



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	31.91	33.71	38.45	PASS
		MCH	31.91	33.71	38.45	PASS
		HCH	31.84	33.64	38.45	PASS
	GSM/TM2	LCH	27.19	28.99	38.45	PASS
		MCH	27.25	29.05	38.45	PASS
		HCH	27.17	28.97	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	28.74	32.64	33	PASS
		MCH	28.73	32.63	33	PASS
		HCH	28.69	32.59	33	PASS
	GSM/TM2	LCH	26.24	30.14	33	PASS
		MCH	26.17	30.07	33	PASS
		HCH	26.10	30.00	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	6.46	13	PASS
		MCH	6.52	13	PASS
		HCH	6.52	13	PASS
	GSM/TM2	LCH	8.61	13	PASS
		MCH	8.58	13	PASS
		HCH	8.35	13	PASS
GSM 1900	GSM/TM1	LCH	6.49	13	PASS
		MCH	6.52	13	PASS
		HCH	7.16	13	PASS
	GSM/TM2	LCH	8.32	13	PASS
		MCH	8.49	13	PASS
		HCH	8.29	13	PASS



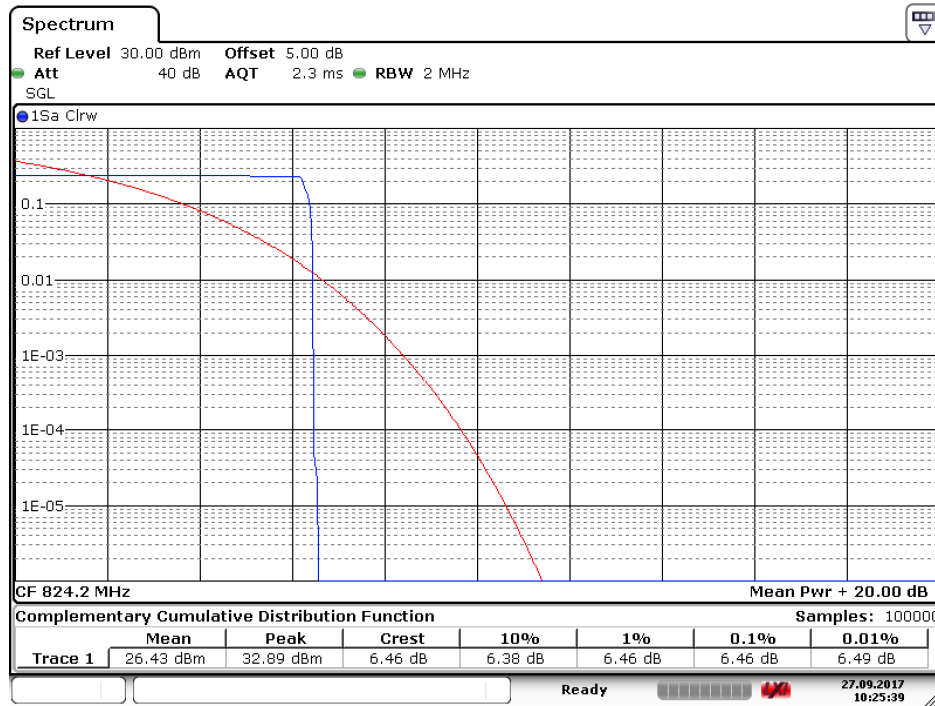
Part II - Test Plots

2.1 For GSM

2.1.1 Test Band = GSM 850

2.1.1.1 Test Mode = GSM/TM1

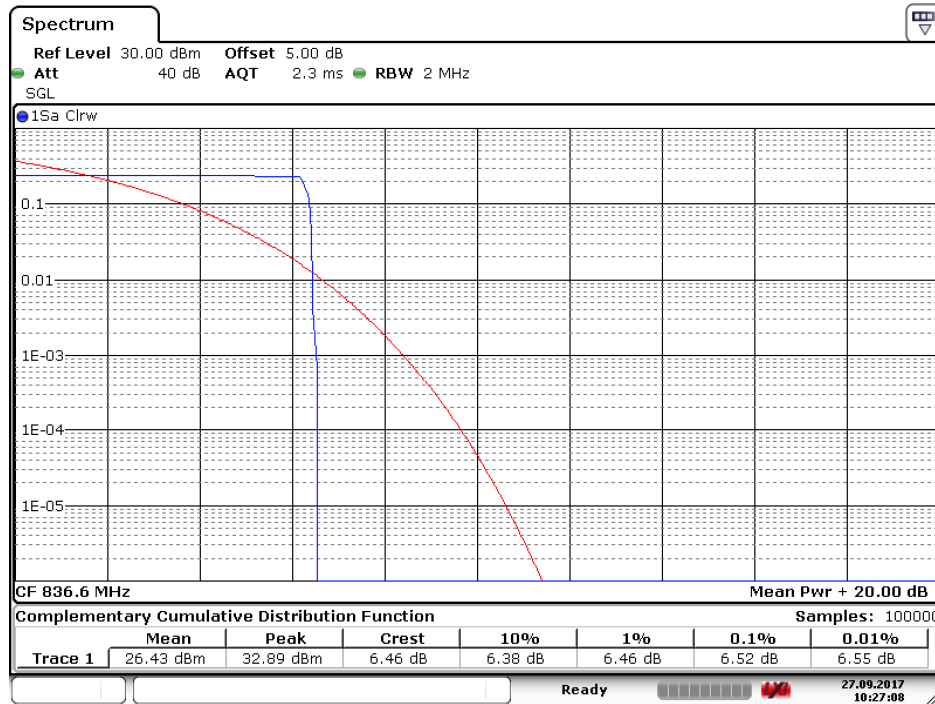
2.1.1.1.1 Test Channel = LCH



Date: 27.SEP.2017 10:25:39

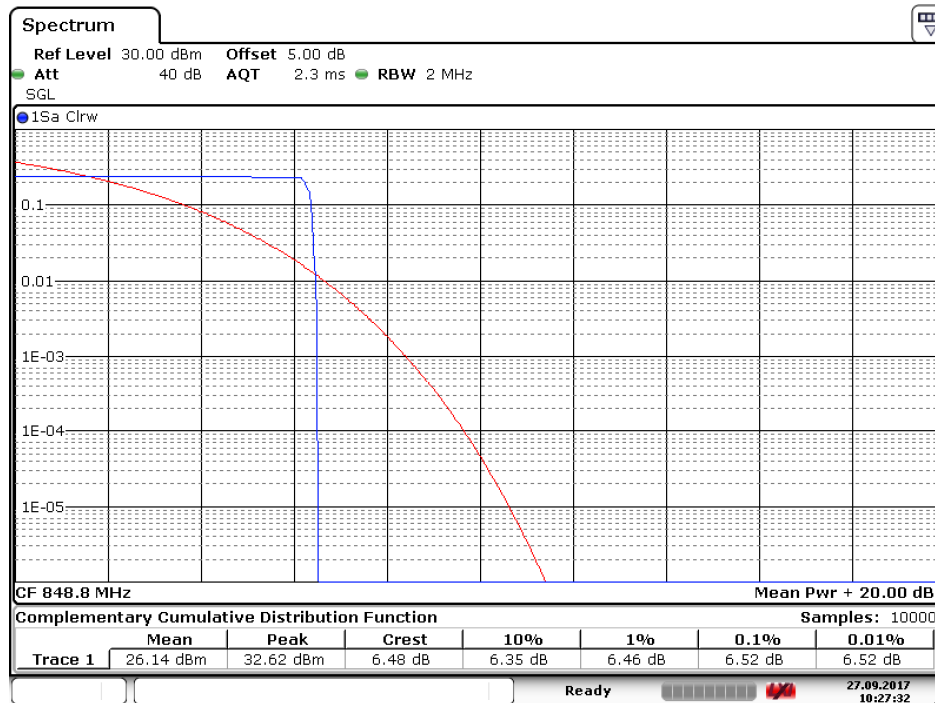


2.1.1.1.2 Test Channel = MCH



Date: 27.SEP.2017 10:27:08

2.1.1.1.3 Test Channel = HCH

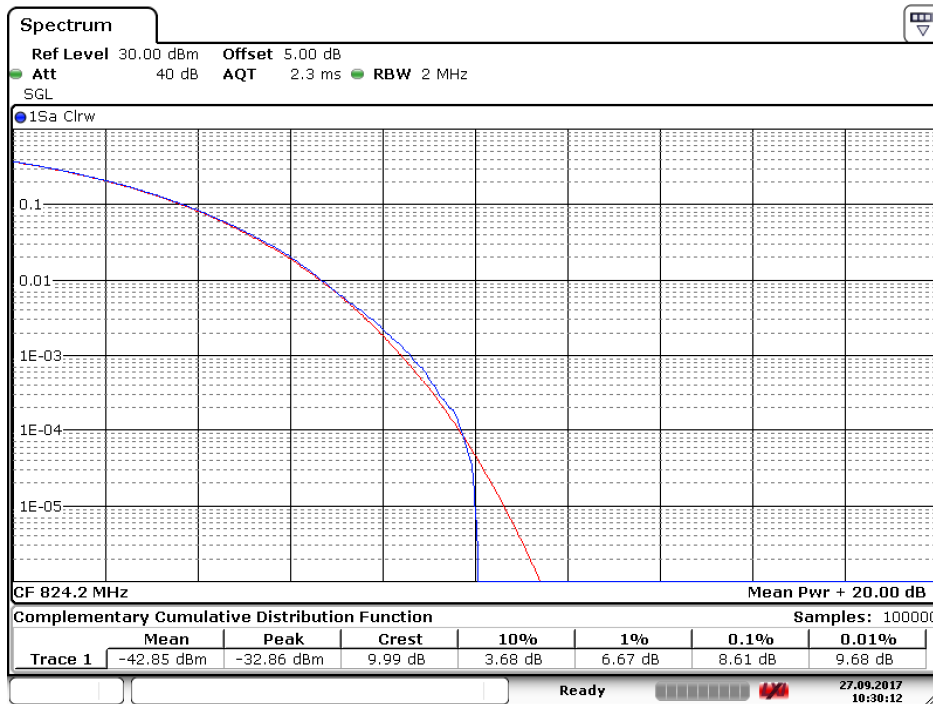


