



# Appendix B

## Test Report for SZEM160300137102



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# 1 Effective (Isotropic) Radiated Power Output Data

## Part I - Test Results

### Part 1 – RF Conducted Power of Transmitter for GSM850

TEST CONDITIONS	RF Output Power(Conducted)					
	Channel128(L)		Channel190(M)		Channel251(H)	
	824.2MHz		836.6 MHz		848.8 MHz	
Tnom/ Vnom	Measured (dBm)	Limit (dBm)	Measured (dBm)	Limit (dBm)	Measured(dBm)	Limit (dBm)
GSM/TM1 (GPRS)	33.14	38.5	33.43	38.5	33.41	38.5

### Part 2– Effective Radiated Power of Transmitter (ERP) for GSM850

Test Mode	Freq. (MHz)	Meas. Level (dBm)	SGP (dBm)	Substitution Gain(dBd)	Cable Loss (dB)	Substitution Level(ERP) / dBm	Limit (dBm)	Result
GSM/TM1 (GPRS)	824.2	33.21	27.85	5.95	0.6	33.2	38.5	Pass
GSM/TM1 (GPRS)	836.6	33.5	27.43	6.65	0.6	33.48	38.5	Pass
GSM/TM1 (GPRS)	848.8	33.48	27.21	6.85	0.6	33.46	38.5	Pass

Note:

a: For getting the ERP (Efficient Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

b: SGP=Signal Generator Level

c: RBW > emission bandwidth, VBW > 3 x RBW.

Detector: RMS



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## Part 3 – RF Conducted Power of Transmitter for GSM1900

TEST CONDITIONS	RF Output Power(Conducted)					
	Channel512(L)		Channel661(M)		Channel810(H)	
	1850.2MHz		1880.0 MHz		1909.8 MHz	
Tnom/ Vnom	Measured (dBm)	Limit (dBm)	Measured (dBm)	Limit (dBm)	Measured(dBm)	Limit (dBm)
GSM/TM1 (GPRS)	30.14	38.5	30.07	38.5	30.02	38.5

## Part 4– Effective Isotropic Radiated Power of Transmitter (EIRP) for GSM1900

Test Mode	Freq. (MHz)	Meas. Level (dBm)	SGP (dBm)	Substitution Gain(dBd)	Cable Loss (dB)	Substitution Level(ERP) / dBm	Limit (dBm)	Result
GSM/TM1 (GPRS)	1850.2	30.42	23.51	7.9	1	30.41	38.5	Pass
GSM/TM1 (GPRS)	1880.0	30.35	23.43	7.9	1	30.33	38.5	Pass
GSM/TM1 (GPRS)	1909.8	30.3	23.39	7.9	1	30.29	38.5	Pass

Note:

a: For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b: SGP=Signal Generator Level

c: RBW > emission bandwidth, VBW > 3 x RBW.

Detector: RMS



## 2 Peak-to-Average Ratio

### Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM850	GSM/TM1	LCH	9.77	13	PASS
		MCH	9.15	13	PASS
		HCH	9.31	13	PASS

