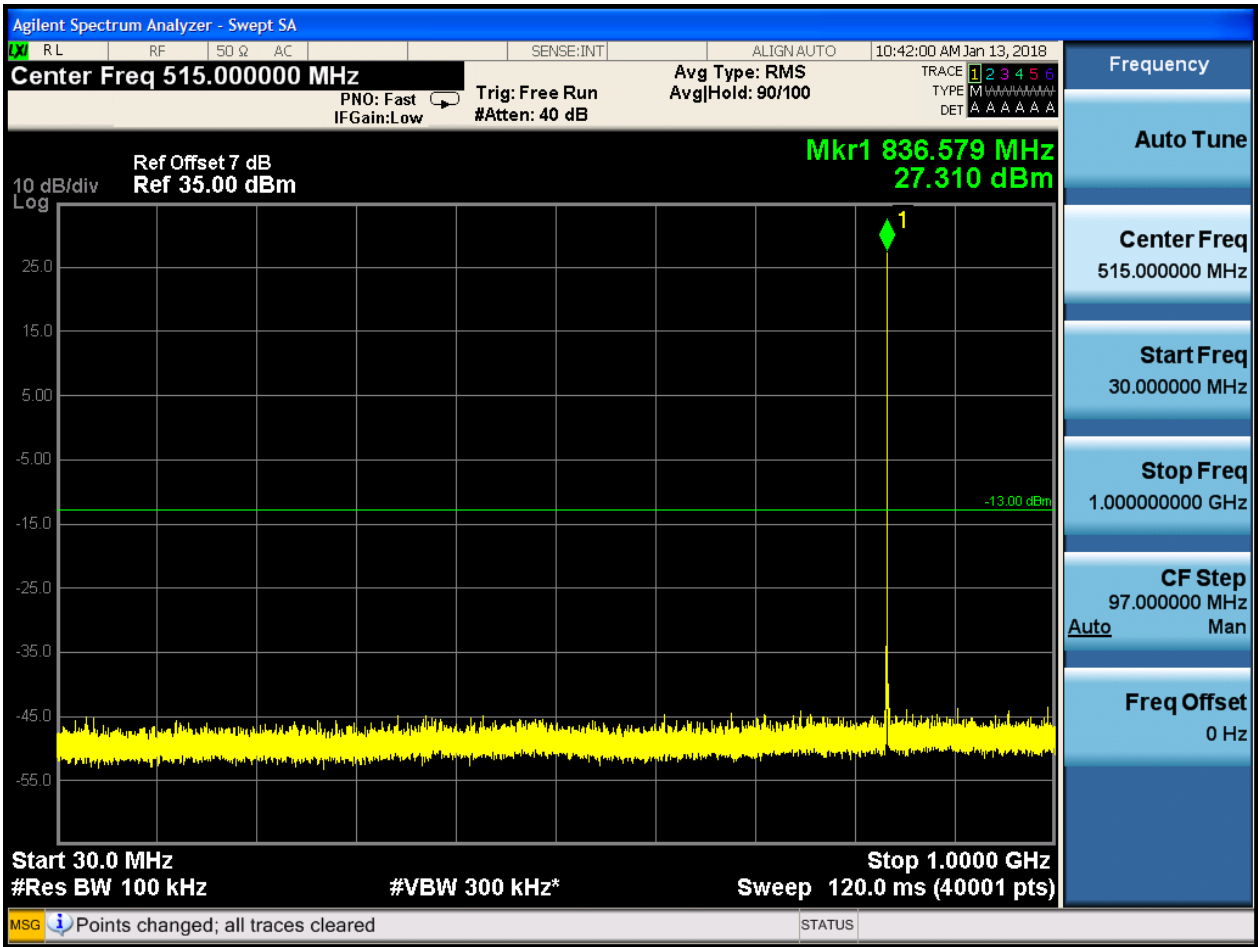


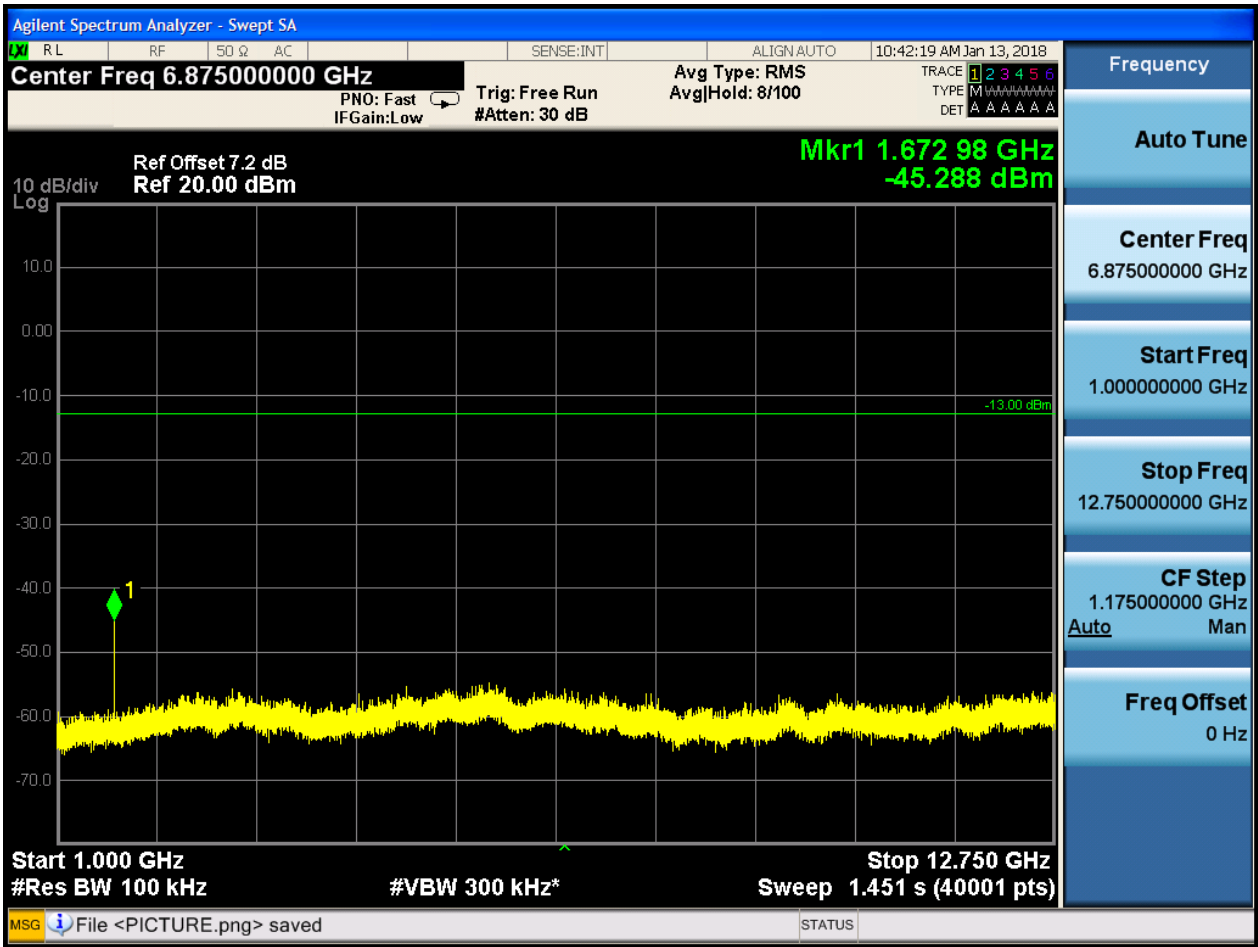


6.1.1.2.2 Test Channel = MCH



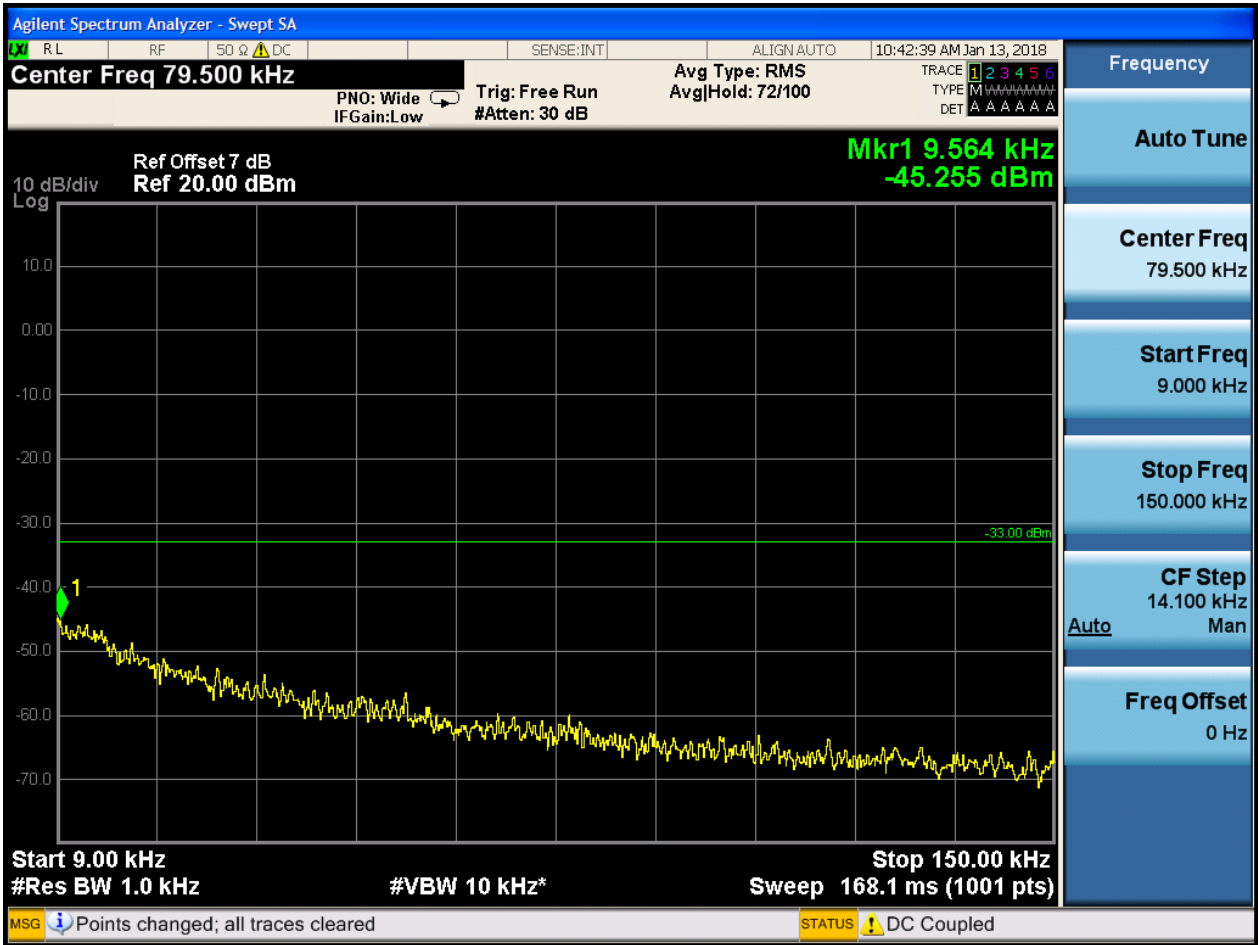


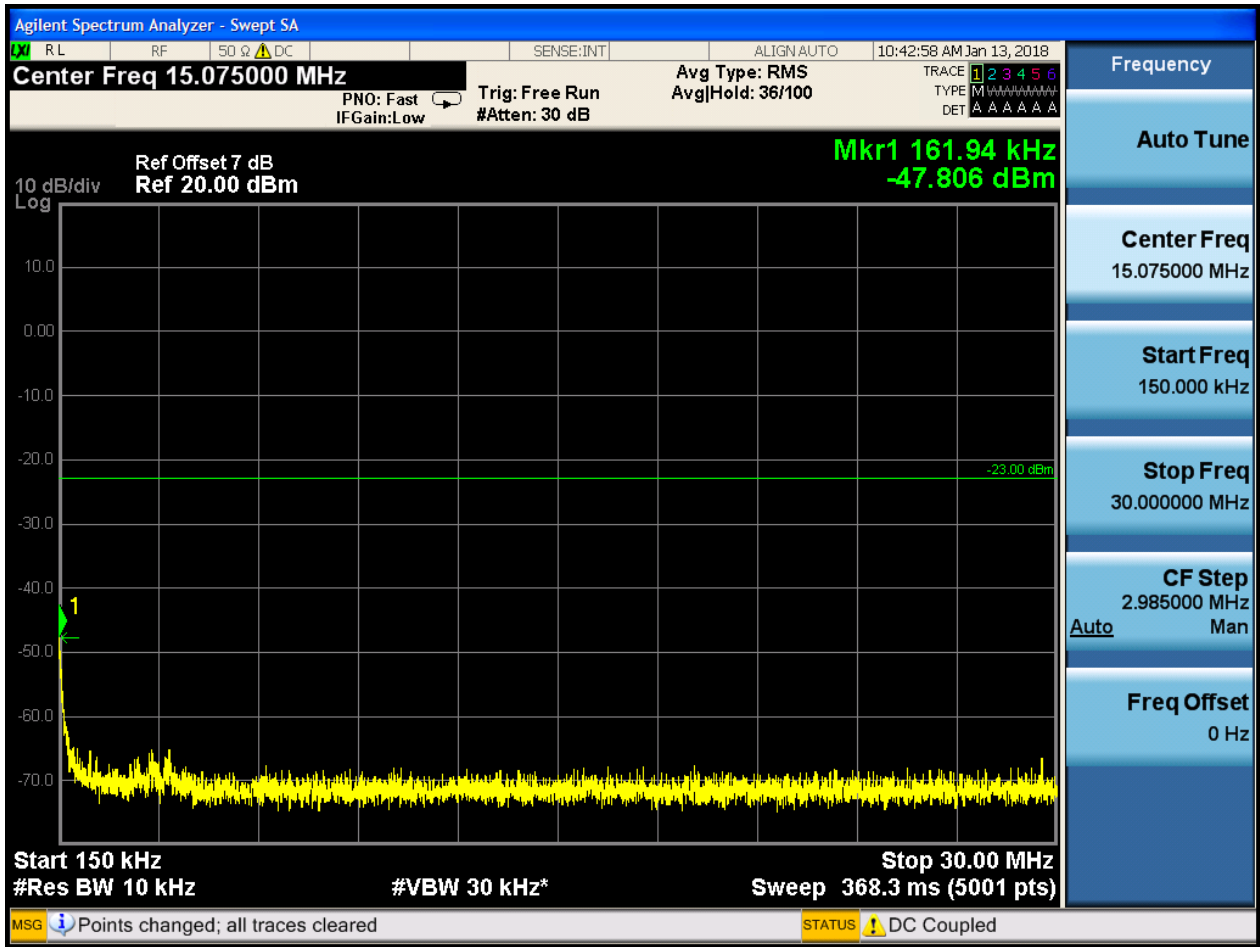


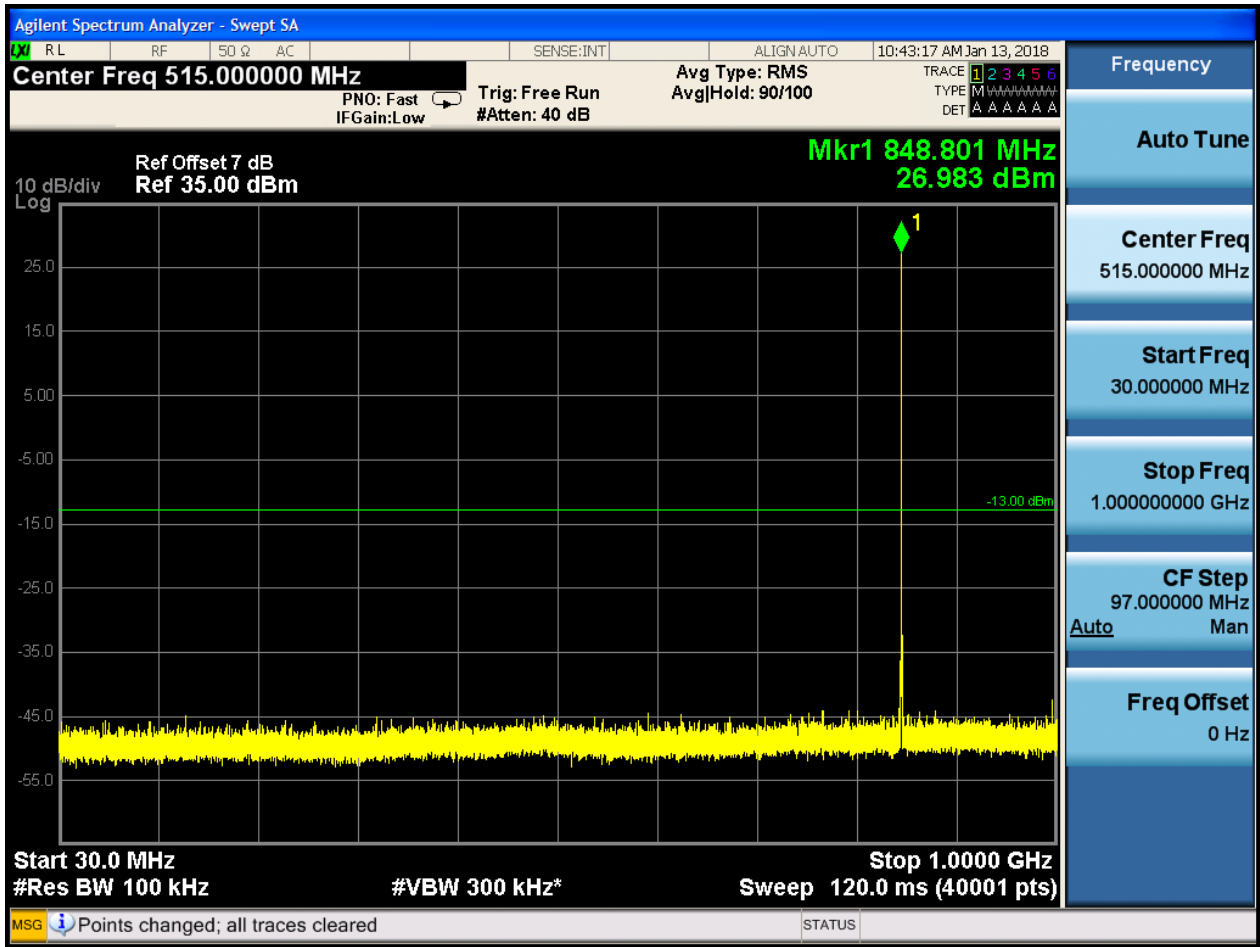


