



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	32.4	23.5	38.5	PASS
		MCH	32.43	23.53	38.5	PASS
		HCH	32.35	23.45	38.5	PASS
	GSM/TM2	LCH	25.45	16.55	38.5	PASS
		MCH	25.49	16.59	38.5	PASS
		HCH	25.49	16.59	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	29.38	26.38	33	PASS
		MCH	29.12	26.12	33	PASS
		HCH	29.11	26.11	33	PASS
	GSM/TM2	LCH	25.42	22.42	33	PASS
		MCH	25..31	22.31	33	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
		HCH	25.26	22.26	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
GSM850	GSM/TM1	LCH	0.13	13	PASS
		MCH	0.13	13	PASS
		HCH	0.12	13	PASS
	GSM/TM2	LCH	2.84	13	PASS
		MCH	2.88	13	PASS
		HCH	2.79	13	PASS
GSM1900	GSM/TM1	LCH	0.16	13	PASS
		MCH	0.13	13	PASS
		HCH	0.12	13	PASS
	GSM/TM2	LCH	2.84	13	PASS
		MCH	2.95	13	PASS
		HCH	2.9	13	PASS

3Appendix_C: Modulation Characteristics

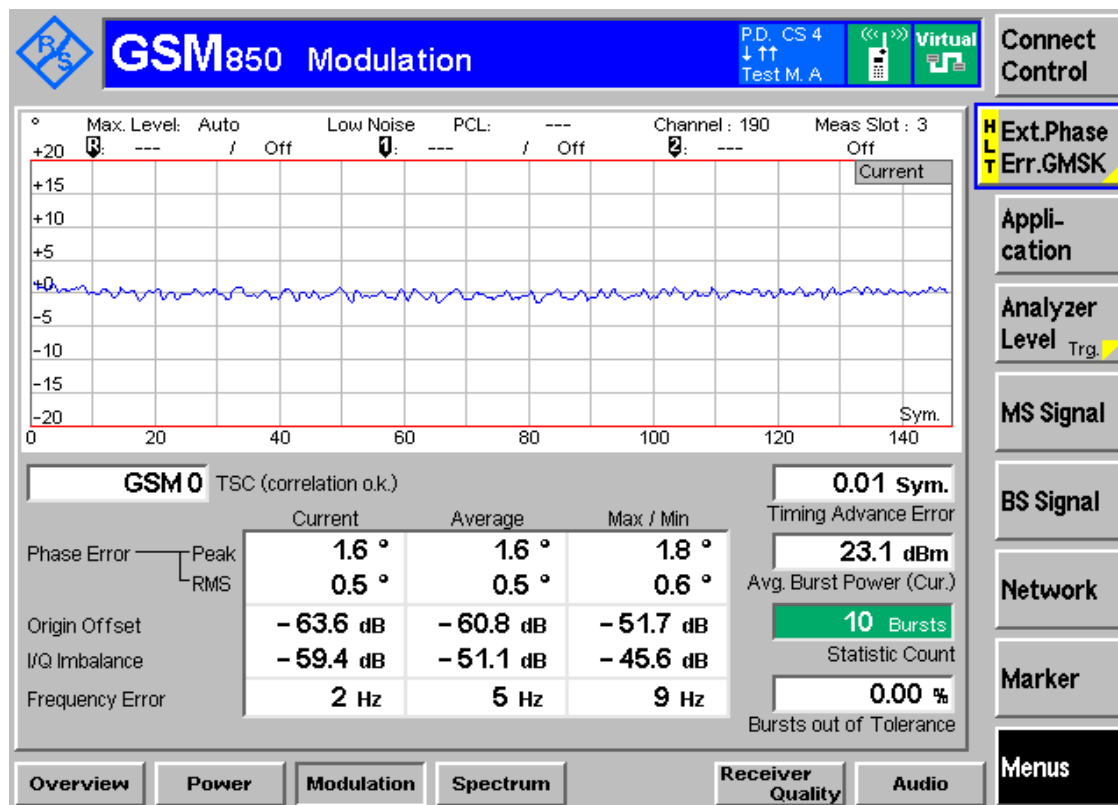
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

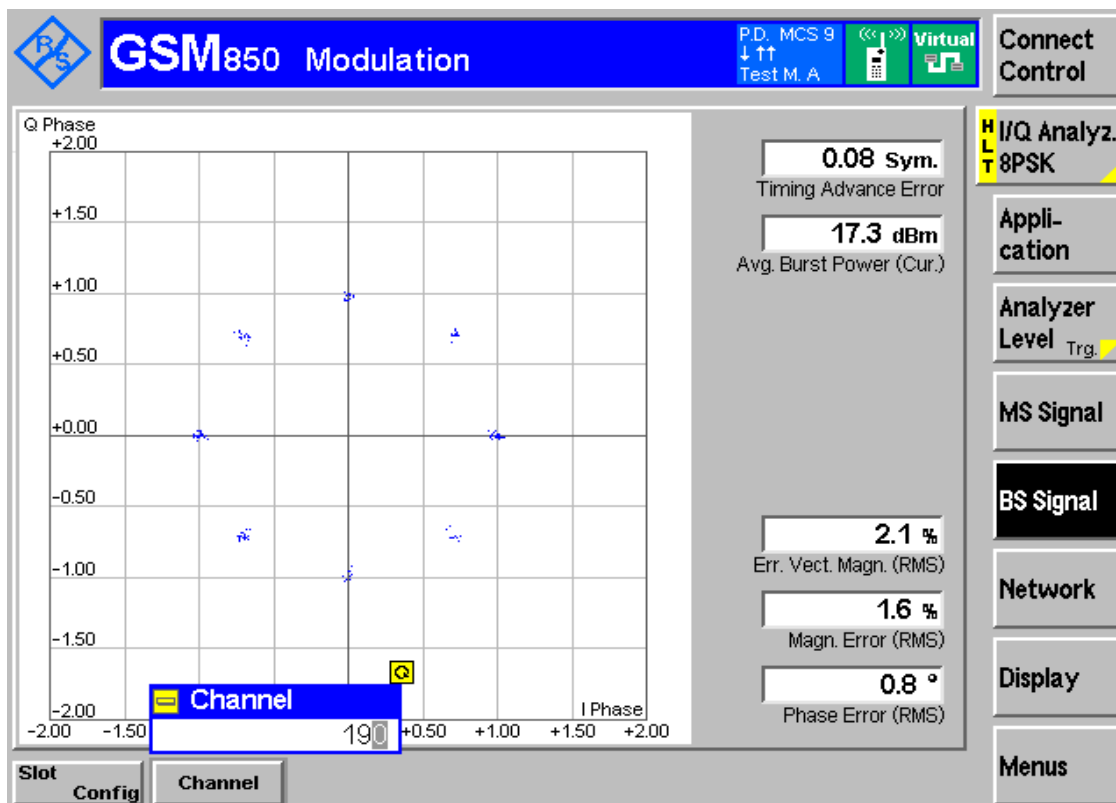
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

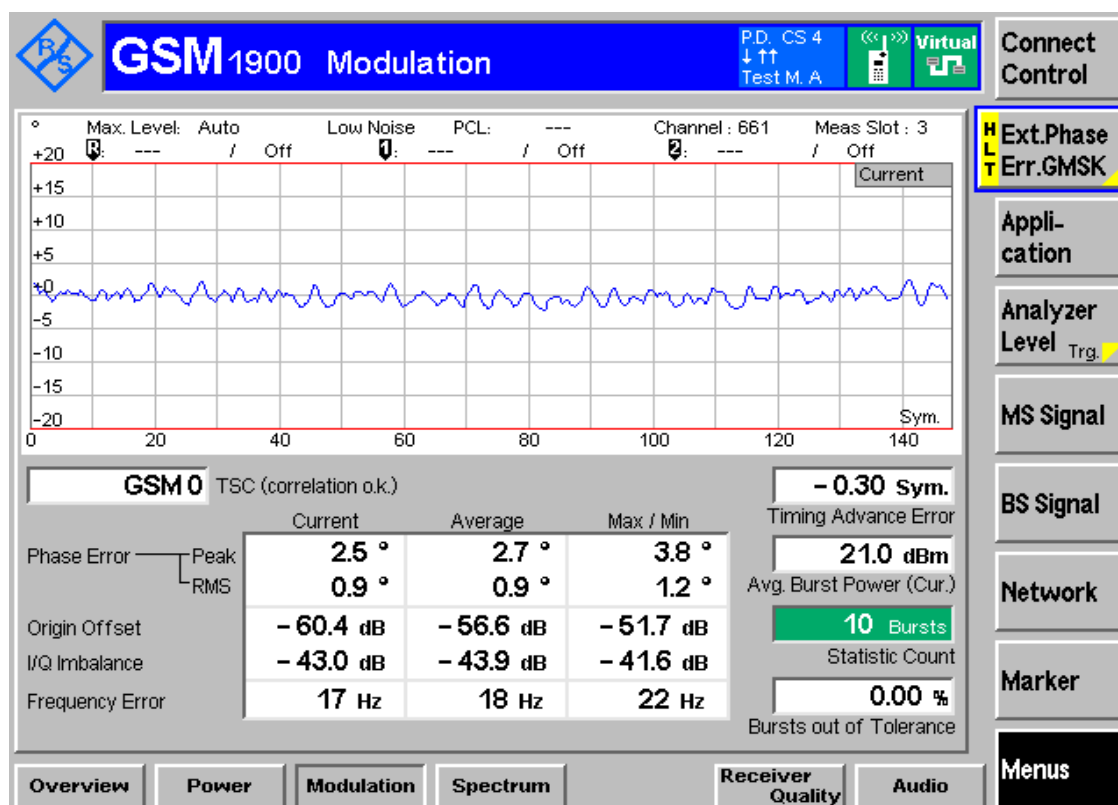
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

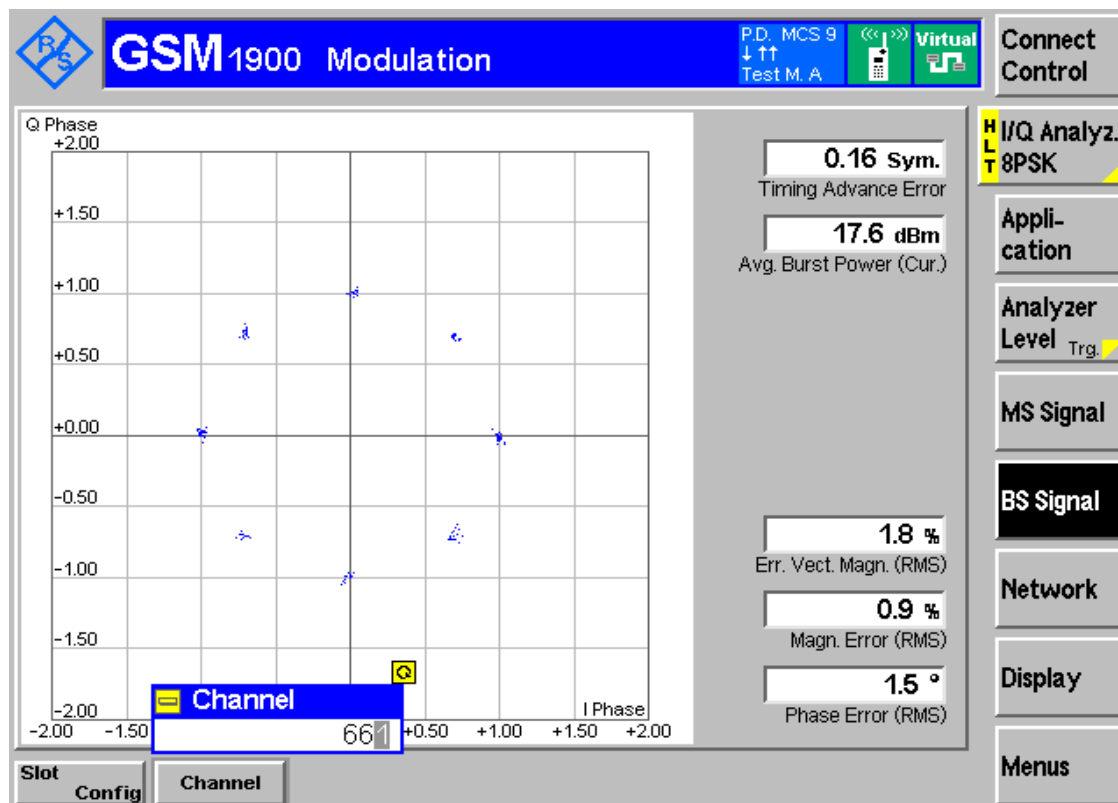
3.1.2.1 Test Mode = GSM/TM1

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	243.23	308.86	Pass
		MCH	243.54	309.02	Pass
		HCH	245.54	311.46	Pass
	GSM/TM2	LCH	251.82	317.44	Pass
		MCH	252.41	318.29	Pass
		HCH	250.22	315.89	Pass
GSM1900	GSM/TM1	LCH	245.66	315.86	Pass
		MCH	245.96	317.02	Pass
		HCH	243.03	312.55	Pass
	GSM/TM2	LCH	249.96	322.38	Pass
		MCH	244.02	317.14	Pass
		HCH	246.91	320.01	Pass

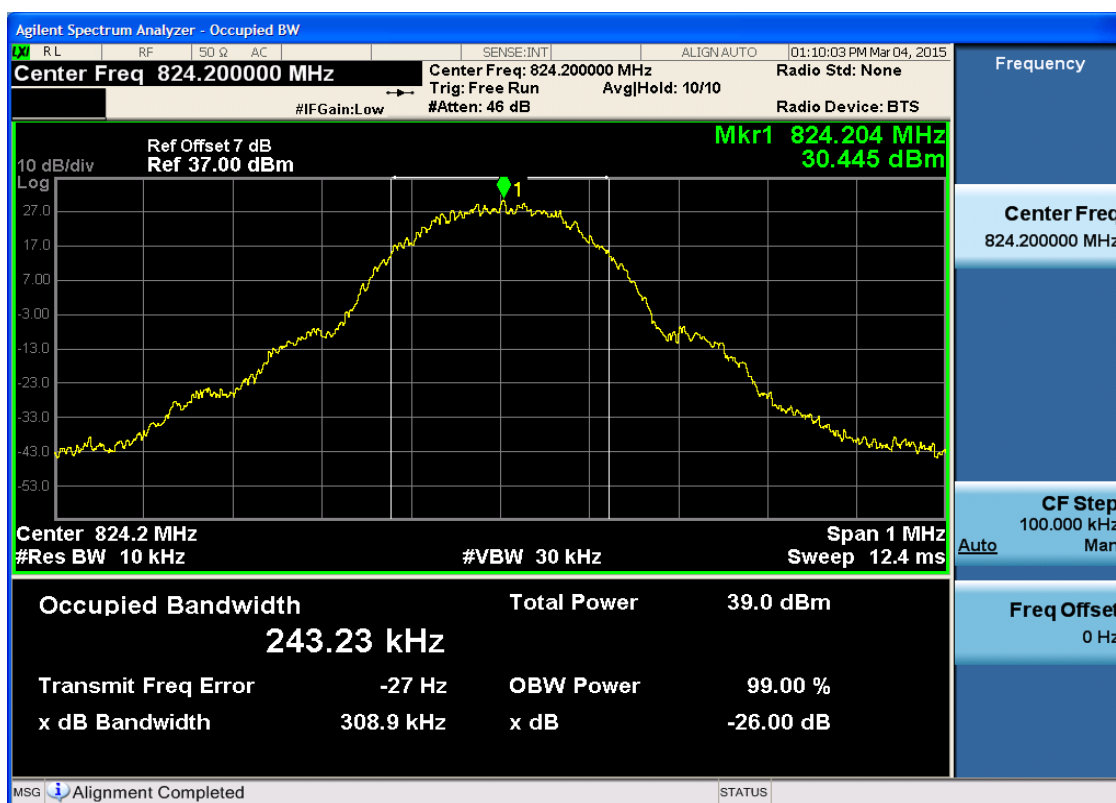
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

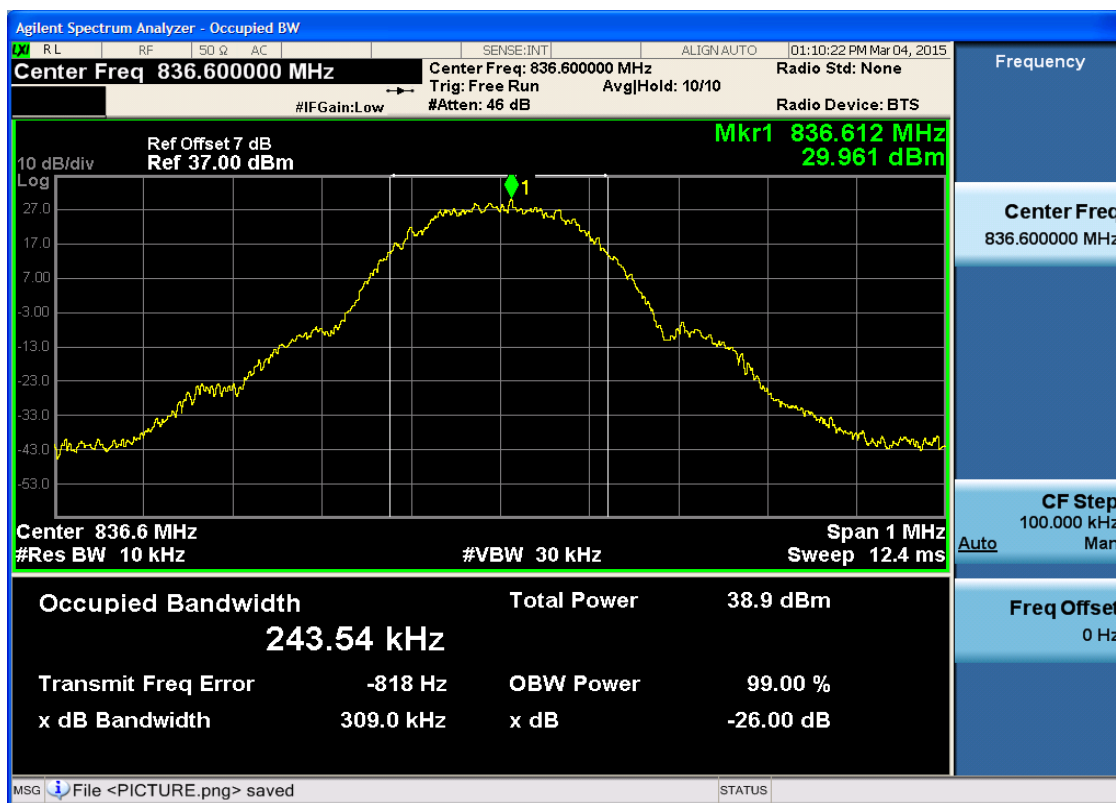
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



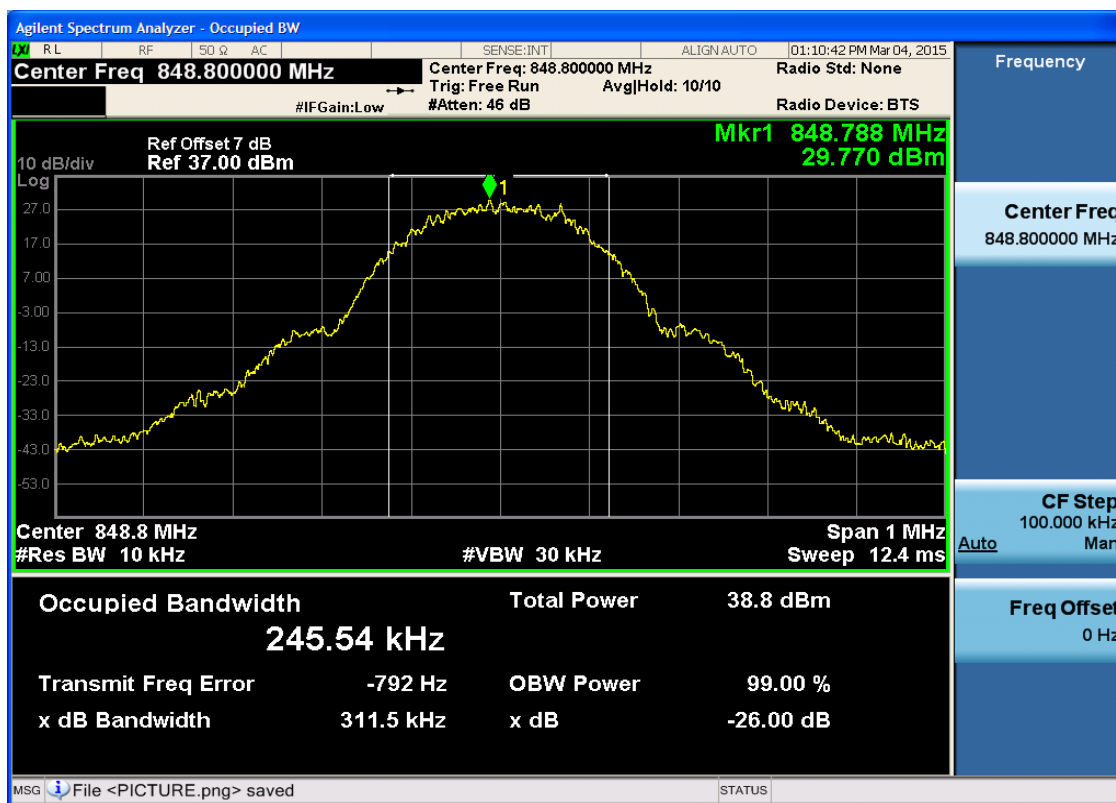


4.1.1.1.2 Test Channel = MCH



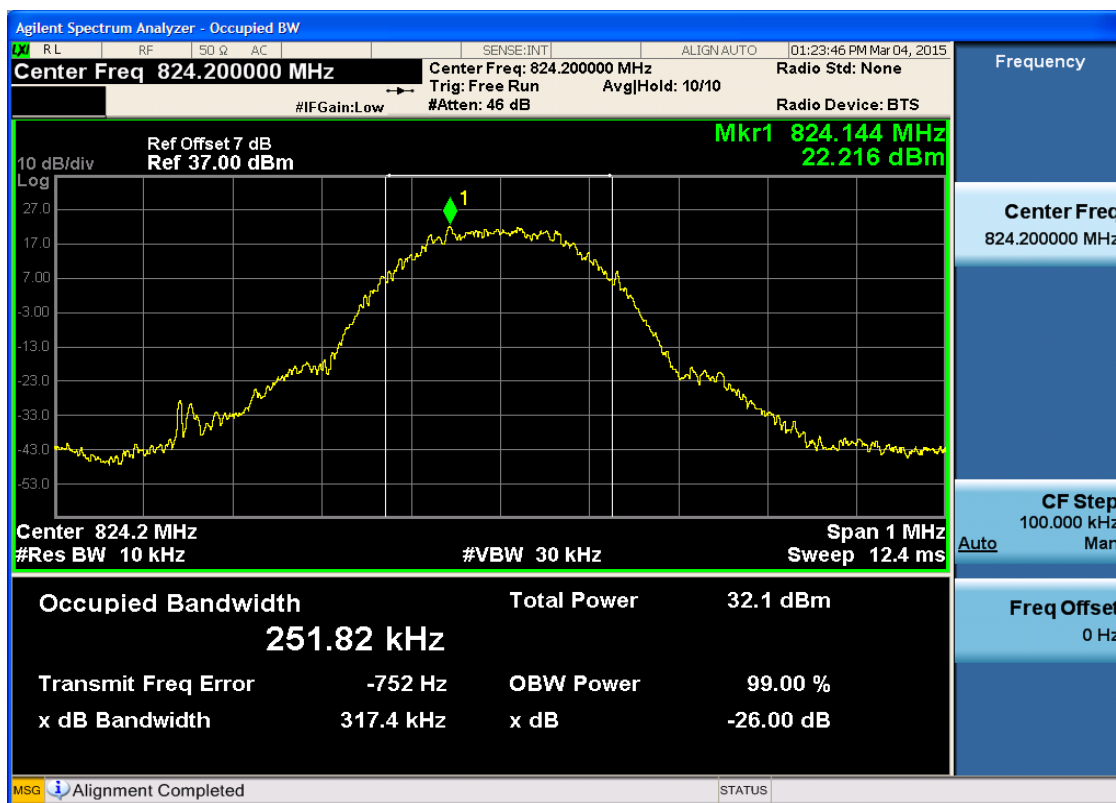


4.1.1.1.3 Test Channel = HCH



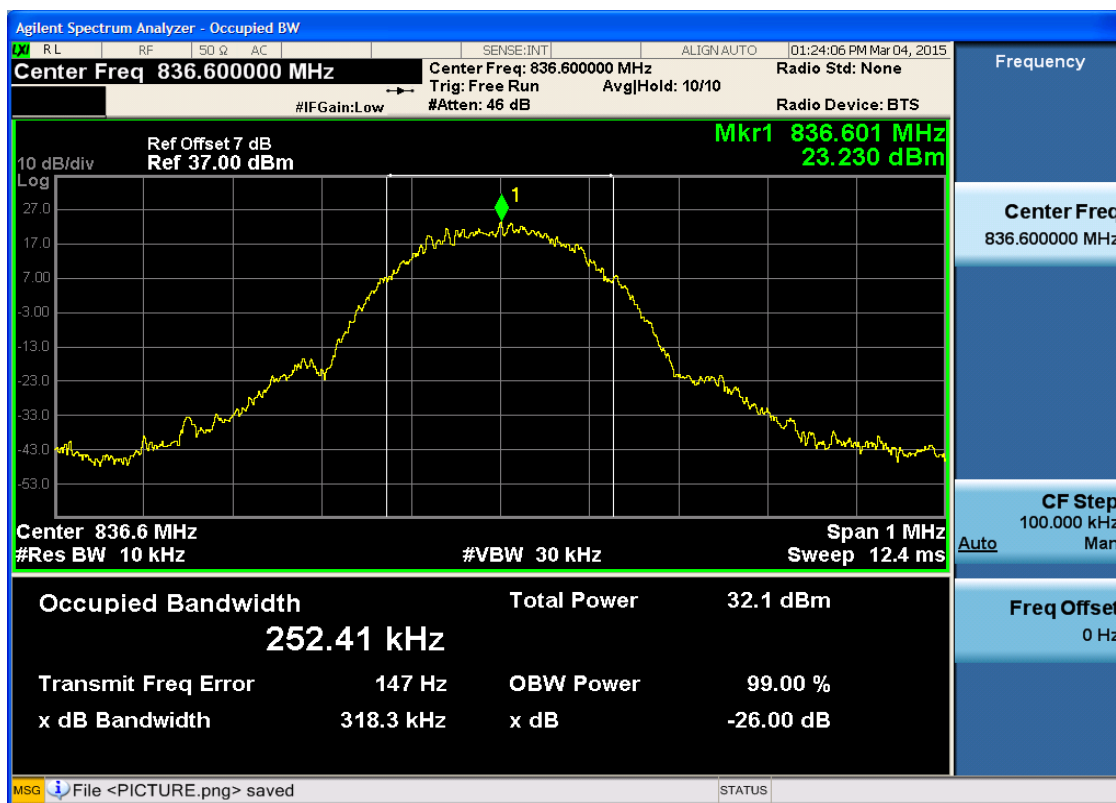
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



