



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	28.62	38.5	PASS
		MCH	32.59	28.76	38.5	PASS
		HCH	32.66	28.69	38.5	PASS
	GSM/TM2	LCH	26.03	21.98	38.5	PASS
		MCH	26.05	21.89	38.5	PASS
		HCH	26.10	22.15	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	29.71	28.86	33	PASS
		MCH	29.53	28.46	33	PASS
		HCH	29.82	29.00	33	PASS
	GSM/TM2	LCH	25.37	24.22	33	PASS
		MCH	25.40	24.24	33	PASS



Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
		HCH	25.43	24.42	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	0.13	13	PASS
		MCH	0.15	13	PASS
		HCH	0.14	13	PASS
	GSM/TM2	LCH	3.23	13	PASS
		MCH	3.22	13	PASS
		HCH	3.05	13	PASS
GSM1900	GSM/TM1	LCH	0.14	13	PASS
		MCH	0.14	13	PASS
		HCH	0.11	13	PASS
	GSM/TM2	LCH	2.7	13	PASS
		MCH	2.77	13	PASS
		HCH	2.89	13	PASS

3Appendix_C: Modulation Characteristics

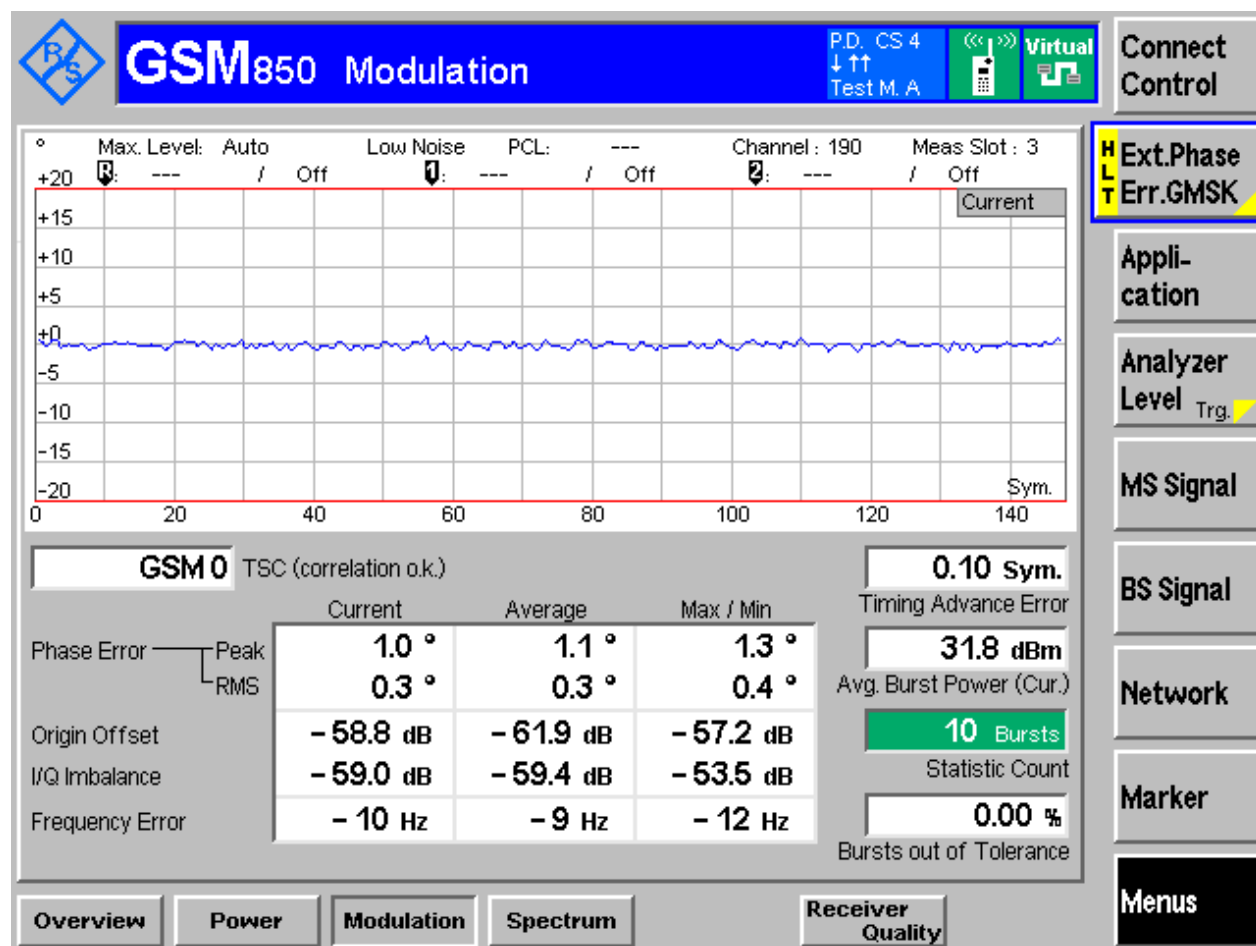
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

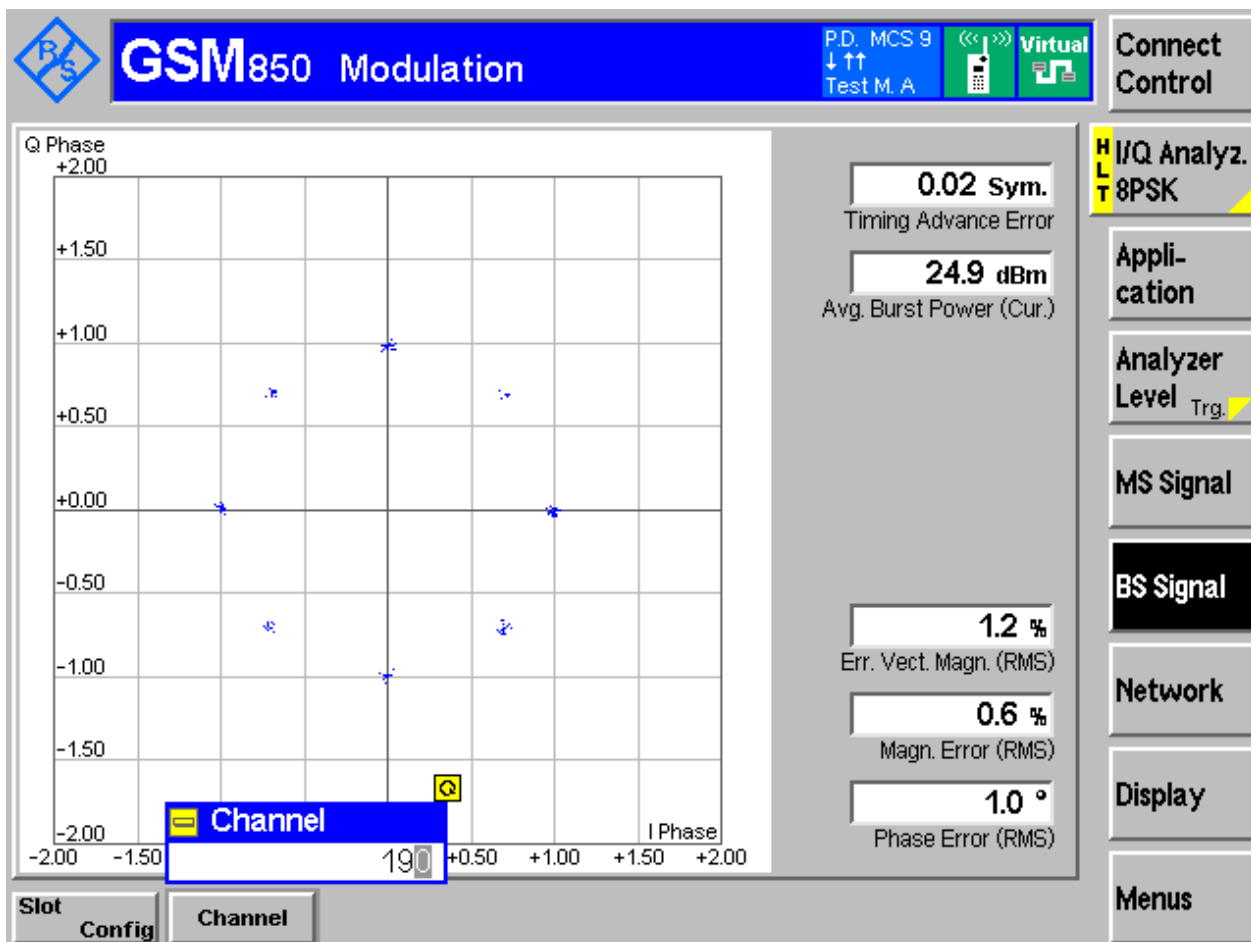
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

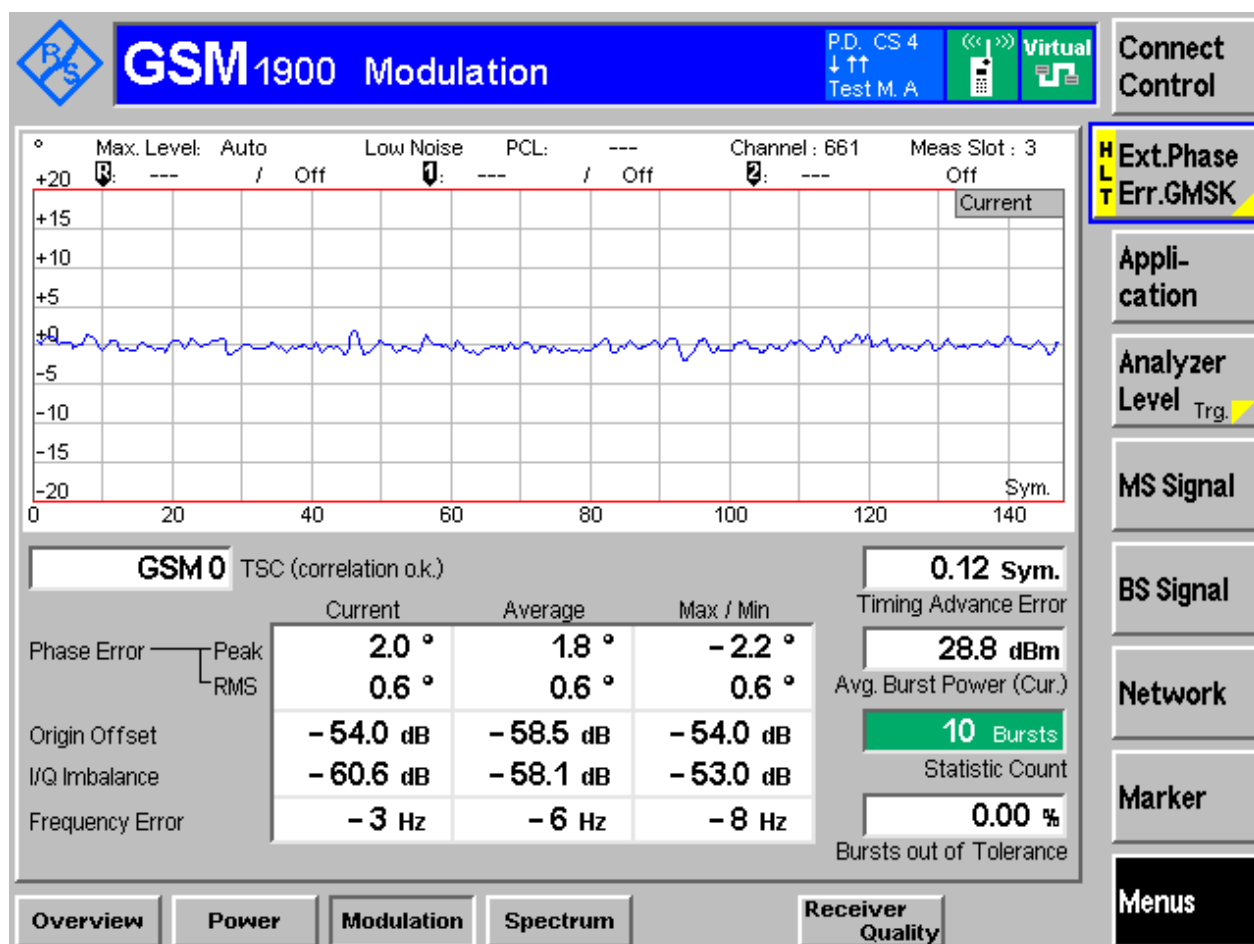
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

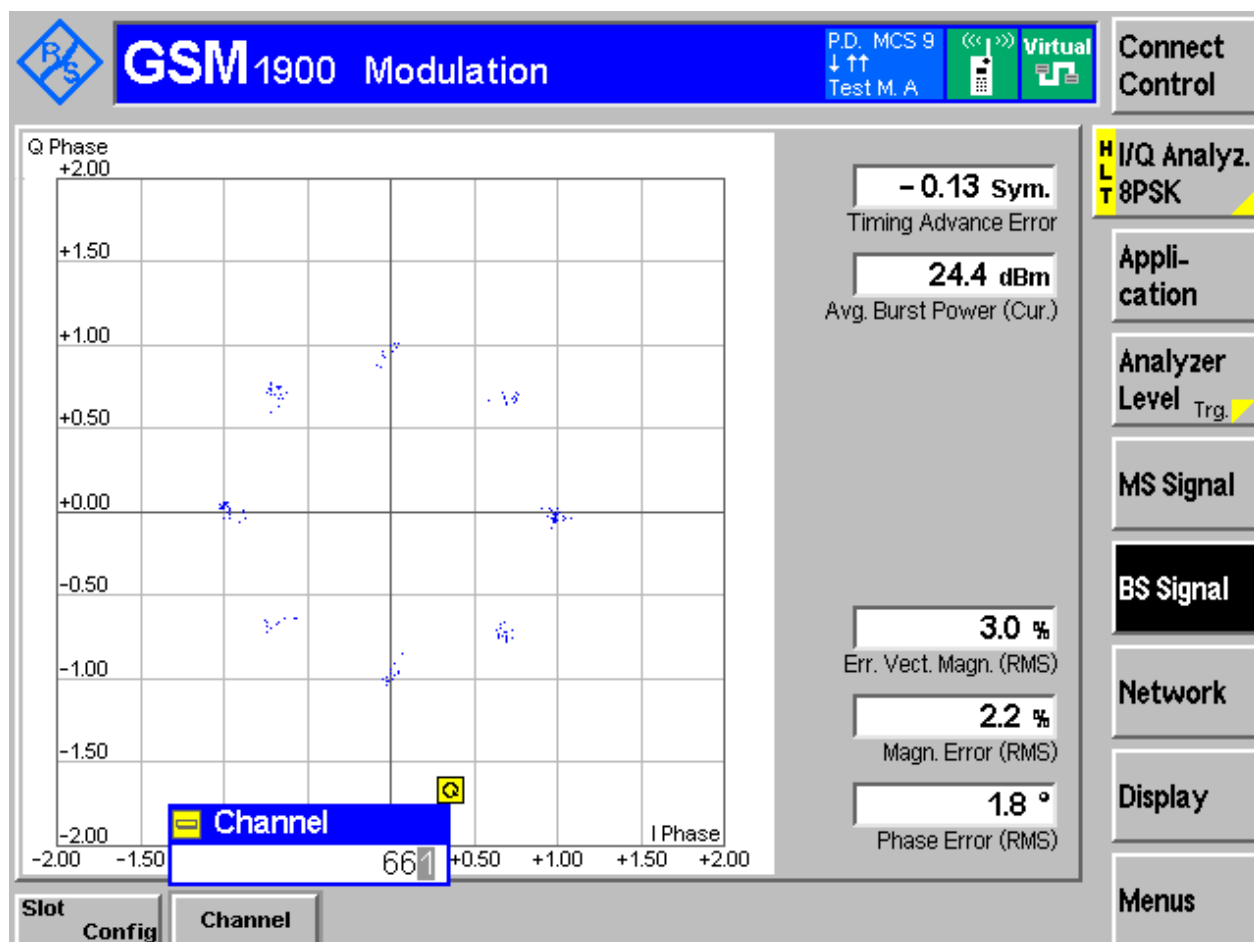
3.1.2.1 Test Mode = GSM/TM1

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	247.40	318.47	Pass
		MCH	248.43	318.20	Pass
		HCH	245.62	316.30	Pass
	GSM/TM2	LCH	247.31	316.14	Pass
		MCH	248.12	306.01	Pass
		HCH	243.74	311.80	Pass
GSM1900	GSM/TM1	LCH	245.33	319.41	Pass
		MCH	243.36	316.50	Pass
		HCH	245.75	315.41	Pass
	GSM/TM2	LCH	255.41	327.02	Pass
		MCH	249.55	326.01	Pass
		HCH	256.64	336.23	Pass



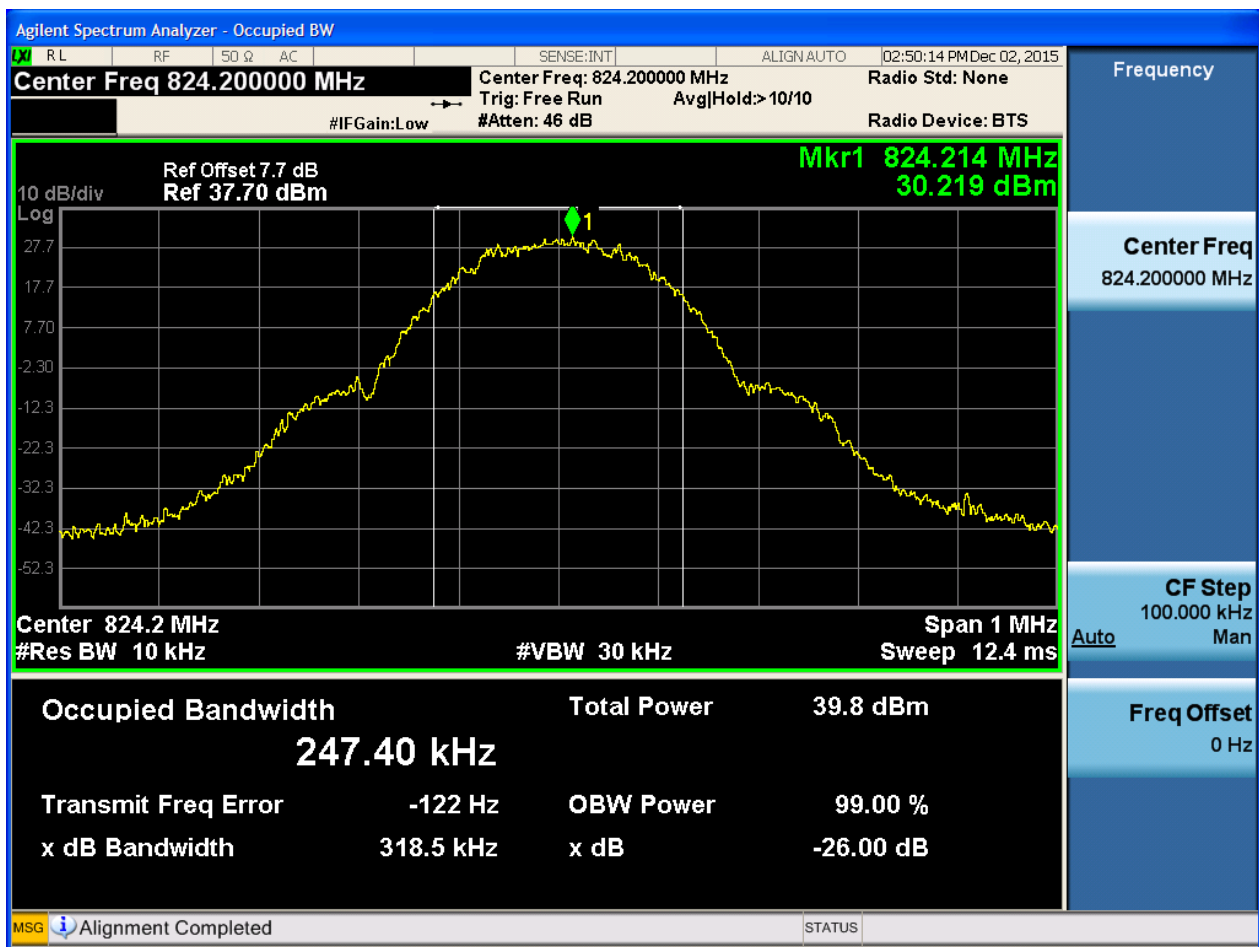
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

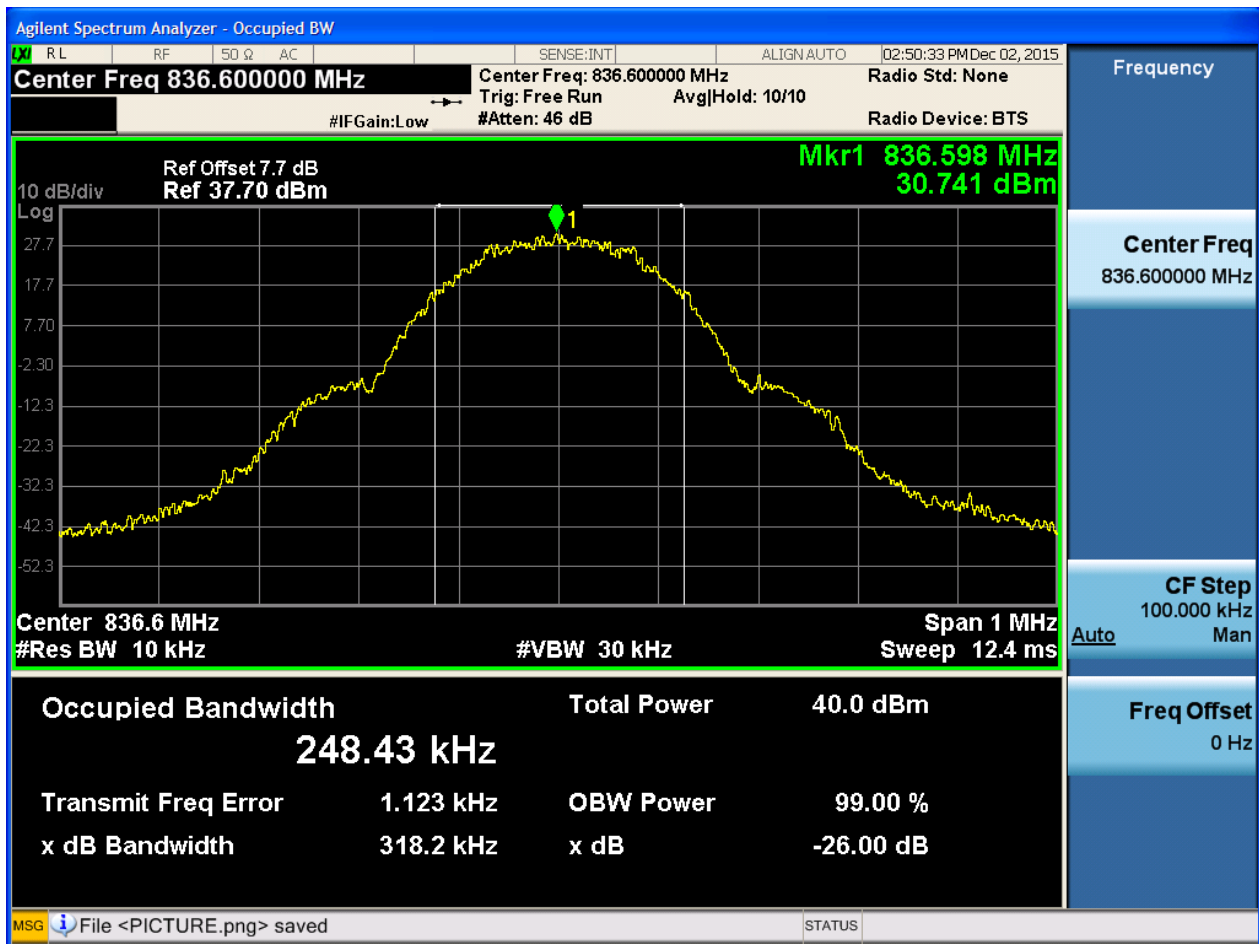
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



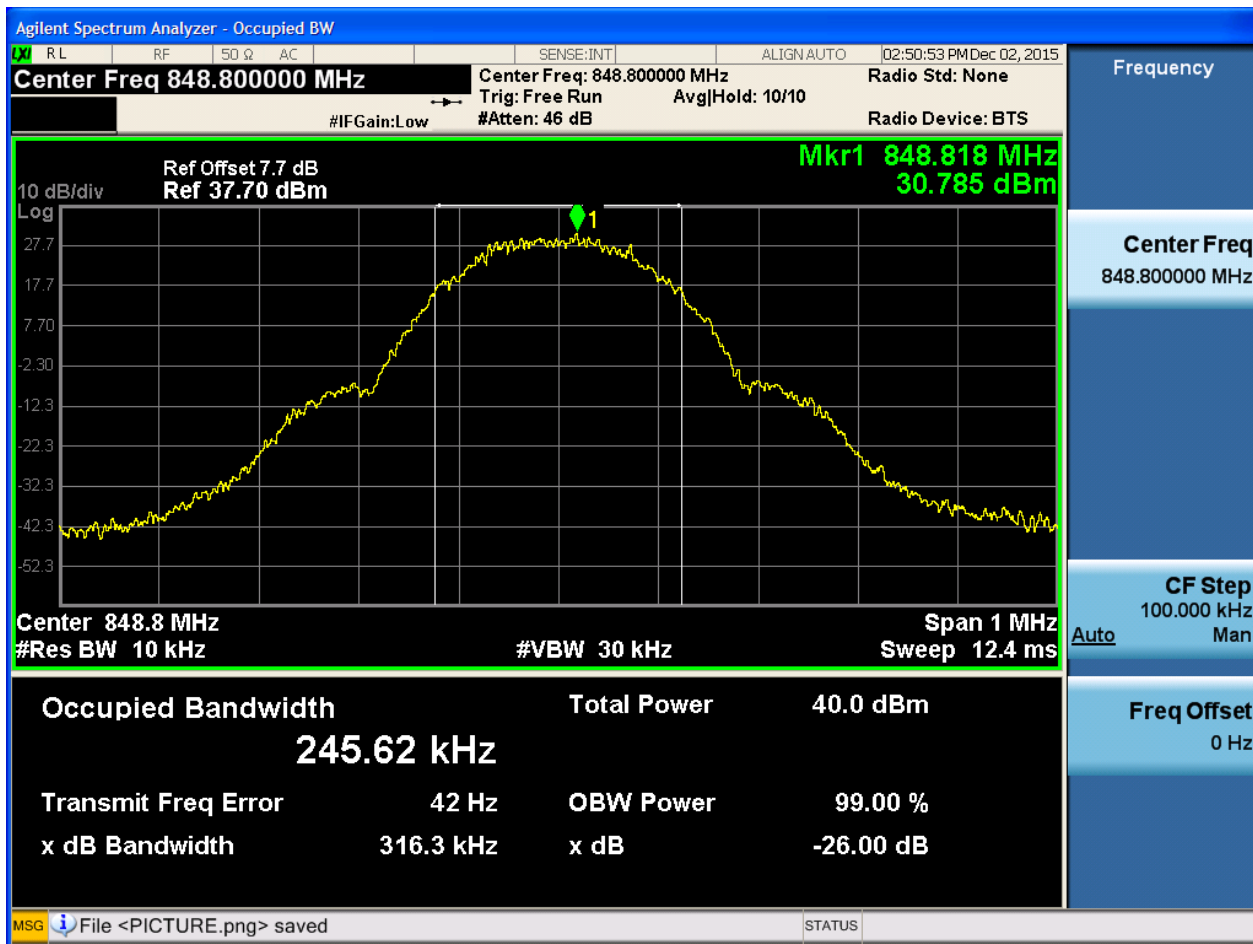


4.1.1.1.2 Test Channel = MCH





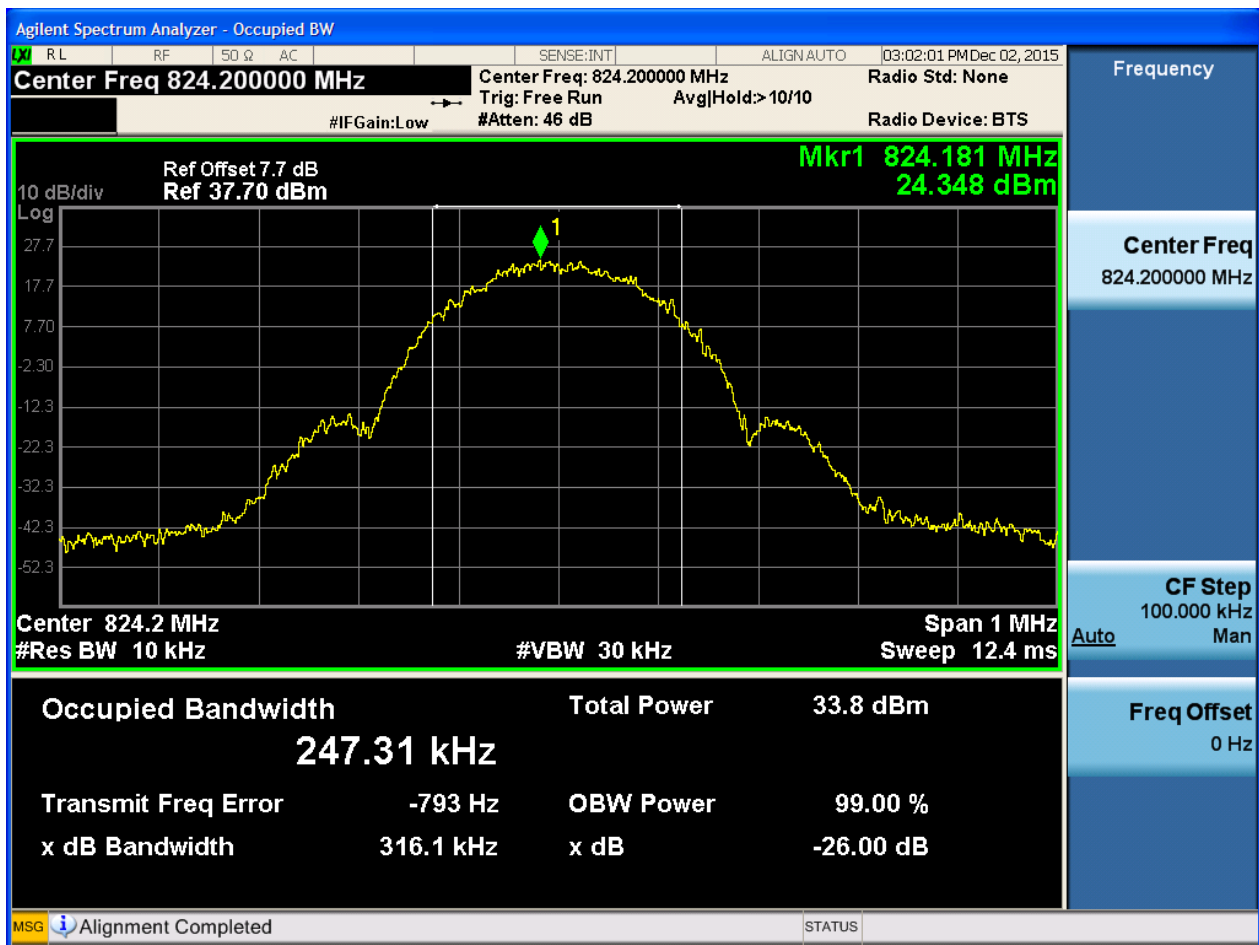
4.1.1.1.3 Test Channel = HCH





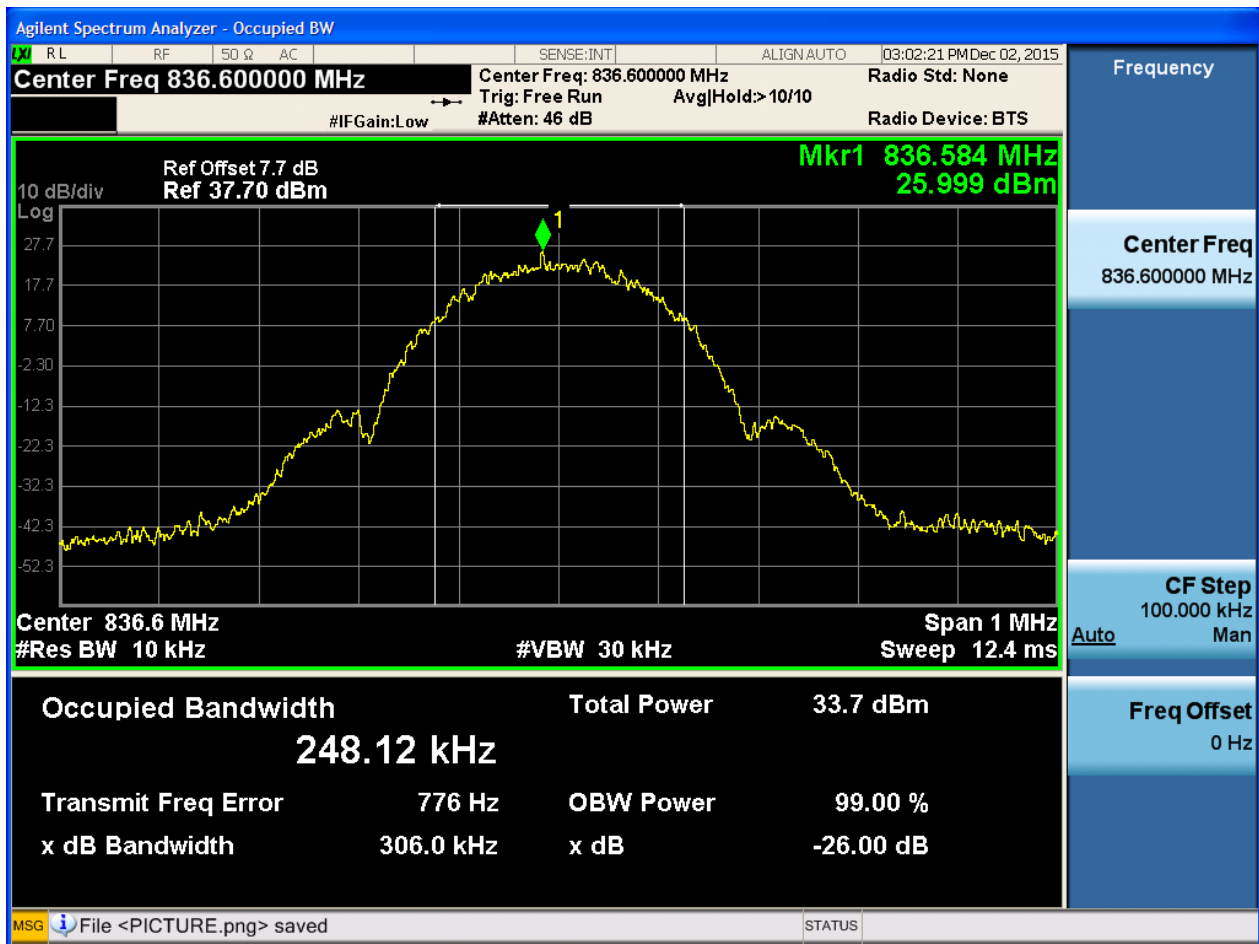
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



