



Appendix B

GSM850&1900



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch Testing Center EEC Laboratory

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1. Effective (Isotropic) Radiated Power Output Data

1.1. Test Result

BAND	Channel	Power(dBm)	ERP(dBm)	Limit(dBm)	Verdict
GSM850	128	32.32	32.46	38.45	PASS
GSM850	190	32.53	32.67	38.45	PASS
GSM850	251	32.20	32.34	38.45	PASS
EGPRS850	128	26.51	26.65	38.45	PASS
EGPRS850	190	26.67	26.81	38.45	PASS
EGPRS850	251	26.67	26.81	38.45	PASS

BAND	Channel	Power(dBm)	EIRP(dBm)	Limit(dBm)	Verdict
GSM1900	512	29.66	31.25	33.00	PASS
GSM1900	661	29.41	31.00	33.00	PASS
GSM1900	810	29.18	30.77	33.00	PASS
EGPRS1900	512	26.20	27.79	33.00	PASS
EGPRS1900	661	25.92	27.51	33.00	PASS
EGPRS1900	810	25.67	27.26	33.00	PASS

Remark:

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

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

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

b: SGP=Signal Generator Level

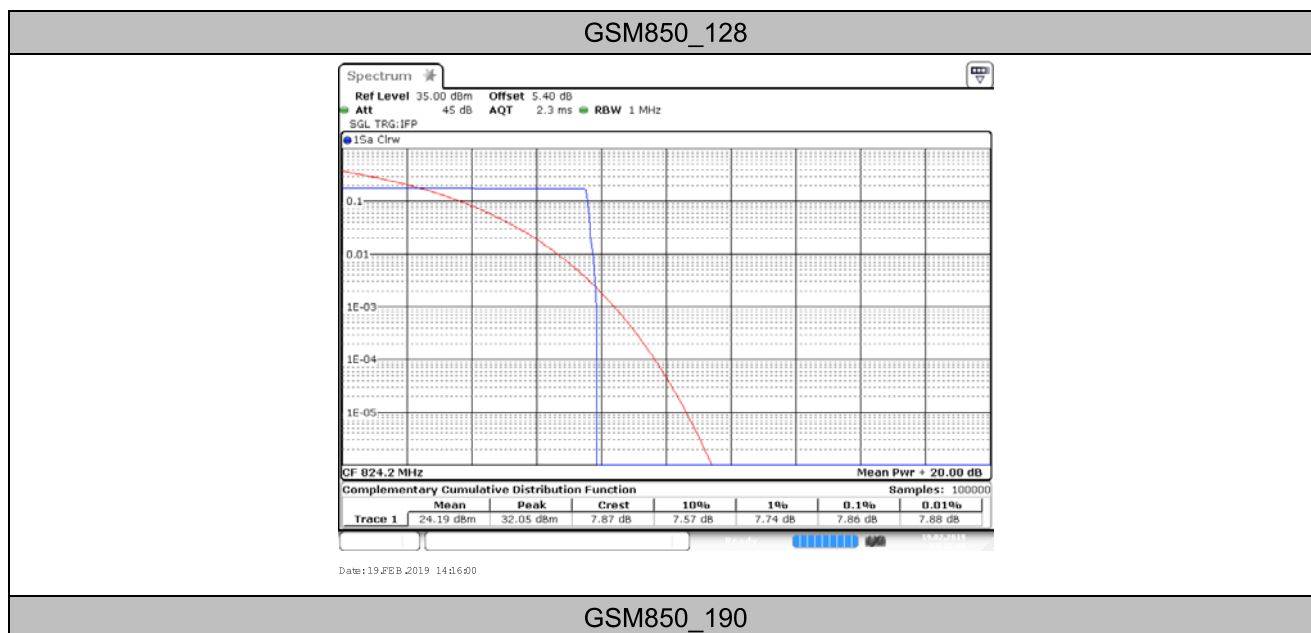


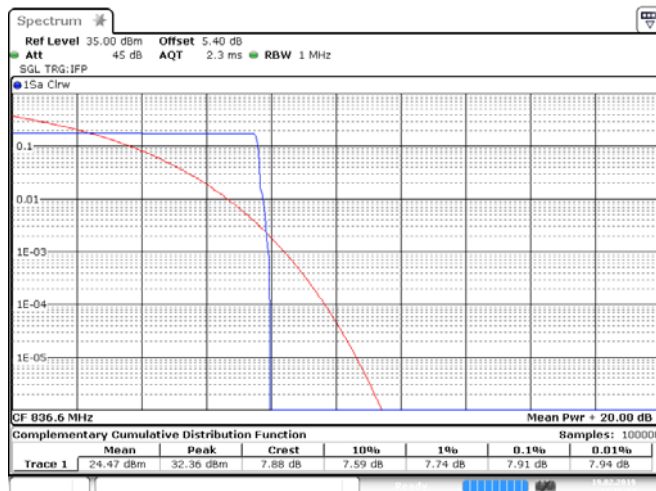
2. Peak-to-Average Ratio

2.1. Test Result

BAND	Channel	Peak-to-Average Ratio(dB)	Limit(dB)	Verdict
GSM850	128	7.86	13	PASS
GSM850	190	7.91	13	PASS
GSM850	251	7.86	13	PASS
EGPRS850	128	10.64	13	PASS
EGPRS850	190	10.61	13	PASS
EGPRS850	251	7.74	13	PASS
GSM1900	512	7.83	13	PASS
GSM1900	661	7.88	13	PASS
GSM1900	810	7.88	13	PASS
EGPRS1900	512	10.72	13	PASS
EGPRS1900	661	10.32	13	PASS
EGPRS1900	810	10.58	13	PASS

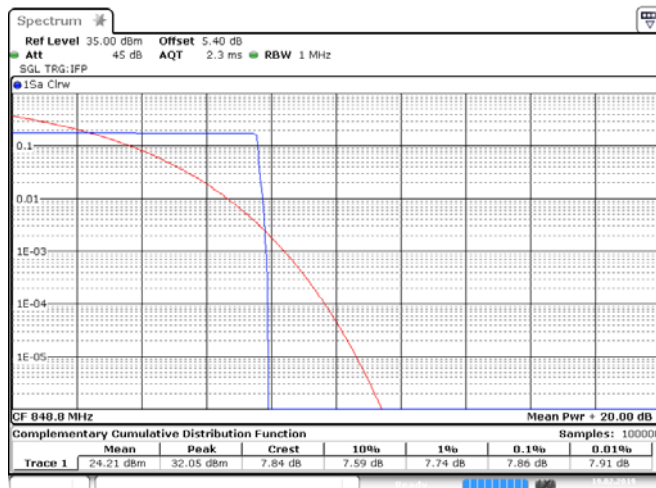
2.2. Part II - Test Plots





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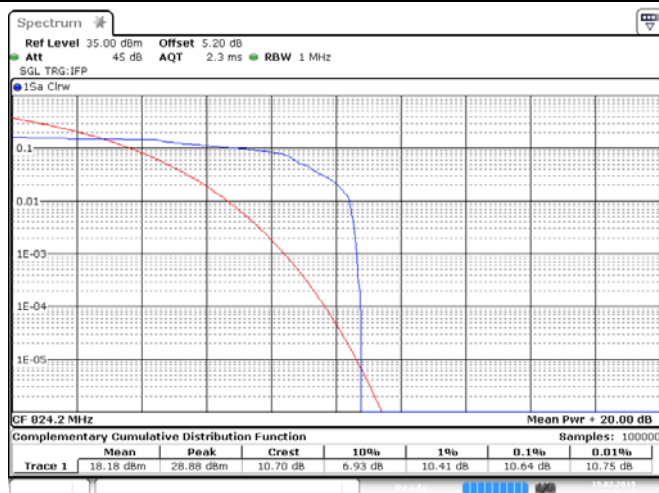
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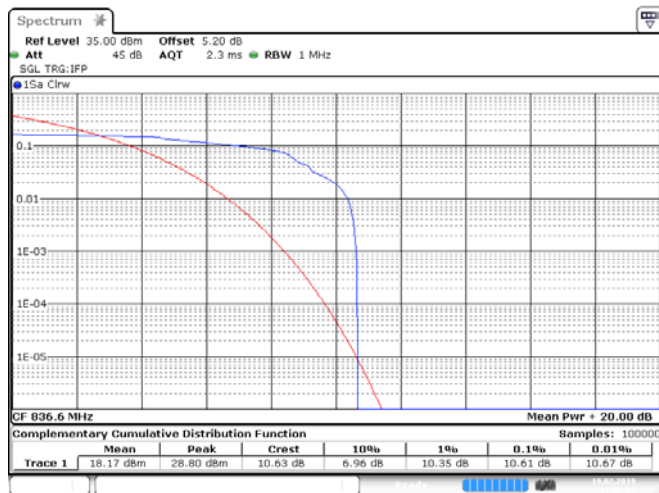
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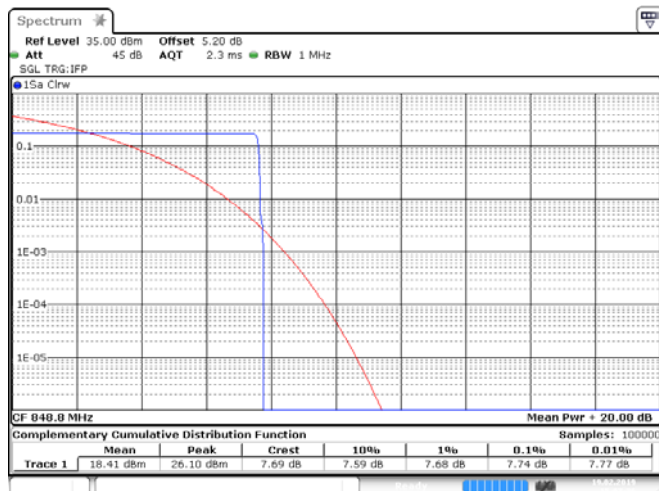
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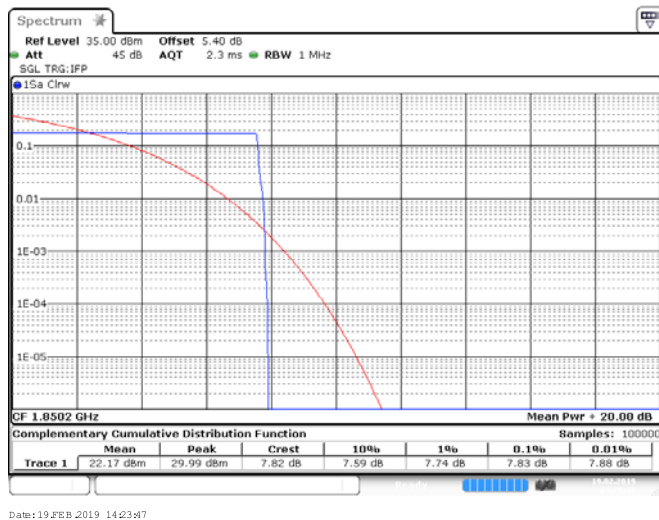
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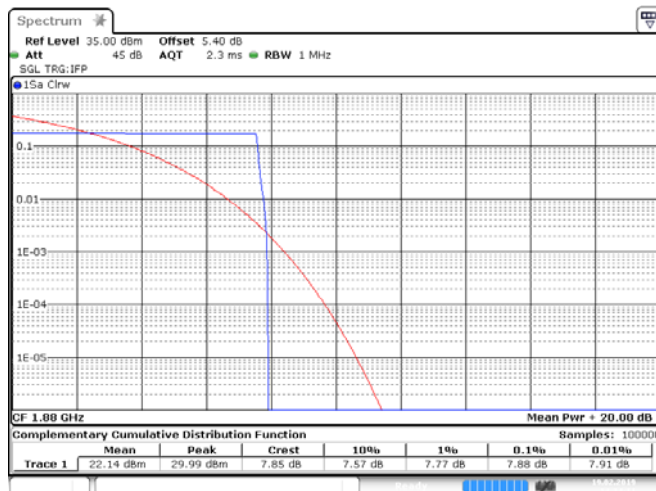


