



# Appendix B

## **GSM850&1900**



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## 1 Effective (Isotropic) Radiated Power Output Data

### Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	ERP[dB]	Limit[dBm]	Verdict
GSM 850	GSM/TM1	LCH	32.57	31.04	38.45	PASS
		MCH	32.59	31.06	38.45	PASS
		HCH	32.52	30.99	38.45	PASS
	GSM/TM2	LCH	26.82	25.29	38.45	PASS
		MCH	26.85	25.32	38.45	PASS
		HCH	26.91	25.38	38.45	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

Test Band	Test Mode	Test Channel	Measured[dB]	EIRP[dB]	Limit[dBm]	Verdict
GSM 1900	GSM/TM1	LCH	29.64	30.31	33	PASS
		MCH	29.39	30.06	33	PASS
		HCH	29.30	29.97	33	PASS
	GSM/TM2	LCH	26.02	26.69	33	PASS
		MCH	26.06	26.73	33	PASS
		HCH	26.21	26.88	33	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
GSM 850	GSM/TM1	LCH	6.43	13	PASS
		MCH	6.41	13	PASS
		HCH	6.41	13	PASS
	GSM/TM2	LCH	8.20	13	PASS
		MCH	8.23	13	PASS
		HCH	8.41	13	PASS
GSM 1900	GSM/TM1	LCH	6.41	13	PASS
		MCH	6.41	13	PASS
		HCH	6.41	13	PASS
	GSM/TM2	LCH	8.41	13	PASS
		MCH	8.17	13	PASS
		HCH	8.61	13	PASS