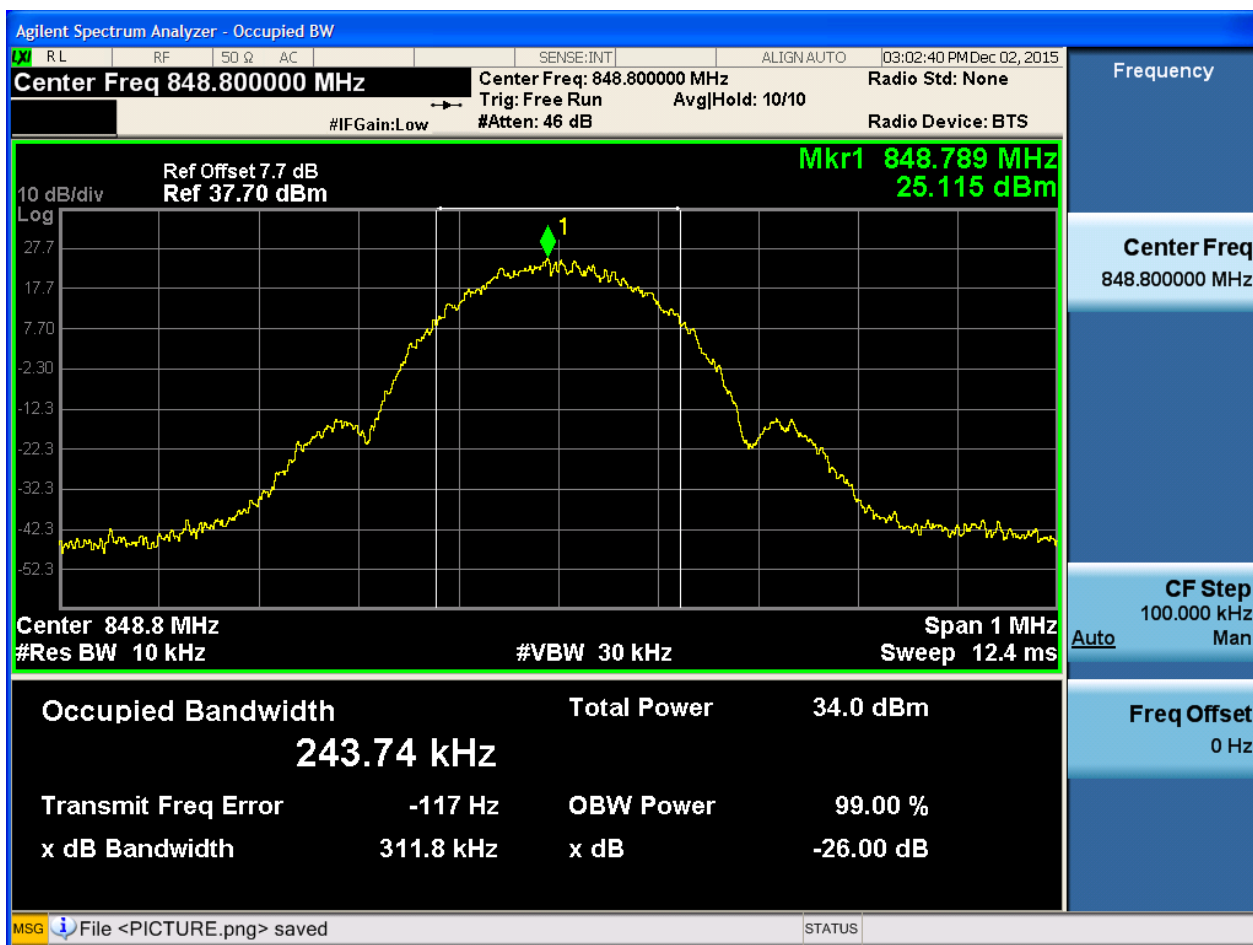


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

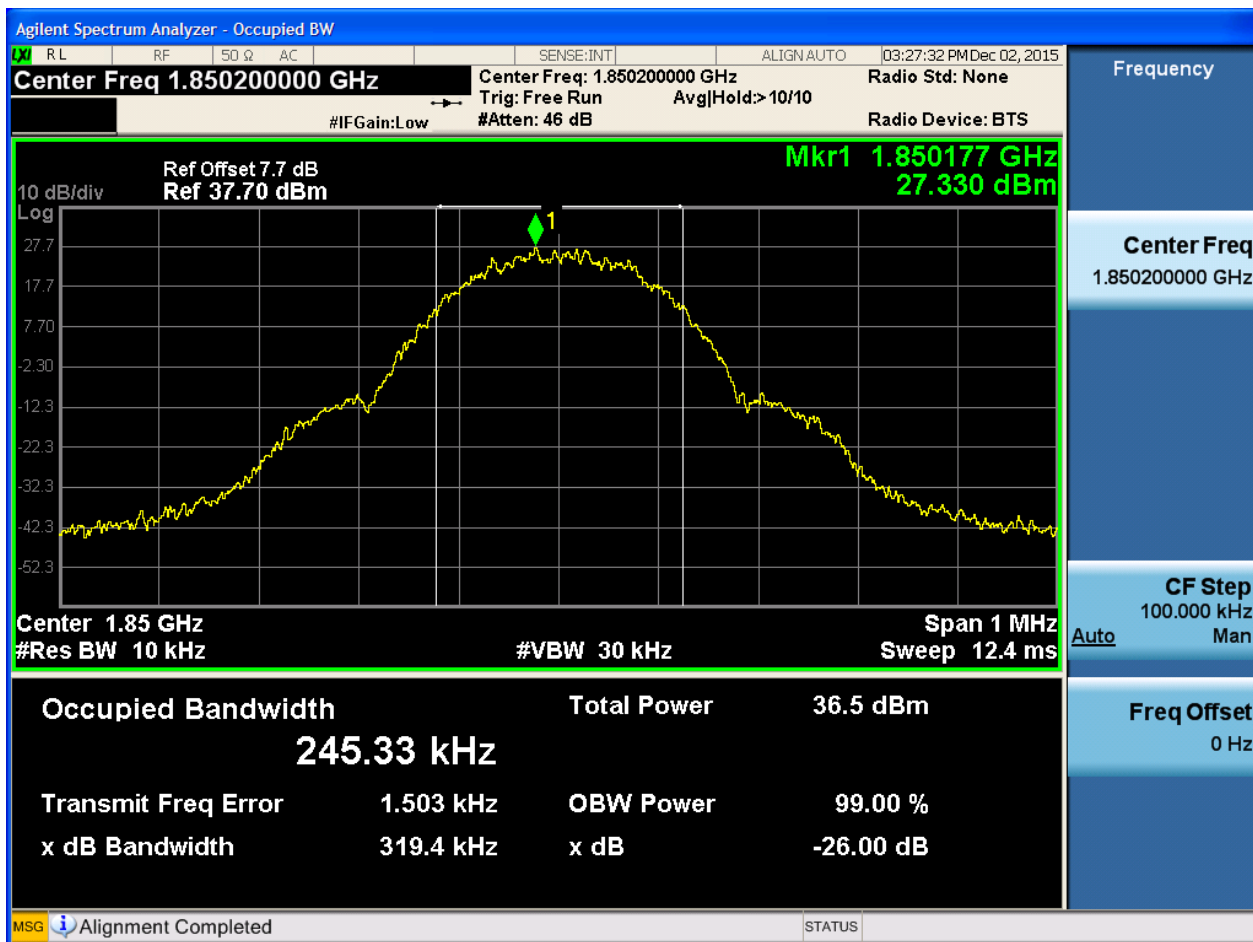




4.1.2 Test Band = GSM1900

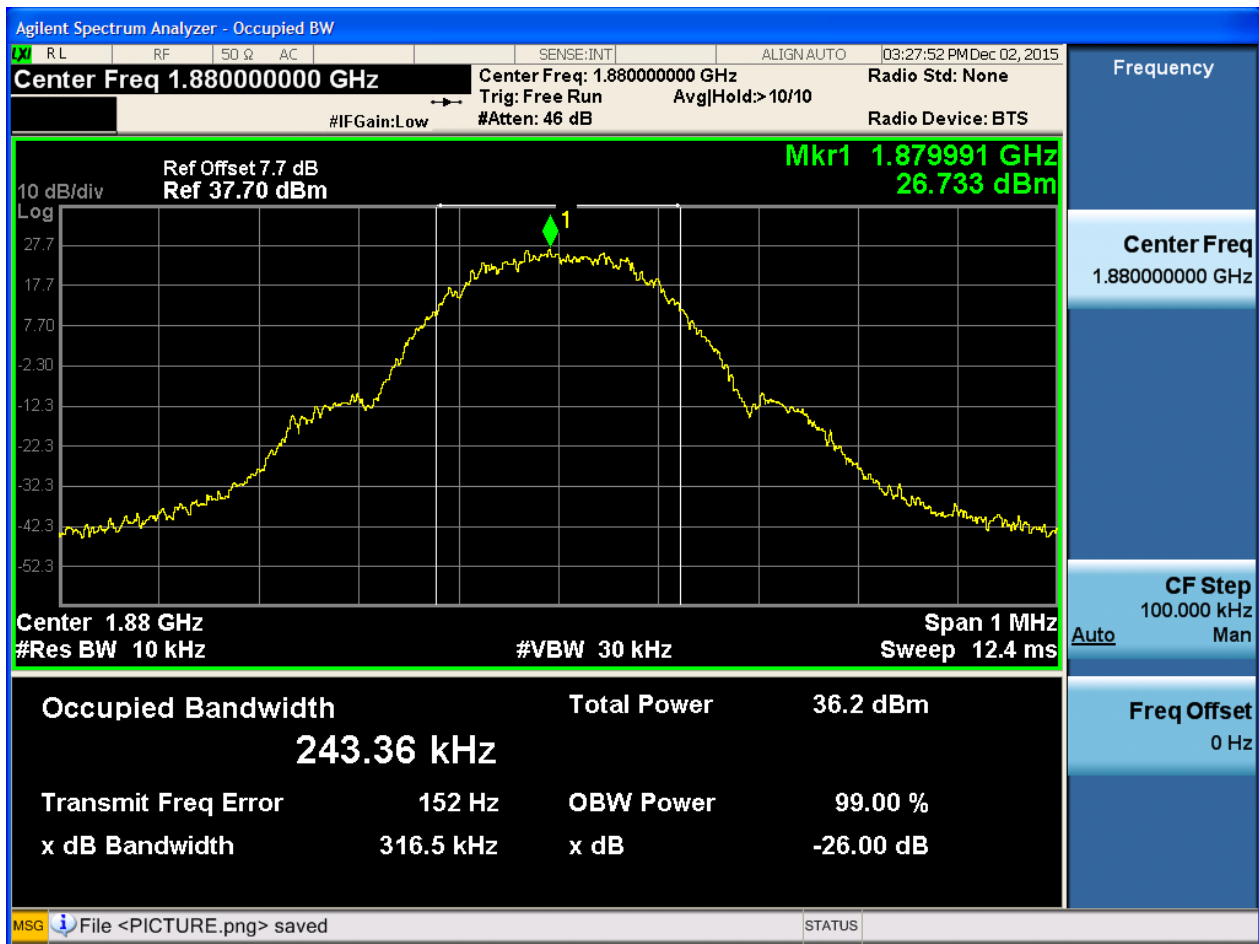
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



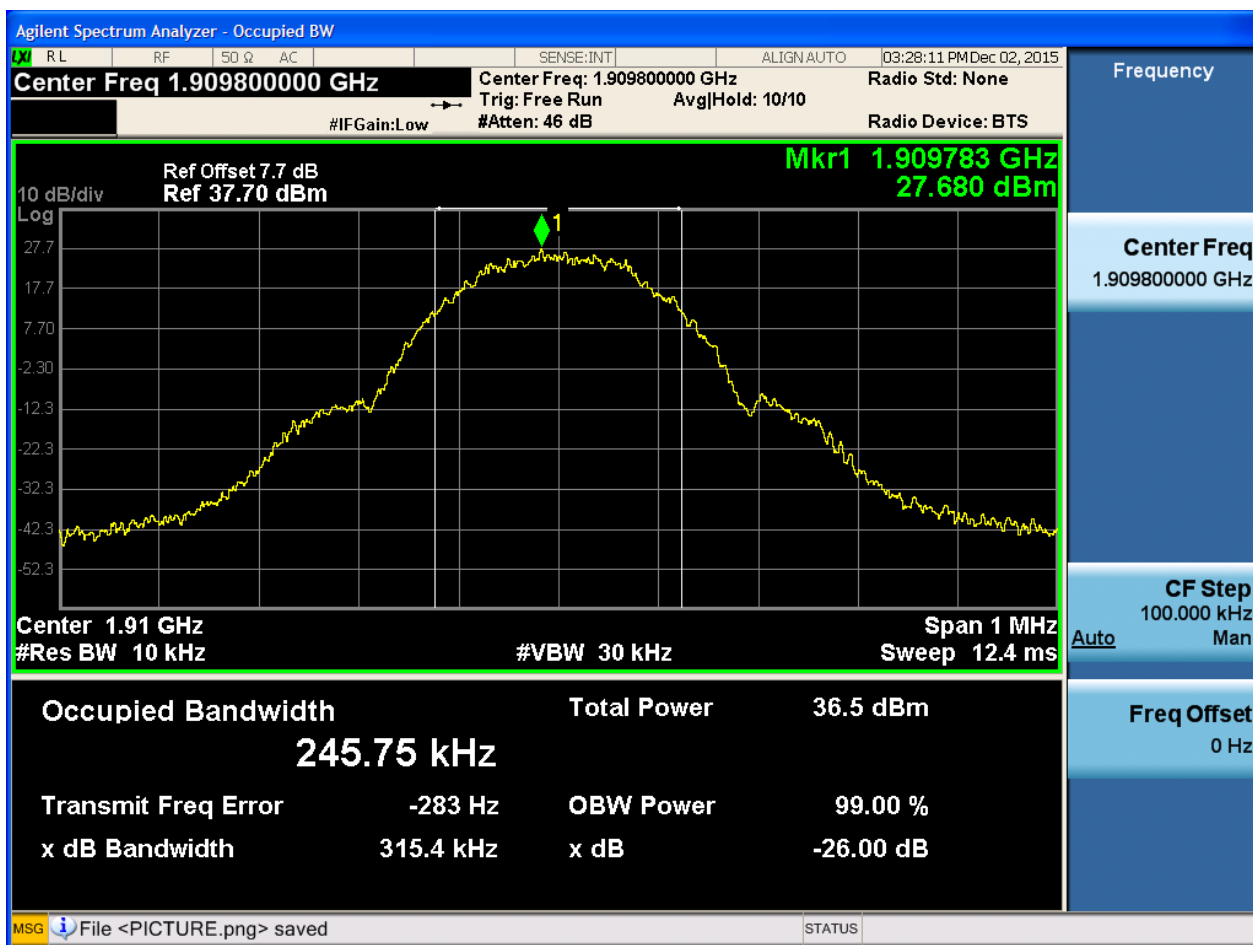


4.1.2.1.2 Test Channel = MCH





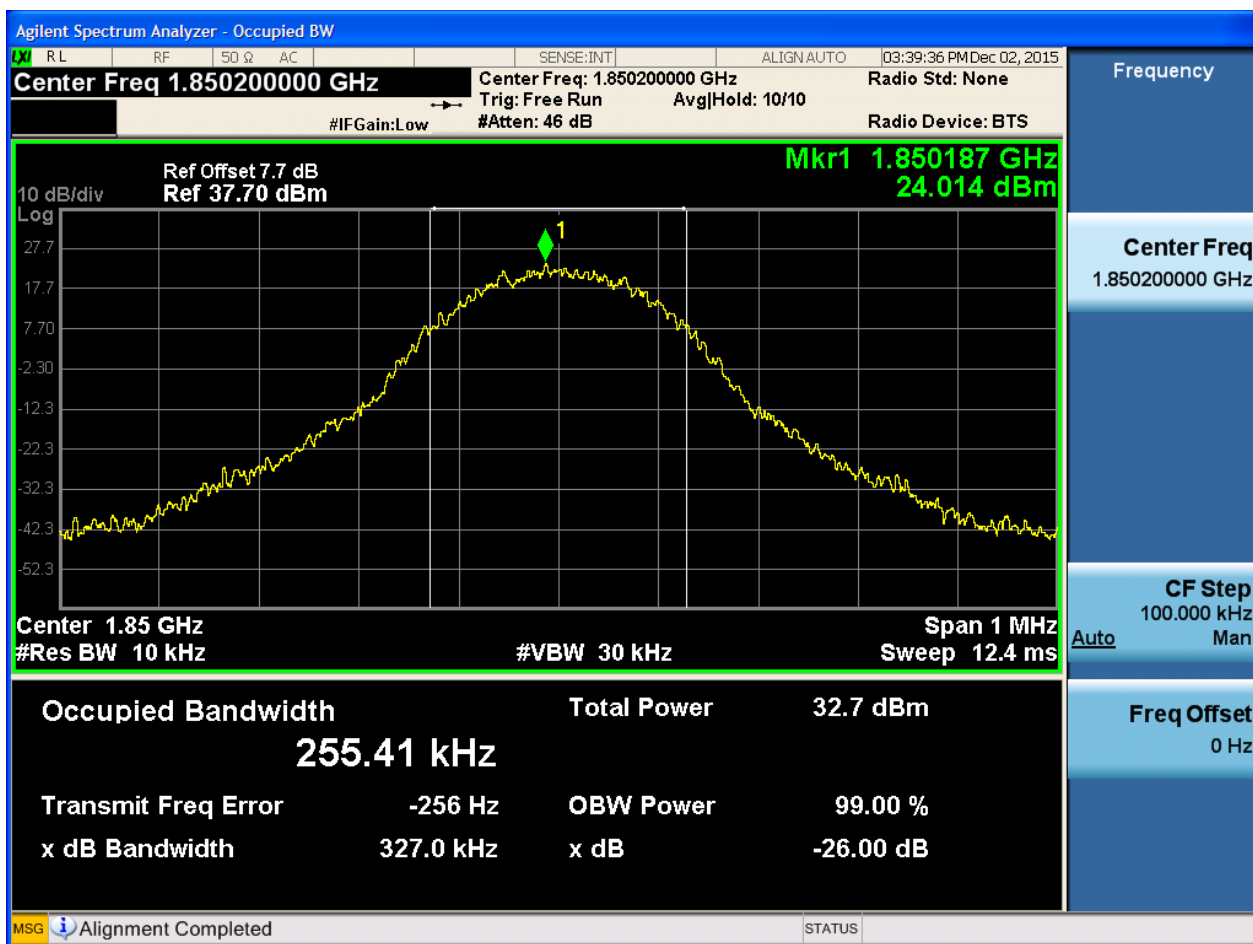
4.1.2.1.3 Test Channel = HCH





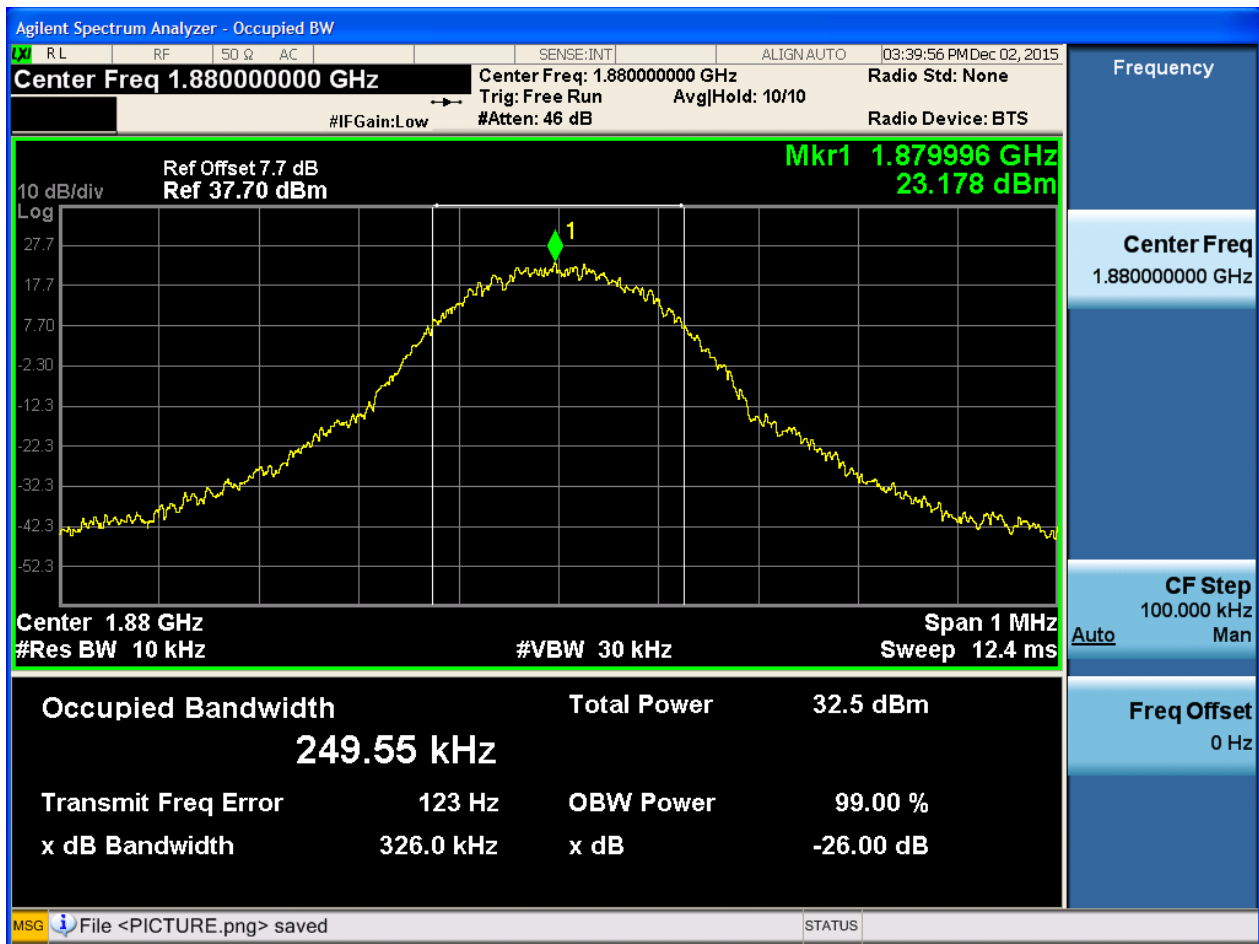
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



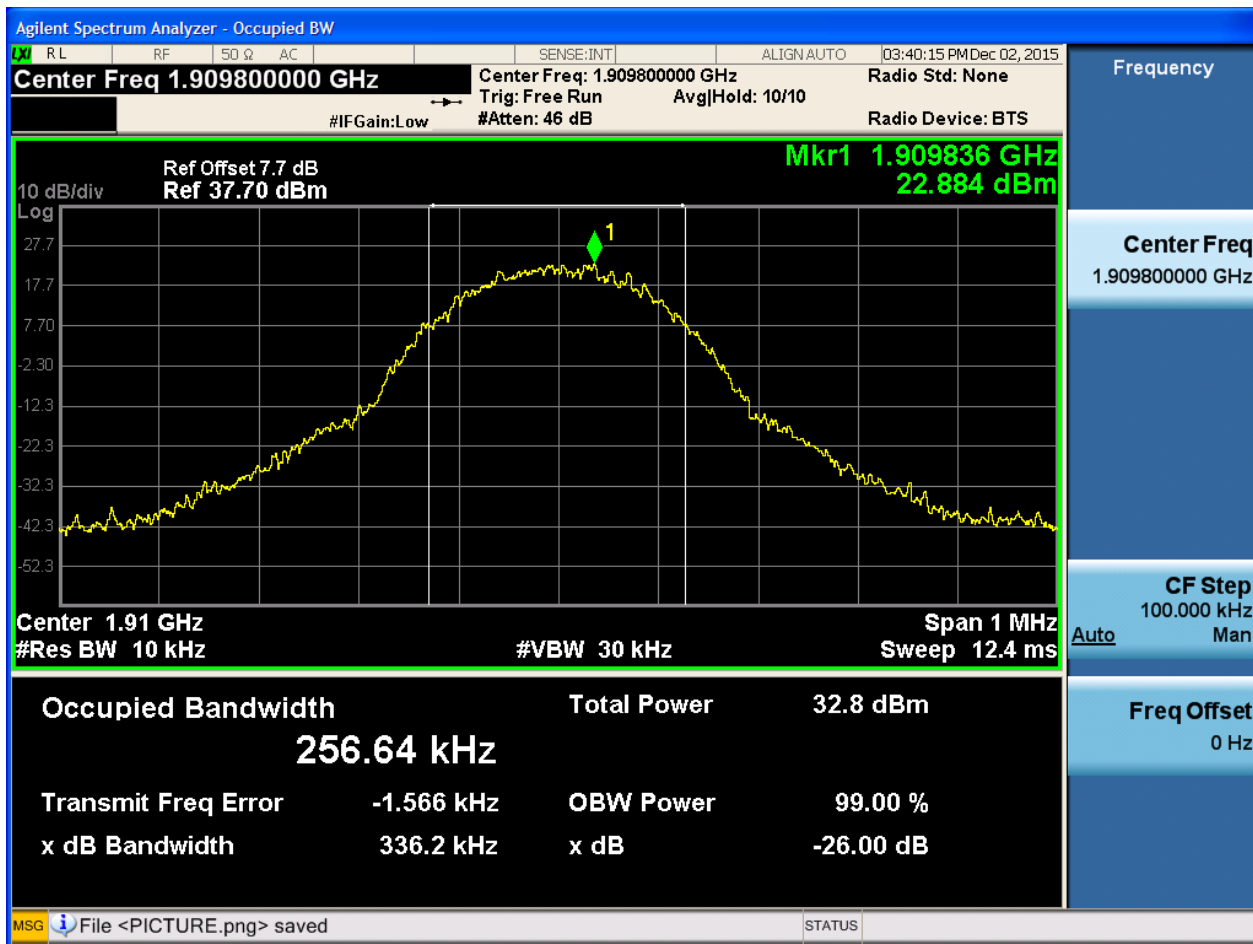


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





5Appendix_E: Band Edges Compliance

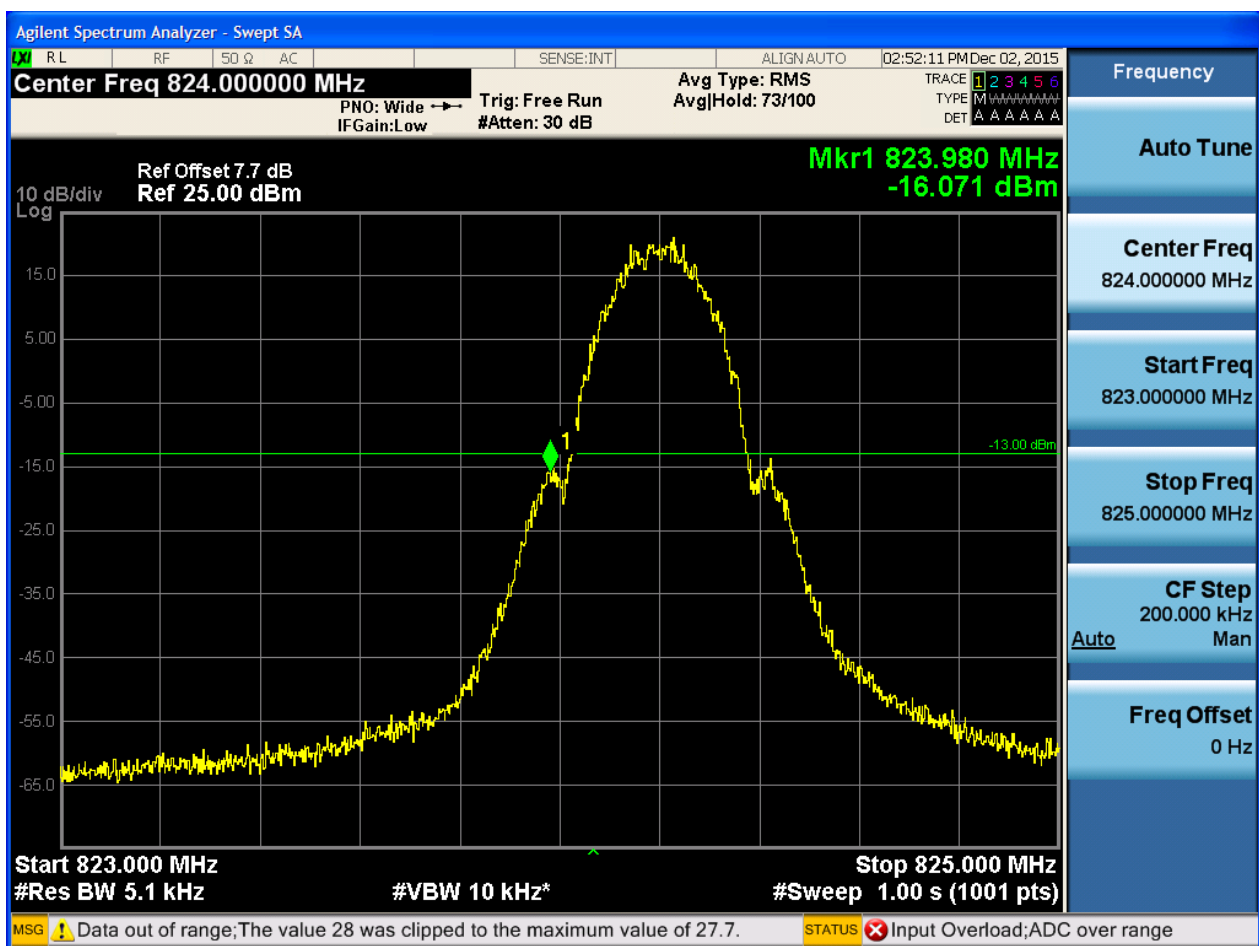
Part I - Test Plots

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





Agilent Spectrum Analyzer - Swept SA

Center Freq 849.000000 MHz

PNO: Wide → Trig: Free Run

IFGain: Low #Atten: 30 dB

Avg Type: RMS

AvgHold: 74/100

TRACE 1 2 3 4 5 6

TYPE [M] [M] [M] [M] [M] [M]

DET A A A A A A

Ref Offset 7.7 dB

Ref 25.00 dBm

Mkr1 849.020 MHz

-13.953 dBm

10 dB/div

Log

Start 848.000 MHz

#Res BW 5.1 kHz

#VBW 10 kHz*

Stop 850.000 MHz

#Sweep 1.00 s (1001 pts)

MSG Data out of range; The value 28 was clipped to the maximum value of 27.7.

