



Appendix for test report

1Appendix_A: Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	ERP [dBm]	Limit [dBm]	Verdict
GSM850	GSM/TM1	LCH	32.5	28.23	38.5	PASS
		MCH	32.72	28.31	38.5	PASS
		HCH	32.79	28.49	38.5	PASS
	GSM/TM2	LCH	26.7	22.29	38.5	PASS
		MCH	26.63	22.25	38.5	PASS
		HCH	26.56	22.20	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	29.82	30.07	33	PASS
		MCH	29.85	30.06	33	PASS
		HCH	29.76	29.73	33	PASS
	GSM/TM2	LCH	25.71	25.62	33	PASS
		MCH	25.67	25.90	33	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
		HCH	25.62	25.87	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: RBW > emission bandwidth, VBW > 3 x RBW.

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	0.18	13	PASS
		HCH	0.18	13	PASS
	GSM/TM2	LCH	3.28	13	PASS
		MCH	3.17	13	PASS
		HCH	3.14	13	PASS

3Appendix_C: Modulation Characteristics

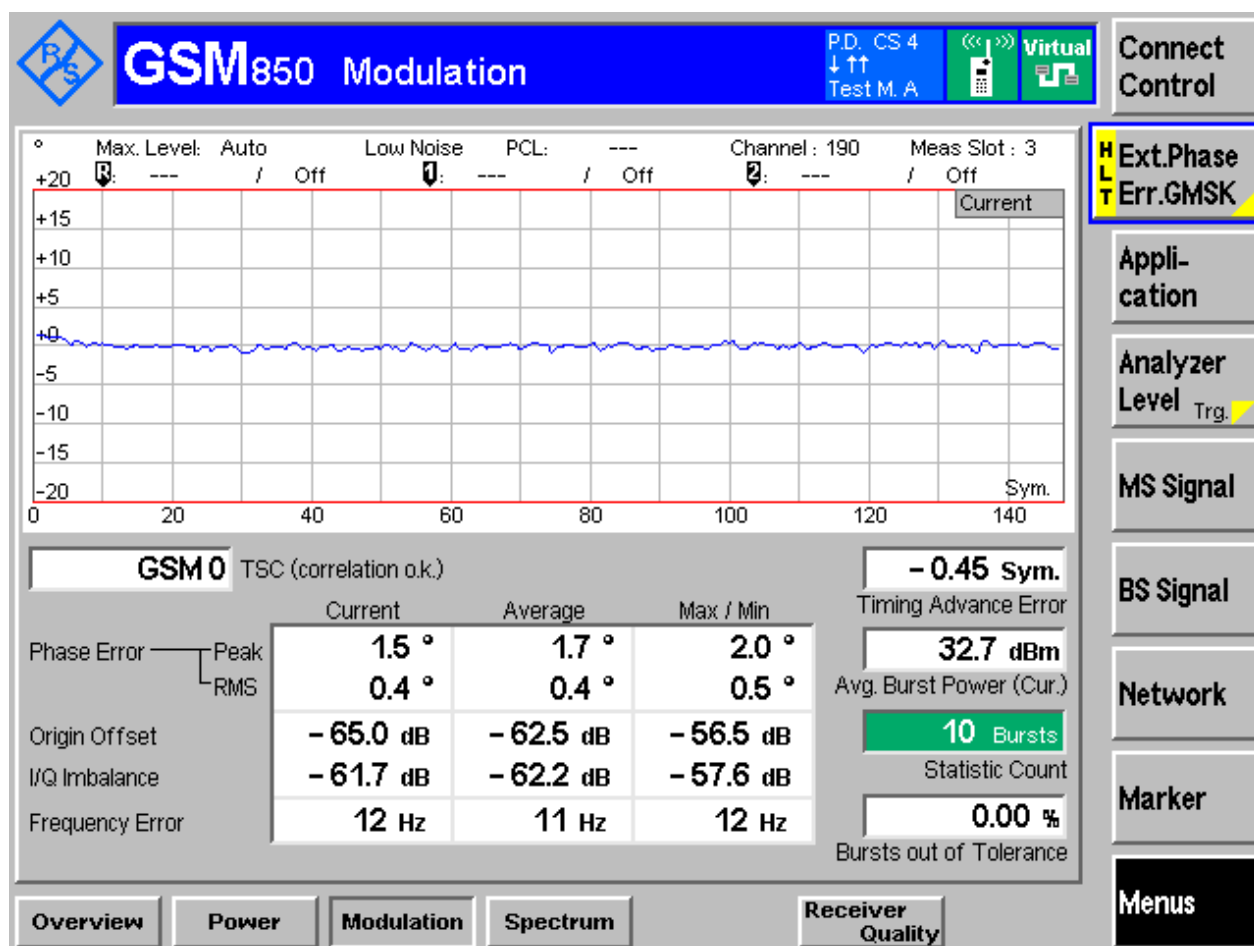
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

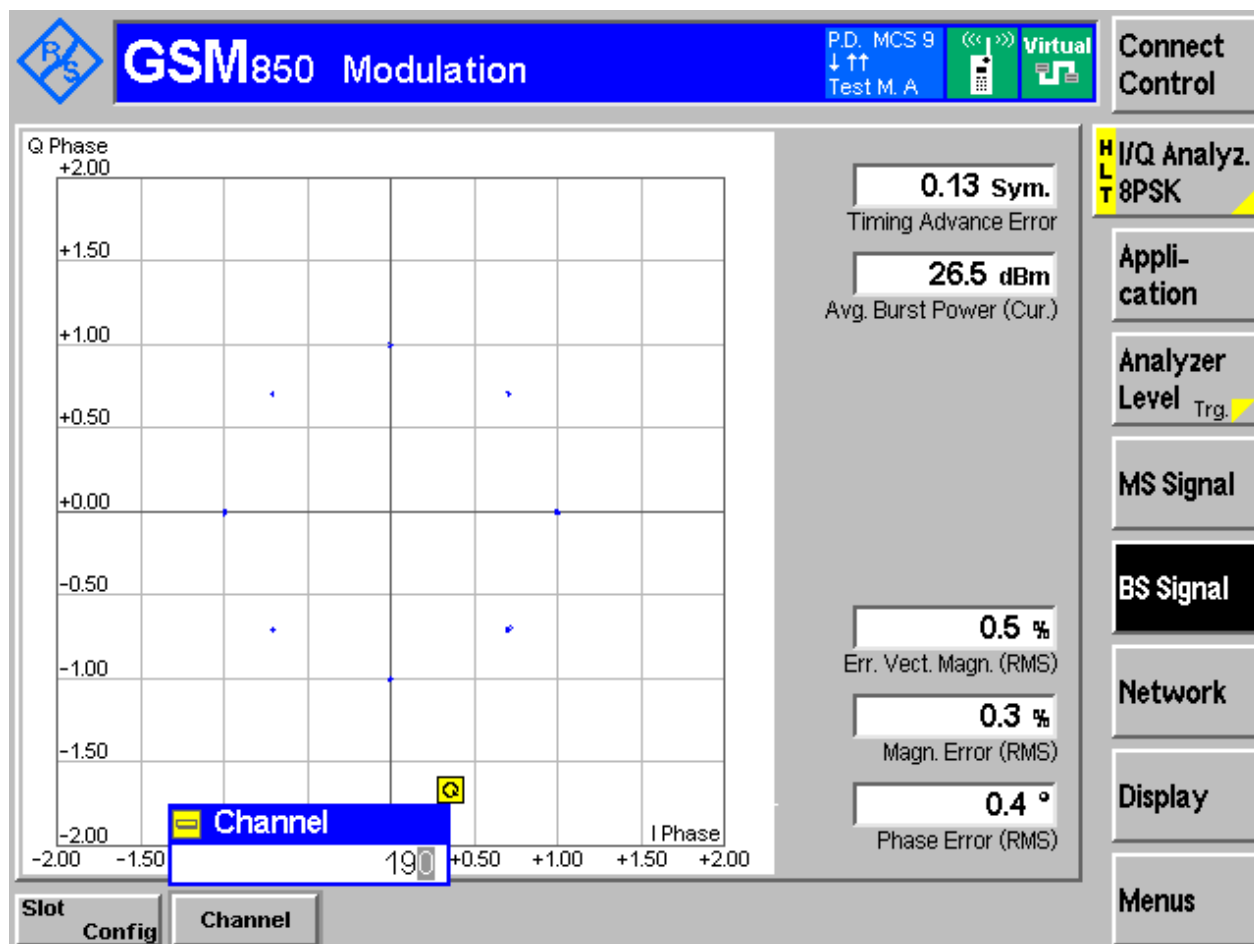
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

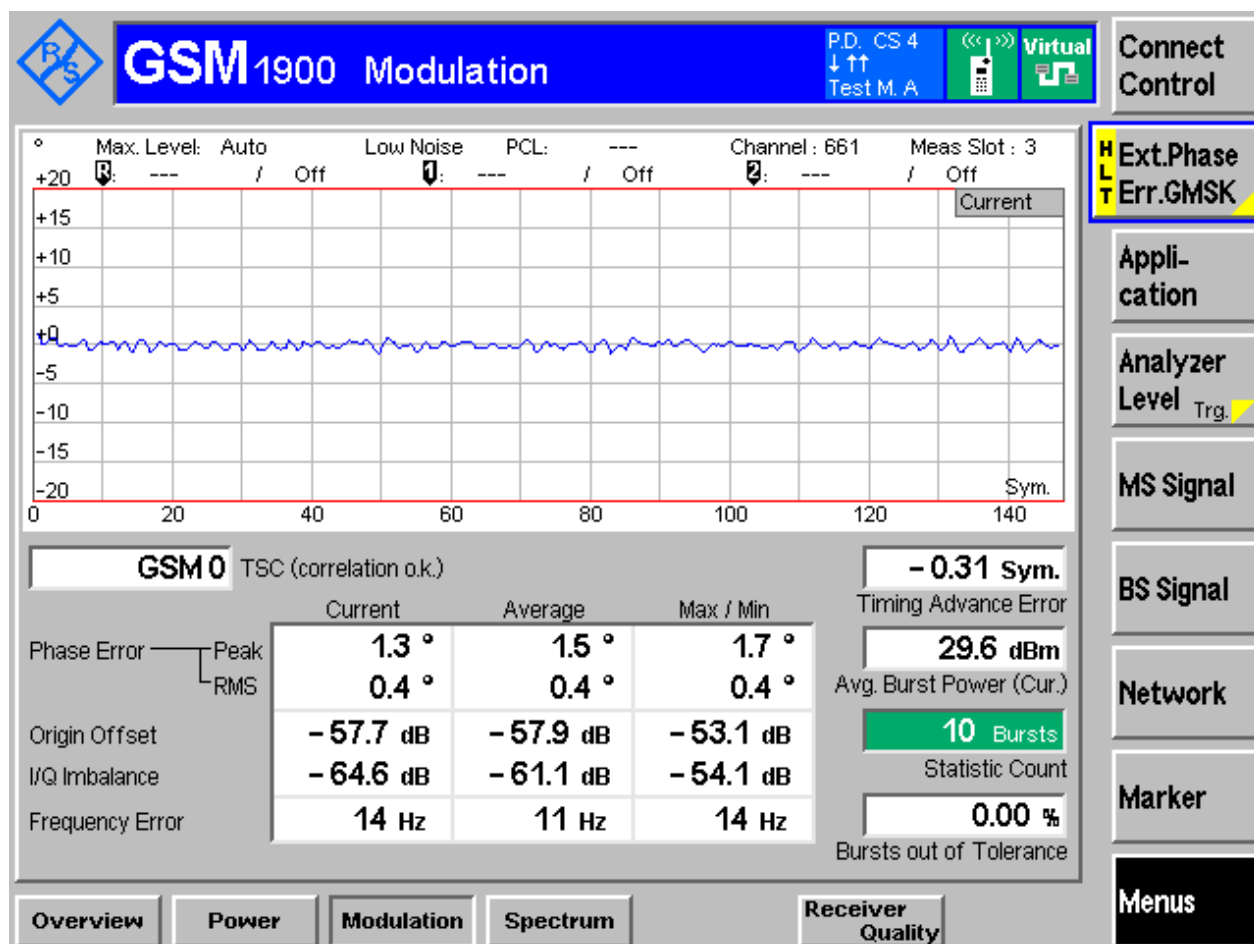
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

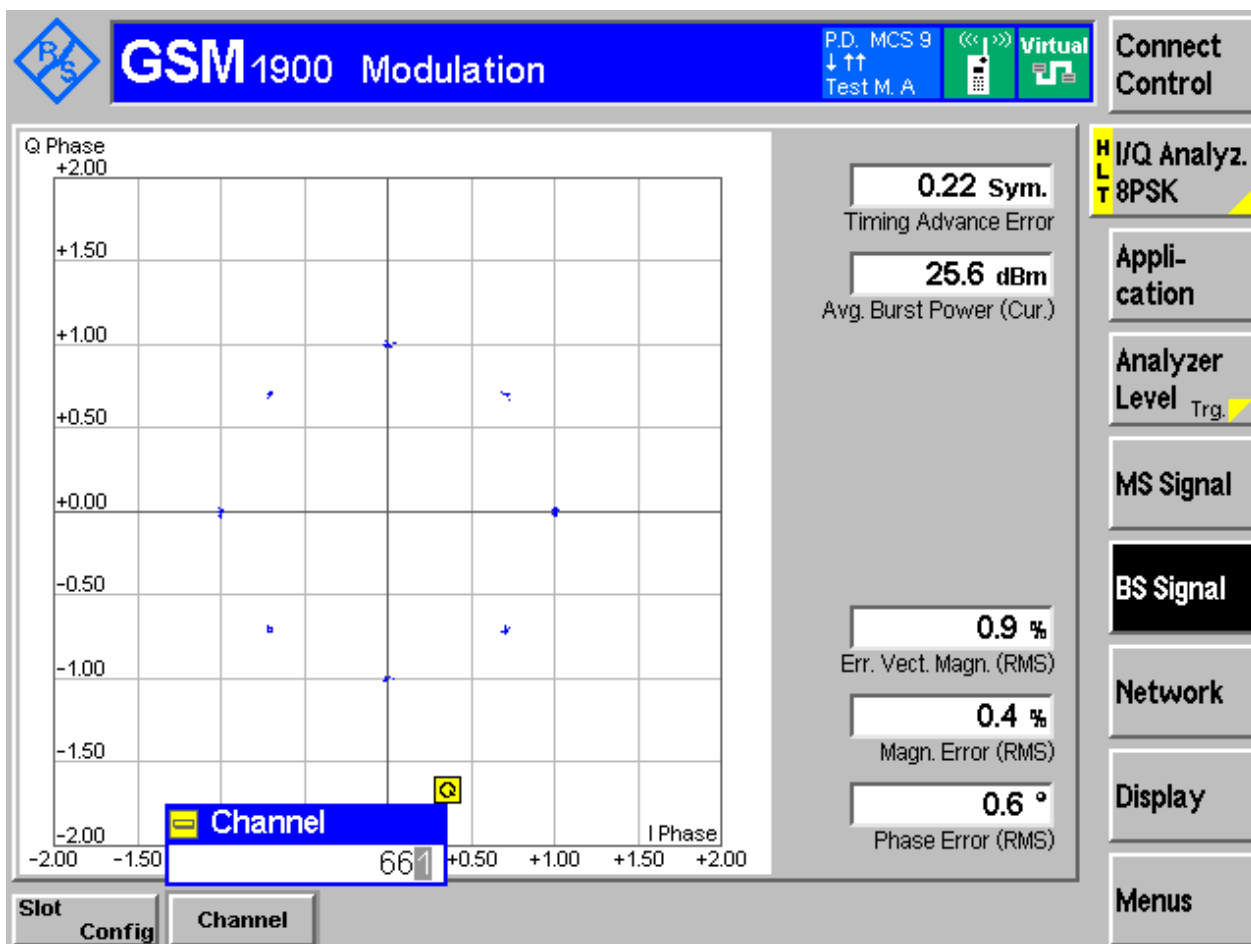
3.1.2.1 Test Mode = GSM/TM1

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	243.73	316.18	Pass
		MCH	241.96	318.55	Pass
		HCH	243.13	318.42	Pass
	GSM/TM2	LCH	243.99	317.12	Pass
		MCH	243.81	312.05	Pass
		HCH	241.76	303.25	Pass
GSM1900	GSM/TM1	LCH	243.22	309.76	Pass
		MCH	246.17	317.29	Pass
		HCH	246.07	316.36	Pass
	GSM/TM2	LCH	244.02	312.19	Pass
		MCH	244.41	308.55	Pass
		HCH	245.20	313.28	Pass



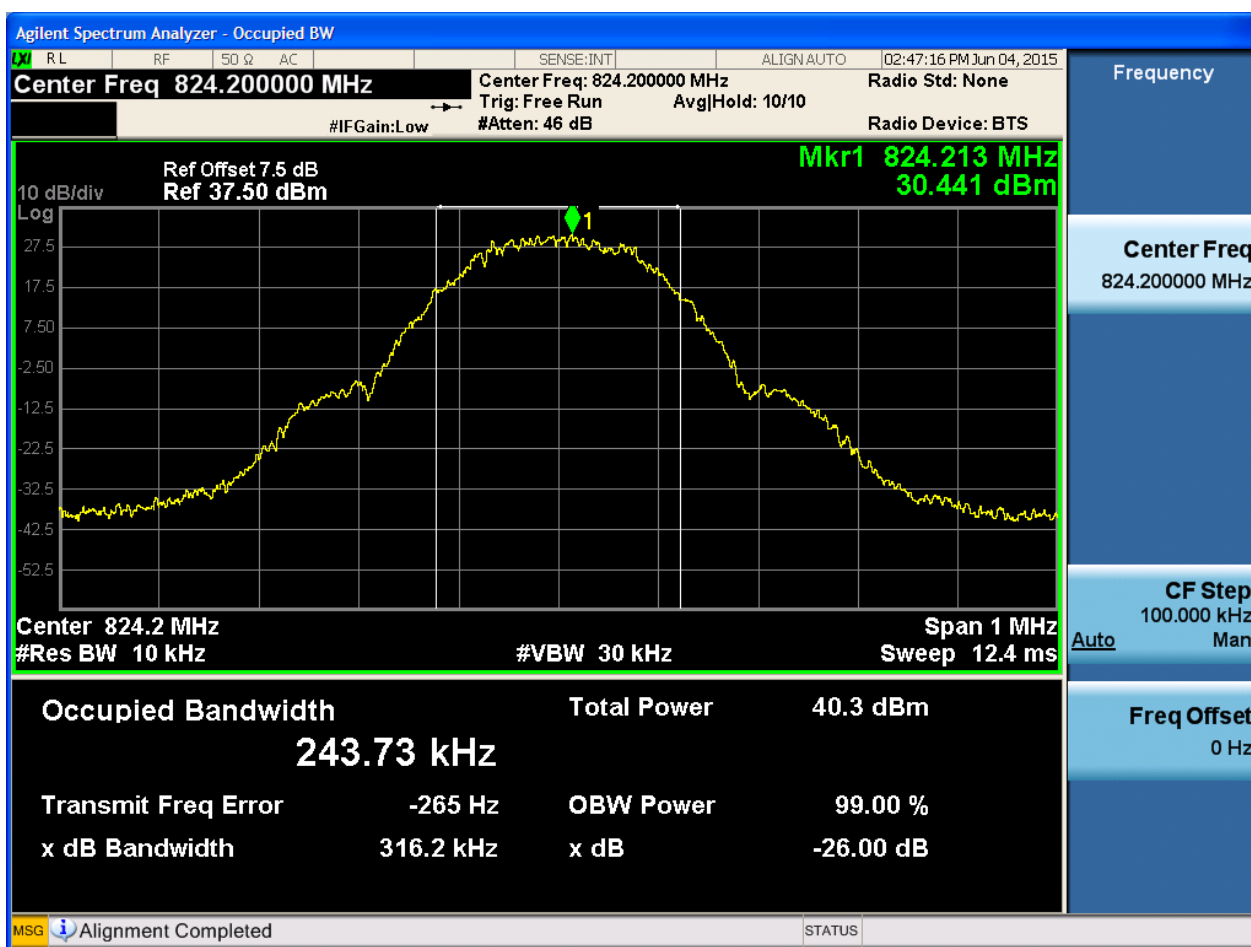
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

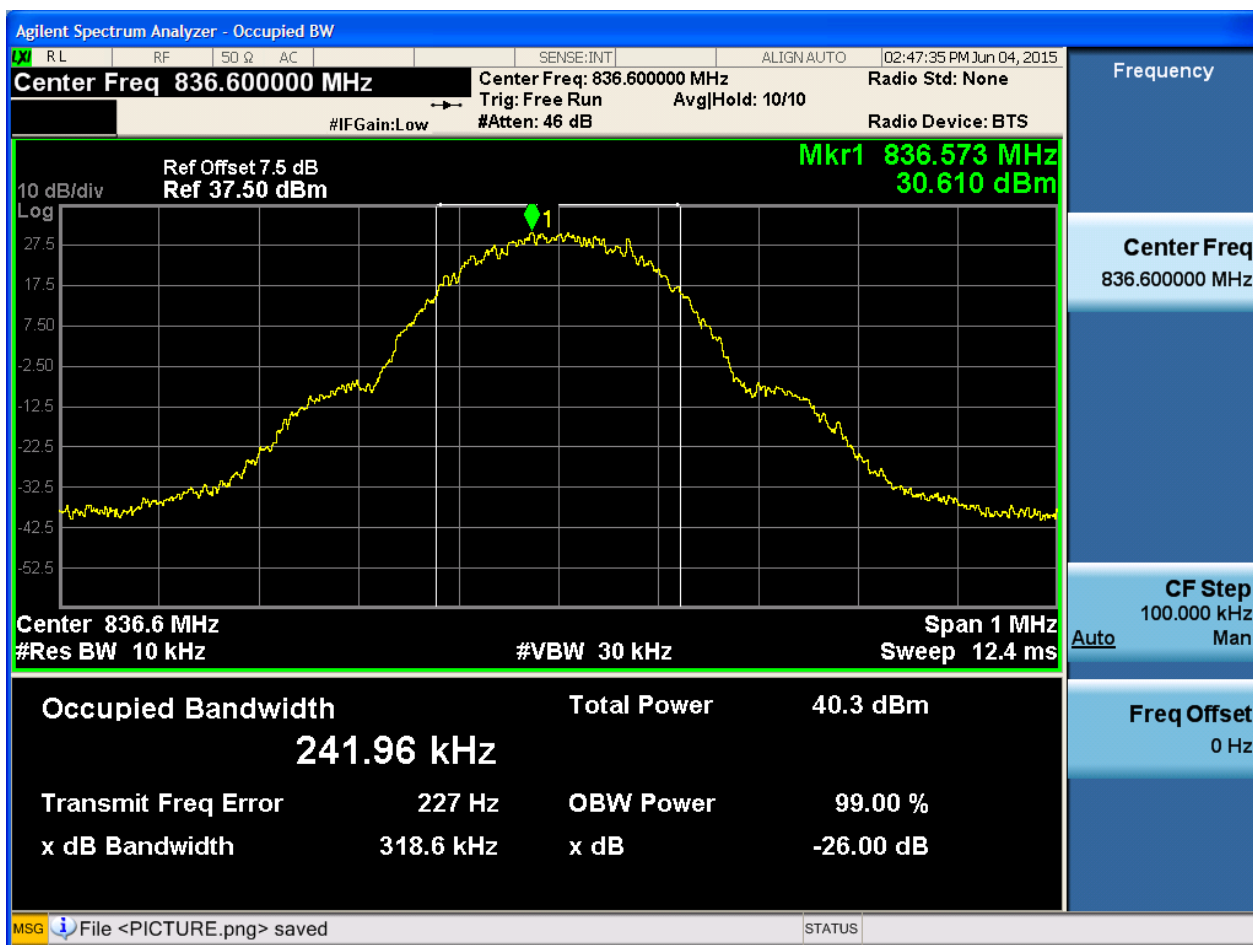
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



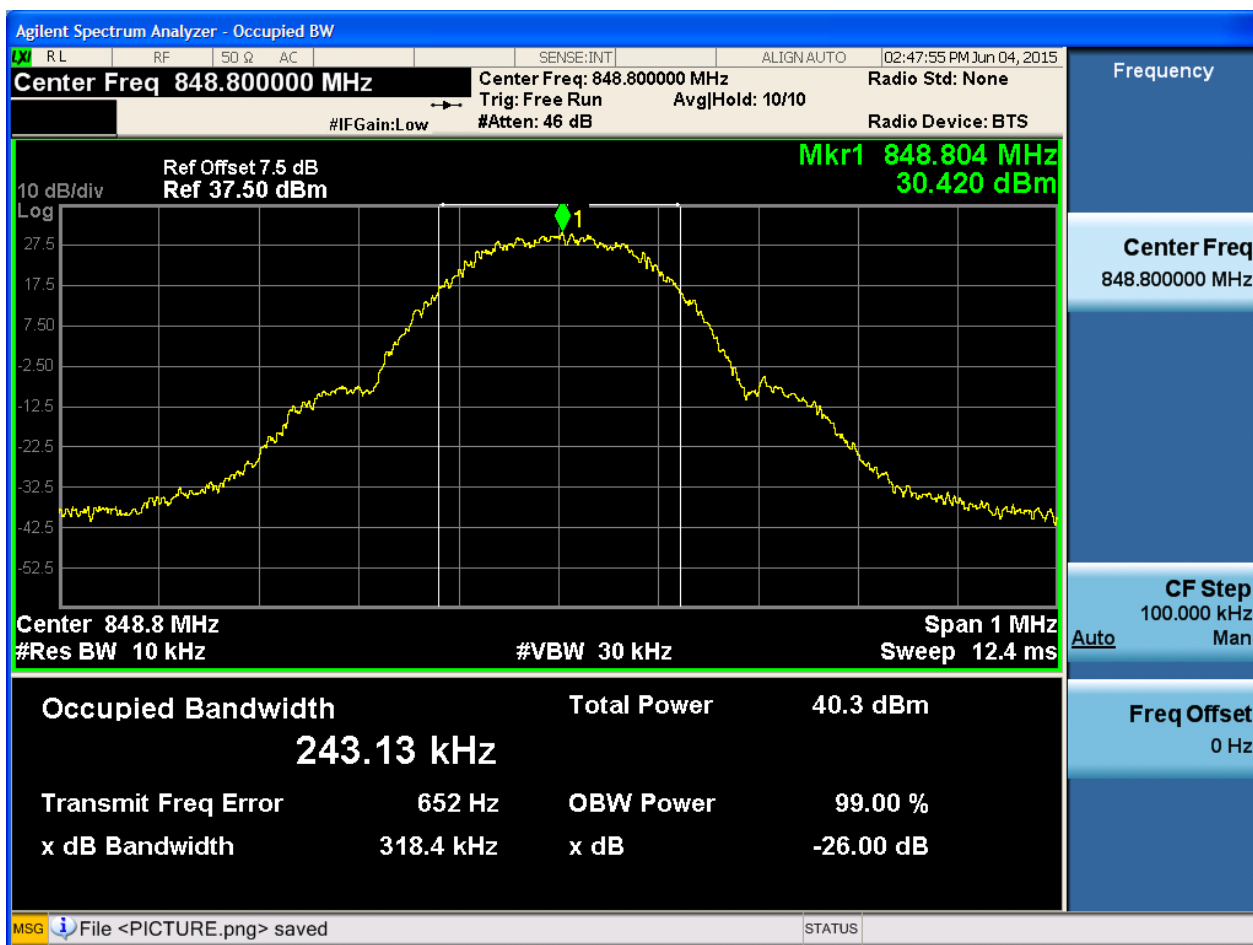


4.1.1.1.2 Test Channel = MCH



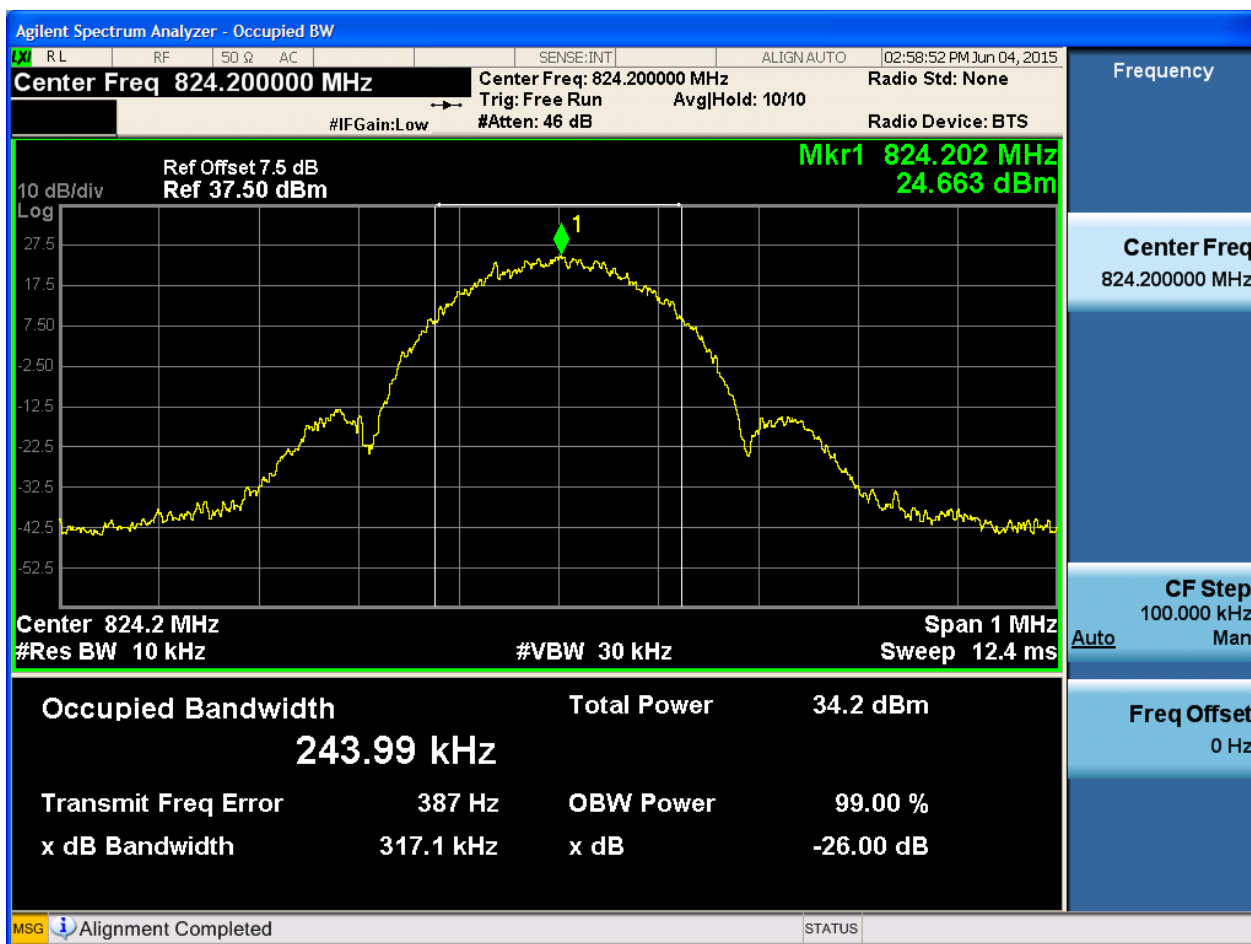


4.1.1.1.3 Test Channel = HCH



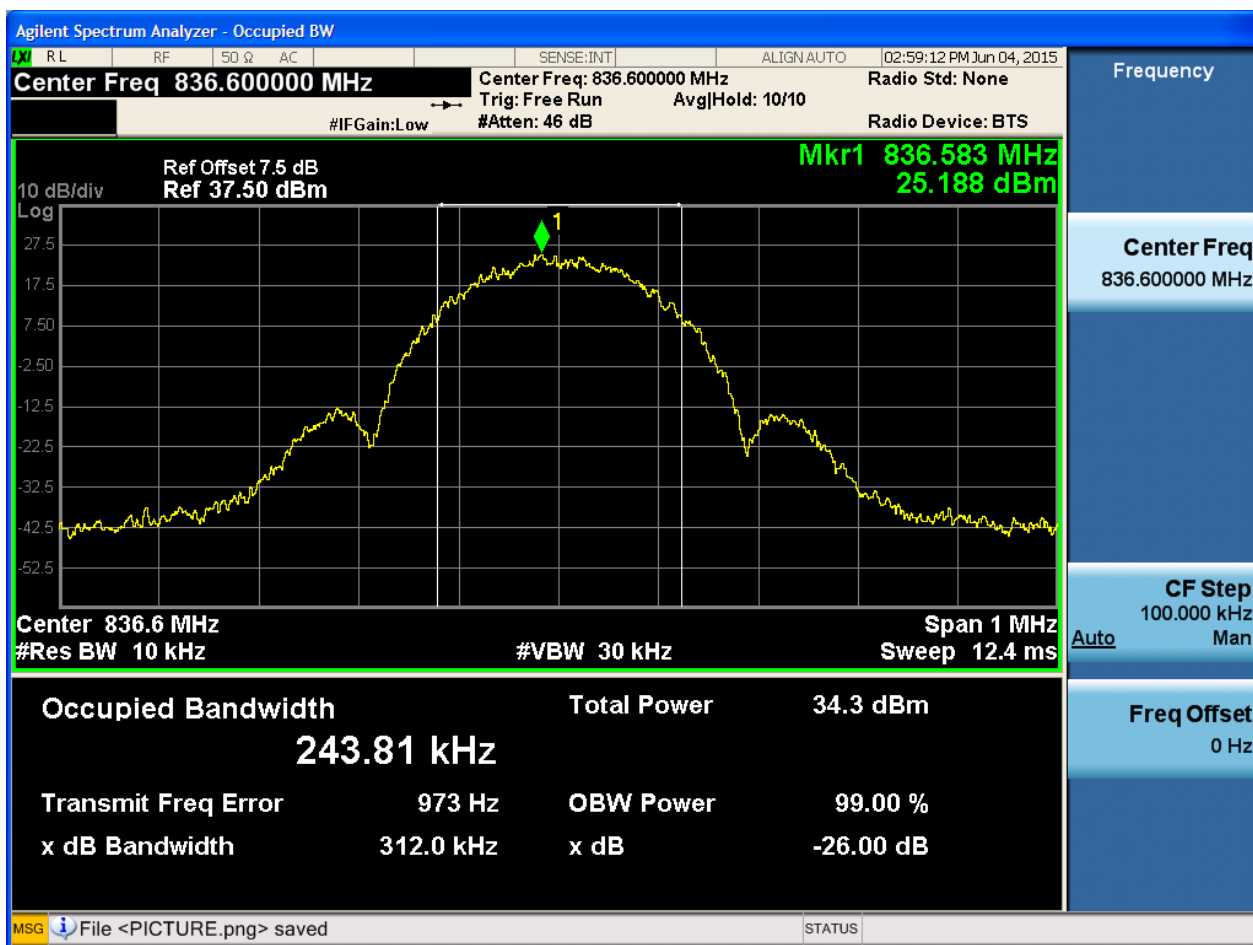
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



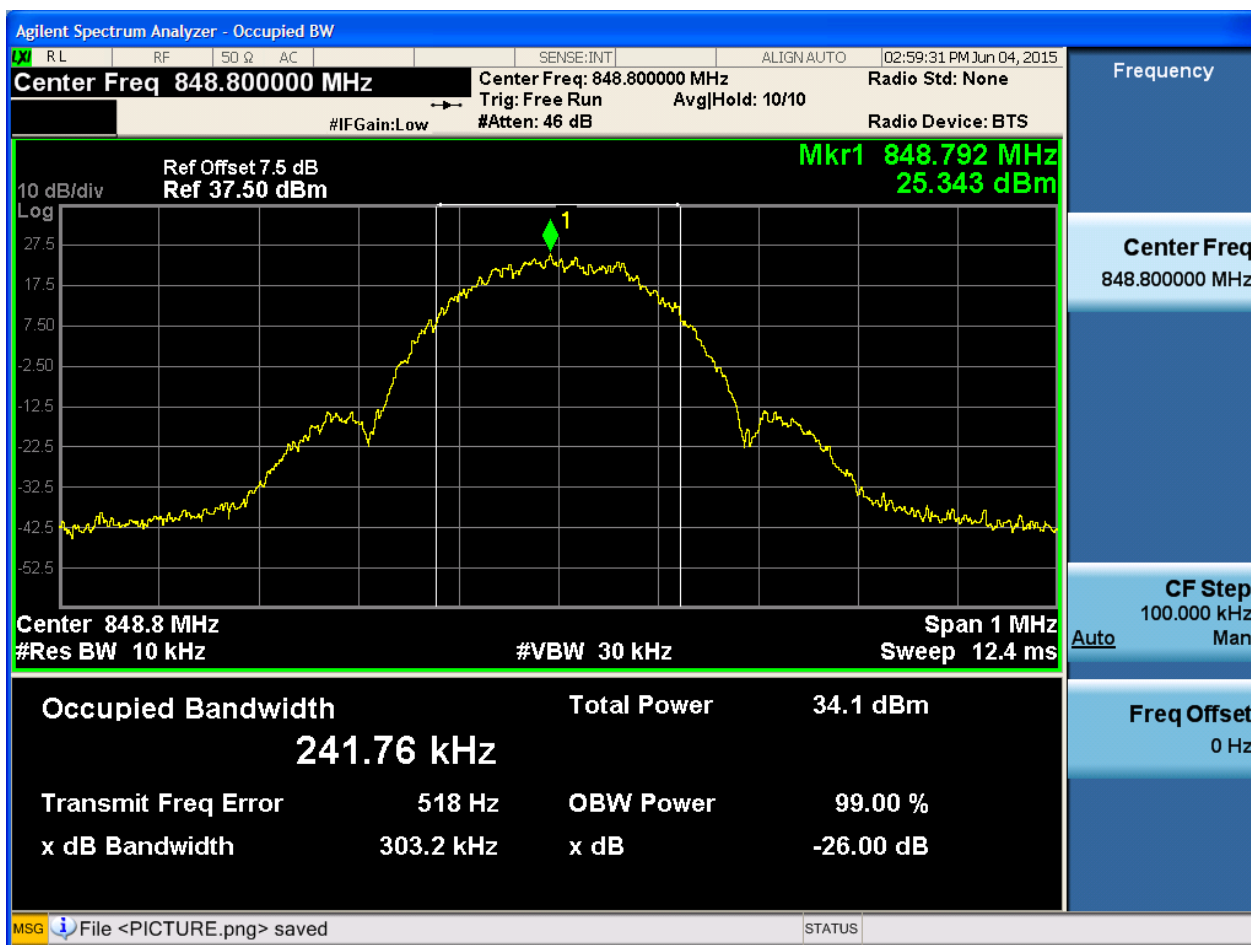


4.1.1.2.2 Test Channel = MCH





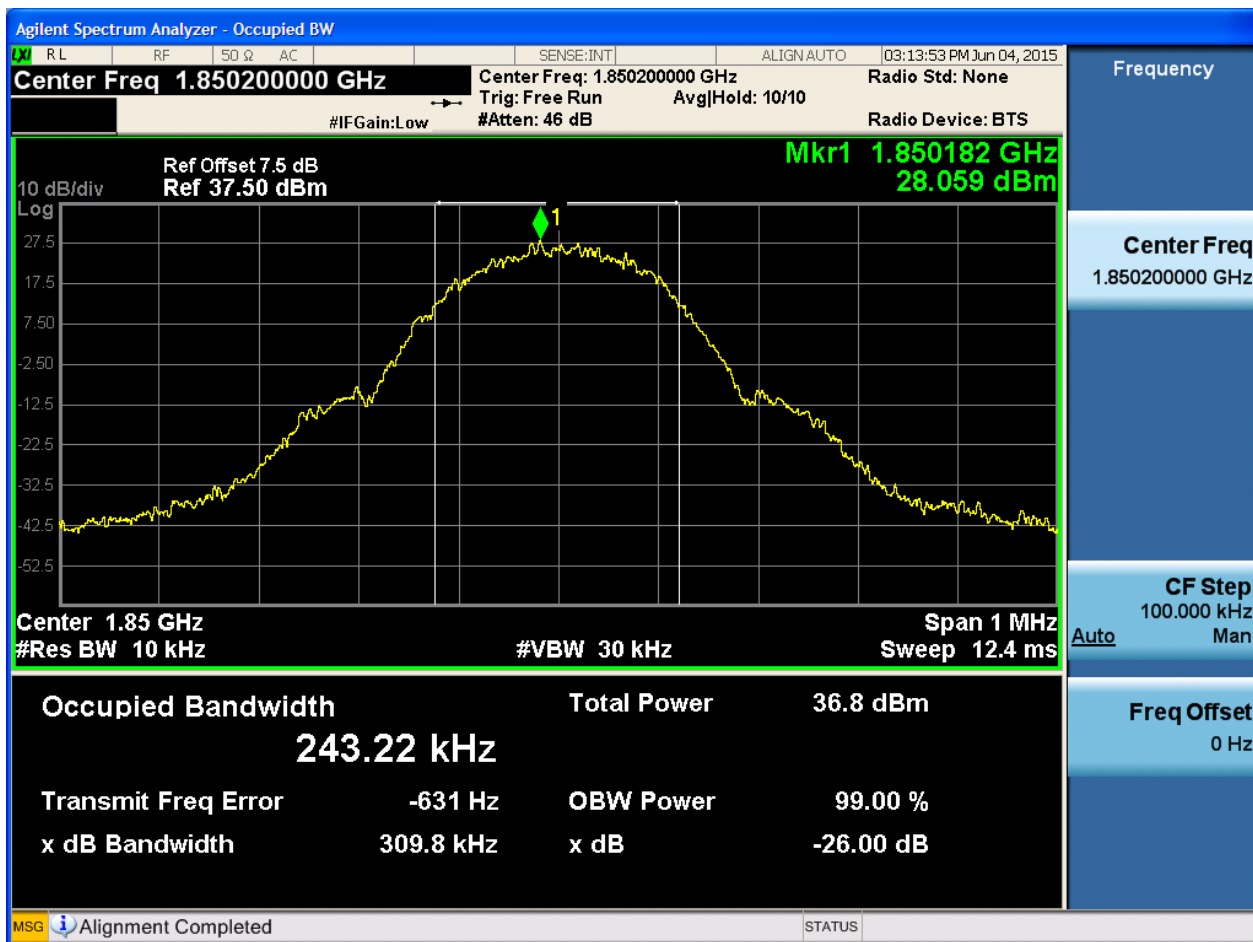
4.1.1.2.3 Test Channel = HCH



4.1.2 Test Band = GSM1900

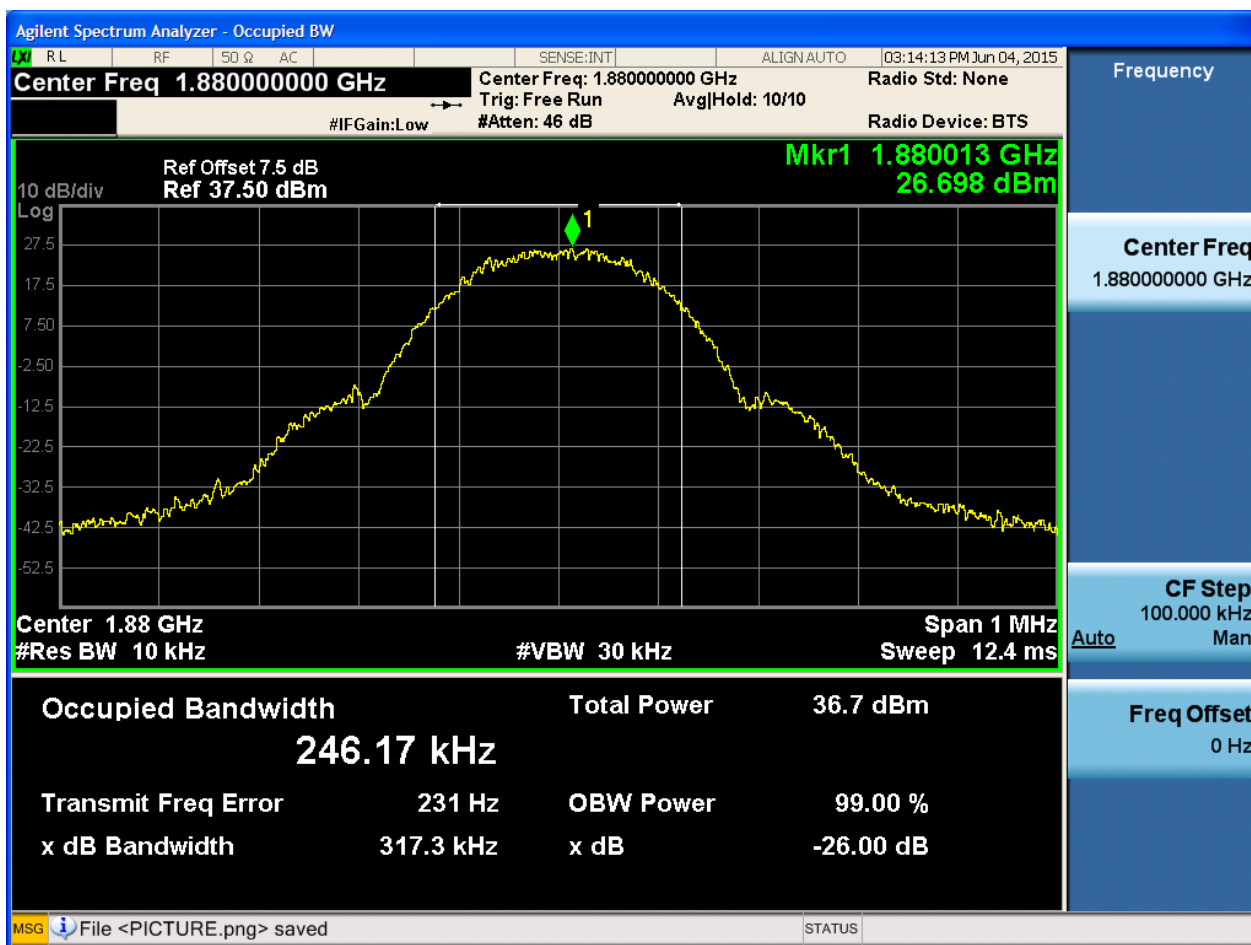
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



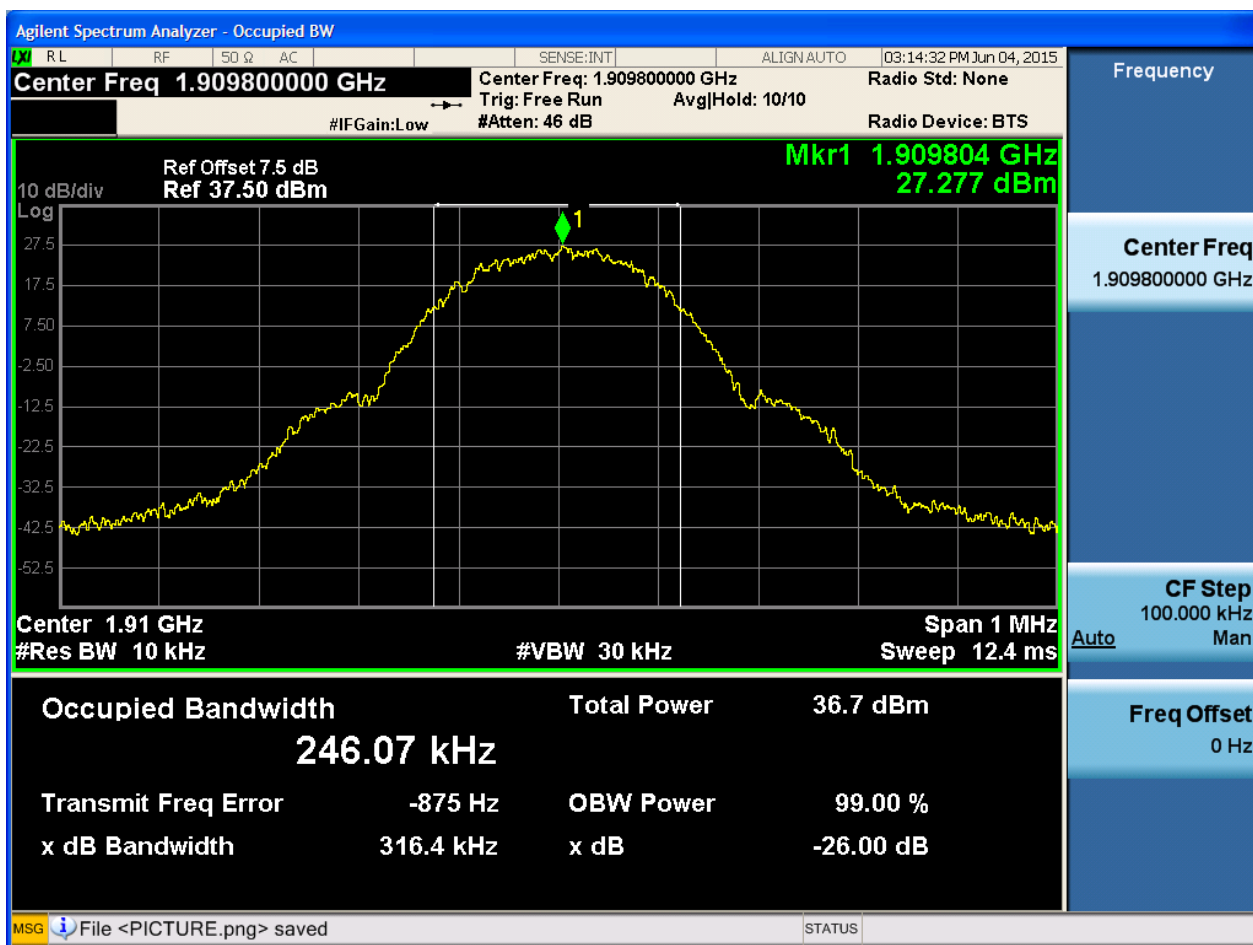


4.1.2.1.2 Test Channel = MCH





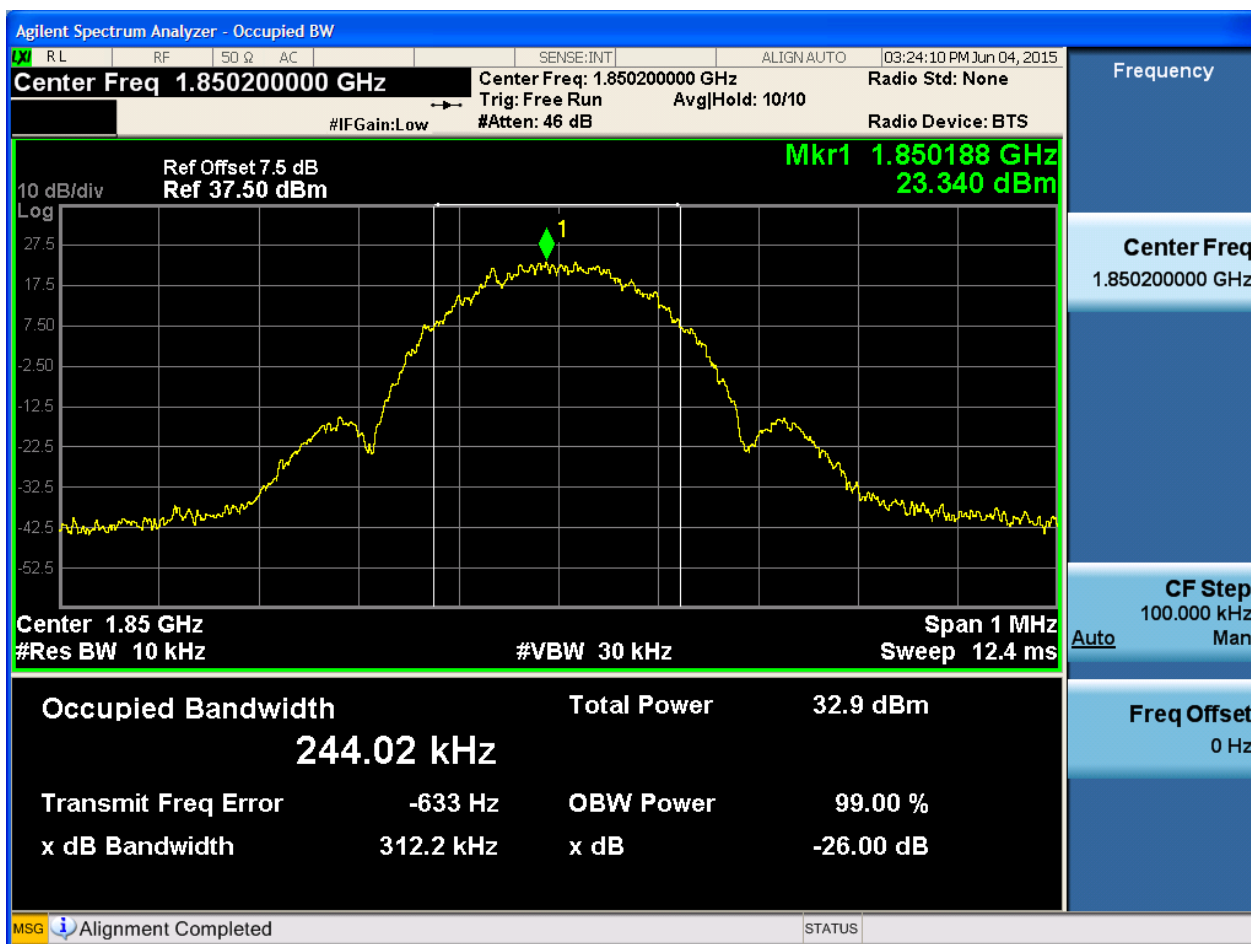
4.1.2.1.3 Test Channel = HCH





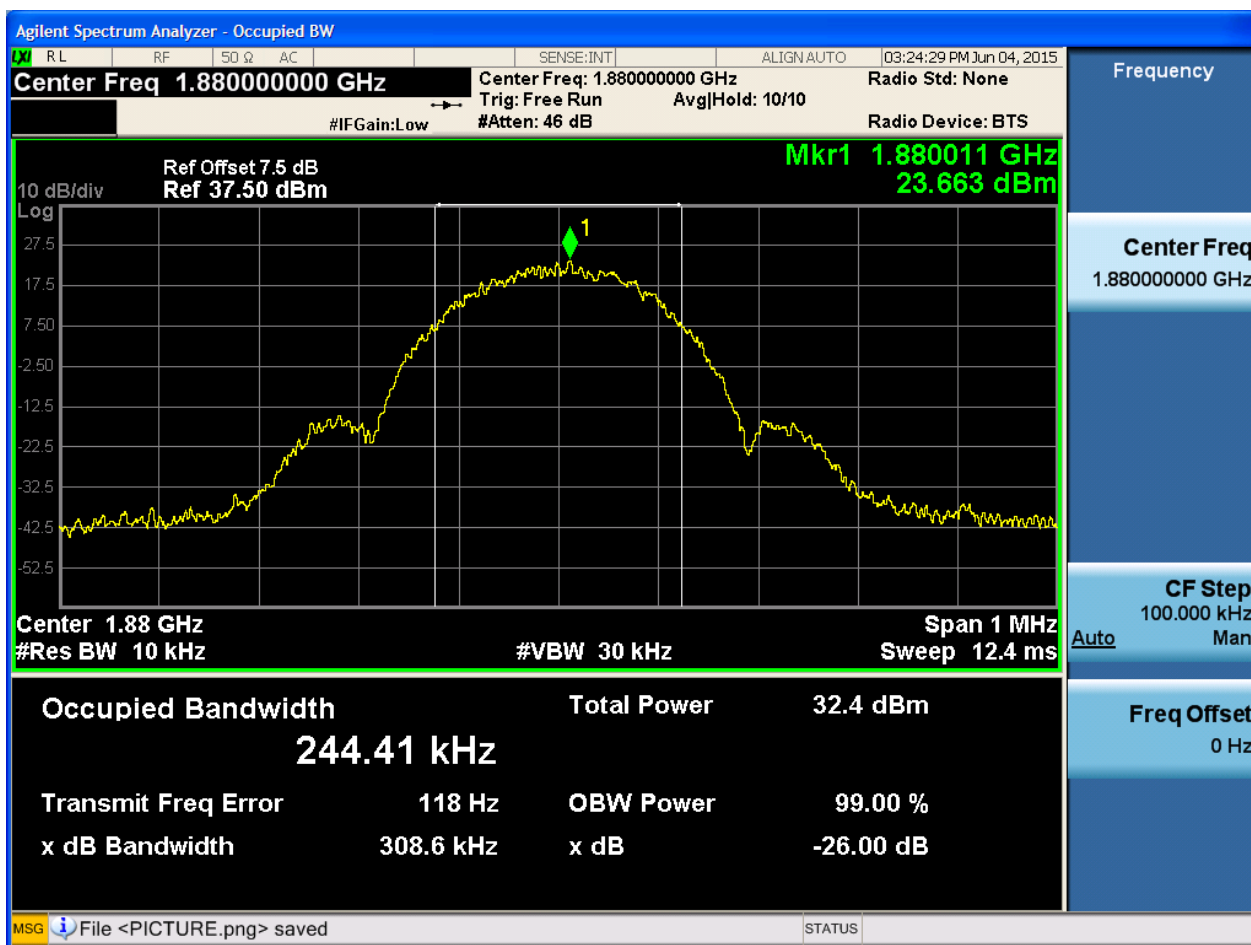
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