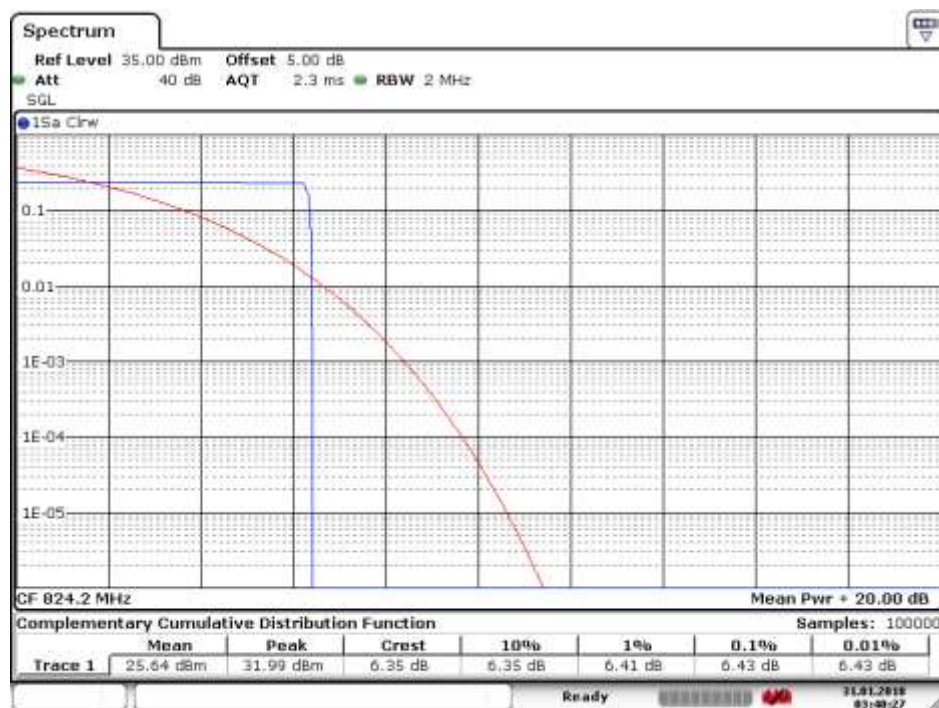
## Part II - Test Plots

### 2.1 For GSM

#### 2.1.1 Test Band = GSM 850

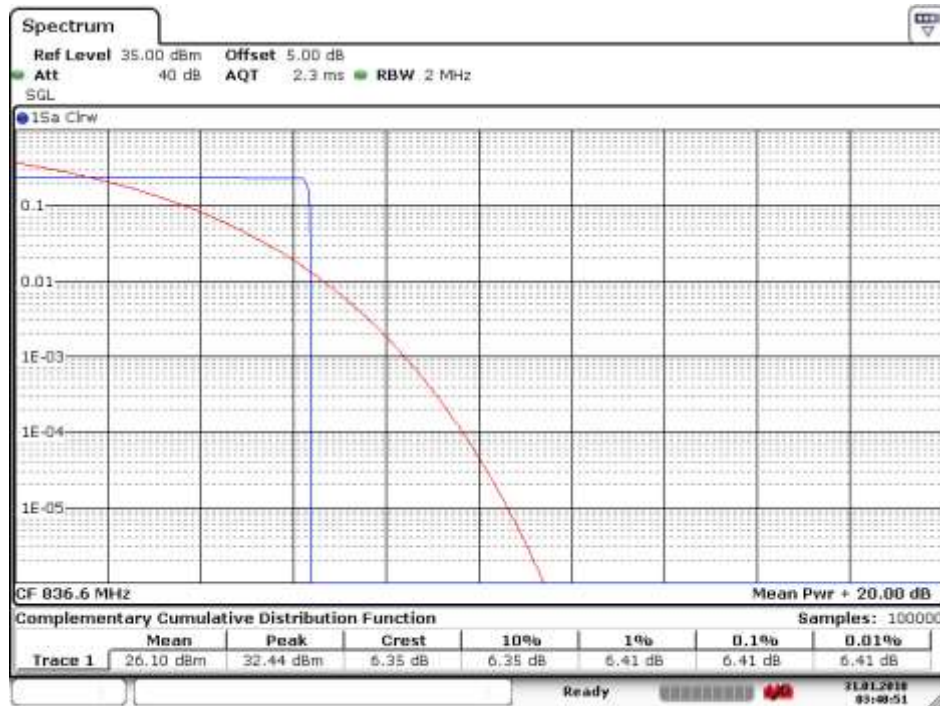
##### 2.1.1.1 Test Mode = GSM/TM1

##### 2.1.1.1.1 Test Channel = LCH



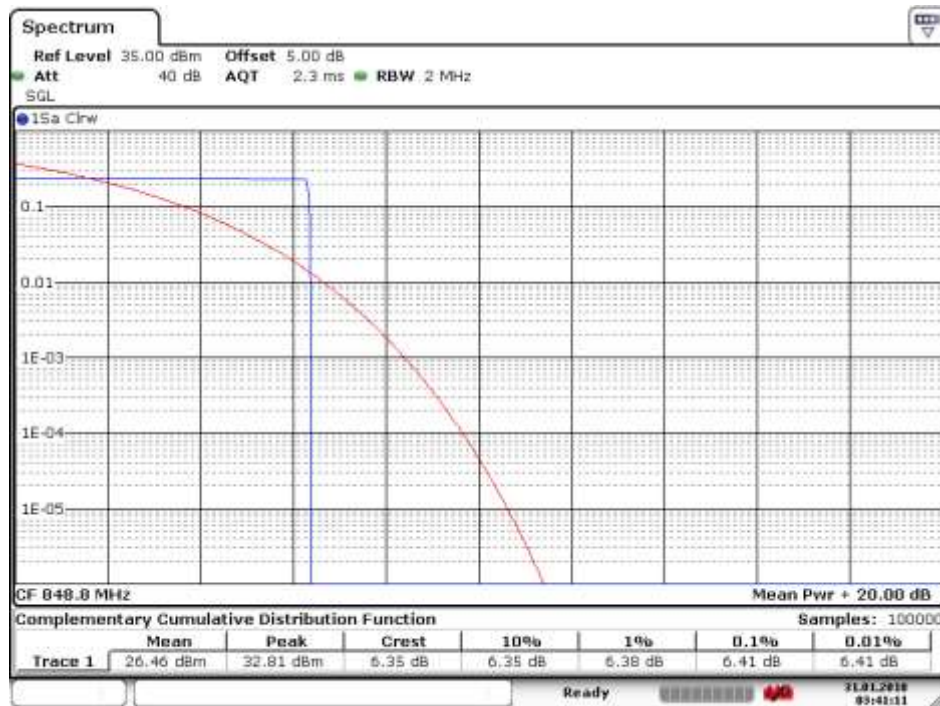
Date: 31. JAN 2018 03:40:27

#### 2.1.1.1.2 Test Channel = MCH



Date: 31.JAN 2018 03:40:51

#### 2.1.1.1.3 Test Channel = HCH

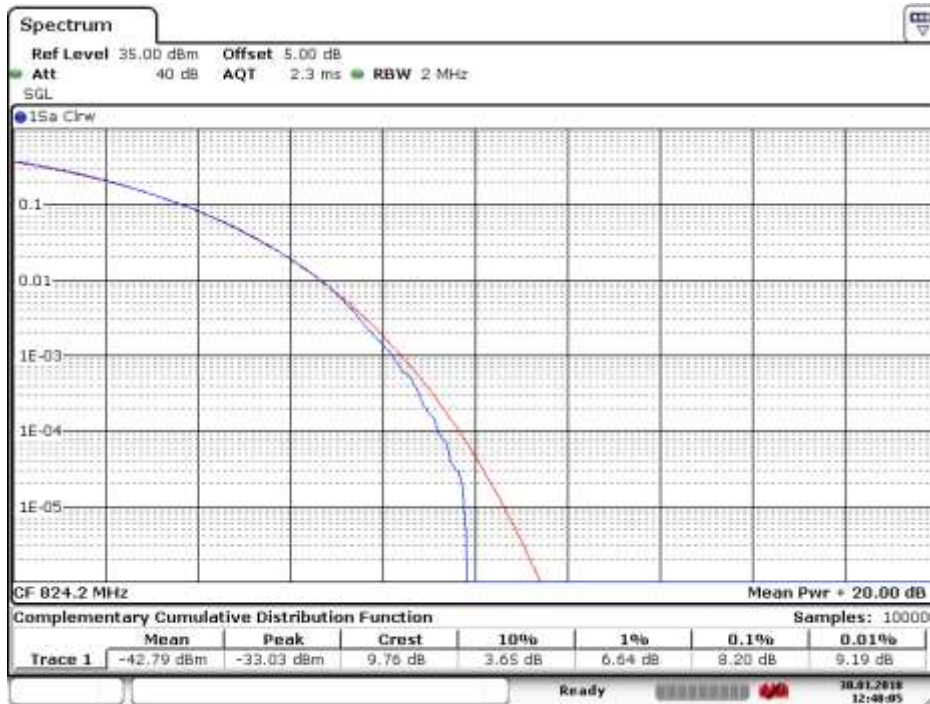


Date: 31.JAN 2018 03:41:12



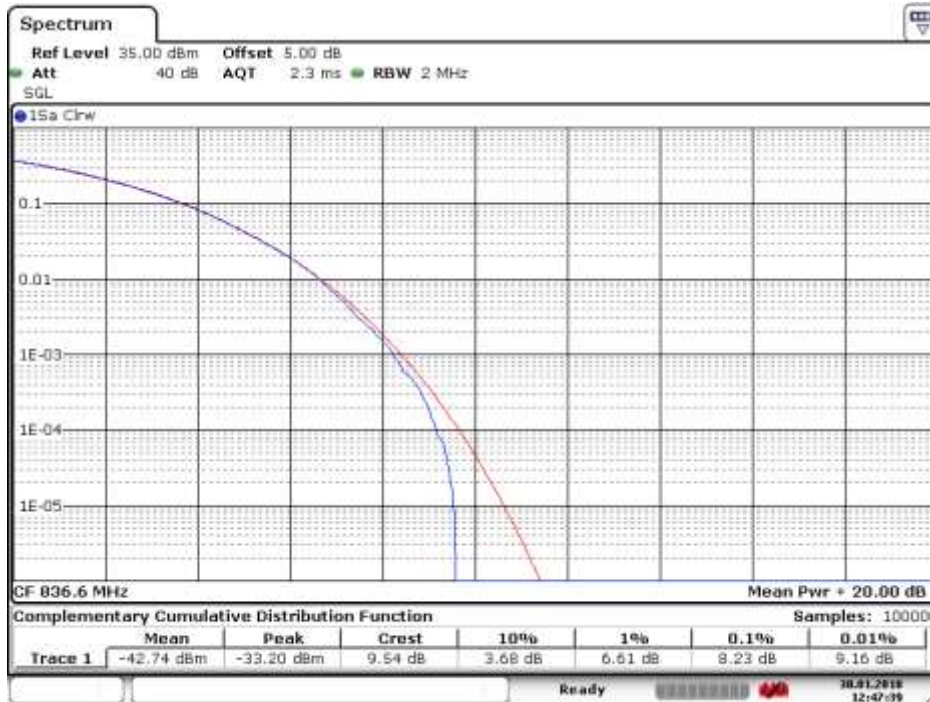
#### 2.1.1.2 Test Mode = GSM/TM2

#### 2.1.1.2.1 Test Channel = LCH



Date: 30 JAN 2018 12:48:05

#### 2.1.1.2.2 Test Channel = MCH



Date: 30 JAN 2018 12:47:39

### 2.1.1.2.3 Test Channel = HCH

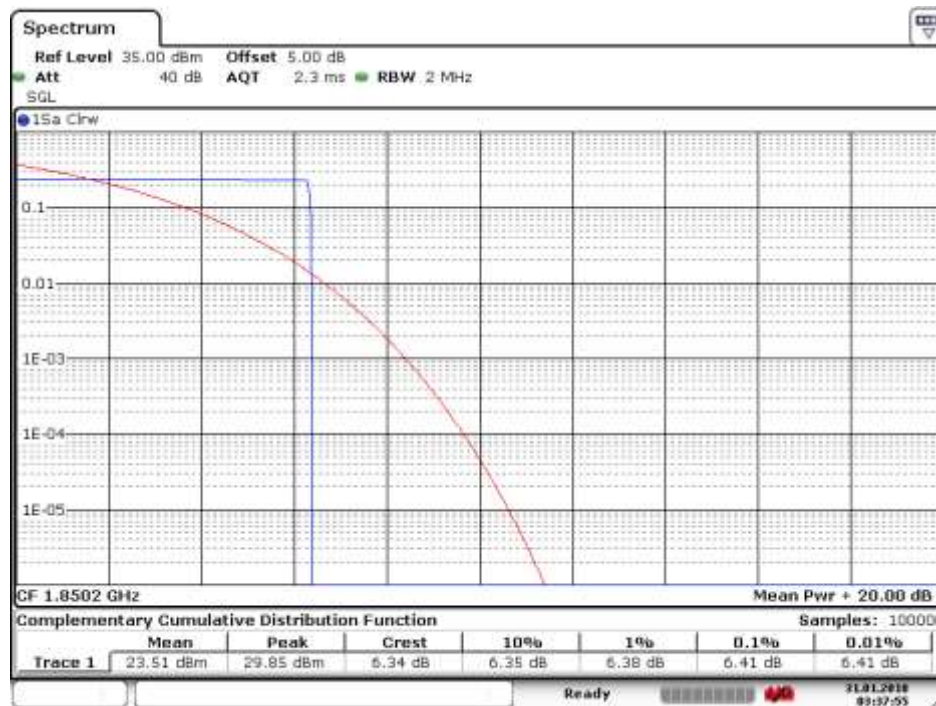


Date: 30 JAN 2018 12:47:12

### 2.1.2 Test Band = GSM 1900

#### 2.1.2.1 Test Mode = GSM/TM1

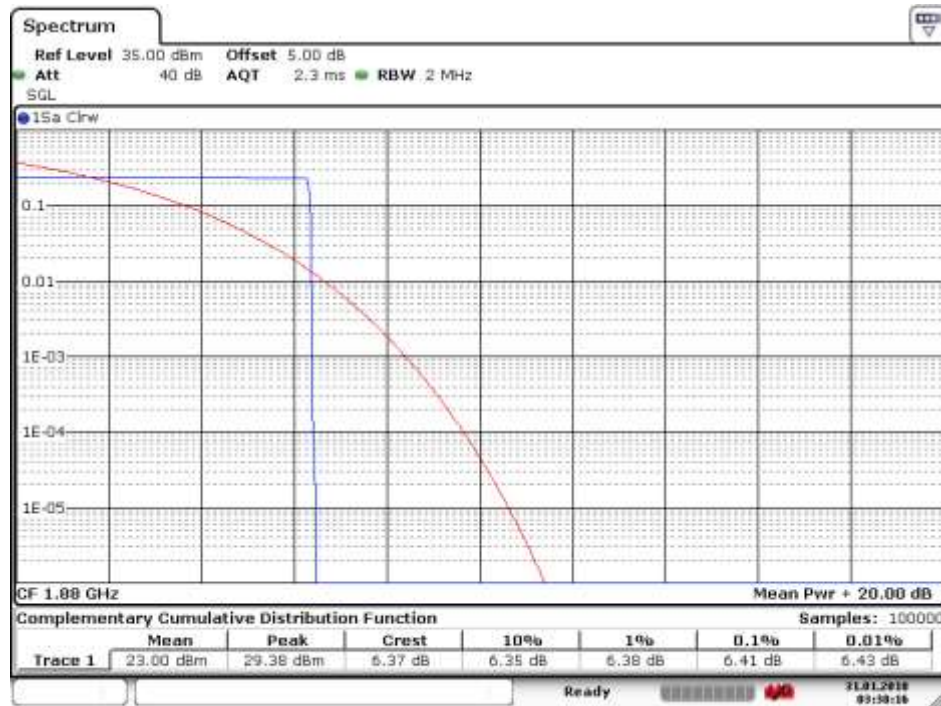
##### 2.1.2.1.1 Test Channel = LCH



Date: 31 JAN 2018 03:37:55

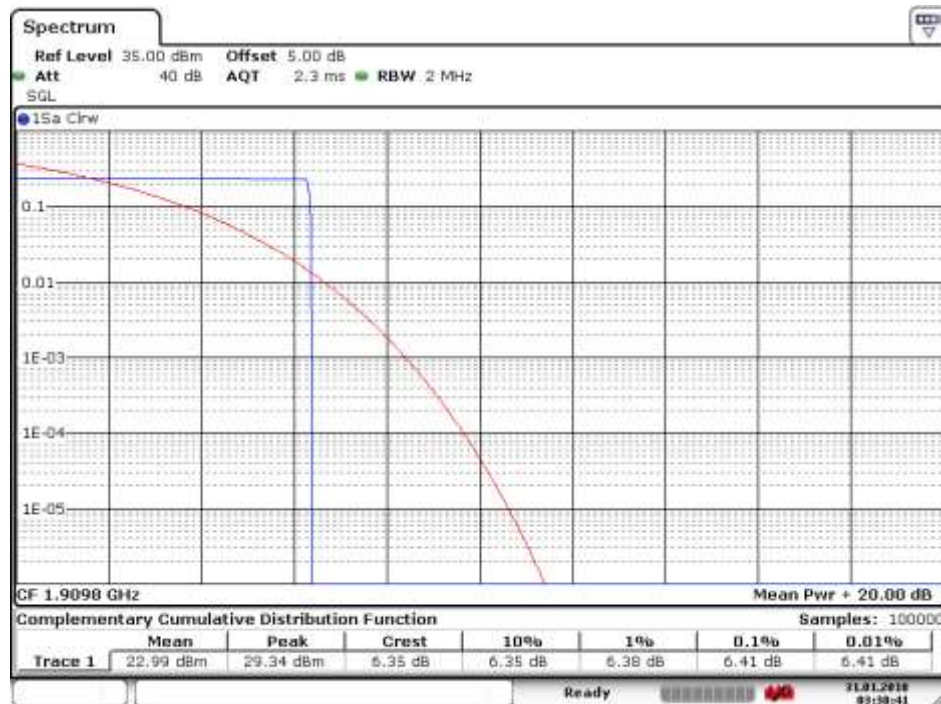


### 2.1.2.1.2 Test Channel = MCH



Date: 31.JAN 2018 03:38:18

### 2.1.2.1.3 Test Channel = HCH



Date: 31.JAN 2018 03:38:41



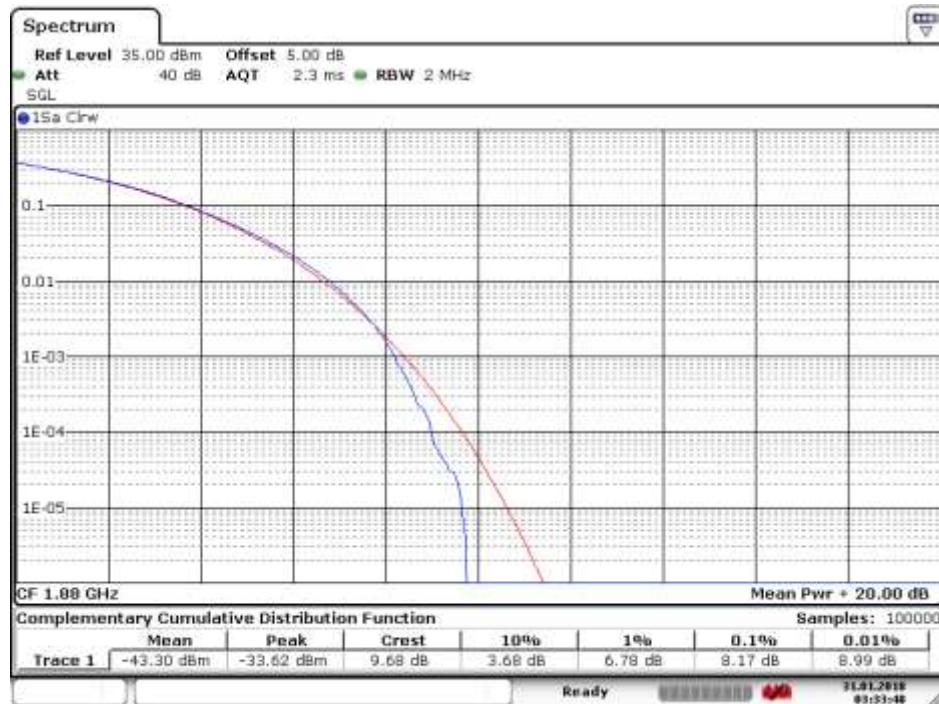
## 2.1.2.2 Test Mode = GSM/TM2

### 2.1.2.2.1 Test Channel = LCH



Date: 31.JAN.2018 03:34:23

