



# Appendix for test report



## 1Appendix\_A: Effective (Isotropic) Radiated Power Output Data

### Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP/ERP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	27.38	27.57	33	PASS
		MCH	27.17	27.46	33	PASS
		HCH	26.91	27.33	33	PASS
	GSM/TM2	LCH	22.84	23.37	33	PASS
		MCH	22.92	23.35	33	PASS
		HCH	22.77	23.32	33	PASS
GSM850	GSM/TM1	LCH	32.99	29.04	38.5	PASS
		MCH	33.13	29.18	38.5	PASS
		HCH	33.25	29.3	38.5	PASS
	GSM/TM2	LCH	26.54	22.59	38.5	PASS
		MCH	26.62	22.67	38.5	PASS
		HCH	26.64	22.69	38.5	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	0.43	13	PASS
		MCH	0.40	13	PASS
		HCH	0.39	13	PASS
	GSM/TM2	LCH	3.21	13	PASS
		MCH	3.14	13	PASS
		HCH	3.27	13	PASS
GSM1900	GSM/TM1	LCH	0.20	13	PASS
		MCH	0.19	13	PASS
		HCH	0.18	13	PASS
	GSM/TM2	LCH	3.11	13	PASS
		MCH	3.19	13	PASS
		HCH	3.25	13	PASS

### 3Appendix\_C: Modulation Characteristics

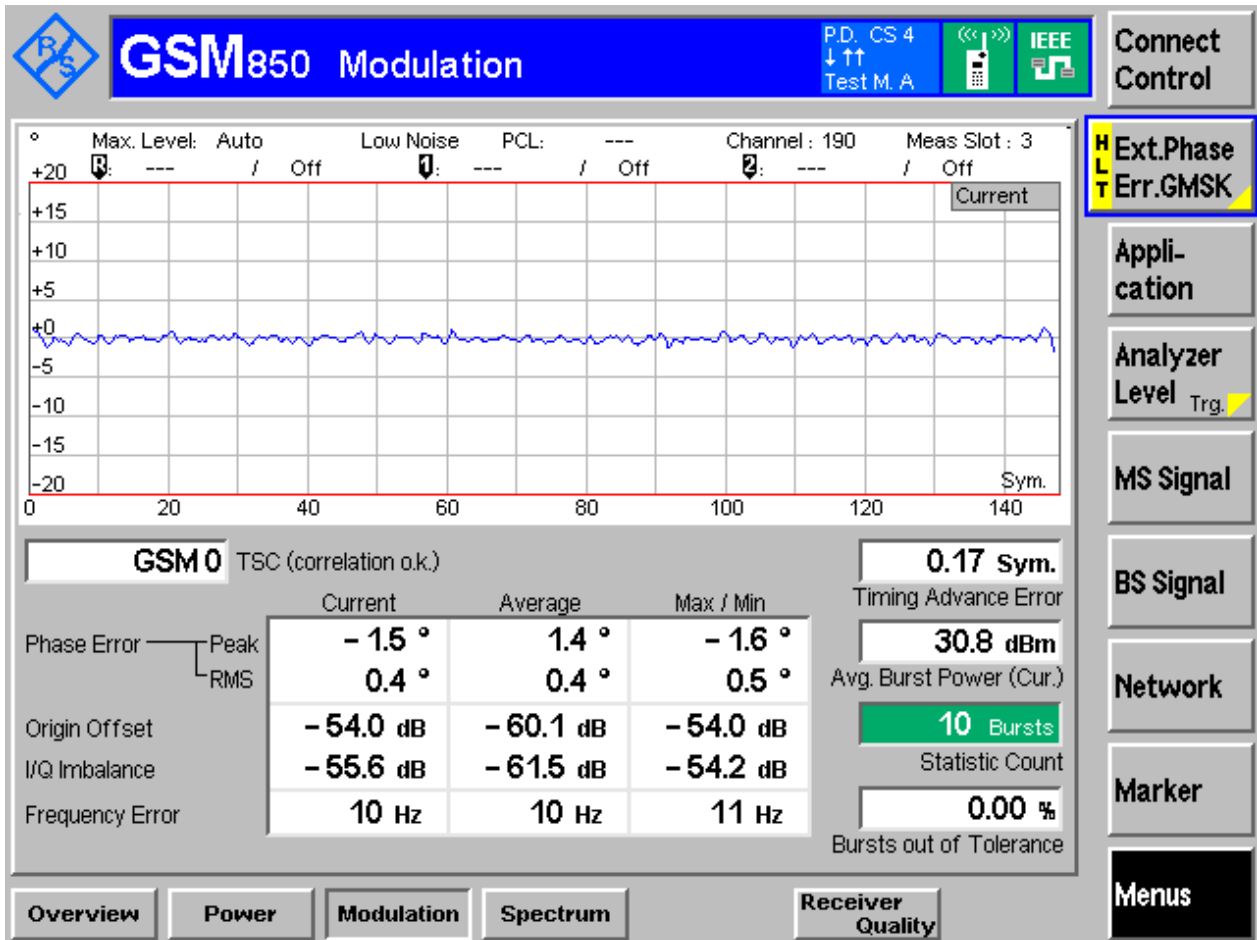
#### Part I - Test Plots

#### 3.1 For GSM

#### 3.1.1 Test Band = GSM850

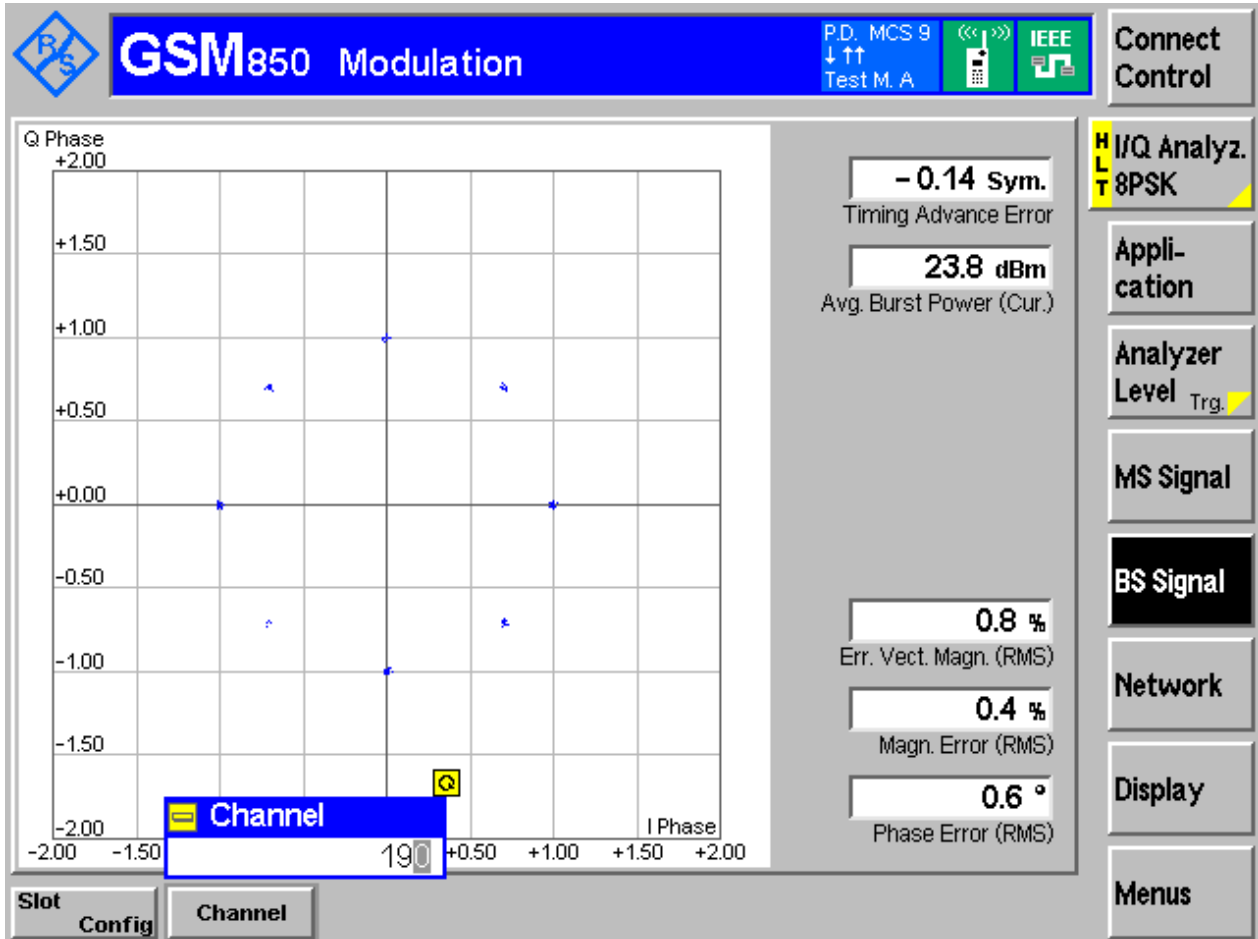
#### 3.1.1.1 Test Mode = GSM/TM1

#### 3.1.1.1.1 Test Channel = MCH



### 3.1.1.2 Test Mode = GSM/TM2

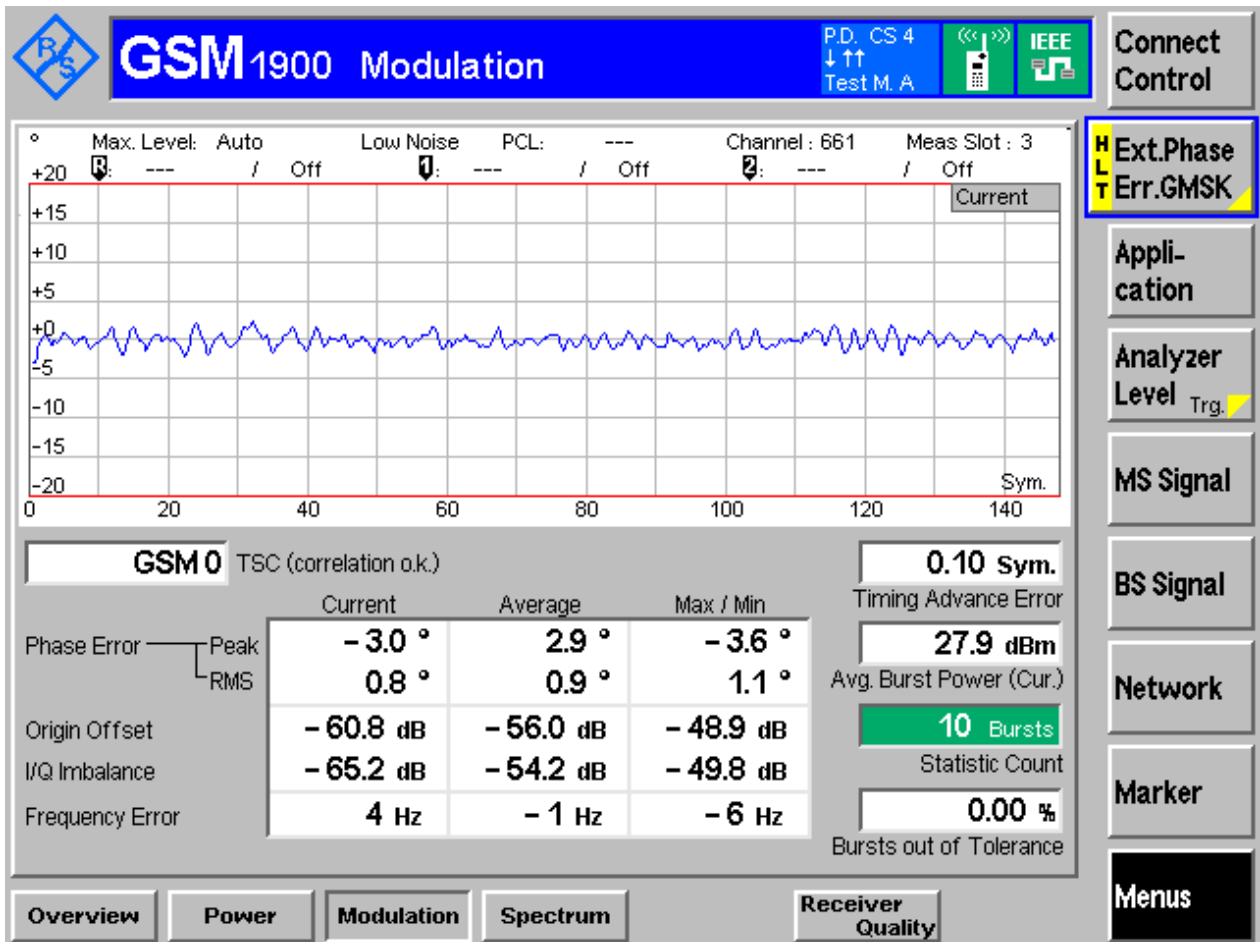
#### 3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

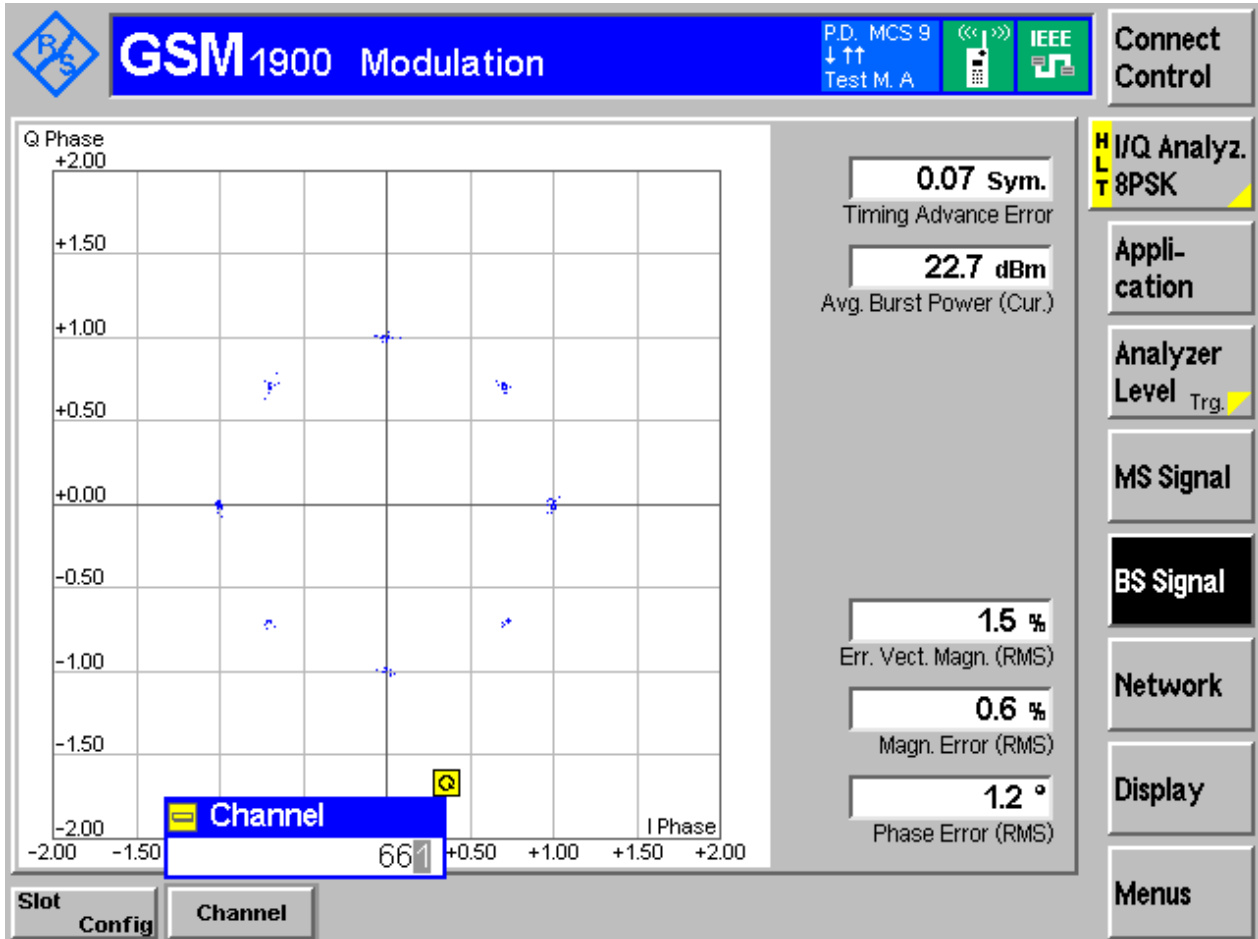
3.1.2.1 Test Mode = GSM/TM1

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	243.04	315.16	Pass
		MCH	241.93	314.81	Pass
		HCH	243.15	316.34	Pass
	GSM/TM2	LCH	243.60	305.46	Pass
		MCH	246.56	313.82	Pass
		HCH	247.09	315.72	Pass
GSM1900	GSM/TM1	LCH	245.77	316.30	Pass
		MCH	243.28	319.81	Pass
		HCH	243.03	318.79	Pass
	GSM/TM2	LCH	242.12	310.71	Pass
		MCH	240.05	307.68	Pass
		HCH	242.19	308.70	Pass



