



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[dBm]	ERP[dBm]	Limit[dBm]	Verdict
GSM 850	GSM/TM1	LCH	31.28	29.68	38.45	PASS
		MCH	31.35	29.75	38.45	PASS
		HCH	31.34	29.74	38.45	PASS
	GSM/TM2	LCH	26.04	24.44	38.45	PASS
		MCH	26.10	24.50	38.45	PASS
		HCH	25.98	24.38	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[dBm]	EIRP[dBm]	Limit[dBm]	Verdict
GSM 1900	GSM/TM1	LCH	27.94	27.24	33	PASS
		MCH	27.97	27.27	33	PASS
		HCH	28.02	27.32	33	PASS
	GSM/TM2	LCH	24.27	23.57	33	PASS
		MCH	24.41	23.71	33	PASS
		HCH	24.70	24.00	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	6.43	13	PASS
		MCH	6.38	13	PASS
		HCH	6.38	13	PASS
	GSM/TM2	LCH	8.26	13	PASS
		MCH	8.20	13	PASS
		HCH	8.49	13	PASS
GSM 1900	GSM/TM1	LCH	6.46	13	PASS
		MCH	6.43	13	PASS
		HCH	6.43	13	PASS
	GSM/TM2	LCH	8.58	13	PASS
		MCH	8.29	13	PASS
		HCH	8.26	13	PASS