### 2.1.2.2.2 Test Channel = MCH



Date: 31.JAN.2018 03:33:48



2.1.2.2.3 Test Channel = HCH



Date: 31.JAN.2018 03:32:49

### 3 Modulation Characteristics

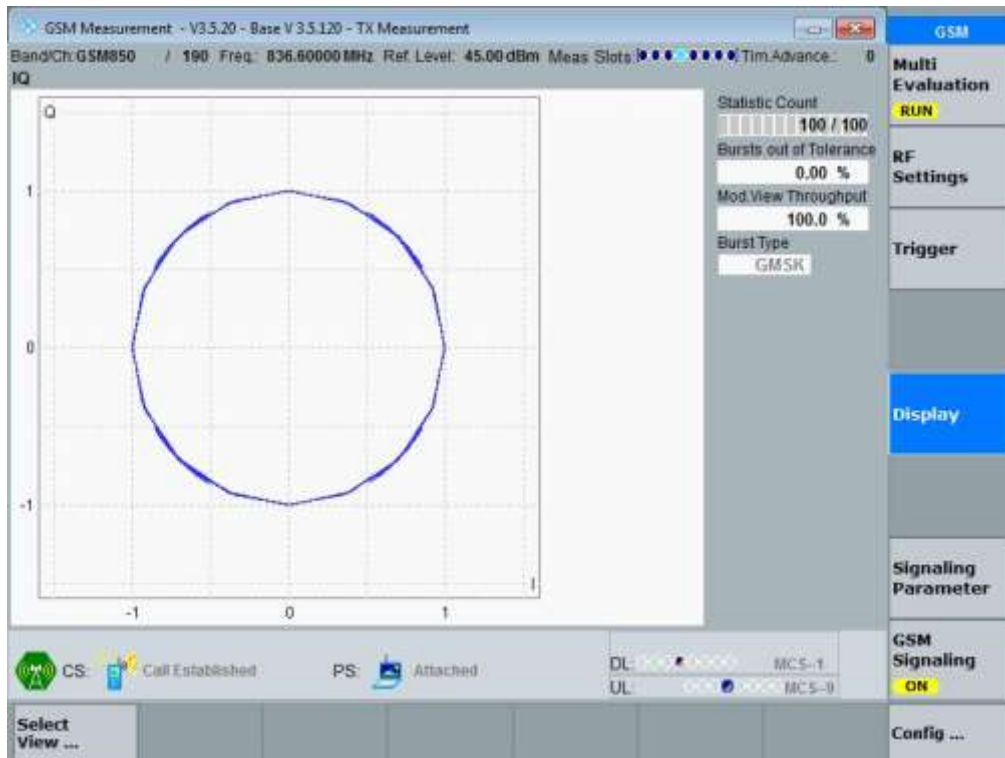
#### Part I - Test Plots

#### 3.1 For GSM

##### 3.1.1 Test Band = GSM 850

##### 3.1.1.1 Test Mode = GSM/TM1

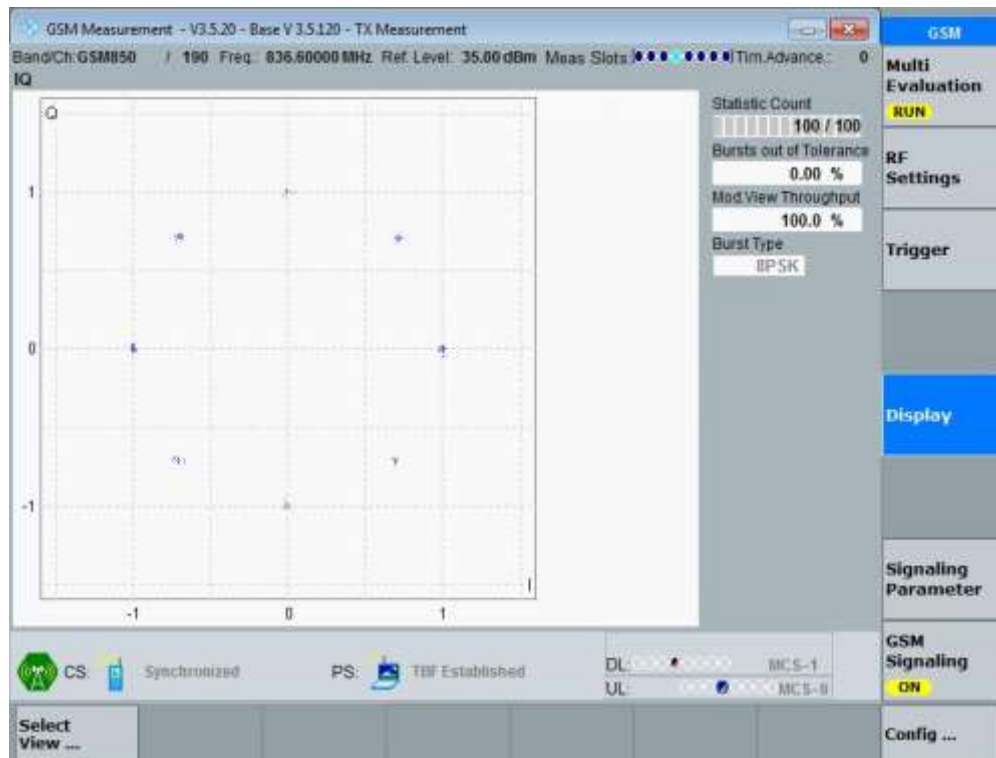
##### 3.1.1.1.1 Test Channel = MCH





### 3.1.1.2 Test Mode = GSM/TM2

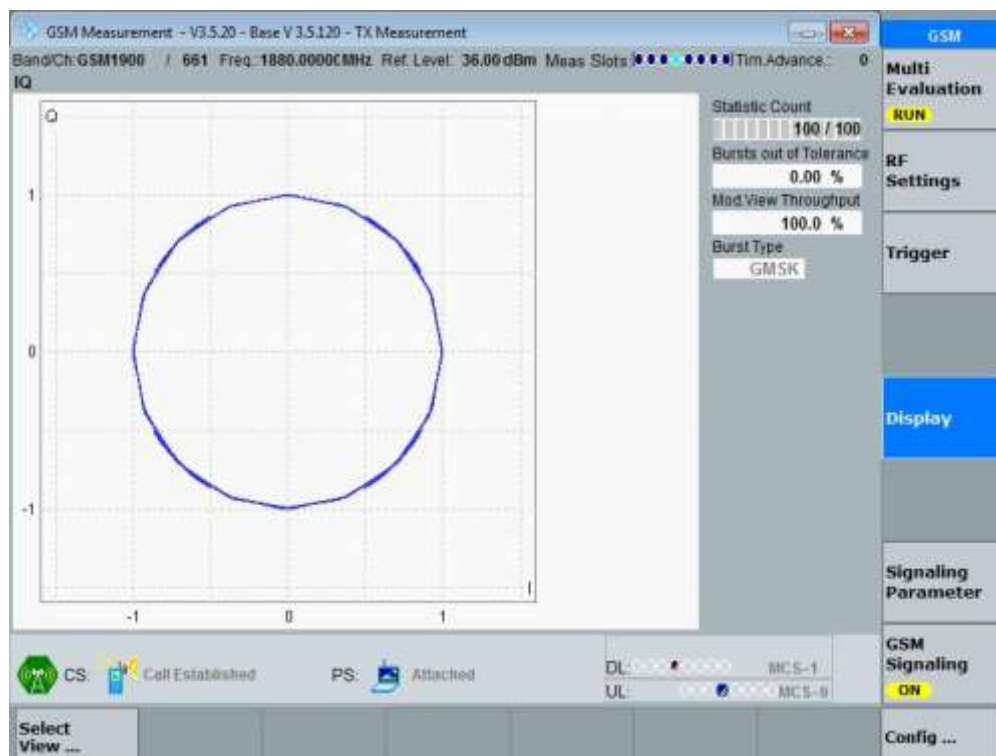
#### 3.1.1.2.1 Test Channel = MCH



### 3.1.2 Test Band = GSM 1900

#### 3.1.2.1 Test Mode = GSM/TM1

##### 3.1.2.1.1 Test Channel = MCH

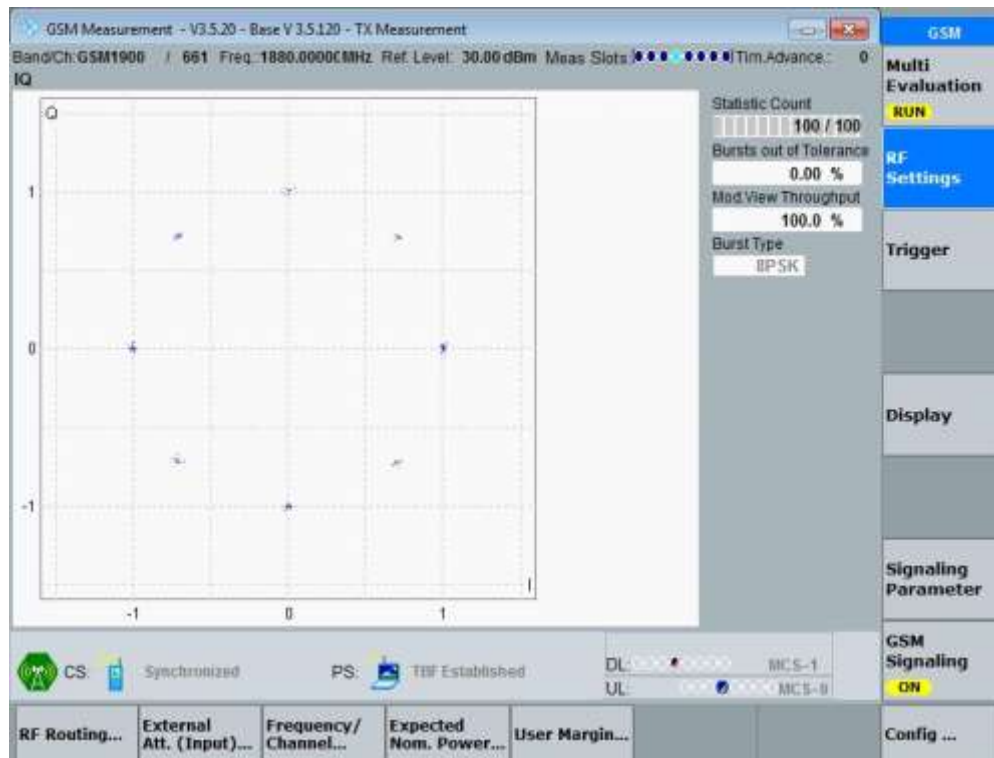






### 3.1.2.2 Test Mode = GSM/TM2

#### 3.1.2.2.1 Test Channel = MCH





## 4 Bandwidth

### Part I - Test Results

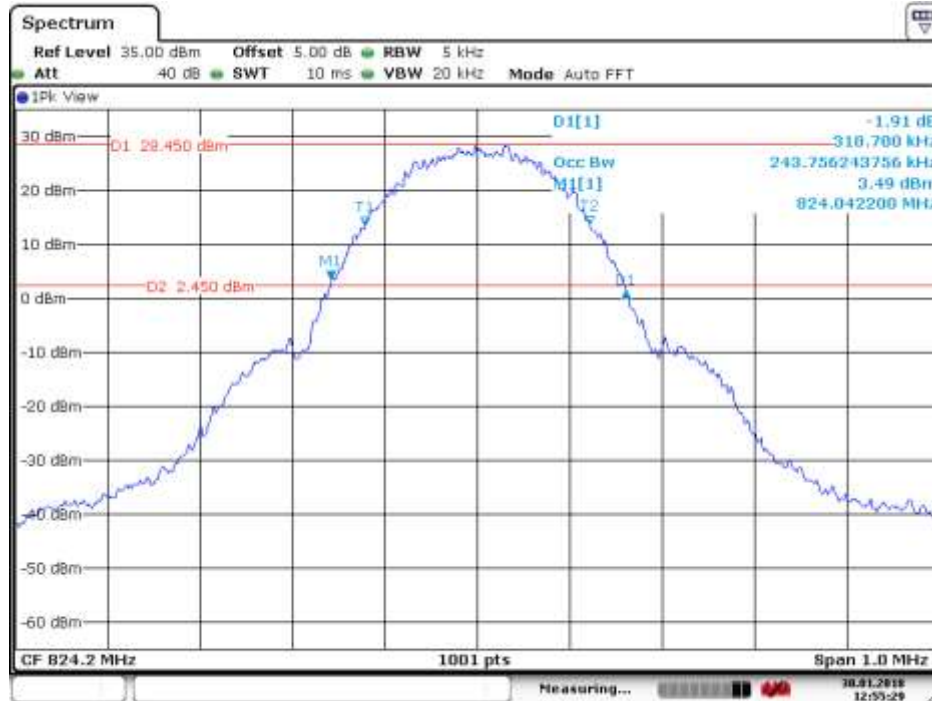
Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM 850	GSM/TM1	LCH	243.8	318.7	PASS
		MCH	245.8	315.7	PASS
		HCH	244.8	318.7	PASS
	GSM/TM2	LCH	236.8	306.7	PASS
		MCH	237.8	306.7	PASS
		HCH	239.8	304.7	PASS
GSM 1900	GSM/TM1	LCH	244.8	316.7	PASS
		MCH	243.8	321.7	PASS
		HCH	245.8	320.7	PASS
	GSM/TM2	LCH	239.8	314.7	PASS
		MCH	241.8	317.7	PASS
		HCH	241.8	318.7	PASS