GSM1900_512



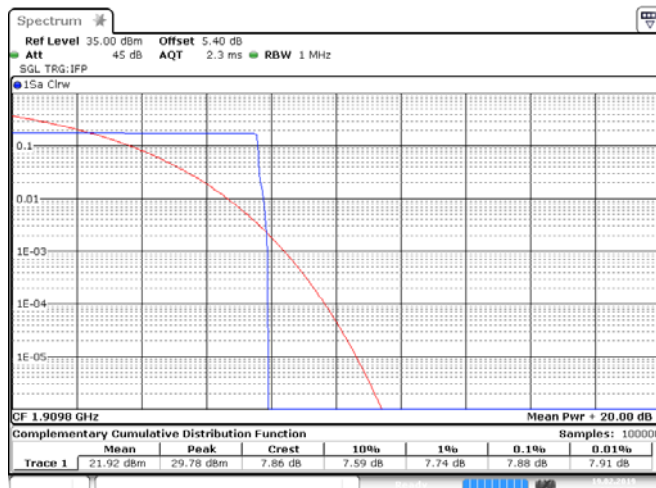
GSM1900_661





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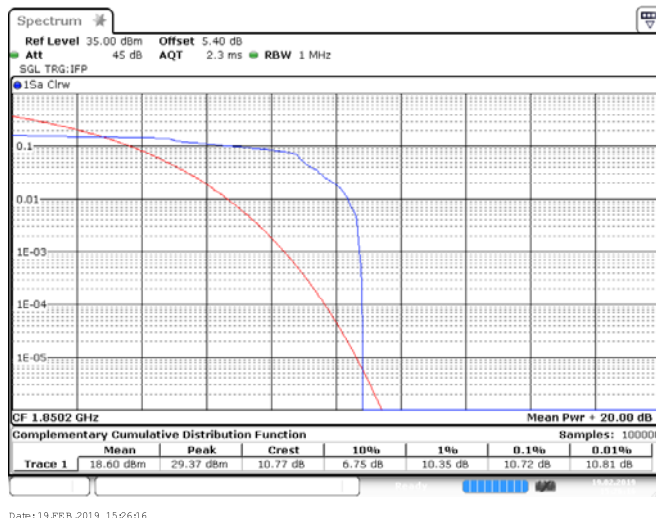
GSM1900_810



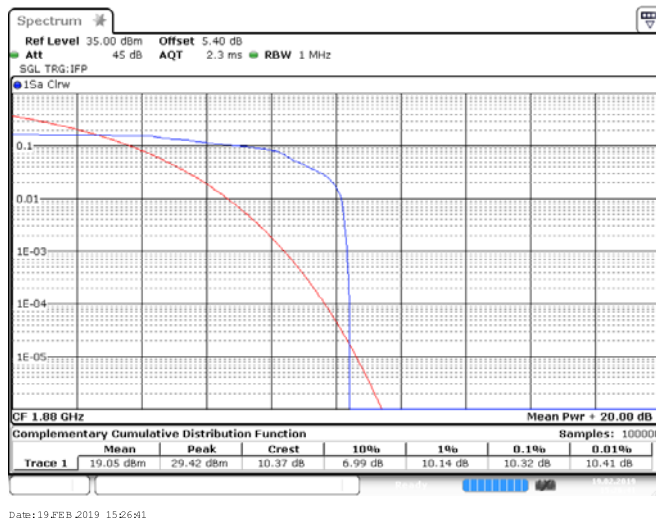
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EGPRS1900_512





EGPRS1900_661

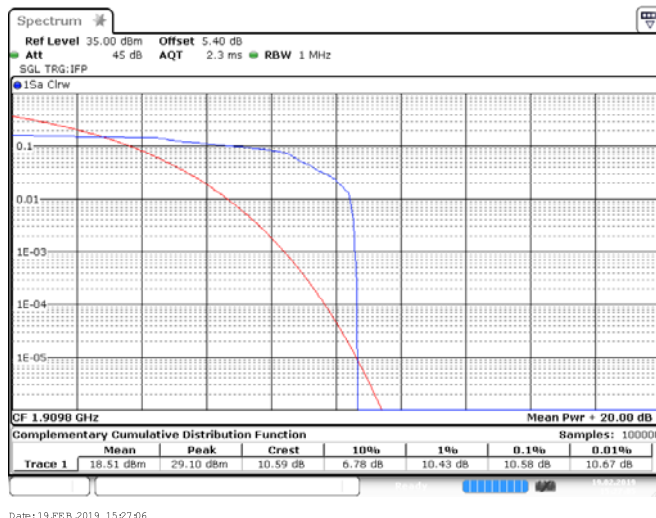


EGPRS1900_810



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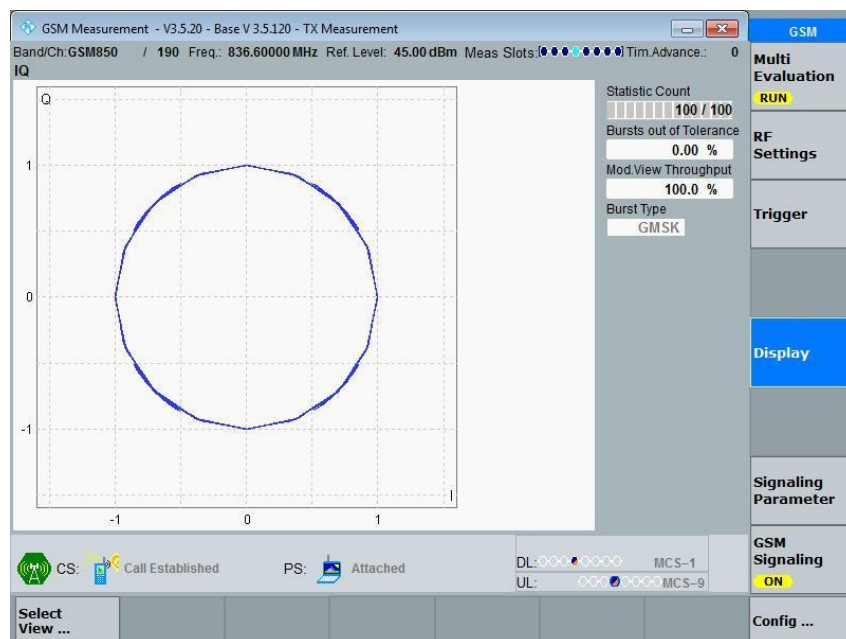
3. Modulation Characteristics