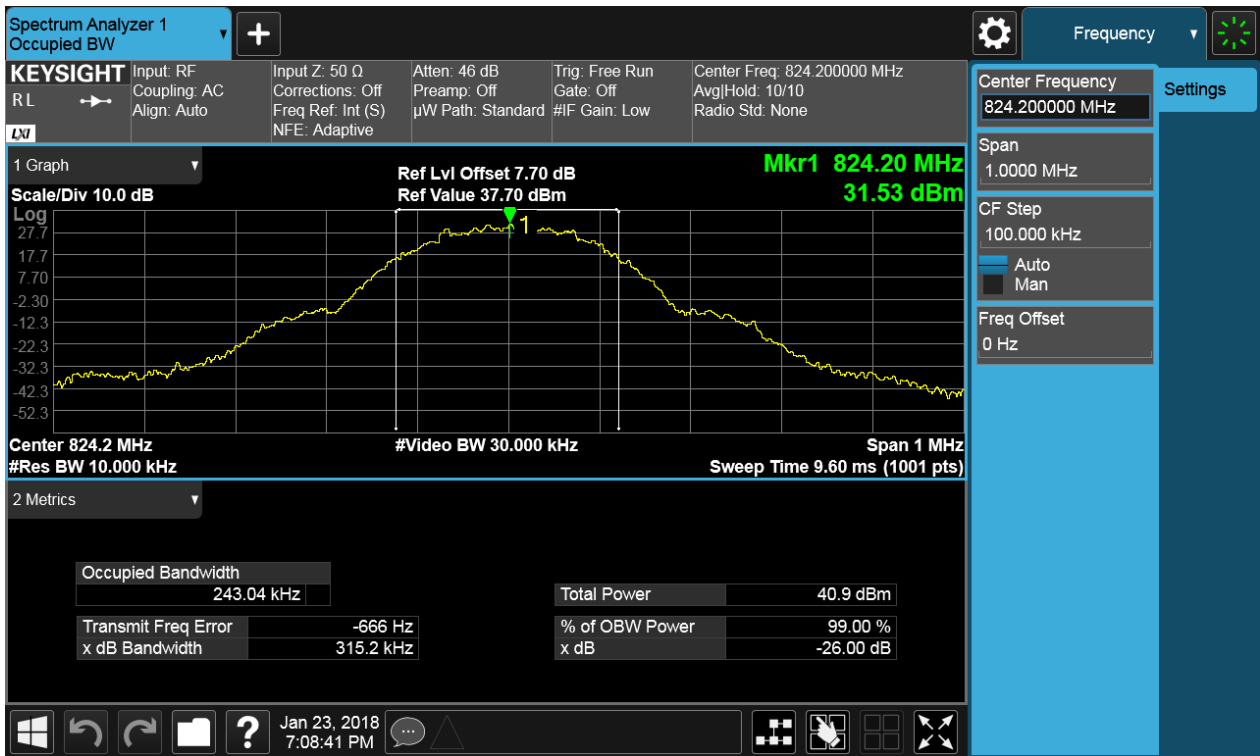
## Part II - Test Plots

### 4.1 For GSM

#### 4.1.1 Test Band = GSM850

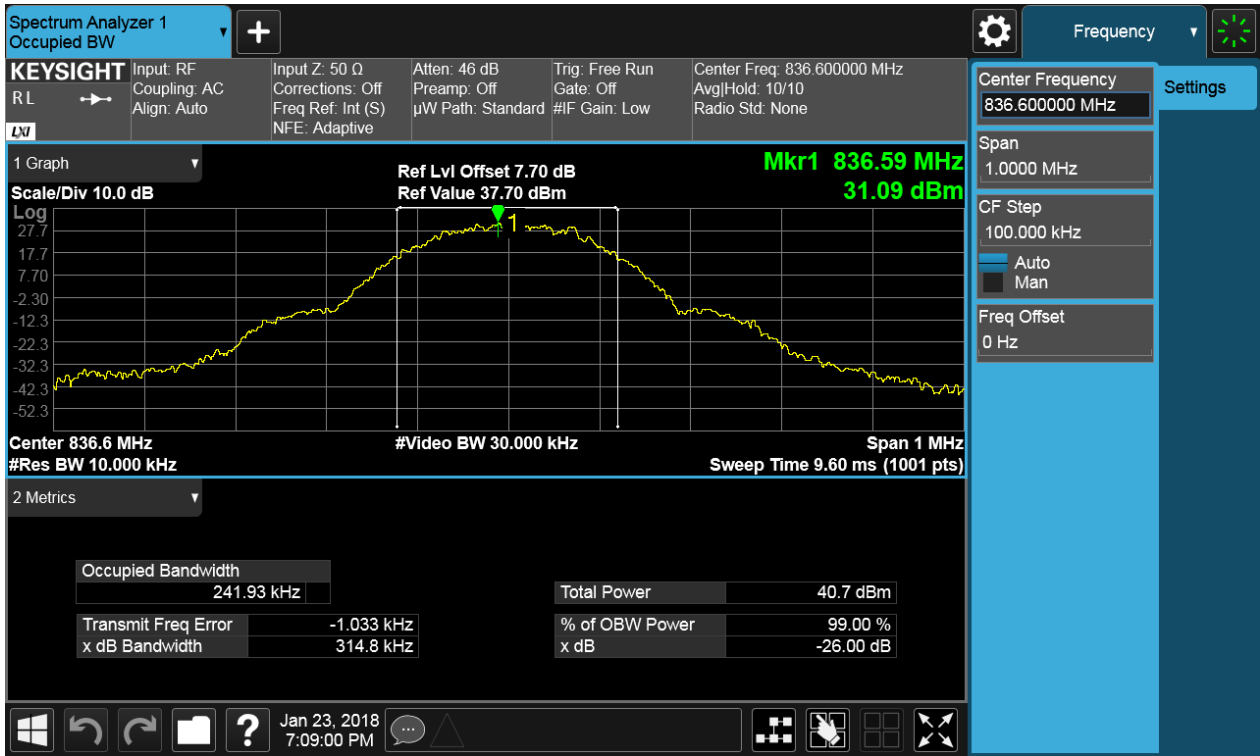
##### 4.1.1.1 Test Mode = GSM/TM1

##### 4.1.1.1.1 Test Channel = LCH



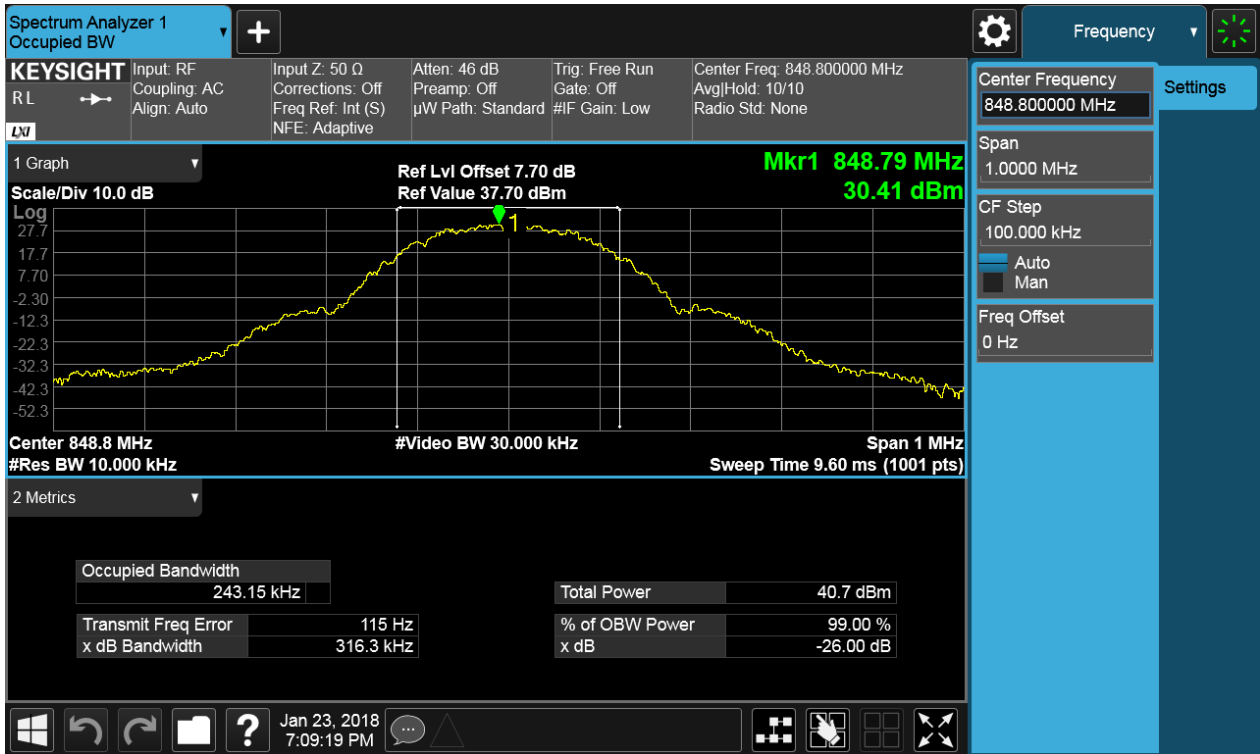


### 4.1.1.1.2 Test Channel = MCH





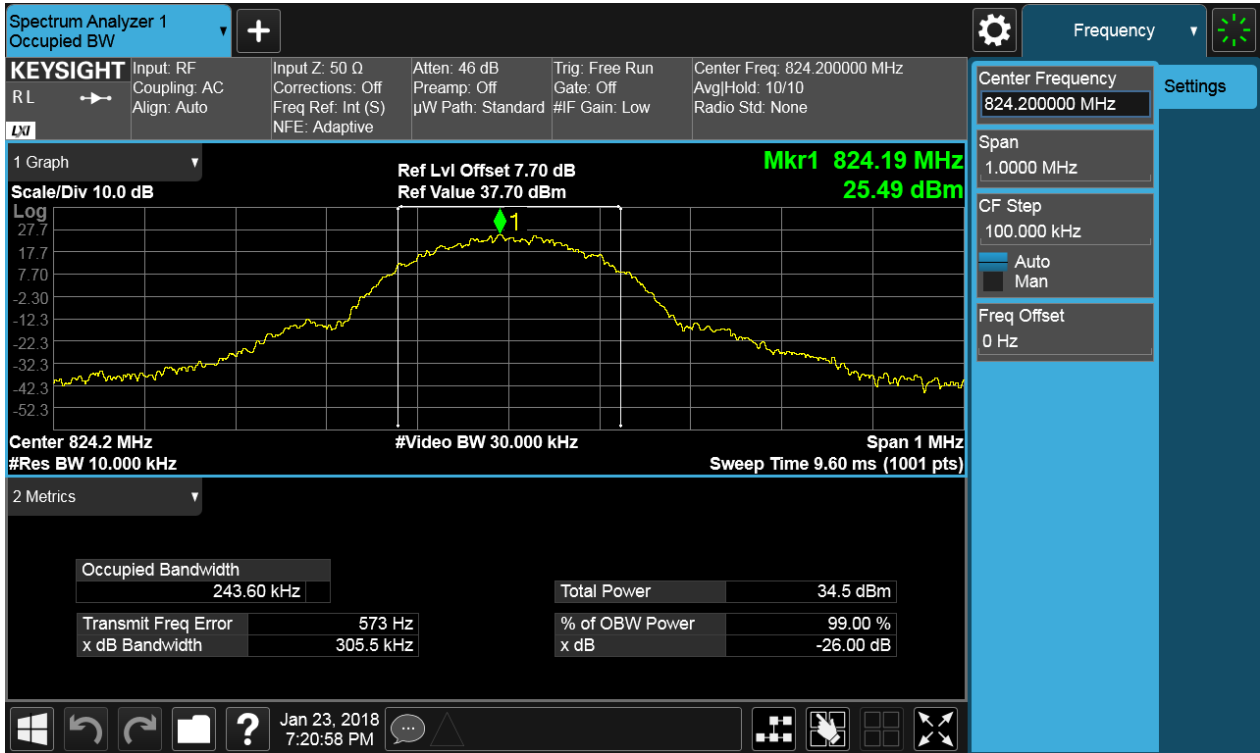
### 4.1.1.1.3 Test Channel = HCH





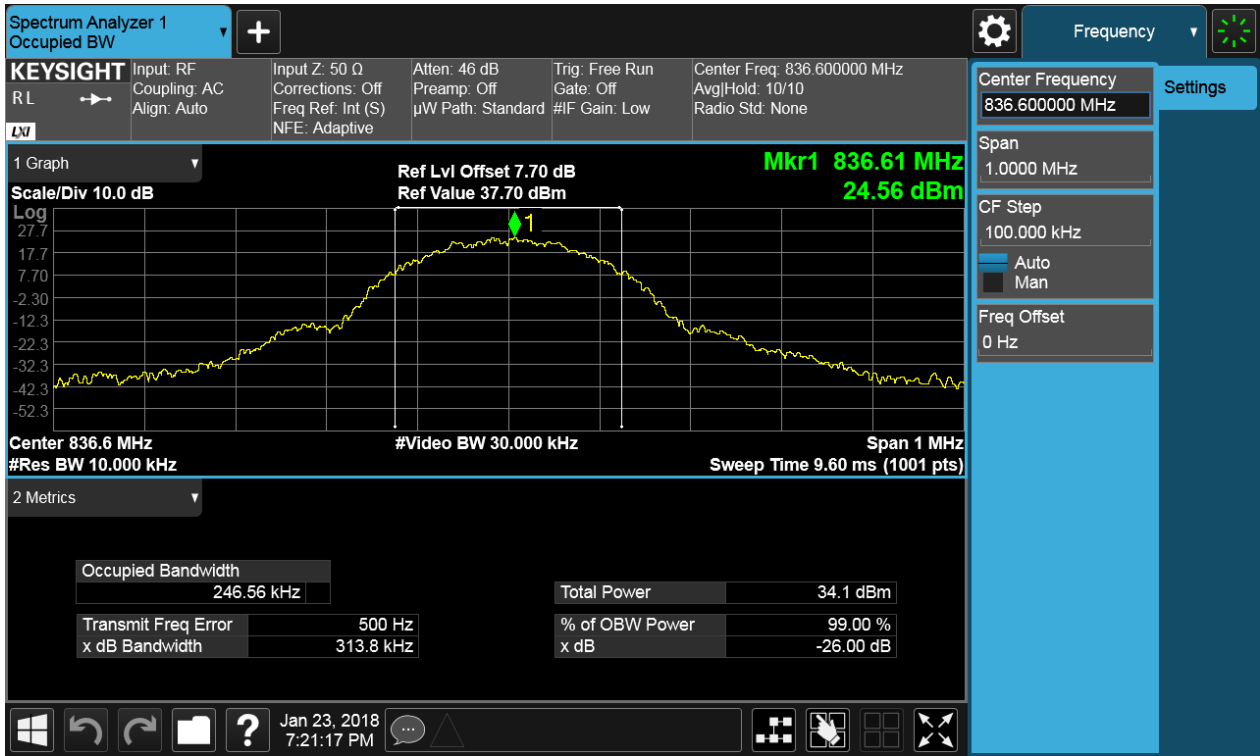
### 4.1.1.2 Test Mode = GSM/TM2

#### 4.1.1.2.1 Test Channel = LCH



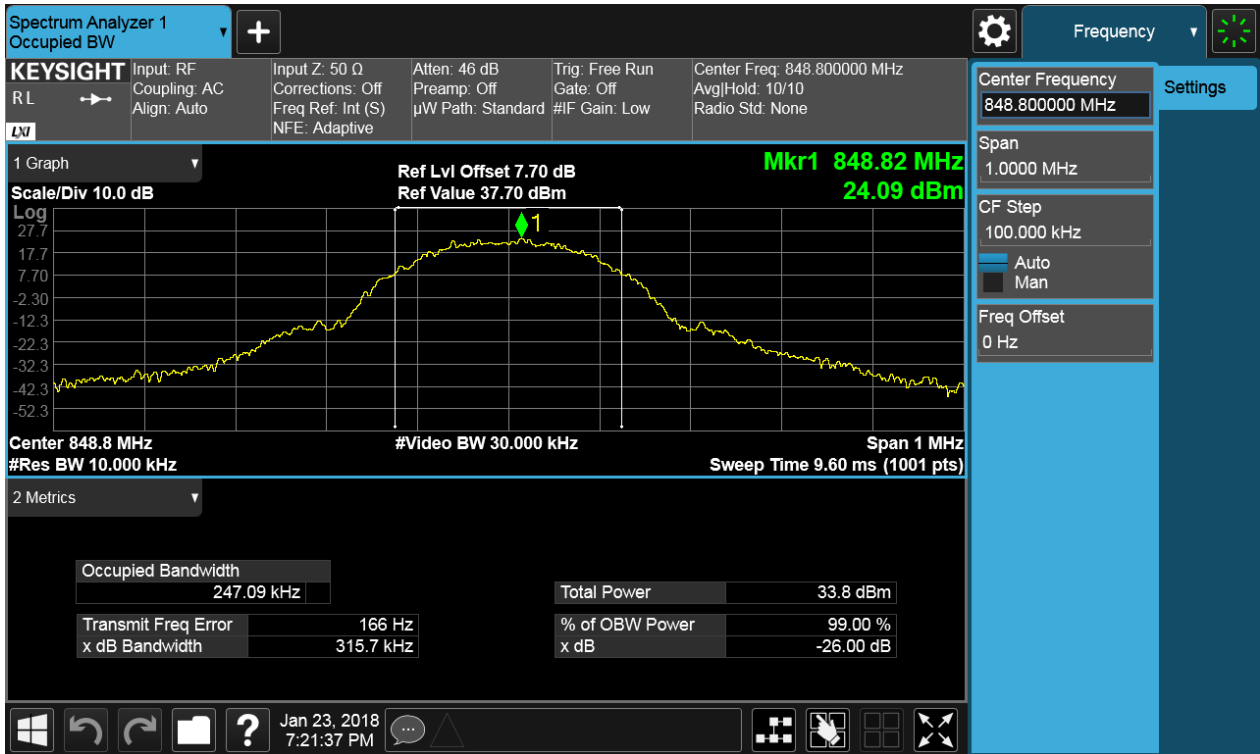


### 4.1.1.2.2 Test Channel = MCH





### 4.1.1.2.3 Test Channel = HCH

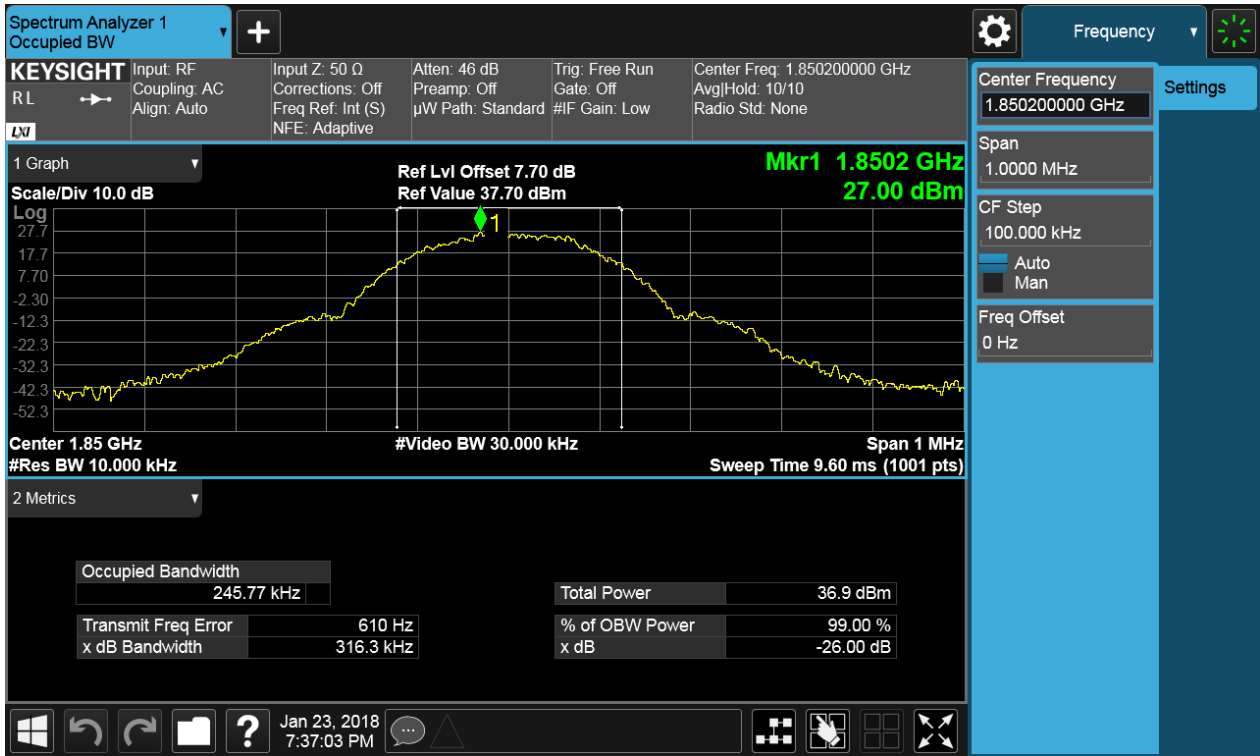




### 4.1.3 Test Band = GSM1900

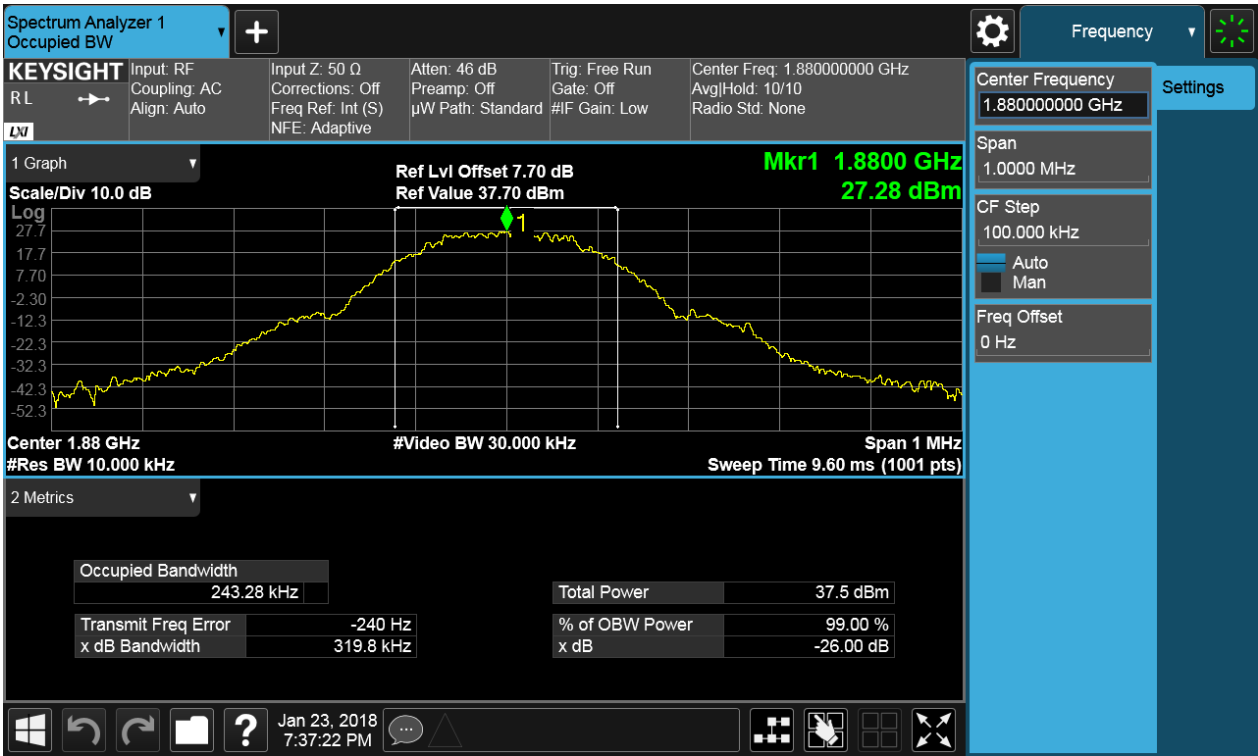
#### 4.1.3.1 Test Mode = GSM/TM1

##### 4.1.3.1.1 Test Channel = LCH





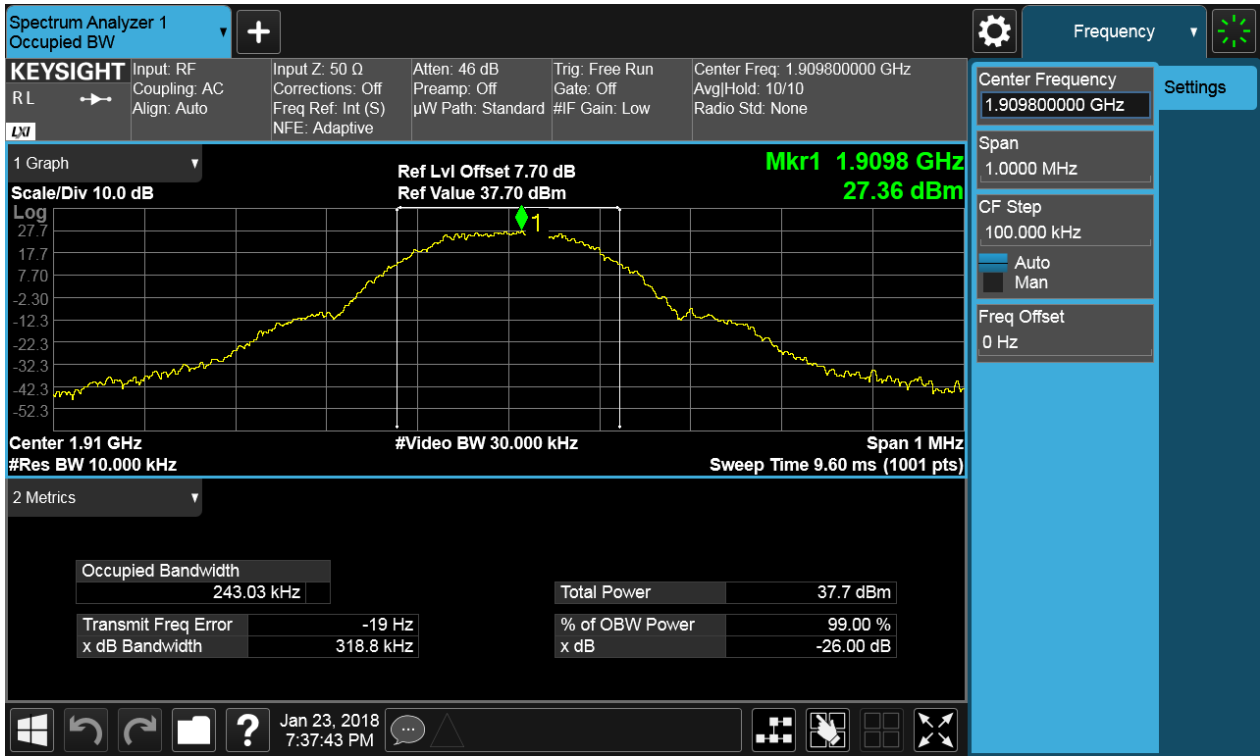
### 4.1.3.1.2 Test Channel = MCH







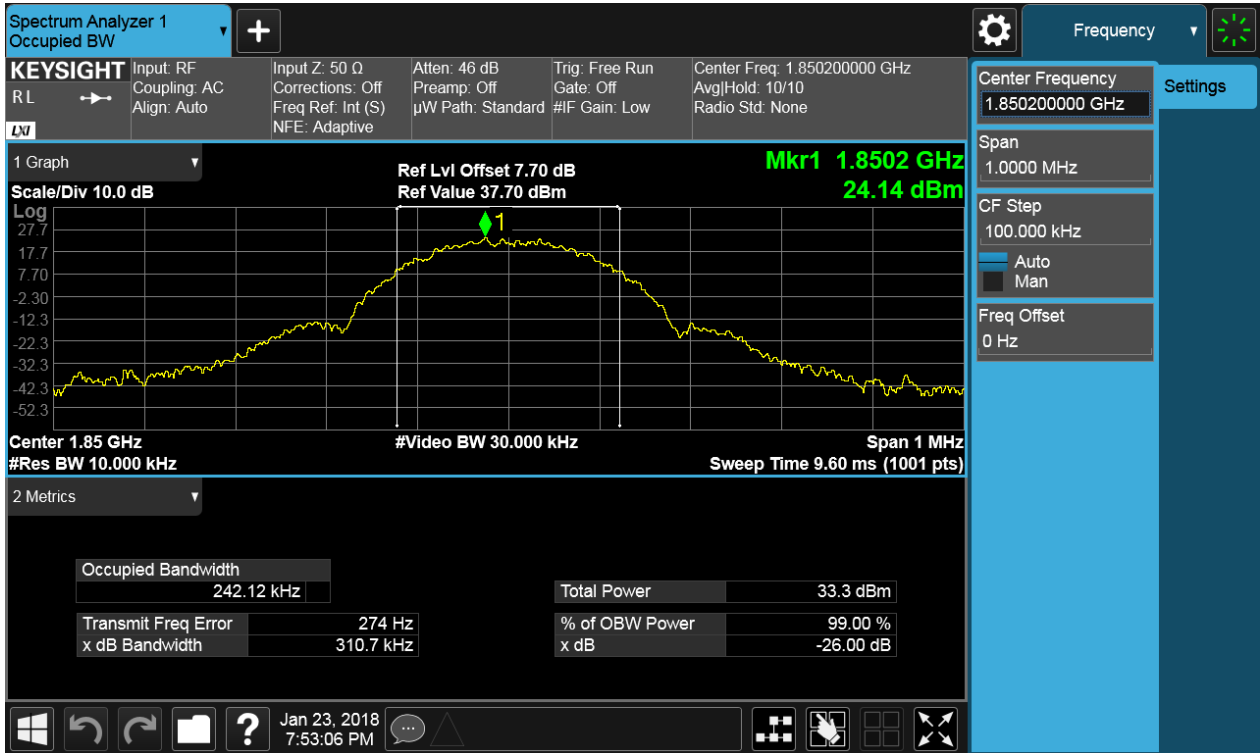
### 4.1.3.1.3 Test Channel = HCH





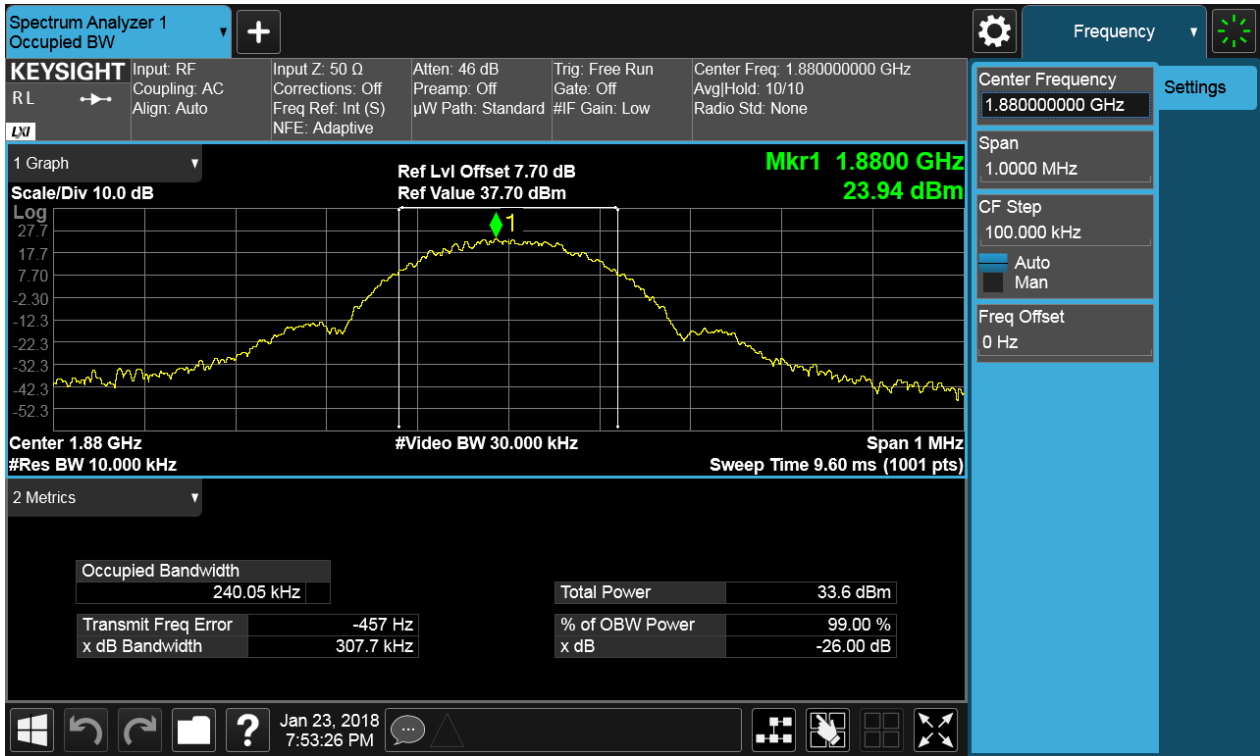
