



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	31.65	27.59	38.5	PASS
		MCH	31.91	27.85	38.5	PASS
		HCH	32.13	28.07	38.5	PASS
	GSM/TM2	LCH	25.79	21.73	38.5	PASS
		MCH	25.82	21.76	38.5	PASS
		HCH	25.8	21.74	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	29.64	32.25	33	PASS
		MCH	29.14	31.75	33	PASS
		HCH	29.33	31.94	33	PASS
	GSM/TM2	LCH	24.79	27.4	33	PASS
		MCH	24.82	27.43	33	PASS



Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
		HCH	24.71	27.32	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	0.41	13	PASS
		MCH	0.41	13	PASS
		HCH	0.41	13	PASS
	GSM/TM2	LCH	3.35	13	PASS
		MCH	3.46	13	PASS
		HCH	3.36	13	PASS

3Appendix_C: Modulation Characteristics

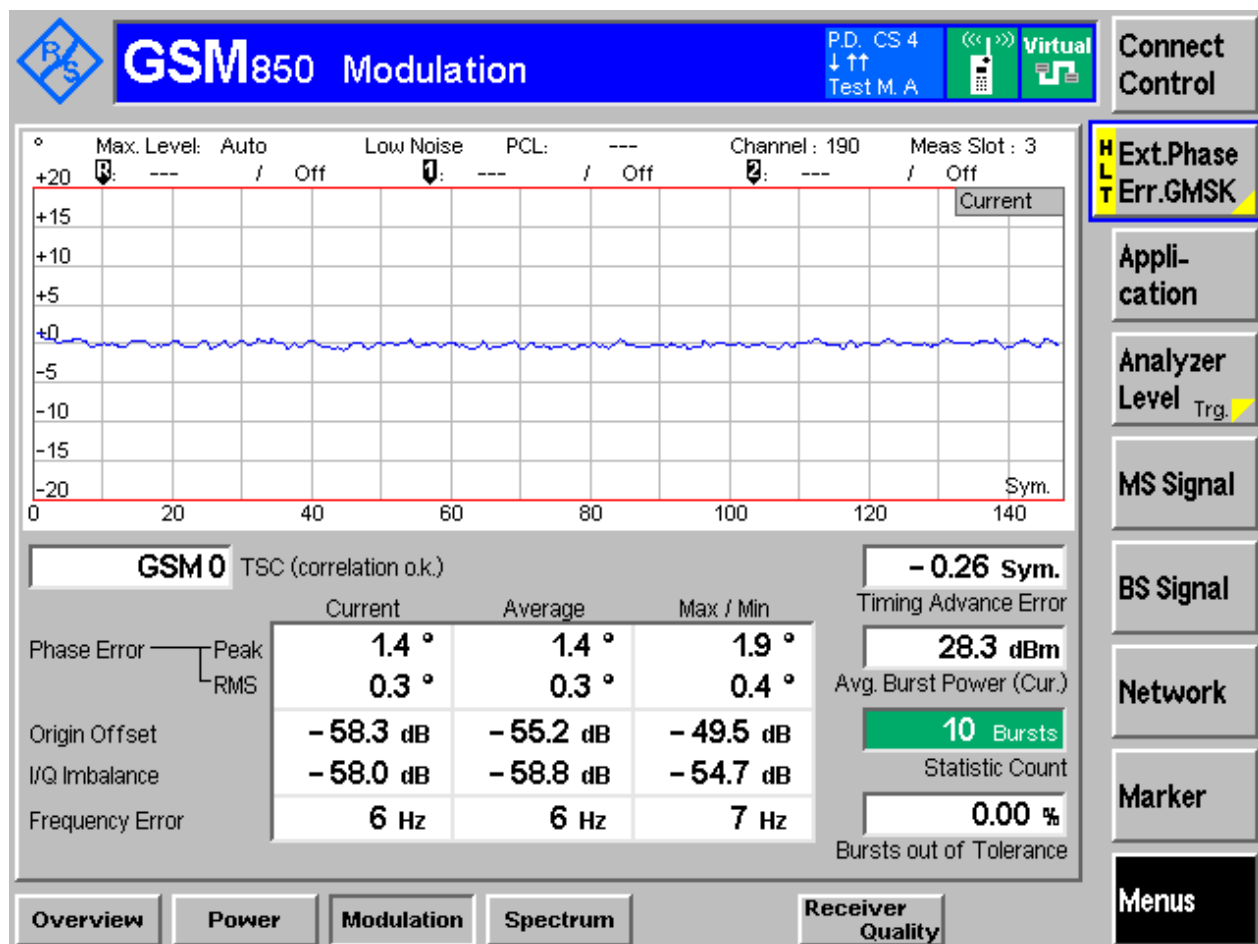
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

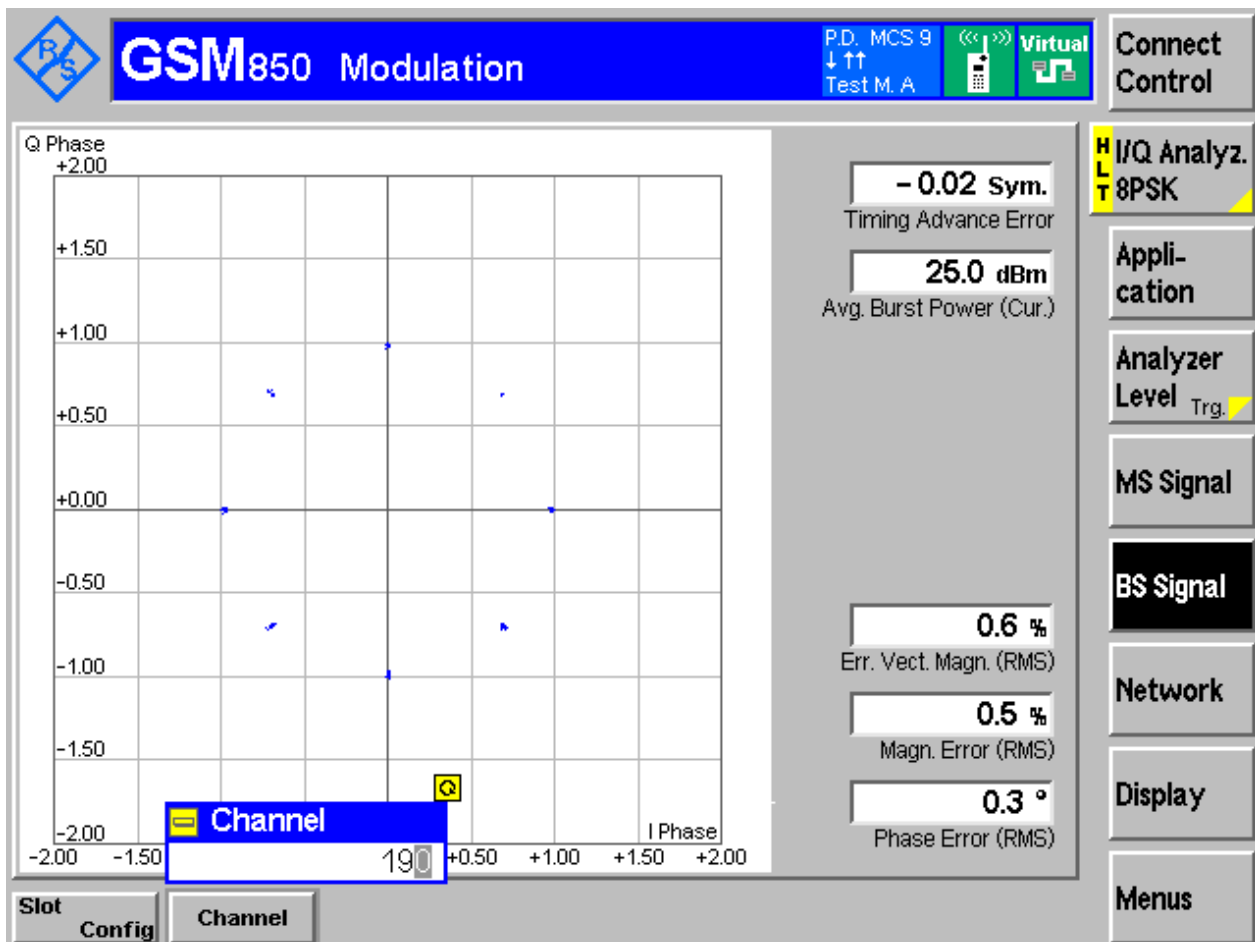
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

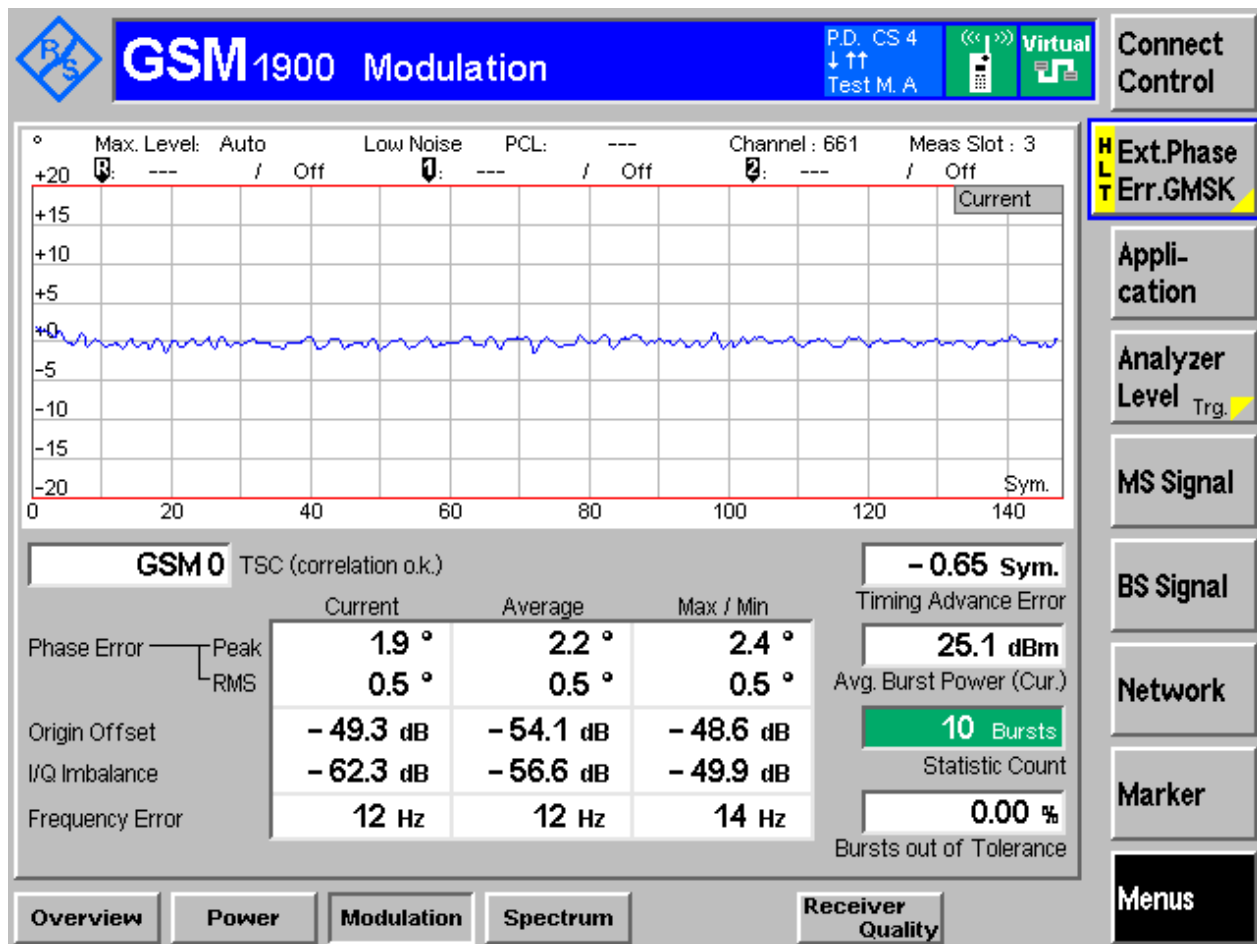
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

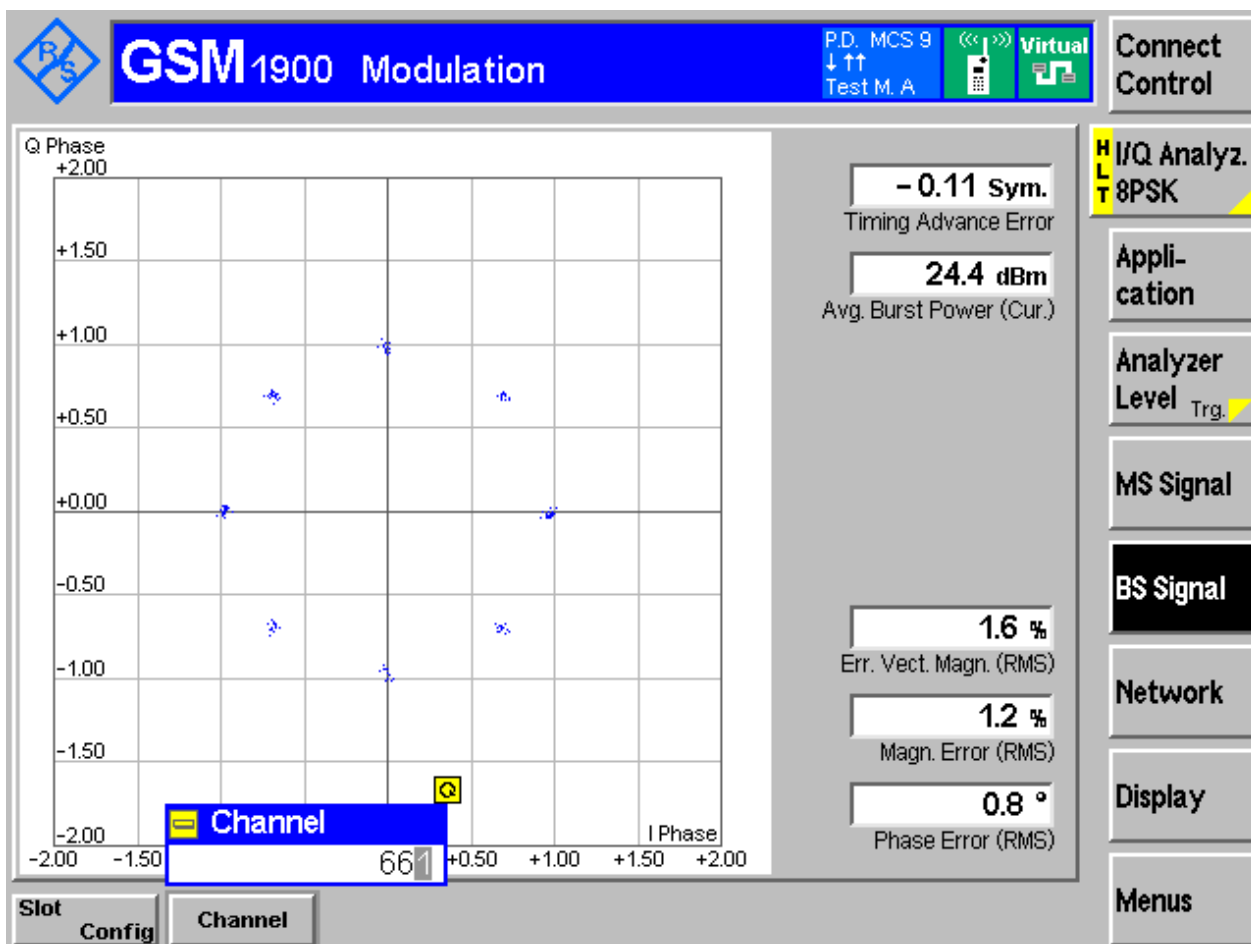
3.1.2.1 Test Mode = GSM/TM1

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	244.11	318.06	Pass
		MCH	243.93	318.26	Pass
		HCH	243.40	314.28	Pass
	GSM/TM2	LCH	242.55	305.18	Pass
		MCH	246.21	309.77	Pass
		HCH	241.86	306.60	Pass
GSM1900	GSM/TM1	LCH	244.61	312.53	Pass
		MCH	246.71	314.22	Pass
		HCH	245.59	310.53	Pass
	GSM/TM2	LCH	243.11	303.76	Pass
		MCH	244.42	312.64	Pass
		HCH	243.88	310.45	Pass

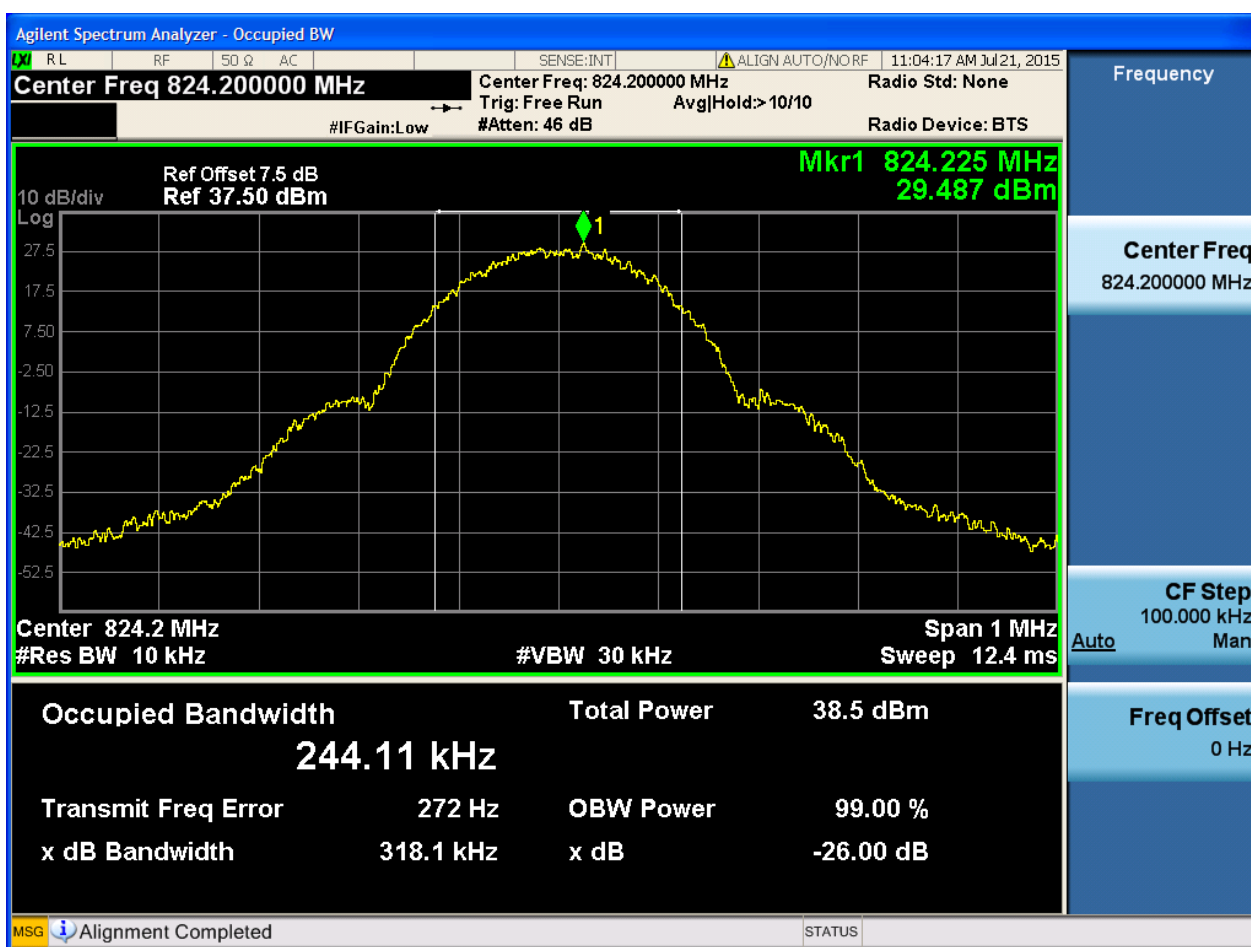
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

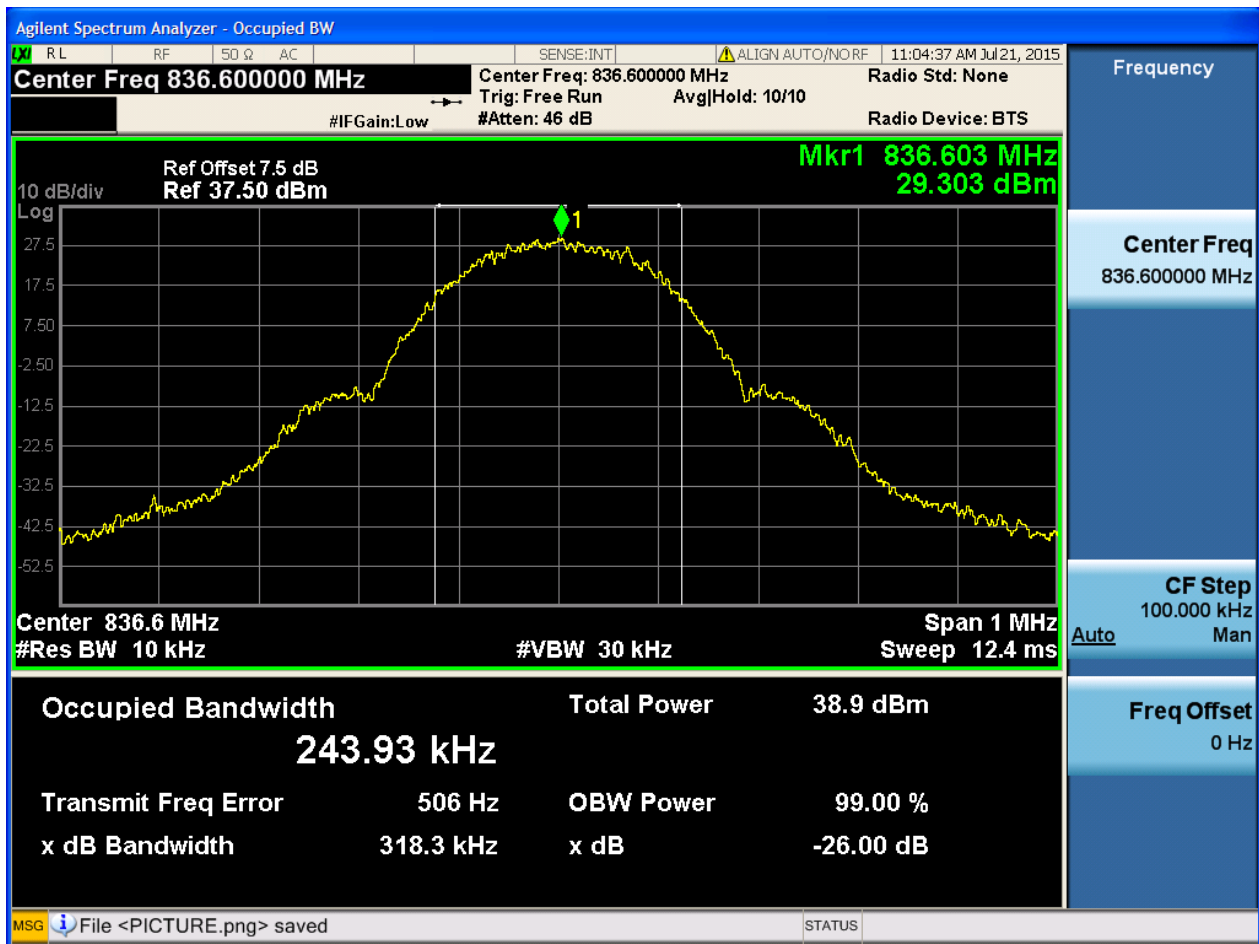
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



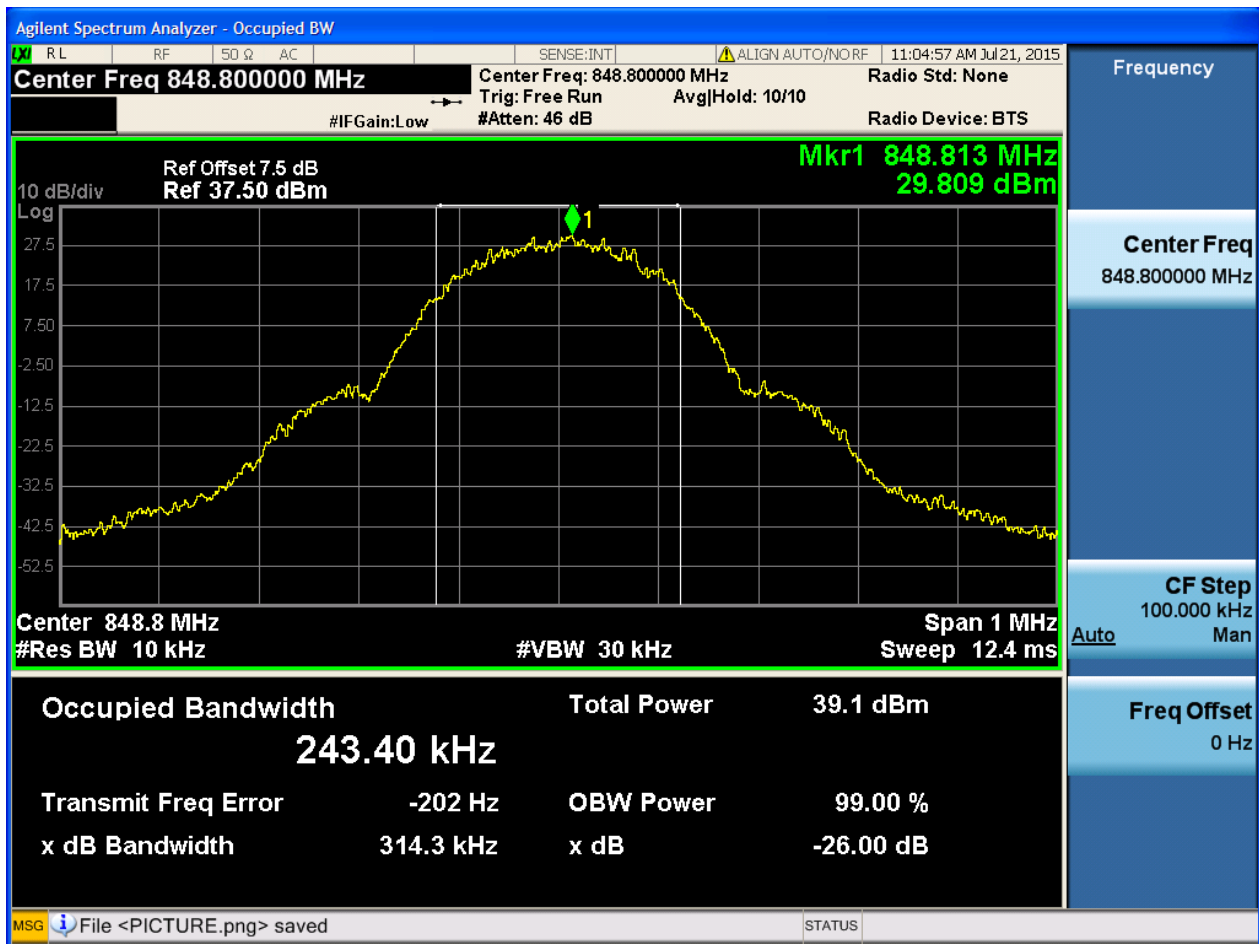


4.1.1.1.2 Test Channel = MCH



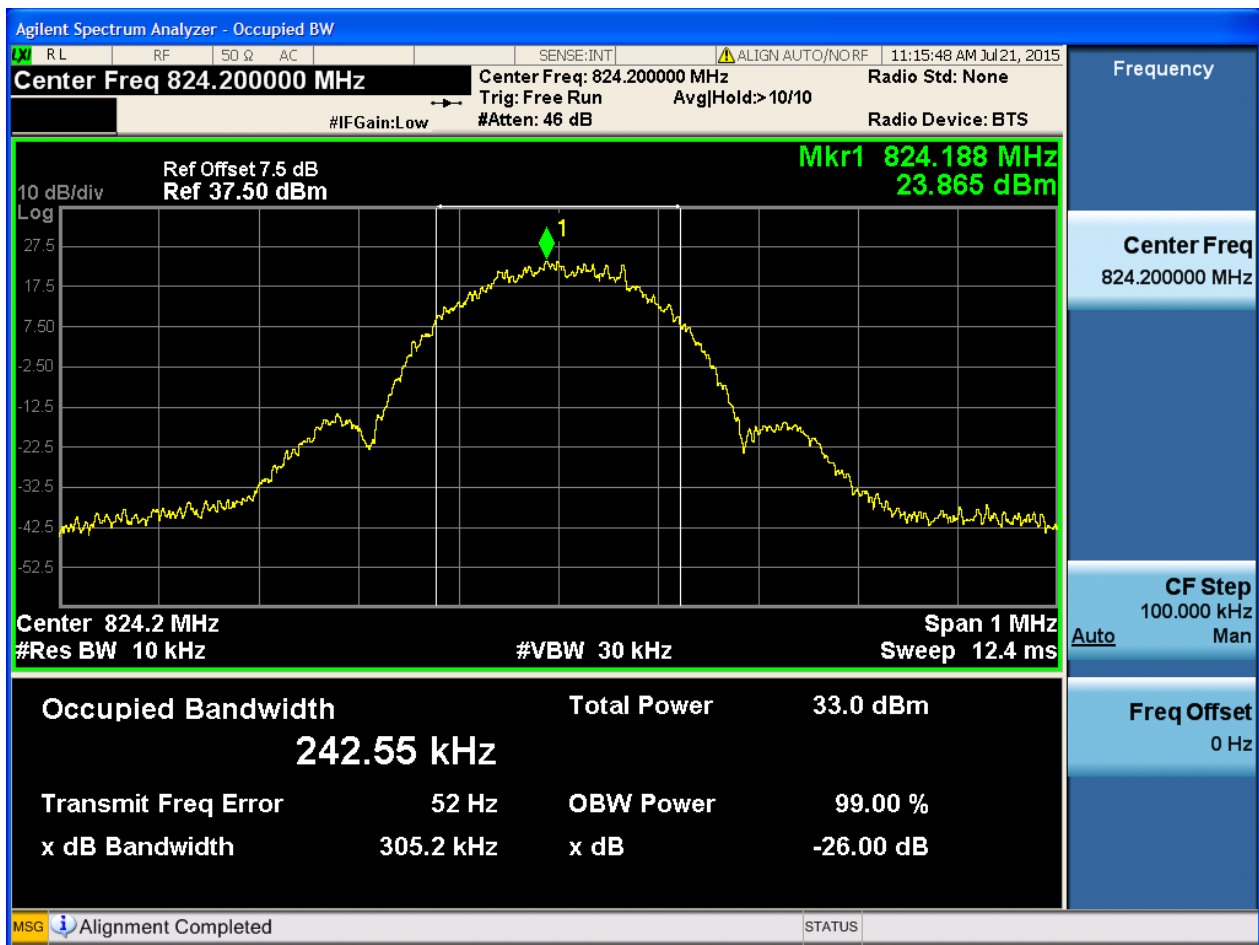


4.1.1.1.3 Test Channel = HCH



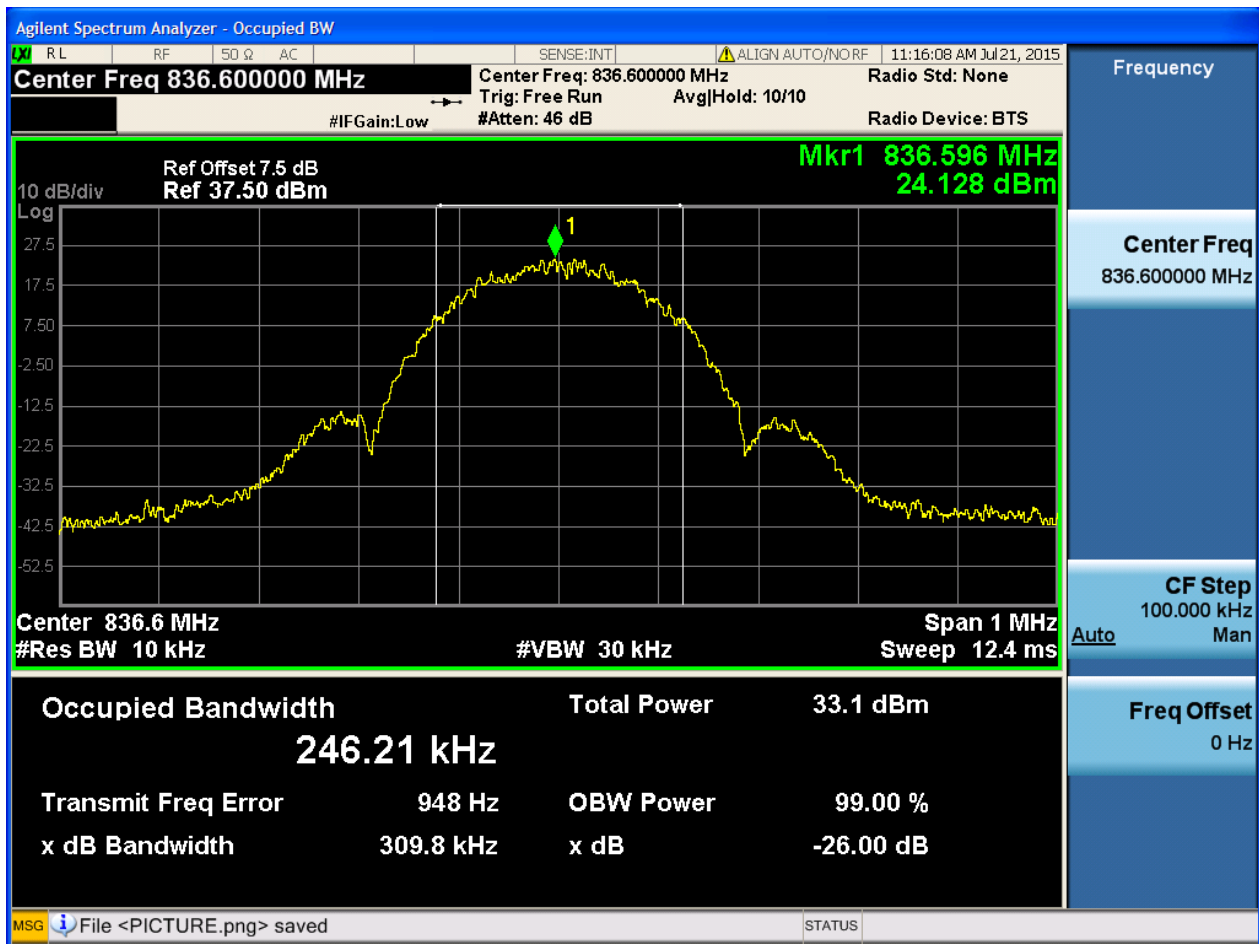
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