3.1. For GSM

3.1.1. Test BAND = GSM 850

3.1.1.1. Test Mode = GSM/TM1

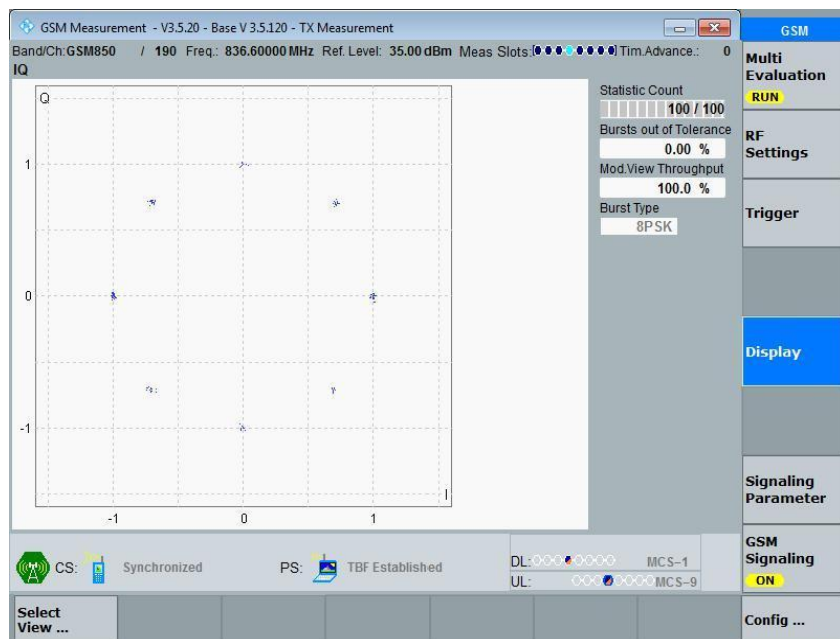
3.1.1.1.1. Test Channel = MCH





3.1.1.2. Test Mode = GSM/TM2

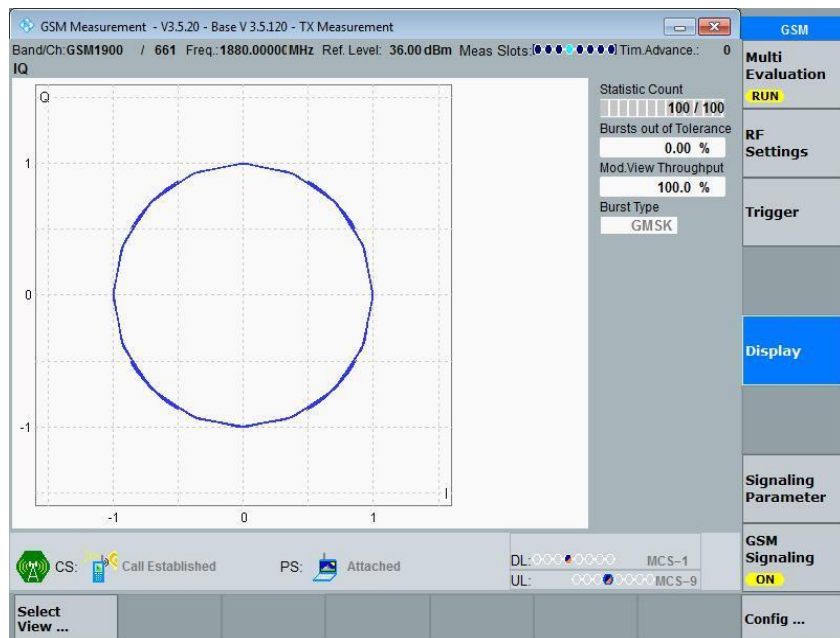
3.1.1.2.1. Test Channel = MCH



3.1.2. Test BAND = GSM 1900

3.1.2.1. Test Mode = GSM/TM1

3.1.2.1.1. Test Channel = MCH



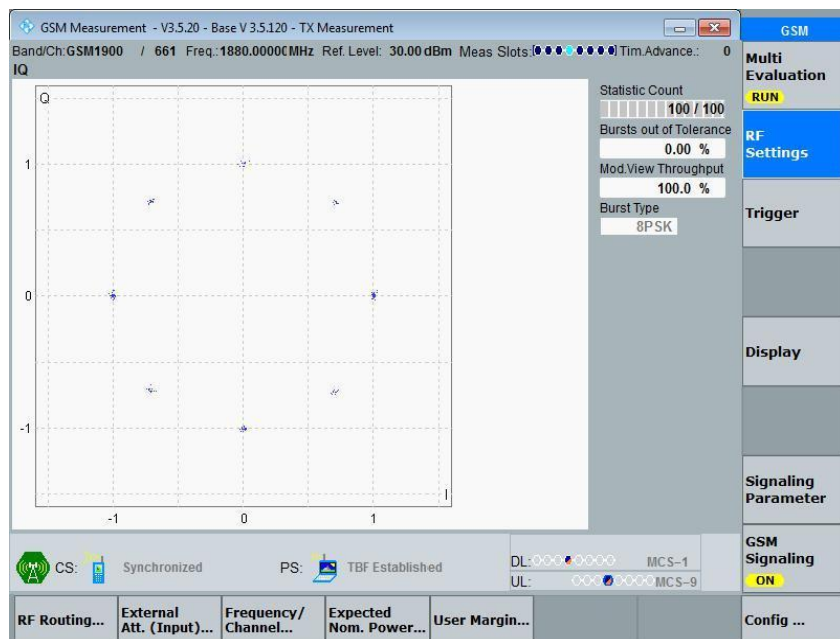
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3.1.2.2. Test Mode = GSM/TM2

3.1.2.2.1. Test Channel = MCH



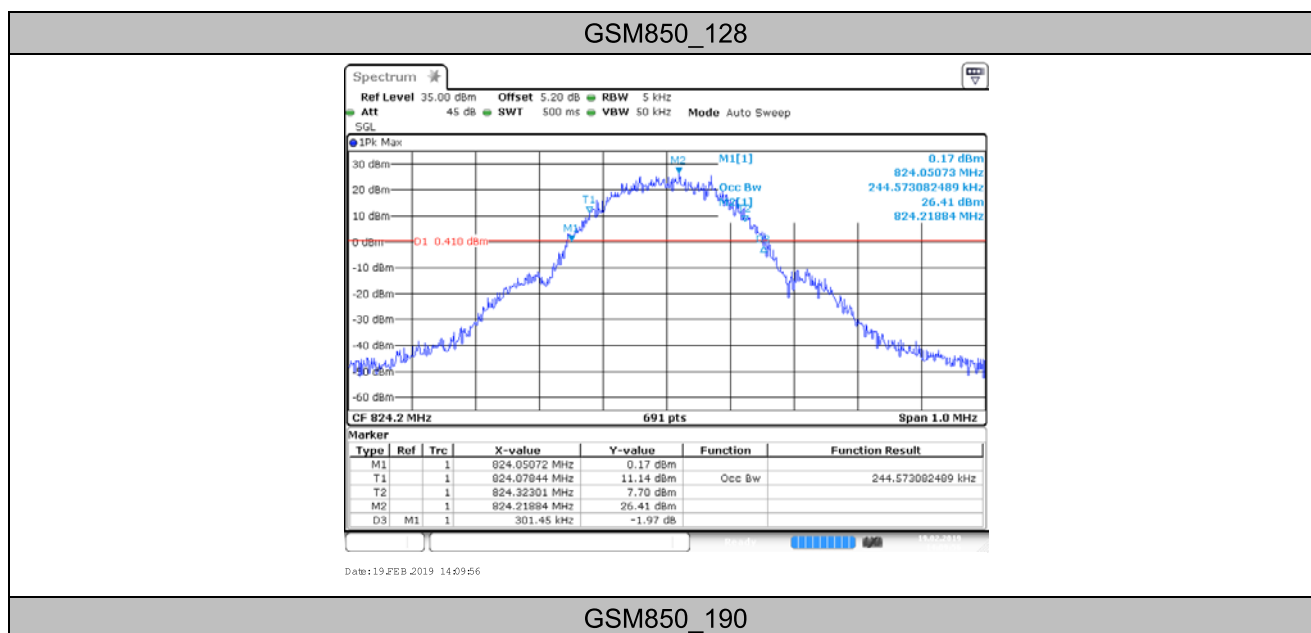


4. 26dB Bandwidth and Occupied Bandwidth

4.1. Test Result

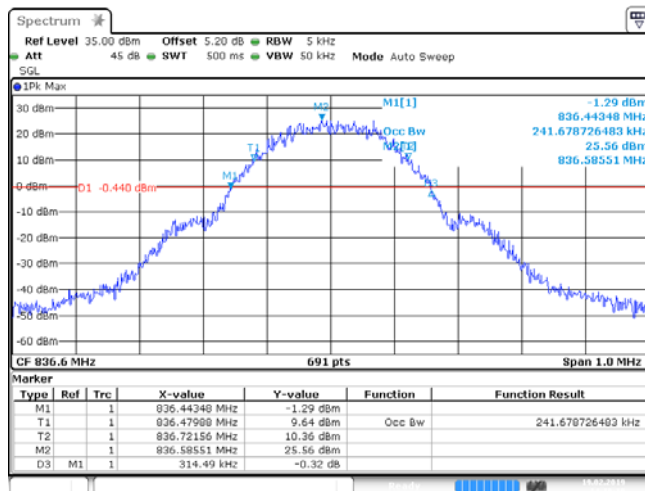
BAND	Channel	Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Limit(kHz)	Verdict
GSM850	128	244.57	301.45	---	PASS
GSM850	190	241.68	314.49	---	PASS
GSM850	251	247.47	295.65	---	PASS
EGPRS850	128	244.57	307.25	---	PASS
EGPRS850	190	240.23	294.20	---	PASS
EGPRS850	251	244.57	295.65	---	PASS
GSM1900	512	244.57	295.65	---	PASS
GSM1900	661	248.91	307.25	---	PASS
GSM1900	810	243.13	304.35	---	PASS
EGPRS1900	512	248.91	291.30	---	PASS
EGPRS1900	661	246.02	298.55	---	PASS
EGPRS1900	810	247.47	305.80	---	PASS

