



# Appendix for test report

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

### Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dBm]	ERP [dBm]	Limit [dBm]	Verdict
GSM850	GSM/TM1	LCH	33.47	29.73	38.5	PASS
		MCH	33.58	29.75	38.5	PASS
		HCH	33.43	29.59	38.5	PASS
	GSM/TM2	LCH	27.36	23.53	38.5	PASS
		MCH	27.34	23.42	38.5	PASS
		HCH	27.24	23.39	38.5	PASS
Test Band	Test Mode	Test Channel	Measured[dBm]	EIRP [dBm]	Limit [dBm]	Verdict
GSM1900	GSM/TM1	LCH	30.61	31.53	33	PASS
		MCH	30.52	31.32	33	PASS
		HCH	30.53	31.18	33	PASS
	GSM/TM2	LCH	26.42	27.33	33	PASS
		MCH	26.32	27.16	33	PASS
		HCH	26.31	27.01	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.

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	0.19	13	PASS
		MCH	0.19	13	PASS
		HCH	0.18	13	PASS
	GSM/TM2	LCH	2.72	13	PASS
		MCH	2.84	13	PASS
		HCH	2.82	13	PASS
GSM1900	GSM/TM1	LCH	0.24	13	PASS
		MCH	0.23	13	PASS
		HCH	0.28	13	PASS
	GSM/TM2	LCH	2.78	13	PASS
		MCH	2.79	13	PASS
		HCH	2.93	13	PASS

### 3Appendix\_C: Modulation Characteristics

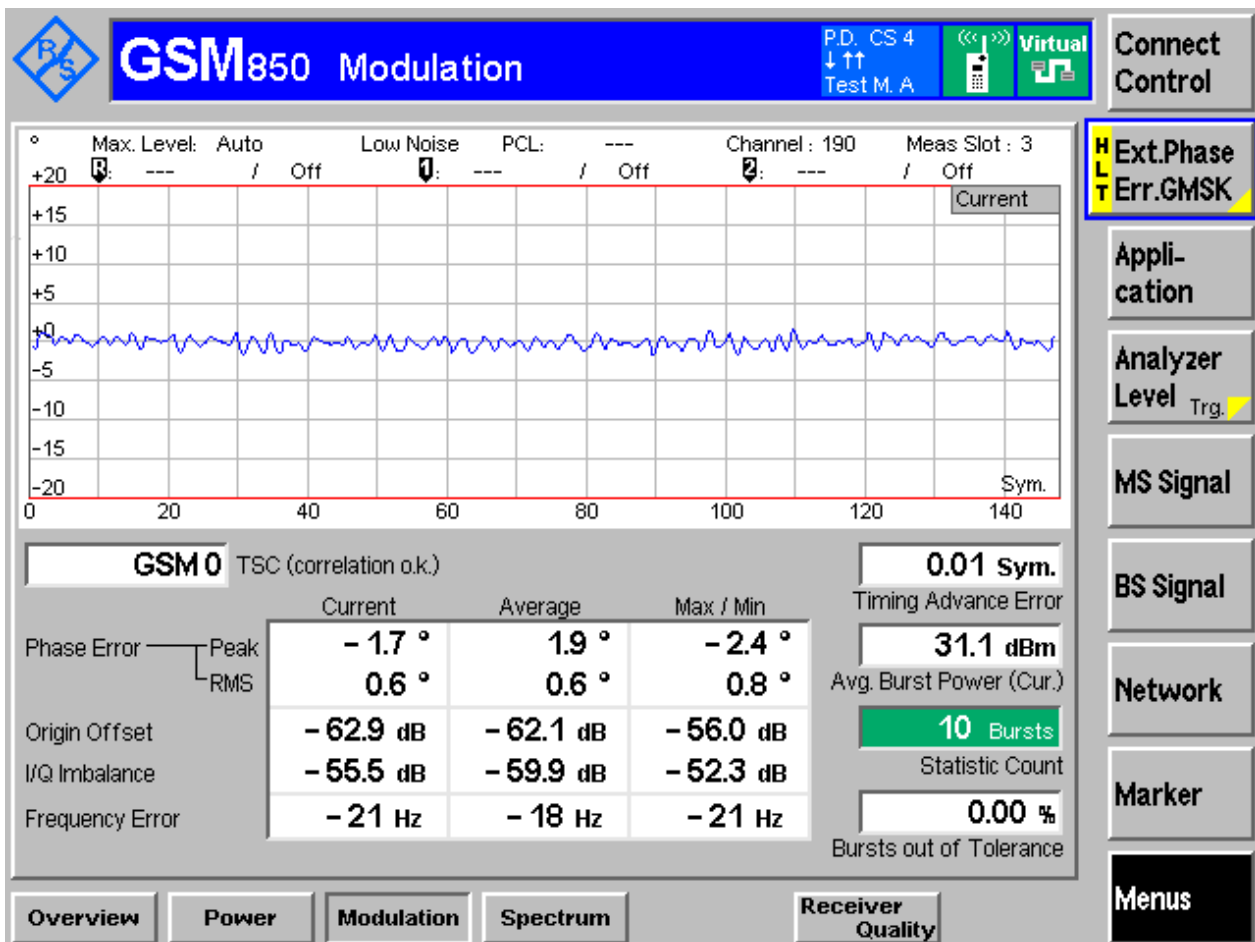
#### Part I - Test Plots

#### 3.1 For GSM

#### 3.1.1 Test Band = GSM850

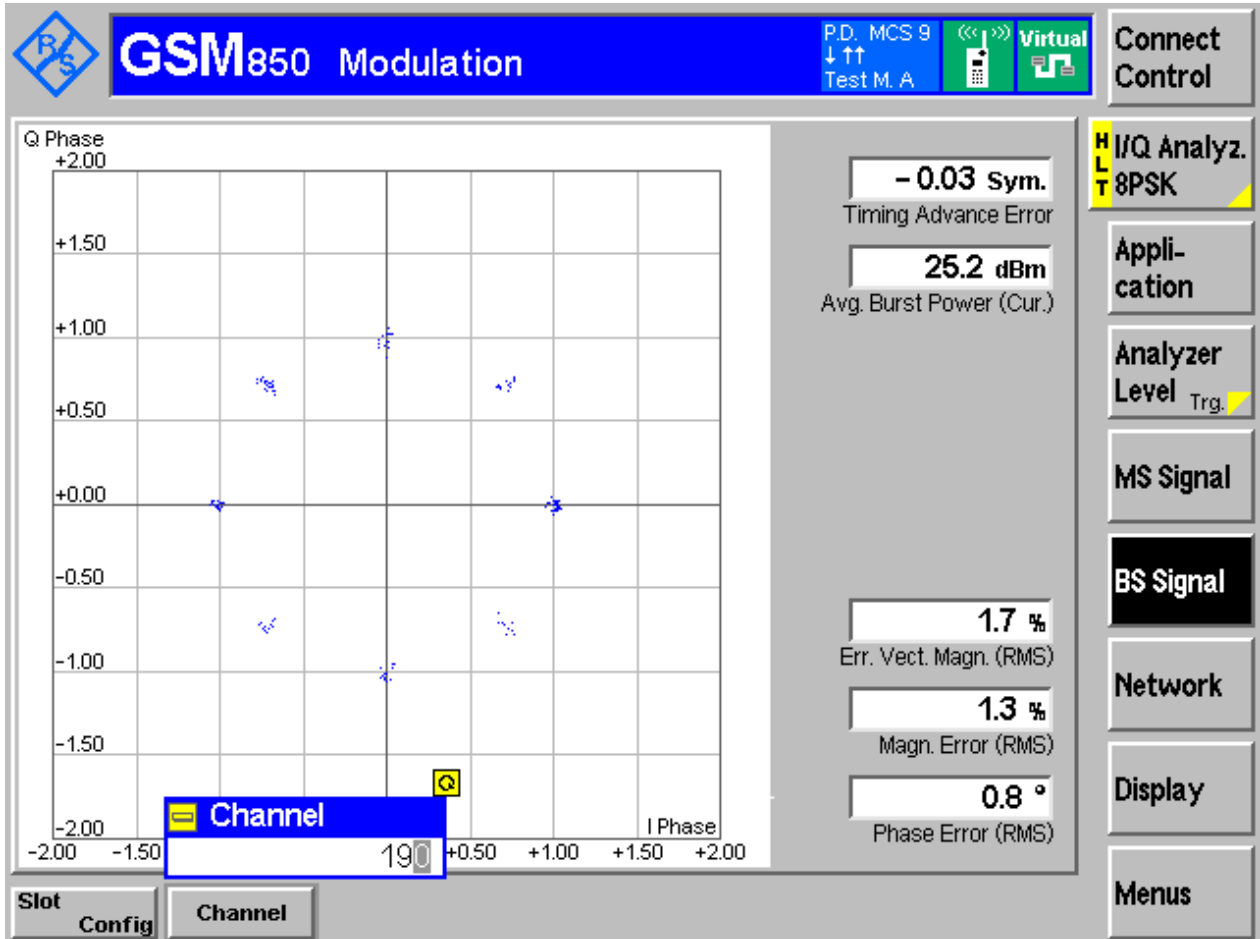
#### 3.1.1.1 Test Mode = GSM/TM1

#### 3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

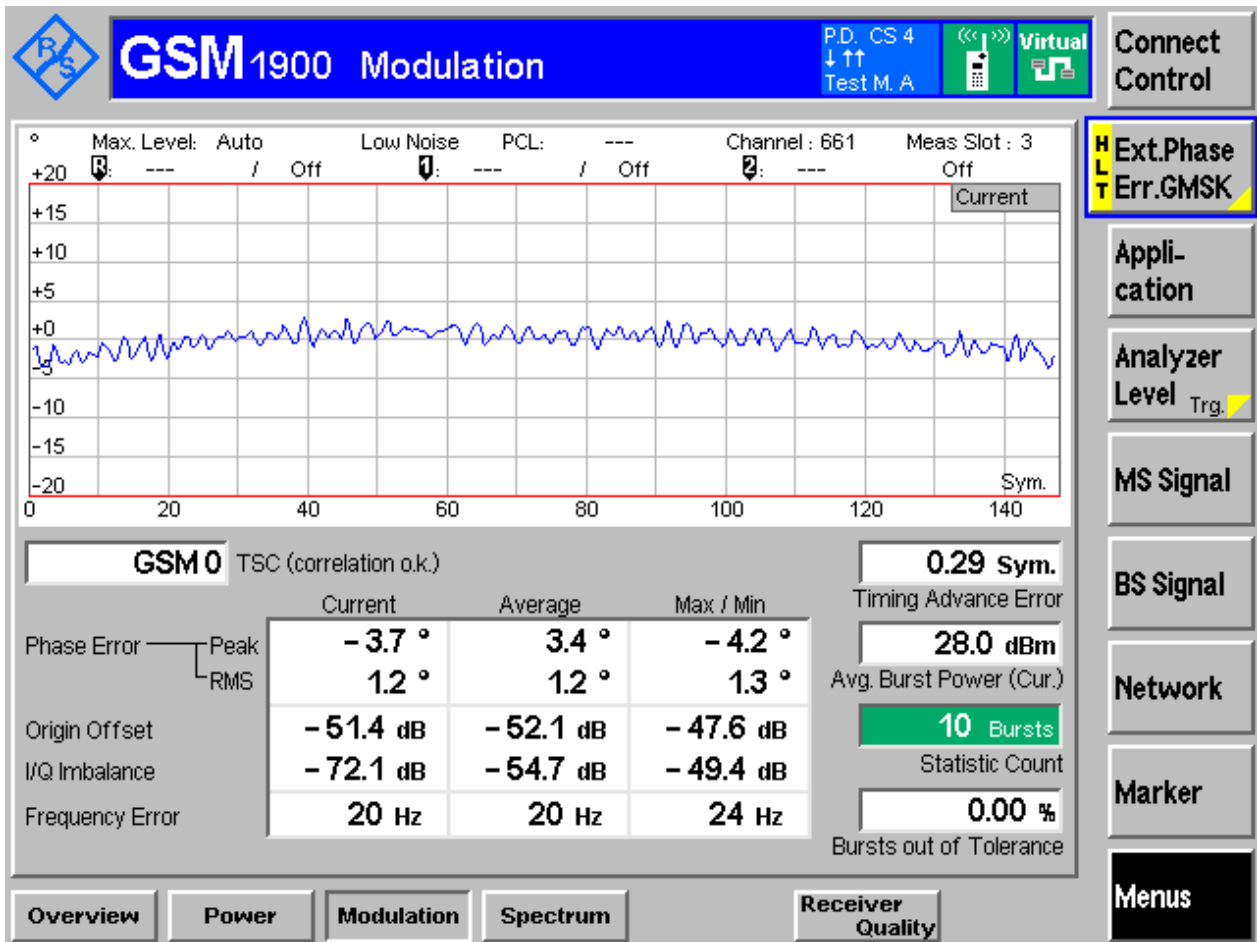
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM1900

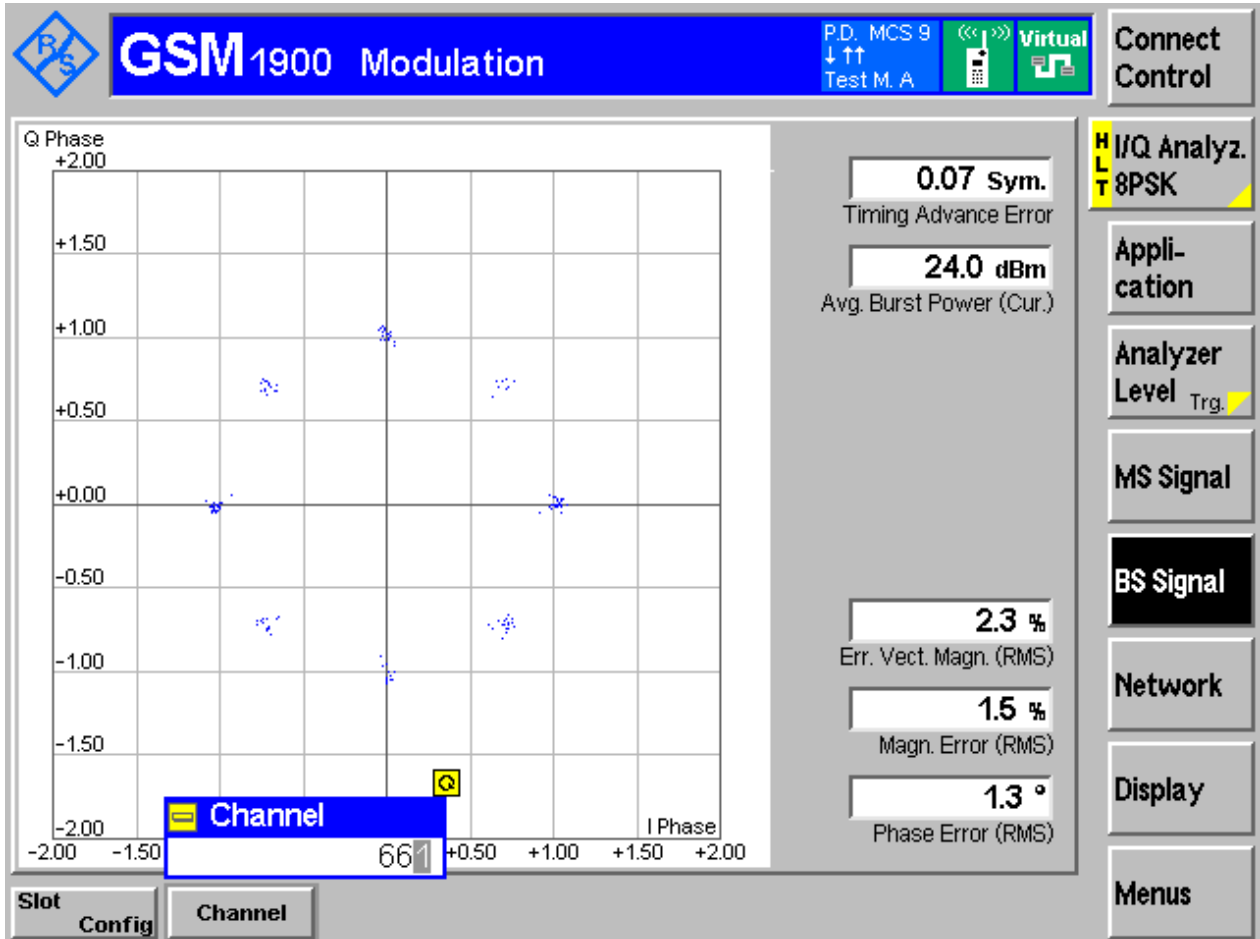
3.1.2.1 Test Mode = GSM/TM1

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	249.57	328.20	Pass
		MCH	246.66	321.80	Pass
		HCH	242.62	314.29	Pass
	GSM/TM2	LCH	255.08	323.49	Pass
		MCH	253.36	328.85	Pass
		HCH	252.55	319.28	Pass
GSM1900	GSM/TM1	LCH	242.86	318.80	Pass
		MCH	242.00	320.18	Pass
		HCH	242.17	314.91	Pass
	GSM/TM2	LCH	244.86	316.30	Pass
		MCH	253.43	314.65	Pass
		HCH	256.59	322.67	Pass