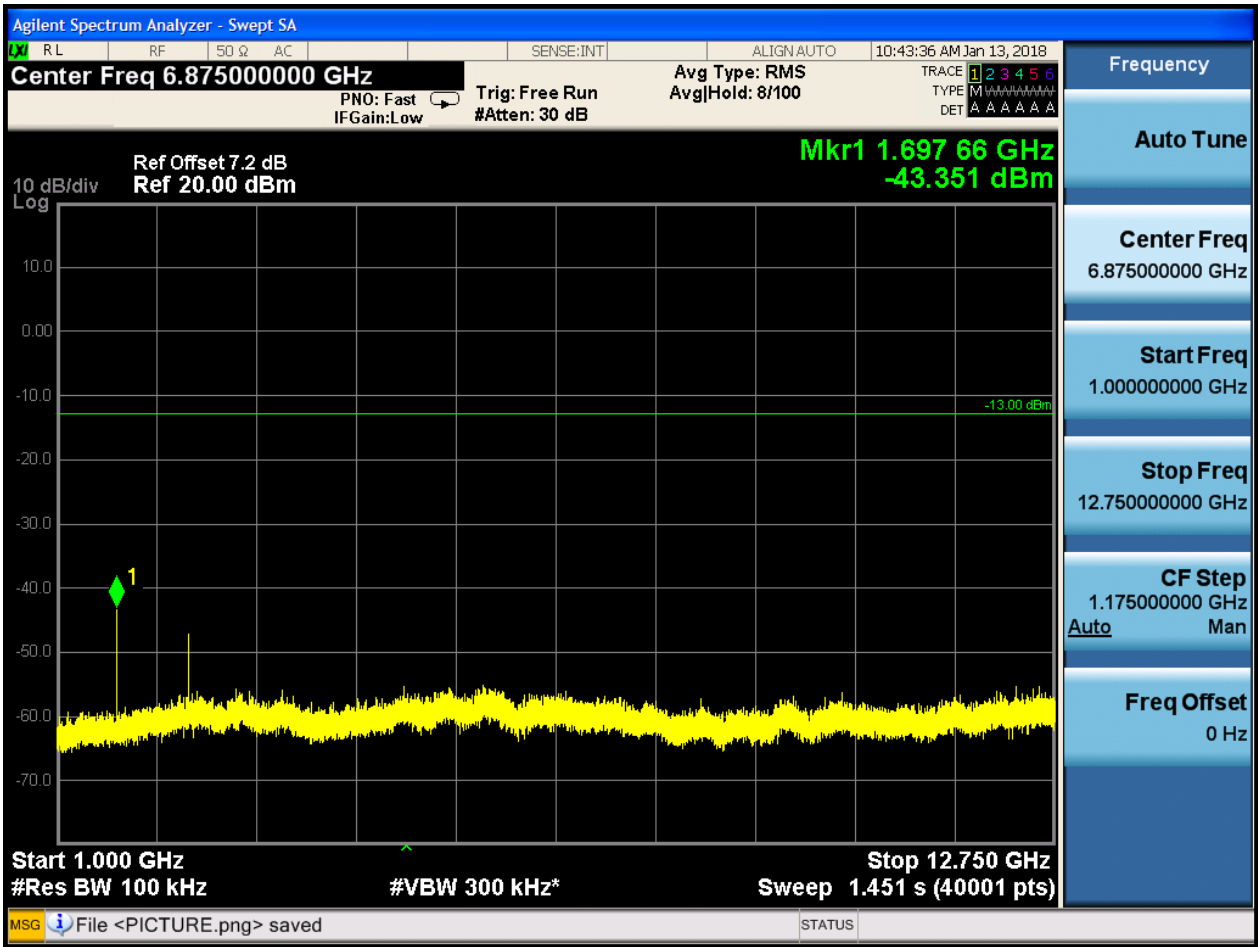


6.1.1.2.3 Test Channel = HCH







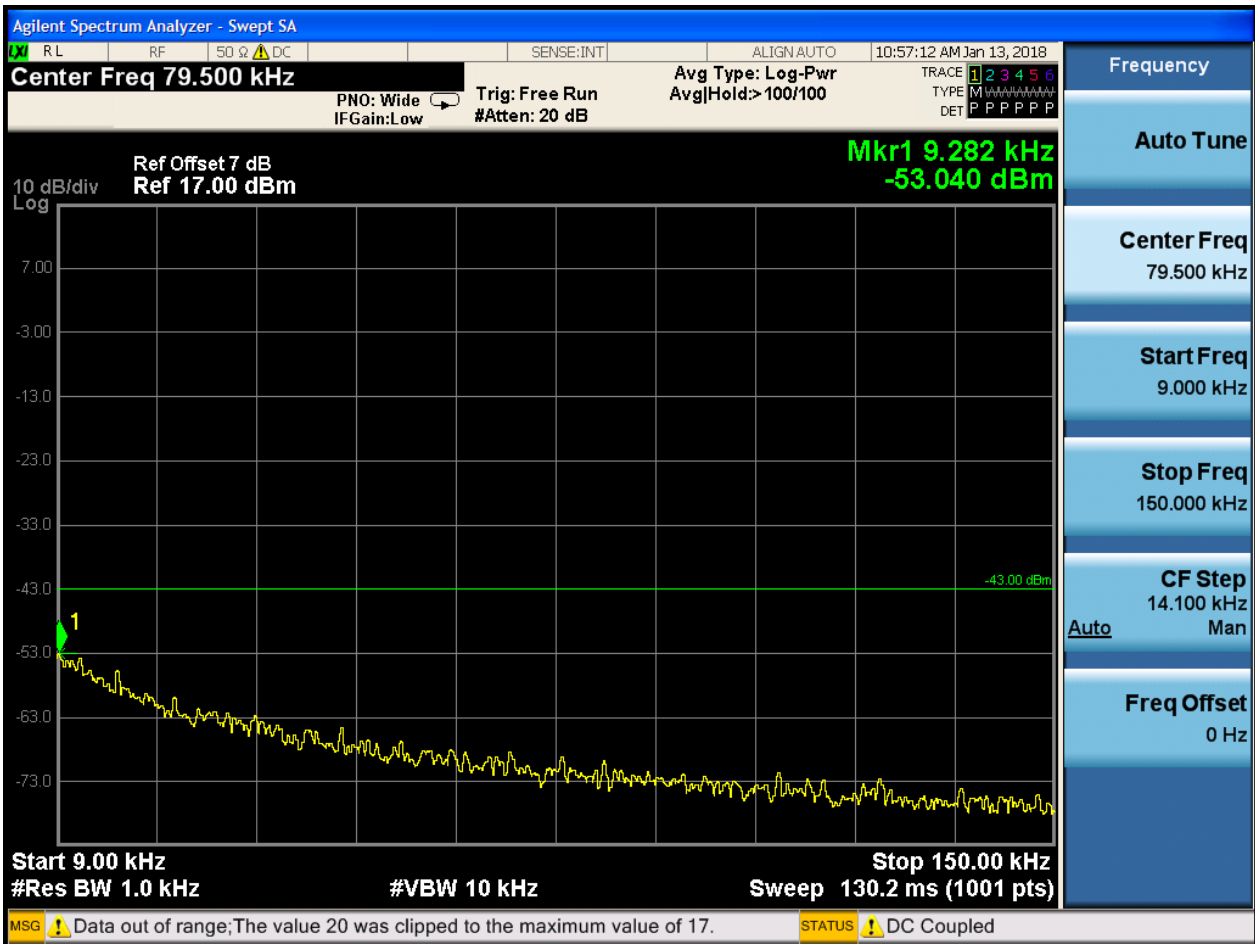


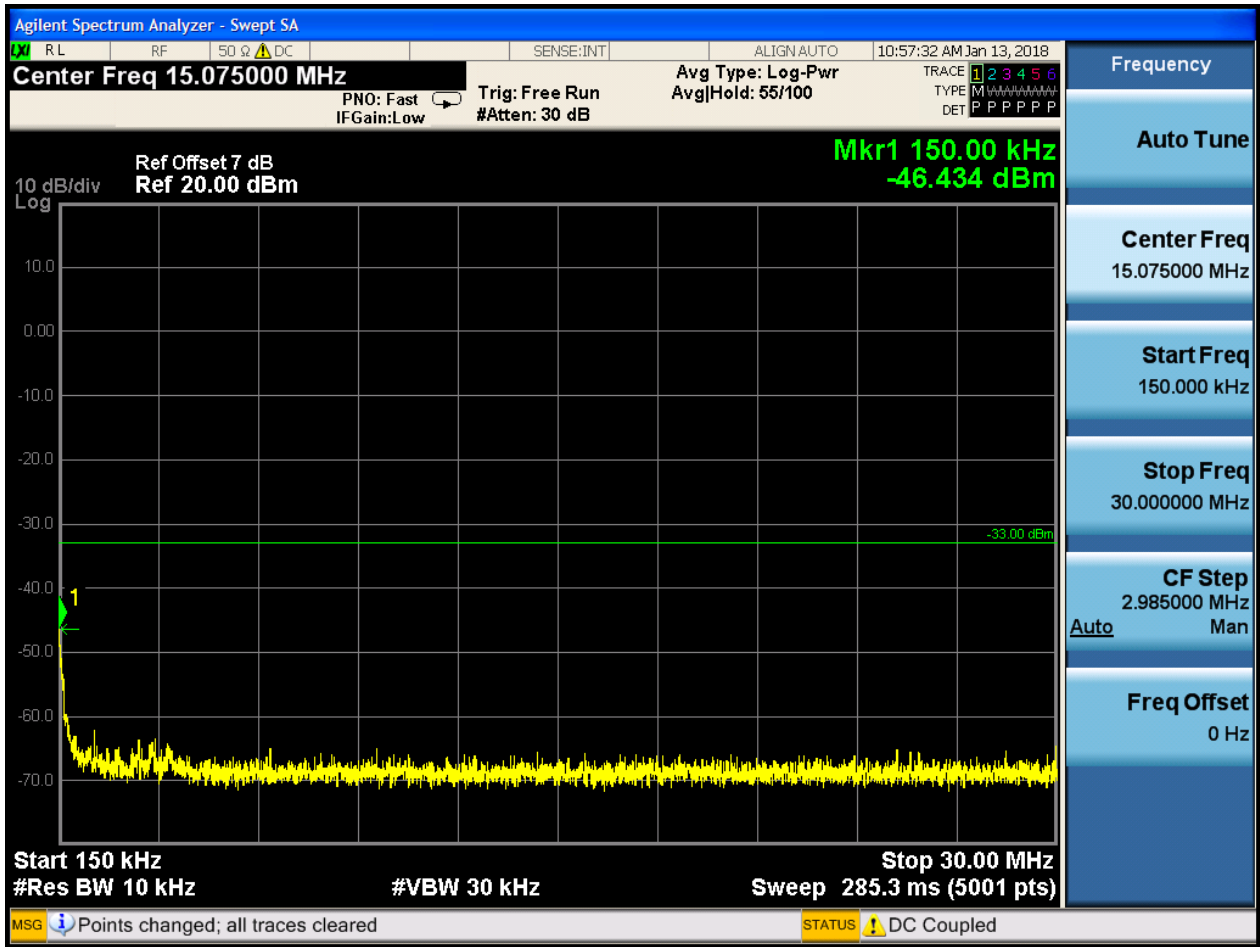


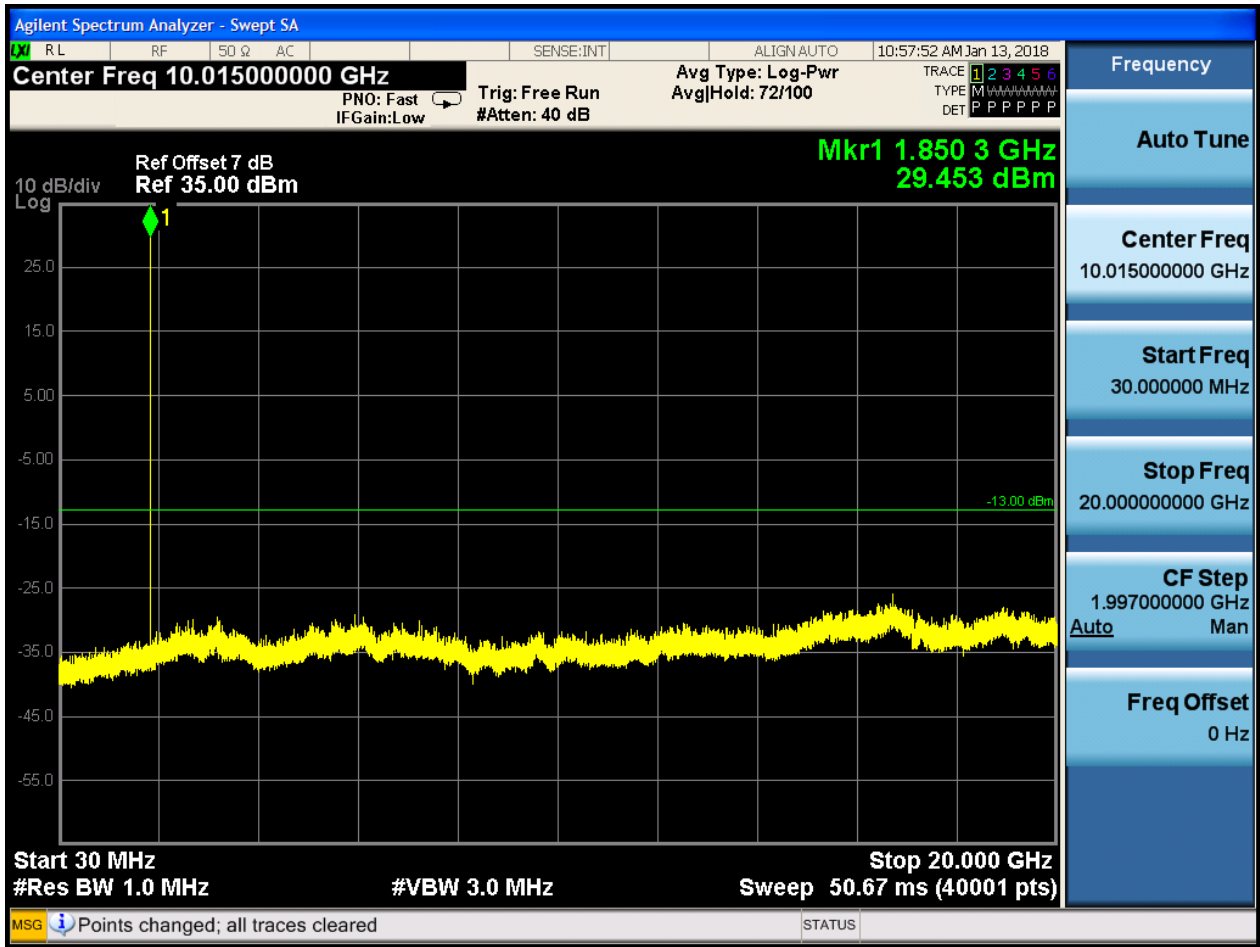
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH

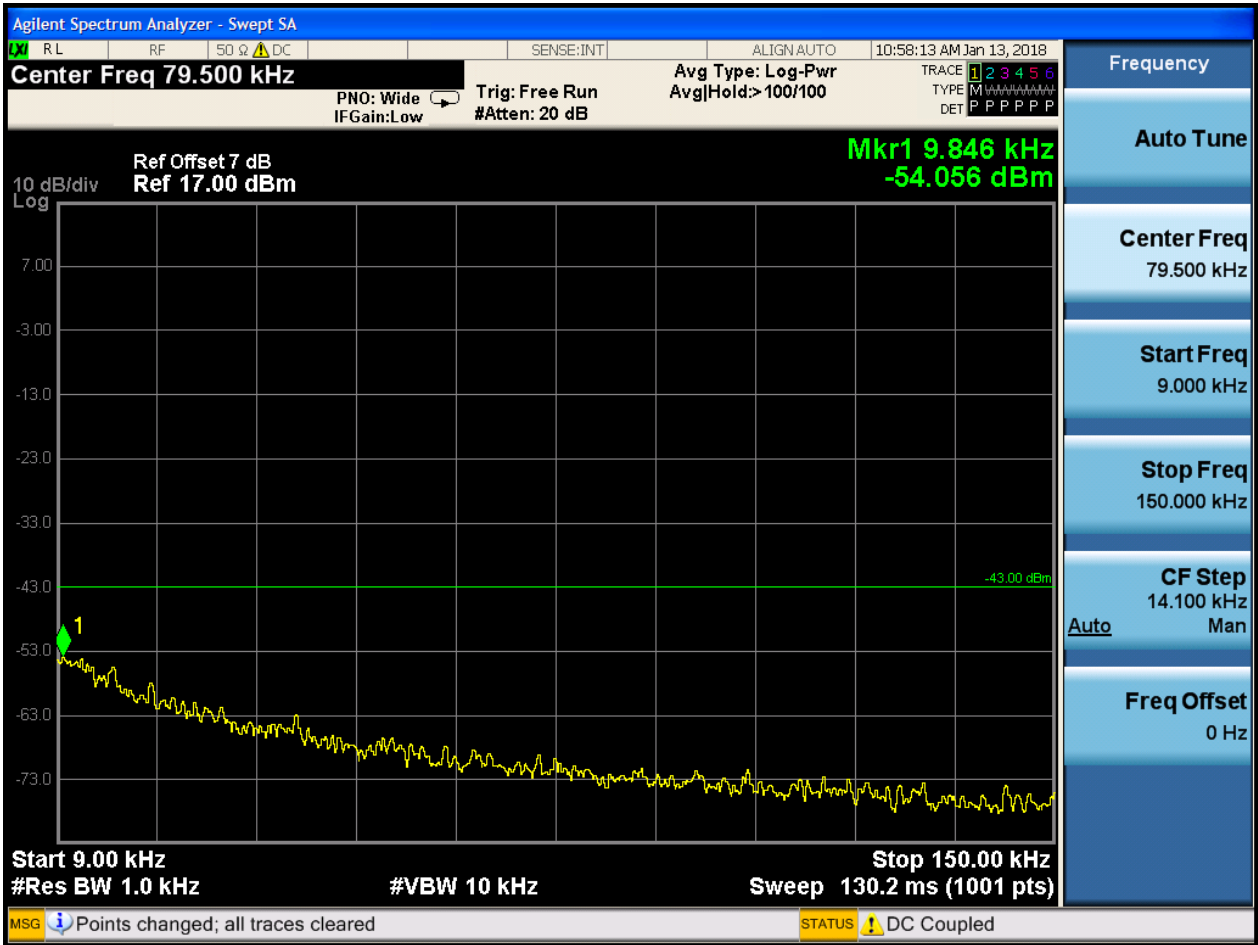


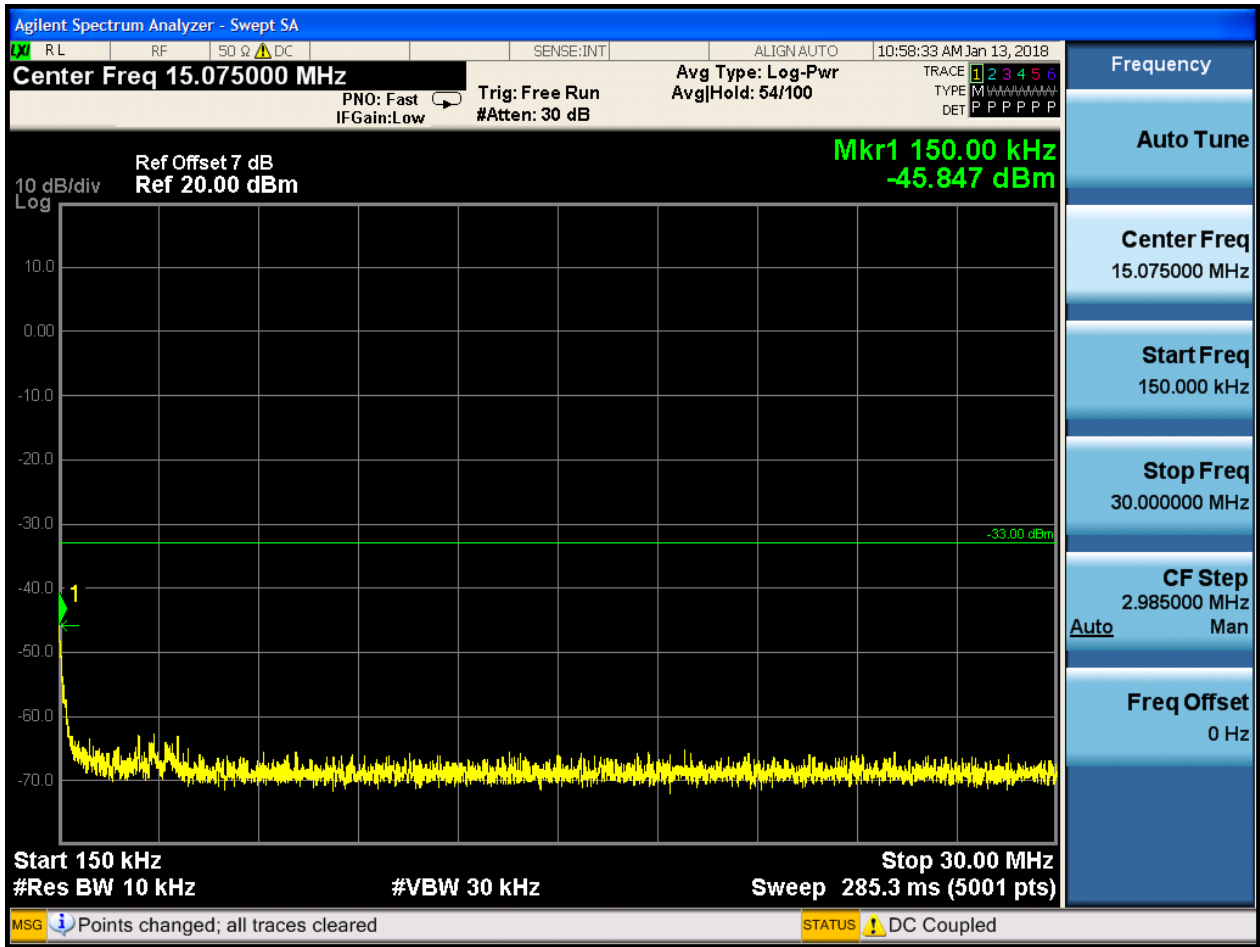


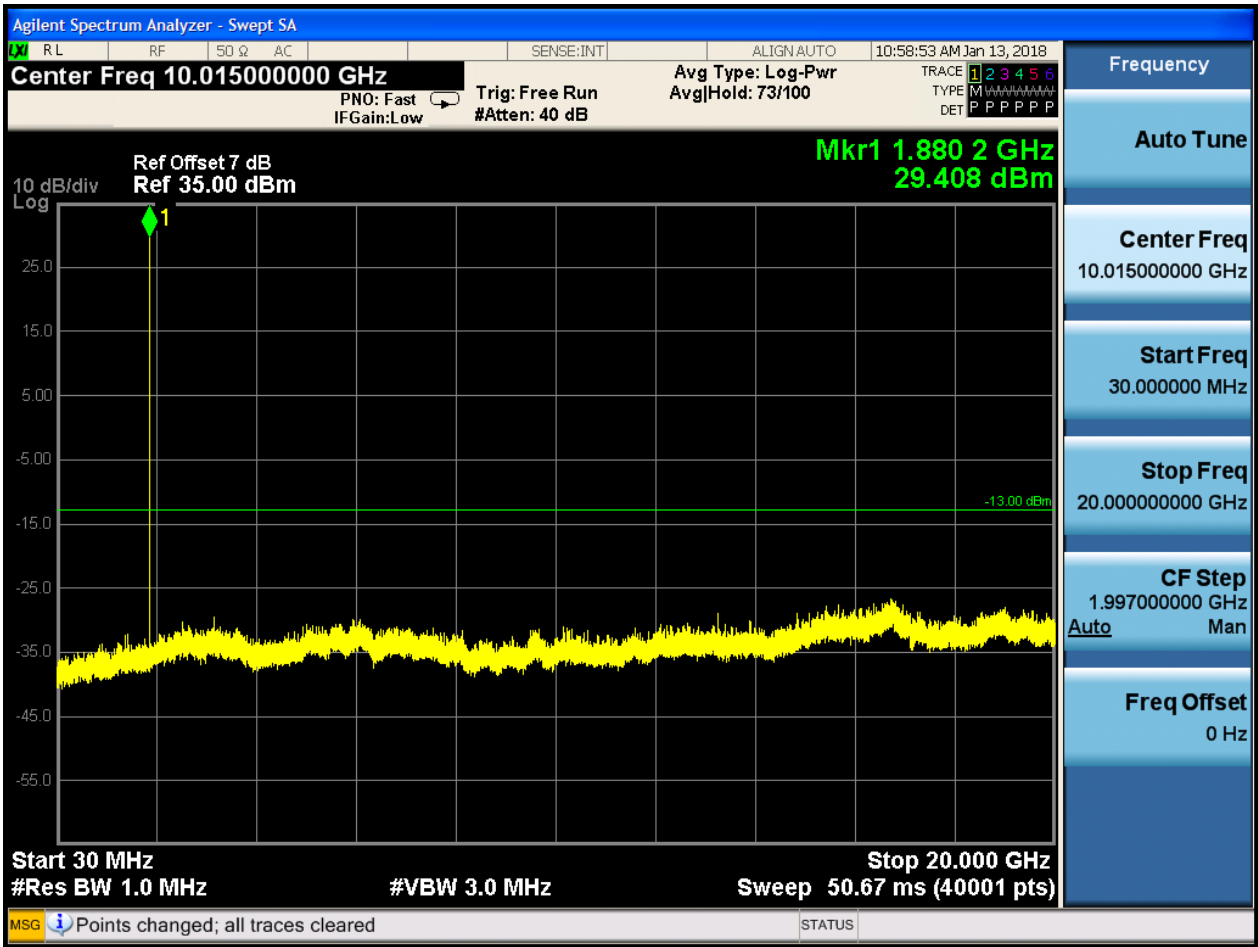




6.1.2.1.2 Test Channel = MCH

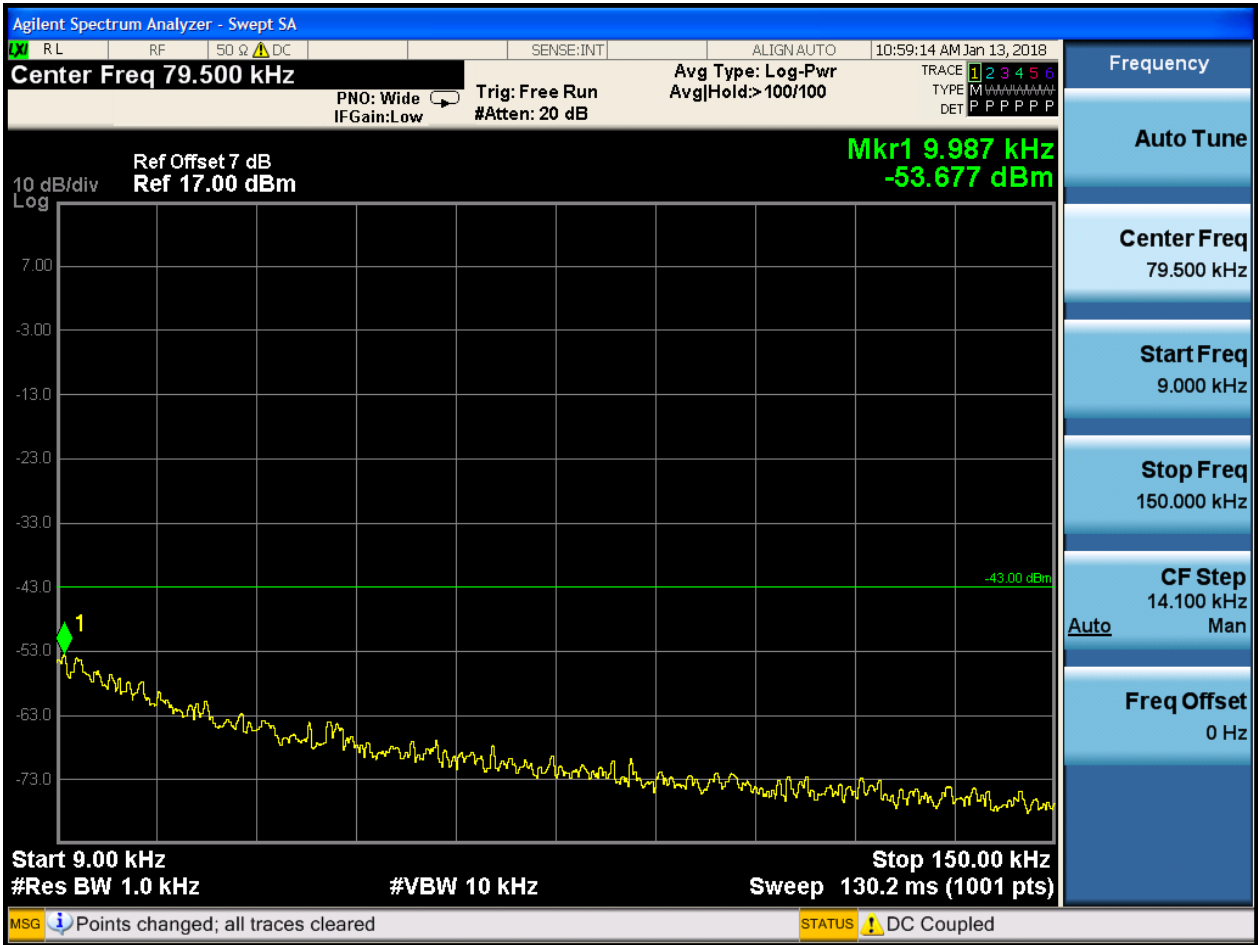


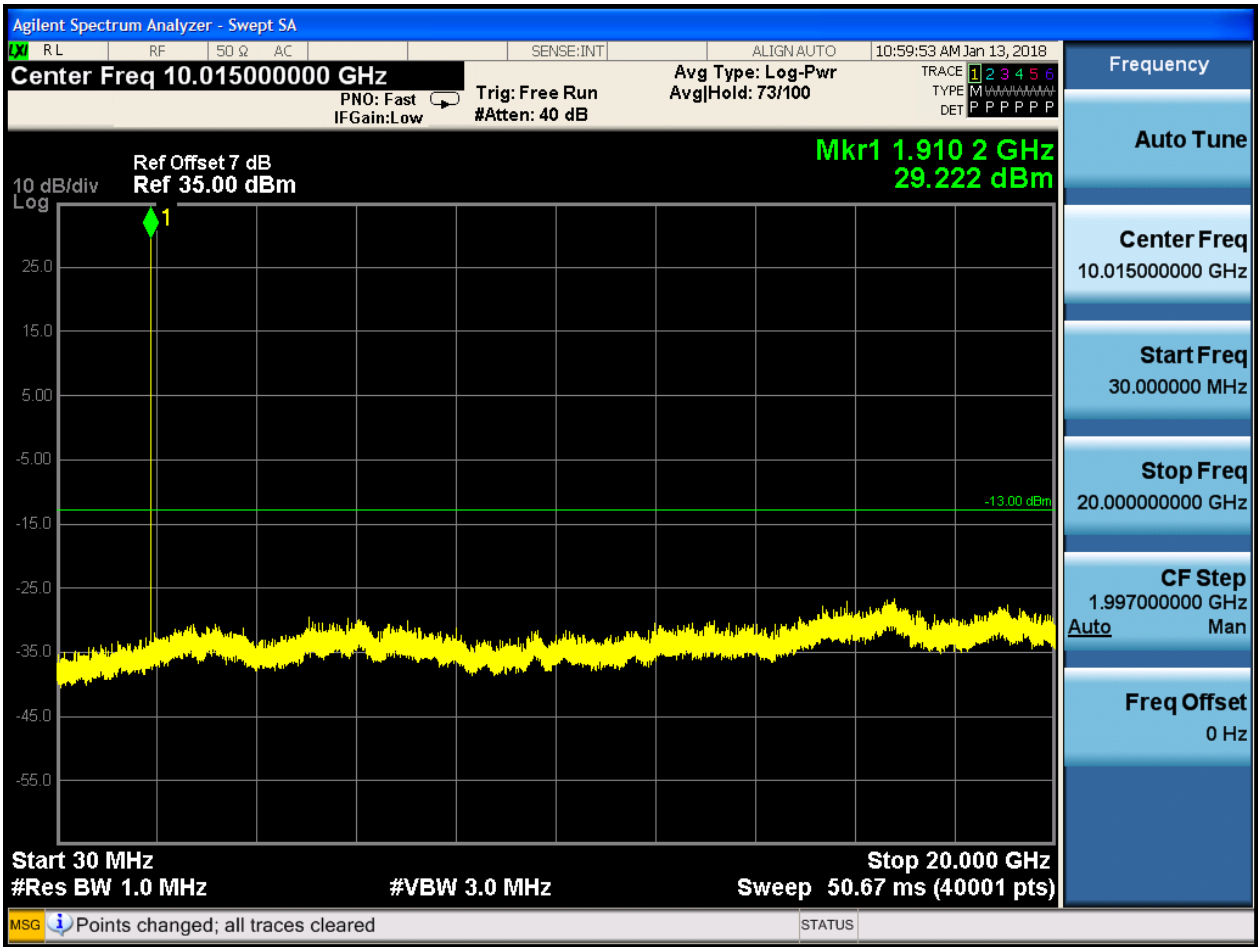