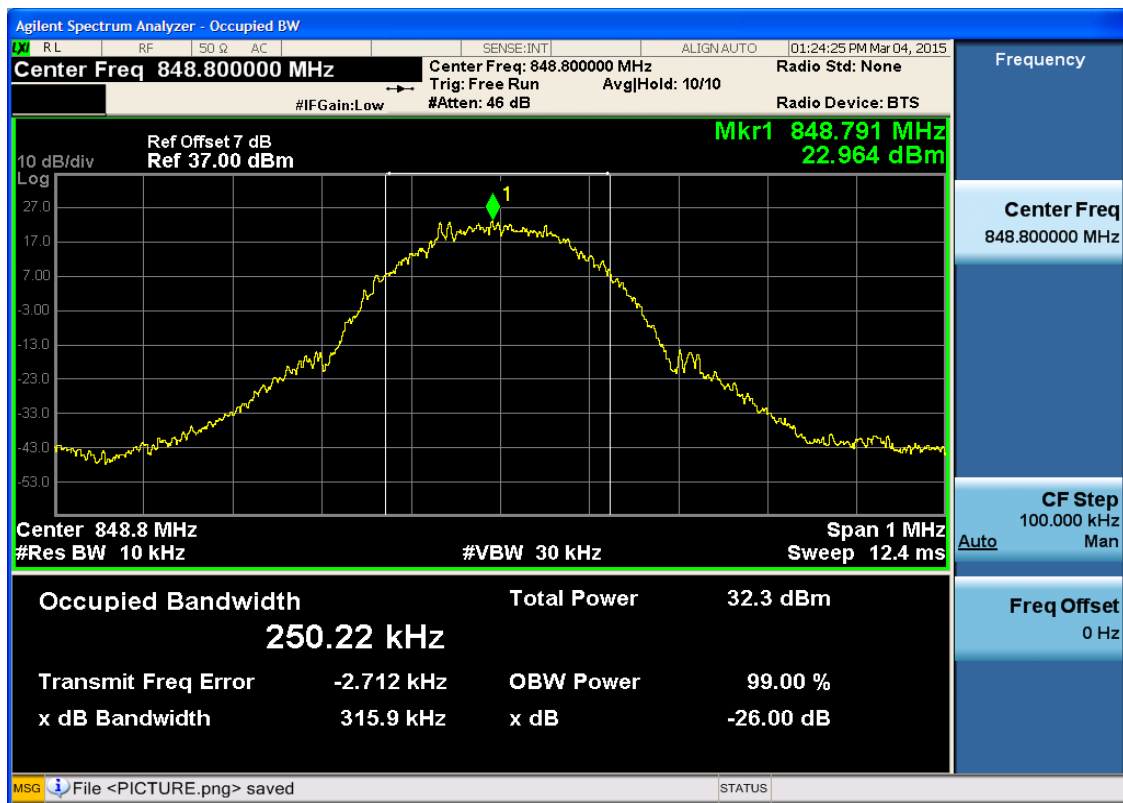


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

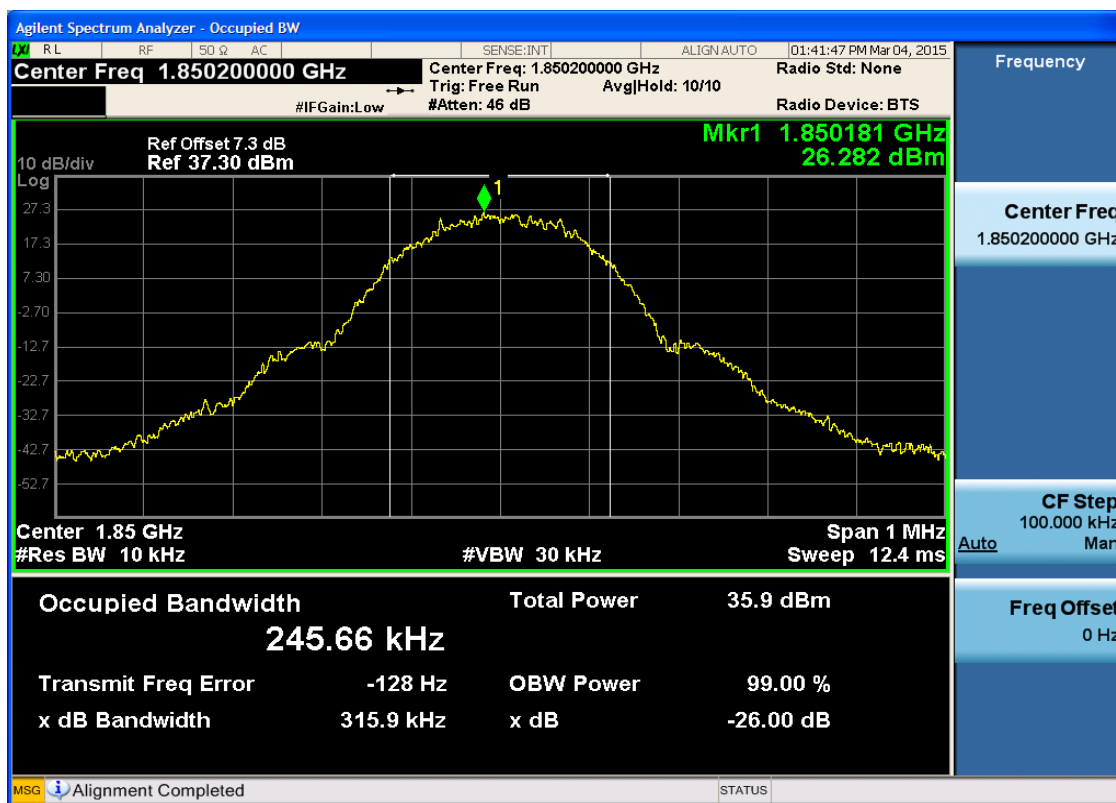




4.1.2 Test Band = GSM1900

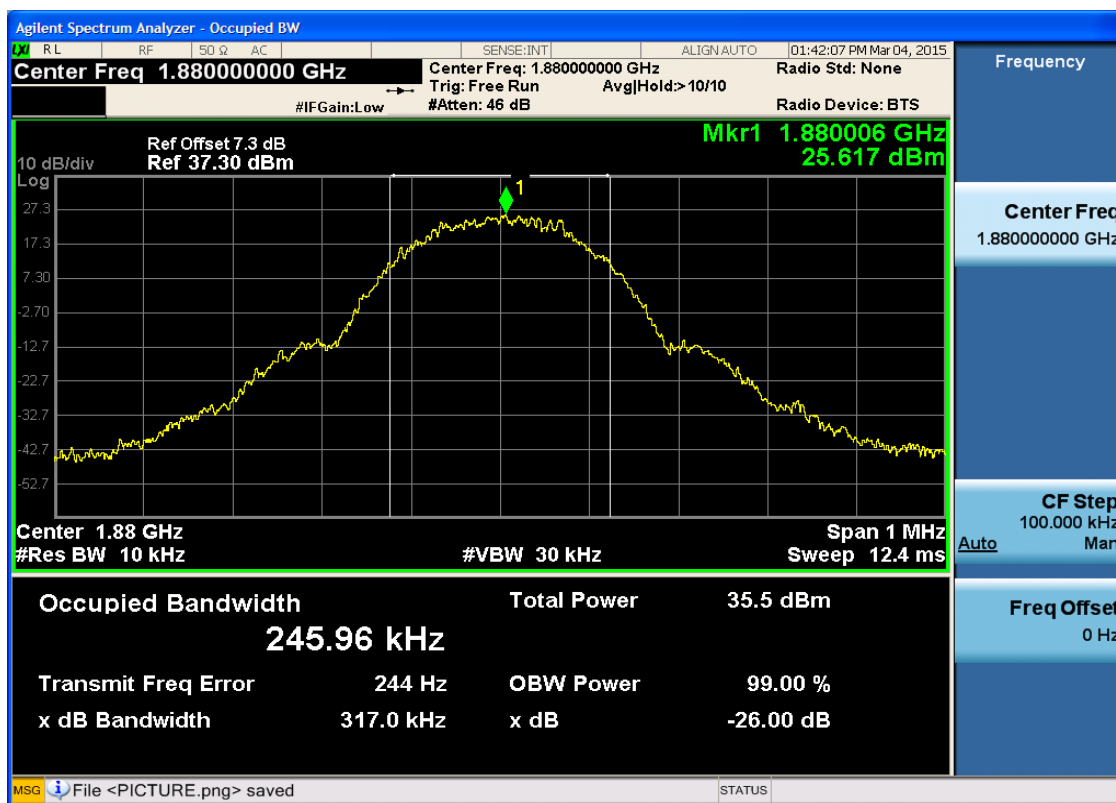
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



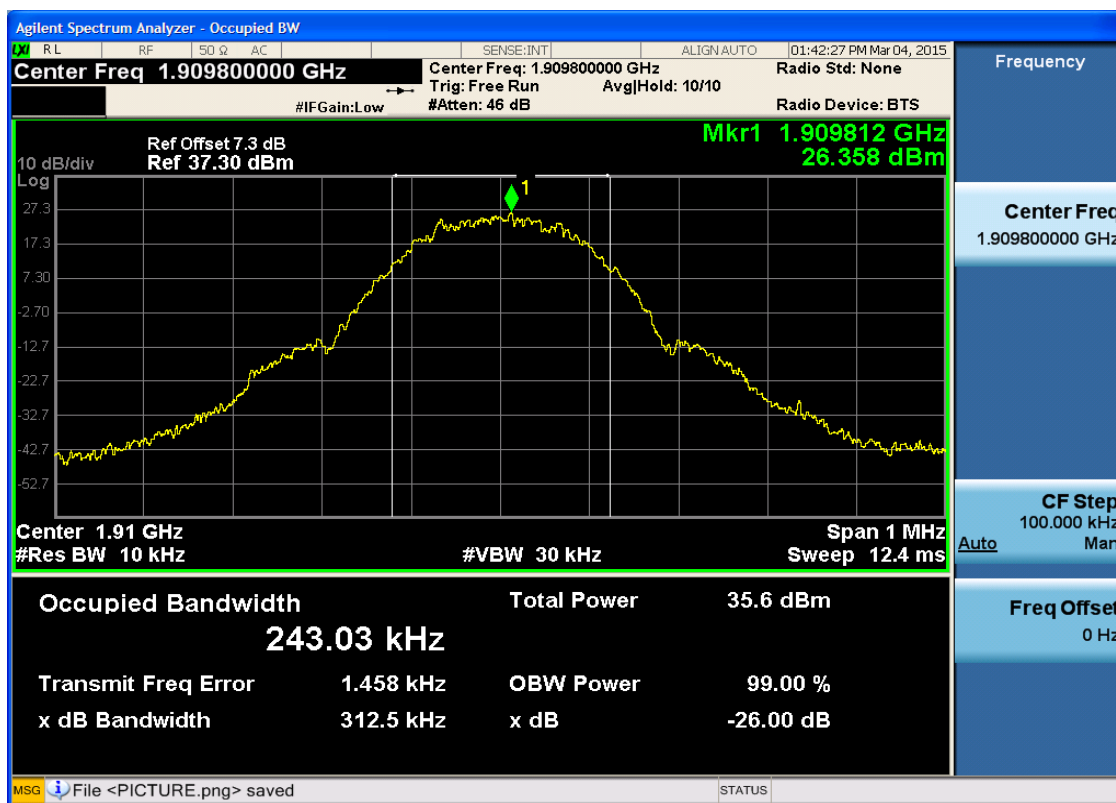


4.1.2.1.2 Test Channel = MCH



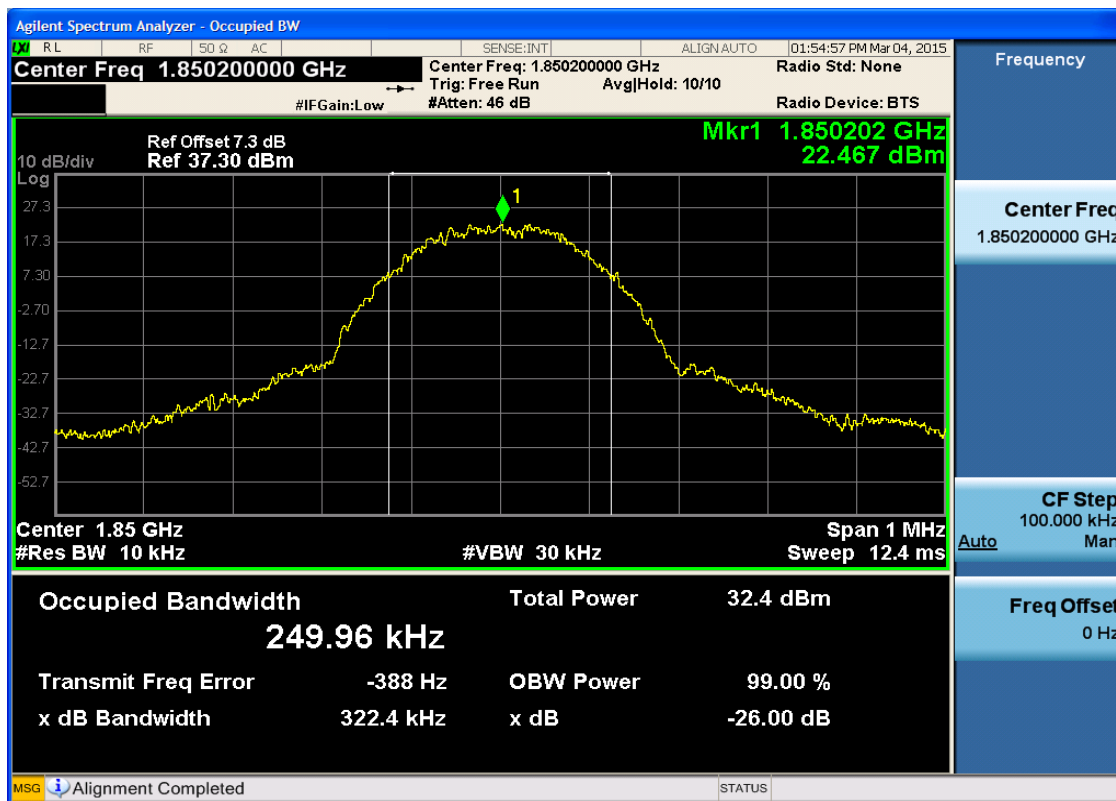


4.1.2.1.3 Test Channel = HCH



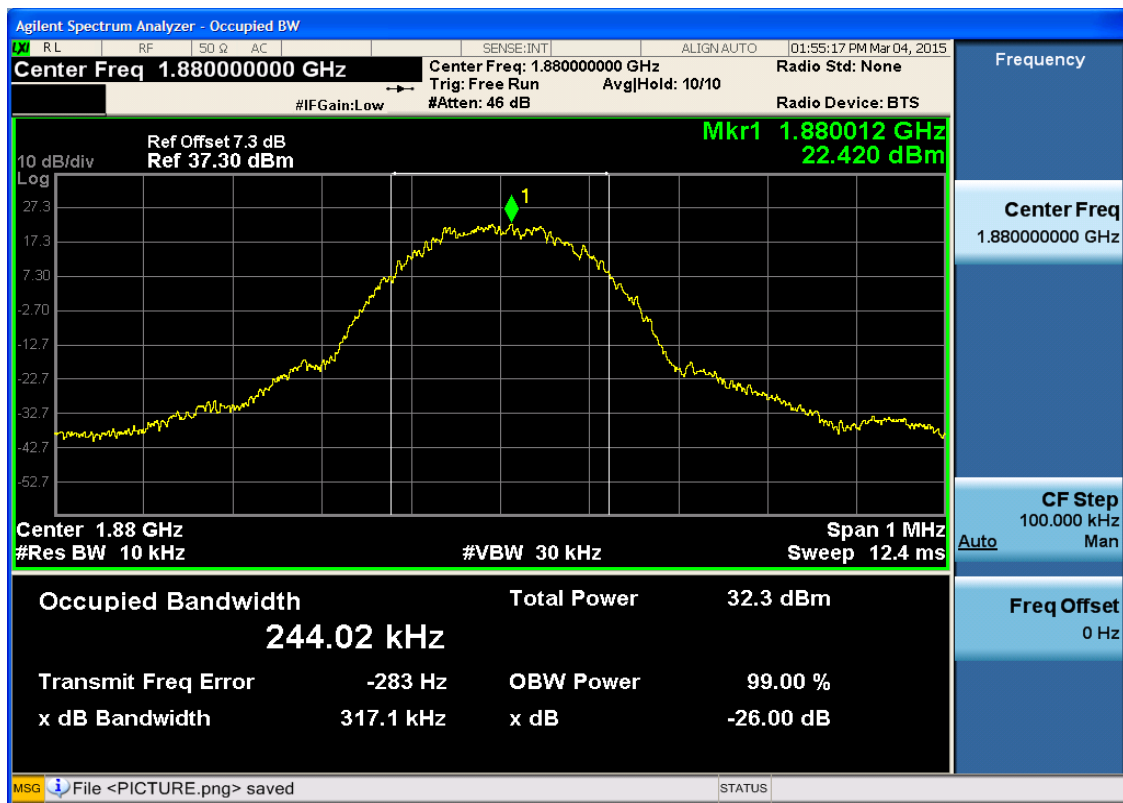
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



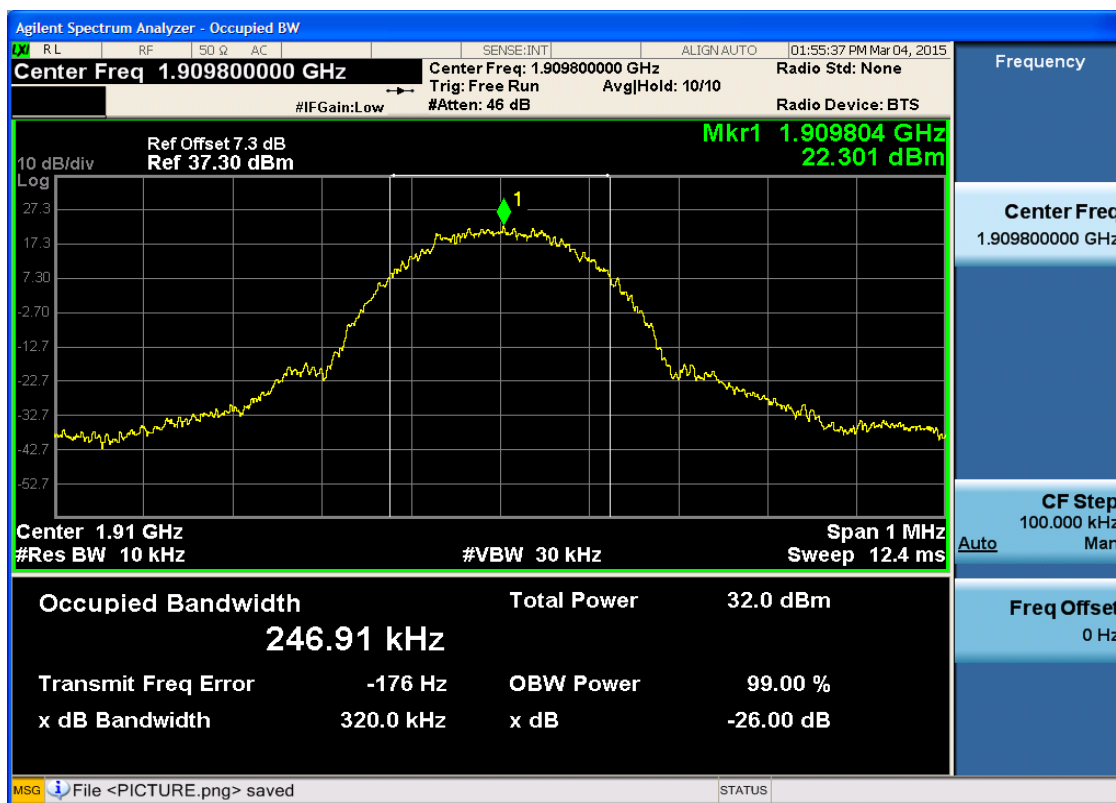


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH



5Appendix_E: Band Edges Compliance

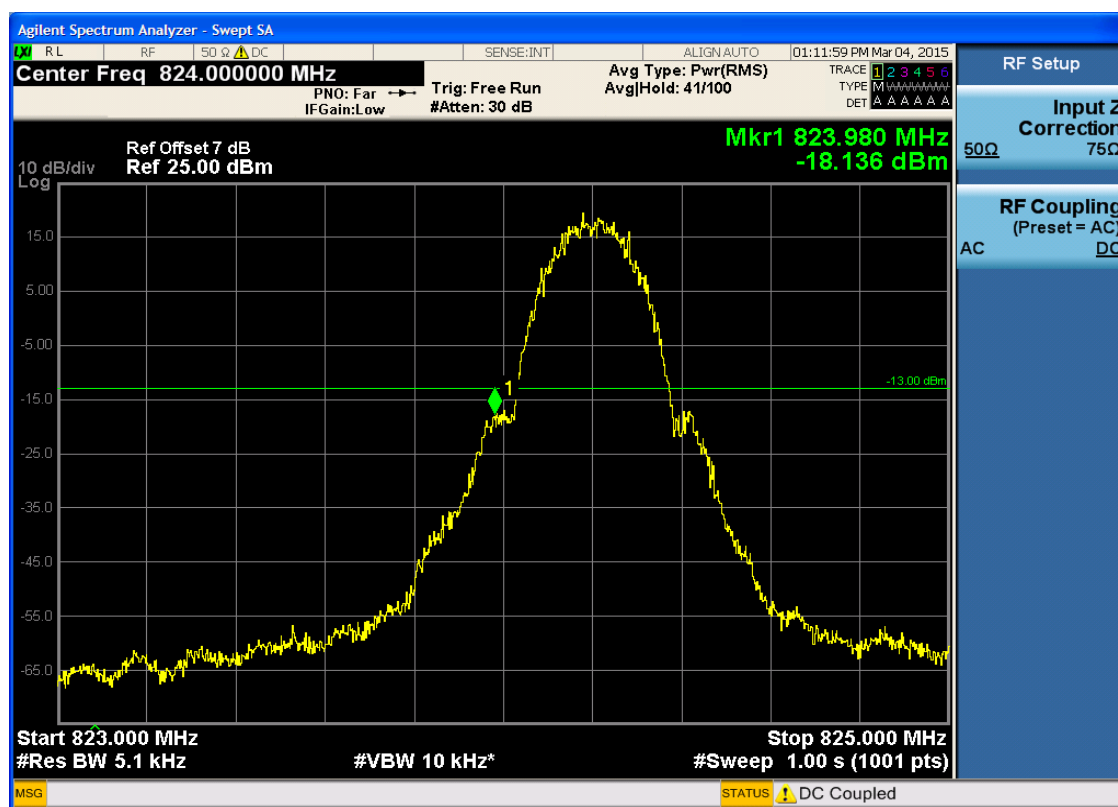
Part I - Test Plots

5.1 For GSM

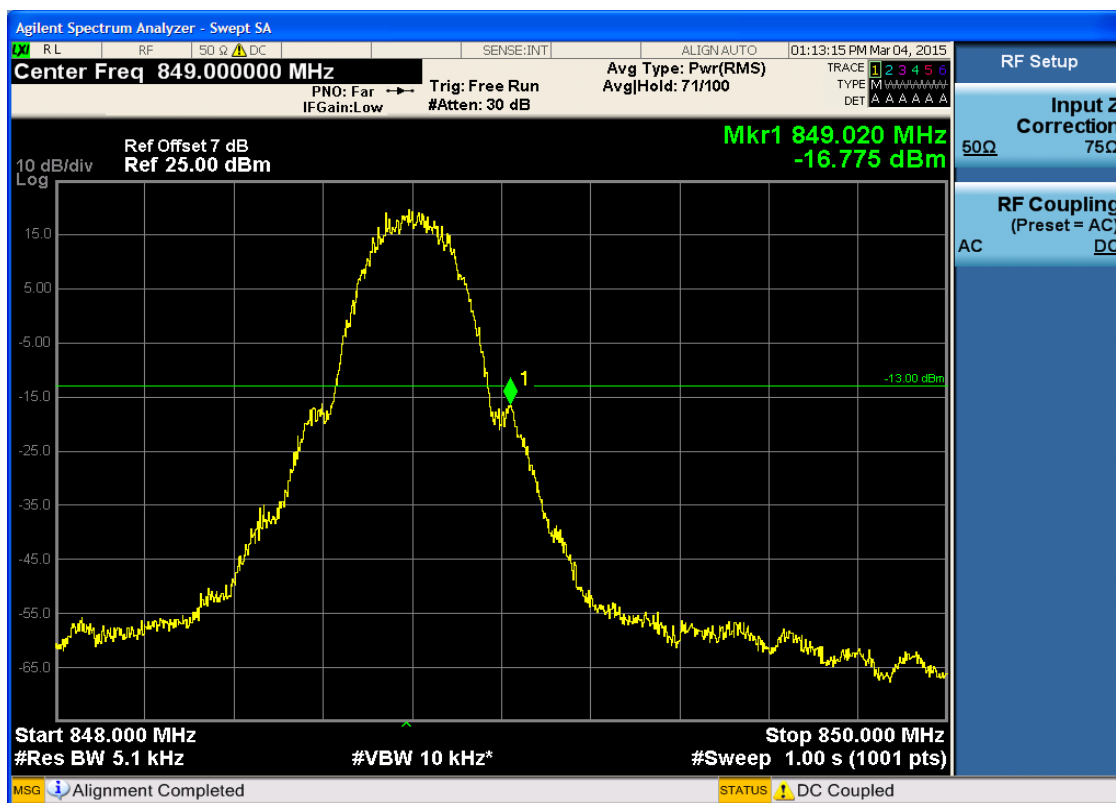
5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH

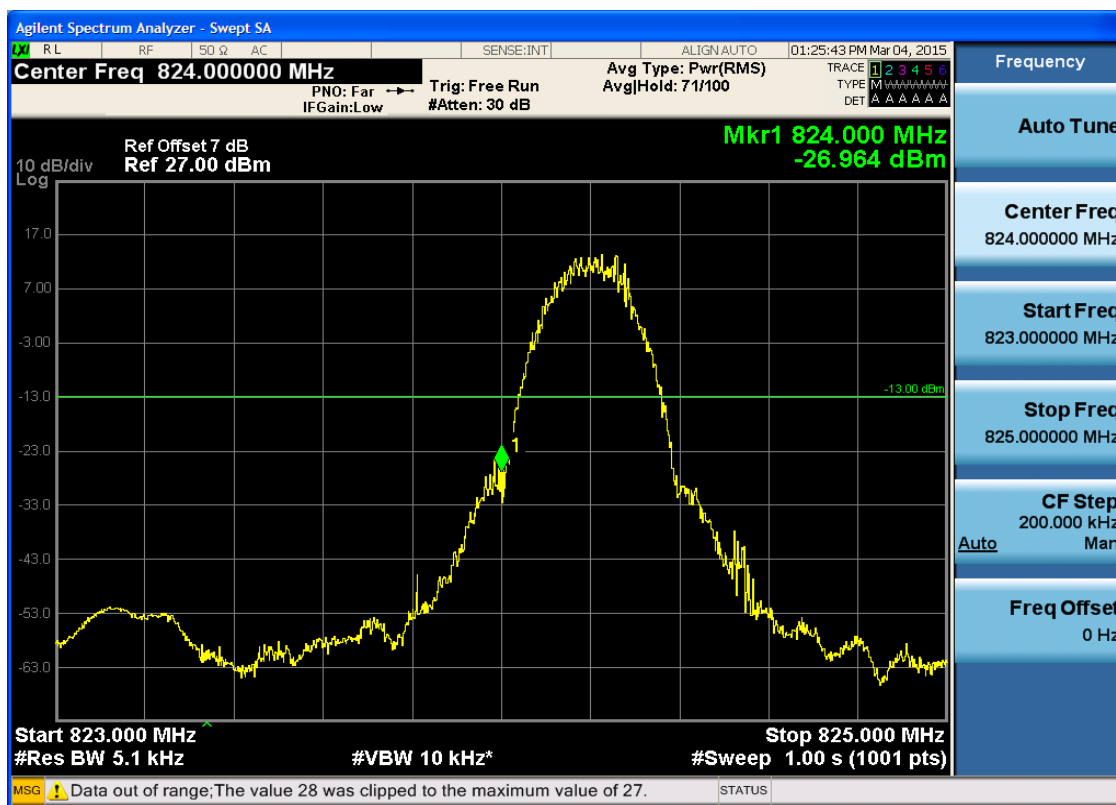


5.1.1.1.2 Test Channel = HCH

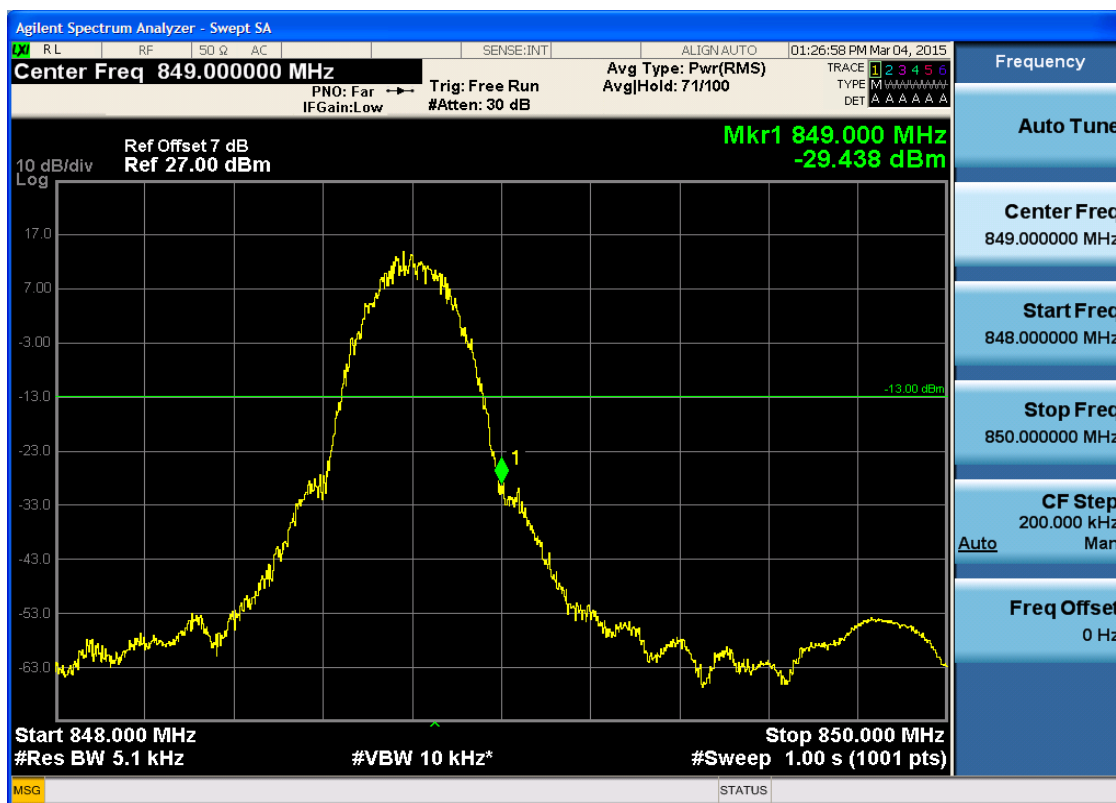


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



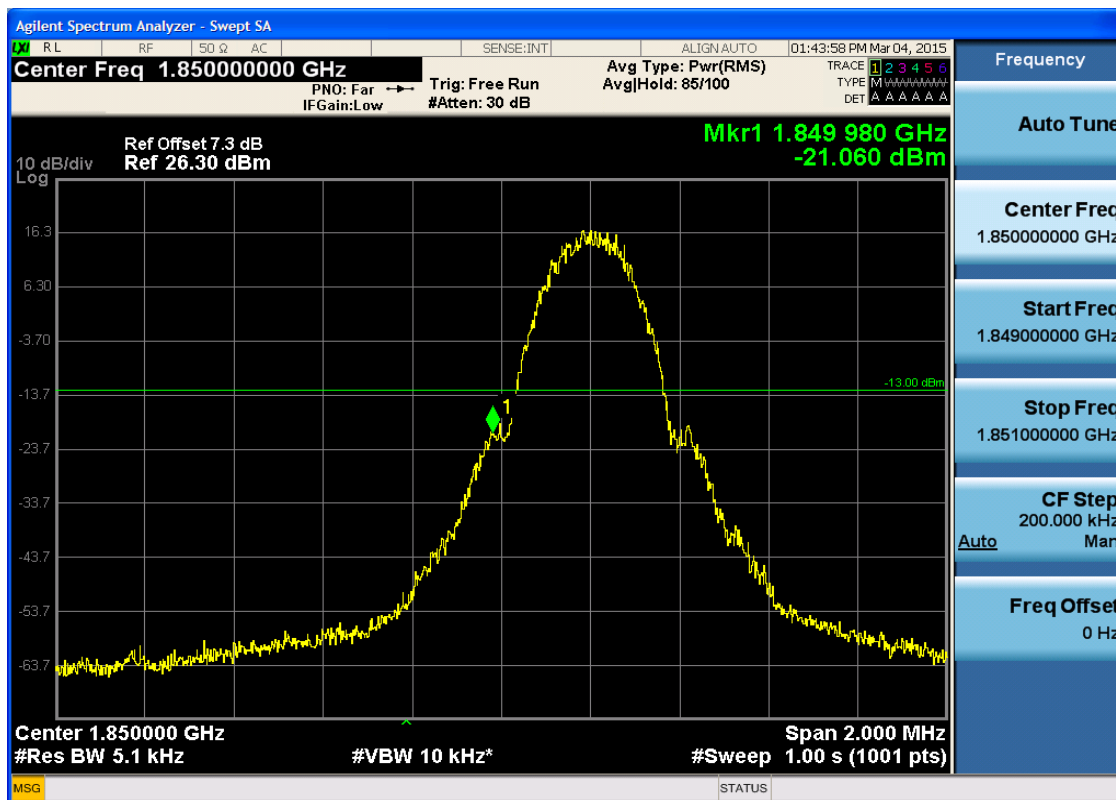
5.1.1.2.2 Test Channel = HCH



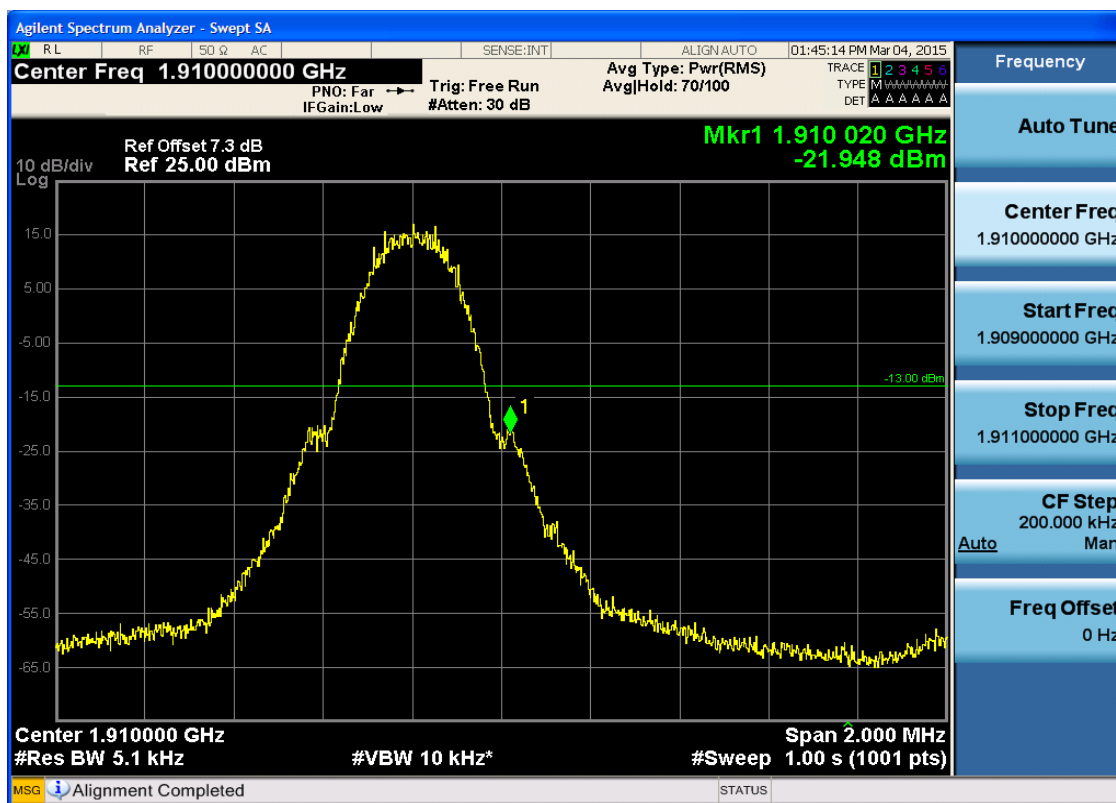
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

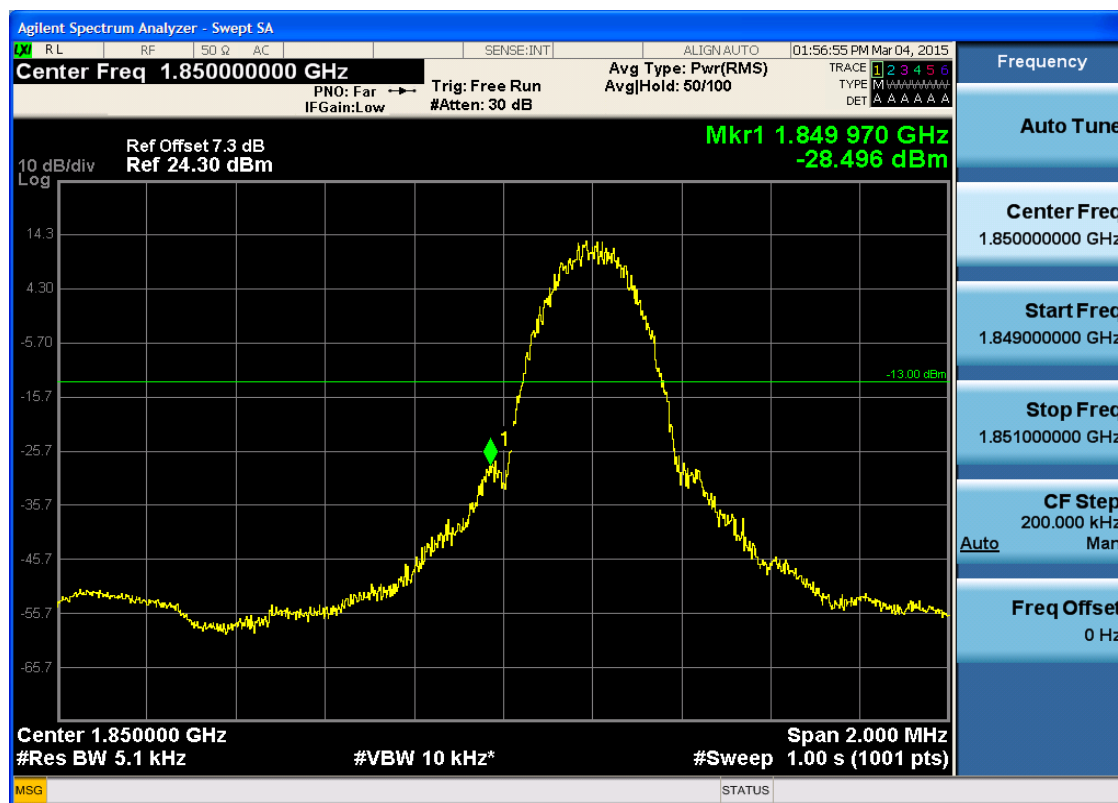


5.1.2.1.2 Test Channel = HCH

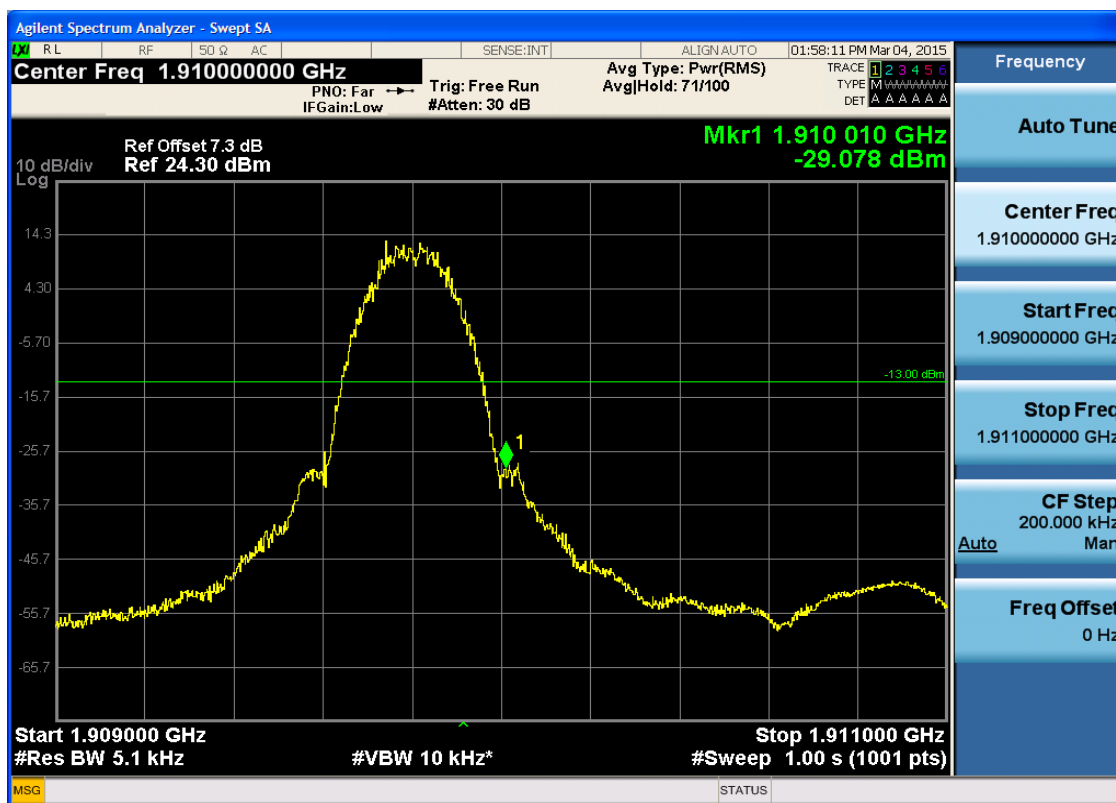


5.1.2.2 Test Mode = GSM/TM2

5.1.2.2.1 Test Channel = LCH



5.1.2.2.2 Test Channel = HCH



6Appendix_F: Spurious Emission at Antenna Terminal

NOTE: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k * (Span / RBW)$ " with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

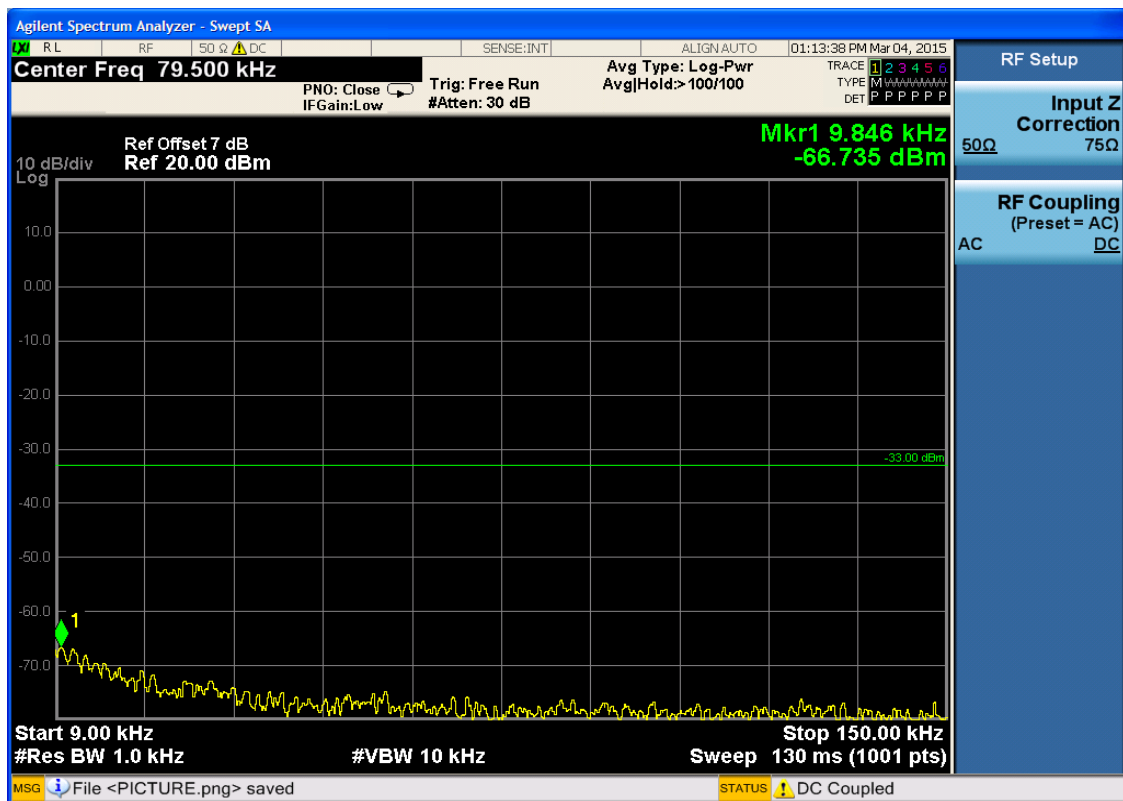
Part I - Test Plots

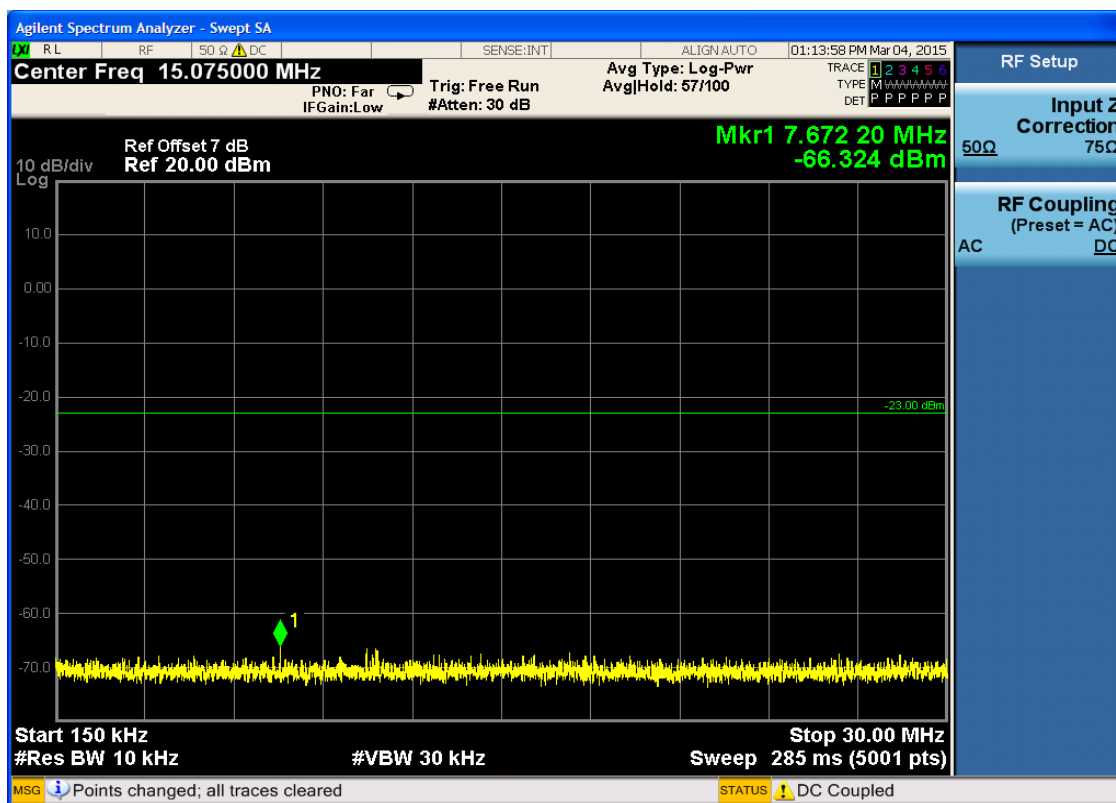
6.1 For GSM

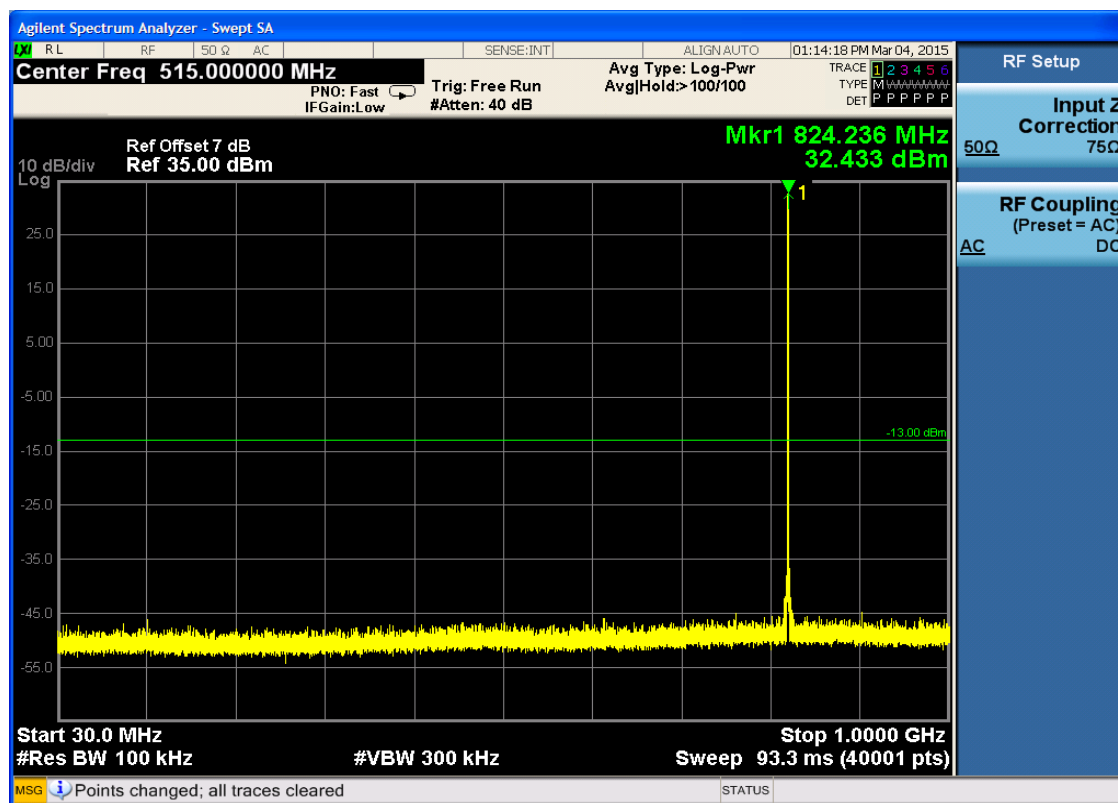
6.1.1 Test Band = GSM850

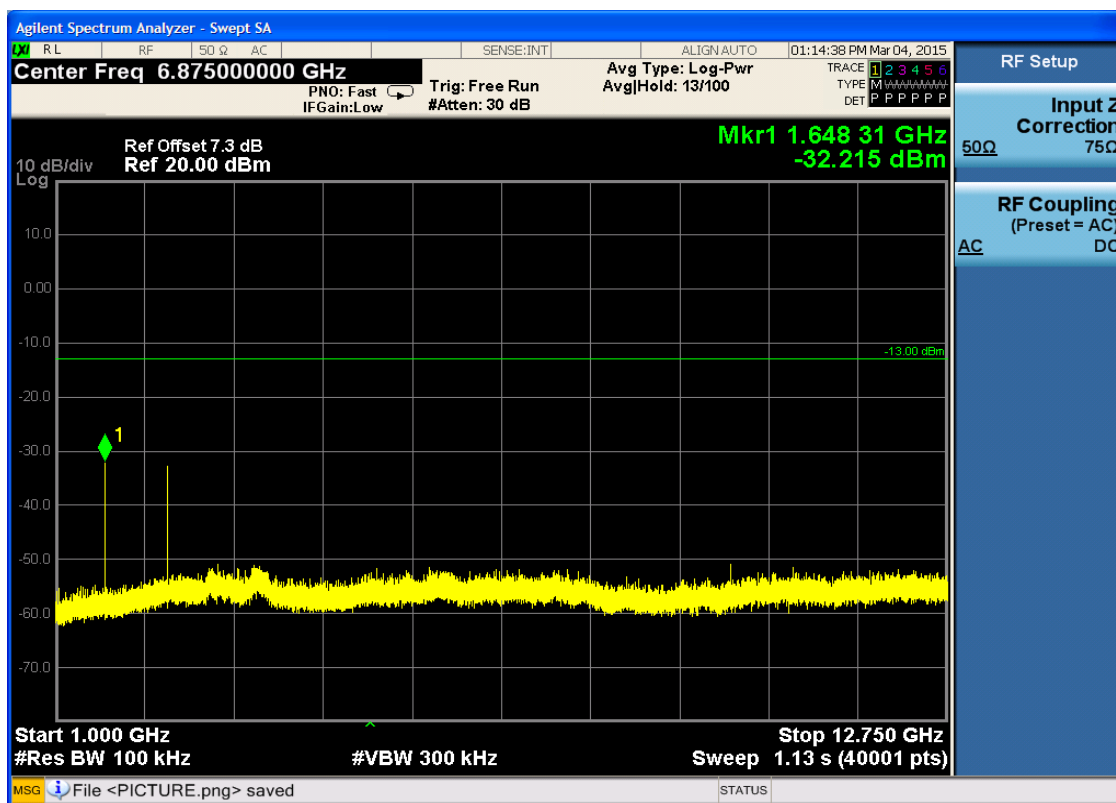
6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH











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MX R L RF 50 Ω DC SENSE:INT ALIGN:AUTO 01:15:01 PM Mar 04, 2015

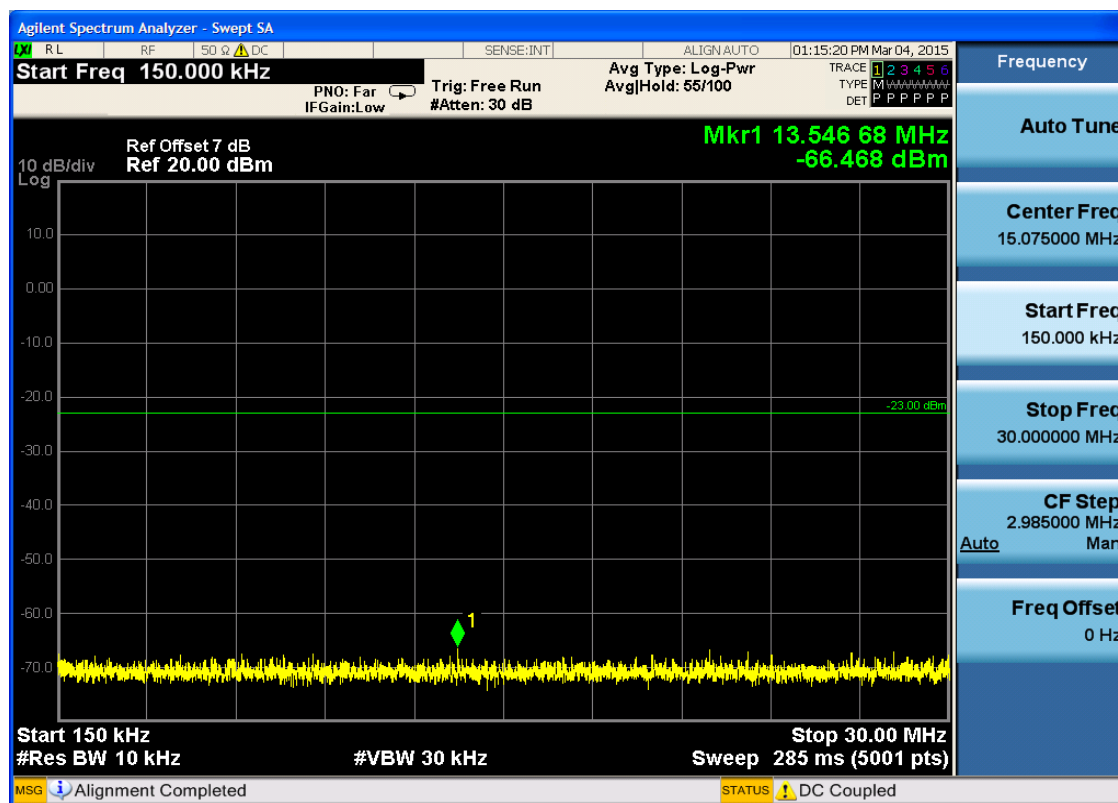
Start Freq 9.000 kHz PNO: Close Trig: Free Run Avg Type: Log-Pwr Mkr1 9.846 kHz
IF Gain: Low #Atten: 30 dB Avg Hold: > 100/100 TYPE M DET P P P P P

