



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/EIRP [dBm]	Limit [dBm]	Verdict
GSM850	GSM/TM1	LCH	32.84	28.07	38.5	PASS
		MCH	32.91	28.14	38.5	PASS
		HCH	33.04	28.27	38.5	PASS
	GSM/TM2	LCH	26.64	21.87	38.5	PASS
		MCH	26.65	21.88	38.5	PASS
		HCH	26.7	21.93	38.5	PASS
GSM1900	GSM/TM1	LCH	30.14	28.24	33	PASS
		MCH	30.23	28.33	33	PASS
		HCH	30.25	28.35	33	PASS
	GSM/TM2	LCH	25.52	23.62	33	PASS
		MCH	25.54	23.64	33	PASS
		HCH	25.52	23.62	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,

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

$$\text{EIRP [dBm]} = \text{SGP b, SGP=Signal Generator Level}$$

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
GSM1900	GSM/TM1	LCH	0.18	13	PASS
		MCH	0.2	13	PASS
		HCH	0.2	13	PASS
	GSM/TM2	LCH	3.18	13	PASS
		MCH	3.17	13	PASS
		HCH	3.18	13	PASS

3Appendix_C: Modulation Characteristics

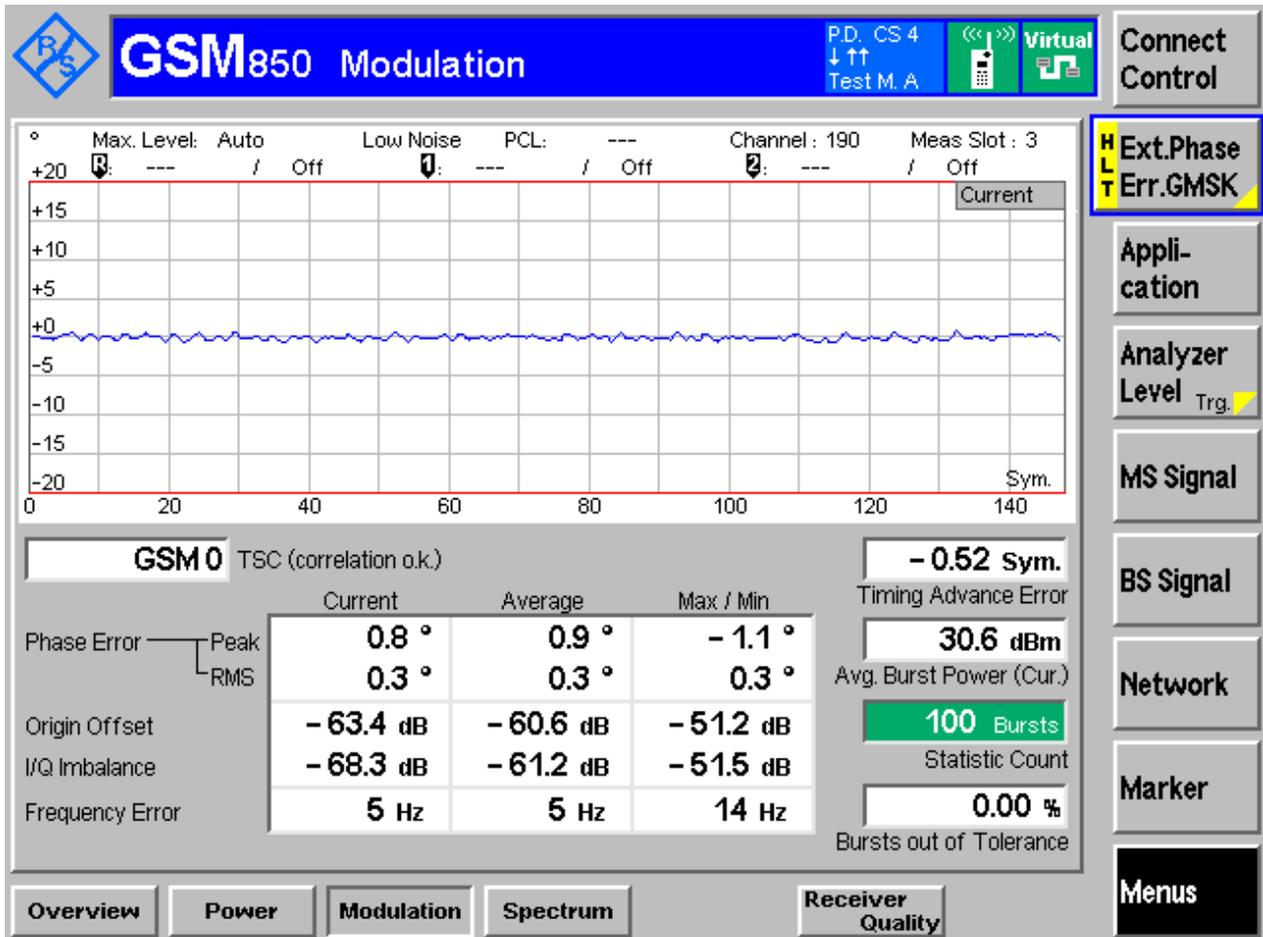
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

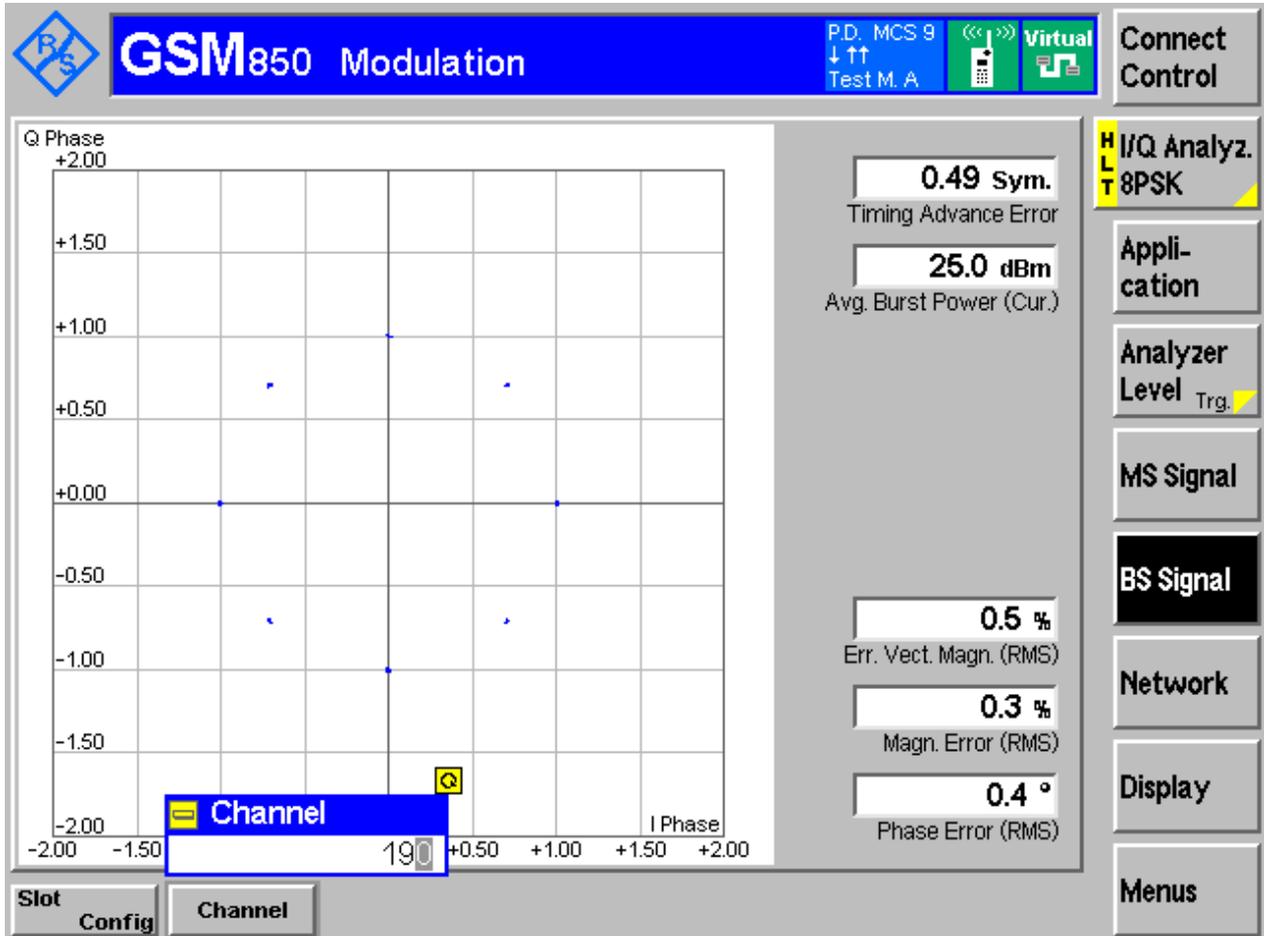
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

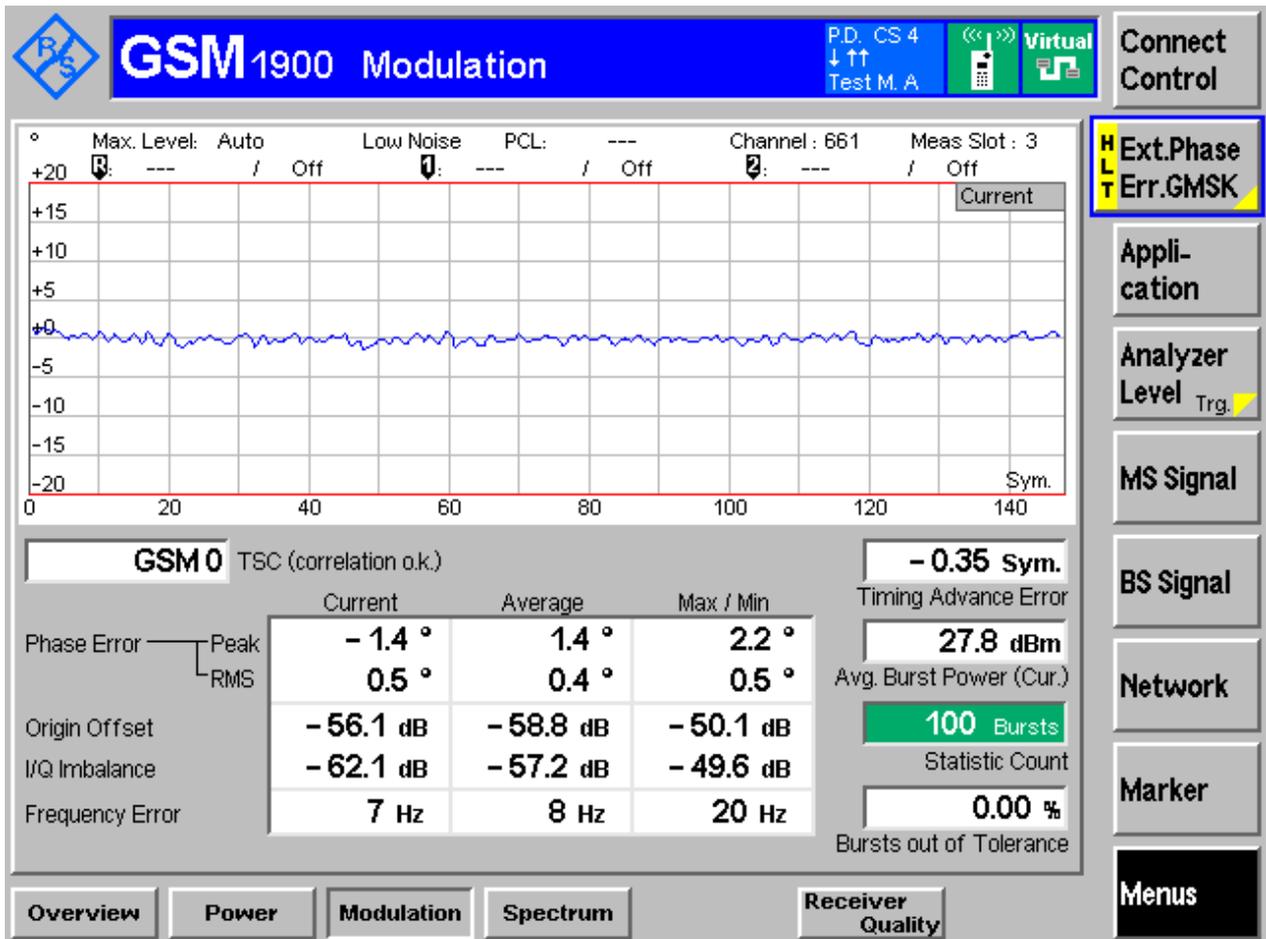
3.1.1.2.1 Test Channel = MCH



3.1.3 Test Band = GSM1900

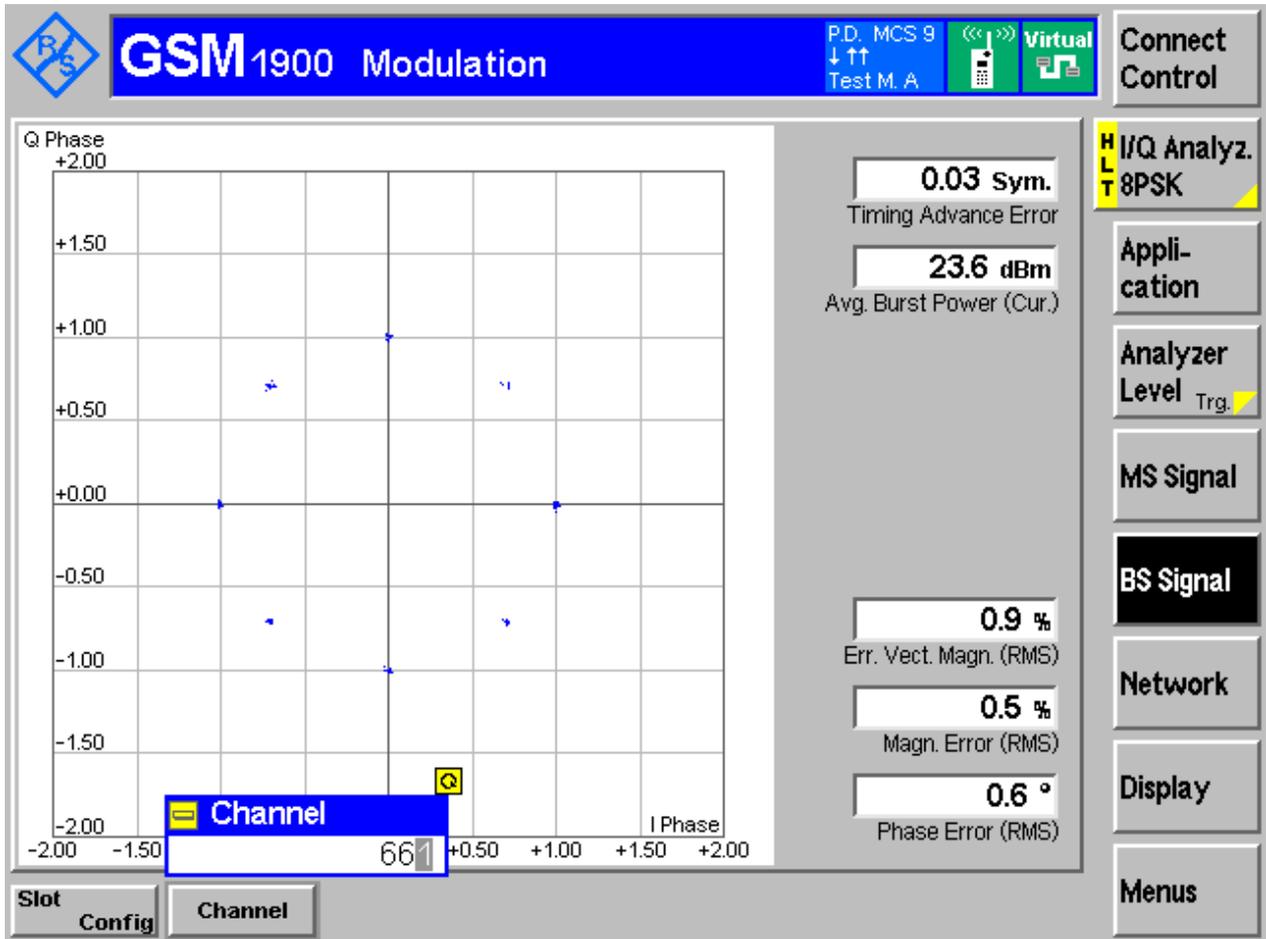
3.1.3.1 Test Mode = GSM/TM1

3.1.3.1.1 Test Channel = MCH



3.1.3.2 Test Mode = GSM/TM2

3.1.3.2.1 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	241.71	317.68	Pass
		MCH	245.70	316.30	Pass
		HCH	244.53	314.48	Pass
	GSM/TM2	LCH	242.15	311.39	Pass
		MCH	239.05	307.04	Pass
		HCH	239.64	306.65	Pass
GSM1900	GSM/TM1	LCH	246.87	314.71	Pass
		MCH	246.51	317.23	Pass
		HCH	246.81	315.00	Pass
	GSM/TM2	LCH	240.73	303.58	Pass
		MCH	244.51	315.48	Pass
		HCH	243.07	304.50	Pass

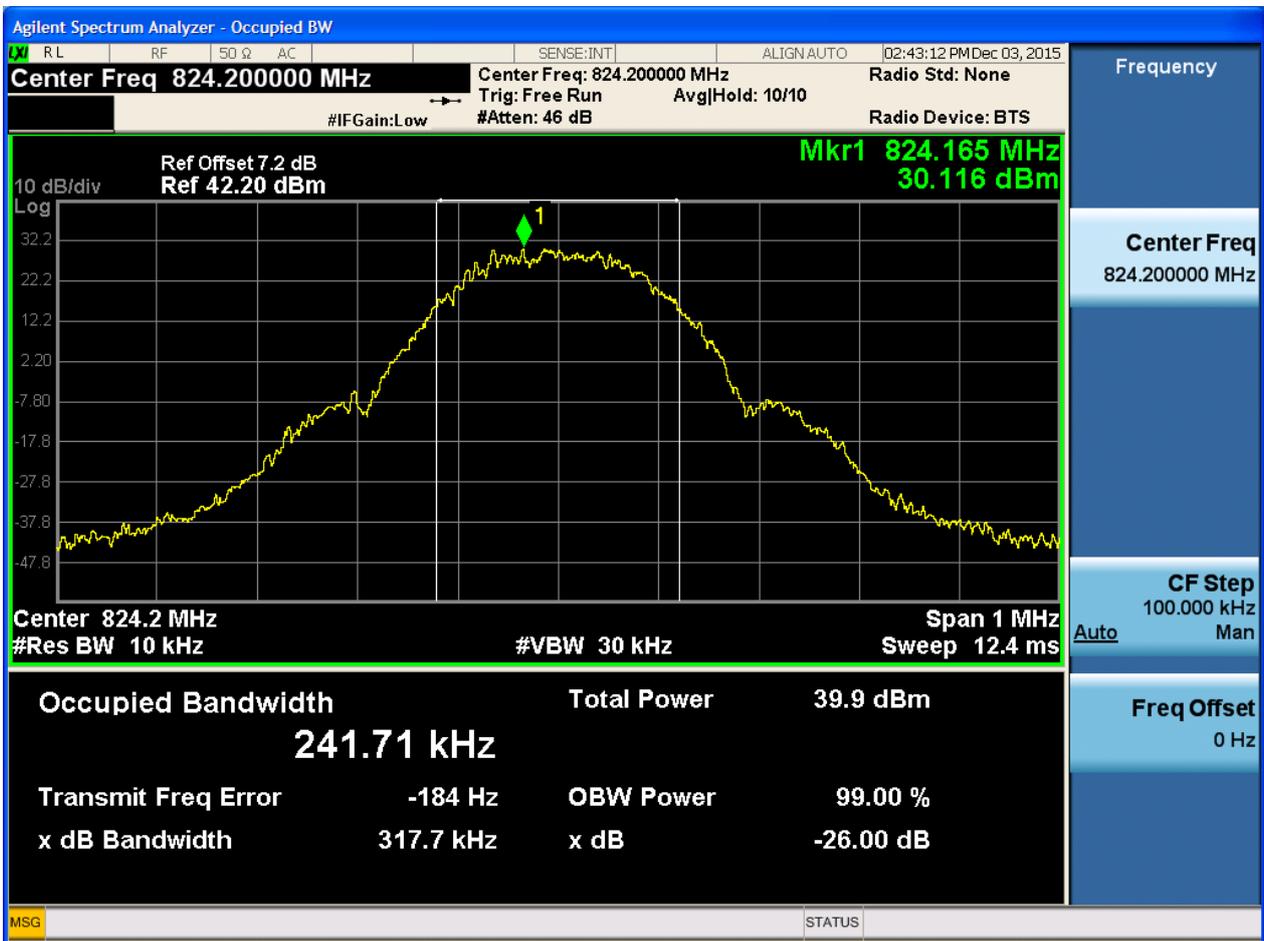
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

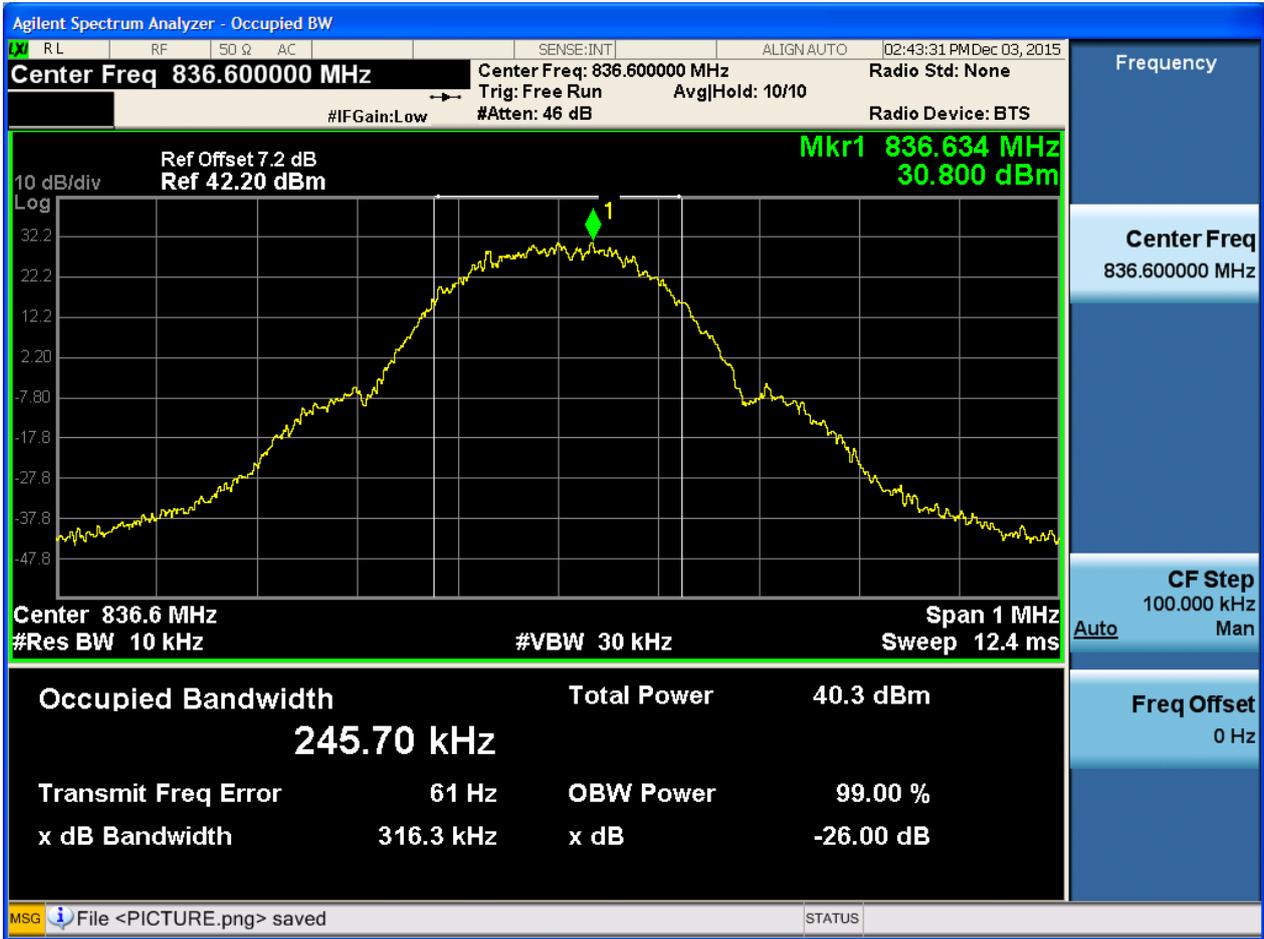
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