## 4.1 For GSM

### 4.1.1 Test Band = GSM 850

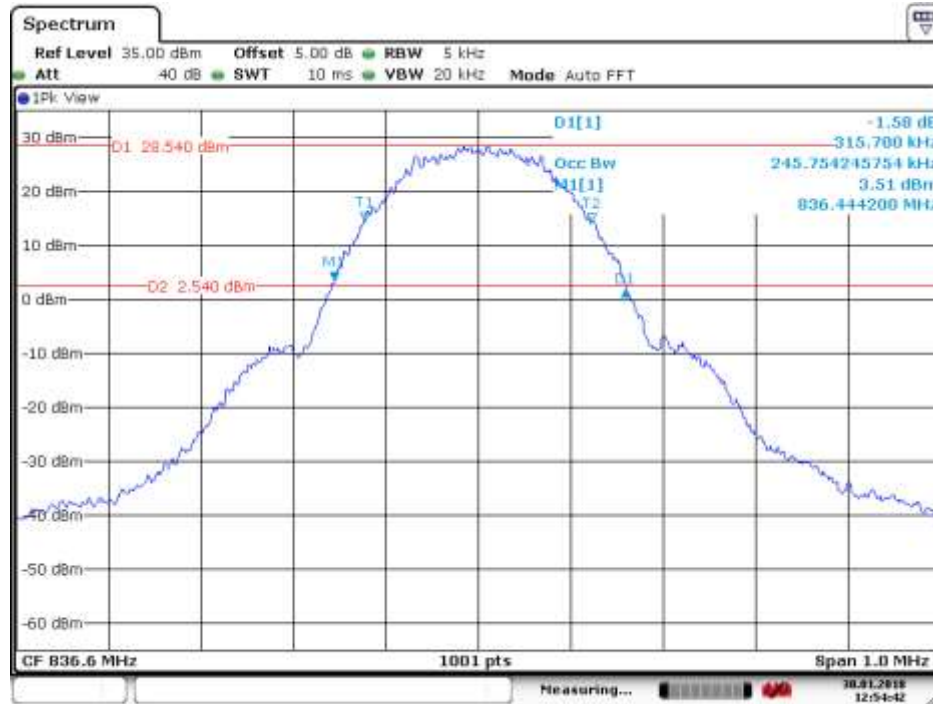
#### 4.1.1.1 Test Mode = GSM/TM1

##### 4.1.1.1.1 Test Channel = LCH



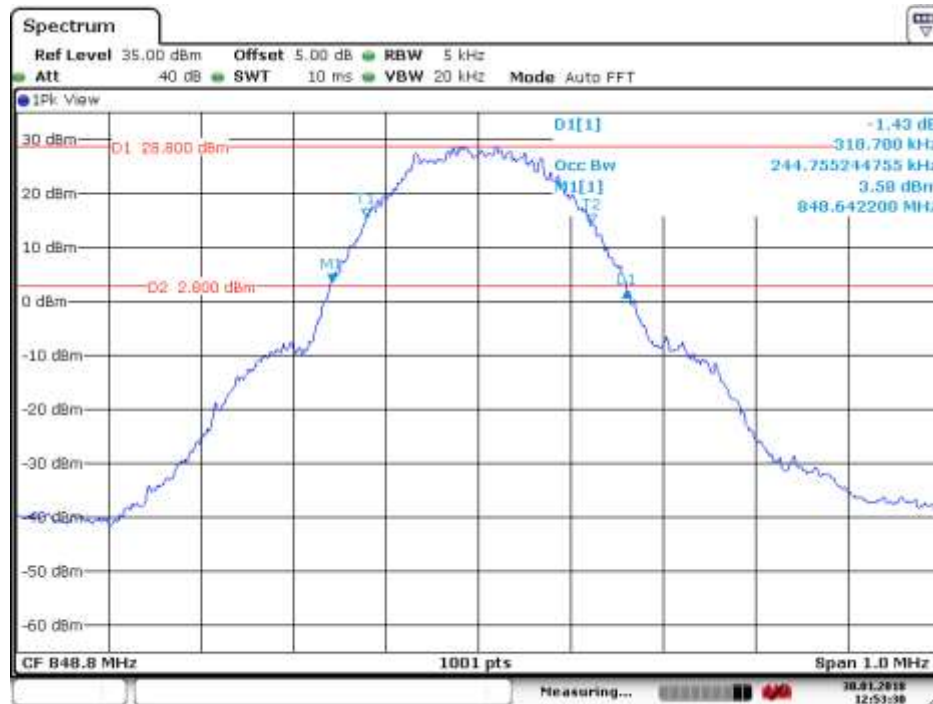
Date: 30 JAN 2018 12:55:30

#### 4.1.1.1.2 Test Channel = MCH



Date: 30. JAN 2018 12:54:42

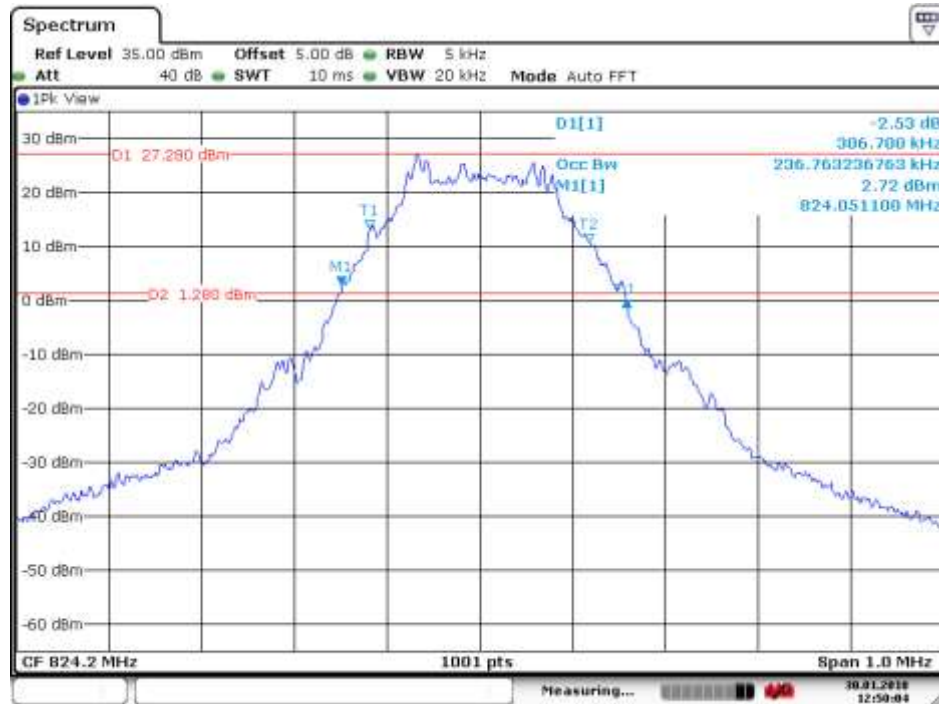
#### 4.1.1.1.3 Test Channel = HCH



Date: 30. JAN 2018 12:53:30

#### 4.1.1.2 Test Mode = GSM/TM2

##### 4.1.1.2.1 Test Channel = LCH



Date: 30.JAN 2018 12:50:04

##### 4.1.1.2.2 Test Channel = MCH



Date: 30.JAN 2018 12:50:58



#### 4.1.1.2.3 Test Channel = HCH



Date: 30. JAN 2018 12:52:03

#### 4.1.2 Test Band = GSM 1900

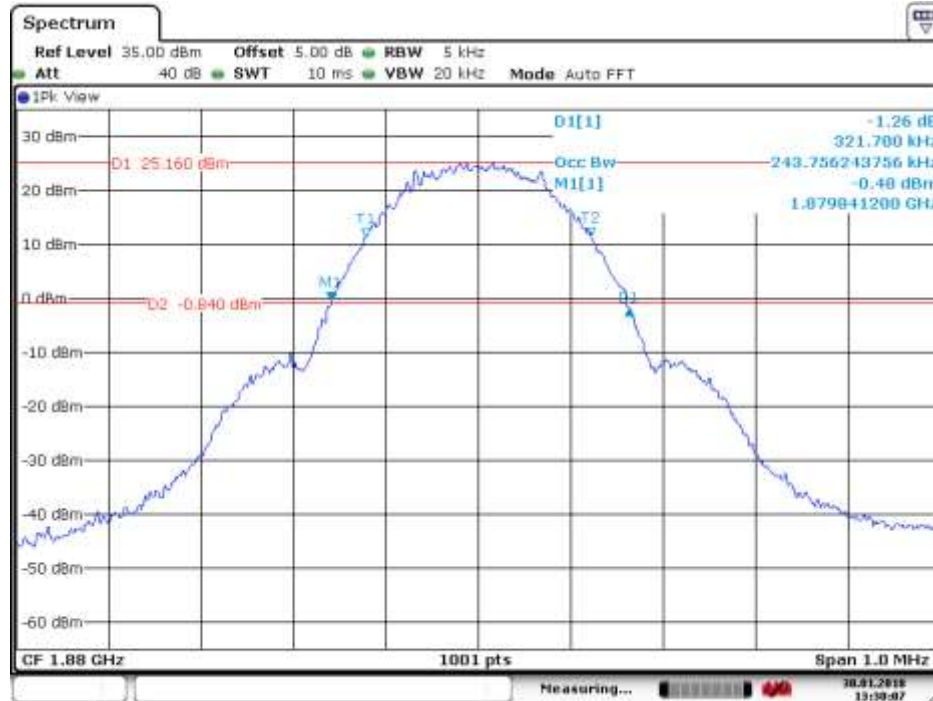
##### 4.1.2.1 Test Mode = GSM/TM1

##### 4.1.2.1.1 Test Channel = LCH



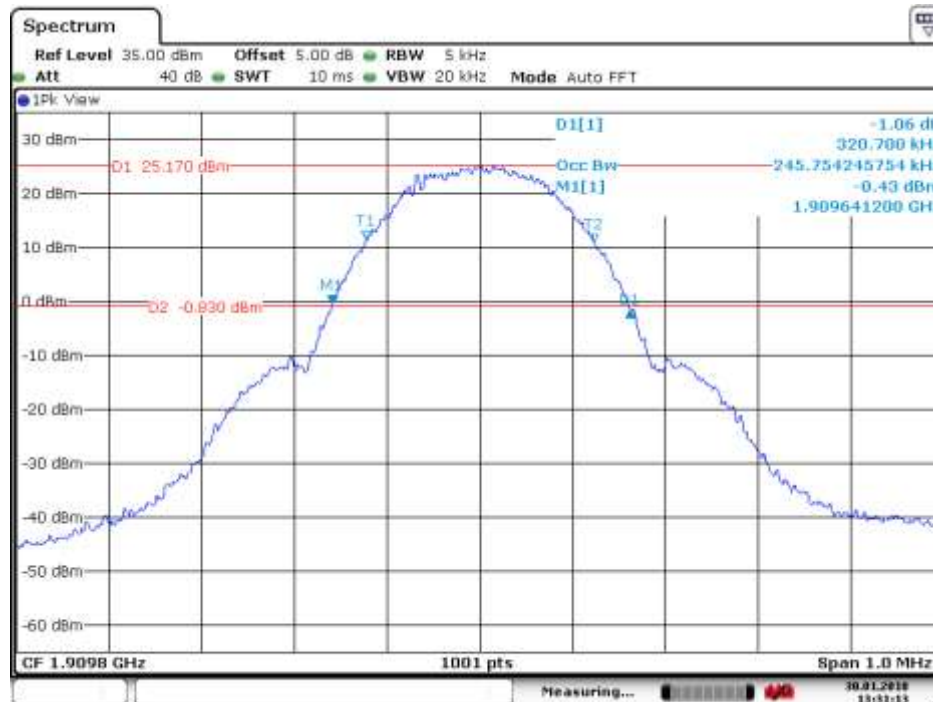
Date: 30. JAN 2018 13:28:58

#### 4.1.2.1.2 Test Channel = MCH



Date: 30.JAN.2018 13:30:08