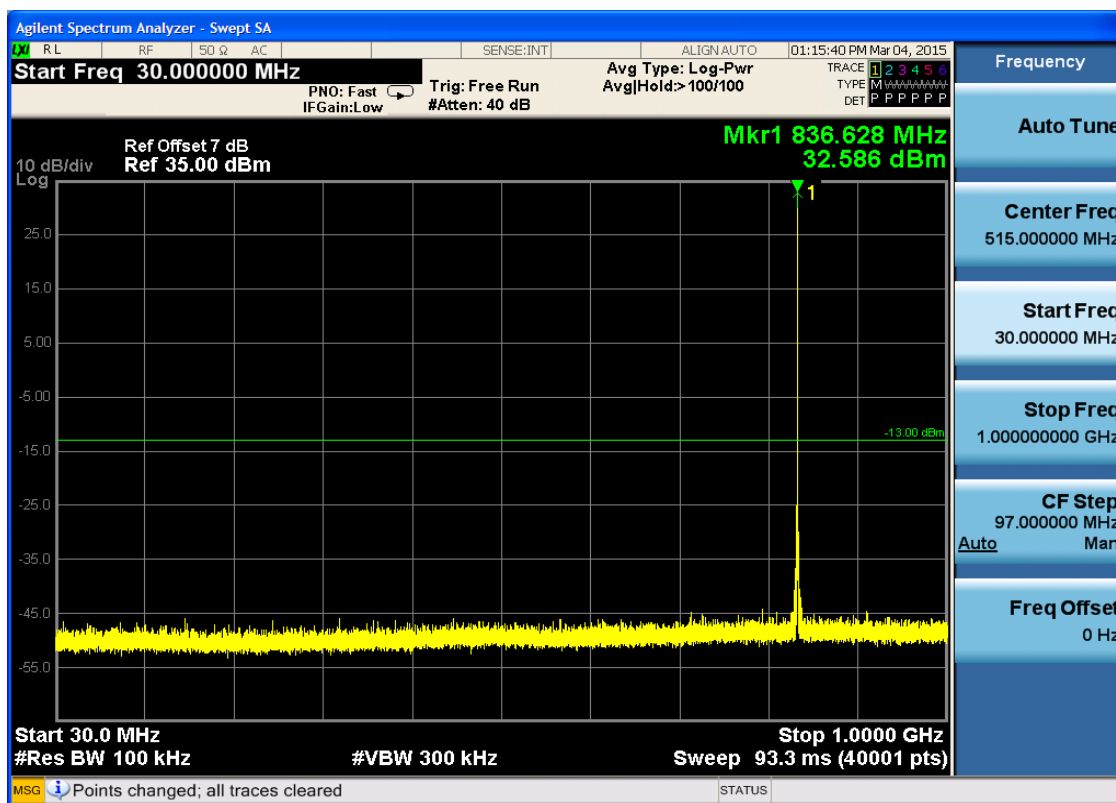
10 dB/div Ref Offset 7 dB
Log Ref 11.00 dBm

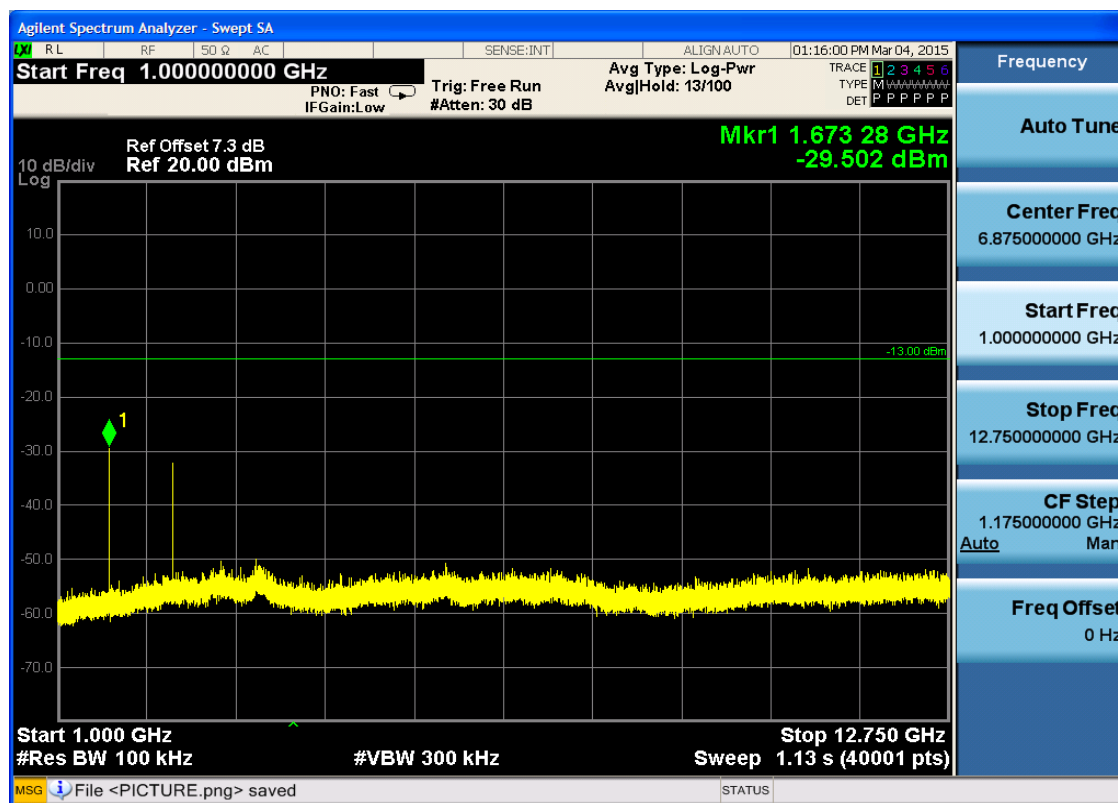
Start 9.00 kHz Stop 150.00 kHz
#Res BW 1.0 kHz #VBW 10 kHz Sweep 130 ms (1001 pts)

MSG STATUS DC Coupled

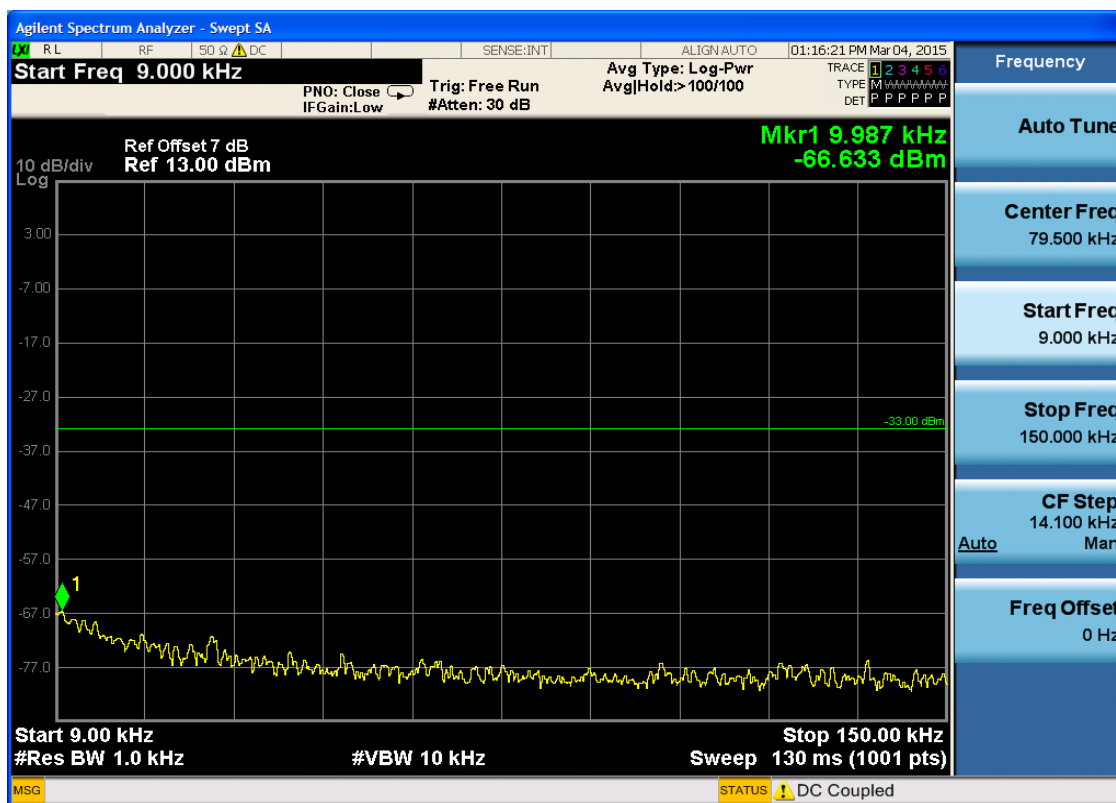
Frequency Auto Tune Center Freq 79.500 kHz Start Freq 9.000 kHz Stop Freq 150.00 kHz CF Step 14.100 kHz Auto Man Freq Offset 0 Hz

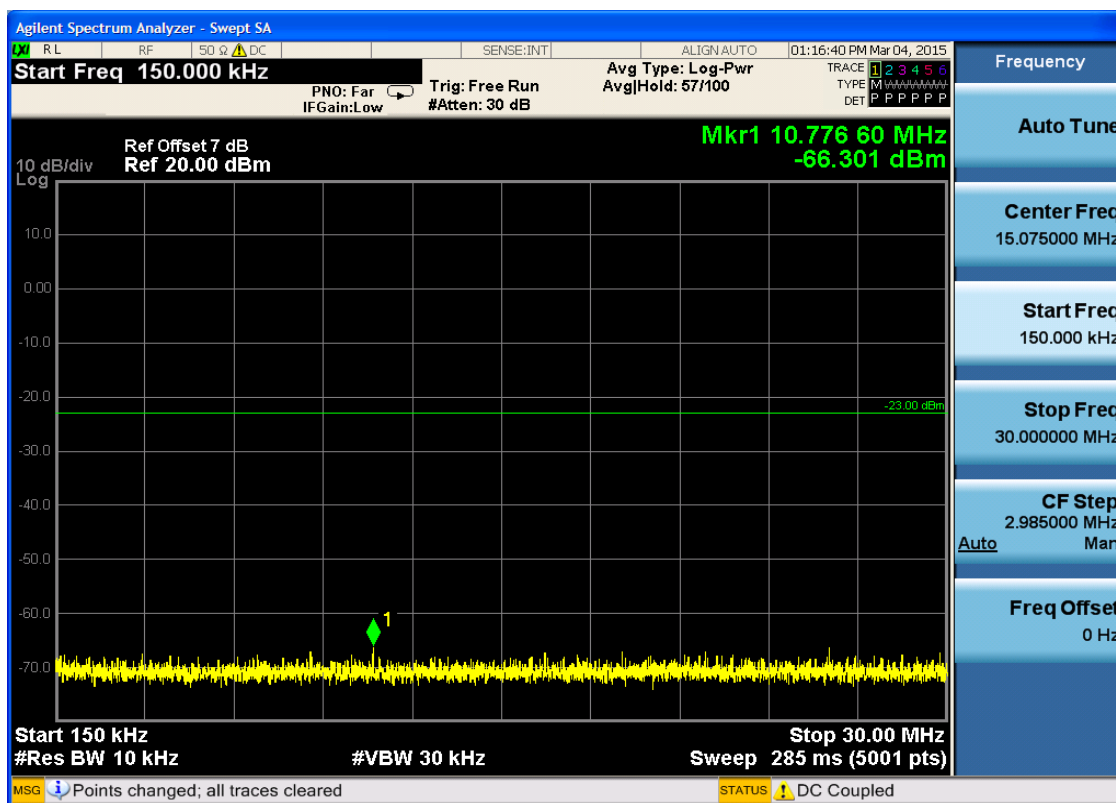


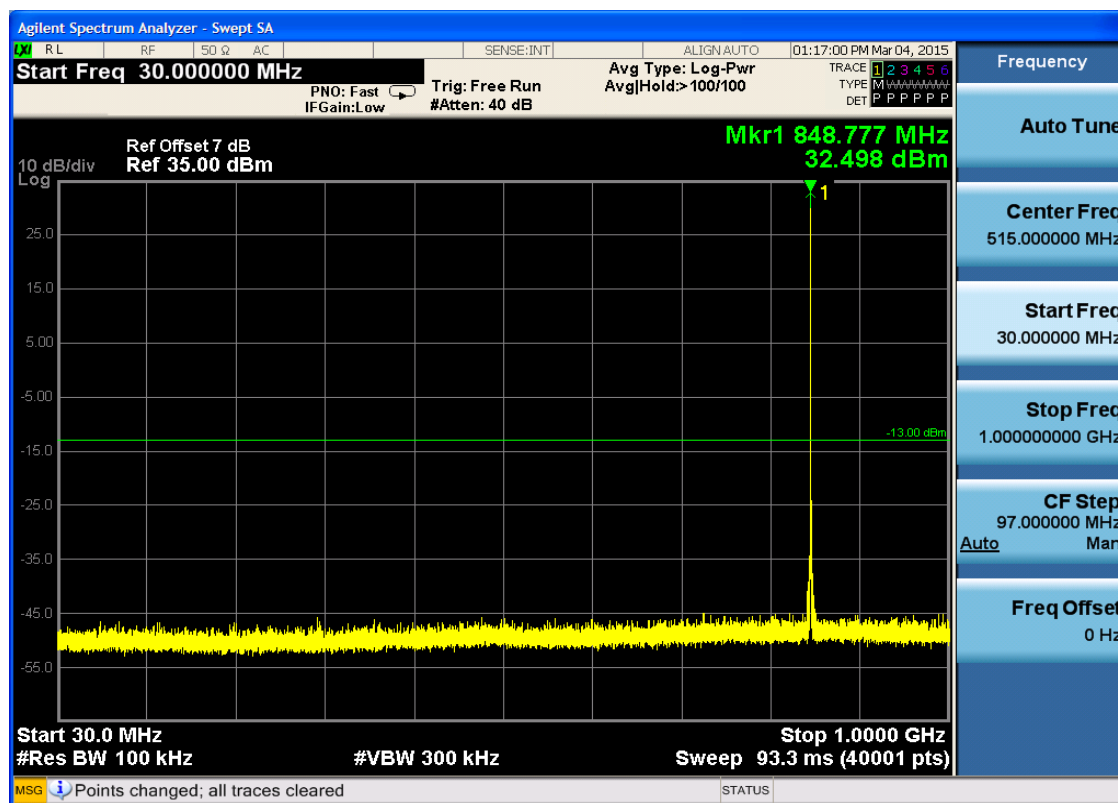


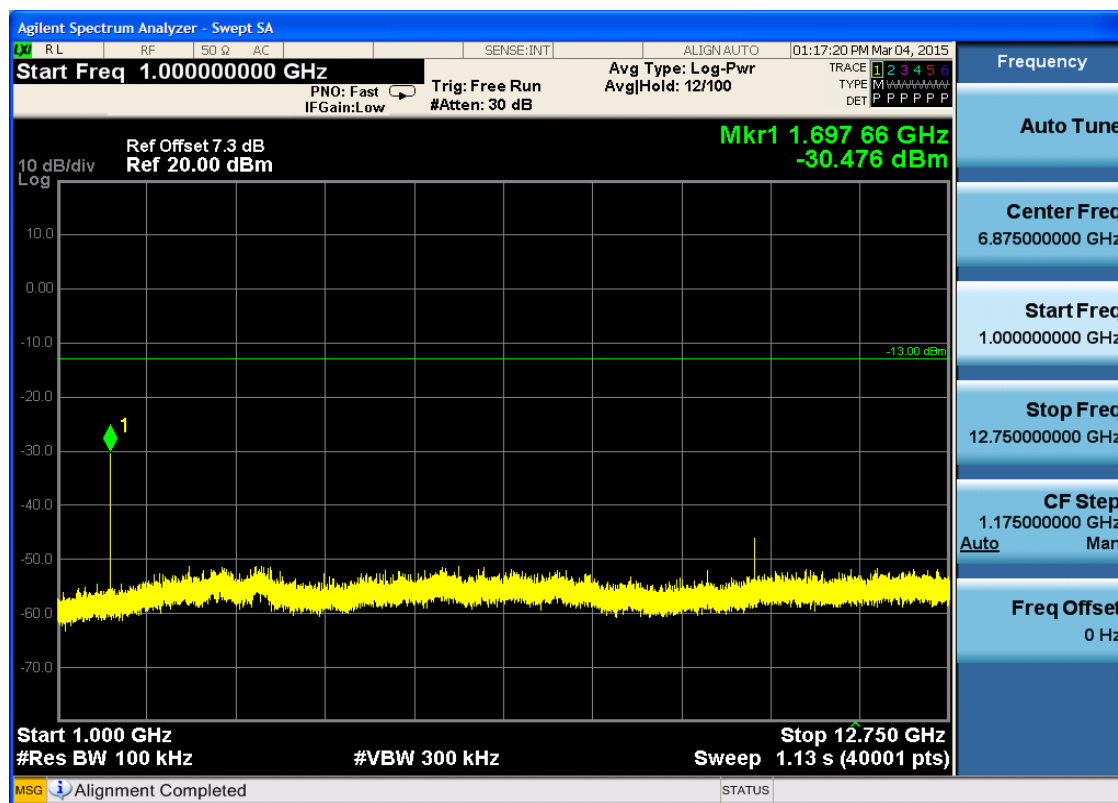


6.1.1.1.3 Test Channel = HCH



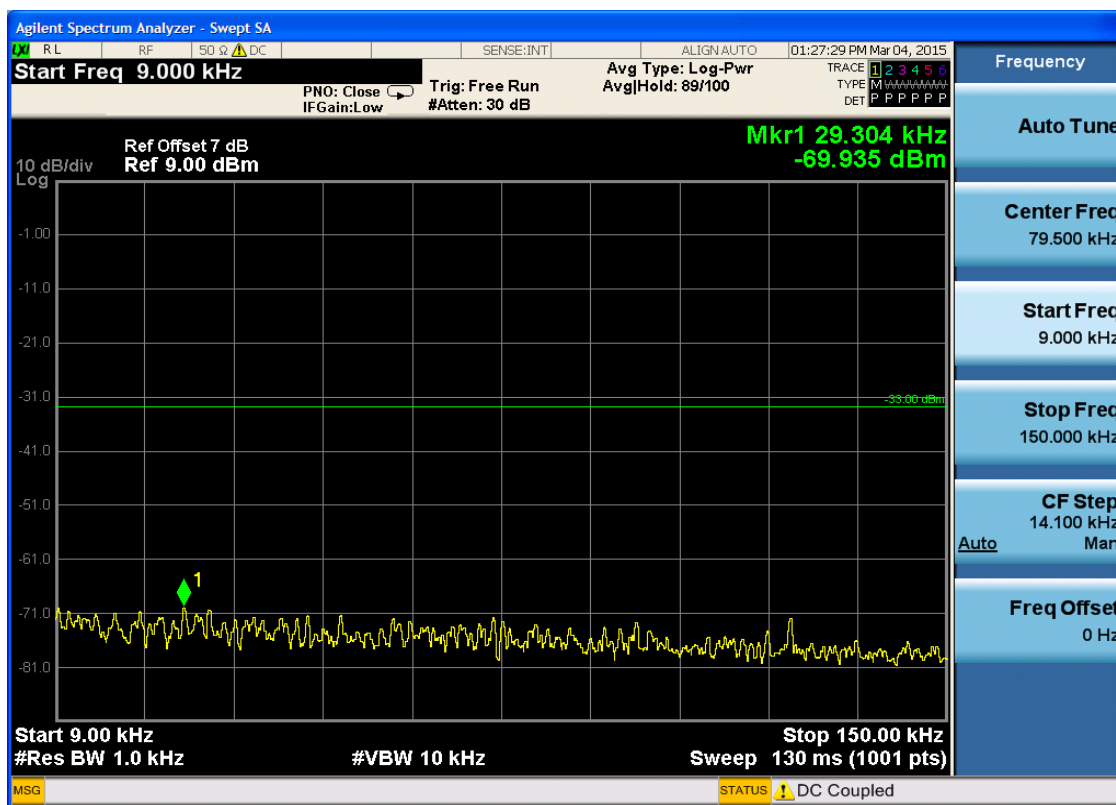


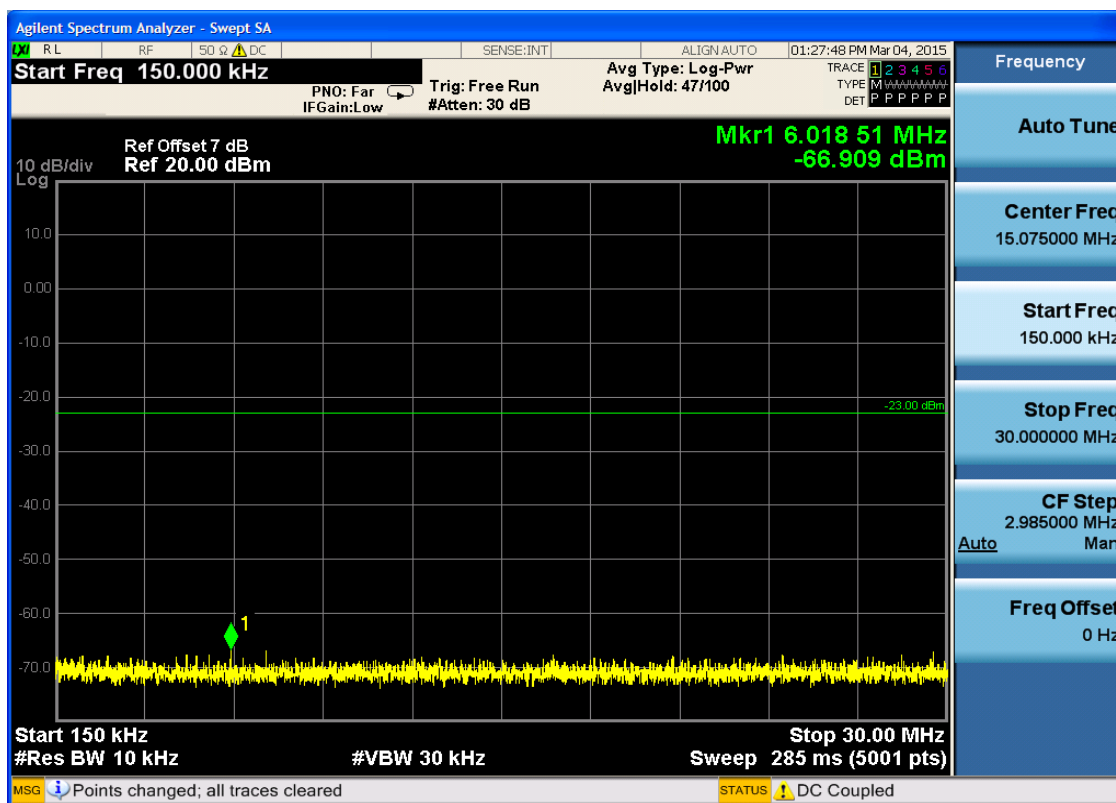


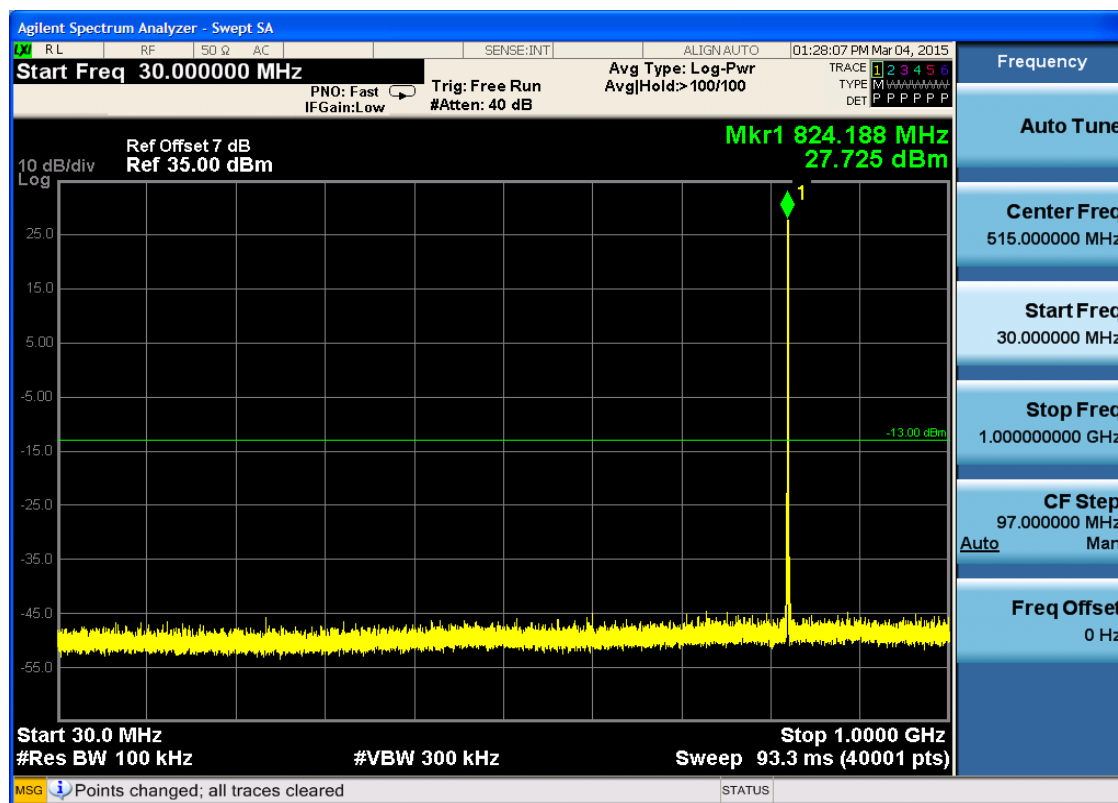


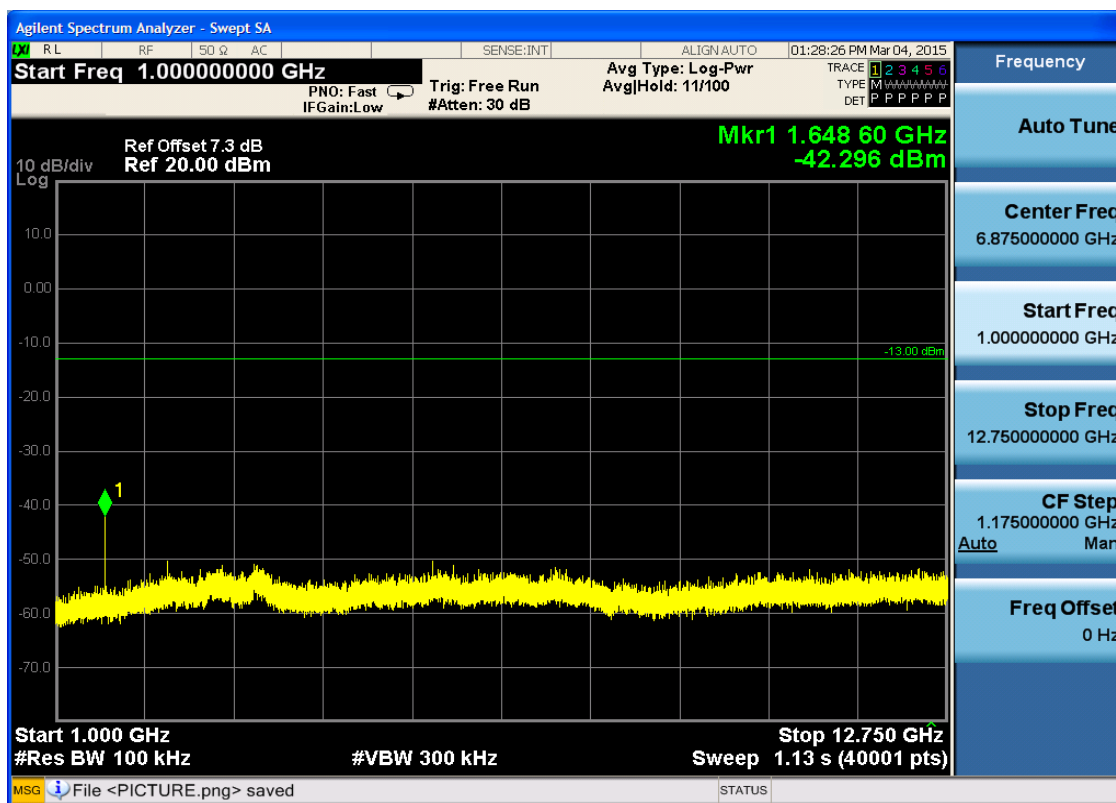
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH