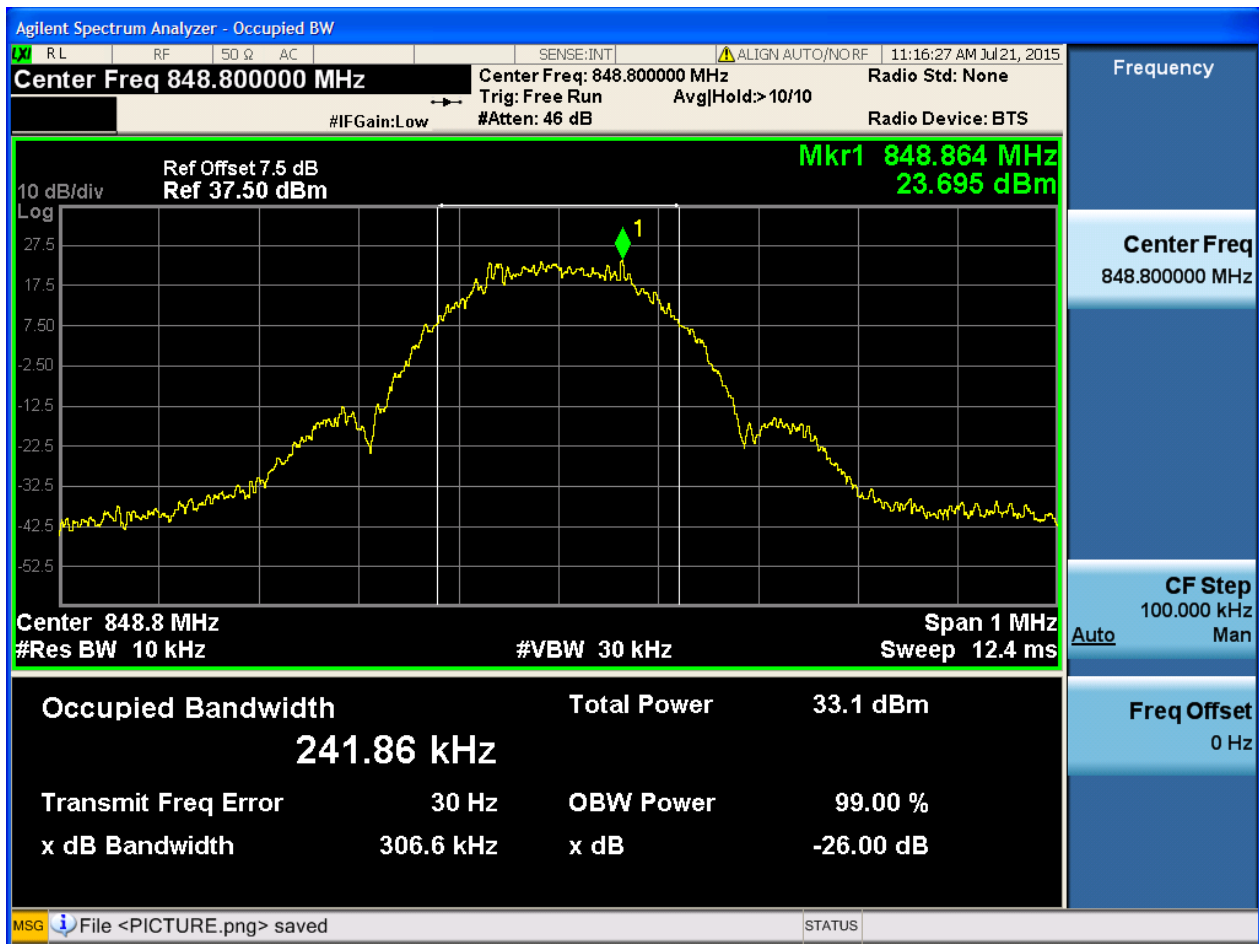


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

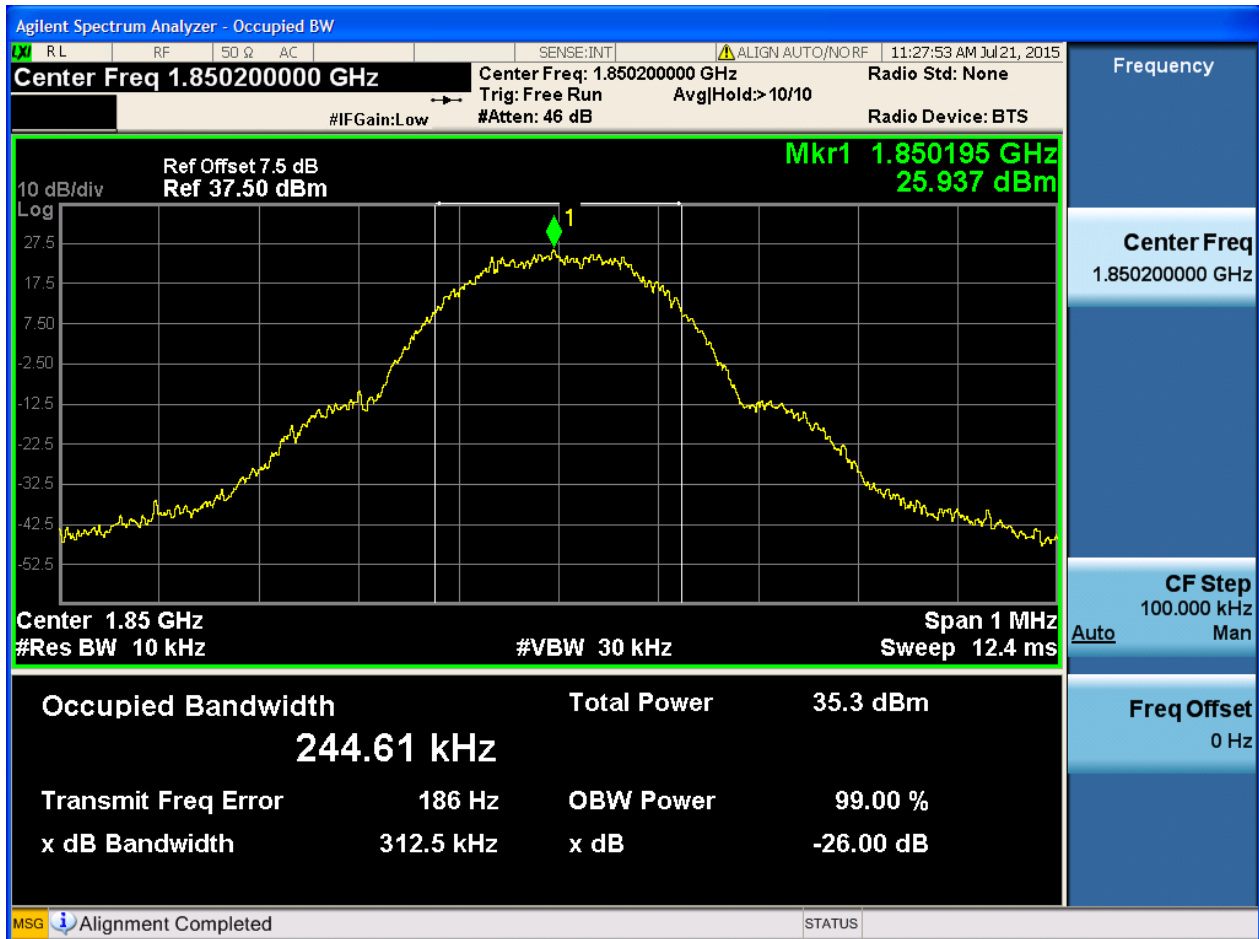




4.1.2 Test Band = GSM1900

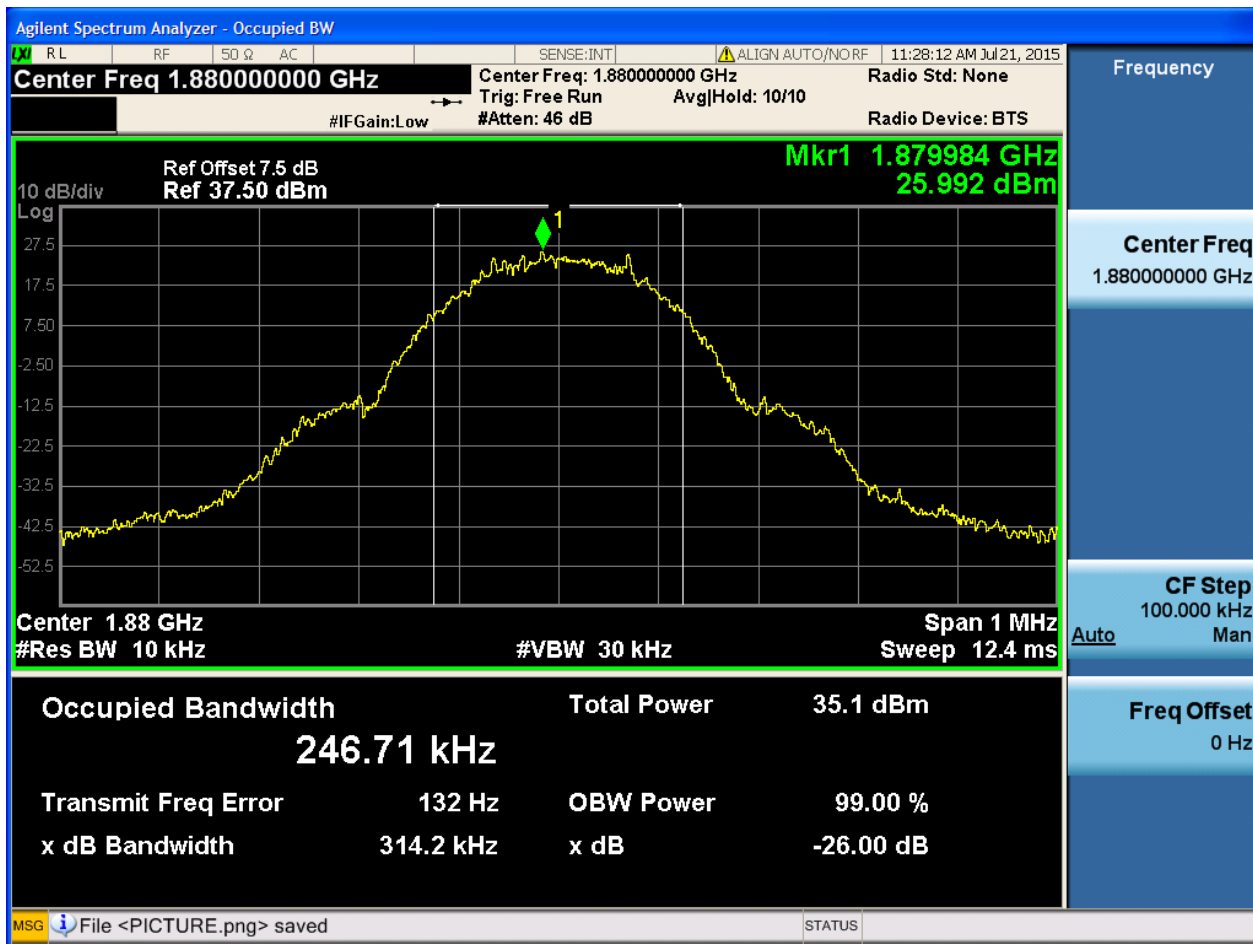
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



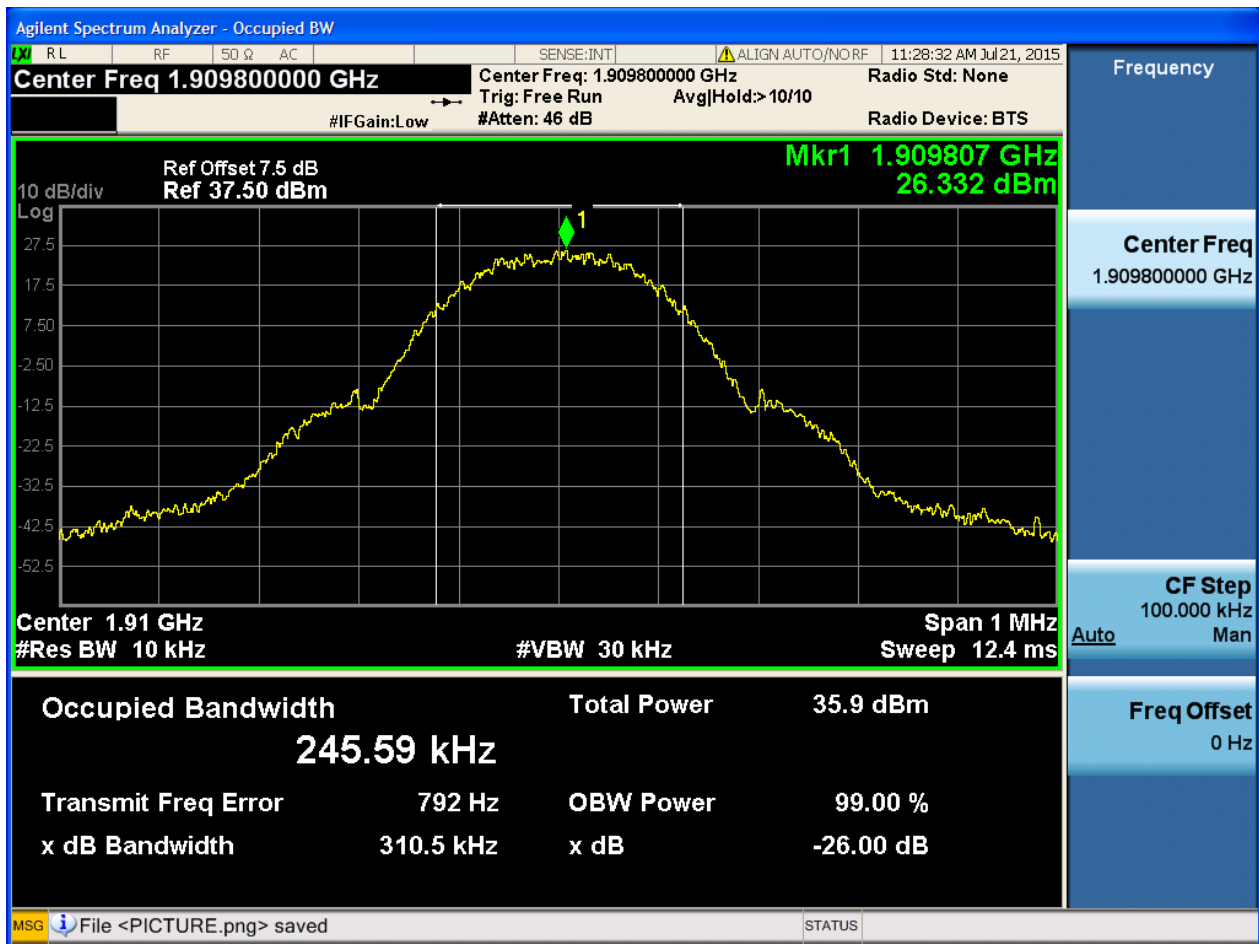


4.1.2.1.2 Test Channel = MCH





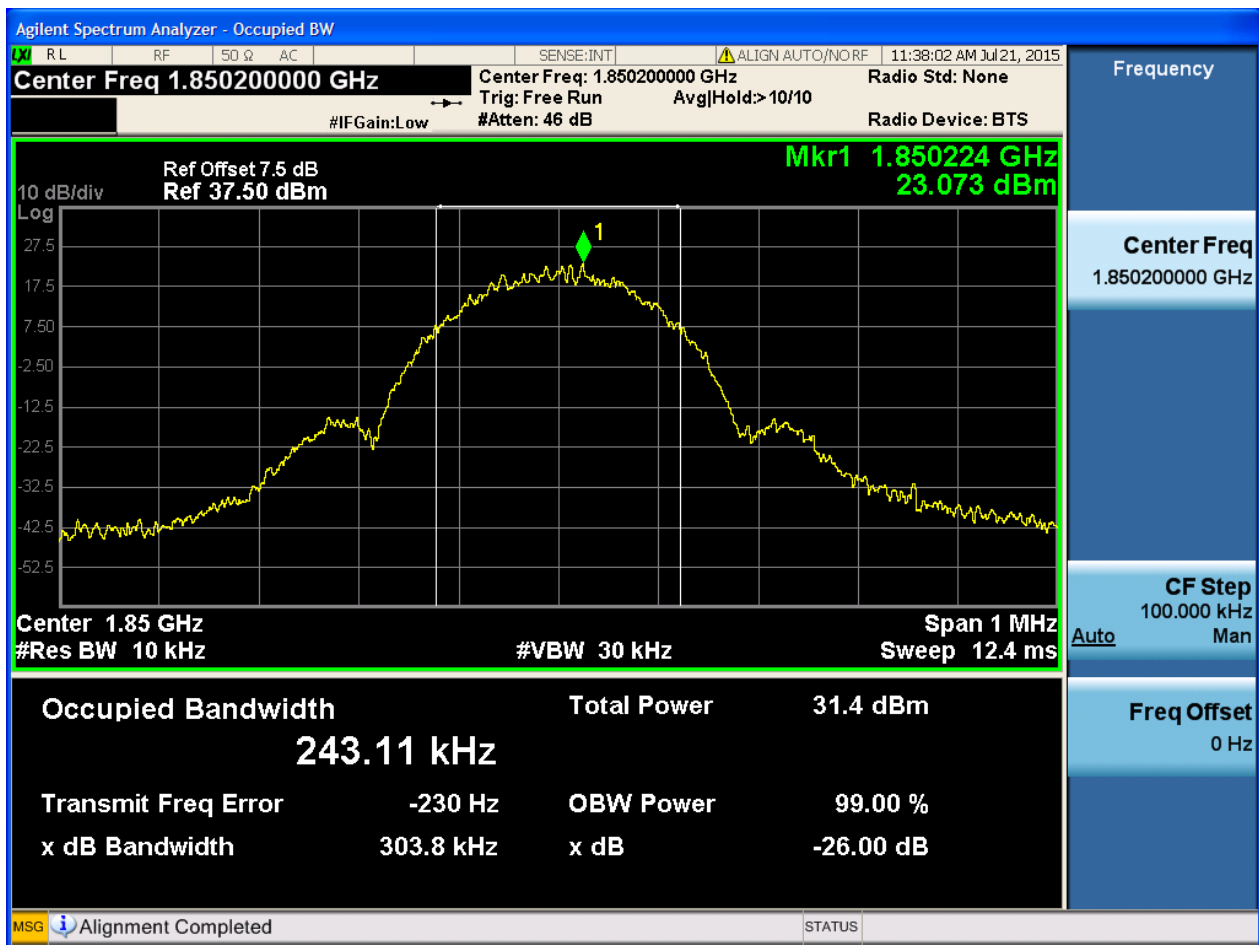
4.1.2.1.3 Test Channel = HCH





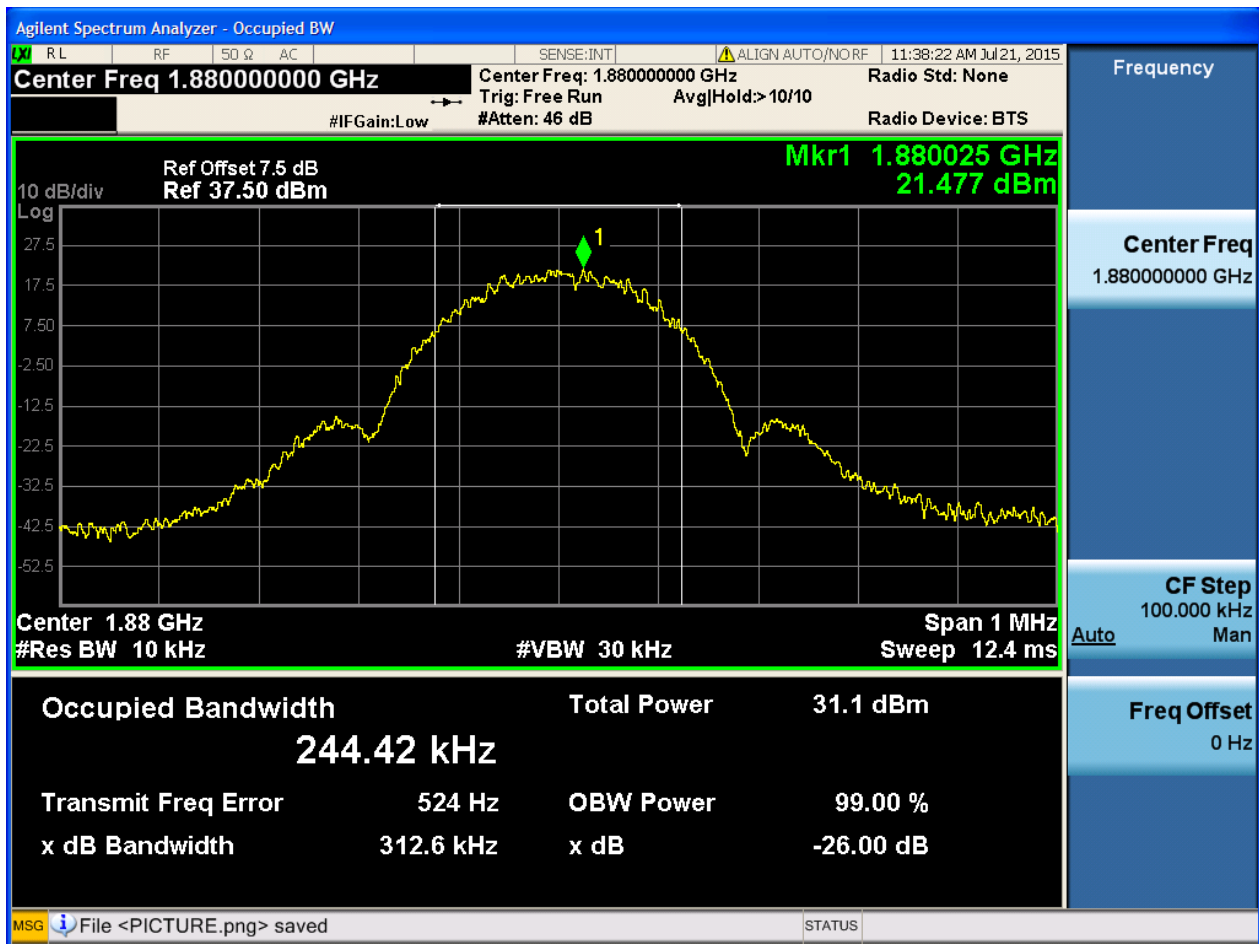
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