STATUS Input Overload; ADC over range

Frequency

Auto Tune

Center Freq

849.000000 MHz

Start Freq

848.000000 MHz

Stop Freq

850.000000 MHz

CF Step

200.000 kHz

Auto

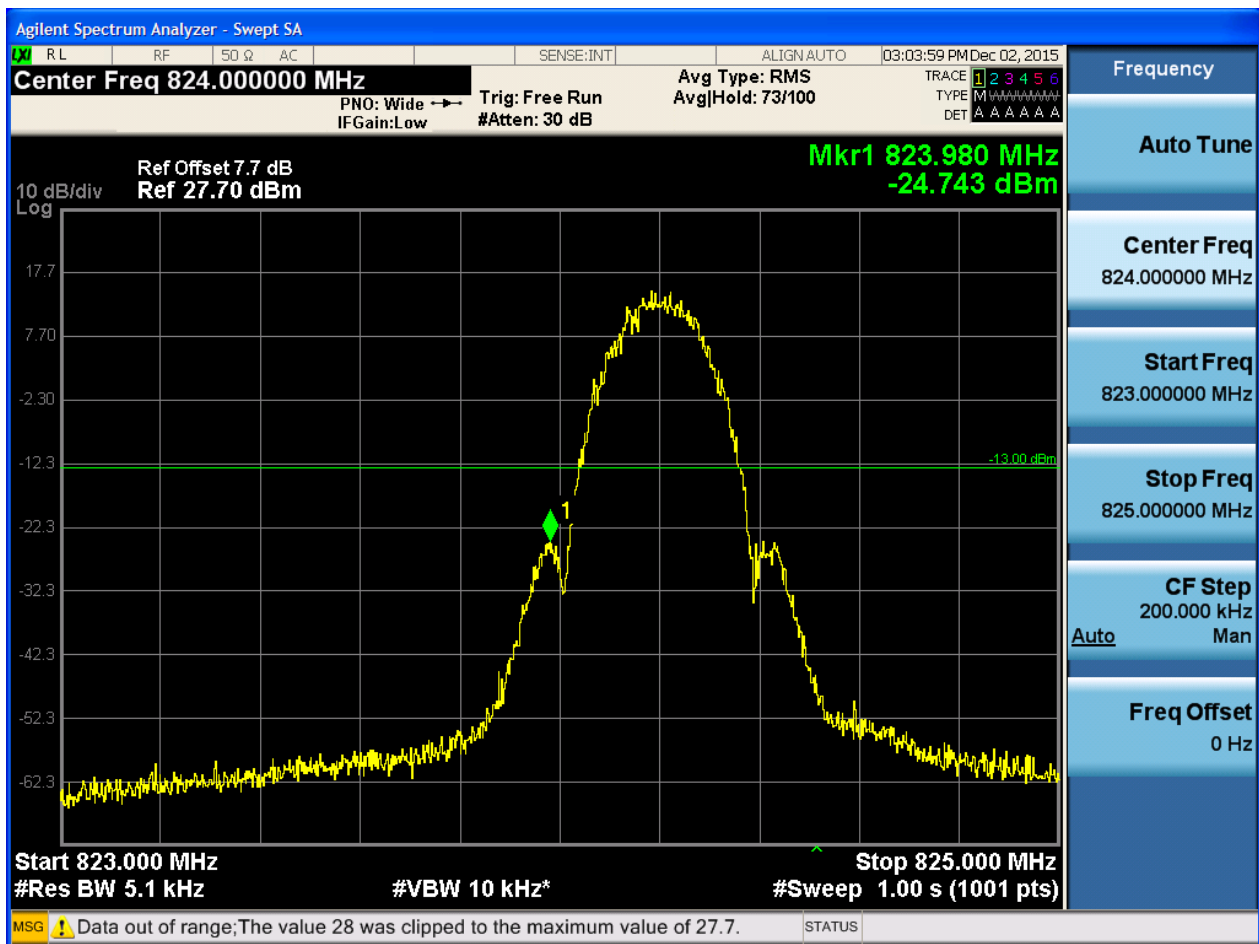
Man

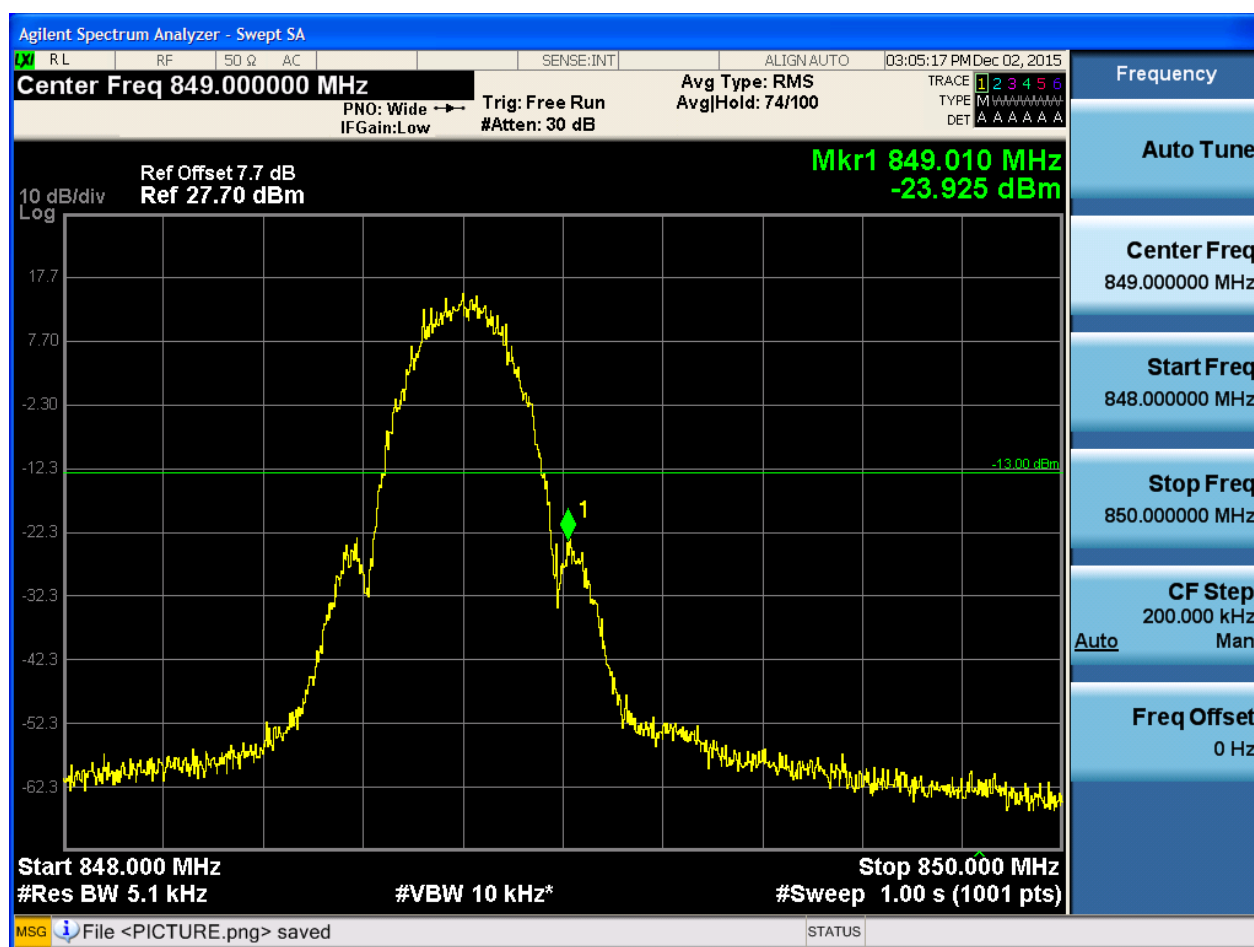
Freq Offset

0 Hz

5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



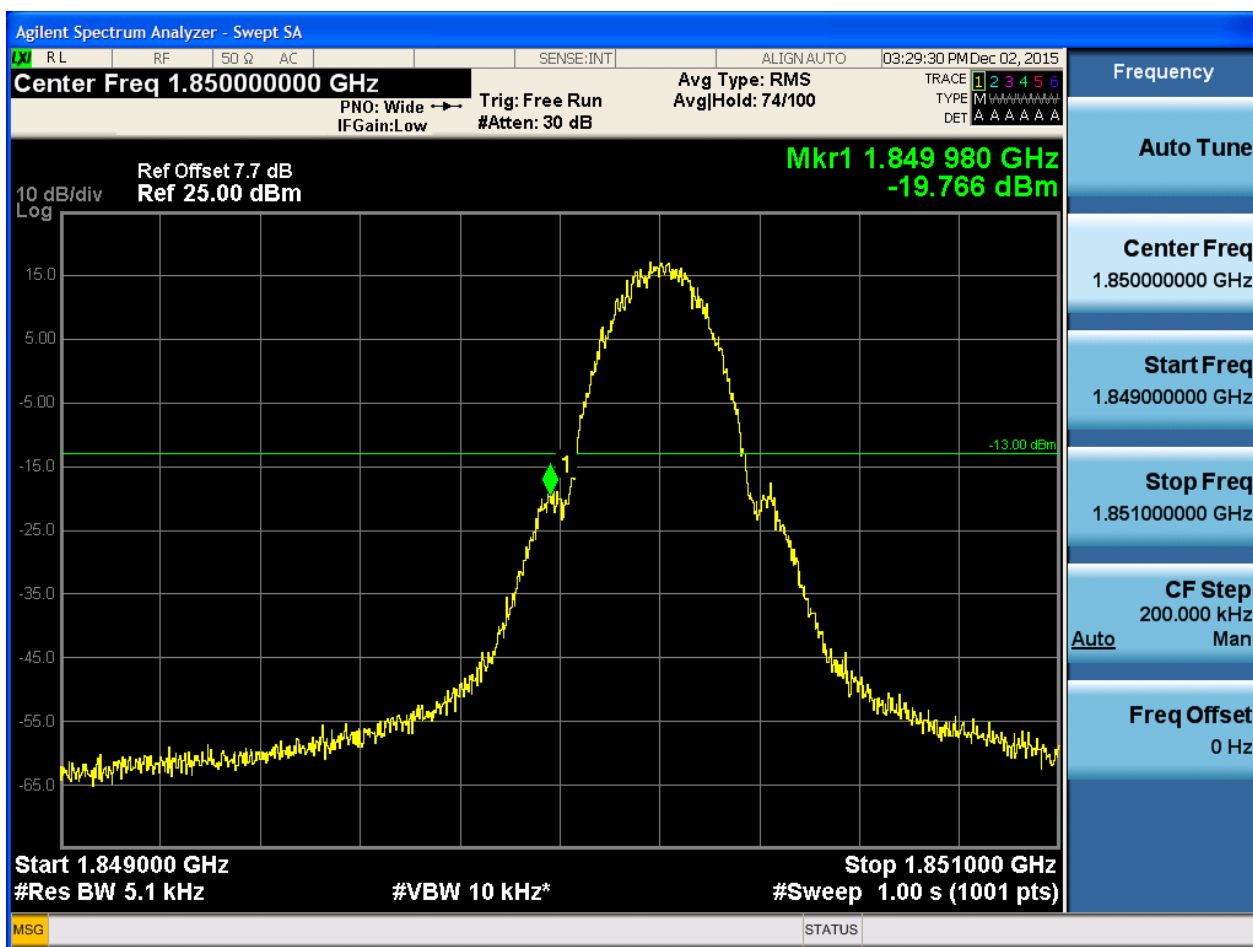




5.1.2 Test Band = GSM1900

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 7.7 dB
Ref 25.00 dBm

10 dB/div
Log

Mkr1 1.910 020 GHz
-19.791 dBm

Start 1.909000 GHz
#Res BW 5.1 kHz

Stop 1.911000 GHz
#Sweep 1.00 s (1001 pts)

#VBW 10 kHz*

MSG Data out of range;The value 28 was clipped to the maximum value of 27.7.

STATUS Input Overload;ADC over range

Frequency

Auto Tune

Center Freq
1.91000000 GHz

Start Freq
1.909000000 GHz

Stop Freq
1.911000000 GHz

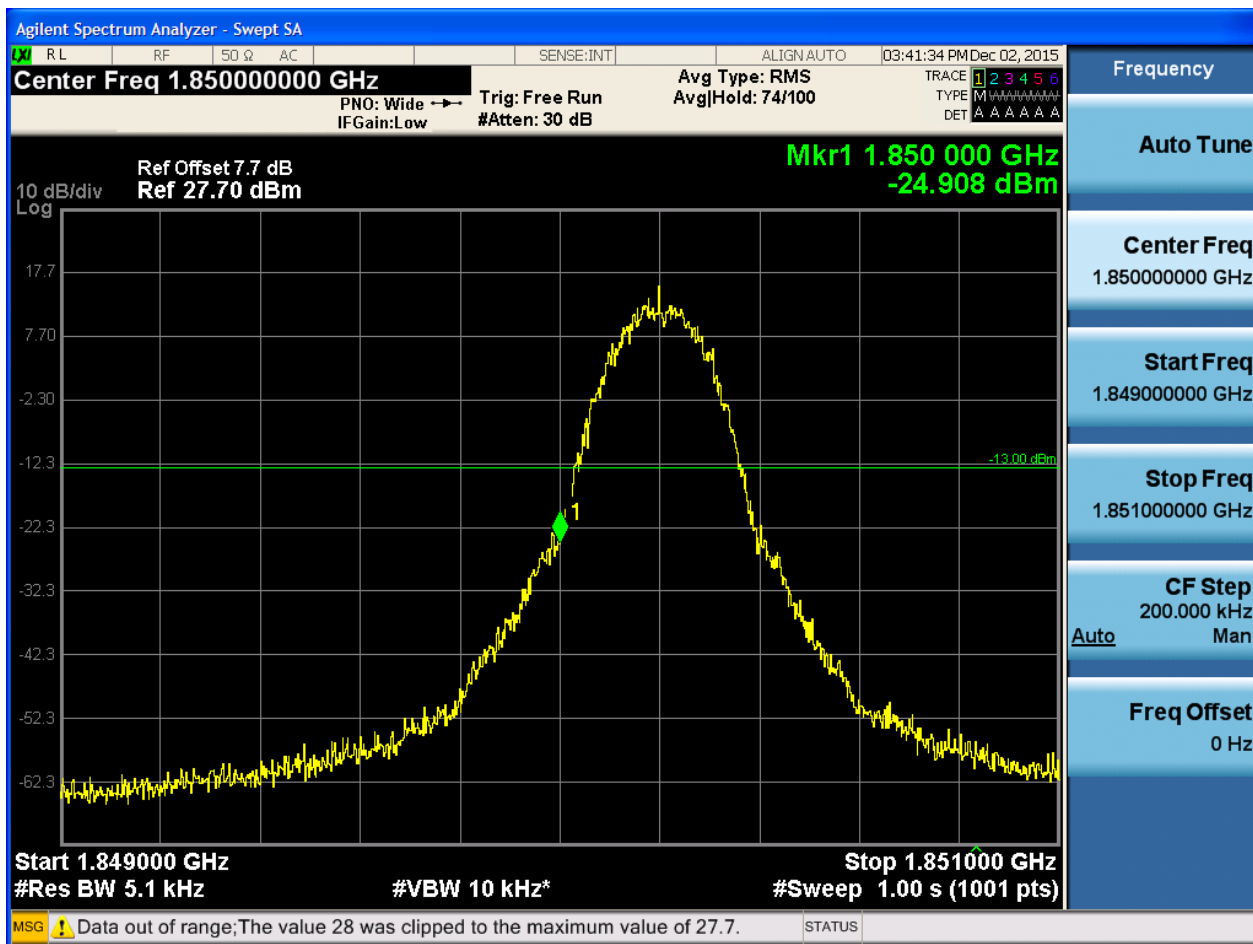
CF Step
200.000 kHz
Man

Freq Offset
0 Hz

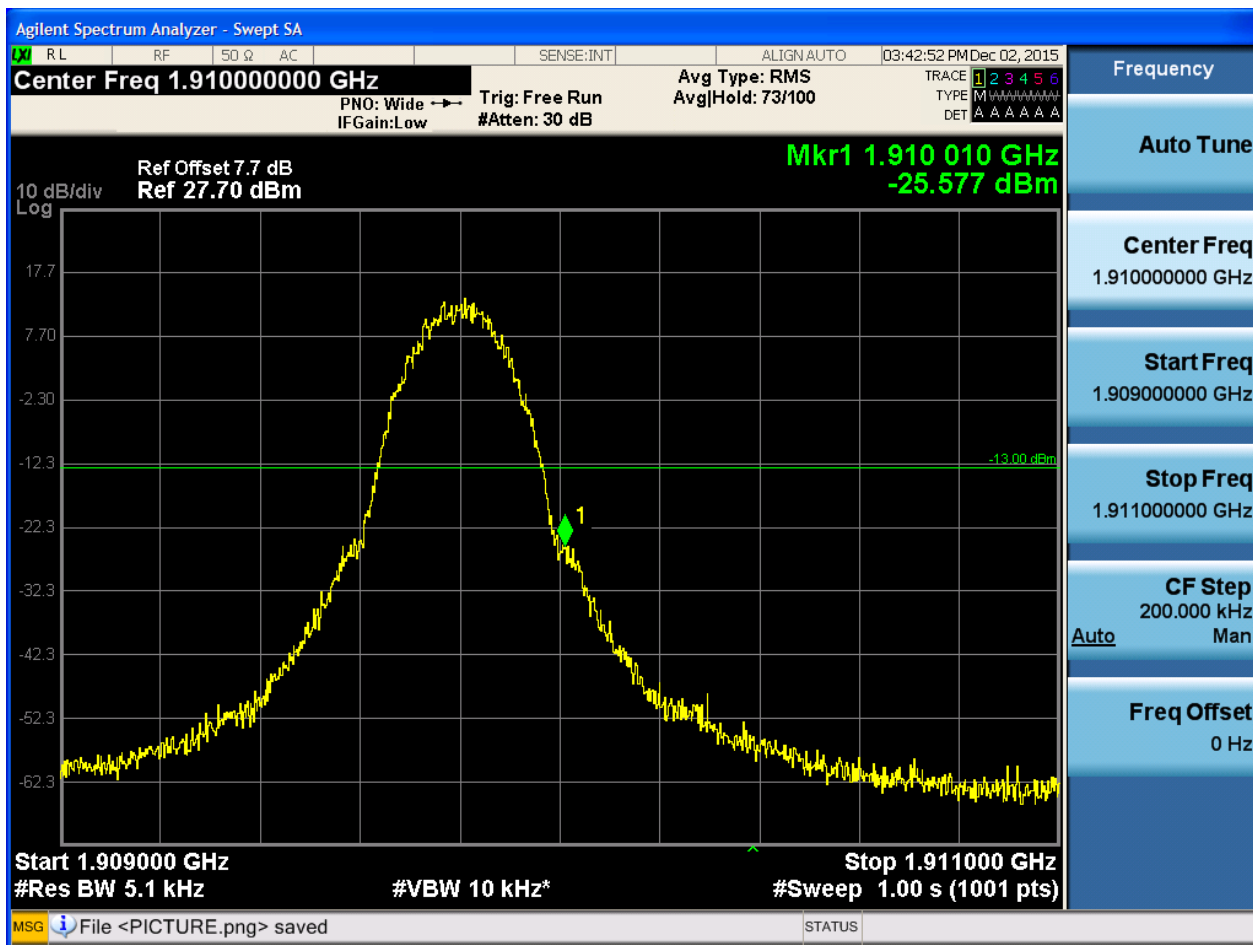


5.1.2.2 Test Mode = GSM/TM2

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.

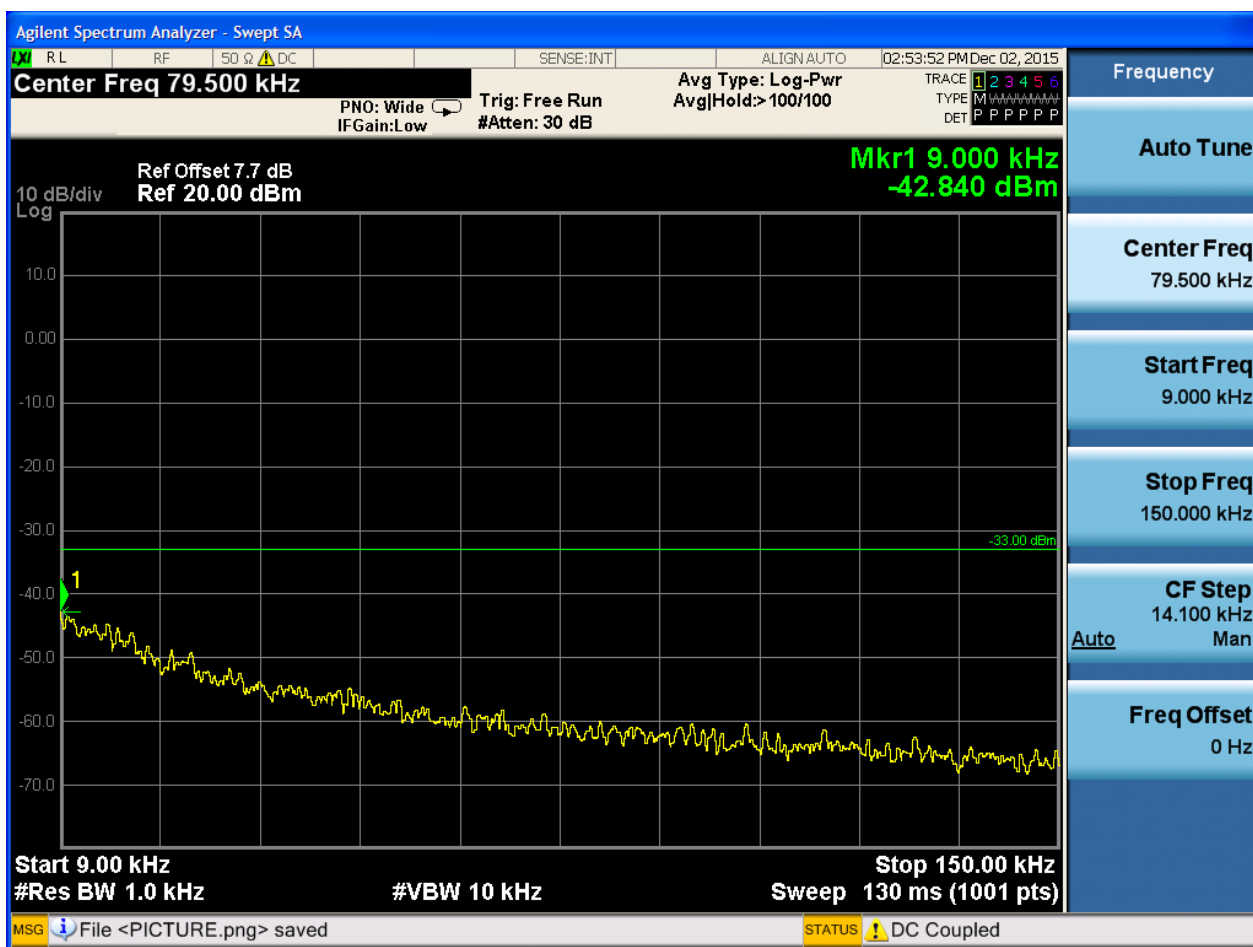
Part I - Test Plots

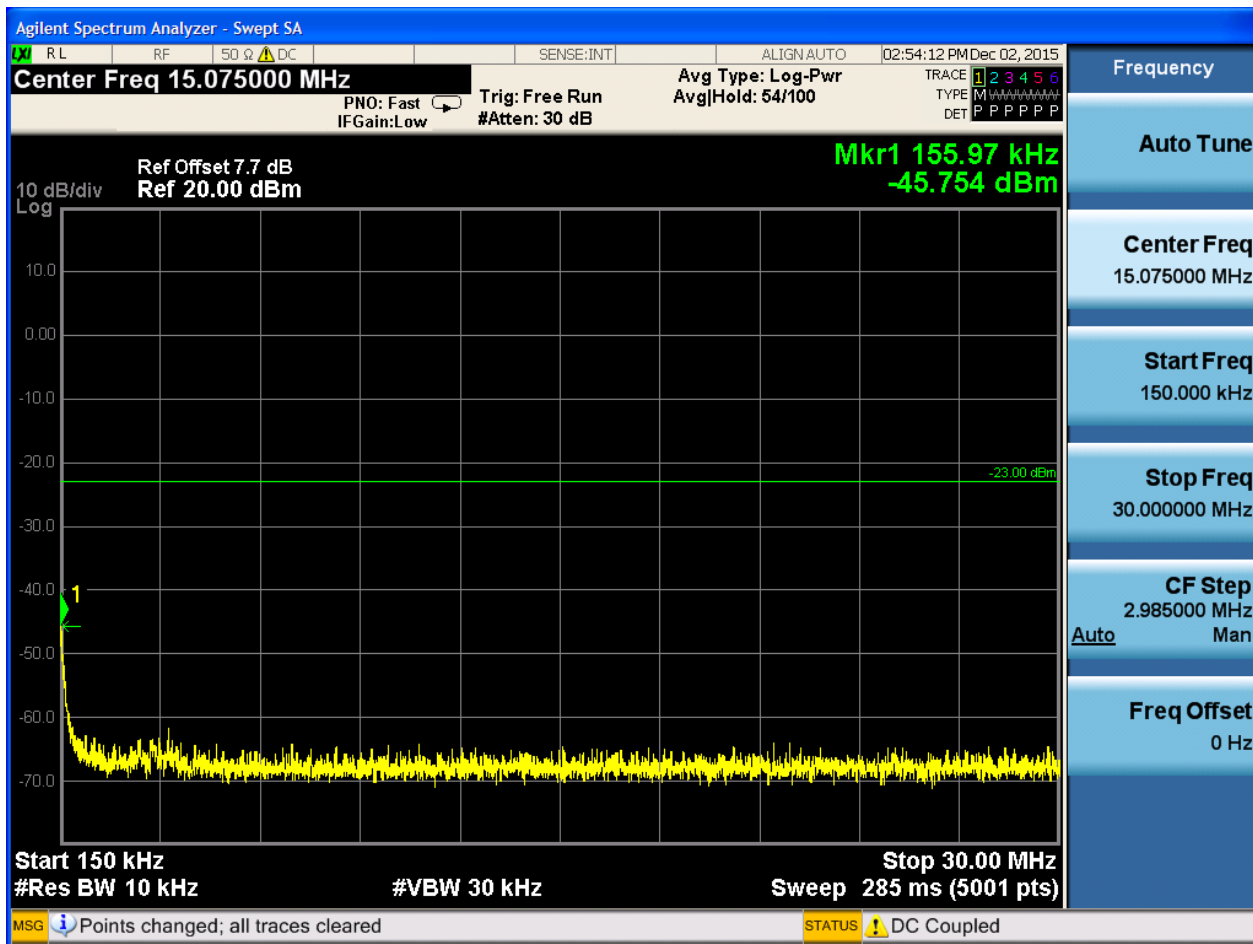
6.1 For GSM

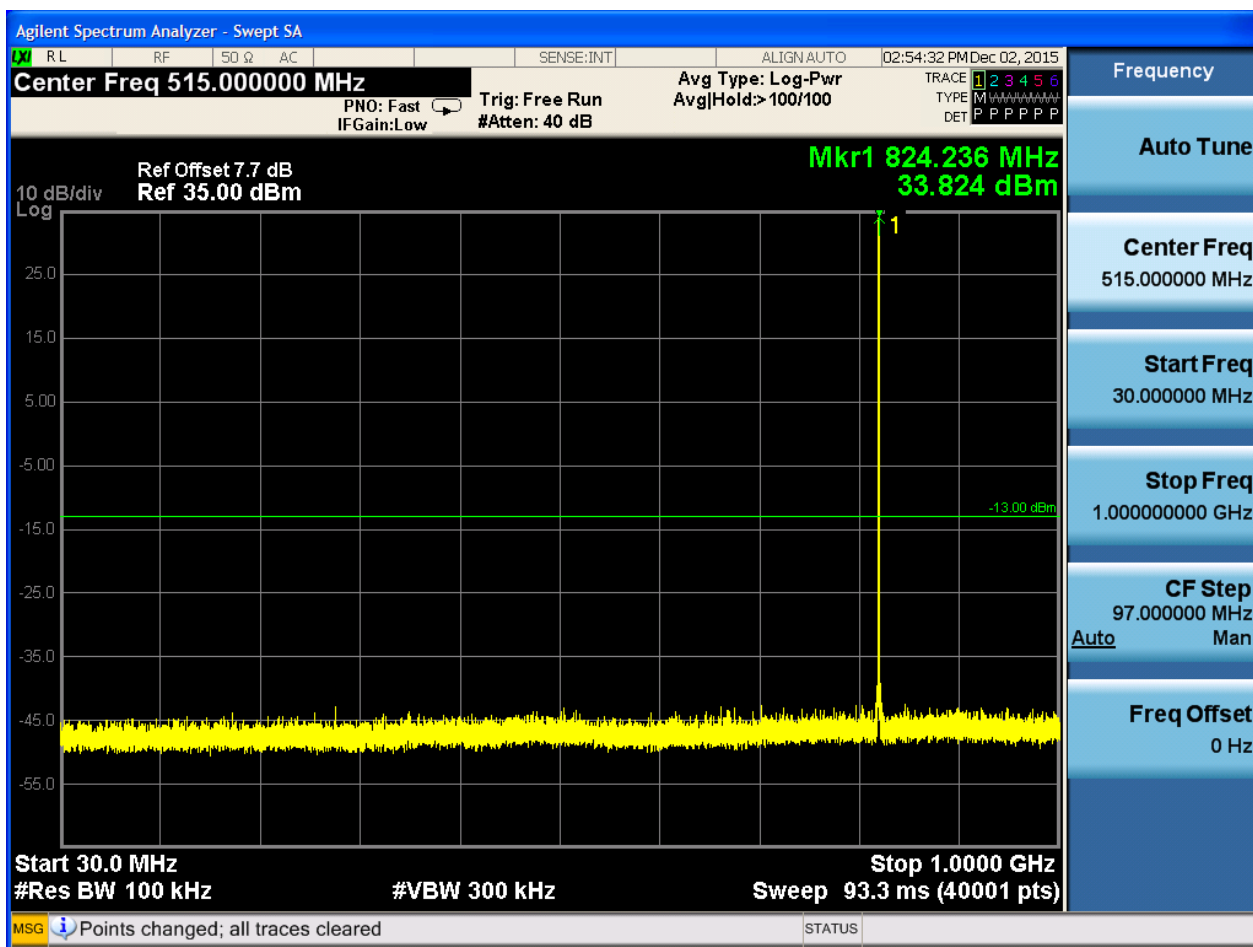
6.1.1 Test Band = GSM850

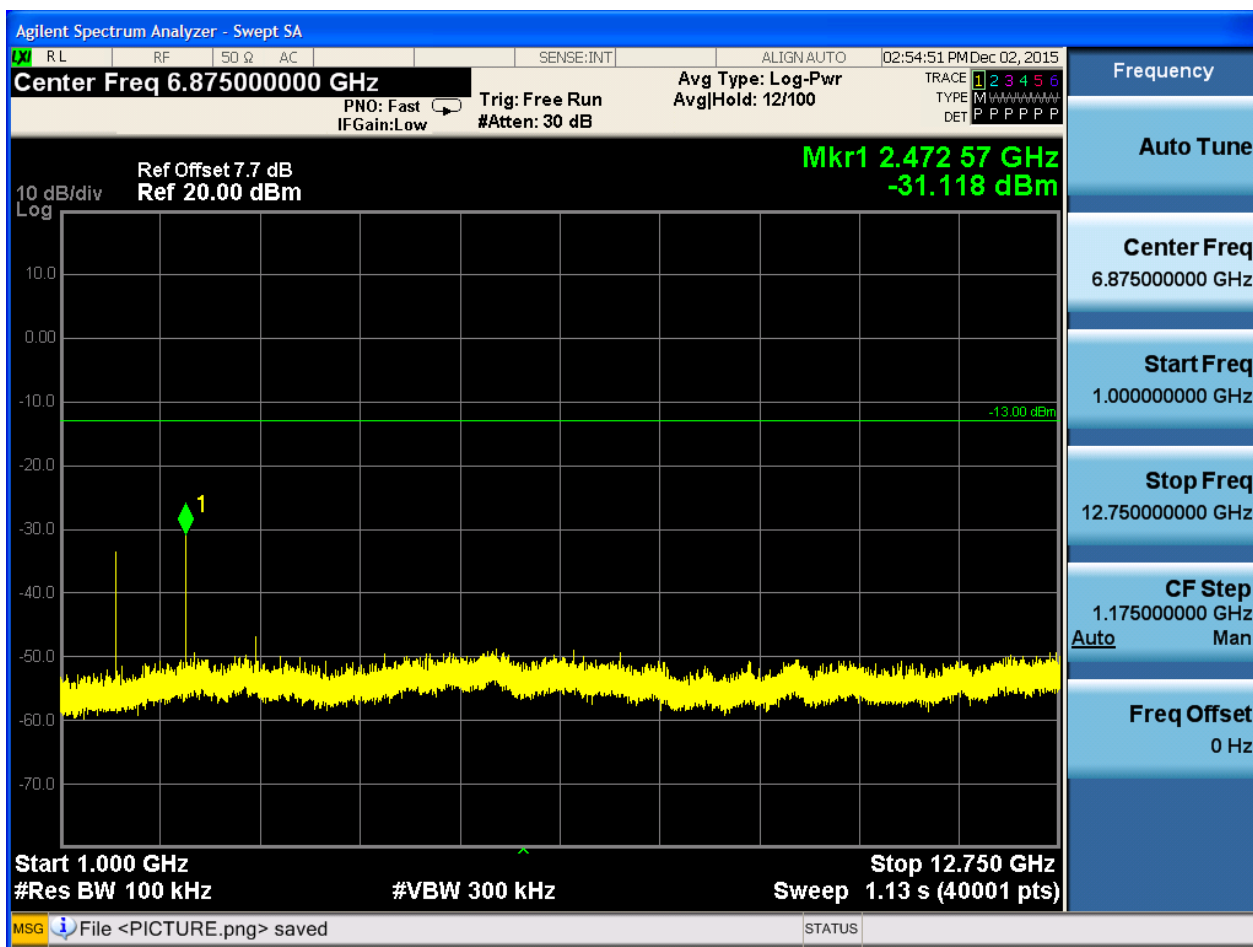
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH