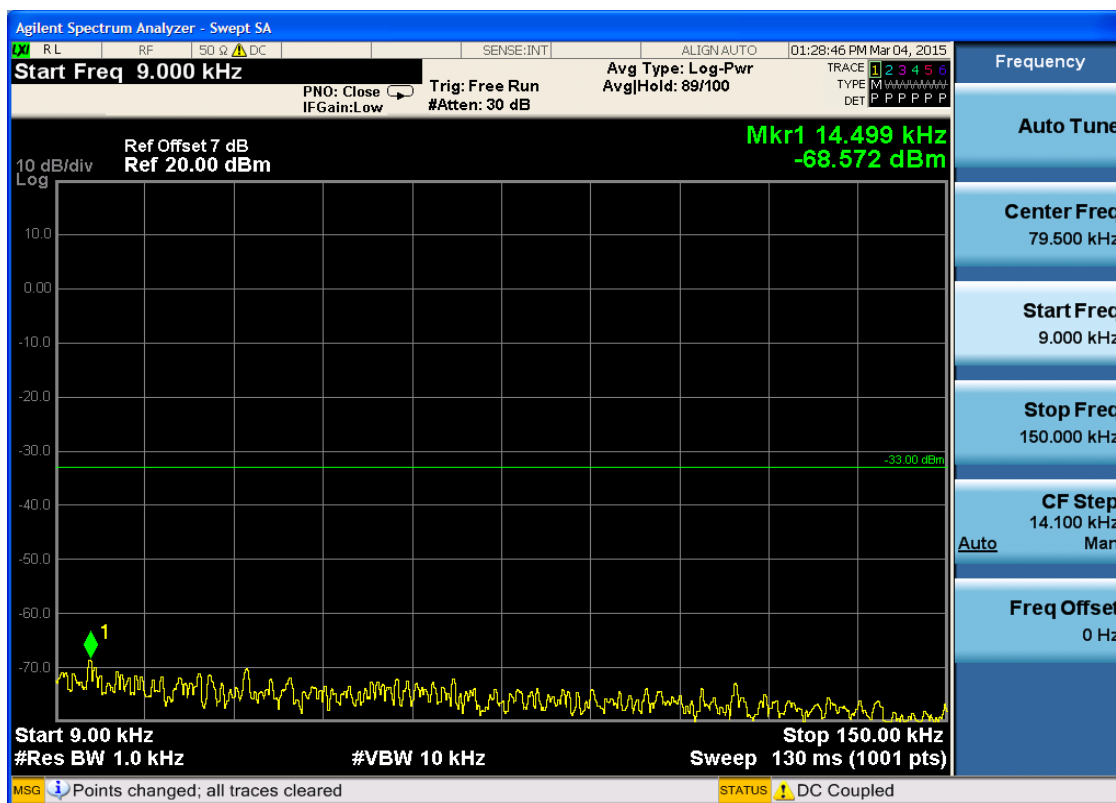


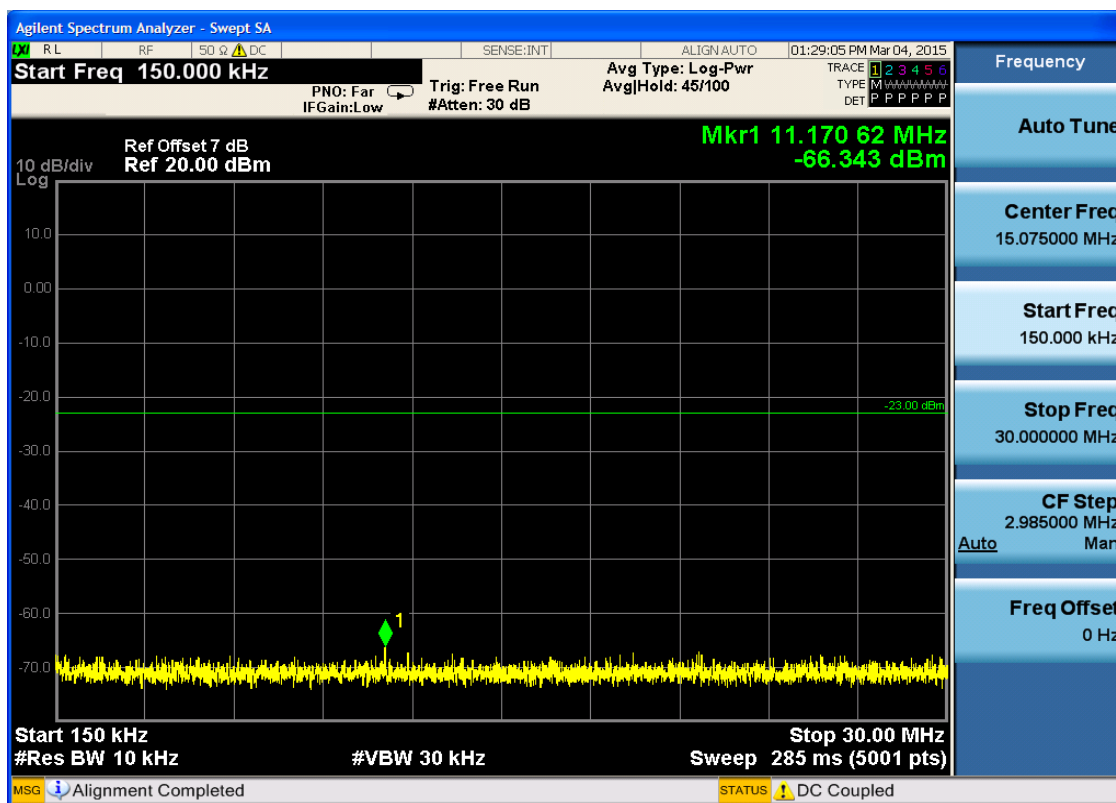


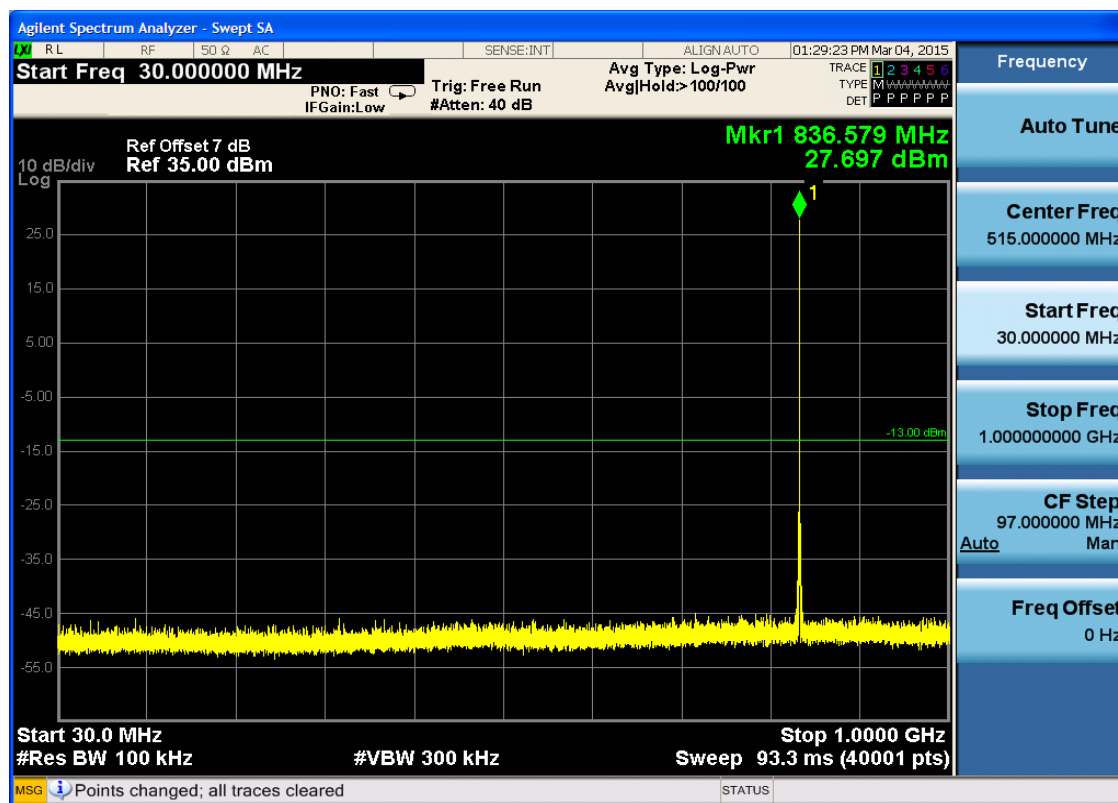


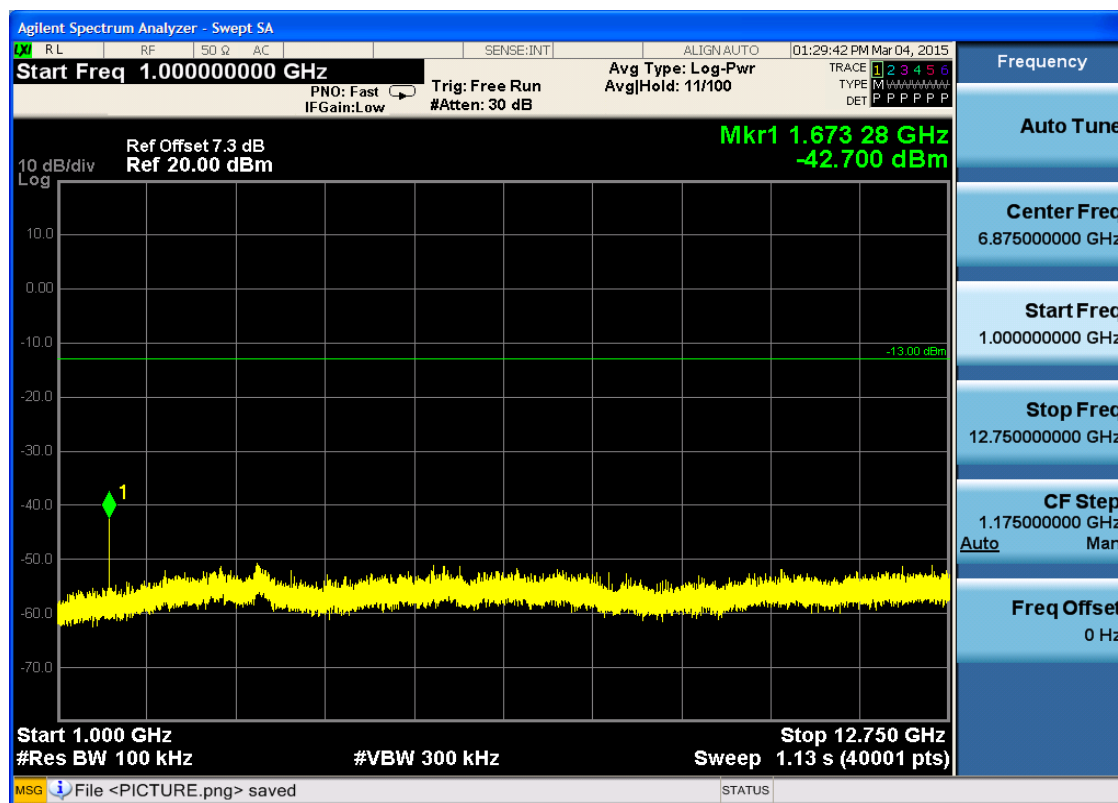


6.1.1.2.2 Test Channel = MCH

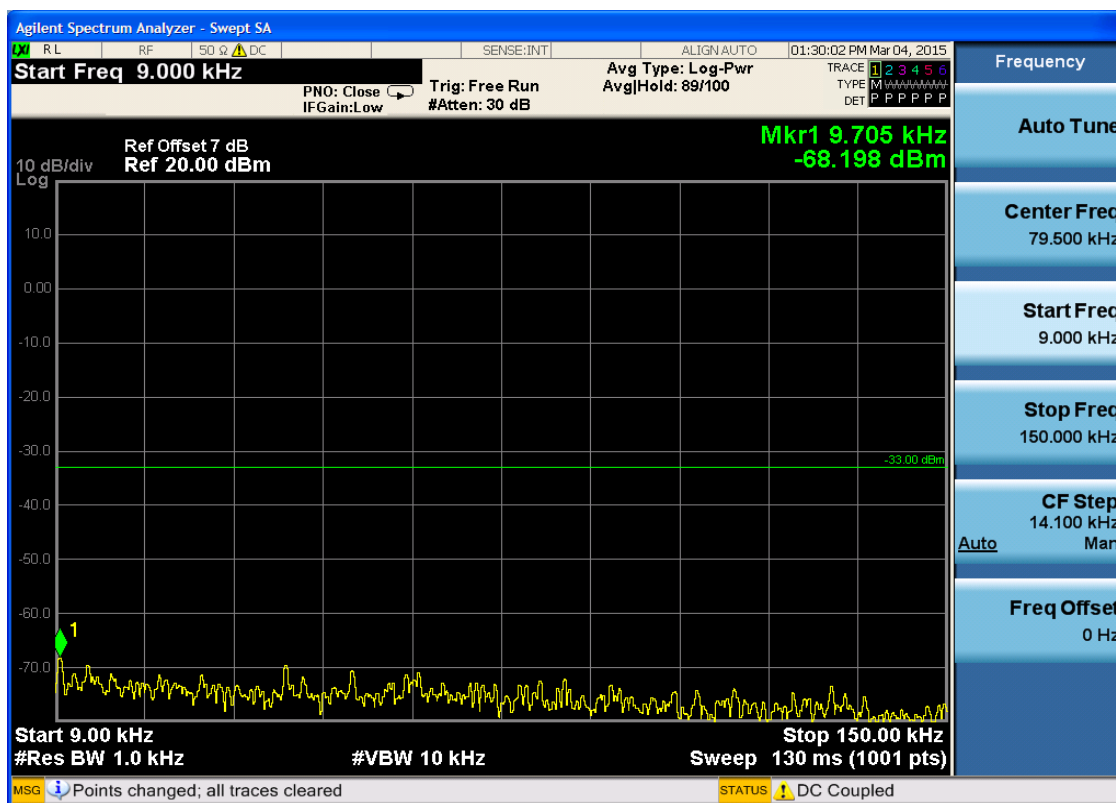


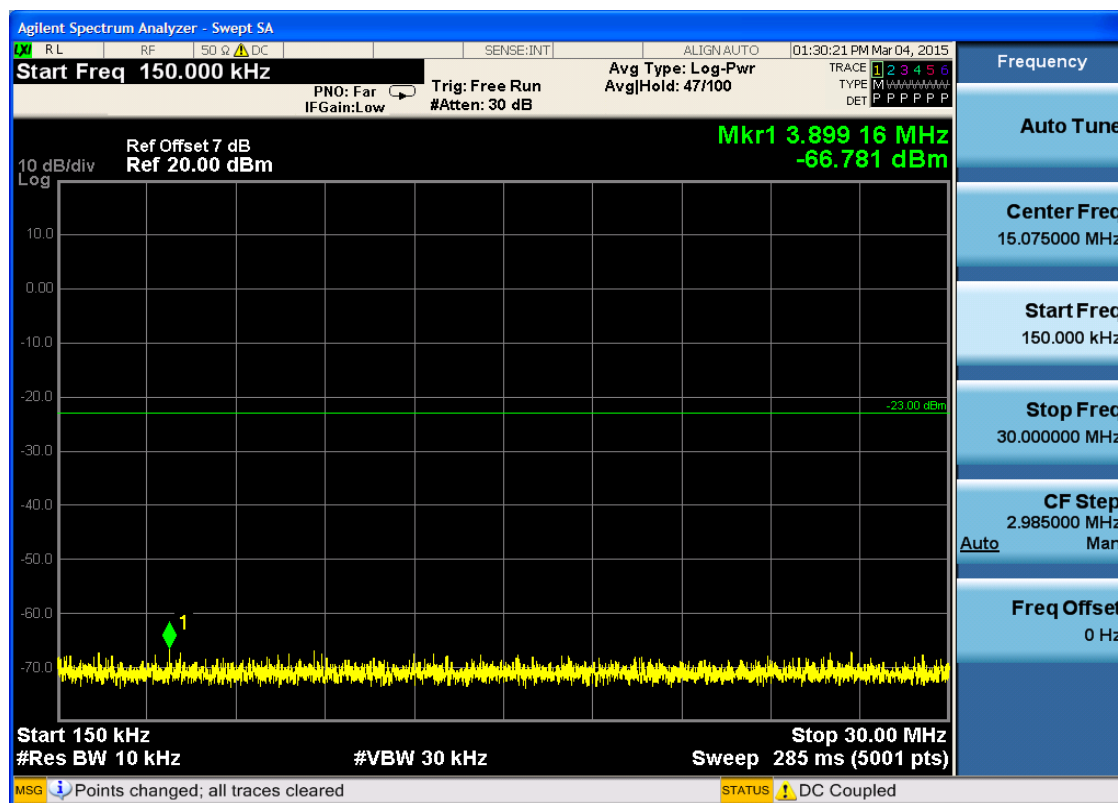


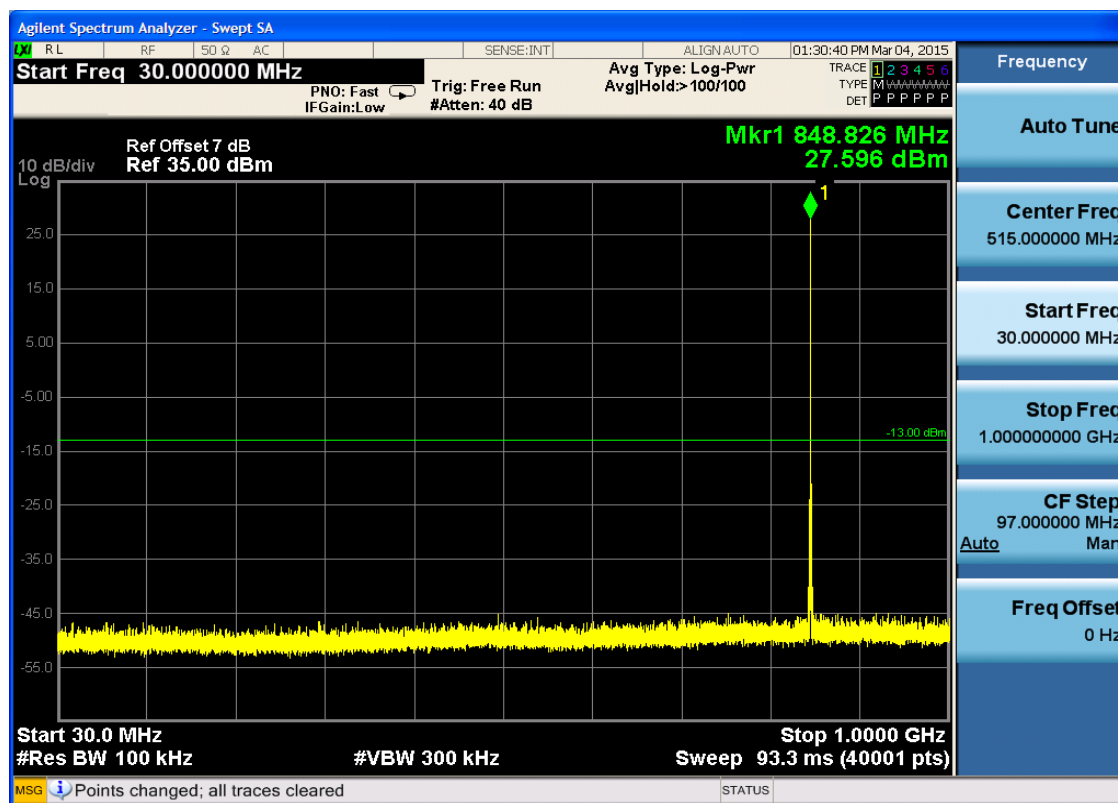


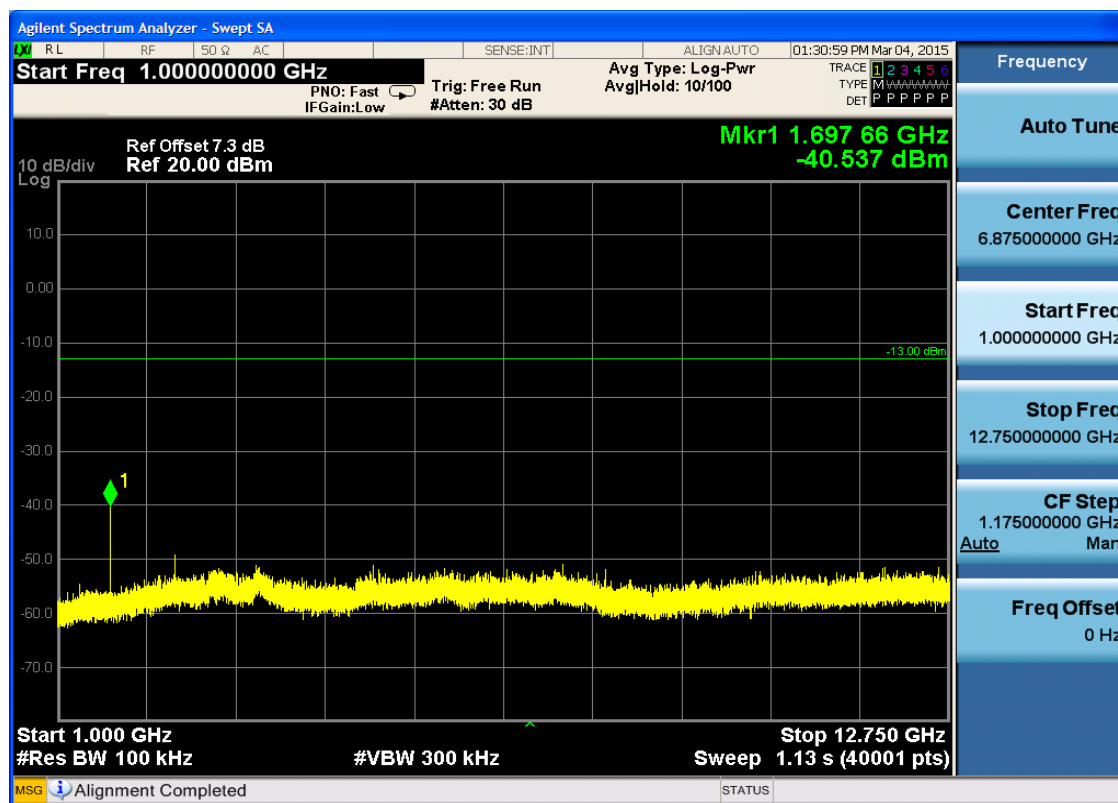


6.1.1.2.3 Test Channel = HCH





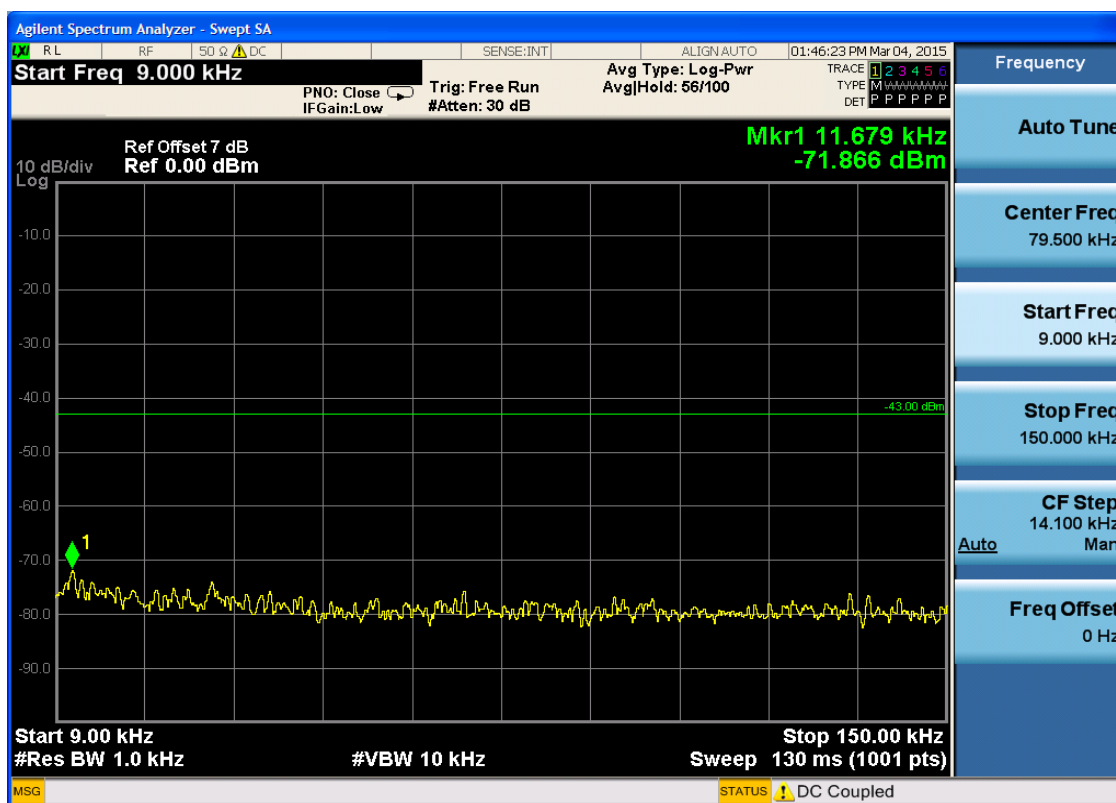


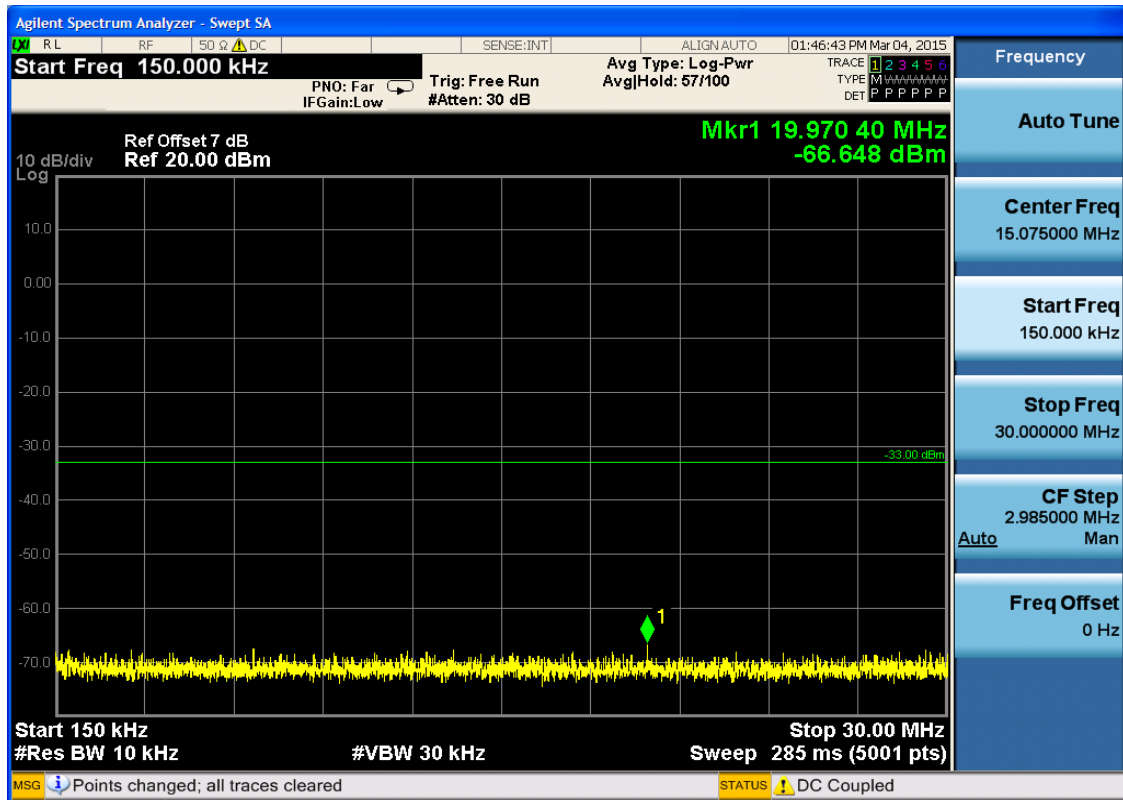


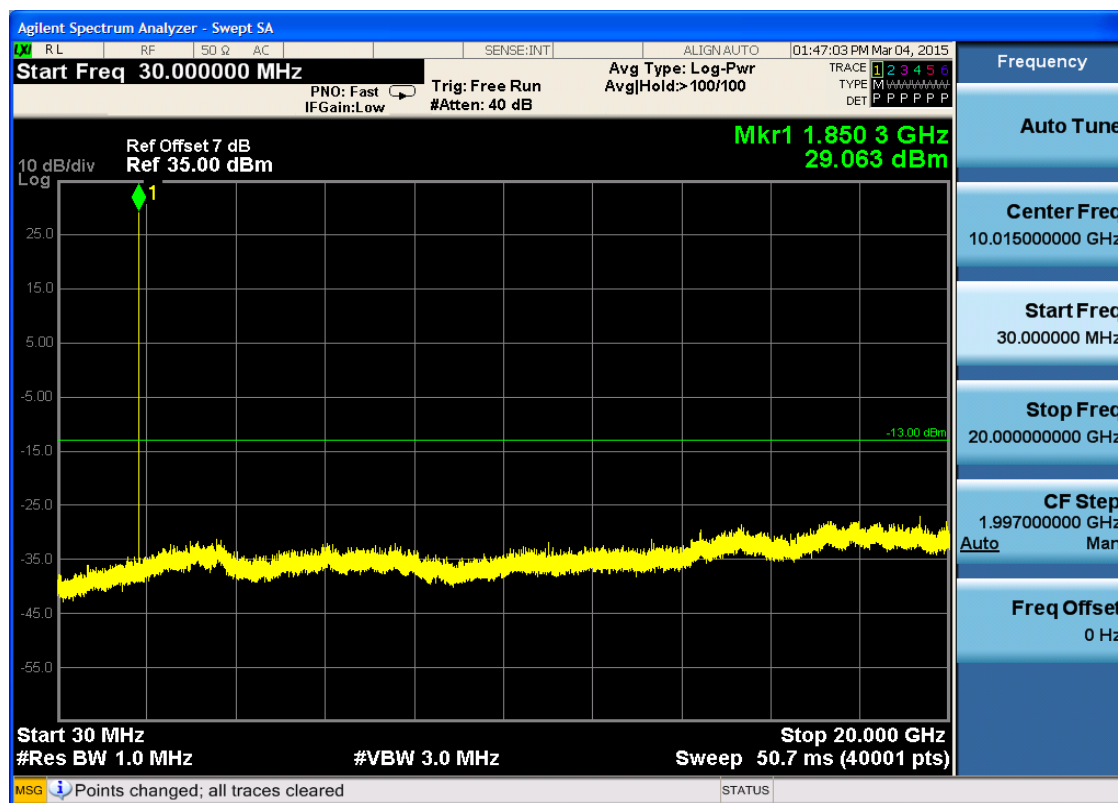
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

