



# Appendix for test report



## 1 Appendix\_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	29.49	38.5	PASS
		MCH	33.32	29.37	38.5	PASS
		HCH	33.14	29.19	38.5	PASS
	GSM/TM2	LCH	26.91	22.96	38.5	PASS
		MCH	26.91	22.96	38.5	PASS
		HCH	26.88	22.93	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	30.02	30.22	33	PASS
		MCH	29.9	30.1	33	PASS
		HCH	29.85	30.05	33	PASS
	GSM/TM2	LCH	26.64	26.84	33	PASS
		MCH	26.39	26.59	33	PASS
		HCH	26.42	26.62	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	0.3	13	PASS
		MCH	0.3	13	PASS
		HCH	0.3	13	PASS
	GSM/TM2	LCH	3.26	13	PASS
		MCH	3.14	13	PASS
		HCH	3.29	13	PASS
GSM1900	GSM/TM1	LCH	0.32	13	PASS
		MCH	0.29	13	PASS
		HCH	0.28	13	PASS
	GSM/TM2	LCH	3.27	13	PASS
		MCH	3.16	13	PASS
		HCH	3.16	13	PASS

### 3Appendix\_C: Modulation Characteristics

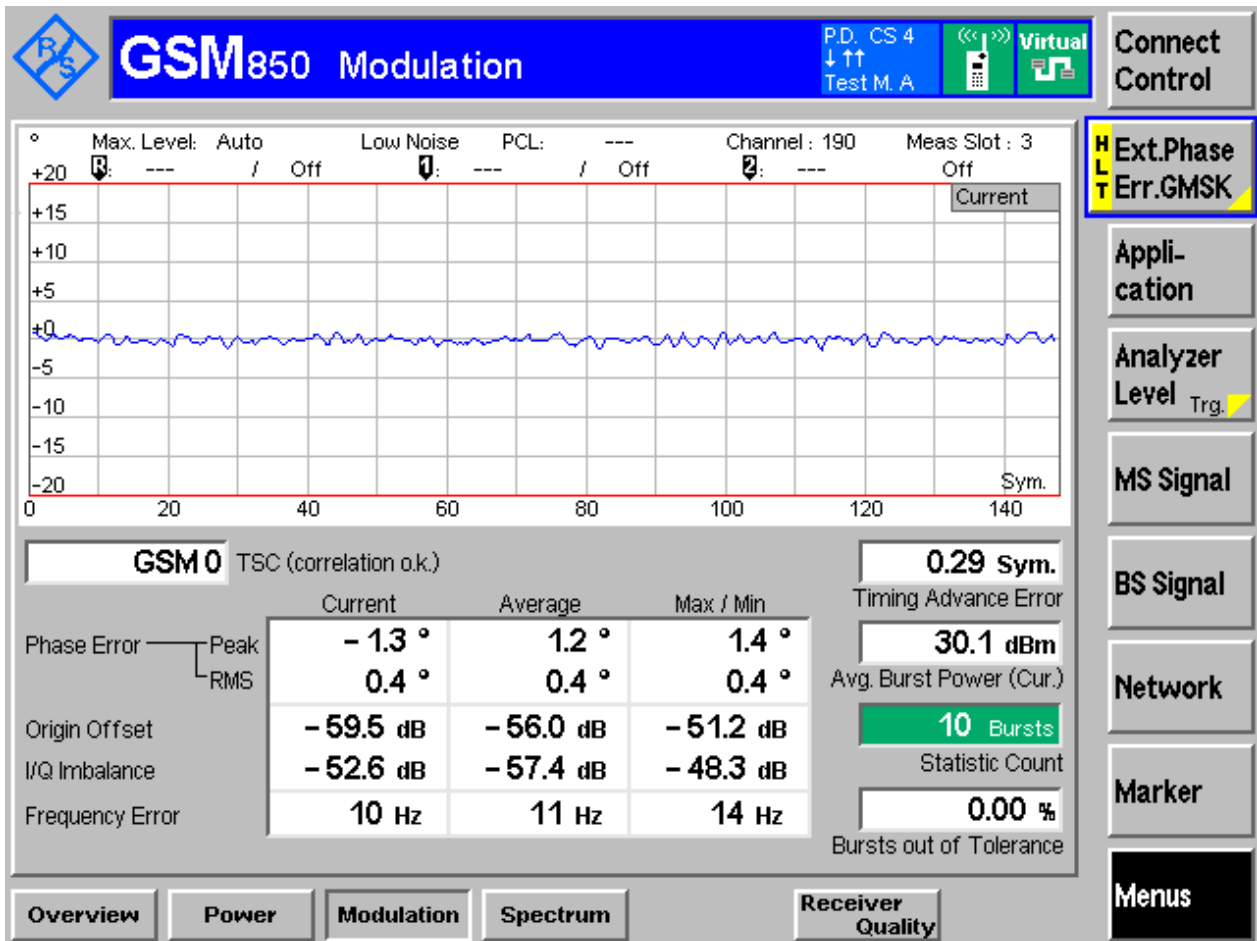
#### Part I - Test Plots

#### 3.1 For GSM

#### 3.1.1 Test Band = GSM850

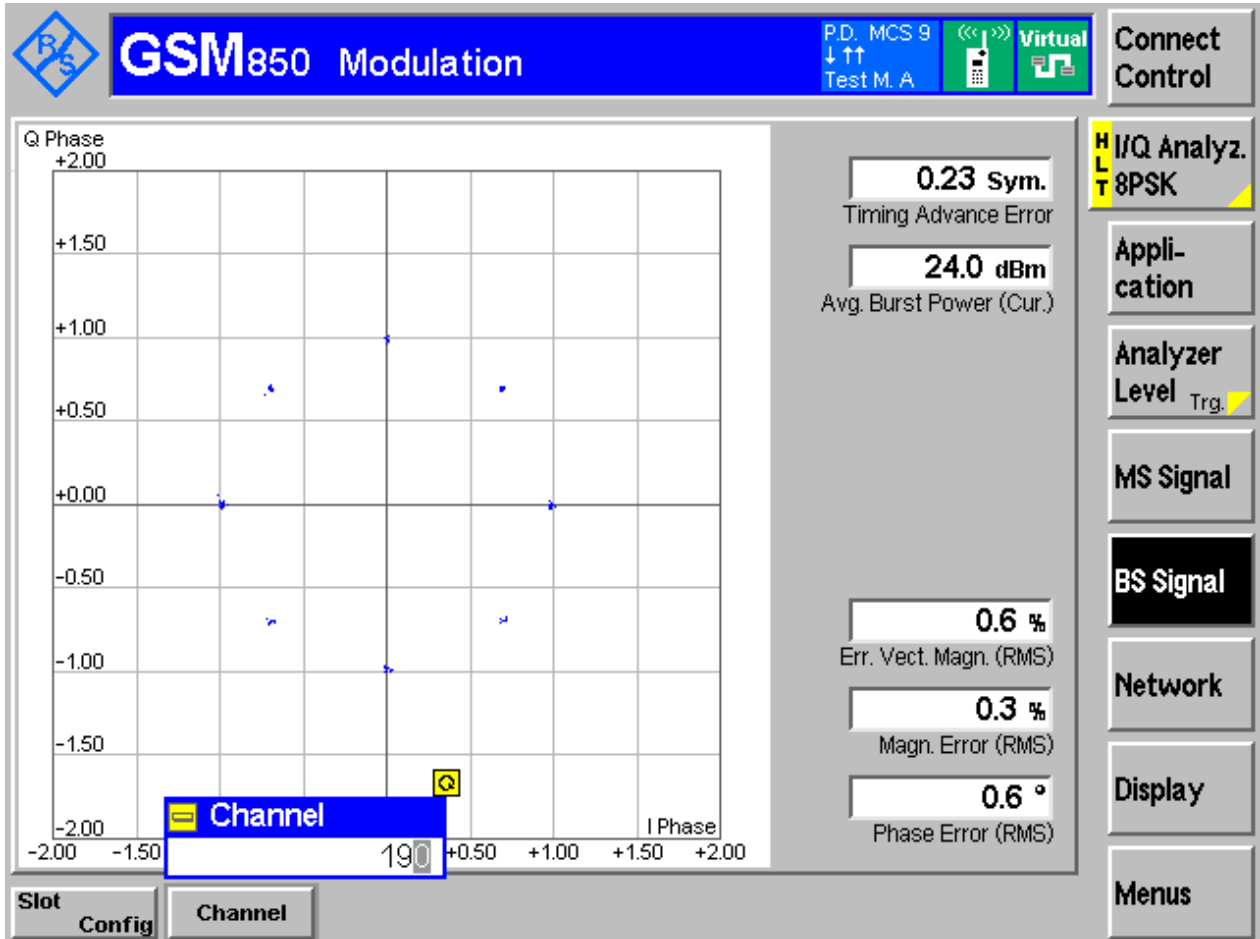
#### 3.1.1.1 Test Mode = GSM/TM1

#### 3.1.1.1.1 Test Channel = MCH



### 3.1.1.2 Test Mode = GSM/TM2

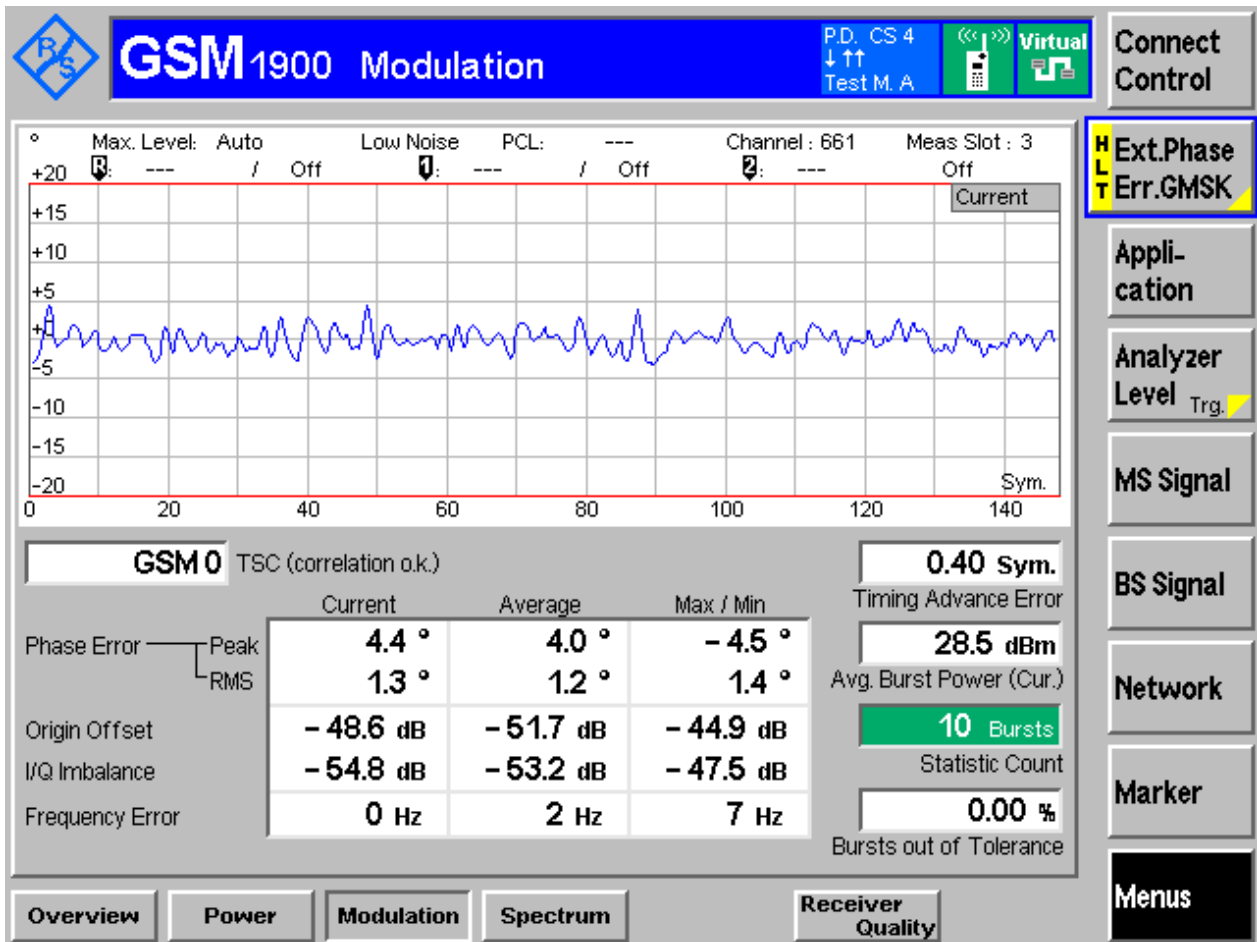
#### 3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

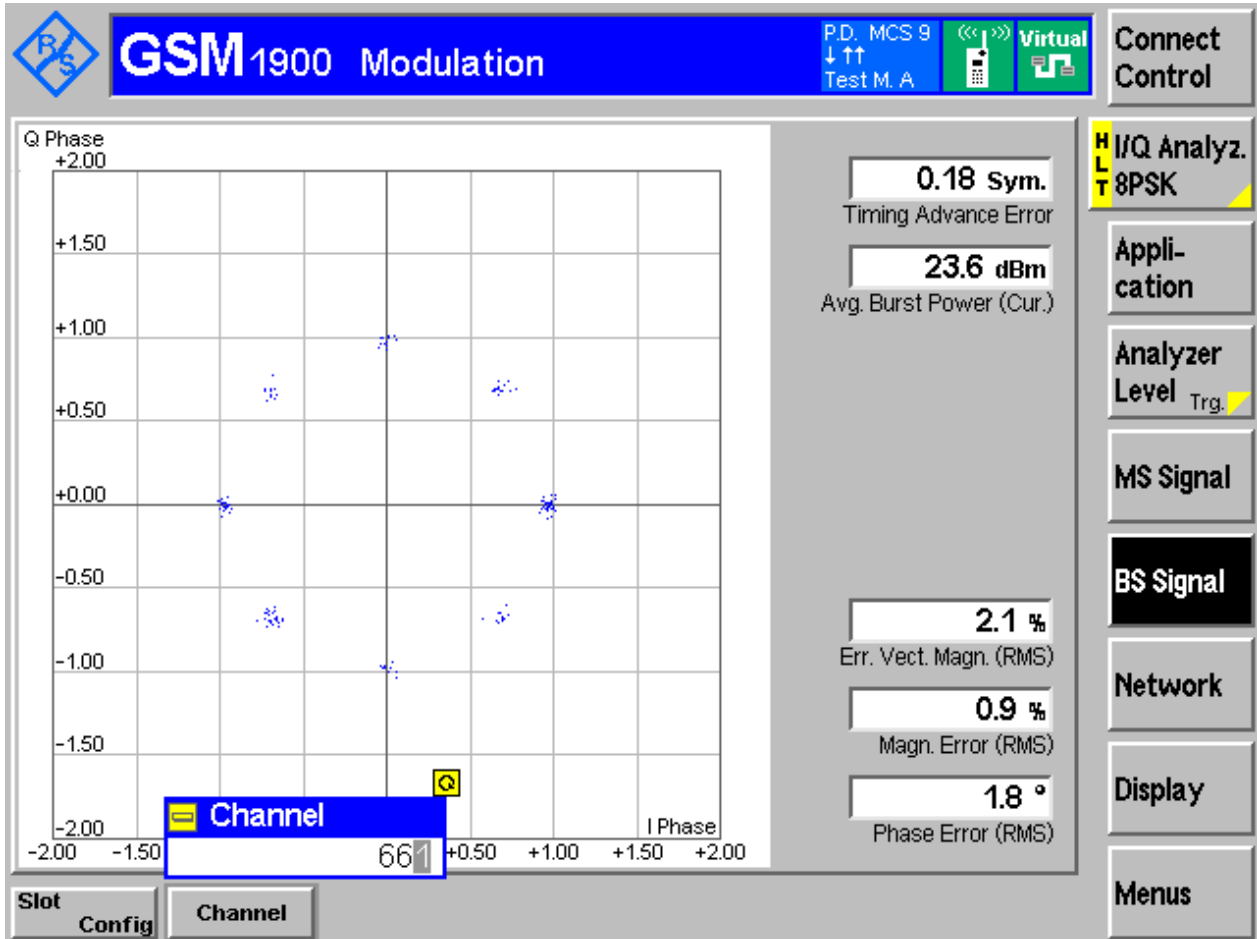
3.1.2.1 Test Mode = GSM/TM1

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	245.05	319.24	Pass
		MCH	245.28	311.11	Pass
		HCH	243.08	315.73	Pass
	GSM/TM2	LCH	243.85	316.00	Pass
		MCH	240.78	312.09	Pass
		HCH	241.08	306.53	Pass
GSM1900	GSM/TM1	LCH	244.28	323.65	Pass
		MCH	245.28	317.52	Pass
		HCH	242.55	321.28	Pass
	GSM/TM2	LCH	244.82	316.60	Pass
		MCH	247.16	315.55	Pass
		HCH	244.90	309.60	Pass



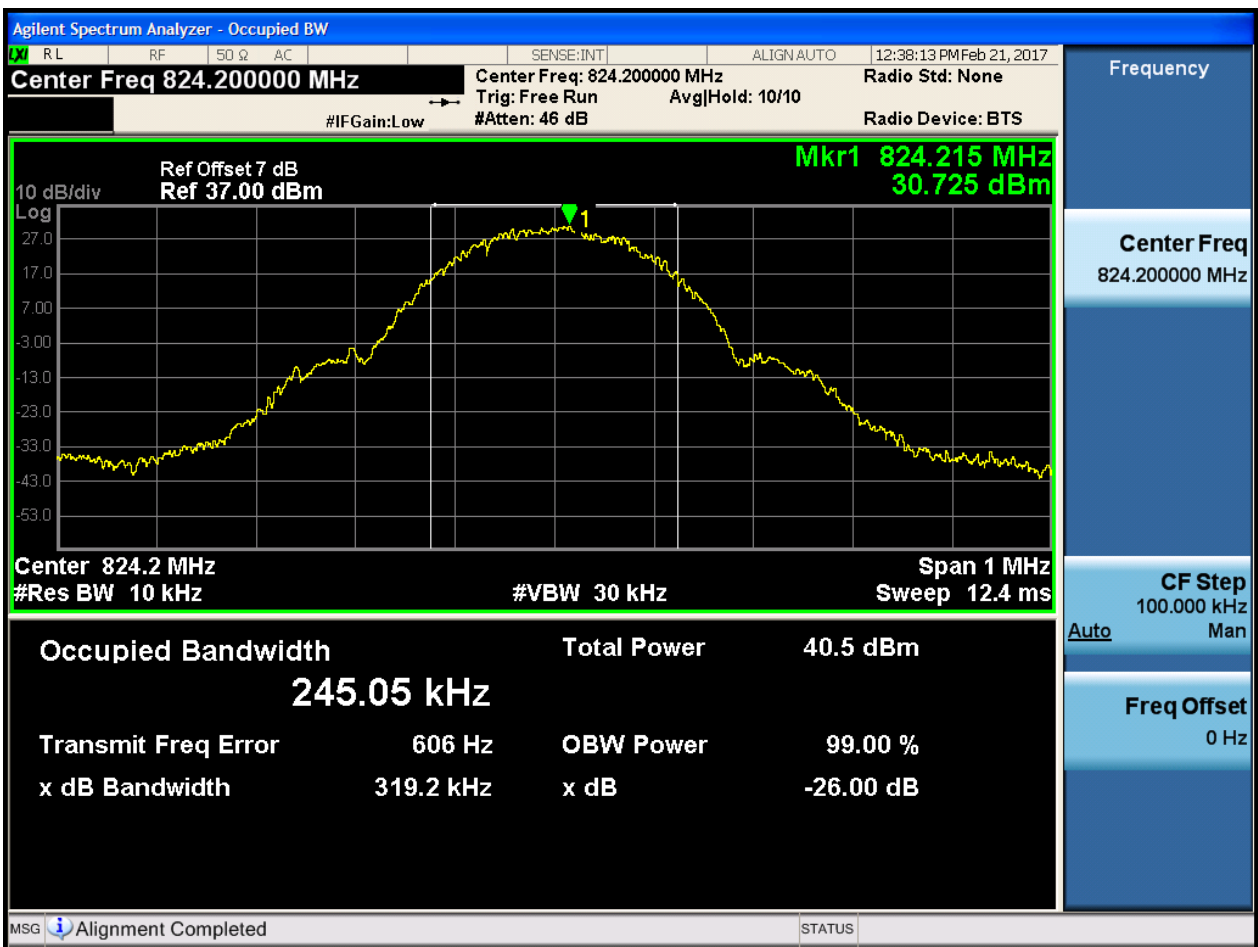
Part II - Test Plots

4.1 For GSM

4.1.1 Test Band = GSM850

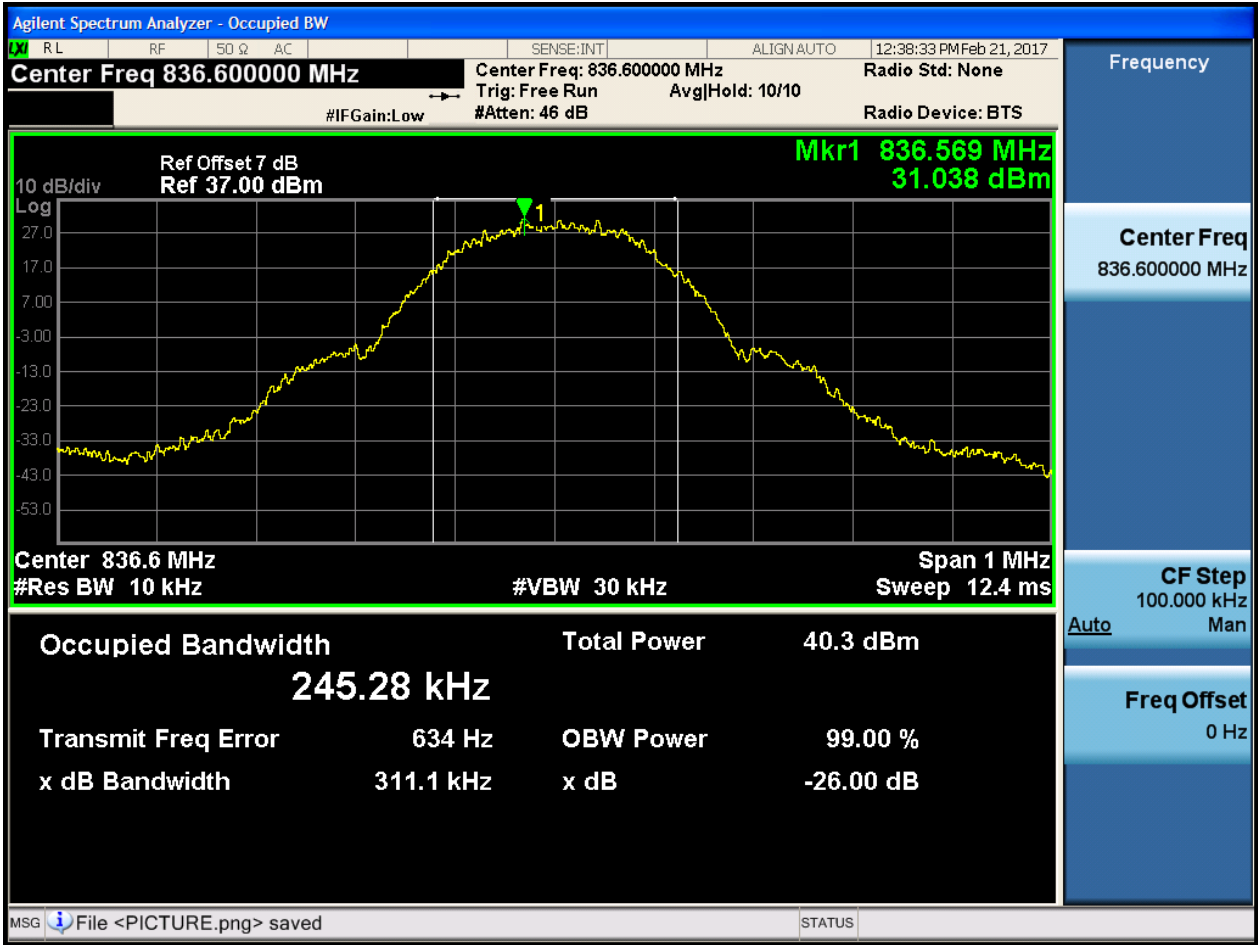
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH





4.1.1.1.2 Test Channel = MCH





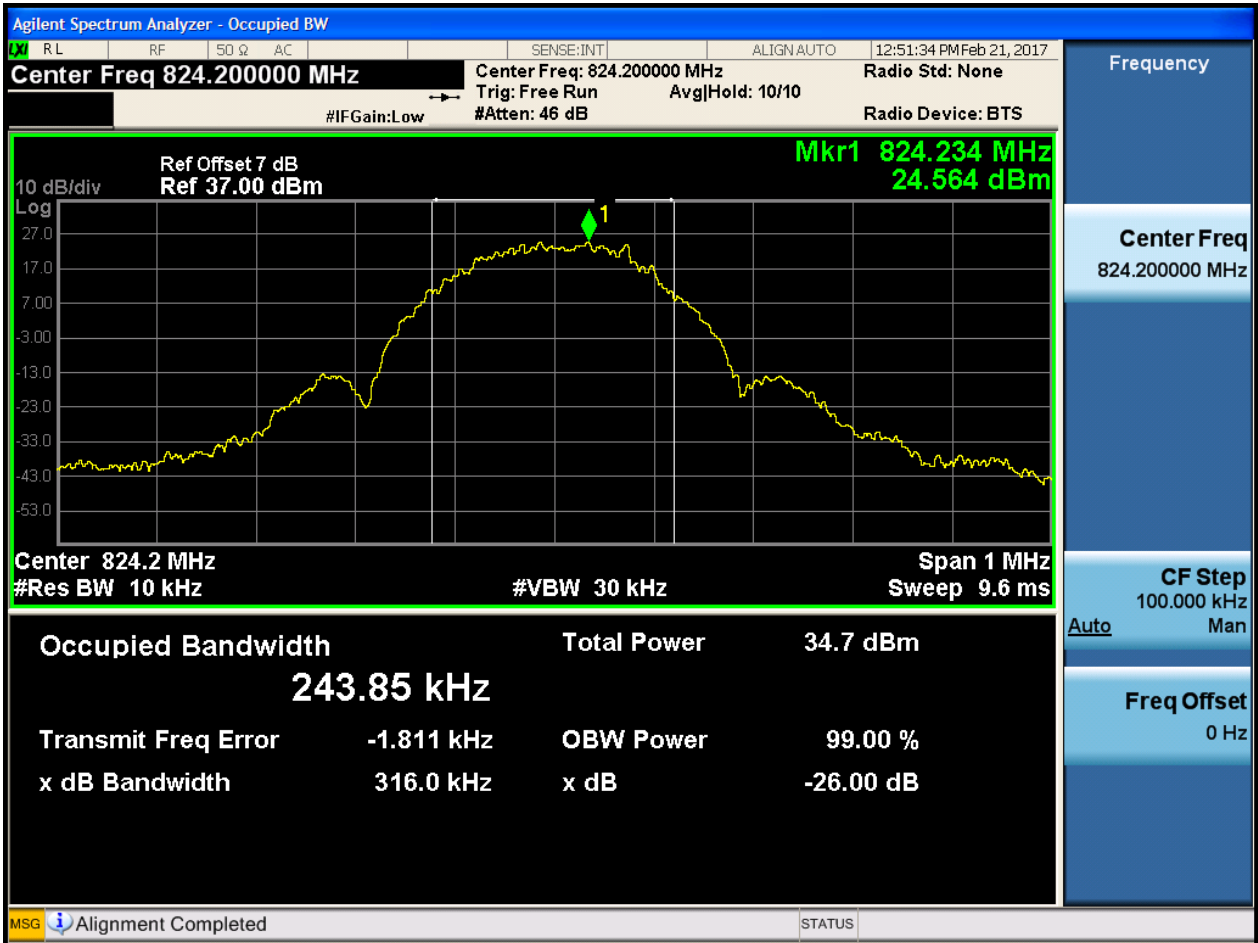
4.1.1.1.3 Test Channel = HCH





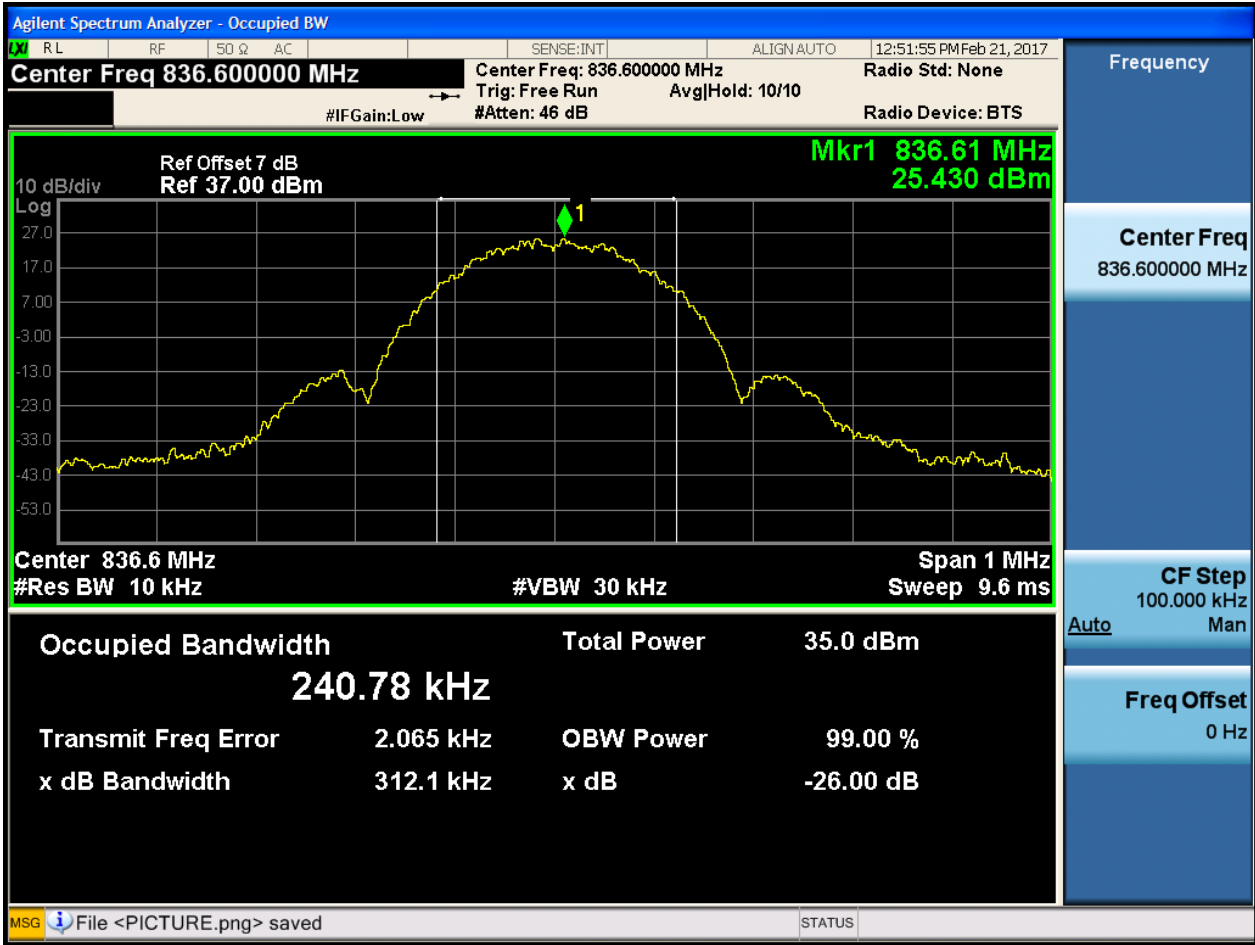
### 4.1.1.2 Test Mode = GSM/TM2

#### 4.1.1.2.1 Test Channel = LCH



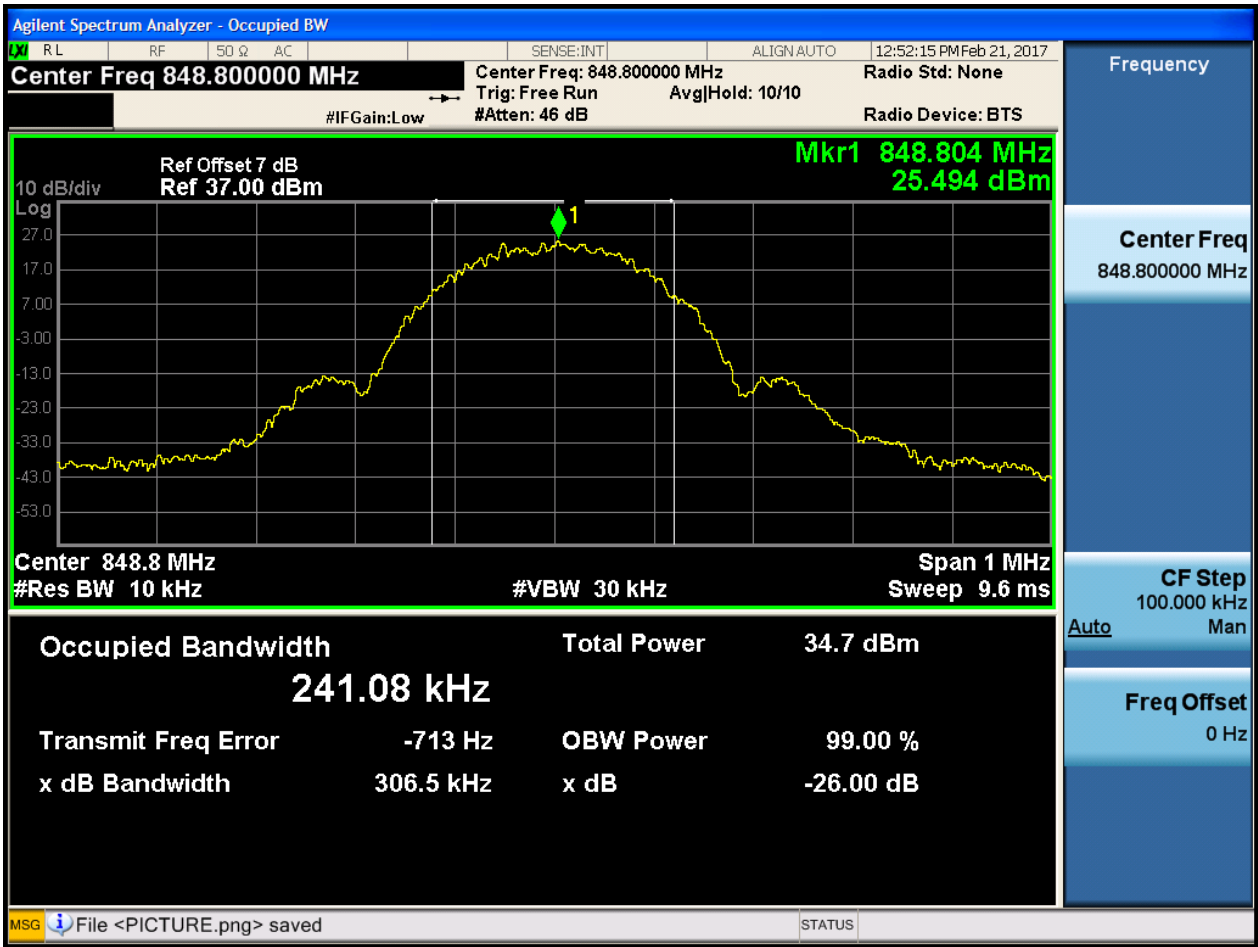


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH





4.1.2 Test Band = GSM1900

4.1.2.1 Test Mode = GSM/TM1

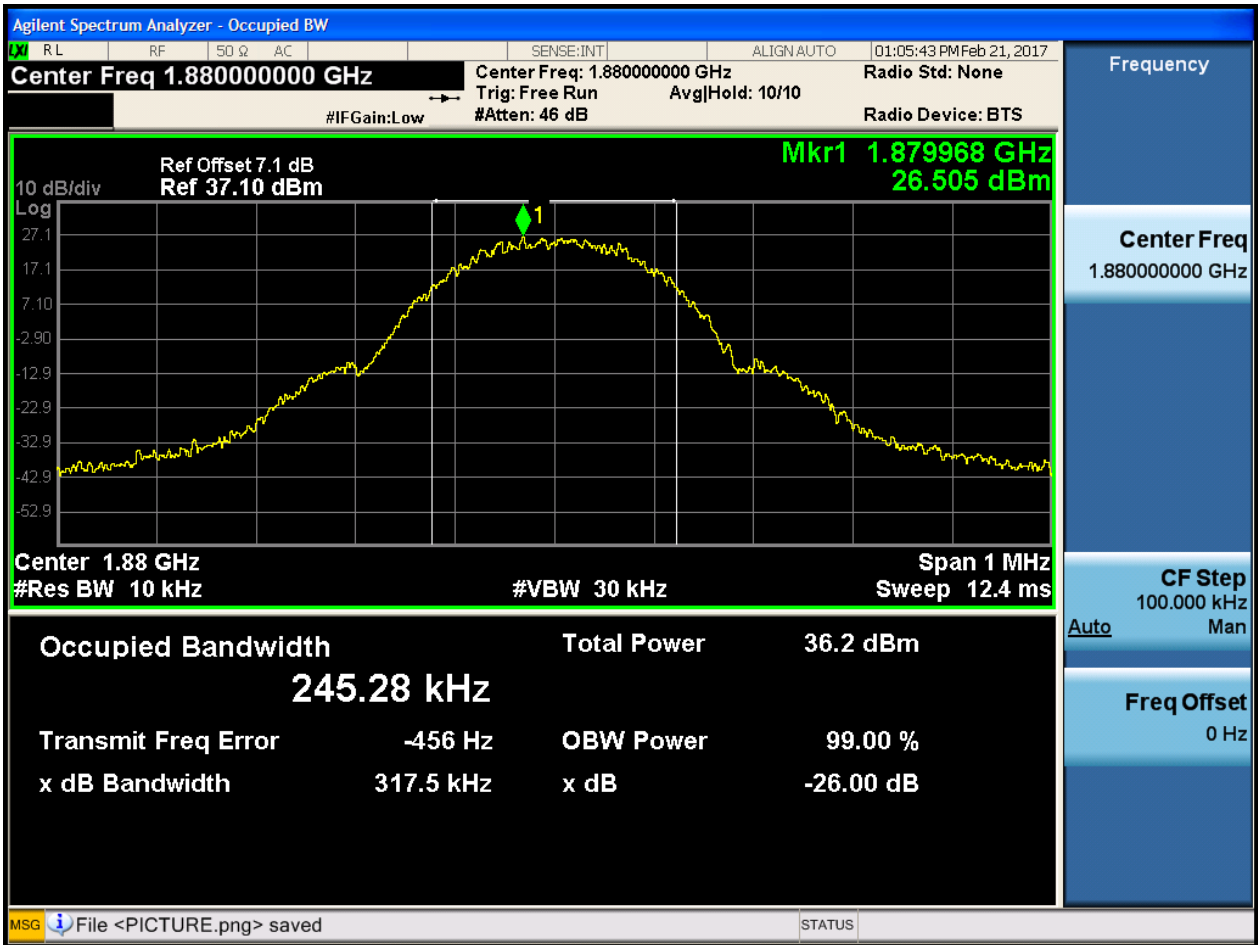
4.1.2.1.1 Test Channel = LCH







4.1.2.1.2 Test Channel = MCH





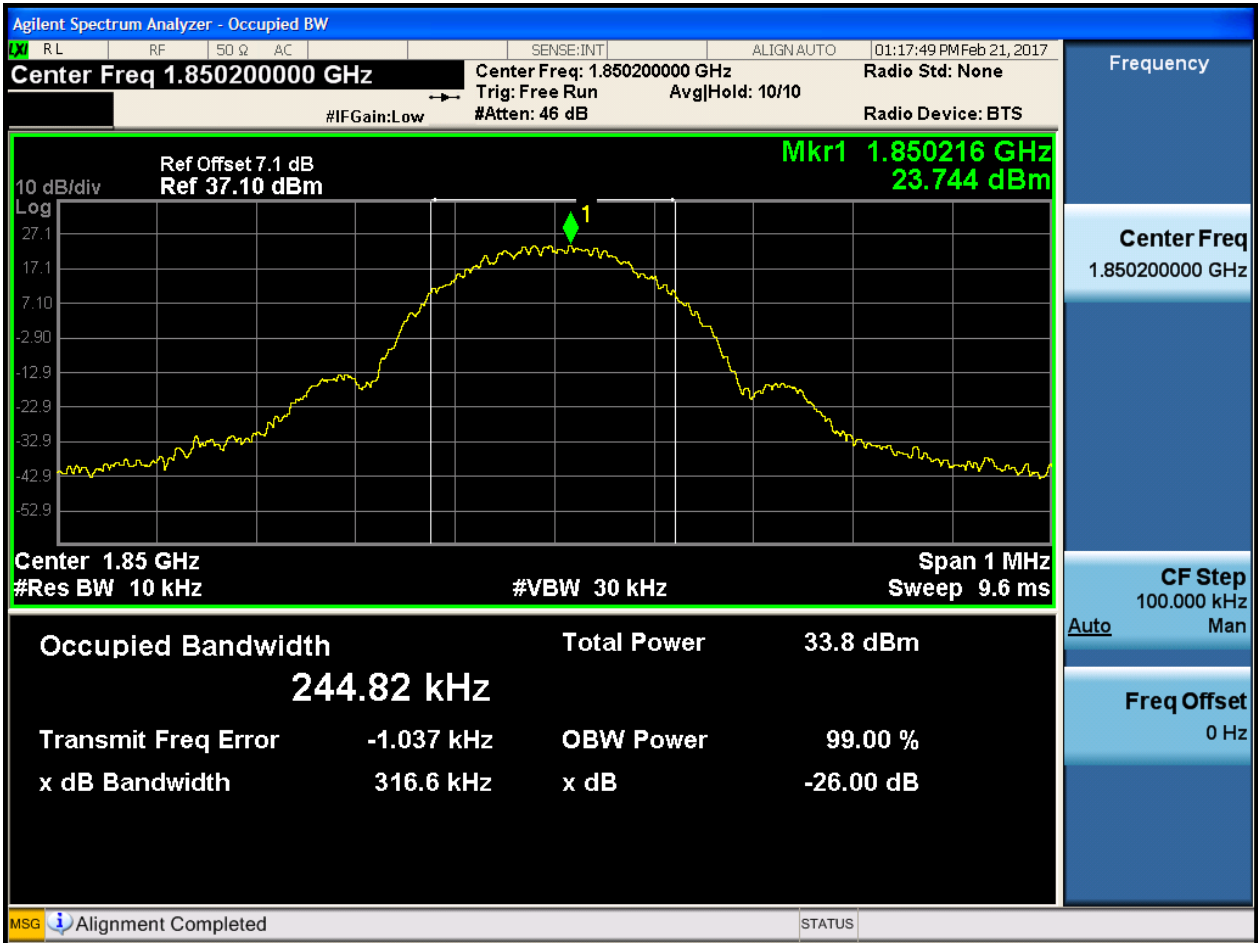
4.1.2.1.3 Test Channel = HCH





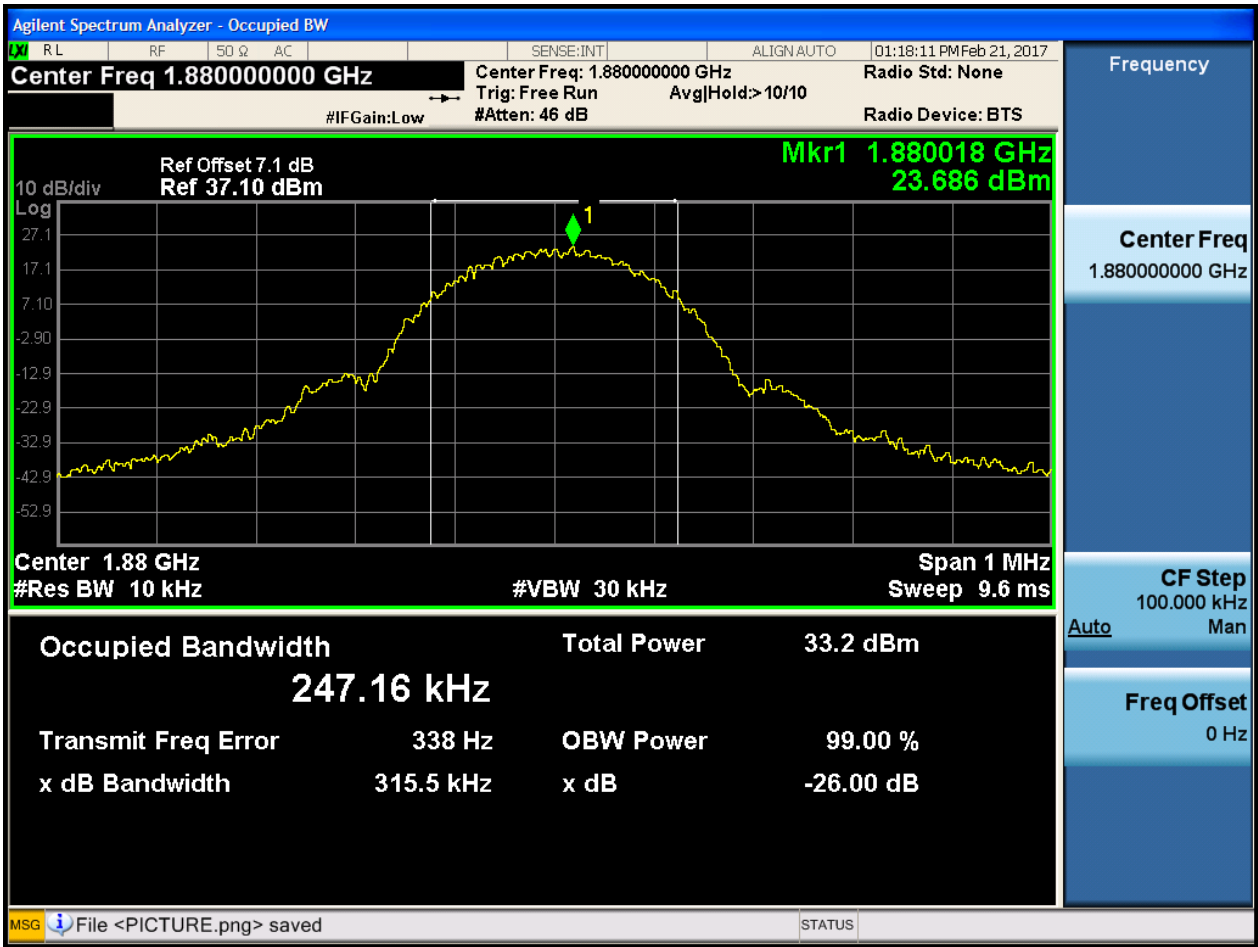
### 4.1.2.2 Test Mode = GSM/TM2

#### 4.1.2.2.1 Test Channel = LCH



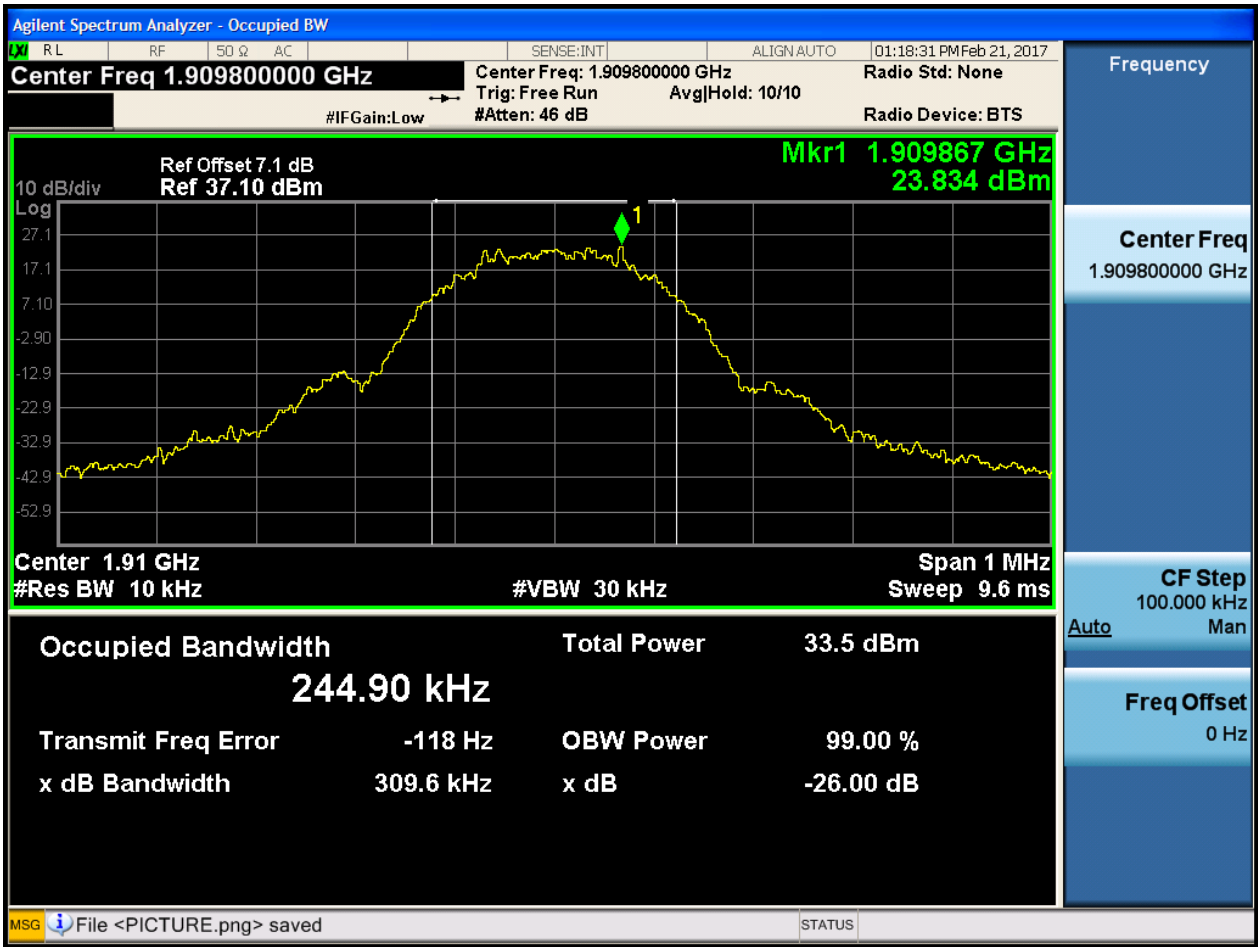


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





## 5Appendix\_E: Band Edges Compliance

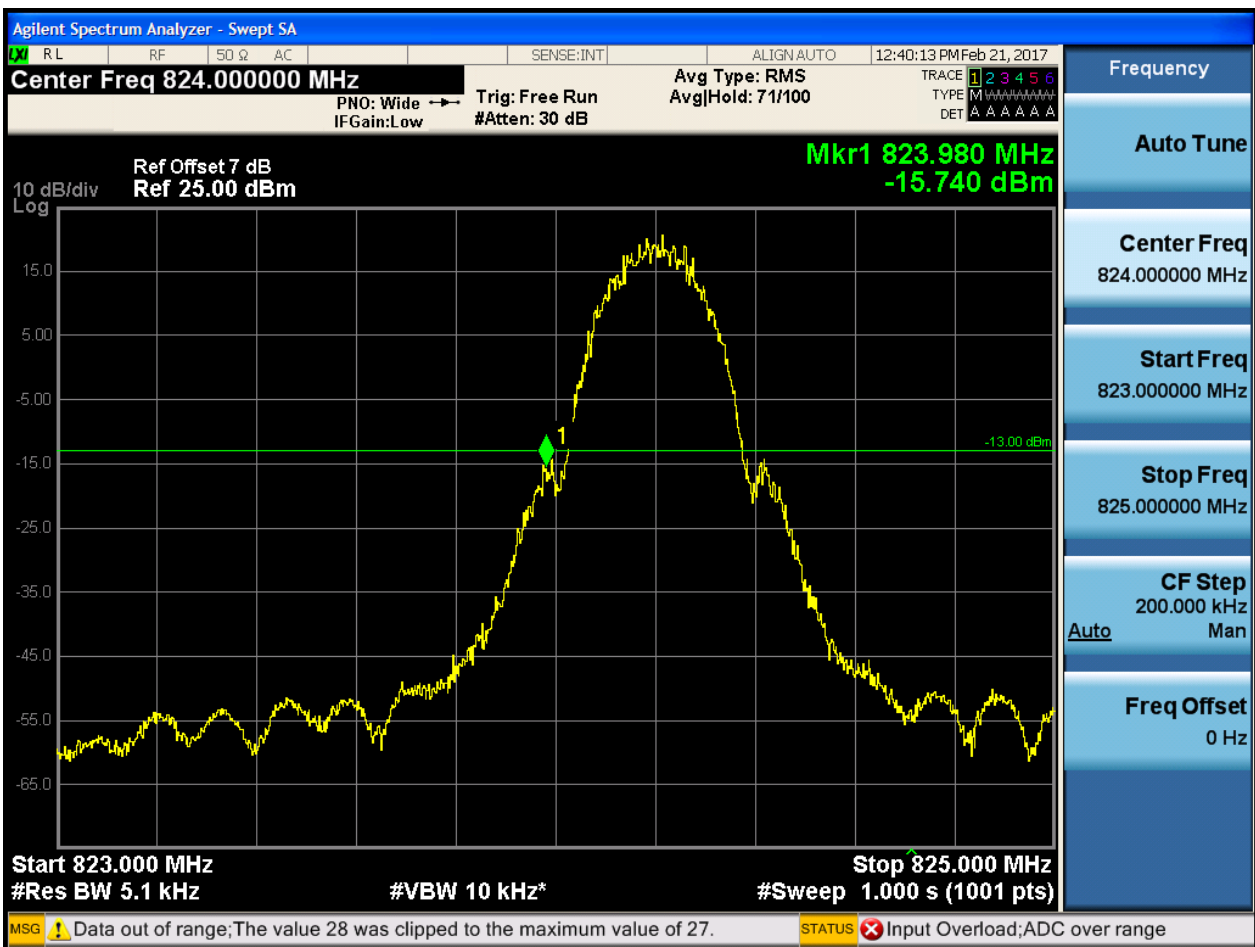
### Part I - Test Plots

#### 5.1 For GSM

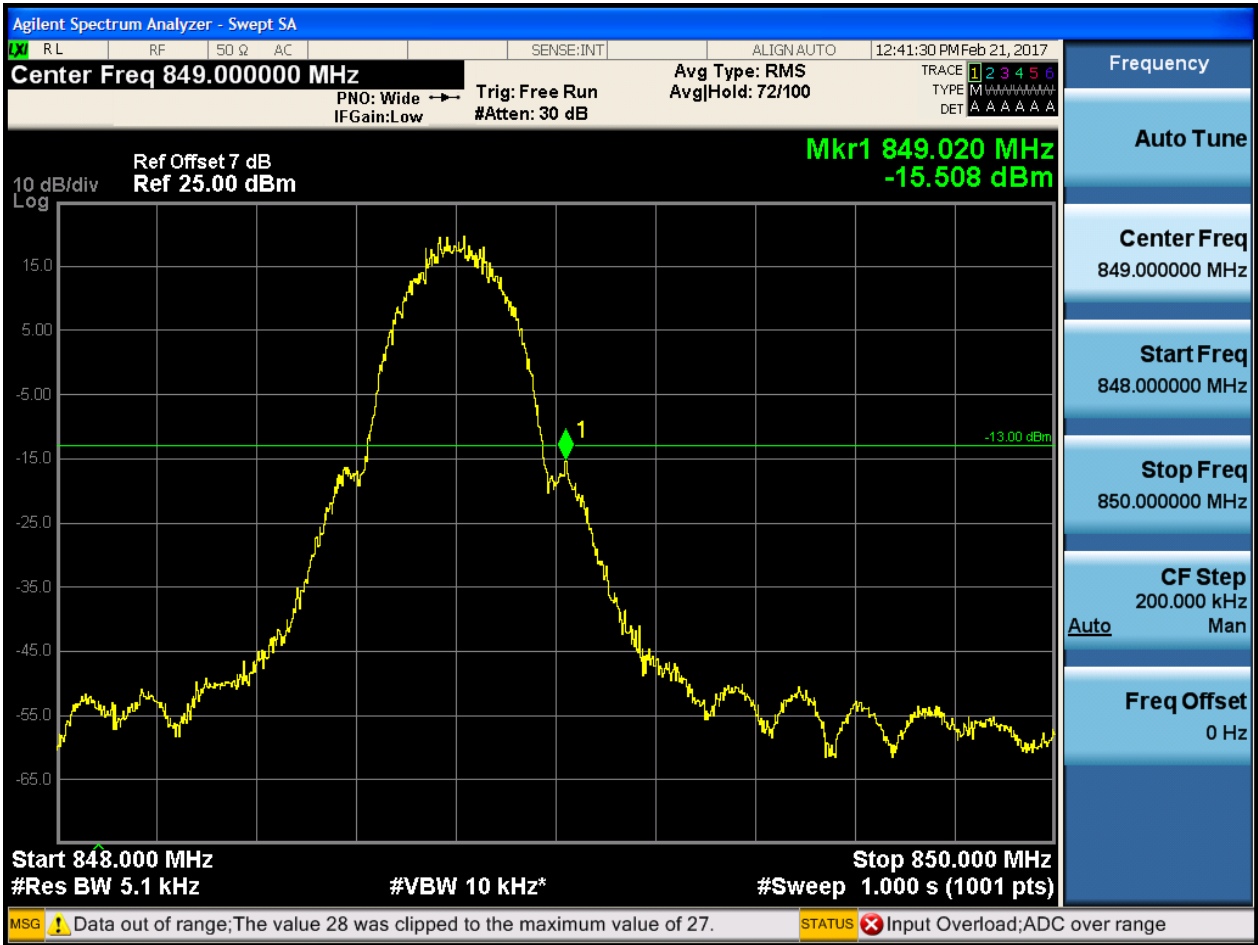
##### 5.1.1 Test Band = GSM850

##### 5.1.1.1 Test Mode = GSM/TM1

##### 5.1.1.1.1 Test Channel = LCH



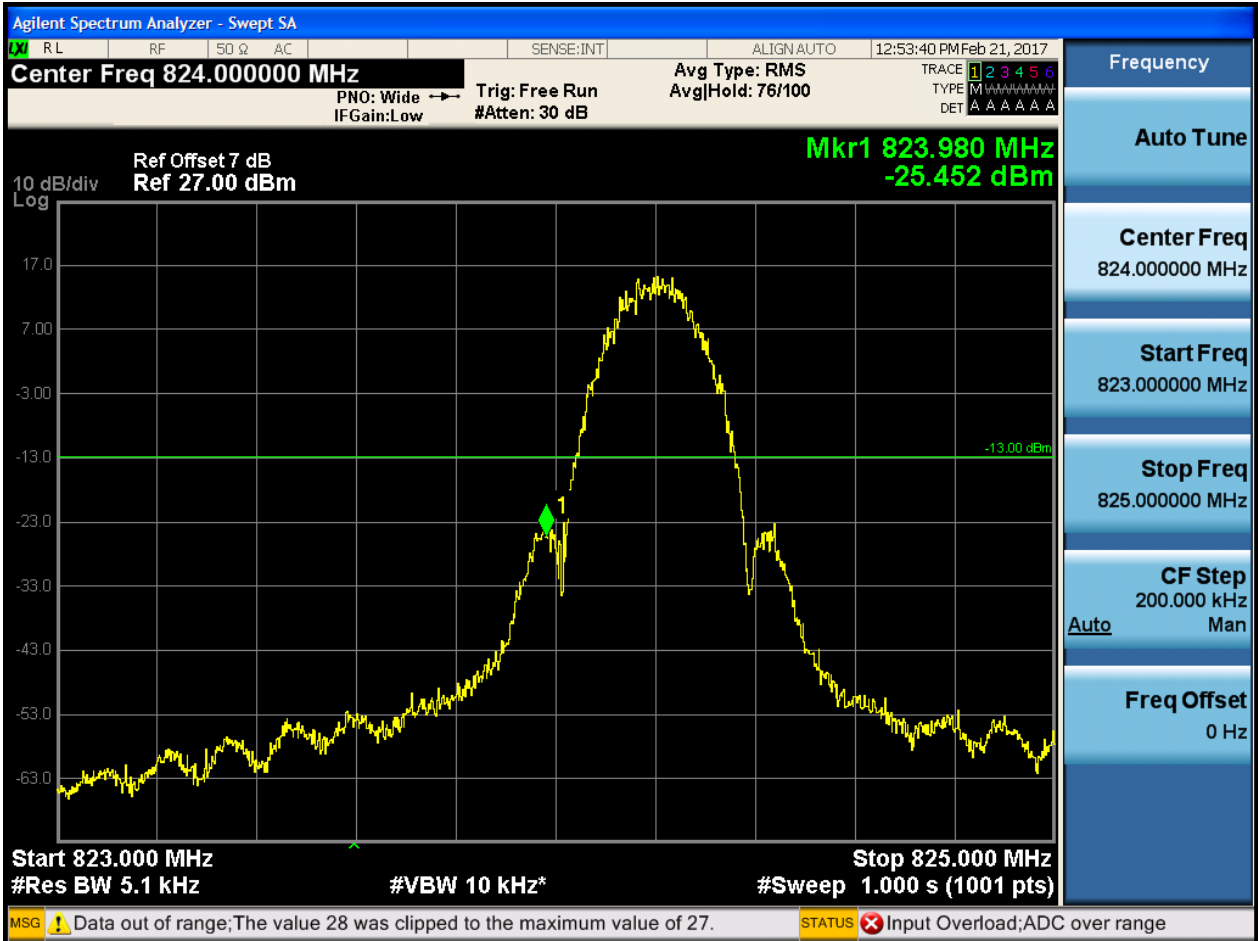
5.1.1.1.2 Test Channel = HCH





5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH





## 5.1.1.2.2 Test Channel = HCH

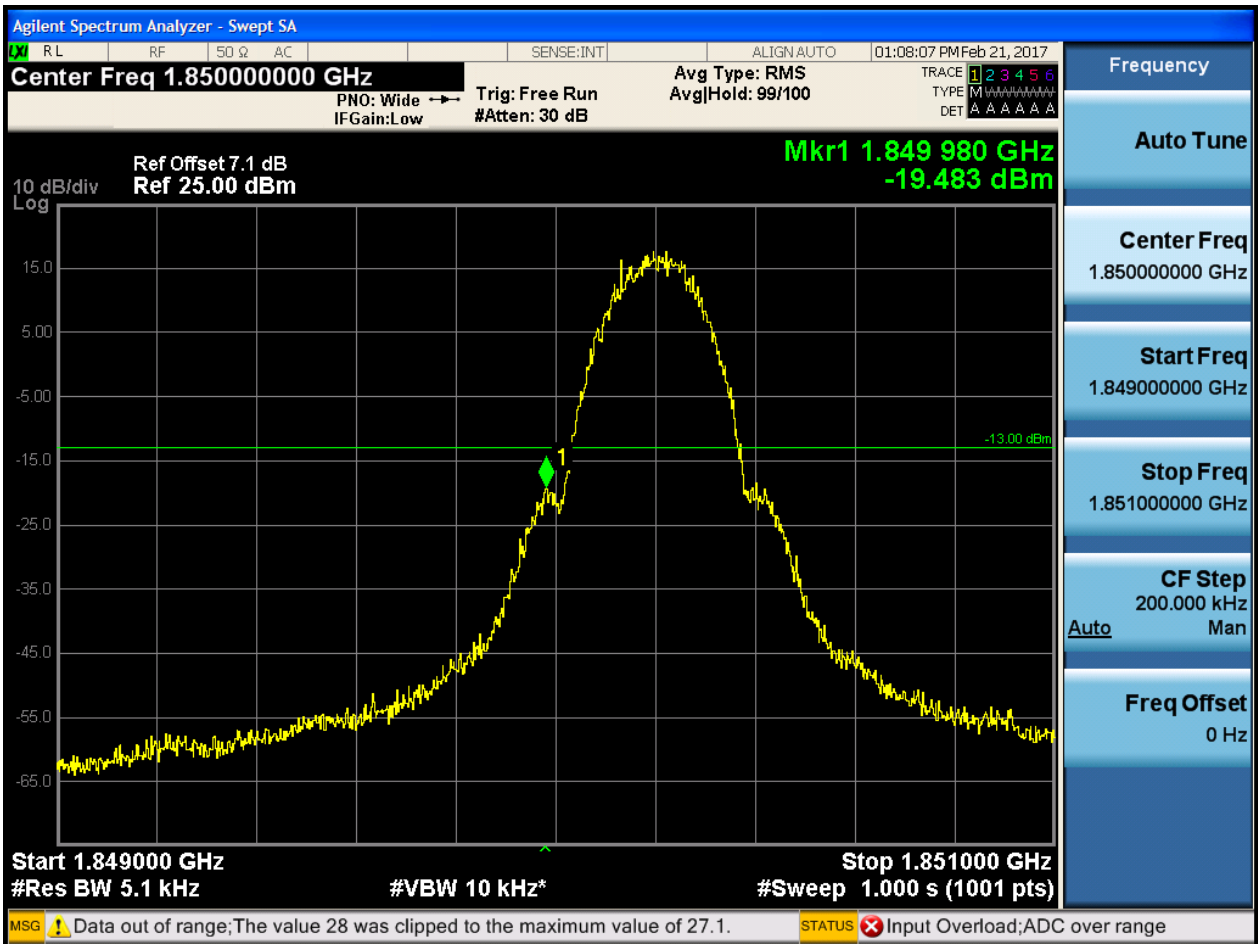




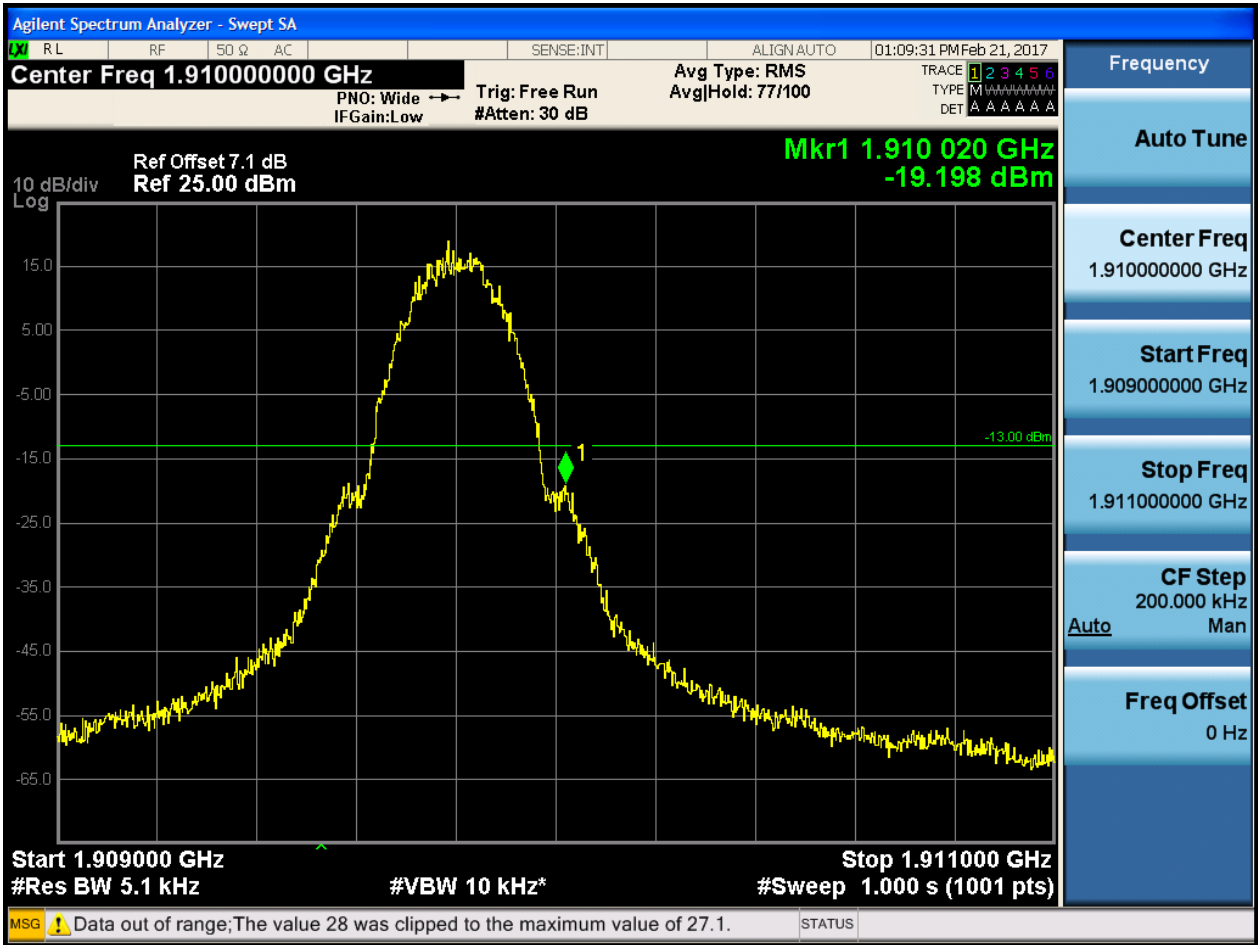
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH