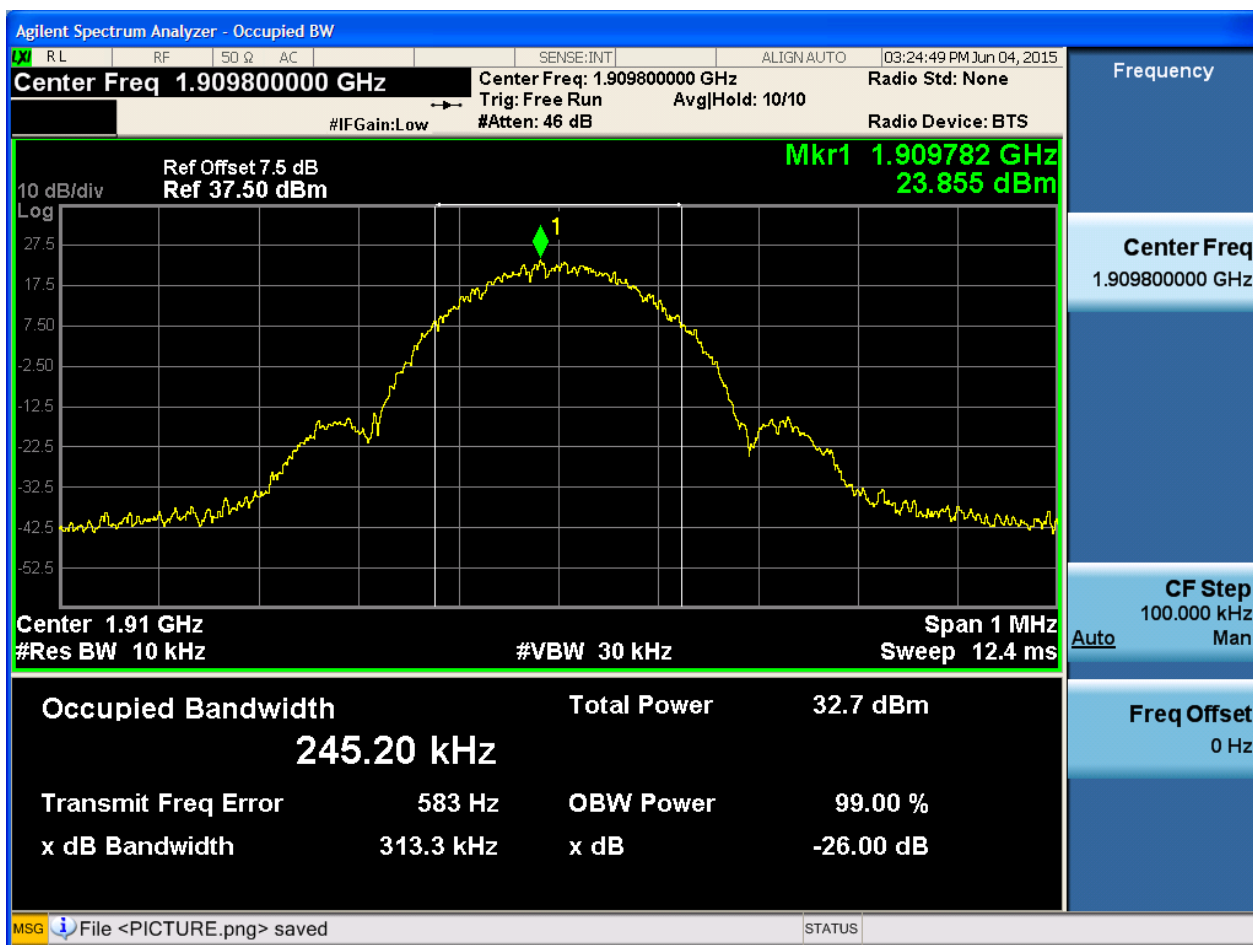


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH



5Appendix_E: Band Edges Compliance

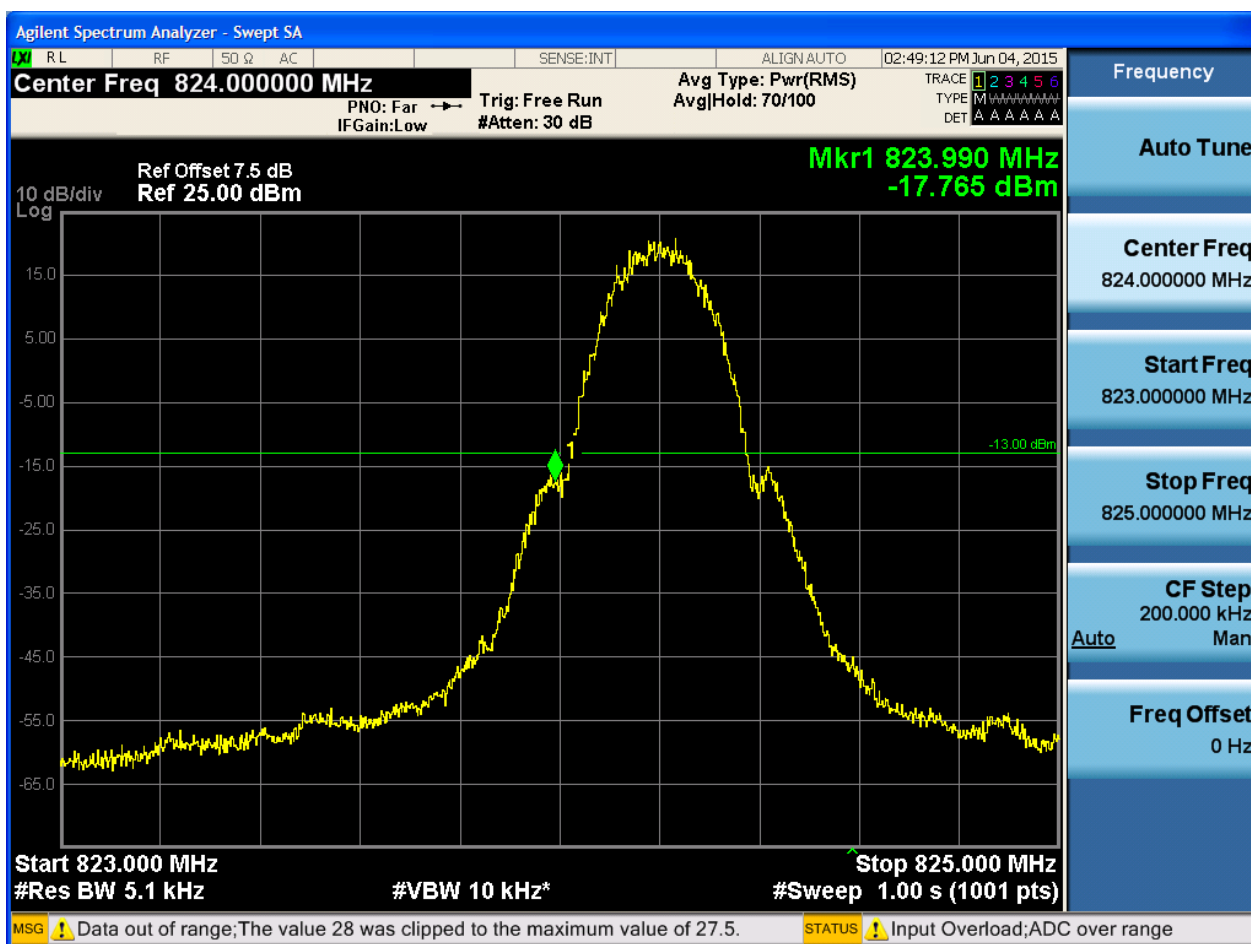
Part I - Test Plots

5.1 For GSM

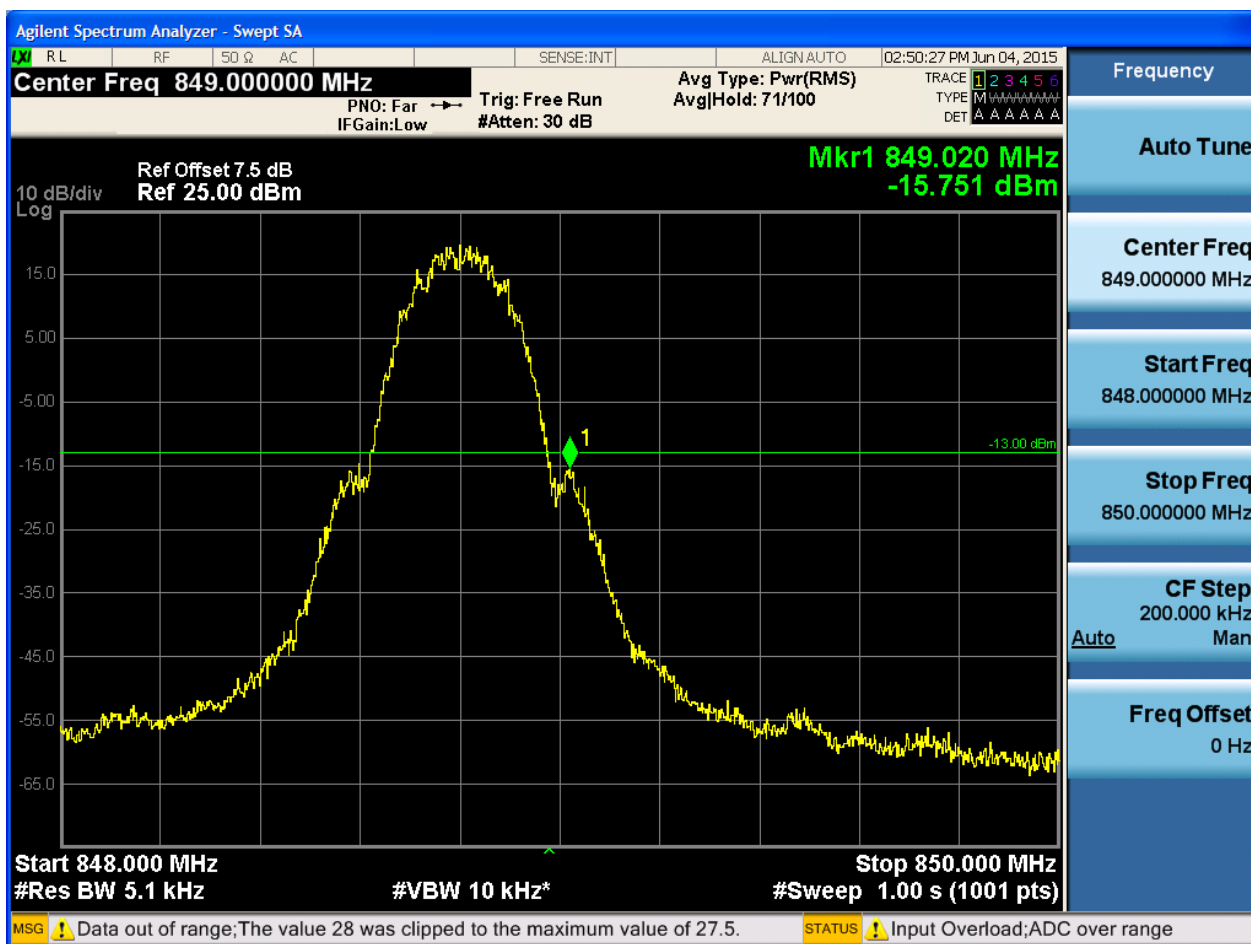
5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH

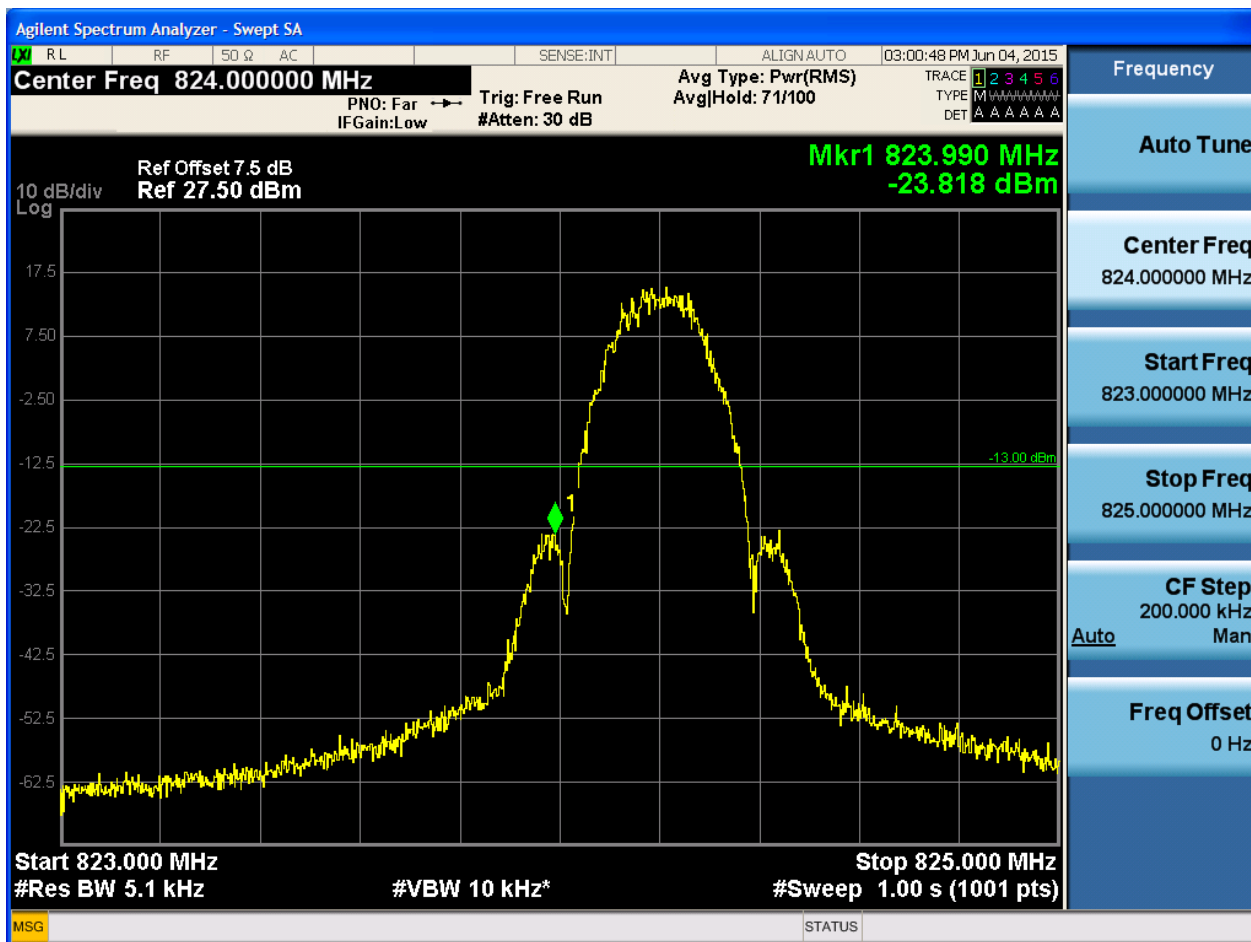


5.1.1.1.2 Test Channel = HCH

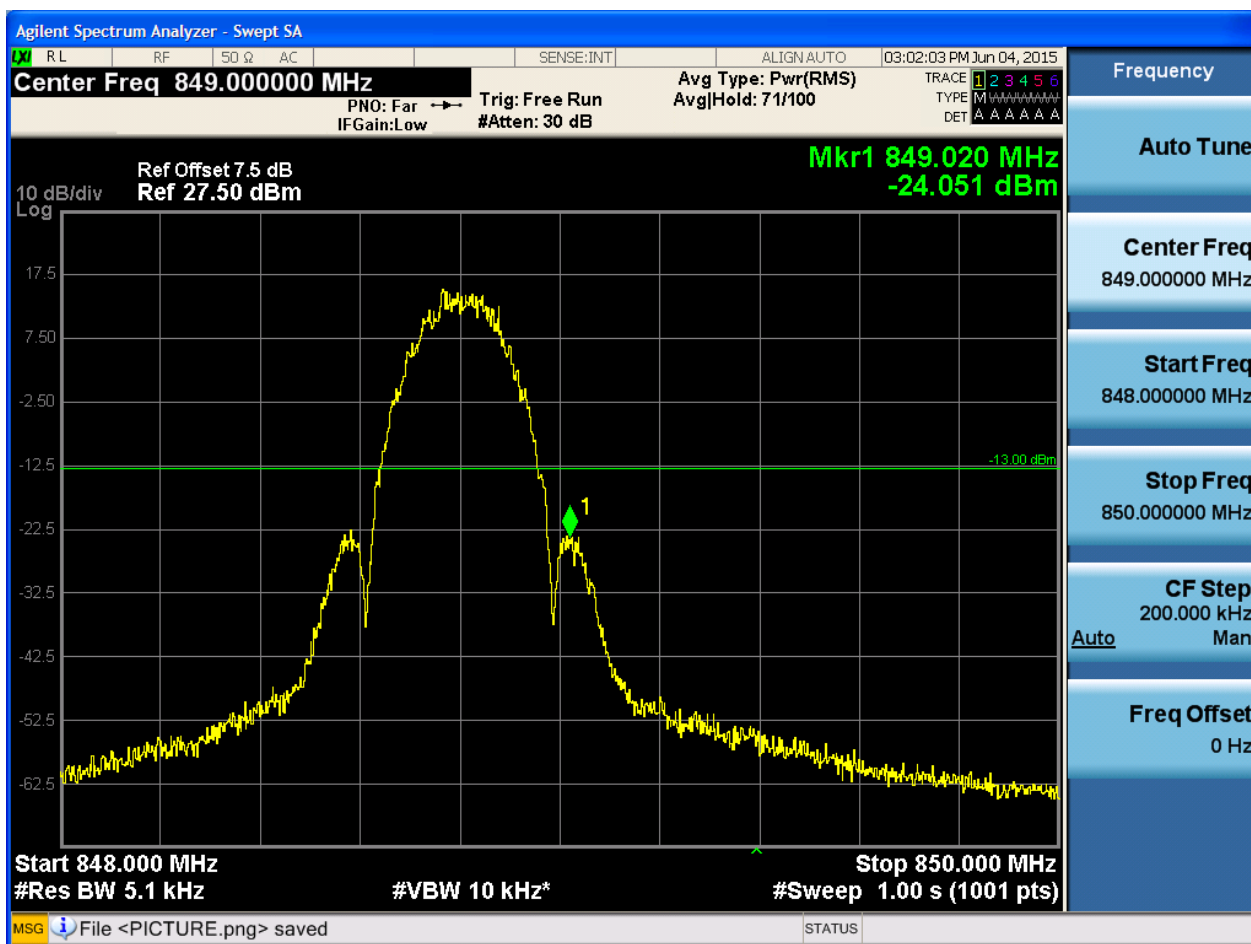


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



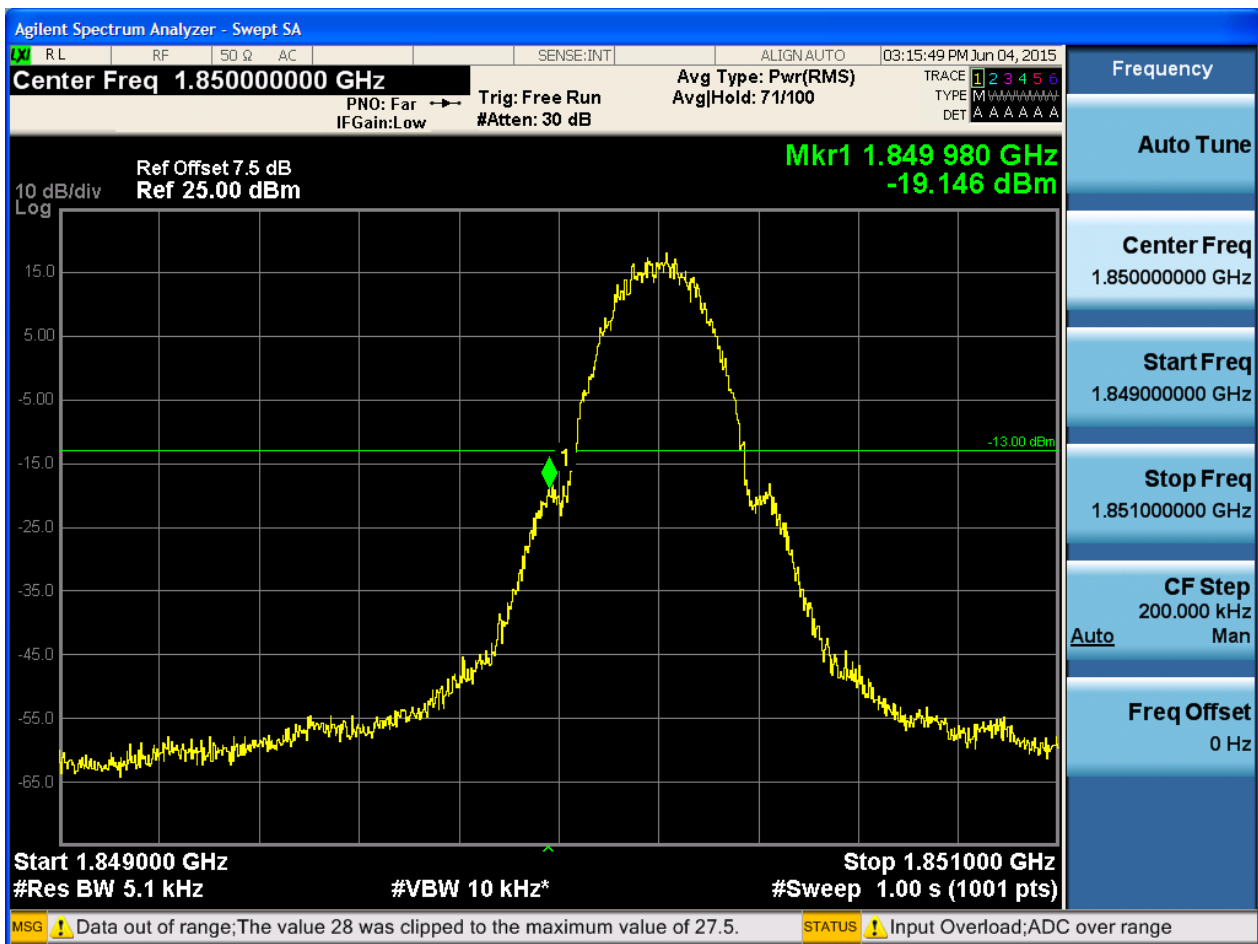
5.1.1.2.2 Test Channel = HCH



5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH





Agilent Spectrum Analyzer - Swept SA

Center Freq 1.91000000 GHz

Ref Offset 7.5 dB
Ref 25.00 dBm

10 dB/div
Log

Mkr1 1.910 020 GHz
-19.487 dBm

Start 1.909000 GHz
#Res BW 5.1 kHz

Stop 1.911000 GHz
#Sweep 1.00 s (1001 pts)

#VBW 10 kHz*

Auto Tune

Center Freq
1.91000000 GHz

Start Freq
1.909000000 GHz

Stop Freq
1.911000000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

Alignment Completed

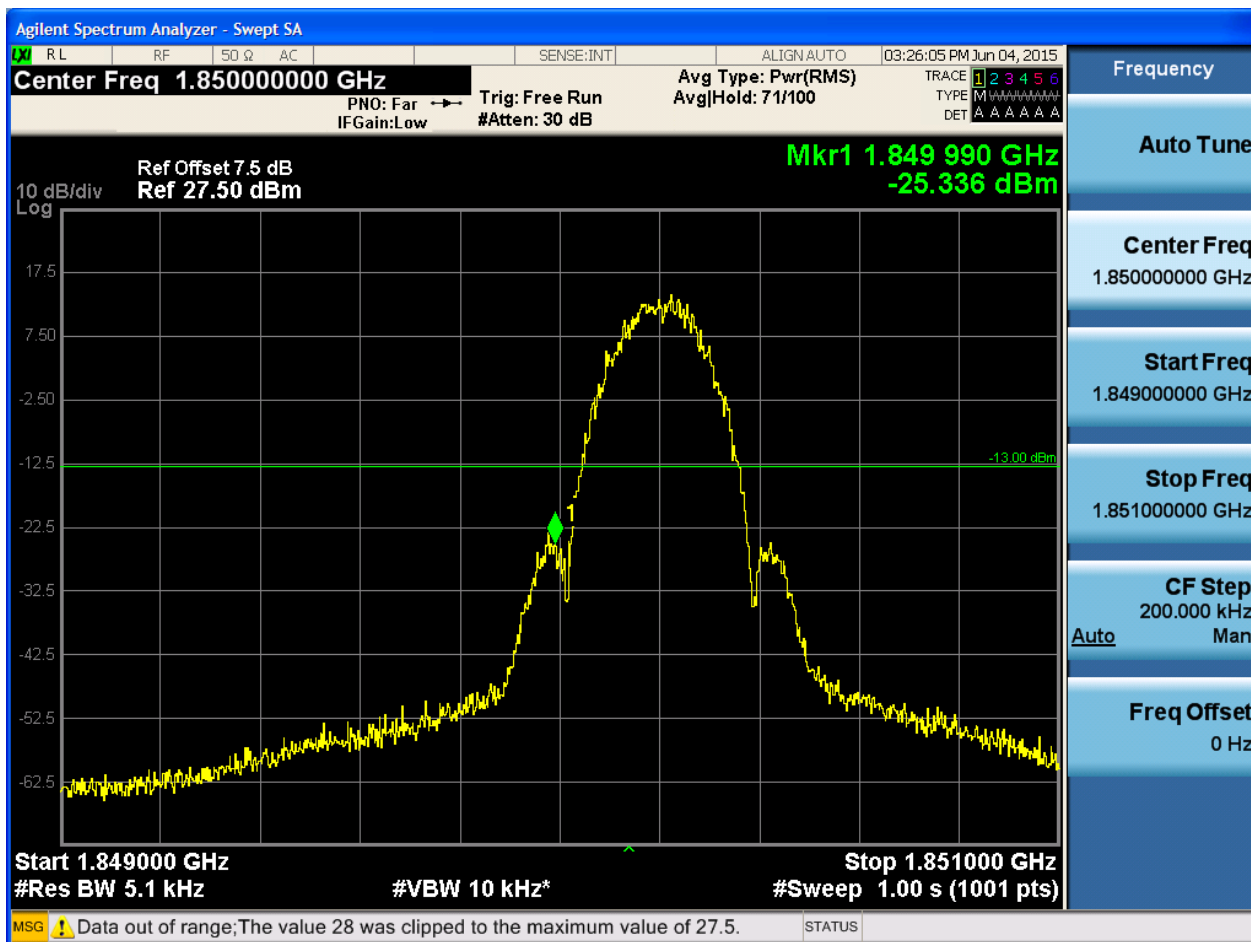
STATUS Input Overload; ADC over range

Detailed description: This is a screenshot of an Agilent Spectrum Analyzer in 'Swept SA' mode. The main display shows a yellow signal trace on a black grid. A prominent peak is visible at 1.910020 GHz, marked with a green diamond and labeled 'Mkr1 1.910 020 GHz -19.487 dBm'. The signal is centered around 1.910000 GHz. The y-axis is labeled '10 dB/div Log' and ranges from -65.0 to 15.0 dBm. The x-axis shows frequency from 1.909000 GHz to 1.911000 GHz. Various settings are displayed at the top and bottom, including 'Center Freq 1.91000000 GHz', 'Ref Offset 7.5 dB', 'Ref 25.00 dBm', 'Start 1.909000 GHz', 'Stop 1.911000 GHz', and '#Sweep 1.00 s (1001 pts)'. On the right side, there are buttons for 'Auto Tune', 'Center Freq', 'Start Freq', 'Stop Freq', 'CF Step', and 'Freq Offset'. At the bottom, there is a status bar showing 'Alignment Completed' and a warning 'STATUS Input Overload; ADC over range'.

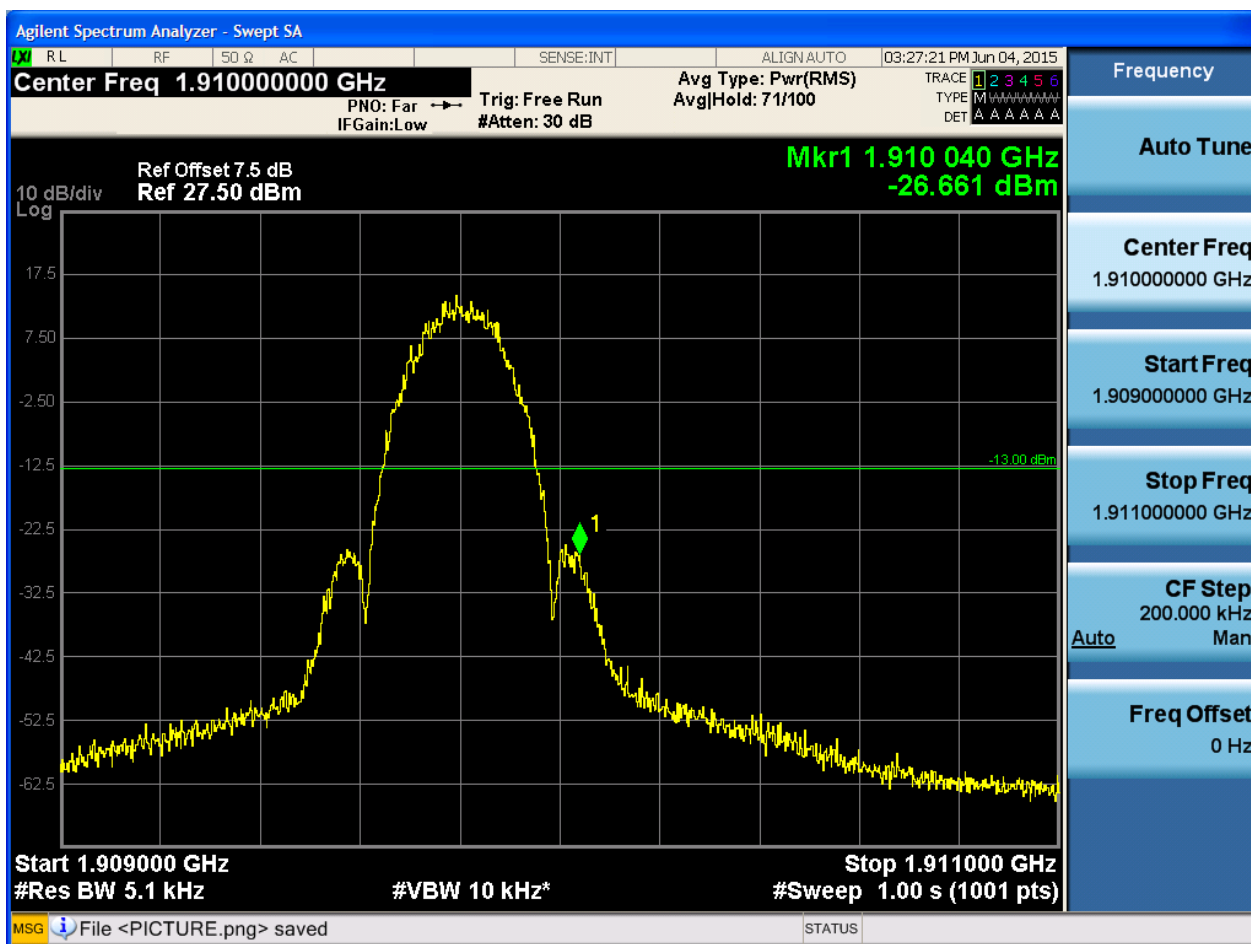
Parameter	Value
Center Freq	1.91000000 GHz
Start Freq	1.909000000 GHz
Stop Freq	1.911000000 GHz
CF Step	200.000 kHz
Freq Offset	0 Hz

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.

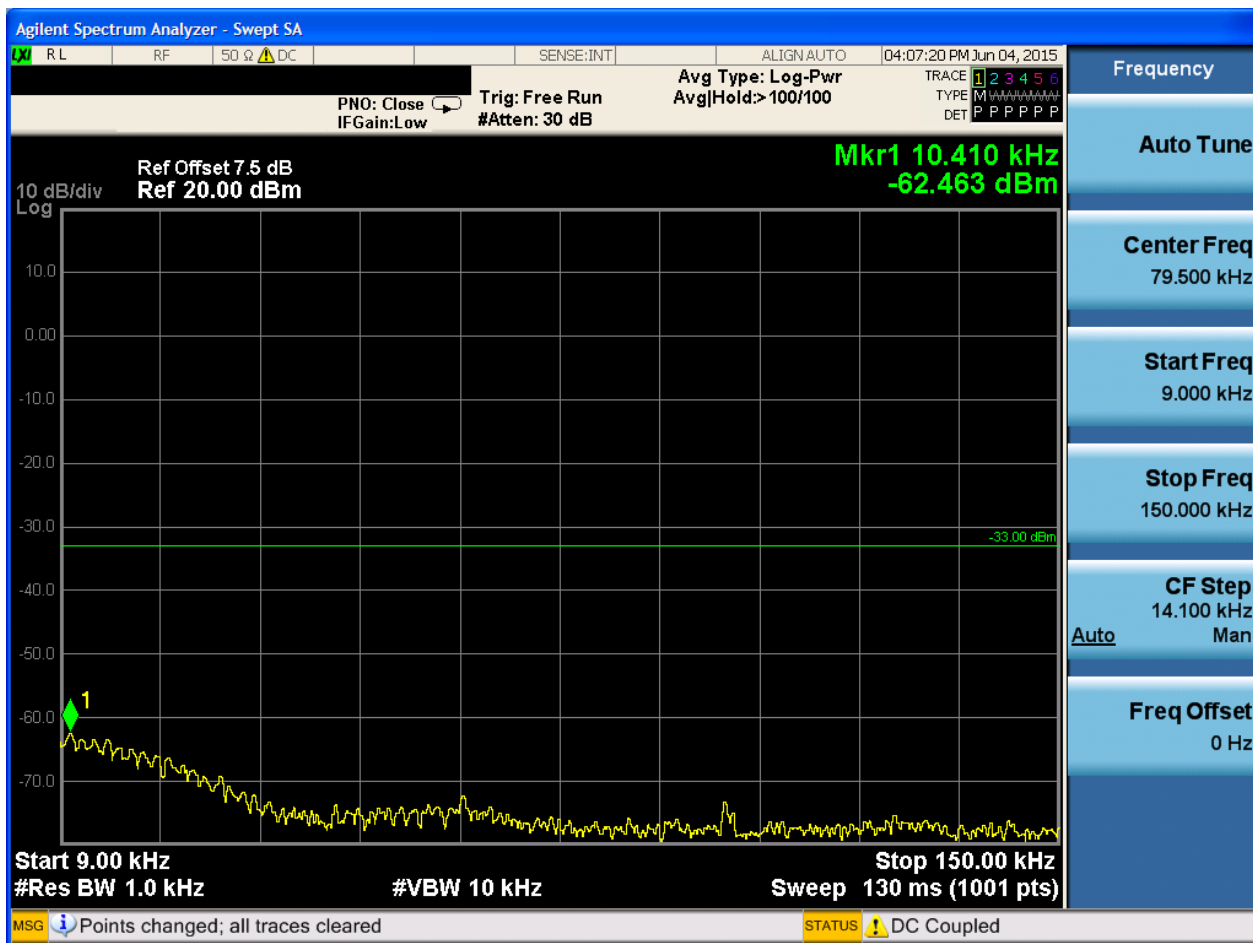
Part I - Test Plots

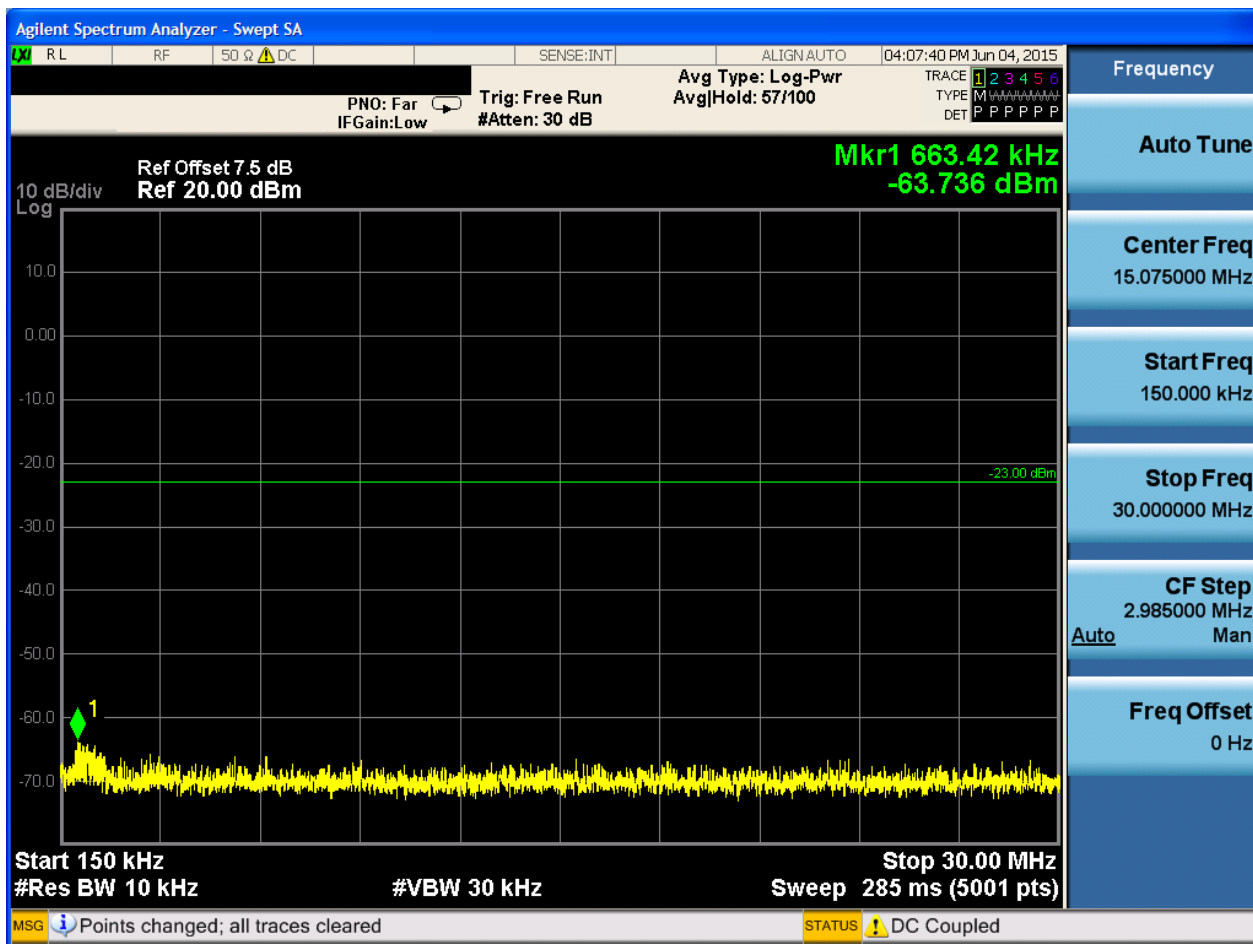
6.1 For GSM

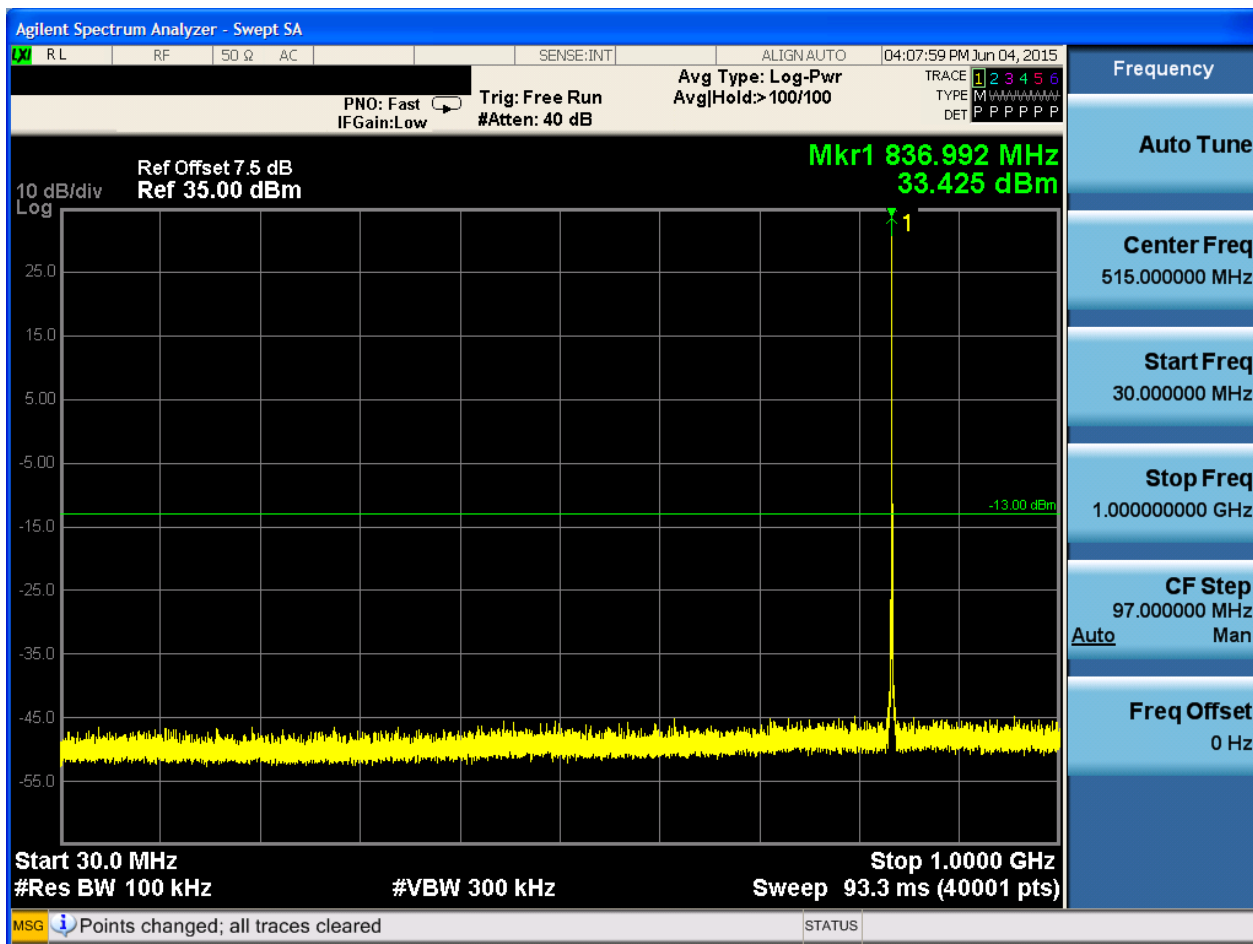
6.1.1 Test Band = GSM850

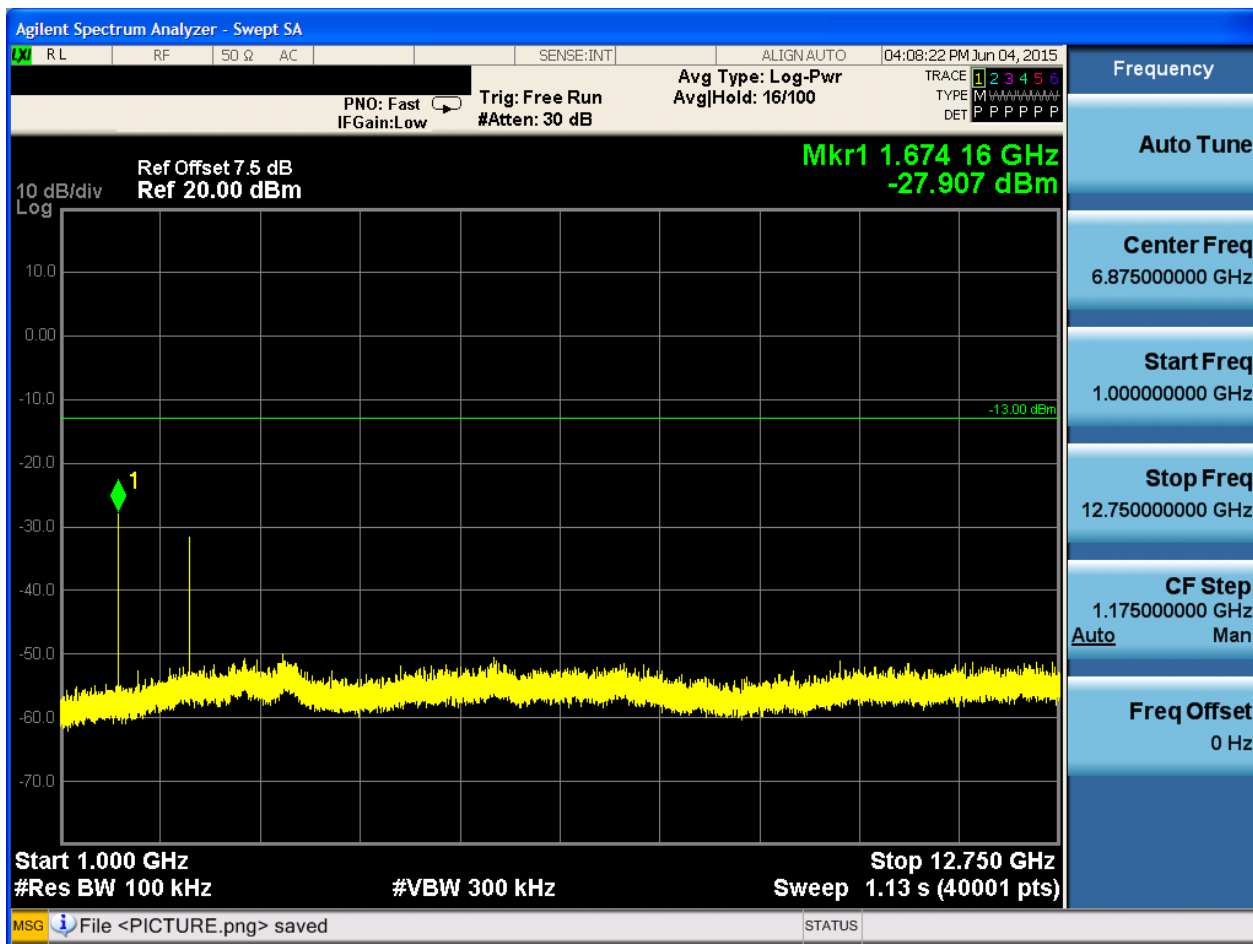
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH

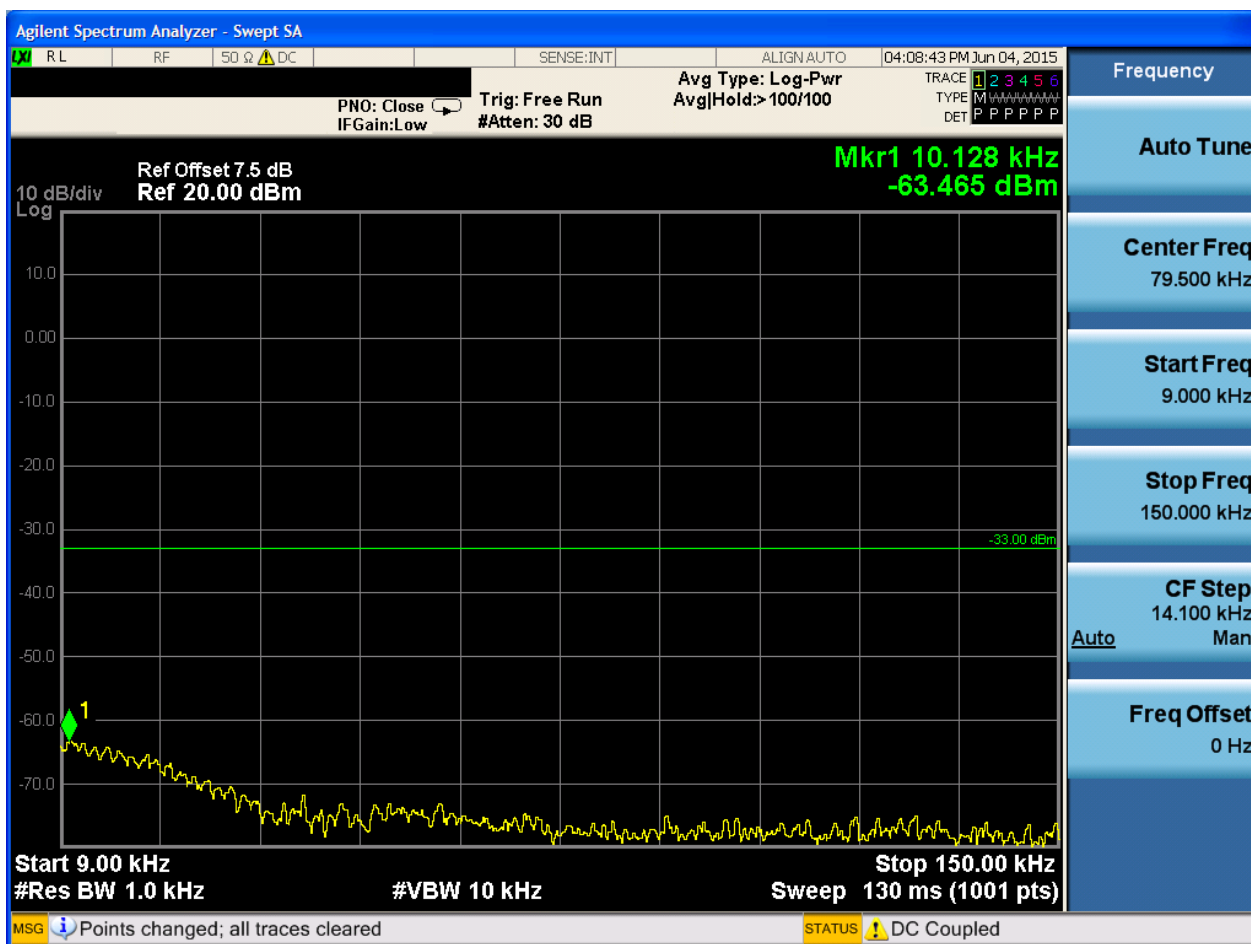


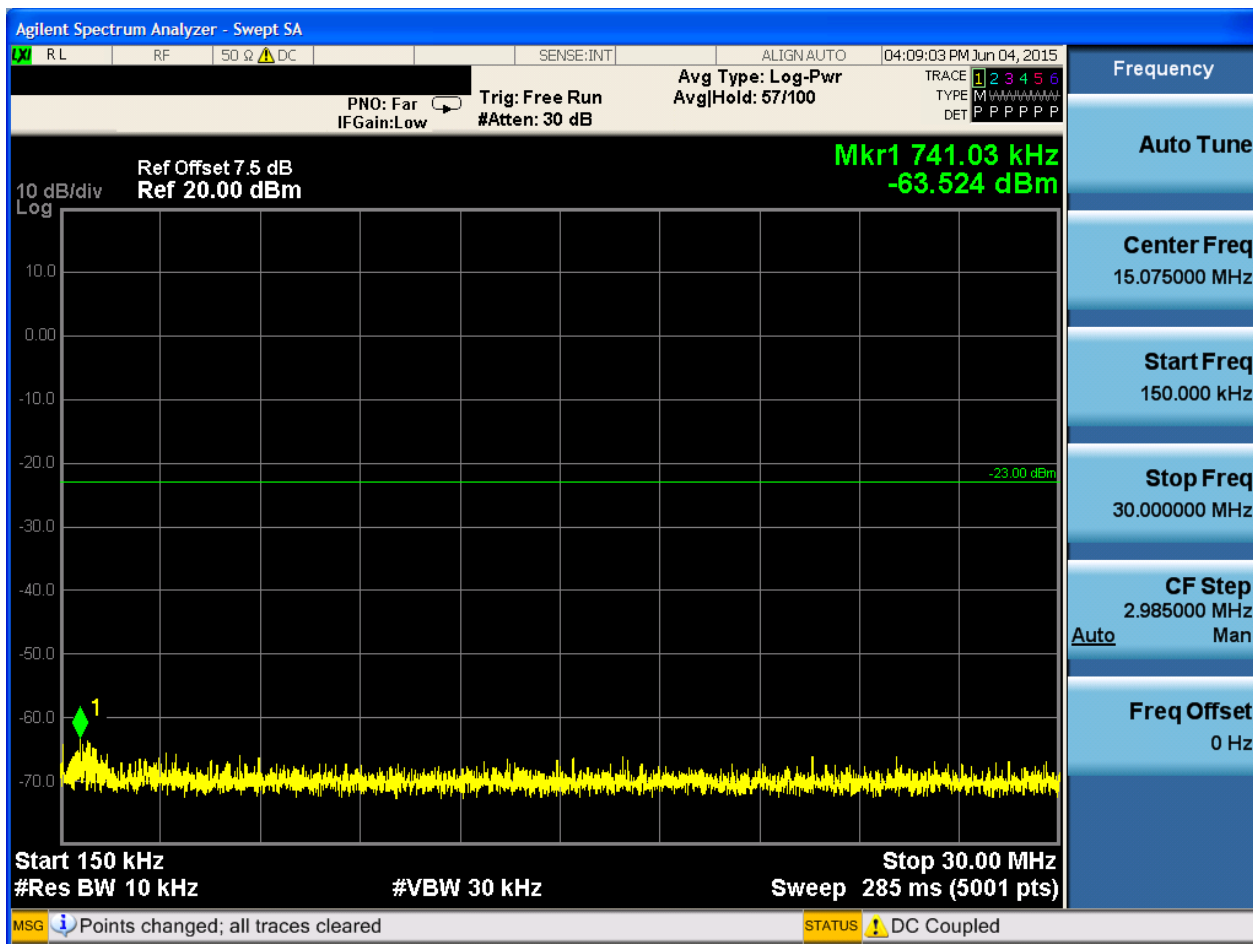


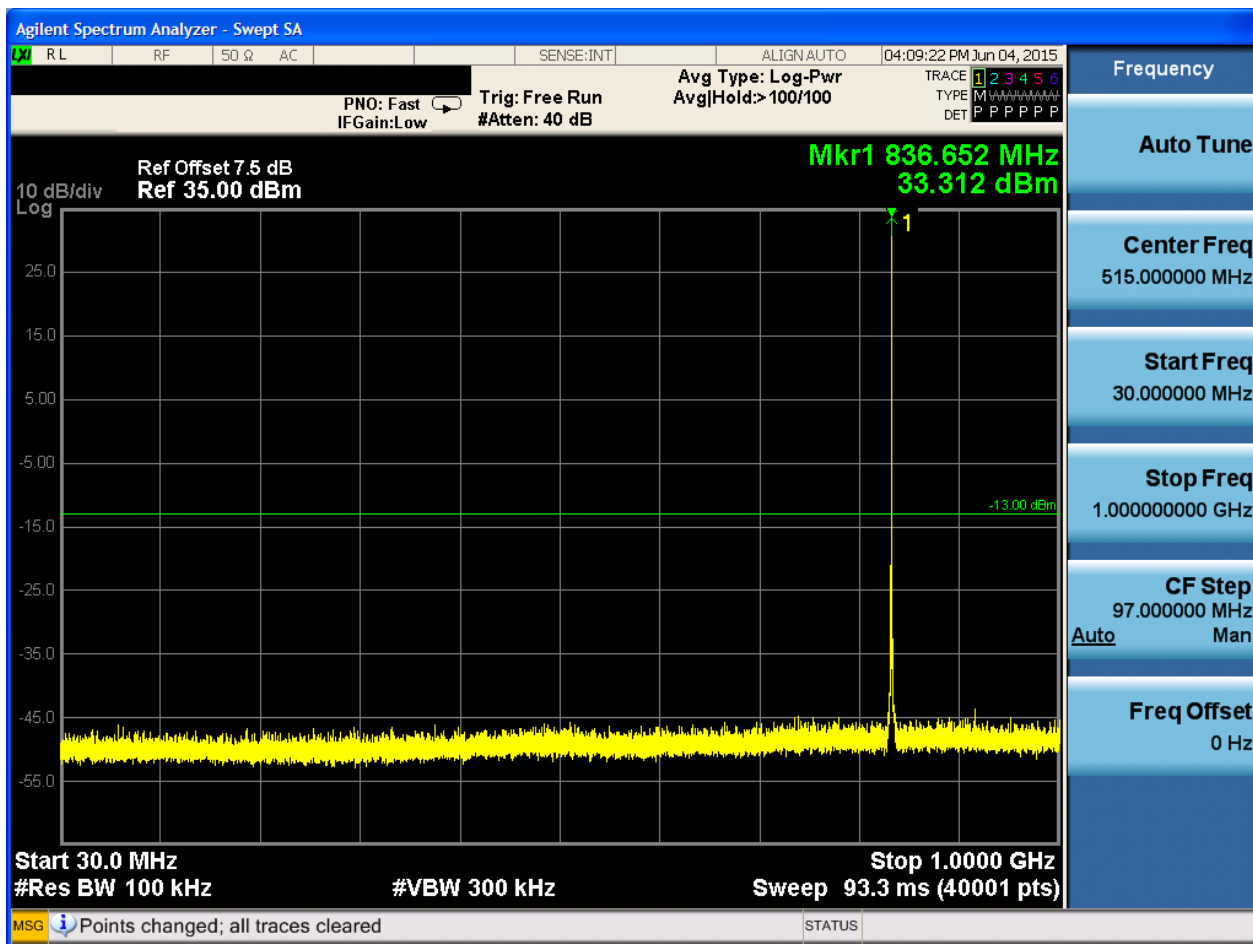


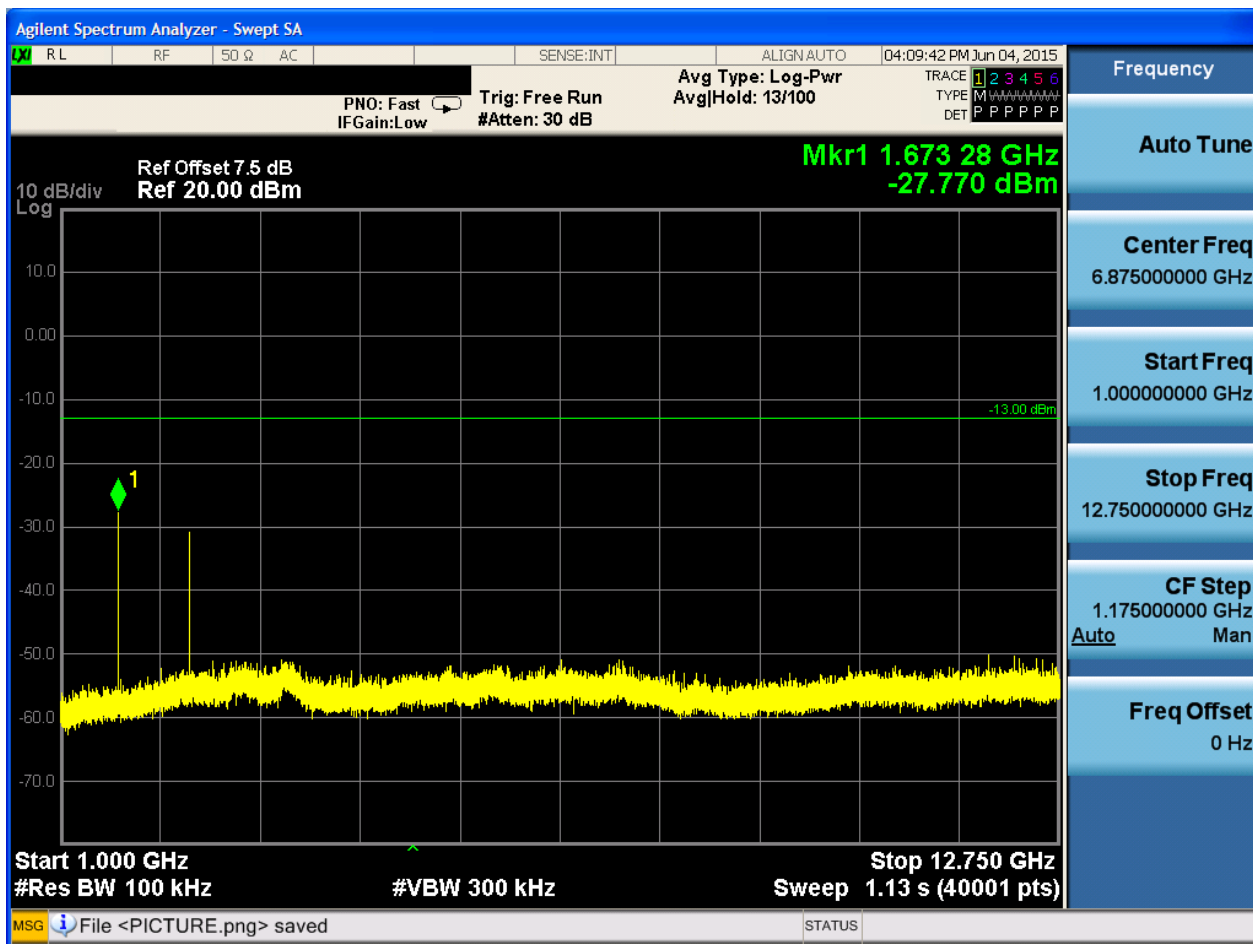


6.1.1.1.2 Test Channel = MCH

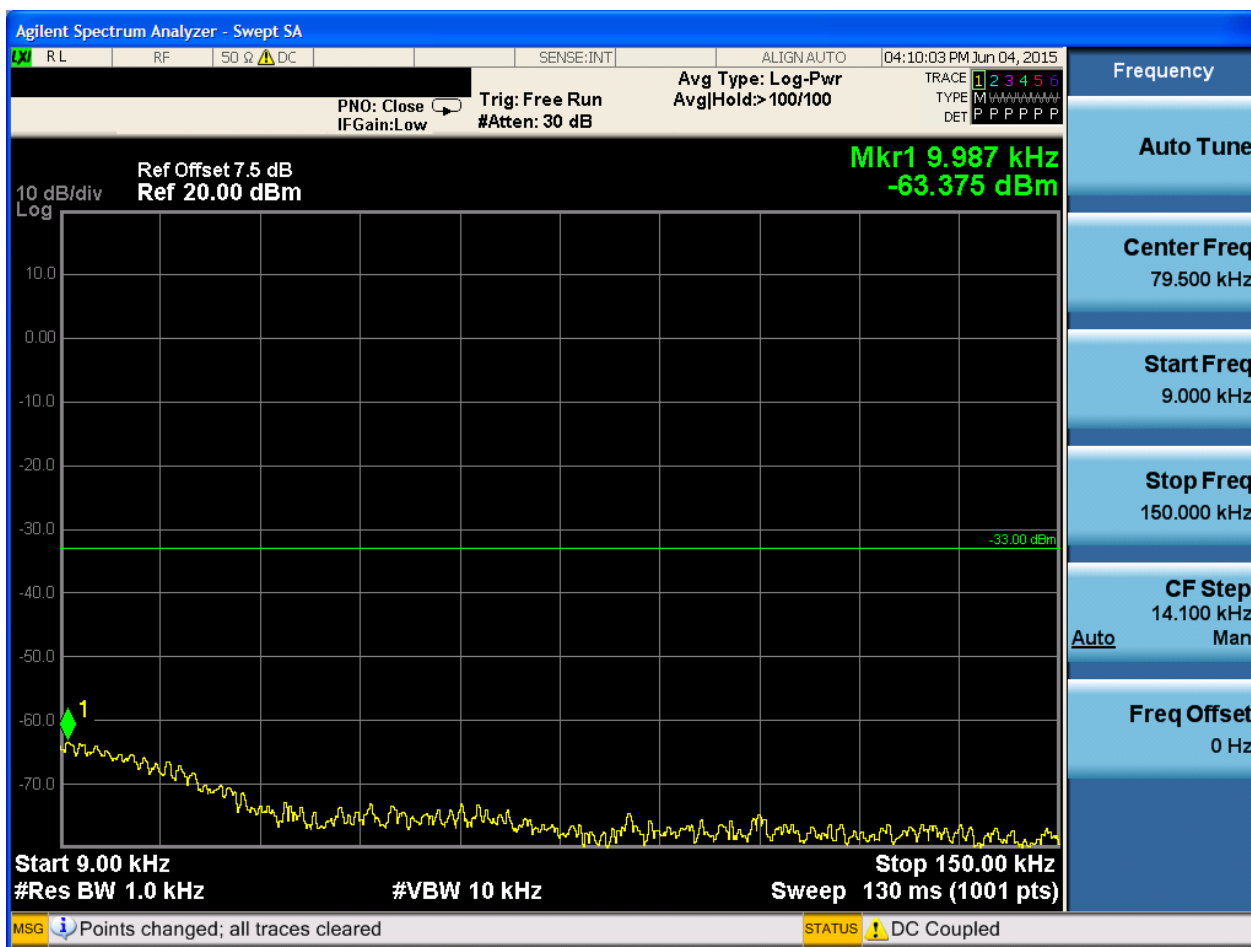


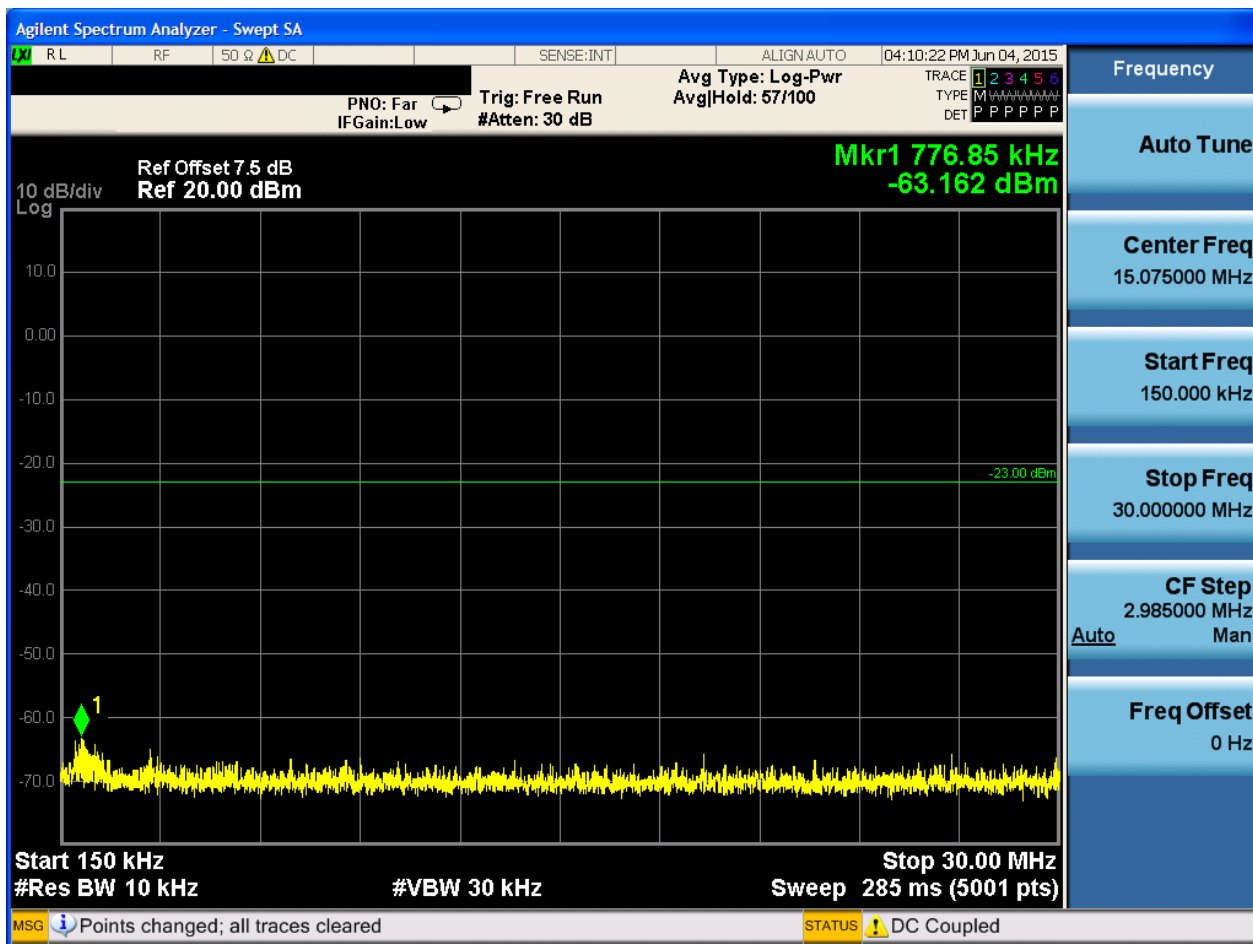


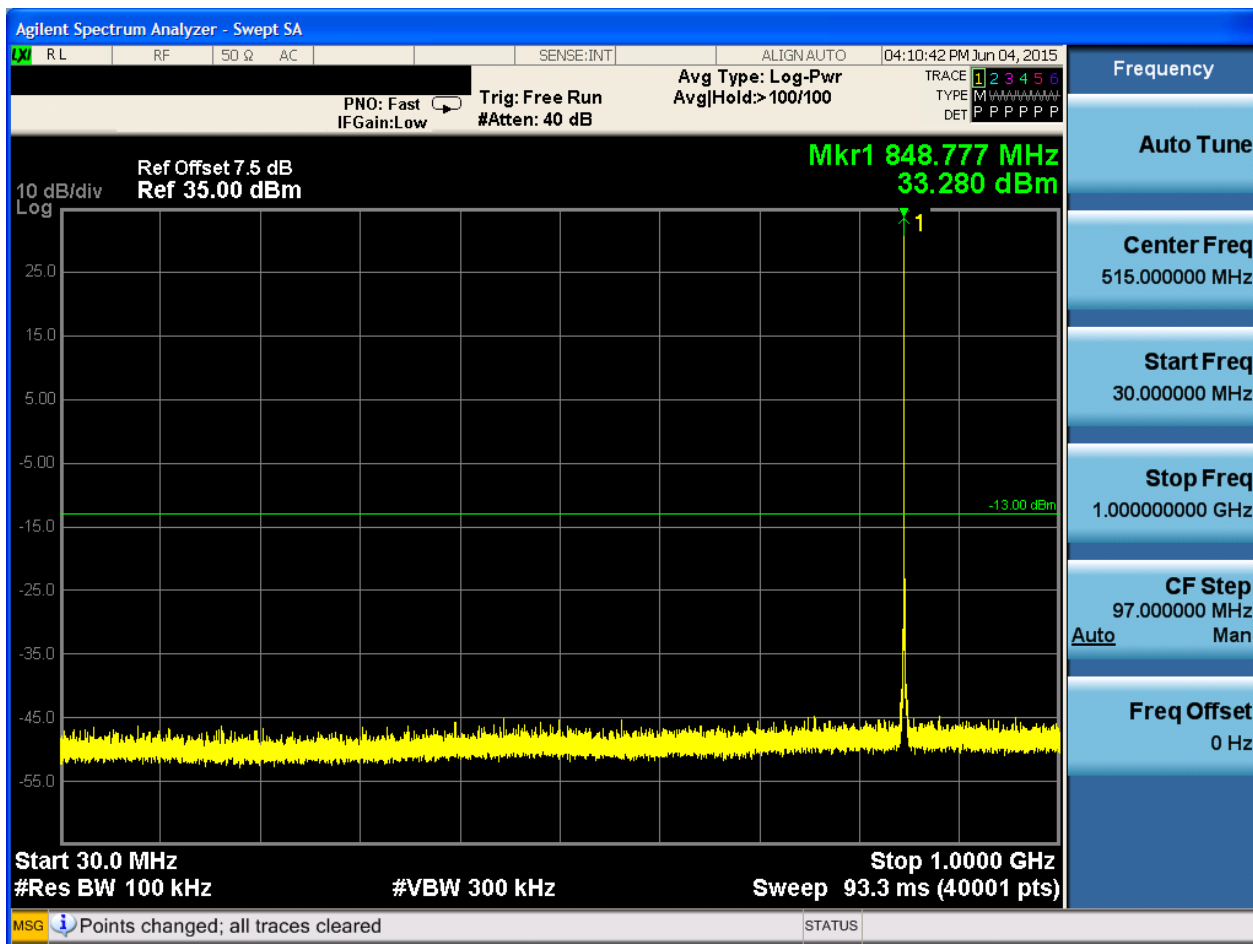


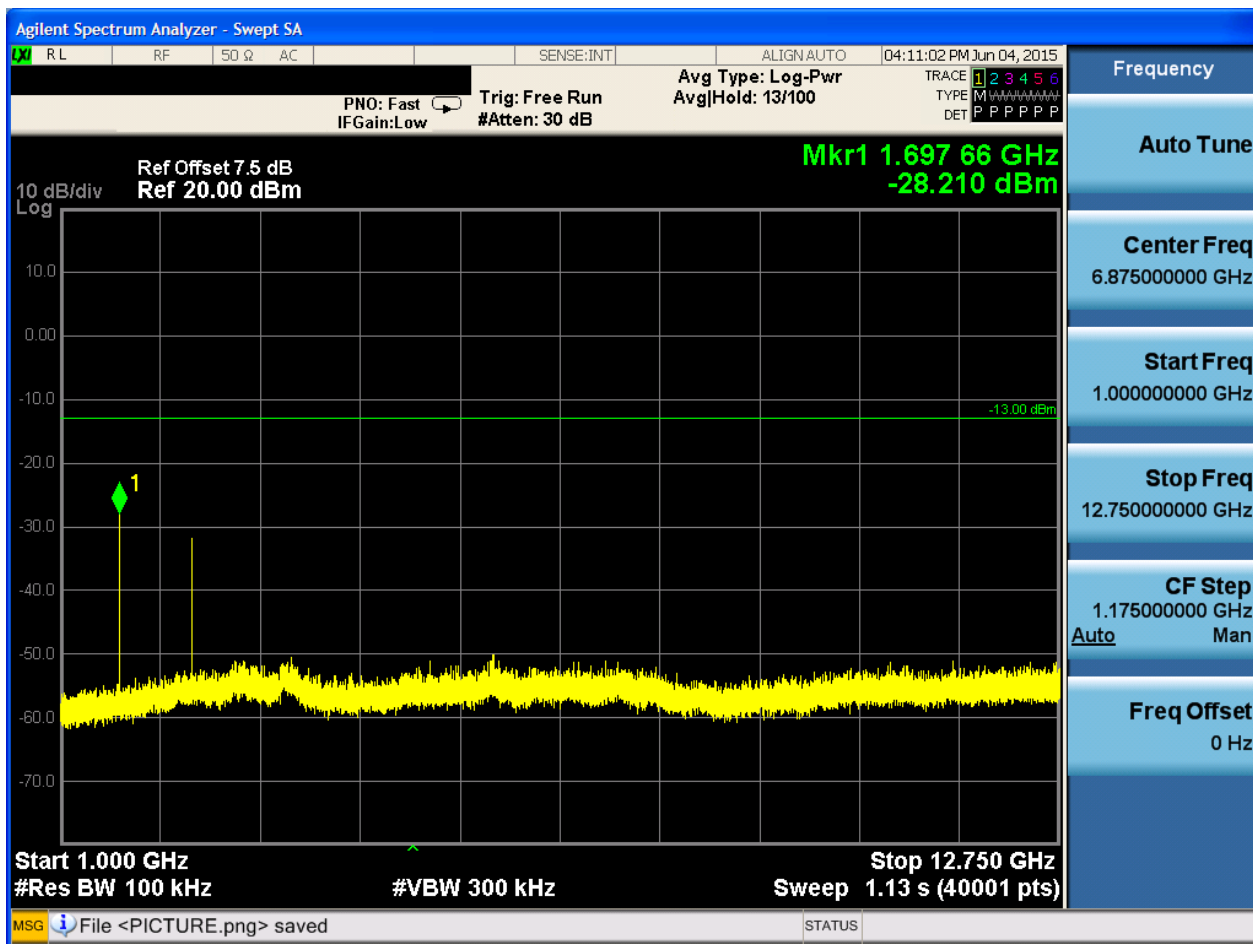


6.1.1.1.3 Test Channel = HCH



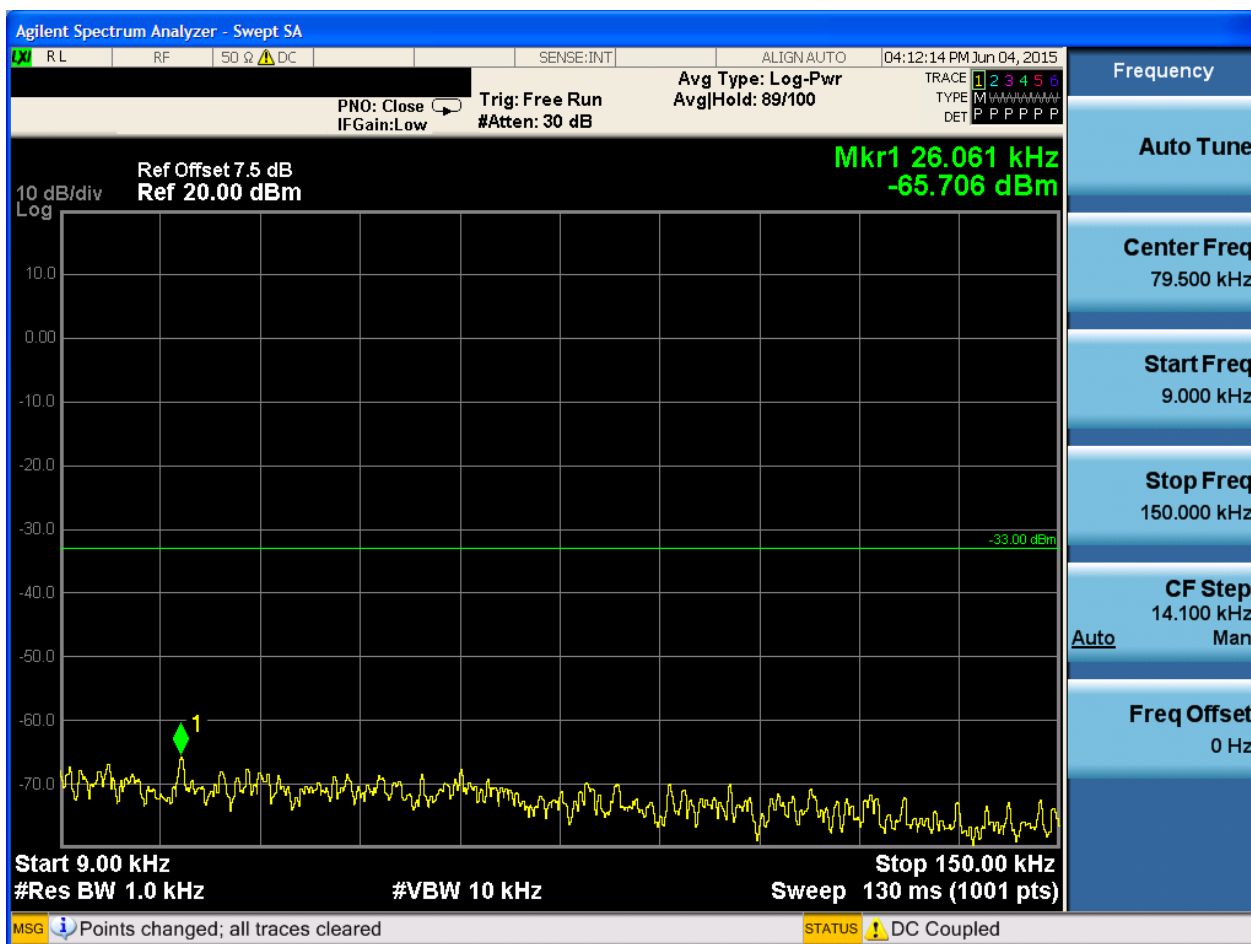


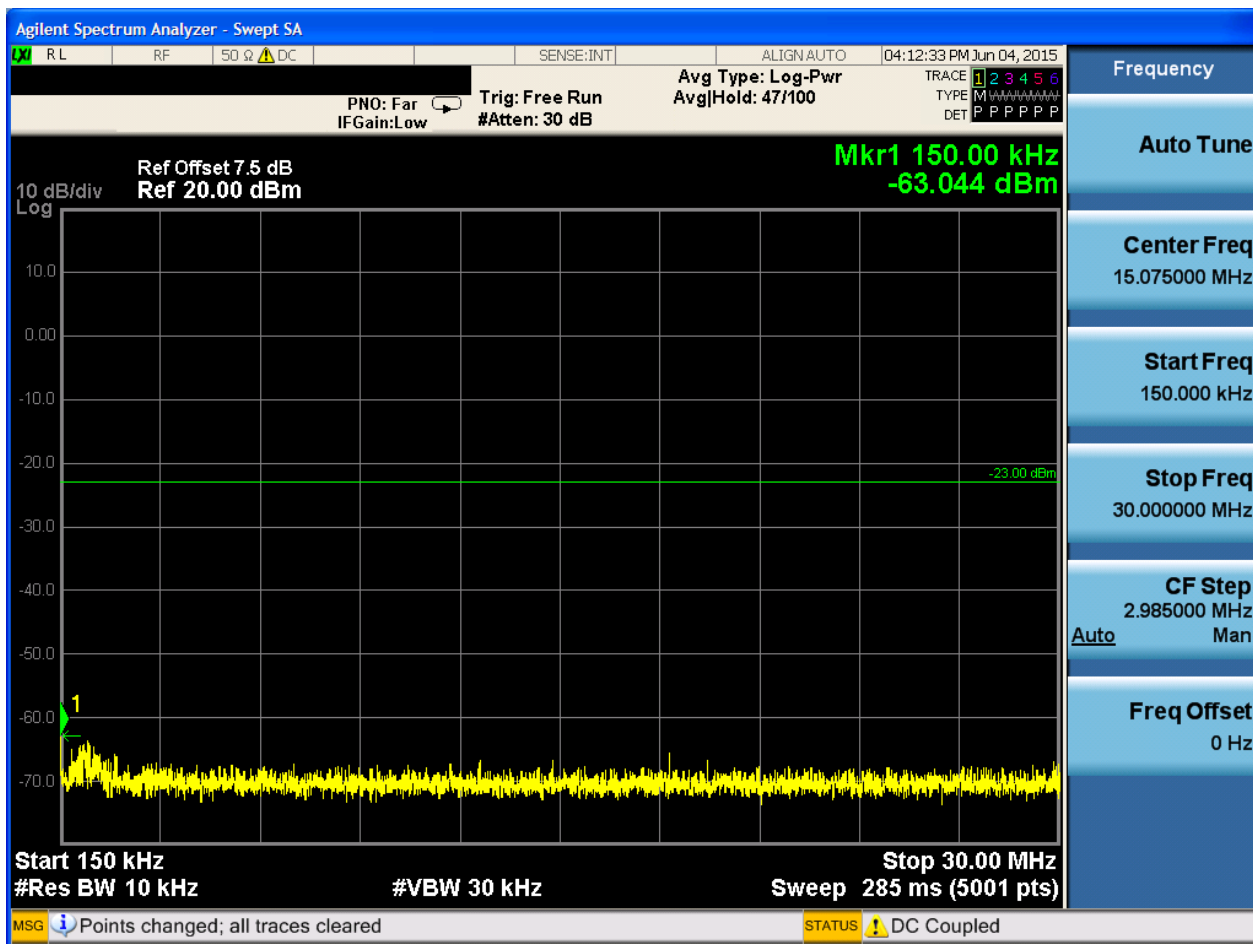


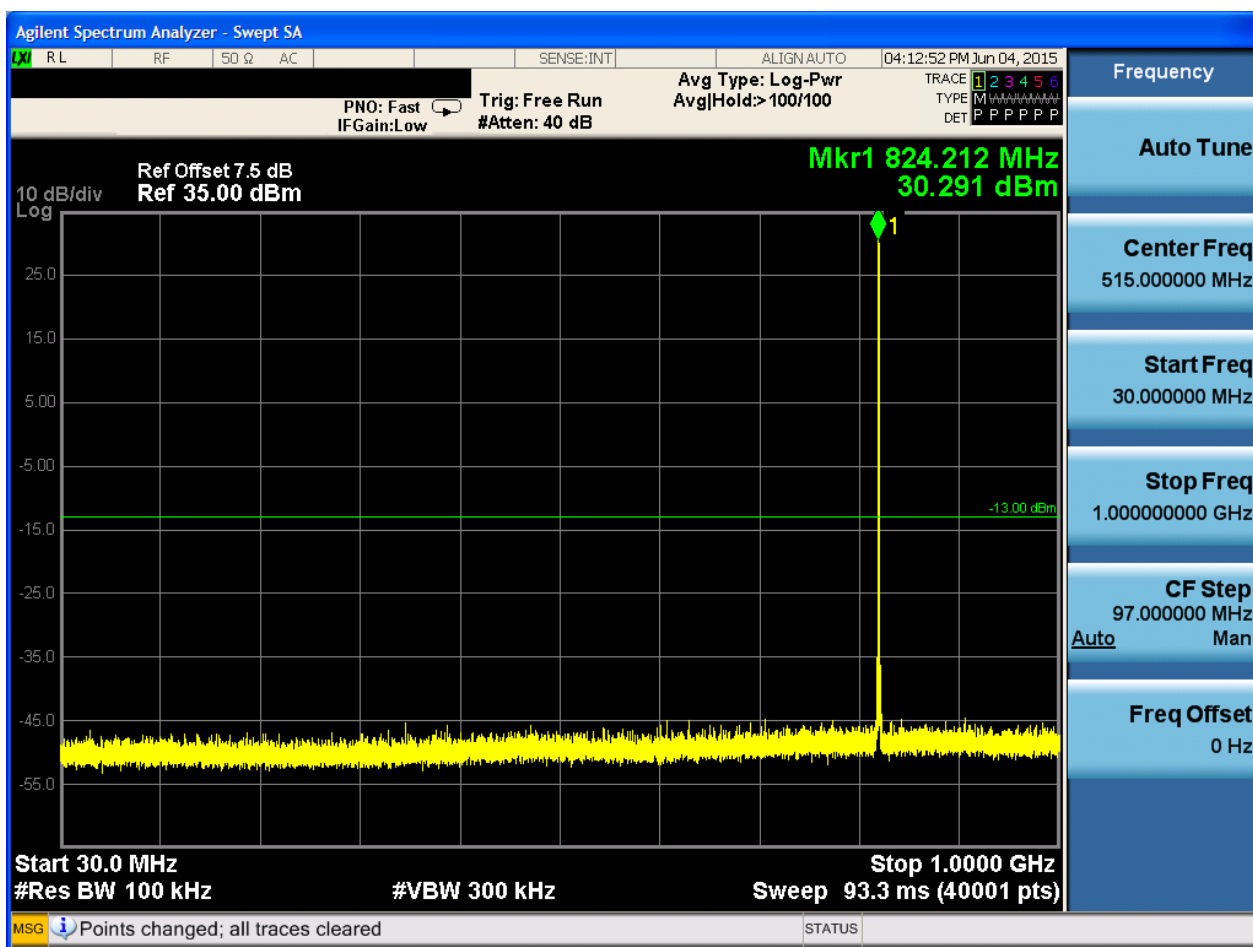


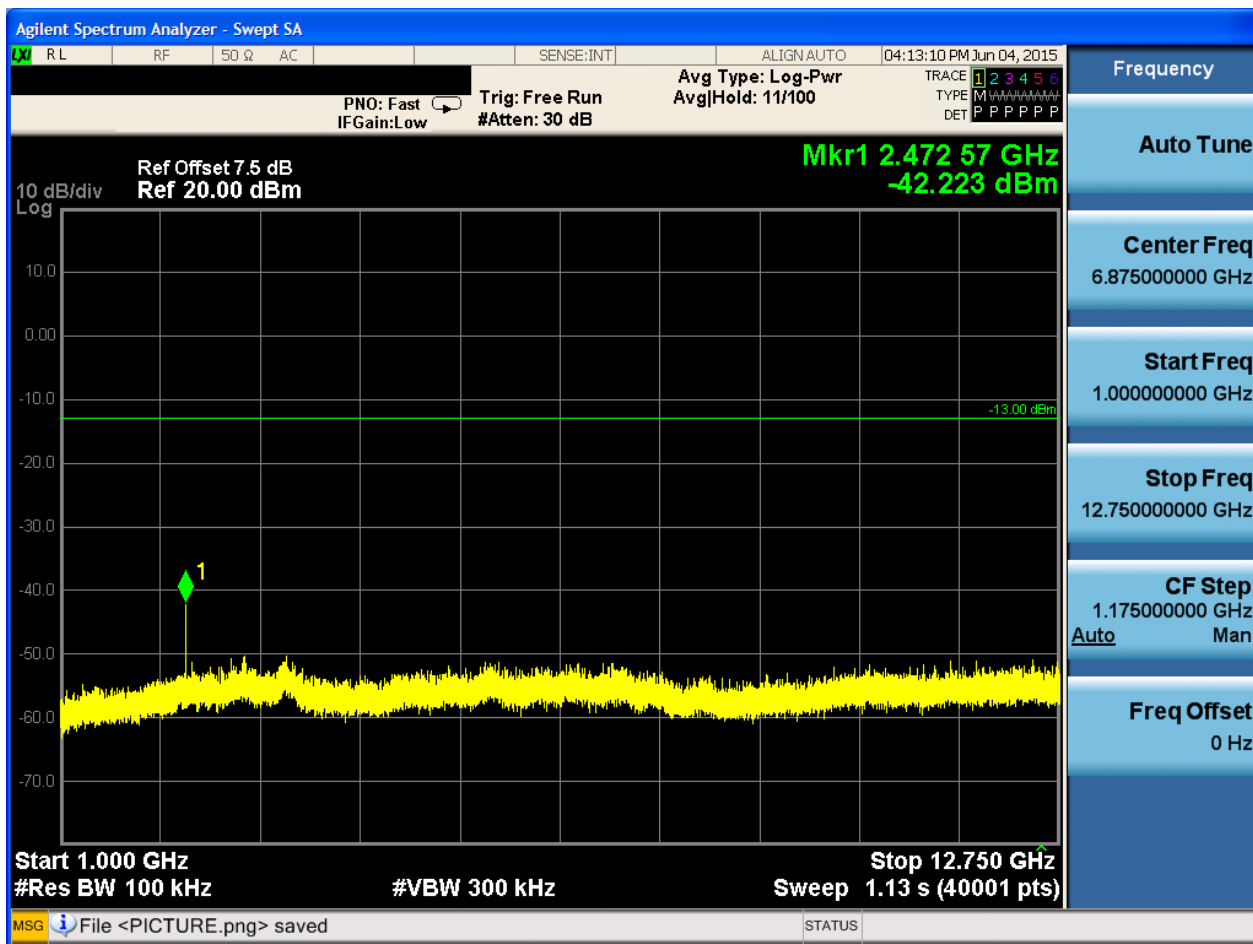
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH

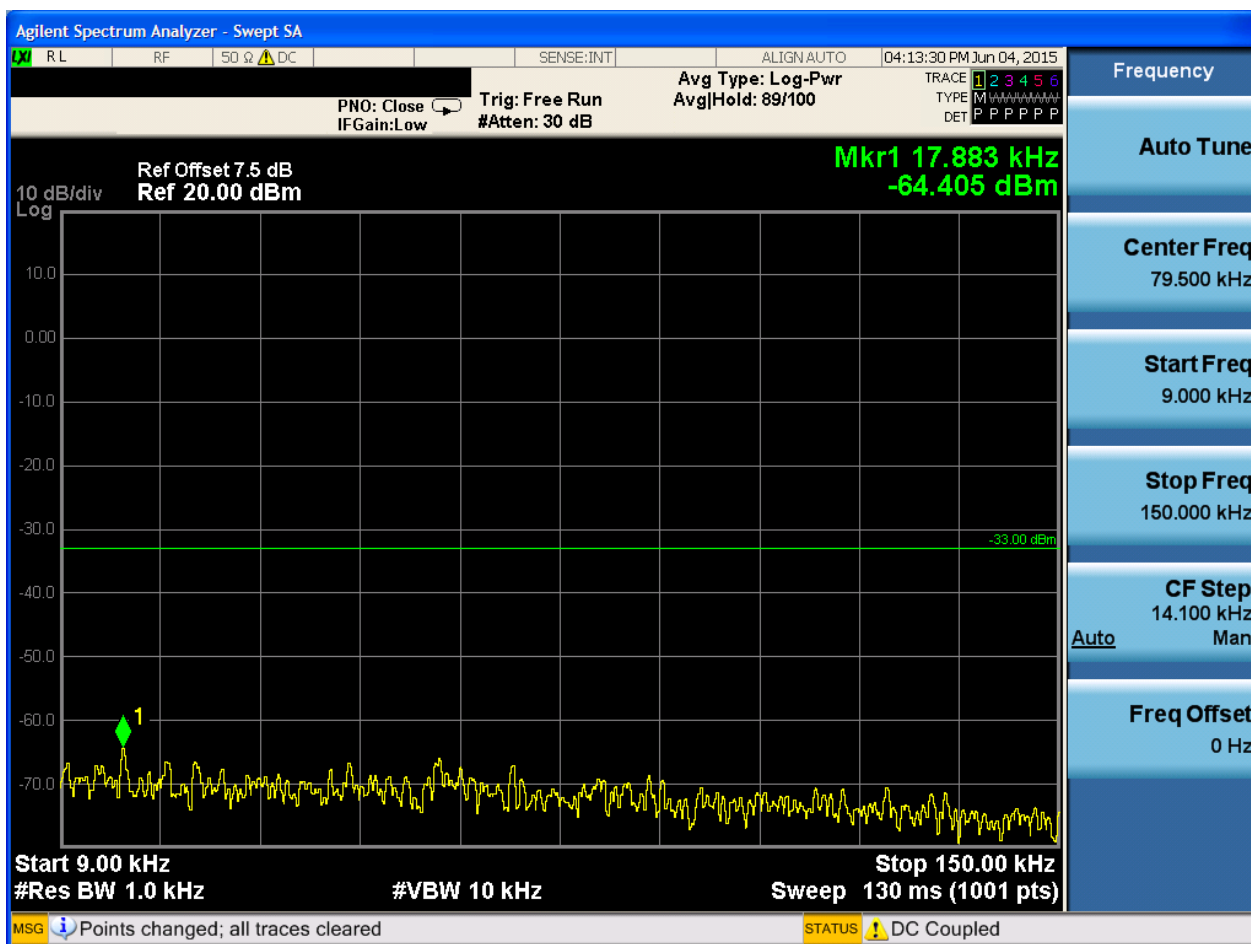


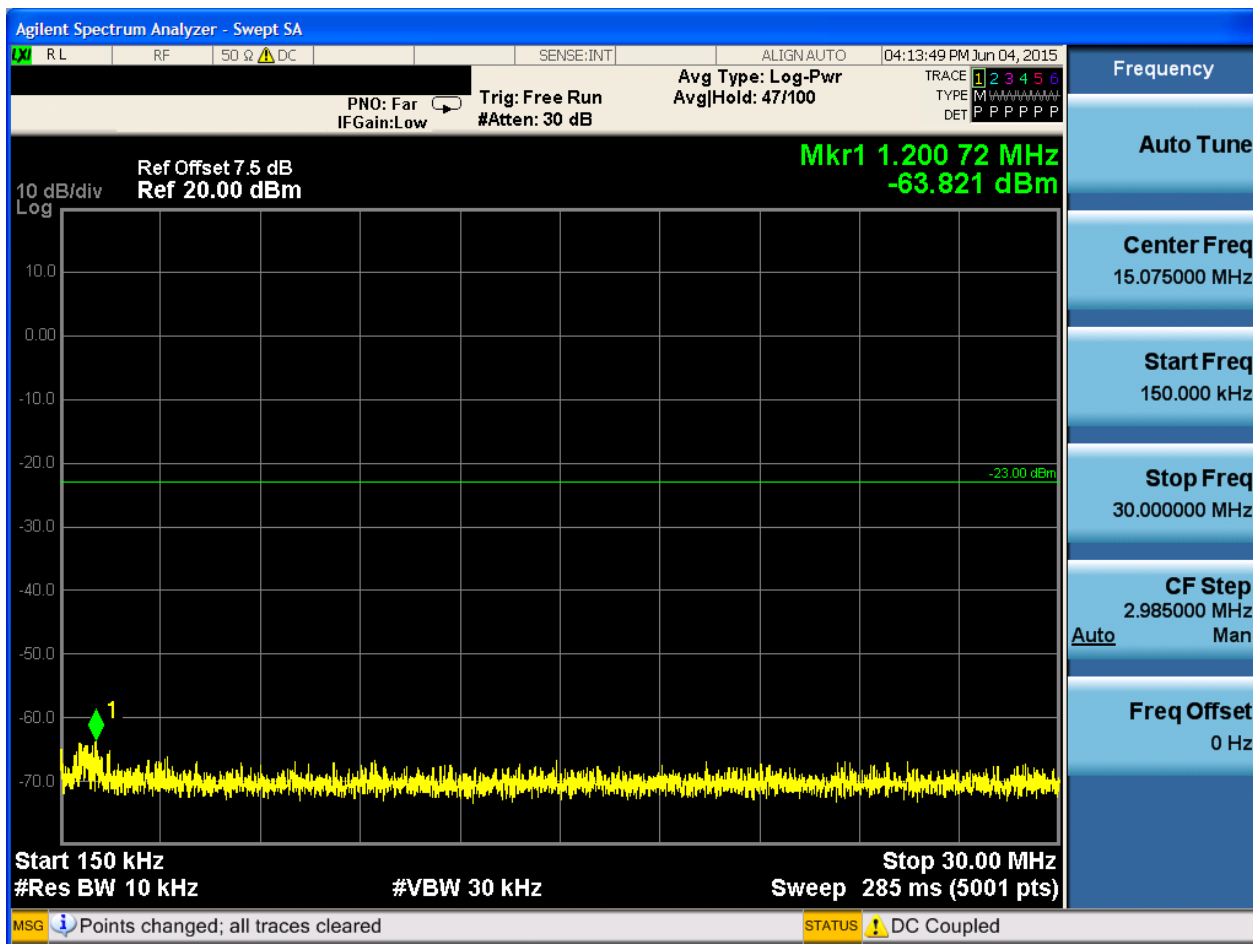


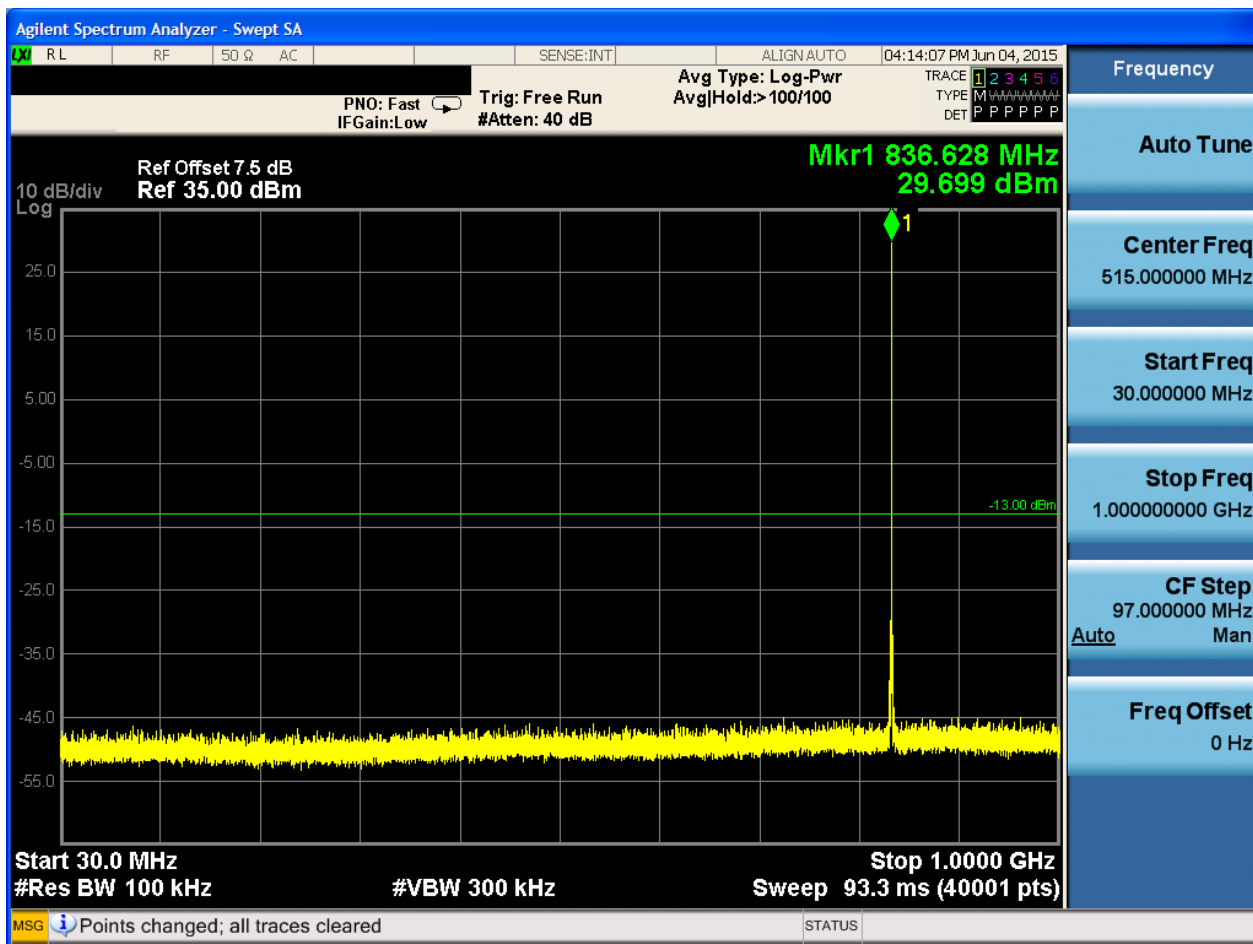


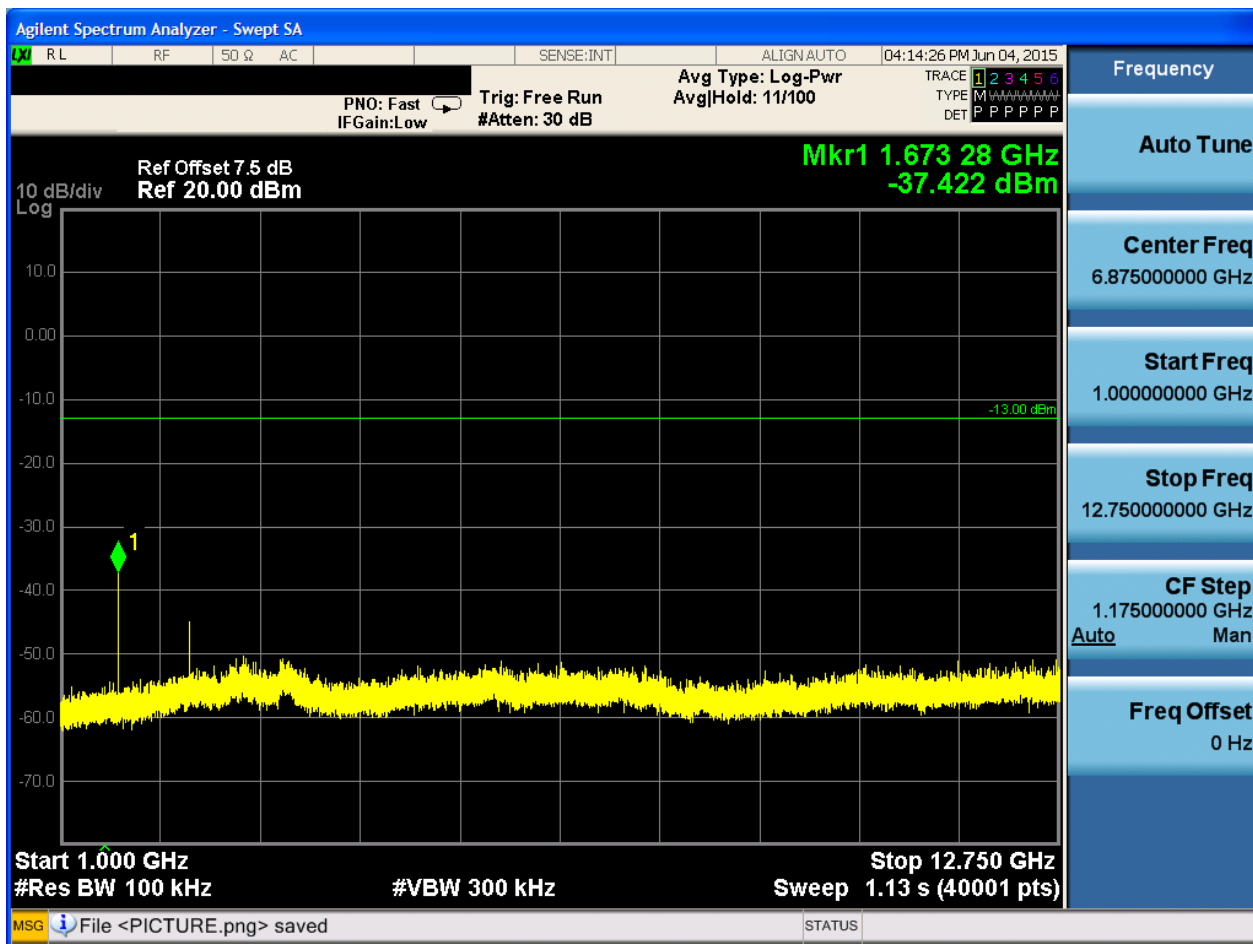


6.1.1.2.2 Test Channel = MCH

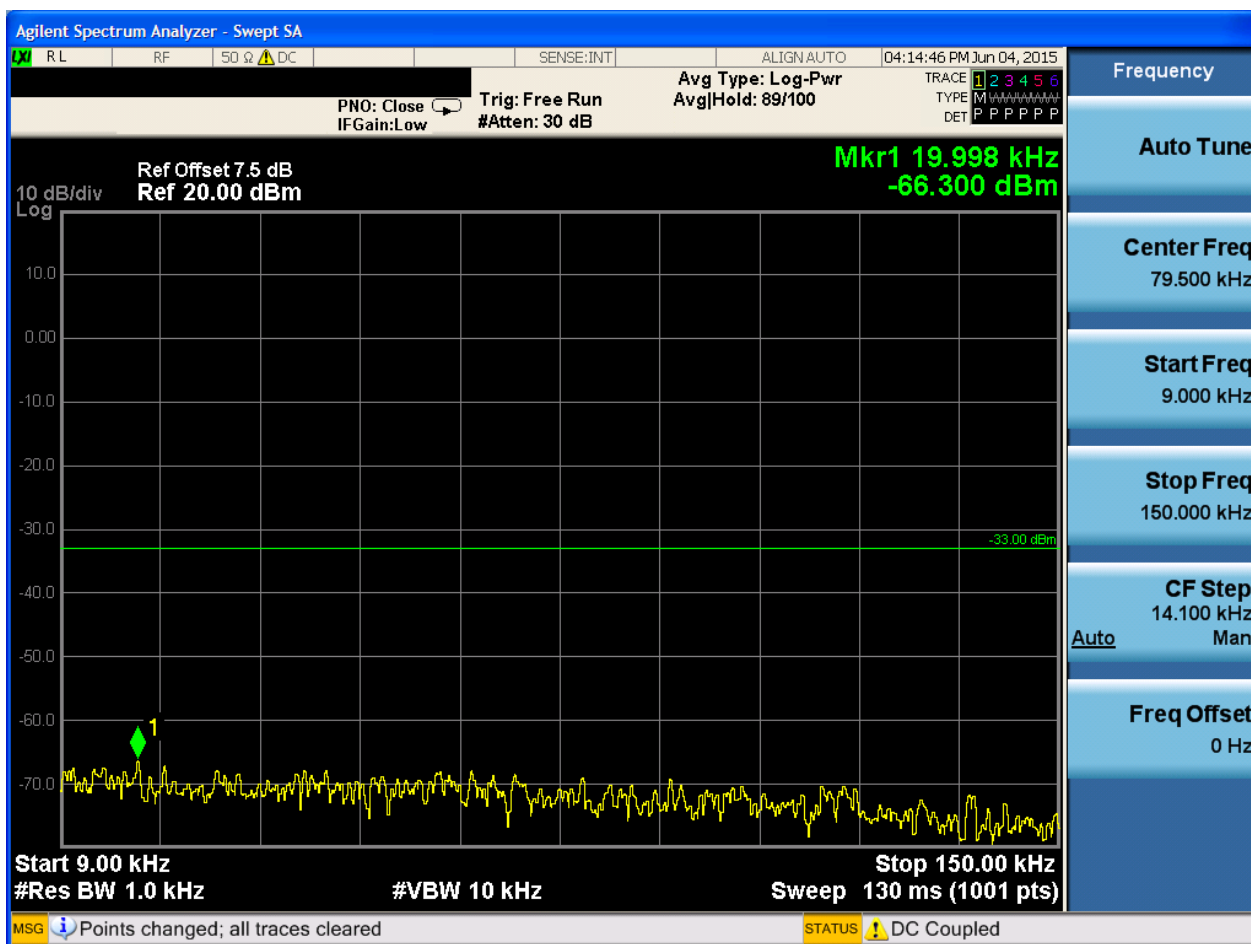


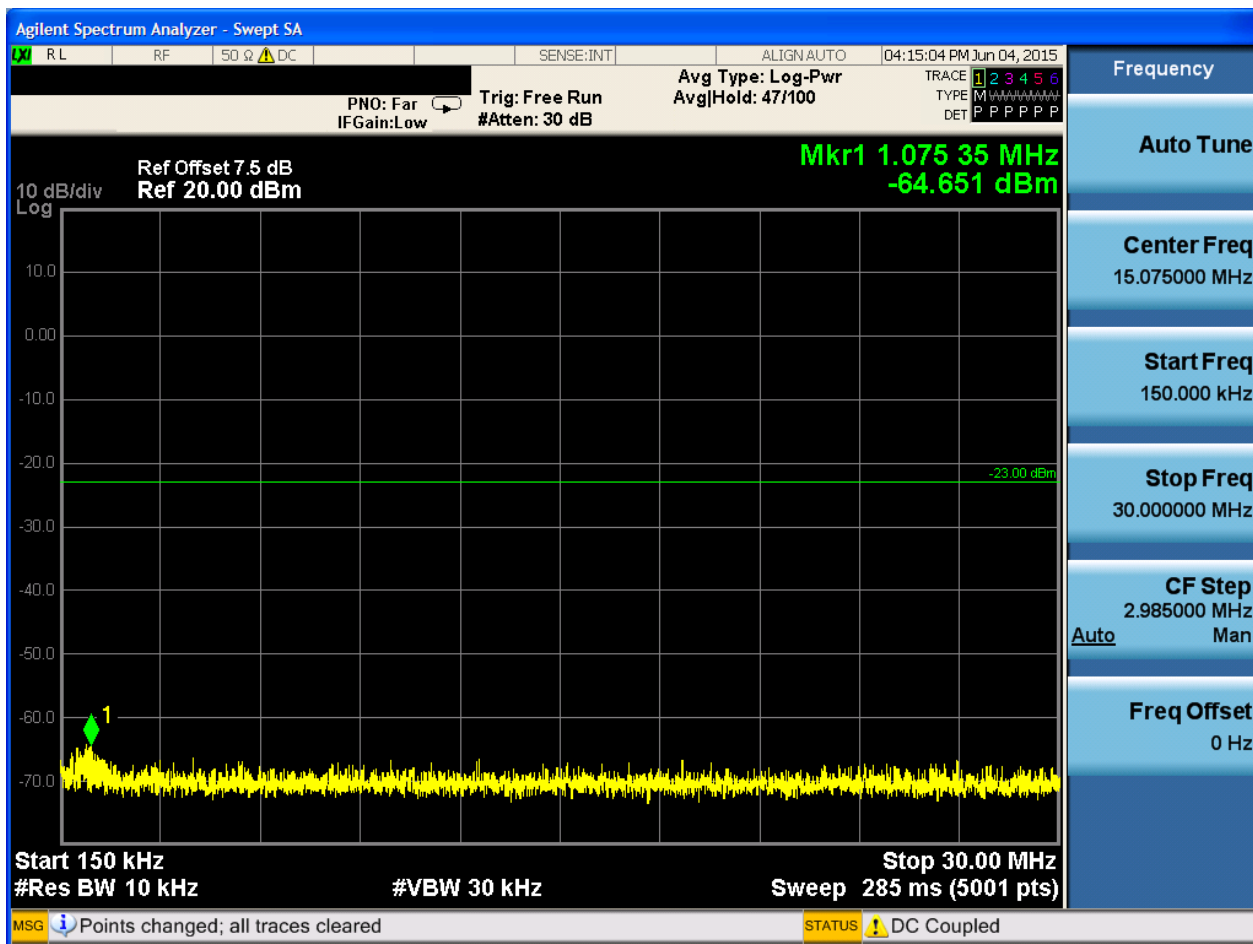


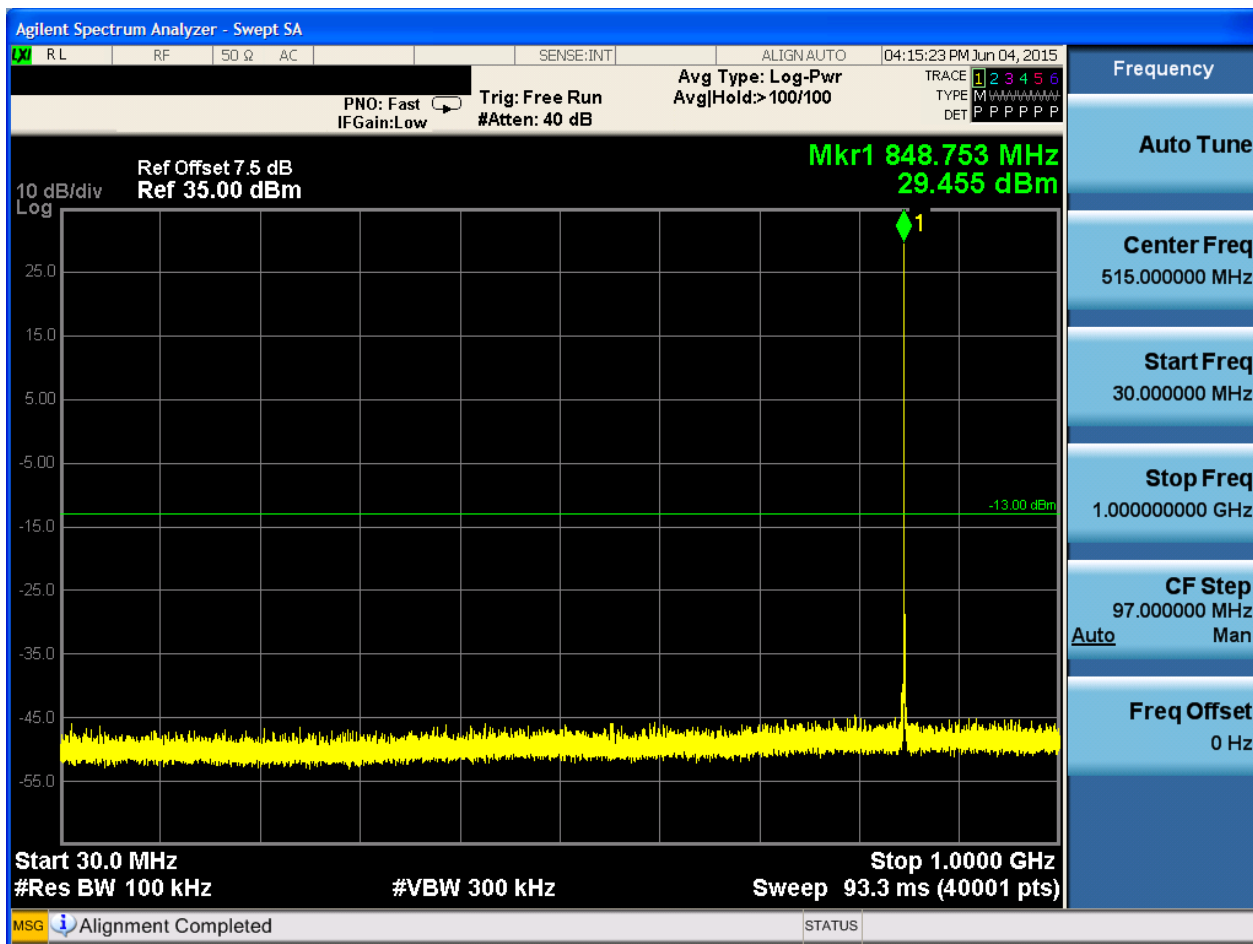


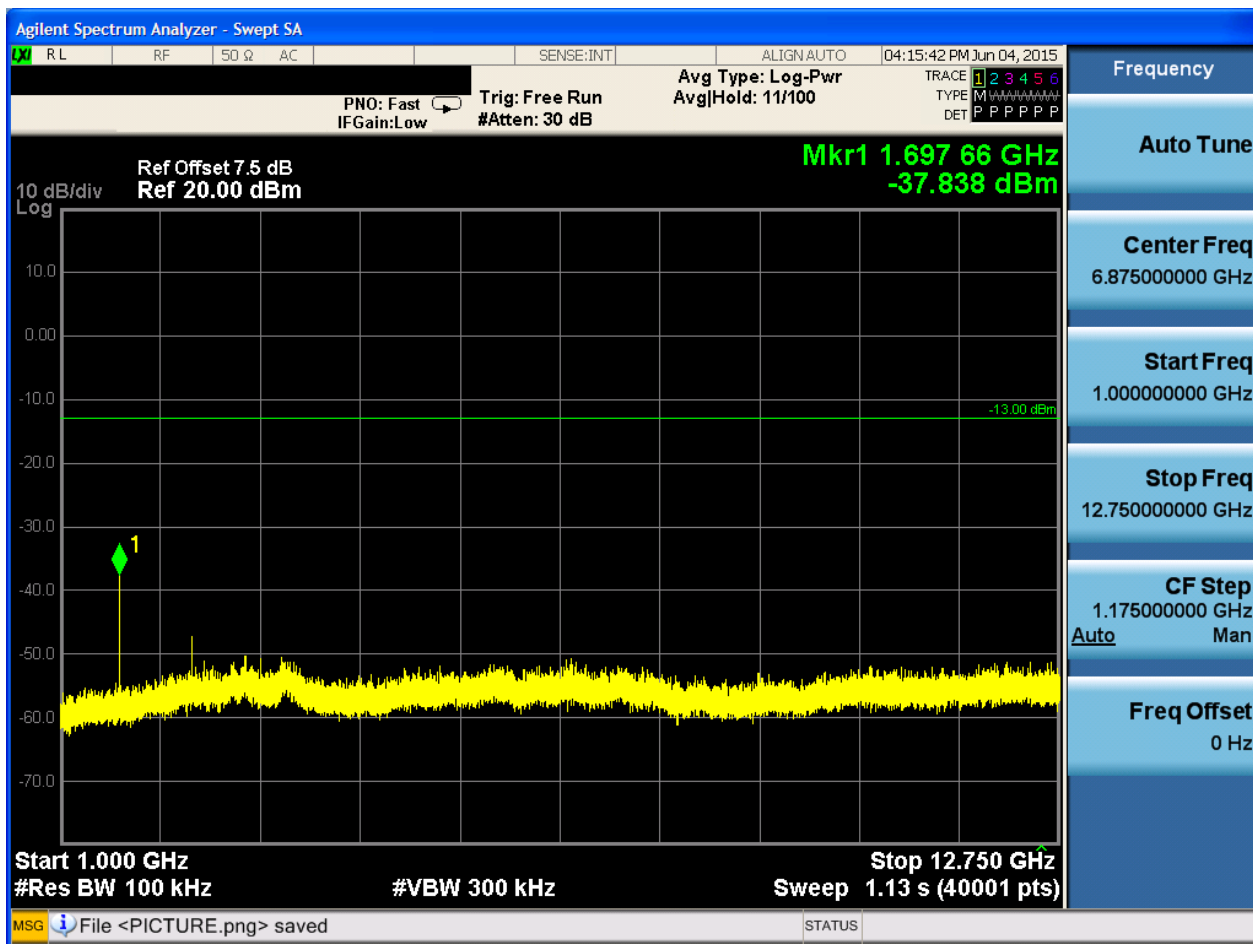


6.1.1.2.3 Test Channel = HCH





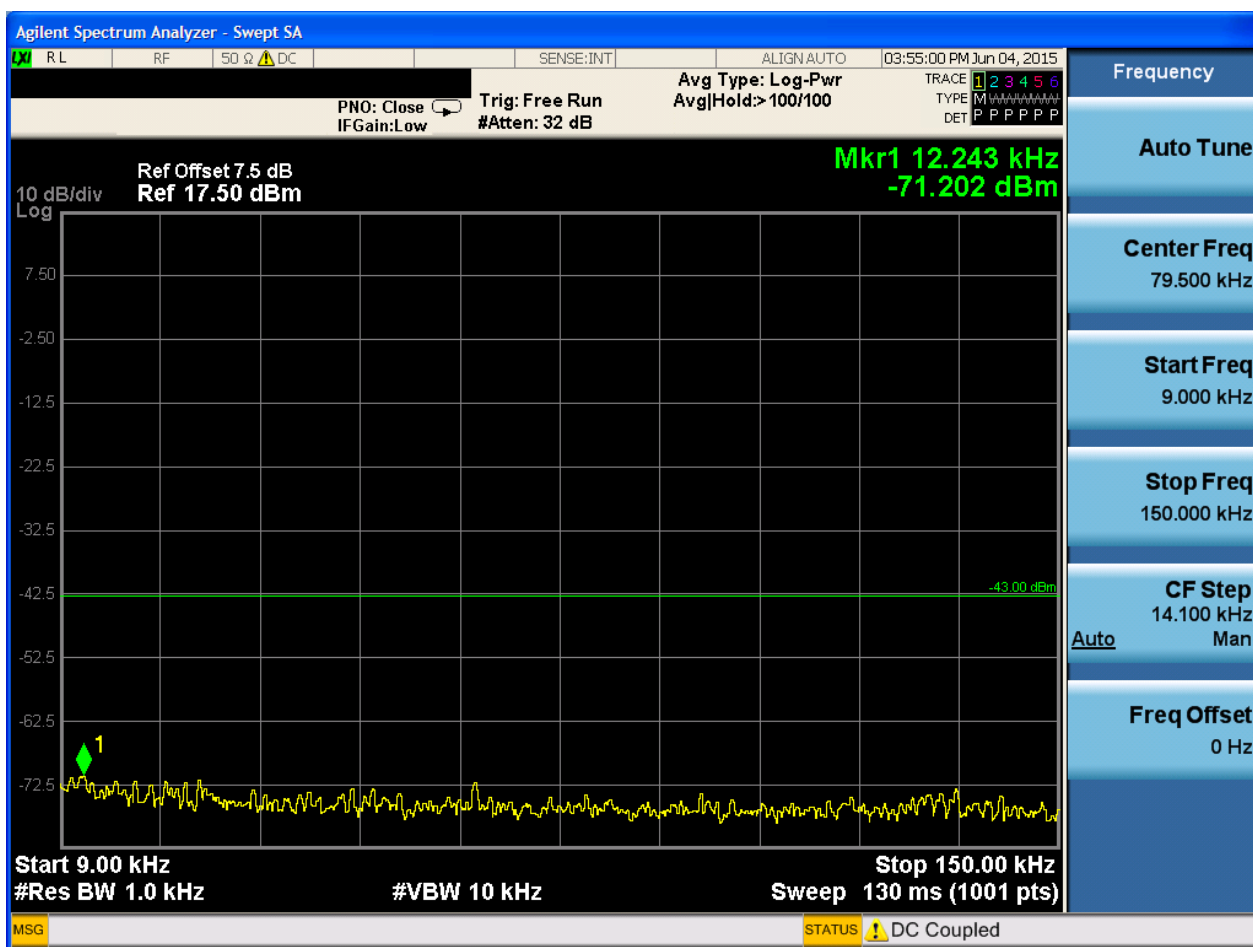


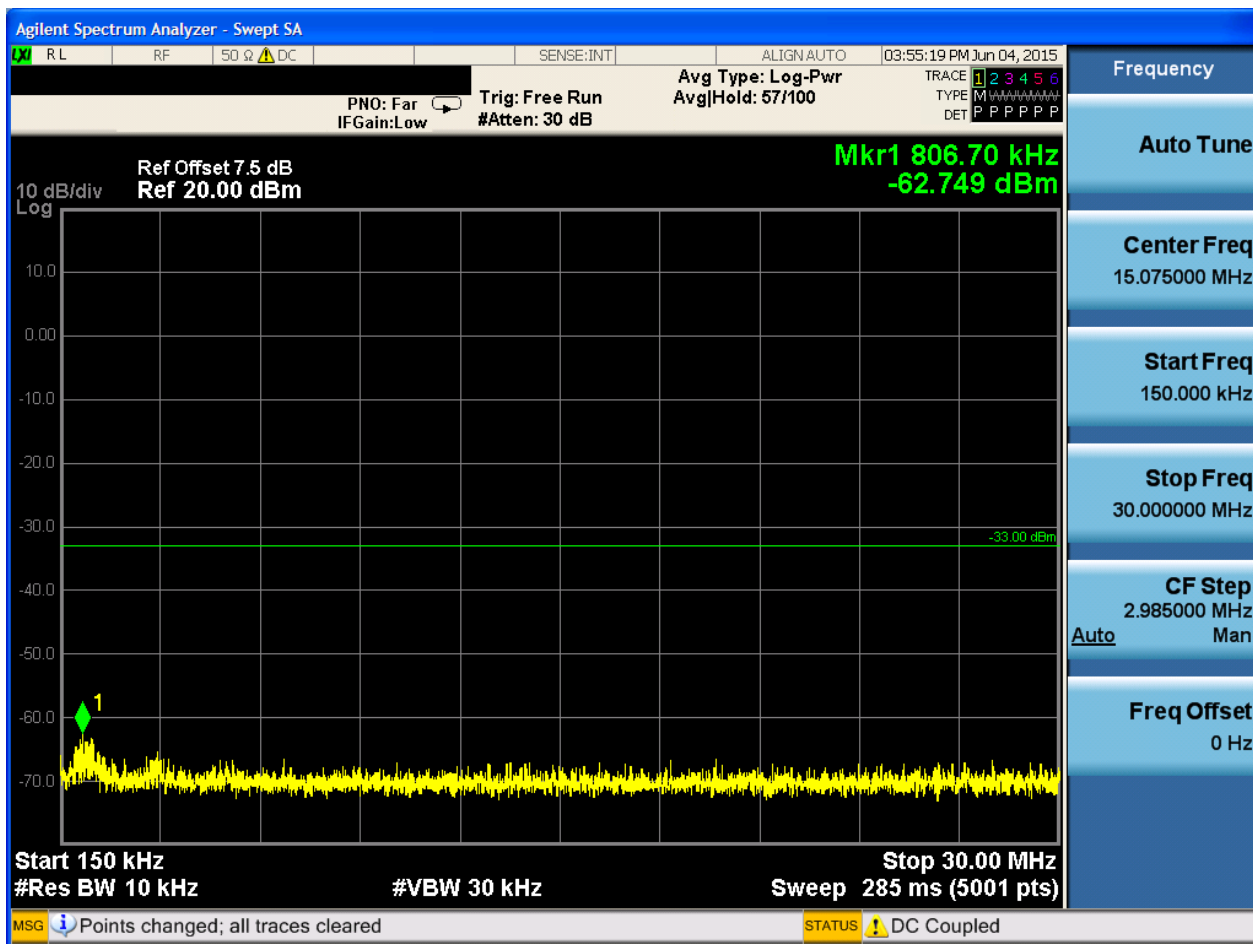


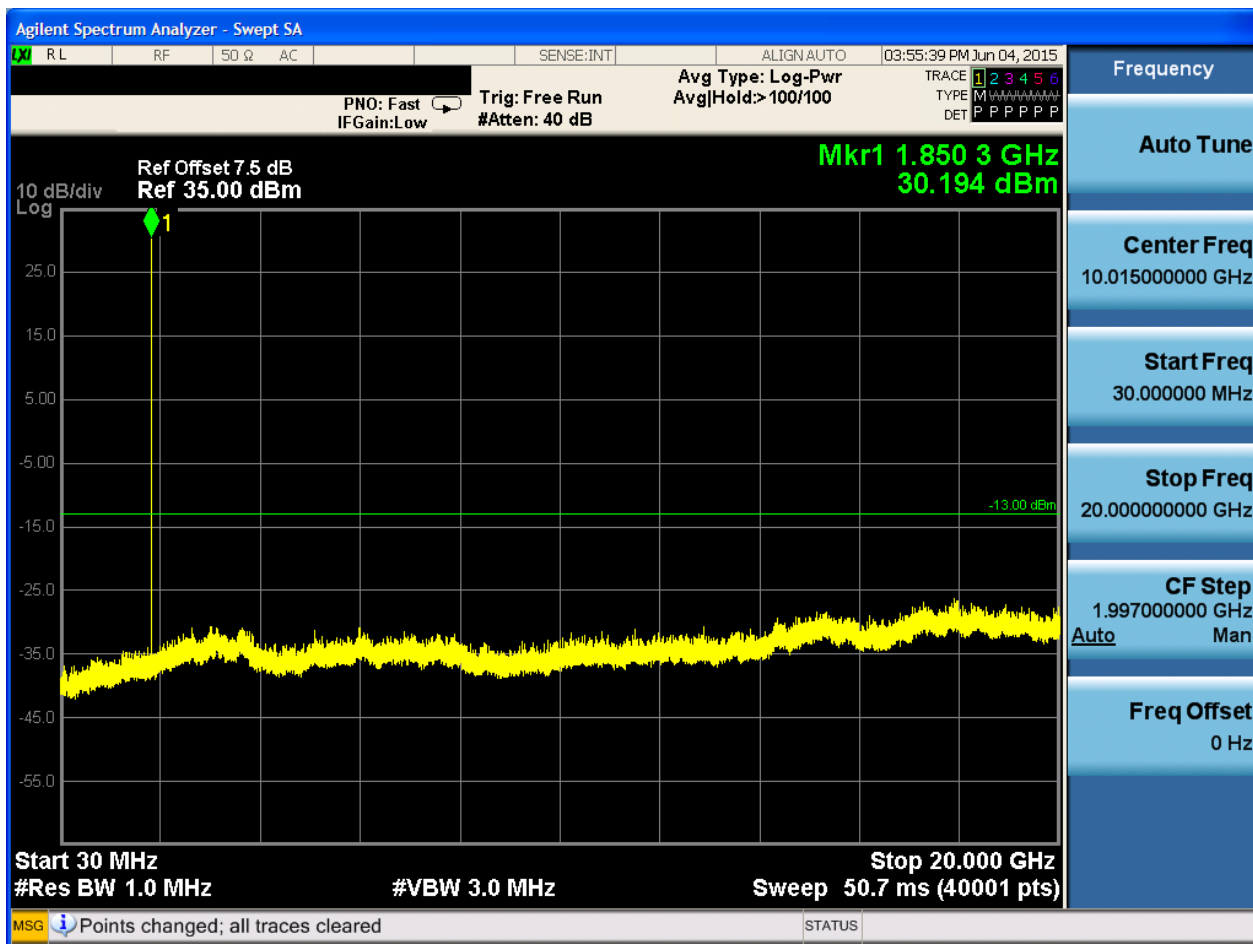
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