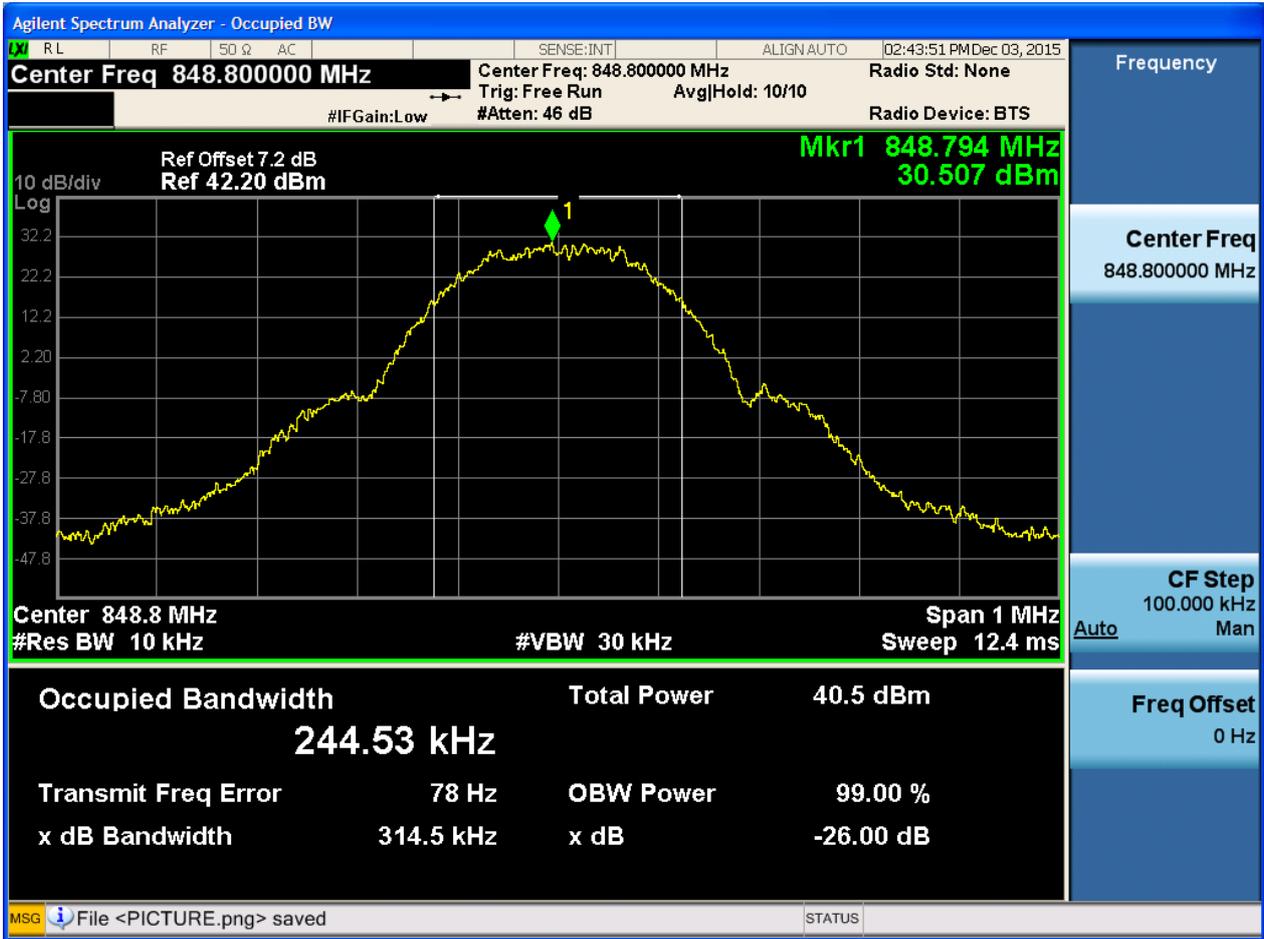


4.1.1.1.2 Test Channel = MCH





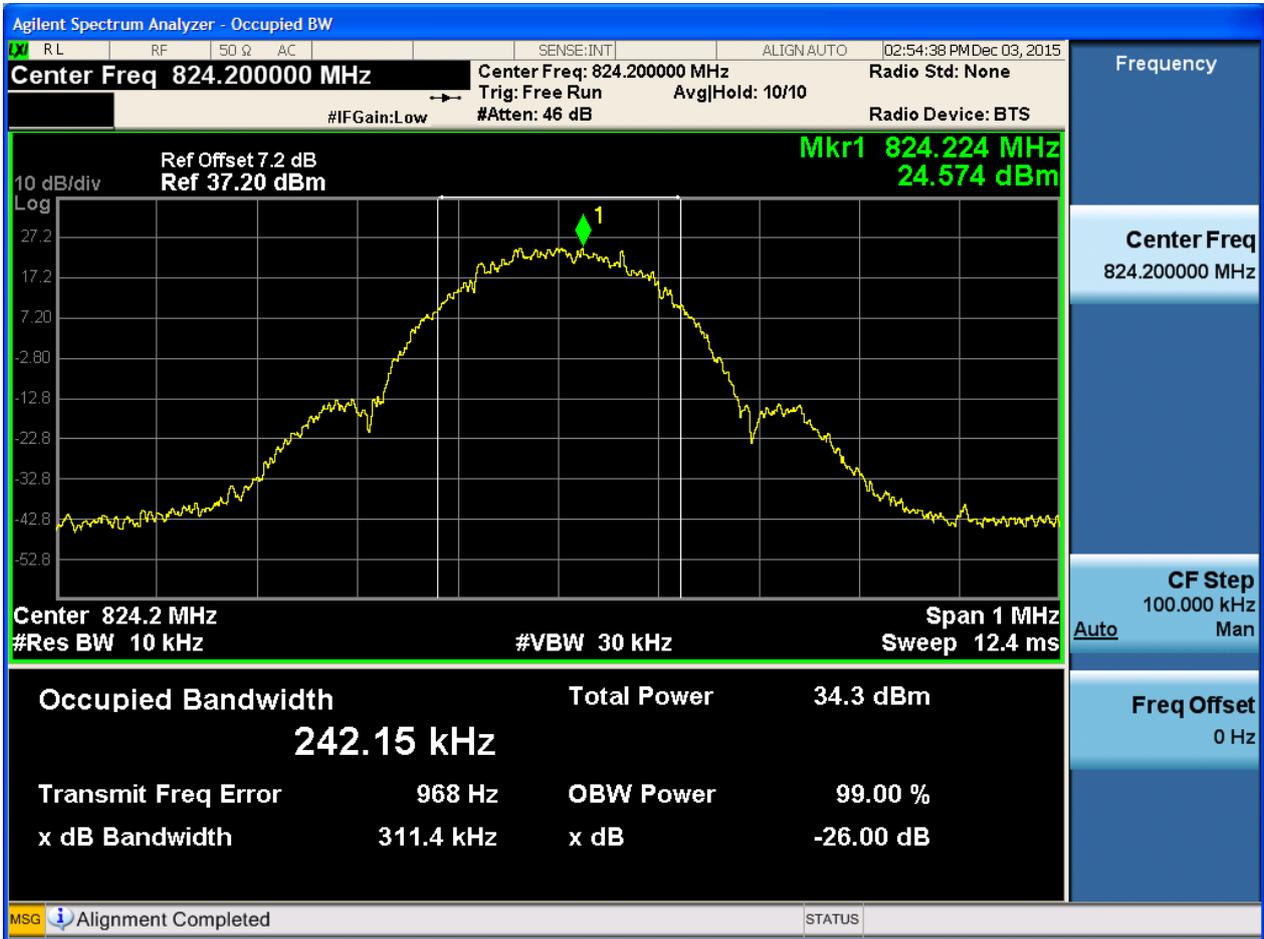
4.1.1.1.3 Test Channel = HCH





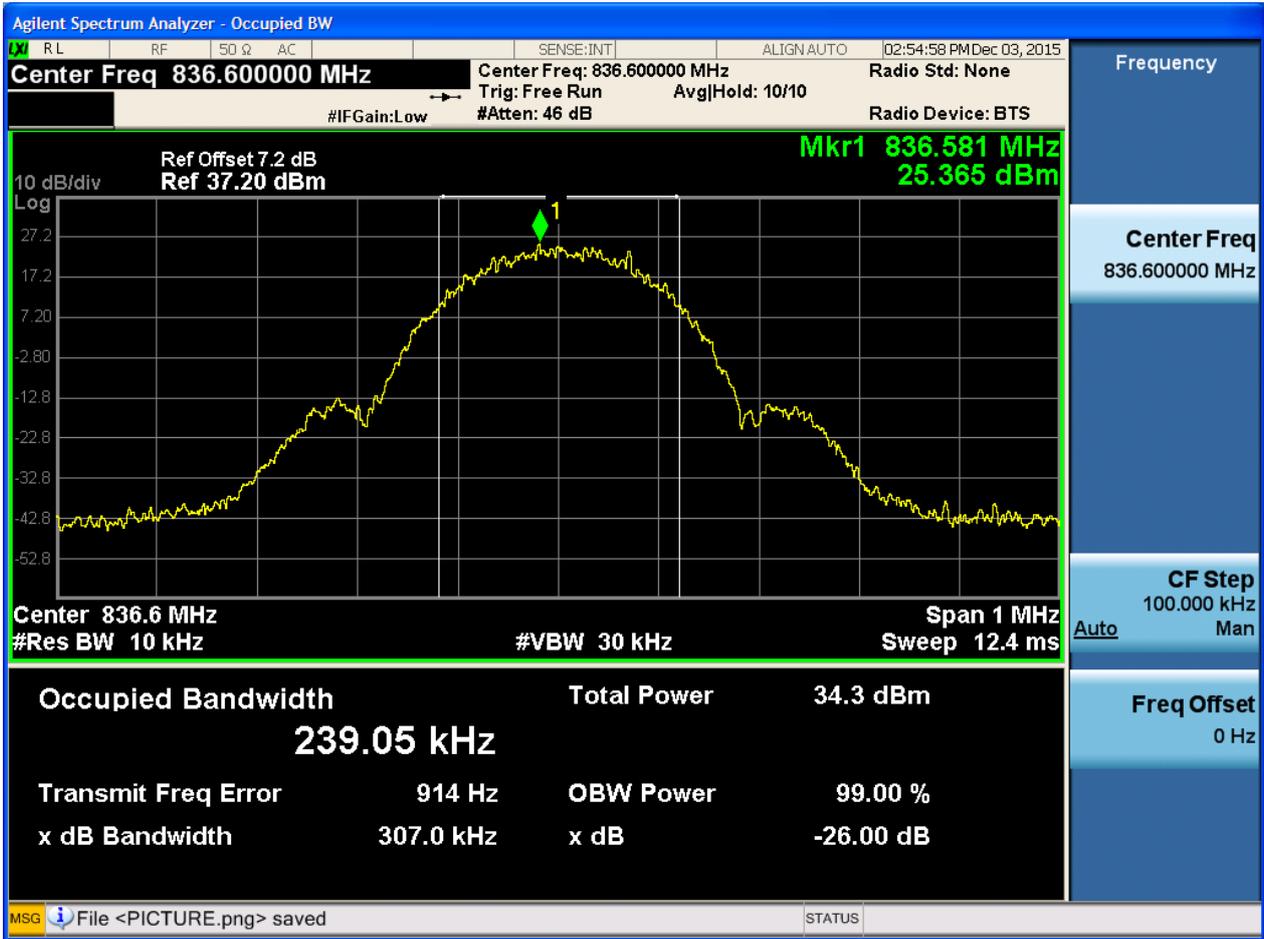
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



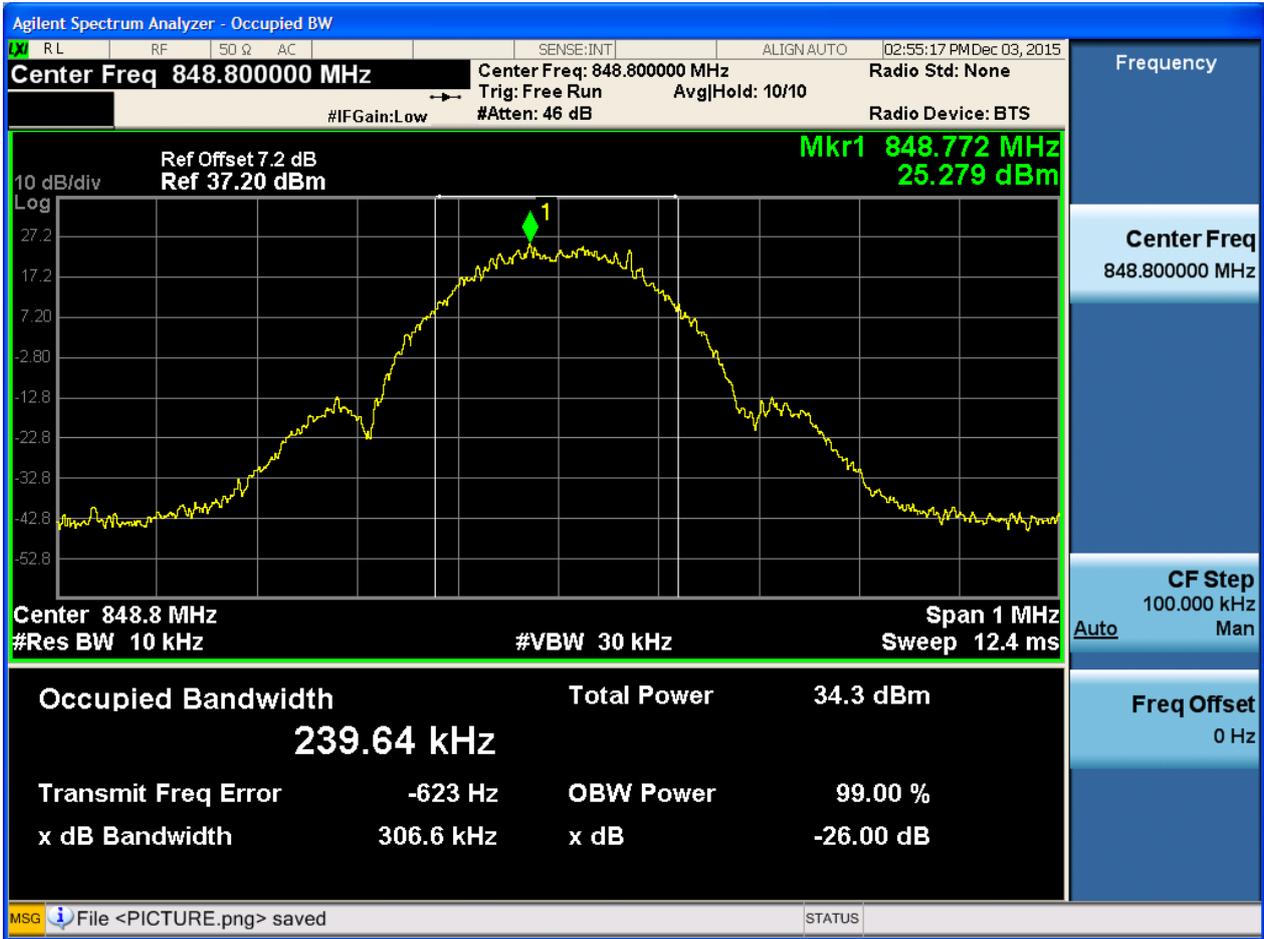


4.1.1.2.2 Test Channel = MCH





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



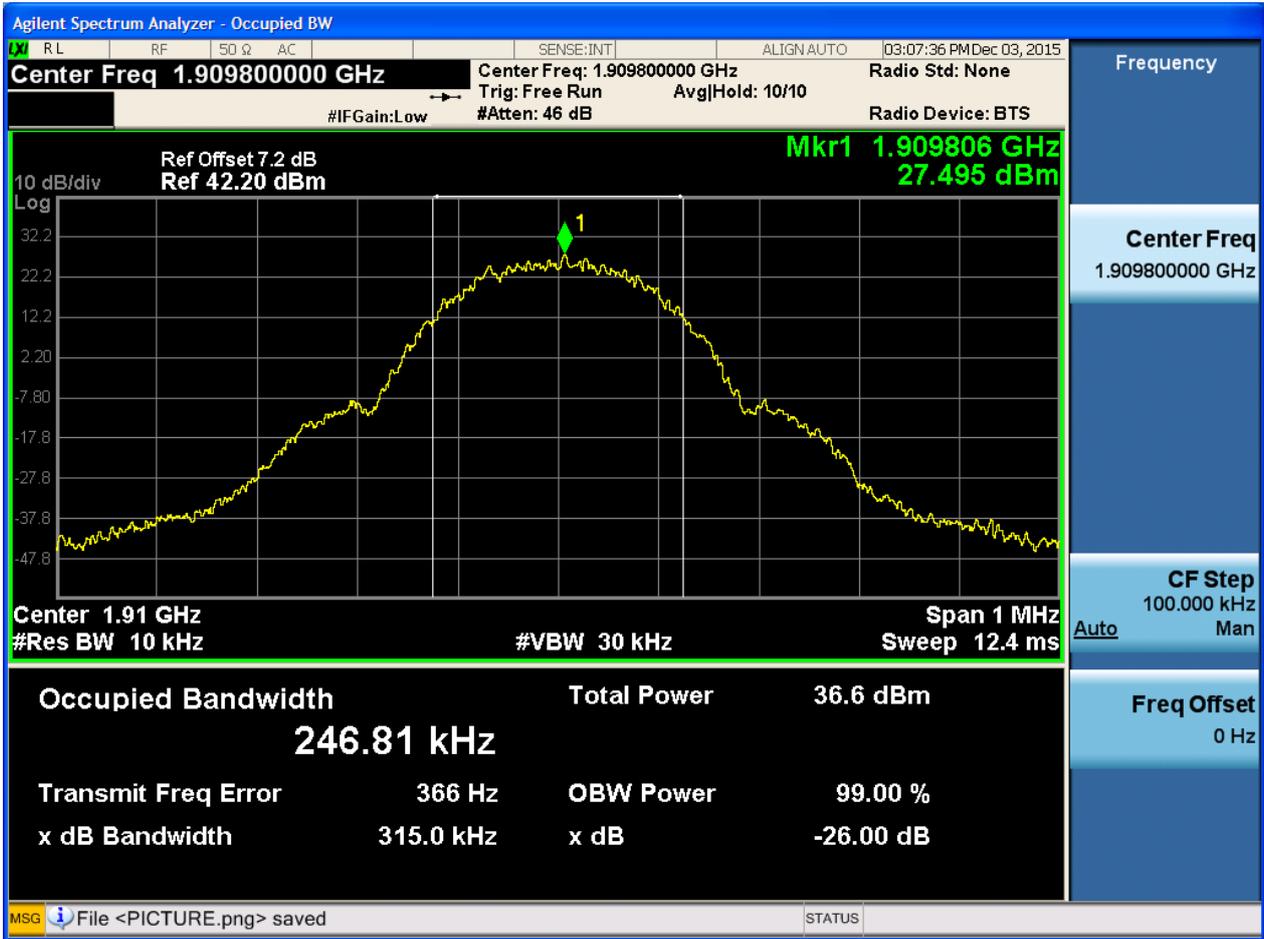


4.1.2.1.2 Test Channel = MCH





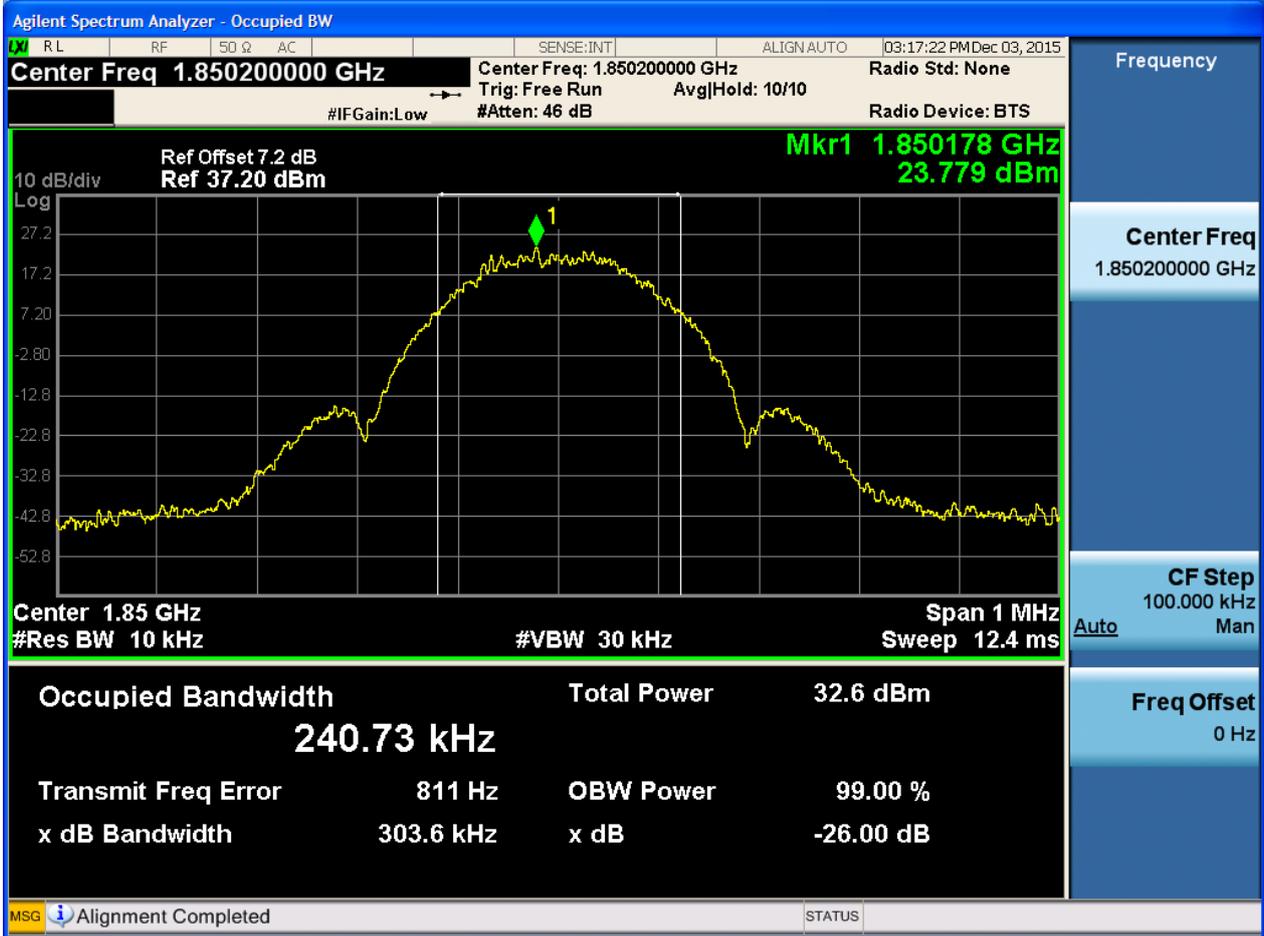
4.1.2.1.3 Test Channel = HCH





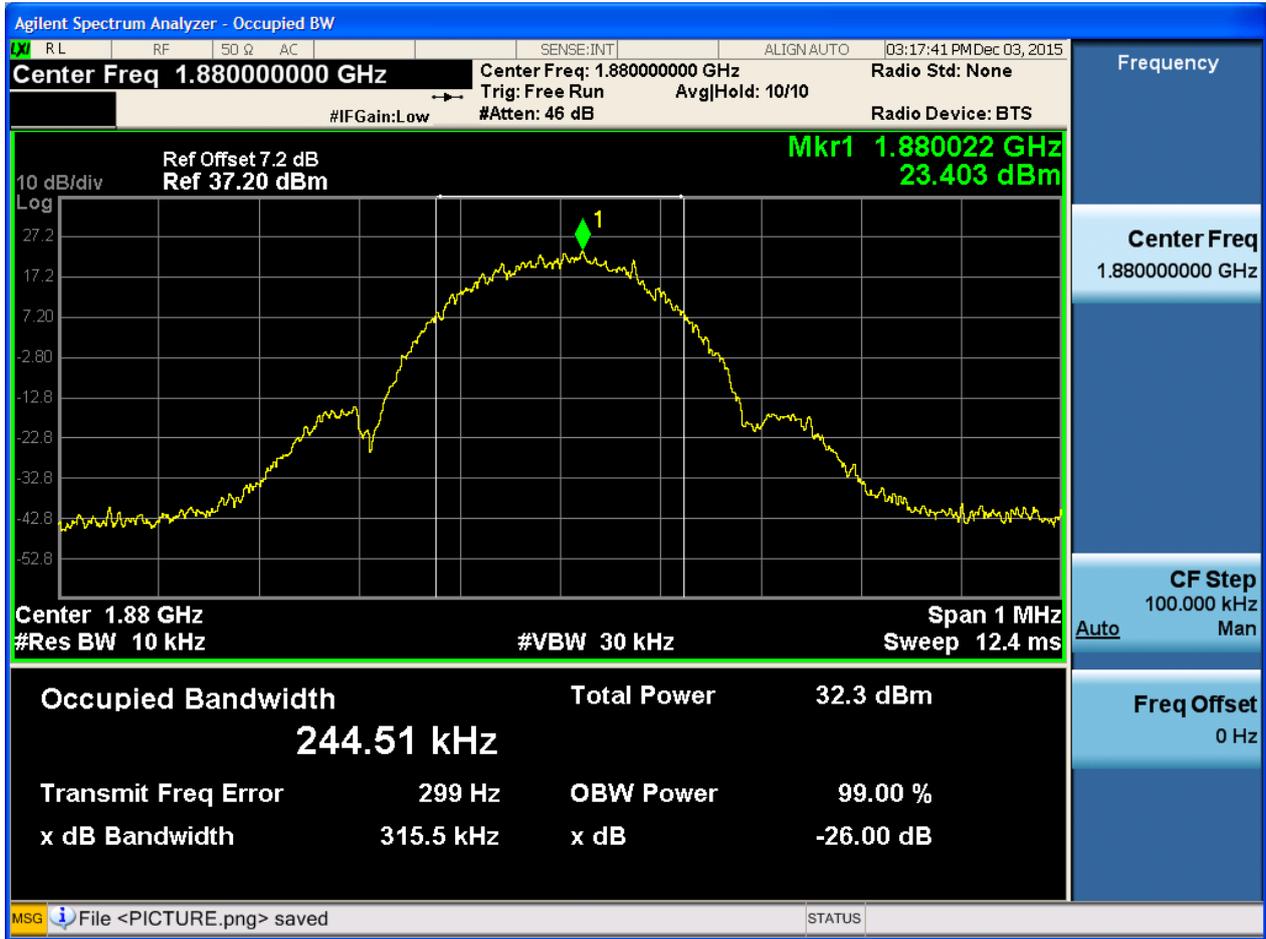
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



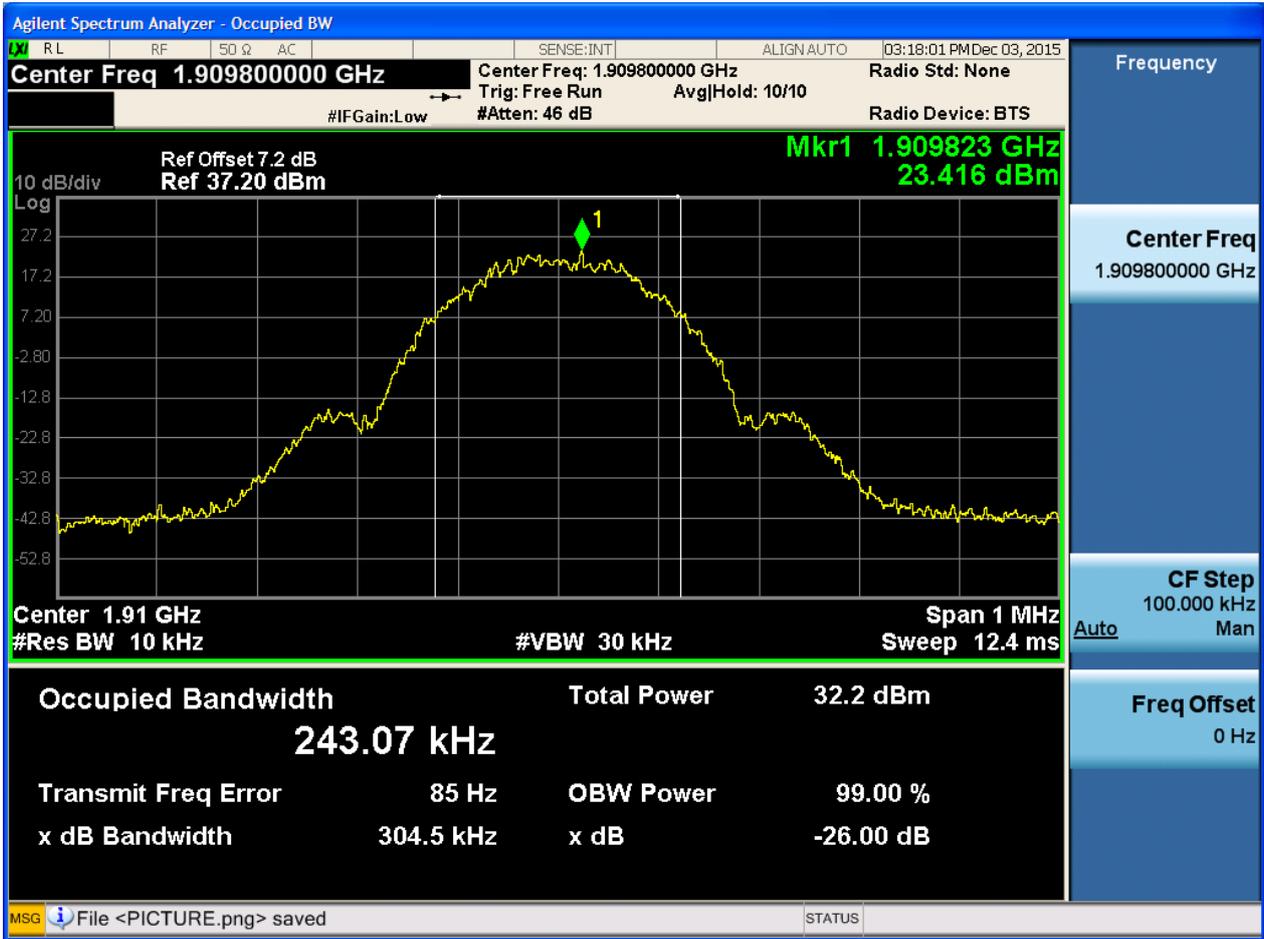


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





5Appendix_E: Band Edges Compliance

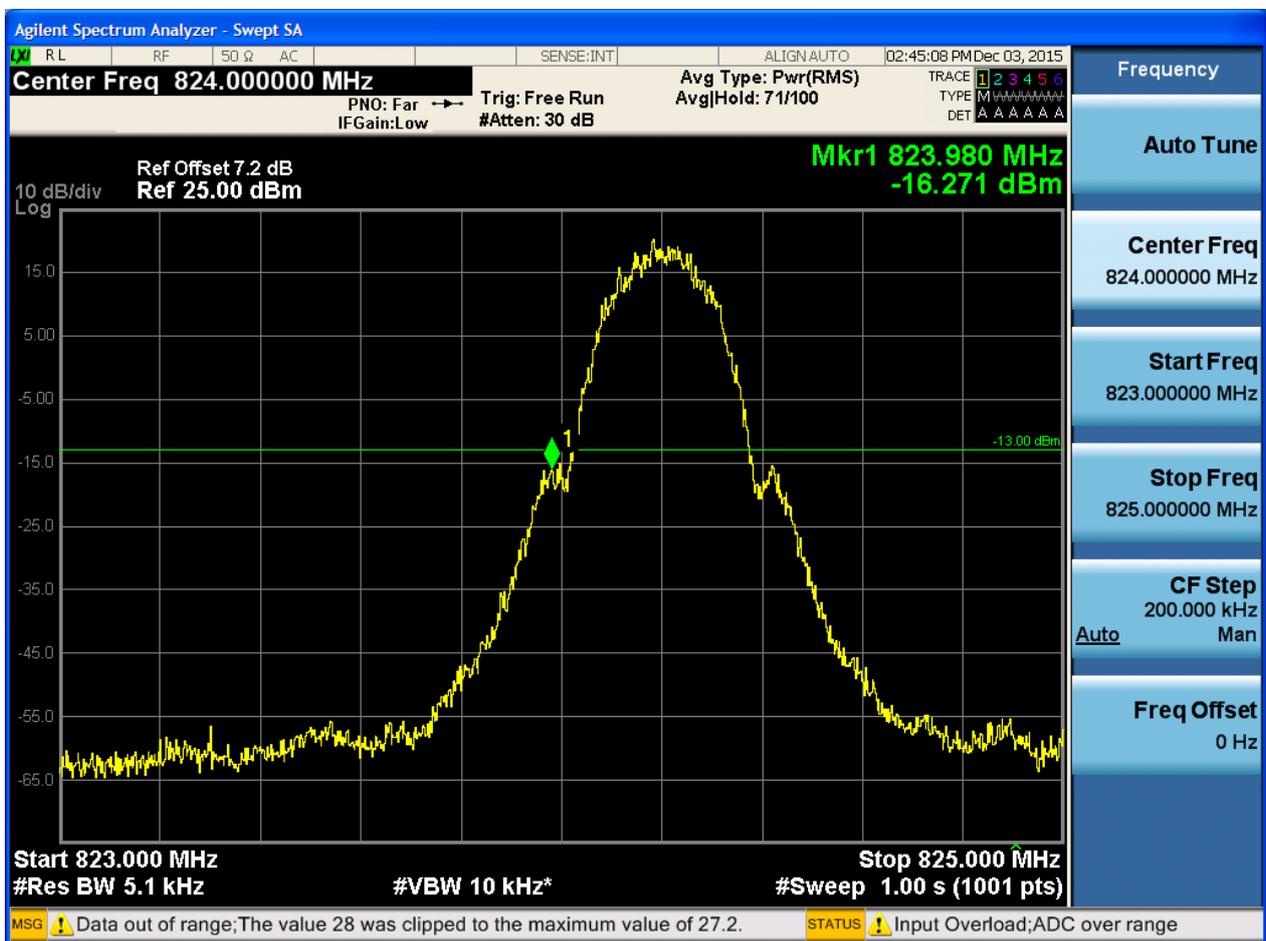
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM850