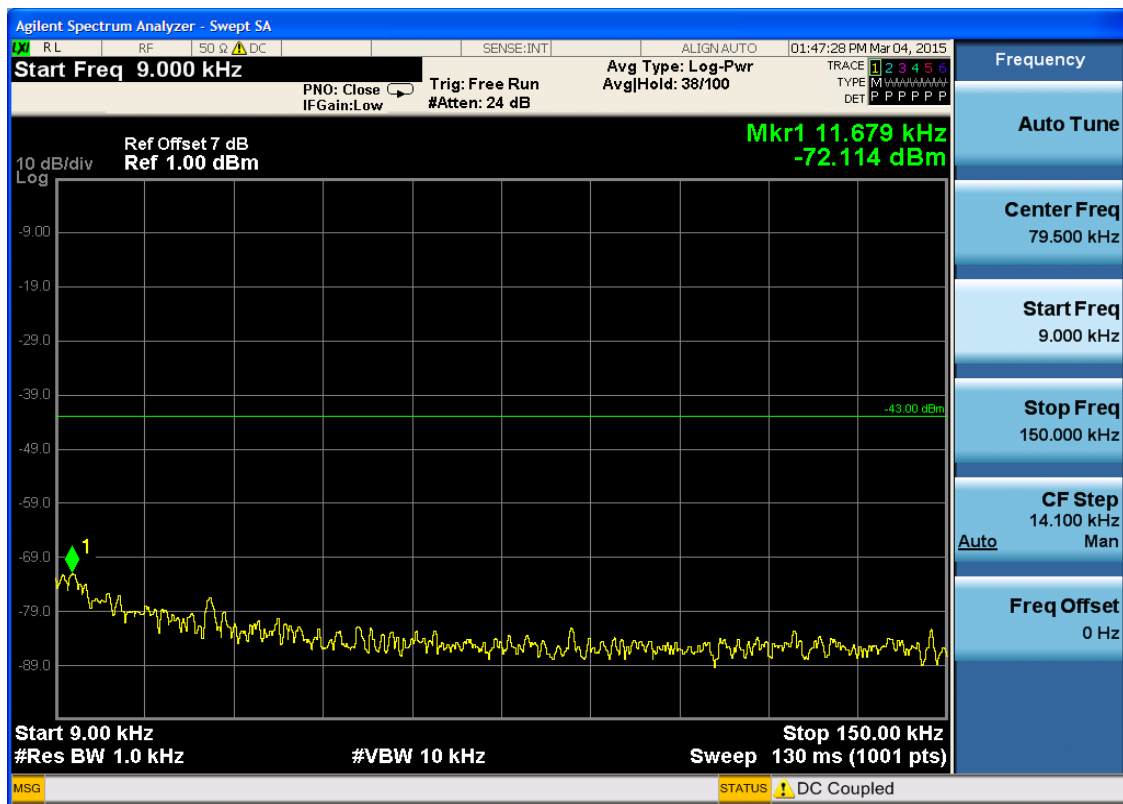
6.1.2.1.1 Test Channel = LCH

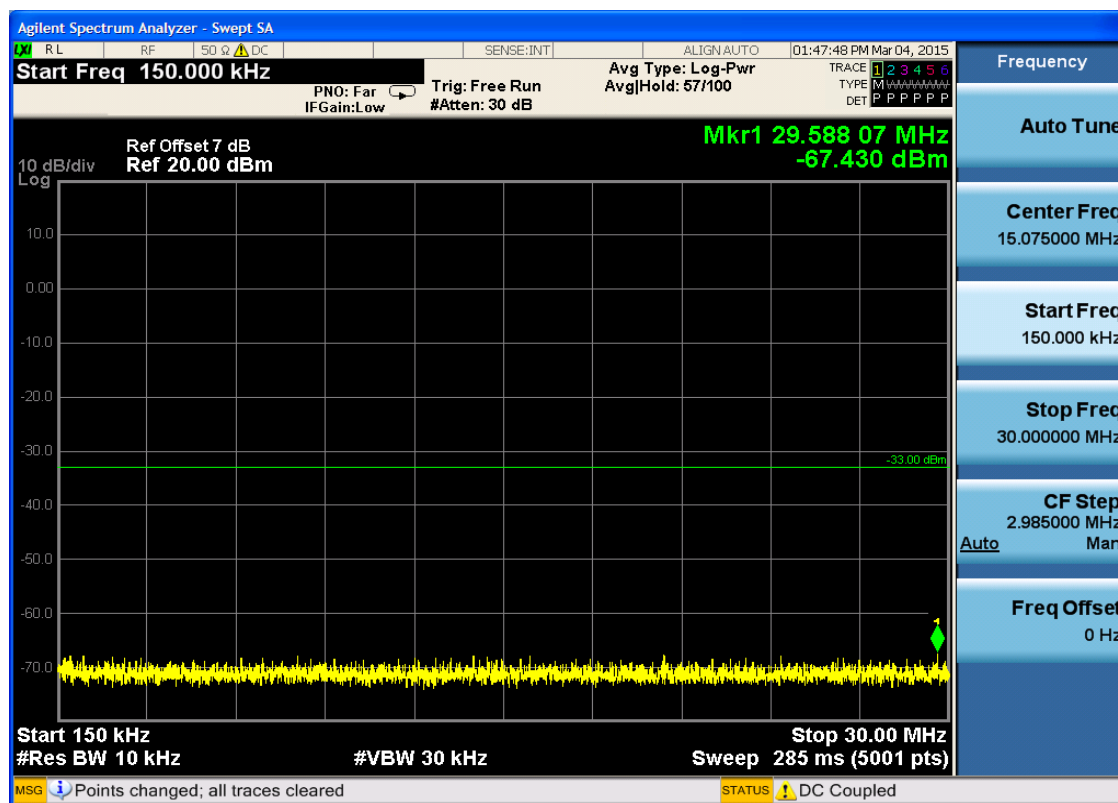


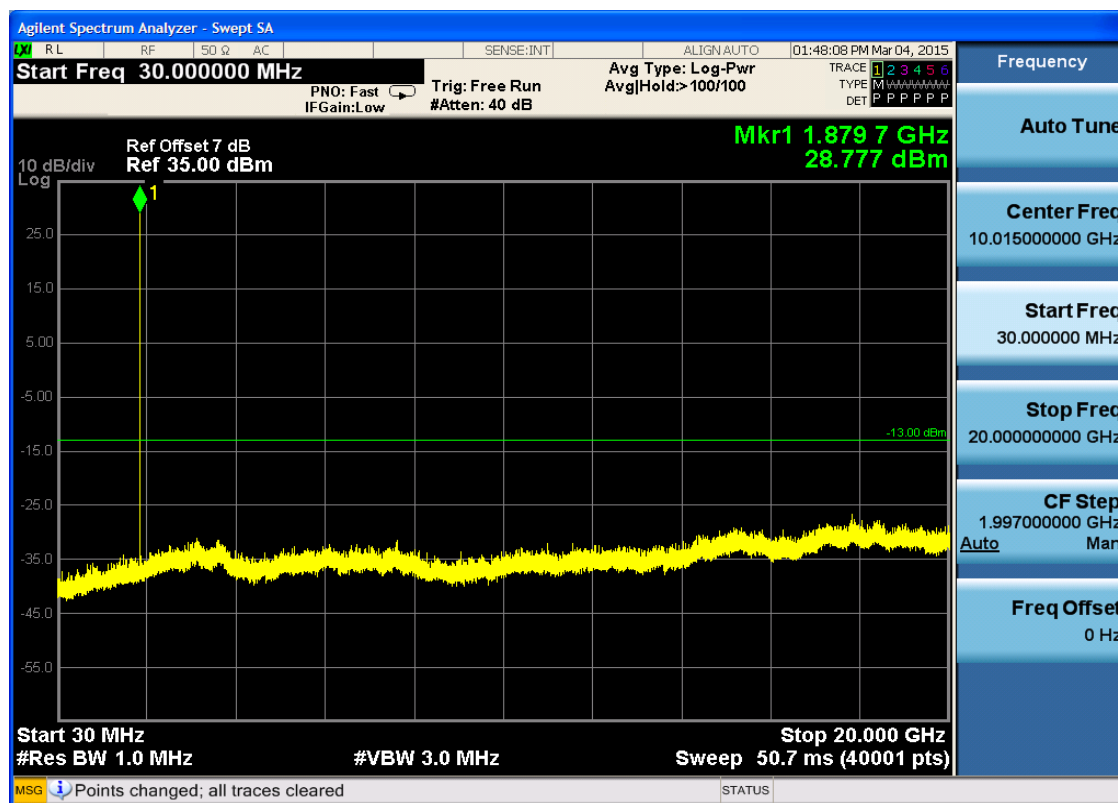




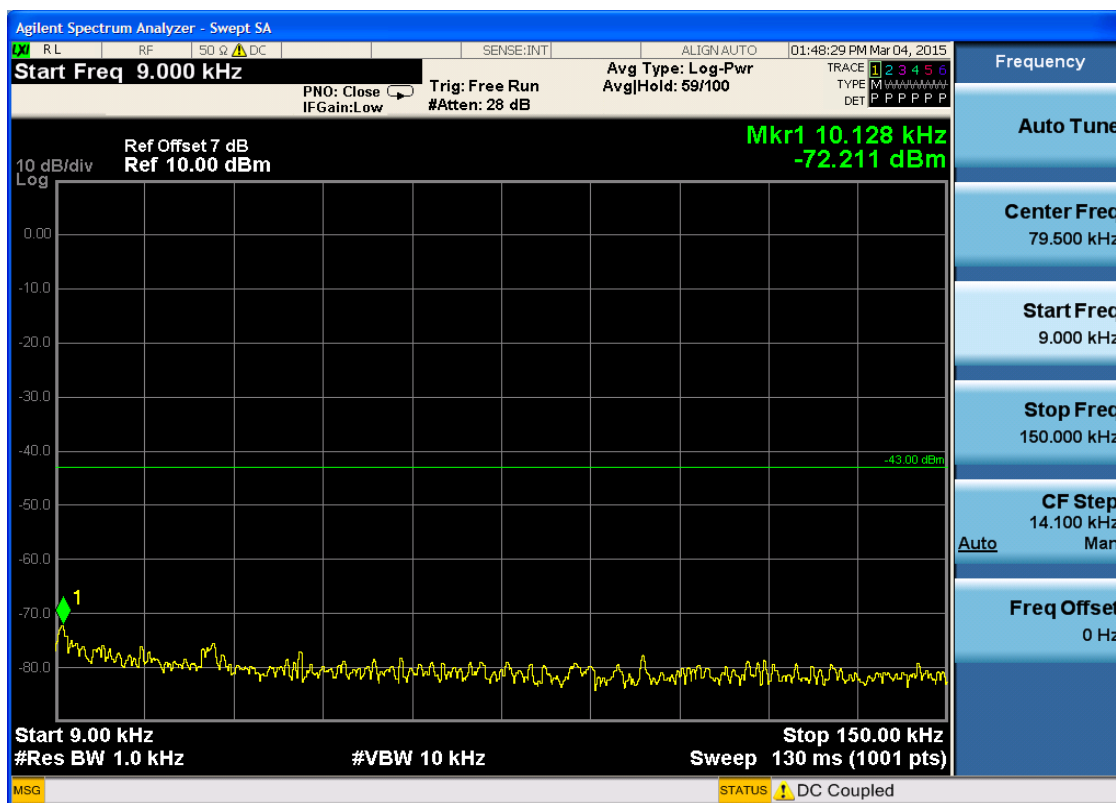
6.1.2.1.2 Test Channel = MCH

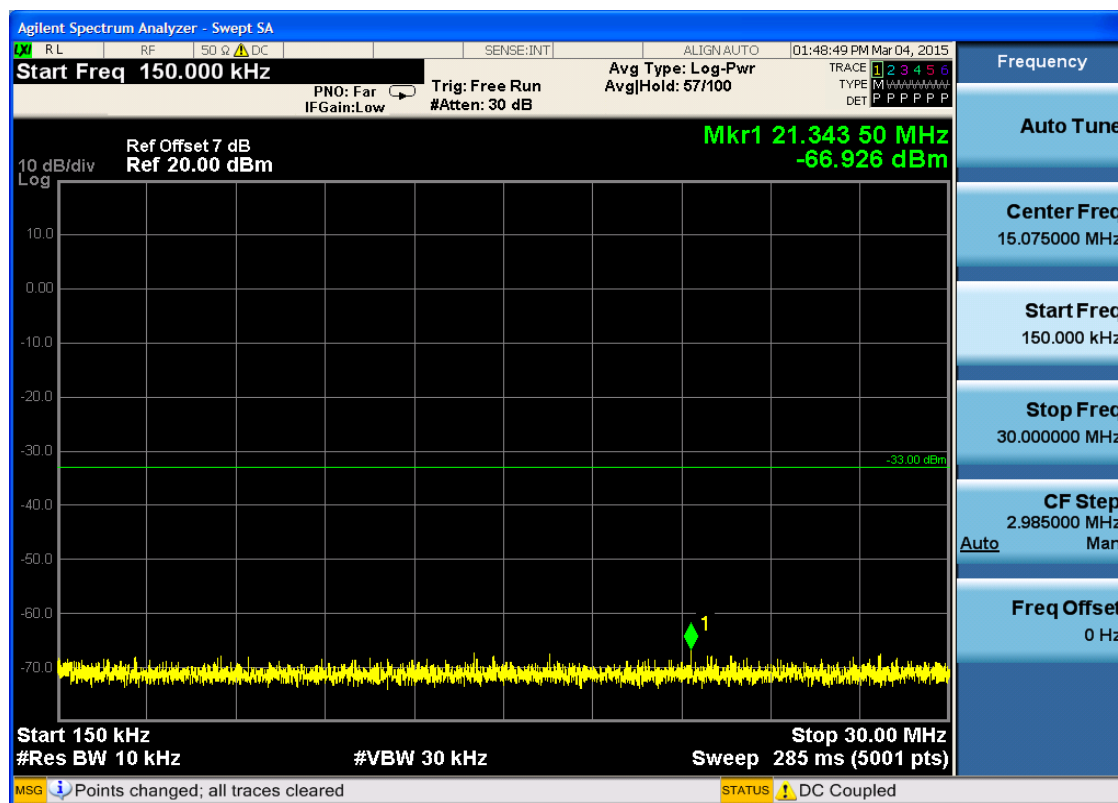


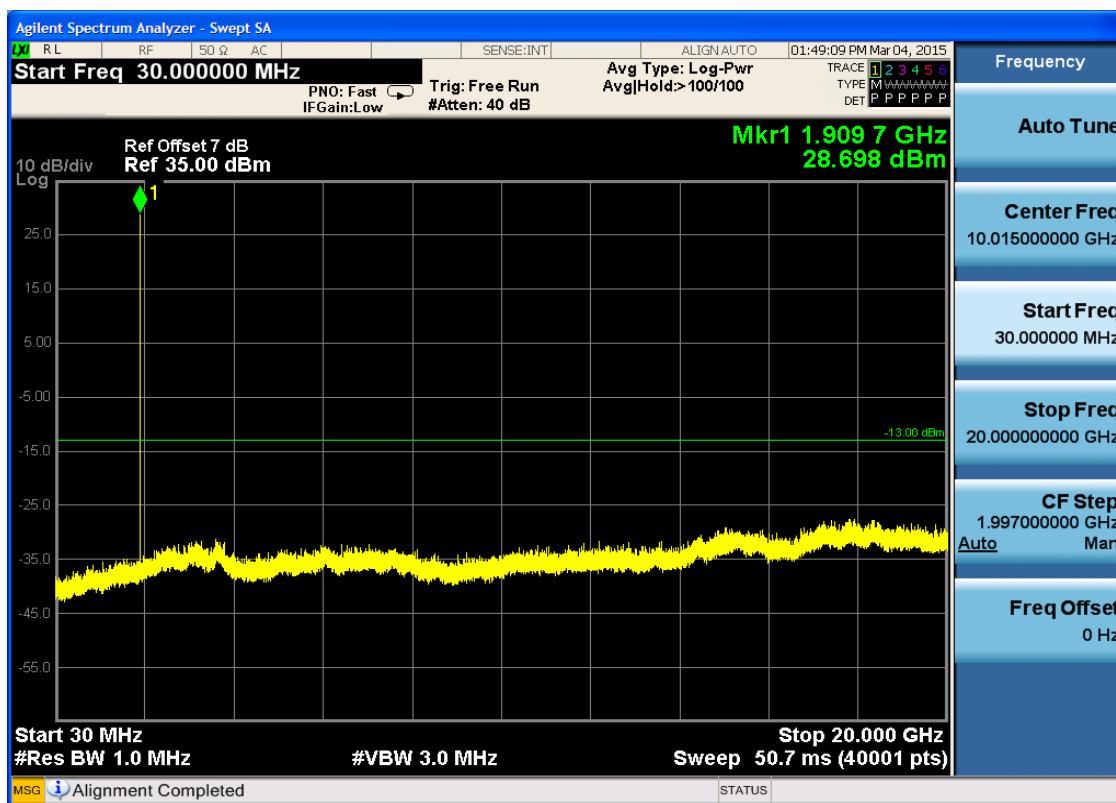




6.1.2.1.3 Test Channel = HCH

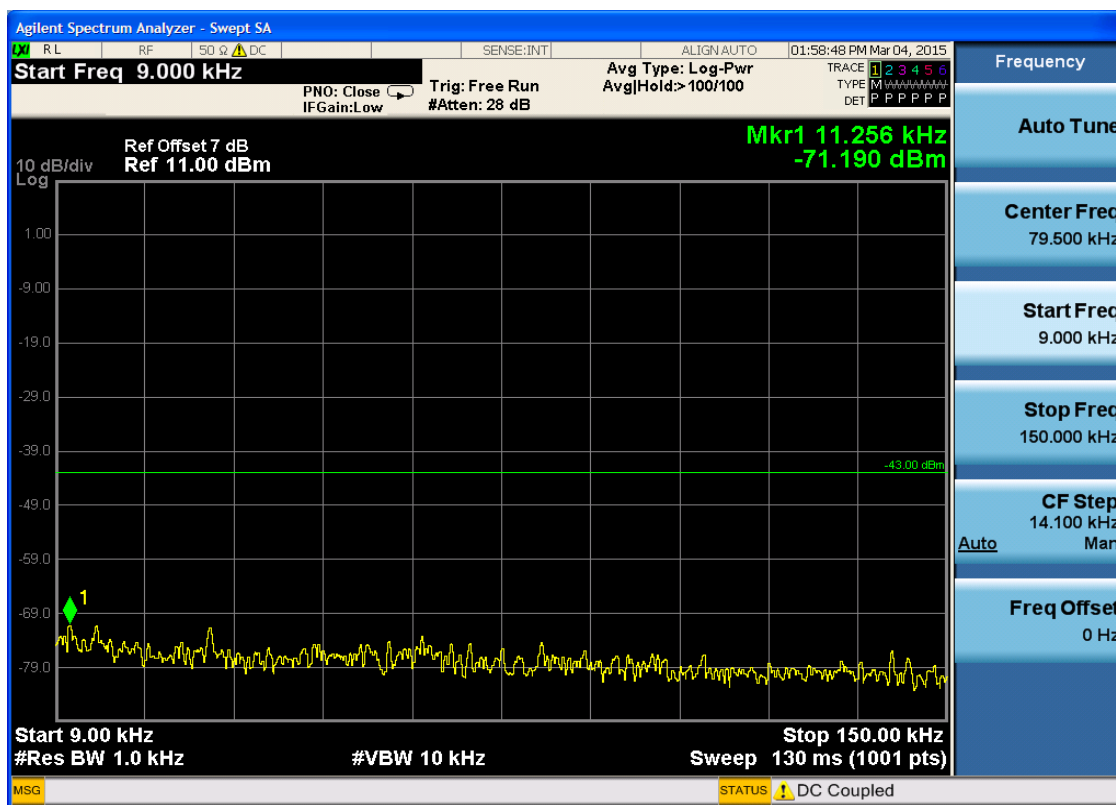


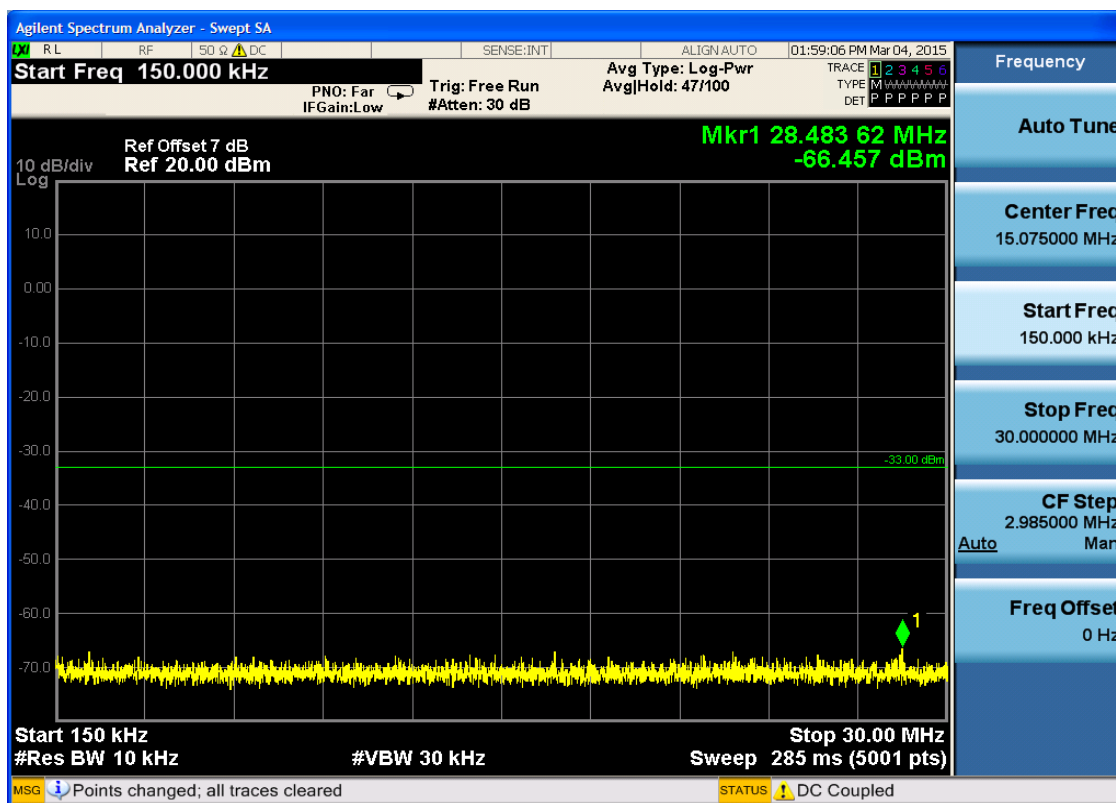


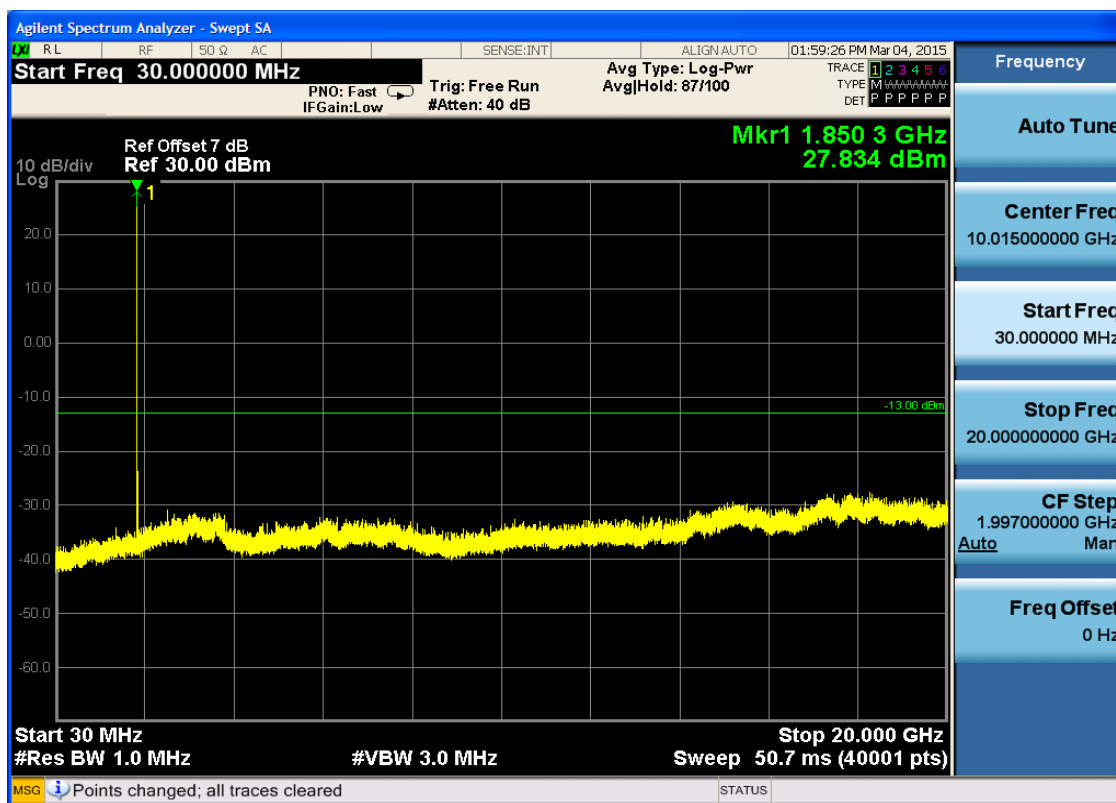


6.1.2.2 Test Mode = GSM/TM2

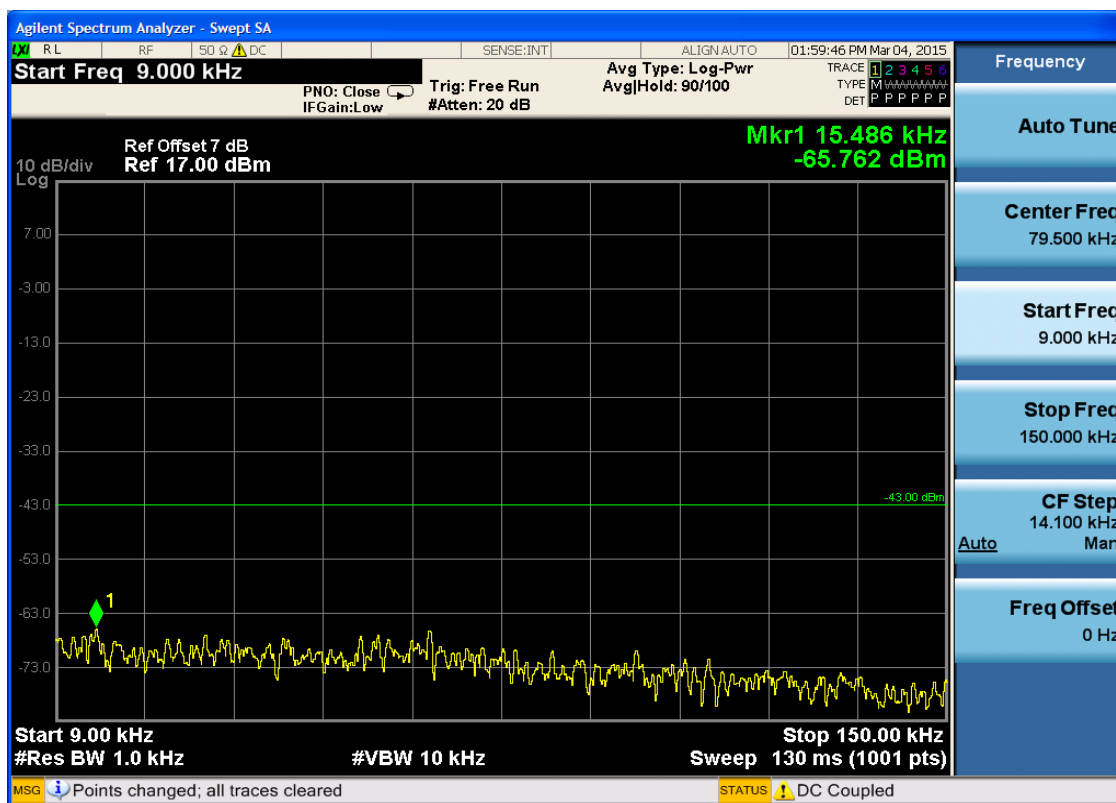
6.1.2.2.1 Test Channel = LCH

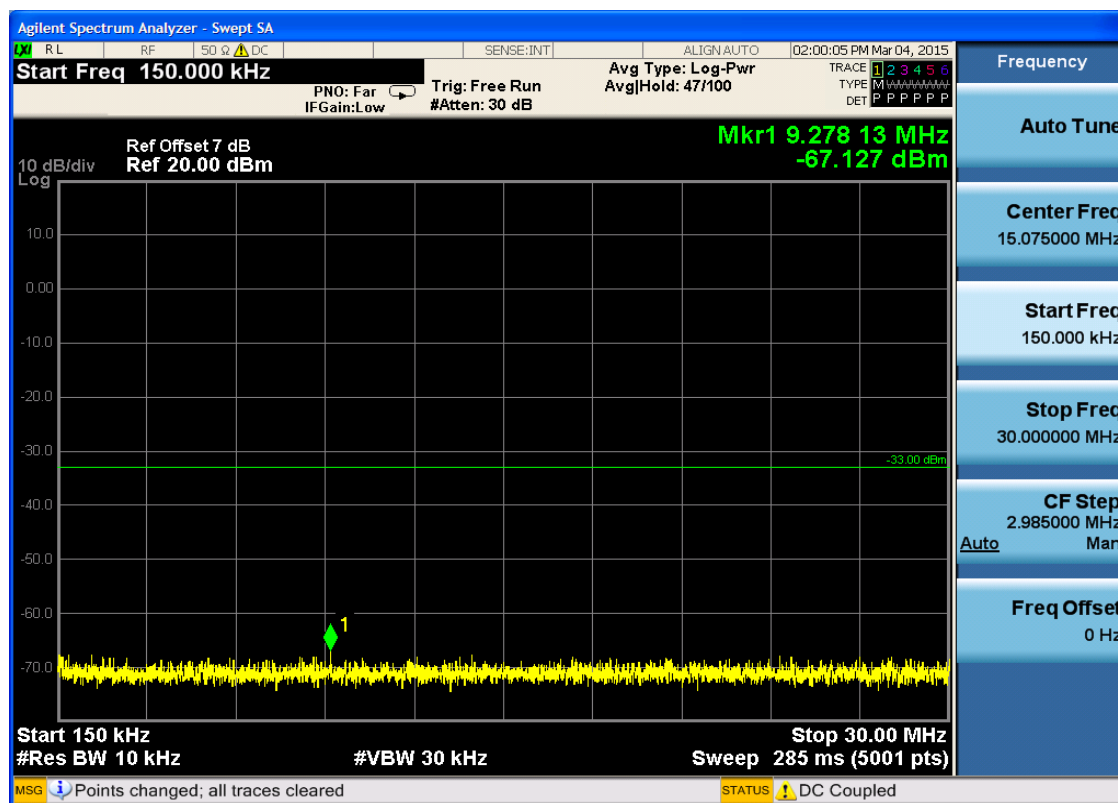


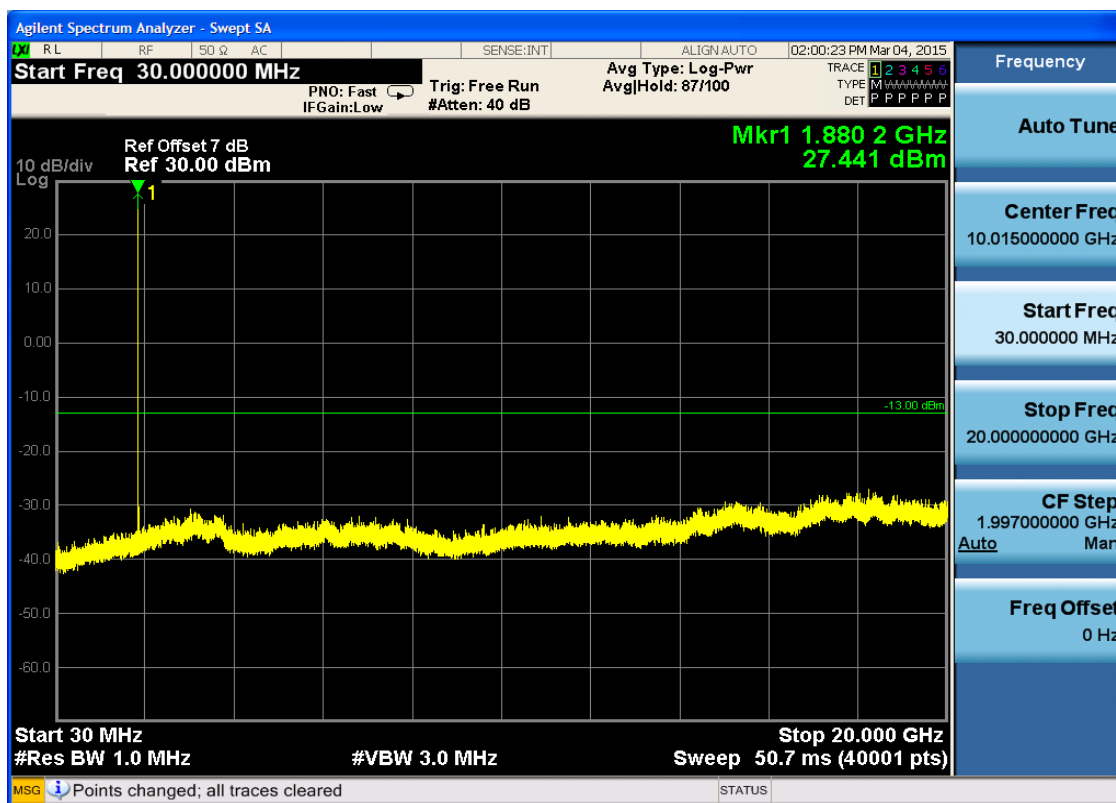




6.1.2.2.2 Test Channel = MCH









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Start Freq 9.000 kHz

Ref Offset 7 dB
Ref 17.00 dBm

10 dB/div
Log