### 4.1.3.2 Test Mode = GSM/TM2

#### 4.1.3.2.1 Test Channel = LCH



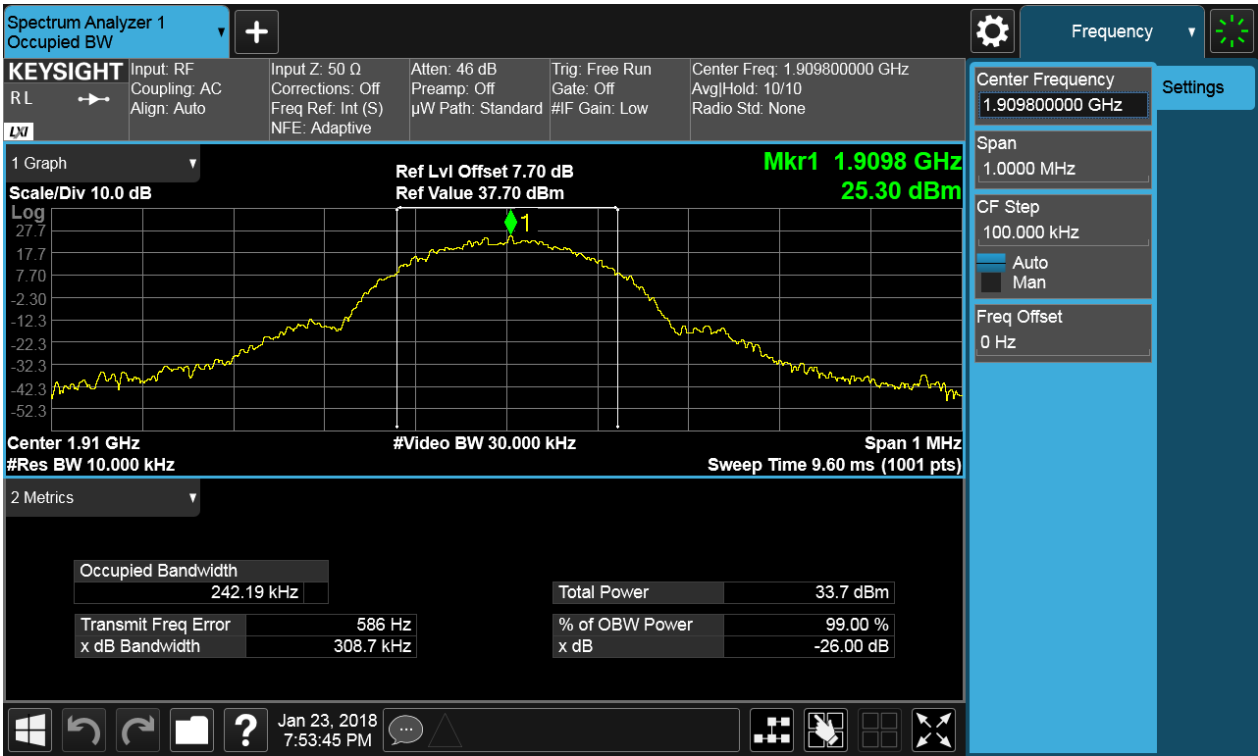


### 4.1.3.2.2 Test Channel = MCH





### 4.1.3.2.3 Test Channel = HCH



## 5Appendix\_E: Band Edges Compliance

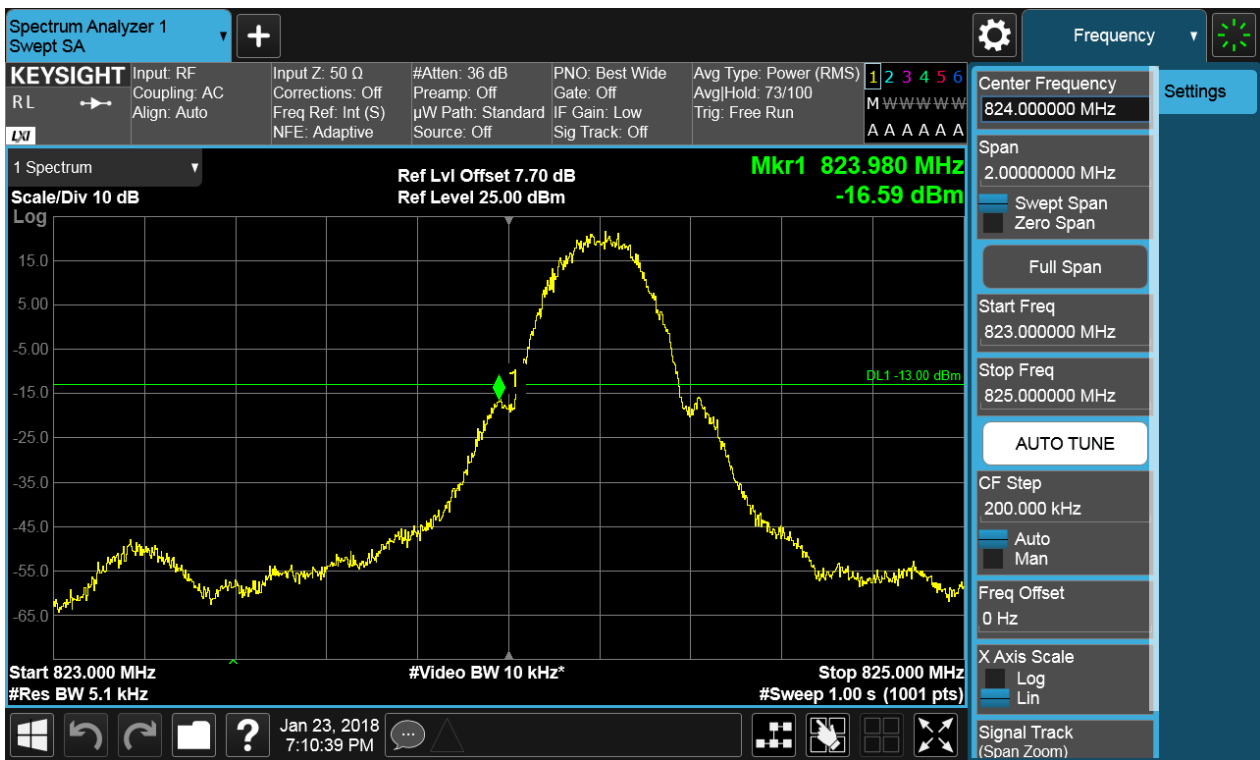
### Part I - Test Plots

#### 5.1 For GSM

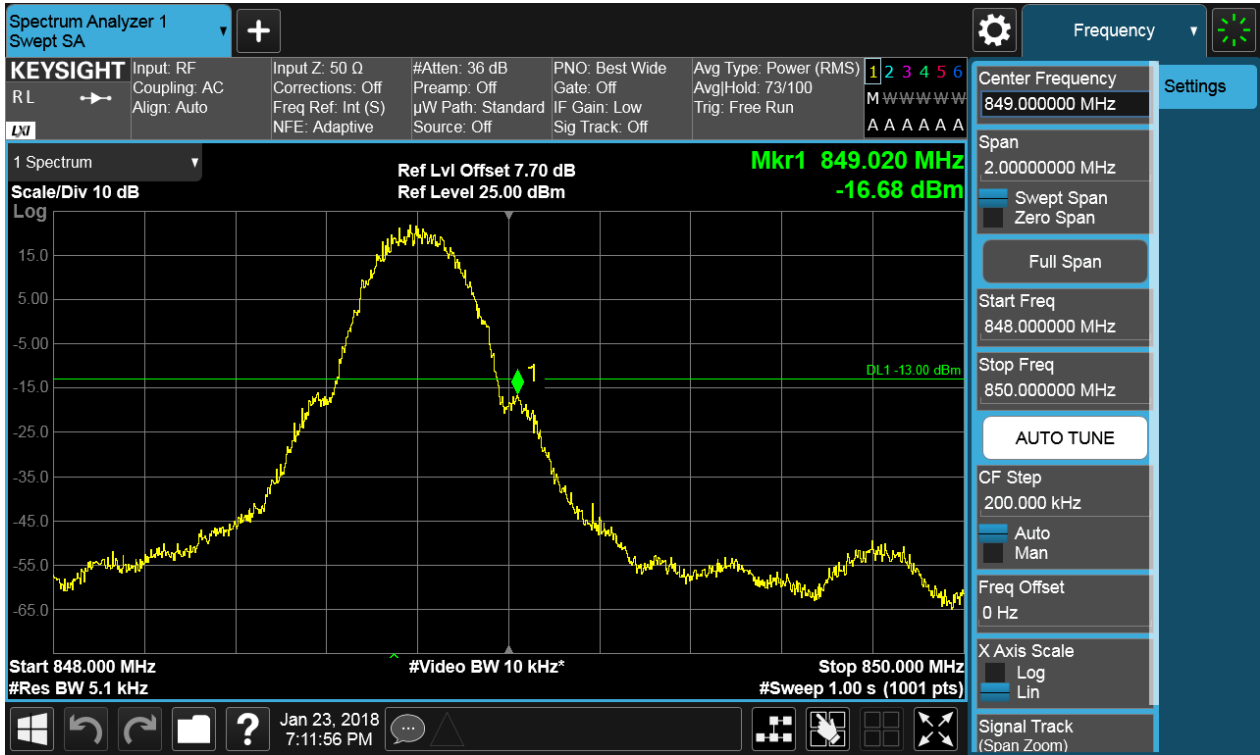
##### 5.1.1 Test Band = GSM850

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

##### 5.1.1.1.1 Test Channel = LCH

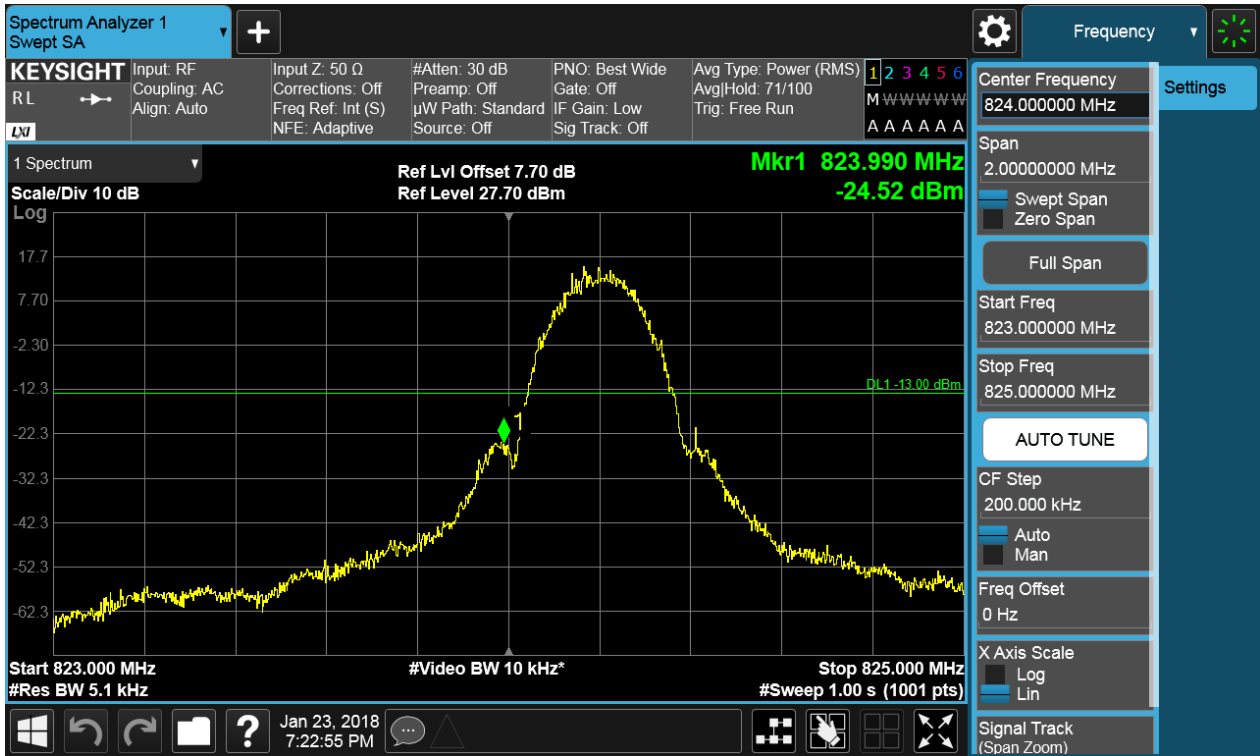


5.1.1.1.2 Test Channel = HCH

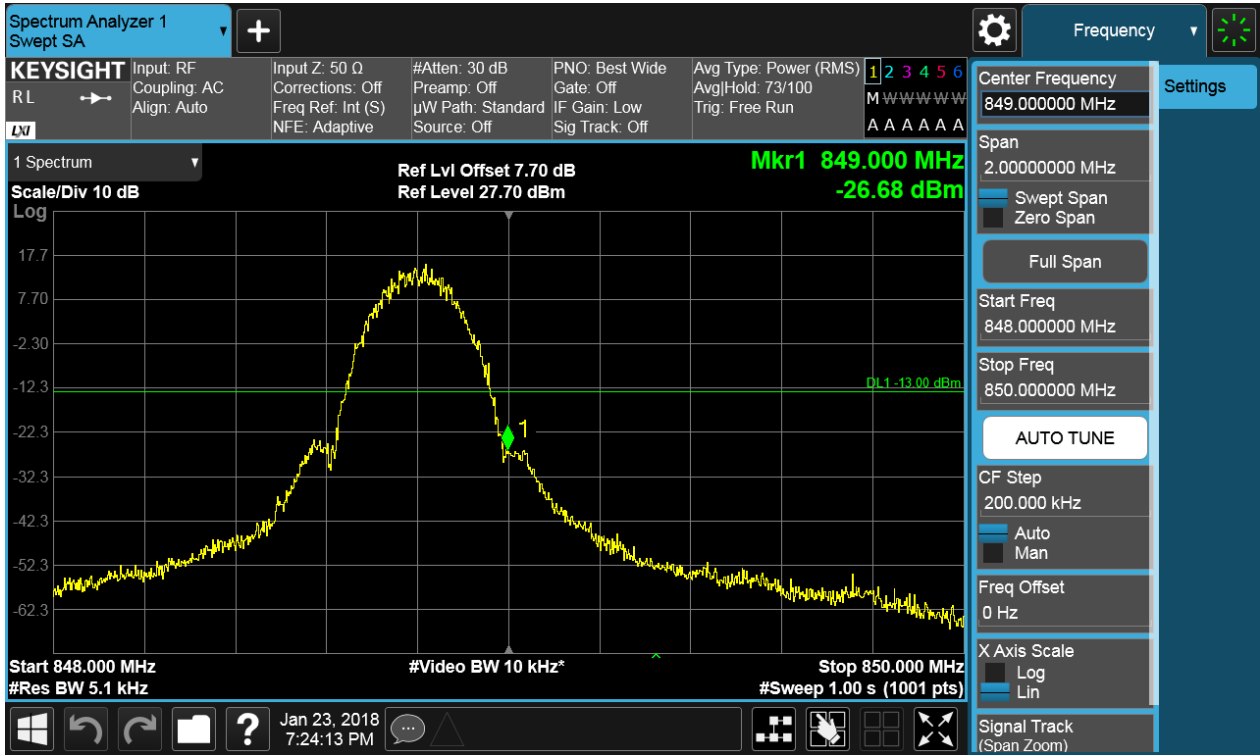


5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



5.1.1.2.2 Test Channel = HCH

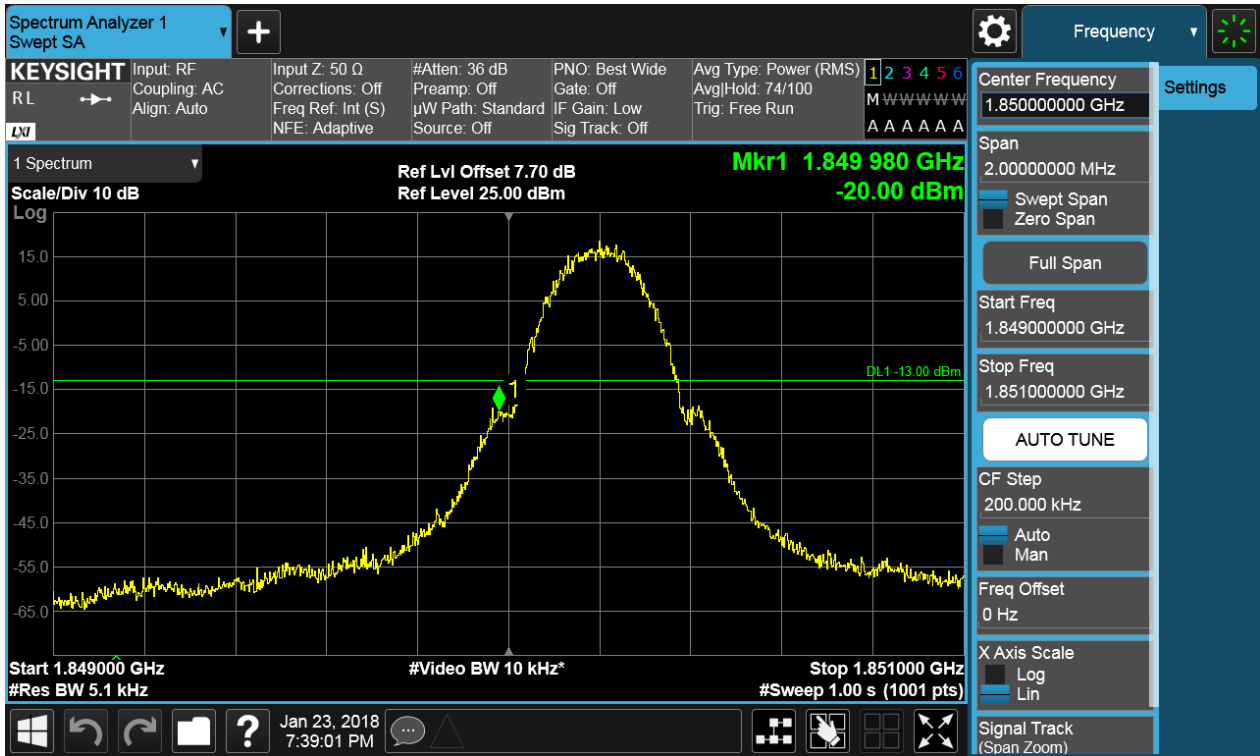




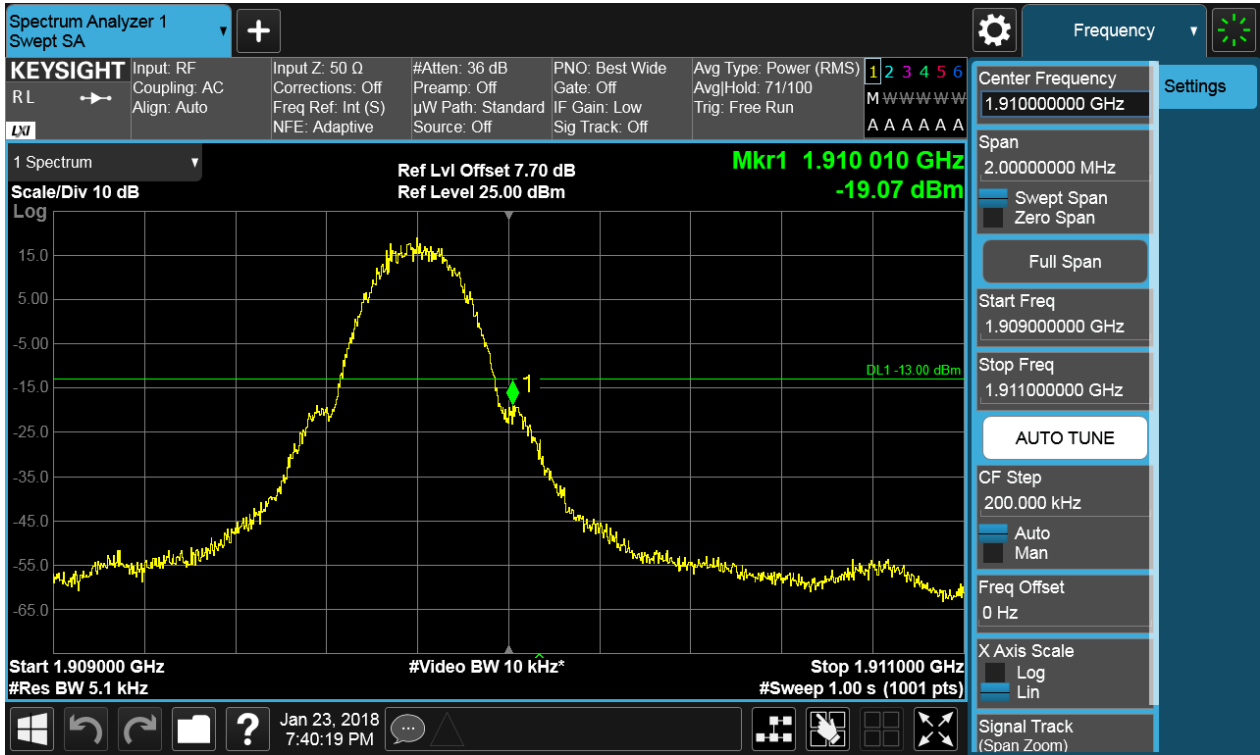
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

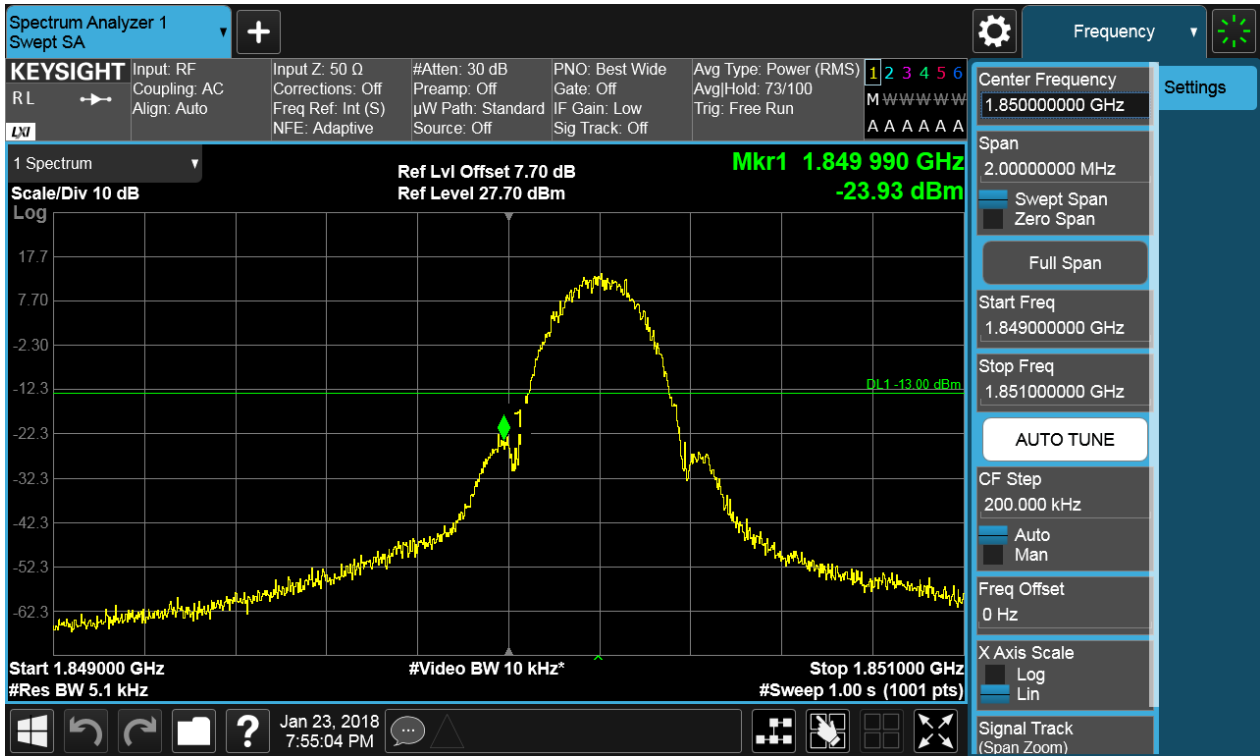


5.1.2.1.2 Test Channel = HCH



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.

