



# 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	33.44	28.69	38.5	PASS
		MCH	33.52	28.77	38.5	PASS
		HCH	33.55	28.8	38.5	PASS
	GSM/TM2	LCH	26.68	21.93	38.5	PASS
		MCH	26.71	21.96	38.5	PASS
		HCH	26.68	21.93	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	30.47	30.07	33	PASS
		MCH	30.35	29.95	33	PASS
		HCH	30.31	29.91	33	PASS
	GSM/TM2	LCH	25.5	25.1	33	PASS
		MCH	25.49	25.09	33	PASS
		HCH	25.54	25.14	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	0.22	13	PASS
		MCH	0.21	13	PASS
		HCH	0.22	13	PASS
	GSM/TM2	LCH	2.78	13	PASS
		MCH	2.94	13	PASS
		HCH	2.76	13	PASS
GSM1900	GSM/TM1	LCH	0.2	13	PASS
		MCH	0.25	13	PASS
		HCH	0.26	13	PASS
	GSM/TM2	LCH	3.17	13	PASS
		MCH	3.06	13	PASS
		HCH	3.27	13	PASS

### 3Appendix\_C: Modulation Characteristics

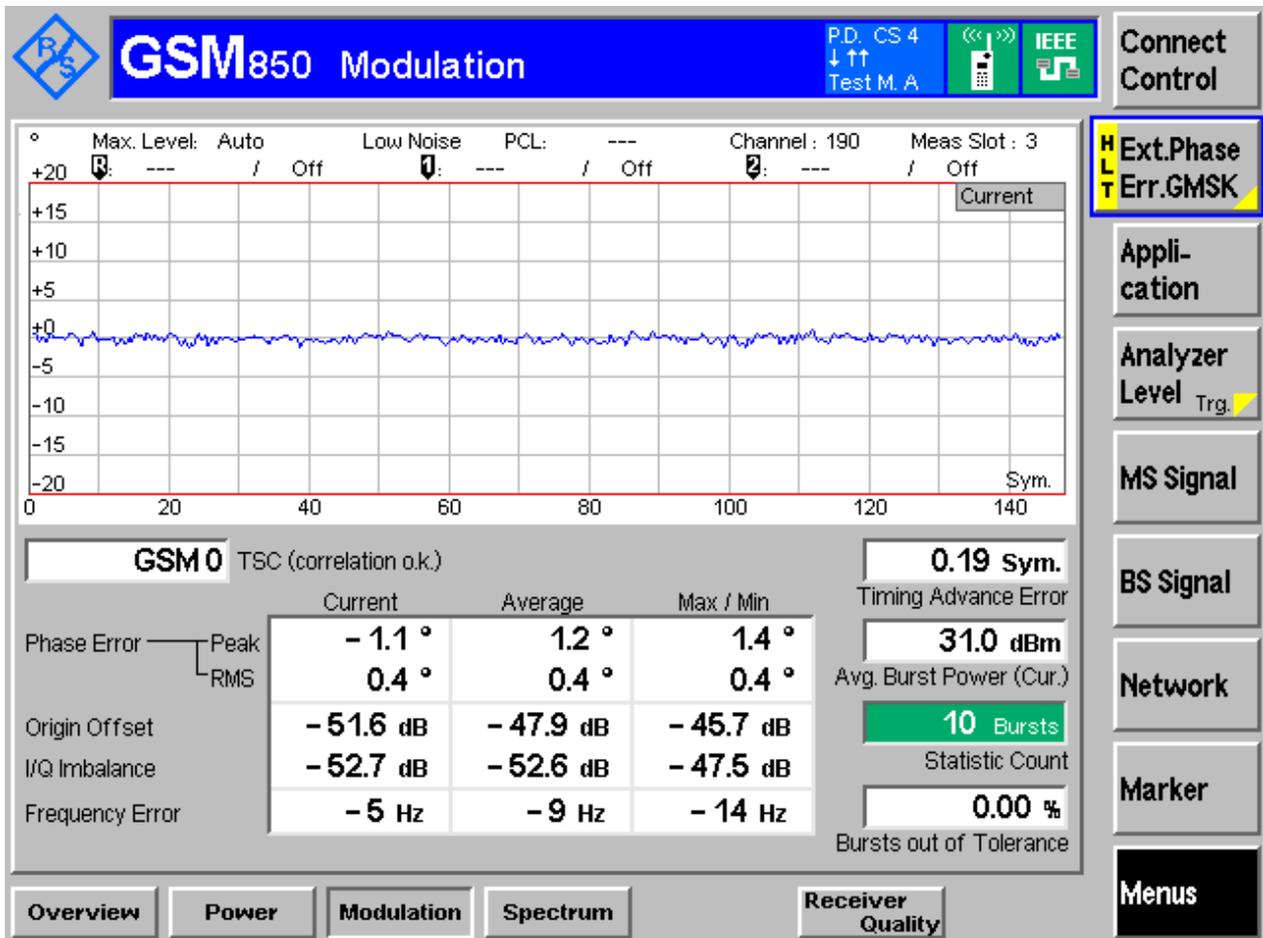
#### Part I - Test Plots

#### 3.1 For GSM

#### 3.1.1 Test Band = GSM850

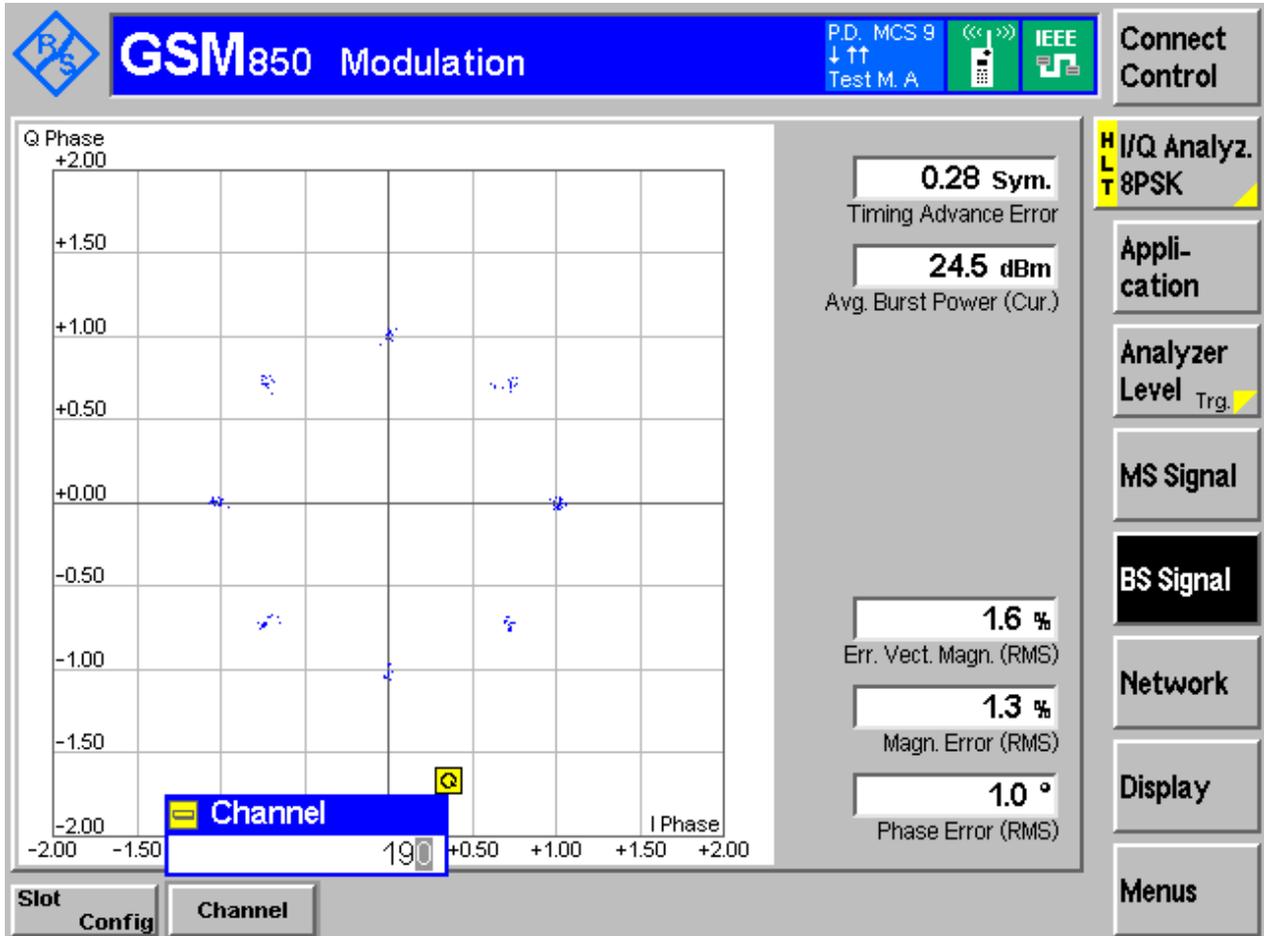
#### 3.1.1.1 Test Mode = GSM/TM1

#### 3.1.1.1.1 Test Channel = MCH



### 3.1.1.2 Test Mode = GSM/TM2

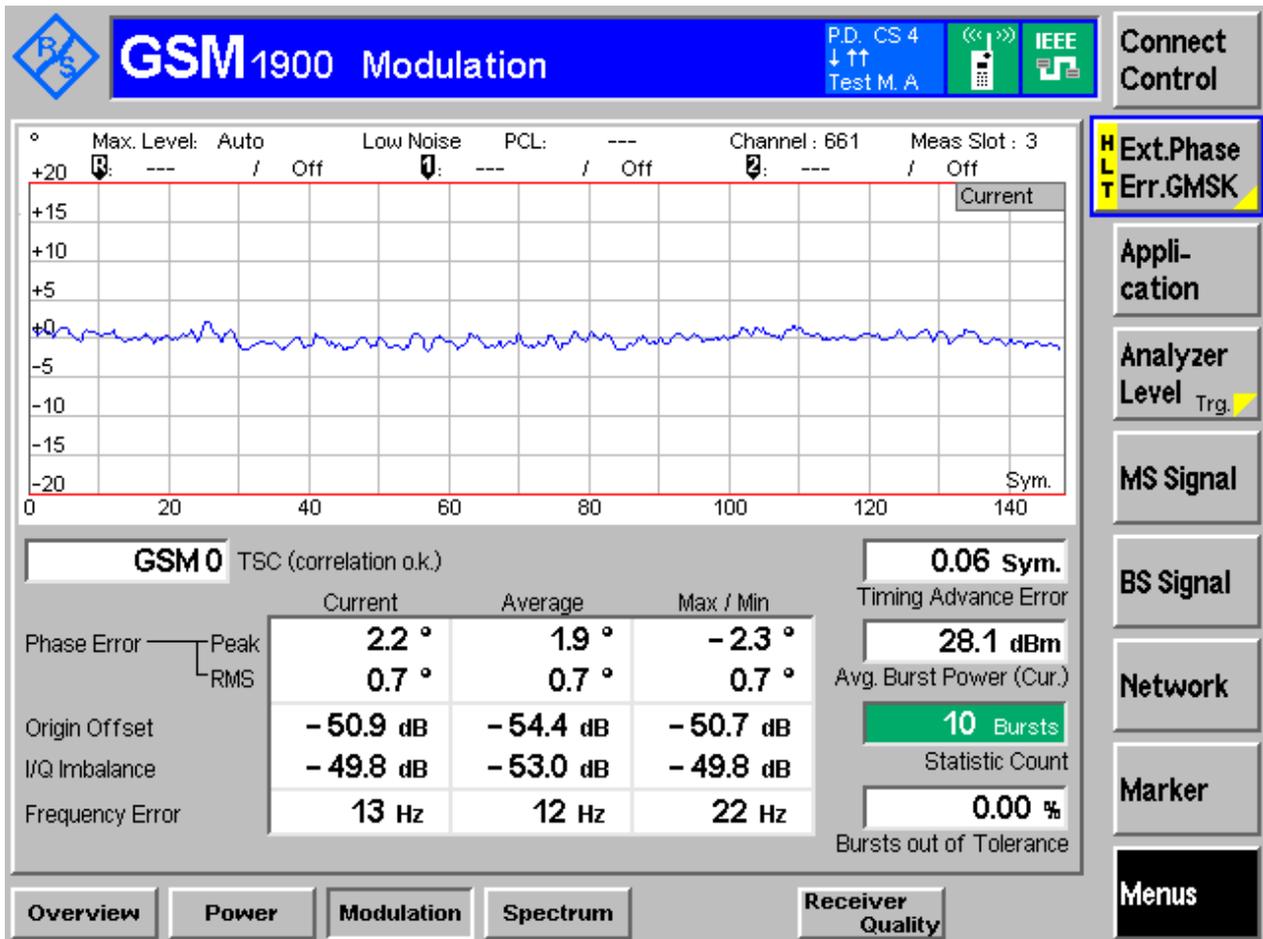
#### 3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

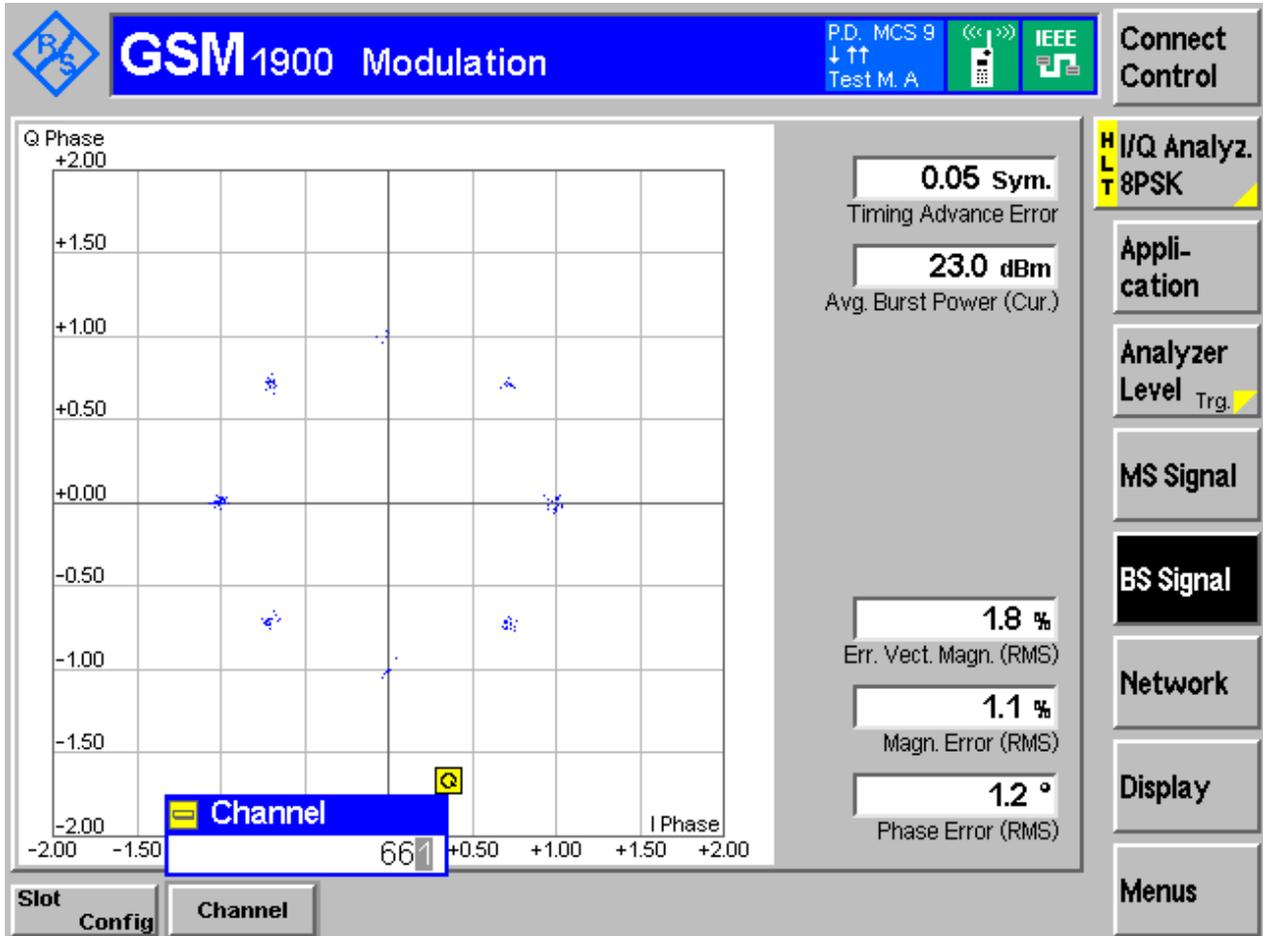
3.1.2.1 Test Mode = GSM/TM1

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	244.61	311.42	Pass
		MCH	239.90	308.76	Pass
		HCH	245.78	309.56	Pass
	GSM/TM2	LCH	256.29	329.99	Pass
		MCH	252.32	322.11	Pass
		HCH	254.63	319.60	Pass
GSM1900	GSM/TM1	LCH	247.15	316.28	Pass
		MCH	246.59	318.34	Pass
		HCH	245.05	319.36	Pass
	GSM/TM2	LCH	247.91	319.87	Pass
		MCH	246.43	319.80	Pass
		HCH	250.05	316.99	Pass



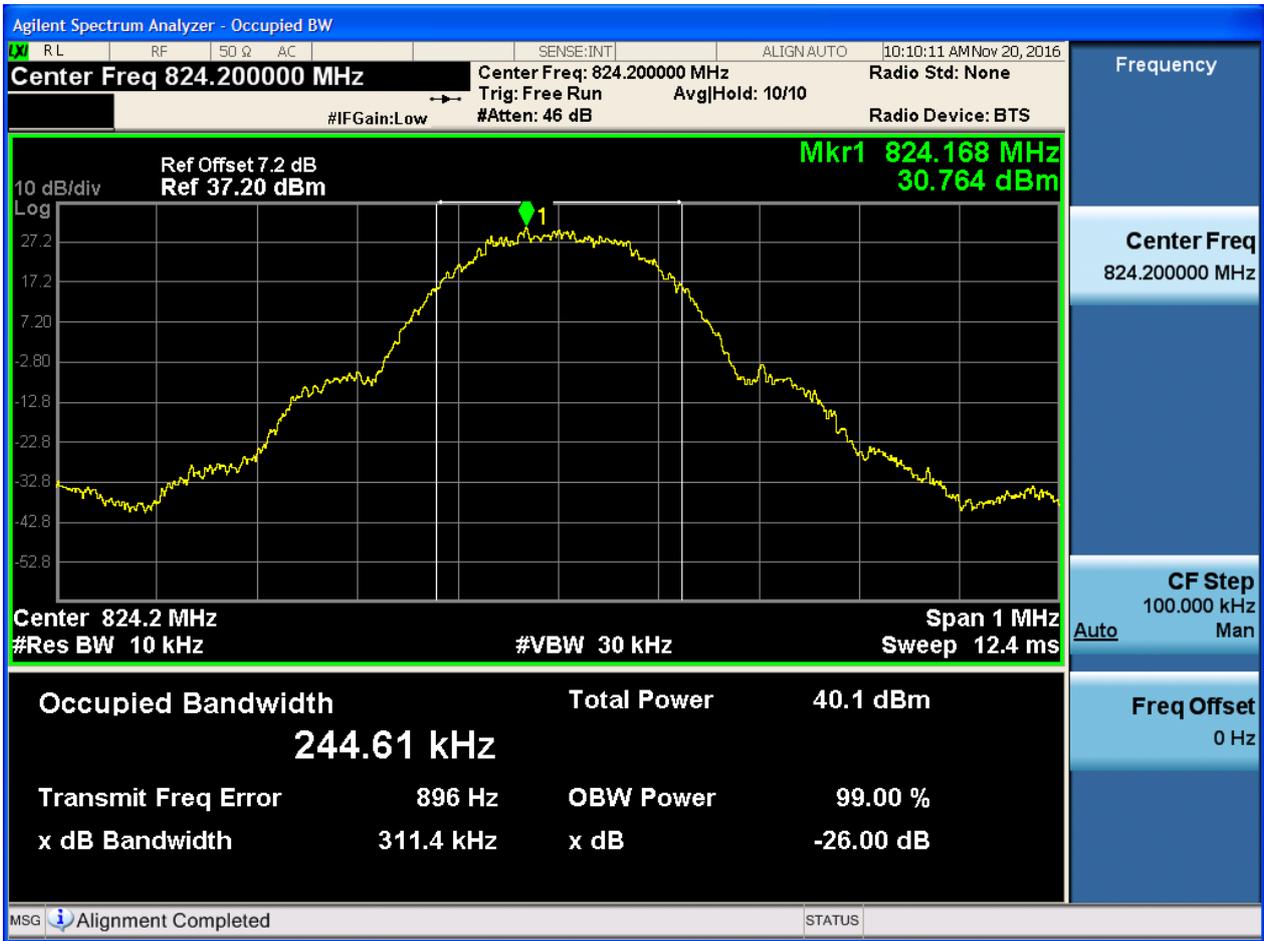
Part II - Test Plots

4.1 For GSM

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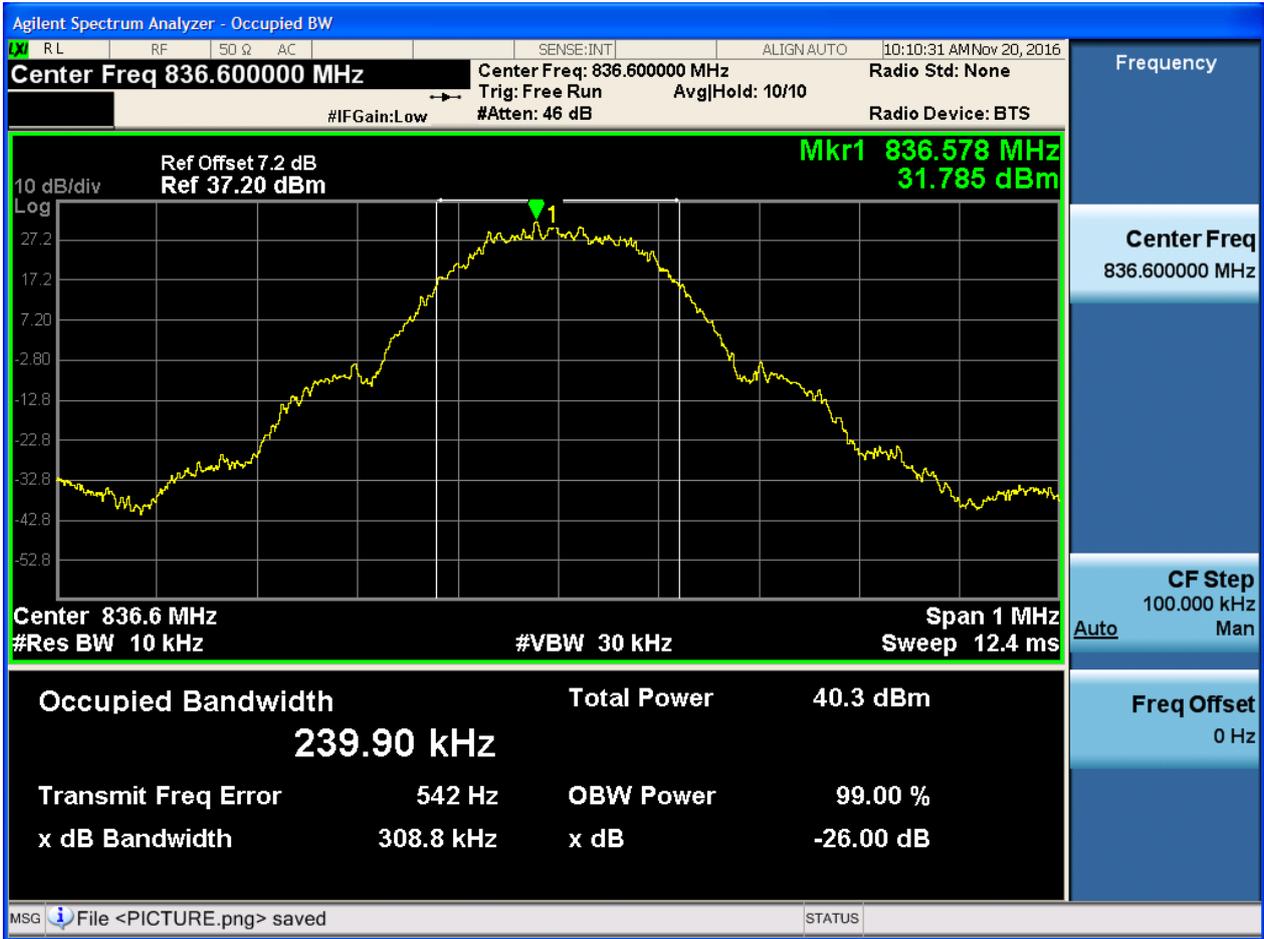
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



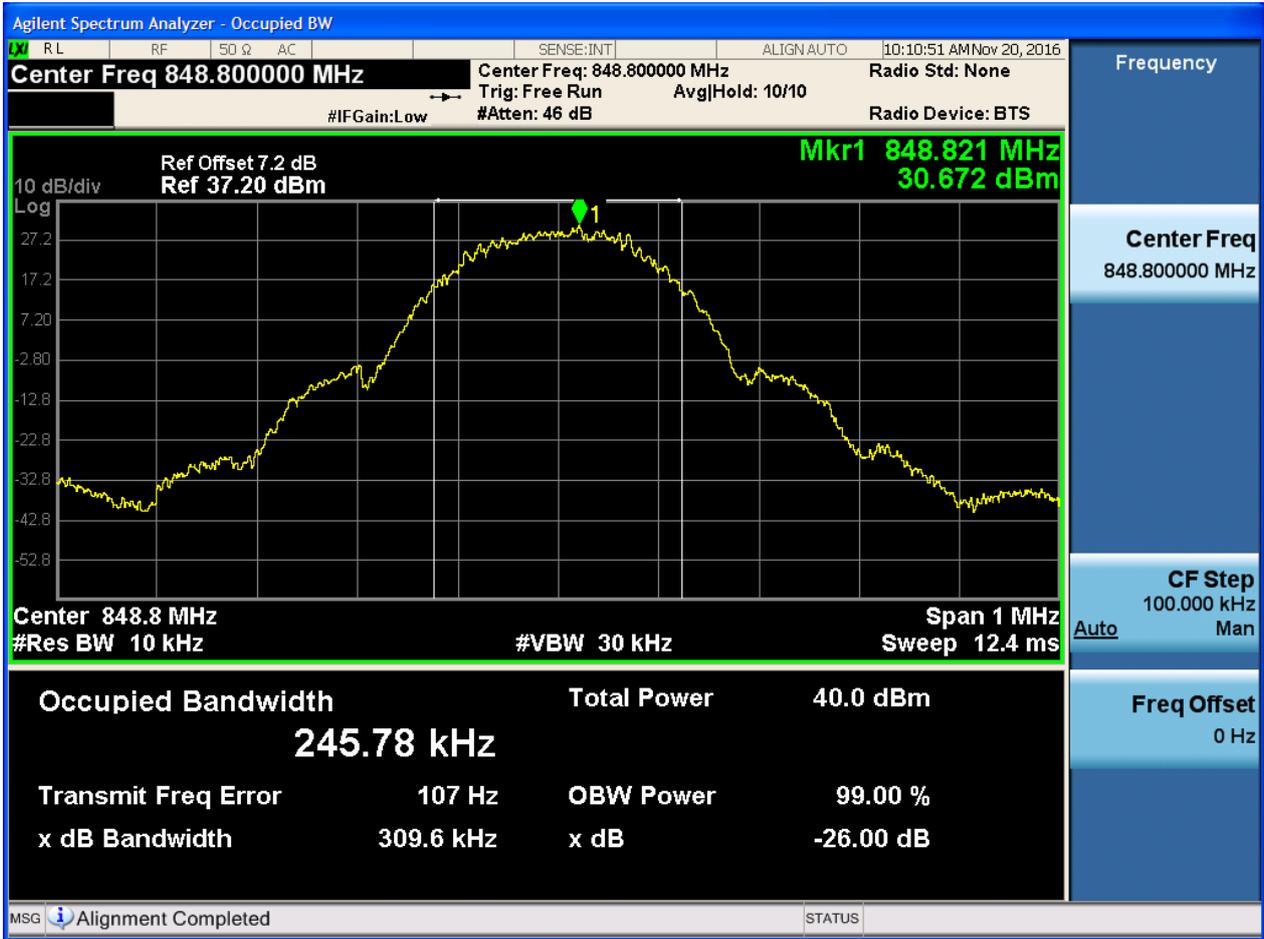


4.1.1.1.2 Test Channel = MCH





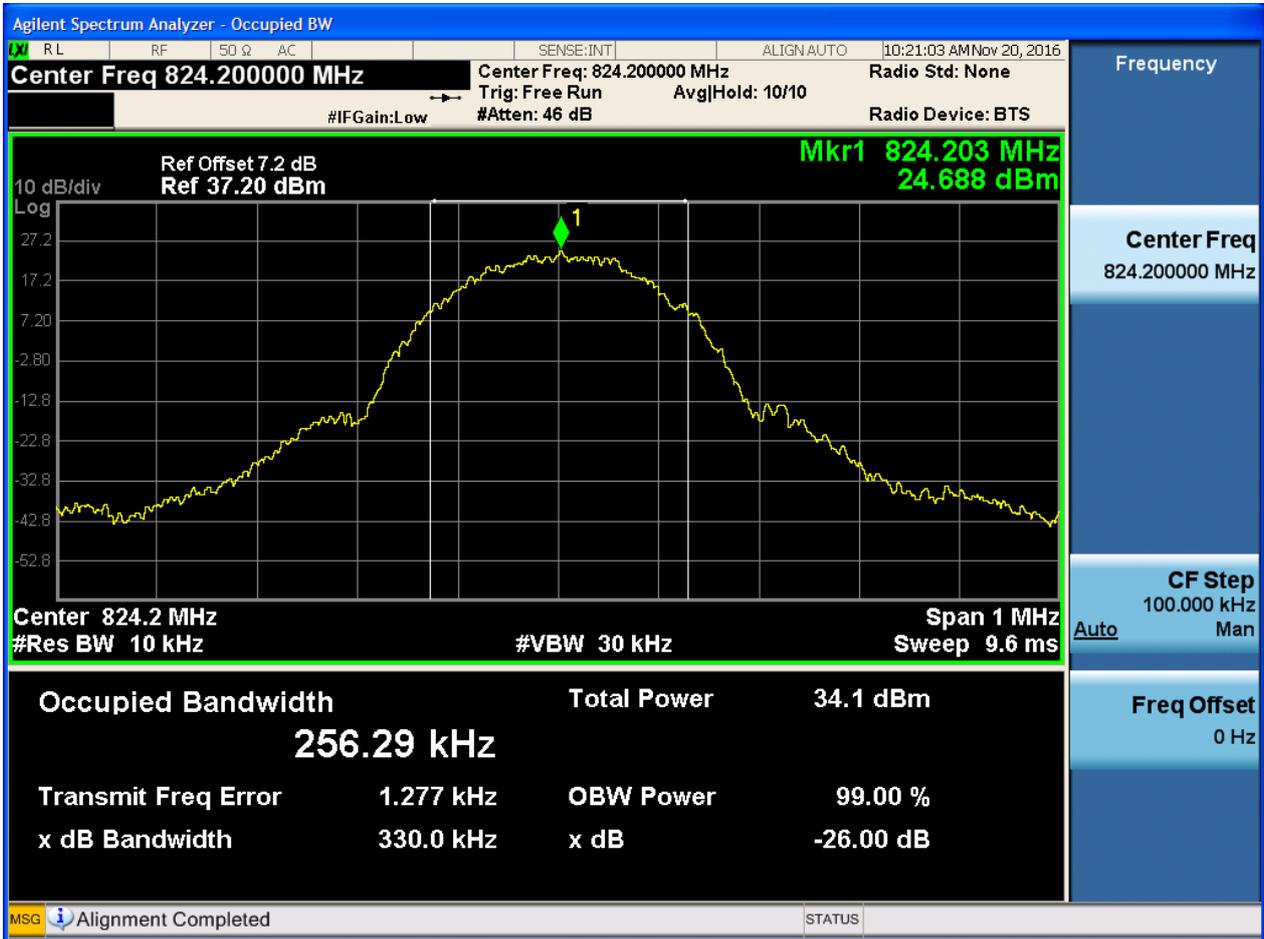
4.1.1.1.3 Test Channel = HCH





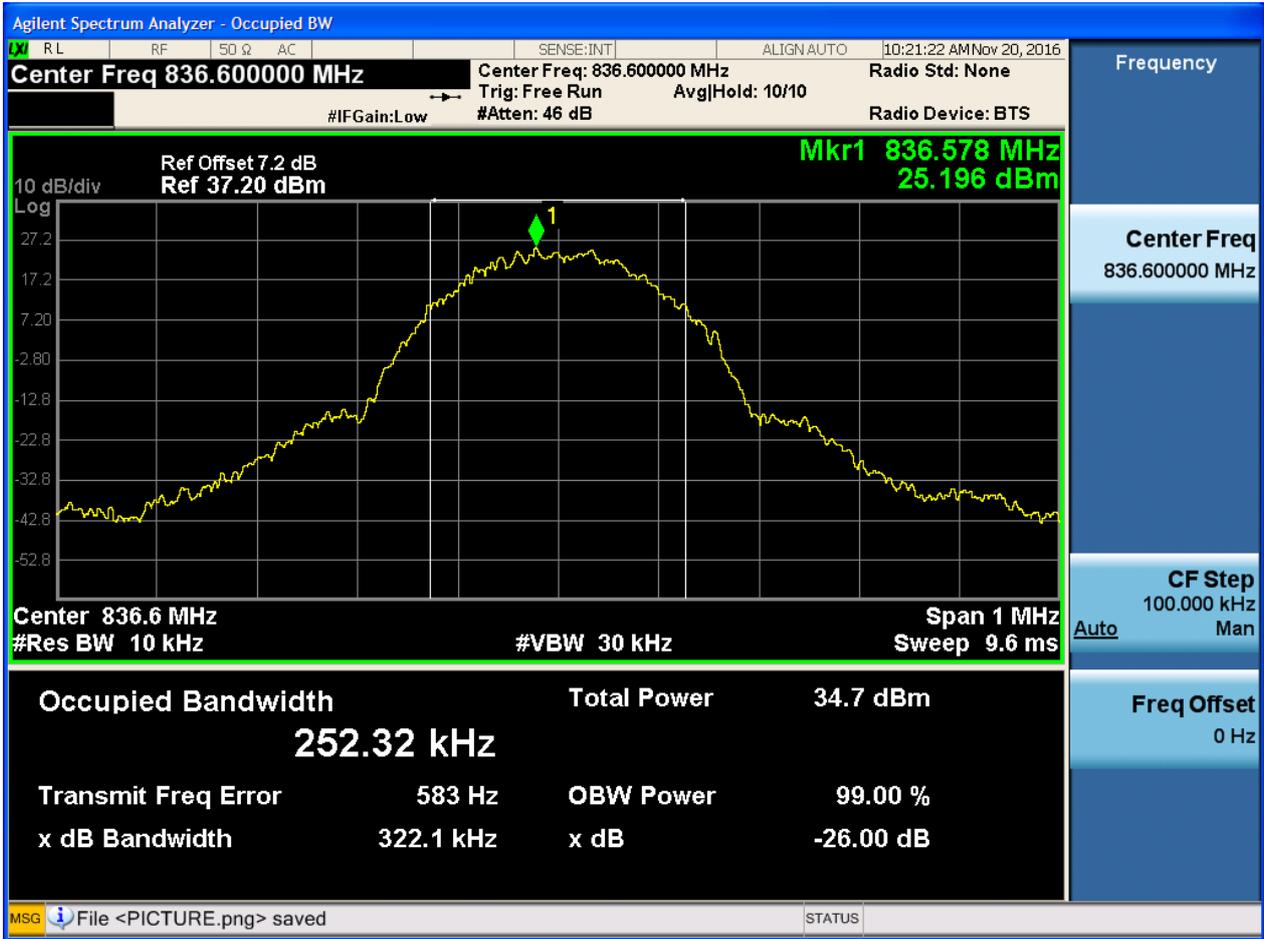
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4.1.1.2.1 Test Channel = LCH