Date: 27.SEP.2017 10:27:33



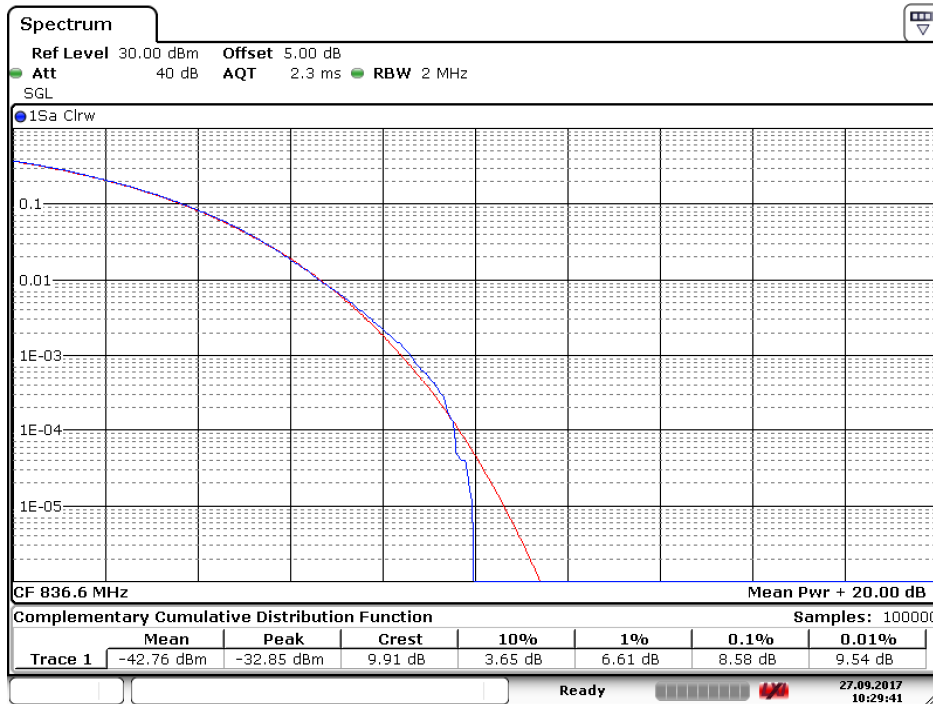
2.1.1.2 Test Mode = GSM/TM2

2.1.1.2.1 Test Channel = LCH



Date: 27.SEP.2017 10:30:12

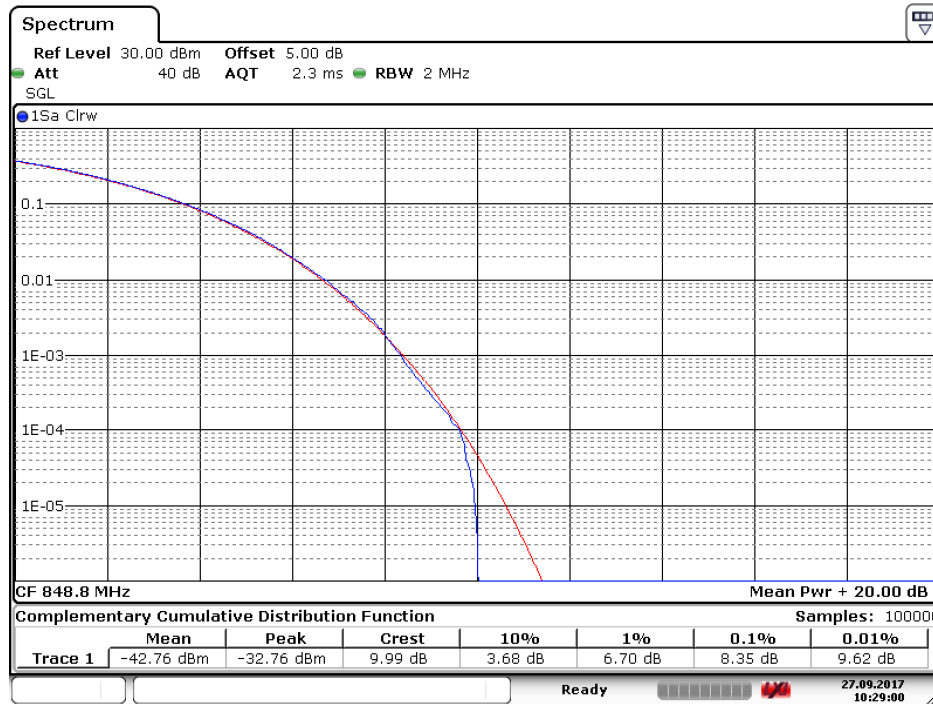
2.1.1.2.2 Test Channel = MCH



Date: 27.SEP.2017 10:29:41



2.1.1.2.3 Test Channel = HCH

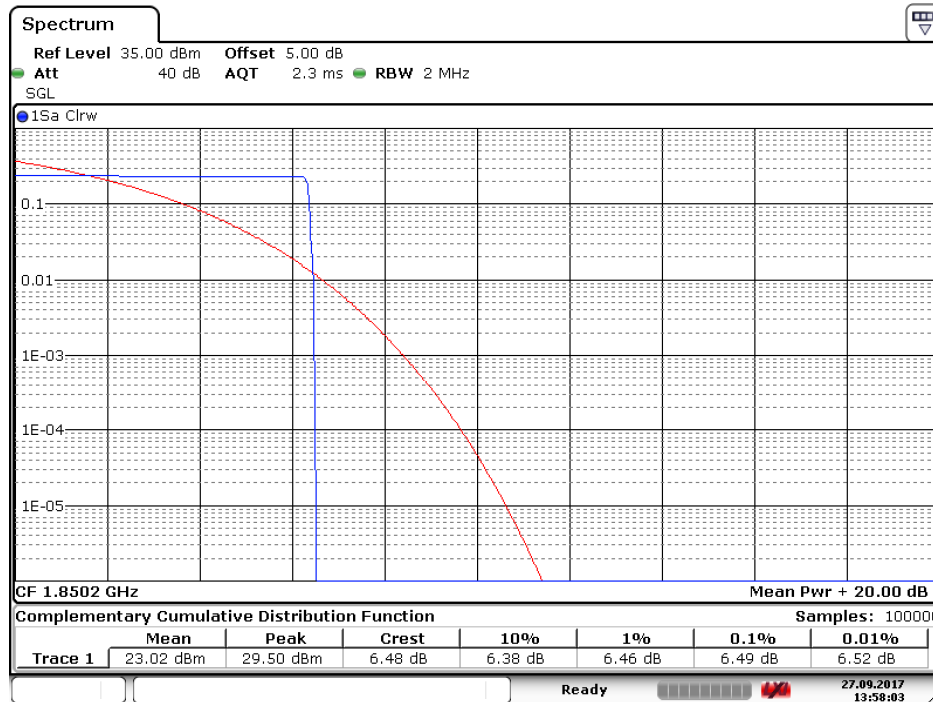


Date: 27.SEP.2017 10:29:00

2.1.2 Test Band = GSM 1900

2.1.2.1 Test Mode = GSM/TM1

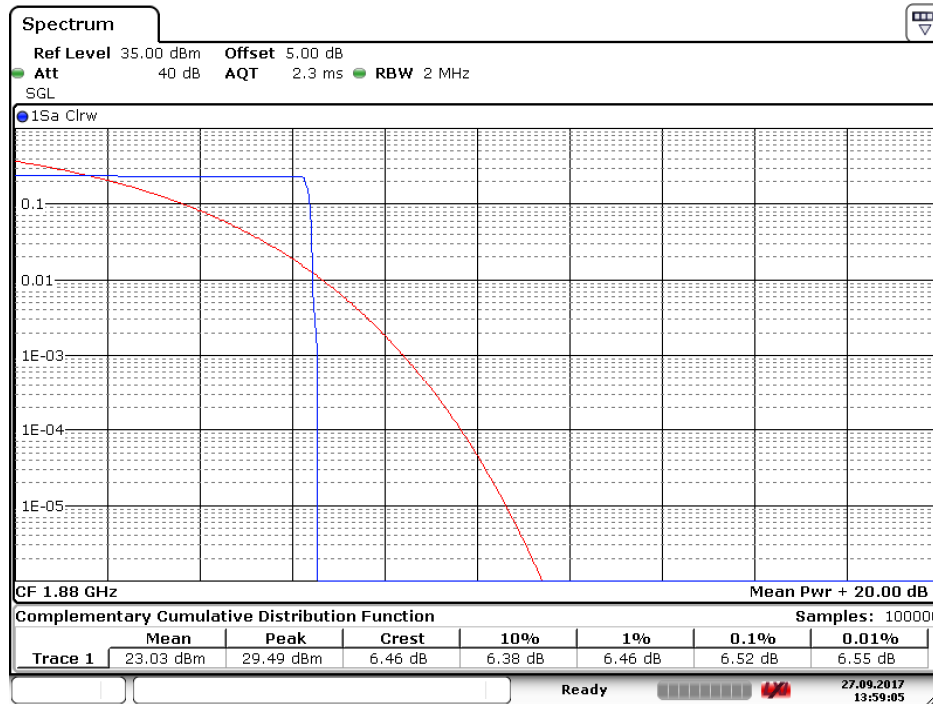
2.1.2.1.1 Test Channel = LCH



Date: 27.SEP.2017 13:58:03

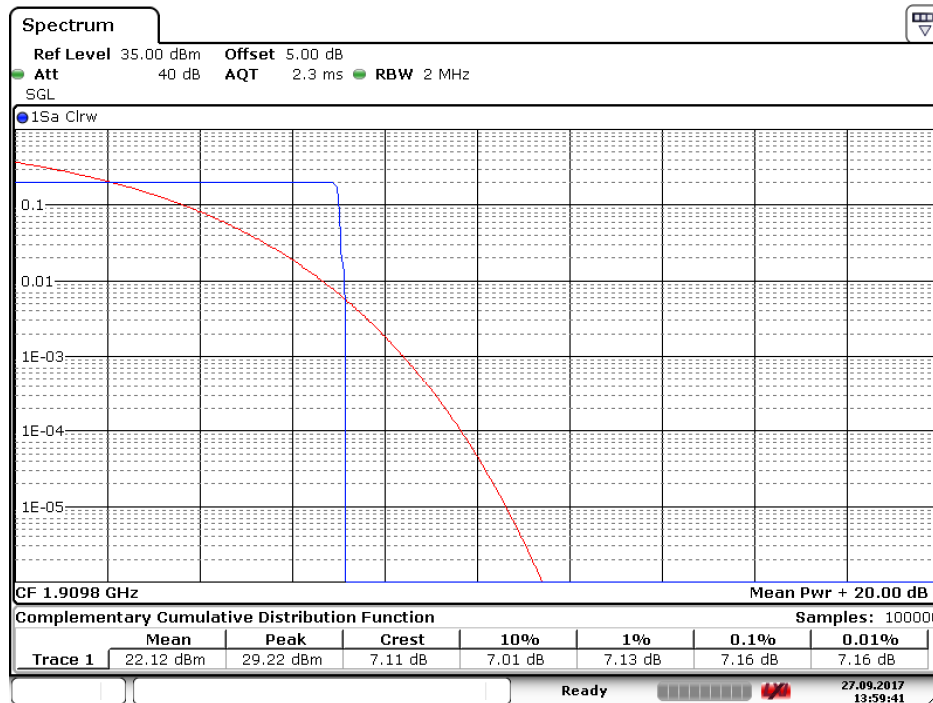


2.1.2.1.2 Test Channel = MCH



Date: 27.SEP.2017 13:59:05

2.1.2.1.3 Test Channel = HCH

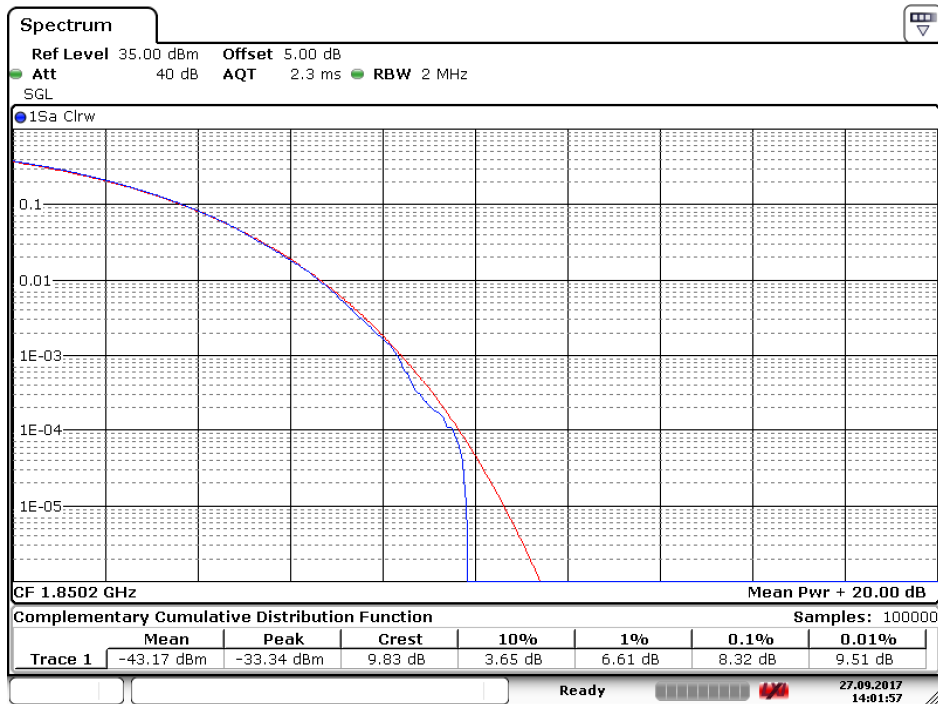


Date: 27.SEP.2017 13:59:41



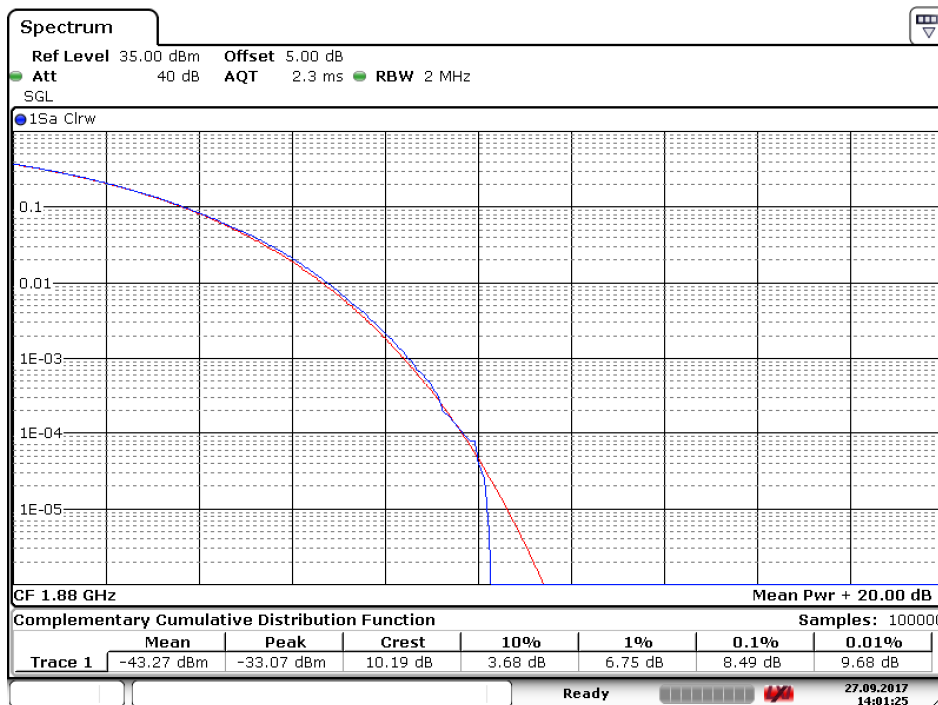
2.1.2.2 Test Mode = GSM/TM2

2.1.2.2.1 Test Channel = LCH



Date: 27.SEP.2017 14:01:57

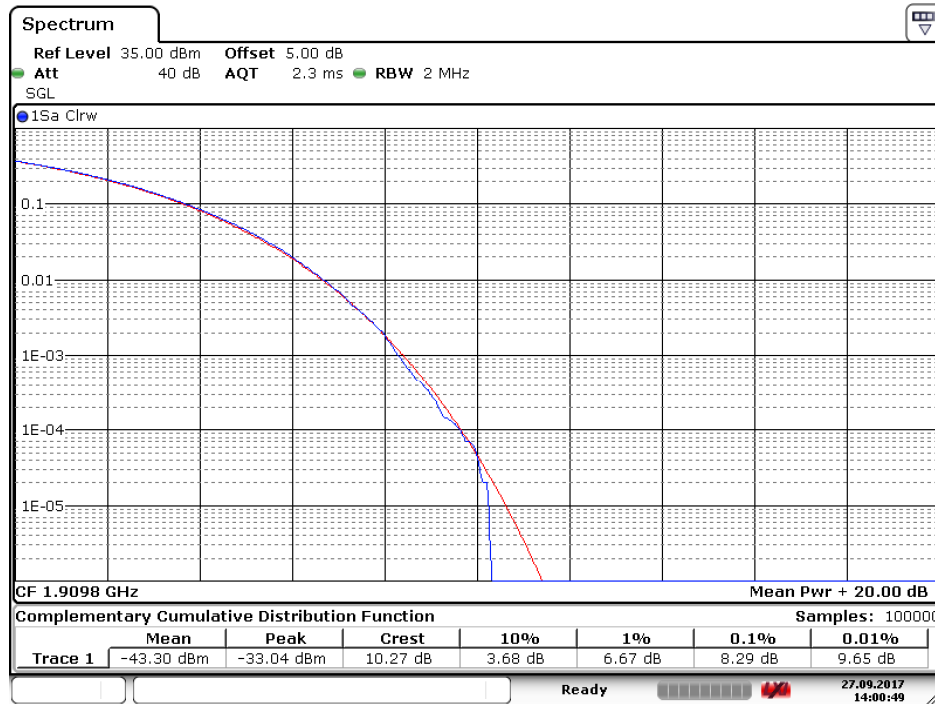
2.1.2.2.2 Test Channel = MCH



Date: 27.SEP.2017 14:01:25



2.1.2.2.3 Test Channel = HCH



Date: 27.SEP.2017 14:00:50

3 Modulation Characteristics

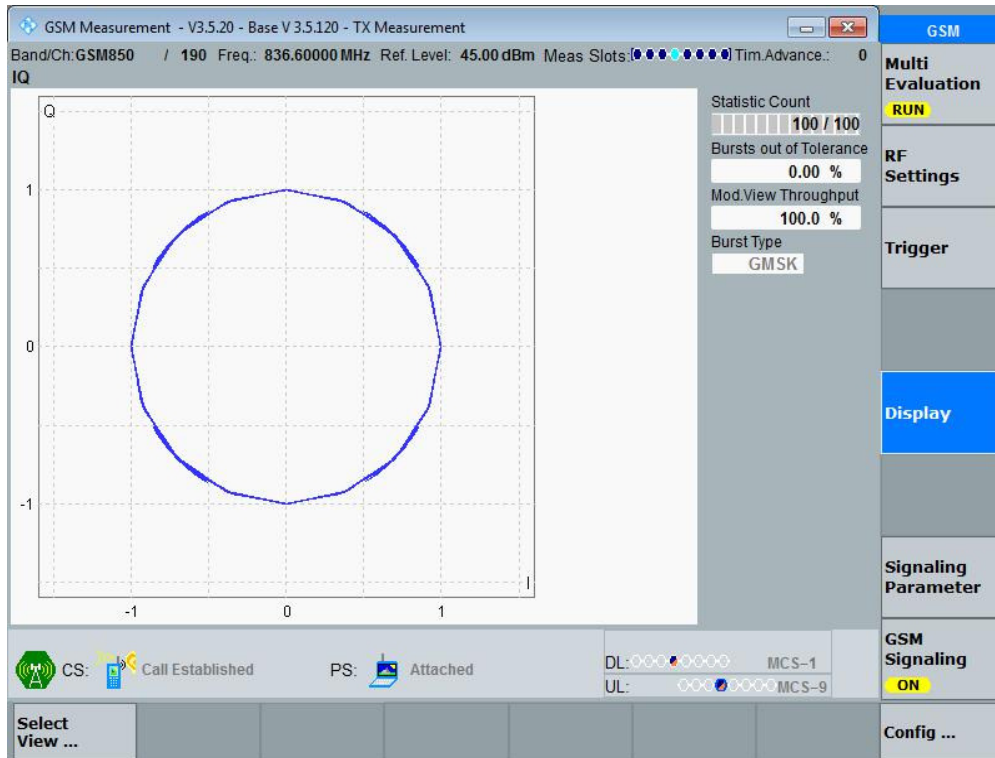
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM 850