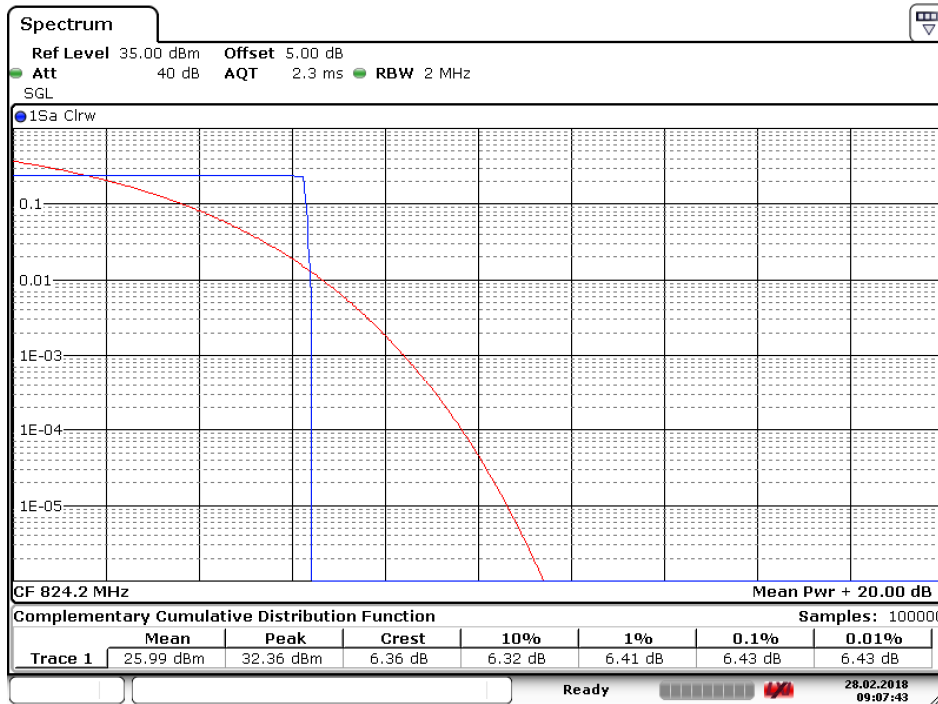
Part II - Test Plots

2.1 For GSM

2.1.1 Test Band = GSM 850

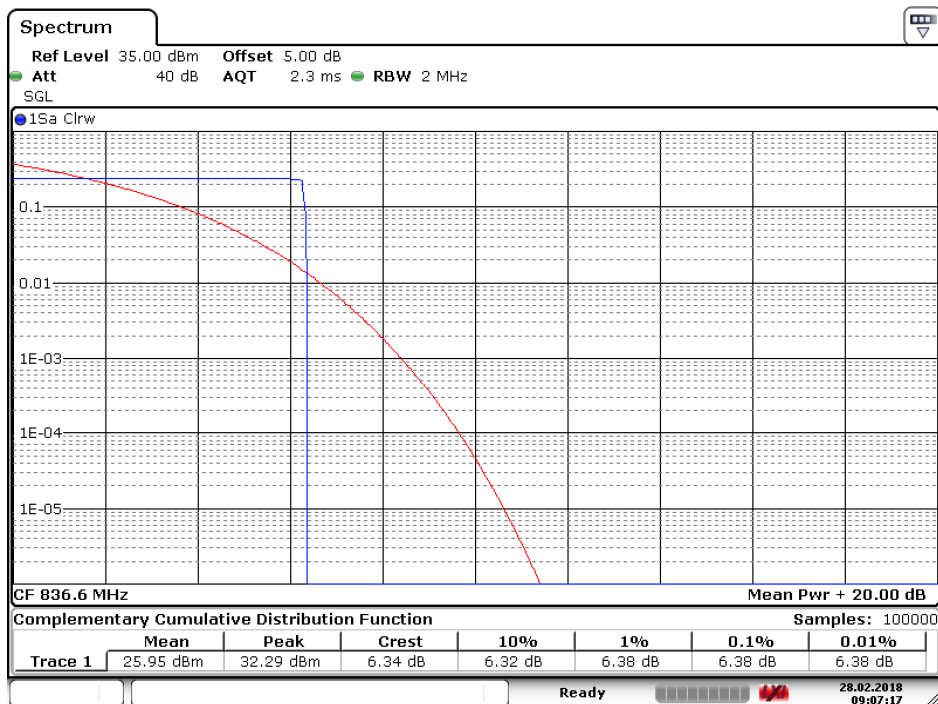
2.1.1.1 Test Mode = GSM/TM1

2.1.1.1.1 Test Channel = LCH



Date: 28.FEB.2018 09:07:43

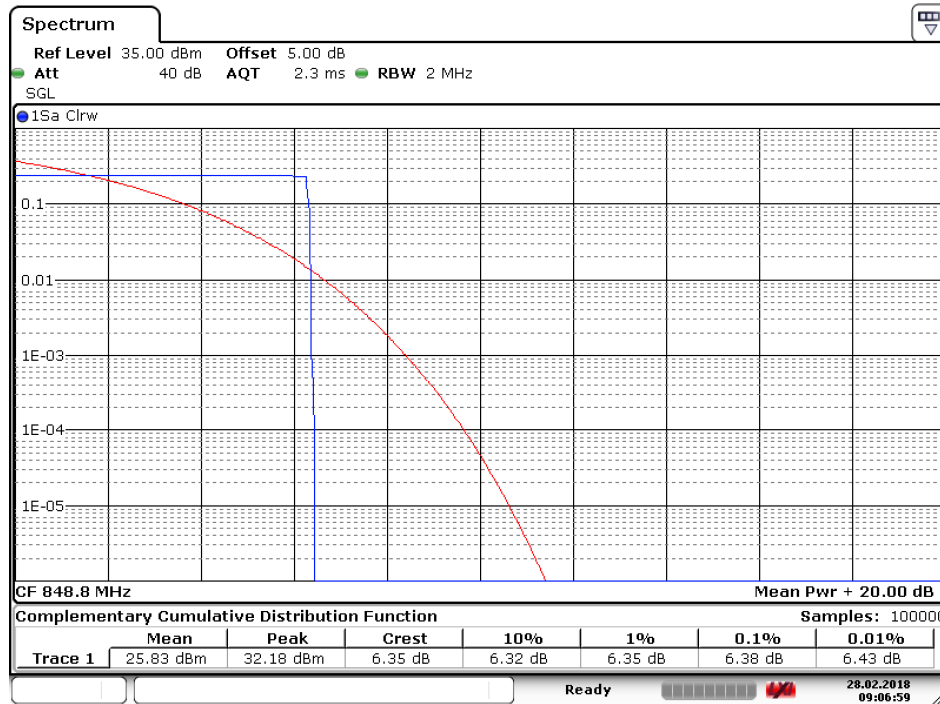
2.1.1.1.2 Test Channel = MCH



Date: 28.FEB.2018 09:07:17



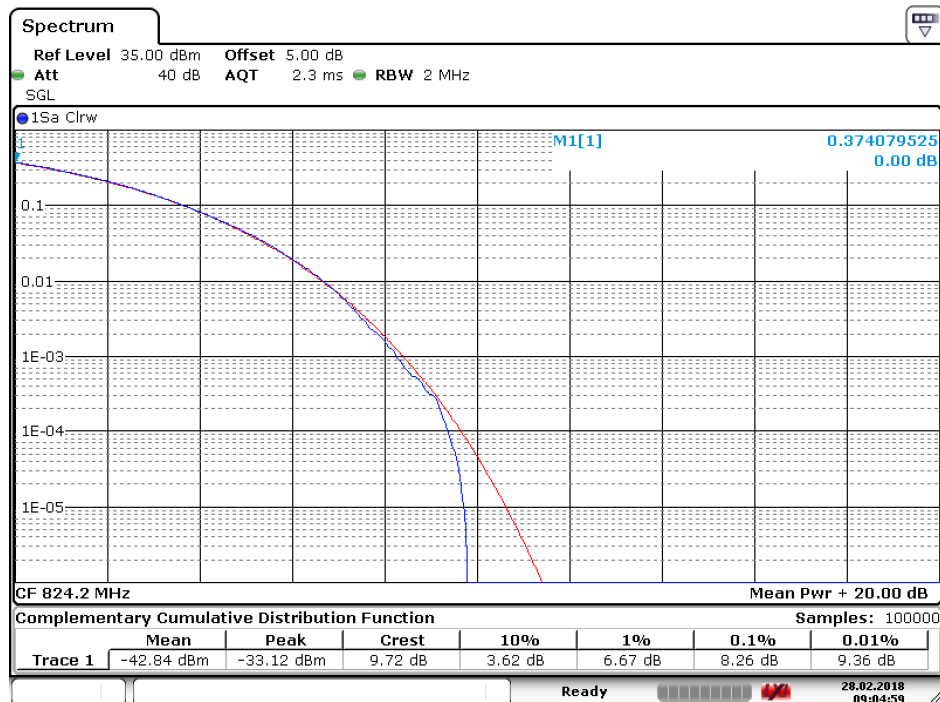
2.1.1.1.3 Test Channel = HCH



Date: 28.FEB.2018 09:06:59

2.1.1.2 Test Mode = GSM/TM2

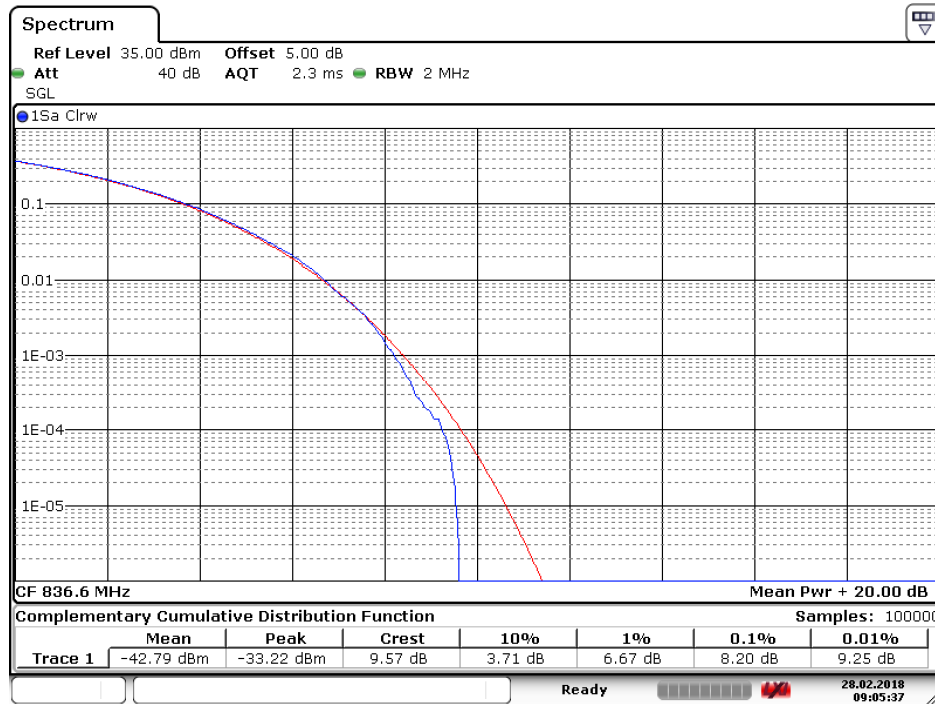
2.1.1.2.1 Test Channel = LCH



Date: 28.FEB.2018 09:04:59

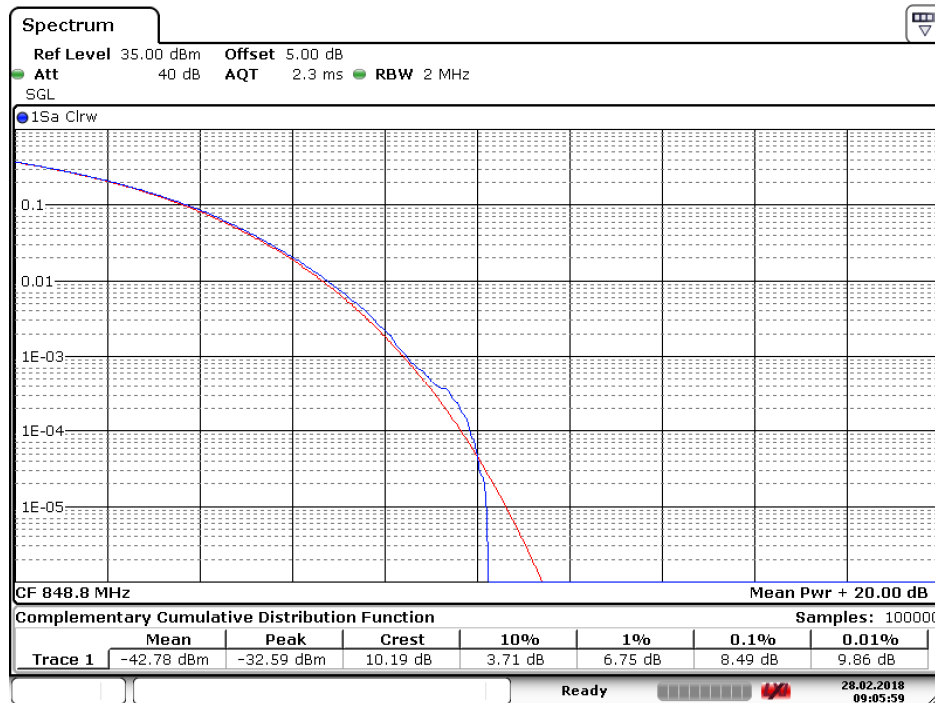


2.1.1.2.2 Test Channel = MCH



Date: 28.FEB.2018 09:05:38

2.1.1.2.3 Test Channel = HCH



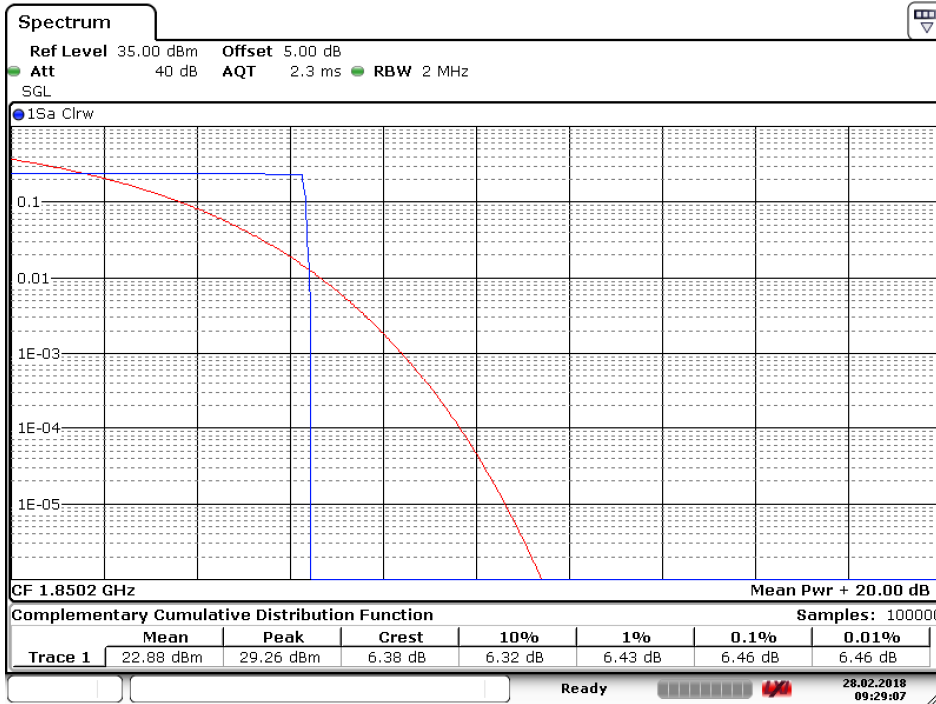
Date: 28.FEB.2018 09:05:59



2.1.2 Test Band = GSM 1900

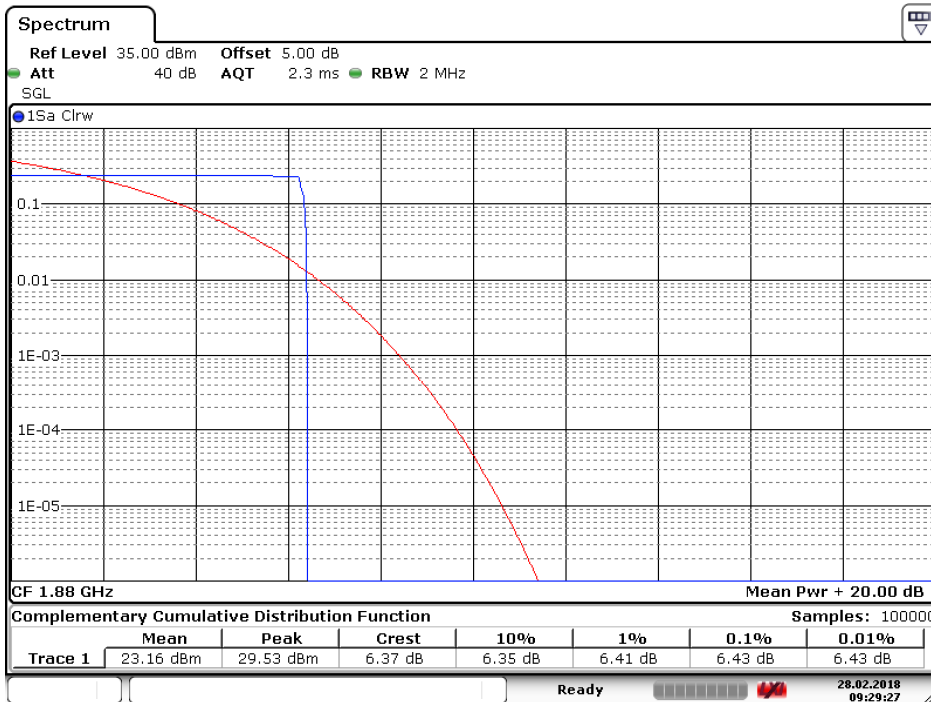
2.1.2.1 Test Mode = GSM/TM1

2.1.2.1.1 Test Channel = LCH



Date: 28.FEB.2018 09:29:07

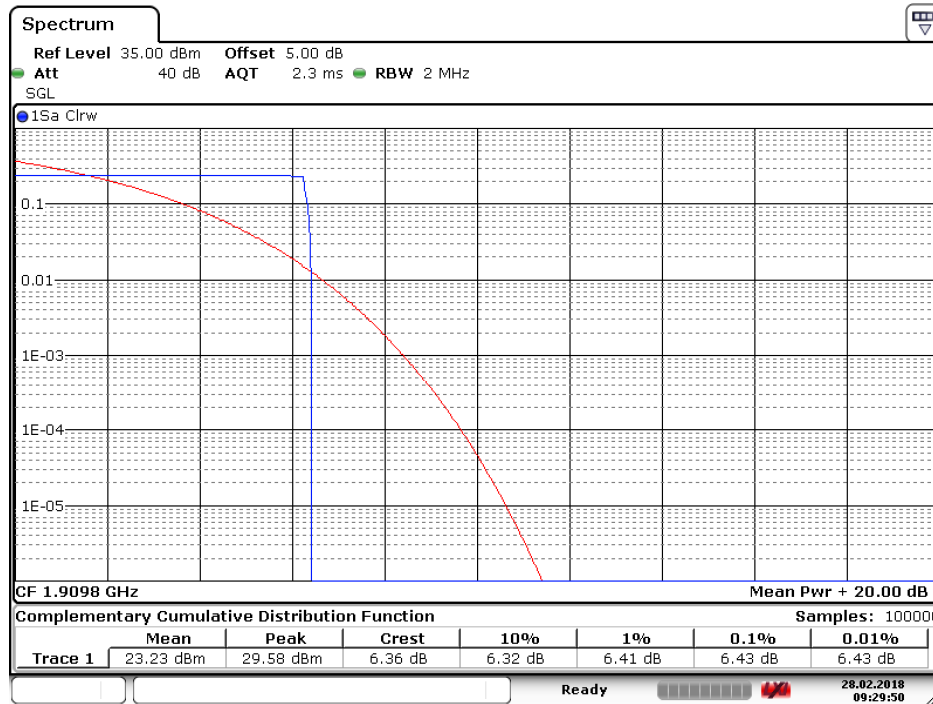
2.1.2.1.2 Test Channel = MCH



Date: 28.FEB.2018 09:29:27



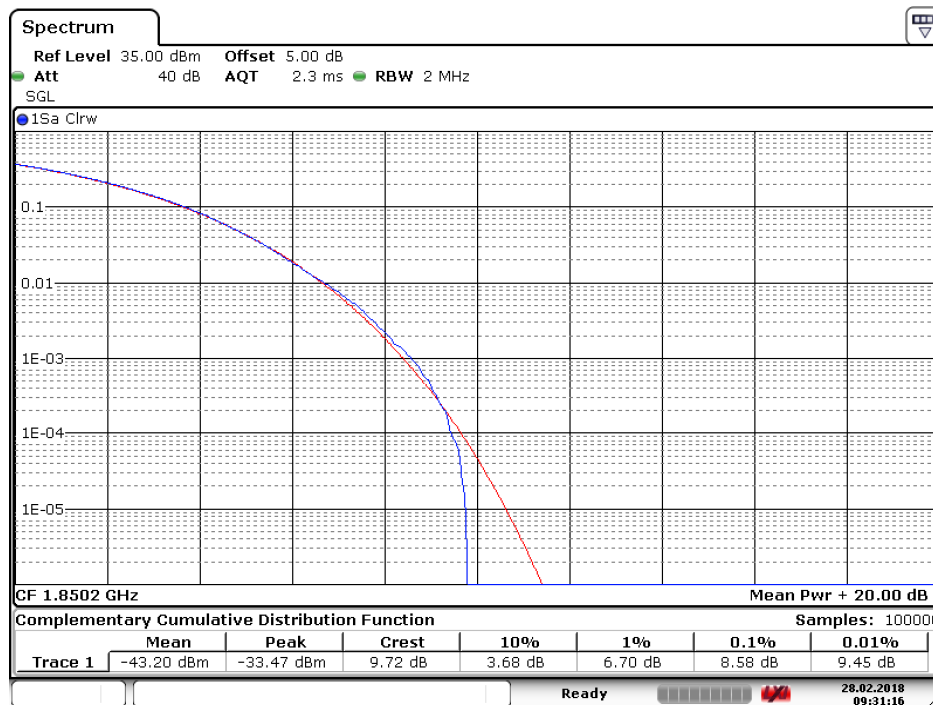
2.1.2.1.3 Test Channel = HCH



Date: 28.FEB.2018 09:29:51

2.1.2.2 Test Mode = GSM/TM2

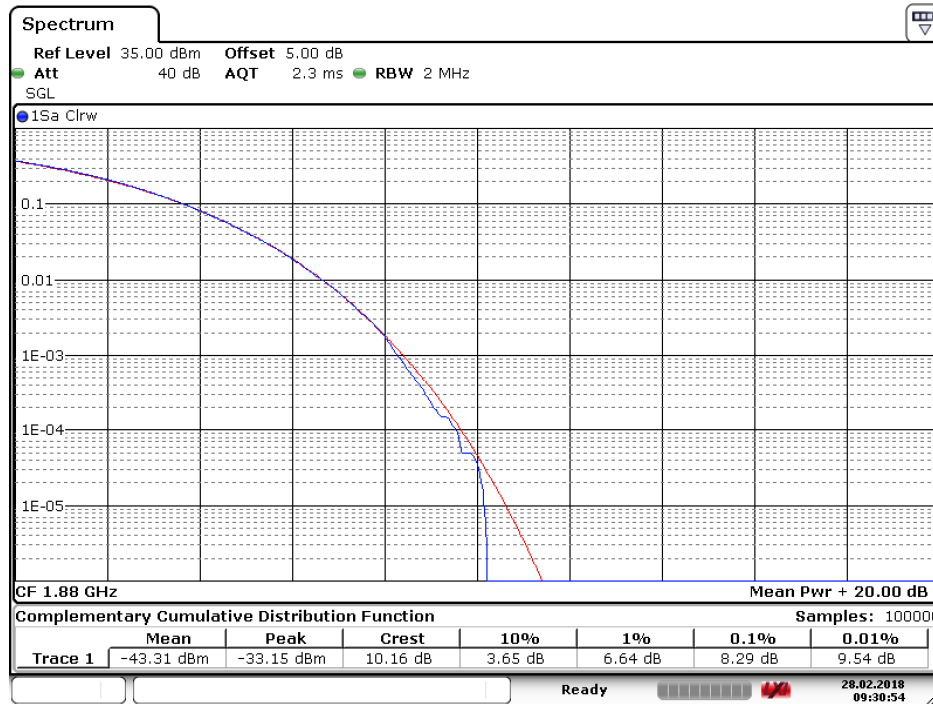
2.1.2.2.1 Test Channel = LCH



Date: 28.FEB.2018 09:31:17

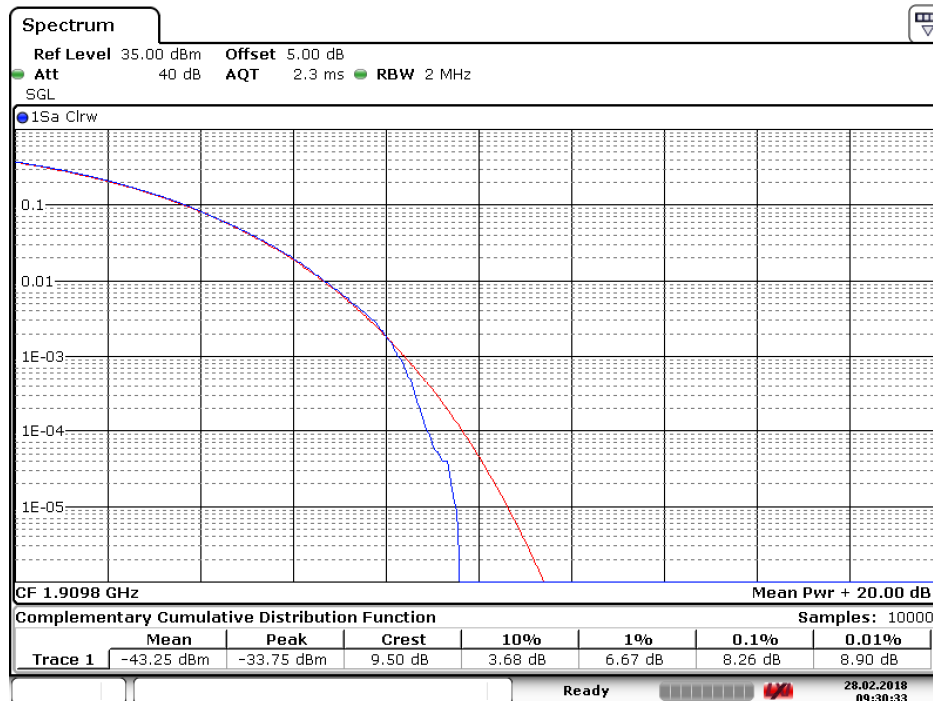


2.1.2.2.2 Test Channel = MCH



Date: 28.FEB.2018 09:30:54

2.1.2.2.3 Test Channel = HCH



Date: 28.FEB.2018 09:30:34

3 Modulation Characteristics

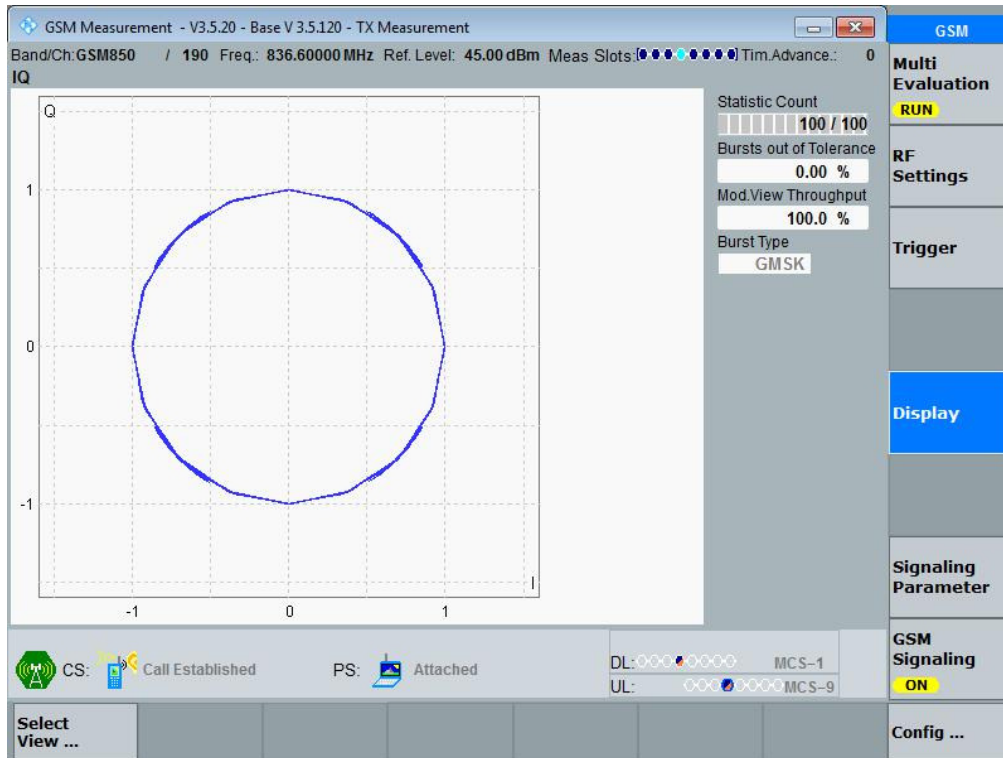
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM 850

