



Appendix B

GSM850&1900



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1 Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Main Supply:

Test Band	Test Mode	Test Channel	Measured[dB]	ERP[dB]	Limit[dBm]	Verdict
GSM 850	GSM/TM1	LCH	32.16	31.24	38.45	PASS
		MCH	32.39	31.44	38.45	PASS
		HCH	32.31	31.38	38.45	PASS
	GSM/TM2	LCH	26.45	25.52	38.45	PASS
		MCH	26.43	25.49	38.45	PASS
		HCH	26.48	25.56	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	29.84	29.84	33	PASS
		MCH	29.87	29.83	33	PASS
		HCH	29.91	29.83	33	PASS
	GSM/TM2	LCH	26.12	26.08	33	PASS
		MCH	26.24	26.19	33	PASS
		HCH	26.29	26.21	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



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Secondary Supply:

Test Band	Test Mode	Test Channel	Measured[dB]	ERP[dB]	Limit[dBm]	Verdict
GSM 850	GSM/TM1	LCH	32.07	31.12	38.45	PASS
		MCH	32.21	31.29	38.45	PASS
		HCH	32.03	31.11	38.45	PASS
	GSM/TM2	LCH	25.93	24.98	38.45	PASS
		MCH	25.85	24.92	38.45	PASS
		HCH	25.81	24.89	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	29.66	28.68	33	PASS
		MCH	29.67	28.59	33	PASS
		HCH	29.79	28.79	33	PASS
	GSM/TM2	LCH	25.42	24.30	33	PASS
		MCH	24.96	23.85	33	PASS
		HCH	24.92	23.86	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	6.46	13	PASS
		HCH	6.46	13	PASS
	GSM/TM2	LCH	8.38	13	PASS
		MCH	8.46	13	PASS
		HCH	8.29	13	PASS
GSM 1900	GSM/TM1	LCH	6.49	13	PASS
		MCH	6.43	13	PASS
		HCH	6.41	13	PASS
	GSM/TM2	LCH	8.49	13	PASS
		MCH	8.29	13	PASS
		HCH	8.49	13	PASS

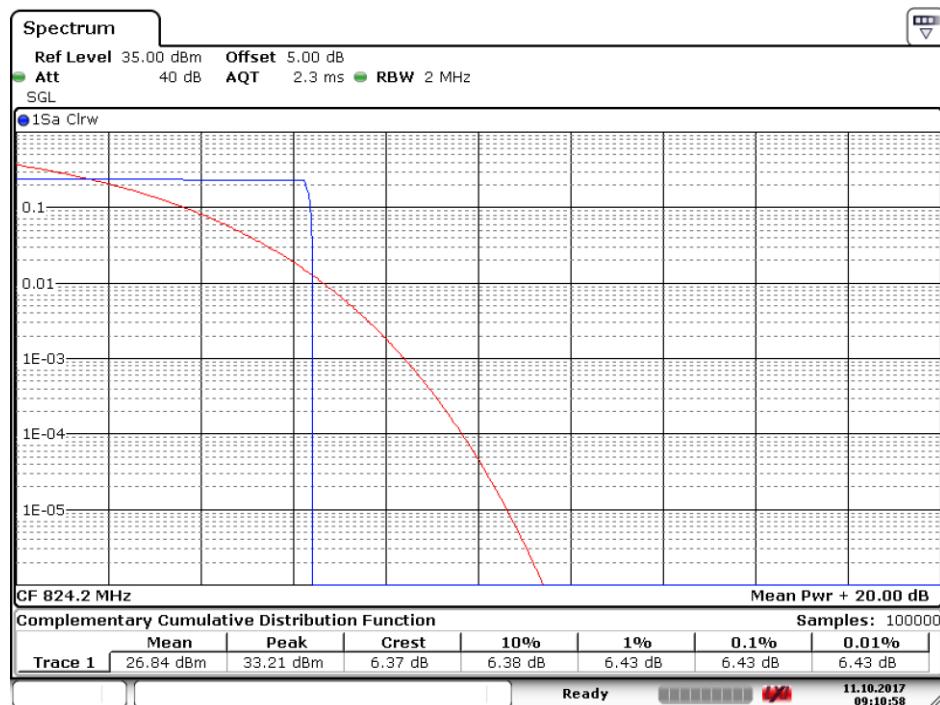
Part II - Test Plots

2.1 For GSM

2.1.1 Test Band = GSM 850

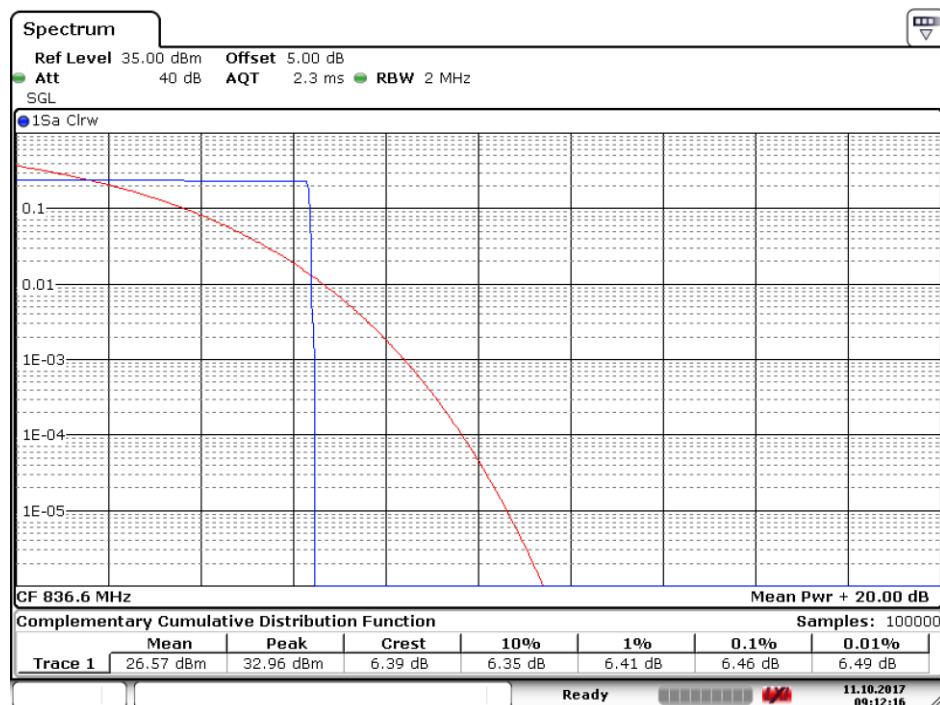
2.1.1.1 Test Mode = GSM/TM1

2.1.1.1.1 Test Channel = LCH



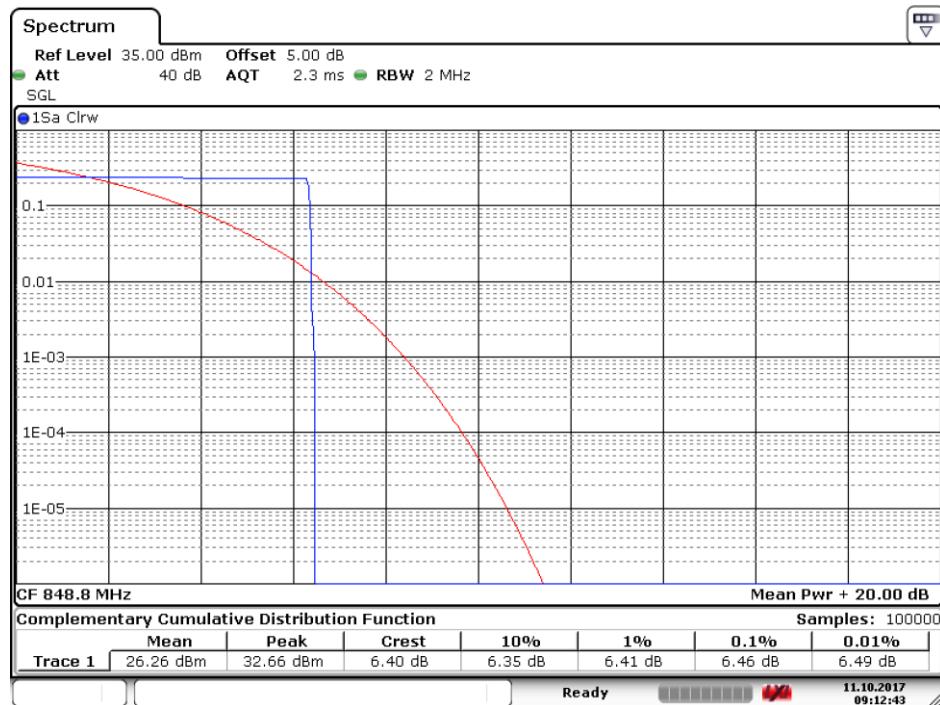
Date: 11.OCT.2017 09:10:58

2.1.1.1.2 Test Channel = MCH



Date: 11.OCT.2017 09:12:16

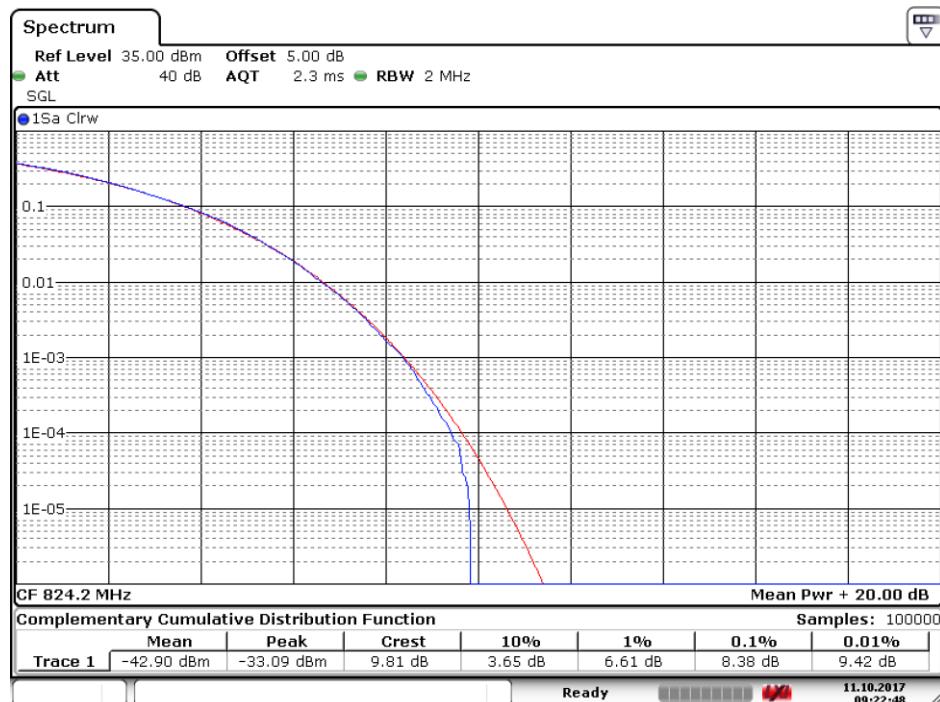
2.1.1.1.3 Test Channel = HCH



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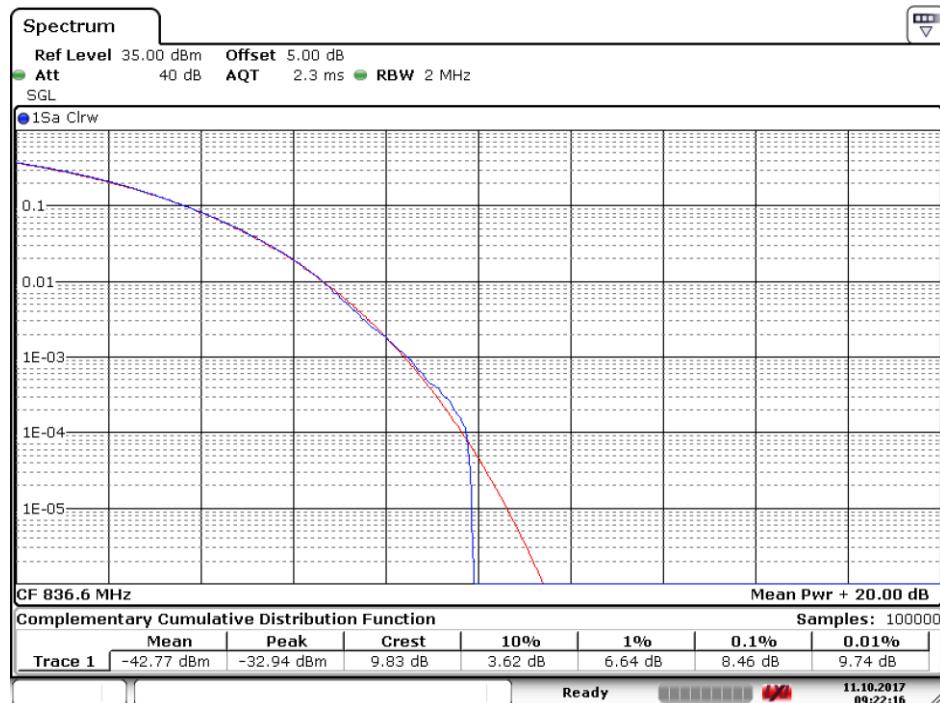
2.1.1.2 Test Mode = GSM/TM2

2.1.1.2.1 Test Channel = LCH



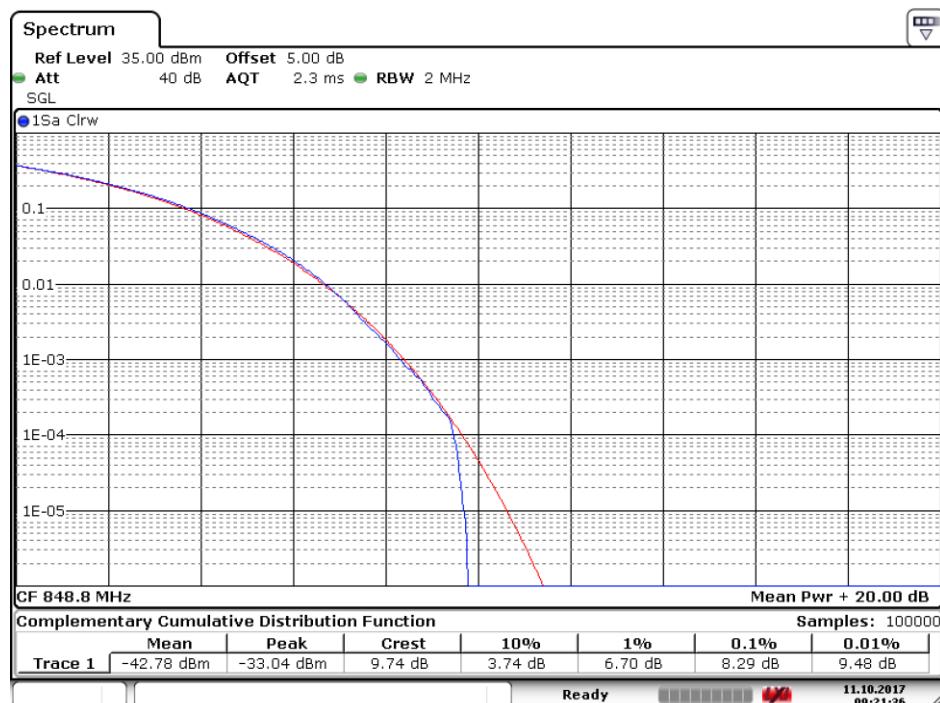
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Date: 11.OCT.2017 09:22:16