6.1.2.1.3 Test Channel = HCH

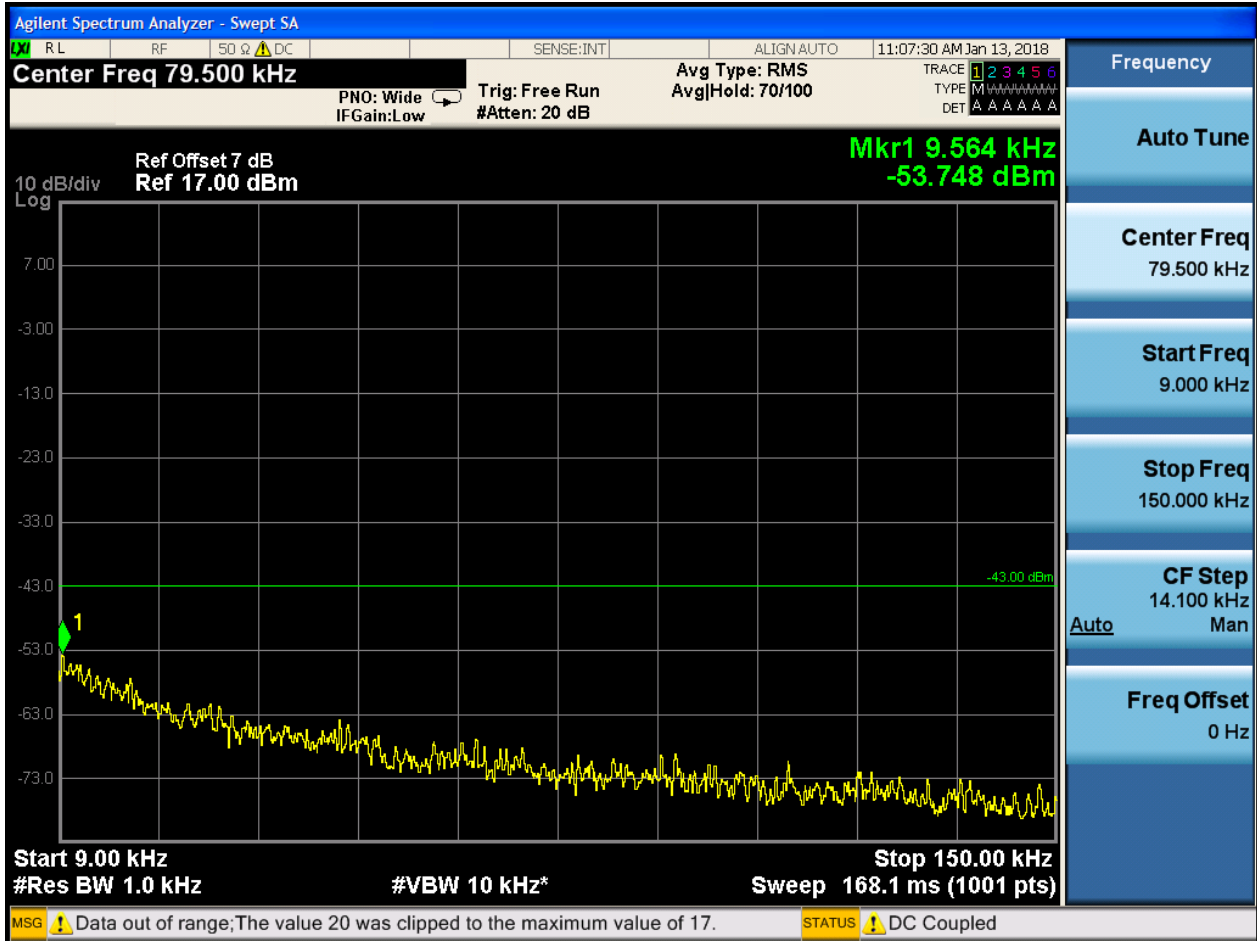


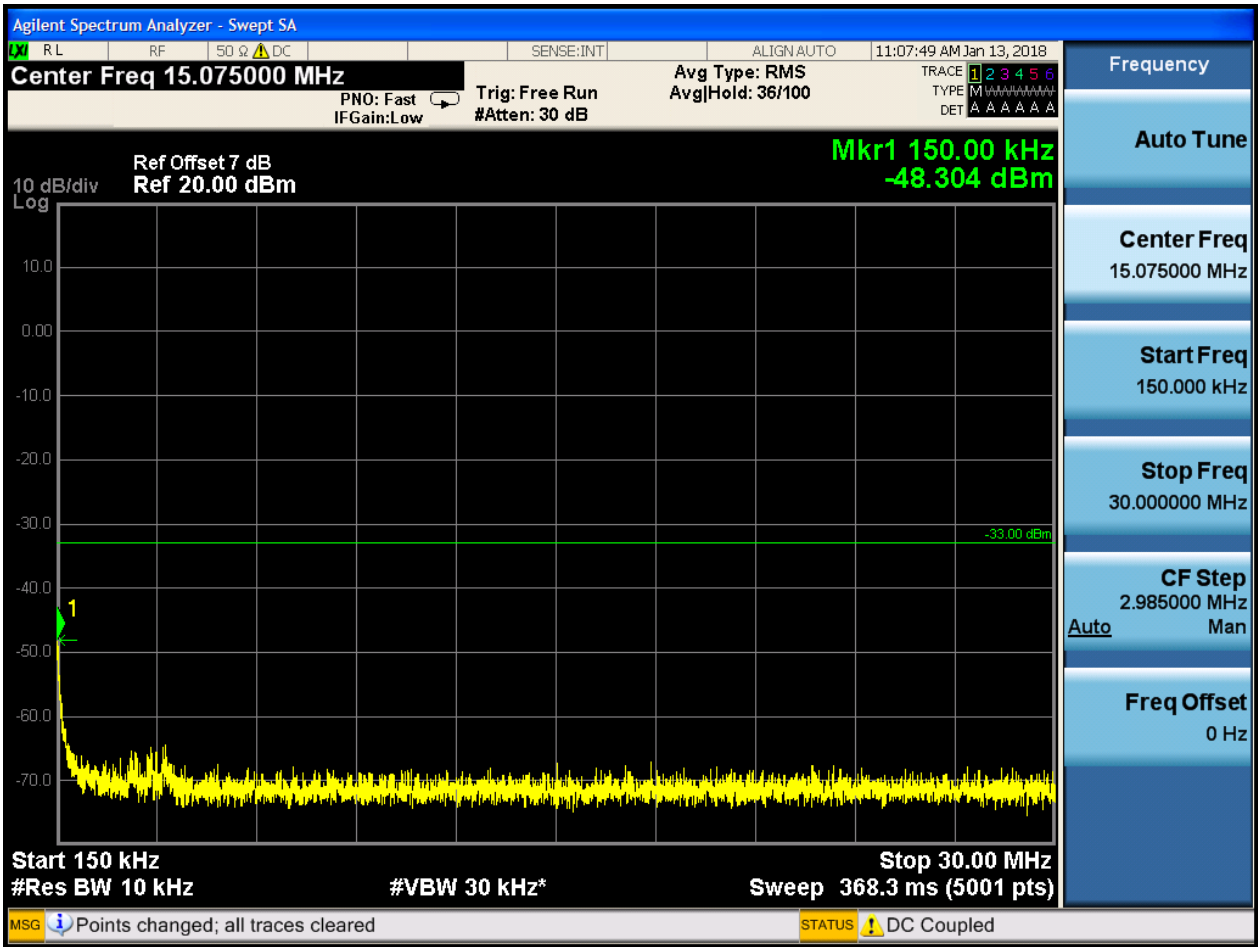


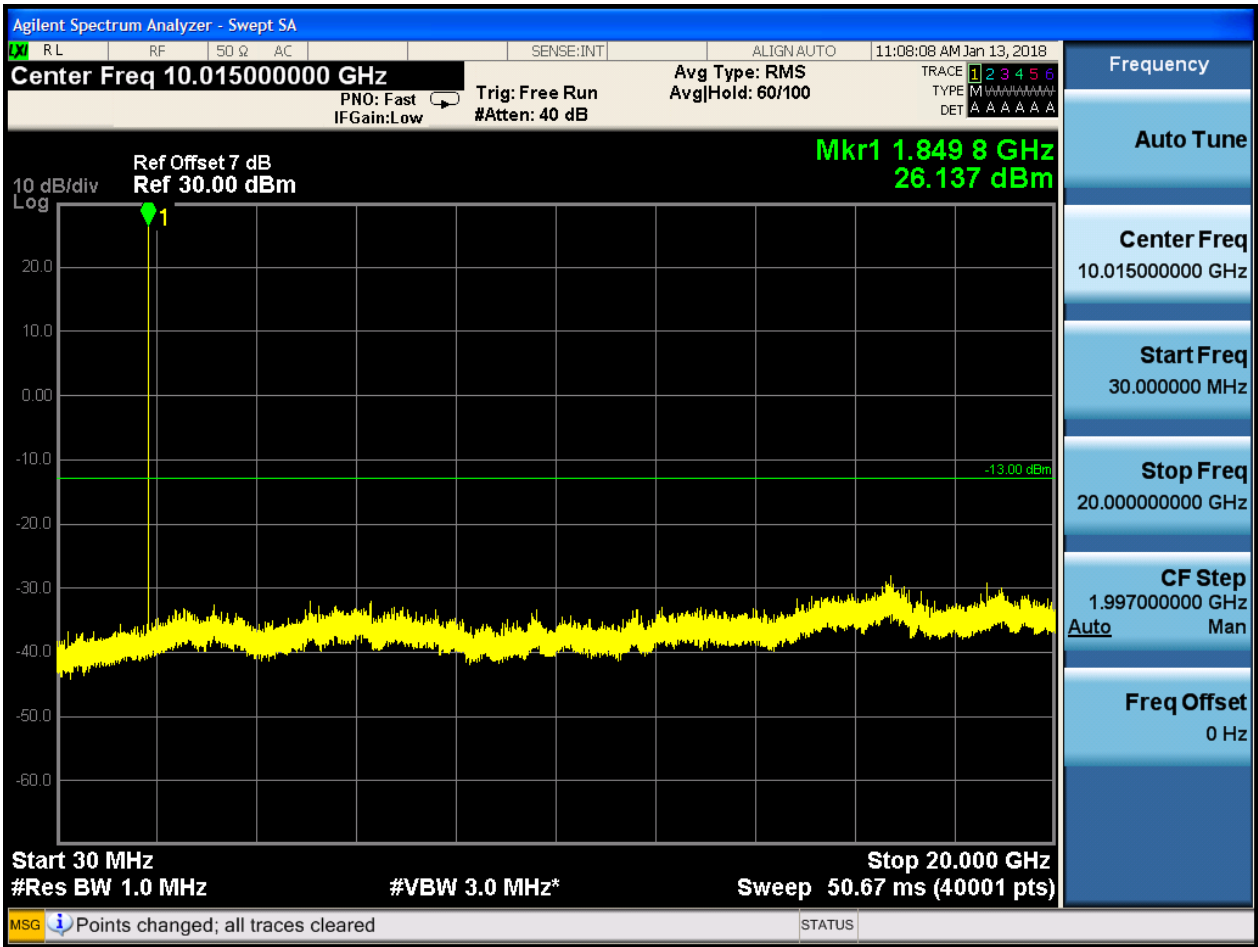


6.1.2.2 Test Mode = GSM/TM2

6.1.2.2.1 Test Channel = LCH