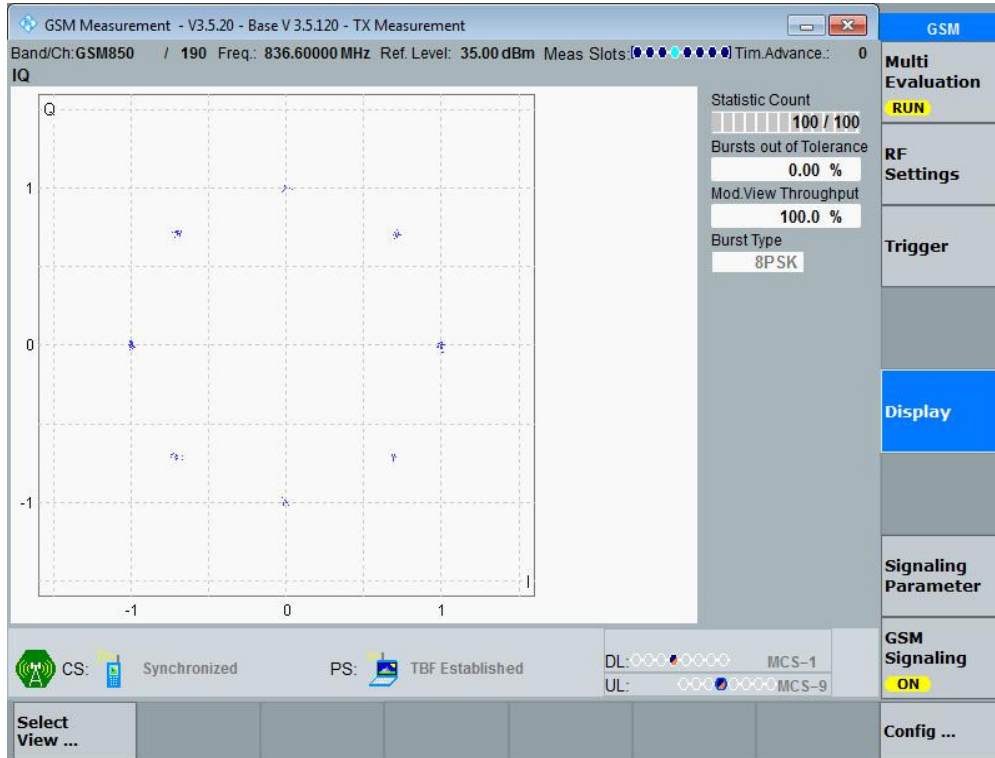
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

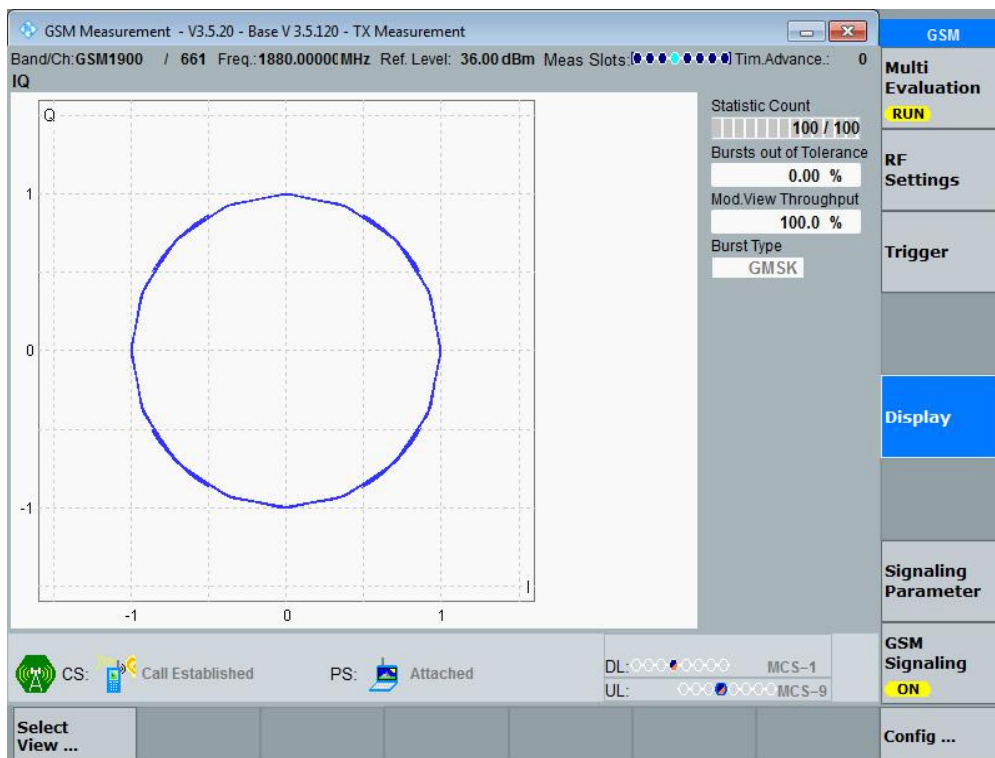
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM 1900

3.1.2.1 Test Mode = GSM/TM1

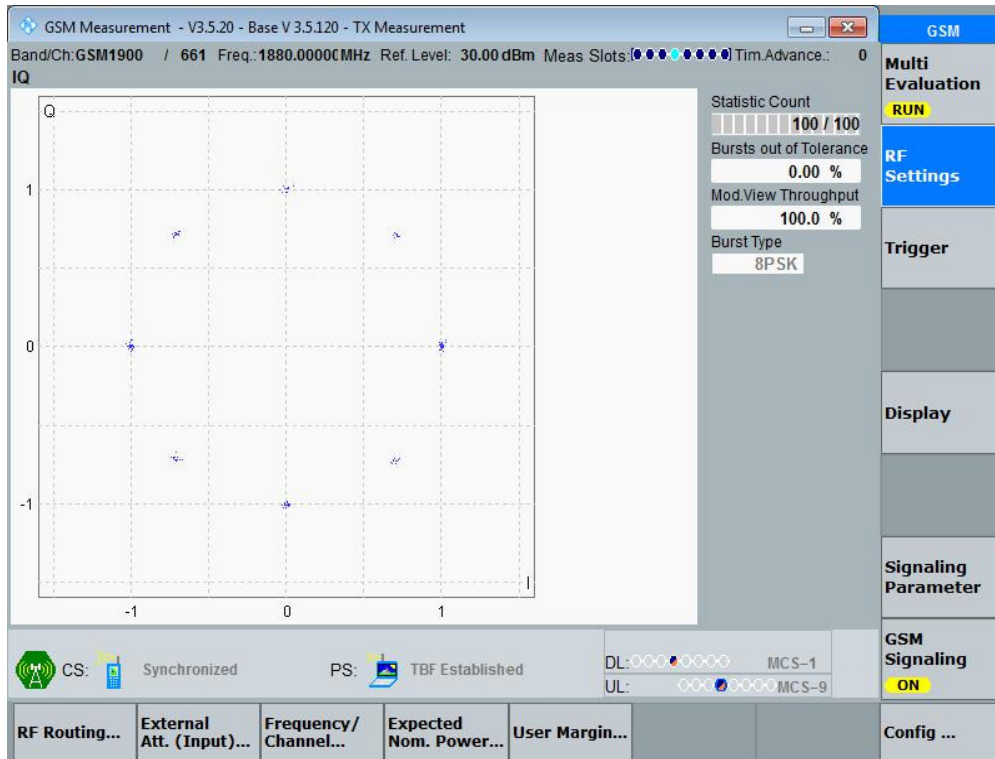
3.1.2.1.1 Test Channel = MCH





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	244.8	318.7	PASS
		MCH	245.8	314.7	PASS
		HCH	245.8	312.7	PASS
	GSM/TM2	LCH	239.8	316.7	PASS
		MCH	243.8	320.7	PASS
		HCH	238.8	316.7	PASS
GSM 1900	GSM/TM1	LCH	243.8	311.7	PASS
		MCH	242.8	309.7	PASS
		HCH	242.8	314.7	PASS
	GSM/TM2	LCH	239.8	313.7	PASS
		MCH	244.8	315.7	PASS
		HCH	240.8	312.7	PASS