2.1.1.2.3 Test Channel = HCH

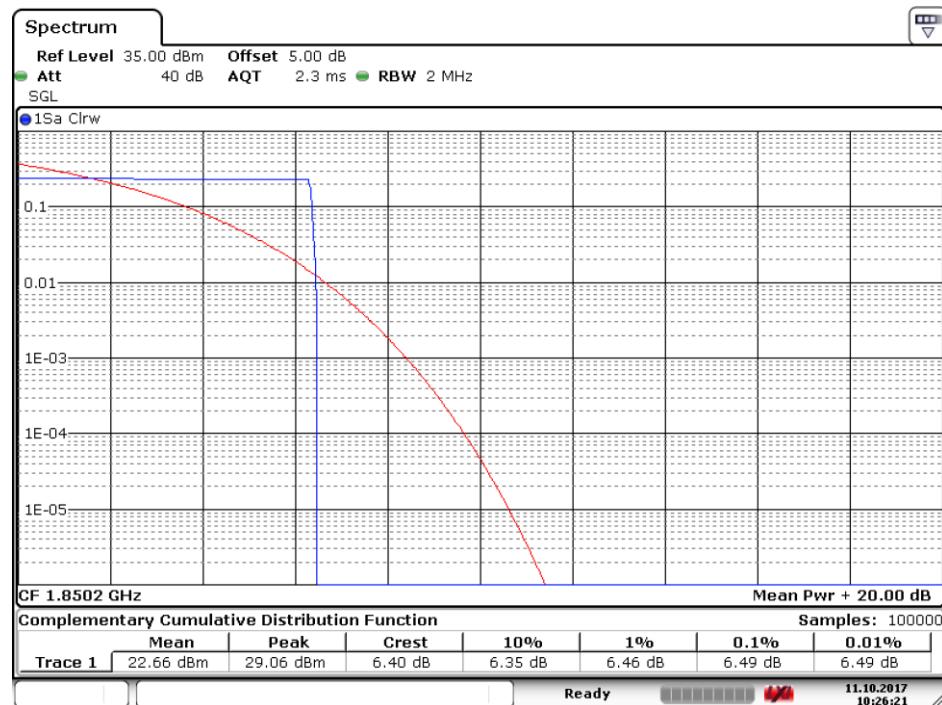


Date: 11.OCT.2017 09:21:36

2.1.2 Test Band = GSM 1900

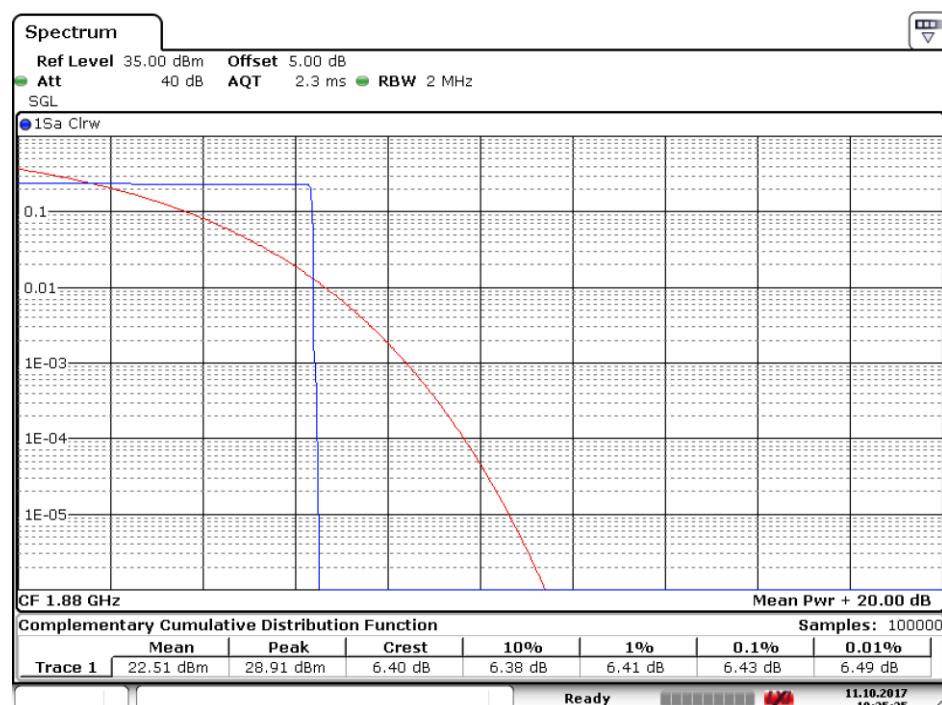
2.1.2.1 Test Mode = GSM/TM1

2.1.2.1.1 Test Channel = LCH



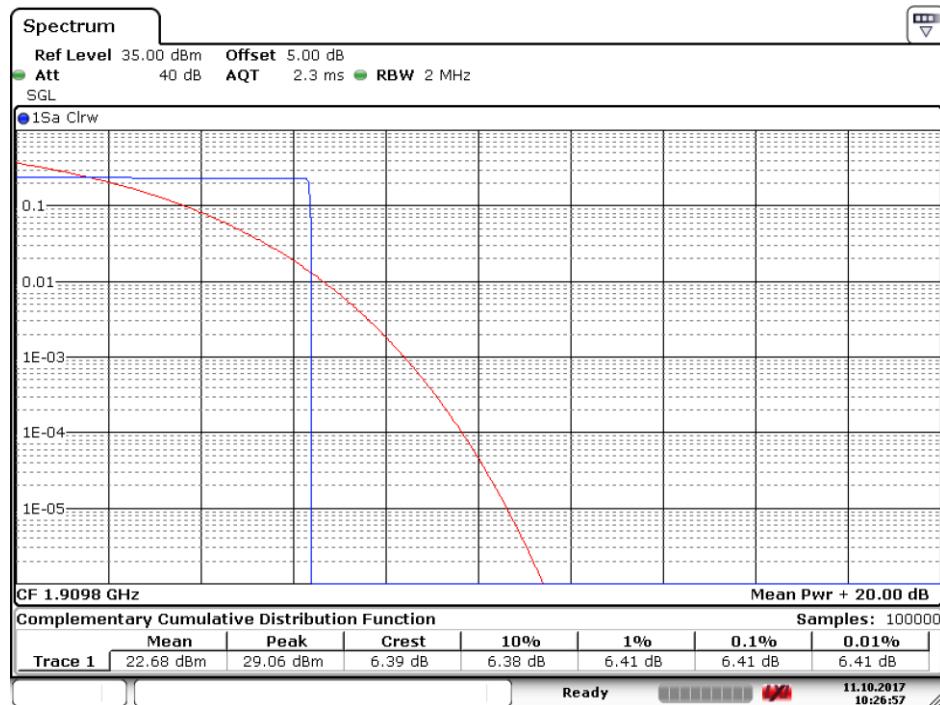
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2.1.2.1.2 Test Channel = MCH



Date: 11.OCT.2017 10:25:25

2.1.2.1.3 Test Channel = HCH



Date: 11.OCT.2017 10:26:58

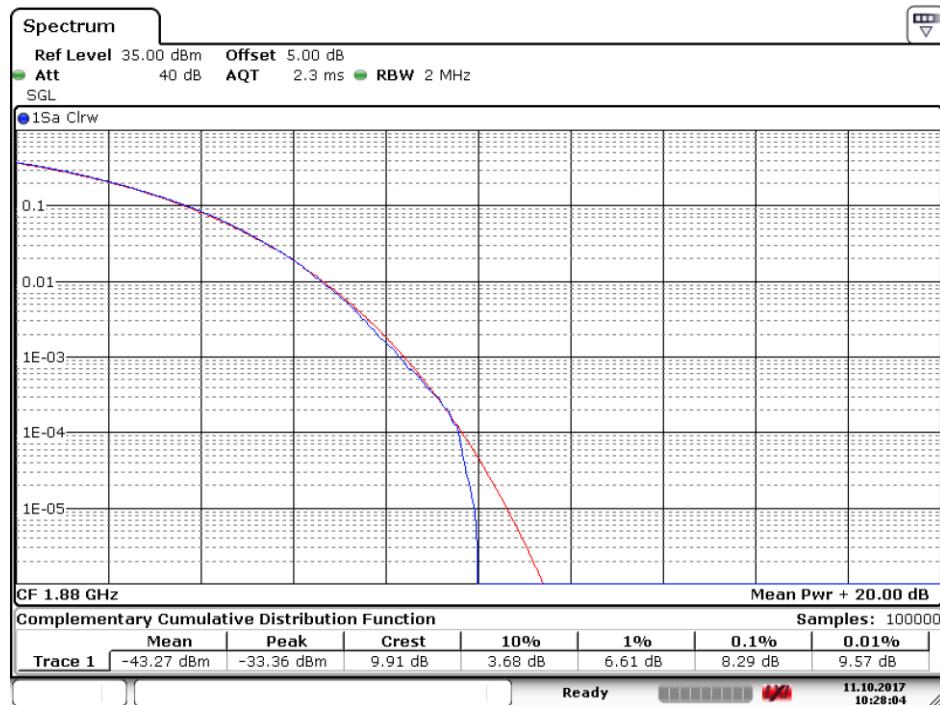
2.1.2.2 Test Mode = GSM/TM2

2.1.2.2.1 Test Channel = LCH



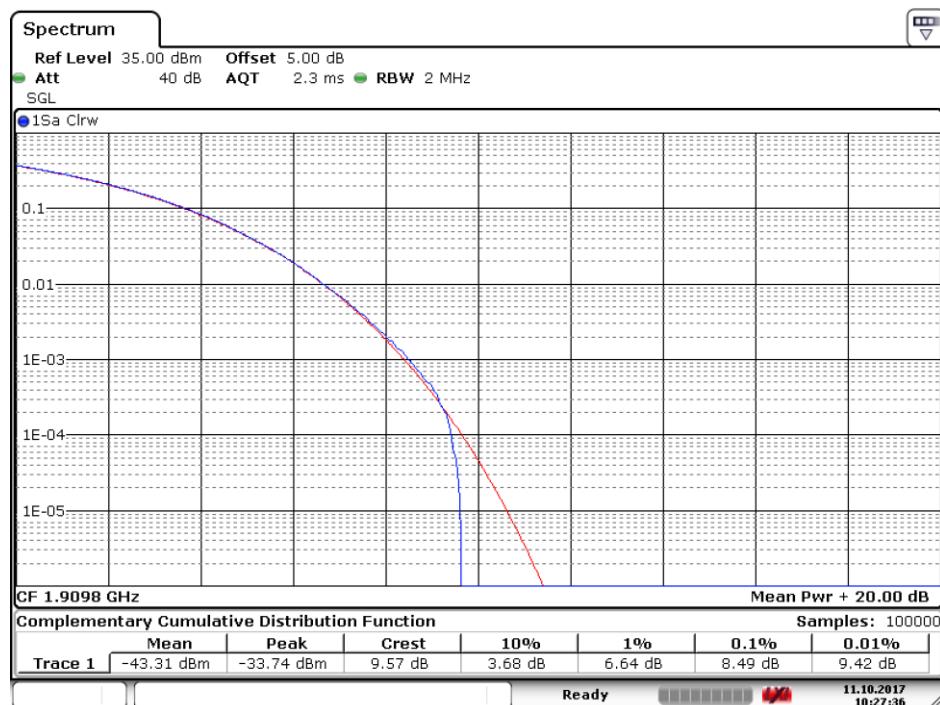
Date: 11.OCT.2017 10:29:05

2.1.2.2.2 Test Channel = MCH



Date: 11.OCT.2017 10:28:05

2.1.2.2.3 Test Channel = HCH



Date: 11.OCT.2017 10:27:36

3 Modulation Characteristics

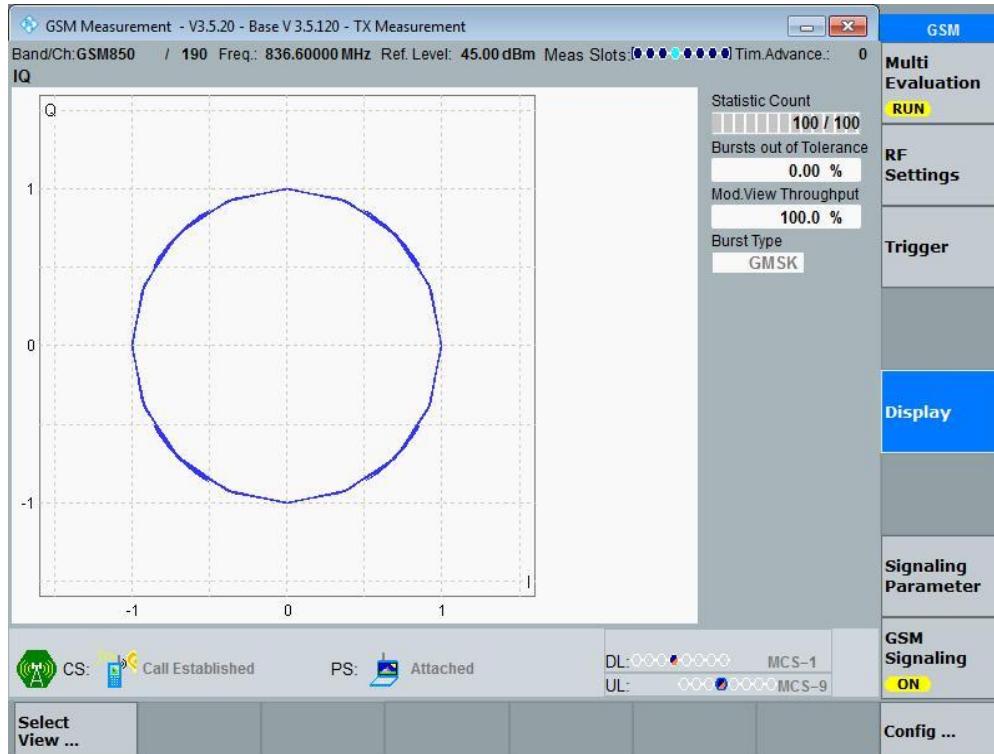
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM 850

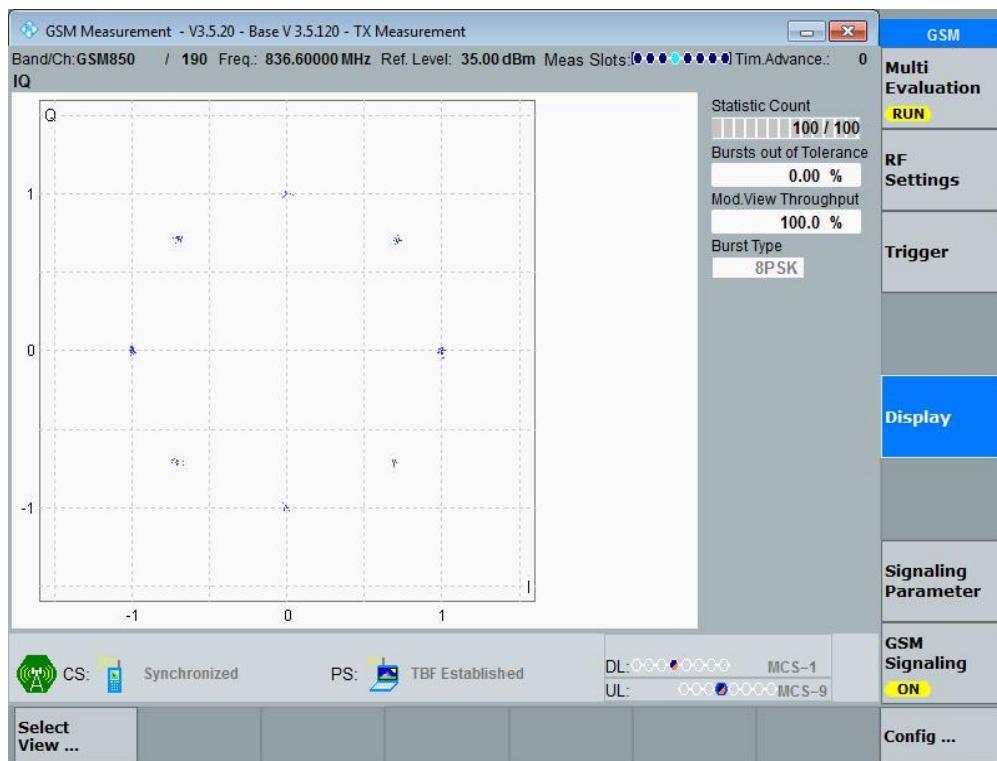
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = MCH