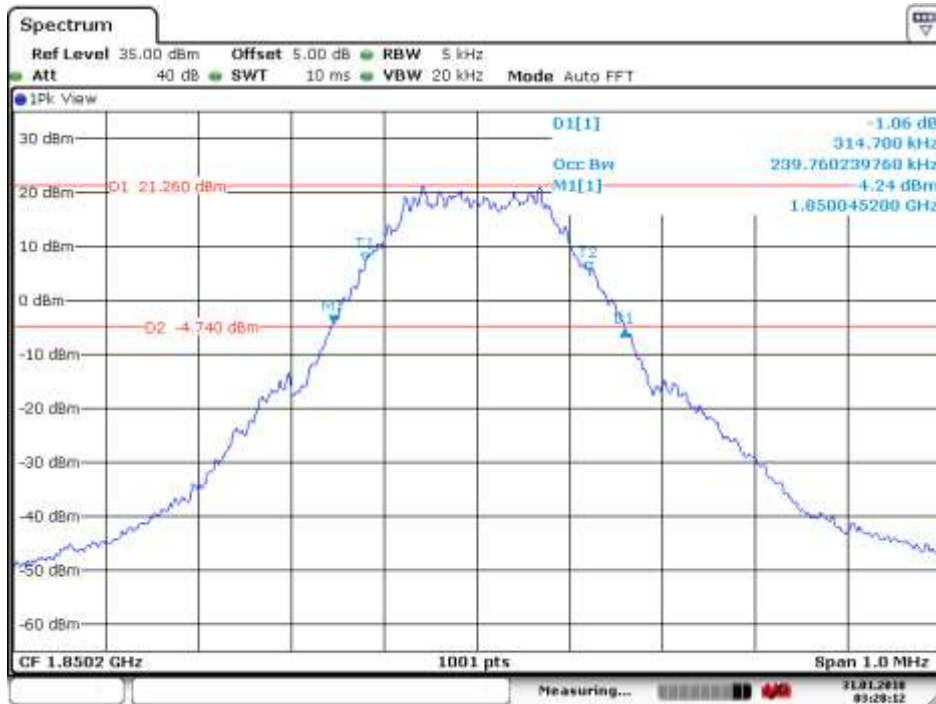
#### 4.1.2.1.3 Test Channel = HCH



Date: 30.JAN.2018 13:31:13

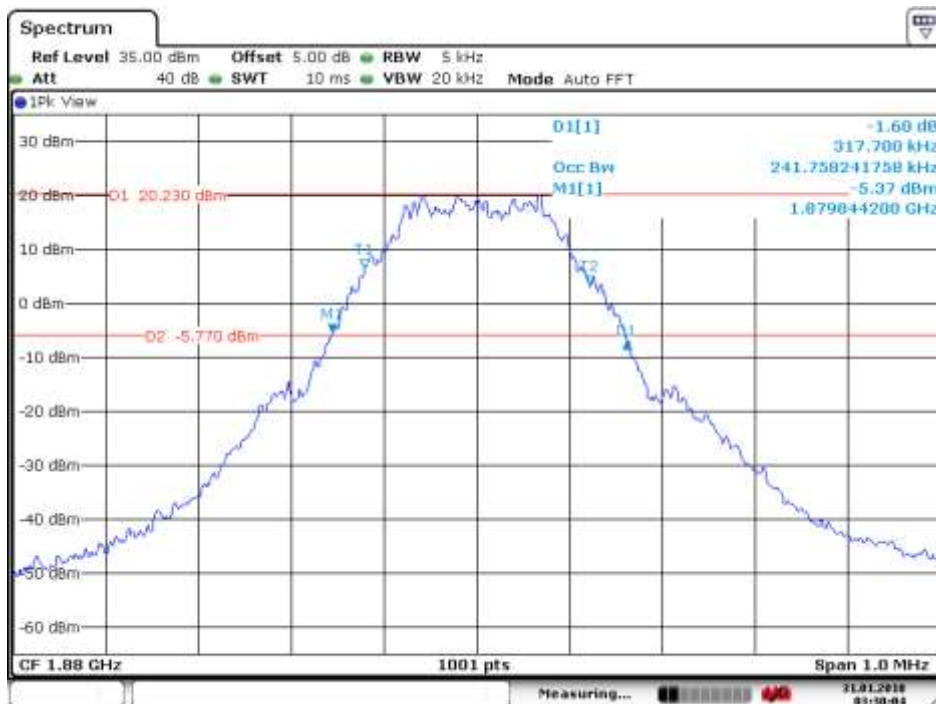
#### 4.1.2.2 Test Mode = GSM/TM2

##### 4.1.2.2.1 Test Channel = LCH



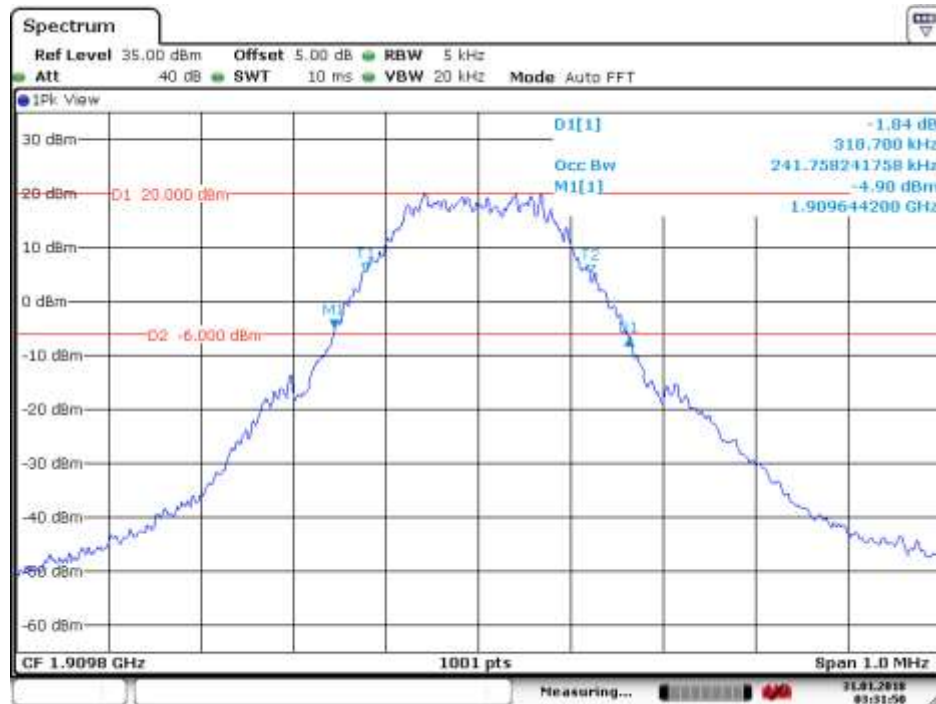
Date: 31.JAN 2018 03:28:12

##### 4.1.2.2.2 Test Channel = MCH



Date: 31.JAN 2018 03:30:04

#### 4.1.2.2.3 Test Channel = HCH



Date: 31.JAN.2018 03:31:51

## 5 Band Edges Compliance

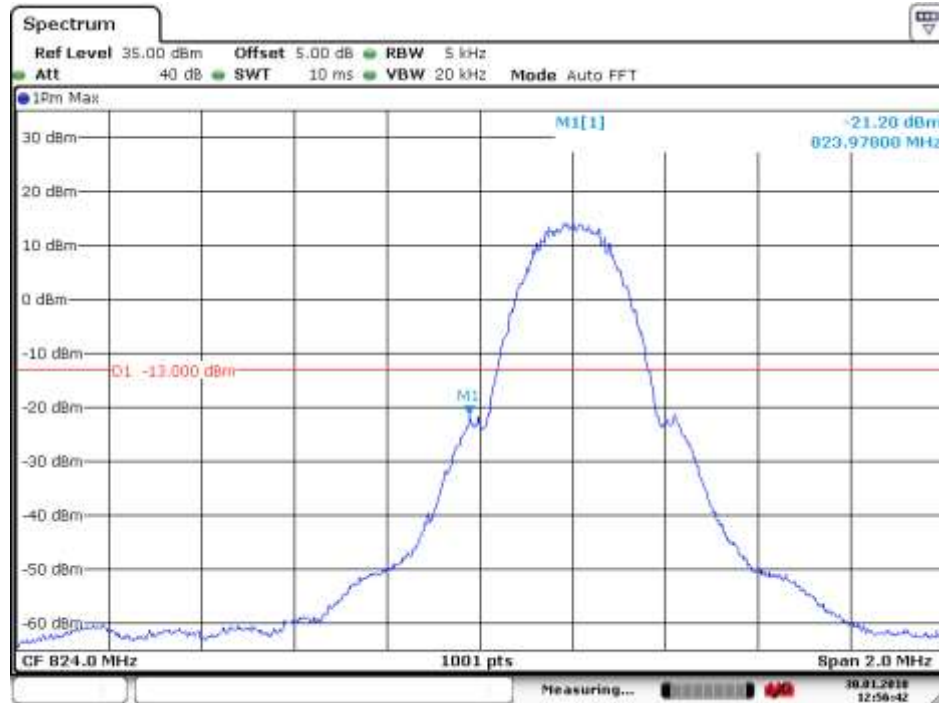
### Part I - Test Plots

#### 5.1 For GSM

##### 5.1.1 Test Band = GSM 850

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

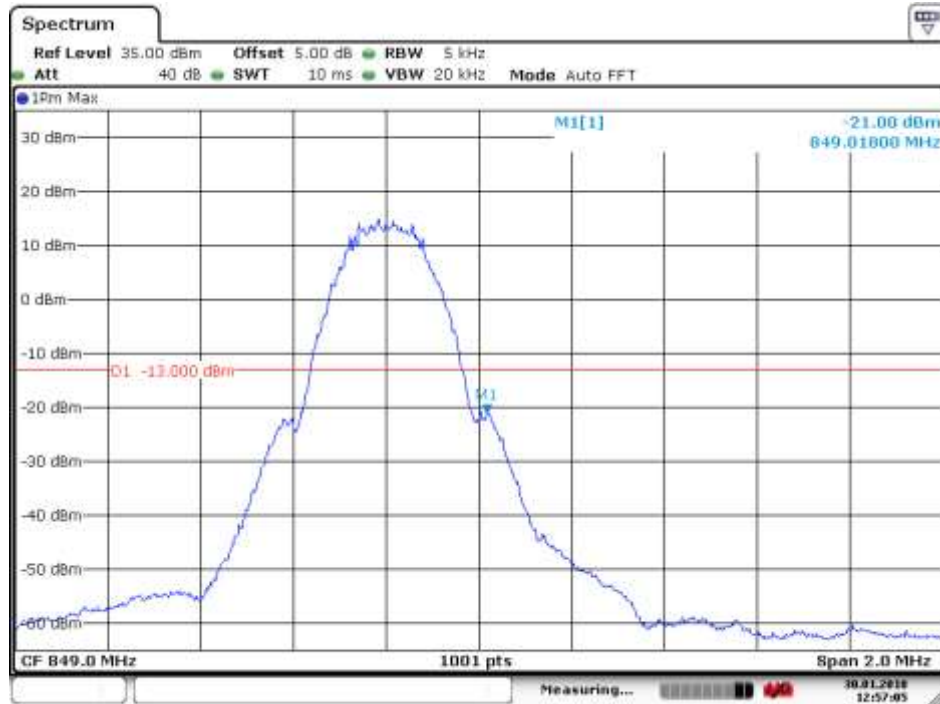
##### 5.1.1.1.1 Test Channel = LCH



Date: 30 JAN 2018 12:56:42



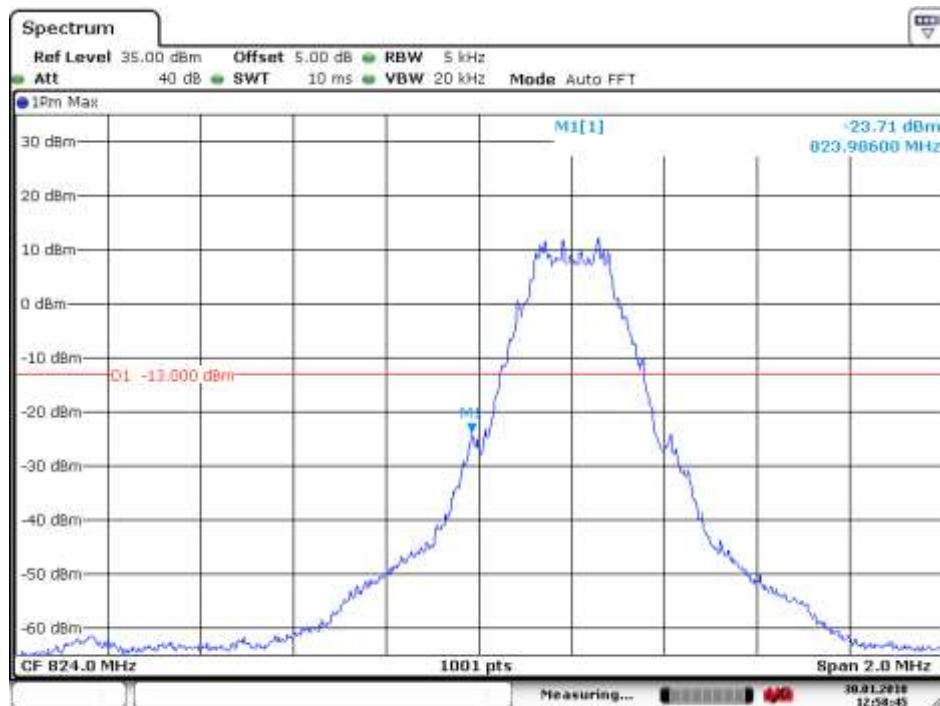
#### 5.1.1.1.2 Test Channel = HCH



Date: 30. JAN 2018 12:57:06

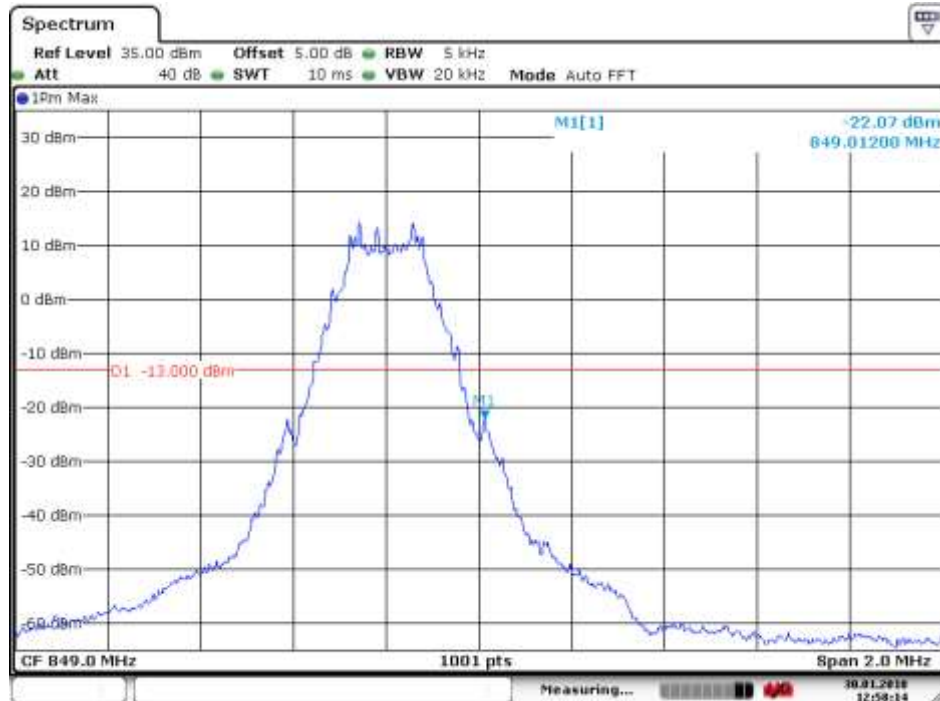