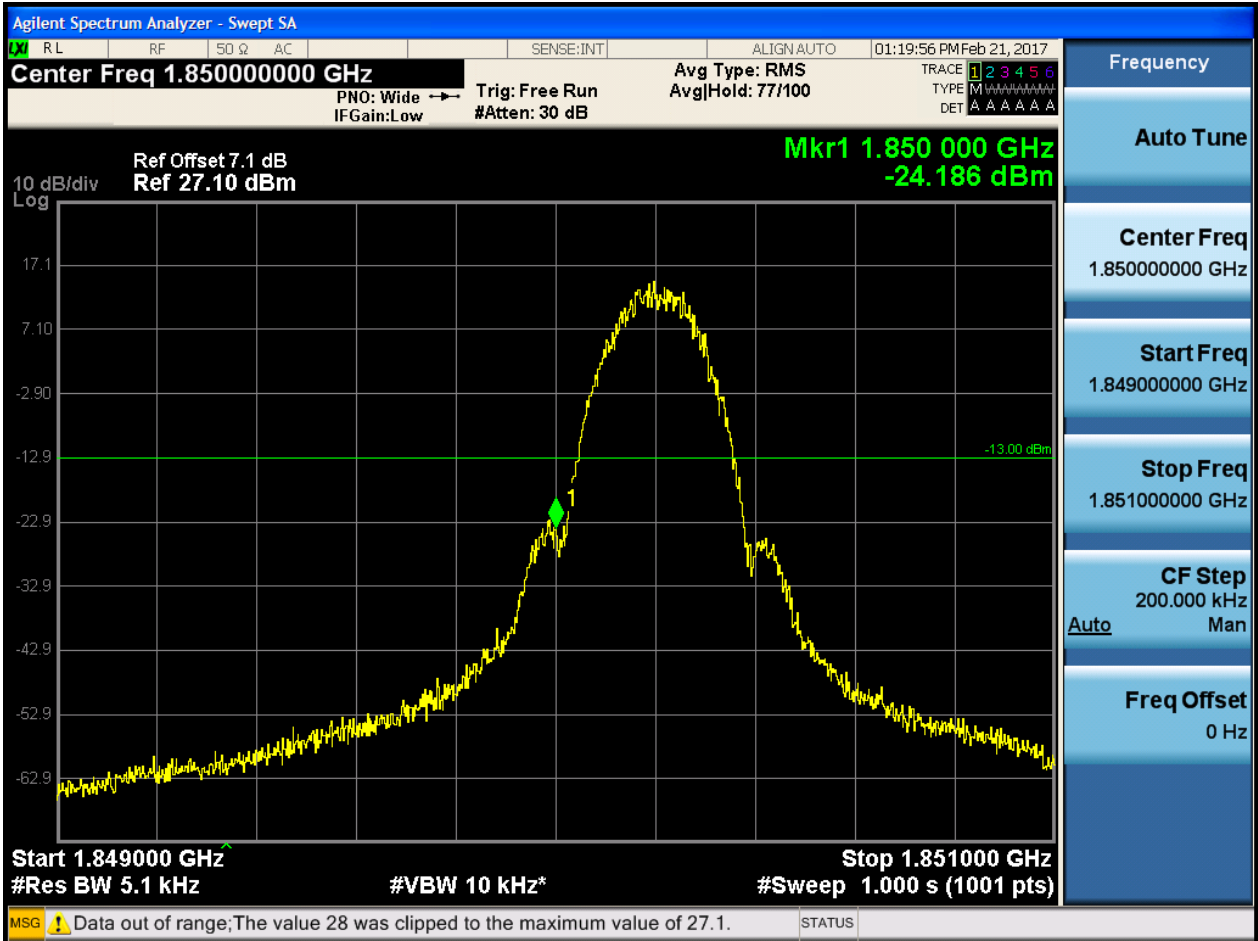
5.1.2.1.2 Test Channel = HCH





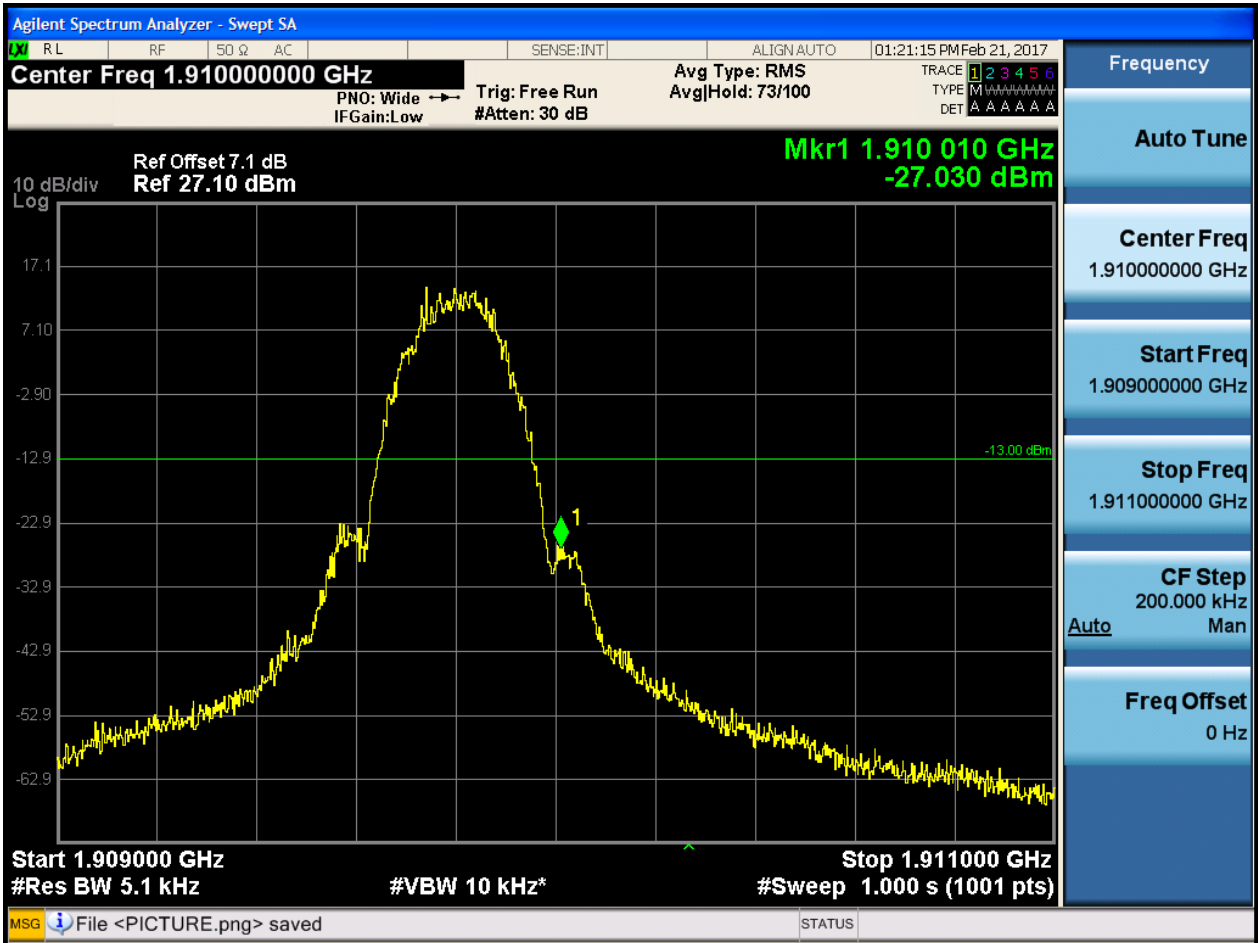
### 5.1.2.2 Test Mode = GSM/TM2

#### 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.

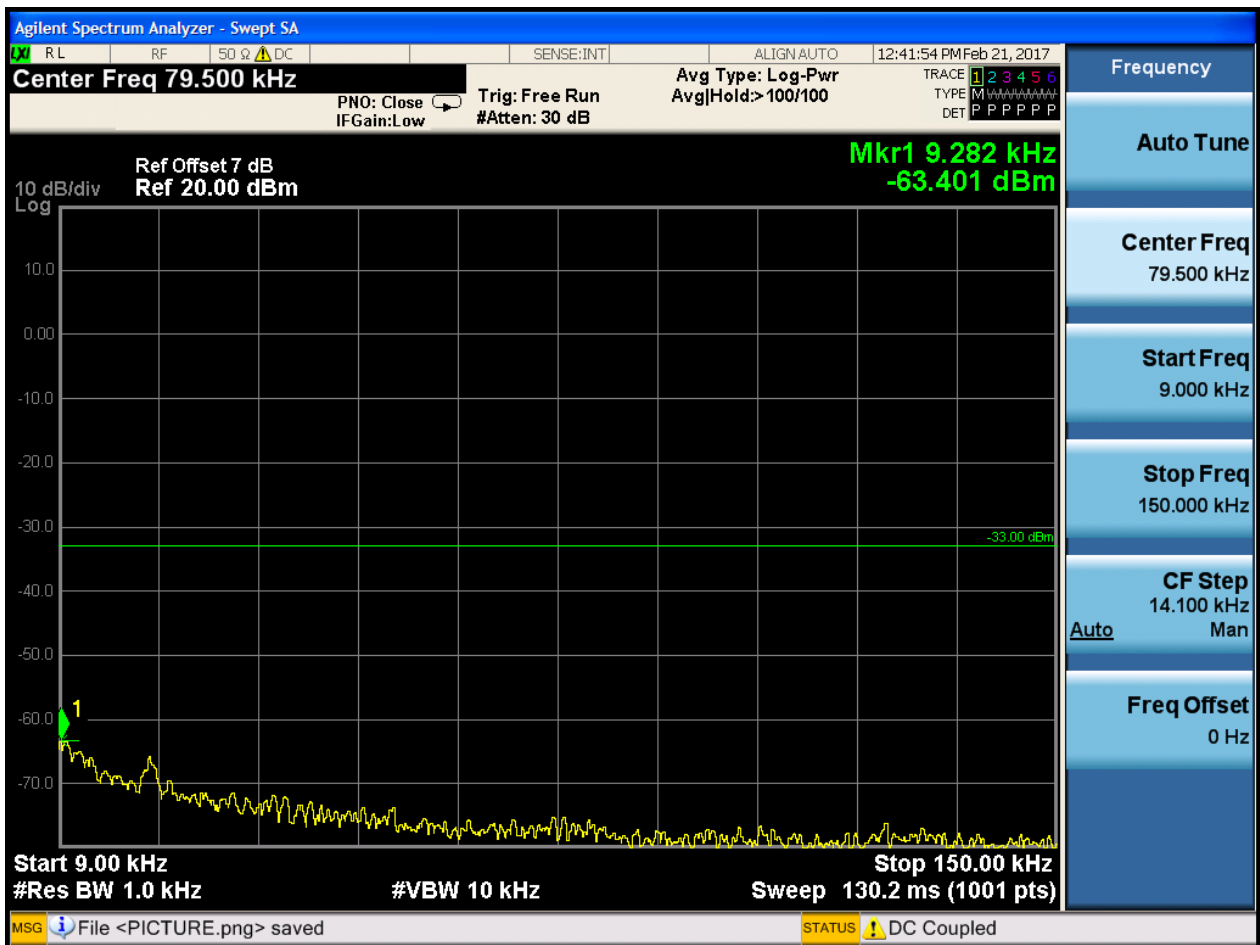
### Part I - Test Plots

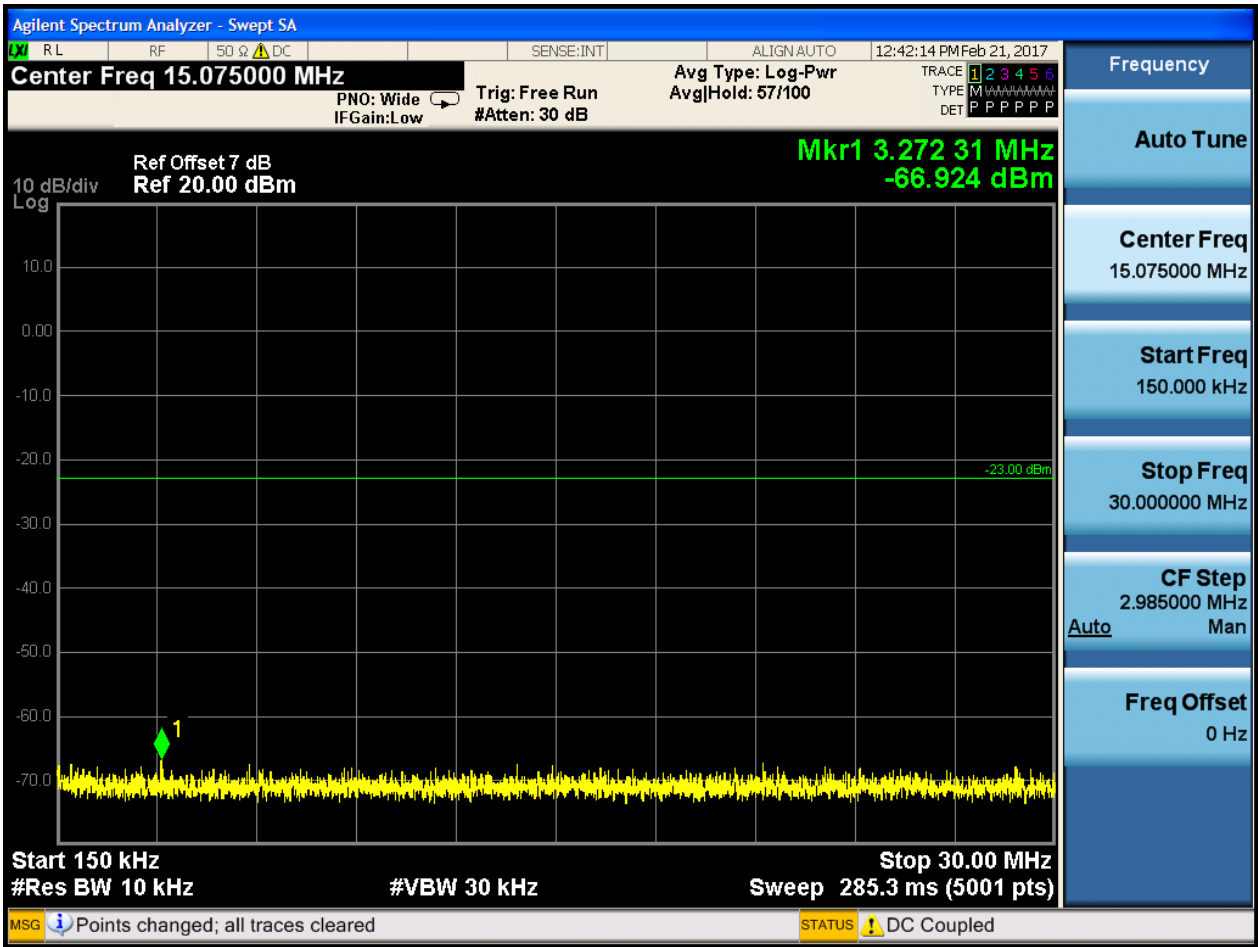
#### 6.1 For GSM

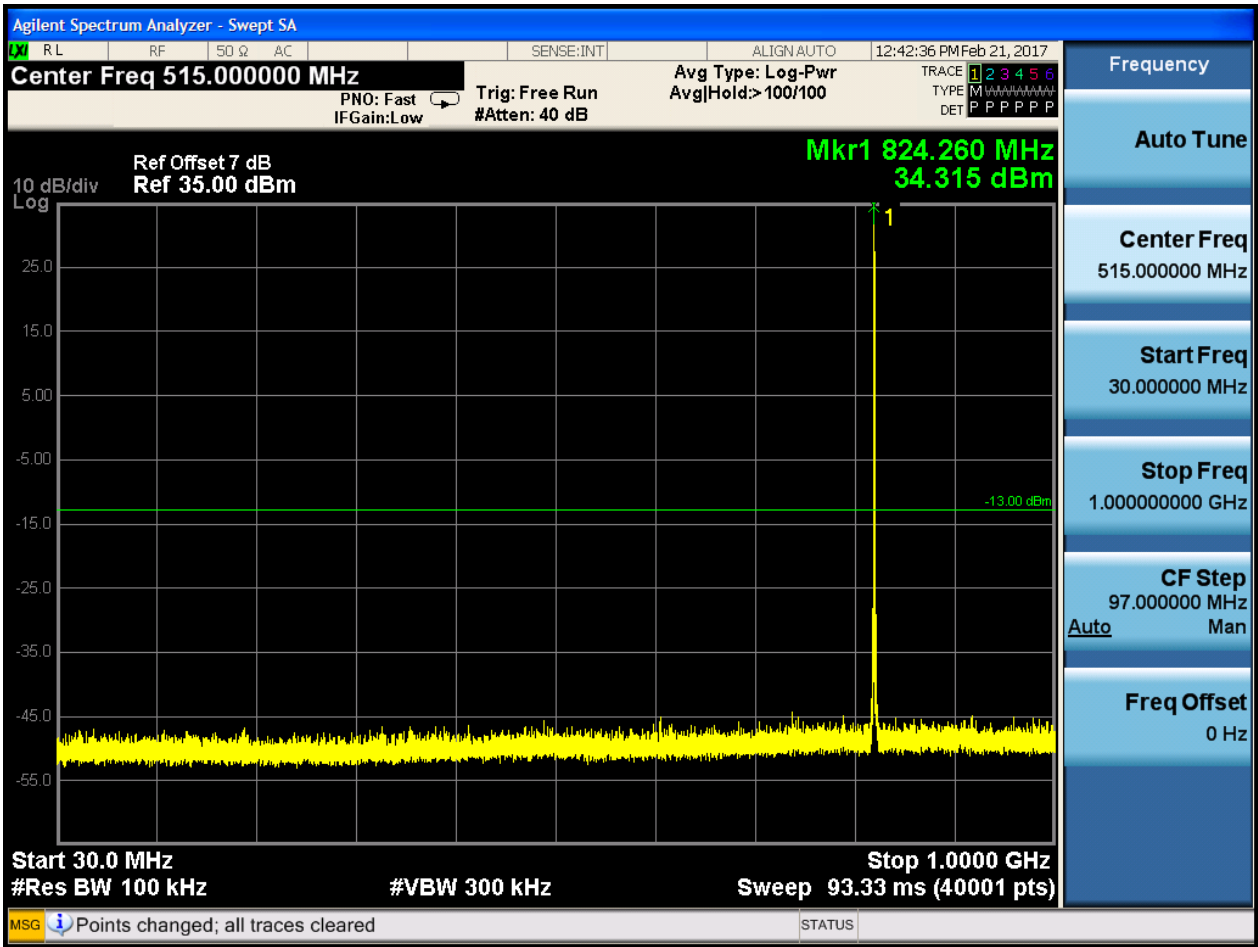
##### 6.1.1 Test Band = GSM850

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

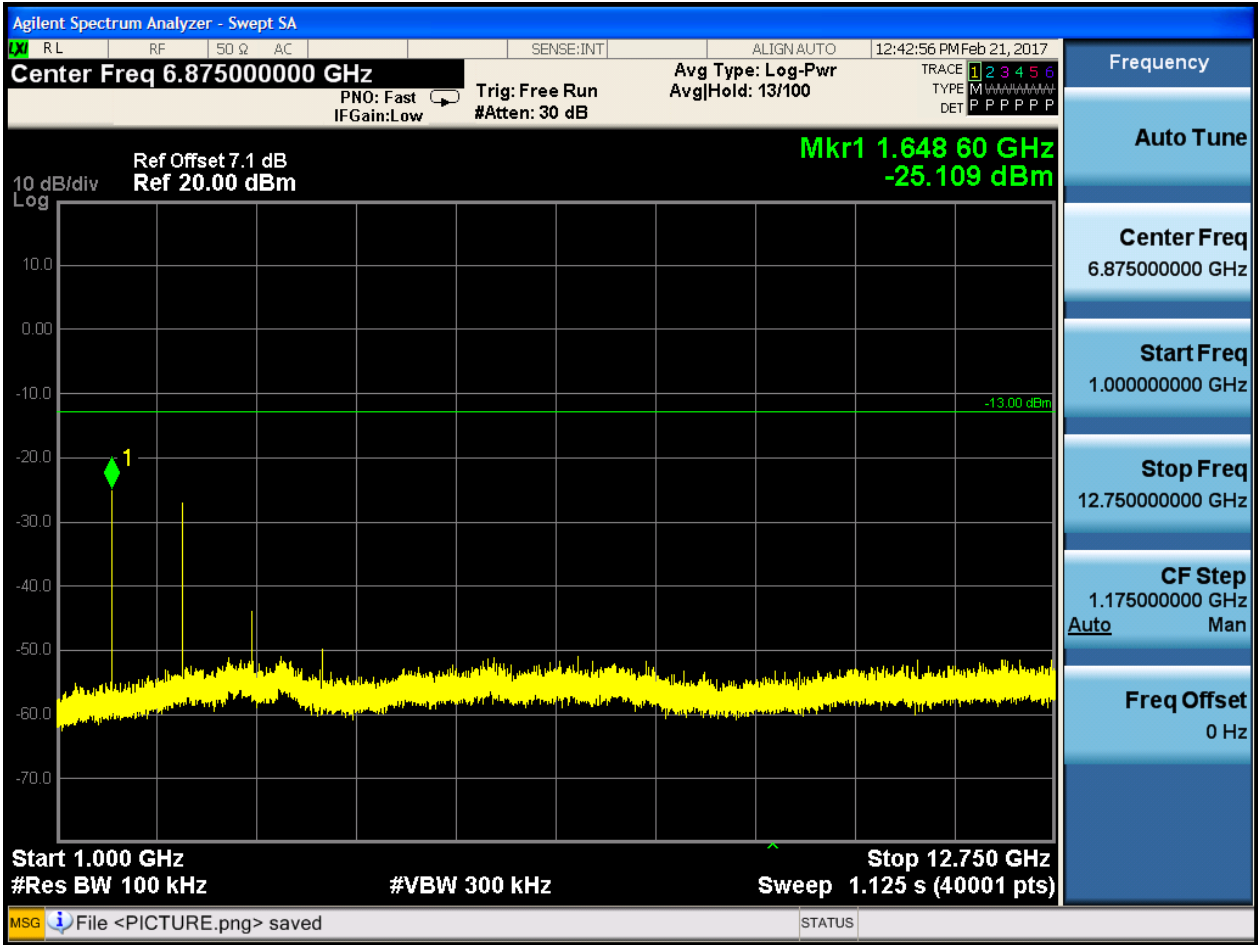
##### 6.1.1.1.1 Test Channel = LCH





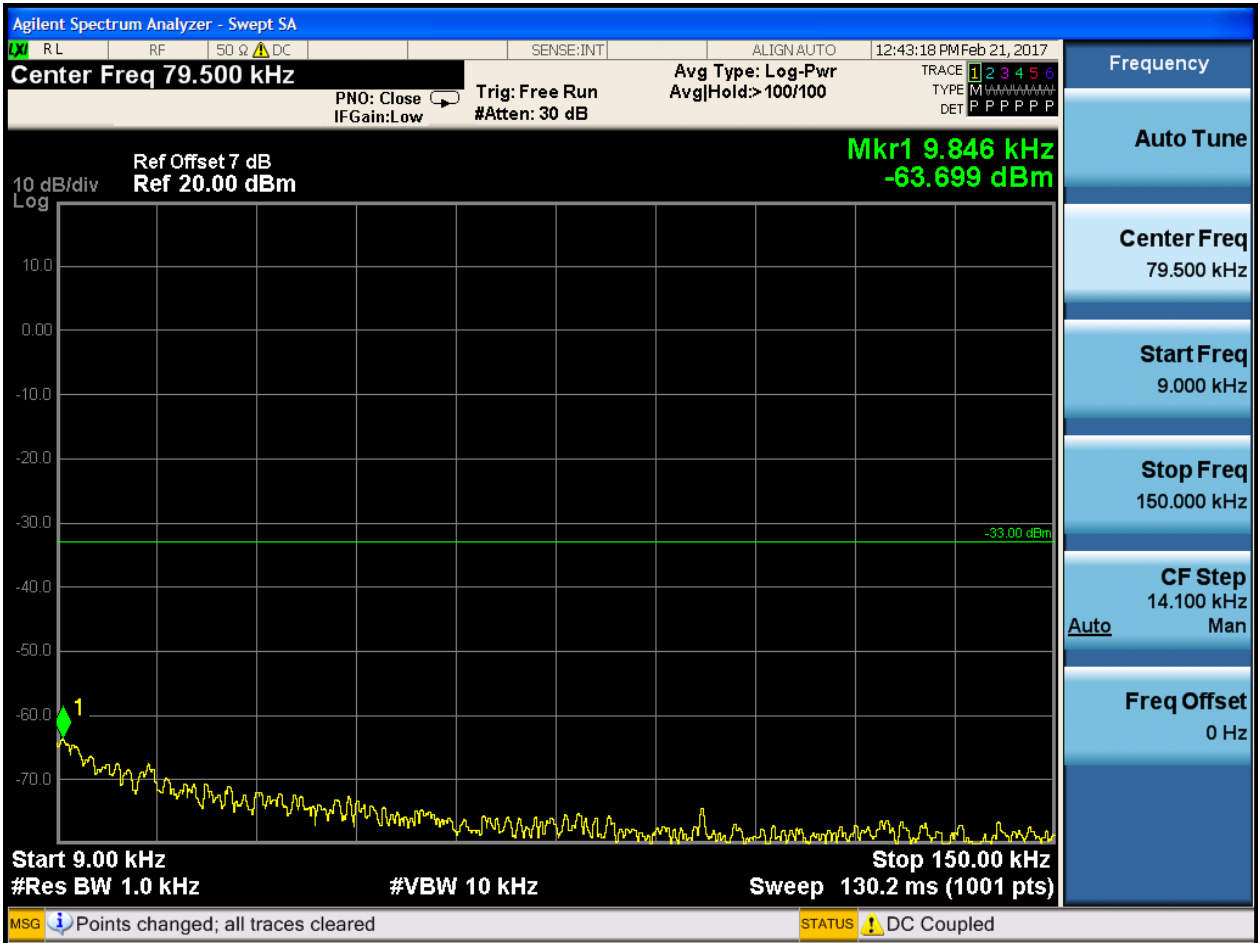