3.1.1.2 Test Mode = GSM/TM2

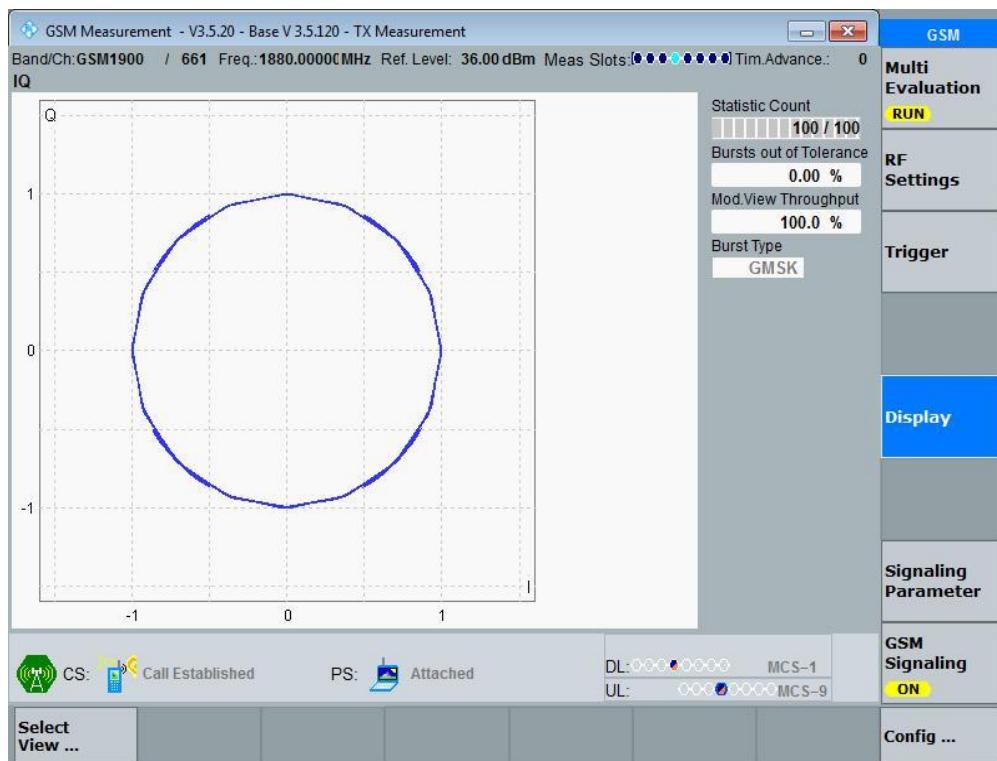
3.1.1.2.1 Test Channel = MCH



3.1.2 Test Band = GSM 1900

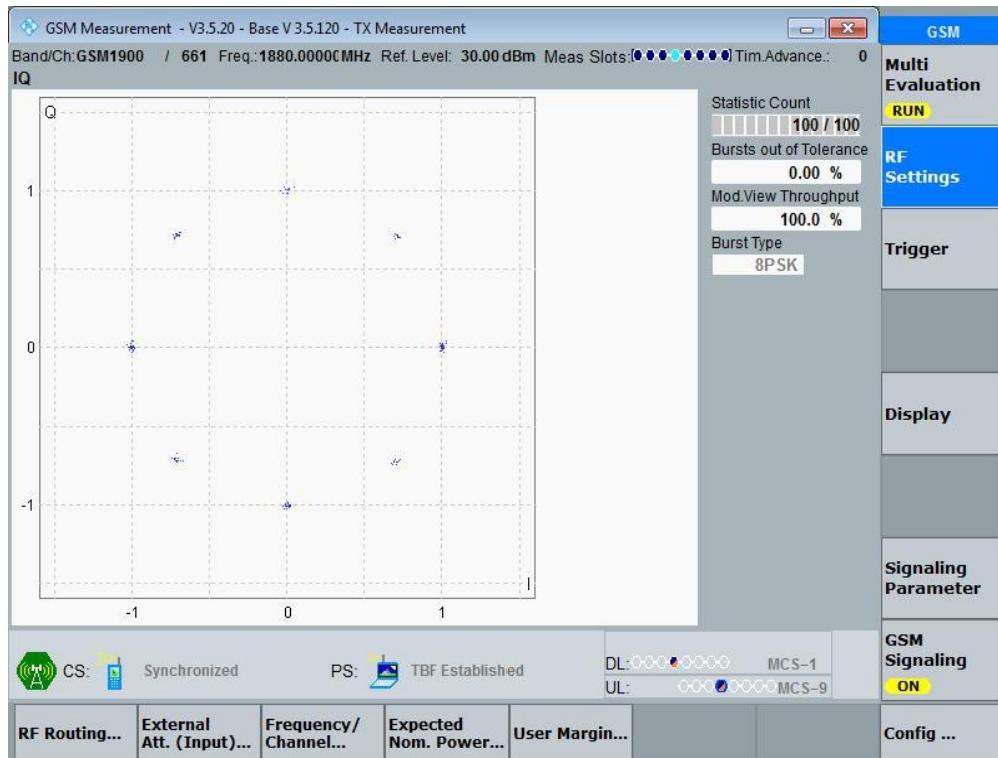
3.1.2.1 Test Mode = GSM/TM1

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

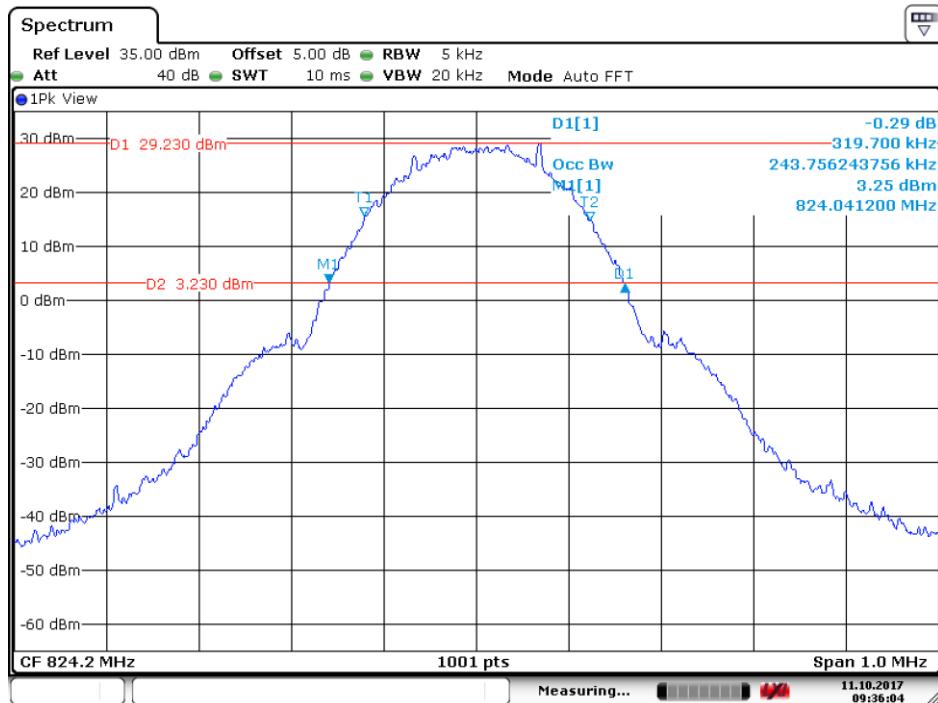
Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM 850	GSM/TM1	LCH	243.8	319.7	PASS
		MCH	242.8	322.7	PASS
		HCH	244.8	318.7	PASS
	GSM/TM2	LCH	237.8	315.7	PASS
		MCH	238.8	317.7	PASS
		HCH	239.8	312.7	PASS
GSM 1900	GSM/TM1	LCH	246.8	316.7	PASS
		MCH	245.8	316.7	PASS
		HCH	246.8	313.7	PASS
	GSM/TM2	LCH	245.8	316.7	PASS
		MCH	244.8	312.7	PASS
		HCH	242.8	315.7	PASS

4.1 For GSM

4.1.1 Test Band = GSM 850

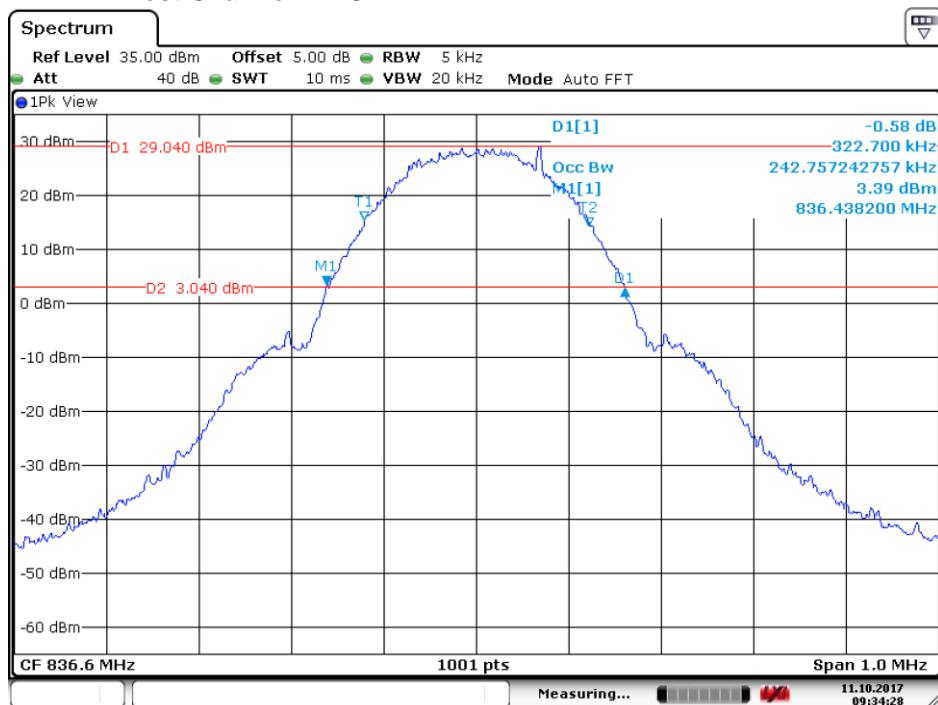
4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



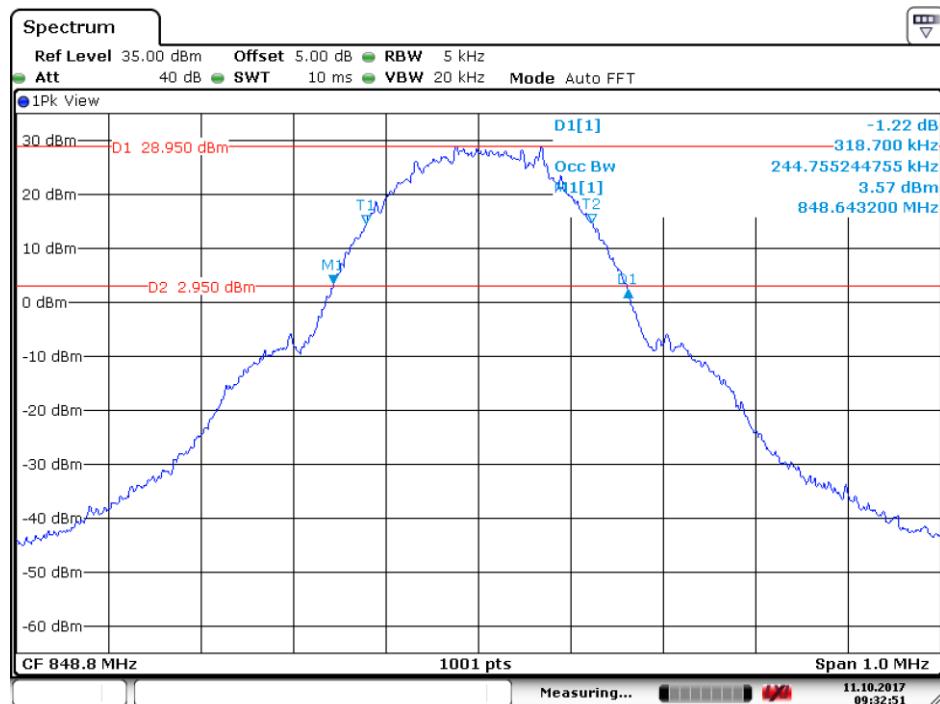
Date: 11.OCT.2017 09:36:05

4.1.1.1.2 Test Channel = MCH



Date: 11.OCT.2017 09:34:29

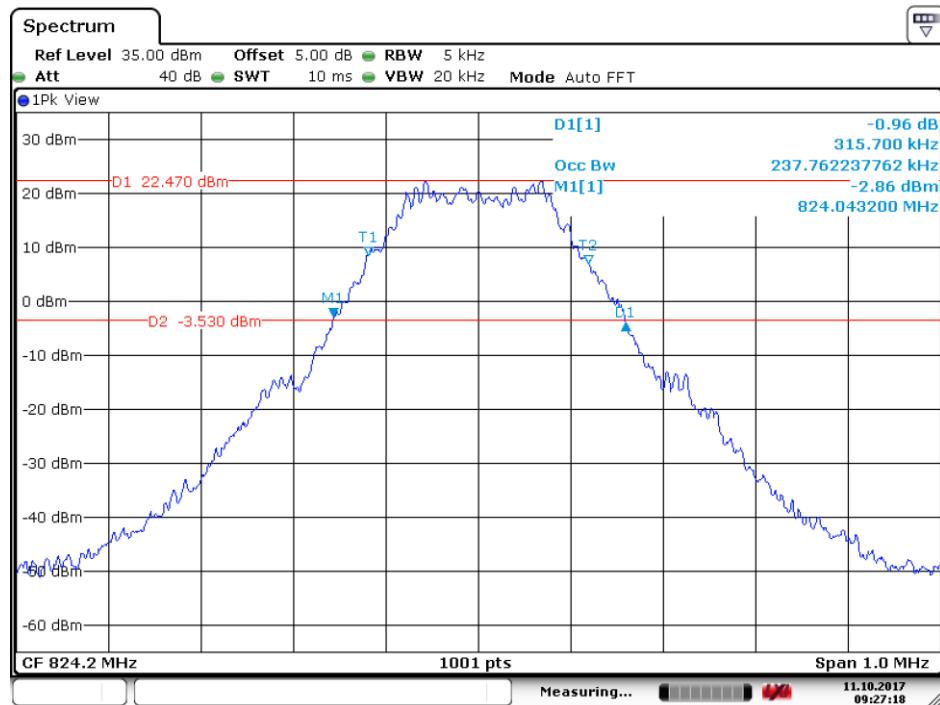
4.1.1.1.3 Test Channel = HCH



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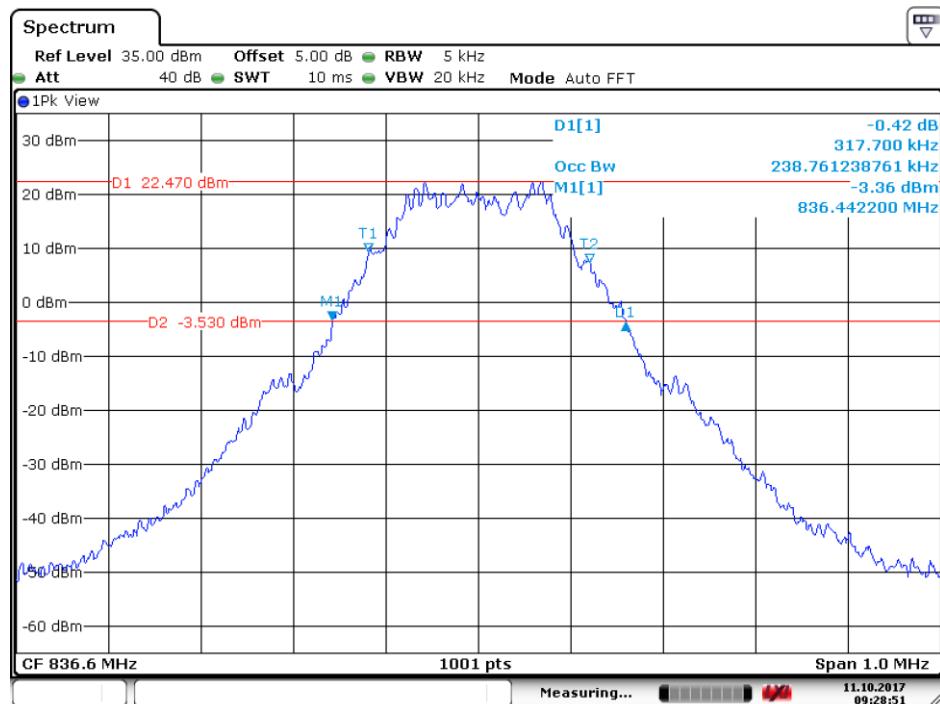
4.1.1.2 Test Mode = GSM/TM2