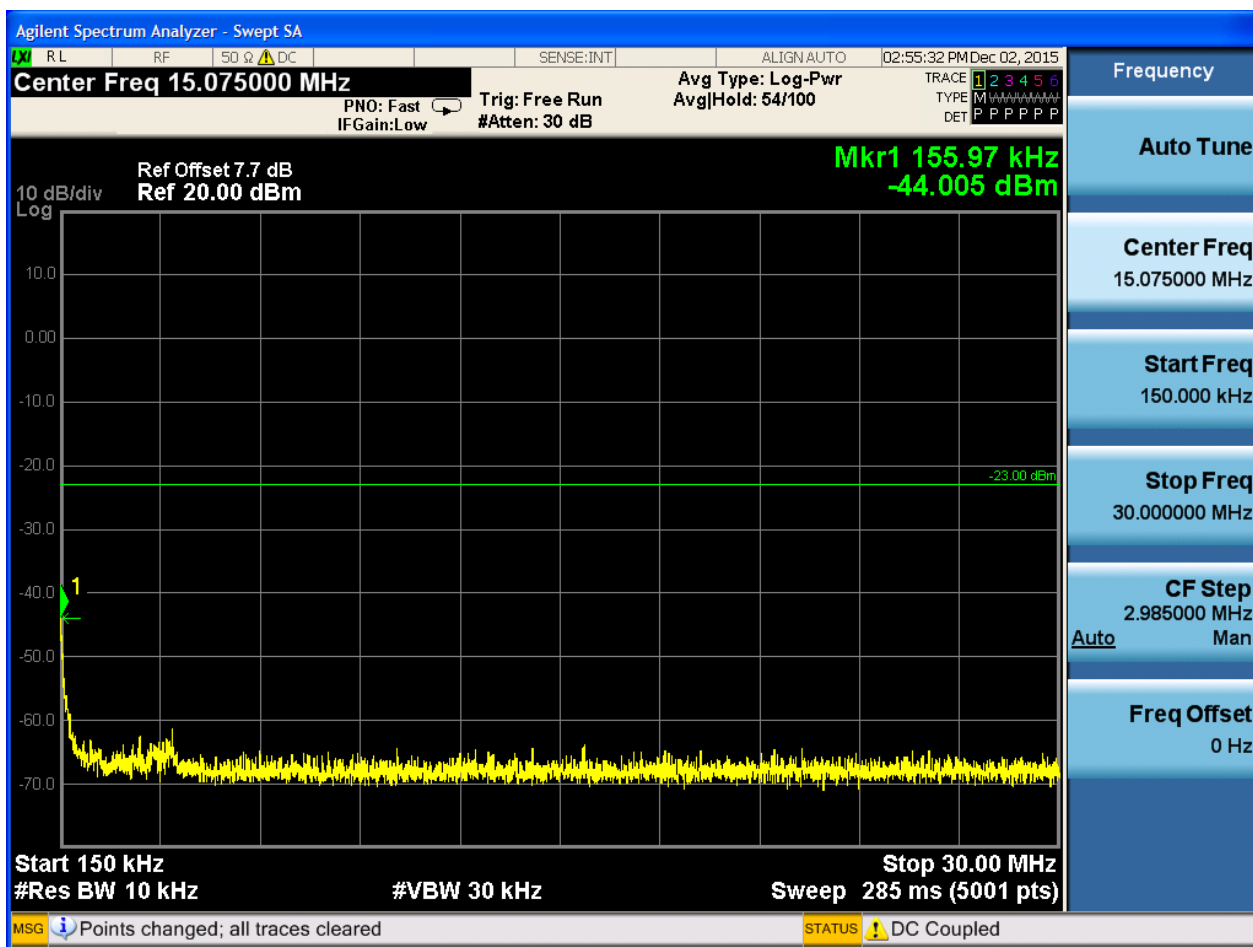


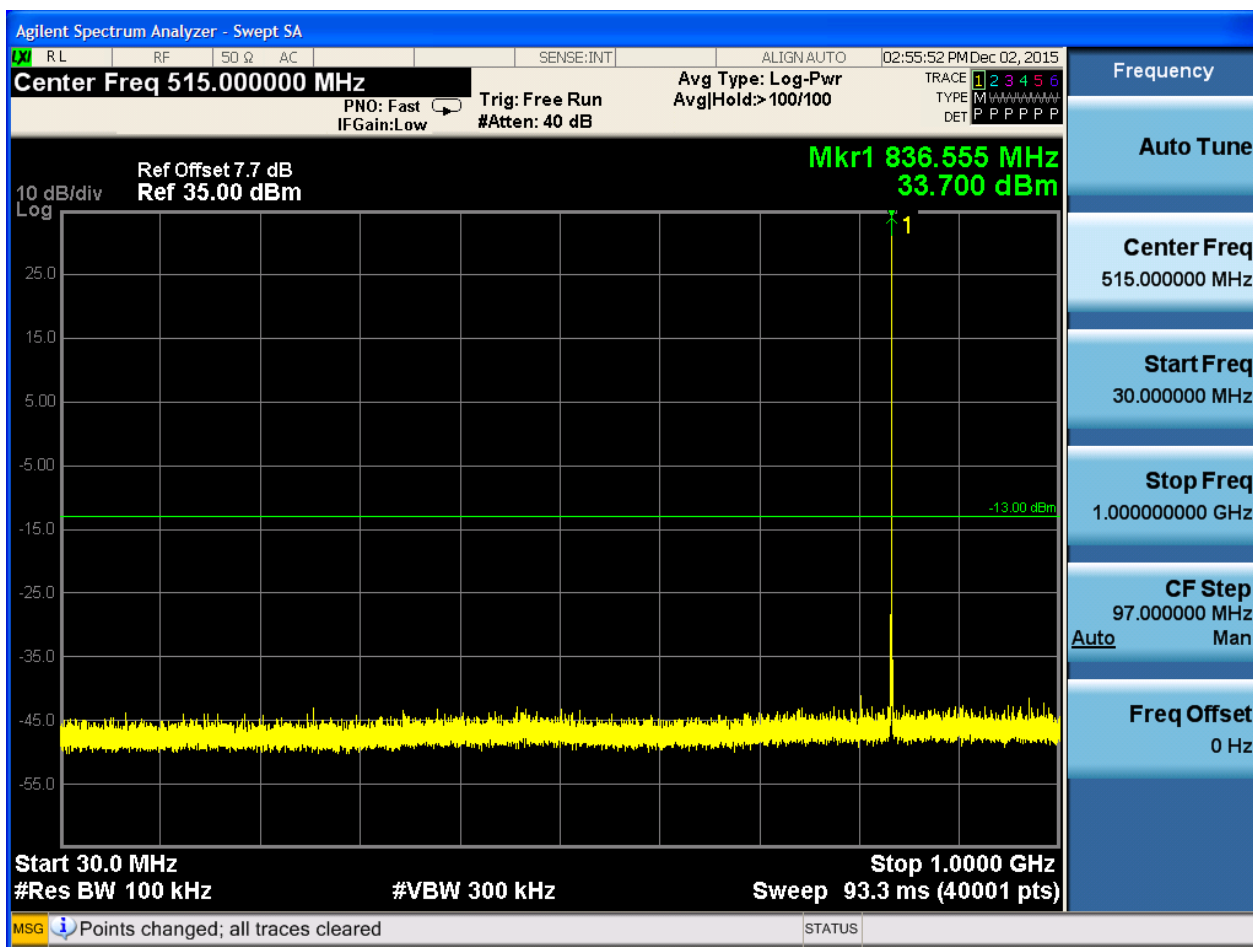


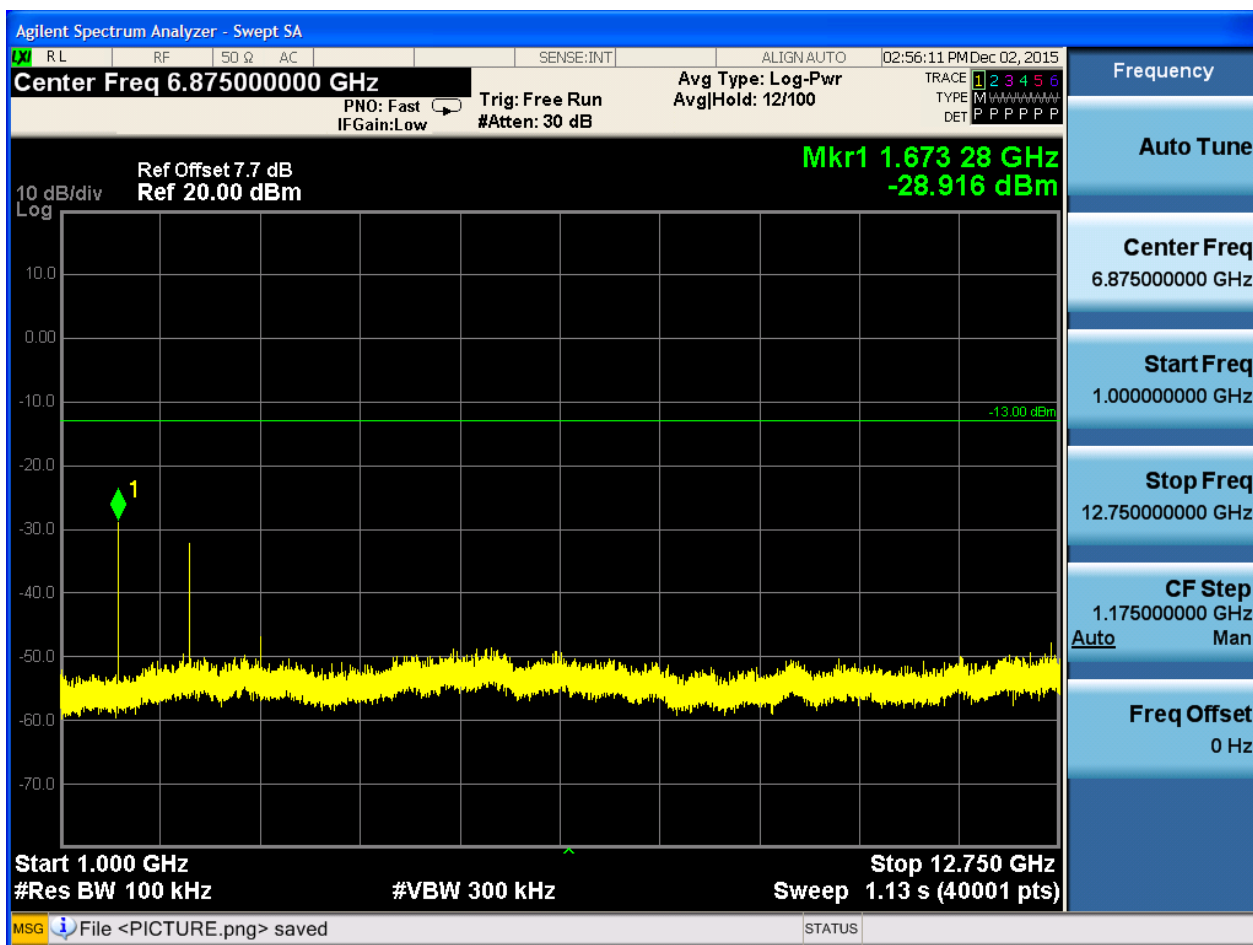


6.1.1.1.2 Test Channel = MCH

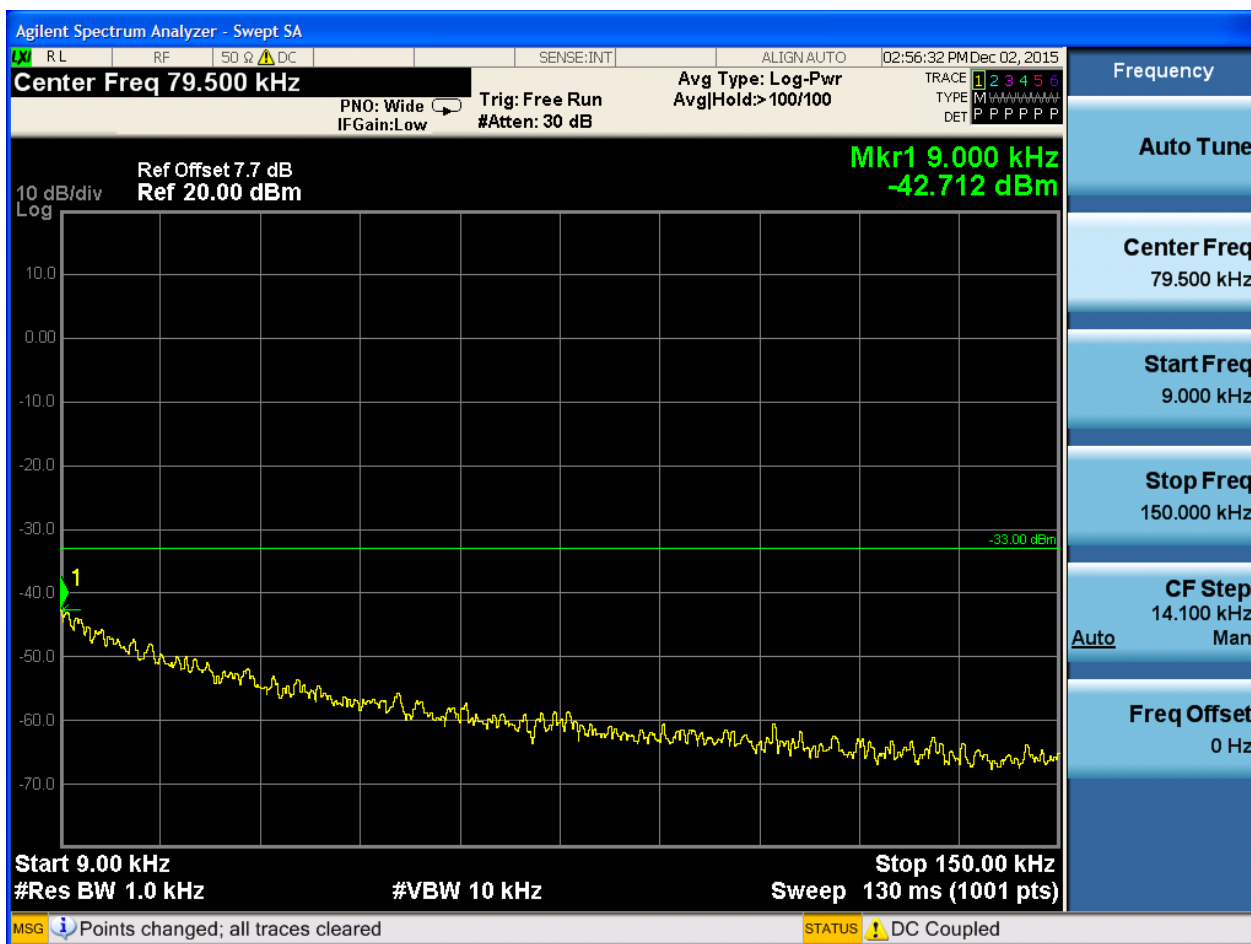


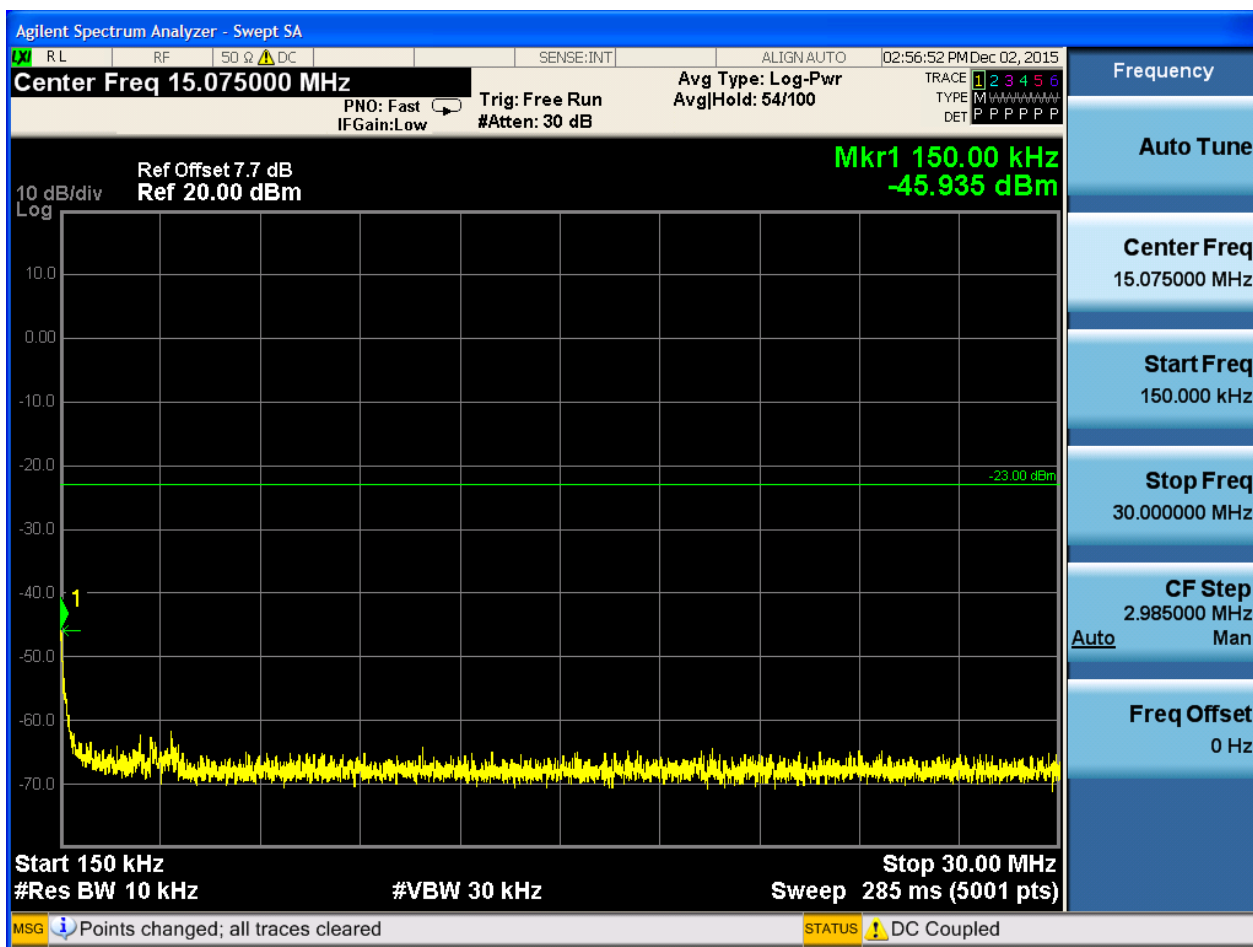


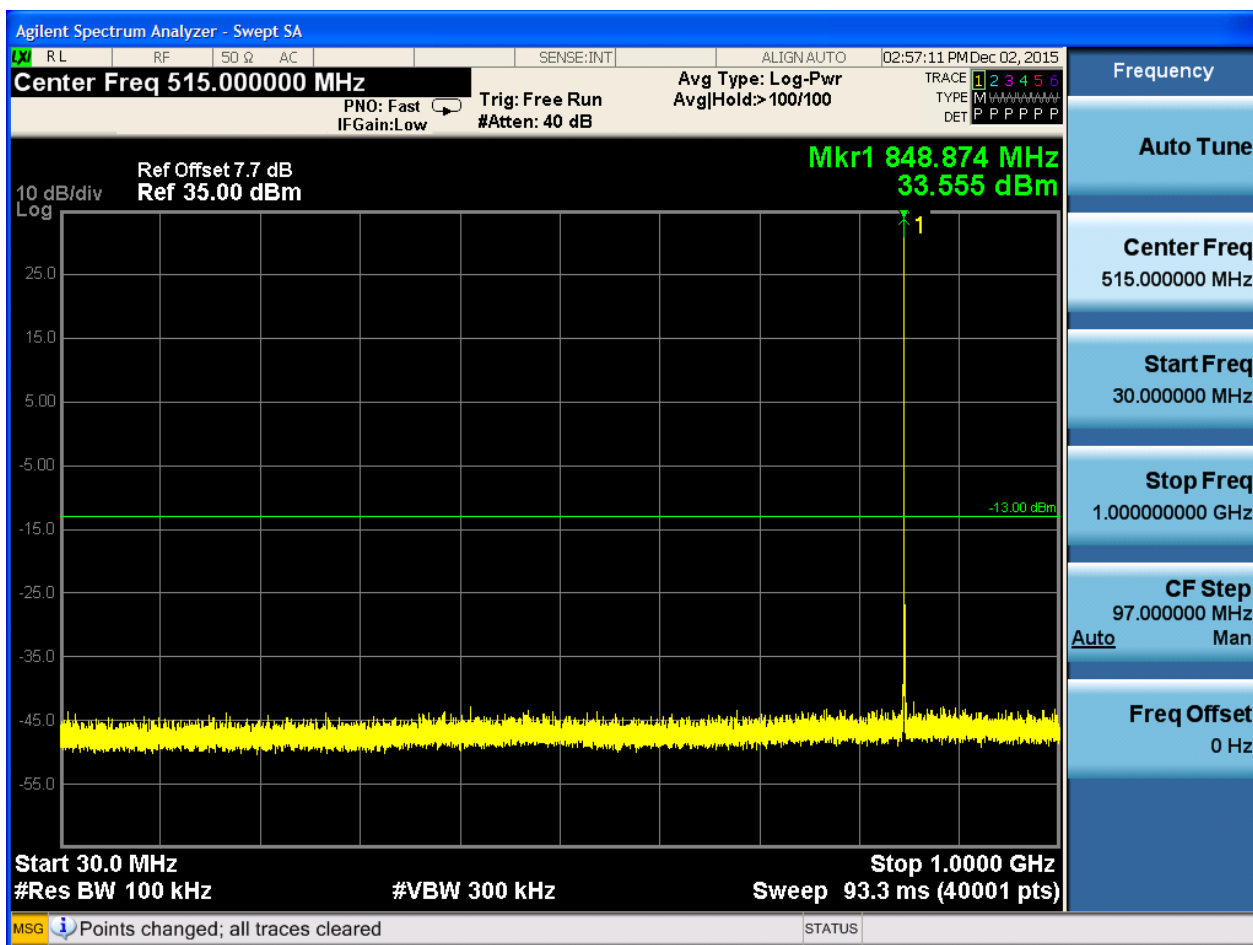


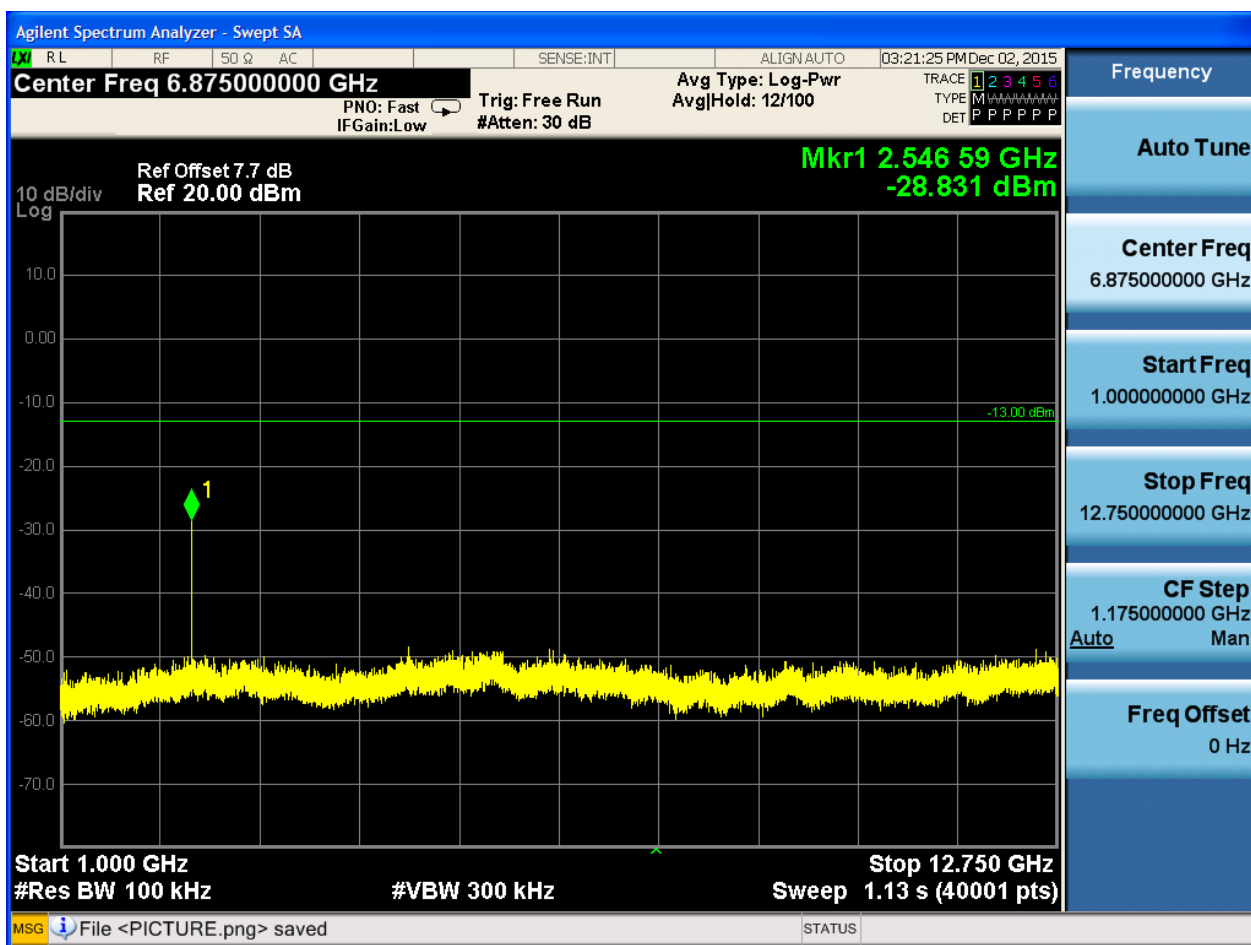


6.1.1.1.3 Test Channel = HCH





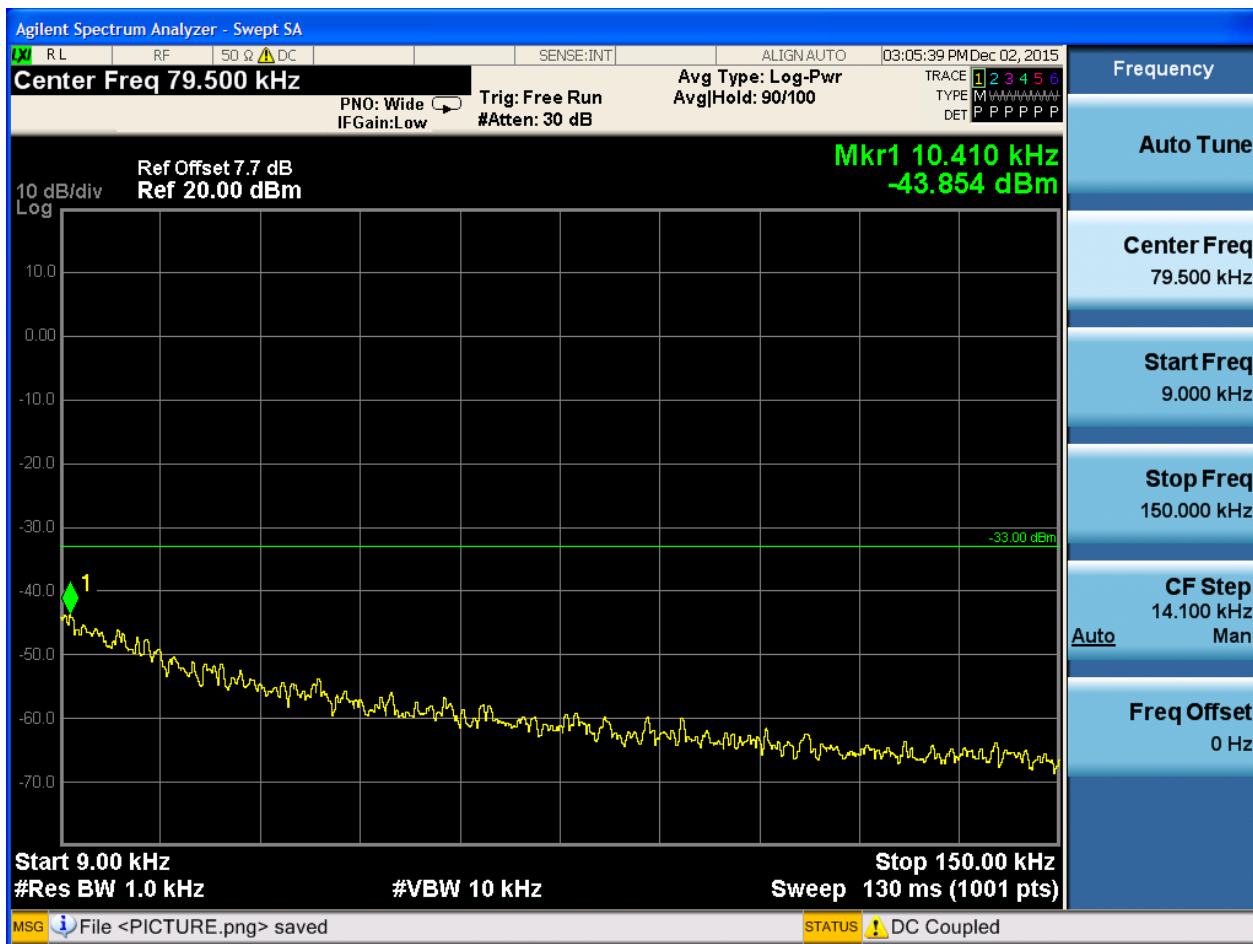


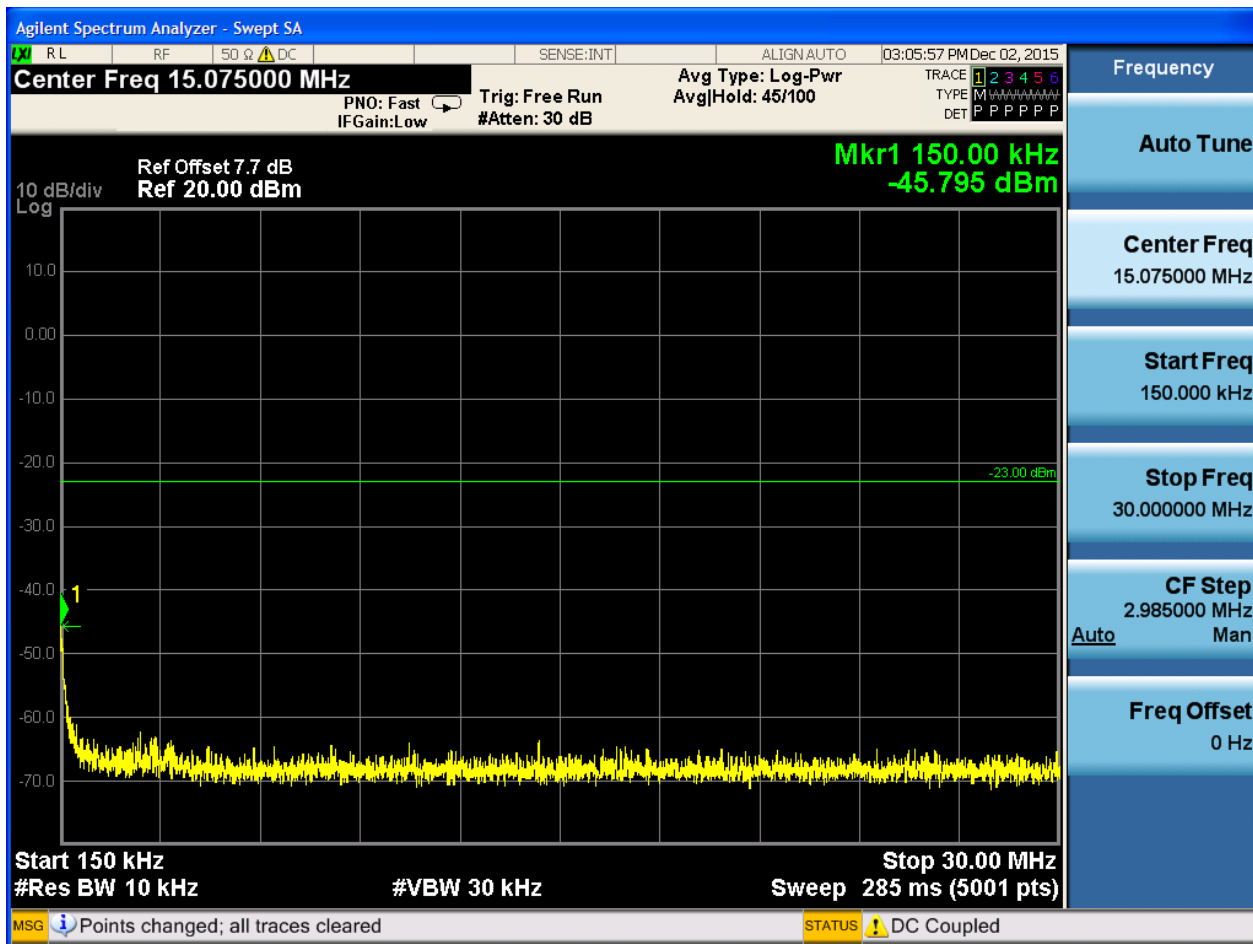


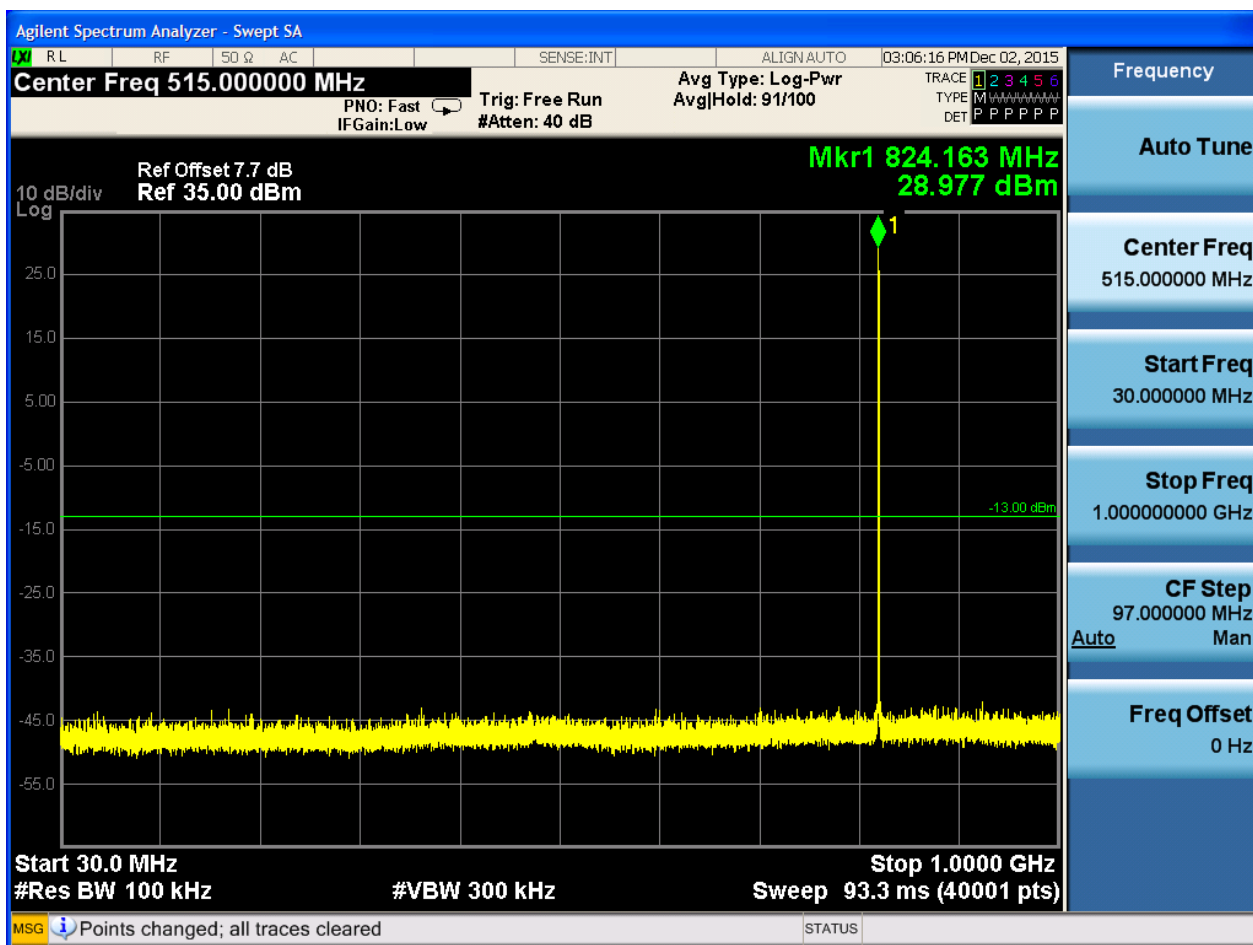


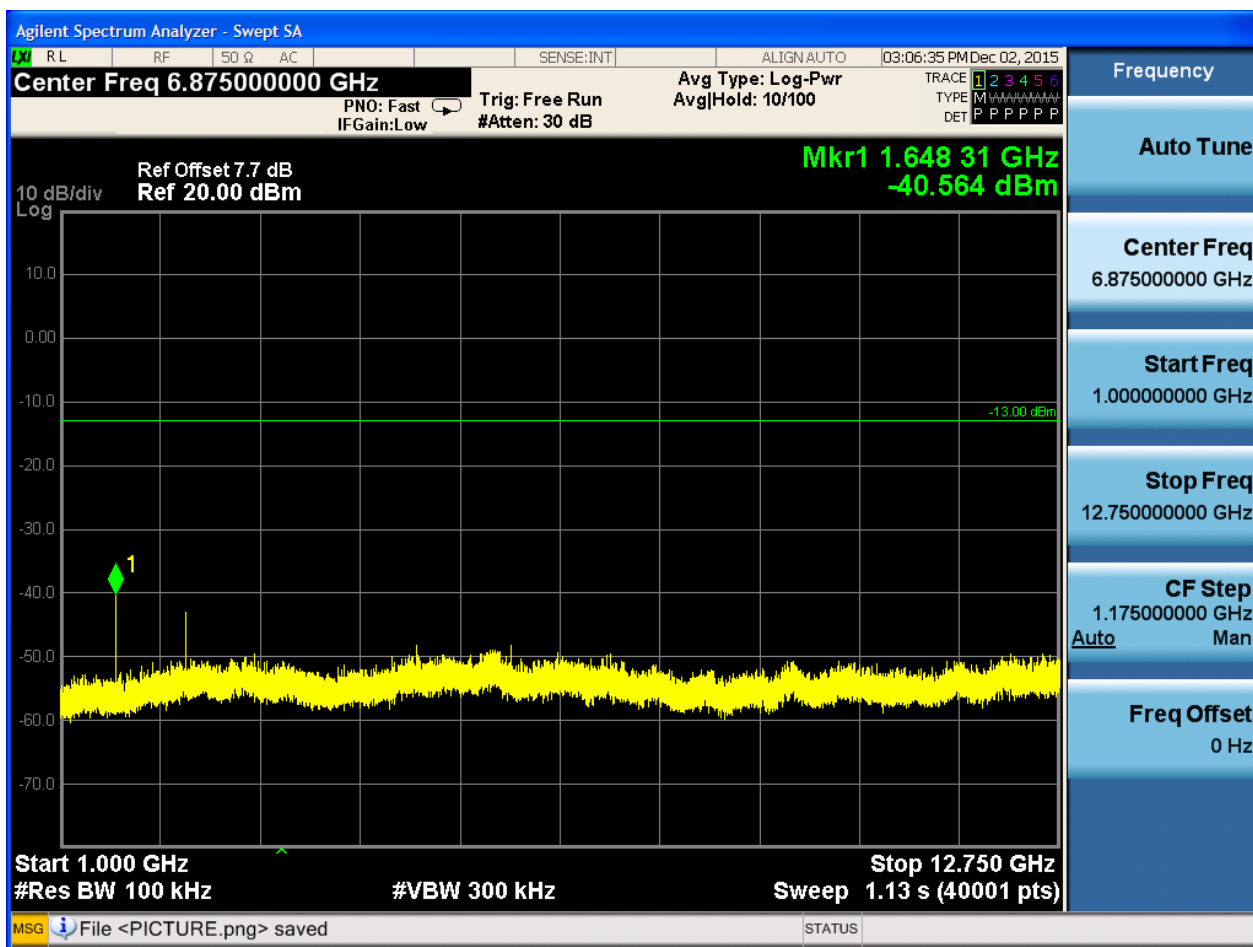
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH

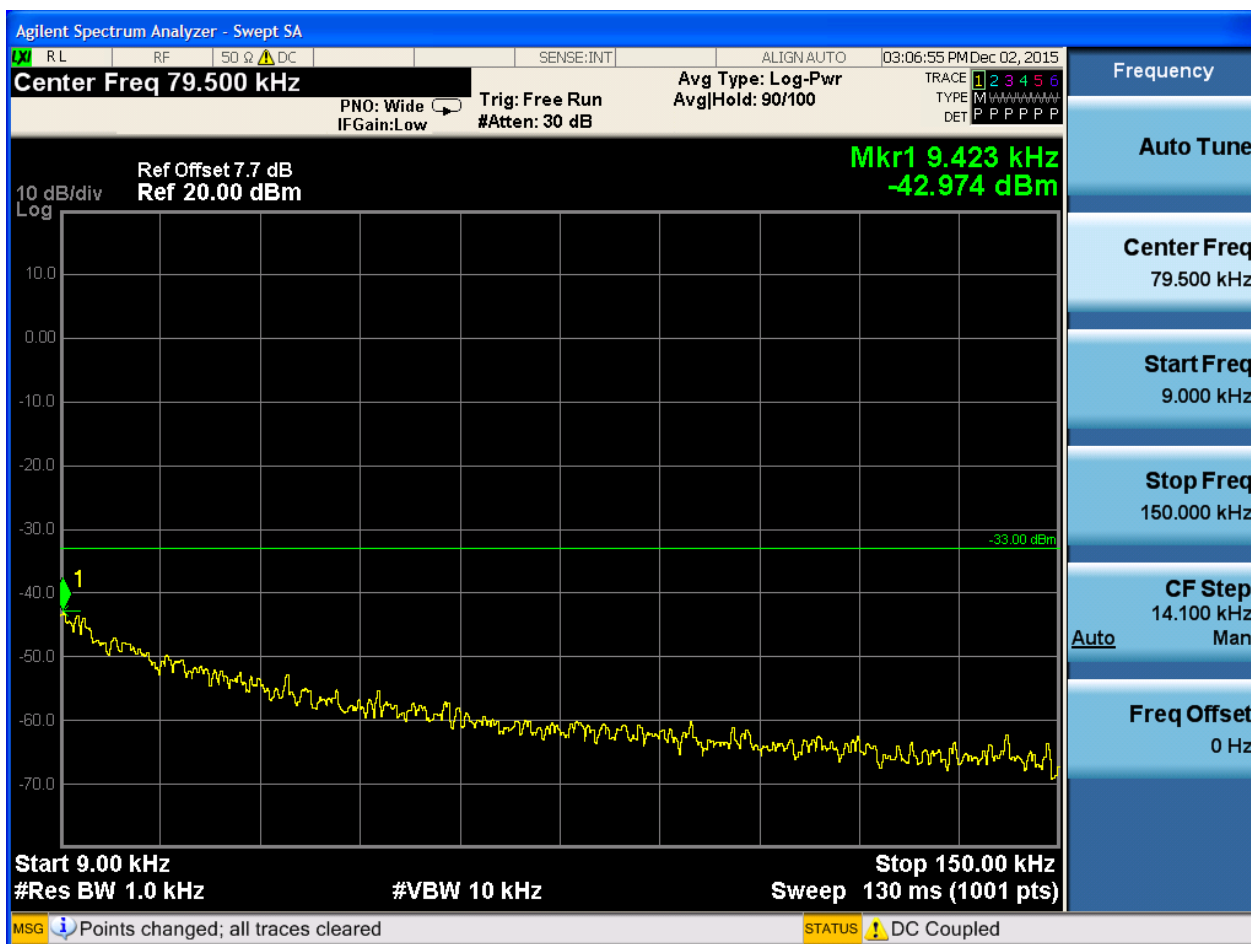


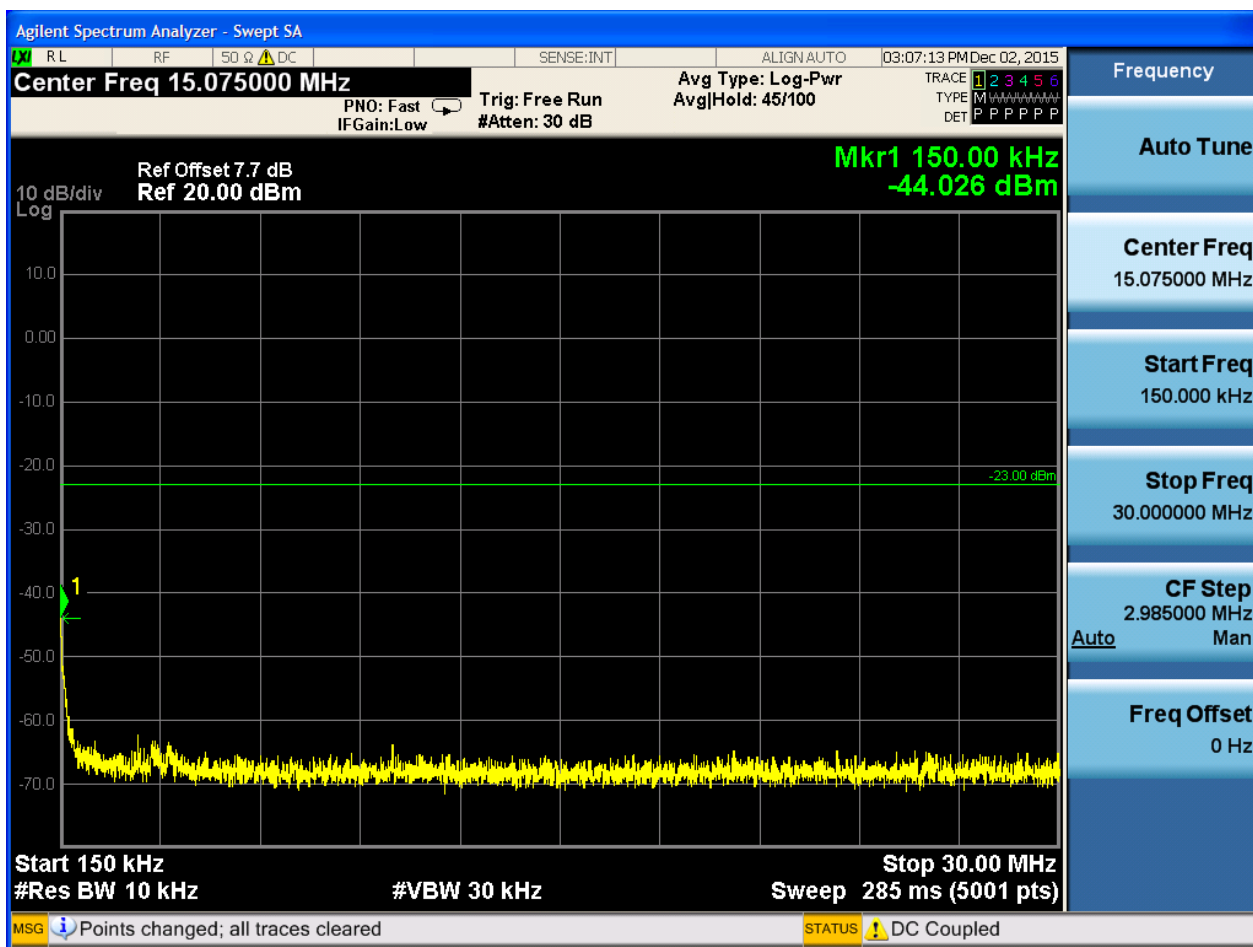


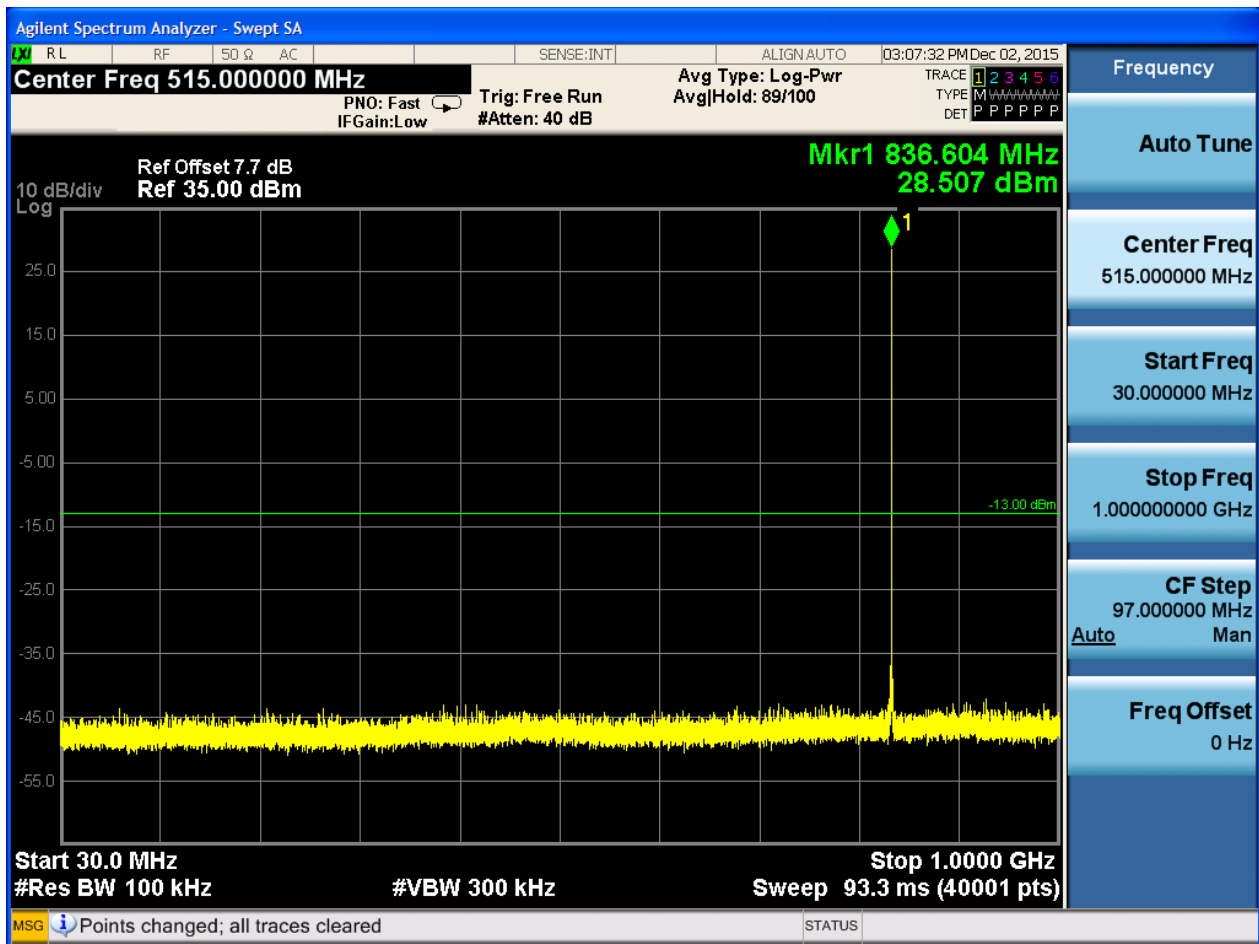


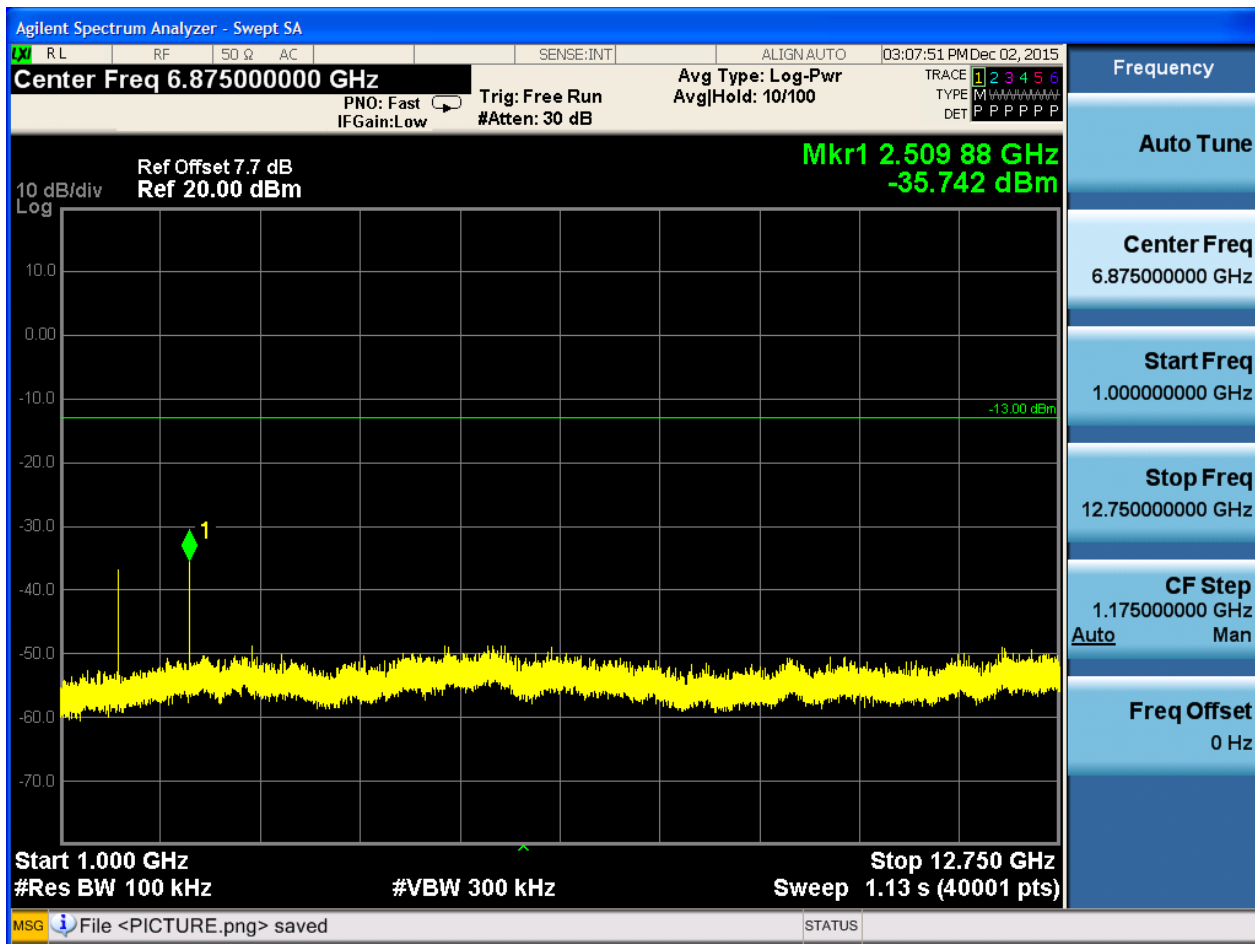


6.1.1.2.2 Test Channel = MCH

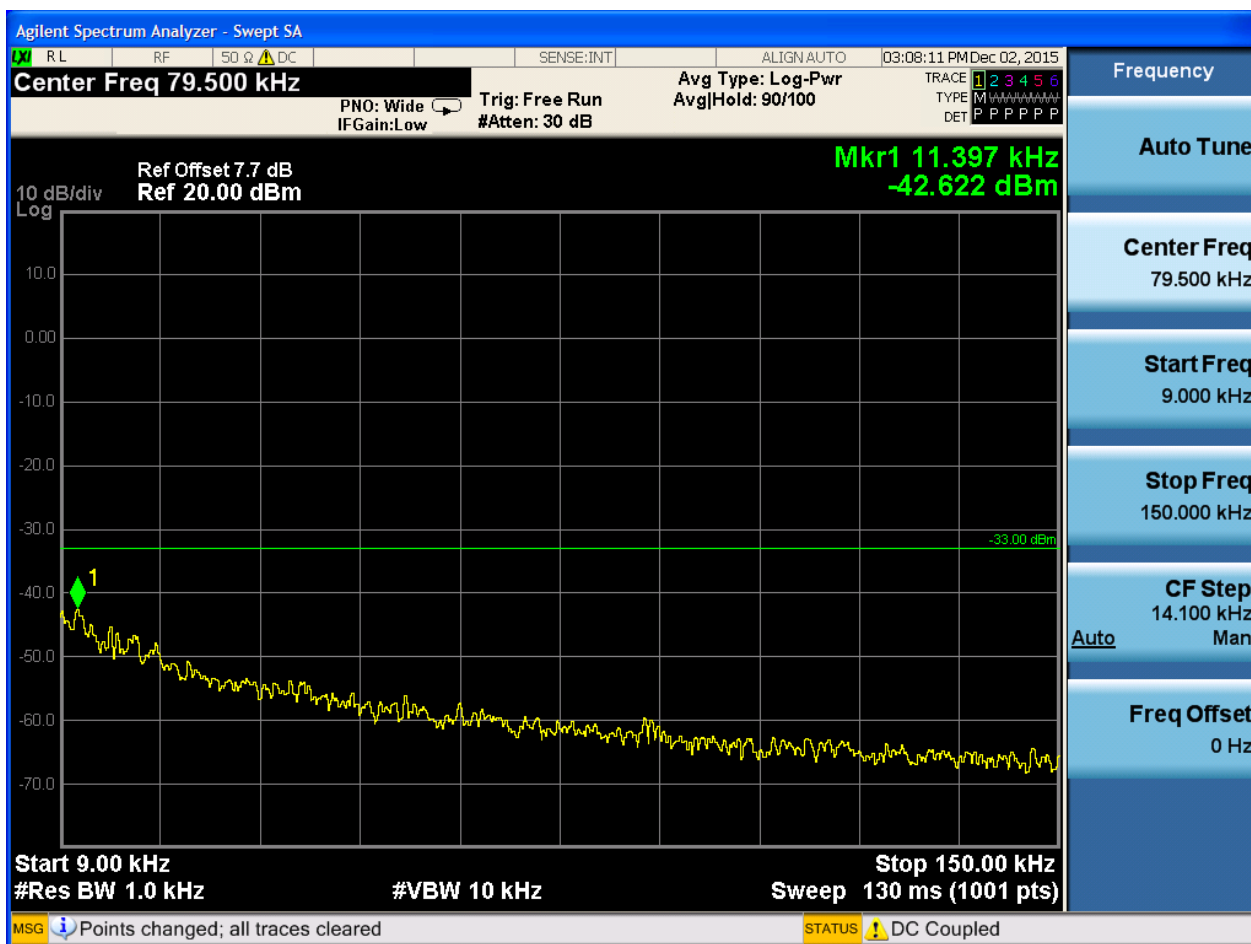


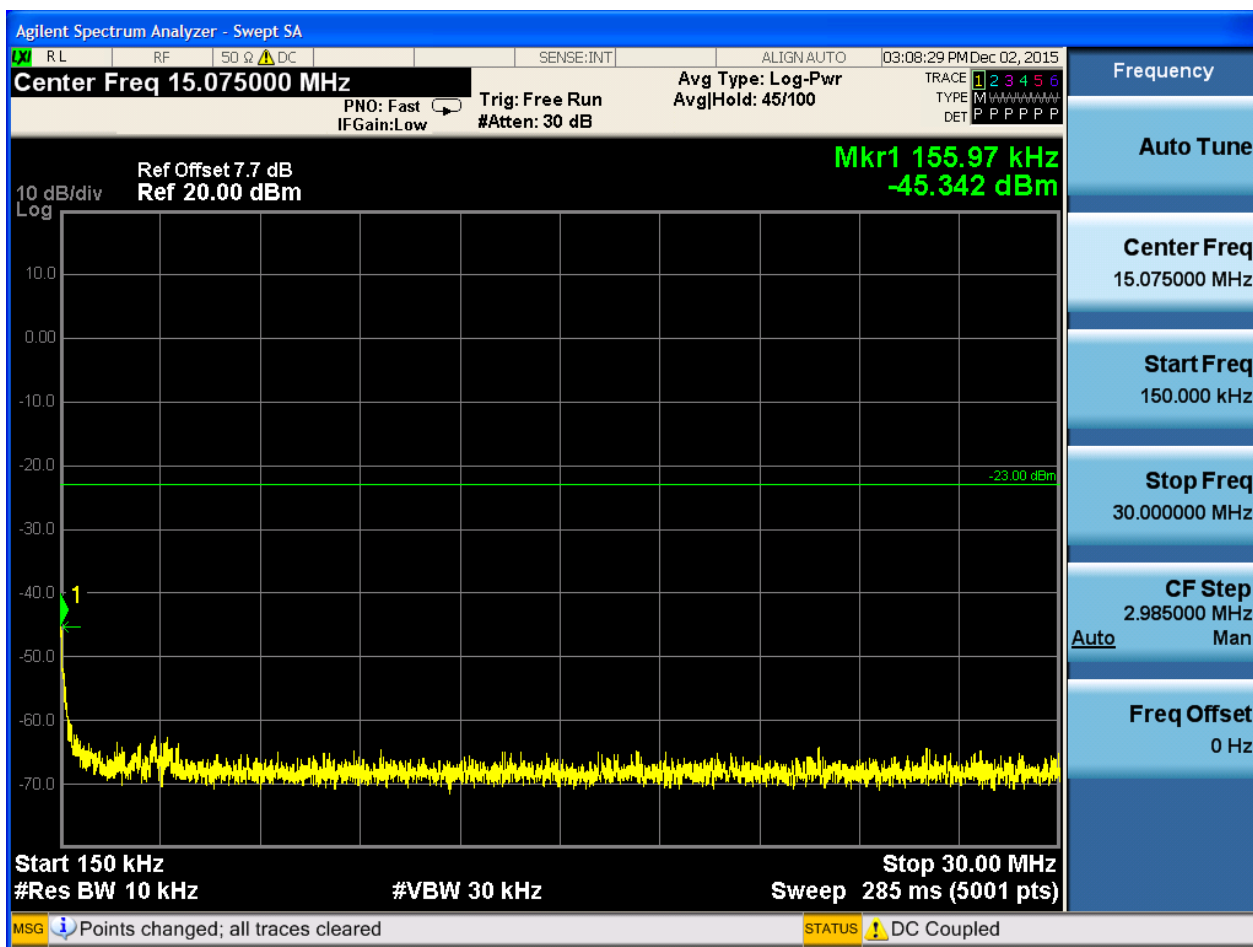


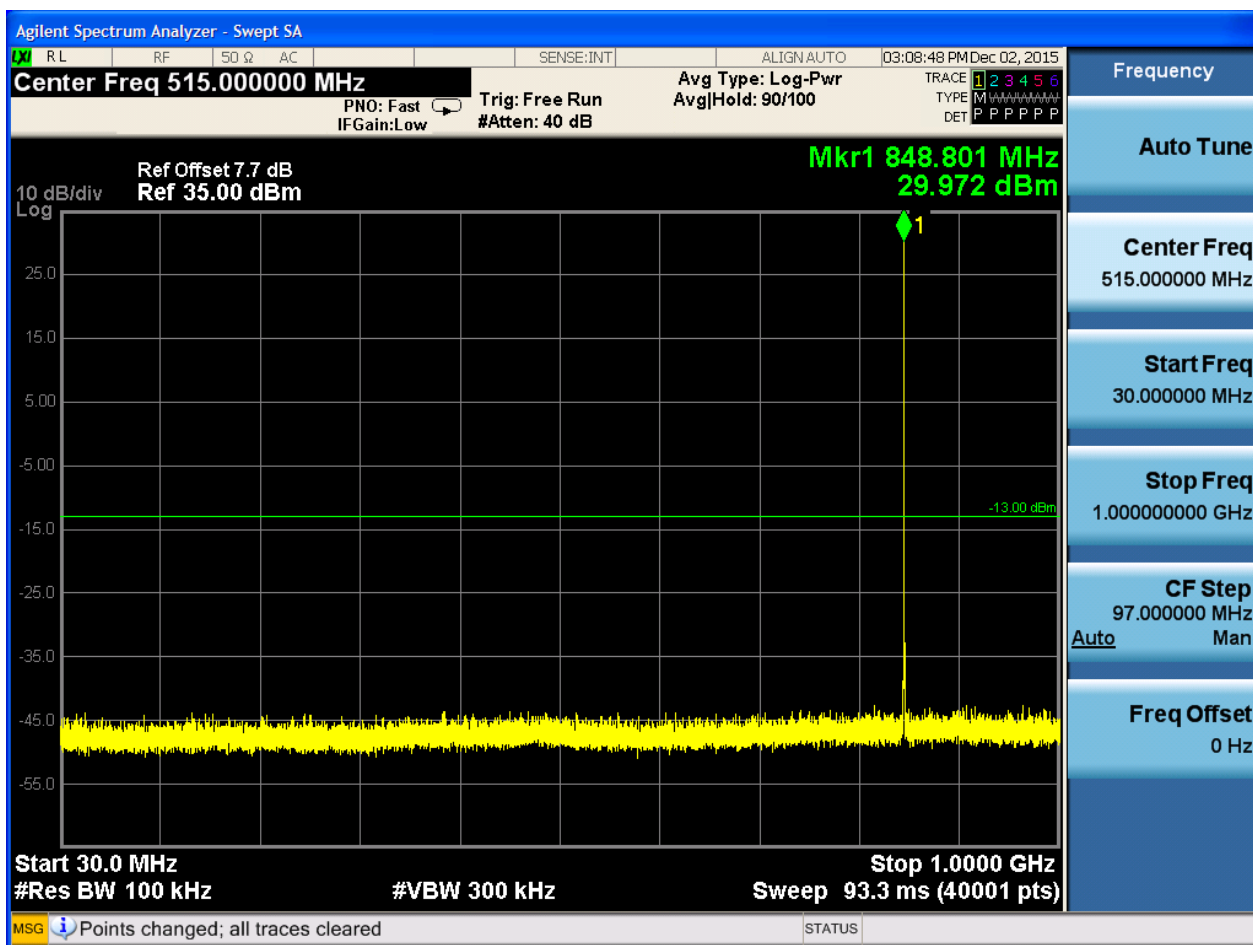


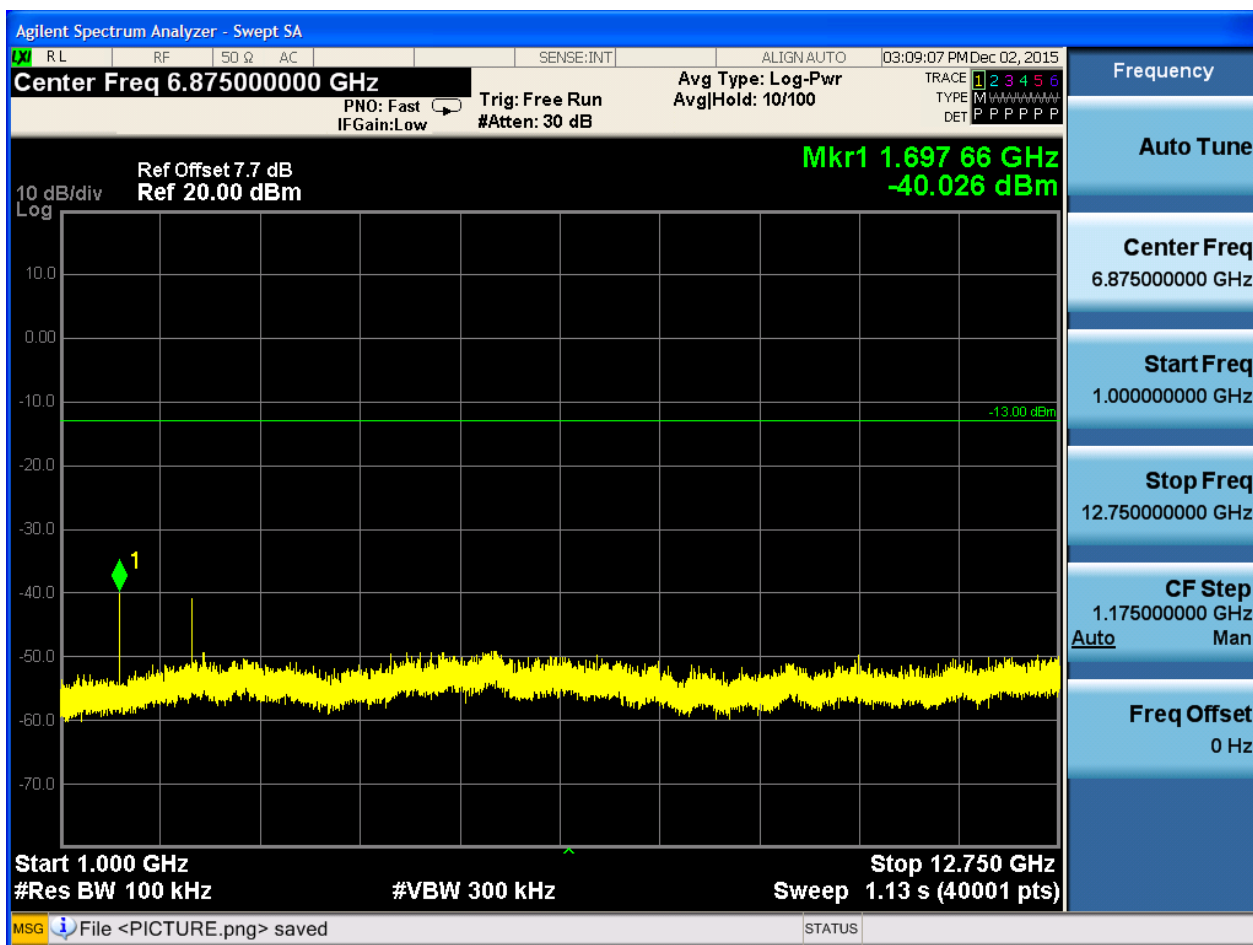


6.1.1.2.3 Test Channel = HCH







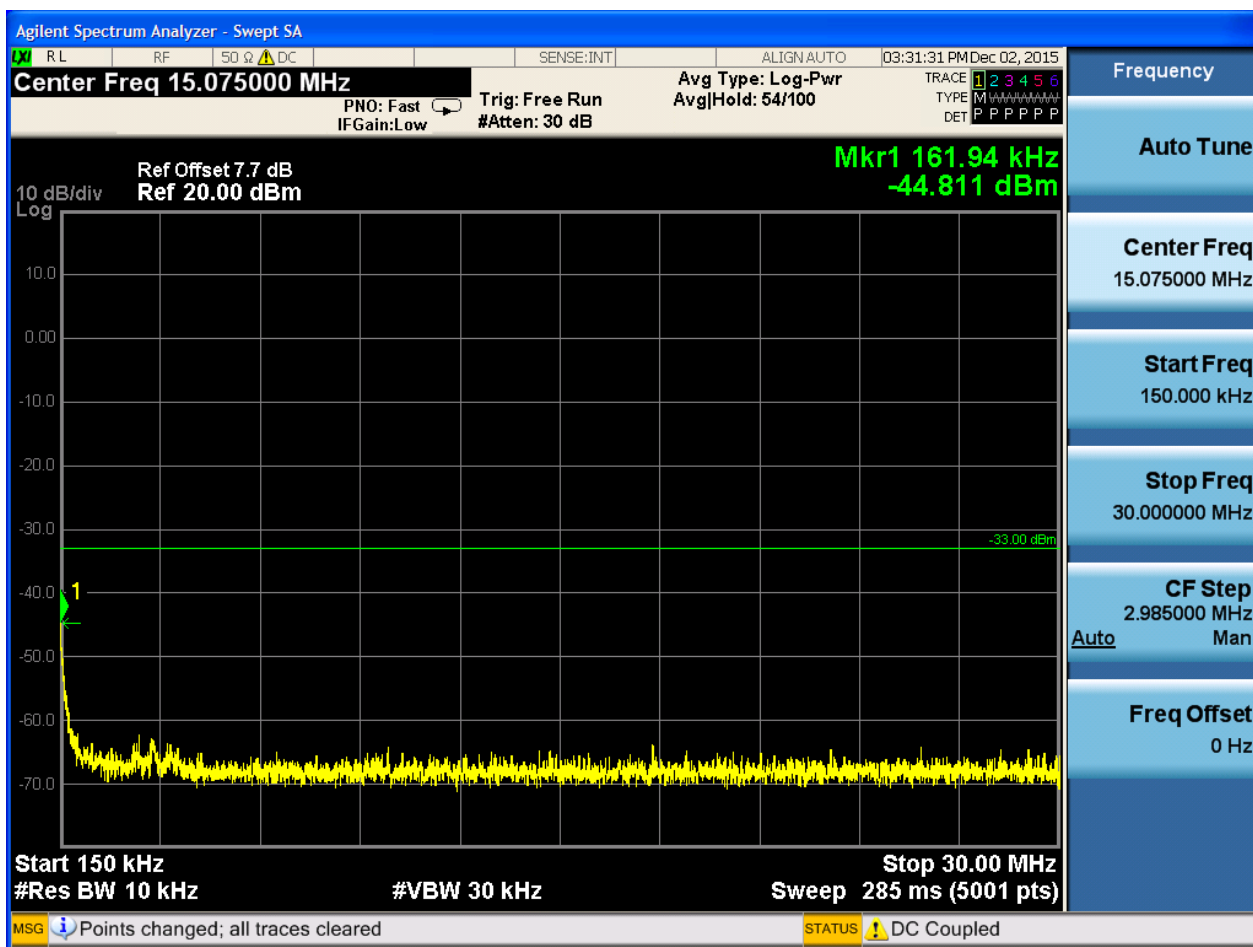


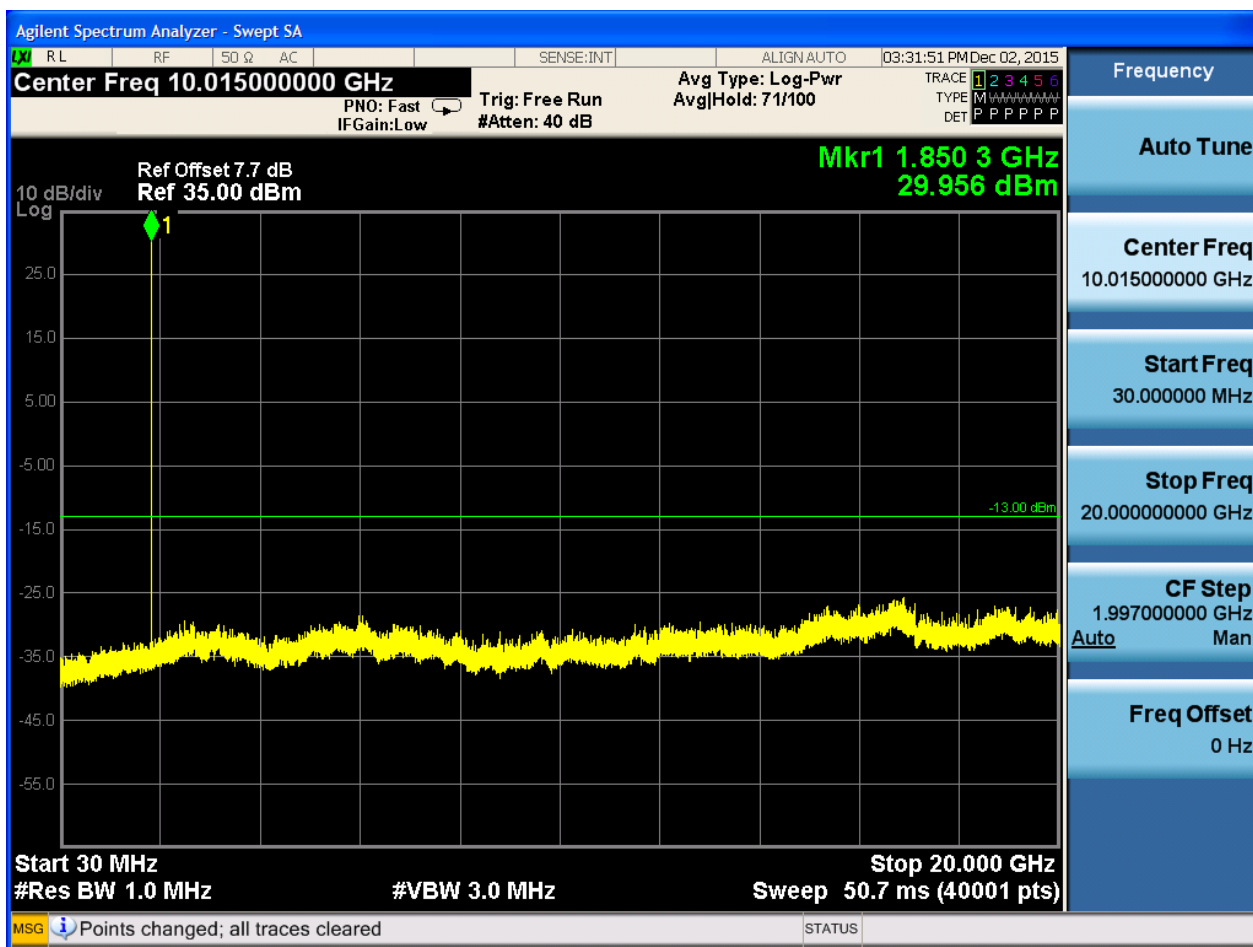
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