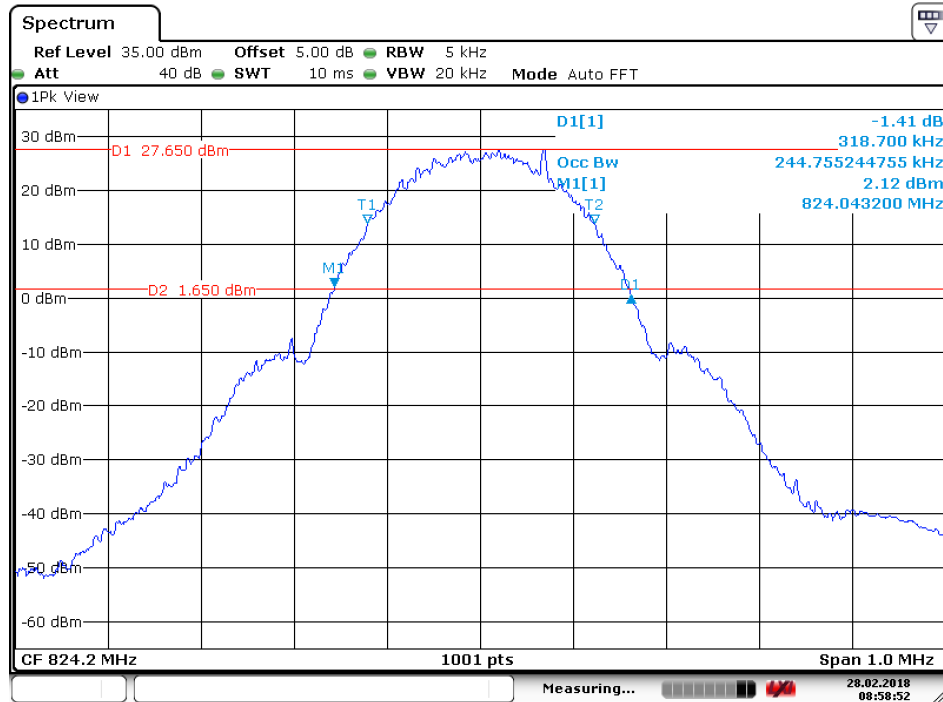


4.1 For GSM

4.1.1 Test Band = GSM 850

4.1.1.1 Test Mode = GSM/TM1

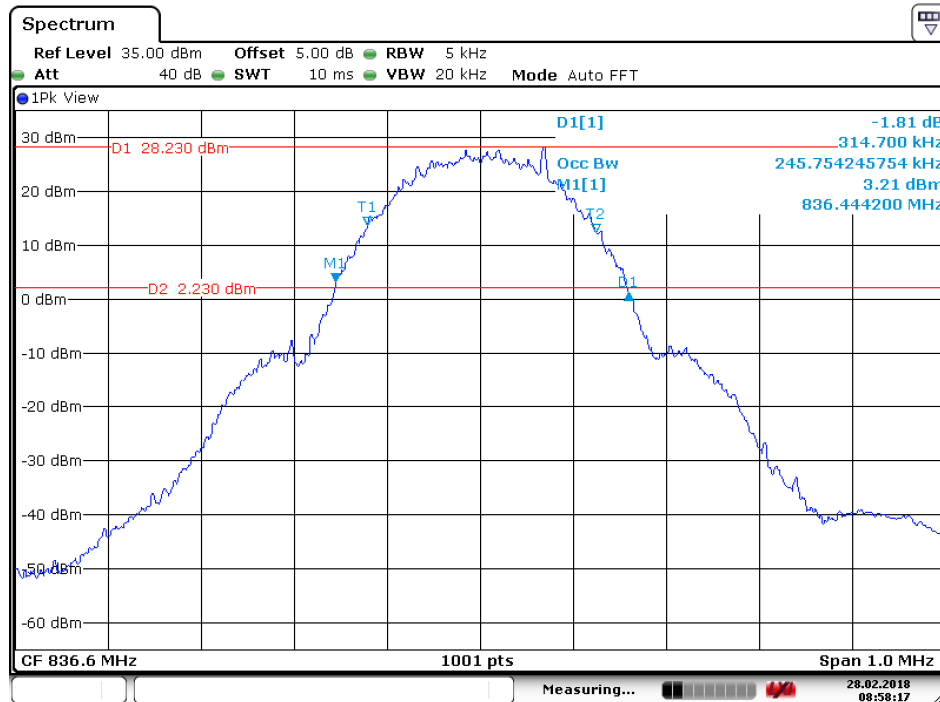
4.1.1.1.1 Test Channel = LCH



Date: 28.FEB.2018 08:58:53

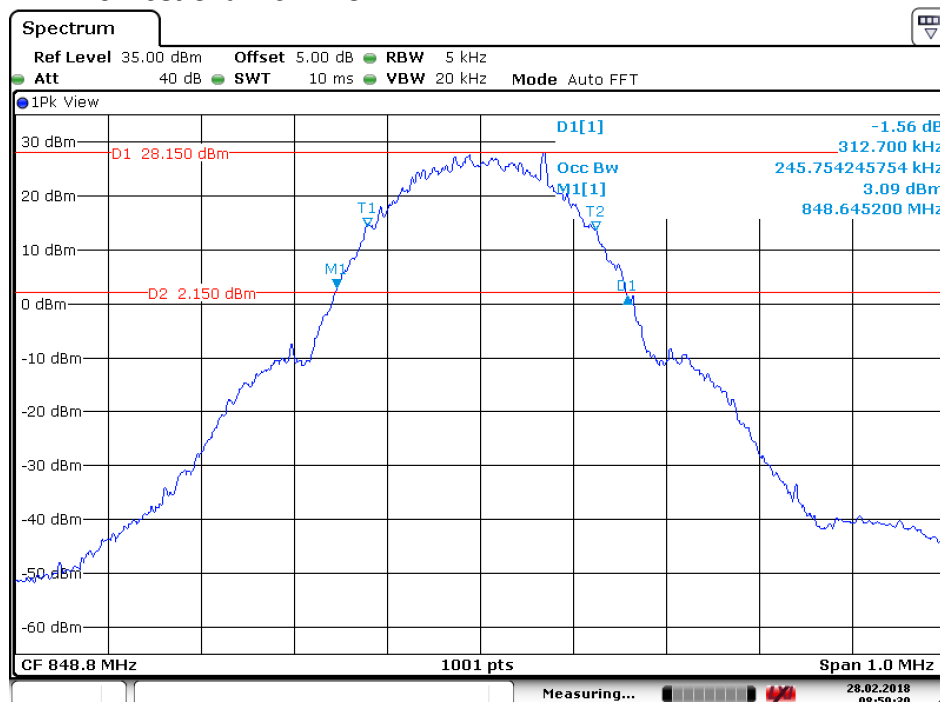


4.1.1.1.2 Test Channel = MCH



Date: 28.FEB.2018 08:58:17

4.1.1.1.3 Test Channel = HCH

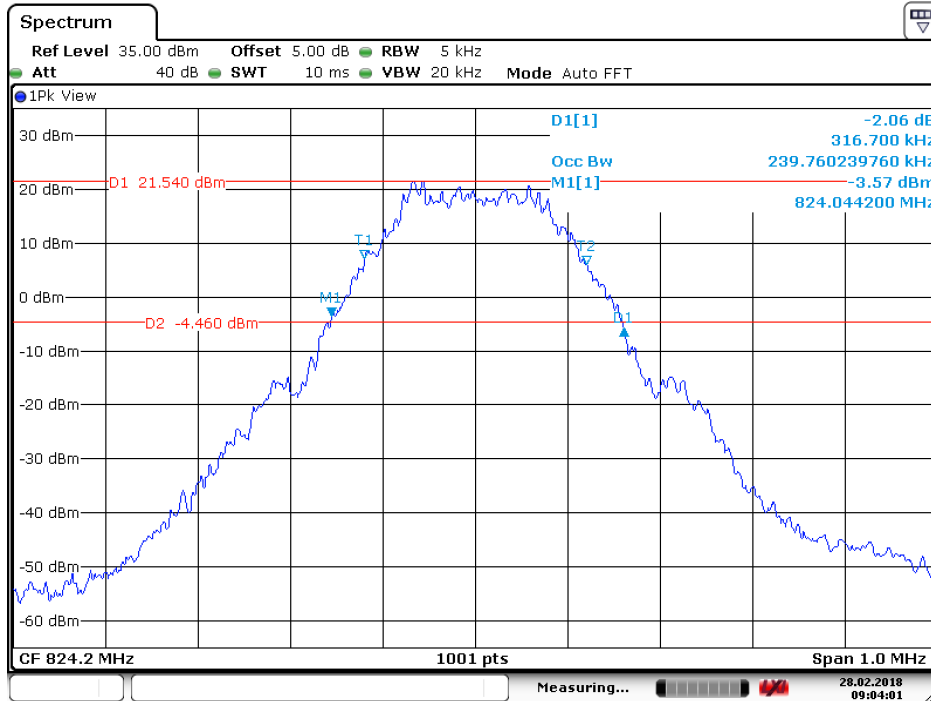


Date: 28.FEB.2018 08:59:30



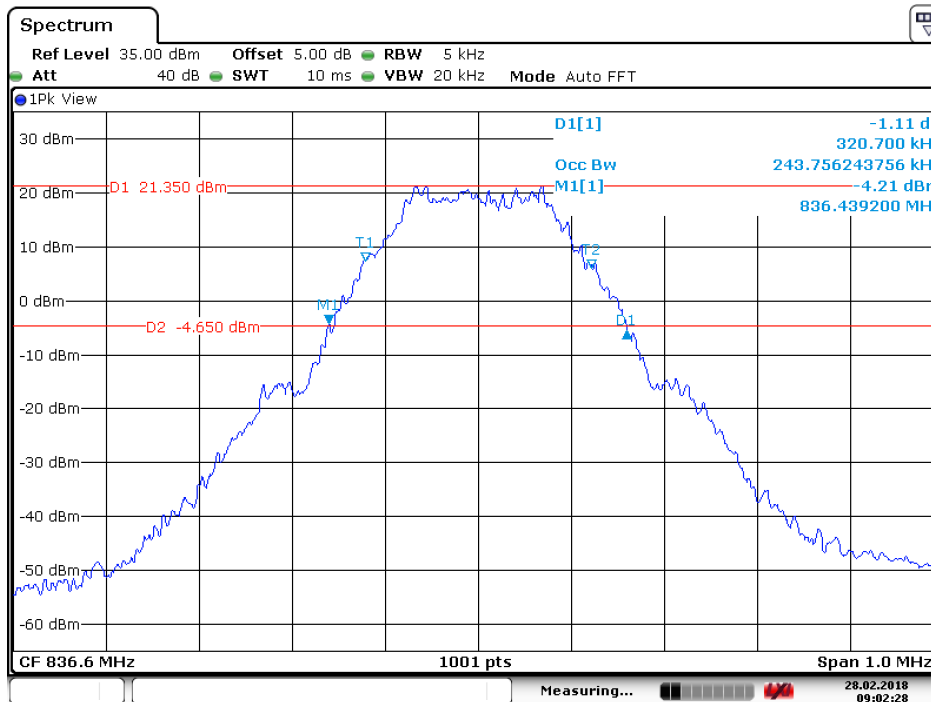
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



Date: 28.FEB.2018 09:04:02

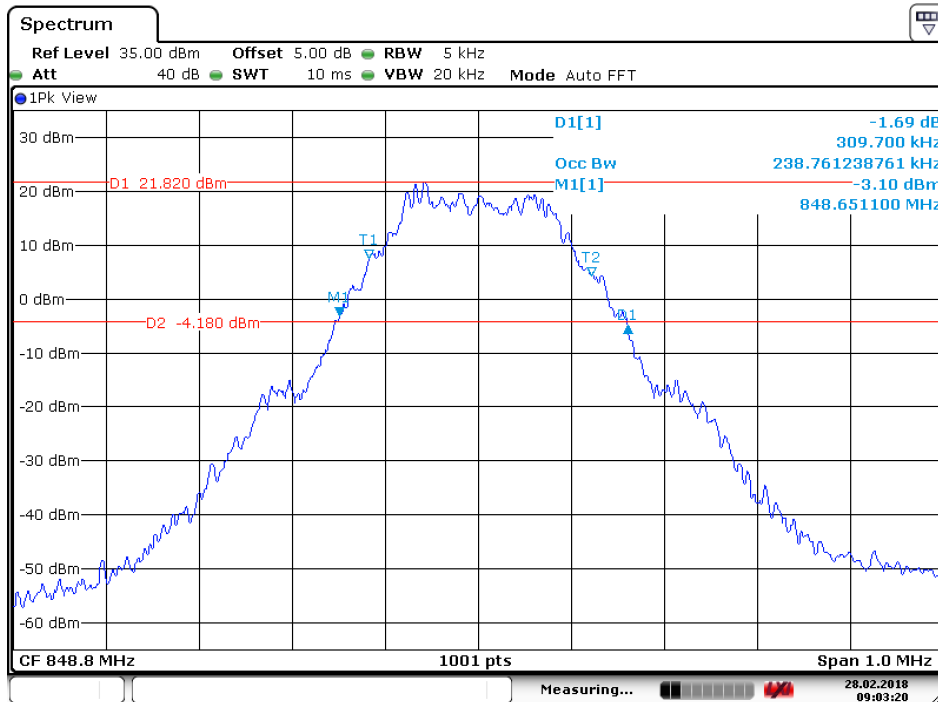
4.1.1.2.2 Test Channel = MCH



Date: 28.FEB.2018 09:02:28



4.1.1.2.3 Test Channel = HCH

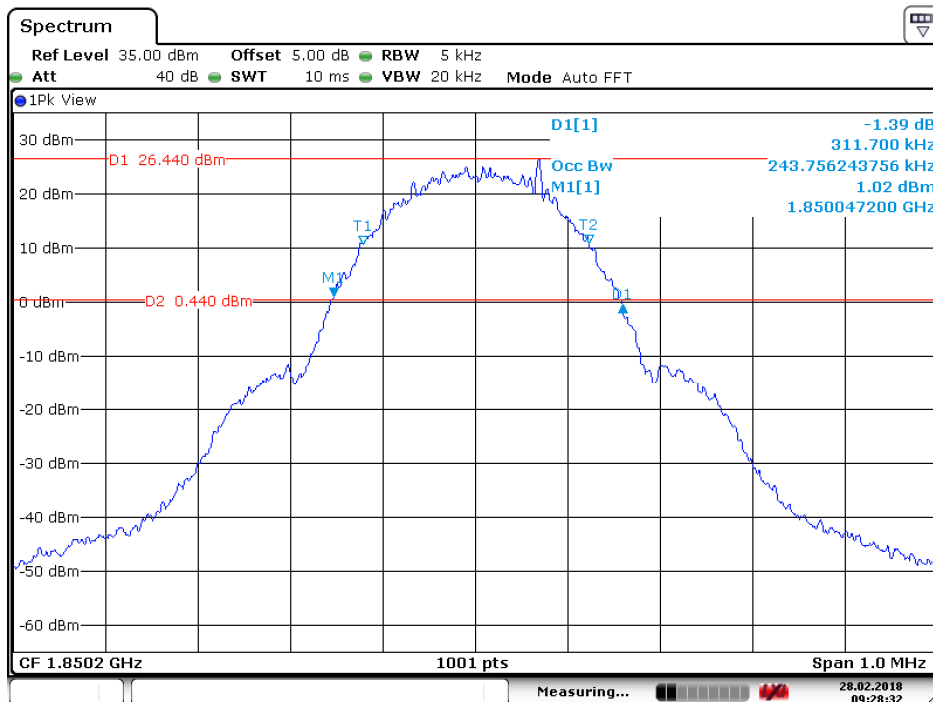


Date: 28.FEB.2018 09:03:21

4.1.2 Test Band = GSM 1900

4.1.2.1 Test Mode = GSM/TM1

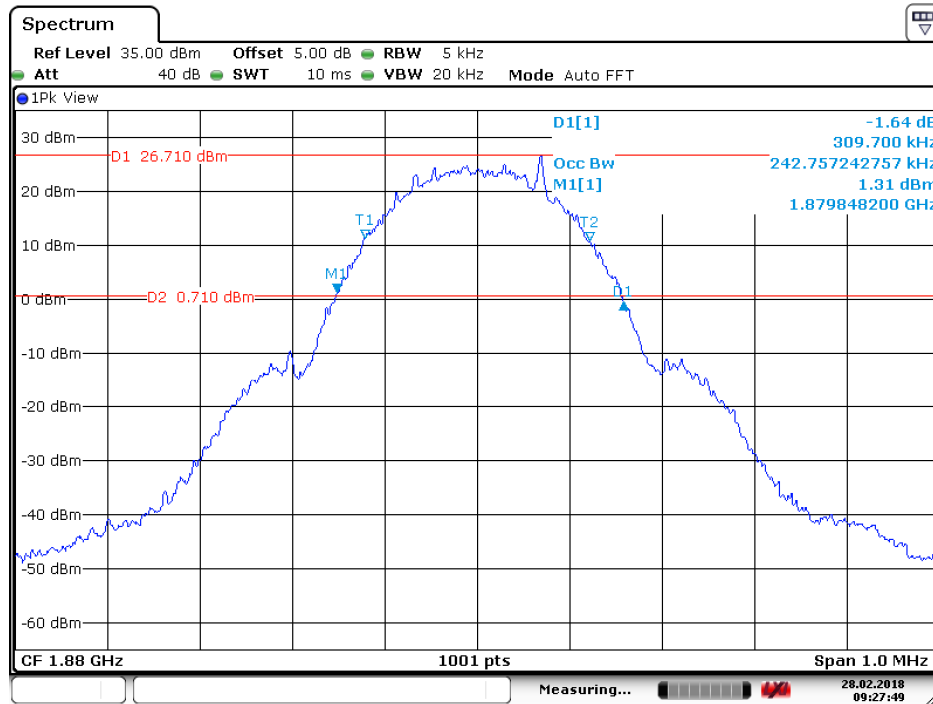
4.1.2.1.1 Test Channel = LCH



Date: 28.FEB.2018 09:28:33

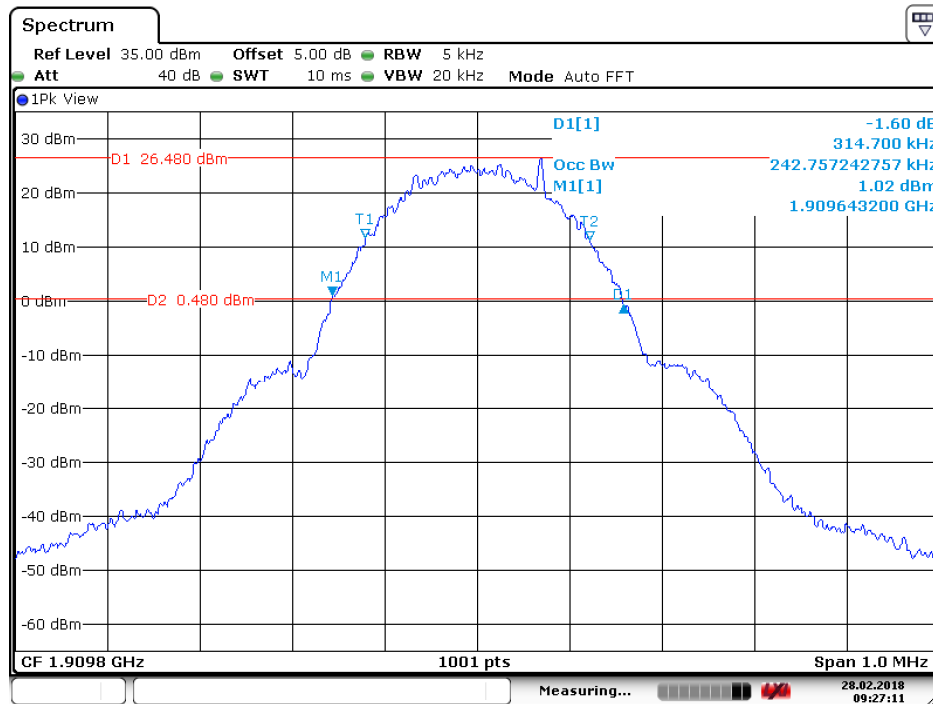


4.1.2.1.2 Test Channel = MCH



Date: 28.FEB.2018 09:27:49

4.1.2.1.3 Test Channel = HCH

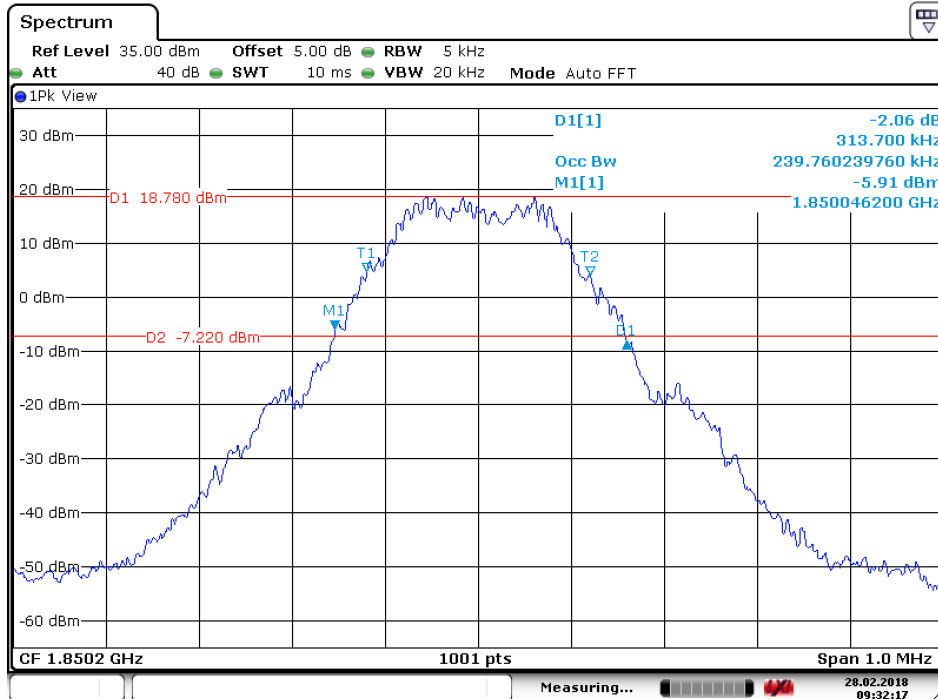


Date: 28.FEB.2018 09:27:12



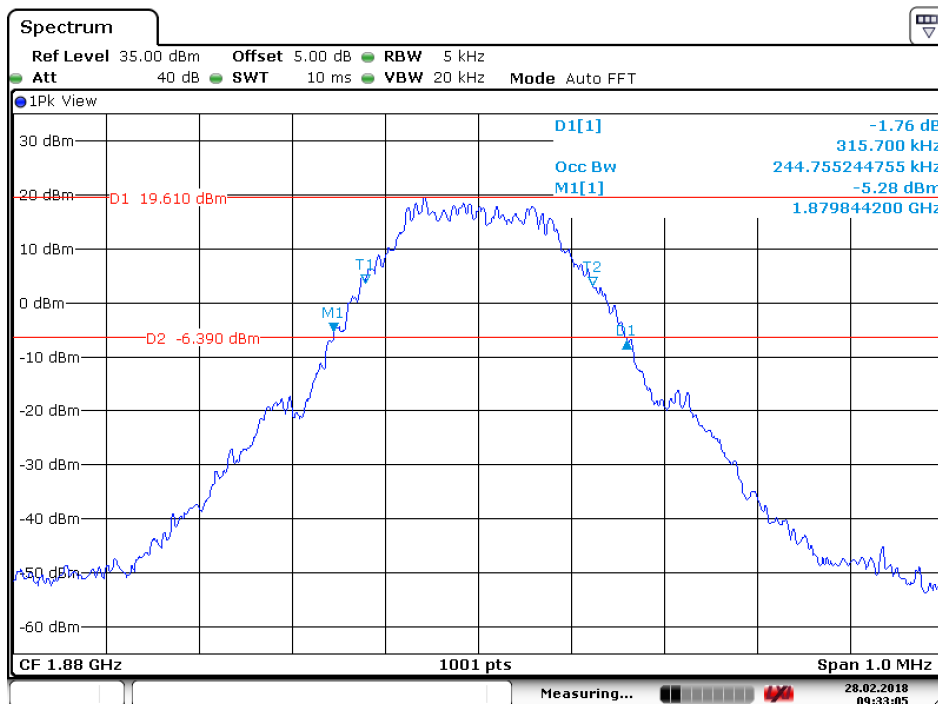
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