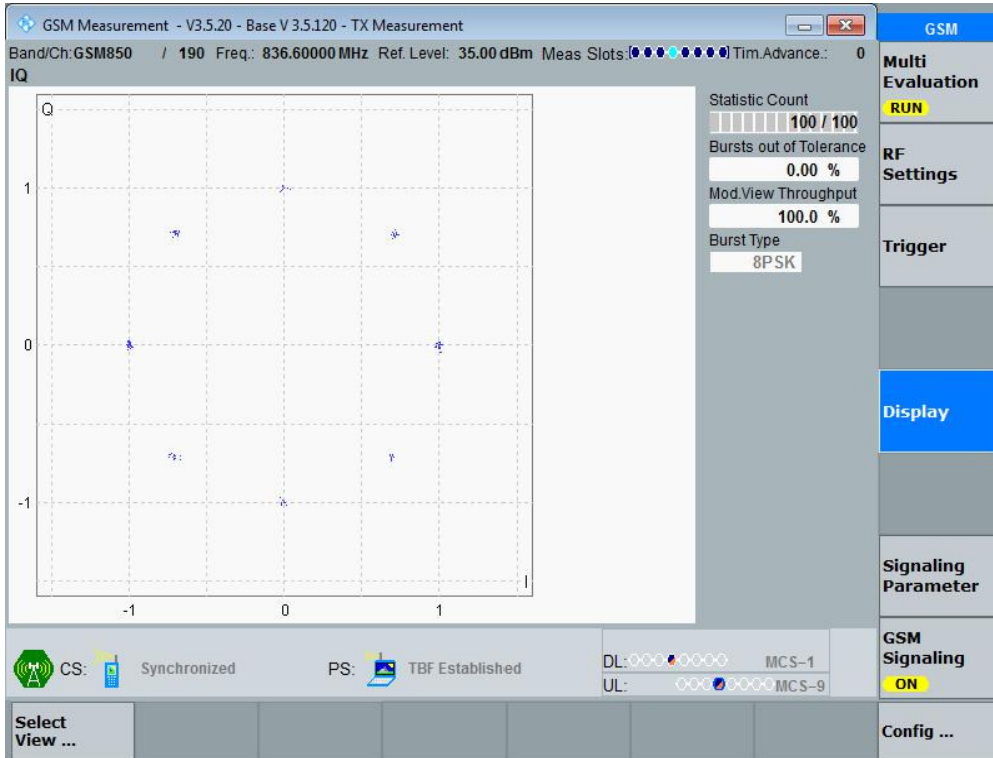
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

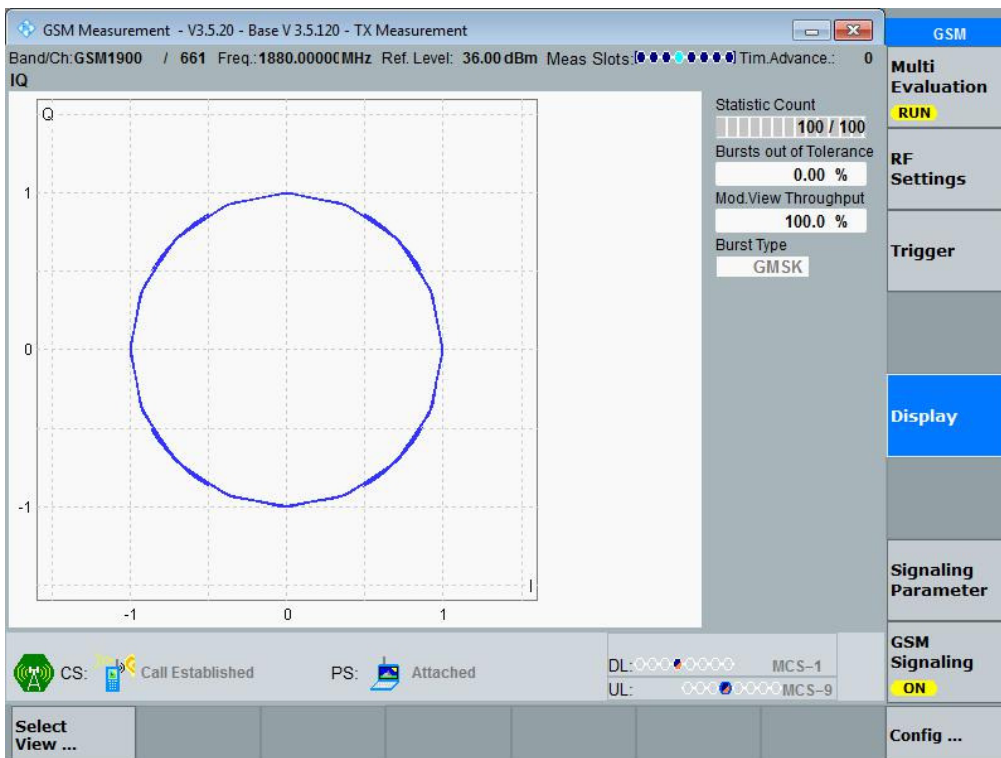
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM 1900

3.1.2.1 Test Mode = GSM/TM1

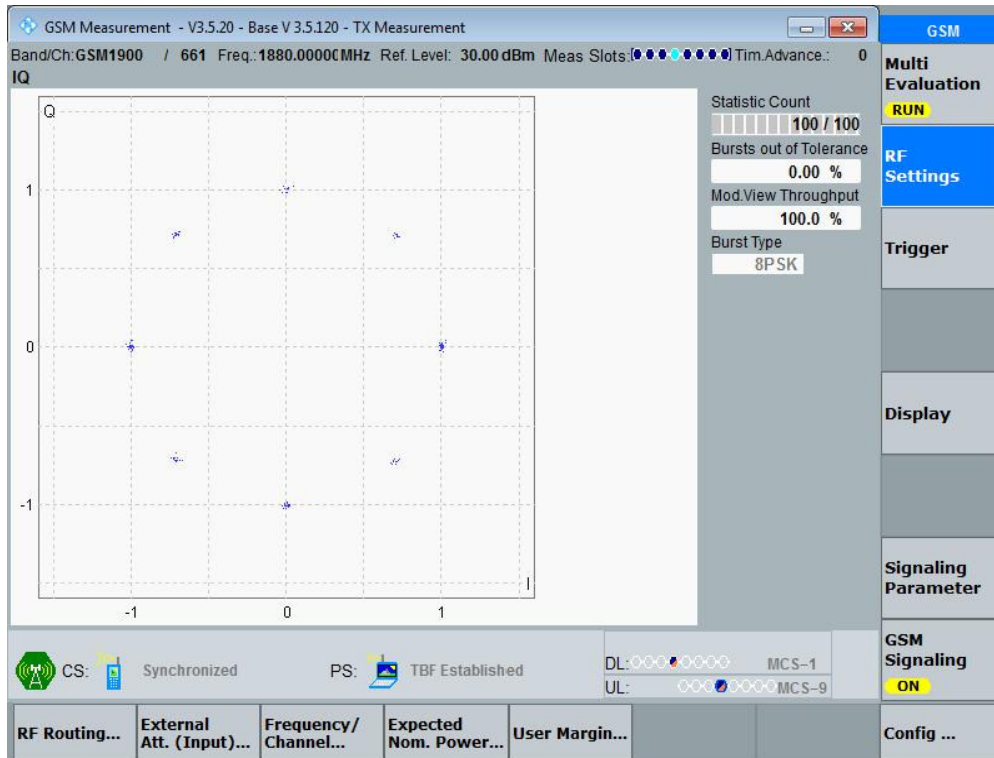
3.1.2.1.1 Test Channel = MCH





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	240.8	316.7	PASS
		MCH	244.8	315.7	PASS
		HCH	243.8	317.7	PASS
	GSM/TM2	LCH	235.8	315.7	PASS
		MCH	237.8	315.7	PASS
		HCH	238.8	314.7	PASS
GSM 1900	GSM/TM1	LCH	240.8	318.7	PASS
		MCH	242.8	321.7	PASS
		HCH	241.8	318.7	PASS
	GSM/TM2	LCH	237.8	312.7	PASS
		MCH	237.8	312.7	PASS
		HCH	235.8	311.7	PASS

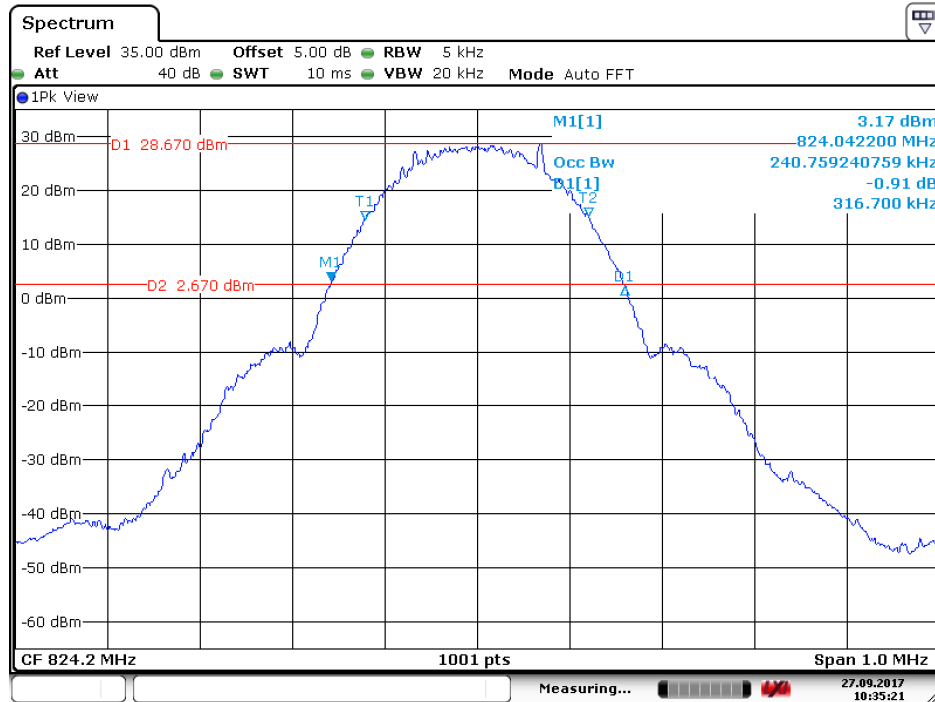


4.1 For GSM

4.1.1 Test Band = GSM 850

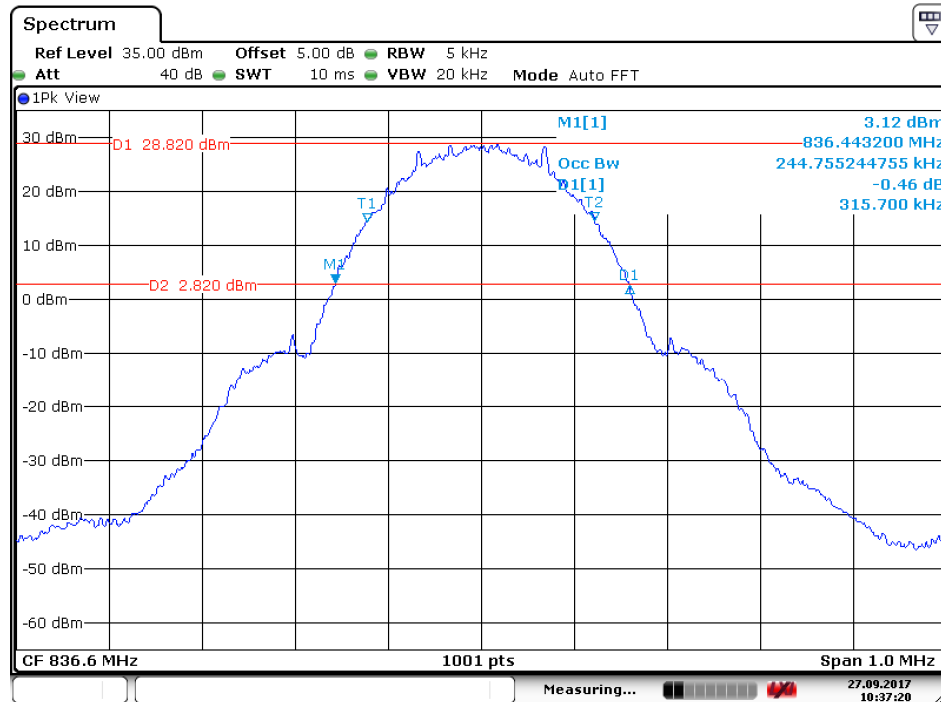
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