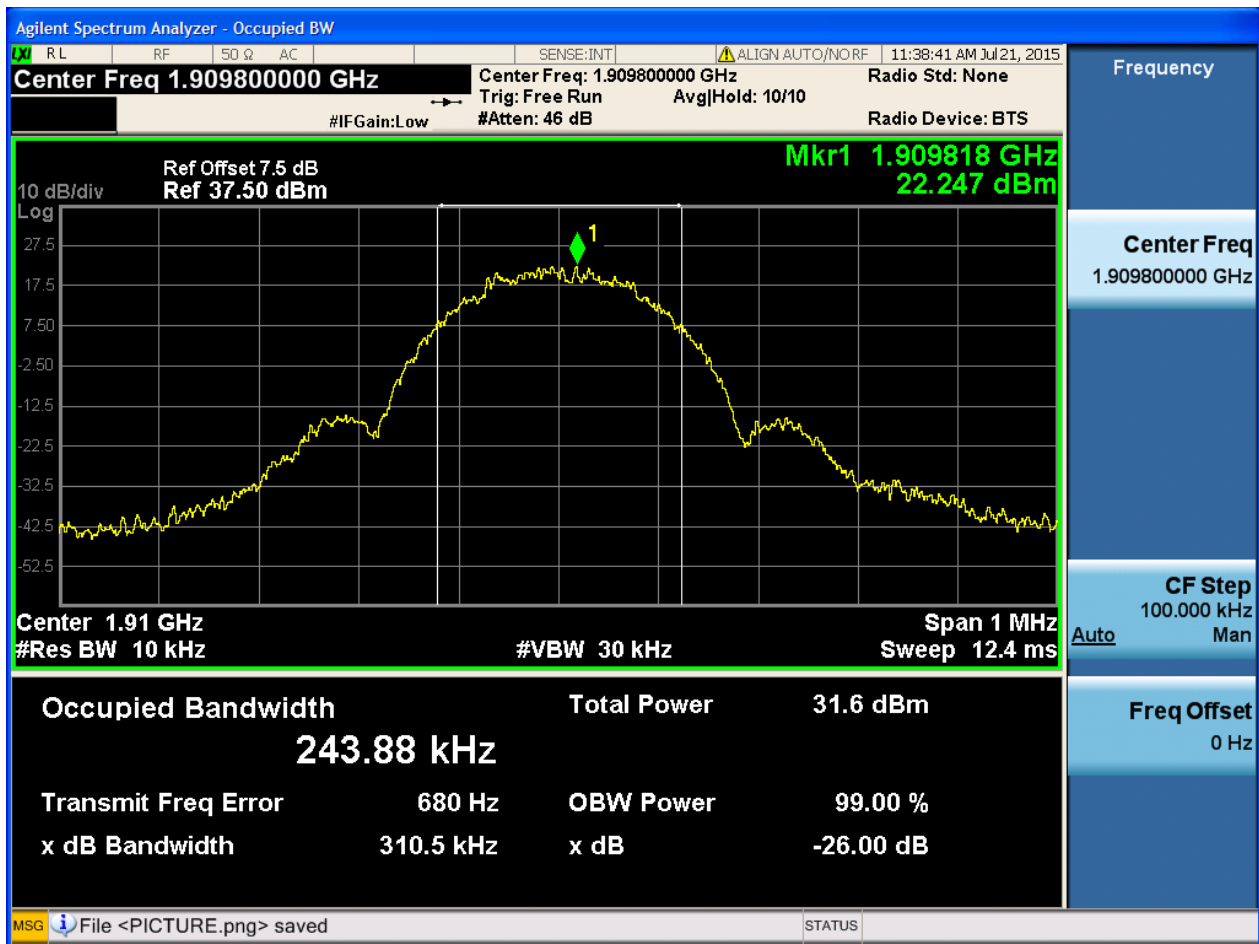


4.1.2.2.2 Test Channel = MCH



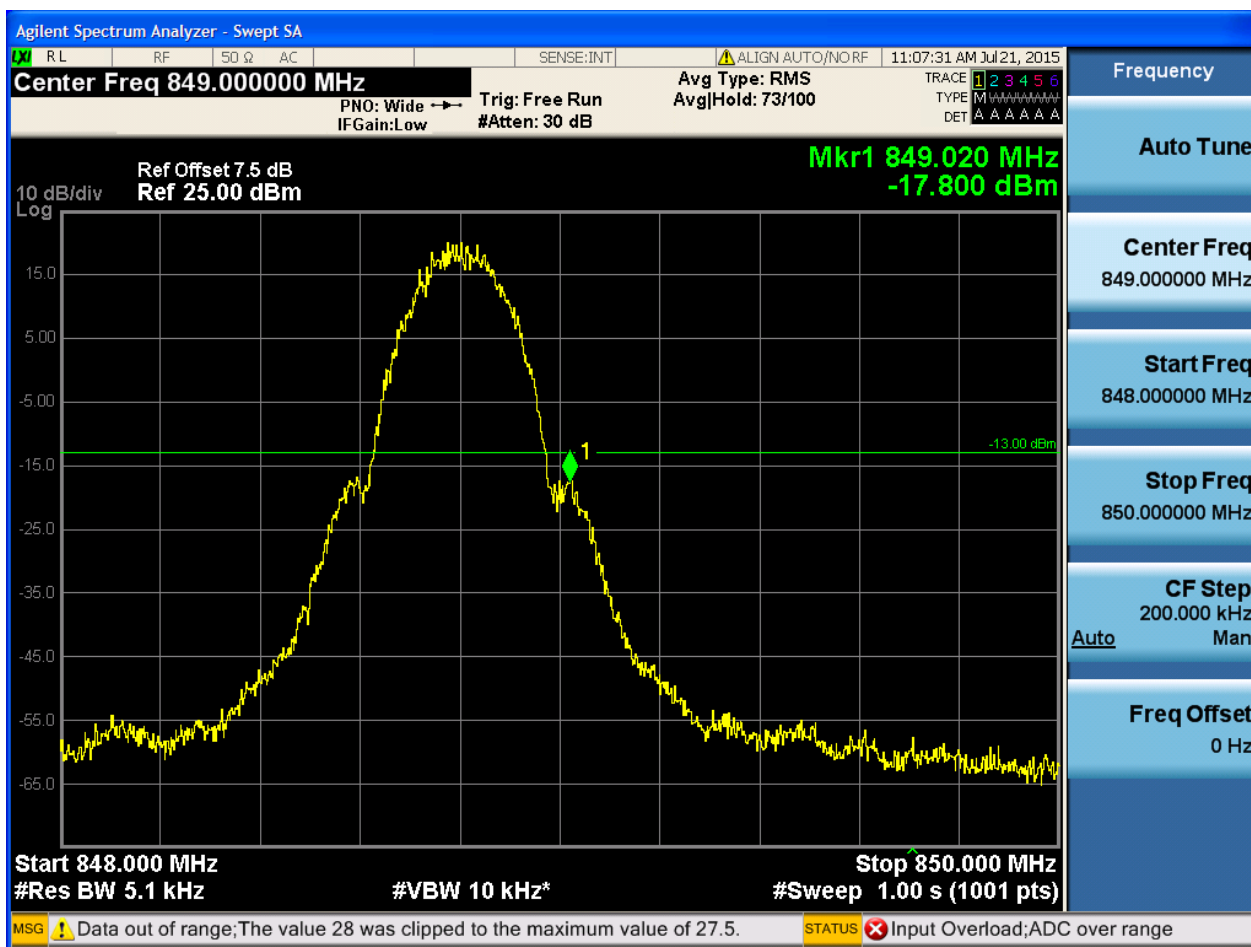


4.1.2.2.3 Test Channel = HCH



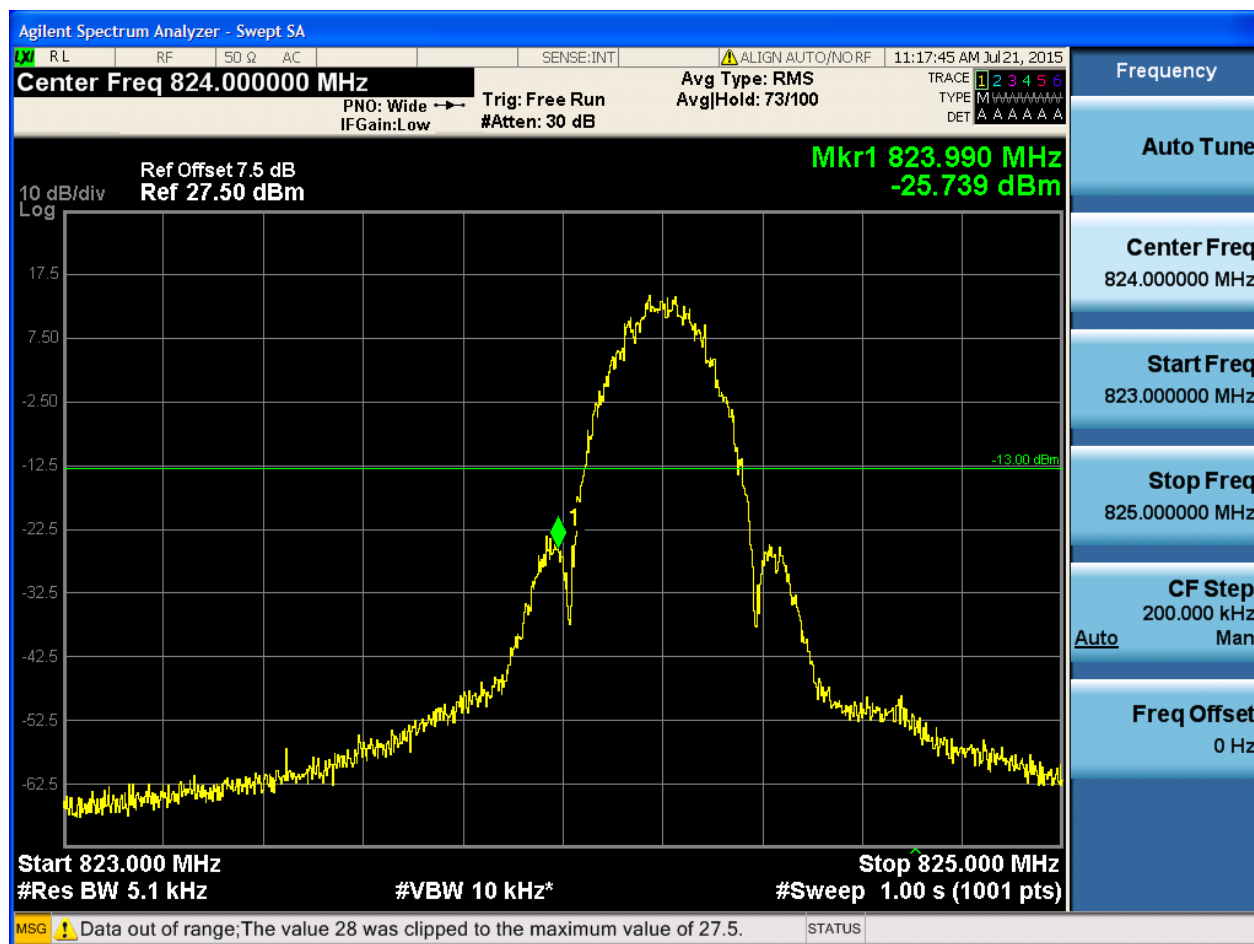


5.1.1.1.2 Test Channel = HCH

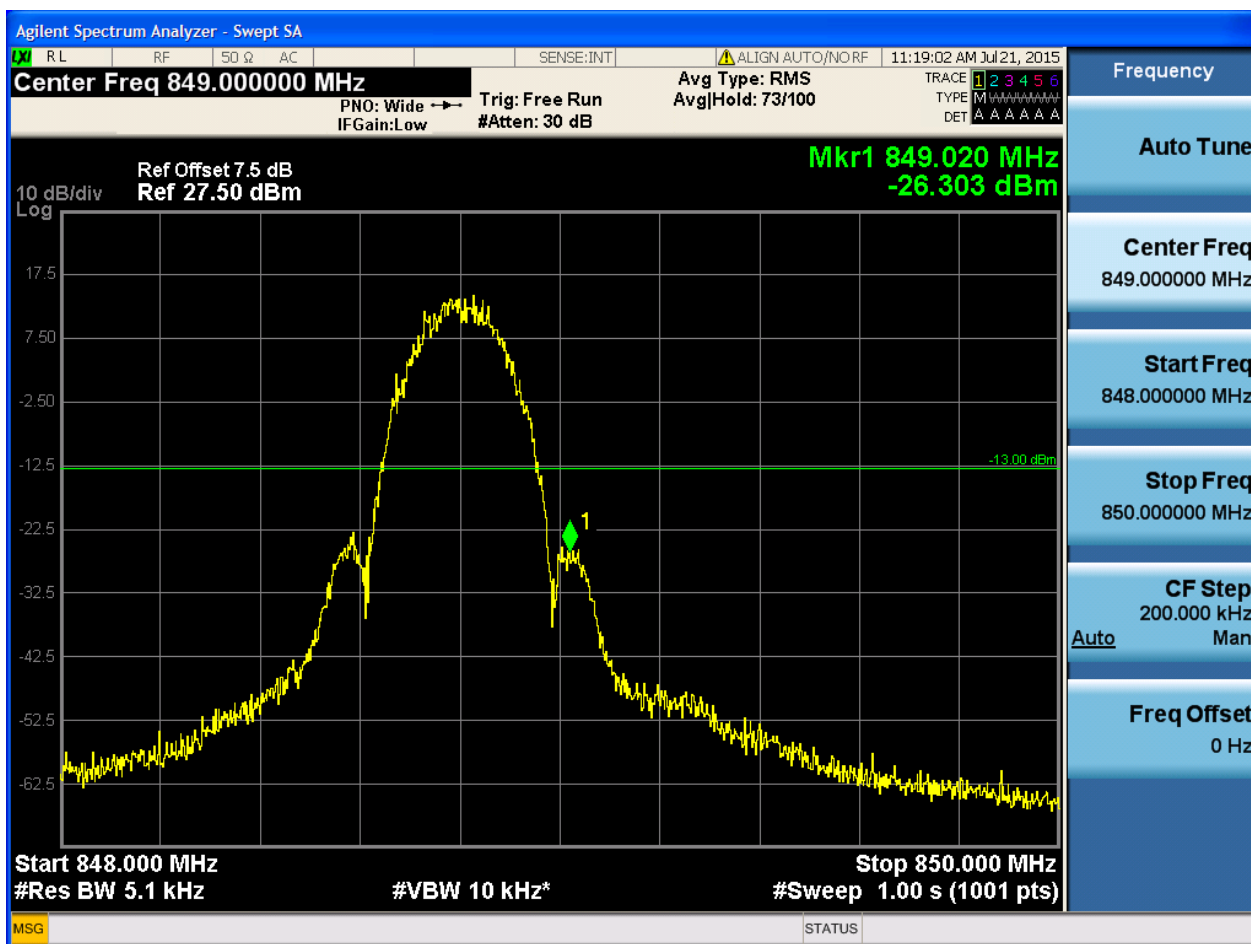


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



5.1.1.2.2 Test Channel = HCH

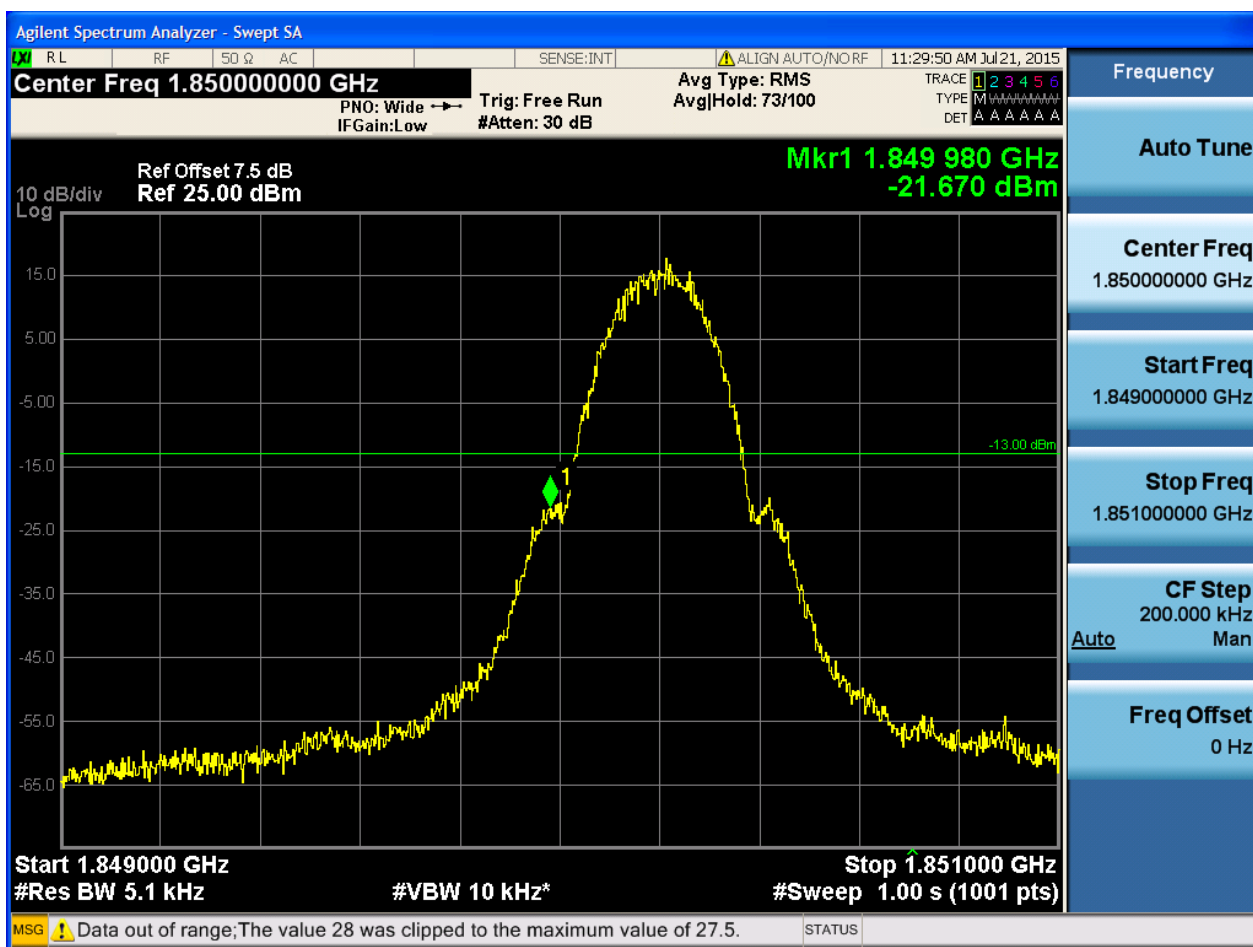




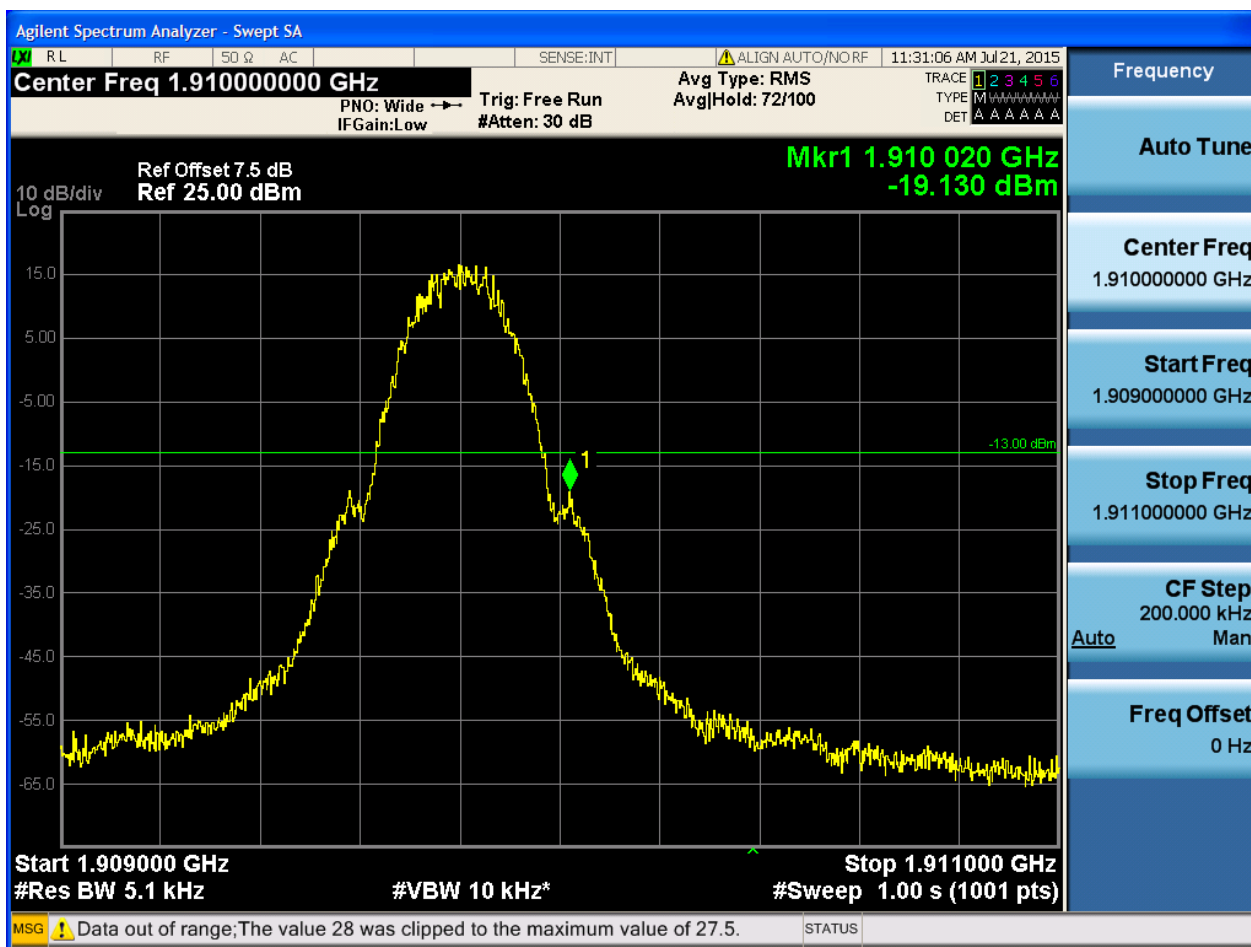
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

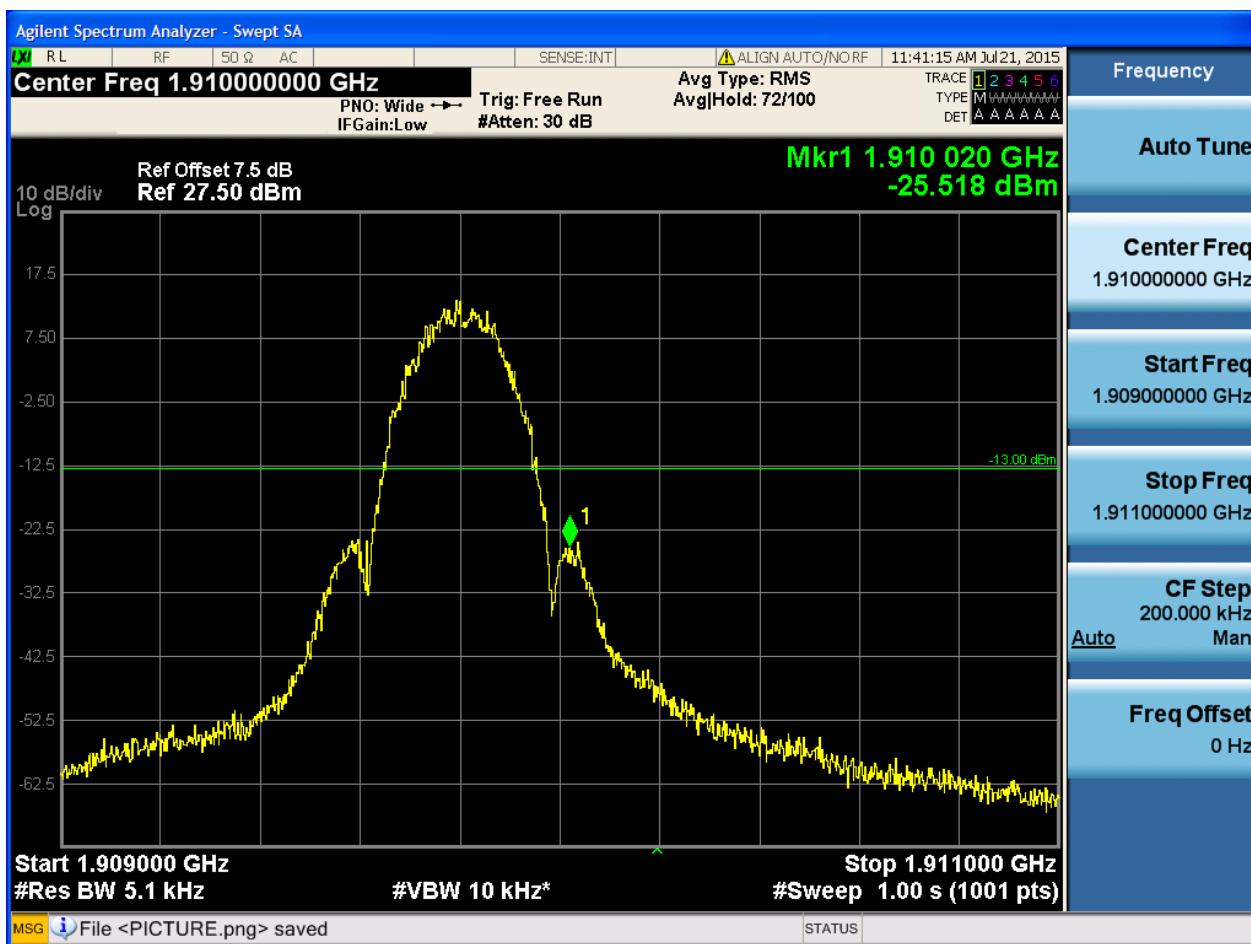


5.1.2.1.2 Test Channel = HCH





5.1.2.2.2 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.

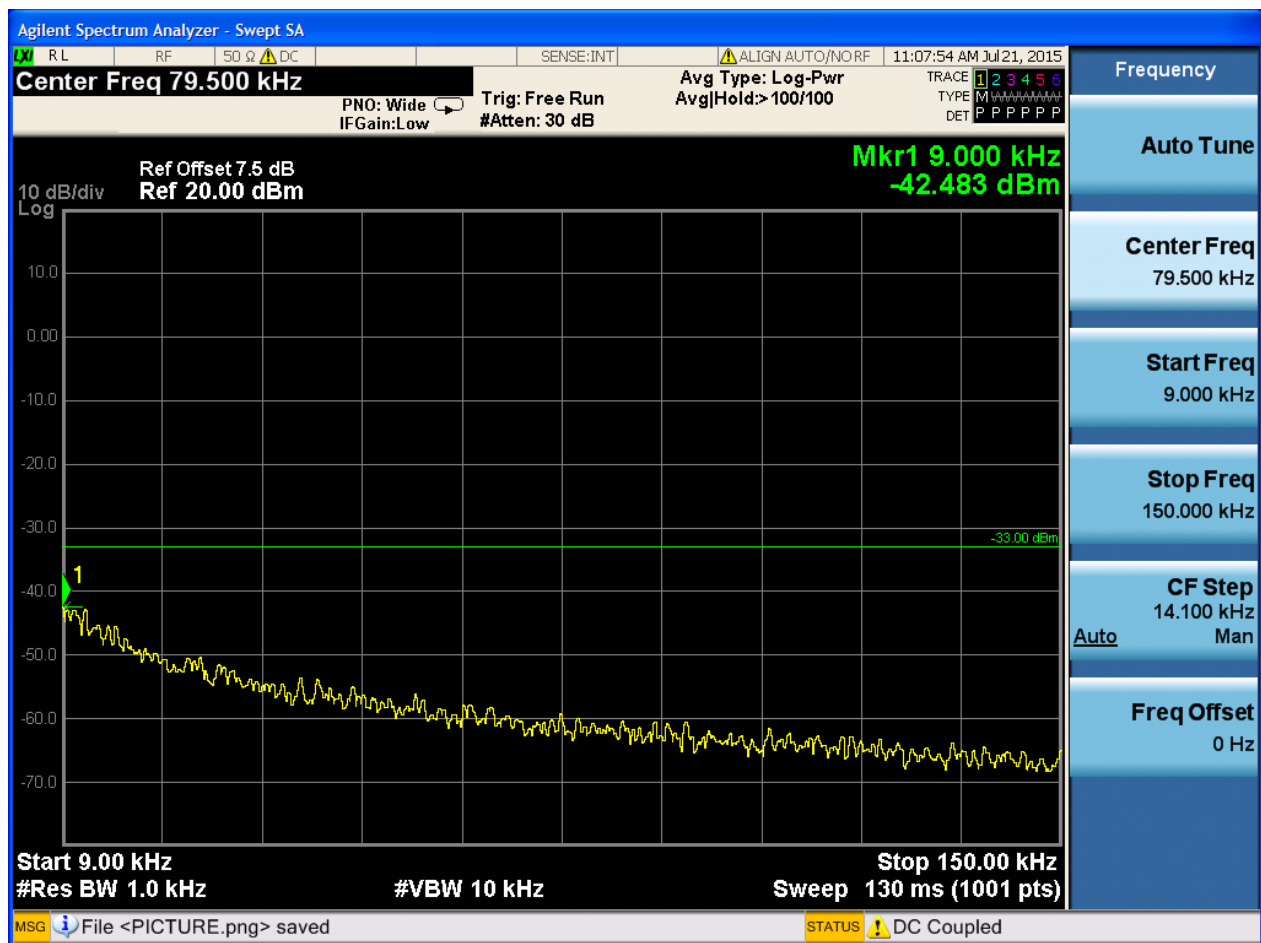
Part I - Test Plots

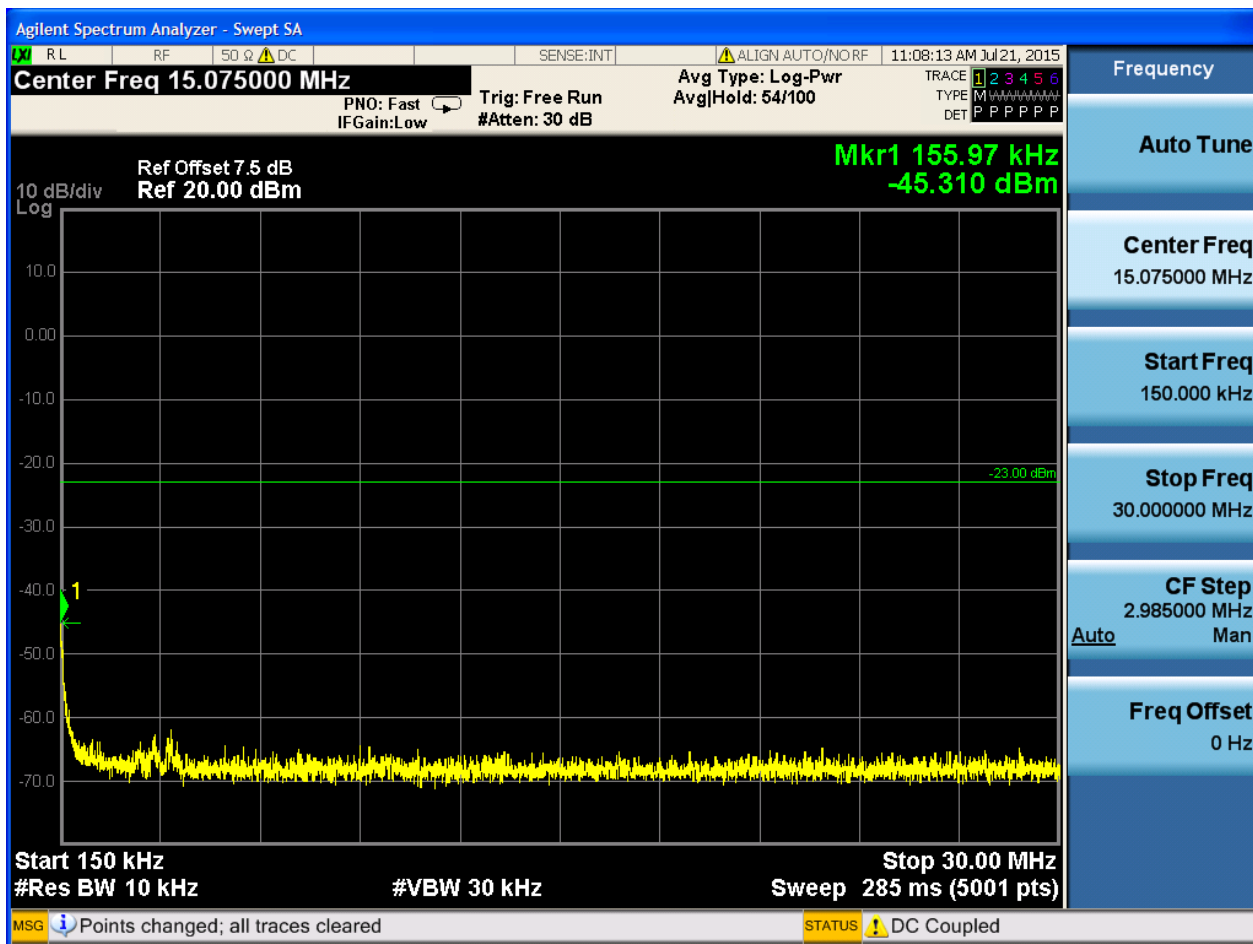
6.1 For GSM

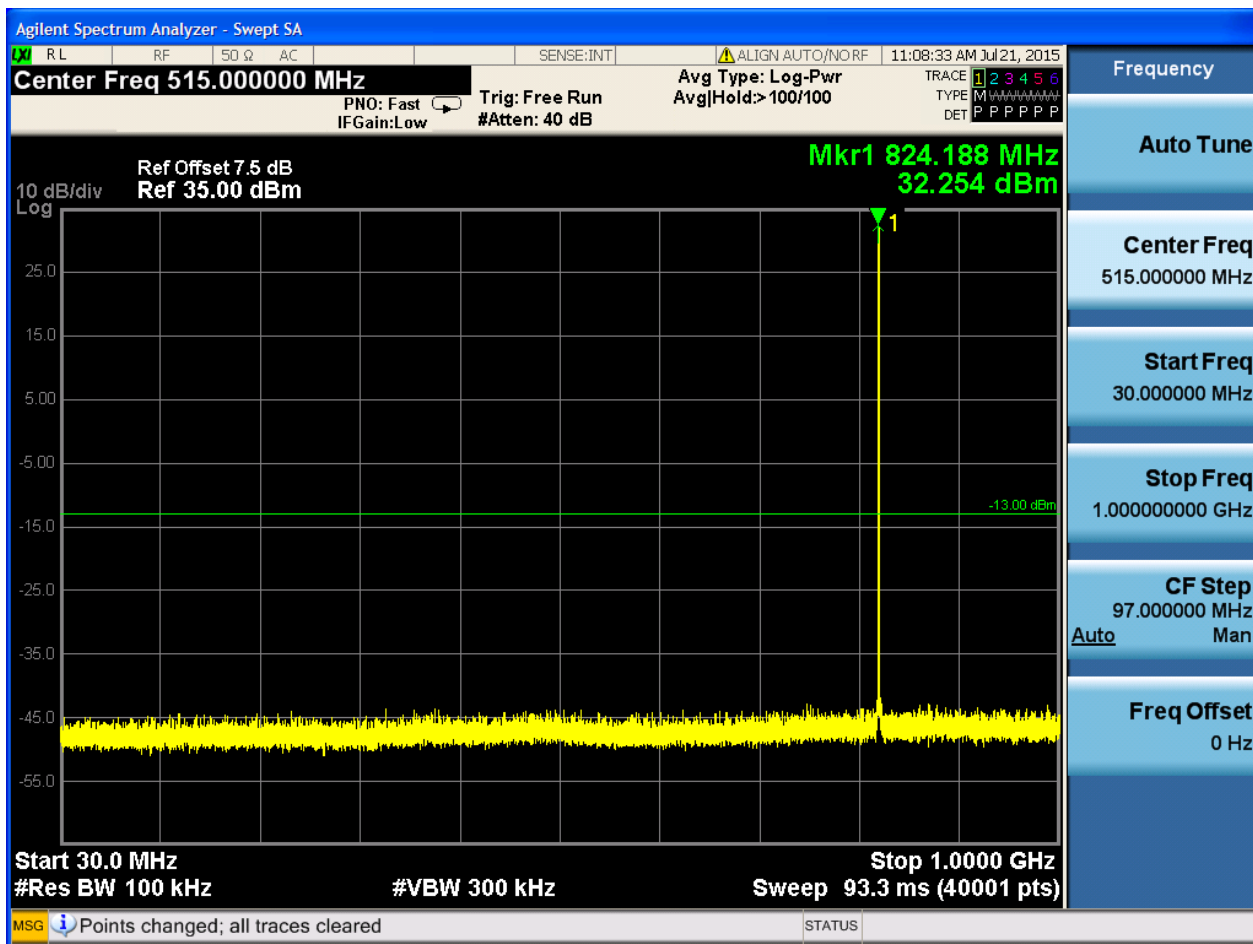
6.1.1 Test Band = GSM850

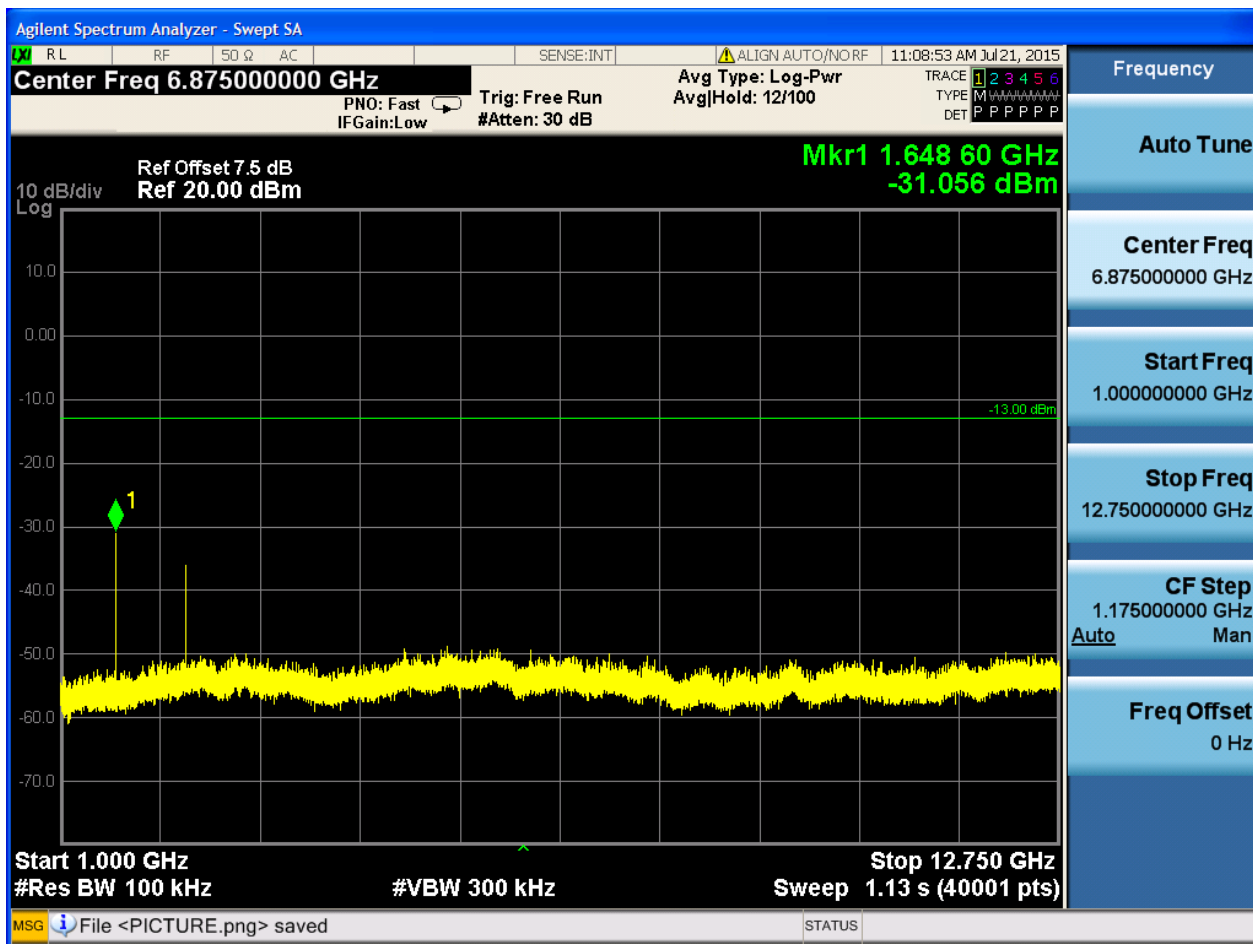
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH



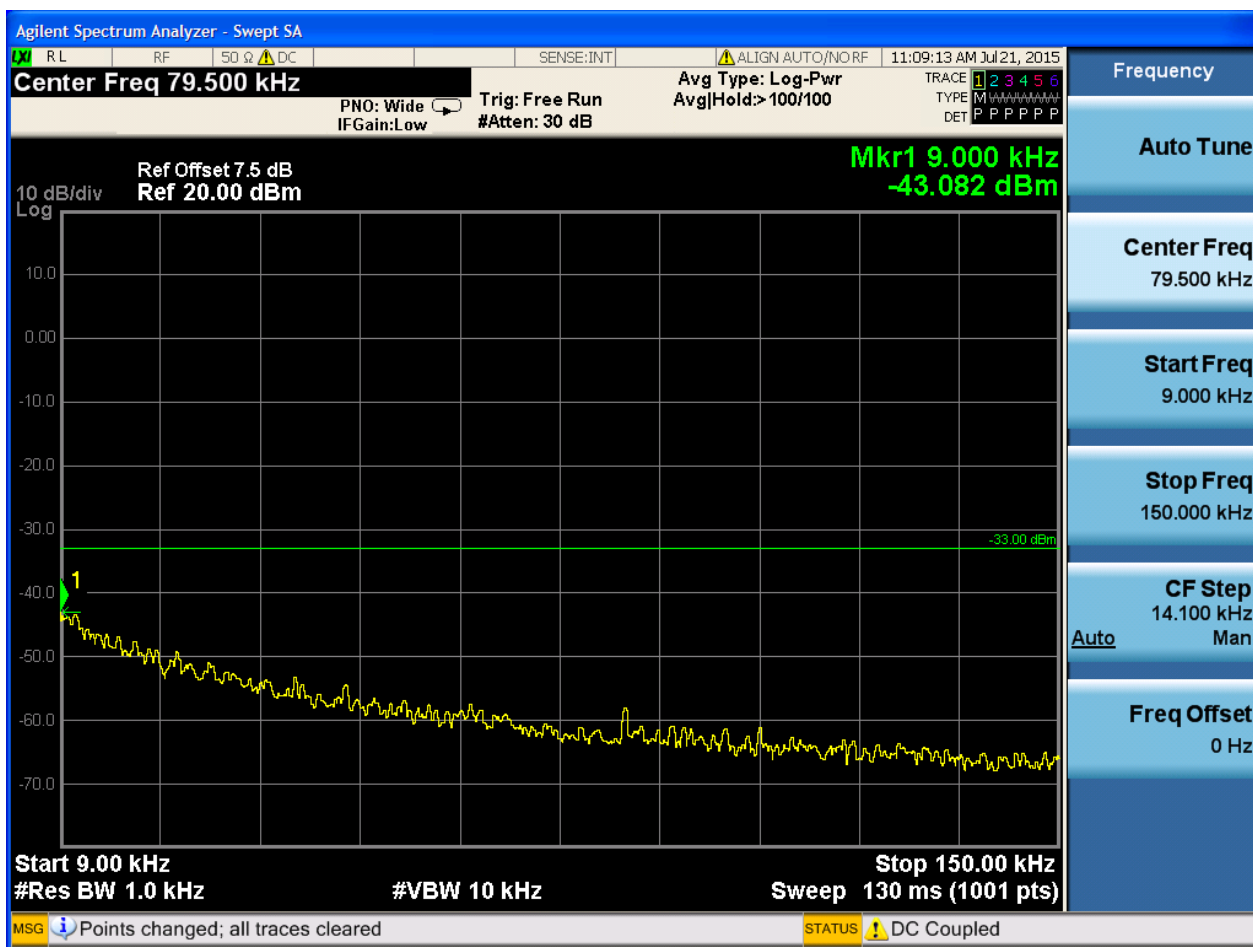


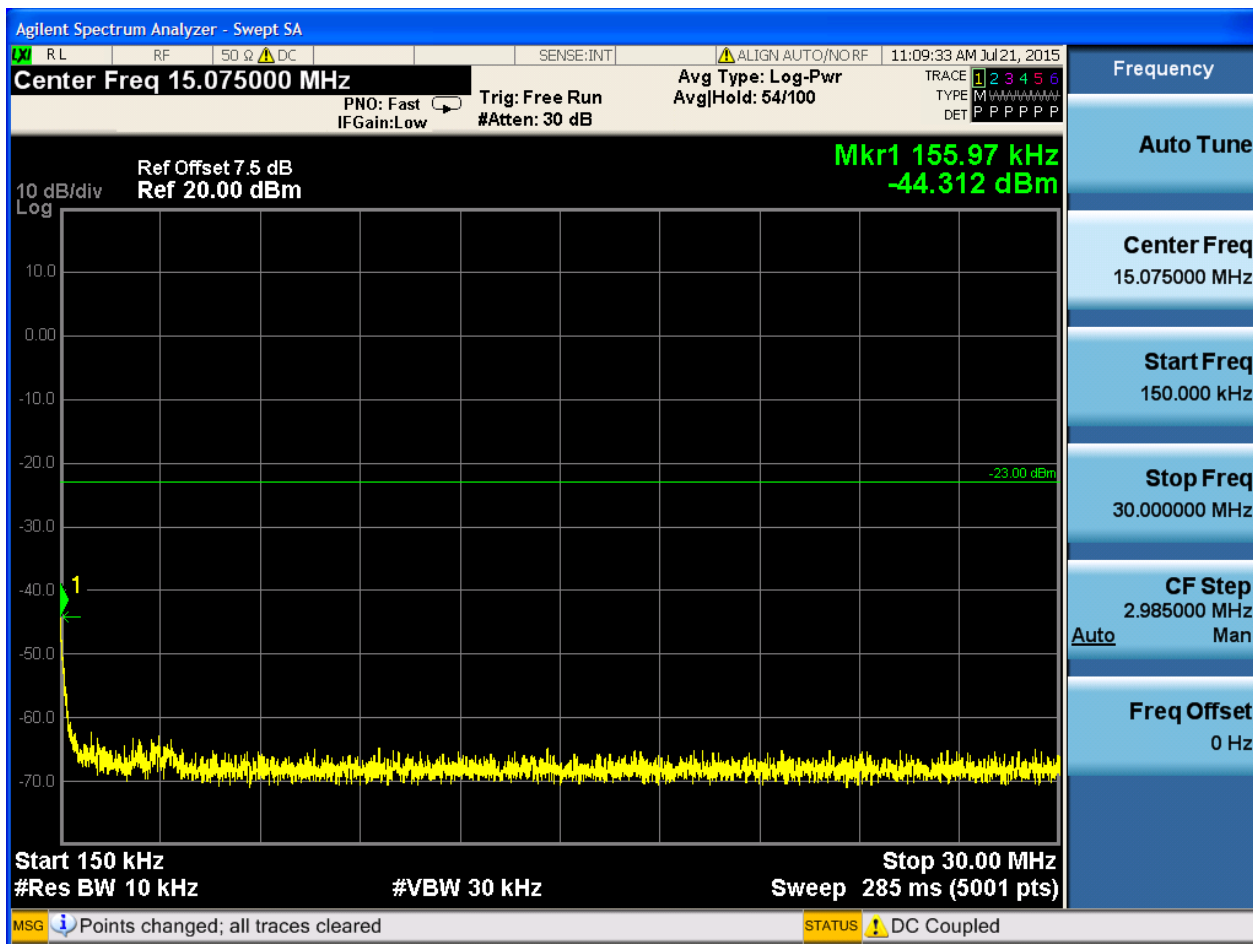


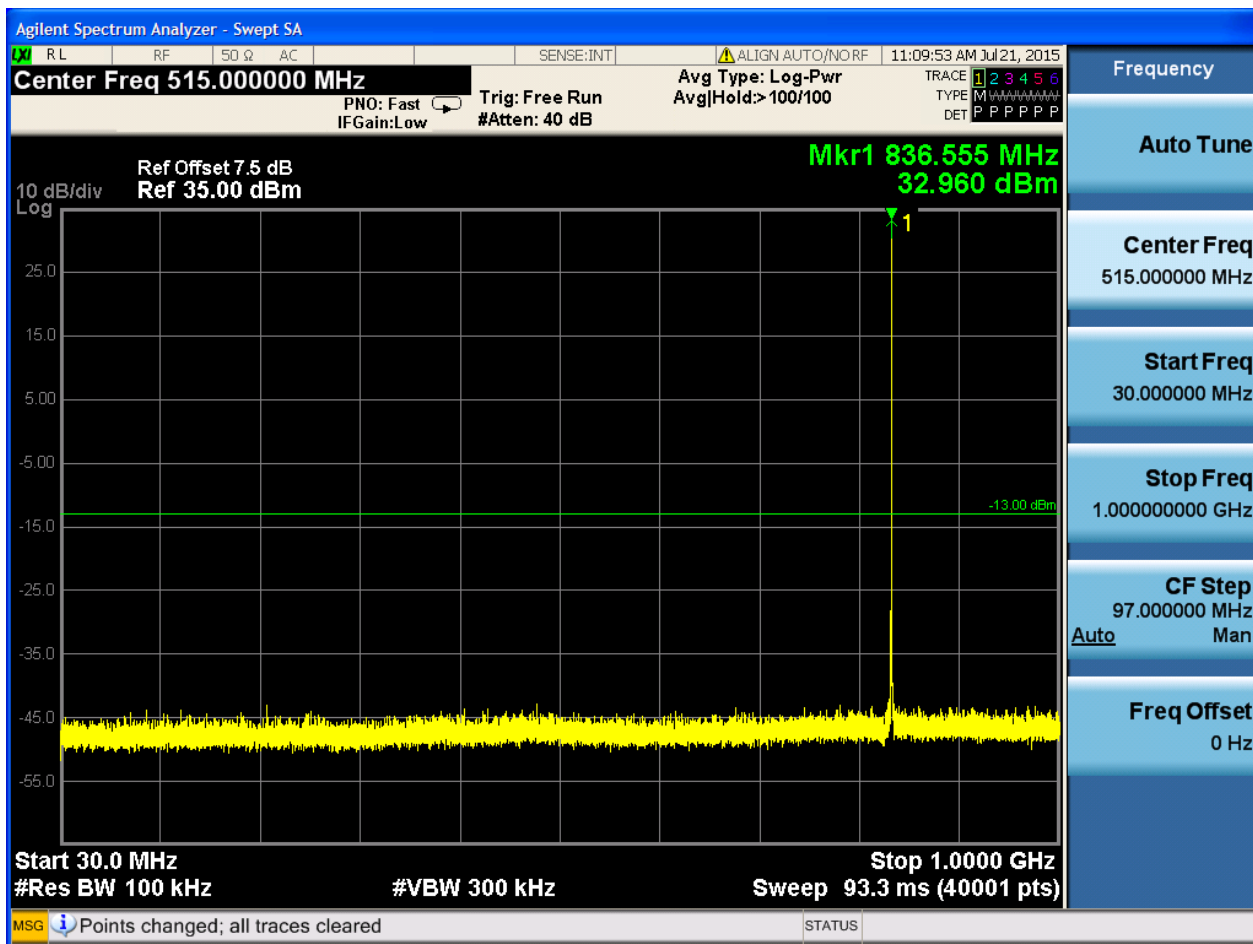


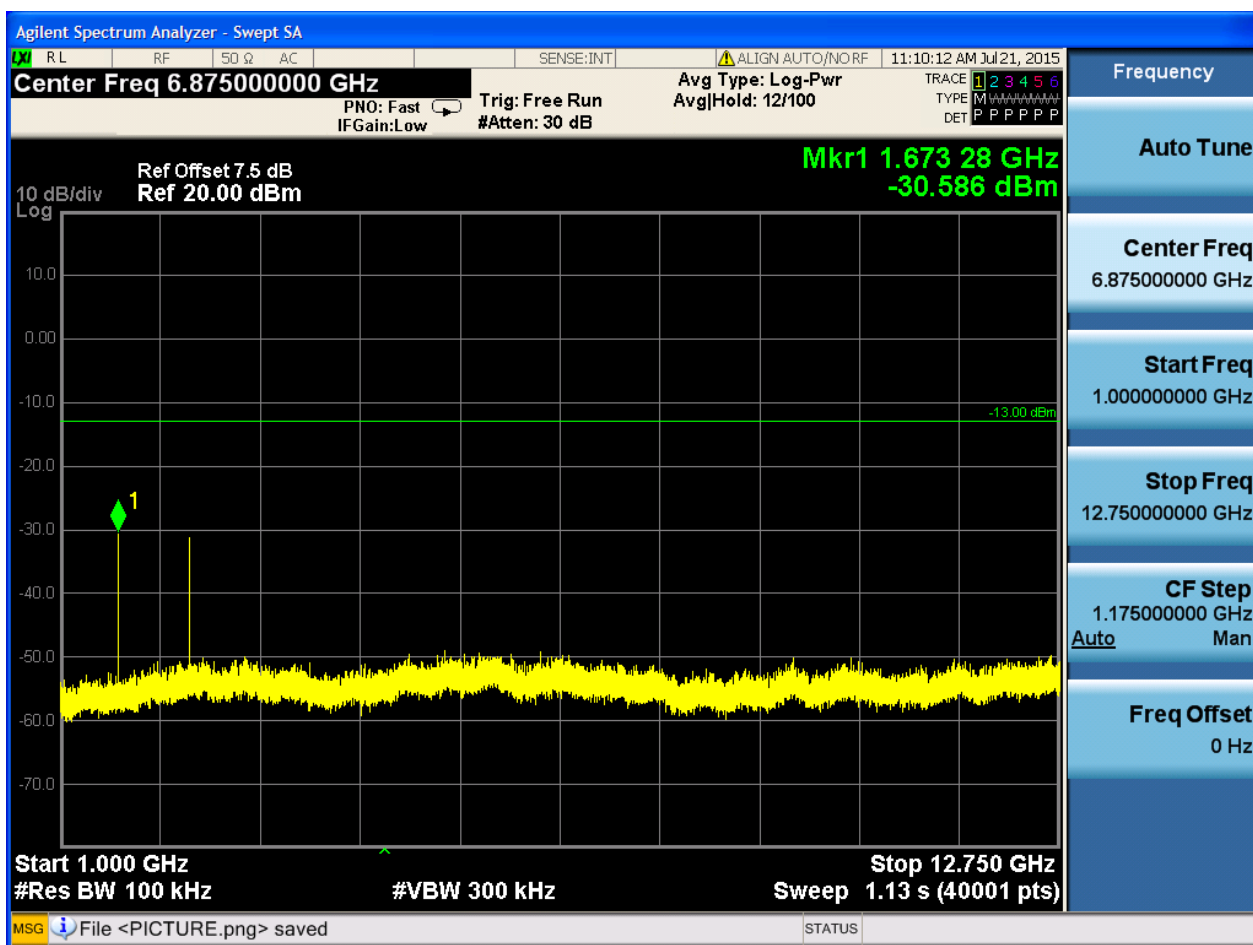


6.1.1.1.2 Test Channel = MCH

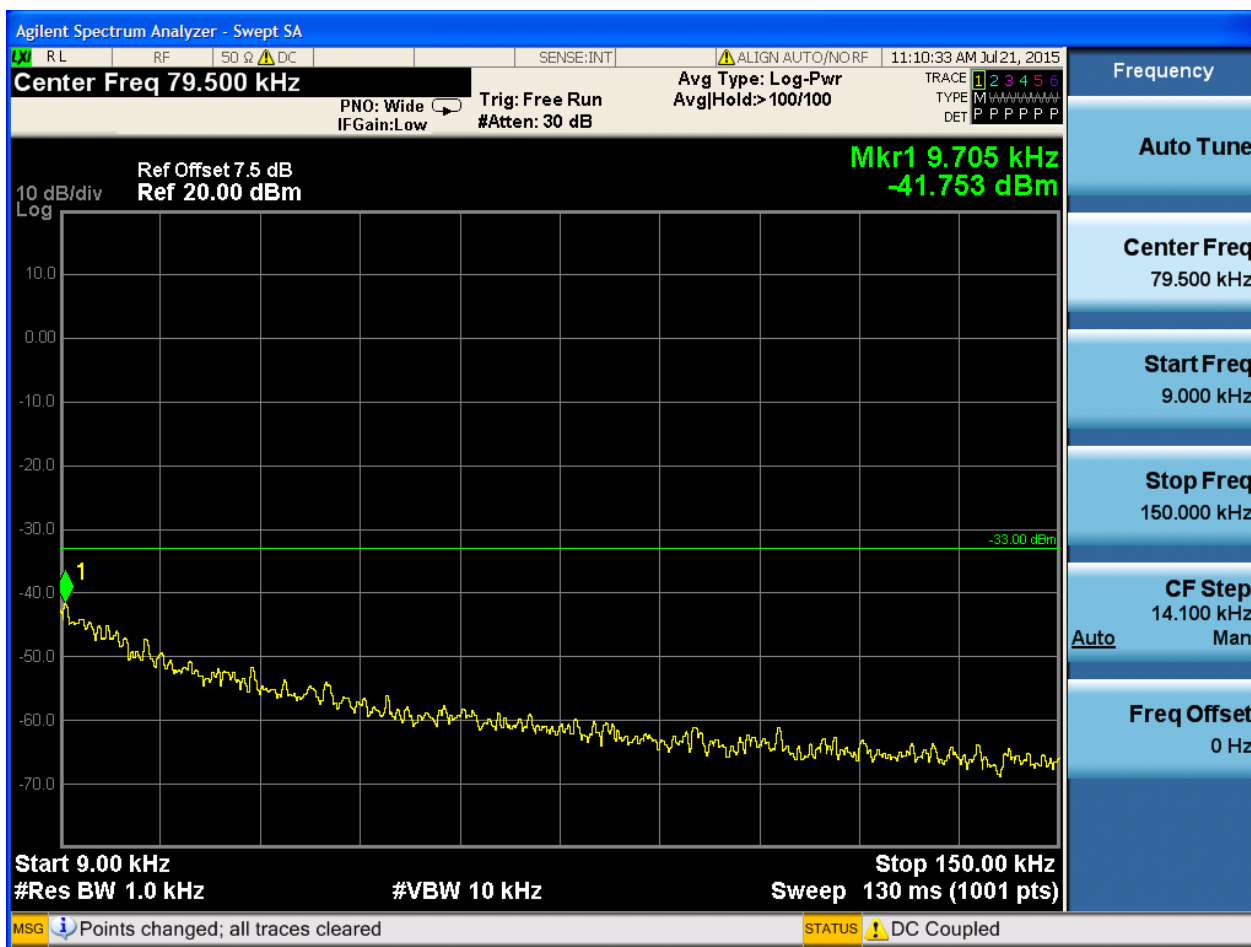


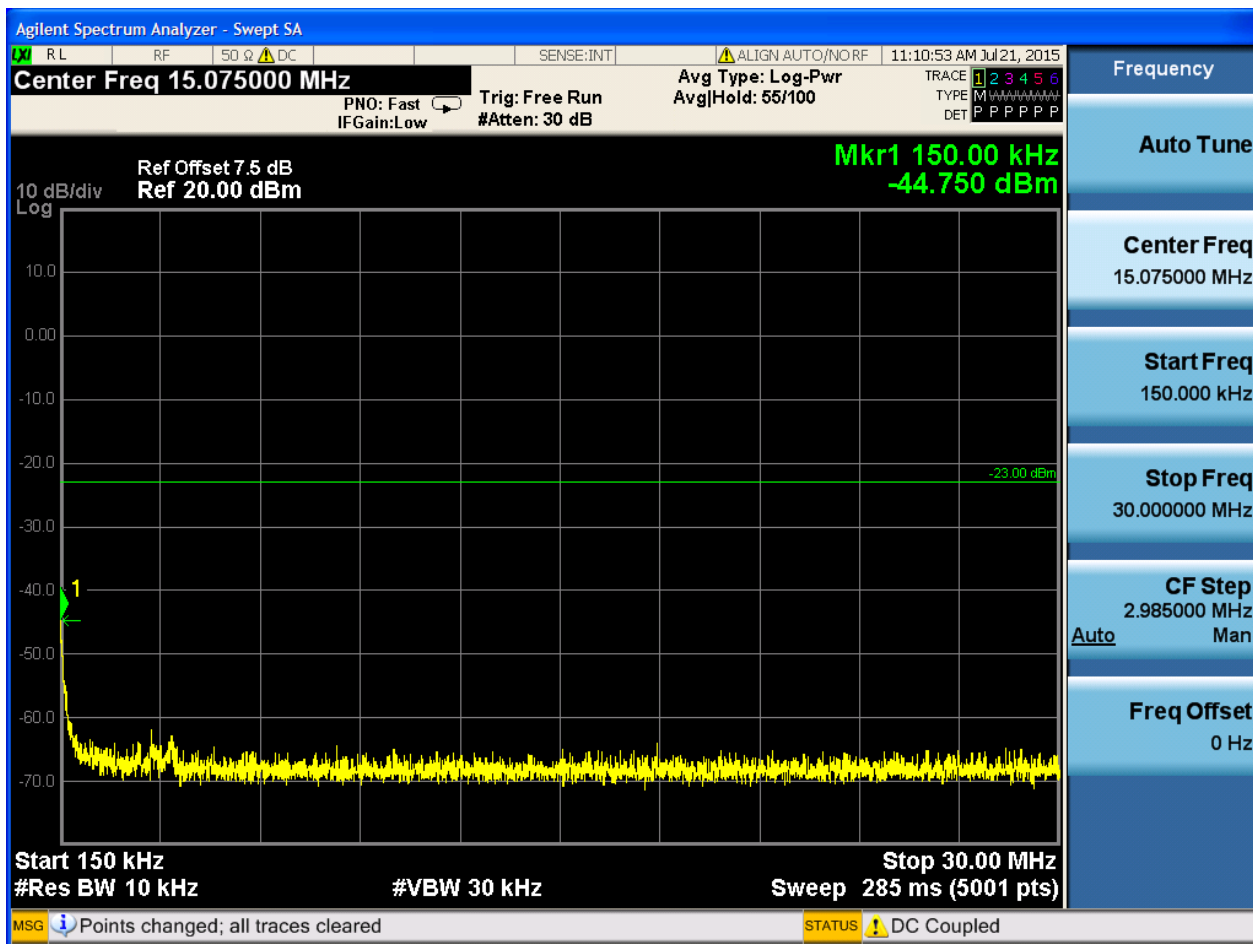


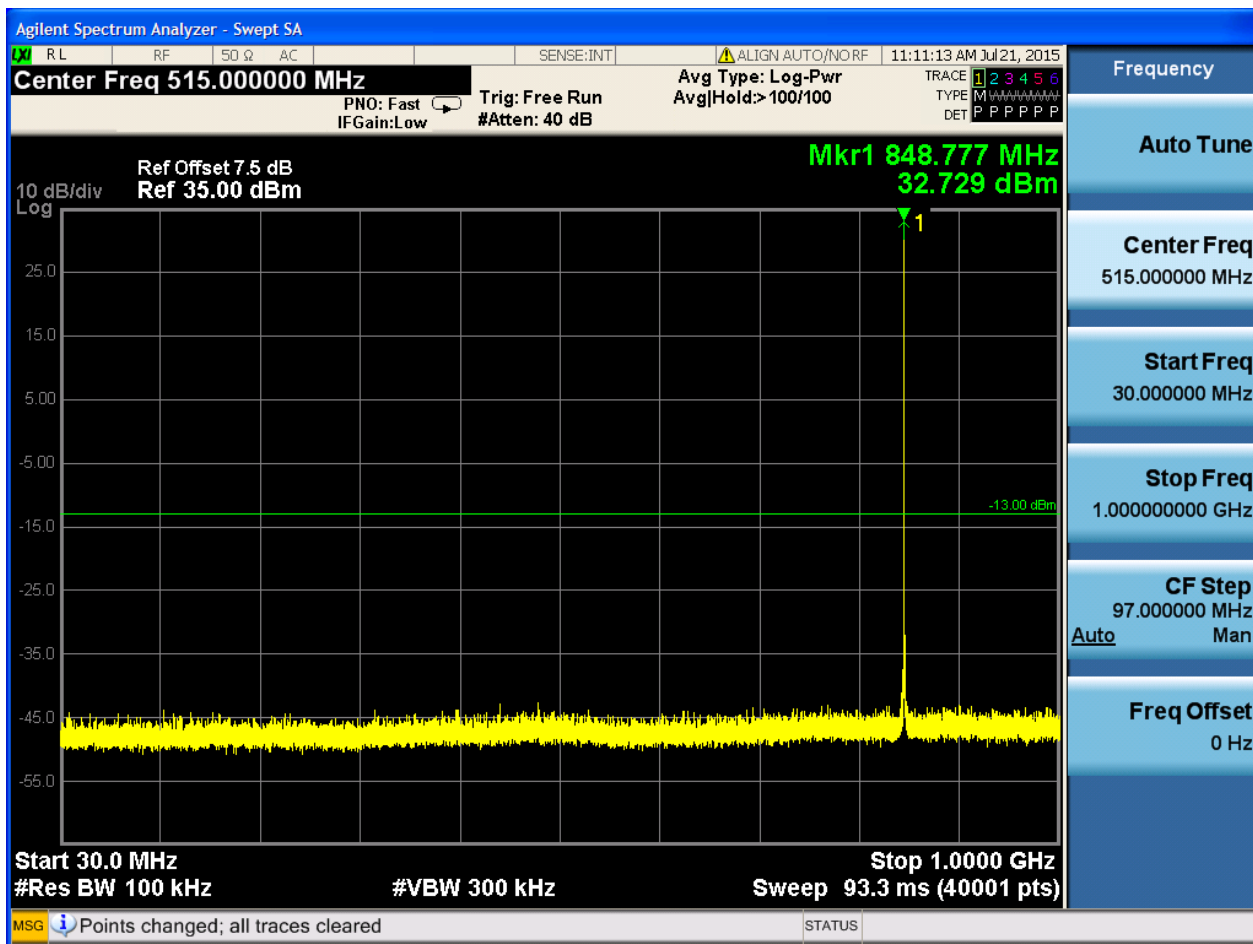


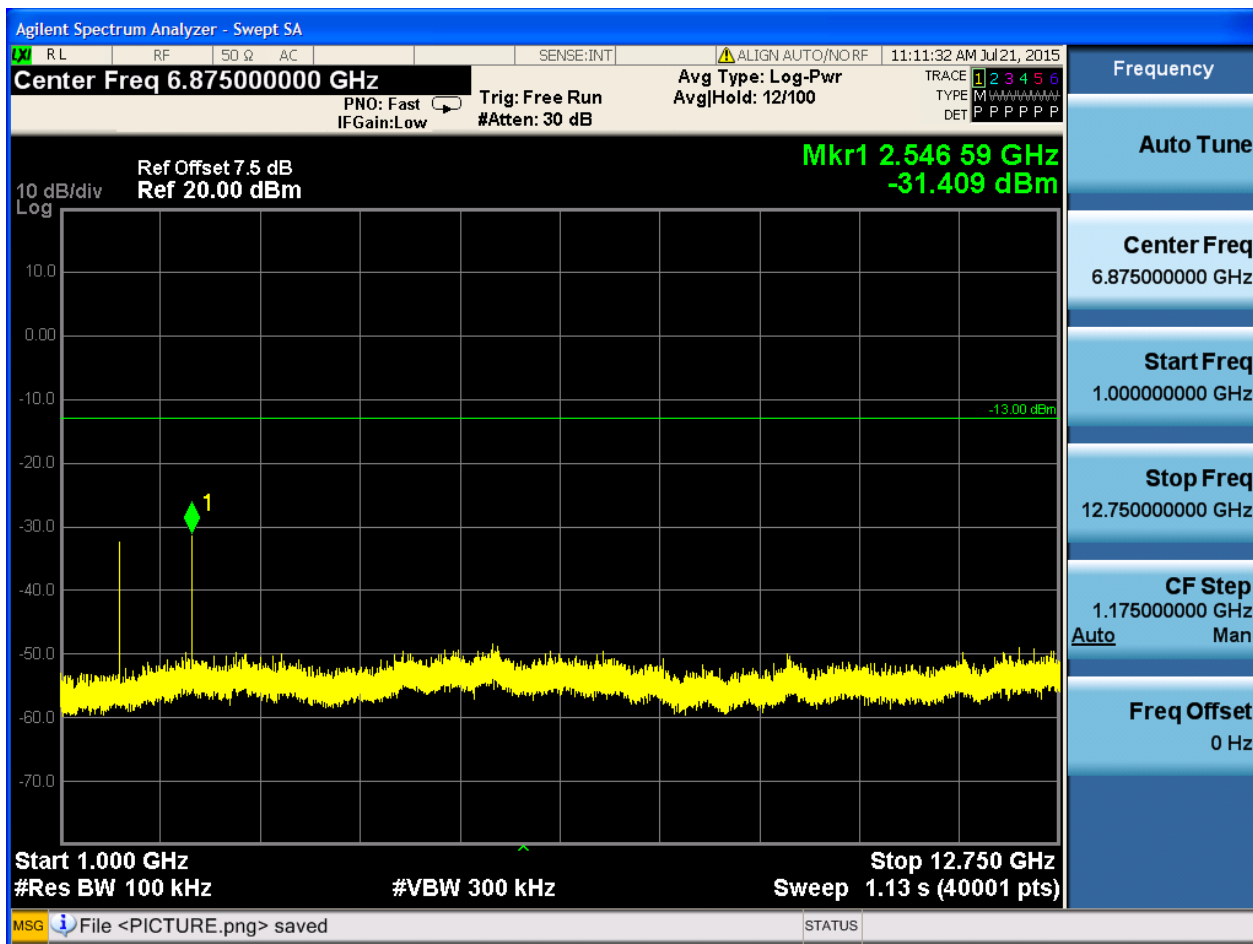


6.1.1.1.3 Test Channel = HCH





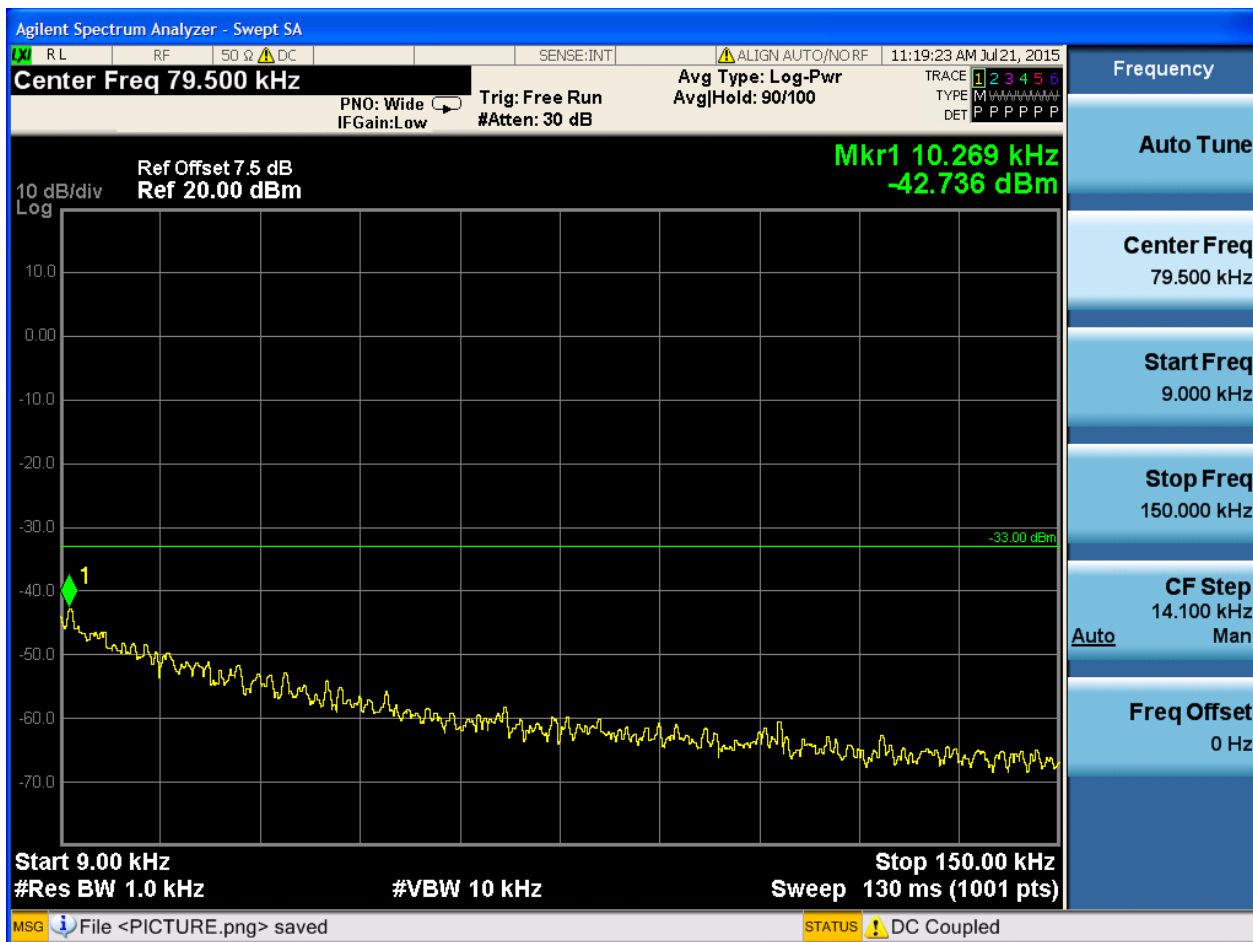


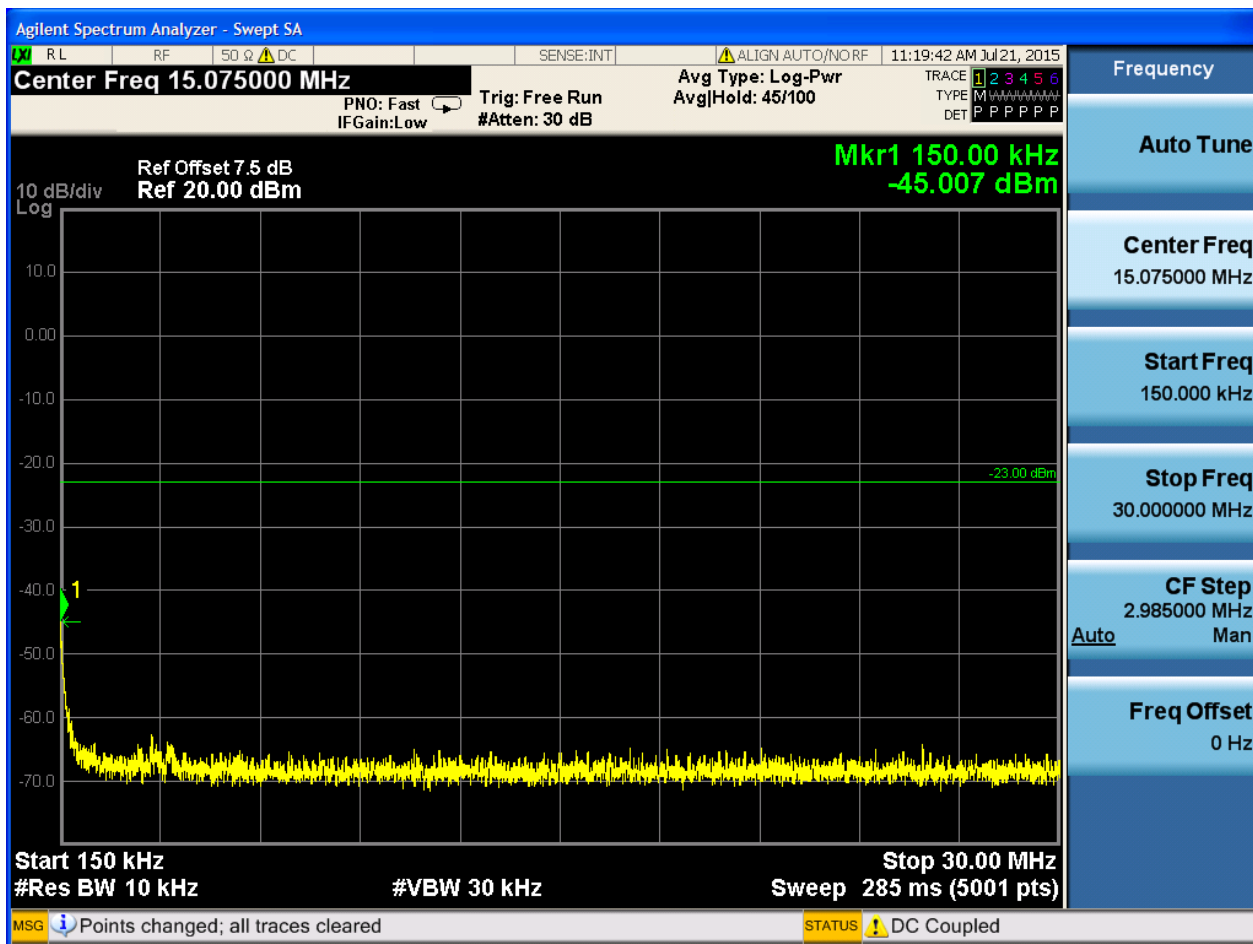


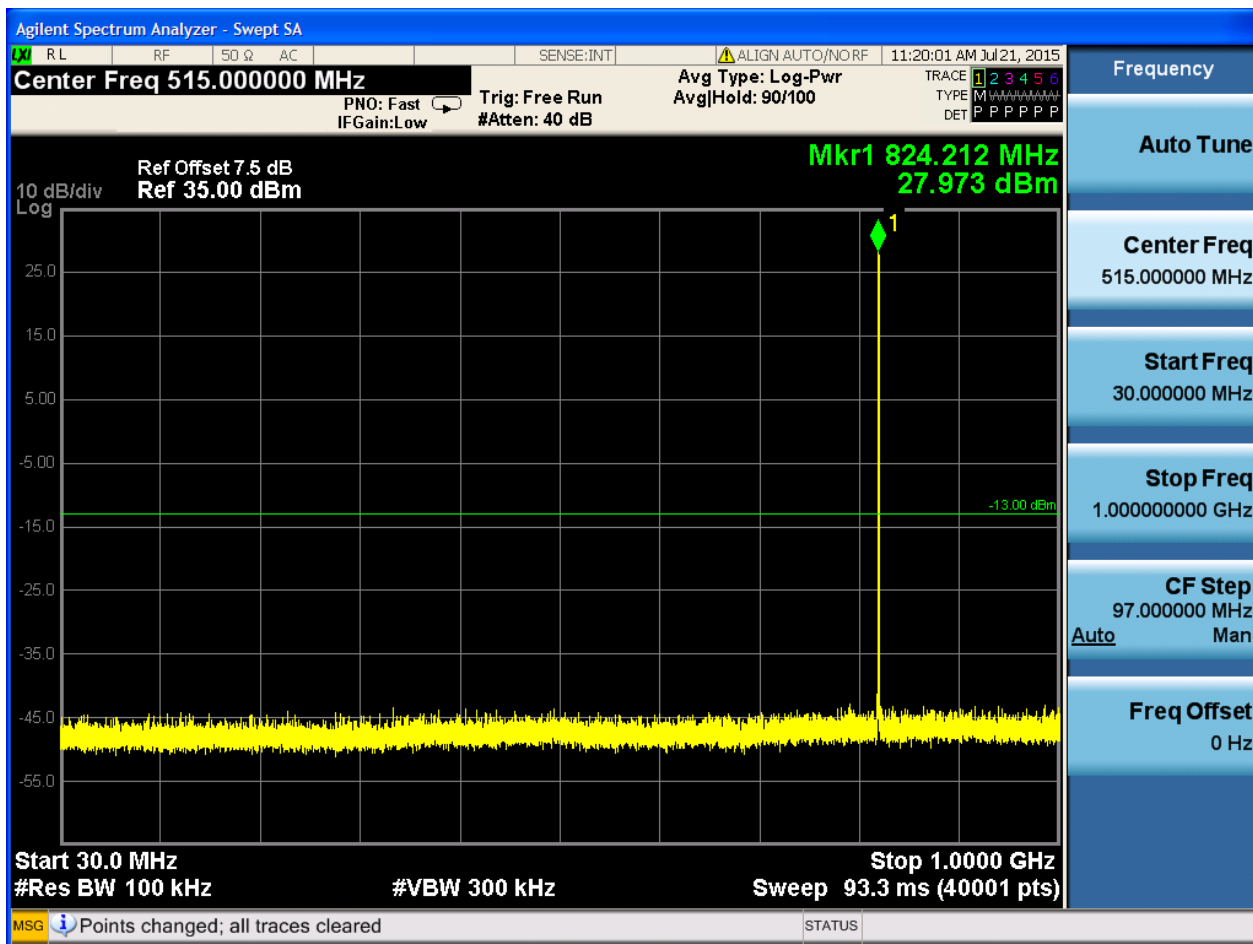