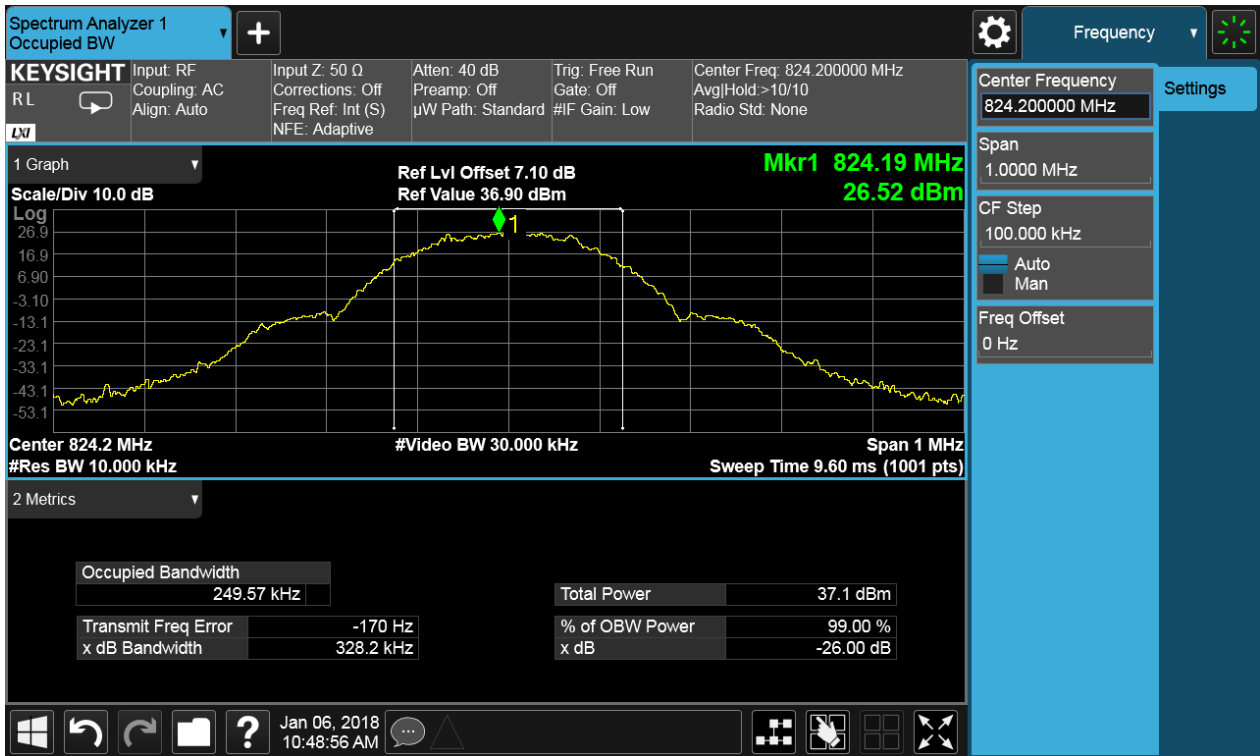
## Part II - Test Plots

### 4.1 For GSM

#### 4.1.1 Test Band = GSM850

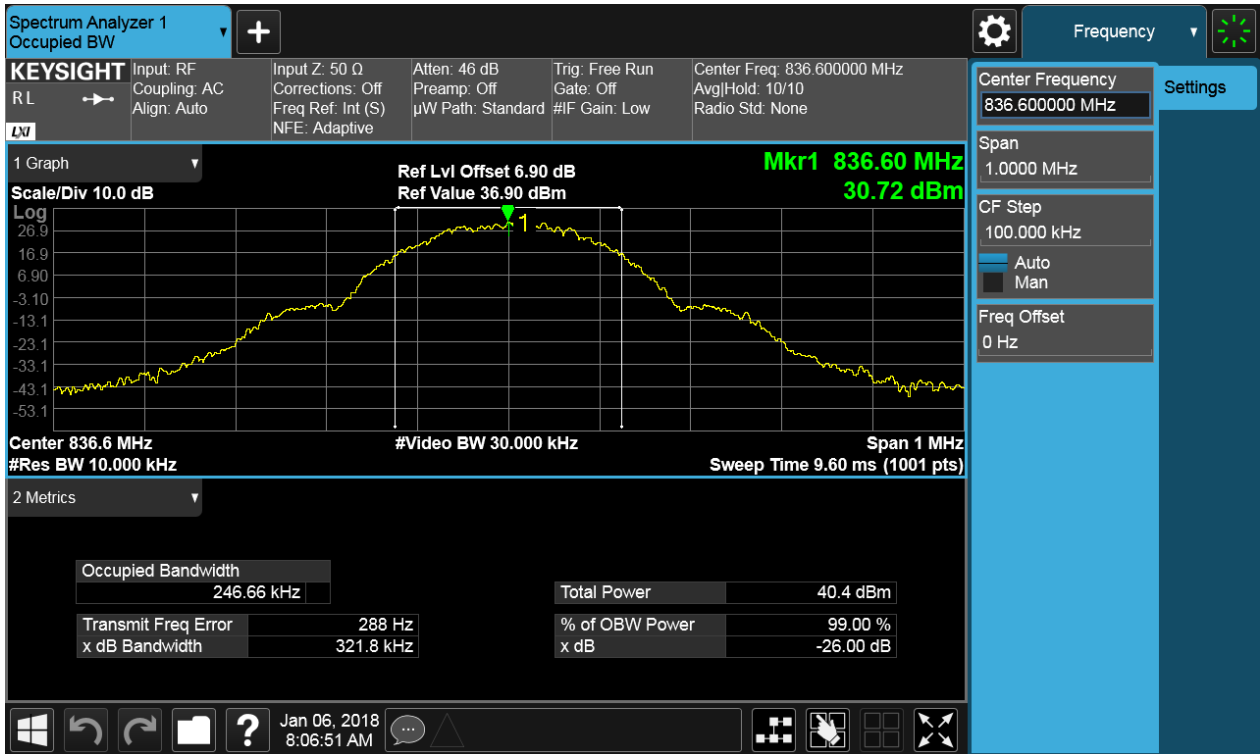
##### 4.1.1.1 Test Mode = GSM/TM1

##### 4.1.1.1.1 Test Channel = LCH



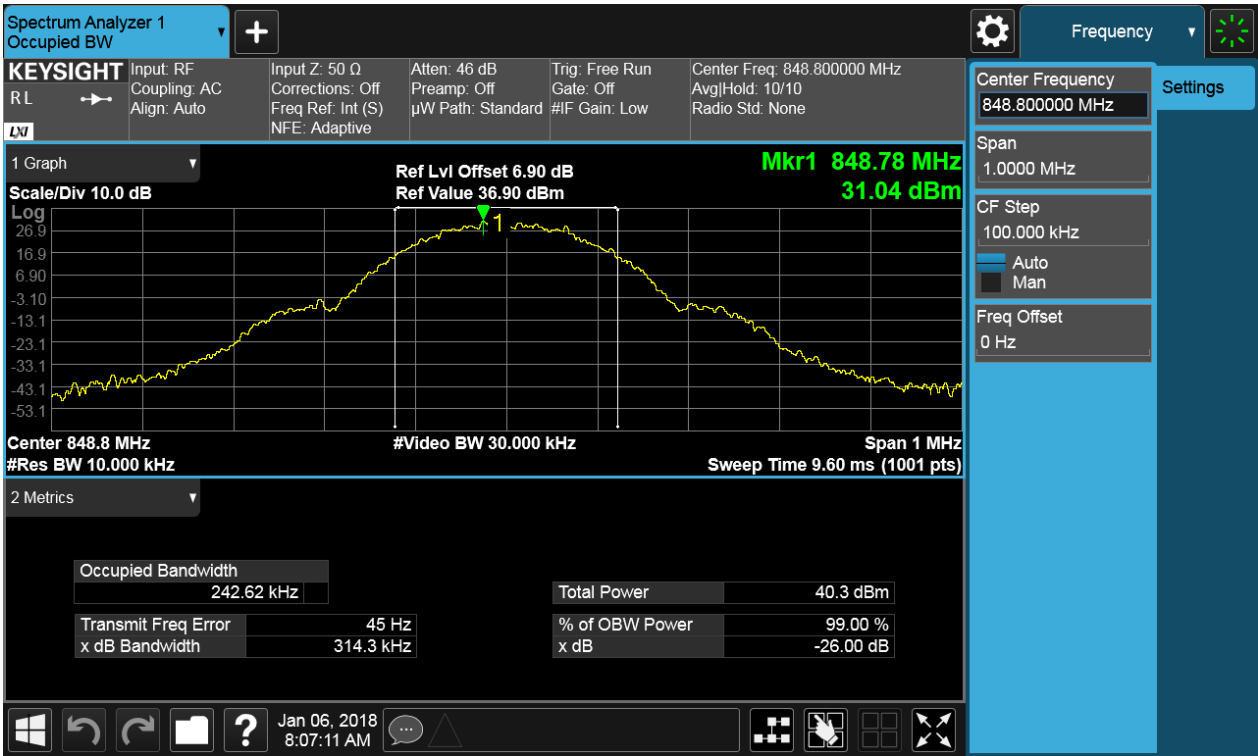


### 4.1.1.1.2 Test Channel = MCH





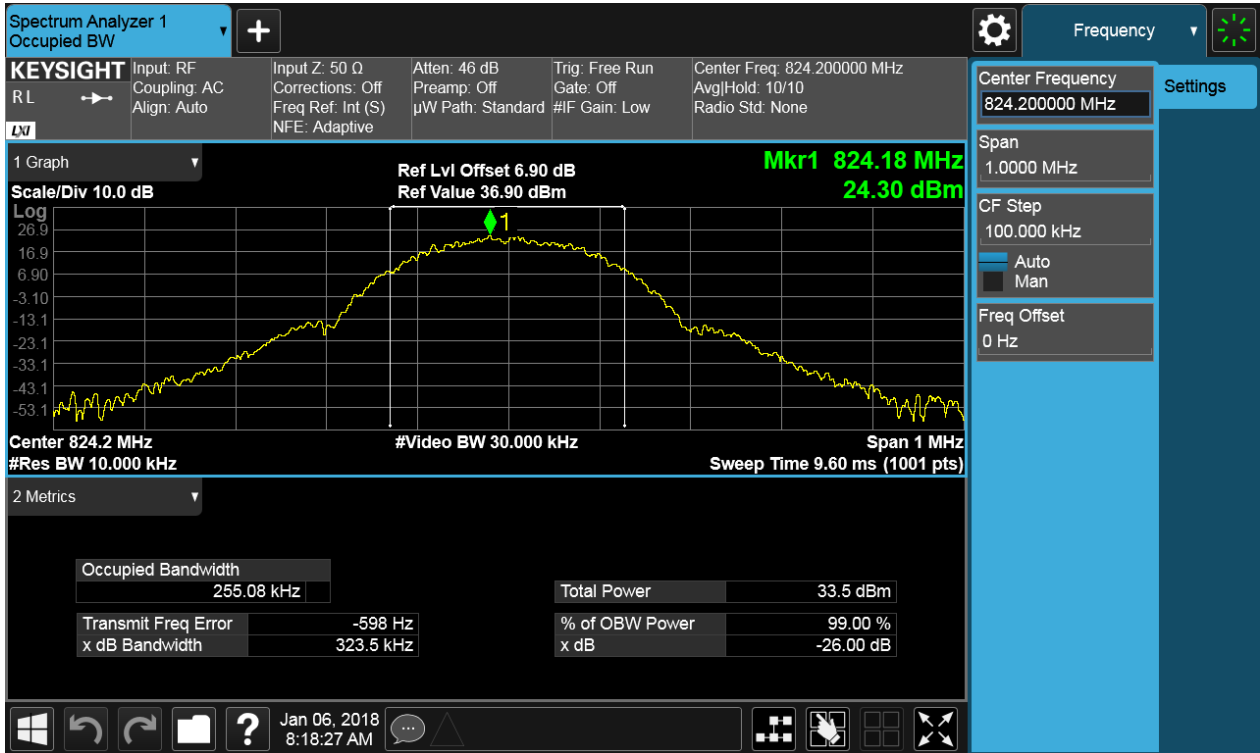
### 4.1.1.1.3 Test Channel = HCH





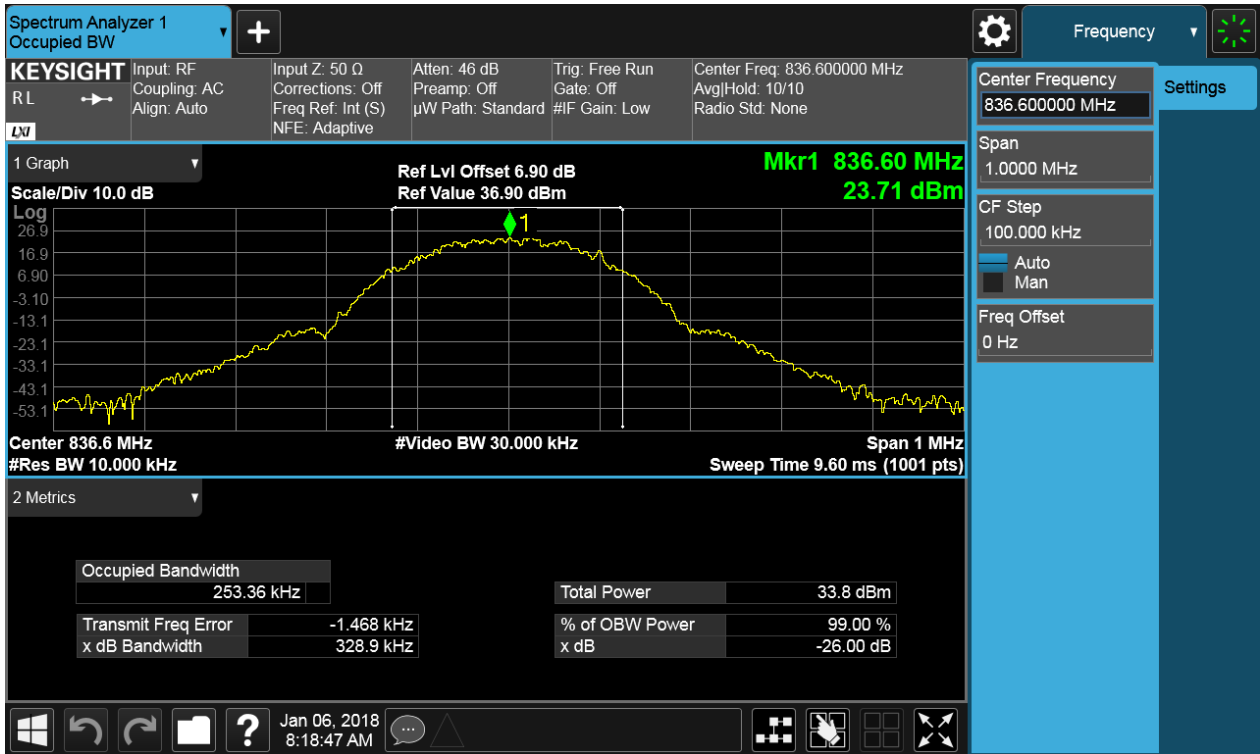
### 4.1.1.2 Test Mode = GSM/TM2

#### 4.1.1.2.1 Test Channel = LCH



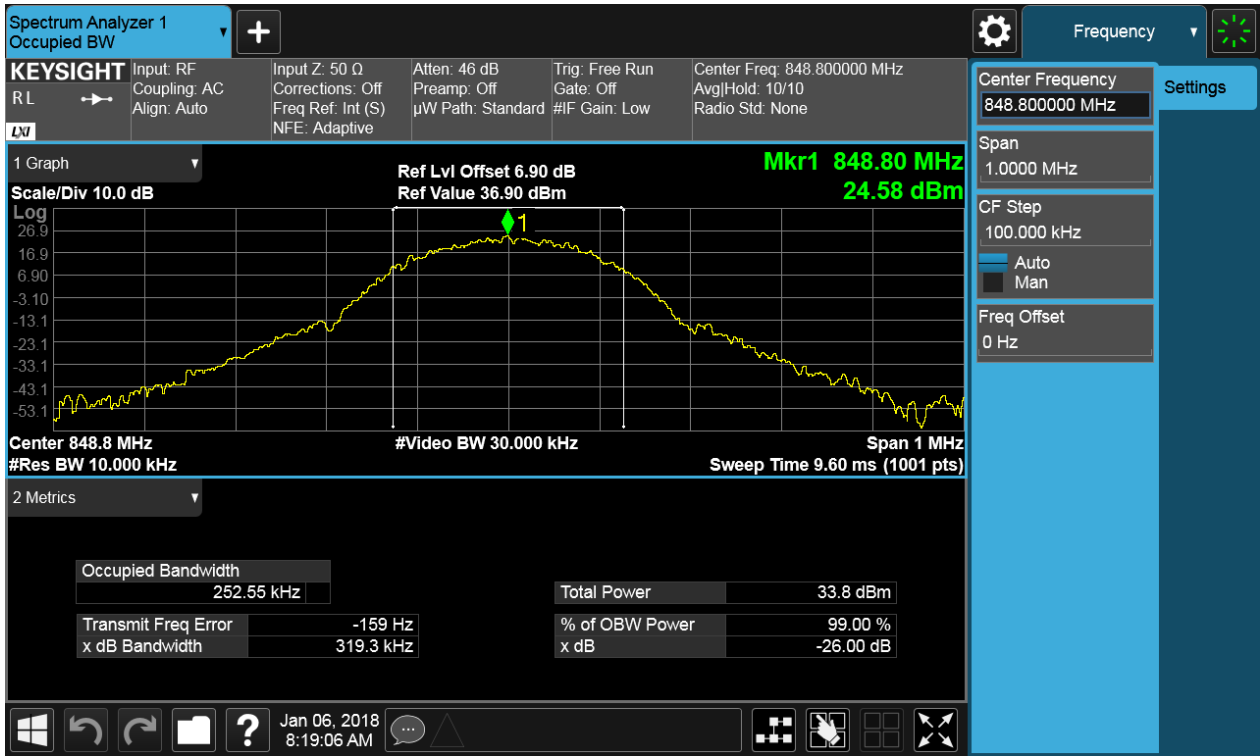


### 4.1.1.2.2 Test Channel = MCH





### 4.1.1.2.3 Test Channel = HCH

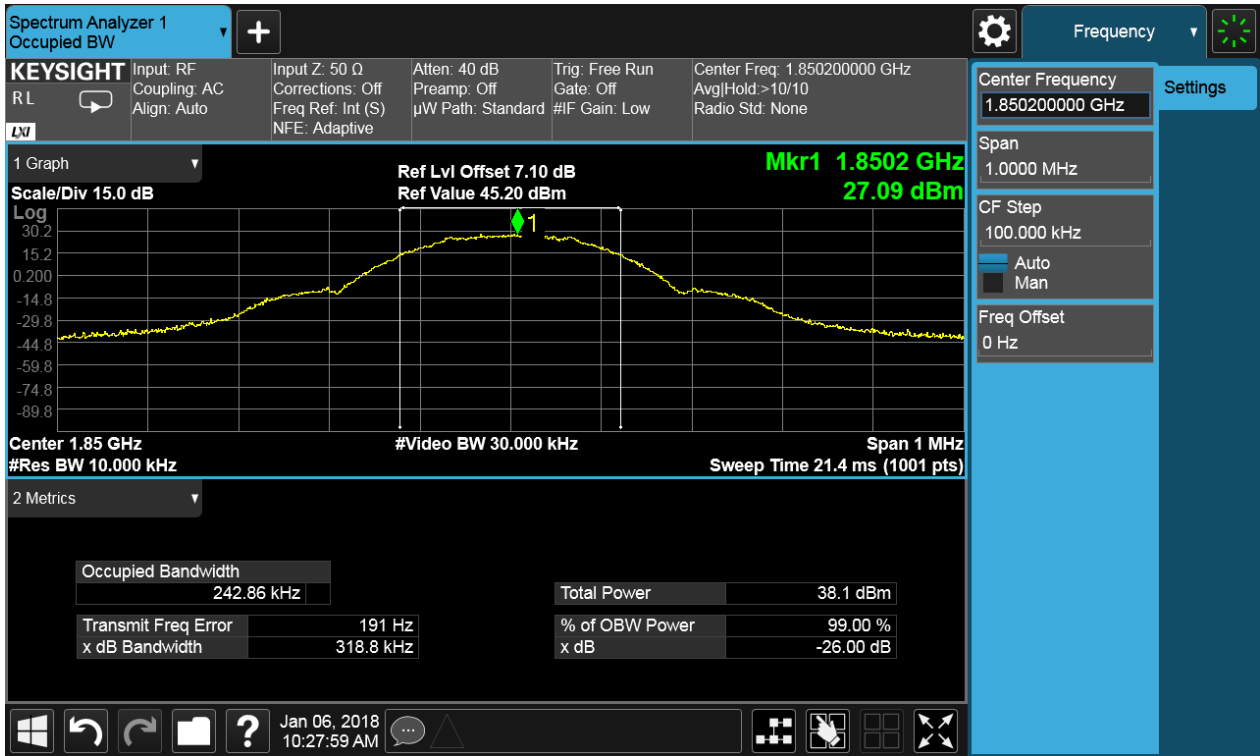




### 4.1.2 Test Band = GSM1900

#### 4.1.2.1 Test Mode = GSM/TM1

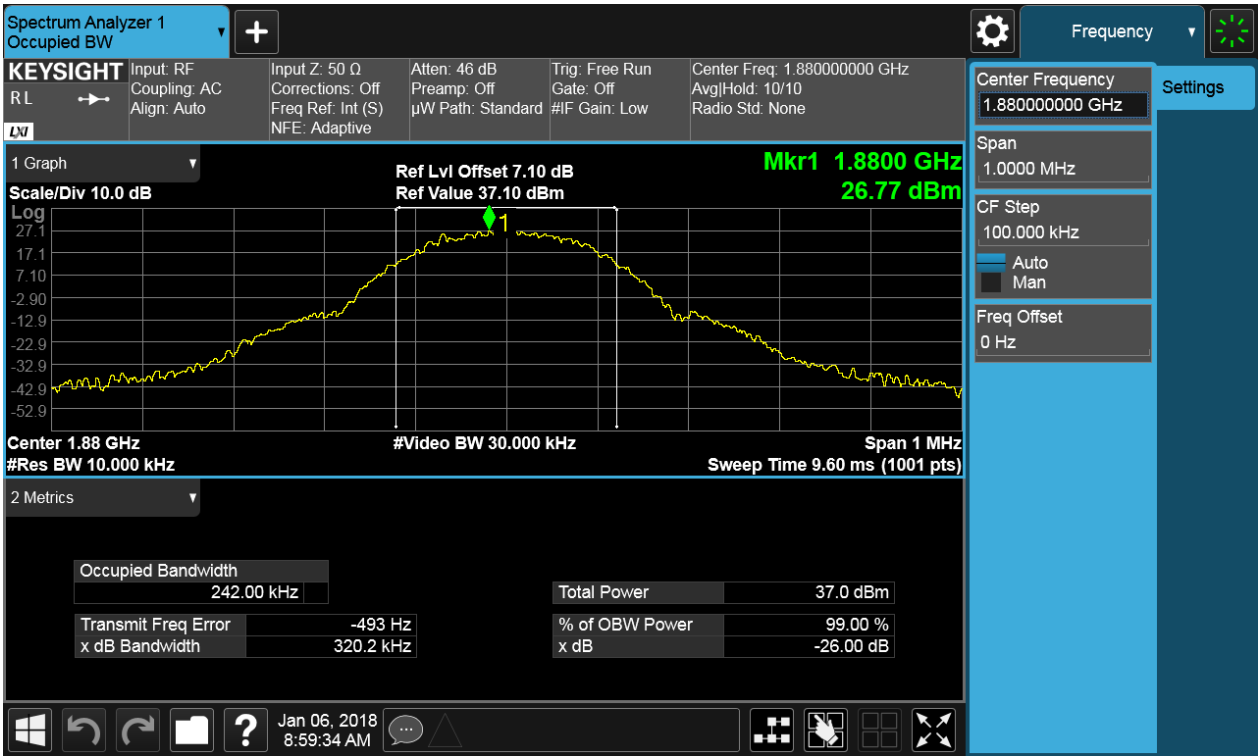
##### 4.1.2.1.1 Test Channel = LCH



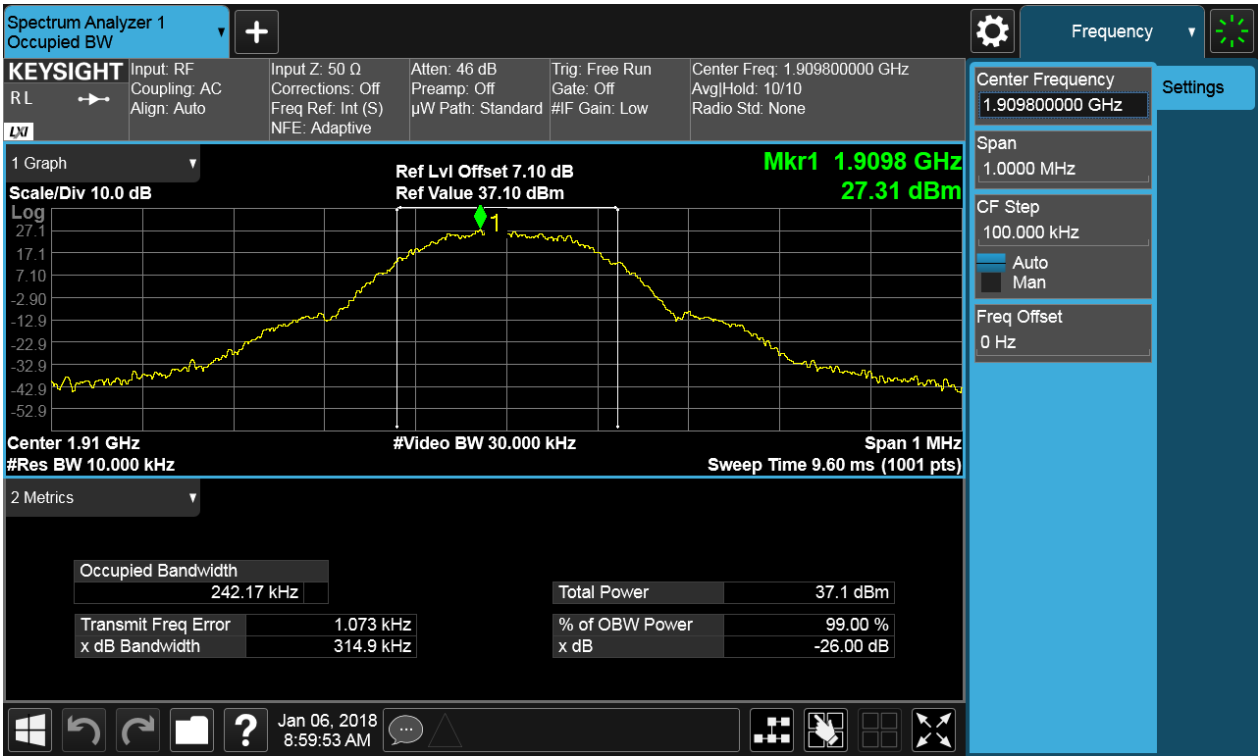




### 4.1.2.1.2 Test Channel = MCH



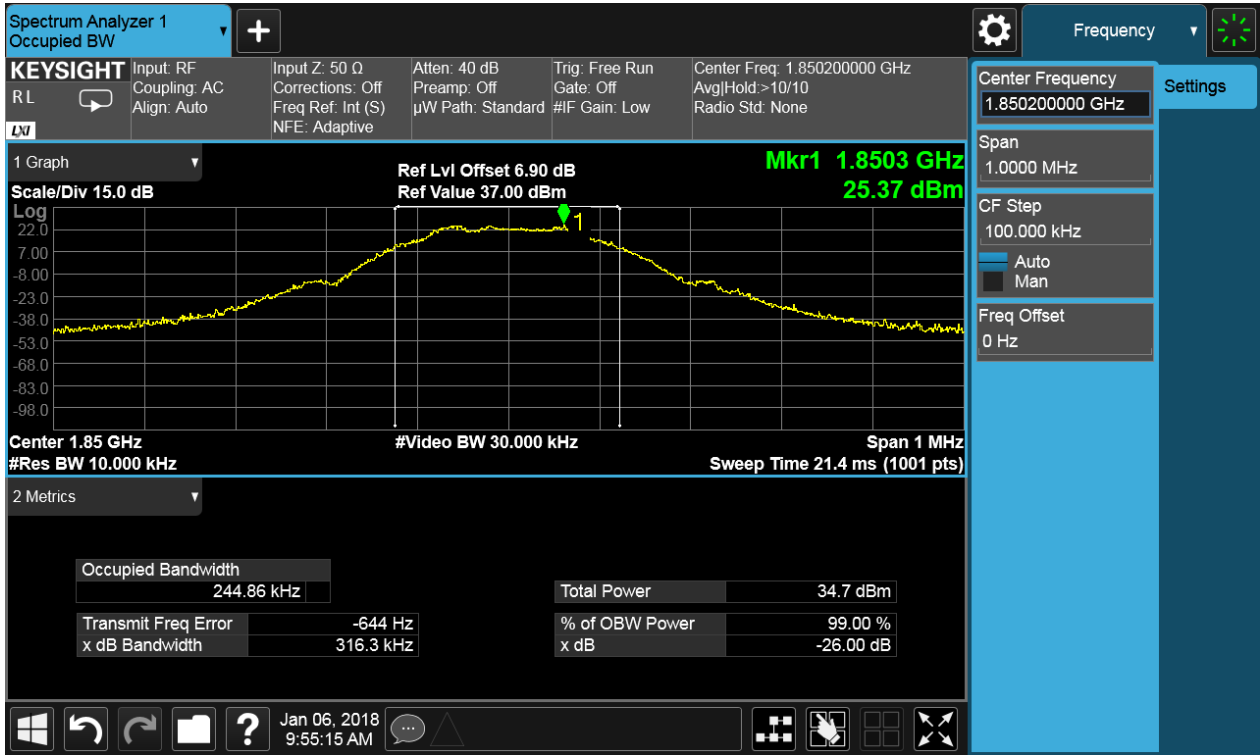