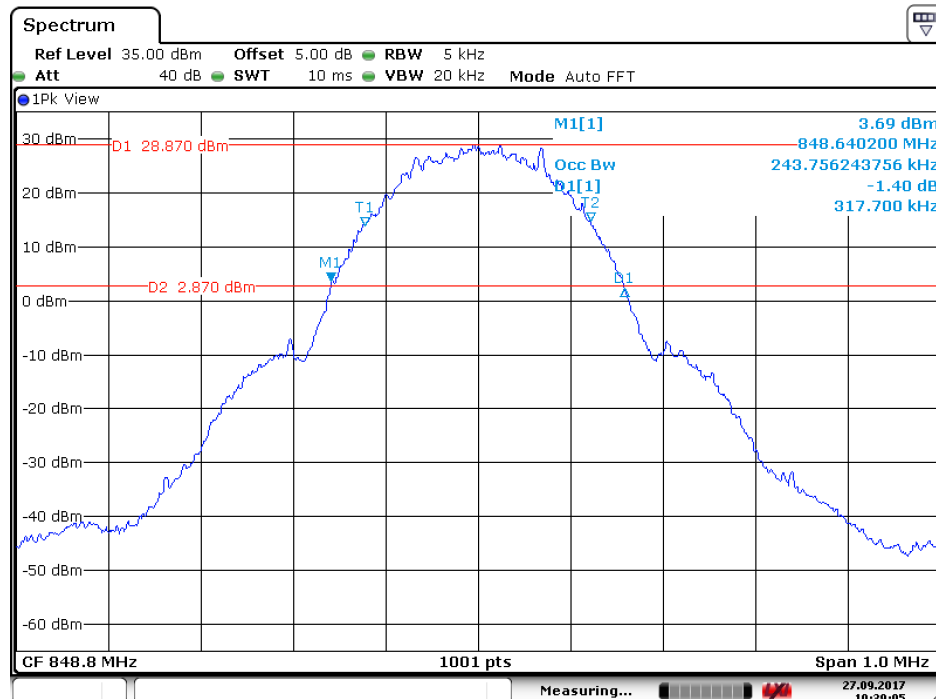
Date: 27.SEP.2017 10:35:21

4.1.1.1.2 Test Channel = MCH



Date: 27.SEP.2017 10:37:21

4.1.1.1.3 Test Channel = HCH

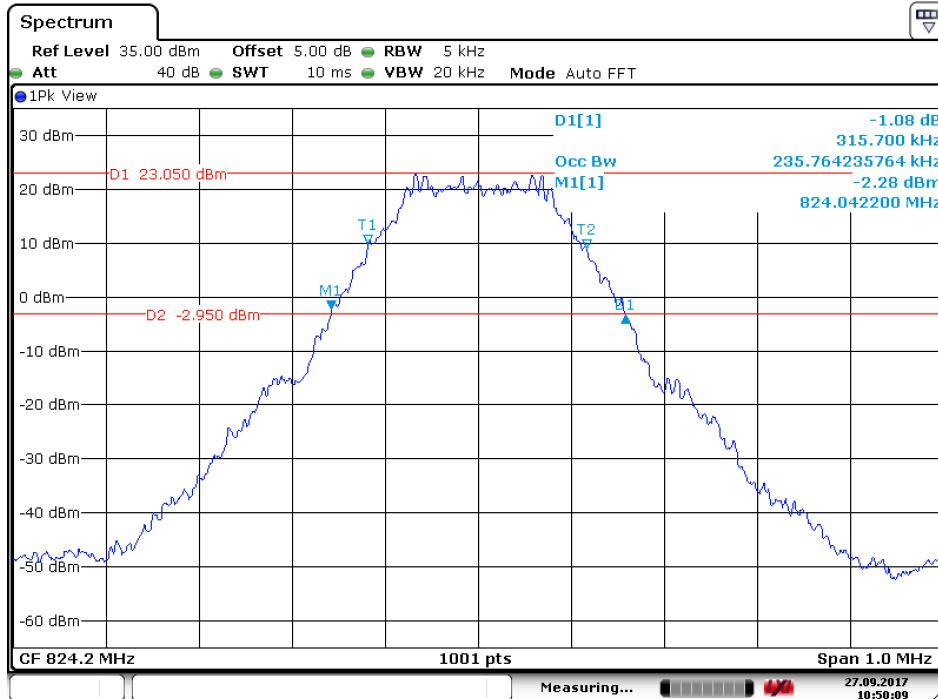


Date: 27.SEP.2017 10:39:05



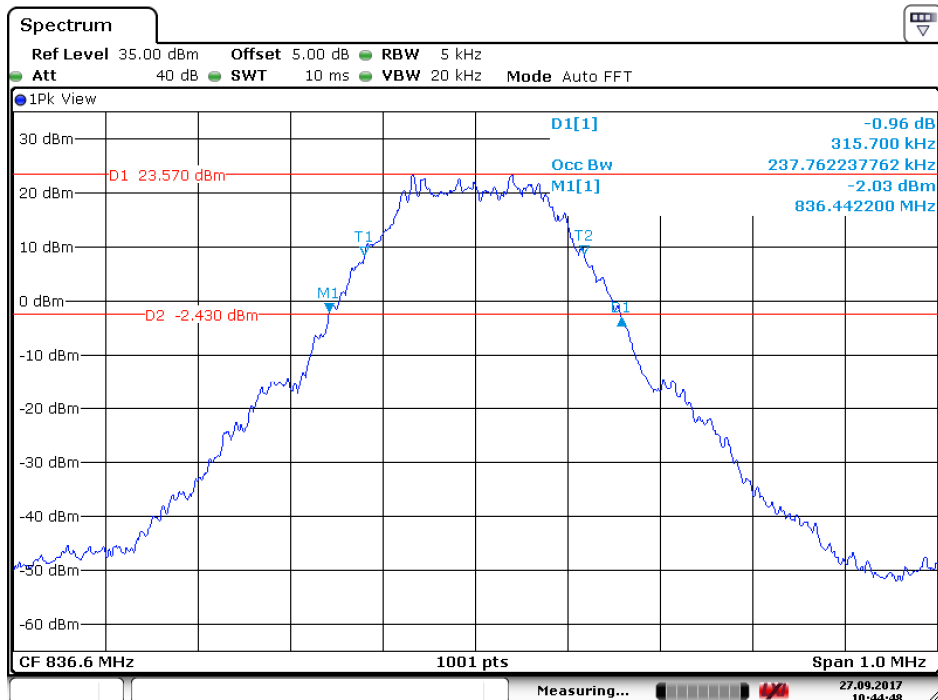
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



Date: 27.SEP.2017 10:50:10

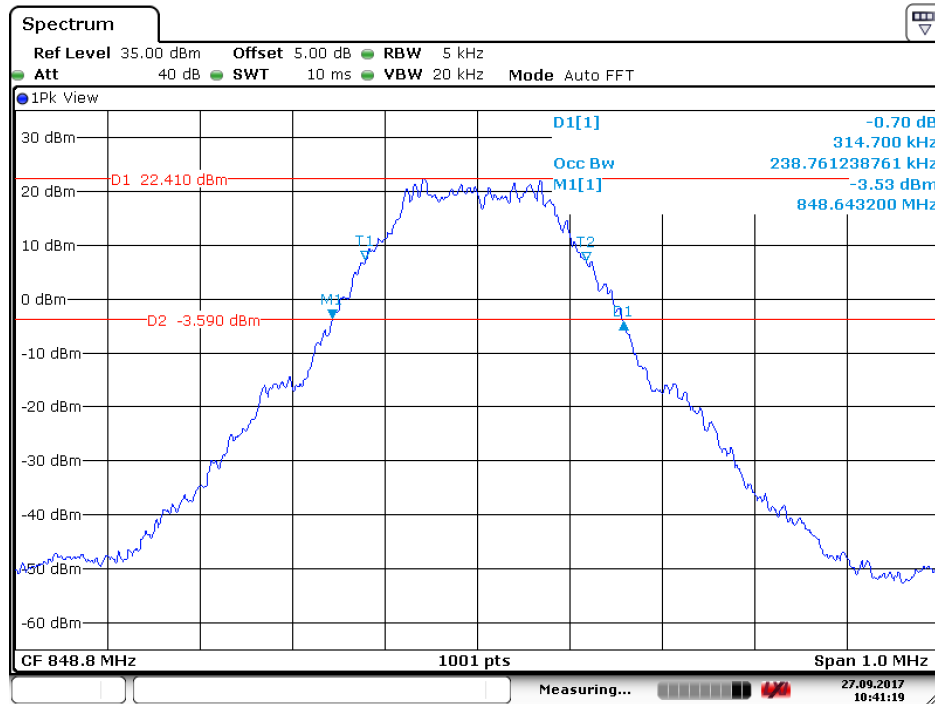
4.1.1.2.2 Test Channel = MCH



Date: 27.SEP.2017 10:44:48



4.1.1.2.3 Test Channel = HCH

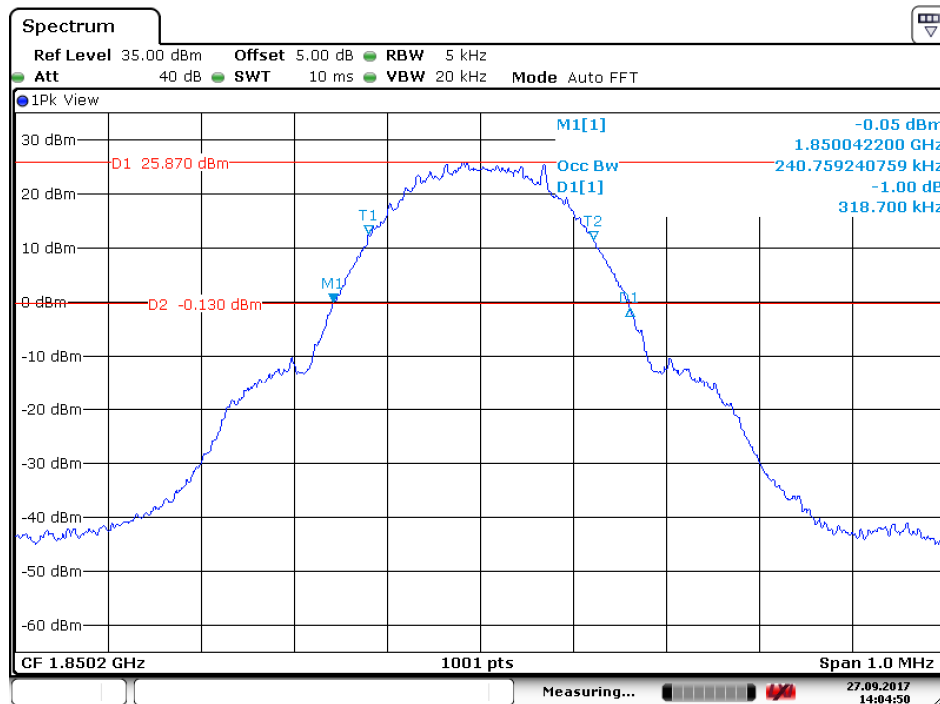


Date: 27.SEP.2017 10:41:19

4.1.2 Test Band = GSM 1900

4.1.2.1 Test Mode = GSM/TM1

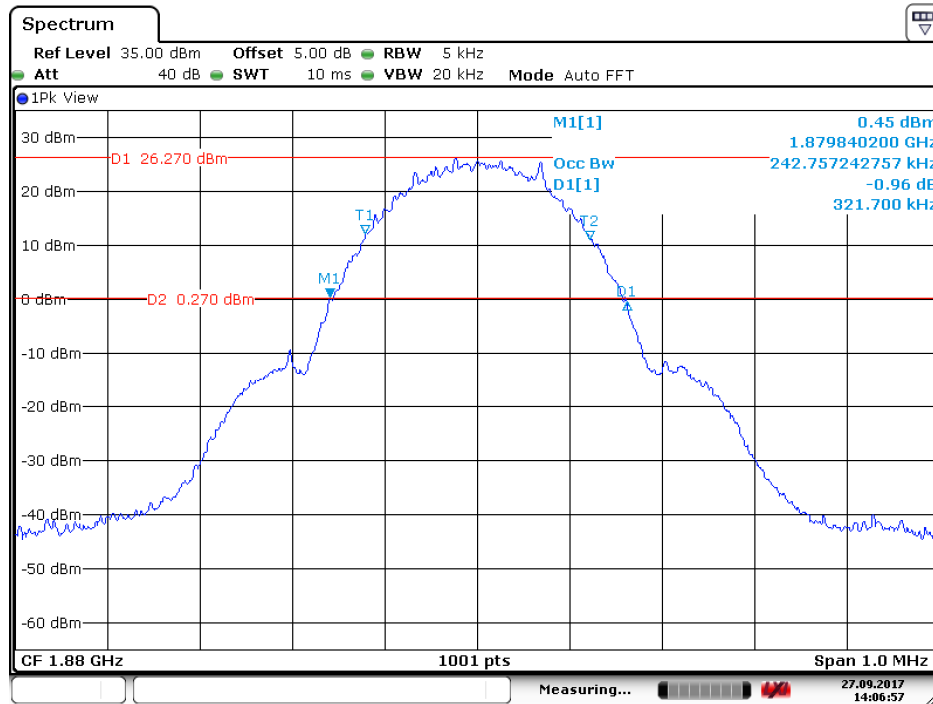
4.1.2.1.1 Test Channel = LCH



Date: 27.SEP.2017 14:04:51

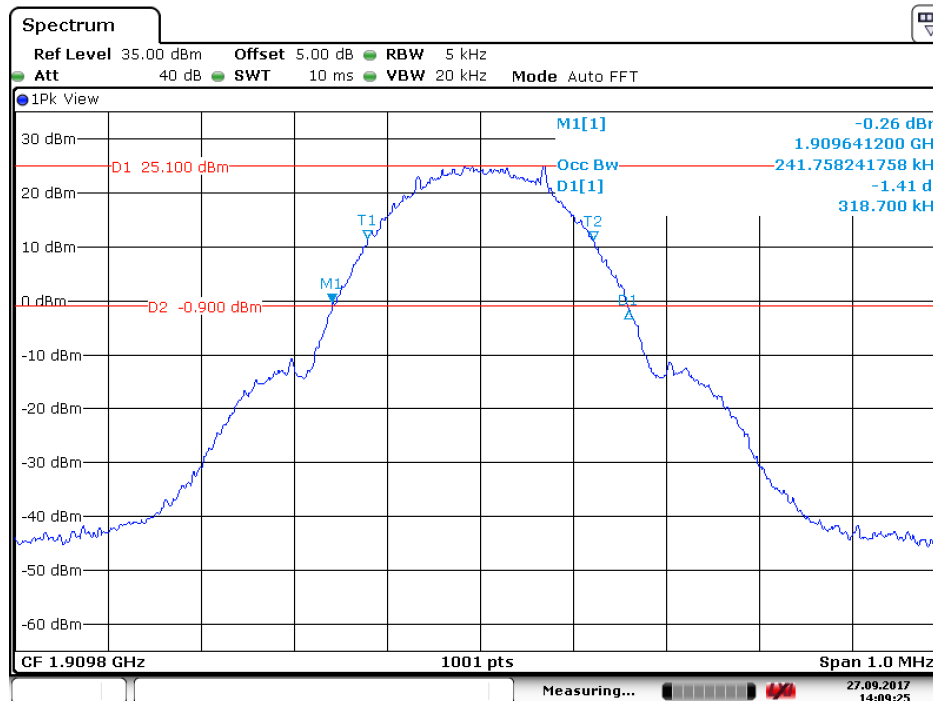


4.1.2.1.2 Test Channel = MCH



Date: 27.SEP.2017 14:06:57

4.1.2.1.3 Test Channel = HCH

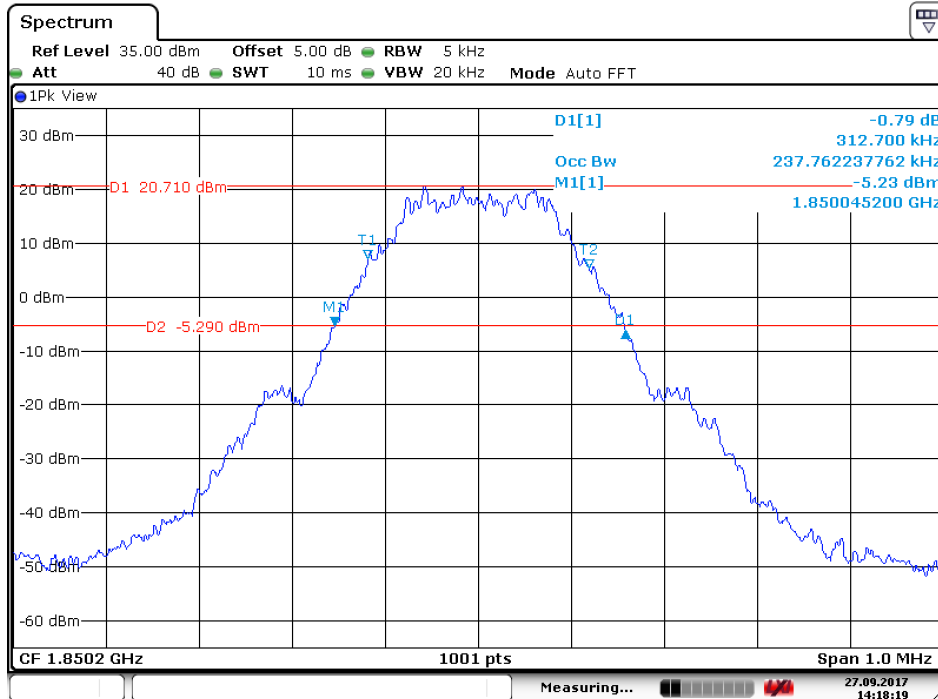


Date: 27.SEP.2017 14:09:26



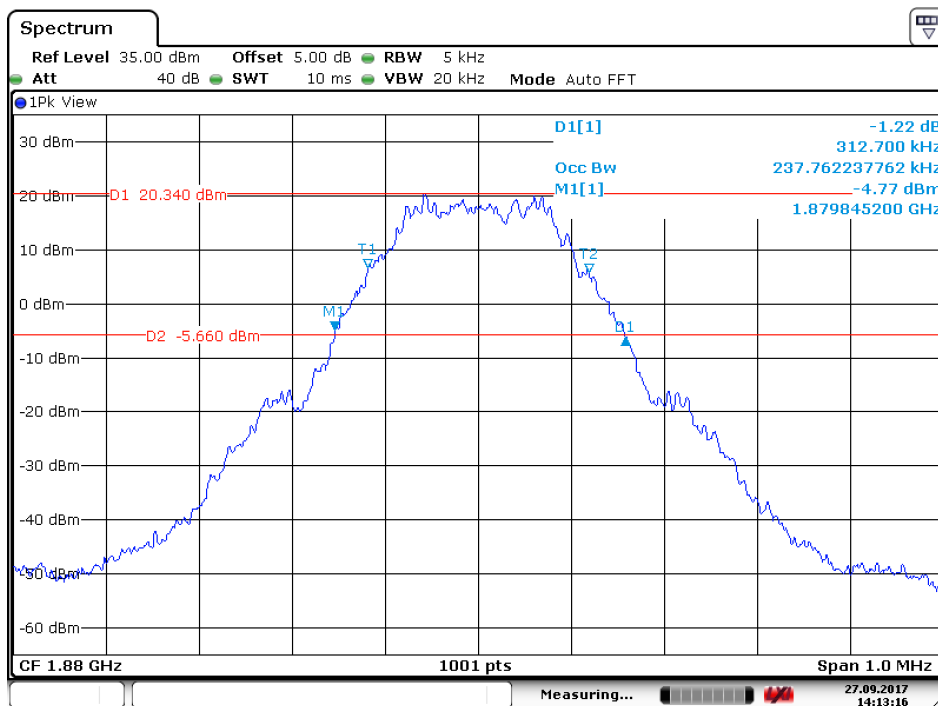
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