Date: 28.FEB.2018 09:32:18

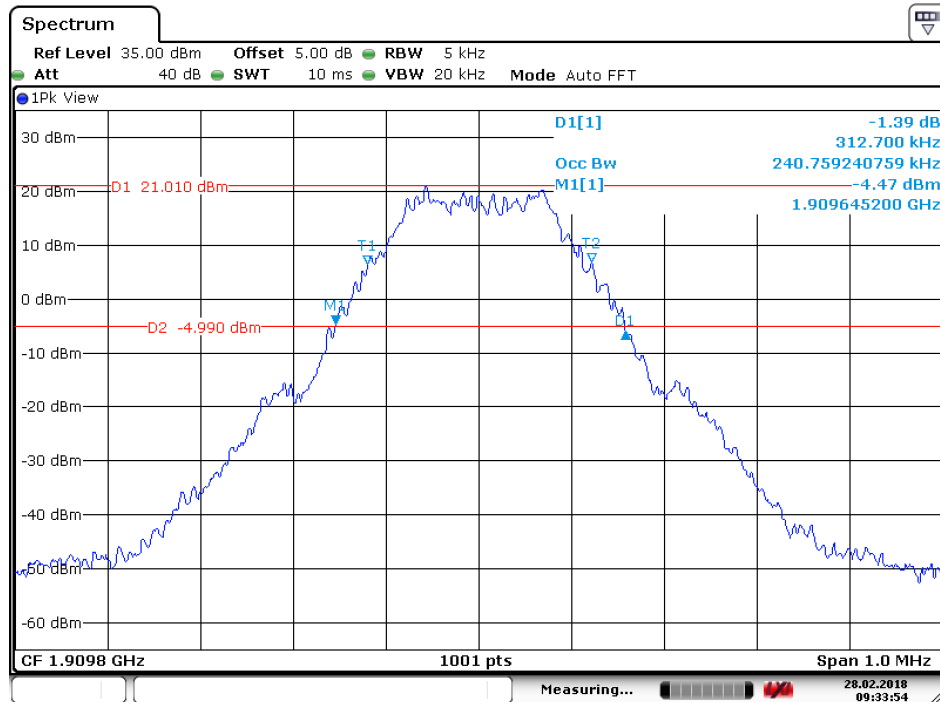
4.1.2.2.2 Test Channel = MCH



Date: 28.FEB.2018 09:33:05



4.1.2.2.3 Test Channel = HCH



Date: 28.FEB.2018 09:33:54

5 Band Edges Compliance

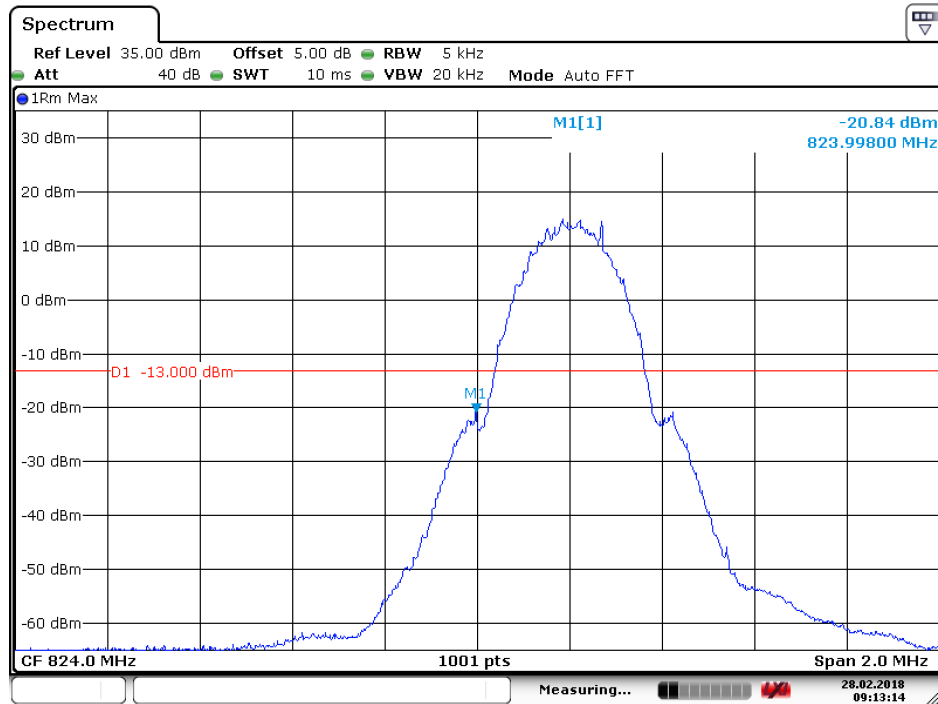
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM 850

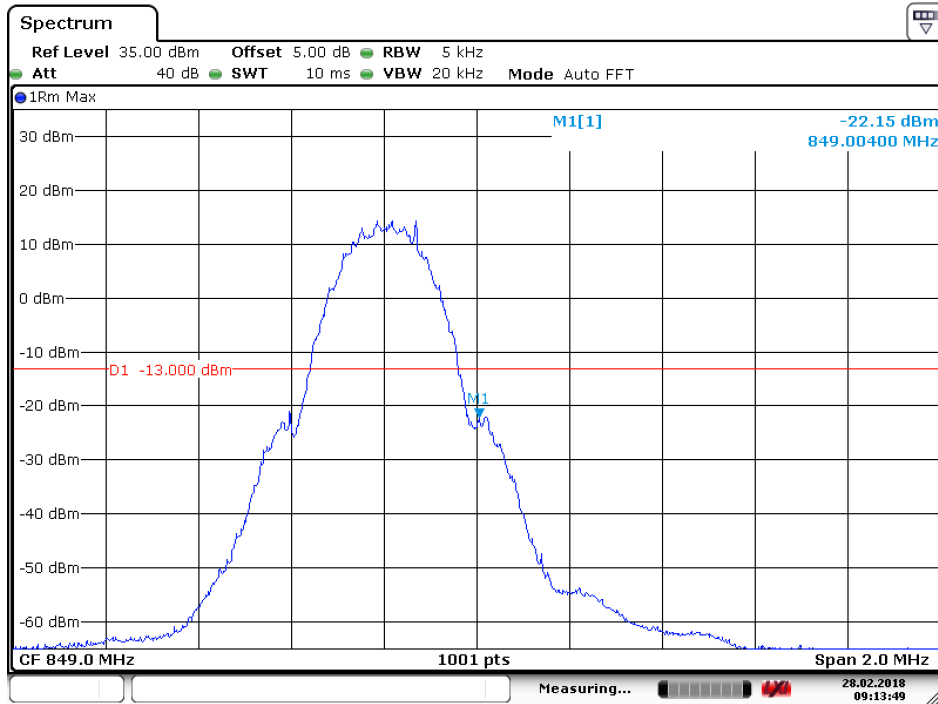
5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH