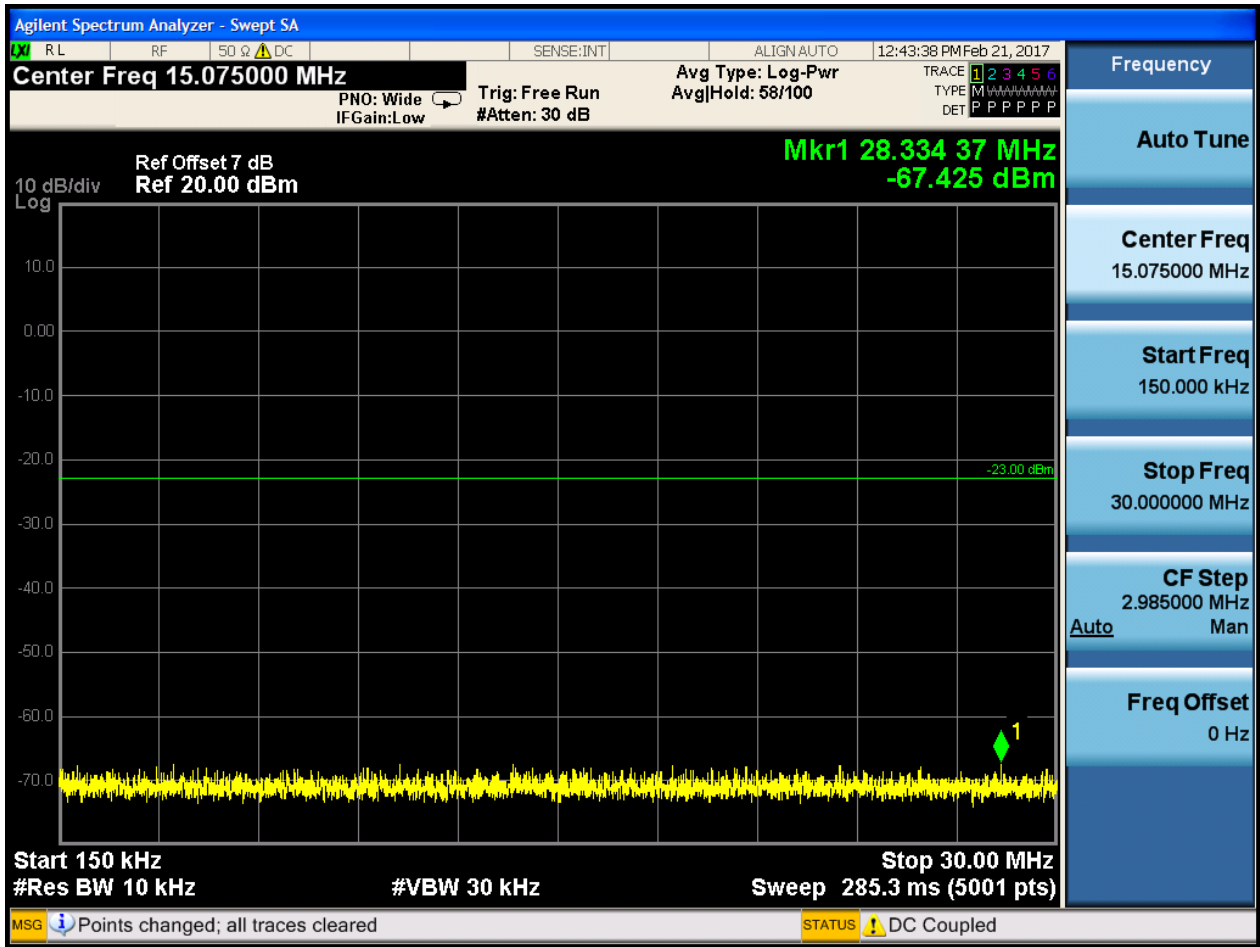


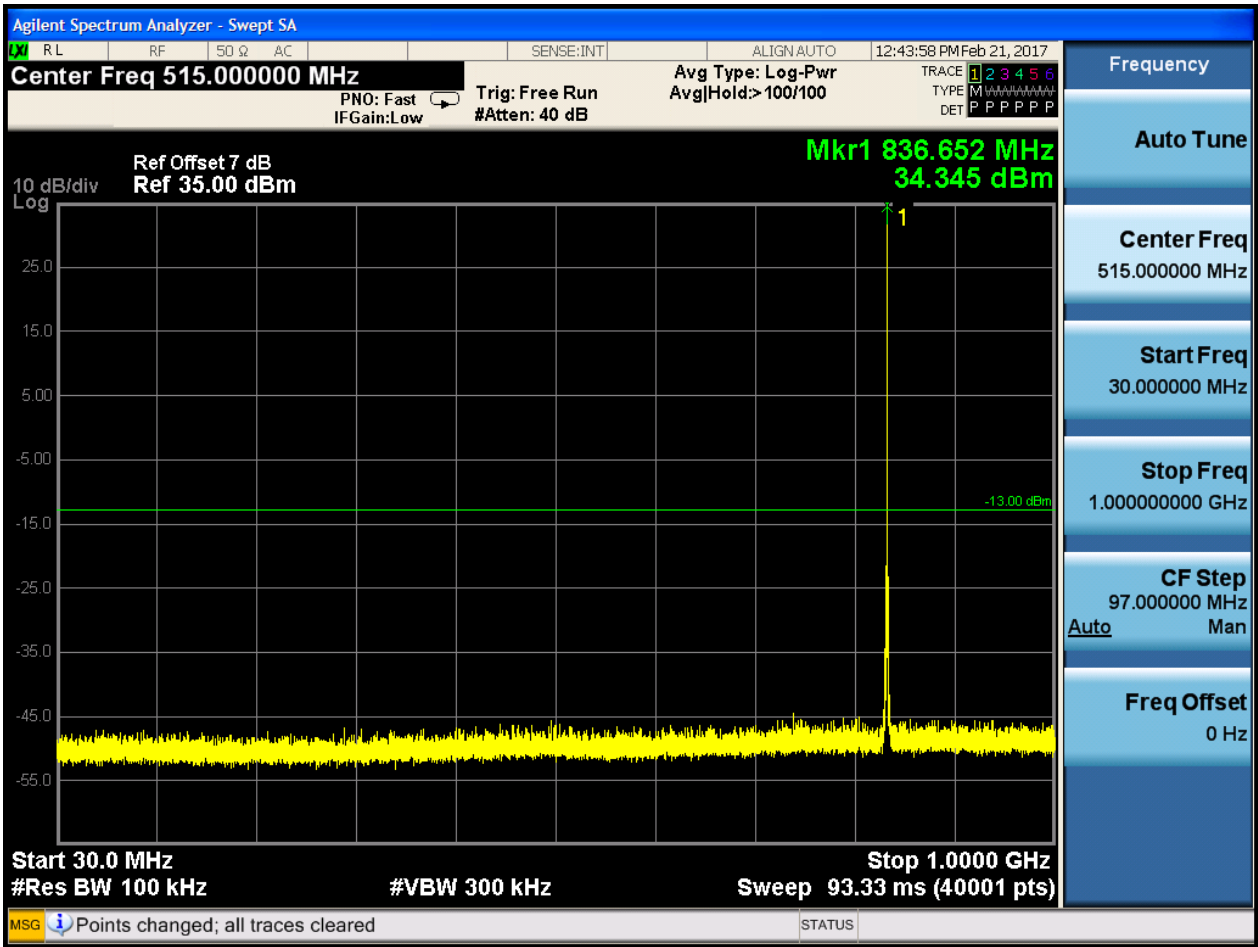


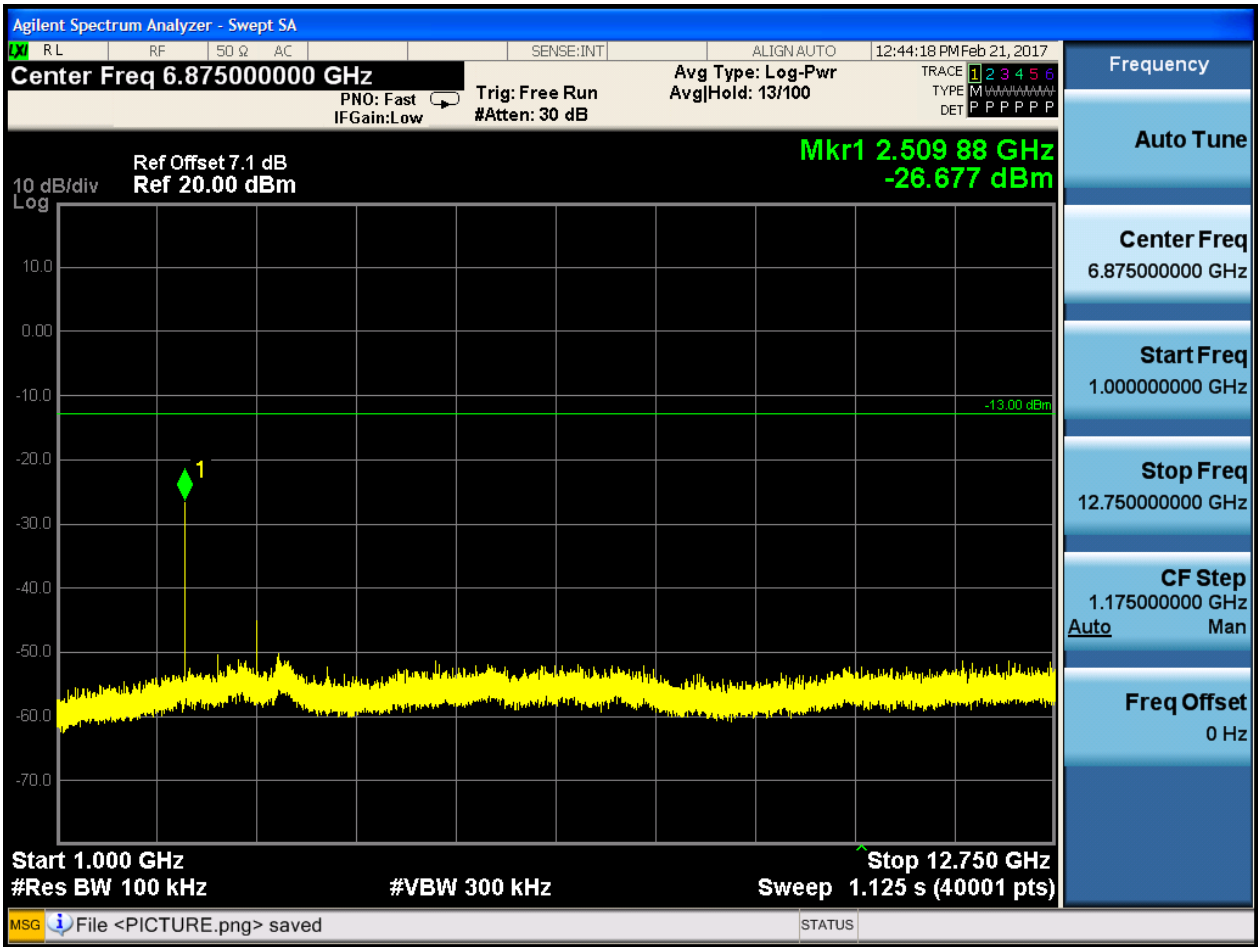


6.1.1.1.2 Test Channel = MCH



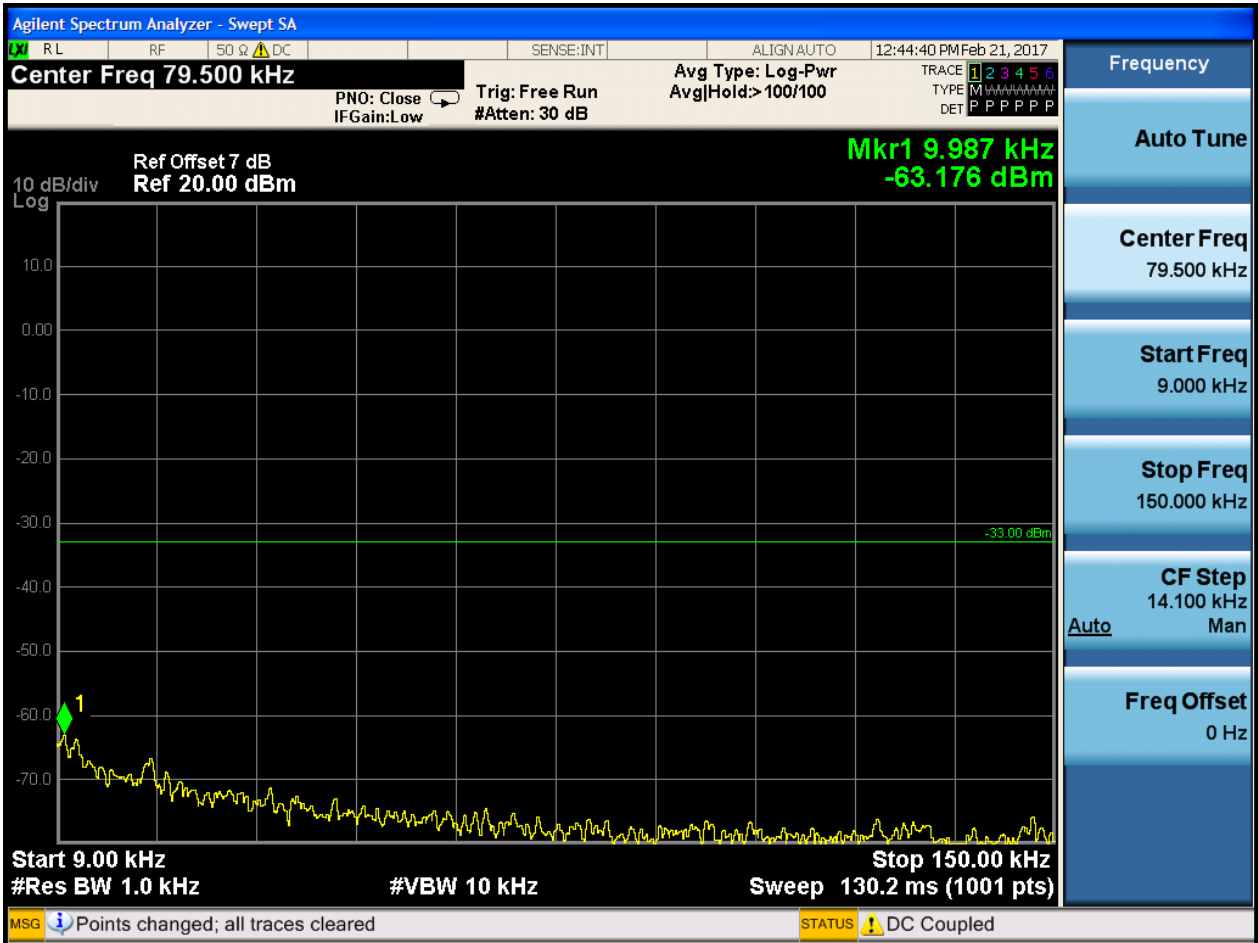


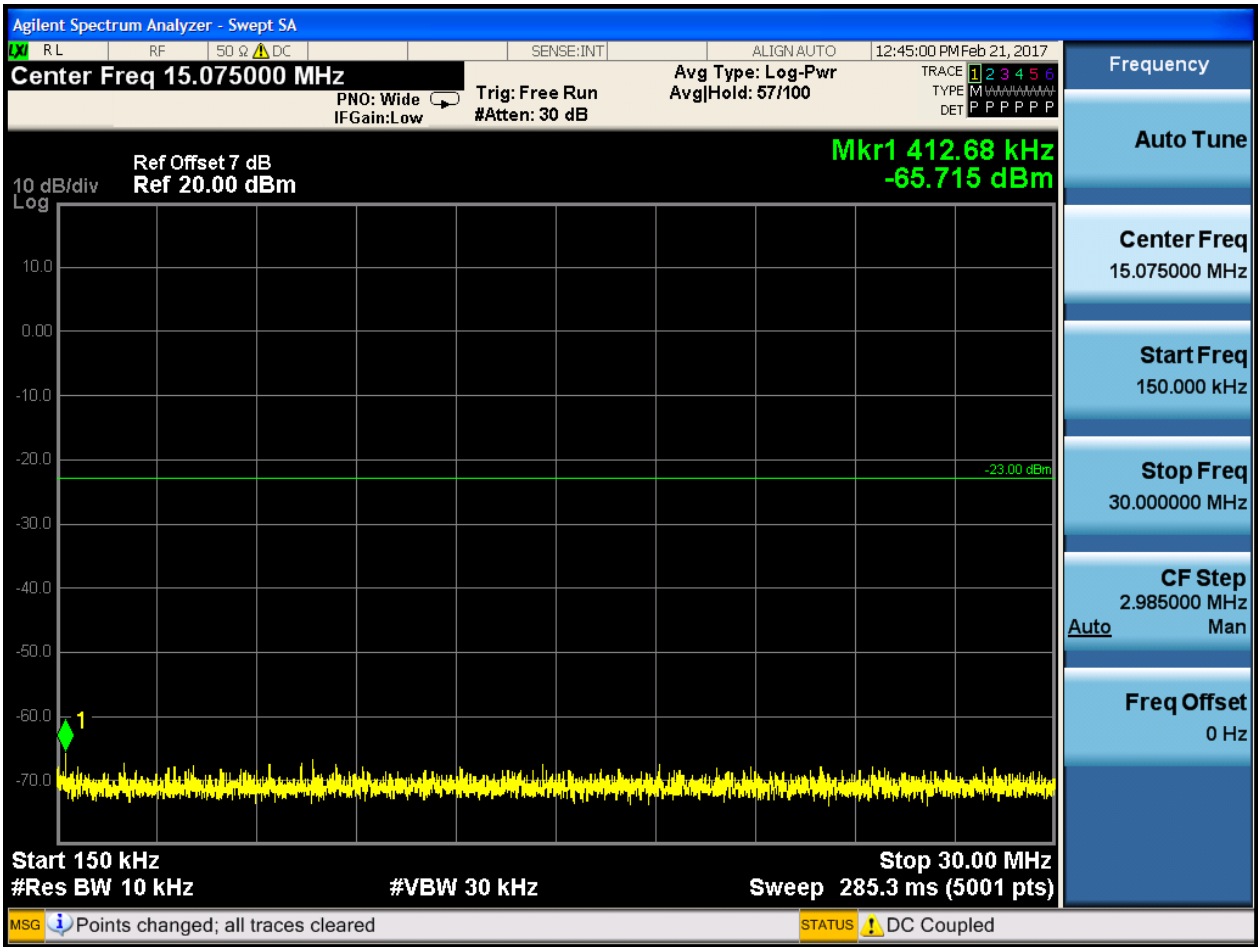


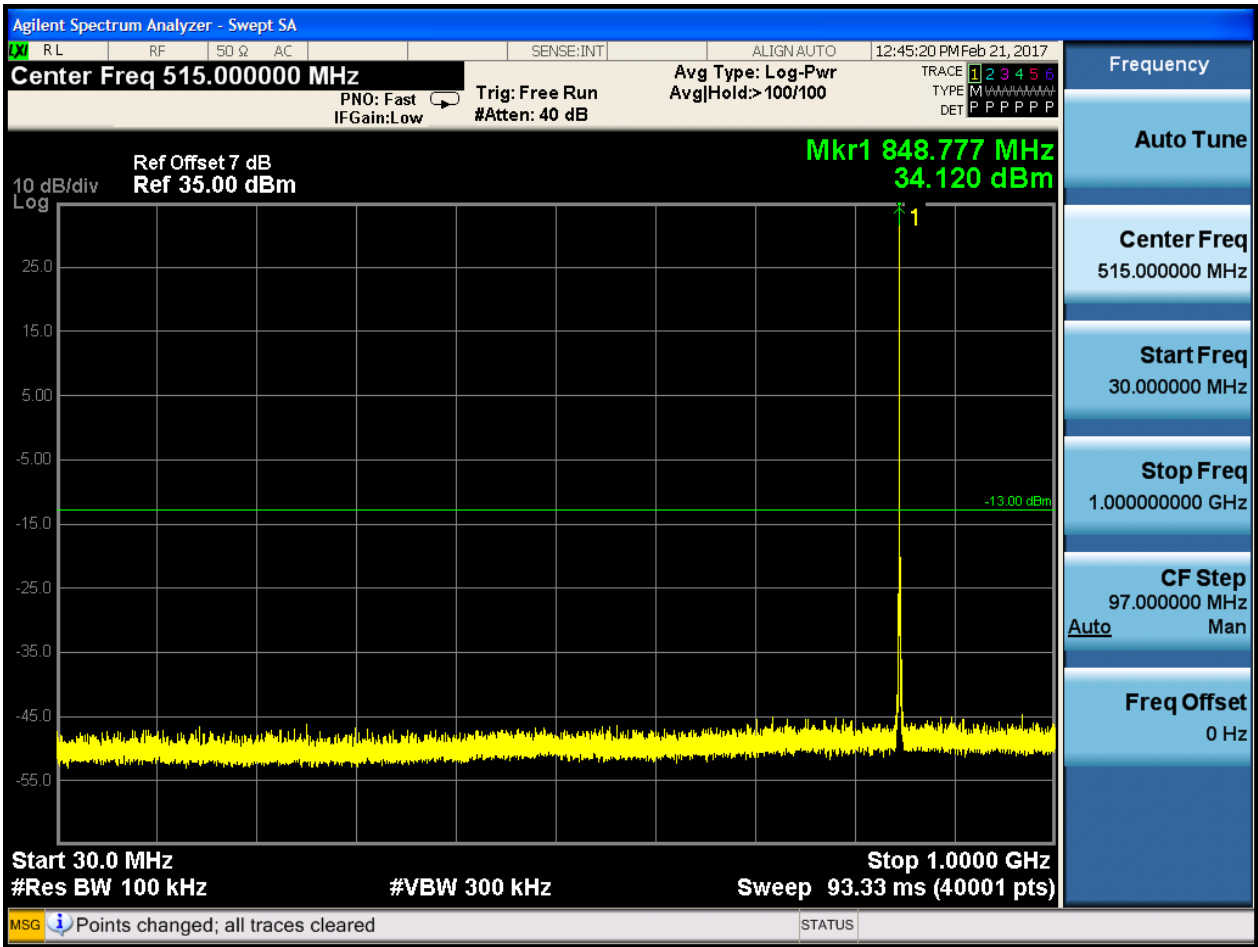




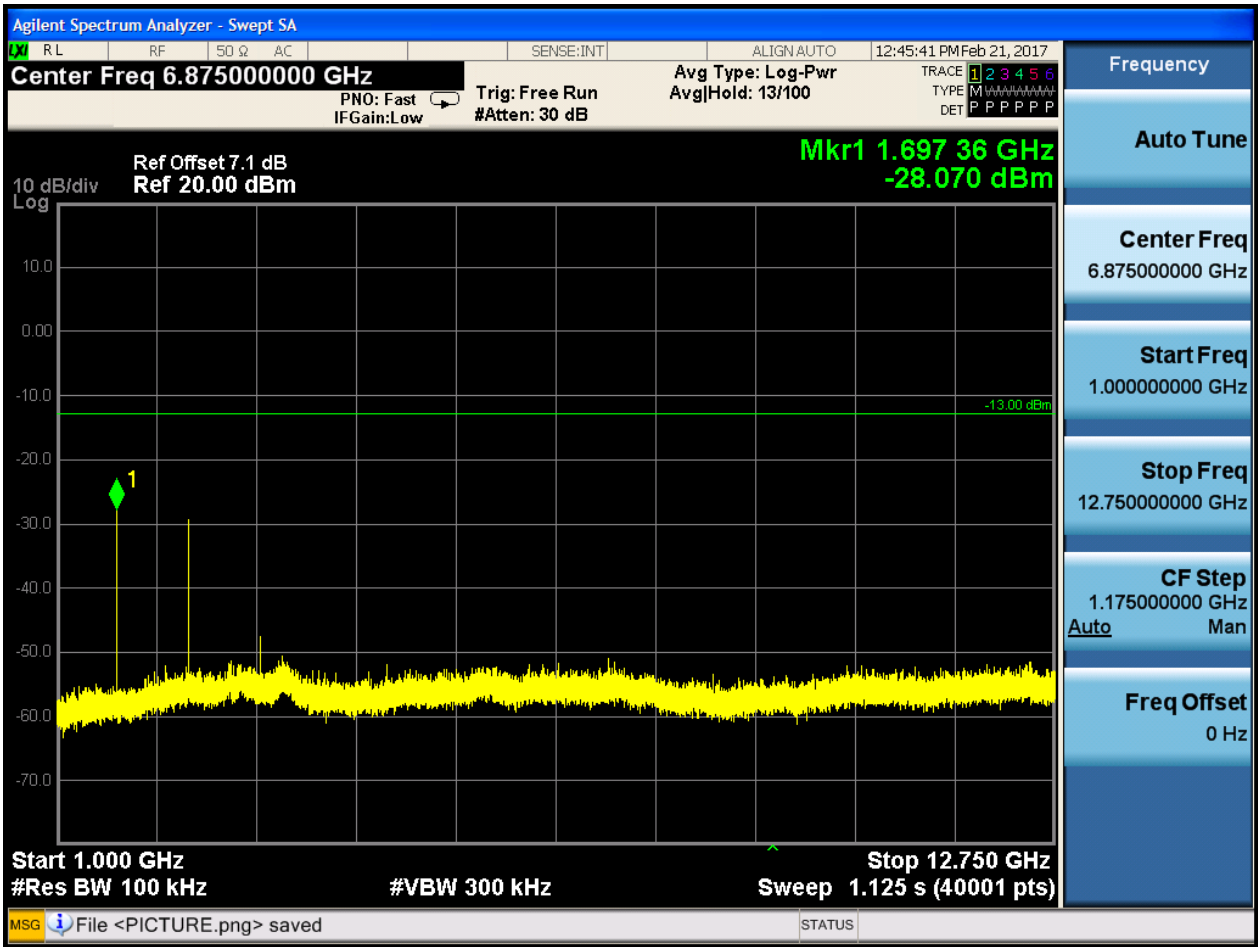
6.1.1.1.3 Test Channel = HCH







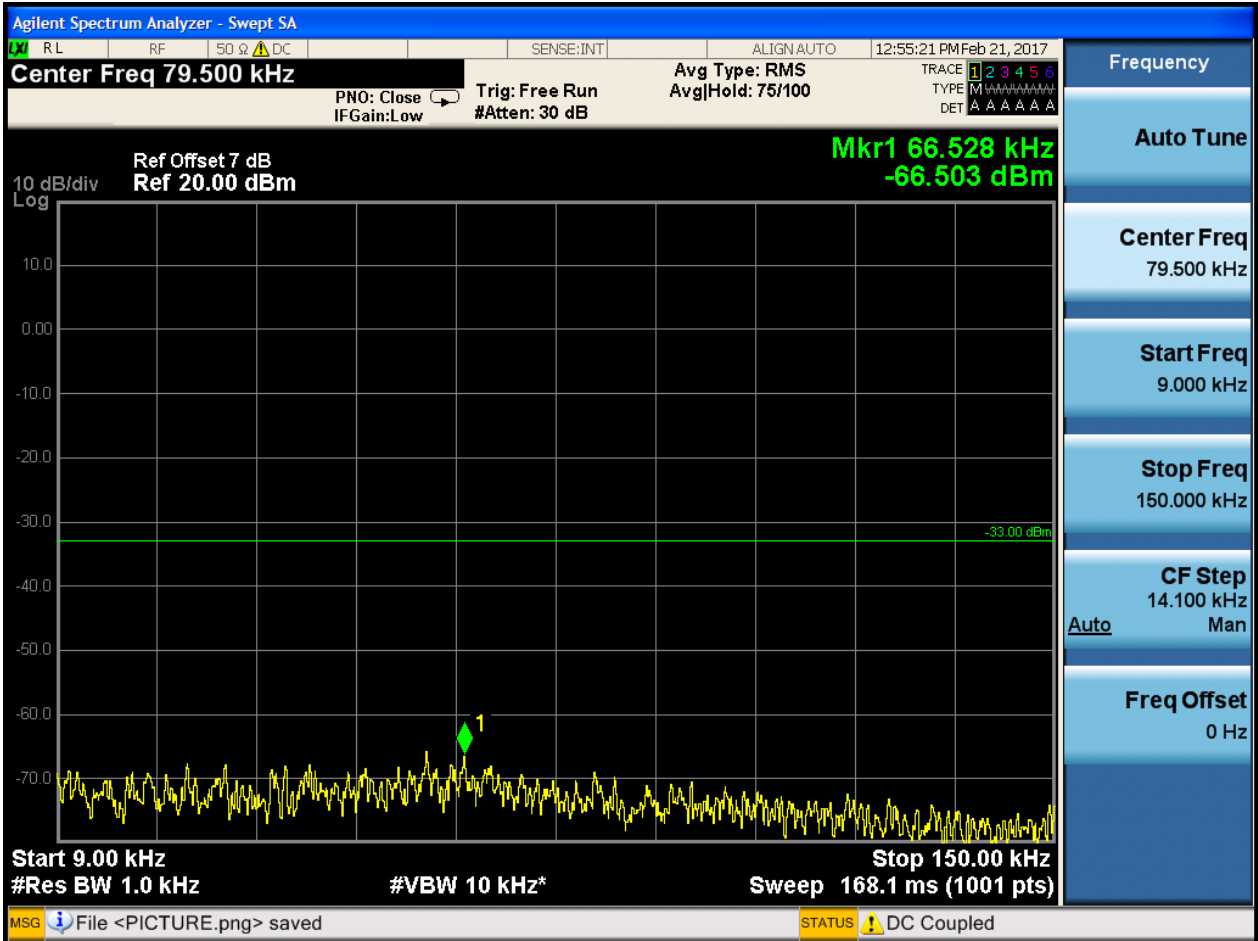


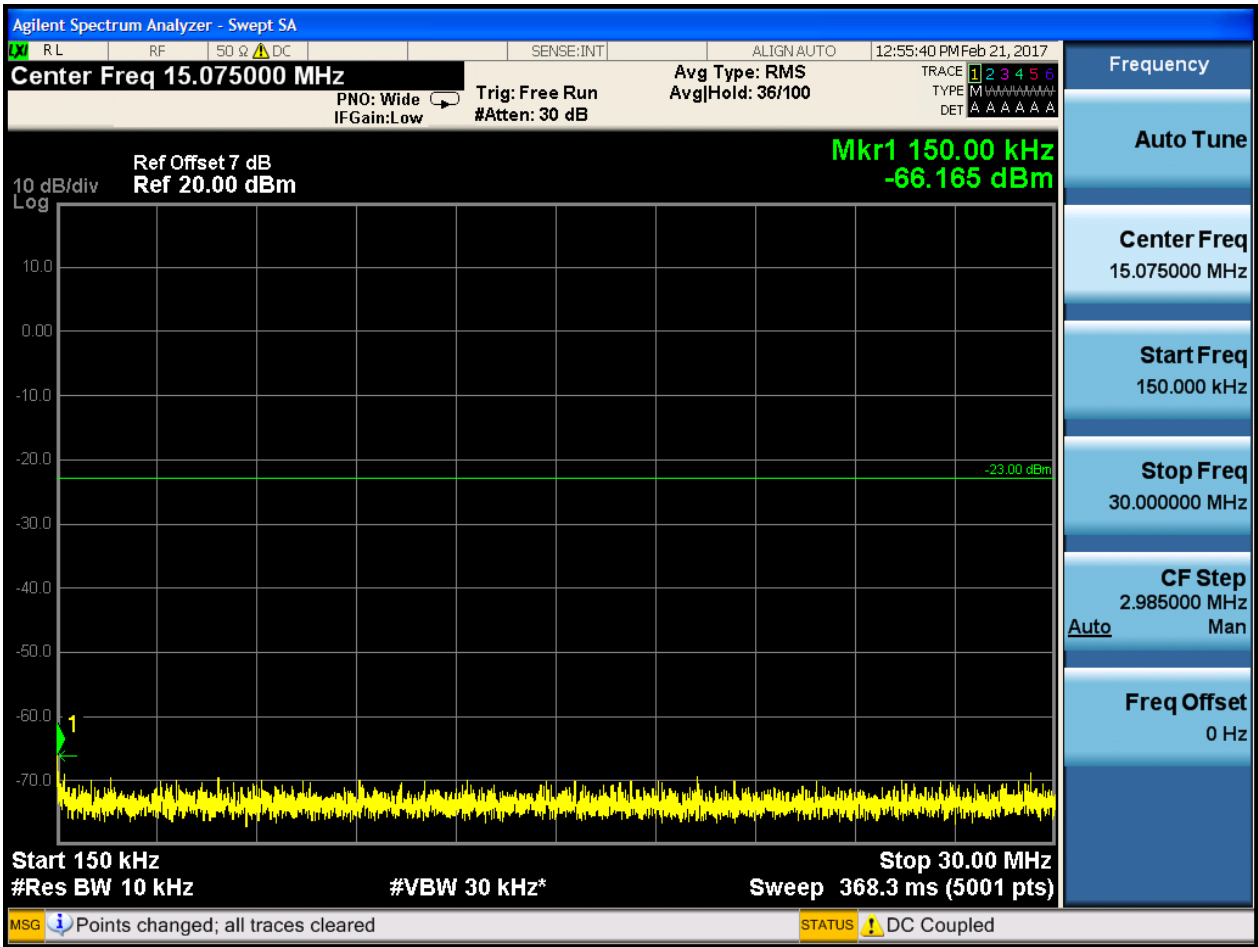


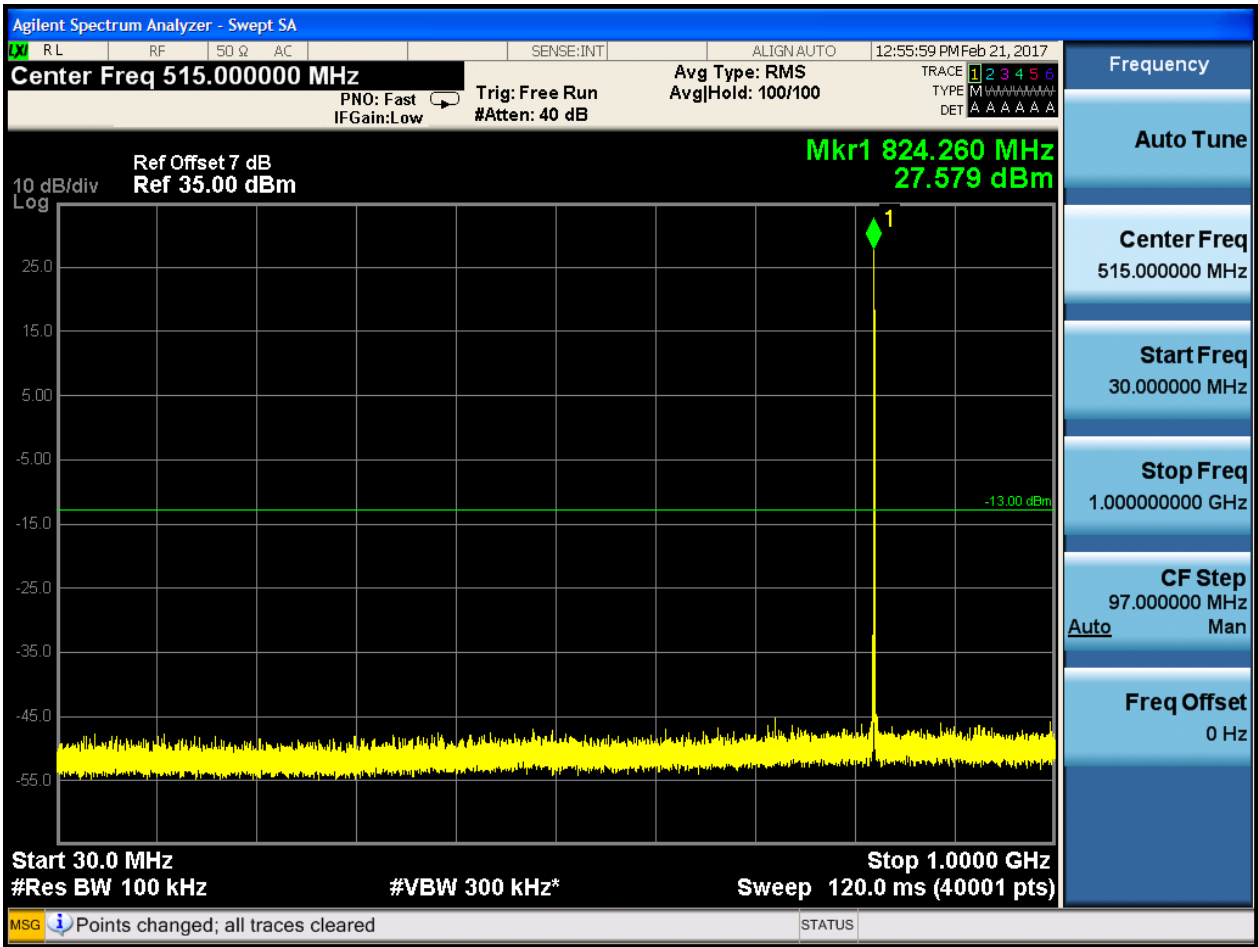


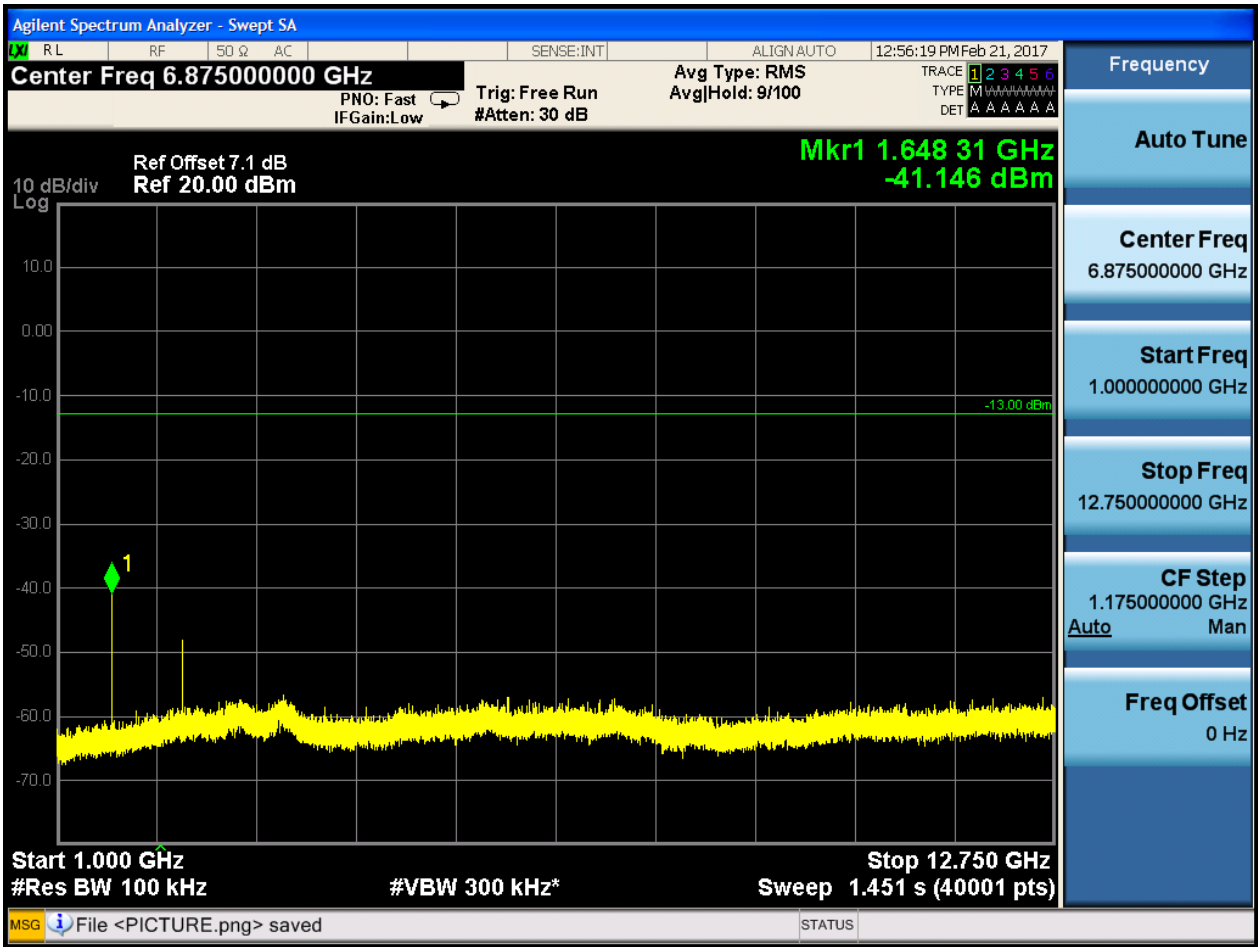
### 6.1.1.2 Test Mode = GSM/TM2

#### 6.1.1.2.1 Test Channel = LCH

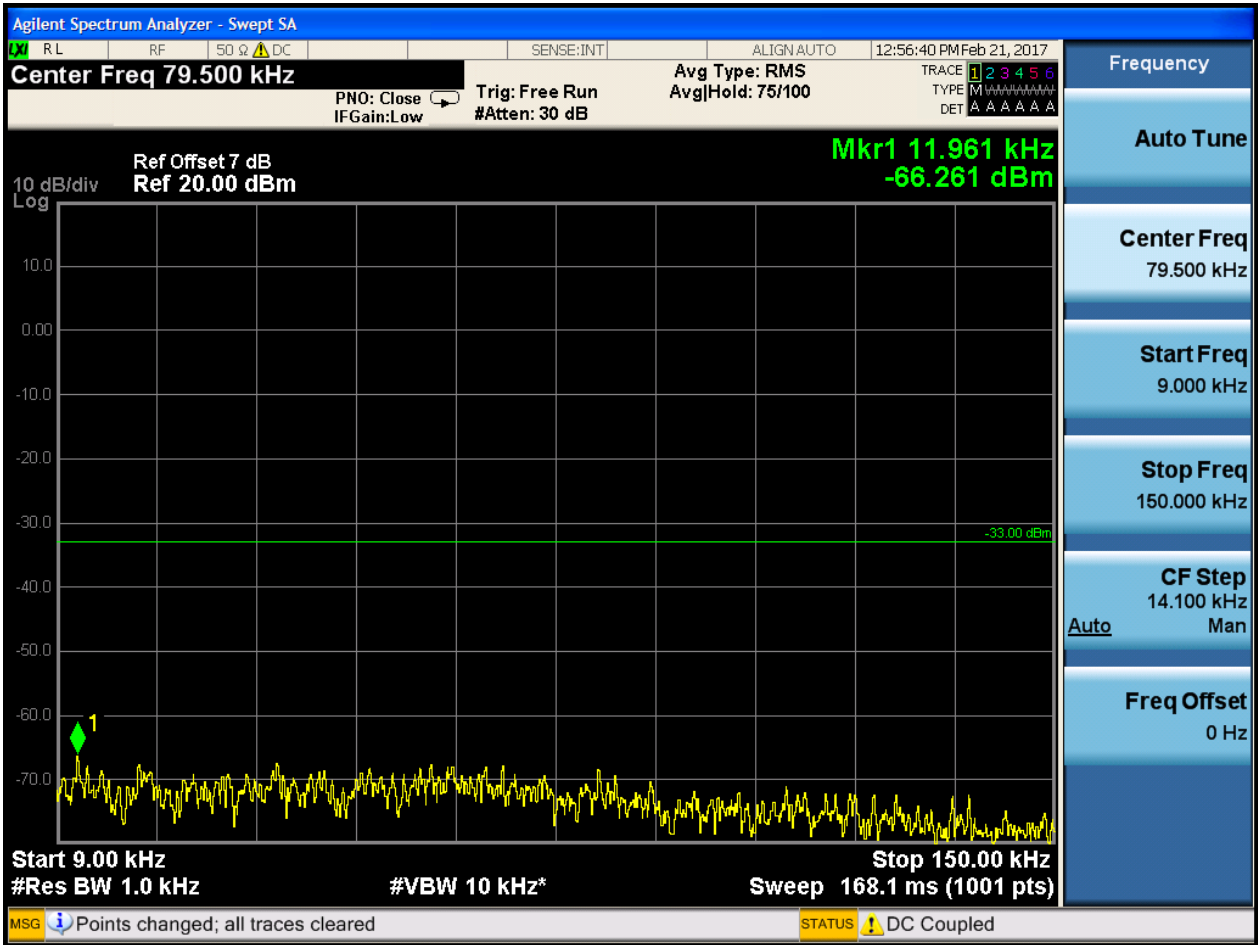