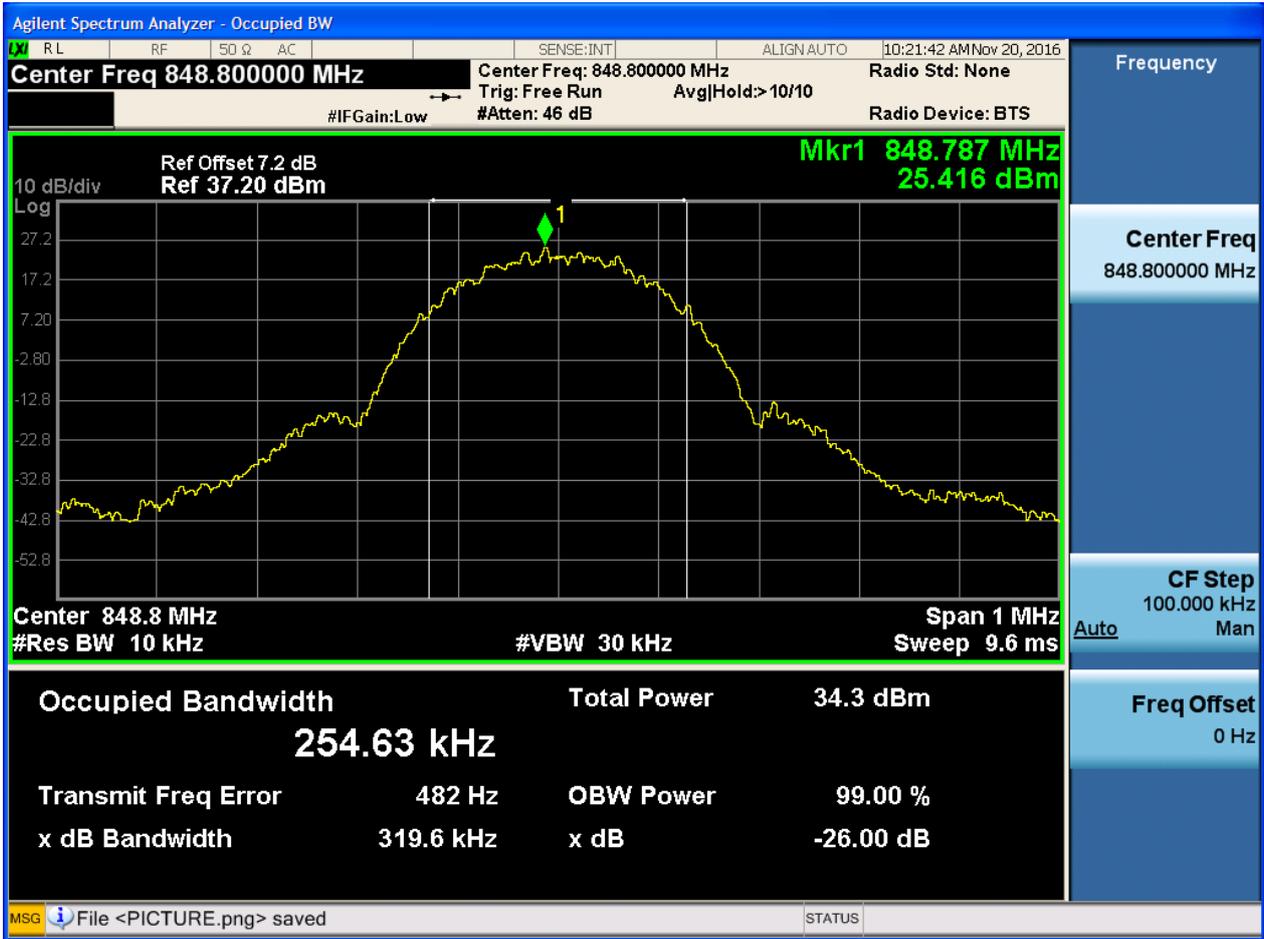


4.1.1.2.2 Test Channel = MCH





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



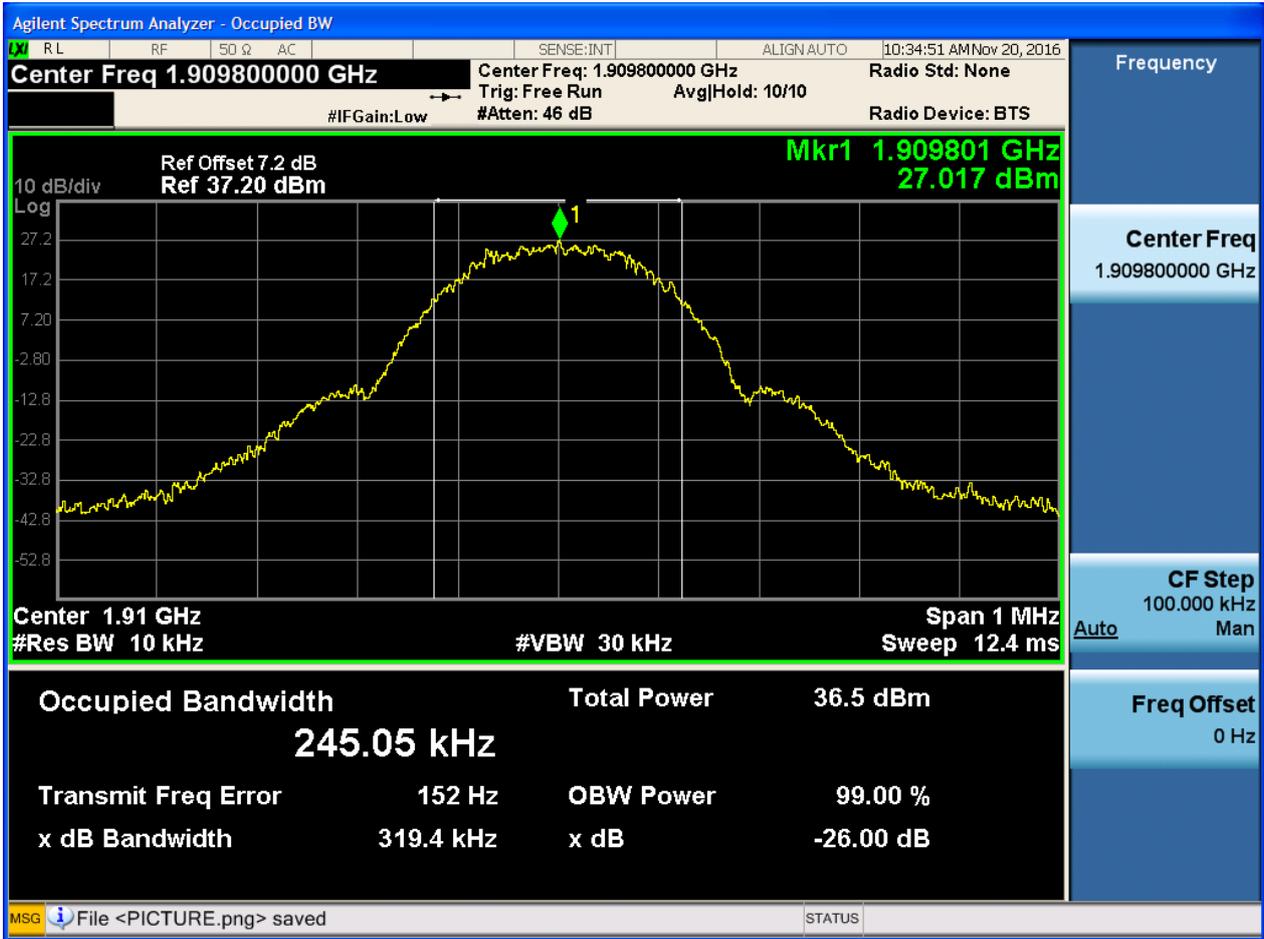


4.1.2.1.2 Test Channel = MCH





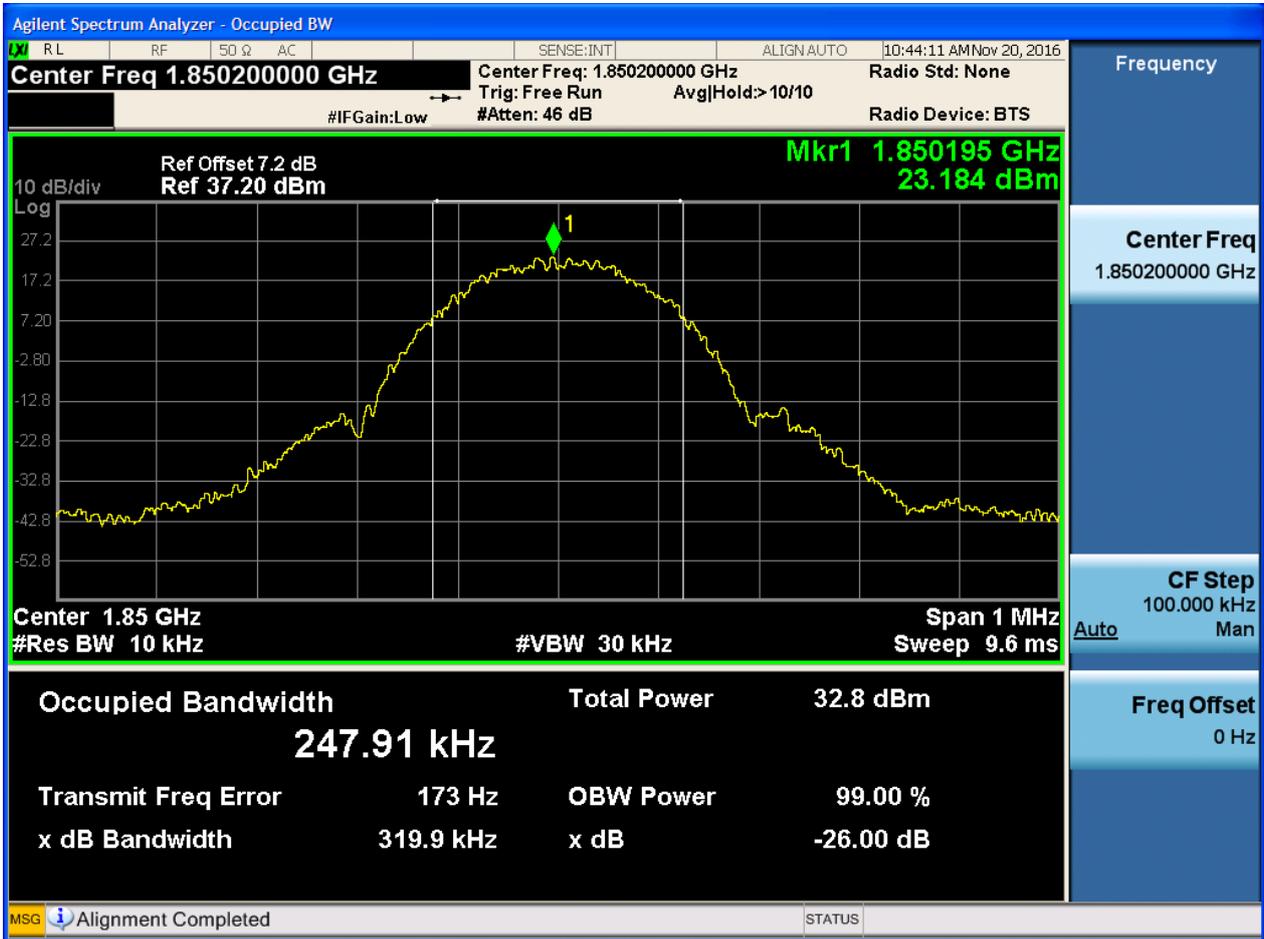
4.1.2.1.3 Test Channel = HCH





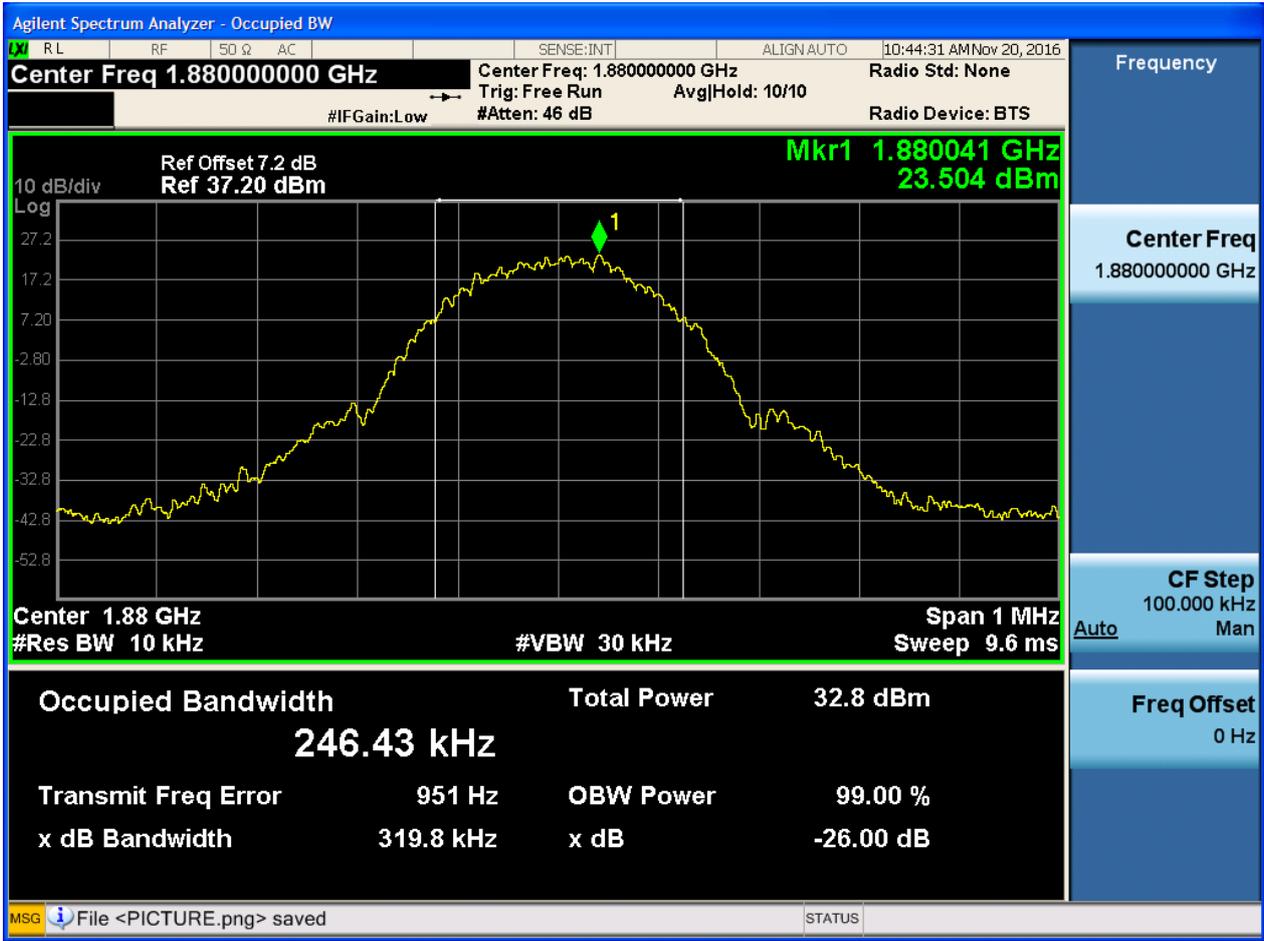
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



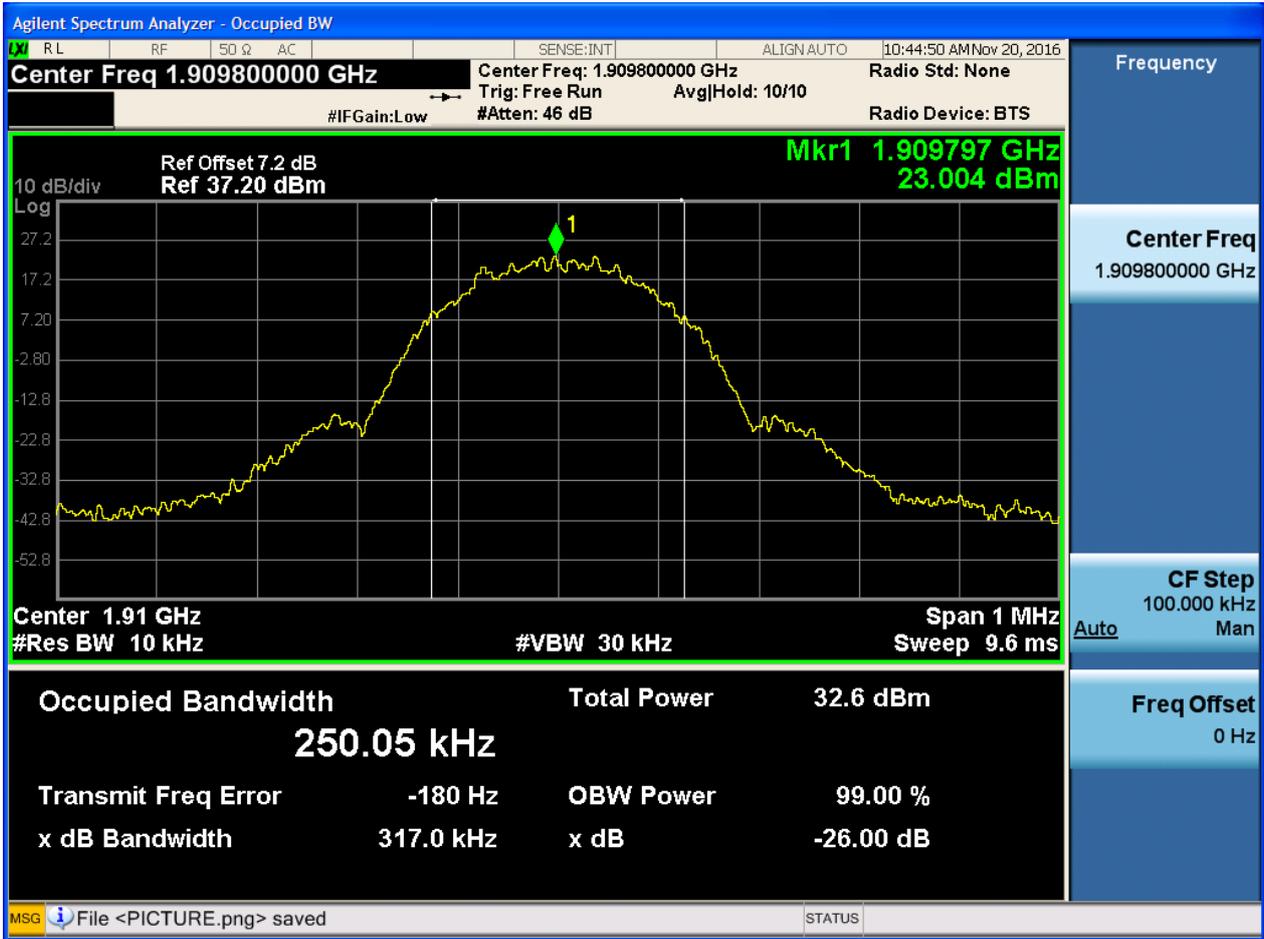


4.1.2.2.2 Test Channel = MCH





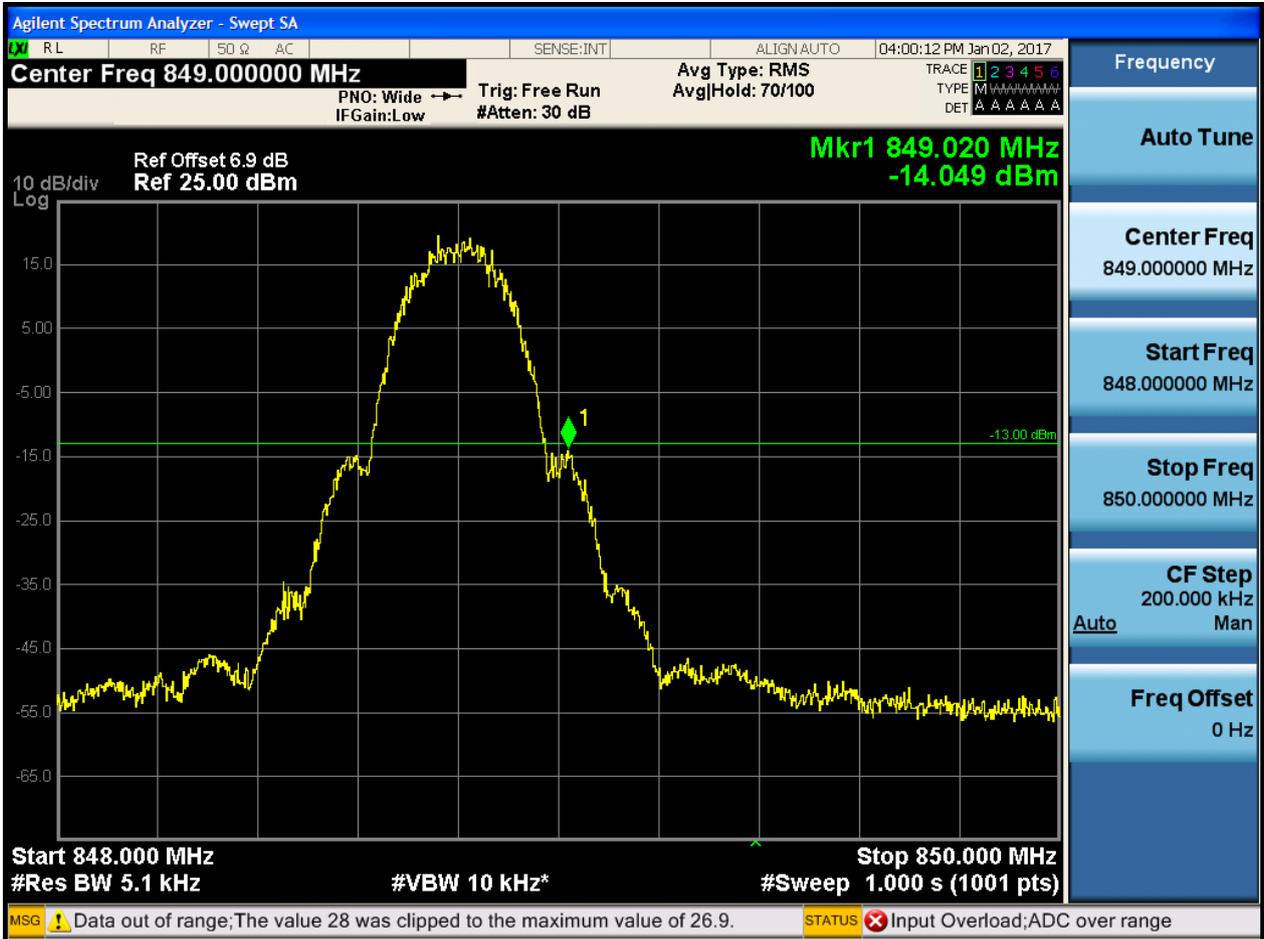
4.1.2.2.3 Test Channel = HCH







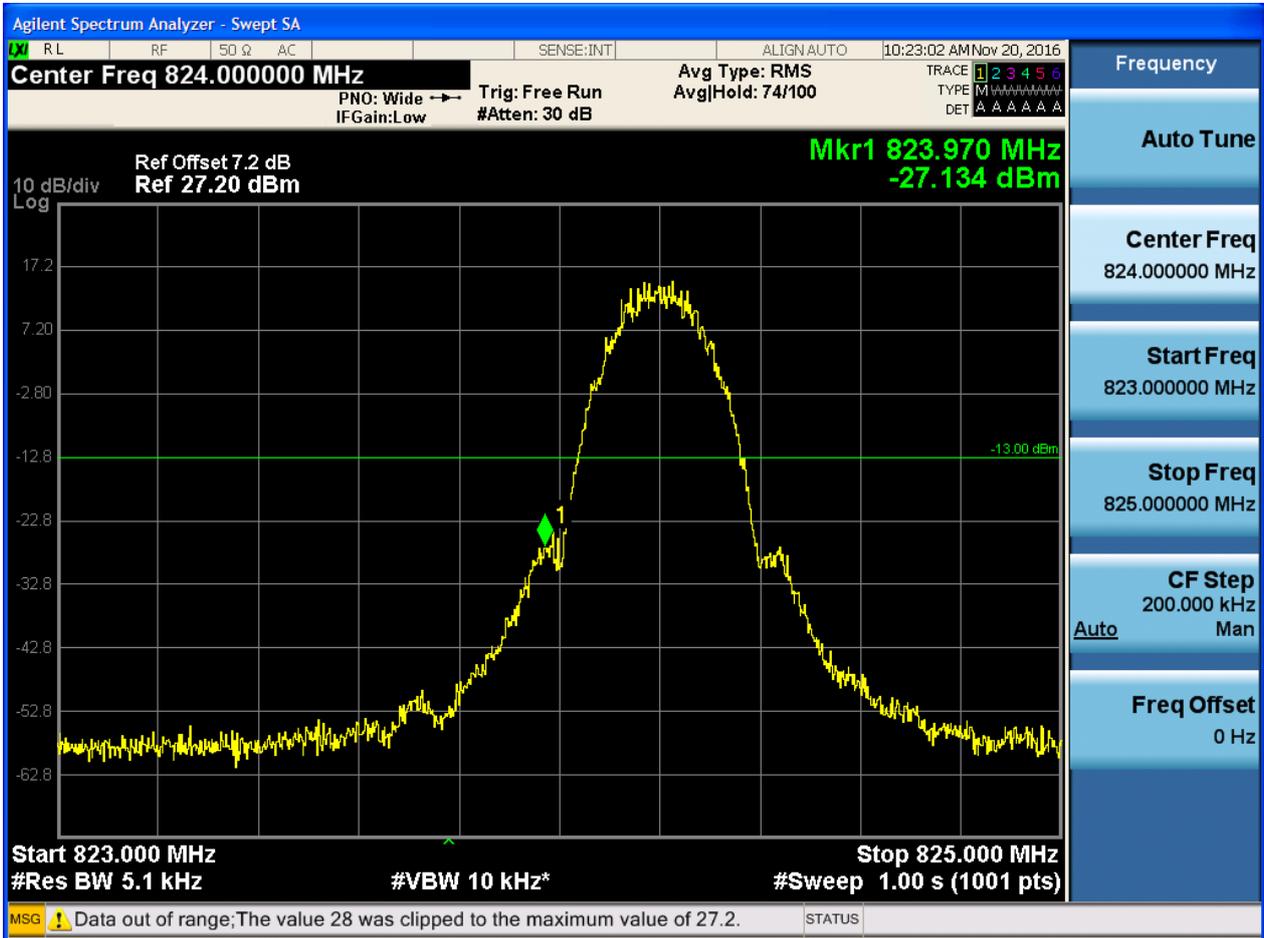
5.1.1.1.2 Test Channel = HCH





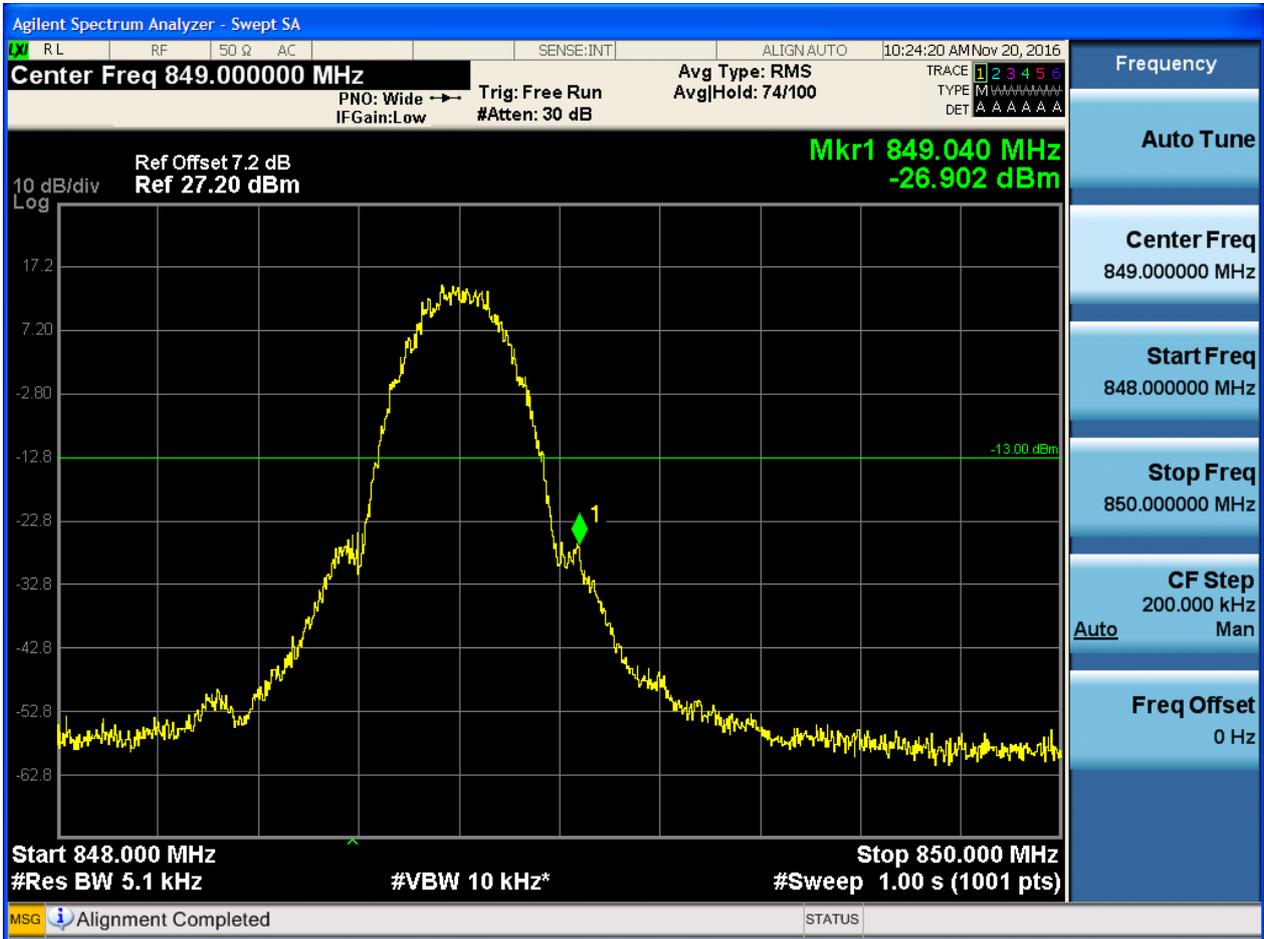
5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH





5.1.1.2.2 Test Channel = HCH

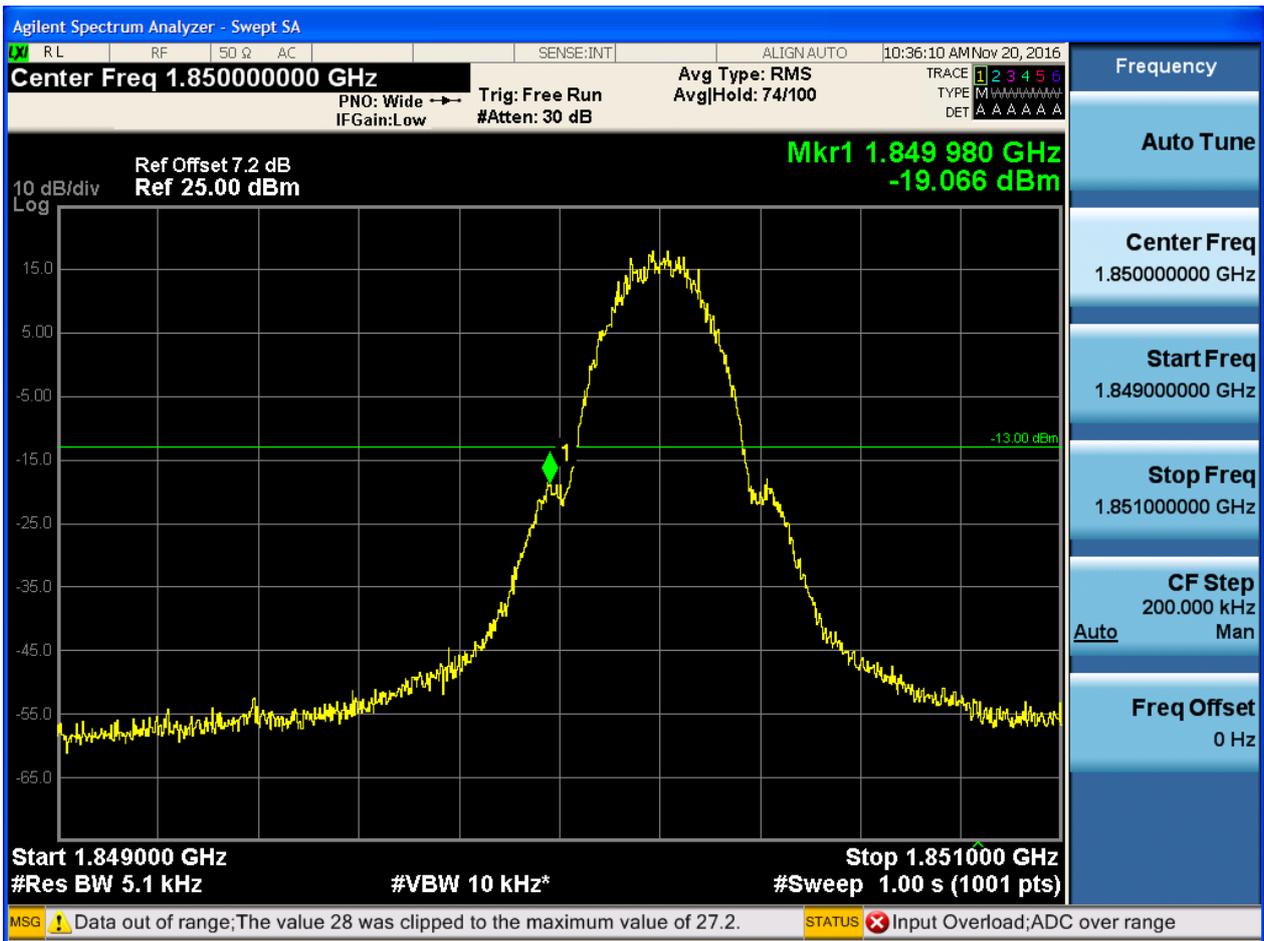




5.1.2 Test Band = GSM1900

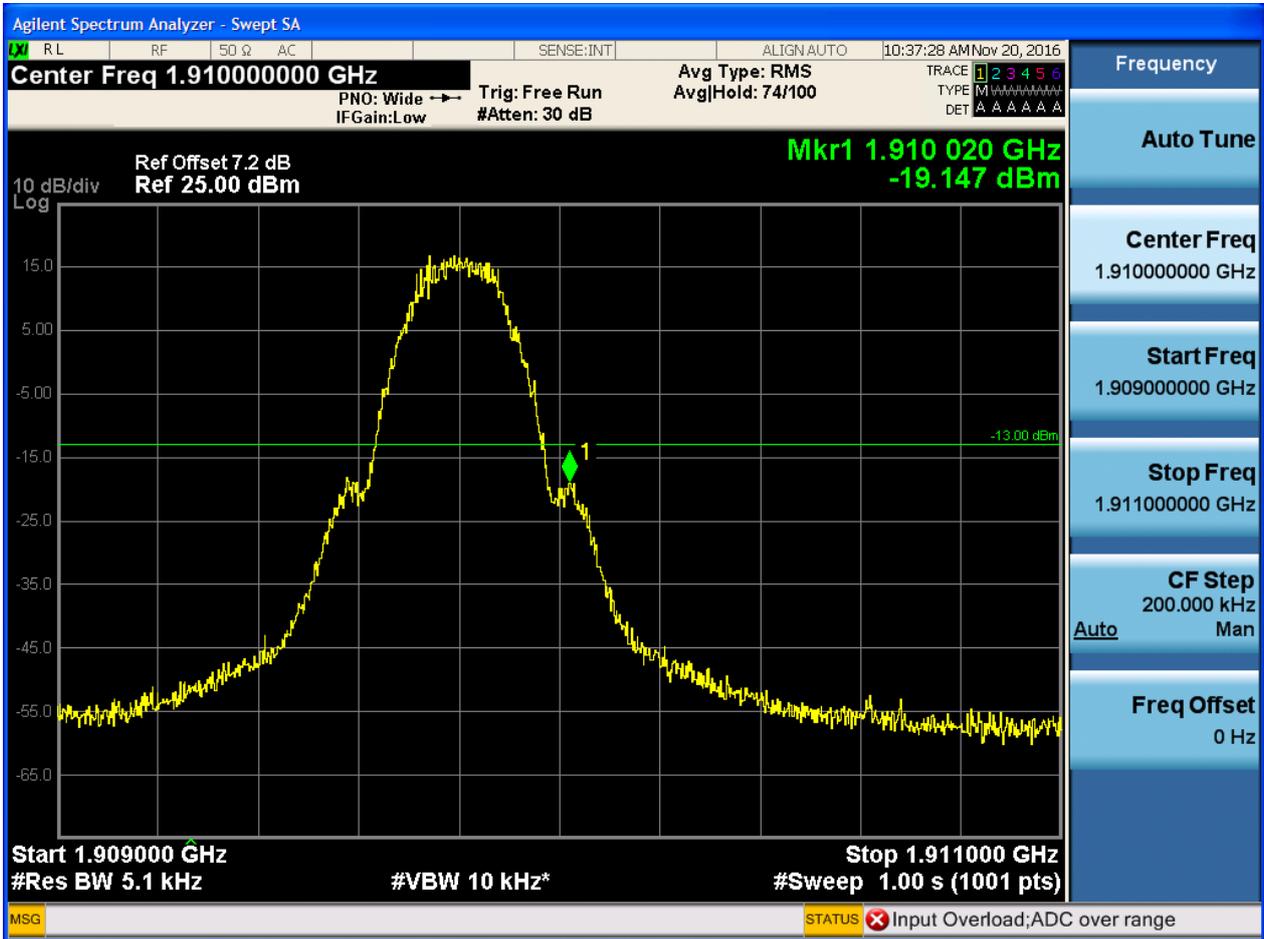
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5.1.2.1.1 Test Channel = LCH





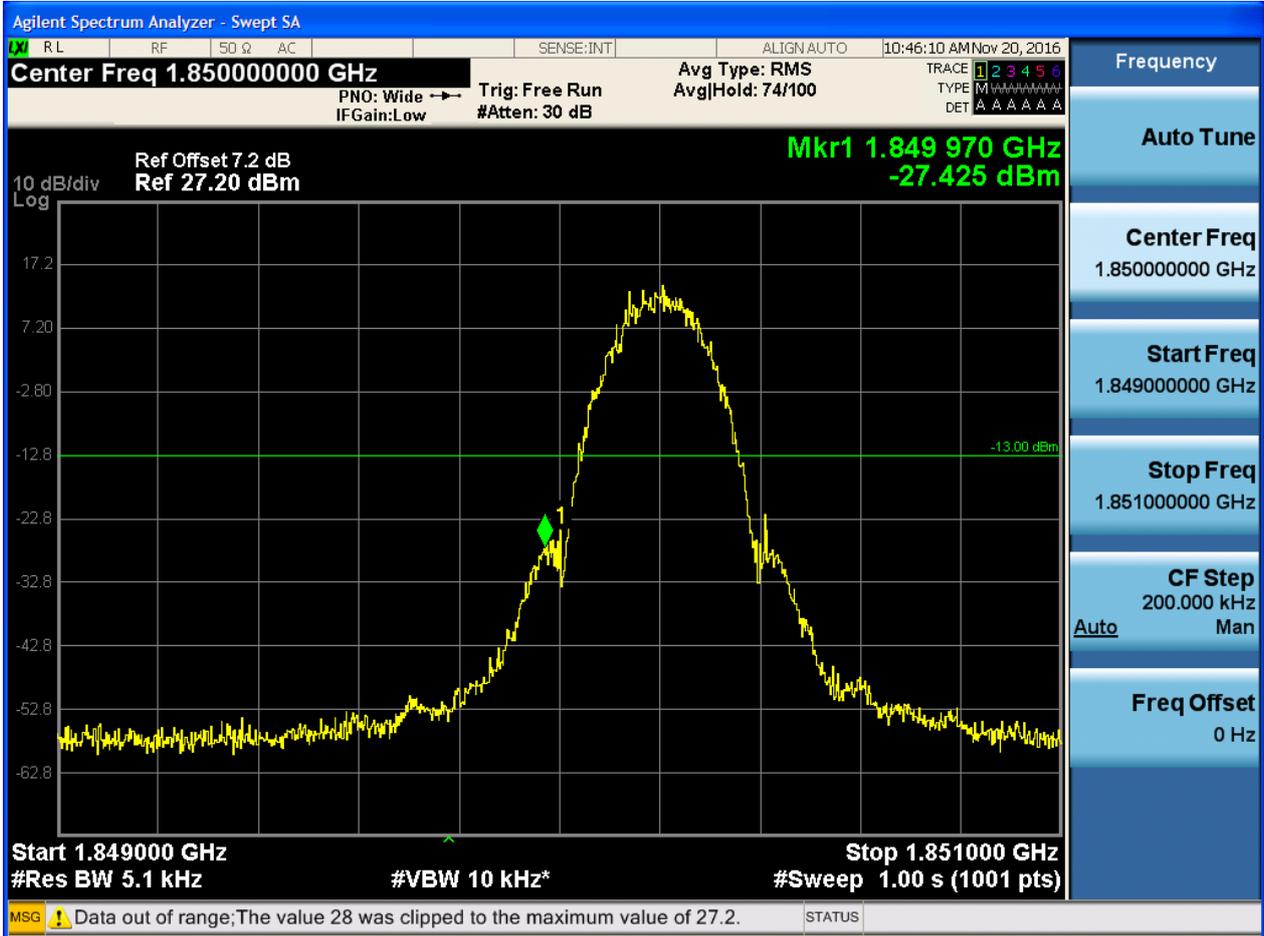
5.1.2.1.2 Test Channel = HCH



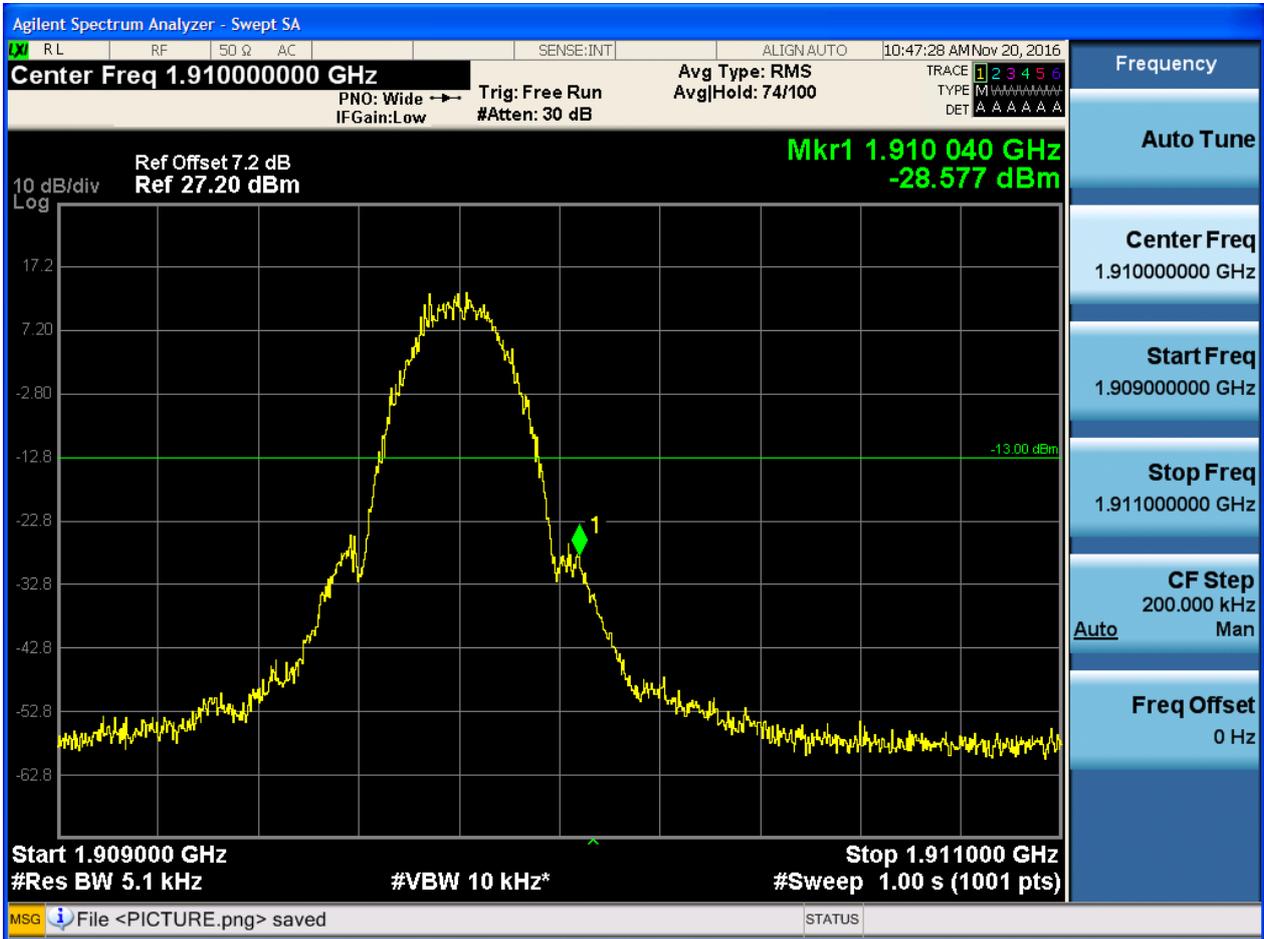


5.1.2.2 Test Mode = GSM/TM2

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.

