



Appendix for Test report

1 Appendix_A: Output Power Data

Part I - Test Results

Test Band	Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (ERP) [dBm]	FCC limit [dBm]	Result
GSM850	GSM/T M1	824.2	30.74	Dipole Ant.	33.89	-2.75	0.6	30.54	38.5	Pass
		836.6	30.88	Dipole Ant.	34.15	-2.87	0.6	30.68	38.5	Pass
		848.8	30.92	Dipole Ant.	34.51	-2.85	0.6	31.06	38.5	Pass
	GSM/T M2	824.2	24.2	Dipole Ant.	27.35	-2.75	0.6	24	38.5	Pass
		836.6	24.29	Dipole Ant.	27.56	-2.87	0.6	24.09	38.5	Pass
		848.8	24.23	Dipole Ant.	27.48	-2.85	0.6	24.03	38.5	Pass

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

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

b, SGP=Signal Generator Level

Test Band	Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	FCC limit [dBm]	Result
GSM1900	GSM/T M1	1850.2	30.11	Horn Ant.	26.41	4.5	1	29.91	33	Pass
		1880	30.03	Horn Ant.	26.33	4.5	1	29.83	33	Pass
		1909.8	30.07	Horn Ant.	26.07	4.8	1	29.87	33	Pass
	GSM/T M2	1850.2	26.23	Horn Ant.	22.74	4.5	1	26.24	33	Pass
		1880	26.31	Horn Ant.	22.61	4.5	1	26.11	33	Pass
		1909.8	26.24	Horn Ant.	22.24	4.8	1	26.04	33	Pass

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

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

b, SGP=Signal Generator Level



Peak-to-Average Ratio

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM1900	GSM/TM1	LCH	0.44	13	PASS
		MCH	0.43	13	PASS
		HCH	0.47	13	PASS
	GSM/TM2	LCH	2.87	13	PASS
		MCH	2.97	13	PASS
		HCH	2.96	13	PASS

2Appendix_B: Modulation Characteristics

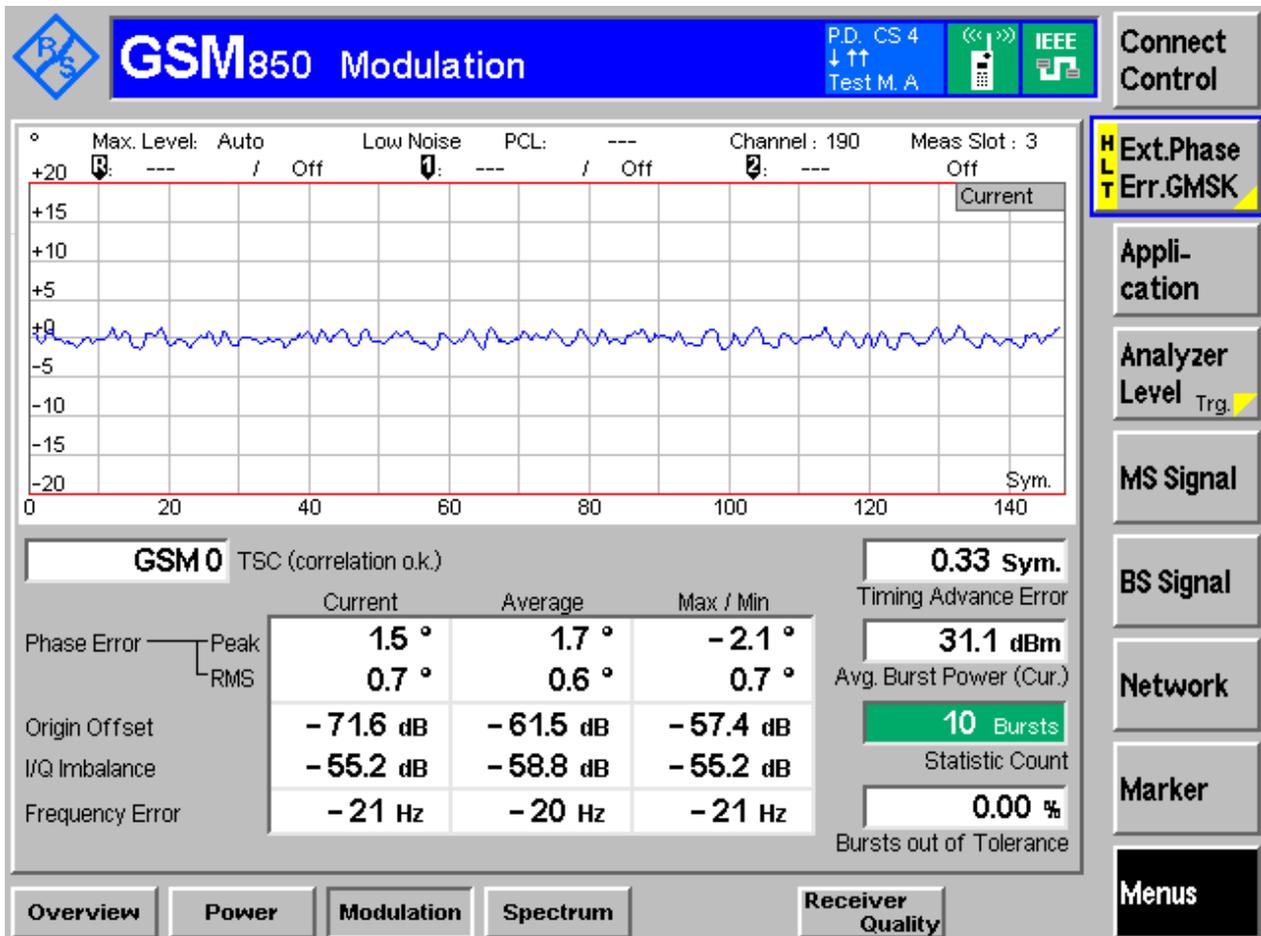
Part I - Test Plots

2.1 For GSM

2.1.1 Test Band = GSM850

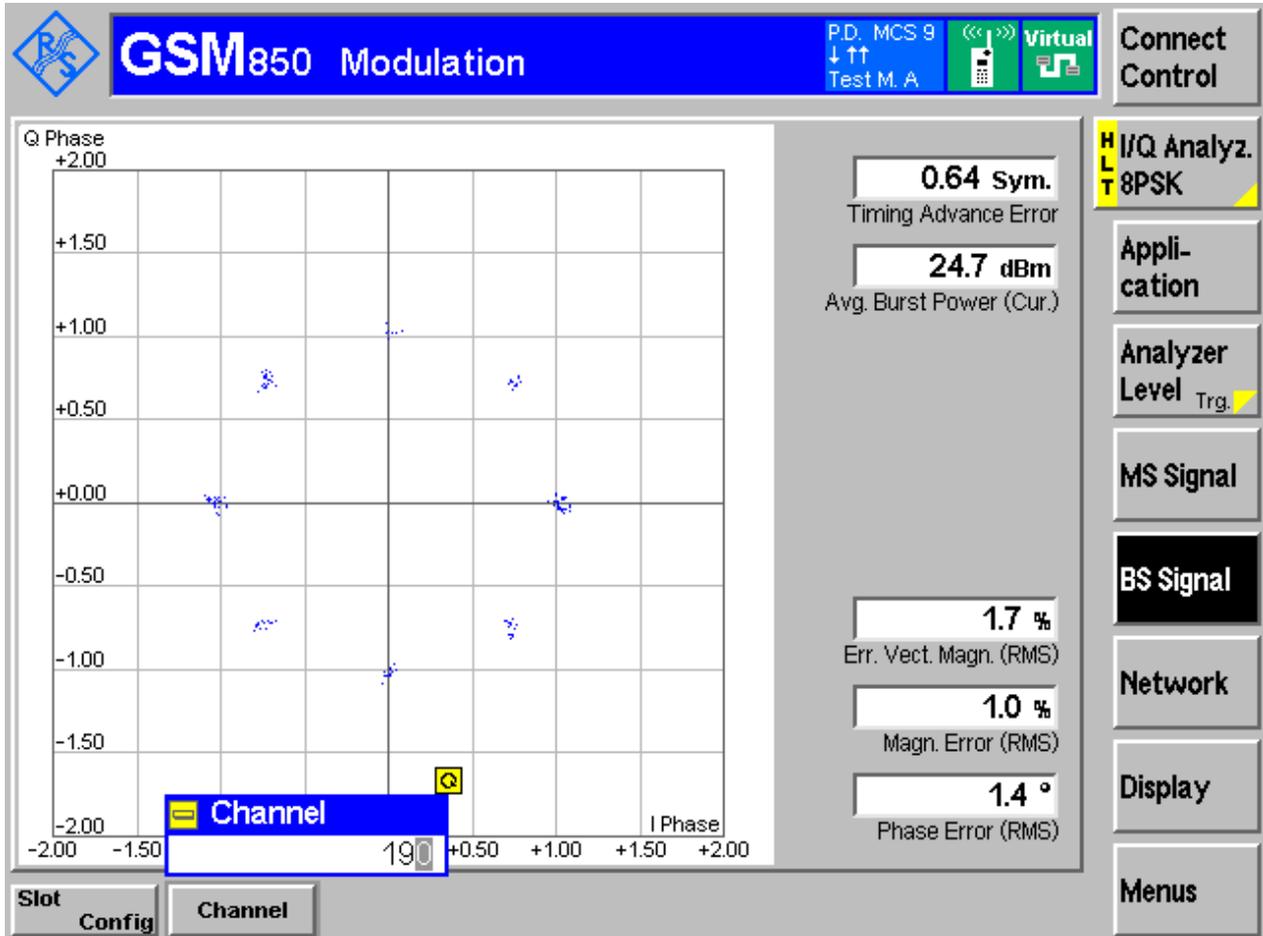
2.1.1.1 Test Mode = GSM/TM1

2.1.1.1.1 Test Channel = MCH



2.1.1.2 Test Mode = GSM/TM2

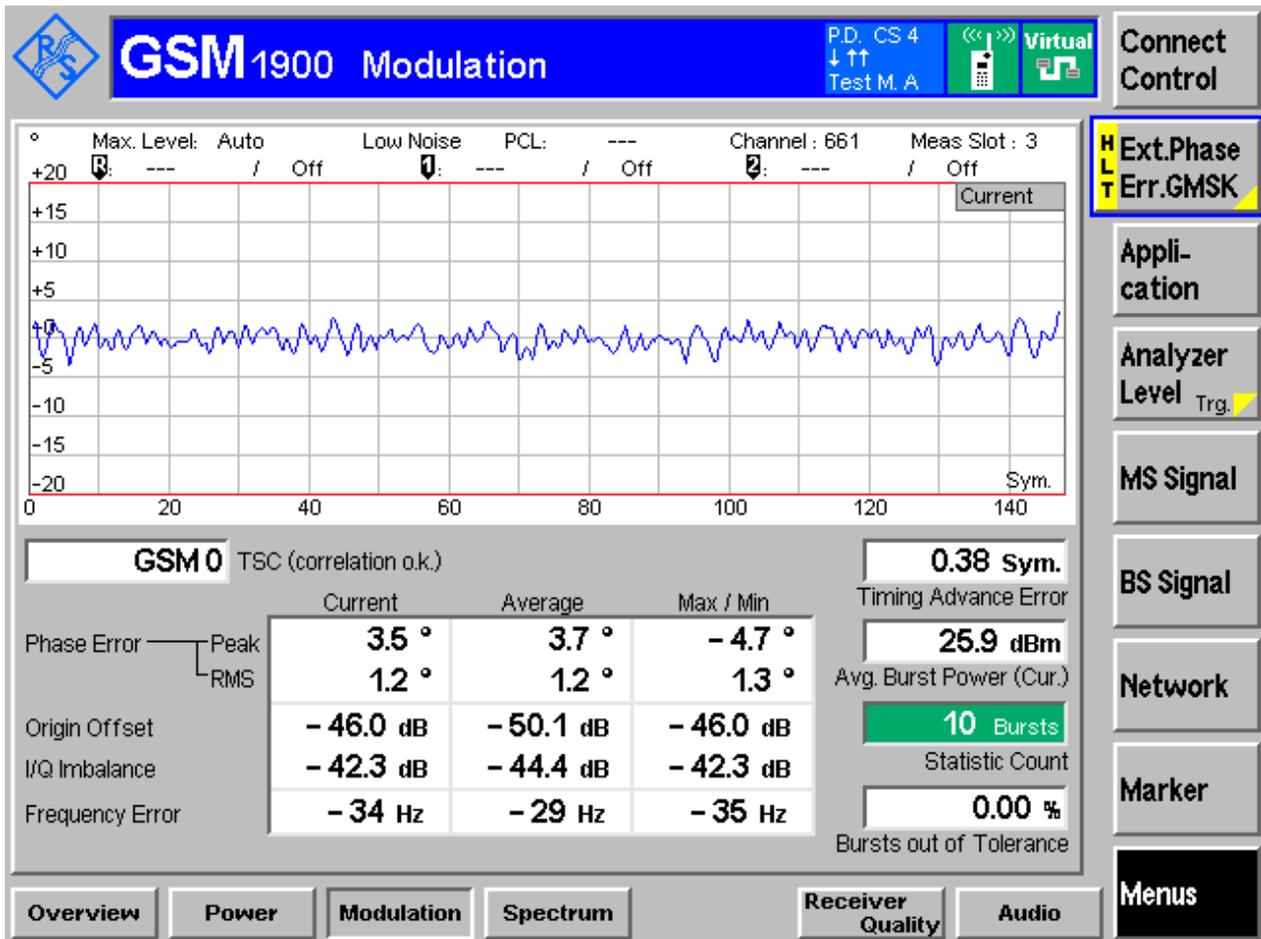
2.1.1.2.1 Test Channel = MCH



2.1.2 Test Band = GSM1900

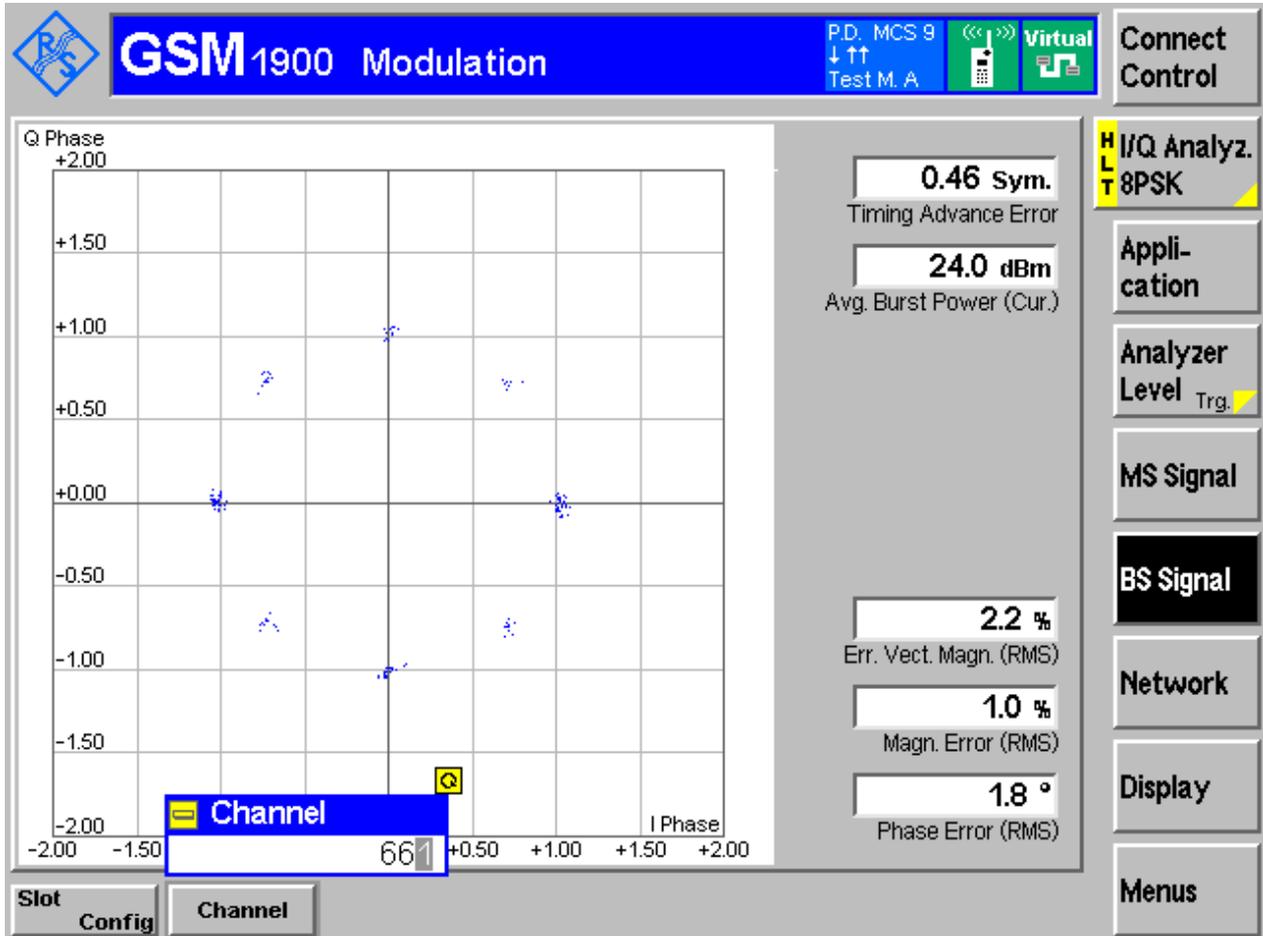
2.1.2.1 Test Mode = GSM/TM1

2.1.2.1.1 Test Channel = MCH



2.1.2.2 Test Mode = GSM/TM2

2.1.2.2.1 Test Channel = MCH





3Appendix_C: Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	248.68	312.12	Pass
		MCH	247.75	317.25	Pass
		HCH	246.02	319.16	Pass
	GSM/TM2	LCH	252.39	323.73	Pass
		MCH	249.78	319.19	Pass
		HCH	248.22	311.74	Pass
GSM1900	GSM/TM1	LCH	248.01	318.63	Pass
		MCH	247.59	319.62	Pass
		HCH	249.55	315.92	Pass
	GSM/TM2	LCH	249.29	318.99	Pass
		MCH	248.71	318.38	Pass
		HCH	249.66	321.36	Pass

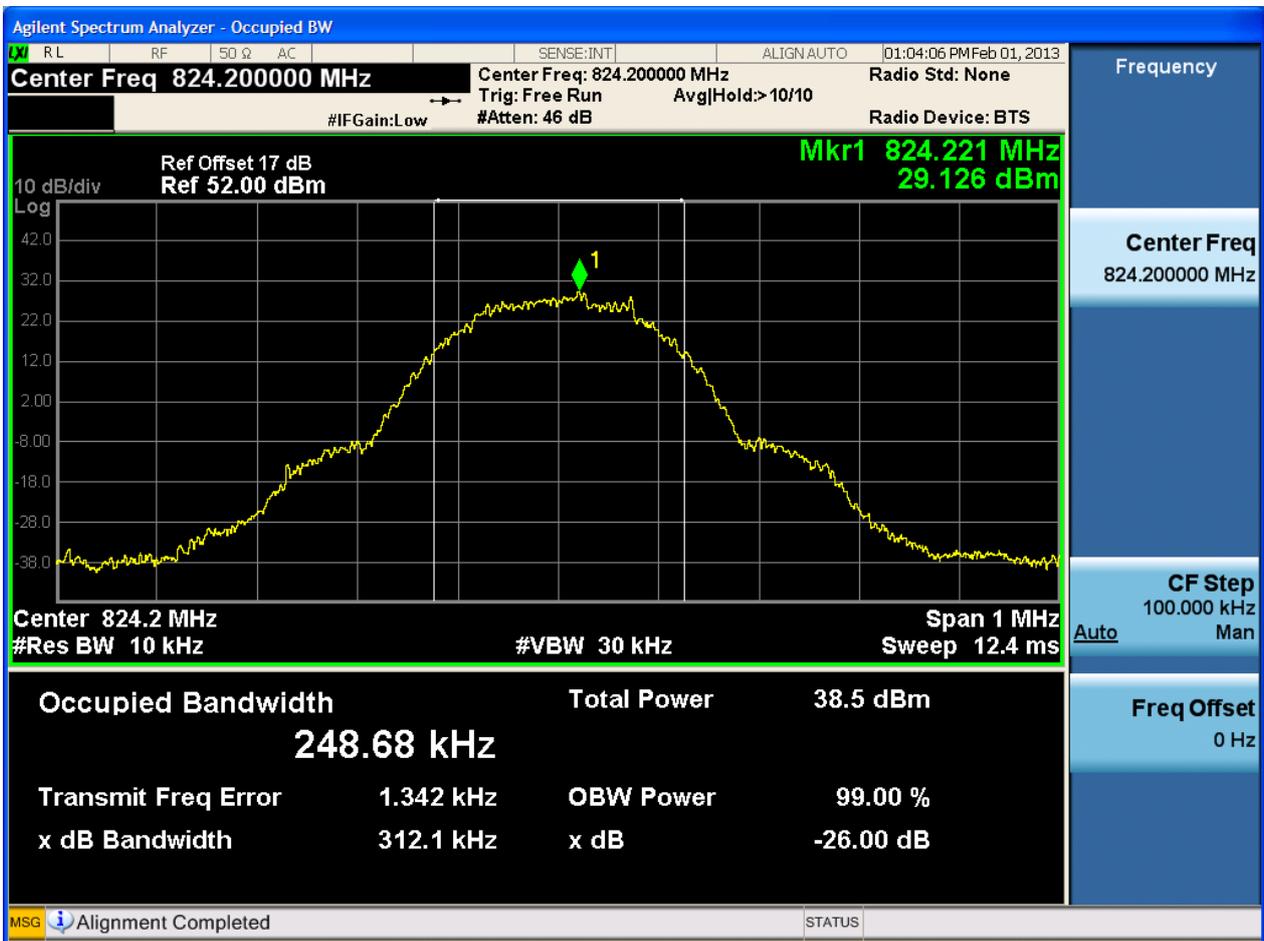
Part II - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

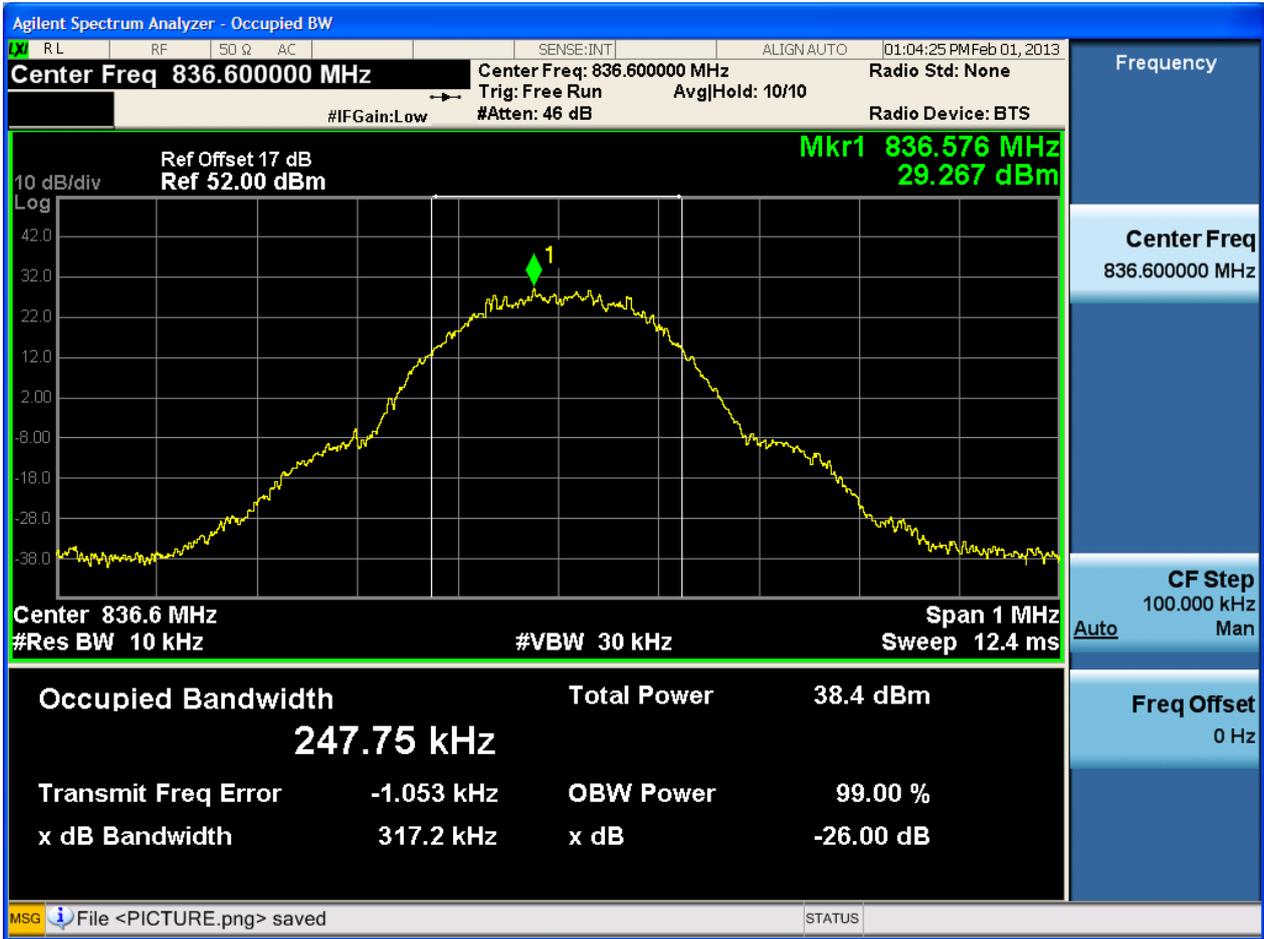
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = LCH