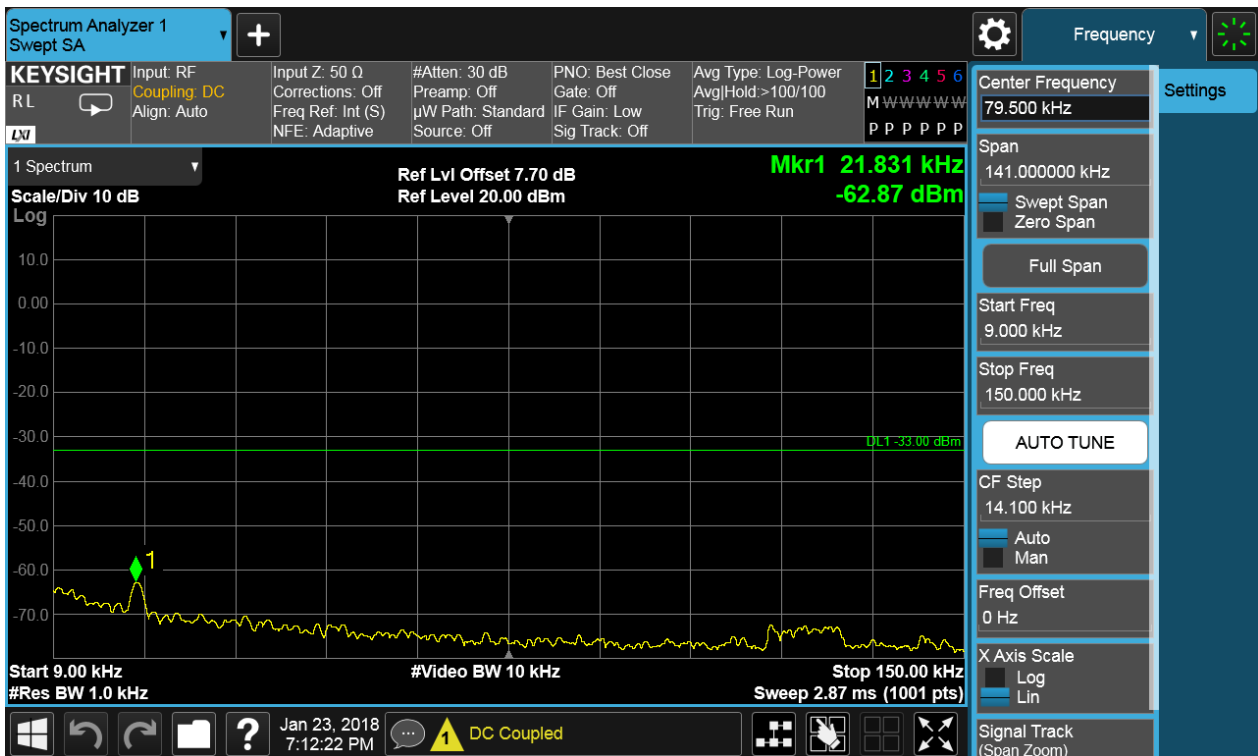
### Part I - Test Plots

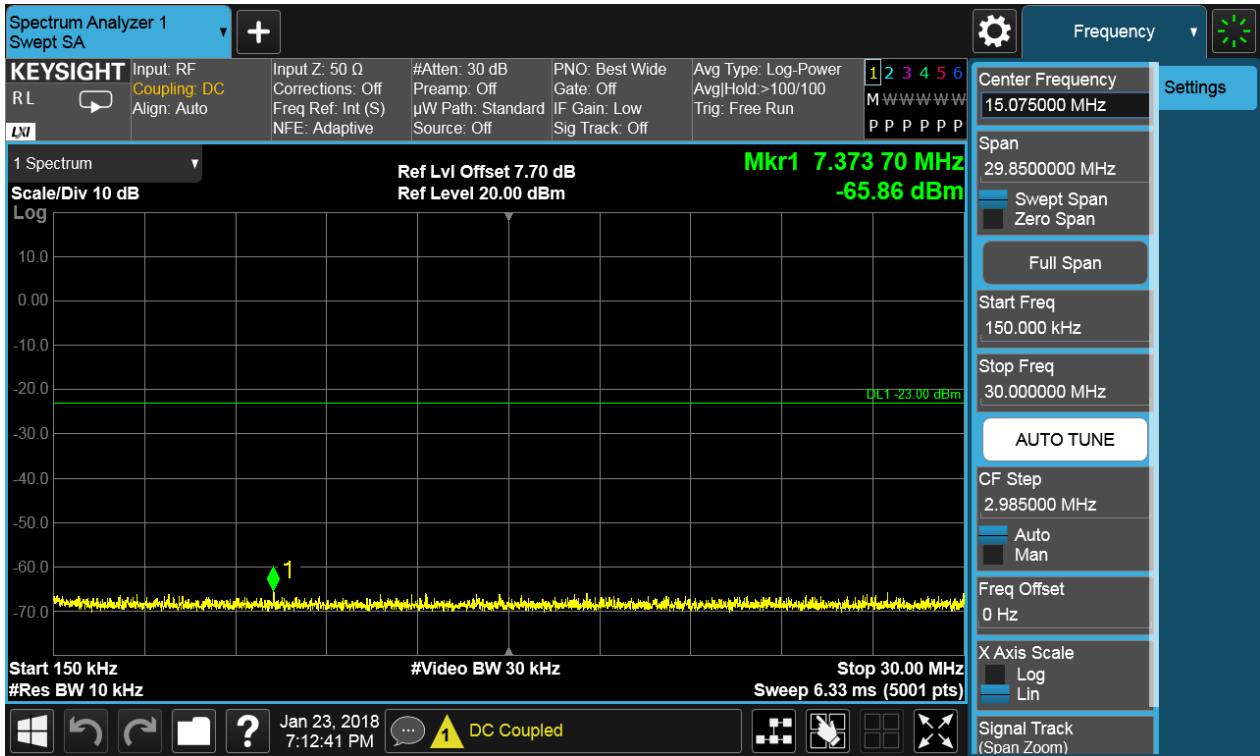
#### 6.1 For GSM

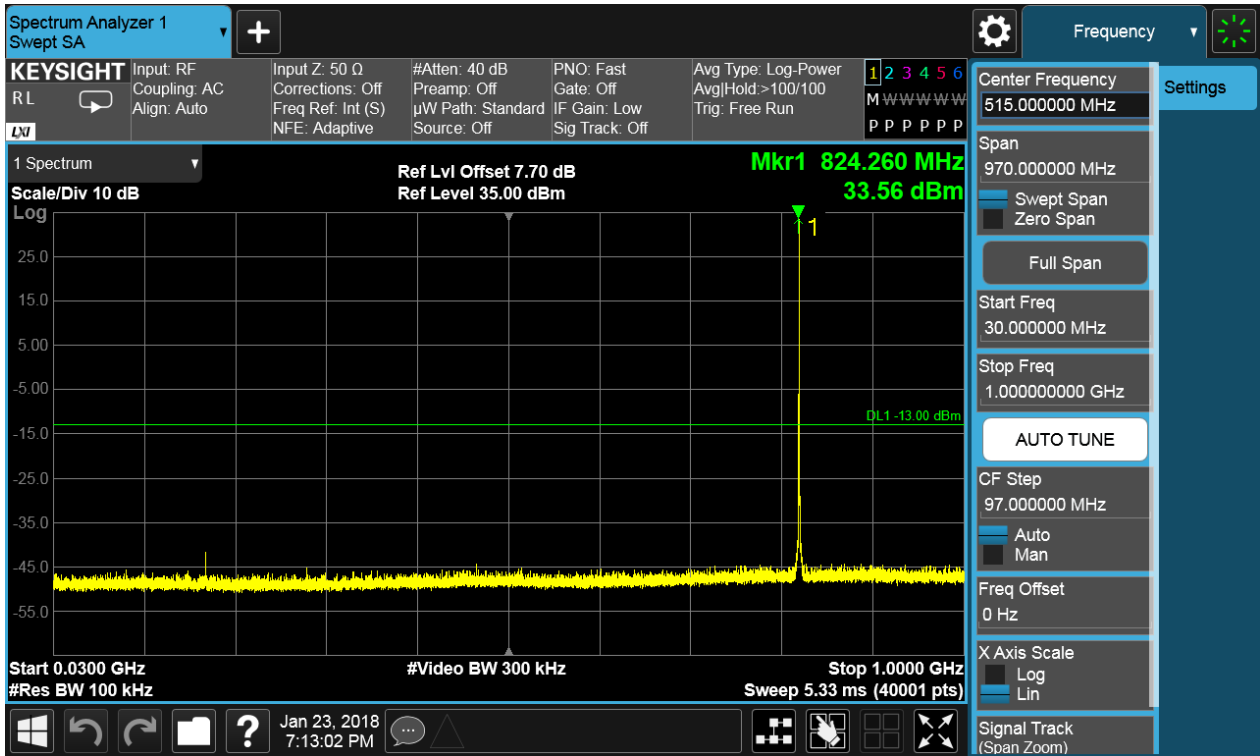
##### 6.1.1 Test Band = GSM850

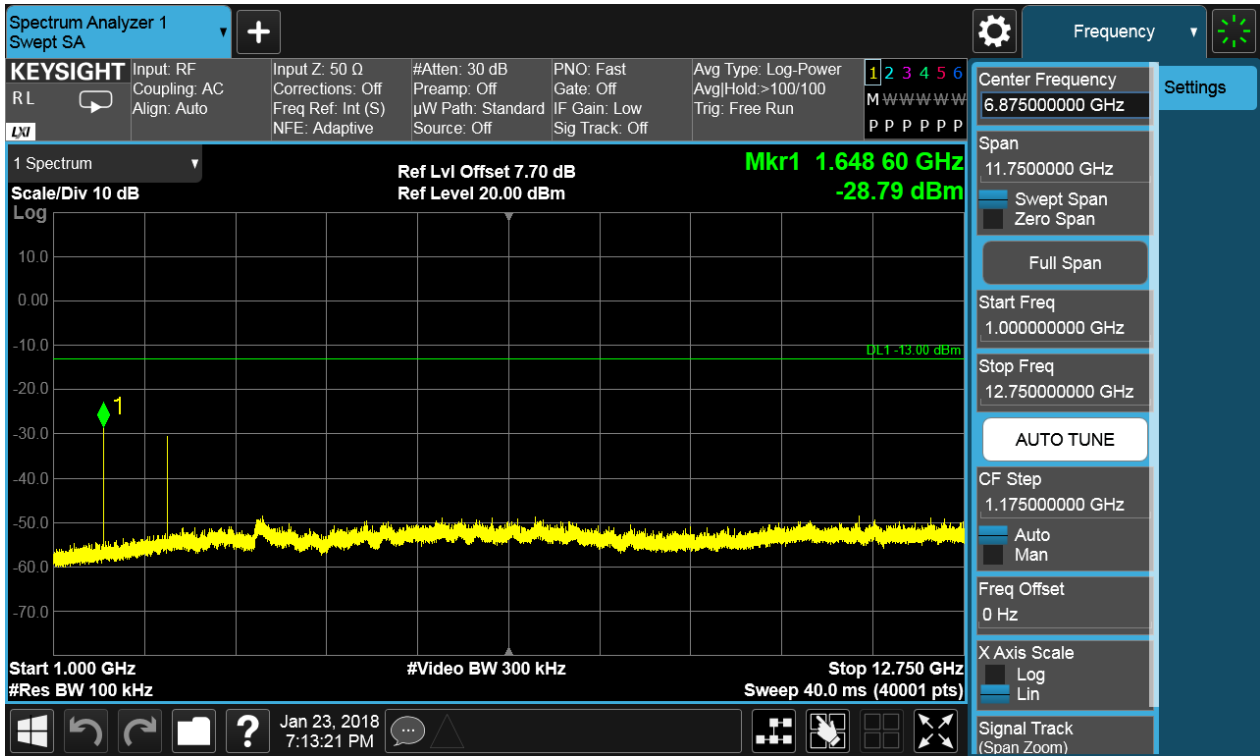
##### 6.1.1.1 Test Mode = GSM/TM1

##### 6.1.1.1.1 Test Channel = LCH



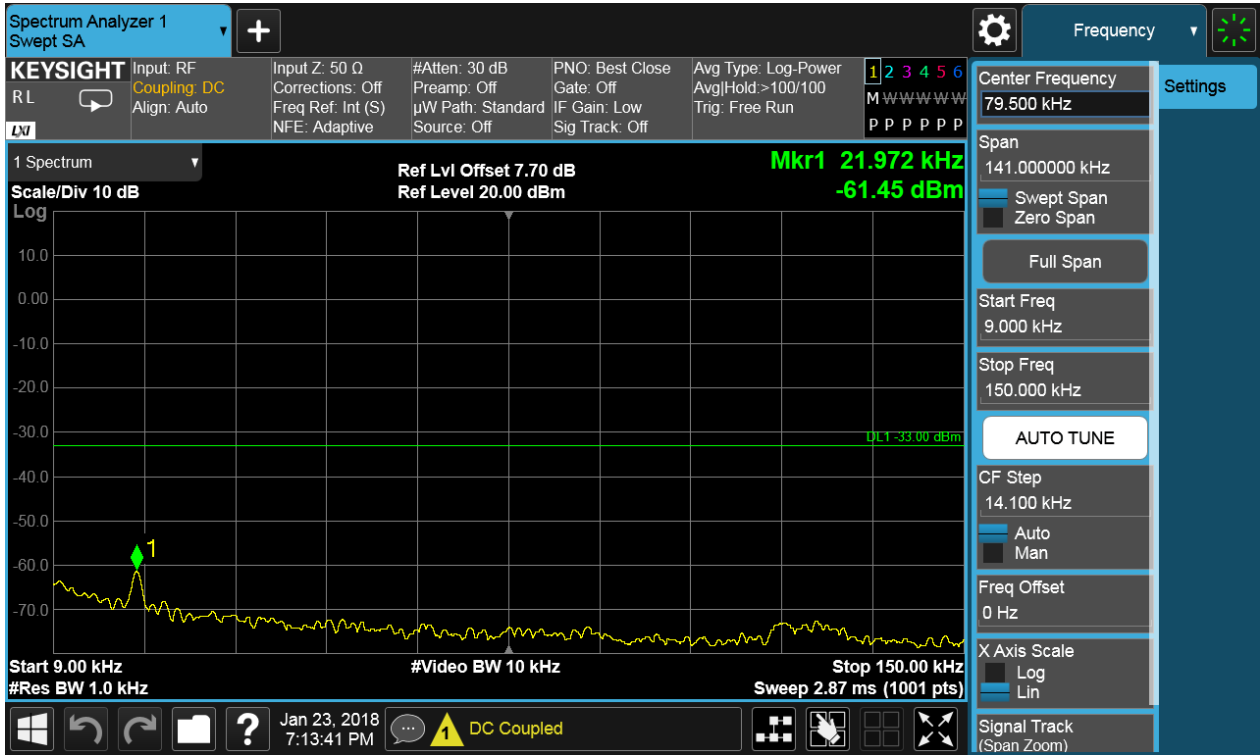


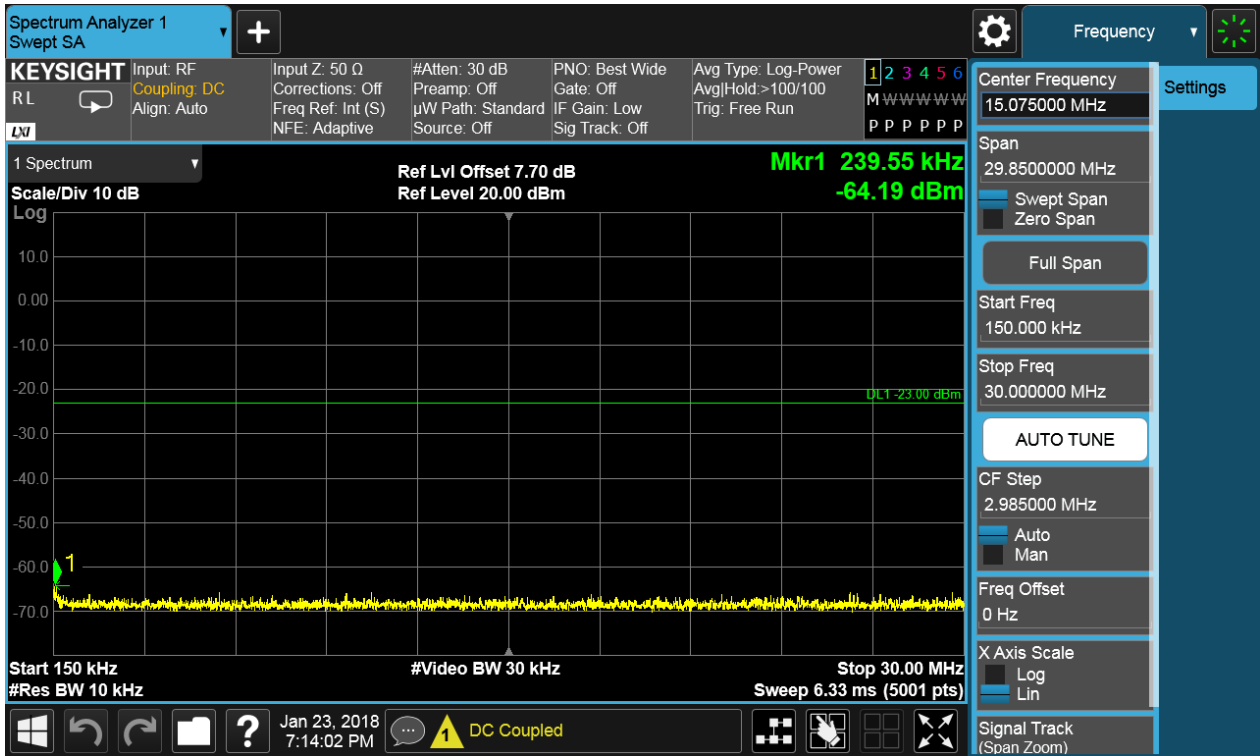


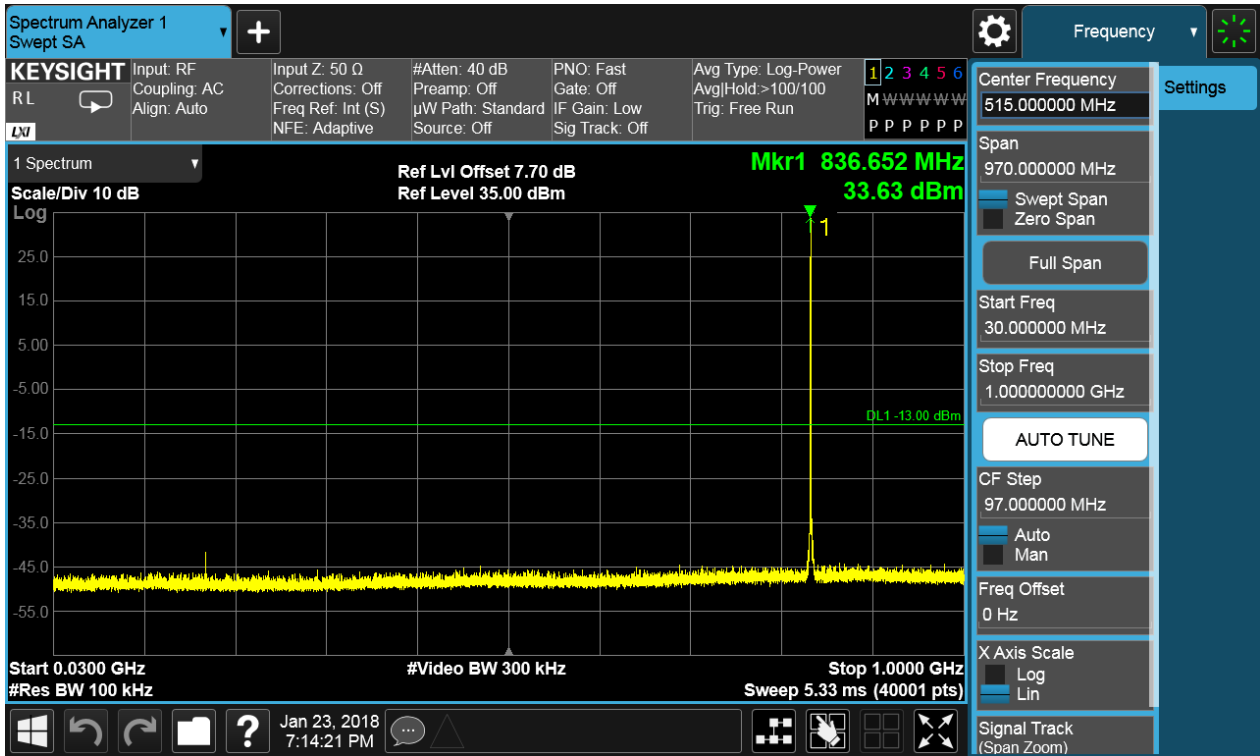


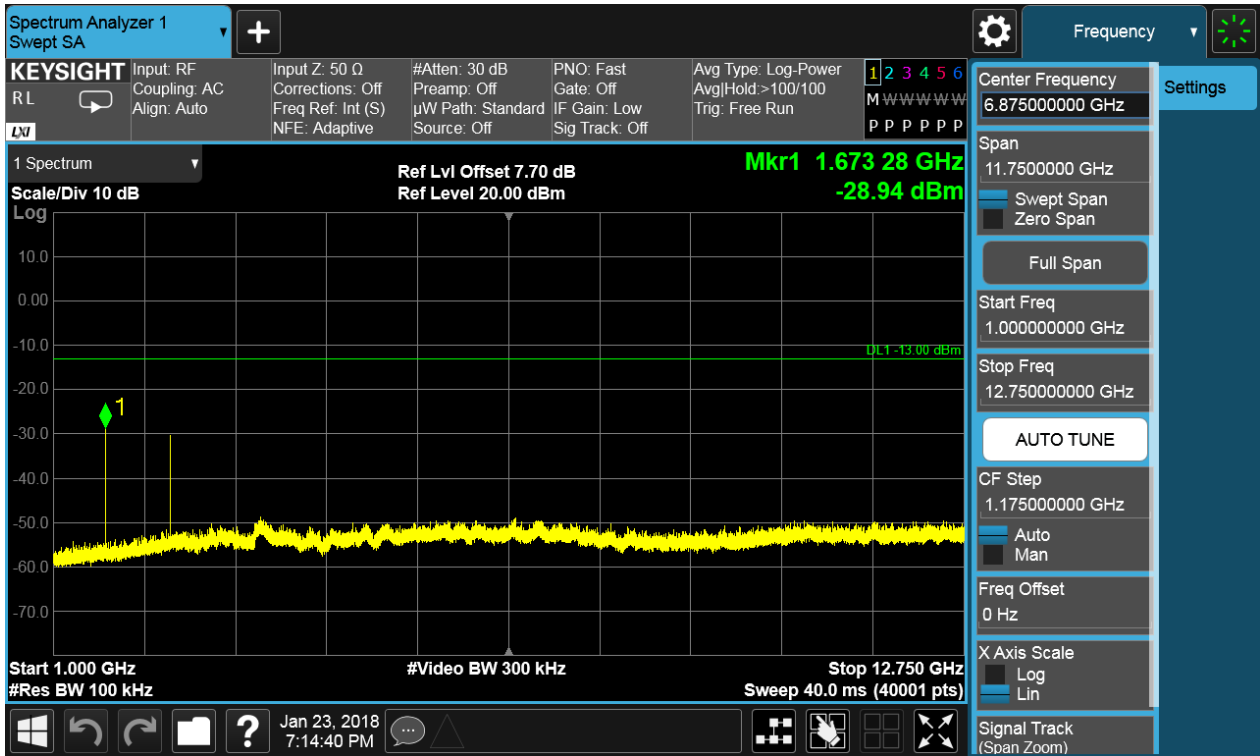


6.1.1.1.2 Test Channel = MCH