7.00
-3.00
-13.0
-23.0
-33.0
-43.0
-53.0
-63.0
-73.0

Mkr1 18.306 kHz
-65.561 dBm

-43.00 dBm

Start 9.00 kHz
#Res BW 1.0 kHz

#VBW 10 kHz

Stop 150.00 kHz
Sweep 130 ms (1001 pts)

MSG Points changed; all traces cleared

STATUS DC Coupled

Frequency

Auto Tune

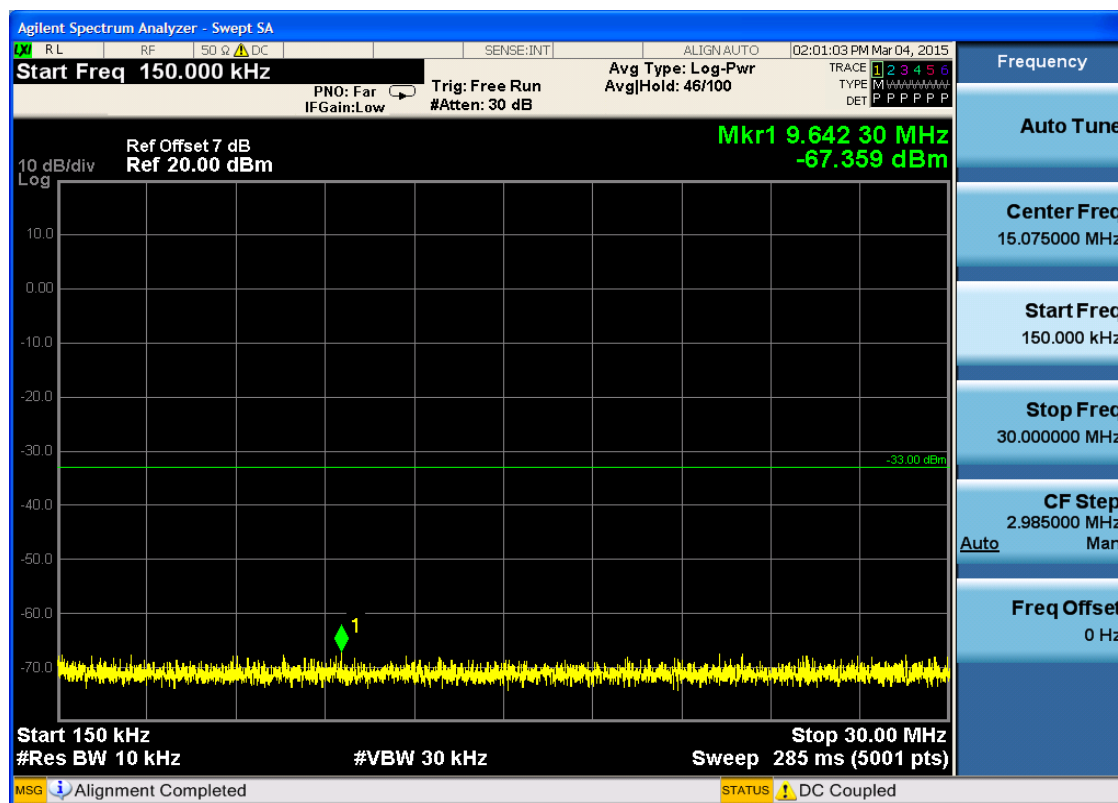
Center Freq
79.500 kHz

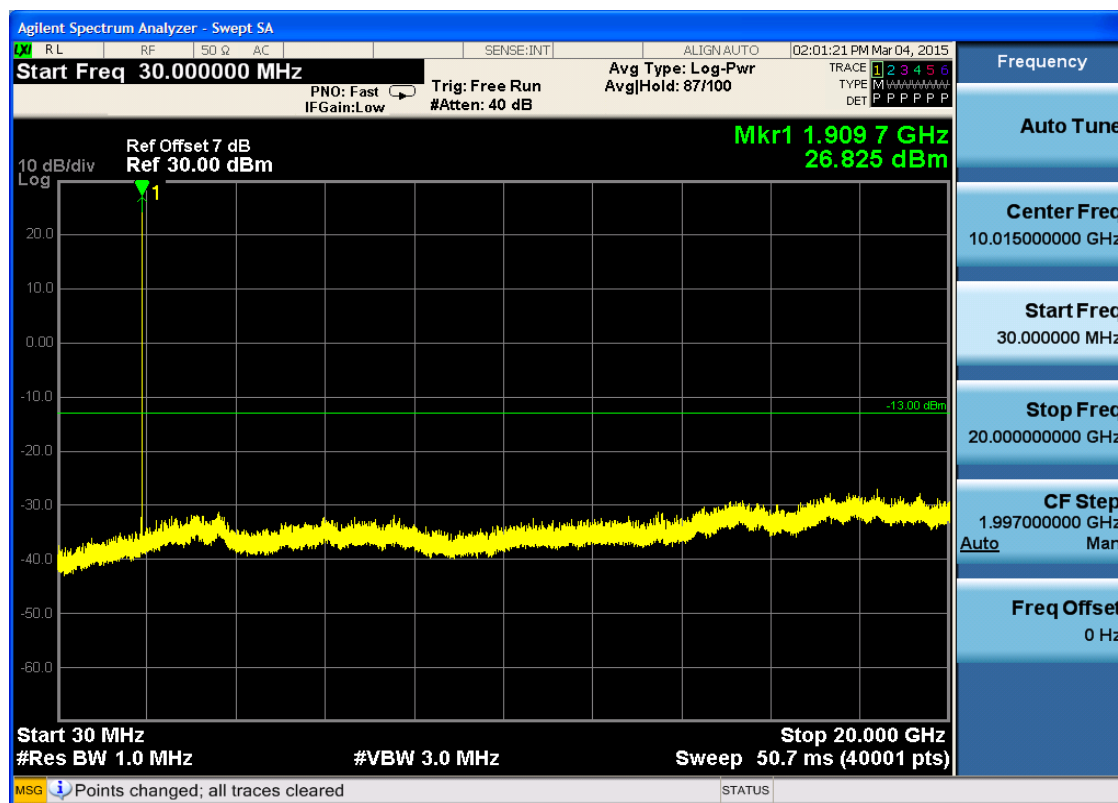
Start Freq
9.000 kHz

Stop Freq
150.000 kHz

CF Step
14.100 kHz
Man

Freq Offset
0 Hz





7Appendix_G: Field Strength of Spurious Radiation

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

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

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

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

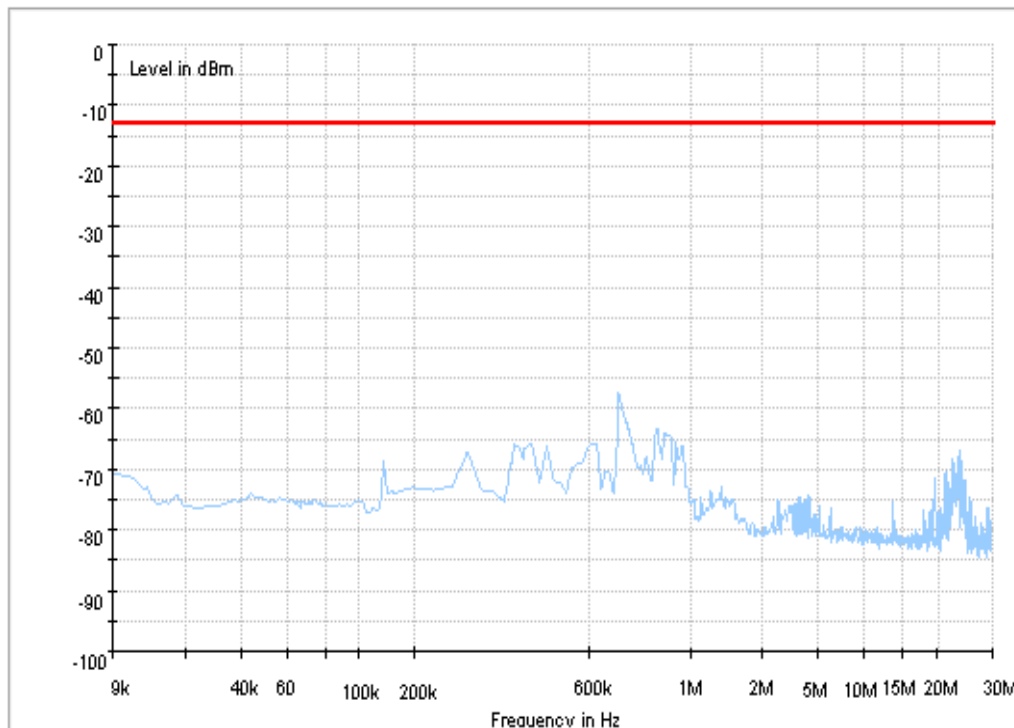
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

