



# 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	32.17	27.21	38.5	PASS
		MCH	32.28	27.47	38.5	PASS
		HCH	32.26	27.33	38.5	PASS
	GSM/TM2	LCH	25.58	20.66	38.5	PASS
		MCH	25.66	20.59	38.5	PASS
		HCH	25.67	20.87	38.5	PASS

Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	29.27	30.59	33	PASS
		MCH	29.28	30.57	33	PASS
		HCH	29.18	30.55	33	PASS
	GSM/TM2	LCH	24.71	26.13	33	PASS
		MCH	24.72	26.07	33	PASS



Test Band	Test Mode	Test Channel	Conducted Power [dBm]	EIRP [dBm]	Limit [dBm]	Verdict
		HCH	24.66	25.97	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:

$$\text{SET Span} = 1.5 * \text{OBW}$$

SET RBW=1%of the OBW,not to exceed 1MHz

$$\text{SET VBW} \geq 3 * \text{RBW}$$

SET Sweep time=auto-couple.

## 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	0.12	13	PASS
		MCH	0.16	13	PASS
		HCH	0.13	13	PASS
	GSM/TM2	LCH	3.09	13	PASS
		MCH	3.05	13	PASS
		HCH	3.13	13	PASS
GSM1900	GSM/TM1	LCH	0.1	13	PASS
		MCH	0.14	13	PASS
		HCH	0.11	13	PASS
	GSM/TM2	LCH	3.22	13	PASS
		MCH	3.3	13	PASS
		HCH	3.16	13	PASS

### 3Appendix\_C: Modulation Characteristics

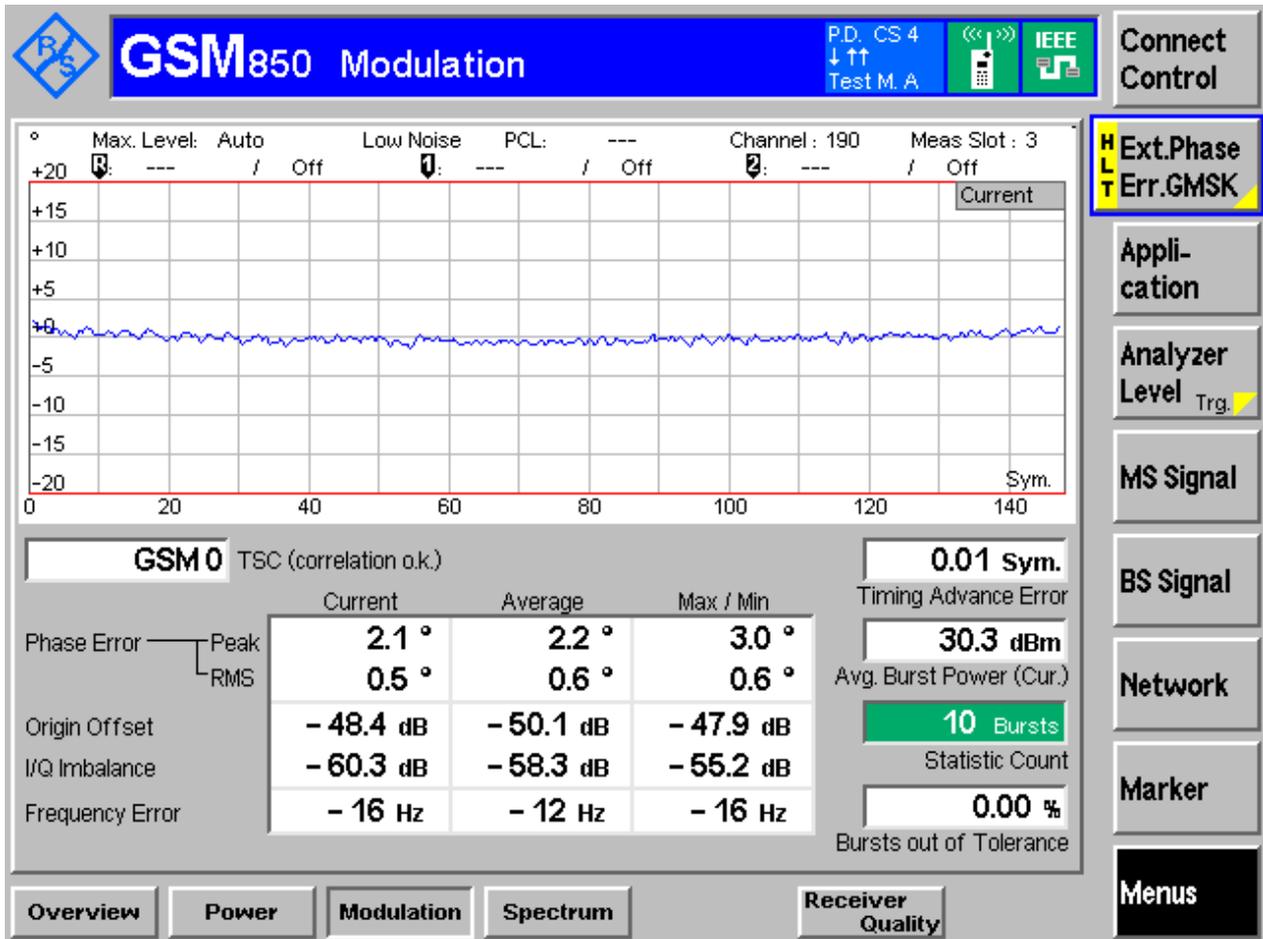
#### Part I - Test Plots

#### 3.1 For GSM

#### 3.1.1 Test Band = GSM850

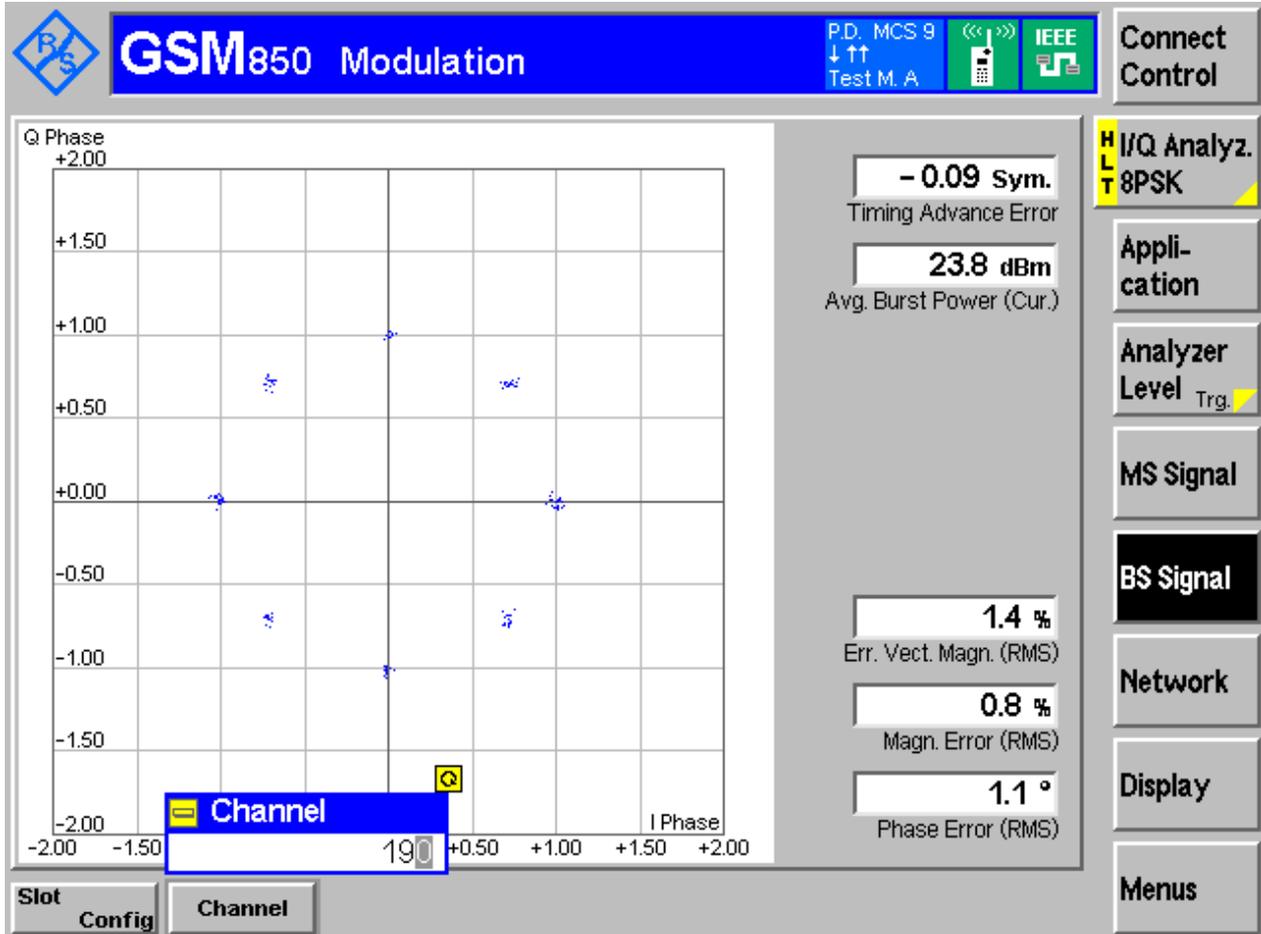
#### 3.1.1.1 Test Mode = GSM/TM1

#### 3.1.1.1.1 Test Channel = MCH



### 3.1.1.2 Test Mode = GSM/TM2

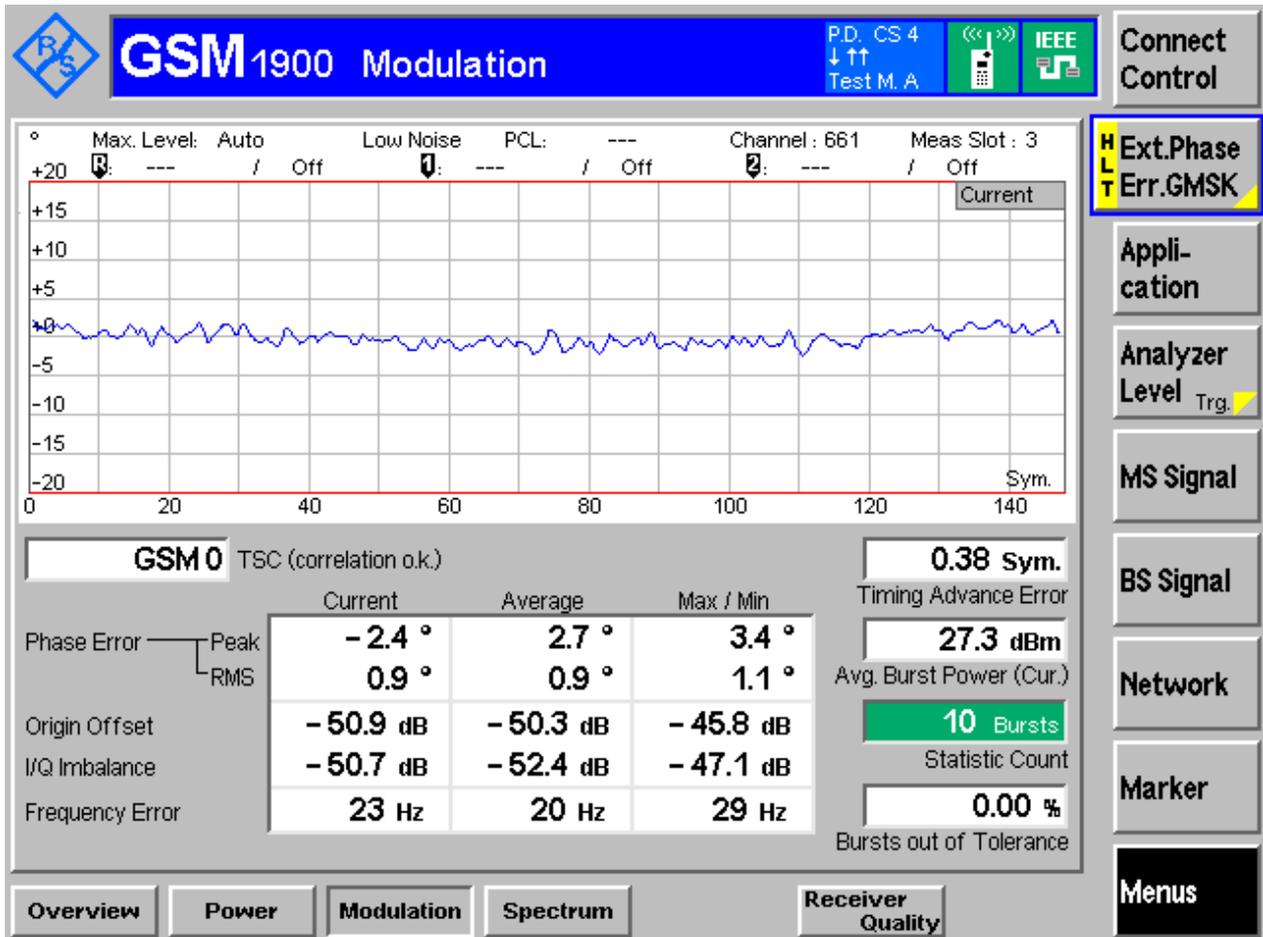
#### 3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

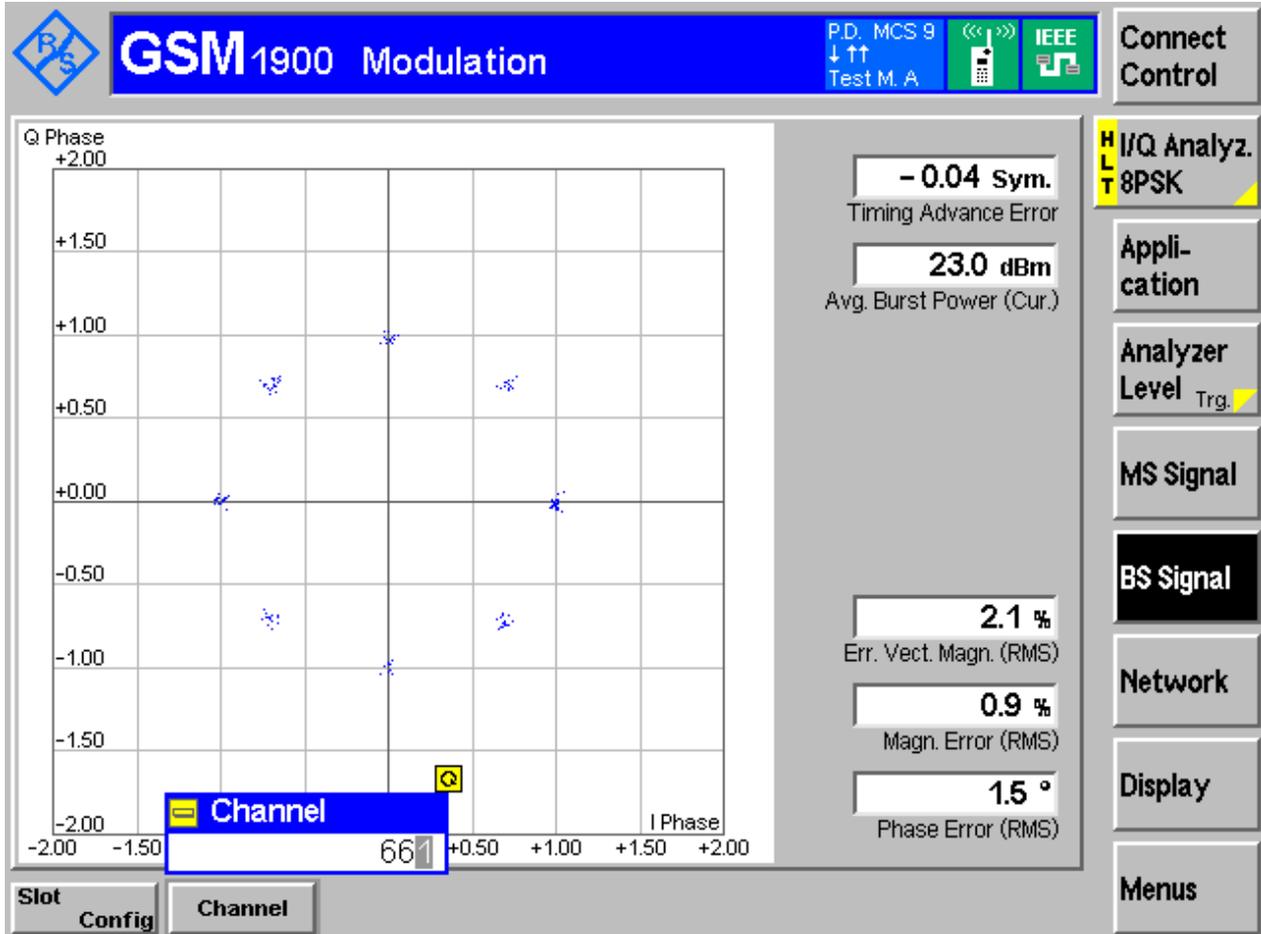
3.1.2.1 Test Mode = GSM/TM1

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	243.62	314.29	Pass
		MCH	245.52	313.06	Pass
		HCH	246.02	318.42	Pass
	GSM/TM2	LCH	246.99	319.98	Pass
		MCH	249.59	316.91	Pass
		HCH	248.73	318.97	Pass
GSM1900	GSM/TM1	LCH	246.46	314.28	Pass
		MCH	245.13	318.81	Pass
		HCH	245.92	313.75	Pass
	GSM/TM2	LCH	250.21	325.91	Pass
		MCH	246.09	315.10	Pass
		HCH	244.95	318.82	Pass