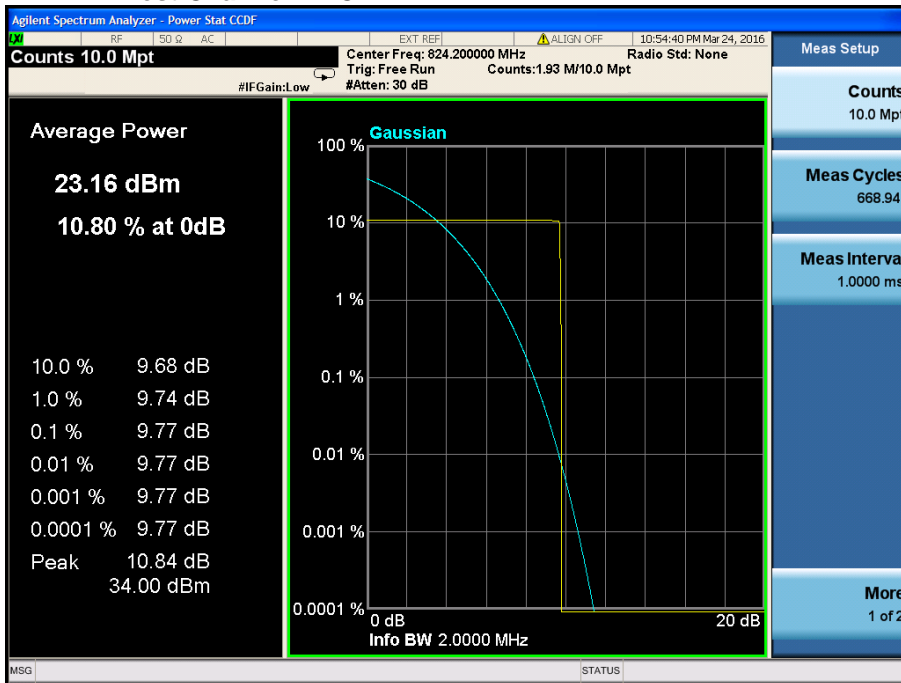


## 2.1 For GSM

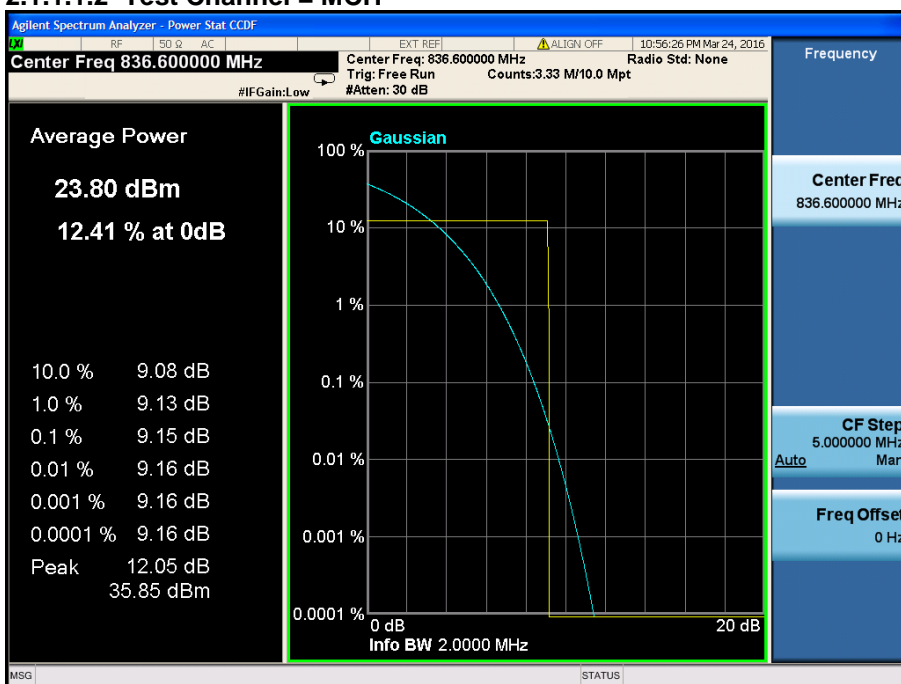
### 2.1.1 Test Band = GSM850

#### 2.1.1.1 Test Mode = GSM/TM1

##### 2.1.1.1.1 Test Channel = LCH

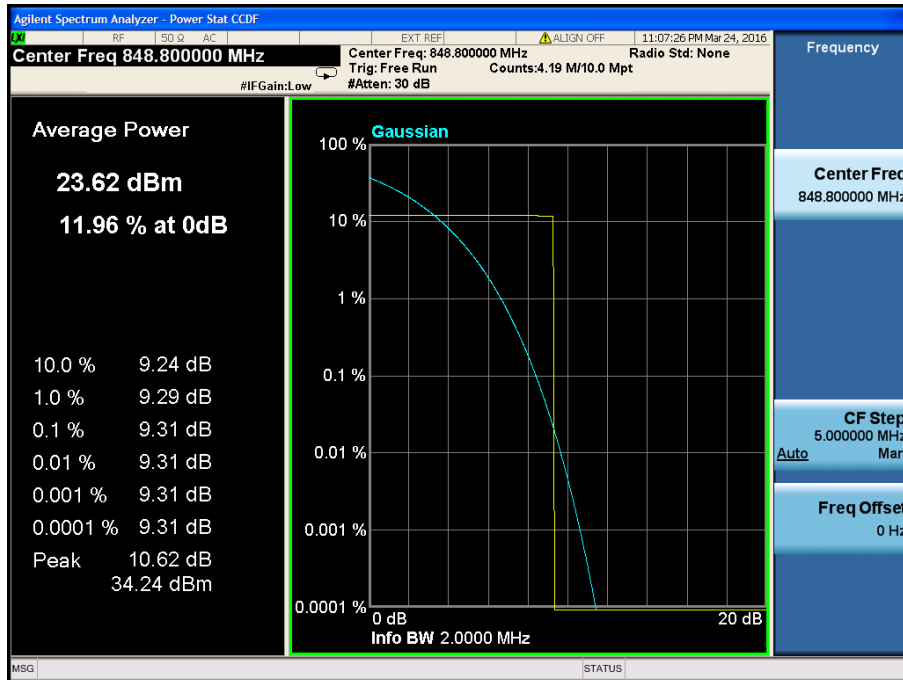


##### 2.1.1.1.2 Test Channel = MCH





2.1.1.1.3 Test Channel = HCH





### 3 Modulation Characteristics

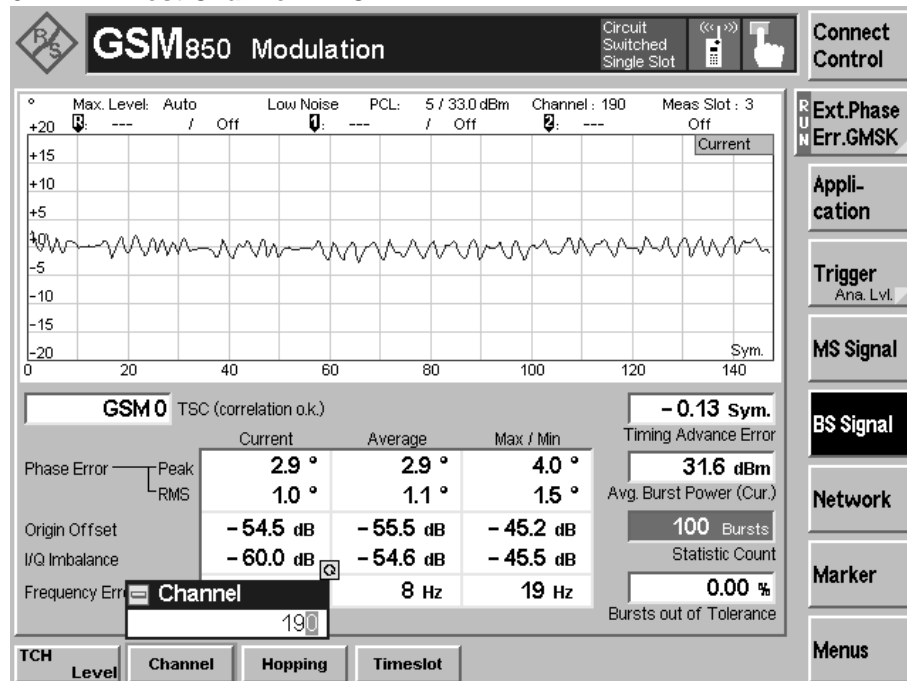
#### Part I - Test Plots

#### 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



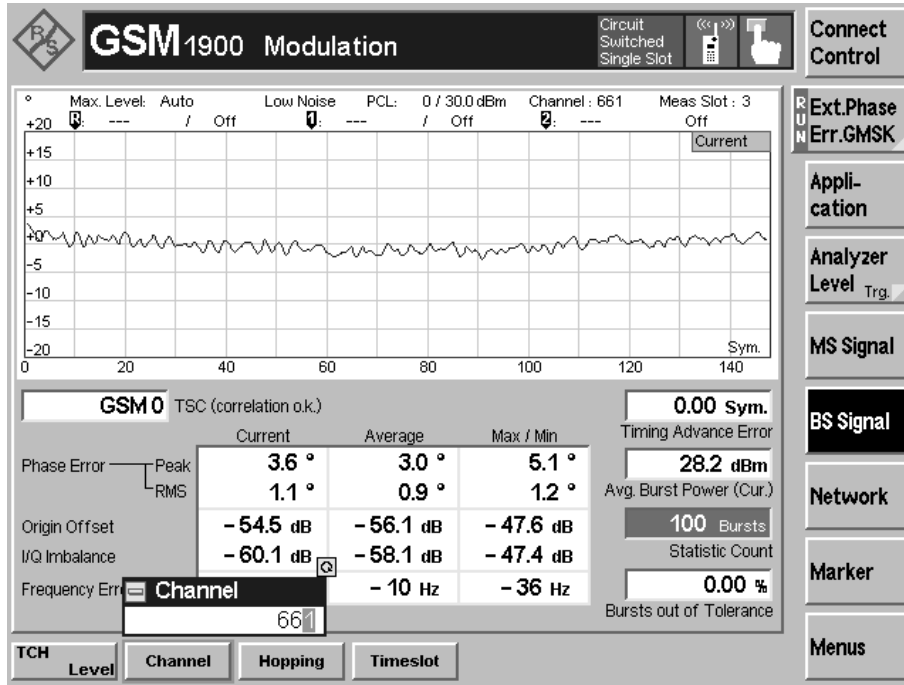




### 3.1.2 Test Band = GSM1900

#### 3.1.2.1 Test Mode = GSM/TM1

##### 3.1.2.1.1 Test Channel = MCH





## 4 Bandwidth

### Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	238.69	313.6	PASS
		MCH	243.07	313.5	PASS
		HCH	241.64	312.6	PASS

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM1900	GSM/TM1	LCH	239.89	313.9	PASS
		MCH	244.31	313.1	PASS
		HCH	243.88	316.8	PASS