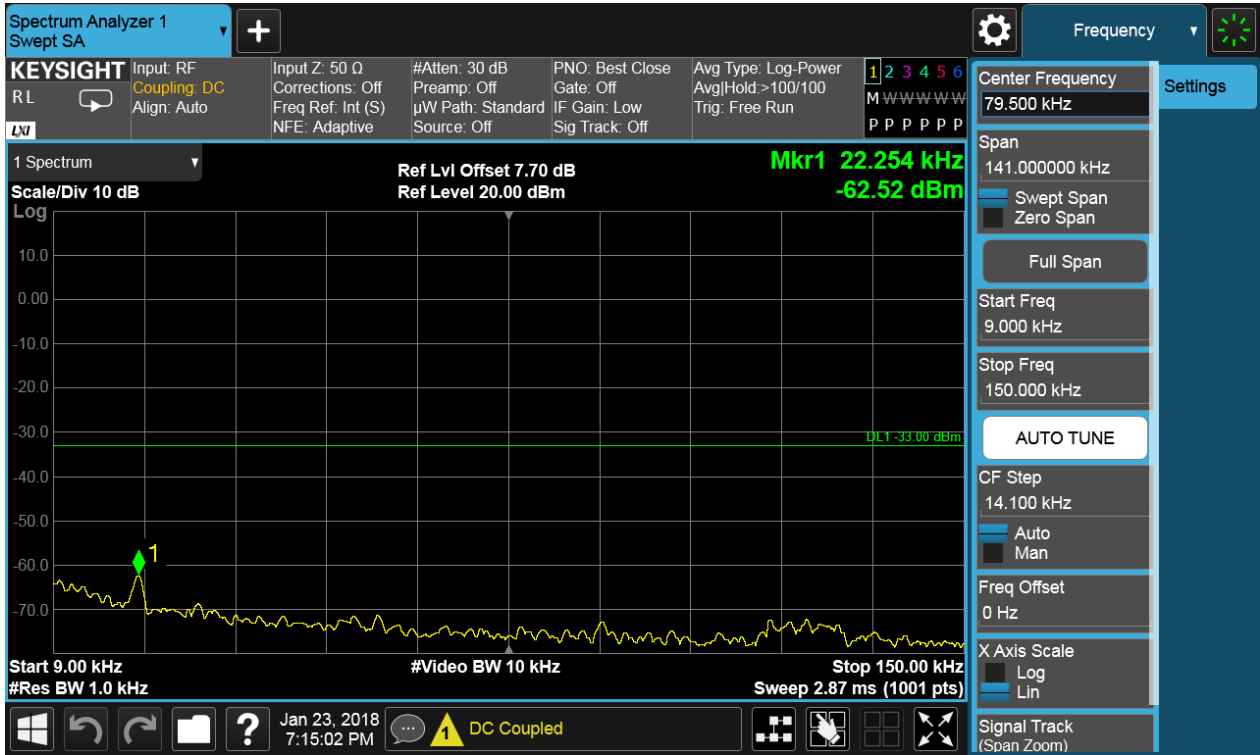


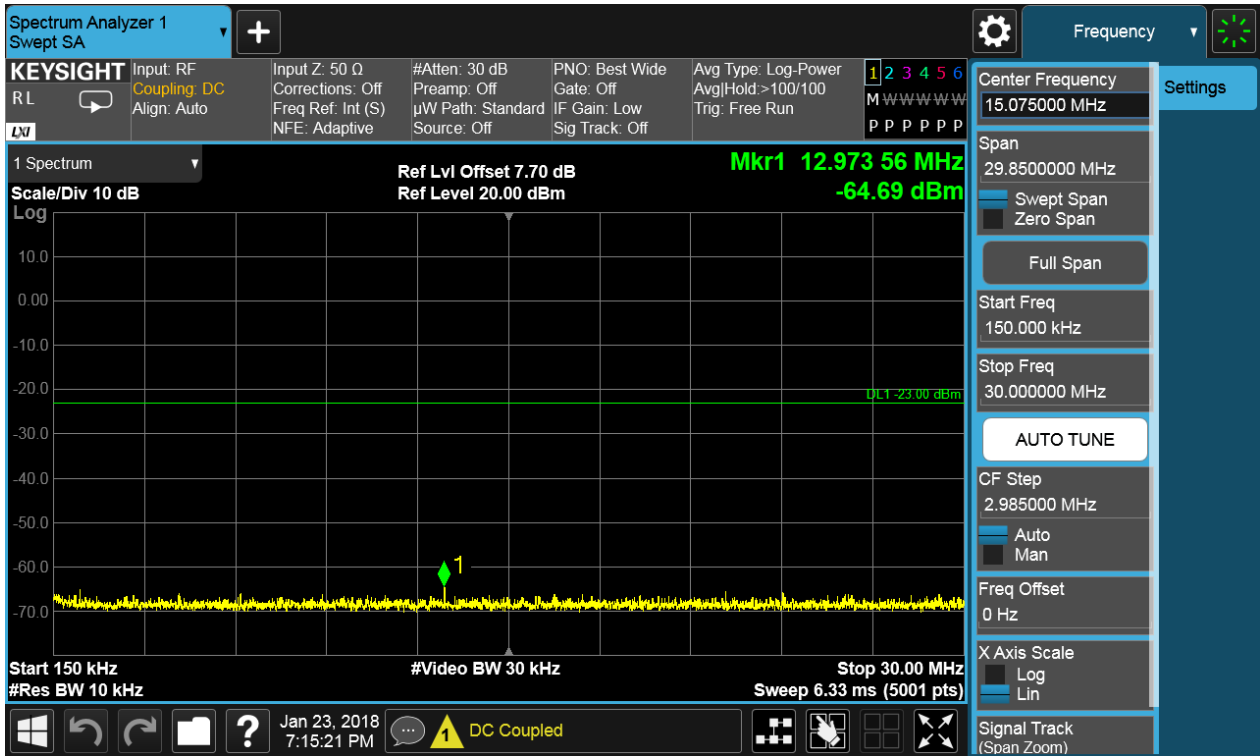


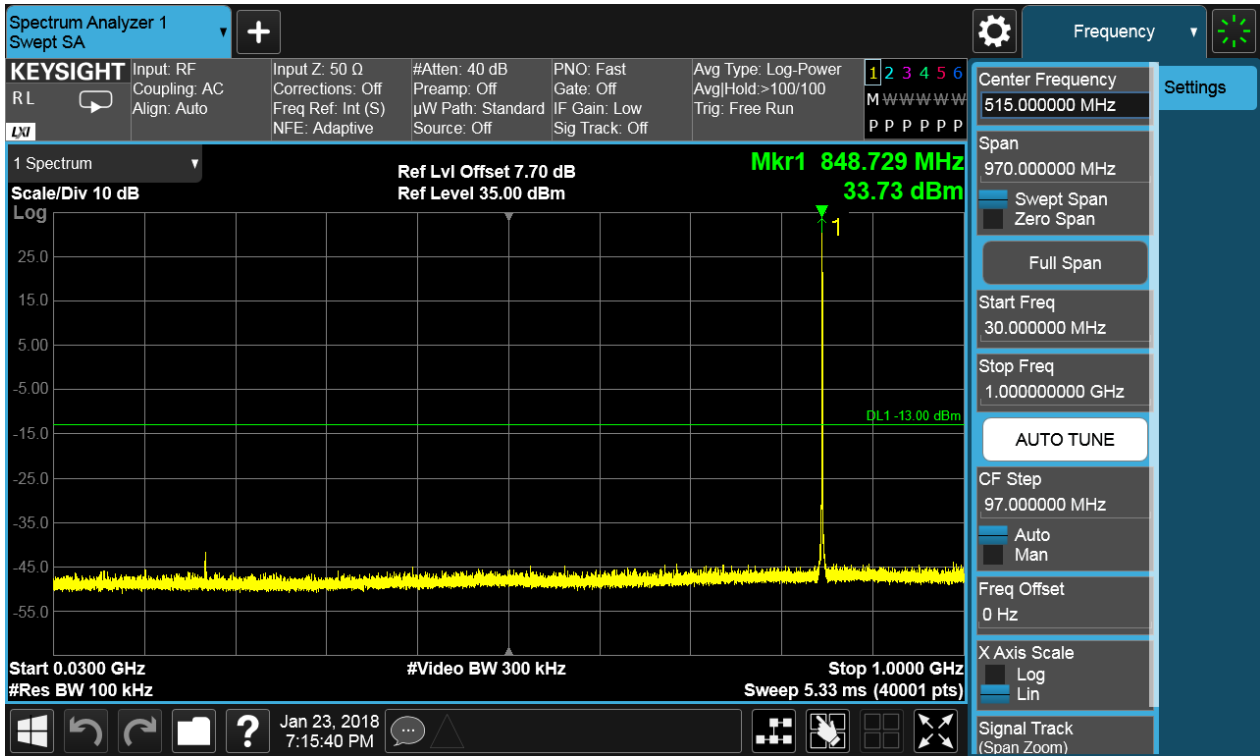


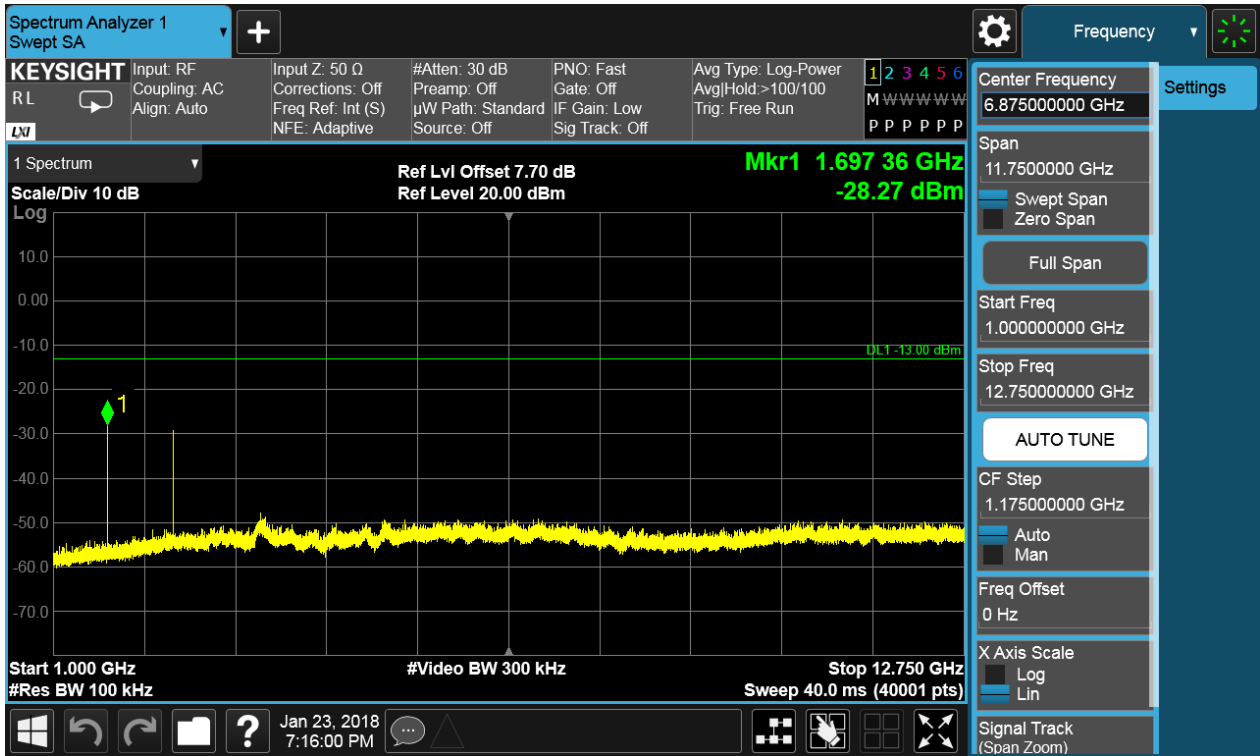


## 6.1.1.1.3 Test Channel = HCH







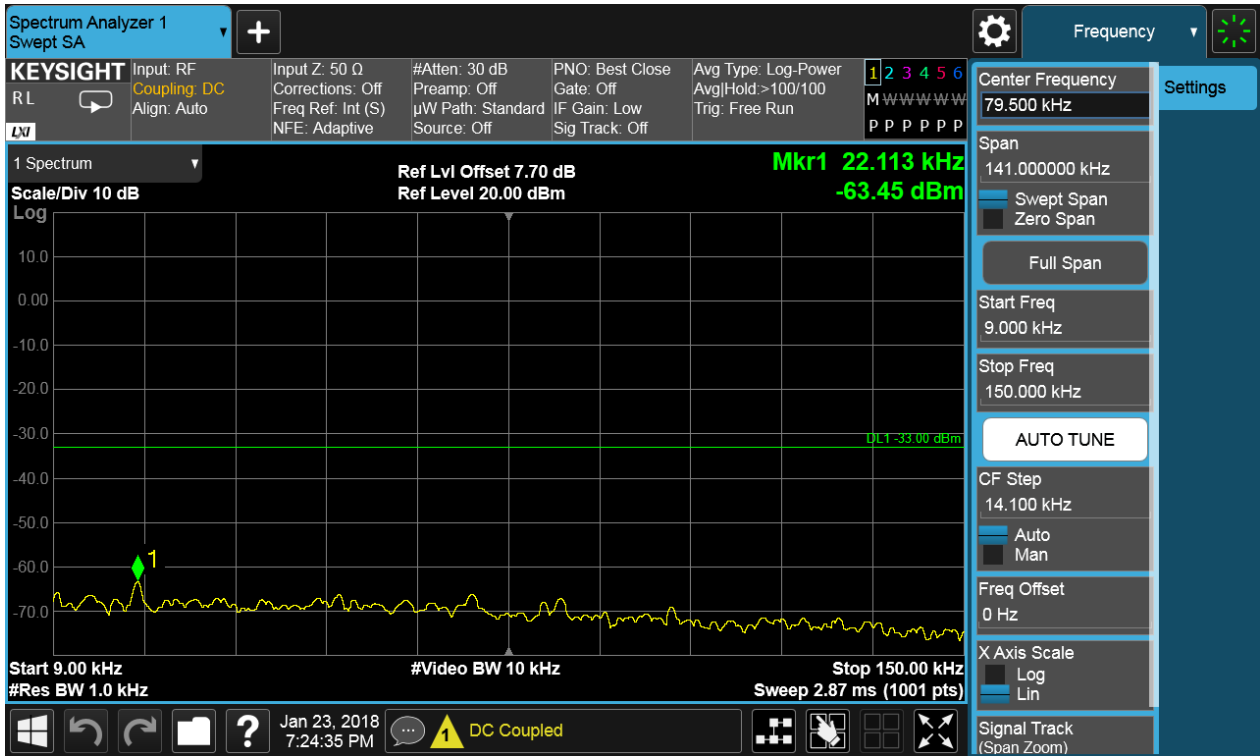


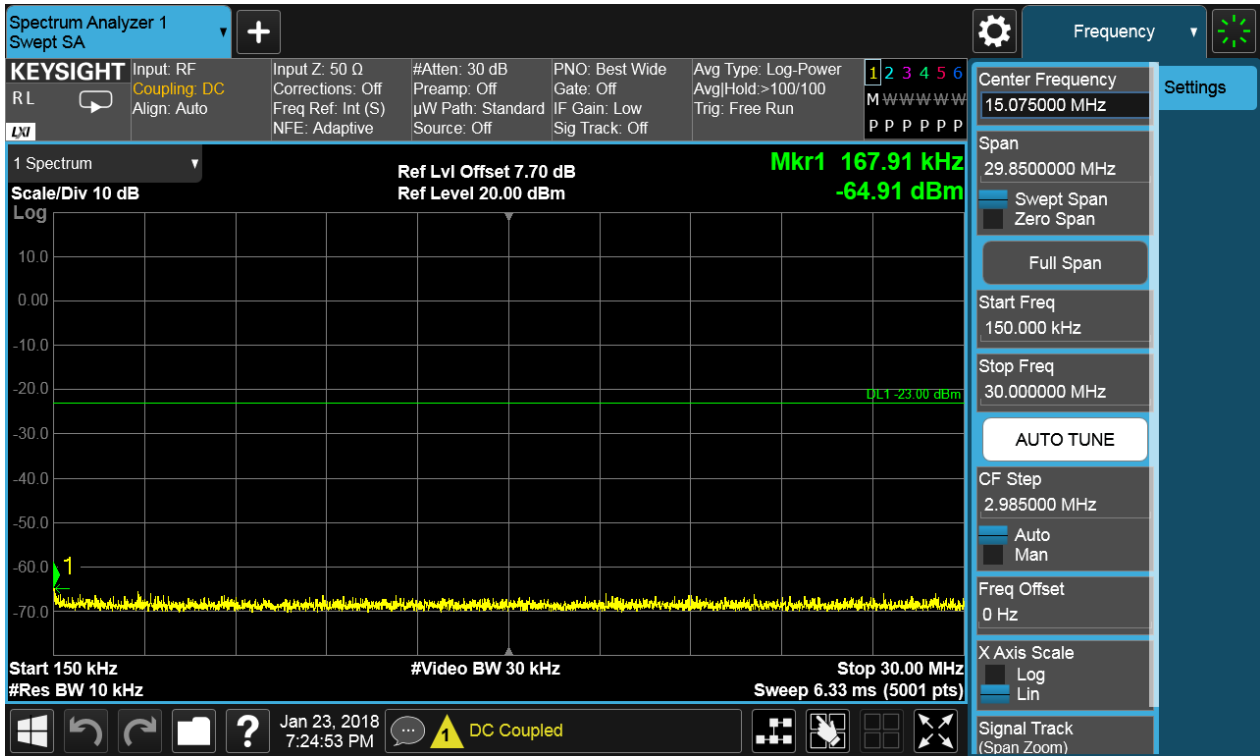


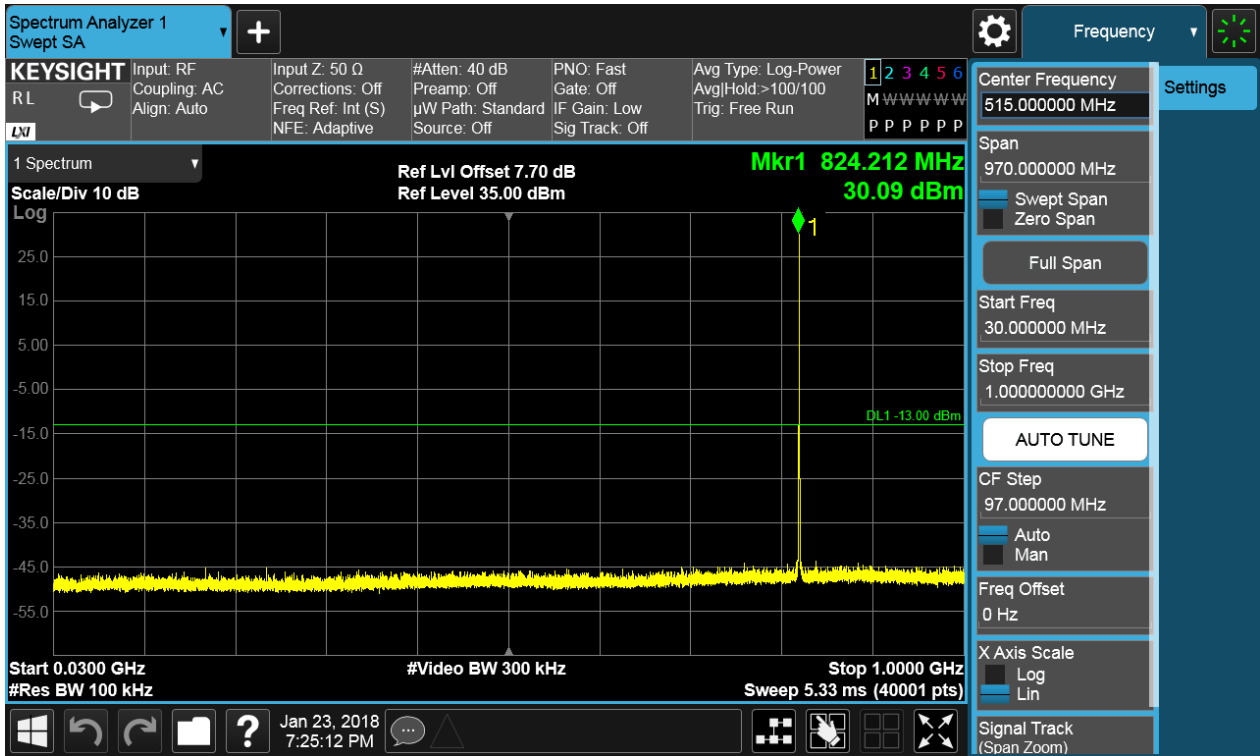


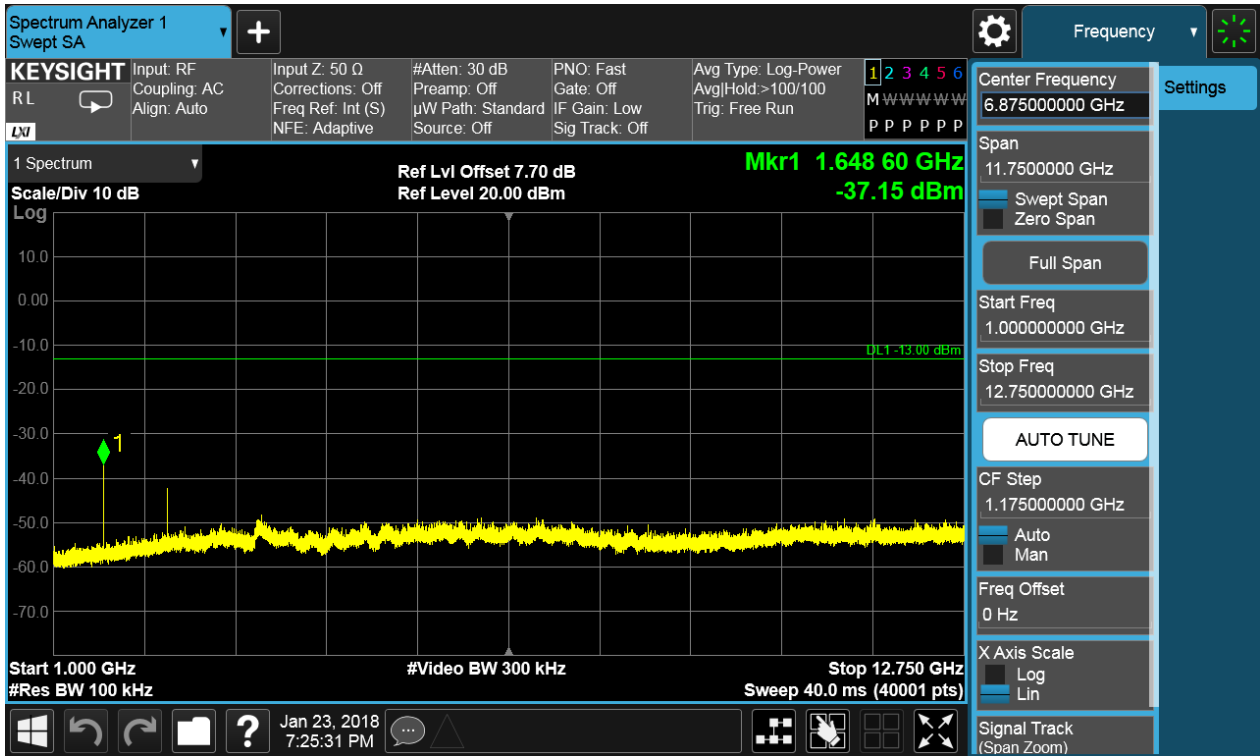
### 6.1.1.2 Test Mode = GSM/TM2

#### 6.1.1.2.1 Test Channel = LCH

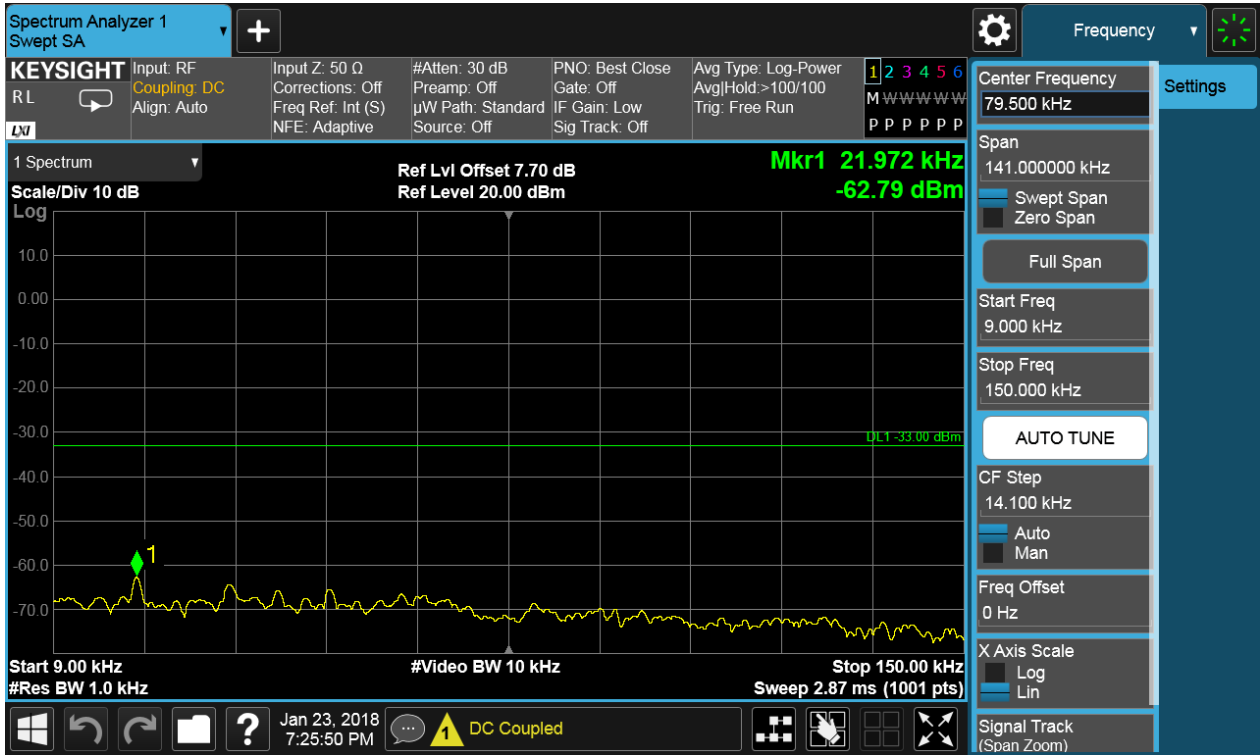


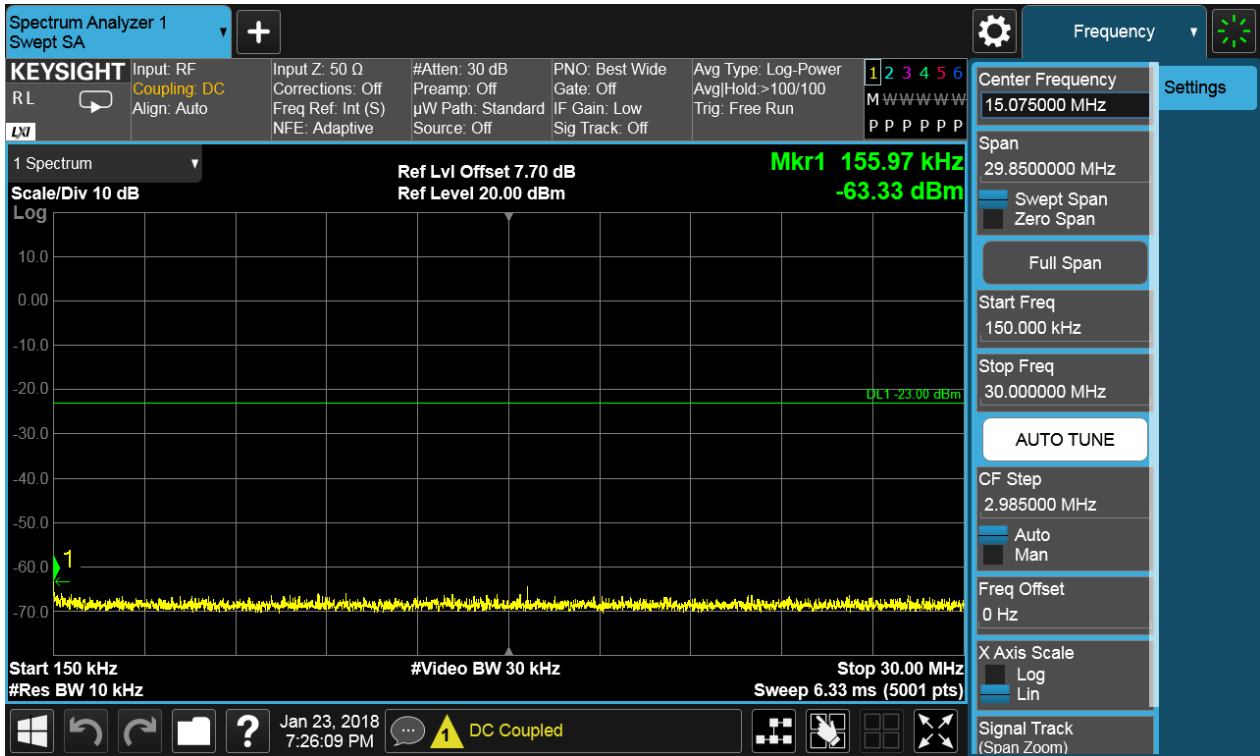