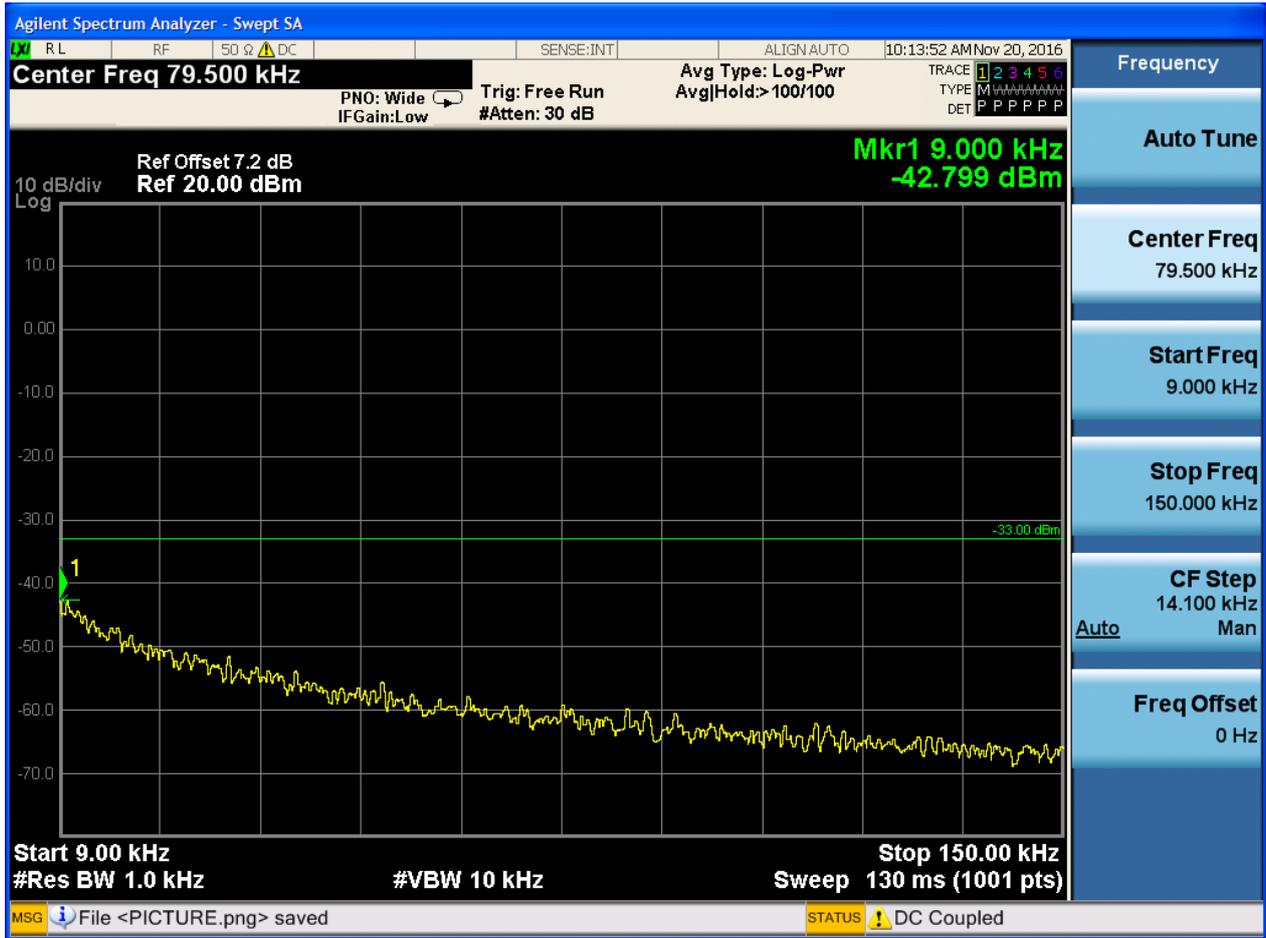
### Part I - Test Plots

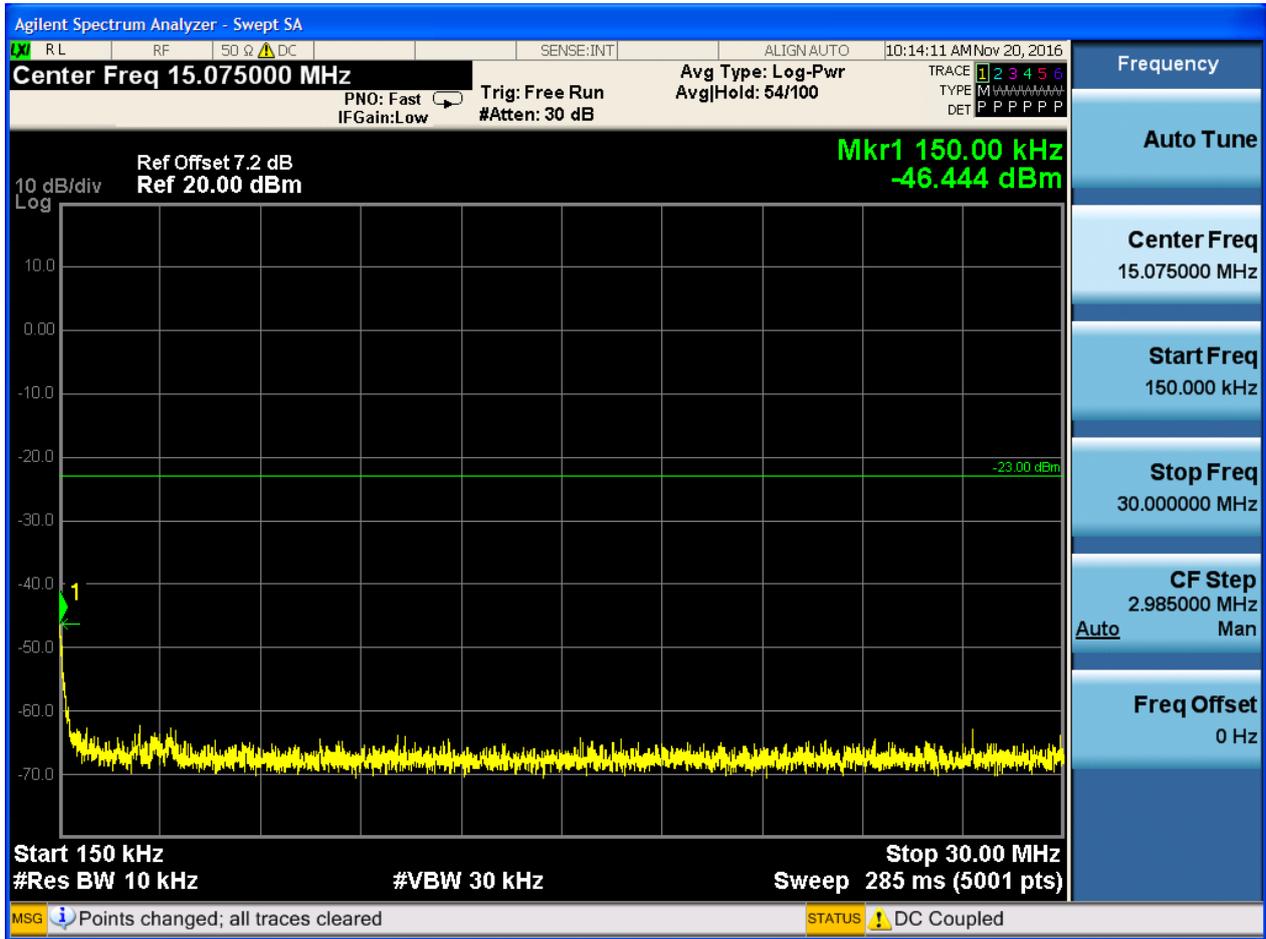
#### 6.1 For GSM

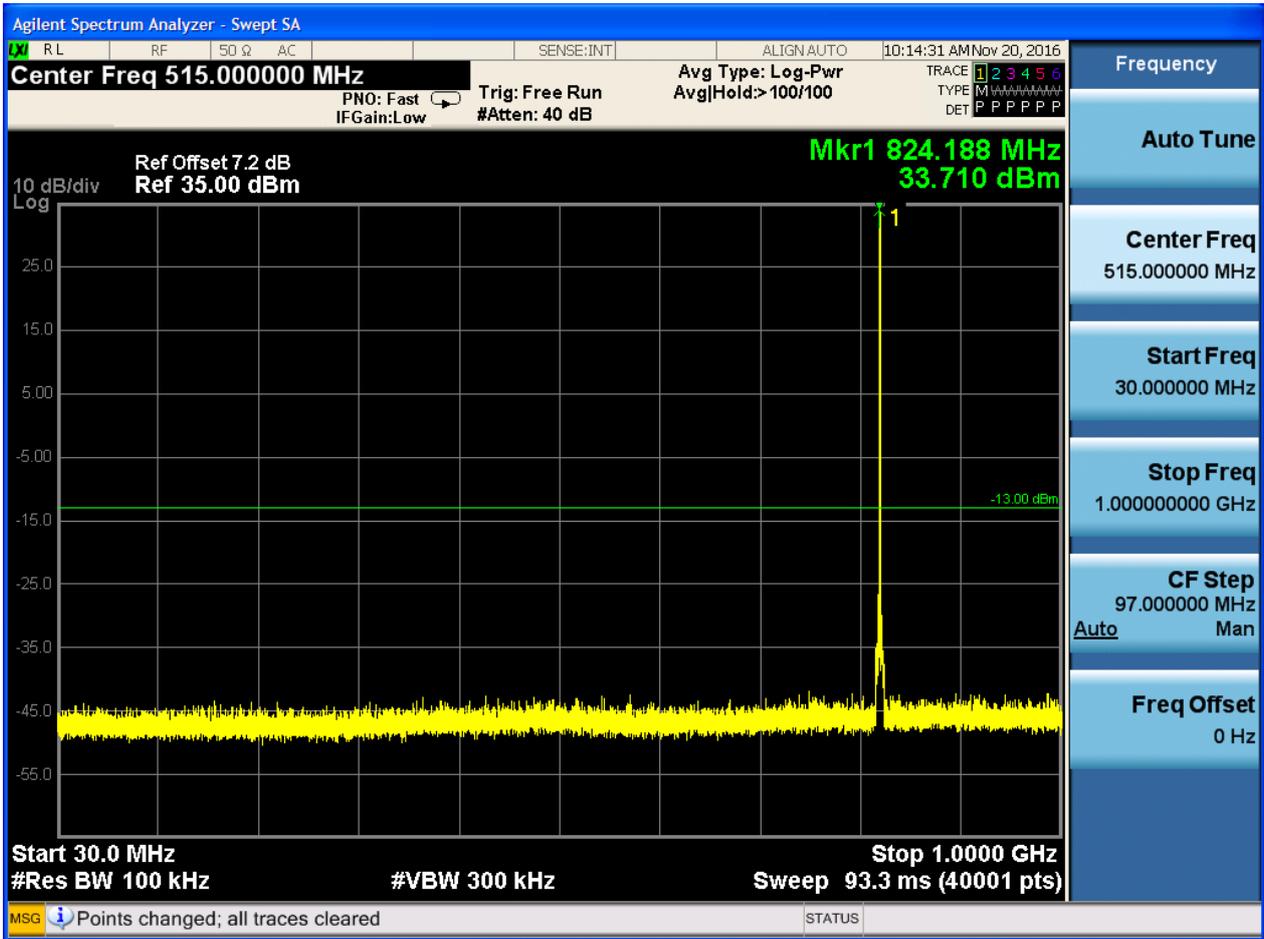
##### 6.1.1 Test Band = GSM850

##### 6.1.1.1 Test Mode = GSM/TM1

##### 6.1.1.1.1 Test Channel = LCH





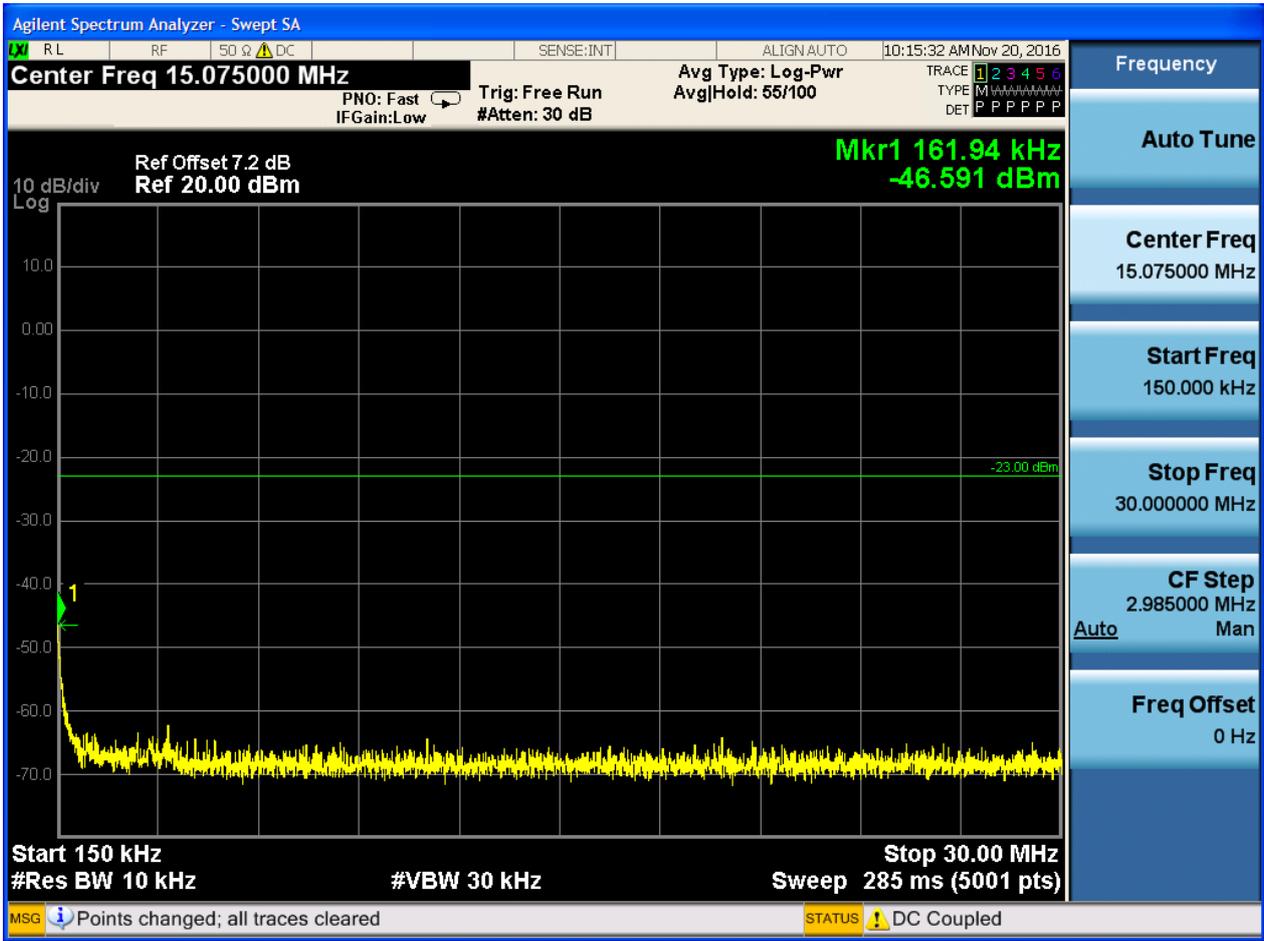


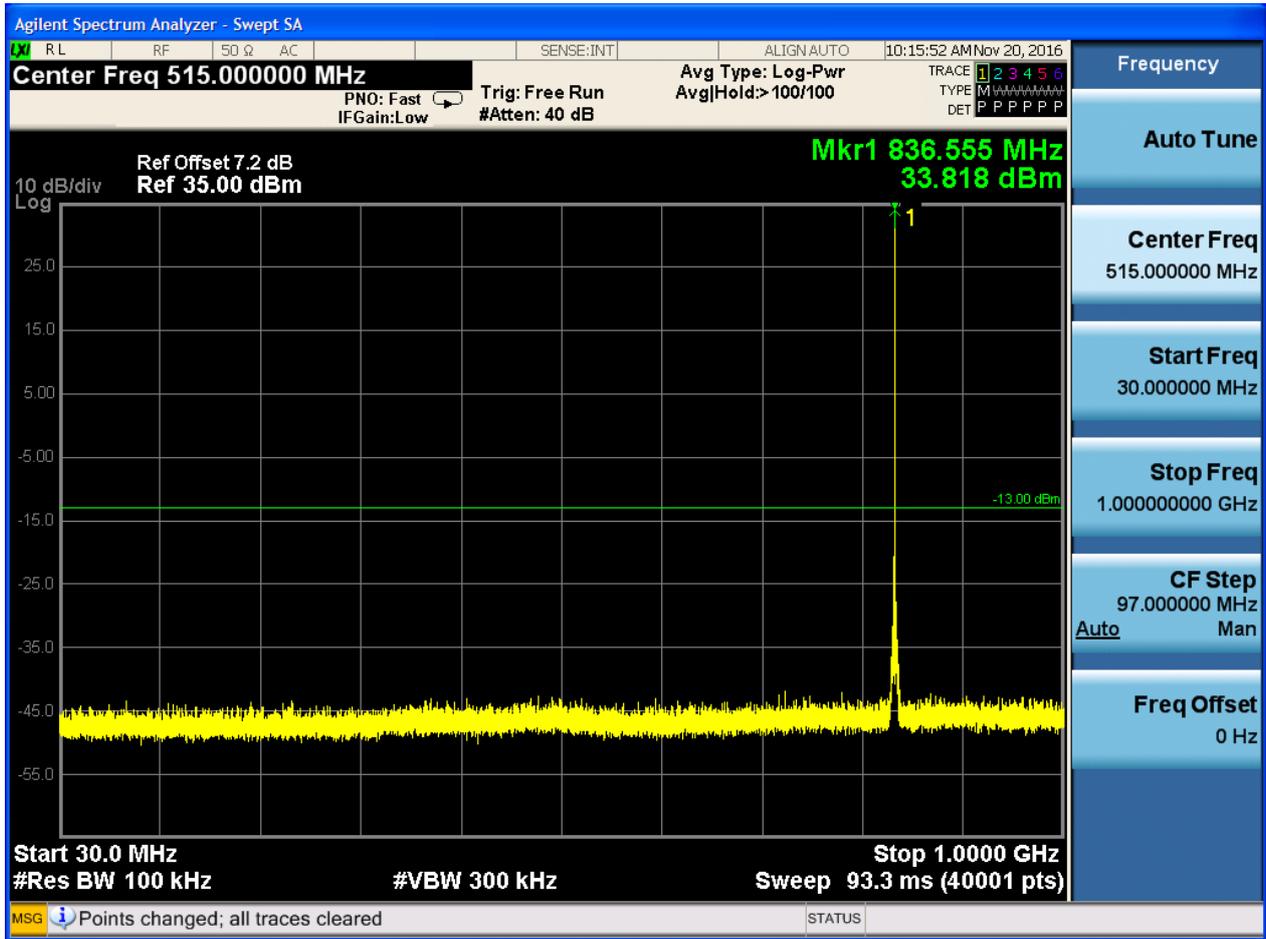


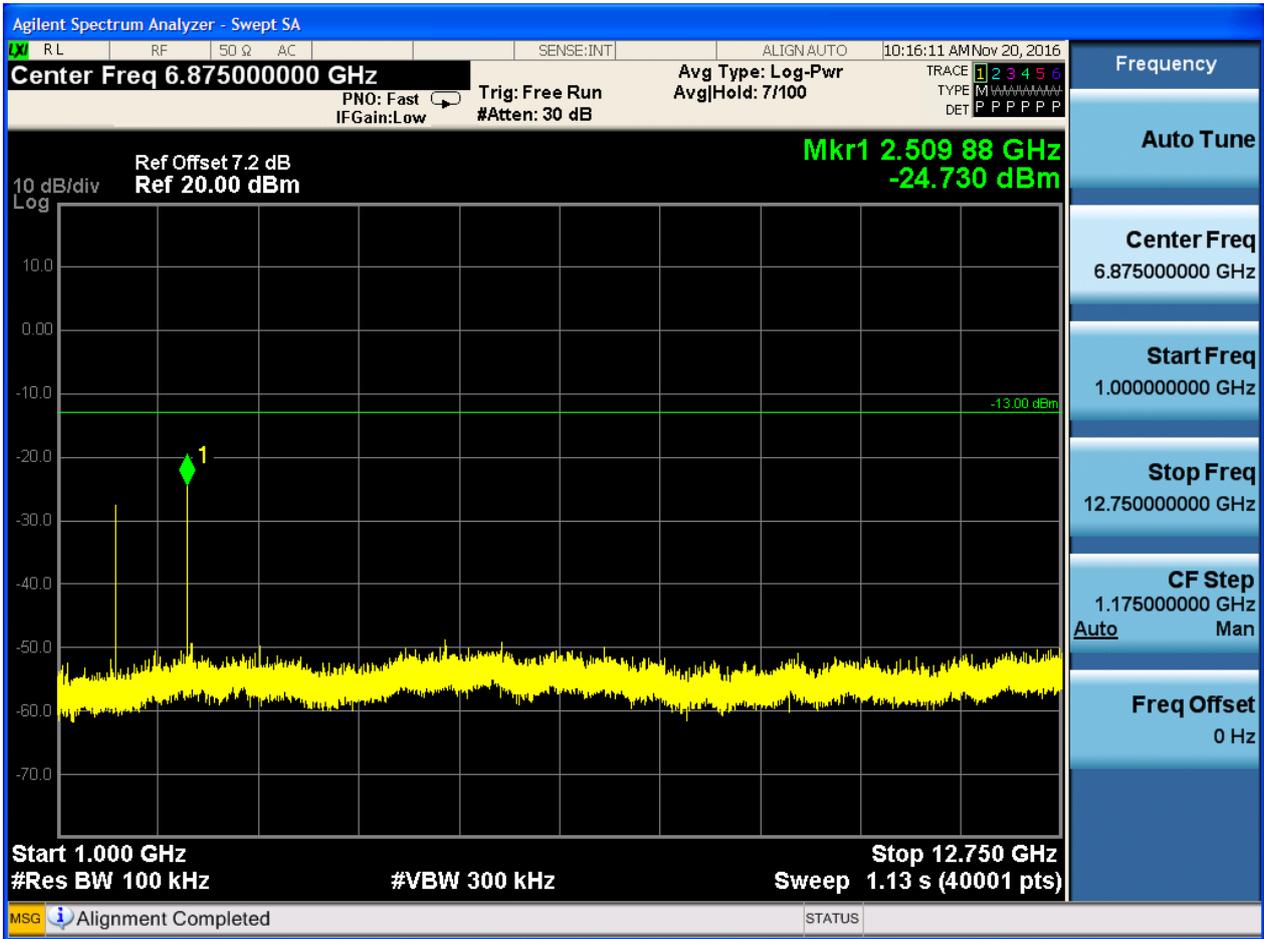


6.1.1.1.2 Test Channel = MCH





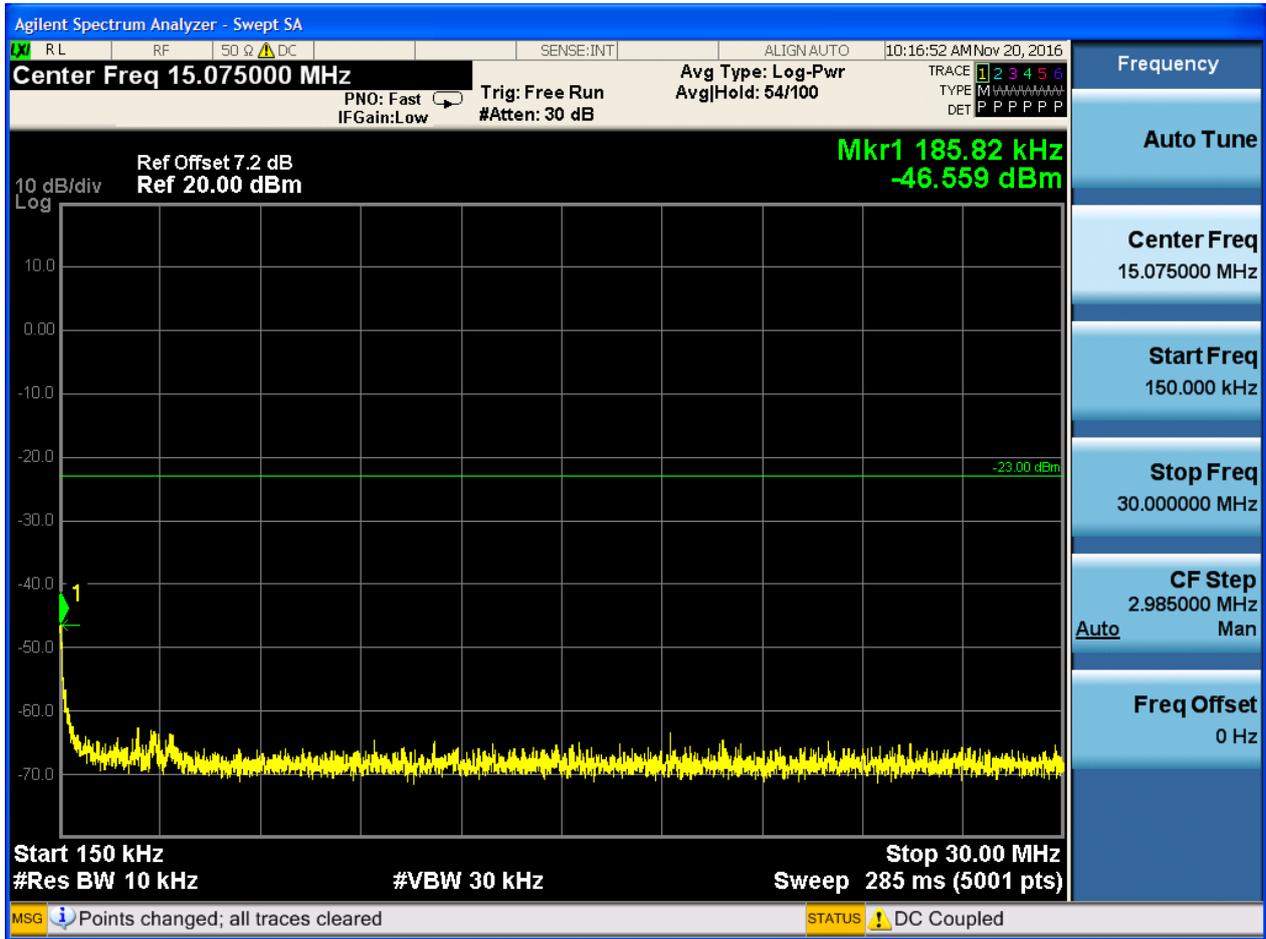


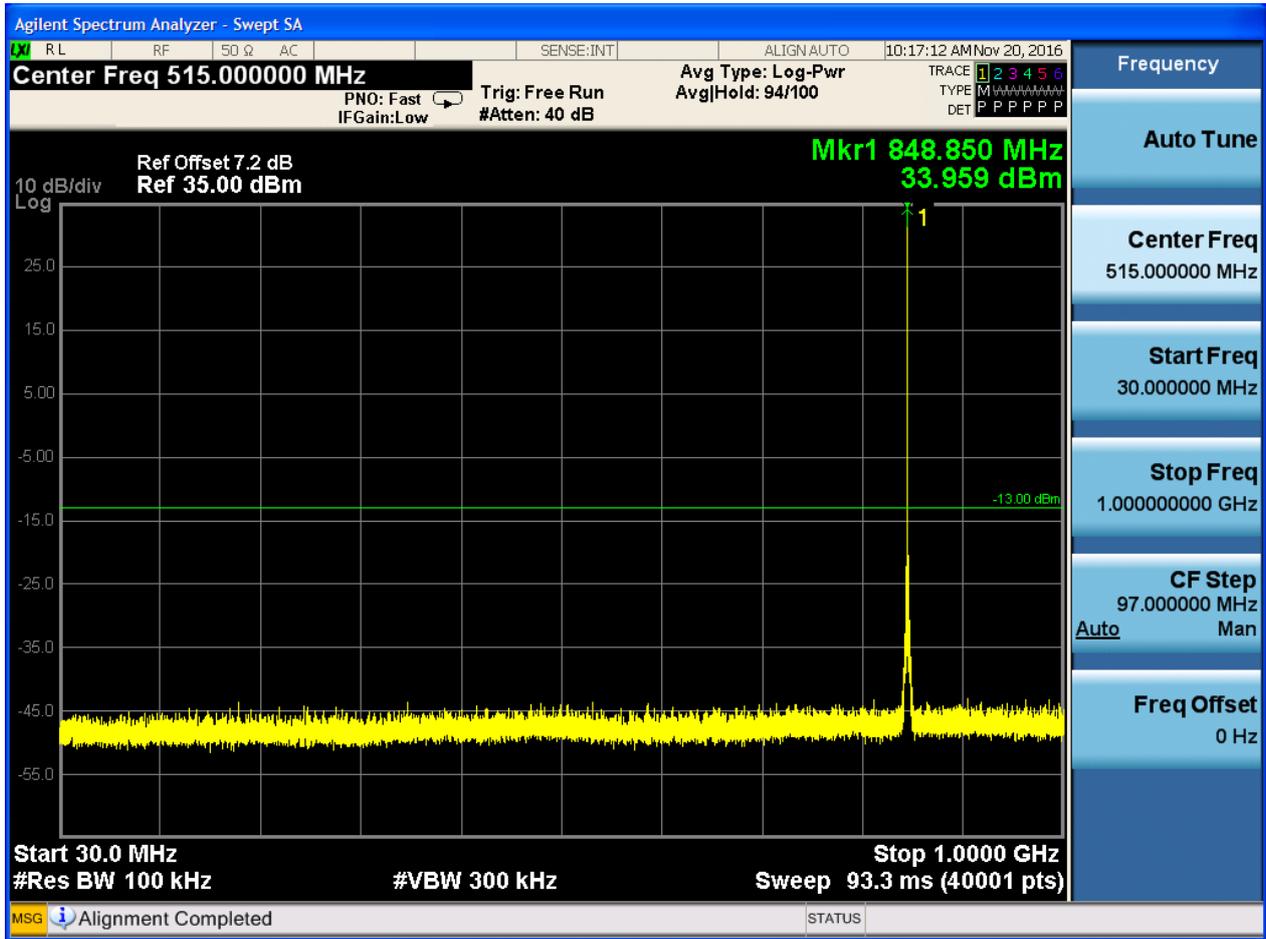


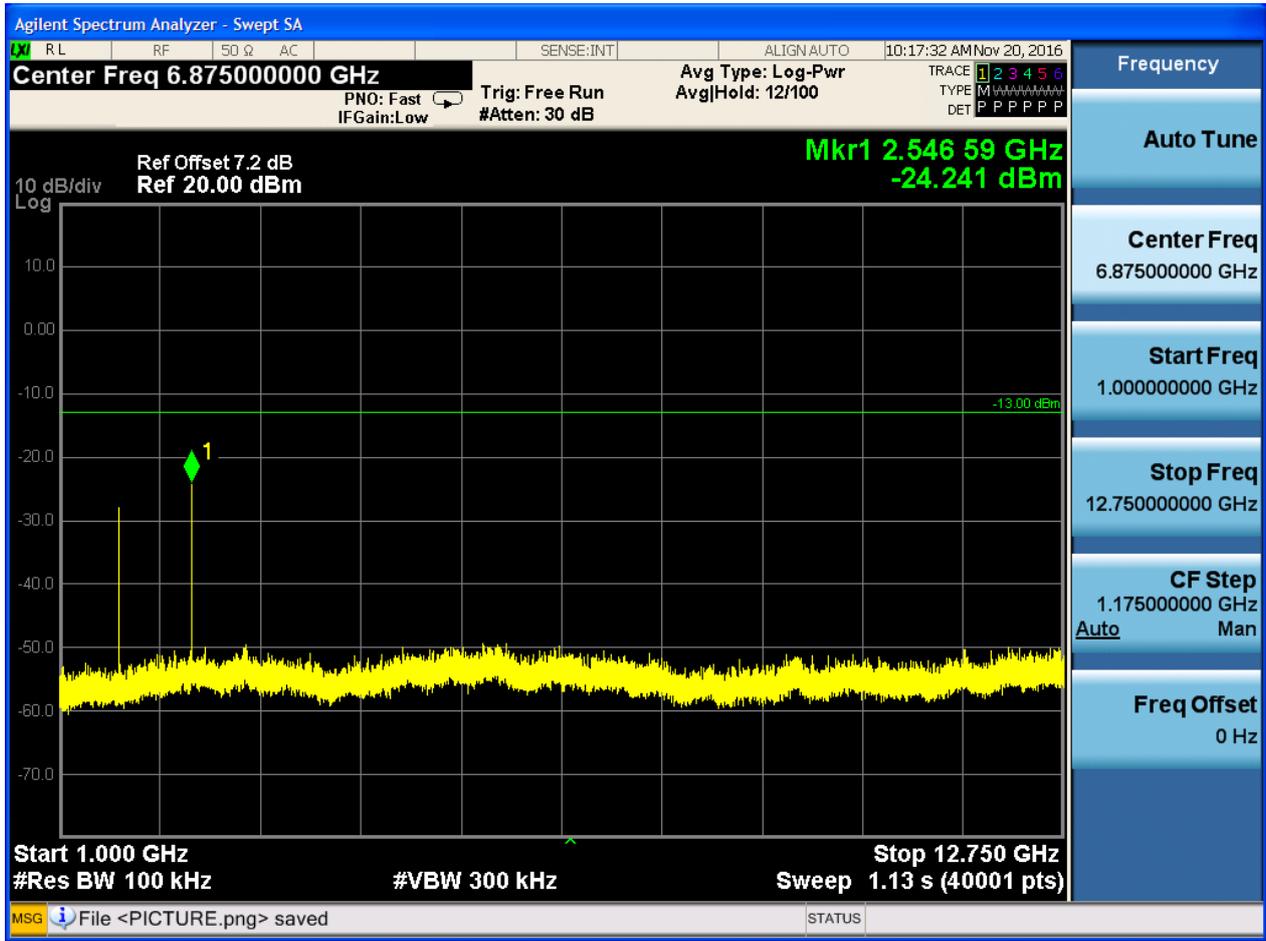


### 6.1.1.1.3 Test Channel = HCH





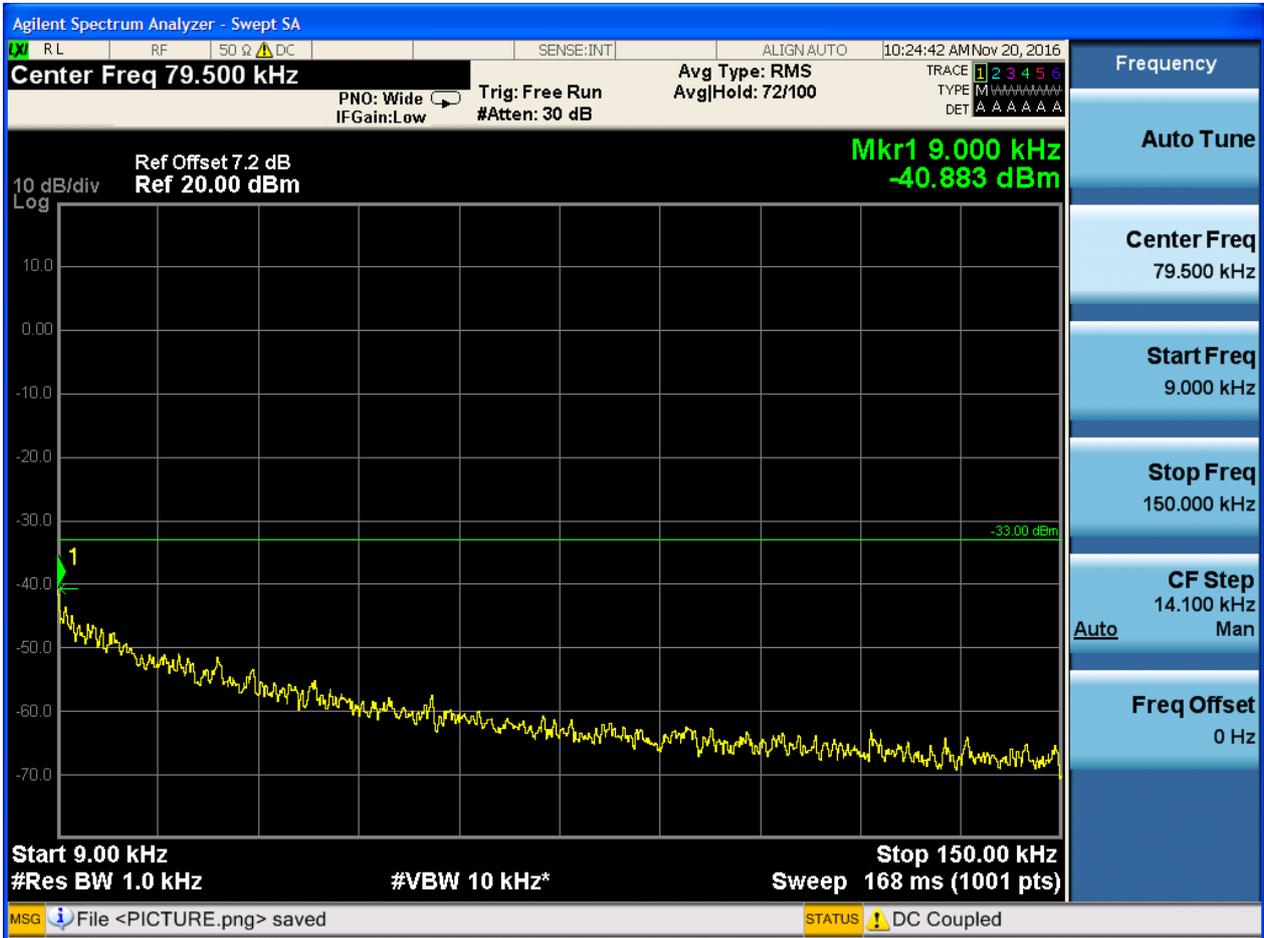


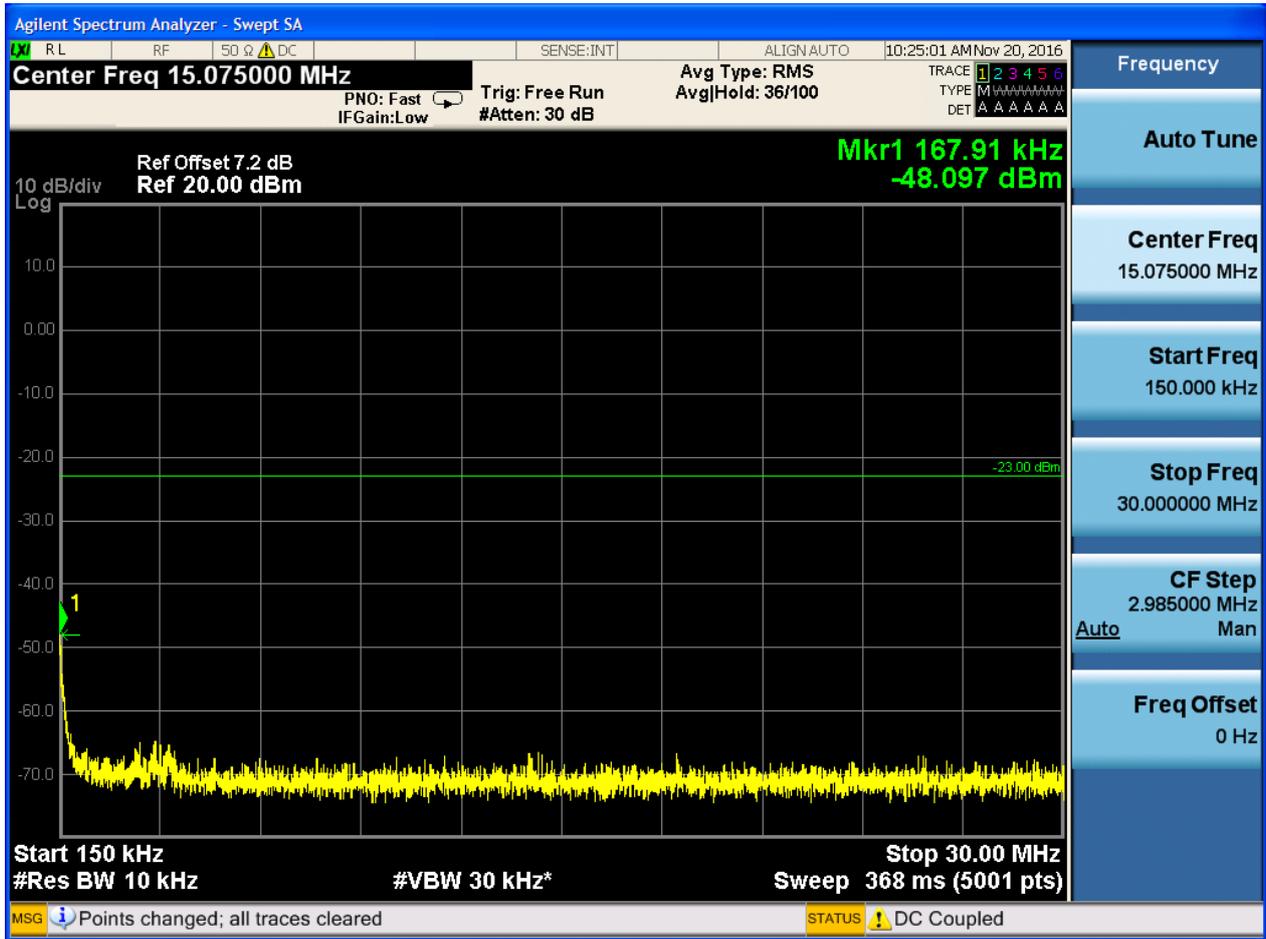


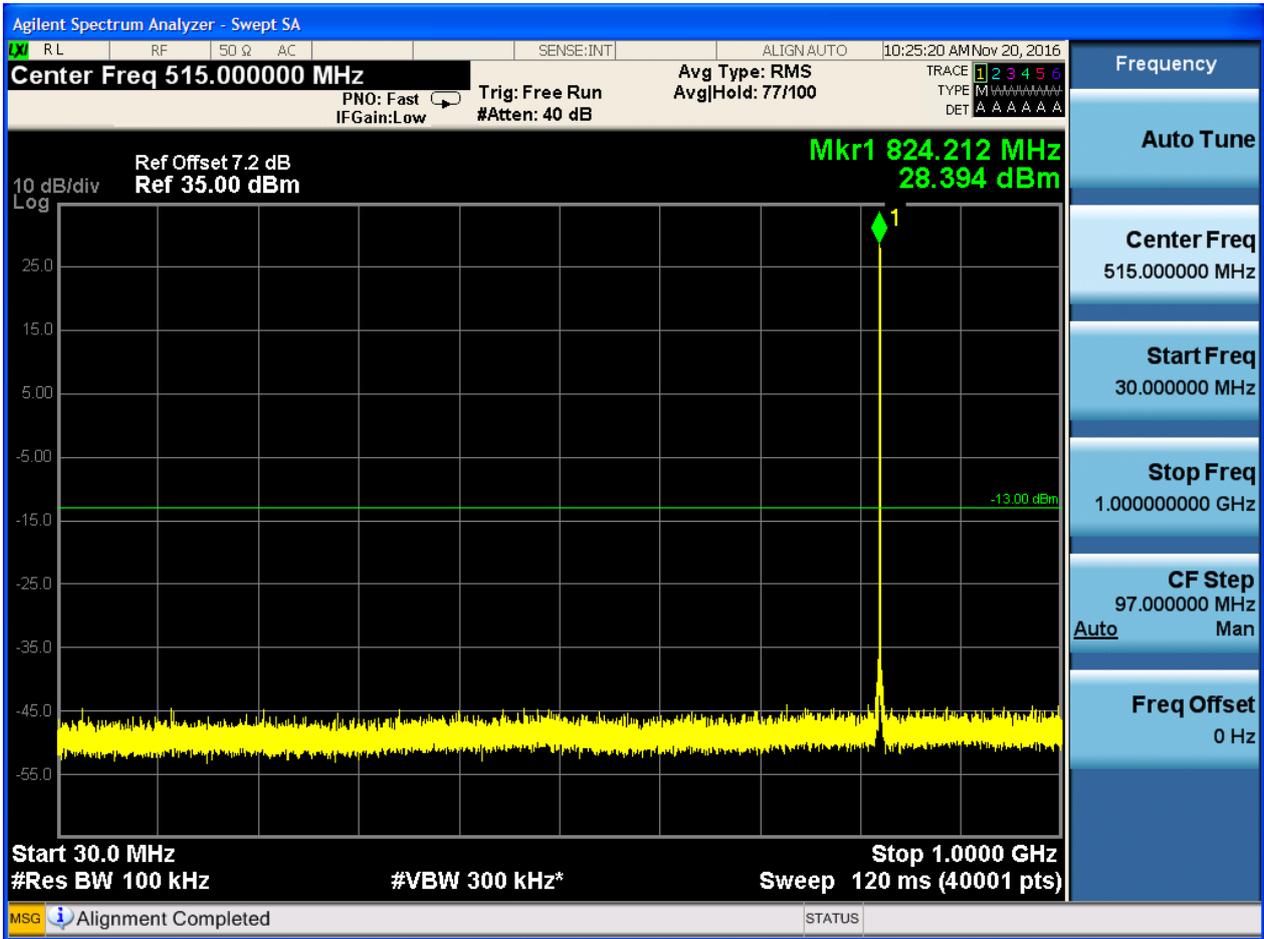


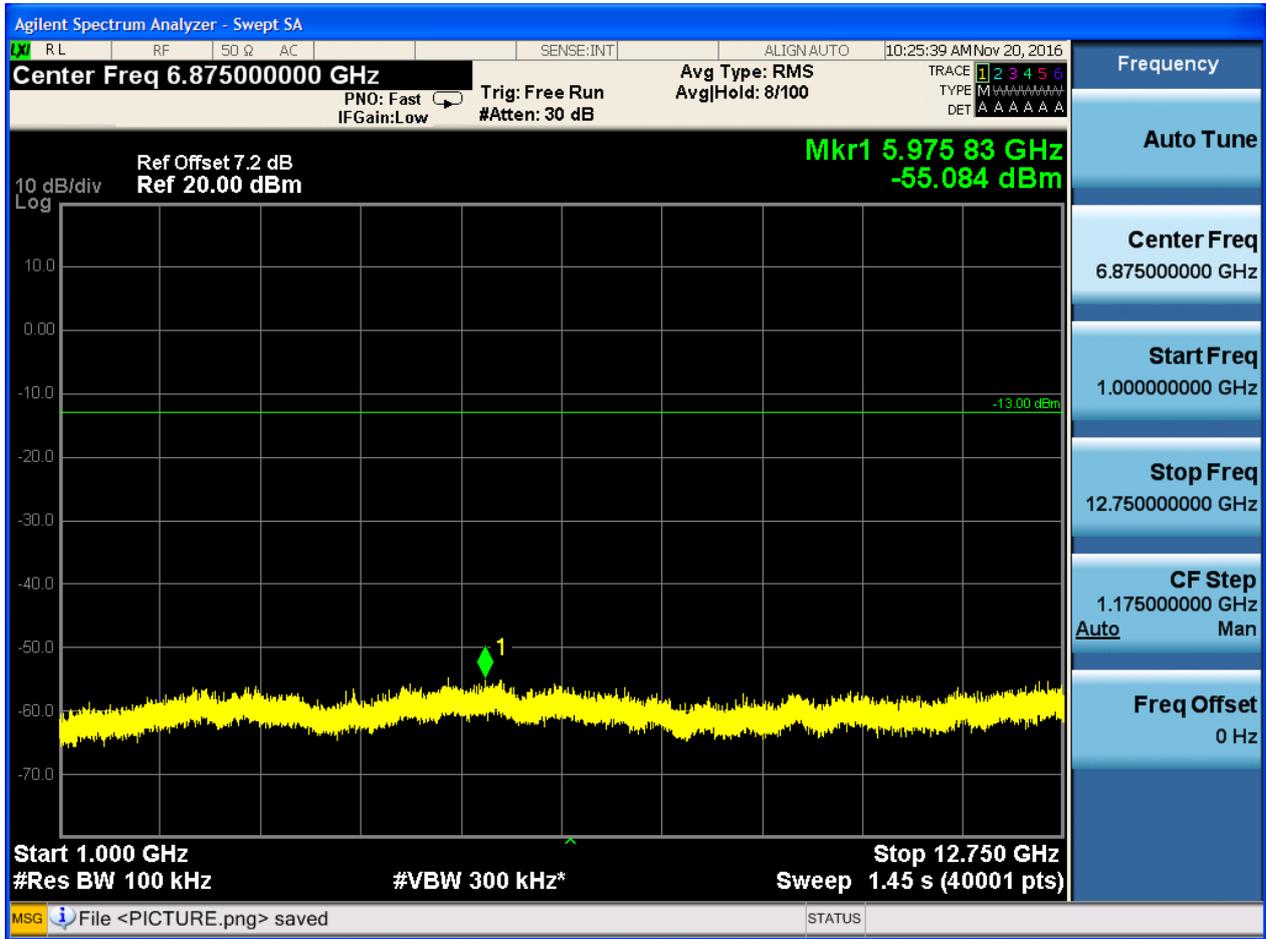
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH



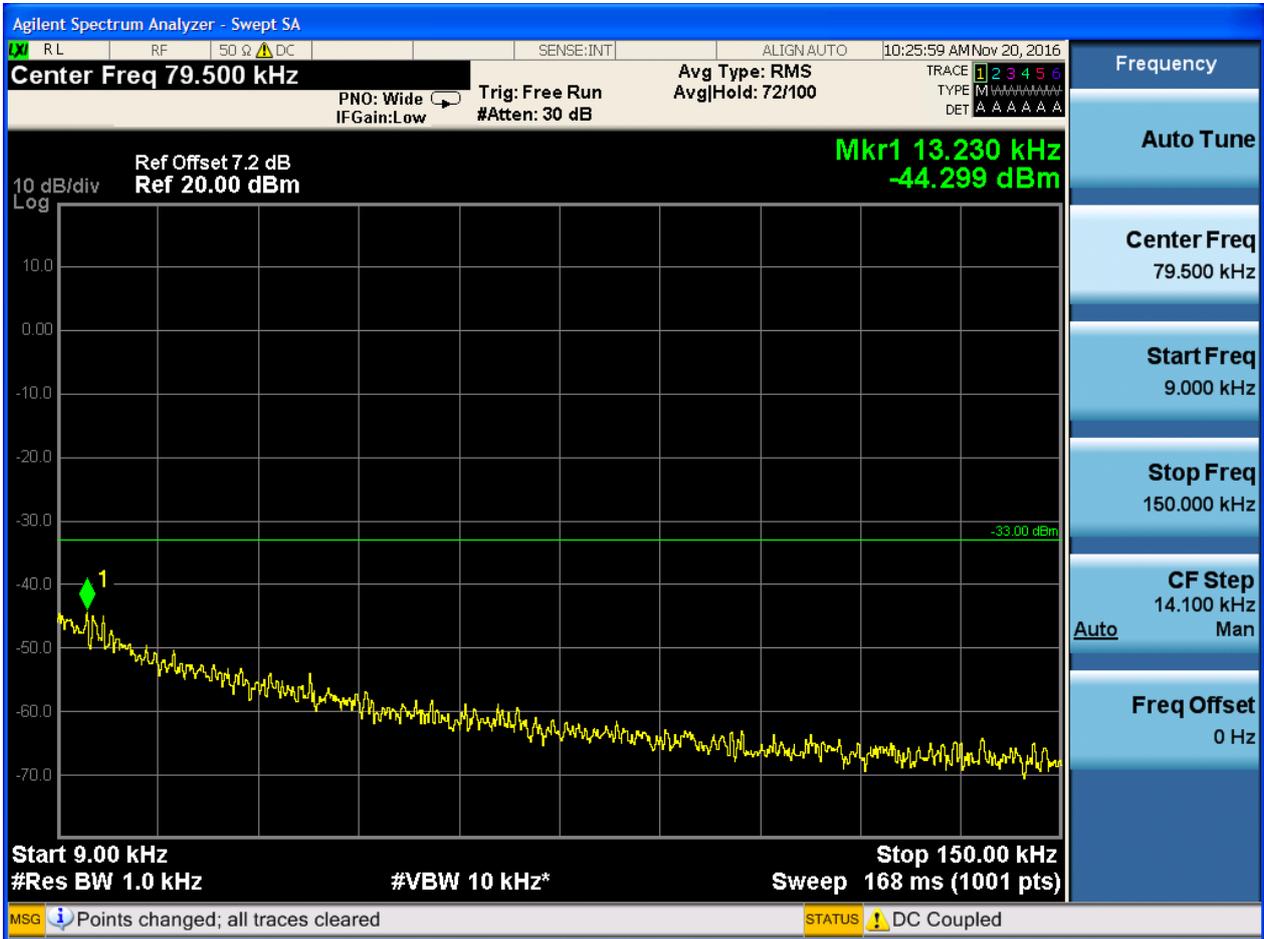




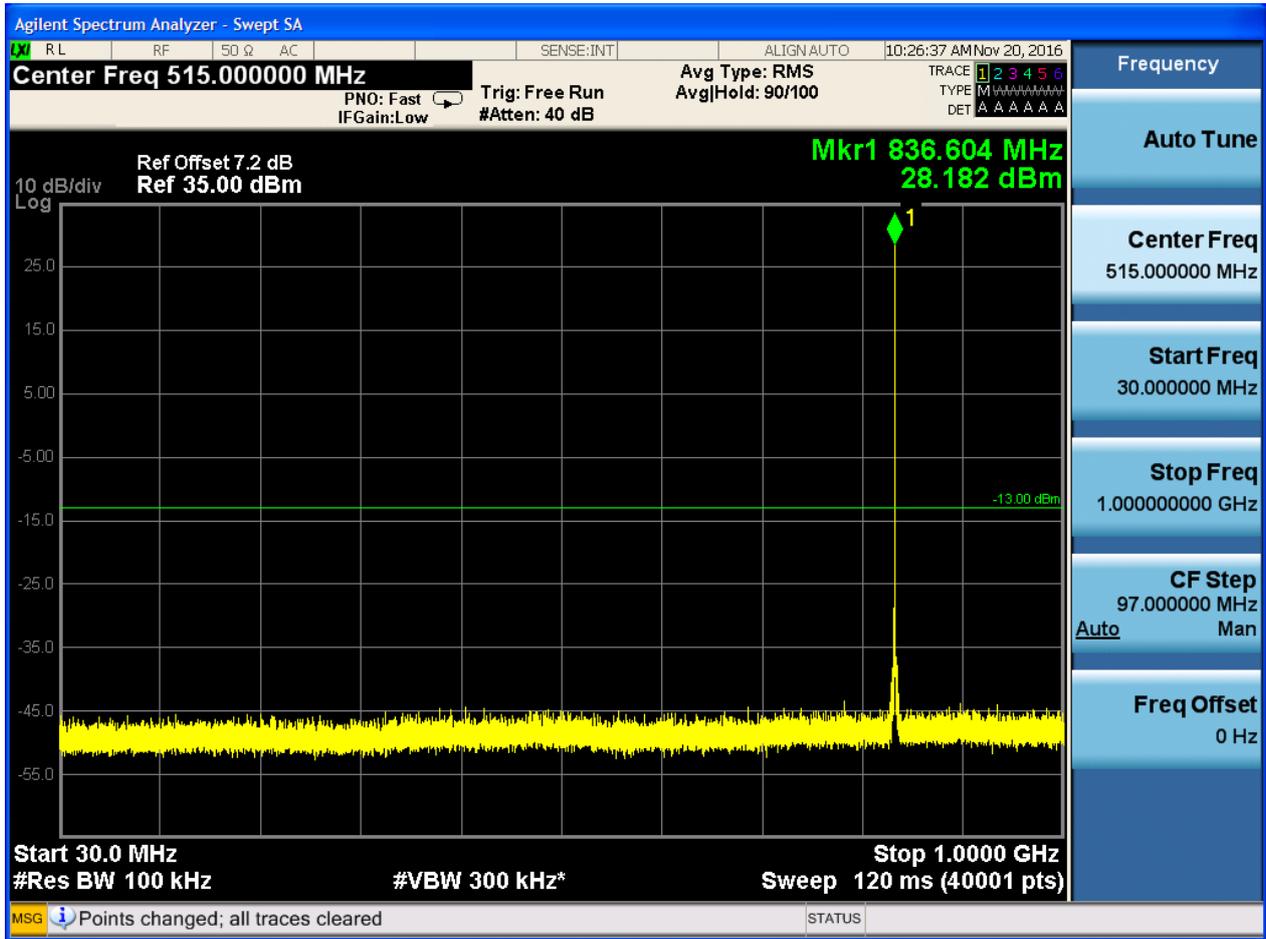


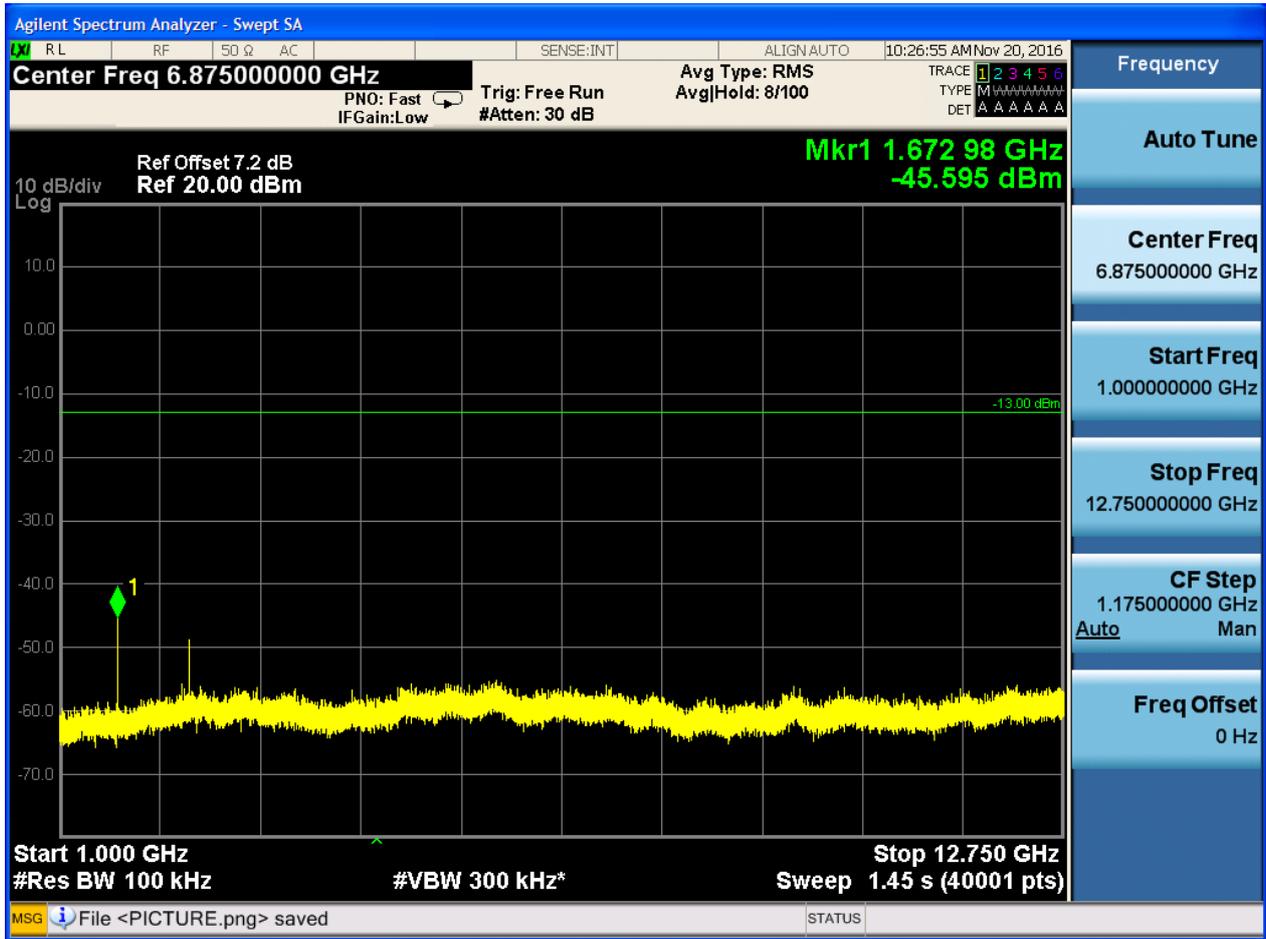


6.1.1.2.2 Test Channel = MCH



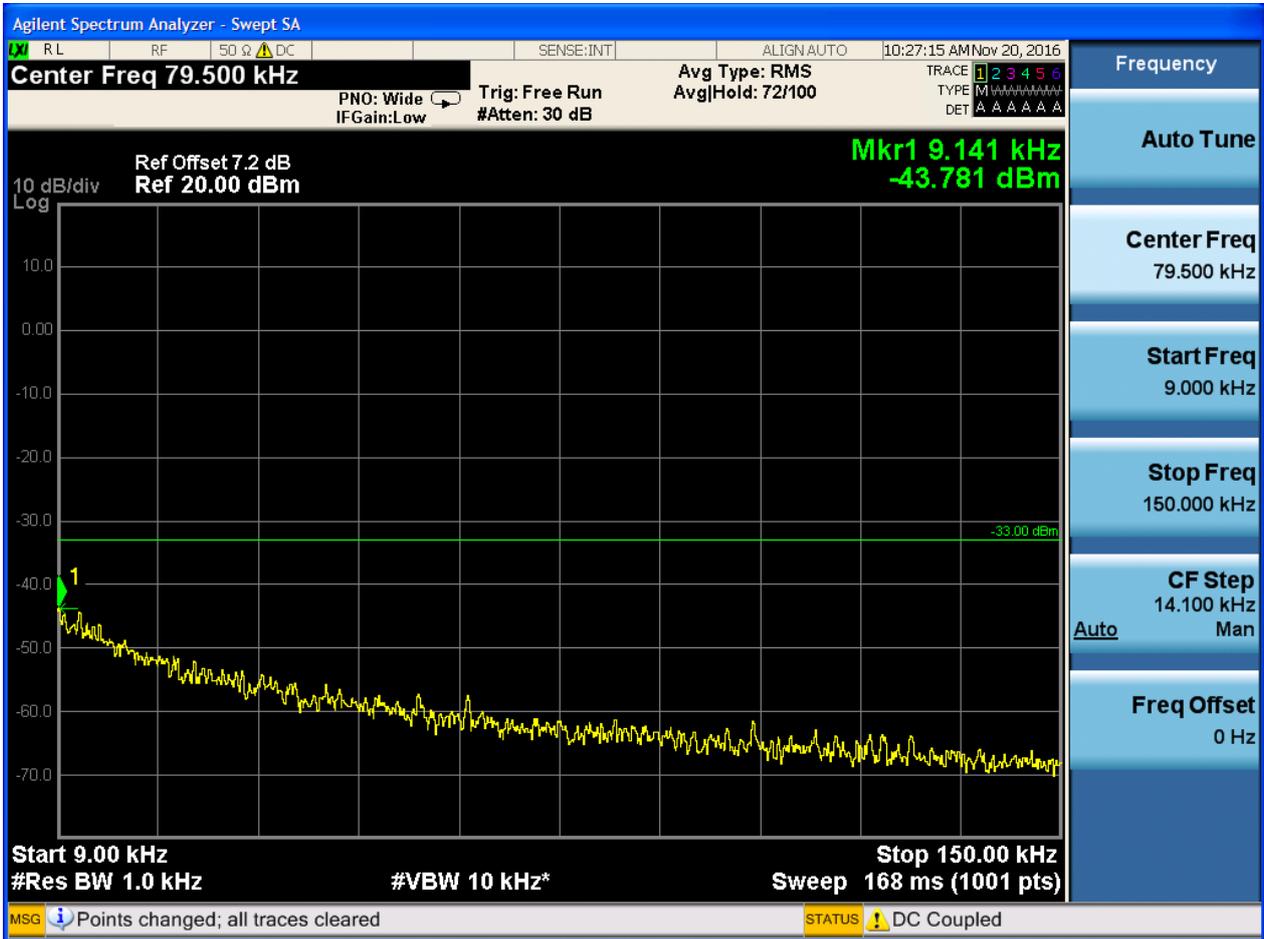


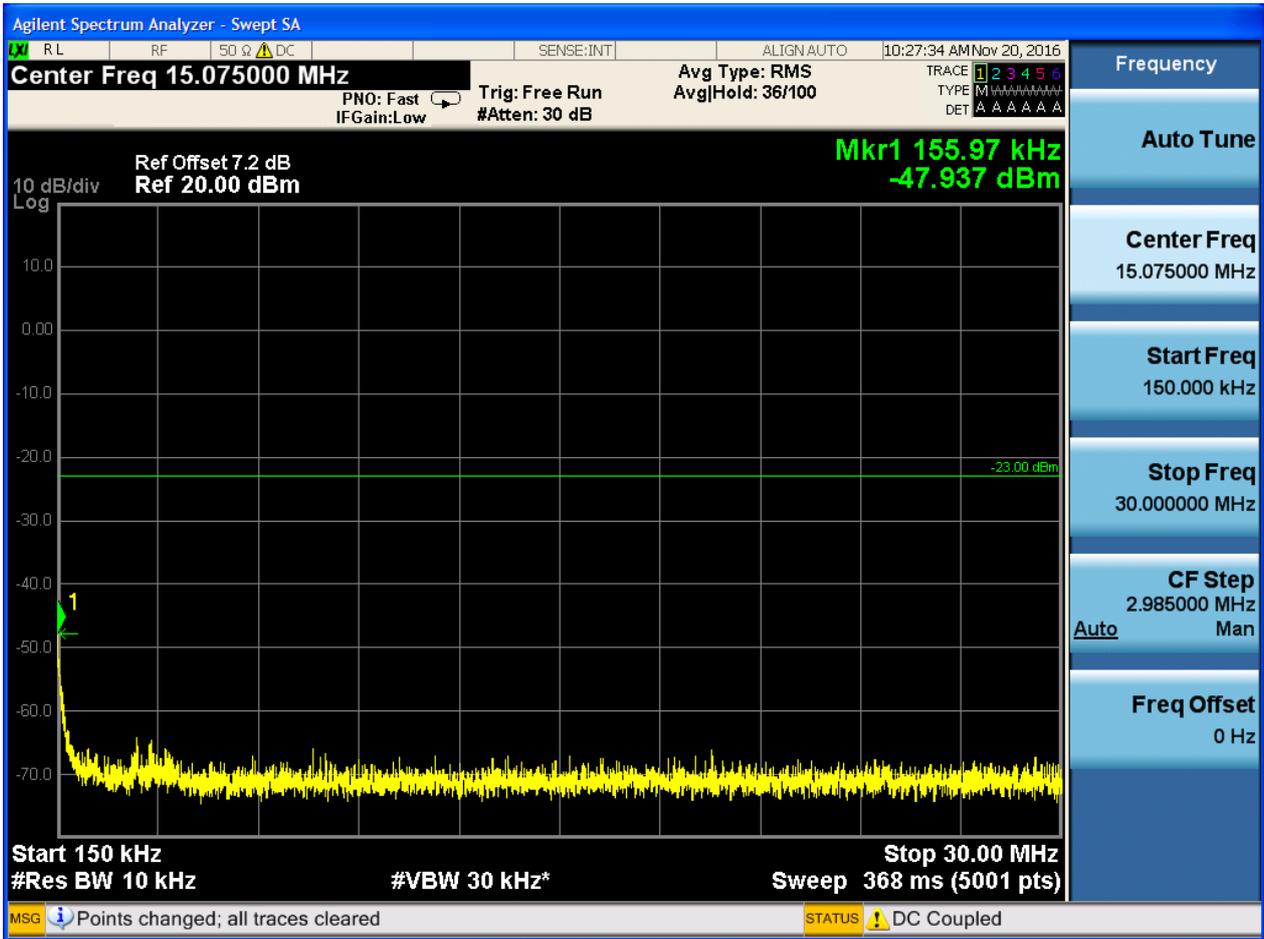


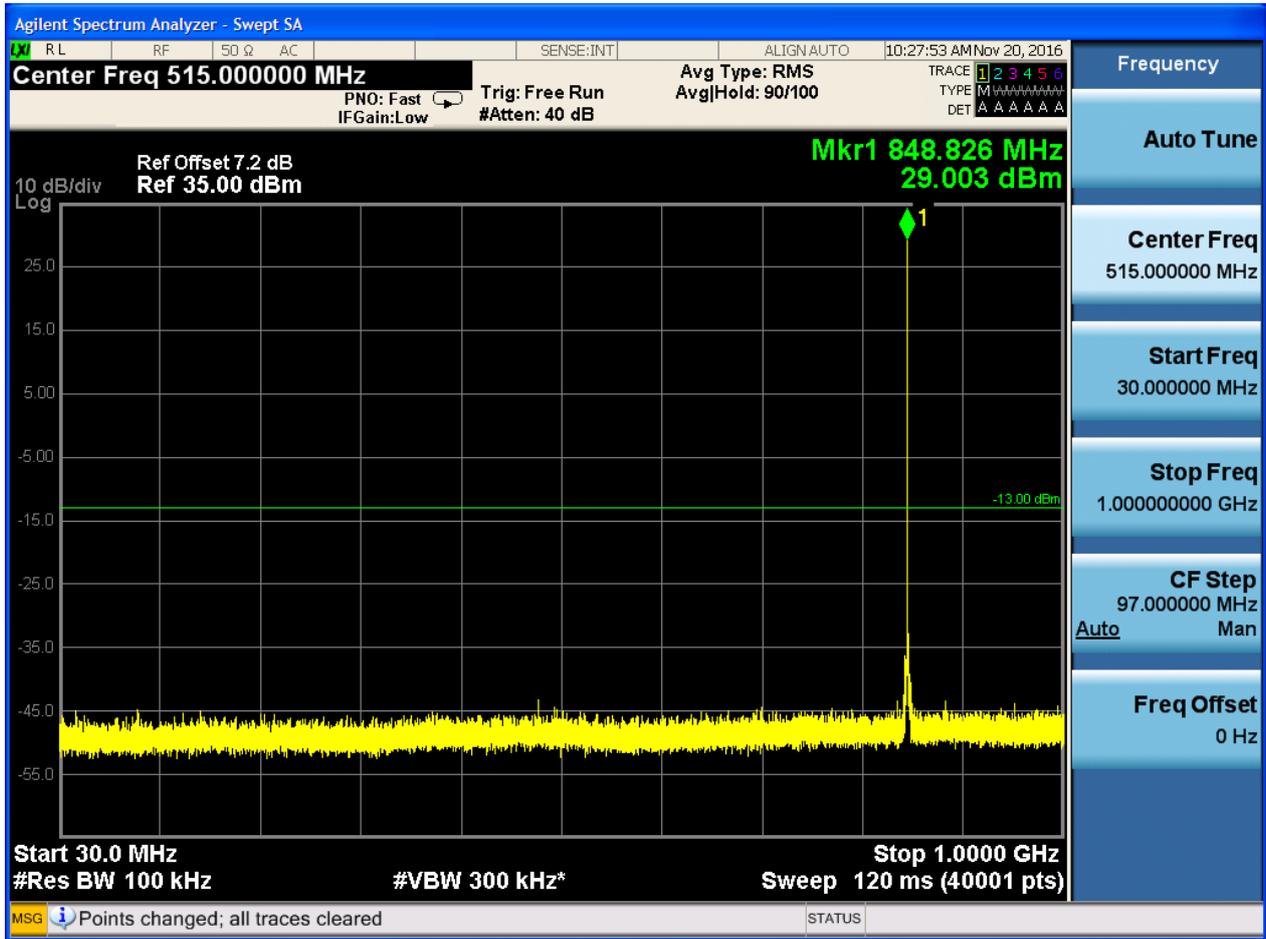


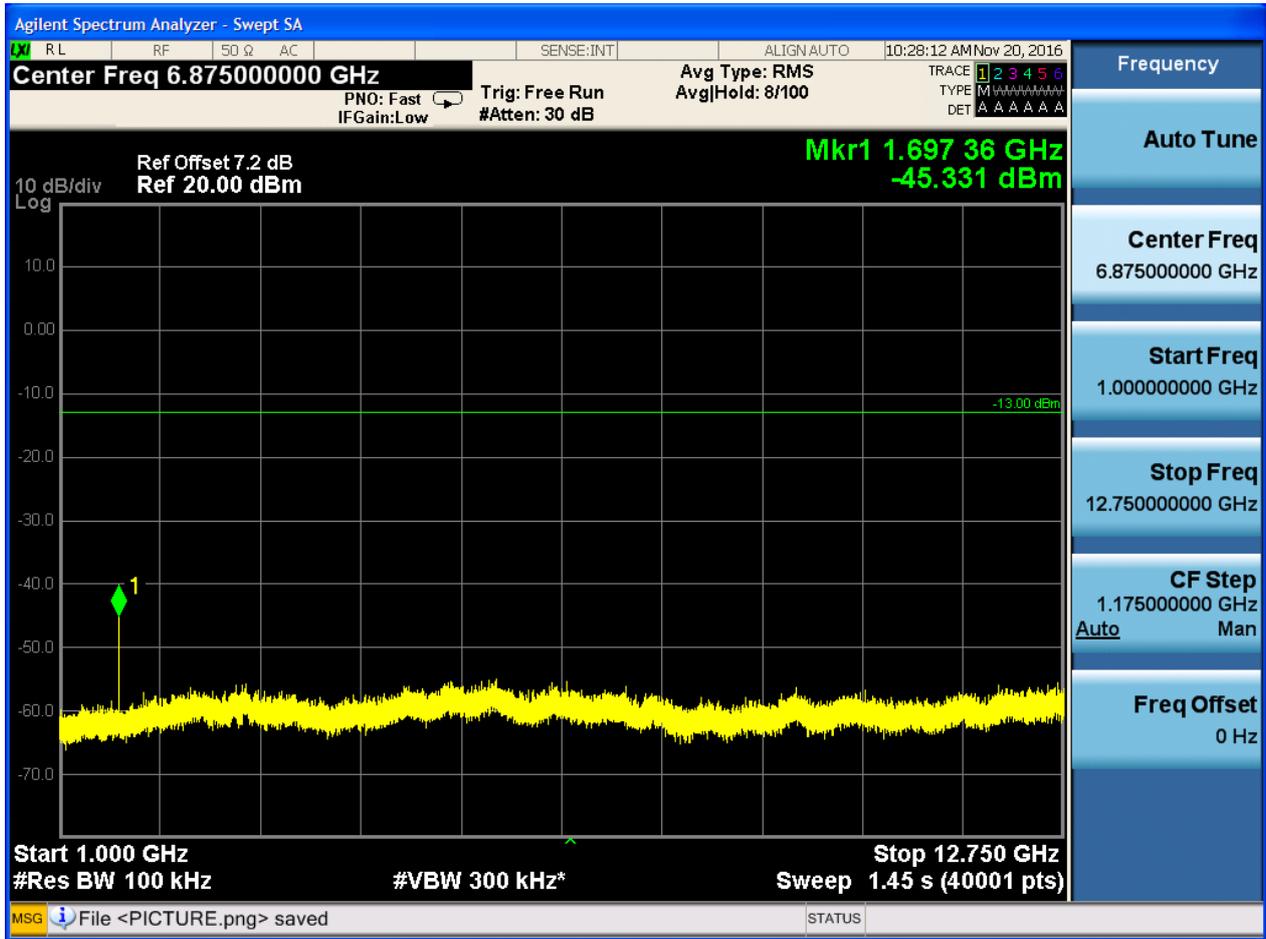


### 6.1.1.2.3 Test Channel = HCH









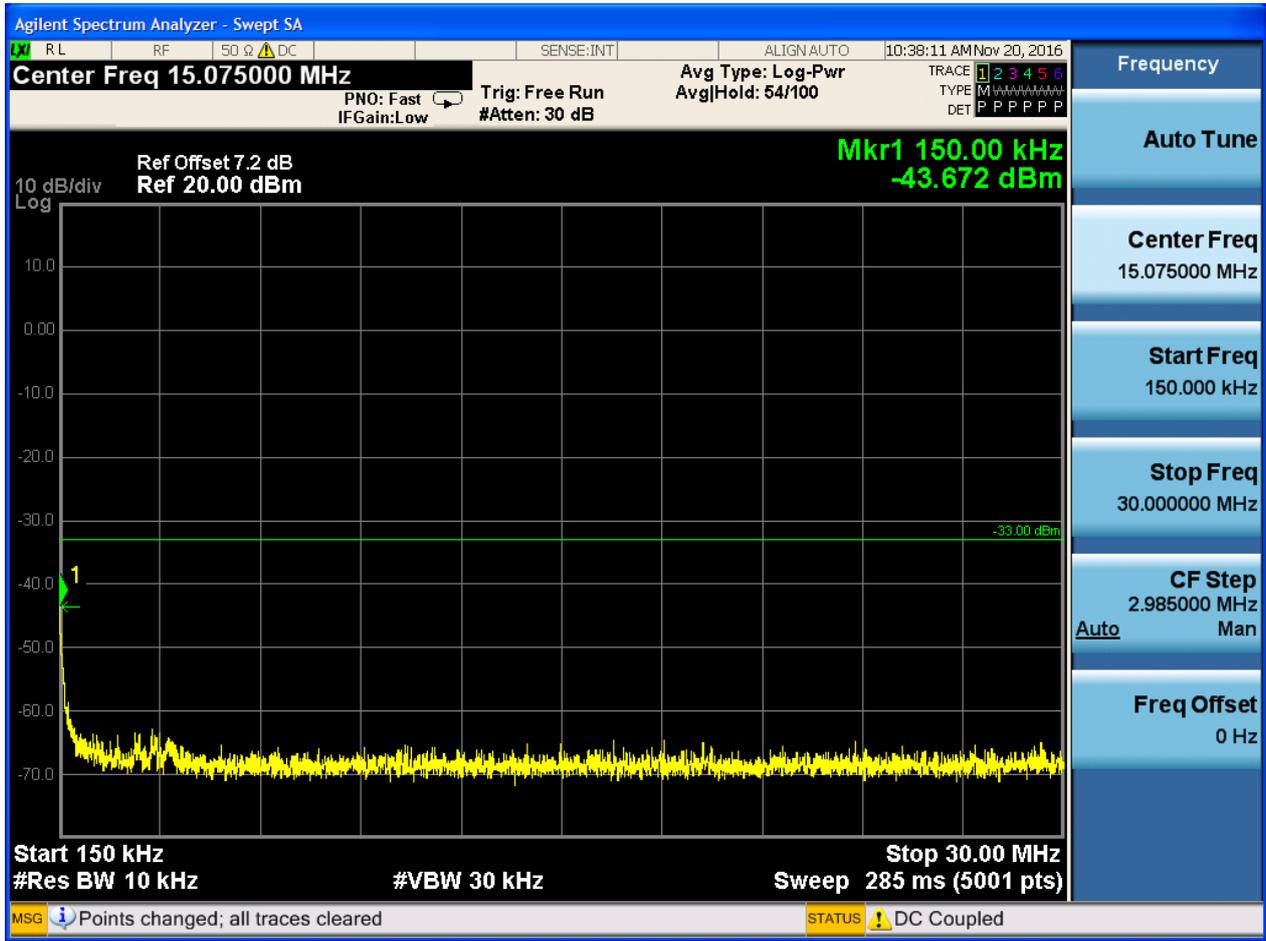


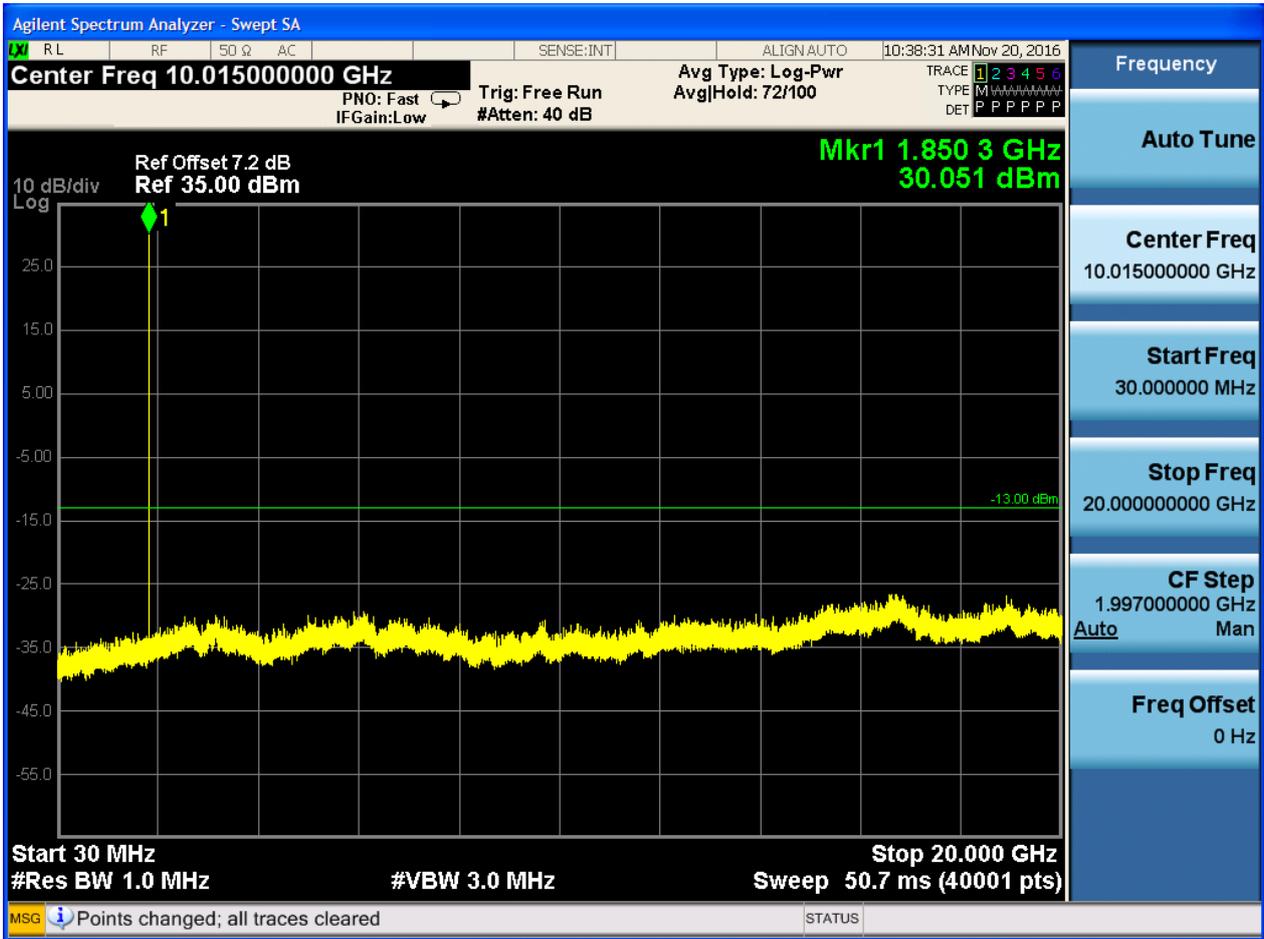
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH

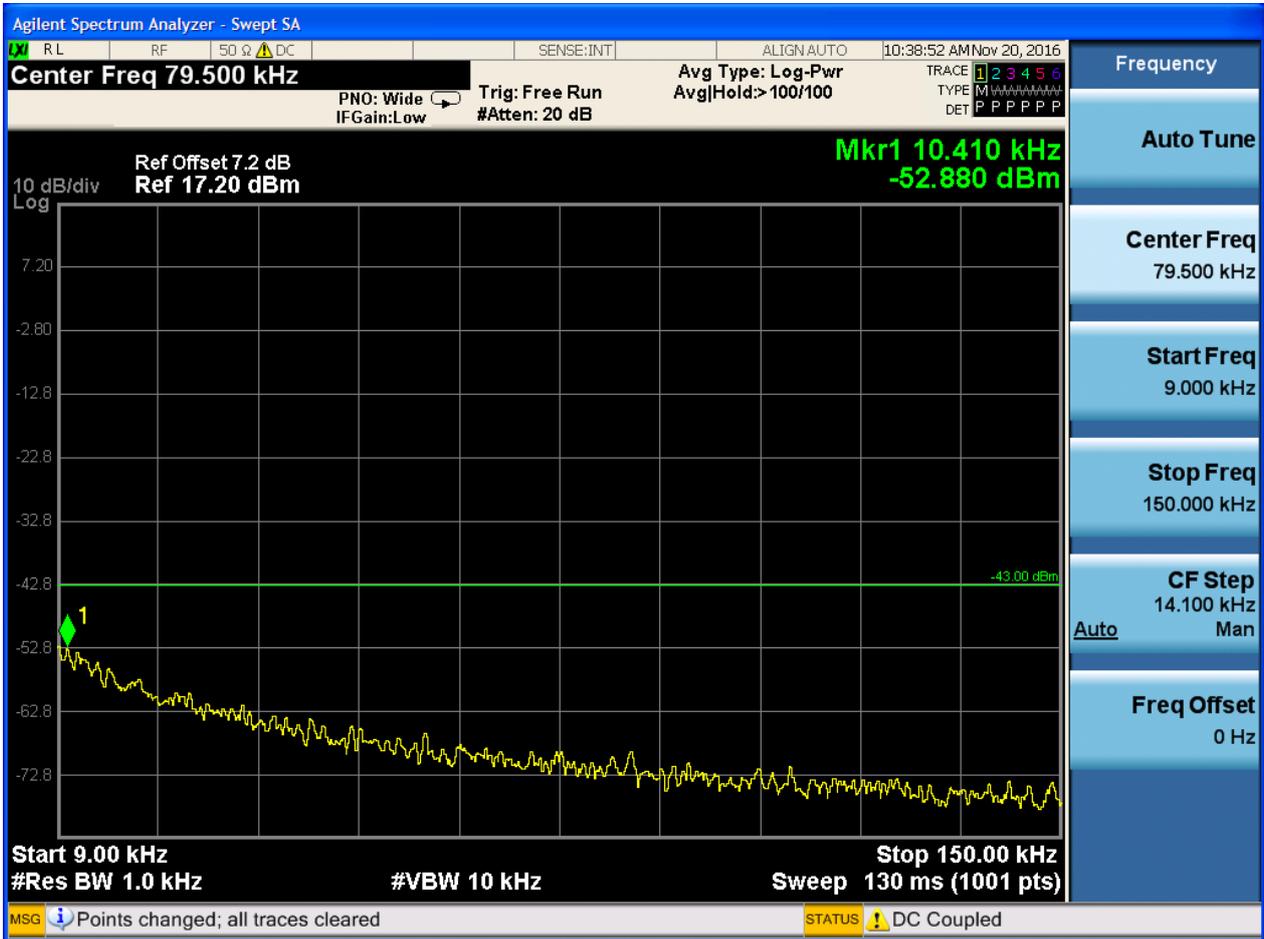


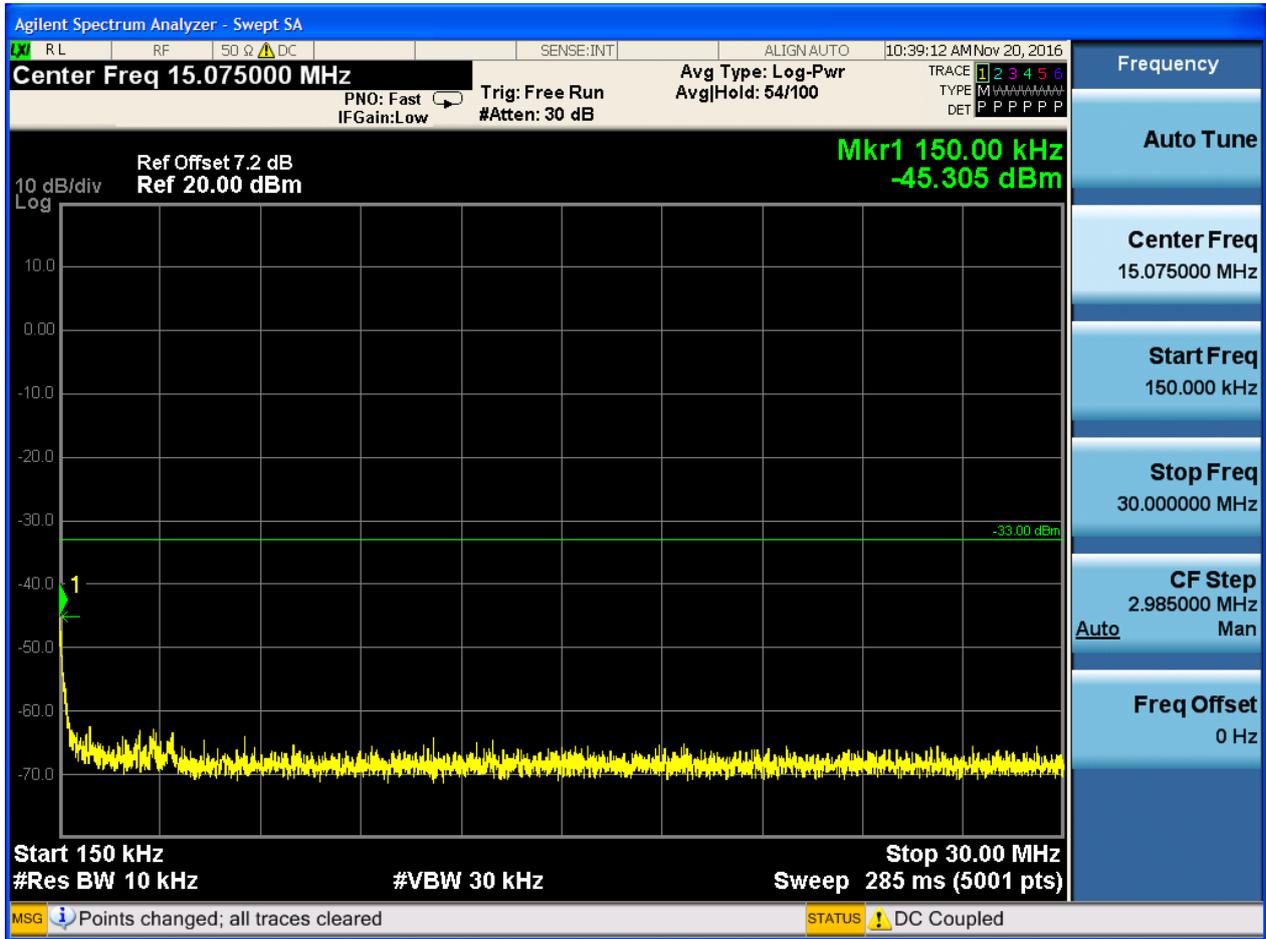


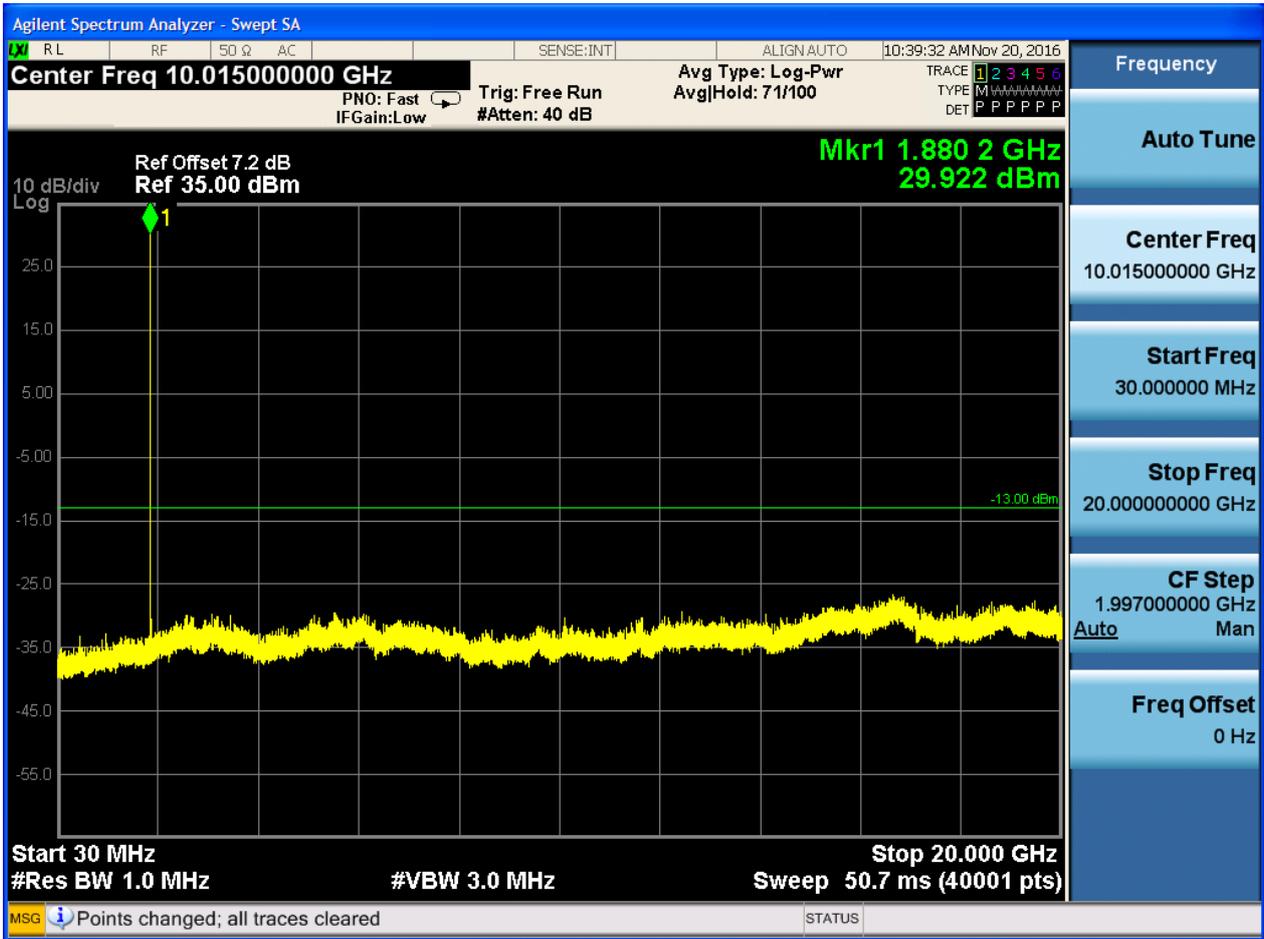




6.1.2.1.2 Test Channel = MCH



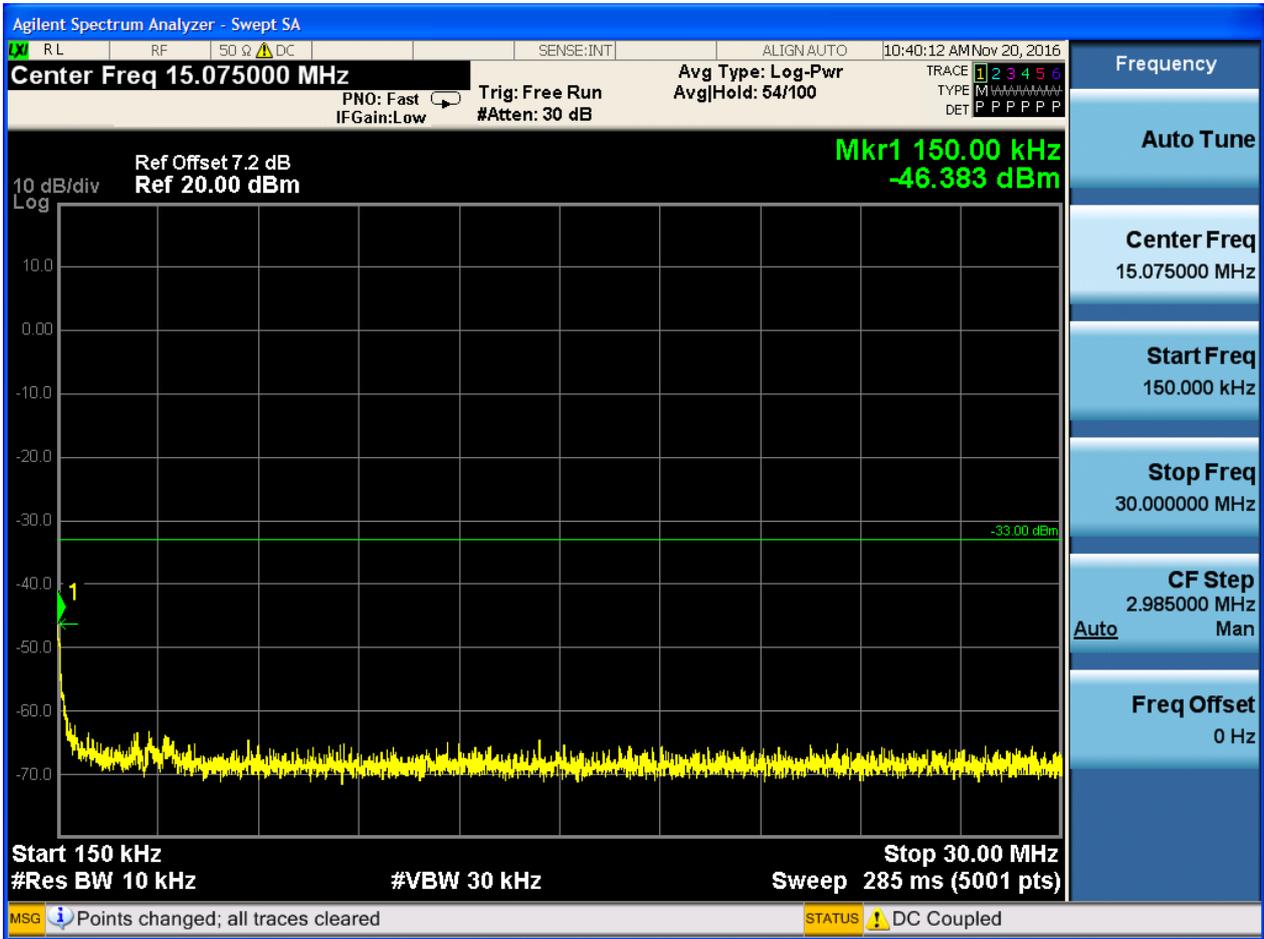


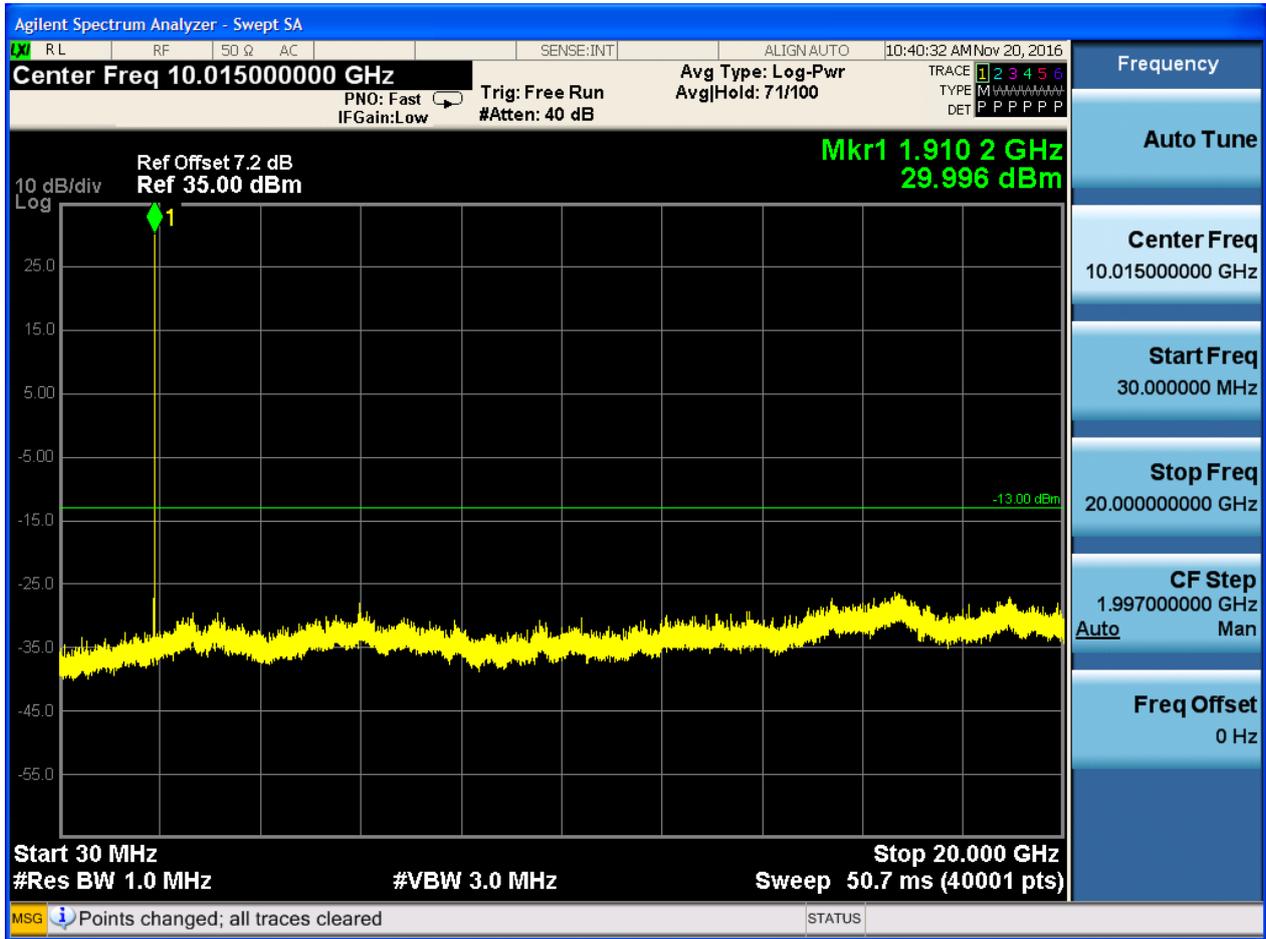




### 6.1.2.1.3 Test Channel = HCH



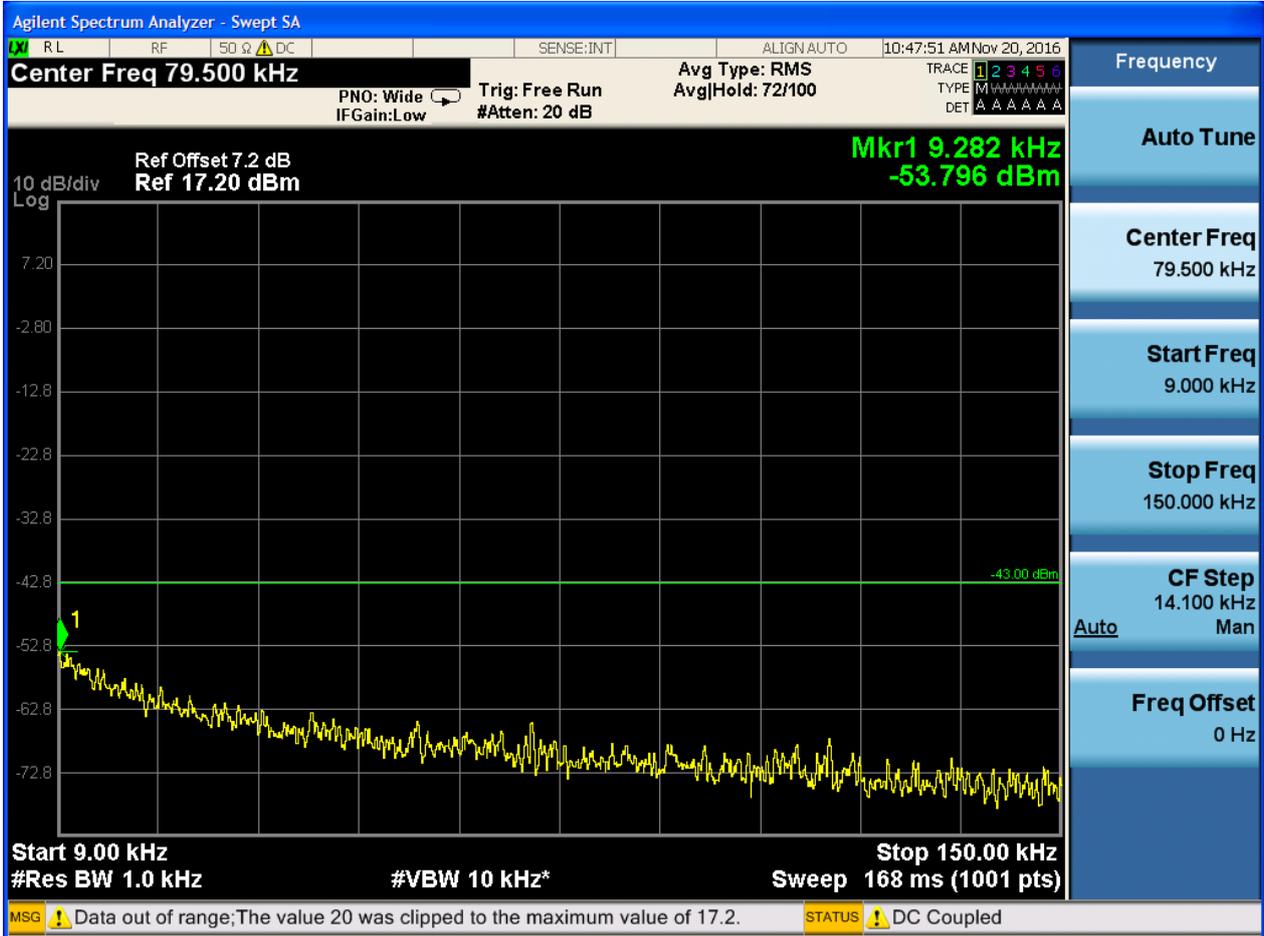


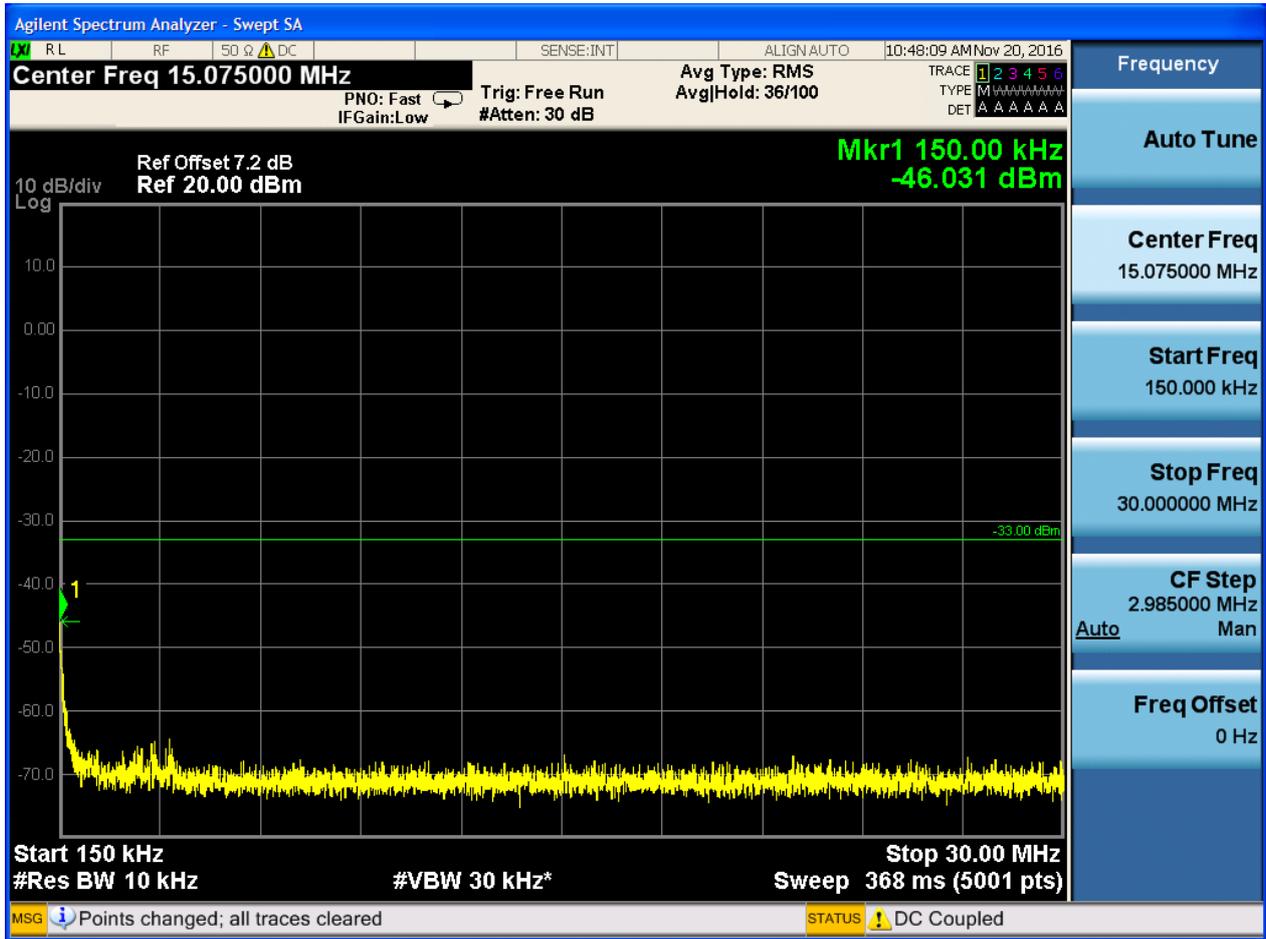


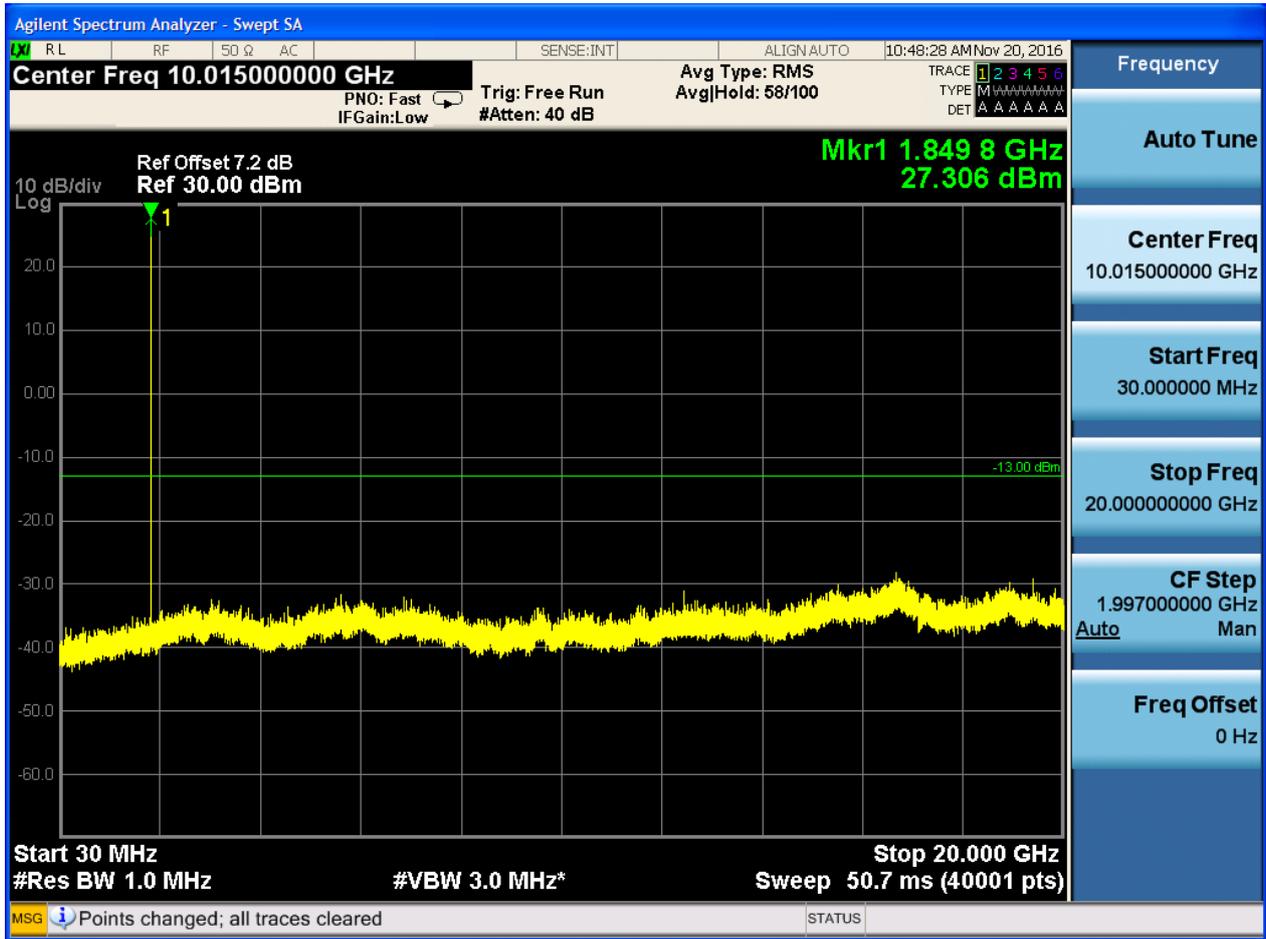


6.1.2.2 Test Mode = GSM/TM2

6.1.2.2.1 Test Channel = LCH