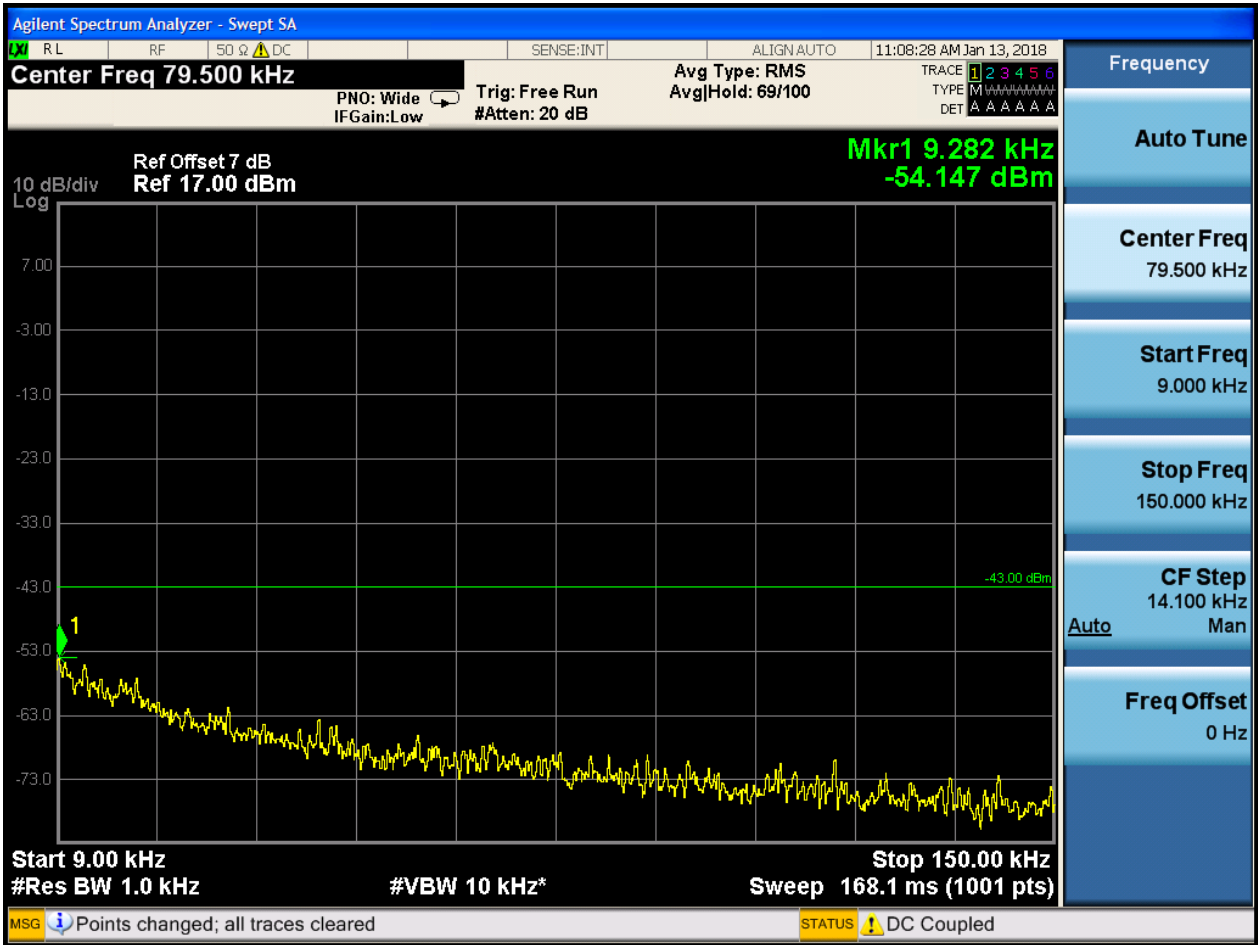


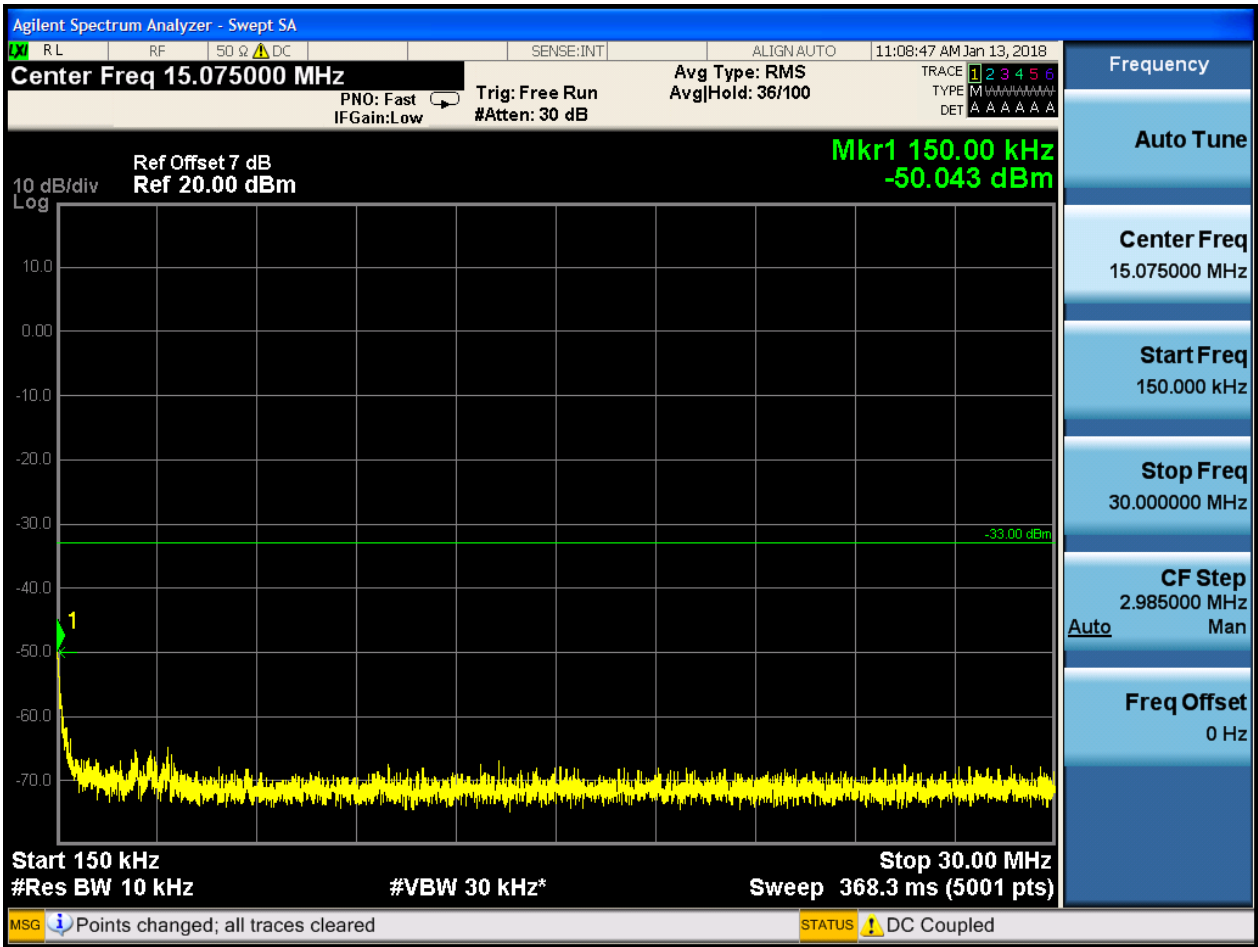


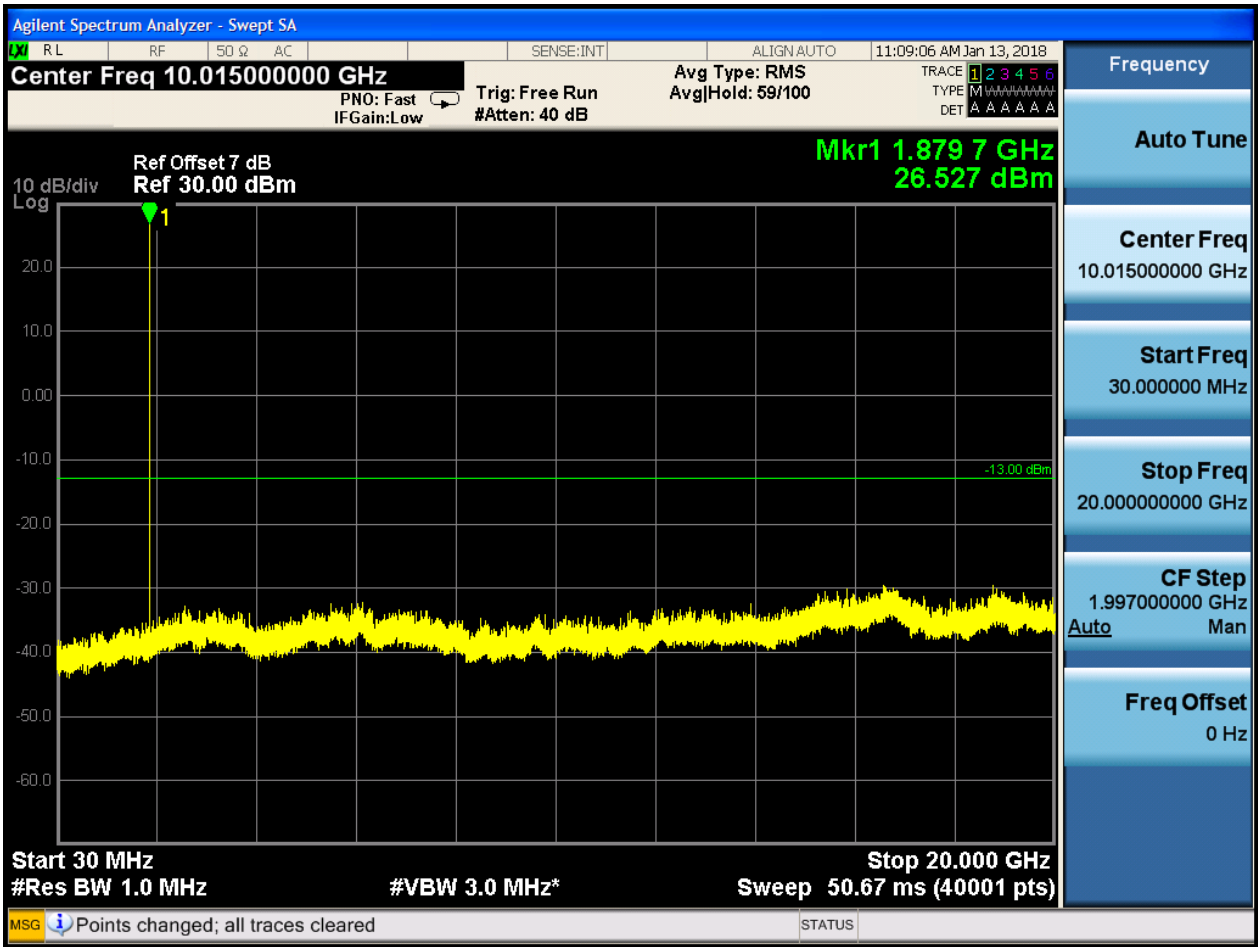




6.1.2.2.2 Test Channel = MCH

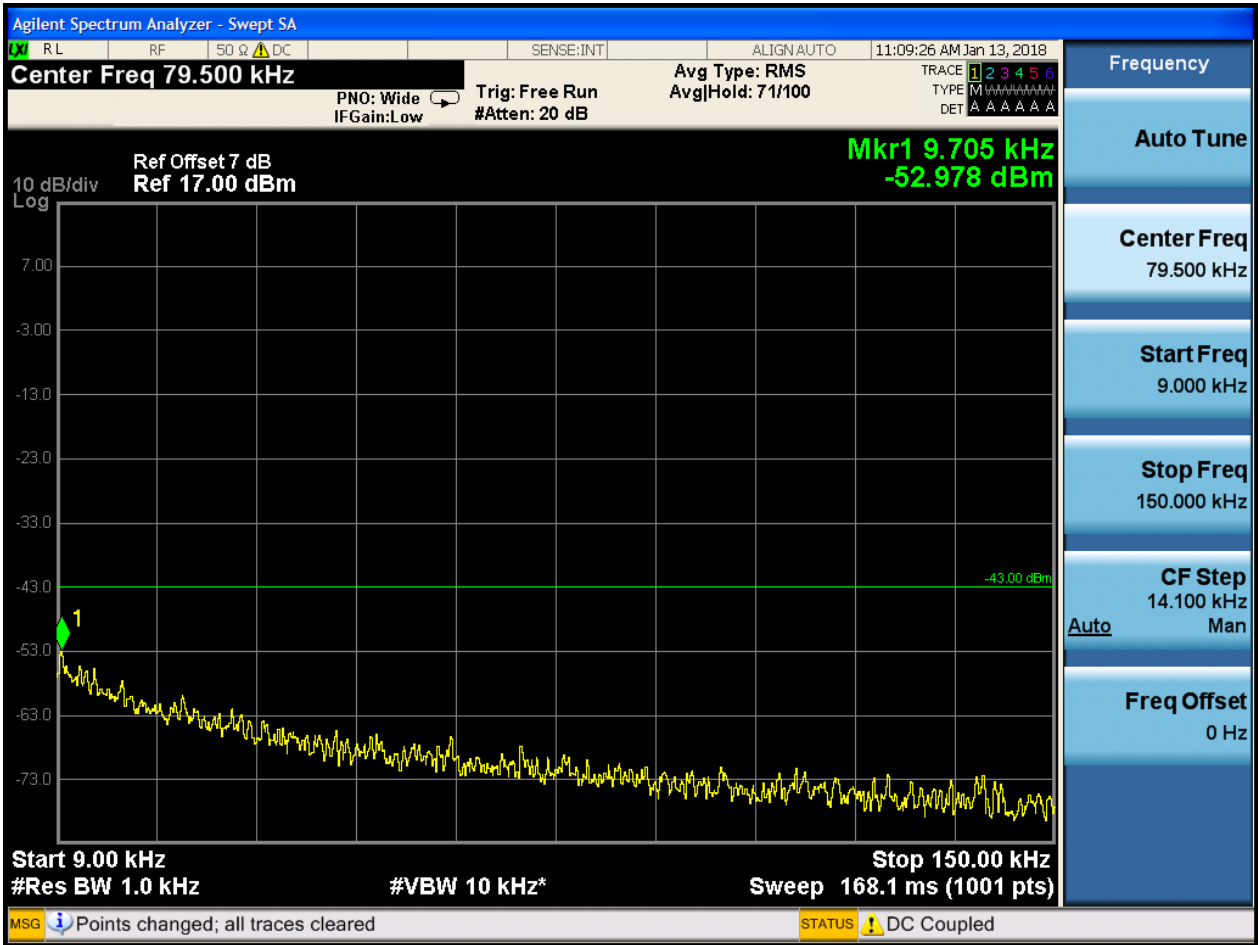


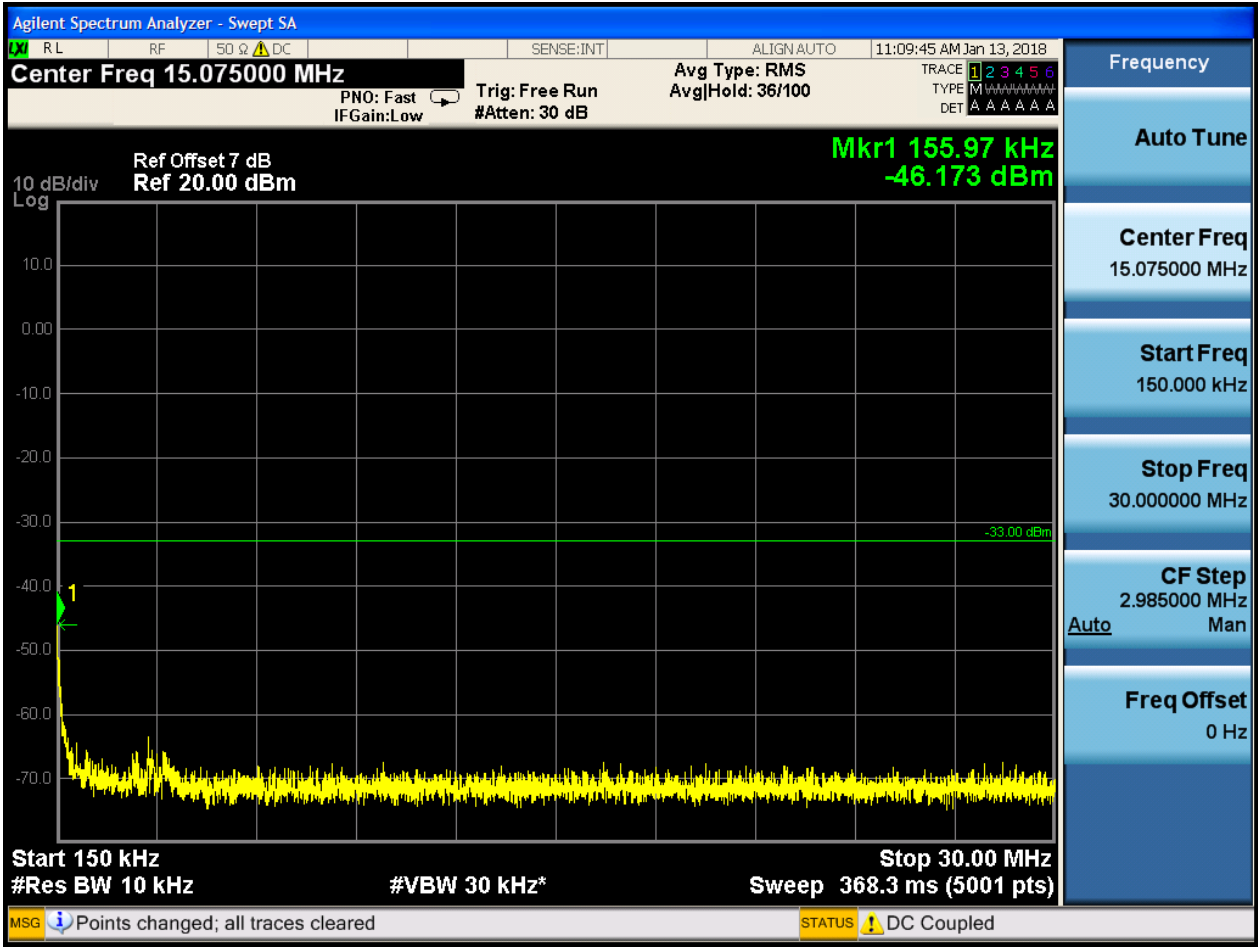