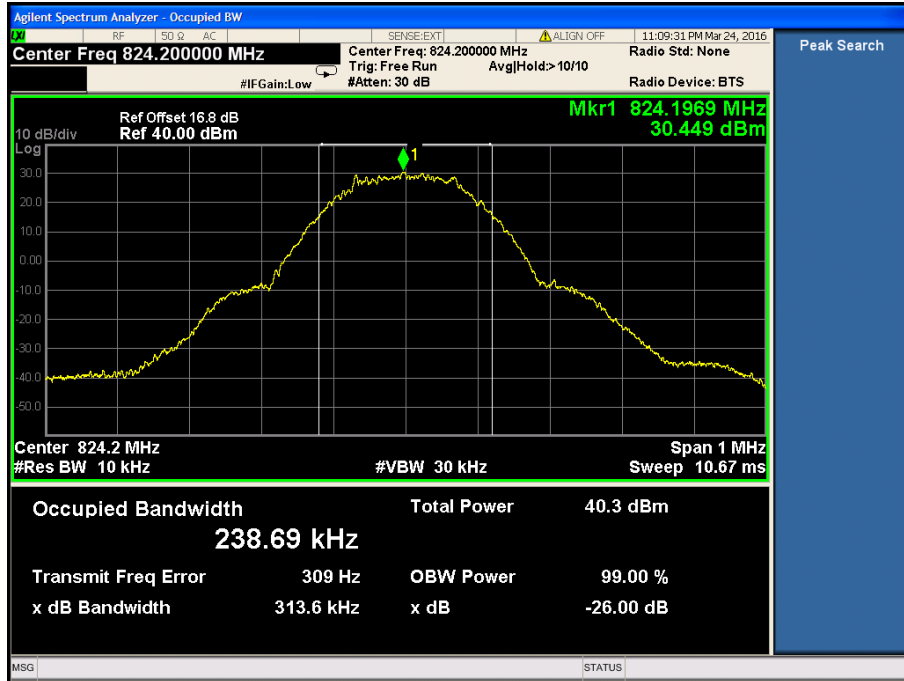


## 4.1 For GSM

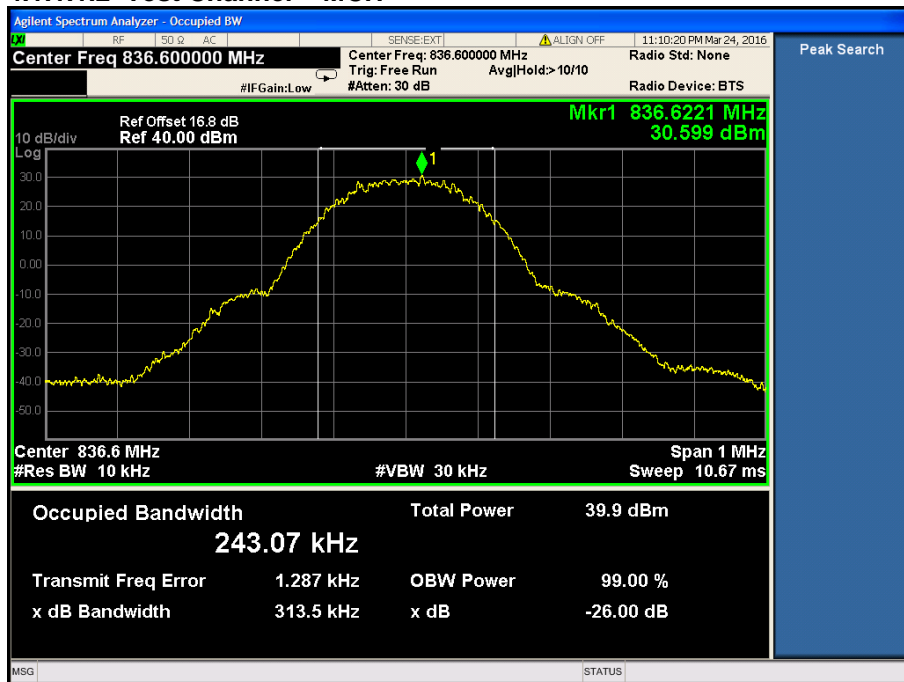
### 4.1.1 Test Band = GSM850

#### 4.1.1.1 Test Mode = GSM/TM1

##### 4.1.1.1.1 Test Channel = LCH

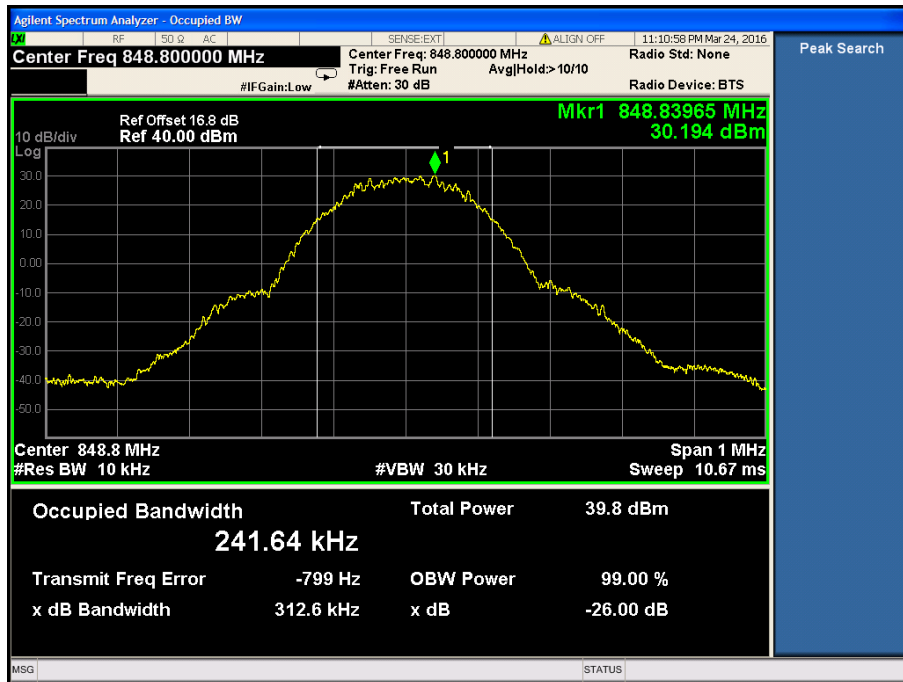


##### 4.1.1.1.2 Test Channel = MCH





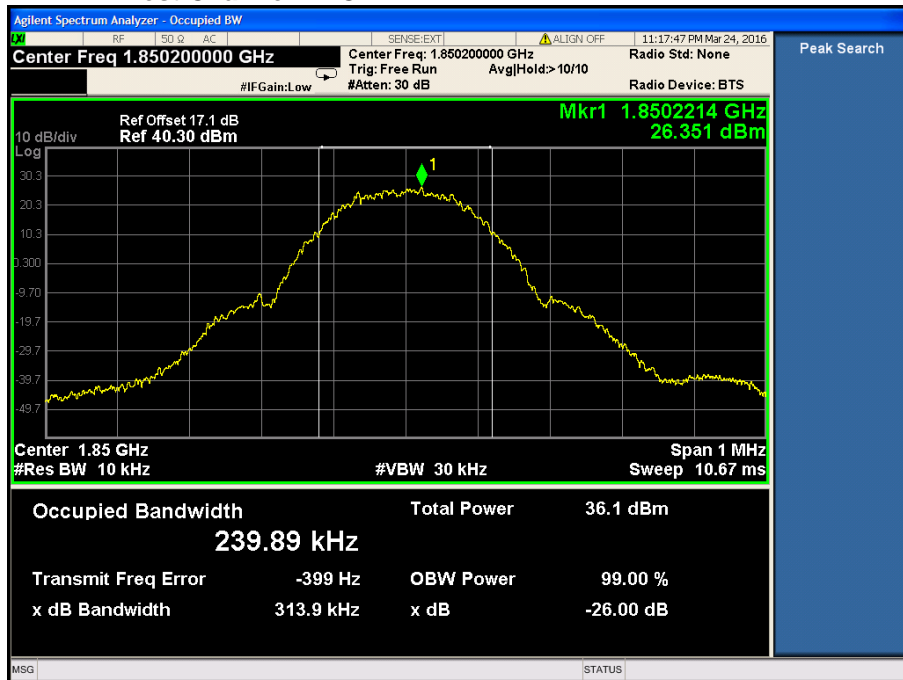
#### 4.1.1.1.3 Test Channel = HCH



#### 4.1.2 Test Band = GSM1900

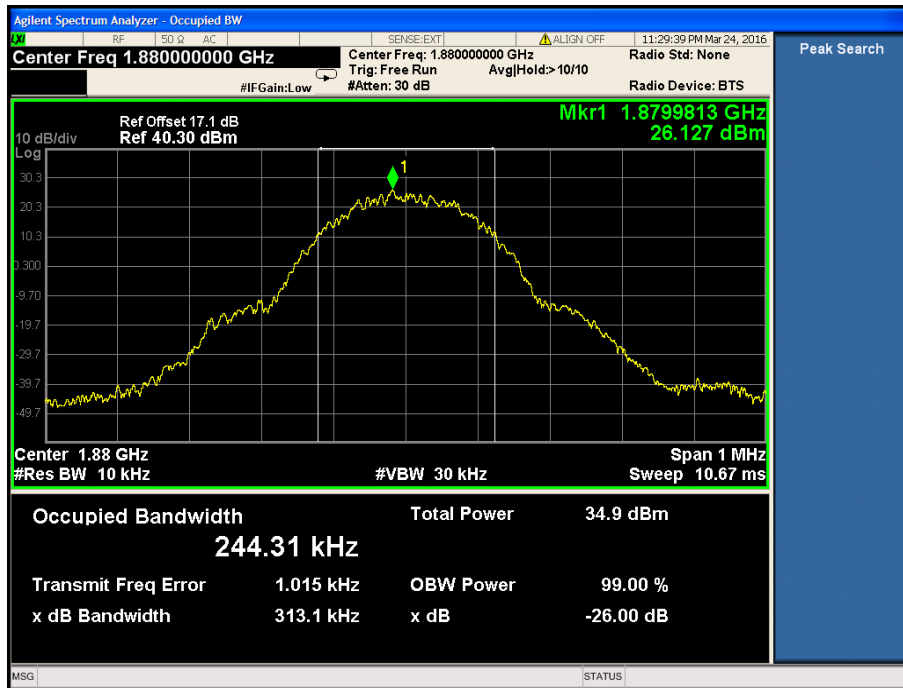
##### 4.1.2.1 Test Mode = GSM/TM1

##### 4.1.2.1.1 Test Channel = LCH

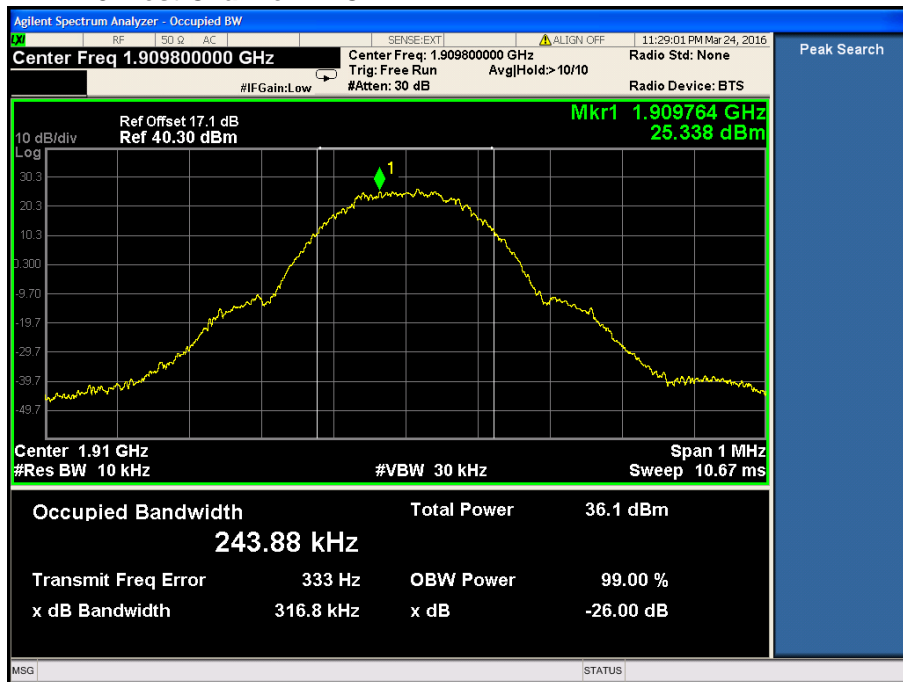