4.1.2.1.3 Test Channel = HCH





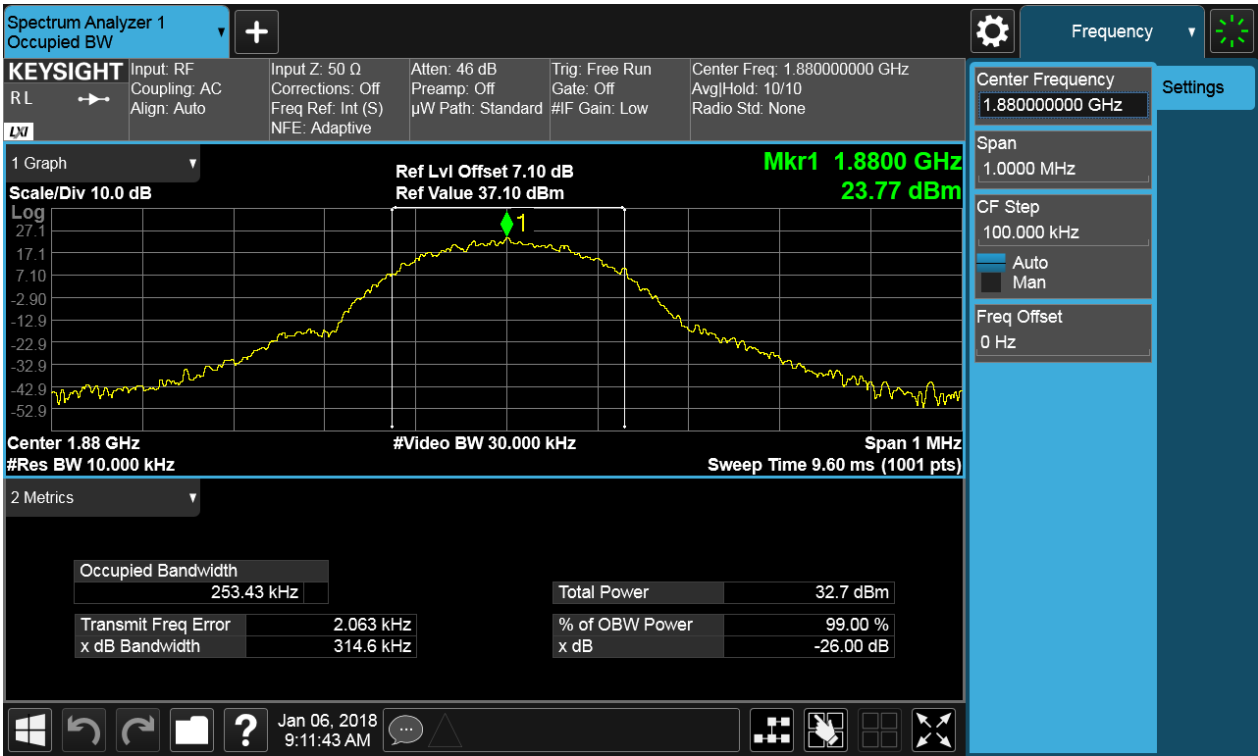
### 4.1.2.2 Test Mode = GSM/TM2

#### 4.1.2.2.1 Test Channel = LCH



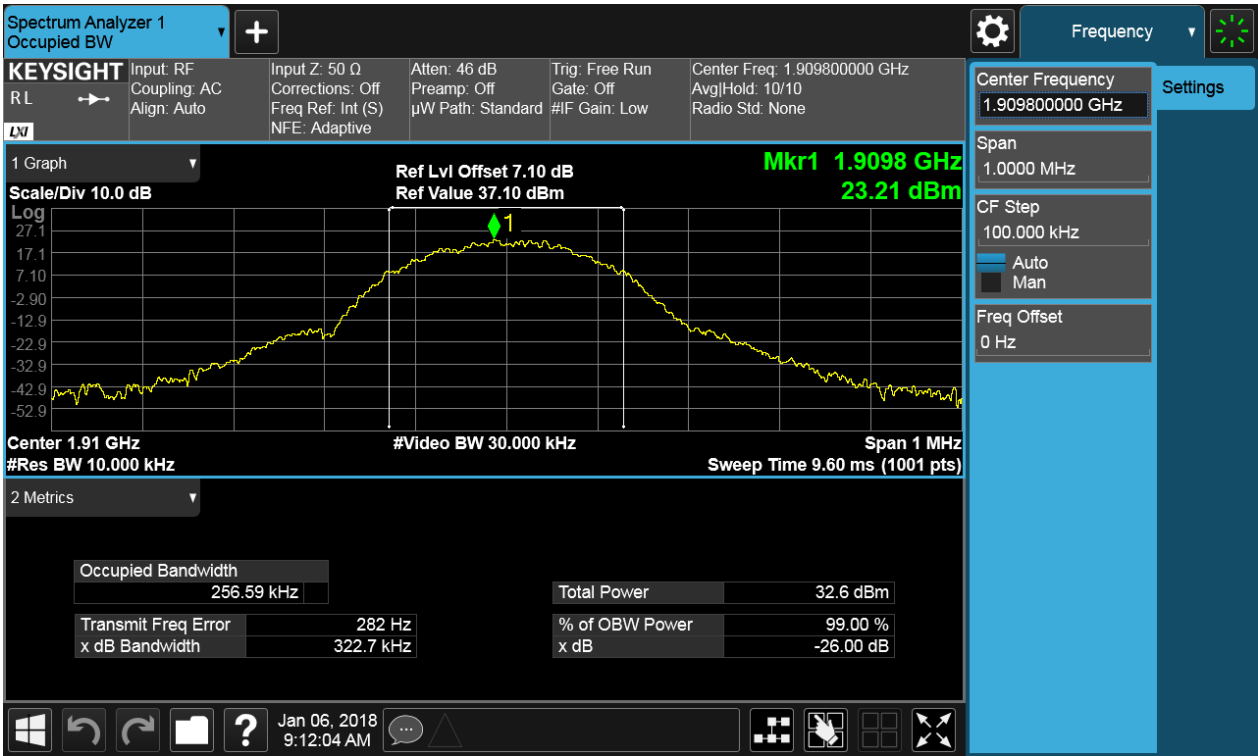


### 4.1.2.2.2 Test Channel = MCH





### 4.1.2.2.3 Test Channel = HCH





## 5Appendix\_E: Band Edges Compliance

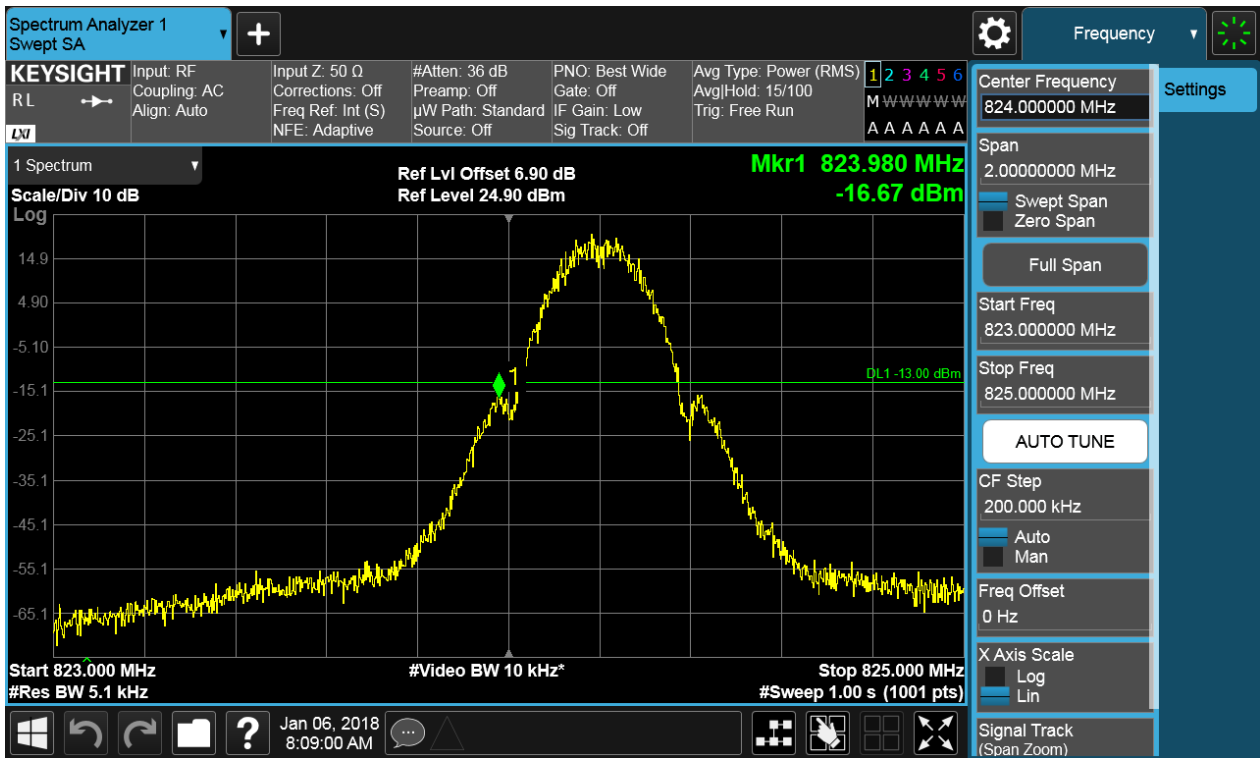
### Part I - Test Plots

#### 5.1 For GSM

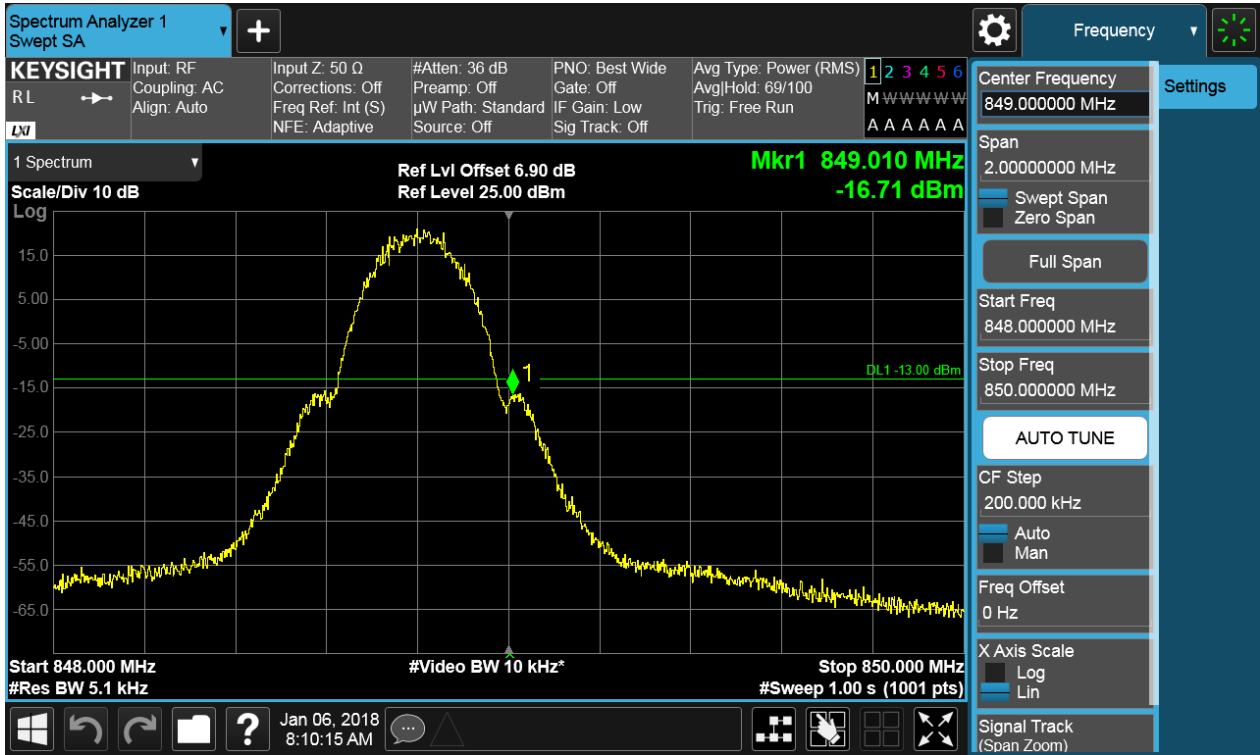
##### 5.1.1 Test Band = GSM850

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

##### 5.1.1.1.1 Test Channel = LCH

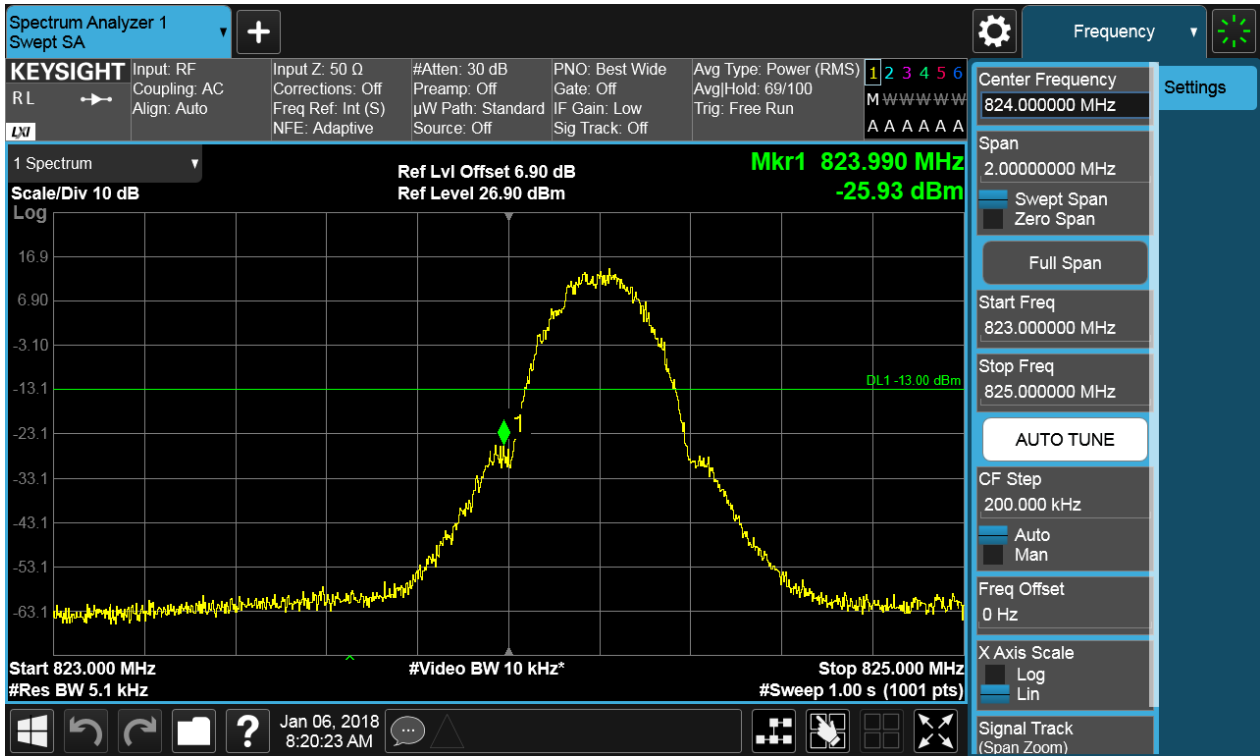


5.1.1.1.2 Test Channel = HCH



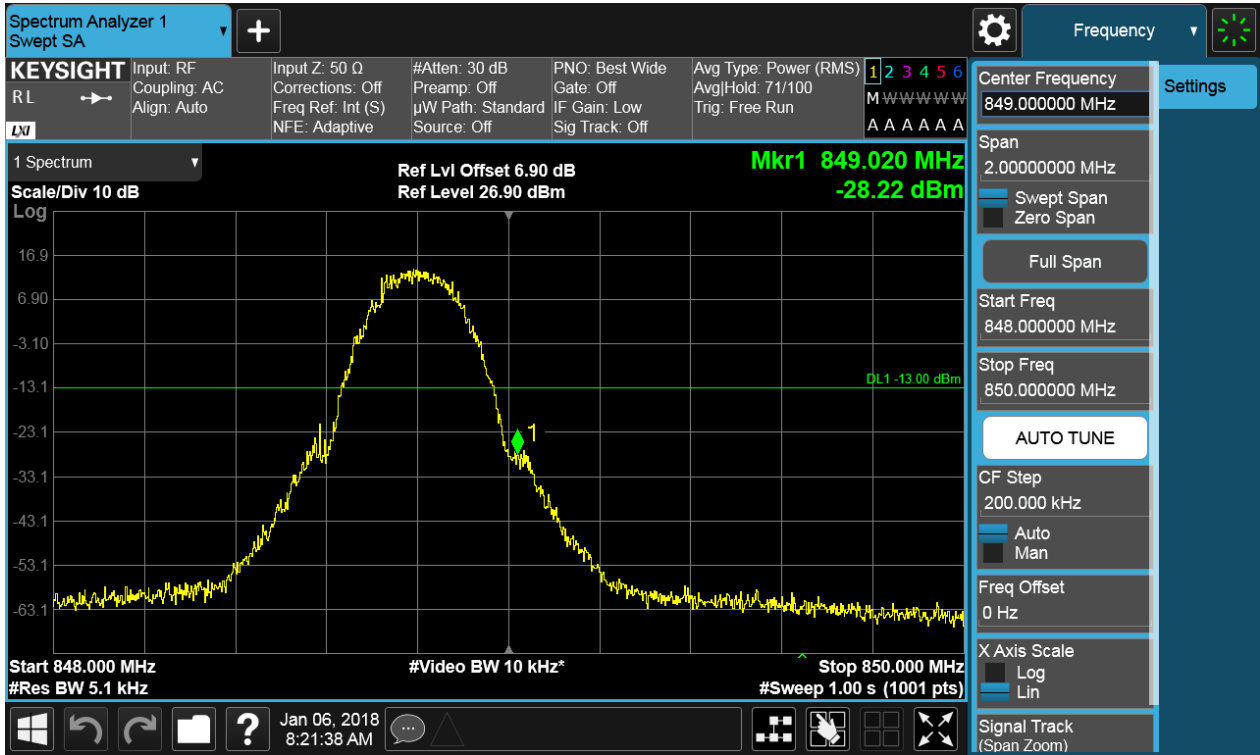
5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH





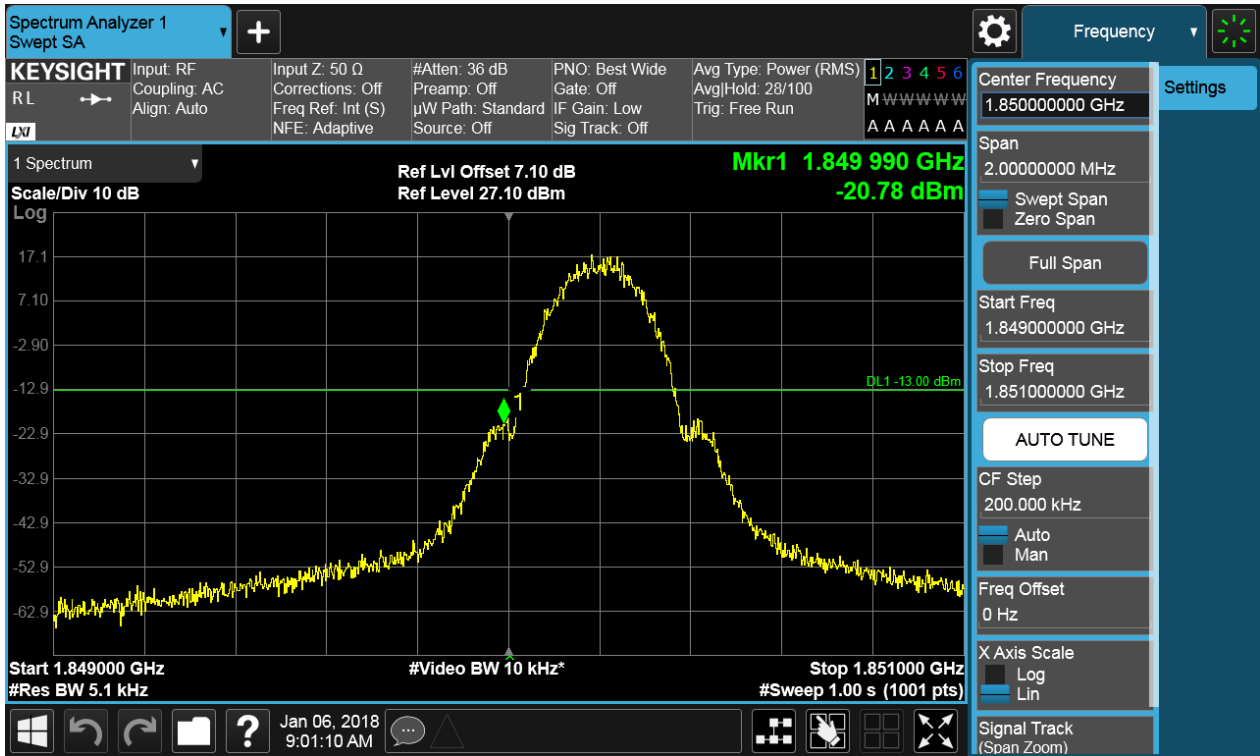
5.1.1.2.2 Test Channel = HCH



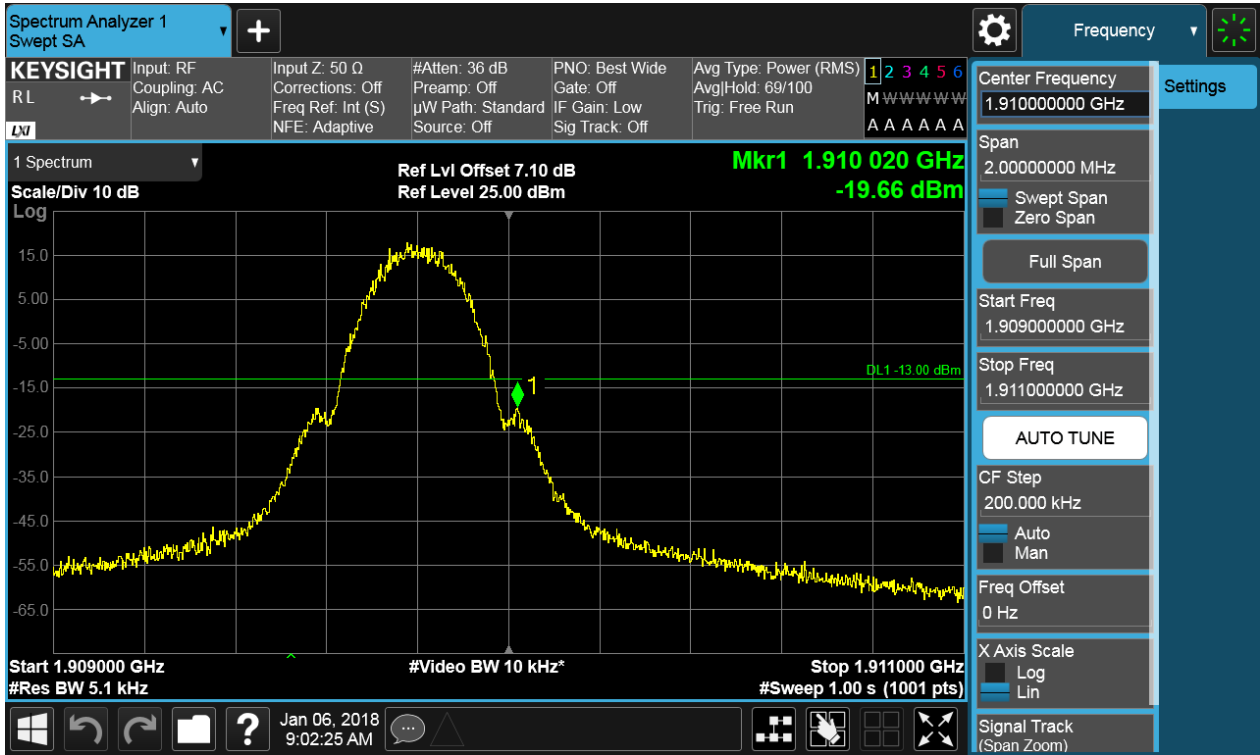
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH

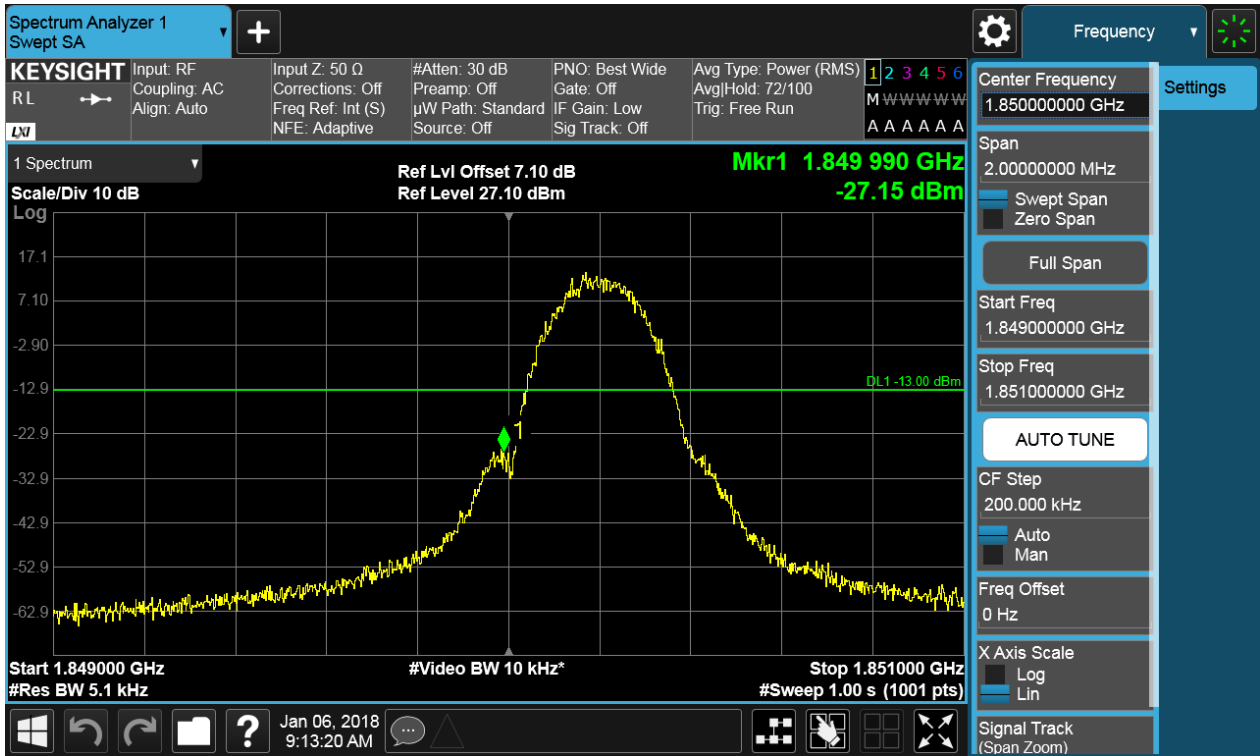


5.1.2.1.2 Test Channel = HCH

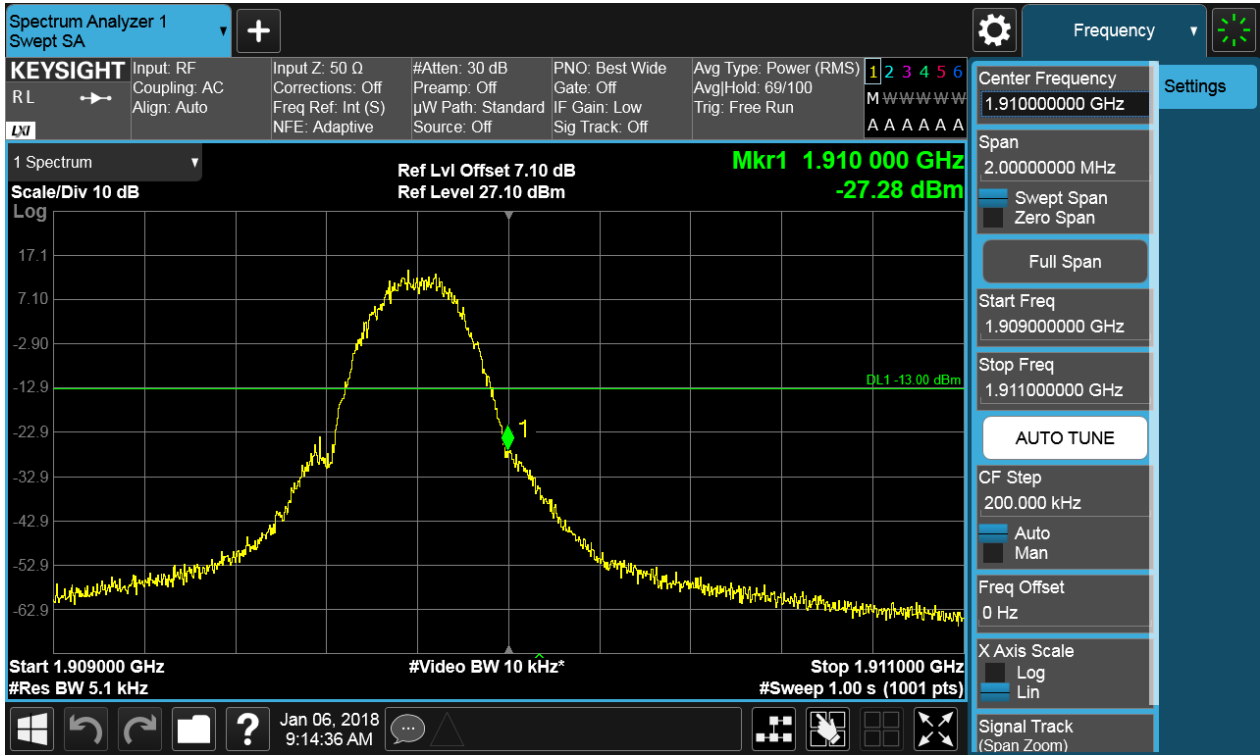


### 5.1.2.2 Test Mode = GSM/TM2

#### 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.

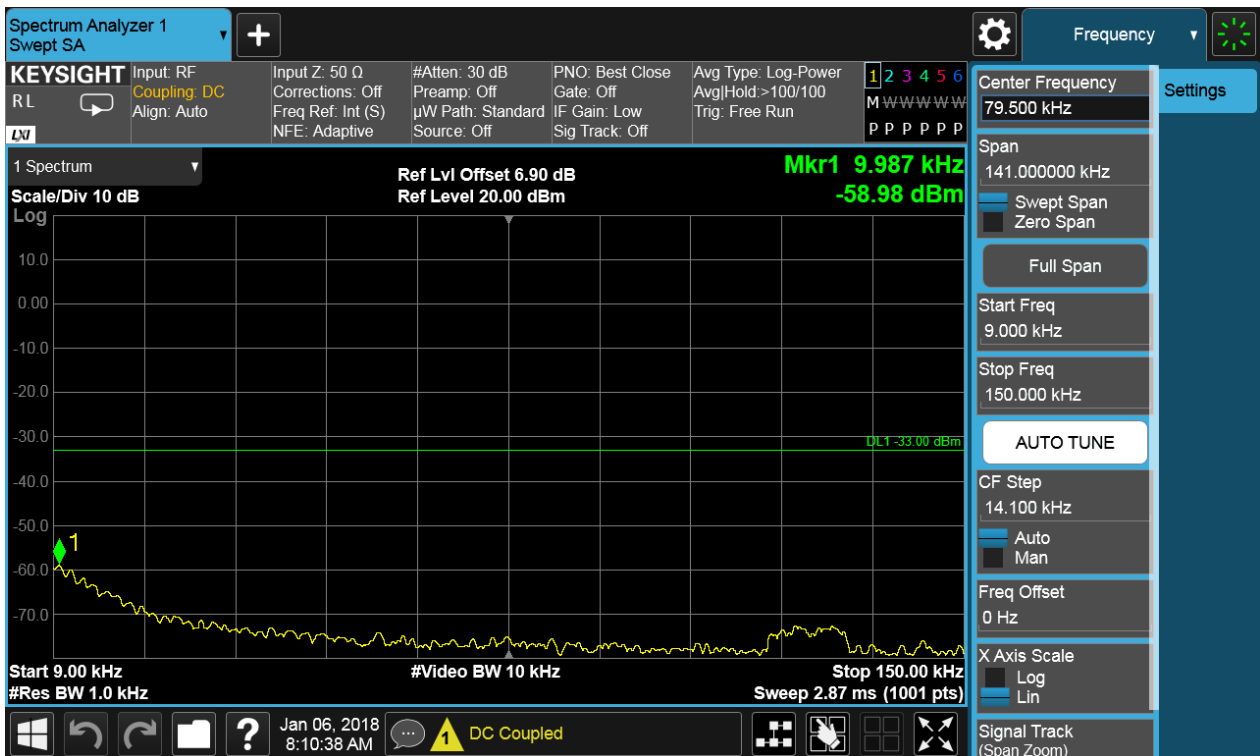
### Part I - Test Plots

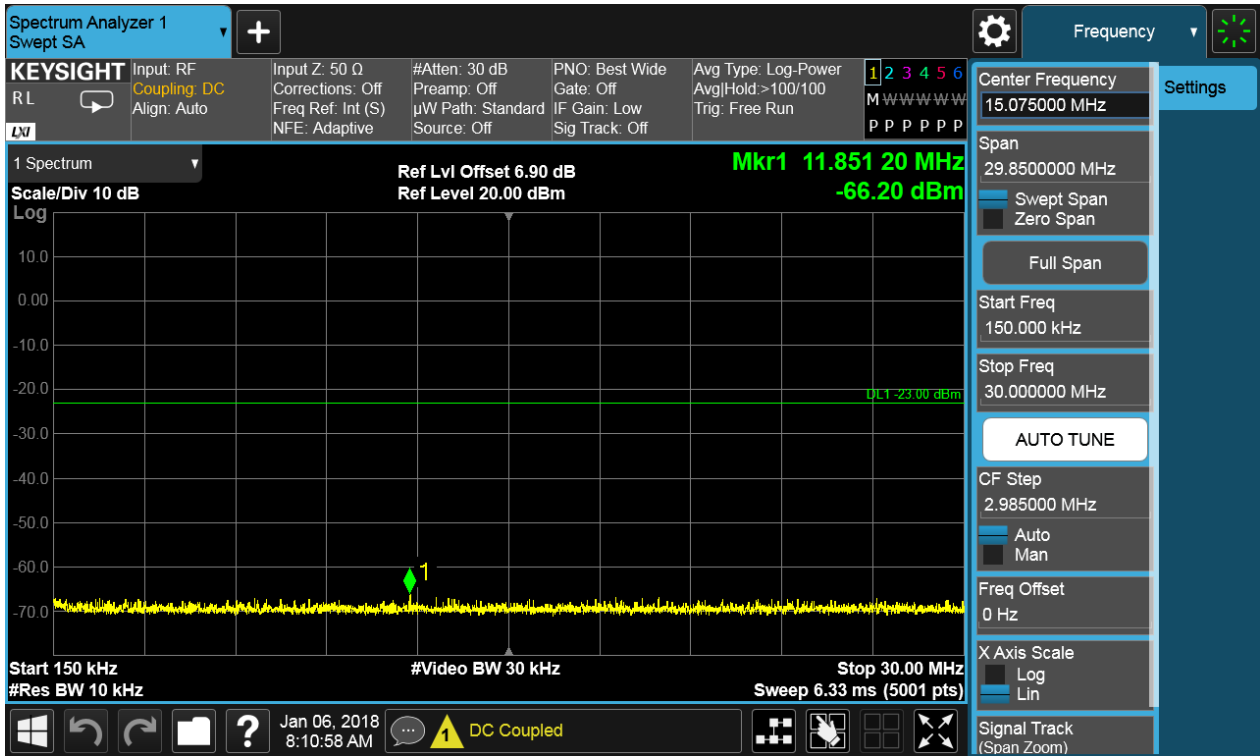
#### 6.1 For GSM

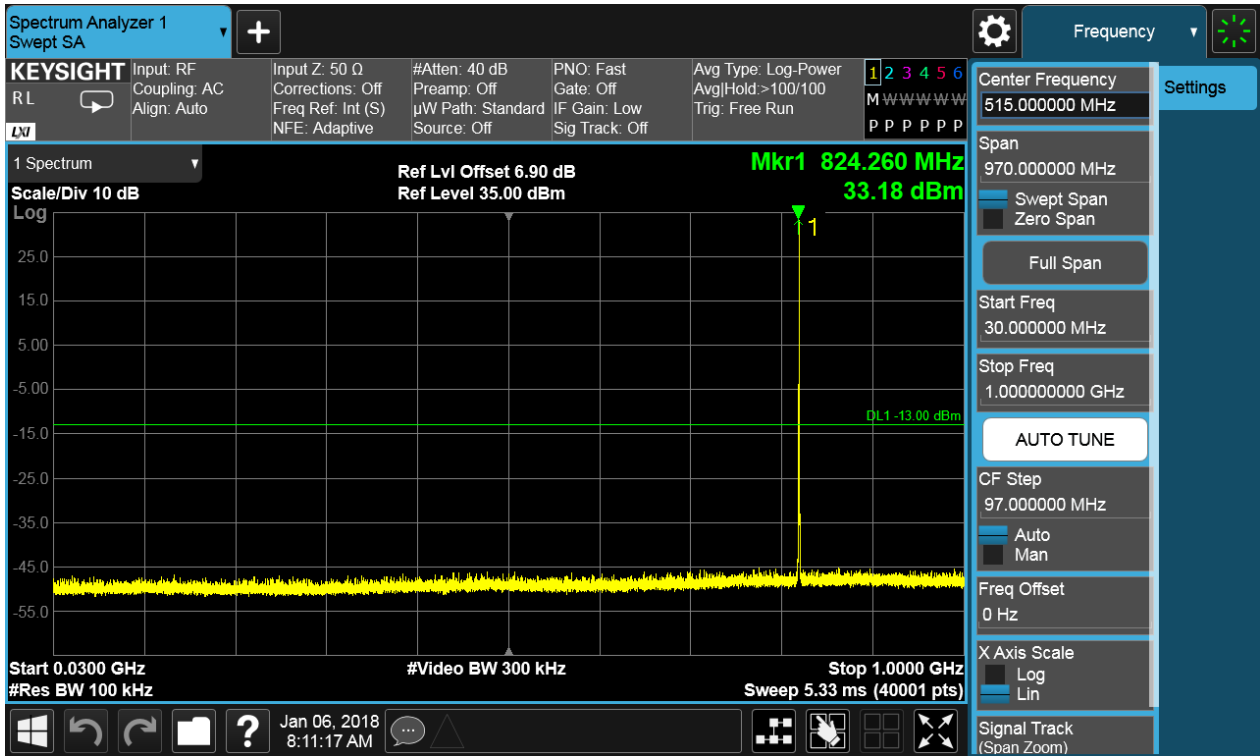
##### 6.1.1 Test Band = GSM850

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

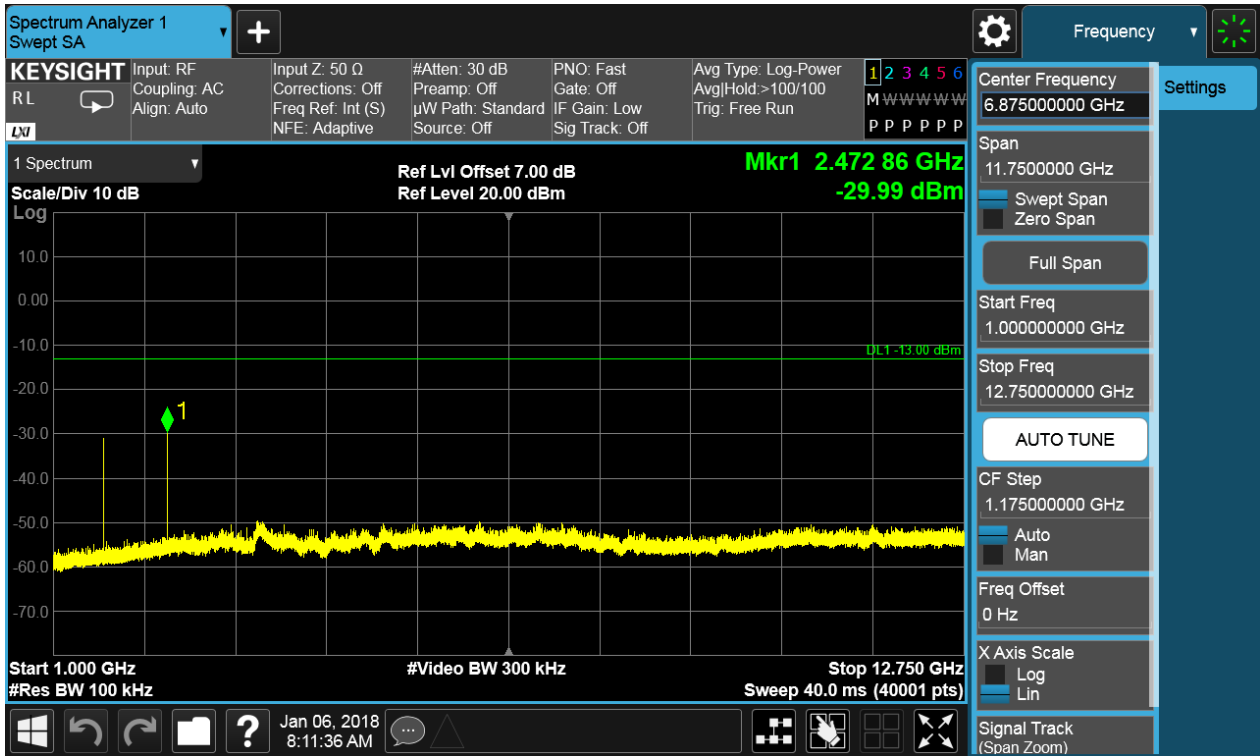
##### 6.1.1.1.1 Test Channel = LCH





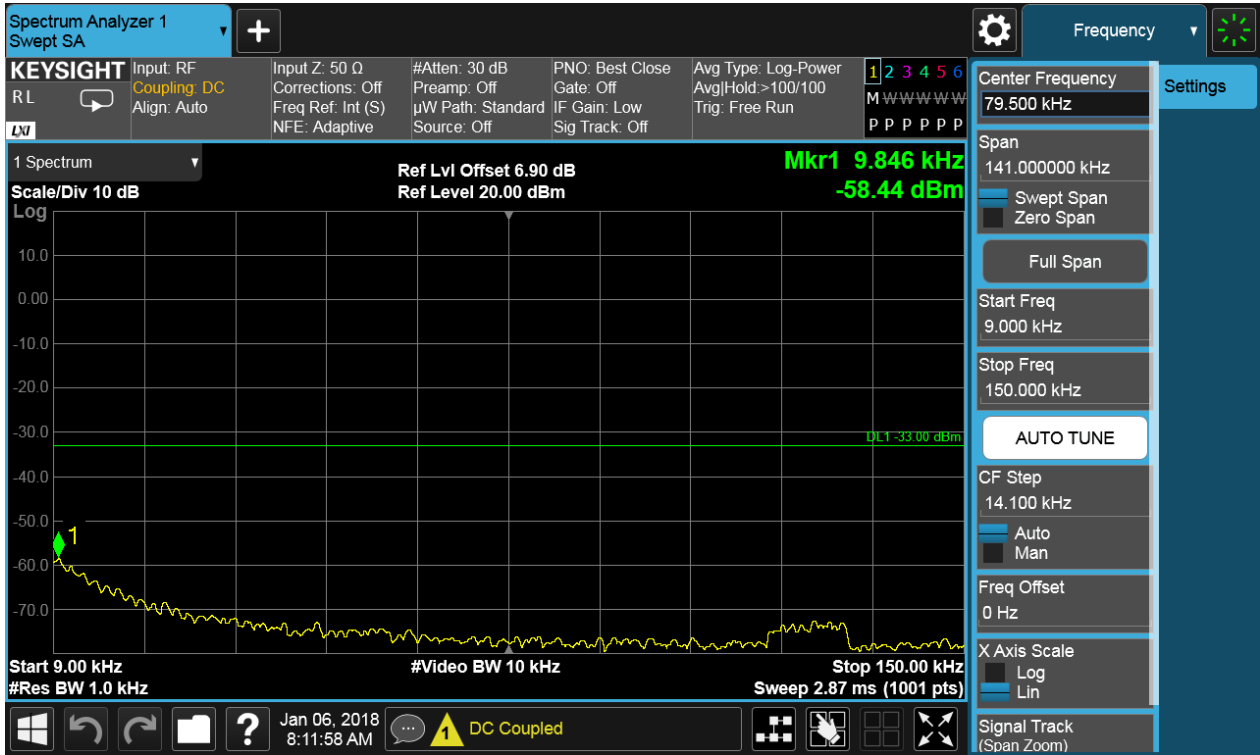


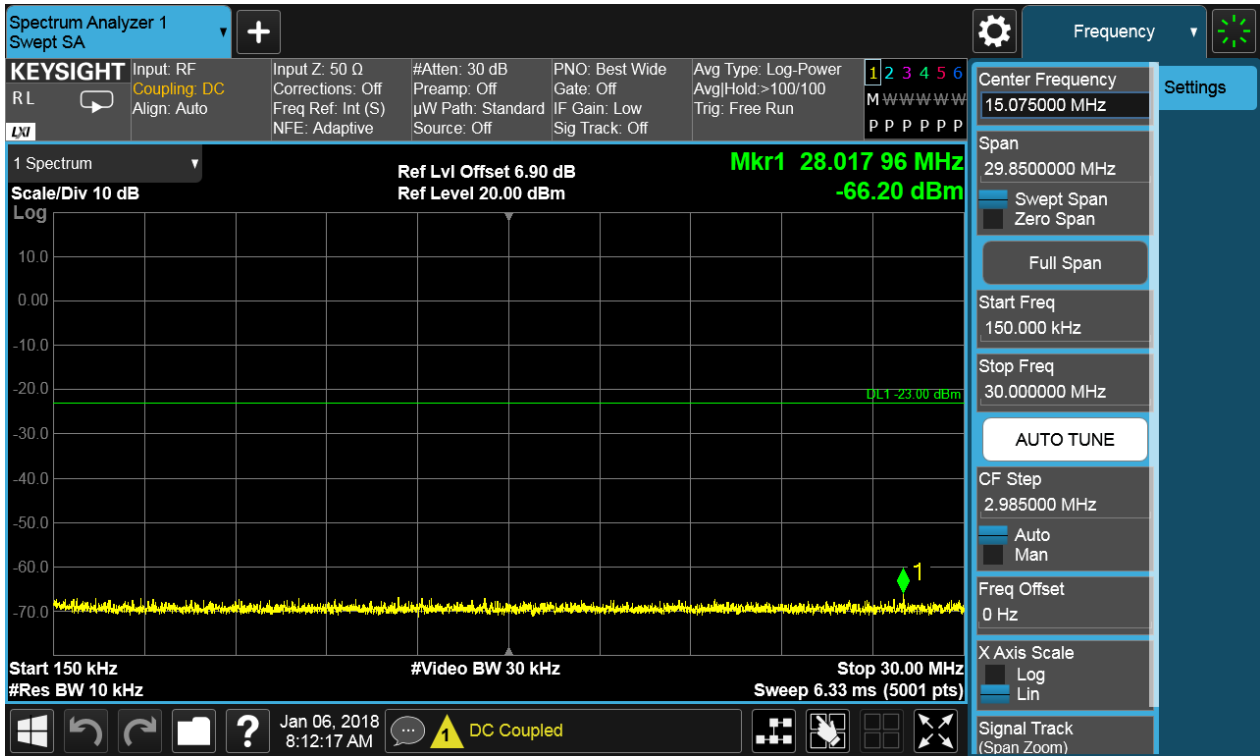


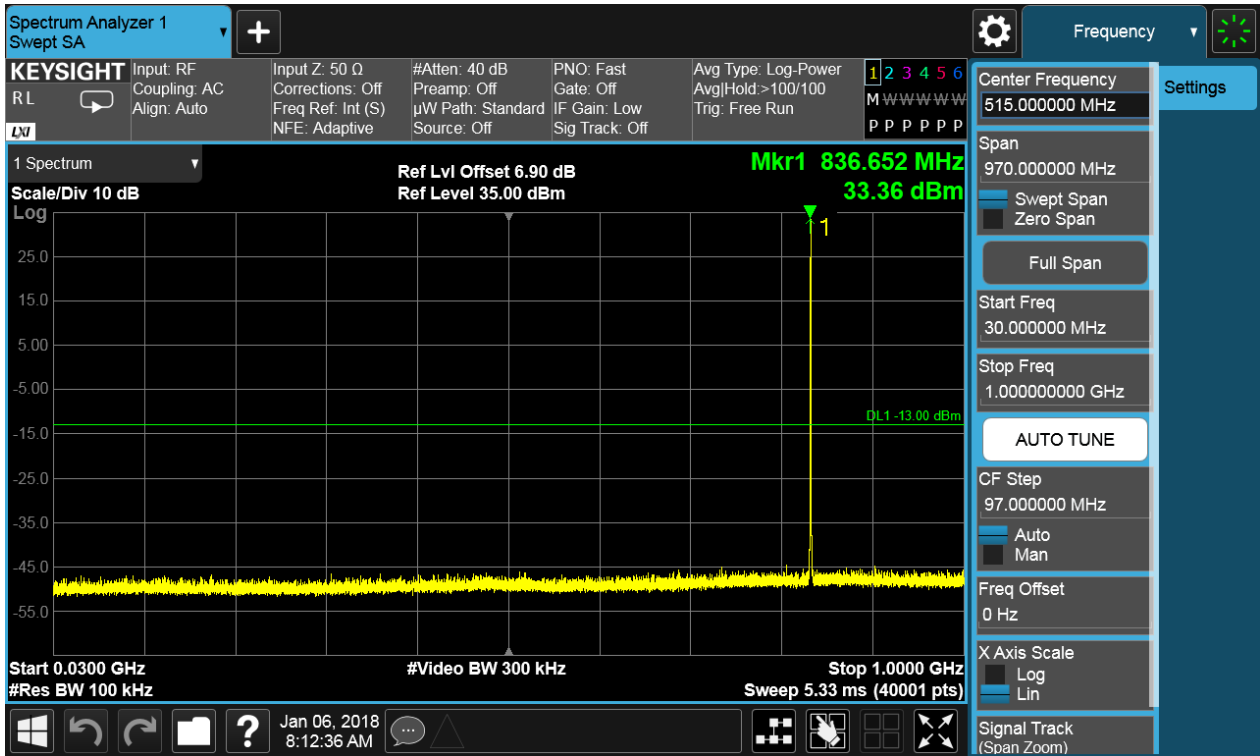


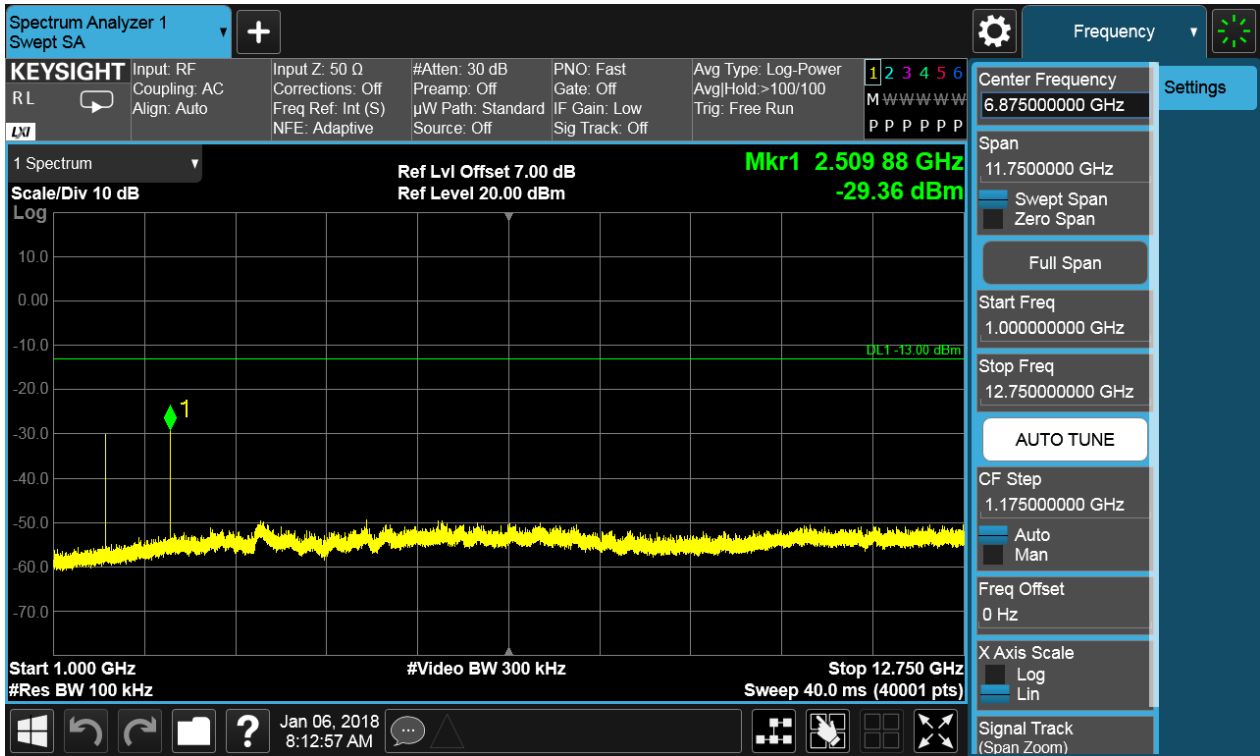