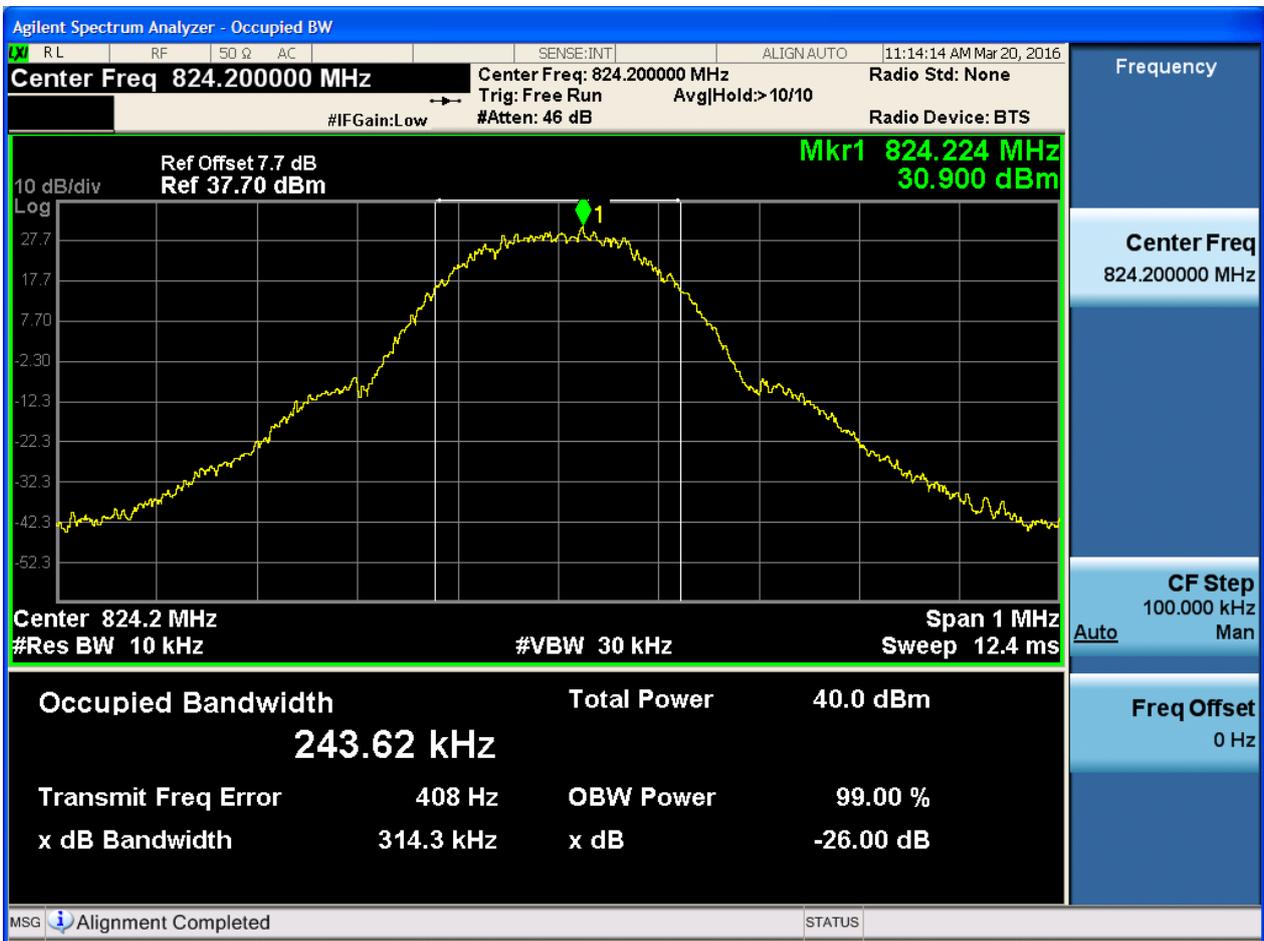
**Part II - Test Plots**

**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





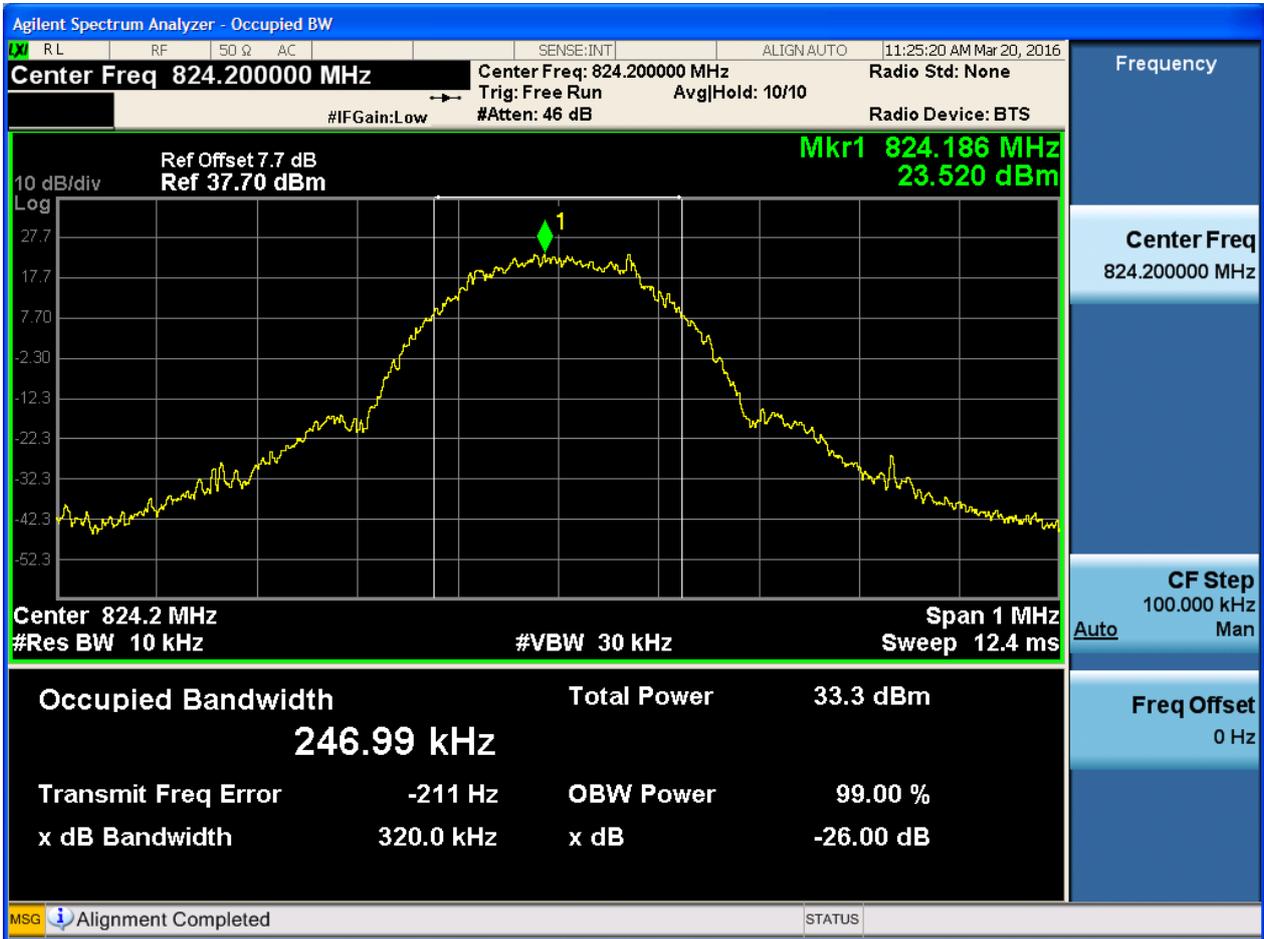
4.1.1.1.3 Test Channel = HCH





4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



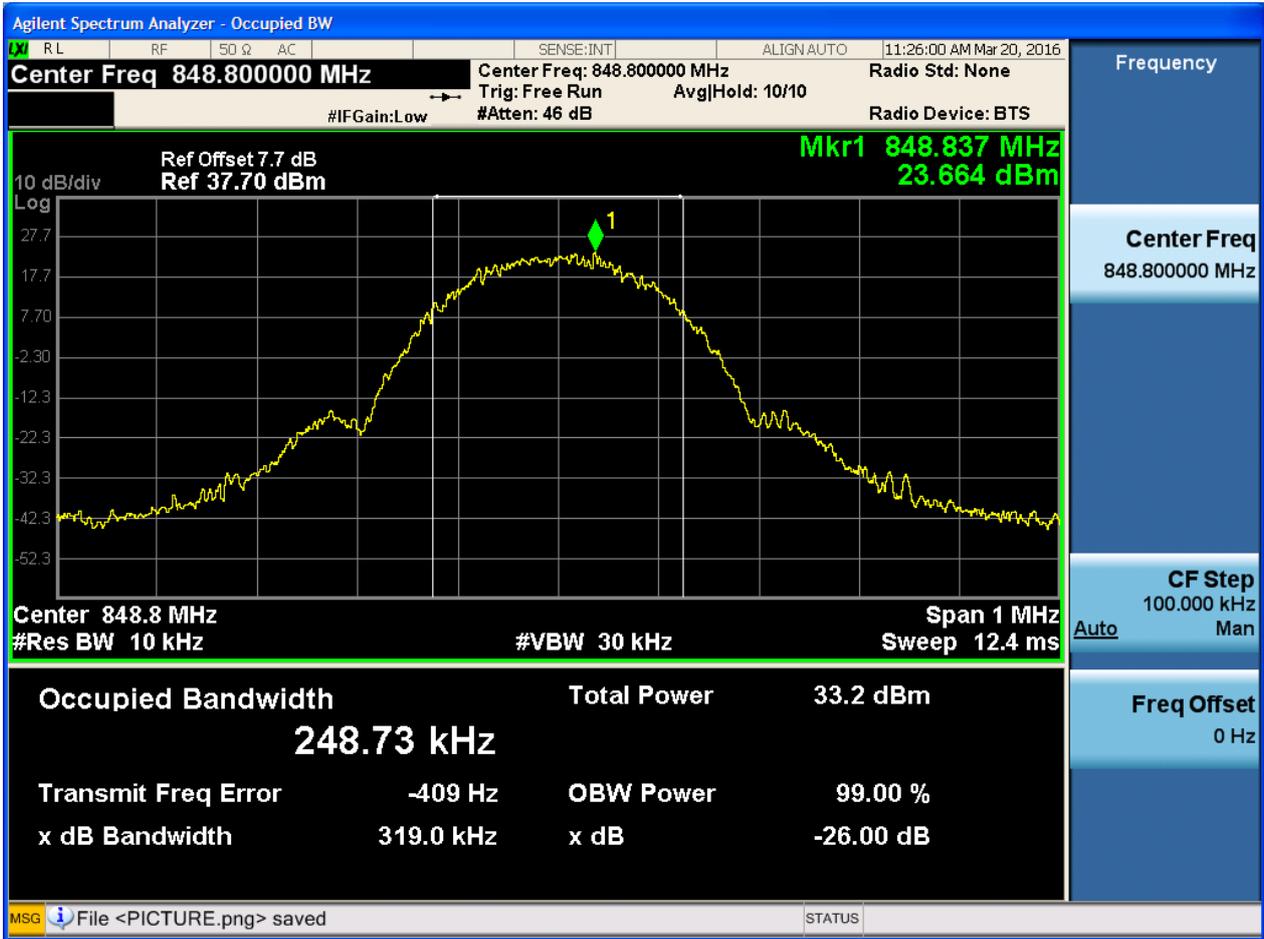


4.1.1.2.2 Test Channel = MCH





4.1.1.2.3 Test Channel = HCH

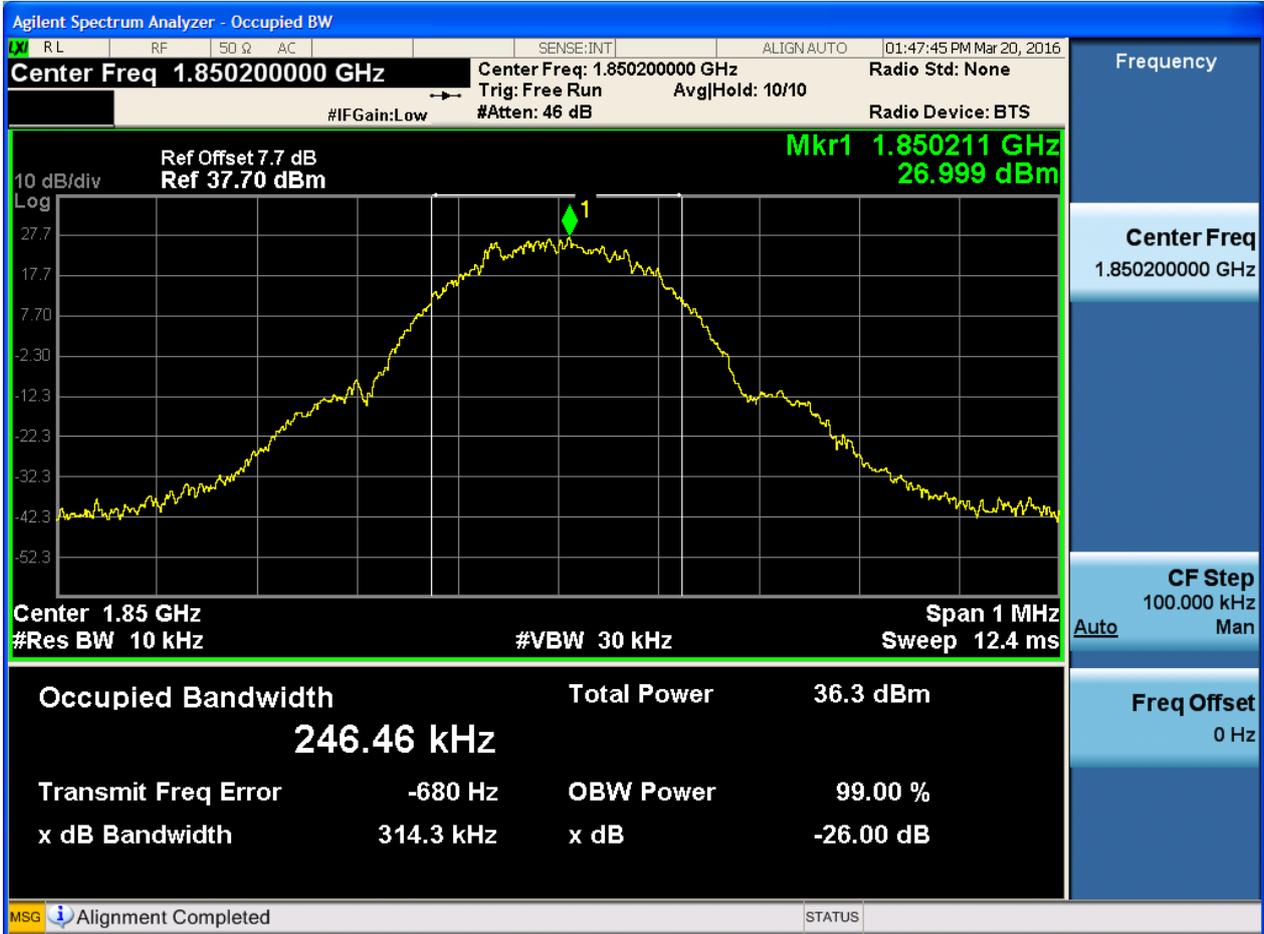




4.1.2 Test Band = GSM1900

4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



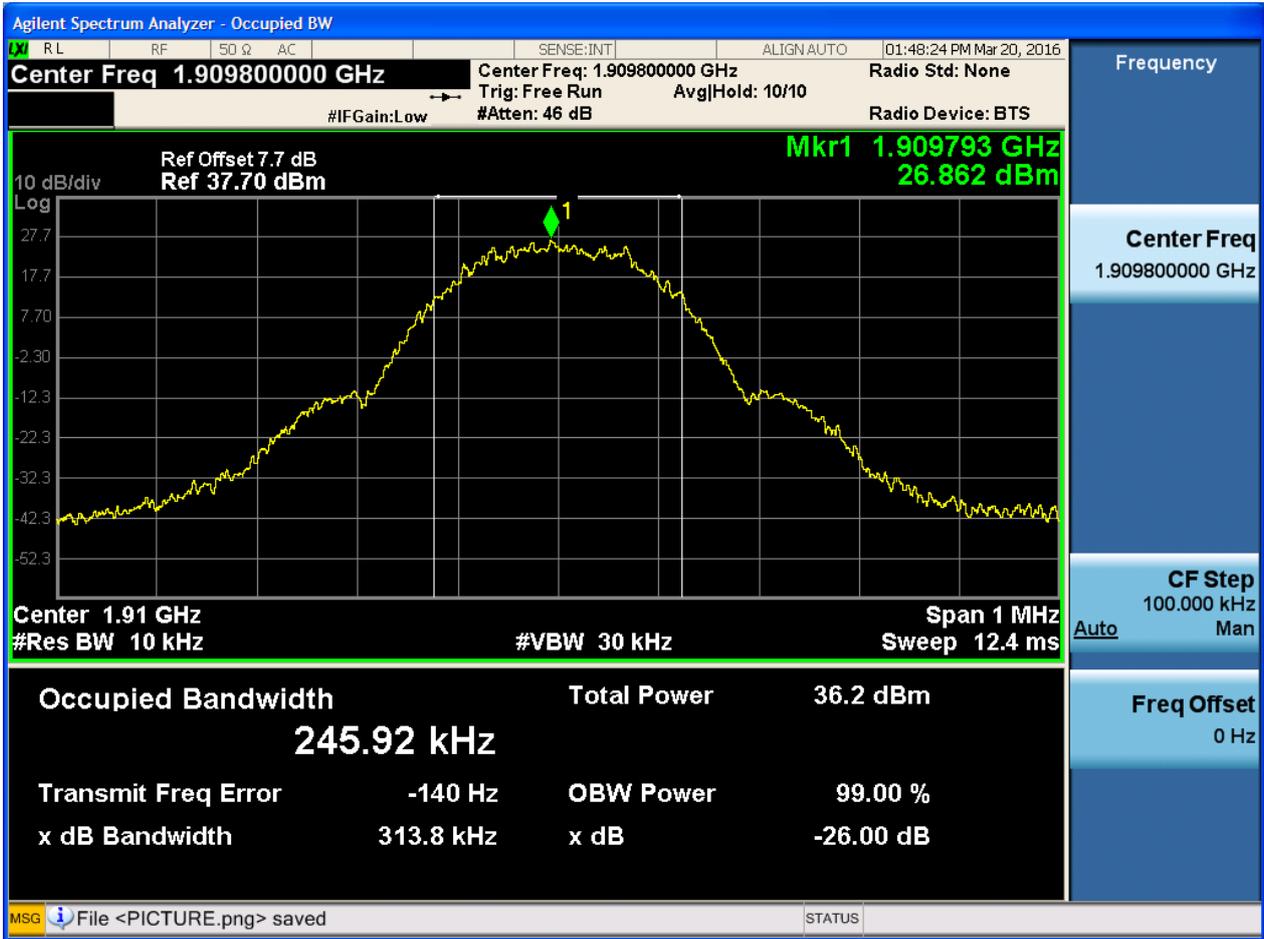


4.1.2.1.2 Test Channel = MCH





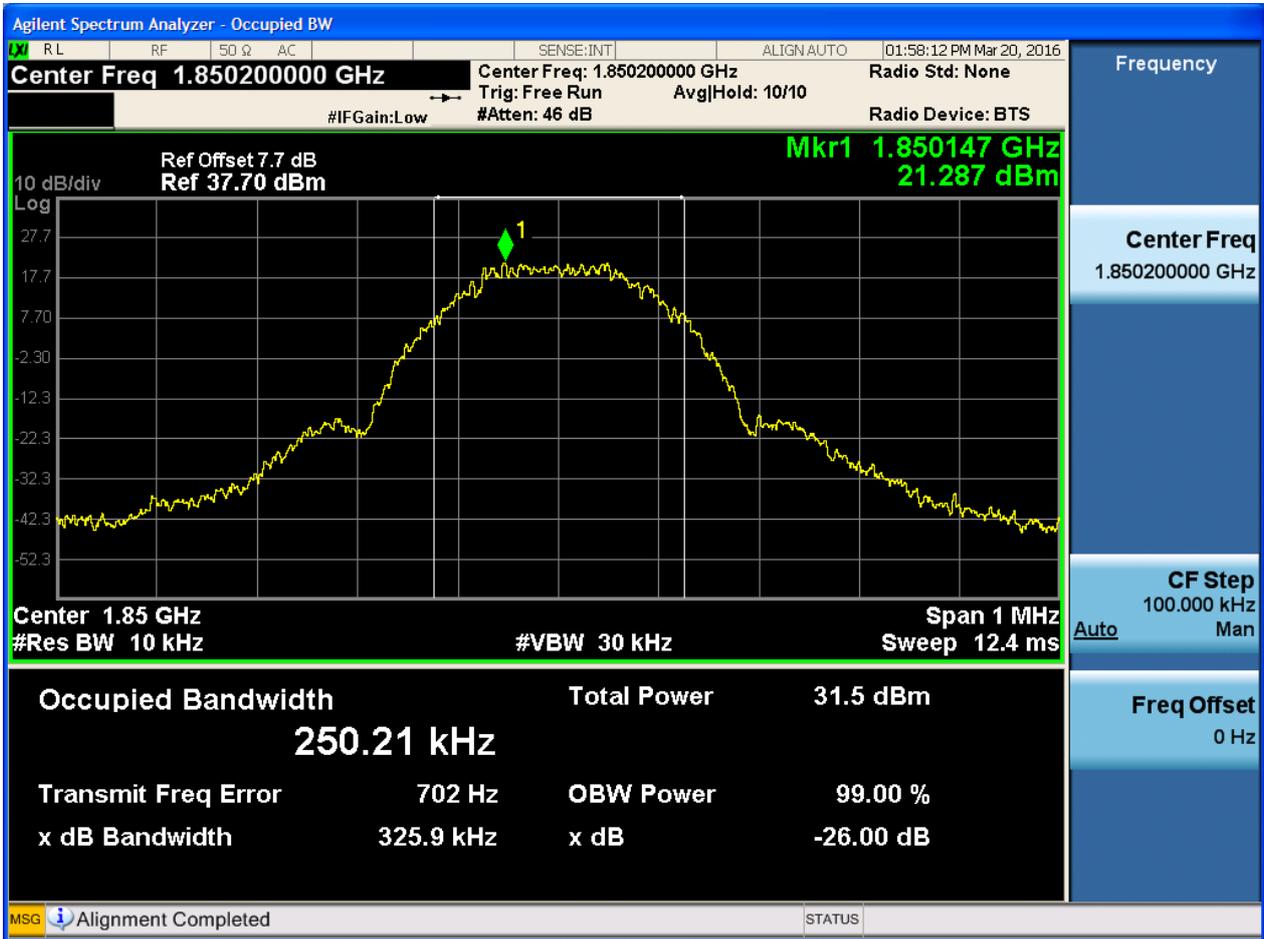
4.1.2.1.3 Test Channel = HCH





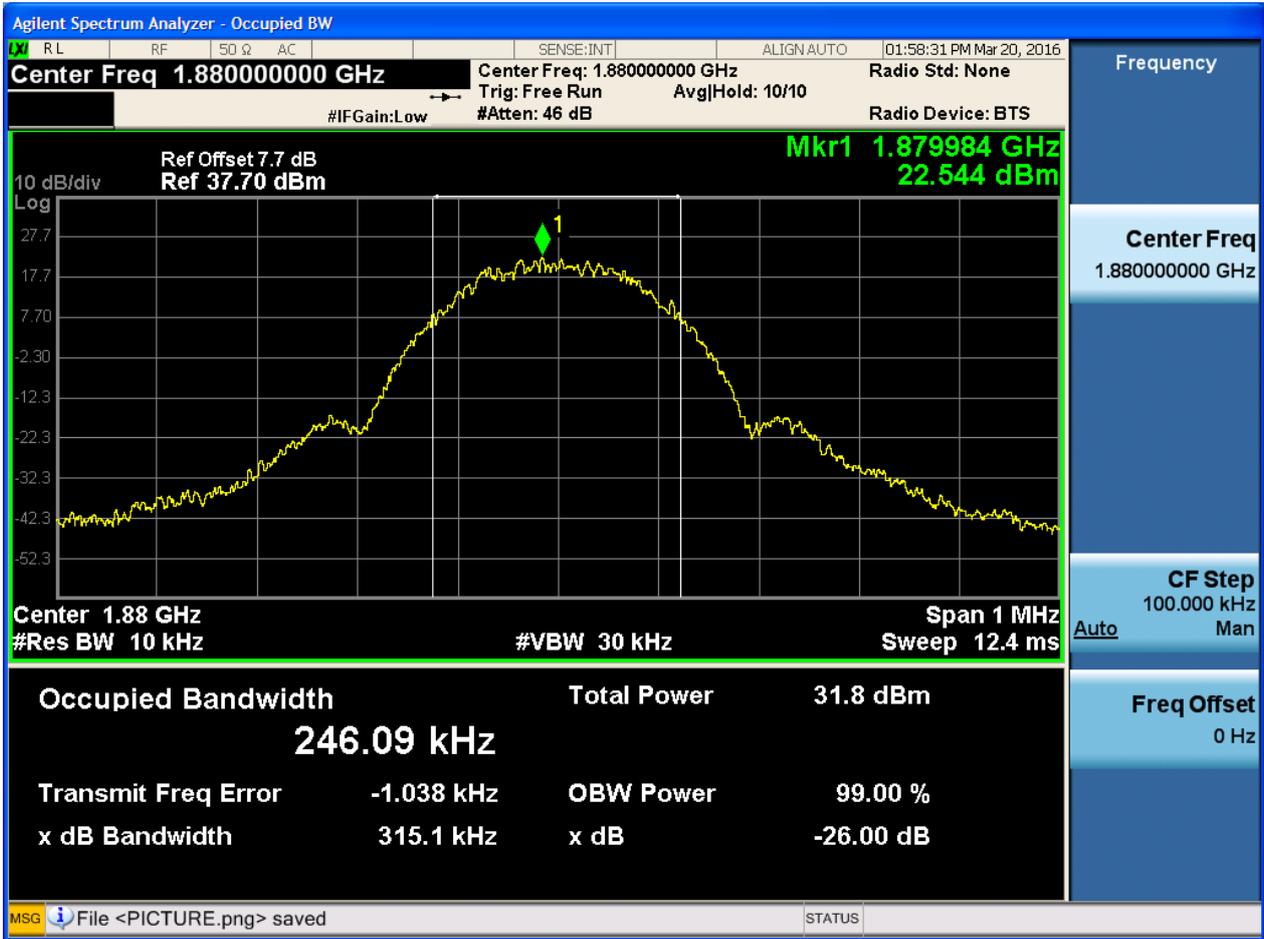
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