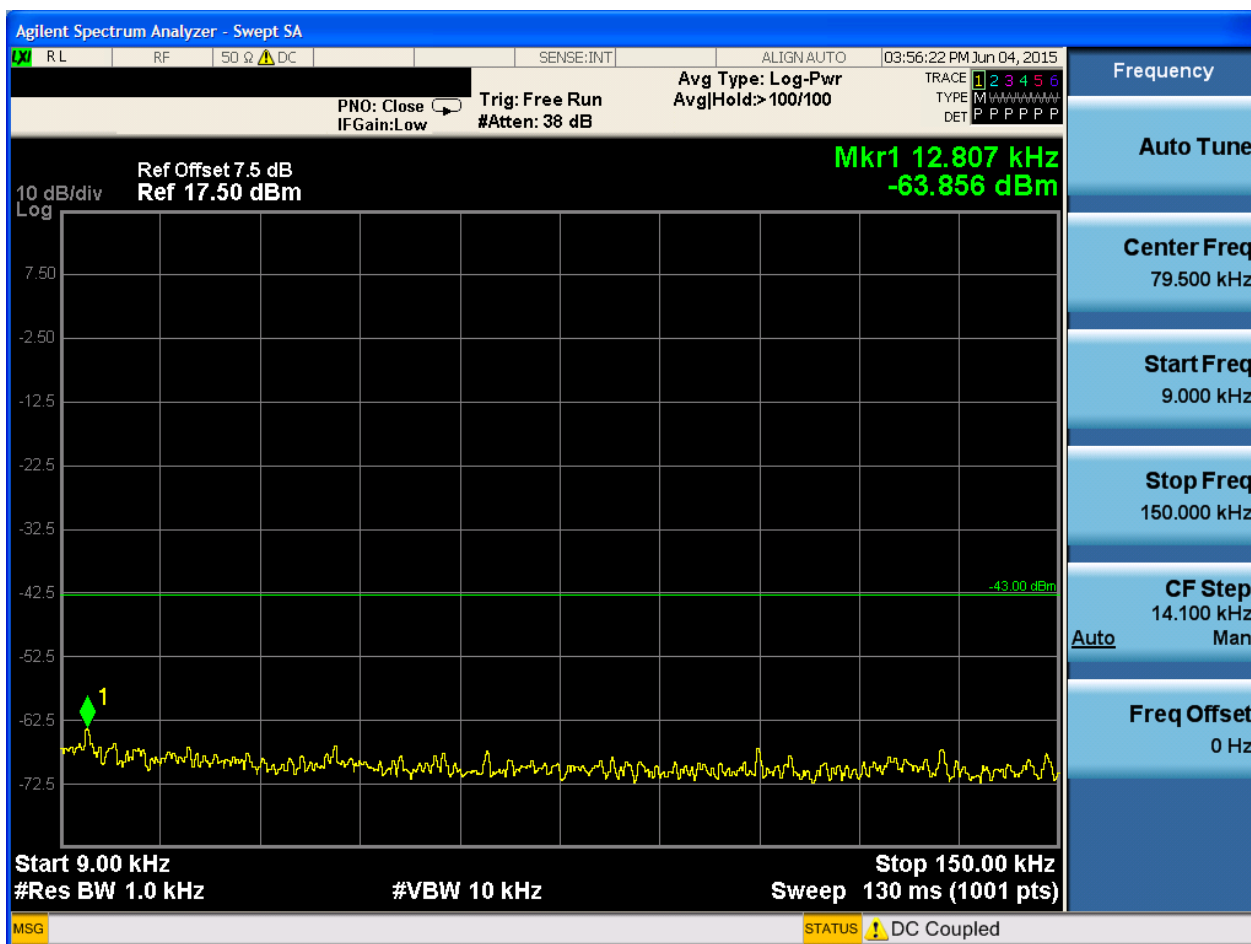
6.1.2.1.1 Test Channel = LCH

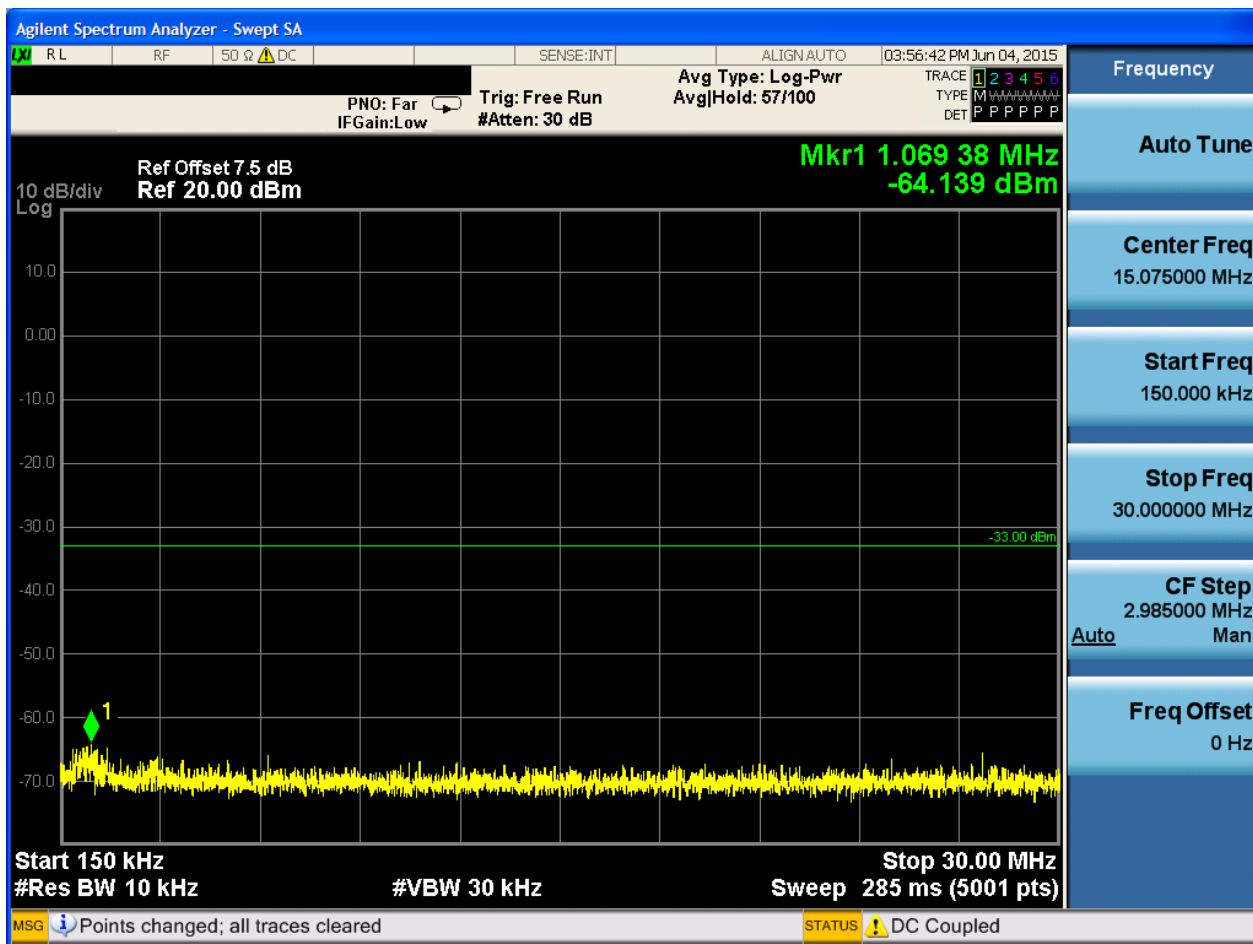


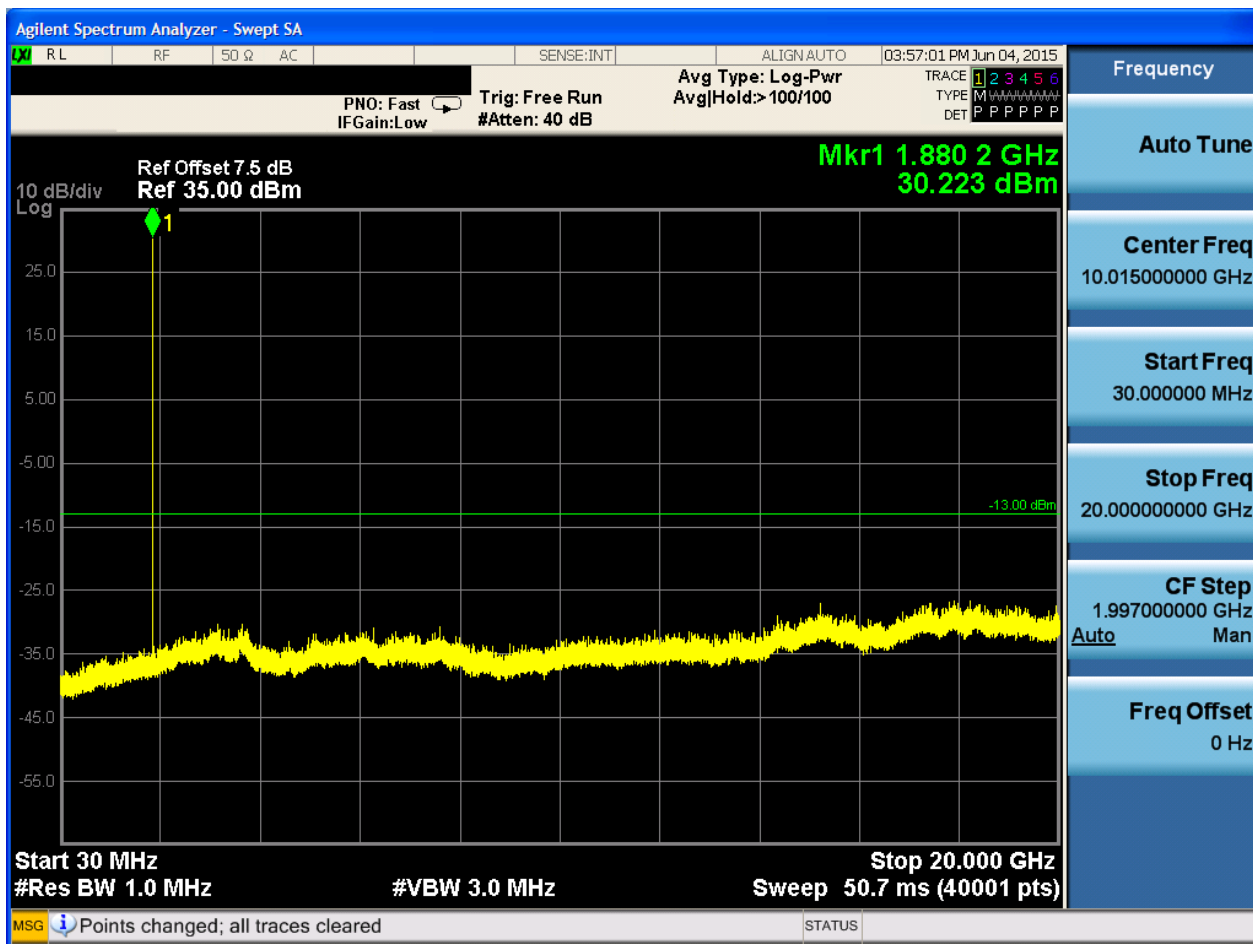




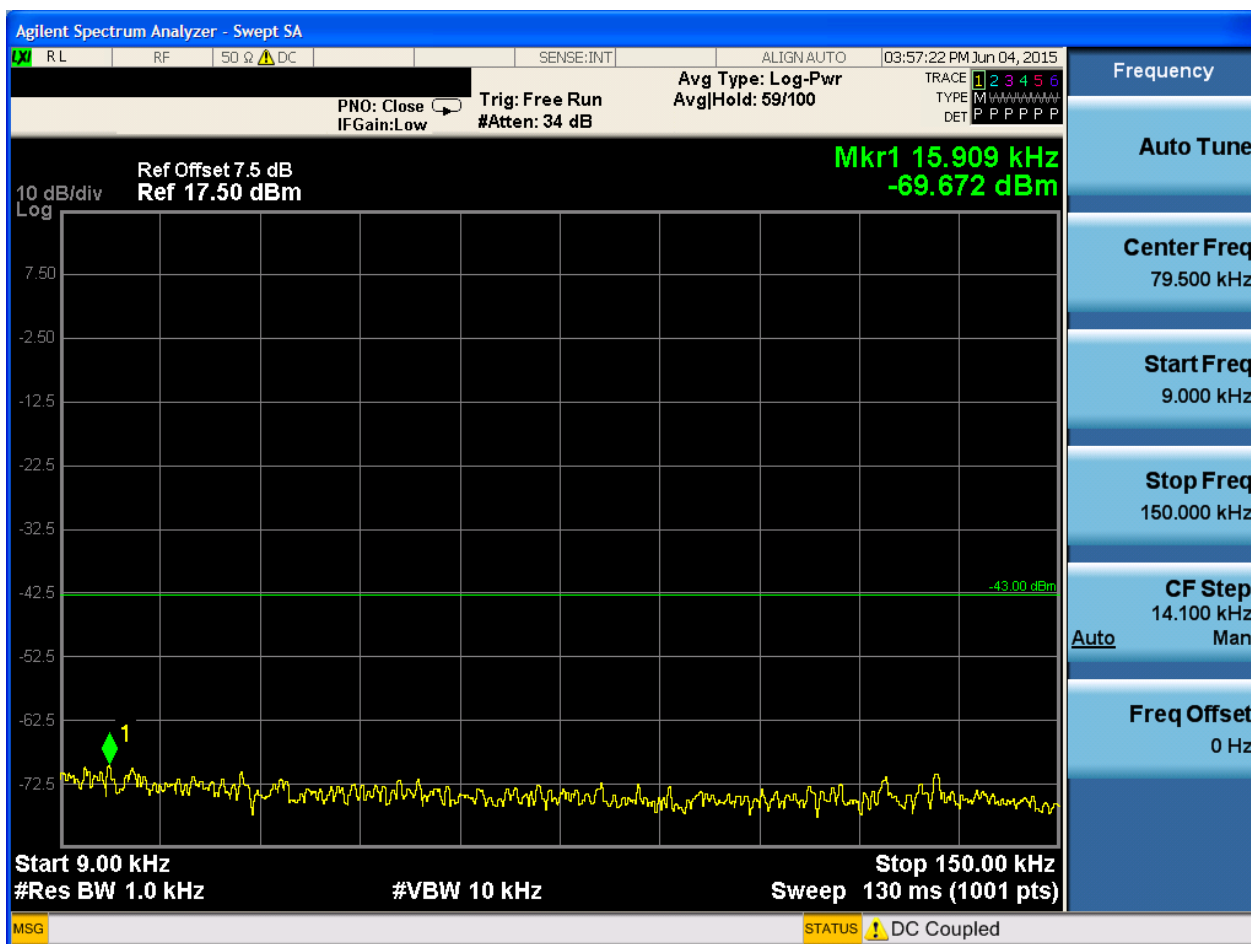
6.1.2.1.2 Test Channel = MCH

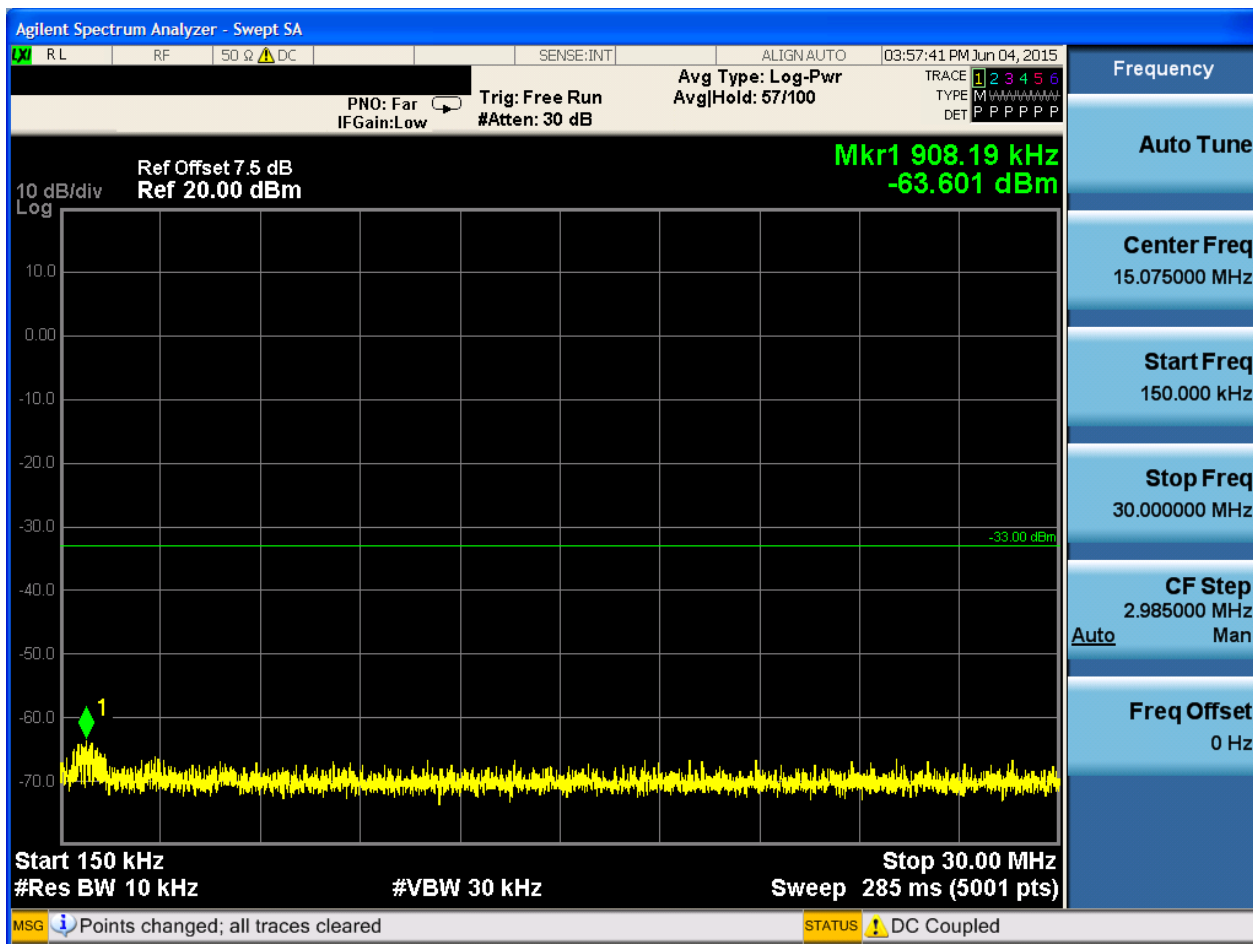


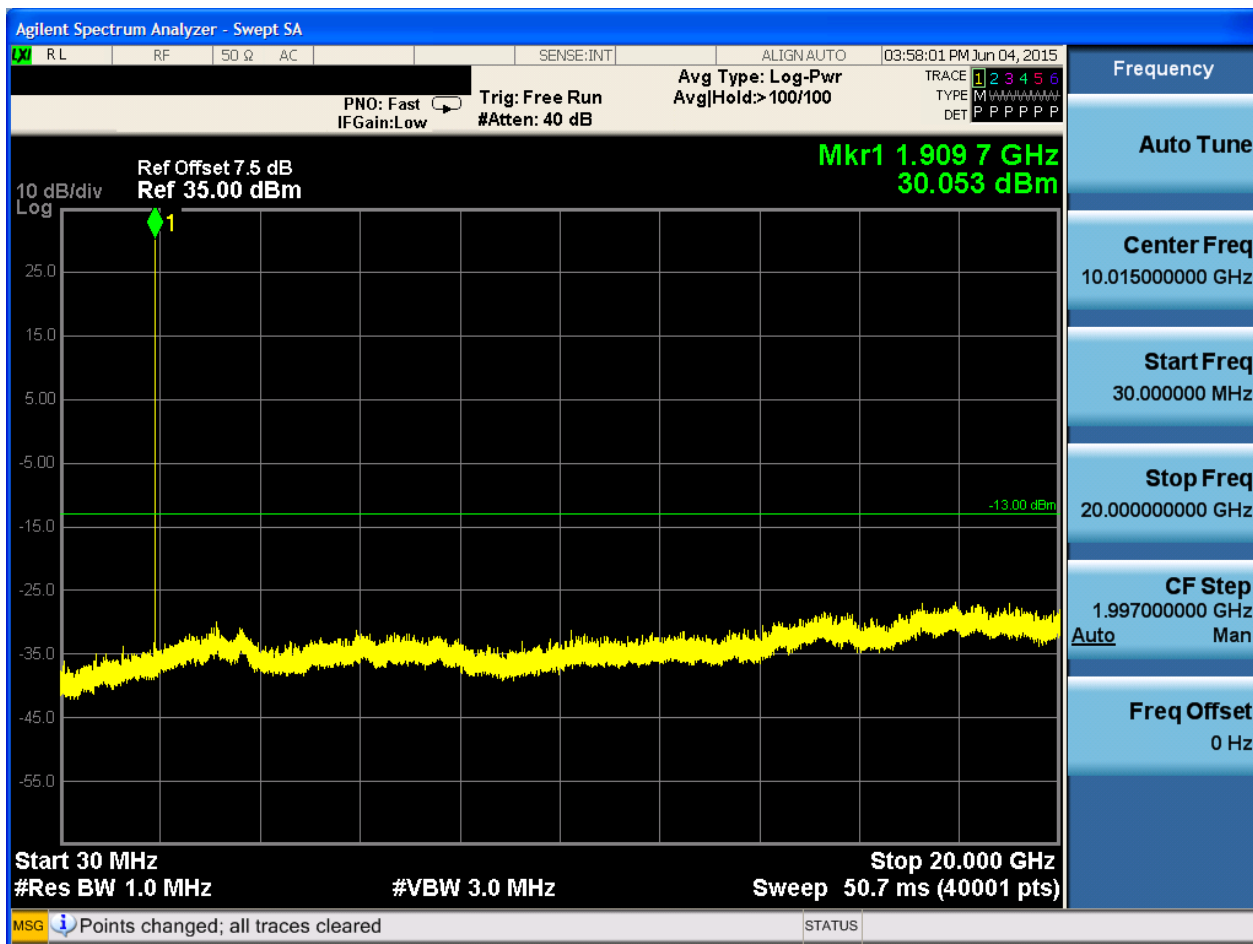




6.1.2.1.3 Test Channel = HCH

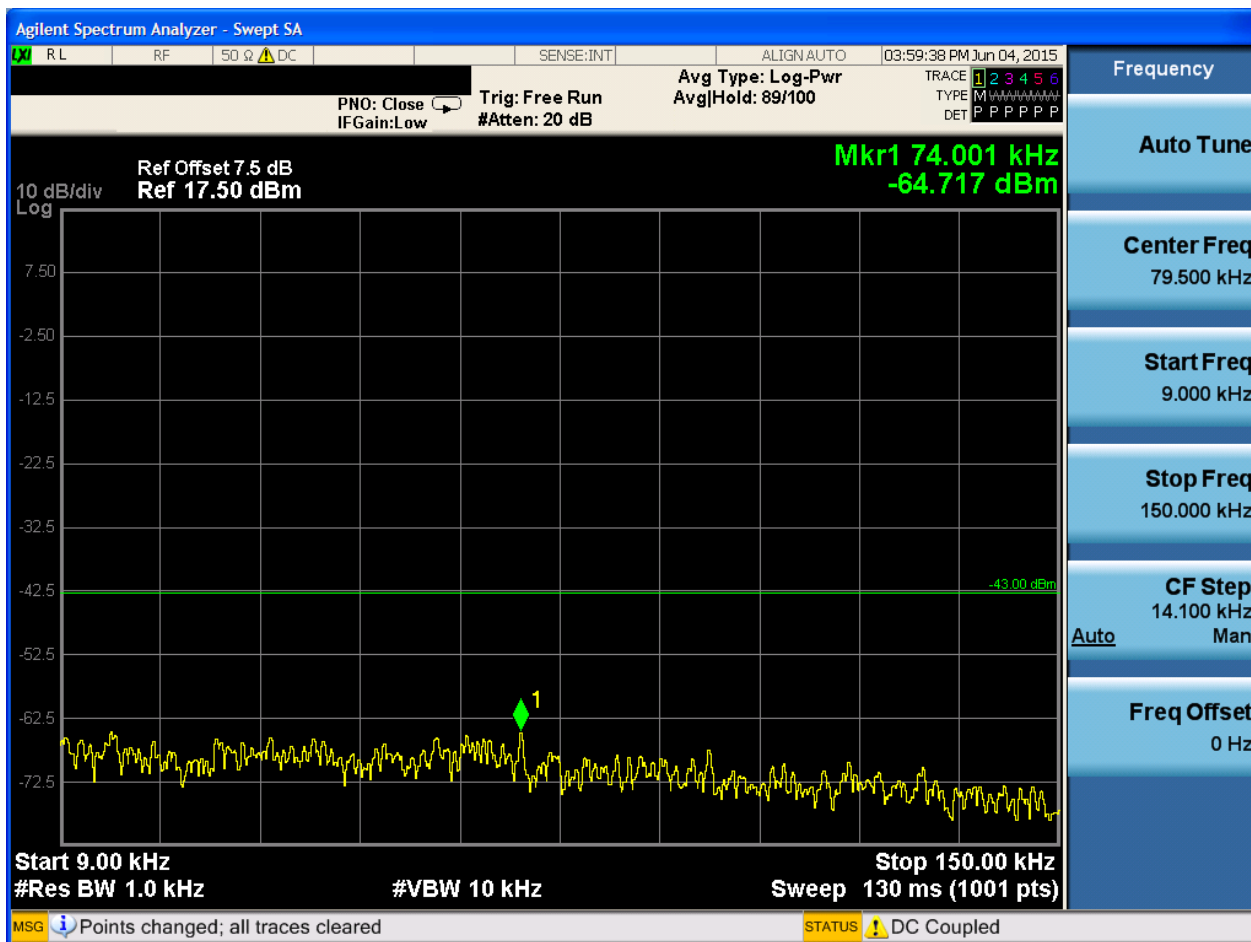


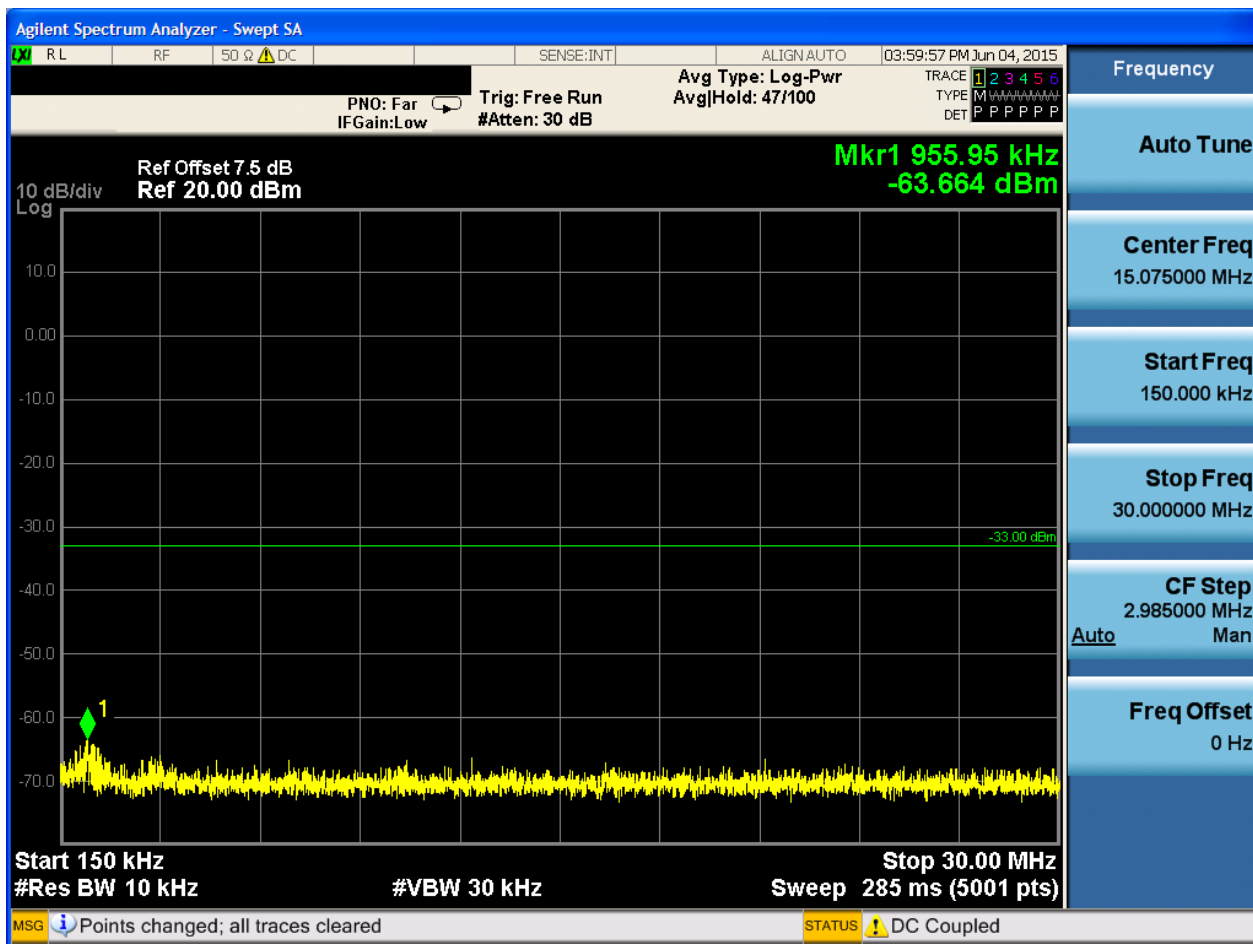




6.1.2.2 Test Mode = GSM/TM2

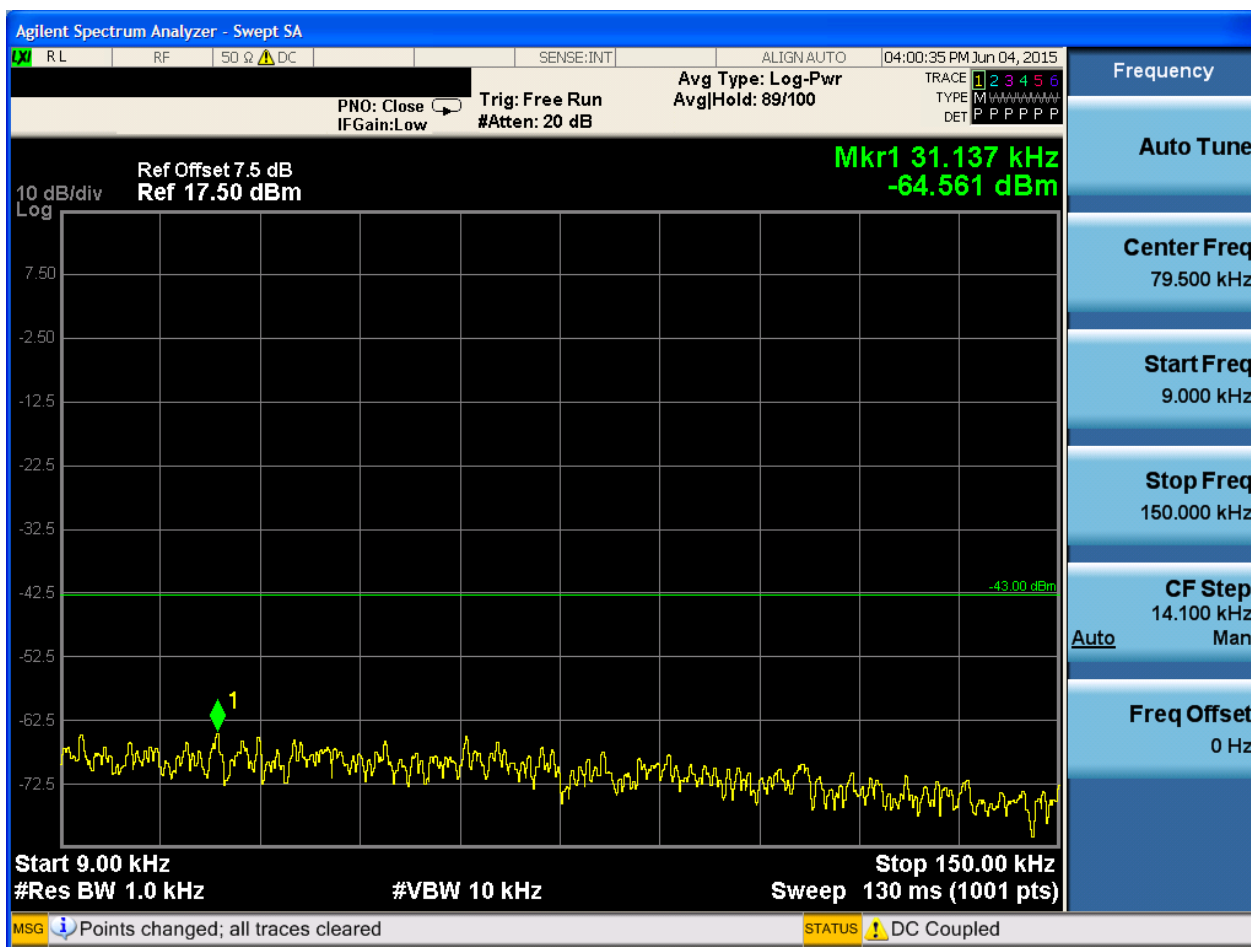
6.1.2.2.1 Test Channel = LCH

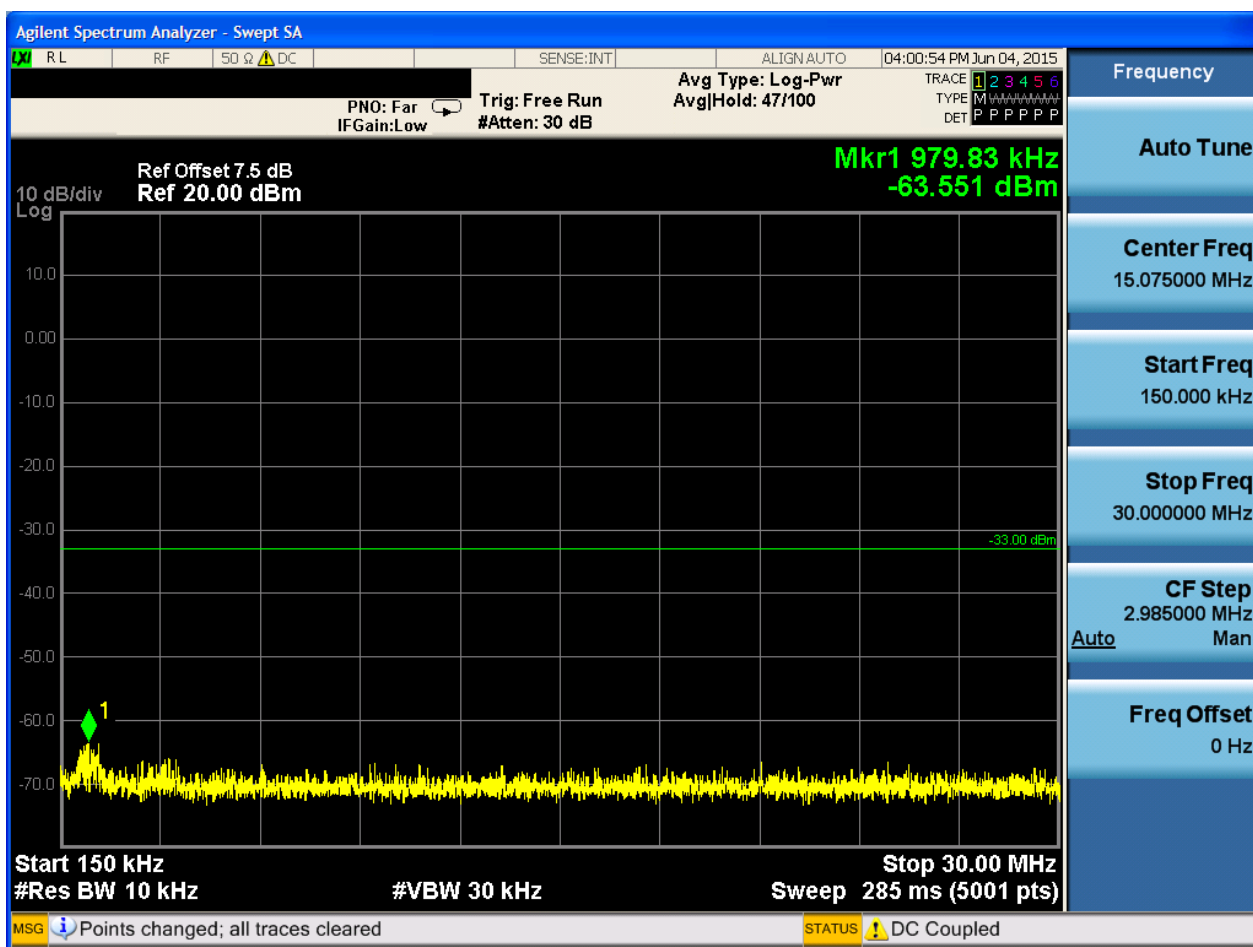


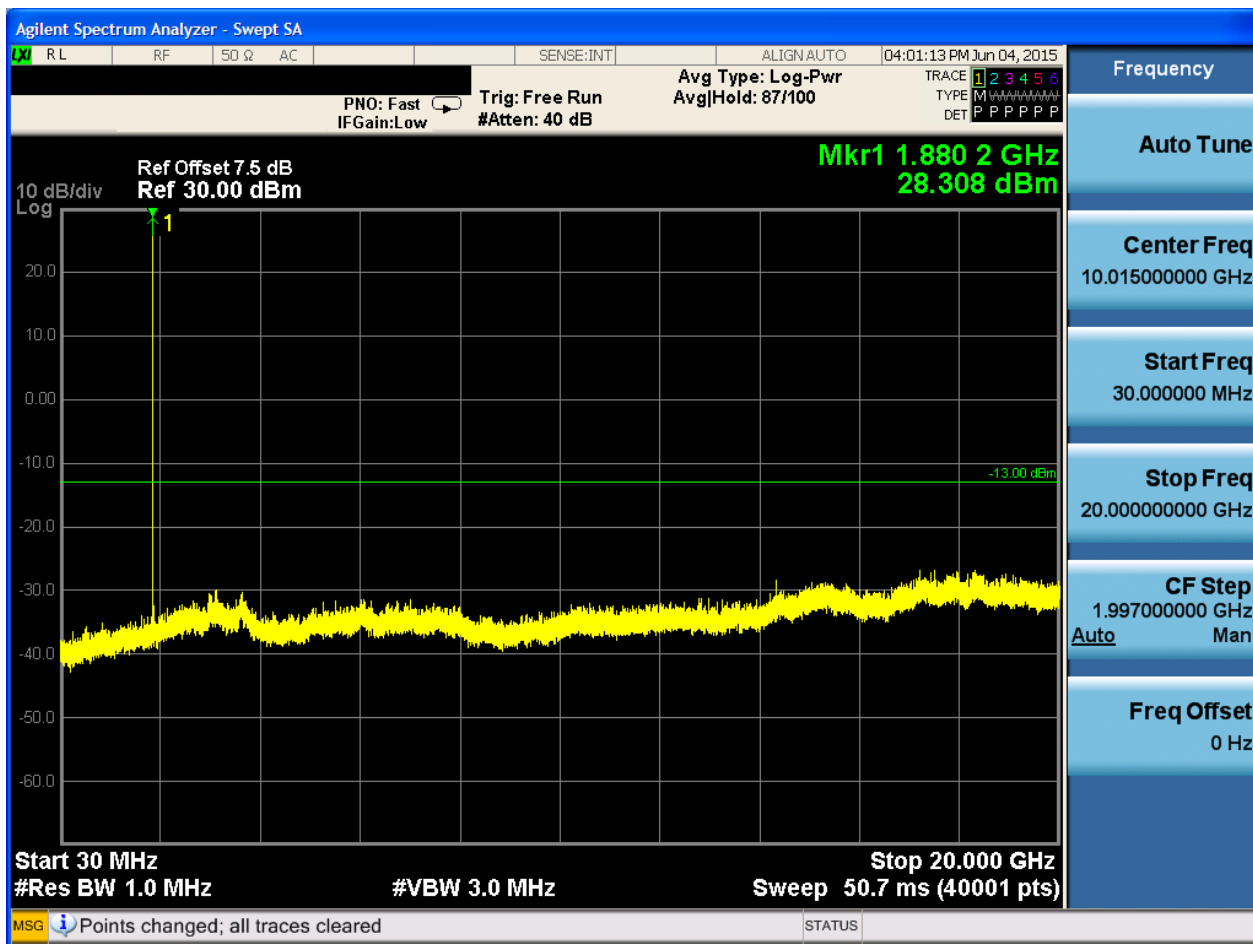




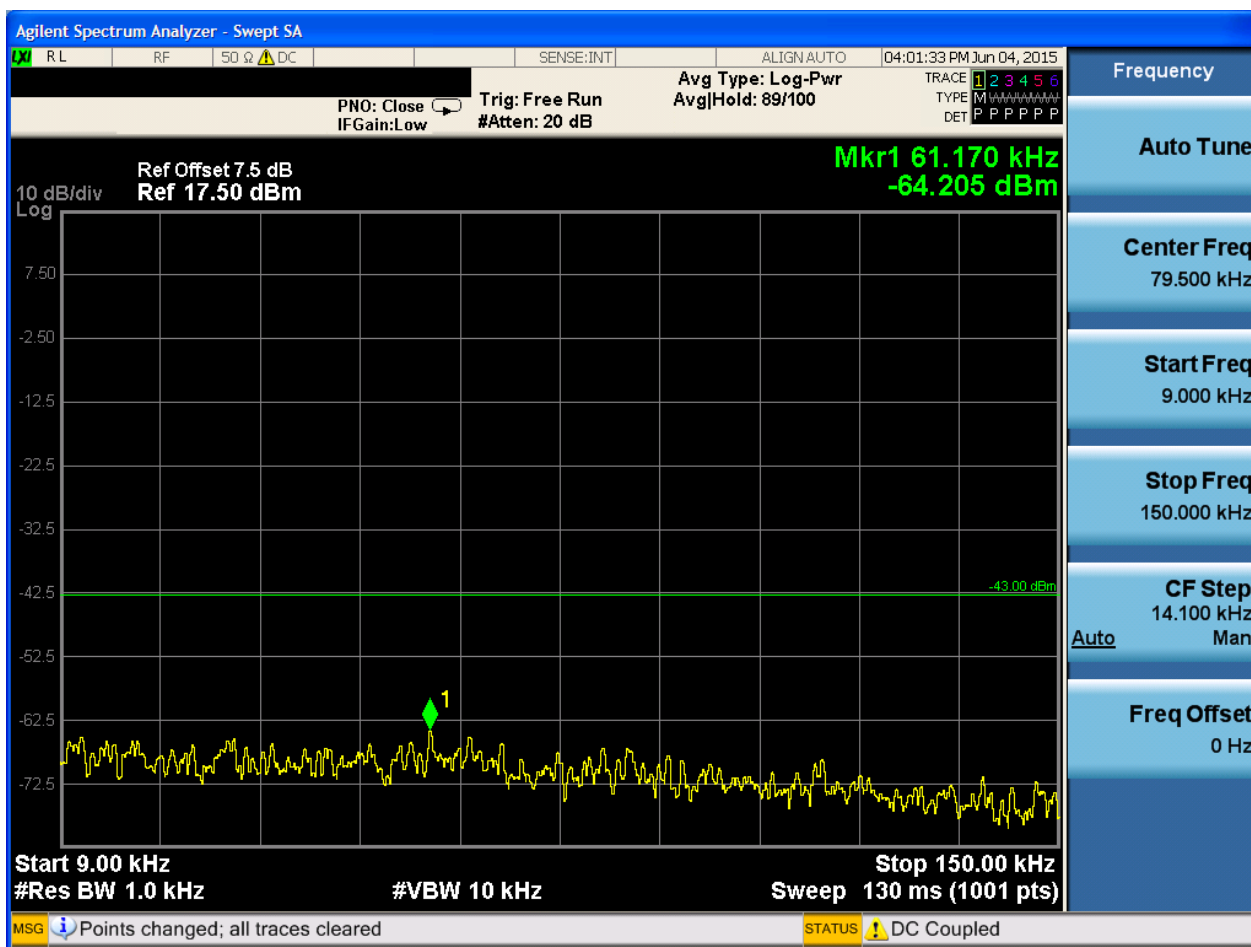
6.1.2.2.2 Test Channel = MCH

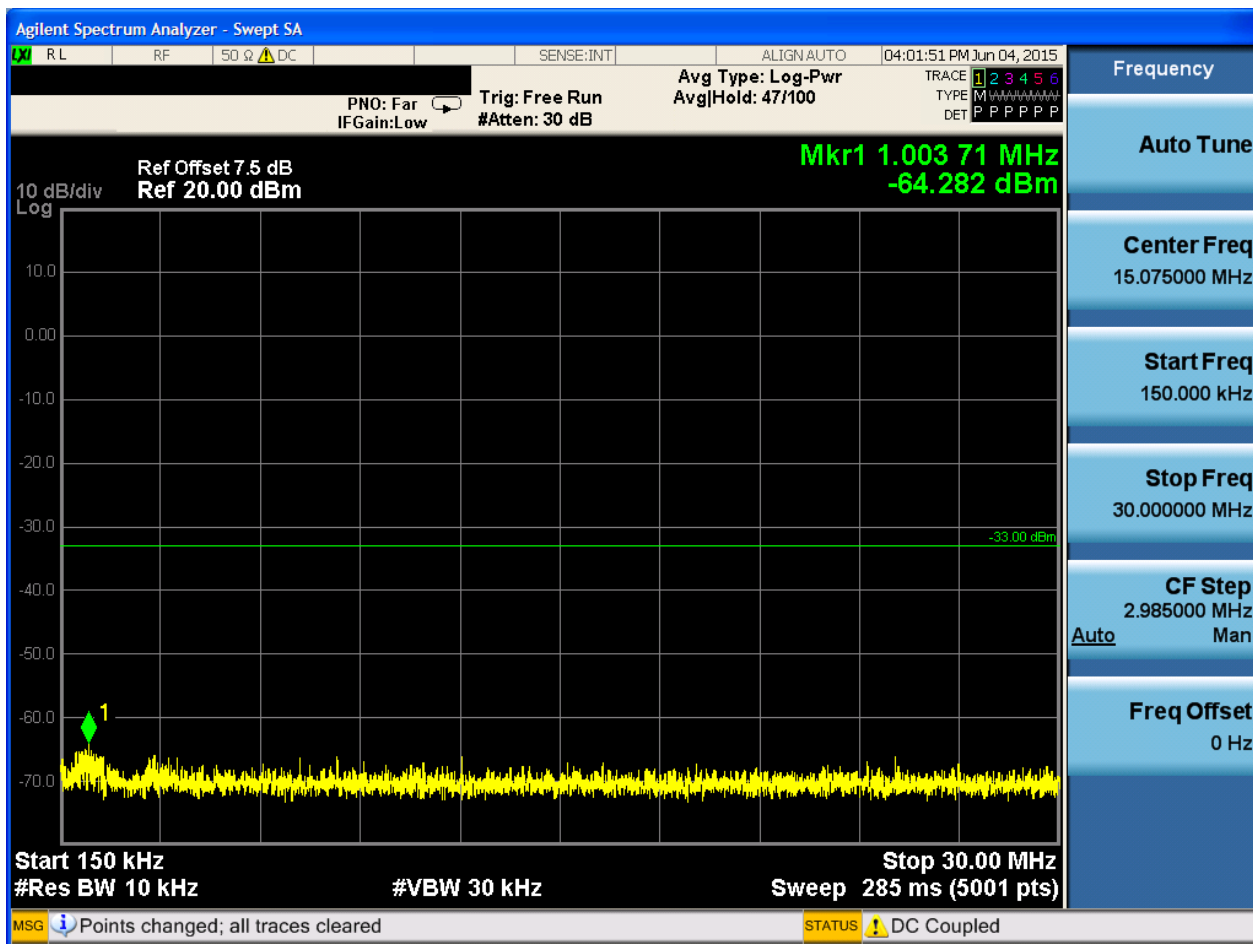


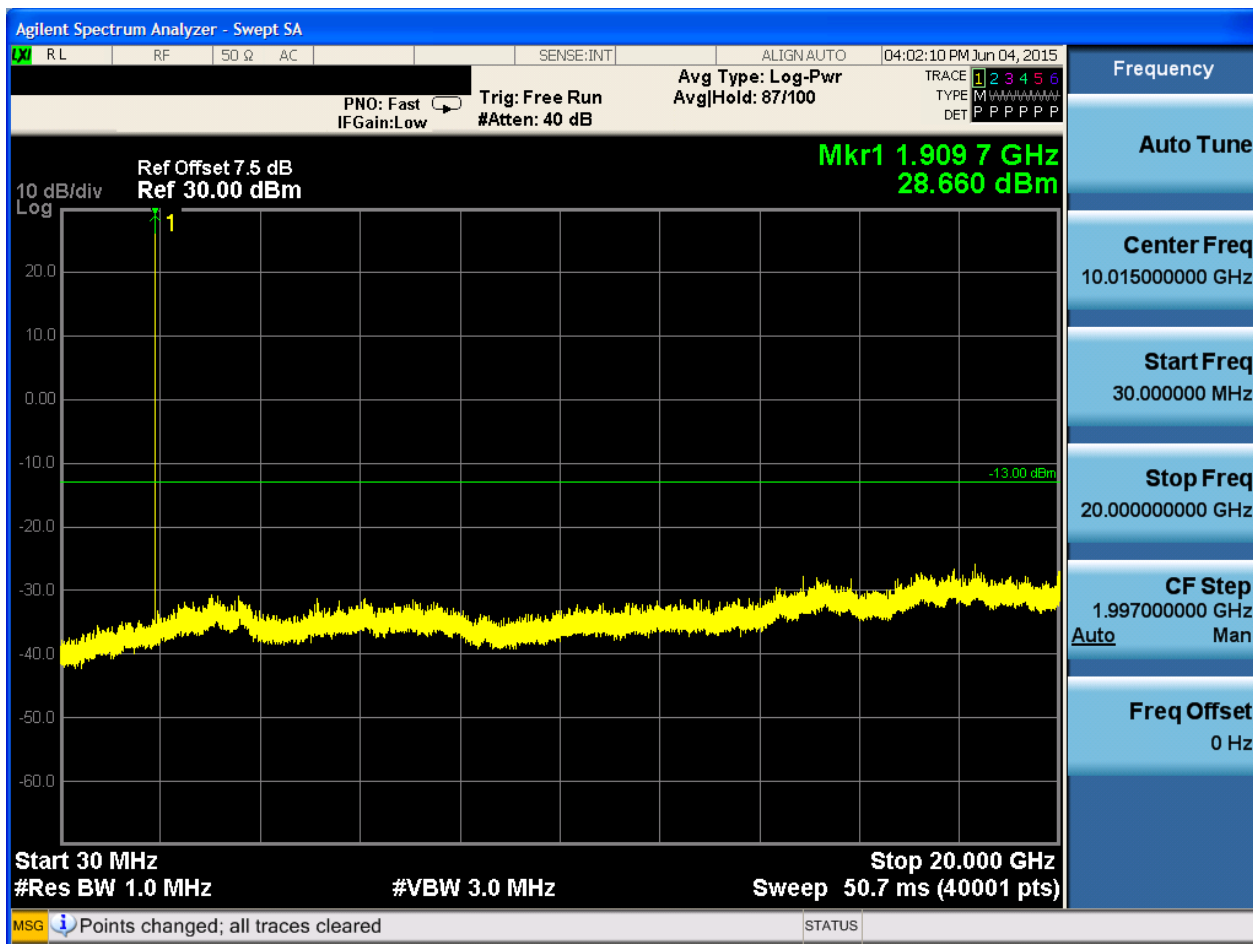




6.1.2.2.3 Test Channel = HCH





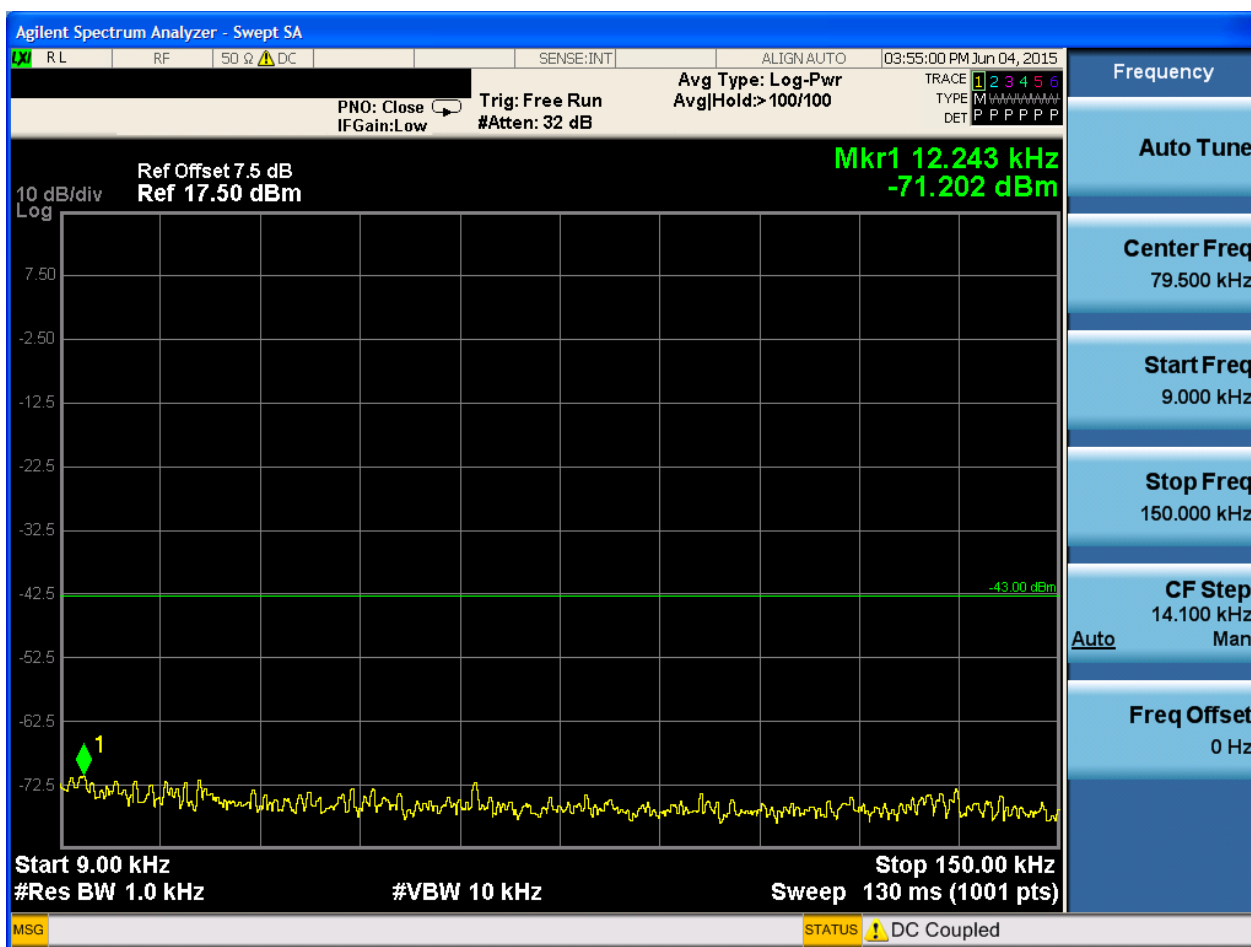


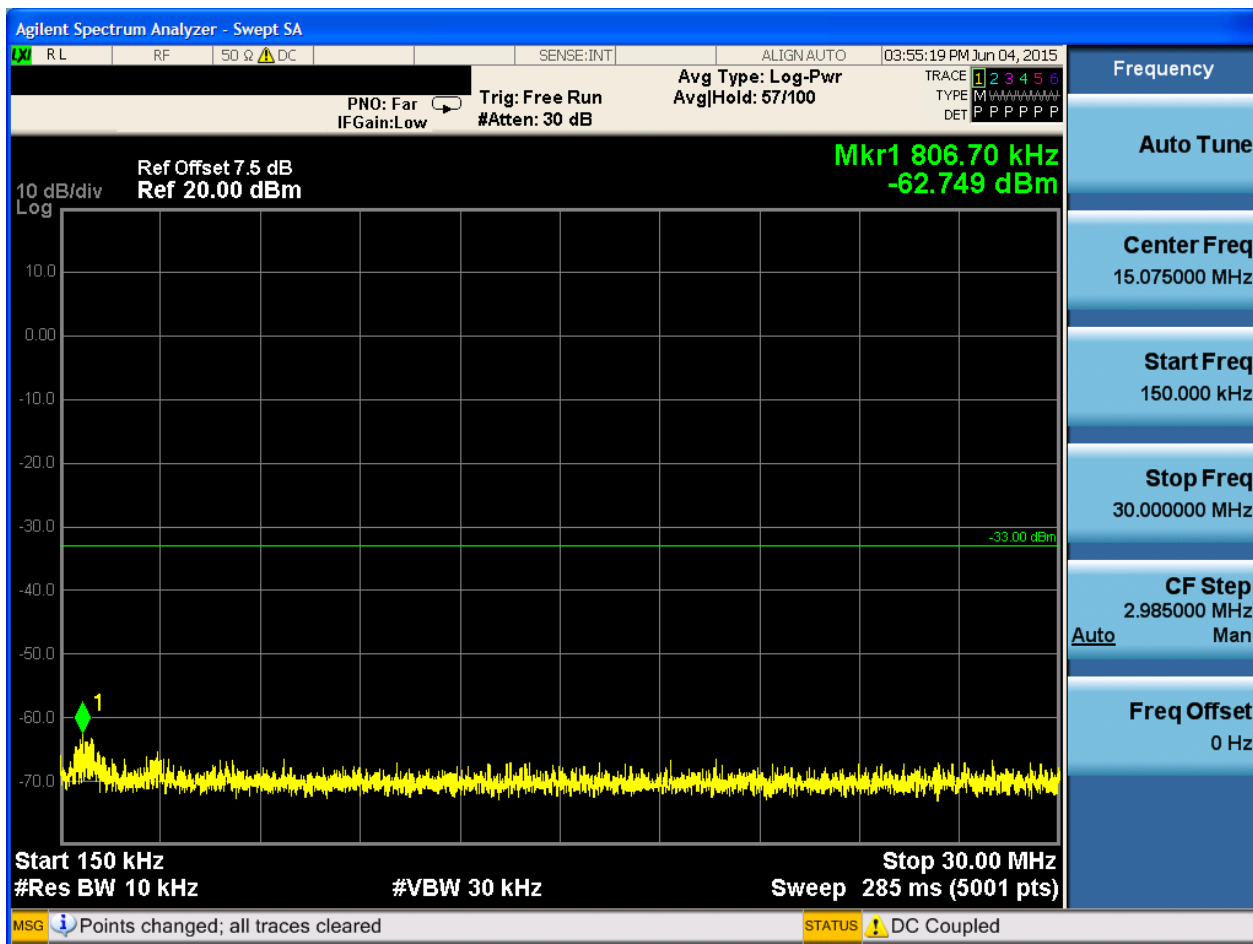


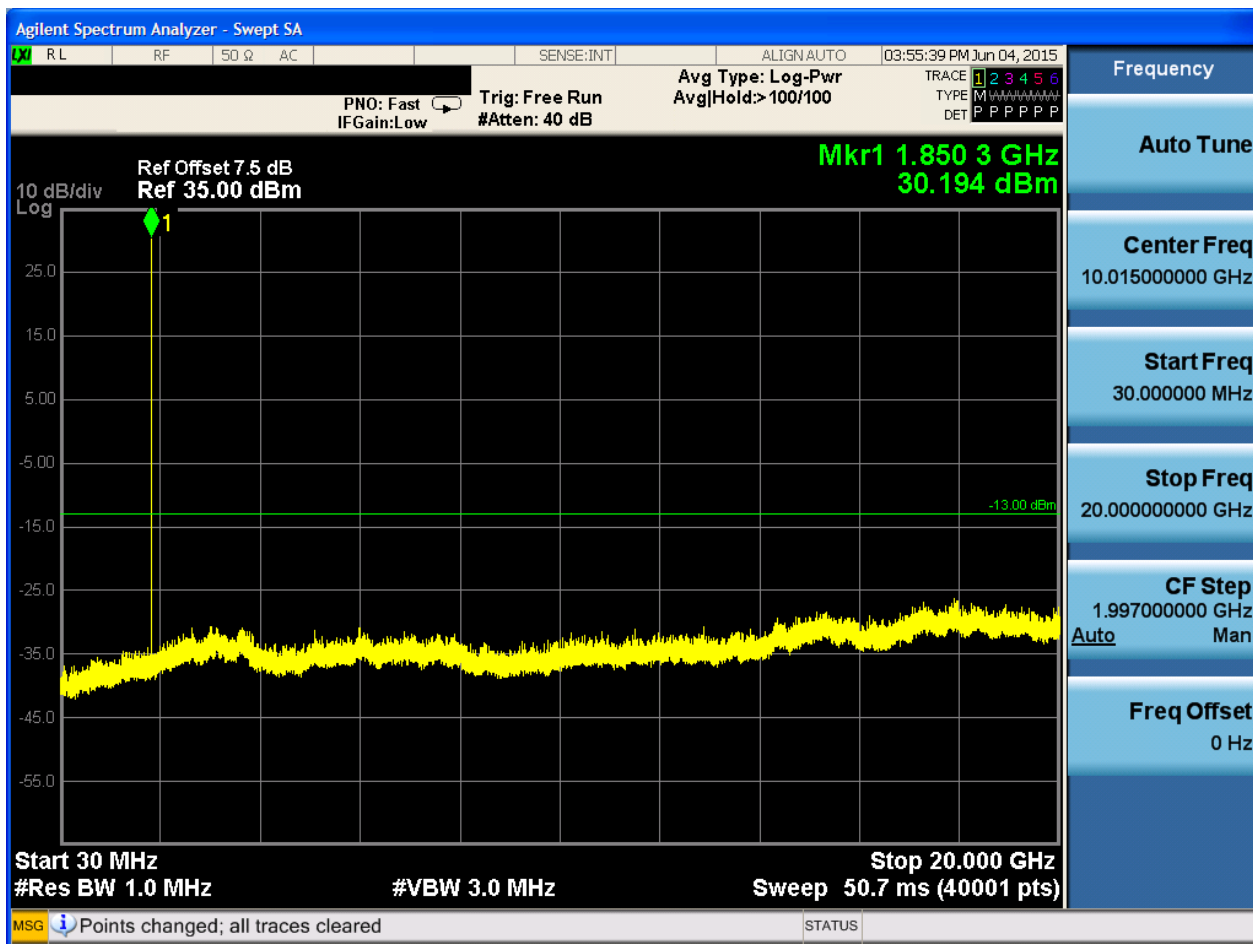
6.1.3 Test Band = GSM1900

6.1.3.1 Test Mode = GSM/TM1

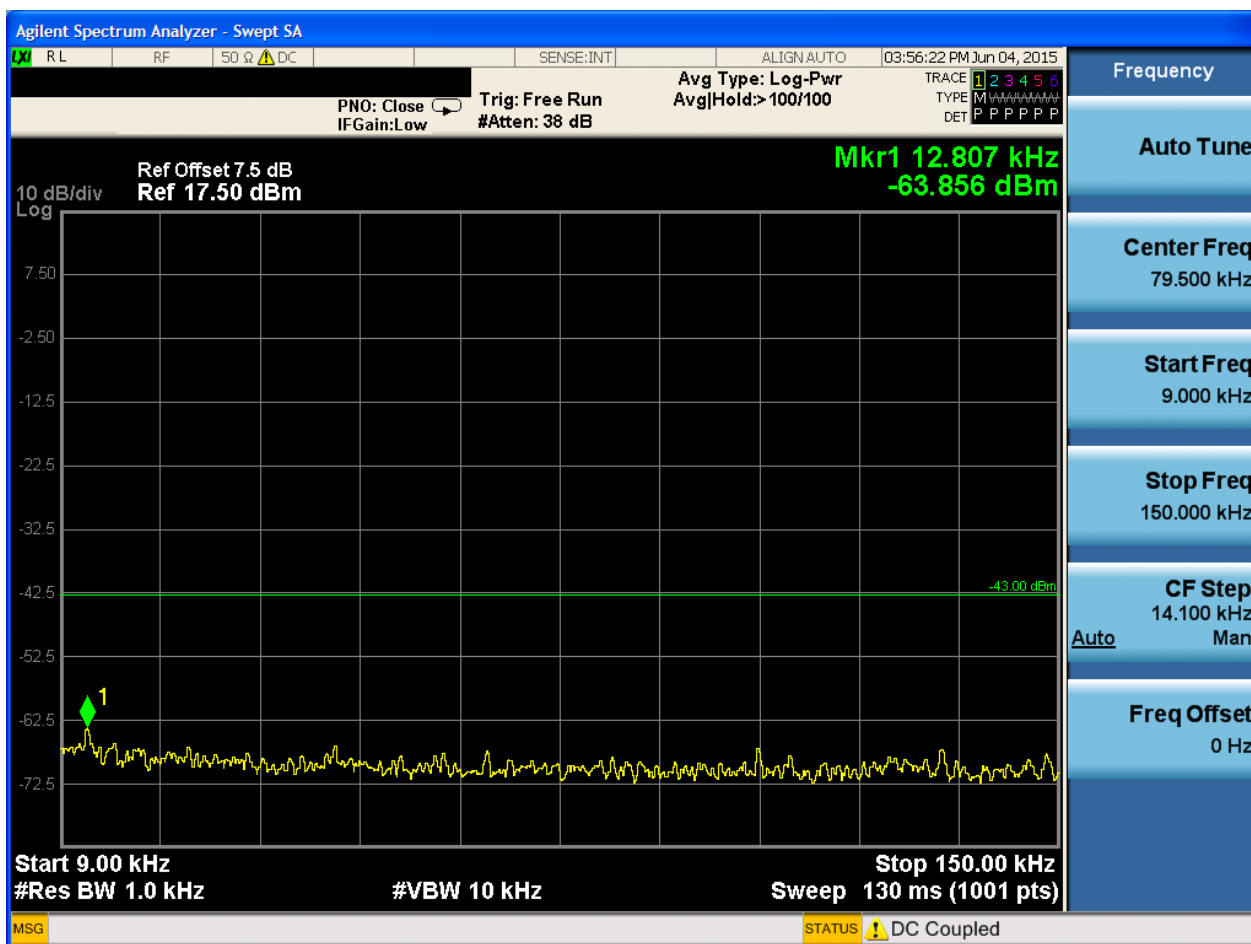
6.1.3.1.1 Test Channel = LCH

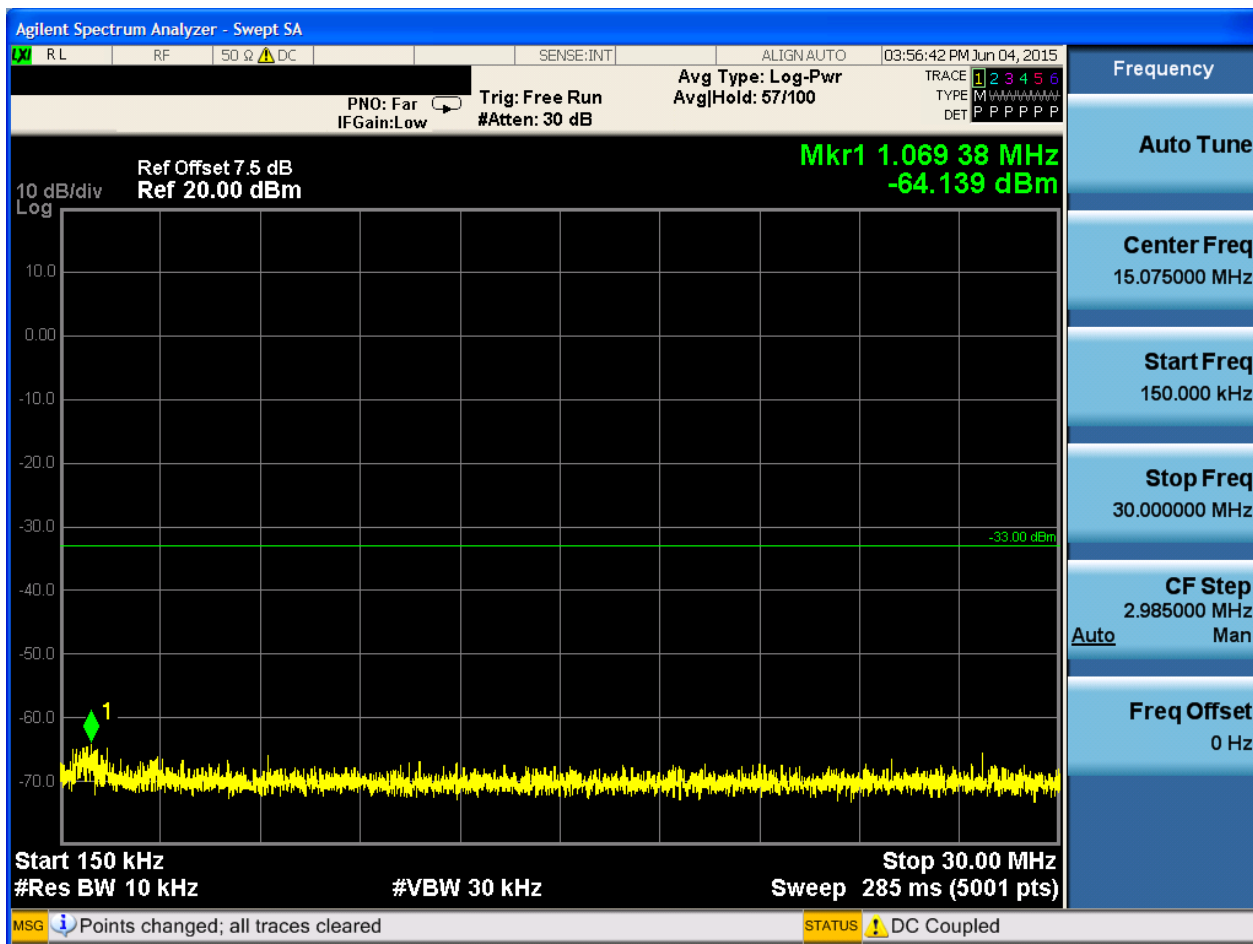


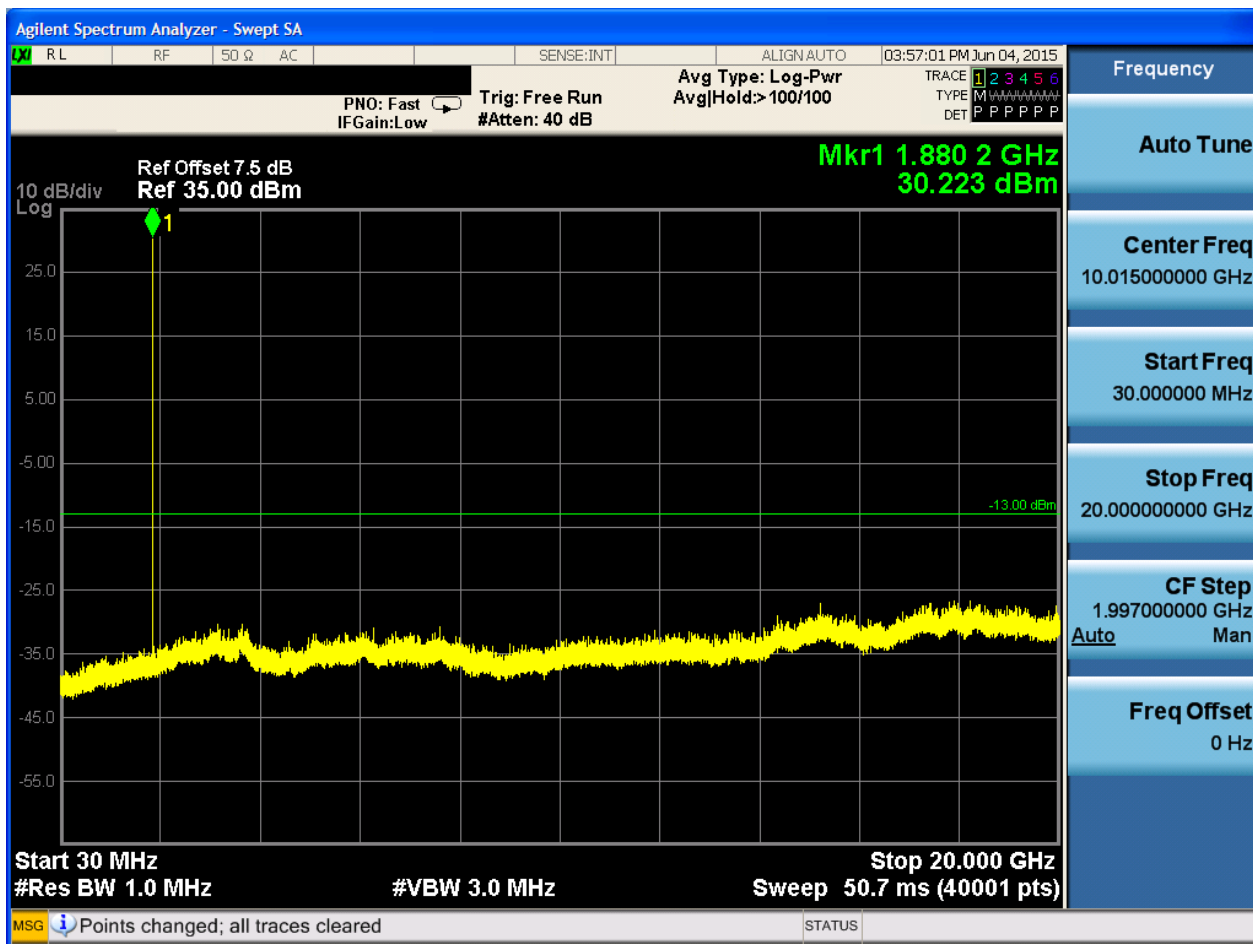




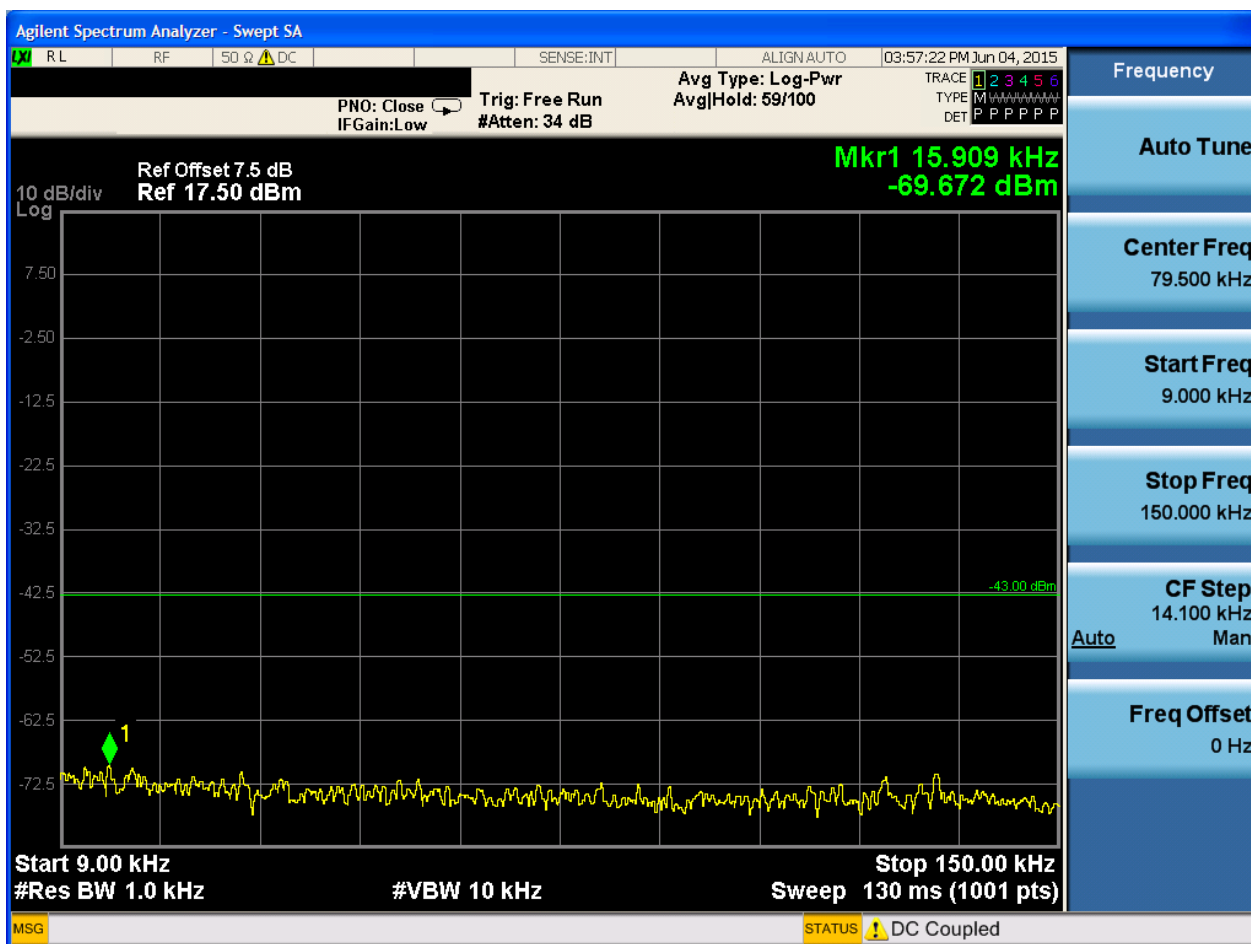
6.1.3.1.2 Test Channel = MCH

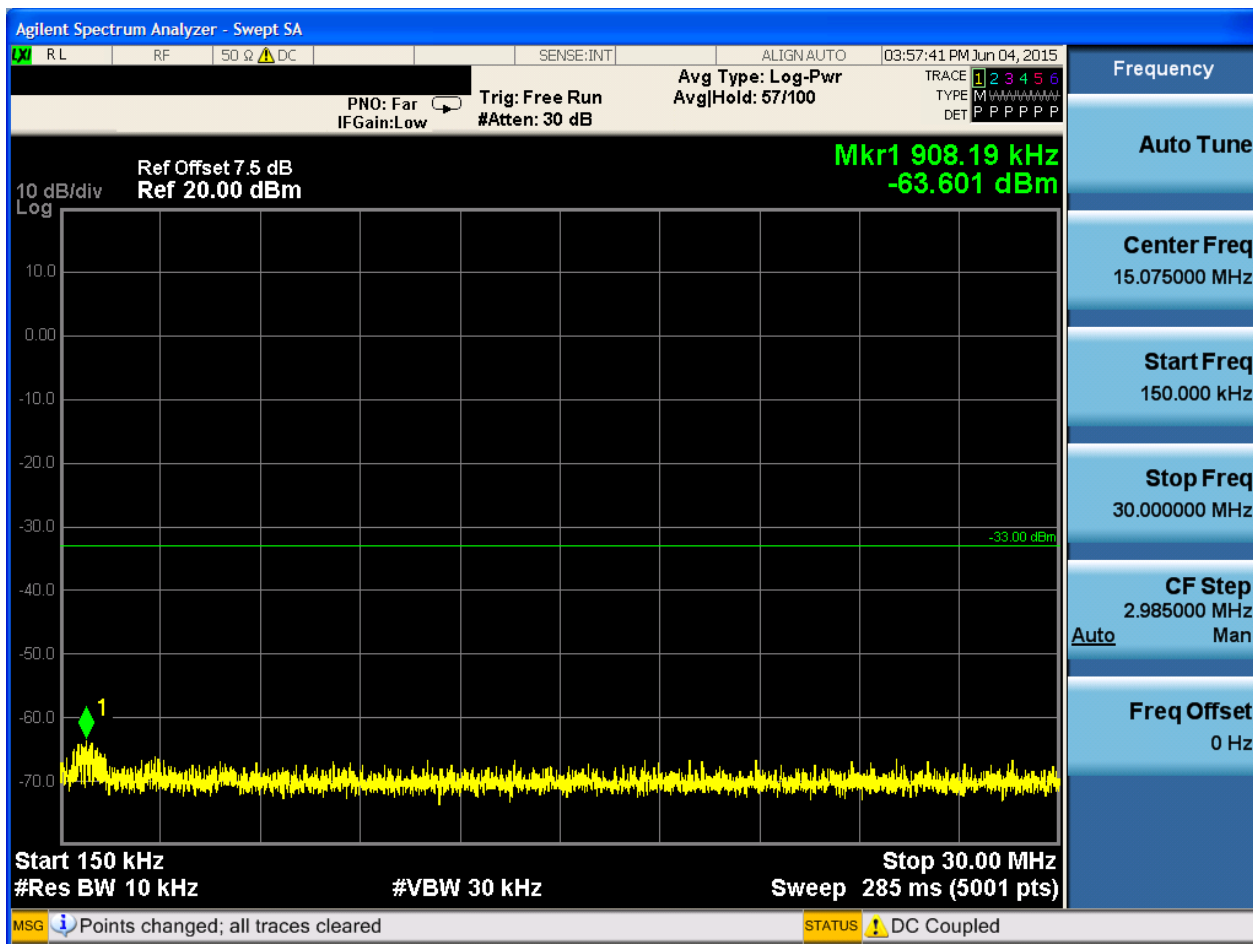


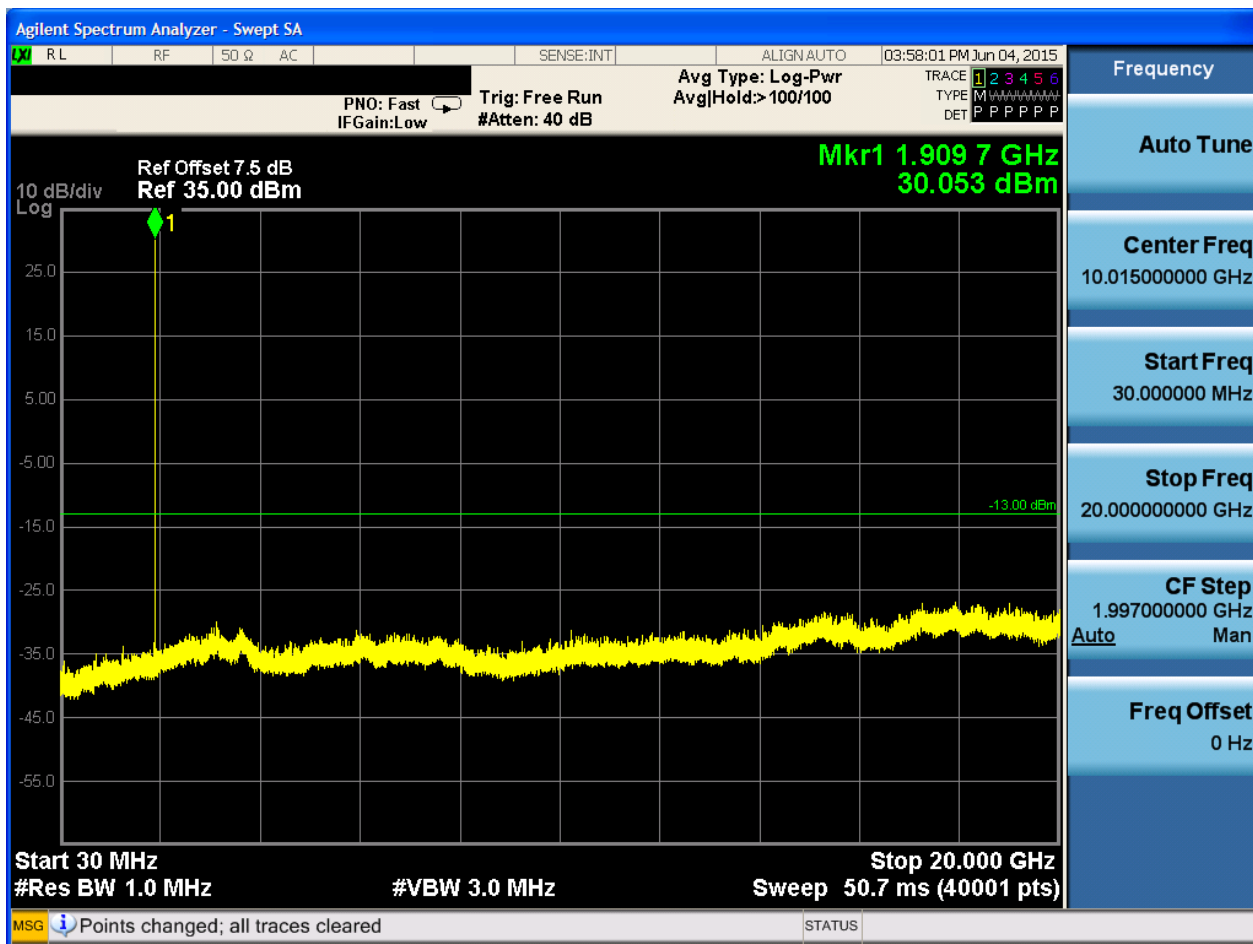




6.1.3.1.3 Test Channel = HCH

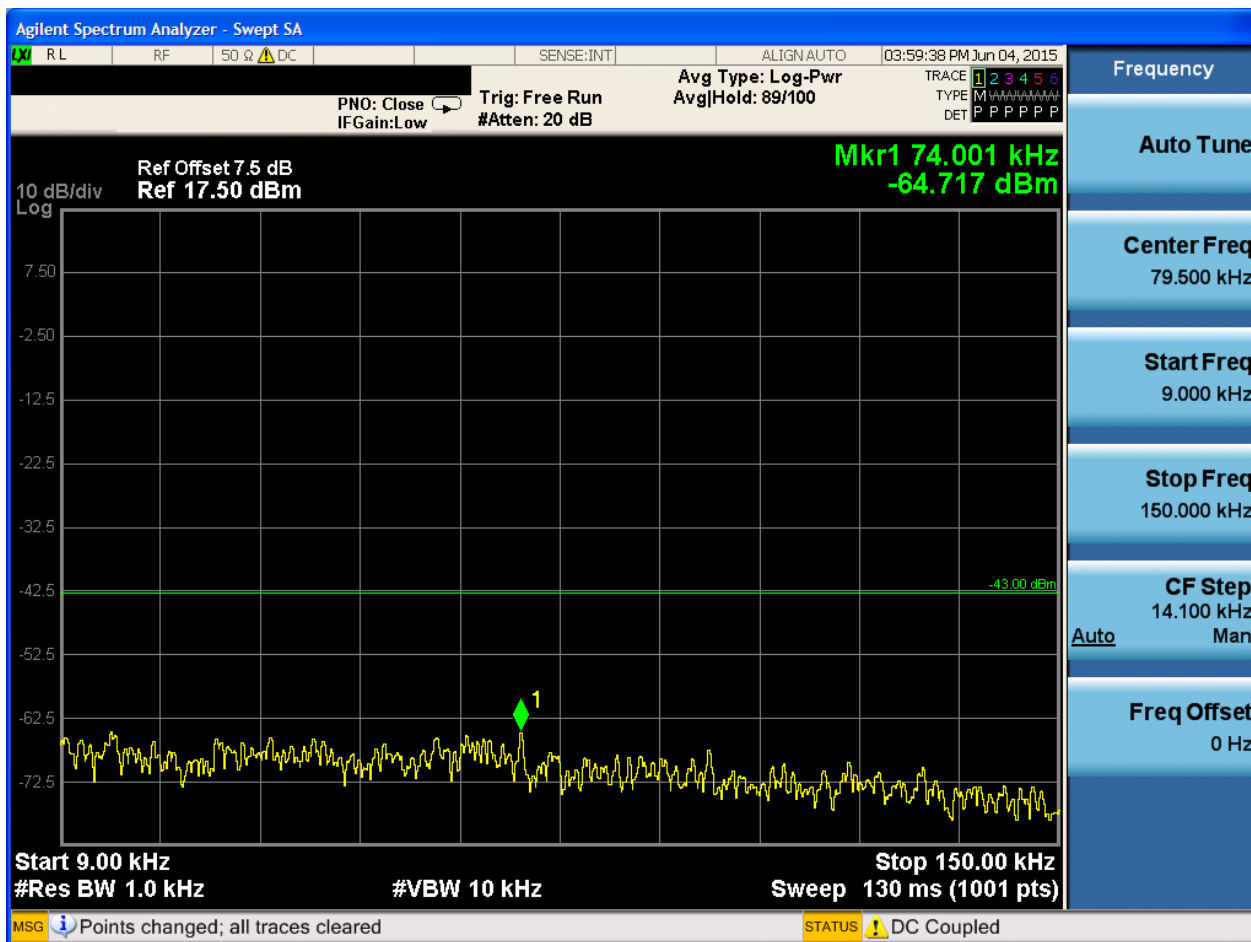


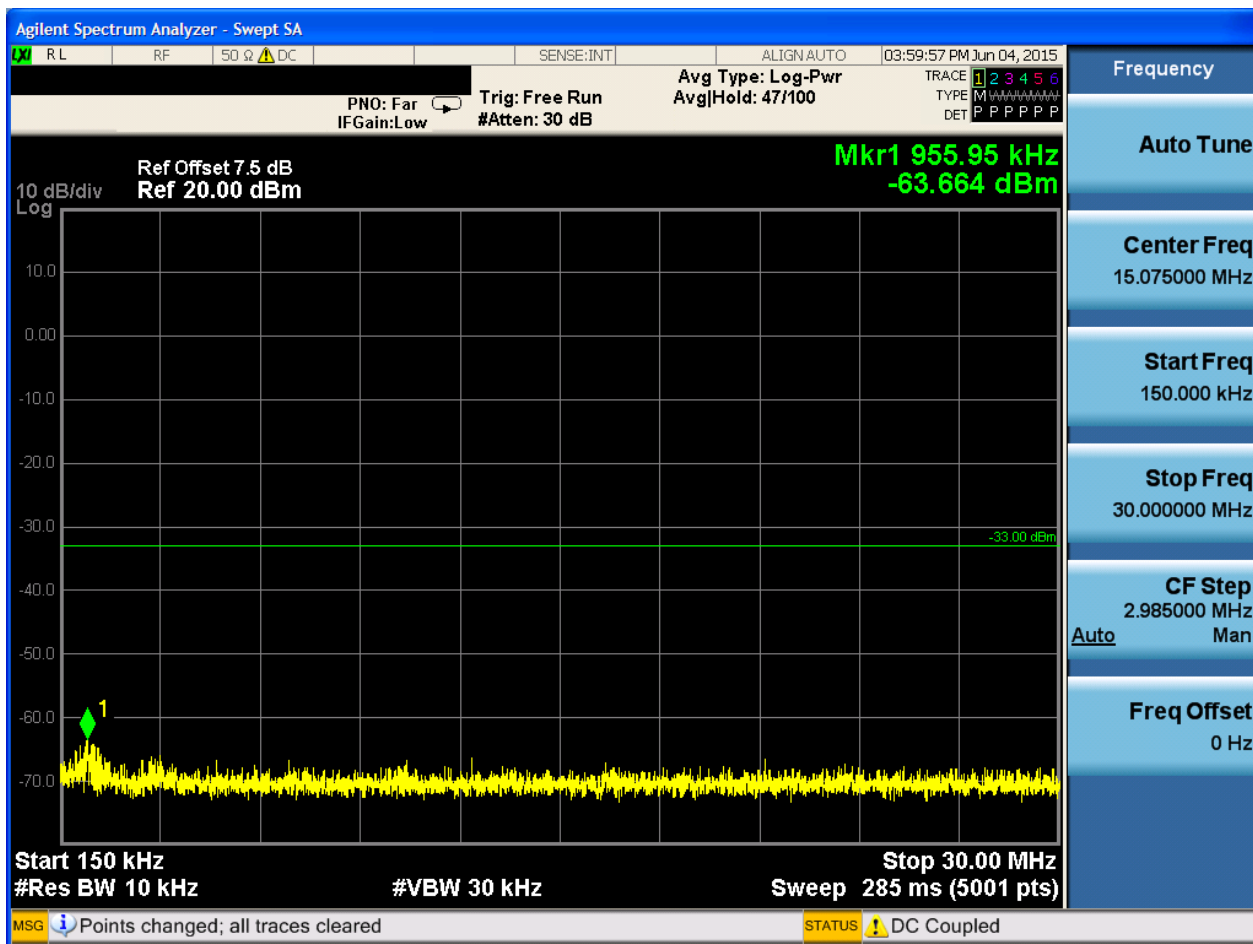


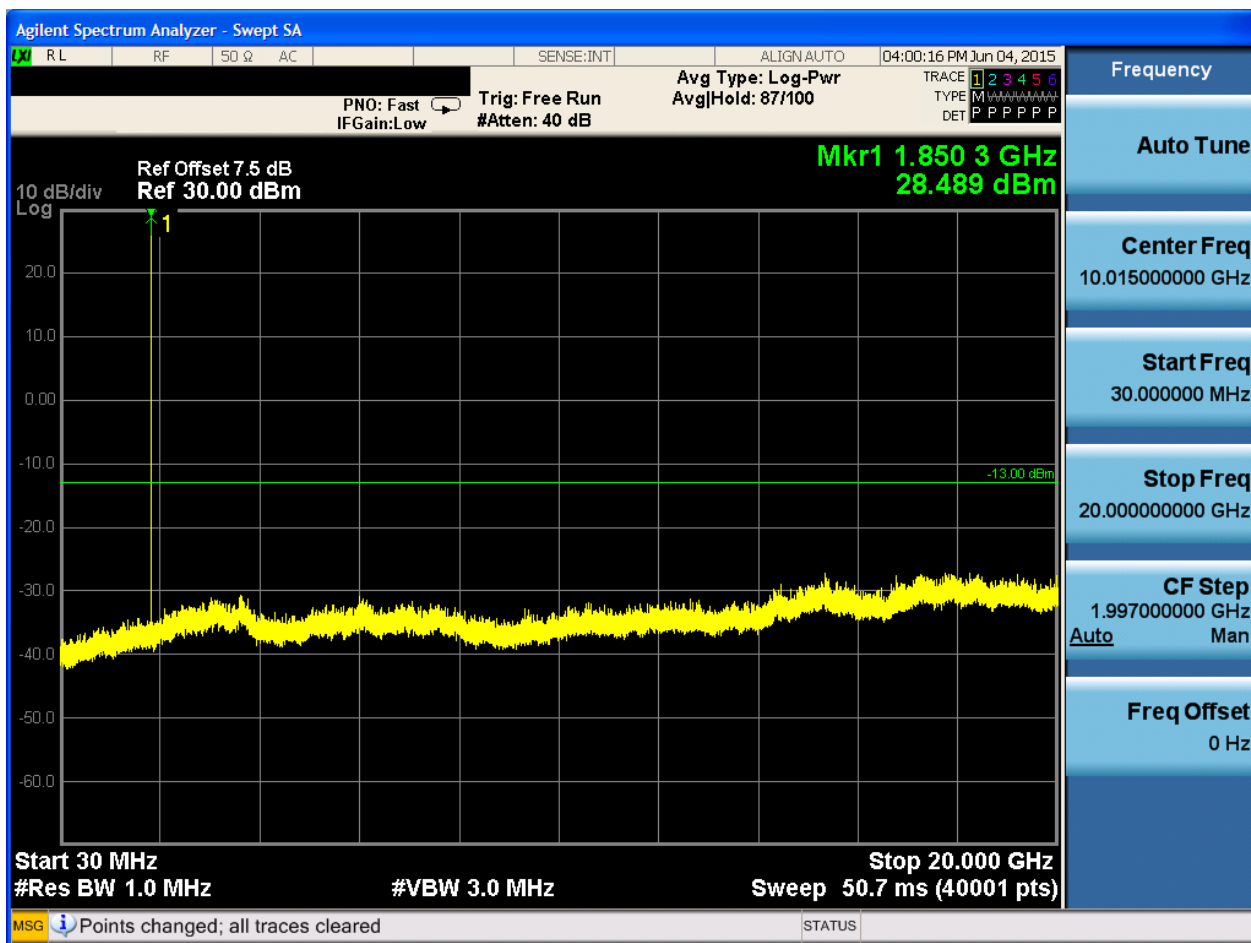


6.1.3.2 Test Mode = GSM/TM2

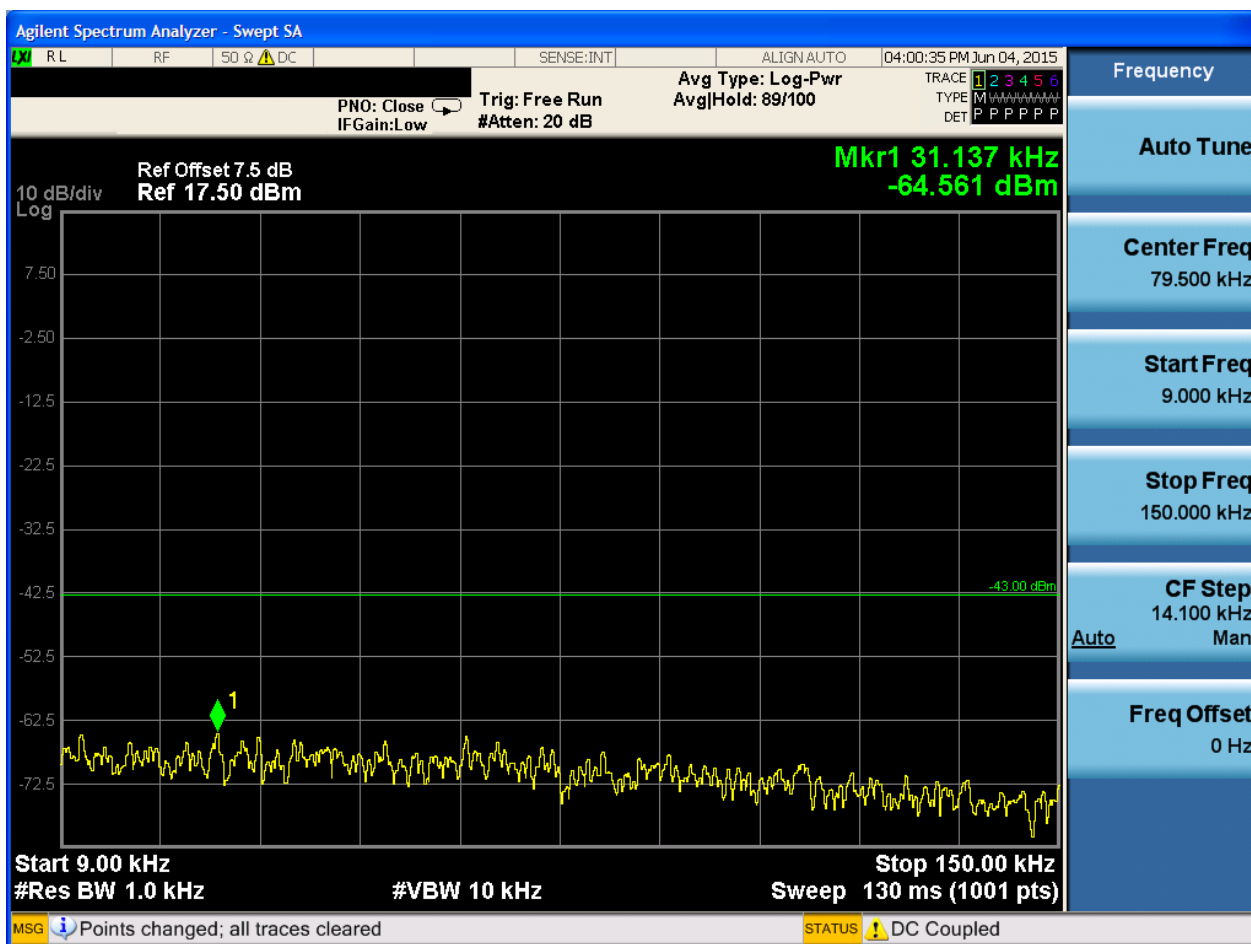
6.1.3.2.1 Test Channel = LCH

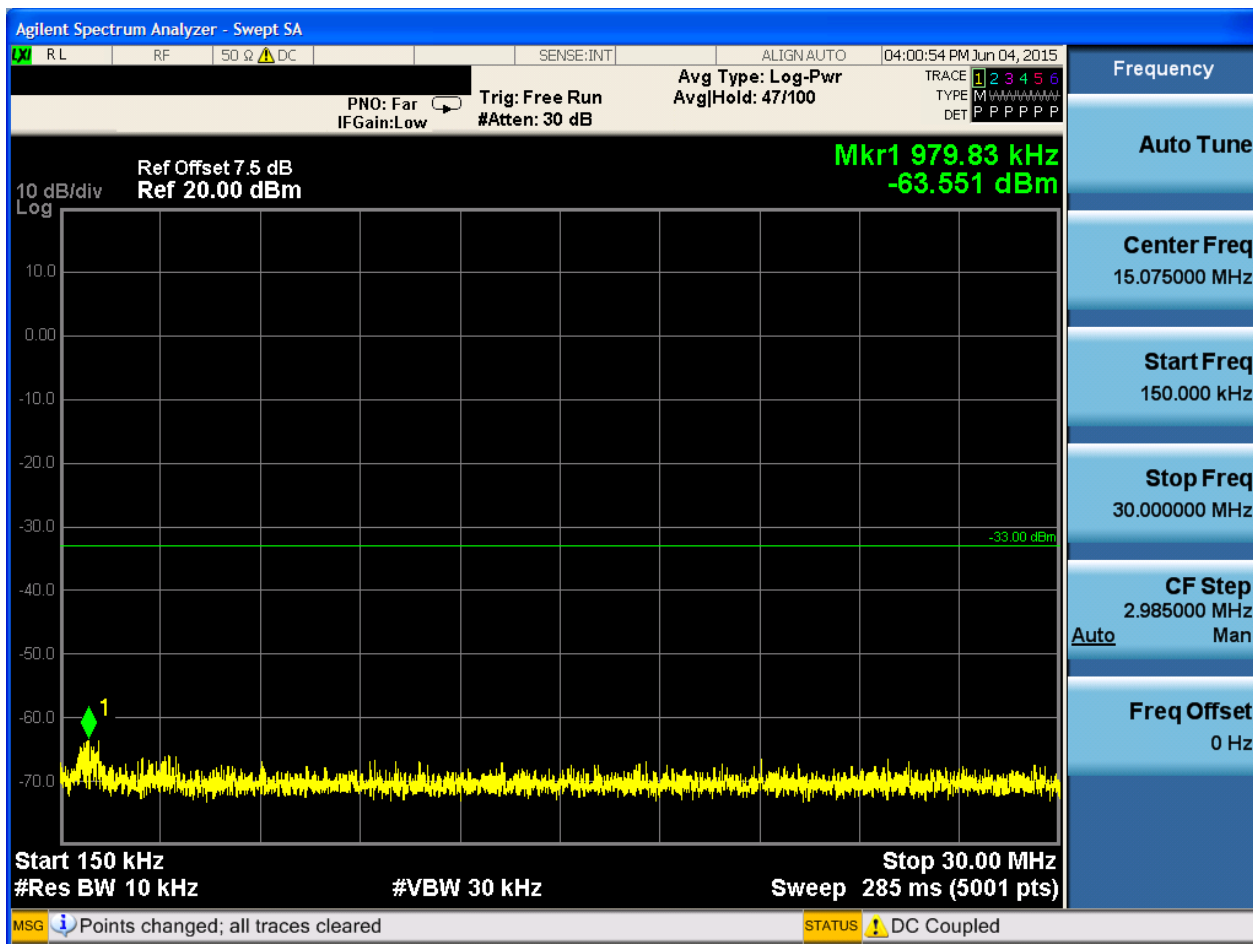


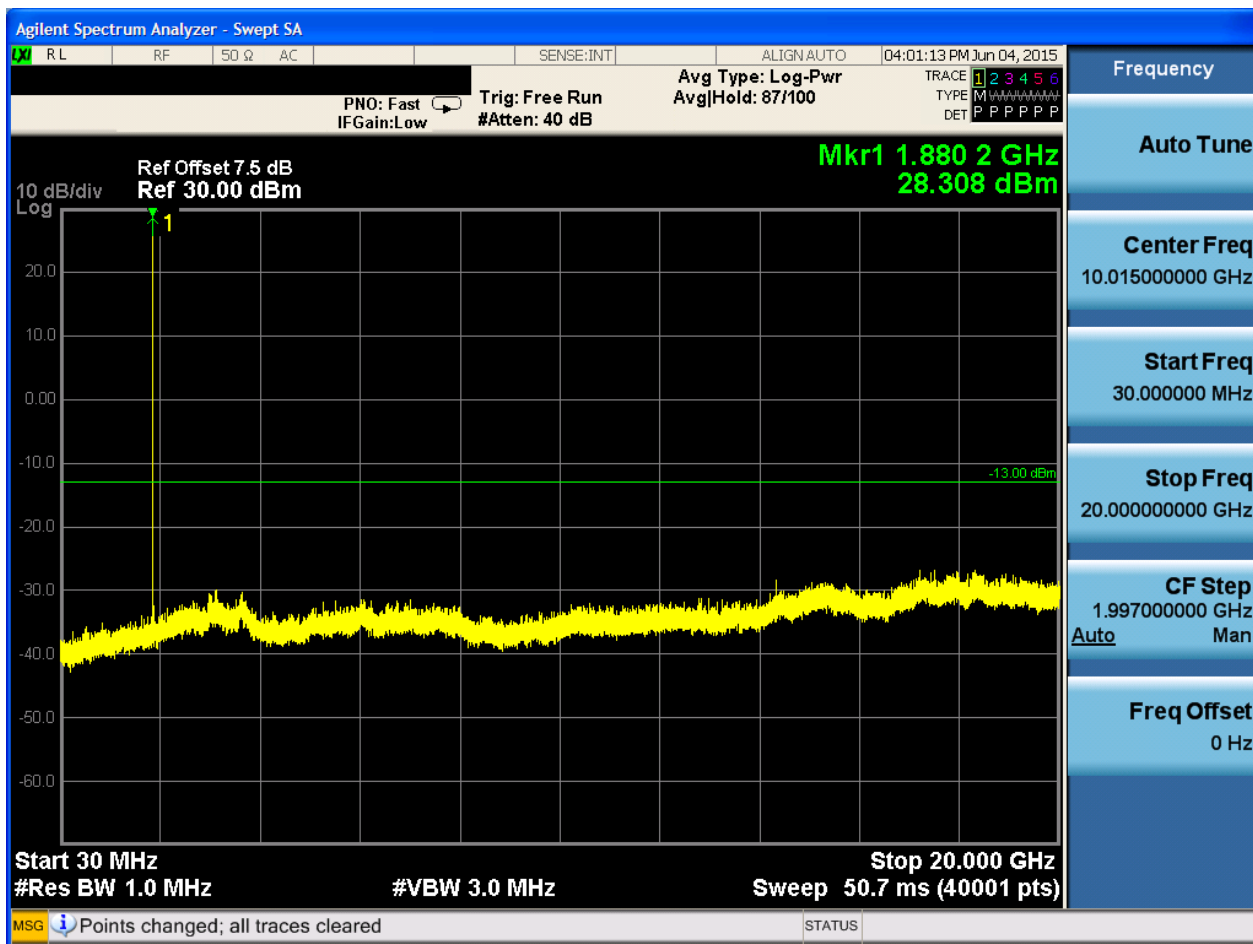




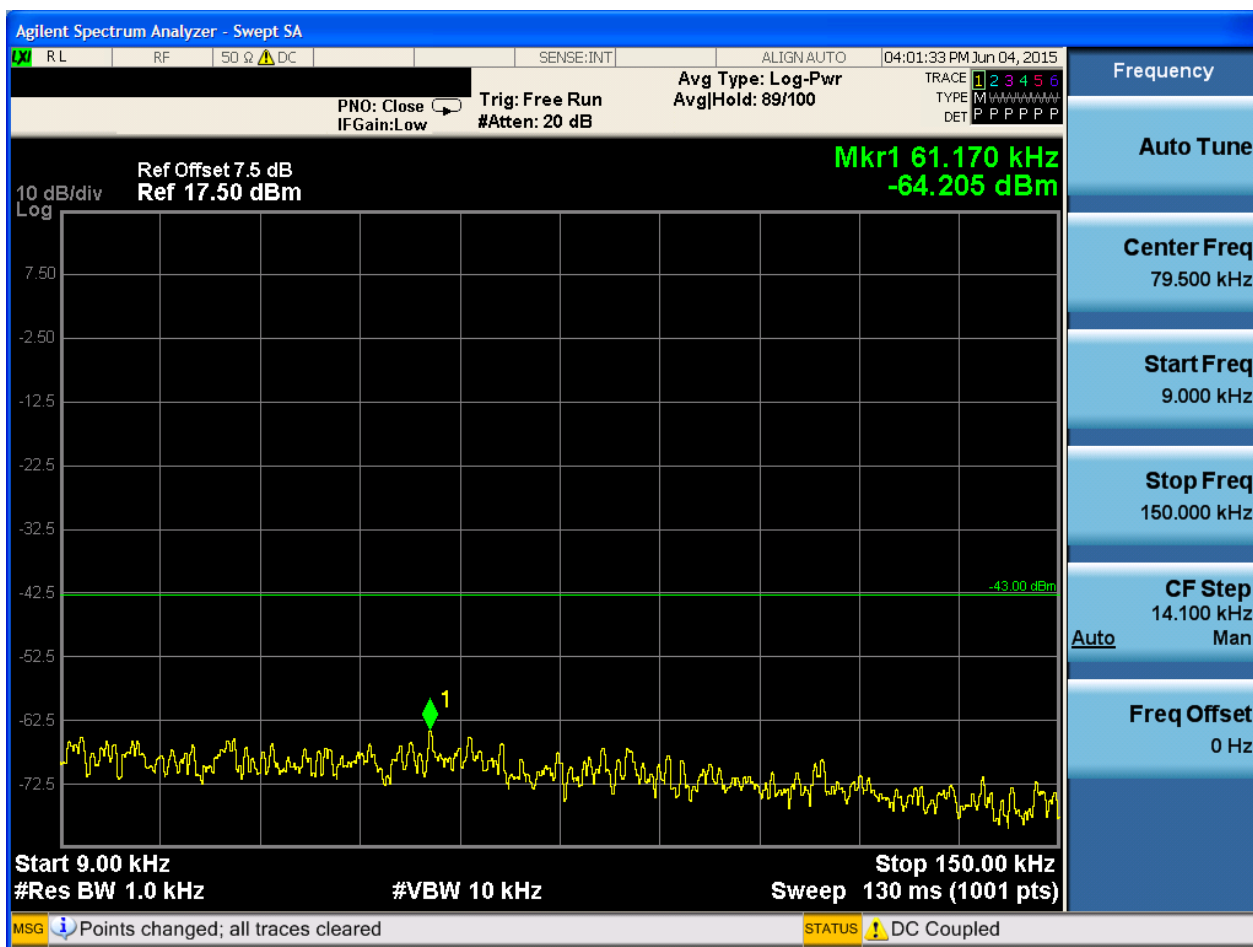
6.1.3.2.2 Test Channel = MCH

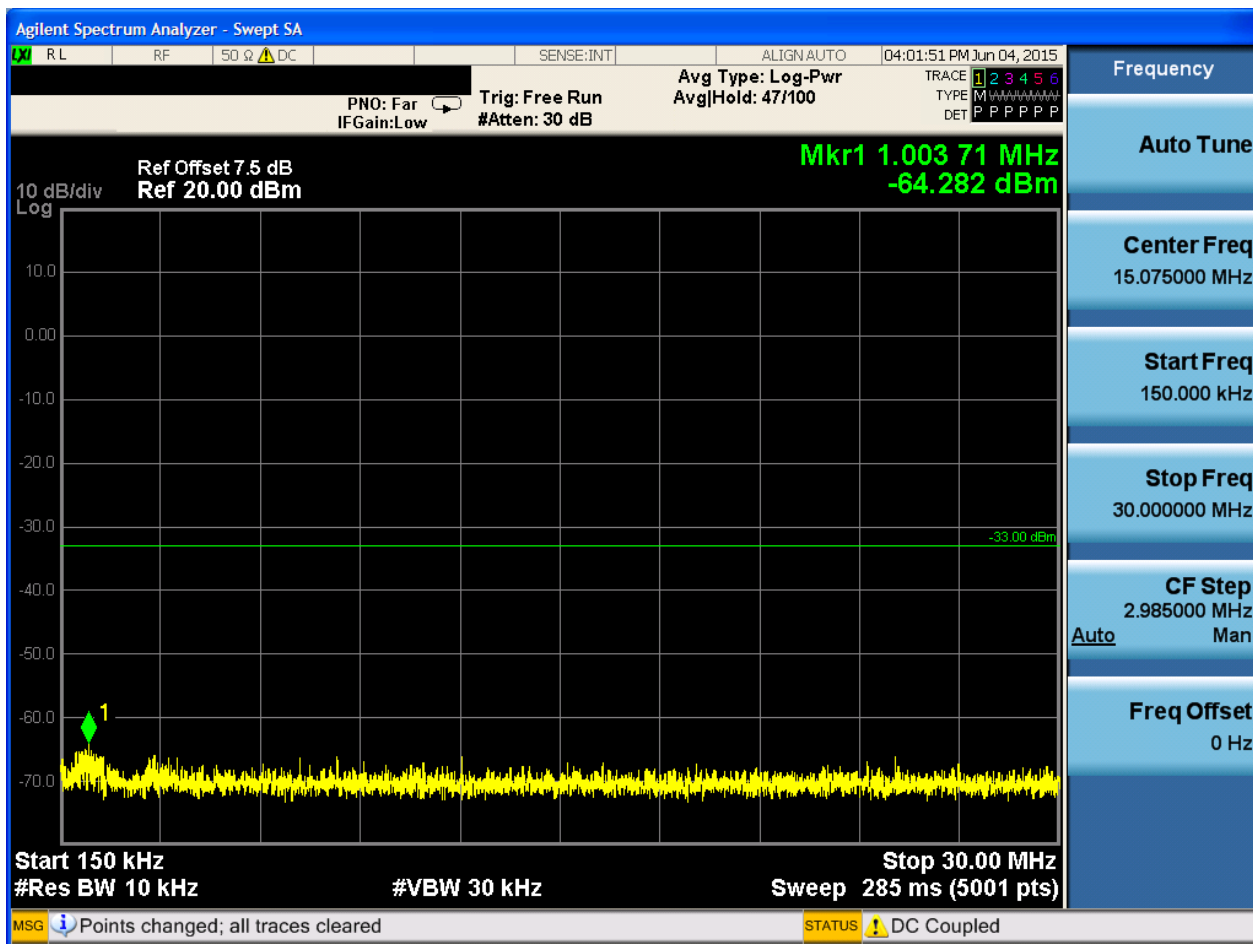


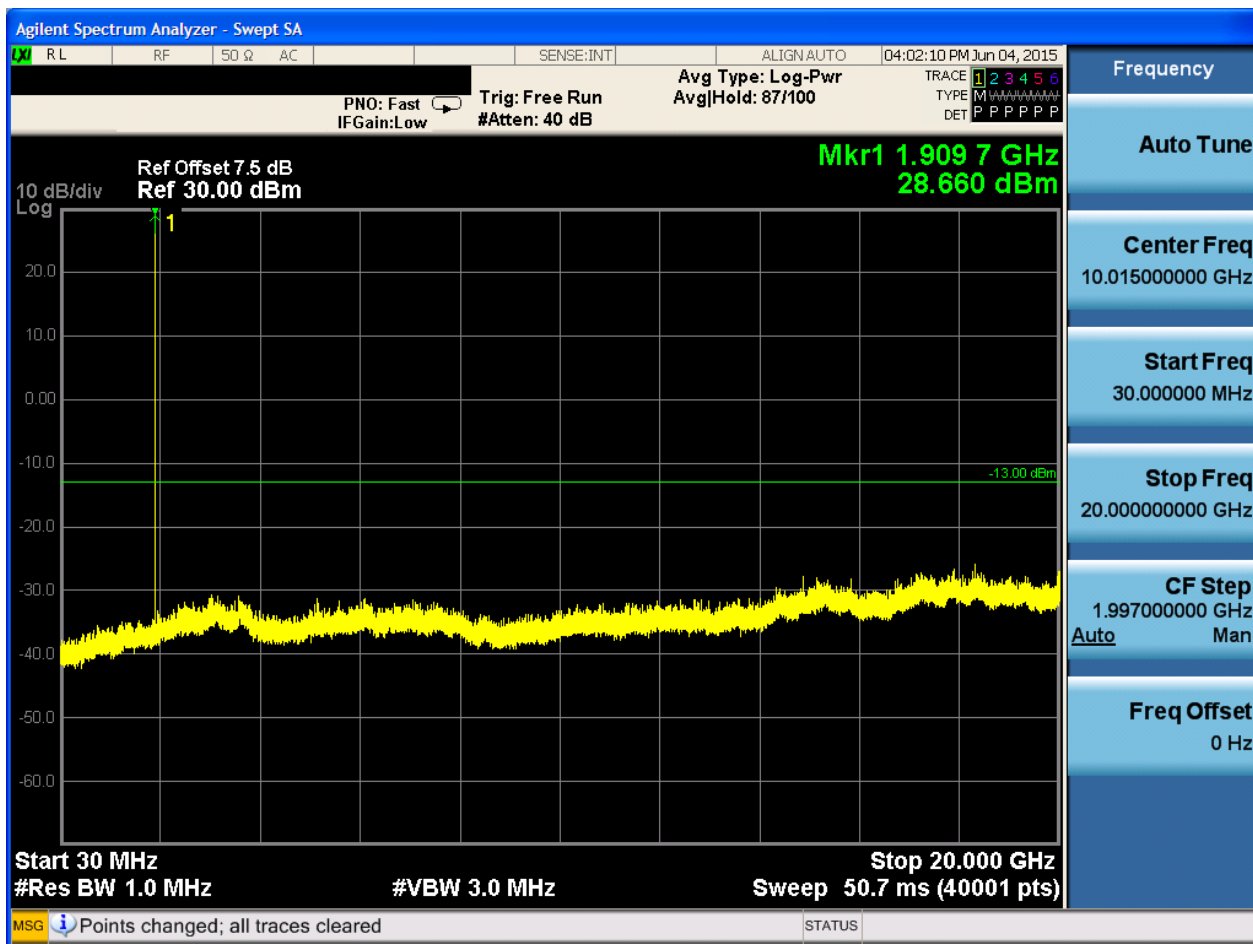




6.1.3.2.3 Test Channel = HCH



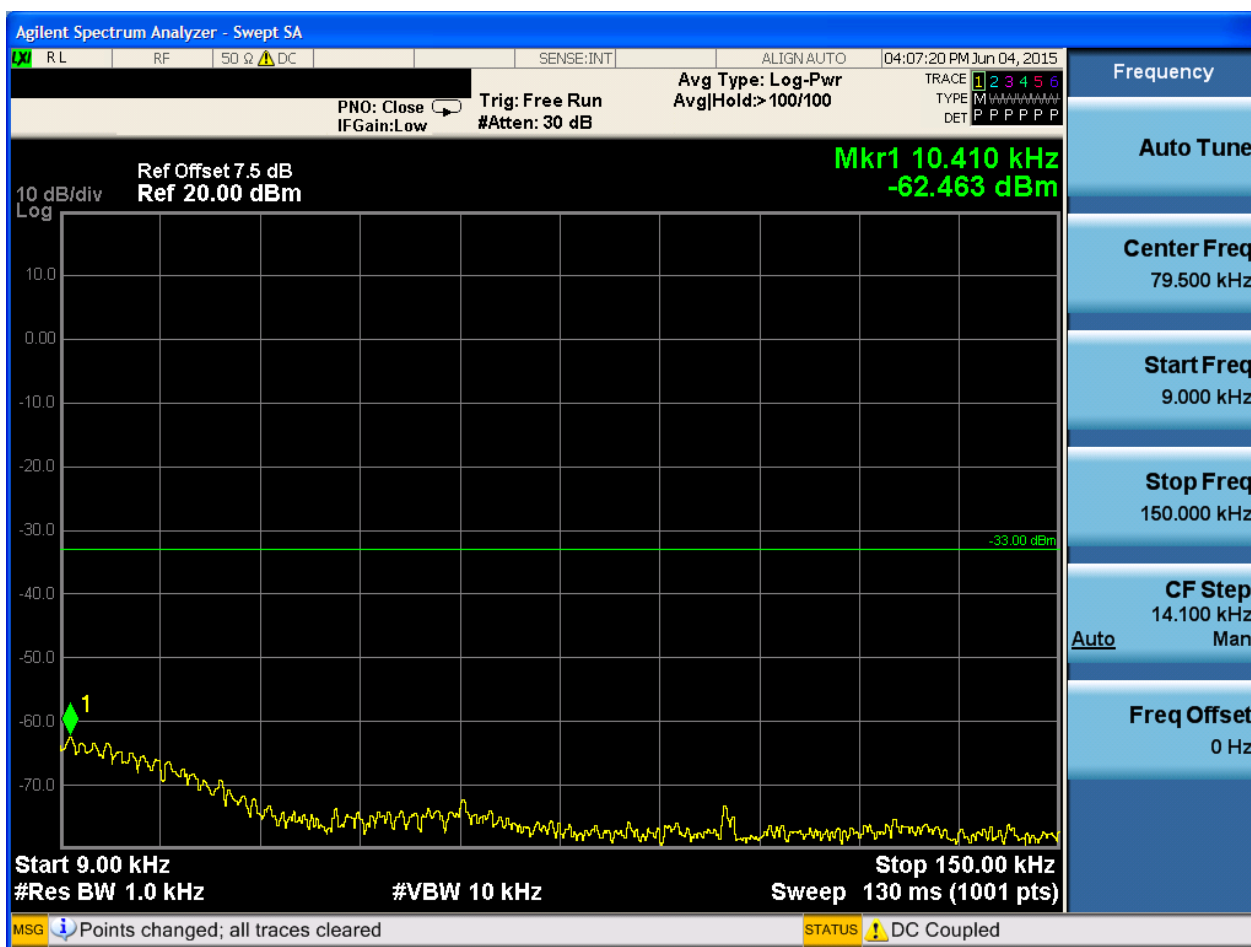


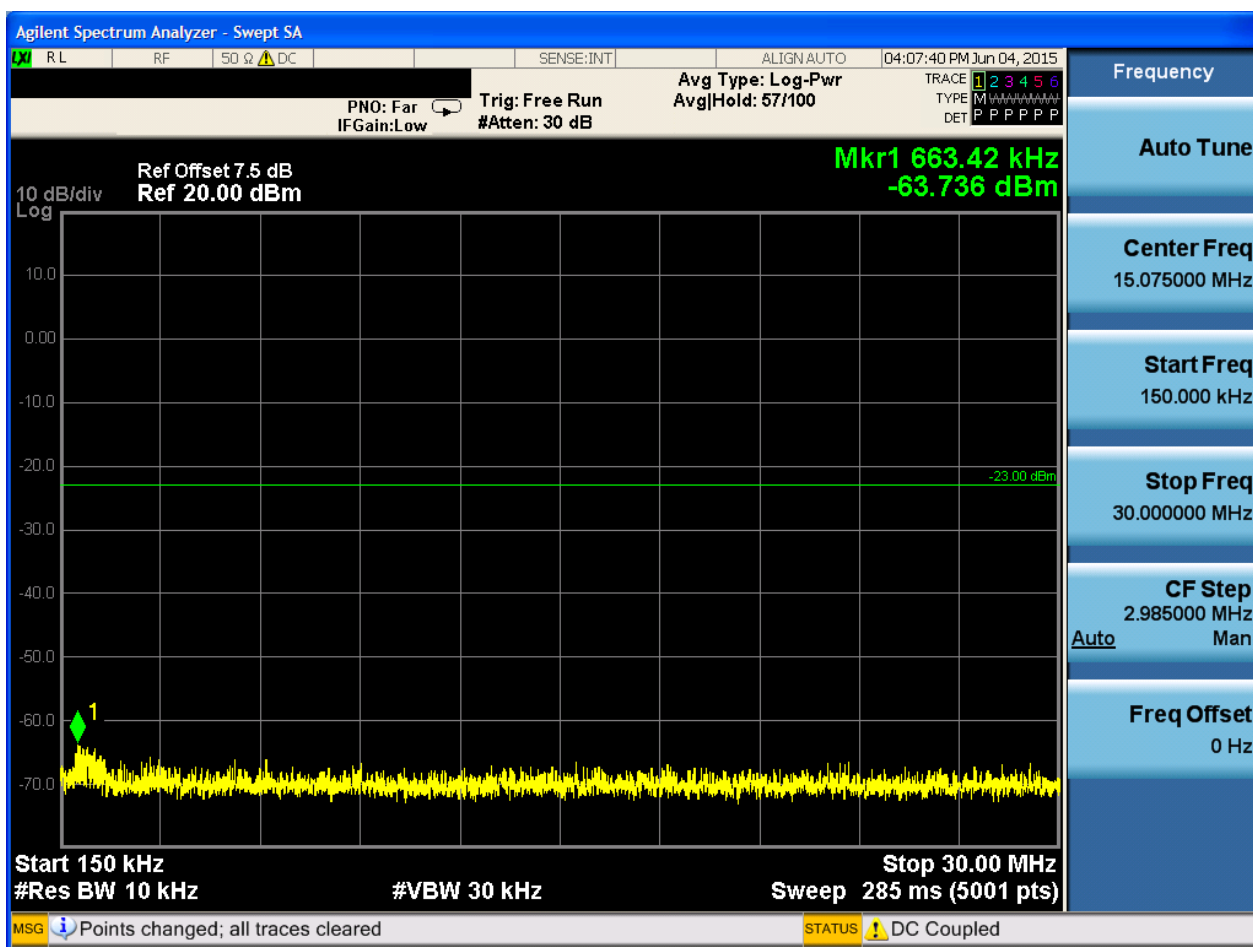


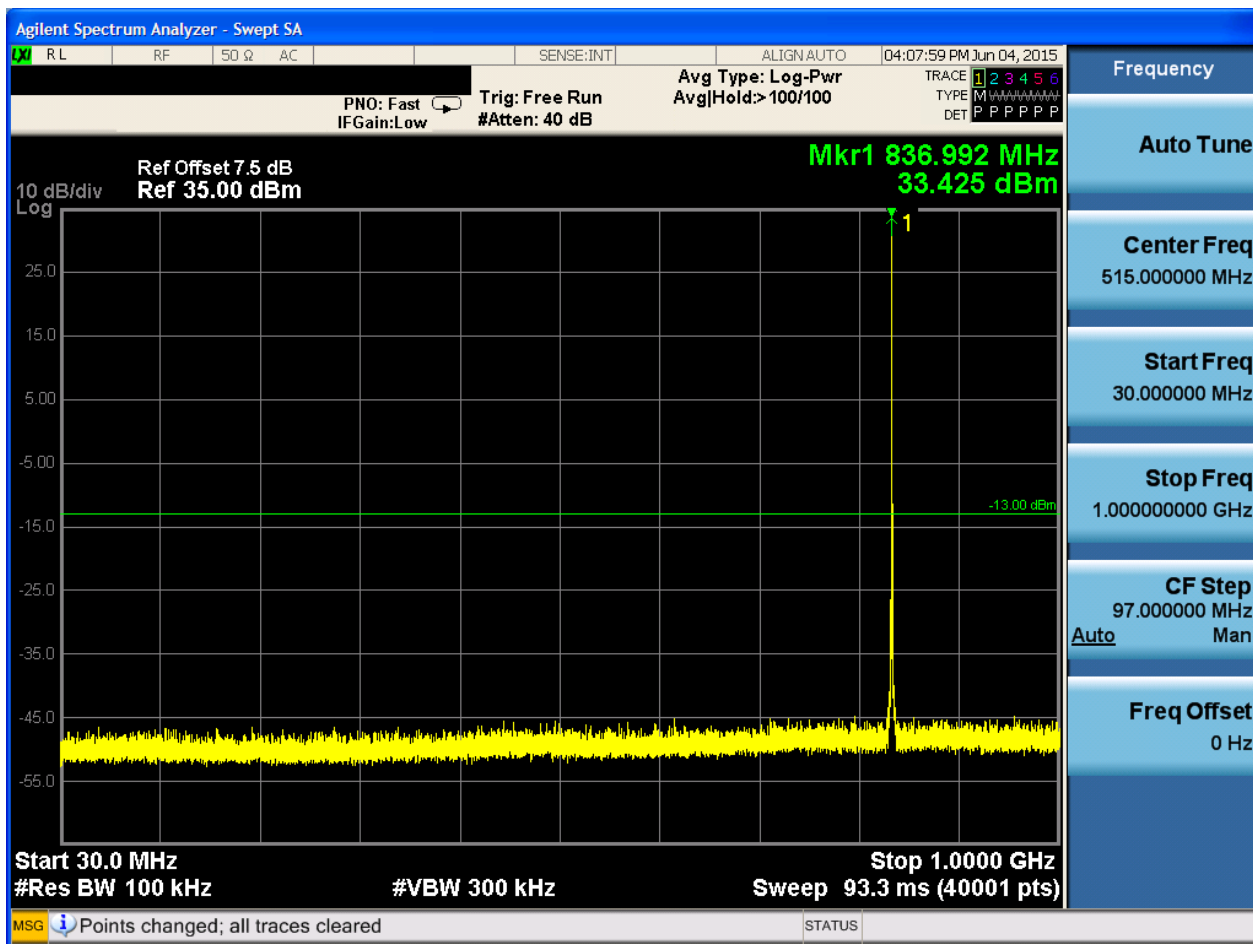