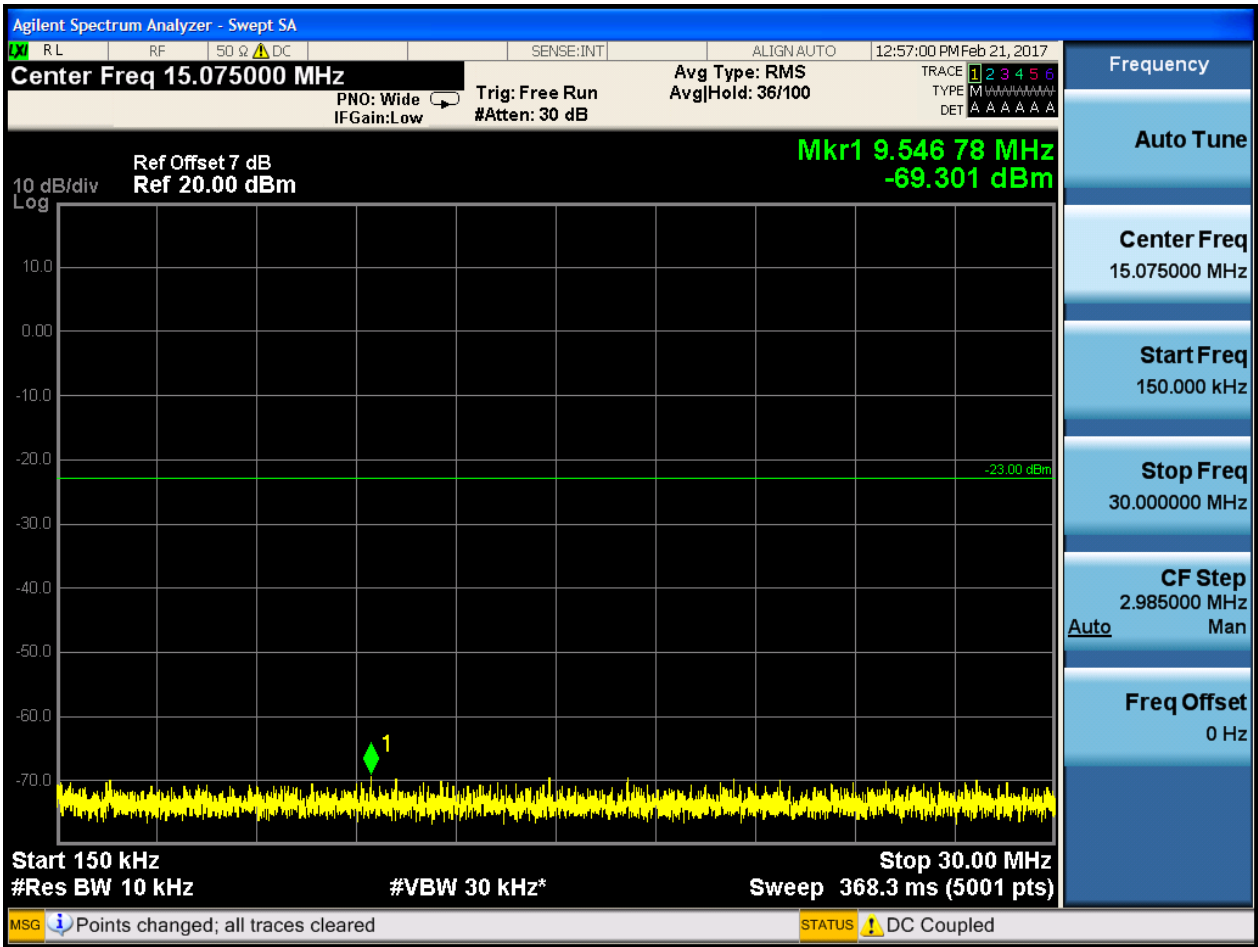


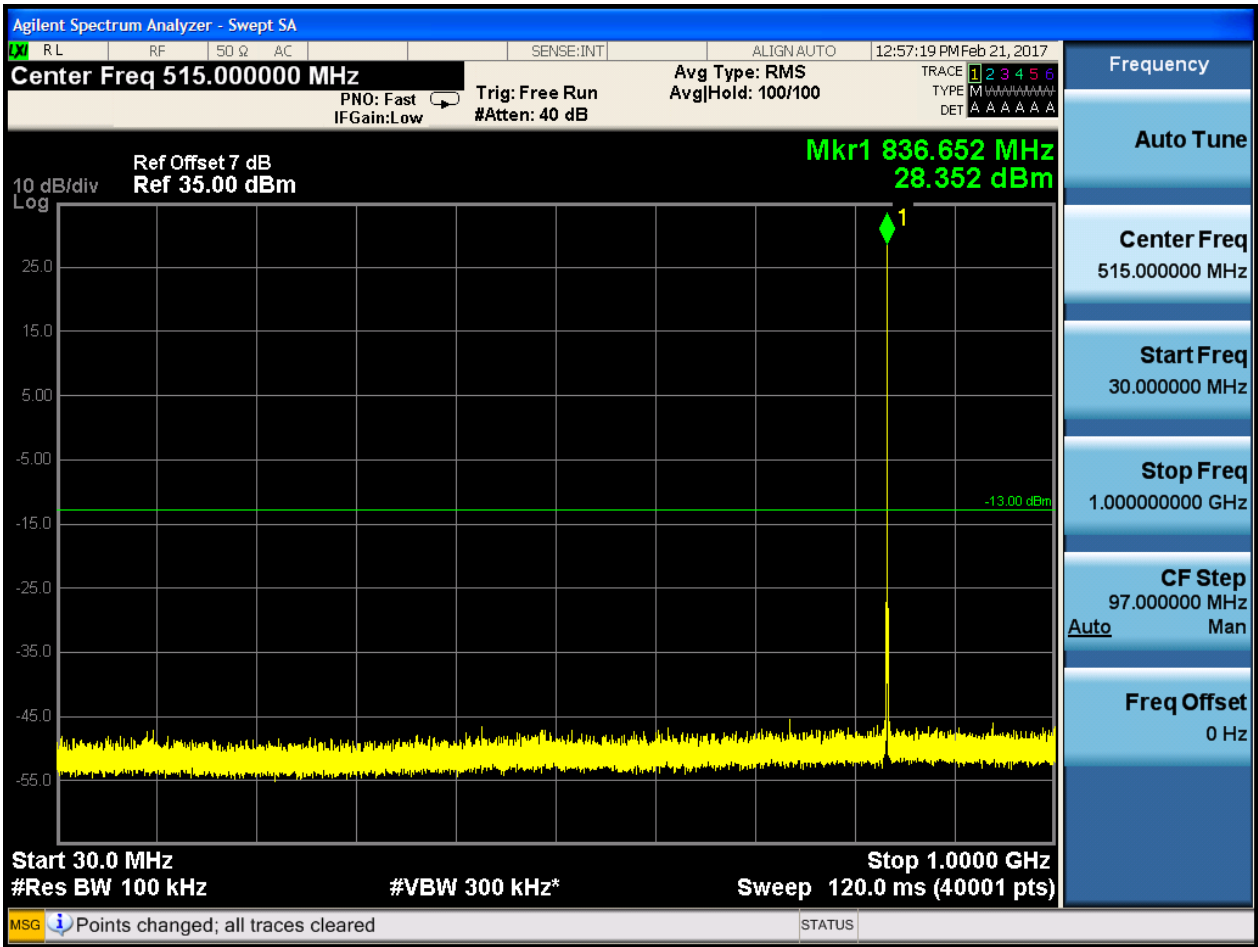




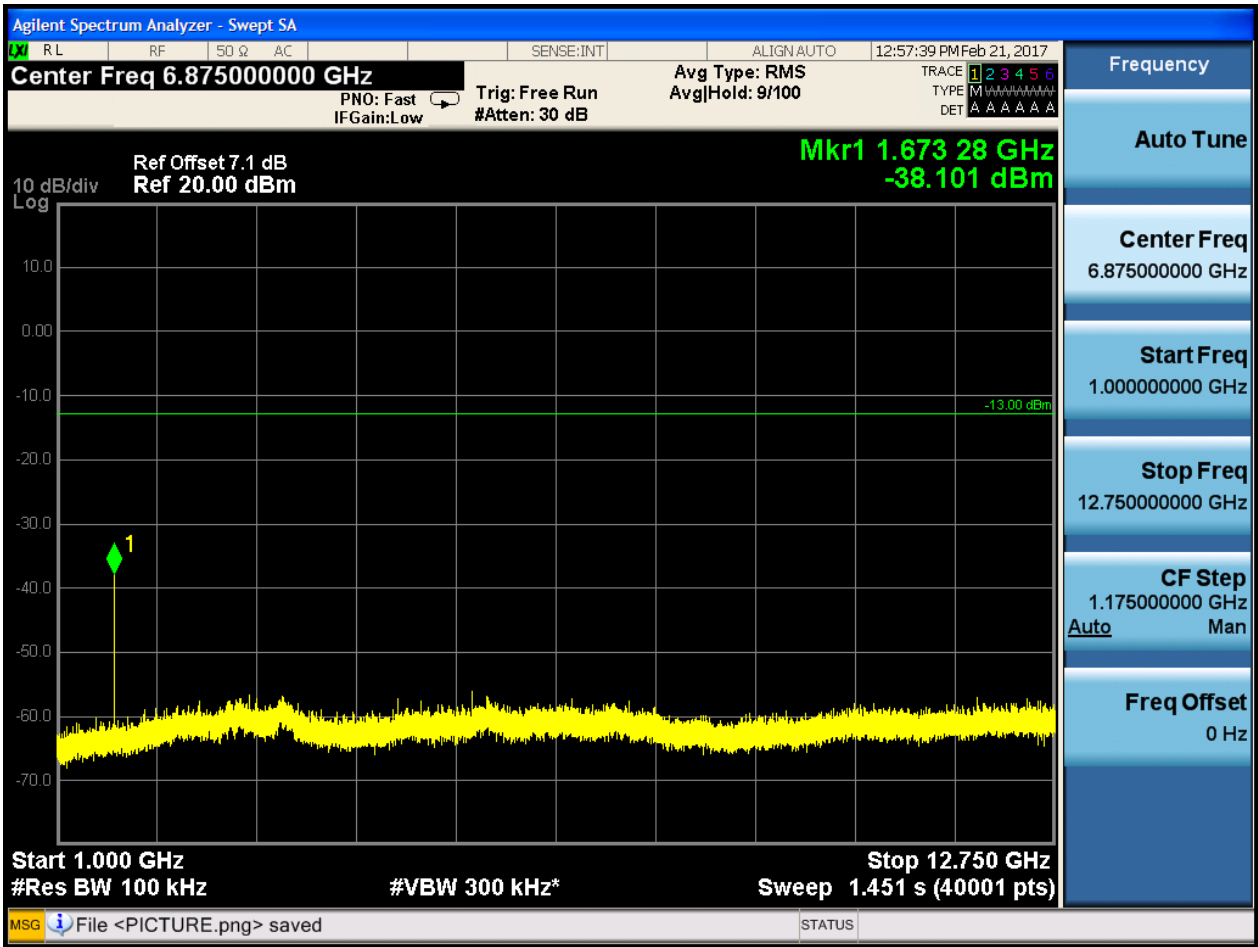
6.1.1.2.2 Test Channel = MCH





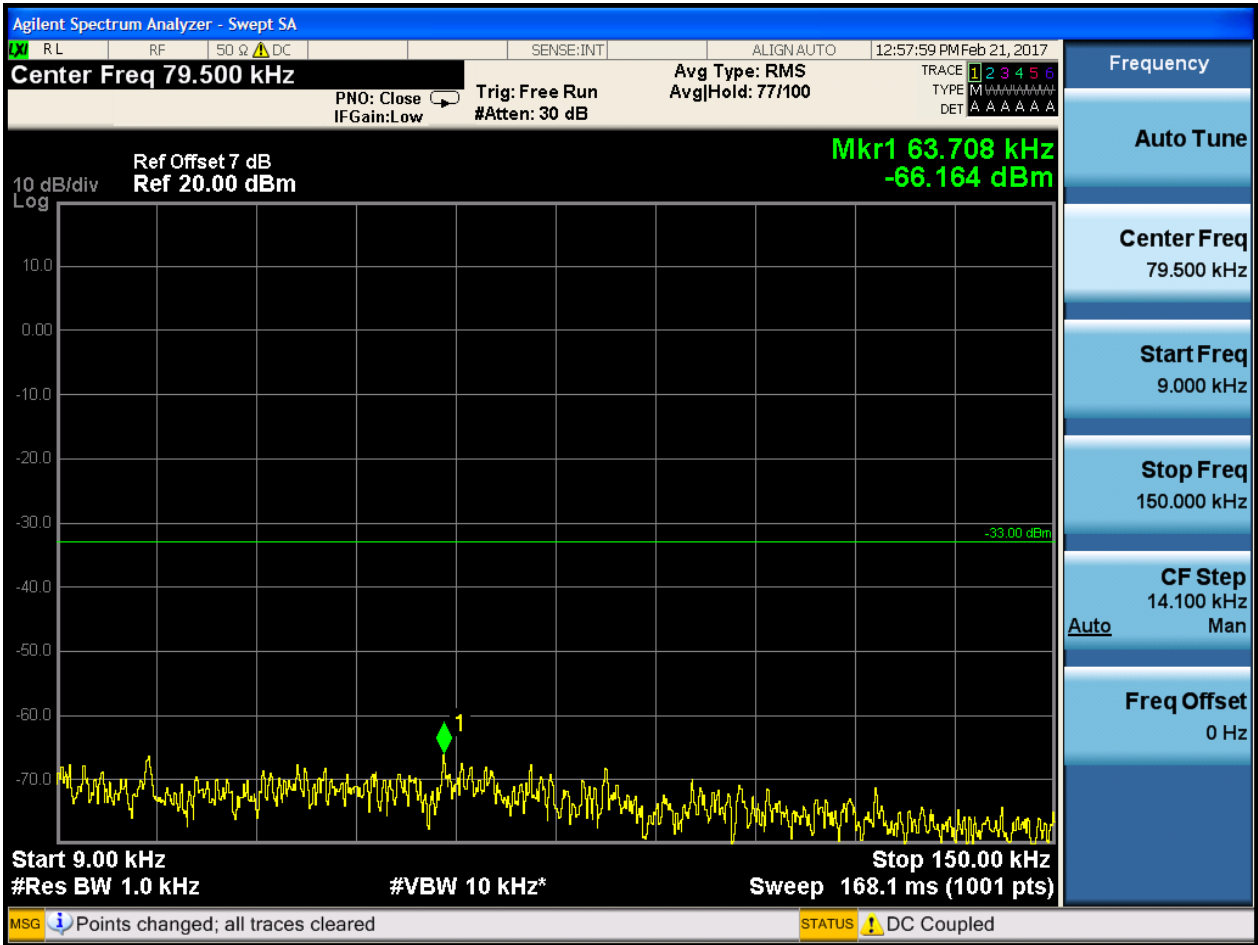


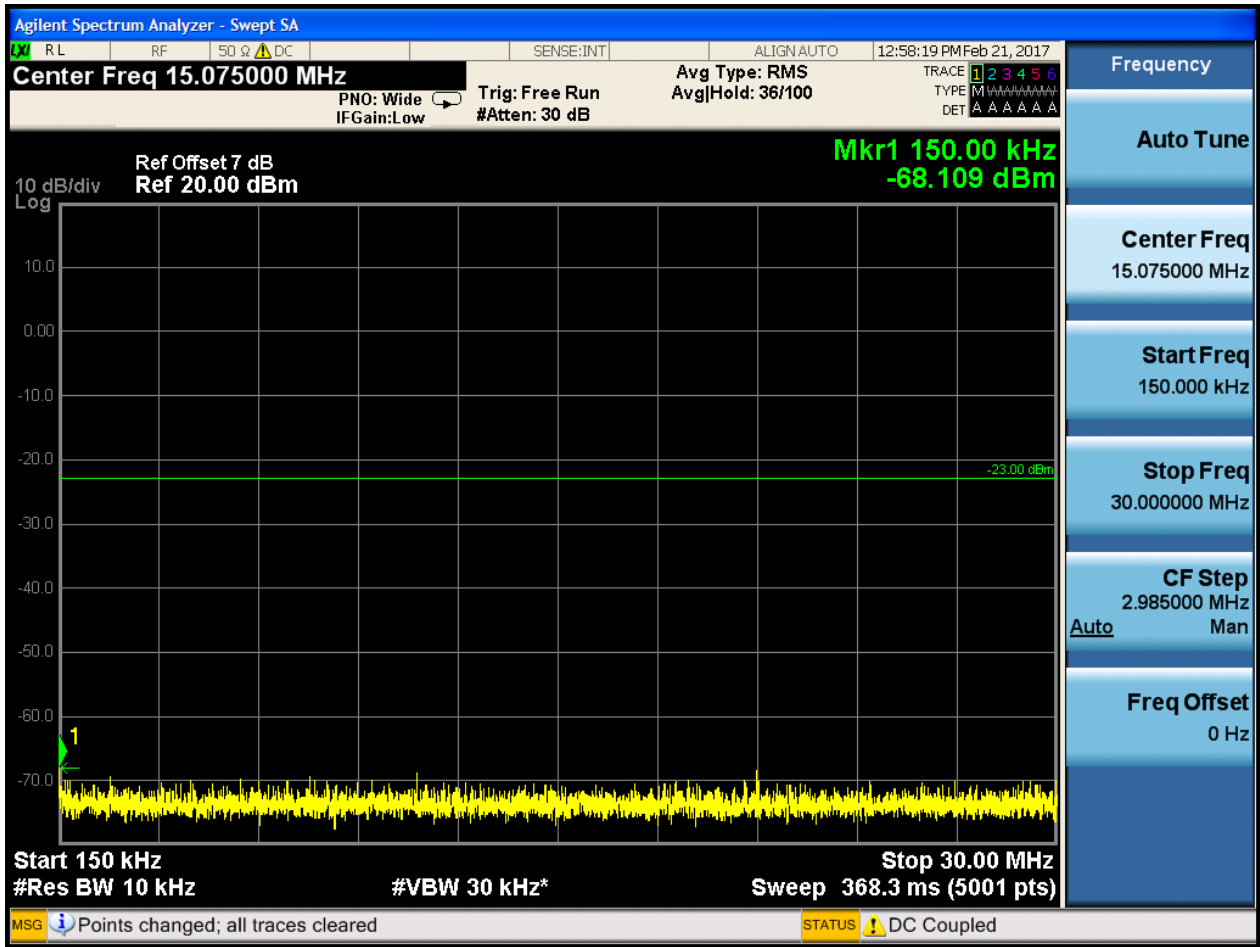


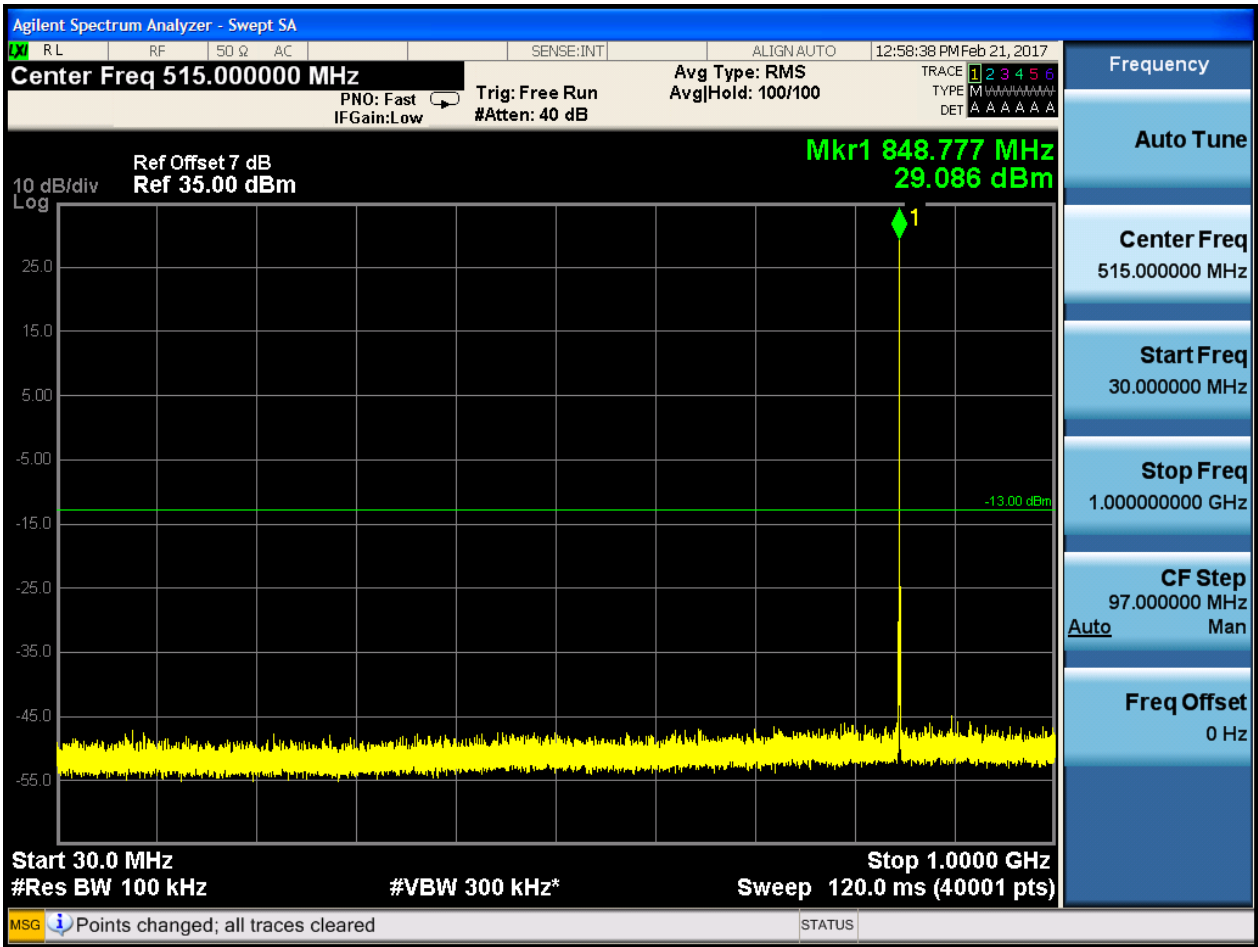


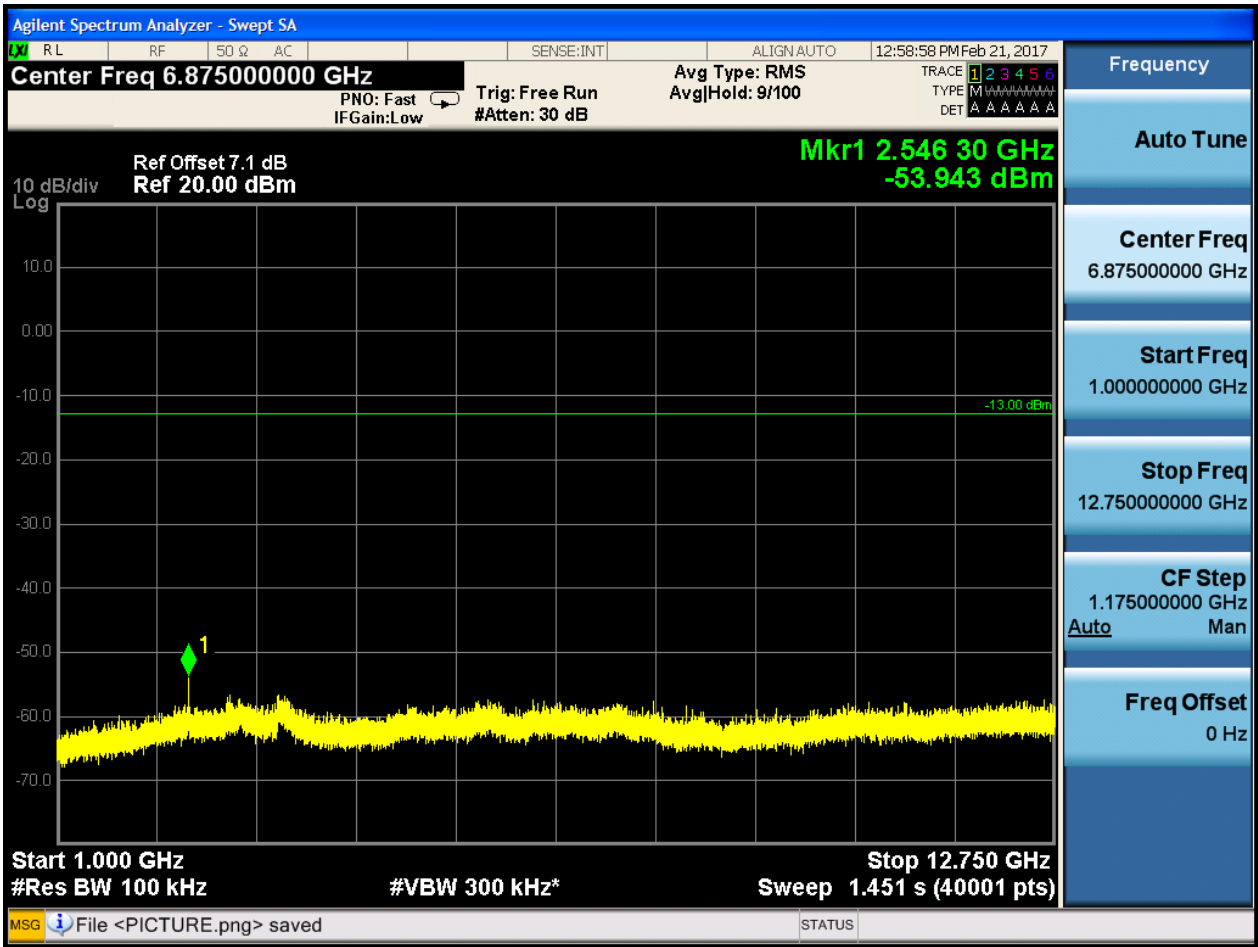


6.1.1.2.3 Test Channel = HCH







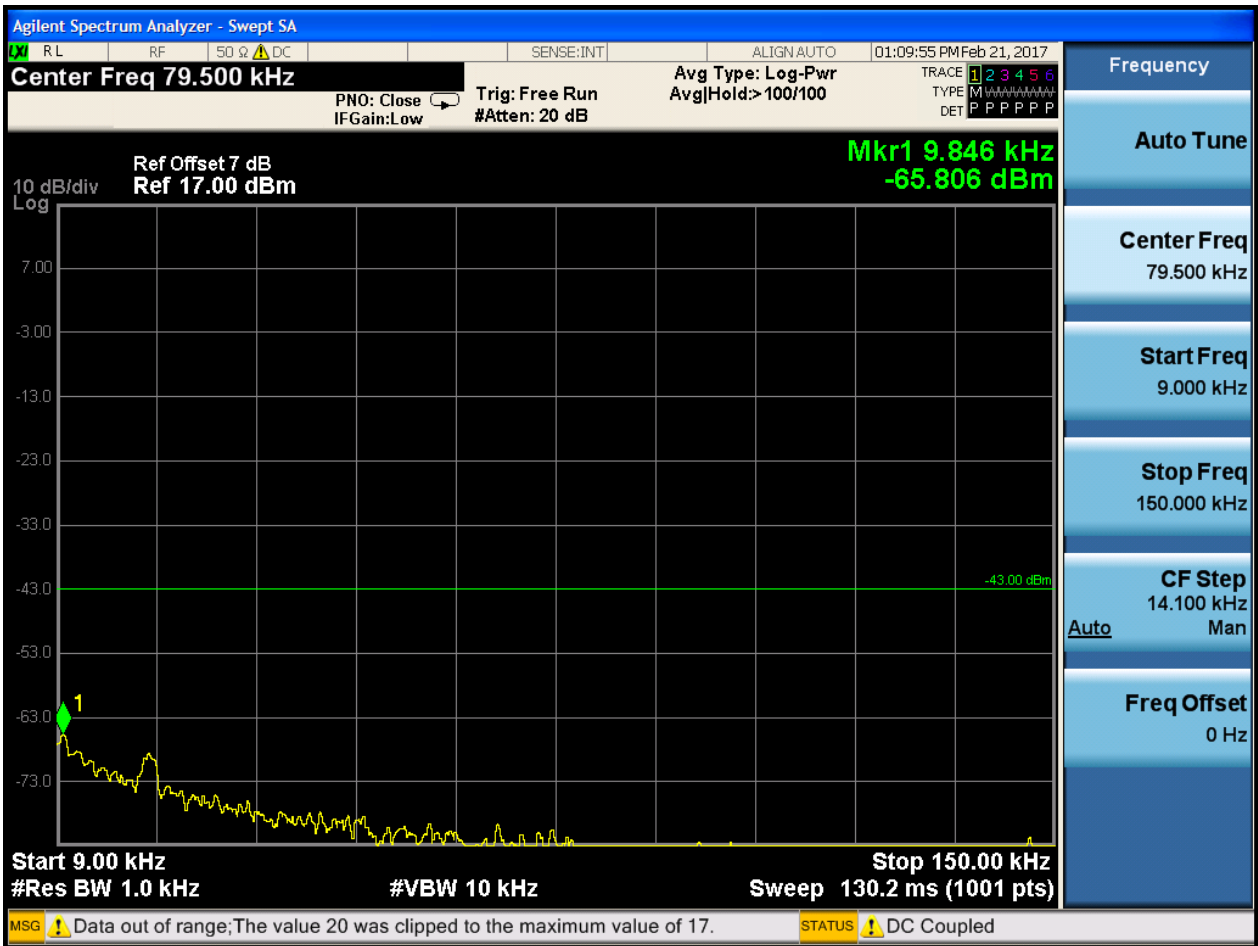


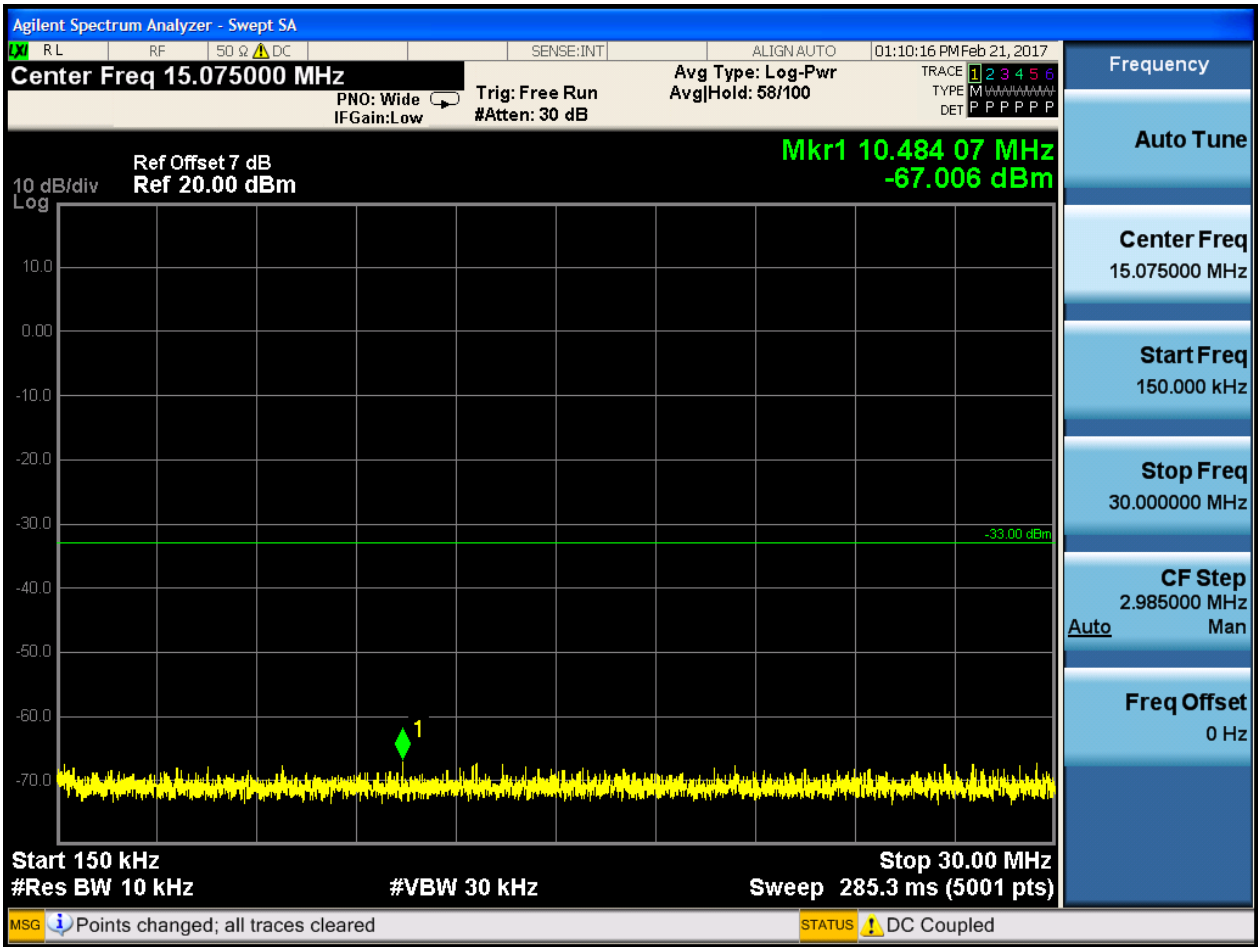


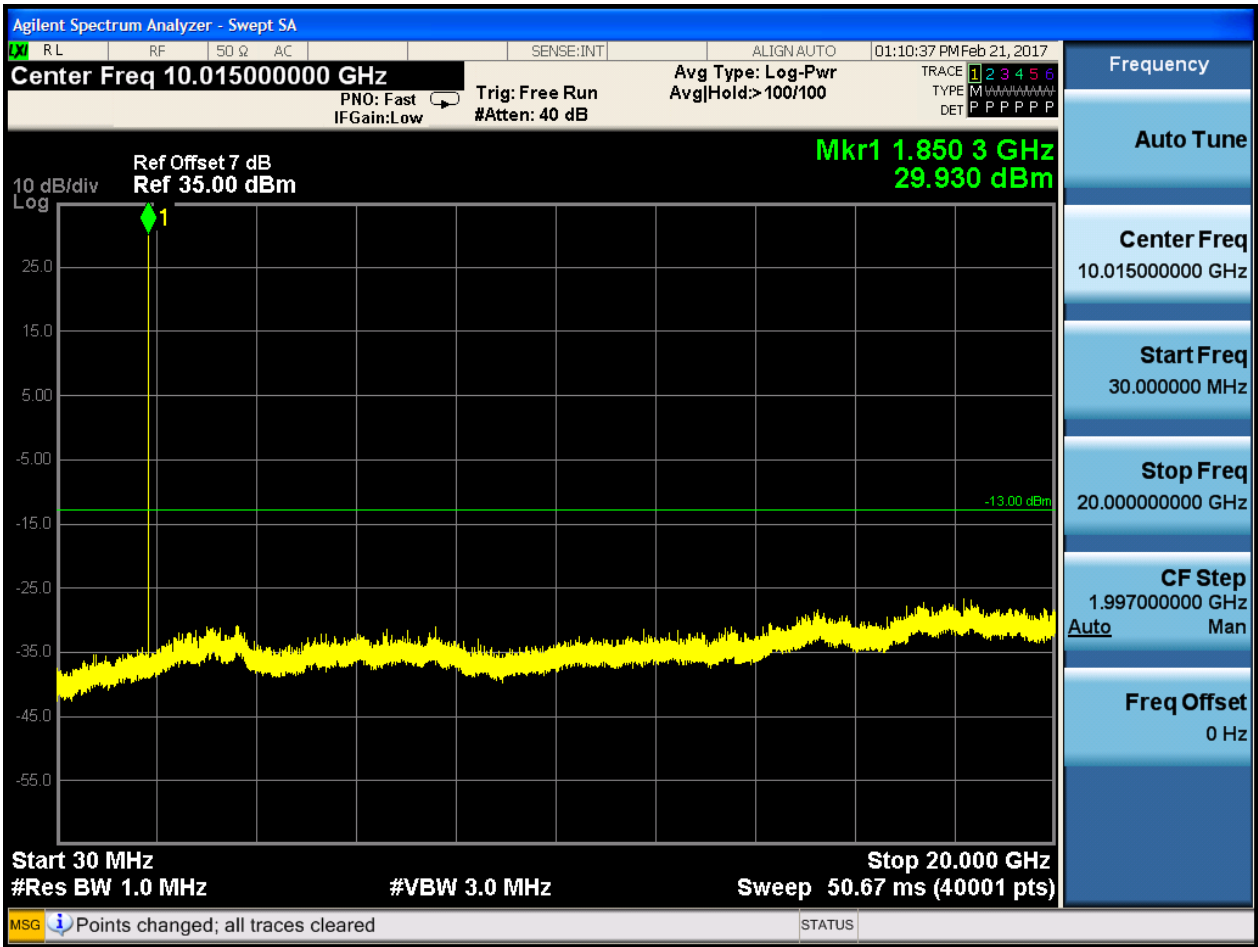
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH



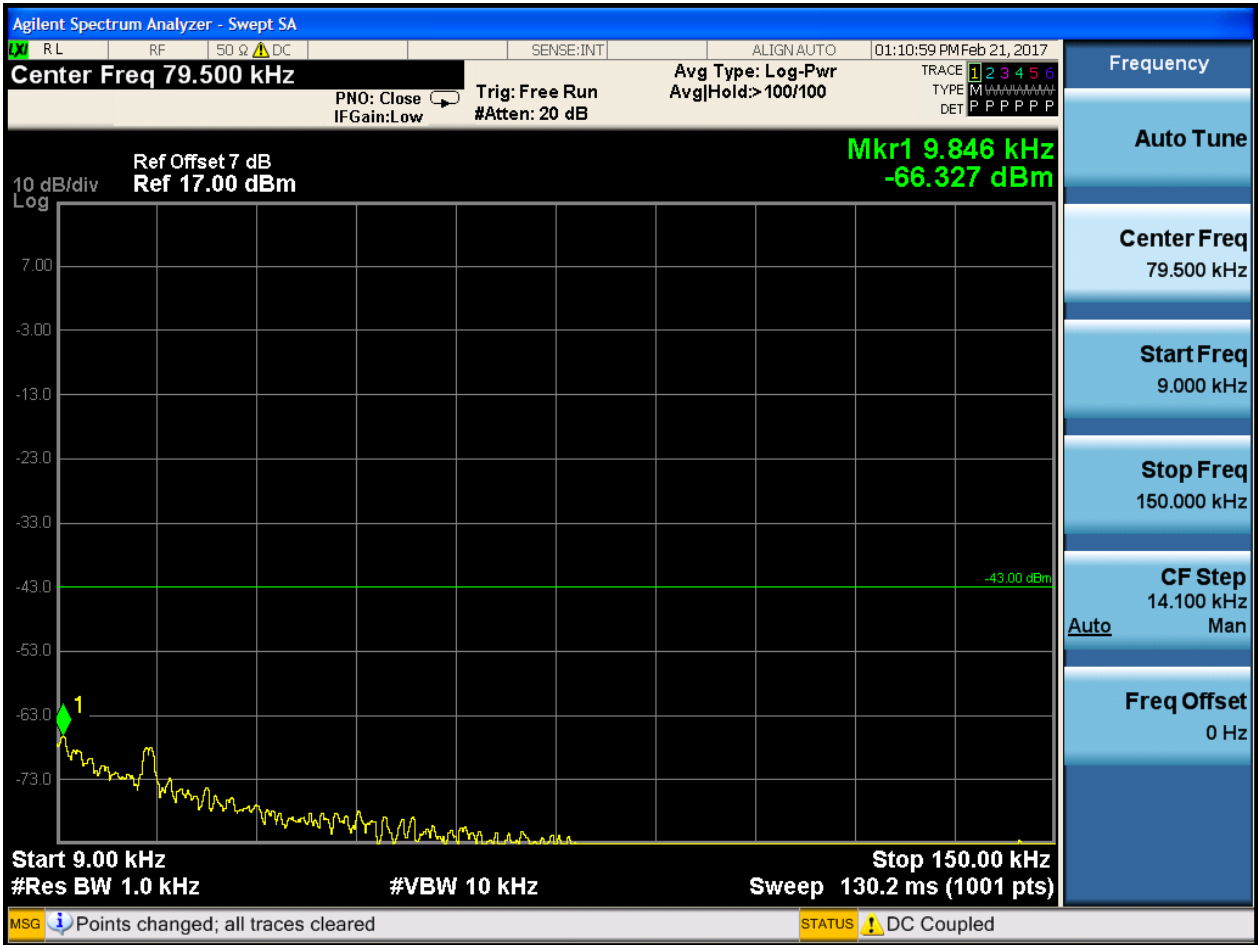


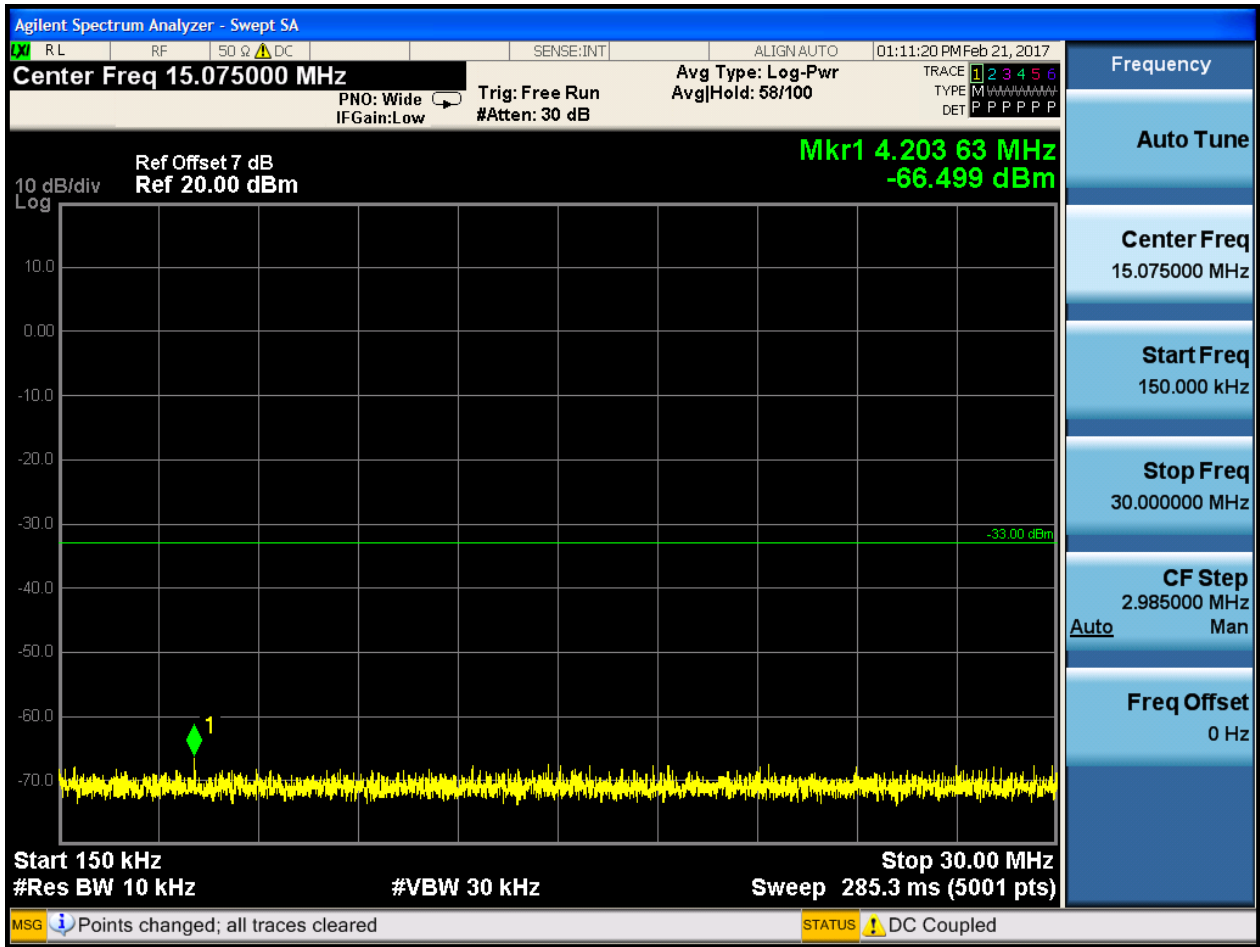


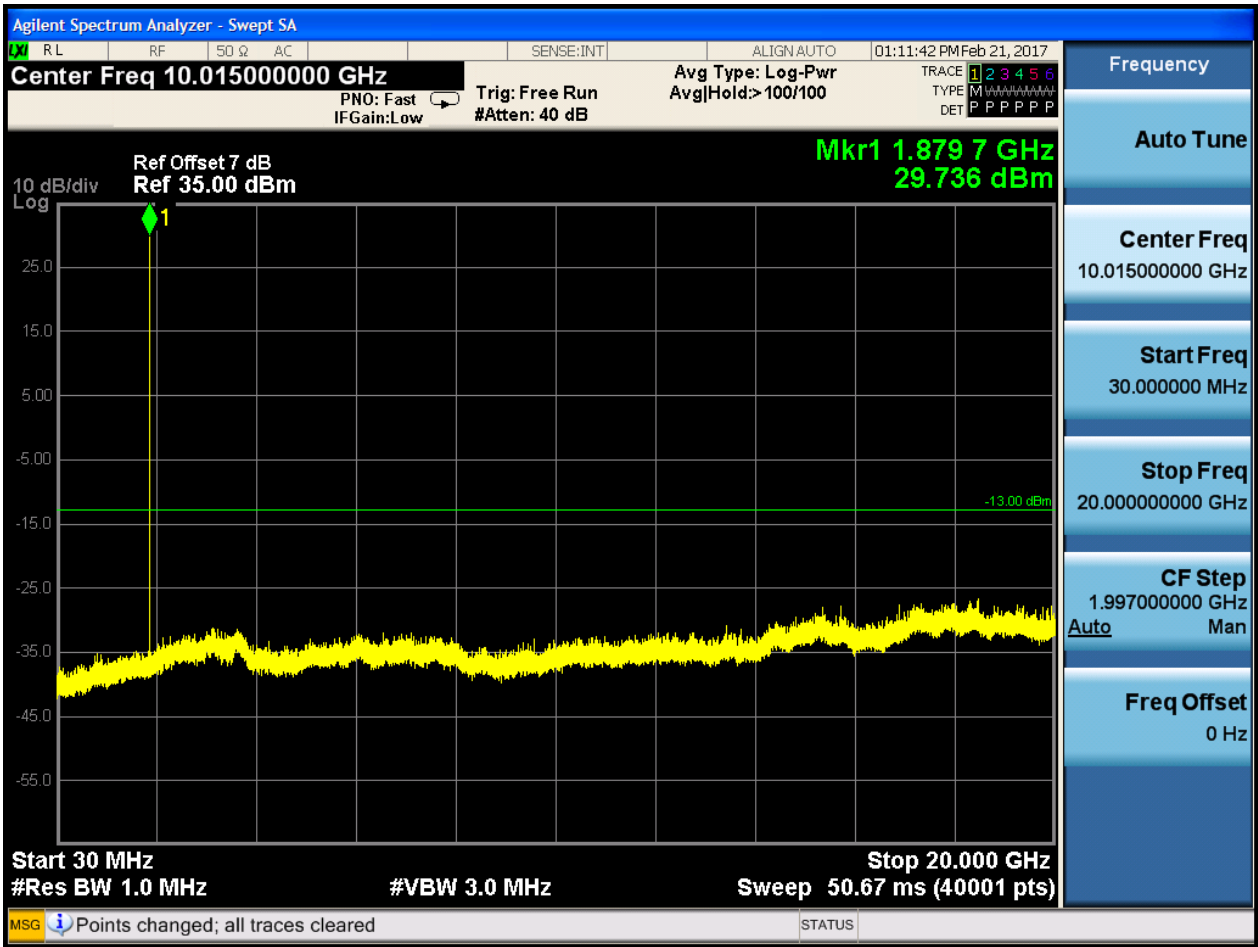




### 6.1.2.1.2 Test Channel = MCH

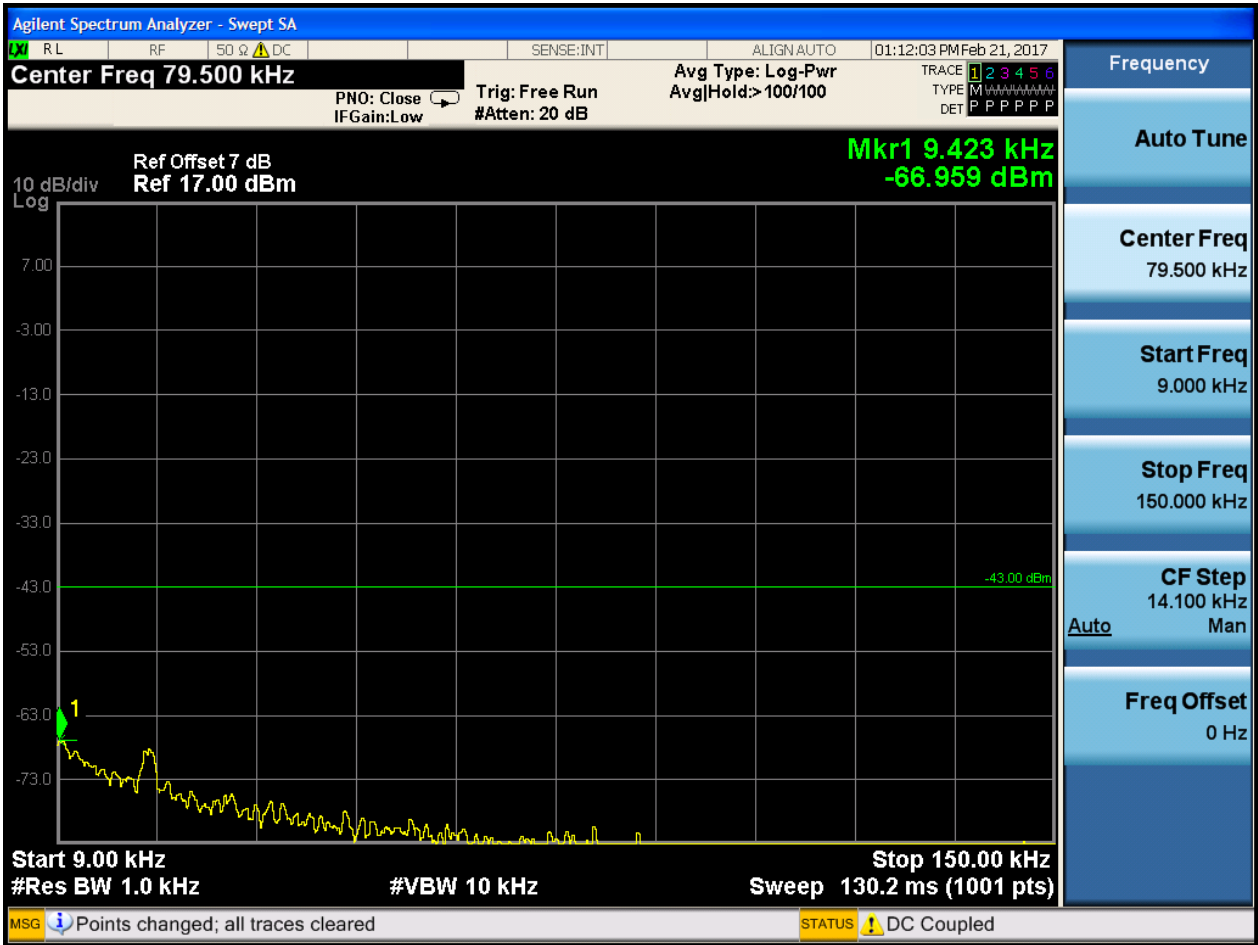


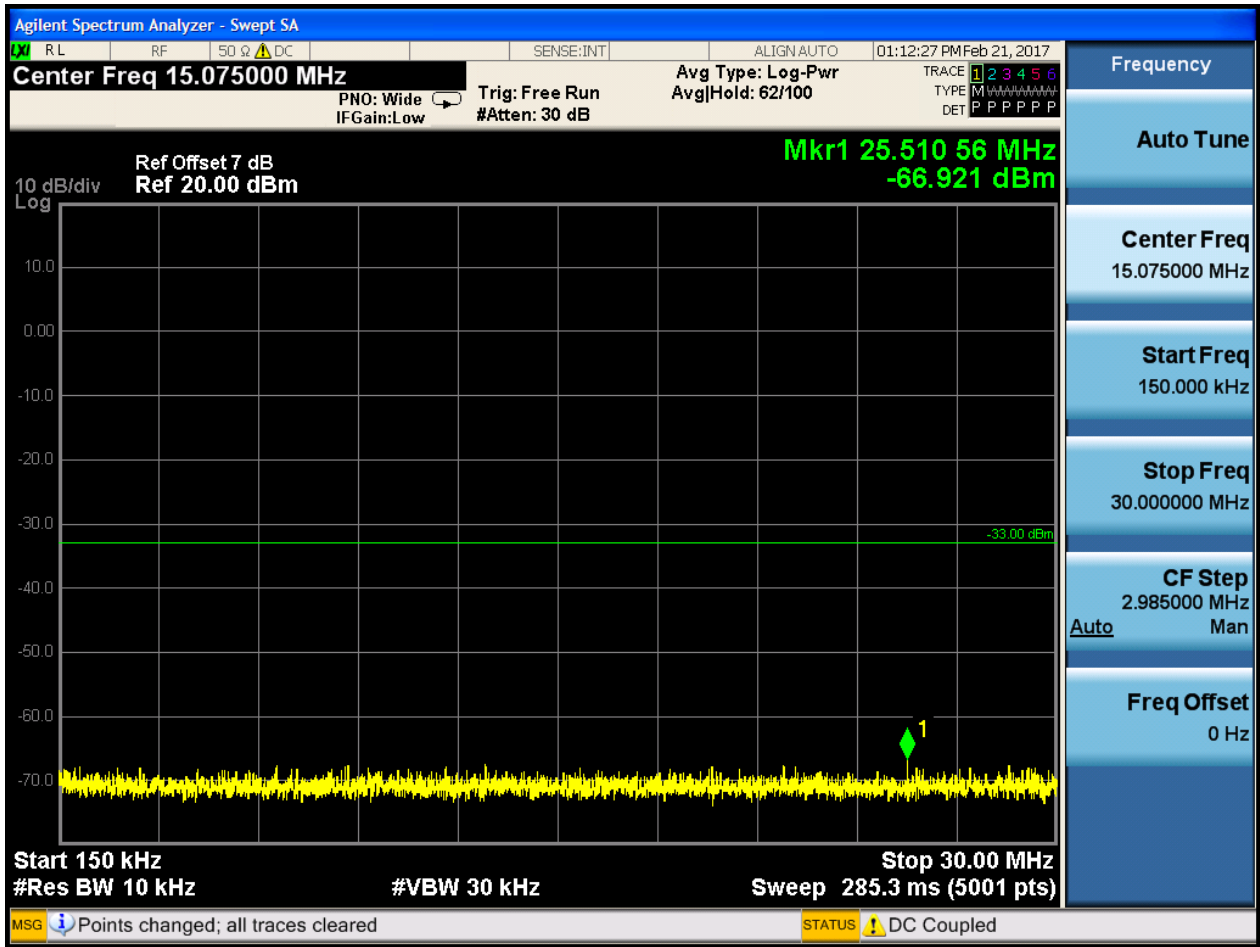


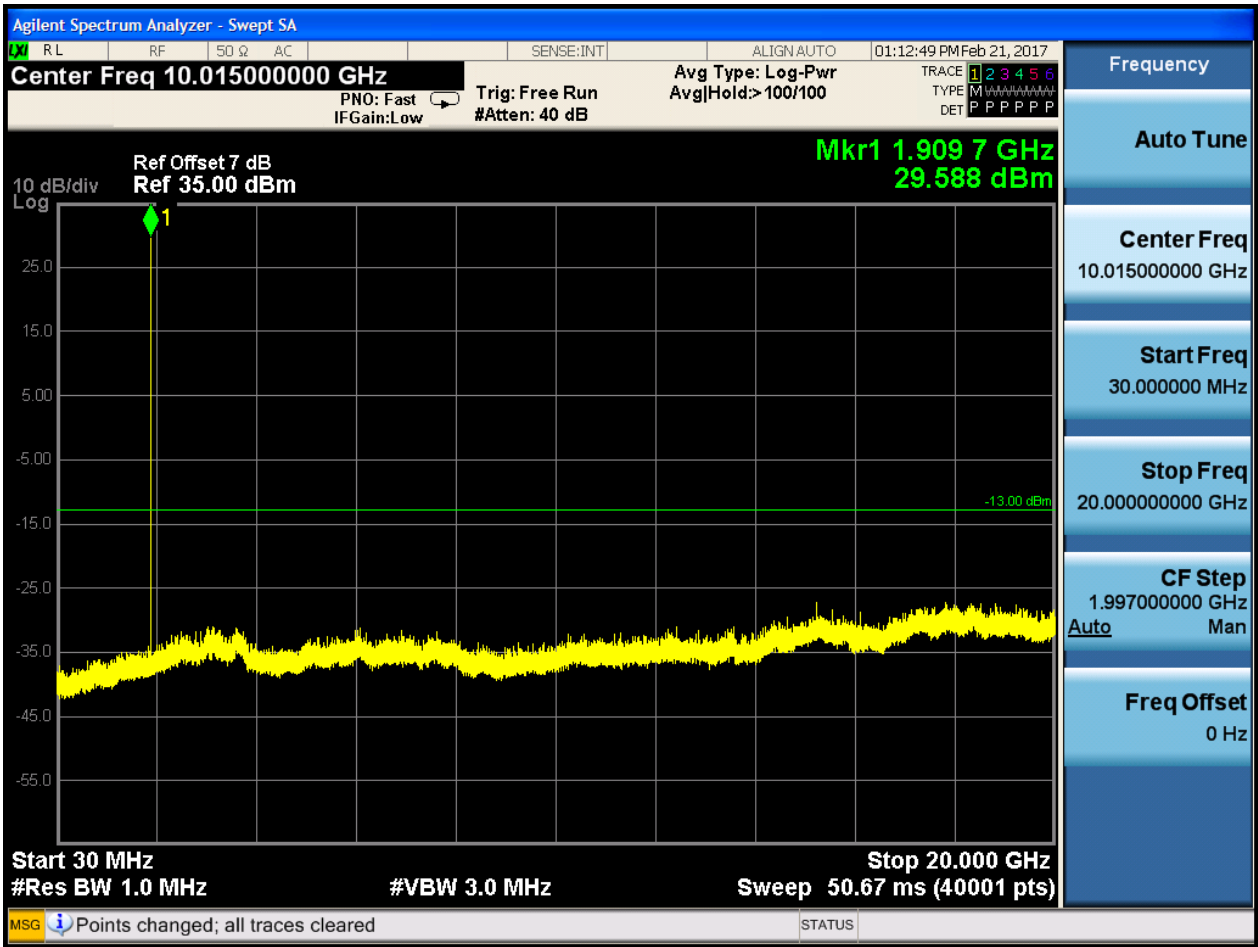




### 6.1.2.1.3 Test Channel = HCH



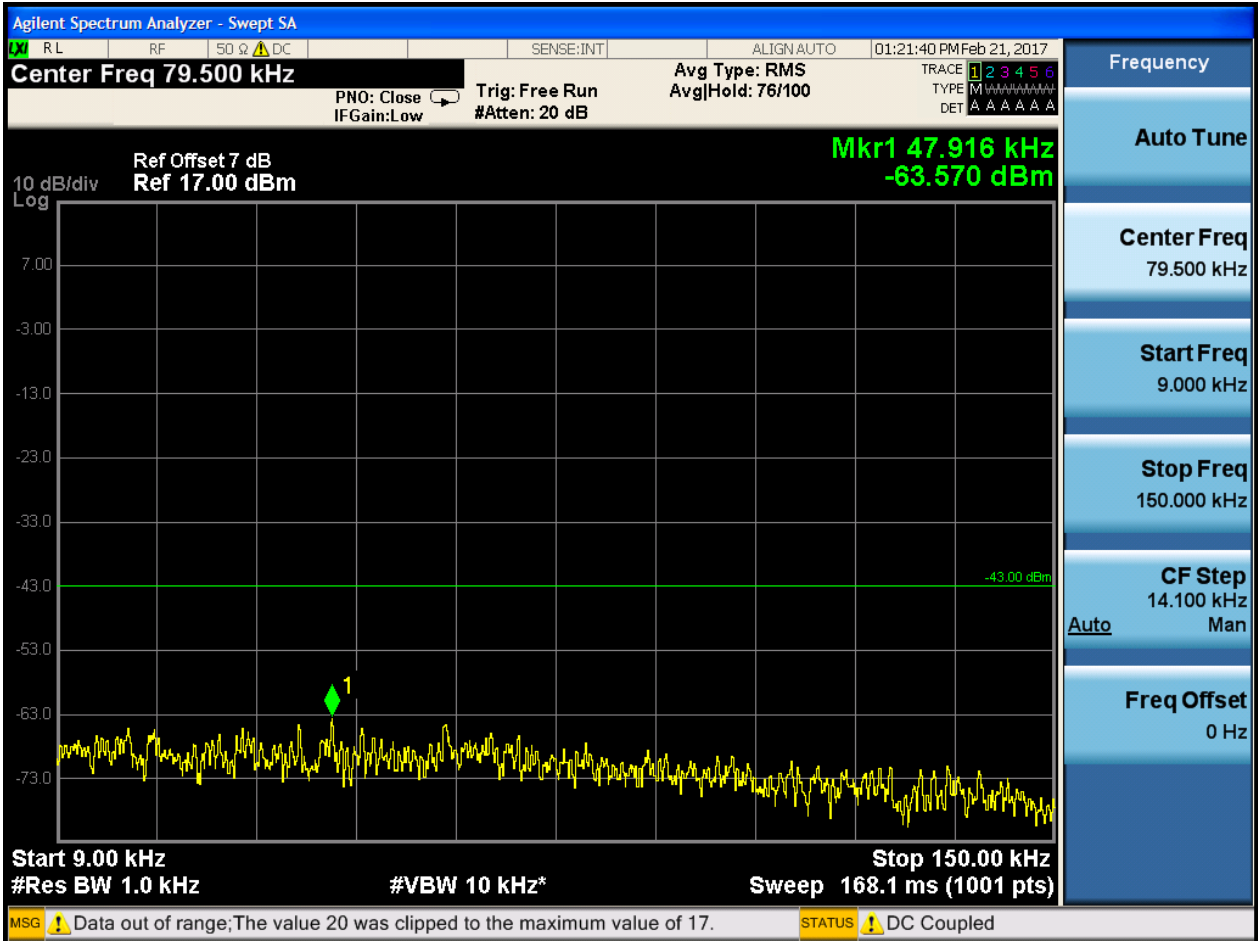


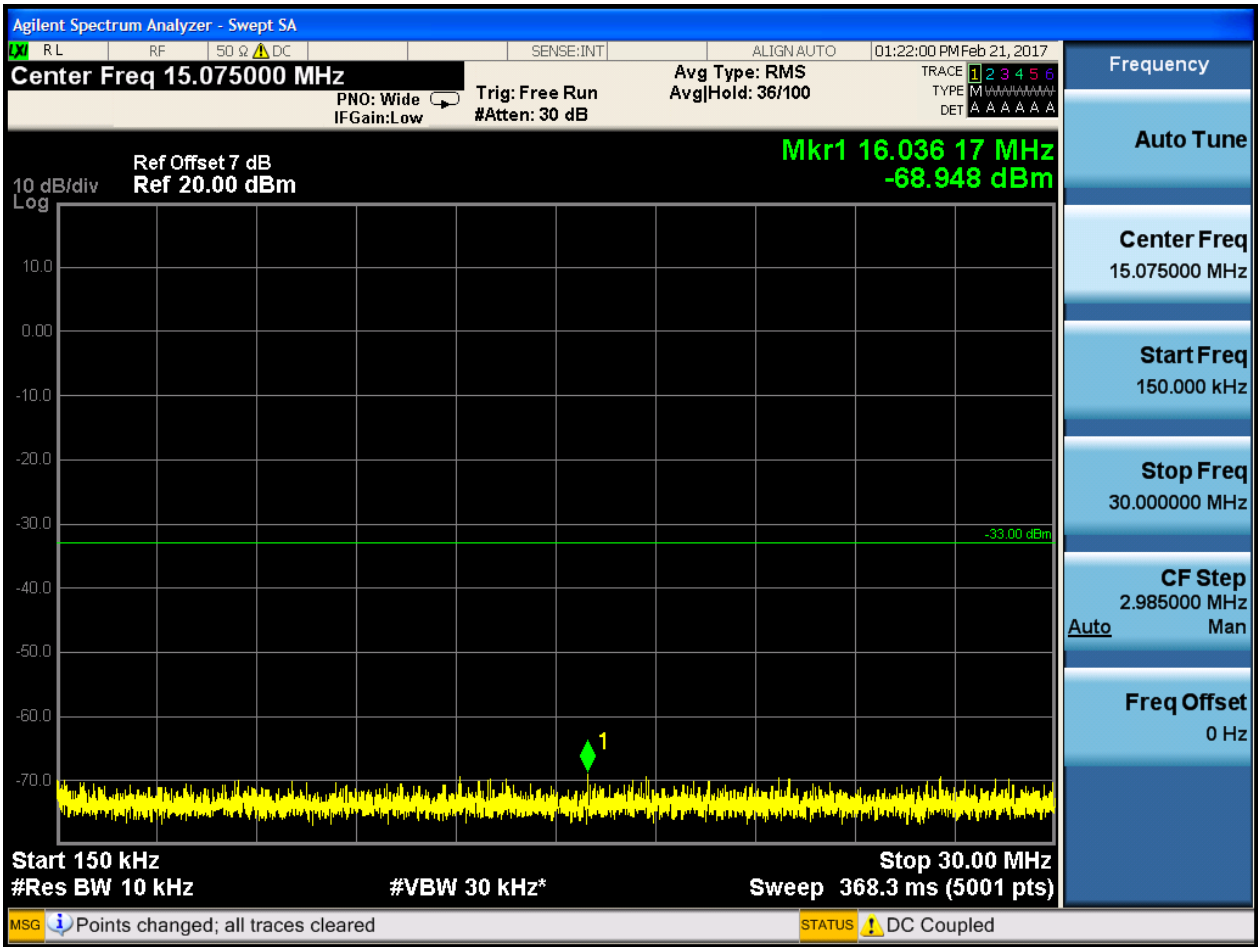




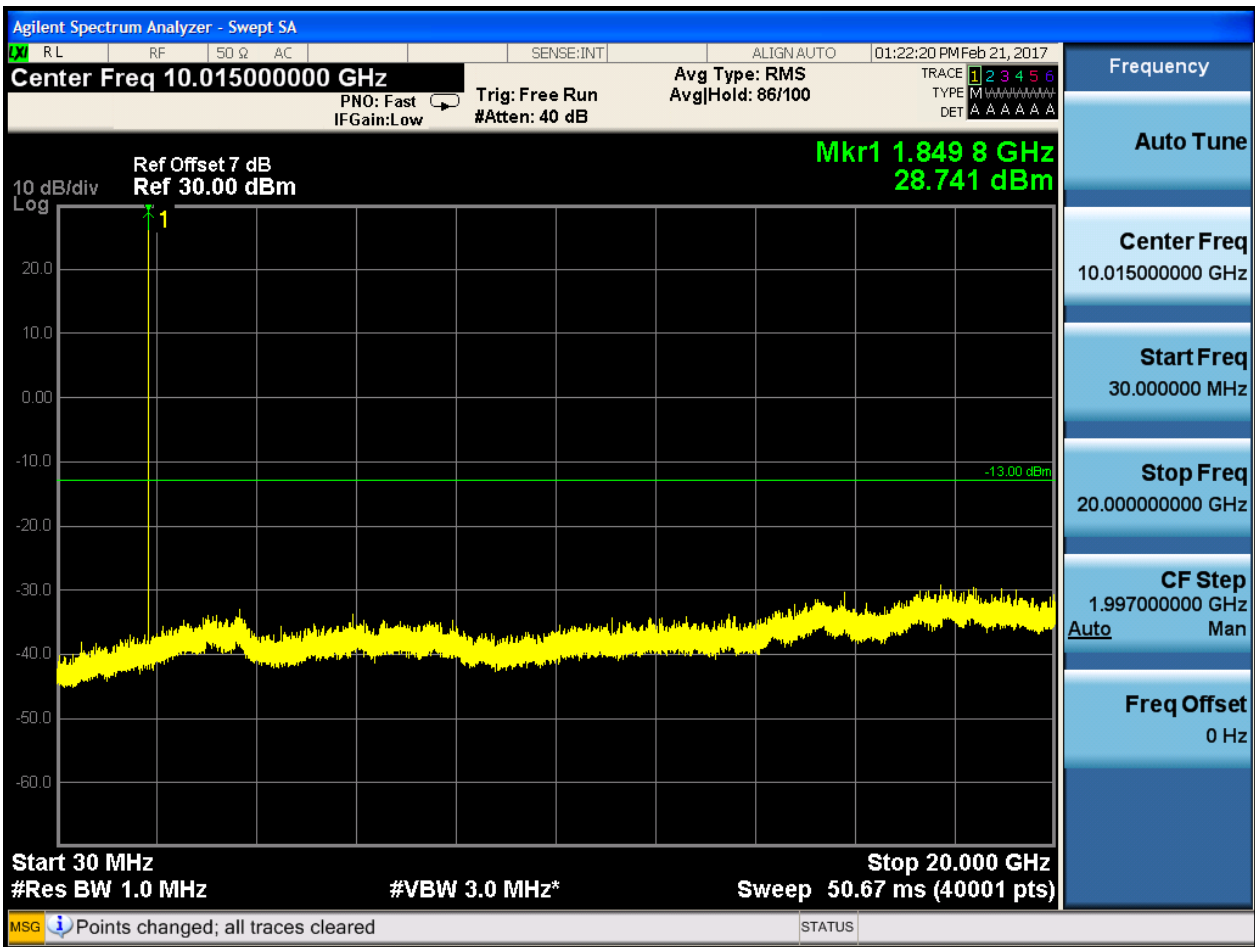
### 6.1.2.2 Test Mode = GSM/TM2

#### 6.1.2.2.1 Test Channel = LCH



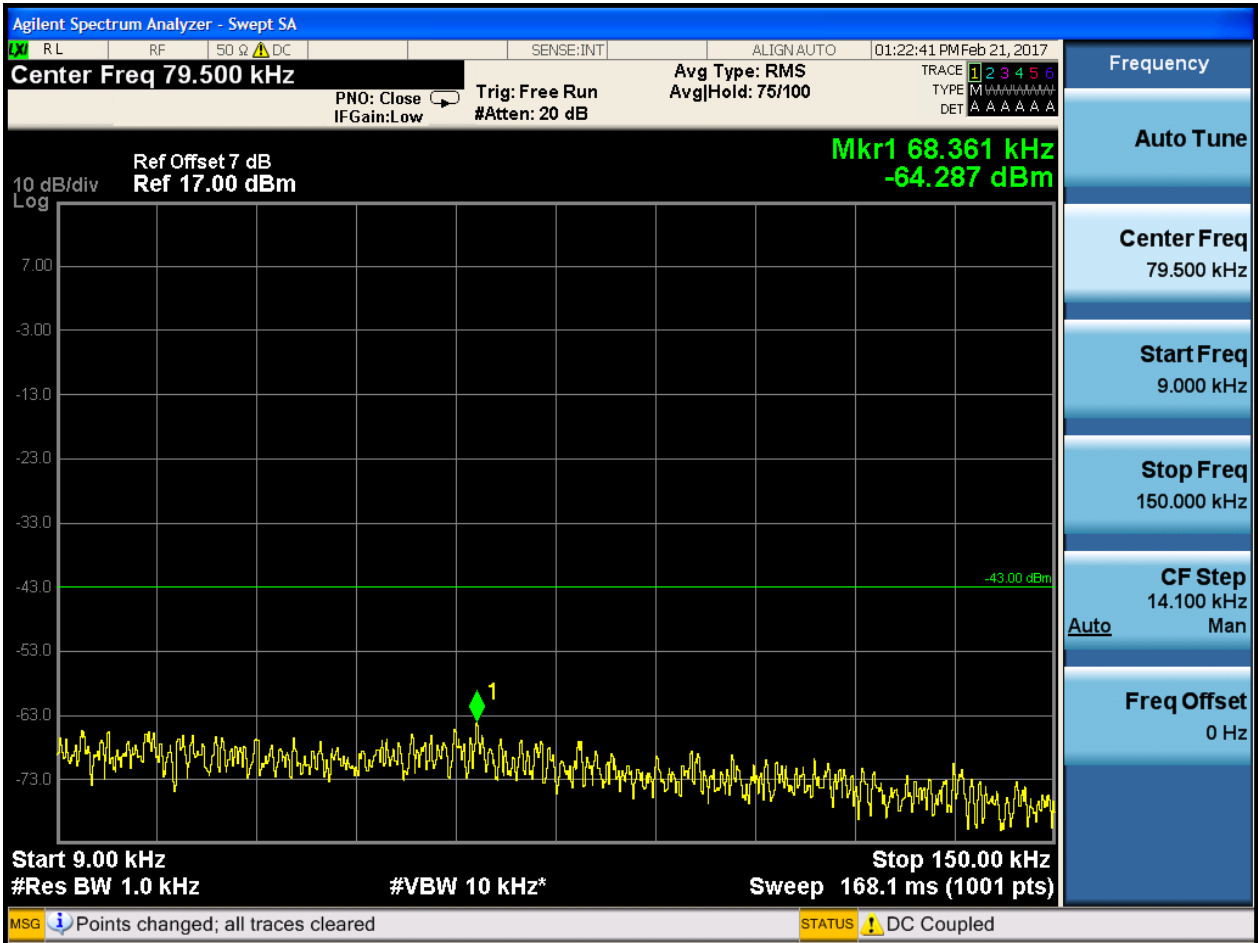


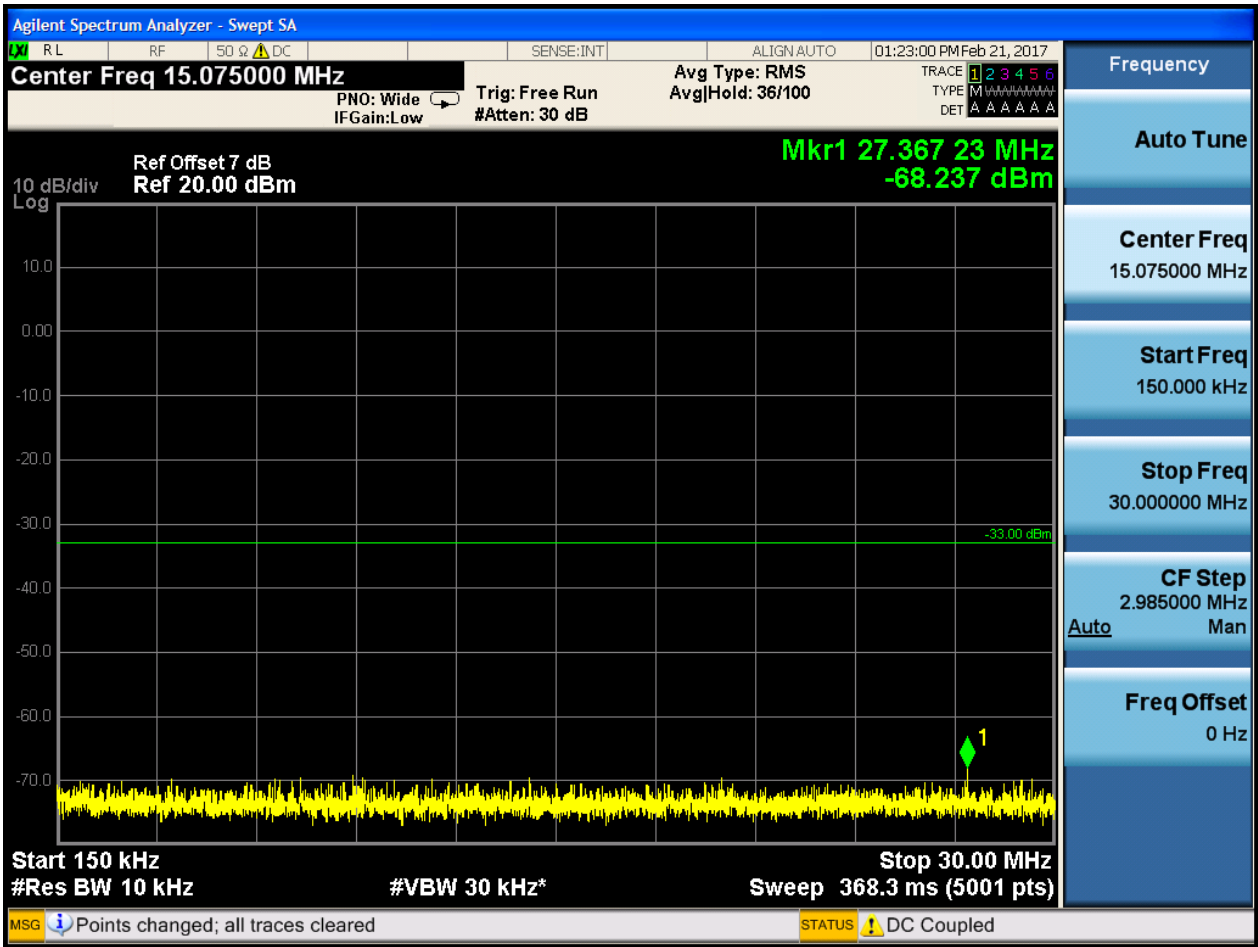


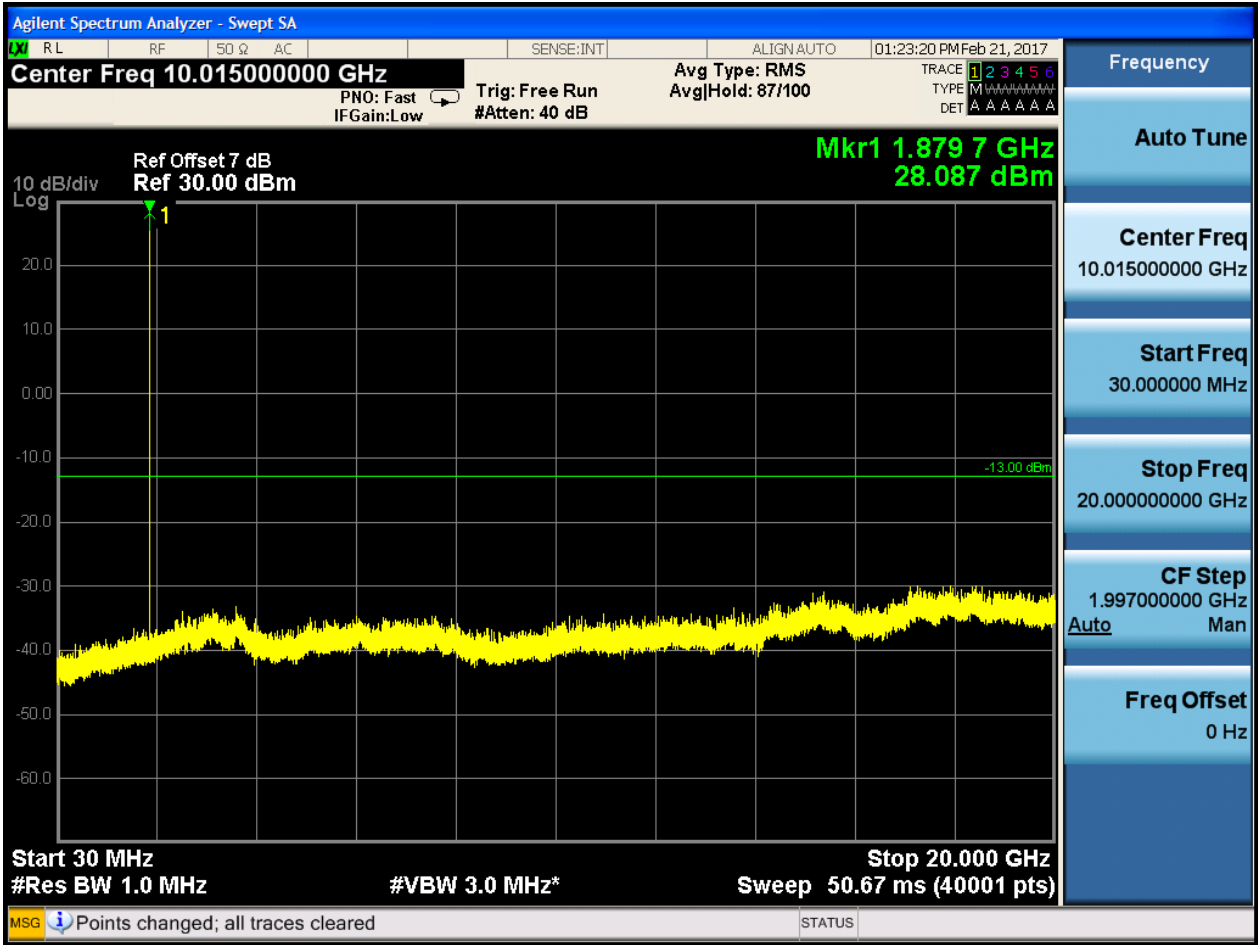




6.1.2.2.2 Test Channel = MCH

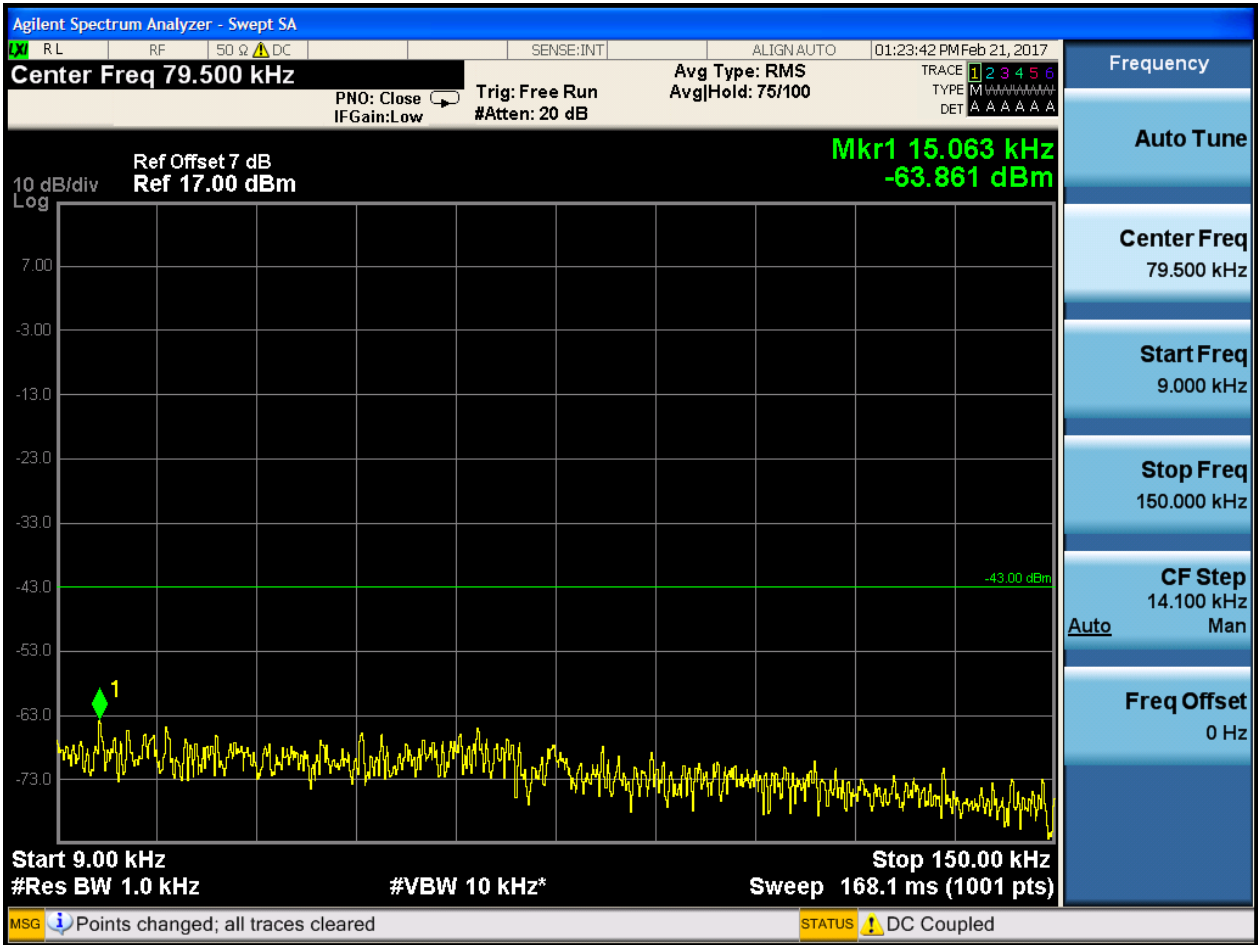


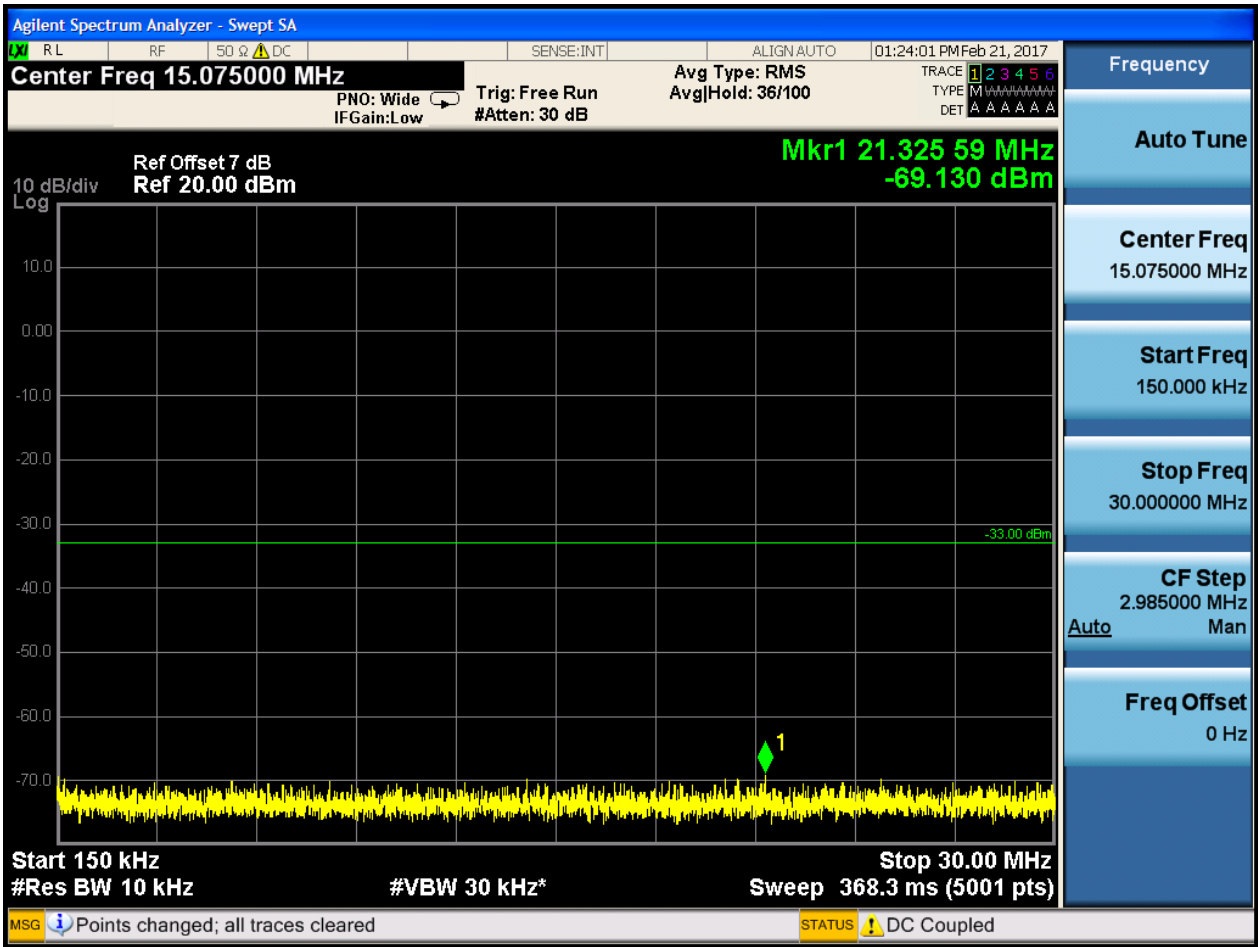


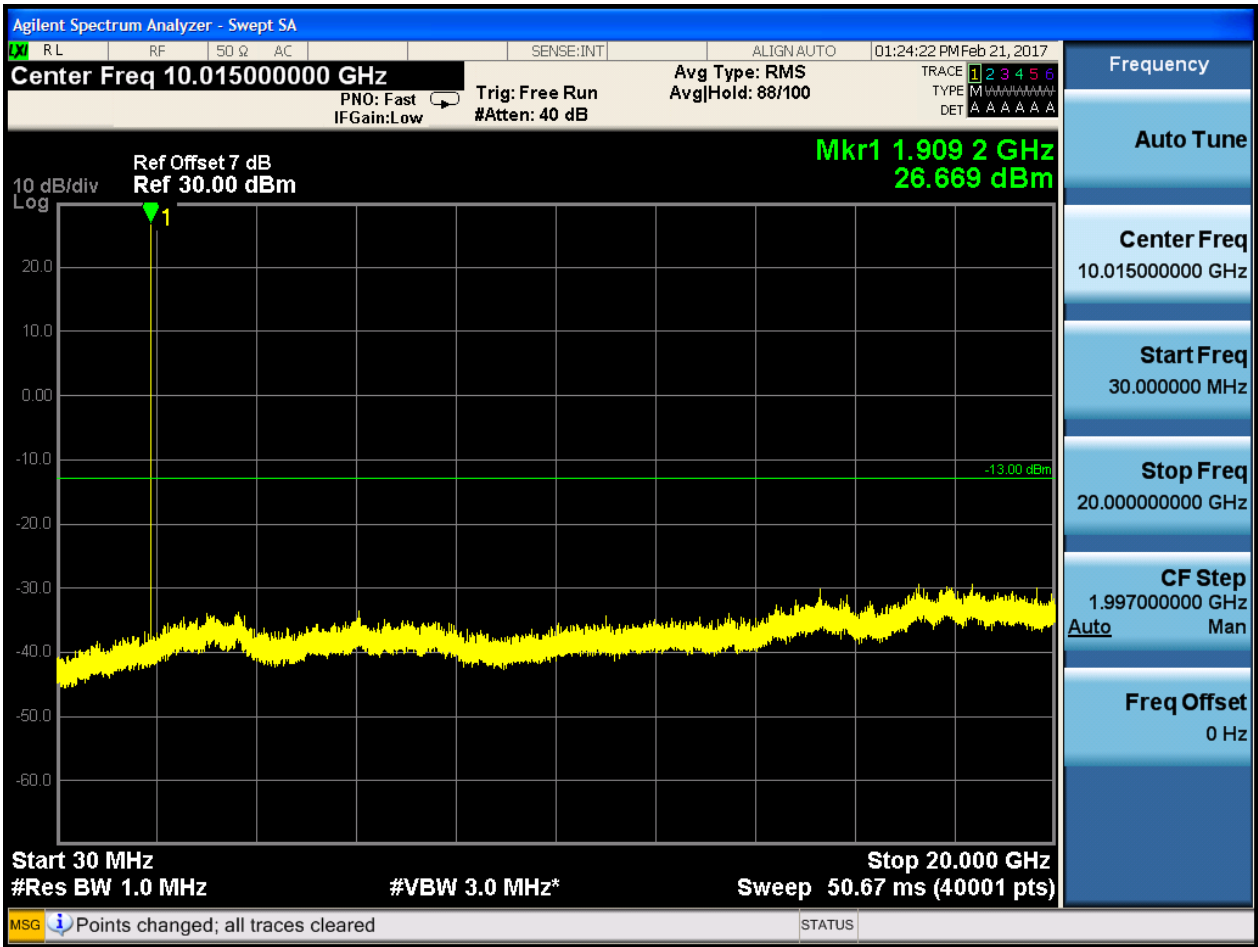




6.1.2.2.3 Test Channel = HCH







## 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

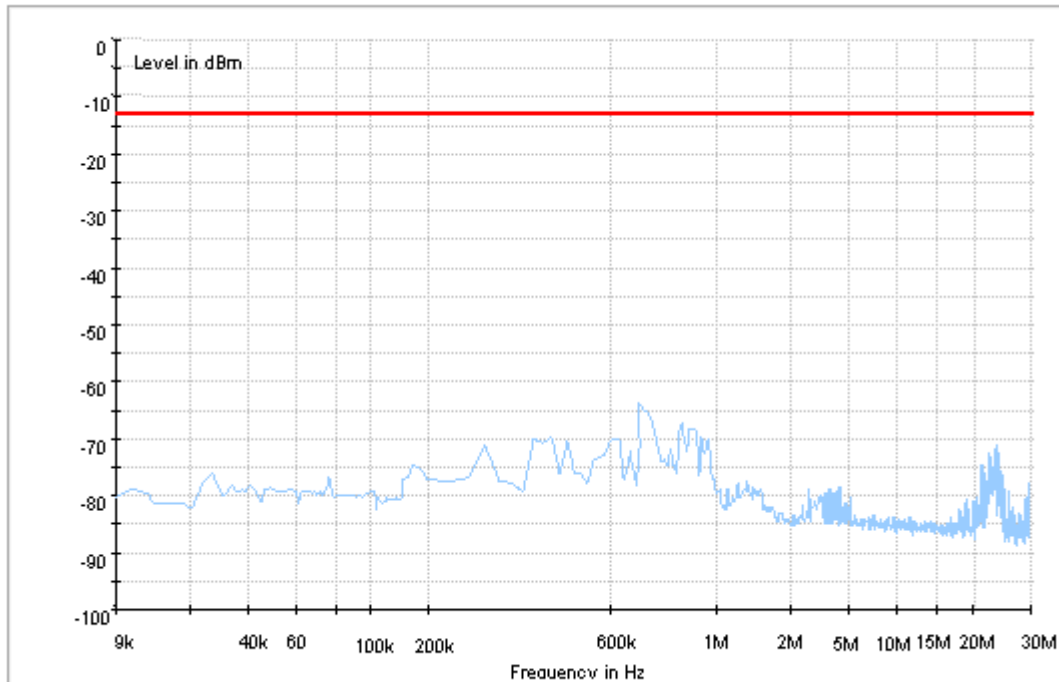
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

### Part I - Test Plots

#### 7.1 For GSM

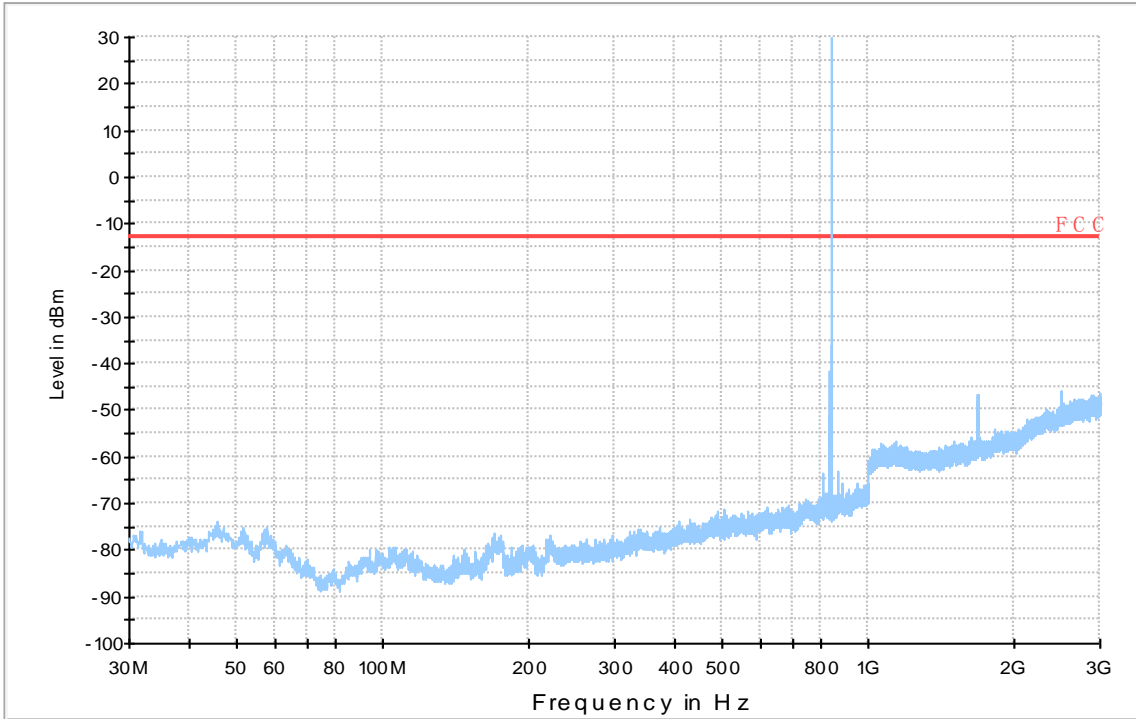
##### 7.1.1 Test Band = GSM850

##### 7.1.1.1 Test Mode = GSM/TM1

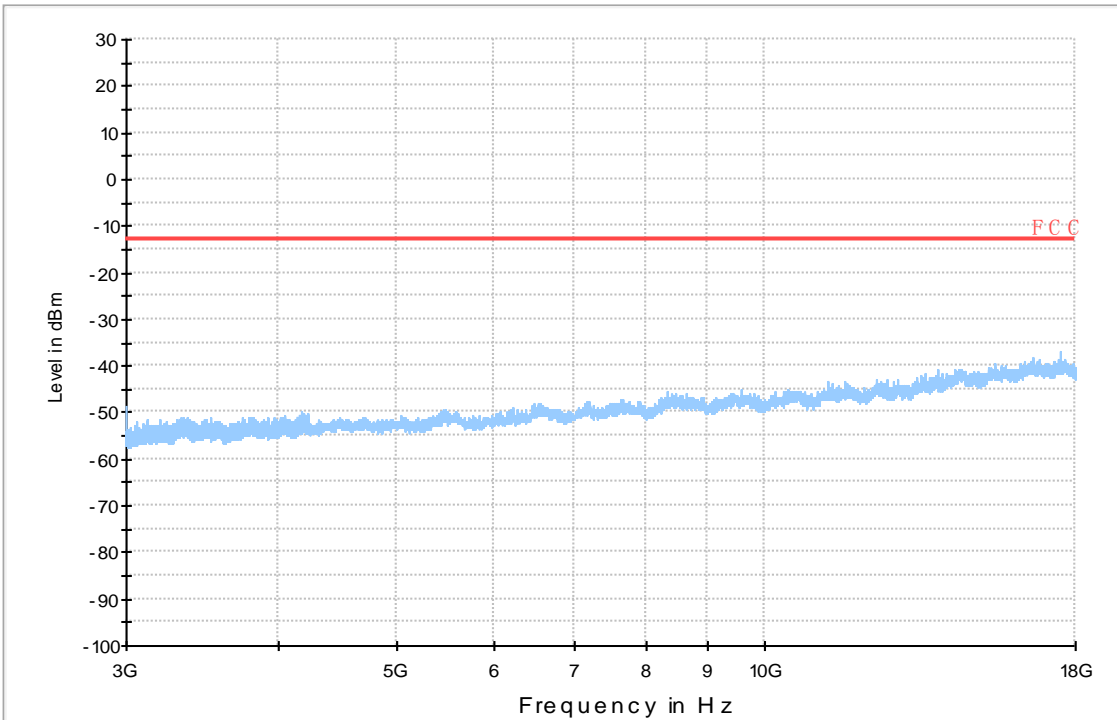




Copy of FCC PART22 GSM850\_L

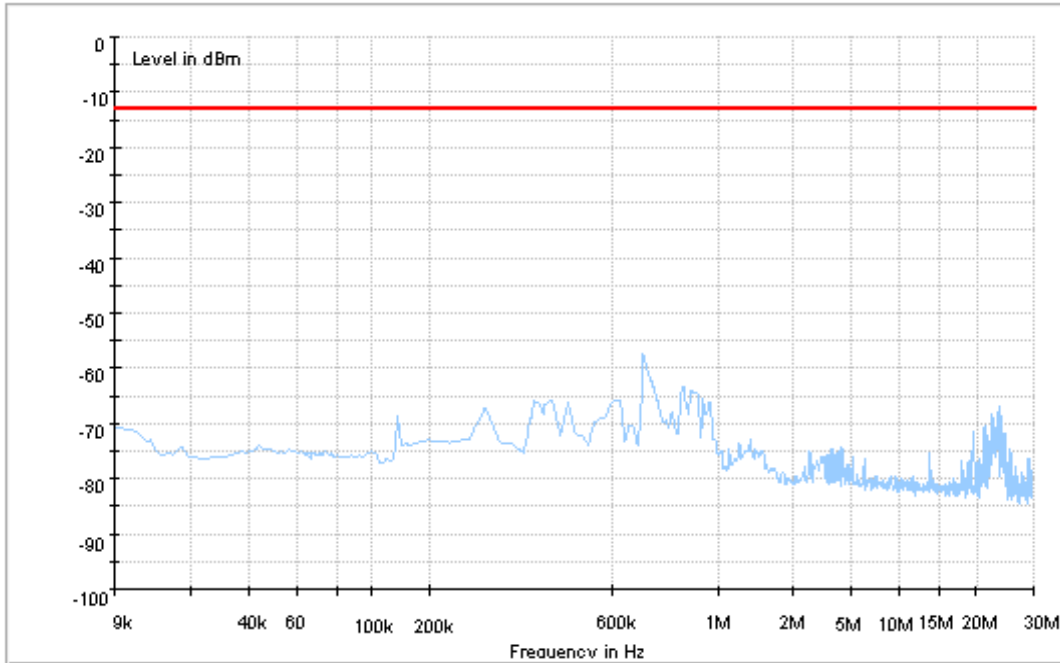


Copy of FCC PART22 GSM850\_H

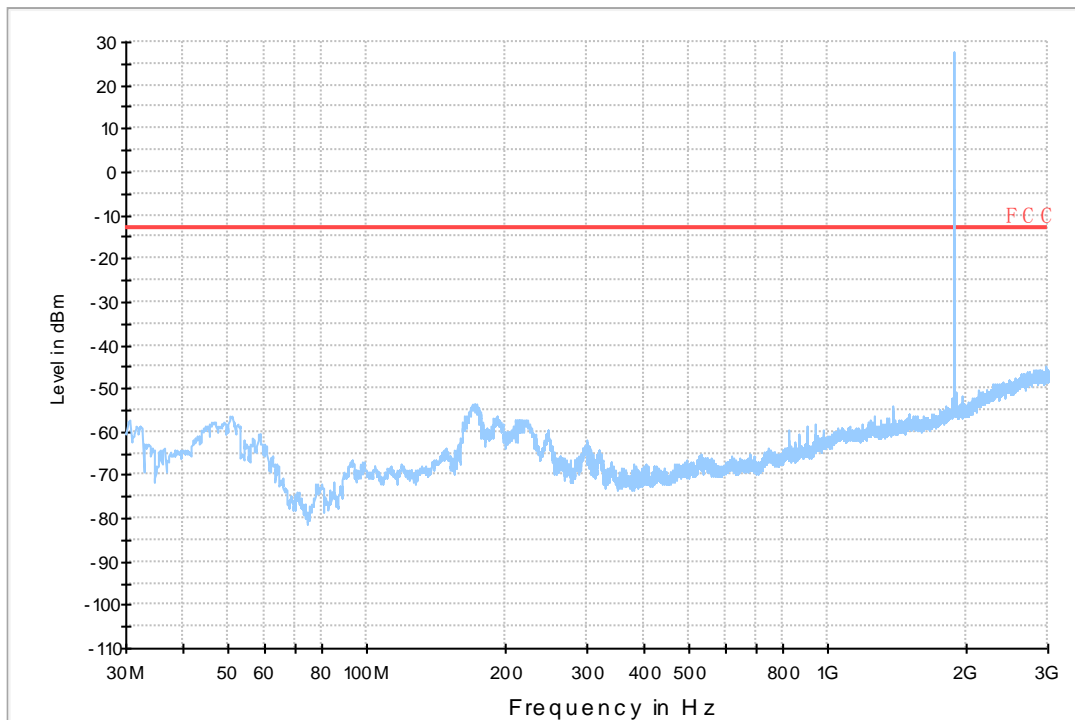


### 7.1.2 Test Band = GSM1900

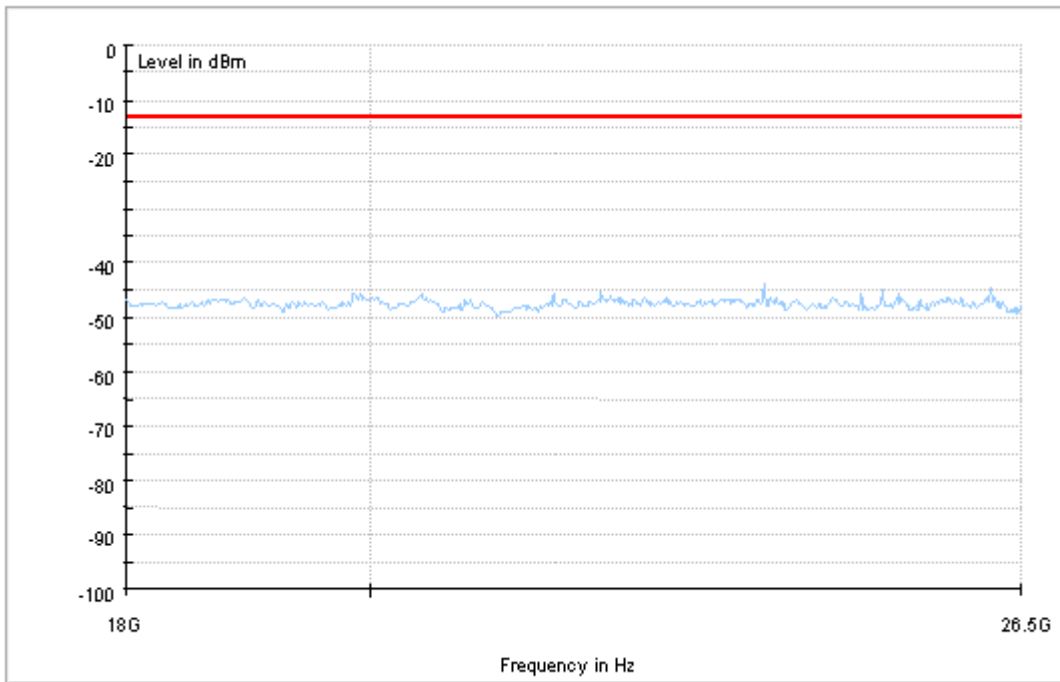
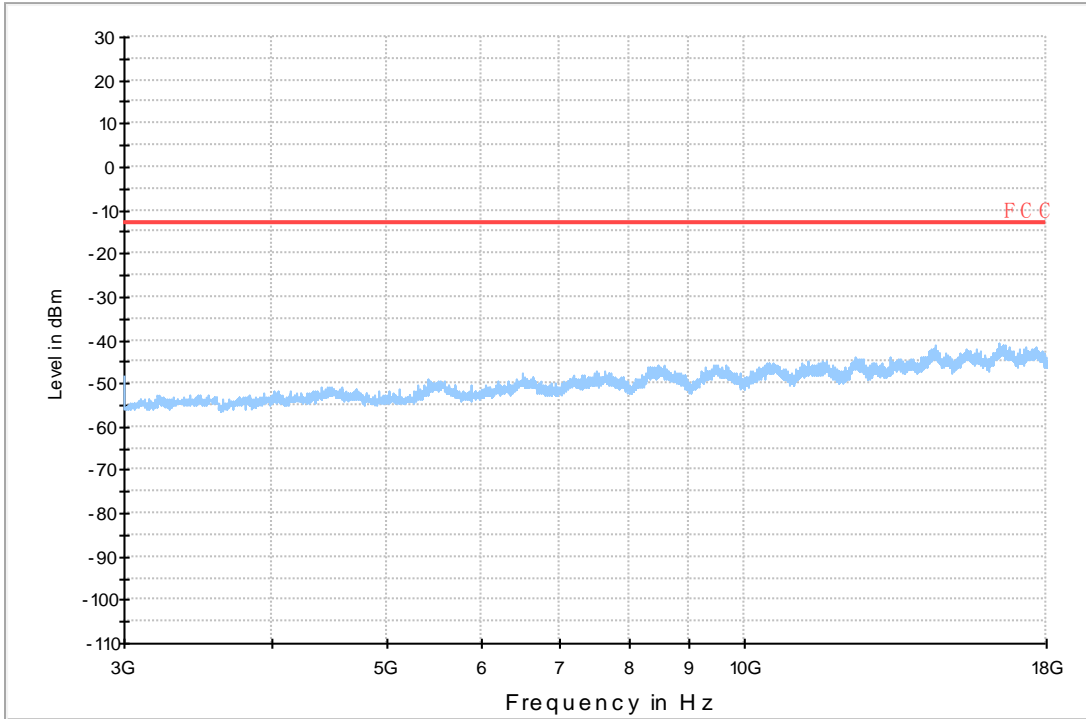
#### 7.1.2.1 Test Mode = GSM/TM1



Copy of FCC PART24 GSM1900\_L



Copy of FCC PART24 GSM1900\_H



## 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	7.94	0.00963	PASS
				VN	6.65	0.00807	PASS
				VH	10.85	0.01316	PASS
		MCH	TN	VL	10.91	0.01304	PASS
				VN	7.04	0.00842	PASS
				VH	15.37	0.01837	PASS
		HCH	TN	VL	11.95	0.01408	PASS
				VN	12.59	0.01483	PASS
				VH	10.98	0.01294	PASS
	GSM/TM2	LCH	TN	VL	15.88	0.01927	PASS
				VN	14.14	0.01716	PASS
				VH	16.56	0.02009	PASS
		MCH	TN	VL	14.43	0.01725	PASS
				VN	16.92	0.02022	PASS