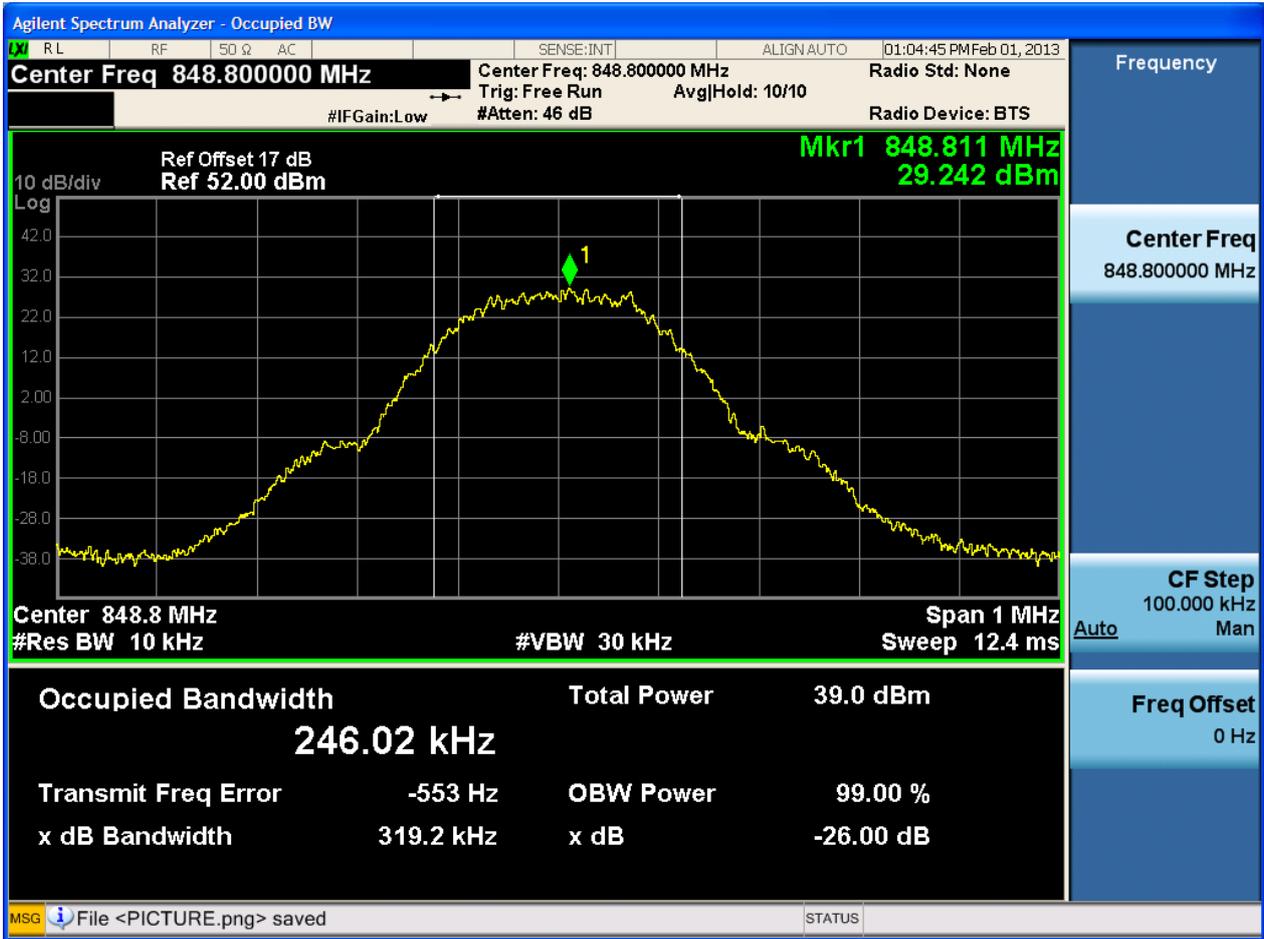


3.1.1.1.2 Test Channel = MCH





3.1.1.1.3 Test Channel = HCH





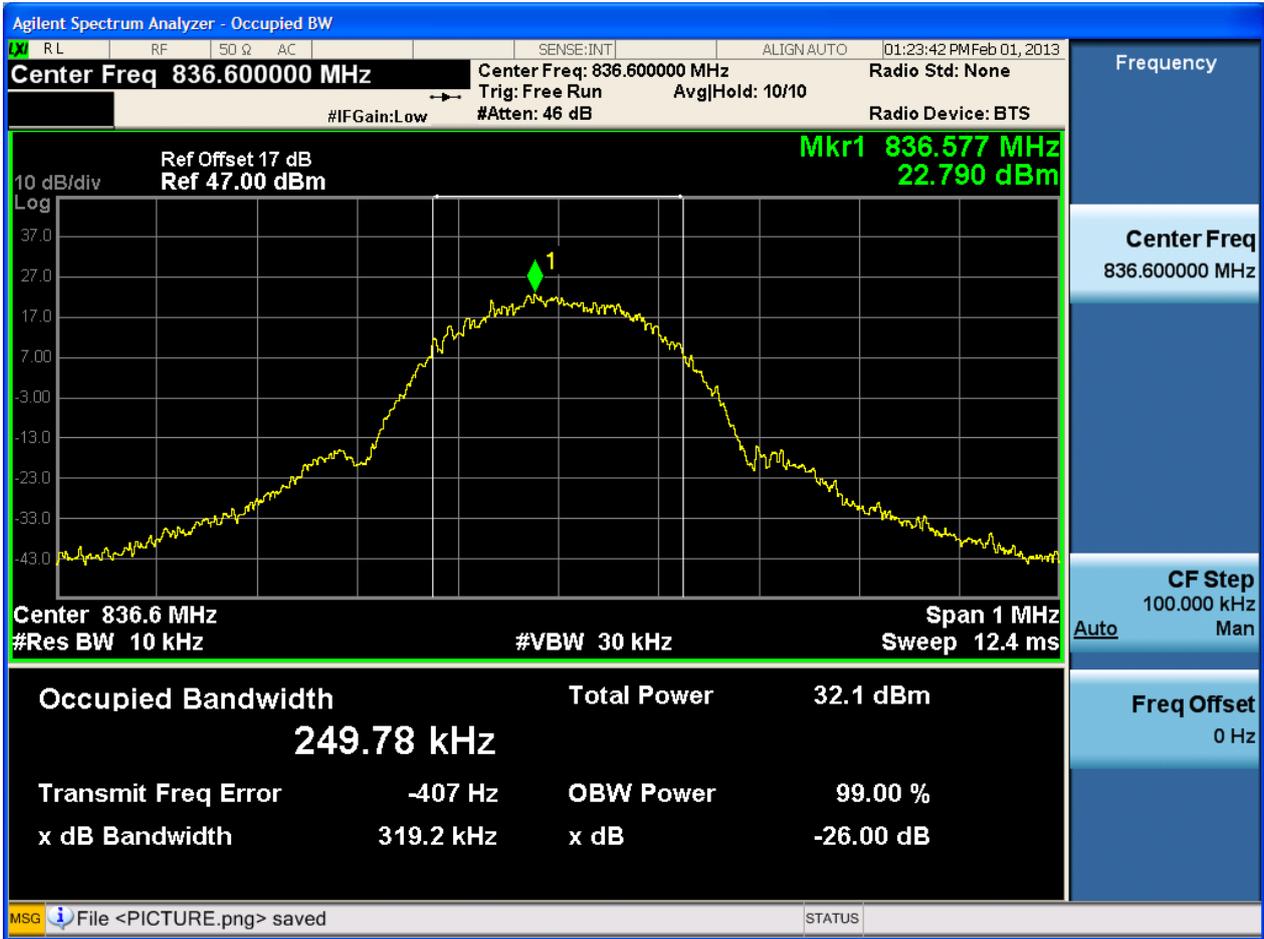
3.1.1.2 Test Mode = GSM/TM2

3.1.1.2.1 Test Channel = LCH



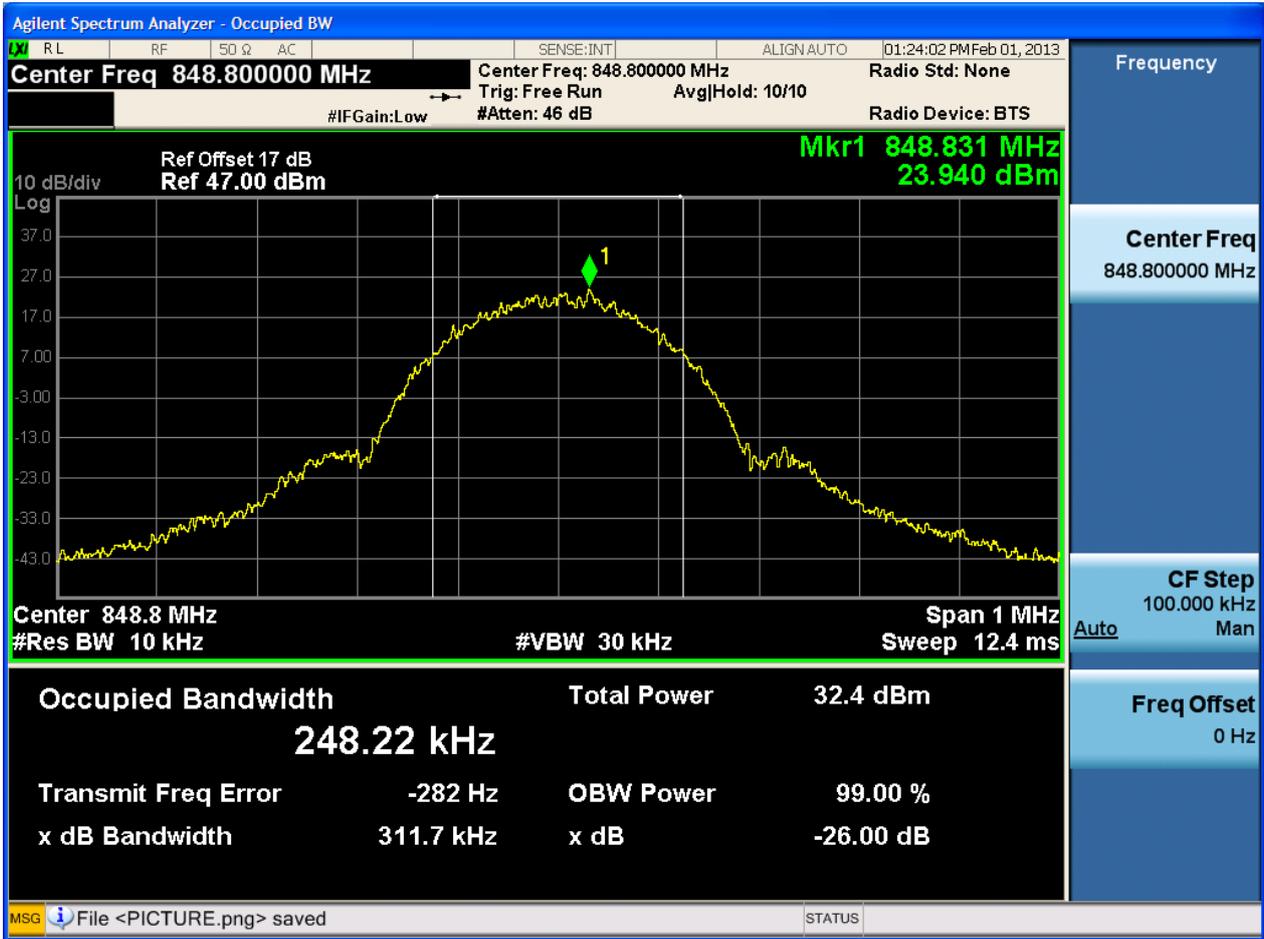


3.1.1.2.2 Test Channel = MCH





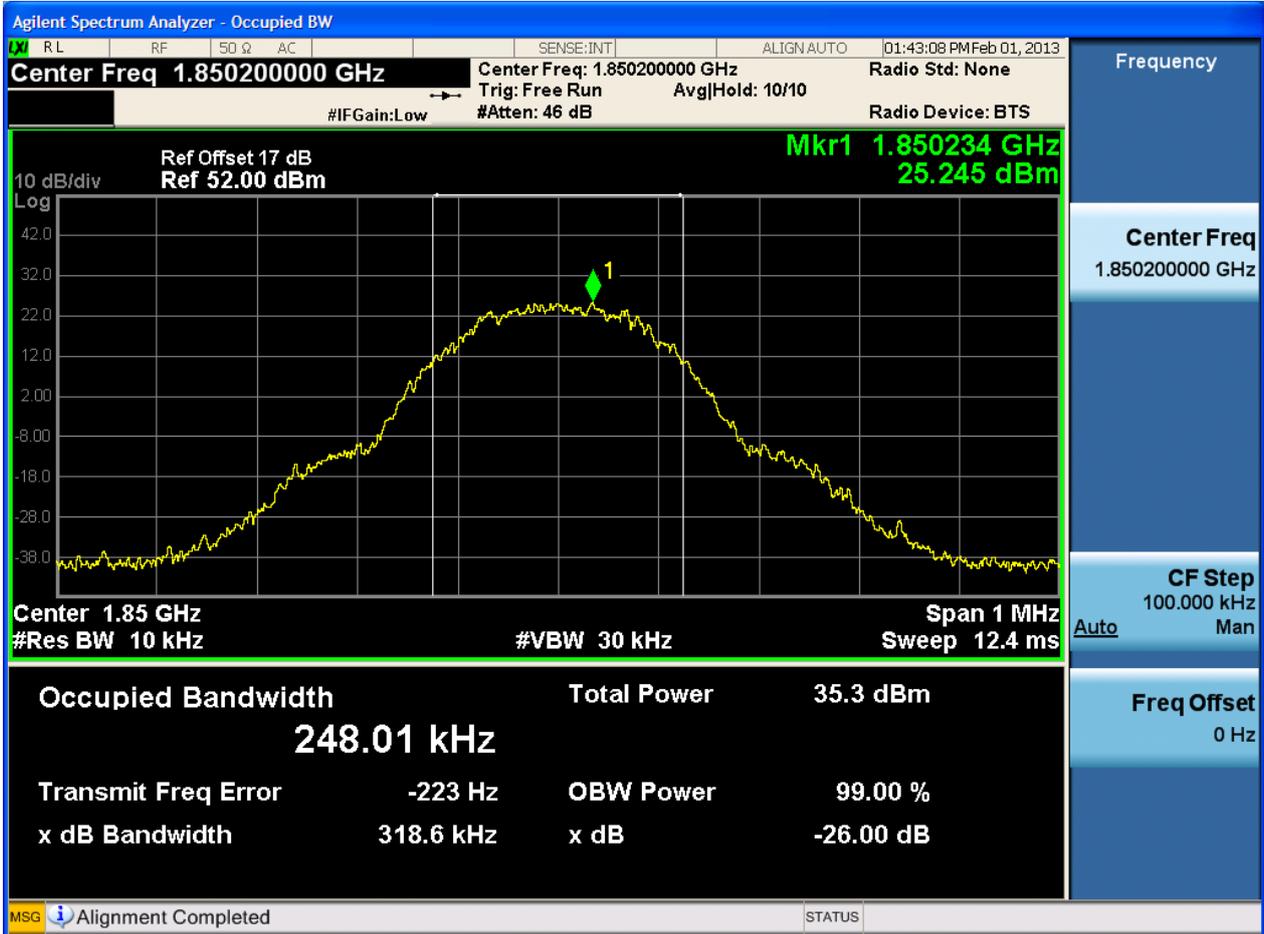
3.1.1.2.3 Test Channel = HCH



3.1.2 Test Band = GSM1900

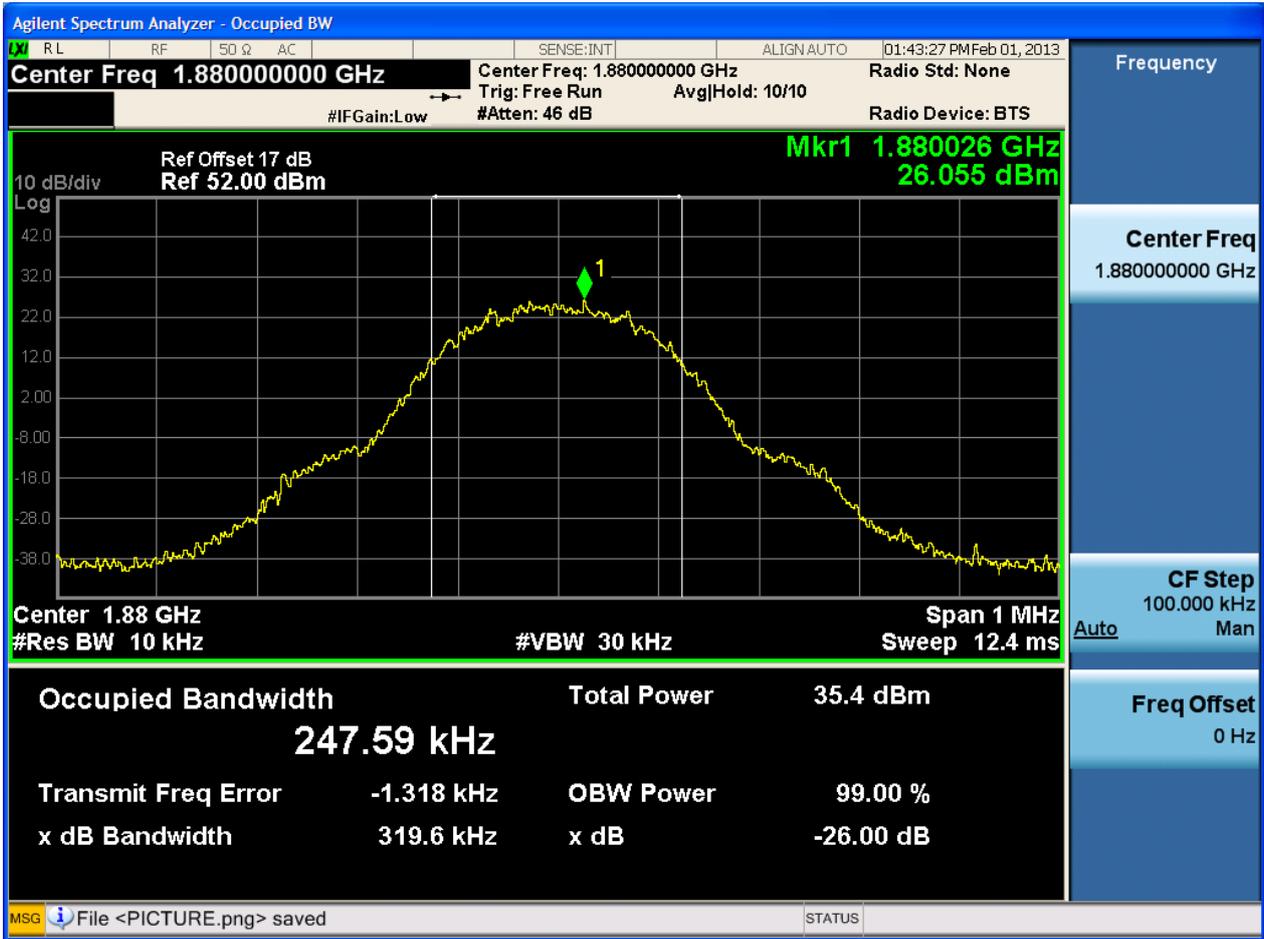
3.1.2.1 Test Mode = GSM/TM1

3.1.2.1.1 Test Channel = LCH



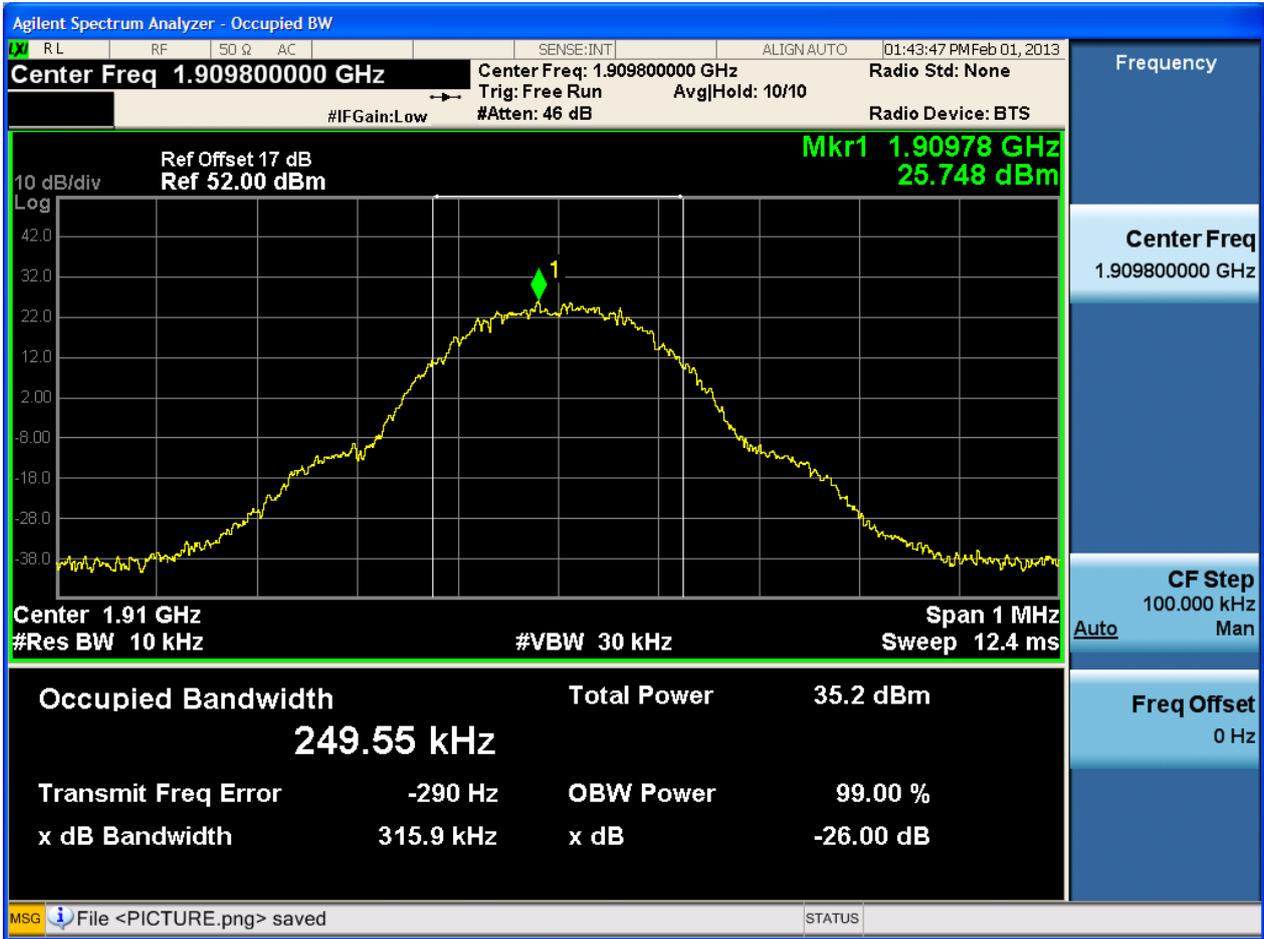


3.1.2.1.2 Test Channel = MCH





3.1.2.1.3 Test Channel = HCH





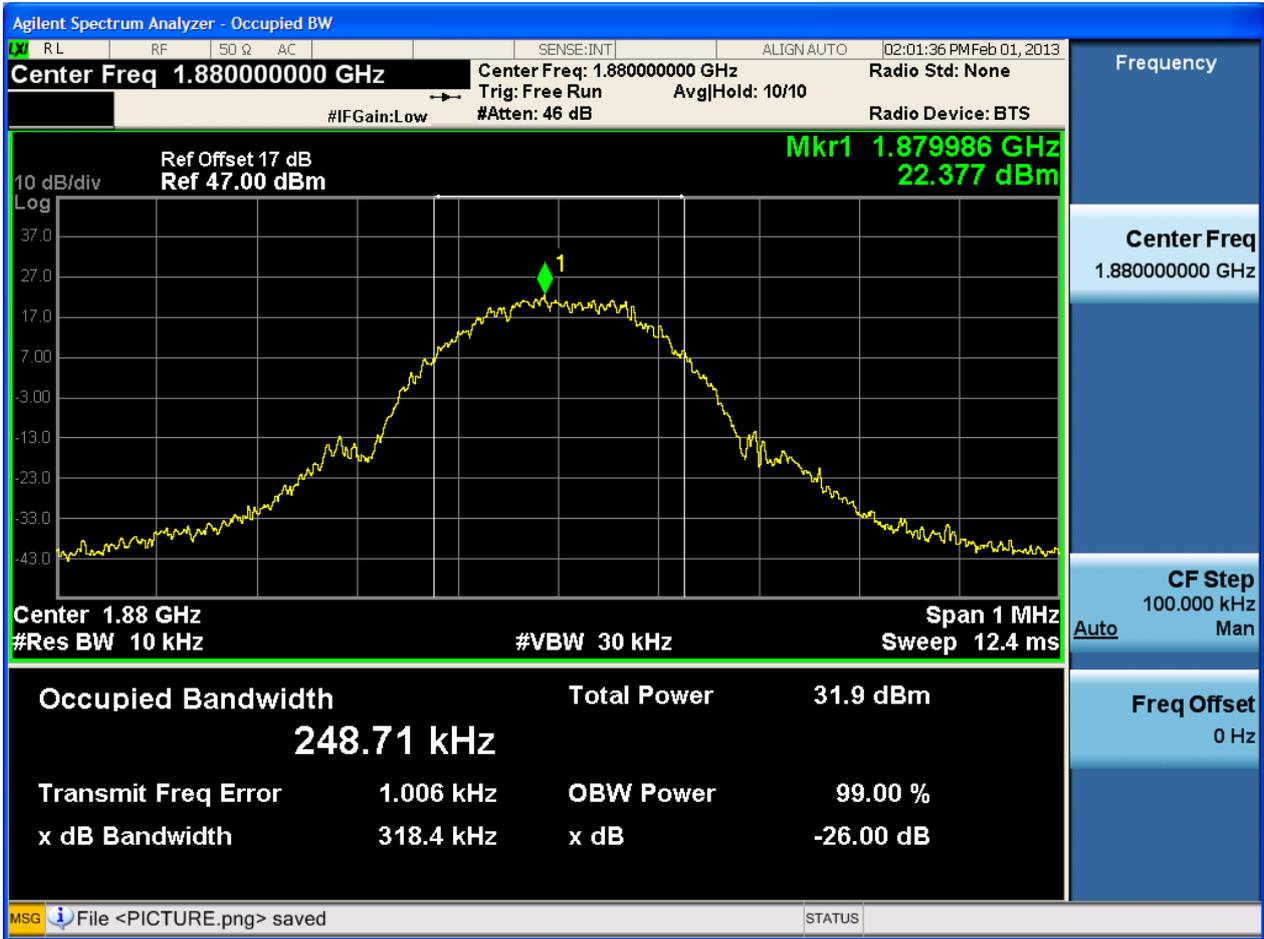
3.1.2.2 Test Mode = GSM/TM2

3.1.2.2.1 Test Channel = LCH



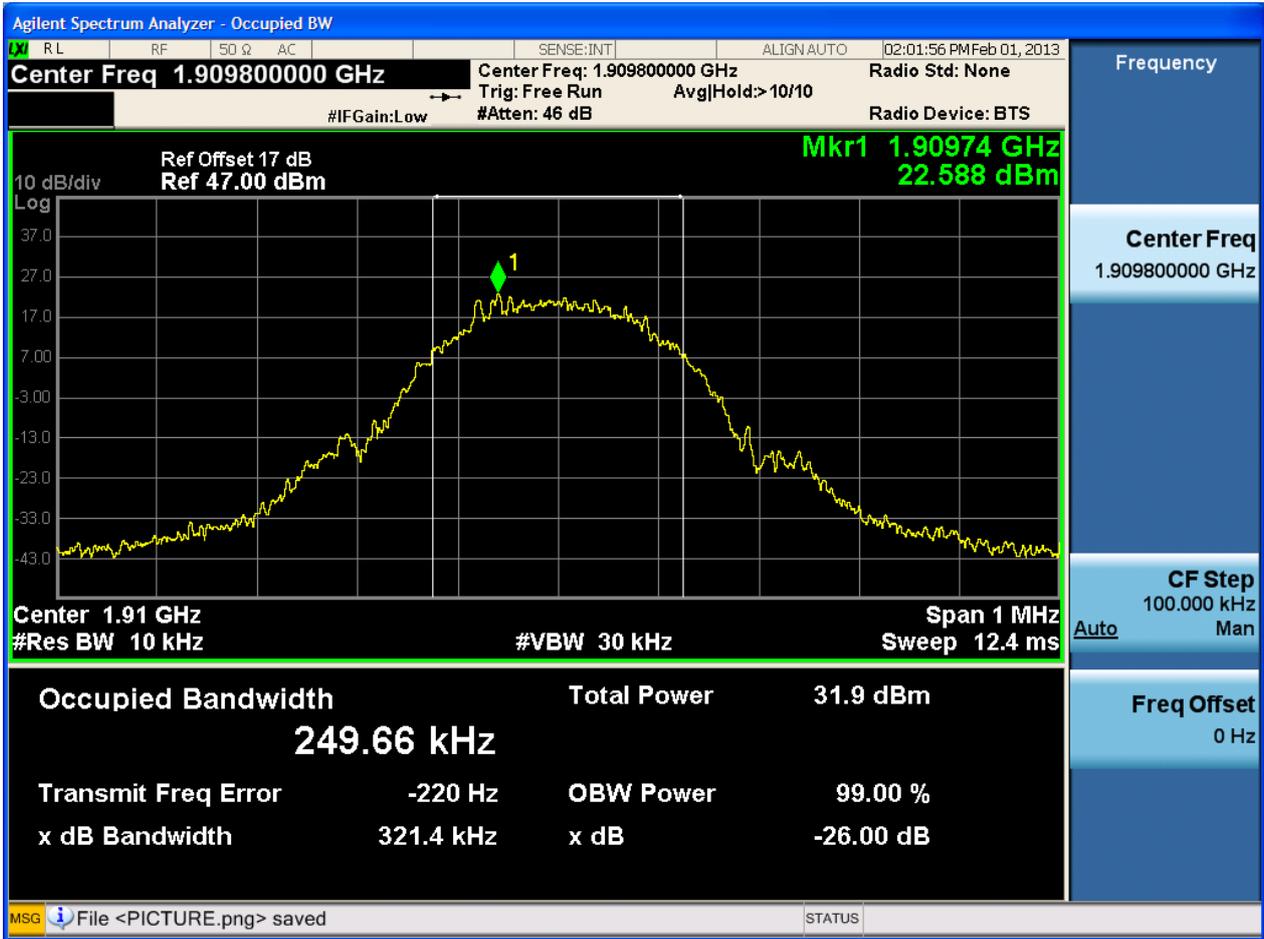


3.1.2.2.2 Test Channel = MCH





3.1.2.2.3 Test Channel = HCH



4Appendix_D: Band Edges Compliance

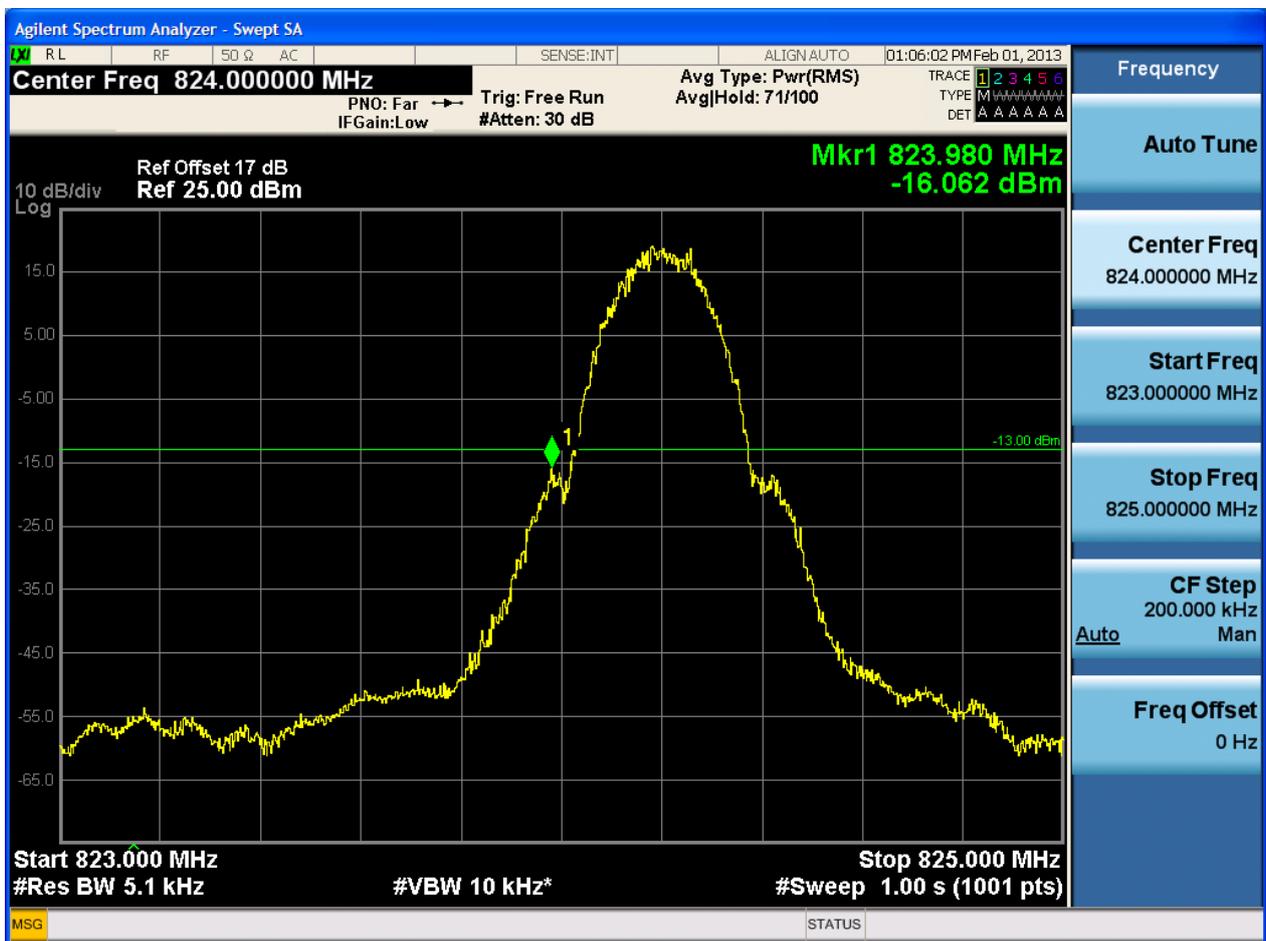
Part I - Test Plots

4.1 For GSM

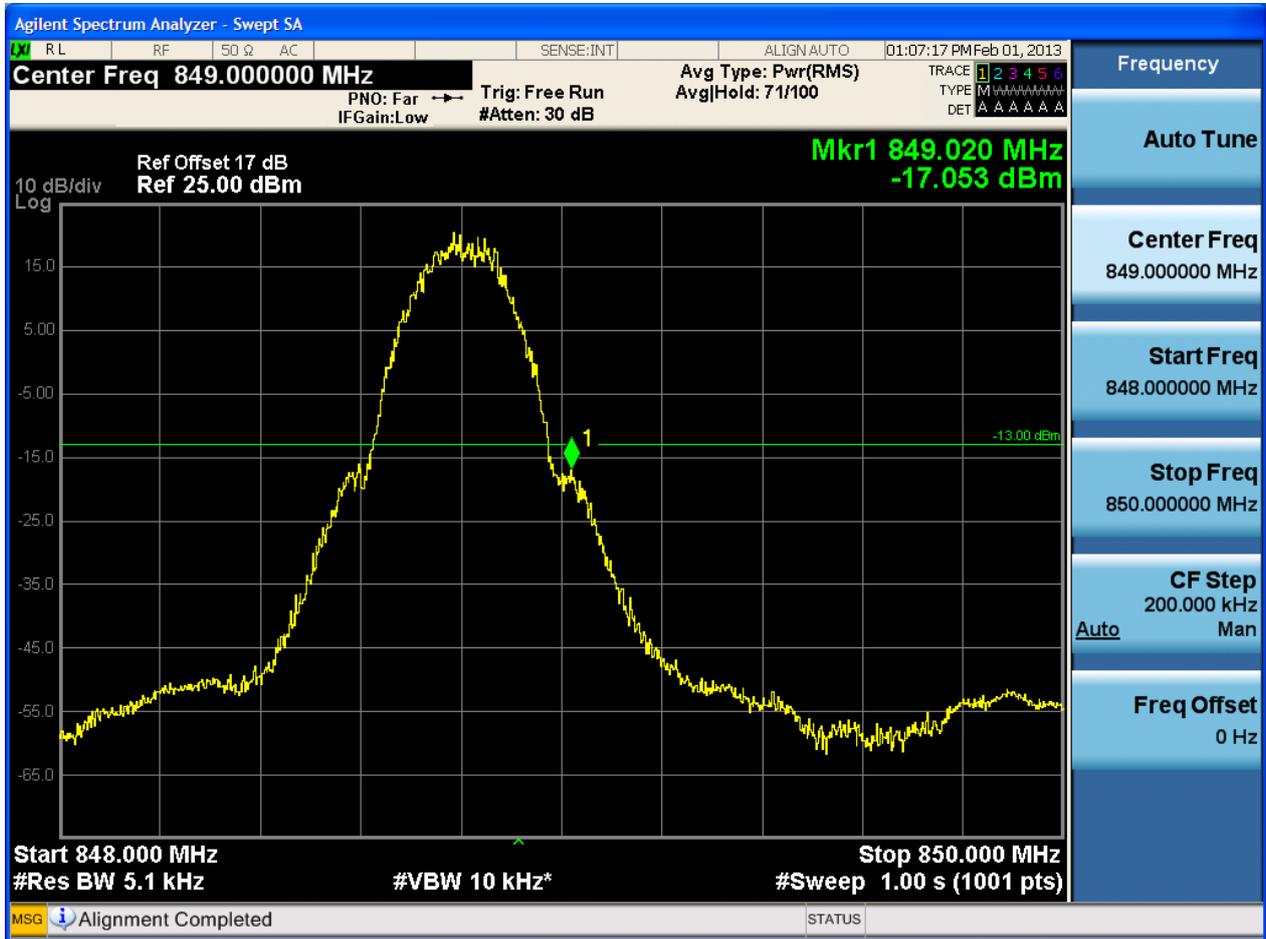
4.1.1 Test Band = GSM850