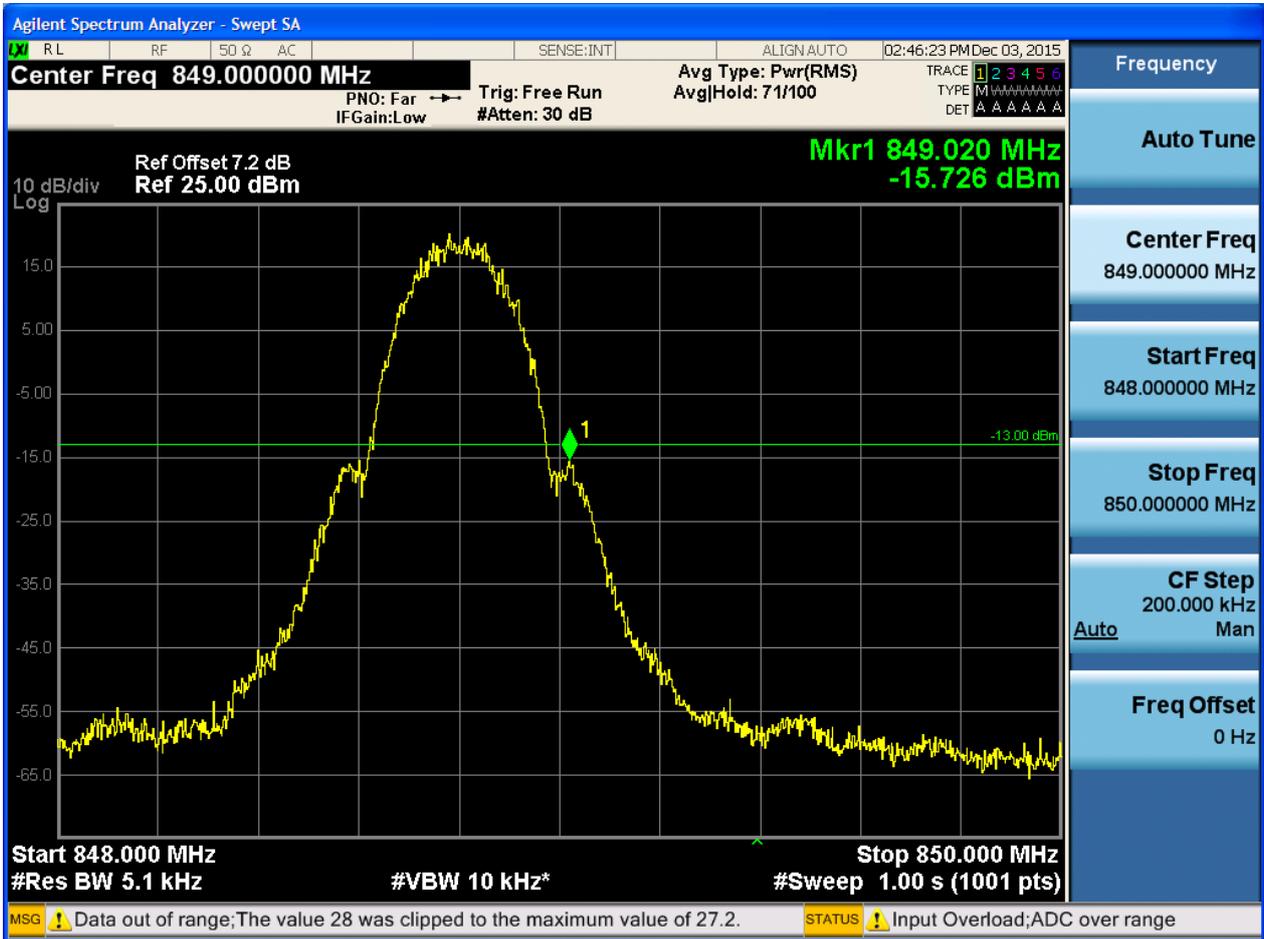
5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH





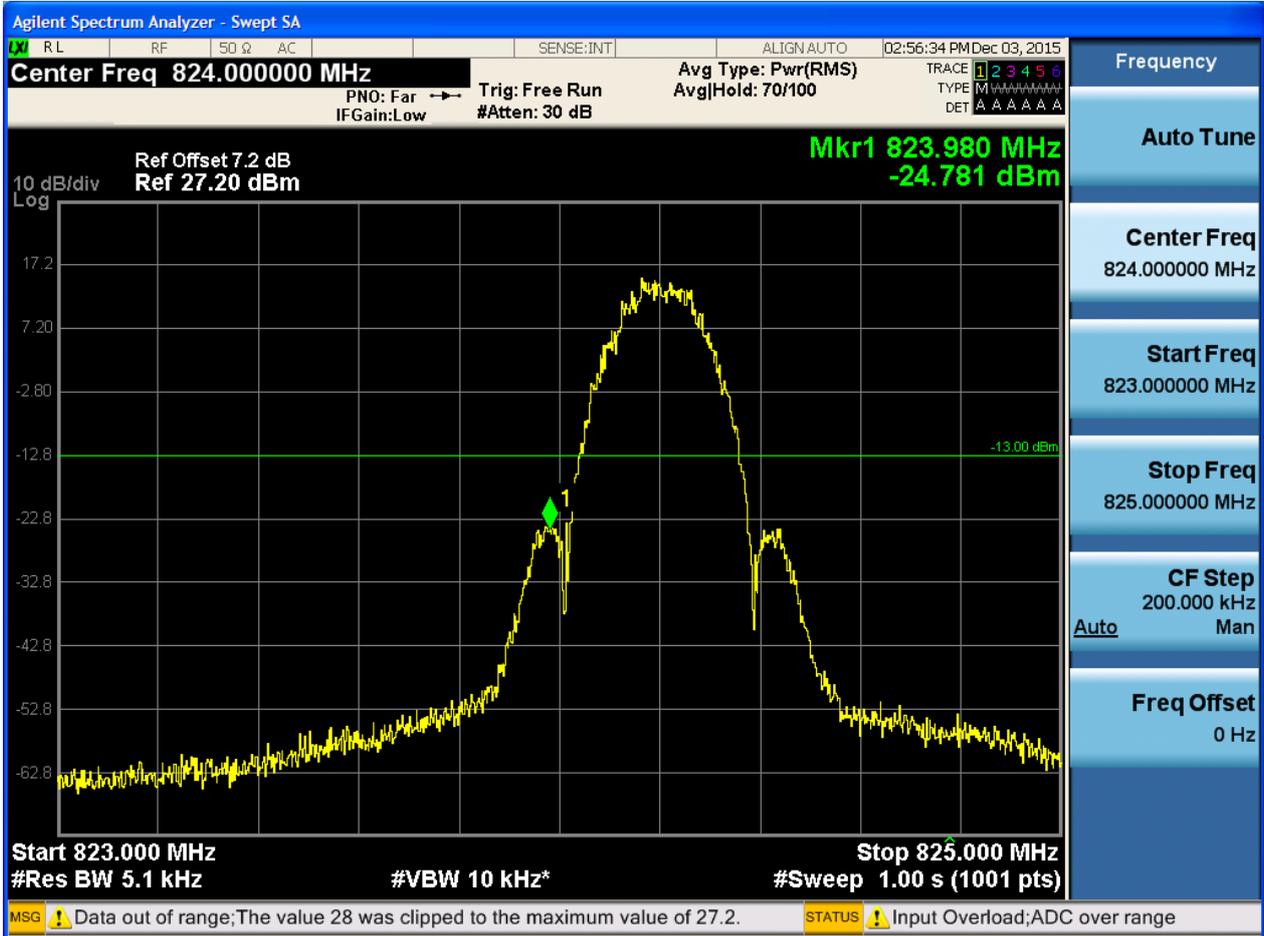
5.1.1.1.2 Test Channel = HCH





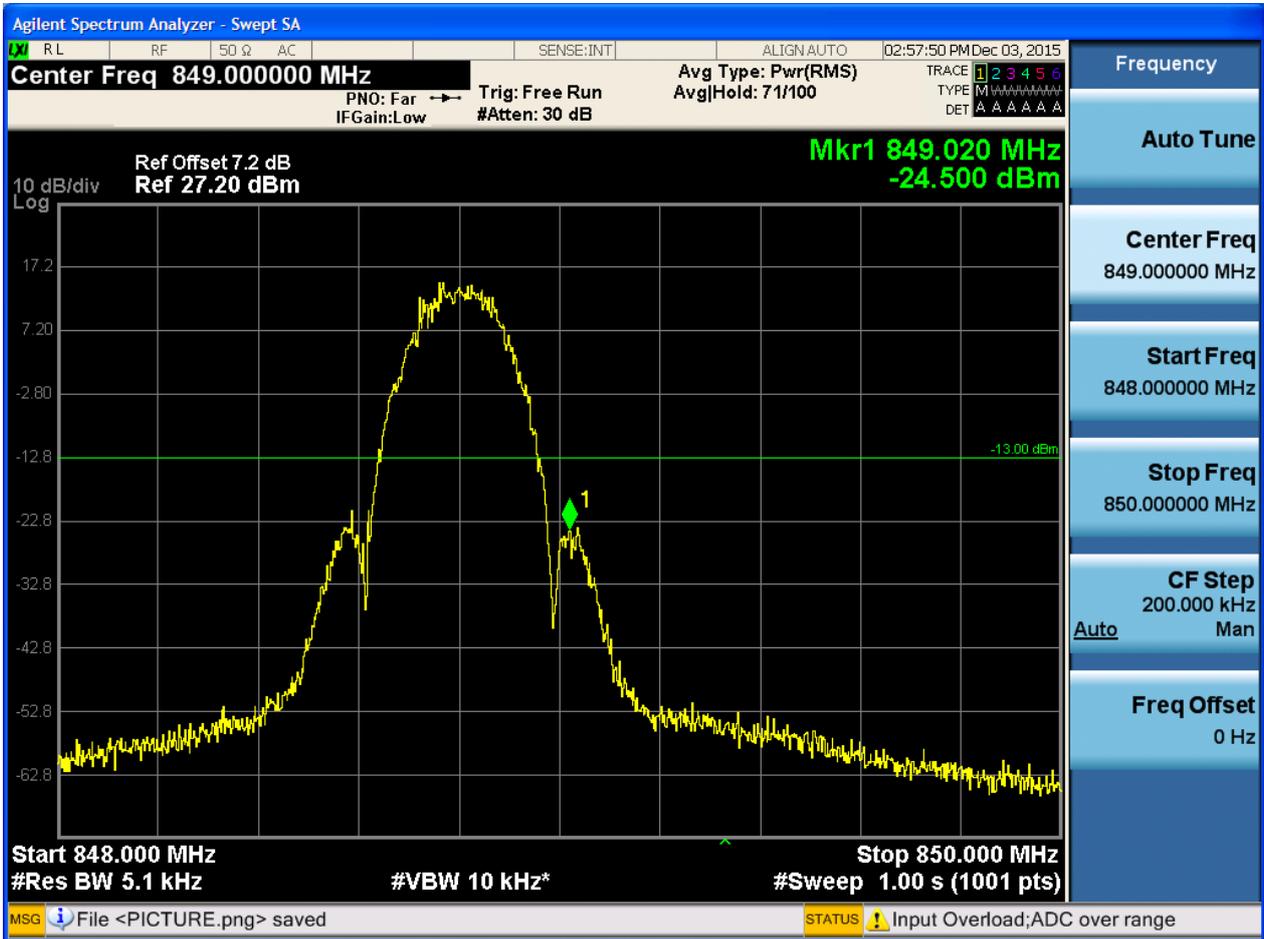
5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH





5.1.1.2.2 Test Channel = HCH

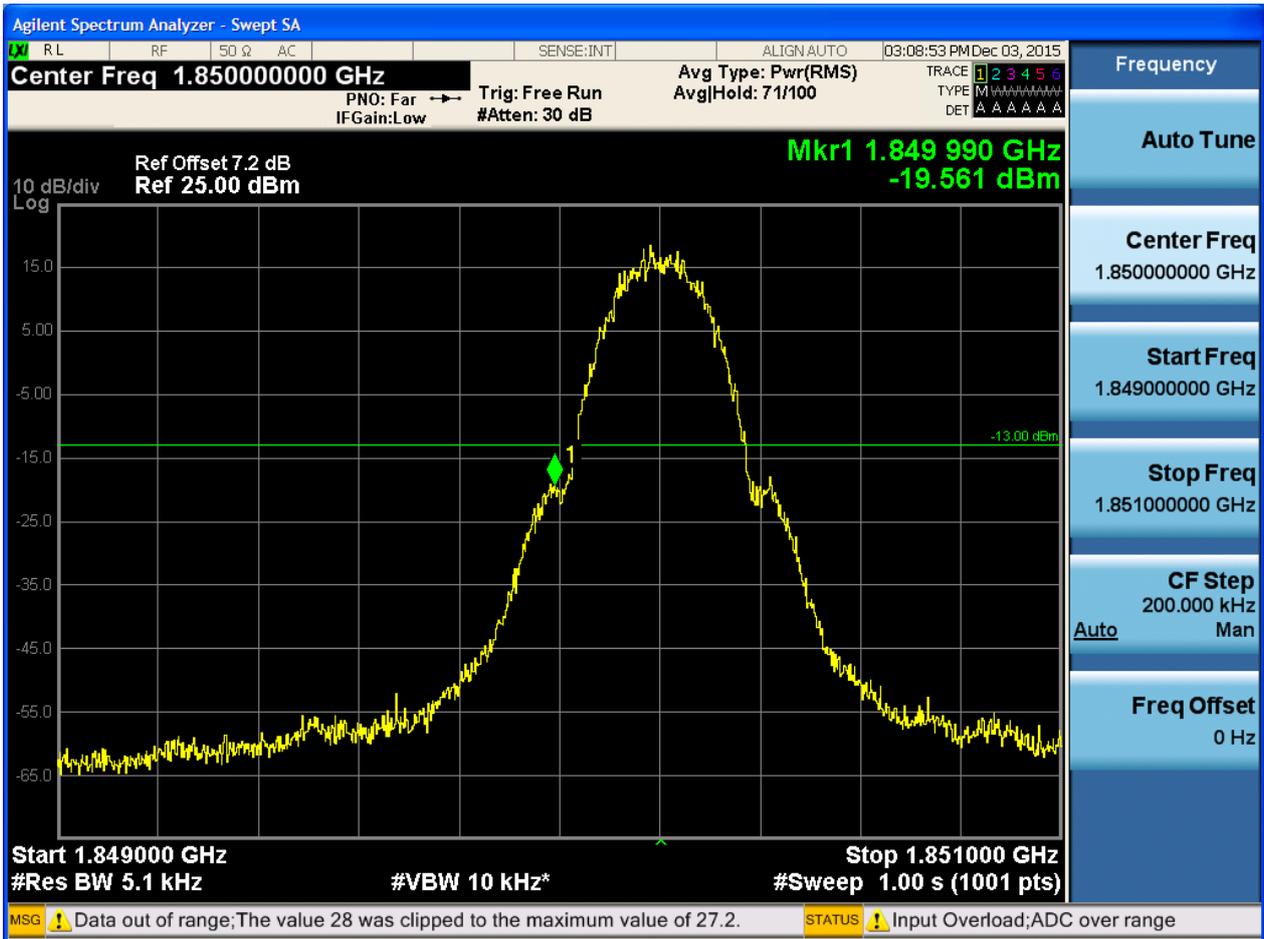




5.1.2 Test Band = GSM1900

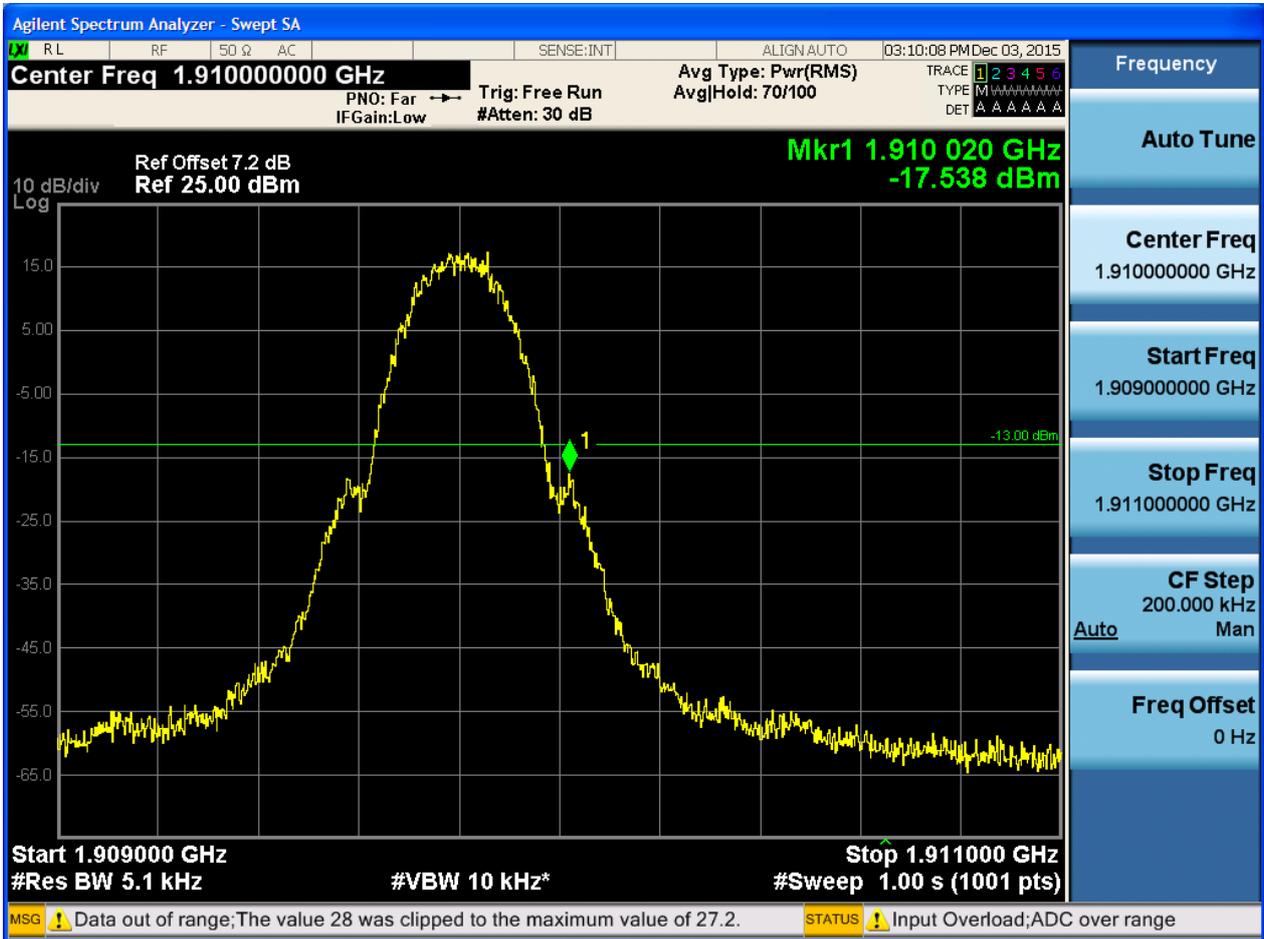
5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH





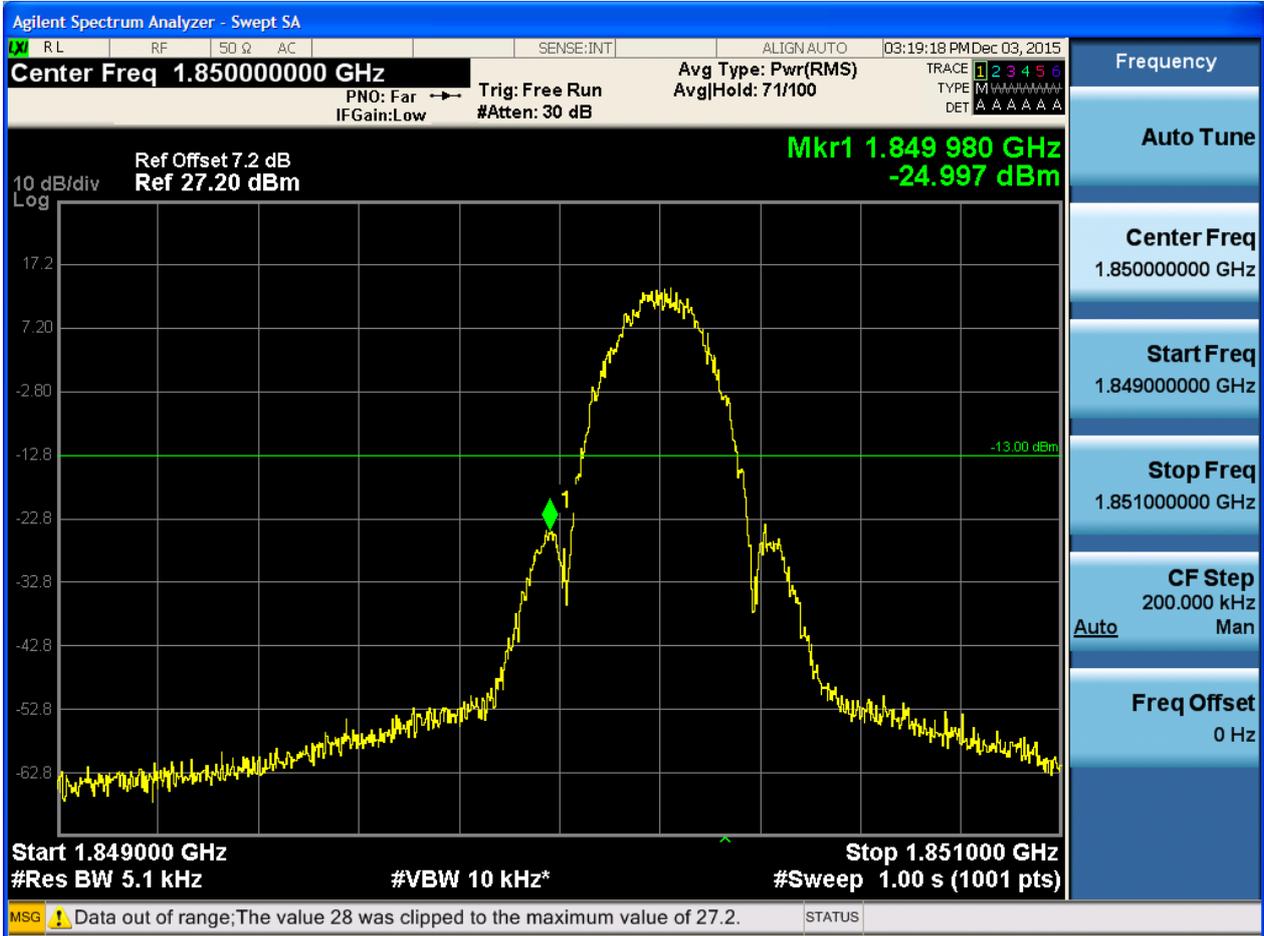
5.1.2.1.2 Test Channel = HCH



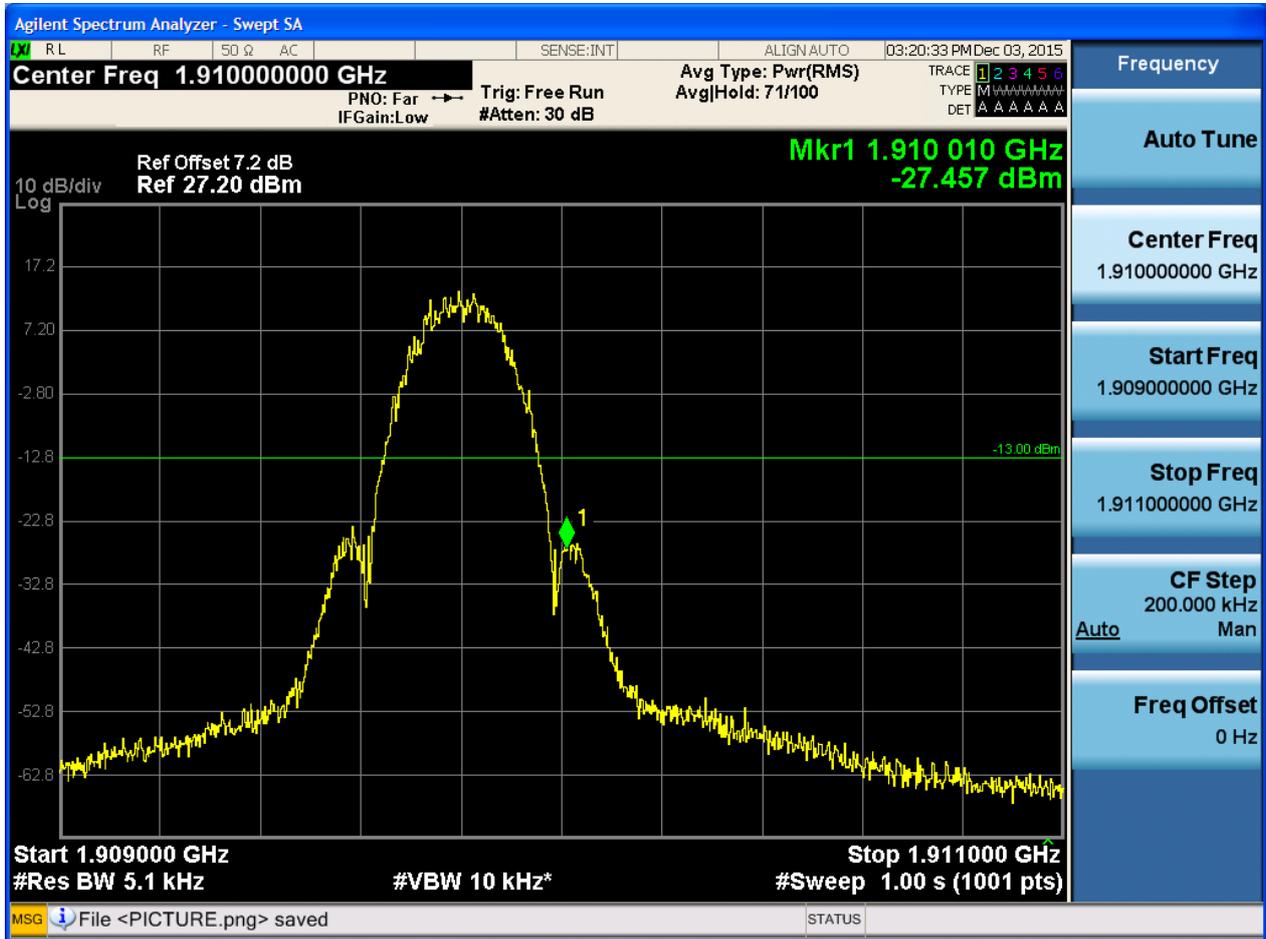


5.1.2.2 Test Mode = GSM/TM2

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.