Part I - Test Plots

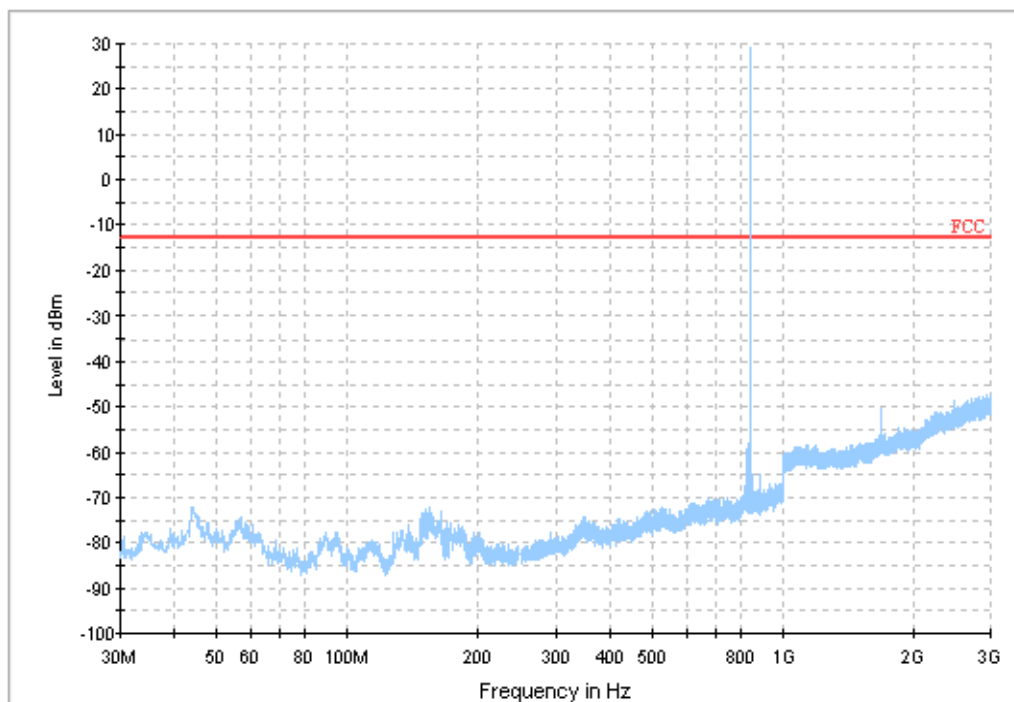
7.1 For GSM

7.1.1 Test Band = GSM850

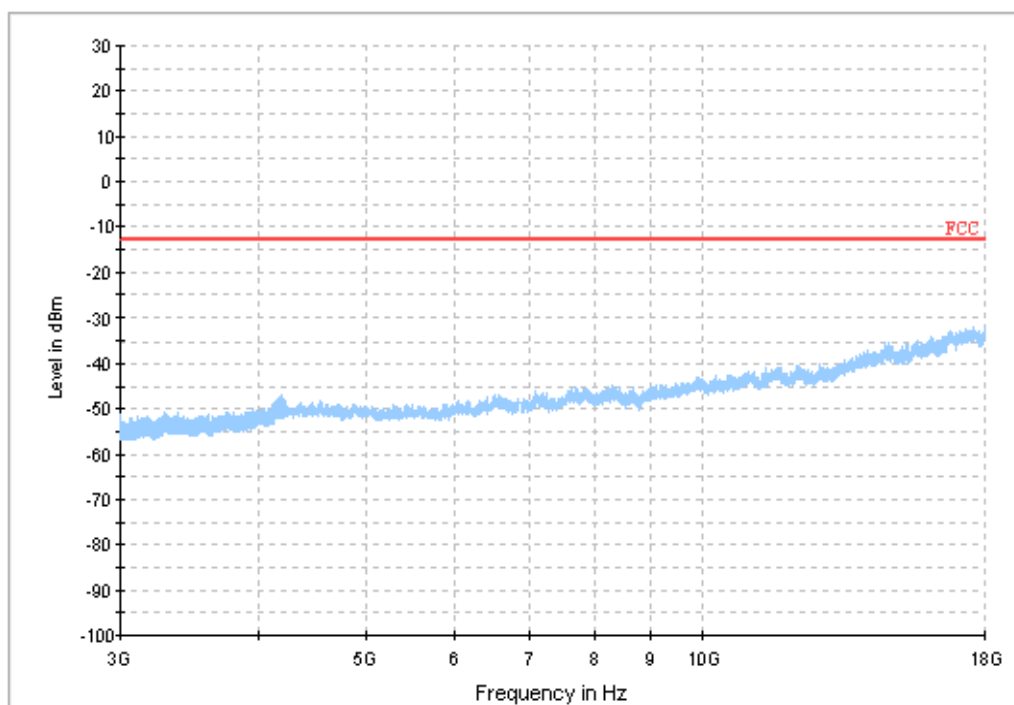
7.1.1.1 Test Mode = GSM/TM1



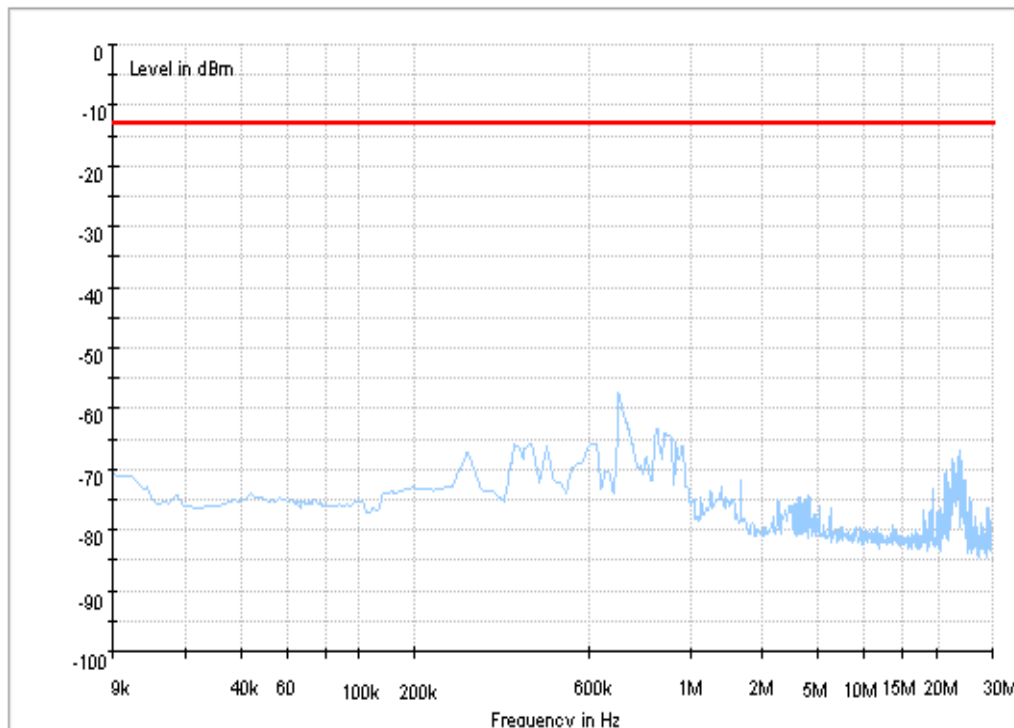
Copy of FCC PART22 GSM850_L



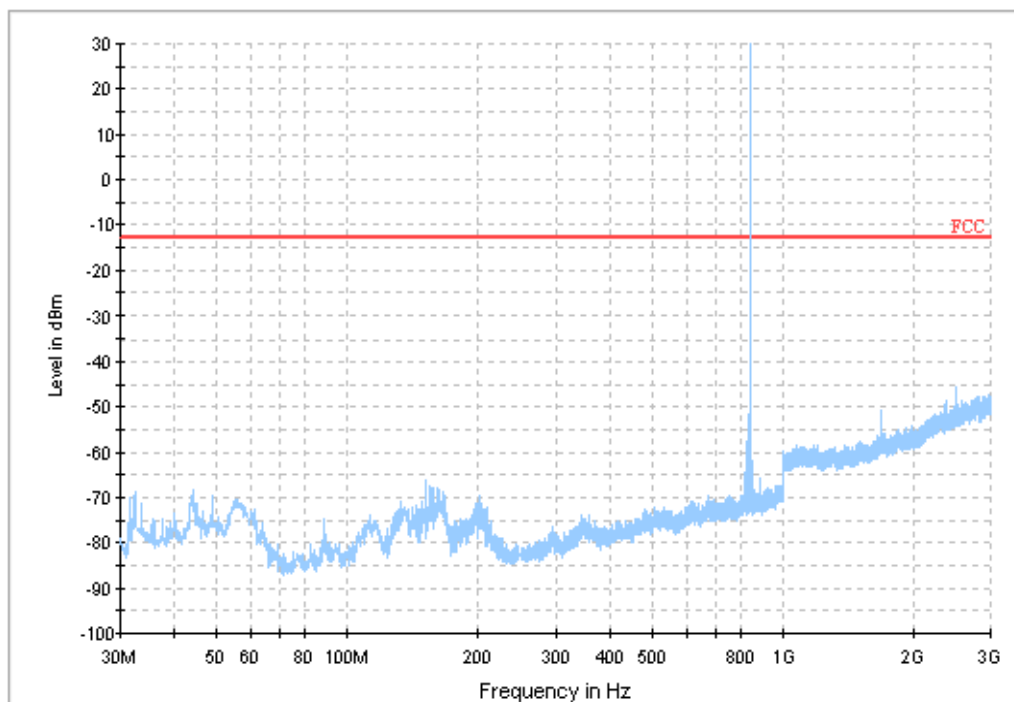
Copy of FCC PART22 GSM850_H



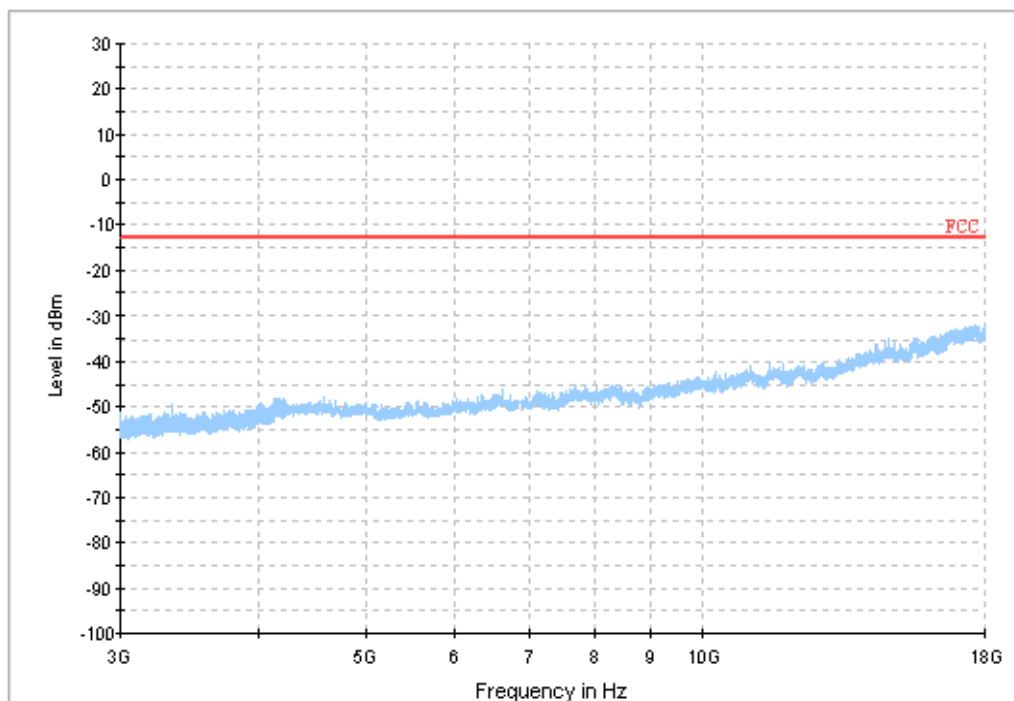
7.1.1.2 Test Mode = GSM/TM2



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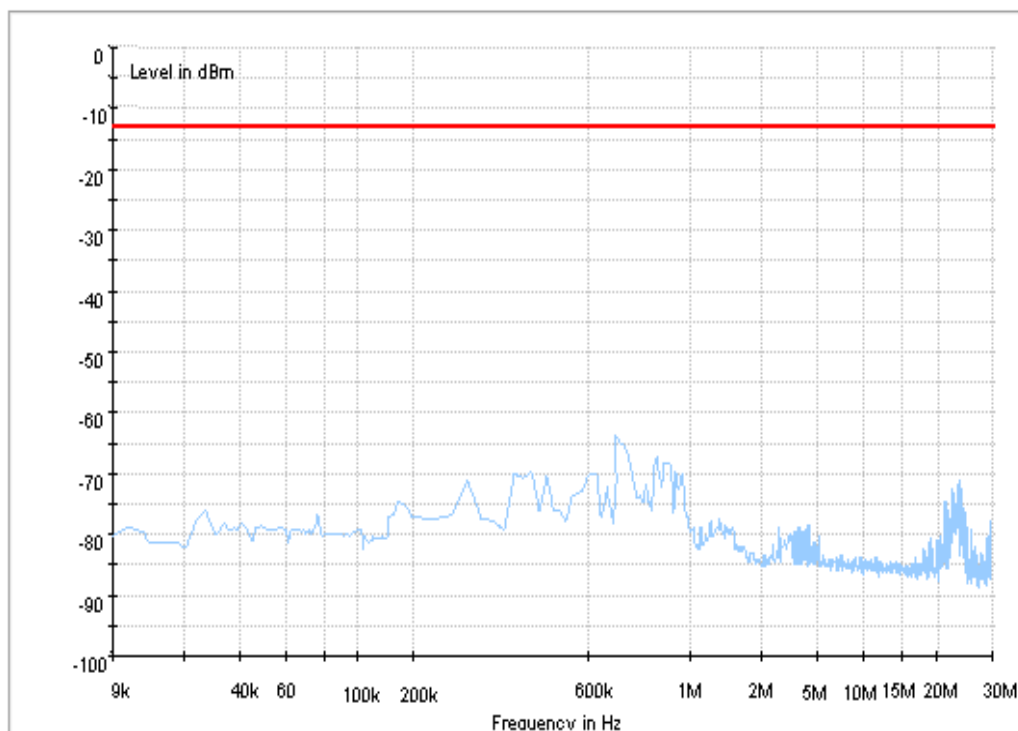


Copy of FCC PART22 GSM850_H

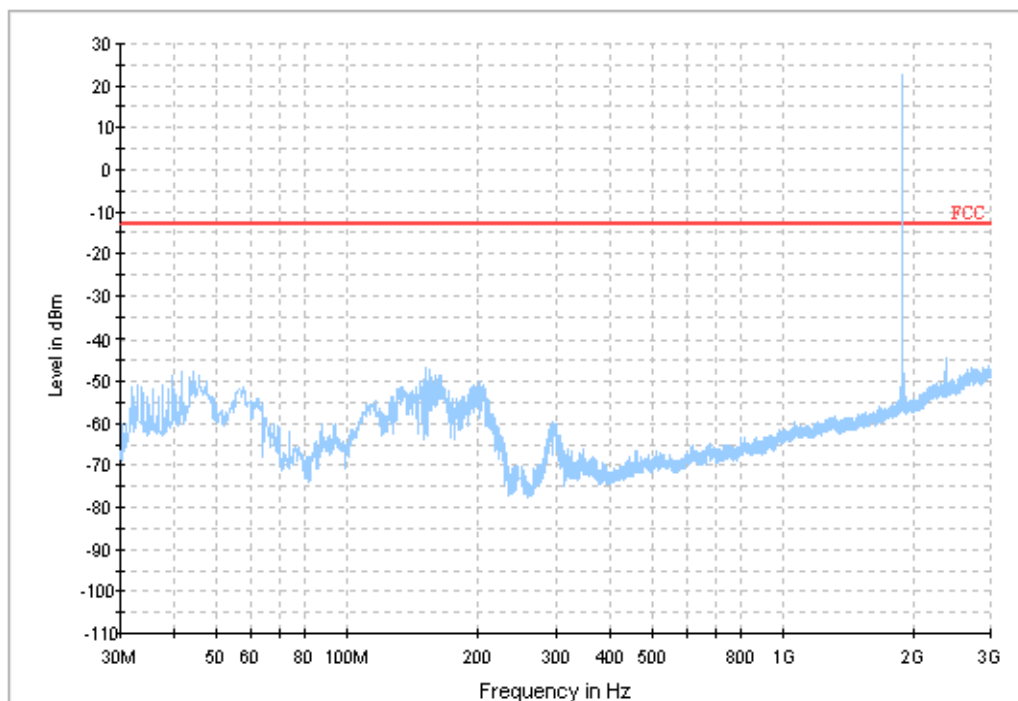


7.1.2 Test Band = GSM1900

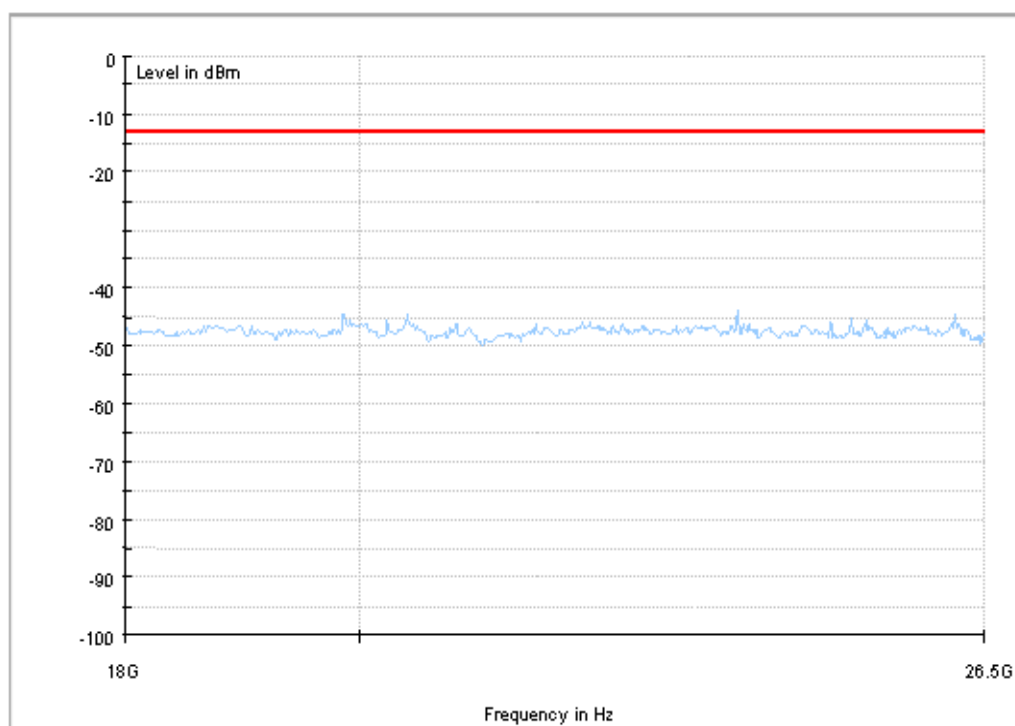
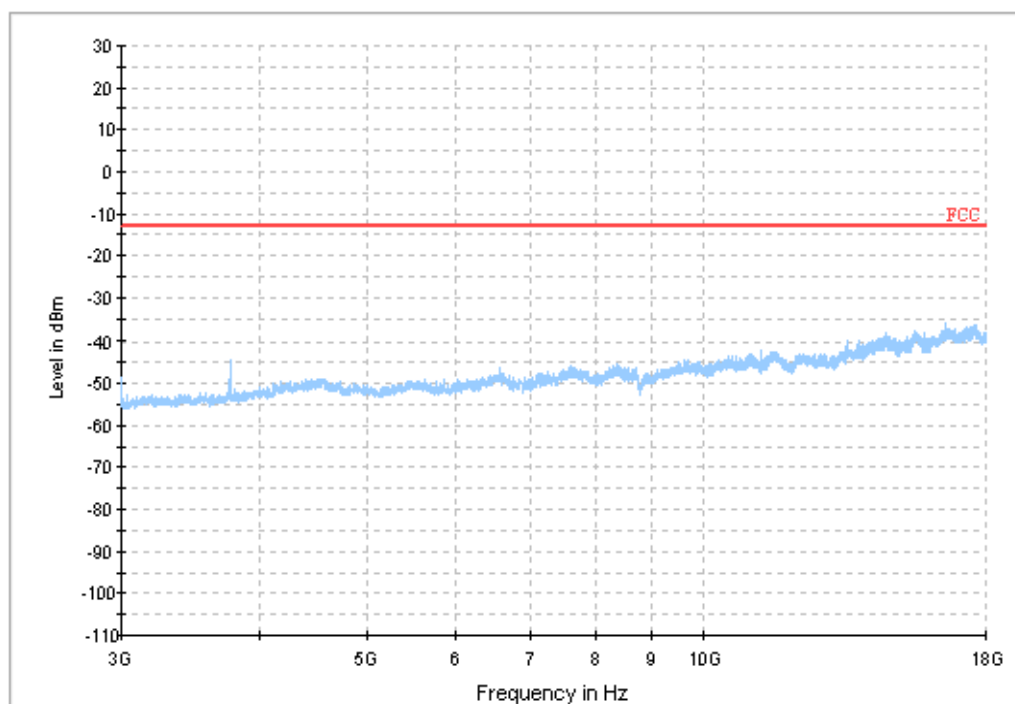
7.1.2.1 Test Mode = GSM/TM1



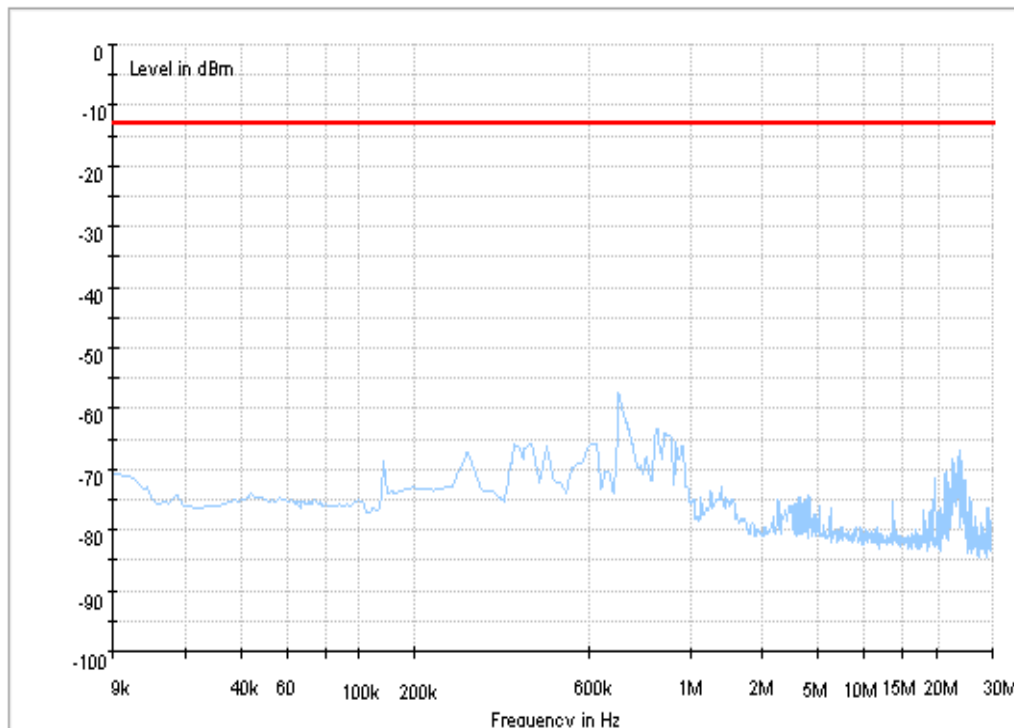
Copy of FCC PART24 GSM1900_L



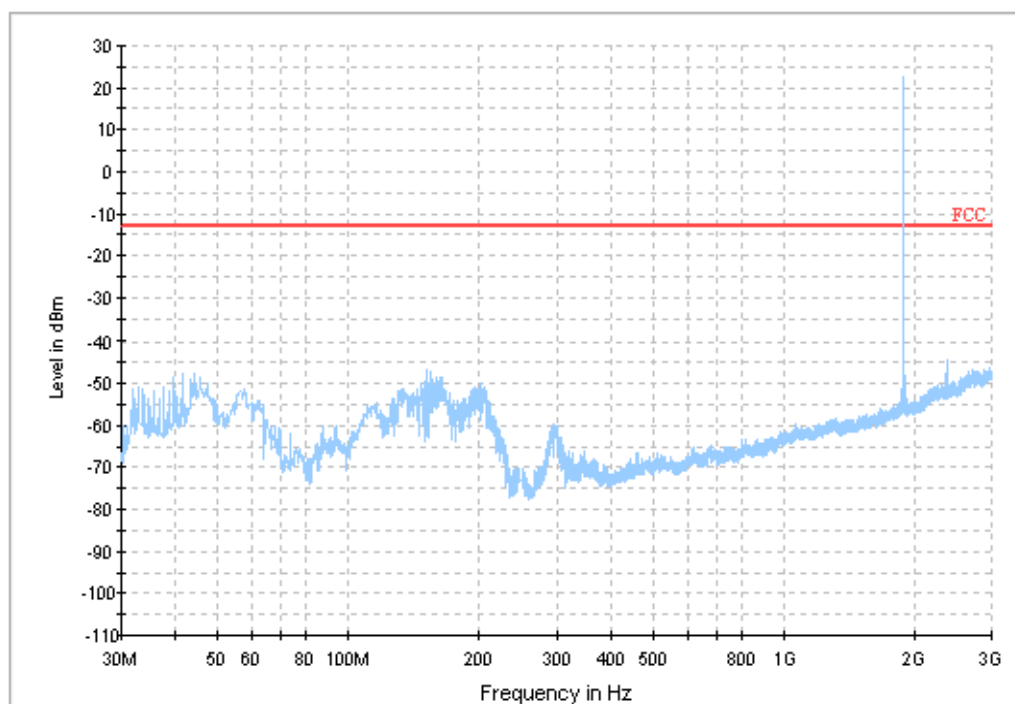
Copy of FCC PART24 GSM1900_H



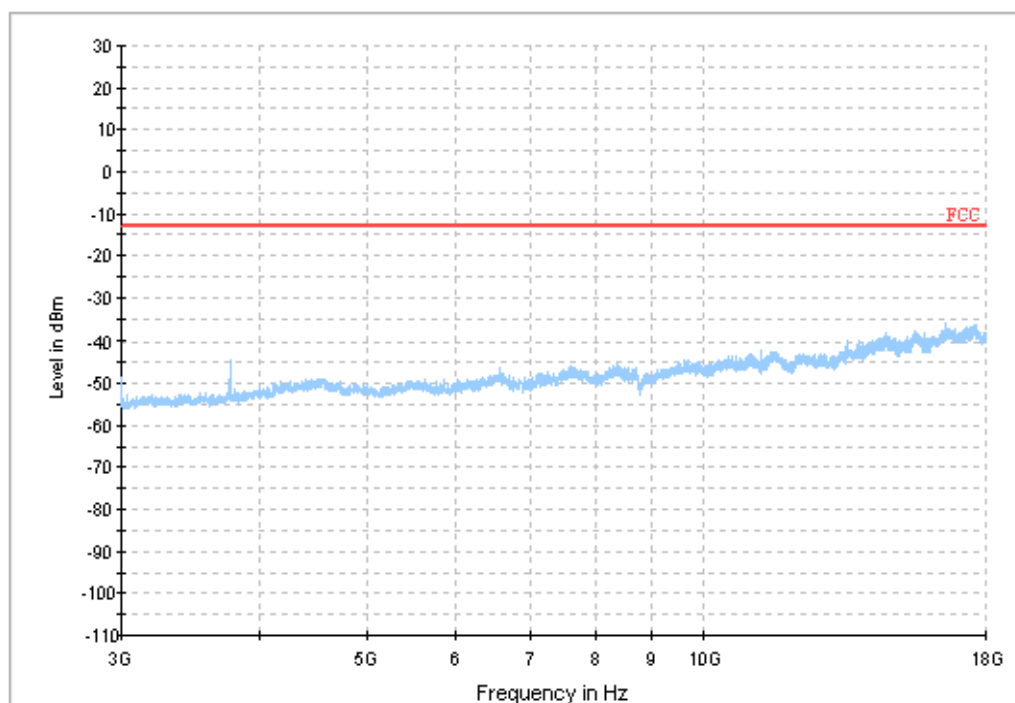
7.1.2.2 Test Mode = GSM/TM2

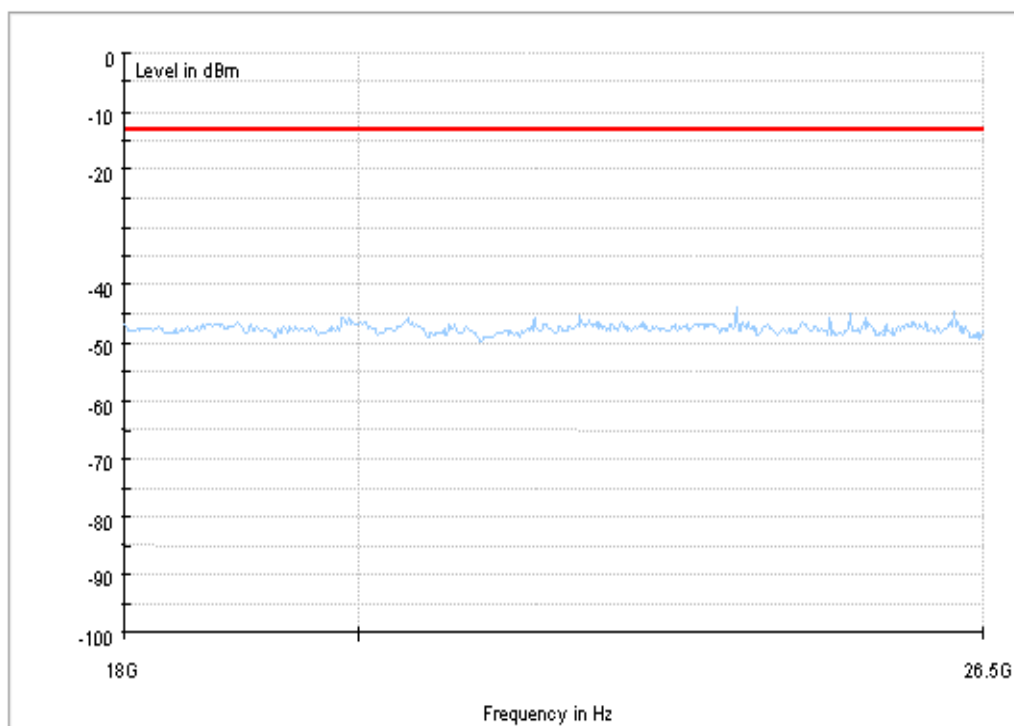


Copy of FCC PART24 GSM1900_L



Copy of FCC PART24 GSM1900_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	-6.84	-0.0083	PASS
				VN	-3.03	-0.00368	PASS
				VH	-6.72	-0.00815	PASS
		MCH	TN	VL	-7.94	-0.00949	PASS
				VN	0.39	0.00047	PASS
				VH	-7.81	-0.00934	PASS
		HCH	TN	VL	-1.36	-0.0016	PASS
				VN	-4.26	-0.00502	PASS
				VH	-3.94	-0.00464	PASS
	GSM/TM2	LCH	TN	VL	2.1	0.00255	PASS
				VN	4.94	0.00599	PASS
				VH	1.9	0.00231	PASS
		MCH	TN	VL	5.17	0.00618	PASS
				VN	2.03	0.00243	PASS
				VH	4.2	0.00502	PASS
		HCH	TN	VL	2.71	0.00319	PASS
				VN	-3.68	-0.00434	PASS
				VH	5.29	0.00623	PASS
GSM1900	GSM/TM1	LCH	TN	VL	24.86	0.01344	PASS
				VN	30.35	0.0164	PASS
				VH	30.8	0.01665	PASS
		MCH	TN	VL	29.77	0.01584	PASS
				VN	38.1	0.02027	PASS
				VH	35.06	0.01865	PASS
		HCH	TN	VL	34.42	0.01802	PASS
				VN	36.16	0.01893	PASS
				VH	31.12	0.01629	PASS
	GSM/TM2	LCH	TN	VL	33.25	0.01797	PASS
				VN	24.7	0.01335	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		MCH	TN	VH	19.34	0.01045	PASS
				VL	30.99	0.01648	PASS
				VN	38.36	0.0204	PASS
				VH	35	0.01862	PASS
		HCH	TN	VL	27.99	0.01466	PASS
				VN	22.41	0.01173	PASS
				VH	26.35	0.0138	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	-8.52	-0.01034	PASS
				-20	-8.98	-0.0109	PASS
				-10	-7.1	-0.00861	PASS
				0	-3.42	-0.00415	PASS
				10	-8.39	-0.01018	PASS
				20	-7.1	-0.00861	PASS
				30	-3.49	-0.00423	PASS
				40	-6.91	-0.00838	PASS
				50	-3.49	-0.00423	PASS
		MCH	VN	-30	-2.84	-0.00339	PASS
				-20	-3.42	-0.00409	PASS
				-10	-5.81	-0.00694	PASS
				0	-8.72	-0.01042	PASS
				10	-4.58	-0.00547	PASS
				20	-3.75	-0.00448	PASS
				30	-6.97	-0.00833	PASS
				40	-4.71	-0.00563	PASS
				50	-0.58	-0.00069	PASS
		HCH	VN	-30	-2.84	-0.00335	PASS
				-20	-6.2	-0.0073	PASS
				-10	-5.75	-0.00677	PASS
				0	-4.65	-0.00548	PASS
				10	-7.94	-0.00935	PASS
				20	-5.88	-0.00693	PASS
				30	-5.23	-0.00616	PASS
				40	-3.36	-0.00396	PASS
				50	-10.4	-0.01225	PASS
	GSM/TM2	LCH	VN	-30	6.46	0.00784	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				-20	-1.97	-0.00239	PASS
				-10	2.62	0.00318	PASS
				0	3.62	0.00439	PASS
				10	1.52	0.00184	PASS
				20	-3.29	-0.00399	PASS
				30	-2.97	-0.0036	PASS
				40	-1.97	-0.00239	PASS
				50	4.36	0.00529	PASS
		MCH	VN	-30	-2.42	-0.00289	PASS
				-20	-1.49	-0.00178	PASS
				-10	4.36	0.00521	PASS
				0	5.33	0.00637	PASS
				10	1.78	0.00213	PASS
				20	-1.29	-0.00154	PASS
				30	1.9	0.00227	PASS
				40	-1.36	-0.00163	PASS
				50	0.23	0.00027	PASS
		HCH	VN	-30	9.81	0.01156	PASS
				-20	-0.55	-0.00065	PASS
				-10	-0.39	-0.00046	PASS
				0	-0.52	-0.00061	PASS
				10	-3.71	-0.00437	PASS
				20	0.74	0.00087	PASS
				30	0.29	0.00034	PASS
				40	-4.1	-0.00483	PASS
				50	-1.1	-0.0013	PASS
GSM1900	GSM/TM1	LCH	VN	-30	19.5	0.01054	PASS
				-20	35.19	0.01902	PASS
				-10	30.35	0.0164	PASS
				0	22.41	0.01211	PASS
				10	16.59	0.00897	PASS
				20	24.02	0.01298	PASS
				30	24.99	0.01351	PASS
				40	21.57	0.01166	PASS
				50	27.18	0.01469	PASS
		MCH	VN	-30	24.73	0.01315	PASS
				-20	33.25	0.01769	PASS
				-10	40.81	0.02171	PASS
				0	32.54	0.01731	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				10	40.16	0.02136	PASS
				20	33.64	0.01789	PASS
				30	39.65	0.02109	PASS
				40	38.36	0.0204	PASS
				50	31.12	0.01655	PASS
		HCH	VN	-30	35.9	0.0188	PASS
				-20	30.93	0.0162	PASS
				-10	32.09	0.0168	PASS
				0	36.22	0.01897	PASS
				10	36.35	0.01903	PASS
				20	46.81	0.02451	PASS
				30	26.02	0.01362	PASS
				40	40.94	0.02144	PASS
				50	43.2	0.02262	PASS
	GSM/TM2	LCH	VN	-30	19.57	0.01058	PASS
				-20	19.31	0.01044	PASS
				-10	21.76	0.01176	PASS
				0	21.02	0.01136	PASS
				10	25.8	0.01394	PASS
				20	21.5	0.01162	PASS
				30	20.18	0.01091	PASS
				40	22.05	0.01192	PASS
				50	29.35	0.01586	PASS
		MCH	VN	-30	60.31	0.03208	PASS
				-20	22.21	0.01181	PASS
				-10	34.03	0.0181	PASS
				0	40.07	0.02131	PASS
				10	33.58	0.01786	PASS
				20	34.03	0.0181	PASS
				30	23.28	0.01238	PASS
				40	31.58	0.0168	PASS
				50	34.8	0.01851	PASS
		HCH	VN	-30	42.29	0.02214	PASS
				-20	38.65	0.02024	PASS
				-10	25.83	0.01352	PASS
				0	38.84	0.02034	PASS
				10	30.19	0.01581	PASS
				20	31.7	0.0166	PASS
				30	36.48	0.0191	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				40	47.04	0.02463	PASS
				50	44.65	0.02338	PASS

END