6.1.4 Test Band = GSM850

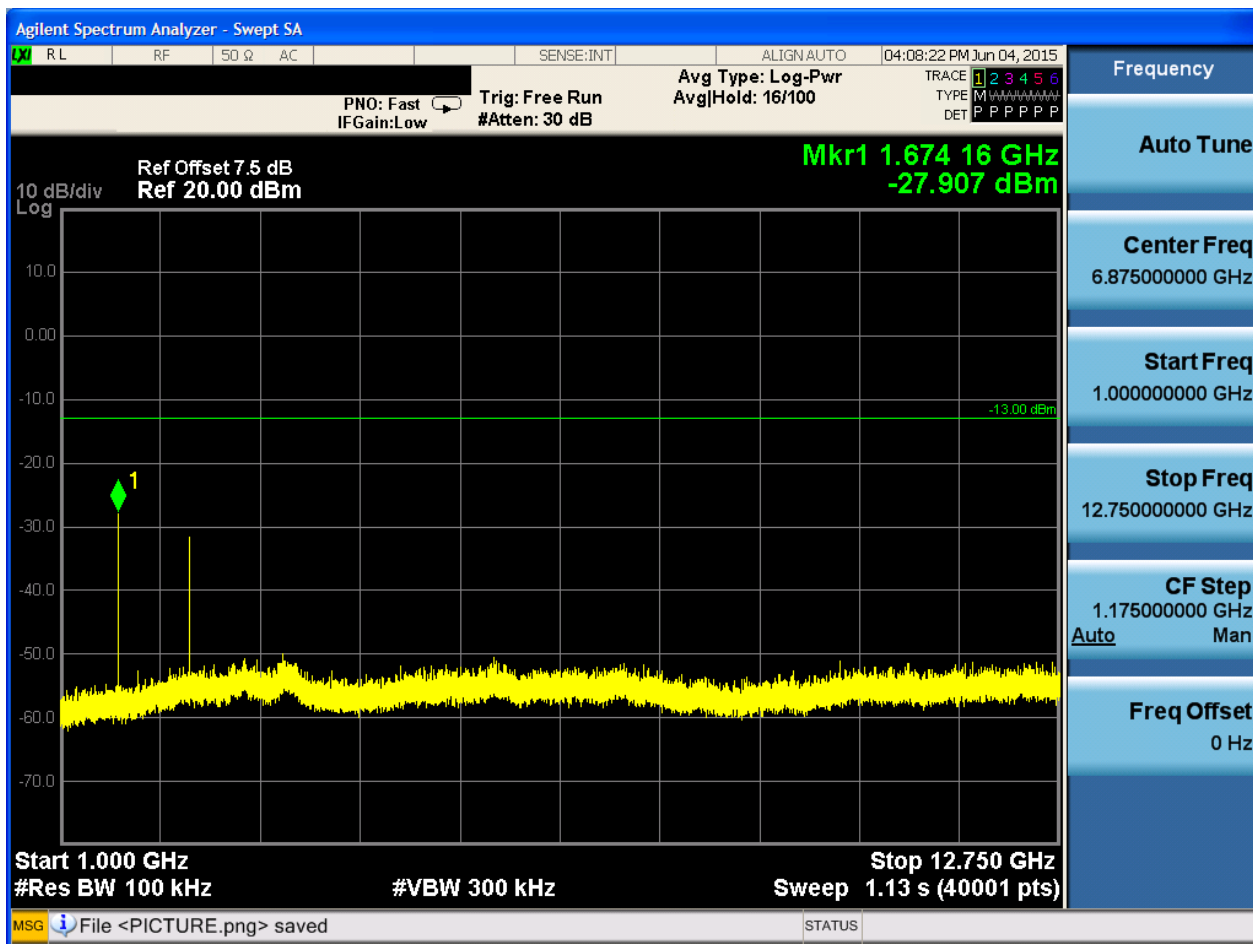
6.1.4.1 Test Mode = GSM/TM1

6.1.4.1.1 Test Channel = LCH

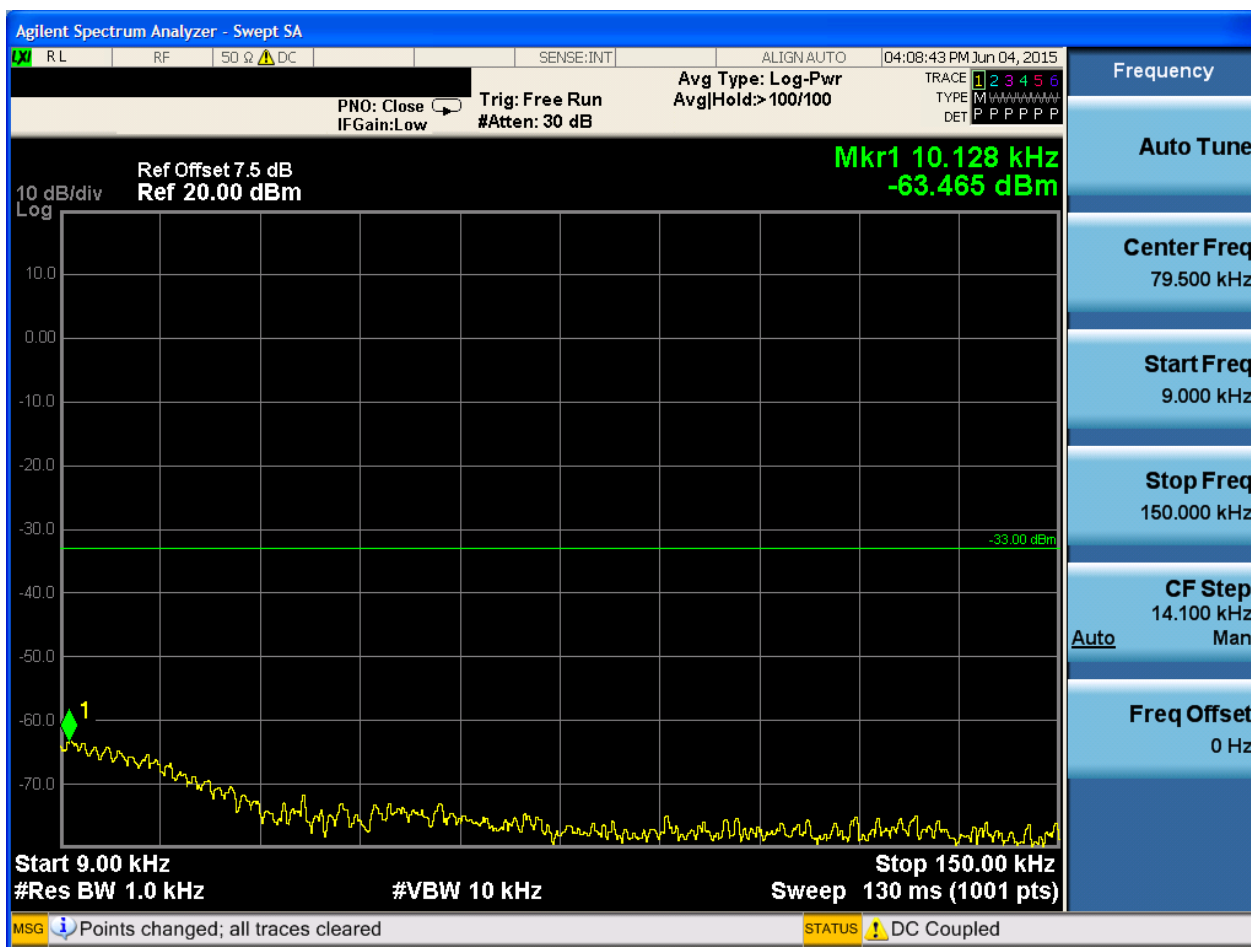


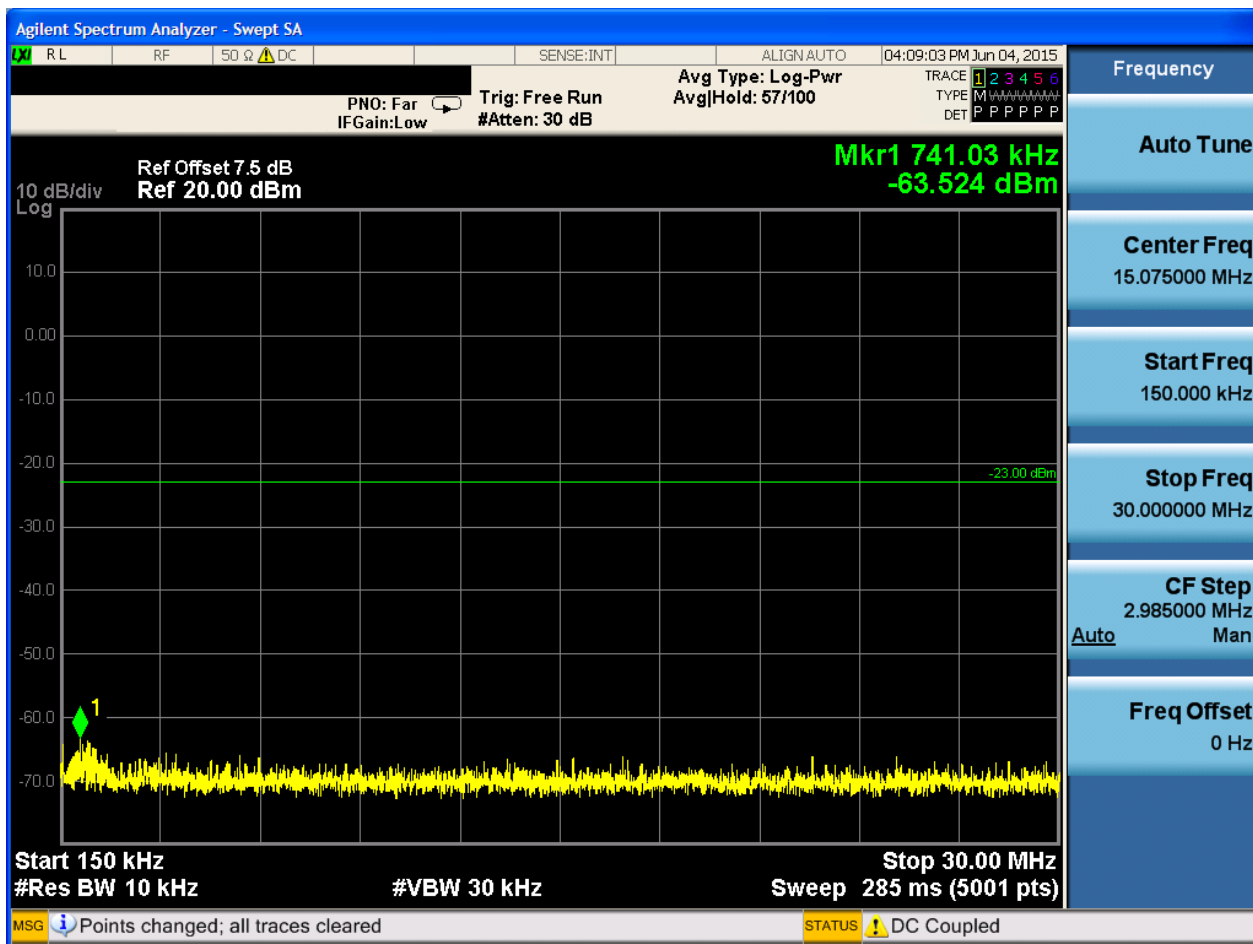


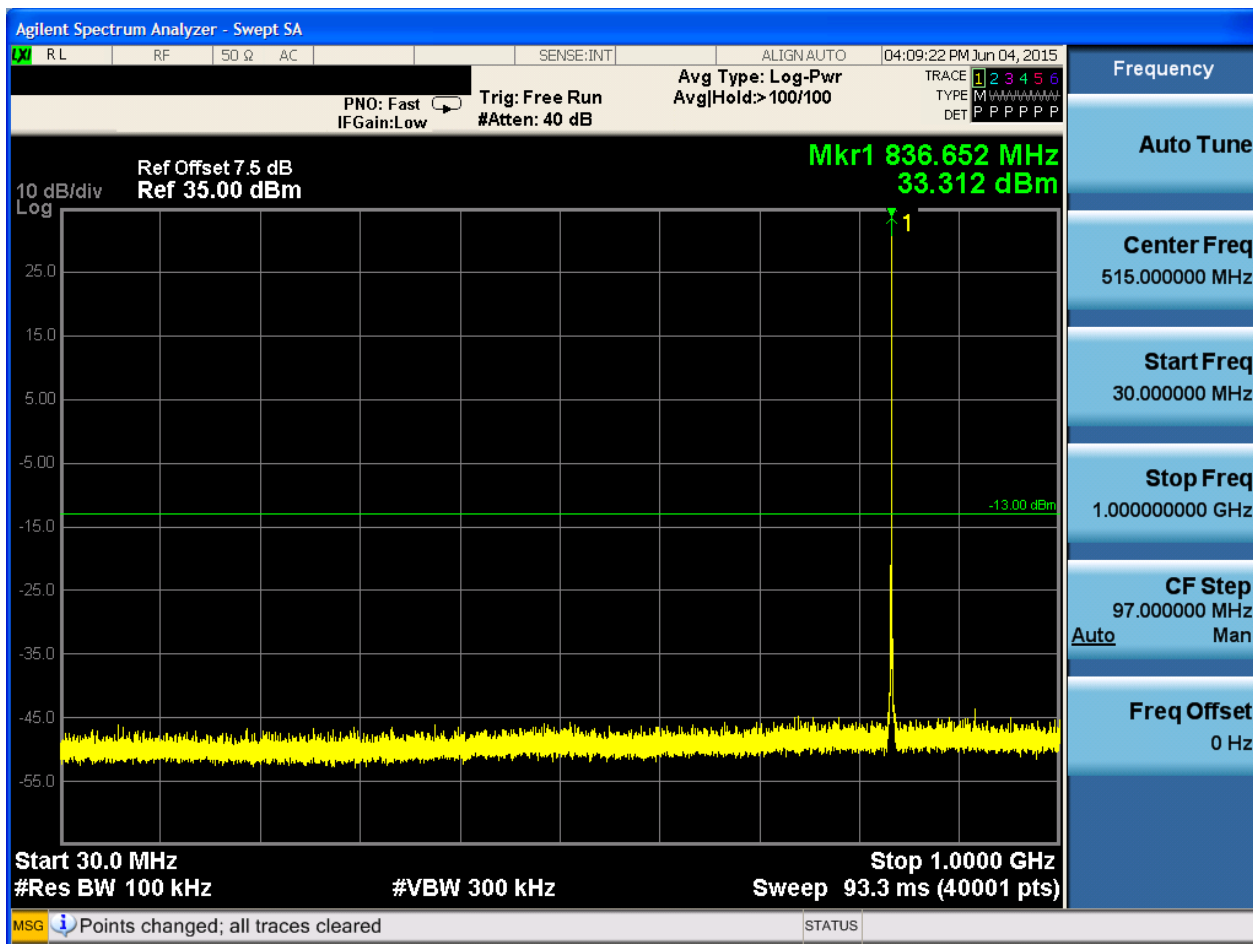


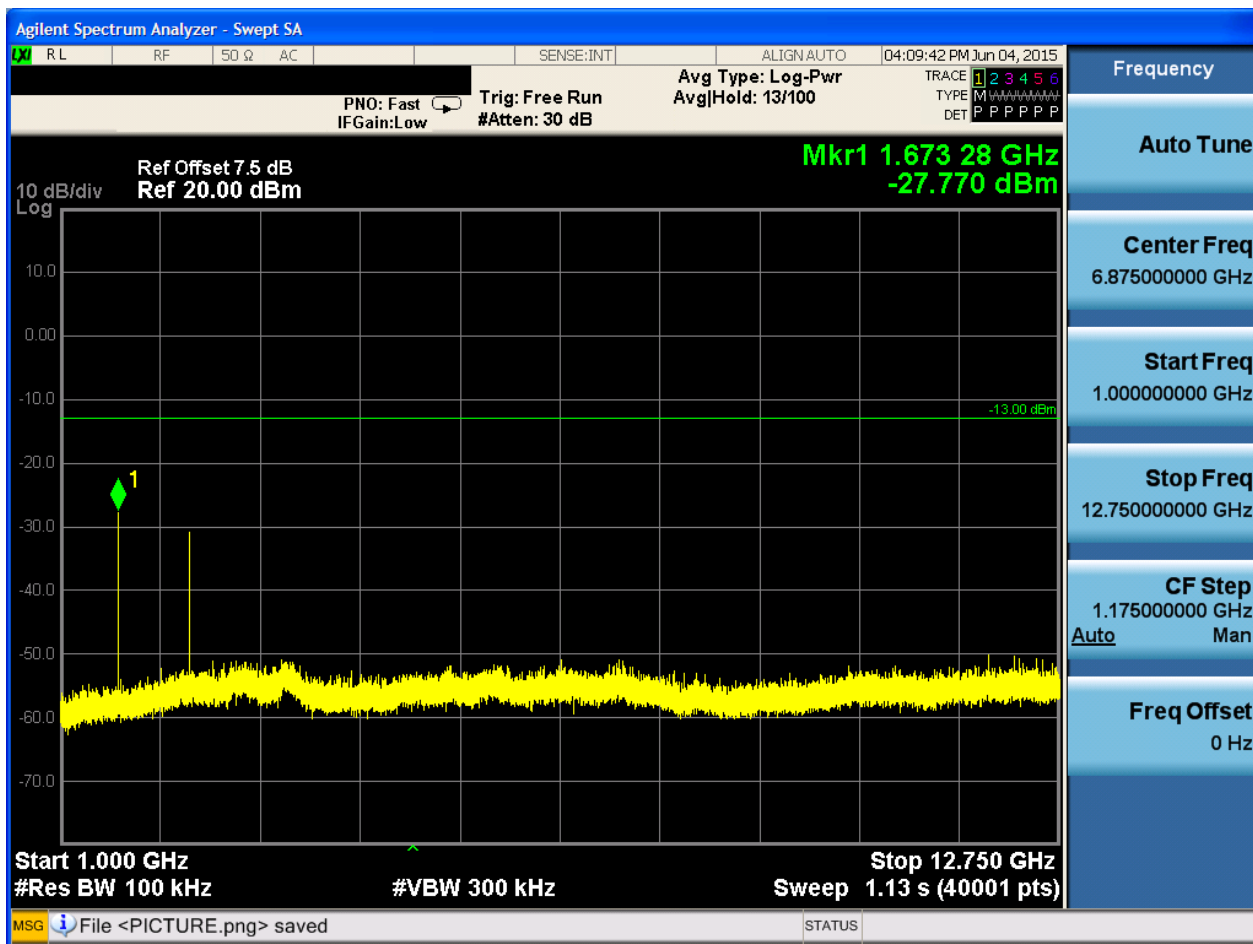


6.1.4.1.2 Test Channel = MCH

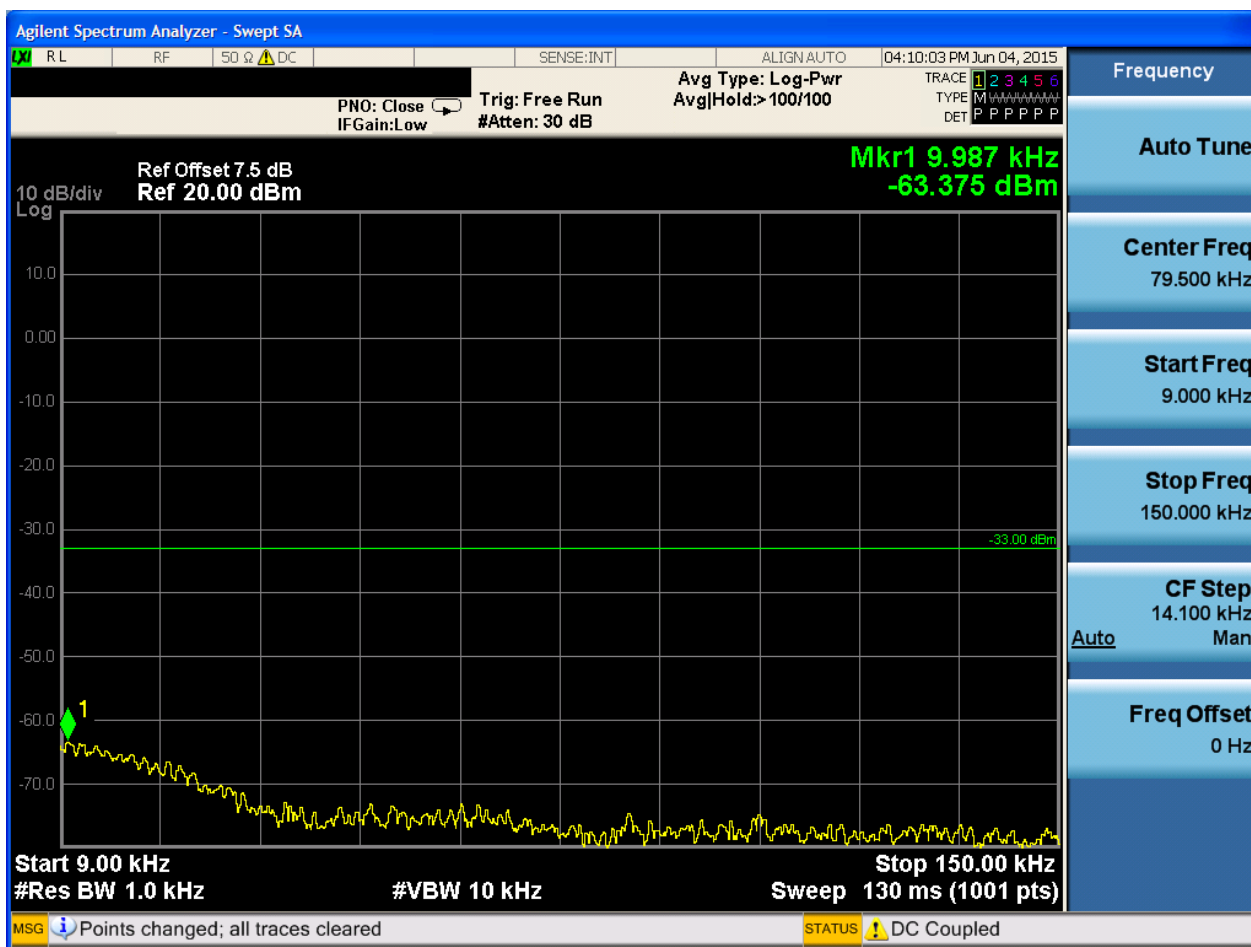


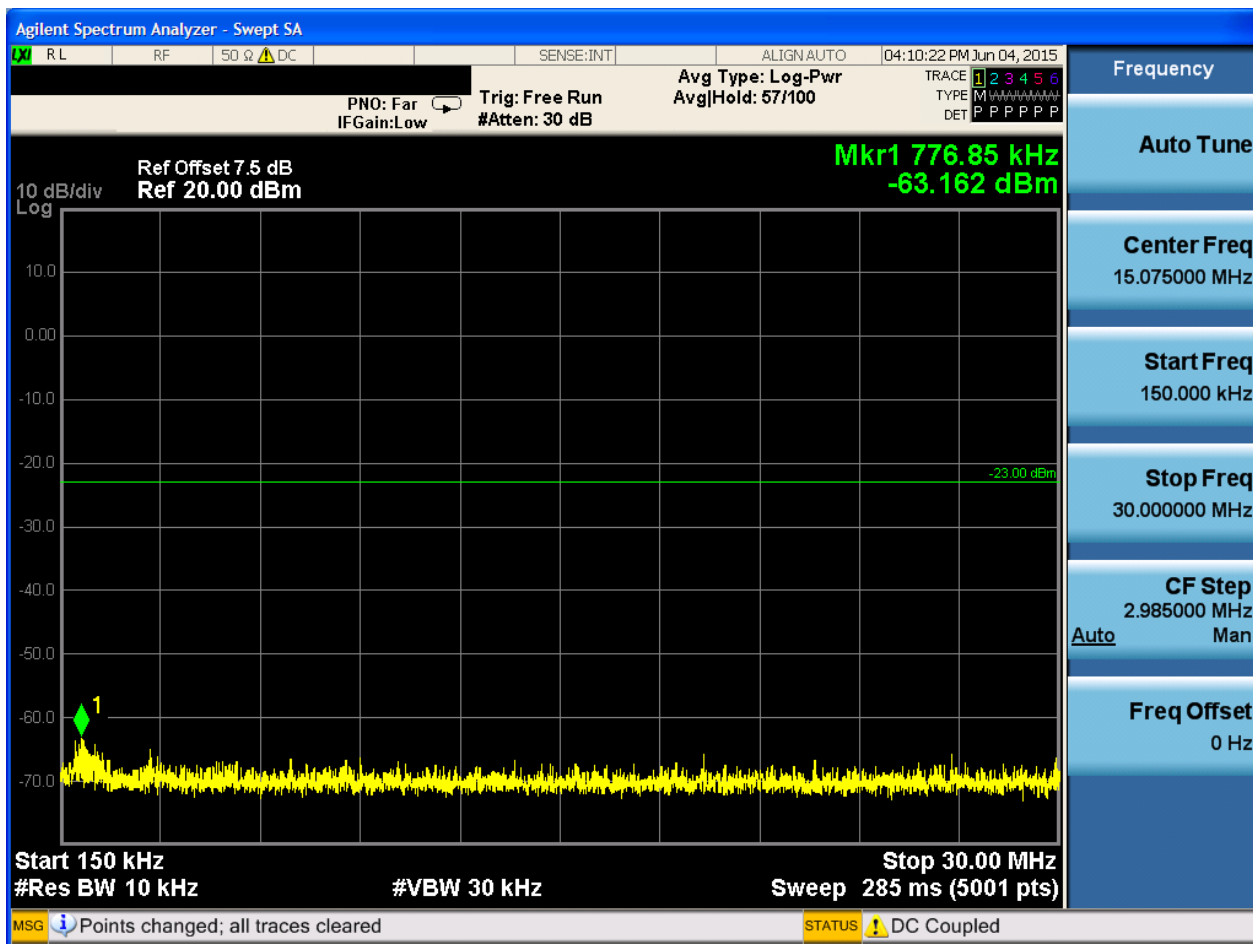


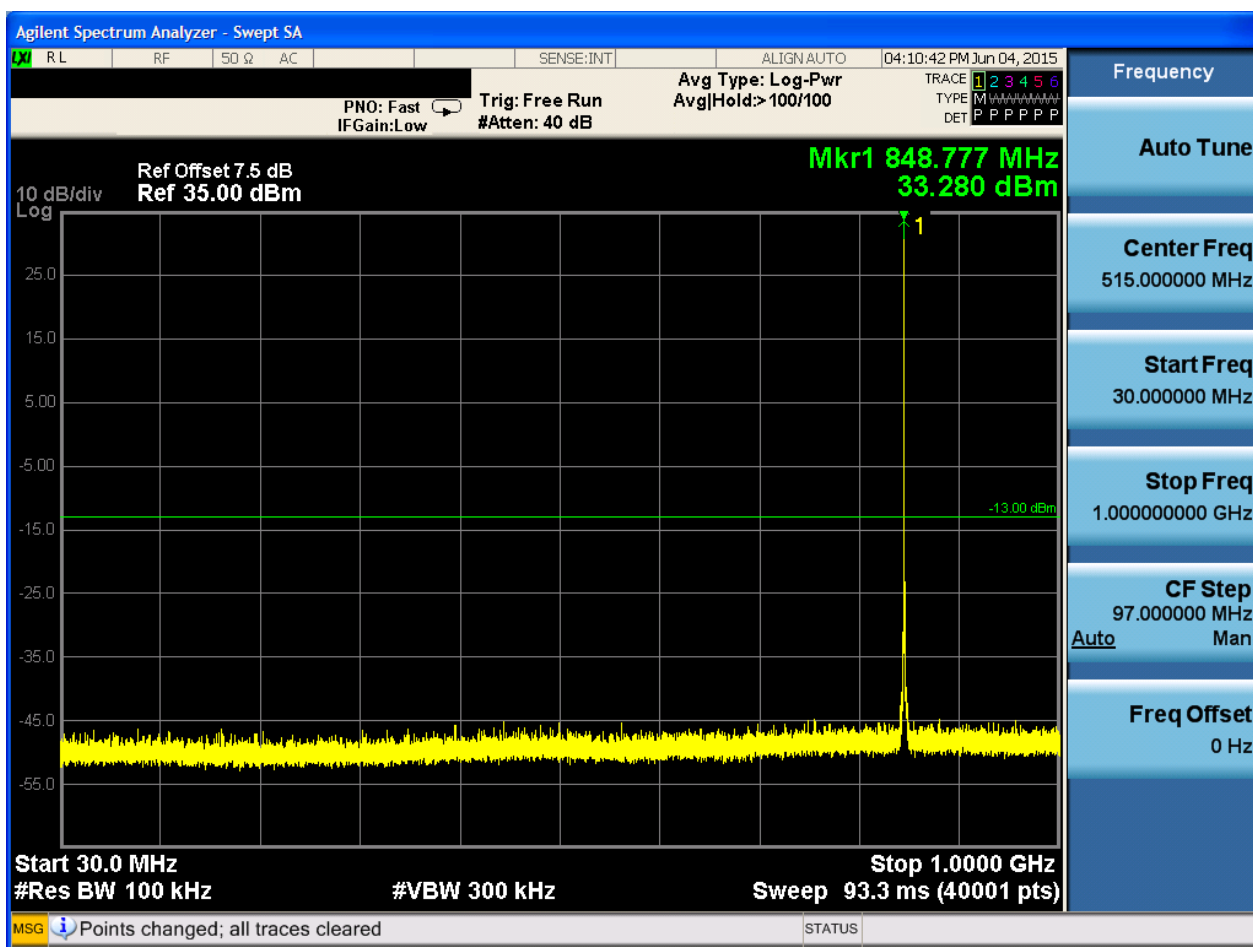


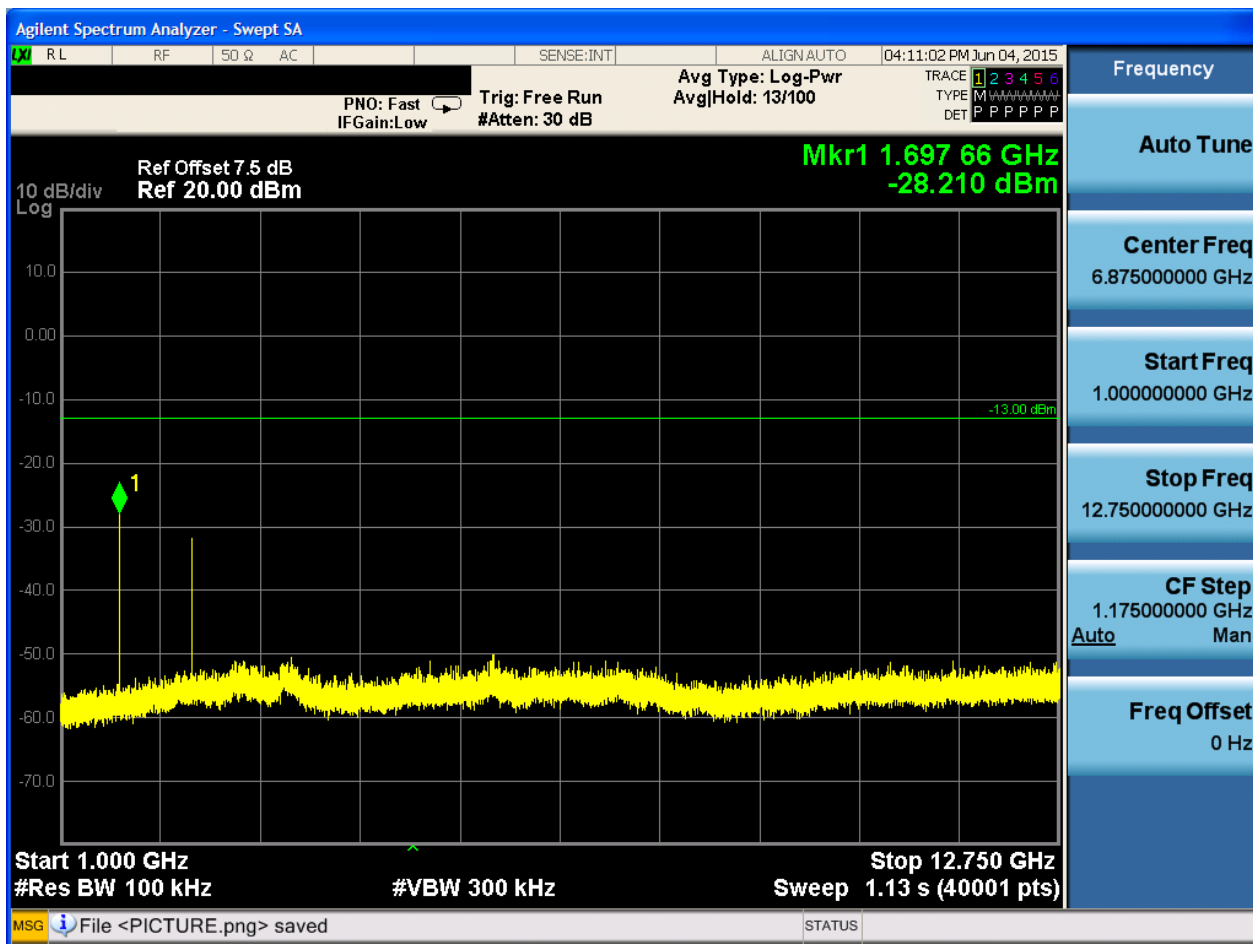


6.1.4.1.3 Test Channel = HCH



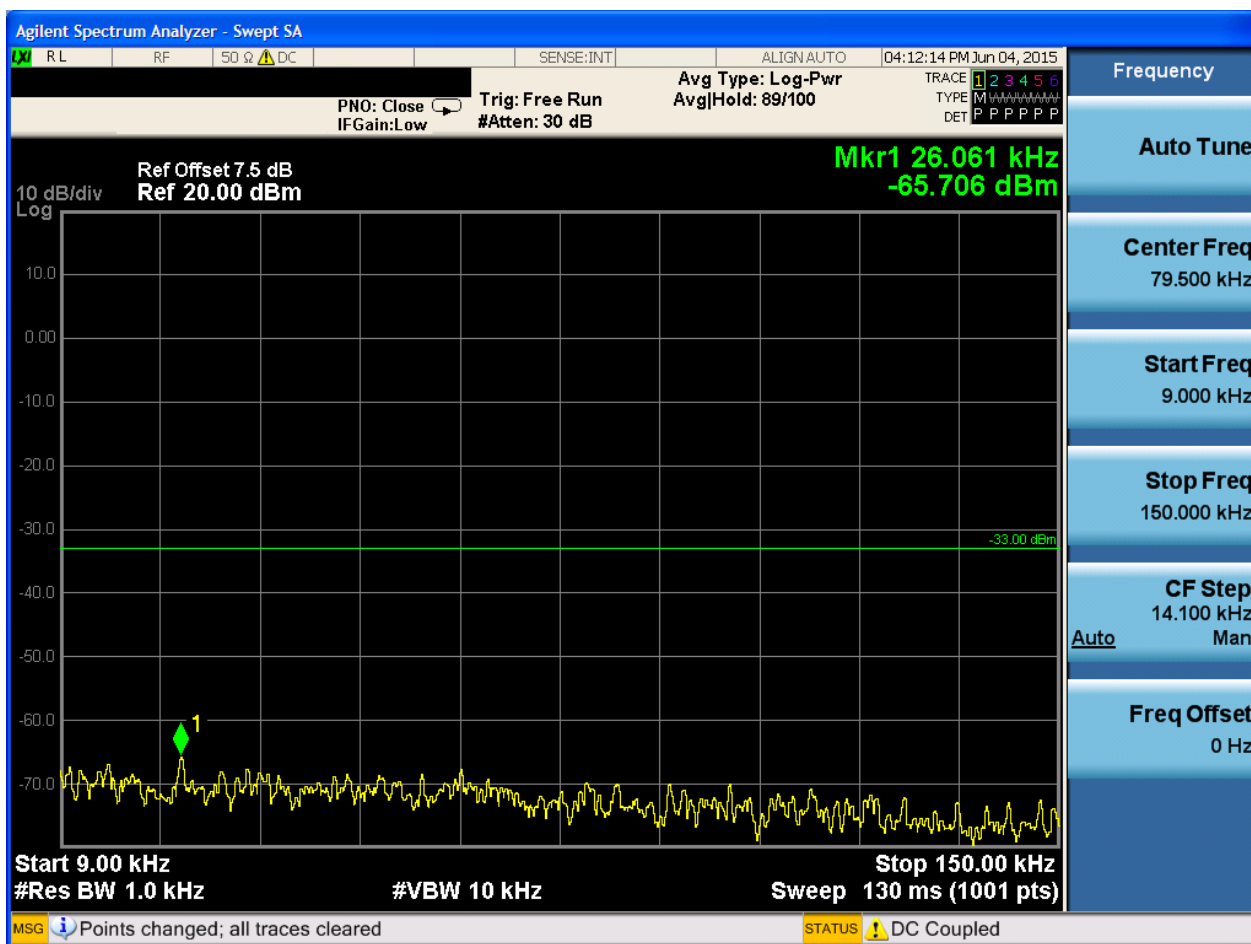


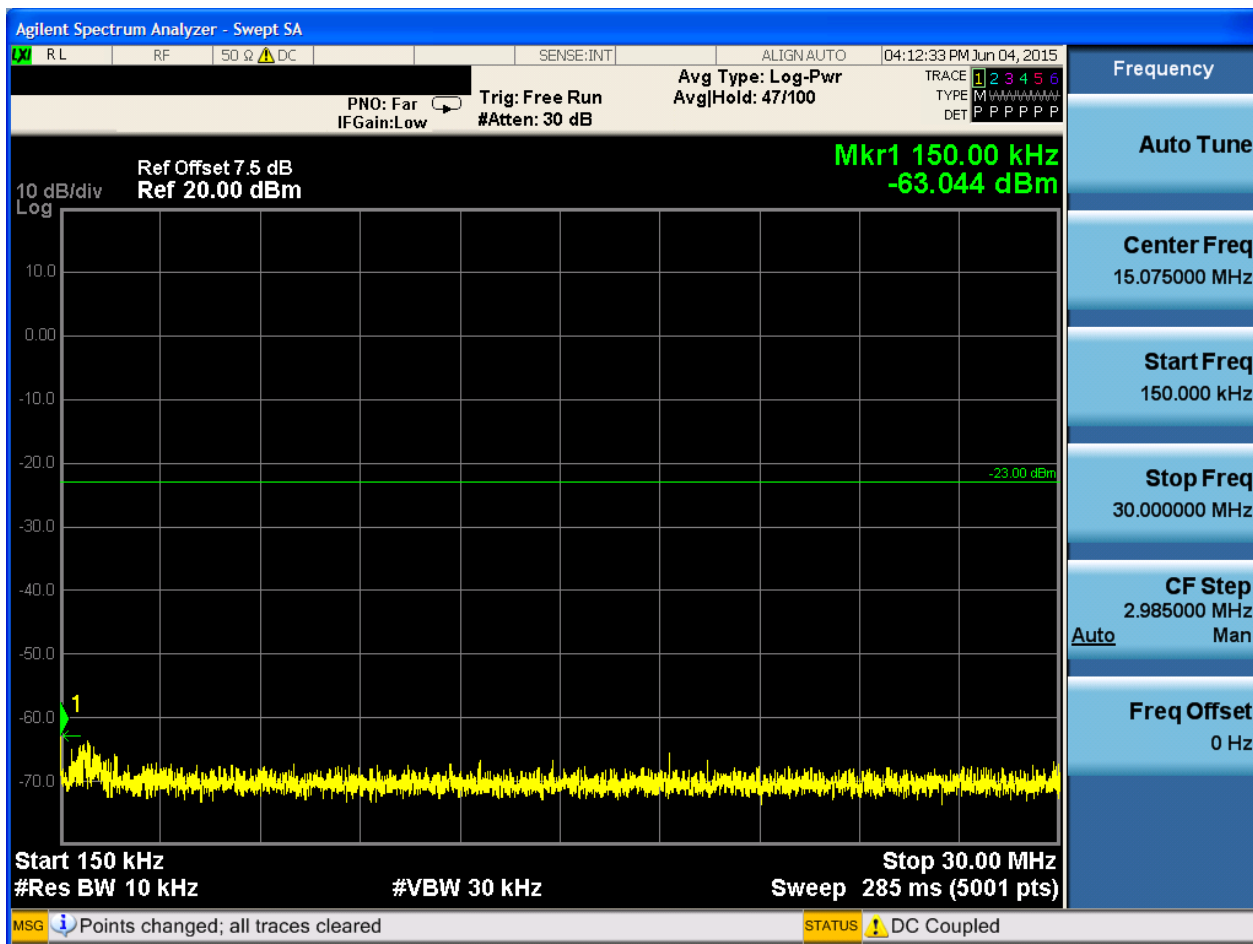


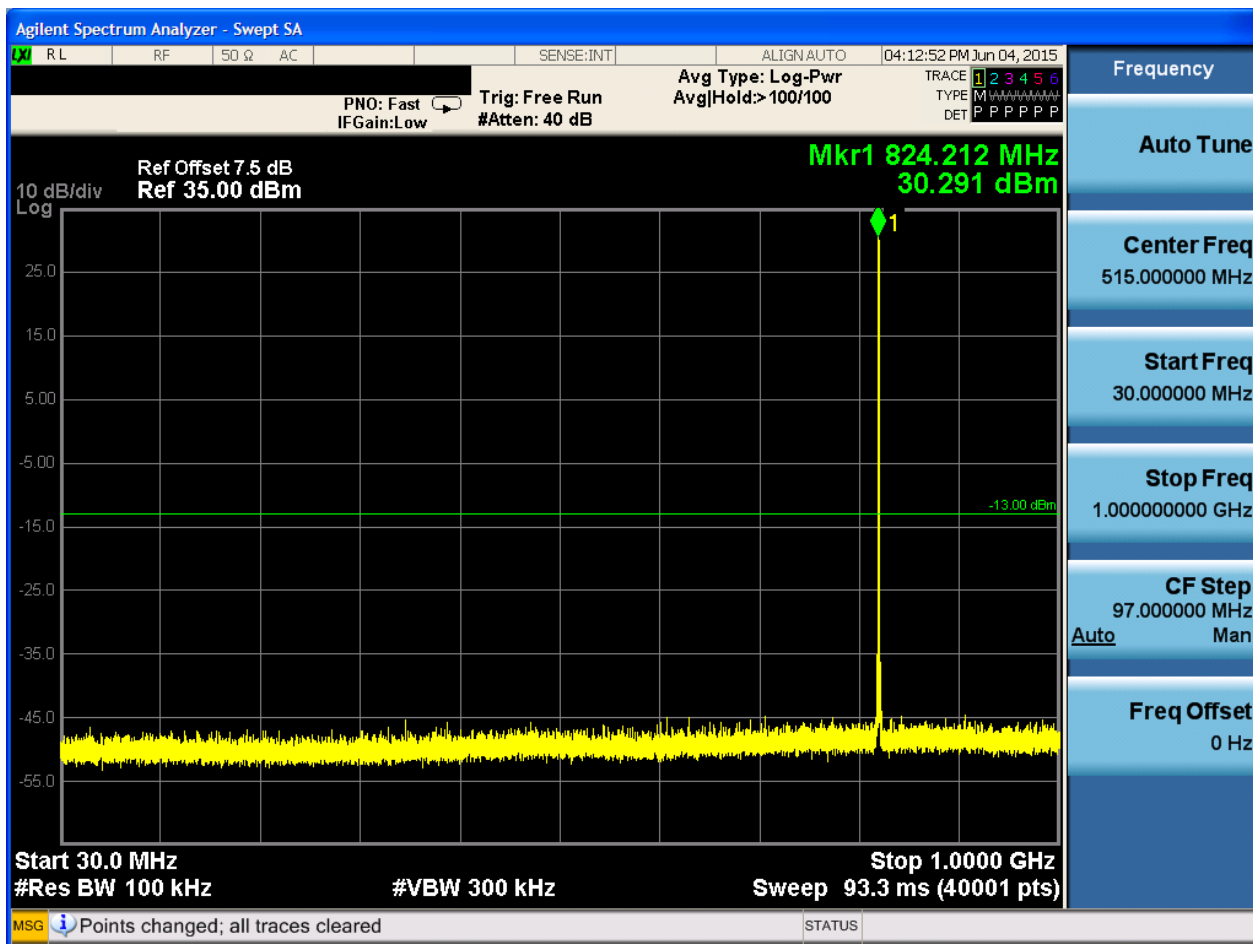


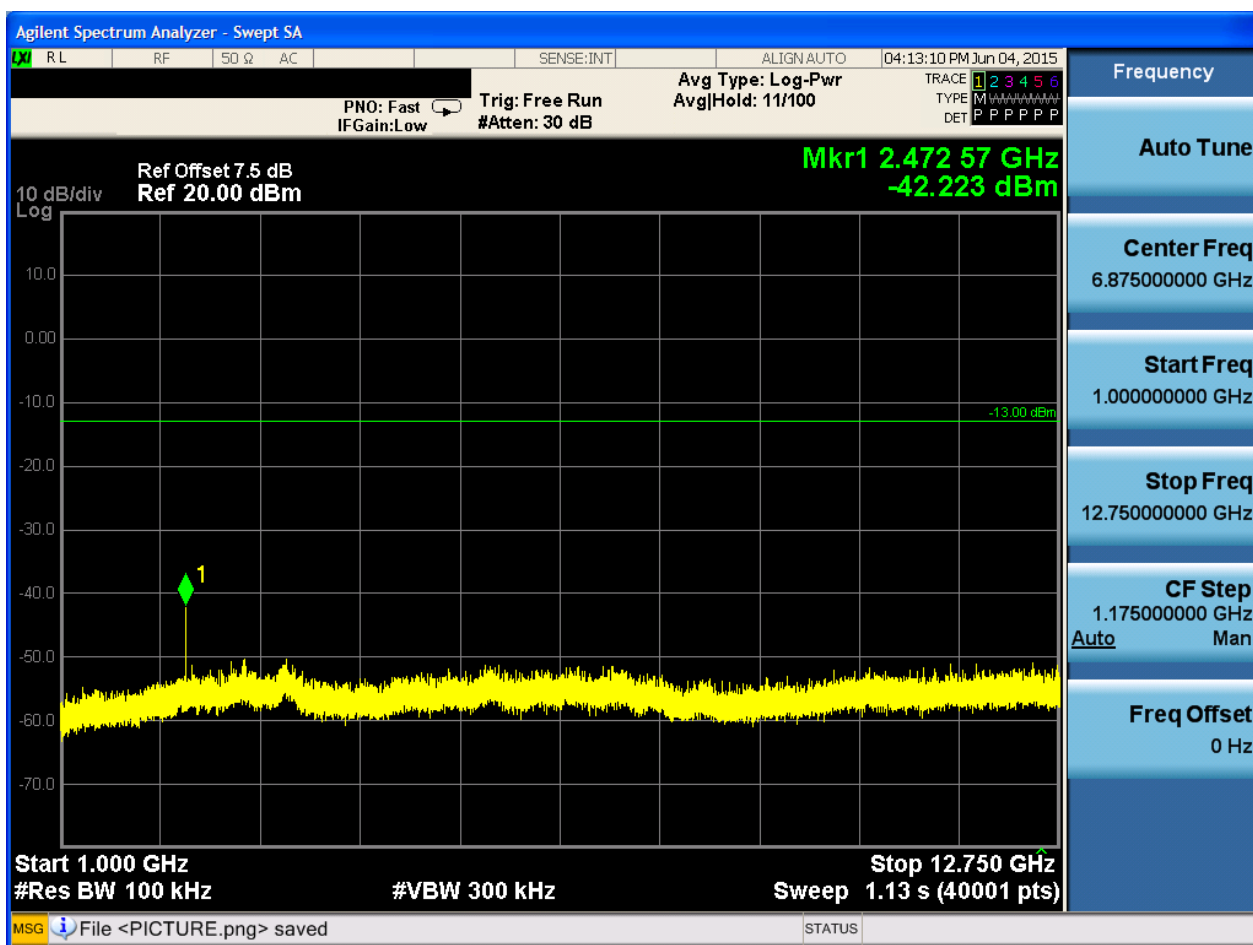
6.1.4.2 Test Mode = GSM/TM2

6.1.4.2.1 Test Channel = LCH

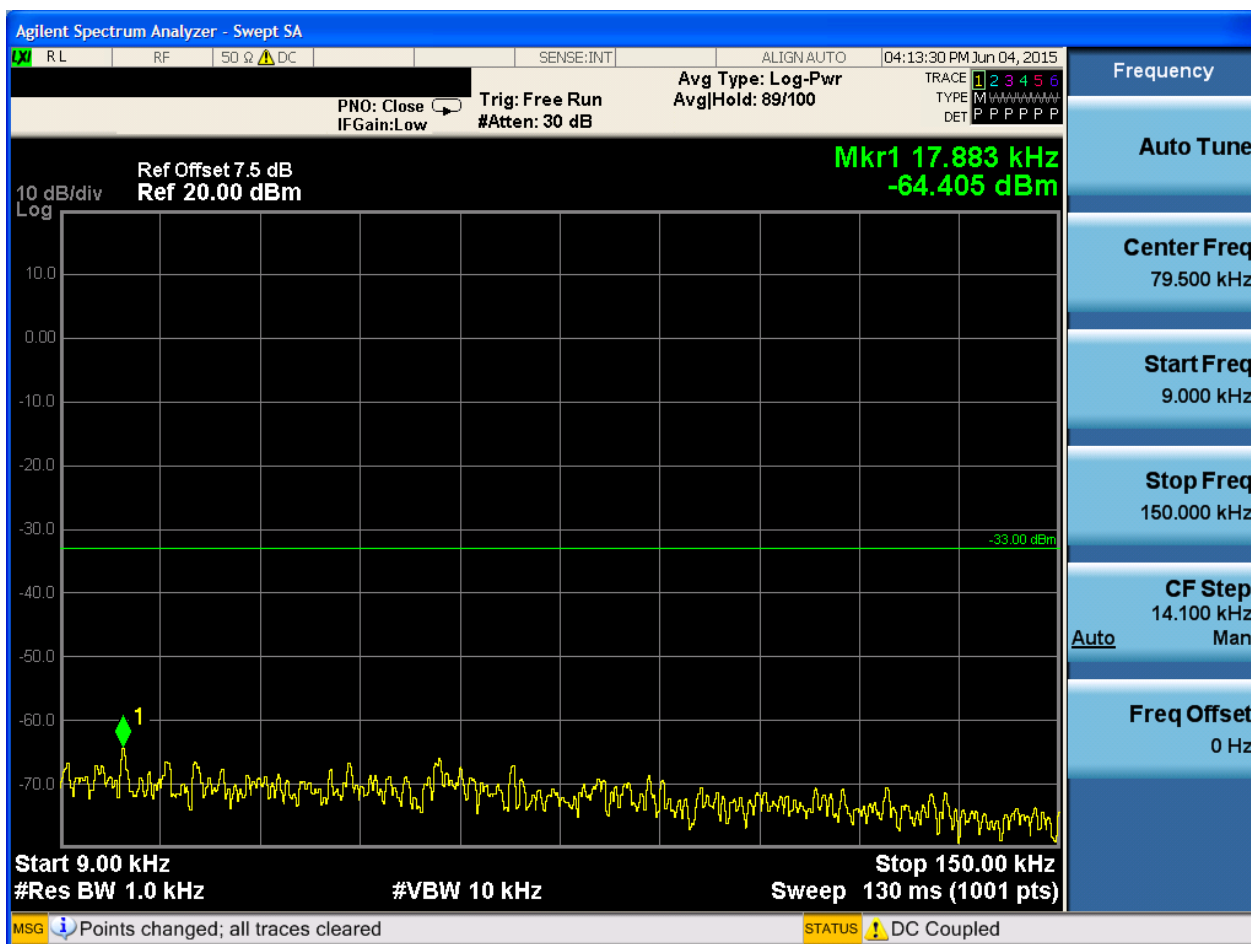


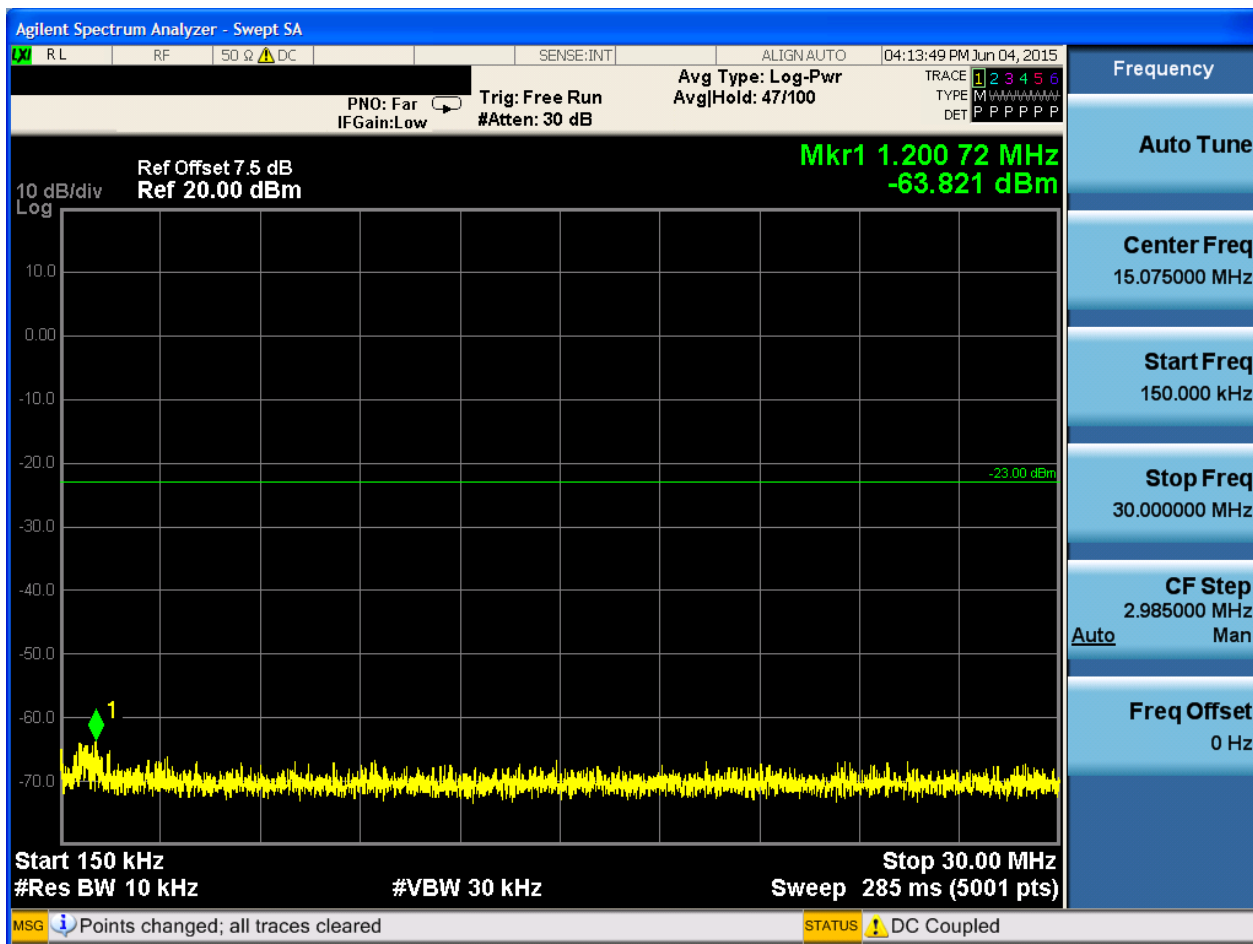


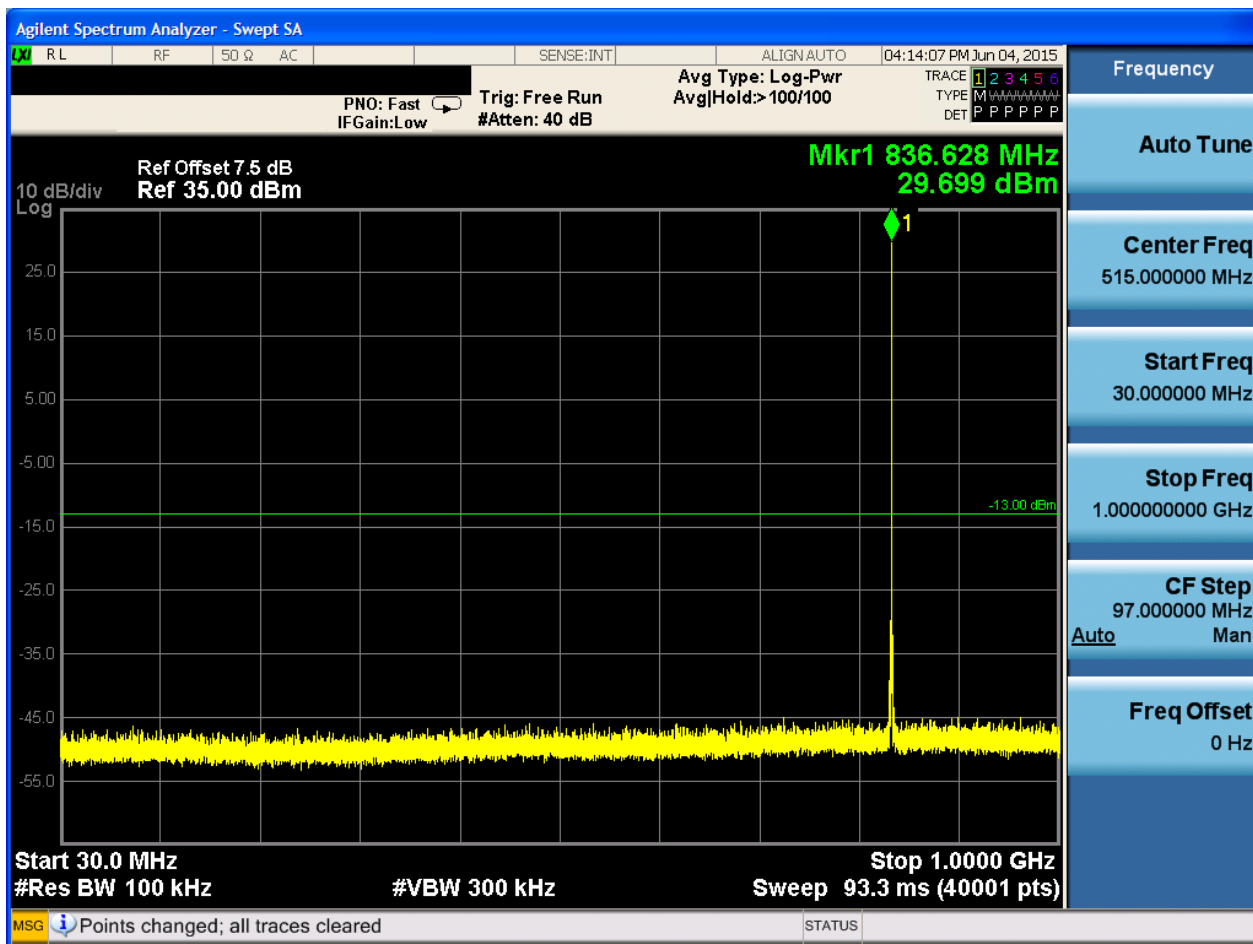


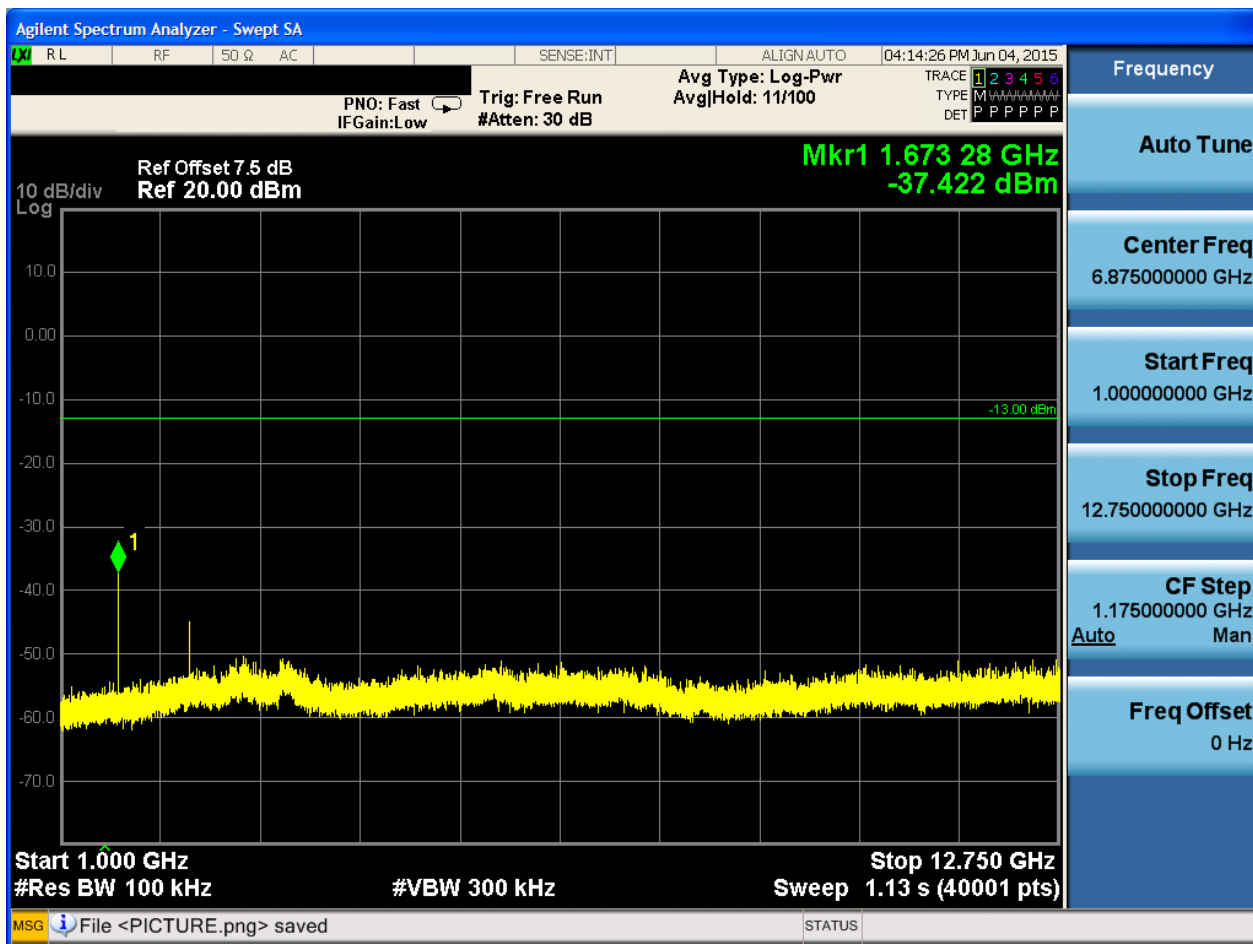


6.1.4.2.2 Test Channel = MCH

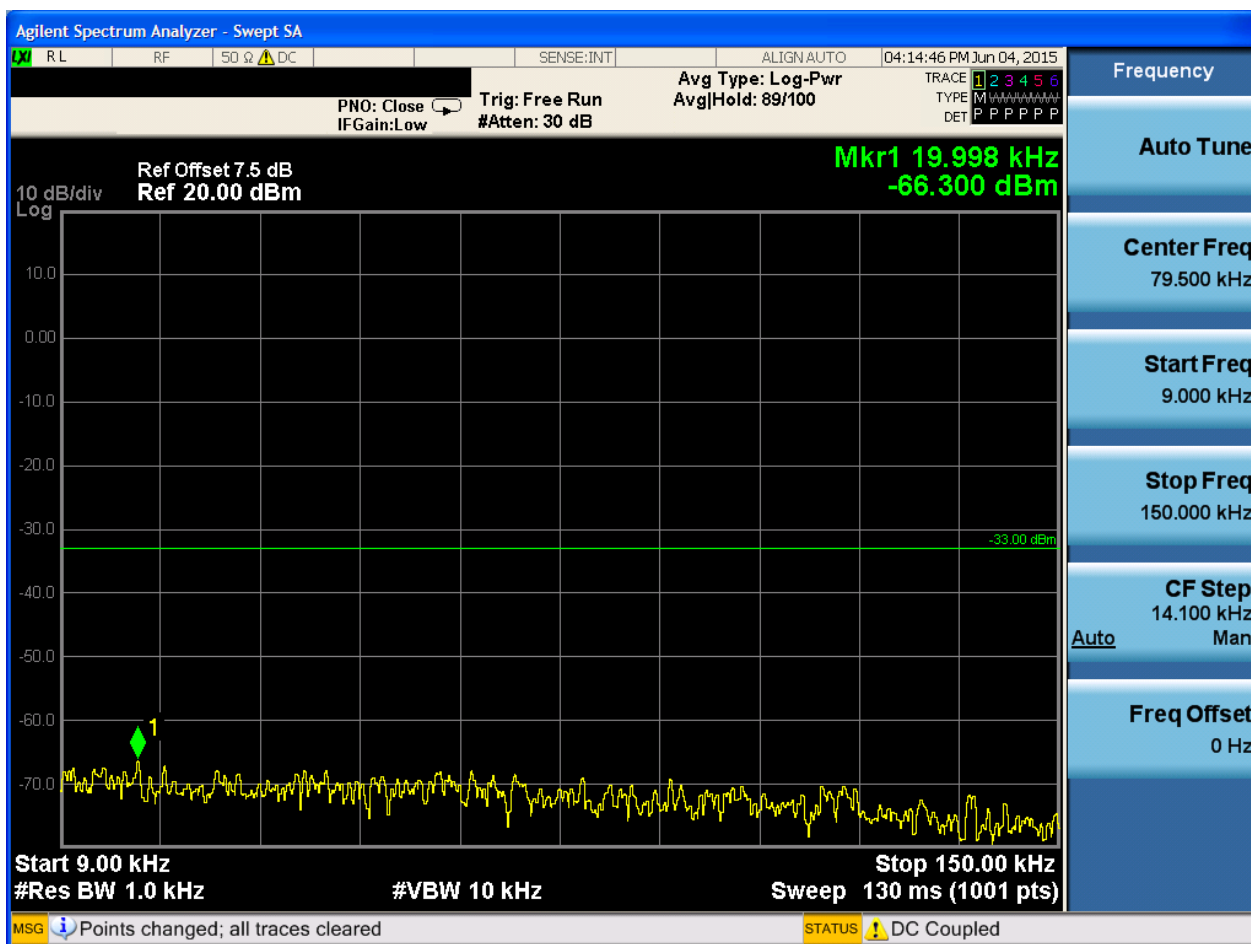


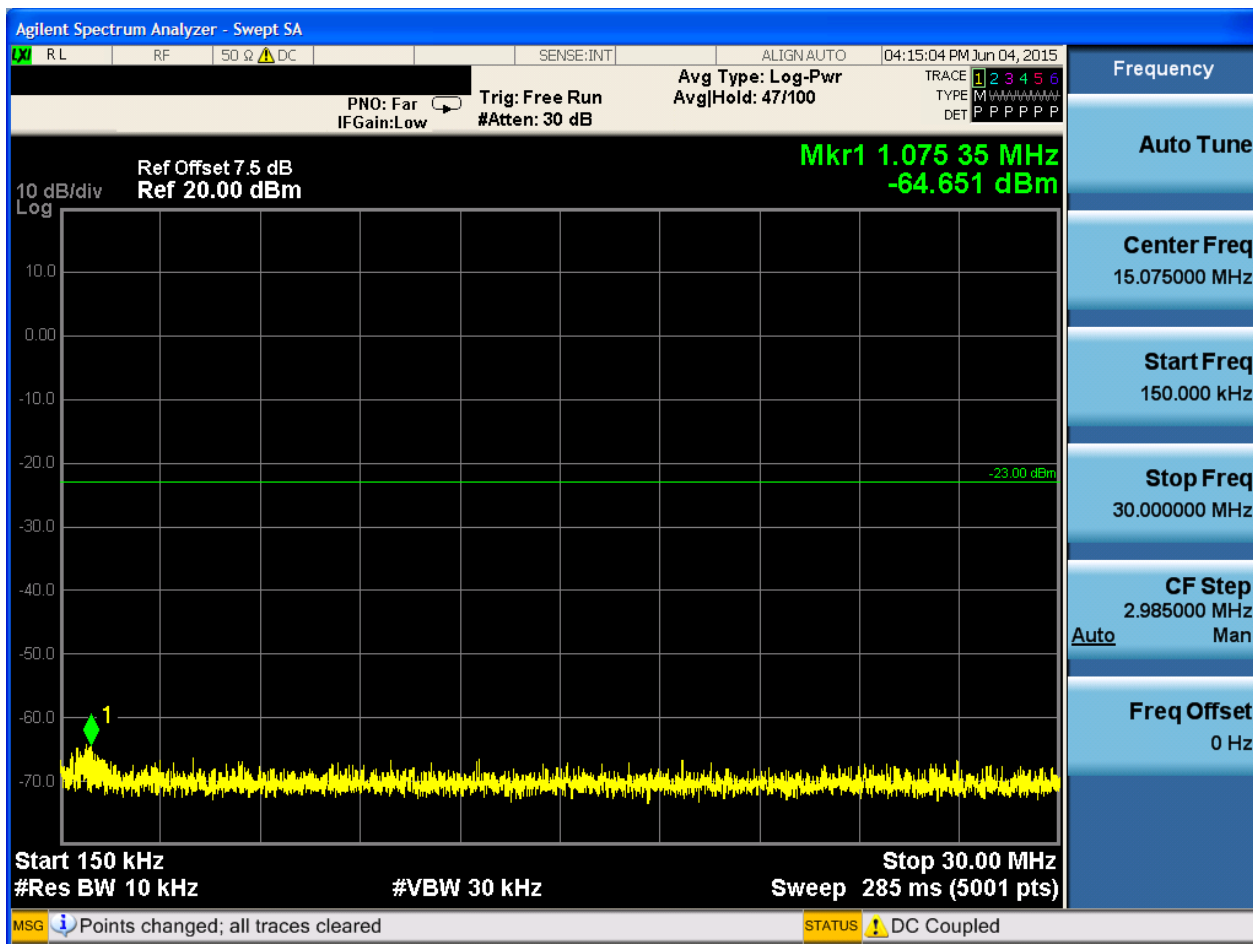


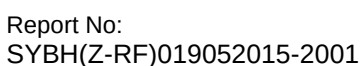


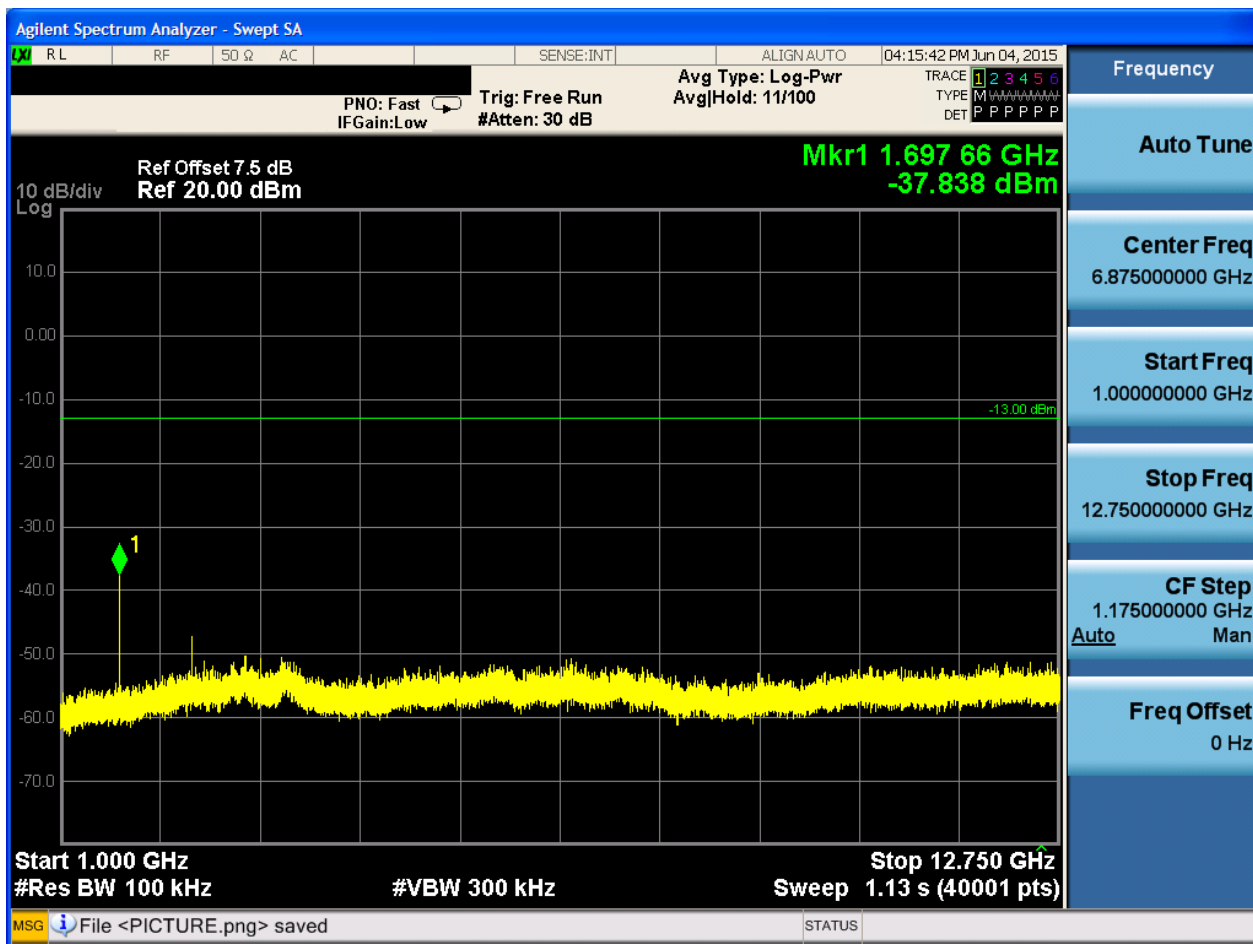


6.1.4.2.3 Test Channel = HCH









7Appendix_G: Field Strength of Spurious Radiation

Note:

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

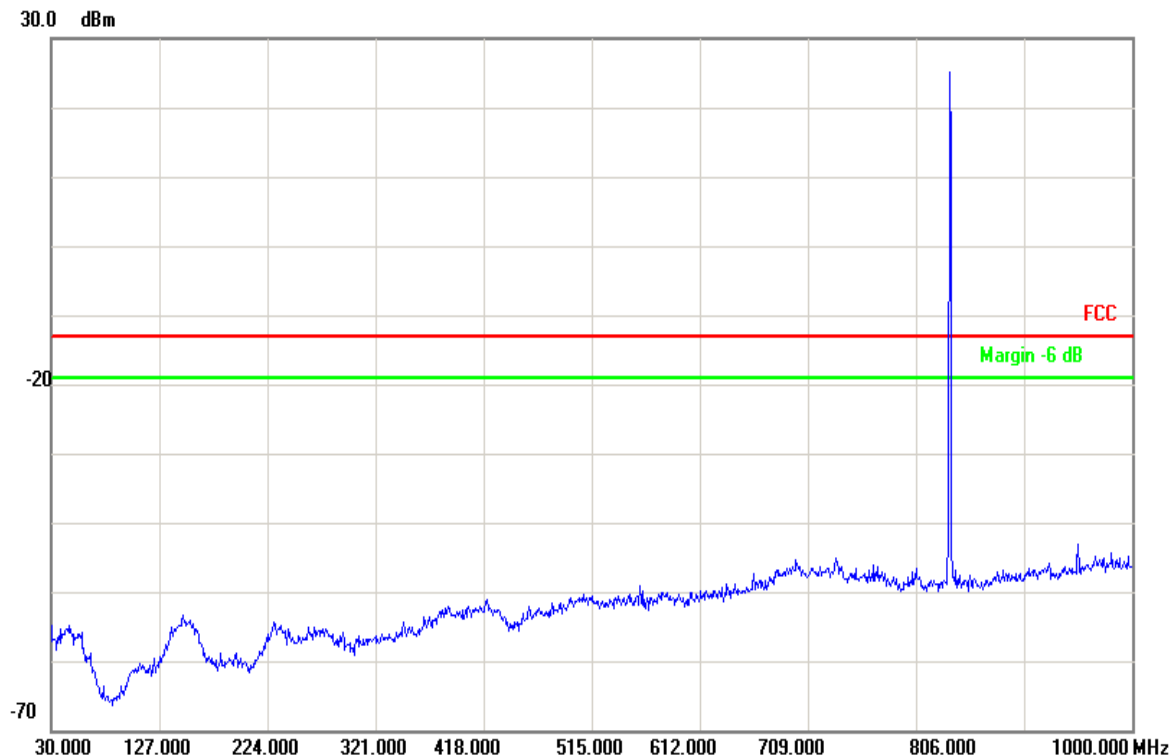
NOTE1: No peak found in the Test Range of “9 kHz to 30MHz”

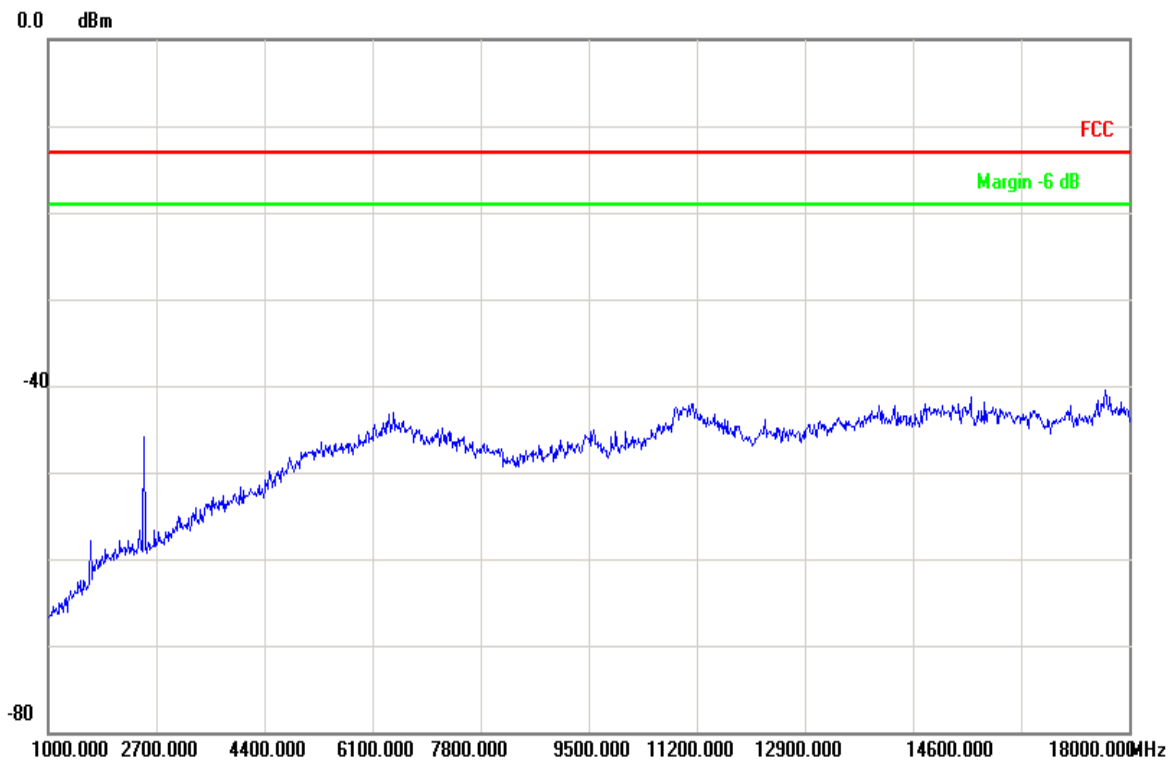
NOTE2: We tested all modes, but the data presented below is the worst case.

Part I - Test Plots

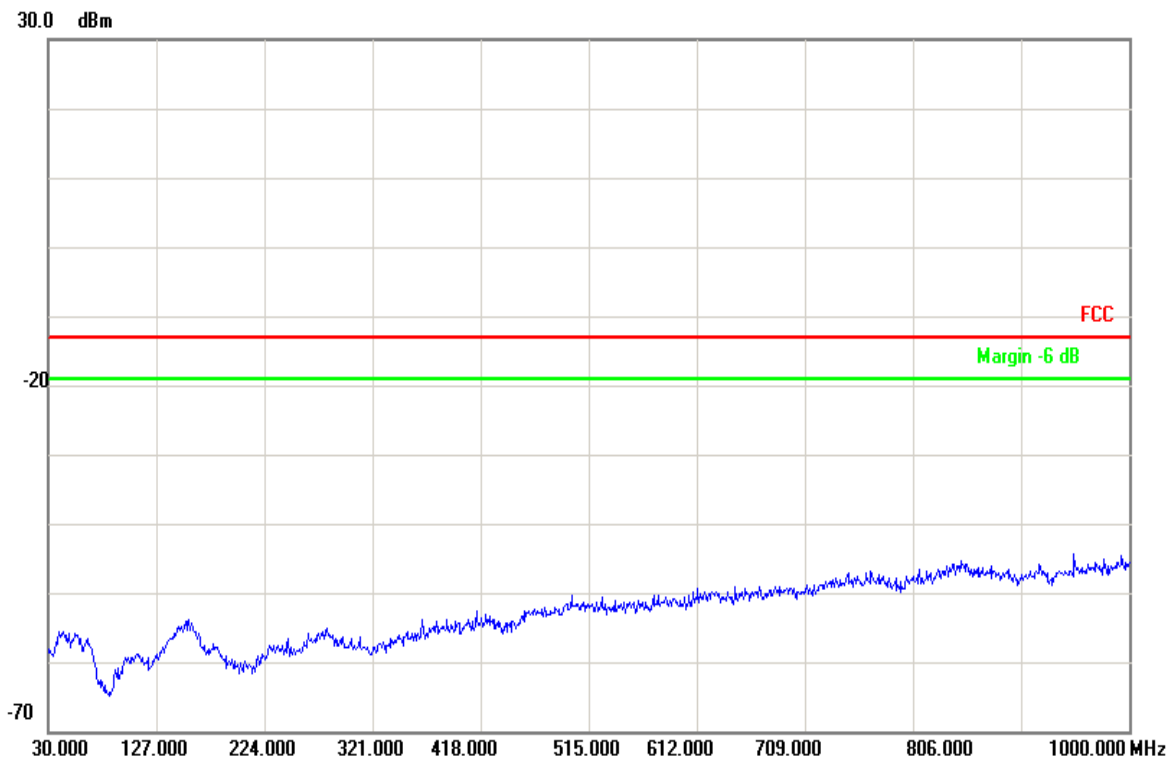
7.1 For GSM

7.1.1 Test Band = GSM850

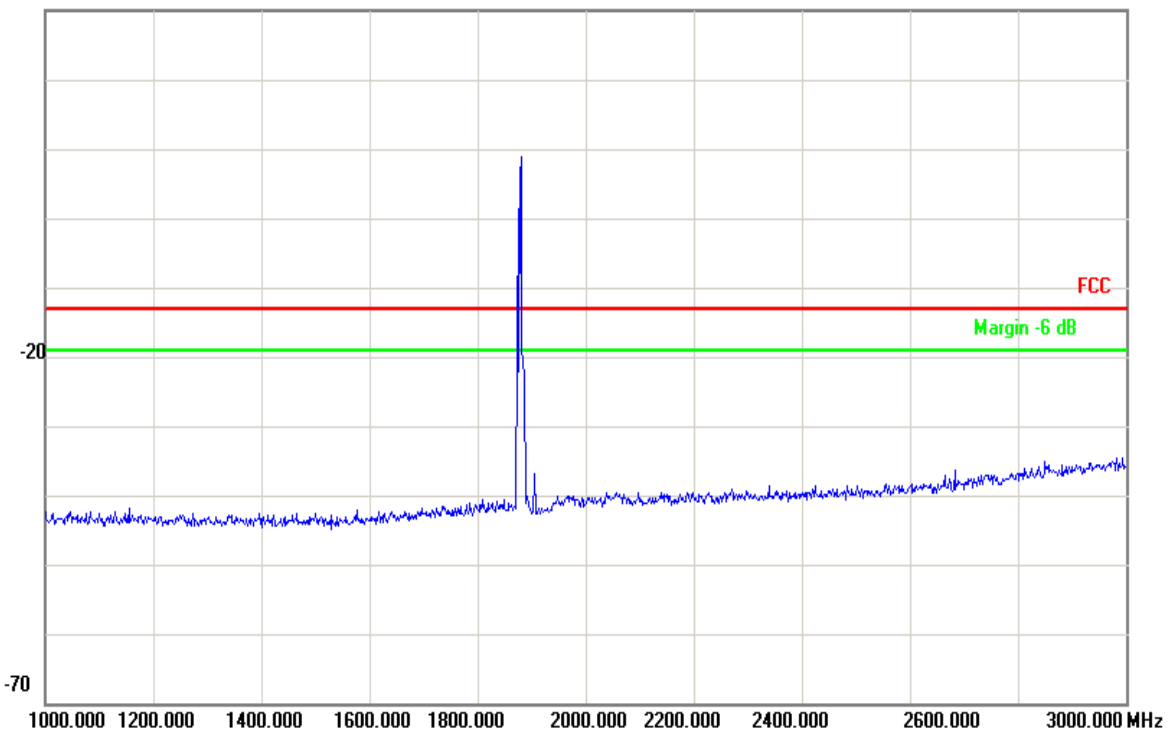




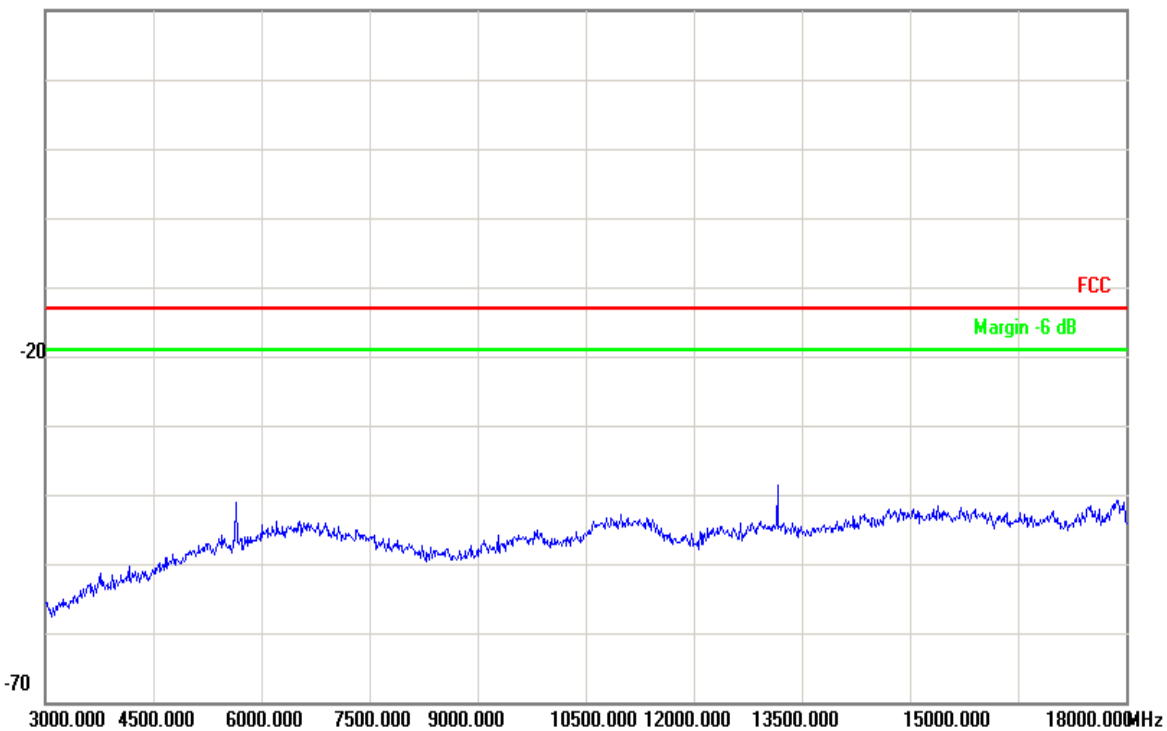
7.1.2 Test Band = GSM1900

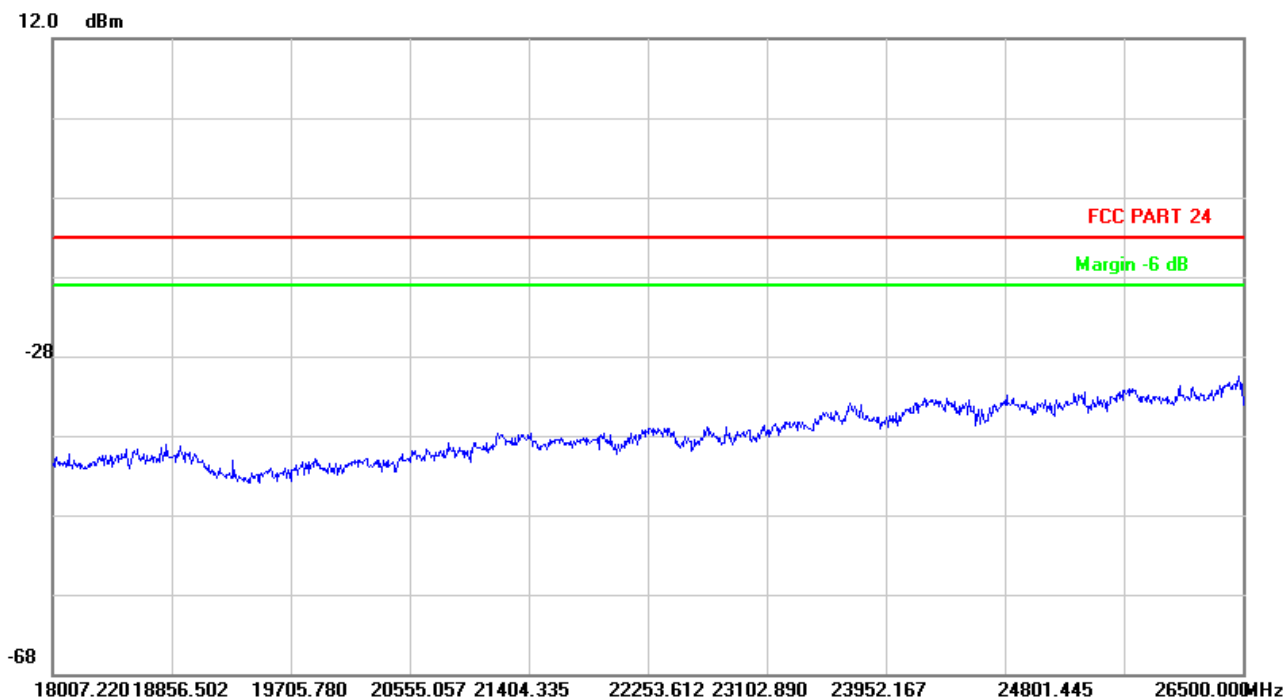


30.0 dBm



30.0 dBm





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	15.37	0.01865	PASS
				VN	15.43	0.01872	PASS
				VH	14.33	0.01739	PASS
		MCH	TN	VL	0.65	0.00078	PASS
				VN	9.75	0.01165	PASS
				VH	1.81	0.00216	PASS