4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH

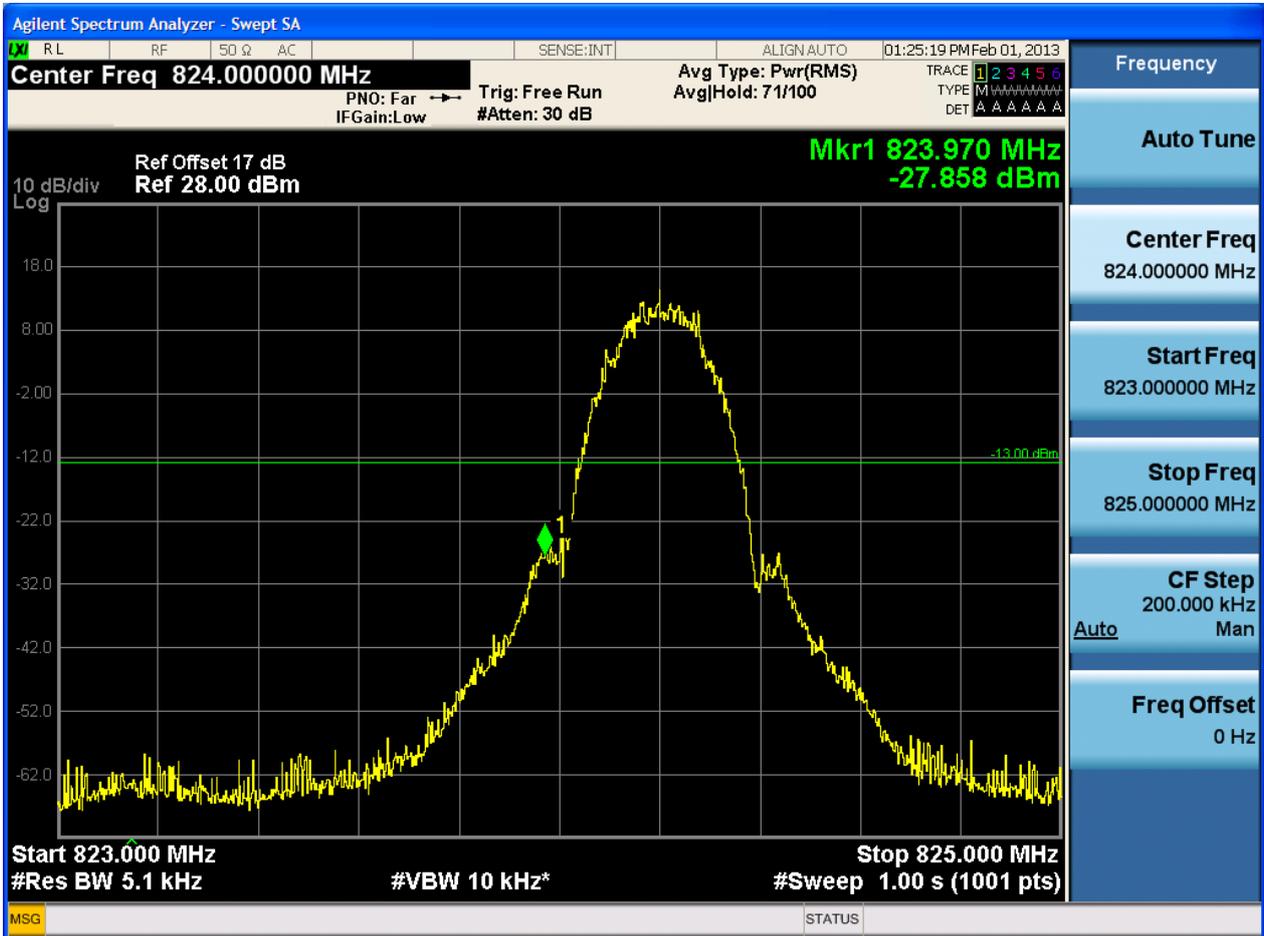


4.1.1.1.2 Test Channel = HCH

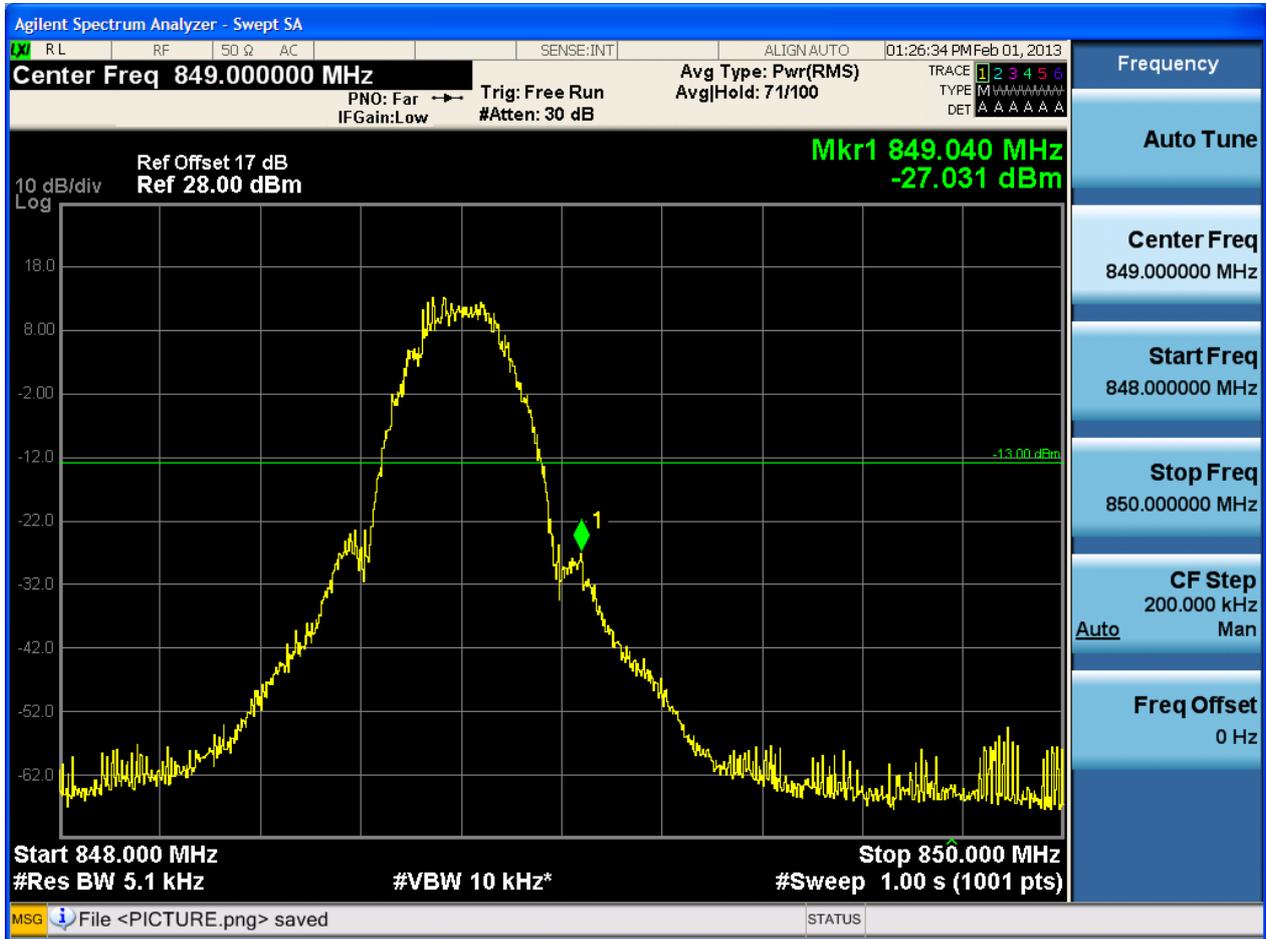


4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



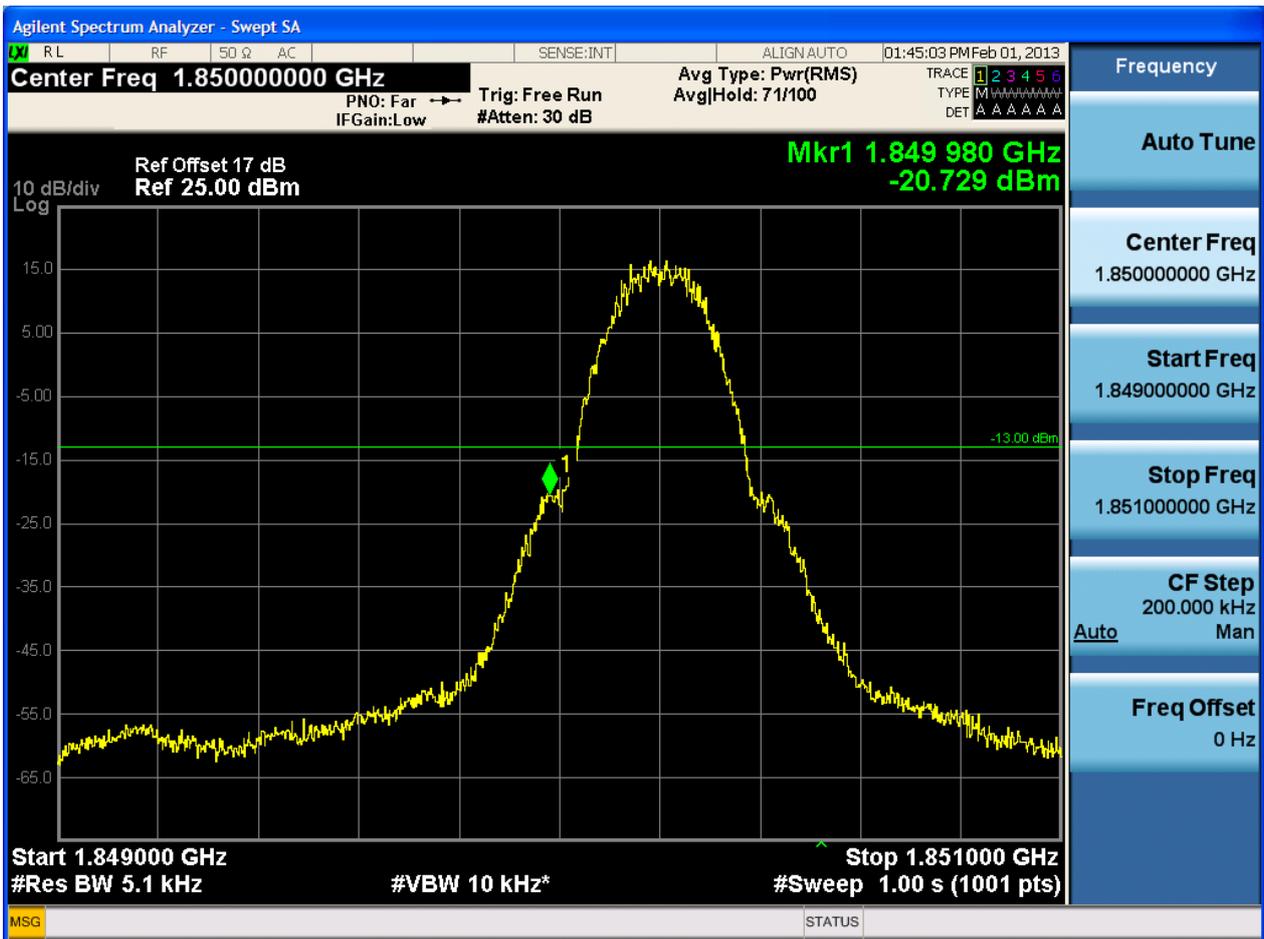
4.1.1.2.2 Test Channel = HCH



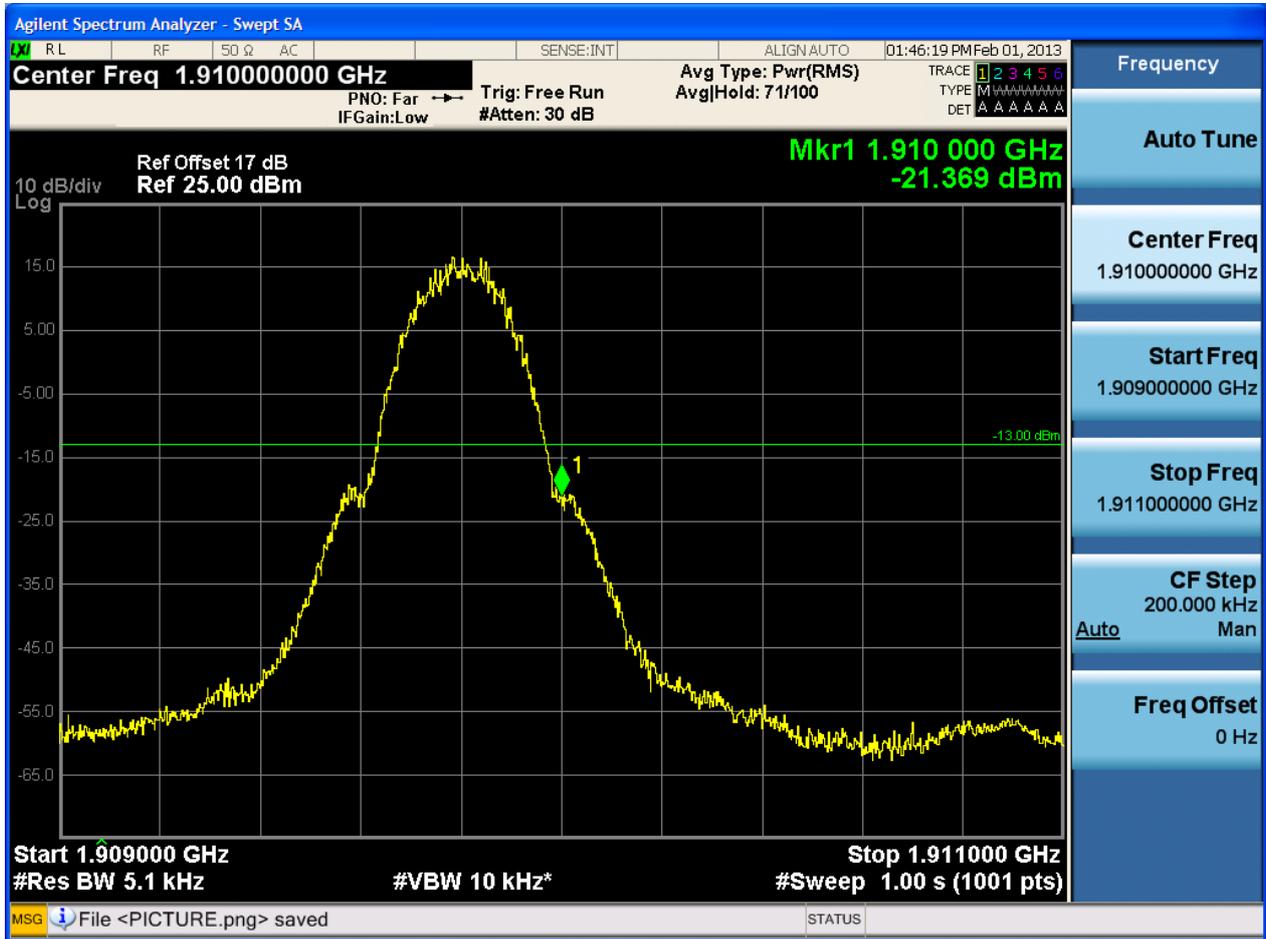
4.1.2 Test Band = GSM1900

4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH

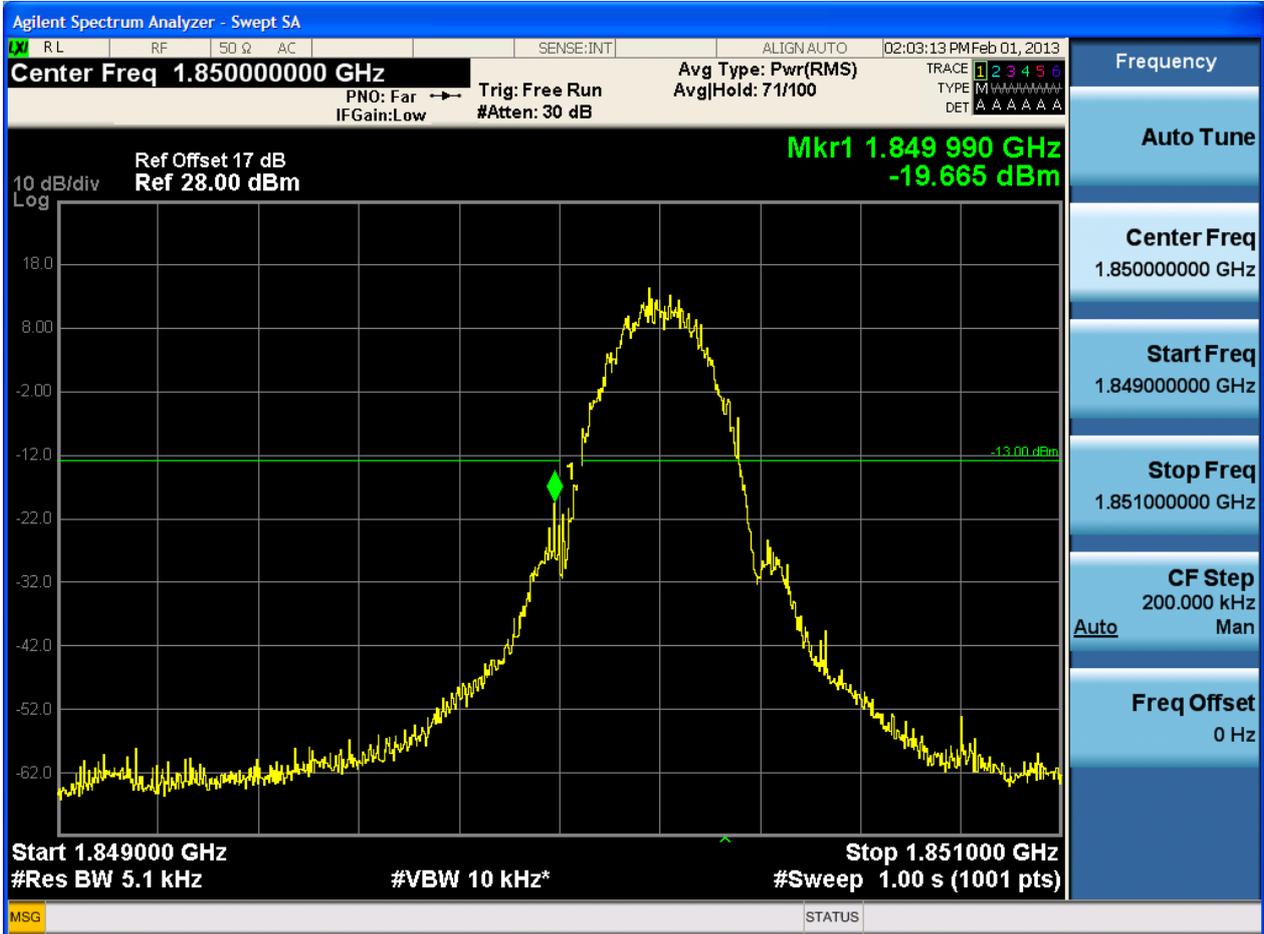


4.1.2.1.2 Test Channel = HCH

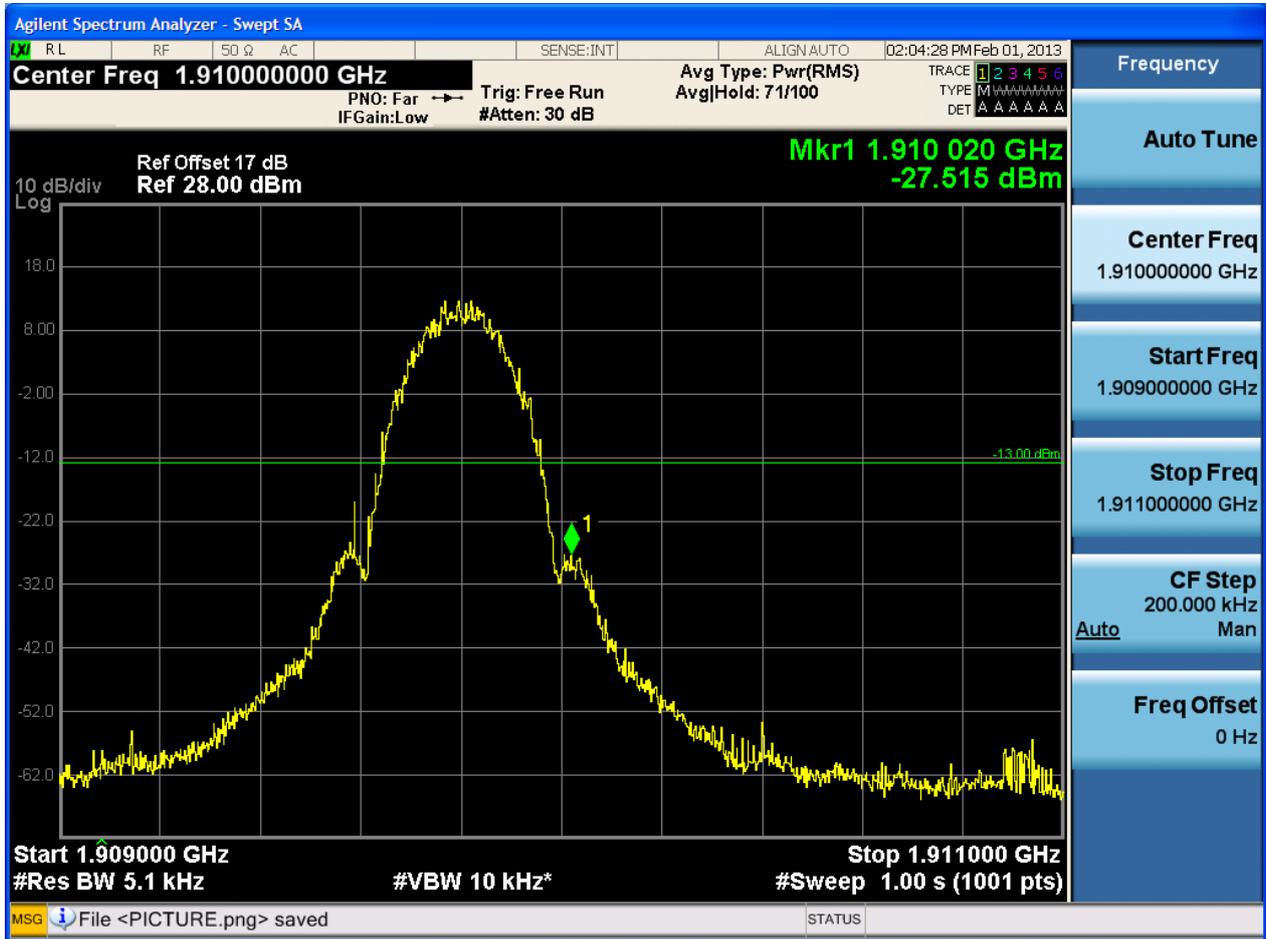


4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



4.1.2.2.2 Test Channel = HCH



5Appendix_E: 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.

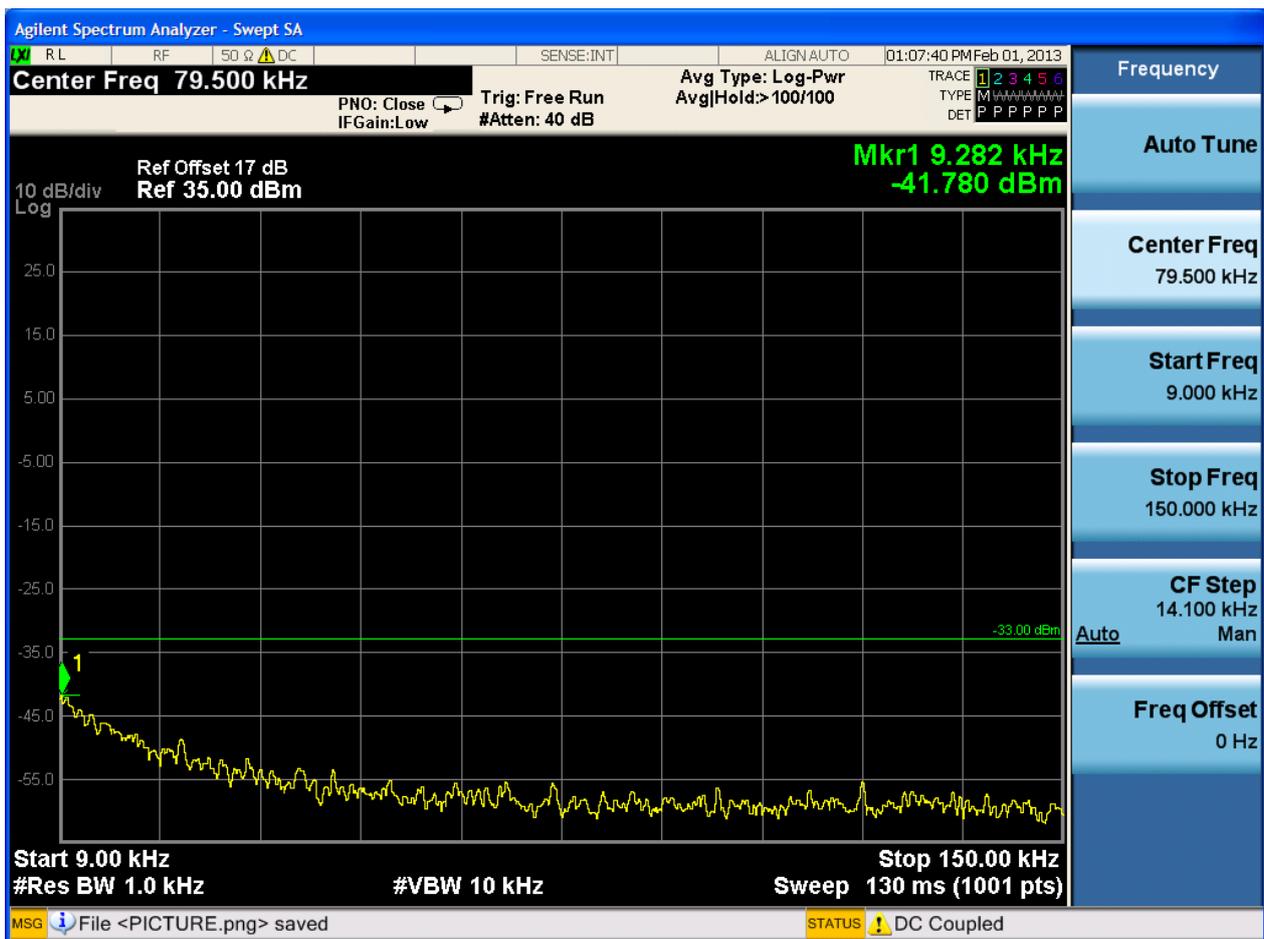
Part I - Test Plots

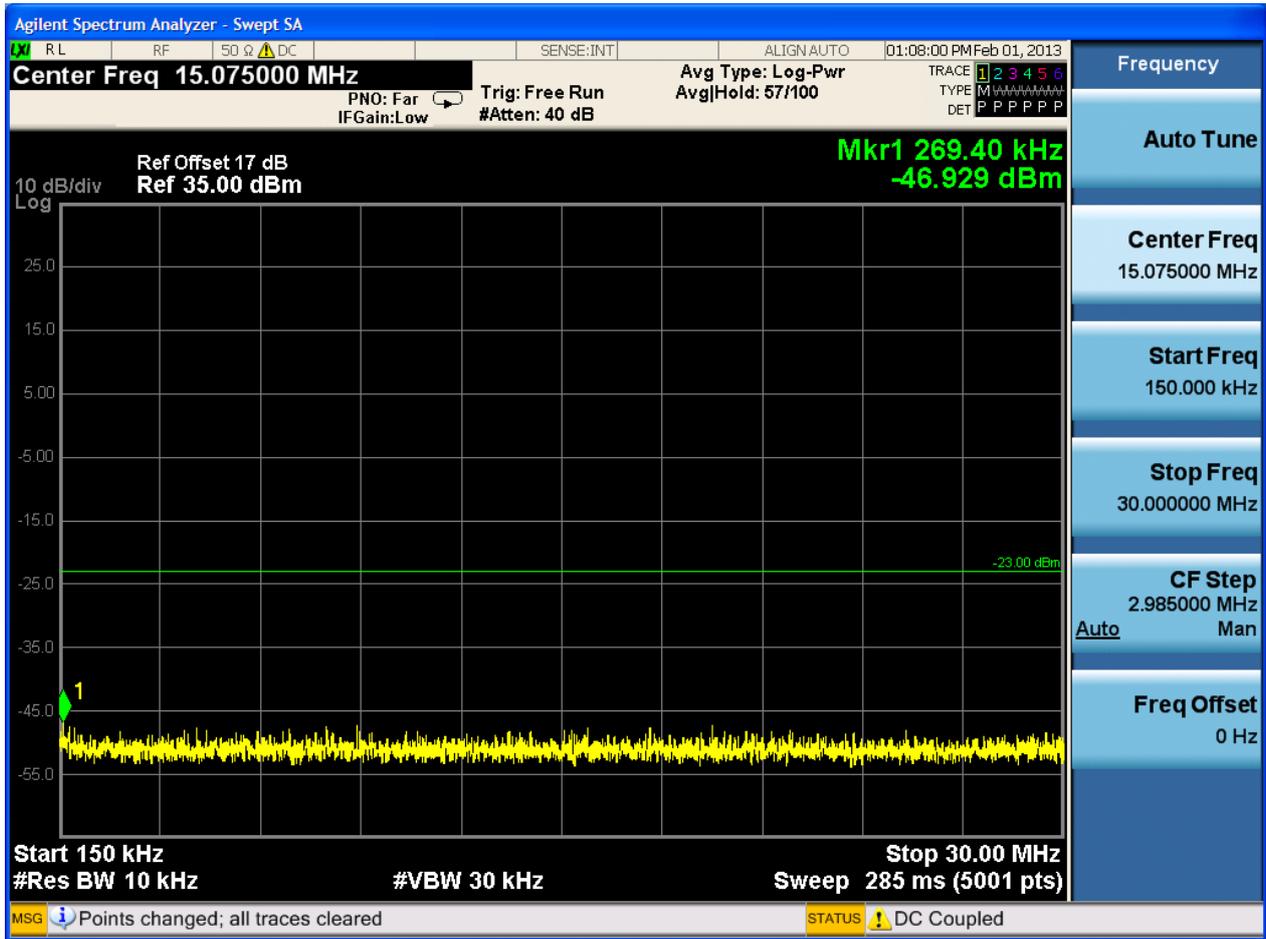
5.1 For GSM

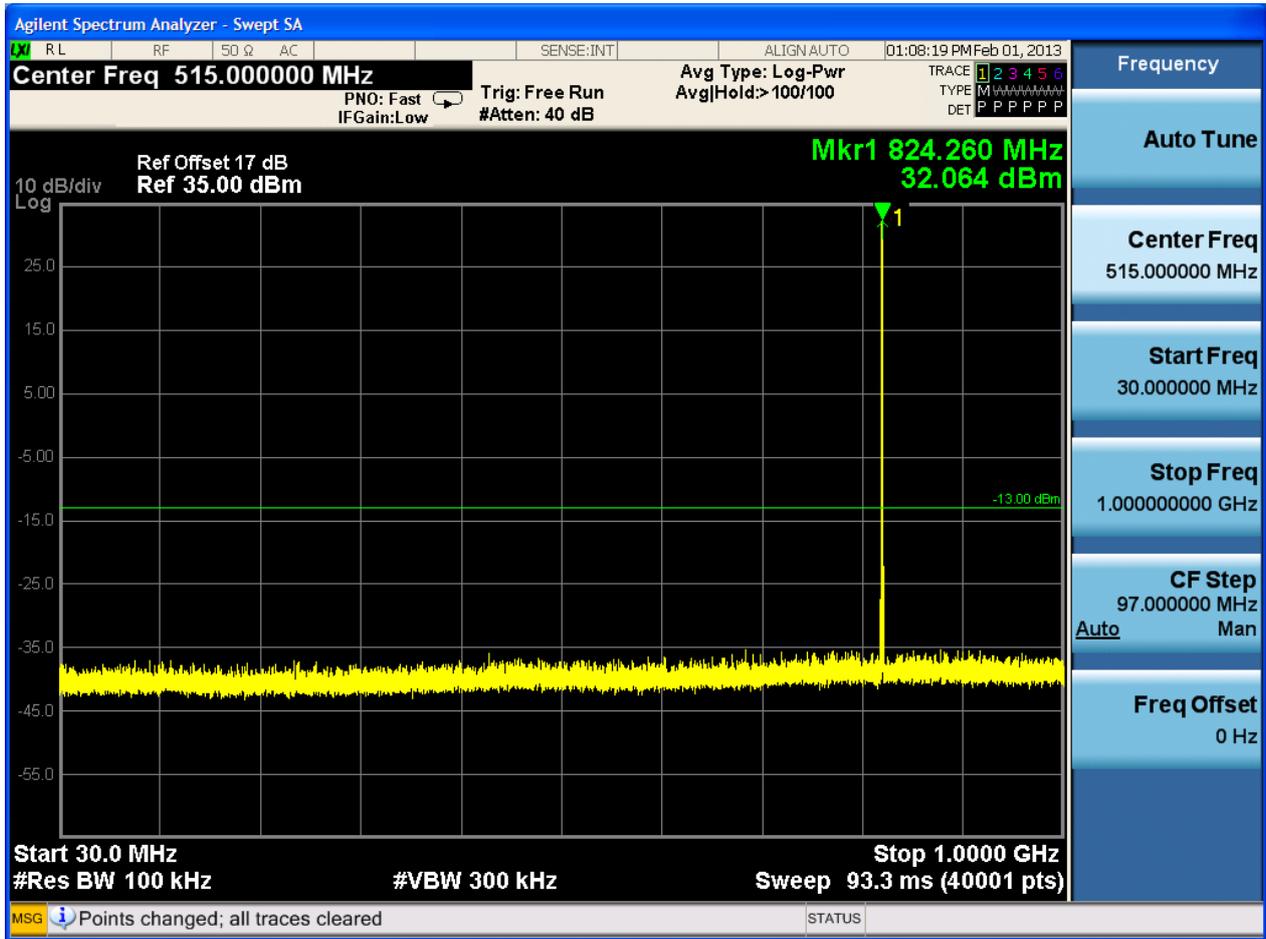
5.1.1 Test Band = GSM850

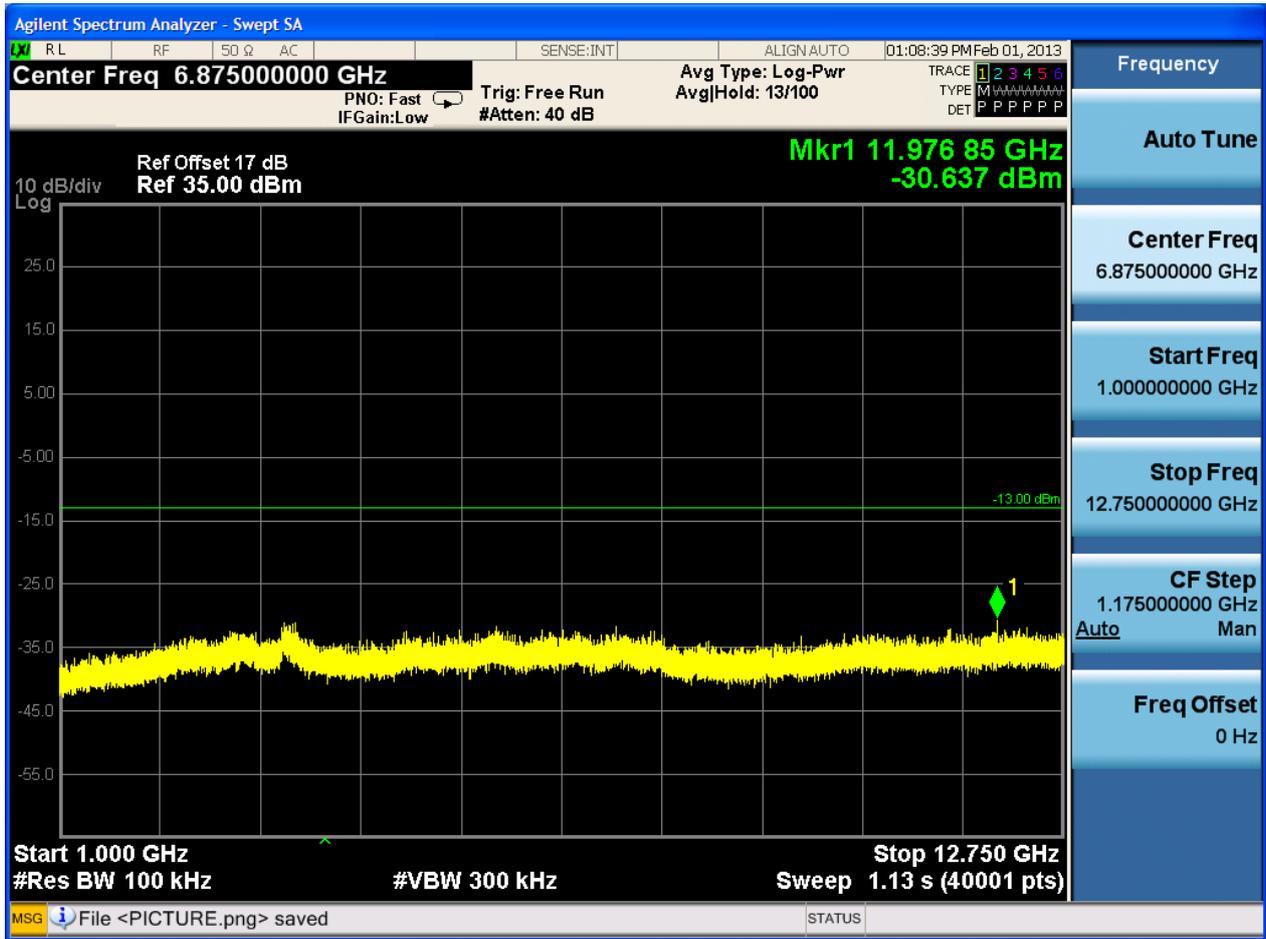
5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH

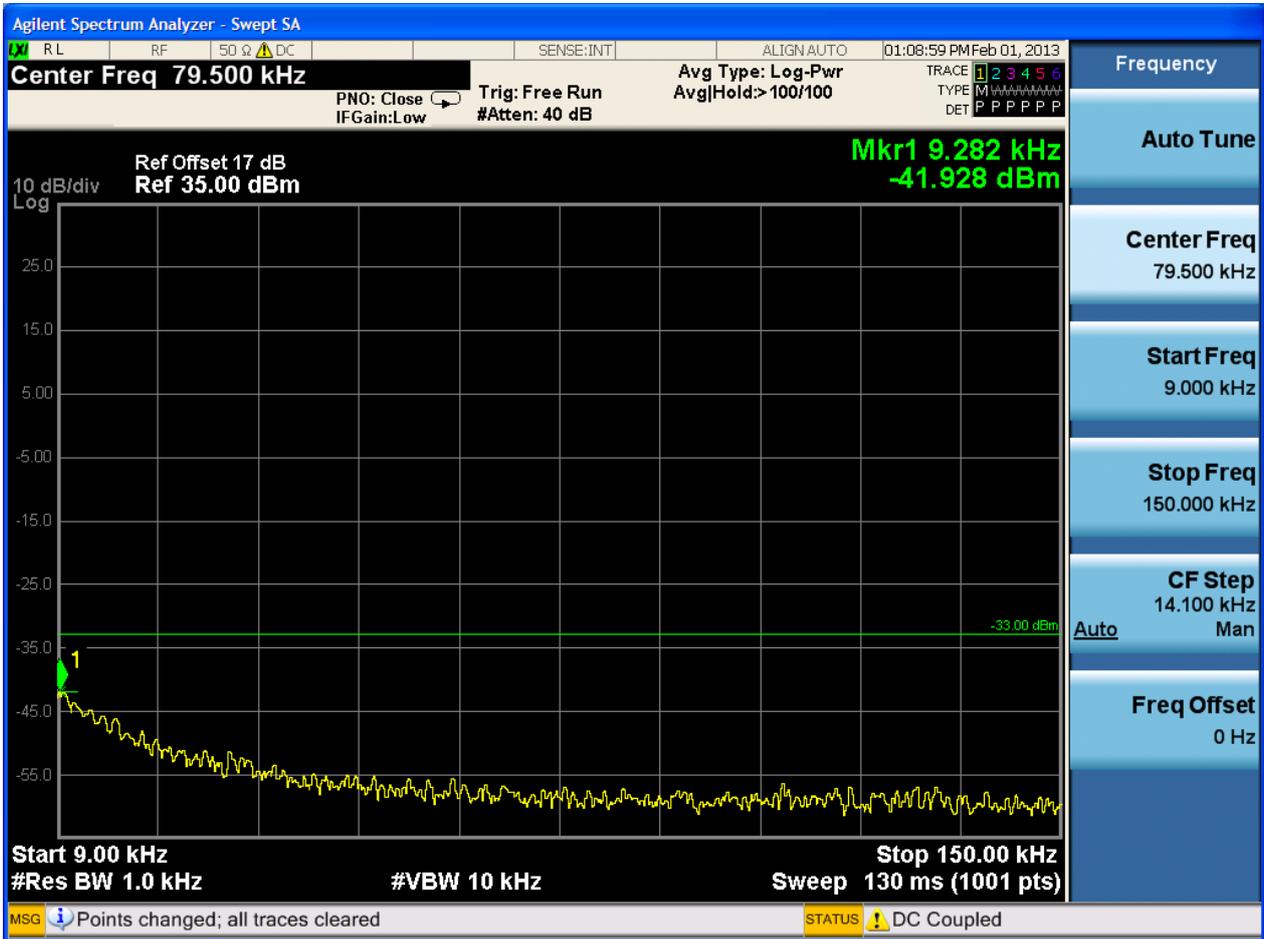


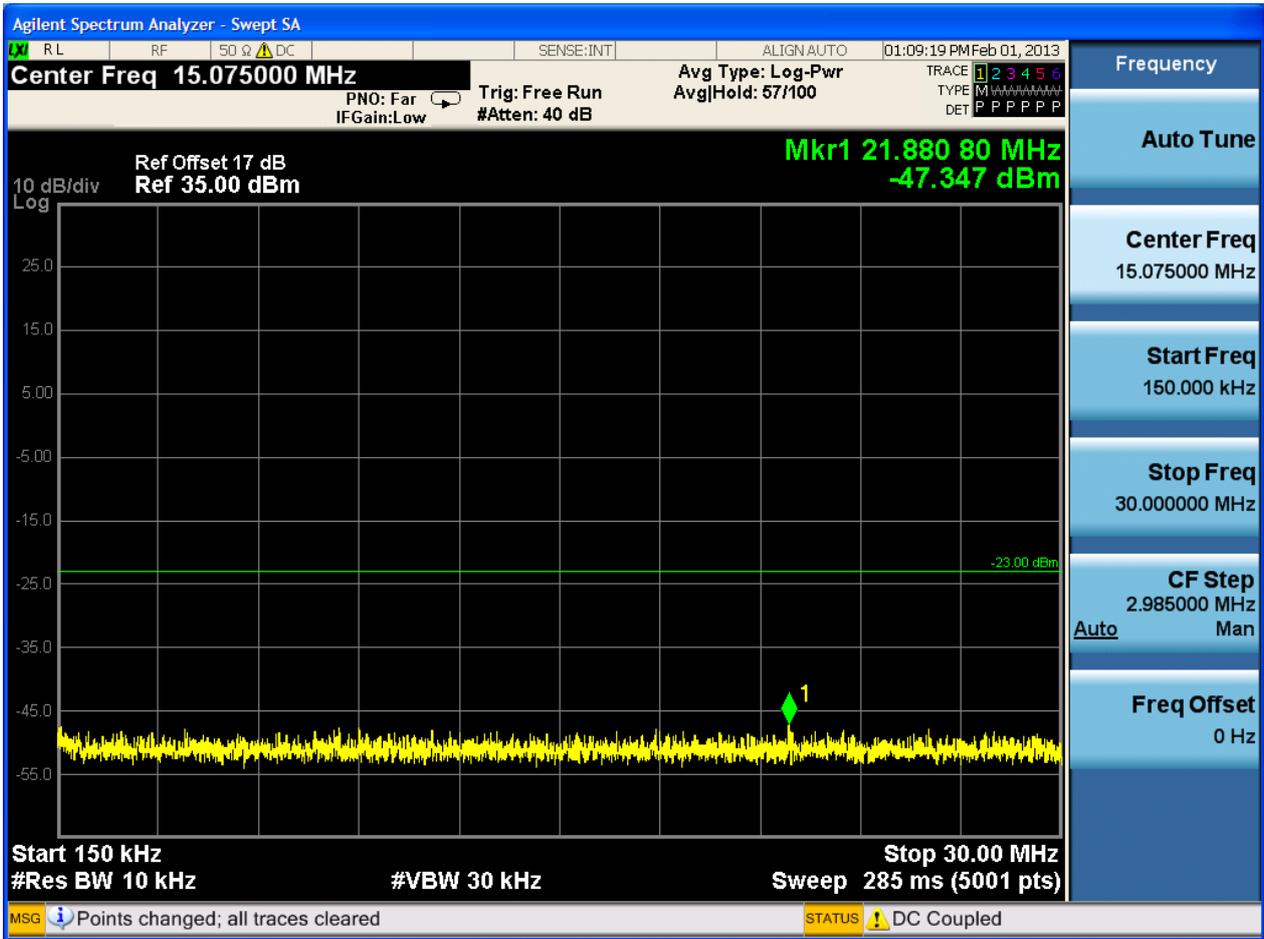


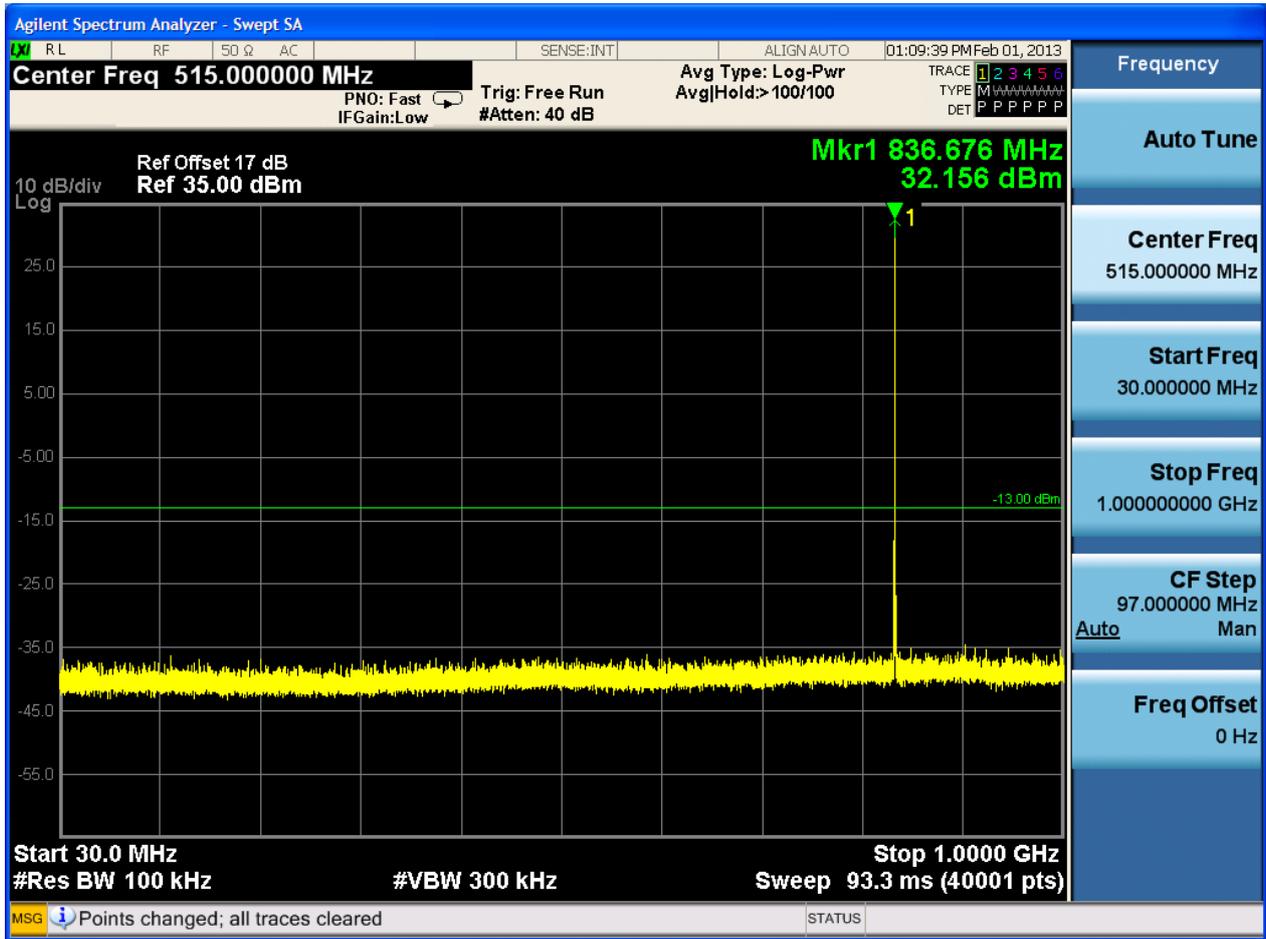


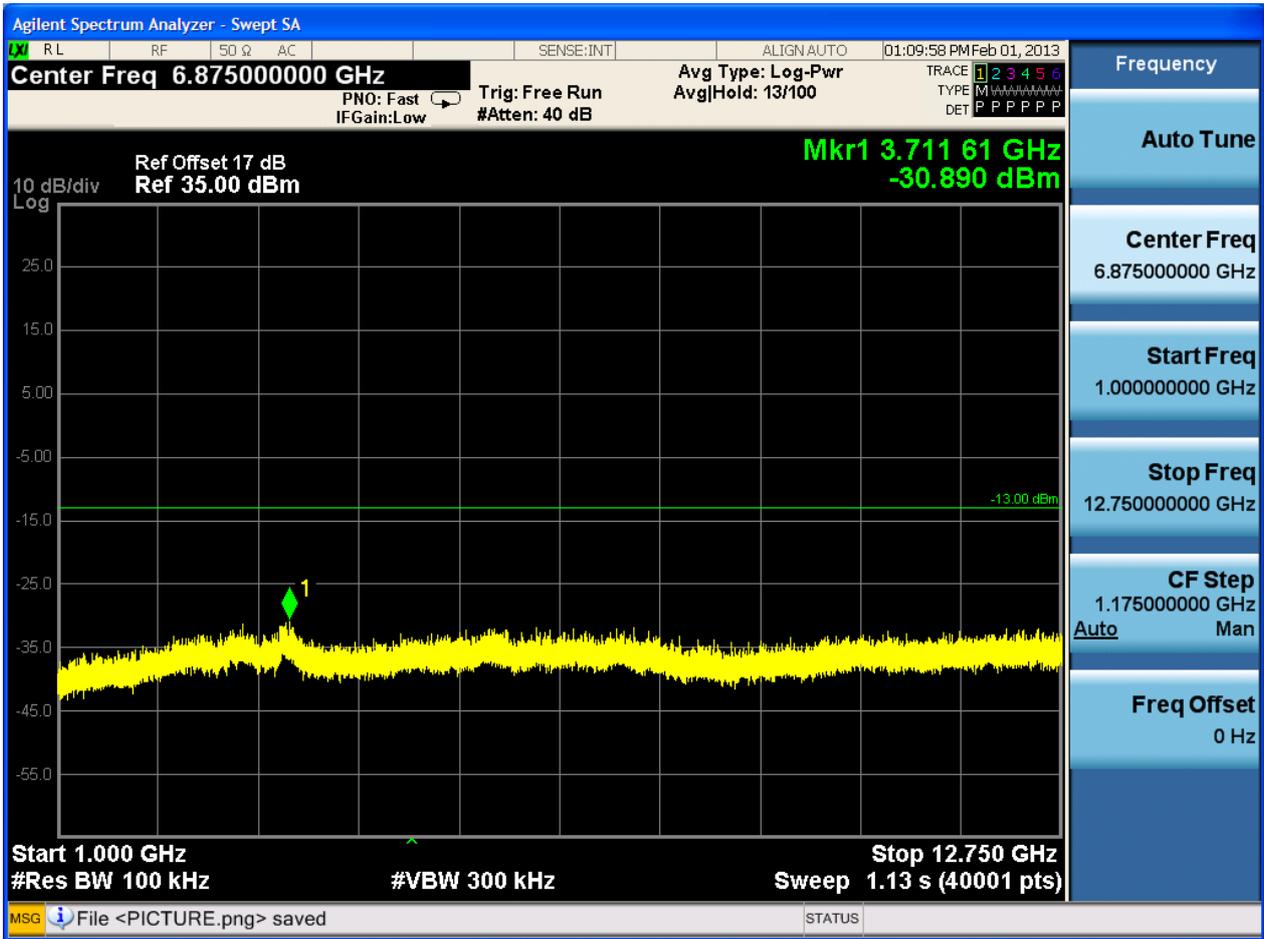


5.1.1.1.2 Test Channel = MCH



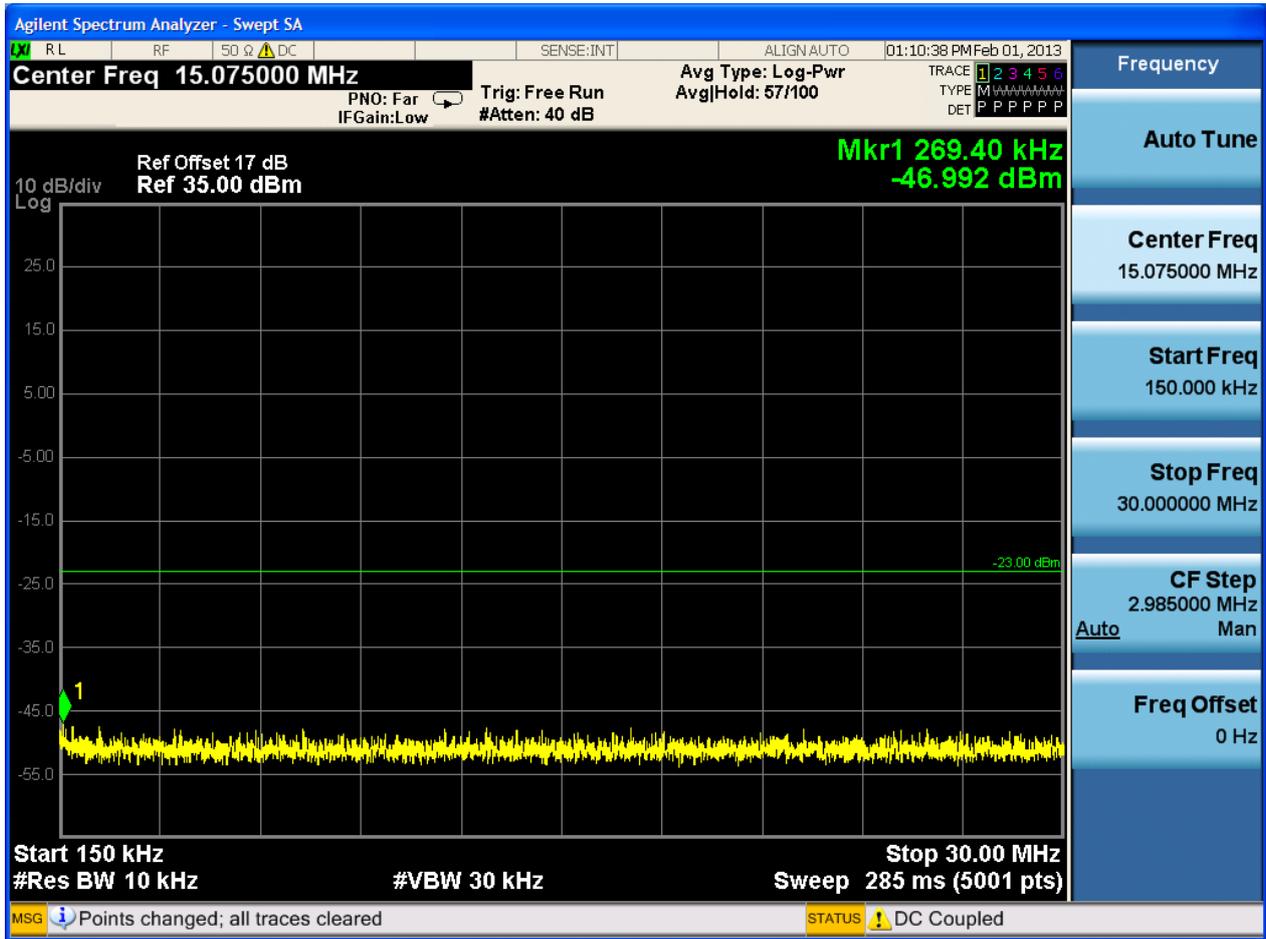


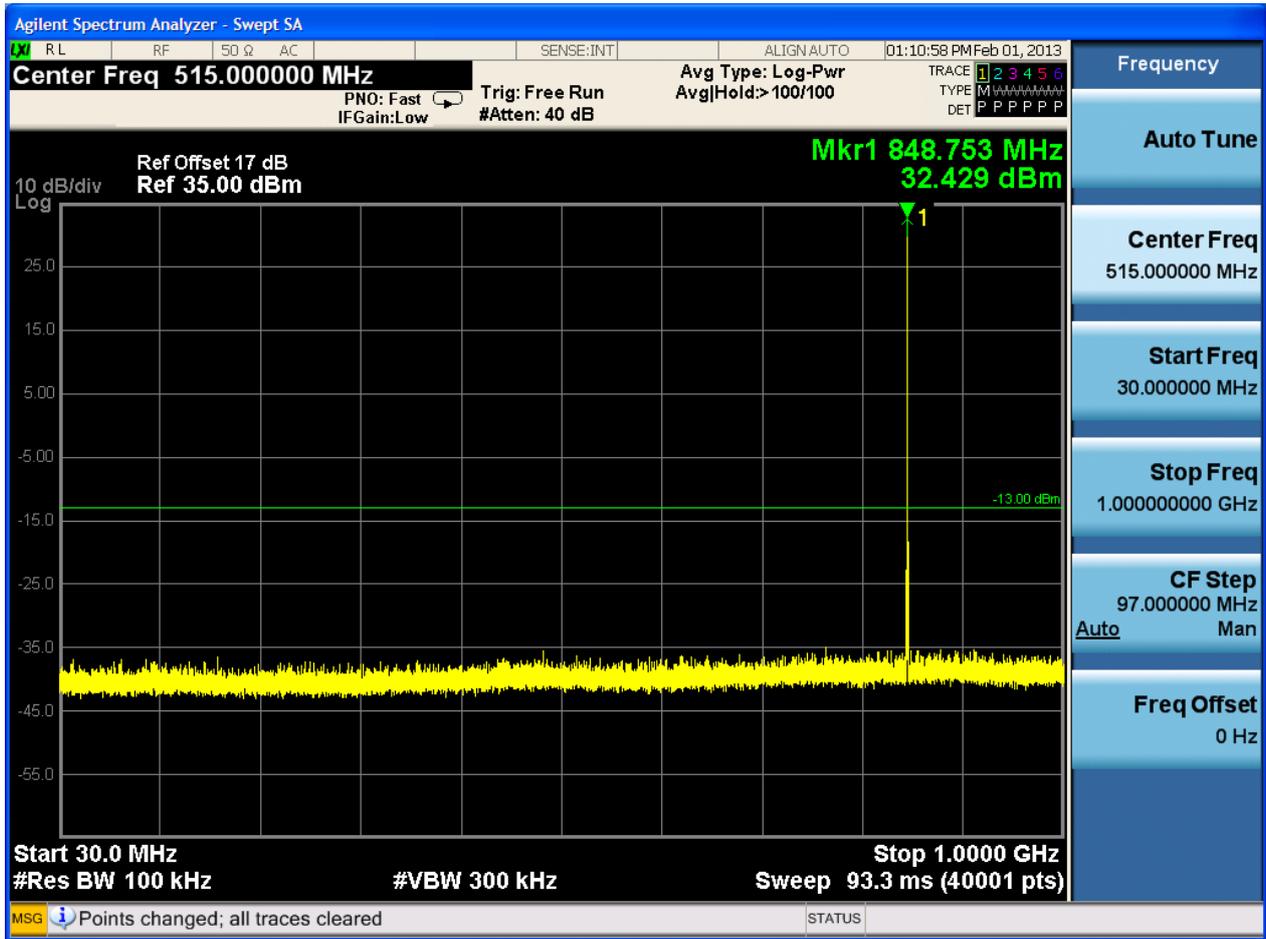


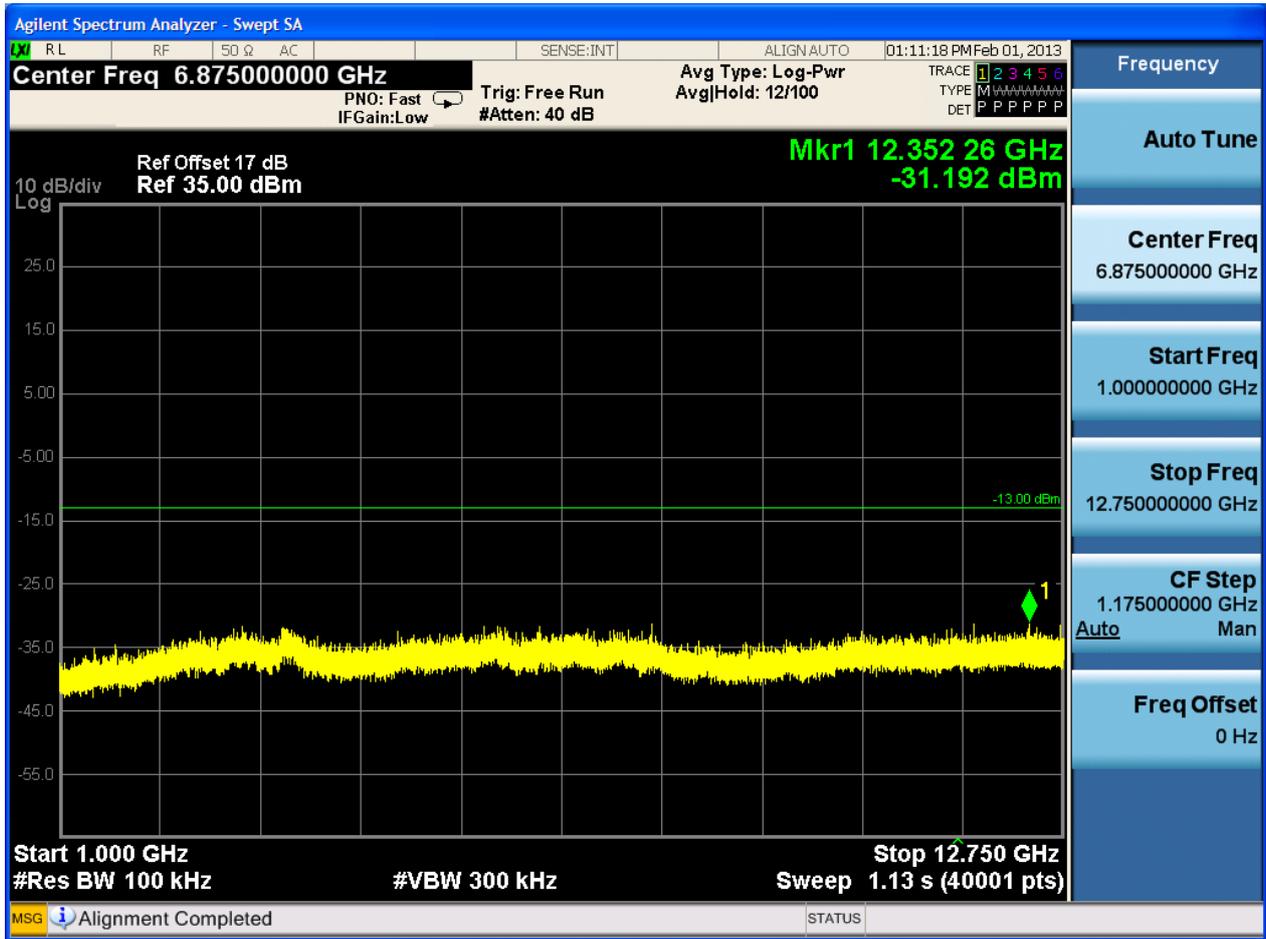


5.1.1.1.3 Test Channel = HCH



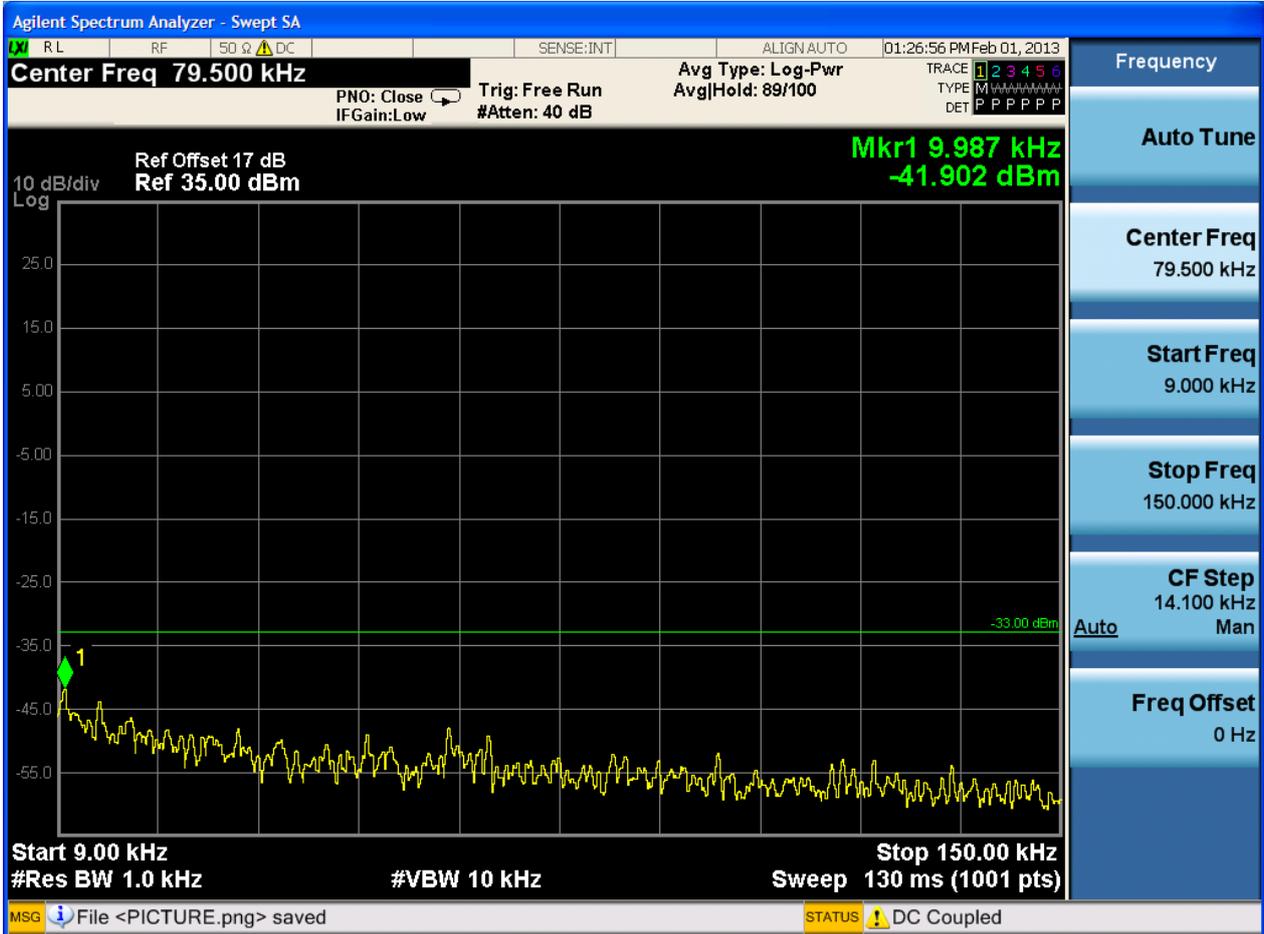


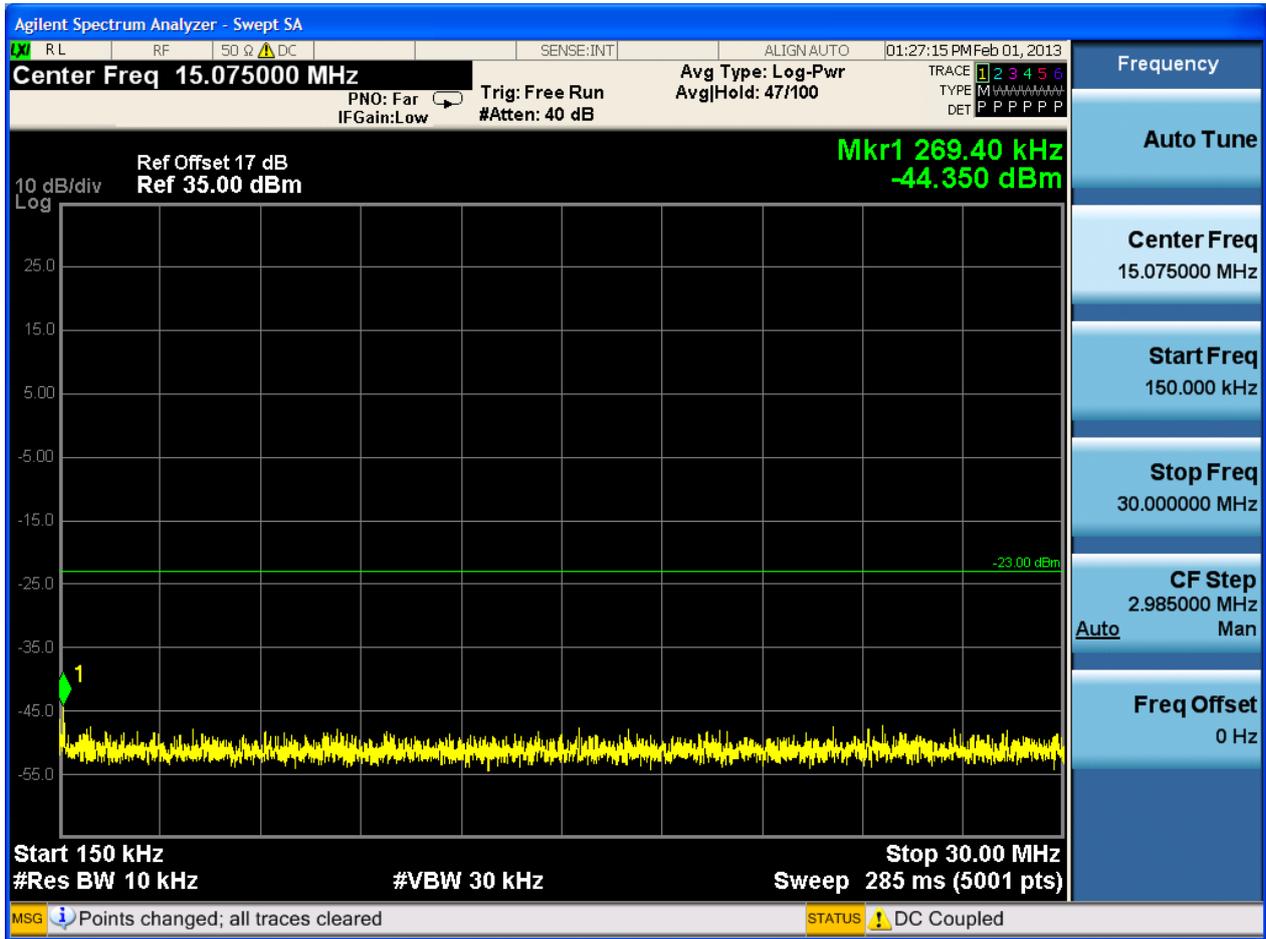


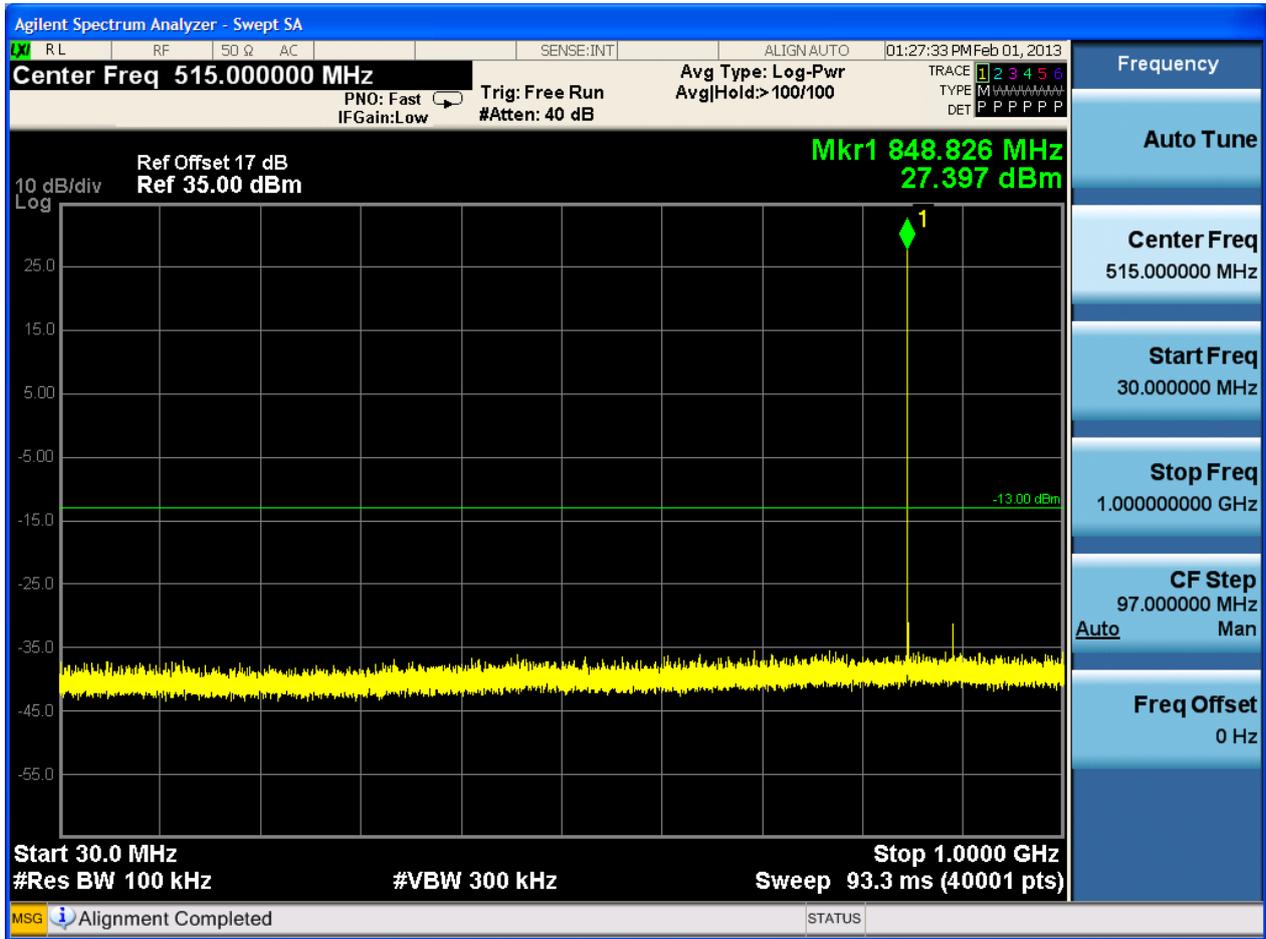


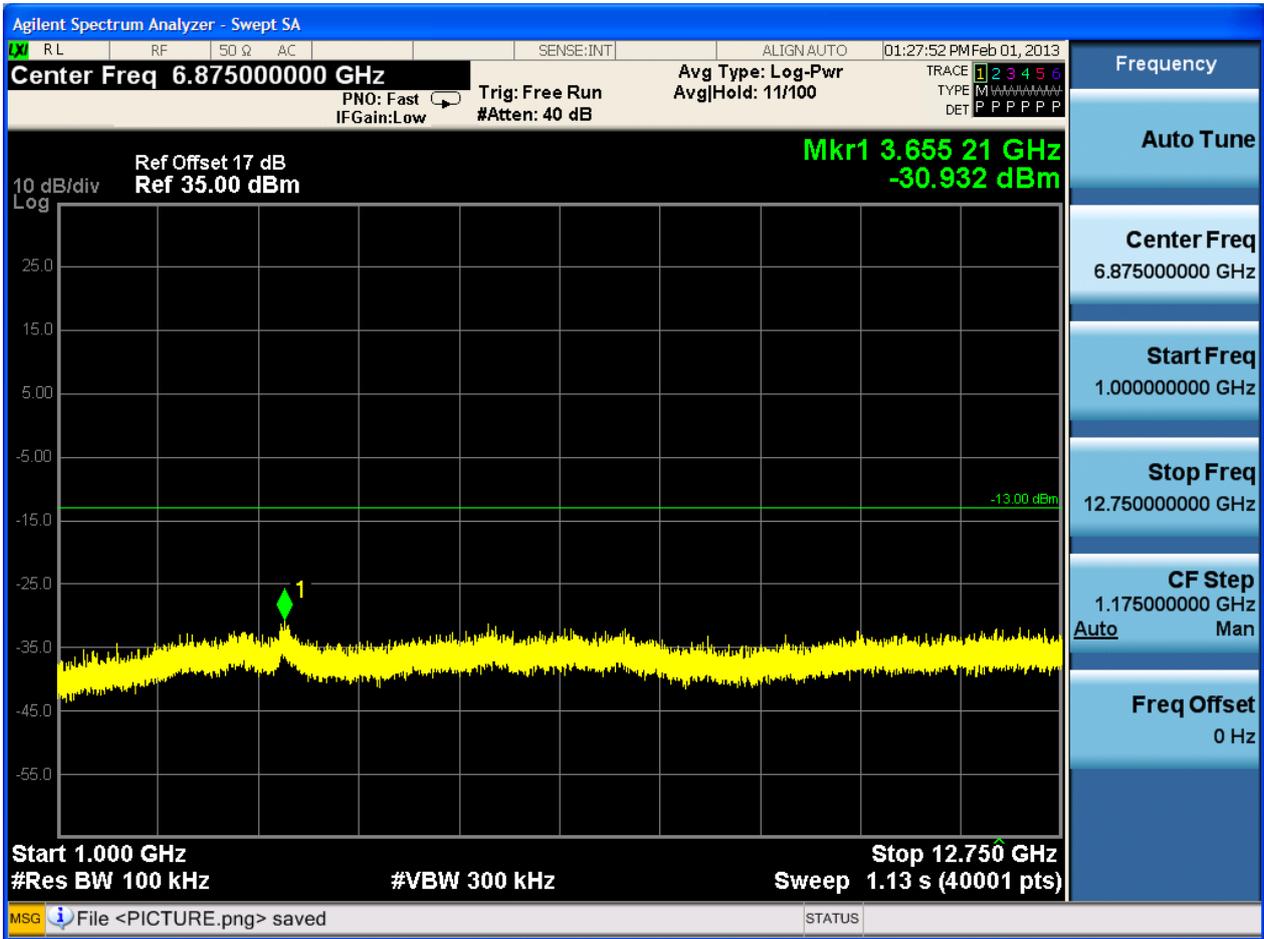
5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH

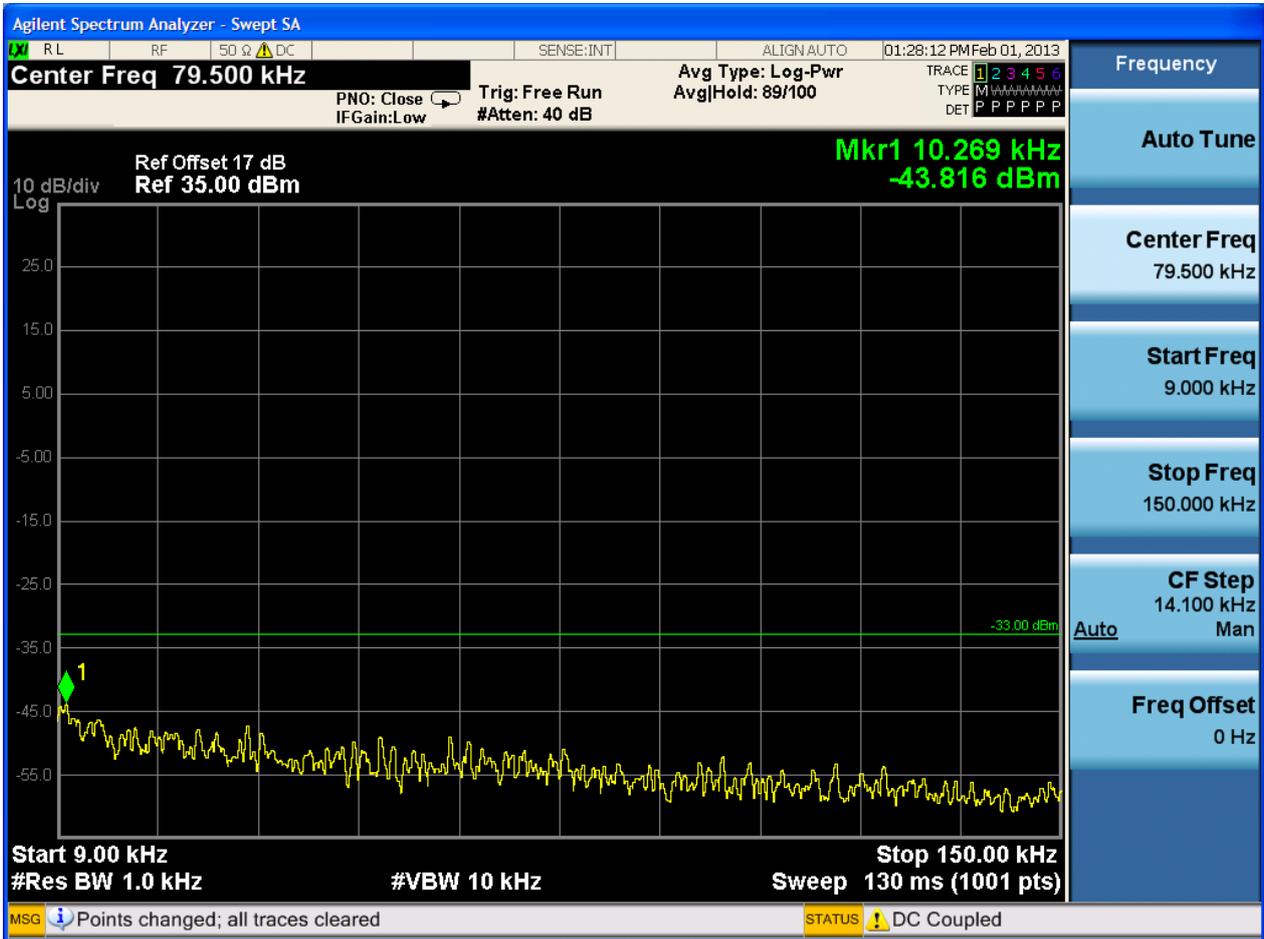


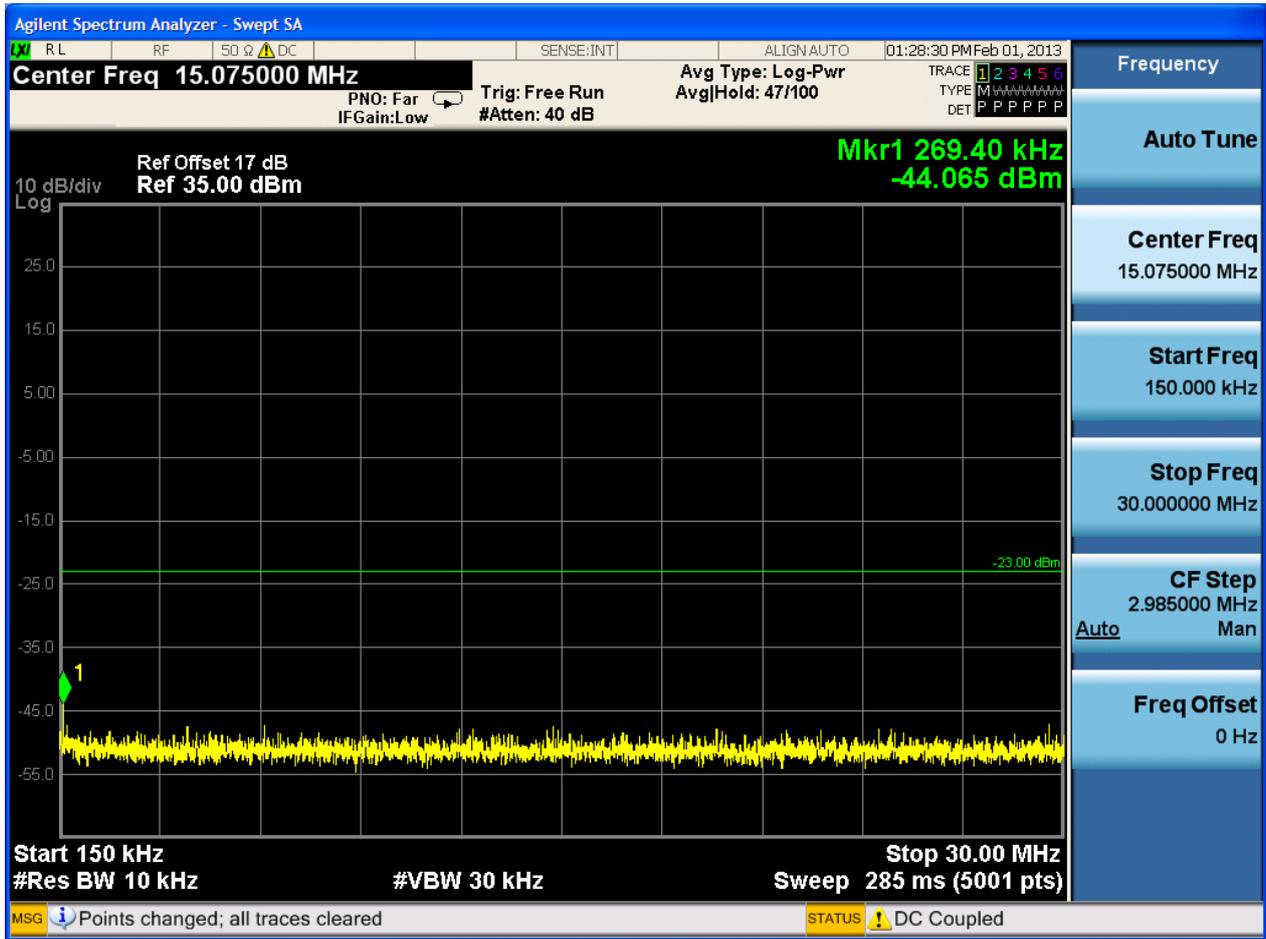


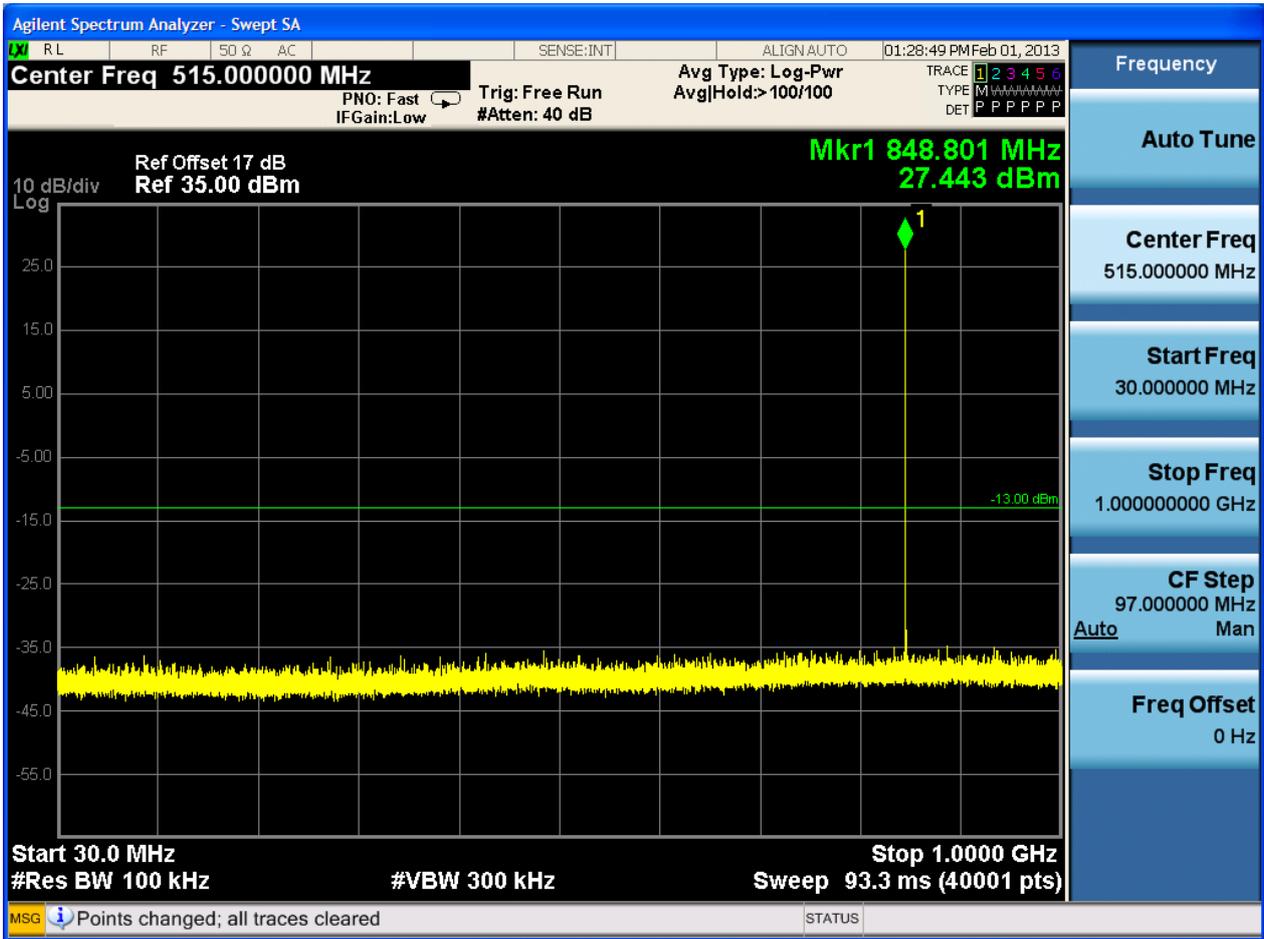


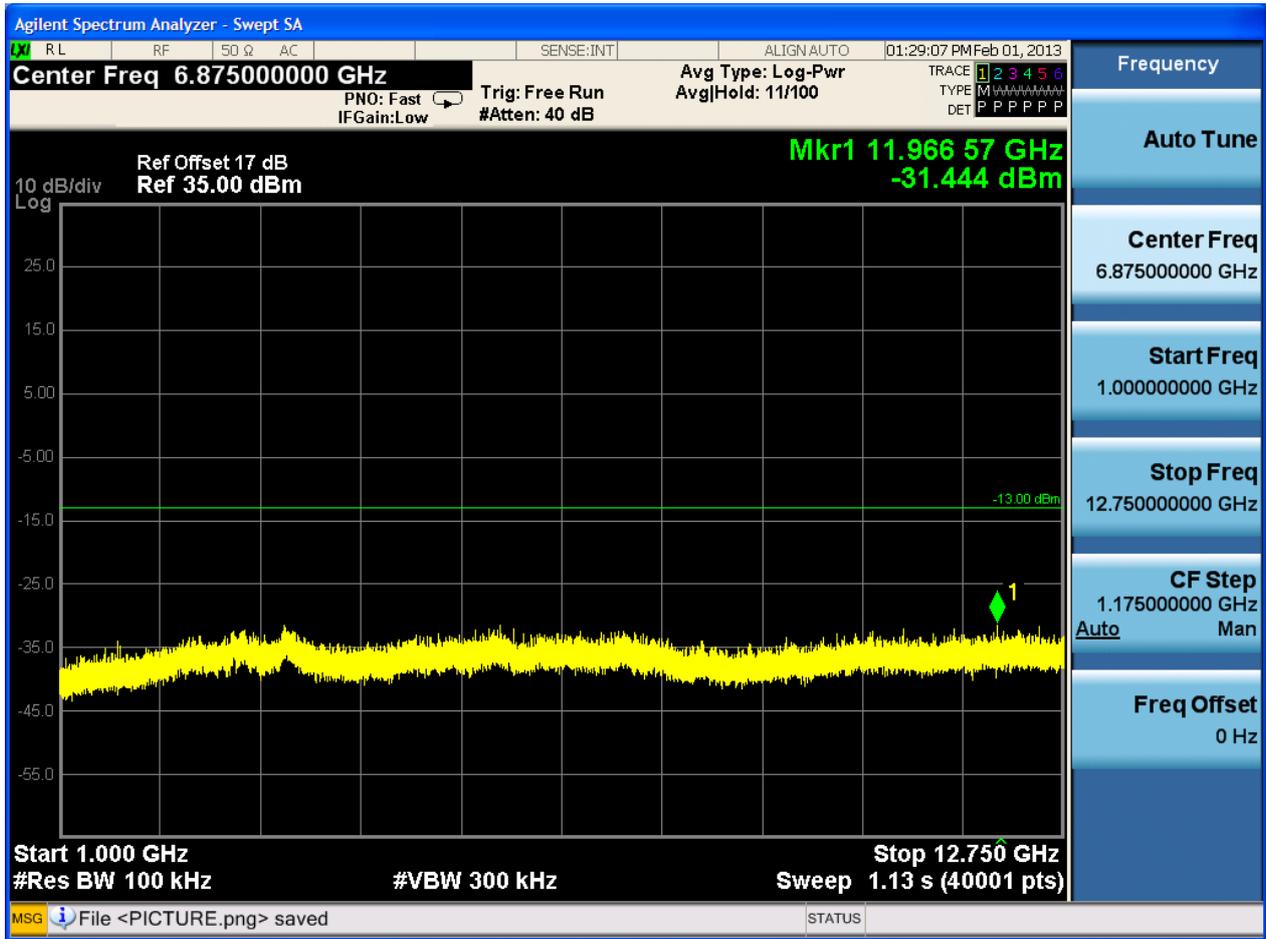


5.1.1.2.2 Test Channel = MCH

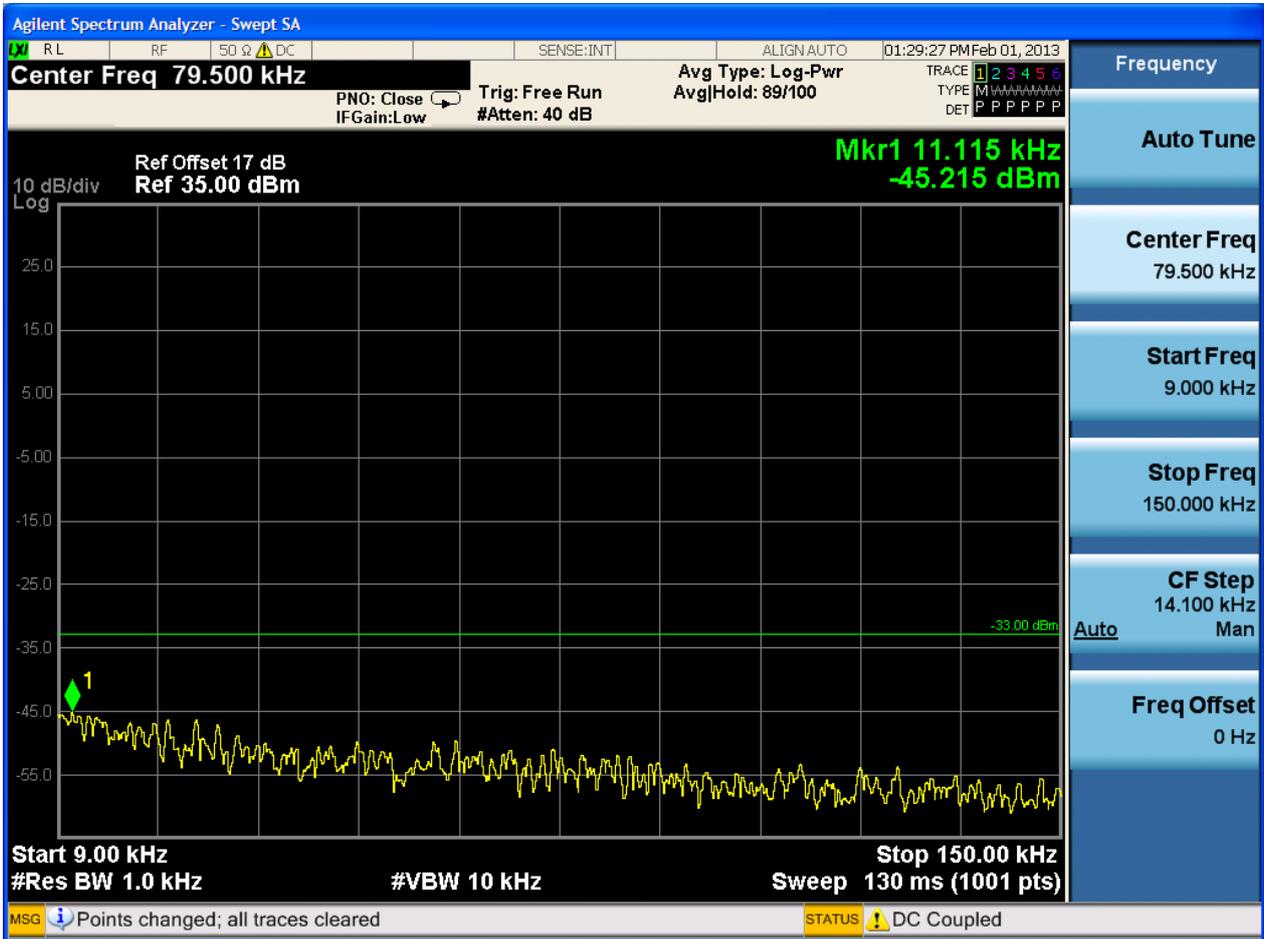


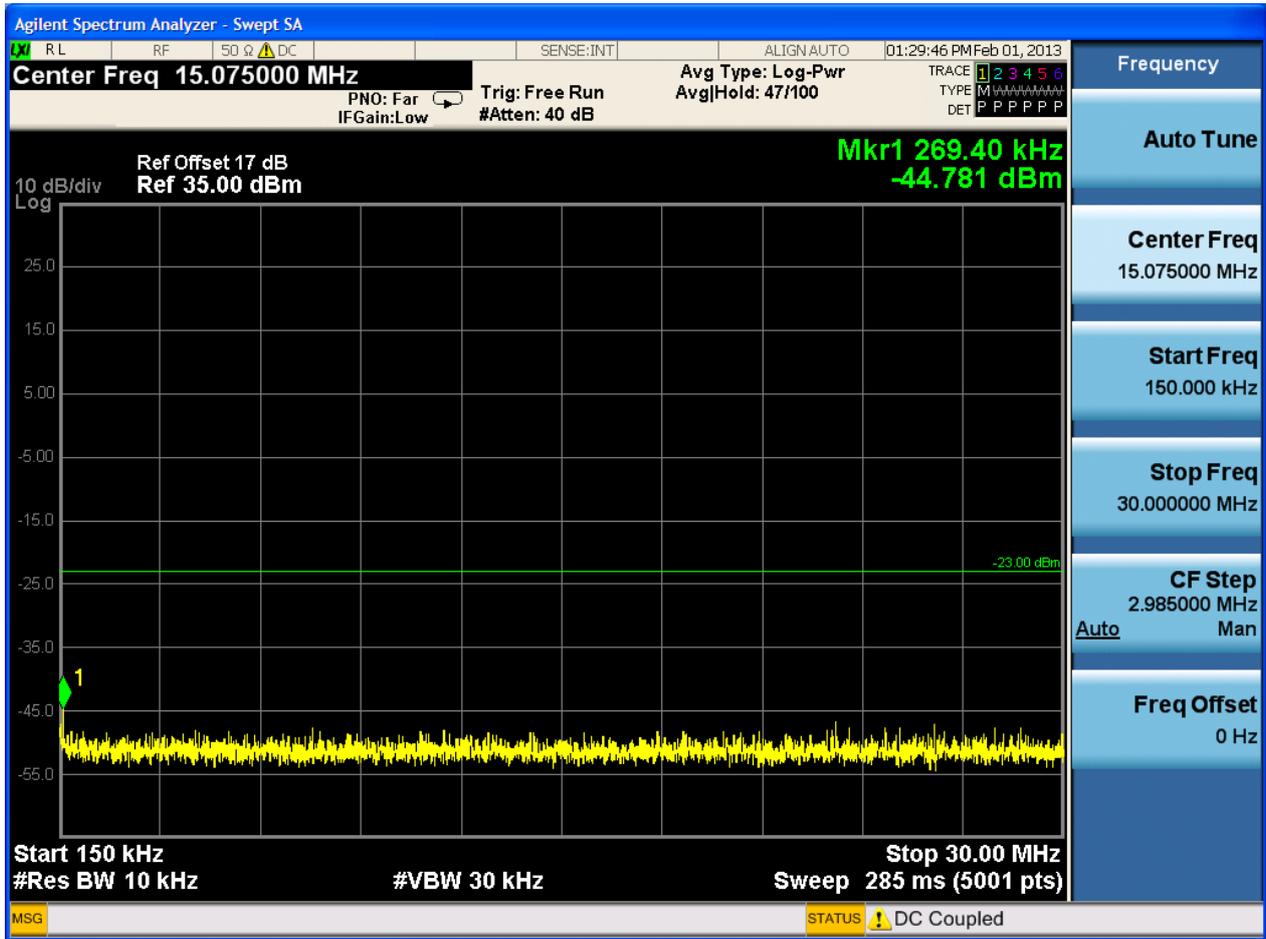


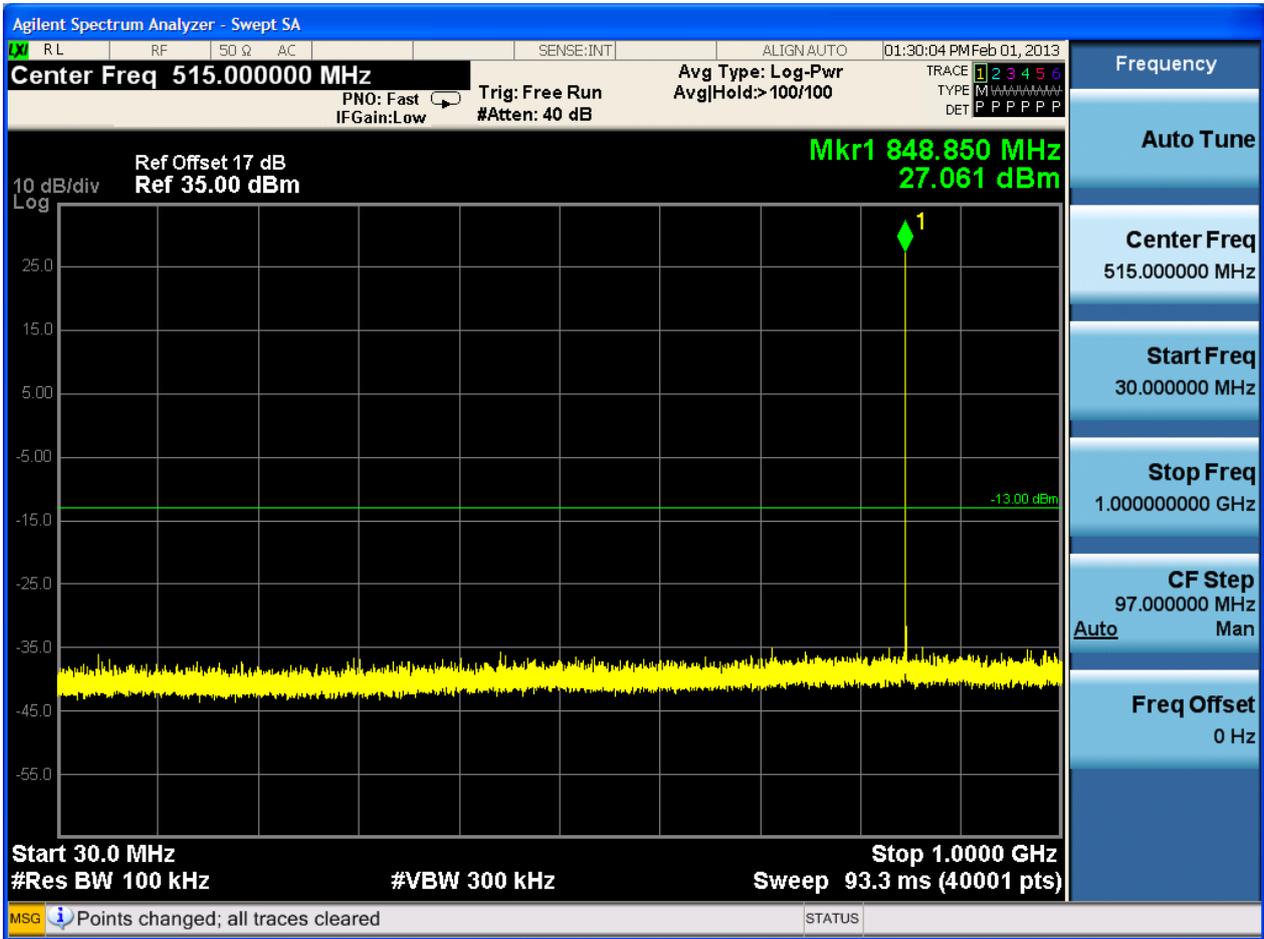


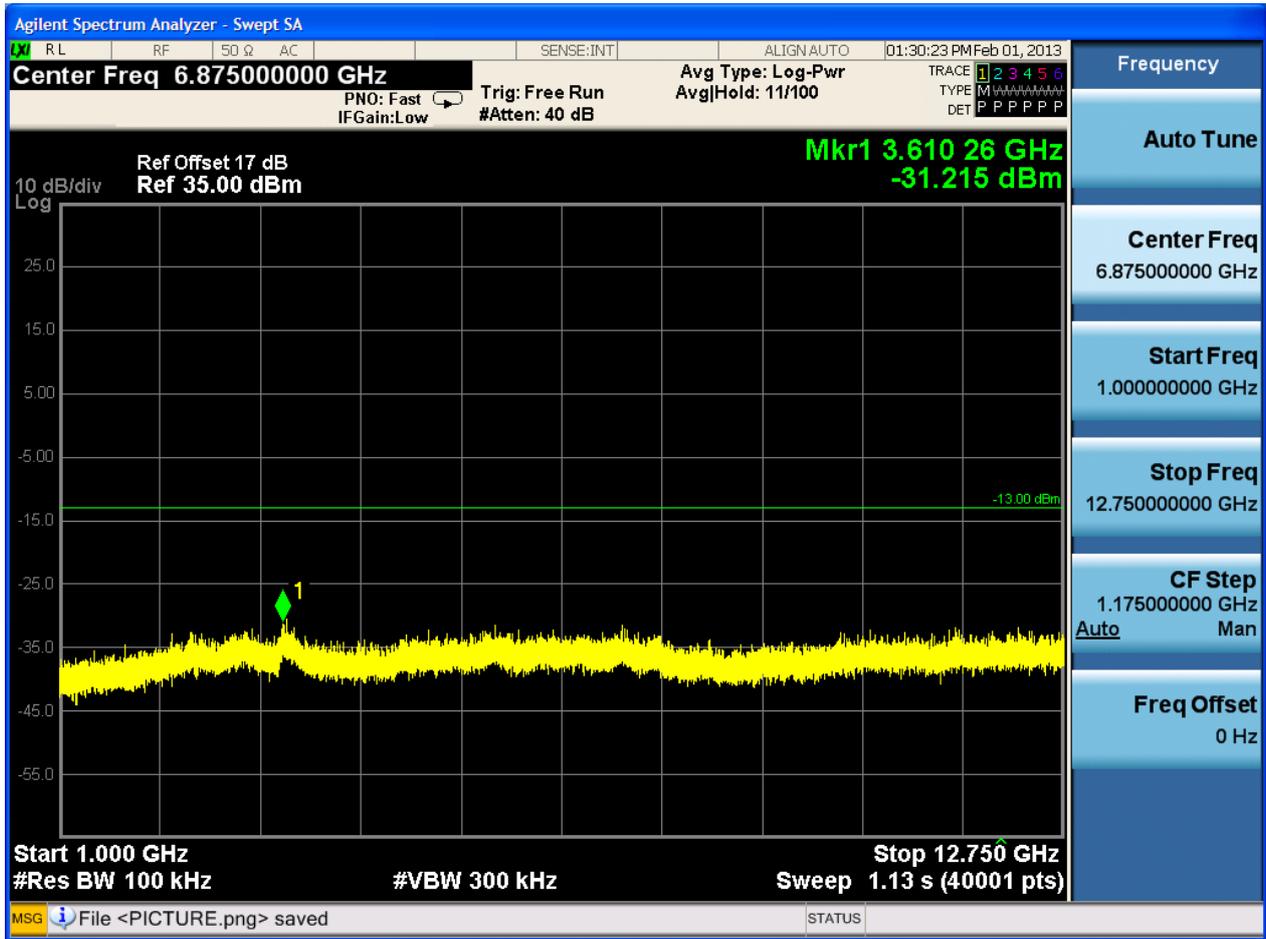


5.1.1.2.3 Test Channel = HCH







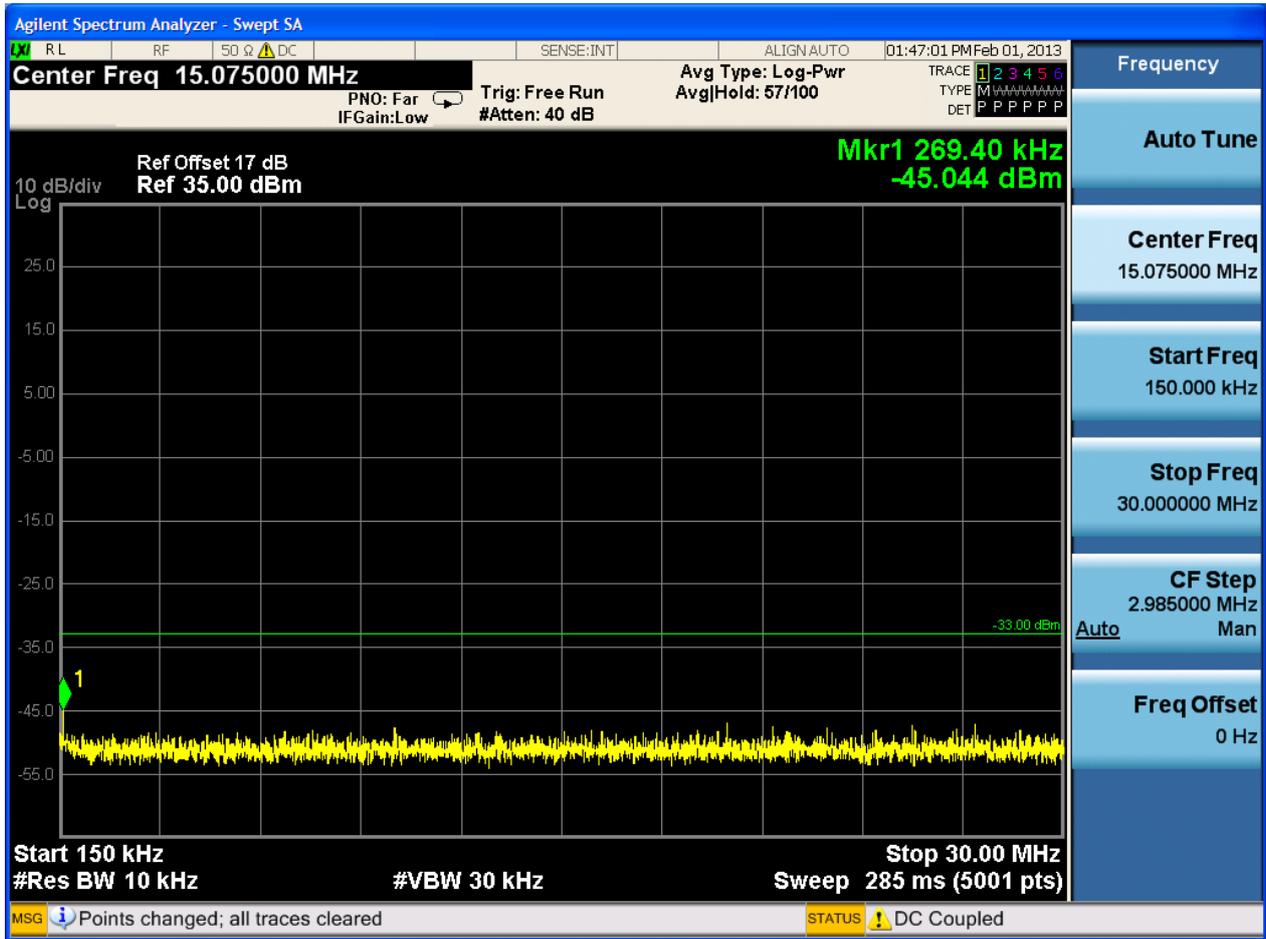


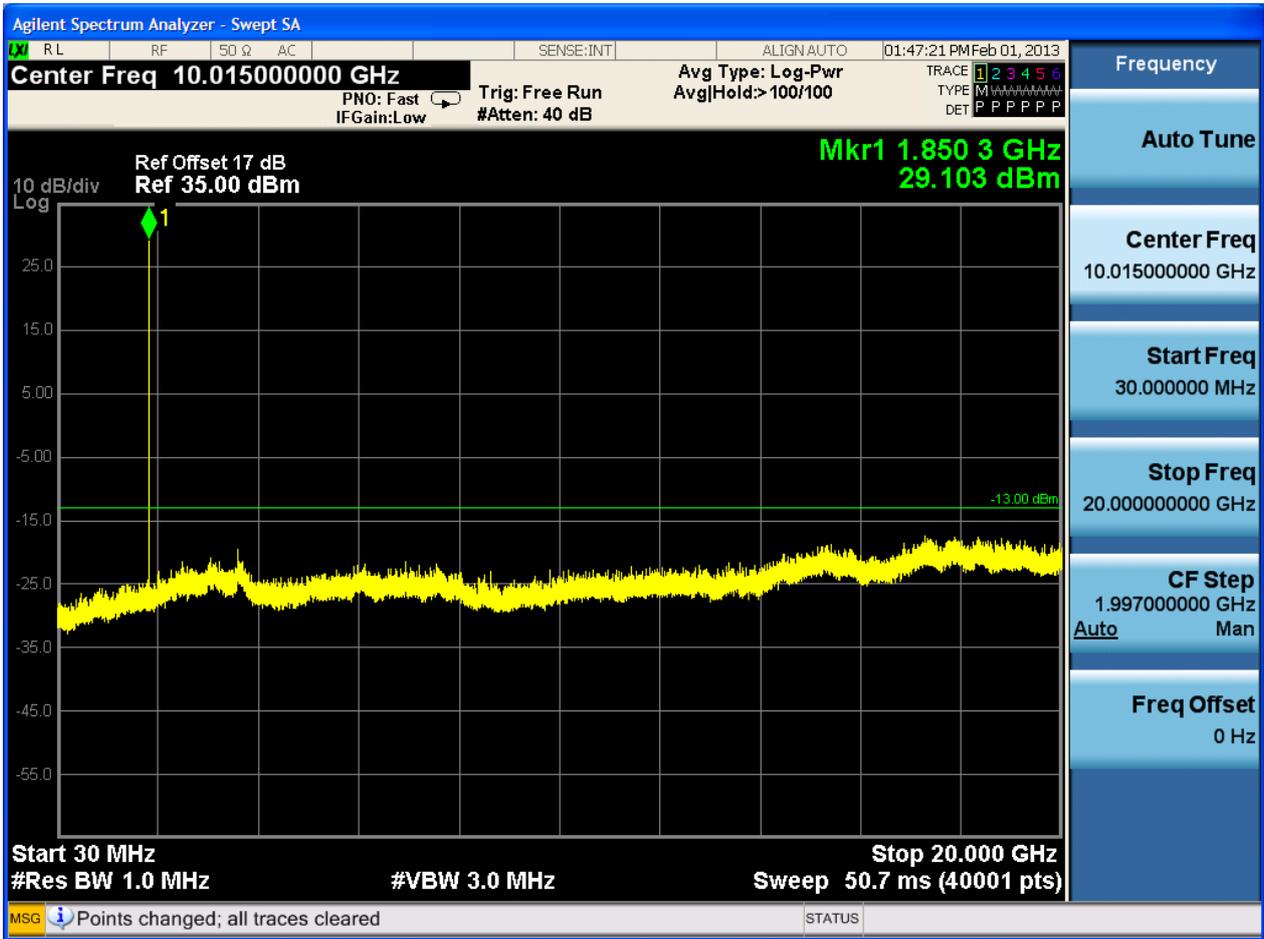
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