#### 5.1.1.2 Test Mode = GSM/TM2

##### 5.1.1.2.1 Test Channel = LCH



Date: 30. JAN 2018 12:58:45

#### 5.1.1.2.2 Test Channel = HCH

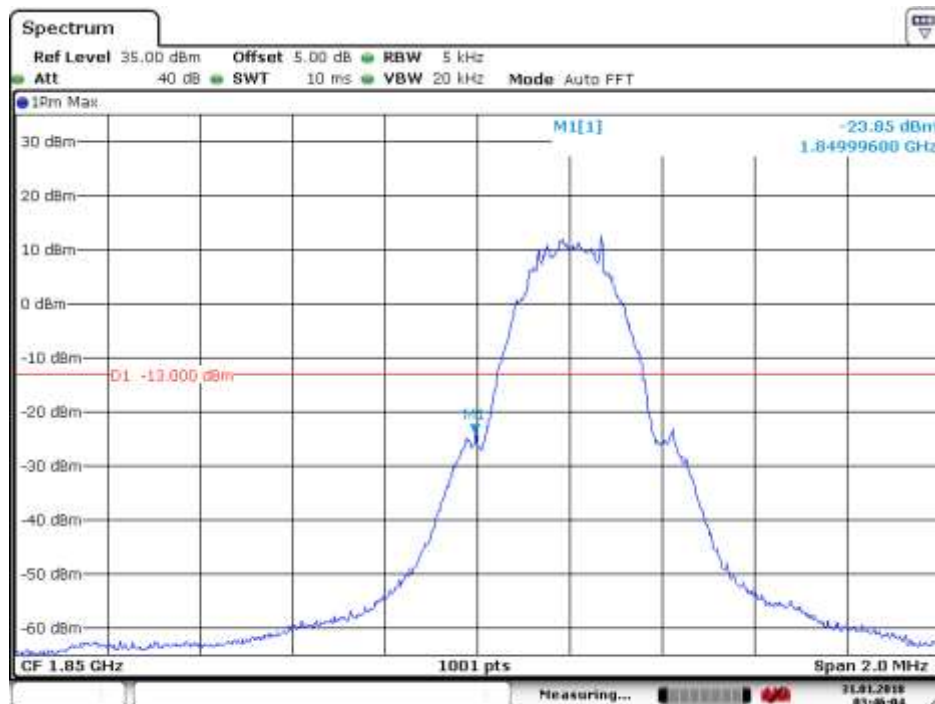


Date: 30 JAN 2018 12:58:15

#### 5.1.2 Test Band = GSM 1900

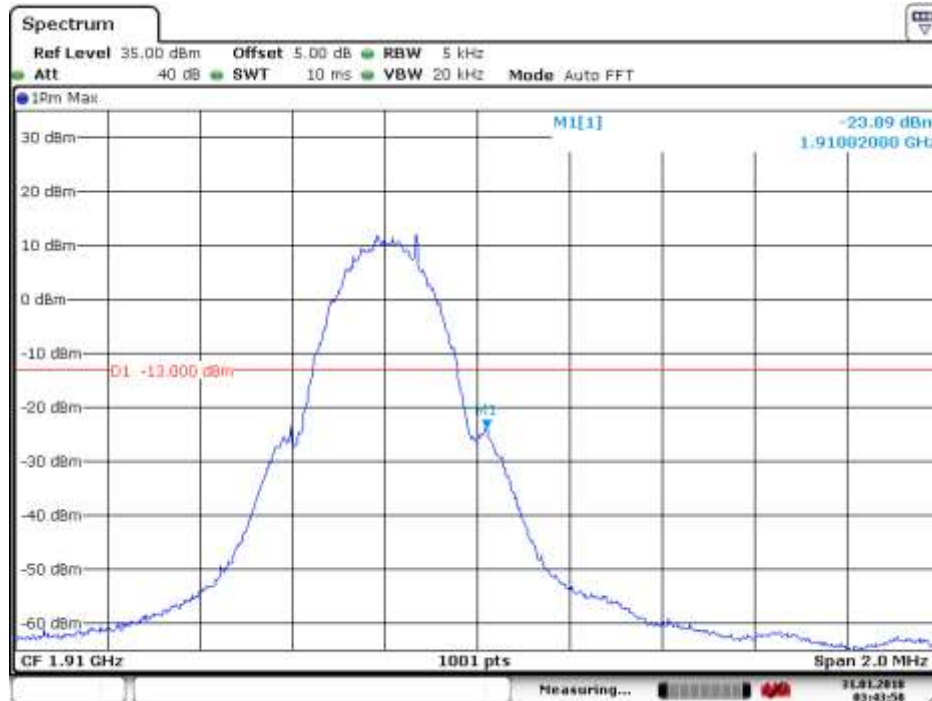
##### 5.1.2.1 Test Mode = GSM/TM1

##### 5.1.2.1.1 Test Channel = LCH



Date: 31 JAN 2018 03:46:04

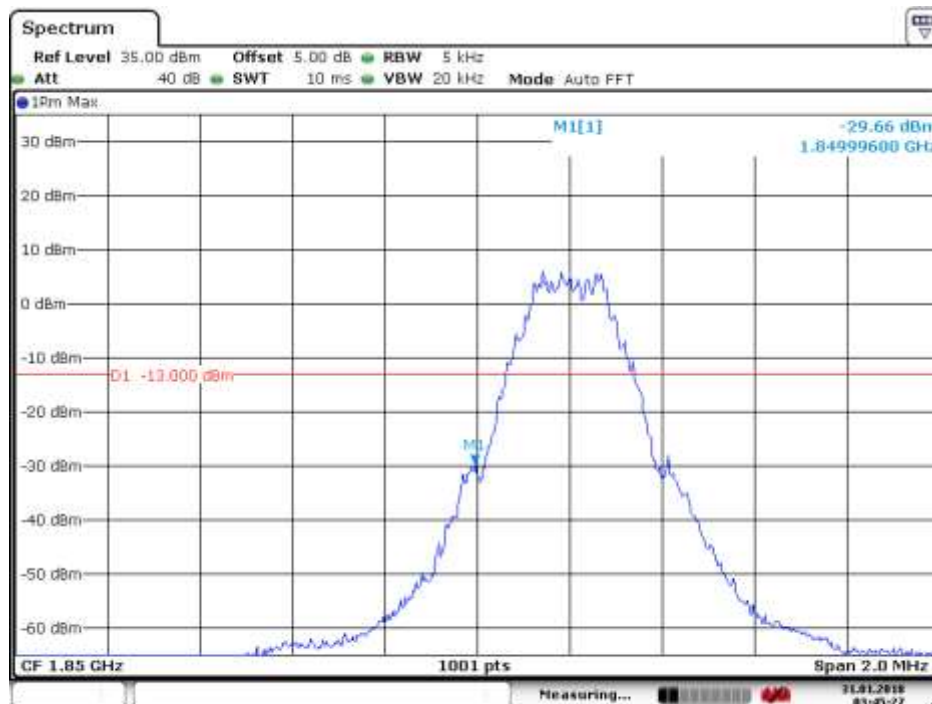
#### 5.1.2.1.2 Test Channel = HCH



Date: 31 JAN 2018 03:43:58

#### 5.1.2.2 Test Mode = GSM/TM2

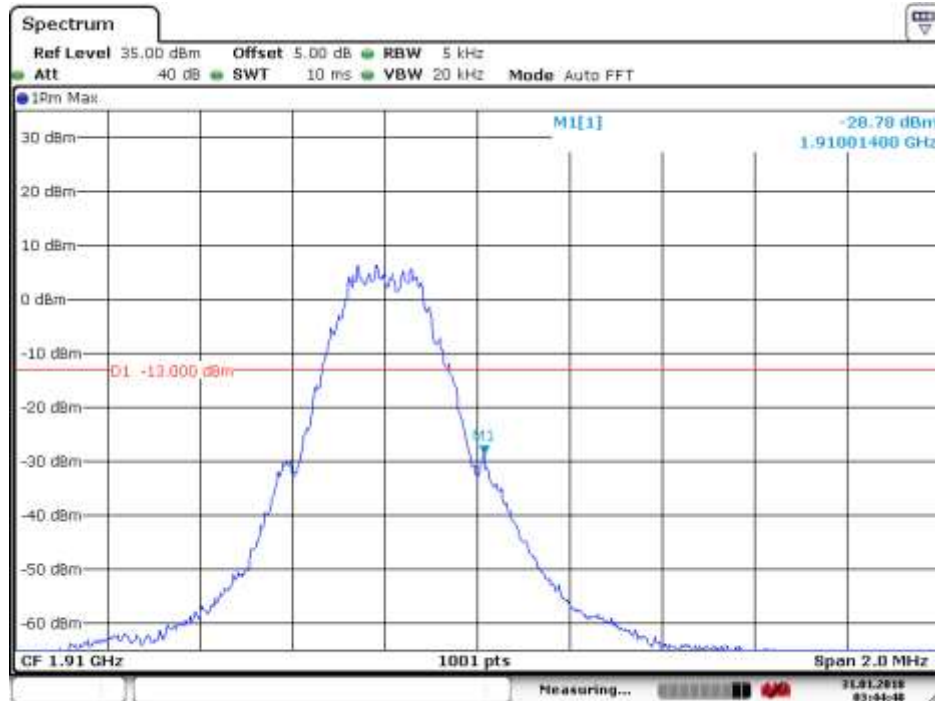
##### 5.1.2.2.1 Test Channel = LCH



Date: 31 JAN 2018 03:45:27



#### 5.1.2.2.2 Test Channel = HCH



Date: 31.JAN.2018 03:44:48

## 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 =  $k \cdot (\text{Span} / \text{RBW})$ " with  $k$  between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