#### 4.1.2.1.2 Test Channel = MCH



#### 4.1.2.1.3 Test Channel = HCH





## 5 Band Edges Compliance

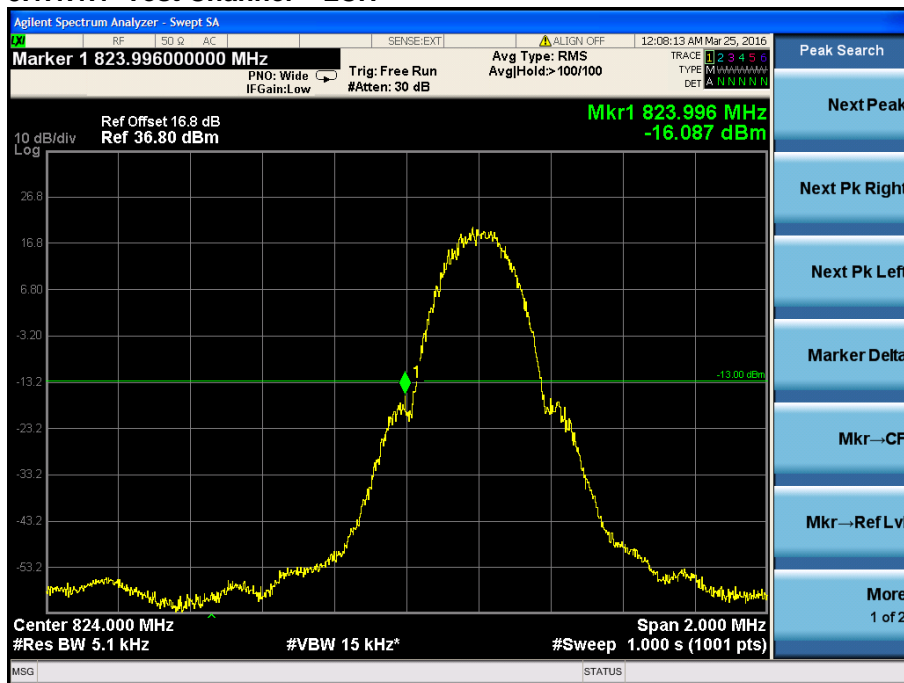
### Part I - Test Plots

#### 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



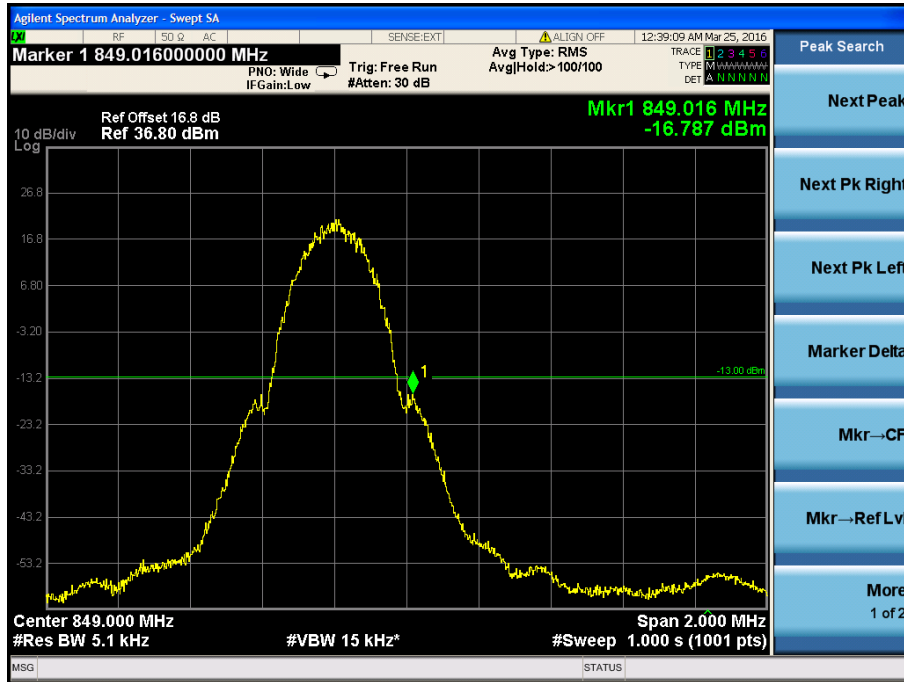


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## 5.1.1.1.2 Test Channel = HCH



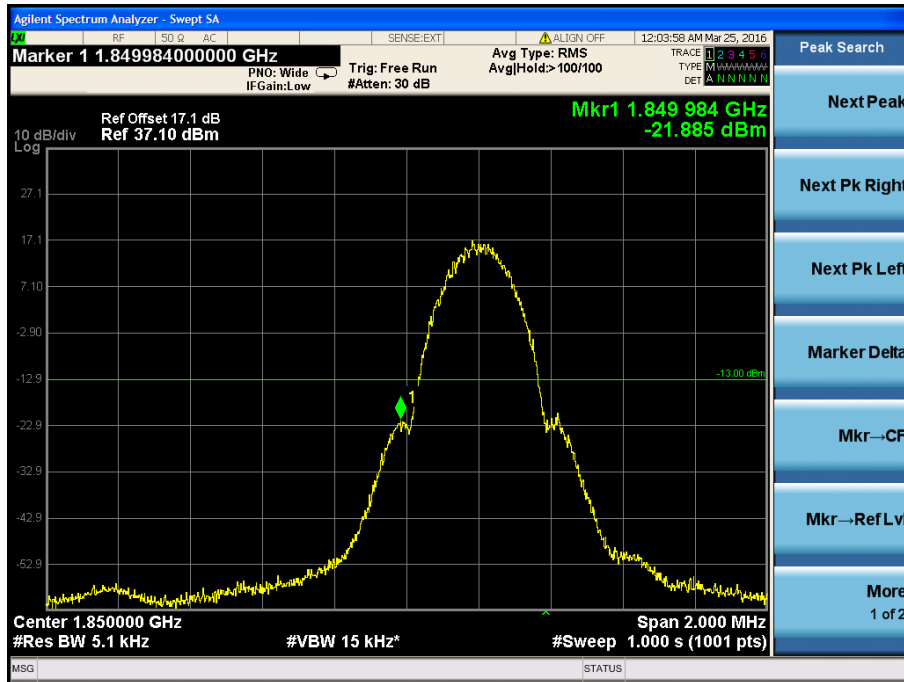
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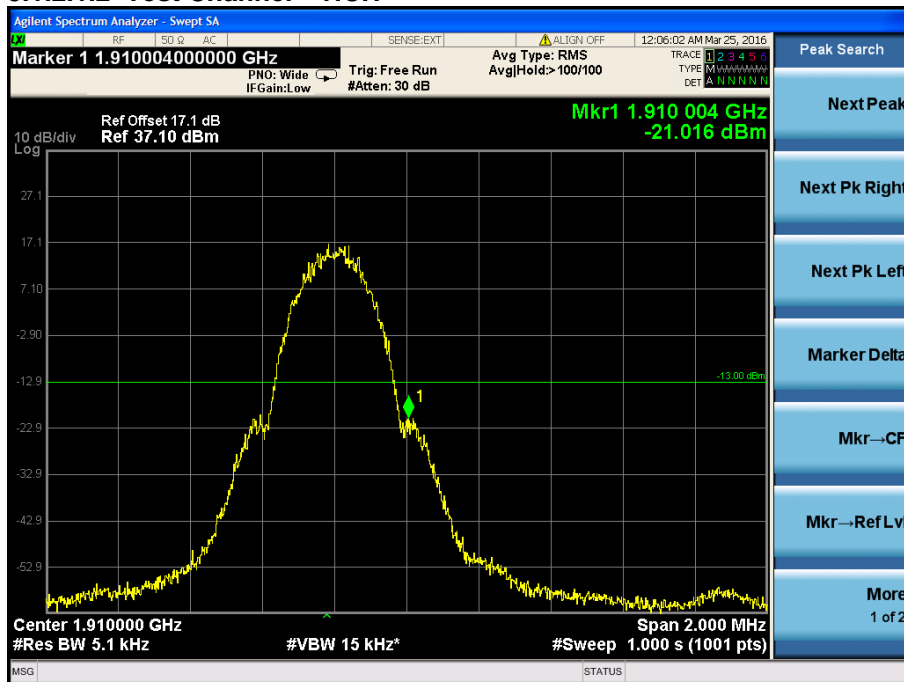
## 5.1.2 Test Band = GSM1900