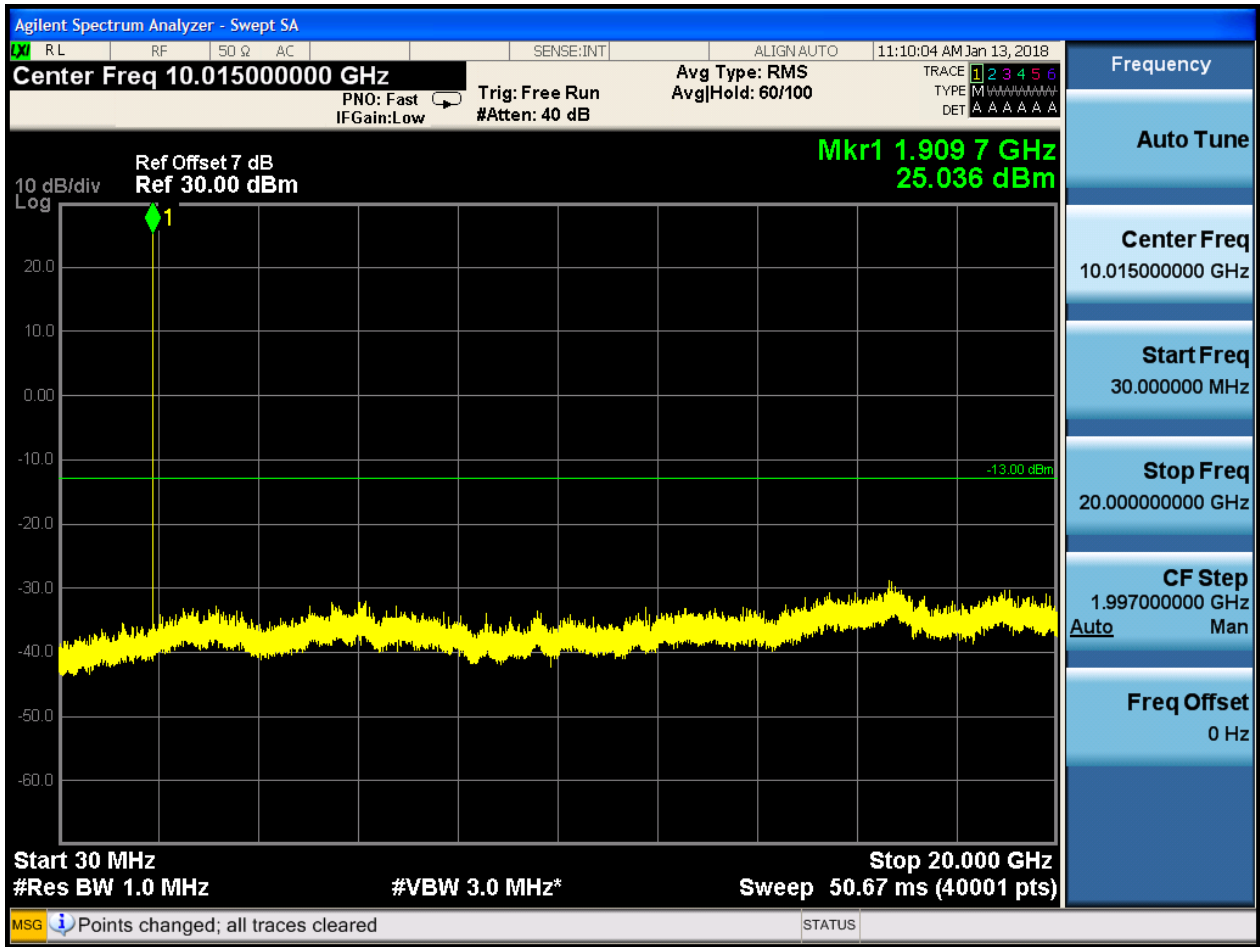




6.1.2.2.3 Test Channel = HCH







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

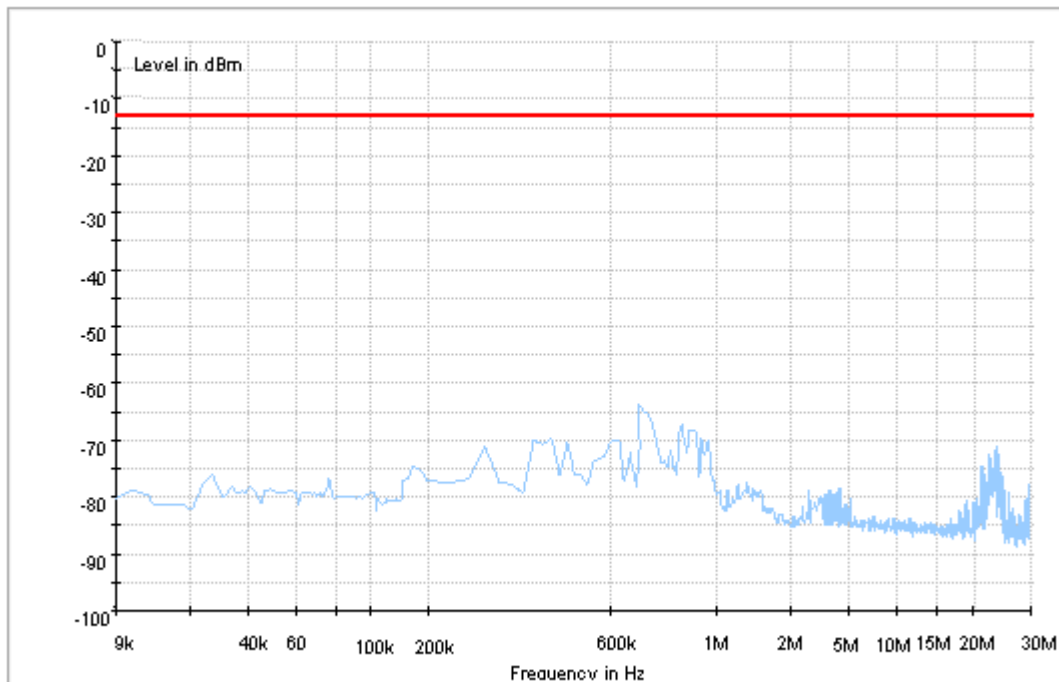
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