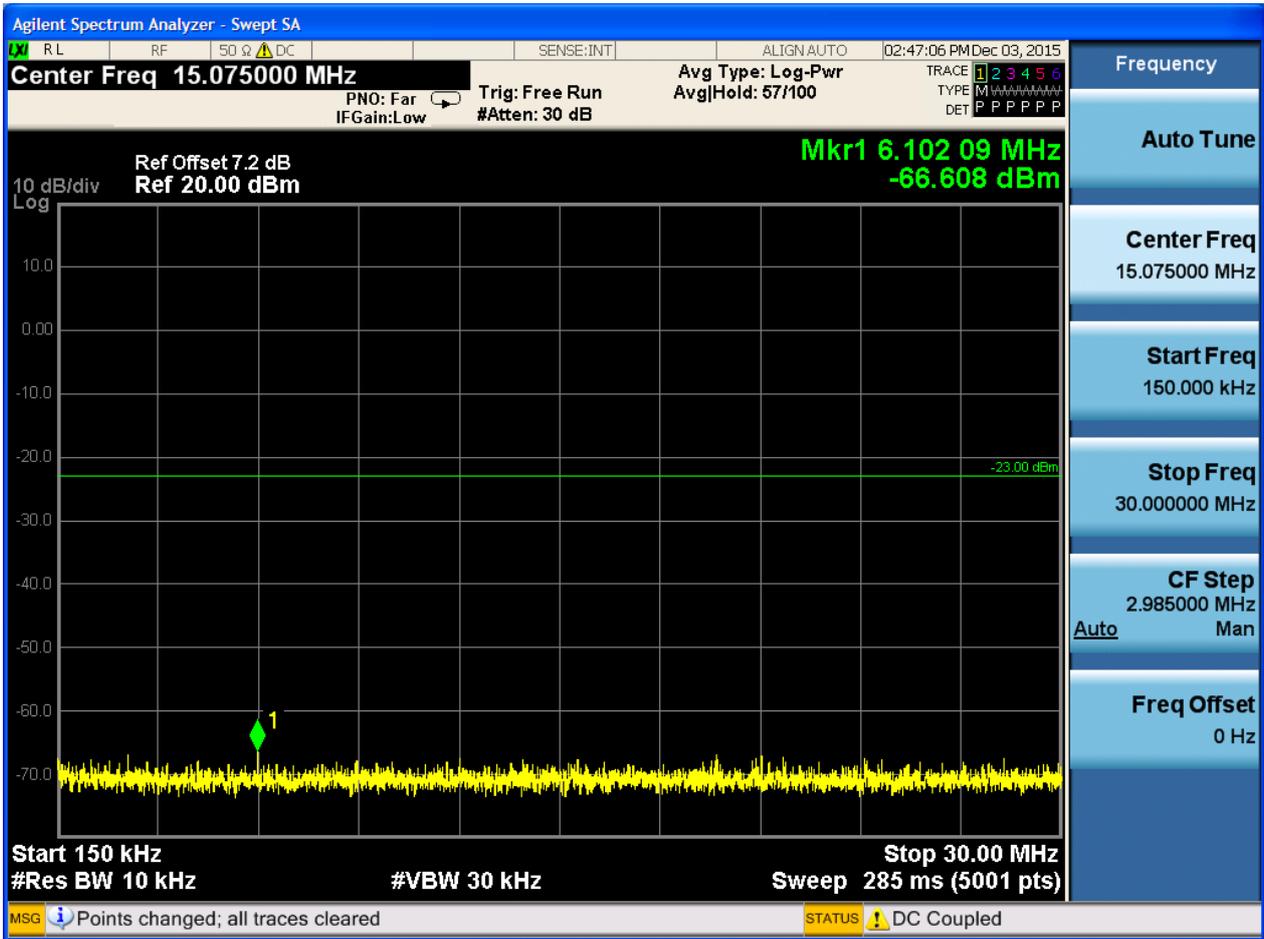
Part I - Test Plots

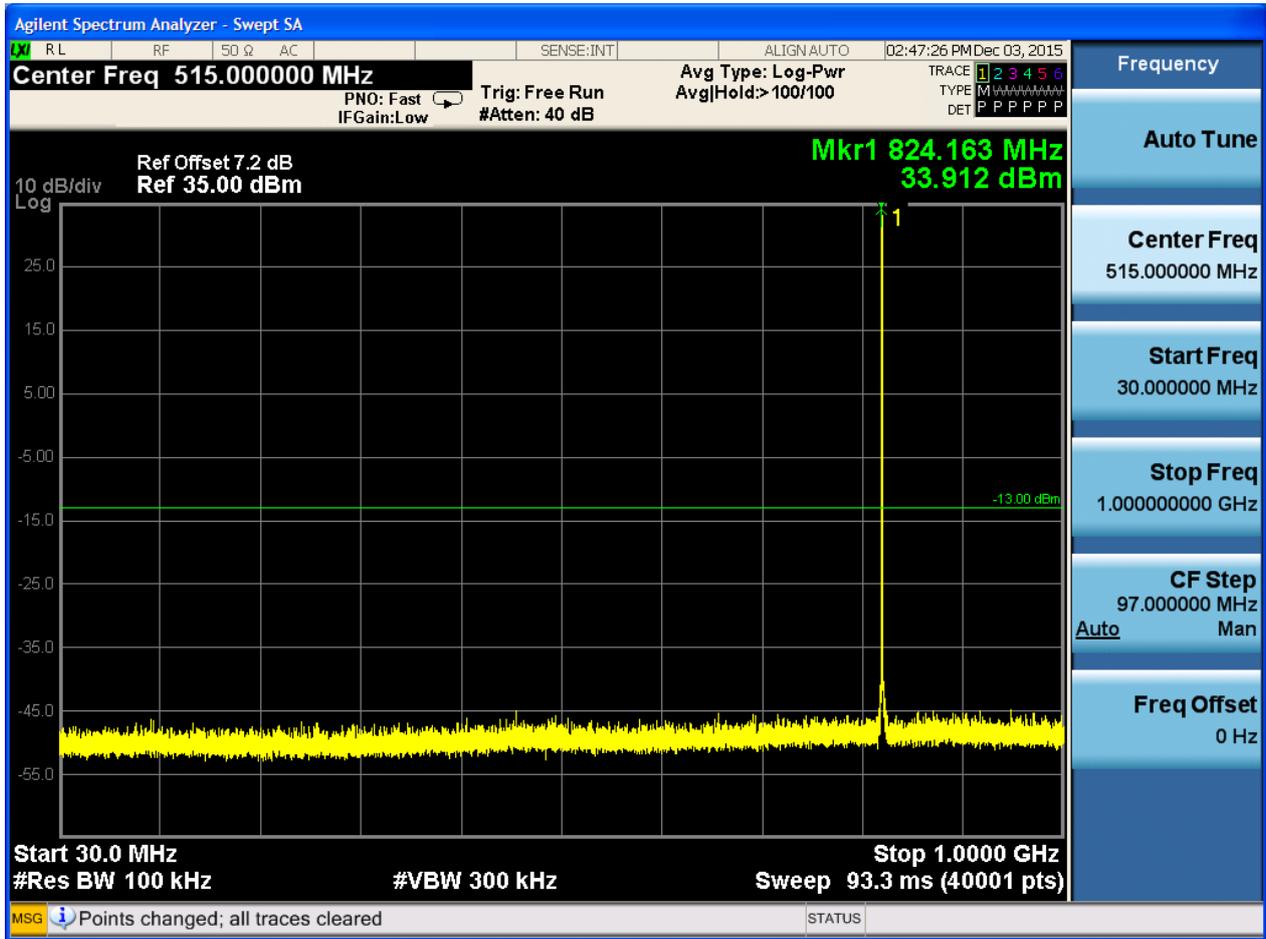
6.1 For GSM

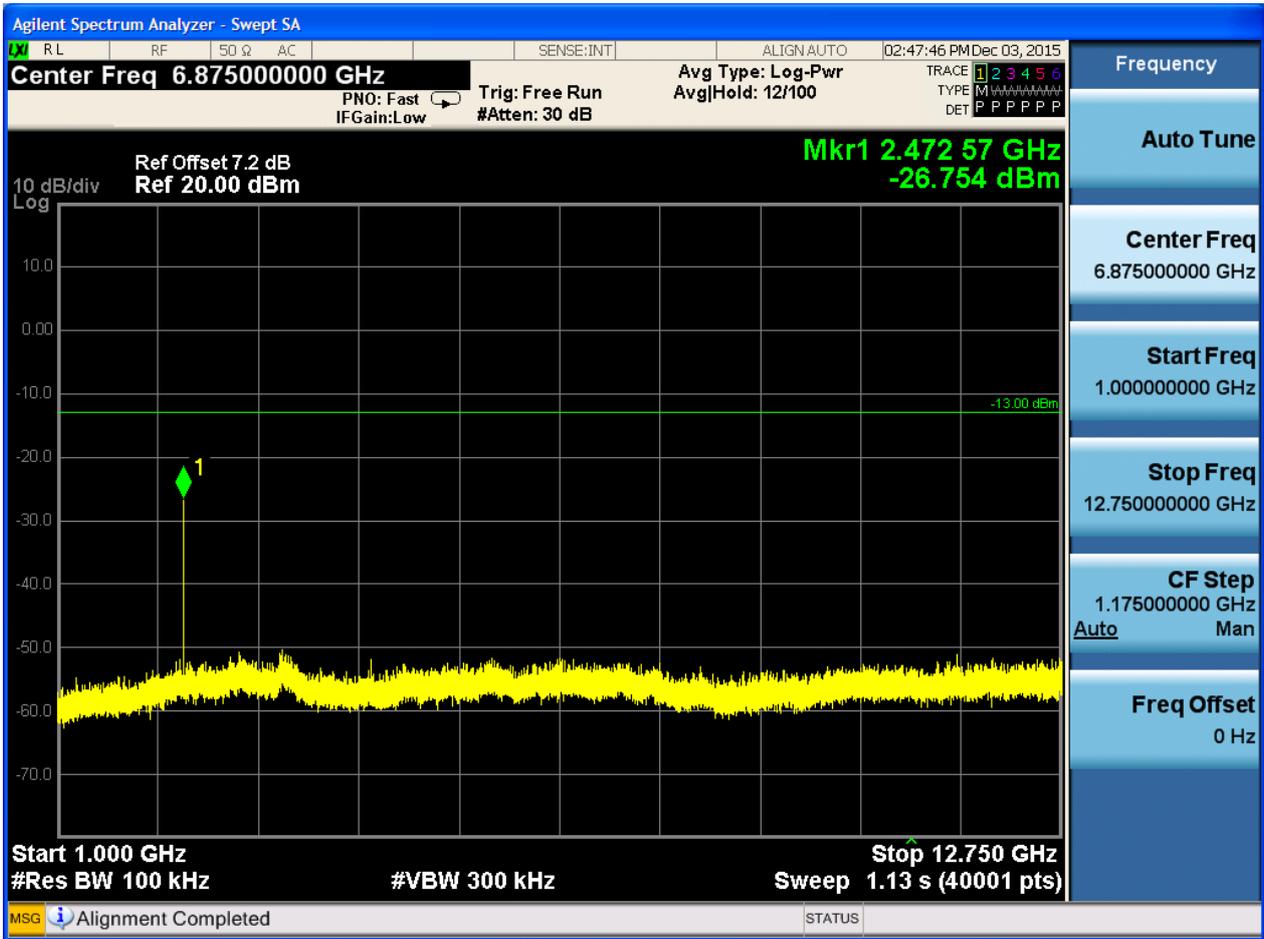
6.1.1 Test Band = GSM850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH