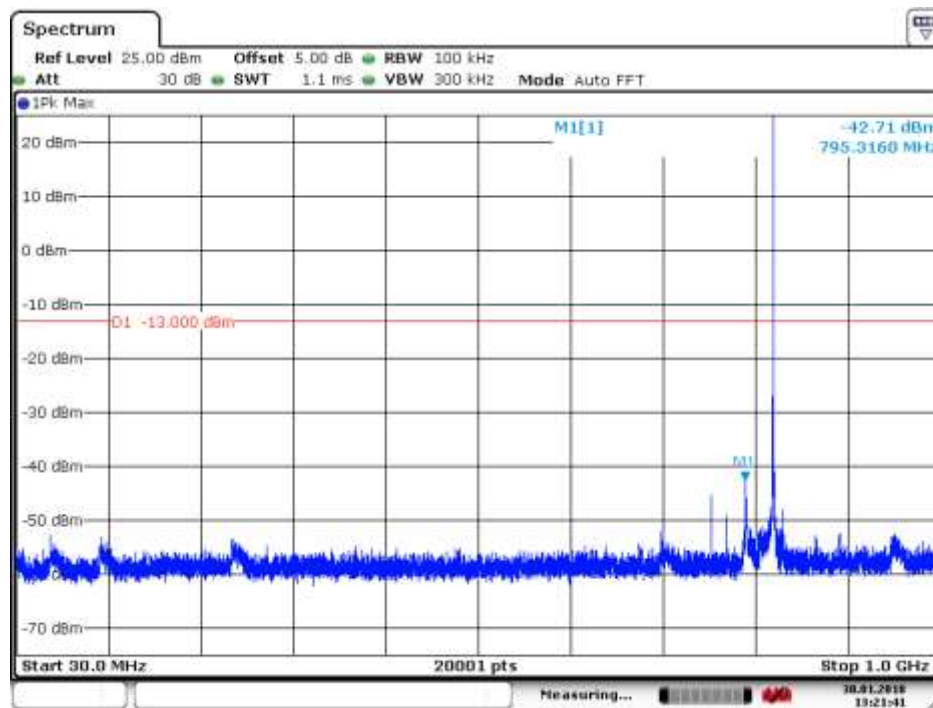
Part I - Test Plots

### 6.1 For GSM

#### 6.1.1 Test Band = GSM 850

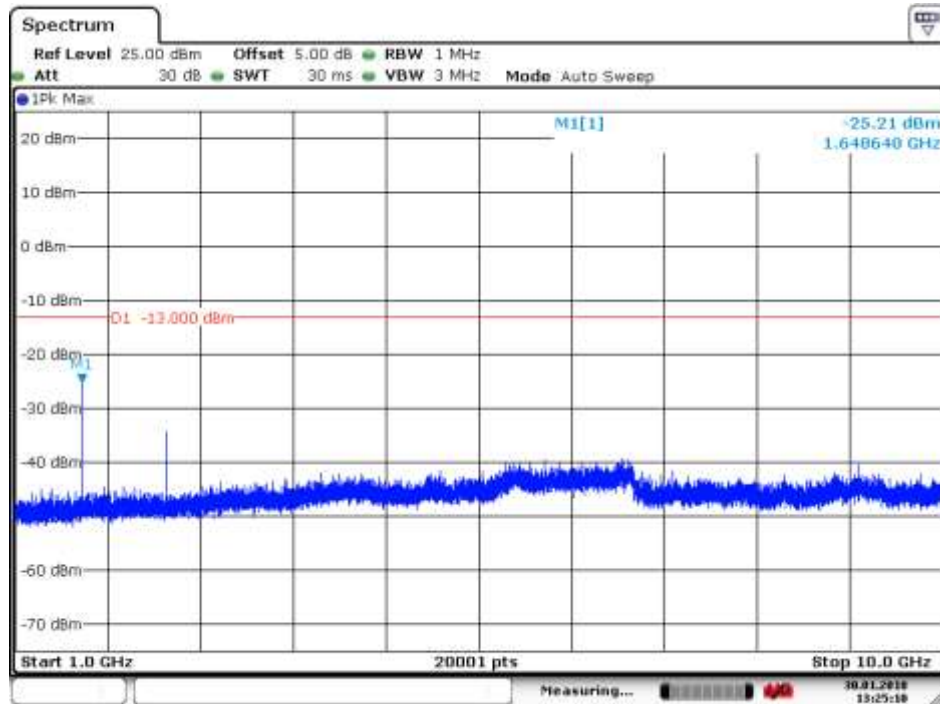
##### 6.1.1.1 Test Mode = GSM/TM1

##### 6.1.1.1.1 Test Channel = LCH



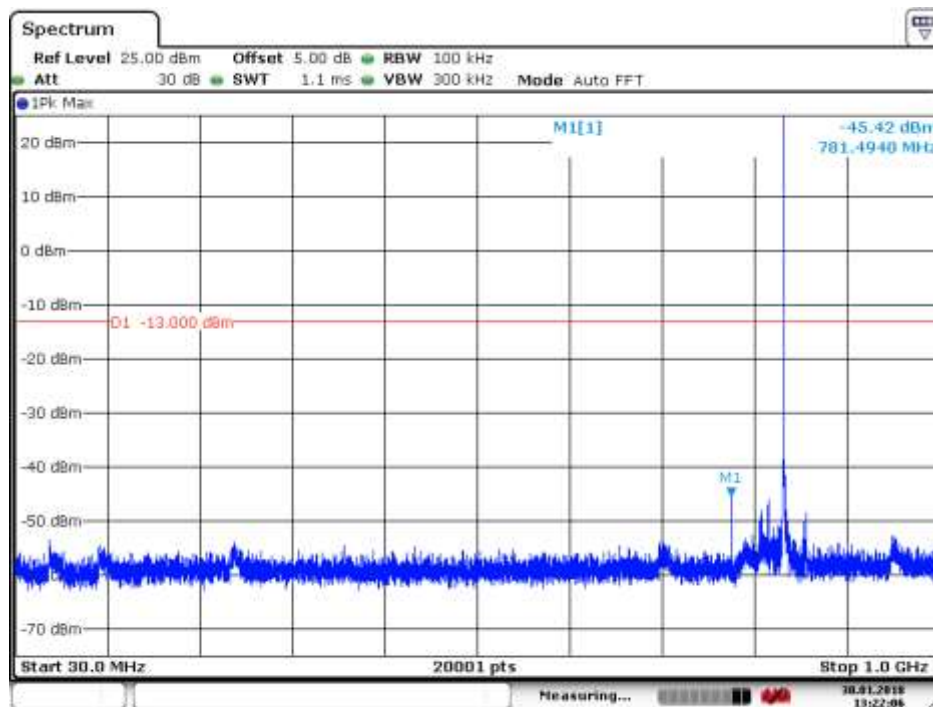
Date: 30. JAN 2018 13:21:41



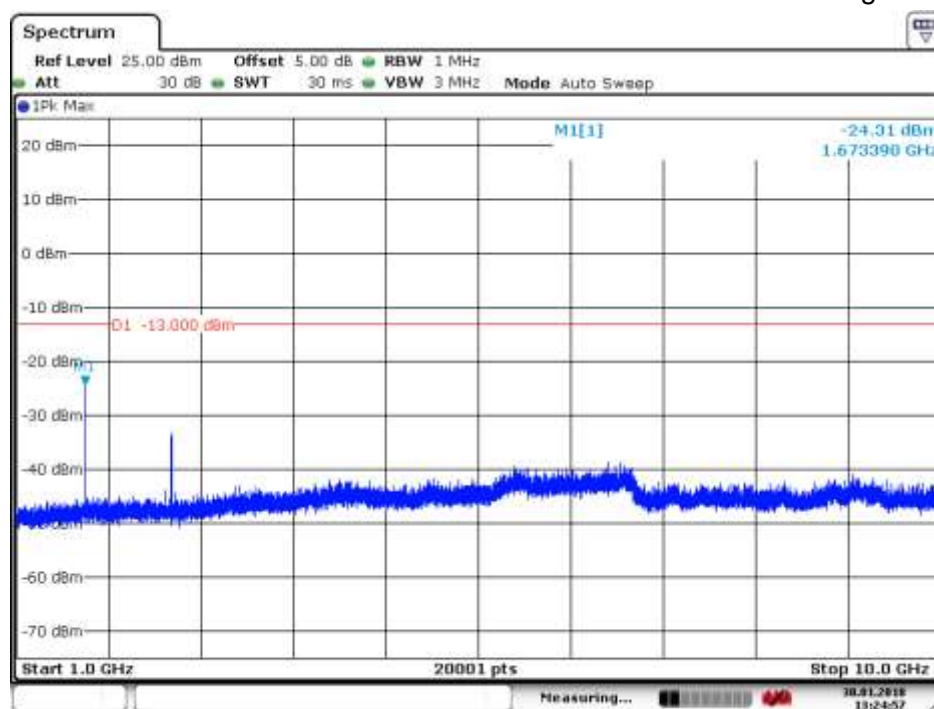


Date: 30 JAN 2018 13:25:10

#### 6.1.1.1.2 Test Channel = MCH

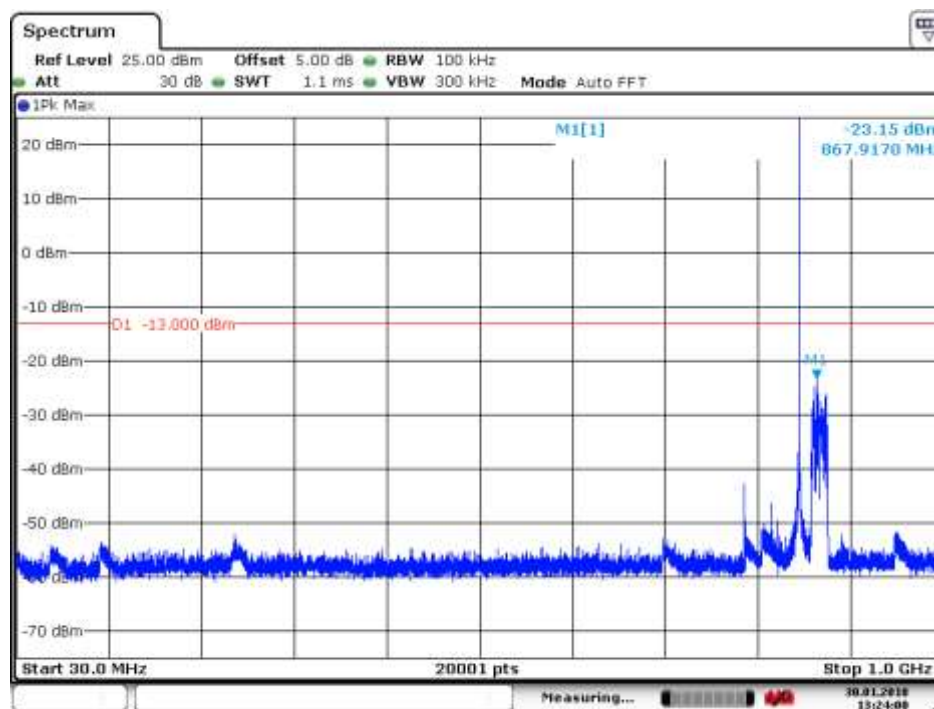


Date: 30 JAN 2018 13:22:07

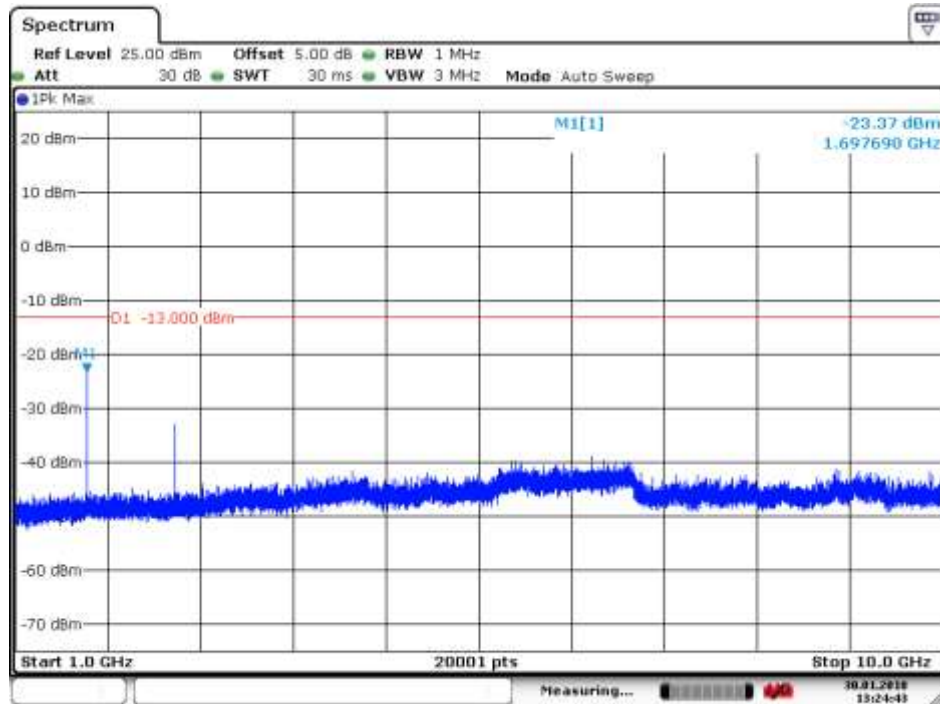


Date: 30 JAN 2018 13:24:57

#### 6.1.1.1.3 Test Channel = HCH



Date: 30 JAN 2018 13:24:01

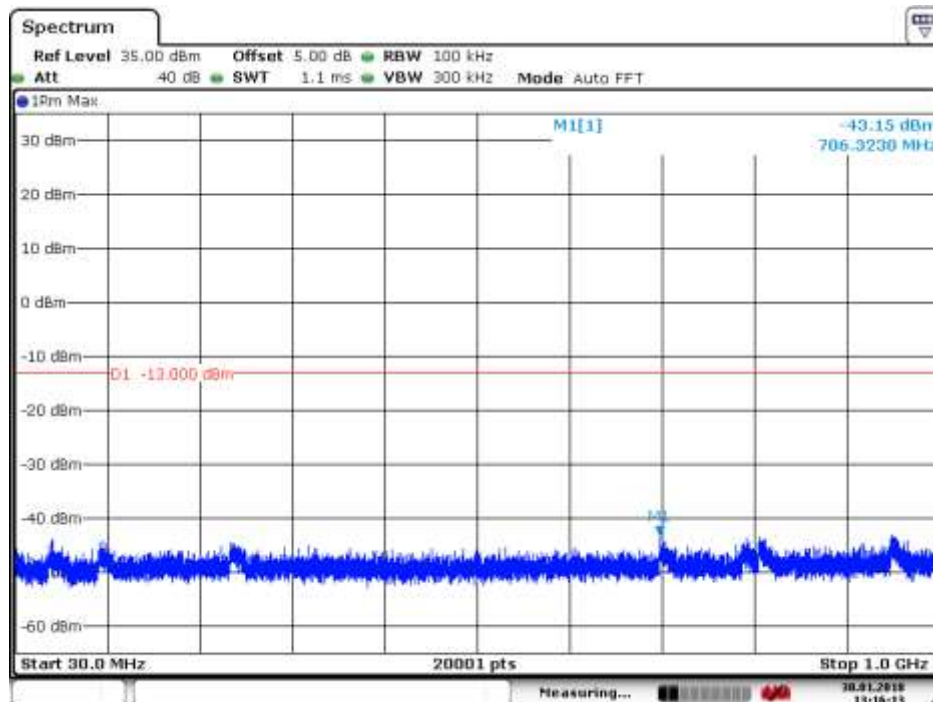


Date: 30.JAN.2018 13:24:42

## 6.1.2 Test Band = GSM 1900

### 6.1.2.1 Test Mode = GSM/TM1

#### 6.1.2.1.1 Test Channel = LCH



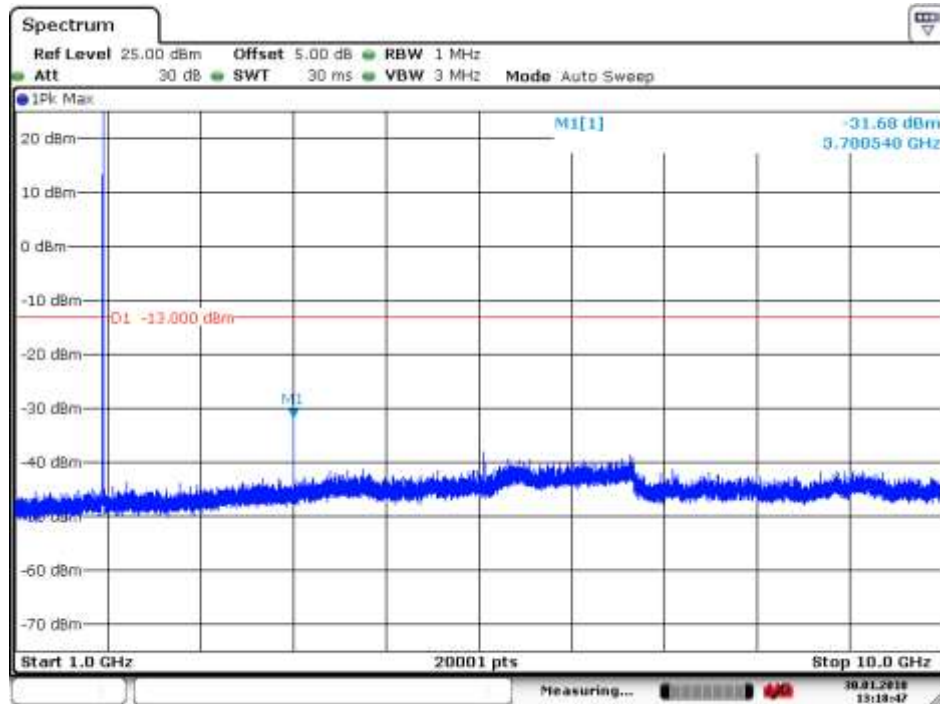
Date: 30.JAN.2018 13:16:13



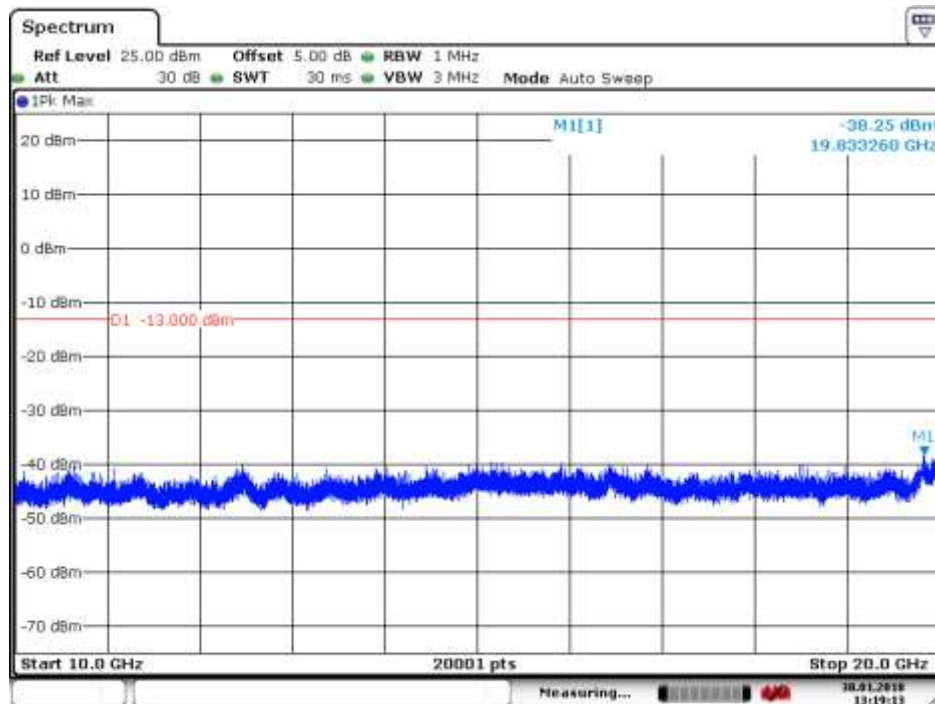
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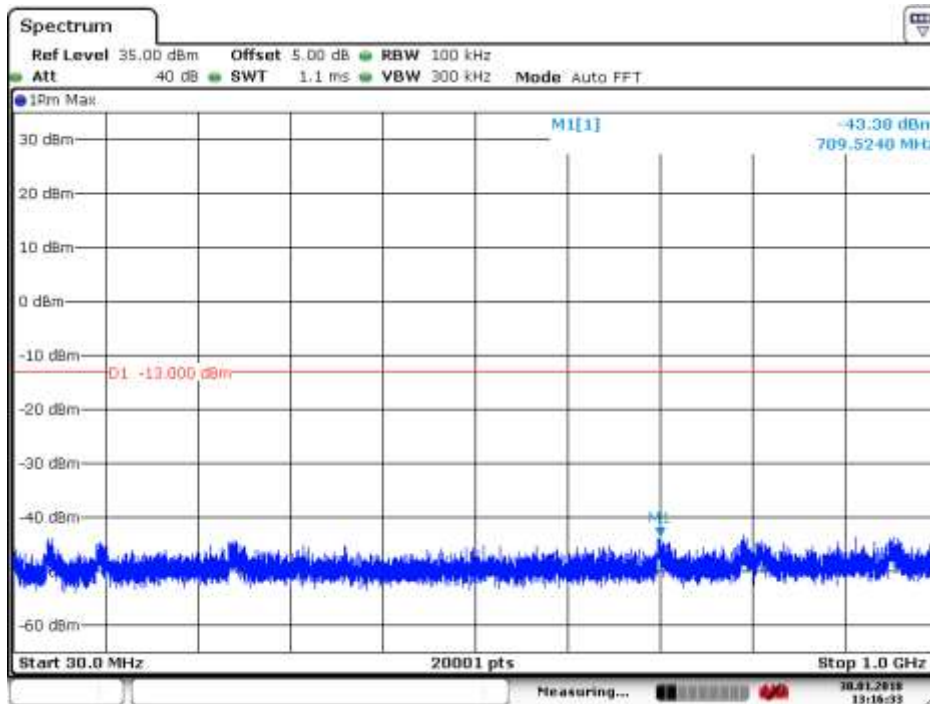
Date: 30.JAN.2018 13:18:47