Date: 27.SEP.2017 14:18:19

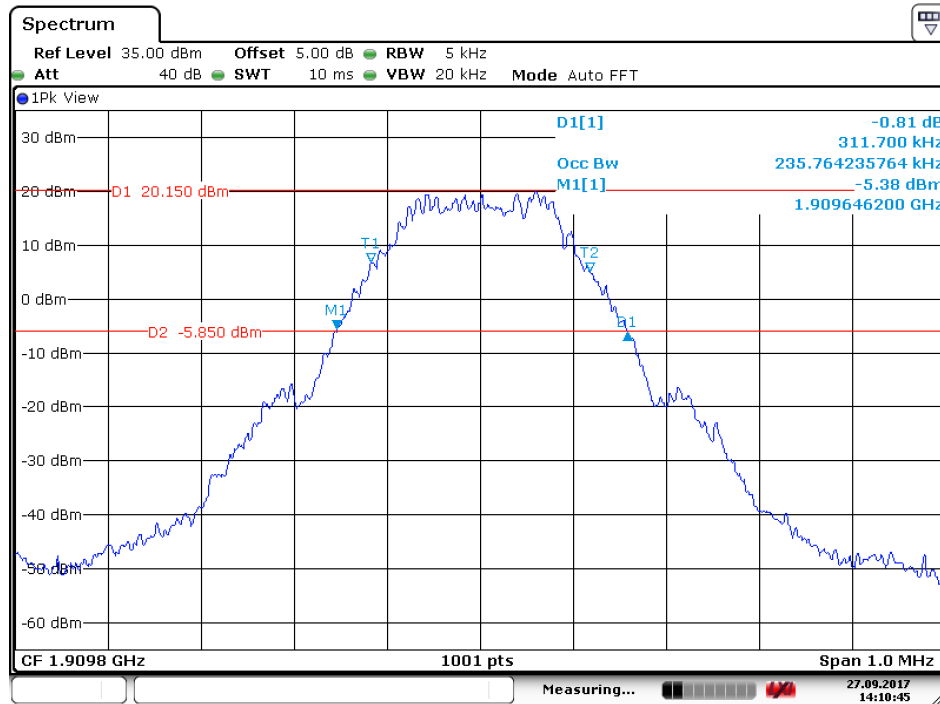
4.1.2.2.2 Test Channel = MCH



Date: 27.SEP.2017 14:13:16



4.1.2.2.3 Test Channel = HCH



Date: 27.SEP.2017 14:10:46



5 Band Edges Compliance

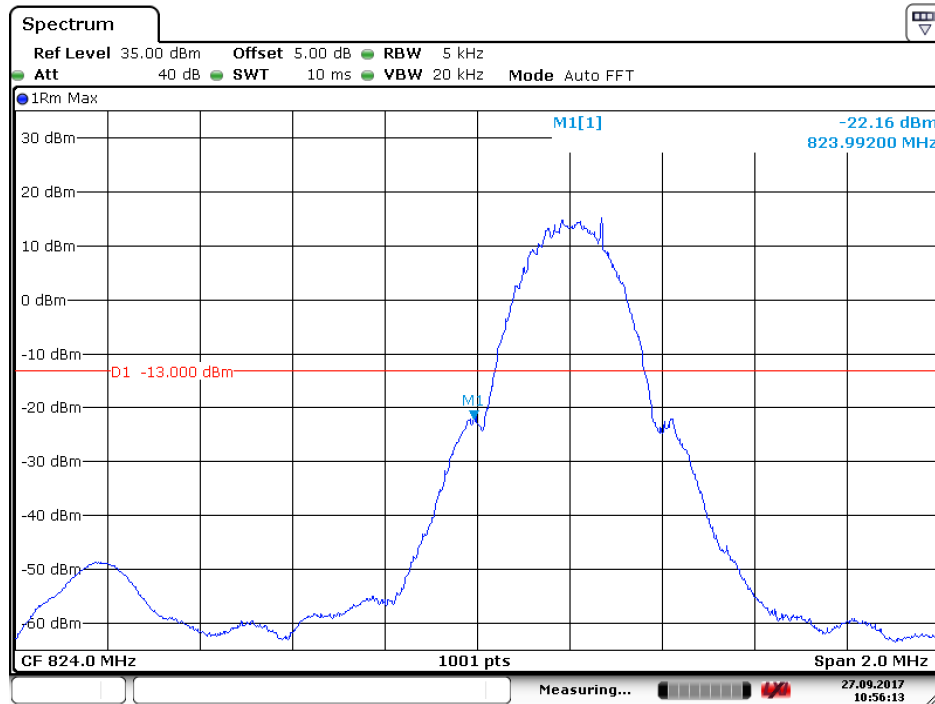
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM 850

5.1.1.1 Test Mode = GSM/TM1

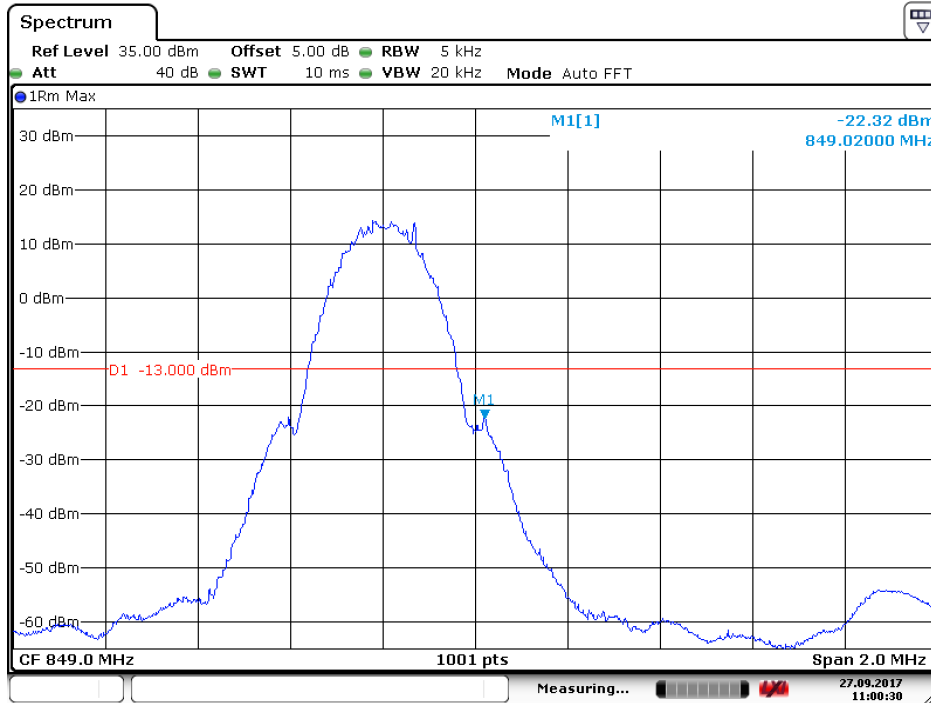
5.1.1.1.1 Test Channel = LCH



Date: 27.SEP.2017 10:56:13



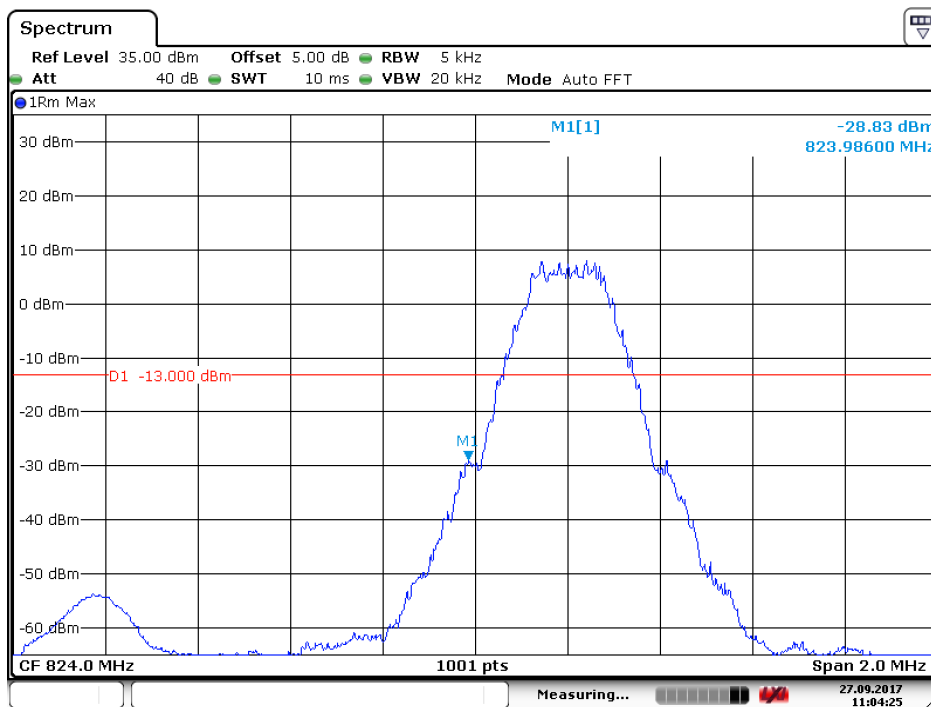
5.1.1.1.2 Test Channel = HCH



Date: 27.SEP.2017 11:00:30

5.1.1.2 Test Mode = GSM/TM2

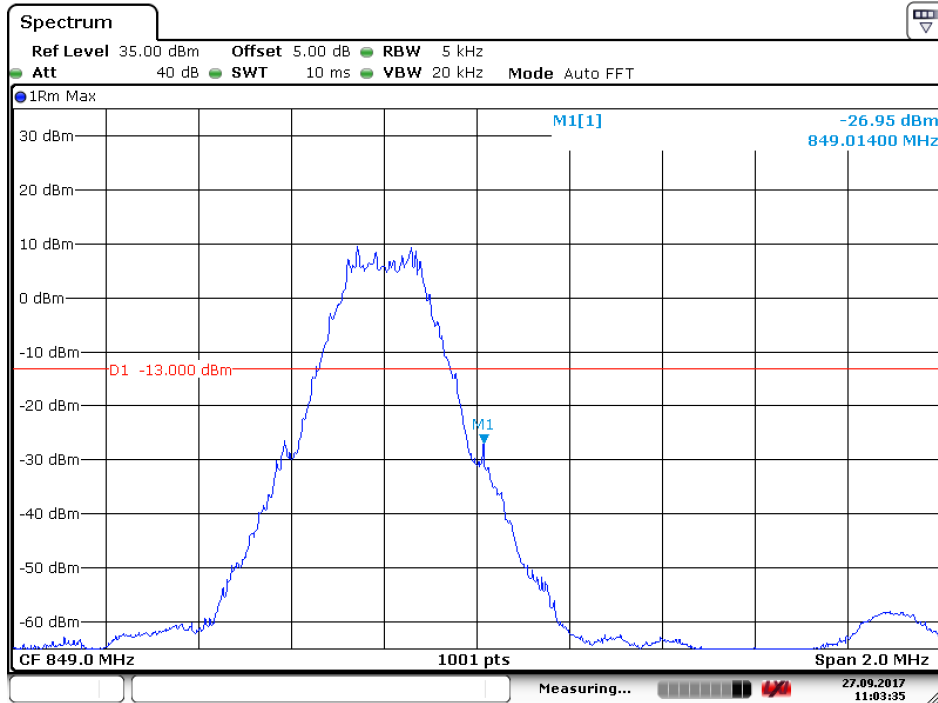
5.1.1.2.1 Test Channel = LCH



Date: 27.SEP.2017 11:04:25



5.1.1.2.2 Test Channel = HCH

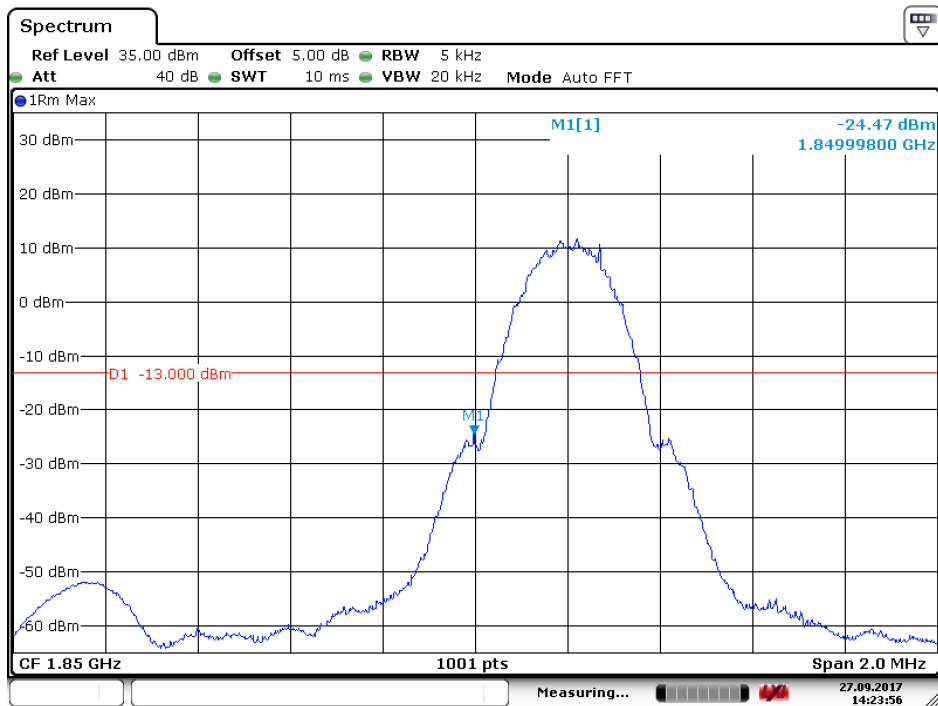


Date: 27.SEP.2017 11:03:35

5.1.2 Test Band = GSM 1900

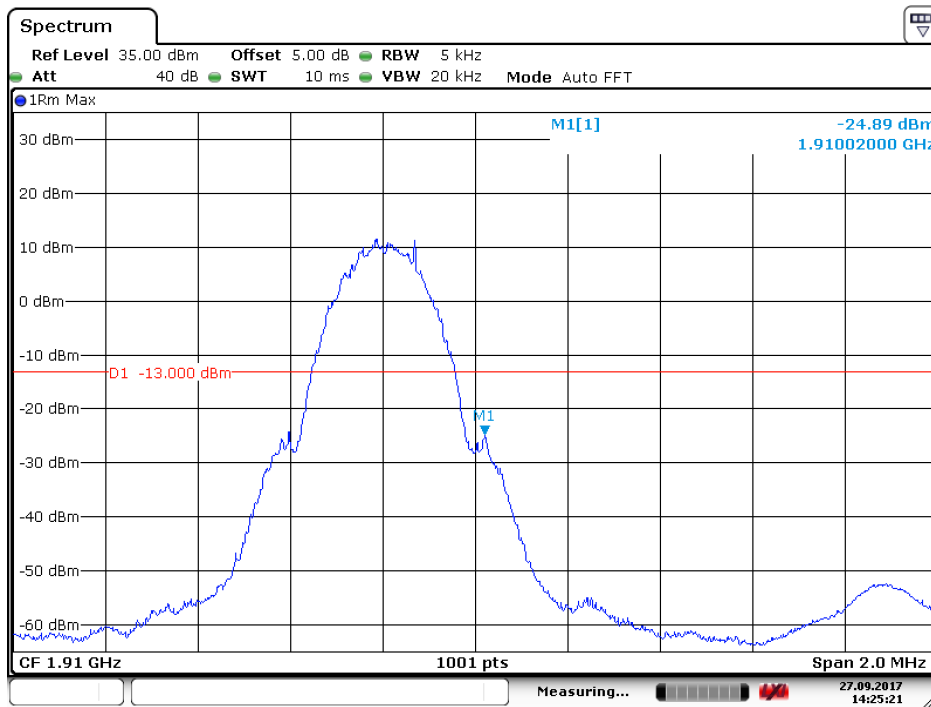
5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH