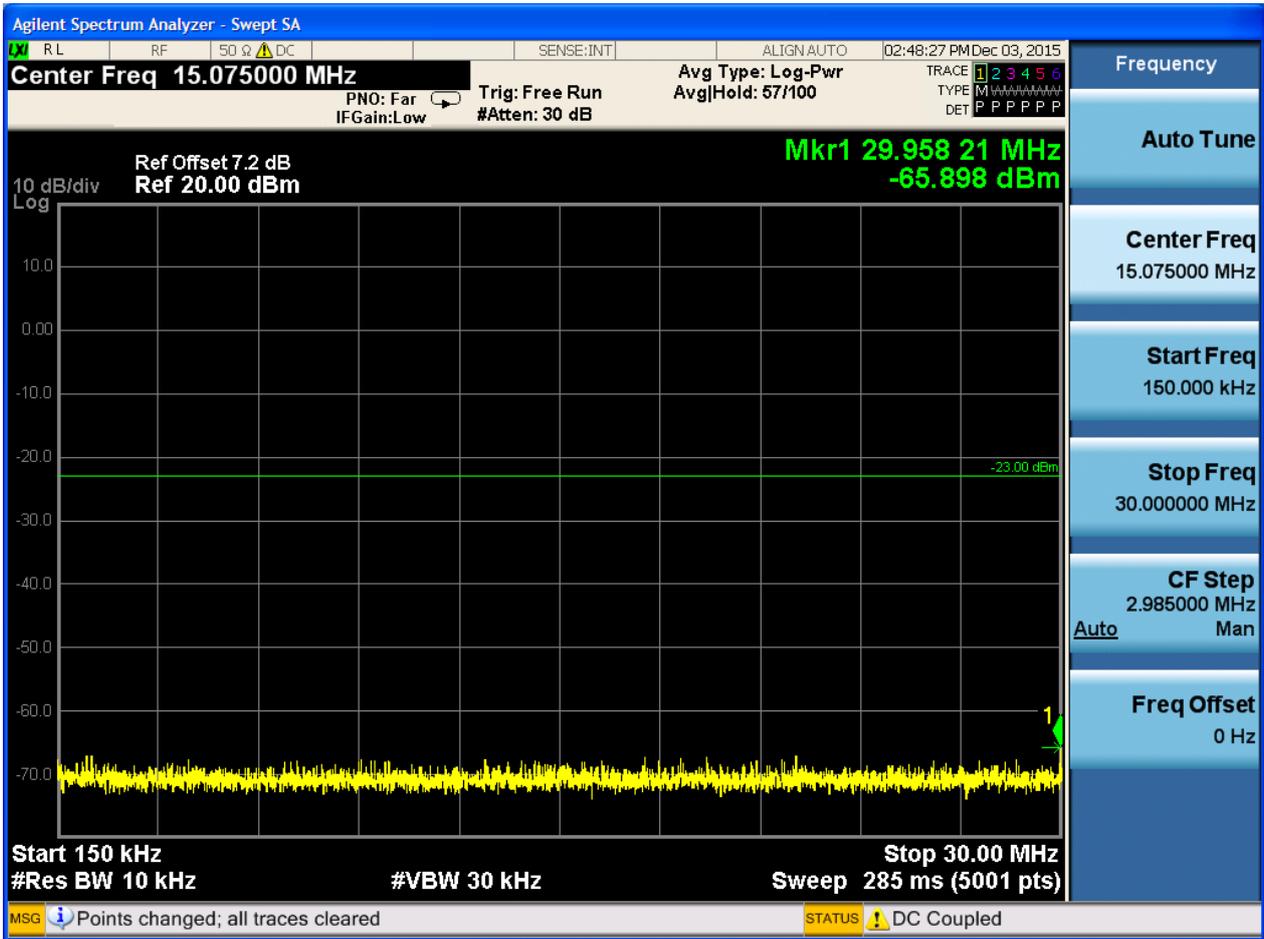


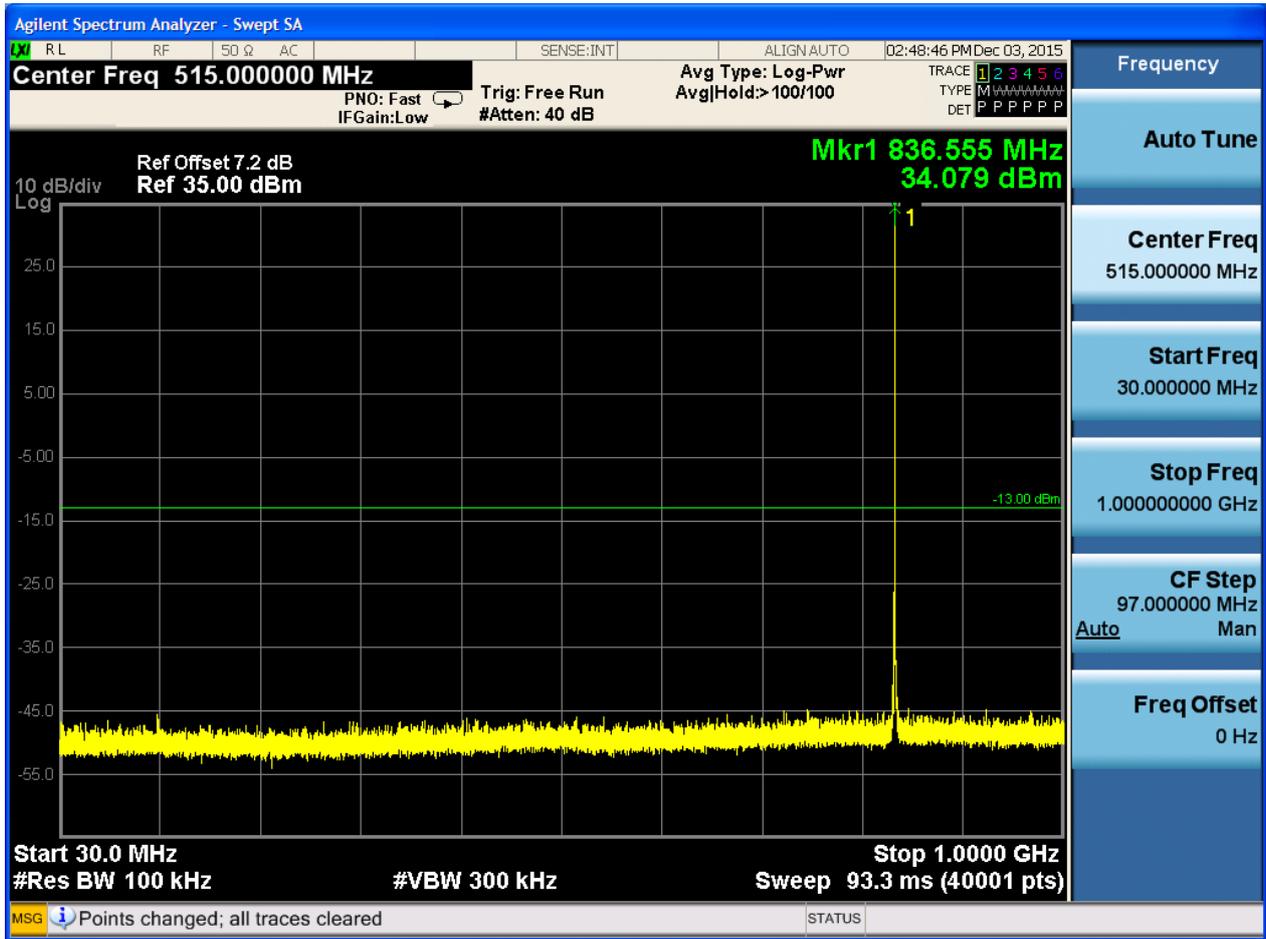


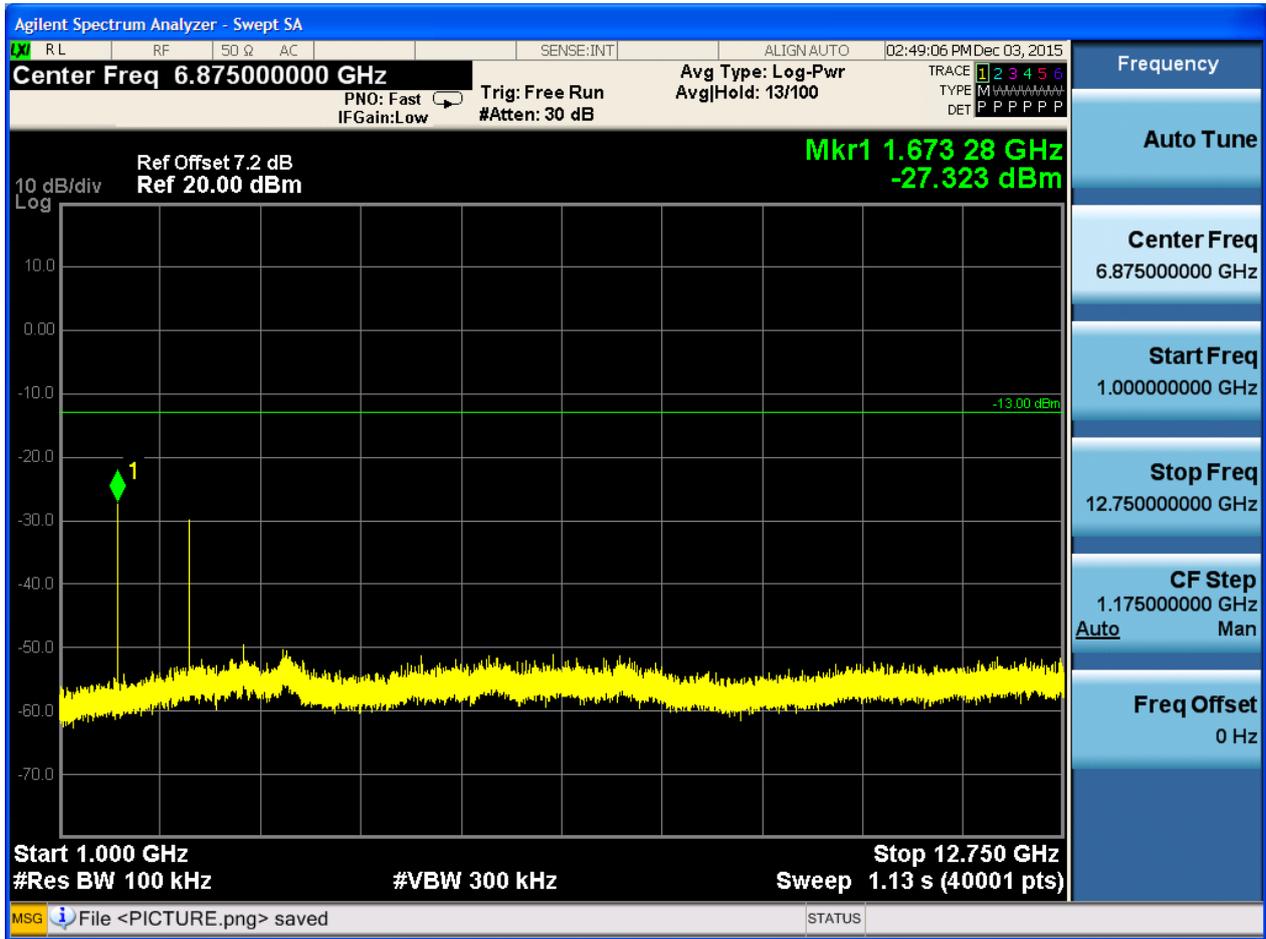


6.1.1.1.2 Test Channel = MCH



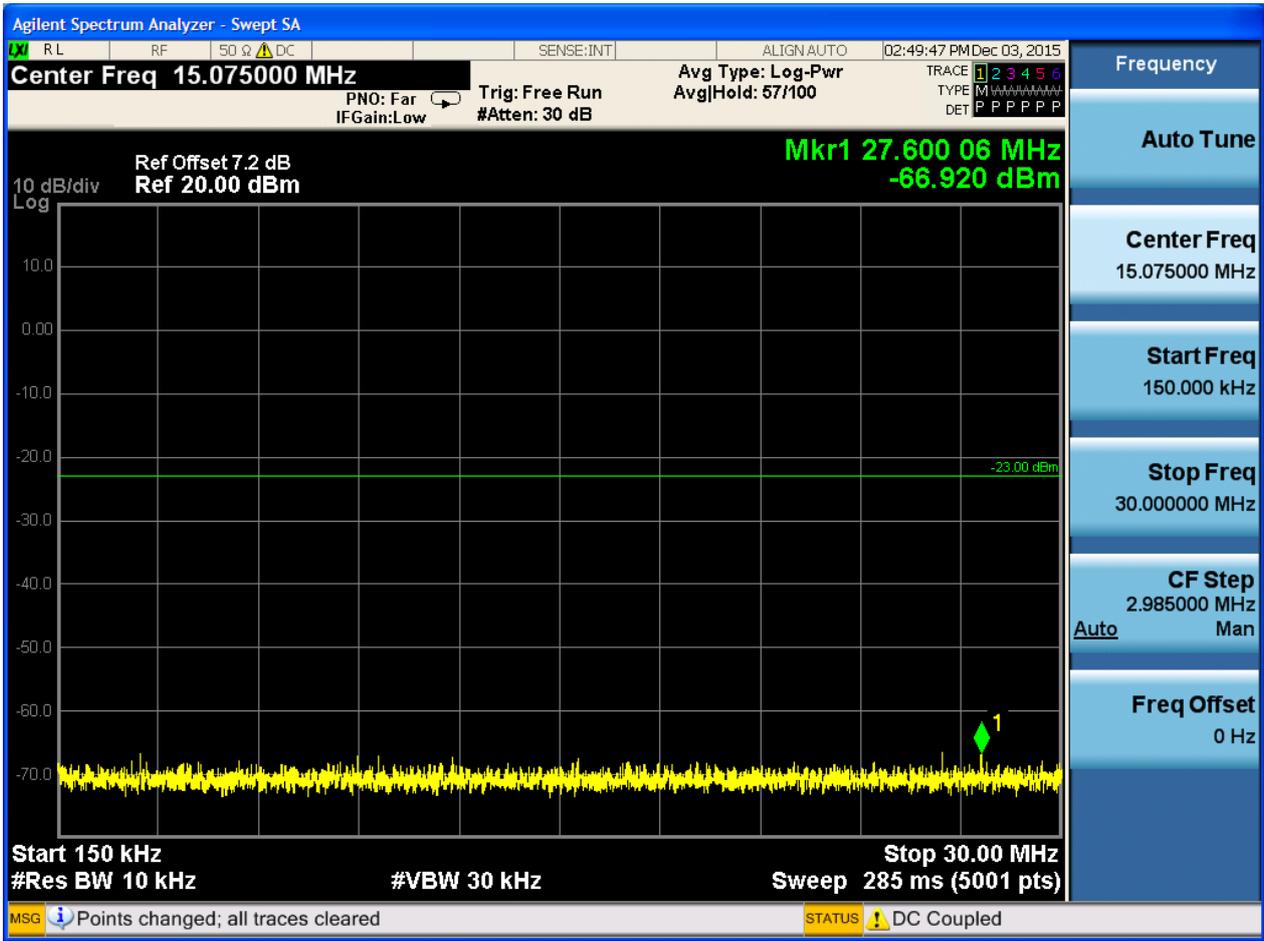


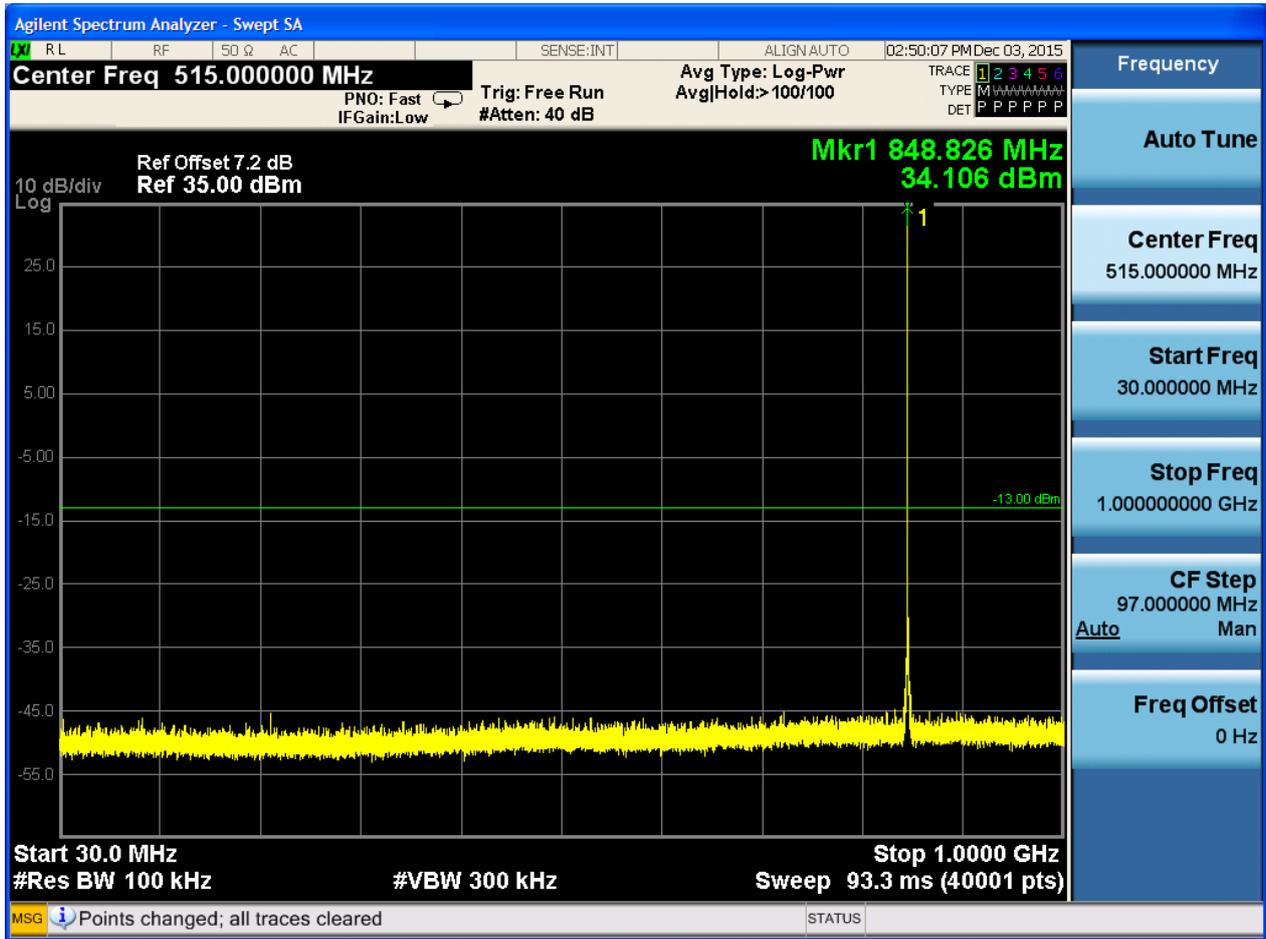


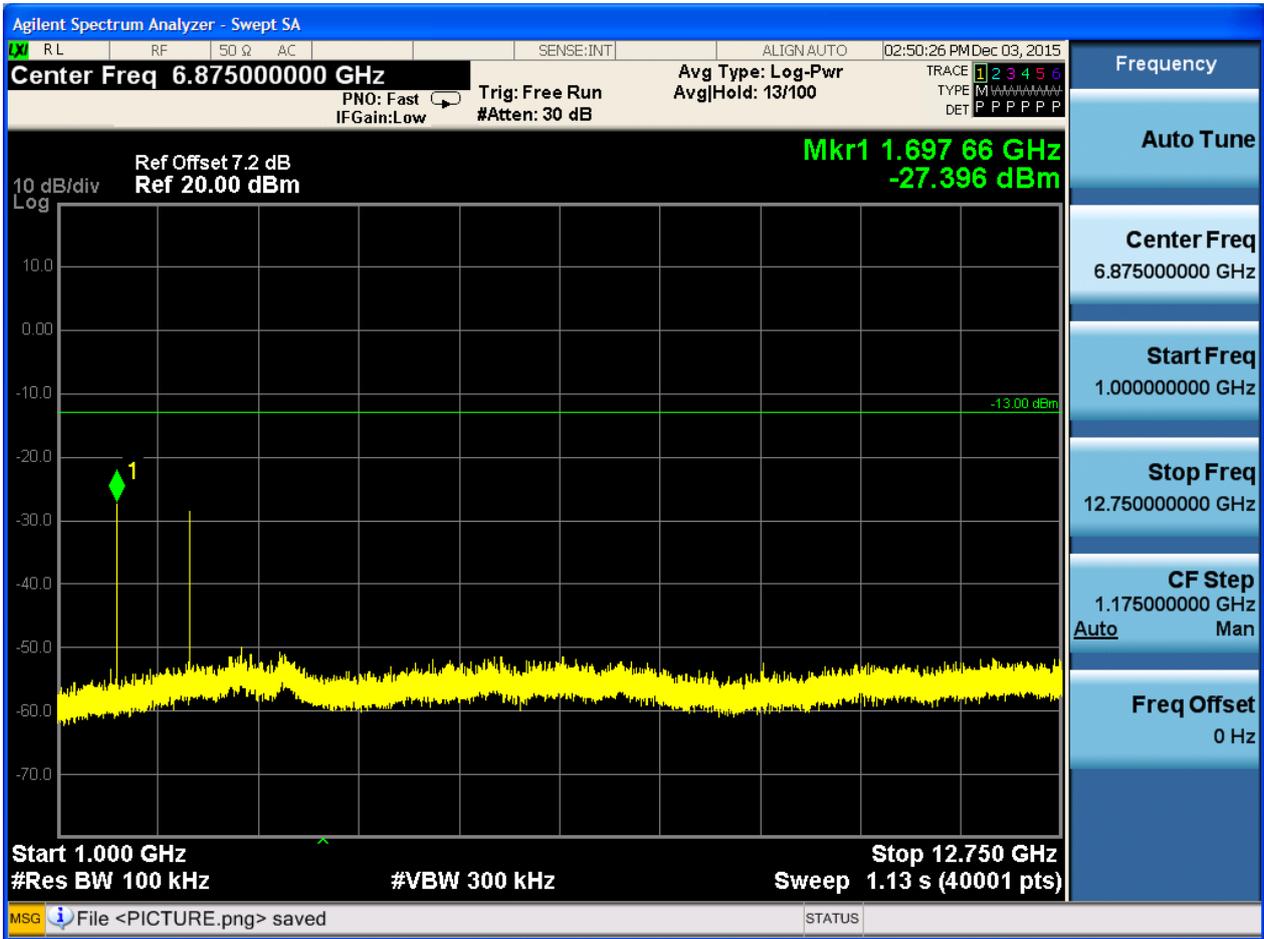


6.1.1.1.3 Test Channel = HCH





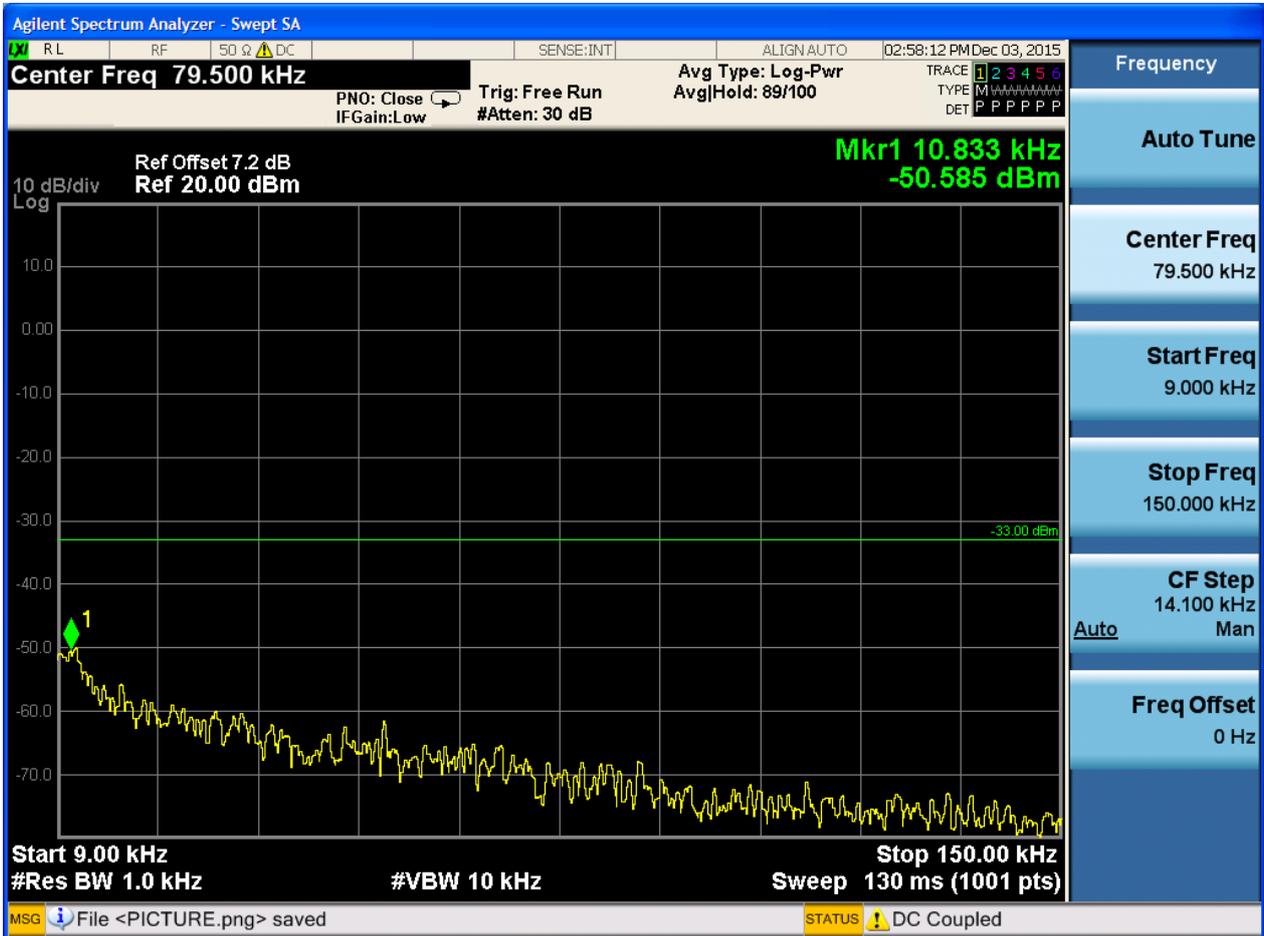


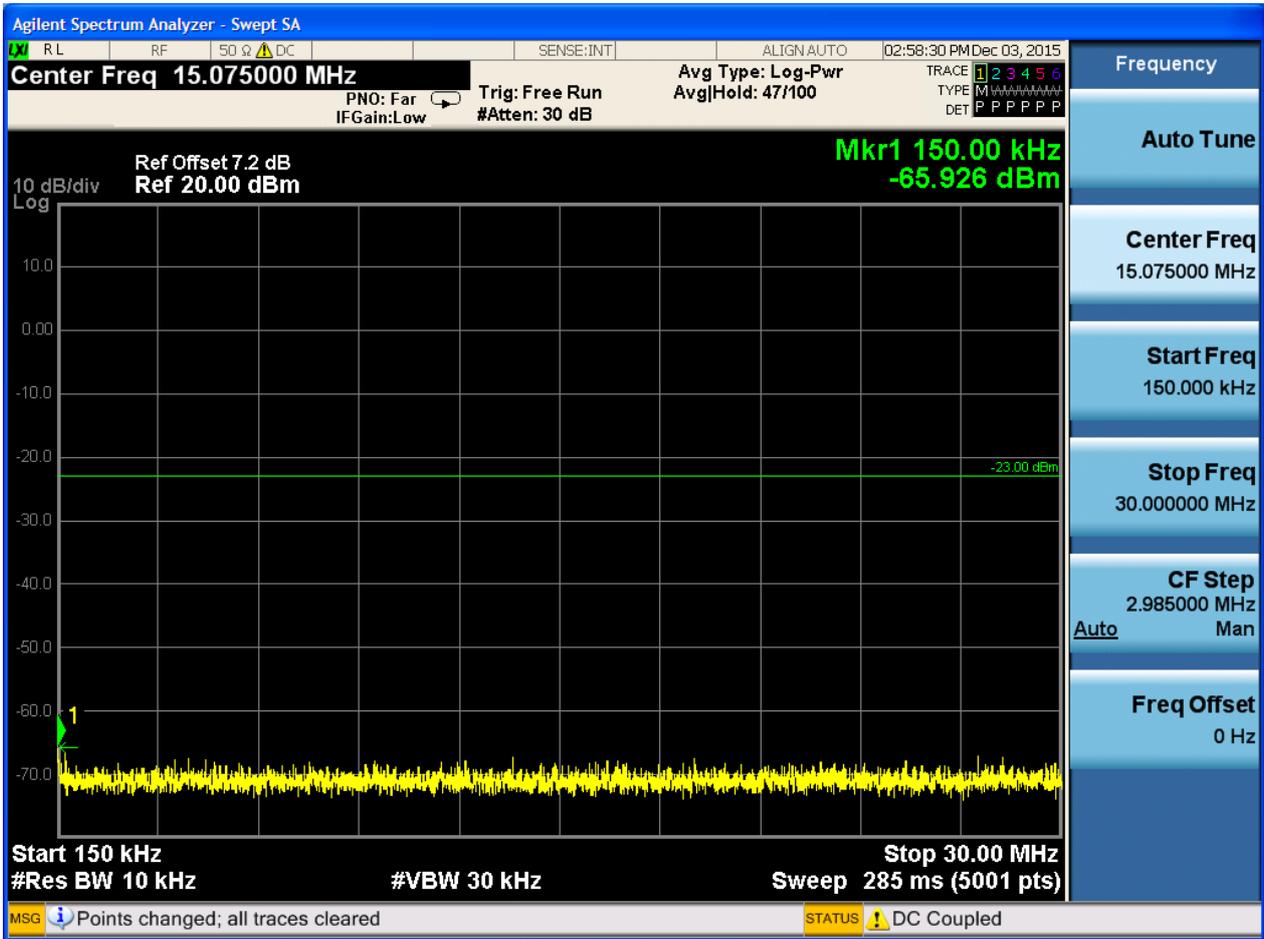


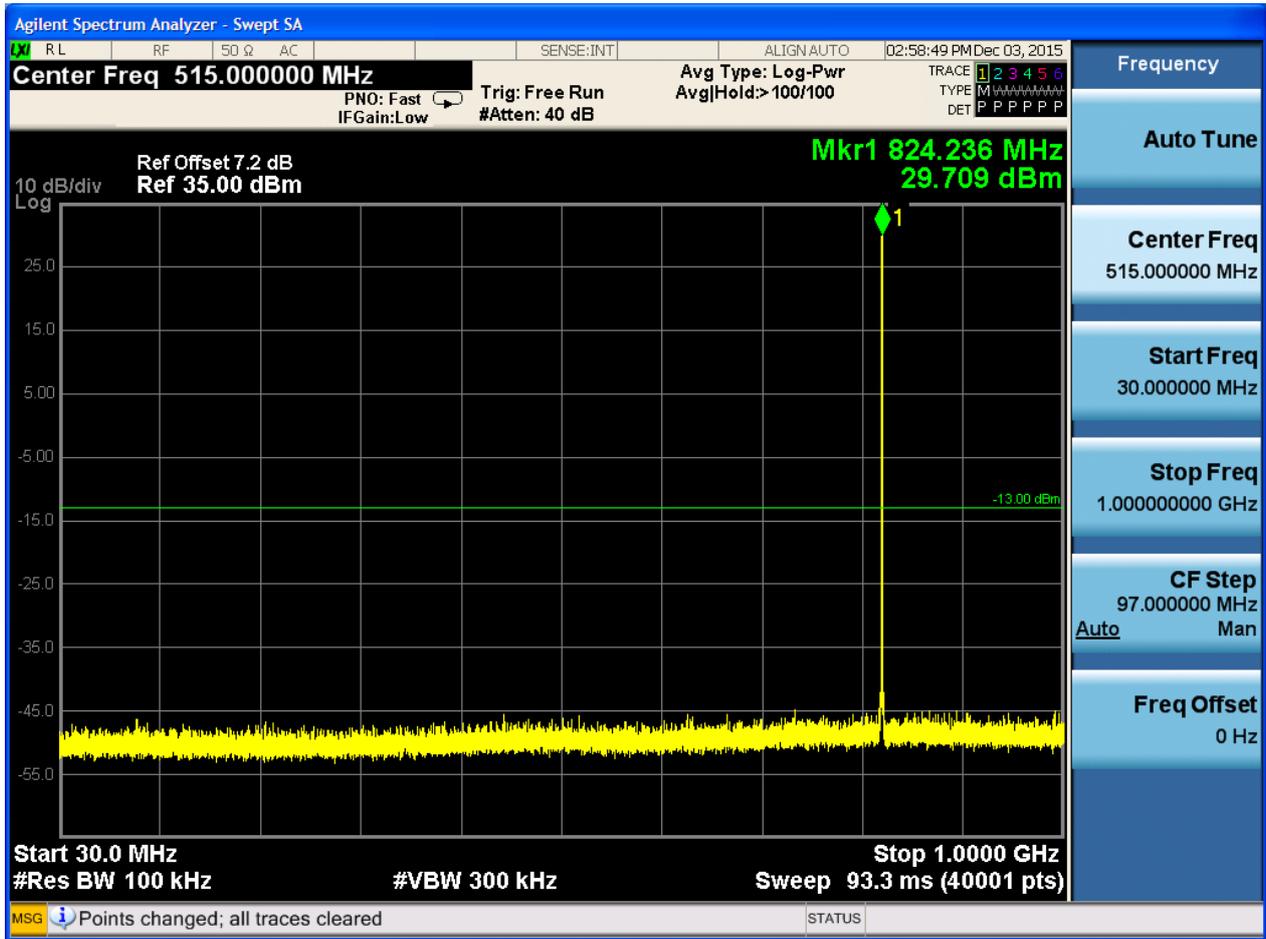


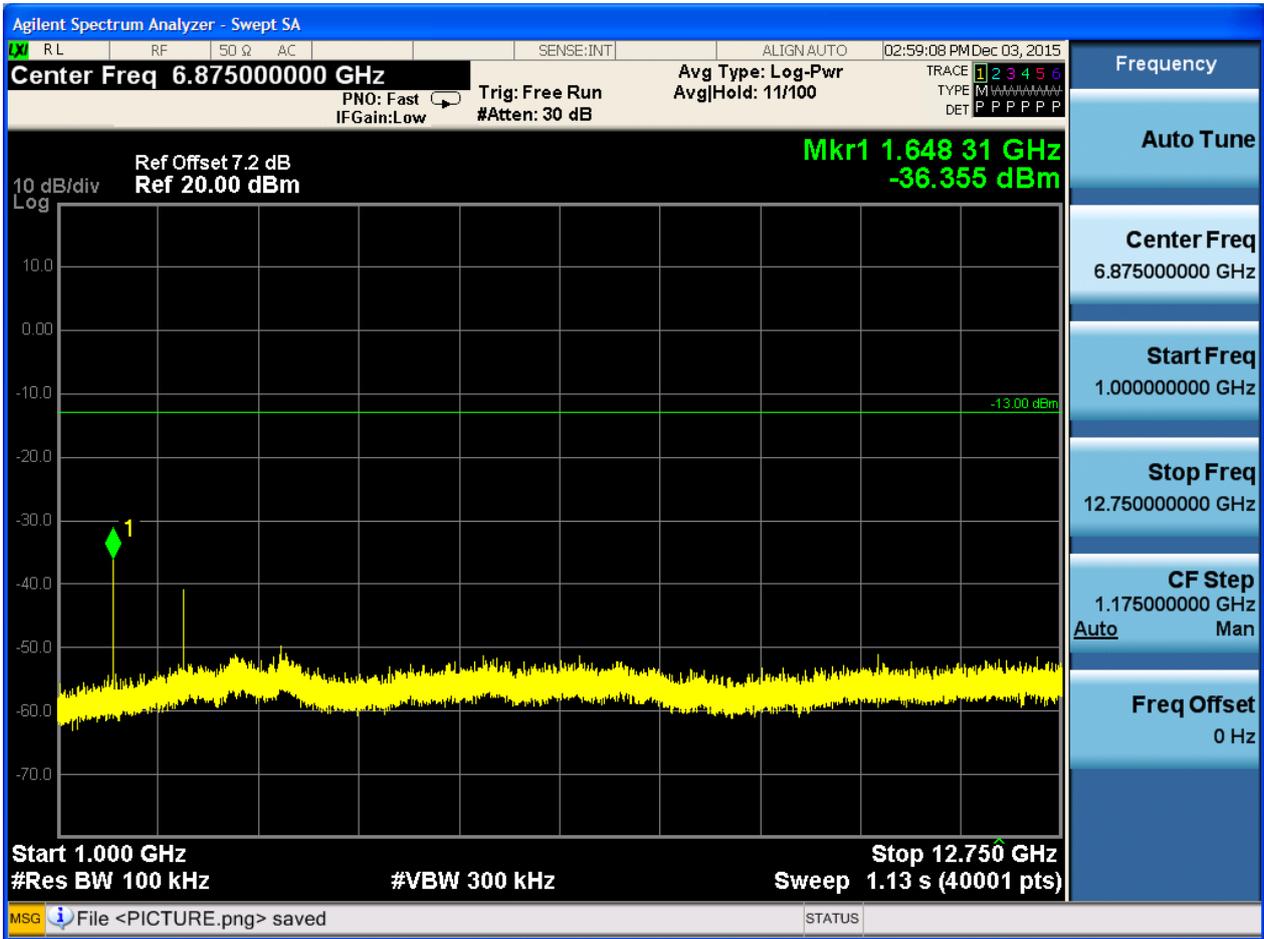