### 6.1.1.1.2 Test Channel = MCH

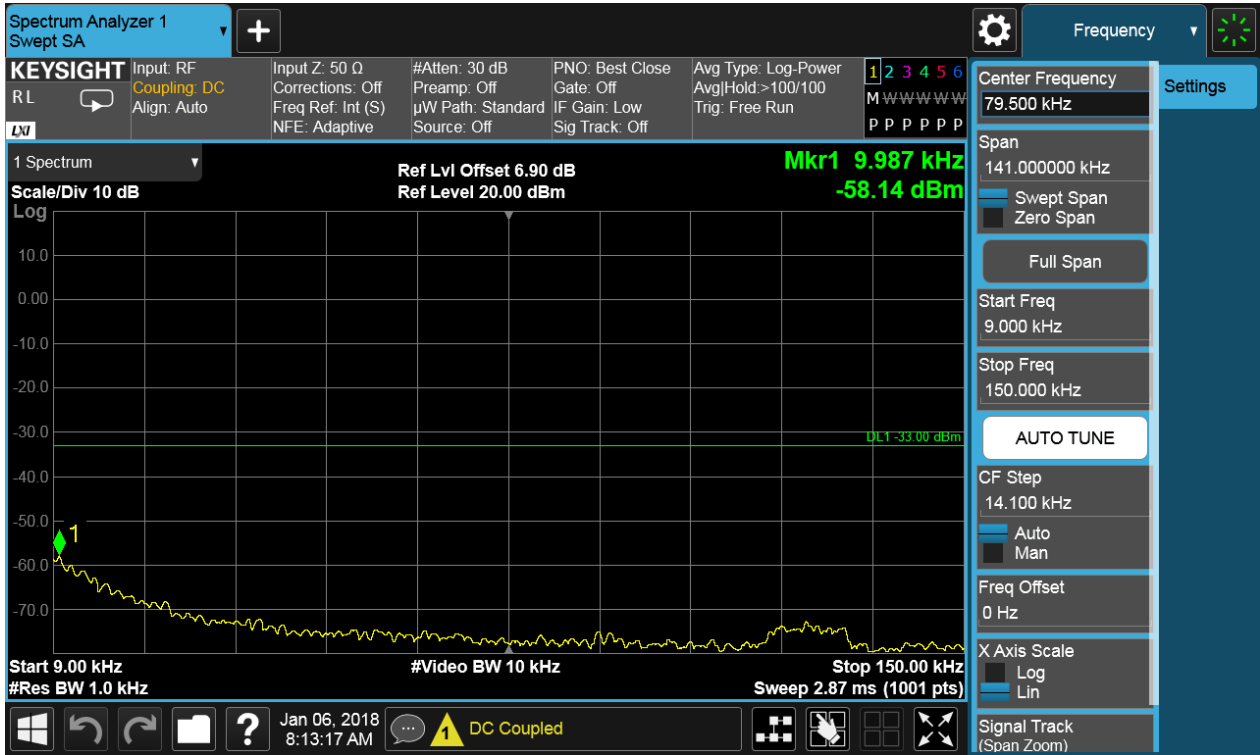


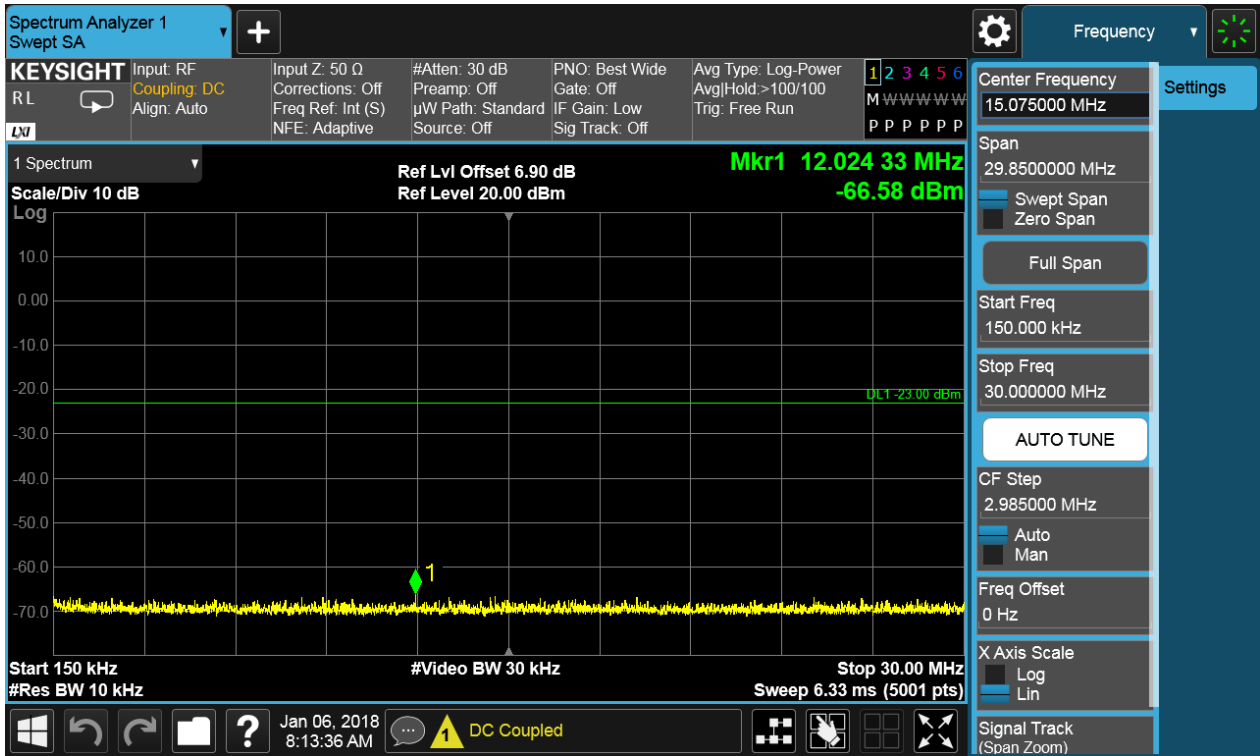


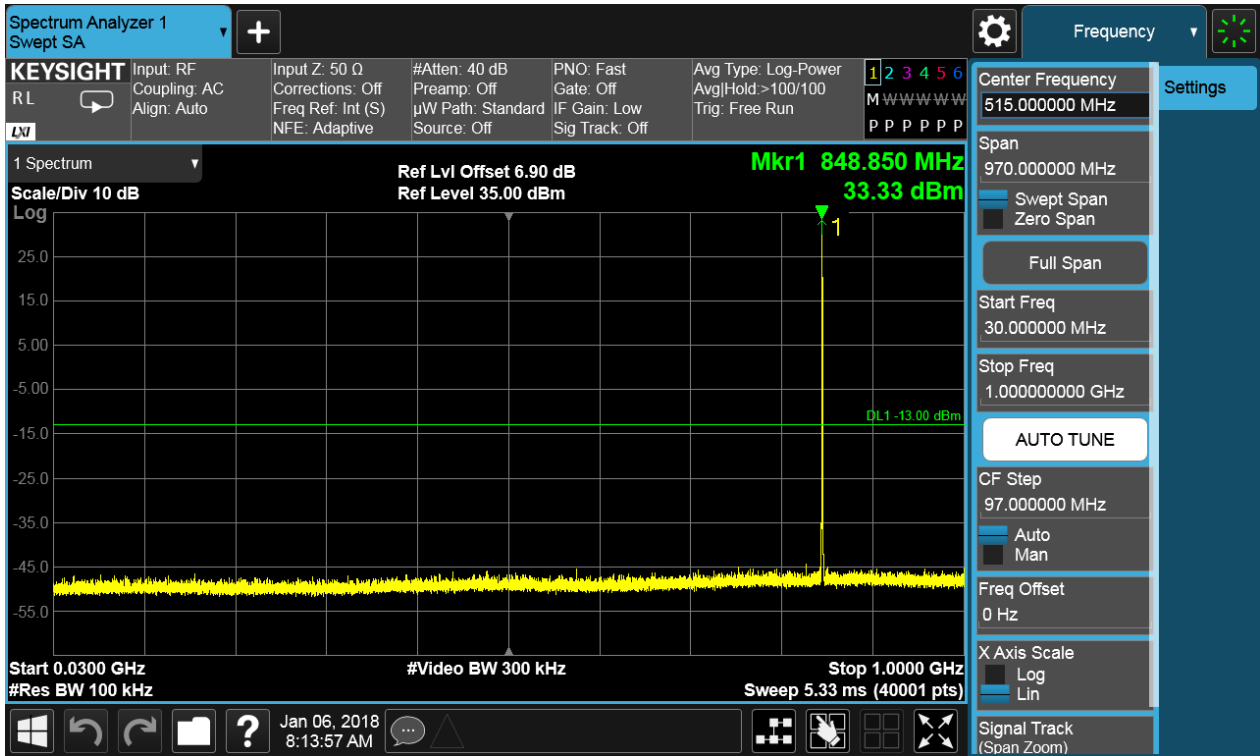




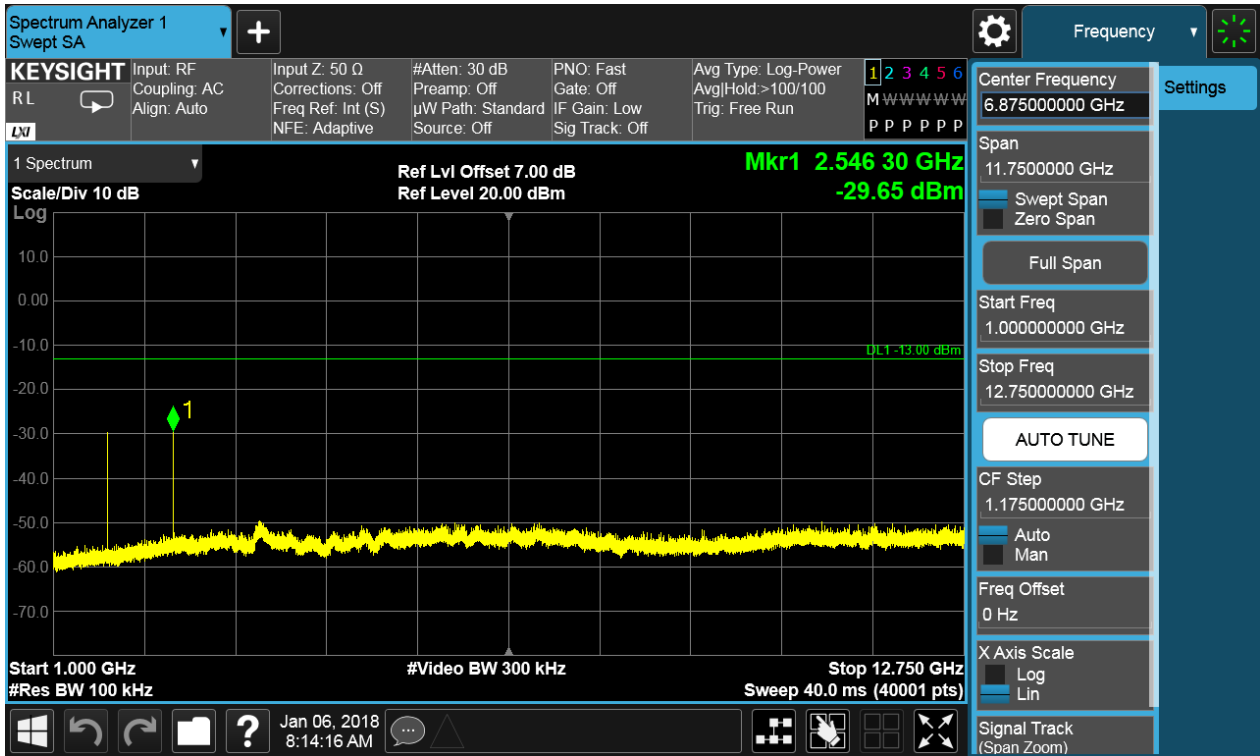
6.1.1.1.3 Test Channel = HCH







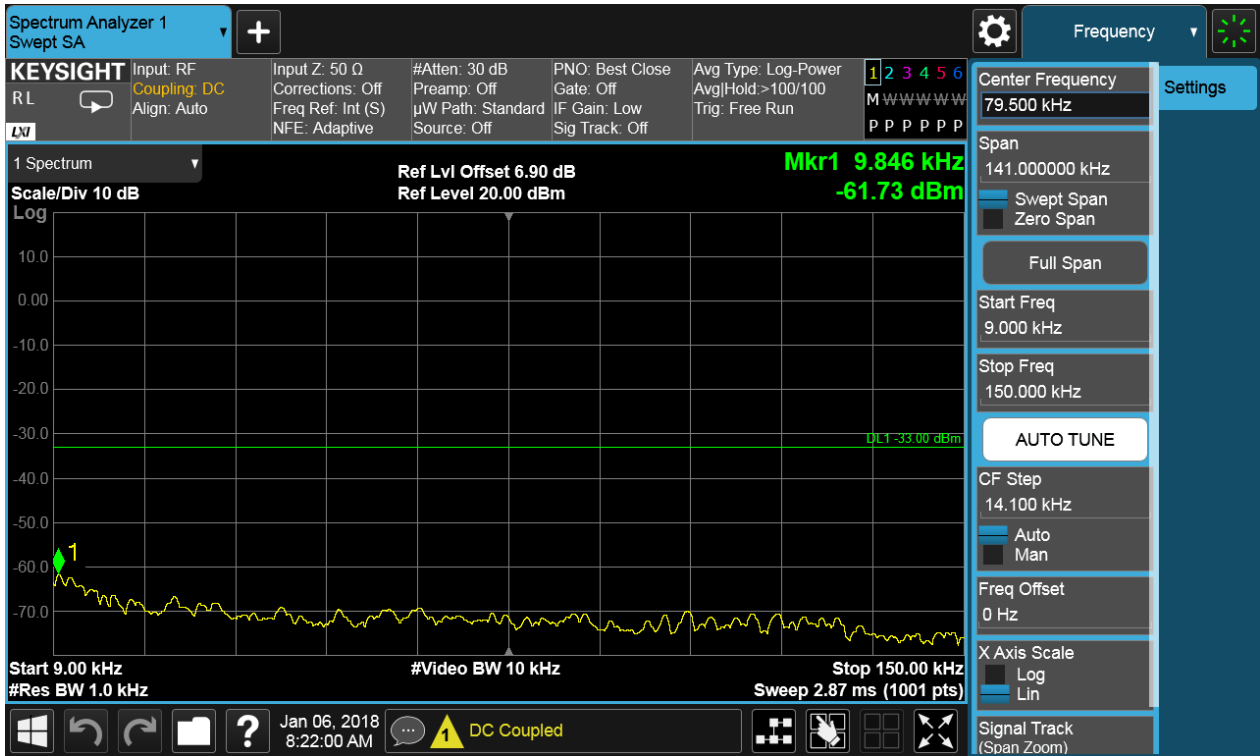


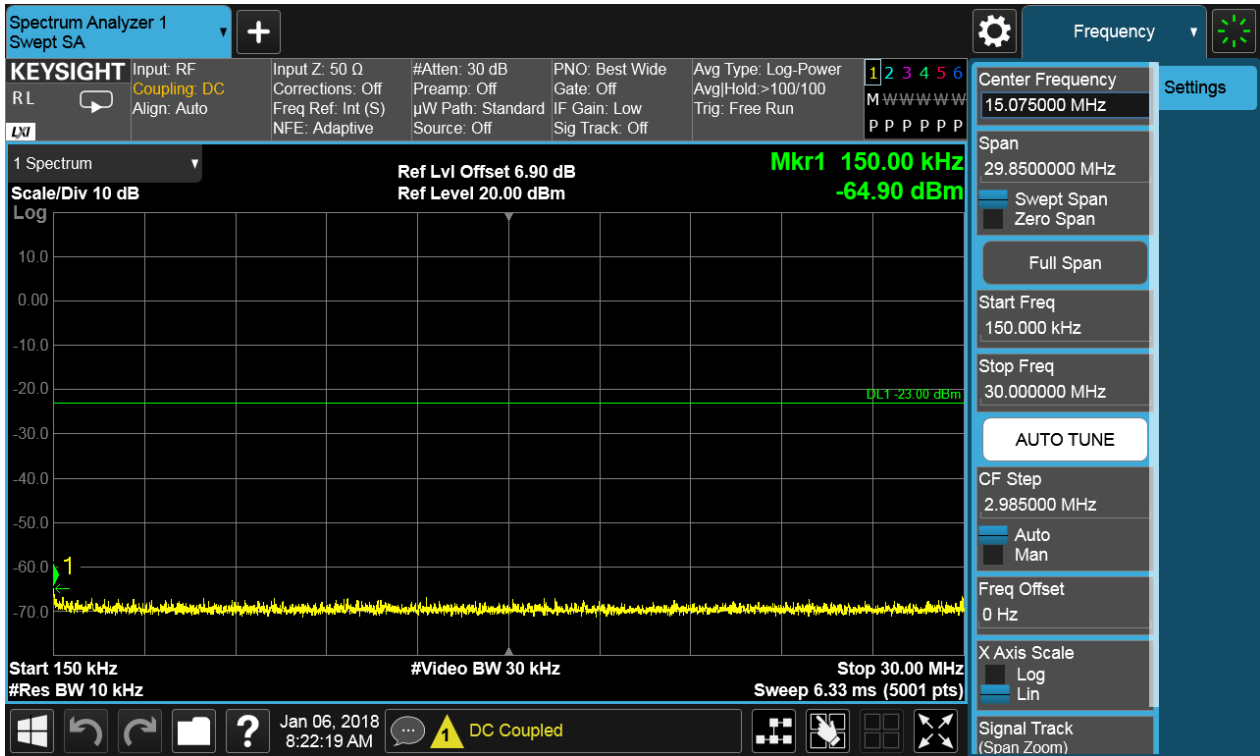


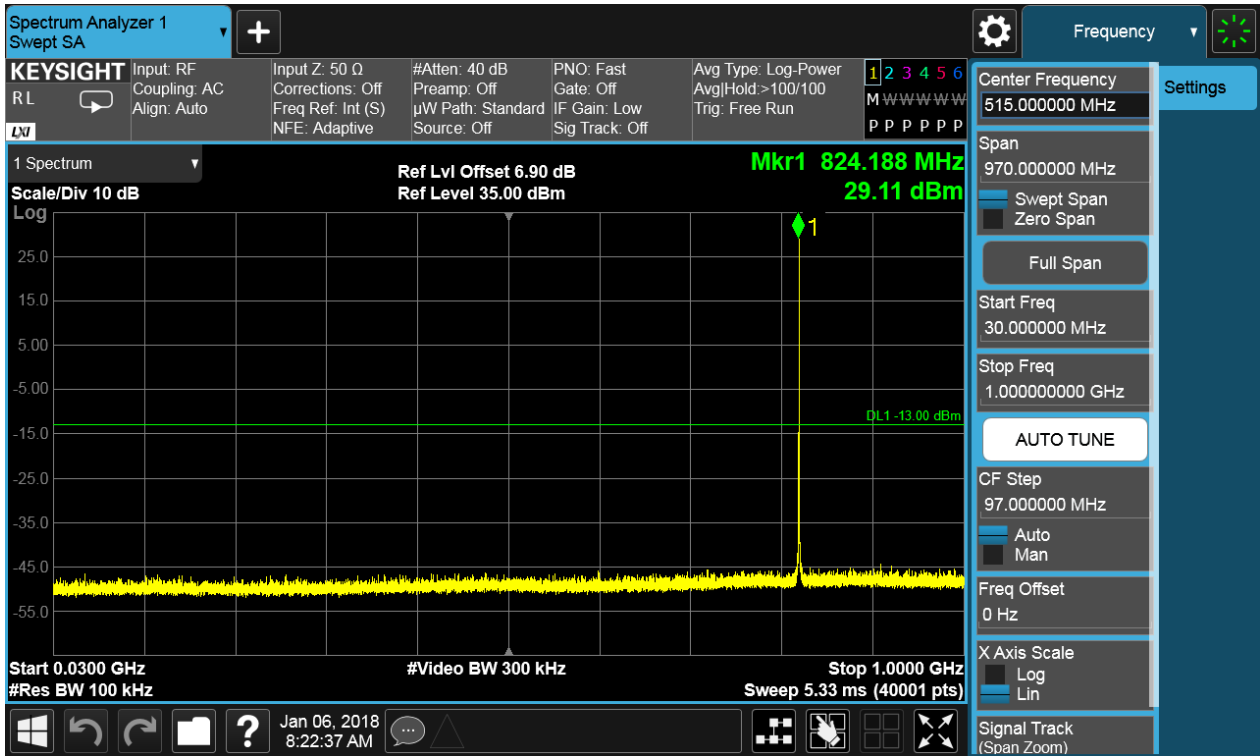


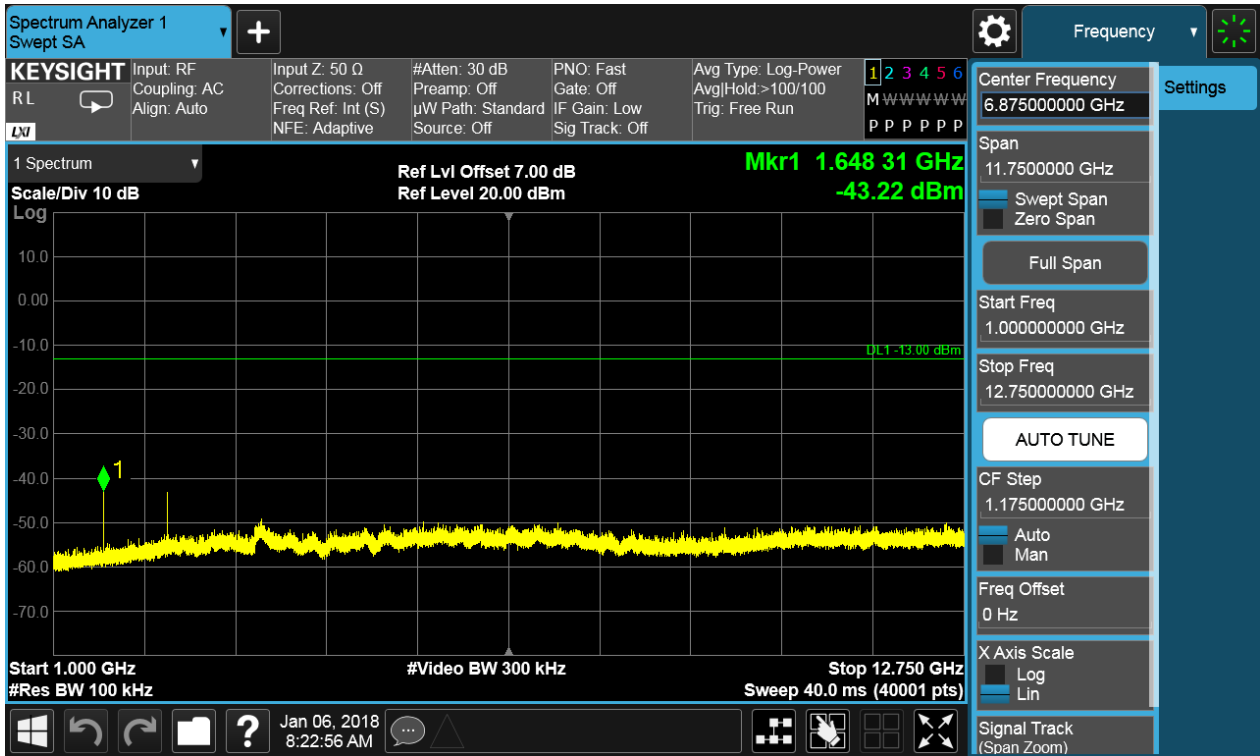
### 6.1.1.2 Test Mode = GSM/TM2

#### 6.1.1.2.1 Test Channel = LCH

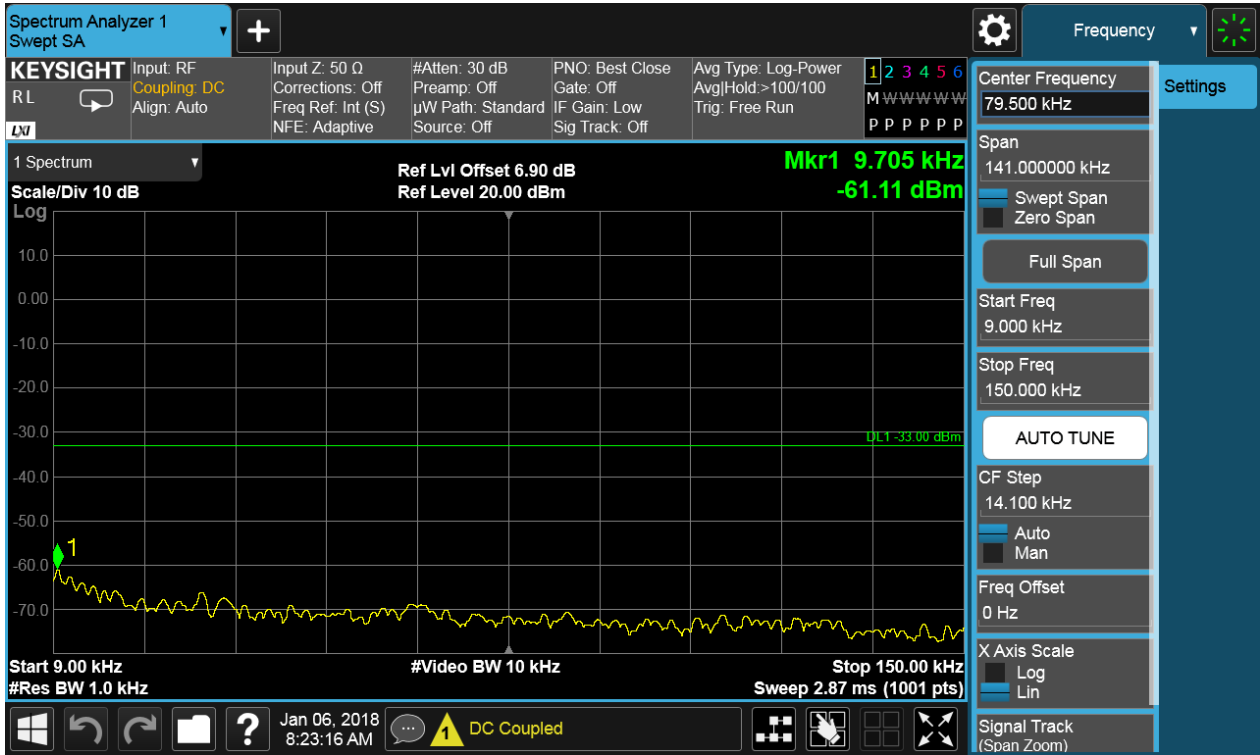


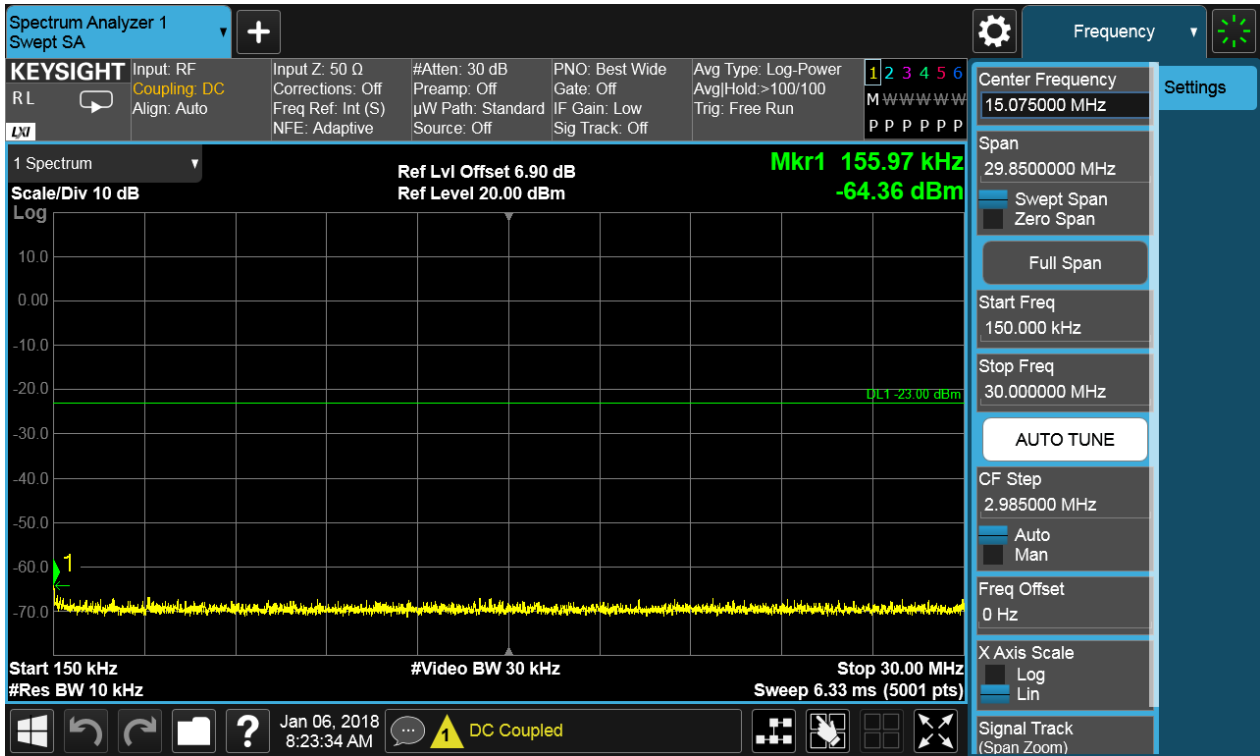


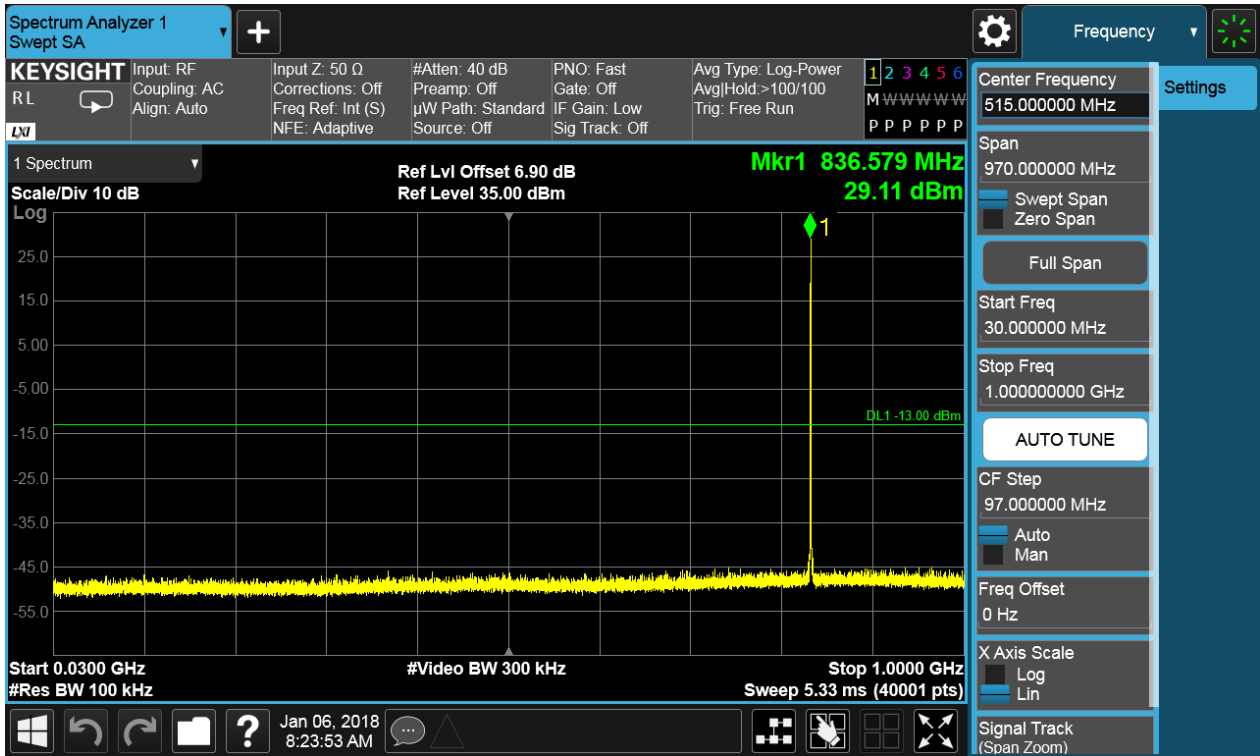




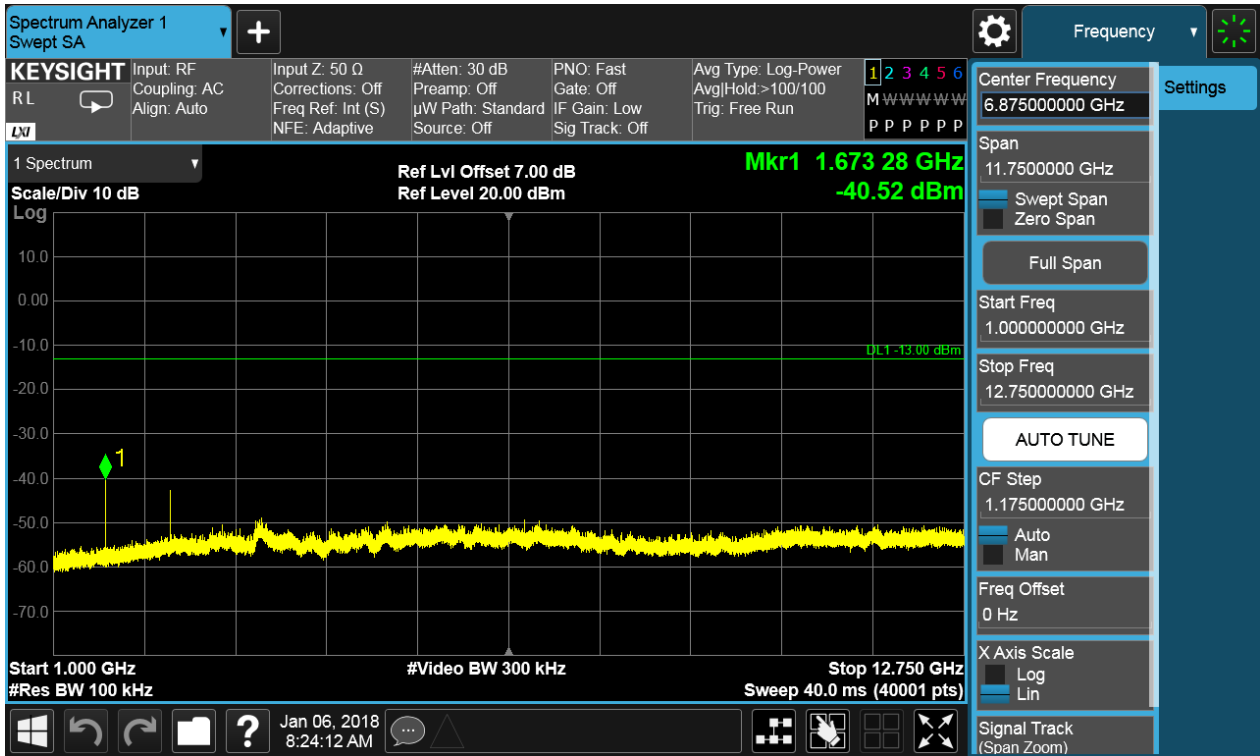
6.1.1.2.2 Test Channel = MCH





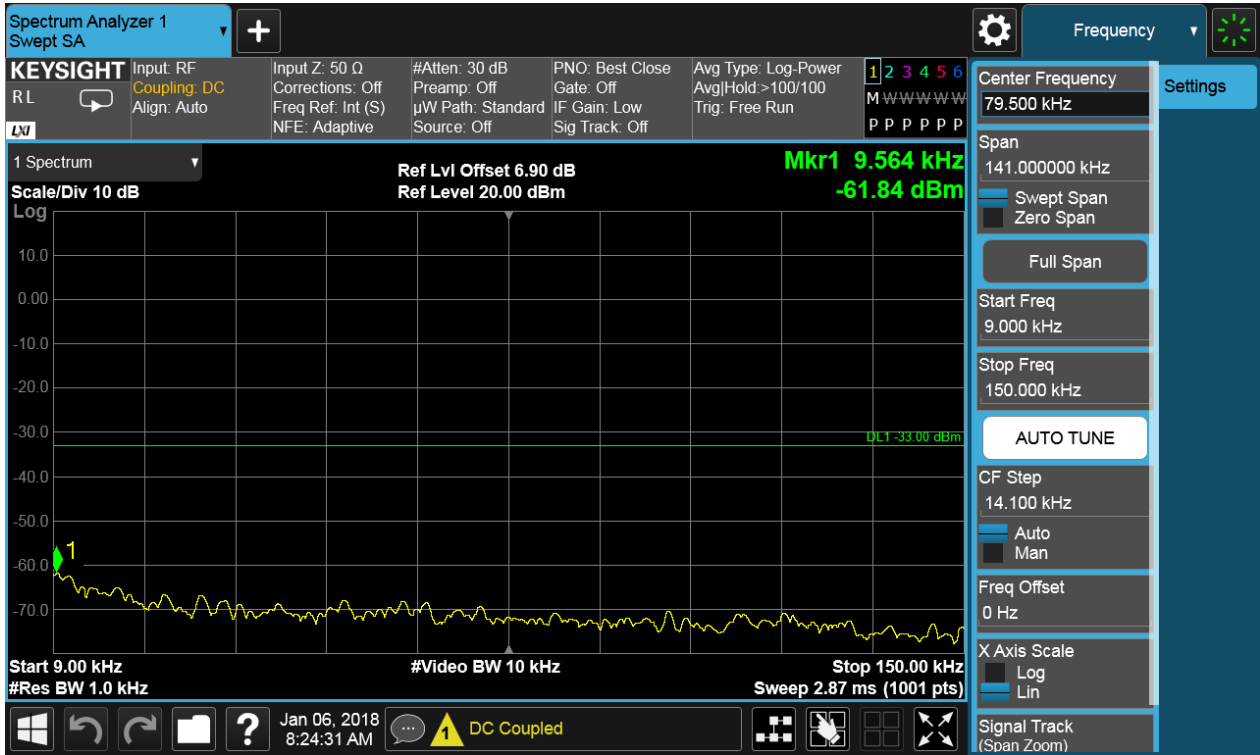