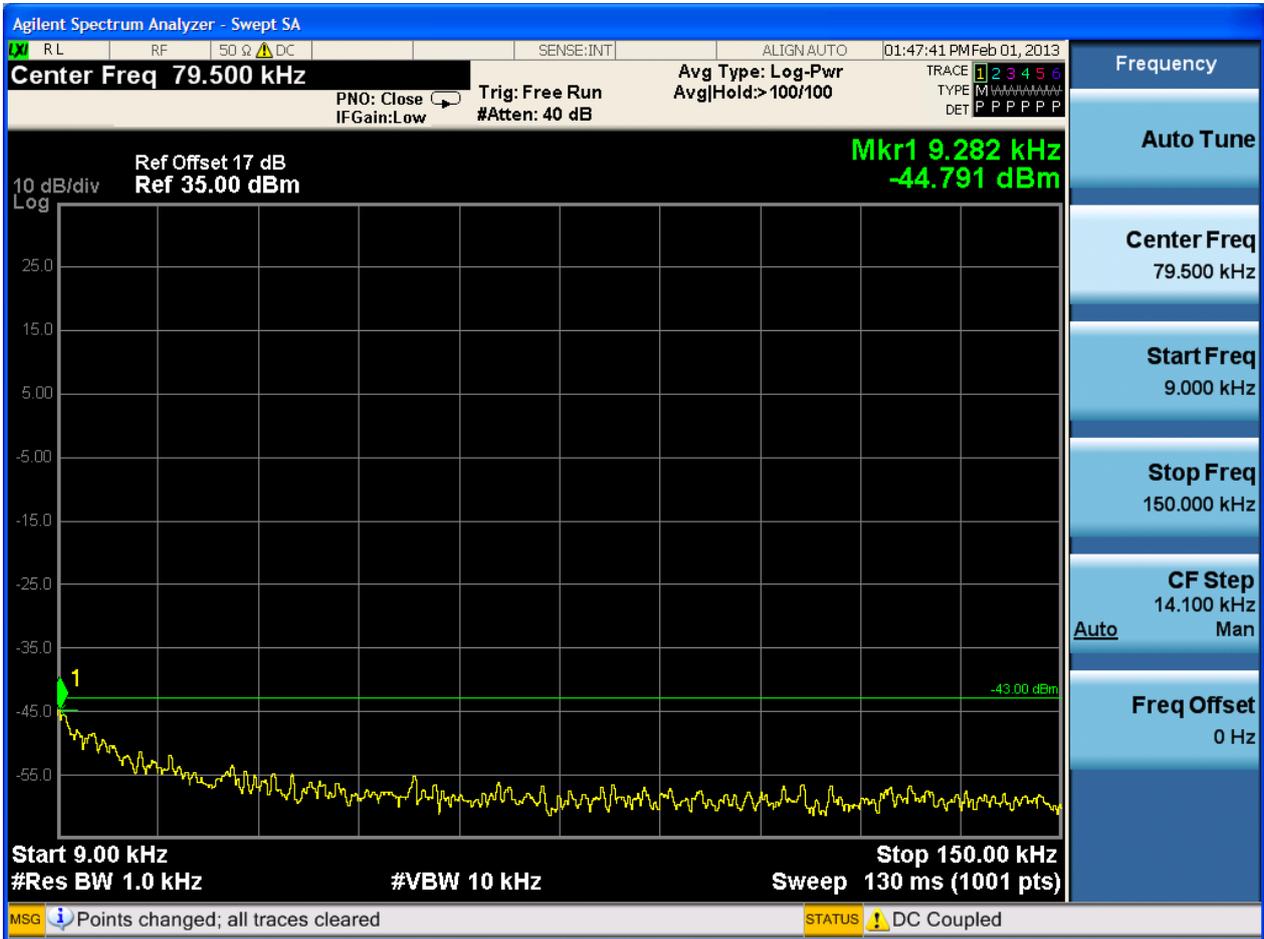
5.1.2.1.1 Test Channel = LCH

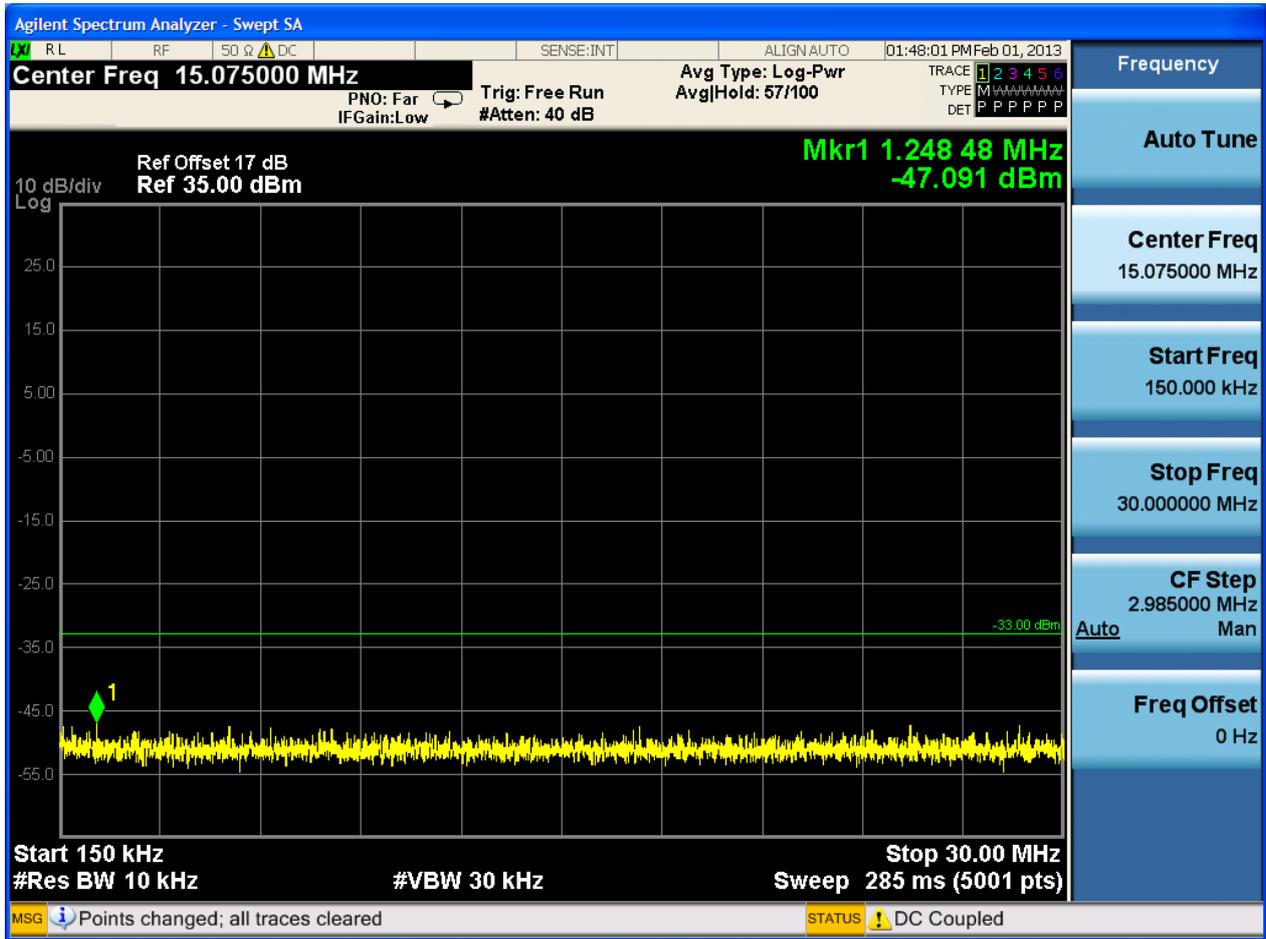






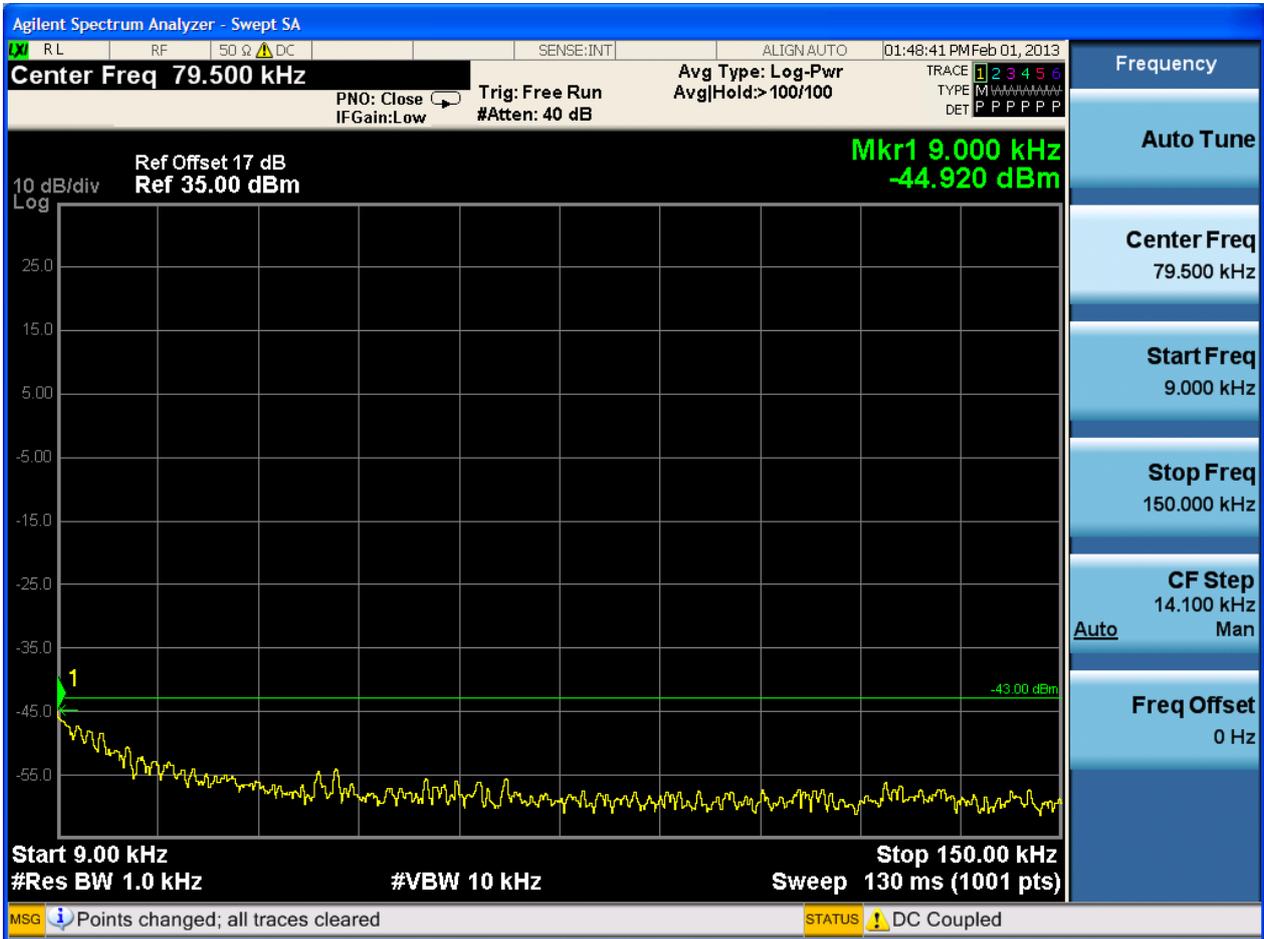
5.1.2.1.2 Test Channel = MCH

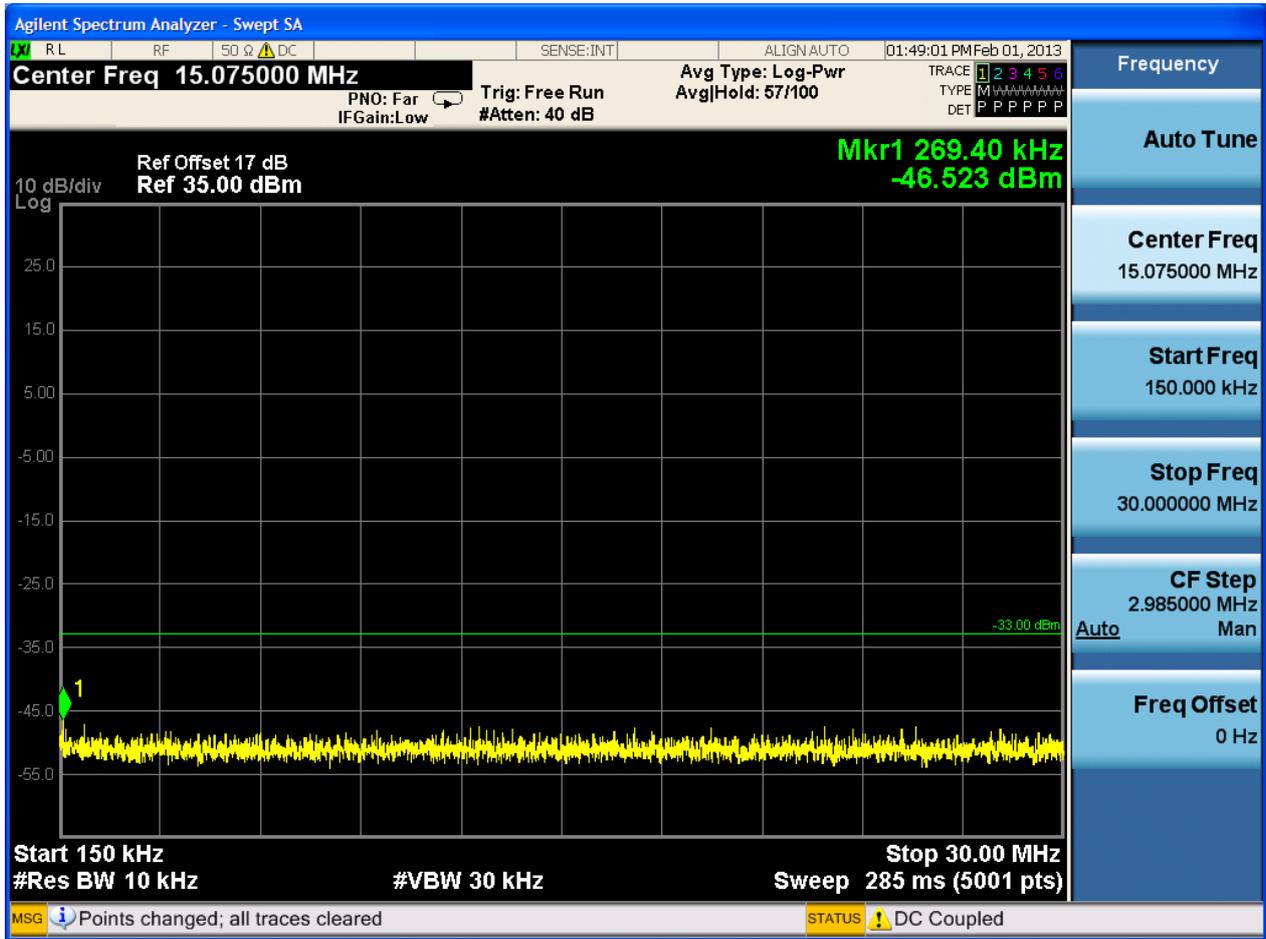


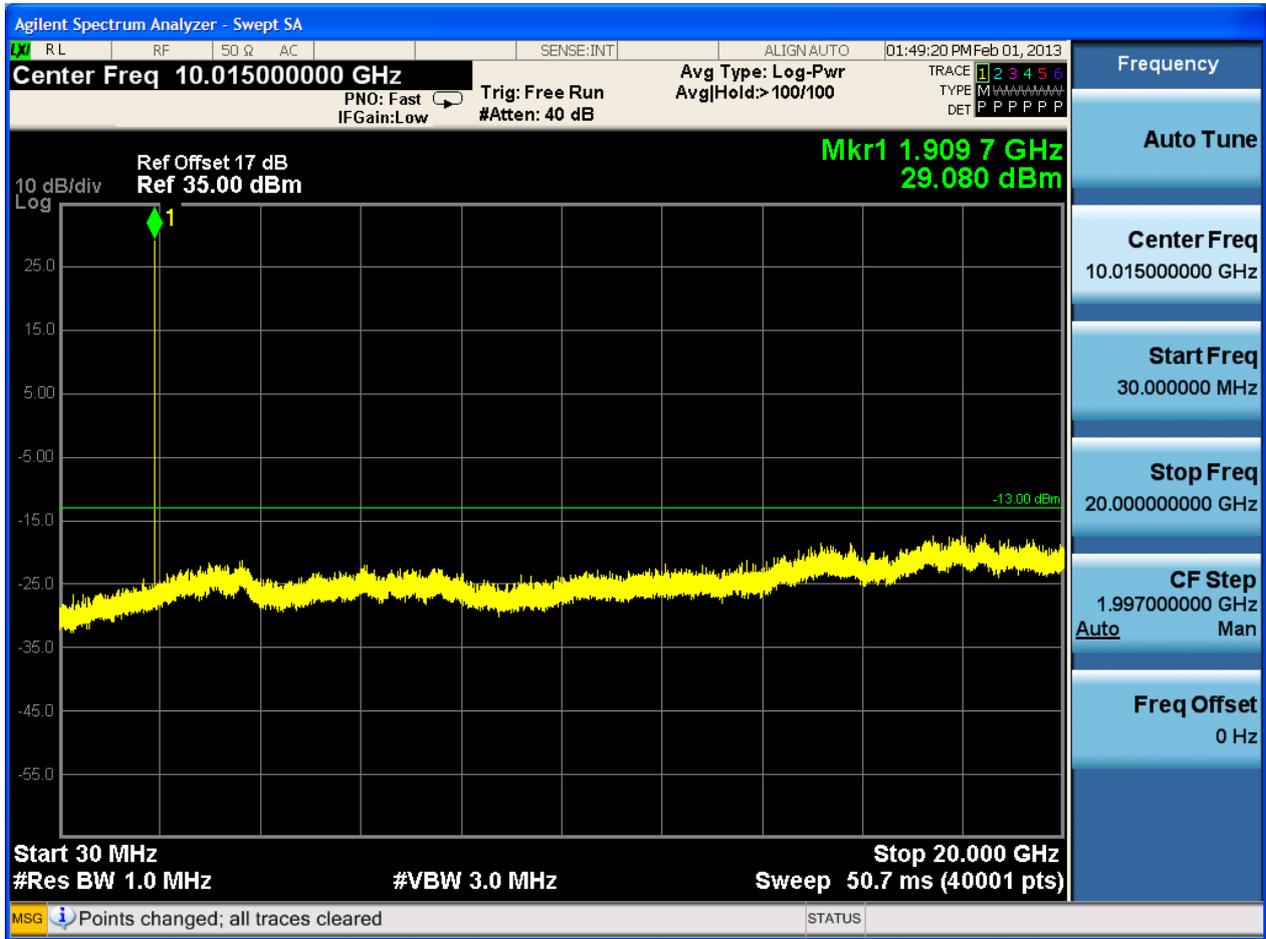


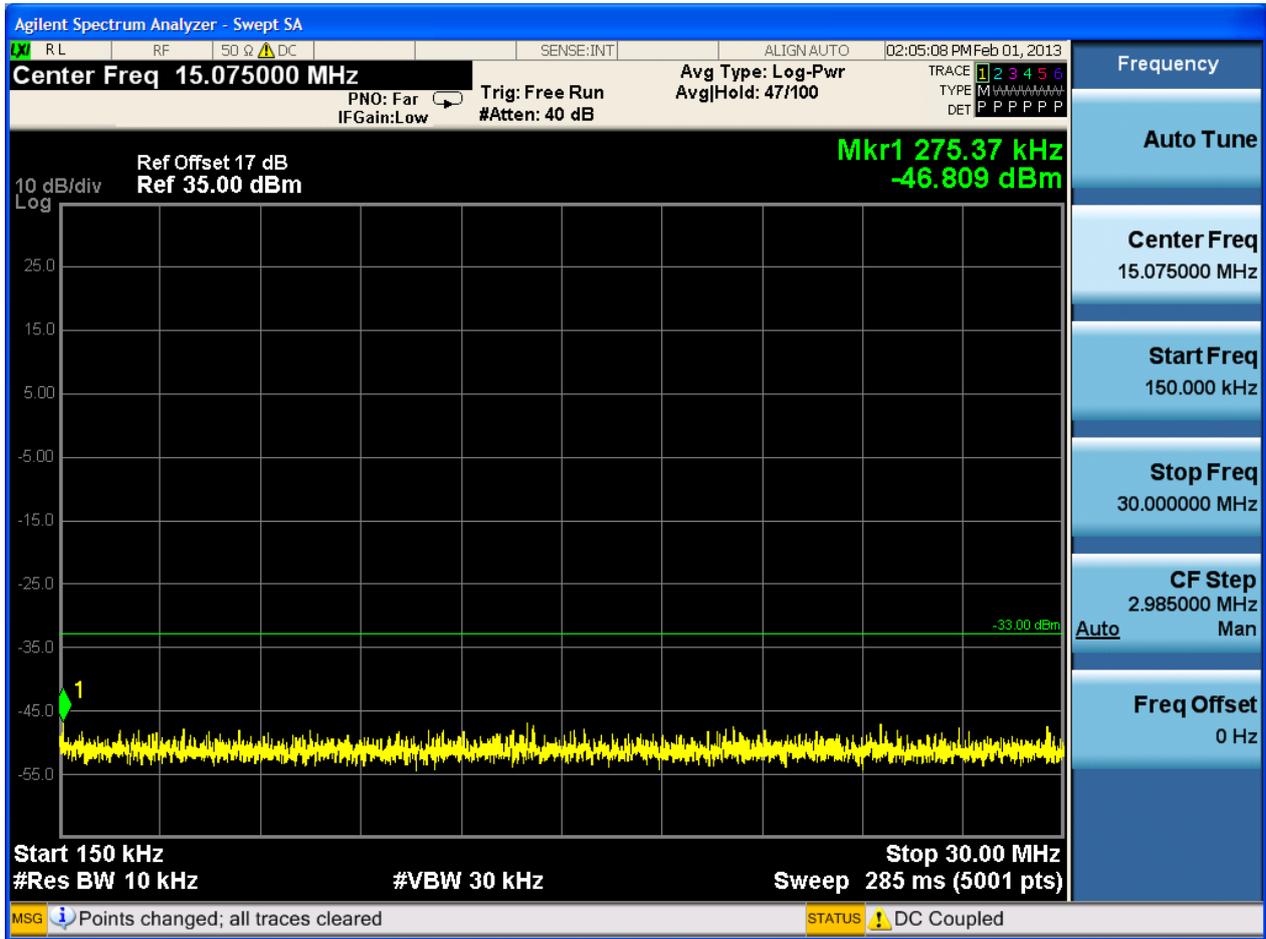


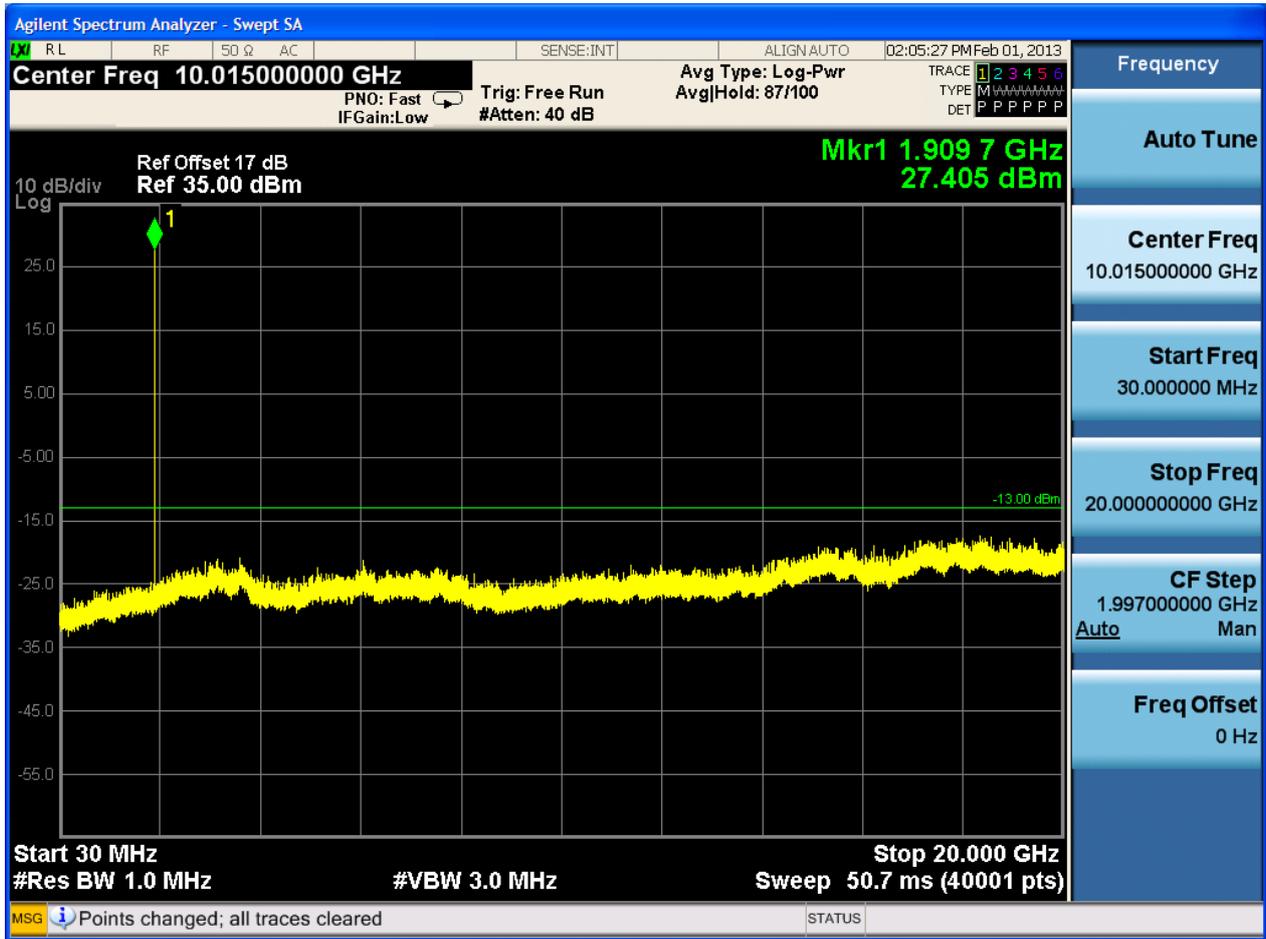
5.1.2.1.3 Test Channel = HCH



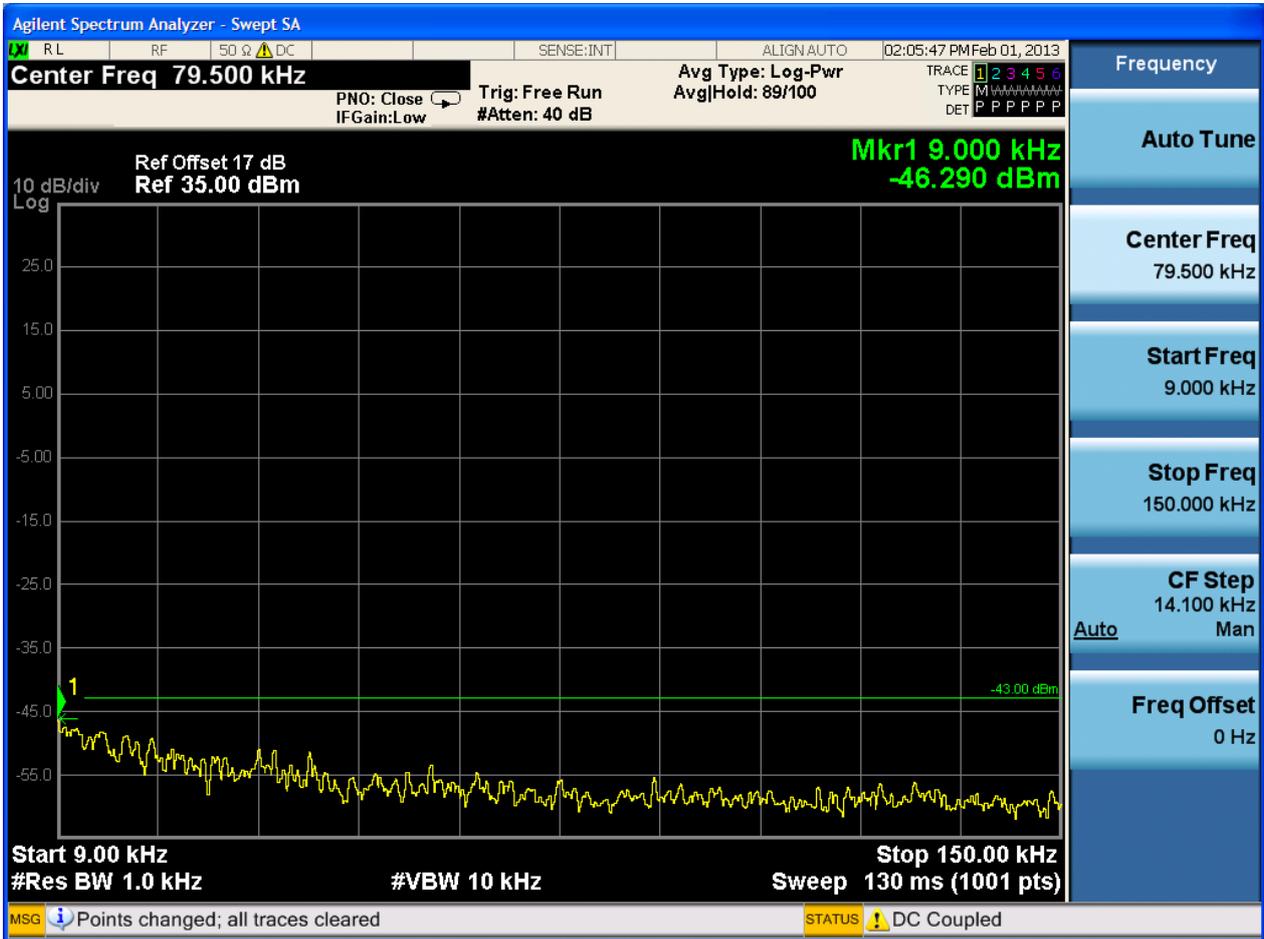


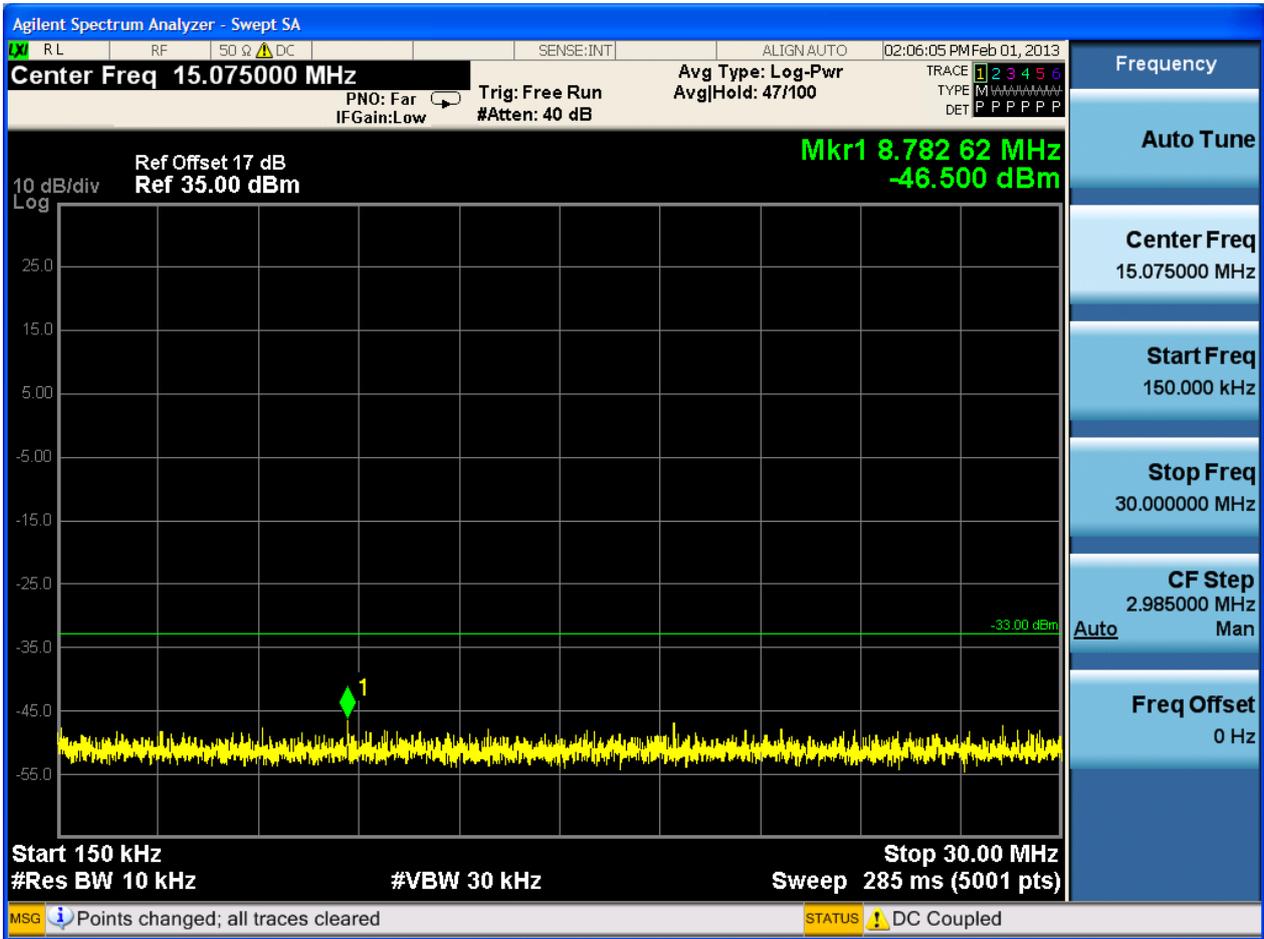


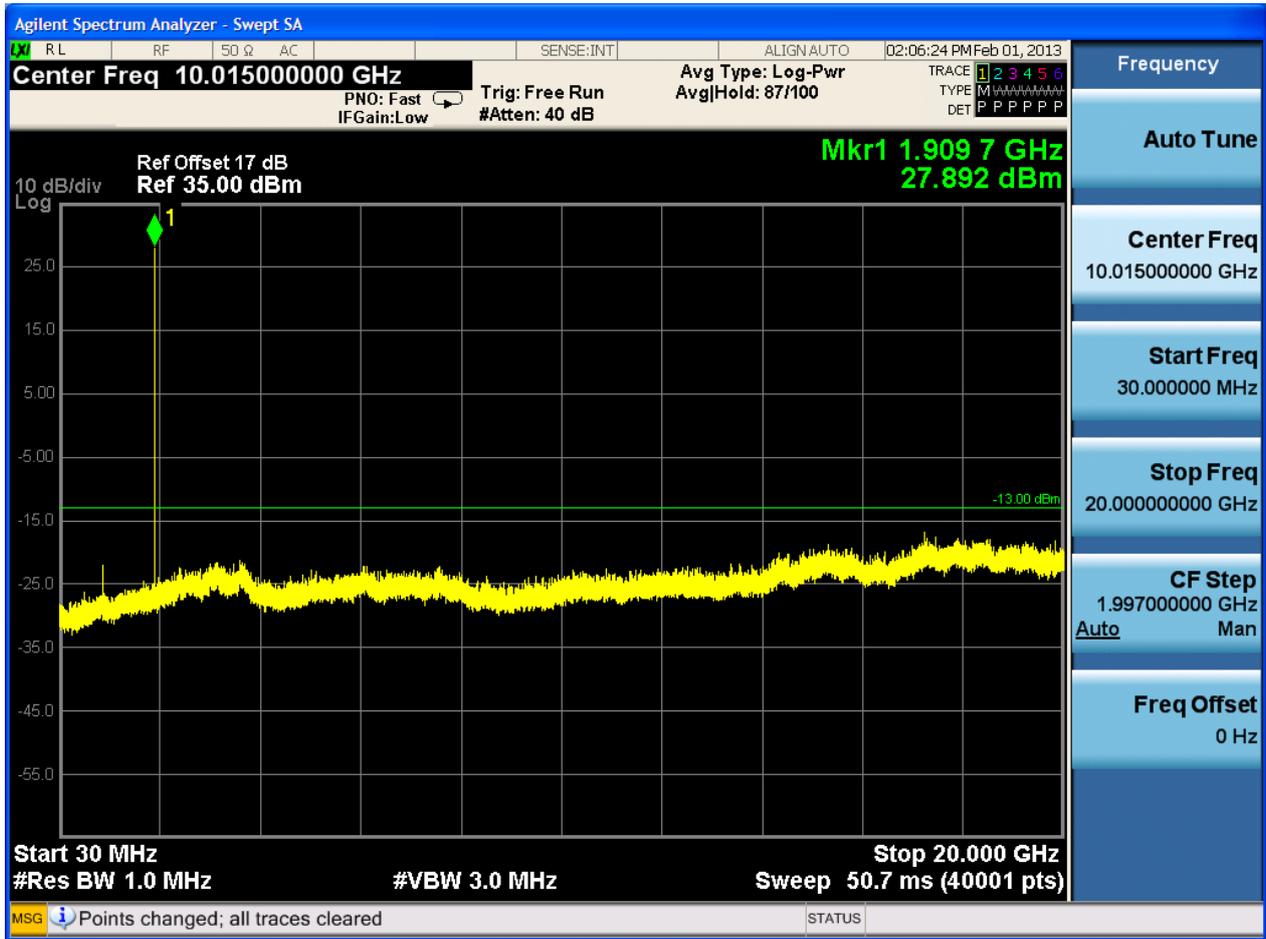