6.1.1.2 Test Mode = GSM/TM2

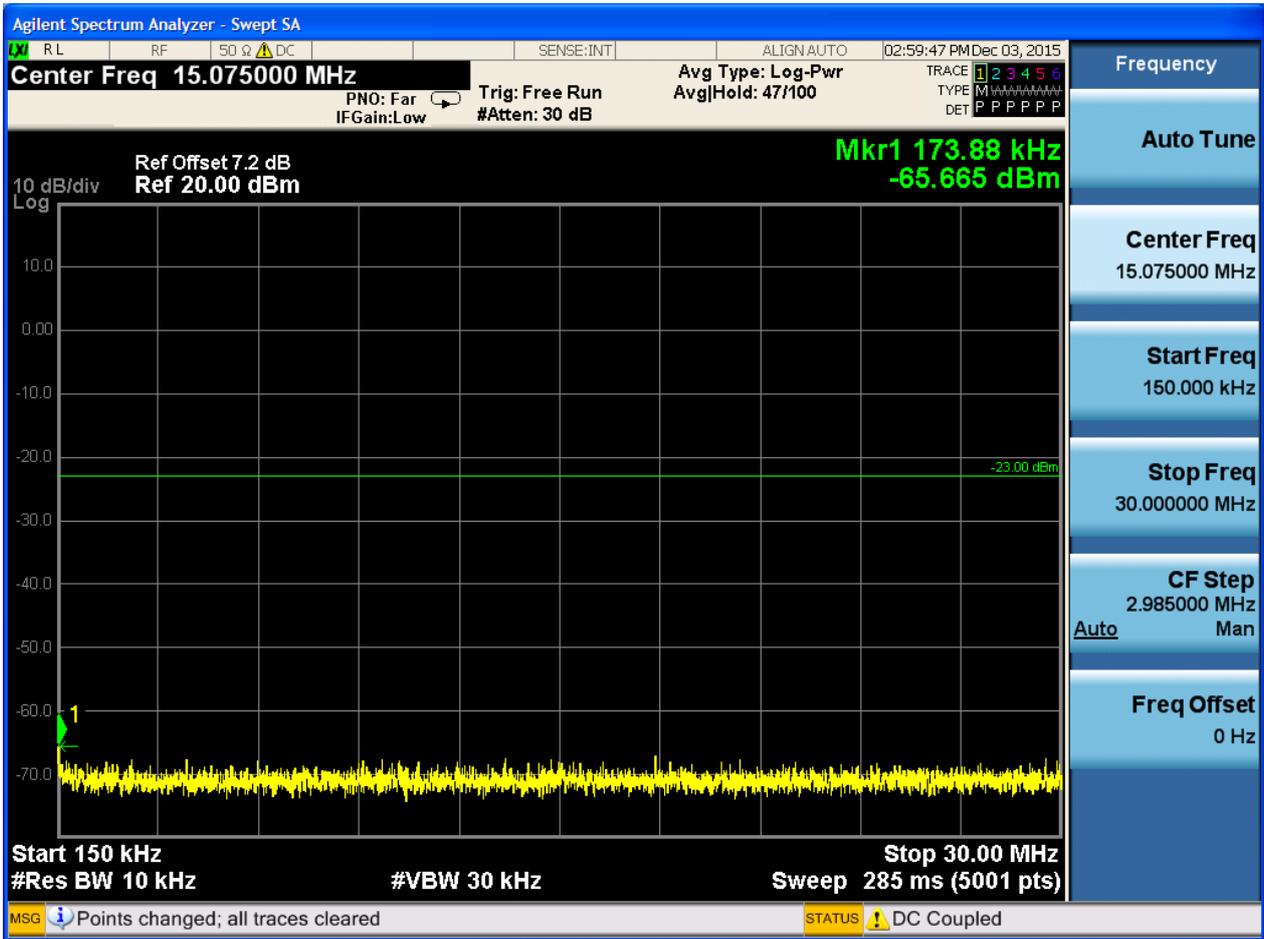
6.1.1.2.1 Test Channel = LCH

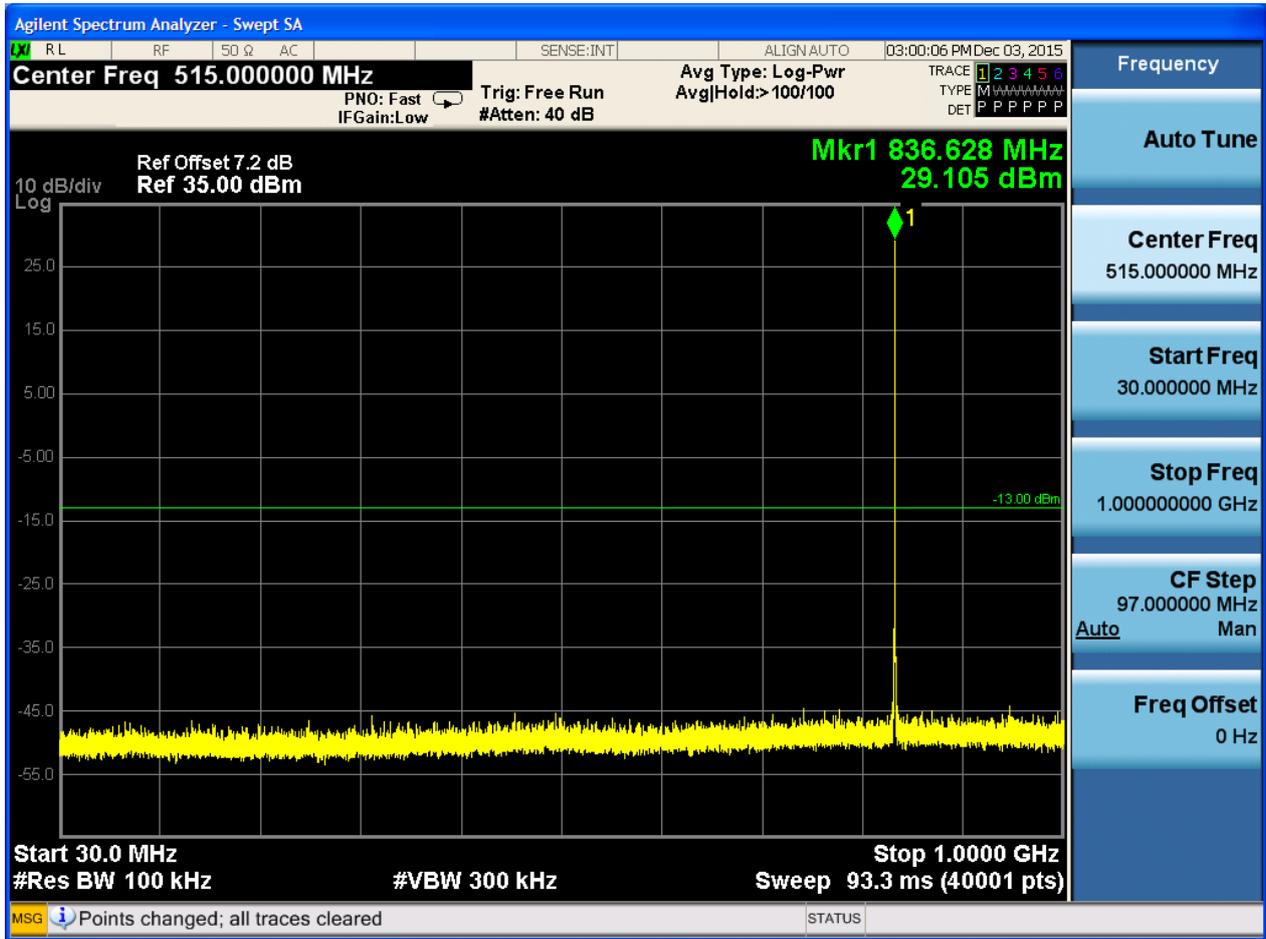


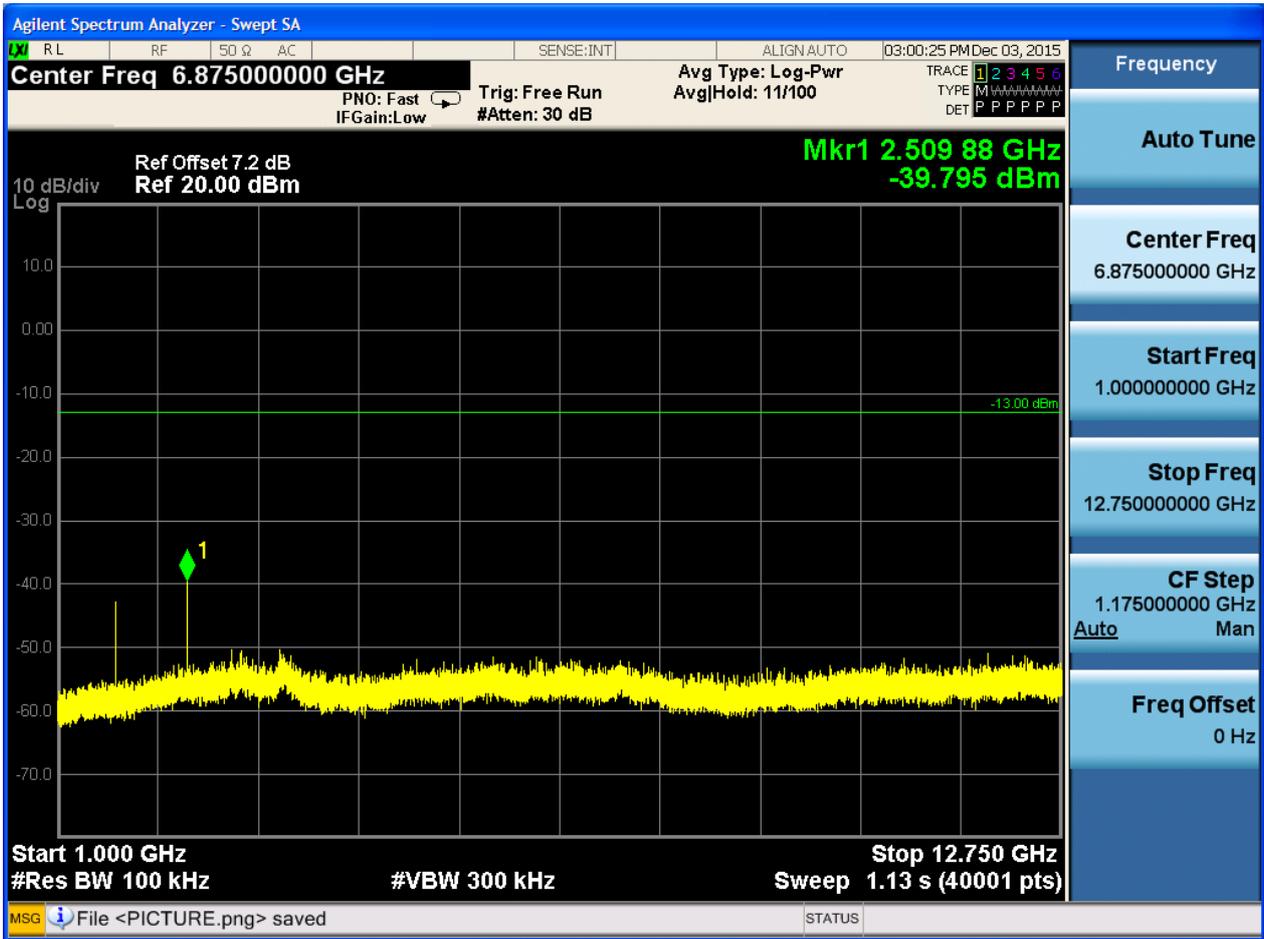






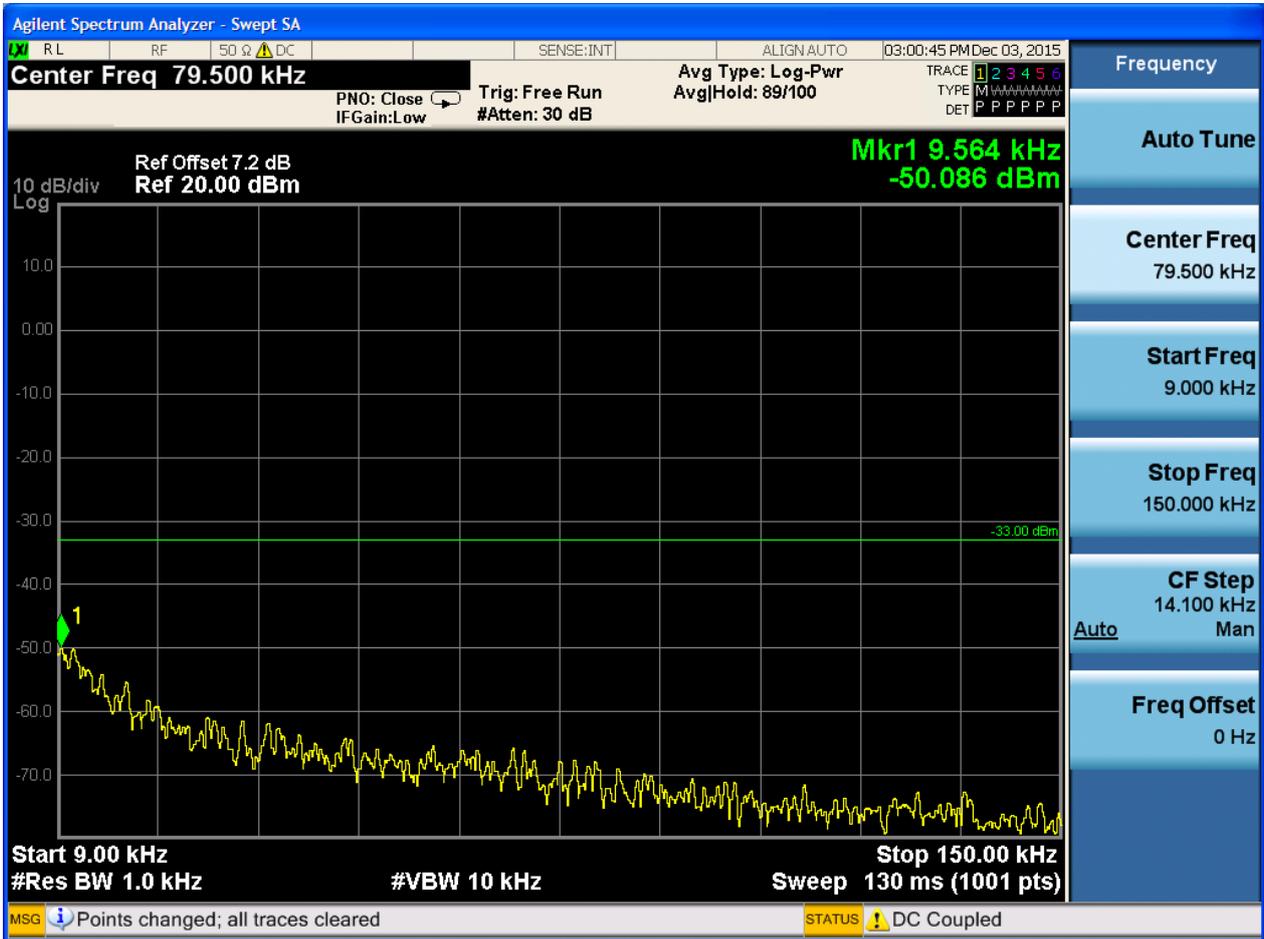


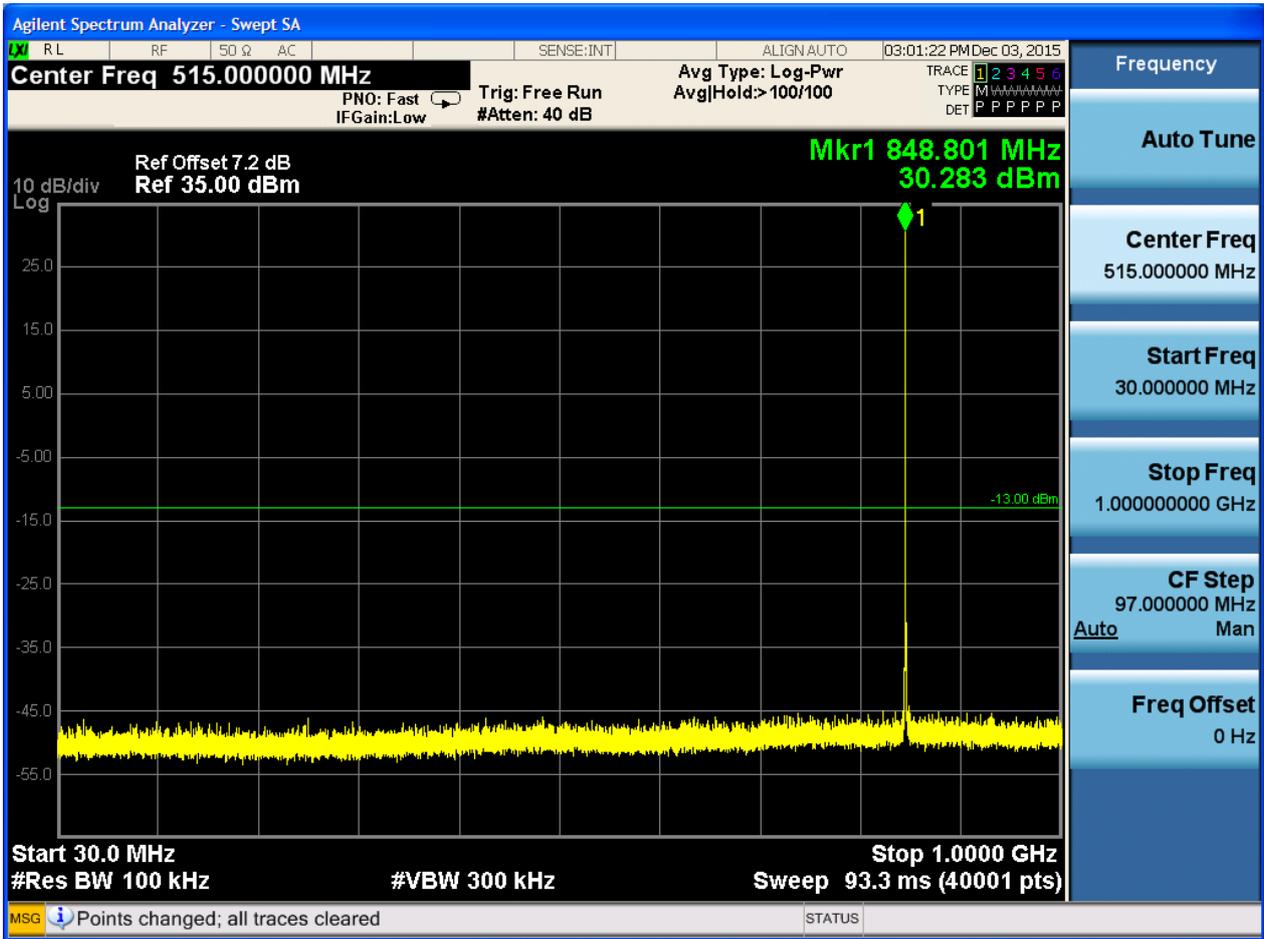






6.1.1.2.3 Test Channel = HCH





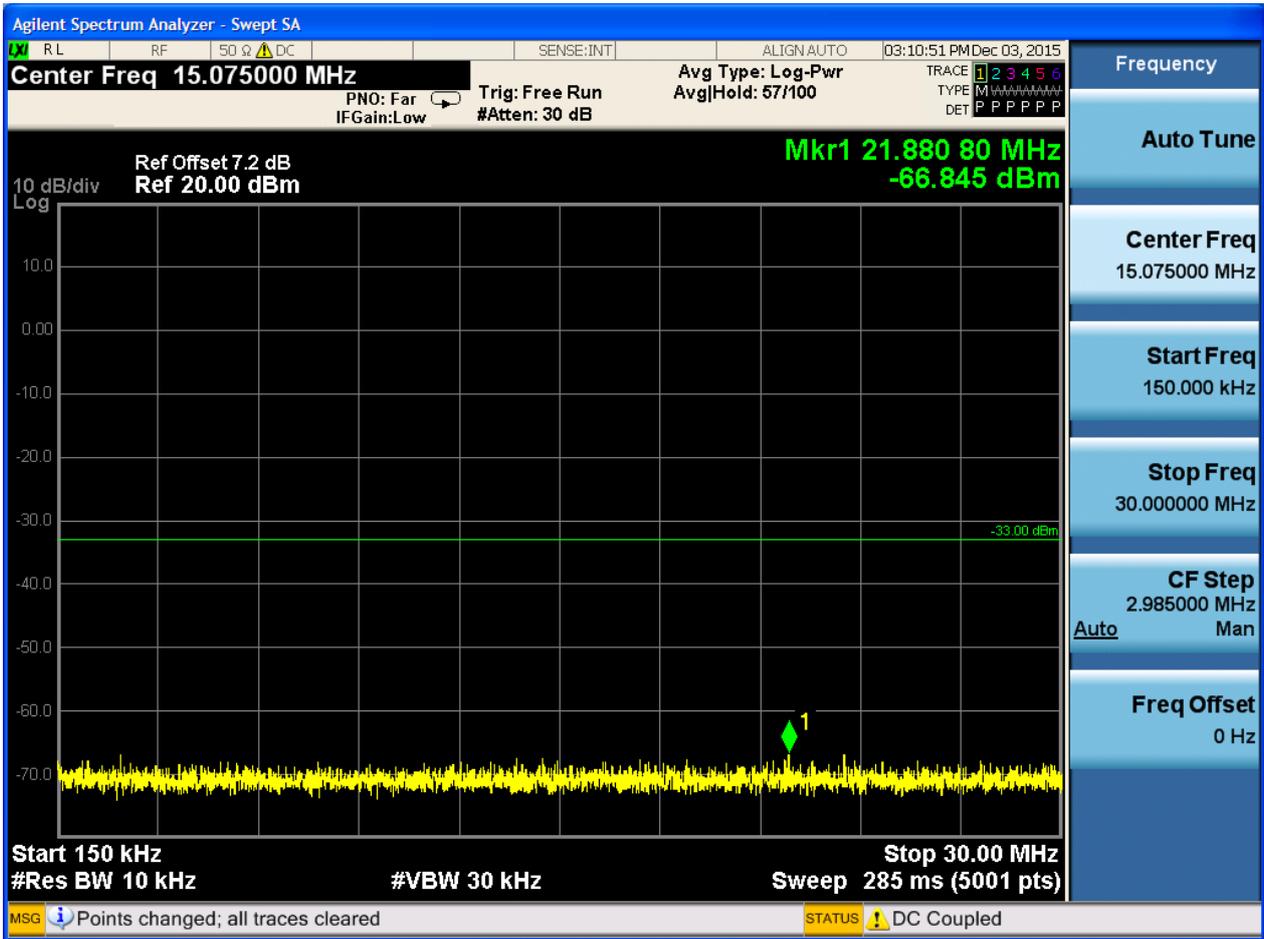


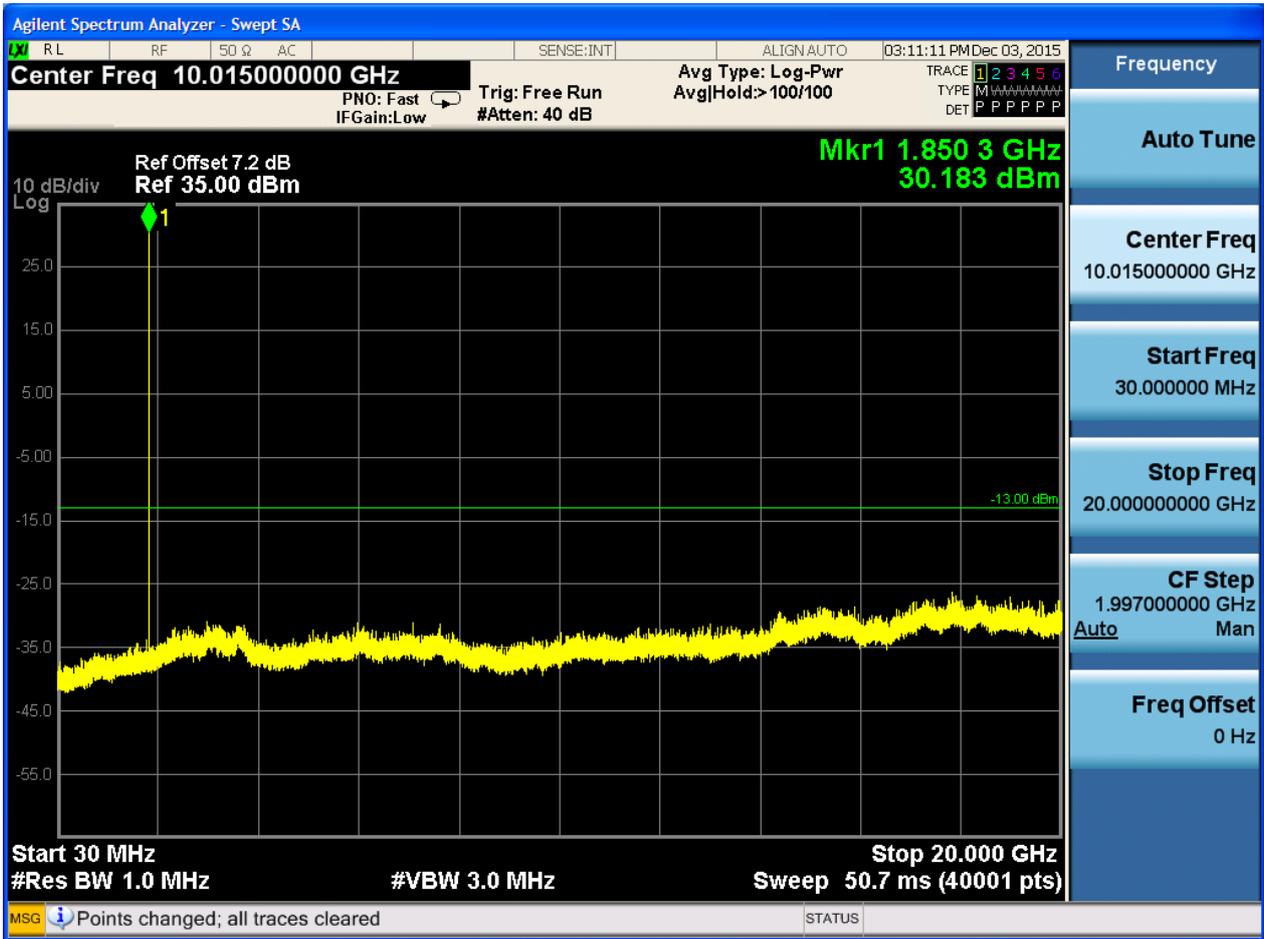
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH