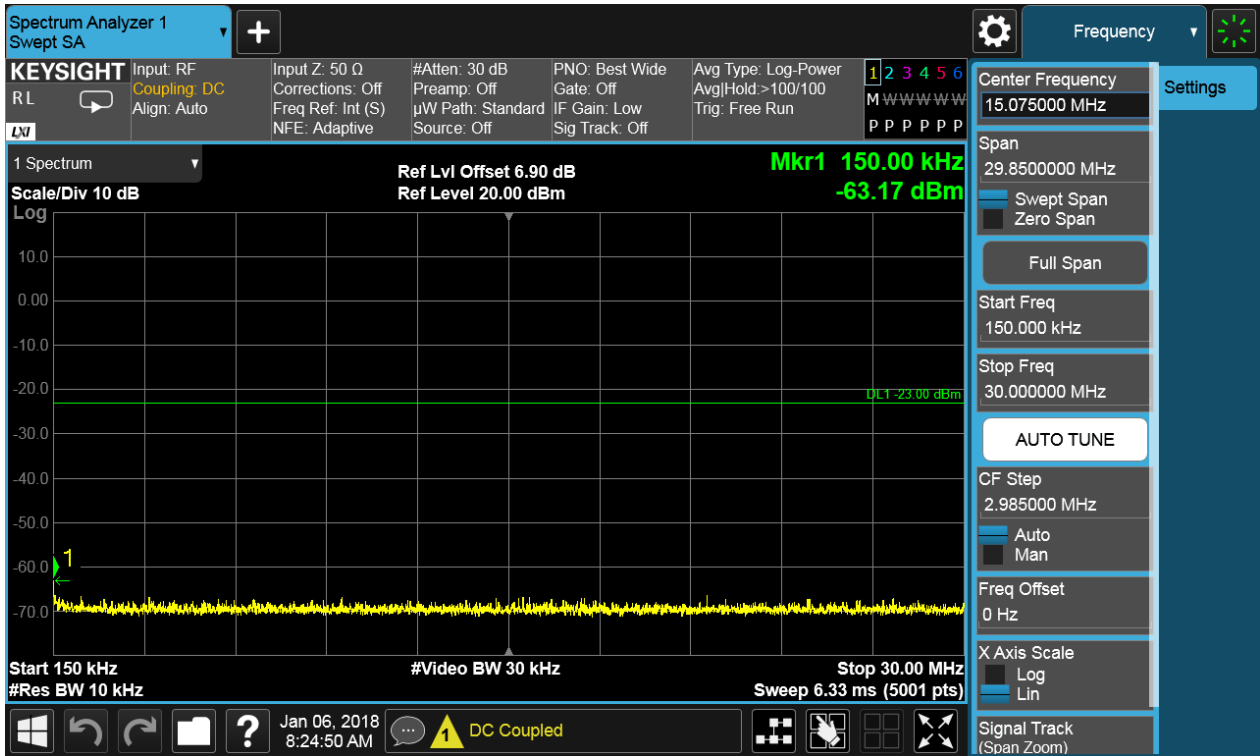


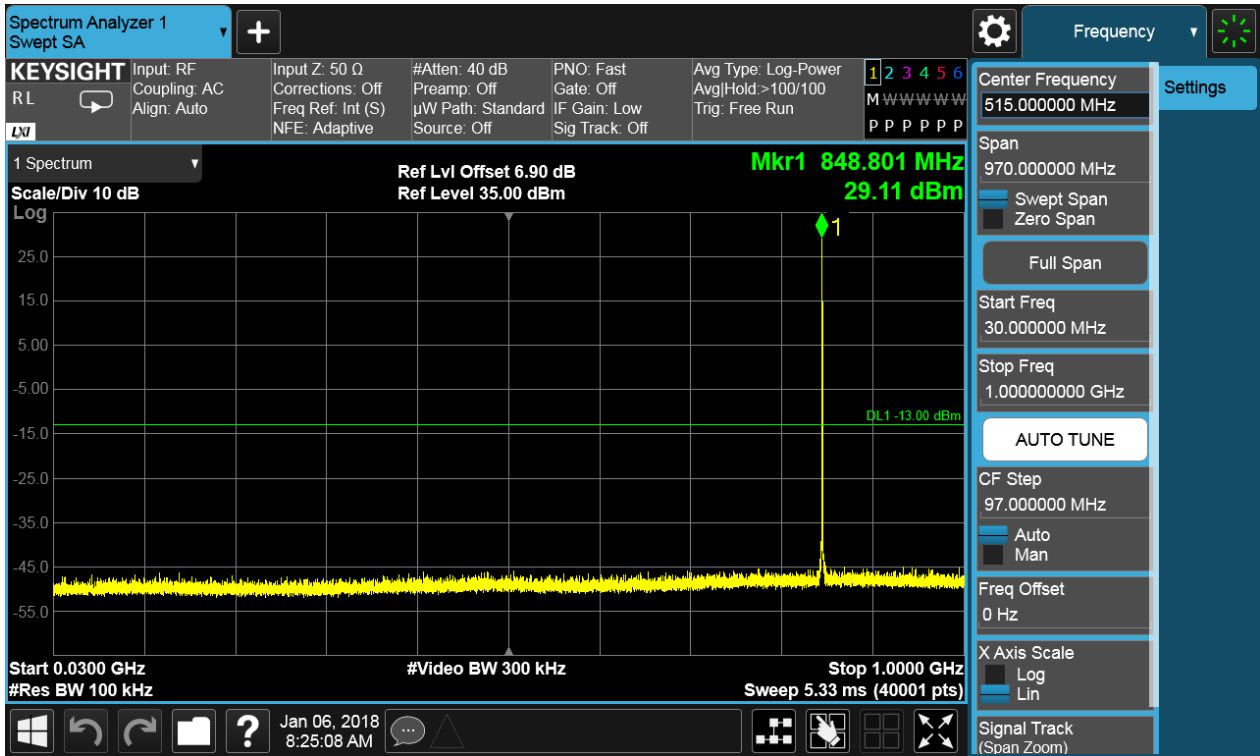


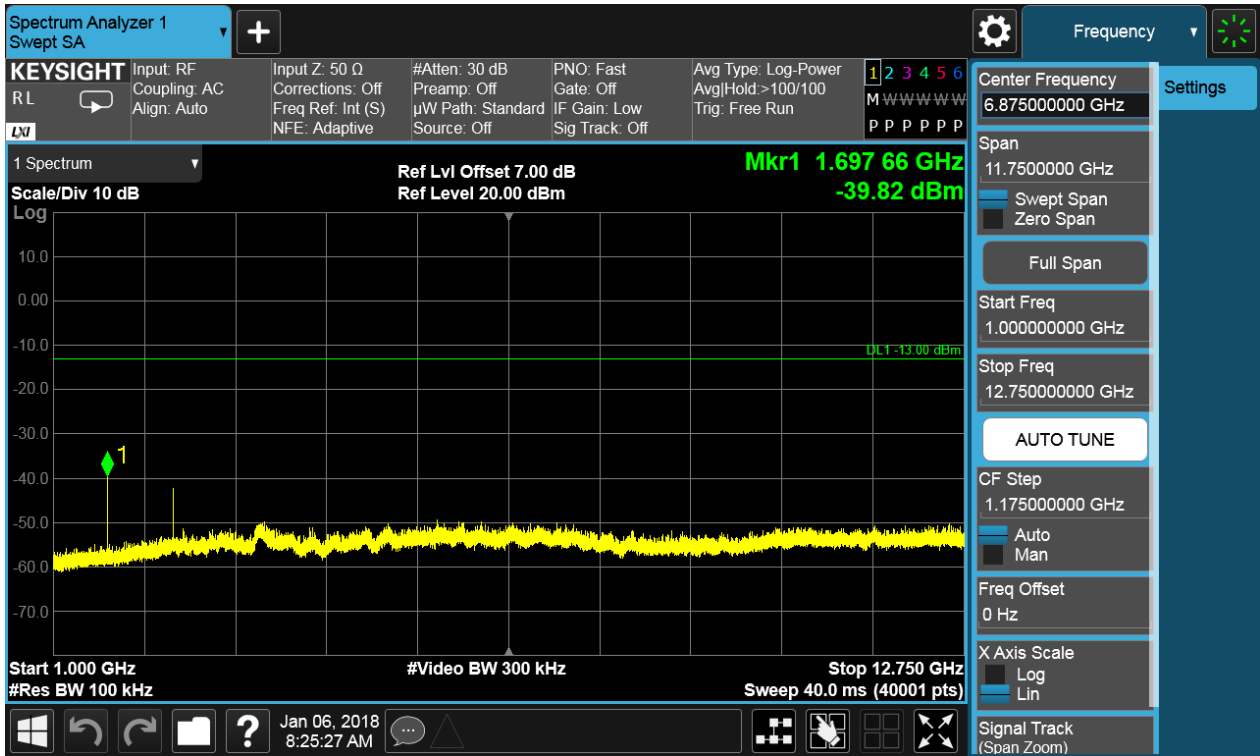


### 6.1.1.2.3 Test Channel = HCH





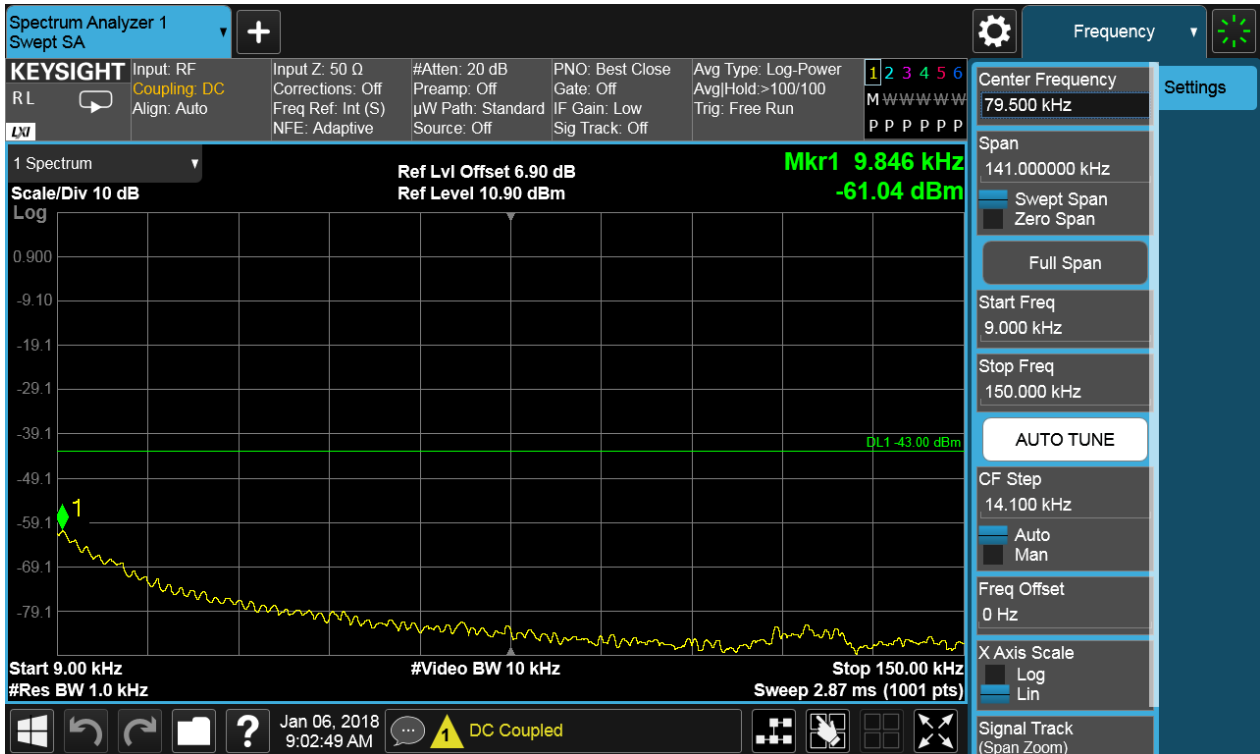


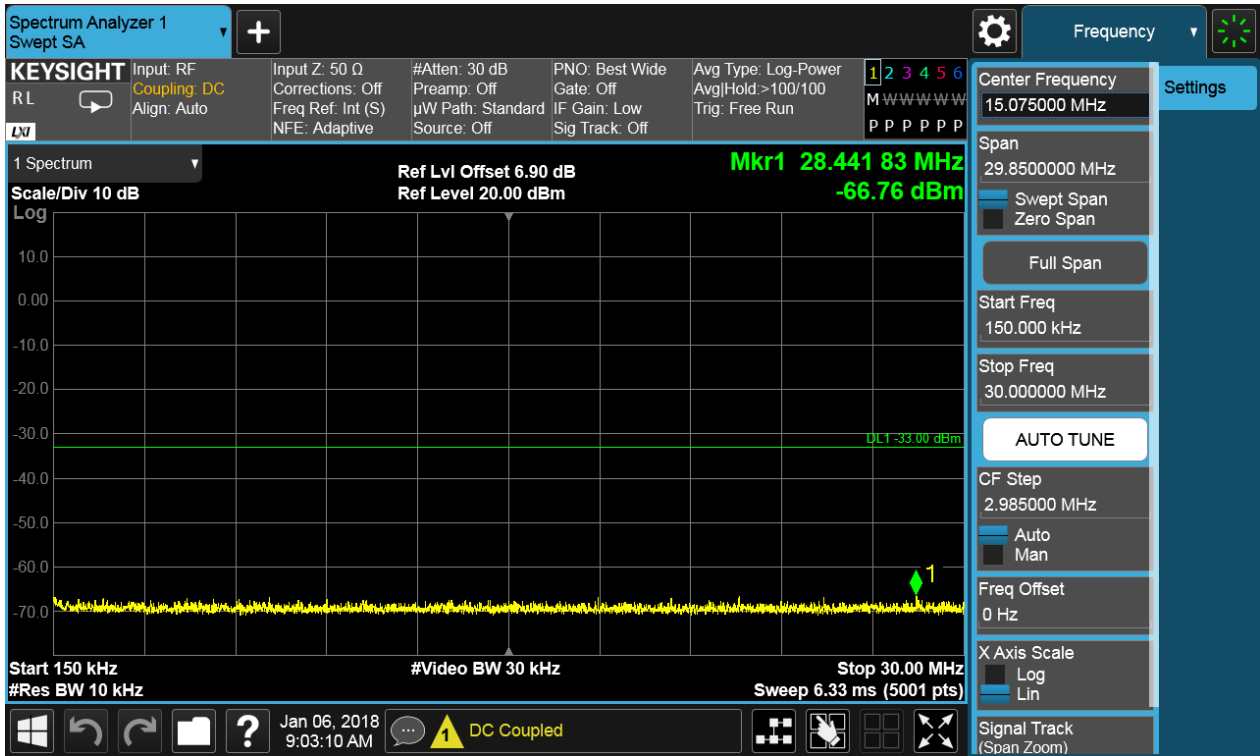


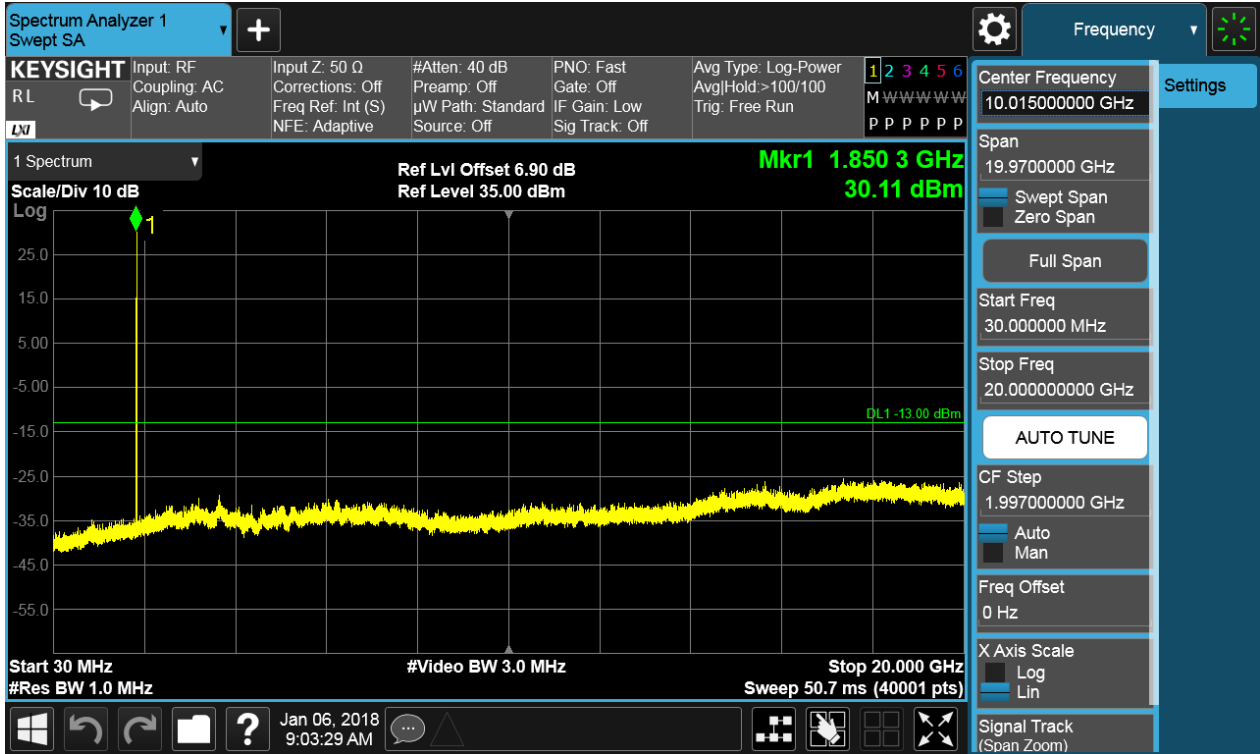
## 6.1.2 Test Band = GSM1900

### 6.1.2.1 Test Mode = GSM/TM1

#### 6.1.2.1.1 Test Channel = LCH

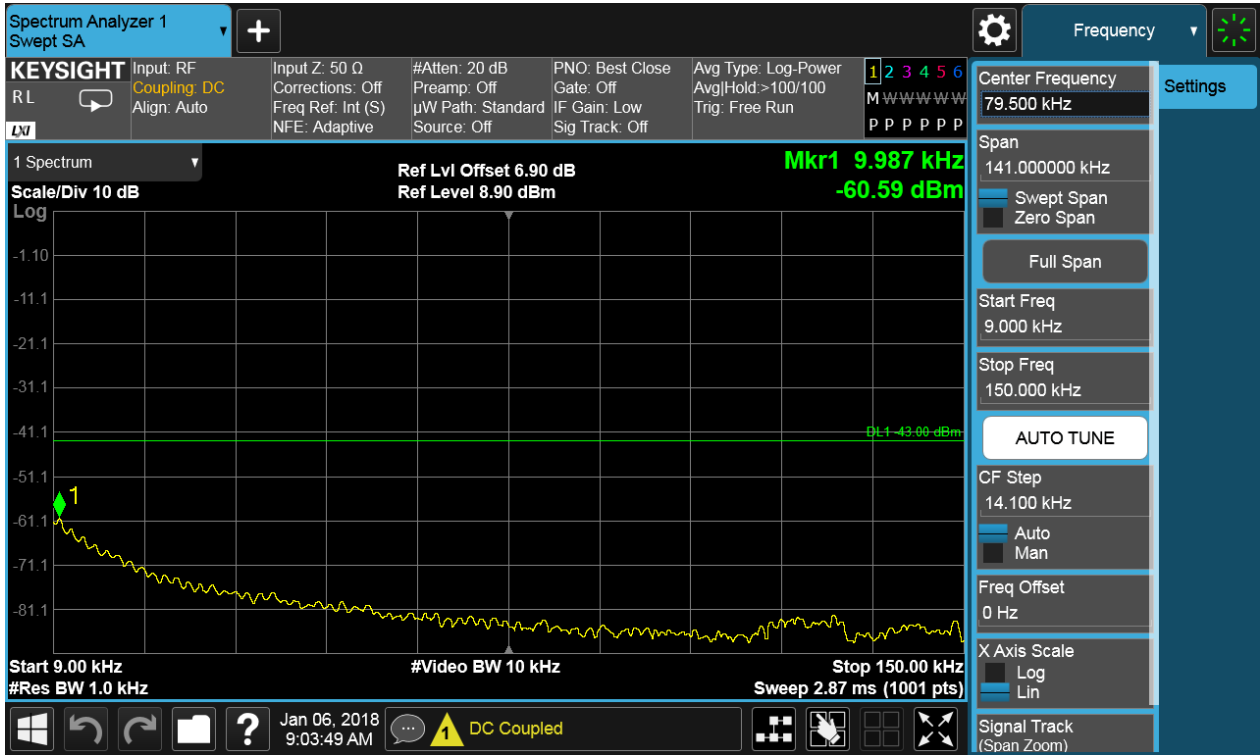


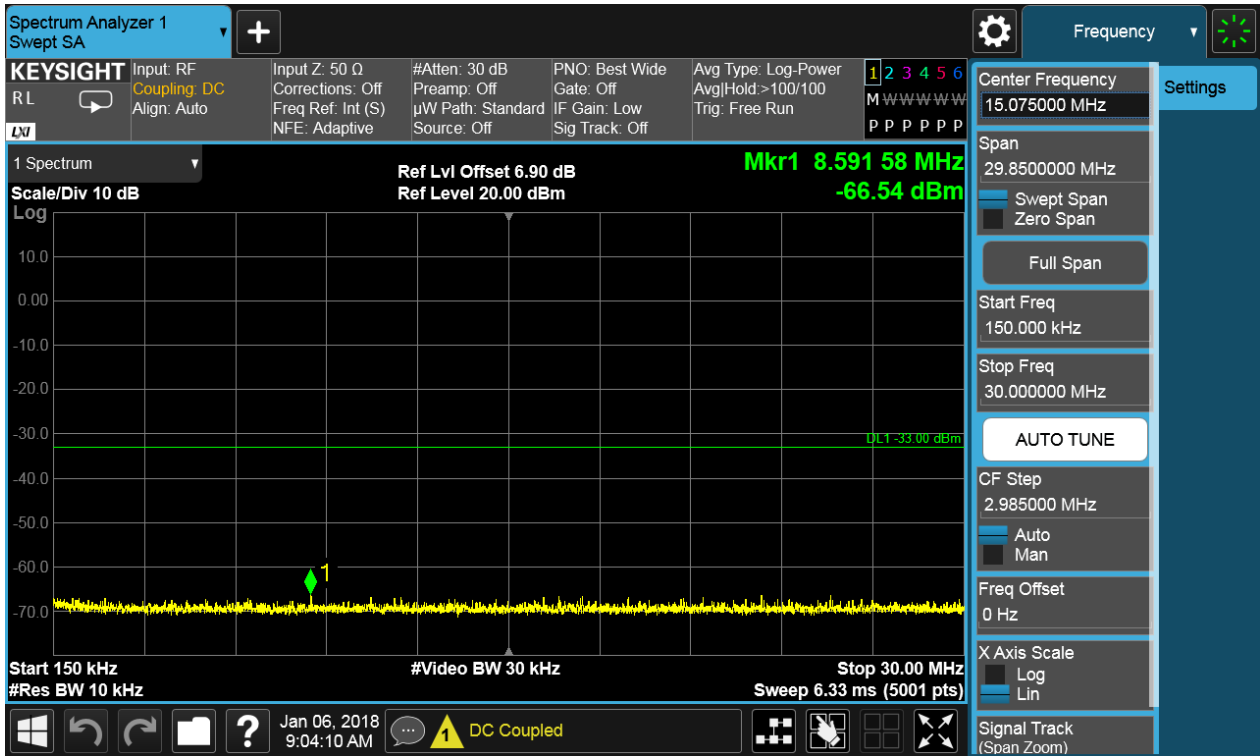


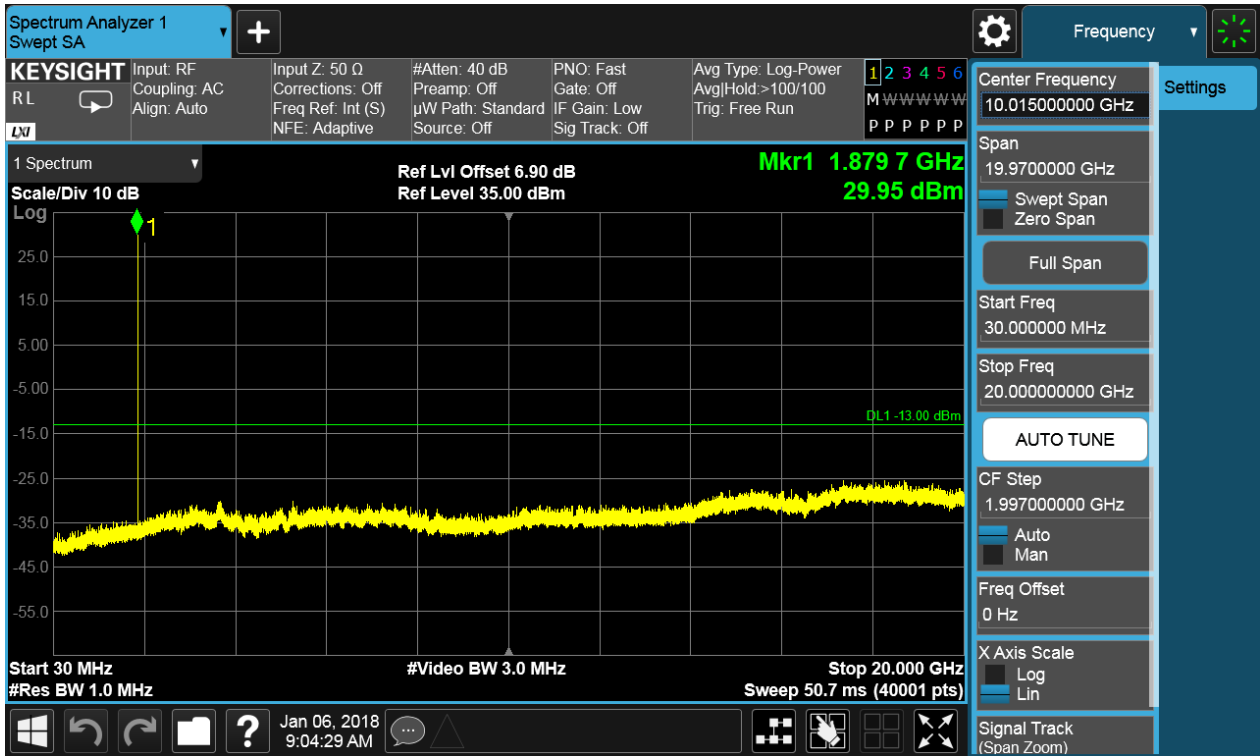




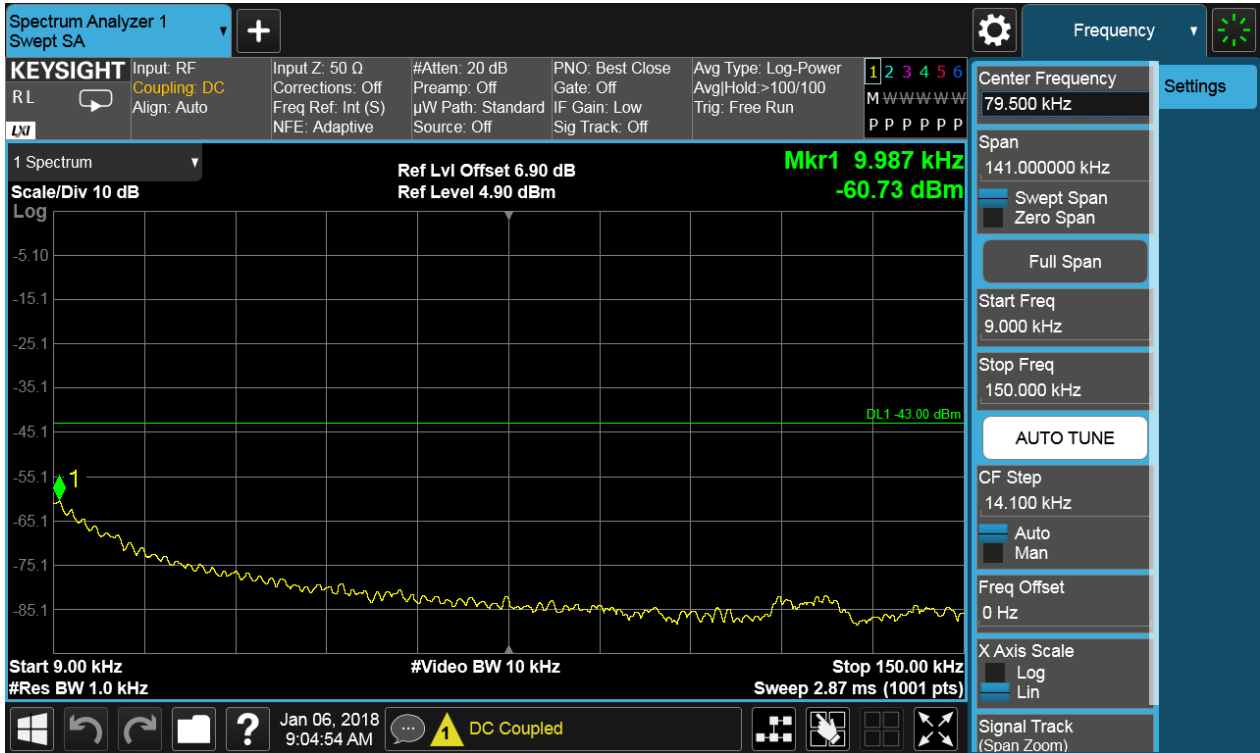
6.1.2.1.2 Test Channel = MCH

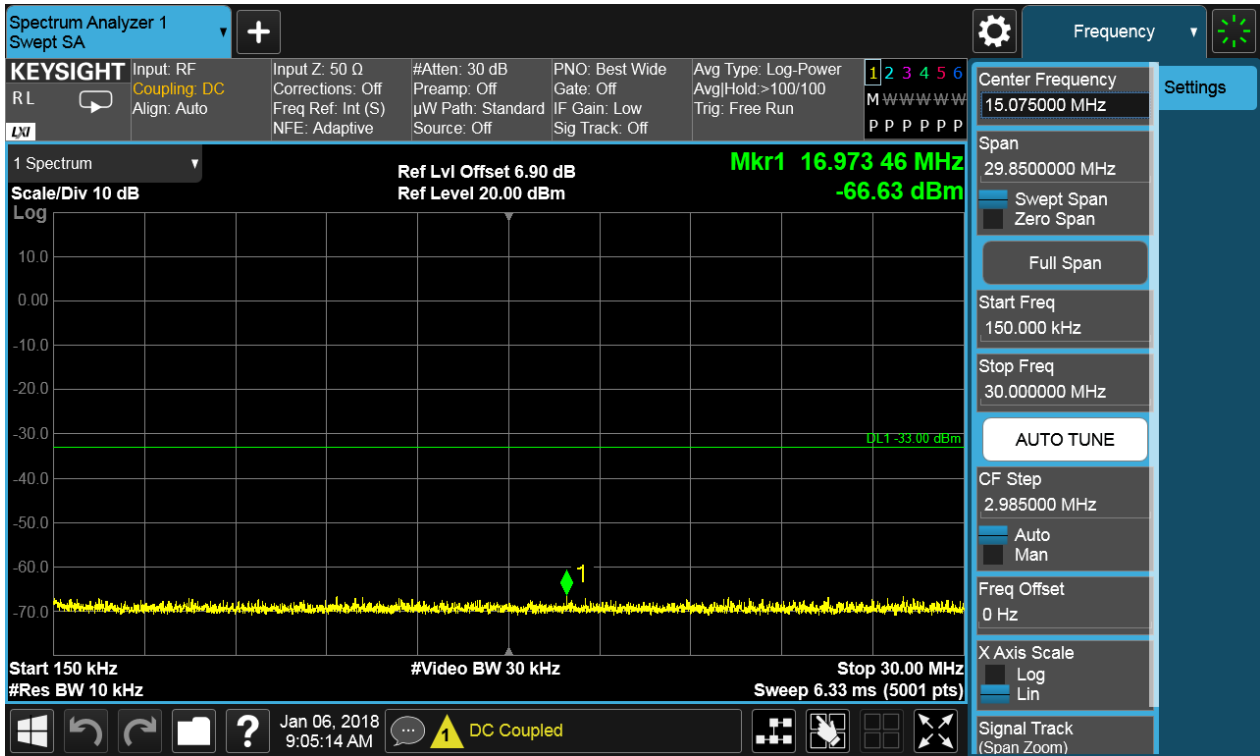


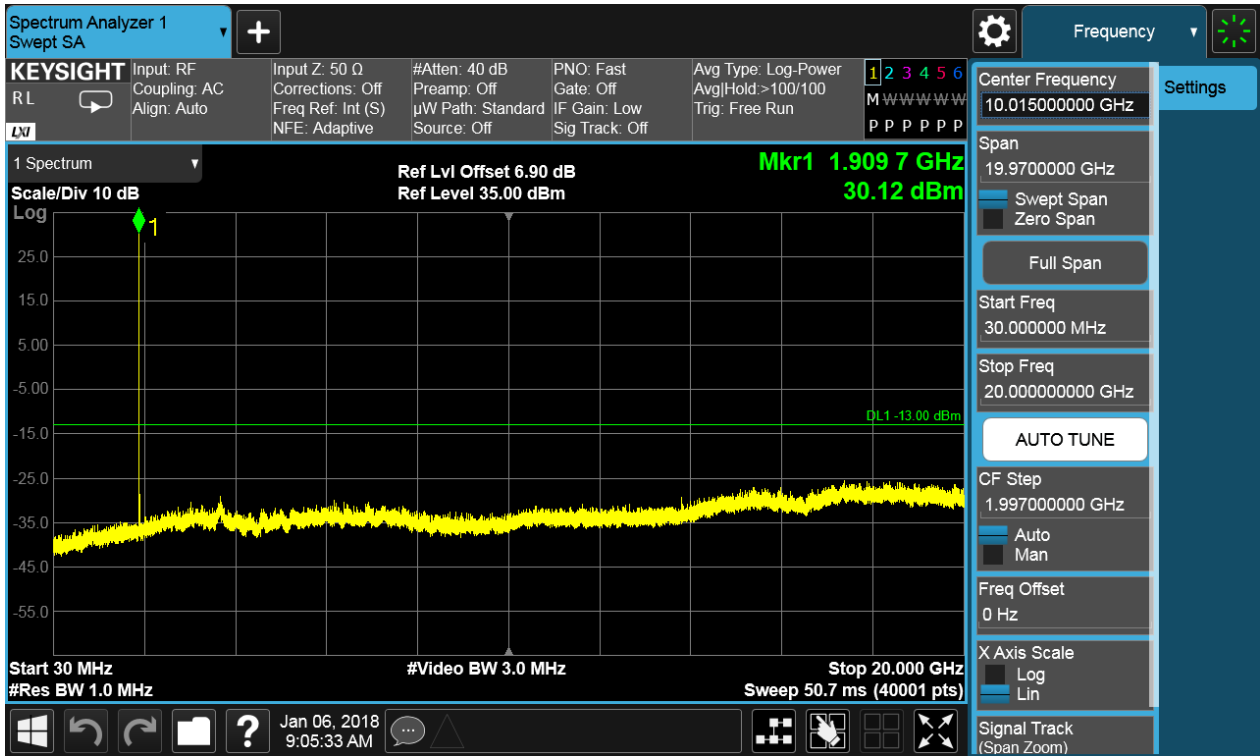




## 6.1.2.1.3 Test Channel = HCH

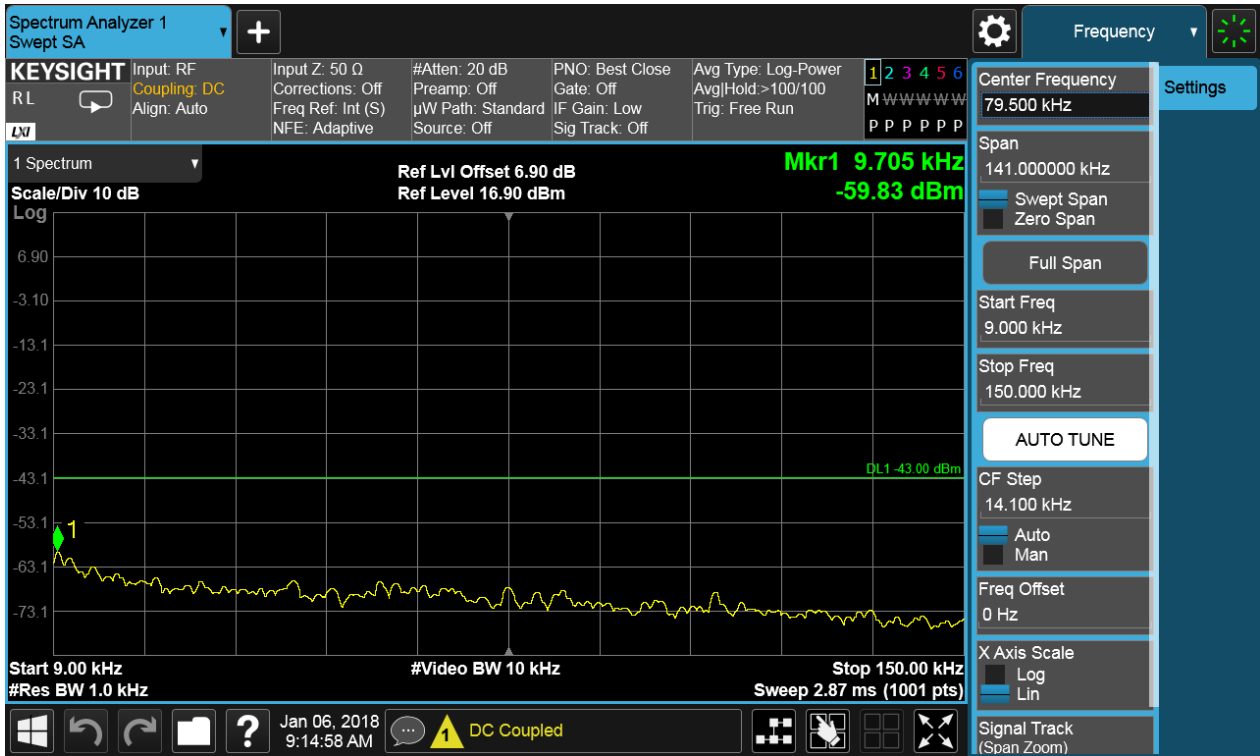