		HCH	TN	VL	5.17	0.00609	PASS
				VN	7.49	0.00882	PASS
				VH	7.04	0.00829	PASS
	GSM/TM2	LCH	TN	VL	12.14	0.01473	PASS
				VN	12.85	0.01559	PASS
				VH	9.91	0.01202	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		MCH	TN	VL	10.4	0.01243	PASS
				VN	9.3	0.01112	PASS
				VH	10.85	0.01297	PASS
		HCH	TN	VL	14.79	0.01742	PASS
				VN	11.98	0.01411	PASS
				VH	13.46	0.01586	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-2.2	-0.00119	PASS
				VN	-4.07	-0.0022	PASS
				VH	0.26	0.00014	PASS
		MCH	TN	VL	7.36	0.00391	PASS
				VN	5.36	0.00285	PASS
				VH	5.75	0.00306	PASS
		HCH	TN	VL	-10.59	-0.00555	PASS
				VN	9.1	0.00476	PASS
				VH	-4.65	-0.00243	PASS
	GSM/TM2	LCH	TN	VL	2.42	0.00131	PASS
				VN	1.36	0.00074	PASS
				VH	4.29	0.00232	PASS
		MCH	TN	VL	7.3	0.00388	PASS
				VN	4.55	0.00242	PASS
				VH	7.43	0.00395	PASS
		HCH	TN	VL	-5.68	-0.00297	PASS
				VN	-4.91	-0.00257	PASS
				VH	-4.84	-0.00253	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	13.04	0.01582	PASS
				-20	14.08	0.01708	PASS
				-10	13.5	0.01638	PASS
				0	11.11	0.01348	PASS
				10	10.4	0.01262	PASS
				20	12.59	0.01528	PASS
				30	15.17	0.01841	PASS
				40	9.56	0.0116	PASS
				50	13.24	0.01606	PASS
		MCH	VN	-30	2.91	0.00348	PASS
				-20	3.81	0.00455	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				-10	3.03	0.00362	PASS
				0	4.26	0.00509	PASS
				10	5.75	0.00687	PASS
				20	9.23	0.01103	PASS
				30	5.81	0.00694	PASS
				40	6.33	0.00757	PASS
				50	2.91	0.00348	PASS
		HCH	VN	-30	7.43	0.00875	PASS
				-20	6.07	0.00715	PASS
				-10	5.17	0.00609	PASS
				0	4.07	0.0048	PASS
				10	5.49	0.00647	PASS
				20	7.49	0.00882	PASS
				30	6.07	0.00715	PASS
				40	8.07	0.00951	PASS
				50	6.84	0.00806	PASS
	GSM/TM2	LCH	VN	-30	11.07	0.01343	PASS
				-20	10.3	0.0125	PASS
				-10	10.33	0.01253	PASS
				0	8.14	0.00988	PASS
				10	11.62	0.0141	PASS
				20	8.01	0.00972	PASS
				30	10.04	0.01218	PASS
				40	9.59	0.01164	PASS
				50	11.59	0.01406	PASS
		MCH	VN	-30	8.62	0.0103	PASS