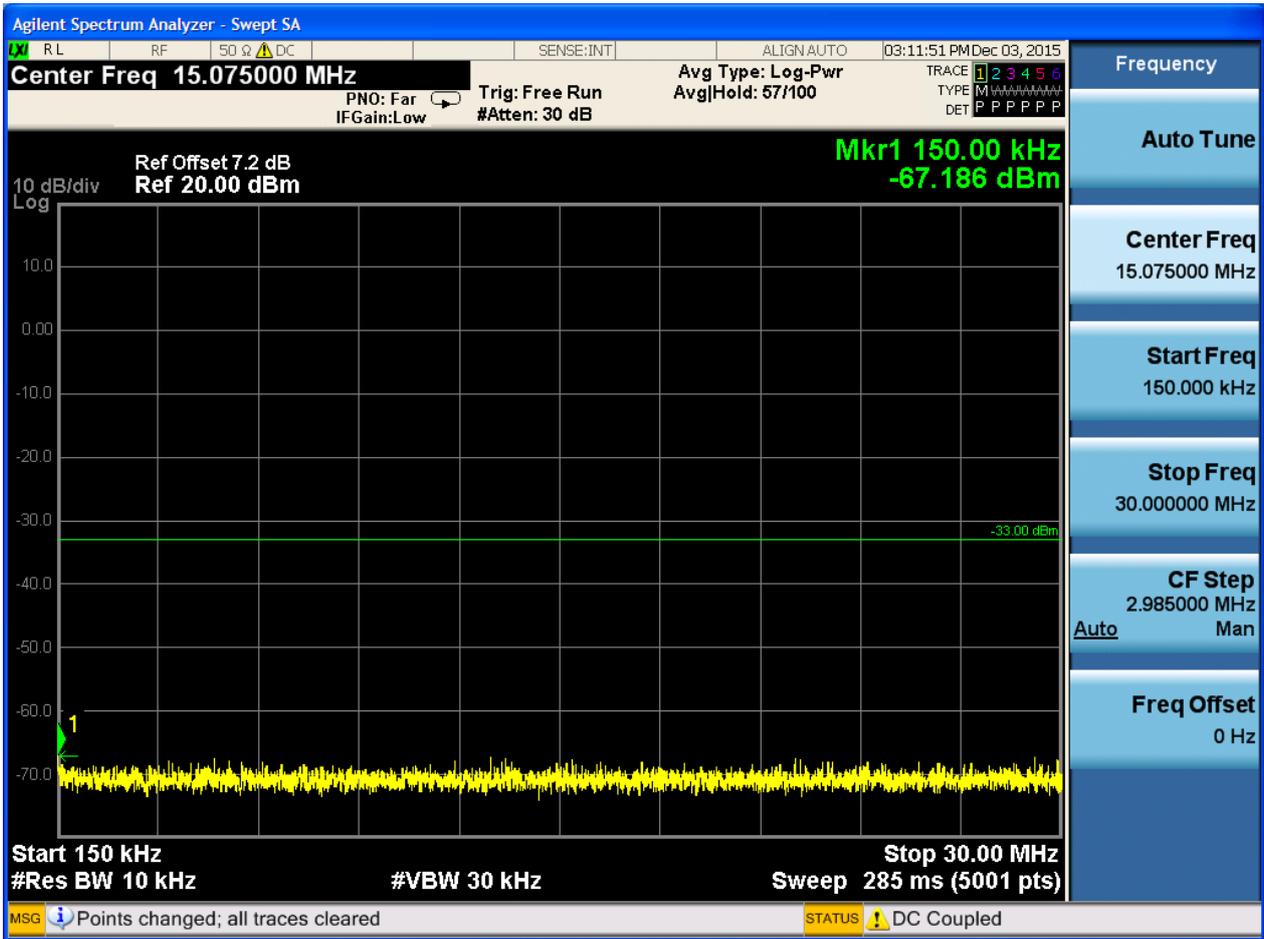




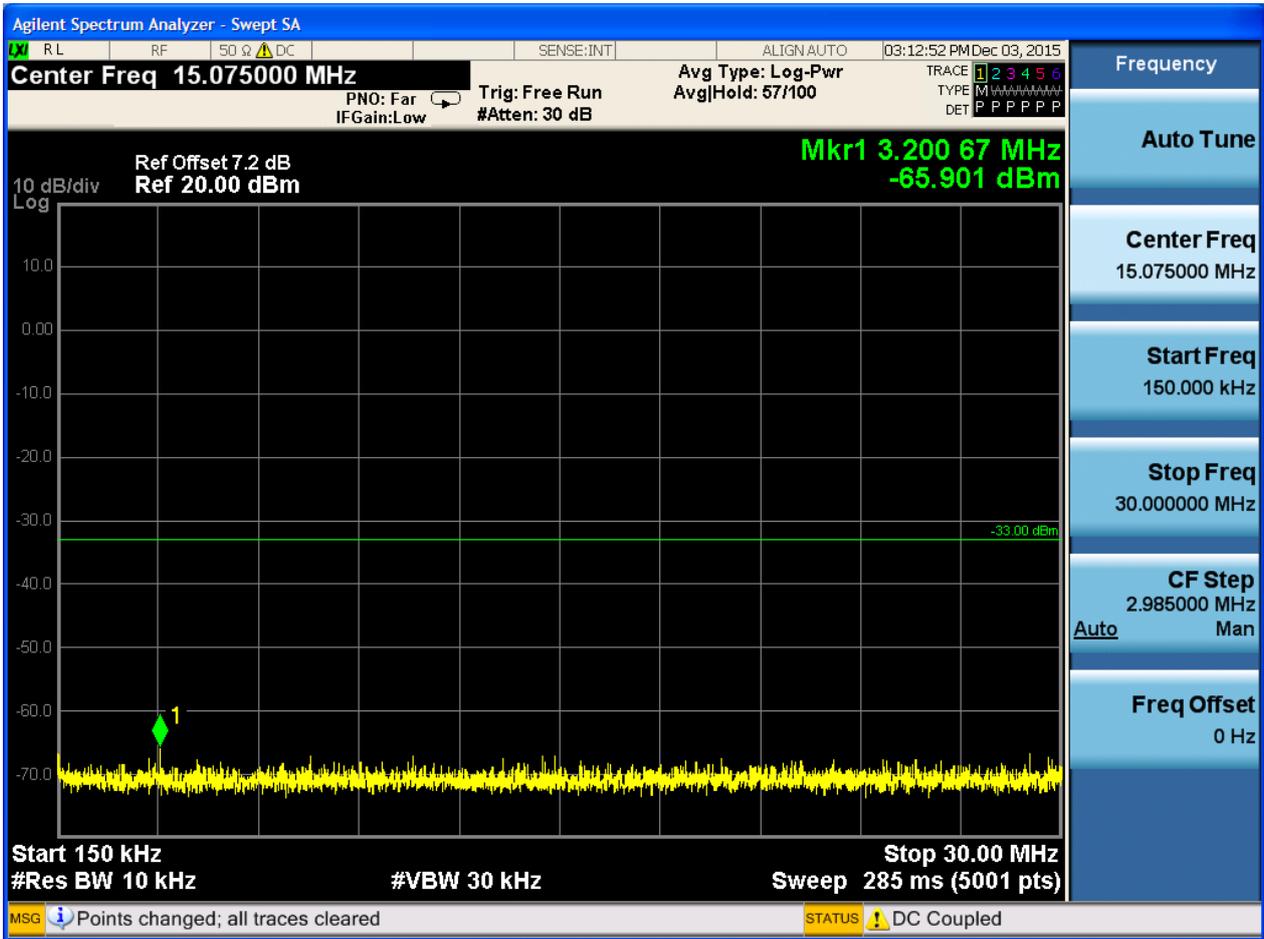


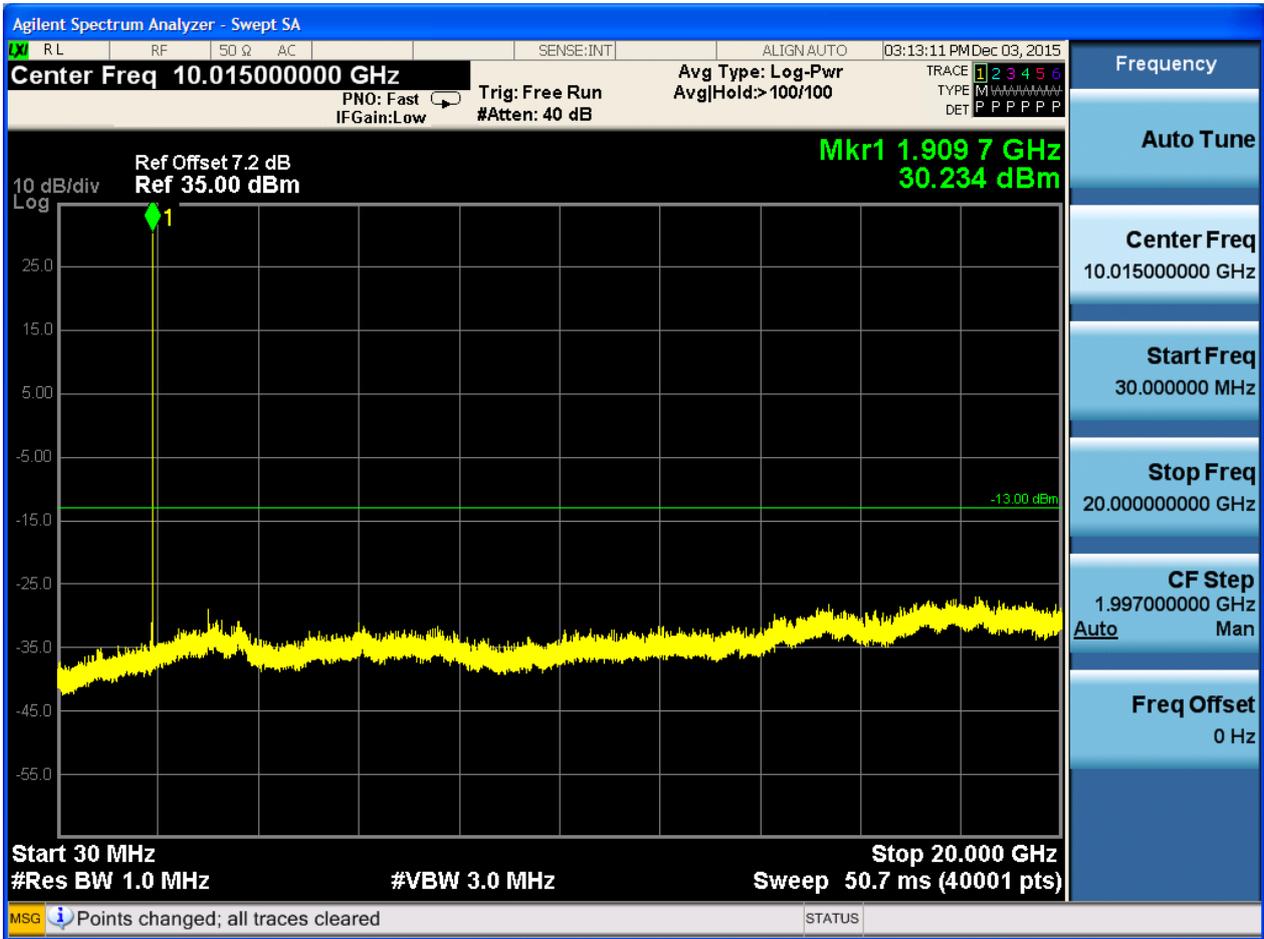
6.1.2.1.2 Test Channel = MCH







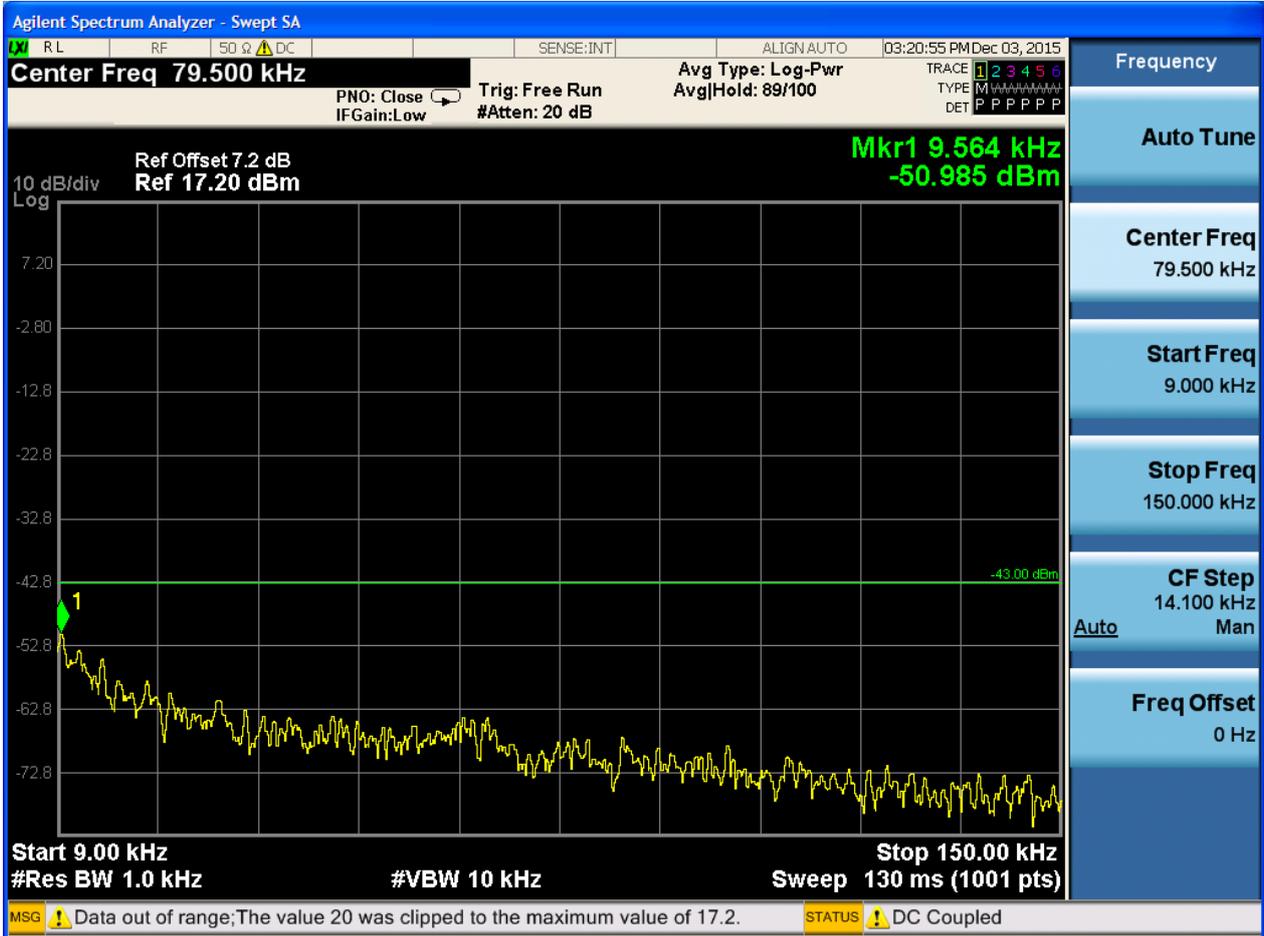


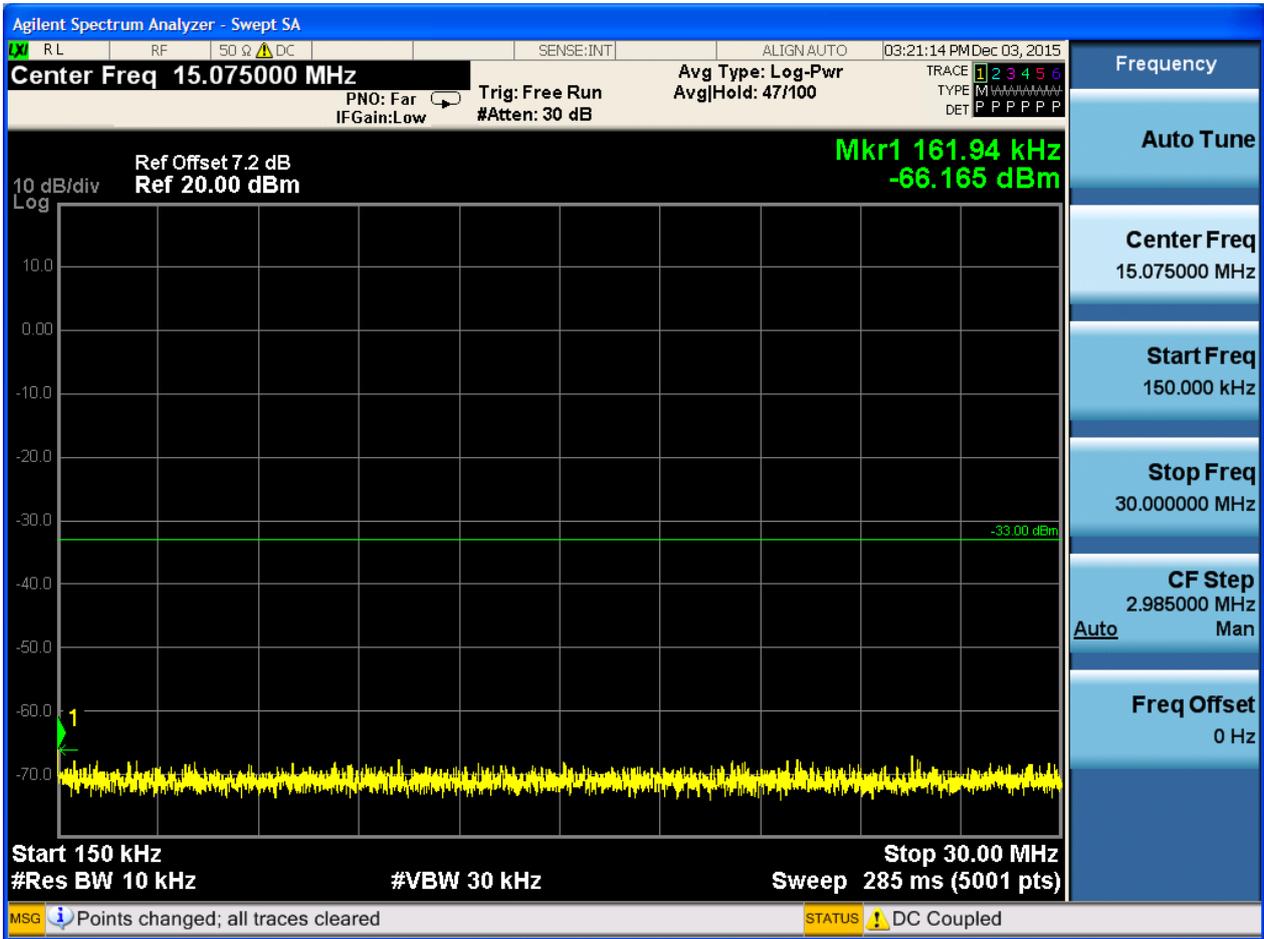


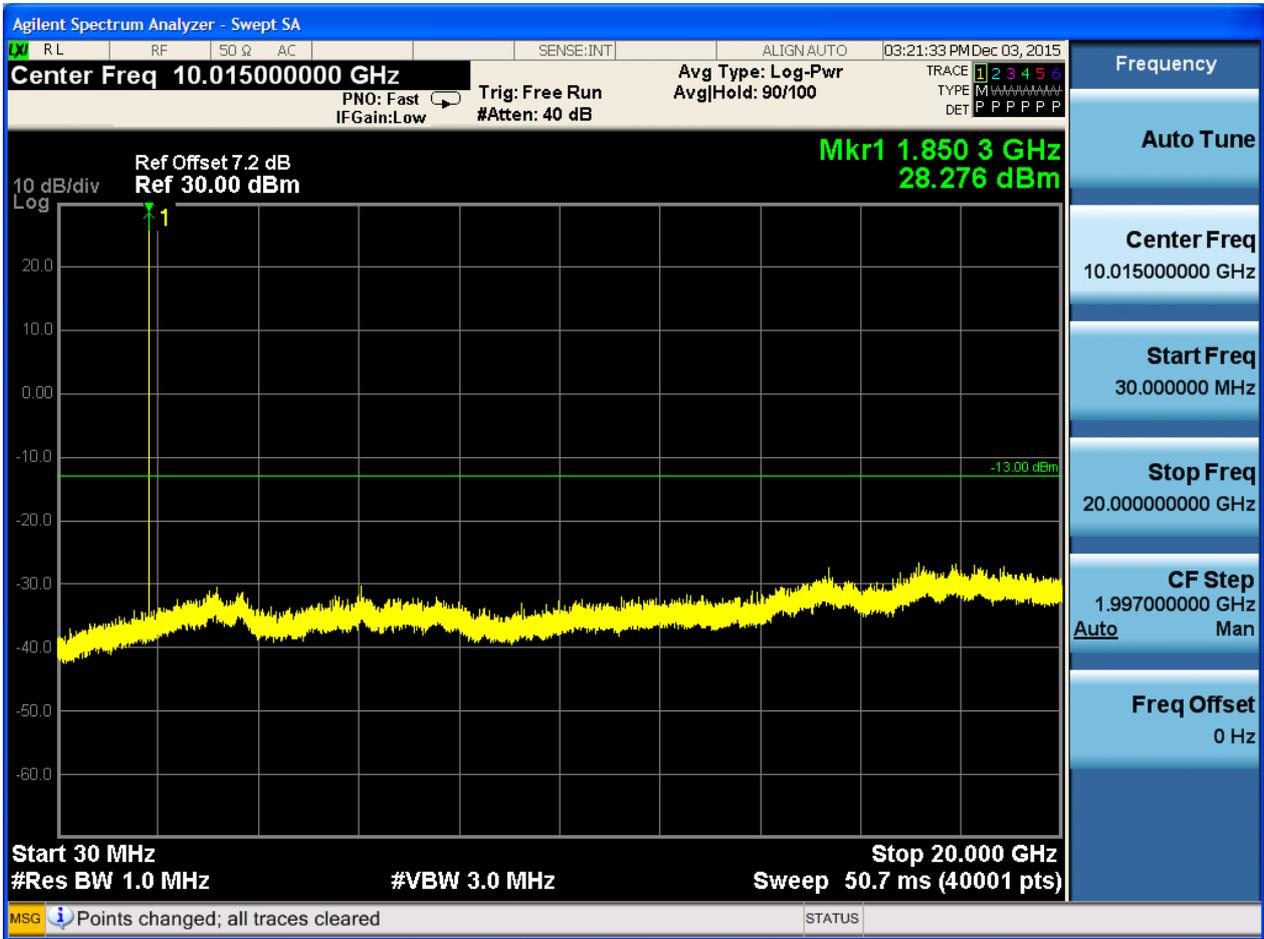


6.1.2.2 Test Mode = GSM/TM2

6.1.2.2.1 Test Channel = LCH

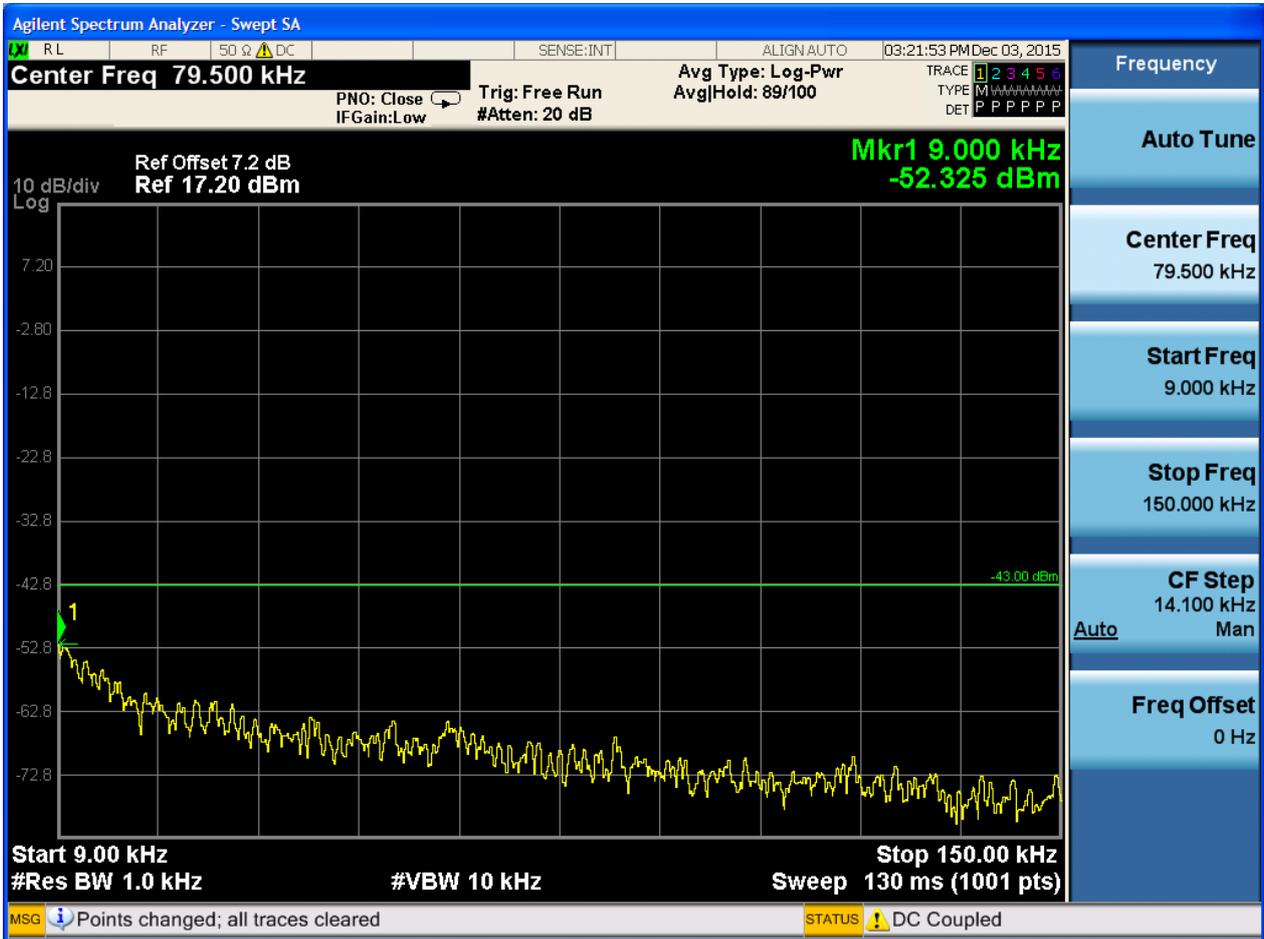


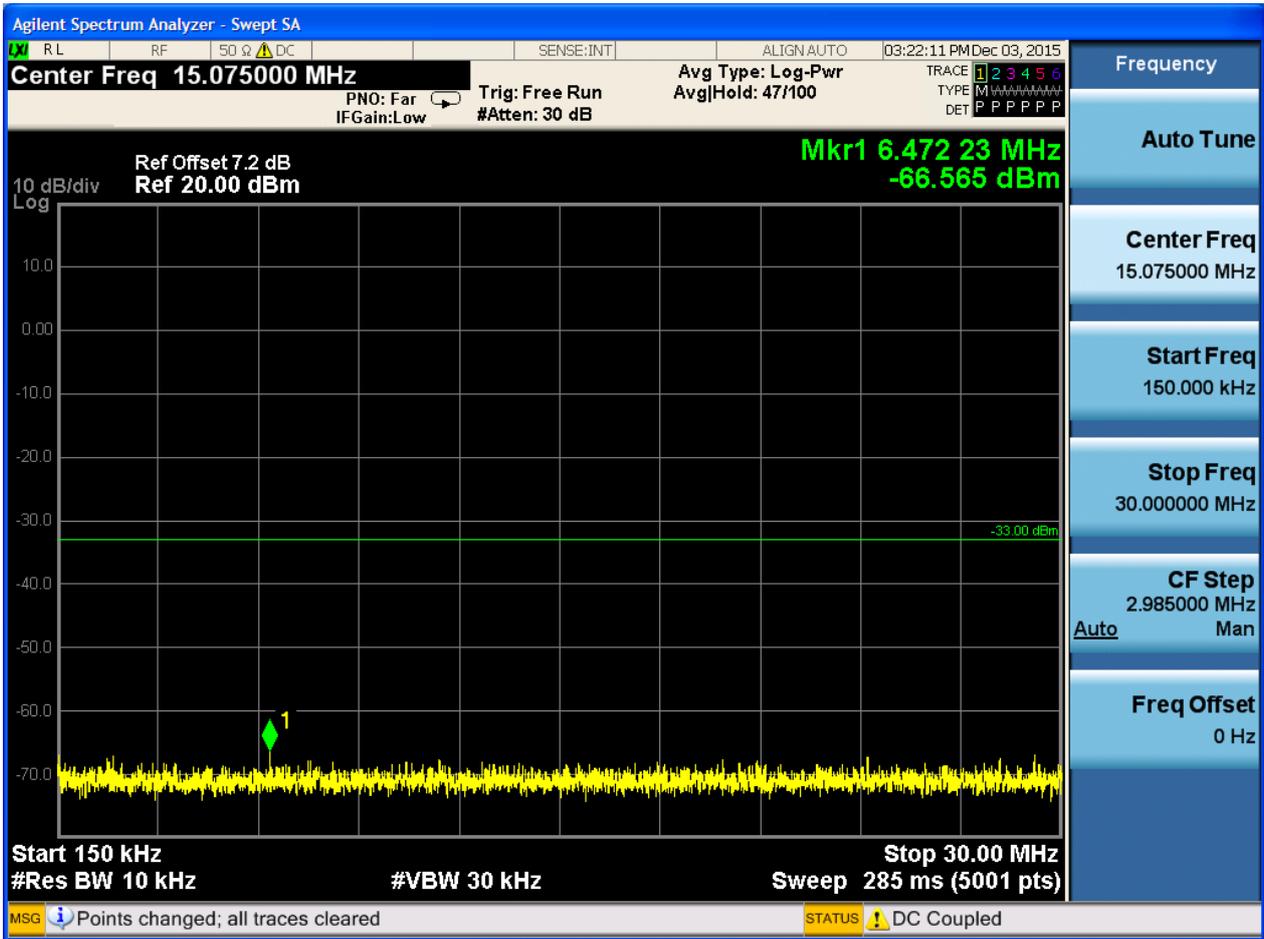






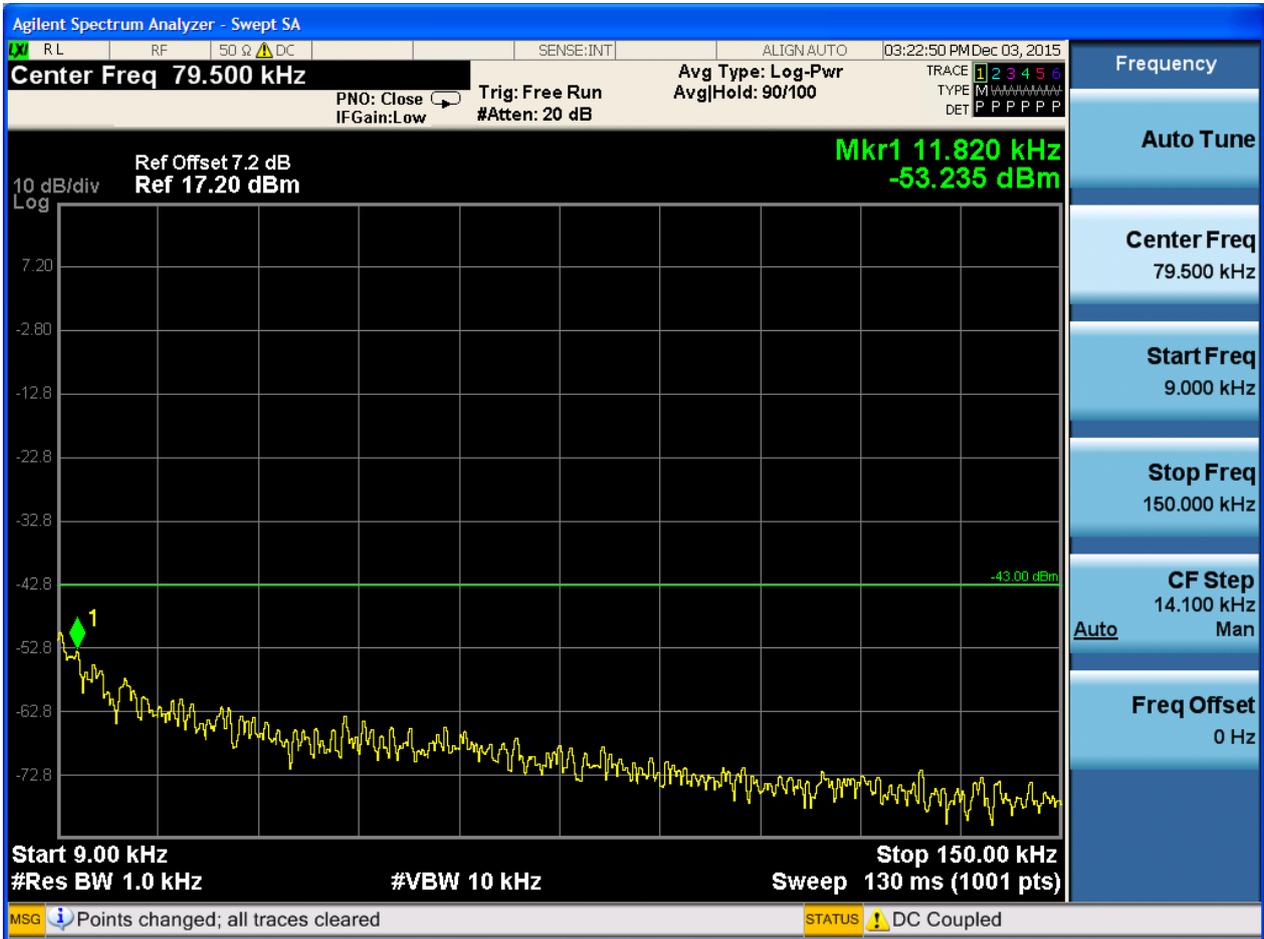
6.1.2.2.2 Test Channel = MCH

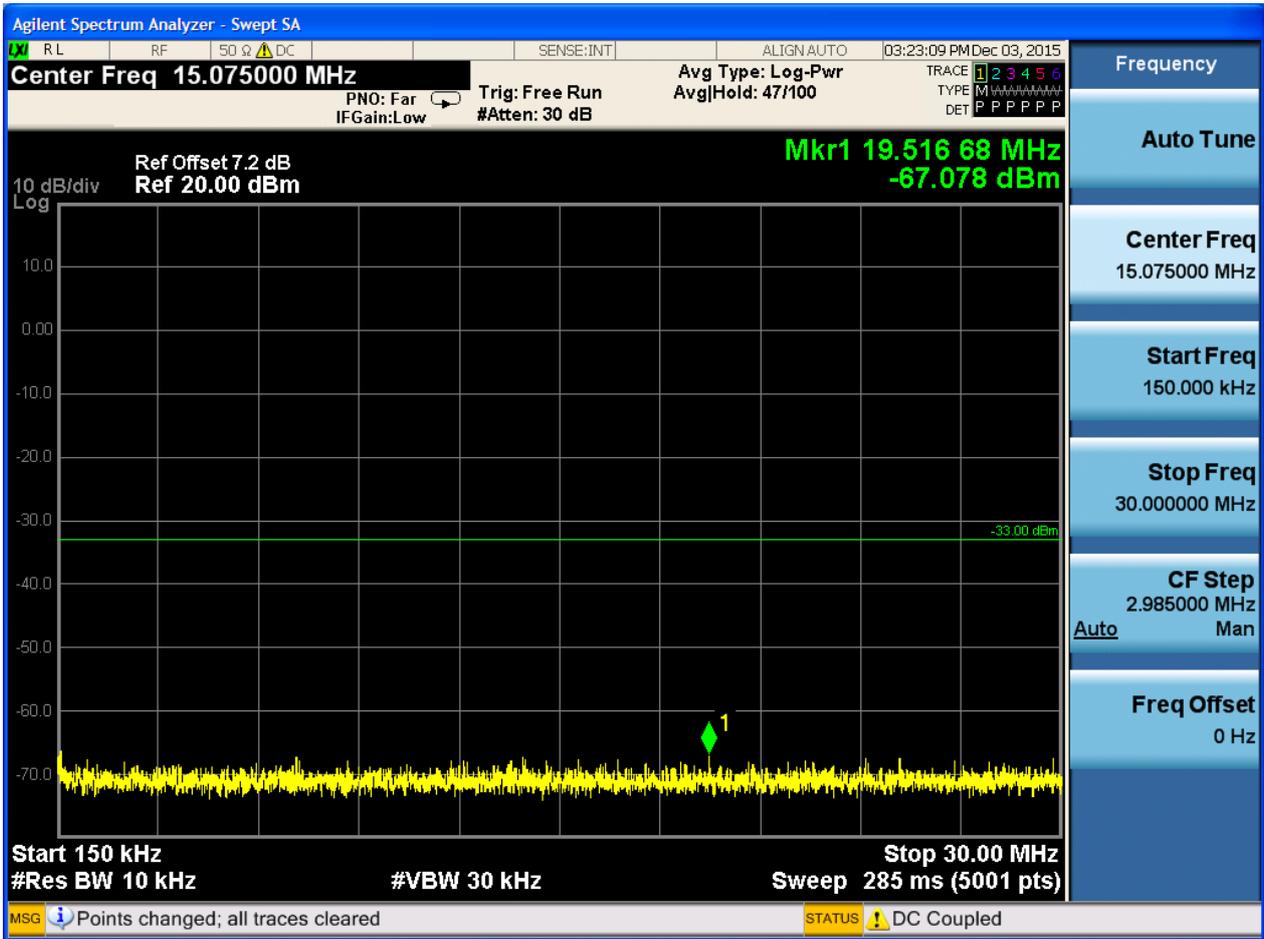






6.1.2.2.3 Test Channel = HCH







7Appendix_G: Field Strength of Spurious Radiation

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

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

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

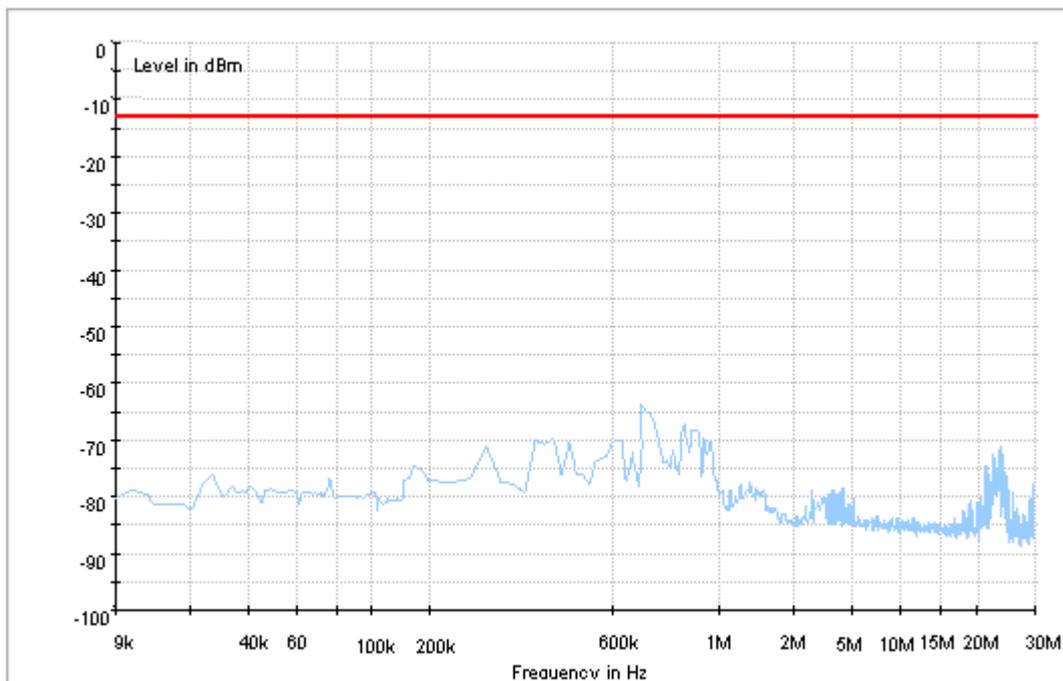
30MHz~1GHz, RBW = 100 kHz, VBW = 300 kHz. Detector: PK

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

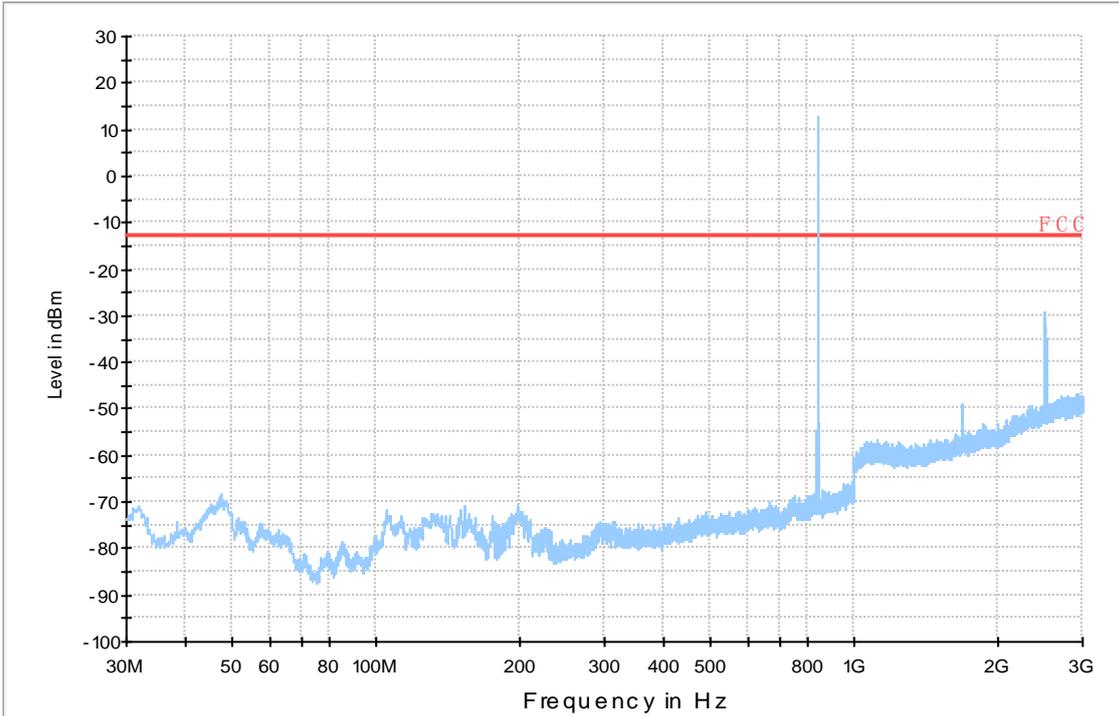
Part I - Test Plots

7.1 For GSM

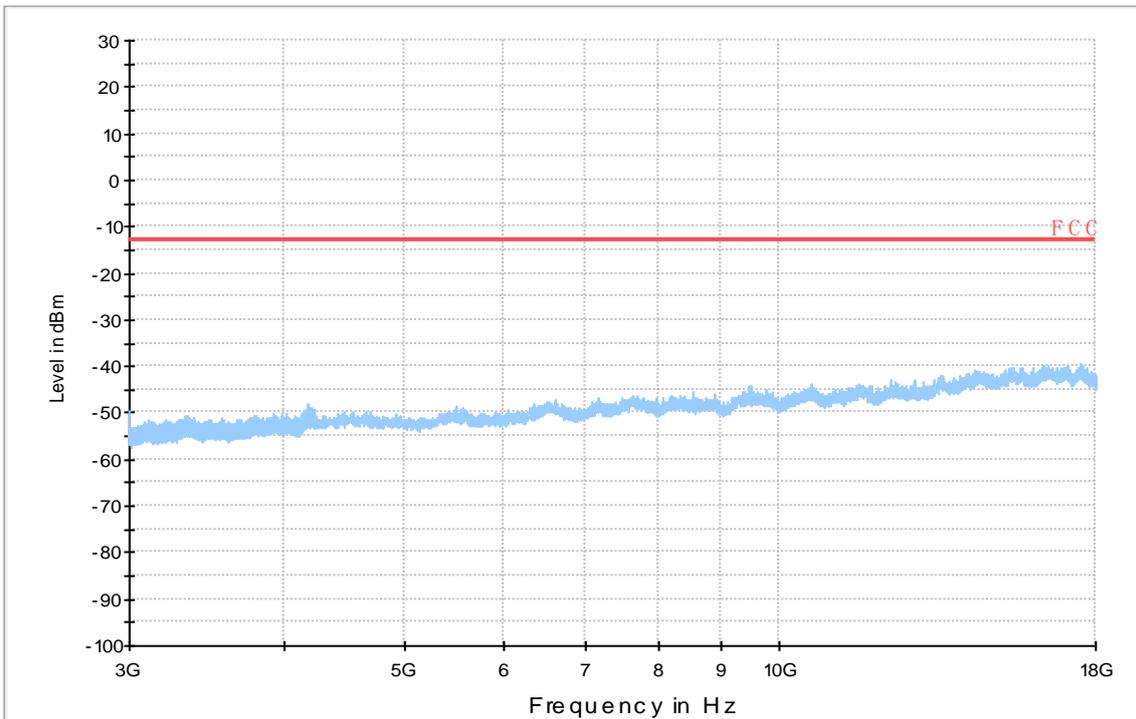
7.1.1 Test Band = GSM850



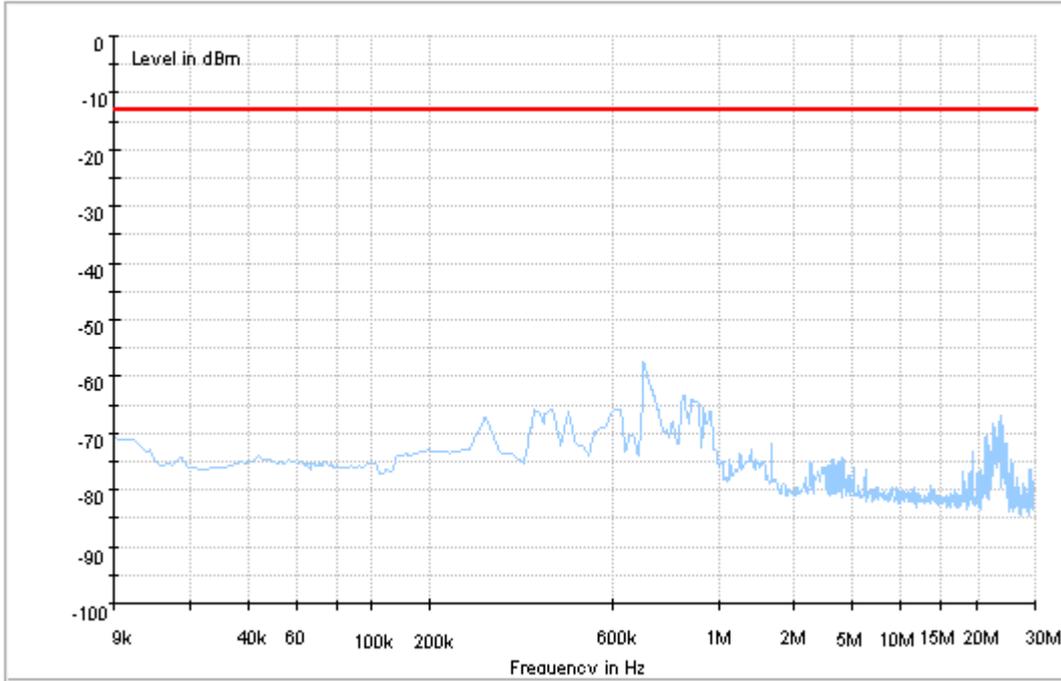
Copy of FCC PART22 GSM850_L



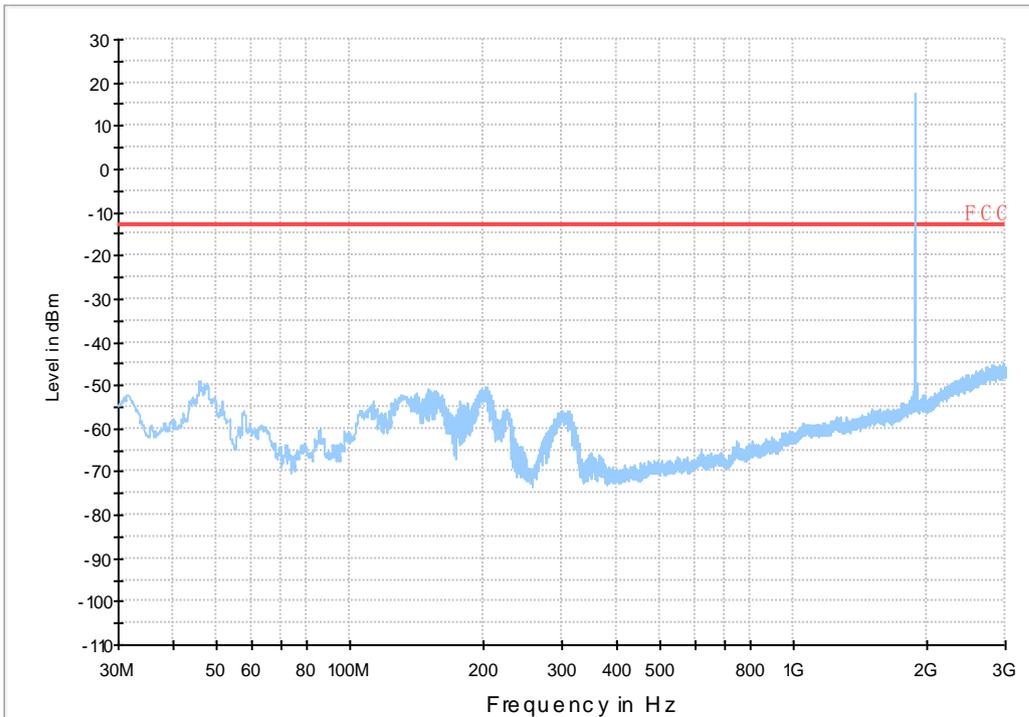
Copy of FCC PART22 GSM850_H



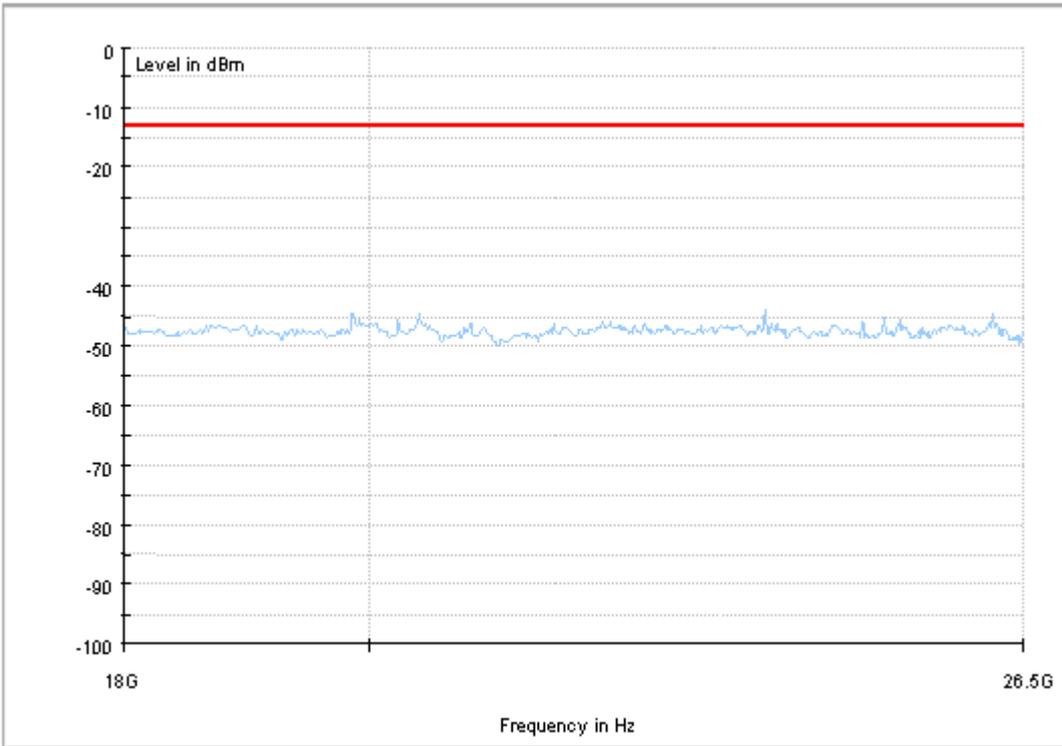
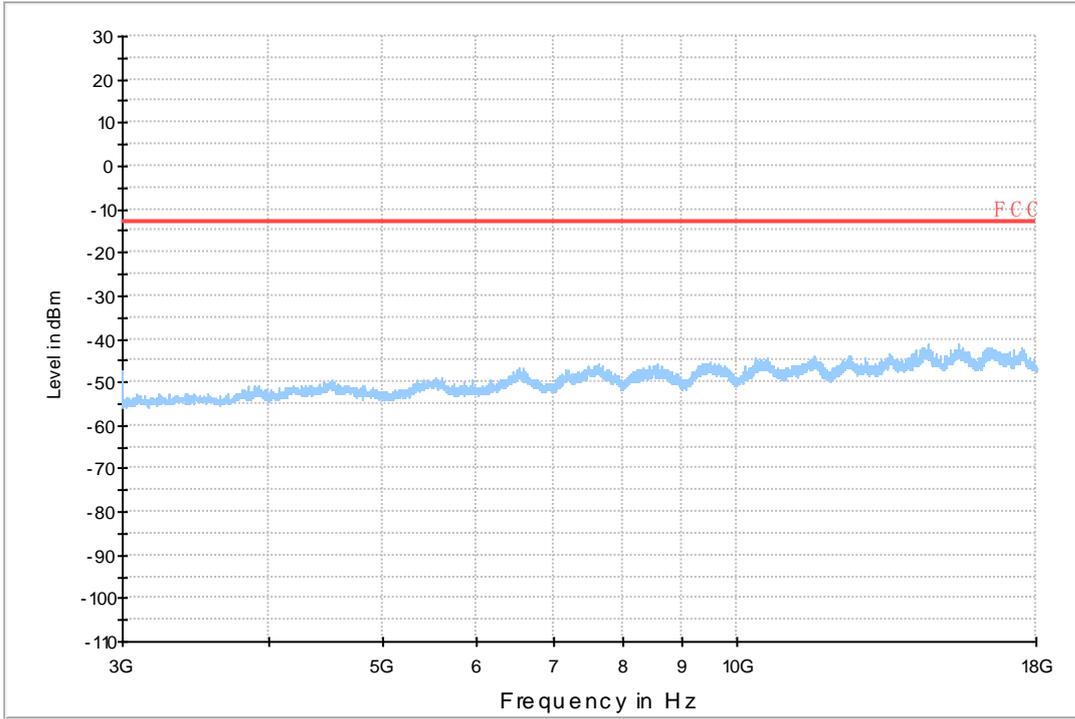
7.1.2 Test Band = GSM1900



Copy of FCC PART24 GSM 1900_L



Copy of FCC PART24 GSM 1900_H



8Appendix_H: Frequency Stability

8.1 For GSM

8.1.1Frequency 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	10.14	0.0123	PASS
				VN	5.94	0.00721	PASS
				VH	8.39	0.01018	PASS
		MCH	TN	VL	6.52	0.00779	PASS
				VN	6.84	0.00818	PASS
				VH	10.91	0.01304	PASS
		HCH	TN	VL	6.91	0.00814	PASS
				VN	8.65	0.01019	PASS
				VH	9.56	0.01126	PASS
	GSM/TM2	LCH	TN	VL	11.56	0.01403	PASS
				VN	11.78	0.01429	PASS
				VH	11.88	0.01441	PASS
		MCH	TN	VL	13.85	0.01656	PASS
				VN	13.04	0.01559	PASS
				VH	13.43	0.01605	PASS
		HCH	TN	VL	11.62	0.01369	PASS
				VN	12.56	0.0148	PASS
				VH	12.49	0.01471	PASS
GSM1900	GSM/TM1	LCH	TN	VL	6.26	0.00338	PASS
				VN	0.90	0.00049	PASS
				VH	3.36	0.00182	PASS
		MCH	TN	VL	-6.84	-0.00364	PASS
				VN	-5.42	-0.00288	PASS
				VH	15.43	0.00821	PASS
		HCH	TN	VL	8.39	0.00439	PASS
				VN	10.53	0.00551	PASS
				VH	4.26	0.00223	PASS
	GSM/TM2	LCH	TN	VL	4.16	0.00225	PASS
				VN	12.46	0.00673	PASS
				VH	2.20	0.00119	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		MCH	TN	VL	1.26	0.00067	PASS
				VN	2.55	0.00136	PASS
				VH	14.08	0.00749	PASS
		HCH	TN	VL	6.78	0.00355	PASS
				VN	7.23	0.00379	PASS
				VH	16.50	0.00864	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	5.42	0.00658	PASS
				-20	11.04	0.01339	PASS
				-10	7.30	0.00886	PASS
				0	5.68	0.00689	PASS
				10	5.55	0.00673	PASS
				20	8.46	0.01026	PASS
				30	6.13	0.00744	PASS
				40	8.85	0.01074	PASS