Part I - Test Plots

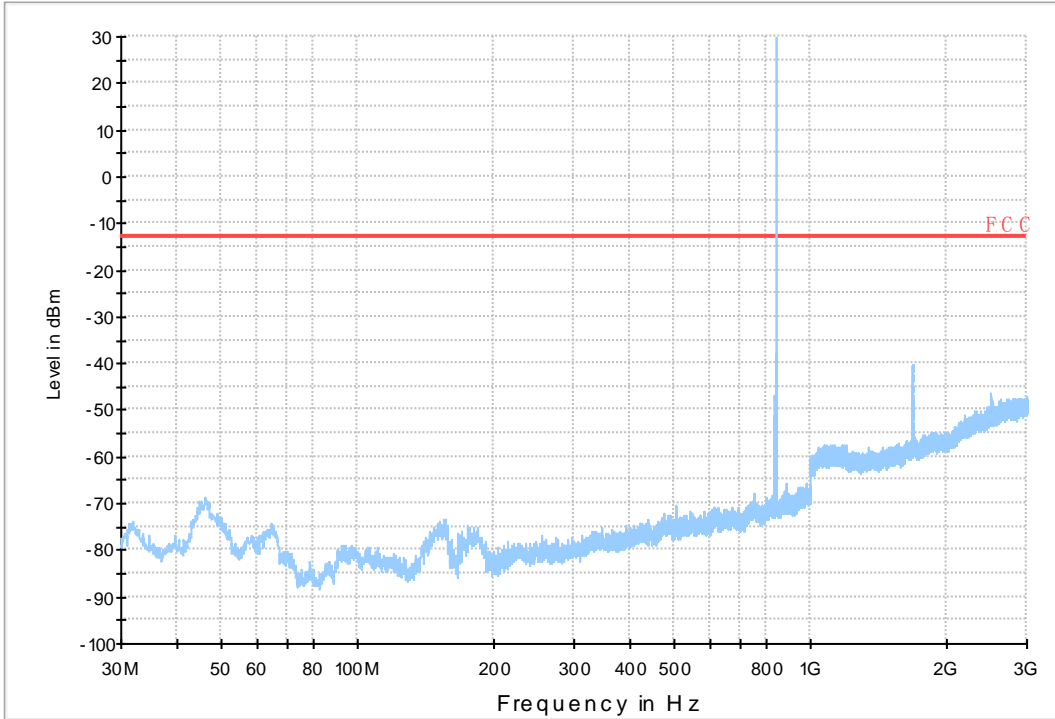
7.1 For GSM

7.1.1 Test Band = GSM850

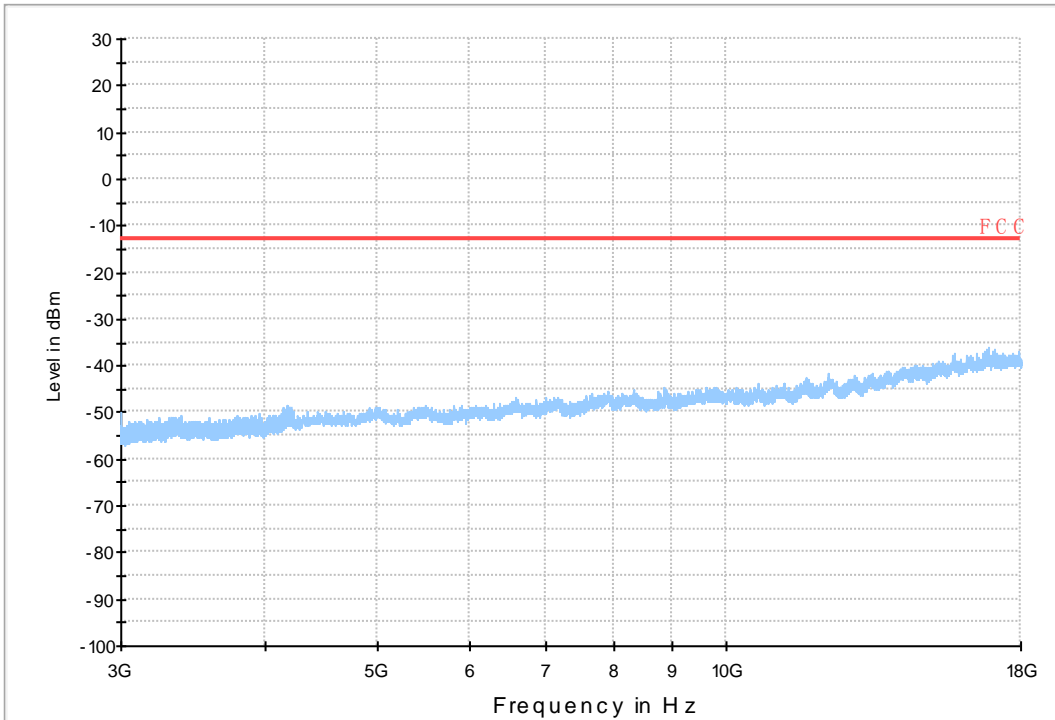
7.1.1.1 Test Mode = GSM/TM1



Copy of FCC PART22 GSM850_L

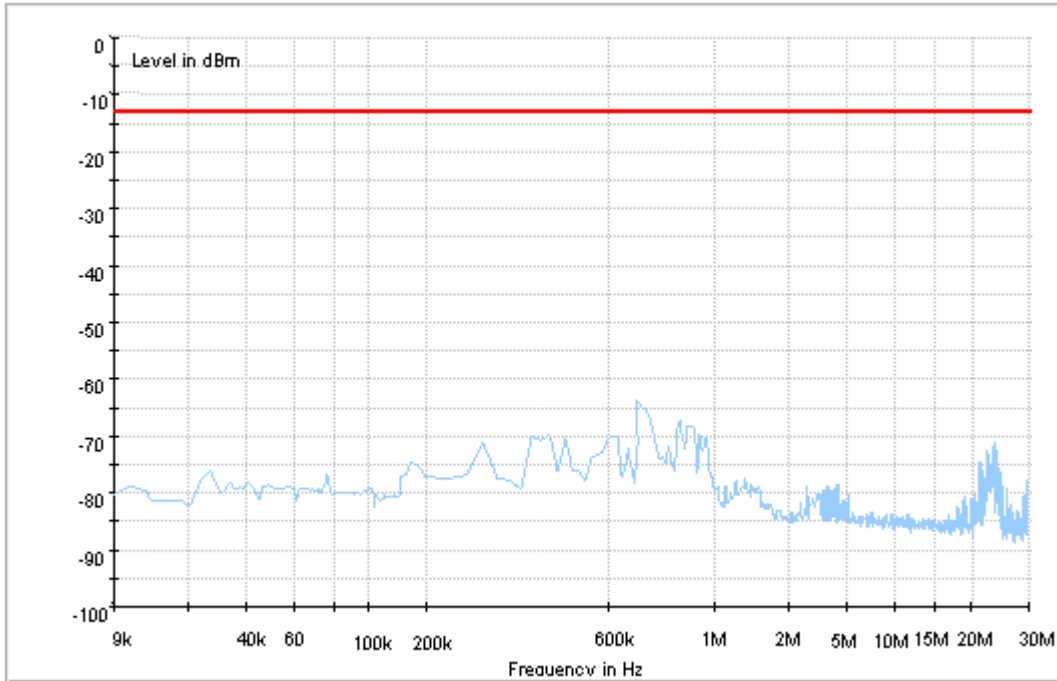


Copy of FCC PART22 GSM850_H

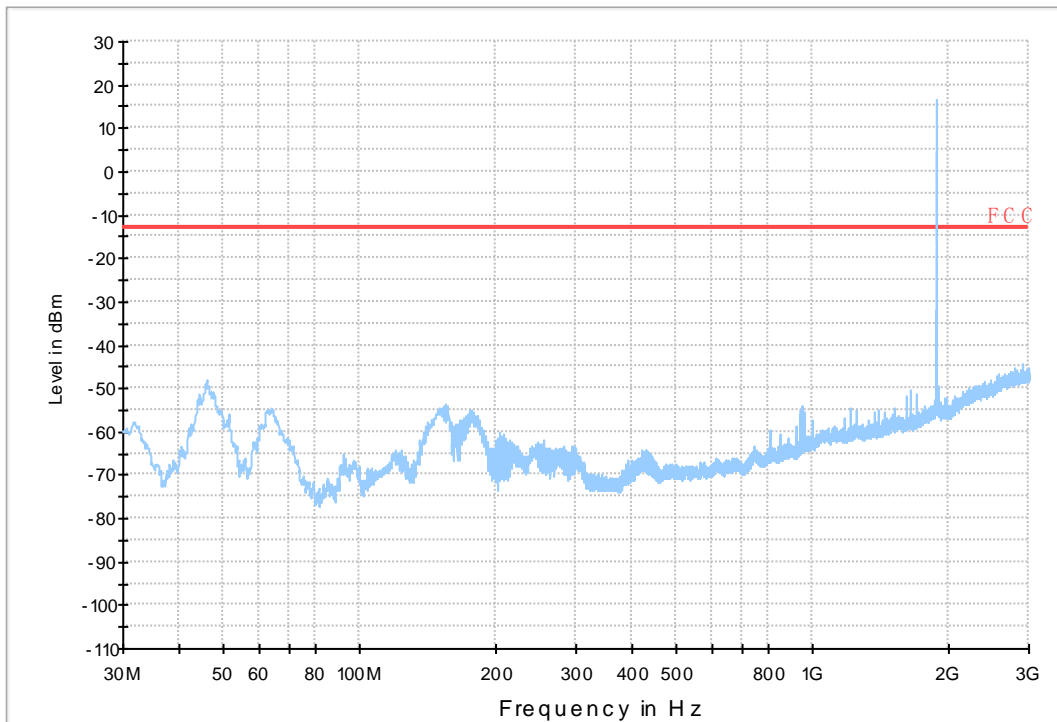


7.1.2 Test Band = GSM1900

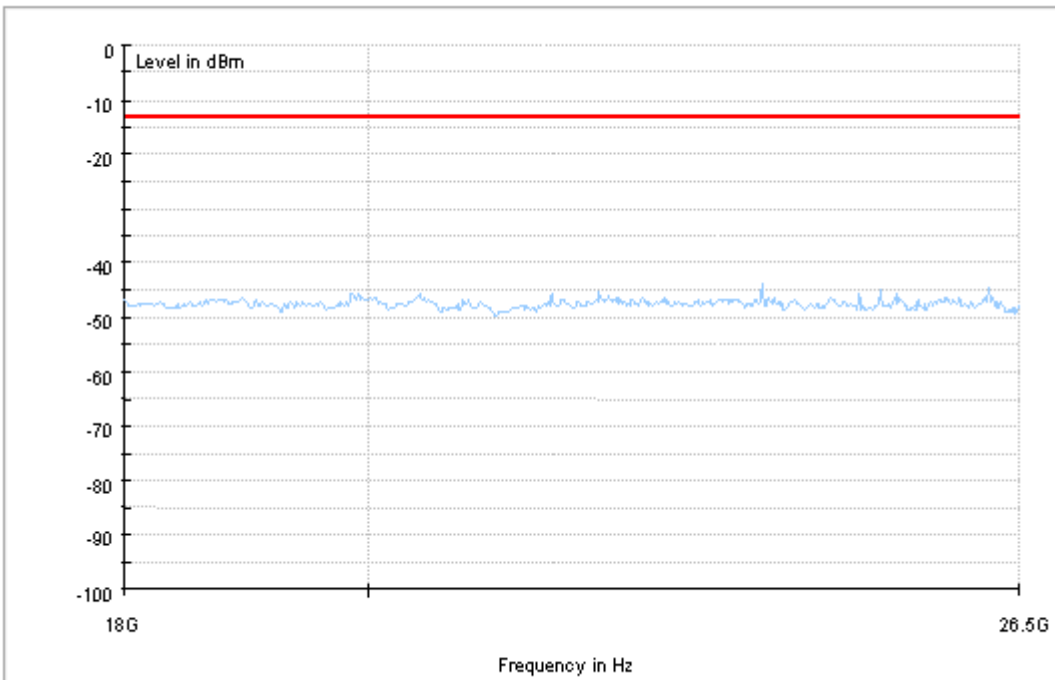
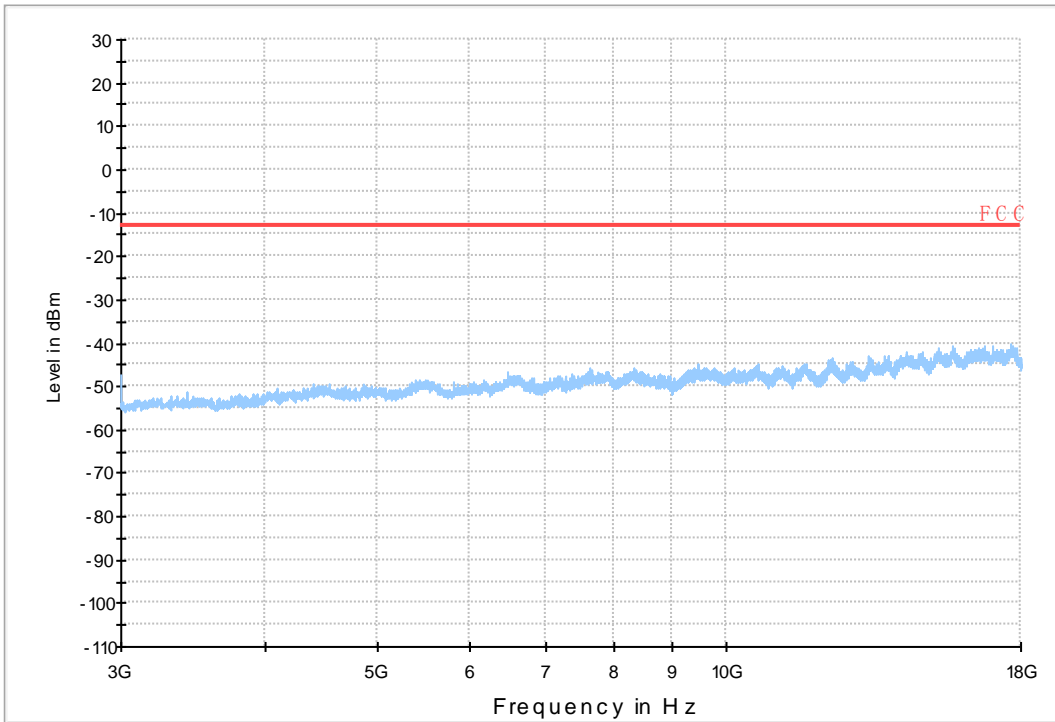
7.1.2.1 Test Mode = GSM/TM1



Copy of FCC PART 24 GSM1900_L



Copy of FCC PART 24 GSM1900_H



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	14.92	0.0181	PASS
				VN	12.91	0.01566	PASS
				VH	12.40	0.01504	PASS
		MCH	TN	VL	15.88	0.01898	PASS
				VN	12.85	0.01536	PASS
				VH	13.82	0.01652	PASS
		HCH	TN	VL	13.24	0.0156	PASS
				VN	13.30	0.01567	PASS
				VH	12.33	0.01453	PASS
	GSM/TM2	LCH	TN	VL	18.89	0.02292	PASS
				VN	15.17	0.01841	PASS
				VH	14.43	0.01751	PASS
		MCH	TN	VL	15.08	0.01803	PASS
				VN	17.47	0.02088	PASS
				VH	16.08	0.01922	PASS
		HCH	TN	VL	16.18	0.01906	PASS
				VN	17.01	0.02004	PASS
				VH	16.98	0.02	PASS
GSM1900	GSM/TM1	LCH	TN	VL	8.14	0.0044	PASS
				VN	-4.00	-0.00216	PASS
				VH	1.23	0.00066	PASS
		MCH	TN	VL	-11.88	-0.00632	PASS
				VN	-4.13	-0.0022	PASS
				VH	-7.81	-0.00415	PASS
		HCH	TN	VL	4.20	0.0022	PASS
				VN	2.91	0.00152	PASS
				VH	2.07	0.00108	PASS
	GSM/TM2	LCH	TN	VL	12.17	0.00658	PASS
				VN	8.14	0.0044	PASS
				VH	10.40	0.00562	PASS
		MCH	TN	VL	8.20	0.00436	PASS
				VN	3.75	0.00199	PASS
				VH			



Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	7.36	0.00391	PASS
		HCH	TN	VL	11.36	0.00595	PASS
				VN	16.69	0.00874	PASS
				VH	19.82	0.01038	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	14.27	0.01731	PASS
				-20	11.69	0.01418	PASS
				-10	14.46	0.01754	PASS
				0	12.72	0.01543	PASS
				10	13.88	0.01684	PASS
				20	15.24	0.01849	PASS
				30	16.79	0.02037	PASS
				40	12.85	0.01559	PASS
		50	13.75	0.01668	PASS		
		MCH	VN	-30	11.88	0.0142	PASS
				-20	13.11	0.01567	PASS
				-10	10.98	0.01312	PASS
				0	13.24	0.01583	PASS
				10	12.33	0.01474	PASS
				20	9.56	0.01143	PASS
				30	14.33	0.01713	PASS
				40	12.01	0.01436	PASS
		50	13.11	0.01567	PASS		
		HCH	VN	-30	11.95	0.01408	PASS
				-20	13.24	0.0156	PASS
				-10	11.95	0.01408	PASS
				0	15.69	0.01848	PASS
				10	12.91	0.01521	PASS
				20	13.95	0.01643	PASS
	30			11.62	0.01369	PASS	
	40			12.98	0.01529	PASS	
	50	16.27	0.01917	PASS			
	GSM/TM2	LCH	VN	-30	16.85	0.02044	PASS
				-20	14.14	0.01716	PASS