4.2. Test Plots

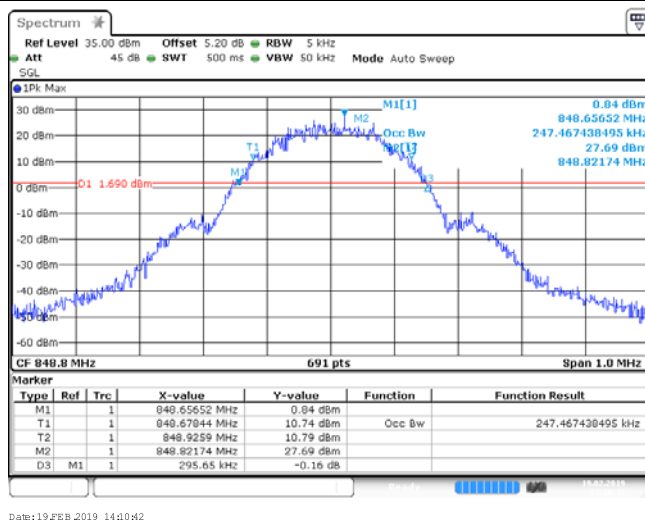


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GSM850_251

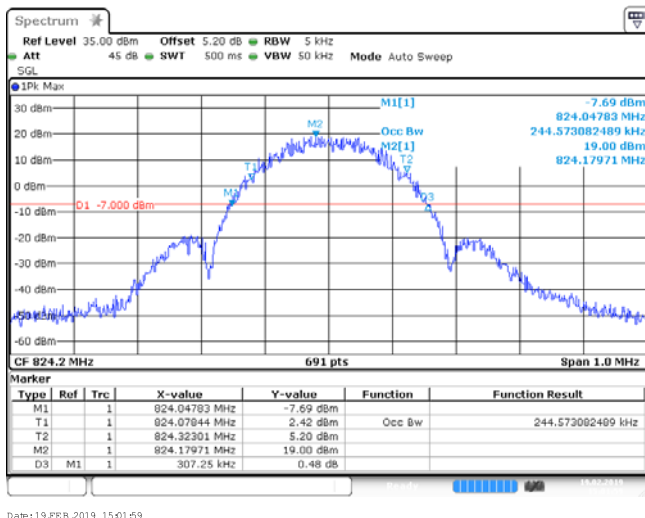


EGPRS850_128

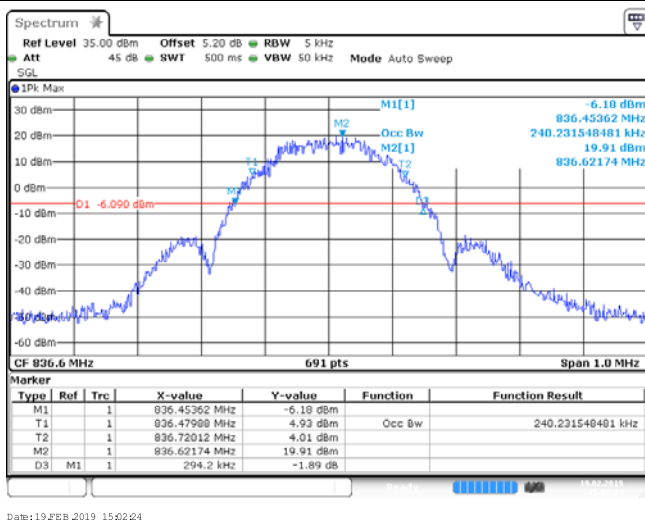


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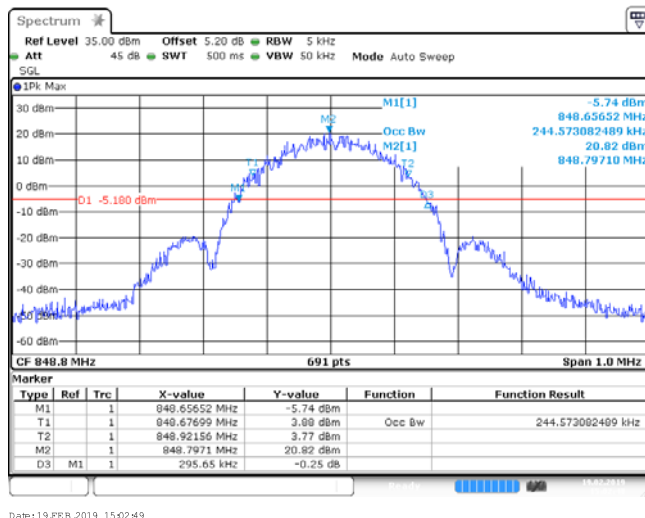


EGPRS850_190

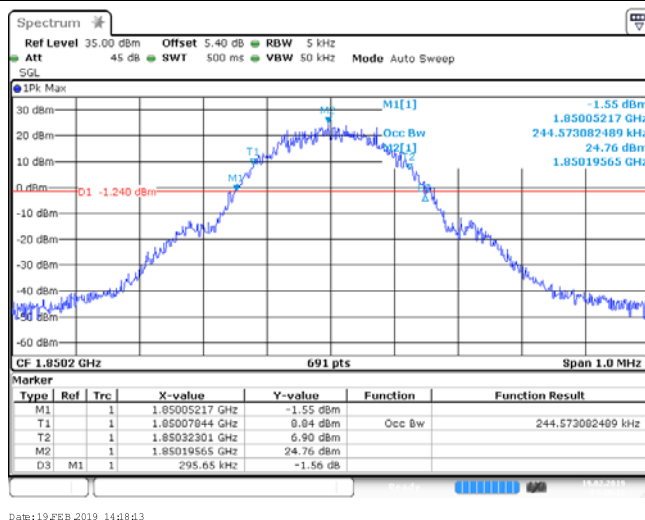


EGPRS850_251



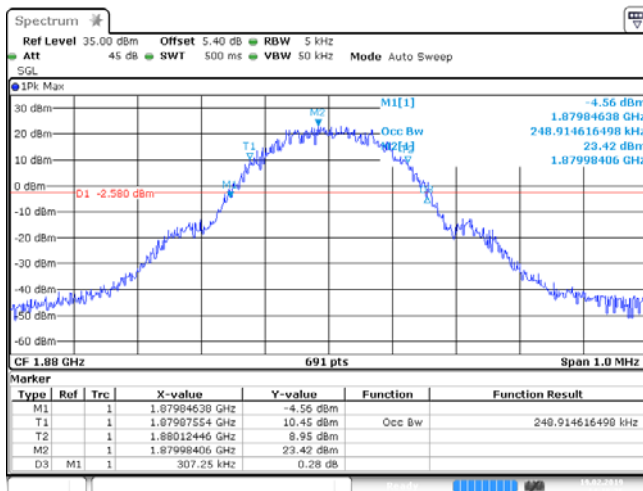


GSM1900_512



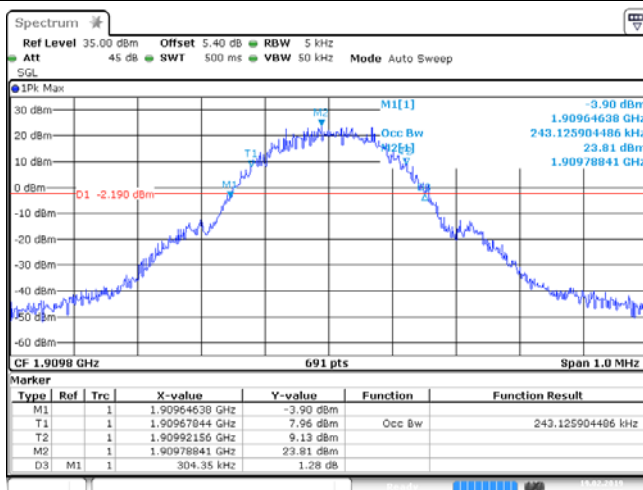
GSM1900_661





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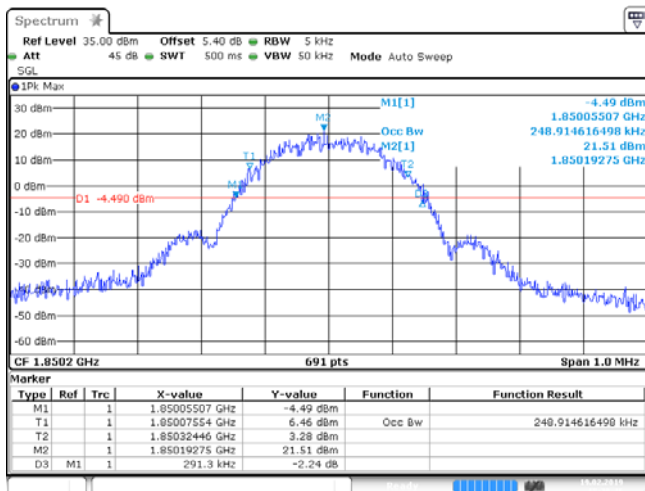
GSM1900_810



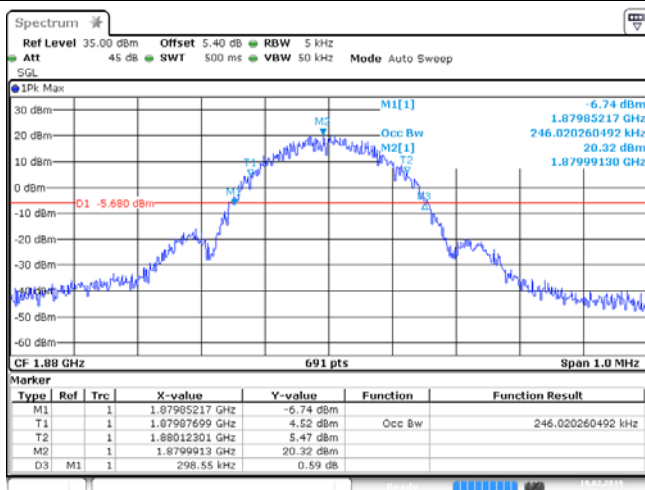
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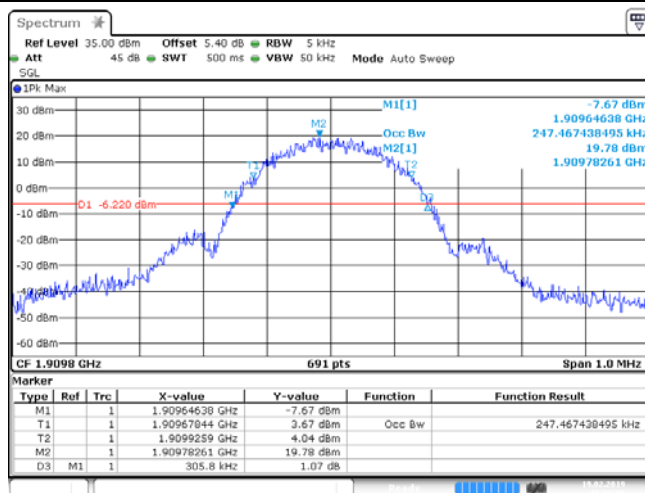