4.1.1.2.1 Test Channel = LCH



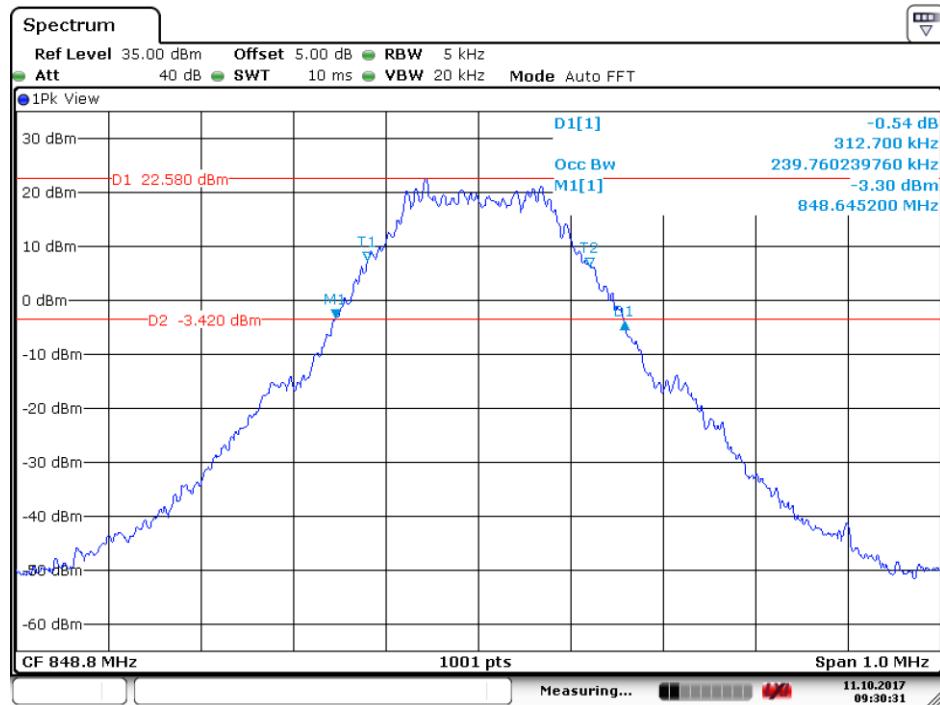
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4.1.1.2.2 Test Channel = MCH



Date: 11.OCT.2017 09:28:52

4.1.1.2.3 Test Channel = HCH

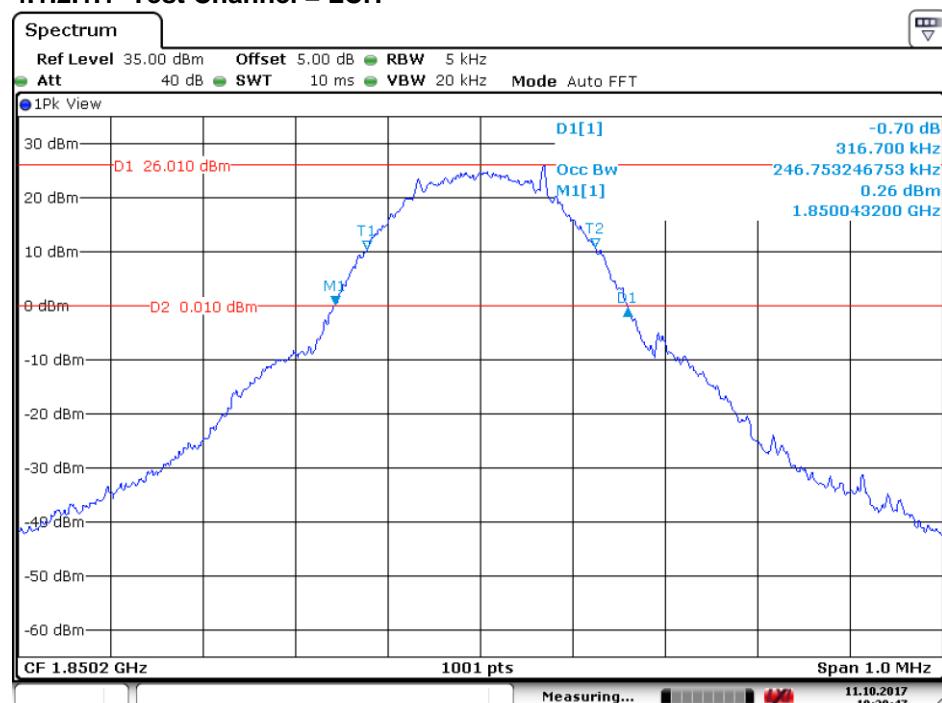


Date: 11.OCT.2017 09:30:31

4.1.2 Test Band = GSM 1900

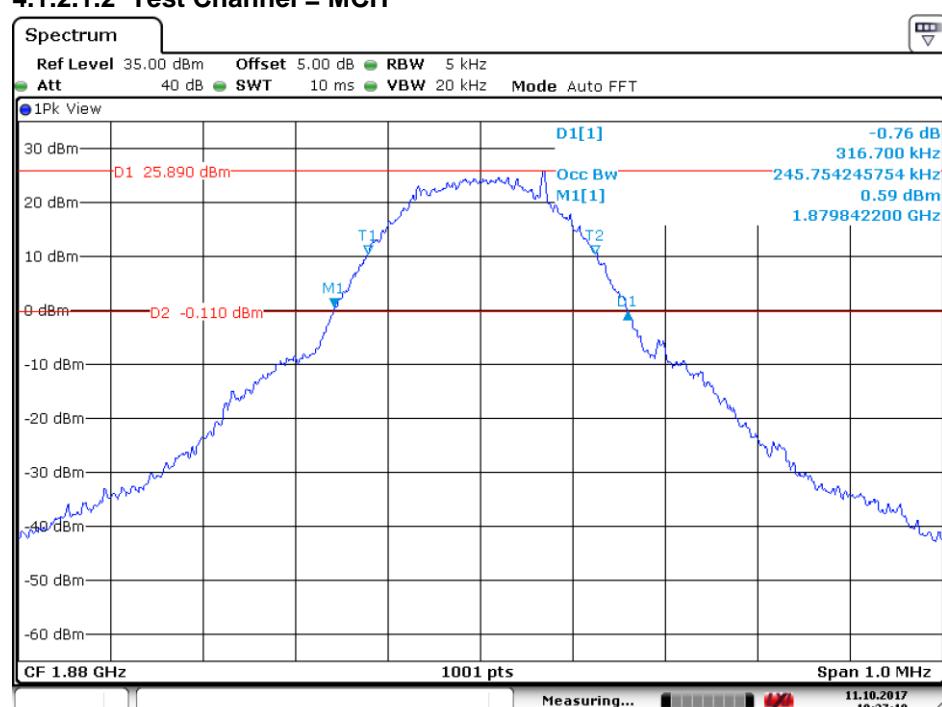
4.1.2.1 Test Mode = GSM/TM1

4.1.2.1.1 Test Channel = LCH



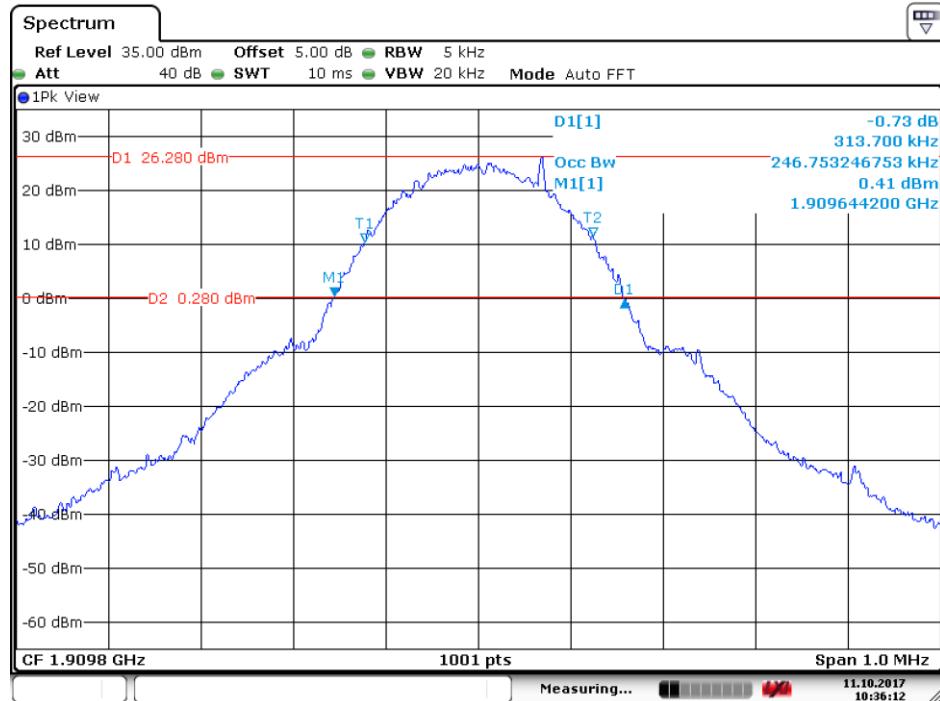
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4.1.2.1.2 Test Channel = MCH



Date: 11.OCT.2017 10:37:19

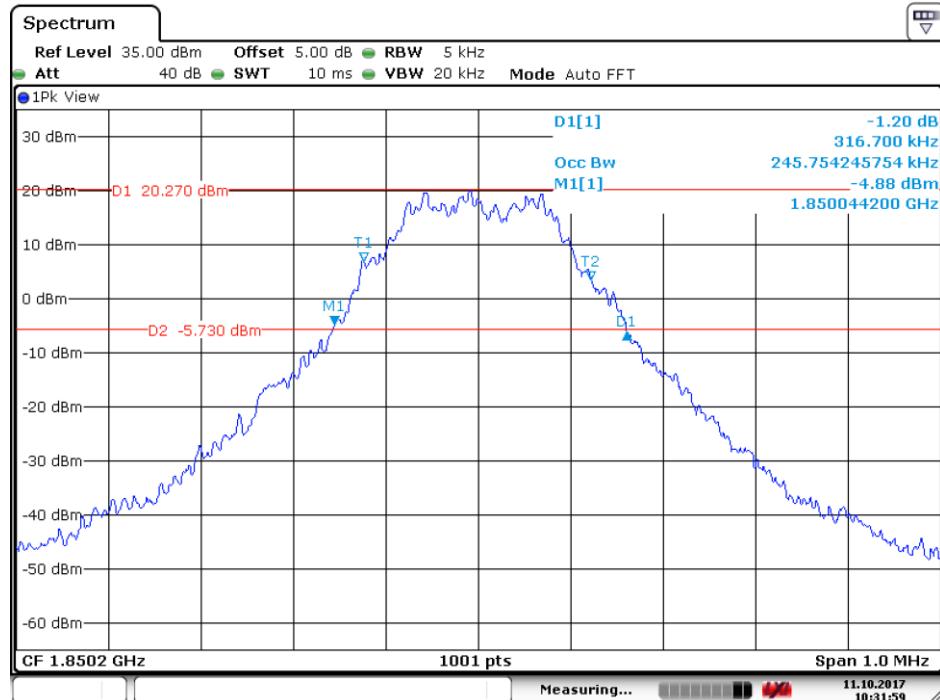
4.1.2.1.3 Test Channel = HCH



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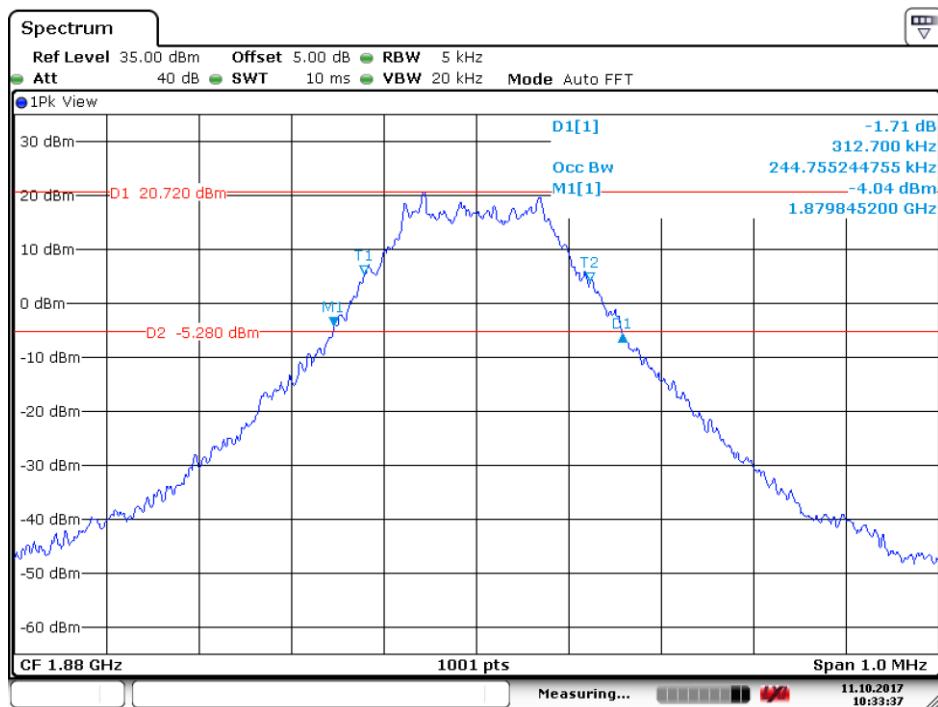
4.1.2.2 Test Mode = GSM/TM2