				VH	15.69	0.01875	PASS
		HCH	TN	VL	14.92	0.01758	PASS
				VN	18.69	0.02202	PASS
				VH	17.63	0.02077	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-5.94	-0.00321	PASS
				VN	1.81	0.00098	PASS
				VH	-4.39	-0.00237	PASS
		MCH	TN	VL	2.58	0.00137	PASS
				VN	0.26	0.00014	PASS
				VH	4.91	0.00261	PASS
		HCH	TN	VL	-6.46	-0.00338	PASS
				VN	-8.14	-0.00426	PASS
				VH	-6.65	-0.00348	PASS
	GSM/TM2	LCH	TN	VL	-4.39	-0.00237	PASS
				VN	7.85	0.00424	PASS
				VH	5.59	0.00302	PASS
		MCH	TN	VL	-0.29	-0.00015	PASS
				VN	0.61	0.00032	PASS
				VH			



Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	3.45	0.00184	PASS
		HCH	TN	VL	-0.65	-0.00034	PASS
				VN	-4.88	-0.00256	PASS
				VH	-10.94	-0.00573	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	9.04	0.01097	PASS
				-20	13.04	0.01582	PASS
				-10	11.49	0.01394	PASS
				0	12.98	0.01575	PASS
				10	8.91	0.01081	PASS
				20	13.11	0.01591	PASS
				30	15.05	0.01826	PASS
				40	13.11	0.01591	PASS
		50	11.36	0.01378	PASS		
		MCH	VN	-30	9.49	0.01134	PASS
				-20	9.69	0.01158	PASS
				-10	10.46	0.0125	PASS
				0	10.07	0.01204	PASS
				10	10.40	0.01243	PASS
				20	9.69	0.01158	PASS
				30	10.07	0.01204	PASS
				40	11.56	0.01382	PASS
		50	5.68	0.00679	PASS		
		HCH	VN	-30	15.11	0.0178	PASS
				-20	16.27	0.01917	PASS
				-10	14.14	0.01666	PASS
				0	10.14	0.01195	PASS
				10	13.62	0.01605	PASS
				20	12.33	0.01453	PASS
	30			11.04	0.01301	PASS	
	40			11.43	0.01347	PASS	
	50	11.04	0.01301	PASS			
	GSM/TM2	LCH	VN	-30	18.79	0.0228	PASS
				-20	13.75	0.01668	PASS
				-10	15.59	0.01892	PASS
				0	16.43	0.01993	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict						
				10	15.50	0.01881	PASS						
				20	15.53	0.01884	PASS						
				30	11.11	0.01348	PASS						
				40	14.85	0.01802	PASS						
				50	12.46	0.01512	PASS						
		MCH	VN			-30	15.43	0.01844	PASS				
						-20	13.92	0.01664	PASS				
						-10	14.40	0.01721	PASS				
						0	15.76	0.01884	PASS				
						10	14.59	0.01744	PASS				
						20	17.18	0.02054	PASS				