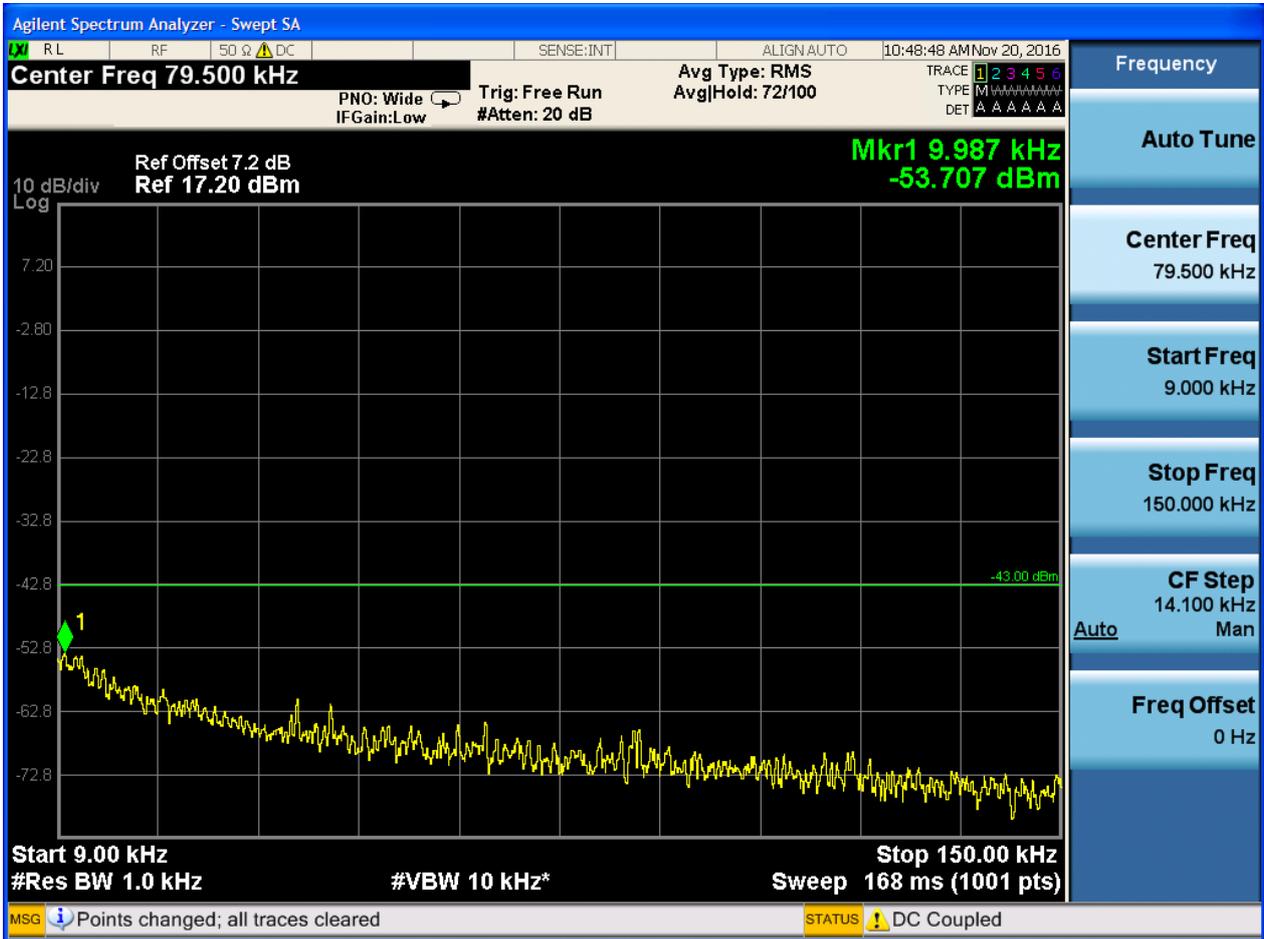


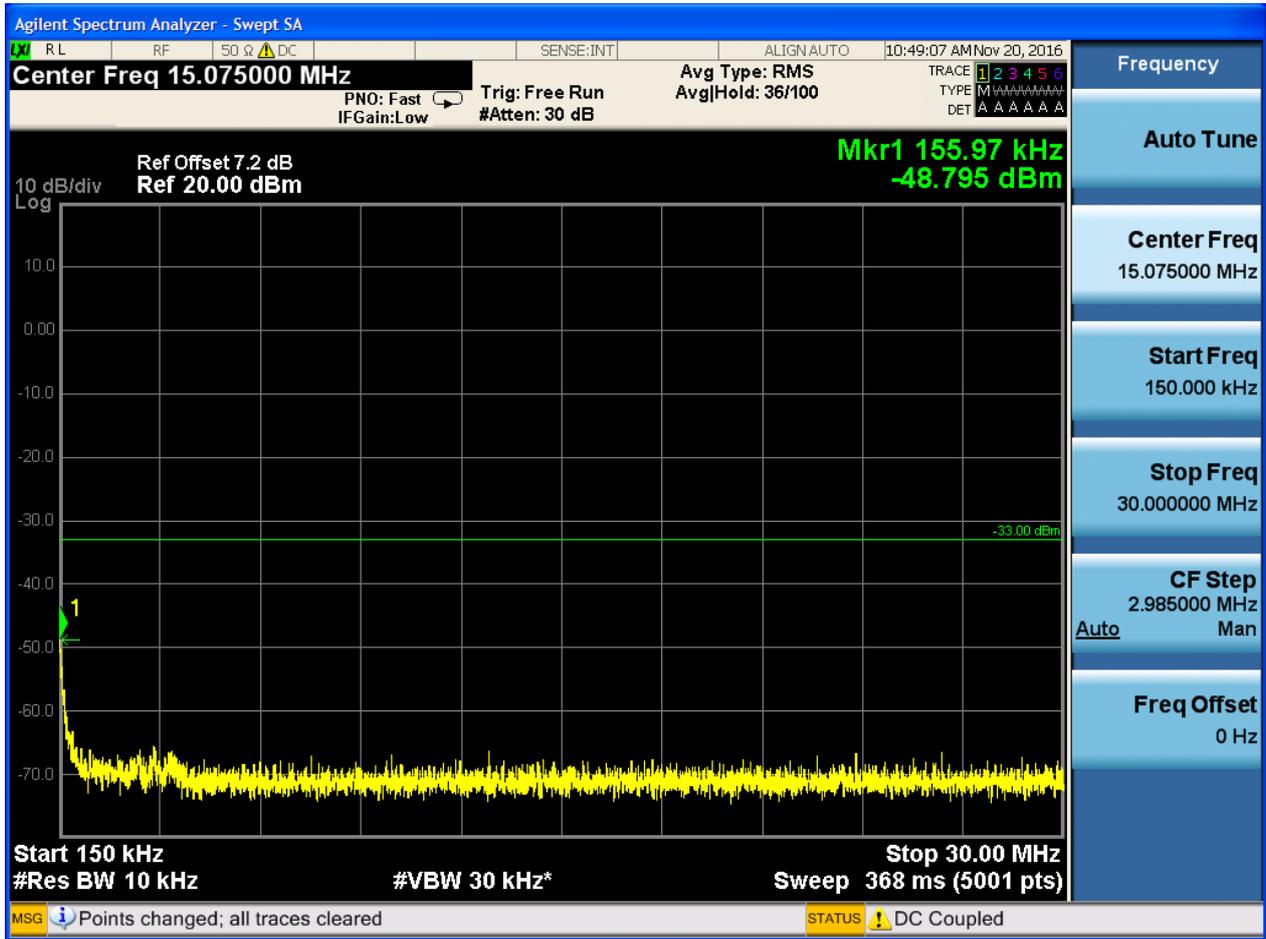


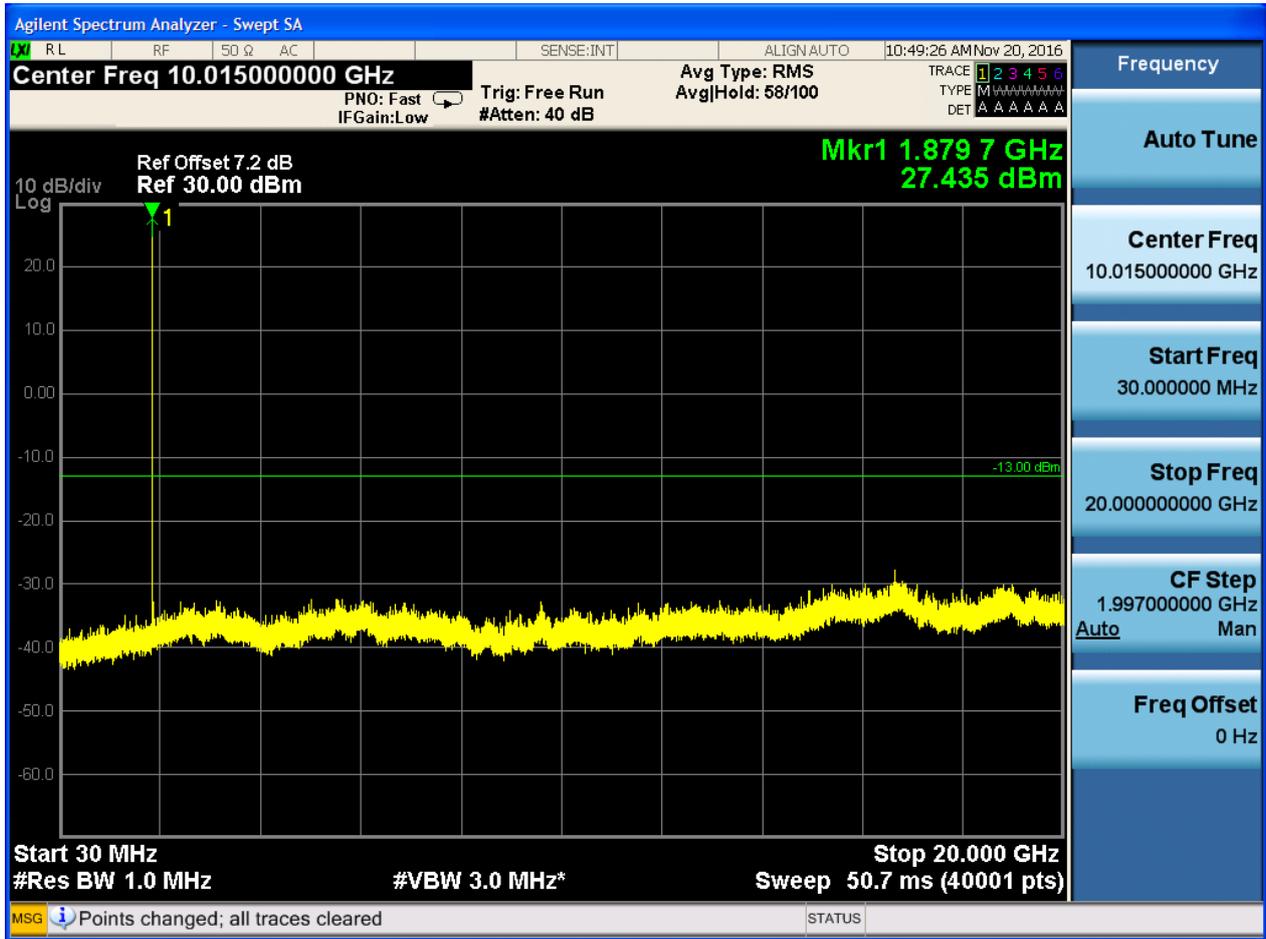




### 6.1.2.2.2 Test Channel = MCH

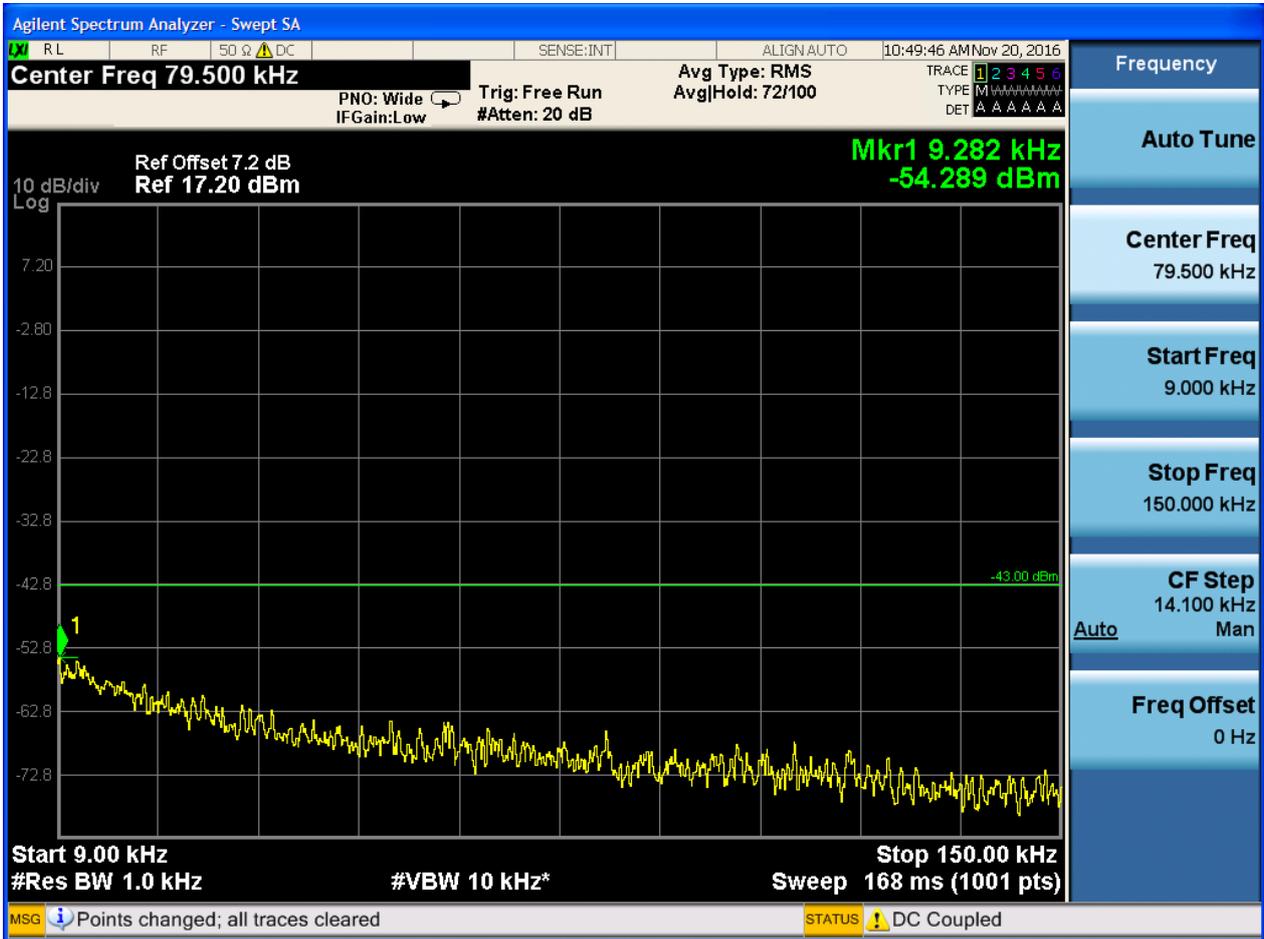




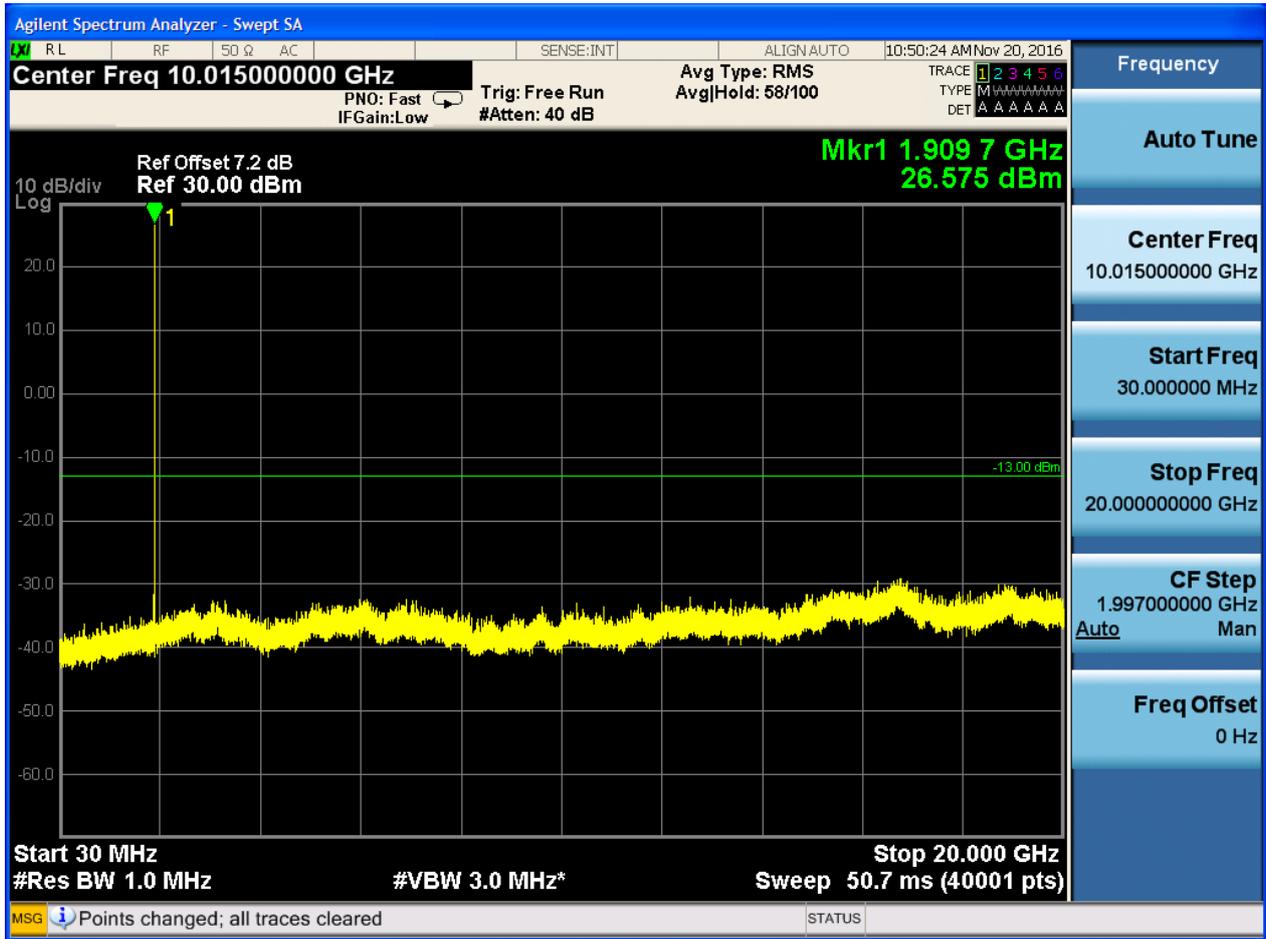




### 6.1.2.2.3 Test Channel = HCH







## 7Appendix\_G: Field Strength of Spurious Radiation

Note: 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

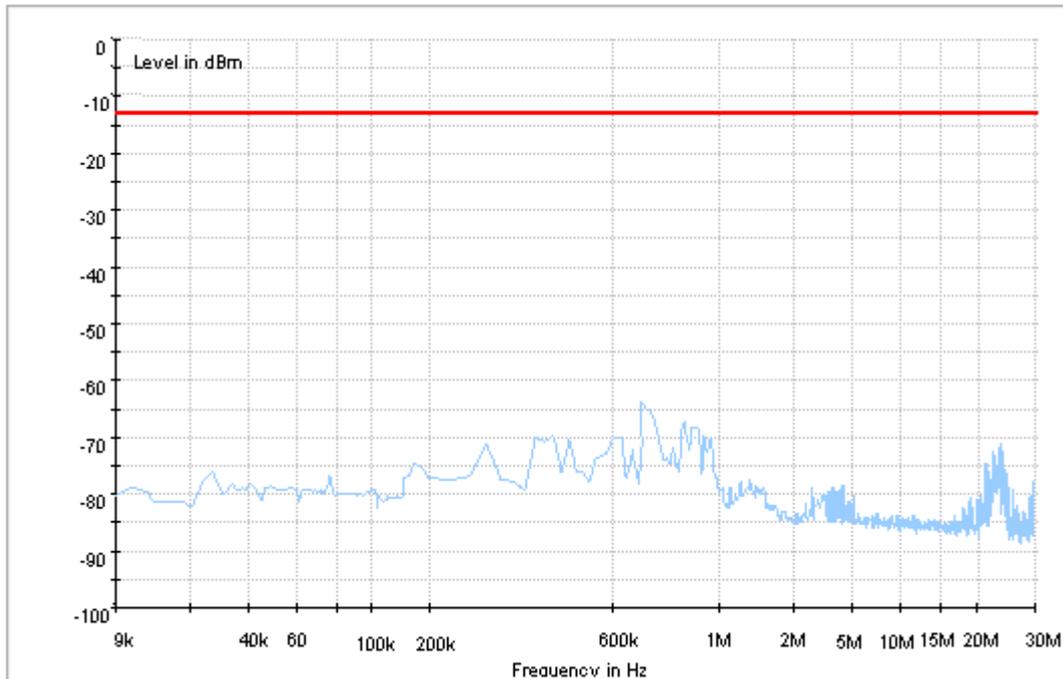
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