4.1.2.2.1 Test Channel = LCH



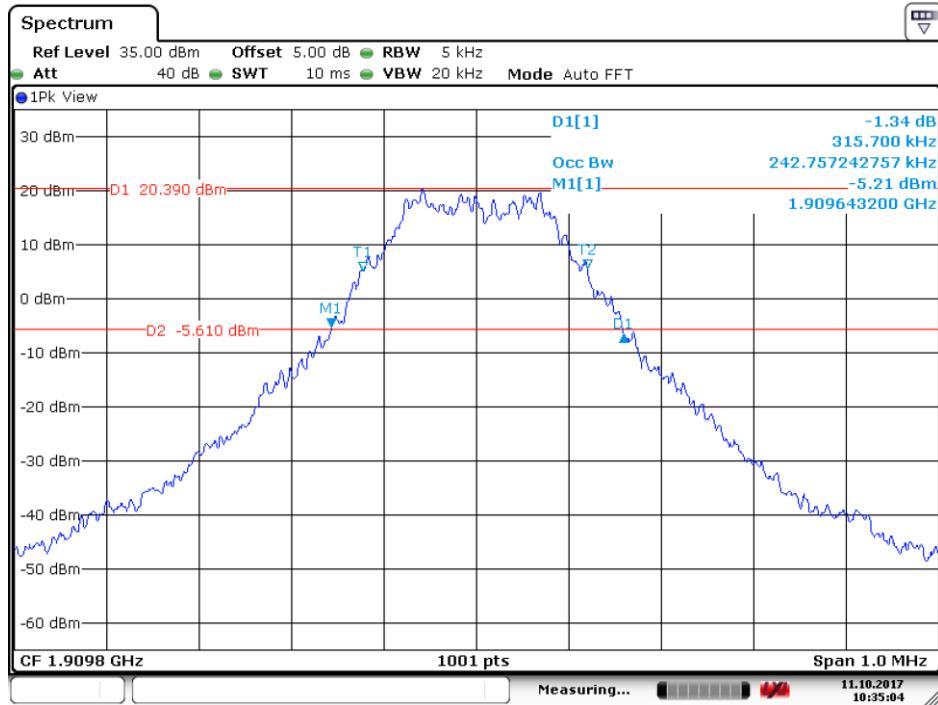
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4.1.2.2.2 Test Channel = MCH



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4.1.2.2.3 Test Channel = HCH



Date: 11.OCT.2017 10:35:05

5 Band Edges Compliance

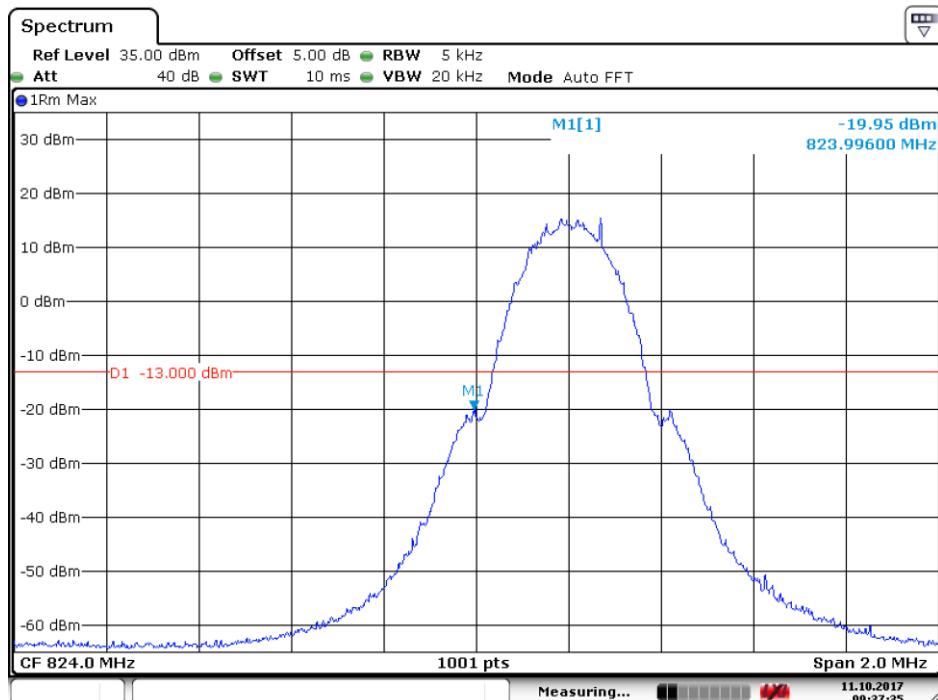
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM 850

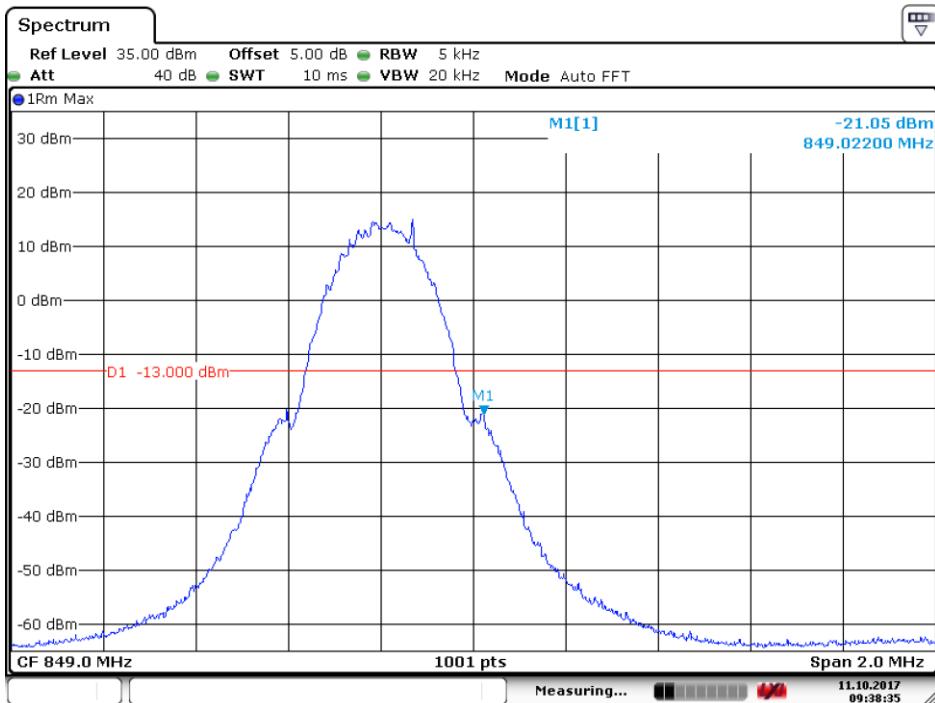
5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH



Date: 11.OCT.2017 09:37:36

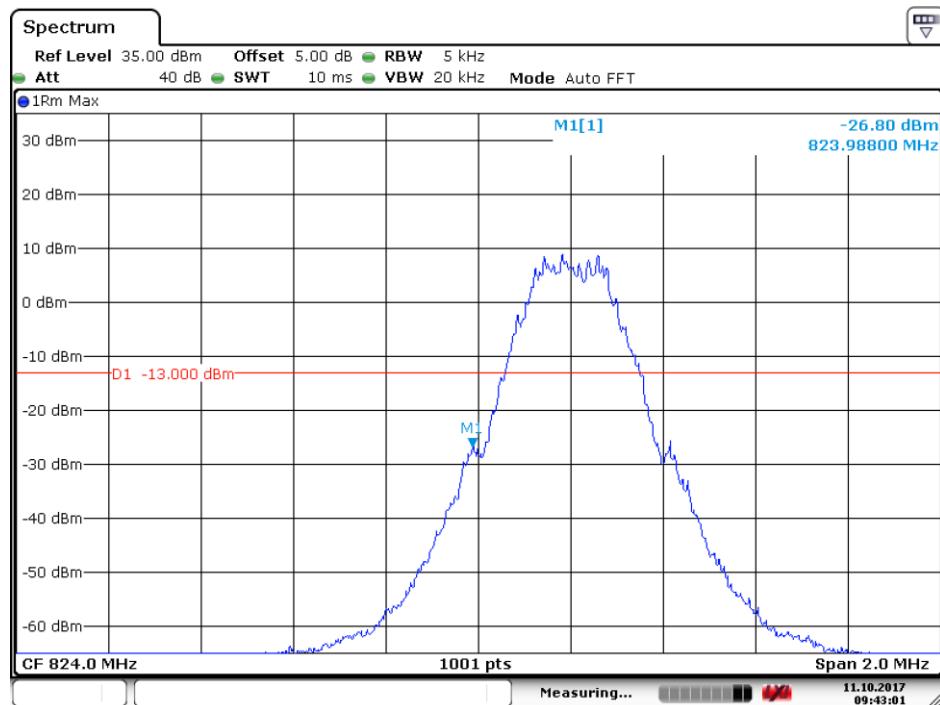
5.1.1.1.2 Test Channel = HCH



Date: 11.OCT.2017 09:38:36

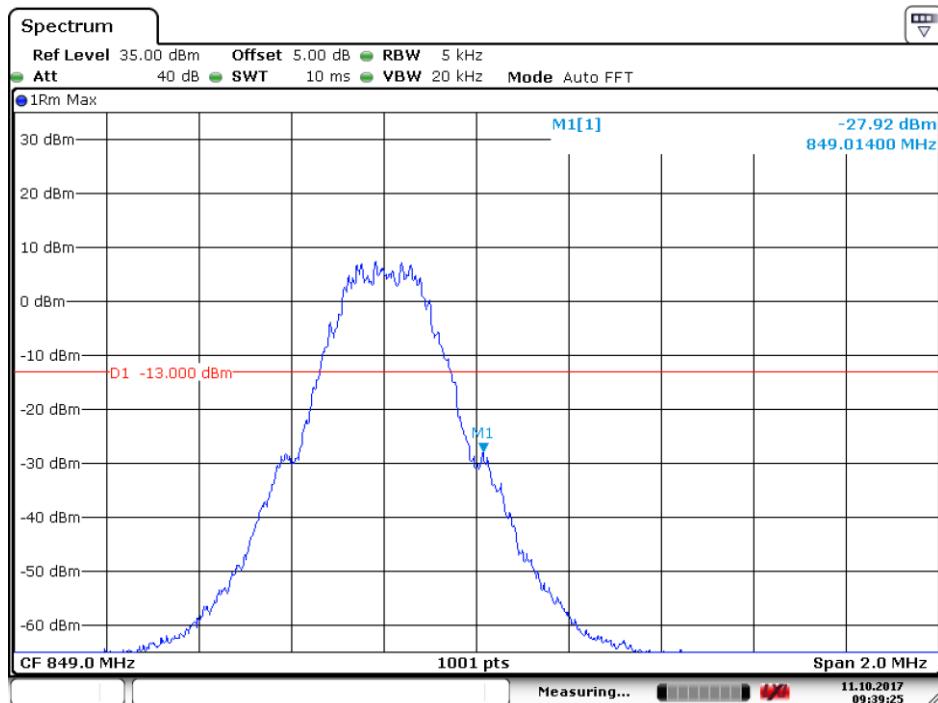
5.1.1.2 Test Mode = GSM/TM2

5.1.1.2.1 Test Channel = LCH



Date: 11.OCT.2017 09:43:02

5.1.1.2.2 Test Channel = HCH

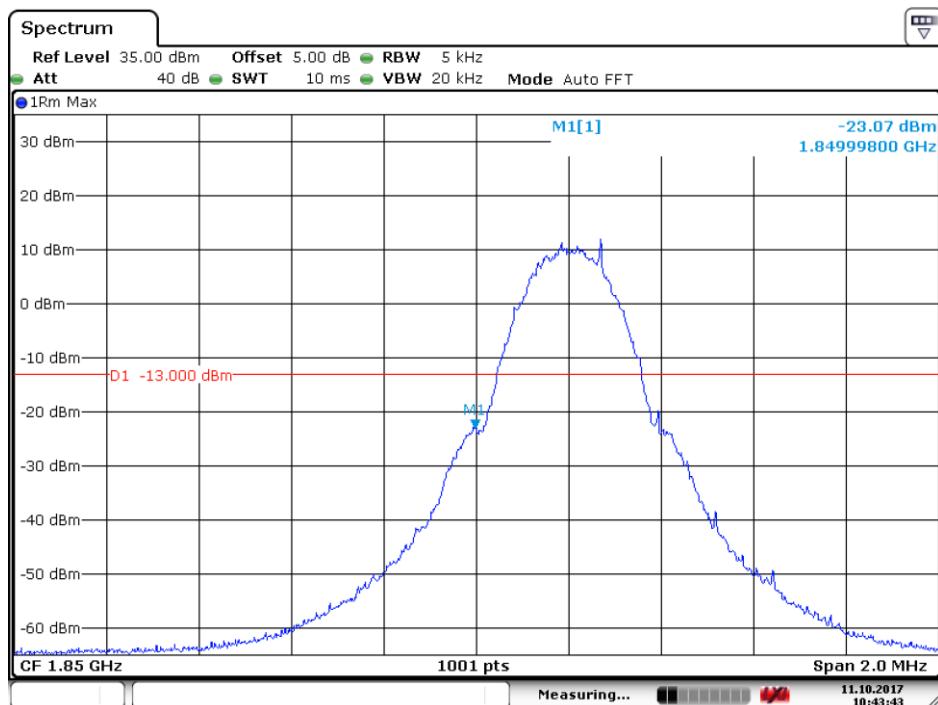


Date: 11.OCT.2017 09:39:26

5.1.2 Test Band = GSM 1900

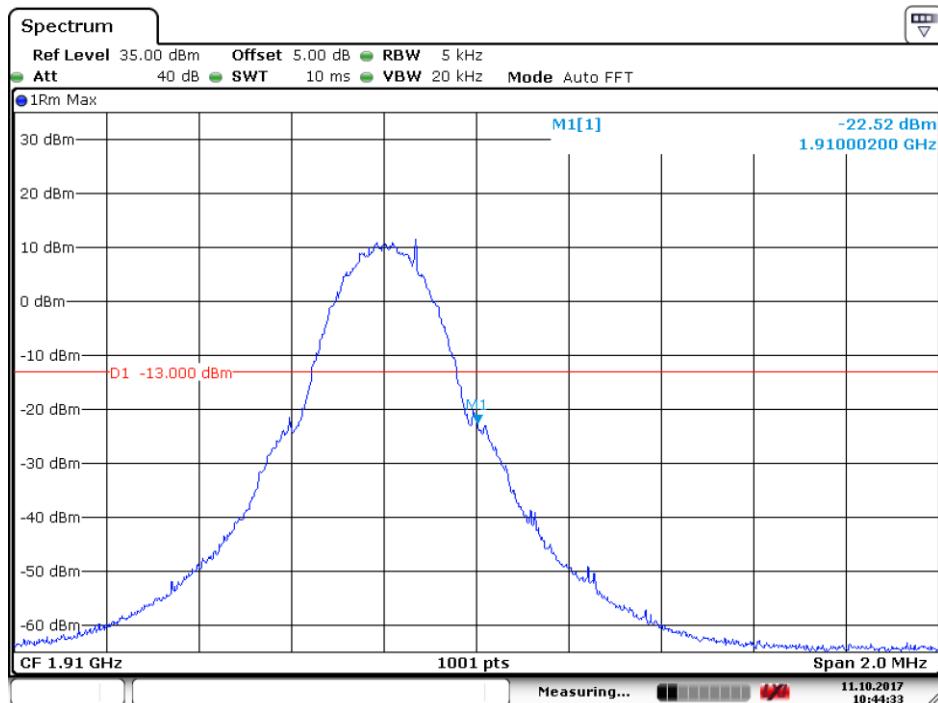
5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = LCH