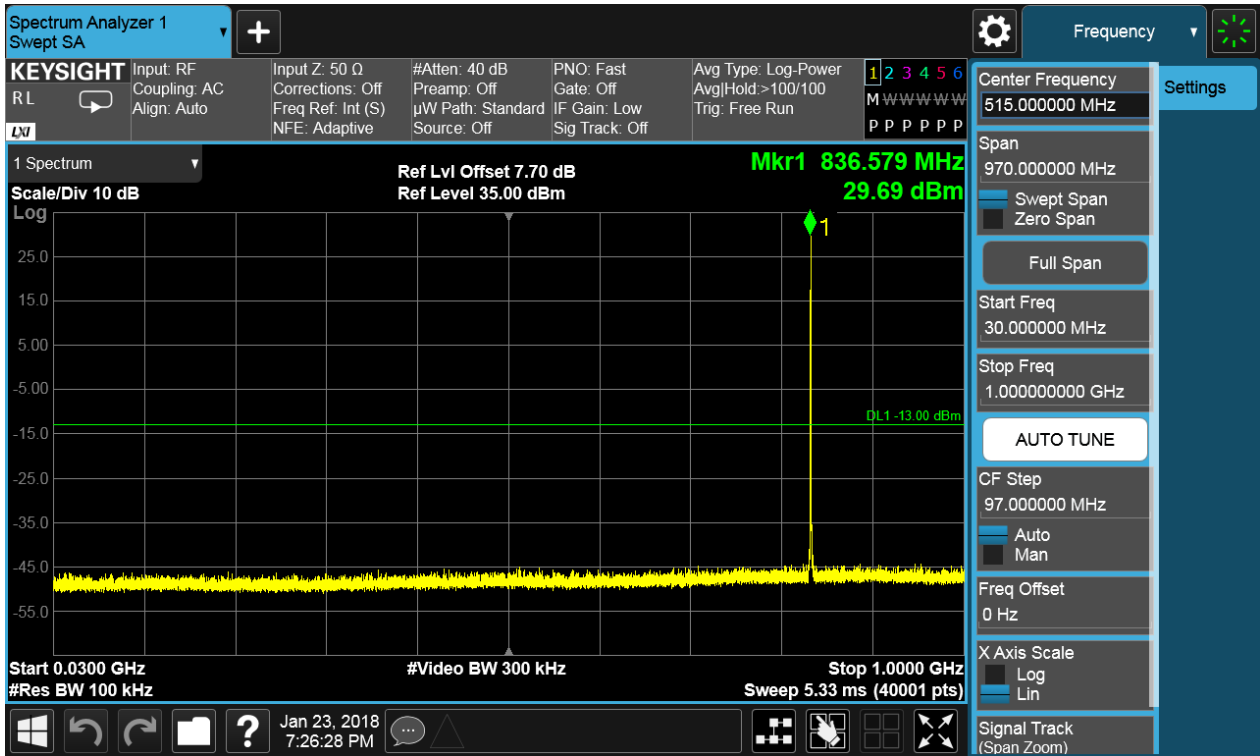


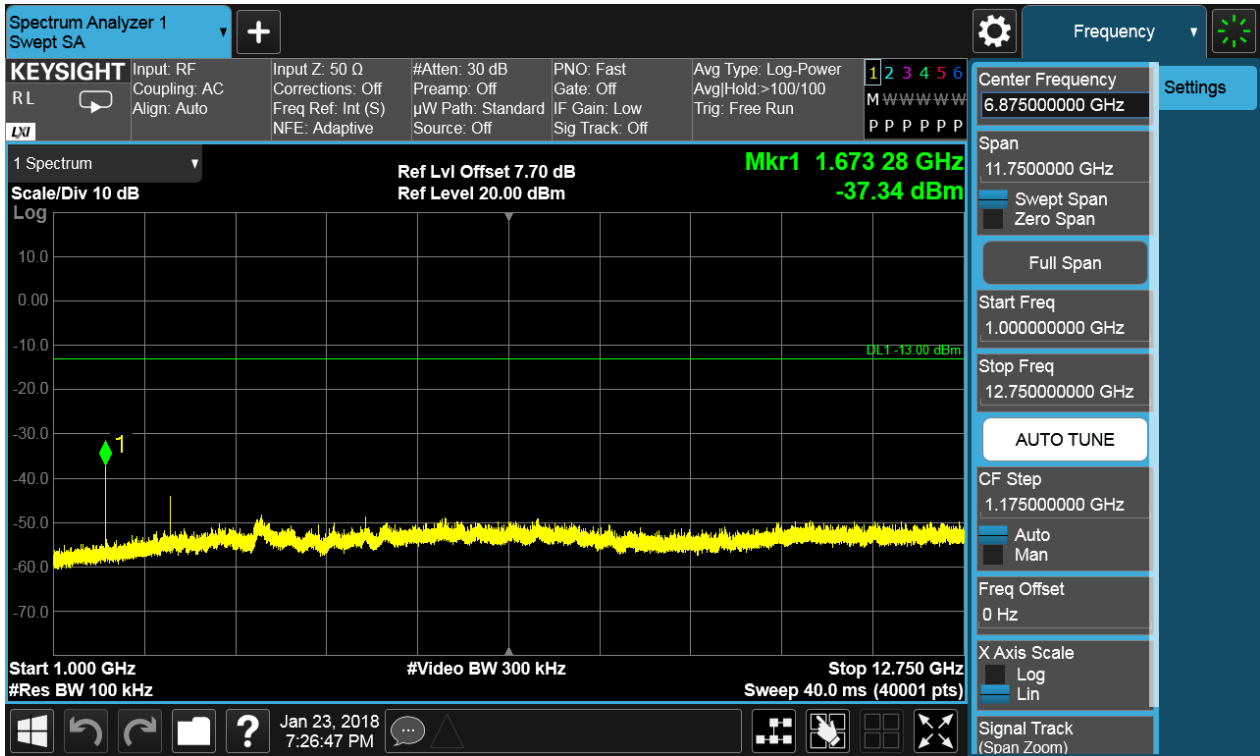


6.1.1.2.2 Test Channel = MCH



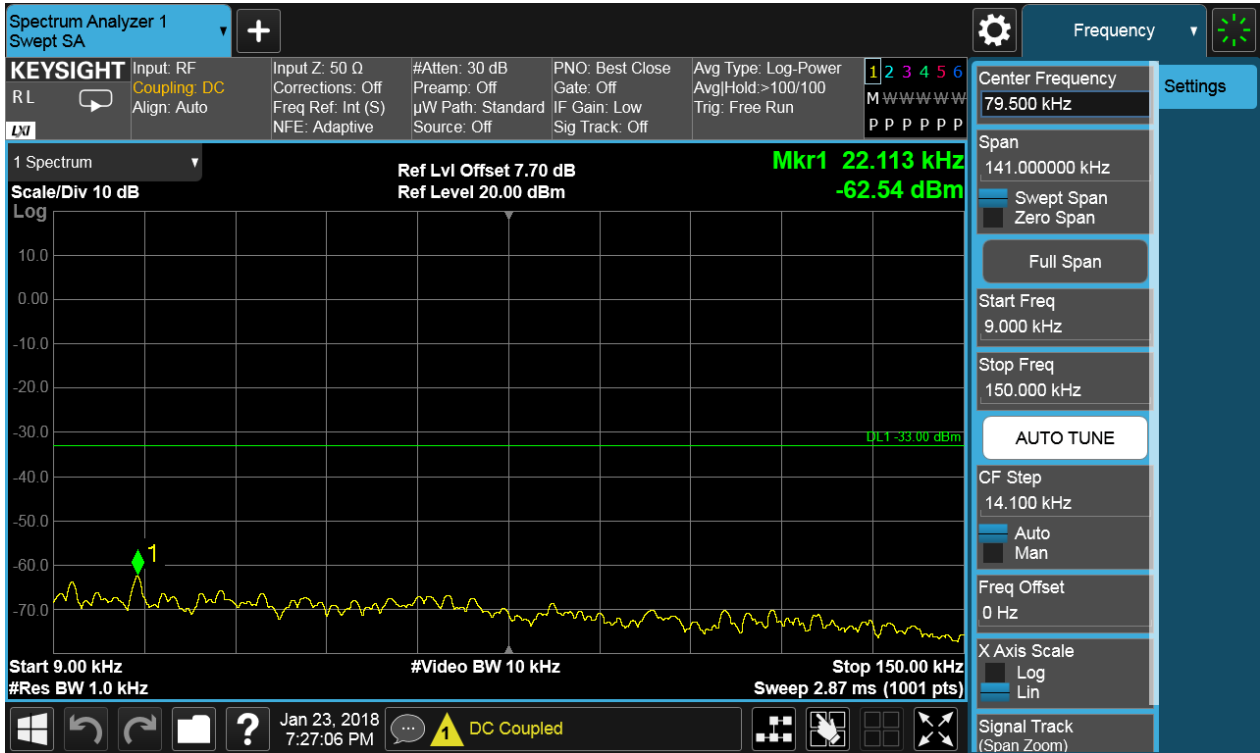


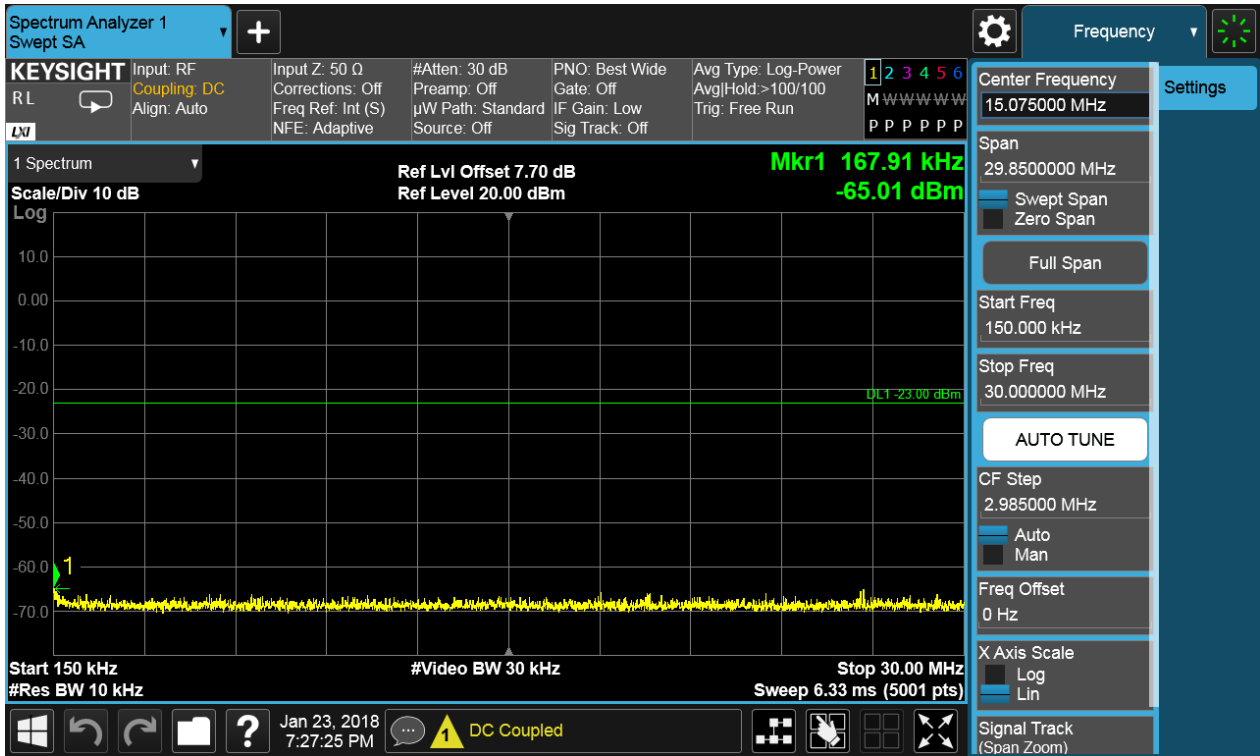


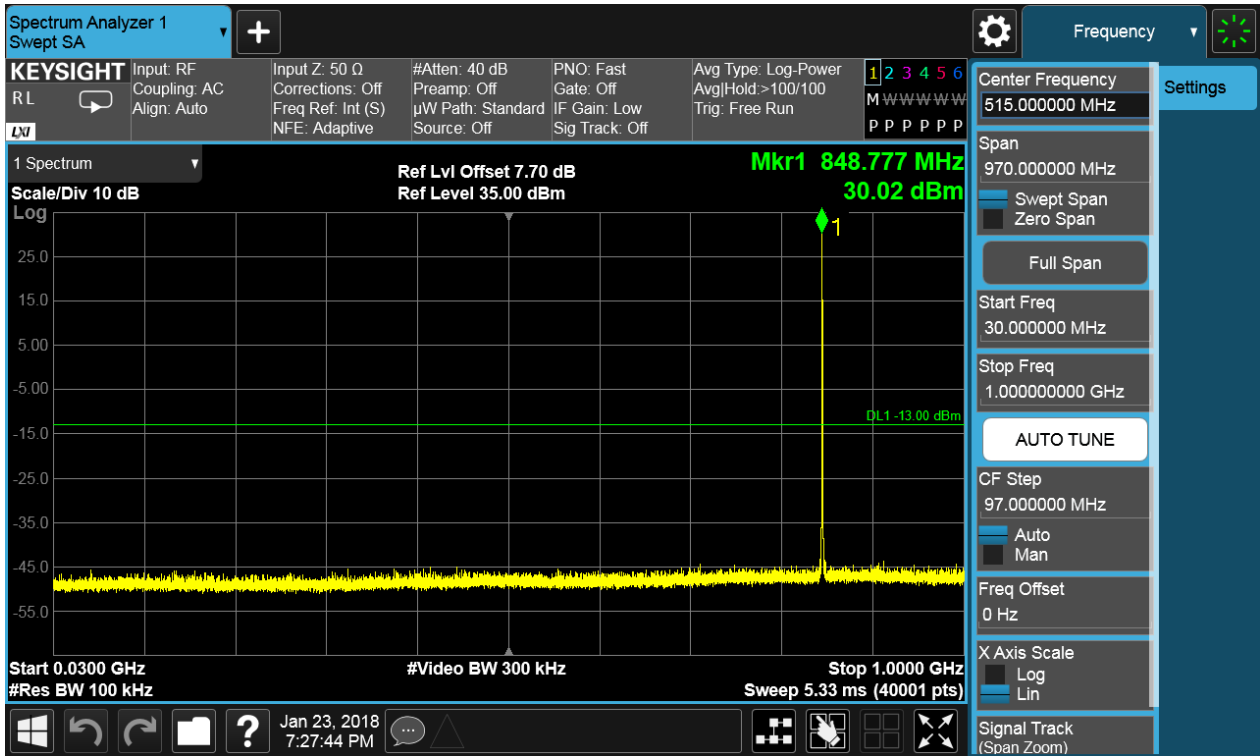


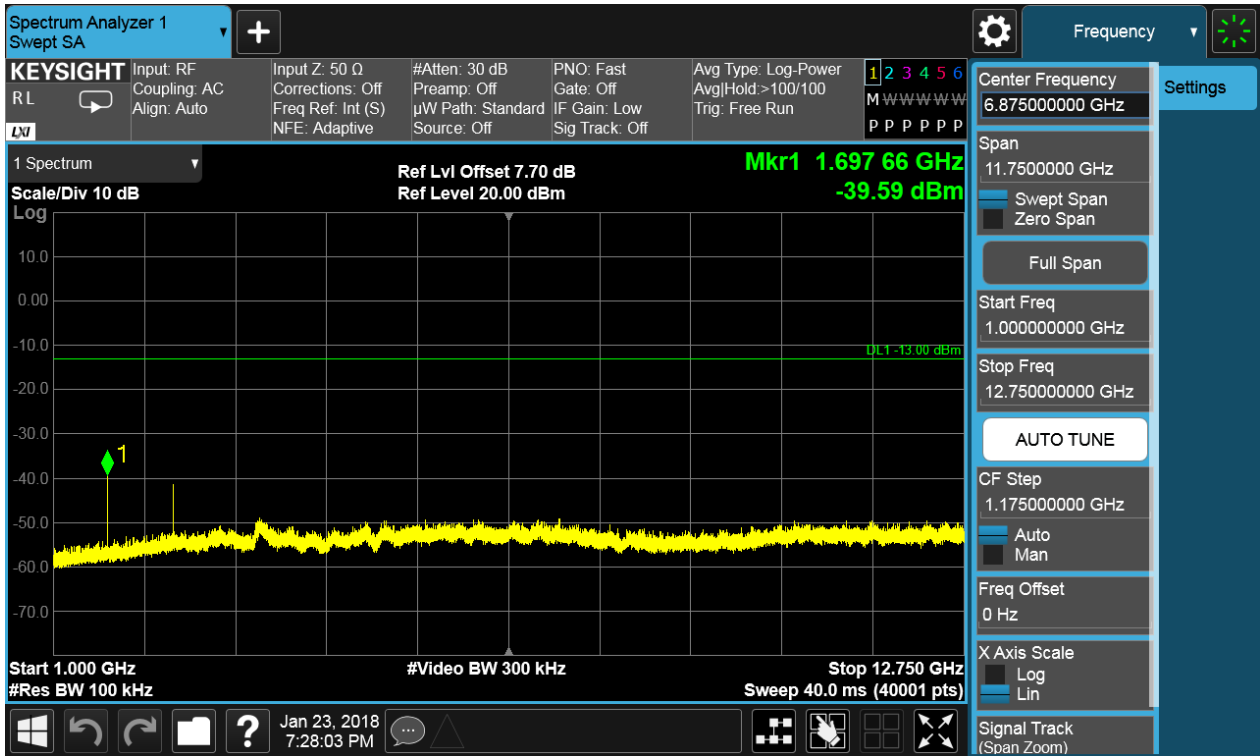


## 6.1.1.2.3 Test Channel = HCH





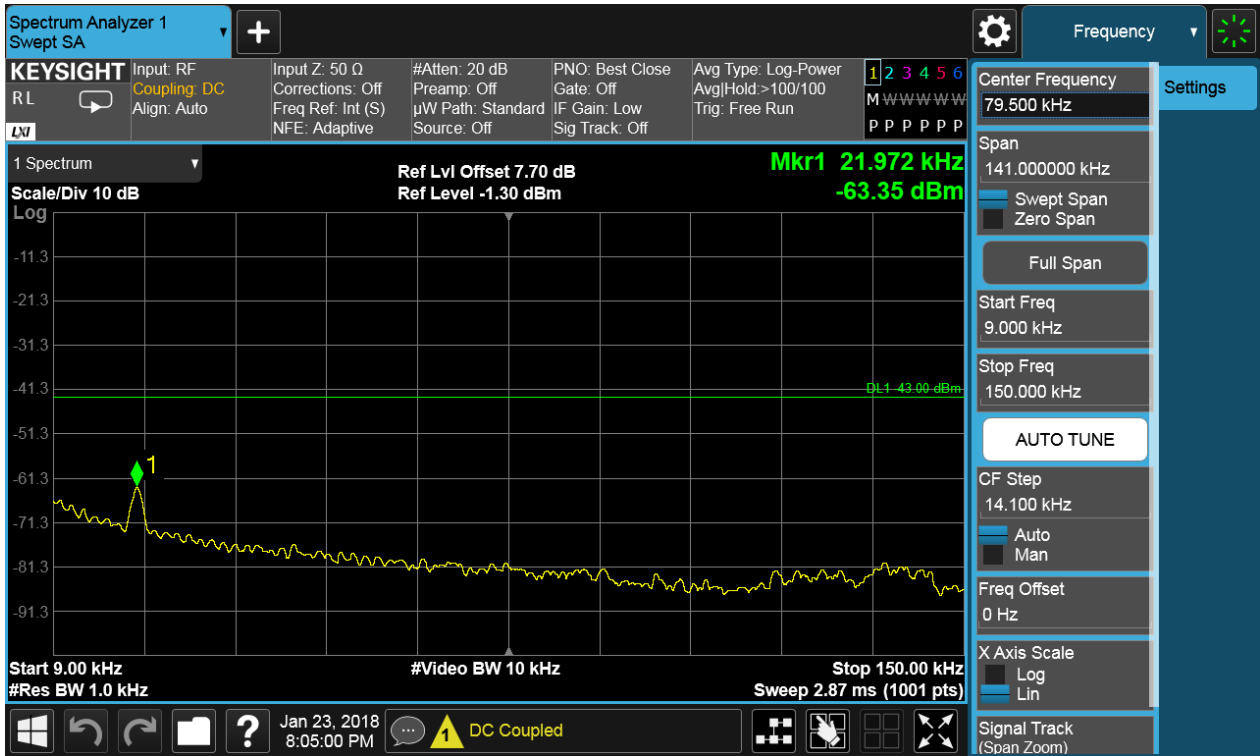


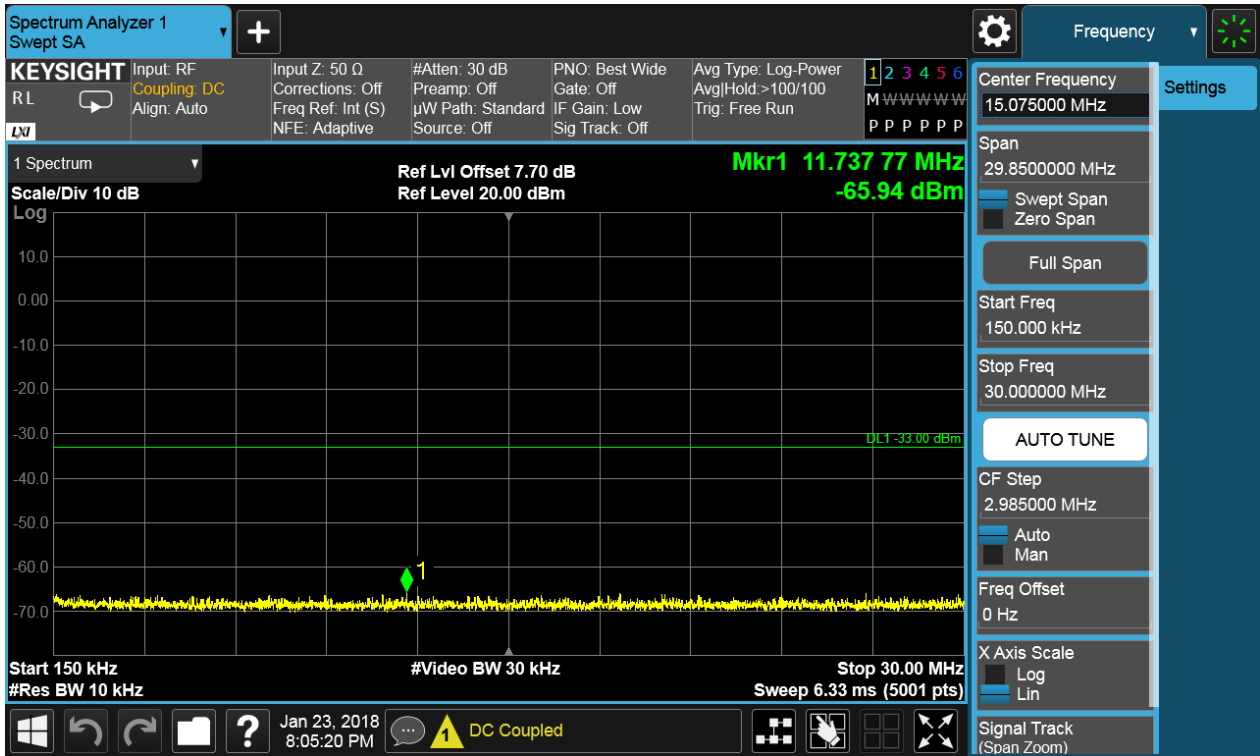


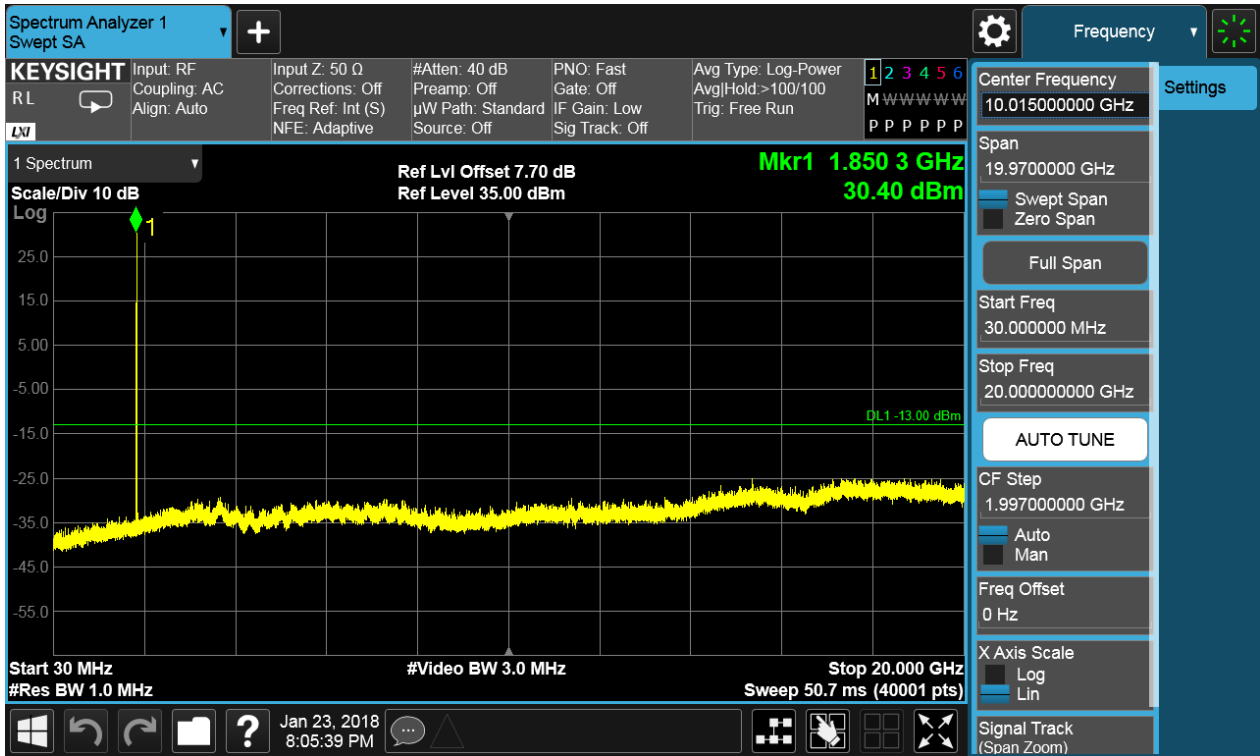
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