### Part I - Test Plots

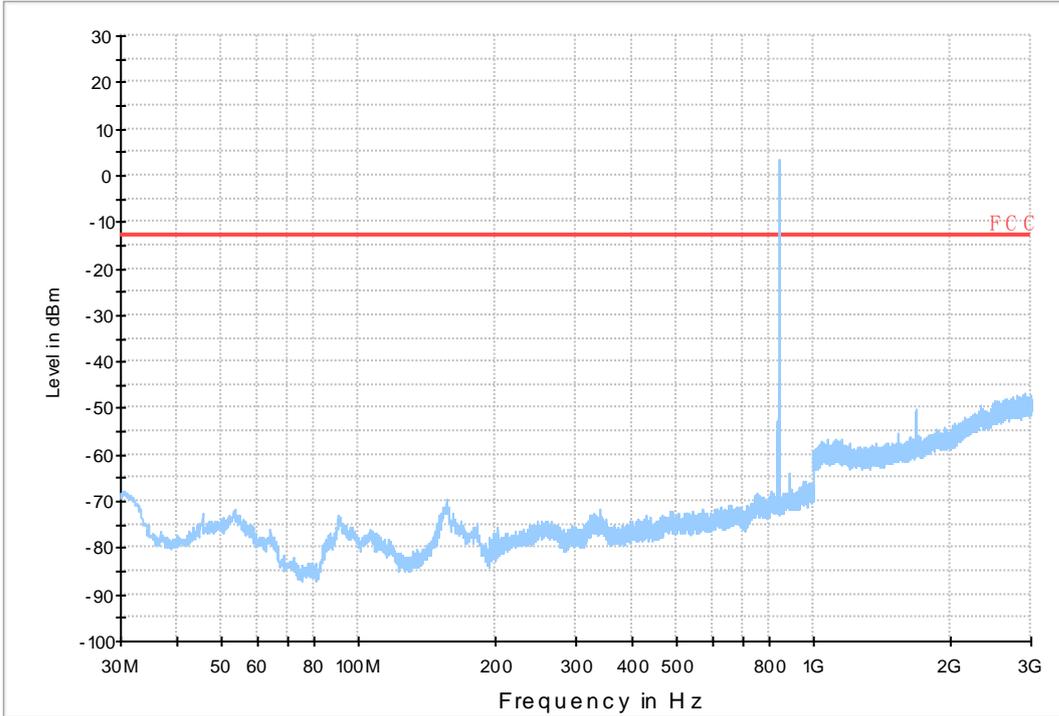
#### 7.1 For GSM

##### 7.1.1 Test Band = GSM850

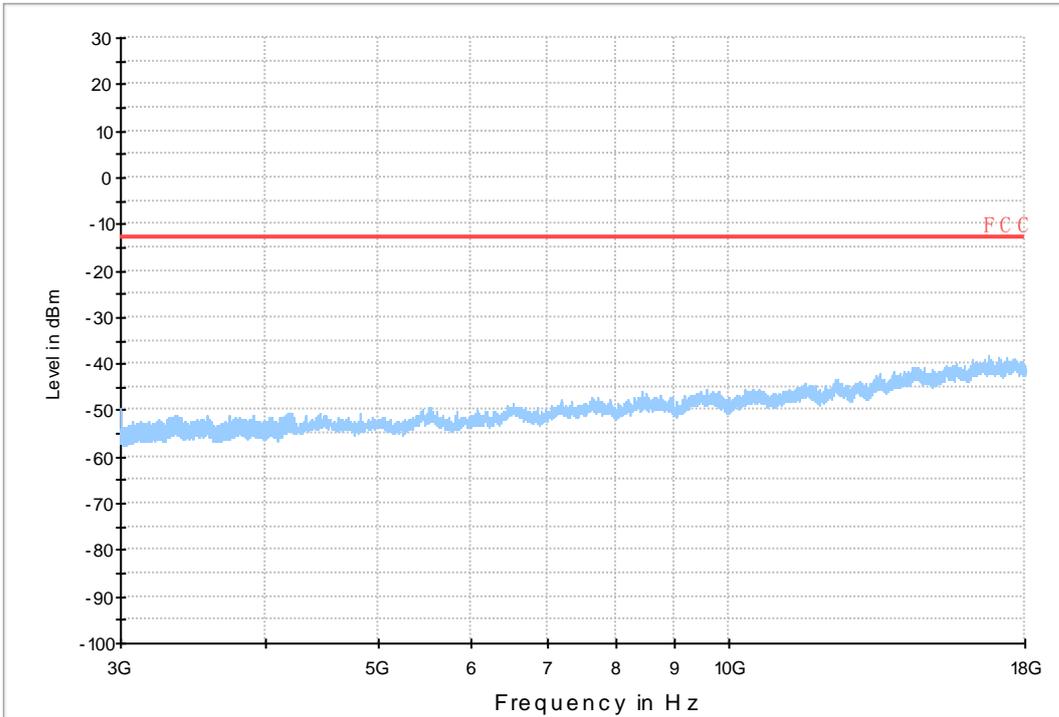
##### 7.1.1.1 Test Mode = GSM/Ant1



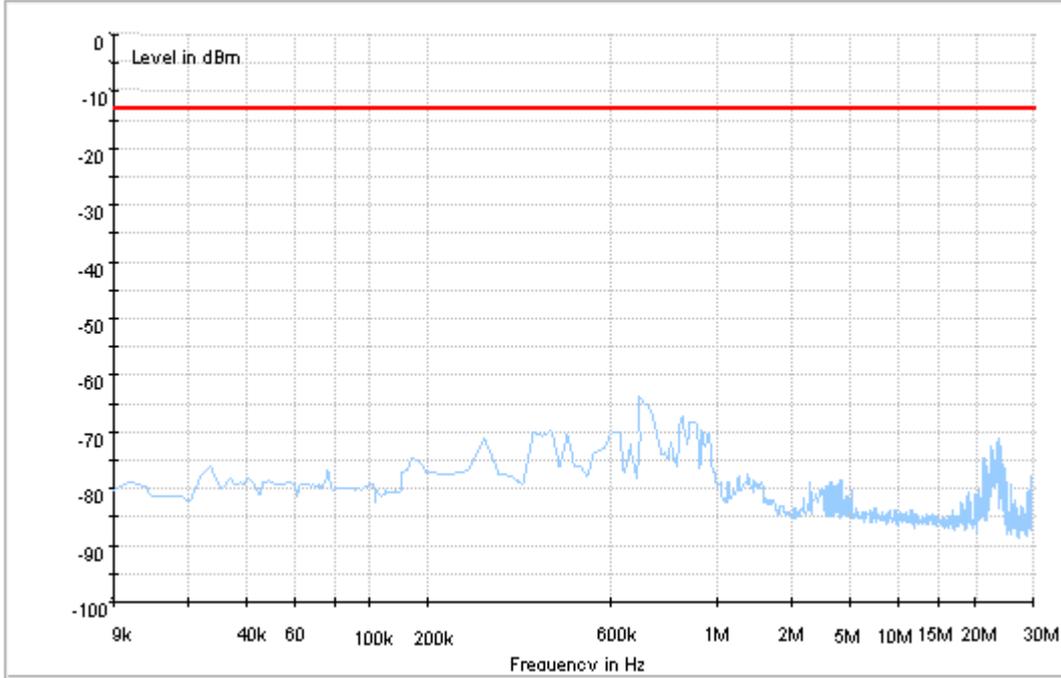
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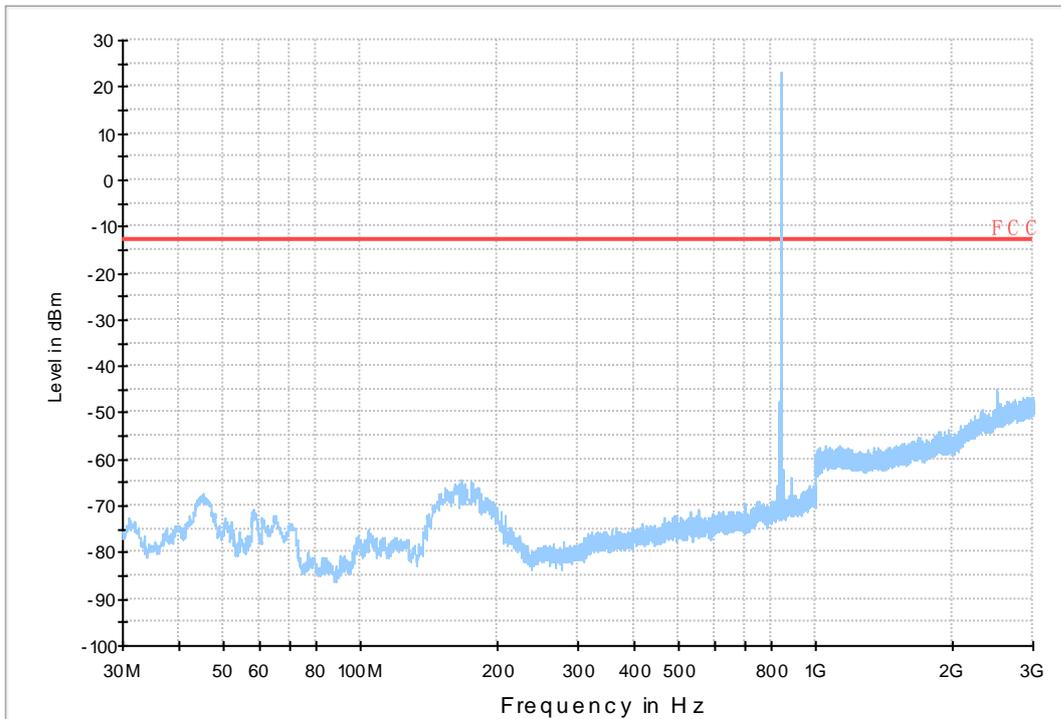
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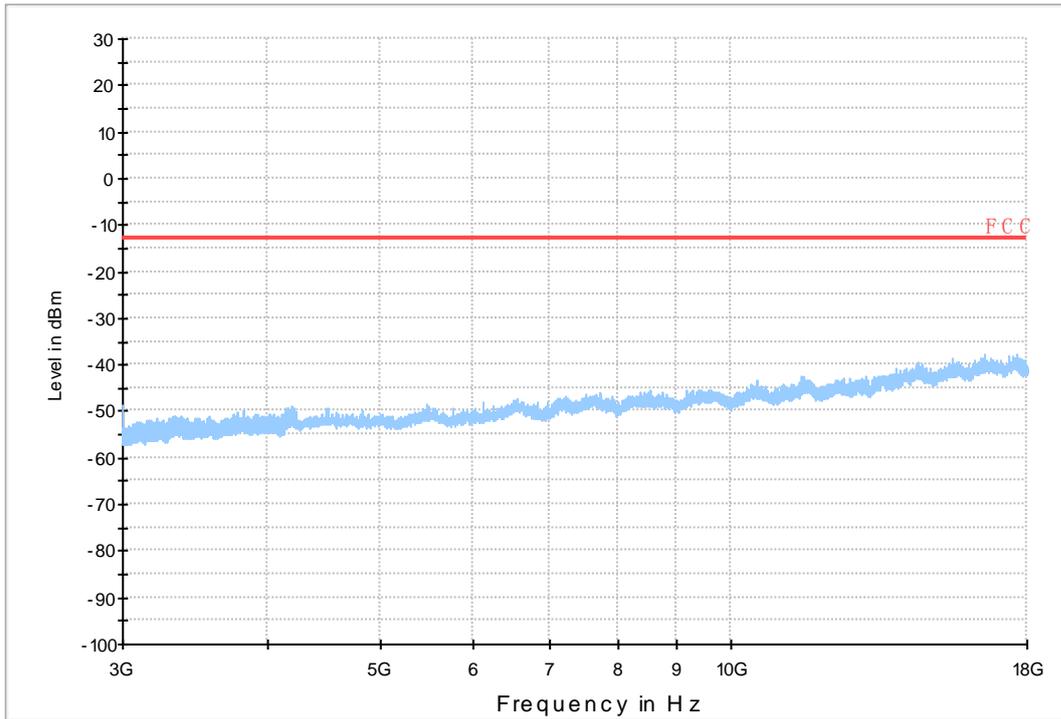
### 7.1.1.2 Test Mode = GSM/Ant2



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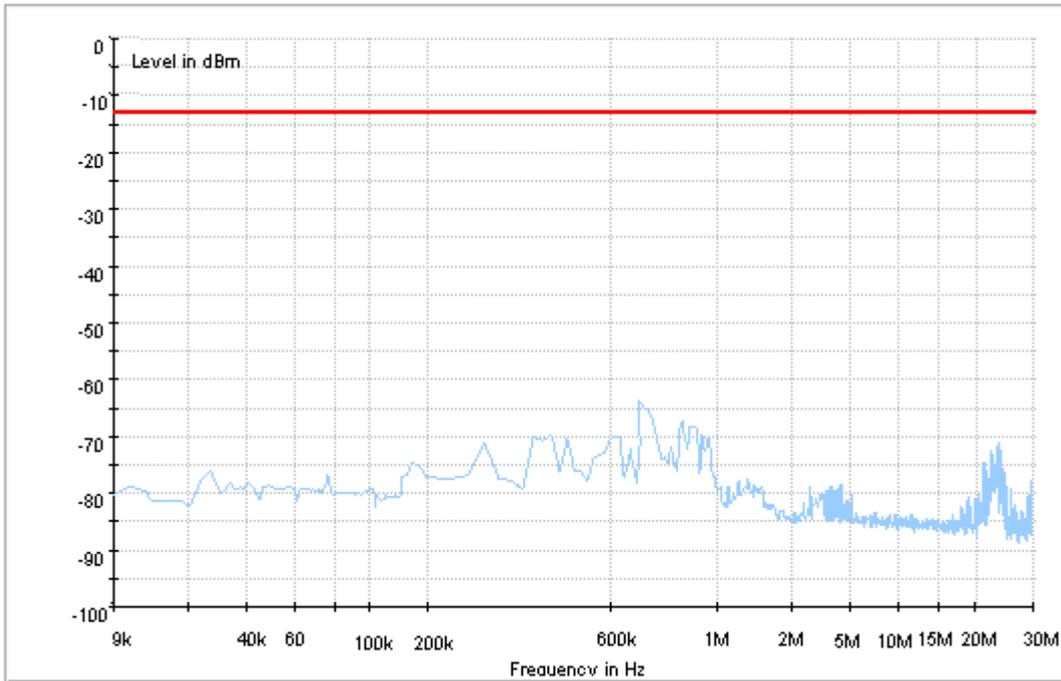


Copy of FCC PART22 GSM850\_H

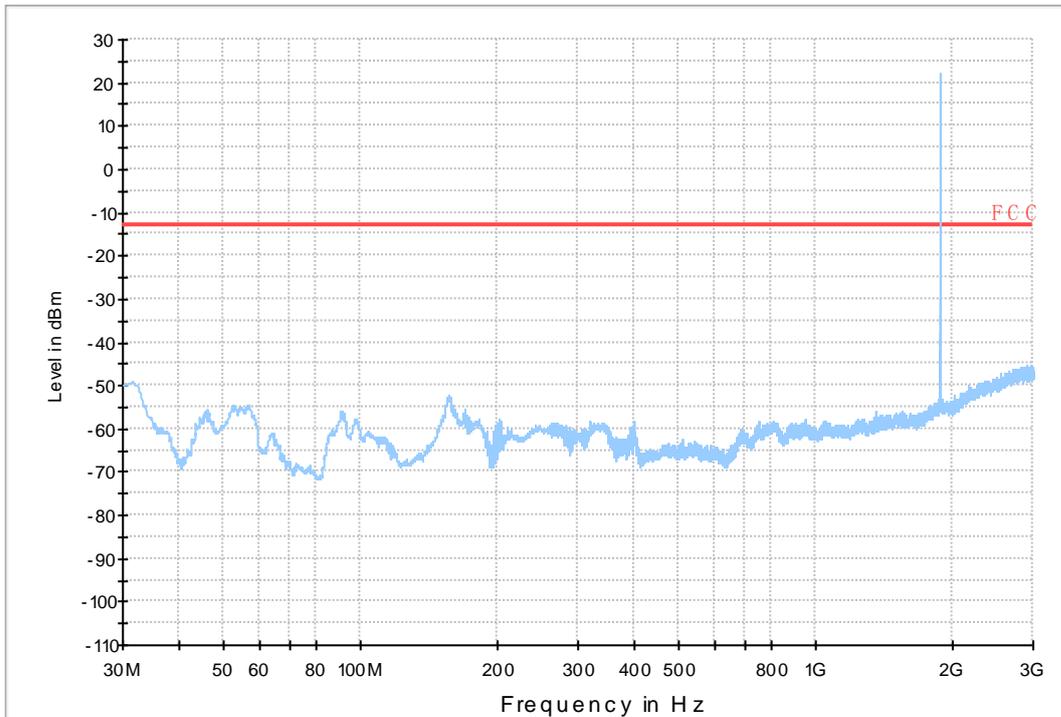


### 7.1.2 Test Band = GSM1900

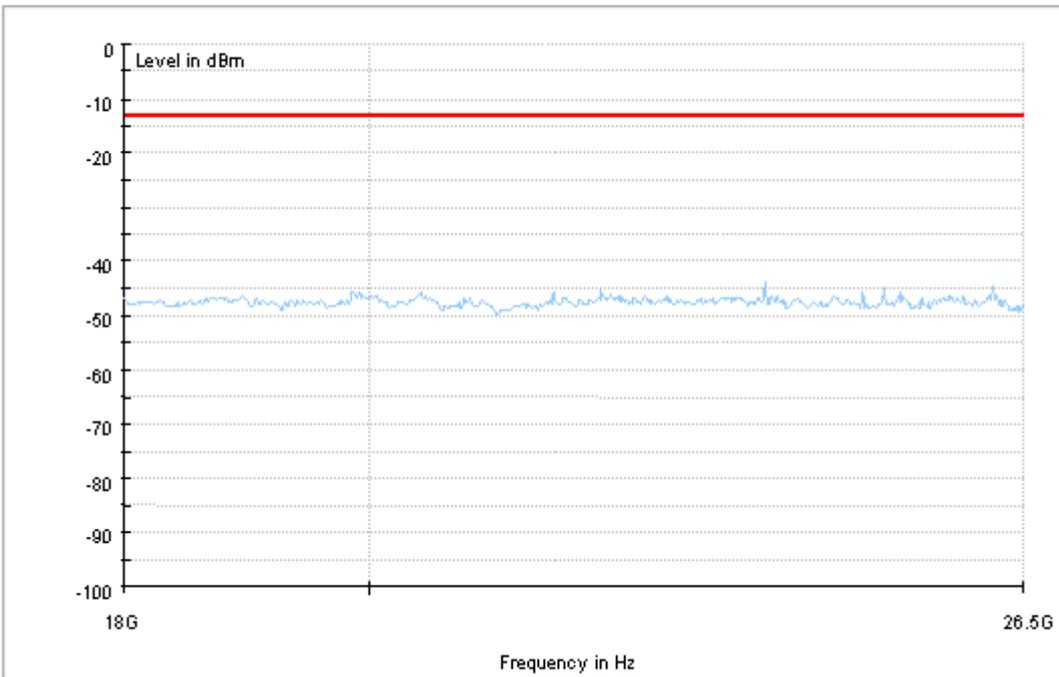
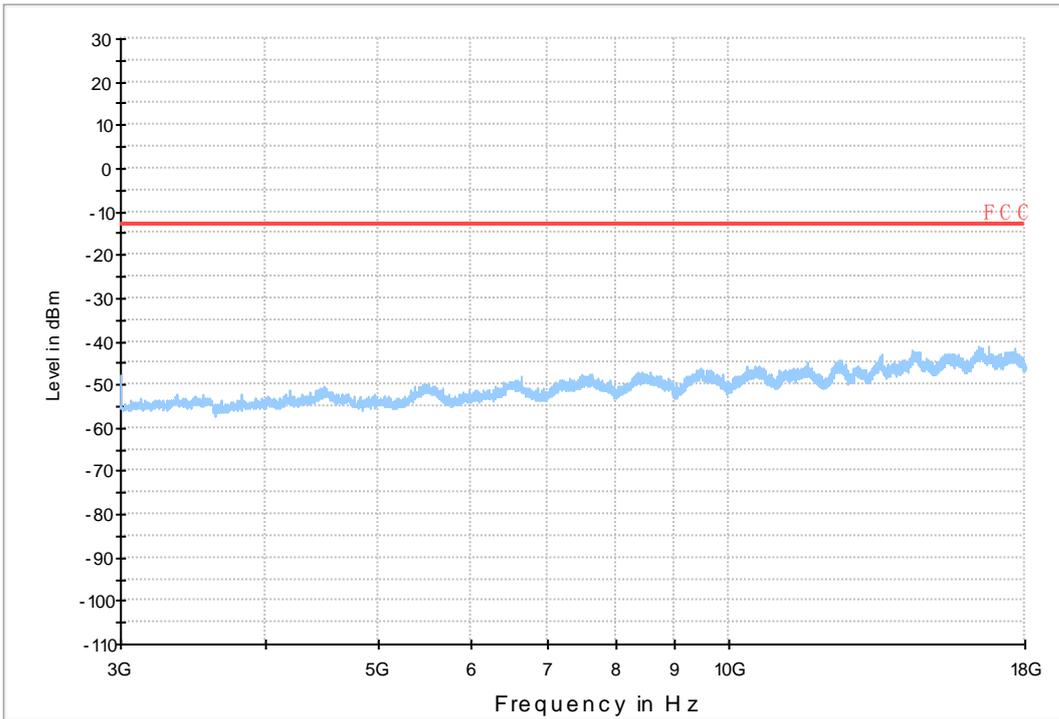
#### 7.1.2.1 Test Mode = GSM/ Ant1



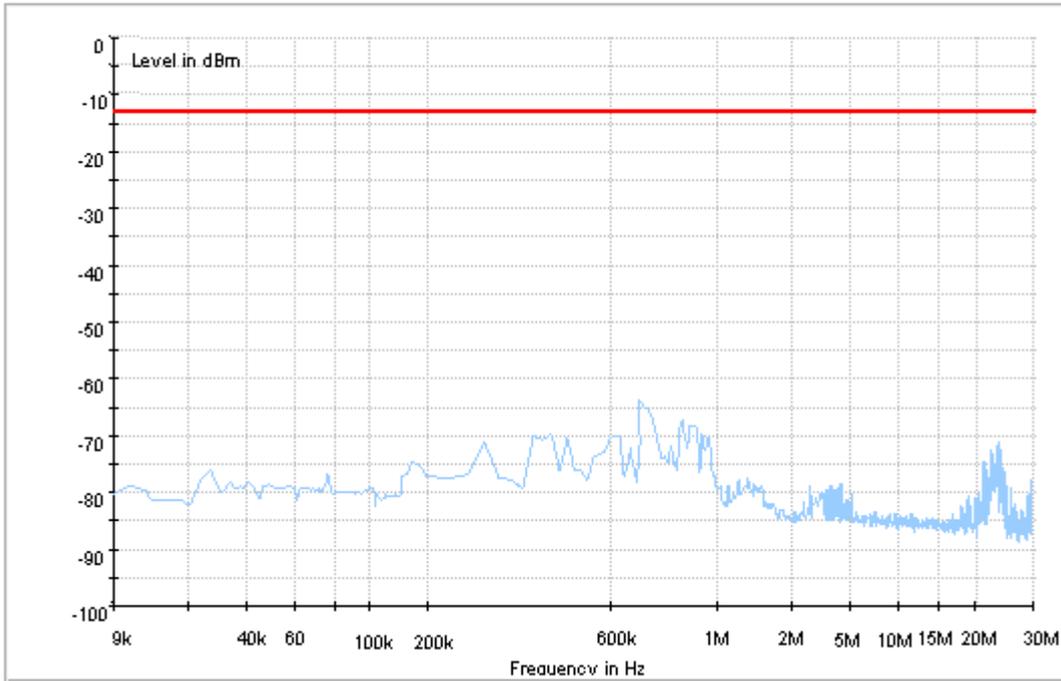
Copy of FCC PART24 GSM1900\_L



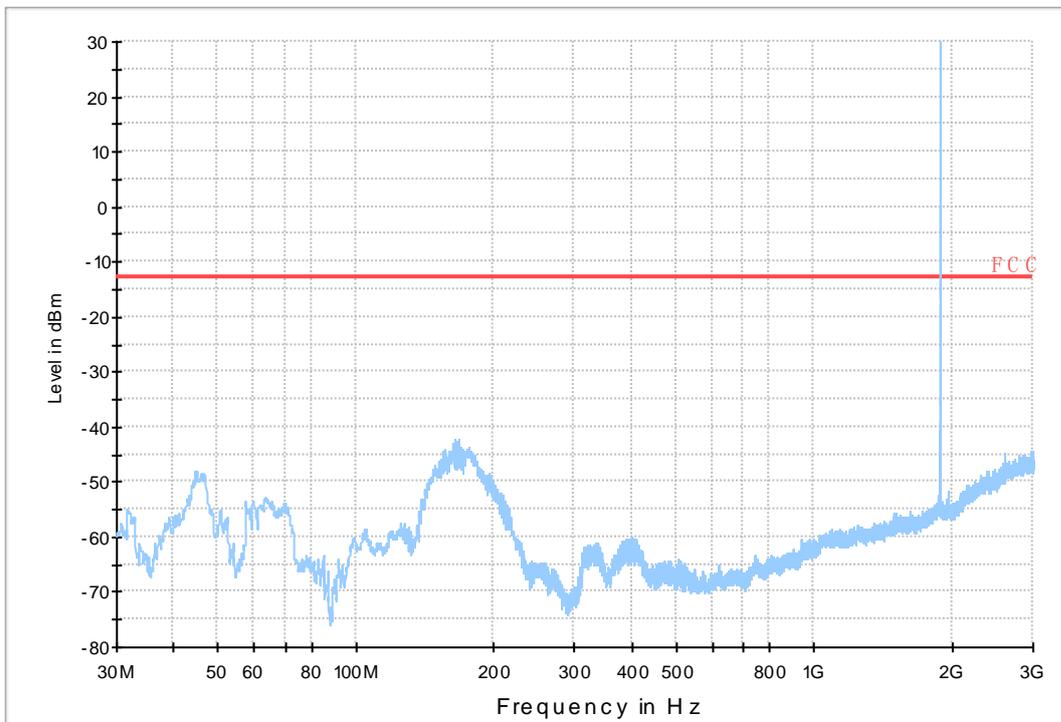
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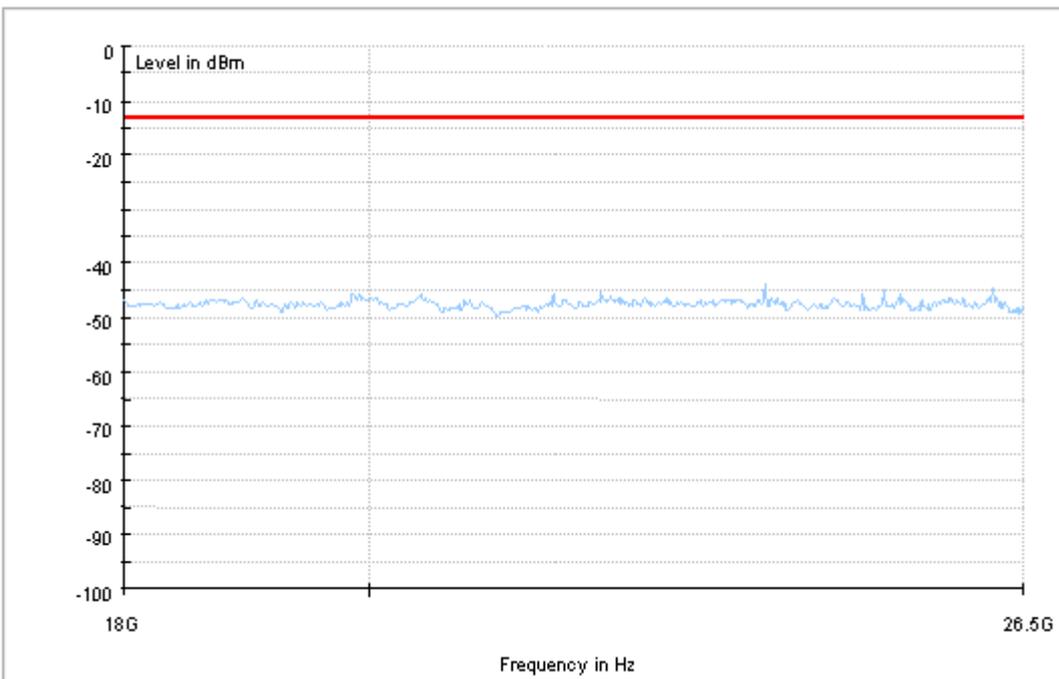
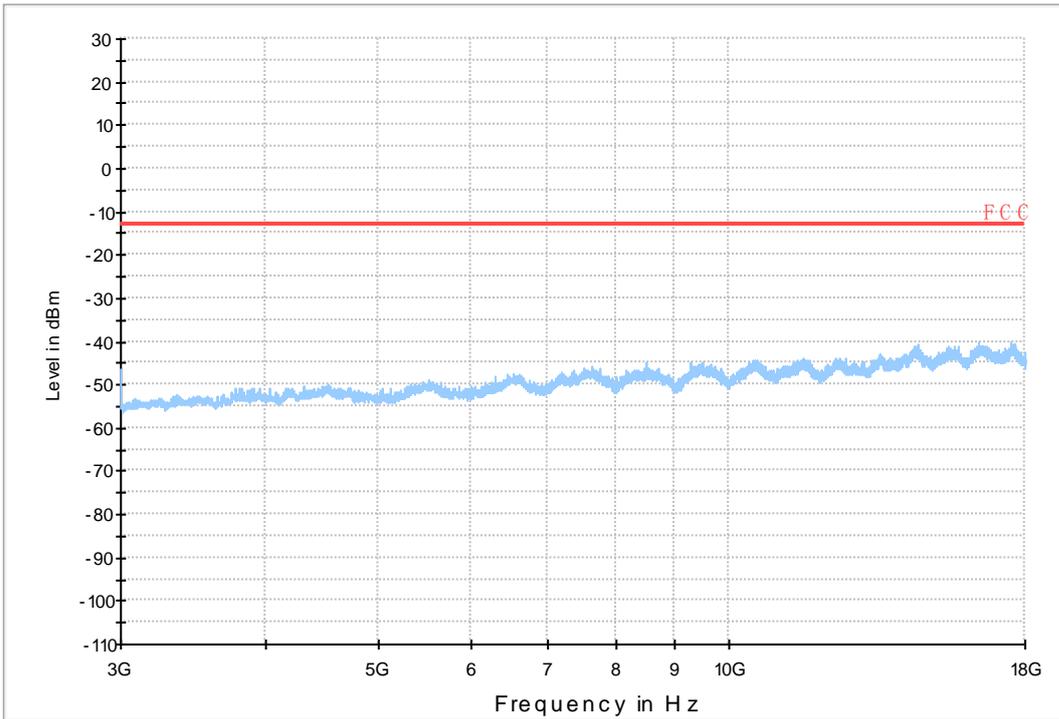
### 7.1.2.2 Test Mode = GSM/ Ant2



Copy of FCC PART24 GSM1900\_L



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## 8Appendix\_H: Frequency Stability

### 8.1 For GSM

#### 8.1.1 Frequency 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	-10.20	-0.01238	PASS
				VN	-7.23	-0.00877	PASS
				VH	-10.14	-0.0123	PASS
		MCH	TN	VL	-7.10	-0.00849	PASS
				VN	-7.43	-0.00888	PASS
				VH	-9.23	-0.01103	PASS
		HCH	TN	VL	-8.91	-0.0105	PASS
				VN	-6.84	-0.00806	PASS
				VH	-8.07	-0.00951	PASS
	GSM/TM2	LCH	TN	VL	-9.78	-0.01187	PASS
				VN	-5.65	-0.00686	PASS
				VH	-16.40	-0.0199	PASS
		MCH	TN	VL	-13.98	-0.01671	PASS
				VN	-4.20	-0.00502	PASS
				VH	-10.20	-0.01219	PASS
		HCH	TN	VL	-10.36	-0.01221	PASS
				VN	-13.66	-0.01609	PASS
				VH	-9.81	-0.01156	PASS
GSM1900	GSM/TM1	LCH	TN	VL	28.15	0.01521	PASS
				VN	28.61	0.01546	PASS
				VH	28.15	0.01521	PASS
		MCH	TN	VL	29.44	0.01566	PASS
				VN	16.66	0.00886	PASS
				VH	32.54	0.01731	PASS
		HCH	TN	VL	26.09	0.01366	PASS
				VN	26.99	0.01413	PASS
				VH	24.28	0.01271	PASS
	GSM/TM2	LCH	TN	VL	-1.07	-0.00058	PASS
				VN	-3.10	-0.00168	PASS
				VH	7.20	0.00389	PASS
		MCH	TN	VL	12.11	0.00644	PASS
				VN	12.98	0.0069	PASS
				VH			

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	22.28	0.01185	PASS
		HCH	TN	VL	12.62	0.00661	PASS
				VN	16.18	0.00847	PASS
				VH	17.50	0.00916	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	-10.78	-0.01308	PASS
				-20	-10.98	-0.01332	PASS
				-10	-8.52	-0.01034	PASS
				0	-6.39	-0.00775	PASS
				10	-8.20	-0.00995	PASS
				20	-9.75	-0.01183	PASS
				30	-7.94	-0.00963	PASS
				40	-8.59	-0.01042	PASS
		50	-14.46	-0.01754	PASS		
		MCH	VN	-30	-10.33	-0.01235	PASS
				-20	-6.72	-0.00803	PASS
				-10	-7.68	-0.00918	PASS
				0	-4.33	-0.00518	PASS
				10	-11.24	-0.01344	PASS
				20	-3.10	-0.00371	PASS
				30	-10.40	-0.01243	PASS
				40	-2.84	-0.00339	PASS
		50	-11.17	-0.01335	PASS		
		HCH	VN	-30	-5.68	-0.00669	PASS
				-20	-7.04	-0.00829	PASS
				-10	-8.07	-0.00951	PASS
				0	-9.43	-0.01111	PASS
				10	-6.97	-0.00821	PASS
				20	-11.11	-0.01309	PASS
	30			-9.62	-0.01133	PASS	
	40			-7.49	-0.00882	PASS	
	50	-11.36	-0.01338	PASS			
	GSM/TM2	LCH	VN	-30	-11.43	-0.01387	PASS
				-20	-22.89	-0.02777	PASS
				-10	-12.72	-0.01543	PASS
				0	-17.76	-0.02155	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				10	-10.14	-0.0123	PASS
				20	-15.85	-0.01923	PASS
				30	-10.98	-0.01332	PASS
				40	-14.24	-0.01728	PASS
				50	-12.62	-0.01531	PASS
		MCH	VN	-30	-12.98	-0.01552	PASS
				-20	-16.08	-0.01922	PASS
				-10	-20.57	-0.02459	PASS
				0	-10.72	-0.01281	PASS
				10	-17.14	-0.02049	PASS
				20	-16.59	-0.01983	PASS
				30	-9.94	-0.01188	PASS
				40	-14.17	-0.01694	PASS
				50	-14.50	-0.01733	PASS
				HCH	VN	-30	-10.20
		-20	-14.01			-0.01651	PASS
		-10	-15.66			-0.01845	PASS
		0	-10.94			-0.01289	PASS
		10	-16.34			-0.01925	PASS
		20	-11.04			-0.01301	PASS
		30	-14.30			-0.01685	PASS
		40	-5.20			-0.00613	PASS
		50	-13.95	-0.01643	PASS		
		GSM1900	GSM/TM1	LCH	VN	-30	25.44
-20	29.90					0.01616	PASS
-10	22.47					0.01214	PASS
0	24.80					0.0134	PASS
10	39.20					0.02119	PASS
20	17.11					0.00925	PASS
30	23.76					0.01284	PASS
40	25.18					0.01361	PASS
50	30.09					0.01626	PASS
MCH	VN			-30	27.96	0.01487	PASS
				-20	25.63	0.01363	PASS
				-10	32.09	0.01707	PASS
				0	27.96	0.01487	PASS
				10	12.46	0.00663	PASS
				20	25.31	0.01346	PASS
				30	32.87	0.01748	PASS
				40	18.34	0.00976	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	35.39	0.01882	PASS
				-30	27.12	0.0142	PASS
				-20	34.48	0.01805	PASS
				-10	26.86	0.01406	PASS
				0	31.51	0.0165	PASS
				10	30.09	0.01576	PASS
				20	32.67	0.01711	PASS
				30	22.08	0.01156	PASS
				40	42.49	0.02225	PASS
				50	24.86	0.01302	PASS
	GSM/TM2	LCH	VN	-30	7.97	0.00431	PASS
				-20	19.21	0.01038	PASS
				-10	12.88	0.00696	PASS
				0	2.45	0.00132	PASS
				10	5.49	0.00297	PASS
				20	3.55	0.00192	PASS
				30	8.43	0.00456	PASS
				40	-2.52	-0.00136	PASS
				50	12.56	0.00679	PASS
				MCH	VN	-30	12.82
		-20	-3.65			-0.00194	PASS
		-10	16.21			0.00862	PASS
		0	5.52			0.00294	PASS
		10	17.63			0.00938	PASS
		20	17.11			0.0091	PASS
		30	4.29			0.00228	PASS
		40	2.84			0.00151	PASS
		50	8.91			0.00474	PASS
		HCH	VN			-30	14.43
				-20	14.46	0.00757	PASS
				-10	5.78	0.00303	PASS
				0	6.10	0.00319	PASS
				10	13.01	0.00681	PASS
				20	5.71	0.00299	PASS
				30	2.32	0.00121	PASS
				40	0.84	0.00044	PASS
				50	1.87	0.00098	PASS

END