Date: 11.OCT.2017 10:43:43

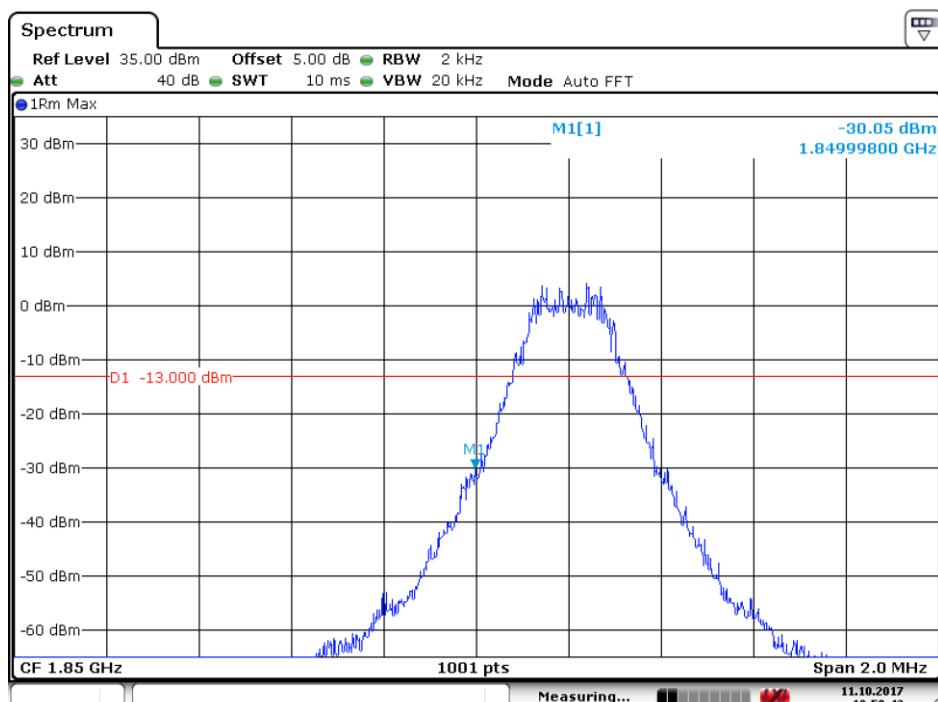
5.1.2.1.2 Test Channel = HCH



Date: 11.OCT.2017 10:44:33

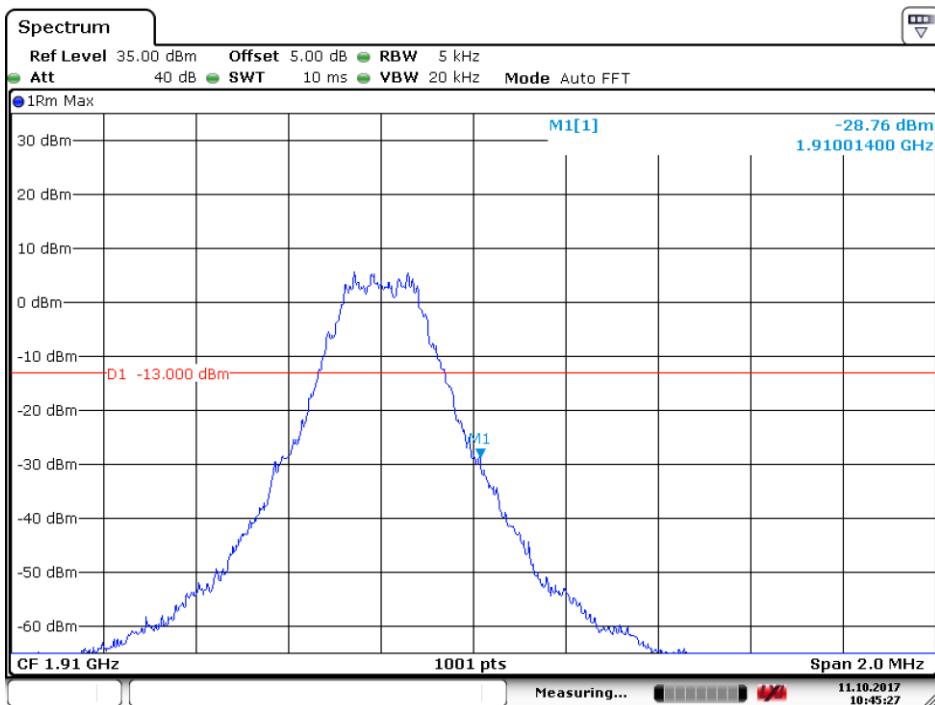
5.1.2.2 Test Mode = GSM/TM2

5.1.2.2.1 Test Channel = LCH



Date: 11.OCT.2017 10:59:42

5.1.2.2.2 Test Channel = HCH



Date: 11.OCT.2017 10:45:27

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.

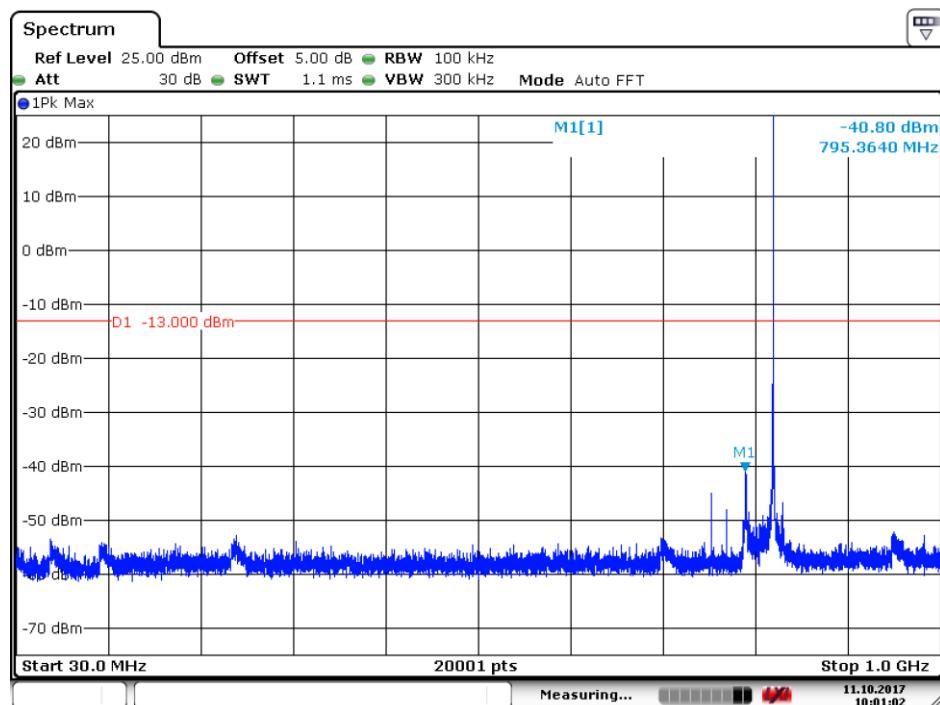
Part I - Test Plots

6.1 For GSM

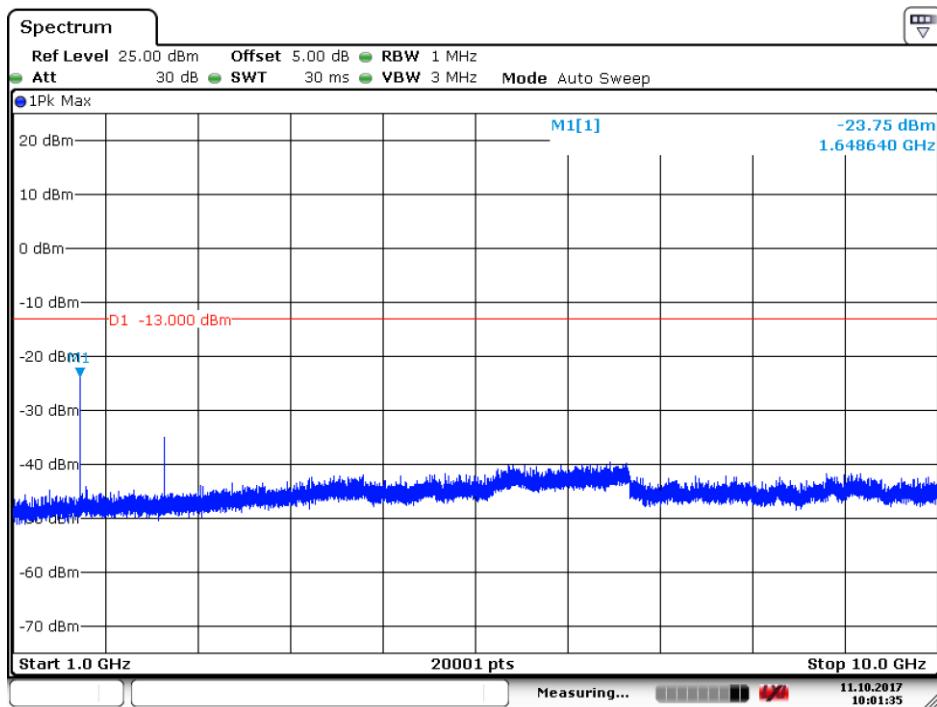
6.1.1 Test Band = GSM 850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH

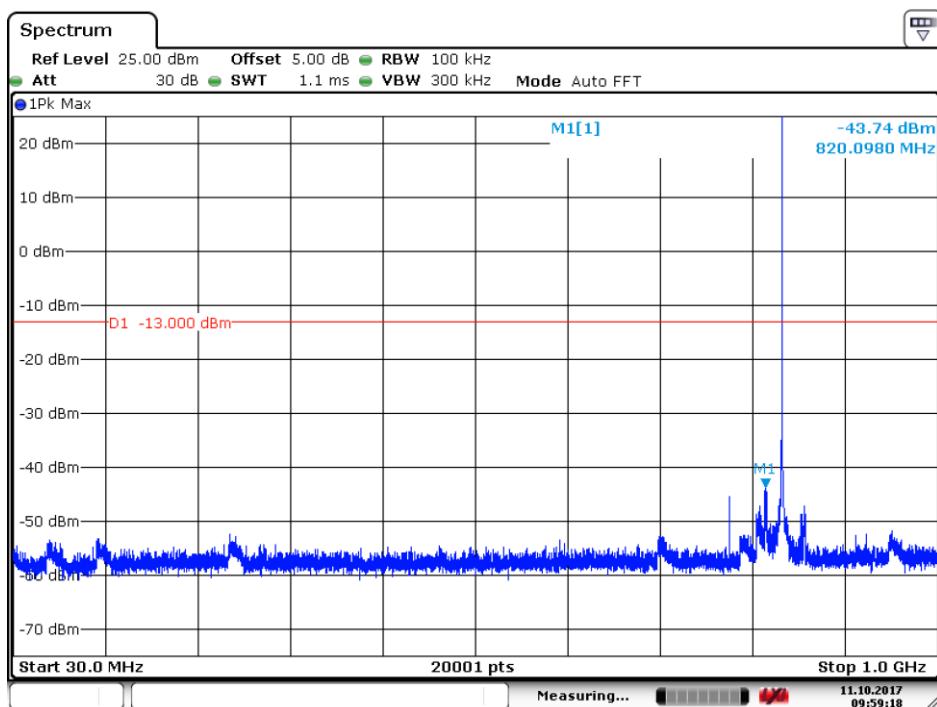


Date: 11.OCT.2017 10:01:02

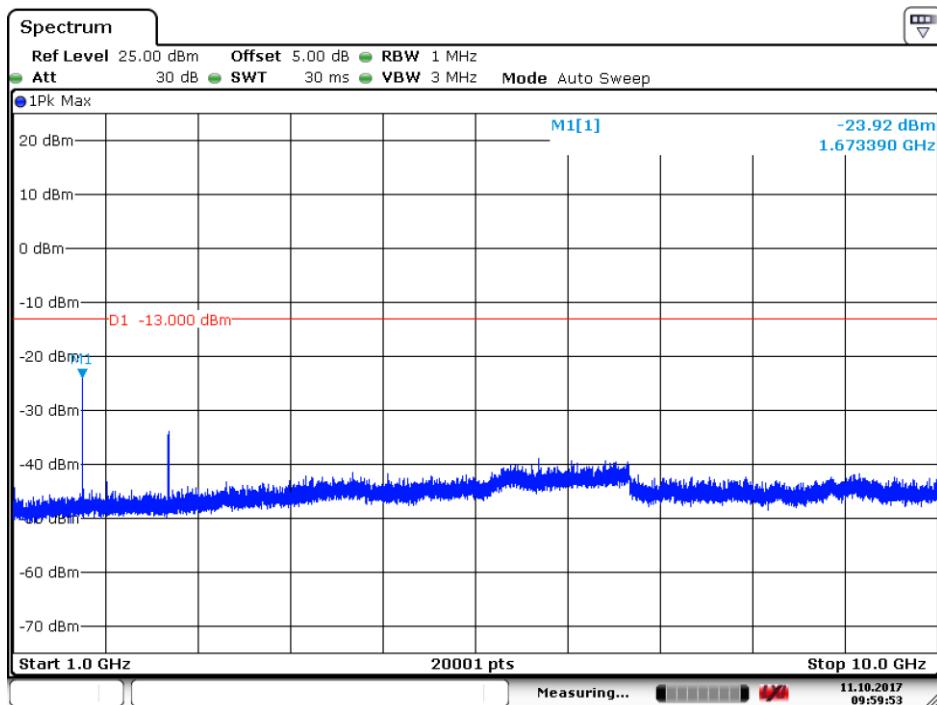


Date: 11.OCT.2017 10:01:36

6.1.1.1.2 Test Channel = MCH

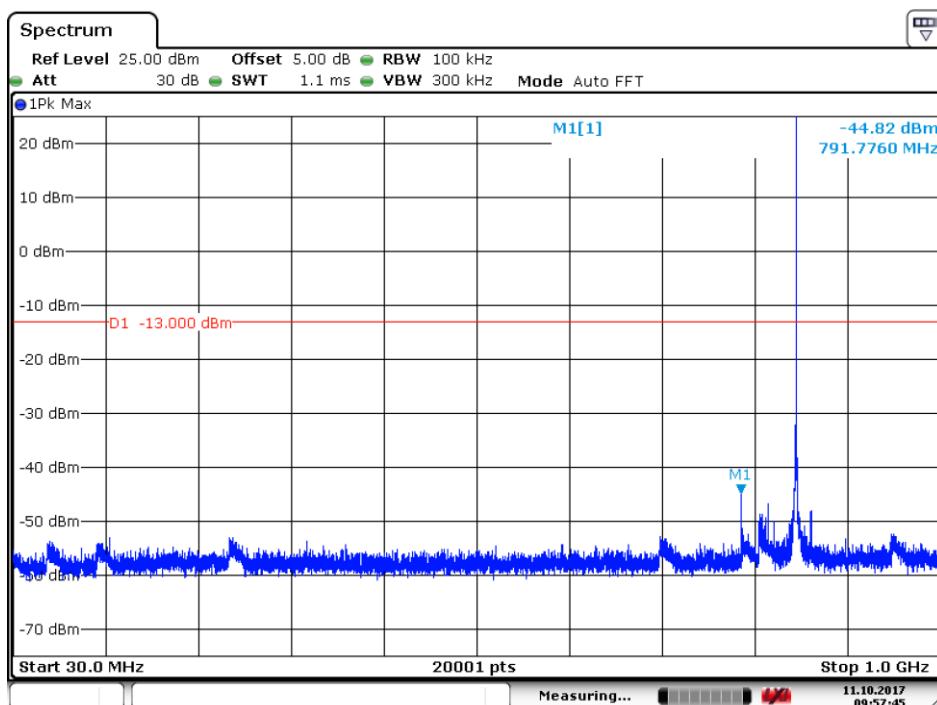


Date: 11.OCT.2017 09:59:19



Date: 11.OCT.2017 09:59:54

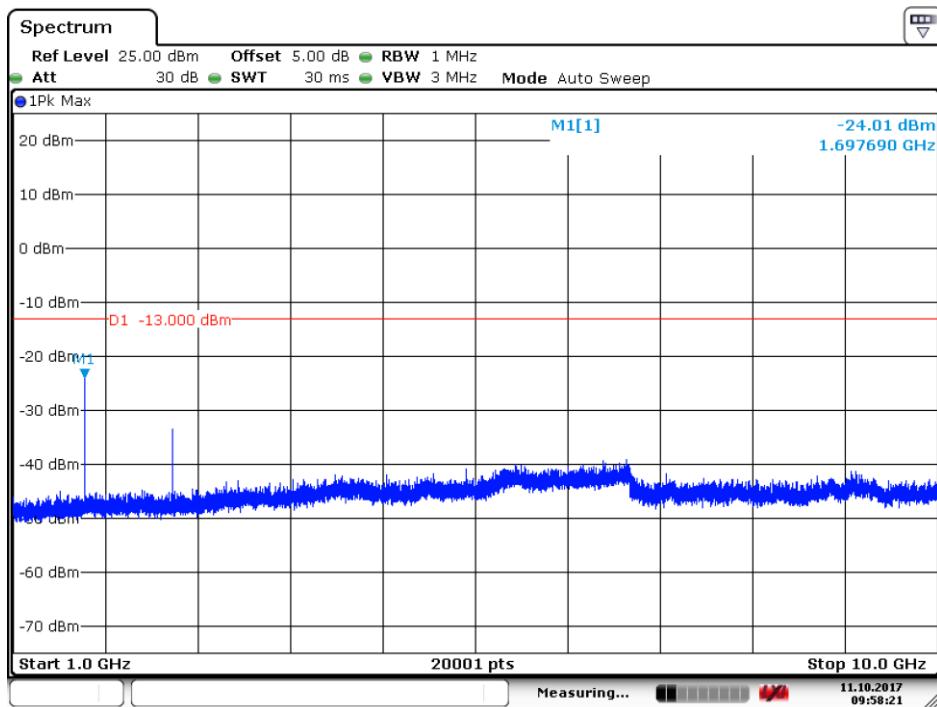
6.1.1.1.3 Test Channel = HCH



Date: 11.OCT.2017 09:57:46

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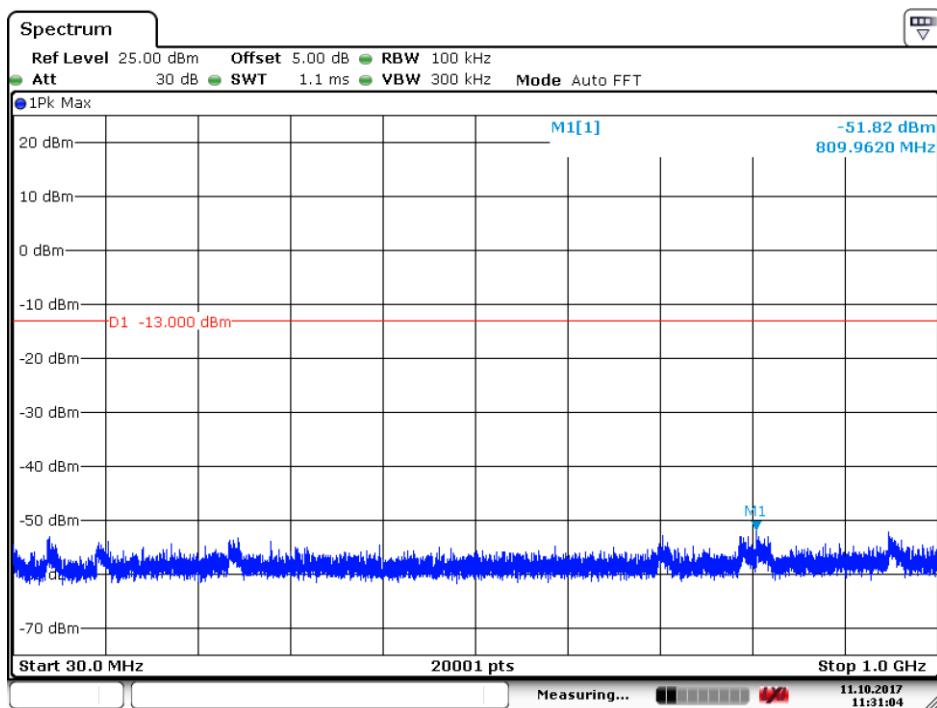


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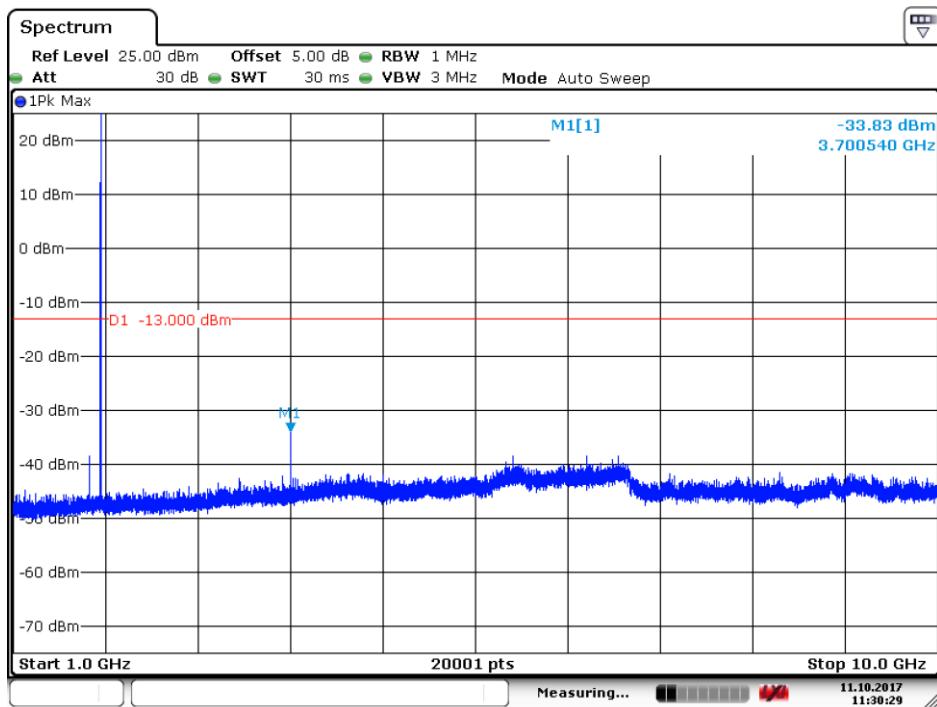
6.1.2 Test Band = GSM 1900

6.1.2.1 Test Mode = GSM/TM1

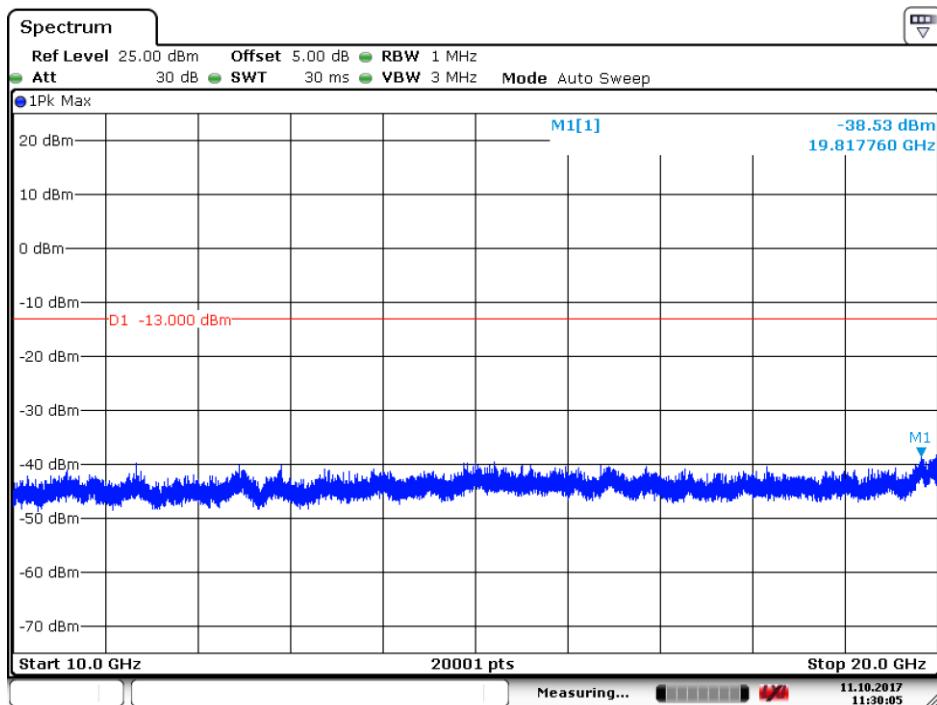
6.1.2.1.1 Test Channel = LCH



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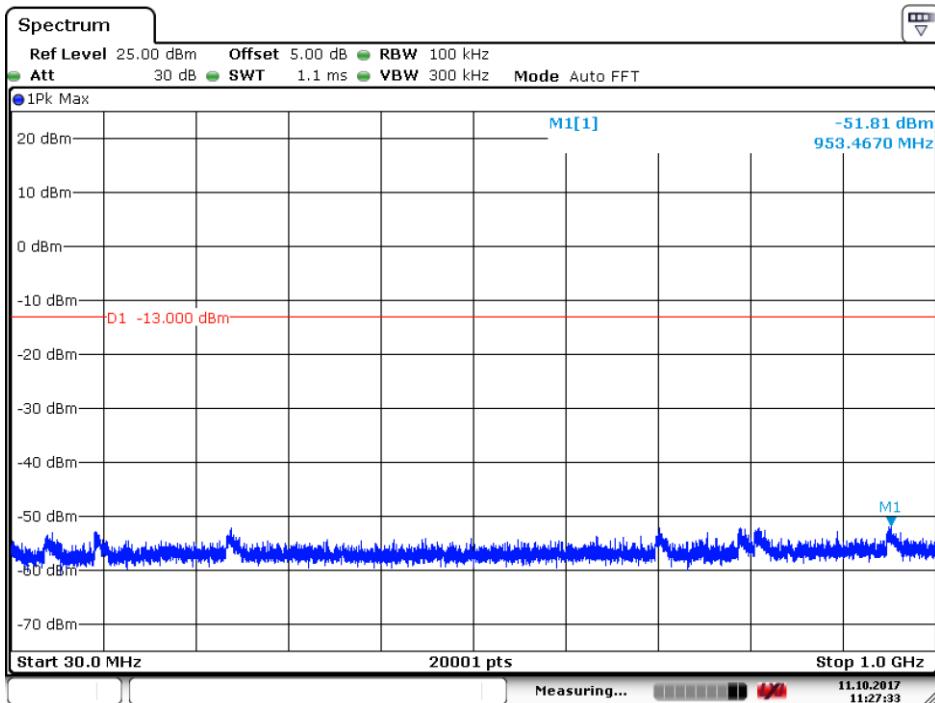


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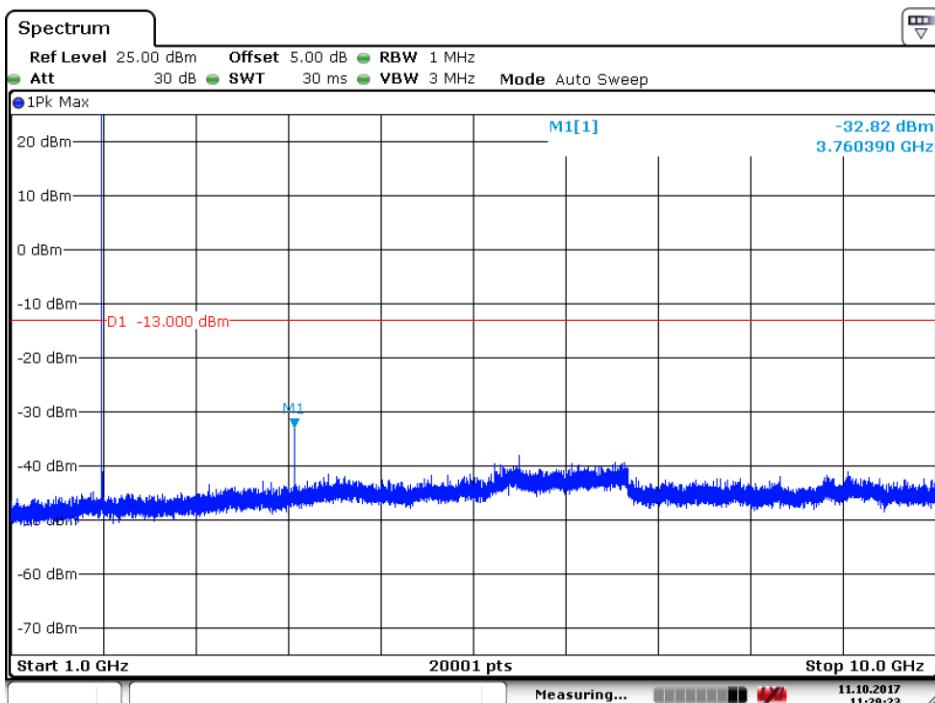


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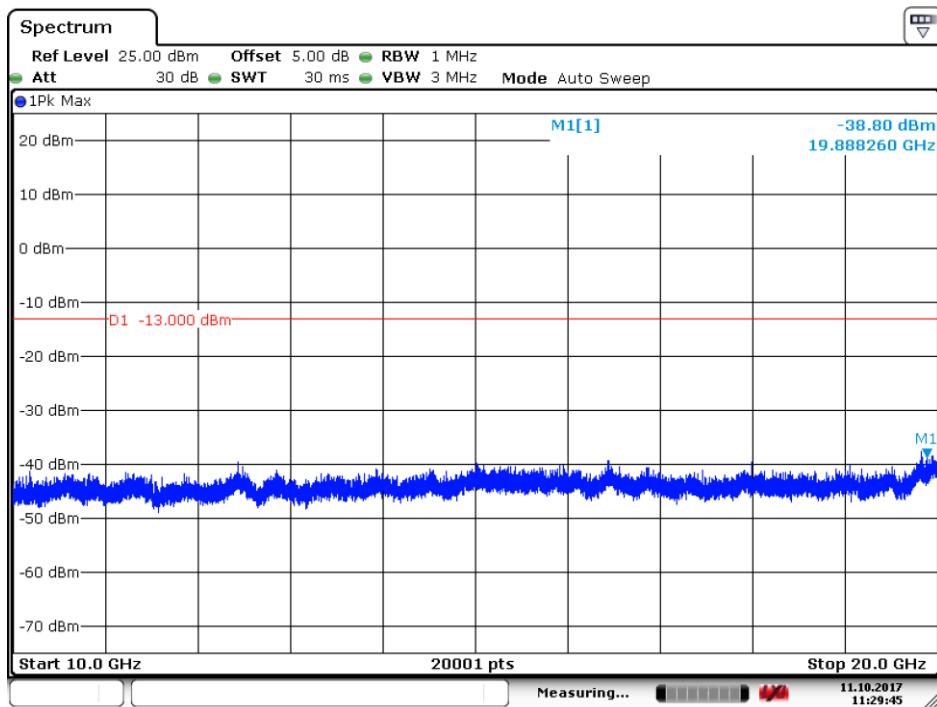
6.1.2.1.2 Test Channel = MCH