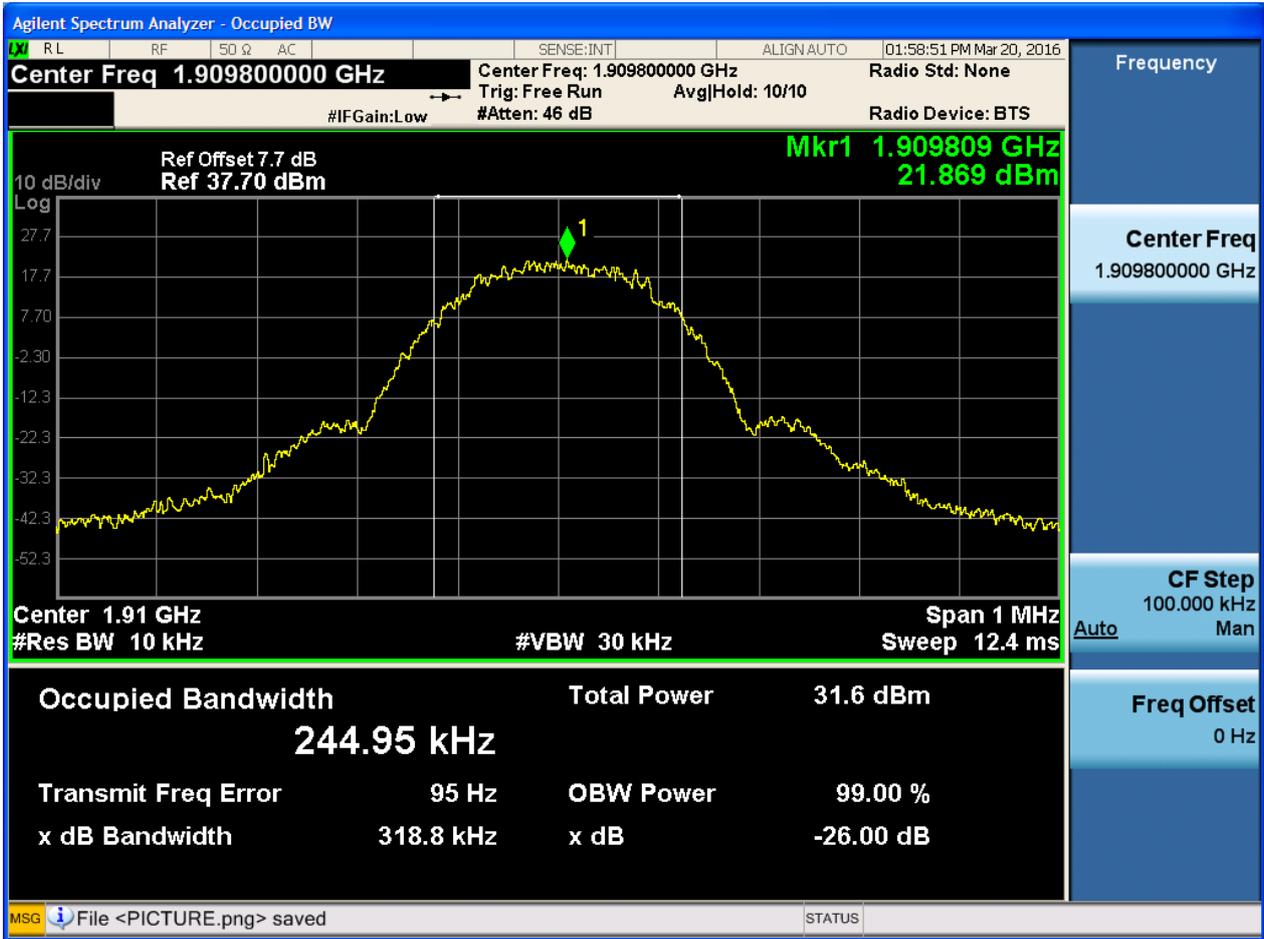


4.1.2.2.2 Test Channel = MCH





4.1.2.2.3 Test Channel = HCH





# 5Appendix\_E: Band Edges Compliance

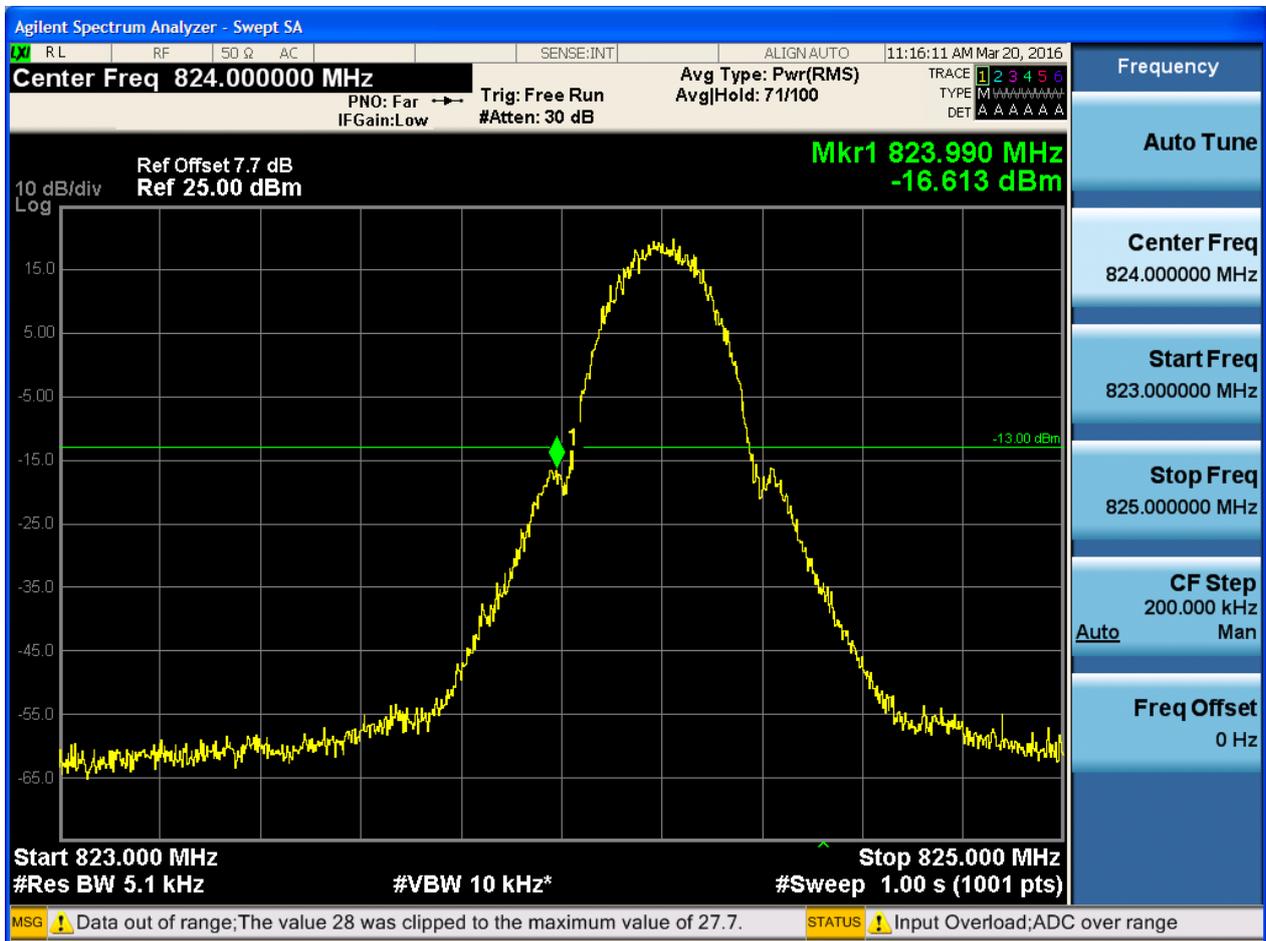
## Part I - Test Plots

### 5.1 For GSM

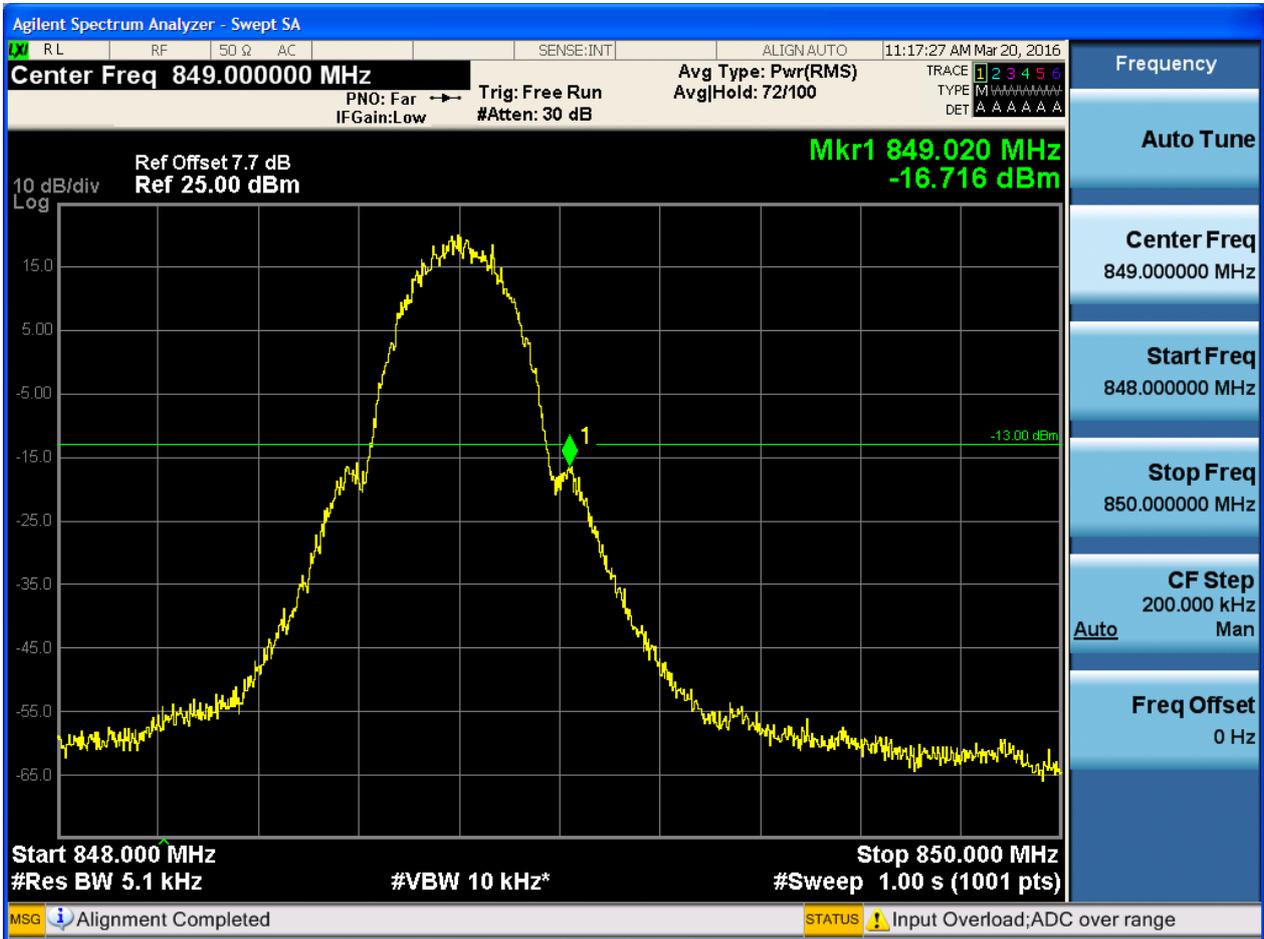
#### 5.1.1 Test Band = GSM850

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

##### 5.1.1.1.1 Test Channel = LCH

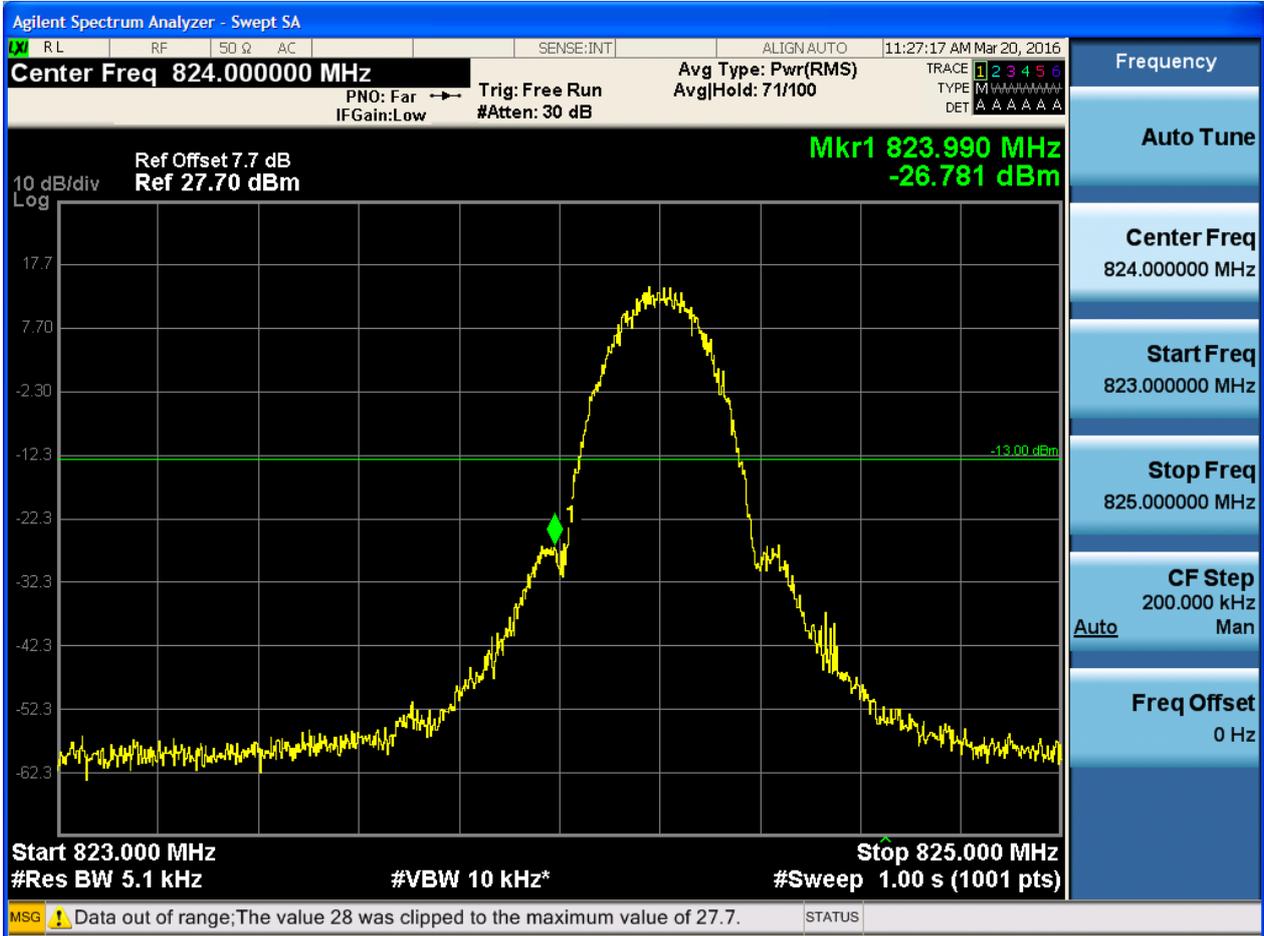


5.1.1.1.2 Test Channel = HCH

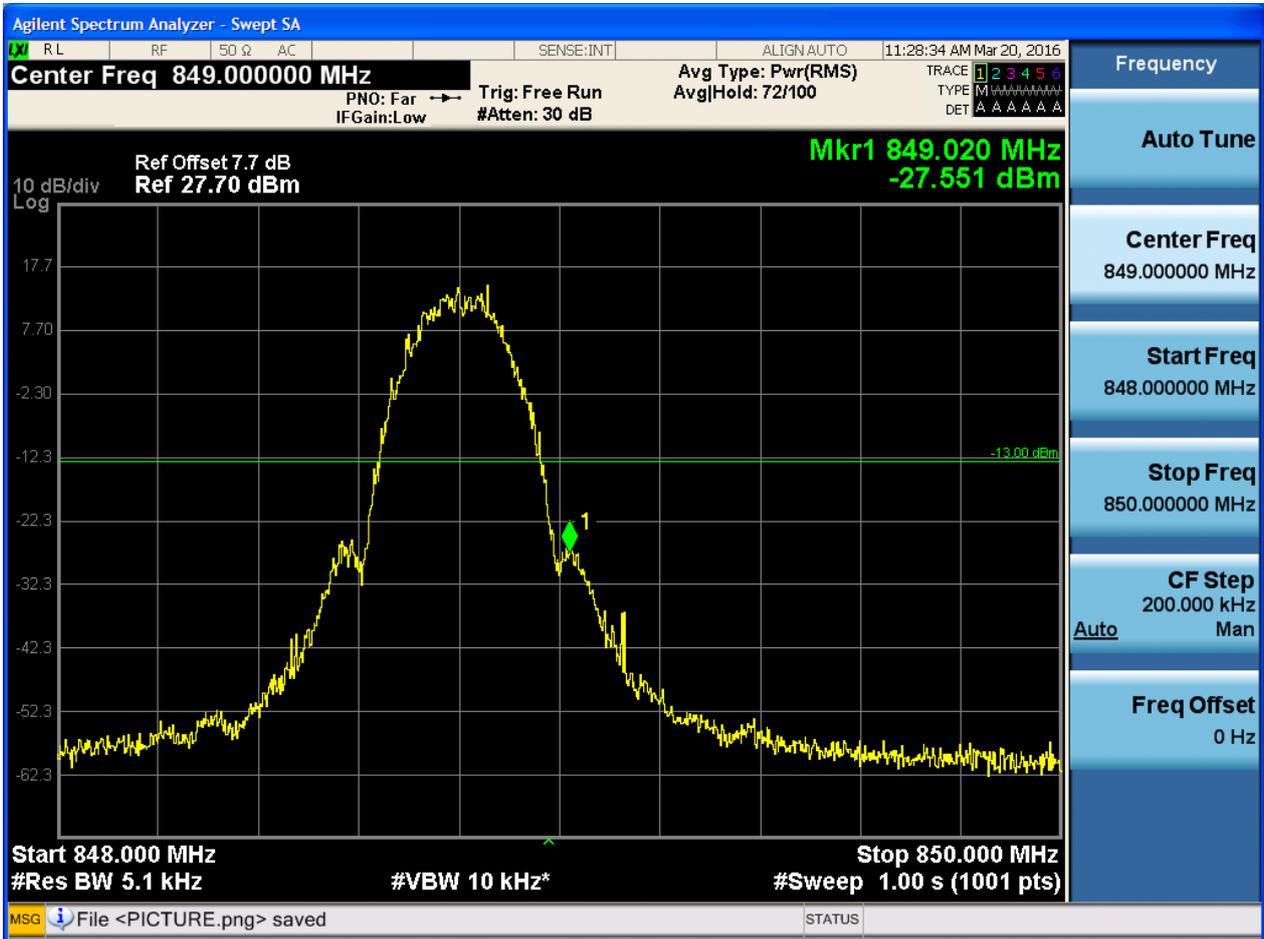


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



5.1.1.2.2 Test Channel = HCH

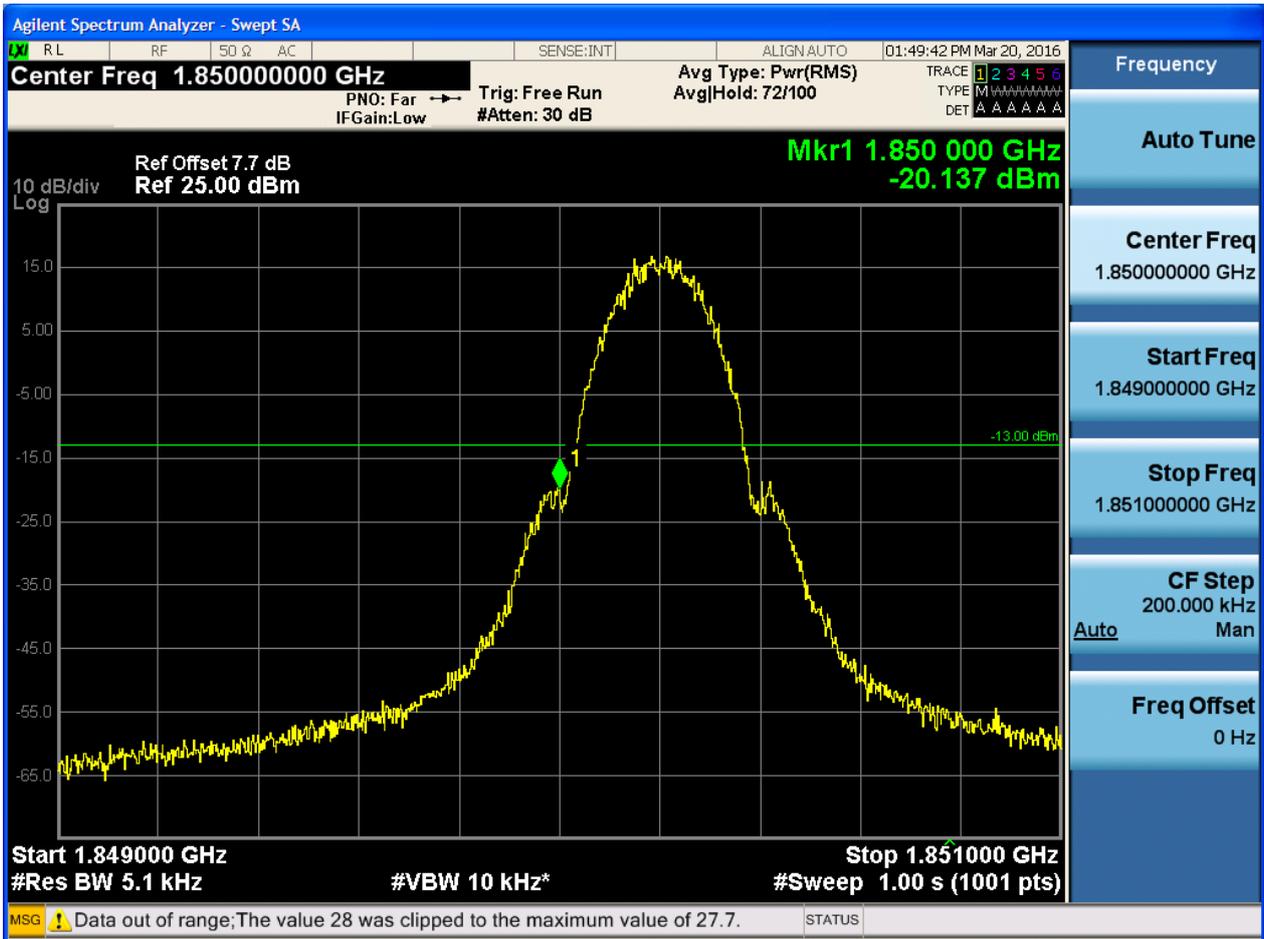




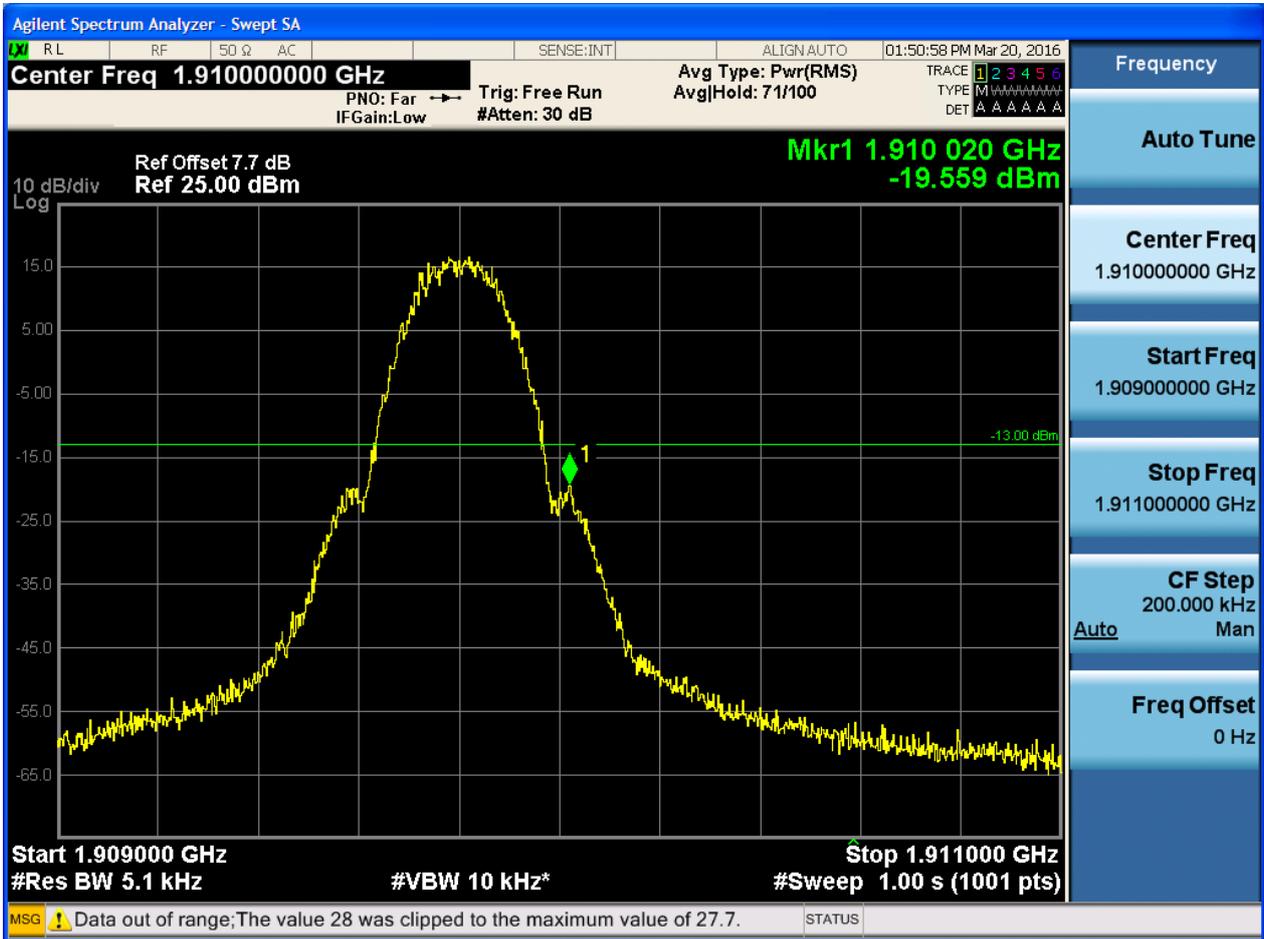
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

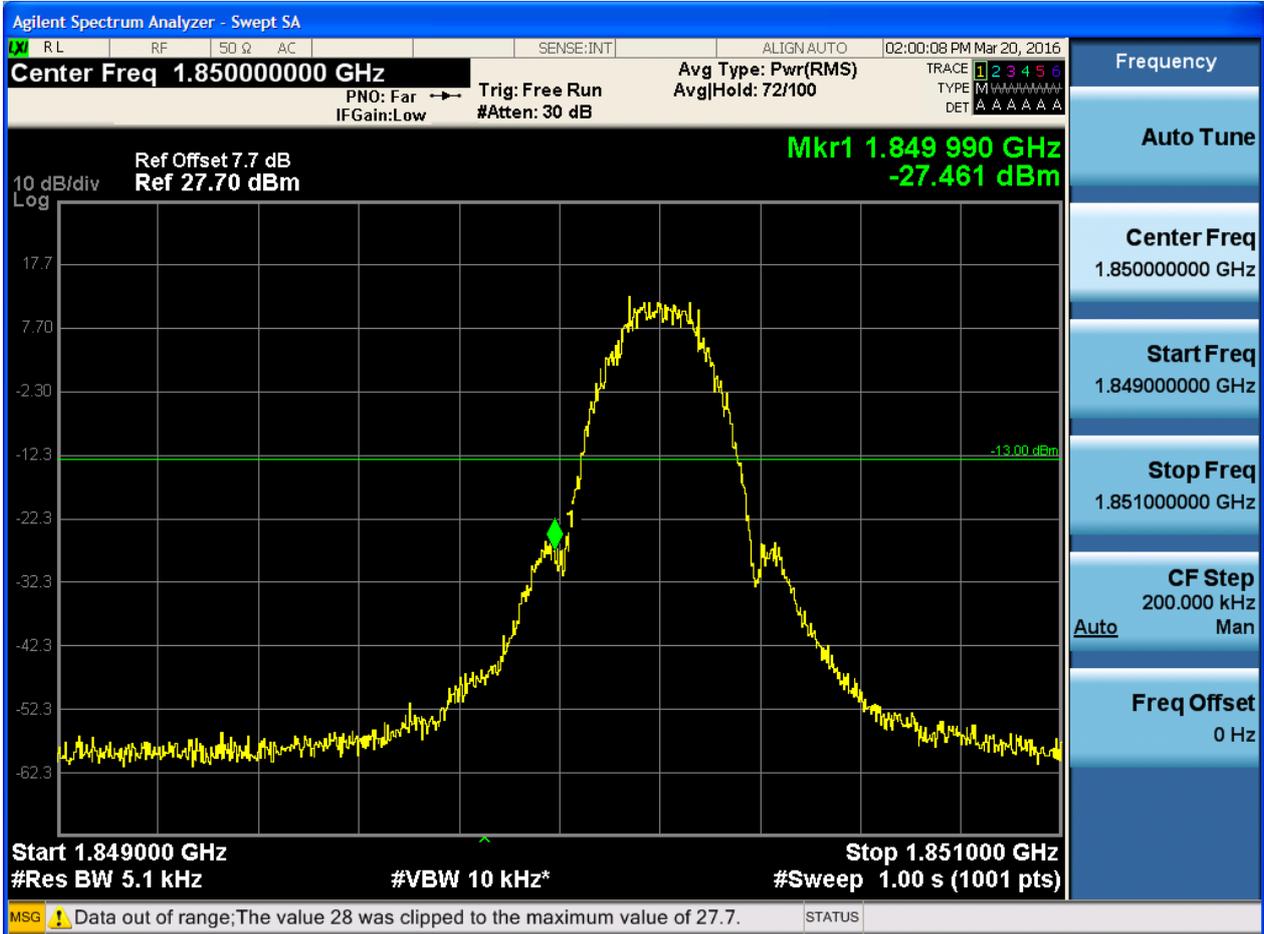


5.1.2.1.2 Test Channel = HCH

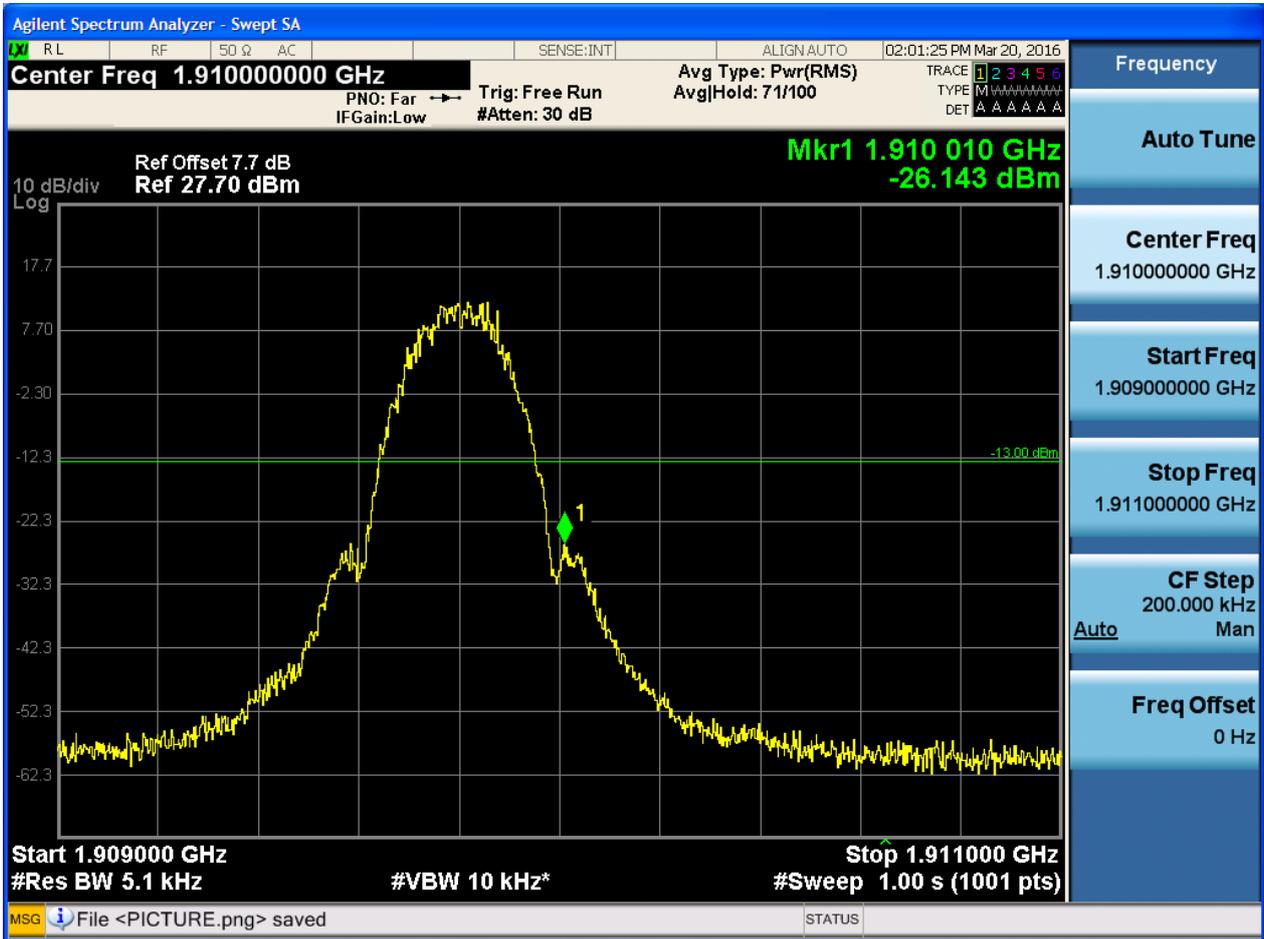


5.1.2.2 Test Mode = GSM/TM2

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.