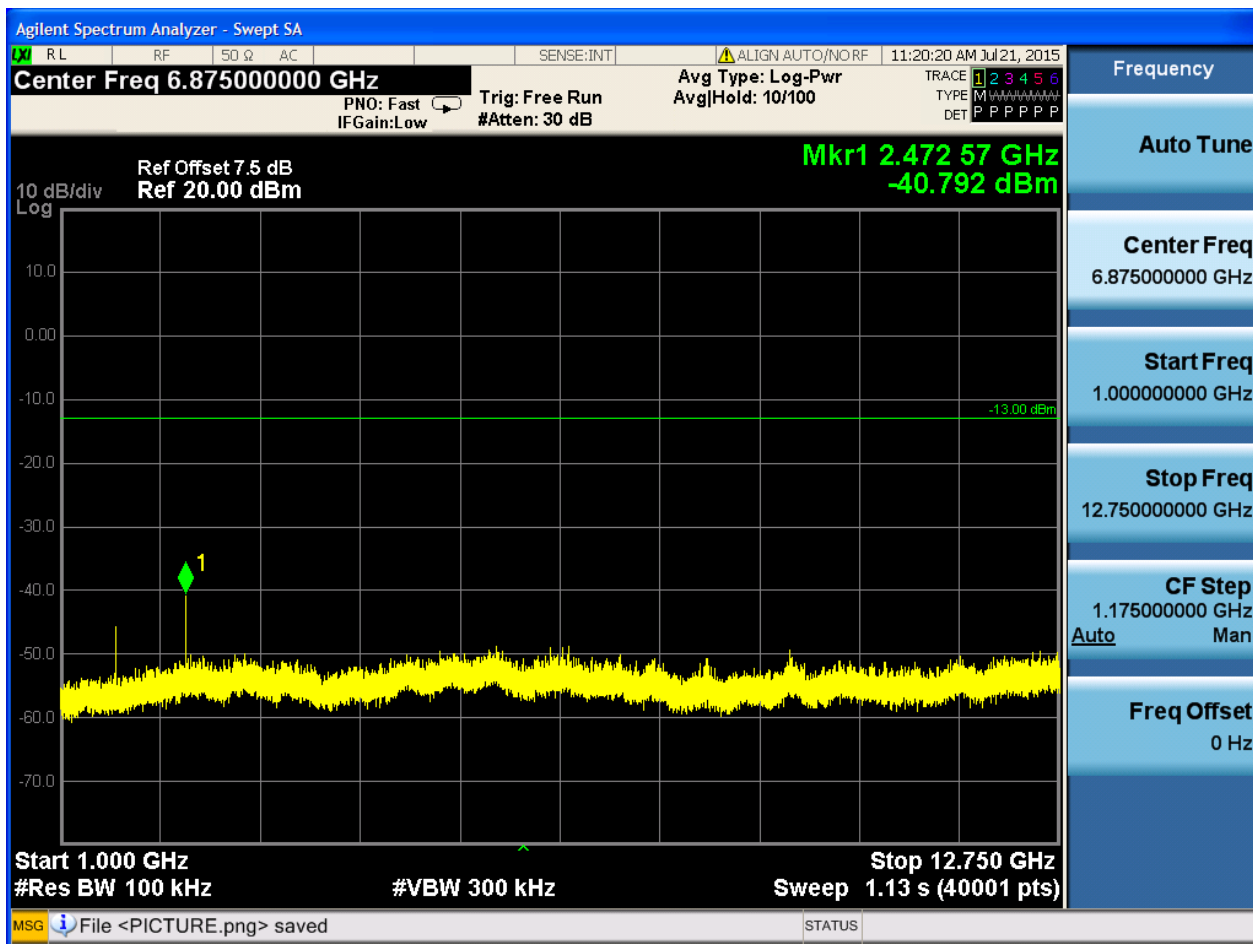
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH

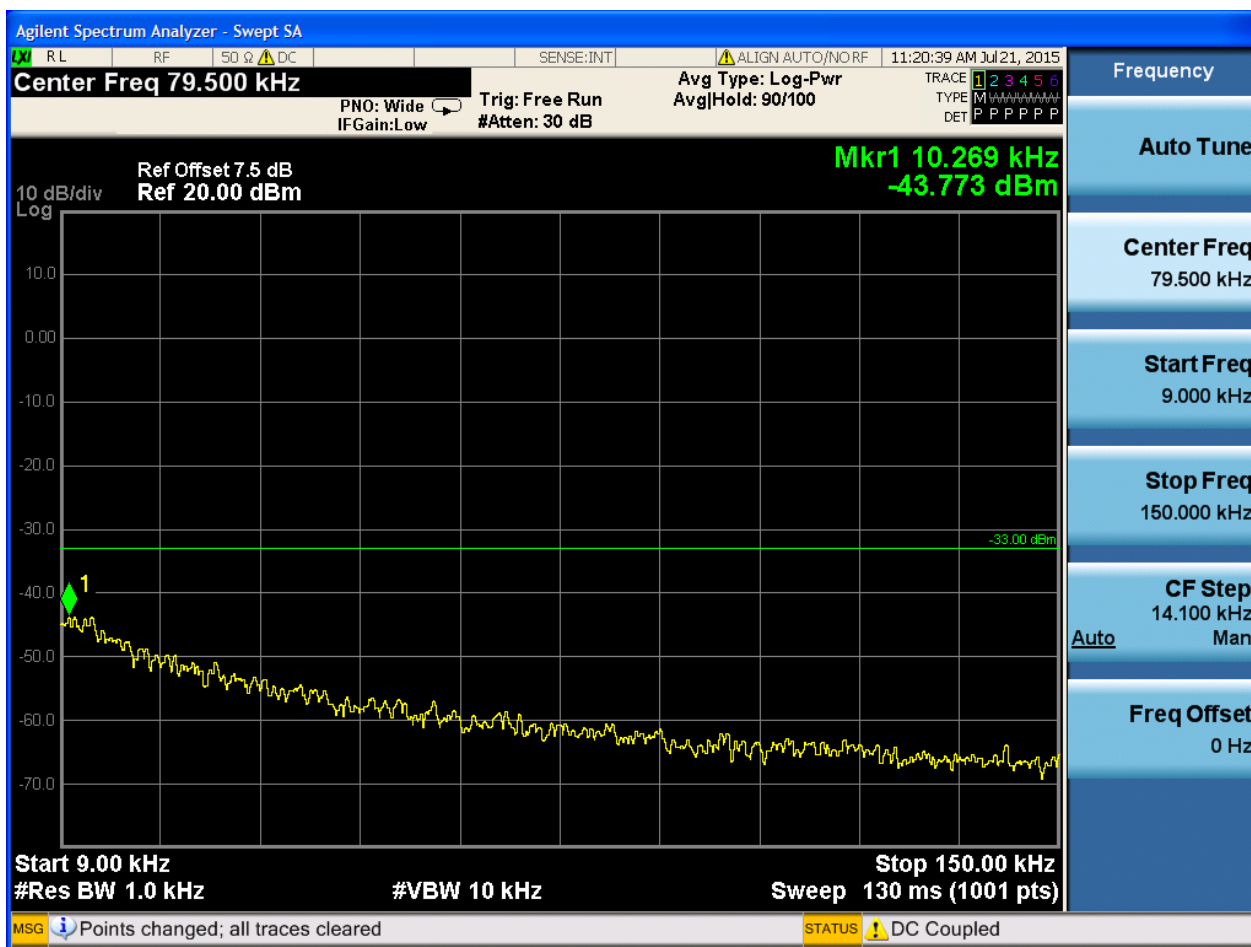


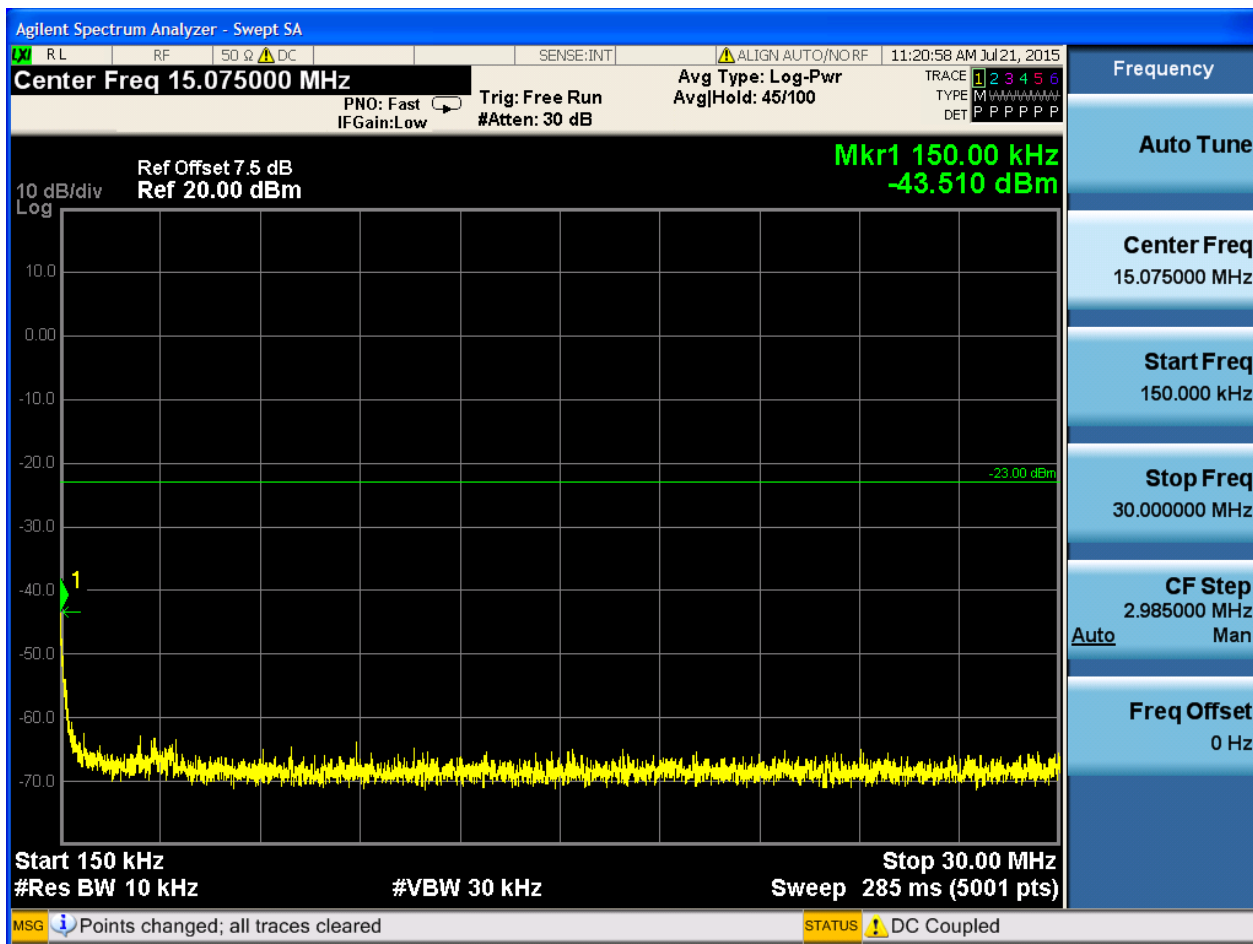


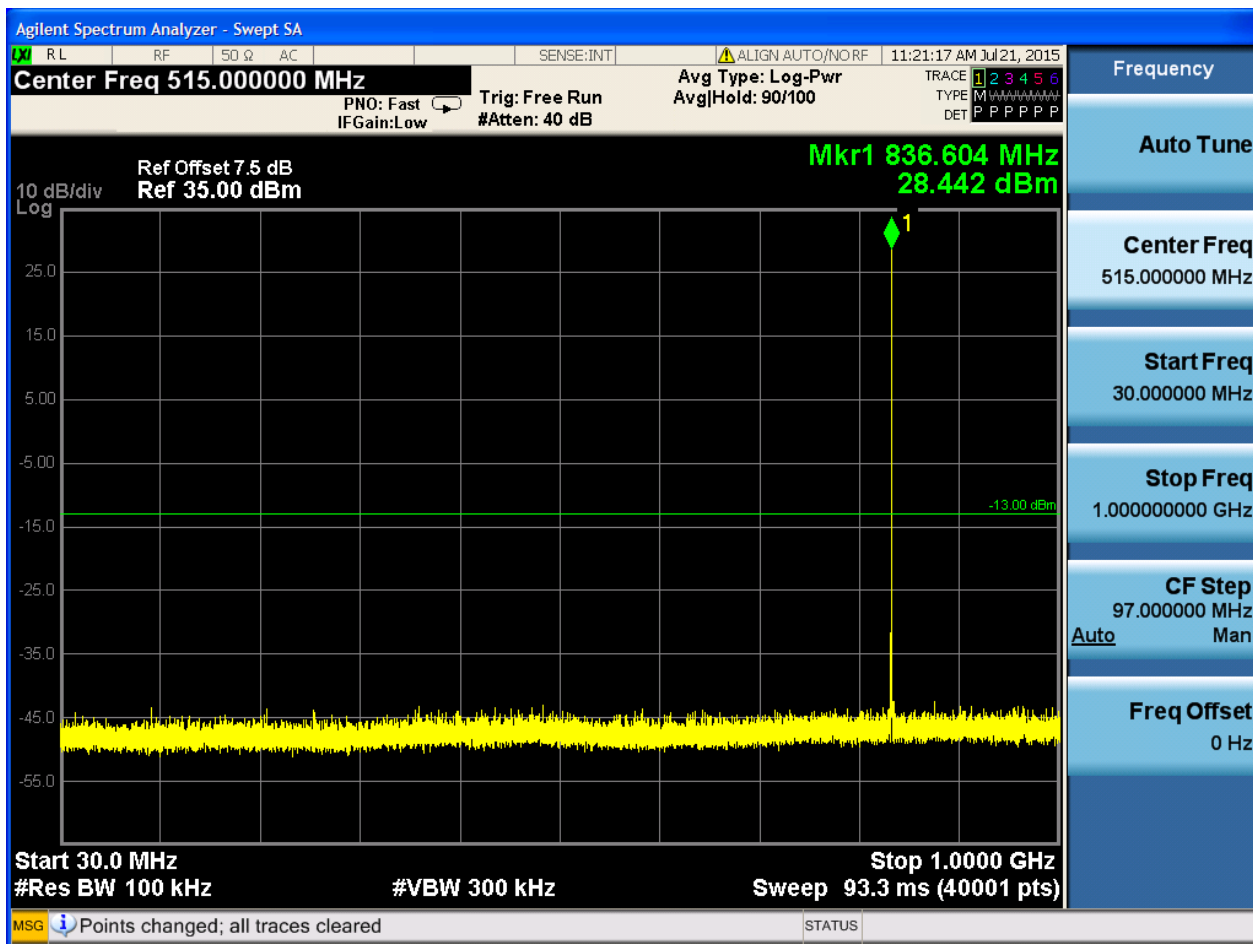


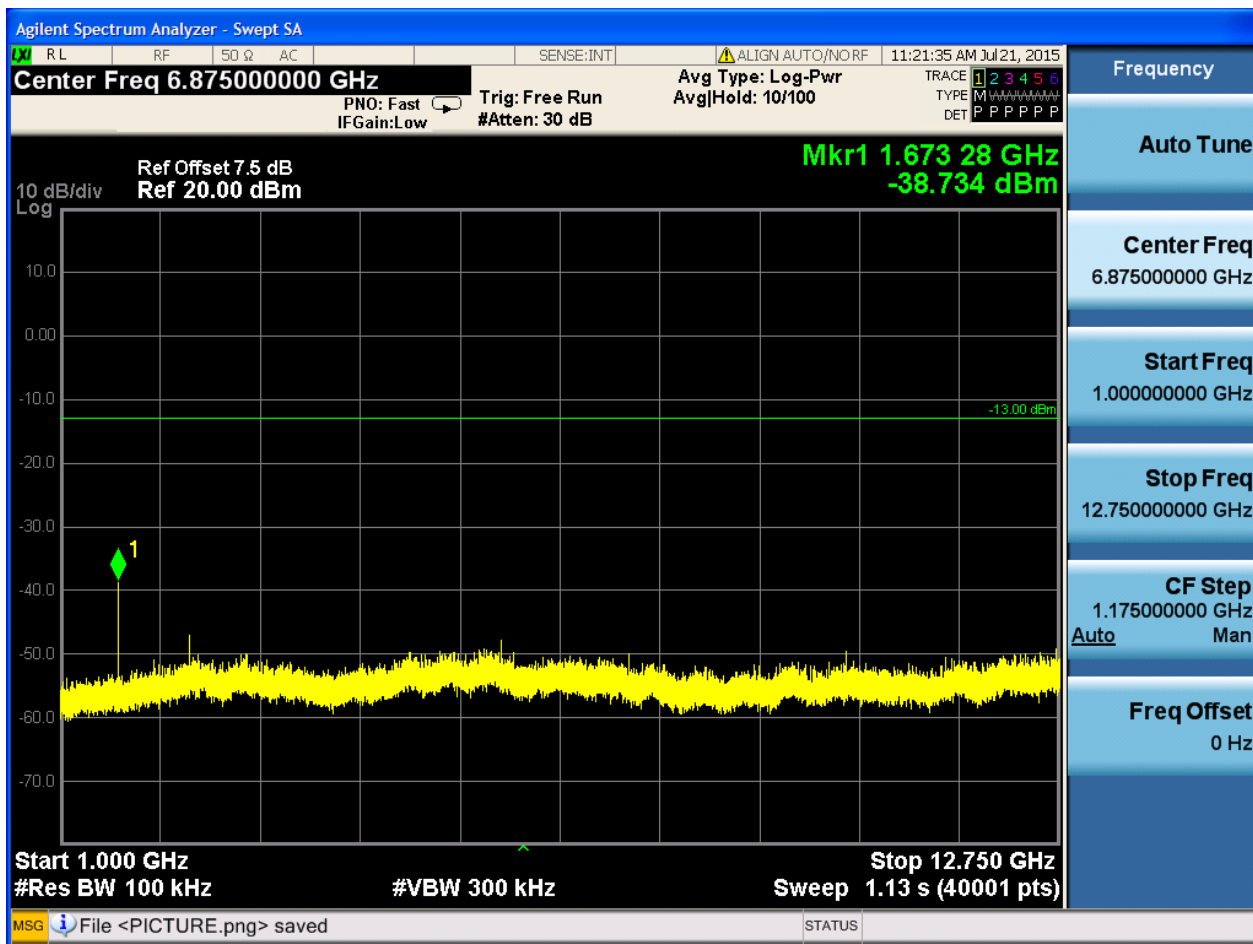


6.1.1.2.2 Test Channel = MCH











Agilent Spectrum Analyzer - Swept SA

Center Freq 79.500 kHz

Ref Offset 7.5 dB
Ref 20.00 dBm

Mkr1 16.332 kHz
-43.359 dBm

Start 9.00 kHz
#Res BW 1.0 kHz

Stop 150.00 kHz
Sweep 130 ms (1001 pts)