Date: 28.FEB.2018 09:13:14

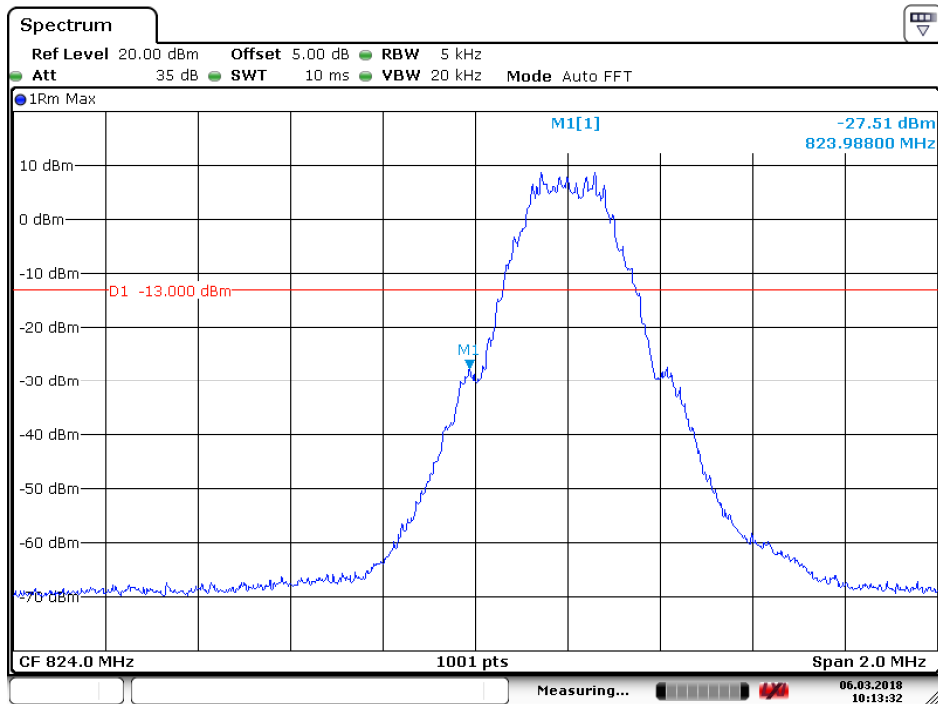
5.1.1.1.2 Test Channel = HCH



Date: 28.FEB.2018 09:13:50

5.1.1.2 Test Mode = GSM/TM2

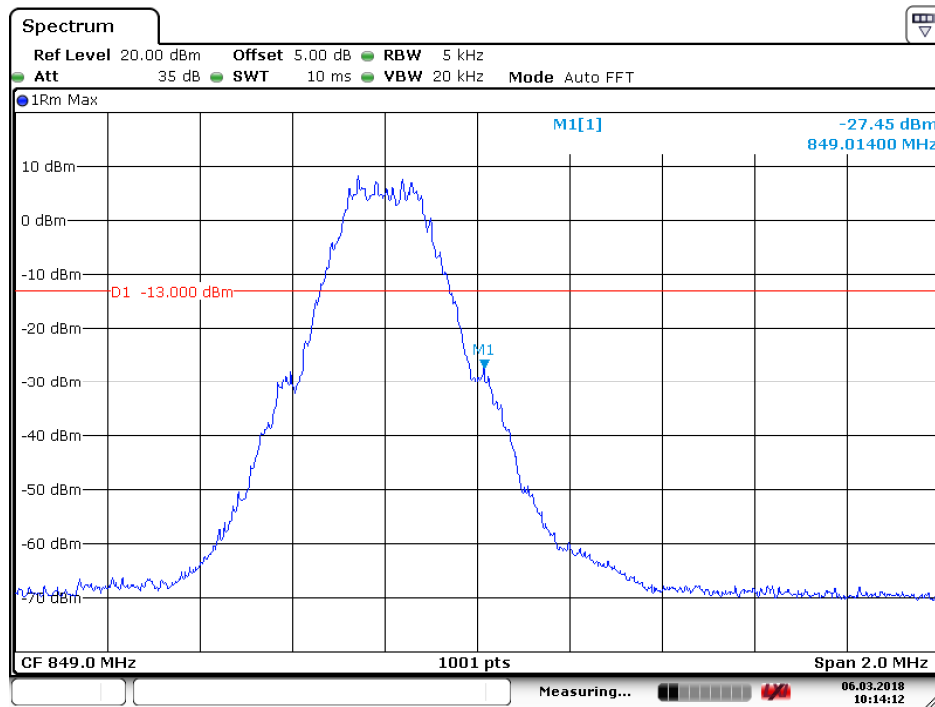
5.1.1.2.1 Test Channel = LCH



Date: 6.MAR.2018 10:13:33



5.1.1.2.2 Test Channel = HCH

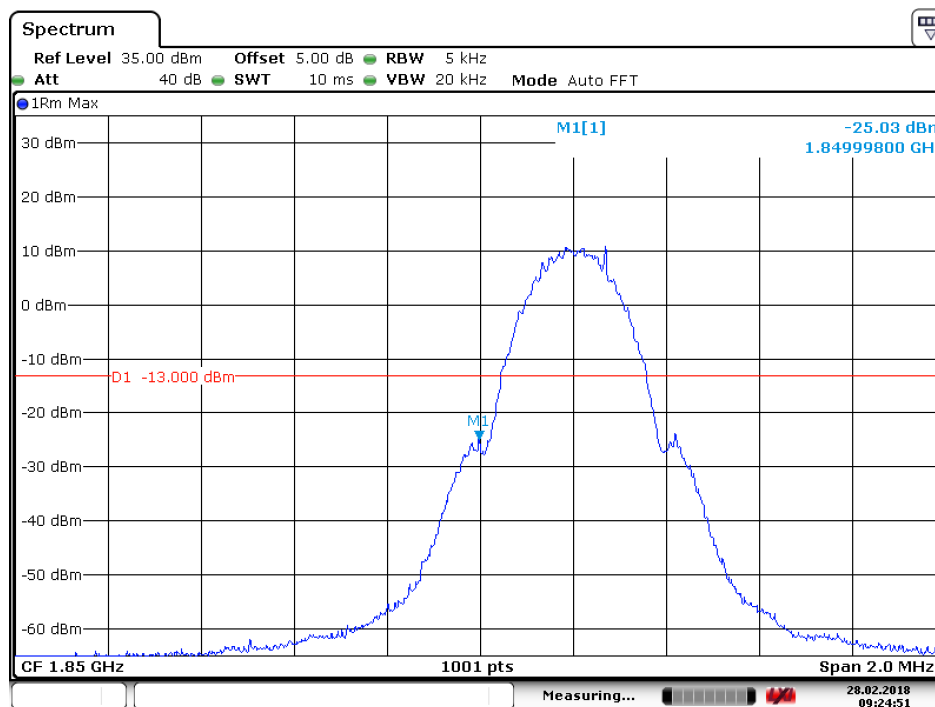


Date: 6.MAR.2018 10:14:12

5.1.2 Test Band = GSM 1900

5.1.2.1 Test Mode = GSM/TM1

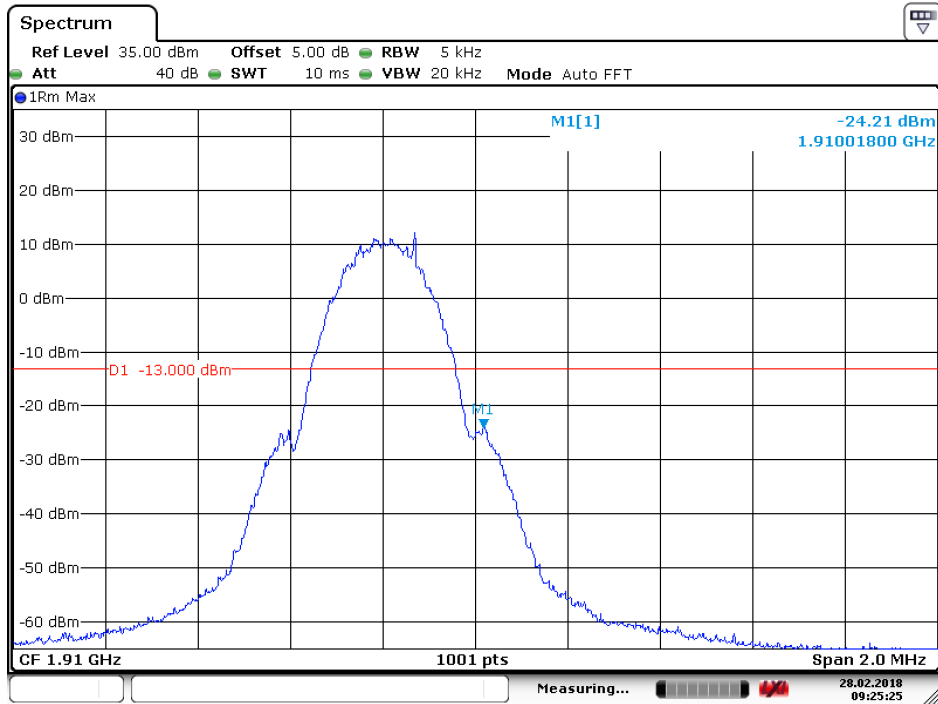
5.1.2.1.1 Test Channel = LCH



Date: 28.FEB.2018 09:24:51



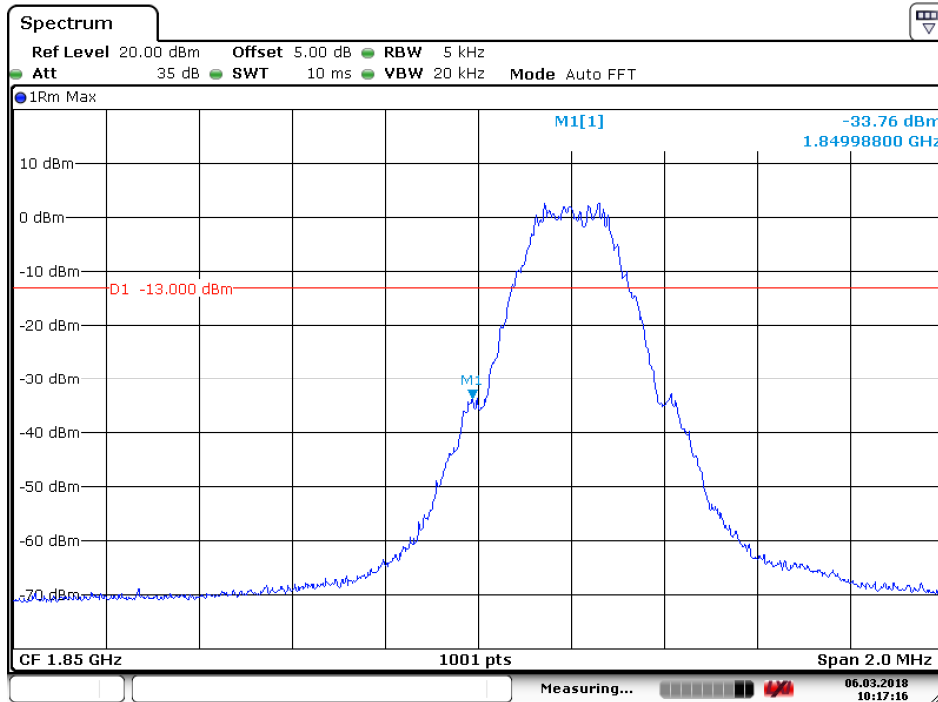
5.1.2.1.2 Test Channel = HCH



Date: 28.FEB.2018 09:25:25

5.1.2.2 Test Mode = GSM/TM2

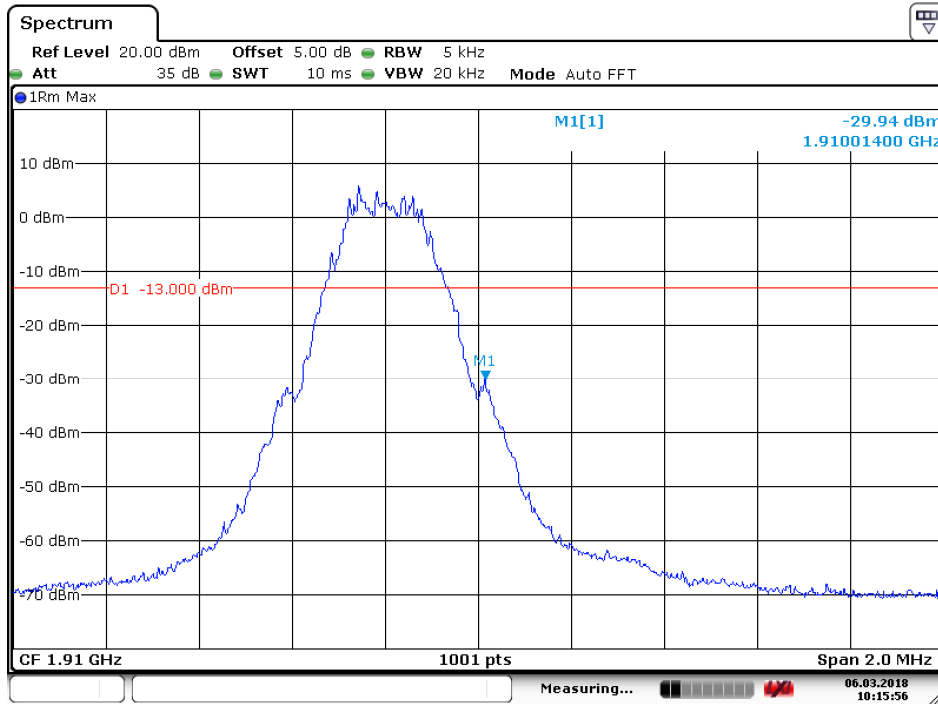
5.1.2.2.1 Test Channel = LCH



Date: 6.MAR.2018 10:17:17



5.1.2.2.2 Test Channel = HCH



Date: 6.MAR.2018 10:15:57



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.

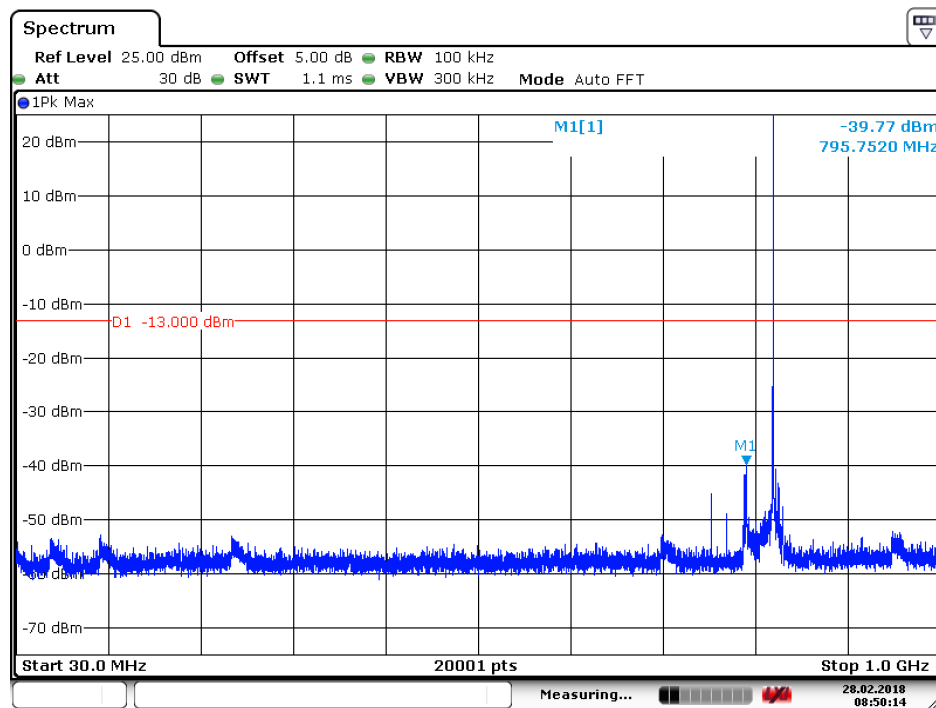
Part I - Test Plots

6.1 For GSM

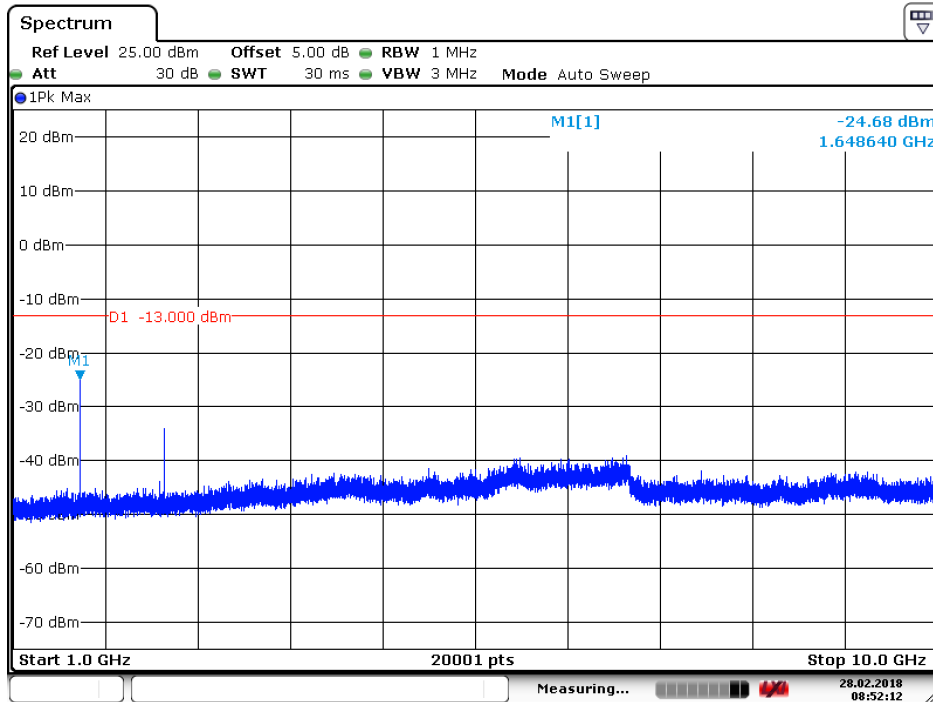
6.1.1 Test Band = GSM 850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH

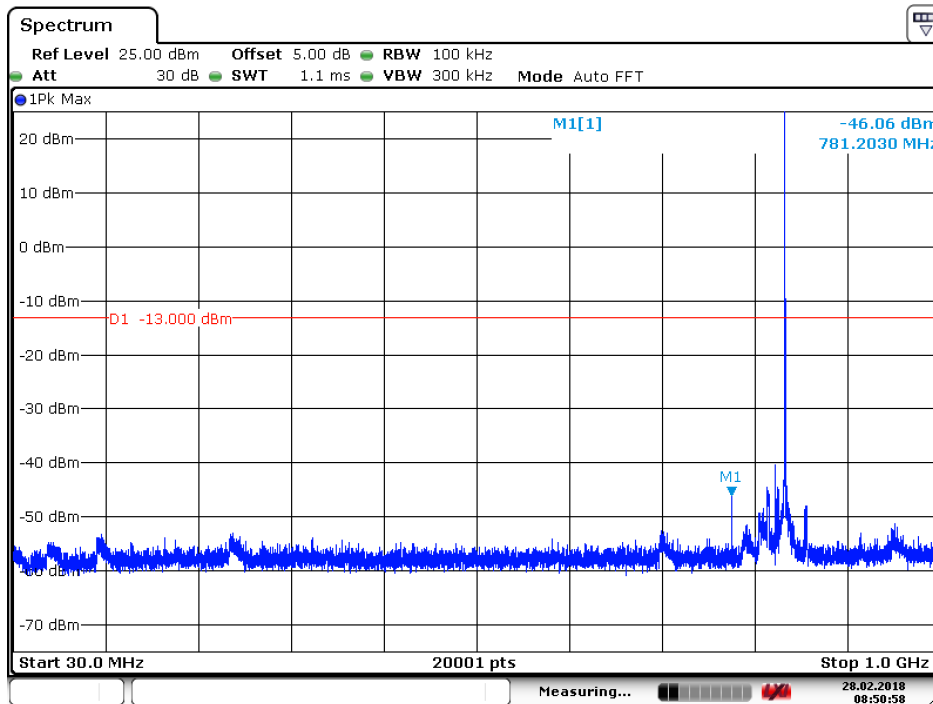


Date: 28.FEB.2018 08:50:15

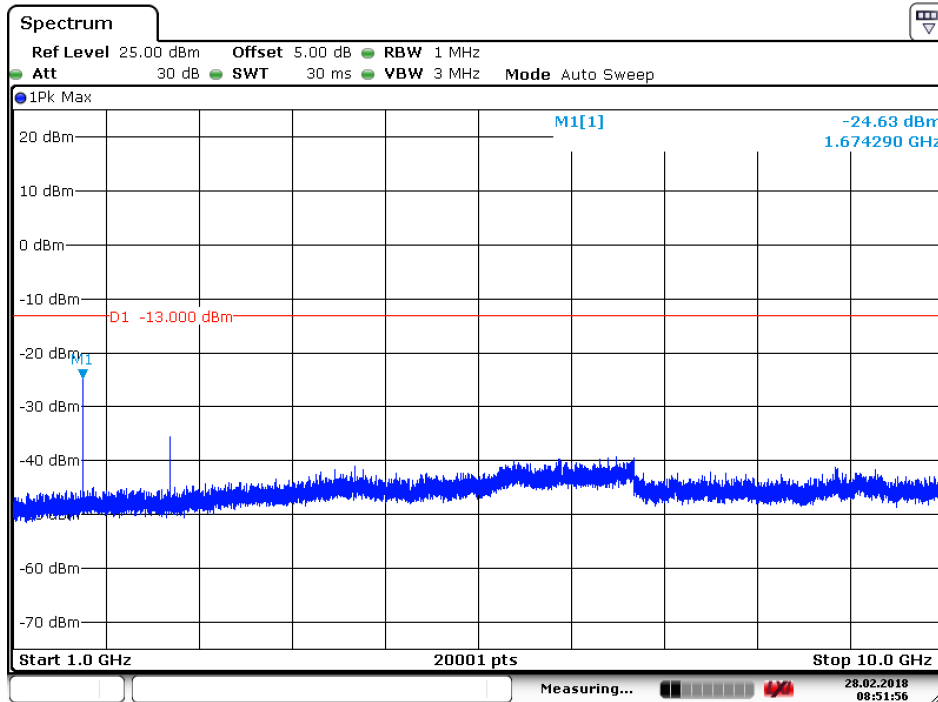


Date: 28.FEB.2018 08:52:12

6.1.1.1.2 Test Channel = MCH

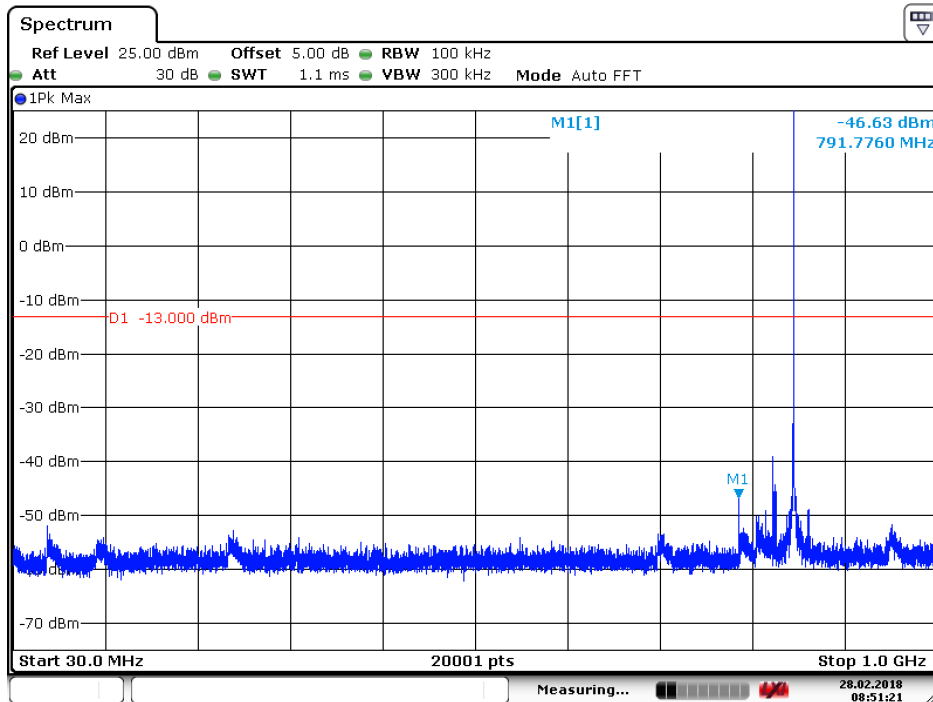


Date: 28.FEB.2018 08:50:58

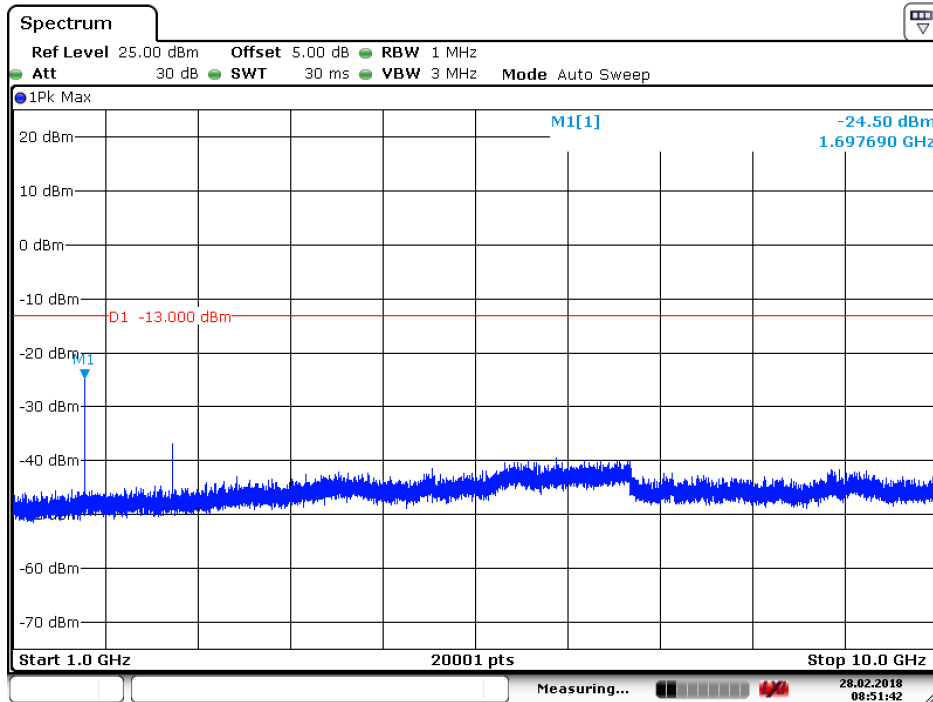


Date: 28.FEB.2018 08:51:56

6.1.1.1.3 Test Channel = HCH



Date: 28.FEB.2018 08:51:22

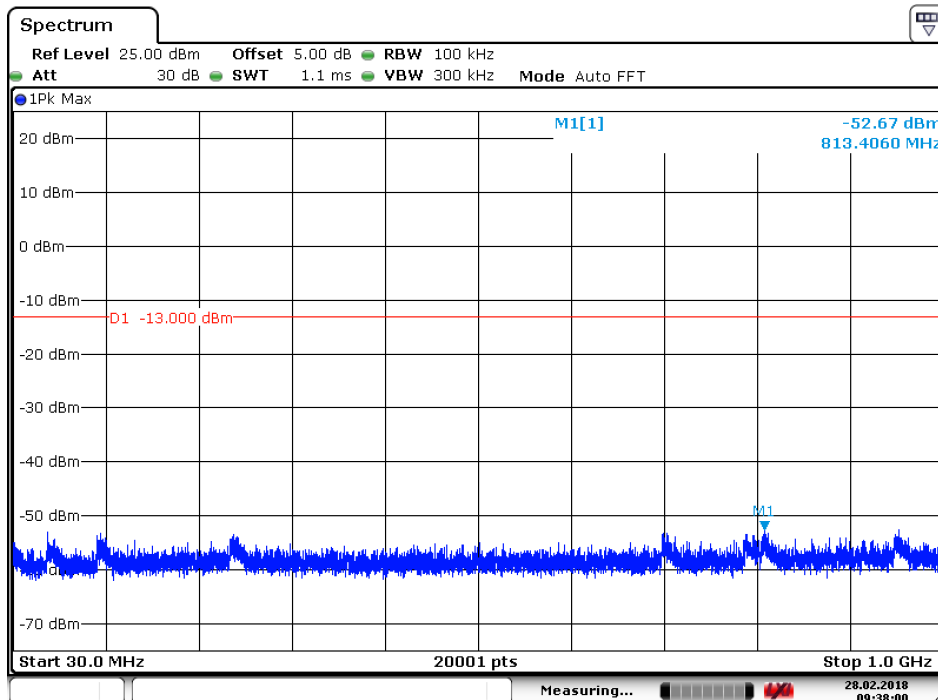


Date: 28.FEB.2018 08:51:42

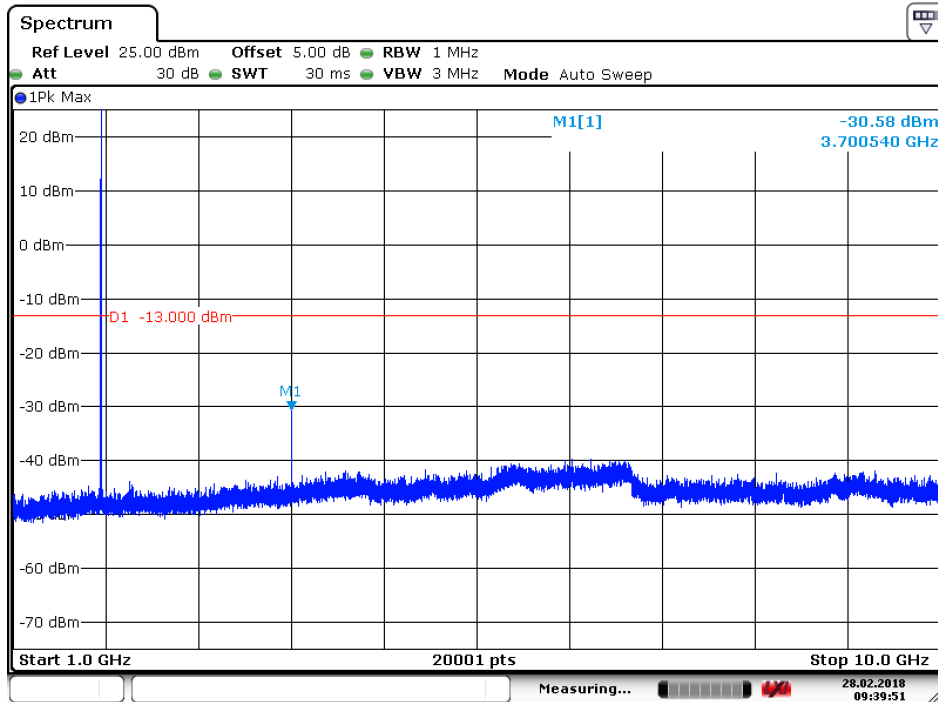
6.1.2 Test Band = GSM 1900

6.1.2.1 Test Mode = GSM/TM1

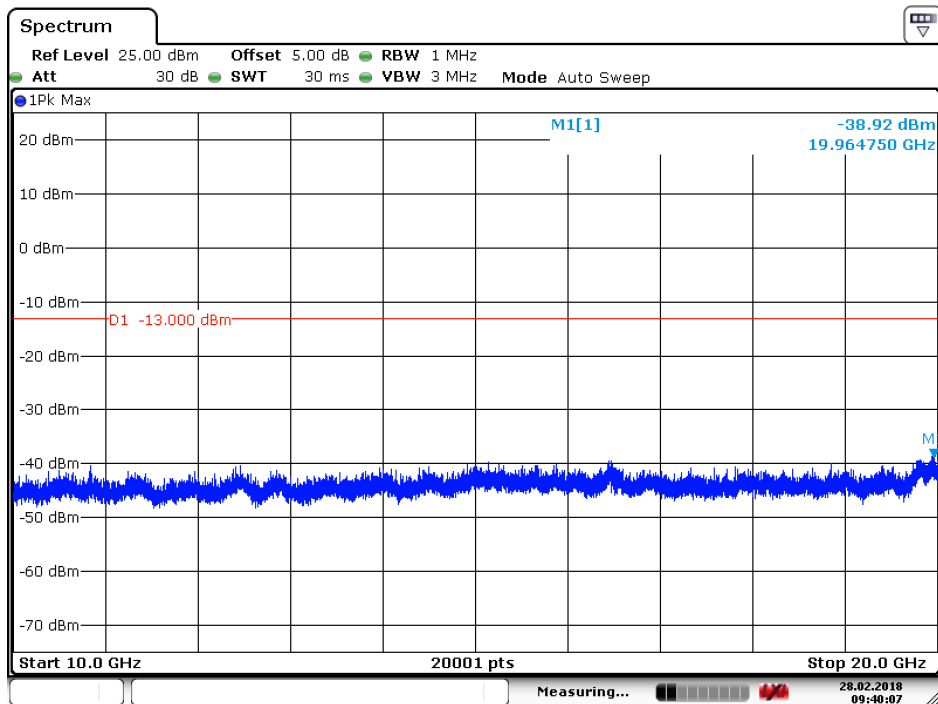
6.1.2.1.1 Test Channel = LCH



Date: 28.FEB.2018 09:38:01



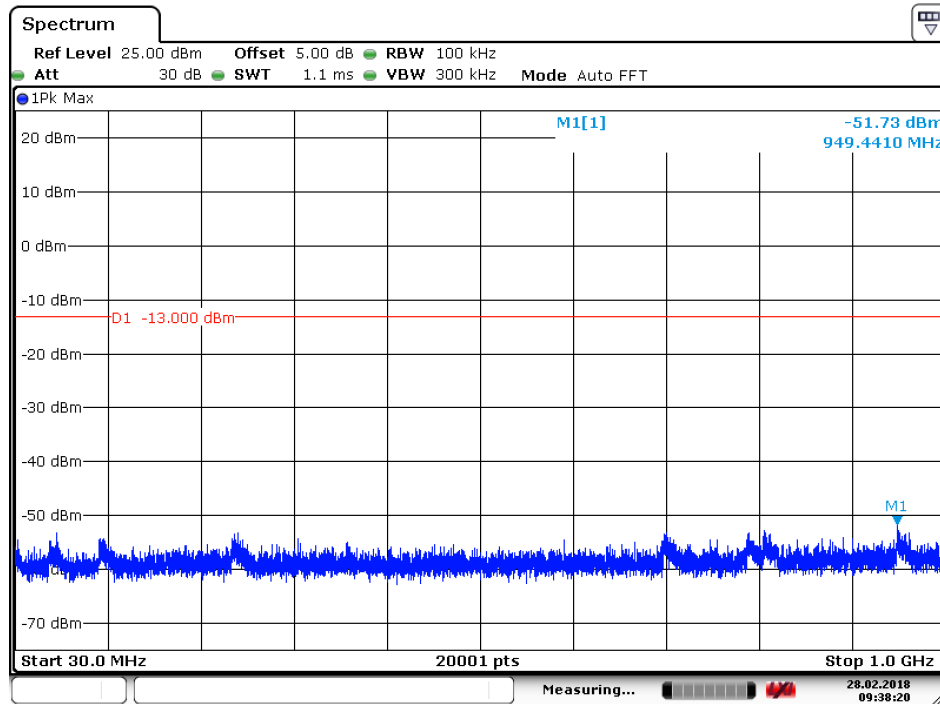
Date: 28.FEB.2018 09:39:51



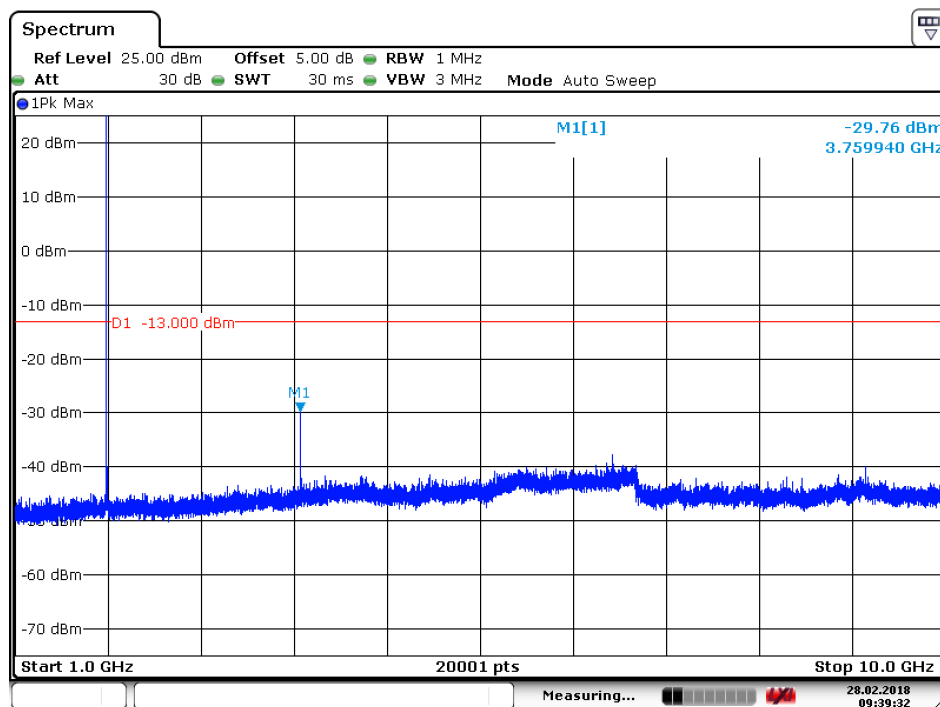
Date: 28.FEB.2018 09:40:07



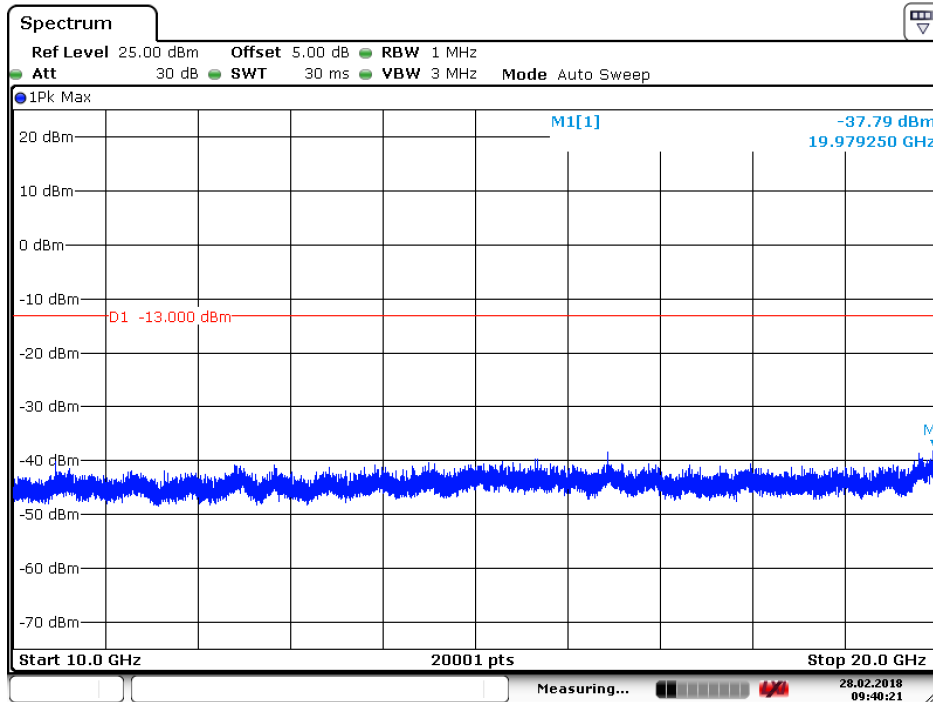
6.1.2.1.2 Test Channel = MCH



Date: 28.FEB.2018 09:38:21

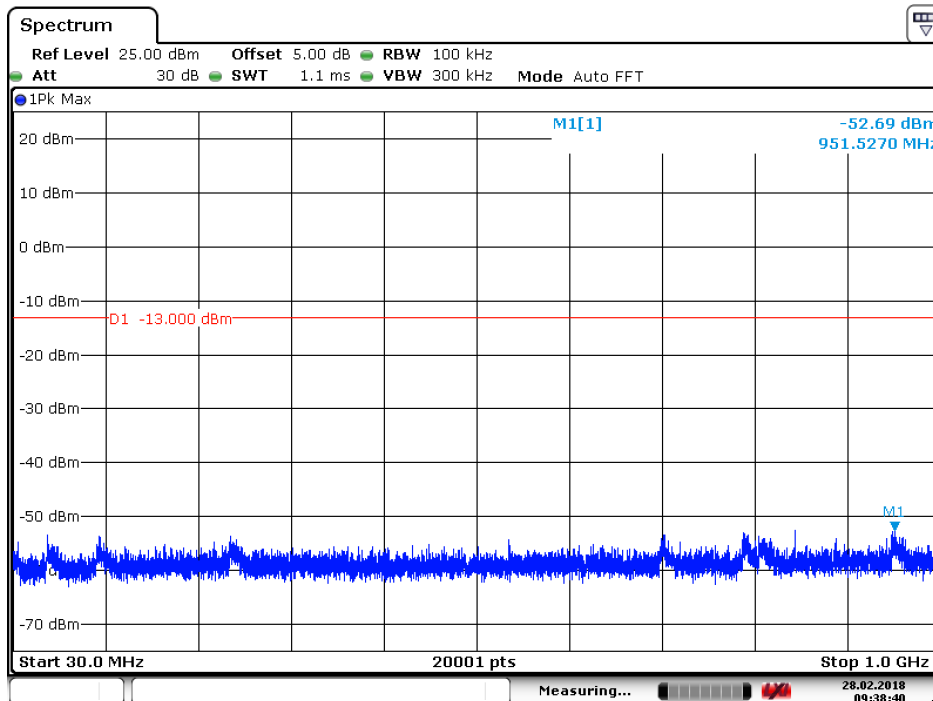


Date: 28.FEB.2018 09:39:33

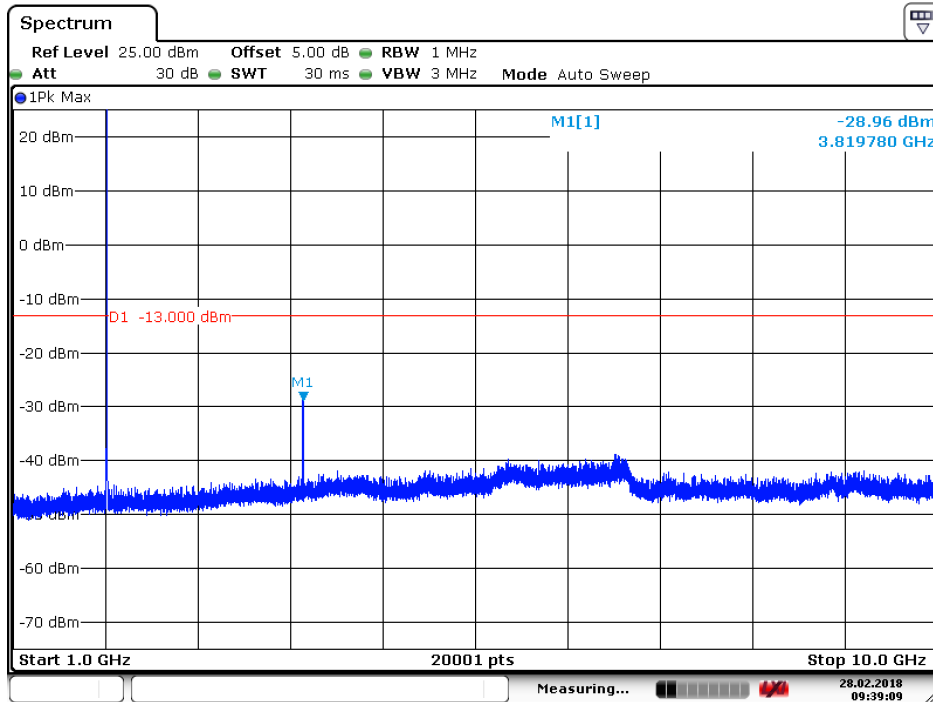


Date: 28.FEB.2018 09:40:22

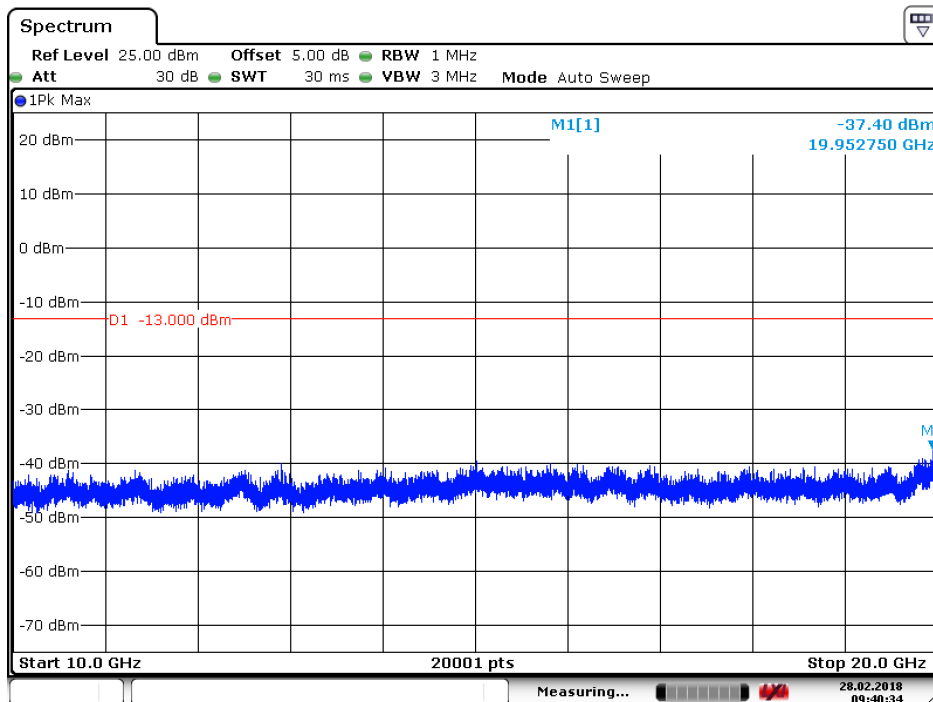
6.1.2.1.3 Test Channel = HCH



Date: 28.FEB.2018 09:38:40



Date: 28.FEB.2018 09:39:09



Date: 28.FEB.2018 09:40:34



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
237.750000	-74.00	-13.00	61.00	Vertical
721.970000	-42.89	-13.00	29.89	Vertical
1648.500000	-42.06	-13.00	29.06	Vertical
2410.500000	-29.01	-13.00	16.01	Vertical
4158.000000	-49.89	-13.00	36.89	Vertical
7065.000000	-47.74	-13.00	34.74	Vertical
268.600000	-75.09	-13.00	62.09	Horizontal
591.140000	-60.07	-13.00	47.07	Horizontal
1649.812500	-42.50	-13.00	29.50	Horizontal
2410.312500	-29.39	-13.00	16.39	Horizontal
4414.875000	-50.18	-13.00	37.18	Horizontal
6694.500000	-48.15	-13.00	35.15	Horizontal

7.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
251.550000	-75.29	-13.00	62.29	Vertical
653.615000	-60.02	-13.00	47.02	Vertical
1672.687500	-42.77	-13.00	29.77	Vertical
2510.062500	-38.25	-13.00	25.25	Vertical
4015.500000	-50.86	-13.00	37.86	Vertical
6576.500000	-47.08	-13.00	34.08	Vertical
222.850000	-79.01	-13.00	66.01	Horizontal
638.180000	-53.52	-13.00	40.52	Horizontal
1674.375000	-44.63	-13.00	31.63	Horizontal
2509.500000	-37.27	-13.00	24.27	Horizontal
3730.500000	-51.17	-13.00	38.17	Horizontal
4934.625000	-49.67	-13.00	36.67	Horizontal

7.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
286.200000	-71.08	-13.00	58.08	Vertical
710.210000	-48.32	-13.00	35.32	Vertical
1697.812500	-43.31	-13.00	30.31	Vertical



2546.250000	-36.32	-13.00	23.32	Vertical
4349.250000	-49.31	-13.00	36.31	Vertical
6917.500000	-47.54	-13.00	34.54	Vertical
223.000000	-77.69	-13.00	64.69	Horizontal
728.585000	-50.02	-13.00	37.02	Horizontal
1697.062500	-43.68	-13.00	30.68	Horizontal
2547.000000	-36.87	-13.00	23.87	Horizontal
4244.625000	-49.11	-13.00	36.11	Horizontal
6707.000000	-48.59	-13.00	35.59	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
340.200000	-76.28	-13.00	63.28	Vertical
595.000000	-58.84	-13.00	45.84	Vertical
891.666667	-54.77	-13.00	41.77	Vertical
2461.520000	-38.84	-13.00	25.84	Vertical
3700.125000	-47.43	-13.00	34.43	Vertical
5550.750000	-32.96	-13.00	19.96	Vertical
263.850000	-77.37	-13.00	64.37	Horizontal
614.166667	-59.64	-13.00	46.64	Horizontal
1059.860000	-50.89	-13.00	37.89	Horizontal
2464.700000	-38.23	-13.00	25.23	Horizontal
3700.500000	-38.10	-13.00	25.10	Horizontal
5550.750000	-43.10	-13.00	30.10	Horizontal

7.1.2.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
218.750000	-79.65	-13.00	66.65	Vertical
637.500000	-61.36	-13.00	48.36	Vertical
888.333333	-54.22	-13.00	41.22	Vertical
2604.620000	-42.04	-13.00	29.04	Vertical
3760.125000	-47.77	-13.00	34.77	Vertical
5640.375000	-34.42	-13.00	21.42	Vertical
350.600000	-78.70	-13.00	65.70	Horizontal
613.333333	-57.44	-13.00	44.44	Horizontal
883.333333	-55.12	-13.00	42.12	Horizontal
2461.520000	-40.38	-13.00	27.38	Horizontal
3759.000000	-41.92	-13.00	28.92	Horizontal
5640.375000	-40.74	-13.00	27.74	Horizontal