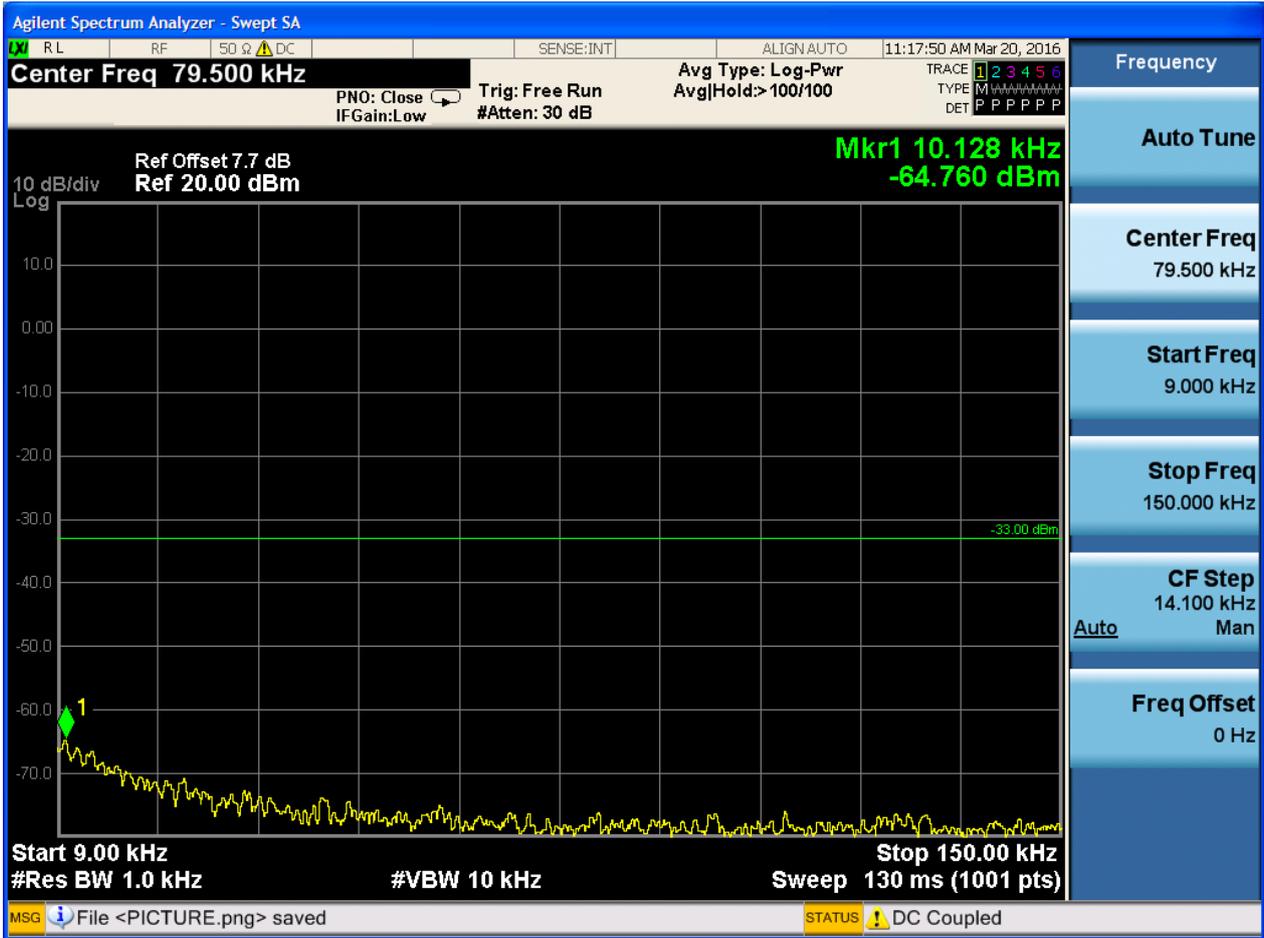
### Part I - Test Plots

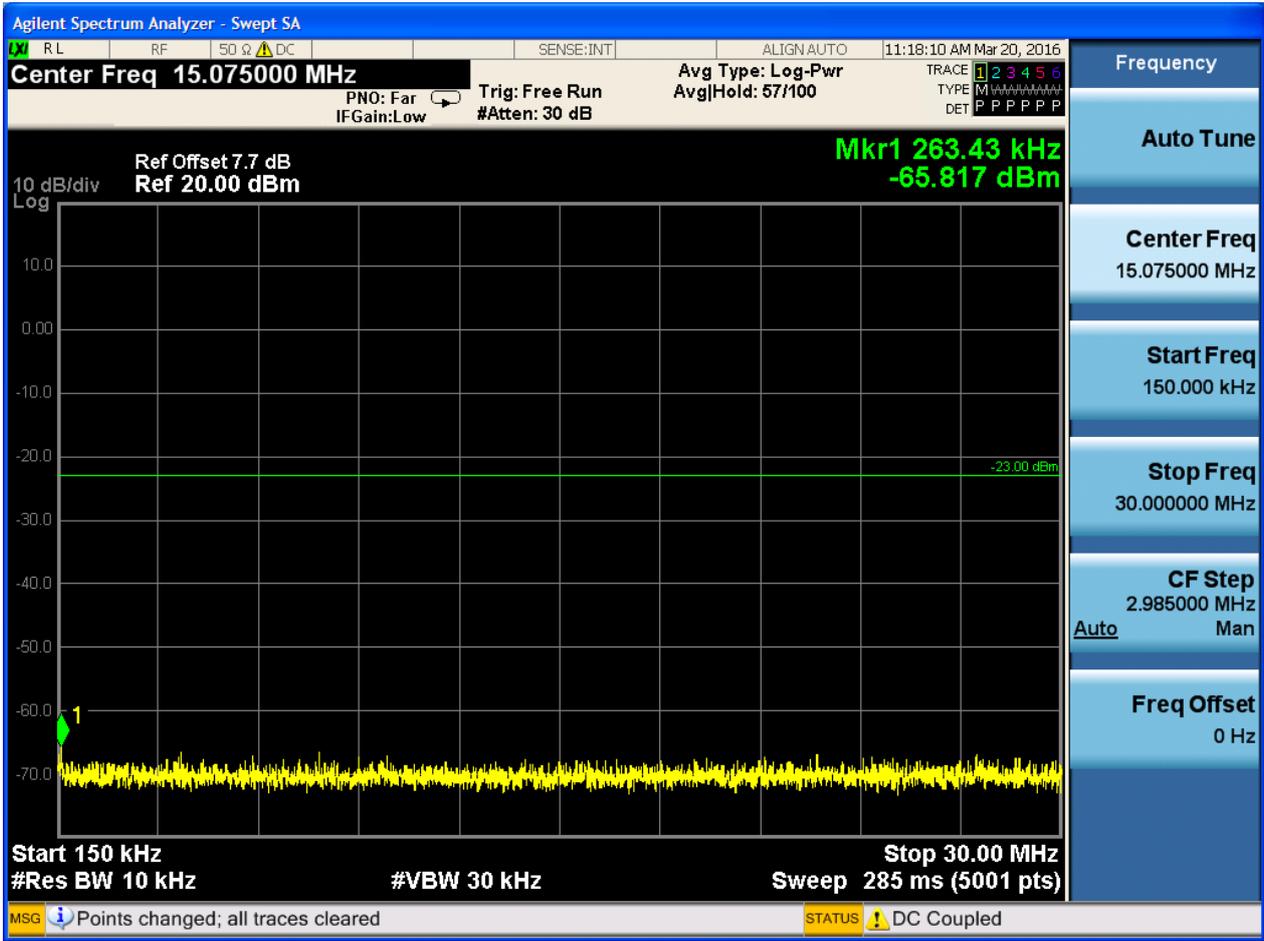
#### 6.1 For GSM

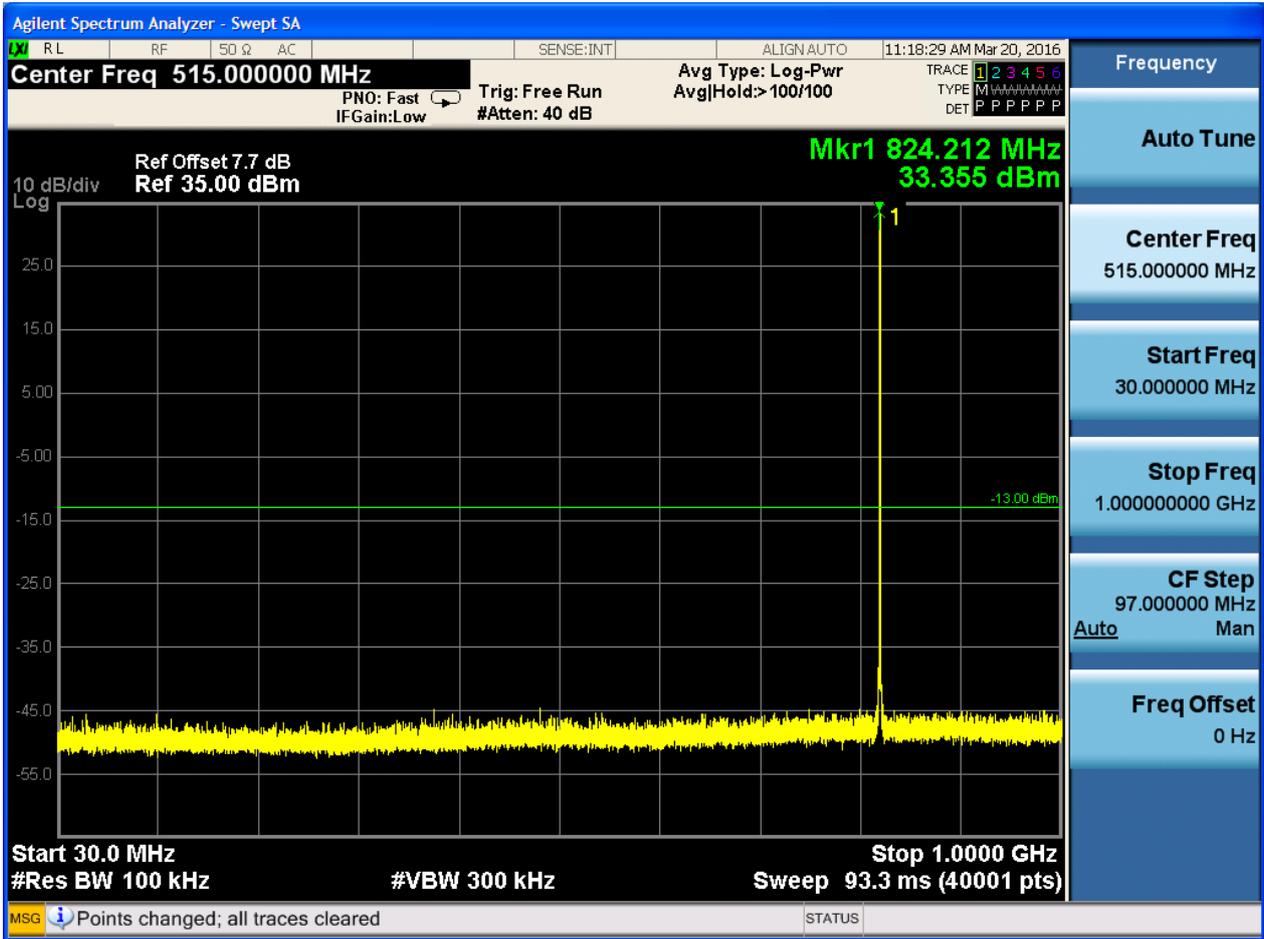
##### 6.1.1 Test Band = GSM850

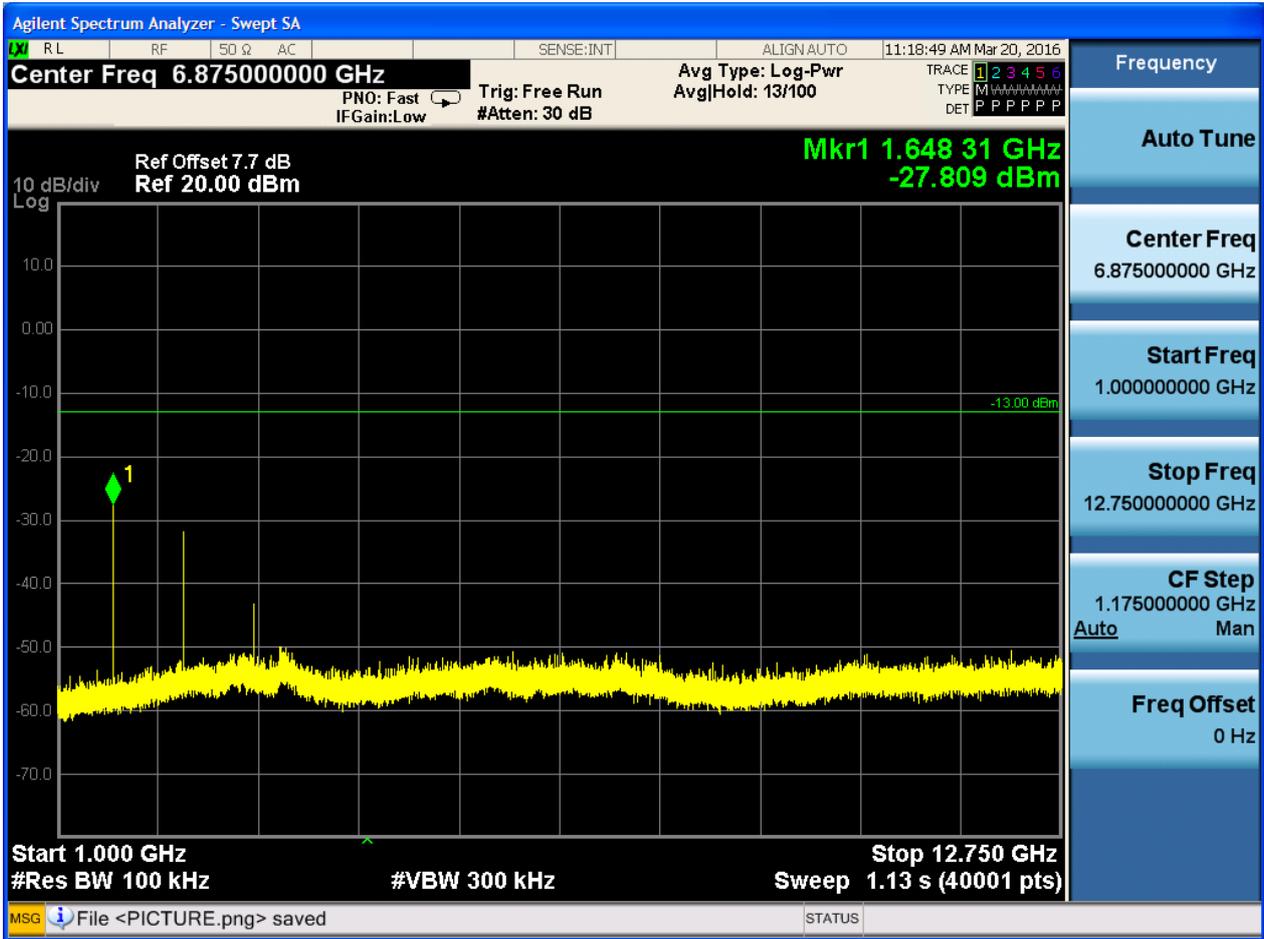
##### 6.1.1.1 Test Mode = GSM/TM1

##### 6.1.1.1.1 Test Channel = LCH

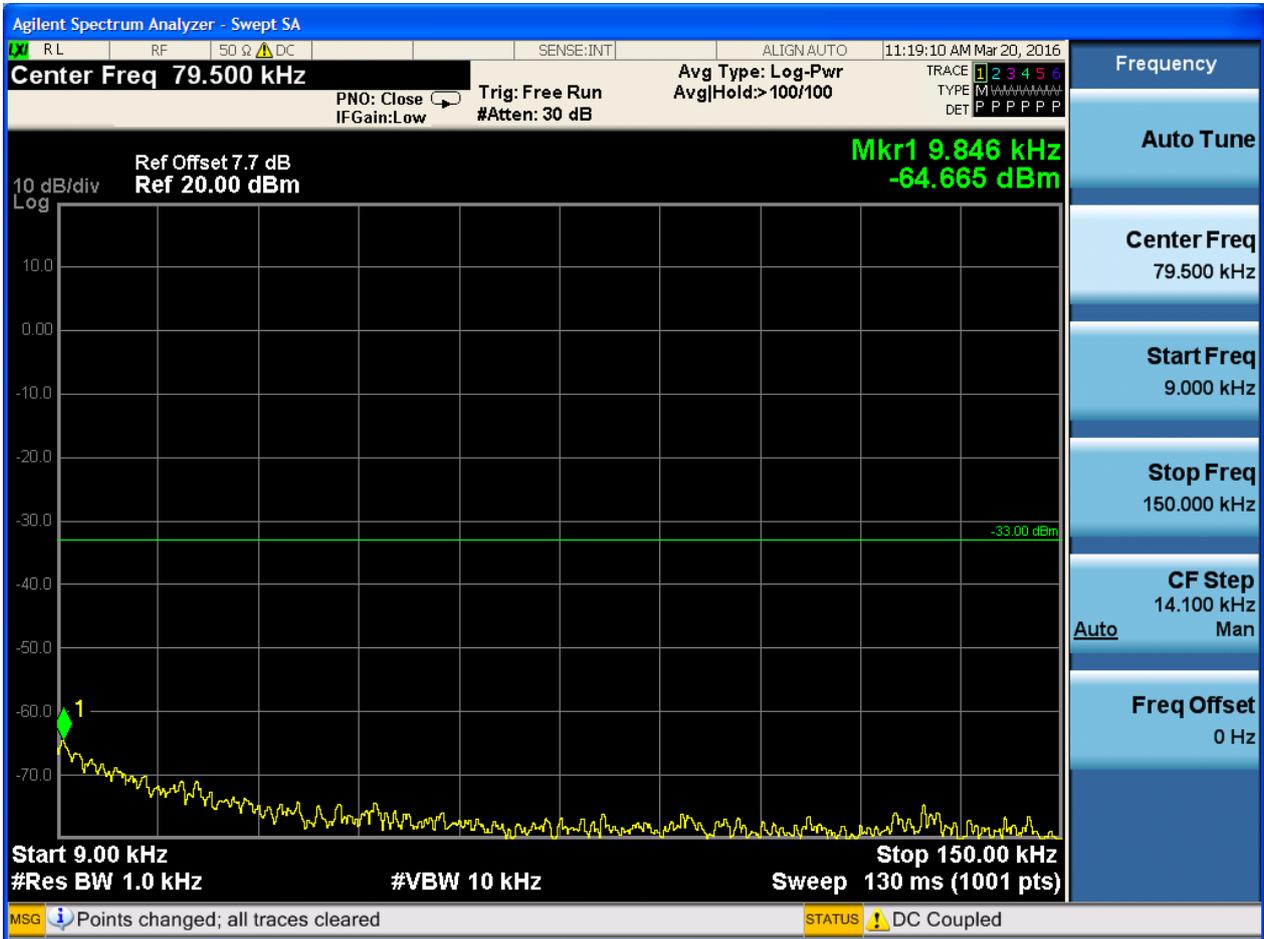


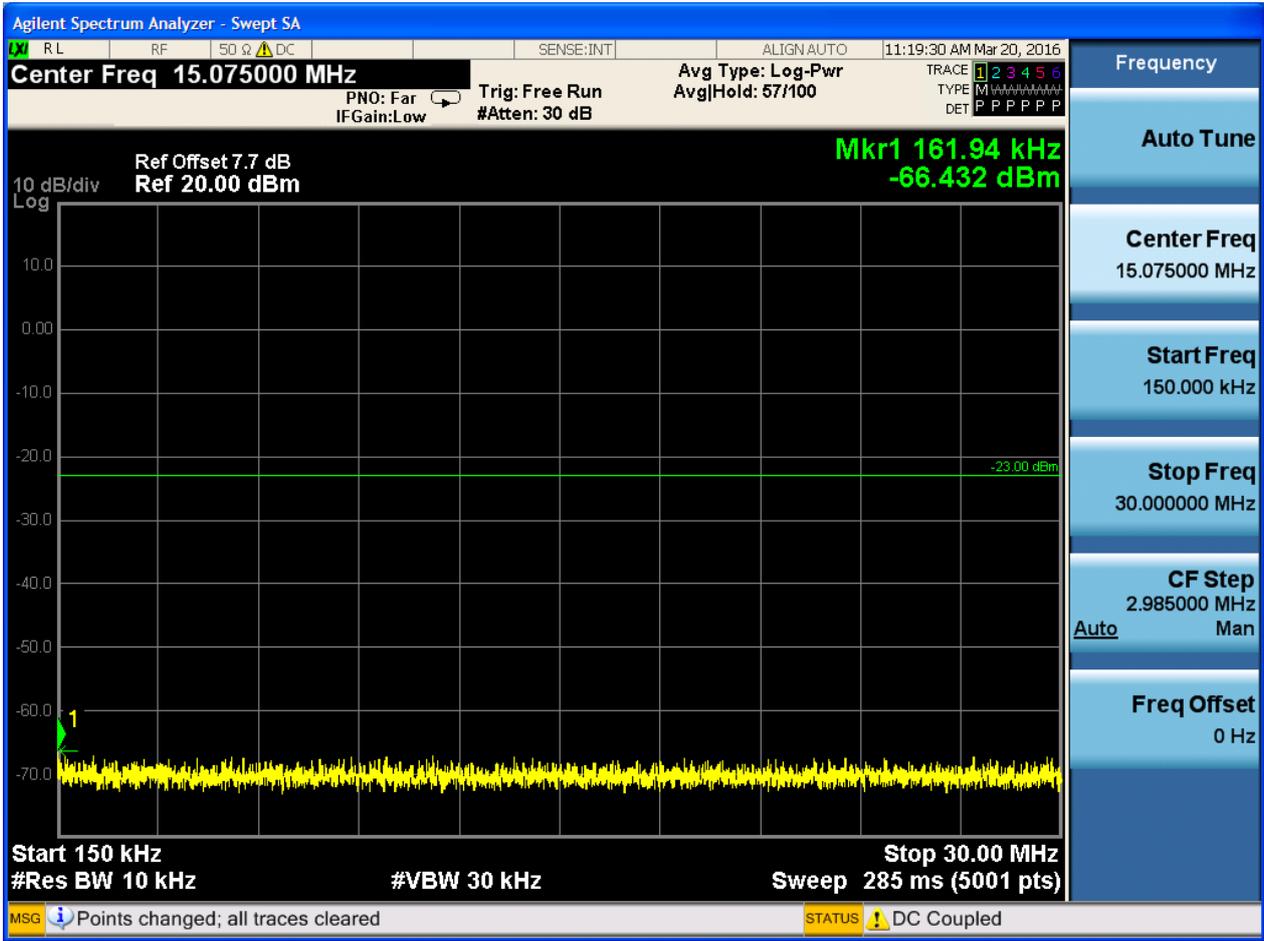


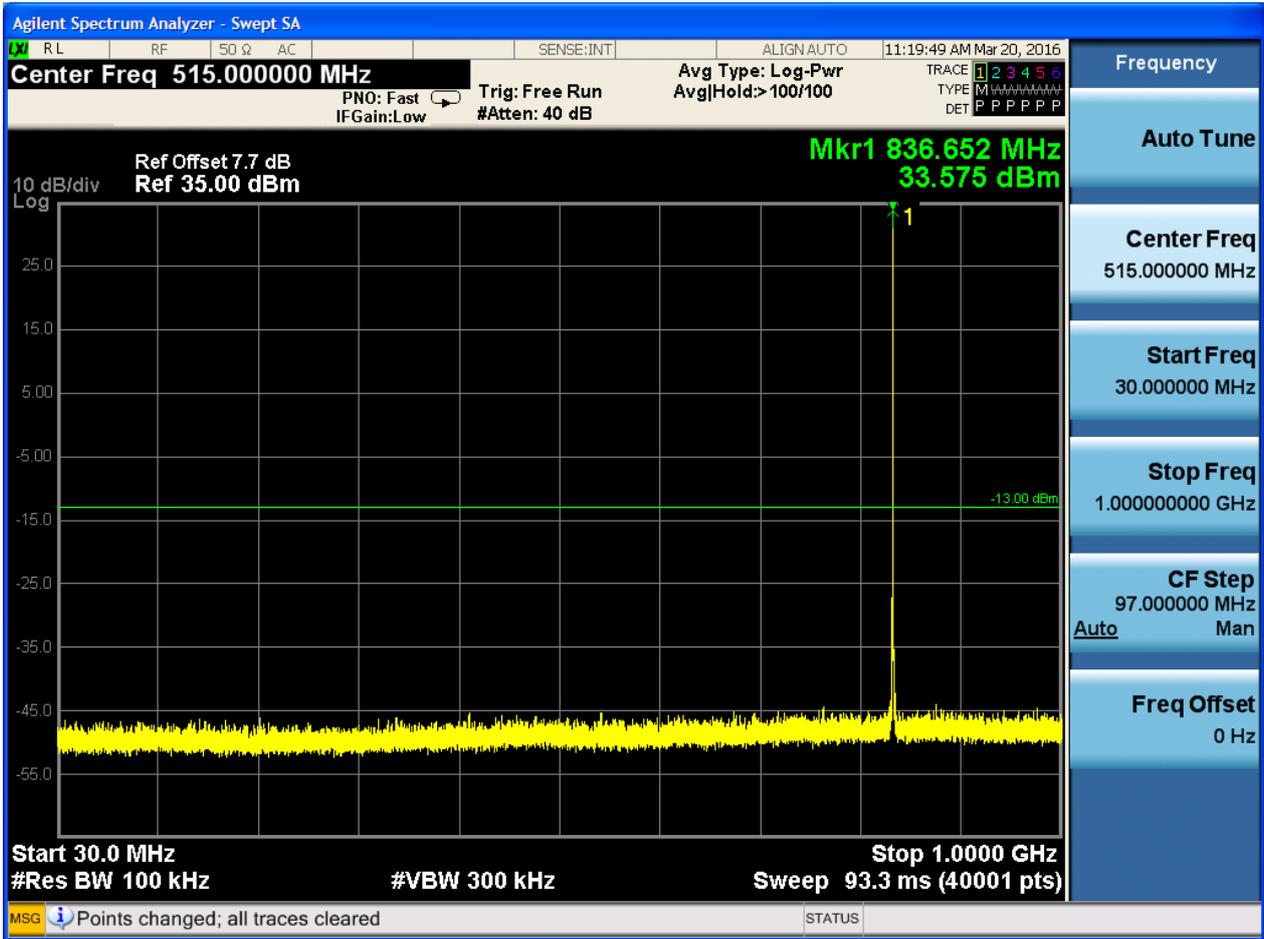


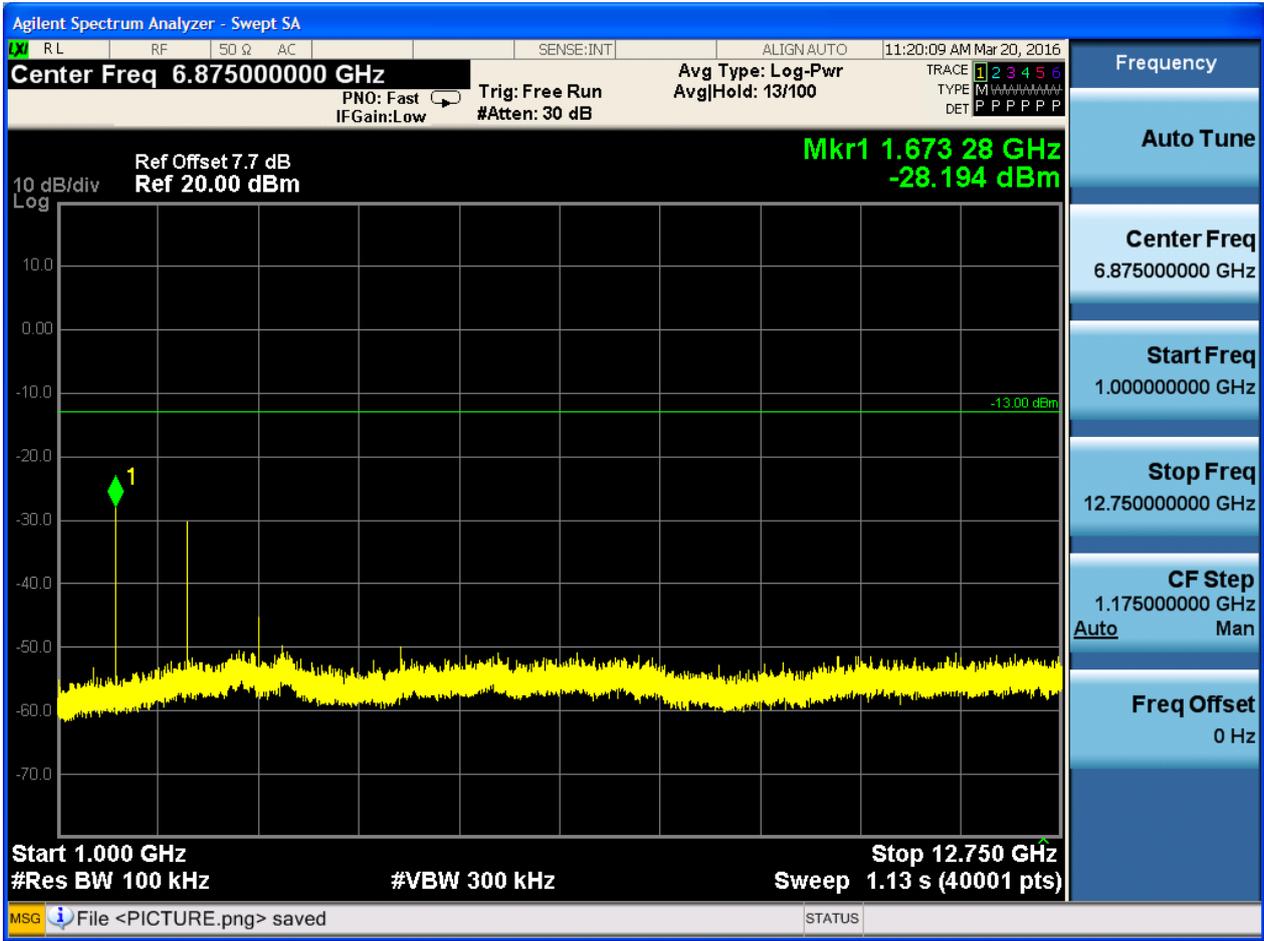


6.1.1.1.2 Test Channel = MCH



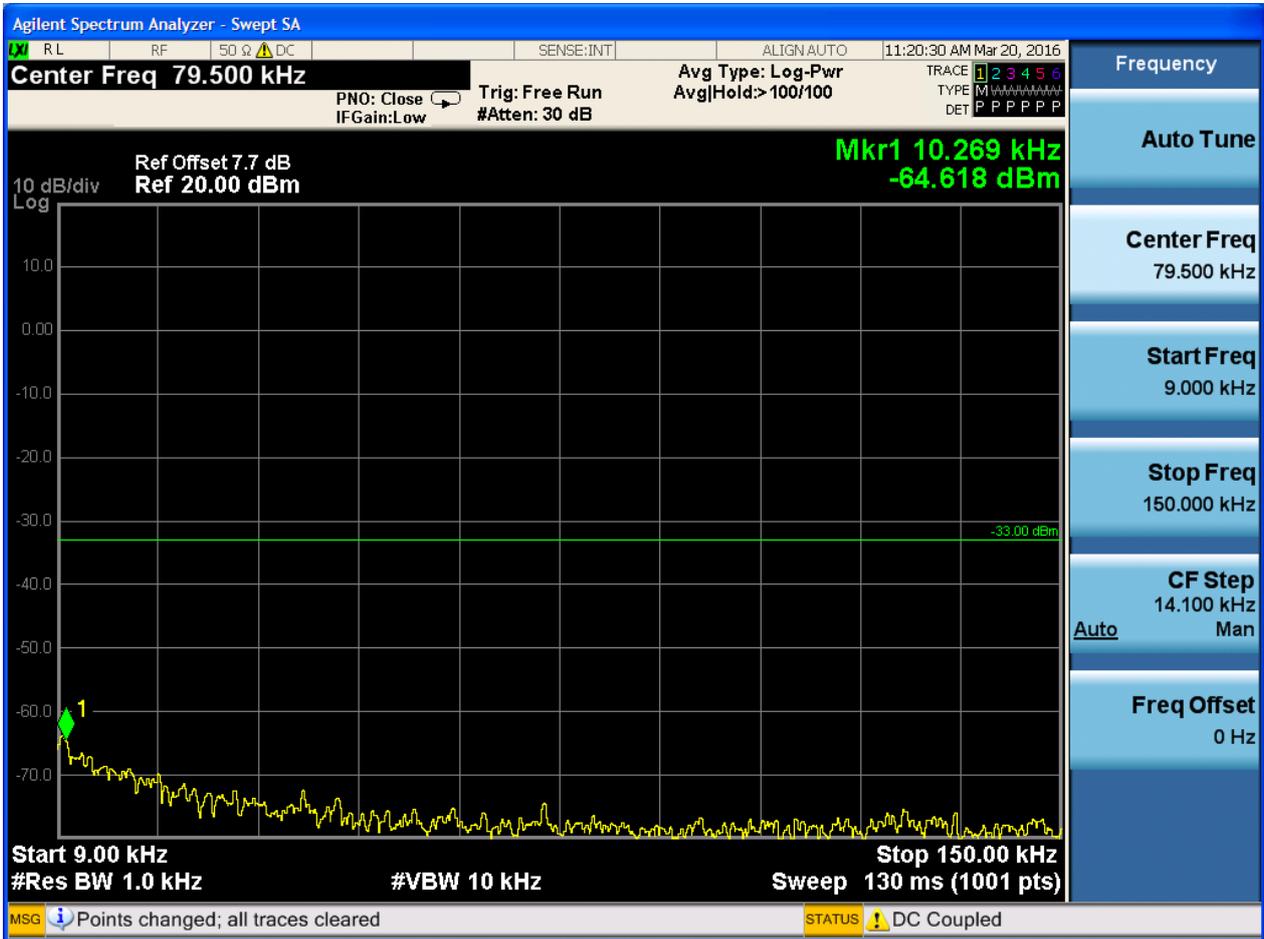