EGPRS1900_661



EGPRS1900_810

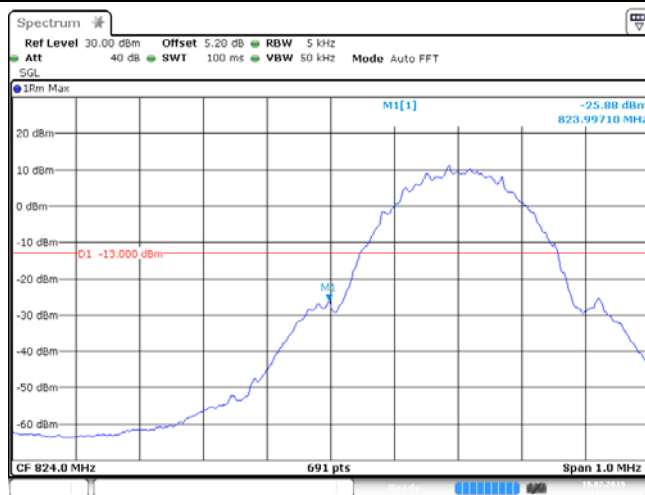




5. Band Edge Compliance

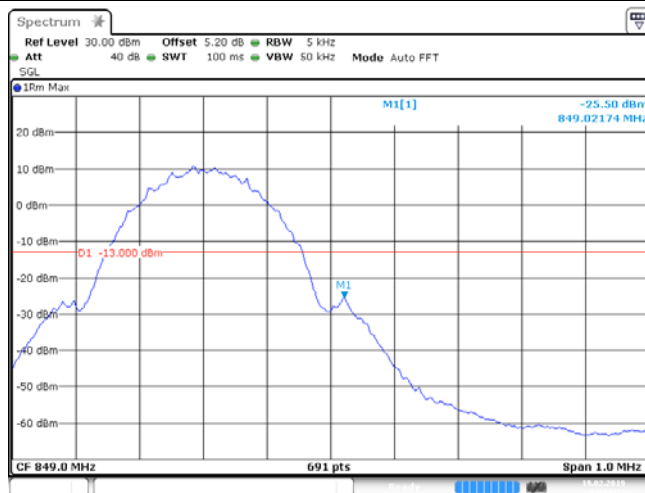
5.1. Test Plots

GSM850_128



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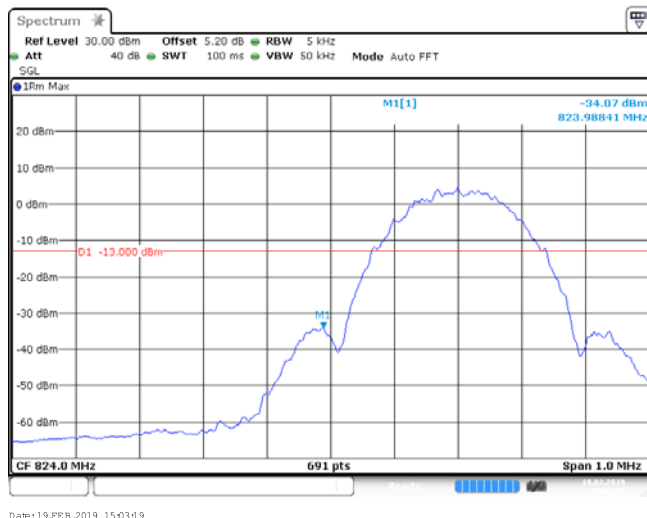
GSM850_251



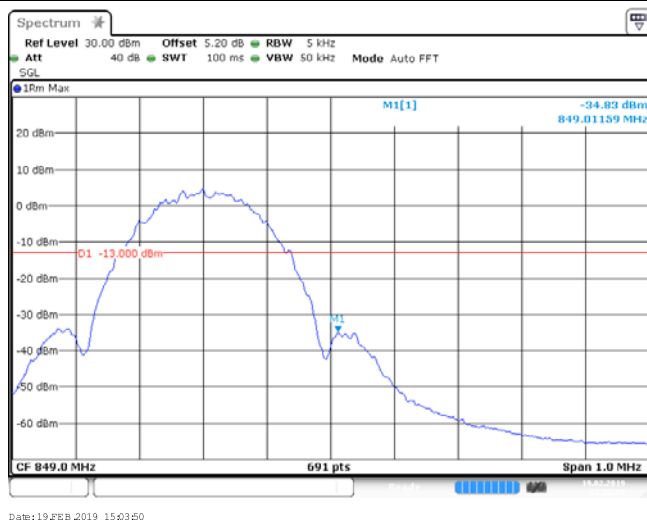
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EGPRS850_128



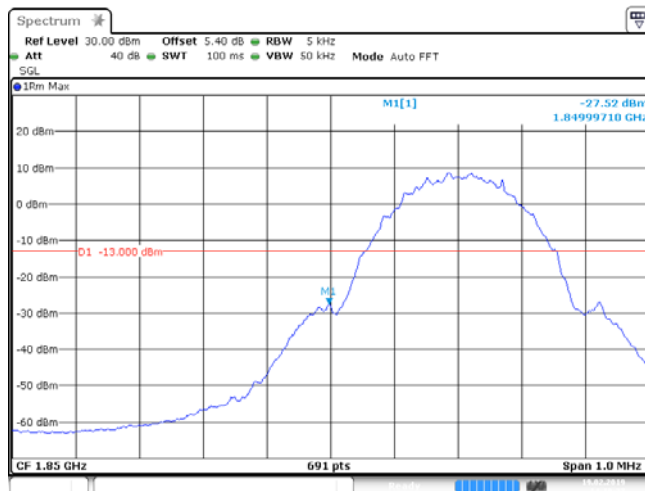


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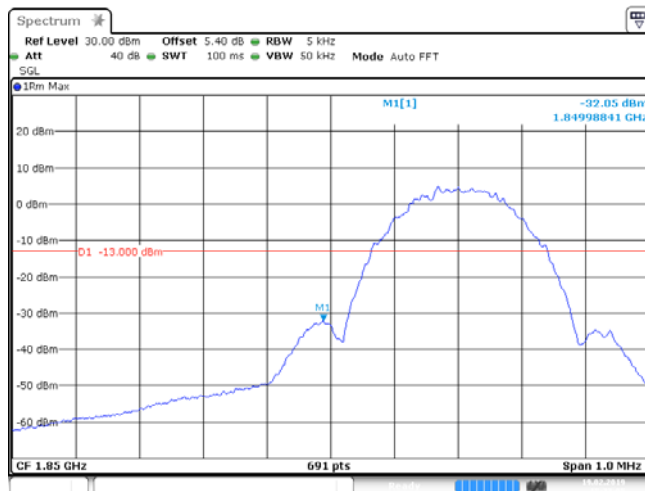
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Date: 19 FEB 2019 15:22:26

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Date: 19 FEB 2019 15:22:27



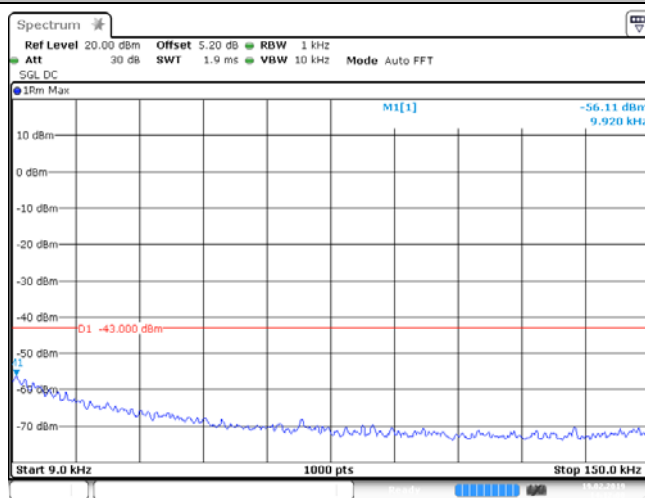
6. Spurious Emission at Antenna Terminal

Remark1: 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 = $k * (\text{Span} / RBW)$ " with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

Remark2: only the worst case data displayed in this report.

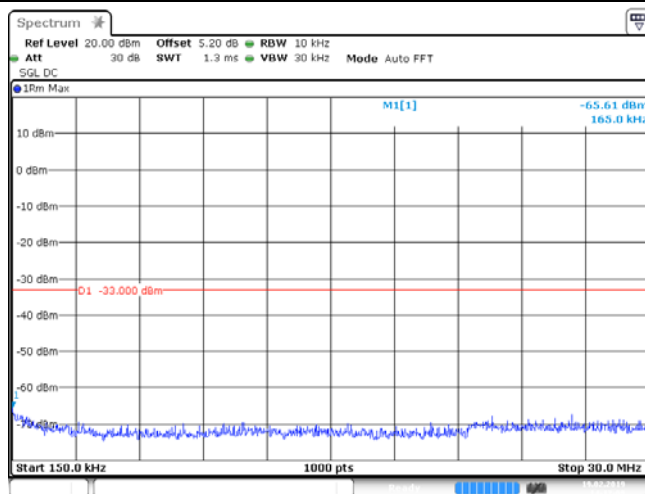
6.1. Test Plots

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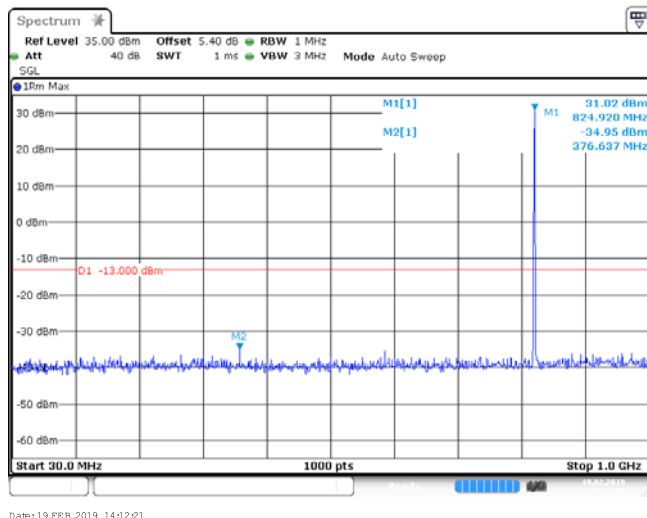
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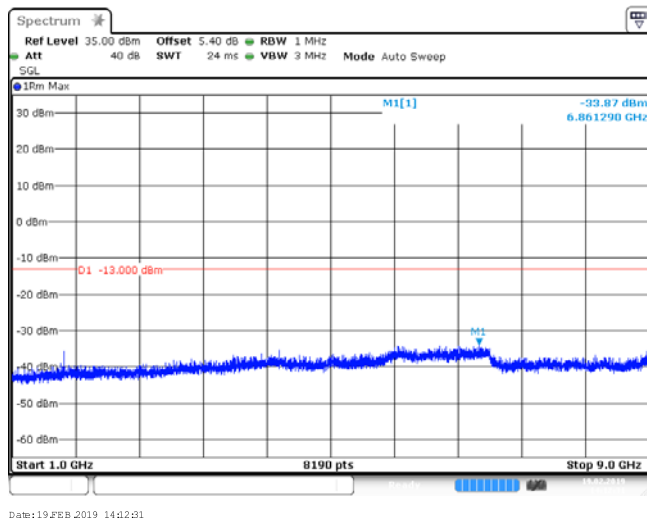
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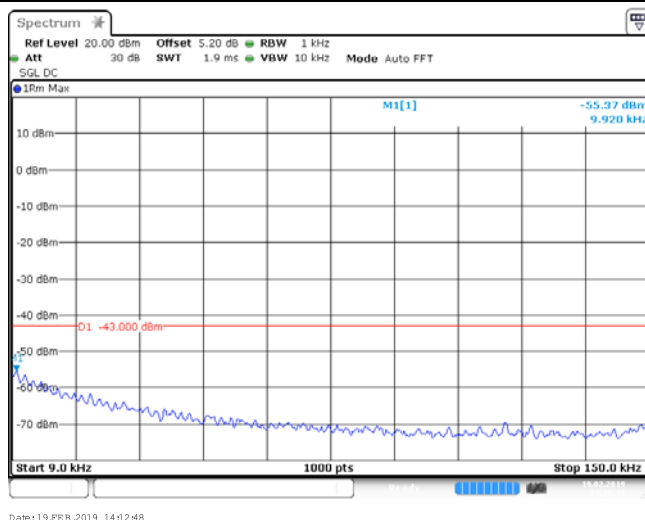