Date: 11.OCT.2017 11:27:33

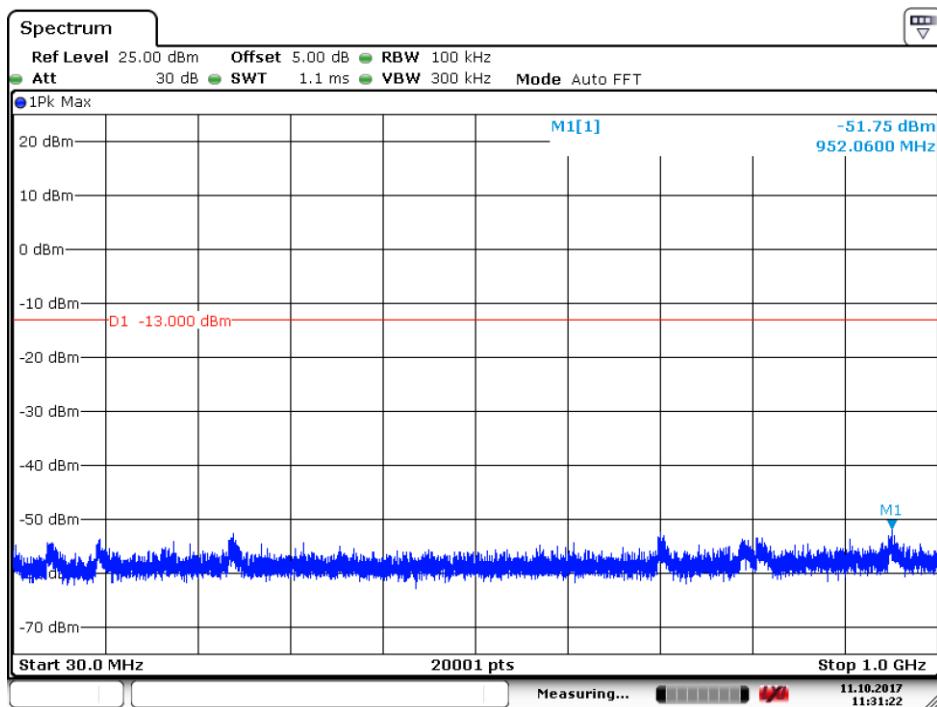


Date: 11.OCT.2017 11:29:24

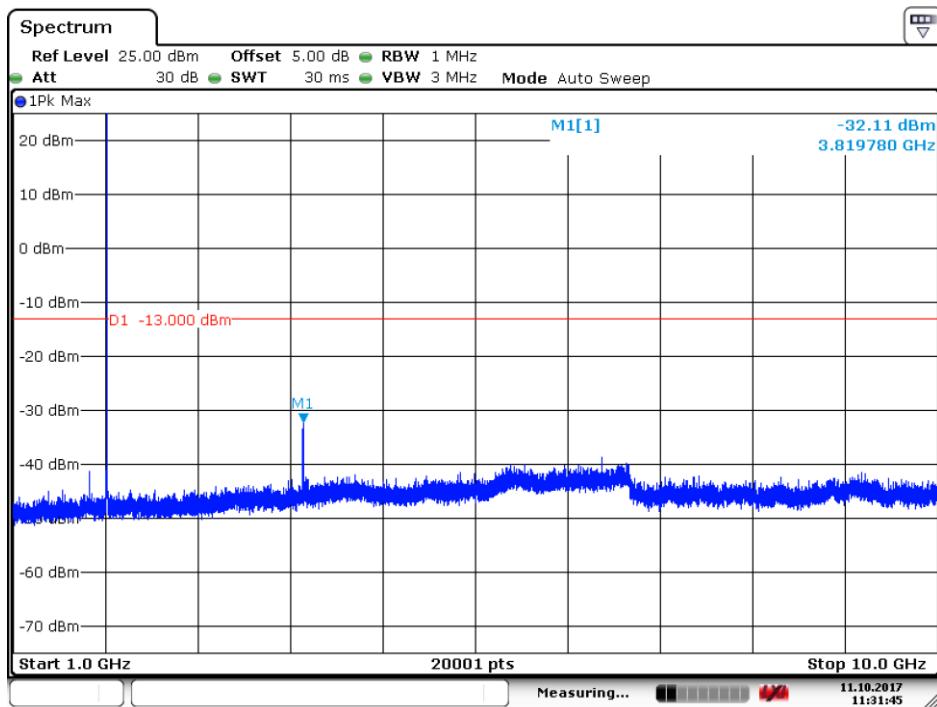


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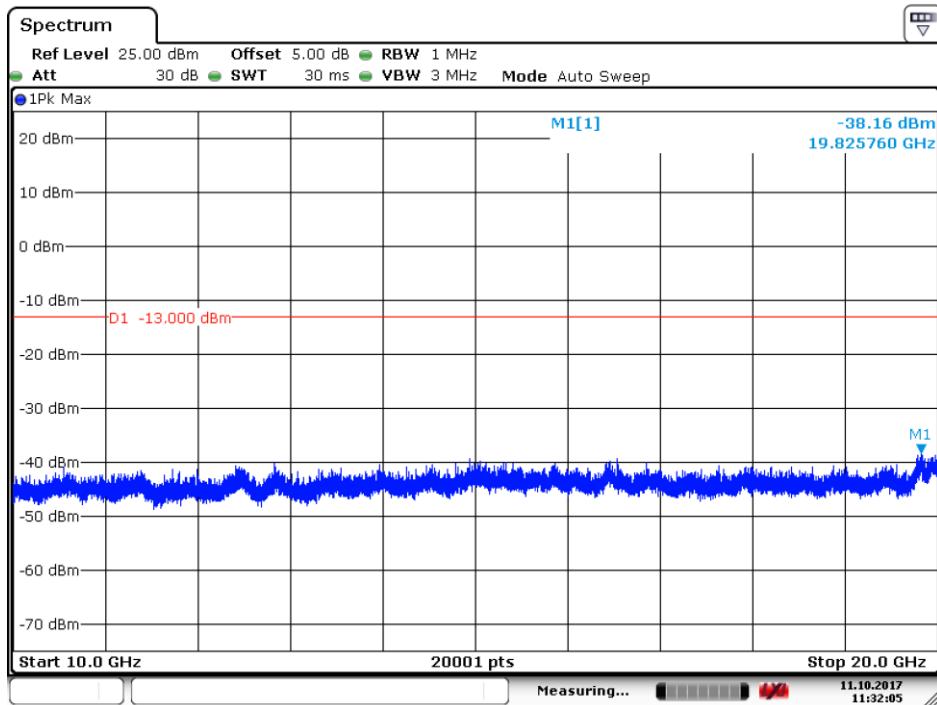
6.1.2.1.3 Test Channel = HCH



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7 Field Strength of Spurious Radiation

Part I - Test Plots

7.1 For GSM

Main Supply:

7.1.1 Test Band = GSM 850

7.1.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1545.937	-49.55	-13.00	-36.55	Vertical
2074.312	-45.54	-13.00	-32.54	Vertical
4336.875	-49.99	-13.00	-36.99	Vertical
1410.833	-50.48	-13.00	-37.48	Horizontal
1801.312	-46.57	-13.00	-33.57	Horizontal
3909.375	-51.43	-13.00	-38.43	Horizontal

7.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1277.500	-51.03	-13.00	-38.03	Vertical
2169.937	-44.36	-13.00	-31.36	Vertical
3621.375	-52.44	-13.00	-39.44	Vertical
1210.833	-51.63	-13.00	-38.63	Horizontal
1758.375	-47.49	-13.00	-34.49	Horizontal
4190.250	-50.97	-13.00	-37.97	Horizontal

7.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1281.666	-51.00	-13.00	-38.00	Vertical
1849.125	-46.95	-13.00	-33.95	Vertical
4093.125	-51.18	-13.00	-38.18	Vertical
1734.750	-48.32	-13.00	-35.32	Horizontal
2167.500	-45.61	-13.00	-32.61	Horizontal
4212.375	-51.14	-13.00	-38.14	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
1278.800	-51.28	-13.00	-38.28	Vertical
2184.860	-44.72	-13.00	-31.72	Vertical
4257.000	-52.32	-13.00	-39.32	Vertical
1473.960	-50.78	-13.00	-37.78	Horizontal
2772.100	-42.08	-13.00	-29.08	Horizontal
4006.125	-51.25	-13.00	-38.25	Horizontal

7.1.2.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1397.700	-52.29	-13.00	-39.29	Vertical
2192.280	-45.17	-13.00	-32.17	Vertical
4344.750	-50.35	-13.00	-37.35	Vertical
1091.020	-52.32	-13.00	-39.32	Horizontal
2780.580	-41.87	-13.00	-28.87	Horizontal
3968.625	-52.12	-13.00	-39.12	Horizontal

7.1.2.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1226.320	-51.20	-13.00	-38.20	Vertical
2230.440	-43.79	-13.00	-30.79	Vertical
4035.375	-51.45	-13.00	-38.45	Vertical
1512.500	-50.47	-13.00	-37.47	Horizontal
2308.880	-44.13	-13.00	-31.13	Horizontal
4159.500	-51.32	-13.00	-38.32	Horizontal

Secondary Supply:

7.1.3 Test Band = GSM 850

7.1.3.1.1 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
1793.625	-46.52	-13.00	-33.52	Vertical
2688.937	-41.80	-13.00	-28.80	Vertical
6324.500	-48.59	-13.00	-35.59	Vertical
1451.666	-50.42	-13.00	-37.42	Horizontal
2606.250	-42.13	-13.00	-29.13	Horizontal
5095.125	-48.65	-13.00	-35.65	Horizontal



7.1.4 Test Band = GSM 1900

7.1.4.1.1 Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Over Limit (dB)	Polarization
2431.840	-36.19	-13.00	23.19	Vertical
3760.125	-47.71	-13.00	34.71	Vertical
5640.375	-45.55	-13.00	32.55	Vertical
2580.240	-36.11	-13.00	23.11	Horizontal
3759.375	-48.41	-13.00	35.41	Horizontal
5640.750	-45.85	-13.00	32.85	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	2.67	0.00324	PASS
				VN	1.31	0.00159	PASS
				VH	-2.38	-0.00289	PASS
		MCH	TN	VL	-2.83	-0.00338	PASS
				VN	-3.82	-0.00457	PASS
				VH	-4.75	-0.00568	PASS
		HCH	TN	VL	3.03	0.00357	PASS
				VN	-2.92	-0.00344	PASS
				VH	-2.90	-0.00342	PASS
	GSM/TM2	LCH	TN	VL	-3.46	-0.00420	PASS
				VN	1.53	0.00186	PASS
				VH	-5.18	-0.00628	PASS
		MCH	TN	VL	3.03	0.00362	PASS
				VN	2.20	0.00263	PASS
				VH	-4.37	-0.00522	PASS
		HCH	TN	VL	1.40	0.00165	PASS
				VN	-3.34	-0.00393	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	-2.33	-0.00126	PASS
				VN	3.14	0.00170	PASS
				VH	1.42	0.00077	PASS
		MCH	TN	VL	1.49	0.00079	PASS
				VN	-2.20	-0.00117	PASS
				VH	3.30	0.00176	PASS
		HCH	TN	VL	-2.55	-0.00134	PASS
				VN	2.37	0.00124	PASS
				VH	-1.60	-0.00084	PASS
	GSM/TM2	LCH	TN	VL	1.25	0.00068	PASS
				VN	-2.30	-0.00124	PASS
				VH	2.30	0.00124	PASS
		MCH	TN	VL	-2.22	-0.00118	PASS
				VN	1.45	0.00077	PASS
				VH	4.54	0.00241	PASS
		HCH	TN	VL	-2.45	-0.00128	PASS
				VN	3.50	0.00183	PASS
				VH	-4.31	-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	1.89	0.00229	PASS
				-10	1.42	0.00172	PASS
				0	-3.60	-0.00437	PASS
				10	2.49	0.00302	PASS
				20	-4.63	-0.00562	PASS
				30	1.73	0.00210	PASS
				40	-0.25	-0.00030	PASS
				50	-4.20	-0.00510	PASS
		MCH	VN	-30	-2.96	-0.00354	PASS
				-20	-5.80	-0.00693	PASS
				-10	-0.43	-0.00051	PASS
				0	-2.53	-0.00302	PASS
				10	1.37	0.00164	PASS
				20	3.80	0.00454	PASS
				30	1.57	0.00188	PASS
				40	0.27	0.00032	PASS
				50	-3.32	-0.00397	PASS
		HCH	VN	-30	-0.94	-0.00111	PASS
				-20	3.76	0.00443	PASS
				-10	3.15	0.00371	PASS
				0	-2.52	-0.00297	PASS
				10	1.56	0.00184	PASS
				20	-2.37	-0.00279	PASS
				30	3.72	0.00438	PASS
				40	-0.36	-0.00042	PASS
				50	-4.52	-0.00533	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	-2.42	-0.00294	PASS
				-20	2.31	0.00280	PASS
				-10	-5.15	-0.00625	PASS
				0	1.32	0.00160	PASS
				10	-5.36	-0.00650	PASS
				20	-4.13	-0.00501	PASS
				30	-4.22	-0.00512	PASS
				40	-5.65	-0.00686	PASS
				50	-5.75	-0.00698	PASS
		MCH	VN	-30	-2.94	-0.00351	PASS
				-20	3.37	0.00403	PASS
				-10	-4.43	-0.00530	PASS
				0	2.90	0.00347	PASS
				10	-5.15	-0.00616	PASS
				20	-3.56	-0.00426	PASS
				30	-2.06	-0.00246	PASS
				40	-3.32	-0.00397	PASS
				50	-5.52	-0.00660	PASS
		HCH	VN	-30	-3.47	-0.00409	PASS
				-20	-2.72	-0.00320	PASS
				-10	-5.71	-0.00673	PASS
				0	-5.62	-0.00662	PASS
				10	3.05	0.00359	PASS
				20	-4.63	-0.00545	PASS
				30	-3.55	-0.00418	PASS
				40	-2.86	-0.00337	PASS
				50	-2.08	-0.00245	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	-3.45	-0.00186	PASS
				-20	-4.49	-0.00243	PASS
				-10	2.03	0.00110	PASS
				0	-3.65	-0.00197	PASS
				10	-3.59	-0.00194	PASS
				20	1.35	0.00073	PASS
				30	-3.30	-0.00178	PASS
				40	-5.04	-0.00272	PASS
				50	-3.34	-0.00181	PASS
		MCH	VN	-30	-4.97	-0.00264	PASS
				-20	5.29	0.00281	PASS
				-10	-2.02	-0.00107	PASS
				0	4.35	0.00231	PASS
				10	-4.27	-0.00227	PASS
				20	-6.37	-0.00339	PASS
				30	-3.43	-0.00182	PASS
				40	-8.40	-0.00447	PASS
				50	-5.20	-0.00277	PASS
		HCH	VN	-30	-3.56	-0.00186	PASS
				-20	3.62	0.00190	PASS
				-10	3.84	0.00201	PASS
				0	-2.34	-0.00123	PASS
				10	-2.28	-0.00119	PASS
				20	-4.14	-0.00217	PASS
				30	1.50	0.00079	PASS
				40	-4.09	-0.00214	PASS
				50	-4.25	-0.00223	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	-4.56	-0.00246	PASS
				30	1.20	0.00065	PASS
				40	-3.33	-0.00180	PASS
				50	-6.11	-0.00330	PASS
		MCH	VN	-30	-5.56	-0.00296	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	-5.30	-0.00282	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	-6.23	-0.00326	PASS
				20	-3.99	-0.00209	PASS
				30	-2.40	-0.00126	PASS
				40	-2.29	-0.00120	PASS
				50	-5.88	-0.00308	PASS

The End