				-10	16.76	0.02033	PASS
				0	16.37	0.01986	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict						
				10	15.24	0.01849	PASS						
				20	16.79	0.02037	PASS						
				30	17.63	0.02139	PASS						
				40	12.82	0.01555	PASS						
				50	17.82	0.02162	PASS						
		MCH	VN			-30	15.82	0.01891	PASS				
						-20	14.85	0.01775	PASS				
						-10	16.14	0.01929	PASS				
						0	18.69	0.02234	PASS				
						10	17.60	0.02104	PASS				
						20	9.72	0.01162	PASS				
						30	13.04	0.01559	PASS				
						40	14.04	0.01678	PASS				
						50	15.63	0.01868	PASS				
						HCH	VN			-30	15.11	0.0178	PASS
		-20	16.59	0.01955	PASS								
		-10	16.72	0.0197	PASS								
		0	17.31	0.02039	PASS								
		10	15.98	0.01883	PASS								
		20	20.47	0.02412	PASS								
		30	17.98	0.02118	PASS								
		40	17.27	0.02035	PASS								
		50	14.92	0.01758	PASS								
		GSM1900	GSM/TM1	LCH	VN					-30	1.61	0.00087	PASS
										-20	-1.68	-0.00091	PASS
										-10	-2.65	-0.00143	PASS
										0	-5.94	-0.00321	PASS
10	1.10									0.00059	PASS		
20	-2.91									-0.00157	PASS		
30	-0.65									-0.00035	PASS		
40	-7.75									-0.00419	PASS		
50	-3.81									-0.00206	PASS		
MCH	VN									-30	-7.30	-0.00388	PASS
										-20	-7.62	-0.00405	PASS
										-10	-5.42	-0.00288	PASS
										0	-13.43	-0.00714	PASS
										10	0.77	0.00041	PASS
										20	-9.81	-0.00522	PASS
										30	-7.30	-0.00388	PASS
										40	-11.88	-0.00632	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	1.16	0.00062	PASS
				-30	0.71	0.00037	PASS
				-20	2.52	0.00132	PASS
				-10	-0.19	-0.0001	PASS
				0	3.68	0.00193	PASS
				10	-0.06	-0.00003	PASS
				20	-3.49	-0.00183	PASS
				30	2.97	0.00156	PASS
				40	0.97	0.00051	PASS
				50	0.26	0.00014	PASS
	GSM/TM2	LCH	VN	-30	11.07	0.00598	PASS
				-20	12.46	0.00673	PASS
				-10	7.01	0.00379	PASS
				0	9.56	0.00517	PASS
				10	13.85	0.00749	PASS
				20	8.56	0.00463	PASS
				30	13.66	0.00738	PASS
				40	10.07	0.00544	PASS
				50	14.04	0.00759	PASS
				MCH	VN	-30	5.33
		-20	7.72			0.00411	PASS
		-10	2.65			0.00141	PASS
		0	6.07			0.00323	PASS
		10	6.30			0.00335	PASS
		20	5.94			0.00316	PASS
		30	1.16			0.00062	PASS
		40	-2.00			-0.00106	PASS
		50	6.10			0.00324	PASS
		HCH	VN			-30	10.56
				-20	9.59	0.00502	PASS
				-10	16.66	0.00872	PASS
				0	14.92	0.00781	PASS
10	9.94			0.0052	PASS		
20	7.01			0.00367	PASS		
30	7.97			0.00417	PASS		
40	13.82			0.00724	PASS		
50	9.62	0.00504	PASS				

END