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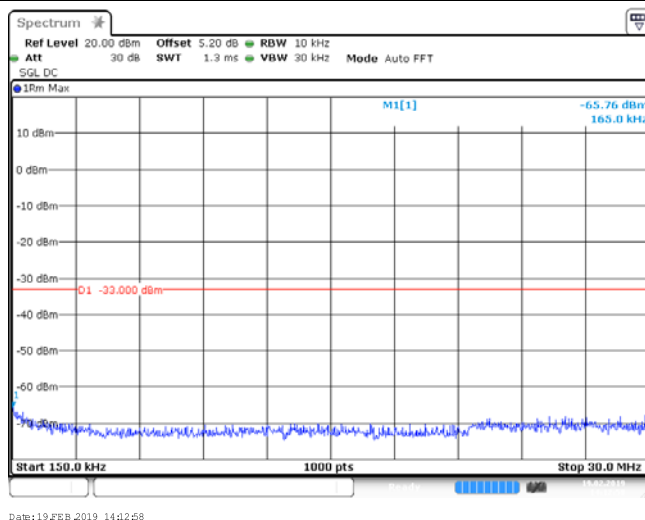


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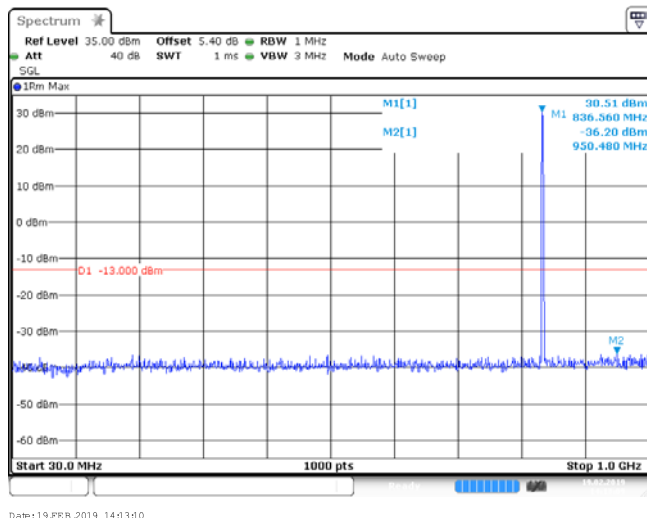


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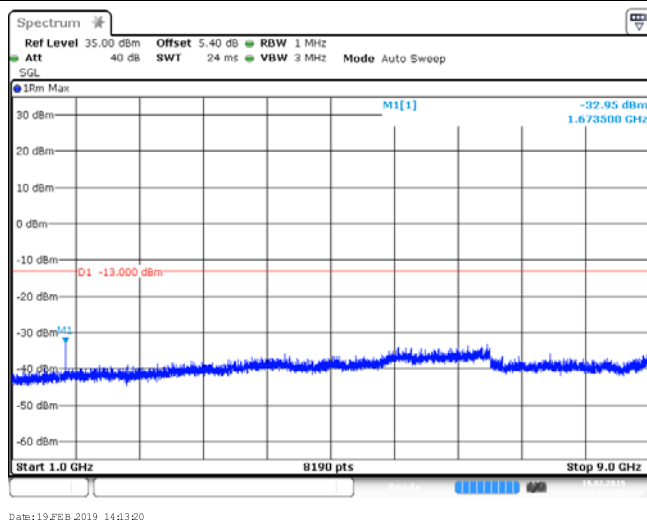


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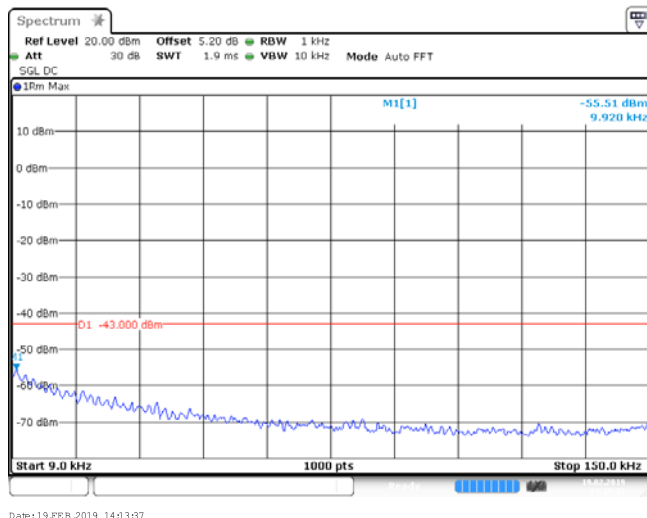


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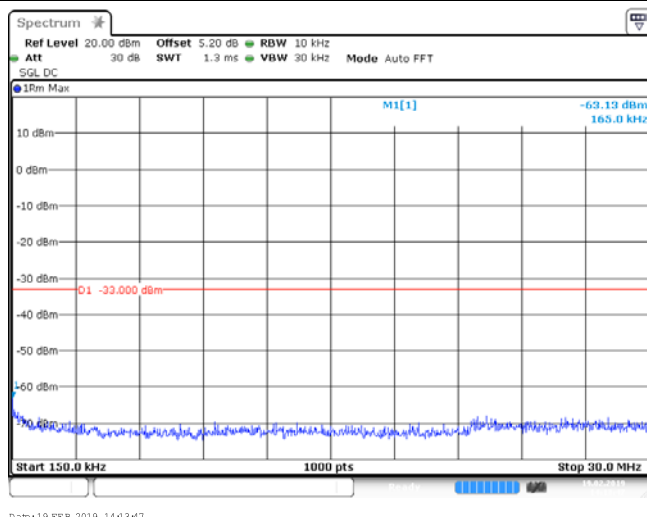
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Date: 19 FEB 2019 14:13:27