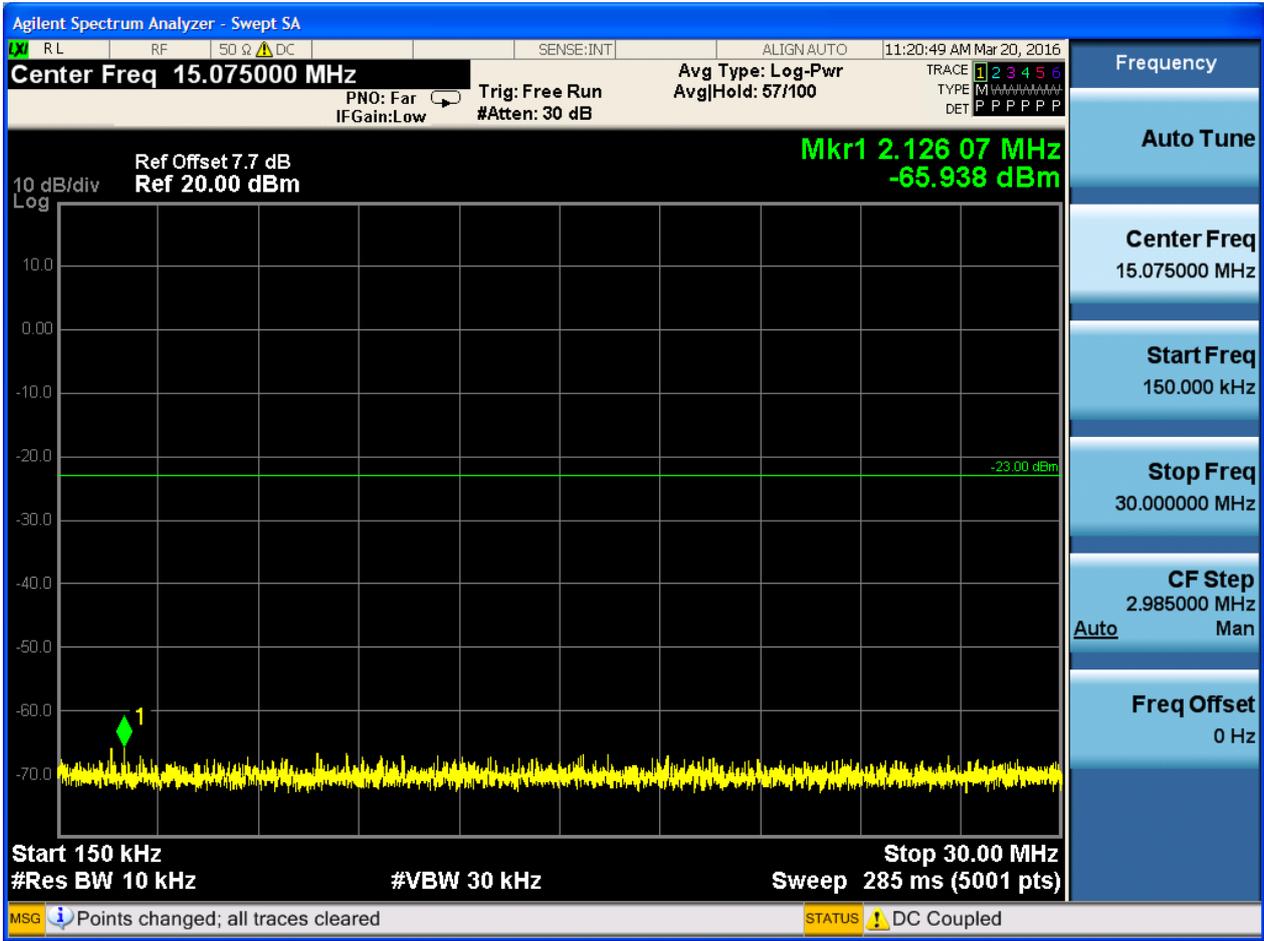


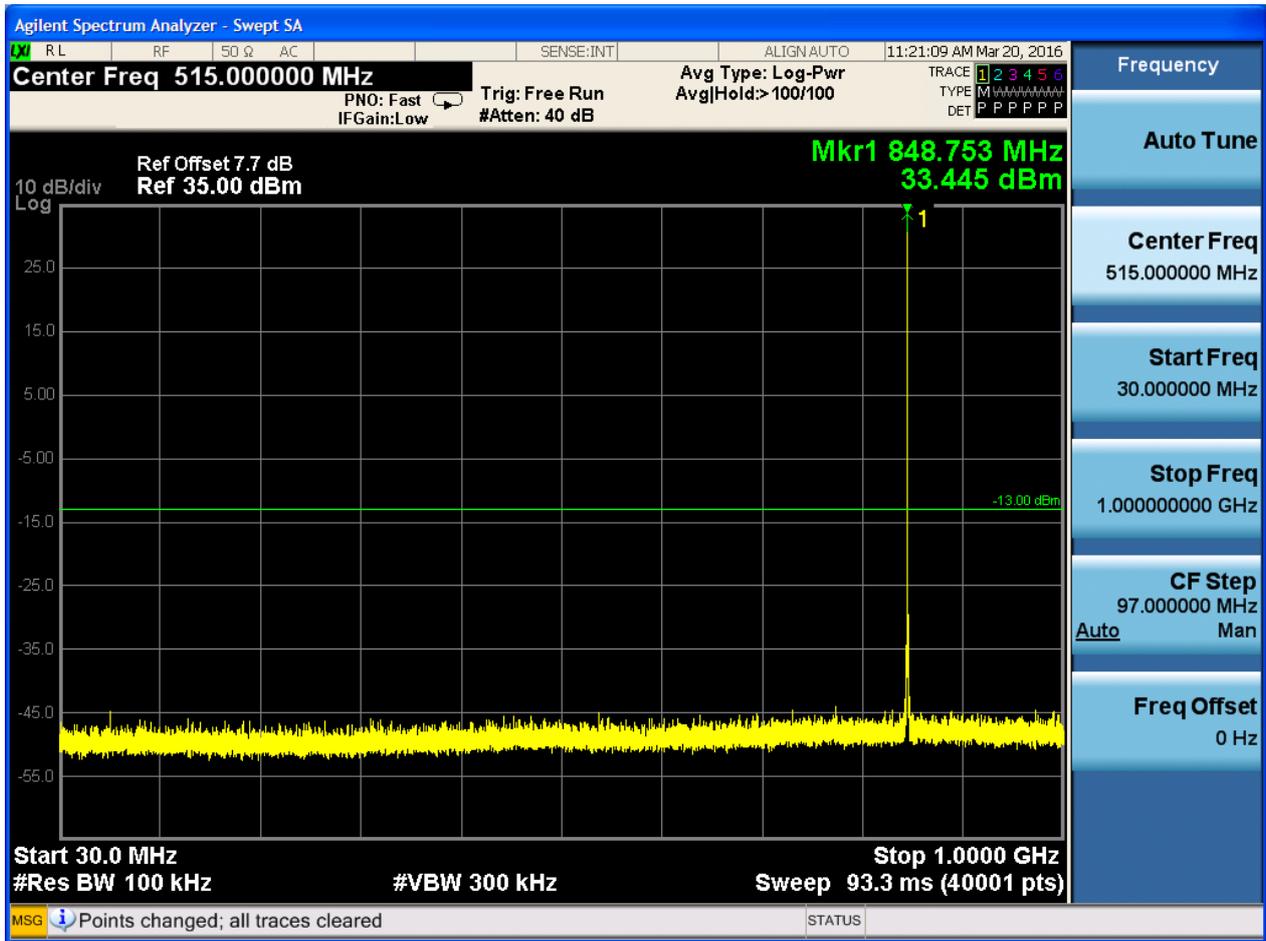


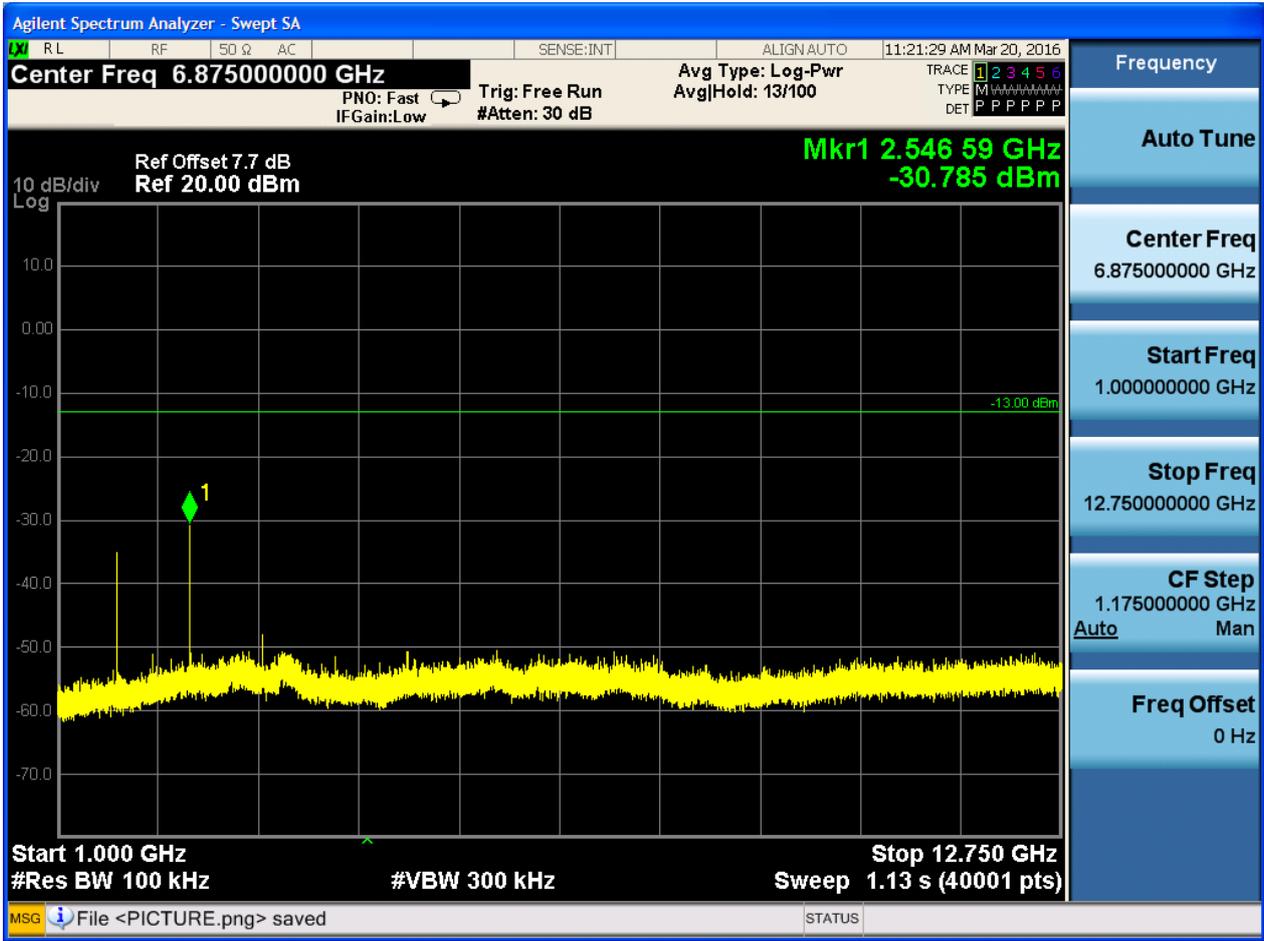


6.1.1.1.3 Test Channel = HCH



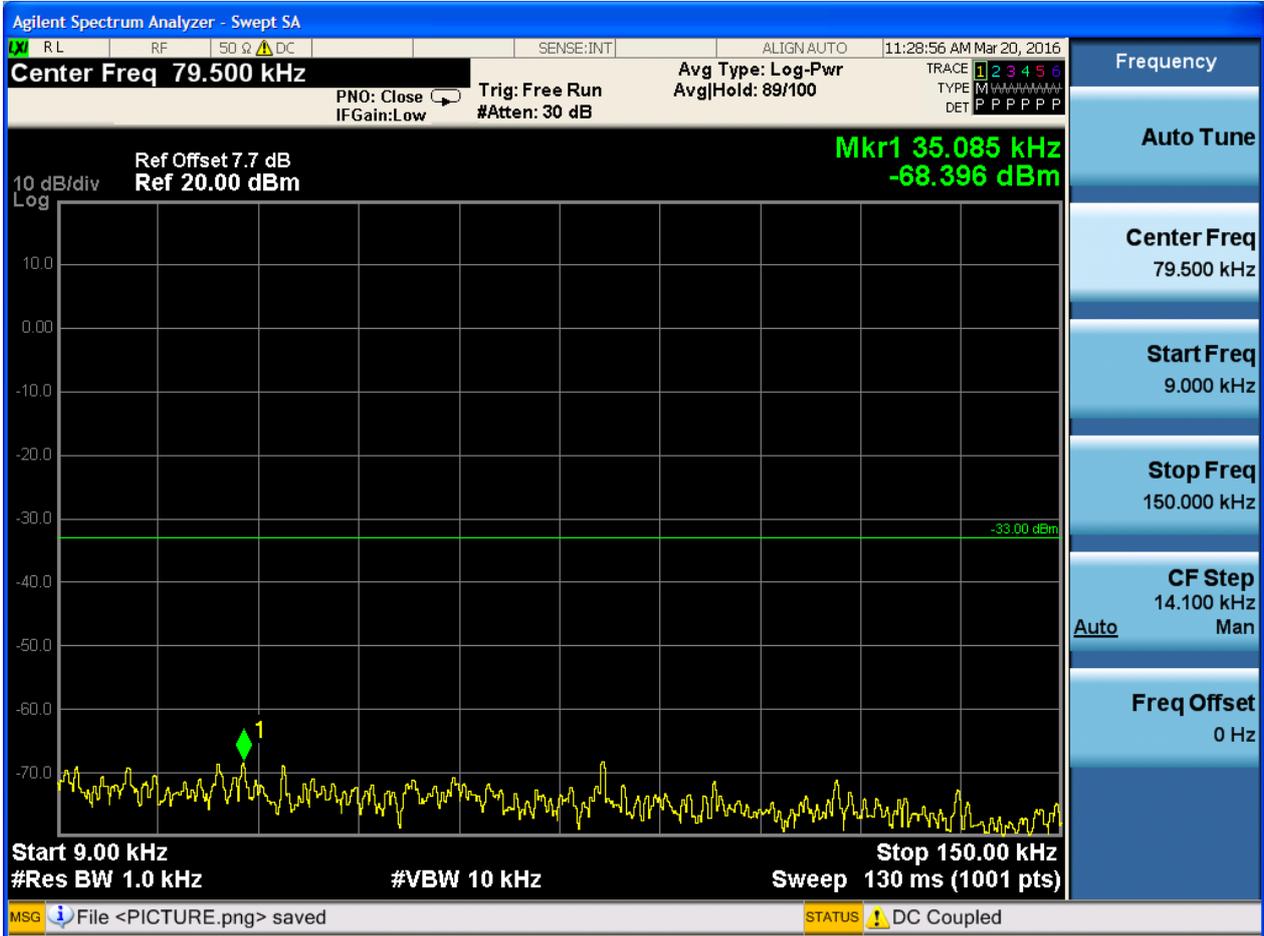


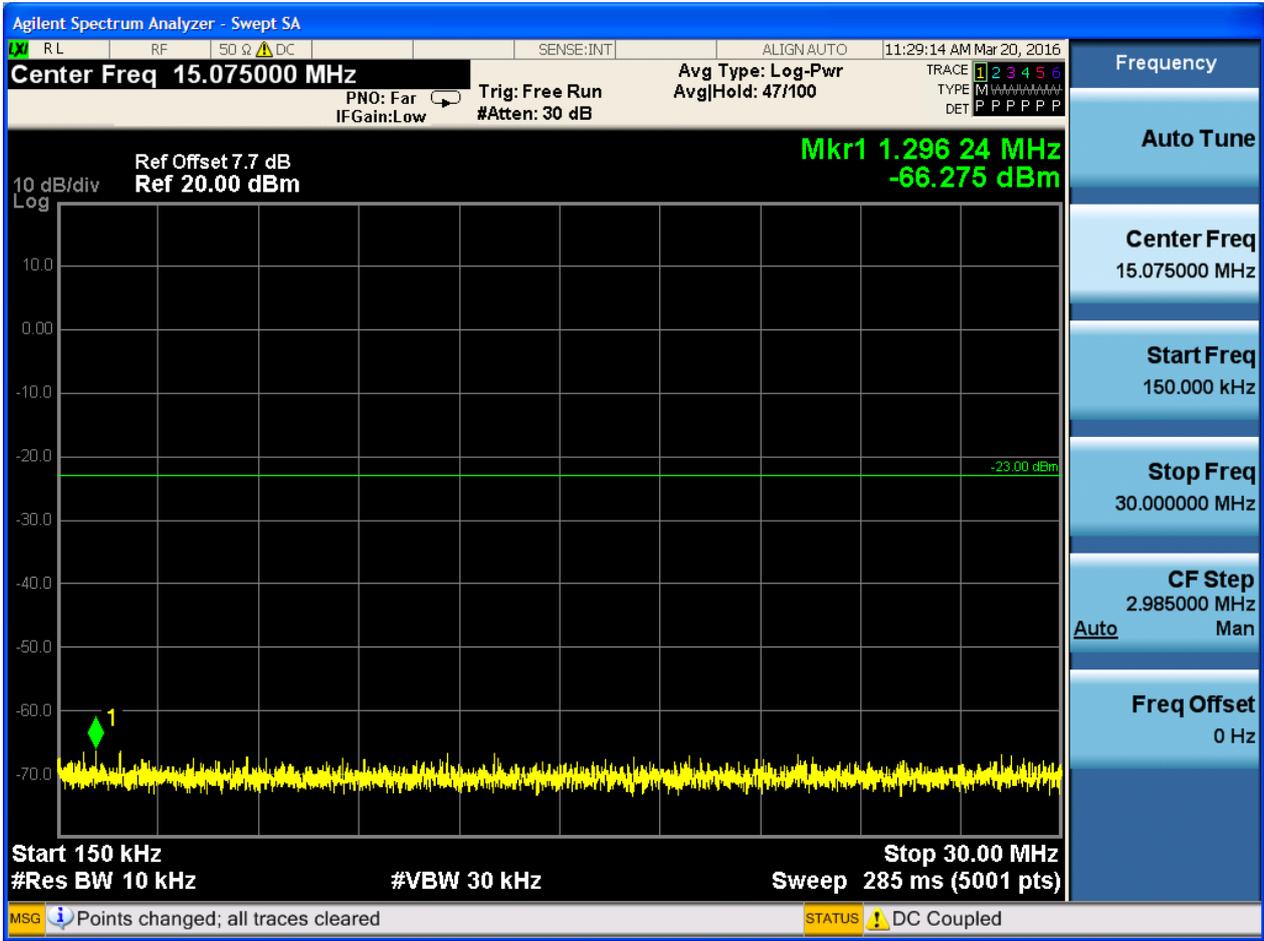


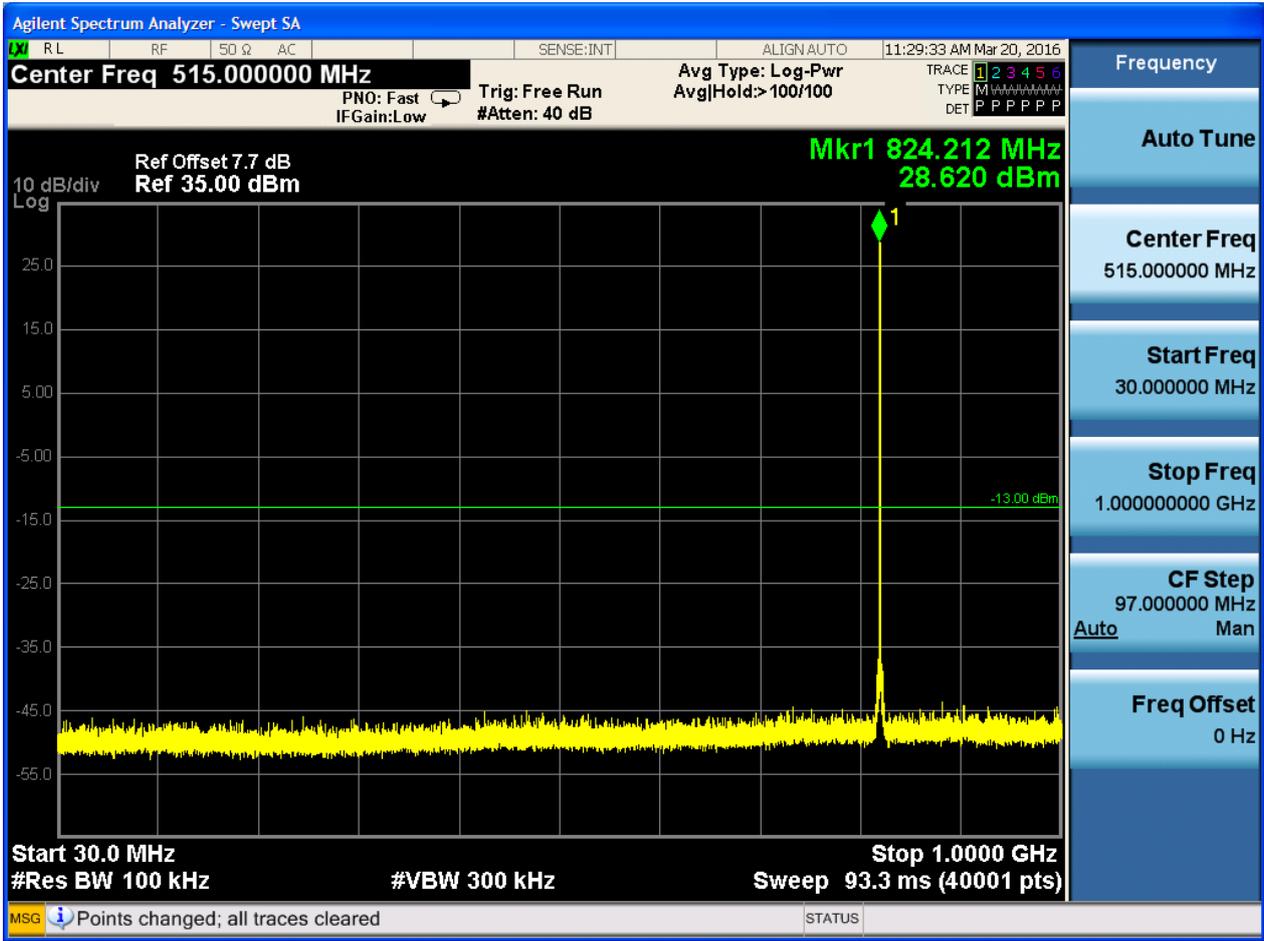


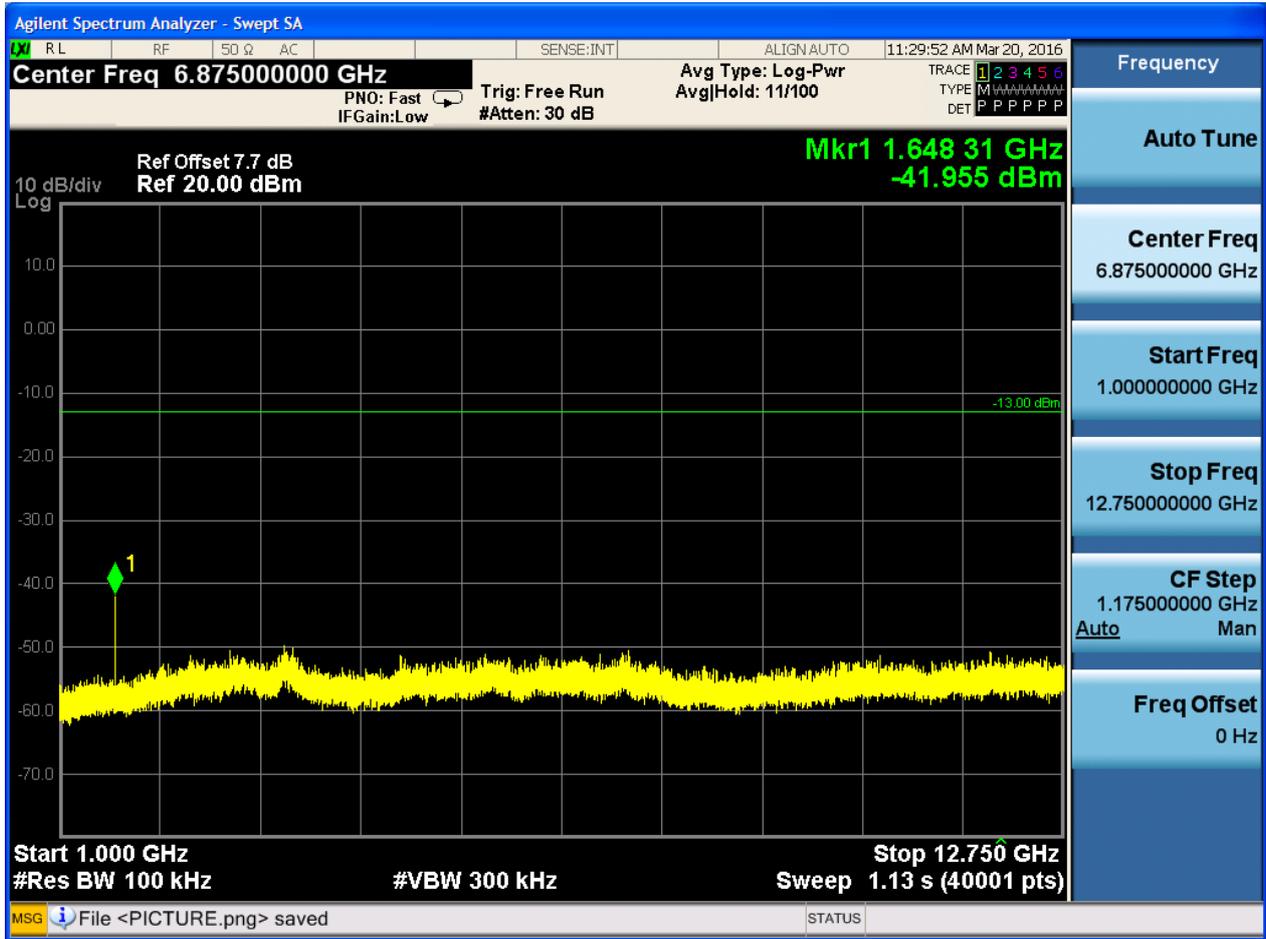
6.1.1.2 Test Mode = GSM/TM2

6.1.1.2.1 Test Channel = LCH

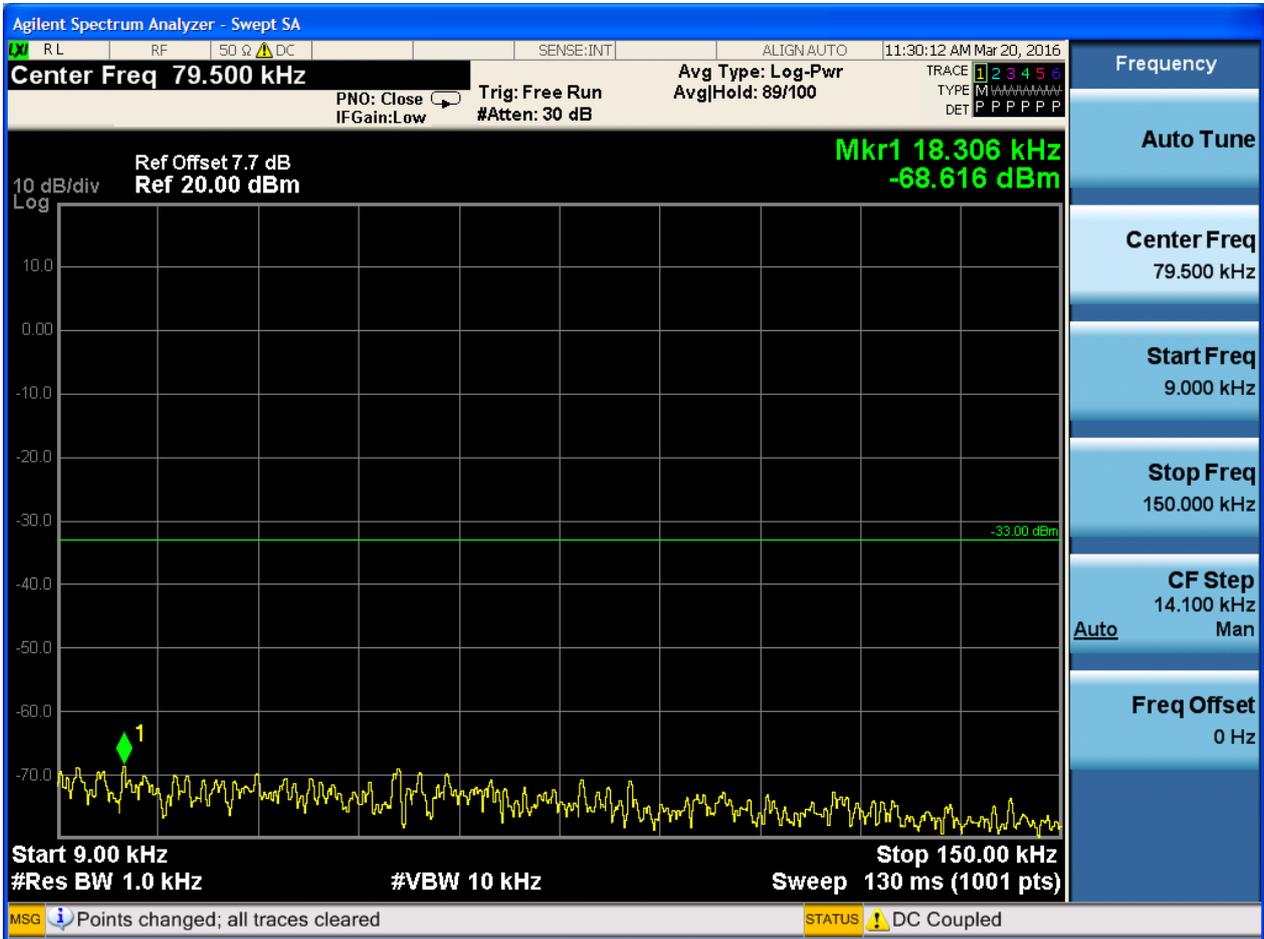


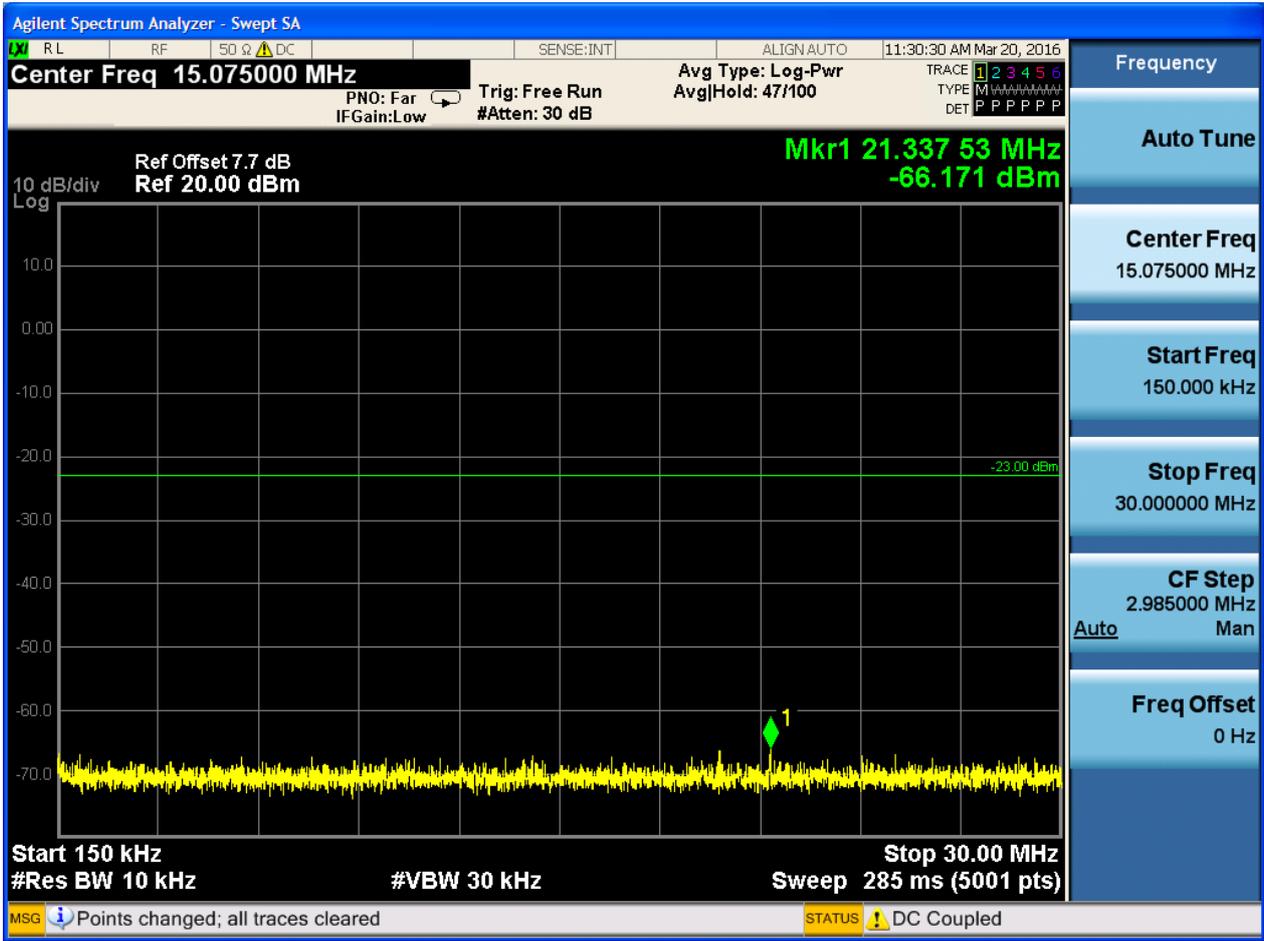


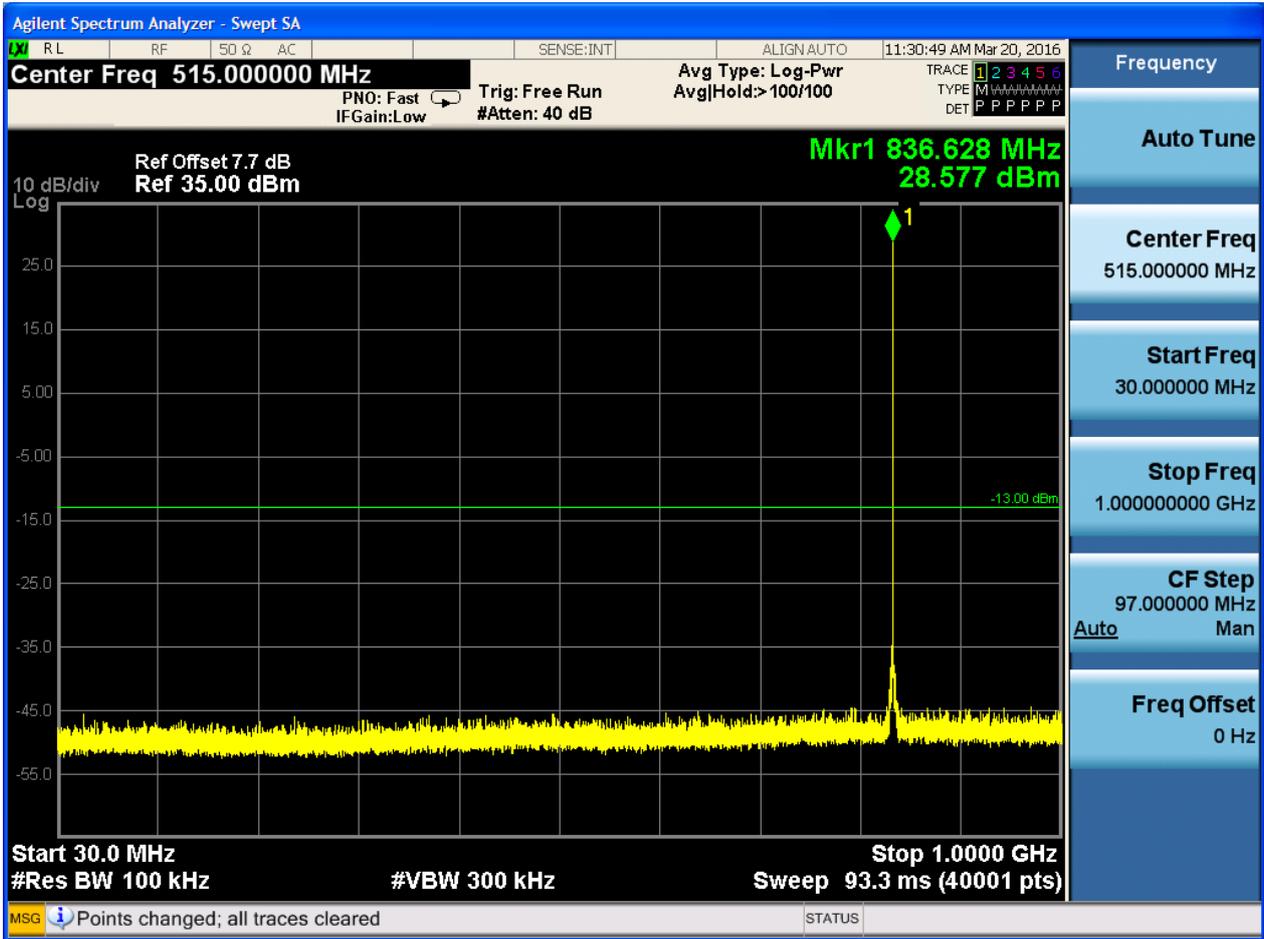