### 5.1.2.1 Test Mode = GSM/TM1

#### 5.1.2.1.1 Test Channel = LCH



#### 5.1.2.1.2 Test Channel = HCH







## 6 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.

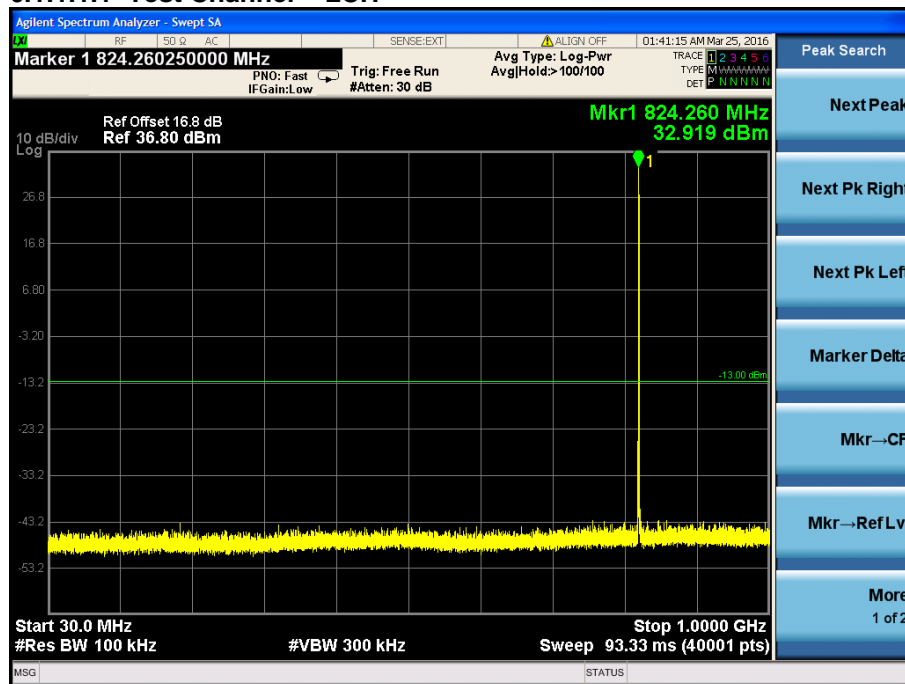
Part I - Test Plots

### 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

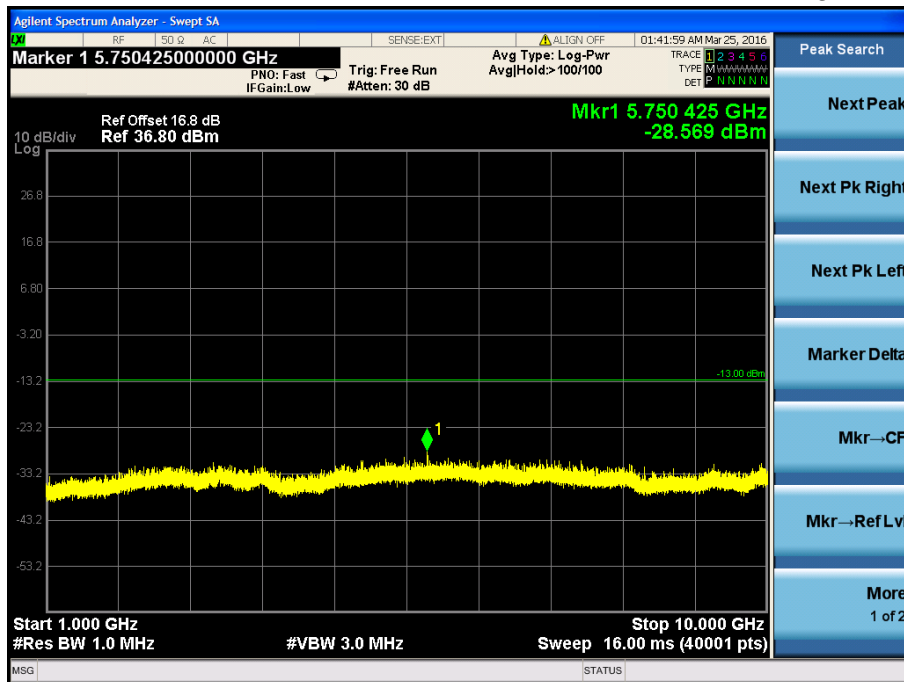




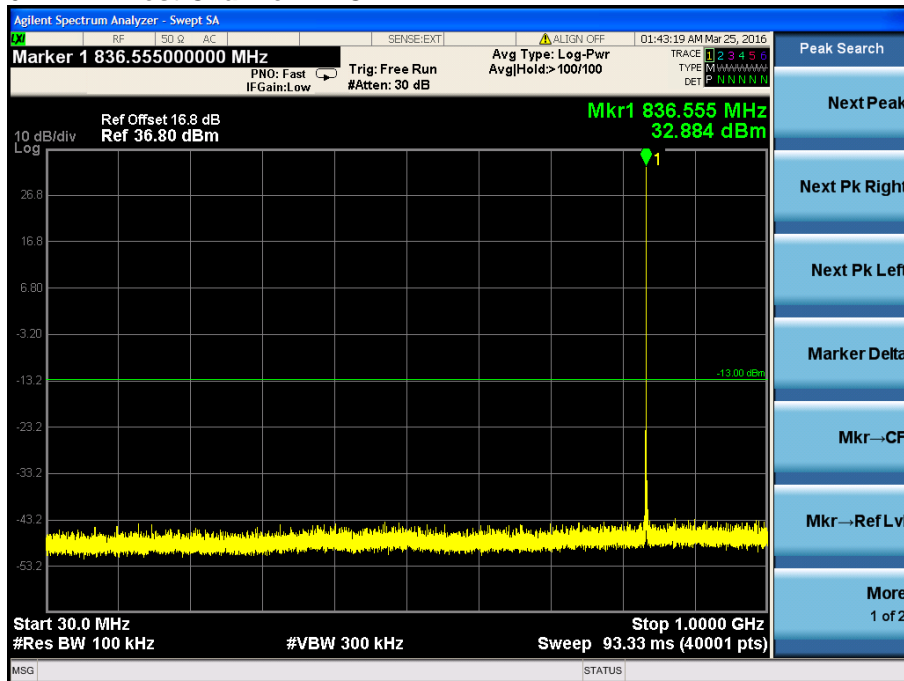
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## 6.1.1.1.2 Test Channel = MCH



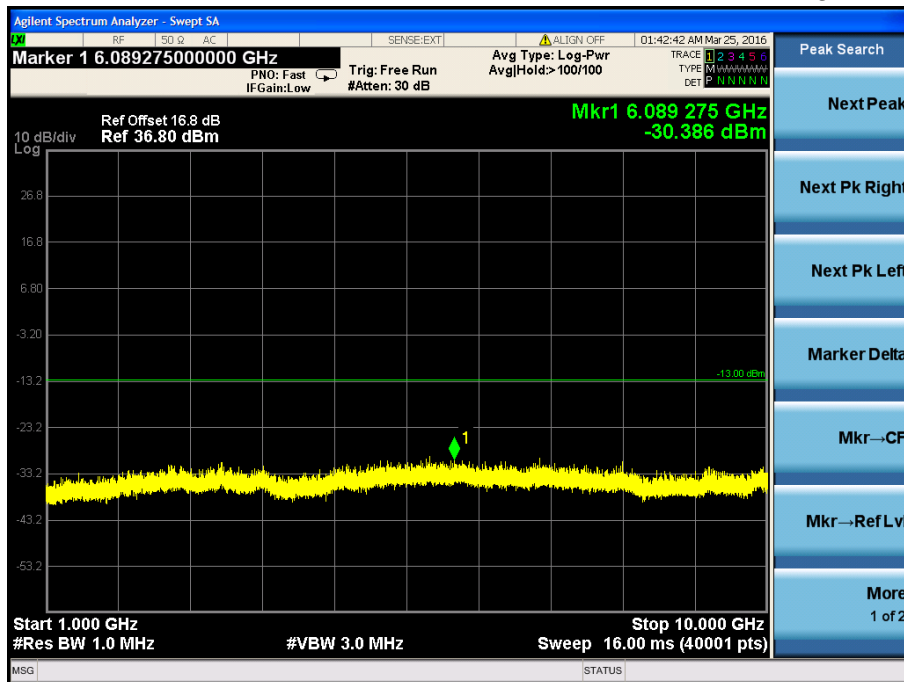
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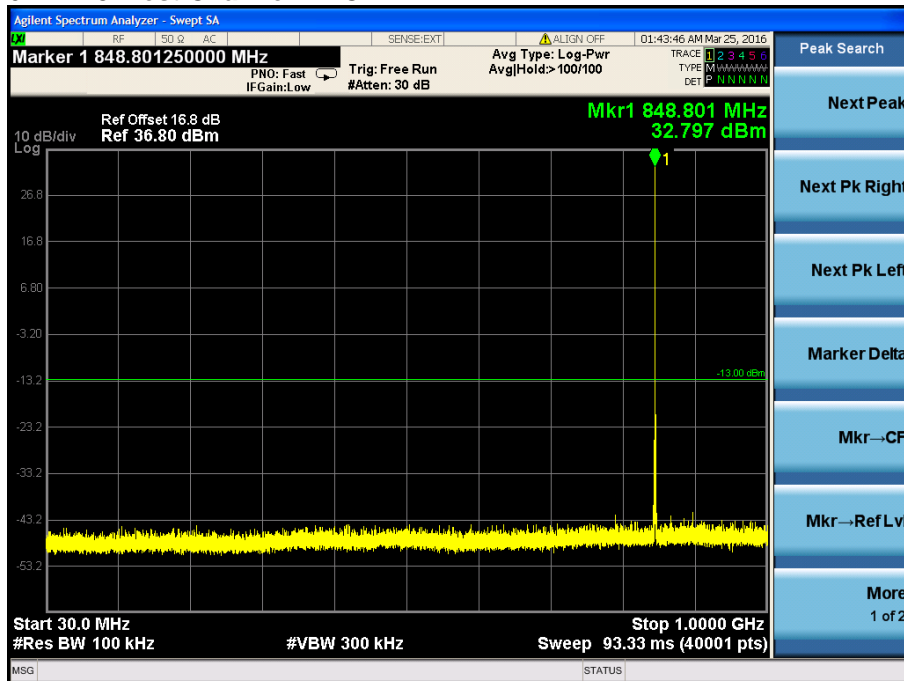
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## 6.1.1.1.3 Test Channel = HCH