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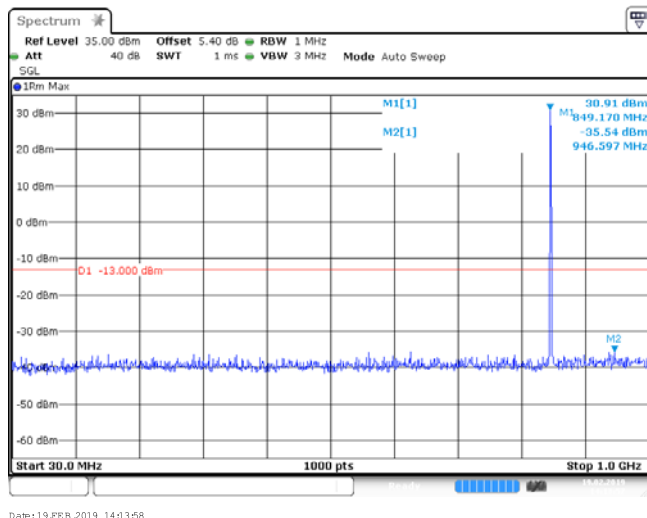
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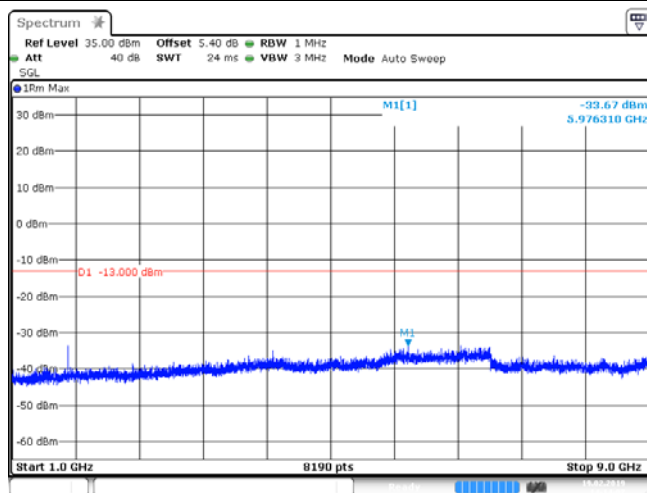
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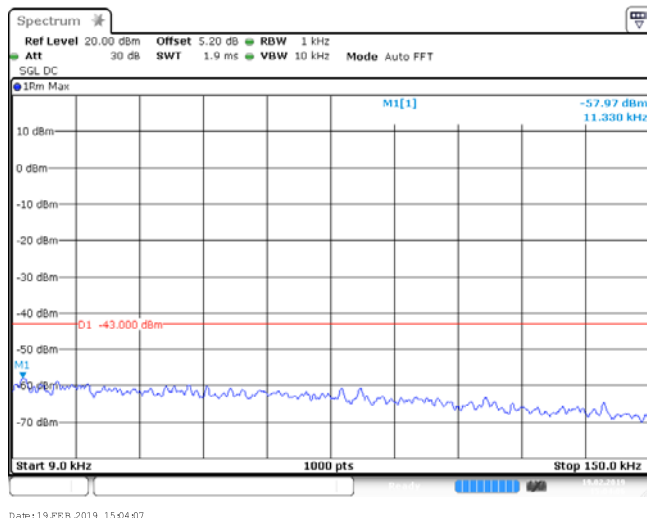
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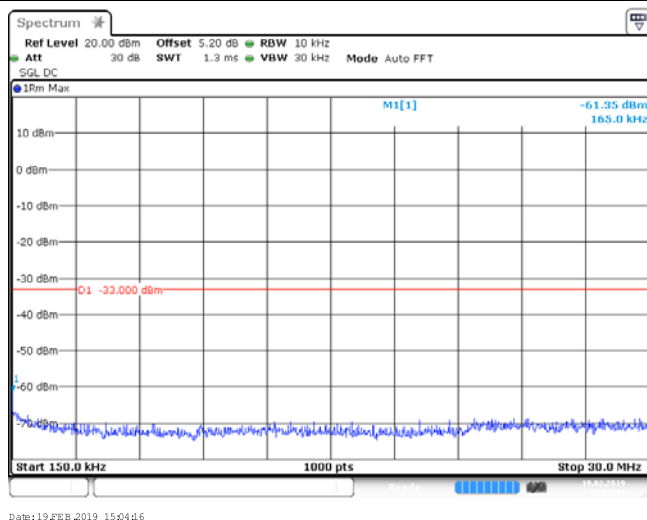
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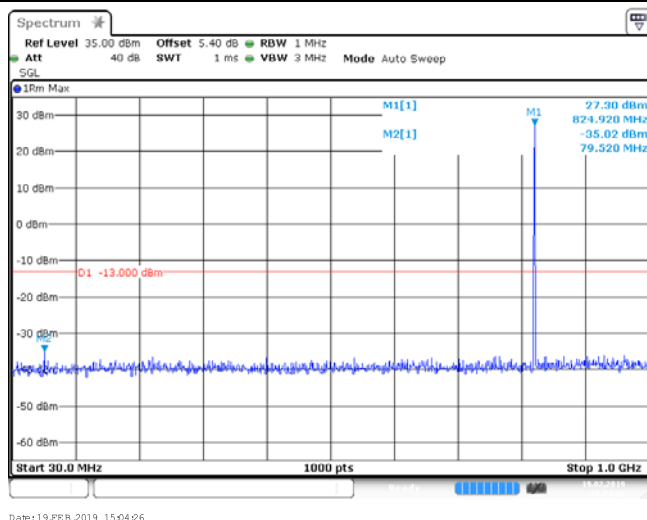
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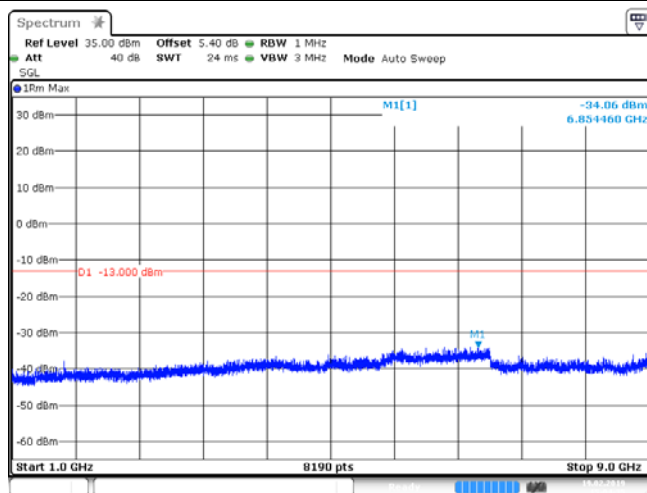
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Date: 19 FEB 2019 15:04:25

EGPRS850_190



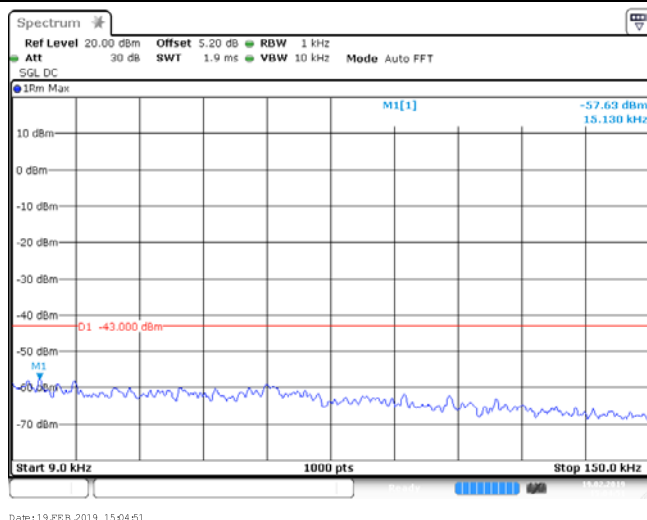
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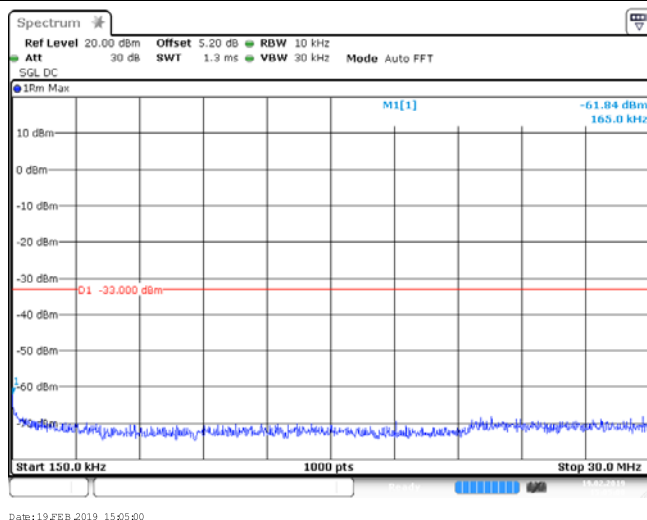
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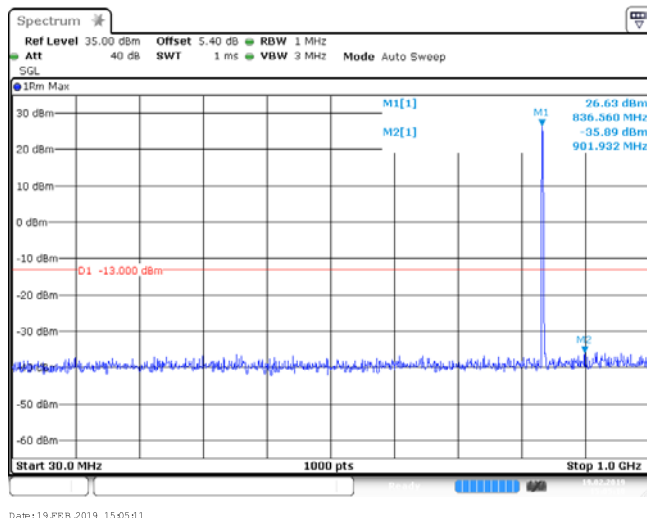


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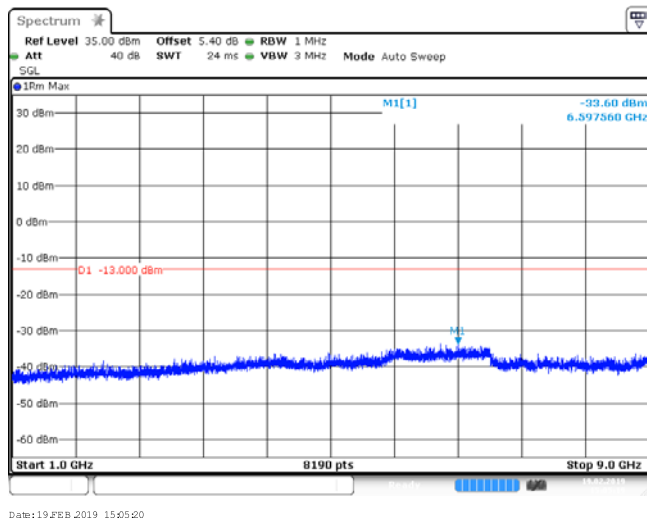


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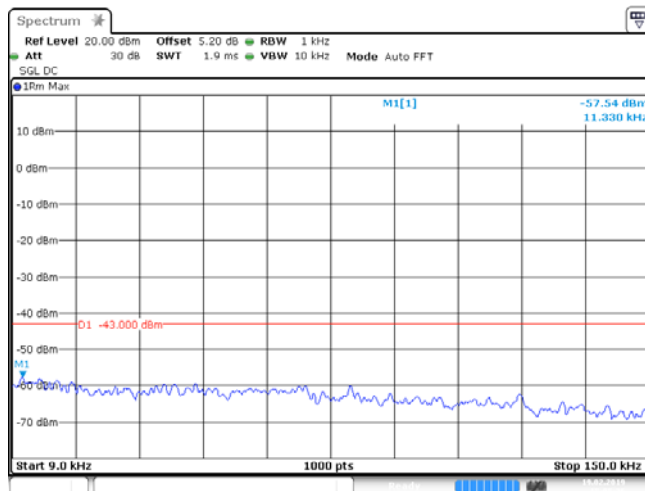