				-20	7.55	0.00902	PASS
				-10	6.23	0.00745	PASS
				0	6.59	0.00788	PASS
				10	7.59	0.00907	PASS
				20	7.52	0.00899	PASS
				30	8.52	0.01018	PASS
				40	7.85	0.00938	PASS
				50	8.65	0.01034	PASS
		HCH	VN	-30	11.46	0.0135	PASS
				-20	13.2	0.01555	PASS
				-10	5.26	0.0062	PASS
				0	14.04	0.01654	PASS
				10	12.62	0.01487	PASS
				20	11.4	0.01343	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				30	12.07	0.01422	PASS
				40	15.82	0.01864	PASS
				50	15.59	0.01837	PASS
GSM1900	GSM/TM1	LCH	VN	-30	-1.74	-0.00094	PASS
				-20	-1.87	-0.00101	PASS
				-10	-0.45	-0.00024	PASS
				0	-2.84	-0.00153	PASS
				10	-4.2	-0.00227	PASS
				20	-7.81	-0.00422	PASS
				30	13.43	0.00726	PASS
				40	-2.26	-0.00122	PASS
				50	-1.23	-0.00066	PASS
		MCH	VN	-30	5.88	0.00313	PASS
				-20	10.72	0.0057	PASS
				-10	8.01	0.00426	PASS
				0	6.59	0.00351	PASS
				10	10.07	0.00536	PASS
				20	7.3	0.00388	PASS
				30	8.33	0.00443	PASS
				40	9.3	0.00495	PASS
				50	13.17	0.00701	PASS
		HCH	VN	-30	8.46	0.00443	PASS
				-20	11.88	0.00622	PASS
				-10	8.46	0.00443	PASS
				0	-7.75	-0.00406	PASS
				10	8.2	0.00429	PASS
				20	12.66	0.00663	PASS
				30	-7.17	-0.00375	PASS
				40	-5.68	-0.00297	PASS
				50	15.05	0.00788	PASS
	GSM/TM2	LCH	VN	-30	1.9	0.00103	PASS
				-20	3.62	0.00196	PASS
				-10	6.46	0.00349	PASS
				0	2.13	0.00115	PASS
				10	2.62	0.00142	PASS
				20	-1.23	-0.00066	PASS
				30	-1.32	-0.00071	PASS
				40	-0.81	-0.00044	PASS
				50	4.55	0.00246	PASS
		MCH	VN	-30	7.88	0.00419	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				-20	5.91	0.00314	PASS
				-10	9.27	0.00493	PASS
				0	9.65	0.00513	PASS
				10	14.4	0.00766	PASS
				20	13.88	0.00738	PASS
				30	11.75	0.00625	PASS
				40	11.3	0.00601	PASS
				50	11.95	0.00636	PASS
		HCH	VN	-30	19.15	0.01003	PASS
				-20	19.11	0.01001	PASS
				-10	-2	-0.00105	PASS
				0	15.4	0.00806	PASS
				10	15.11	0.00791	PASS
				20	19.6	0.01026	PASS
				30	11.27	0.0059	PASS
				40	19.27	0.01009	PASS
				50	13.2	0.00691	PASS



END