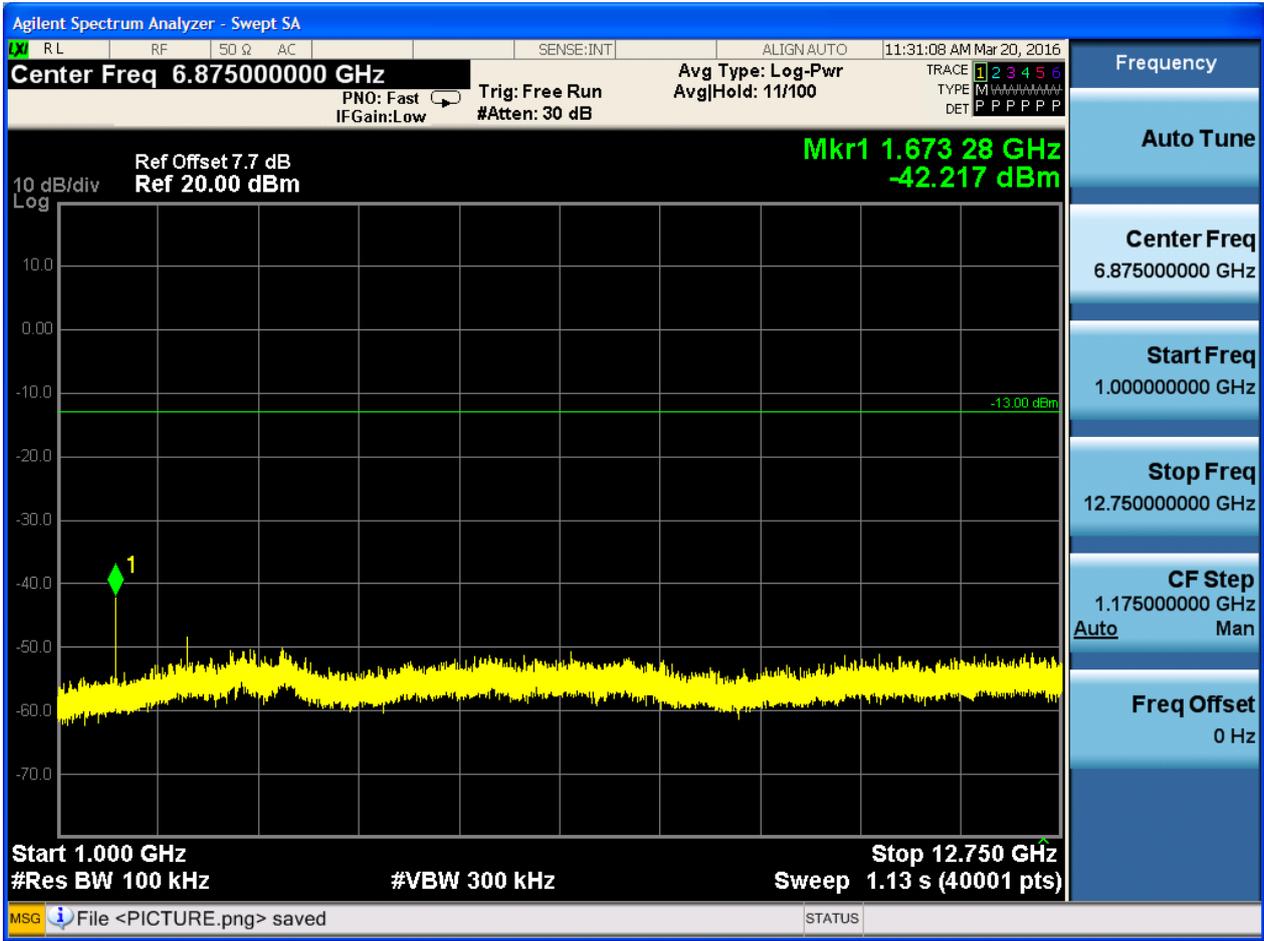


6.1.1.2.2 Test Channel = MCH

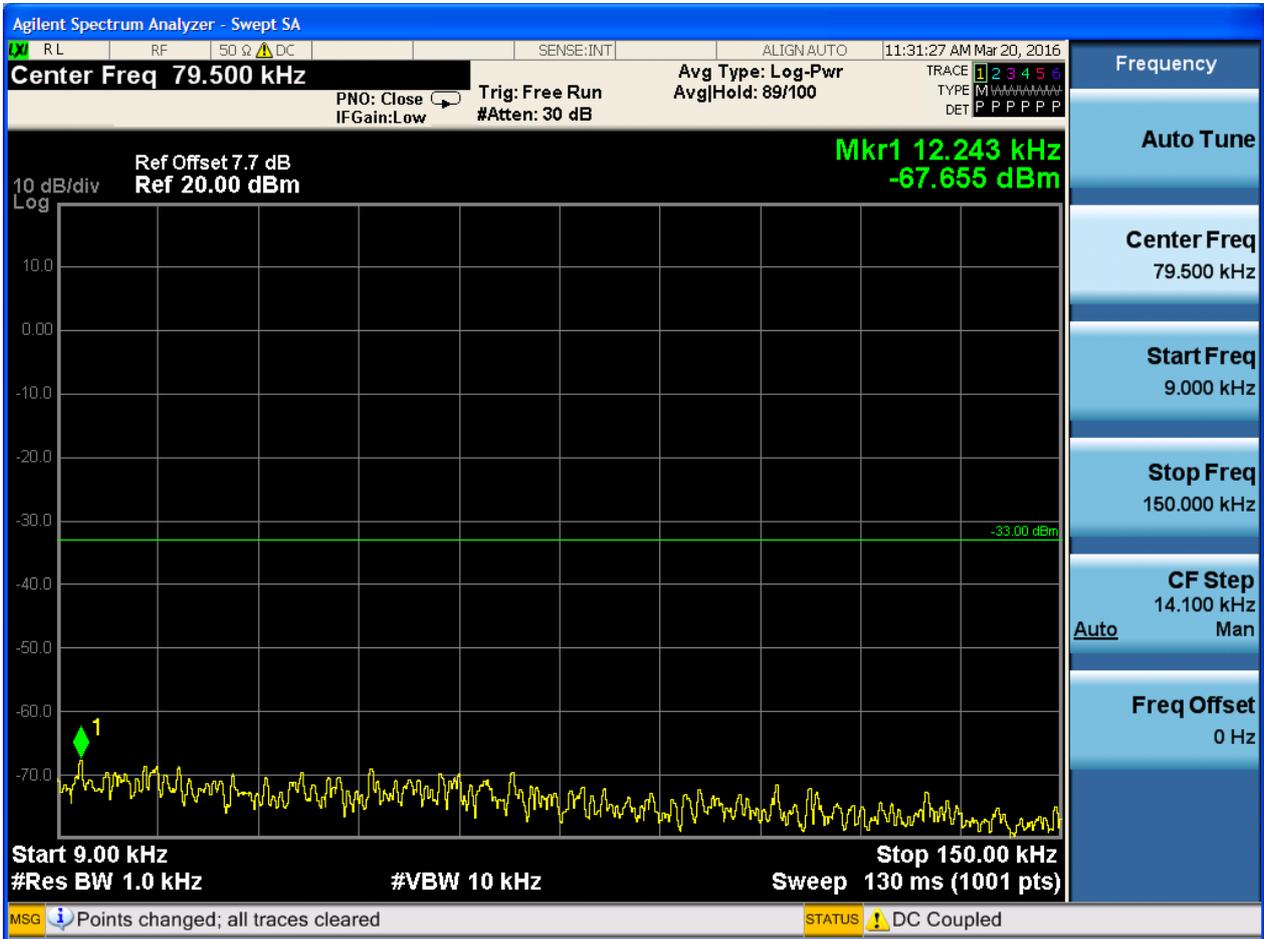


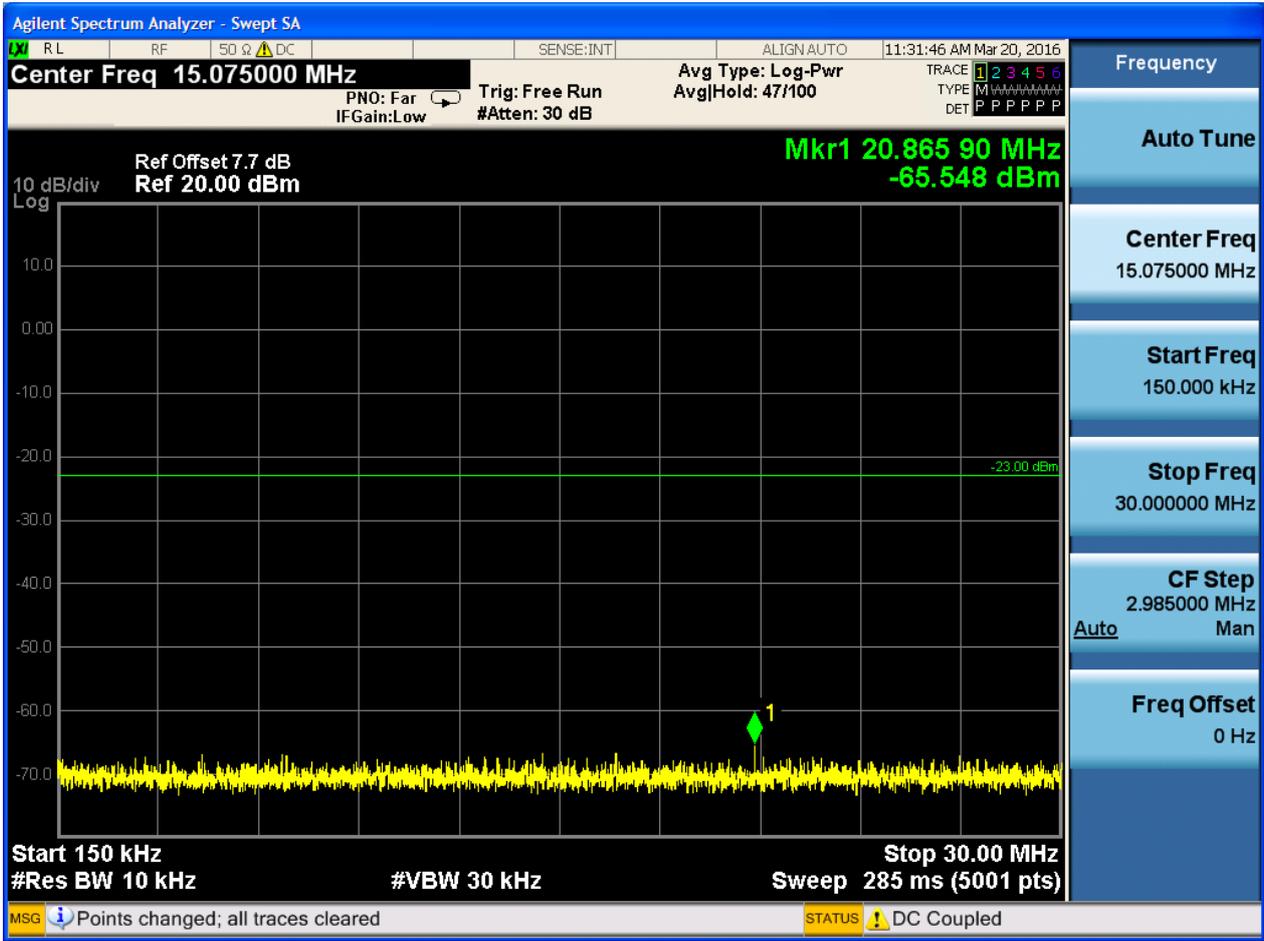


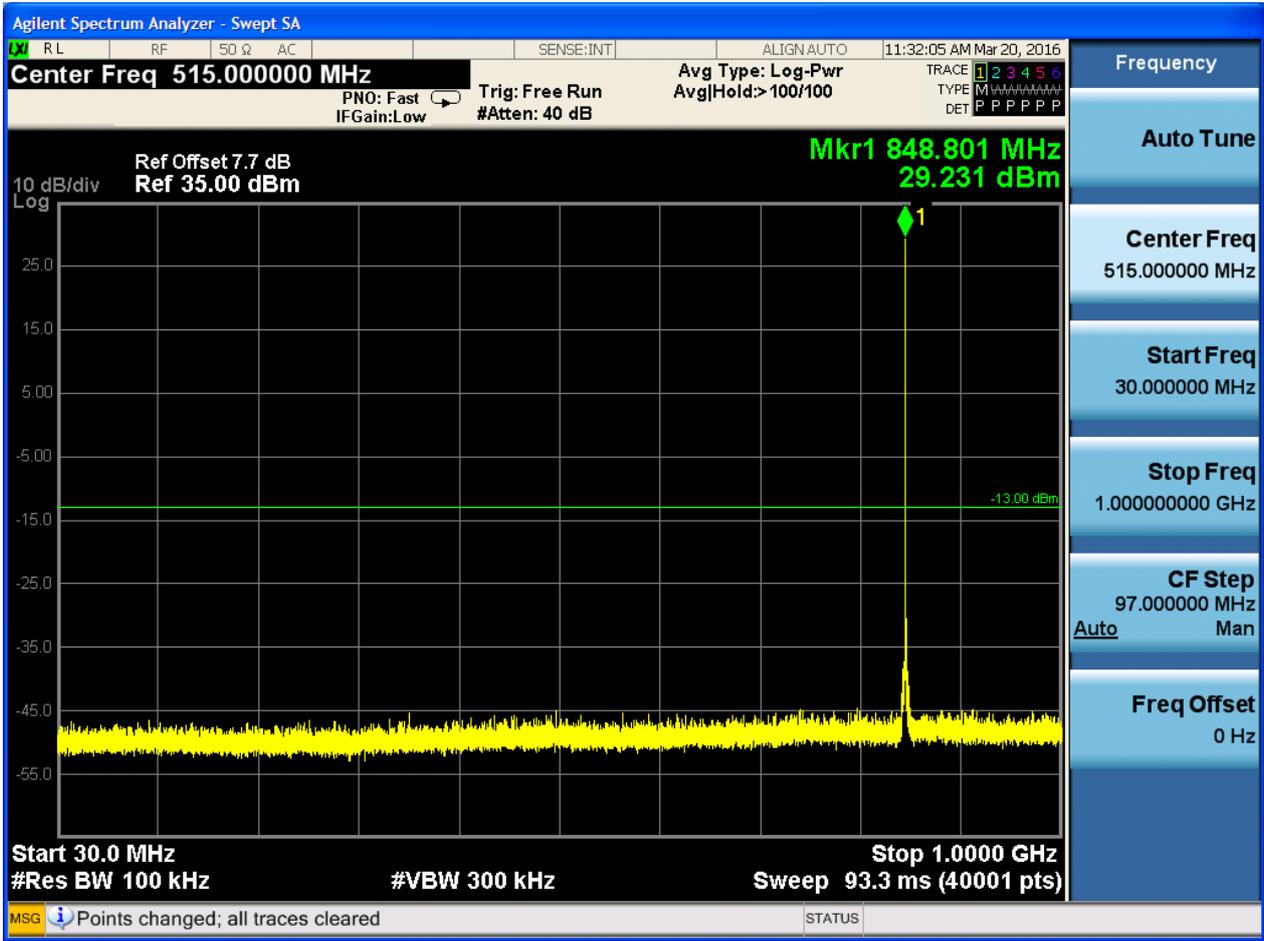


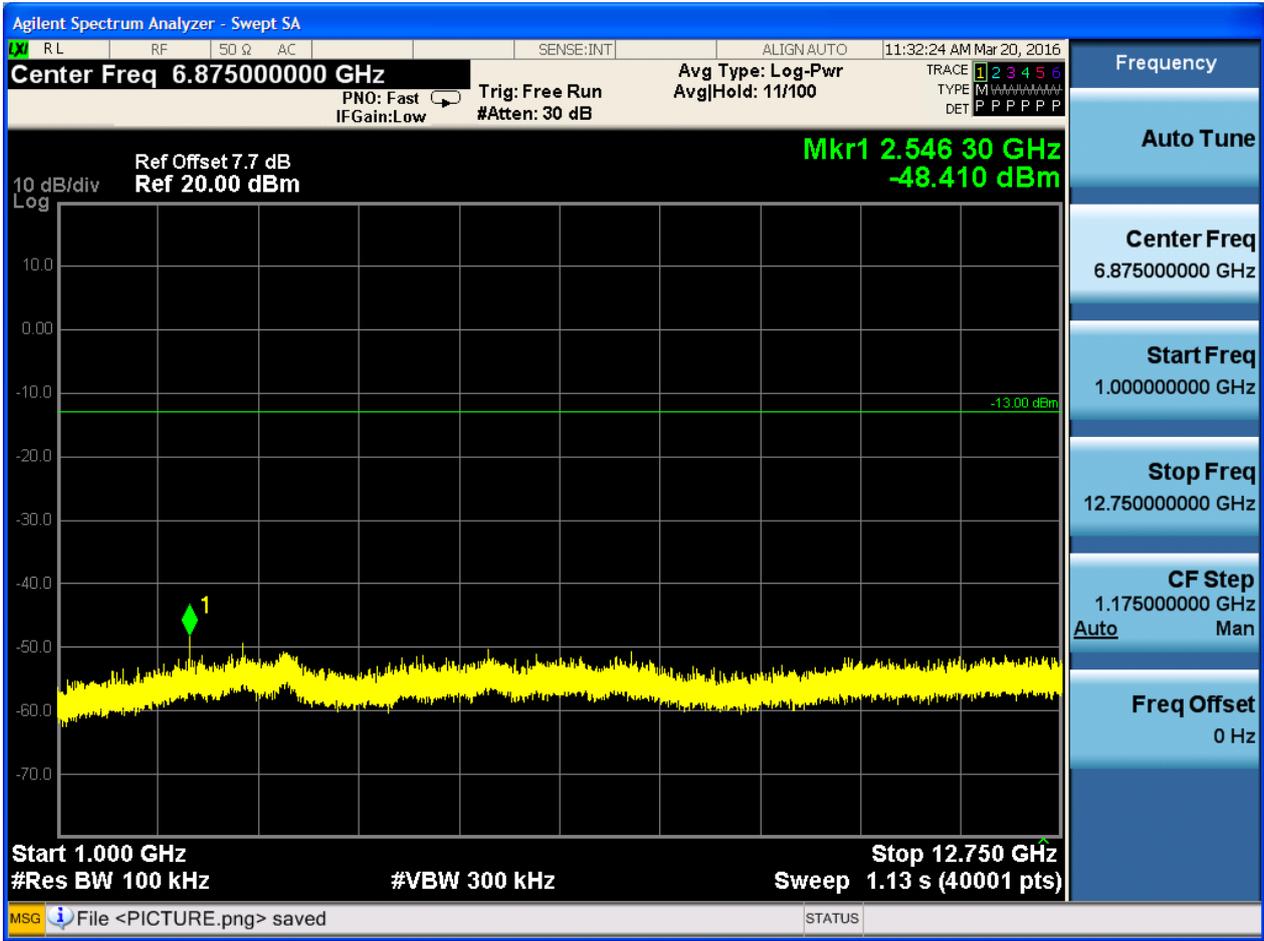


6.1.1.2.3 Test Channel = HCH







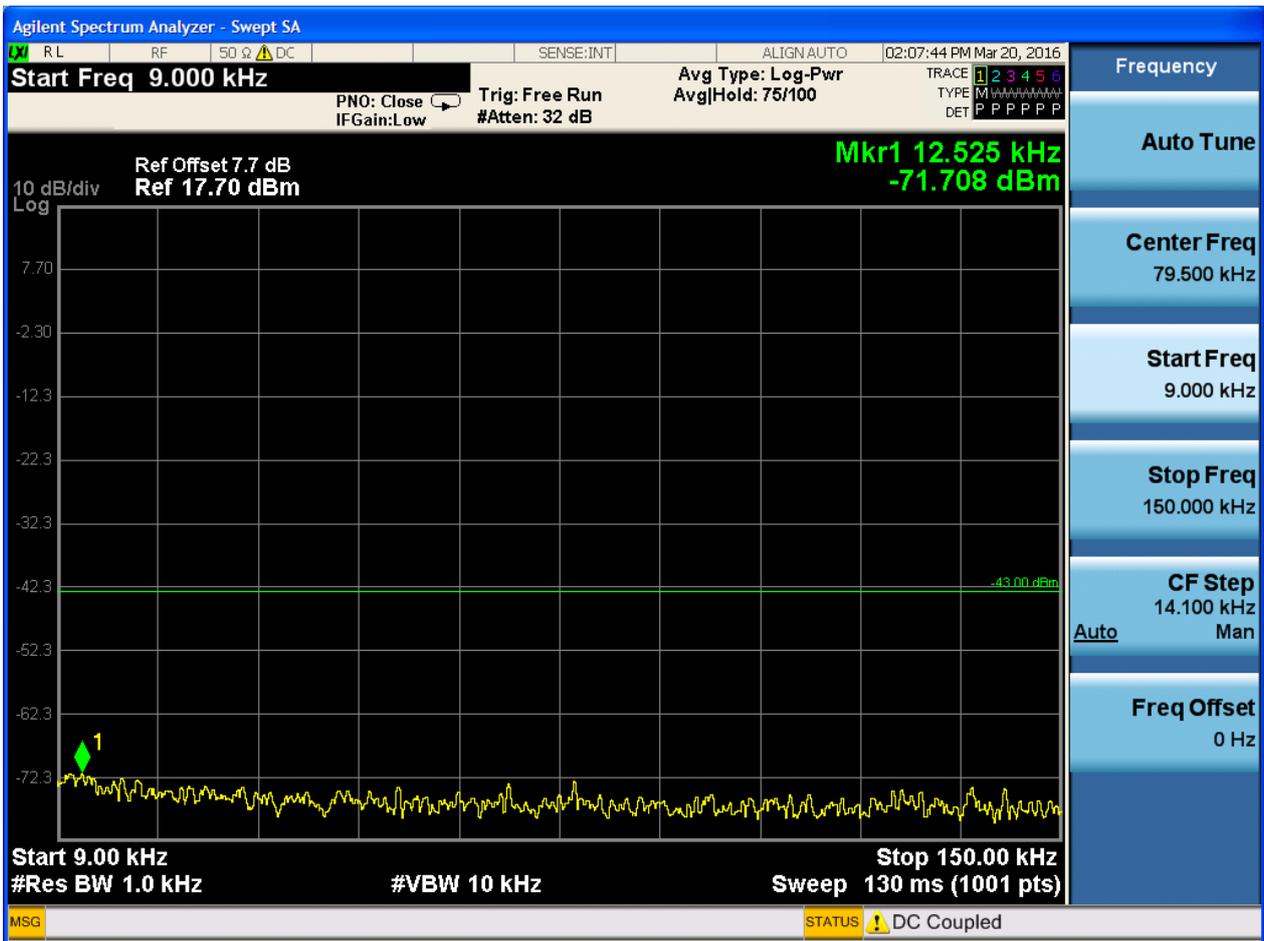


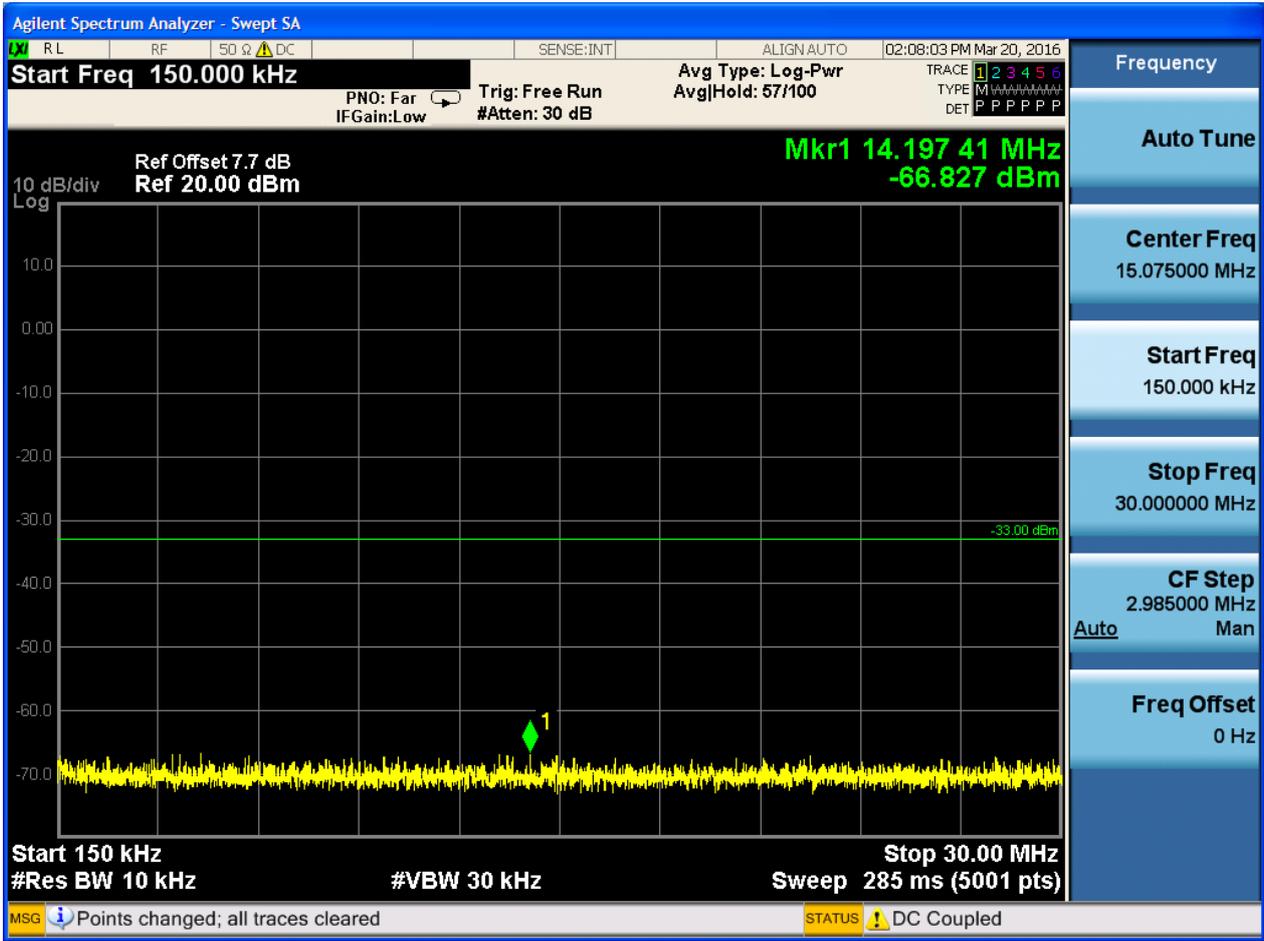


6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

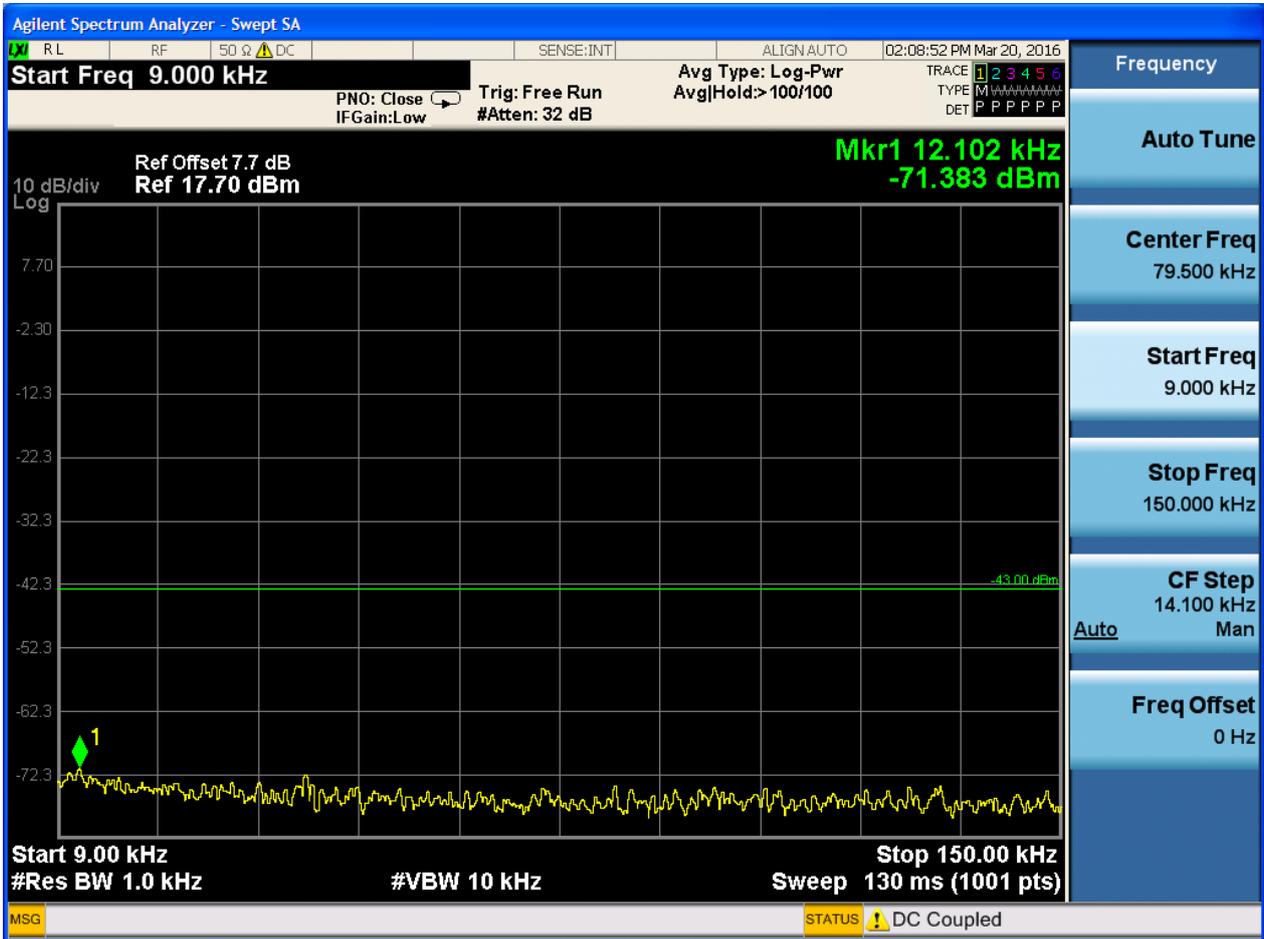
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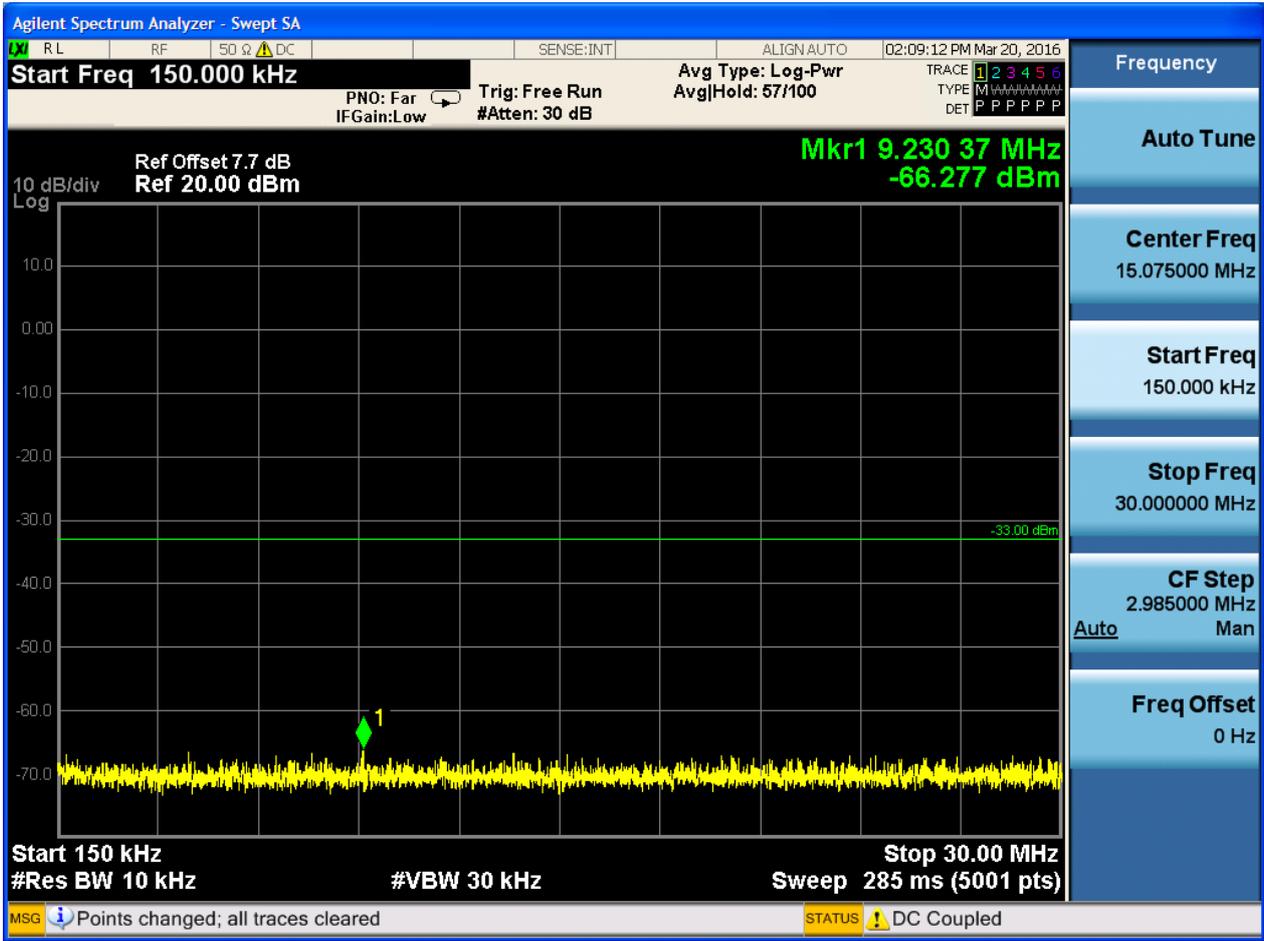