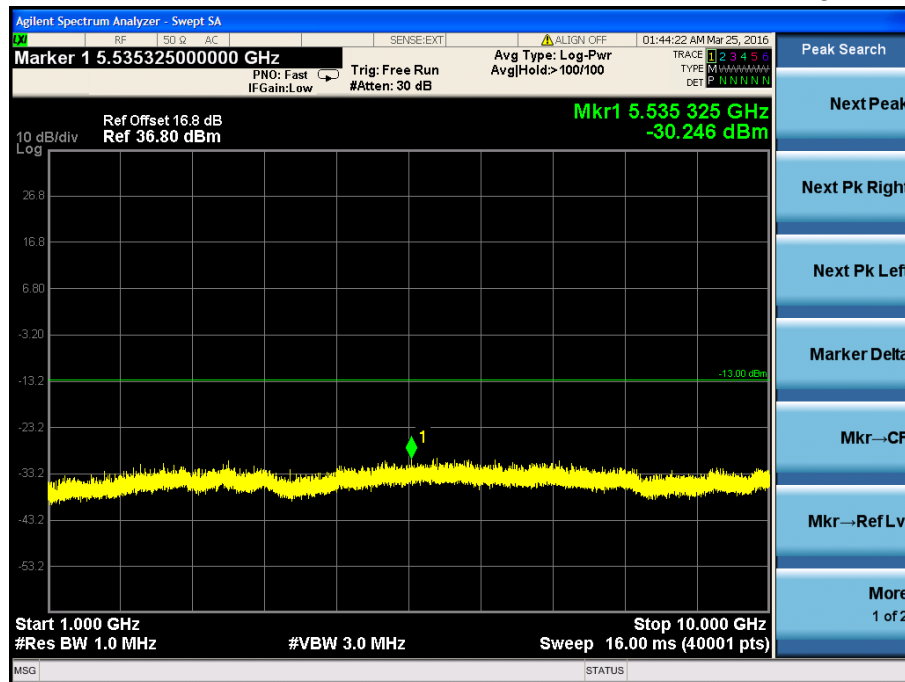
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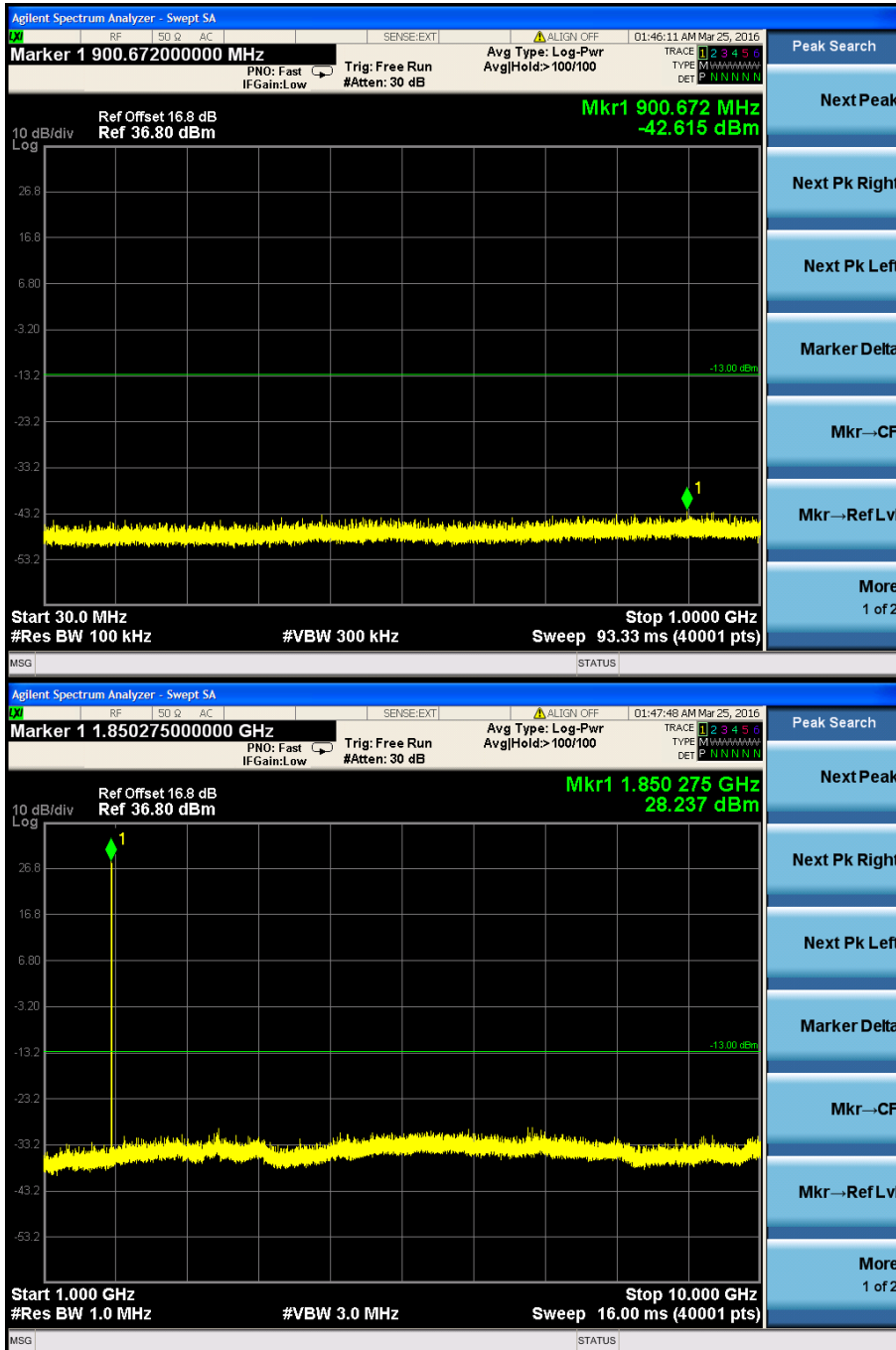
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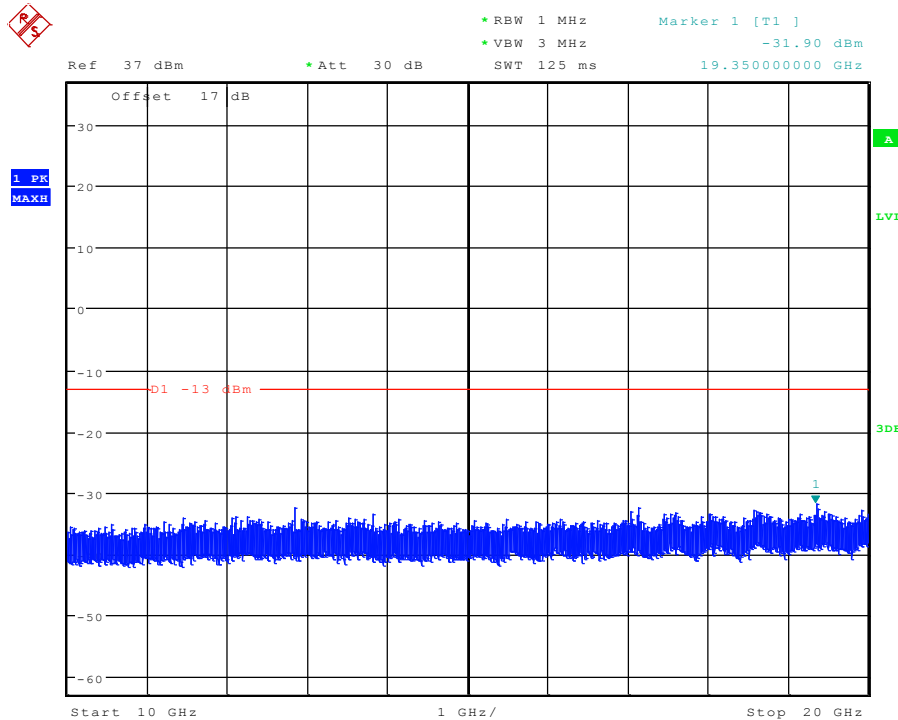