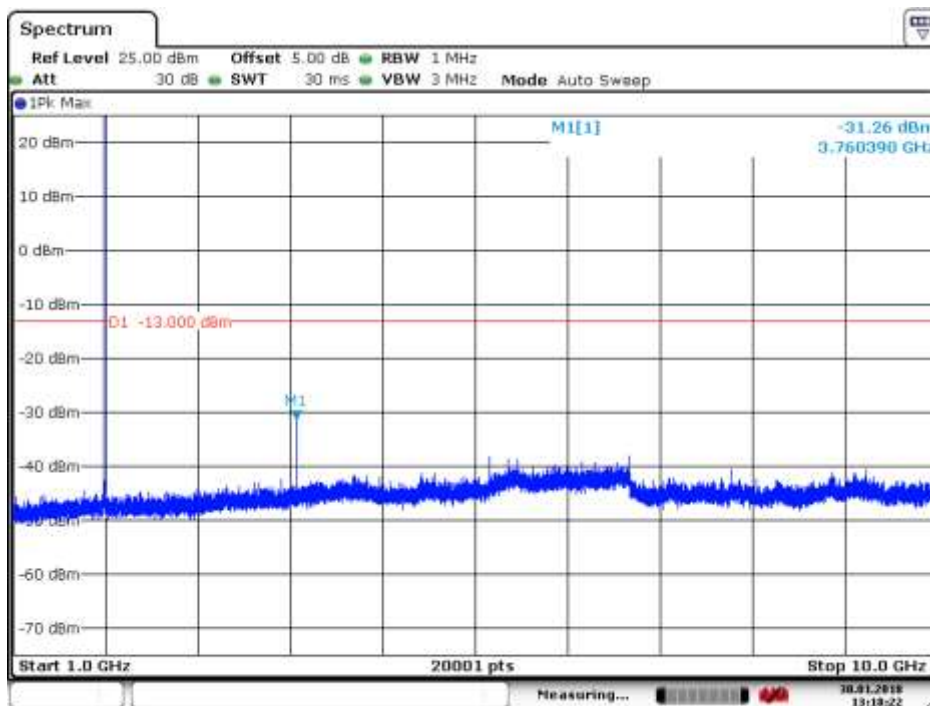
Date: 30.JAN.2018 13:19:13



6.1.2.1.2 Test Channel = MCH

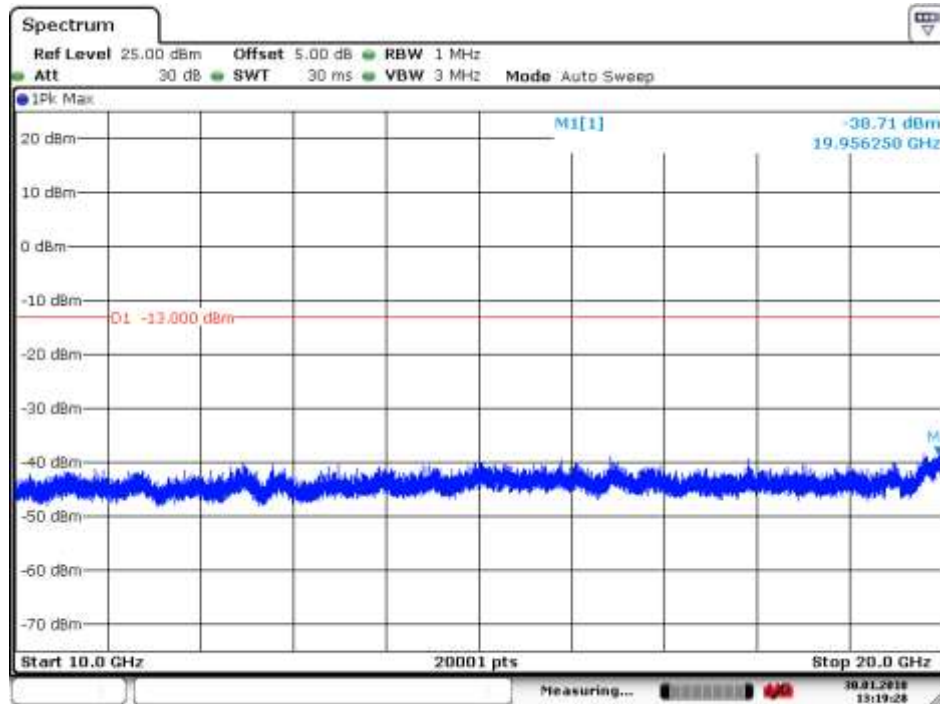


Date: 30 JAN 2018 13:16:33



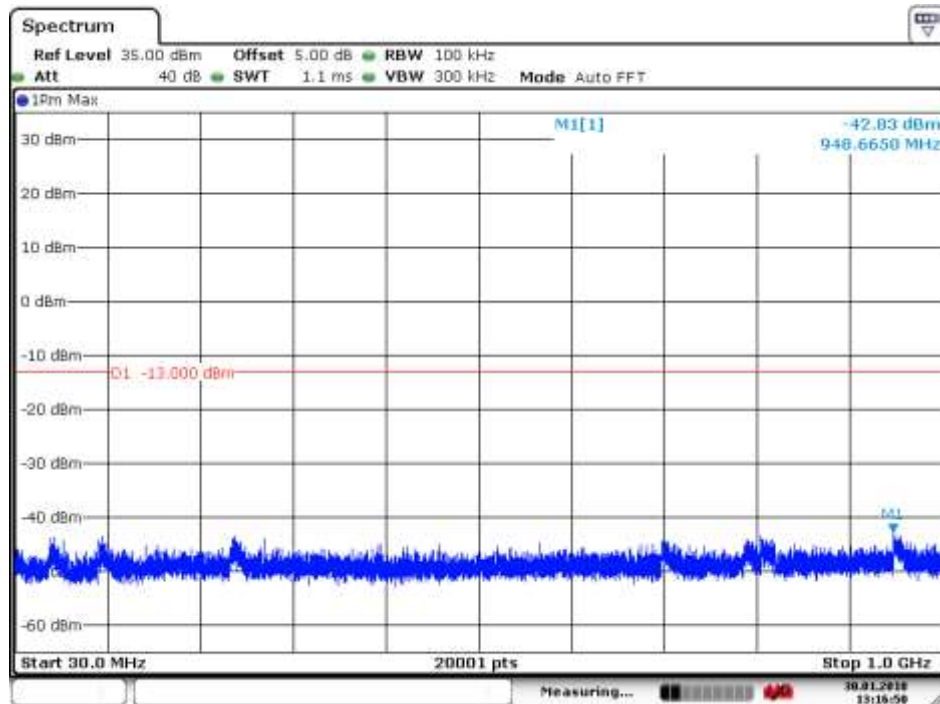
Date: 30 JAN 2018 13:16:23





Date: 30.JAN.2018 13:19:29

#### 6.1.2.1.3 Test Channel = HCH



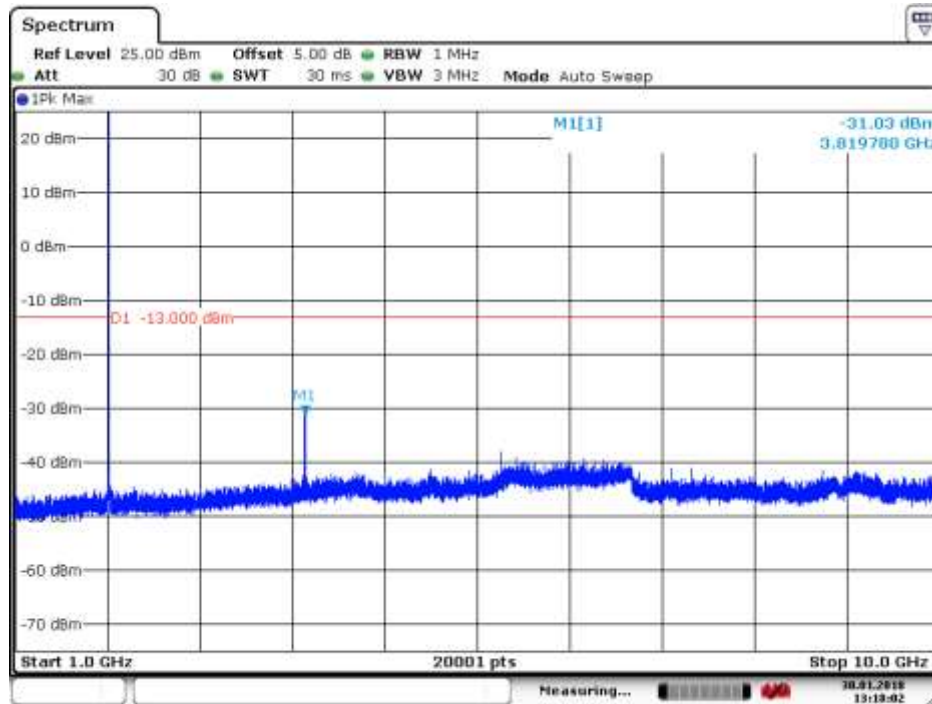
Date: 30.JAN.2018 13:16:51



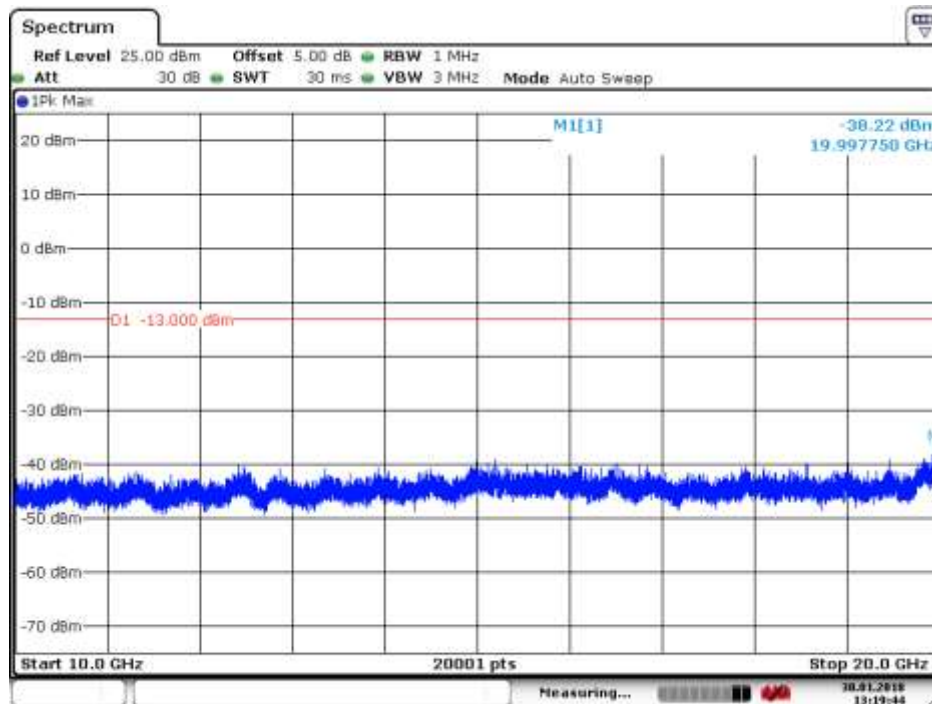
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Date: 30 JAN 2018 13:18:02



Date: 30 JAN 2018 13:19:45



## 7 Field Strength of Spurious Radiation

### Part I - Test Plots

#### 7.1 For GSM

##### 7.1.1 Test Band = GSM 850

###### 7.1.1.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
2600.437	-40.16	-13.00	27.16	Vertical
4508.625	-49.94	-13.00	36.94	Vertical
5401.875	-48.85	-13.00	35.85	Vertical
2183.813	-42.98	-13.00	29.98	Horizontal
3967.500	-50.79	-13.00	37.79	Horizontal
6049.000	-48.31	-13.00	35.31	Horizontal

###### 7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1333.333	-52.29	-13.00	39.29	Vertical
2360.625	-42.25	-13.00	29.25	Vertical
7942.500	-46.22	-13.00	33.22	Vertical
2124.938	-40.15	-13.00	27.15	Horizontal
5613.000	-49.62	-13.00	36.62	Horizontal
7741.500	-46.96	-13.00	33.96	Horizontal

###### 7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1676.625	-48.94	-13.00	35.94	Vertical
5950.875	-48.55	-13.00	35.55	Vertical
7848.000	-47.24	-13.00	34.24	Vertical
2125.688	-40.26	-13.00	27.26	Horizontal
6386.000	-47.79	-13.00	34.79	Horizontal
7875.500	-46.96	-13.00	33.96	Horizontal



## 7.1.2 Test Band = GSM 1900

### 7.1.2.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
2414.880	-42.17	-13.00	29.17	Vertical
6234.000	-48.08	-13.00	35.08	Vertical
7886.000	-46.46	-13.00	33.46	Vertical
2388.380	-42.26	-13.00	29.26	Horizontal
6488.000	-47.43	-13.00	34.43	Horizontal
7934.000	-47.56	-13.00	34.56	Horizontal

### 7.1.2.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
4298.625	-49.37	-13.00	36.37	Vertical
5735.625	-48.50	-13.00	35.50	Vertical
7904.000	-46.84	-13.00	33.84	Vertical
2447.740	-41.81	-13.00	28.81	Horizontal
4394.625	-49.82	-13.00	36.82	Horizontal
5713.875	-48.97	-13.00	35.97	Horizontal

### 7.1.2.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
2581.300	-39.33	-13.00	26.33	Vertical
5427.750	-48.66	-13.00	35.66	Vertical
7070.000	-47.17	-13.00	34.17	Vertical
2303.580	-42.17	-13.00	29.17	Horizontal
5106.375	-48.95	-13.00	35.95	Horizontal
7932.000	-47.20	-13.00	34.20	Horizontal

#### NOTE:

- 1) All modes are tested, but the data presented above is the worst case. The disturbance above 10GHz and below 1GHz 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 Frequency Error VS. Voltage

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM 850	GSM/TM1	LCH	TN	VL	2.65	0.00322	PASS
				VN	1.55	0.00188	PASS
				VH	-3.58	-0.00434	PASS
		MCH	TN	VL	-2.13	-0.00255	PASS
				VN	-1.52	-0.00182	PASS
				VH	-4.25	-0.00508	PASS
		HCH	TN	VL	3.72	0.00438	PASS
				VN	-1.02	-0.00120	PASS
				VH	-2.48	-0.00292	PASS
	GSM/TM2	LCH	TN	VL	-3.86	-0.00468	PASS
				VN	1.27	0.00154	PASS
				VH	-2.78	-0.00337	PASS
		MCH	TN	VL	3.53	0.00422	PASS
				VN	2.20	0.00263	PASS
				VH	-4.70	-0.00562	PASS
		HCH	TN	VL	0.80	0.00094	PASS
				VN	-3.49	-0.00411	PASS
				VH	2.23	0.00263	PASS





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Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM 1900	GSM/TM1	LCH	TN	VL	-4.63	-0.00250	PASS
				VN	2.34	0.00126	PASS
				VH	1.72	0.00093	PASS
		MCH	TN	VL	1.29	0.00069	PASS
				VN	-2.60	-0.00138	PASS
				VH	5.33	0.00284	PASS
		HCH	TN	VL	-2.68	-0.00140	PASS
				VN	2.37	0.00124	PASS
				VH	-4.20	-0.00220	PASS
	GSM/TM2	LCH	TN	VL	1.20	0.00065	PASS
				VN	-3.80	-0.00205	PASS
				VH	2.70	0.00146	PASS
		MCH	TN	VL	-4.22	-0.00224	PASS
				VN	1.89	0.00101	PASS
				VH	0.84	0.00045	PASS
		HCH	TN	VL	-2.33	-0.00122	PASS
				VN	3.80	0.00199	PASS
				VH	-4.83	-0.00253	PASS



## 8.2 Frequency Error VS. Temperature

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM 850	GSM/TM1	LCH	VN	-30	-4.22	-0.00512	PASS
				-20	1.50	0.00182	PASS
				-10	1.82	0.00221	PASS
				0	-2.40	-0.00291	PASS
				10	0.89	0.00108	PASS
				20	-4.93	-0.00598	PASS
				30	1.59	0.00193	PASS
				40	-0.85	-0.00103	PASS
				50	-6.70	-0.00813	PASS
		MCH	VN	-30	-2.58	-0.00308	PASS
				-20	-5.30	-0.00634	PASS
				-10	-0.70	-0.00084	PASS
				0	-3.23	-0.00386	PASS
				10	1.72	0.00206	PASS
				20	2.50	0.00299	PASS
				30	1.48	0.00177	PASS
				40	0.87	0.00104	PASS
				50	-4.32	-0.00516	PASS
		HCH	VN	-30	-0.24	-0.00028	PASS
				-20	3.77	0.00444	PASS
				-10	3.59	0.00423	PASS
				0	-5.42	-0.00639	PASS
				10	1.57	0.00185	PASS
				20	-2.27	-0.00267	PASS
				30	3.58	0.00422	PASS
				40	-0.36	-0.00042	PASS
				50	-4.20	-0.00495	PASS



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Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM 850	GSM/TM2	LCH	VN	-30	-2.12	-0.00257	PASS
				-20	2.41	0.00292	PASS
				-10	-5.80	-0.00704	PASS
				0	1.72	0.00209	PASS
				10	-5.64	-0.00684	PASS
				20	-4.40	-0.00534	PASS
				30	-4.22	-0.00512	PASS
				40	-5.63	-0.00683	PASS
				50	-2.35	-0.00285	PASS
		MCH	VN	-30	-2.19	-0.00262	PASS
				-20	3.77	0.00451	PASS
				-10	-4.93	-0.00589	PASS
				0	1.90	0.00227	PASS
				10	-5.71	-0.00683	PASS
				20	-3.56	-0.00426	PASS
				30	-2.49	-0.00298	PASS
				40	-3.62	-0.00433	PASS
				50	-5.29	-0.00632	PASS
		HCH	VN	-30	-3.77	-0.00444	PASS
				-20	-5.62	-0.00662	PASS
				-10	-2.31	-0.00272	PASS
				0	-5.62	-0.00662	PASS
				10	1.35	0.00159	PASS
				20	-4.63	-0.00545	PASS
				30	-3.45	-0.00406	PASS
				40	-2.95	-0.00348	PASS
				50	-5.68	-0.00669	PASS



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GSM 1900	GSM/TM1	LCH	VN	-30	-3.22	-0.00174	PASS
				-20	-4.49	-0.00243	PASS
				-10	2.50	0.00135	PASS
				0	-3.75	-0.00203	PASS
				10	-0.69	-0.00037	PASS
				20	1.45	0.00078	PASS
				30	-3.30	-0.00178	PASS
				40	-5.71	-0.00309	PASS
				50	-3.54	-0.00191	PASS
		MCH	VN	-30	-4.40	-0.00234	PASS
				-20	1.29	0.00069	PASS
				-10	-2.62	-0.00139	PASS
				0	4.25	0.00226	PASS
				10	-3.97	-0.00211	PASS
				20	-6.00	-0.00319	PASS
				30	-3.93	-0.00209	PASS
				40	-8.70	-0.00463	PASS
				50	-5.50	-0.00293	PASS
		HCH	VN	-30	-3.39	-0.00178	PASS
				-20	3.26	0.00171	PASS
				-10	1.59	0.00083	PASS
				0	-0.60	-0.00031	PASS
				10	-3.58	-0.00187	PASS
				20	-4.49	-0.00235	PASS
				30	1.30	0.00068	PASS
				40	-3.29	-0.00172	PASS
				50	-4.14	-0.00217	PASS



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GSM 1900	GSM/TM2	LCH	VN	-30	-2.83	-0.00153	PASS
				-20	-4.70	-0.00254	PASS
				-10	1.60	0.00086	PASS
				0	-2.59	-0.00140	PASS
				10	-2.29	-0.00124	PASS
				20	-4.56	-0.00246	PASS
				30	1.60	0.00086	PASS
				40	-3.73	-0.00202	PASS
				50	-6.61	-0.00357	PASS
		MCH	VN	-30	-5.46	-0.00290	PASS
				-20	-2.66	-0.00141	PASS
				-10	-4.20	-0.00223	PASS
				0	1.40	0.00074	PASS
				10	-5.27	-0.00280	PASS
				20	-2.14	-0.00114	PASS
				30	-3.78	-0.00201	PASS
				40	0.87	0.00046	PASS
				50	-5.90	-0.00314	PASS
		HCH	VN	-30	-3.08	-0.00161	PASS
				-20	2.97	0.00156	PASS
				-10	1.74	0.00091	PASS
				0	-5.49	-0.00287	PASS
				10	-6.73	-0.00352	PASS
				20	-3.89	-0.00204	PASS
				30	-2.60	-0.00136	PASS
				40	-2.39	-0.00125	PASS
				50	-5.83	-0.00305	PASS

The End