#VBW 10 kHz

Trig: Free Run
#Atten: 30 dB

PNO: Wide
IFGain: Low

Avg Type: Log-Pwr
Avg|Hold: 90/100

TRACE 1 2 3 4 5 6
TYPE M W W W W W W W
DET P P P P P P

Frequency

Auto Tune

Center Freq
79.500 kHz

Start Freq
9.000 kHz

Stop Freq
150.000 kHz

CF Step
14.100 kHz
Man

Auto

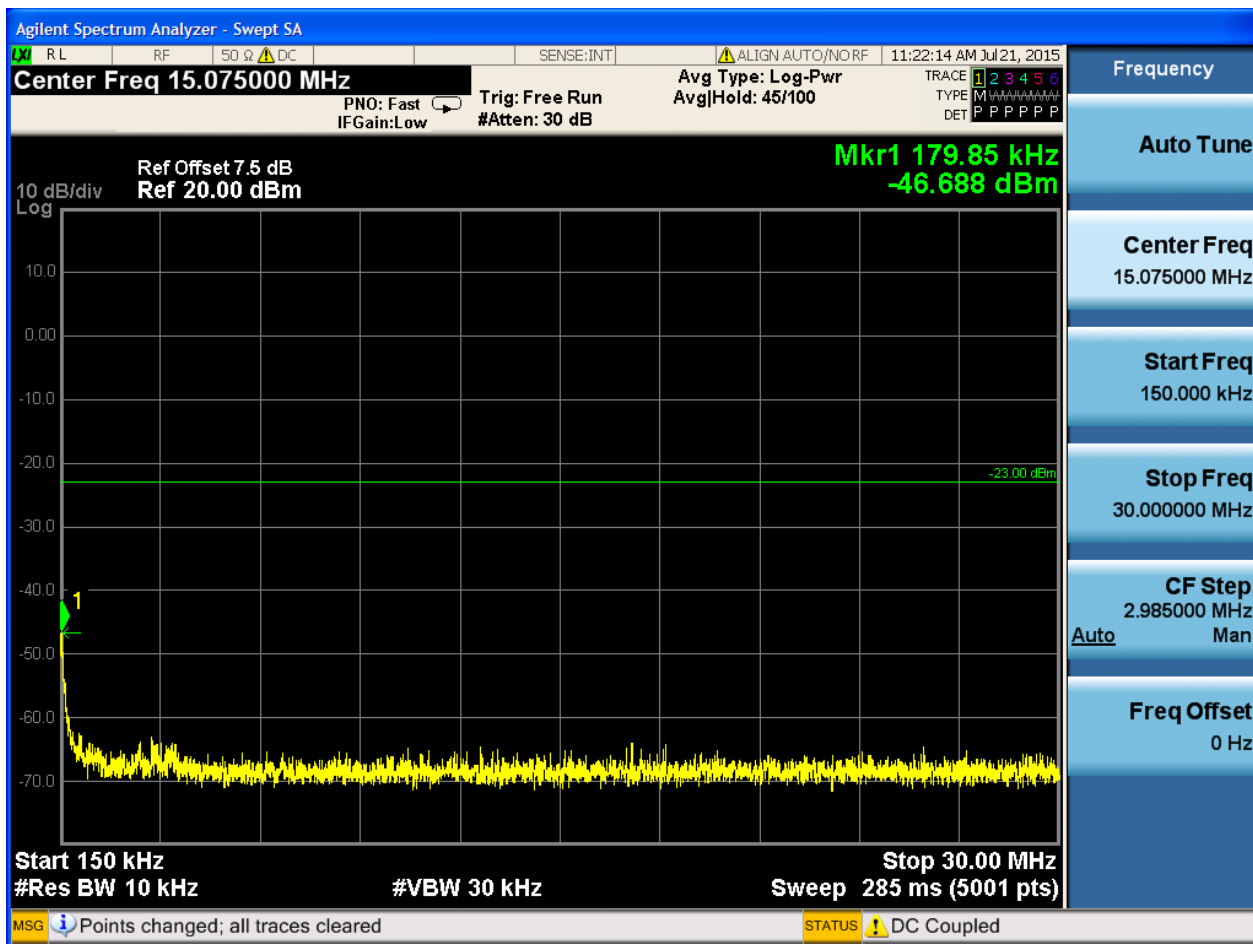
Freq Offset
0 Hz

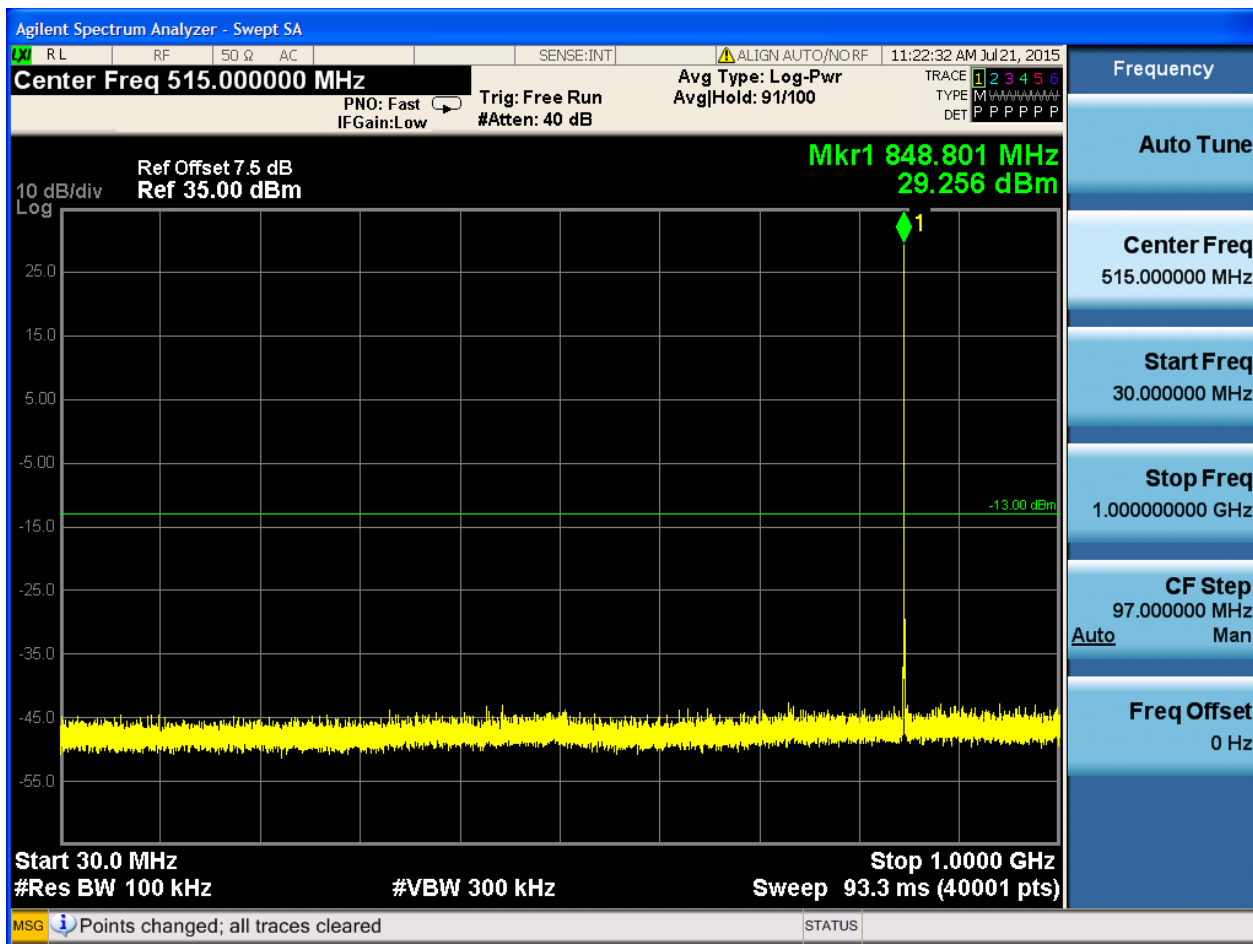
10 dB/div
Log

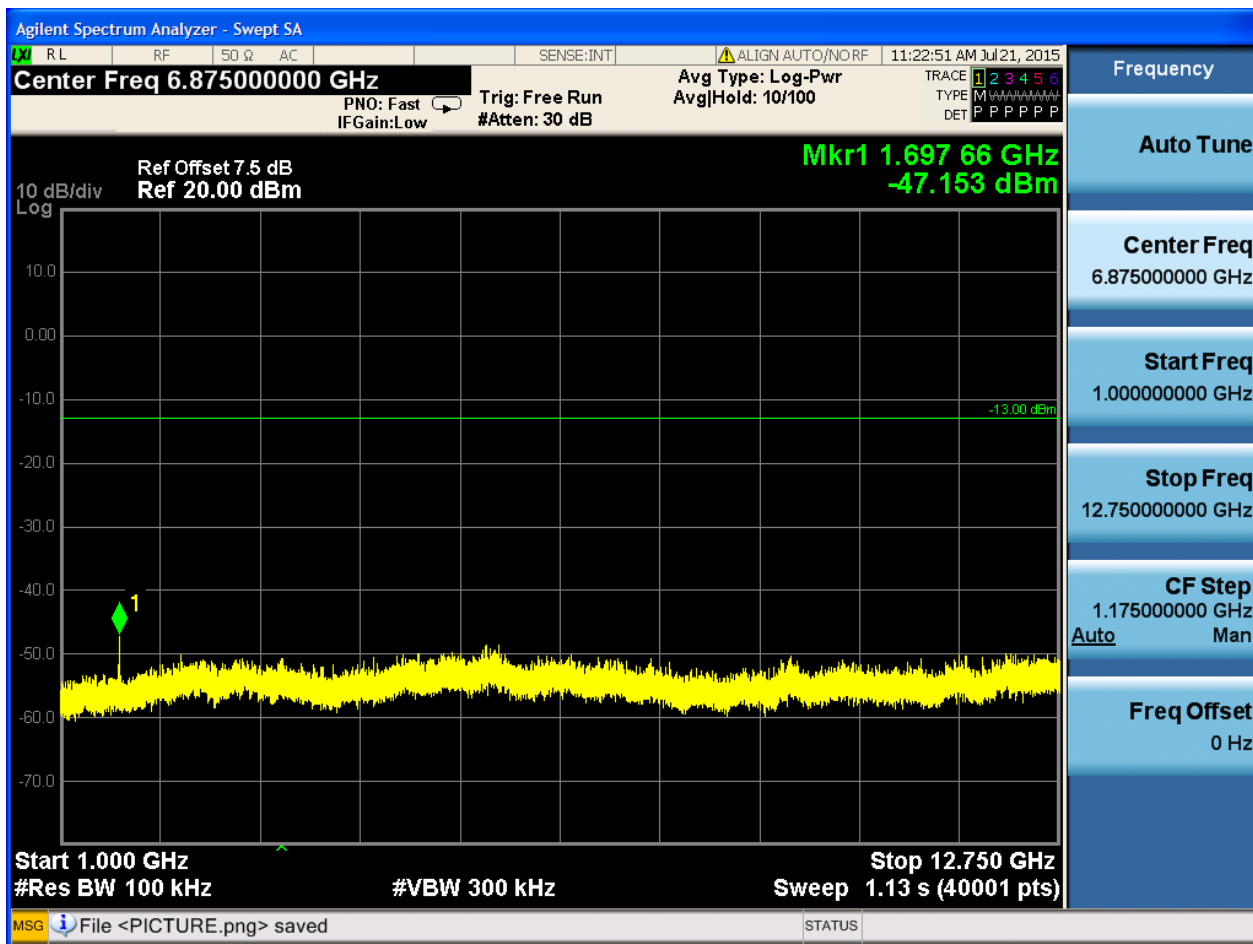
-33.00 dBm

MSG Points changed; all traces cleared

STATUS DC Coupled







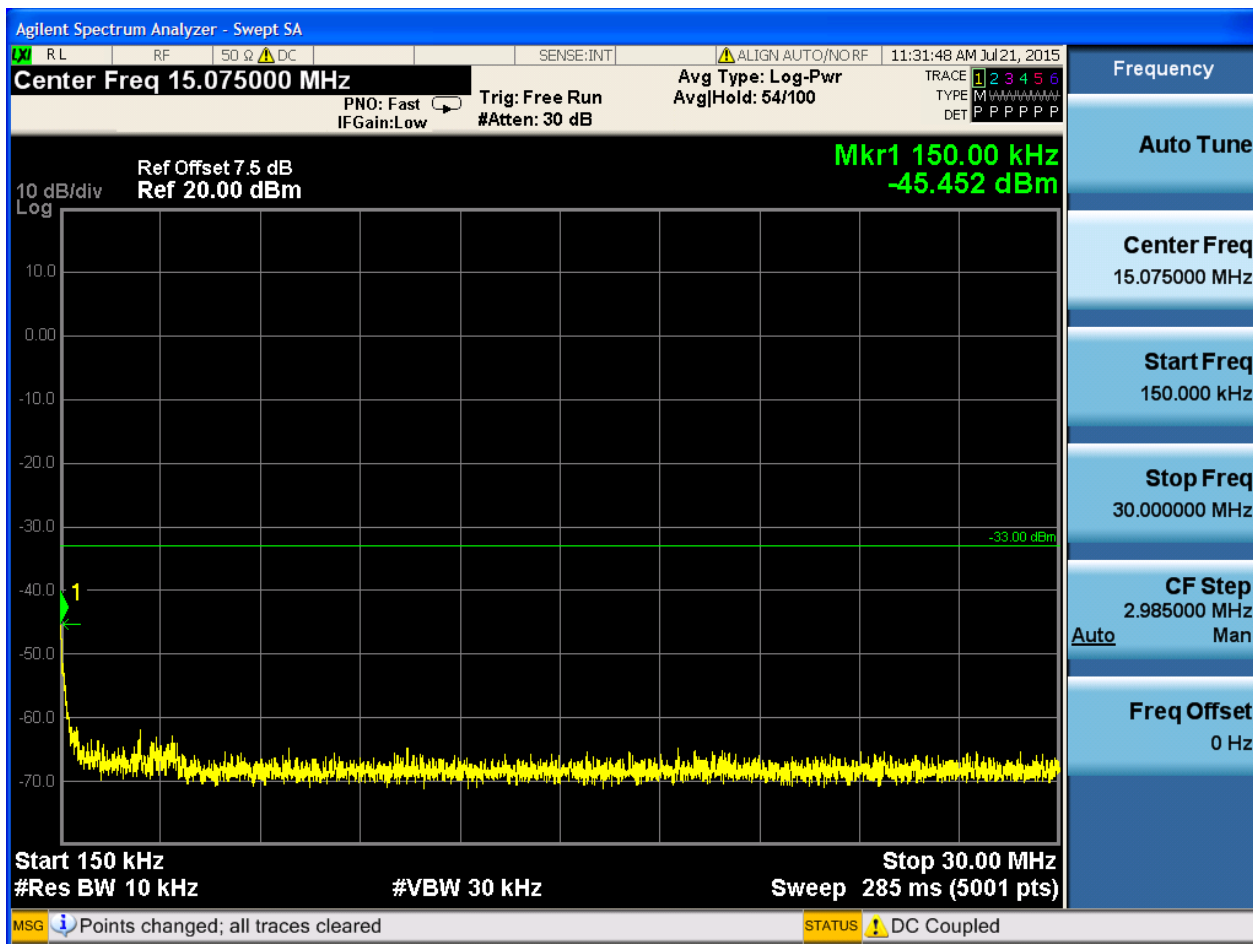


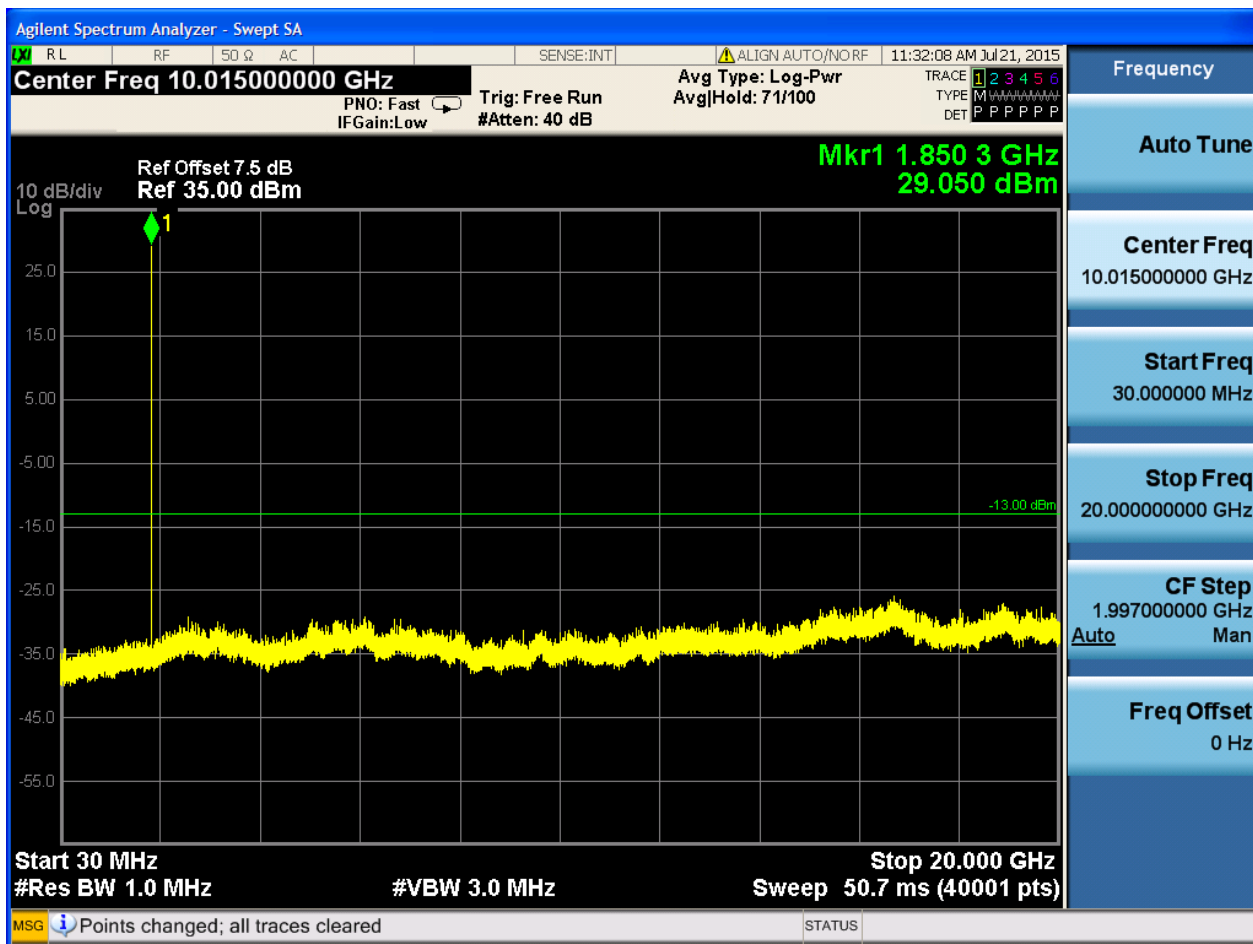
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH

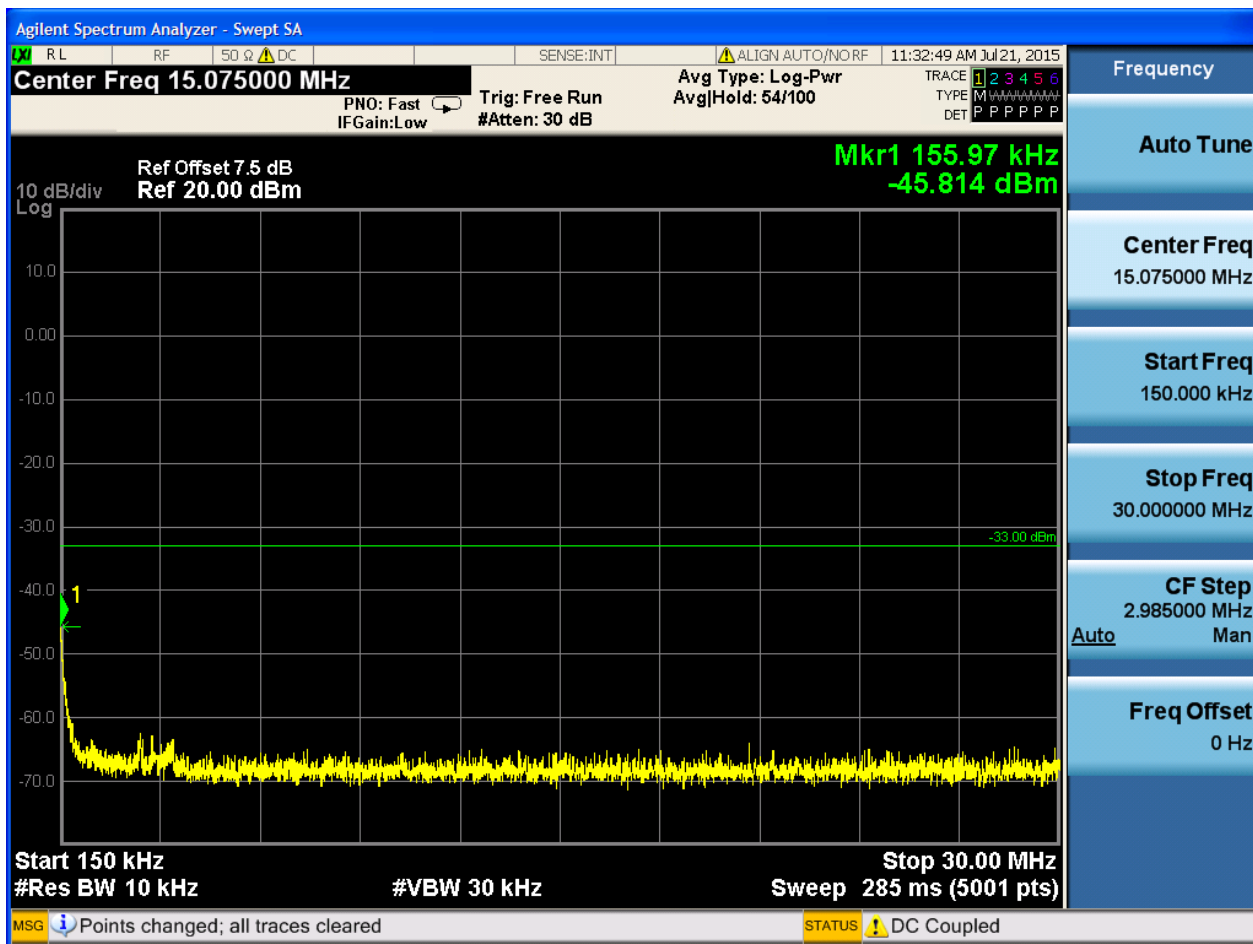


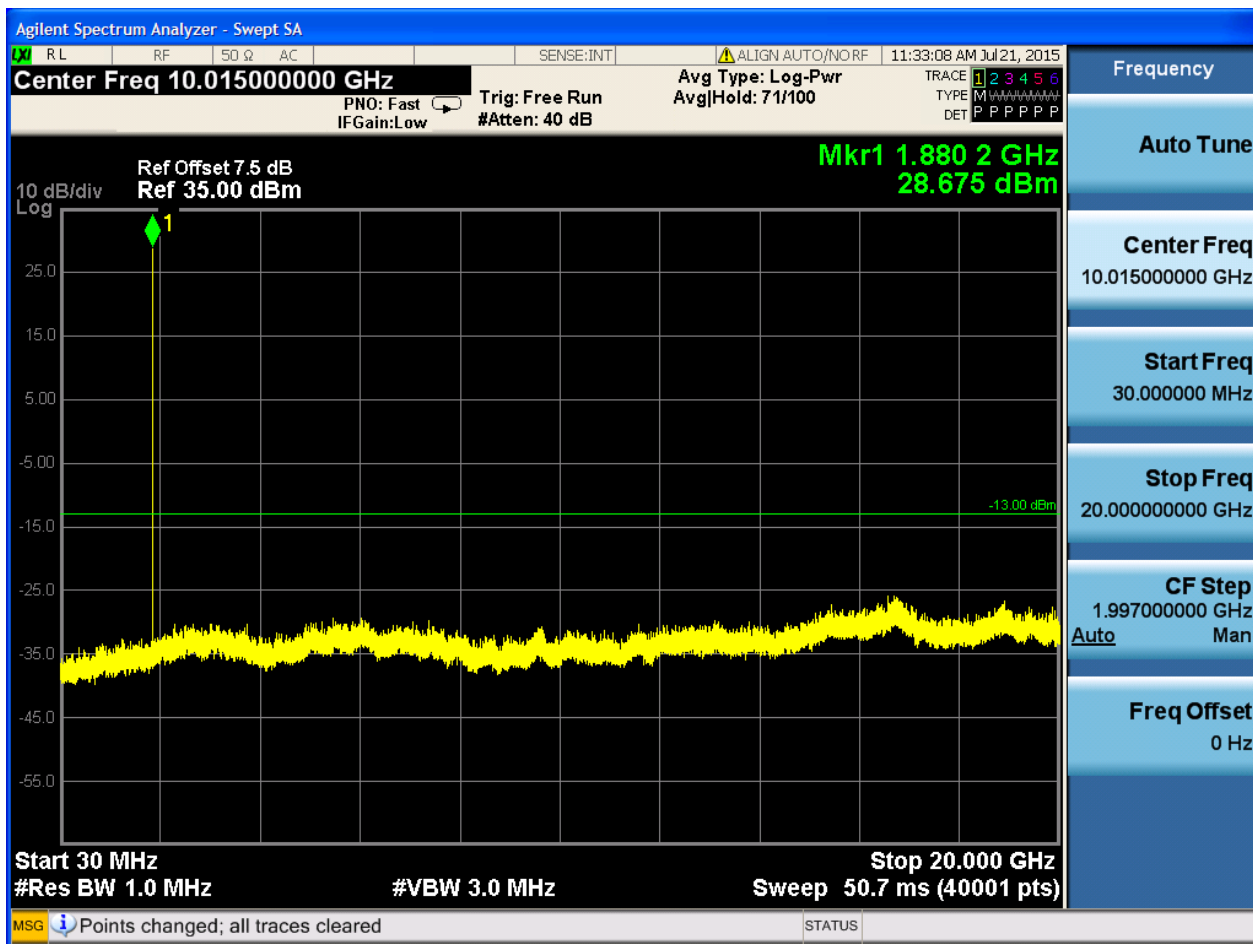




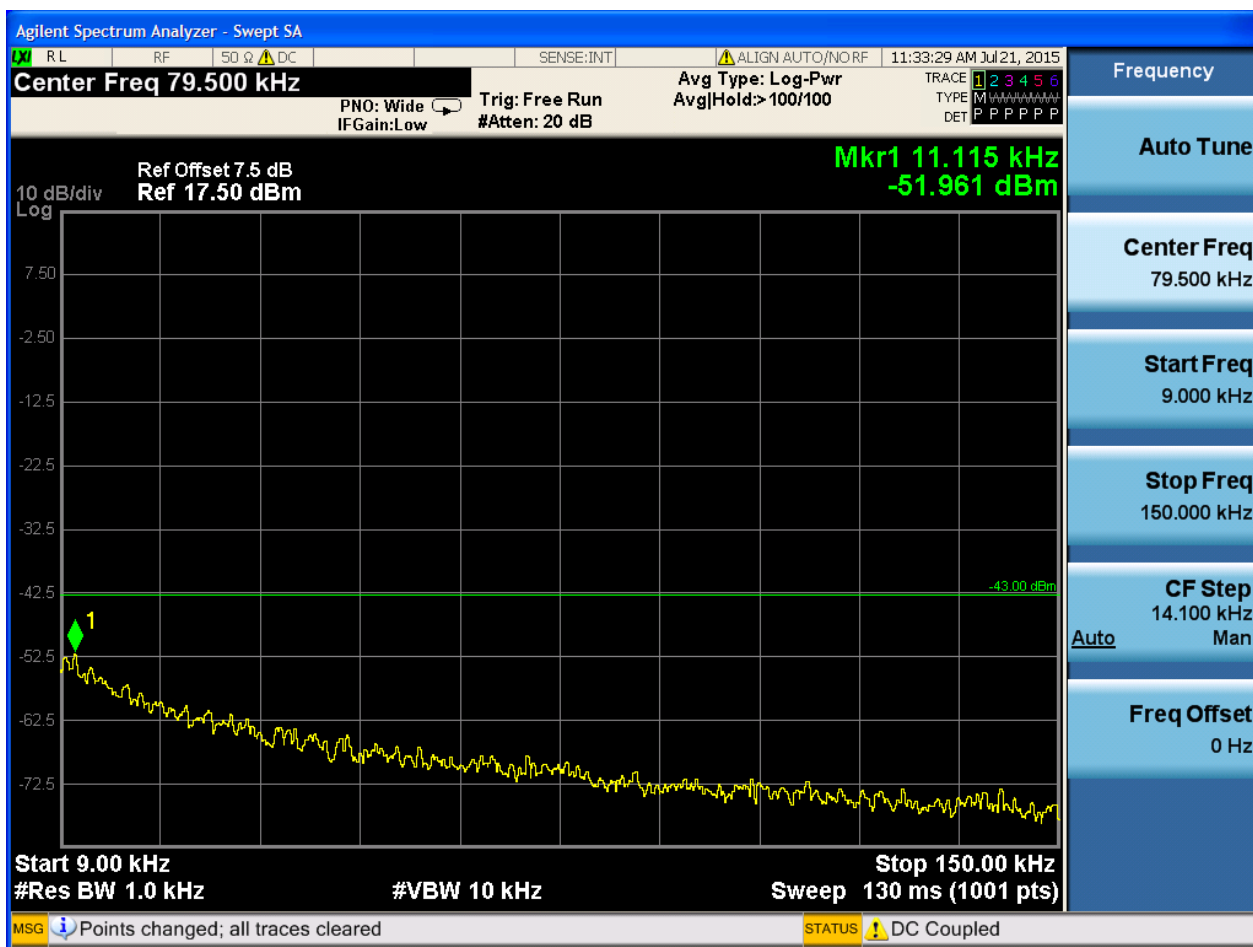
6.1.2.1.2 Test Channel = MCH

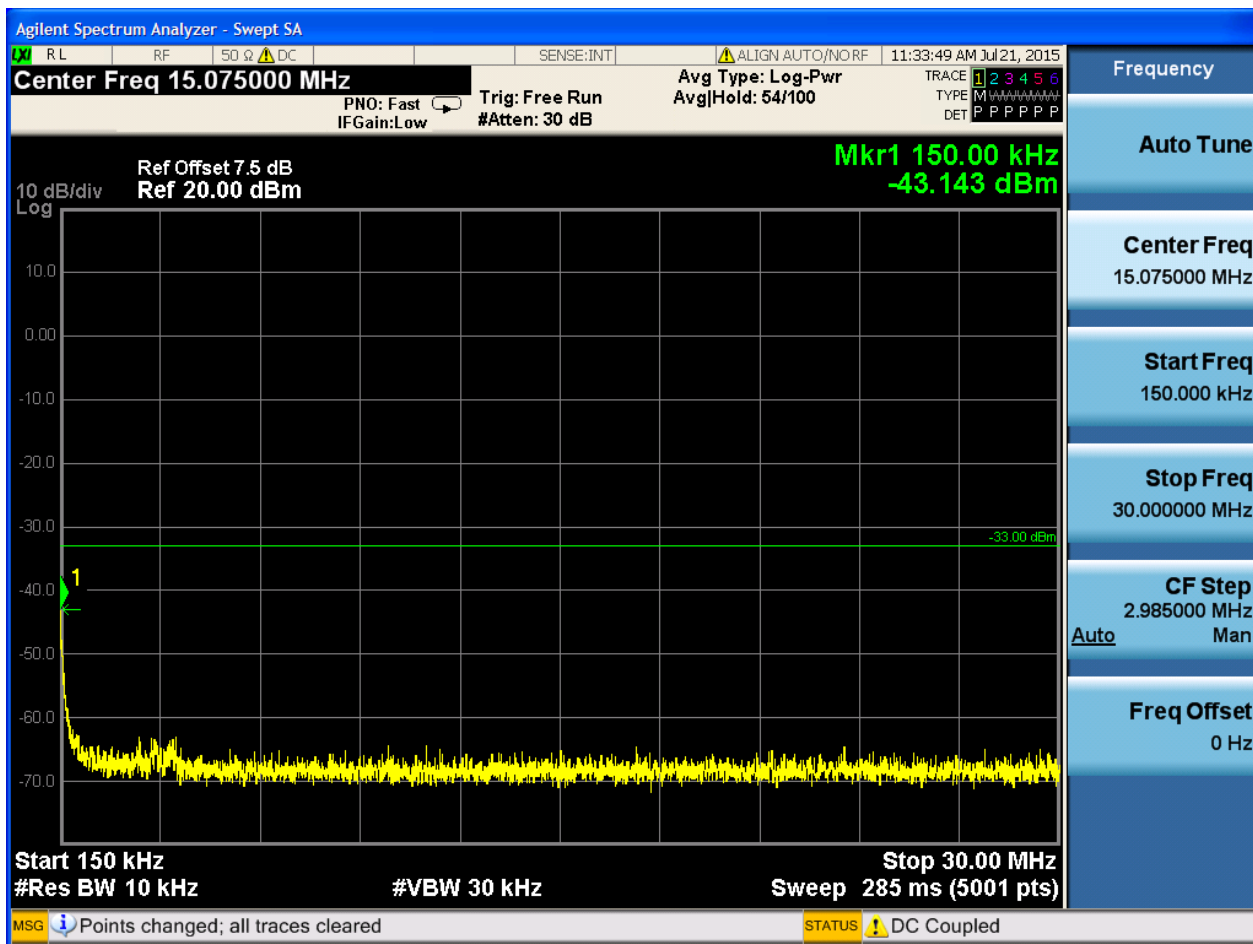


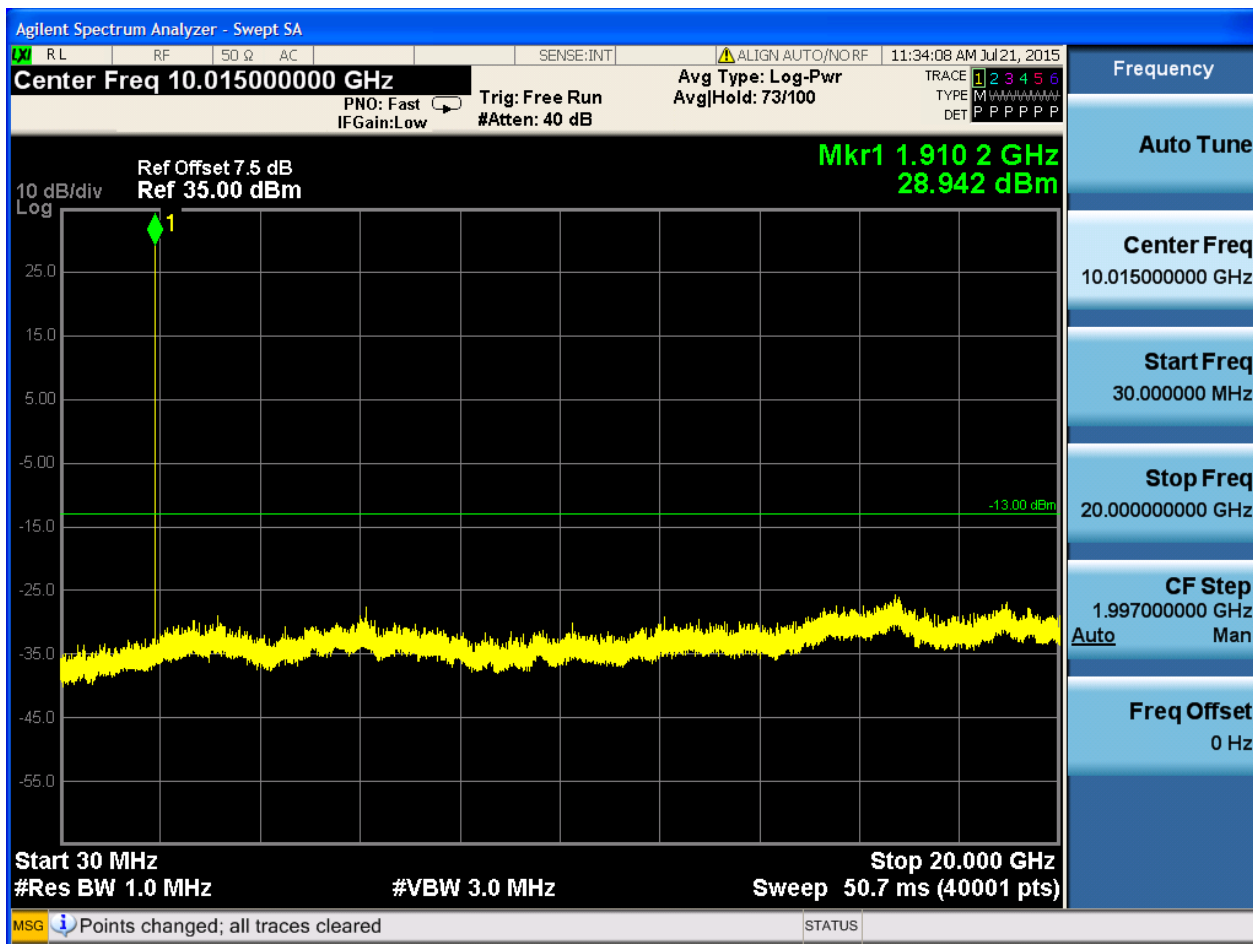




6.1.2.1.3 Test Channel = HCH



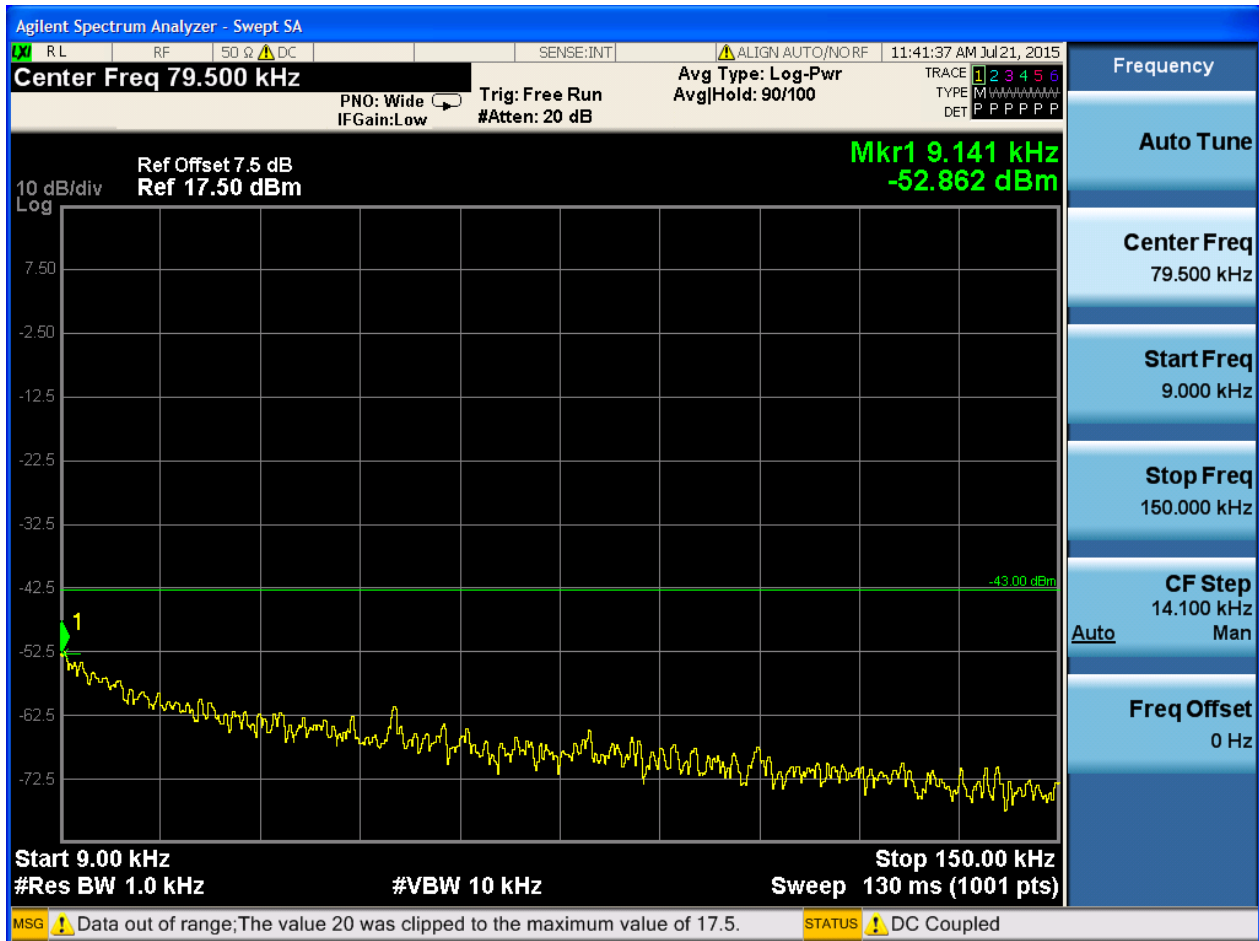


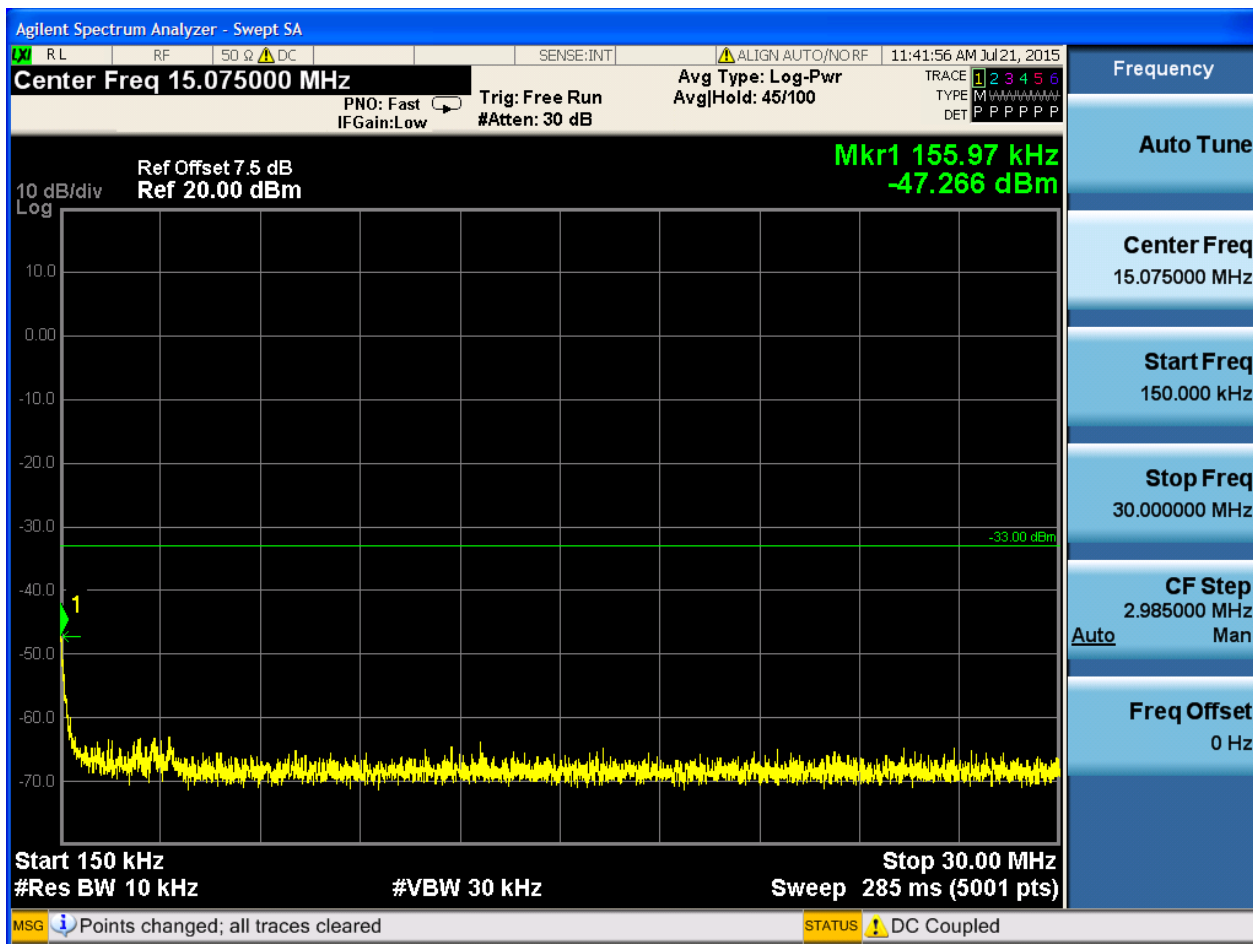


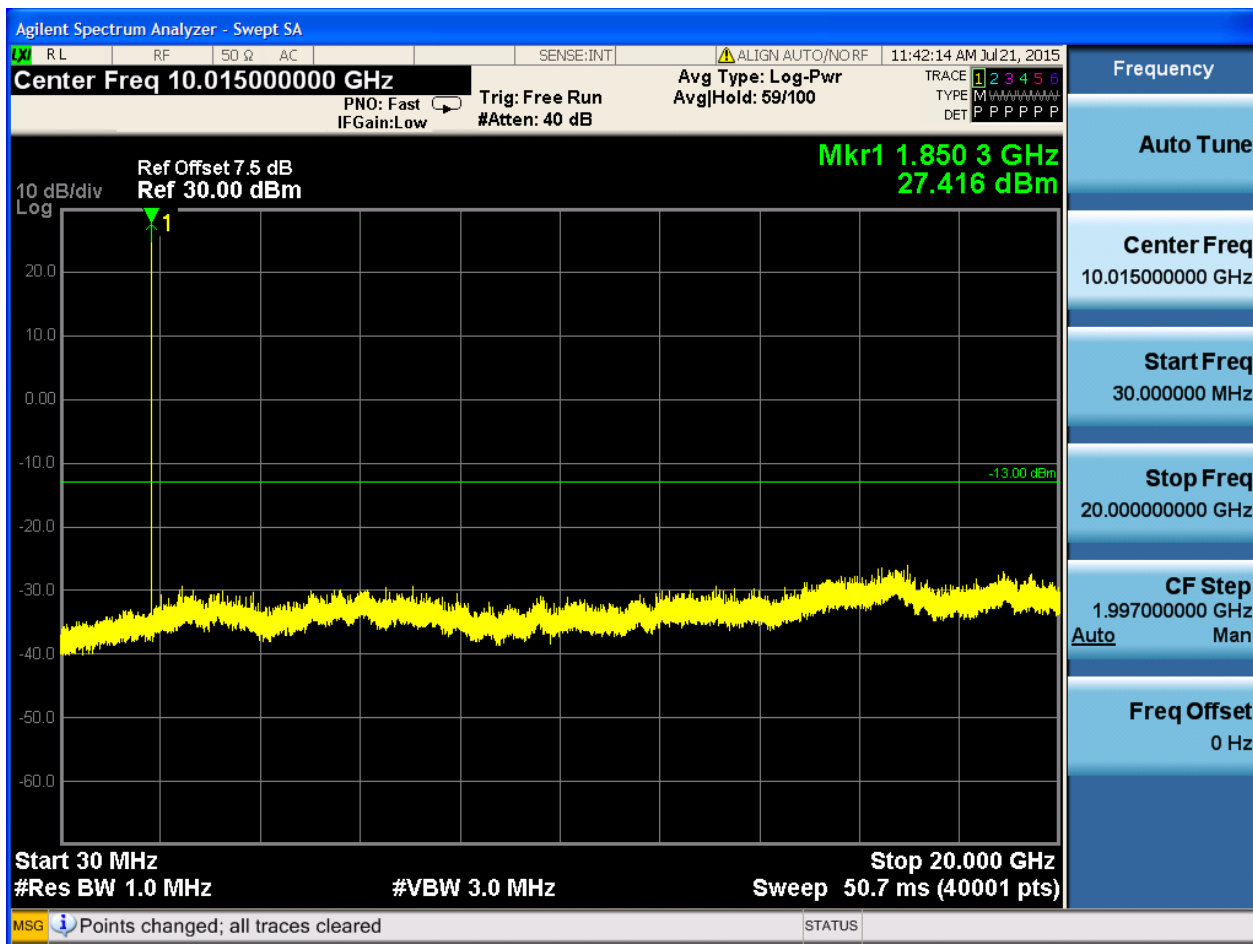


6.1.2.2 Test Mode = GSM/TM2

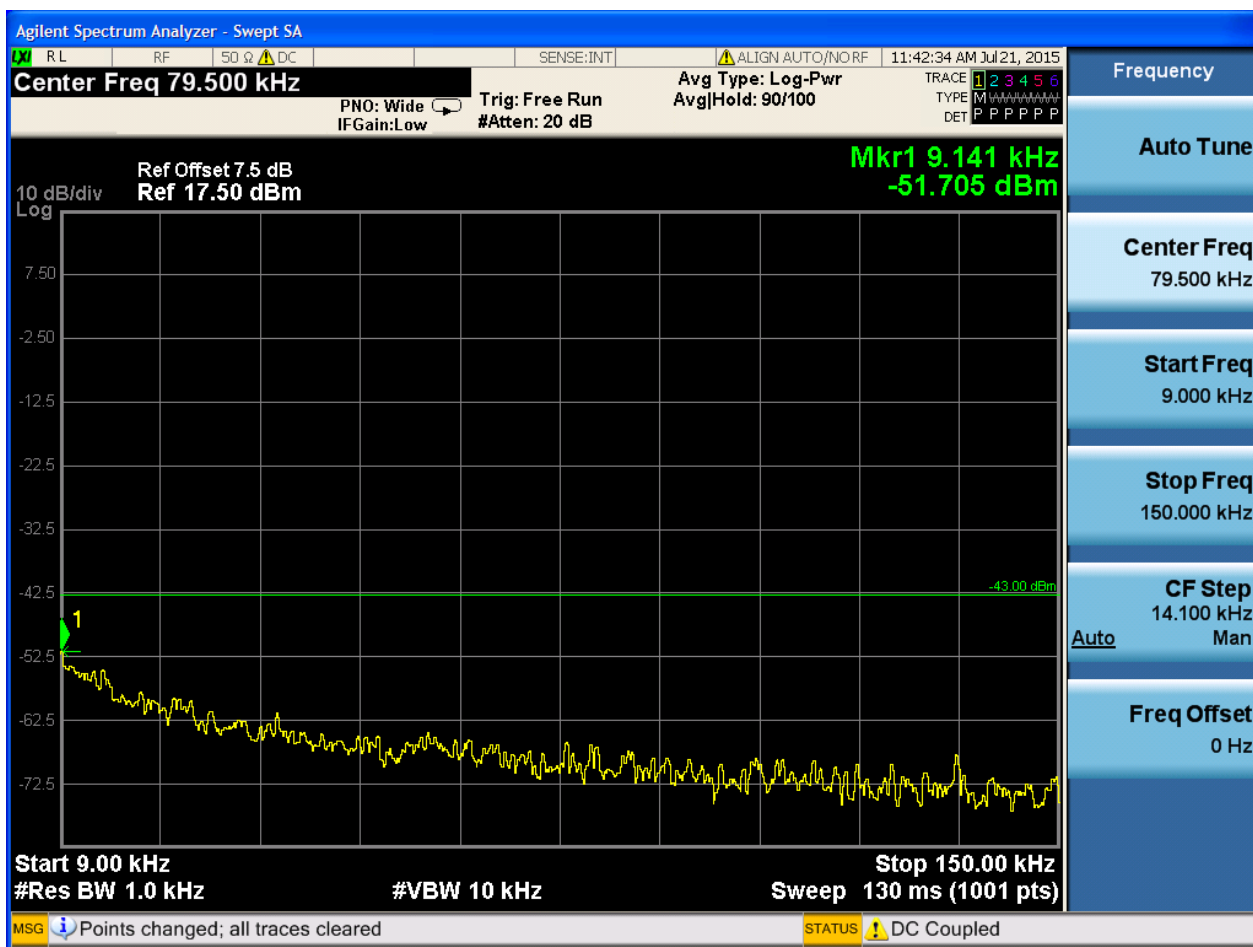
6.1.2.2.1 Test Channel = LCH

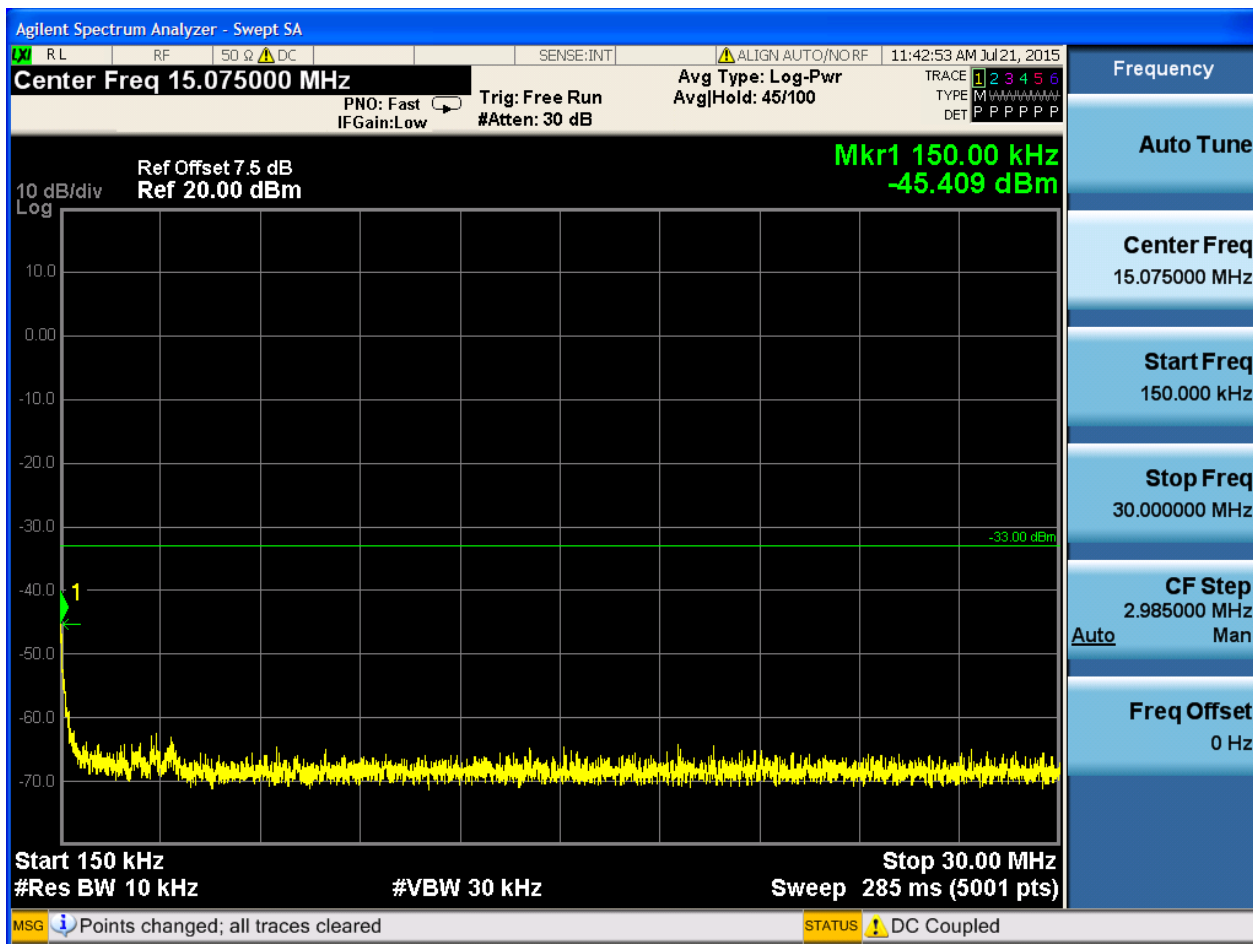


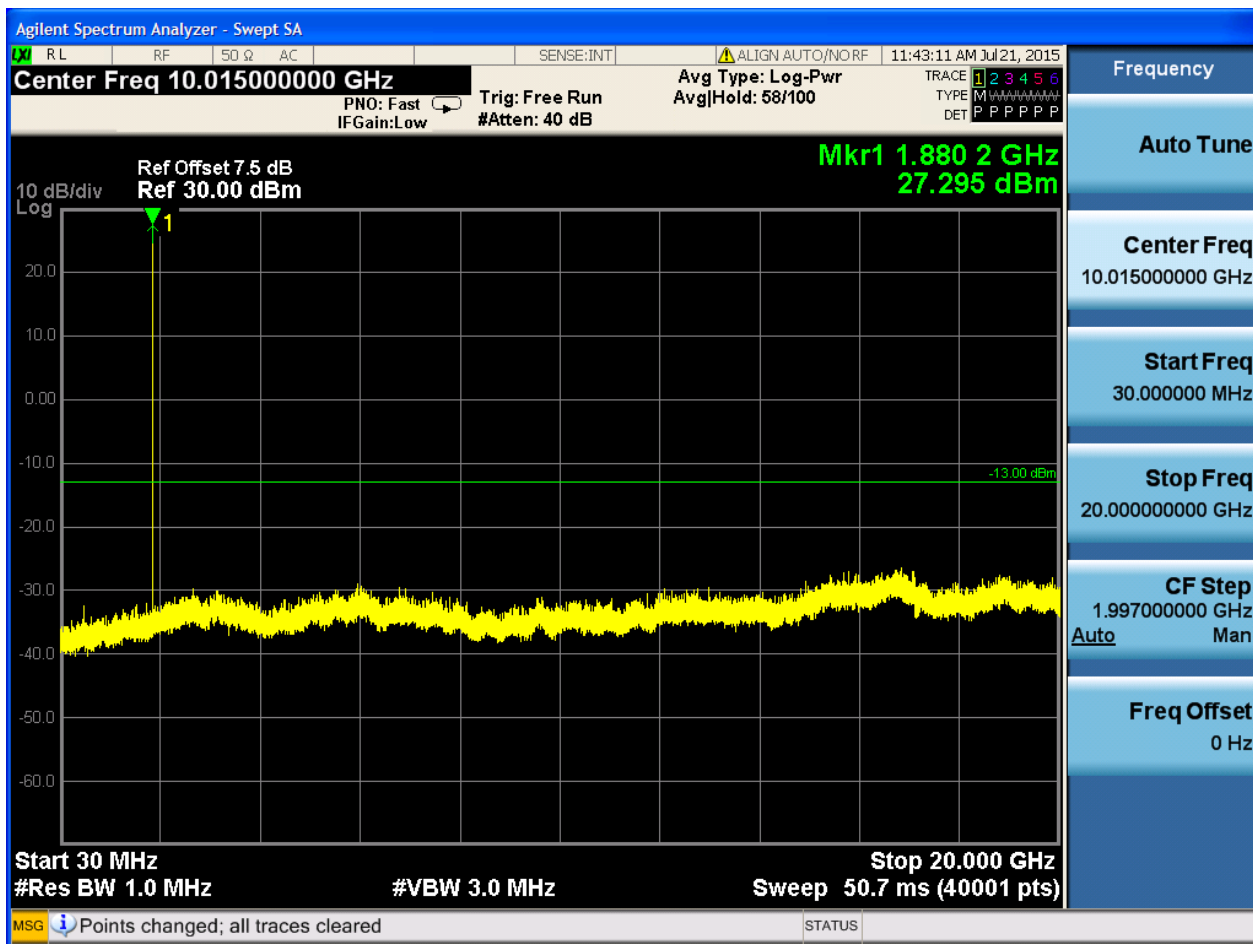




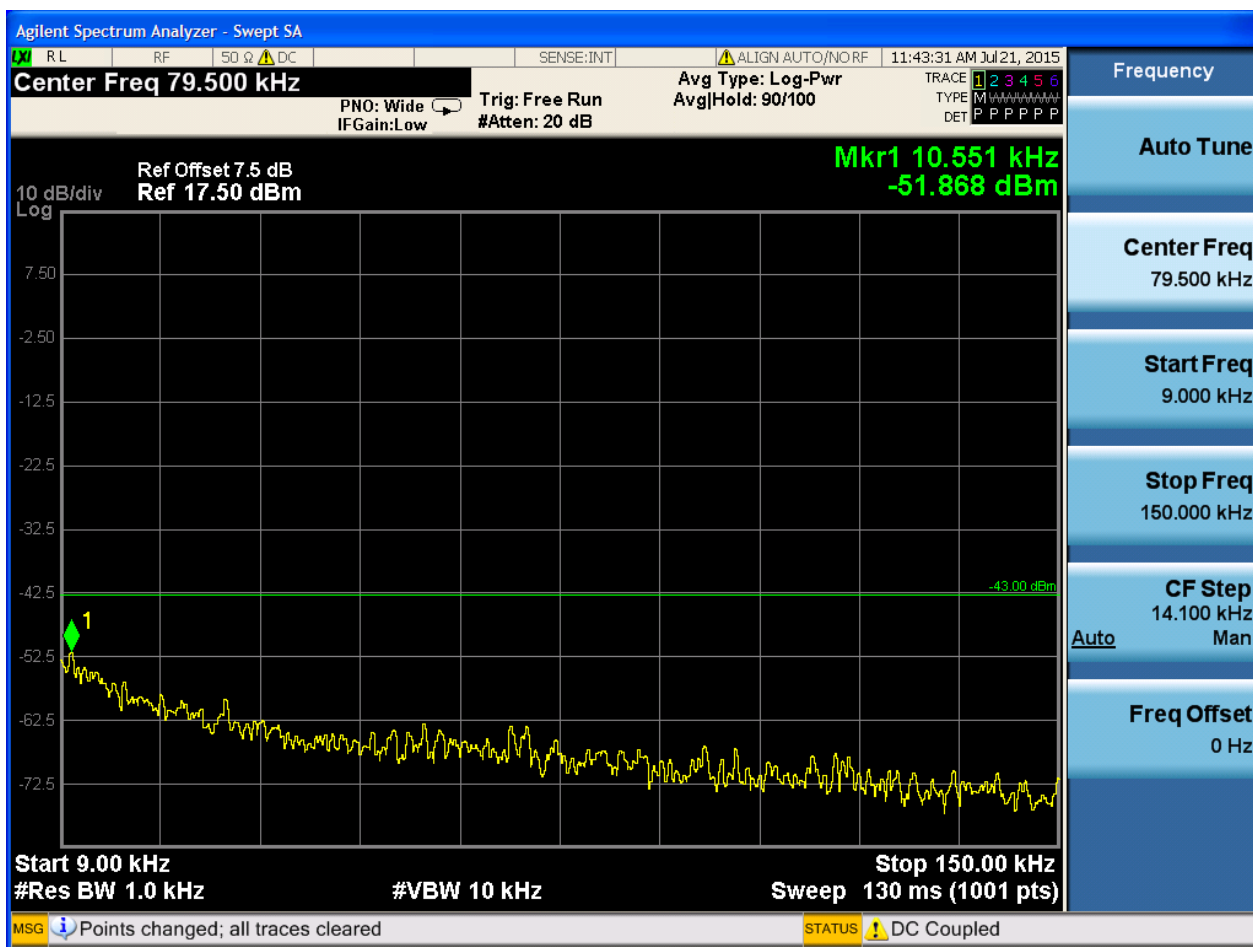
6.1.2.2.2 Test Channel = MCH

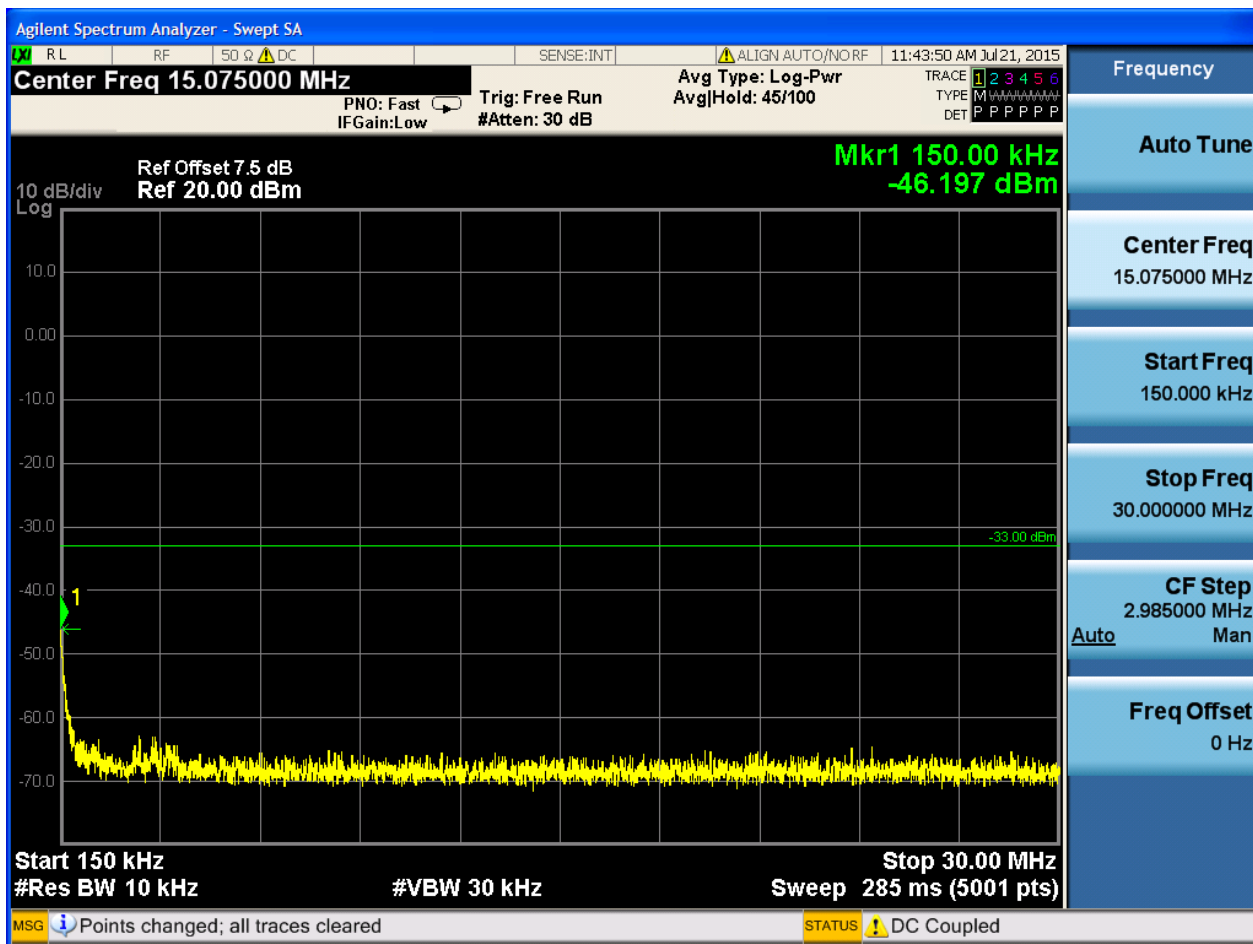


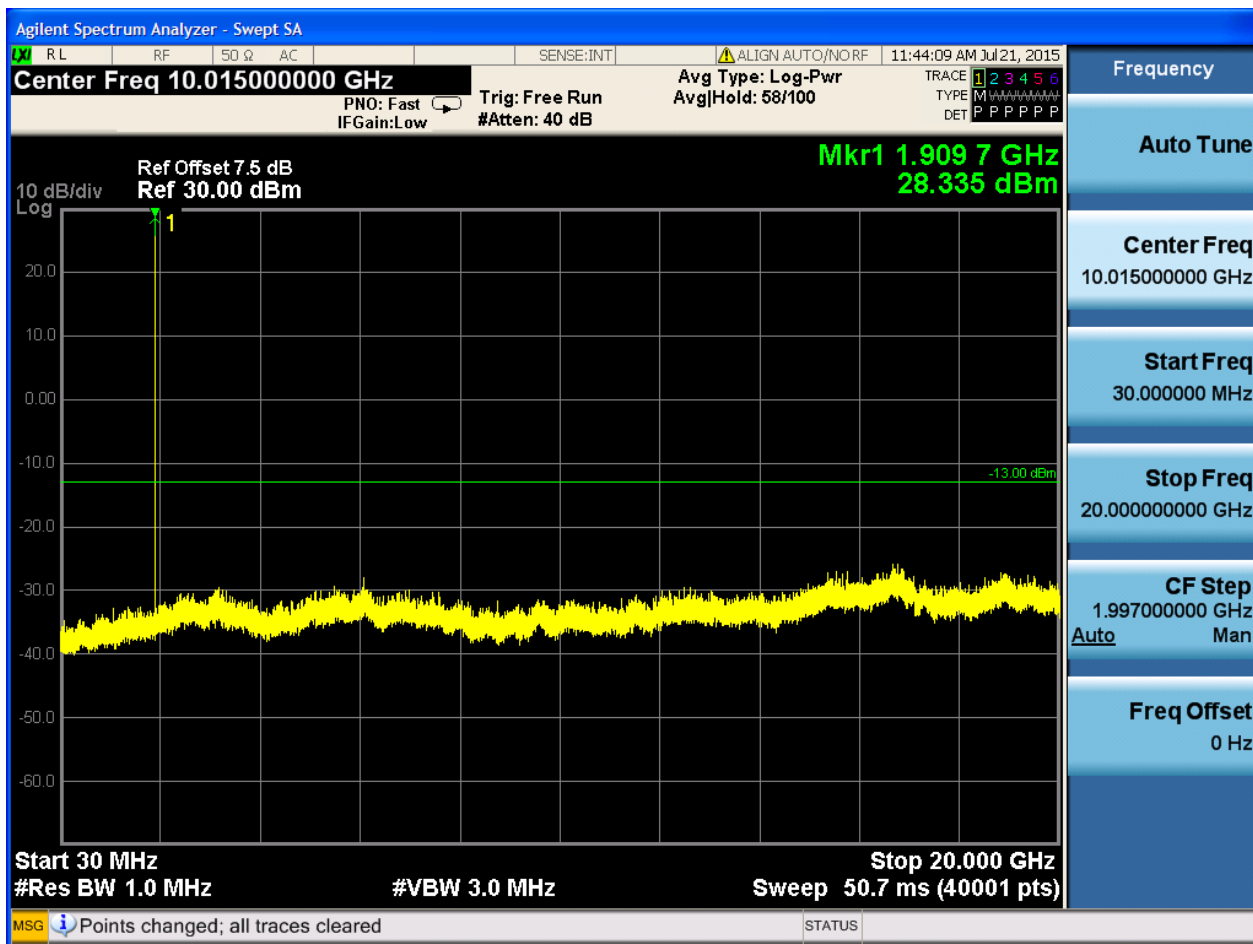




6.1.2.2.3 Test Channel = HCH







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

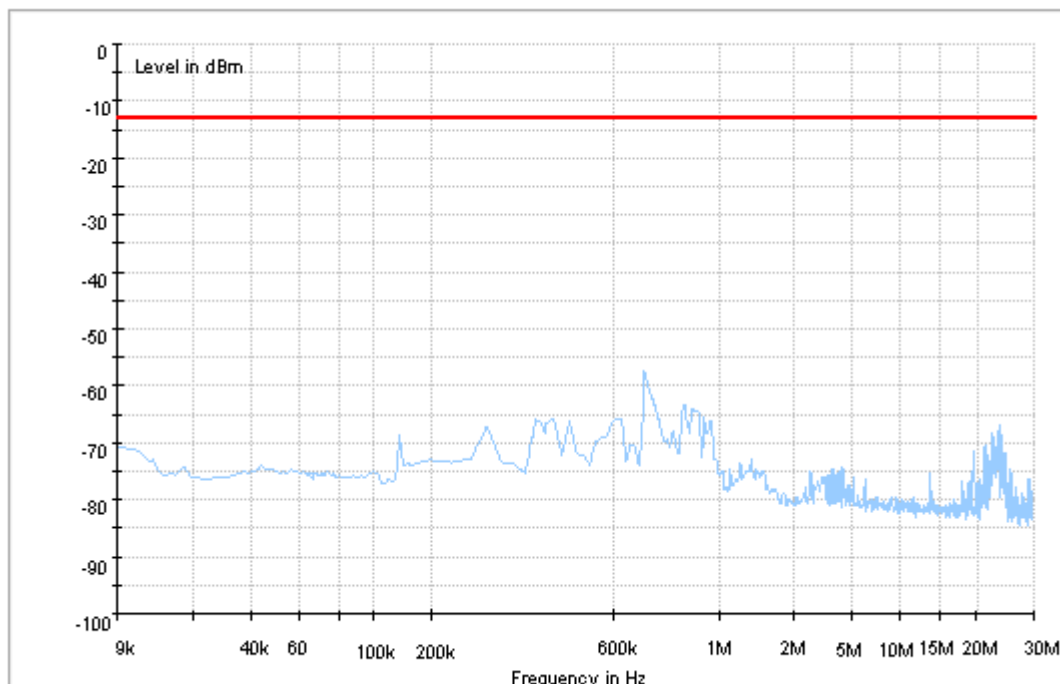
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

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

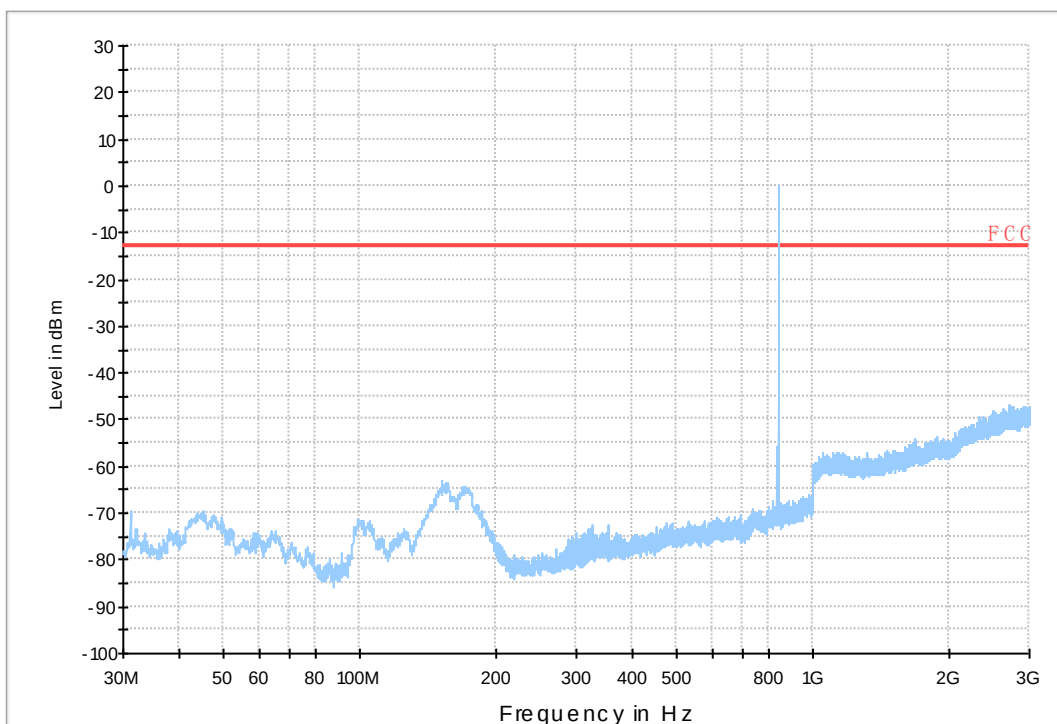
Part I - Test Plots

7.1 For GSM

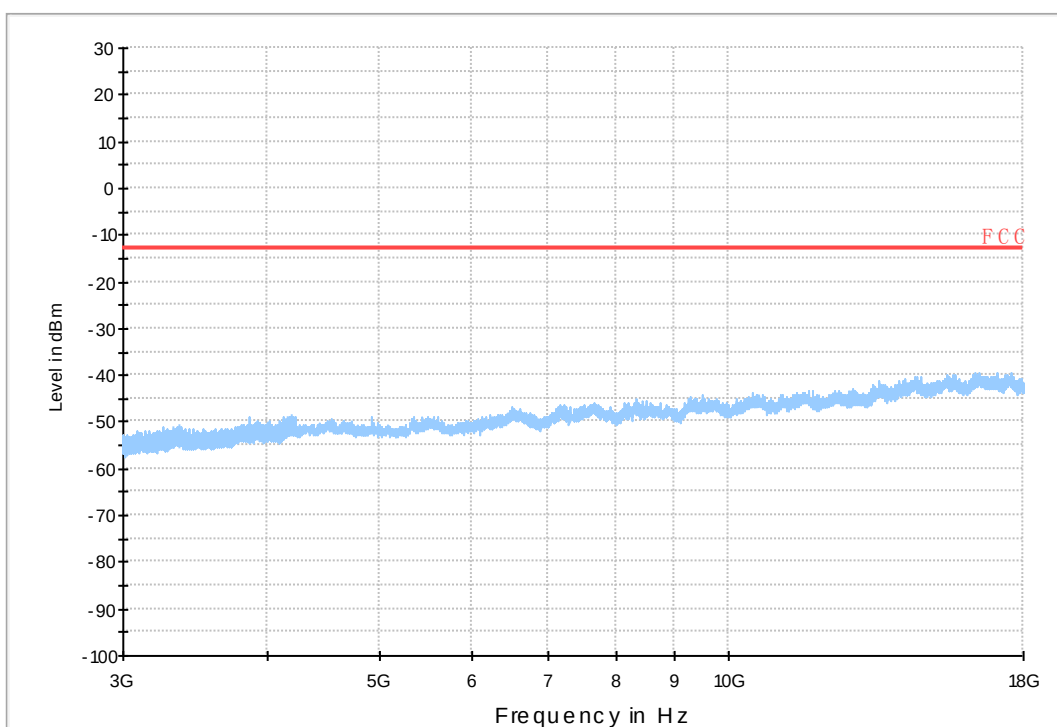
7.1.1 Test Band = GSM850



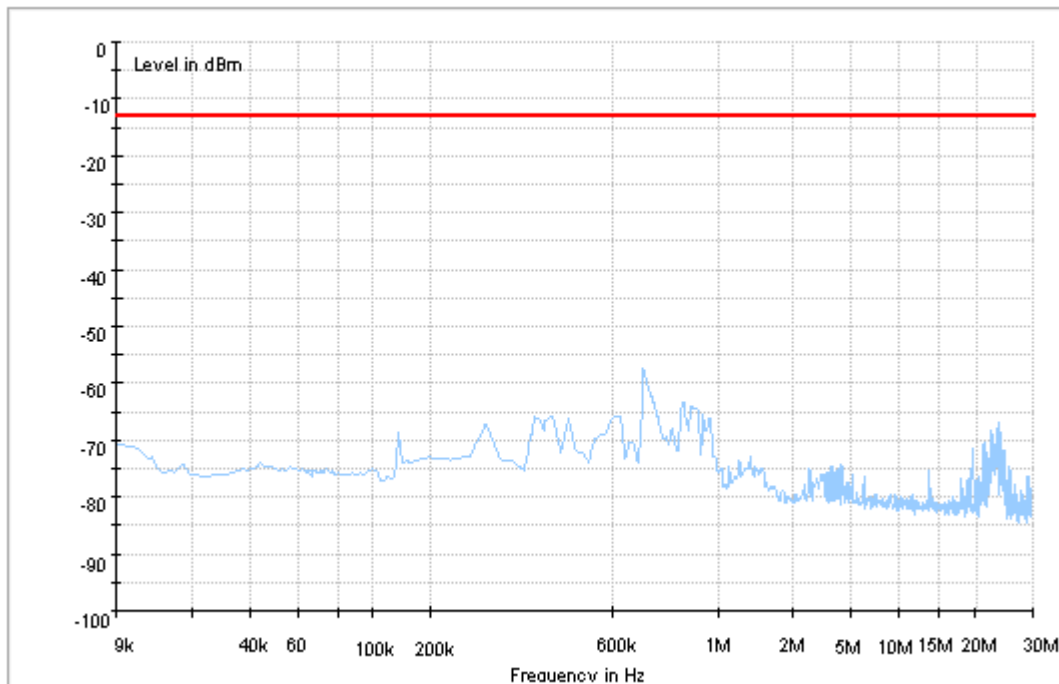
Copy of FCC PART22 G SM850_L



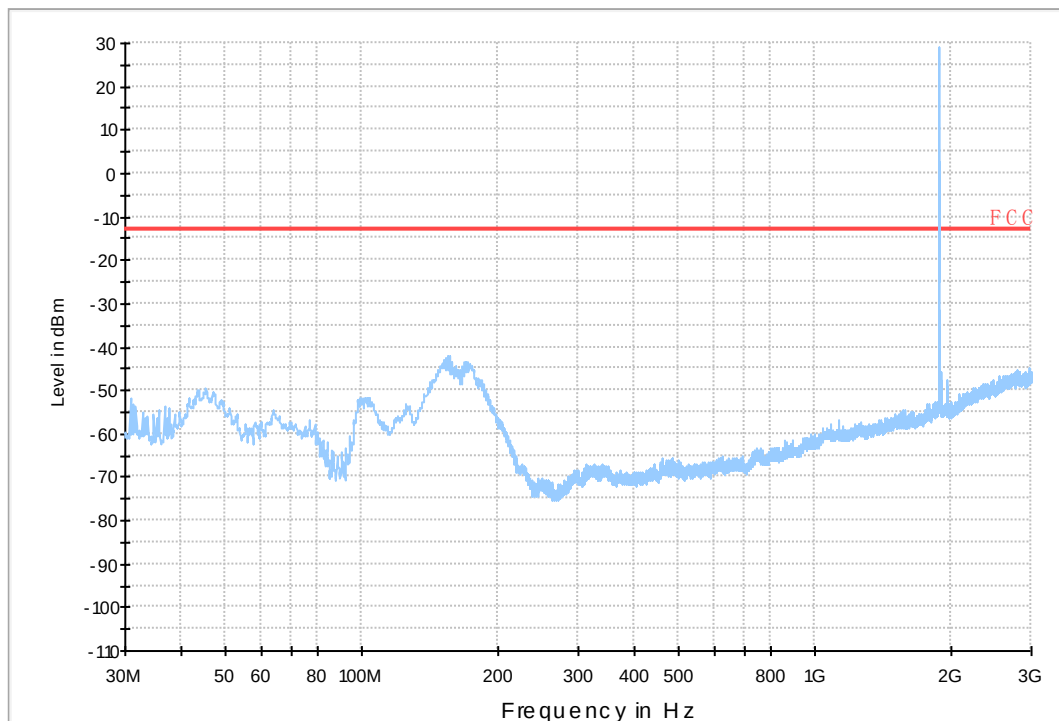
Copy of FCC PART22 G SM850_H



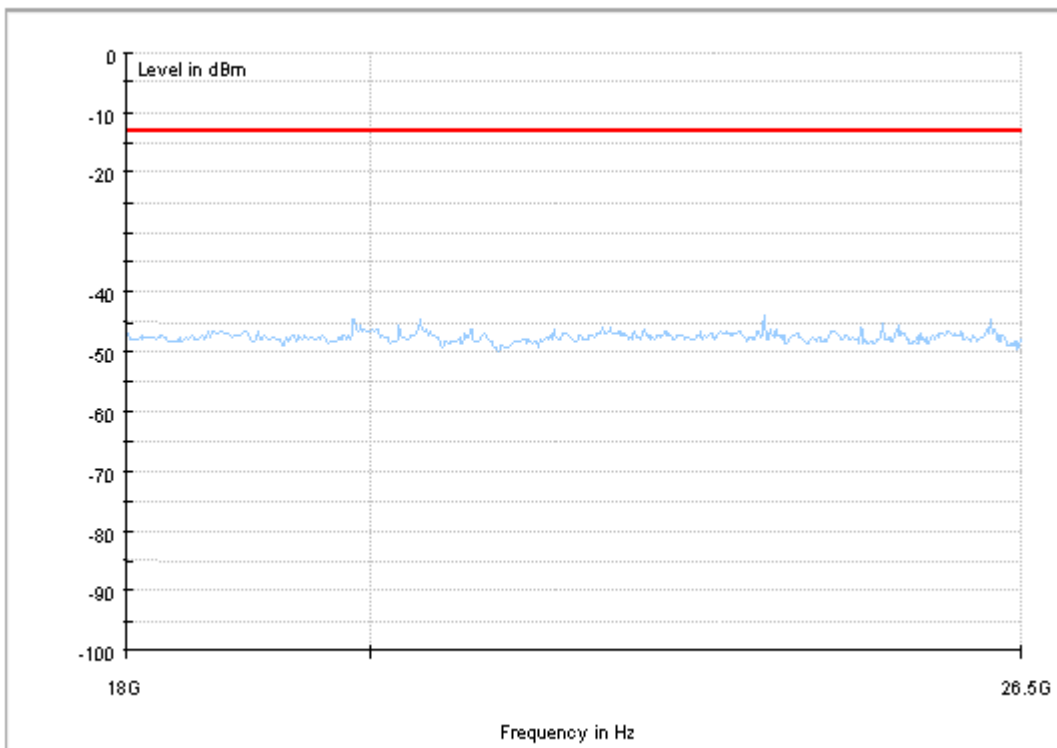
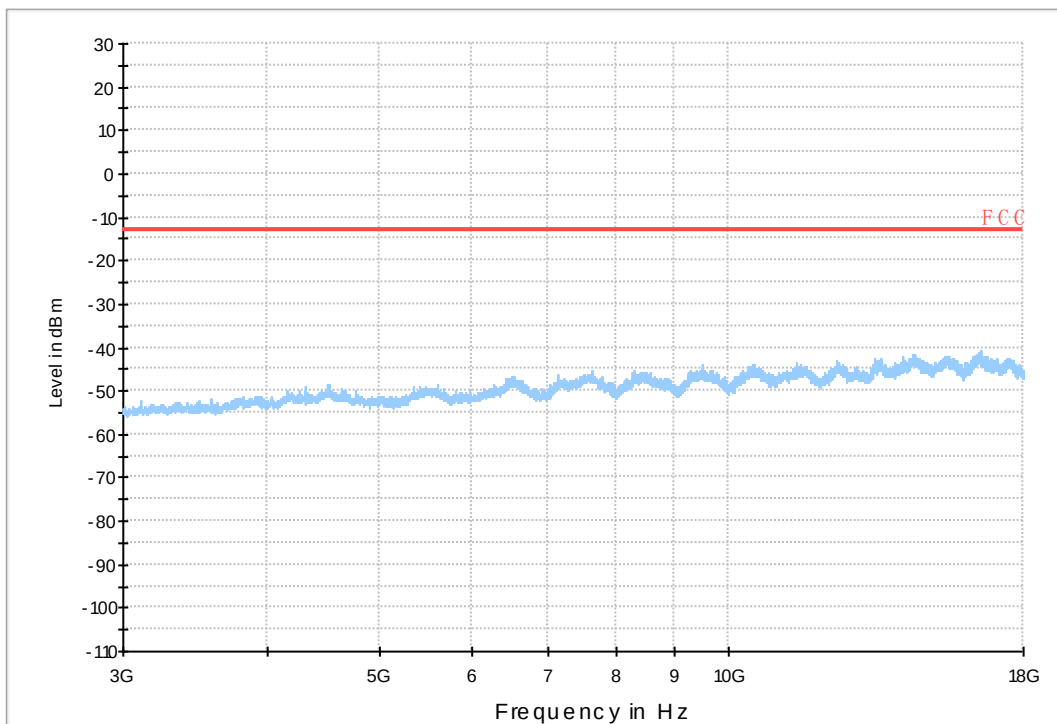
7.1.2 Test Band = GSM1900



Copy of FCC PART 24 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	16.47	0.01998	PASS
				VN	13.17	0.01598	PASS
				VH	11.04	0.01339	PASS
		MCH	TN	VL	16.08	0.01922	PASS
				VN	13.69	0.01636	PASS
				VH	12.72	0.0152	PASS
		HCH	TN	VL	10.07	0.01186	PASS
				VN	15.76	0.01857	PASS
				VH	12.53	0.01476	PASS
	GSM/TM2	LCH	TN	VL	11.04	0.01339	PASS
				VN	13.88	0.01684	PASS
				VH	12.24	0.01485	PASS
		MCH	TN	VL	11.72	0.01401	PASS
				VN	10.36	0.01238	PASS
				VH	12.33	0.01474	PASS
		HCH	TN	VL	7.49	0.00882	PASS
				VN	5.46	0.00643	PASS
				VH	3.68	0.00434	PASS
GSM1900	GSM/TM1	LCH	TN	VL	20.53	0.0111	PASS
				VN	11.82	0.00639	PASS
				VH	10.46	0.00565	PASS
		MCH	TN	VL	11.24	0.00598	PASS
				VN	10.01	0.00532	PASS
				VH	2.78	0.00148	PASS
		HCH	TN	VL	12.91	0.00676	PASS
				VN	14.27	0.00747	PASS
				VH	15.5	0.00812	PASS
	GSM/TM2	LCH	TN	VL	32.61	0.01763	PASS
				VN	17.11	0.00925	PASS
				VH	35.9	0.0194	PASS
		MCH	TN	VL	12.33	0.00656	PASS
				VN	14.24	0.00757	PASS
				VH			

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	TN	VH	14.24	0.00757	PASS
				VL	20.86	0.01092	PASS
				VN	13.04	0.00683	PASS
				VH	11.4	0.00597	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	9.49	0.01151	PASS
				-20	8.27	0.01003	PASS
				-10	15.76	0.01912	PASS
				0	14.08	0.01708	PASS
				10	11.88	0.01441	PASS
				20	14.72	0.01786	PASS
				30	12.85	0.01559	PASS
				40	10.07	0.01222	PASS