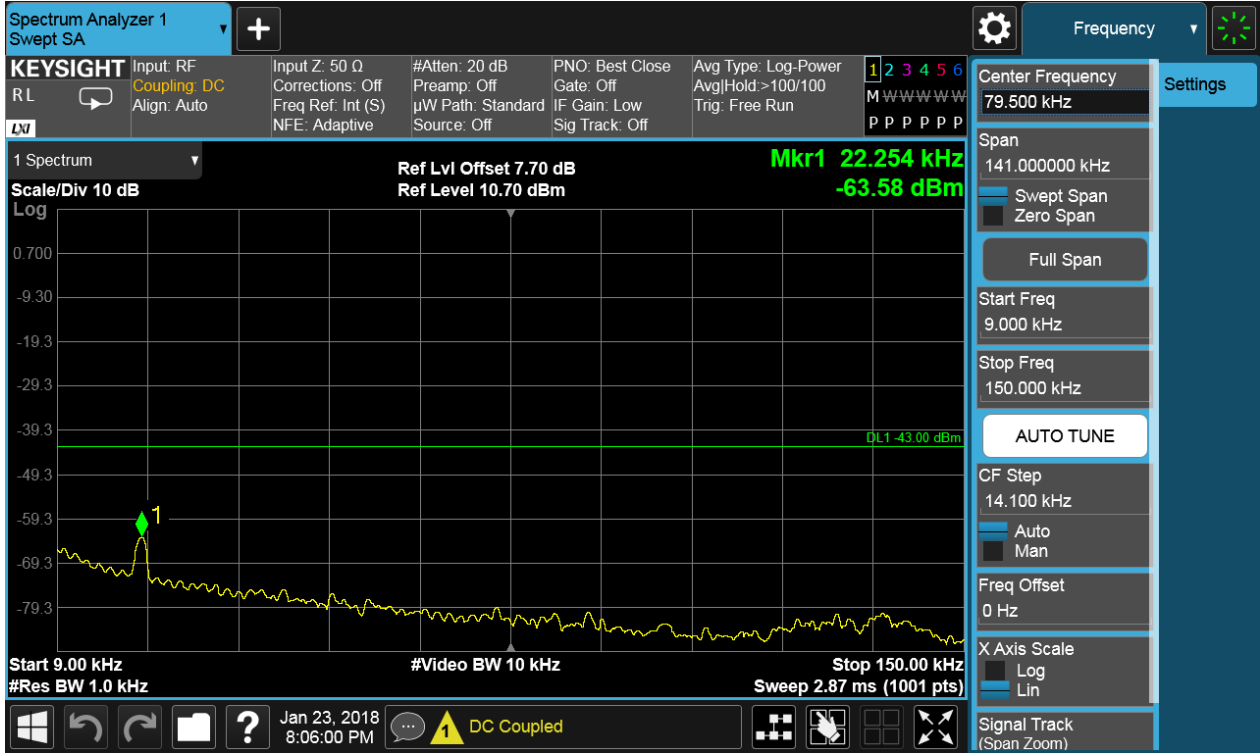
6.1.2.1.1 Test Channel = LCH



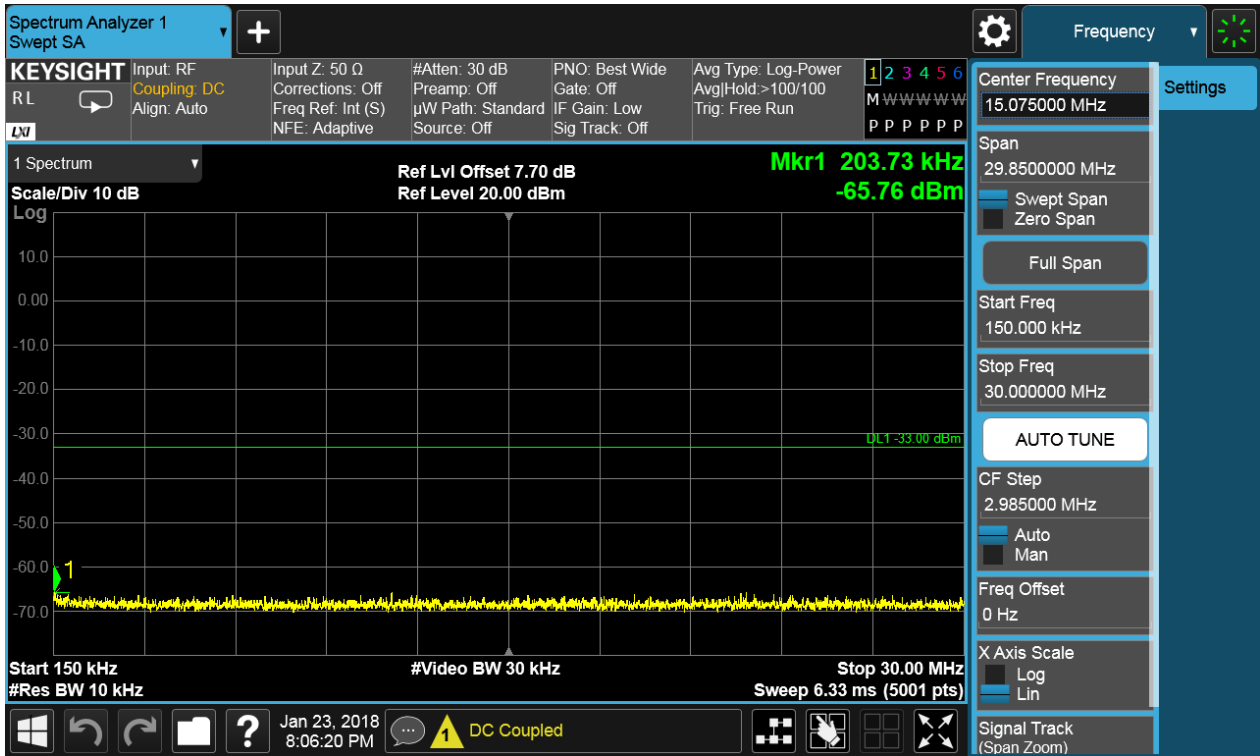


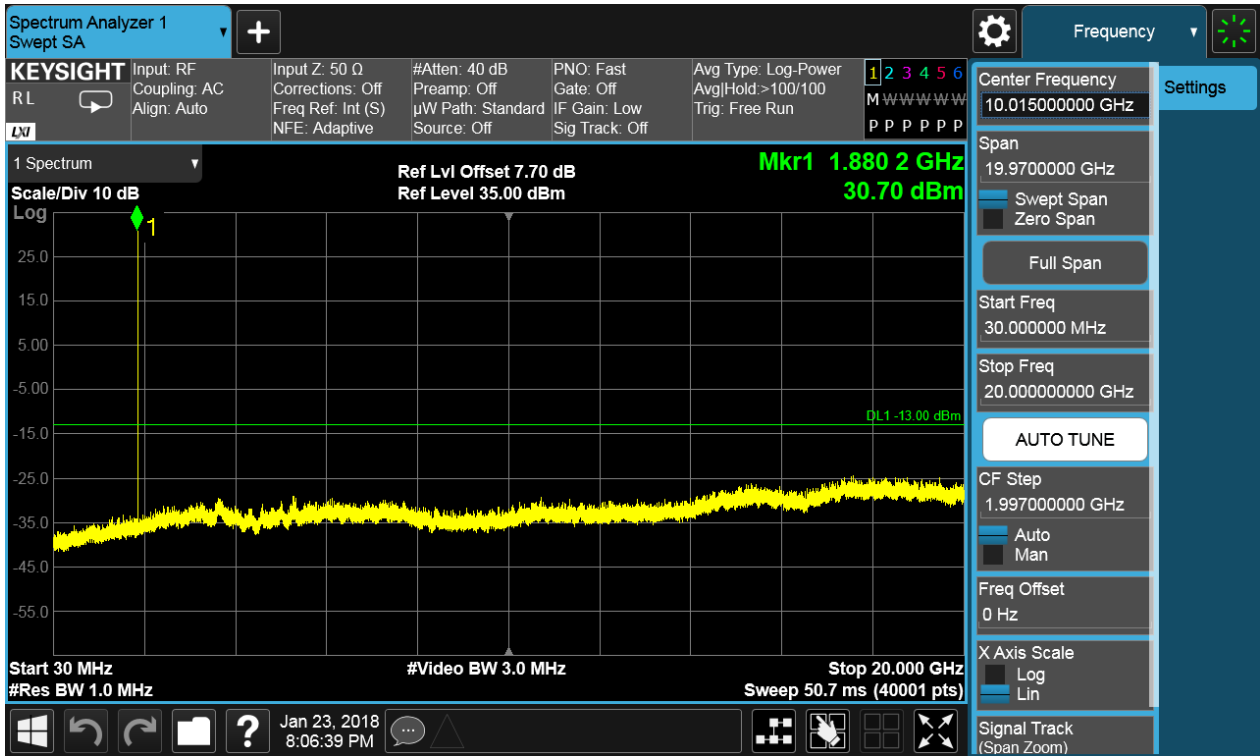


## 6.1.2.1.2 Test Channel = MCH

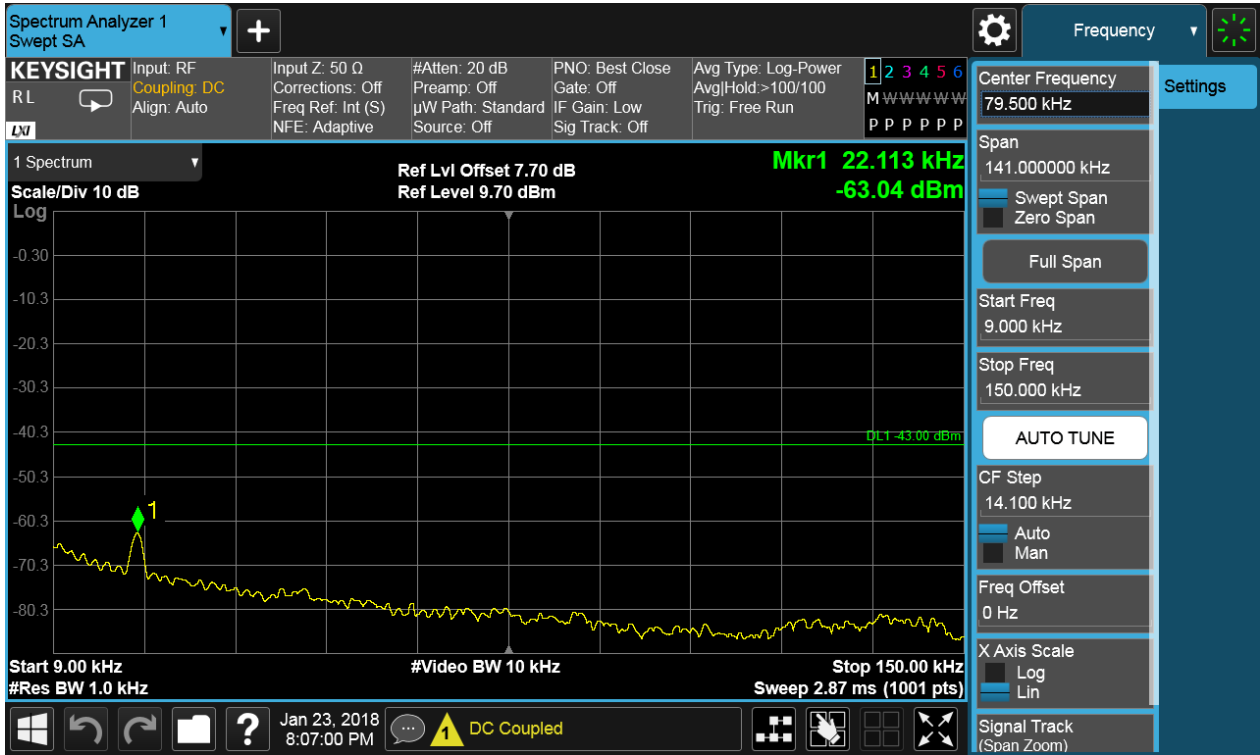


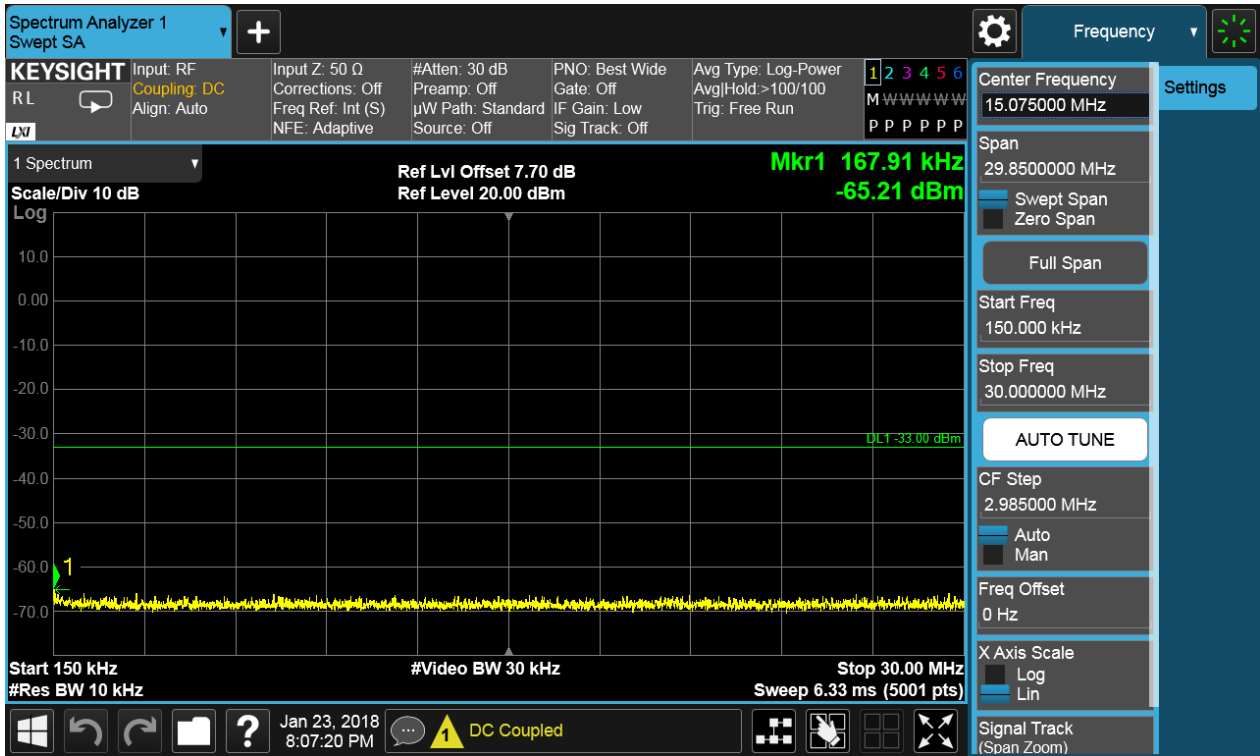


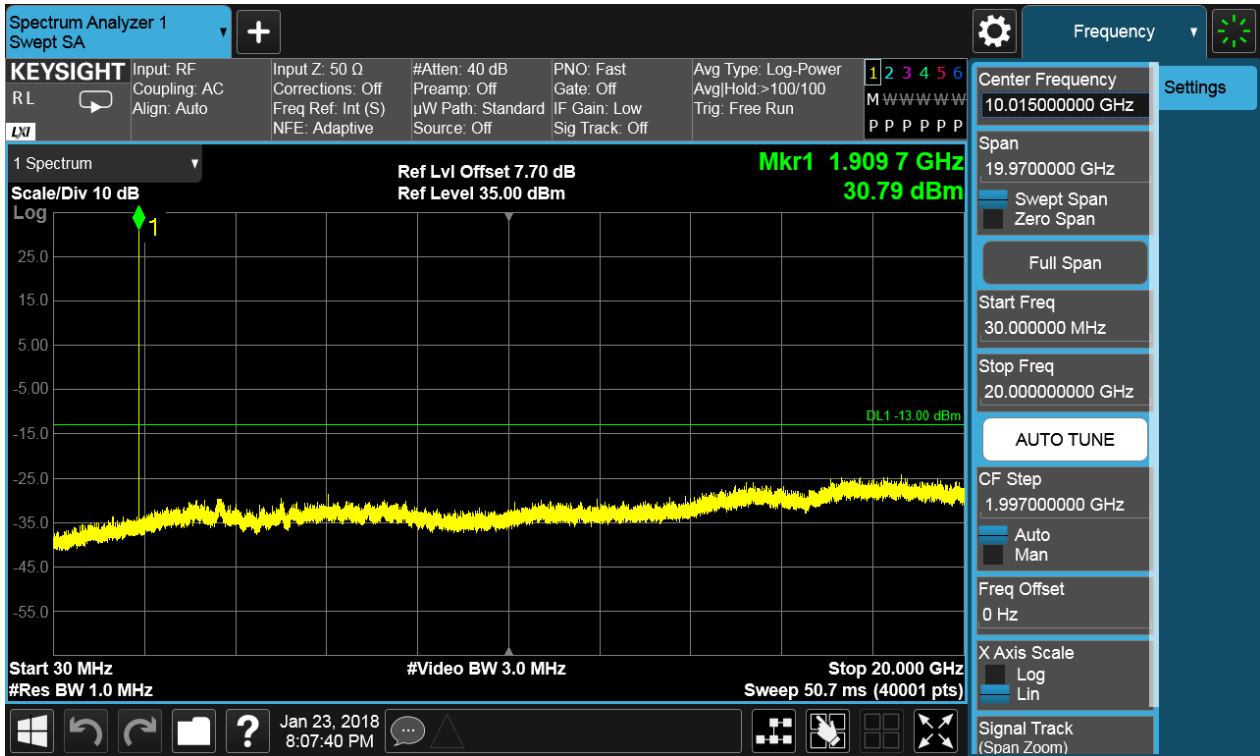




## 6.1.2.1.3 Test Channel = HCH

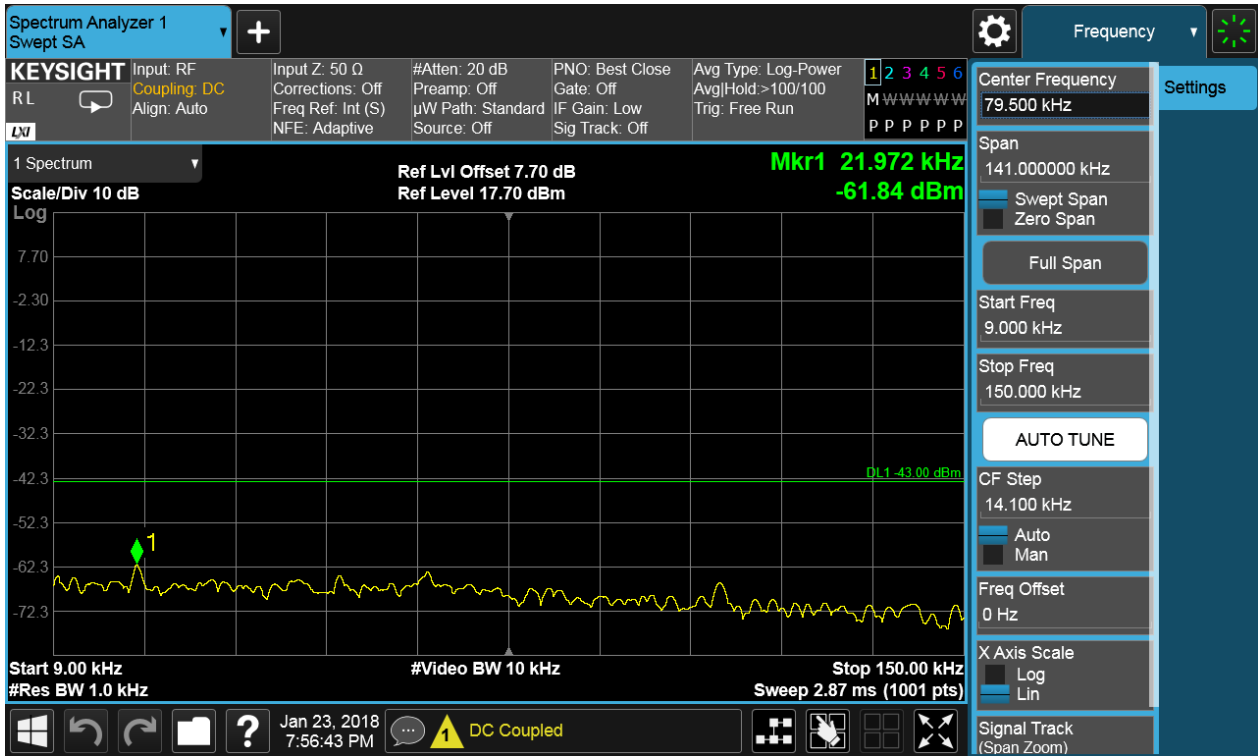


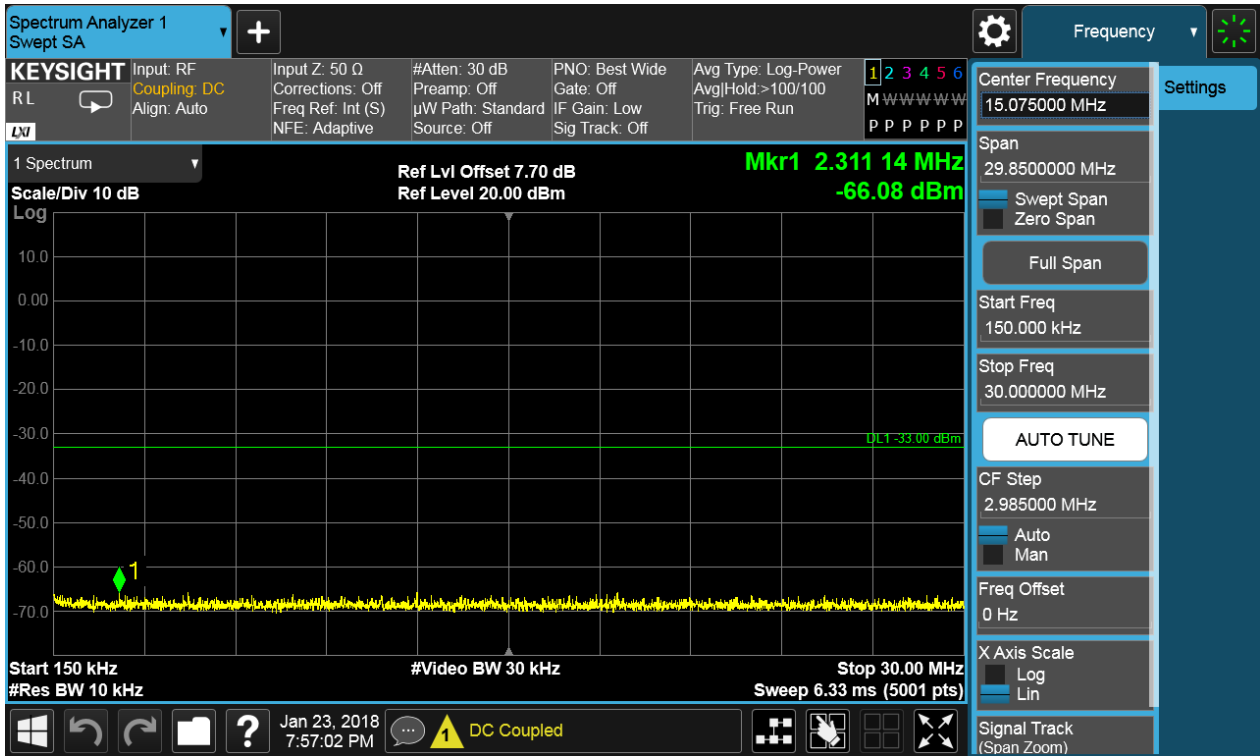


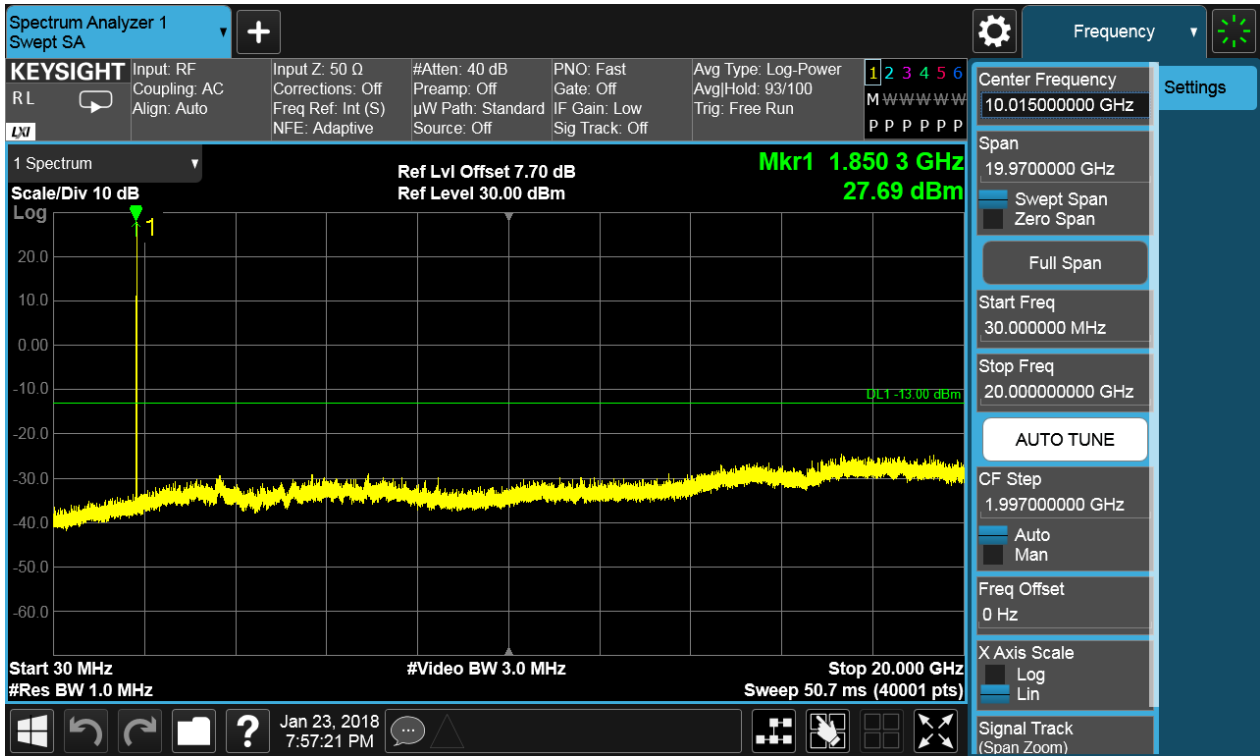


### 6.1.2.2 Test Mode = GSM/TM2

#### 6.1.2.2.1 Test Channel = LCH

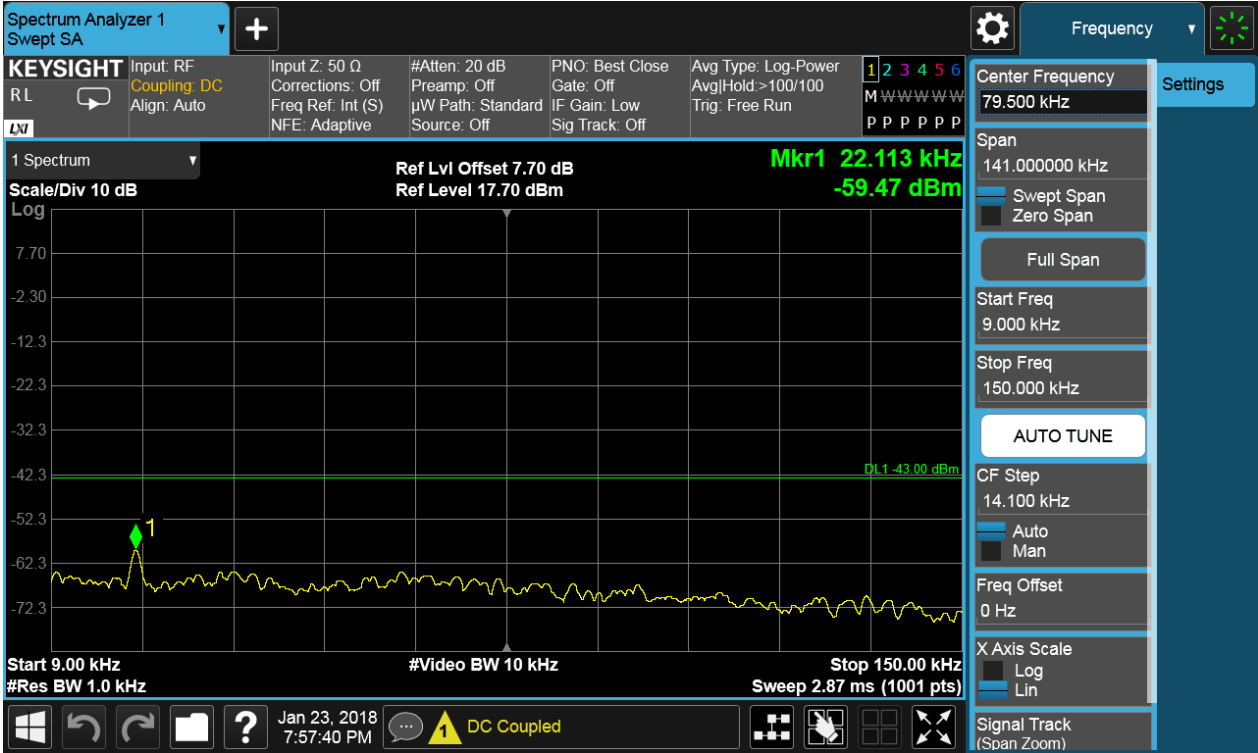


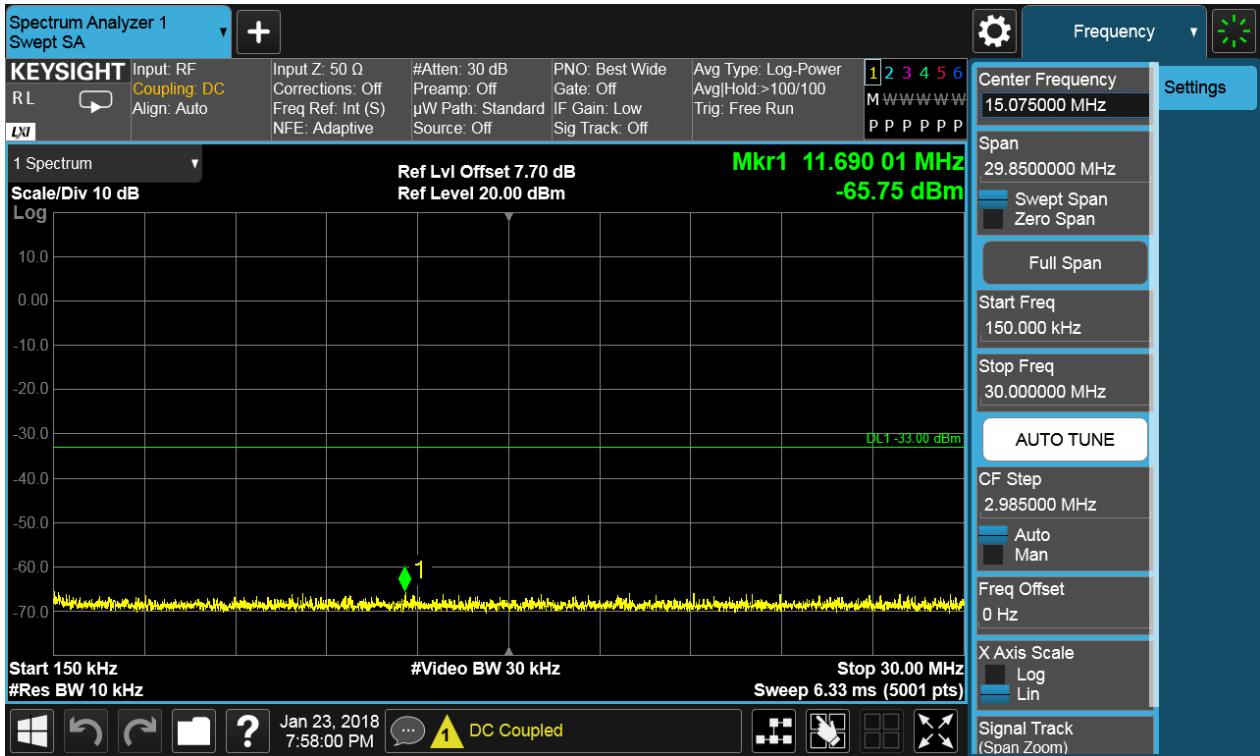


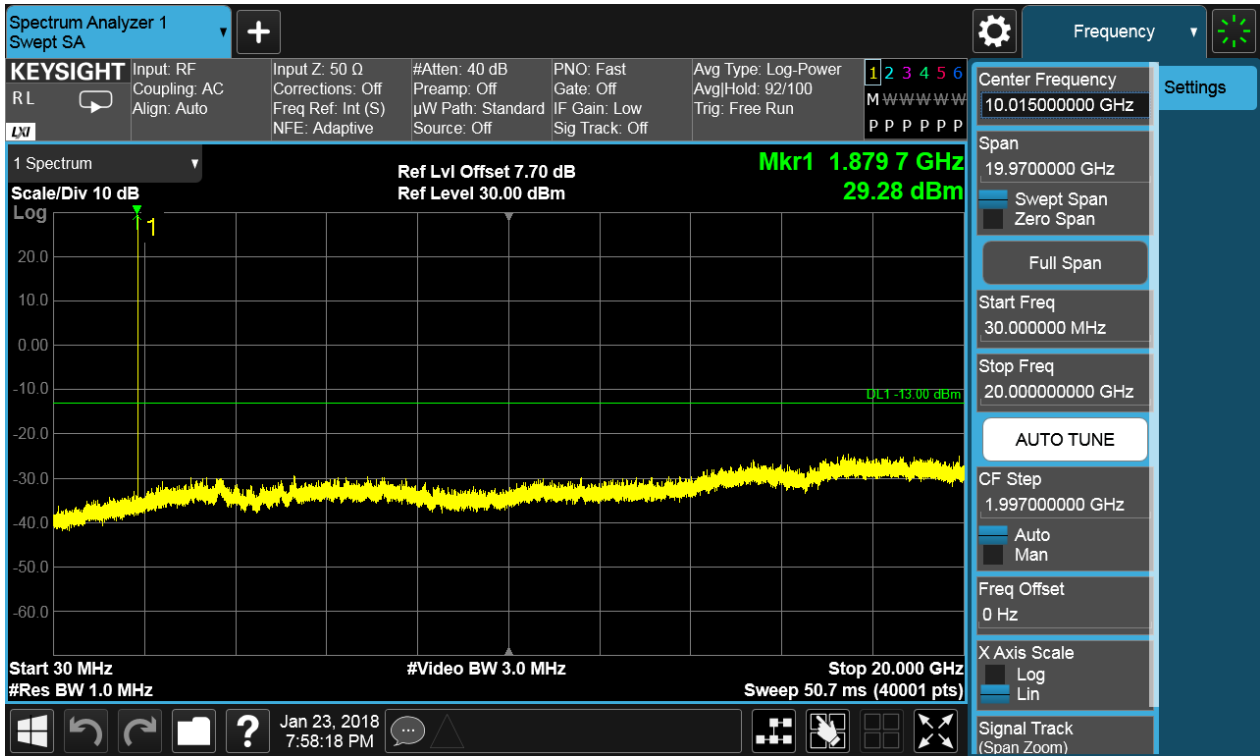




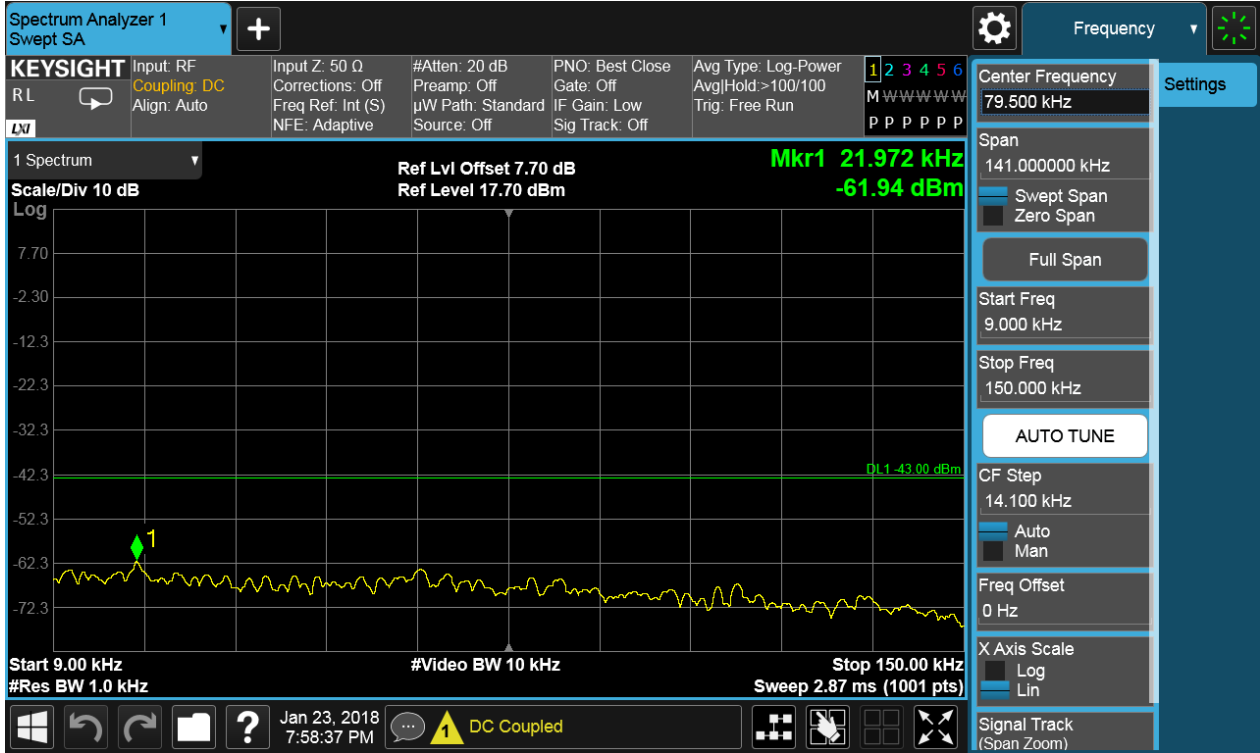
### 6.1.2.2.2 Test Channel = MCH

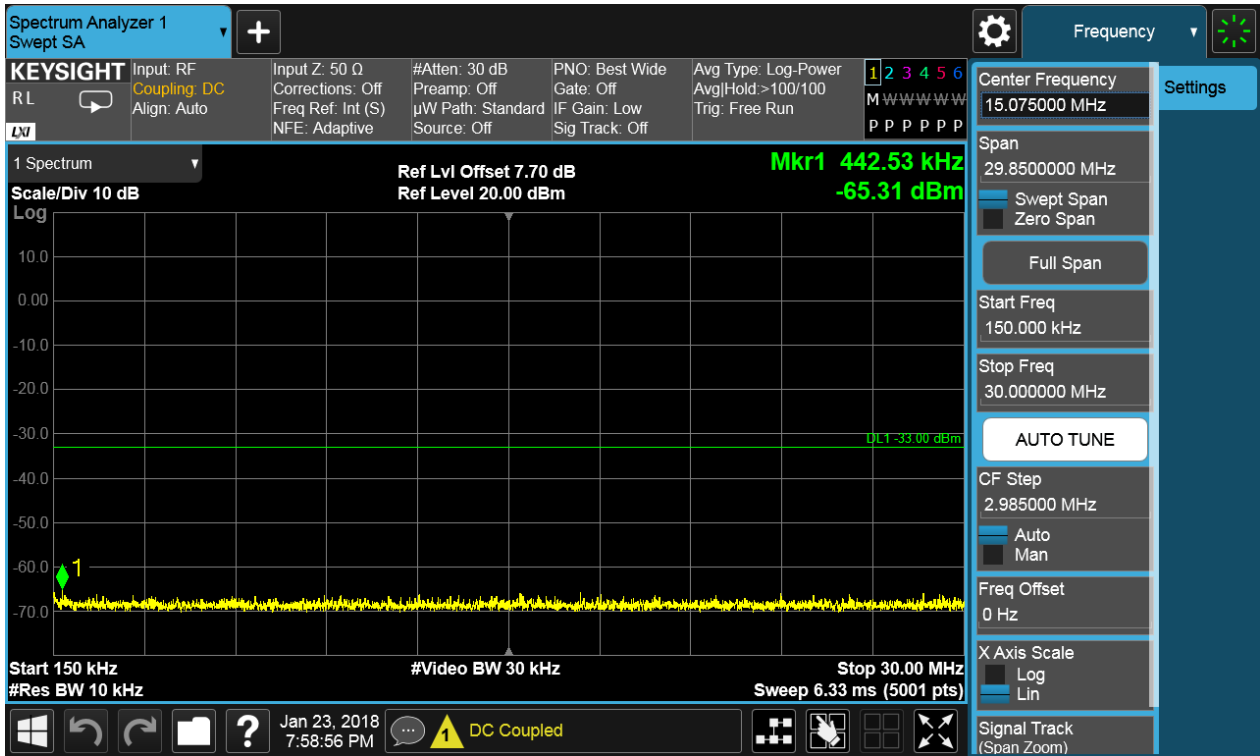


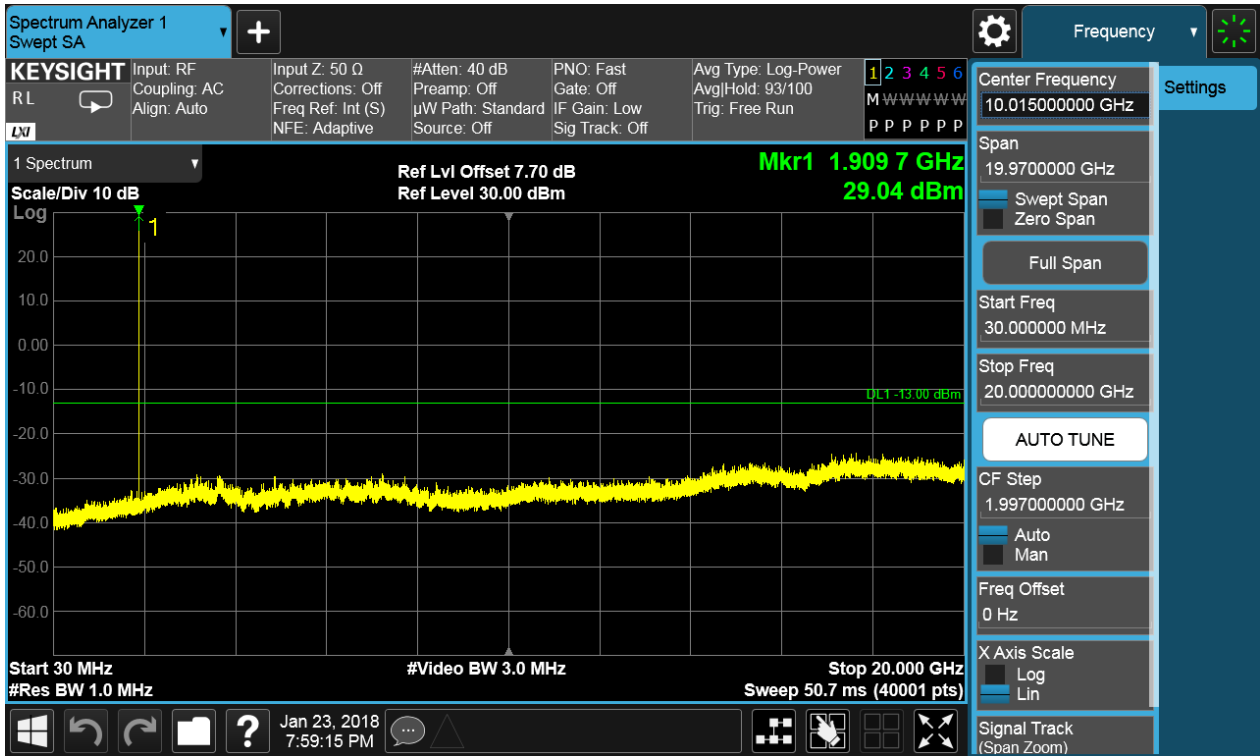




## 6.1.2.2.3 Test Channel = HCH







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

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

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

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

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

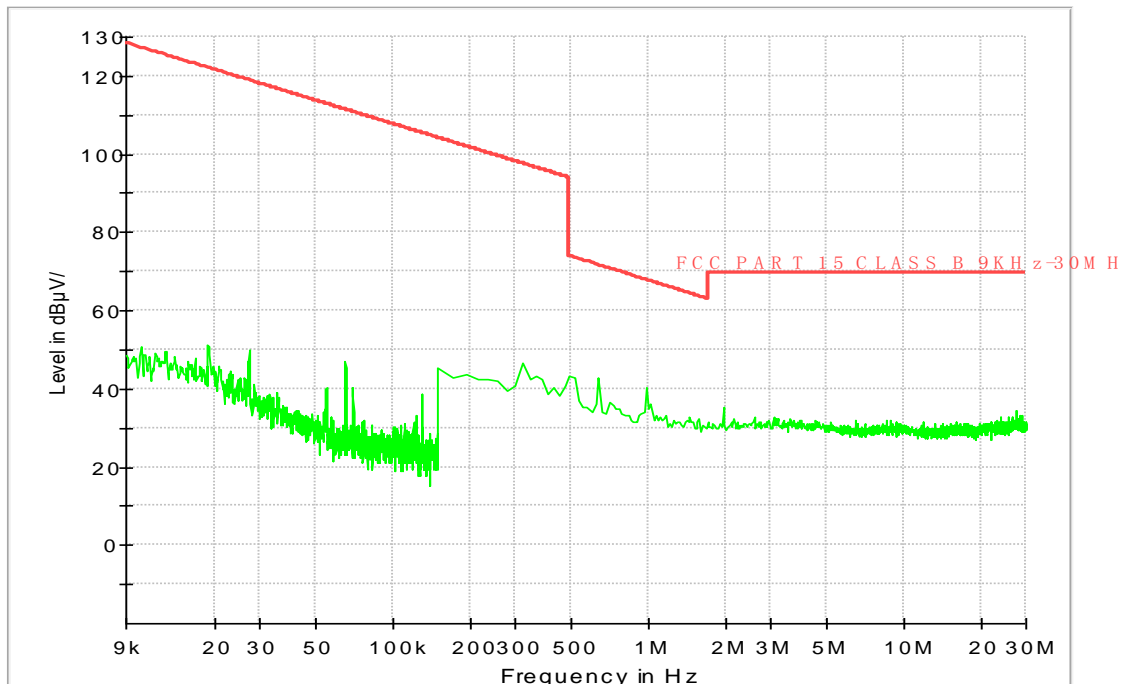
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

### Part I - Test Plots

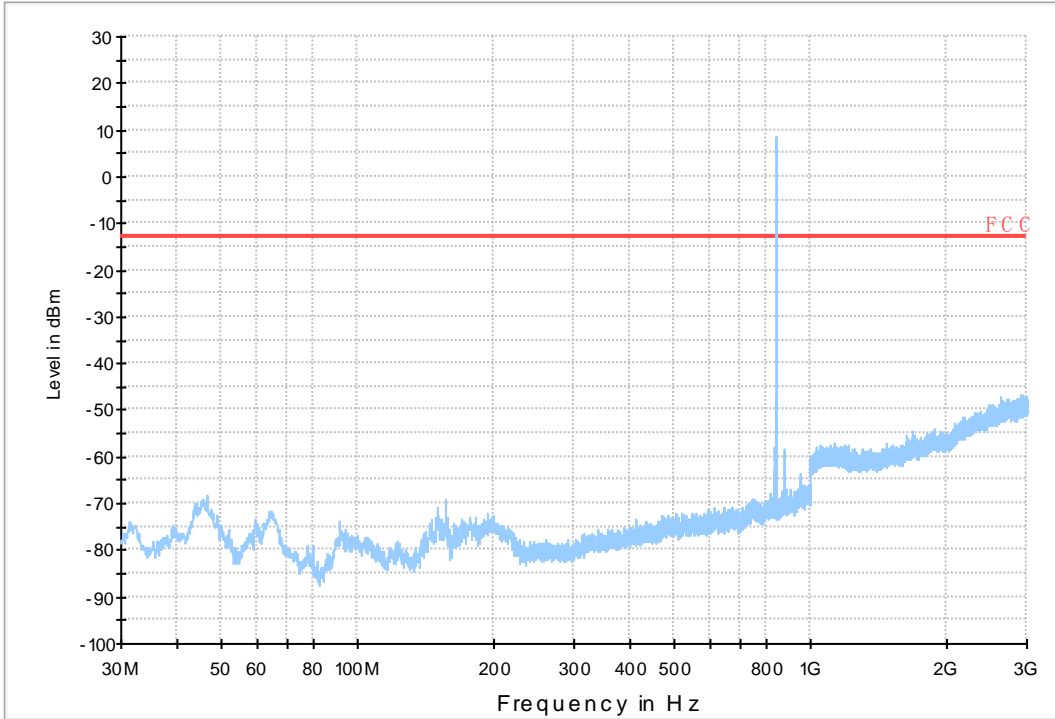
#### 7.1 For GSM

##### 7.1.1 Test Band = GSM850

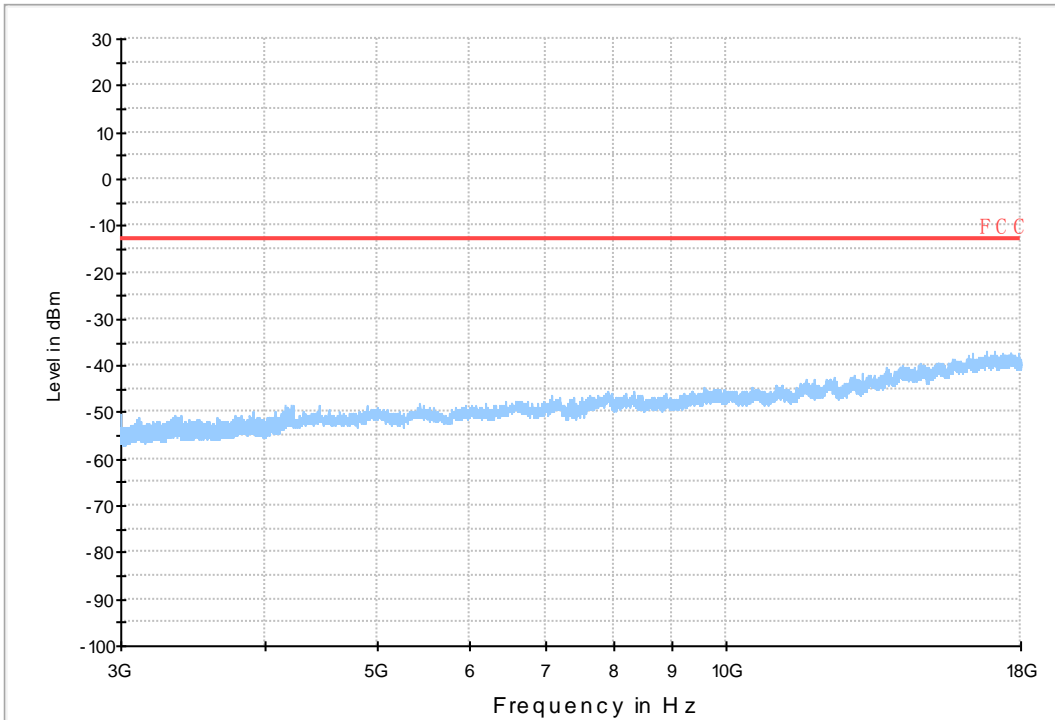
##### 7.1.1.1 Test Mode = GSM/TM1



Copy of FCC PART22 GSM850\_L



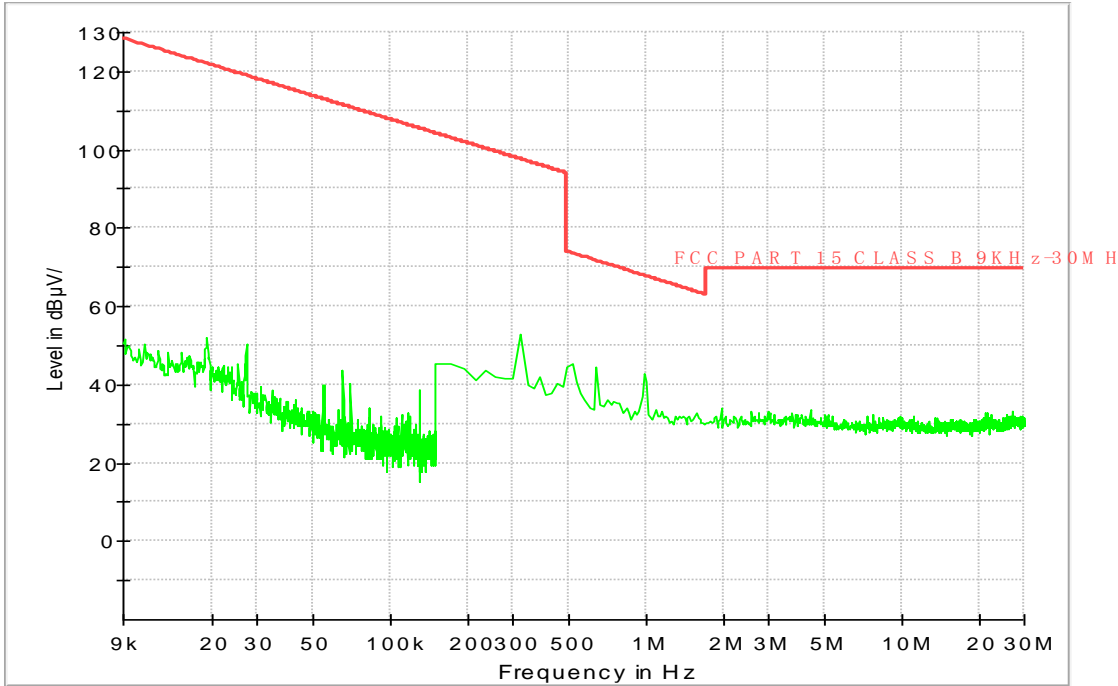
Copy of FCC PART22 GSM850\_H



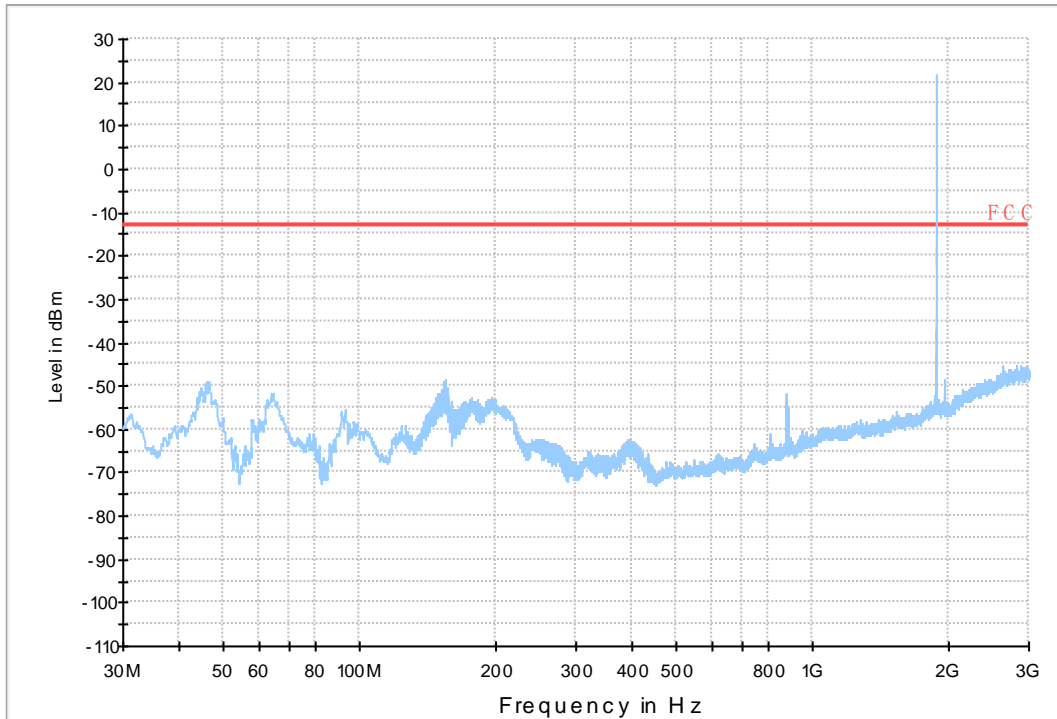


### 7.1.2 Test Band = GSM1900

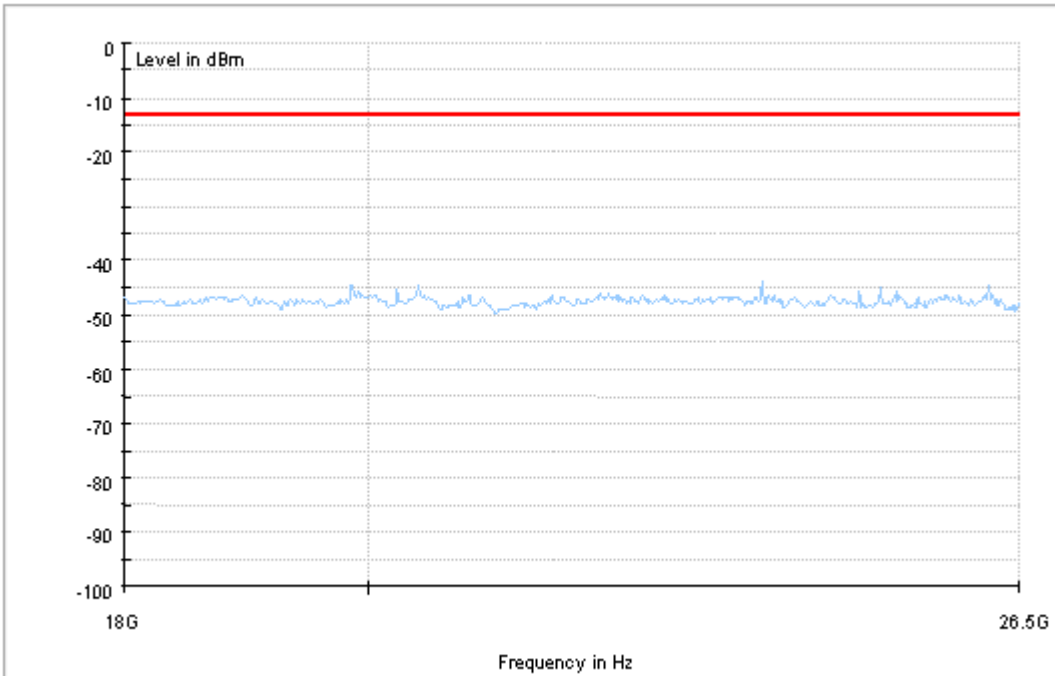
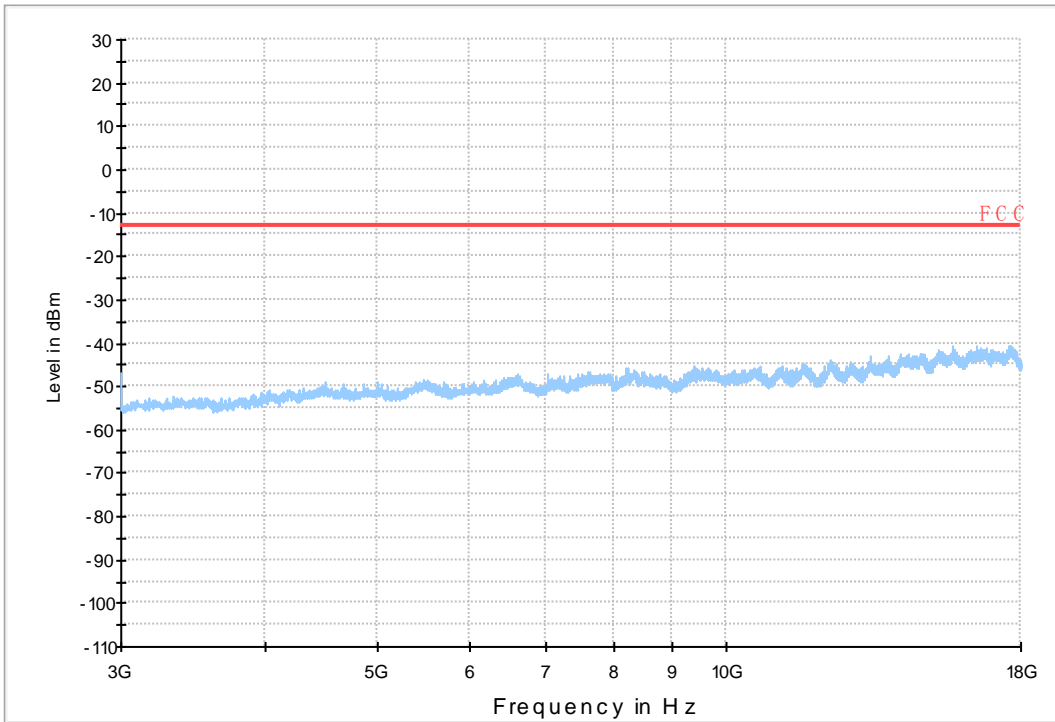
#### 7.1.2.1 Test Mode = GSM/TM1



Copy of FCC PART24 GSM 1900\_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	9.43	0.01144	PASS
				VN	9.94	0.01206	PASS
				VH	14.66	0.01779	PASS
		MCH	TN	VL	8.14	0.00973	PASS
				VN	10.46	0.0125	PASS
				VH	5.75	0.00687	PASS
		HCH	TN	VL	14.59	0.01719	PASS
				VN	8.65	0.01019	PASS
				VH	7.36	0.00867	PASS
	GSM/TM2	LCH	TN	VL	15.43	0.01872	PASS
				VN	16.85	0.02044	PASS
				VH	15.21	0.01845	PASS
		MCH	TN	VL	16.50	0.01972	PASS
				VN	14.14	0.0169	PASS
				VH	15.66	0.01872	PASS
		HCH	TN	VL	17.14	0.02019	PASS
				VN	16.01	0.01886	PASS
				VH	16.85	0.01985	PASS
GSM1900	GSM/TM1	LCH	TN	VL	14.40	0.00778	PASS
				VN	15.37	0.00831	PASS
				VH	4.84	0.00262	PASS
		MCH	TN	VL	8.14	0.00433	PASS
				VN	10.33	0.00549	PASS
				VH	7.88	0.00419	PASS
		HCH	TN	VL	1.68	0.00088	PASS
				VN	7.17	0.00375	PASS
				VH	5.68	0.00297	PASS
	GSM/TM2	LCH	TN	VL	13.75	0.00743	PASS
				VN	9.30	0.00503	PASS
				VH	6.78	0.00366	PASS
		MCH	TN	VL	8.81	0.00469	PASS
				VN	5.42	0.00288	PASS
				VH			

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	4.71	0.00251	PASS
		HCH	TN	VL	6.13	0.00321	PASS
				VN	6.01	0.00315	PASS
				VH	6.88	0.0036	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	10.46	0.01269	PASS
				-20	7.94	0.00963	PASS
				-10	10.65	0.01292	PASS
				0	8.01	0.00972	PASS
				10	10.65	0.01292	PASS