7.1.2.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
349.400000	-77.34	-13.00	64.34	Vertical
650.833333	-59.82	-13.00	46.82	Vertical
932.500000	-53.89	-13.00	40.89	Vertical
2567.520000	-42.14	-13.00	29.14	Vertical
3819.375000	-46.59	-13.00	33.59	Vertical
5729.625000	-31.91	-13.00	18.91	Vertical
197.700000	-82.40	-13.00	69.40	Horizontal
648.333333	-59.11	-13.00	46.11	Horizontal
925.833333	-53.87	-13.00	40.87	Horizontal
2239.980000	-43.49	-13.00	30.49	Horizontal
3819.750000	-43.68	-13.00	30.68	Horizontal
5729.625000	-40.70	-13.00	27.70	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	1.41	0.00171	PASS
				VH	-3.38	-0.00410	PASS
		MCH	TN	VL	-2.70	-0.00323	PASS
				VN	-1.82	-0.00218	PASS
				VH	-4.45	-0.00532	PASS
		HCH	TN	VL	3.02	0.00356	PASS
				VN	-1.92	-0.00226	PASS
				VH	-2.98	-0.00351	PASS
	GSM/TM2	LCH	TN	VL	-3.56	-0.00432	PASS
				VN	1.57	0.00190	PASS
				VH	-2.18	-0.00264	PASS
		MCH	TN	VL	3.03	0.00362	PASS
				VN	2.00	0.00239	PASS
				VH	-4.30	-0.00514	PASS
		HCH	TN	VL	5.40	0.00636	PASS
				VN	-3.39	-0.00399	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	-4.33	-0.00234	PASS
				VN	2.14	0.00116	PASS
				VH	1.42	0.00077	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	-4.60	-0.00241	PASS
	GSM/TM2	LCH	TN	VL	1.20	0.00065	PASS
				VN	-3.33	-0.00180	PASS
				VH	2.90	0.00157	PASS
		MCH	TN	VL	-4.23	-0.00225	PASS
				VN	1.49	0.00079	PASS
				VH	4.54	0.00241	PASS
		HCH	TN	VL	-2.43	-0.00127	PASS
				VN	3.50	0.00183	PASS
				VH	-4.10	-0.00215	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	1.80	0.00218	PASS
				-10	1.02	0.00124	PASS
				0	-2.60	-0.00315	PASS
				10	0.49	0.00059	PASS
				20	-4.33	-0.00525	PASS
				30	1.79	0.00217	PASS
				40	-2.05	-0.00249	PASS
				50	-6.20	-0.00752	PASS
		MCH	VN	-30	-2.98	-0.00356	PASS
				-20	-5.00	-0.00598	PASS
				-10	-1.40	-0.00167	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	0.67	0.00080	PASS
				50	-4.34	-0.00519	PASS
		HCH	VN	-30	-0.54	-0.00064	PASS
				-20	3.77	0.00444	PASS
				-10	3.19	0.00376	PASS
				0	-5.52	-0.00650	PASS
				10	1.50	0.00177	PASS
				20	-2.87	-0.00338	PASS
				30	3.78	0.00445	PASS
				40	-0.96	-0.00113	PASS
				50	-4.50	-0.00530	PASS



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GSM 850	GSM/TM2	LCH	VN	-30	-2.62	-0.00318	PASS
				-20	2.01	0.00244	PASS
				-10	-5.10	-0.00619	PASS
				0	1.52	0.00184	PASS
				10	-5.34	-0.00648	PASS
				20	-4.10	-0.00497	PASS
				30	-4.22	-0.00512	PASS
				40	-5.63	-0.00683	PASS
				50	-2.75	-0.00334	PASS
		MCH	VN	-30	-2.99	-0.00357	PASS
				-20	3.07	0.00367	PASS
				-10	-4.23	-0.00506	PASS
				0	1.90	0.00227	PASS
				10	-5.11	-0.00611	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	-3.55	-0.00418	PASS
				40	-2.85	-0.00336	PASS
				50	-5.22	-0.00615	PASS



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GSM 1900	GSM/TM1	LCH	VN	-30	-3.40	-0.00184	PASS
				-20	-4.89	-0.00264	PASS
				-10	2.00	0.00108	PASS
				0	-3.55	-0.00192	PASS
				10	-0.59	-0.00032	PASS
				20	1.35	0.00073	PASS
				30	-3.90	-0.00211	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	-6.10	-0.00324	PASS
				50	-5.20	-0.00277	PASS
		HCH	VN	-30	-3.99	-0.00209	PASS
				-20	3.66	0.00192	PASS
				-10	1.89	0.00099	PASS
				0	-0.30	-0.00016	PASS
				10	-3.33	-0.00174	PASS
				20	-4.19	-0.00219	PASS
				30	1.30	0.00068	PASS
				40	-3.09	-0.00162	PASS
				50	-4.07	-0.00213	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	-2.23	-0.00121	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	-4.36	-0.00236	PASS
				30	1.20	0.00065	PASS
				40	-3.33	-0.00180	PASS
				50	-6.11	-0.00330	PASS
		MCH	VN	-30	-5.50	-0.00293	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	0.57	0.00030	PASS
				50	-3.30	-0.00176	PASS
		HCH	VN	-30	-3.08	-0.00161	PASS
				-20	2.77	0.00145	PASS
				-10	1.34	0.00070	PASS
				0	-5.29	-0.00277	PASS
				10	-6.44	-0.00337	PASS
				20	-3.99	-0.00209	PASS
				30	-2.40	-0.00126	PASS
				40	-2.29	-0.00120	PASS
				50	-3.00	-0.00157	PASS

The End