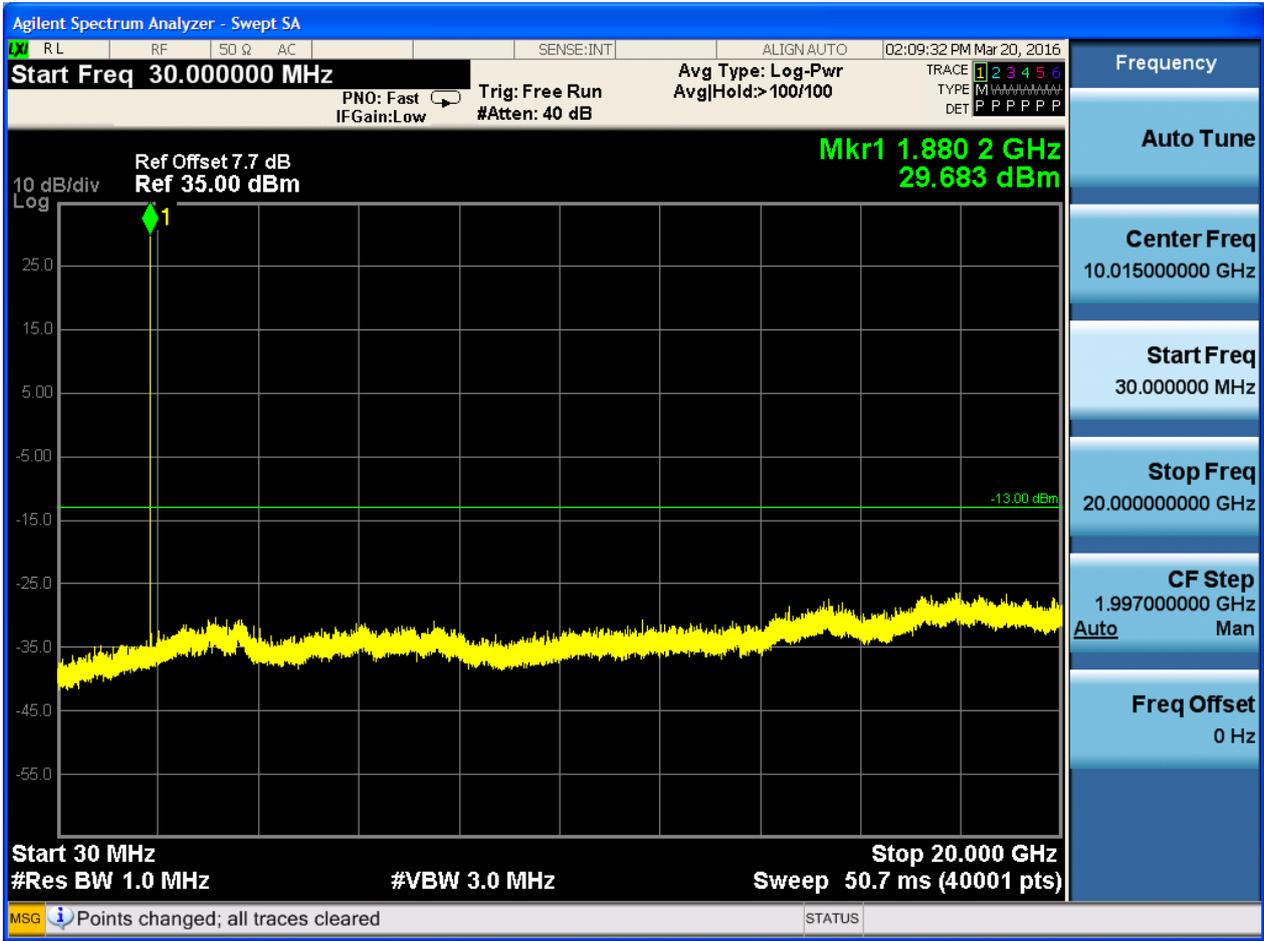




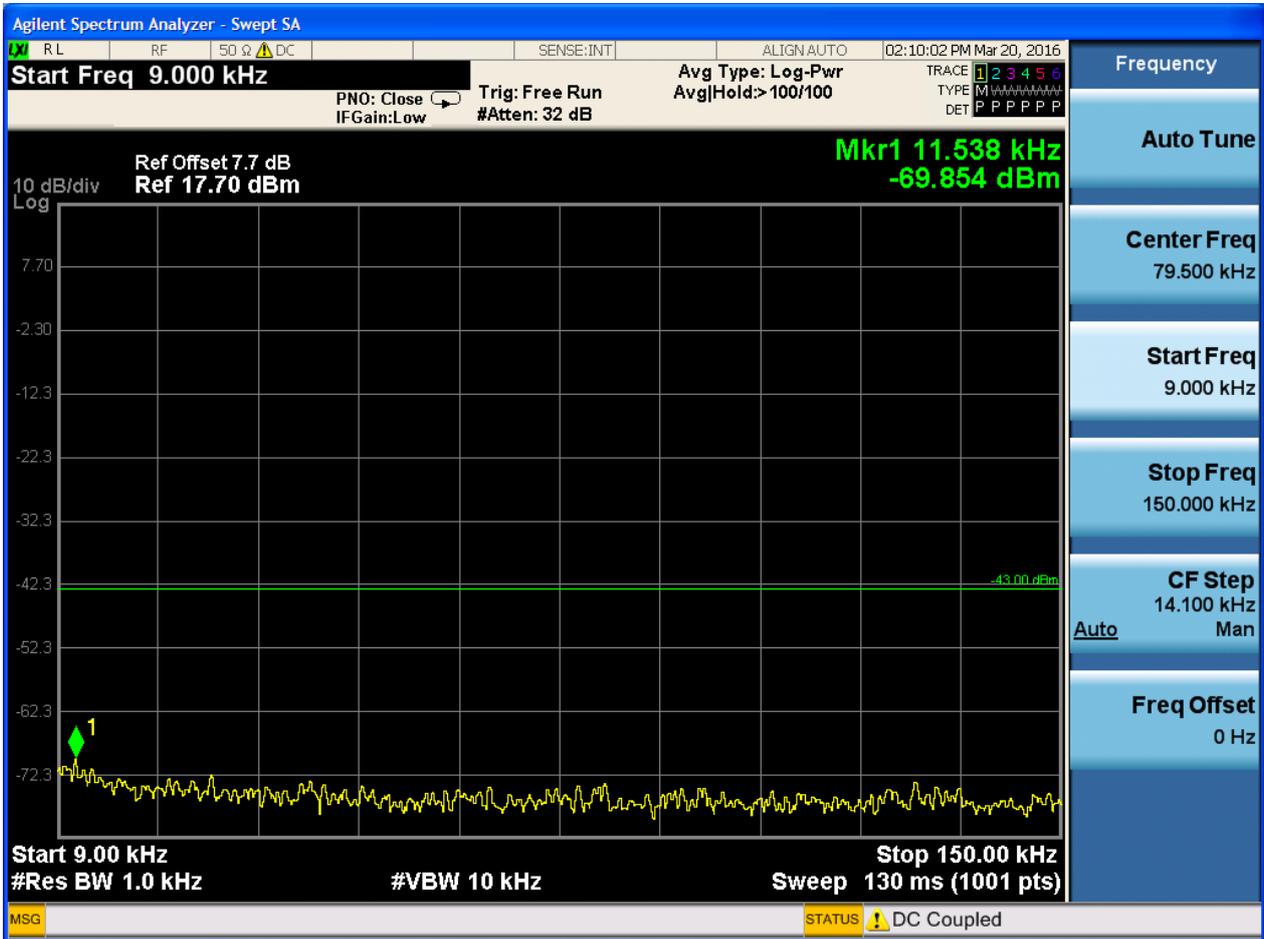
6.1.2.1.2 Test Channel = MCH



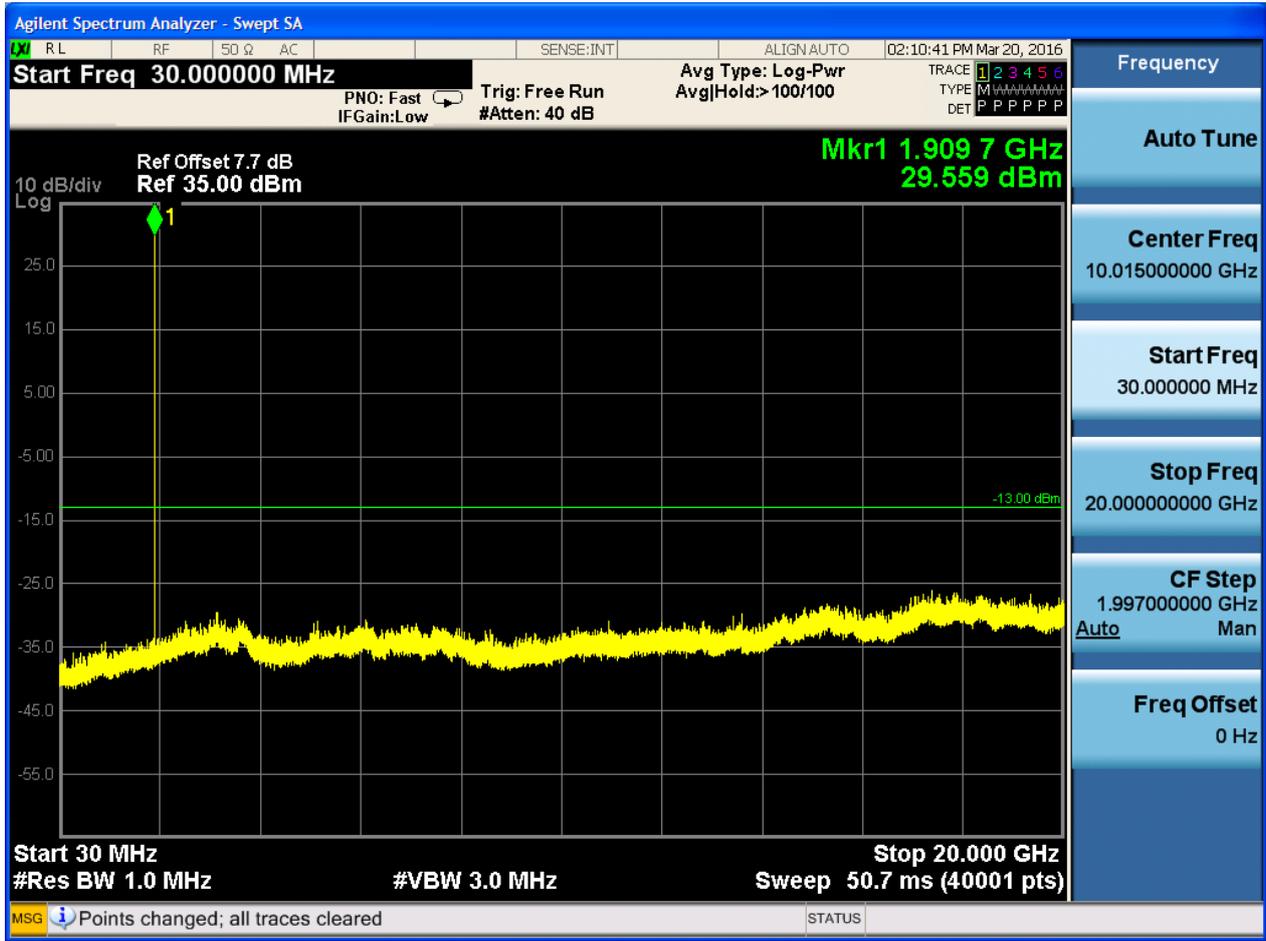




6.1.2.1.3 Test Channel = HCH

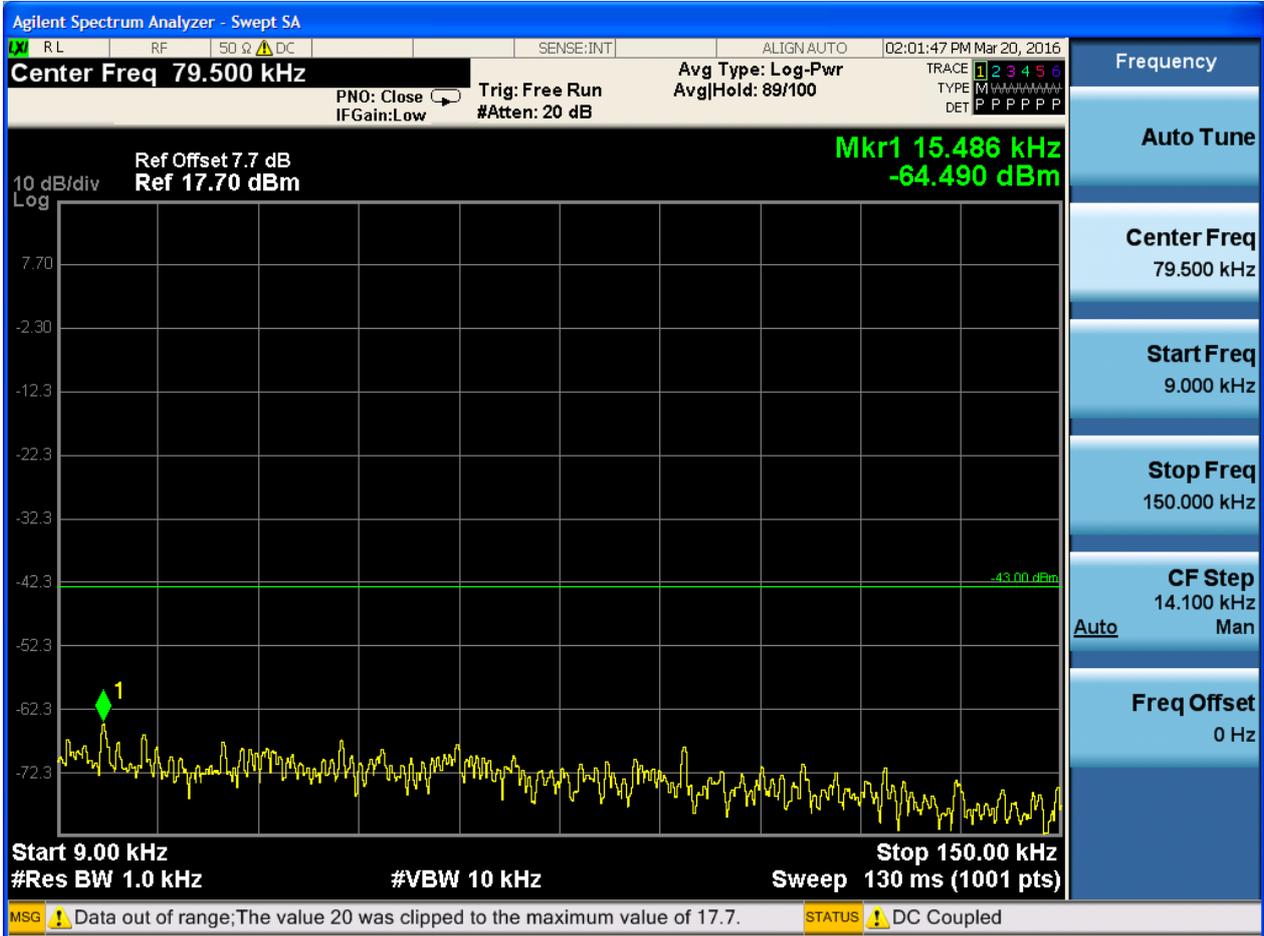


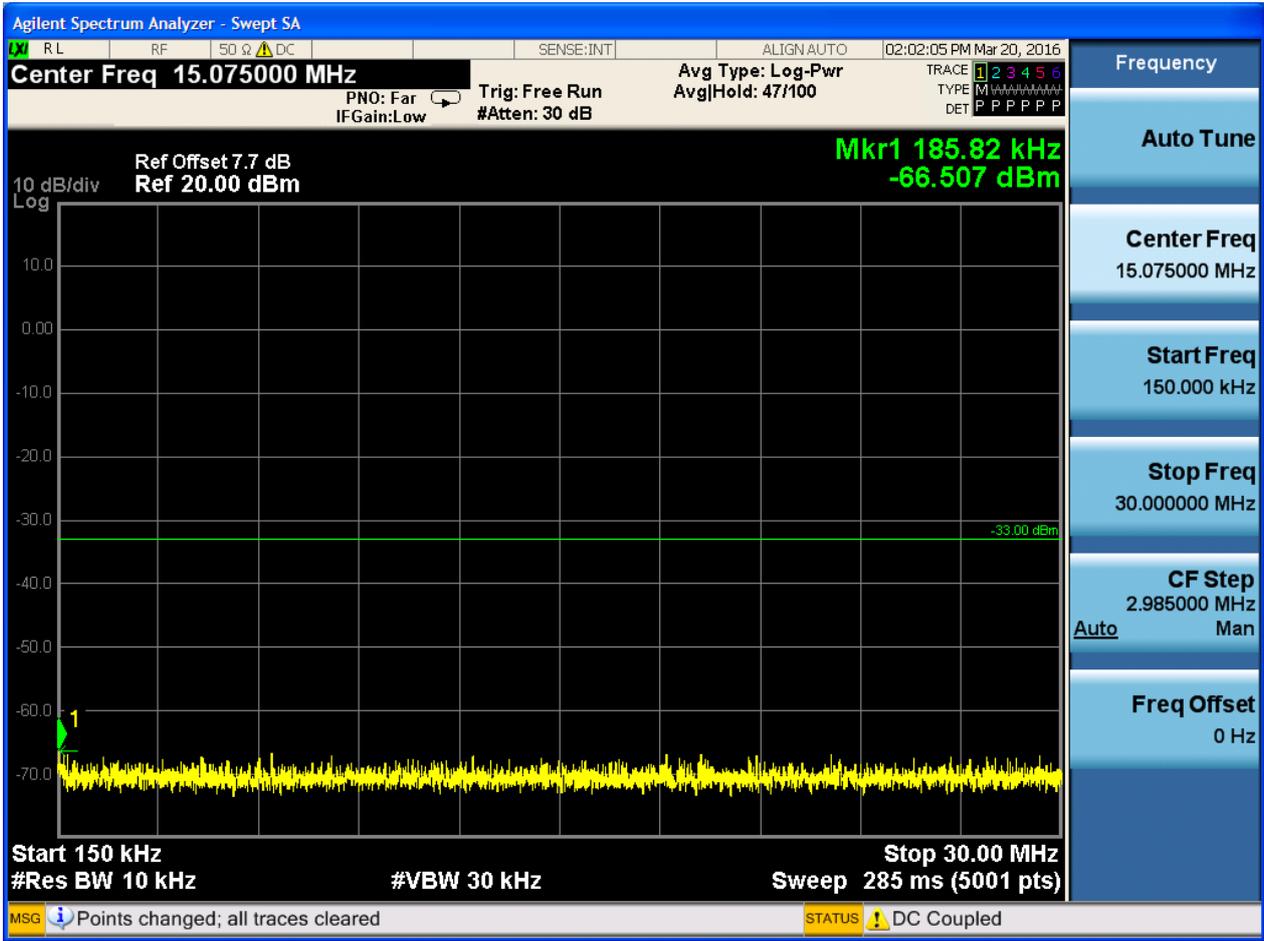




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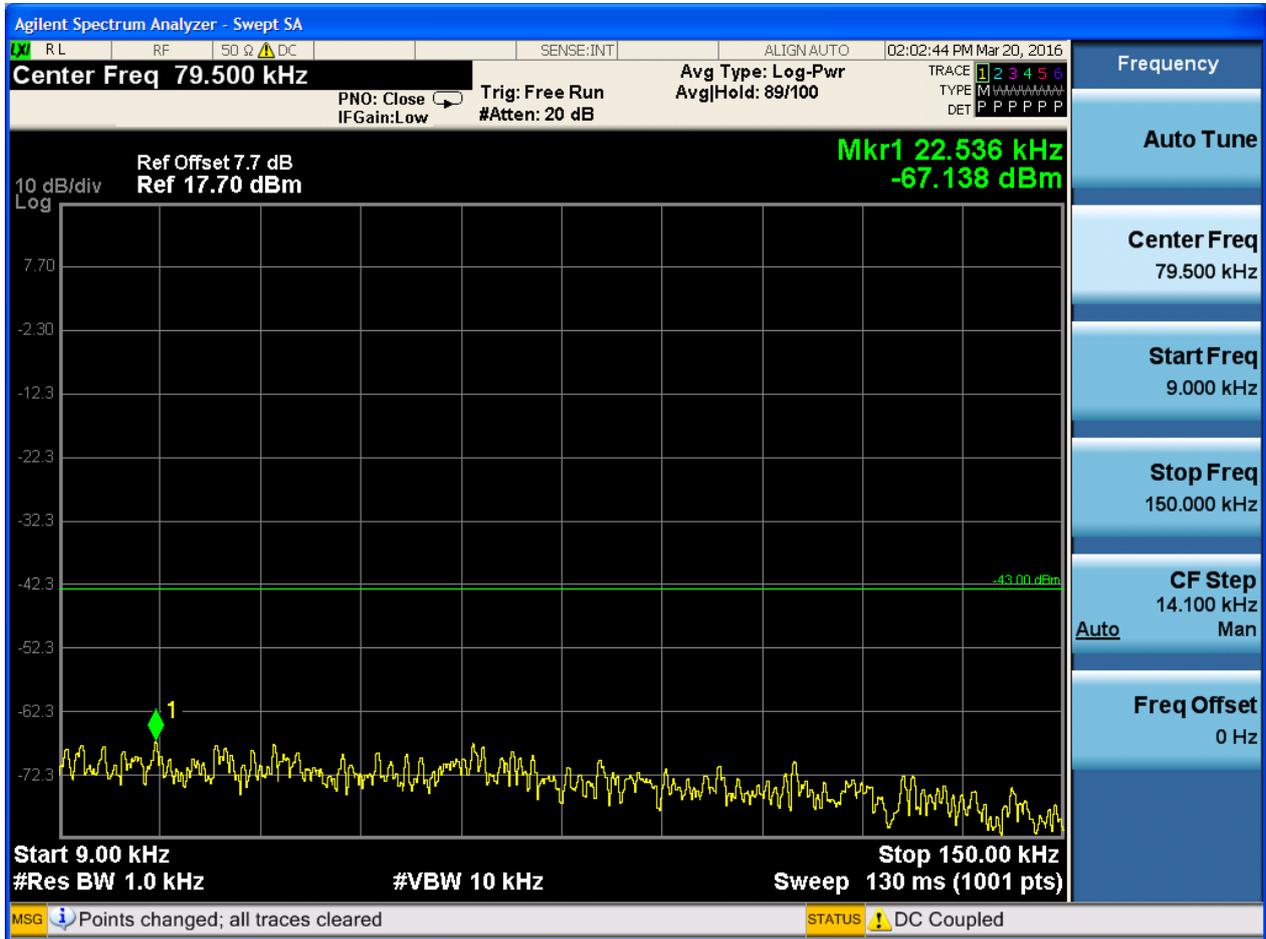
6.1.2.2.1 Test Channel = LCH