				20	11.30	0.01371	PASS
				30	11.56	0.01403	PASS
				40	13.04	0.01582	PASS
		50	11.75	0.01426	PASS		
		MCH	VN	-30	10.33	0.01235	PASS
				-20	7.23	0.00864	PASS
				-10	11.95	0.01428	PASS
				0	9.88	0.01181	PASS
				10	9.56	0.01143	PASS
				20	5.62	0.00672	PASS
				30	7.36	0.0088	PASS
				40	12.01	0.01436	PASS
		50	8.20	0.0098	PASS		
		HCH	VN	-30	9.69	0.01142	PASS
				-20	8.85	0.01043	PASS
				-10	8.33	0.00981	PASS
				0	15.76	0.01857	PASS
				10	9.23	0.01087	PASS
				20	7.68	0.00905	PASS
	30			11.24	0.01324	PASS	
	40			10.65	0.01255	PASS	
	50	6.91	0.00814	PASS			
	GSM/TM2	LCH	VN	-30	16.79	0.02037	PASS
				-20	15.34	0.01861	PASS
				-10	17.50	0.02123	PASS
				0	18.18	0.02206	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict						
				10	18.14	0.02201	PASS						
				20	11.04	0.01339	PASS						
				30	13.88	0.01684	PASS						
				40	15.79	0.01916	PASS						
				50	13.62	0.01653	PASS						
		MCH	VN			-30	14.79	0.01768	PASS				
						-20	15.01	0.01794	PASS				
						-10	17.11	0.02045	PASS				
						0	15.46	0.01848	PASS				
						10	16.85	0.02014	PASS				
						20	12.59	0.01505	PASS				
						30	14.53	0.01737	PASS				
						40	15.40	0.01841	PASS				
						50	17.60	0.02104	PASS				
						HCH	VN			-30	15.98	0.01269	PASS
		-20	18.14	0.00963	PASS								
		-10	18.56	0.01292	PASS								
		0	17.79	0.00972	PASS								
		10	13.75	0.01292	PASS								
		20	17.76	0.01371	PASS								
		30	16.72	0.01403	PASS								
		40	16.92	0.01582	PASS								
		50	14.33	0.01426	PASS								
		GSM1900	GSM/TM1	LCH	VN					-30	6.07	0.01235	PASS
-20	12.40									0.00864	PASS		
-10	13.30									0.01428	PASS		
0	9.69									0.01181	PASS		
10	10.33									0.01143	PASS		
20	11.69									0.00672	PASS		
30	13.62									0.0088	PASS		
40	8.33									0.01436	PASS		
50	6.91									0.0098	PASS		
MCH	VN									-30	2.84	0.01142	PASS
										-20	1.49	0.01043	PASS
										-10	6.13	0.00981	PASS
										0	8.59	0.01857	PASS
										10	7.36	0.01087	PASS
										20	-1.55	0.00905	PASS
										30	4.97	0.01324	PASS
										40	2.58	0.01255	PASS



Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	7.43	0.00814	PASS
				-30	4.46	0.02037	PASS
				-20	8.39	0.01861	PASS
				-10	6.33	0.02123	PASS
				0	6.01	0.02206	PASS
				10	-2.00	0.02201	PASS
				20	6.01	0.01339	PASS
				30	1.81	0.01684	PASS
				40	6.78	0.01916	PASS
				50	2.71	0.01653	PASS
	GSM/TM2	LCH	VN	-30	13.08	0.01768	PASS
				-20	4.62	0.01794	PASS
				-10	16.79	0.02045	PASS
				0	7.07	0.01848	PASS
				10	12.46	0.02014	PASS
				20	15.05	0.01505	PASS
				30	14.59	0.01737	PASS
				40	9.46	0.01841	PASS
				50	12.75	0.02104	PASS
				MCH	VN	-30	6.20
		-20	10.23			0.00963	PASS
		-10	7.72			0.01292	PASS
		0	4.81			0.00972	PASS
		10	3.03			0.01292	PASS
		20	4.36			0.01371	PASS
		30	10.65			0.01403	PASS
		40	7.85			0.01582	PASS
		50	3.23			0.01426	PASS
		HCH	VN			-30	1.03
				-20	1.32	0.00864	PASS
				-10	7.43	0.01428	PASS
				0	5.62	0.01181	PASS
10	0.42			0.01143	PASS		
20	1.68			0.00672	PASS		
30	7.43			0.0088	PASS		
40	8.04			0.01436	PASS		
50	3.87	0.0098	PASS				

END