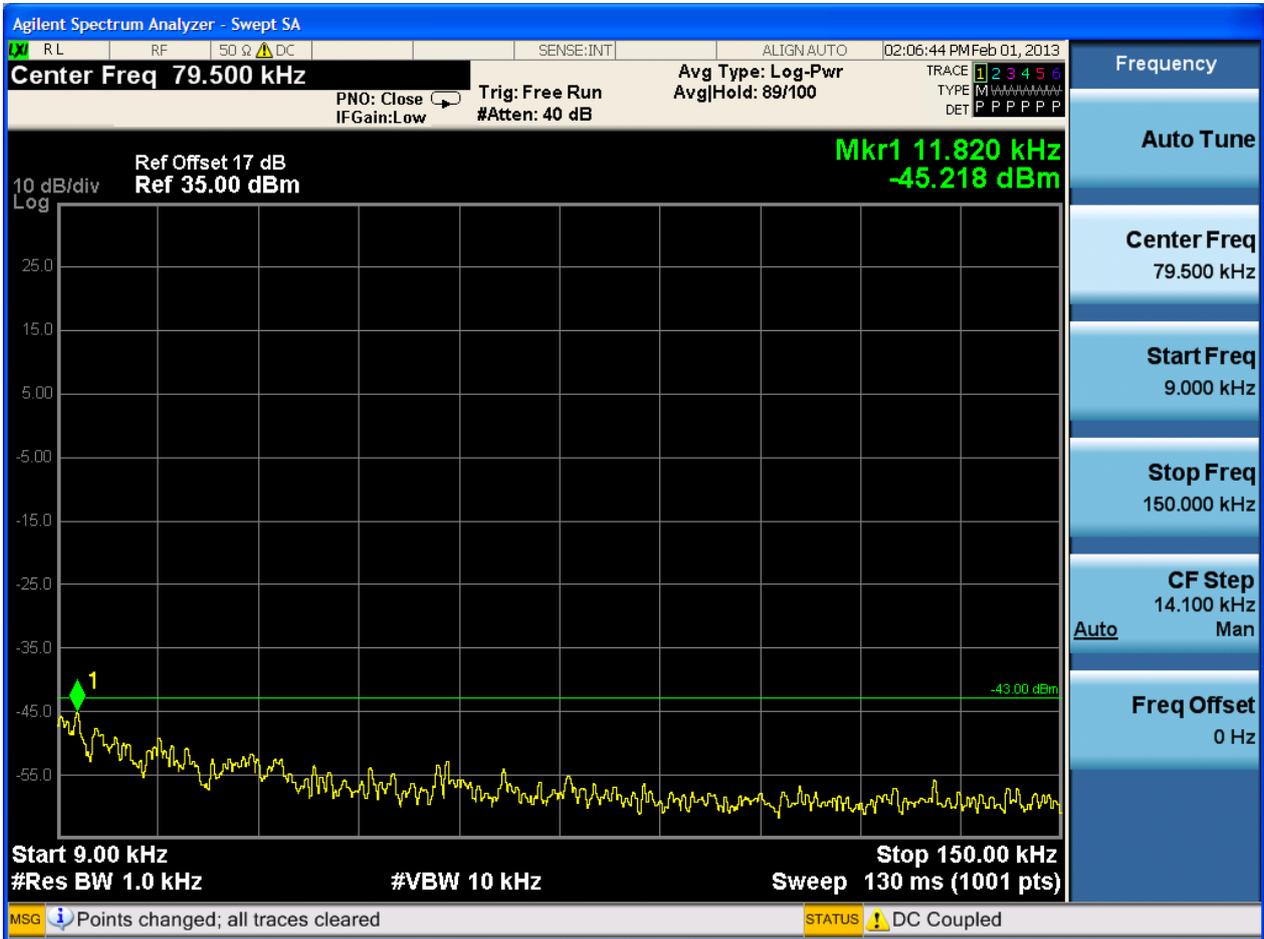
5.1.2.2.2 Test Channel = MCH

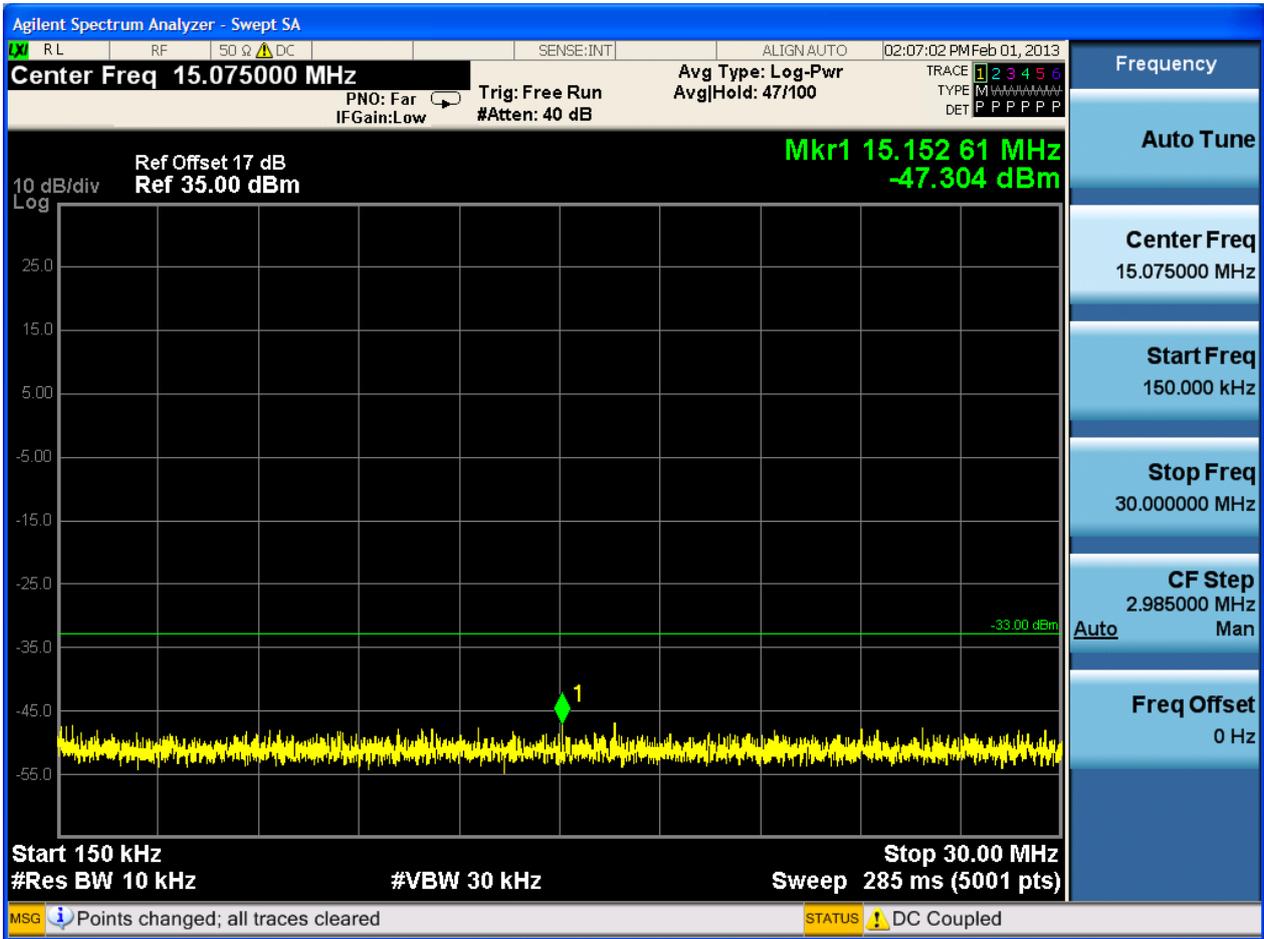


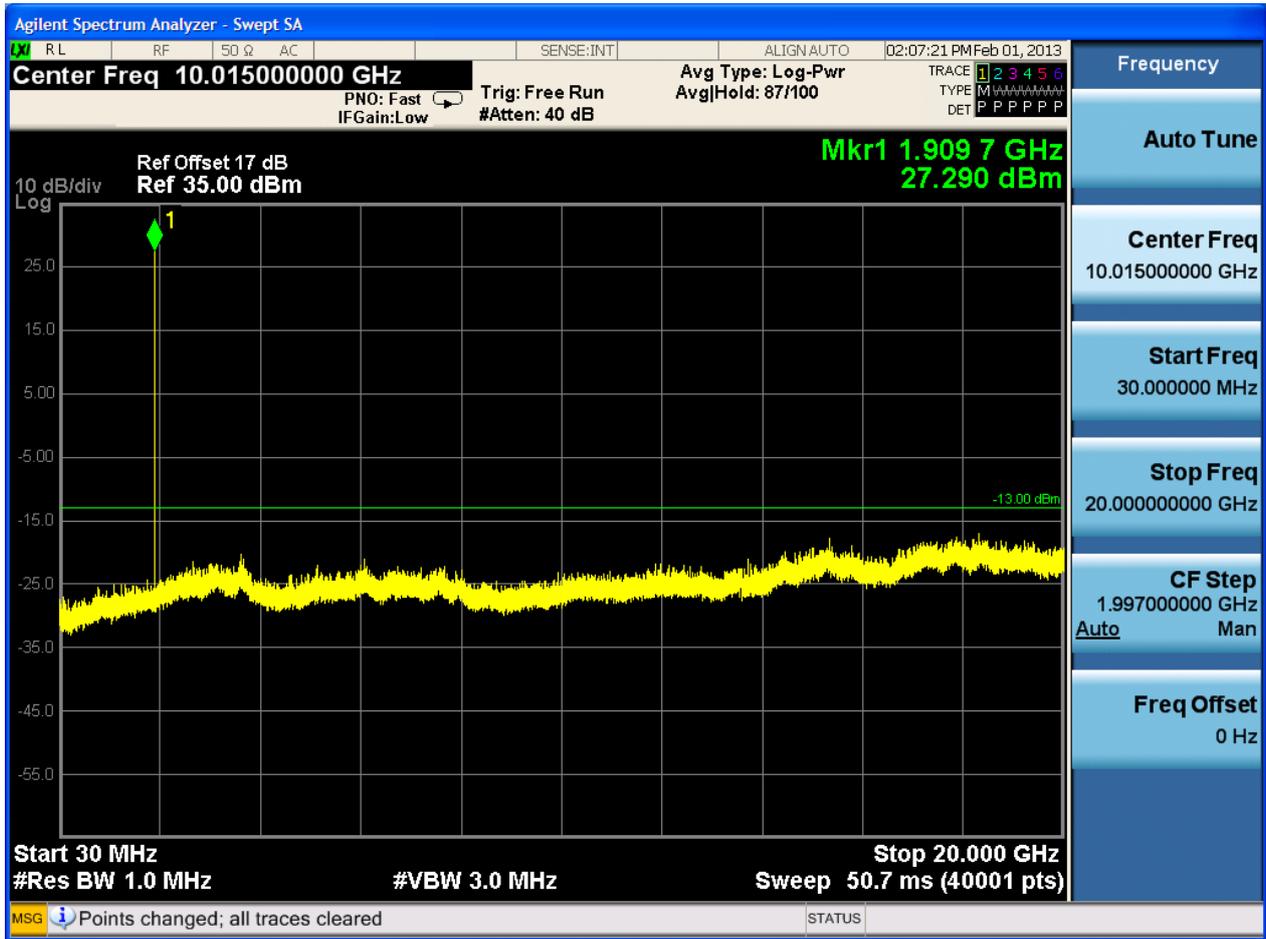




5.1.2.2.3 Test Channel = HCH







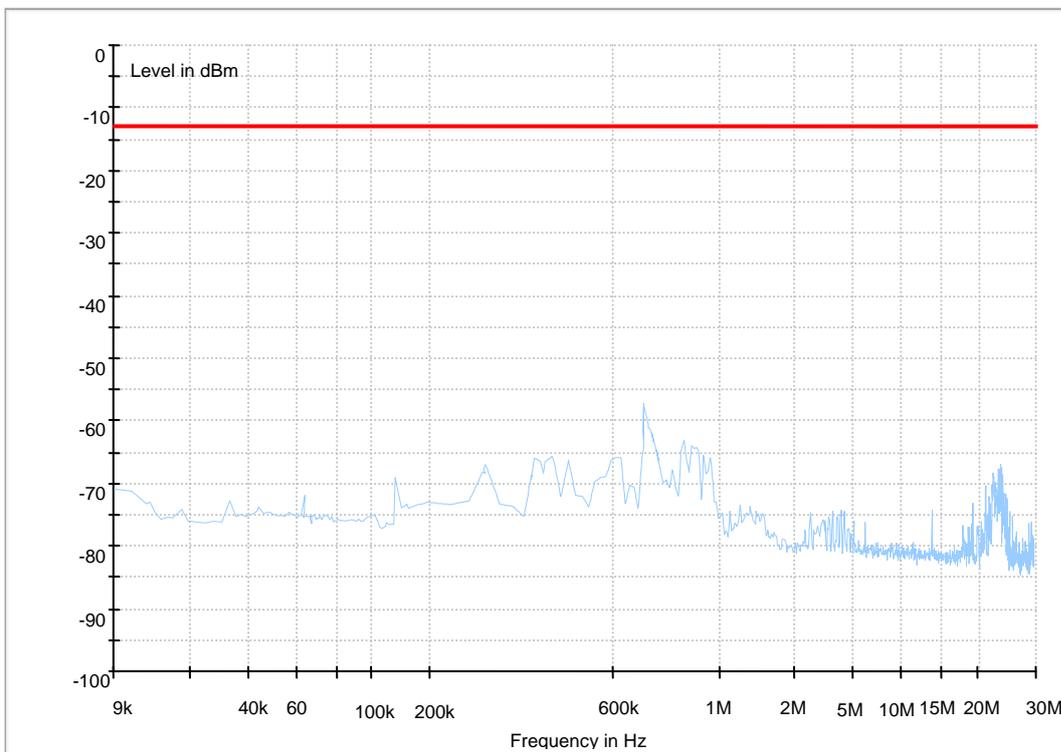
6Appendix_F: Field Strength of Spurious Radiation

6.1For GSM

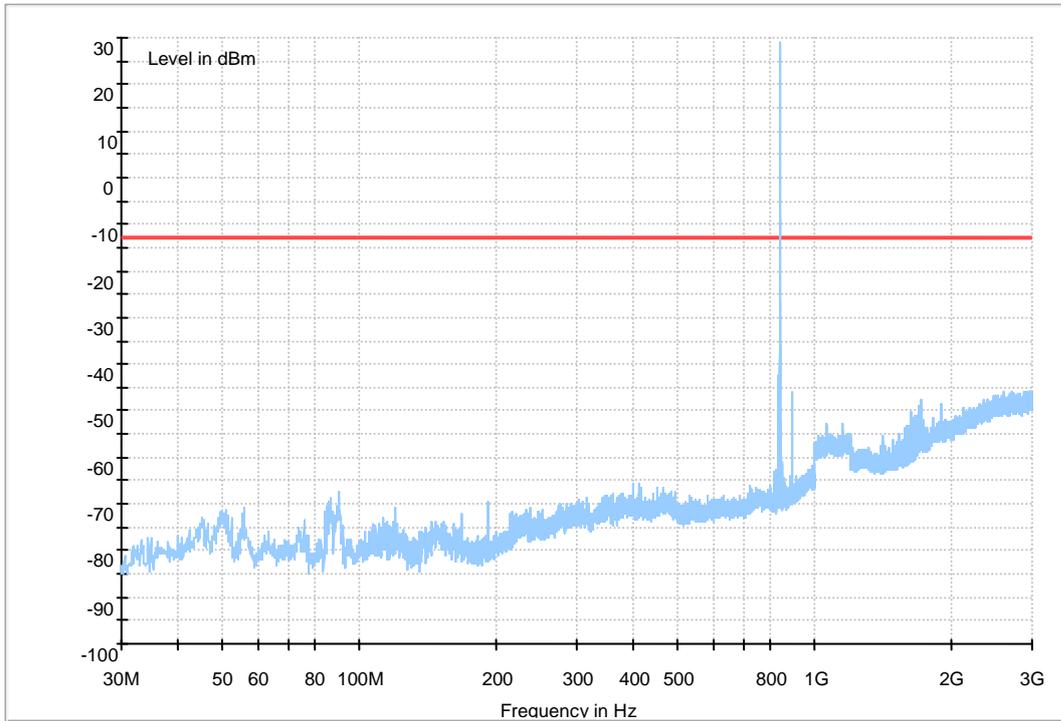
6.1.1Test Band=GSM850

6.1.1.1Test mode=GSM/TM1

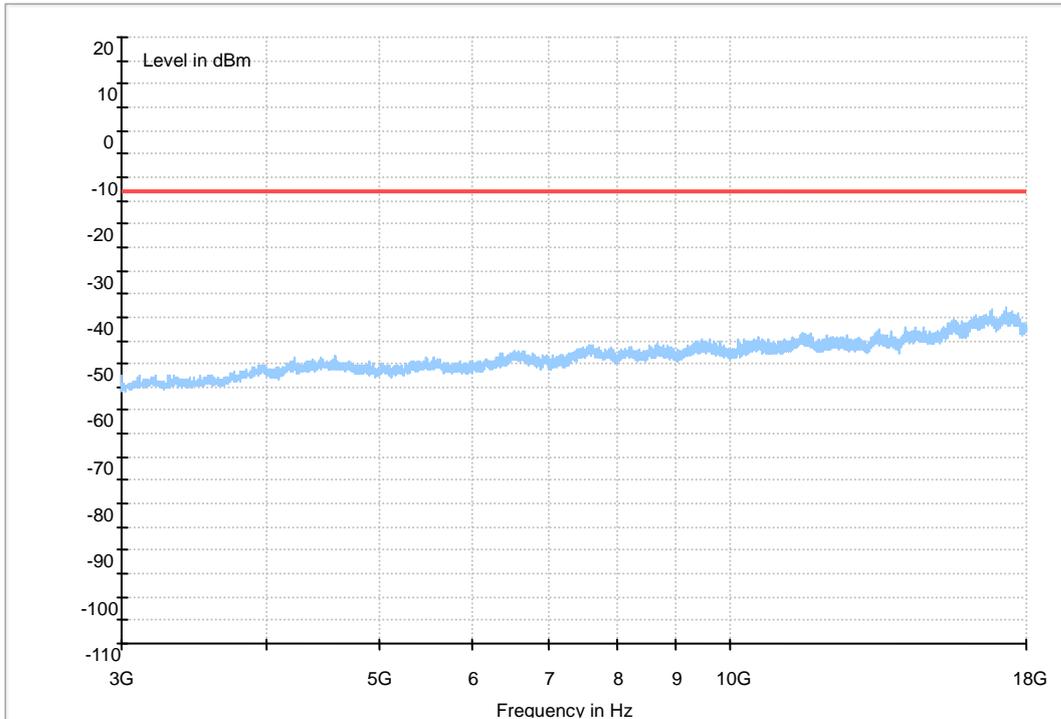
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)

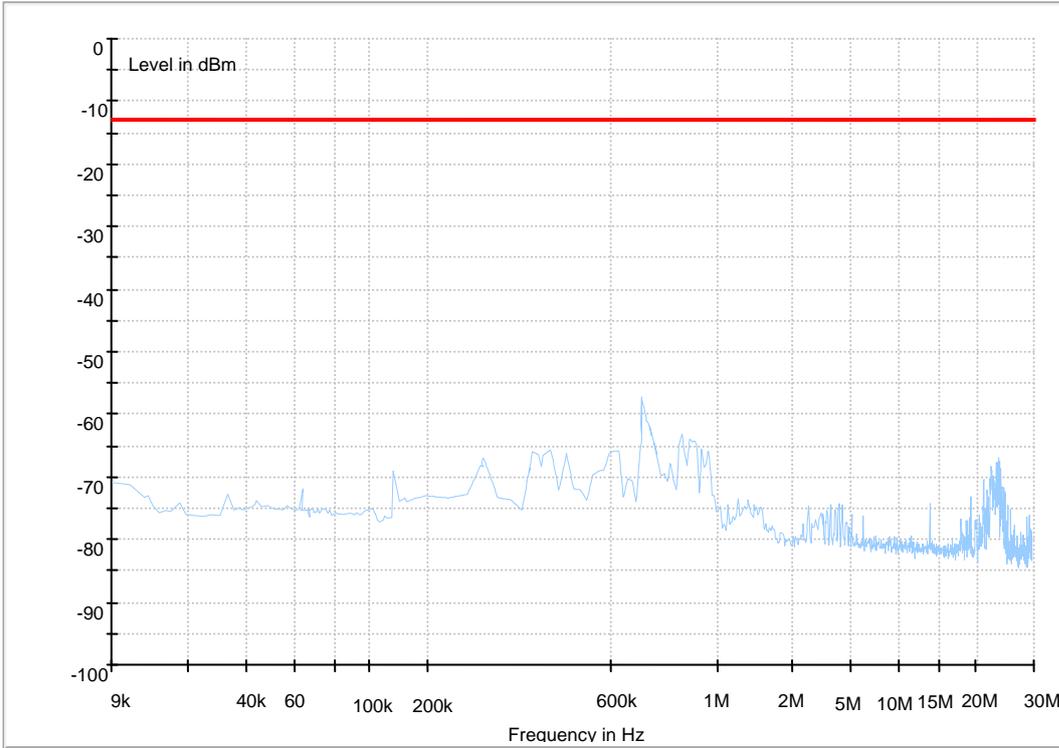


Traffic Mode (3GHz-18GHz)