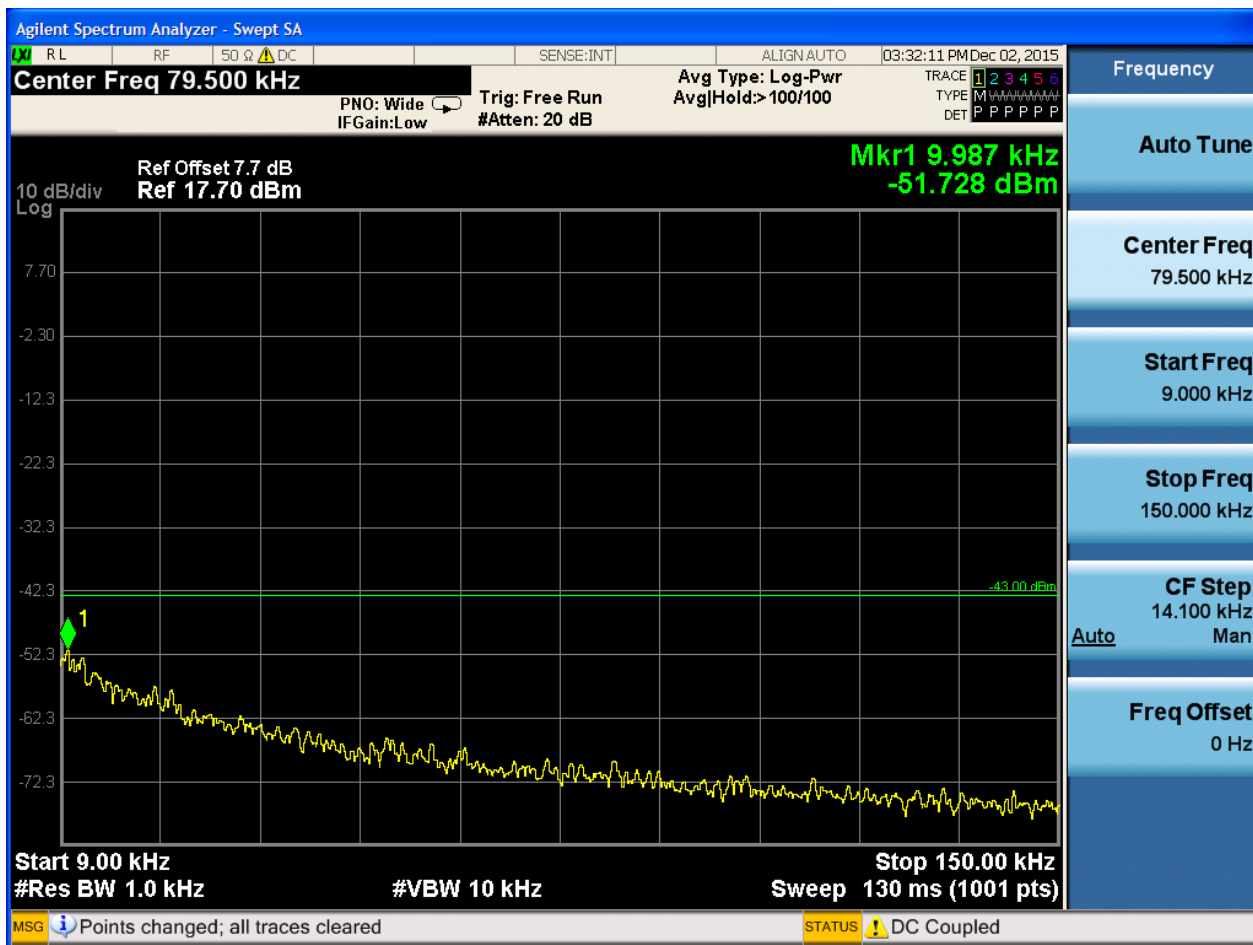
6.1.2.1.1 Test Channel = LCH

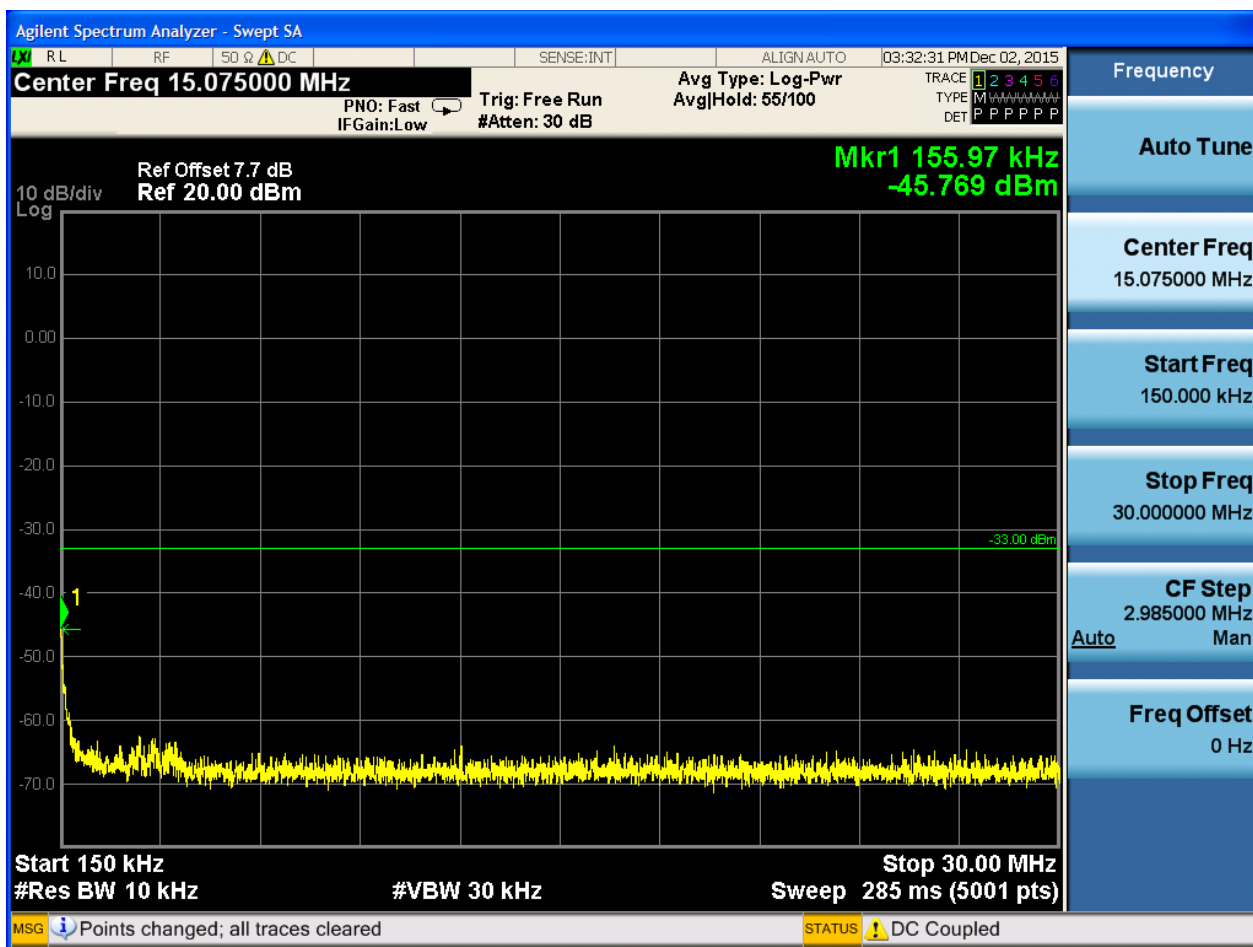


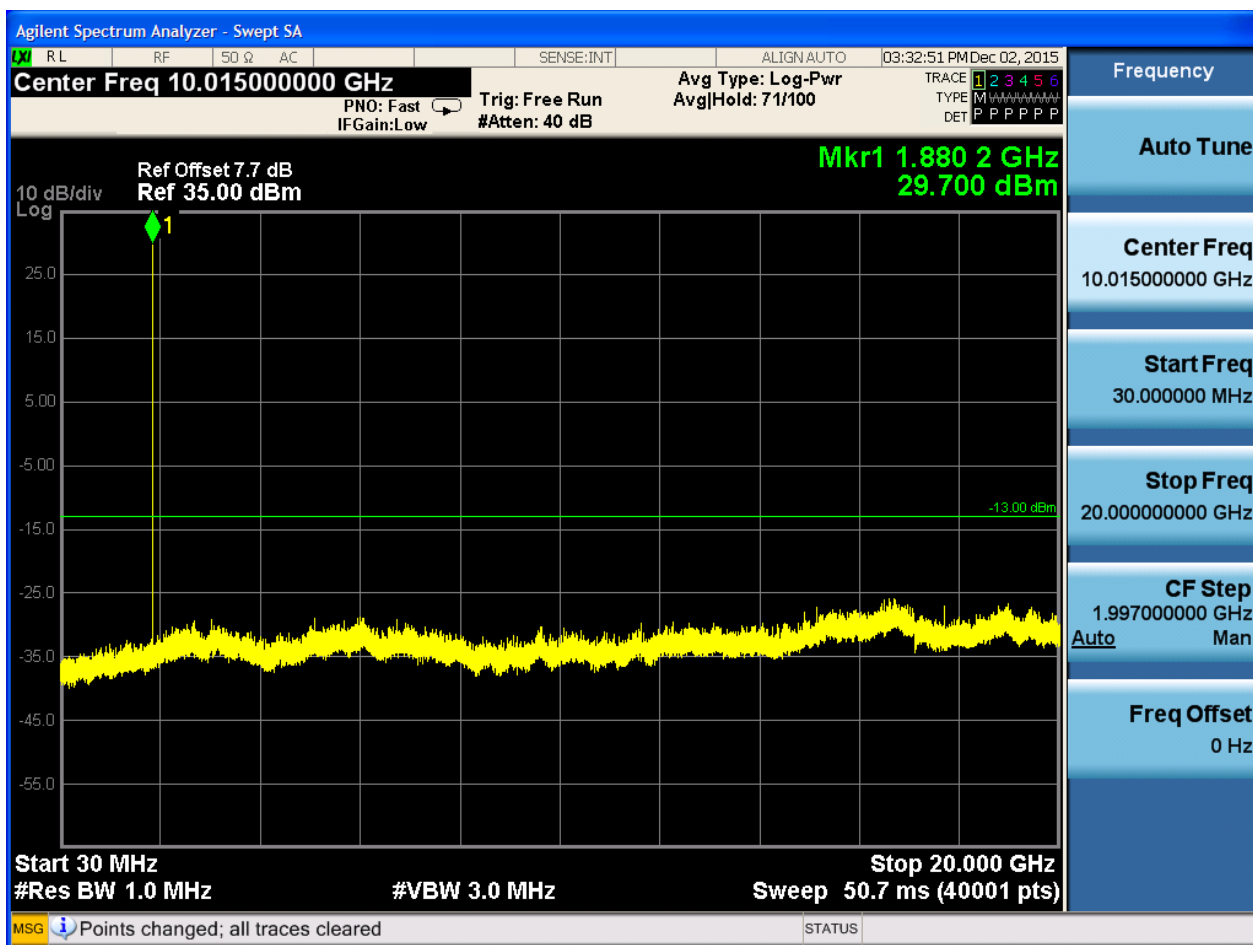




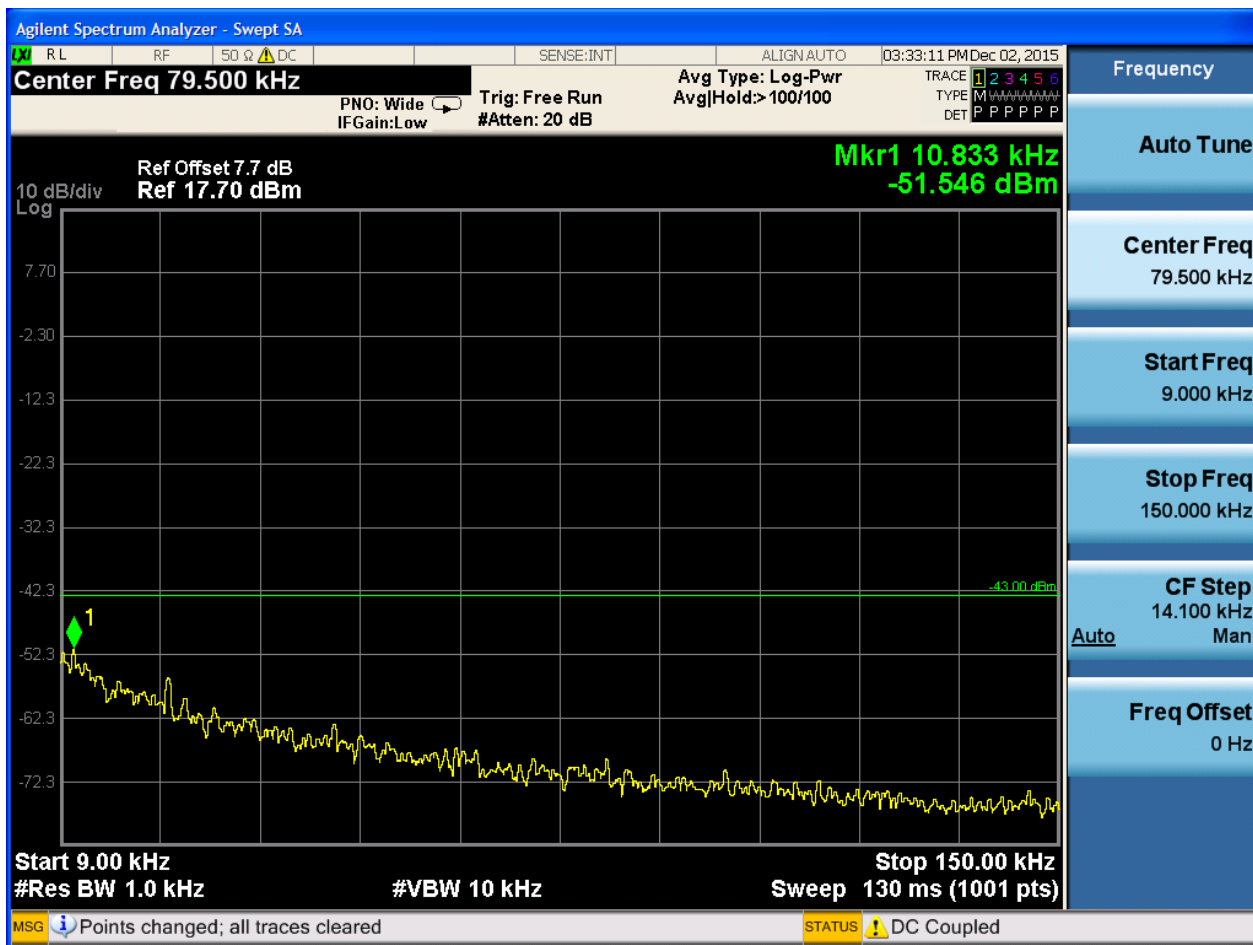
6.1.2.1.2 Test Channel = MCH

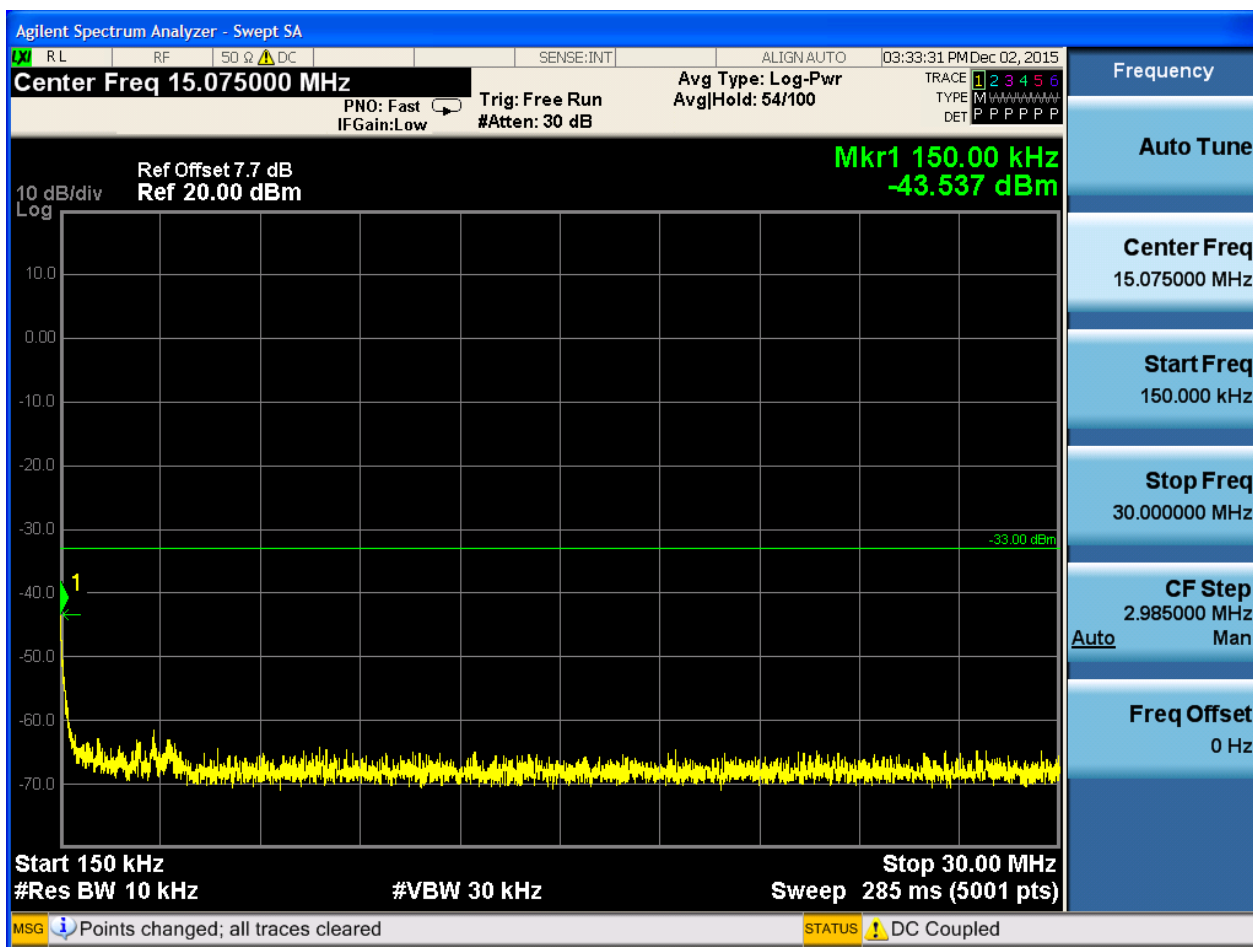


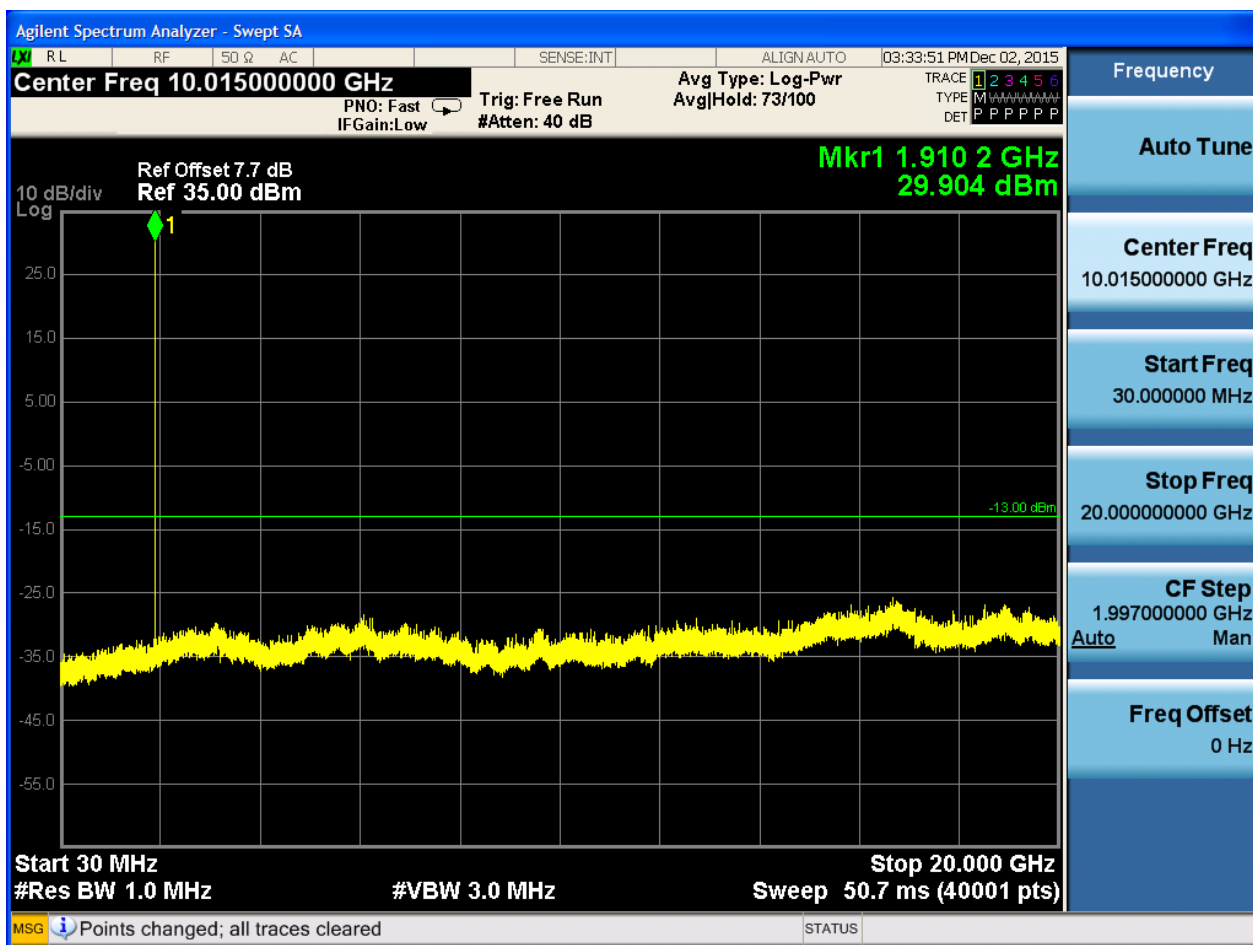




6.1.2.1.3 Test Channel = HCH



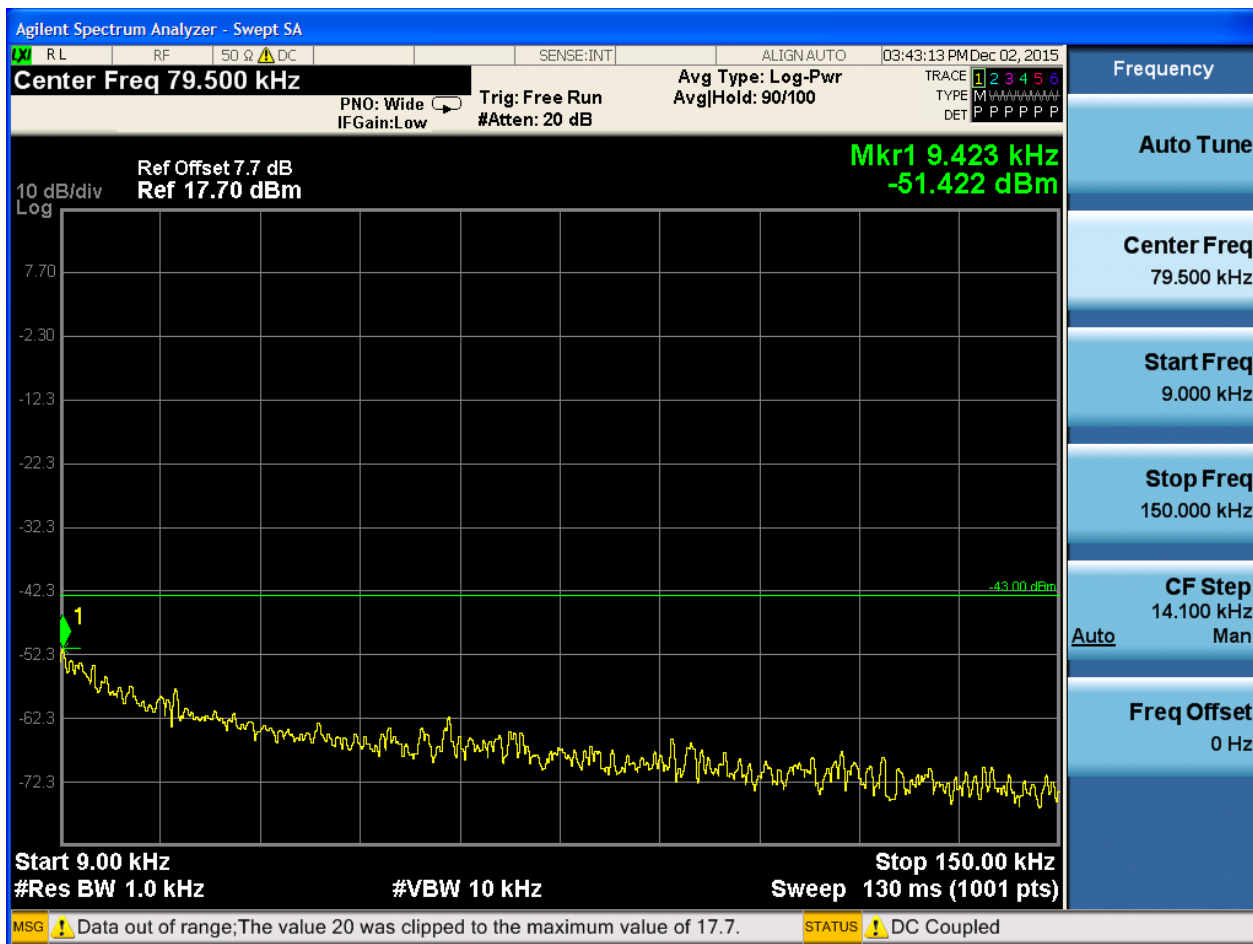


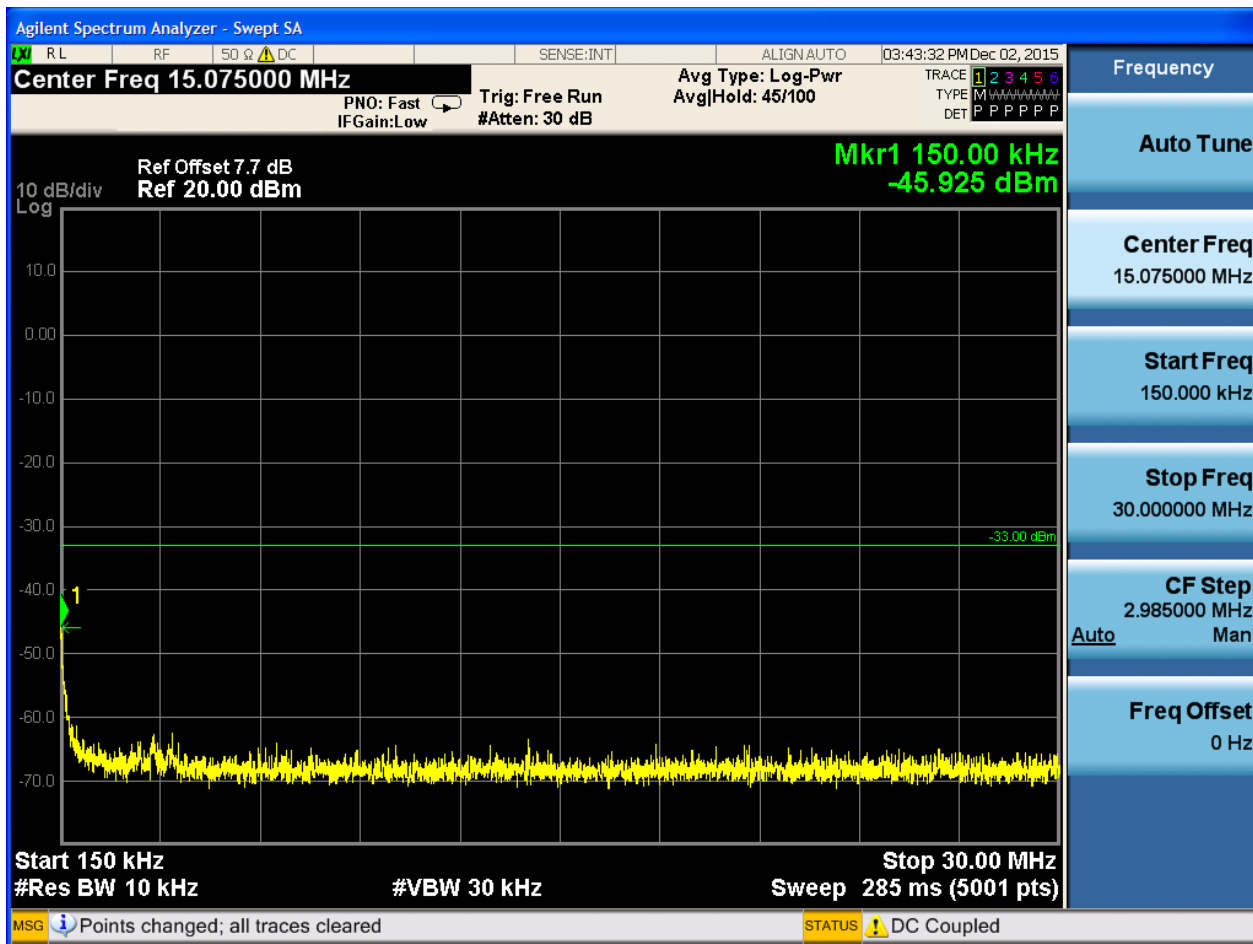


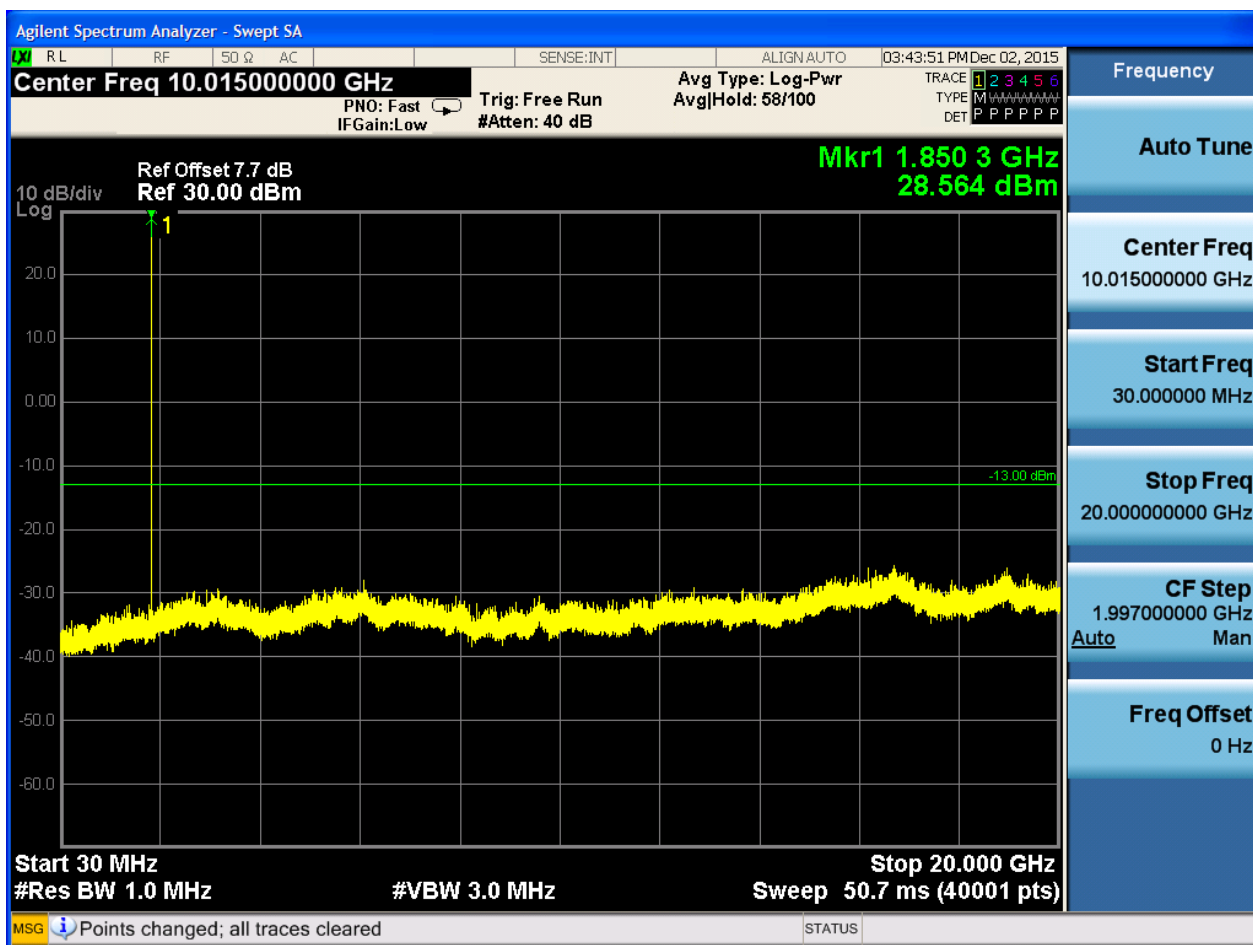


6.1.2.2 Test Mode = GSM/TM2

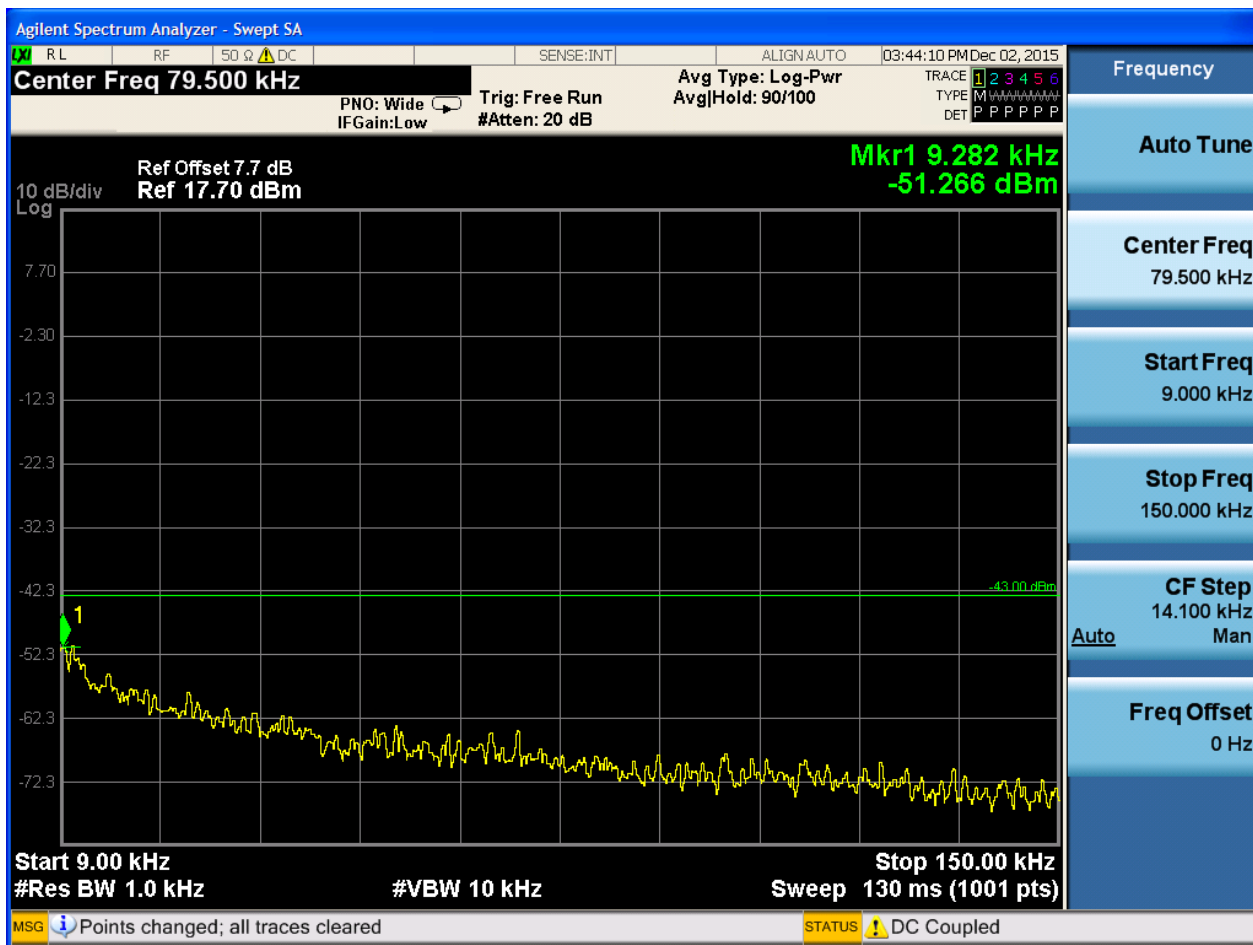
6.1.2.2.1 Test Channel = LCH

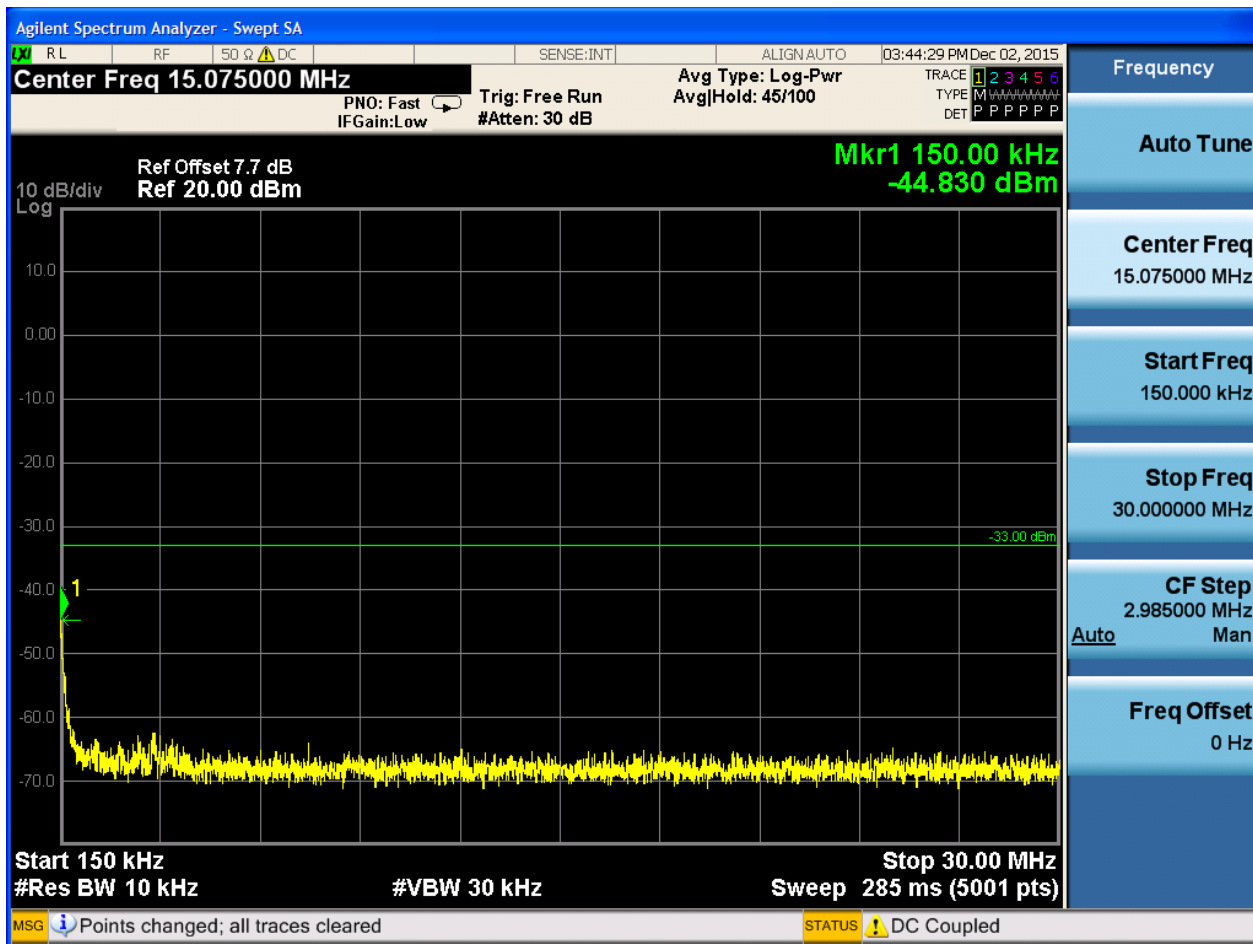


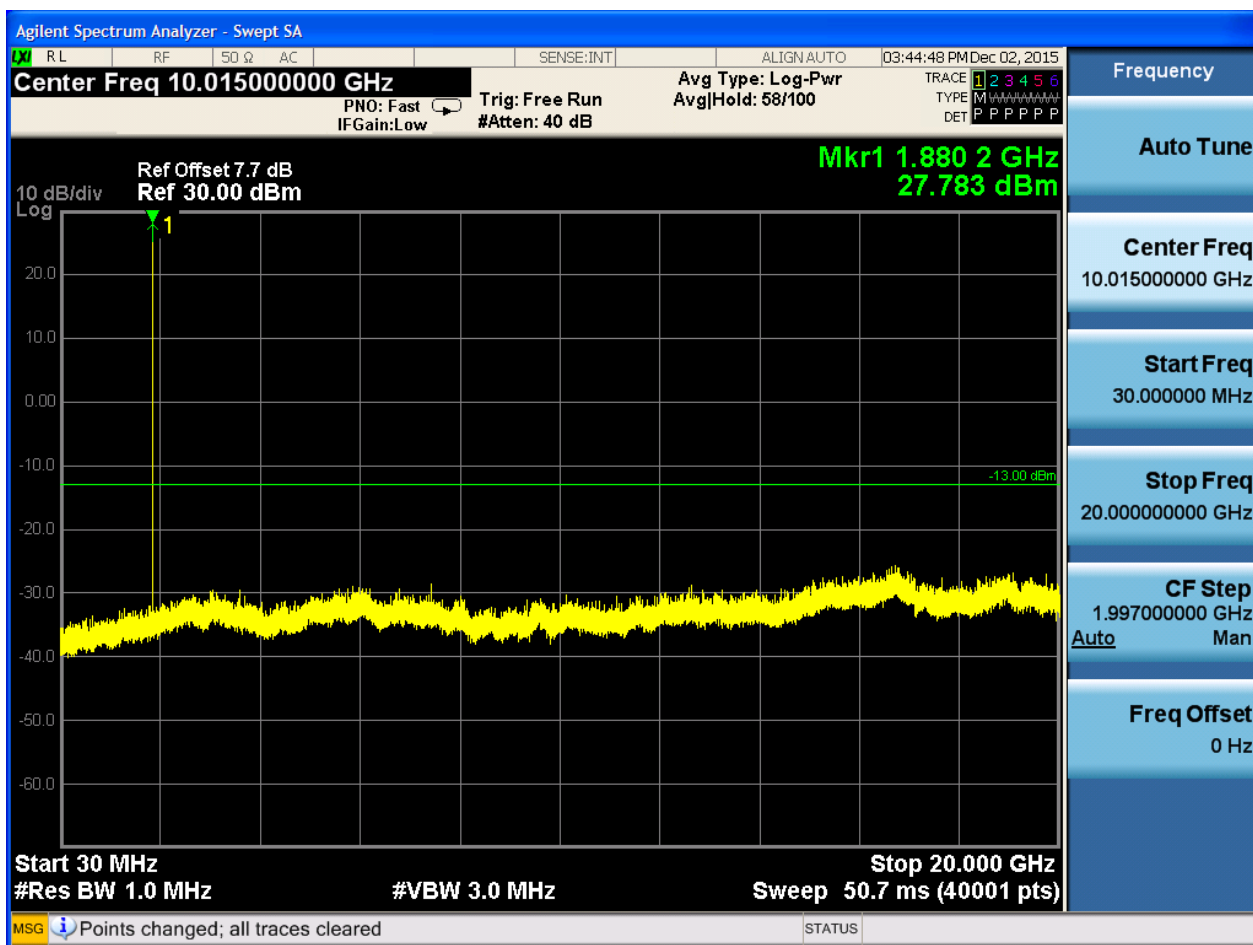




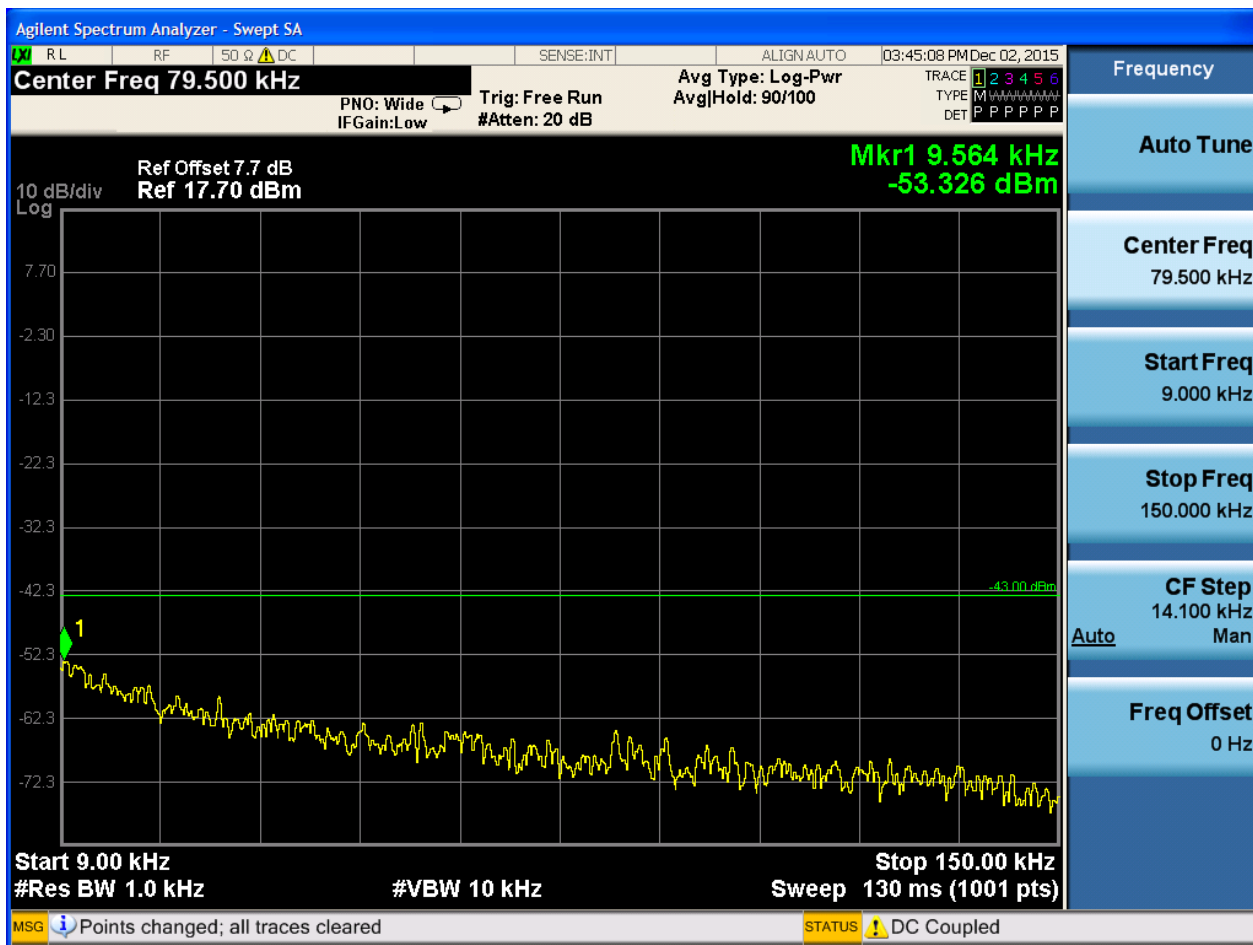
6.1.2.2.2 Test Channel = MCH

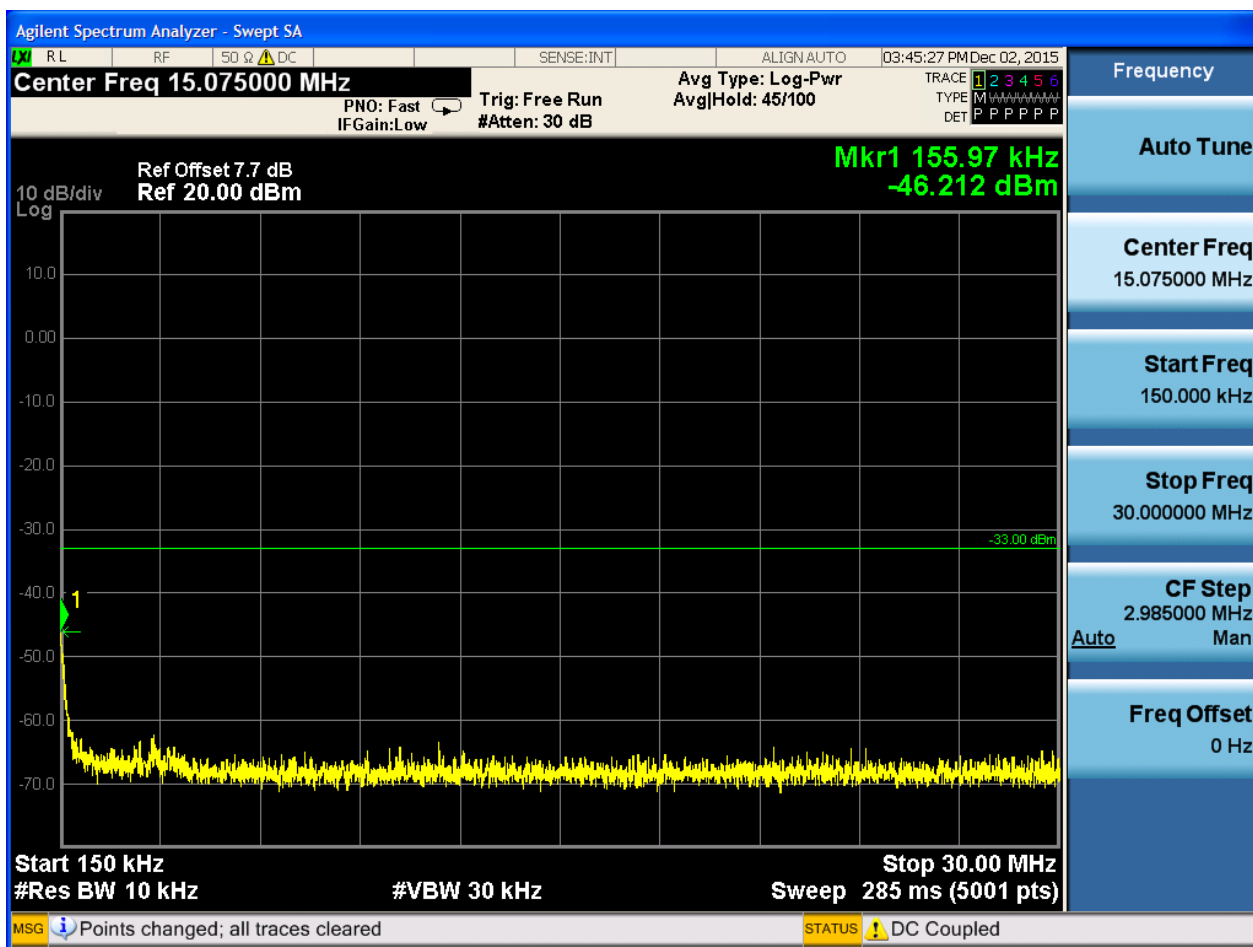


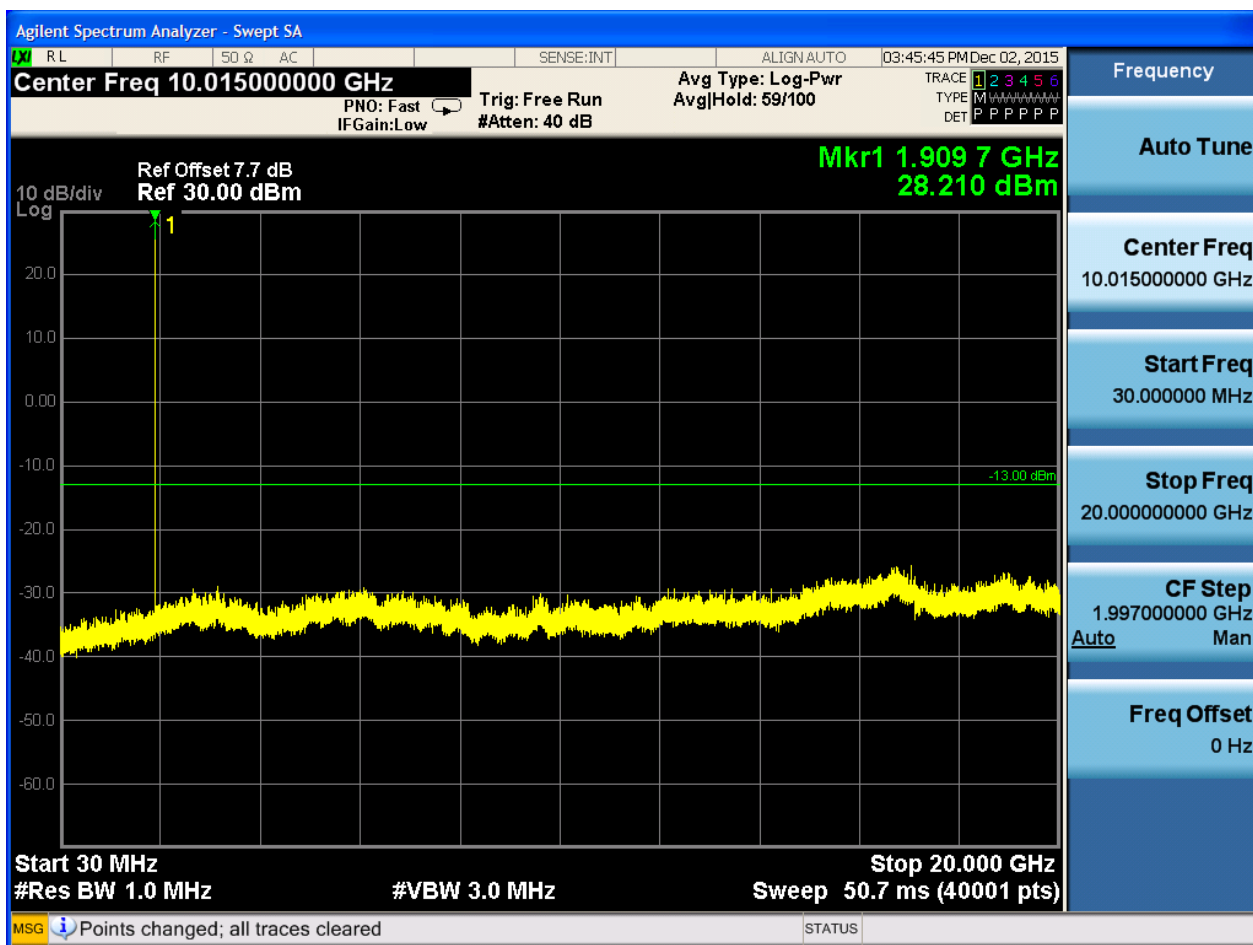




6.1.2.2.3 Test Channel = HCH







7Appendix_G: Field Strength of Spurious Radiation

Note:

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

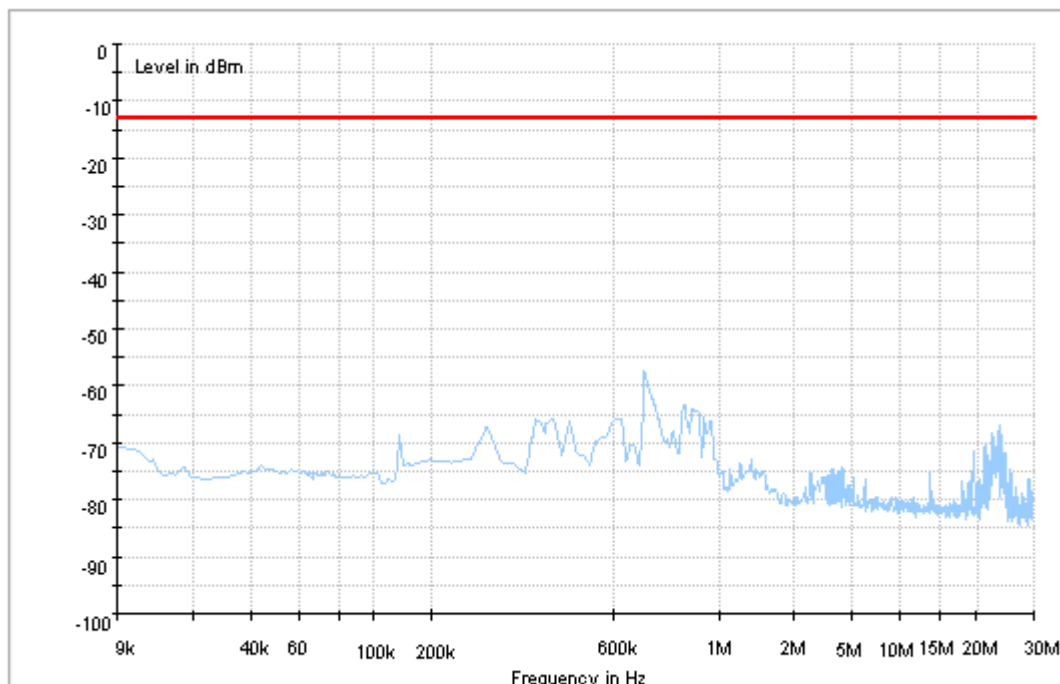
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

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

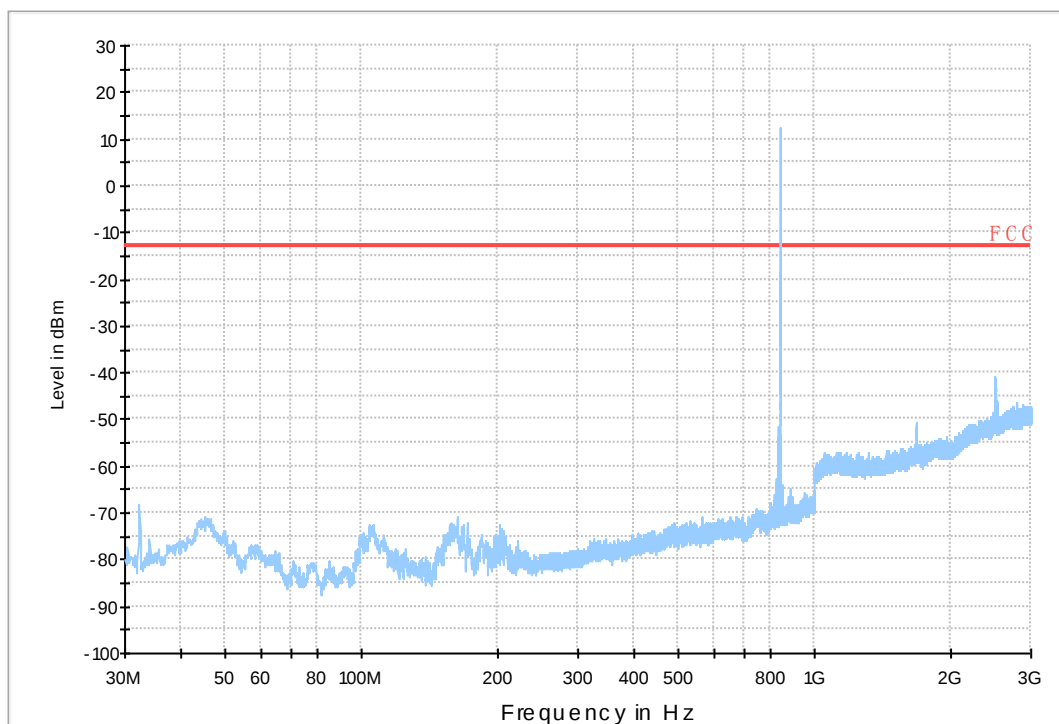
Part I - Test Plots

7.1 For GSM

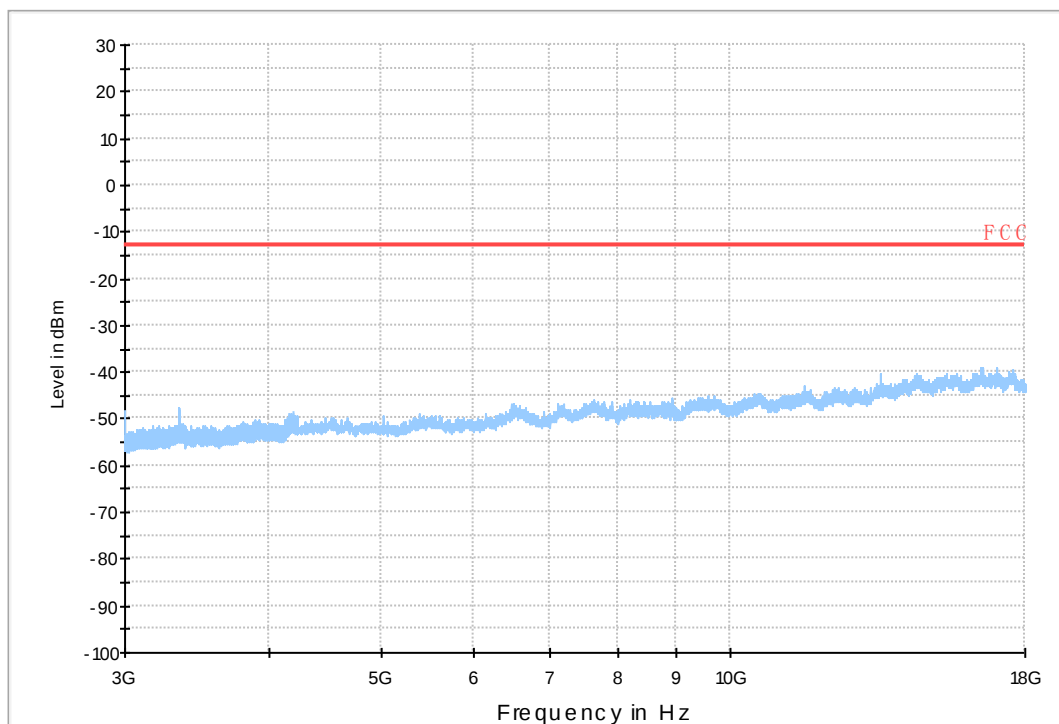
7.1.1 Test Band = GSM850



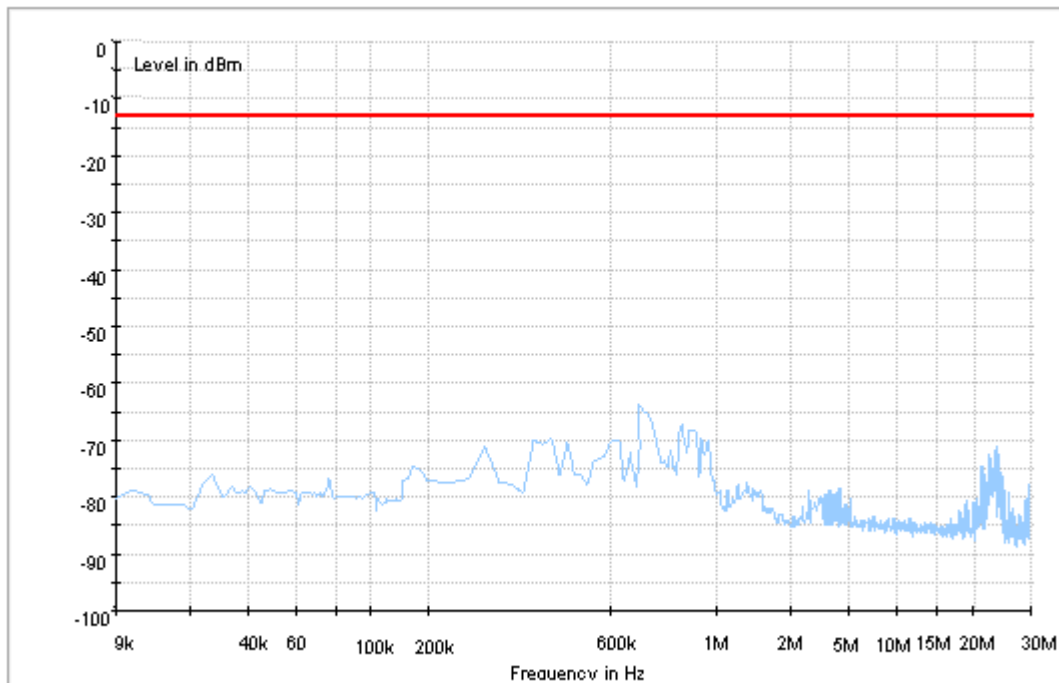
Copy of FCC PART22 G SM 850_L



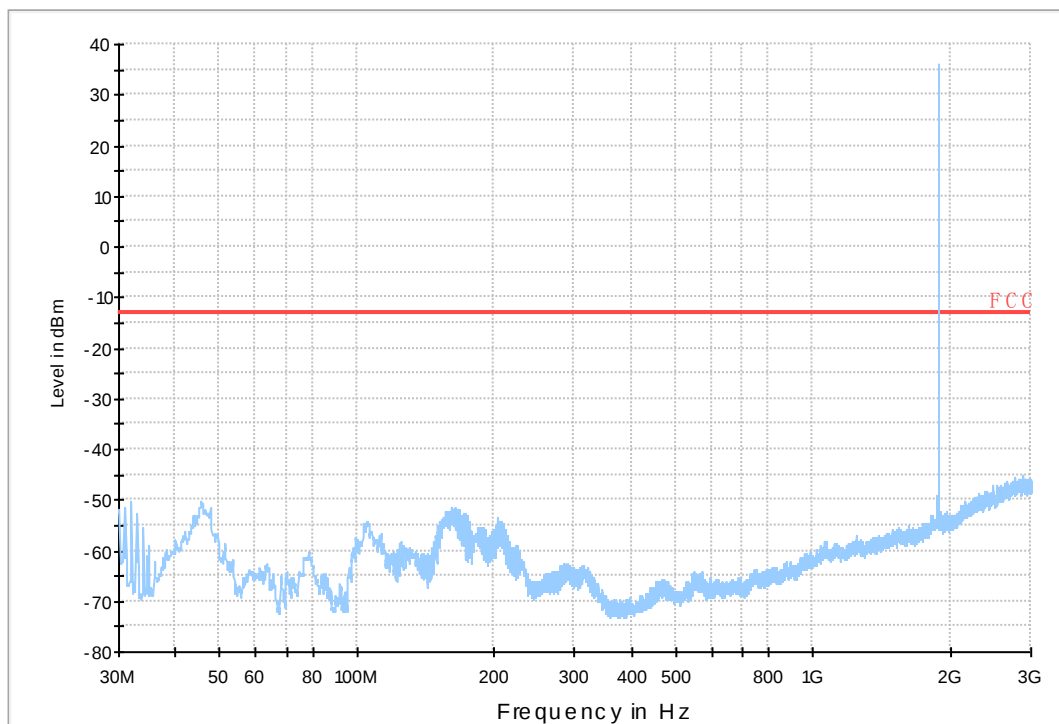
Copy of FCC PART22 G SM 850_H



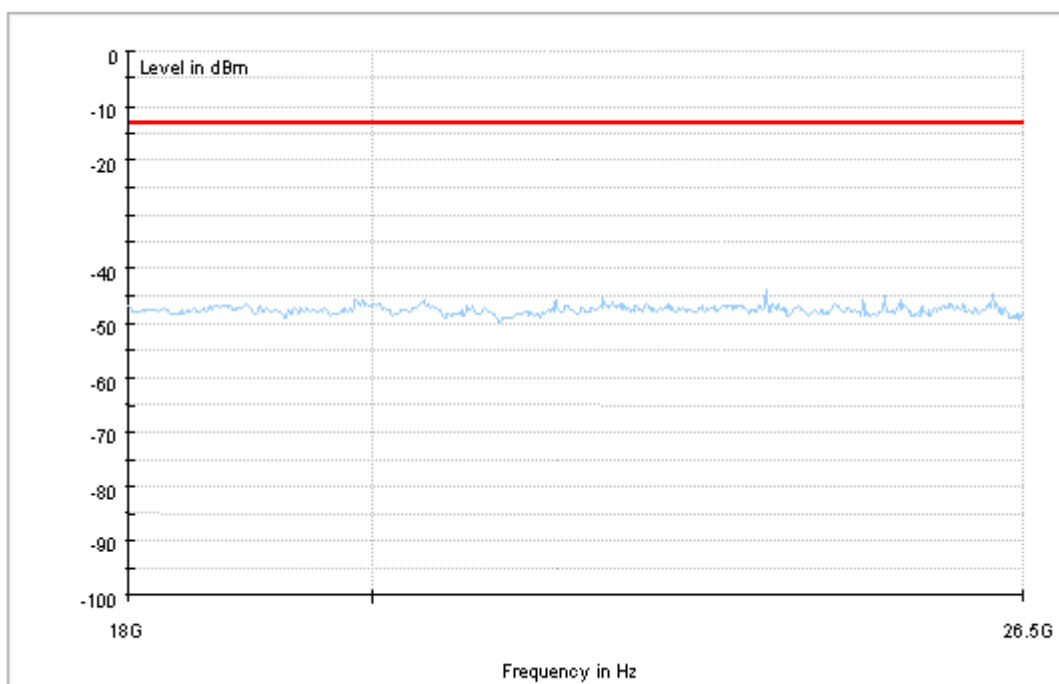
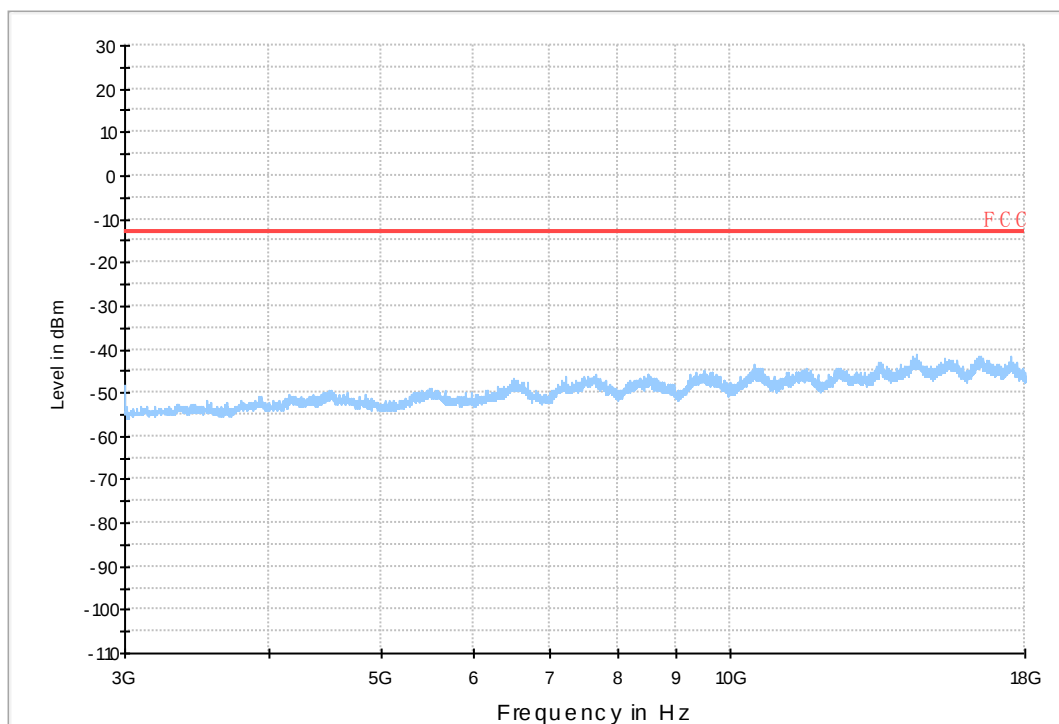
7.1.2 Test Band = GSM1900



Copy of FCC PART 24 G SM 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	-2.58	-0.00313	PASS
				VN	-5.29	-0.00642	PASS
				VH	-1.42	-0.00172	PASS
		MCH	TN	VL	-8.65	-0.01034	PASS
				VN	-1.94	-0.00232	PASS
				VH	-8.33	-0.00996	PASS
		HCH	TN	VL	-5.75	-0.00677	PASS
				VN	-6.52	-0.00768	PASS
				VH	-5.36	-0.00631	PASS
	GSM/TM2	LCH	TN	VL	0.71	0.00086	PASS
				VN	-0.06	-0.00007	PASS