Date: 27.SEP.2017 14:23:57

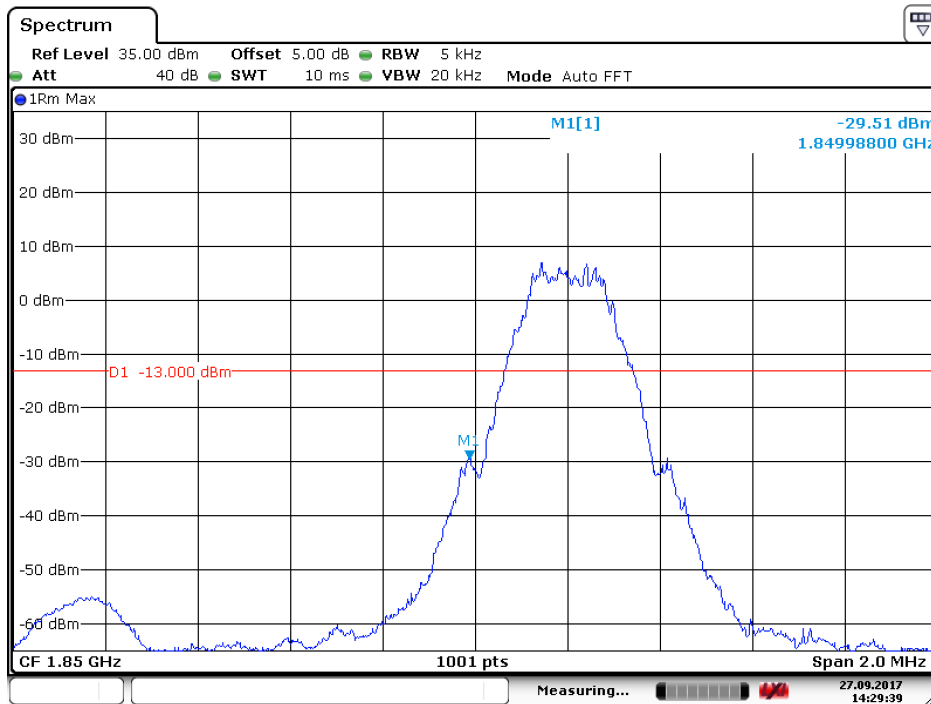
5.1.2.1.2 Test Channel = HCH



Date: 27.SEP.2017 14:25:21

5.1.2.2 Test Mode = GSM/TM2

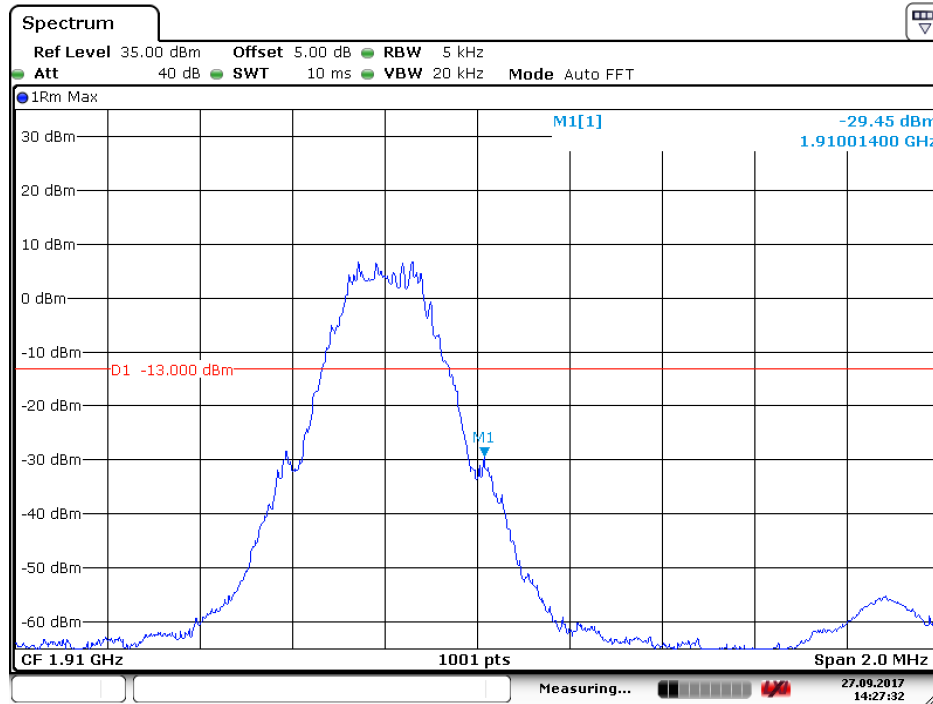
5.1.2.2.1 Test Channel = LCH



Date: 27.SEP.2017 14:29:39



5.1.2.2.2 Test Channel = HCH



Date: 27.SEP.2017 14:27:33

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.

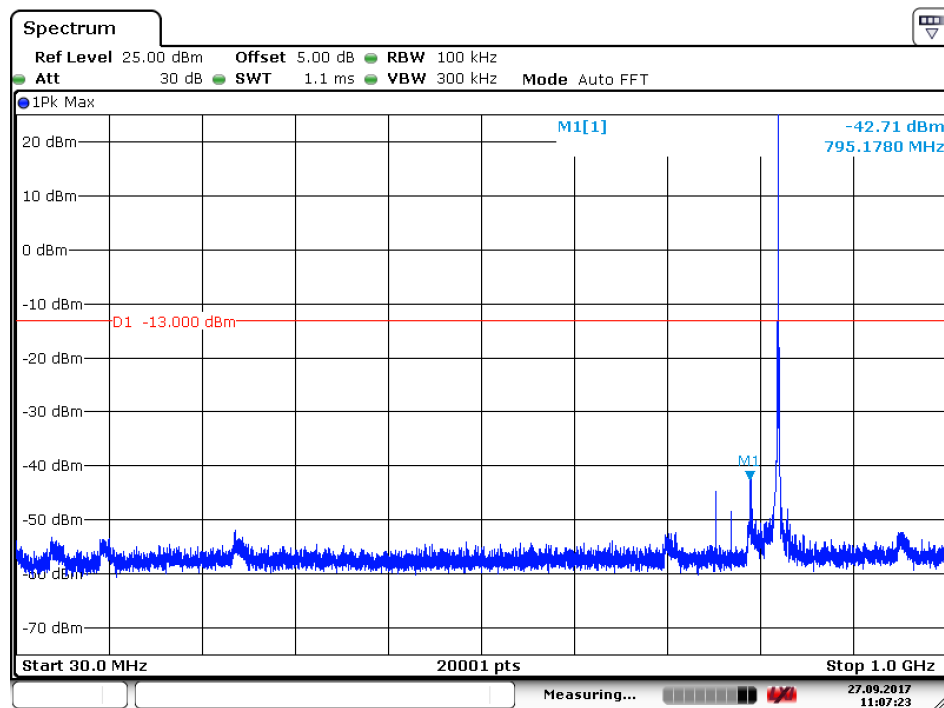
Part I - Test Plots

6.1 For GSM

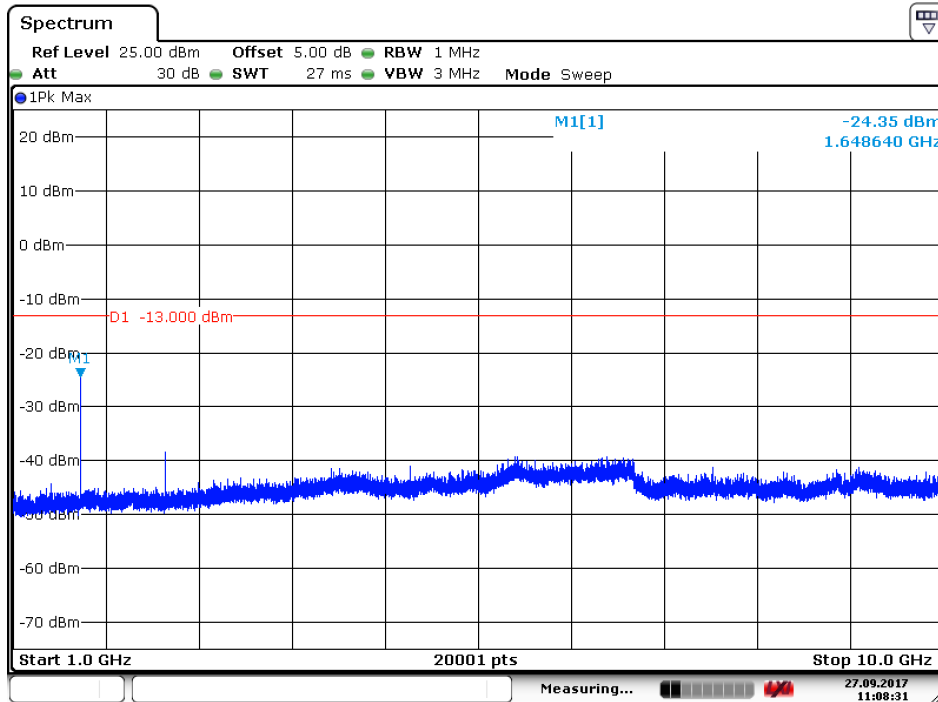
6.1.1 Test Band = GSM 850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH

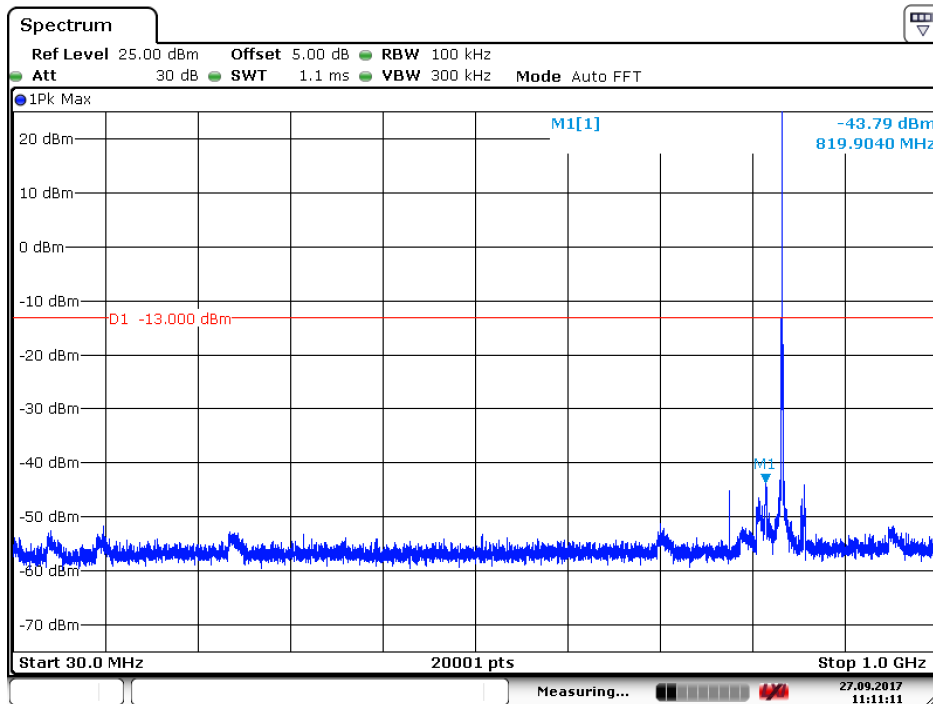


Date: 27.SEP.2017 11:07:24

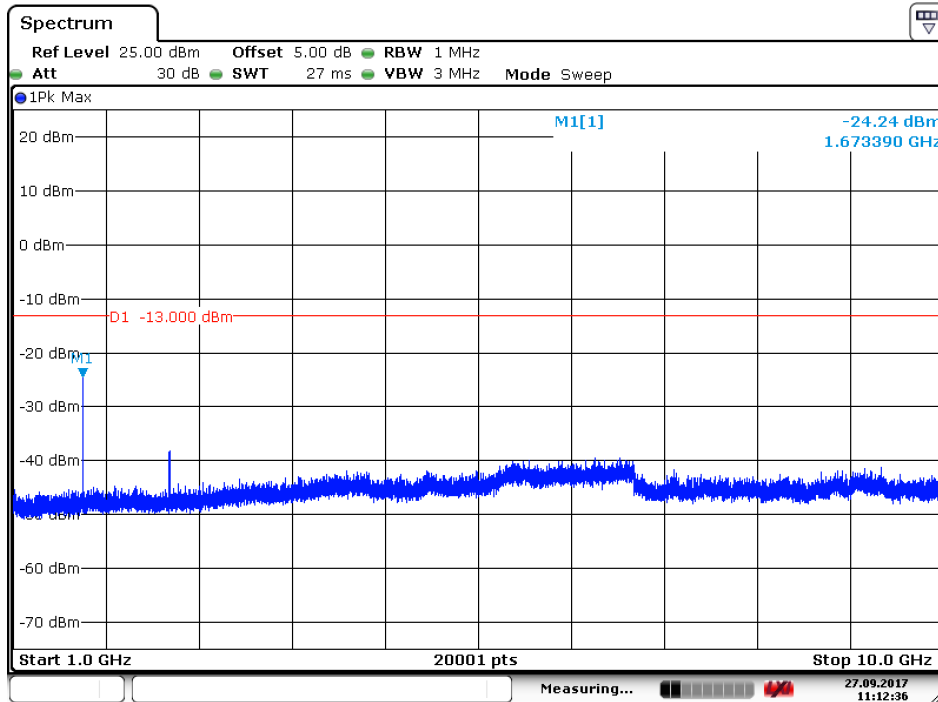


Date: 27.SEP.2017 11:08:32

6.1.1.1.2 Test Channel = MCH

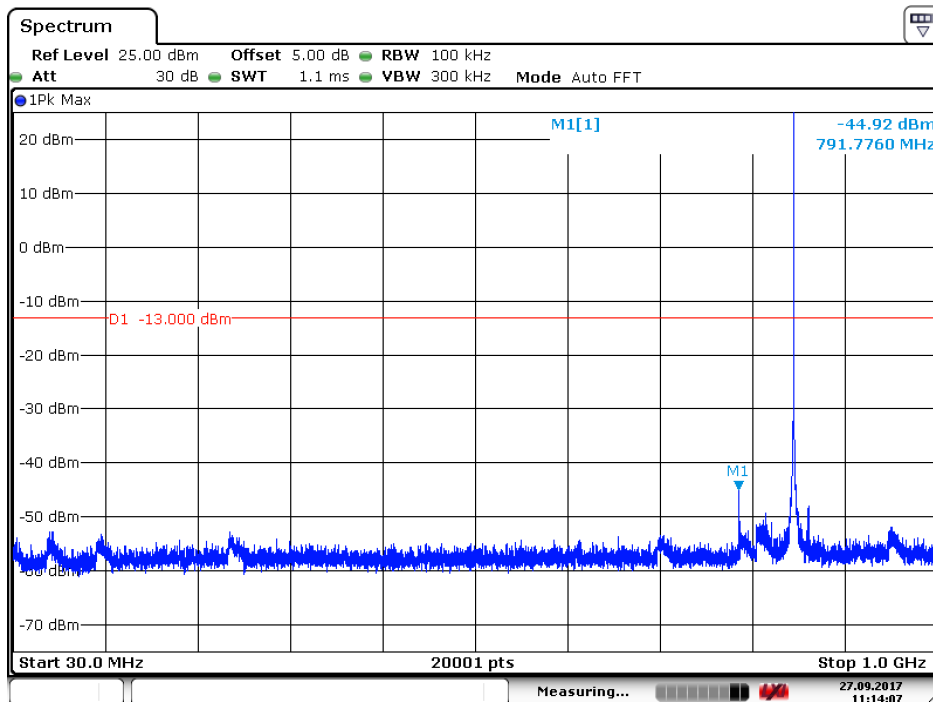


Date: 27.SEP.2017 11:11:12

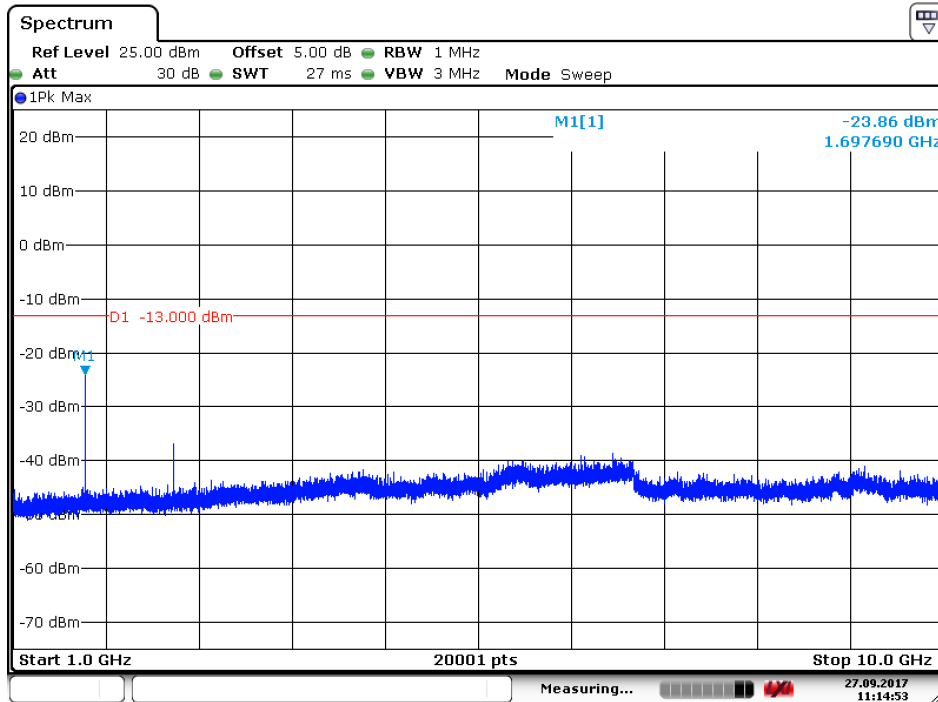


Date: 27.SEP.2017 11:12:36

6.1.1.1.3 Test Channel = HCH



Date: 27.SEP.2017 11:14:07

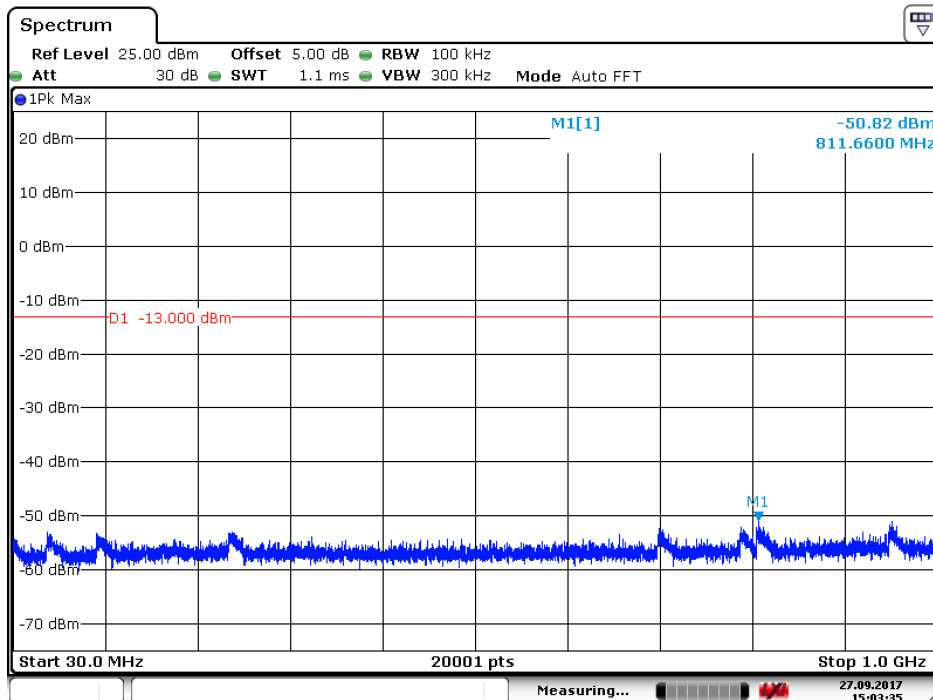


Date: 27.SEP.2017 11:14:53

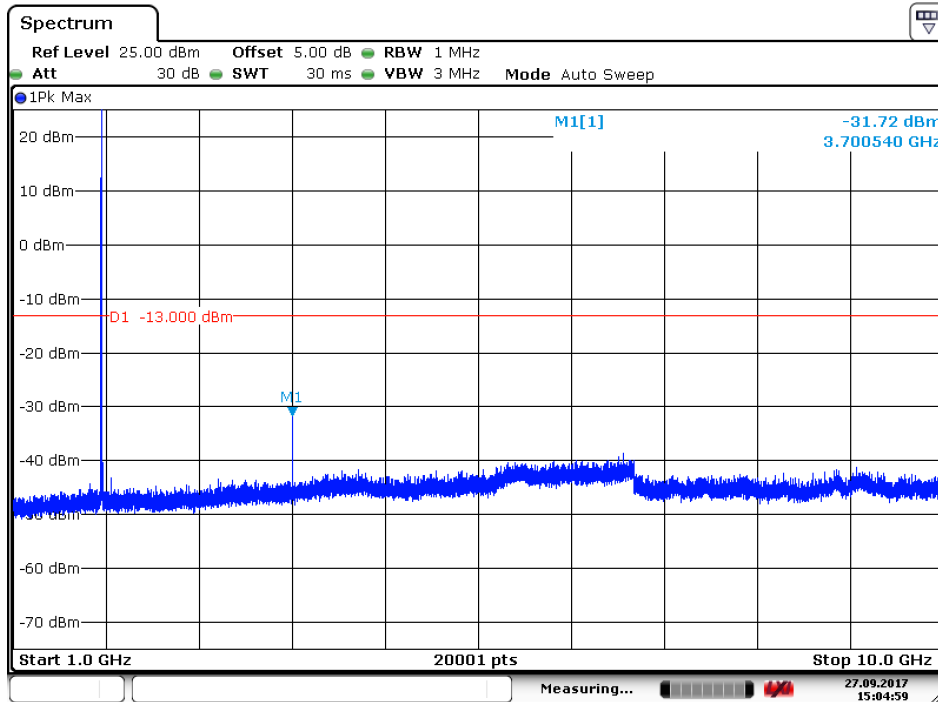
6.1.2 Test Band = GSM 1900

6.1.2.1 Test Mode = GSM/TM1

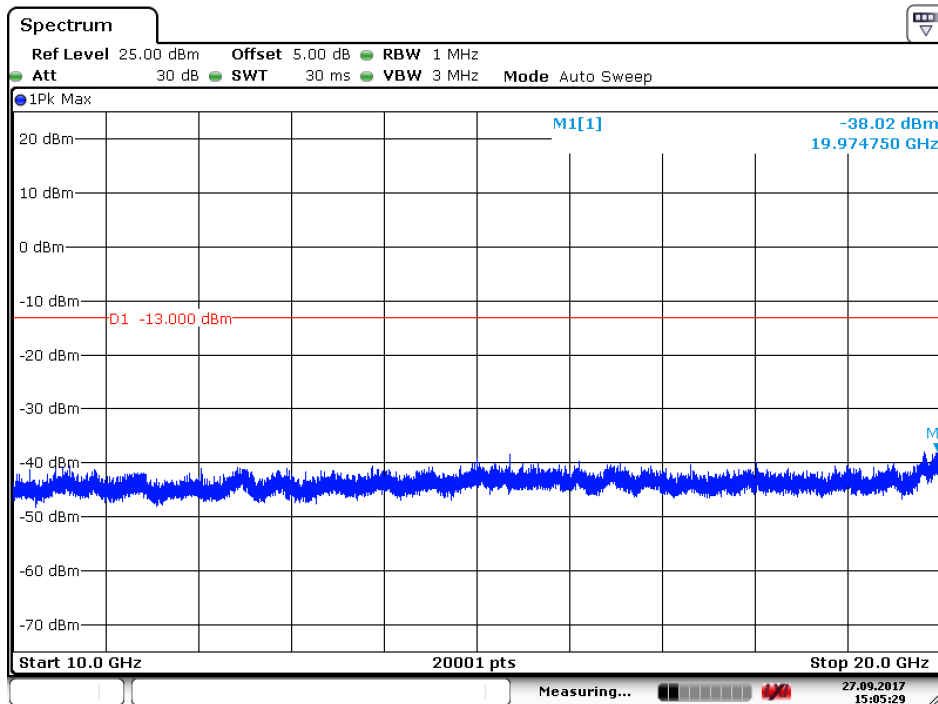
6.1.2.1.1 Test Channel = LCH



Date: 27.SEP.2017 15:03:35



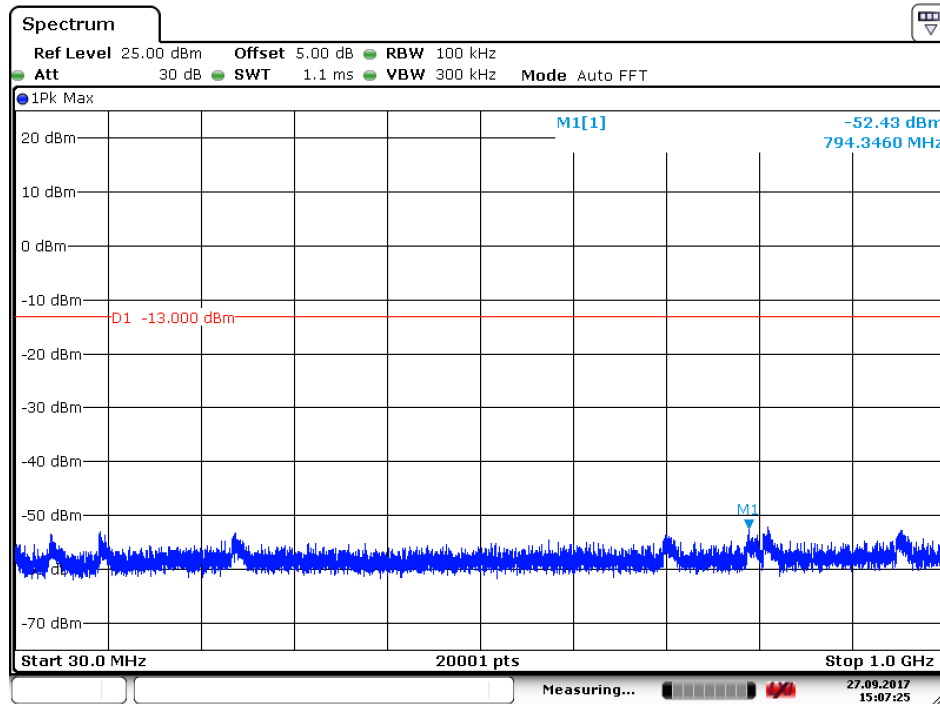
Date: 27.SEP.2017 15:05:00



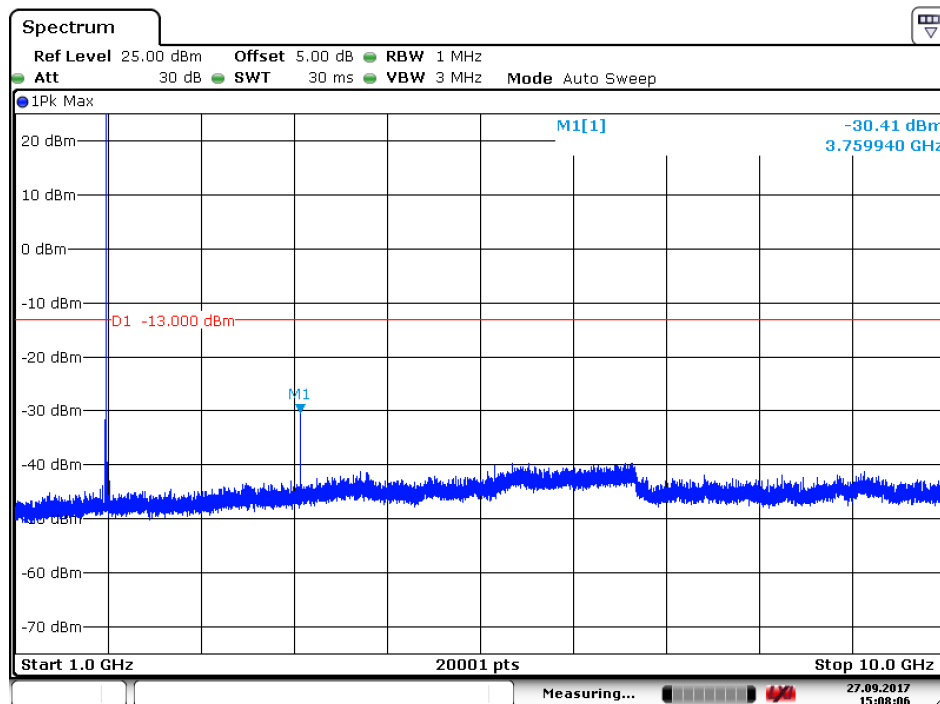
Date: 27.SEP.2017 15:05:29



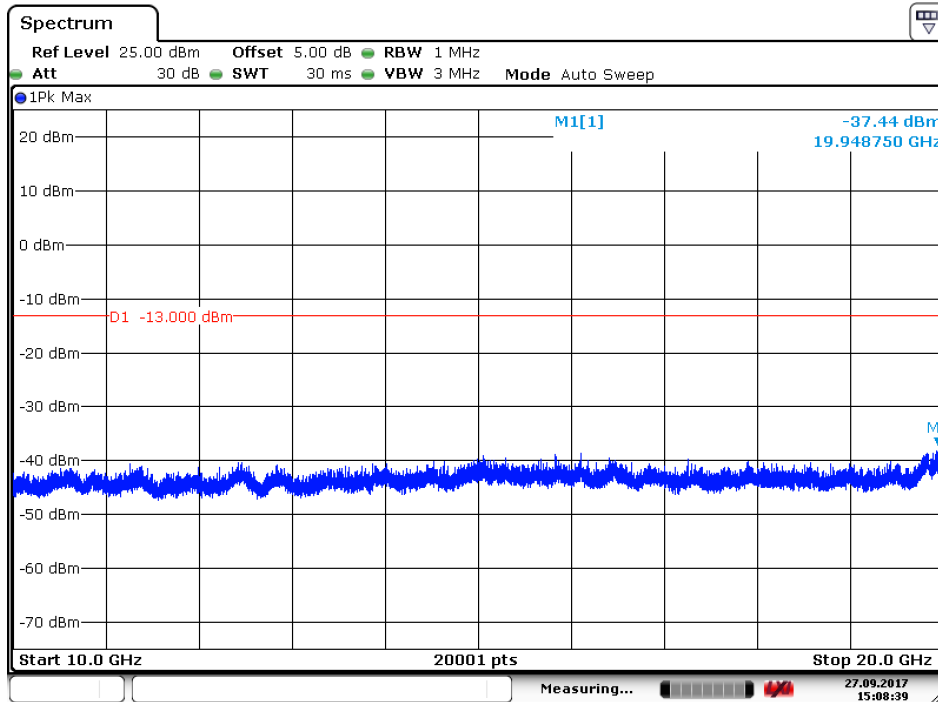
6.1.2.1.2 Test Channel = MCH



Date: 27.SEP.2017 15:07:26

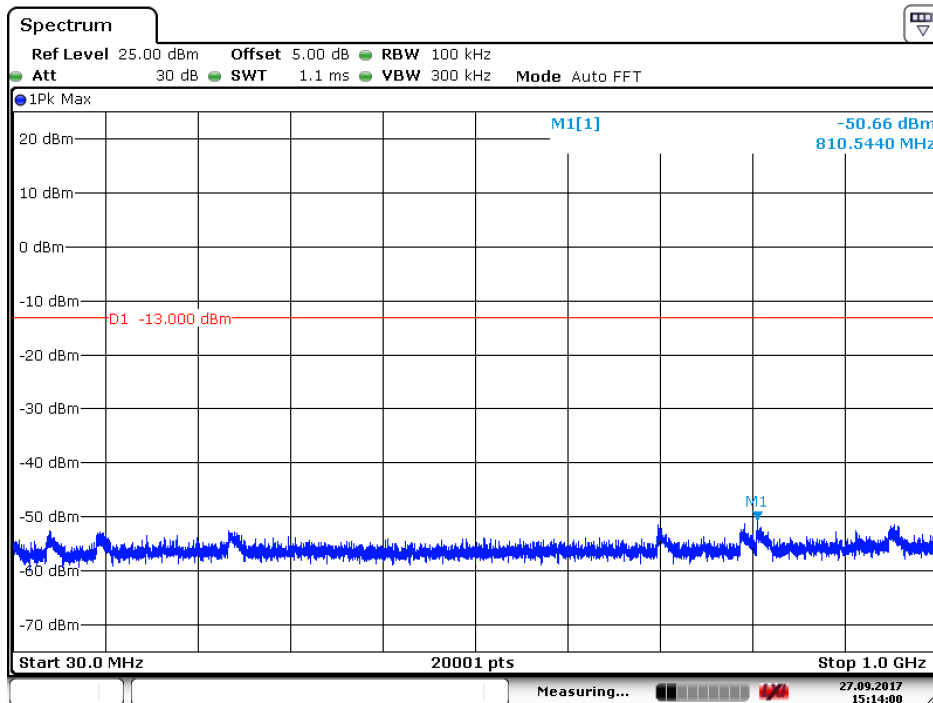


Date: 27.SEP.2017 15:08:06

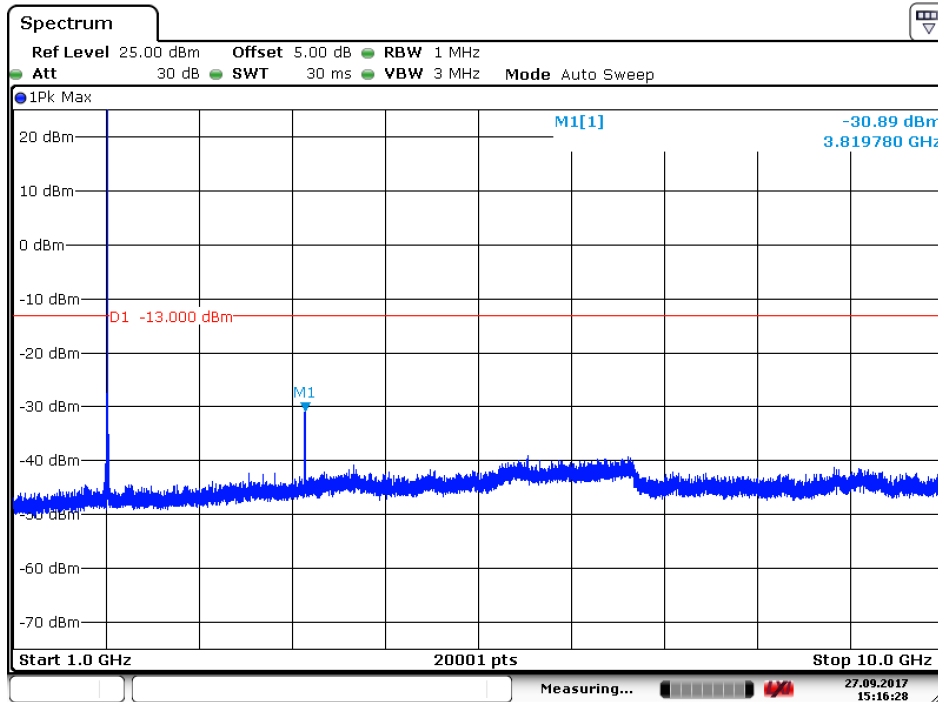


Date: 27.SEP.2017 15:08:40

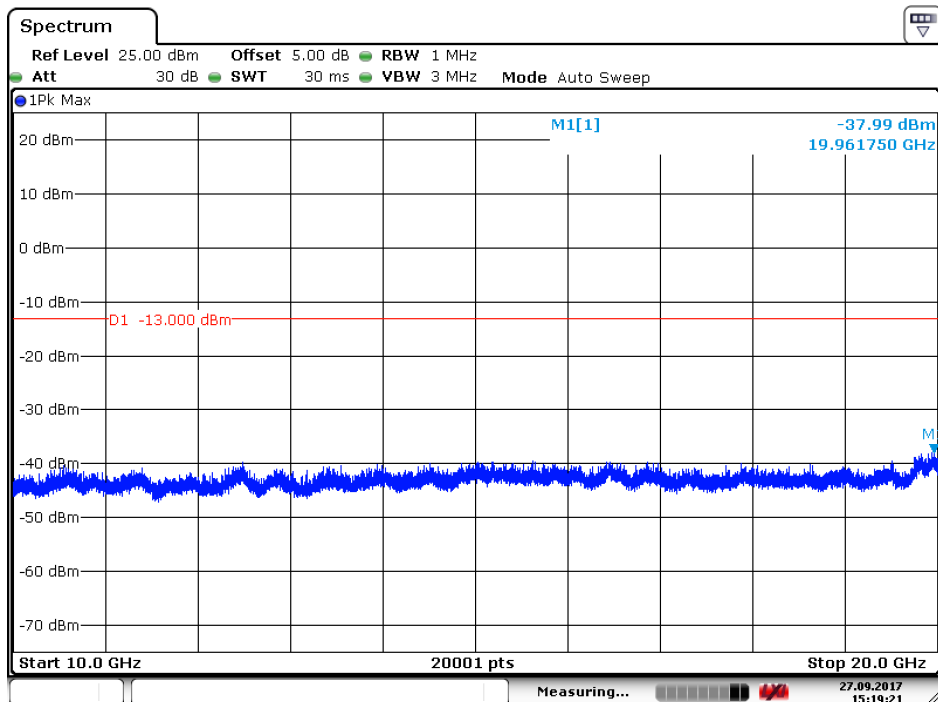
6.1.2.1.3 Test Channel = HCH



Date: 27.SEP.2017 15:14:00



Date: 27.SEP.2017 15:16:28



Date: 27.SEP.2017 15:19:22



7 Field Strength of Spurious Radiation

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
1260.833	-50.90	-13.00	-37.90	Vertical
1979.625	-46.63	-13.00	-33.63	Vertical
4021.875	-51.45	-13.00	-38.45	Vertical
1718.812	-47.91	-13.00	-34.91	Horizontal
2314.875	-44.19	-13.00	-31.19	Horizontal
4343.250	-50.52	-13.00	-37.52	Horizontal

7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1246.666	-51.23	-13.00	-38.23	Vertical
1928.062	-45.66	-13.00	-32.66	Vertical
2695.500	-41.43	-13.00	-38.43	Vertical
1269.166	-51.98	-13.00	-38.98	Horizontal
1540.875	-48.56	-13.00	-35.56	Horizontal
2738.437	-41.22	-13.00	-38.22	Horizontal

7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1245.833	-51.10	-13.00	-38.10	Vertical
2220.000	-44.37	-13.00	-31.37	Vertical
3825.375	-51.62	-13.00	-38.62	Vertical
1517.812	-49.79	-13.00	-36.79	Horizontal
1764.375	-45.80	-13.00	-32.80	Horizontal
2211.937	-42.91	-13.00	-39.91	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
1113.980	-52.41	-13.00	-39.41	Vertical
2192.280	-44.46	-13.00	-31.46	Vertical
4212.375	-50.00	-13.00	-37.00	Vertical
2117.020	-45.44	-13.00	-32.44	Horizontal
2652.320	-42.31	-13.00	-39.31	Horizontal
4052.625	-51.38	-13.00	-38.38	Horizontal

7.1.2.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1123.000	-52.44	-13.00	-39.44	Vertical
2144.580	-45.30	-13.00	-32.30	Vertical
4263.000	-50.82	-13.00	-37.82	Vertical
1232.060	-51.34	-13.00	-38.34	Horizontal
2188.040	-45.20	-13.00	-32.20	Horizontal
4194.375	-51.35	-13.00	-38.35	Horizontal

7.1.2.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1174.660000	-51.70	-13.00	-38.70	Vertical
2144.580000	-45.48	-13.00	-32.48	Vertical
4019.250000	-50.91	-13.00	-37.91	Vertical
1277.980000	-51.84	-13.00	-38.84	Horizontal
2709.560000	-41.66	-13.00	-28.66	Horizontal
4005.000000	-50.71	-13.00	-37.71	Horizontal

NOTE:

- 1) All modes are tested, but the data presented above is the worst case. The disturbance above 13GHz 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 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	2.60	0.00315	PASS
				VN	1.45	0.00176	PASS
				VH	-3.38	-0.00410	PASS
		MCH	TN	VL	-2.73	-0.00326	PASS
				VN	-1.82	-0.00218	PASS
				VH	-4.45	-0.00532	PASS
		HCH	TN	VL	3.01	0.00355	PASS
				VN	-1.92	-0.00226	PASS
				VH	-2.78	-0.00328	PASS
	GSM/TM2	LCH	TN	VL	-3.46	-0.00420	PASS
				VN	1.57	0.00190	PASS
				VH	-2.18	-0.00264	PASS
		MCH	TN	VL	3.03	0.00362	PASS
				VN	2.60	0.00311	PASS
				VH	-4.34	-0.00519	PASS
		HCH	TN	VL	1.43	0.00168	PASS
				VN	-3.14	-0.00370	PASS
				VH	2.73	0.00322	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	-4.23	-0.00229	PASS