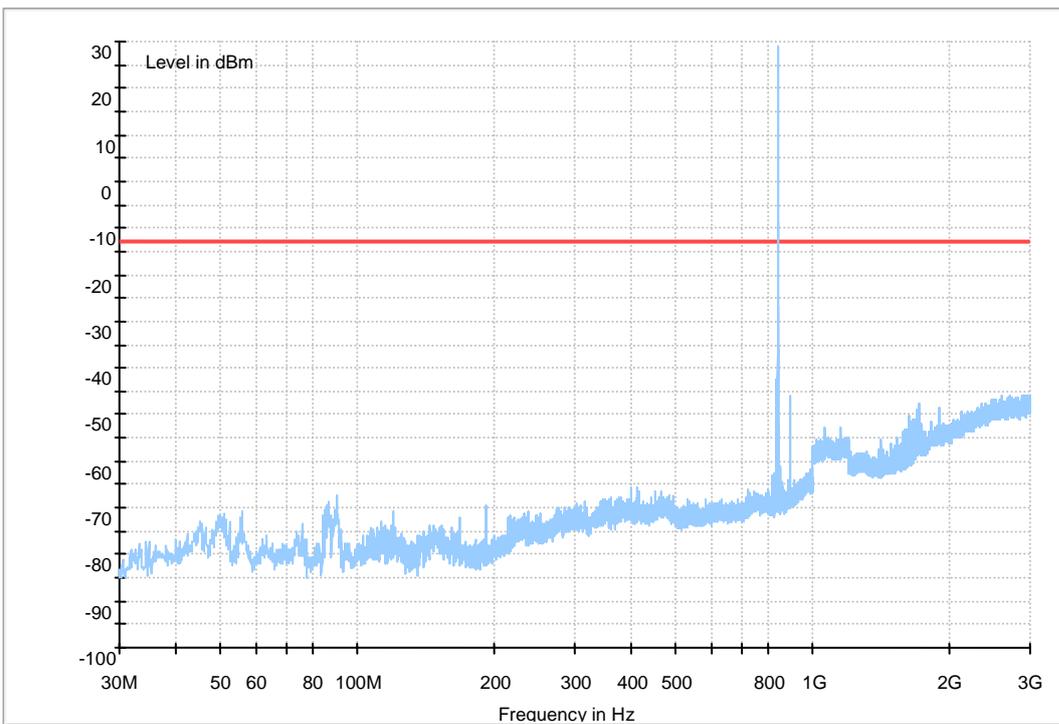


6.1.1.2 Test mode=GSM/TM2

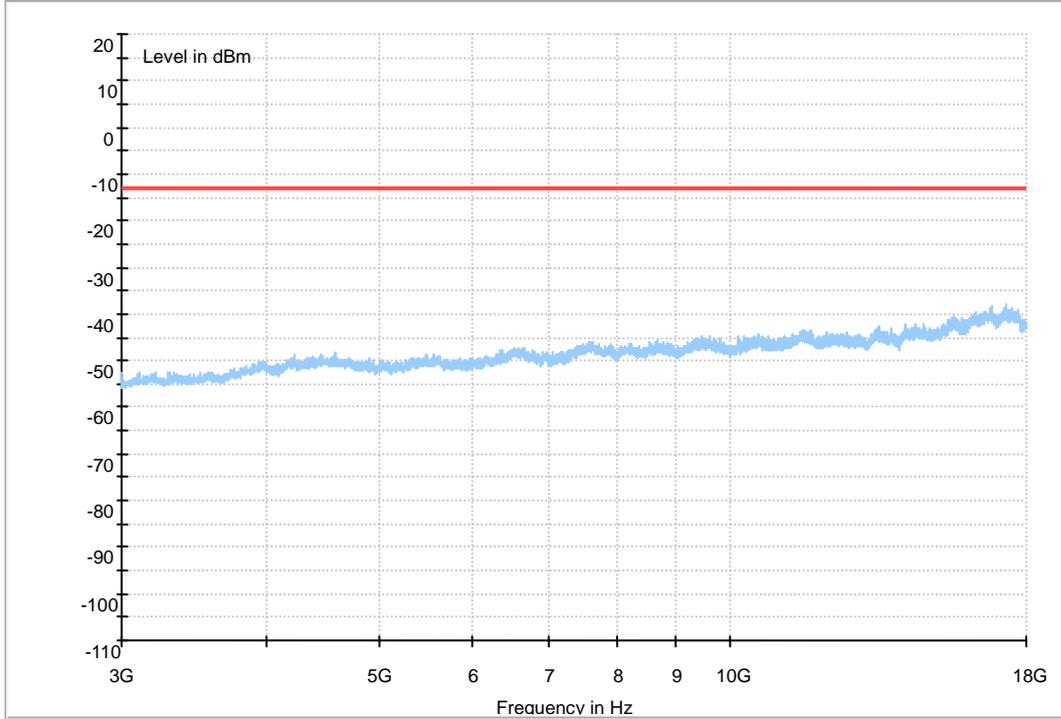
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)



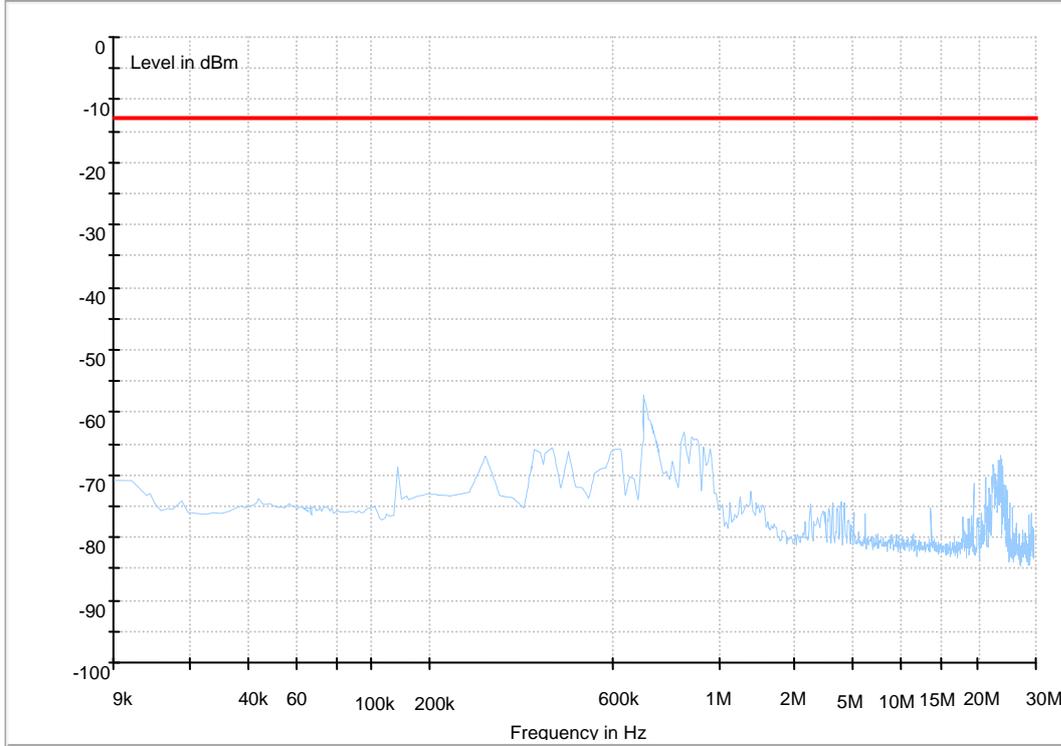
Traffic Mode (3GHz-18GHz)



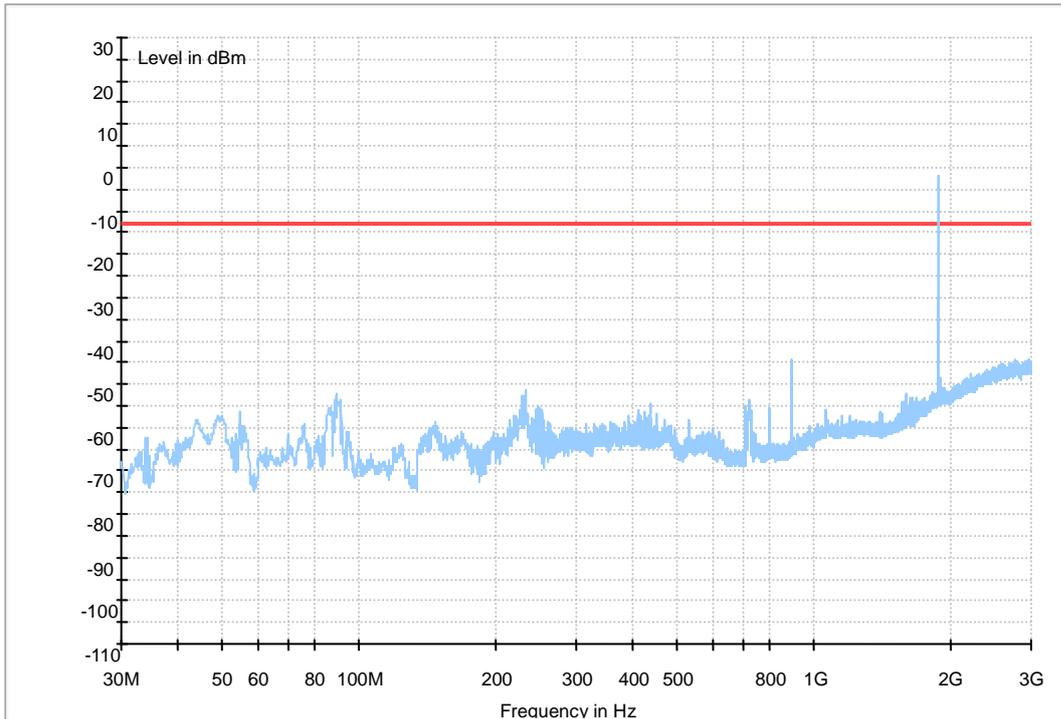
6.1.2 Test Band=GSM1900

6.1.2.1 Test mode=GSM/TM1

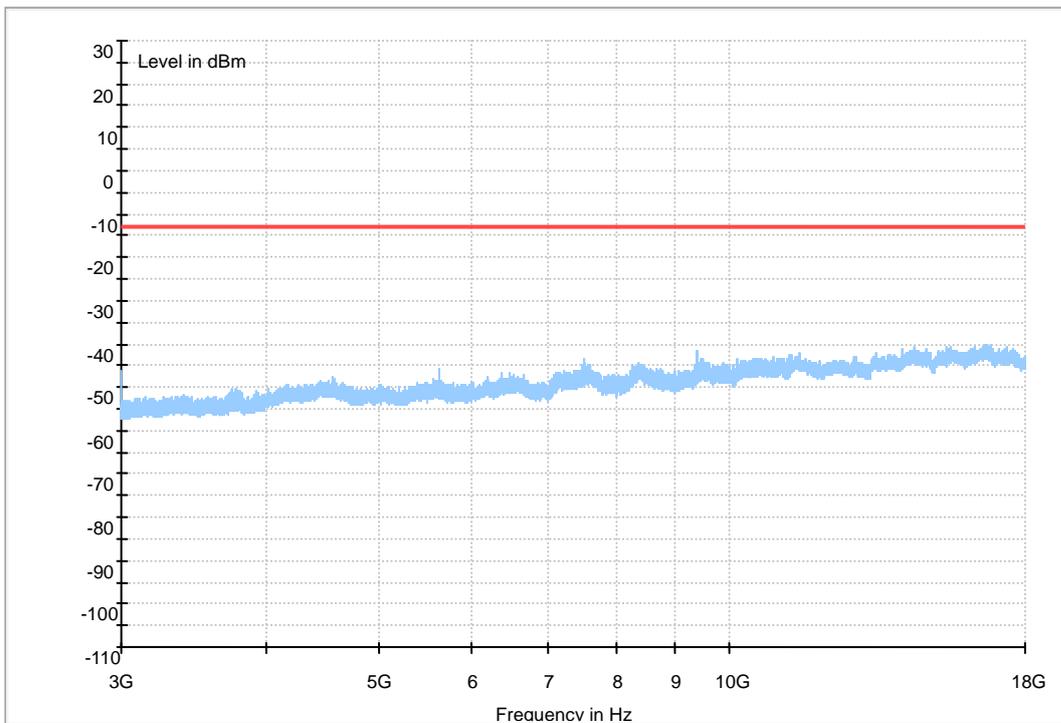
Traffic Mode (9kHz-30MHz)



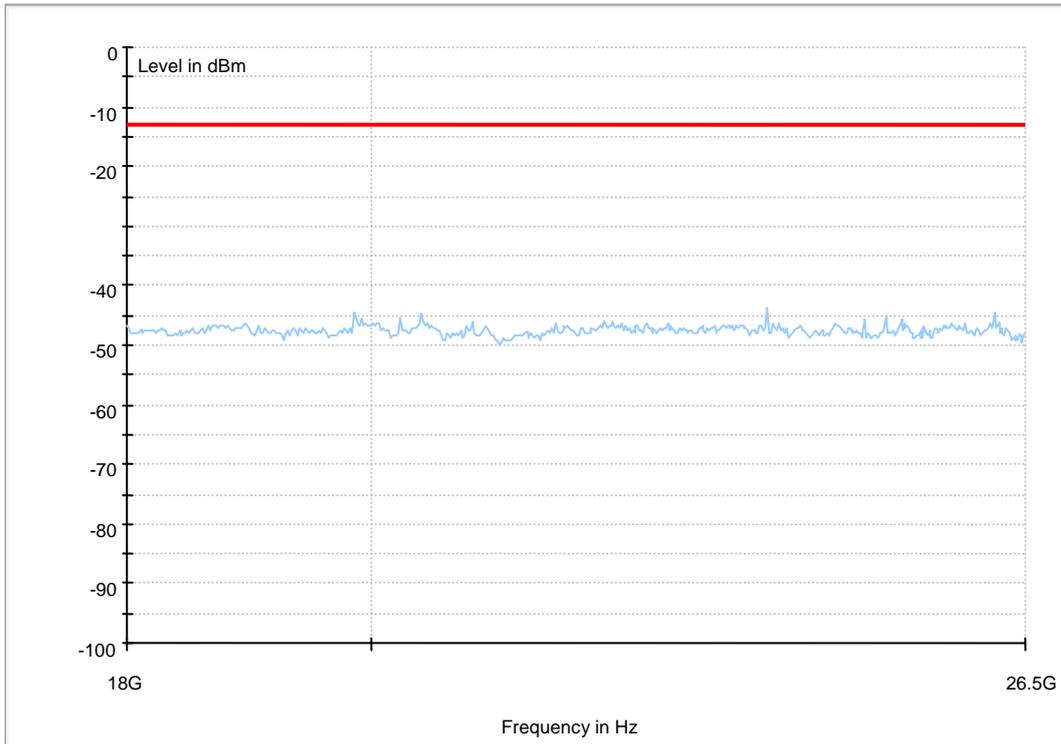
Traffic Mode (30MHz-3GHz)



Traffic Mode (3GHz-18GHz)

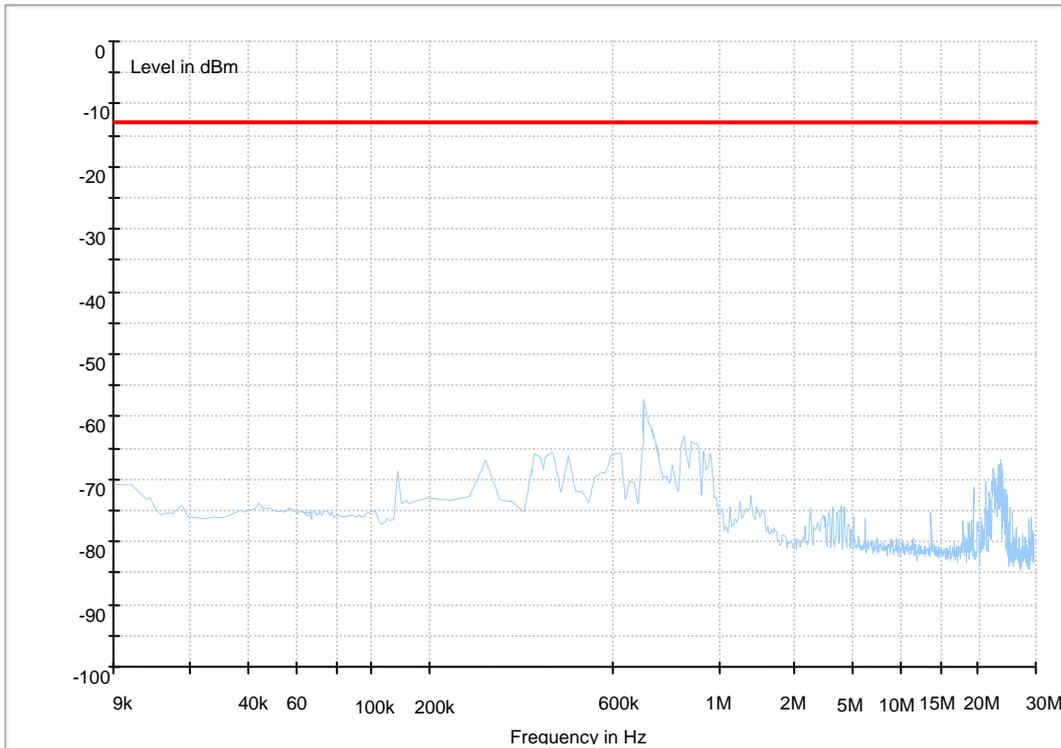


Traffic Mode (18GHz-26.5GHz)

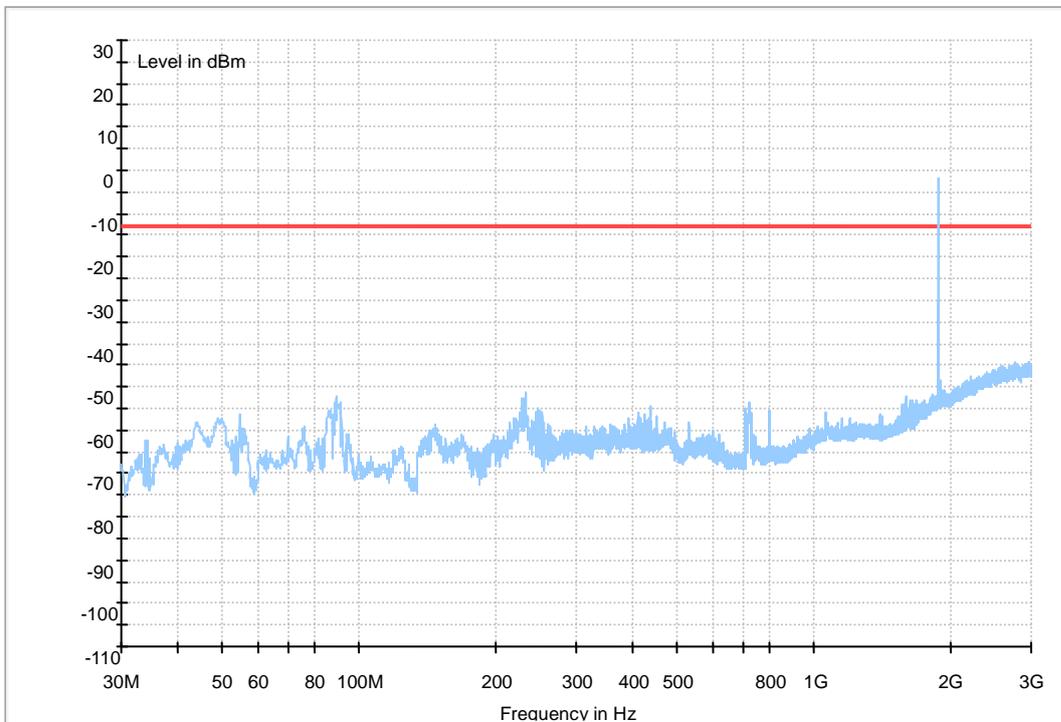


6.1.2.2 Test mode=GSM/TM2

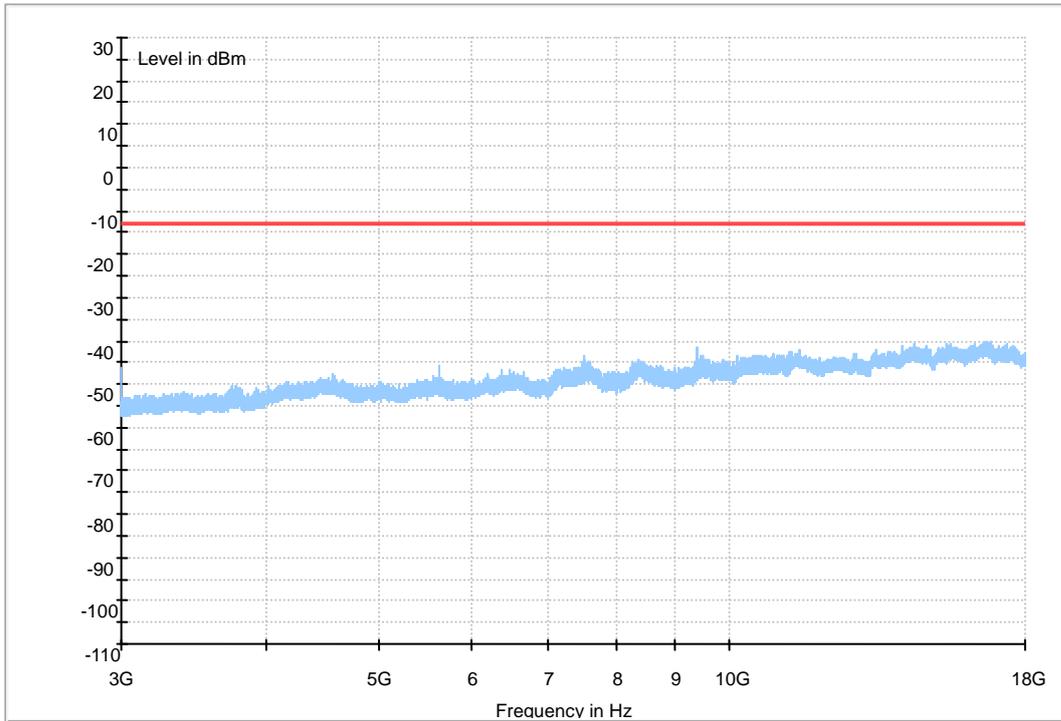
Traffic Mode (9kHz-30MHz)



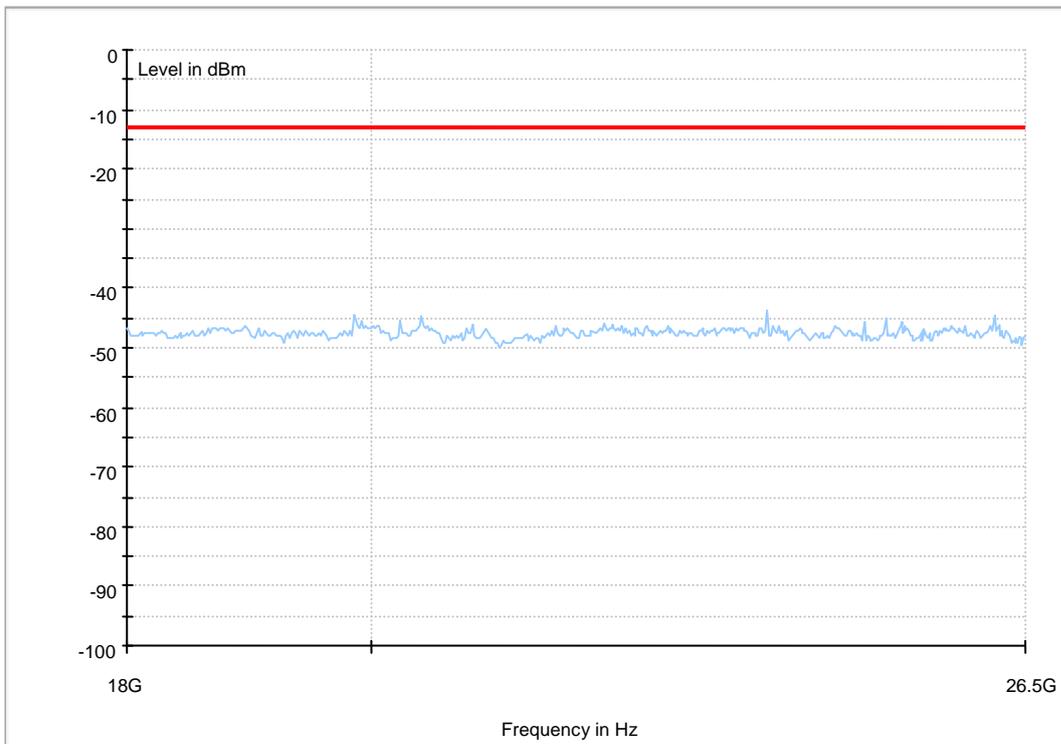
Traffic Mode (30MHz-3GHz)



Traffic Mode (3GHz-18GHz)



Traffic Mode (18GHz-26.5GHz)



7Appendix_G: Frequency Stability

7.1 For GSM

7.1.1 Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict
GSM850	GSM/TM1	LCH	TN	VL	-5.75	-0.00698	±2.5	PASS
				VN	-5.94	-0.00721	±2.5	PASS
				VH	-3.75	-0.00455	±2.5	PASS
		MCH	TN	VL	-8.72	-0.01042	±2.5	PASS
				VN	-7.49	-0.00895	±2.5	PASS
				VH	-7.30	-0.00873	±2.5	PASS
		HCH	TN	VL	-8.91	-0.01050	±2.5	PASS
				VN	-7.94	-0.00935	±2.5	PASS
				VH	-6.01	-0.00708	±2.5	PASS
	GSM/TM2	LCH	TN	VL	-17.40	-0.02111	±2.5	PASS
				VN	-11.24	-0.01364	±2.5	PASS
				VH	-10.53	-0.01278	±2.5	PASS
		MCH	TN	VL	-17.89	-0.02138	±2.5	PASS
				VN	-17.92	-0.02142	±2.5	PASS
				VH	-20.28	-0.02424	±2.5	PASS
		HCH	TN	VL	-21.28	-0.02507	±2.5	PASS
				VN	-20.31	-0.02393	±2.5	PASS
				VH	-16.11	-0.01898	±2.5	PASS
GSM1900	GSM/TM1	LCH	TN	VL	3.87	0.00209	±2.5	PASS
				VN	-0.58	-0.00031	±2.5	PASS
				VH	-6.72	-0.00363	±2.5	PASS
		MCH	TN	VL	-15.37	-0.00818	±2.5	PASS
				VN	-24.92	-0.01326	±2.5	PASS
				VH	-25.89	-0.01377	±2.5	PASS
		HCH	TN	VL	-14.14	-0.00740	±2.5	PASS
				VN	-14.08	-0.00737	±2.5	PASS
				VH	-16.59	-0.00869	±2.5	PASS
	GSM/TM2	LCH	TN	VL	-9.27	-0.00501	±2.5	PASS
				VN	-8.07	-0.00436	±2.5	PASS
				VH	-5.65	-0.00305	±2.5	PASS
		MCH	TN	VL	-21.18	-0.01127	±2.5	PASS
				VN	-36.97	-0.01966	±2.5	PASS
				VH				

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict
				VH	-33.54	-0.01784	±2.5	PASS
		HCH	TN	VL	-25.99	-0.01361	±2.5	PASS
				VN	-25.09	-0.01314	±2.5	PASS
				VH	-25.60	-0.01340	±2.5	PASS

7.1.2 Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict		
GSM850	GSM/TM1	LCH	VN	-30	-6.26	-0.00760	±2.5	PASS		
				-20	-5.04	-0.00612	±2.5	PASS		
				-10	-5.75	-0.00698	±2.5	PASS		
				0	-4.58	-0.00556	±2.5	PASS		
				10	-4.71	-0.00571	±2.5	PASS		
				20	-5.04	-0.00612	±2.5	PASS		
				30	-2.45	-0.00297	±2.5	PASS		
				40	-5.49	-0.00666	±2.5	PASS		
		50	-1.81	-0.00220	±2.5	PASS				
				MCH	VN	-30	-8.07	-0.00965	±2.5	PASS
						-20	-11.24	-0.01344	±2.5	PASS
						-10	-7.36	-0.00880	±2.5	PASS
						0	-10.20	-0.01219	±2.5	PASS
						10	-10.01	-0.01197	±2.5	PASS
						20	-8.39	-0.01003	±2.5	PASS
						30	-16.79	-0.02007	±2.5	PASS
						40	-10.40	-0.01243	±2.5	PASS
				50	-12.20	-0.01458	±2.5	PASS		
				HCH	VN	-30	-8.14	-0.00959	±2.5	PASS
						-20	-7.62	-0.00898	±2.5	PASS
						-10	-5.88	-0.00693	±2.5	PASS
						0	-4.71	-0.00555	±2.5	PASS
						10	-2.97	-0.00350	±2.5	PASS
						20	-4.84	-0.00570	±2.5	PASS
			30			-7.23	-0.00852	±2.5	PASS	
			40			-4.46	-0.00525	±2.5	PASS	
			50	-5.23	-0.00616	±2.5	PASS			
		GSM/TM2	LCH	VN	-30	-20.08	-0.02436	±2.5	PASS	
						-20	-13.59	-0.01649	±2.5	PASS
						-10	-13.82	-0.01677	±2.5	PASS
						0	-15.85	-0.01923	±2.5	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict		
				10	-16.05	-0.01947	±2.5	PASS		
				20	-17.01	-0.02064	±2.5	PASS		
				30	-13.53	-0.01642	±2.5	PASS		
				40	-14.66	-0.01779	±2.5	PASS		
				50	-15.17	-0.01841	±2.5	PASS		
		MCH	VN	-30	-22.28	-0.02663	±2.5	PASS		
				-20	-14.56	-0.01740	±2.5	PASS		
				-10	-18.63	-0.02227	±2.5	PASS		
				0	-19.50	-0.02331	±2.5	PASS		
				10	-19.76	-0.02362	±2.5	PASS		
				20	-22.79	-0.02724	±2.5	PASS		
				30	-24.41	-0.02918	±2.5	PASS		
				40	-20.50	-0.02450	±2.5	PASS		
		HCH	VN	50	-20.95	-0.02504	±2.5	PASS		
				-30	-19.47	-0.02294	±2.5	PASS		
				-20	-17.53	-0.02065	±2.5	PASS		
				-10	-12.30	-0.01449	±2.5	PASS		
				0	-16.98	-0.02000	±2.5	PASS		
				10	-18.14	-0.02137	±2.5	PASS		
				20	-20.15	-0.02374	±2.5	PASS		
				30	-18.31	-0.02157	±2.5	PASS		
		GSM1900	GSM/TM1	LCH	VN	40	-16.98	-0.02000	±2.5	PASS
						50	-17.89	-0.02108	±2.5	PASS
						-30	8.78	0.00475	±2.5	PASS
-20	2.84					0.00153	±2.5	PASS		
-10	-4.13					-0.00223	±2.5	PASS		
0	-2.32					-0.00125	±2.5	PASS		
10	3.49					0.00189	±2.5	PASS		
20	5.42					0.00293	±2.5	PASS		
MCH	VN			30	3.42	0.00185	±2.5	PASS		
				40	3.42	0.00185	±2.5	PASS		
				50	0.19	0.00010	±2.5	PASS		
				-30	-25.05	-0.01332	±2.5	PASS		
				-20	-28.73	-0.01528	±2.5	PASS		
				-10	-24.92	-0.01326	±2.5	PASS		
				0	-22.28	-0.01185	±2.5	PASS		
				10	-25.96	-0.01381	±2.5	PASS		
20	-25.25	-0.01343	±2.5	PASS						
30	-24.47	-0.01302	±2.5	PASS						
40	-21.83	-0.01161	±2.5	PASS						



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict
		HCH	VN	50	-33.71	-0.01793	±2.5	PASS
				-30	-16.79	-0.00879	±2.5	PASS
				-20	-7.81	-0.00409	±2.5	PASS
				-10	-14.01	-0.00734	±2.5	PASS
				0	-14.33	-0.0075	±2.5	PASS
				10	-19.50	-0.01021	±2.5	PASS
				20	-18.98	-0.00994	±2.5	PASS
				30	-15.69	-0.00822	±2.5	PASS
				40	-16.14	-0.00845	±2.5	PASS
				50	-18.40	-0.00963	±2.5	PASS
	GSM/TM2	LCH	VN	-30	-3.49	-0.00189	±2.5	PASS
				-20	1.90	0.00103	±2.5	PASS
				-10	-12.14	-0.00656	±2.5	PASS
				0	0.39	0.00021	±2.5	PASS
				10	-7.33	-0.00396	±2.5	PASS
				20	1.61	0.00087	±2.5	PASS
				30	-1.29	-0.00070	±2.5	PASS
				40	-0.52	-0.00028	±2.5	PASS
				50	-7.78	-0.00420	±2.5	PASS
				MCH	VN	-30	-34.64	-0.01843
		-20	-38.48			-0.02047	±2.5	PASS
		-10	-24.02			-0.01278	±2.5	PASS
		0	-33.16			-0.01764	±2.5	PASS
		10	-31.51			-0.01676	±2.5	PASS
		20	-36.19			-0.01925	±2.5	PASS
		30	-33.58			-0.01786	±2.5	PASS
		40	-34.61			-0.01841	±2.5	PASS
		50	-37.32			-0.01985	±2.5	PASS
		HCH	VN			-30	-32.38	-0.01695
				-20	-32.14	-0.01683	±2.5	PASS
				-10	-25.63	-0.01342	±2.5	PASS
				0	-31.64	-0.01657	±2.5	PASS
				10	-29.75	-0.01558	±2.5	PASS
				20	-32.35	-0.01694	±2.5	PASS
				30	-31.47	-0.01648	±2.5	PASS
				40	-35.35	-0.01851	±2.5	PASS
				50	-32.44	-0.01699	±2.5	PASS

END