				VH	2.03	0.00246	PASS
		MCH	TN	VL	-0.71	-0.00085	PASS
				VN	5.1	0.0061	PASS
				VH	5.23	0.00625	PASS
		HCH	TN	VL	1.36	0.0016	PASS
				VN	0.58	0.00068	PASS
				VH	-0.65	-0.00077	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-0.32	-0.00017	PASS
				VN	2.32	0.00125	PASS
				VH	2.84	0.00153	PASS
		MCH	TN	VL	-0.39	-0.00021	PASS
				VN	0.71	0.00038	PASS
				VH	-1.36	-0.00072	PASS
		HCH	TN	VL	-2.65	-0.00139	PASS
				VN	0.77	0.0004	PASS
				VH	-9.36	-0.0049	PASS
	GSM/TM2	LCH	TN	VL	3.36	0.00182	PASS
				VN	4.29	0.00232	PASS
				VH	8.88	0.0048	PASS
		MCH	TN	VL	3.49	0.00186	PASS
				VN	2.32	0.00123	PASS
				VH	-0.29	-0.00015	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	TN	VL	-6.52	-0.00341	PASS
				VN	7.43	0.00389	PASS
				VH	-2.55	-0.00134	PASS

8.1.2Frequency 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	-4.84	-0.00587	PASS
				-20	-1.36	-0.00165	PASS
				-10	-2.71	-0.00329	PASS
				0	-8.72	-0.01058	PASS
				10	-3.55	-0.00431	PASS
				20	-6.33	-0.00768	PASS
				30	-8.52	-0.01034	PASS
				40	-3.36	-0.00408	PASS
				50	-8.98	-0.0109	PASS
		MCH	VN	-30	-10.33	-0.01235	PASS
				-20	-5.75	-0.00687	PASS
				-10	-2.65	-0.00317	PASS
				0	-2.65	-0.00317	PASS
				10	-0.58	-0.00069	PASS
				20	-4.97	-0.00594	PASS
				30	-5.55	-0.00663	PASS
				40	-2.39	-0.00286	PASS
				50	-4.71	-0.00563	PASS
		HCH	VN	-30	-3.1	-0.00365	PASS
				-20	-4.58	-0.0054	PASS
				-10	-10.2	-0.01202	PASS
				0	-8.98	-0.01058	PASS
				10	-4.07	-0.0048	PASS
				20	-4.2	-0.00495	PASS
				30	-1.49	-0.00176	PASS
				40	-2.13	-0.00251	PASS
				50	-3.03	-0.00357	PASS
	GSM/TM2	LCH	VN	-30	-4.07	-0.00494	PASS
				-20	0.94	0.00114	PASS
				-10	0.74	0.0009	PASS
				0	2.1	0.00255	PASS
				10	2.29	0.00278	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				20	-1.55	-0.00188	PASS
				30	-0.71	-0.00086	PASS
				40	-3.71	-0.0045	PASS
				50	0.74	0.0009	PASS
		MCH	VN	-30	-2.45	-0.00293	PASS
				-20	-1	-0.0012	PASS