						30	15.27	0.01825	PASS				
						40	19.24	0.023	PASS				
						50	14.69	0.01756	PASS				
						HCH	VN			-30	19.05	0.02244	PASS
		-20	14.88	0.01753	PASS								
		-10	14.82	0.01746	PASS								
		0	14.37	0.01693	PASS								
		10	16.18	0.01906	PASS								
		20	11.40	0.01343	PASS								
		30	16.59	0.01955	PASS								
		40	14.27	0.01681	PASS								
		50	14.79	0.01742	PASS								
		GSM1900	GSM/TM1	LCH	VN								
-30	-0.52									-0.00028	PASS		
-20	1.03									0.00056	PASS		
-10	1.03									0.00056	PASS		
0	-3.75									-0.00203	PASS		
10	1.87									0.00101	PASS		
20	0.00									0	PASS		
30	3.87									0.00209	PASS		
40	-0.97									-0.00052	PASS		
50	-0.77			-0.00042	PASS								
MCH	VN												
										-30	2.07	0.0011	PASS
										-20	4.13	0.0022	PASS
										-10	-1.23	-0.00065	PASS
										0	0.06	0.00003	PASS
										10	2.26	0.0012	PASS
										20	2.45	0.0013	PASS
										30	4.07	0.00216	PASS
		40	3.87							0.00206	PASS		



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	2.78	0.00148	PASS
				-30	-7.04	-0.00369	PASS
				-20	-1.87	-0.00098	PASS
				-10	-4.97	-0.0026	PASS
				0	-4.78	-0.0025	PASS
				10	-3.36	-0.00176	PASS
				20	-4.07	-0.00213	PASS
				30	-6.46	-0.00338	PASS
				40	-0.32	-0.00017	PASS
				50	-8.07	-0.00423	PASS
	GSM/TM2	LCH	VN	-30	3.00	0.00162	PASS
				-20	10.98	0.00593	PASS
				-10	4.65	0.00251	PASS
				0	1.87	0.00101	PASS
				10	2.71	0.00146	PASS
				20	8.07	0.00436	PASS
				30	3.39	0.00183	PASS
				40	4.16	0.00225	PASS
				50	2.62	0.00142	PASS
				MCH	VN	-30	6.01
		-20	-0.03			-0.00002	PASS
		-10	6.68			0.00355	PASS
		0	7.59			0.00404	PASS
		10	6.52			0.00347	PASS
		20	0.29			0.00015	PASS
		30	7.59			0.00404	PASS
		40	0.71			0.00038	PASS
		50	5.26			0.0028	PASS
		HCH	VN			-30	-10.04
				-20	-5.00	-0.00262	PASS
				-10	-8.04	-0.00421	PASS
				0	-3.84	-0.00201	PASS
10	-3.13			-0.00164	PASS		
20	-10.91			-0.00571	PASS		
30	-5.42			-0.00284	PASS		
40	-0.81			-0.00042	PASS		
50	-12.79	-0.0067	PASS				

END