## 6.1.2 Test Band = GSM1900

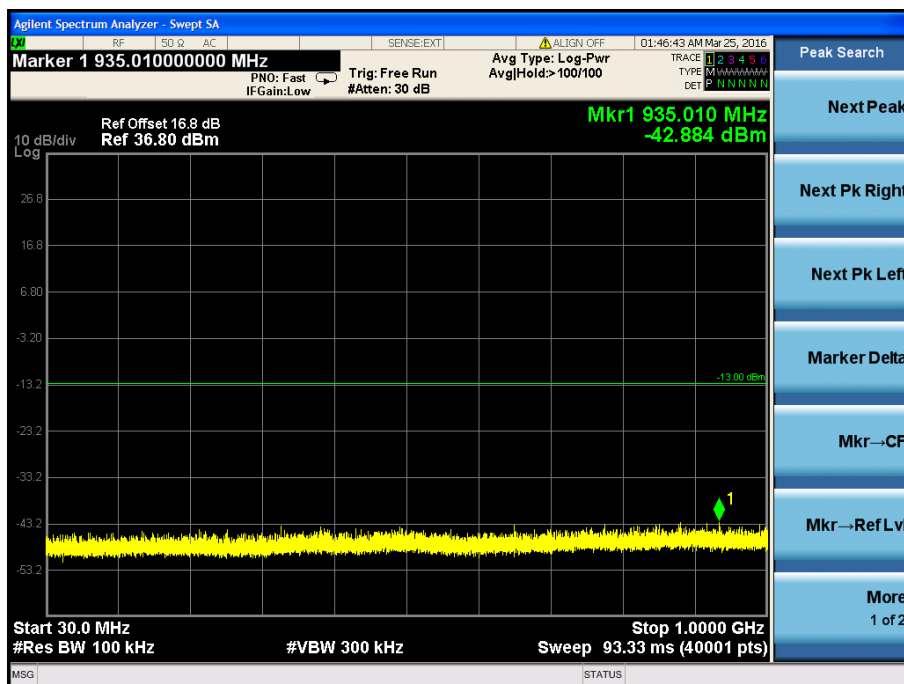
### 6.1.2.1 Test Mode = GSM/TM1

#### 6.1.2.1.1 Test Channel = LCH





#### 6.1.2.1.2 Test Channel = MCH

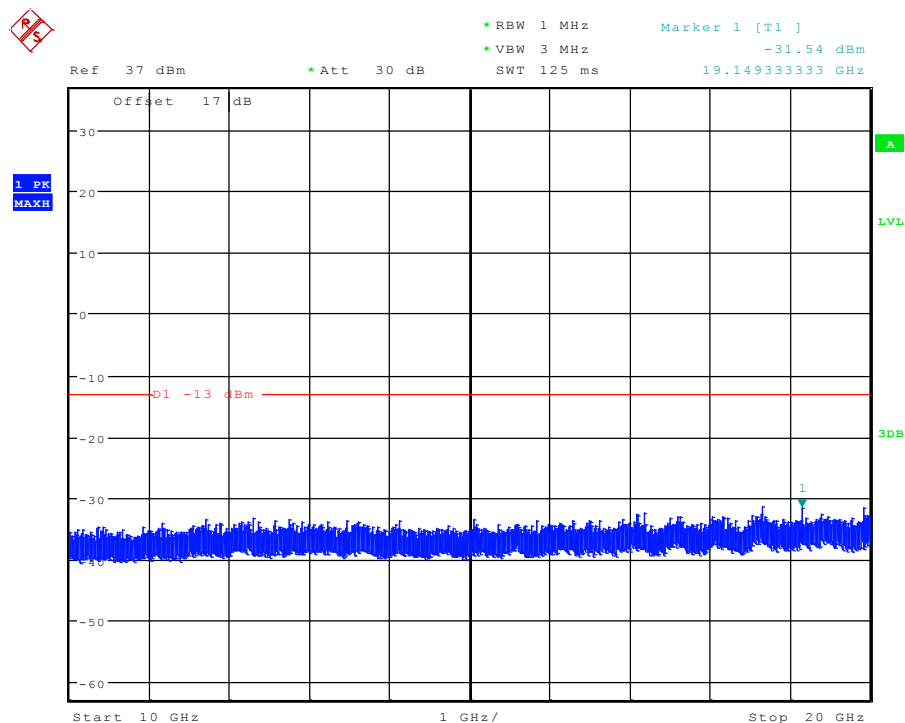
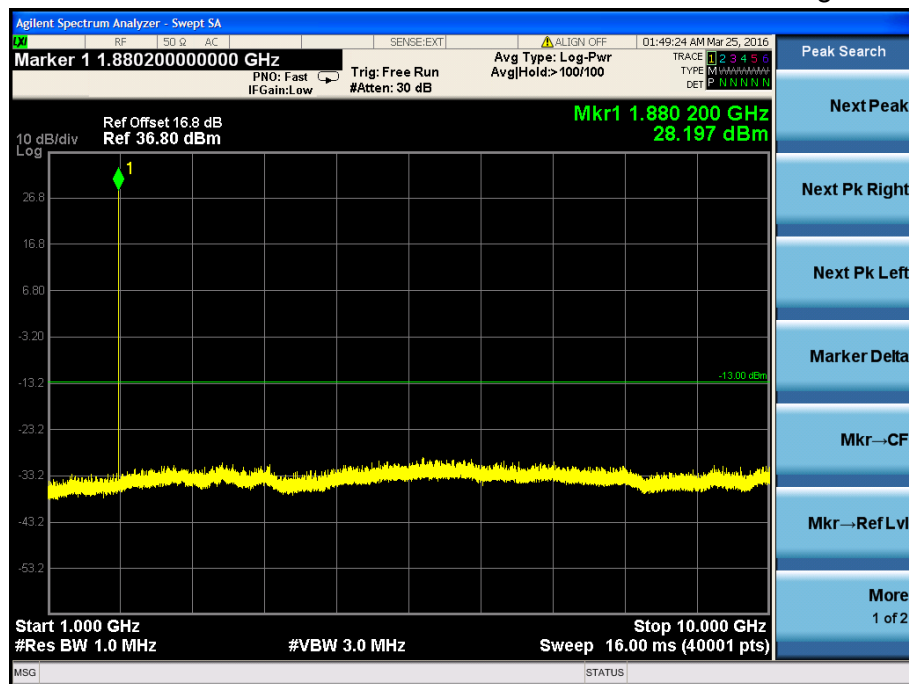




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## 6.1.2.1.3 Test Channel = HCH



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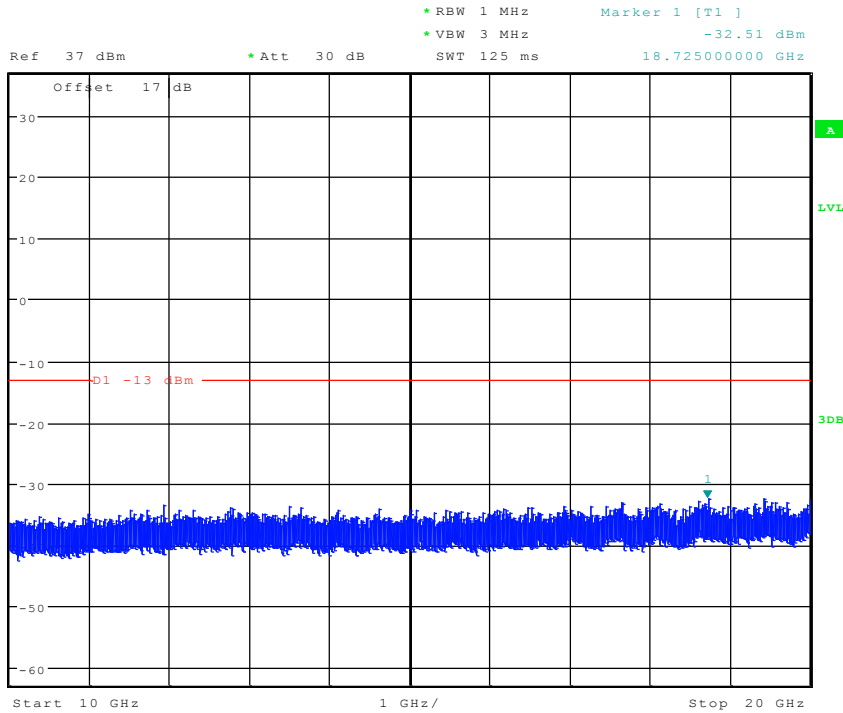
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1 PK  
MAXH



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## 7 Field Strength of Spurious Radiation

### Part I - Test Plots

#### 7.1 For GSM

##### 7.1.1 Test Band = GSM850

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

##### 7.1.1.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
110.365	-79.79	-13.00	-66.79	Vertical
162.114	-84.93	-13.00	-71.93	Vertical
228.414	-84.26	-13.00	-71.26	Vertical
306.014	-79.42	-13.00	-66.42	Vertical
449.719	-78.72	-13.00	-65.72	Vertical
622.767	-75.15	-13.00	-62.15	Vertical
1648.425	-47.23	-13.00	-34.23	Vertical
2393.925	-47.48	-13.00	-34.48	Vertical
3263.900	-58.18	-13.00	-45.18	Vertical
4715.350	-56.33	-13.00	-43.33	Vertical
6531.500	-54.40	-13.00	-41.40	Vertical
8998.300	-53.13	-13.00	-40.13	Vertical

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
119.434	-86.18	-13.00	-73.18	Horizontal
185.637	-85.19	-13.00	-72.19	Horizontal
250.724	-81.03	-13.00	-68.03	Horizontal
327.305	-80.73	-13.00	-67.73	Horizontal
455.927	-78.24	-13.00	-65.24	Horizontal
616.268	-74.58	-13.00	-61.58	Horizontal
1648.050	-45.77	-13.00	-32.77	Horizontal
2408.700	-47.73	-13.00	-34.73	Horizontal
3612.150	-57.62	-13.00	-44.62	Horizontal
4977.150	-55.68	-13.00	-42.68	Horizontal
6660.650	-55.55	-13.00	-42.55	Horizontal
8973.450	-54.39	-13.00	-41.39	Horizontal



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## 7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
65.500	-60.58	-13.00	-47.58	Vertical
106.050	-66.85	-13.00	-53.85	Vertical
151.150	-84.37	-13.00	-71.37	Vertical
279.800	-79.33	-13.00	-66.33	Vertical
398.750	-79.06	-13.00	-66.06	Vertical
605.105	-59.88	-13.00	-46.88	Vertical
1195.000	-50.50	-13.00	-37.50	Vertical
1893.750	-40.25	-13.00	-27.25	Vertical
2568.750	-42.17	-13.00	-29.17	Vertical
4234.500	-50.24	-13.00	-37.24	Vertical
5535.000	-49.97	-13.00	-36.97	Vertical
7532.500	-48.66	-13.00	-35.66	Vertical

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
58.800	-63.92	-13.00	-50.92	Horizontal
82.800	-66.25	-13.00	-53.25	Horizontal
105.100	-68.44	-13.00	-55.44	Horizontal
189.200	-78.90	-13.00	-65.90	Horizontal
577.910	-59.90	-13.00	-46.90	Horizontal
1045.000	-51.84	-13.00	-38.84	Horizontal
1199.167	-50.73	-13.00	-37.73	Horizontal
1897.500	-34.66	-13.00	-21.66	Horizontal
2927.063	-40.91	-13.00	-27.91	Horizontal
4954.500	-49.95	-13.00	-36.95	Horizontal
6303.500	-48.76	-13.00	-35.76	Horizontal
8623.500	-46.88	-13.00	-33.88	Horizontal