				VN	2.24	0.00121	PASS
				VH	2.42	0.00131	PASS
		MCH	TN	VL	1.39	0.00074	PASS
				VN	-2.50	-0.00133	PASS
				VH	5.30	0.00282	PASS
		HCH	TN	VL	-2.58	-0.00135	PASS
				VN	2.47	0.00129	PASS
				VH	-4.64	-0.00243	PASS
	GSM/TM2	LCH	TN	VL	1.20	0.00065	PASS
				VN	-3.27	-0.00177	PASS
				VH	2.48	0.00134	PASS
		MCH	TN	VL	-4.22	-0.00224	PASS
				VN	1.49	0.00079	PASS
				VH	4.54	0.00241	PASS
		HCH	TN	VL	-2.43	-0.00127	PASS
				VN	3.51	0.00184	PASS
				VH	-4.32	-0.00226	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	-4.72	-0.00573	PASS
				-20	1.83	0.00222	PASS
				-10	1.02	0.00124	PASS
				0	-2.60	-0.00315	PASS
				10	0.69	0.00084	PASS
				20	-4.33	-0.00525	PASS
				30	1.79	0.00217	PASS
				40	-3.48	-0.00422	PASS
				50	-6.20	-0.00752	PASS
		MCH	VN	-30	-2.98	-0.00356	PASS
				-20	-5.05	-0.00604	PASS
				-10	-0.47	-0.00056	PASS
				0	-3.53	-0.00422	PASS
				10	1.32	0.00158	PASS
				20	2.80	0.00335	PASS
				30	1.58	0.00189	PASS
				40	2.67	0.00319	PASS
				50	-4.32	-0.00516	PASS
		HCH	VN	-30	-0.54	-0.00064	PASS
				-20	3.37	0.00397	PASS
				-10	3.19	0.00376	PASS
				0	-5.52	-0.00650	PASS
				10	1.54	0.00181	PASS
				20	-2.87	-0.00338	PASS
				30	3.75	0.00442	PASS
				40	-2.66	-0.00313	PASS
				50	-4.50	-0.00530	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	-2.62	-0.00318	PASS
				-20	2.01	0.00244	PASS
				-10	-5.15	-0.00625	PASS
				0	1.52	0.00184	PASS
				10	-5.34	-0.00648	PASS
				20	-4.10	-0.00497	PASS
				30	-4.26	-0.00517	PASS
				40	-5.63	-0.00683	PASS
				50	-2.65	-0.00322	PASS
		MCH	VN	-30	-2.49	-0.00298	PASS
				-20	3.07	0.00367	PASS
				-10	-4.23	-0.00506	PASS
				0	1.95	0.00233	PASS
				10	-5.16	-0.00617	PASS
				20	-3.56	-0.00426	PASS
				30	-2.09	-0.00250	PASS
				40	3.12	0.00373	PASS
				50	-5.59	-0.00668	PASS
		HCH	VN	-30	-3.07	-0.00362	PASS
				-20	-5.72	-0.00674	PASS
				-10	-2.71	-0.00319	PASS
				0	-5.32	-0.00627	PASS
				10	1.05	0.00124	PASS
				20	-4.33	-0.00510	PASS
				30	3.15	0.00371	PASS
				40	-2.86	-0.00337	PASS
				50	-5.08	-0.00598	PASS



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Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM 1900	GSM/TM1	LCH	VN	-30	-3.42	-0.00185	PASS
				-20	-4.89	-0.00264	PASS
				-10	2.05	0.00111	PASS
				0	-3.55	-0.00192	PASS
				10	-1.59	-0.00086	PASS
				20	1.35	0.00073	PASS
				30	-3.93	-0.00212	PASS
				40	-5.01	-0.00271	PASS
				50	-3.44	-0.00186	PASS
		MCH	VN	-30	-4.90	-0.00261	PASS
				-20	1.29	0.00069	PASS
				-10	-2.42	-0.00129	PASS
				0	4.55	0.00242	PASS
				10	-3.27	-0.00174	PASS
				20	-6.30	-0.00335	PASS
				30	-3.33	-0.00177	PASS
				40	-4.11	-0.00219	PASS
				50	-5.20	-0.00277	PASS
		HCH	VN	-30	-2.92	-0.00153	PASS
				-20	3.66	0.00192	PASS
				-10	1.83	0.00096	PASS
				0	-0.89	-0.00047	PASS
				10	-3.18	-0.00167	PASS
				20	-4.19	-0.00219	PASS
				30	1.35	0.00071	PASS
				40	-3.09	-0.00162	PASS
				50	-4.14	-0.00217	PASS



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Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM 1900	GSM/TM2	LCH	VN	-30	-2.63	-0.00142	PASS
				-20	-4.30	-0.00232	PASS
				-10	1.50	0.00081	PASS
				0	-2.49	-0.00135	PASS
				10	-2.99	-0.00162	PASS
				20	-4.56	-0.00246	PASS
				30	1.20	0.00065	PASS
				40	-3.31	-0.00179	PASS
				50	-6.18	-0.00334	PASS
		MCH	VN	-30	-5.26	-0.00280	PASS
				-20	-2.46	-0.00131	PASS
				-10	-4.50	-0.00239	PASS
				0	1.70	0.00090	PASS
				10	-5.37	-0.00286	PASS
				20	-2.74	-0.00146	PASS
				30	-3.58	-0.00190	PASS
				40	1.57	0.00084	PASS
				50	-5.30	-0.00282	PASS
		HCH	VN	-30	-3.08	-0.00161	PASS
				-20	2.76	0.00145	PASS
				-10	1.34	0.00070	PASS
				0	-5.29	-0.00277	PASS
				10	-6.73	-0.00352	PASS
				20	-3.94	-0.00206	PASS
				30	-2.40	-0.00126	PASS
				40	-2.29	-0.00120	PASS
				50	-5.82	-0.00305	PASS

The End