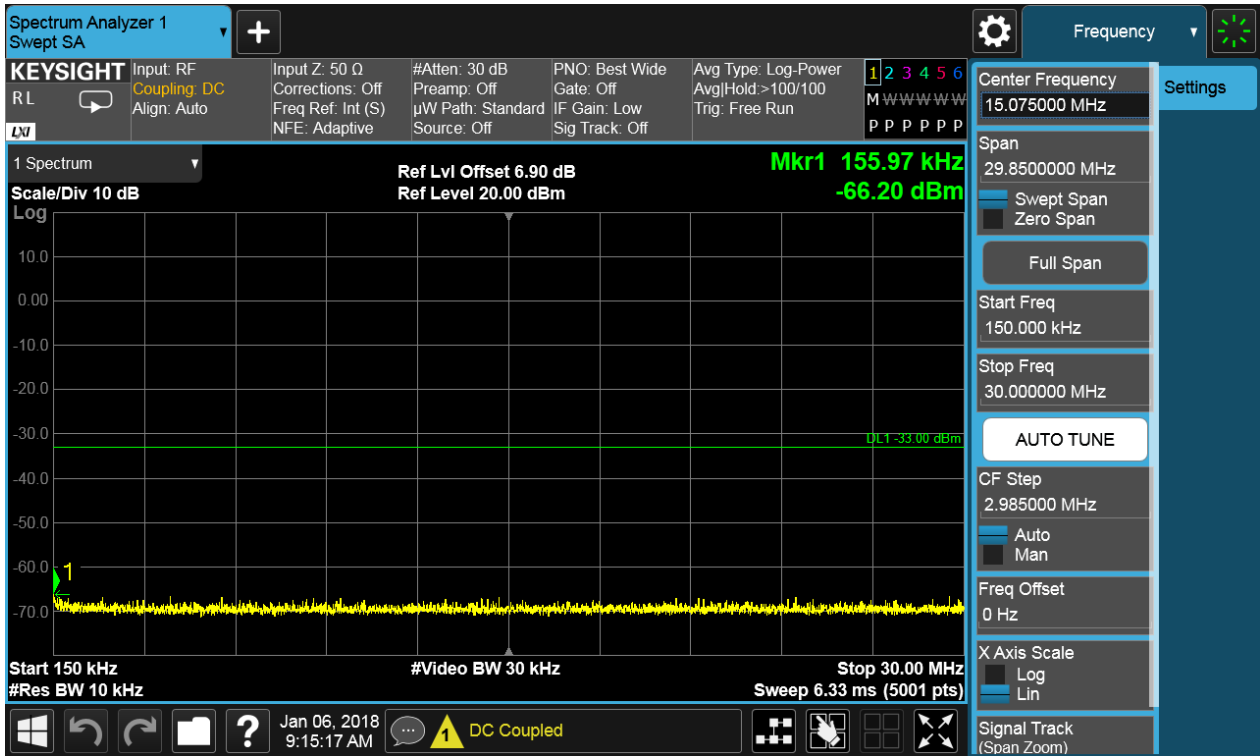




6.1.2.2 Test Mode = GSM/TM2

6.1.2.2.1 Test Channel = LCH

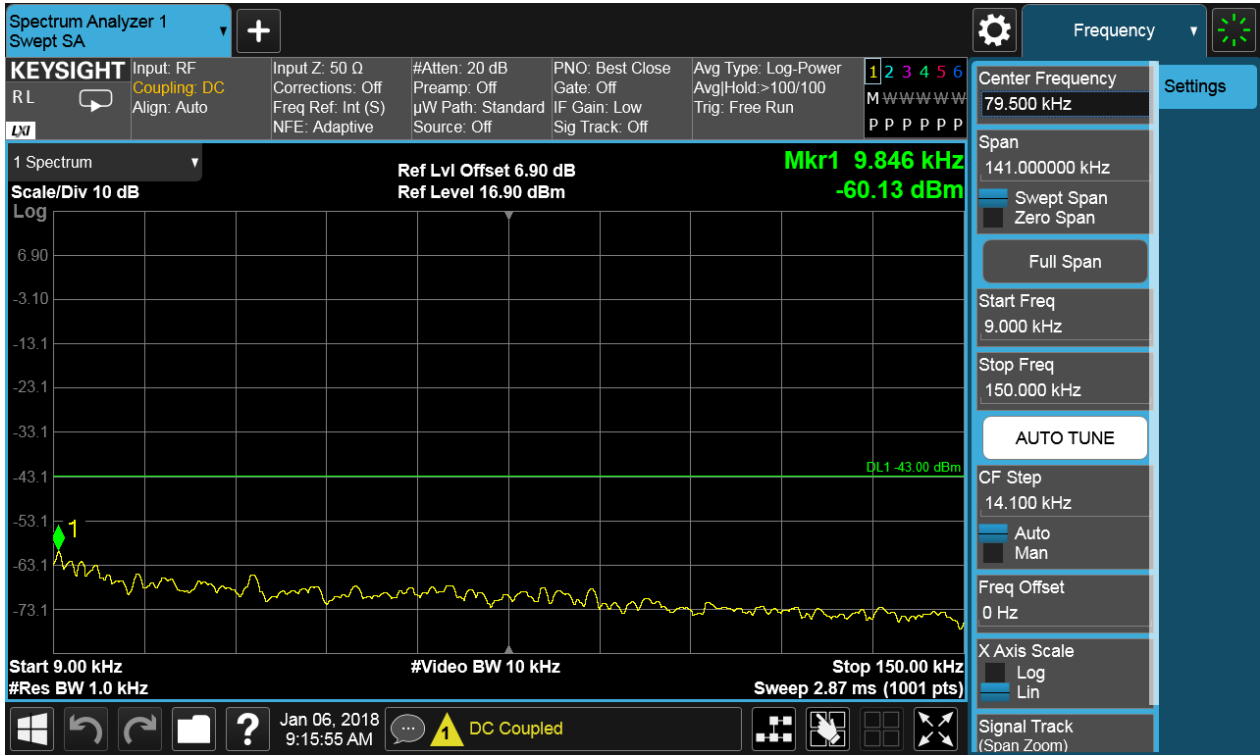


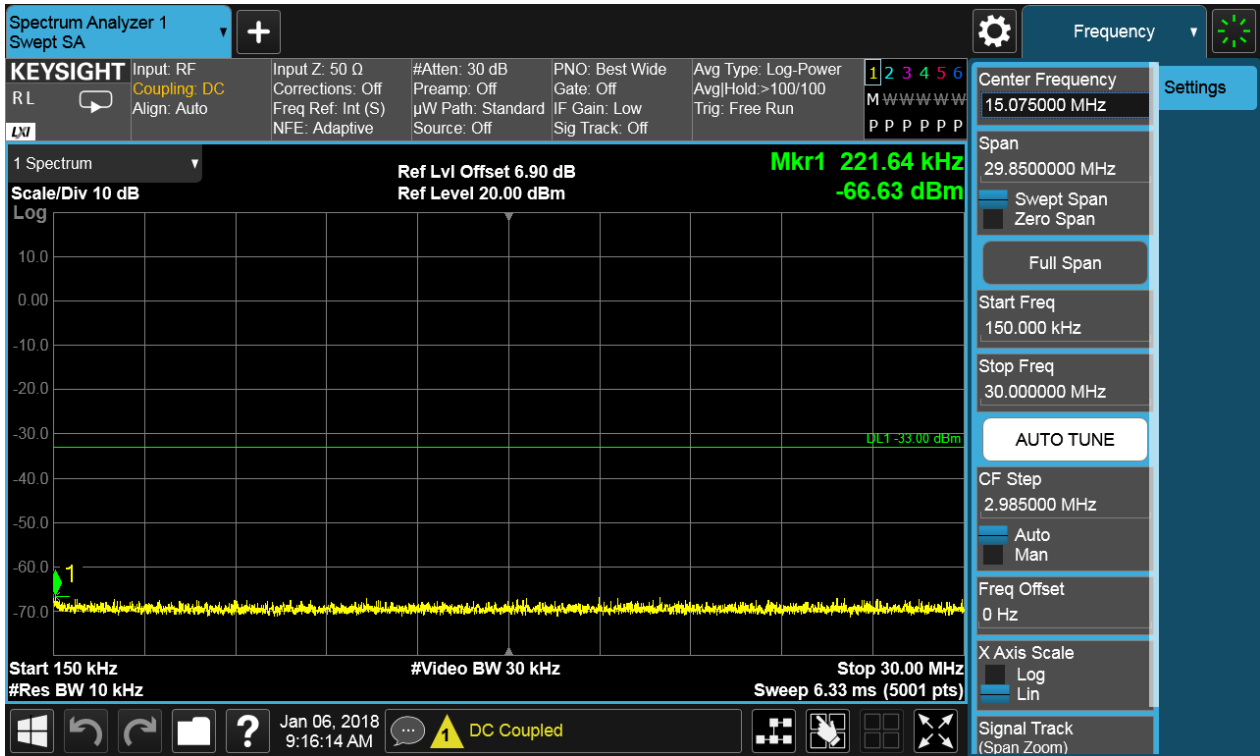


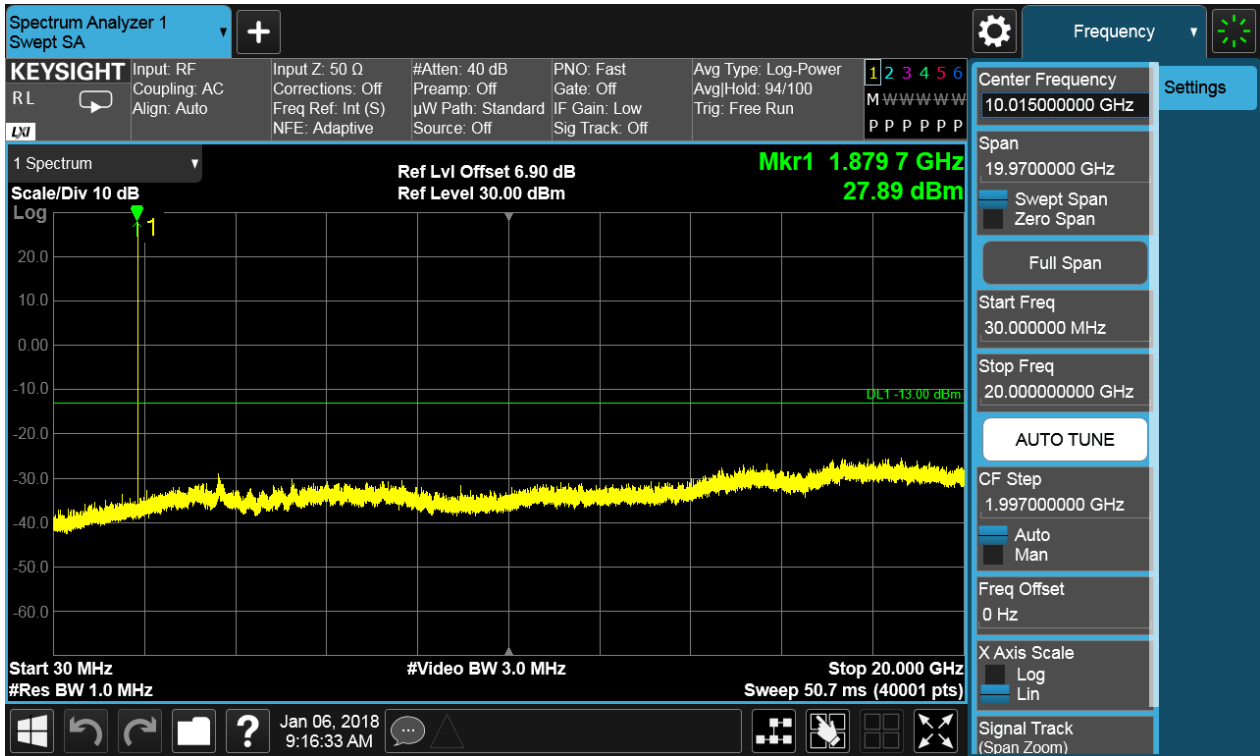




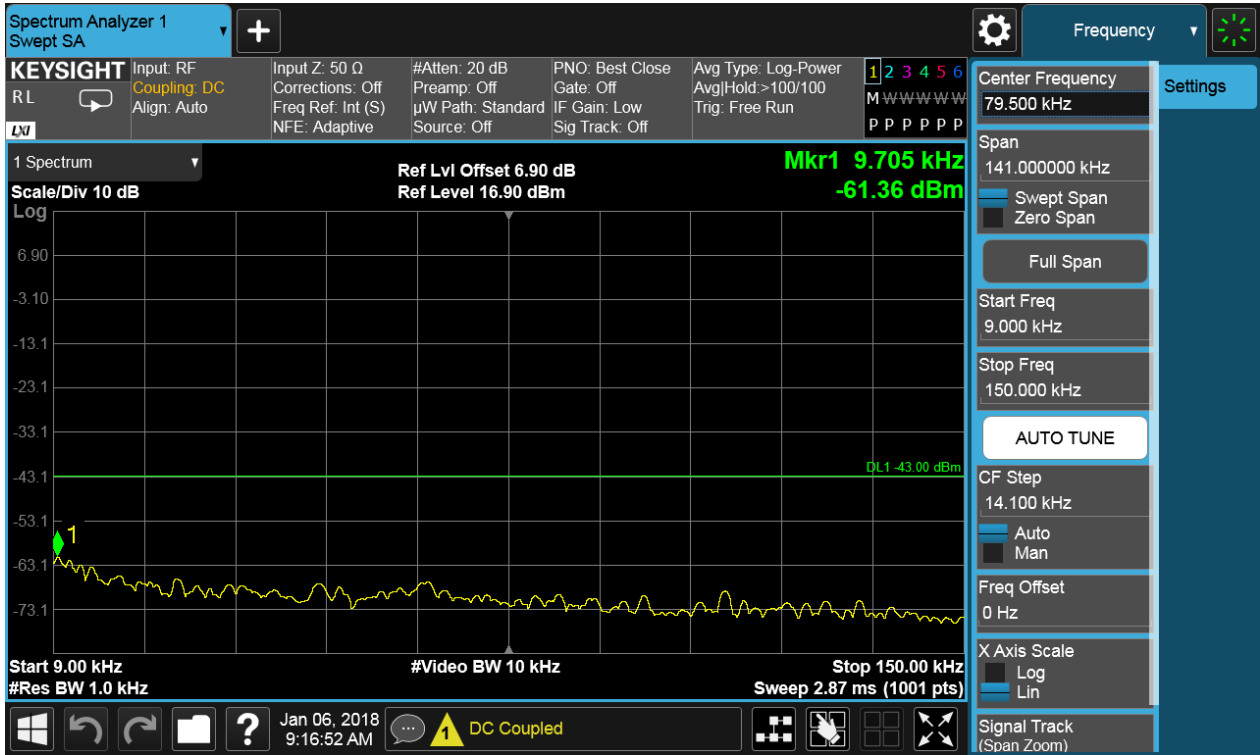
6.1.2.2.2 Test Channel = MCH

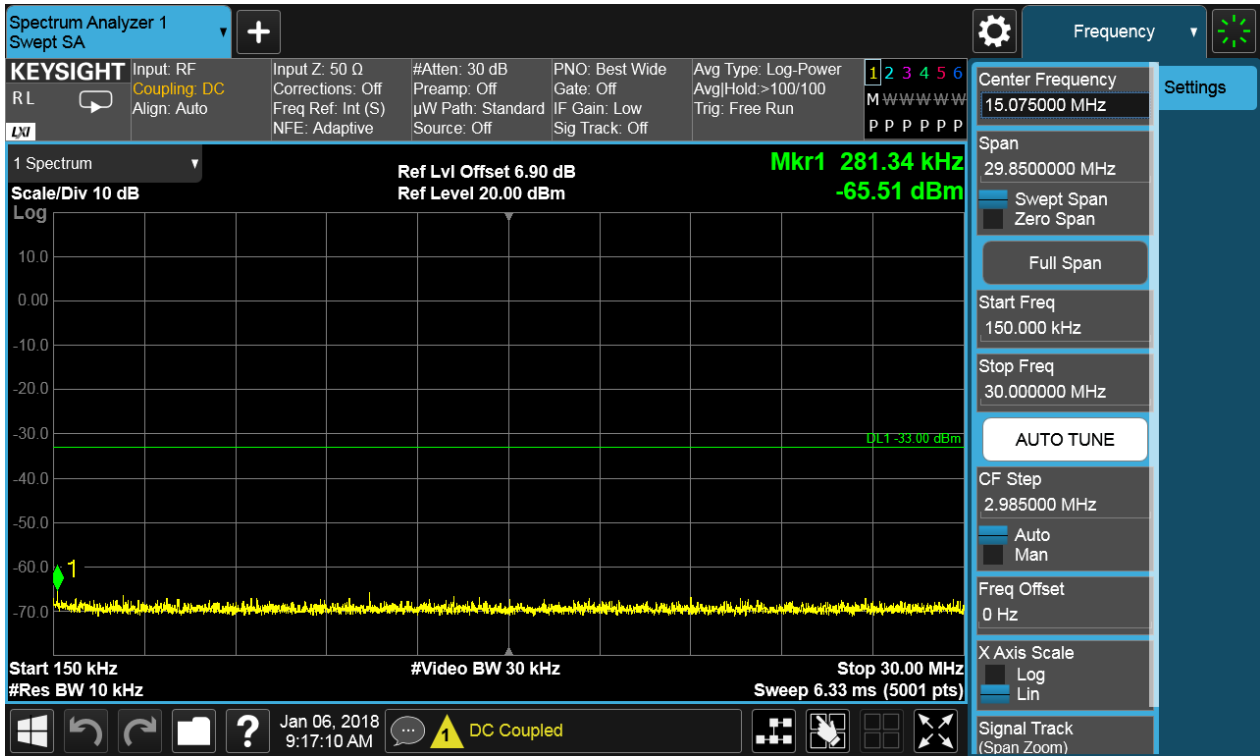


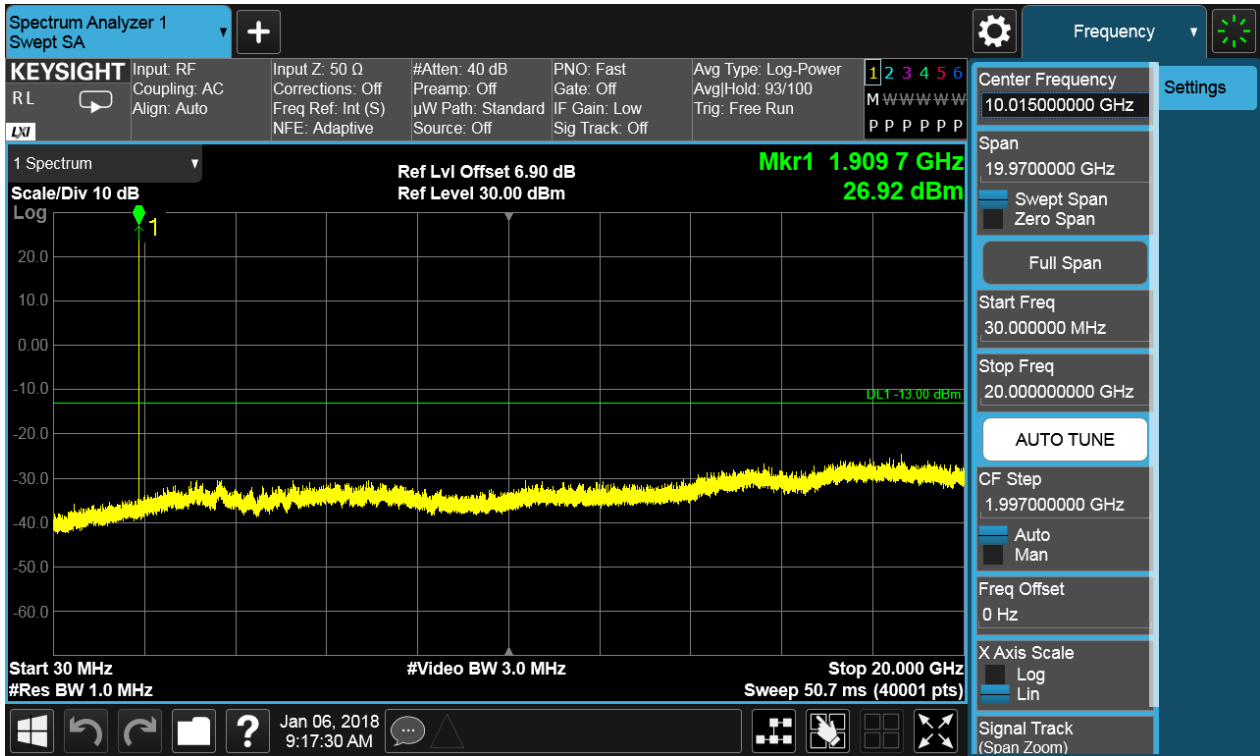




6.1.2.2.3 Test Channel = HCH







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

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

9kHz~150kHz, 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

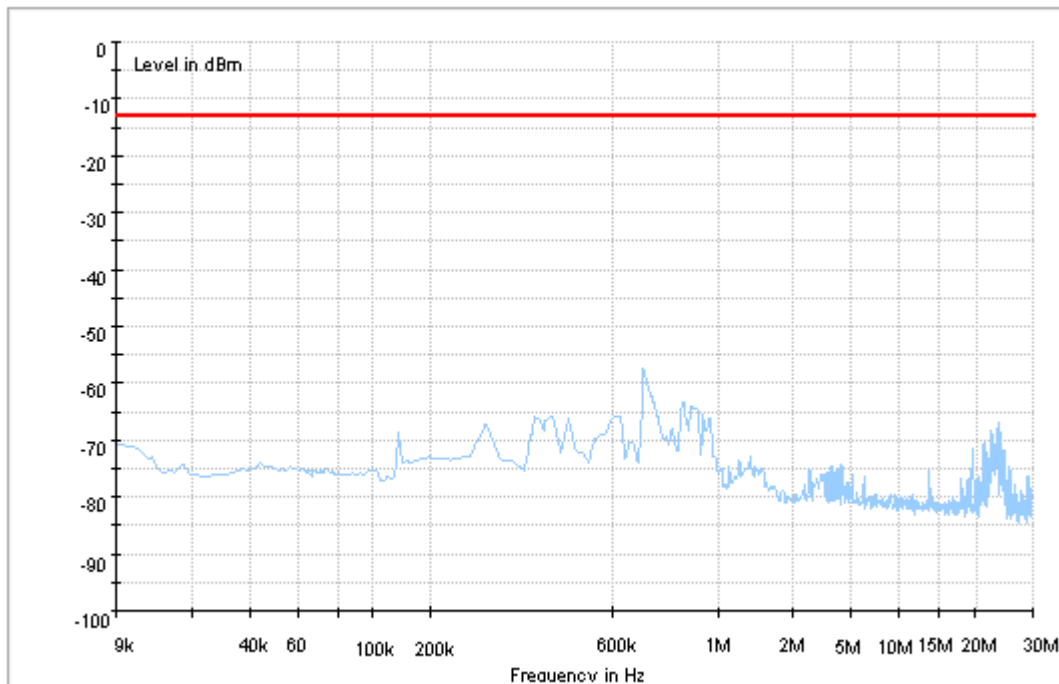
Above 1GHz, RBW = 1 MHz, VBW = 3 MHz. Detector: PK