				-10	0.81	0.00097	PASS
				0	2.62	0.00313	PASS
				10	1.94	0.00232	PASS
				20	9.36	0.01119	PASS
				30	-2.81	-0.00336	PASS
				40	1.26	0.00151	PASS
				50	4.42	0.00528	PASS
		HCH	VN	-30	-0.77	-0.00091	PASS
				-20	5.1	0.00601	PASS
				-10	3.58	0.00422	PASS
				0	-1.29	-0.00152	PASS
				10	1.52	0.00179	PASS
				20	2.16	0.00254	PASS
				30	1.42	0.00167	PASS
				40	4.75	0.0056	PASS
				50	0.94	0.00111	PASS
GSM1900	GSM/TM1	LCH	VN	-30	3.62	0.00196	PASS
				-20	-2.71	-0.00146	PASS
				-10	-7.94	-0.00429	PASS
				0	-0.32	-0.00017	PASS
				10	-3.23	-0.00175	PASS
				20	-1.23	-0.00066	PASS
				30	-0.32	-0.00017	PASS
				40	-0.52	-0.00028	PASS
				50	1.68	0.00091	PASS
		MCH	VN	-30	-3.16	-0.00168	PASS
				-20	-3.42	-0.00182	PASS
				-10	4.71	0.00251	PASS
				0	5.68	0.00302	PASS
				10	-2.45	-0.0013	PASS
				20	-5.94	-0.00316	PASS
				30	7.75	0.00412	PASS
				40	9.23	0.00491	PASS
				50	-1.68	-0.00089	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	-30	-1.42	-0.00074	PASS
				-20	-0.32	-0.00017	PASS
				-10	-2.45	-0.00128	PASS
				0	-4	-0.00209	PASS
				10	-2.52	-0.00132	PASS
				20	-1.81	-0.00095	PASS
				30	-2.07	-0.00108	PASS
				40	-7.81	-0.00409	PASS
				50	-0.97	-0.00051	PASS
	GSM/TM2	LCH	VN	-30	8.46	0.00457	PASS
				-20	1.45	0.00078	PASS
				-10	2.45	0.00132	PASS
				0	-8.1	-0.00438	PASS
				10	2.03	0.0011	PASS
				20	3.13	0.00169	PASS
				30	3.1	0.00168	PASS
				40	1.65	0.00089	PASS
				50	-0.26	-0.00014	PASS
		MCH	VN	-30	0.39	0.00021	PASS
				-20	-1.55	-0.00082	PASS
				-10	0.03	0.00002	PASS
				0	-0.68	-0.00036	PASS
				10	-2.36	-0.00126	PASS
				20	2.58	0.00137	PASS
				30	7.17	0.00381	PASS
				40	-2.36	-0.00126	PASS
				50	2.78	0.00148	PASS
		HCH	VN	-30	-2.36	-0.00124	PASS
				-20	-2.84	-0.00149	PASS
				-10	-7.52	-0.00394	PASS
				0	-1.03	-0.00054	PASS
				10	-5.88	-0.00308	PASS
				20	-3.81	-0.00199	PASS
				30	4.71	0.00247	PASS
				40	-0.61	-0.00032	PASS
				50	-3.13	-0.00164	PASS

END