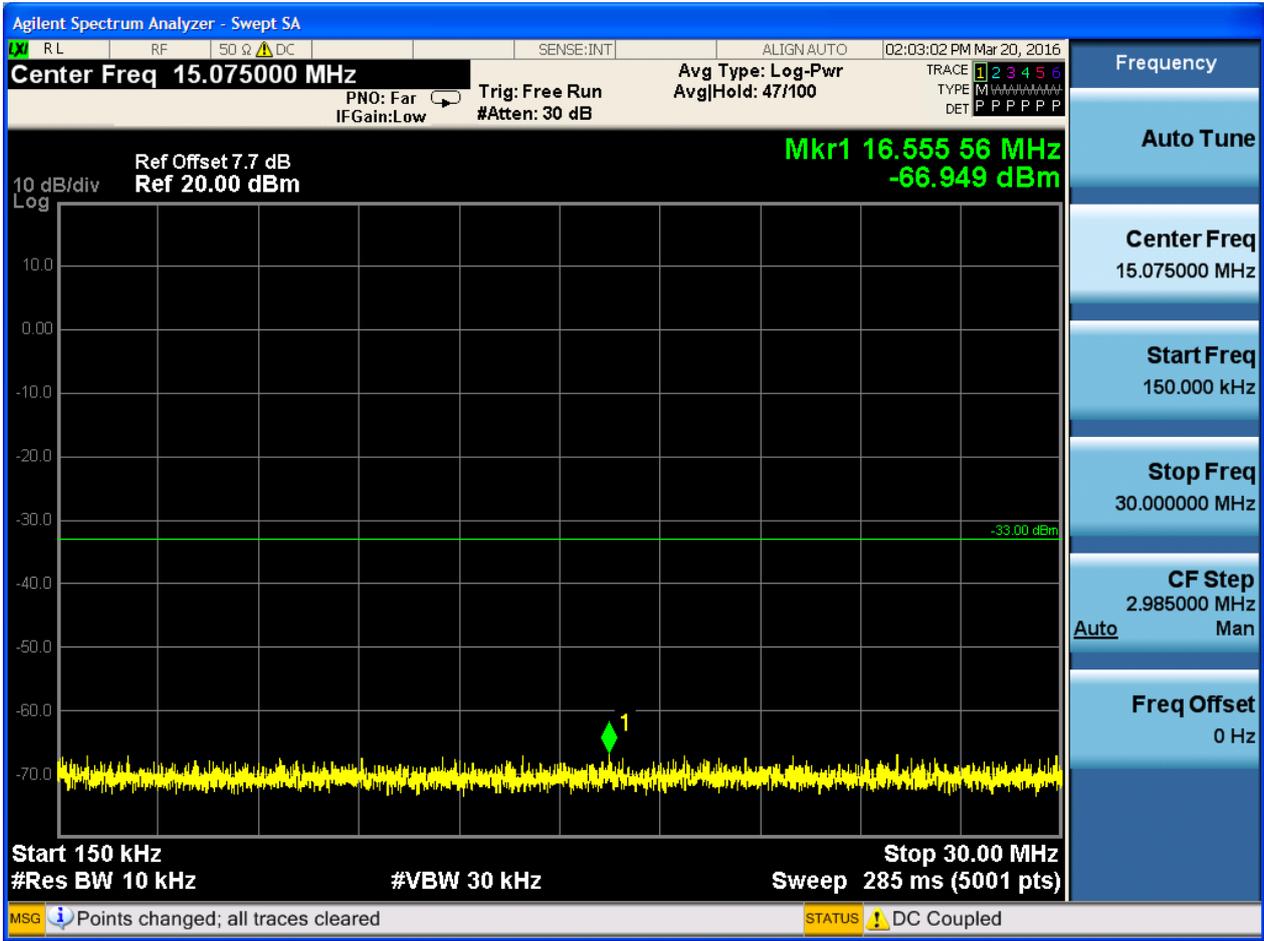






6.1.2.2.2 Test Channel = MCH

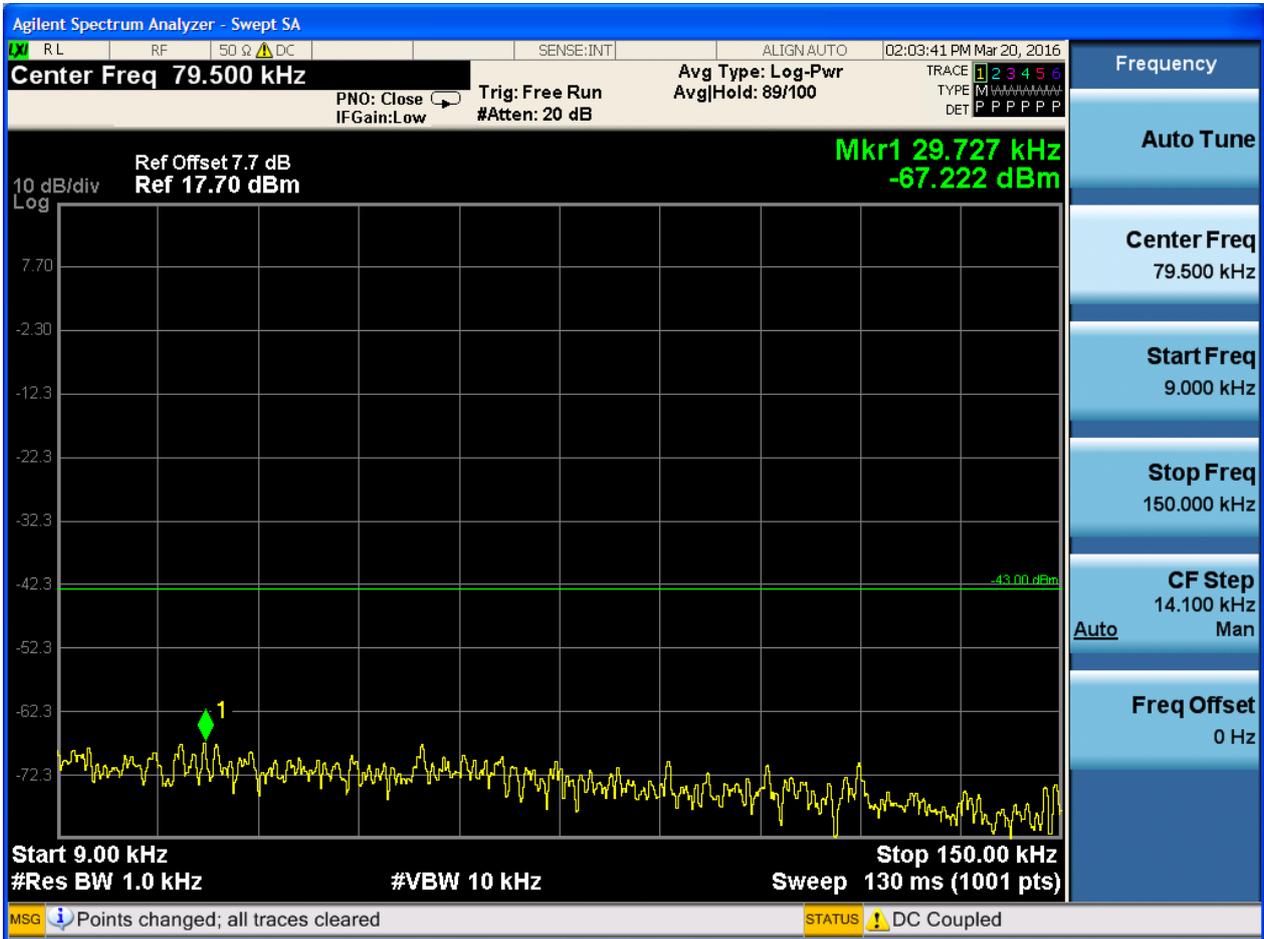


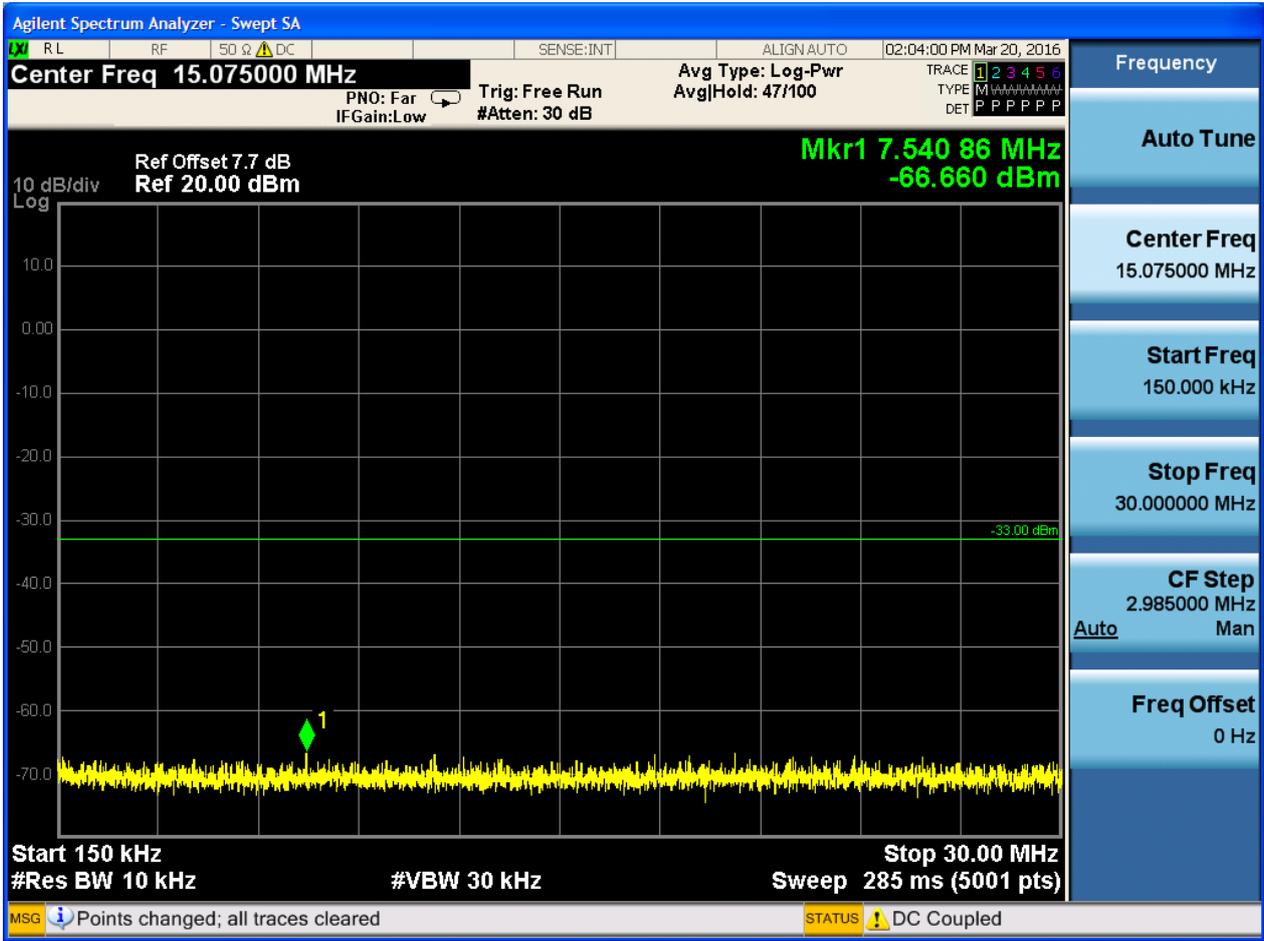


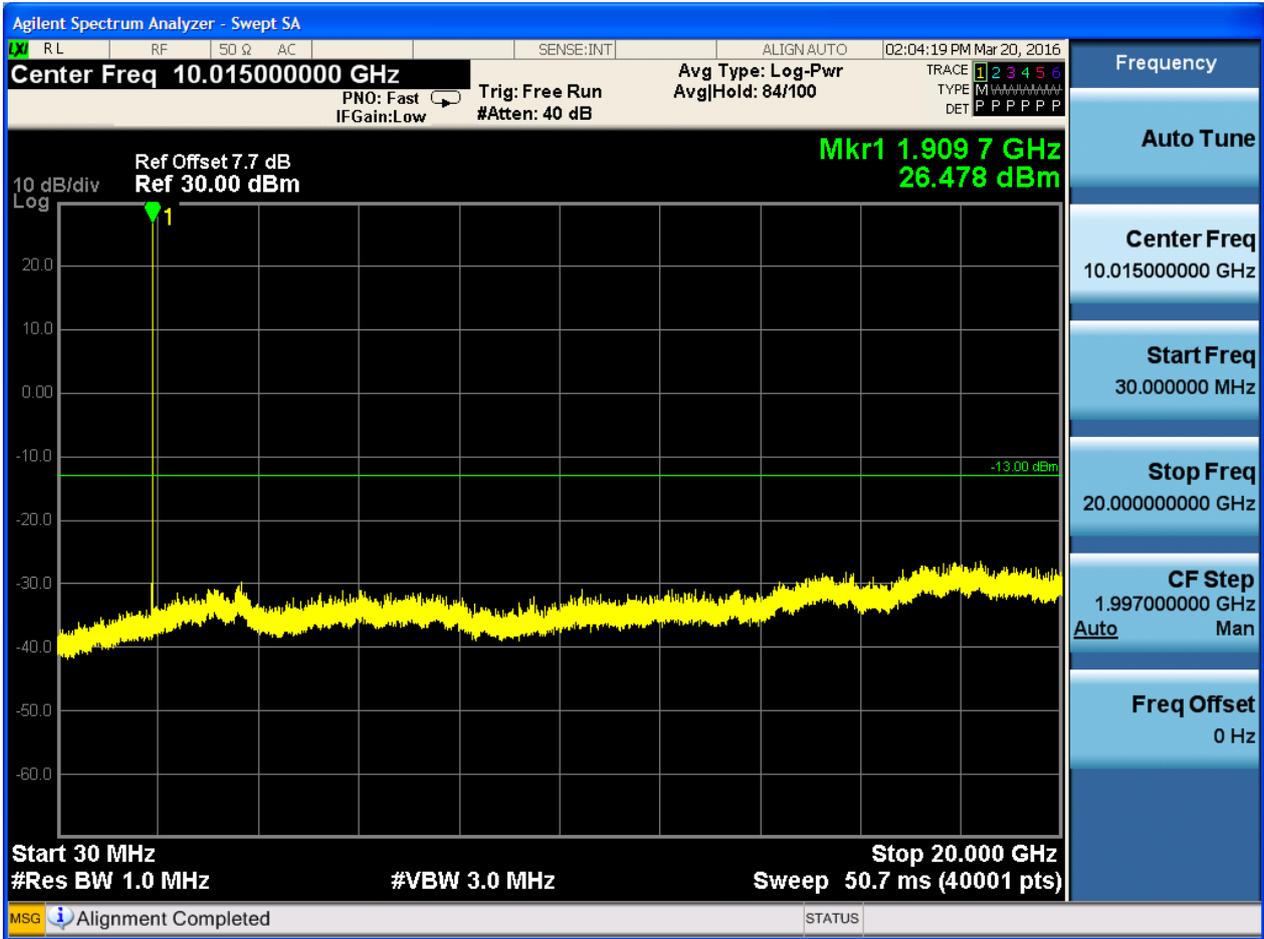




6.1.2.2.3 Test Channel = HCH







## 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

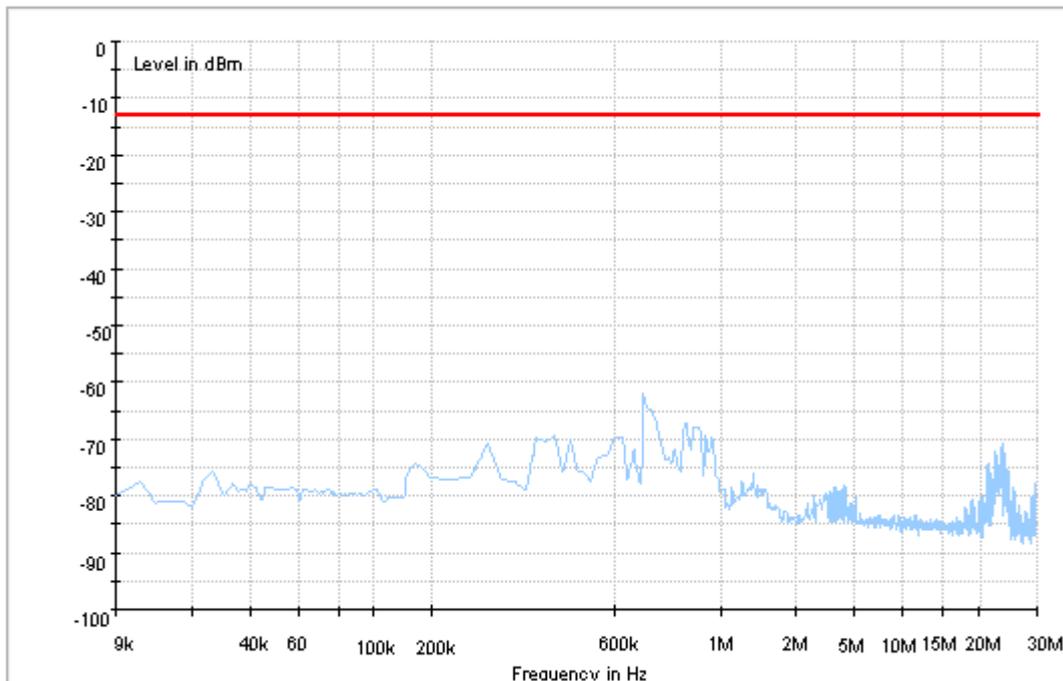
We tested all modes, but the data presented below is the worst case.

### Part I - Test Plots

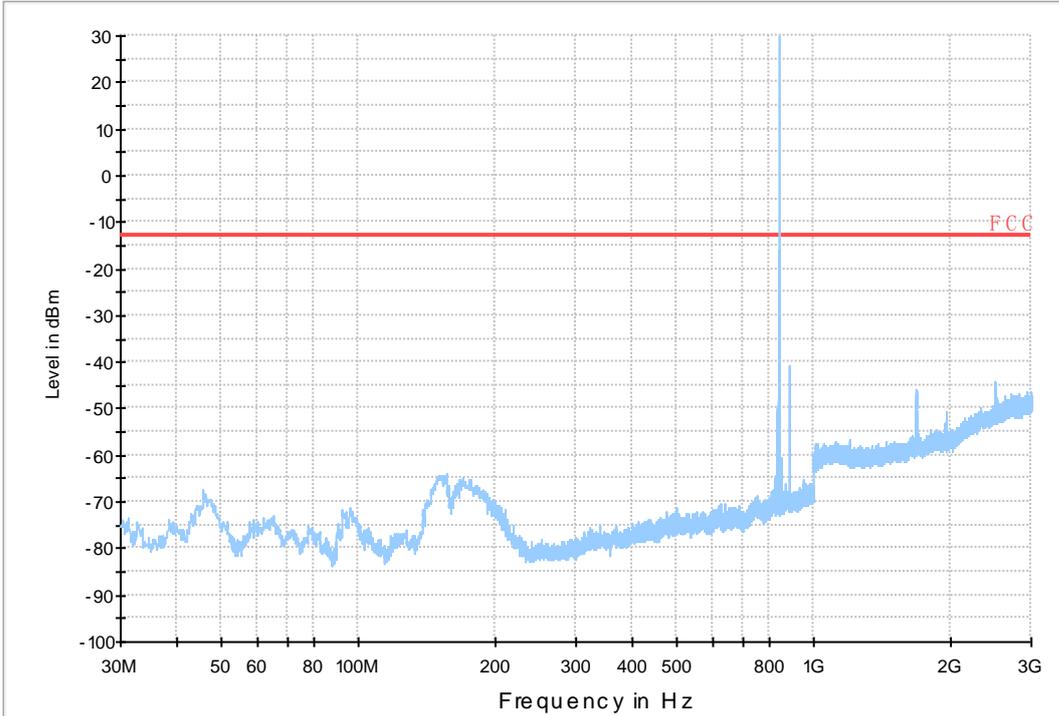
#### 7.1 For GSM

##### 7.1.1 Test Band = GSM850

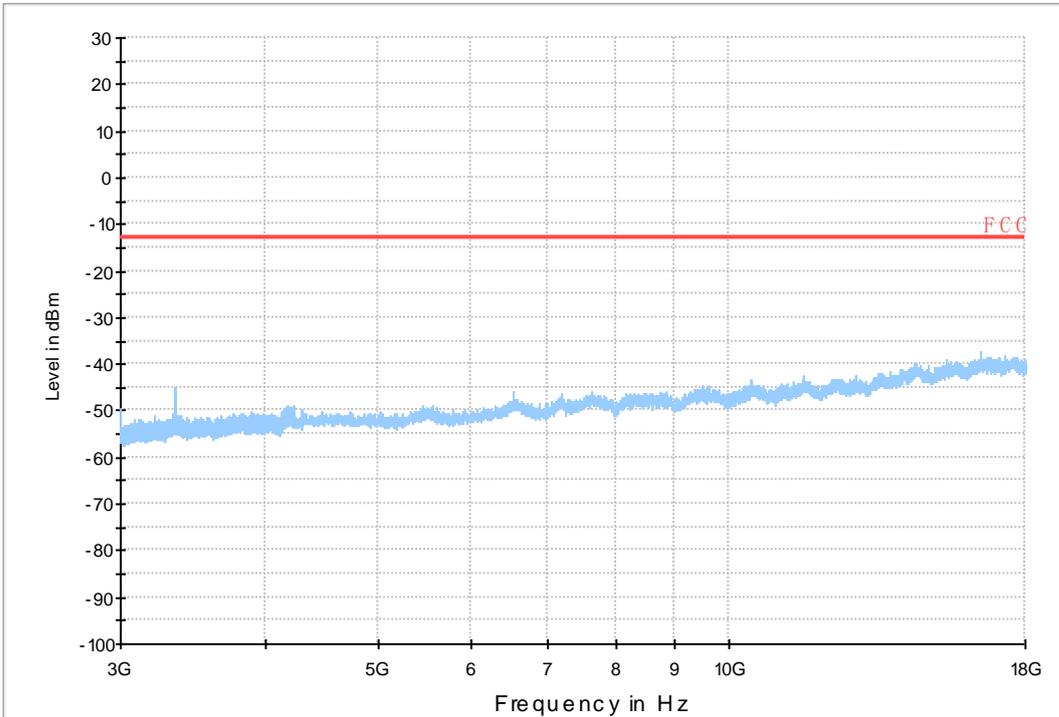
##### 7.1.1.1 Test Mode = GSM/TM1



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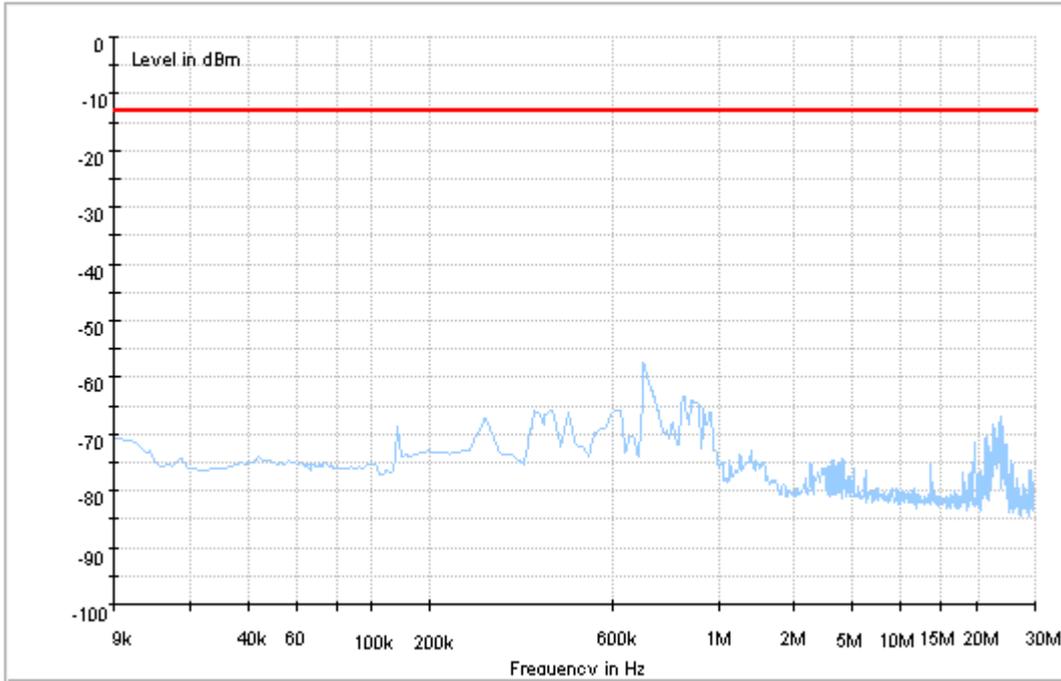


Copy of FCC PART22 GSM850\_H

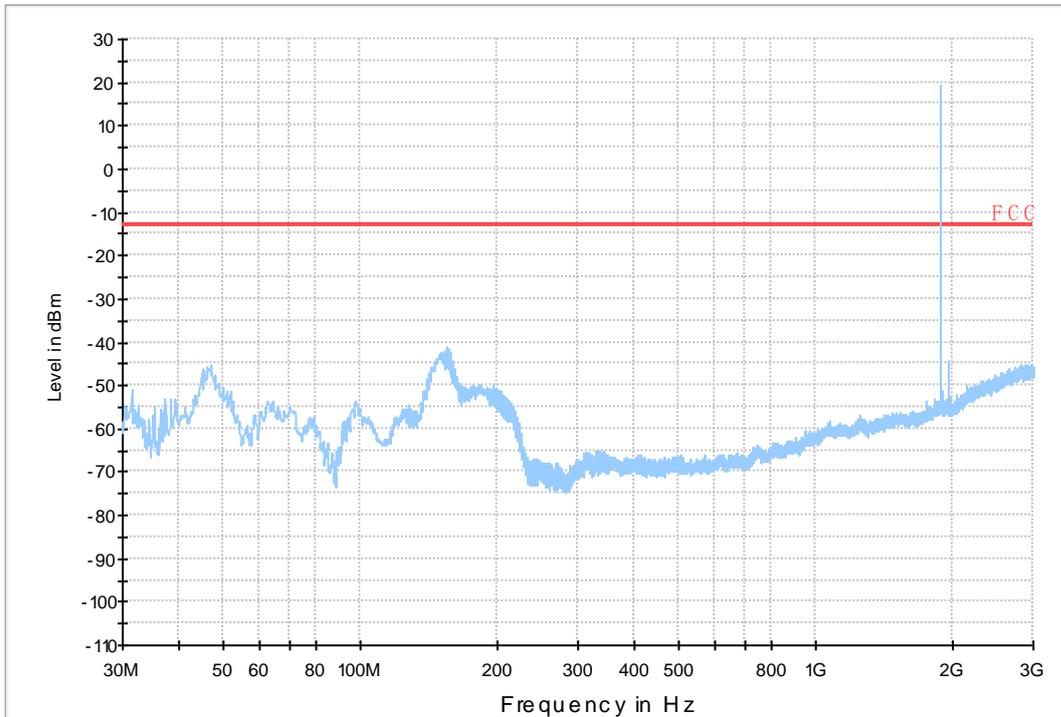


**7.1.2 Test Band = GSM1900**

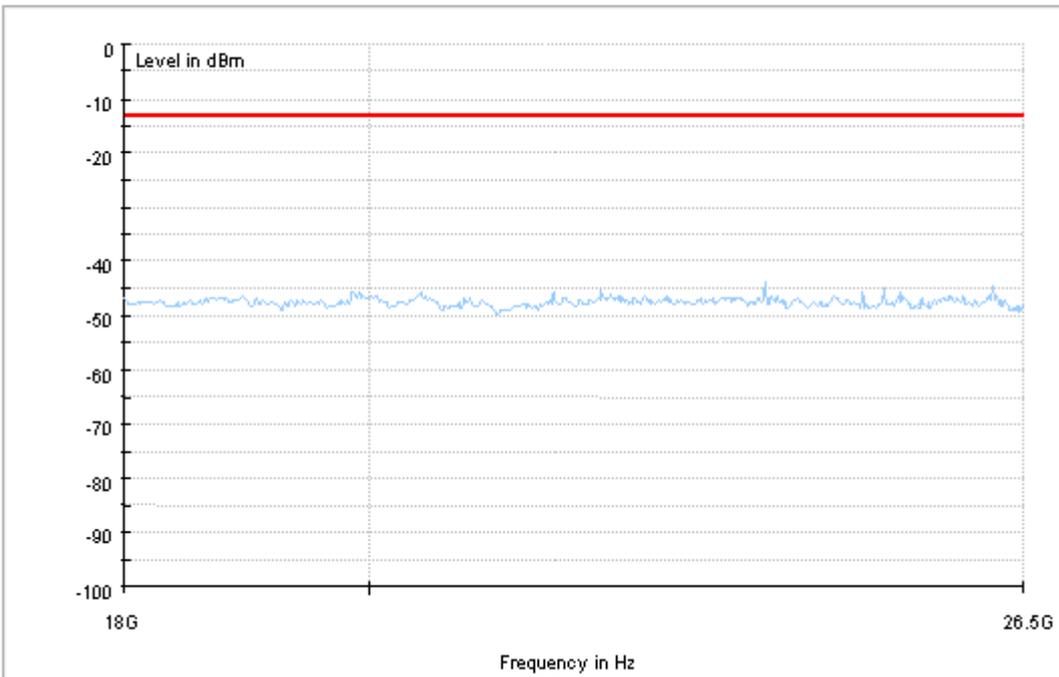
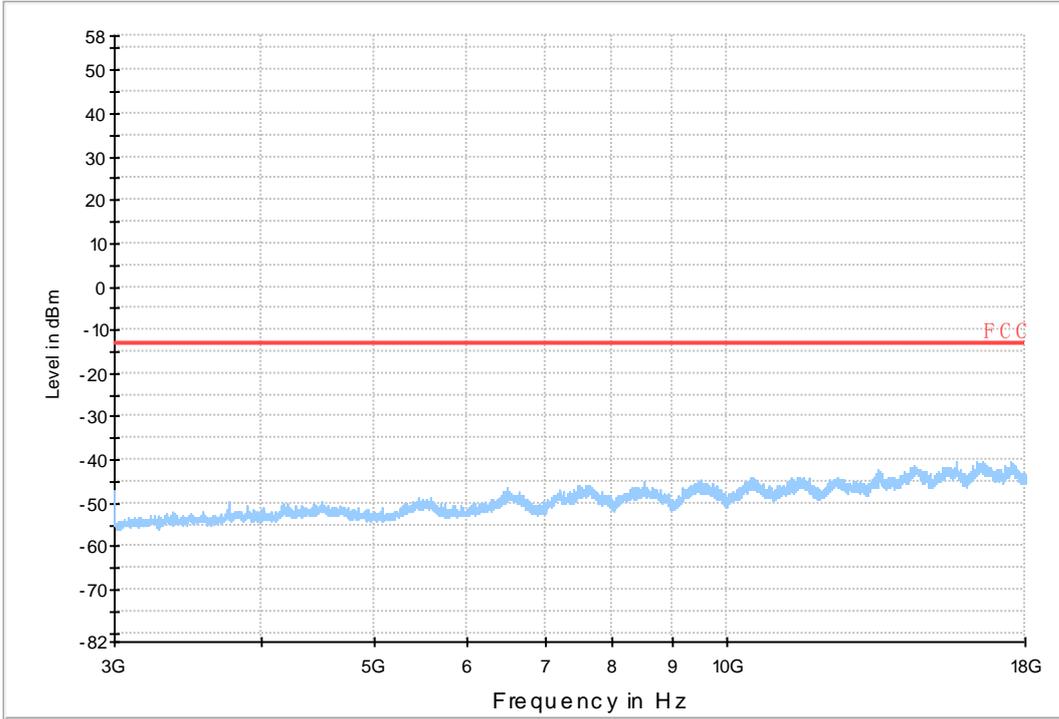
### 7.1.2.1 Test Mode = GSM/TM1



Copy of FCC PART24 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	-13.82	-0.01677	PASS
				VN	-14.14	-0.01716	PASS
				VH	-12.98	-0.01575	PASS
		MCH	TN	VL	-15.88	-0.01898	PASS
				VN	-10.98	-0.01312	PASS
				VH	-16.01	-0.01914	PASS
		HCH	TN	VL	-17.18	-0.02024	PASS
				VN	-12.59	-0.01483	PASS
				VH	-16.66	-0.01963	PASS
	GSM/TM2	LCH	TN	VL	-11.3	-0.01371	PASS
				VN	-8.59	-0.01042	PASS
				VH	-8.43	-0.01023	PASS
		MCH	TN	VL	-11.53	-0.01378	PASS
				VN	-19.44	-0.02324	PASS
				VH	-11.91	-0.01424	PASS
		HCH	TN	VL	-14.21	-0.01674	PASS
				VN	-5.46	-0.00643	PASS
				VH	-13.33	-0.0157	PASS
GSM1900	GSM/TM1	LCH	TN	VL	10.53	0.00569	PASS
				VN	10.46	0.00565	PASS
				VH	6.78	0.00366	PASS
		MCH	TN	VL	25.57	0.0136	PASS
				VN	20.02	0.01065	PASS
				VH	12.85	0.00684	PASS
		HCH	TN	VL	26.8	0.01403	PASS
				VN	19.76	0.01035	PASS
				VH	9.23	0.00483	PASS
	GSM/TM2	LCH	TN	VL	-3.07	-0.00166	PASS
				VN	2.78	0.0015	PASS
				VH	9.07	0.0049	PASS
		MCH	TN	VL	25.02	0.01331	PASS
				VN	4	0.00213	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	6.01	0.0032	PASS
		HCH	TN	VL	6.59	0.00345	PASS
				VN	9.49	0.00497	PASS
				VH	9.36	0.0049	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	-15.63	-0.01896	PASS
				-20	-17.82	-0.02162	PASS
				-10	-13.3	-0.01614	PASS
				0	-14.66	-0.01779	PASS
				10	-10.72	-0.01301	PASS
				20	-19.57	-0.02374	PASS
				30	-9.36	-0.01136	PASS
				40	-13.82	-0.01677	PASS
		50	-13.95	-0.01693	PASS		
		MCH	VN	-30	-18.98	-0.02269	PASS
				-20	-6.97	-0.00833	PASS
				-10	-17.11	-0.02045	PASS
				0	-14.66	-0.01752	PASS
				10	-12.85	-0.01536	PASS
				20	-14.98	-0.01791	PASS
				30	-16.08	-0.01922	PASS
				40	-12.98	-0.01552	PASS
		50	-12.27	-0.01467	PASS		
		HCH	VN	-30	-14.08	-0.01659	PASS
				-20	-16.08	-0.01894	PASS
				-10	-11.3	-0.01331	PASS
				0	-20.73	-0.02442	PASS
				10	-12.72	-0.01499	PASS
				20	-16.98	-0.02	PASS
	30			-15.05	-0.01773	PASS	
	40			-13.3	-0.01567	PASS	
	50	-12.98	-0.01529	PASS			
	GSM/TM2	LCH	VN	-30	-14.33	-0.01739	PASS
				-20	-8.04	-0.00975	PASS
				-10	-9.59	-0.01164	PASS
				0	-14.24	-0.01728	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				10	-15.88	-0.01927	PASS
				20	-11.95	-0.0145	PASS
				30	-9.04	-0.01097	PASS
				40	-8.33	-0.01011	PASS
				50	-14.53	-0.01763	PASS
		MCH	VN	-30	-7.65	-0.00914	PASS
				-20	-14.17	-0.01694	PASS
				-10	-17.5	-0.02092	PASS
				0	-9.46	-0.01131	PASS
				10	-14.59	-0.01744	PASS
				20	-10.17	-0.01216	PASS
				30	-20.89	-0.02497	PASS
				40	-11.3	-0.01351	PASS
				50	-12.75	-0.01524	PASS
				HCH	VN	-30	-8.88
		-20	-16.47			-0.0194	PASS
		-10	-8.68			-0.01023	PASS
		0	-10.23			-0.01205	PASS
		10	-13.56			-0.01598	PASS
		20	-14.46			-0.01704	PASS
		30	-12.66			-0.01492	PASS
		40	-15.08			-0.01777	PASS
		50	-10.2	-0.01202	PASS		
		GSM1900	GSM/TM1	LCH	VN	-30	5.42
-20	15.3					0.00827	PASS
-10	17.43					0.00942	PASS
0	7.81					0.00422	PASS
10	13.17					0.00712	PASS
20	13.95					0.00754	PASS
30	3.23					0.00175	PASS
40	15.95					0.00862	PASS
50	11.95					0.00646	PASS
MCH	VN			-30	18.21	0.00969	PASS
				-20	22.73	0.01209	PASS
				-10	26.6	0.01415	PASS
				0	14.08	0.00749	PASS
				10	23.83	0.01268	PASS
				20	21.24	0.0113	PASS
				30	16.92	0.009	PASS
				40	12.2	0.00649	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	14.08	0.00749	PASS
				-30	21.5	0.01126	PASS
				-20	14.01	0.00734	PASS
				-10	15.5	0.00812	PASS
				0	21.31	0.01116	PASS
				10	23.7	0.01241	PASS
				20	23.63	0.01237	PASS
				30	31.9	0.0167	PASS
				40	21.57	0.01129	PASS
				50	25.12	0.01315	PASS
	GSM/TM2	LCH	VN	-30	-6.42	-0.00347	PASS
				-20	8.17	0.00442	PASS
				-10	-5.68	-0.00307	PASS
				0	2.07	0.00112	PASS
				10	6.78	0.00366	PASS
				20	11.75	0.00635	PASS
				30	-3.16	-0.00171	PASS
				40	7.78	0.0042	PASS
				50	2.81	0.00152	PASS
				MCH	VN	-30	9.27
		-20	18.82			0.01001	PASS
		-10	10.23			0.00544	PASS
		0	1.84			0.00098	PASS
		10	6.94			0.00369	PASS
		20	-2.71			-0.00144	PASS
		30	7.01			0.00373	PASS
		40	-1.45			-0.00077	PASS
		50	2.32			0.00123	PASS
		HCH	VN			-30	21.37
				-20	19.76	0.01035	PASS
				-10	8.36	0.00438	PASS
				0	5.26	0.00275	PASS
10	7.88			0.00413	PASS		
20	6.26			0.00328	PASS		
30	-4.49			-0.00235	PASS		
40	8.78			0.0046	PASS		
50	25.22	0.01321	PASS				

END