				50	11.04	0.01339	PASS
		MCH	VN	-30	8.20	0.0098	PASS
				-20	6.46	0.00772	PASS
				-10	6.91	0.00826	PASS
				0	2.97	0.00355	PASS
				10	6.52	0.00779	PASS
				20	9.49	0.01134	PASS
				30	5.88	0.00703	PASS
				40	3.55	0.00424	PASS
				50	4.97	0.00594	PASS
		HCH	VN	-30	8.27	0.00974	PASS
				-20	4.26	0.00502	PASS
				-10	3.49	0.00411	PASS
				0	4.13	0.00487	PASS
				10	4.00	0.00471	PASS
				20	4.84	0.0057	PASS
				30	5.75	0.00677	PASS
				40	-1.68	-0.00198	PASS
				50	4.58	0.0054	PASS
	GSM/TM2	LCH	VN	-30	10.40	0.01262	PASS
				-20	11.91	0.01445	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict		
				-10	11.85	0.01438	PASS		
				0	11.72	0.01422	PASS		
				10	9.91	0.01202	PASS		
				20	9.56	0.0116	PASS		
				30	8.23	0.00999	PASS		
				40	10.04	0.01218	PASS		
				50	10.36	0.01257	PASS		
		MCH	VN	-30	7.65	0.00914	PASS		
				-20	14.66	0.01752	PASS		
				-10	7.23	0.00864	PASS		
				0	16.85	0.02014	PASS		
				10	8.20	0.0098	PASS		
				20	7.36	0.0088	PASS		
				30	15.53	0.01856	PASS		
				40	15.66	0.01872	PASS		
		HCH	VN	-30	9.85	0.0116	PASS		
				-20	12.27	0.01446	PASS		
				-10	12.85	0.01514	PASS		
				0	12.40	0.01461	PASS		
				10	10.07	0.01186	PASS		
				20	10.11	0.01191	PASS		
				30	12.56	0.0148	PASS		
				40	10.78	0.0127	PASS		
		GSM1900	GSM/TM1	LCH	VN	-30	1.81	0.00098	PASS
						-20	7.17	0.00388	PASS
						-10	-0.19	-0.0001	PASS
						0	0.00	0	PASS
10	1.87					0.00101	PASS		
20	6.97					0.00377	PASS		
30	2.39					0.00129	PASS		
40	1.36			0.00074	PASS				
50	1.23			0.00066	PASS				
MCH	VN			-30	-1.68	-0.00089	PASS		
				-20	4.33	0.0023	PASS		
				-10	18.73	0.00996	PASS		
				0	11.75	0.00625	PASS		
				10	7.23	0.00385	PASS		
		20	13.56	0.00721	PASS				



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict	
				30	10.53	0.0056	PASS	
				40	16.47	0.00876	PASS	
				50	6.01	0.0032	PASS	
		HCH	VN	-30	3.36	0.00176	PASS	
				-20	3.16	0.00165	PASS	
				-10	3.03	0.00159	PASS	
				0	-0.06	-0.00003	PASS	
				10	-0.71	-0.00037	PASS	
				20	-0.26	-0.00014	PASS	
				30	1.42	0.00074	PASS	
				40	-3.68	-0.00193	PASS	
				50	-3.49	-0.00183	PASS	
		GSM/TM2	LCH	VN	-30	5.55	0.003	PASS
					-20	7.20	0.00389	PASS
					-10	8.10	0.00438	PASS
	0				9.30	0.00503	PASS	
	10				-2.65	-0.00143	PASS	
	20				8.59	0.00464	PASS	
	30				8.78	0.00475	PASS	
	40				8.68	0.00469	PASS	
	50				7.39	0.00399	PASS	
	MCH		VN	-30	18.98	0.0101	PASS	
				-20	4.13	0.0022	PASS	
				-10	7.81	0.00415	PASS	
				0	20.24	0.01077	PASS	
				10	20.63	0.01097	PASS	
				20	15.24	0.00811	PASS	
				30	1.71	0.00091	PASS	
				40	17.56	0.00934	PASS	
		50		7.23	0.00385	PASS		
	HCH	VN	-30	-0.87	-0.00046	PASS		
			-20	8.98	0.0047	PASS		
			-10	0.03	0.00002	PASS		
			0	2.84	0.00149	PASS		
			10	3.81	0.00199	PASS		
			20	6.01	0.00315	PASS		
			30	7.14	0.00374	PASS		
			40	6.97	0.00365	PASS		
			50	10.49	0.00549	PASS		