				50	13.82	0.01677	PASS
		MCH	VN	-30	18.08	0.02161	PASS
				-20	14.4	0.01721	PASS
				-10	15.69	0.01875	PASS
				0	14.79	0.01768	PASS
				10	20.02	0.02393	PASS
				20	12.4	0.01482	PASS
				30	16.66	0.01991	PASS
				40	16.14	0.01929	PASS
				50	14.79	0.01768	PASS
		HCH	VN	-30	9.23	0.01087	PASS
				-20	11.49	0.01354	PASS
				-10	12.53	0.01476	PASS
				0	17.56	0.02069	PASS
				10	12.59	0.01483	PASS
				20	11.17	0.01316	PASS
				30	16.72	0.0197	PASS
				40	12.79	0.01507	PASS
				50	16.66	0.01963	PASS
	GSM/TM2	LCH	VN	-30	11.72	0.01422	PASS
				-20	14.98	0.01818	PASS
				-10	14.85	0.01802	PASS
				0	14.82	0.01798	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				10	11.17	0.01355	PASS
				20	11.17	0.01355	PASS
				30	12.98	0.01575	PASS
				40	16.01	0.01942	PASS
				50	11.91	0.01445	PASS
		MCH	VN	-30	12.85	0.01536	PASS
				-20	14.53	0.01737	PASS
				-10	11.14	0.01332	PASS
				0	7.94	0.00949	PASS
				10	10.88	0.01301	PASS
				20	10.53	0.01259	PASS
				30	11.01	0.01316	PASS
				40	11.46	0.0137	PASS
				50	11.66	0.01394	PASS
		HCH	VN	-30	10.88	0.01282	PASS
				-20	12.3	0.01449	PASS
				-10	4.88	0.00575	PASS
				0	7.46	0.00879	PASS
				10	9.07	0.01069	PASS
				20	7.2	0.00848	PASS
				30	9.2	0.01084	PASS
				40	12.33	0.01453	PASS
				50	14.14	0.01666	PASS
GSM1900	GSM/TM1	LCH	VN	-30	5.42	0.00293	PASS
				-20	12.01	0.00649	PASS
				-10	29.19	0.01578	PASS
				0	12.46	0.00673	PASS
				10	14.27	0.00771	PASS
				20	12.91	0.00698	PASS
				30	6.46	0.00349	PASS
				40	32.22	0.01741	PASS
				50	19.44	0.01051	PASS
		MCH	VN	-30	12.27	0.00653	PASS
				-20	7.88	0.00419	PASS
				-10	29.7	0.0158	PASS
				0	7.55	0.00402	PASS
				10	7.17	0.00381	PASS
				20	30.74	0.01635	PASS
				30	10.72	0.0057	PASS
				40	23.12	0.0123	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	30.8	0.01638	PASS
				-30	13.88	0.00727	PASS
				-20	10.01	0.00524	PASS
				-10	12.07	0.00632	PASS
				0	10.91	0.00571	PASS
				10	6.72	0.00352	PASS
				20	11.3	0.00592	PASS
				30	11.62	0.00608	PASS
				40	8.39	0.00439	PASS
				50	11.88	0.00622	PASS
	GSM/TM2	LCH	VN	-30	14.5	0.00784	PASS
				-20	31.87	0.01723	PASS
				-10	10.85	0.00586	PASS
				0	19.63	0.01061	PASS
				10	18.31	0.0099	PASS
				20	36.55	0.01975	PASS
				30	17.34	0.00937	PASS
				40	19.69	0.01064	PASS
				50	17.18	0.00929	PASS
		MCH	VN	-30	31.32	0.01666	PASS
				-20	13.04	0.00694	PASS
				-10	31.54	0.01678	PASS
				0	30.38	0.01616	PASS
				10	12.62	0.00671	PASS
				20	29.12	0.01549	PASS
				30	13.43	0.00714	PASS
				40	12.62	0.00671	PASS
				50	26.51	0.0141	PASS
		HCH	VN	-30	15.85	0.0083	PASS
				-20	14.46	0.00757	PASS
				-10	15.14	0.00793	PASS
				0	19.47	0.01019	PASS
				10	19.73	0.01033	PASS
				20	14.21	0.00744	PASS
				30	14.56	0.00762	PASS
				40	15.14	0.00793	PASS
				50	17.47	0.00915	PASS

END