### Part I - Test Plots

#### 7.1 For GSM\_ANT1

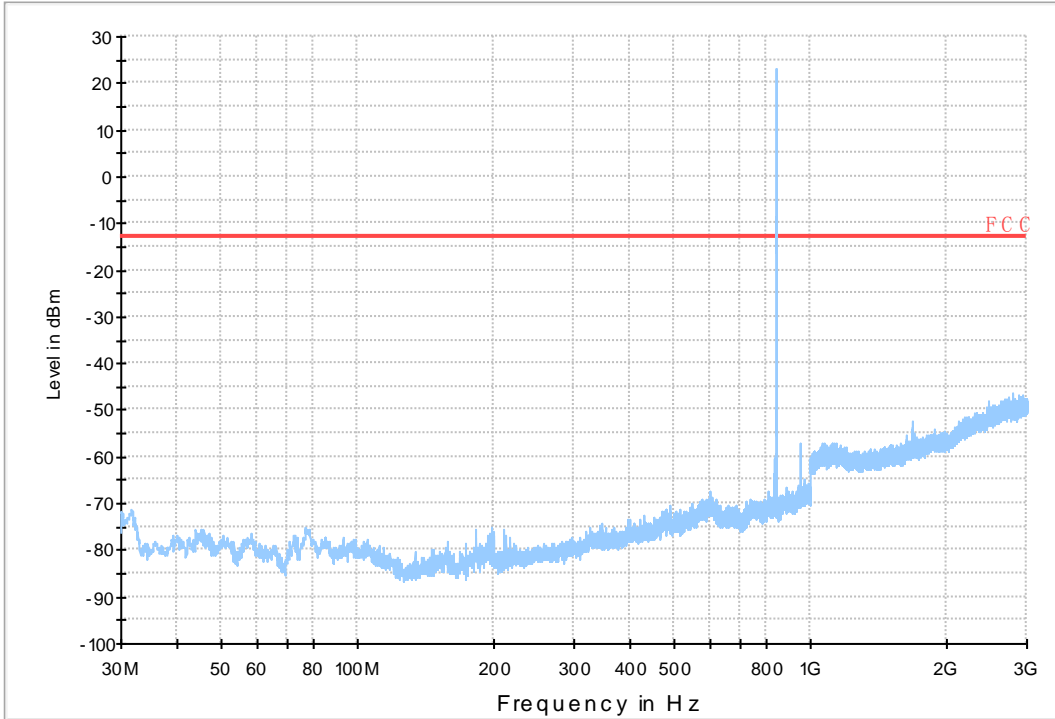
##### 7.1.1 Test Band = GSM850

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

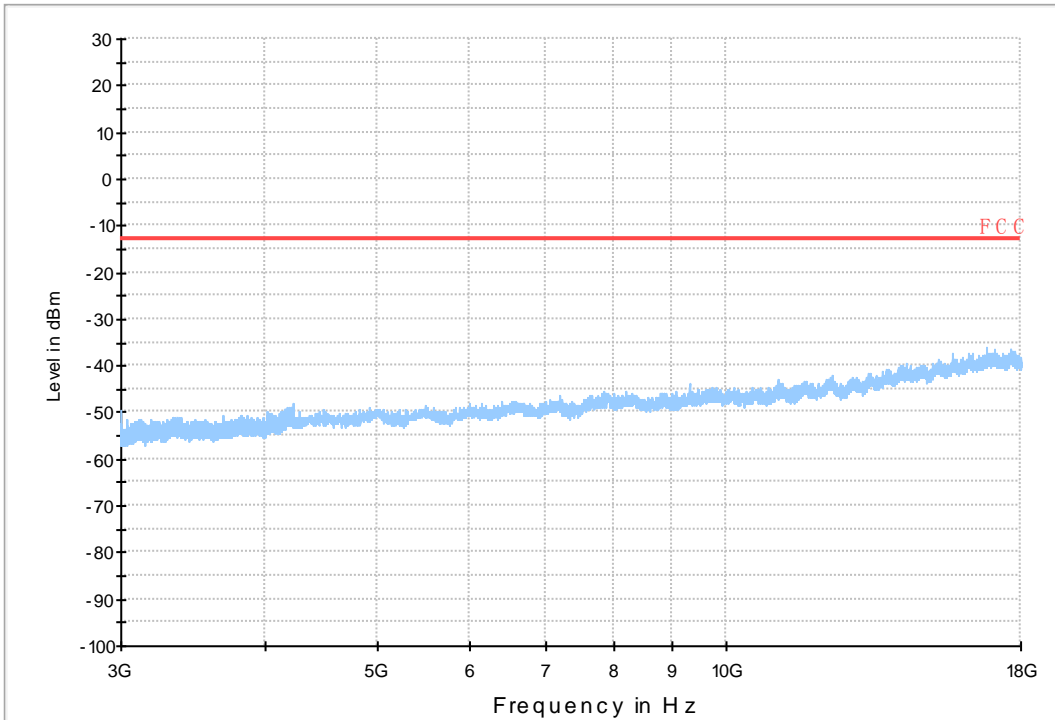




Copy of FCC PART22 GSM850\_L

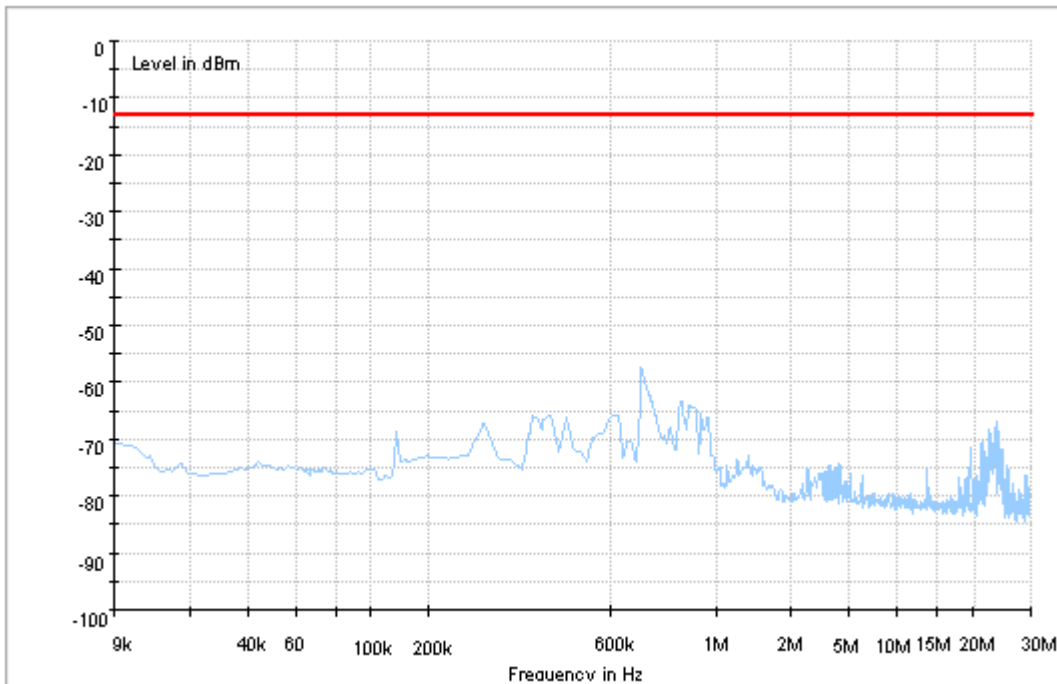


Copy of FCC PART22 GSM850\_H

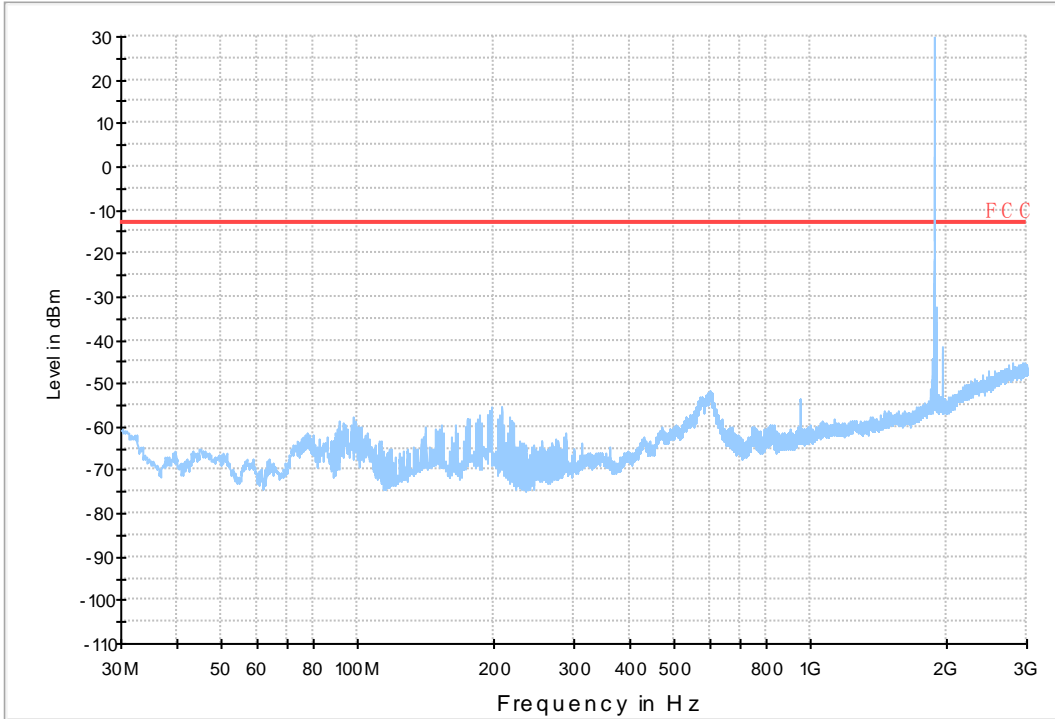


### 7.1.2 Test Band = GSM1900

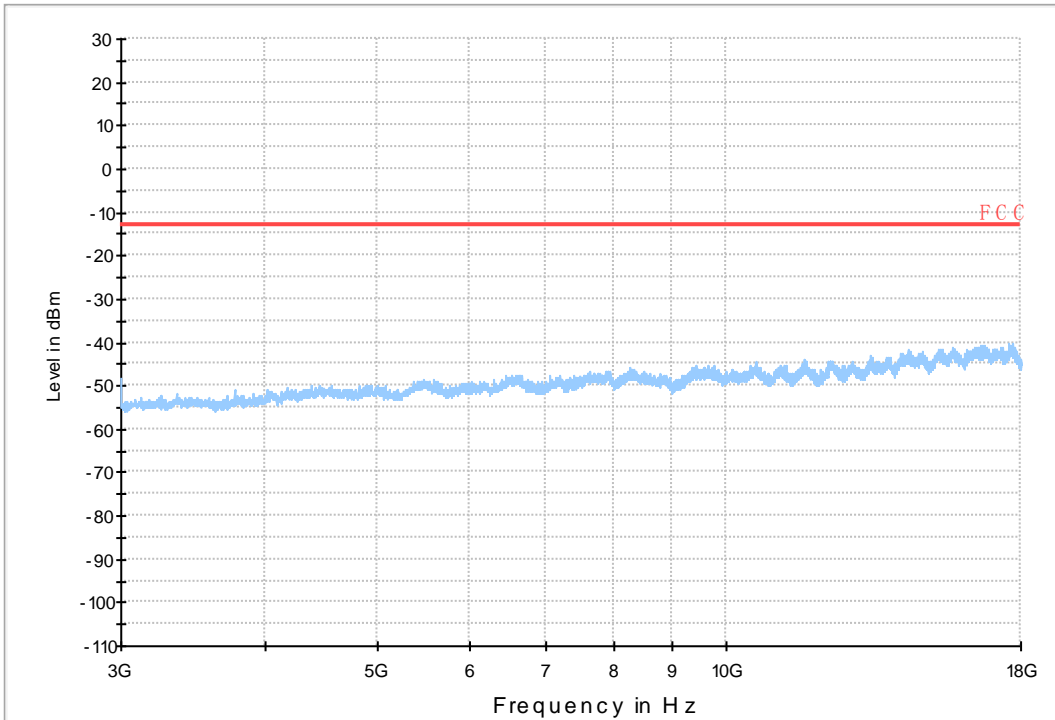
#### 7.1.2.1 Test Mode = GSM/TM1

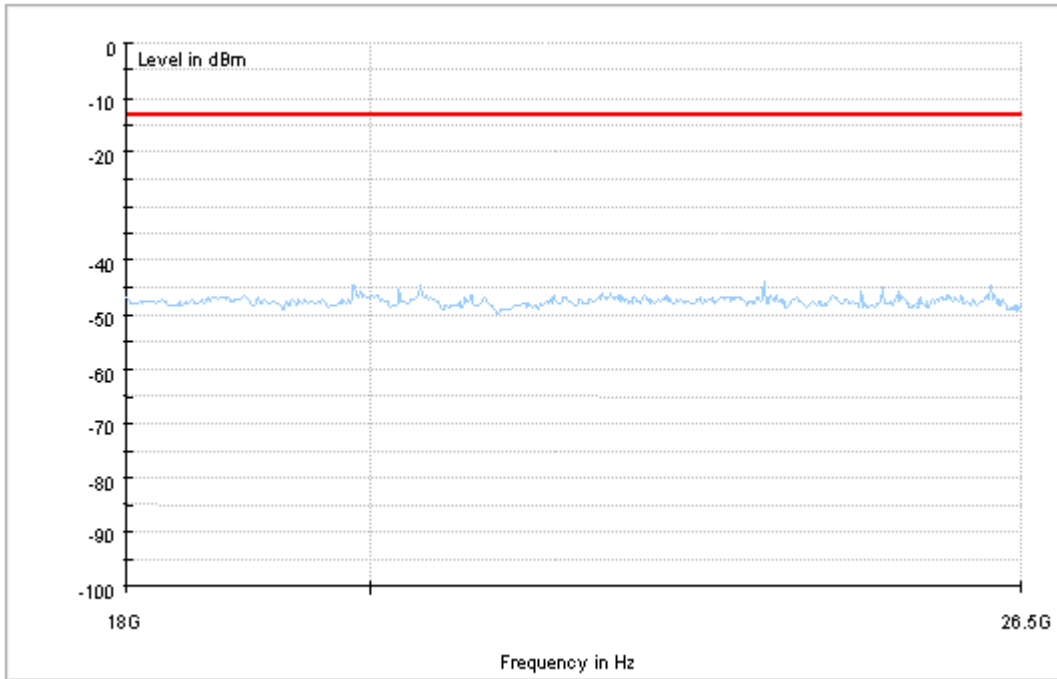


Copy of FCC PART24 GSM1900\_L



Copy of FCC PART24 GSM1900\_H

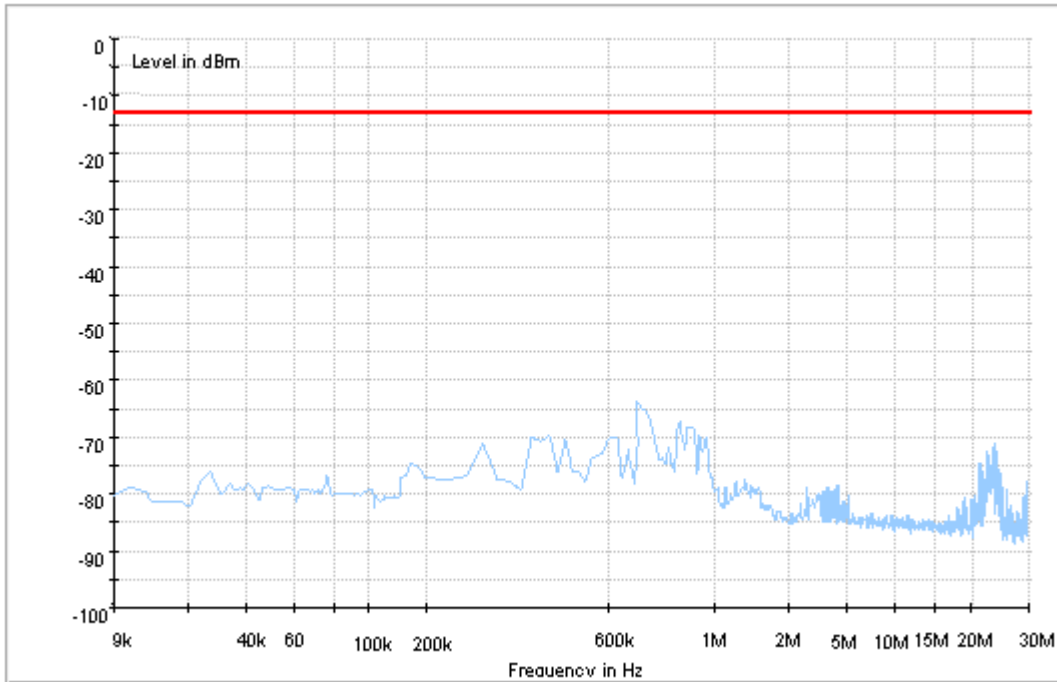




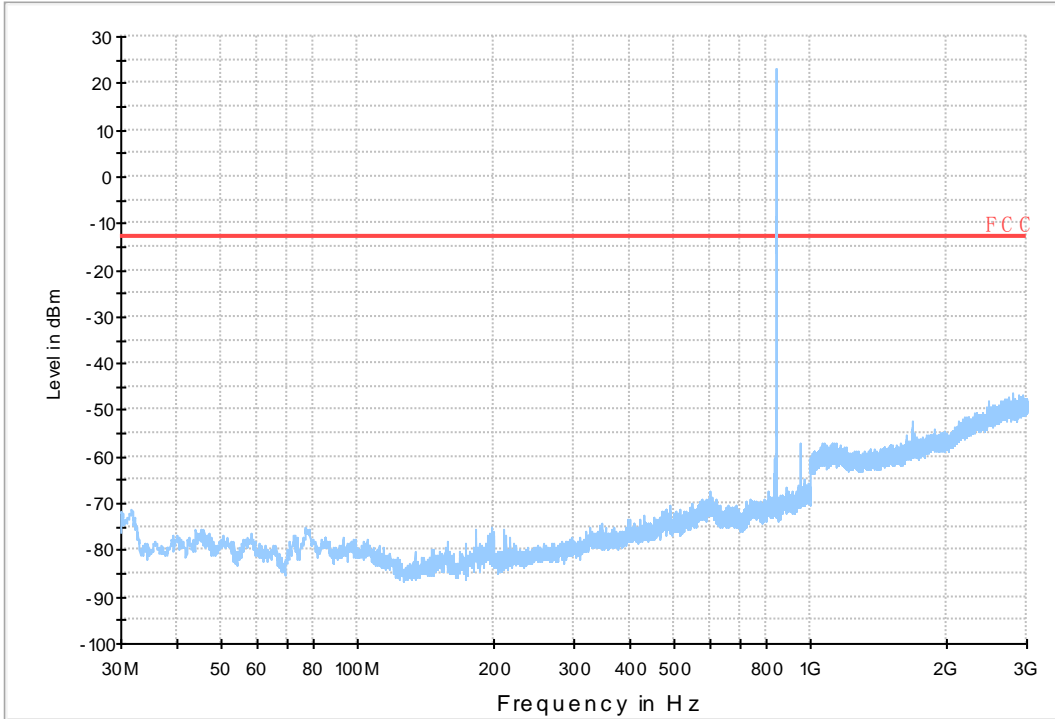
## 7.2 For GSM\_ANT2

### 7.2.1 Test Band = GSM850

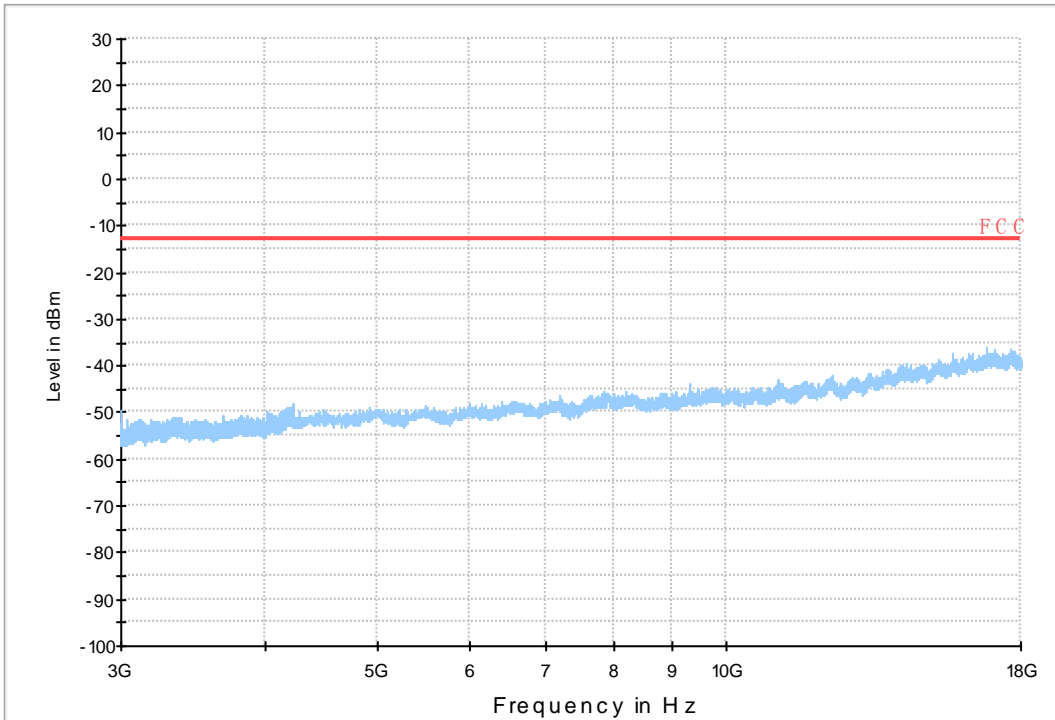
#### 7.2.1.1 Test Mode = GSM/TM1



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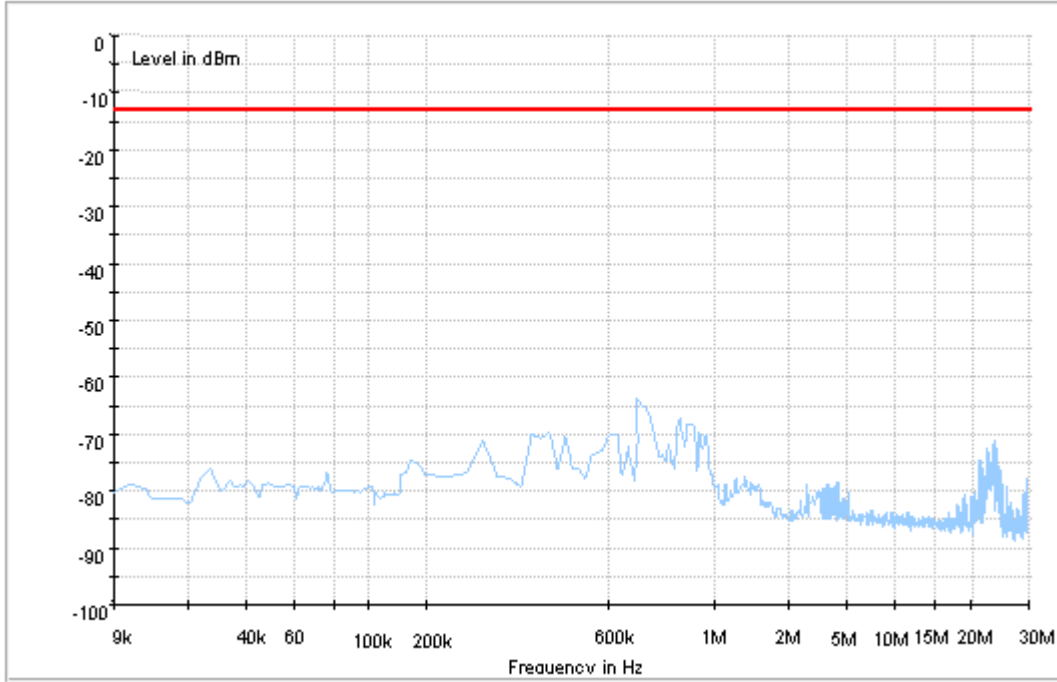


Copy of FCC PART22 GSM850\_H

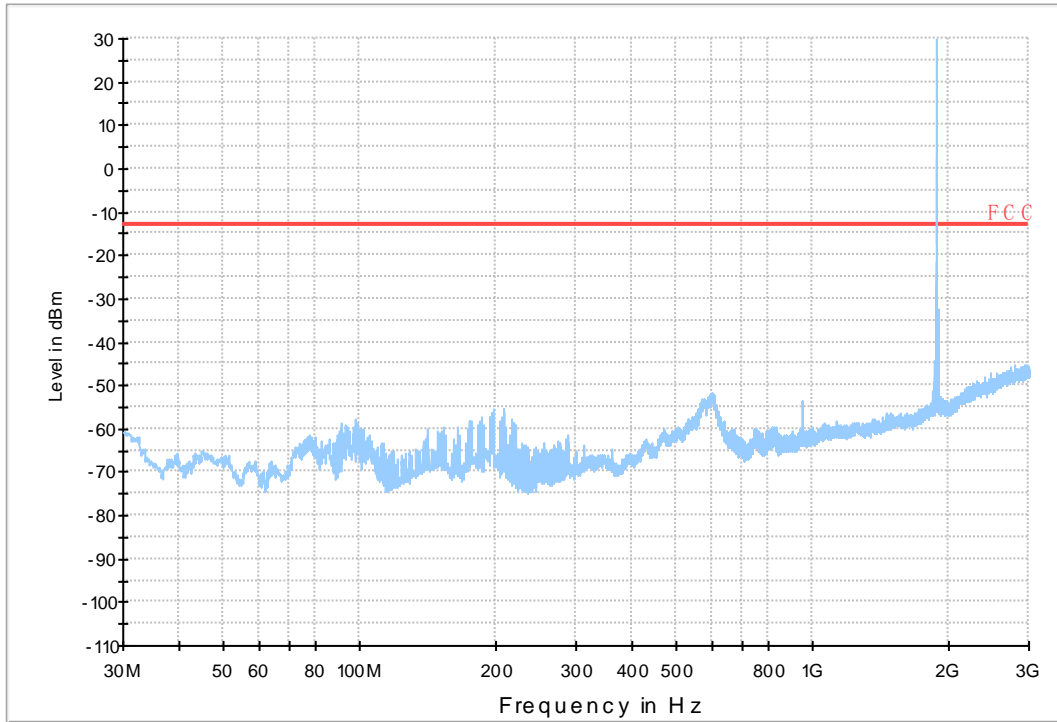


### 7.2.2 Test Band = GSM1900

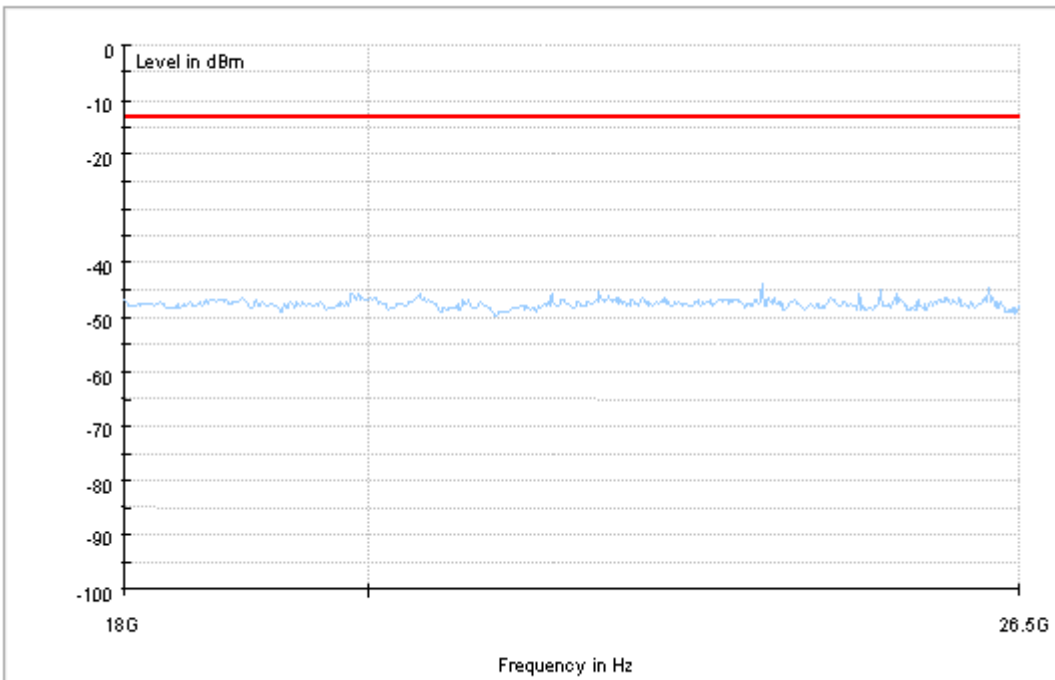
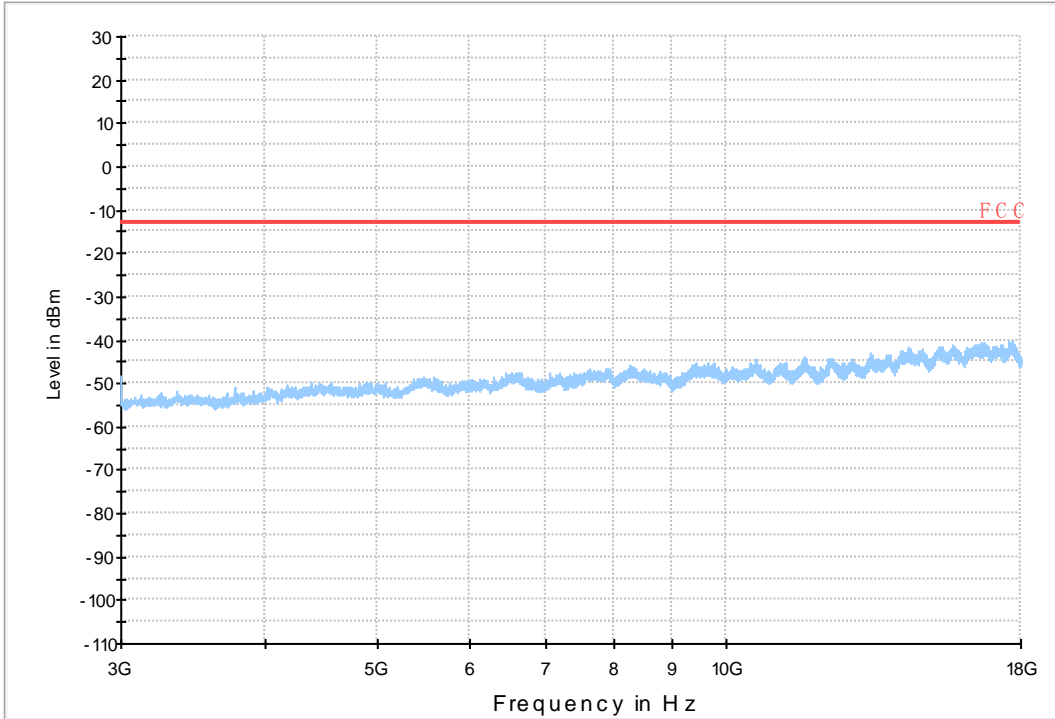
#### 7.2.2.1 Test Mode = GSM/TM1



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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	-9.94	-0.01206	PASS
				VN	-5.10	-0.00619	PASS
				VH	-4.46	-0.00541	PASS
		MCH	TN	VL	-15.88	-0.01898	PASS
				VN	-15.63	-0.01868	PASS
				VH	-16.53	-0.01976	PASS
		HCH	TN	VL	-8.01	-0.00944	PASS
				VN	-6.97	-0.00821	PASS
				VH	-4.65	-0.00548	PASS
	GSM/TM2	LCH	TN	VL	1.00	0.00121	PASS
				VN	-5.36	-0.0065	PASS
				VH	-0.39	-0.00047	PASS
		MCH	TN	VL	-15.50	-0.01853	PASS
				VN	-8.72	-0.01042	PASS
				VH	-4.29	-0.00513	PASS
		HCH	TN	VL	-2.45	-0.00289	PASS
				VN	-5.55	-0.00654	PASS
				VH	4.04	0.00476	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-12.27	-0.00663	PASS
				VN	-14.27	-0.00771	PASS
				VH	-13.37	-0.00723	PASS
		MCH	TN	VL	24.41	0.01298	PASS
				VN	12.27	0.00653	PASS
				VH	13.95	0.00742	PASS
		HCH	TN	VL	1.68	0.00088	PASS
				VN	-0.58	-0.0003	PASS
				VH	0.26	0.00014	PASS
	GSM/TM2	LCH	TN	VL	11.95	0.00646	PASS
				VN	14.17	0.00766	PASS
				VH	13.53	0.00731	PASS
		MCH	TN	VL	30.35	0.01614	PASS
				VN	34.48	0.01834	PASS
				VH			

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
				VH	42.71	0.02272	PASS
		HCH	TN	VL	28.90	0.01513	PASS
				VN	28.28	0.01481	PASS
				VH	17.31	0.00906	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	-7.30	-0.00886	PASS
				-20	-6.33	-0.00768	PASS
				-10	-5.42	-0.00658	PASS
				0	-8.27	-0.01003	PASS
				10	-12.40	-0.01504	PASS
				20	-8.07	-0.00979	PASS
				30	-5.88	-0.00713	PASS
				40	-10.91	-0.01324	PASS
		50	-9.36	-0.01136	PASS		
		MCH	VN	-30	-16.53	-0.01976	PASS
				-20	-17.69	-0.02115	PASS
				-10	-17.56	-0.02099	PASS
				0	-17.43	-0.02083	PASS
				10	-13.50	-0.01614	PASS
				20	-16.34	-0.01953	PASS
				30	-16.01	-0.01914	PASS
				40	-15.43	-0.01844	PASS
		50	-15.88	-0.01898	PASS		
		HCH	VN	-30	-7.94	-0.00935	PASS
				-20	-1.49	-0.00176	PASS
				-10	-5.81	-0.00684	PASS
				0	-8.20	-0.00966	PASS
				10	-4.07	-0.0048	PASS
				20	-2.45	-0.00289	PASS
	30			-5.88	-0.00693	PASS	
	40			-7.10	-0.00836	PASS	
	50	-6.72	-0.00792	PASS			
	GSM/TM2	LCH	VN	-30	-8.07	-0.00979	PASS
				-20	-0.19	-0.00023	PASS
				-10	-4.84	-0.00587	PASS
				0	-7.01	-0.00851	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict		
				10	1.03	0.00125	PASS		
				20	2.84	0.00345	PASS		
				30	-4.52	-0.00548	PASS		
				40	-11.88	-0.01441	PASS		
				50	-2.71	-0.00329	PASS		
		MCH	VN	-30	-11.33	-0.01354	PASS		
				-20	-8.07	-0.00965	PASS		
				-10	-14.14	-0.0169	PASS		
				0	-7.97	-0.00953	PASS		
				10	-5.10	-0.0061	PASS		
				20	-17.24	-0.02061	PASS		
				30	-13.85	-0.01656	PASS		
				40	-10.07	-0.01204	PASS		
				50	-9.10	-0.01088	PASS		
				HCH	VN	-30	-0.52	-0.00061	PASS
		-20	-2.84			-0.00335	PASS		
		-10	1.71			0.00201	PASS		
		0	-5.04			-0.00594	PASS		
		10	1.29			0.00152	PASS		
		20	2.45			0.00289	PASS		
		30	-1.13			-0.00133	PASS		
		40	6.30			0.00742	PASS		
		50	-2.07	-0.00244	PASS				
		GSM1900	GSM/TM1	LCH	VN	-30	-14.33	-0.00775	PASS
						-20	-18.47	-0.00998	PASS
-10	-6.84					-0.0037	PASS		
0	-11.17					-0.00604	PASS		
10	-12.72					-0.00687	PASS		
20	-11.17					-0.00604	PASS		
30	-10.07					-0.00544	PASS		
40	-8.91					-0.00482	PASS		
50	-11.04					-0.00597	PASS		
MCH	VN			-30	20.66	0.01099	PASS		
				-20	15.30	0.00814	PASS		
				-10	19.76	0.01051	PASS		
				0	15.63	0.00831	PASS		
				10	16.98	0.00903	PASS		
				20	18.34	0.00976	PASS		
				30	22.41	0.01192	PASS		
				40	18.66	0.00993	PASS		

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
		HCH	VN	50	22.08	0.01174	PASS
				-30	1.55	0.00081	PASS
				-20	4.78	0.0025	PASS
				-10	4.00	0.00209	PASS
				0	4.39	0.0023	PASS
				10	0.32	0.00017	PASS
				20	9.23	0.00483	PASS
				30	5.81	0.00304	PASS
				40	0.45	0.00024	PASS
				50	7.04	0.00369	PASS
	GSM/TM2	LCH	VN	-30	3.78	0.00204	PASS
				-20	4.10	0.00222	PASS
				-10	10.07	0.00544	PASS
				0	5.13	0.00277	PASS
				10	6.84	0.0037	PASS
				20	1.68	0.00091	PASS
				30	8.14	0.0044	PASS
				40	10.88	0.00588	PASS
				50	6.97	0.00377	PASS
				MCH	VN	-30	38.55
		-20	35.42			0.01884	PASS
		-10	38.10			0.02027	PASS
		0	33.96			0.01806	PASS
		10	33.09			0.0176	PASS
		20	38.78			0.02063	PASS
		30	35.39			0.01882	PASS
		40	41.65			0.02215	PASS
		50	36.13			0.01922	PASS
		HCH	VN			-30	26.73
				-20	32.12	0.01682	PASS
				-10	26.89	0.01408	PASS
				0	26.09	0.01366	PASS
				10	32.38	0.01695	PASS
				20	22.92	0.012	PASS
				30	17.79	0.00932	PASS
				40	19.50	0.01021	PASS
50	23.92	0.01252	PASS				

END