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## 7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
102.896	-84.52	-13.00	-71.52	Vertical
157.555	-84.08	-13.00	-71.08	Vertical
232.682	-83.66	-13.00	-70.66	Vertical
315.423	-79.25	-13.00	-66.25	Vertical
448.943	-78.61	-13.00	-65.61	Vertical
615.686	-76.28	-13.00	-63.28	Vertical
1697.700	-46.11	-13.00	-33.11	Vertical
2460.000	-47.88	-13.00	-34.88	Vertical
3521.150	-57.57	-13.00	-44.57	Vertical
4551.550	-56.69	-13.00	-43.69	Vertical
6176.250	-54.91	-13.00	-41.91	Vertical
8755.050	-53.61	-13.00	-40.61	Vertical

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
98.676	-83.92	-13.00	-70.92	Horizontal
162.939	-86.96	-13.00	-73.96	Horizontal
220.896	-83.55	-13.00	-70.55	Horizontal
316.829	-80.10	-13.00	-67.10	Horizontal
438.419	-78.19	-13.00	-65.19	Horizontal
622.864	-74.95	-13.00	-61.95	Horizontal
1697.400	-46.40	-13.00	-33.40	Horizontal
2474.400	-47.77	-13.00	-34.77	Horizontal
3504.000	-58.45	-13.00	-45.45	Horizontal
4389.500	-57.29	-13.00	-44.29	Horizontal
5452.450	-56.73	-13.00	-43.73	Horizontal
7776.800	-54.07	-13.00	-41.07	Horizontal

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## 7.1.2 Test Band = GSM1900

### 7.1.2.1 Test Mode = GSM/TM1

#### 7.1.2.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
161.038	-84.92	-13.00	-71.92	Vertical
237.536	-81.24	-13.00	-68.24	Vertical
322.631	-77.56	-13.00	-64.56	Vertical
438.105	-78.58	-13.00	-65.58	Vertical
600.051	-73.05	-13.00	-60.05	Vertical
832.410	-72.06	-13.00	-59.06	Vertical
3700.000	-50.27	-13.00	-37.27	Vertical
4437.625	-51.37	-13.00	-38.37	Vertical
5188.375	-50.79	-13.00	-37.79	Vertical
6157.875	-49.48	-13.00	-36.48	Vertical
7428.375	-49.36	-13.00	-36.36	Vertical
9041.000	-48.79	-13.00	-35.79	Vertical

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
161.832	-84.45	-13.00	-71.45	Horizontal
249.970	-80.47	-13.00	-67.47	Horizontal
345.823	-78.49	-13.00	-65.49	Horizontal
479.904	-77.50	-13.00	-64.50	Horizontal
642.379	-74.58	-13.00	-61.58	Horizontal
875.620	-65.37	-13.00	-52.37	Horizontal
3700.000	-50.71	-13.00	-37.71	Horizontal
4532.125	-51.39	-13.00	-38.39	Horizontal
5585.625	-50.55	-13.00	-37.55	Horizontal
6584.875	-49.26	-13.00	-36.26	Horizontal
7426.625	-48.86	-13.00	-35.86	Horizontal
9088.250	-47.64	-13.00	-34.64	Horizontal

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## 7.1.2.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
57.750	-67.87	-13.00	-54.87	Vertical
65.200	-59.84	-13.00	-46.84	Vertical
73.050	-63.29	-13.00	-50.29	Vertical
90.050	-67.83	-13.00	-54.83	Vertical
105.100	-71.77	-13.00	-58.77	Vertical
347.450	-77.17	-13.00	-64.17	Vertical
511.025	-60.37	-13.00	-47.37	Vertical
1229.167	-50.86	-13.00	-37.86	Vertical
1651.125	-47.93	-13.00	-34.93	Vertical
2805.000	-41.46	-13.00	-28.46	Vertical
4292.625	-50.63	-13.00	-37.63	Vertical
5486.250	-49.78	-13.00	-36.78	Vertical

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
59.200	-66.98	-13.00	-53.98	Horizontal
95.550	-69.21	-13.00	-56.21	Horizontal
187.250	-75.48	-13.00	-62.48	Horizontal
206.300	-76.97	-13.00	-63.97	Horizontal
503.333	-58.39	-13.00	-45.39	Horizontal
875.833	-47.29	-13.00	-34.29	Horizontal
1517.420	-49.44	-13.00	-36.44	Horizontal
2413.820	-41.60	-13.00	-28.60	Horizontal
2851.600	-40.42	-13.00	-27.42	Horizontal
4198.875	-49.62	-13.00	-36.62	Horizontal
6201.000	-48.65	-13.00	-35.65	Horizontal
7795.000	-47.80	-13.00	-34.80	Horizontal

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**7.1.2.1.3 Test Channel = HCH**

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
128.764	-82.95	-13.00	-69.95	Vertical
199.970	-82.32	-13.00	-69.32	Vertical
289.255	-80.15	-13.00	-67.15	Vertical
436.165	-78.48	-13.00	-65.48	Vertical
600.007	-73.97	-13.00	-60.97	Vertical
876.105	-67.89	-13.00	-54.89	Vertical
3502.250	-52.43	-13.00	-39.43	Vertical
4052.625	-50.91	-13.00	-37.91	Vertical
4983.625	-50.16	-13.00	-37.16	Vertical
6006.500	-49.65	-13.00	-36.65	Vertical
7298.000	-49.43	-13.00	-36.43	Vertical
8639.375	-48.05	-13.00	-35.05	Vertical

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
165.006	-81.75	-13.00	-68.75	Horizontal
240.578	-81.40	-13.00	-68.40	Horizontal
330.965	-79.87	-13.00	-66.87	Horizontal
453.846	-77.41	-13.00	-64.41	Horizontal
650.006	-72.75	-13.00	-59.75	Horizontal
875.531	-66.71	-13.00	-53.71	Horizontal
3468.125	-52.90	-13.00	-39.90	Horizontal
4025.500	-52.11	-13.00	-39.11	Horizontal
4668.625	-50.74	-13.00	-37.74	Horizontal
5531.375	-50.72	-13.00	-37.72	Horizontal
6547.250	-49.33	-13.00	-36.33	Horizontal
7847.500	-47.58	-13.00	-34.58	Horizontal

**NOTE:**

- 1) The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



## 8 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	-8.65	-0.00468	PASS
				VN	-10.20	-0.00551	PASS
				VH	-12.85	-0.00695	PASS
		MCH	TN	VL	-1.80	-0.00096	PASS
				VN	-2.51	-0.00134	PASS
				VH	-7.49	-0.00398	PASS
		HCH	TN	VL	-19.04	-0.00997	PASS
				VN	-8.39	-0.00439	PASS
				VH	-1.16	-0.00061	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM1900	GSM/TM1	LCH	TN	VL	-10.20	-0.00551	PASS
				VN	-12.85	-0.00695	PASS
				VH	-8.65	-0.00468	PASS
		MCH	TN	VL	-2.51	-0.00134	PASS
				VN	-7.49	-0.00398	PASS
				VH	-1.80	-0.00096	PASS
		HCH	TN	VL	-1.16	-0.00061	PASS
				VN	-19.04	-0.00997	PASS
				VH	-8.39	-0.00439	PASS





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**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	-4.64	-0.00563	PASS
				-20	-1.38	-0.00167	PASS
				-10	-5.38	-0.00653	PASS
				0	-4.19	-0.00508	PASS
				10	-3.35	-0.00406	PASS
				20	-2.05	-0.00249	PASS
				30	-10.19	-0.01236	PASS
				40	0.66	0.00080	PASS
				50	0.88	0.00107	PASS
		MCH	VN	-30	0.14	0.00017	PASS
				-20	-0.51	-0.00061	PASS
				-10	-8.67	-0.01036	PASS
				0	-2.28	-0.00273	PASS
				10	-2.02	-0.00241	PASS
				20	-3.83	-0.00458	PASS
				30	0.04	0.00005	PASS
				40	-5.70	-0.00681	PASS
				50	-6.41	-0.00766	PASS
		HCH	VN	-30	-5.74	-0.00676	PASS
				-20	-7.22	-0.00851	PASS
				-10	-5.09	-0.00600	PASS
				0	-3.83	-0.00451	PASS
				10	-10.26	-0.01209	PASS
				20	-9.67	-0.01139	PASS
				30	-1.54	-0.00181	PASS
				40	-8.61	-0.01014	PASS
				50	-3.67	-0.00432	PASS

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Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM1900	GSM/TM1	LCH	VN	-30	-15.00	-0.00811	PASS
				-20	-8.93	-0.00483	PASS
				-10	-14.10	-0.00762	PASS
				0	-2.28	-0.00123	PASS
				10	1.59	0.00086	PASS
				20	-5.12	-0.00277	PASS
				30	-13.90	-0.00751	PASS
				40	-10.48	-0.00566	PASS
				50	1.27	0.00069	PASS
		MCH	VN	-30	-5.83	-0.00310	PASS
				-20	-7.45	-0.00396	PASS
				-10	-13.19	-0.00702	PASS
				0	-0.73	-0.00039	PASS
				10	-15.39	-0.00819	PASS
				20	-7.70	-0.00410	PASS
				30	2.37	0.00126	PASS
				40	-8.93	-0.00475	PASS
				50	-11.97	-0.00637	PASS
		HCH	VN	-30	-14.74	-0.00772	PASS
				-20	-5.25	-0.00275	PASS
				-10	-6.80	-0.00356	PASS
				0	-11.77	-0.00616	PASS
				10	1.01	0.00053	PASS
				20	2.56	0.00134	PASS
				30	-6.35	-0.00332	PASS
				40	-13.65	-0.00715	PASS
				50	-2.22	-0.00116	PASS

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