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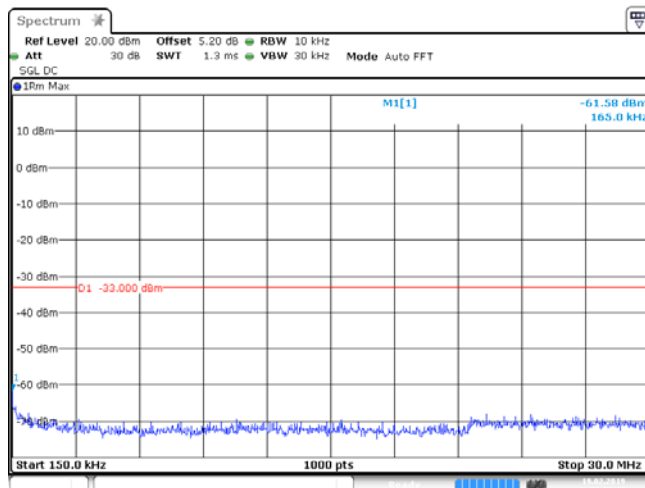
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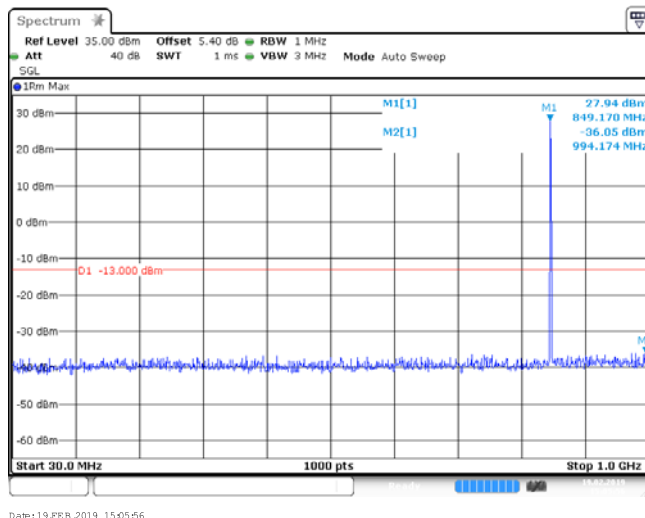
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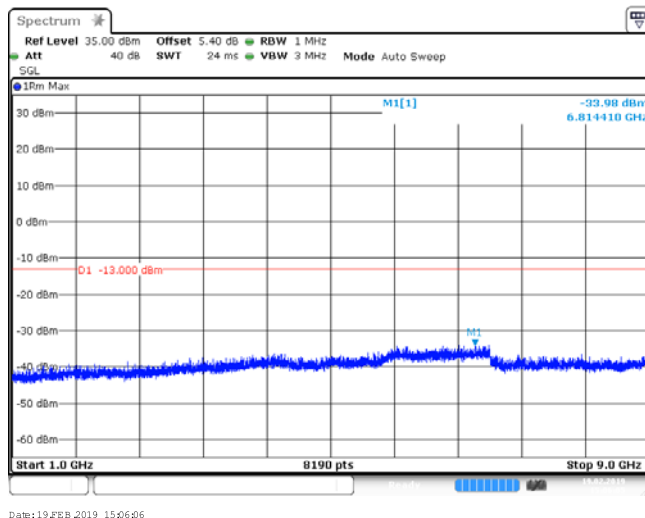
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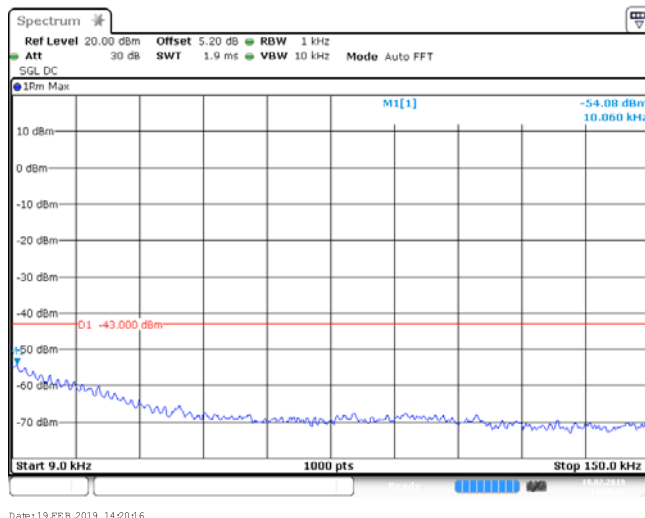


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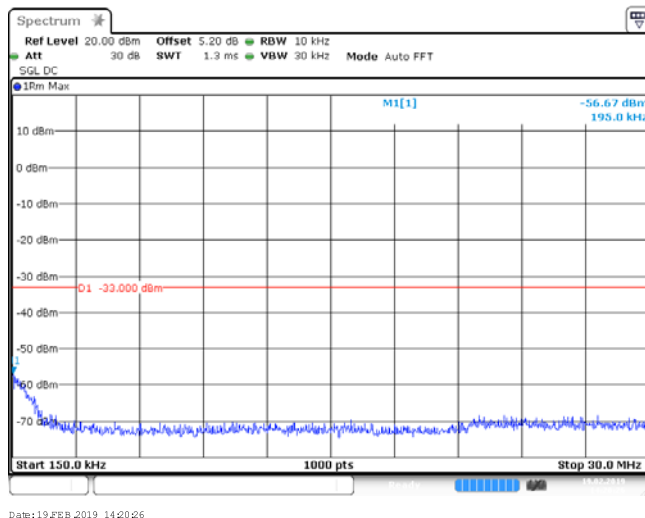


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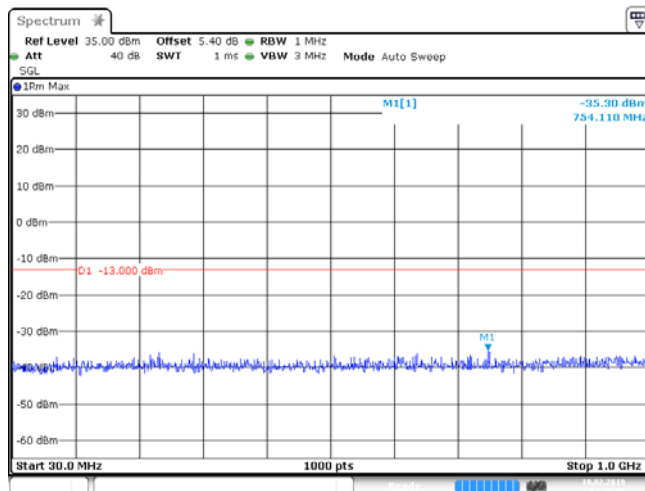


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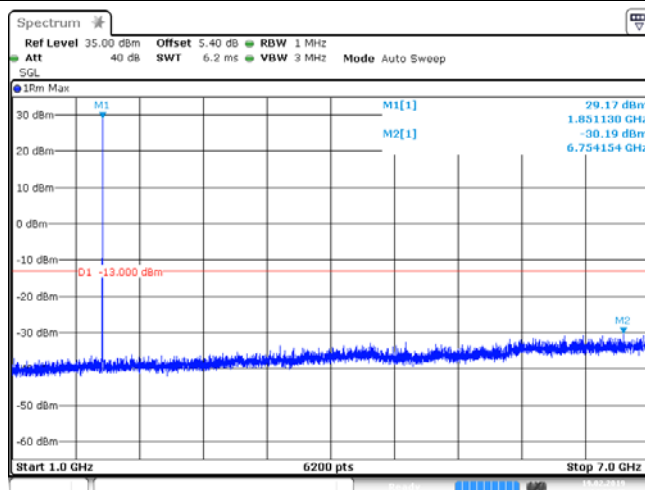
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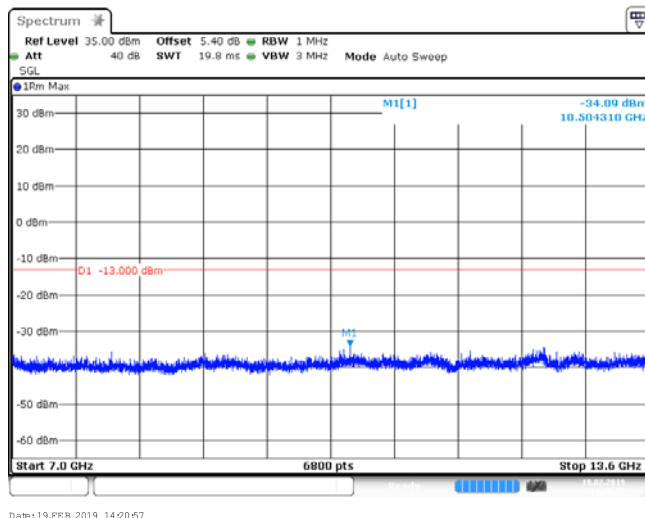
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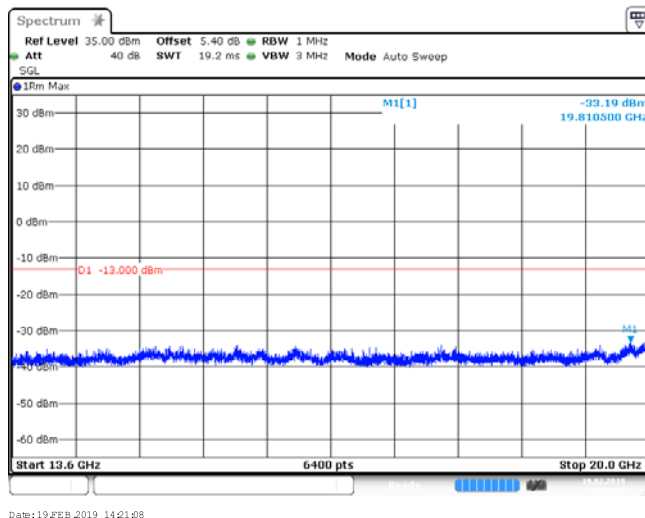
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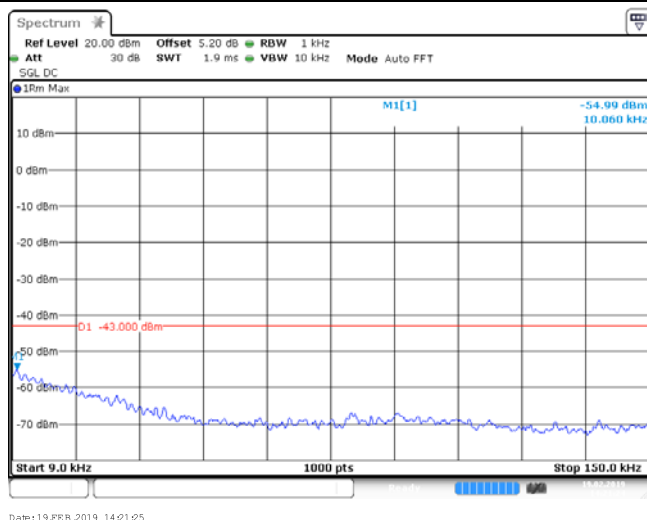


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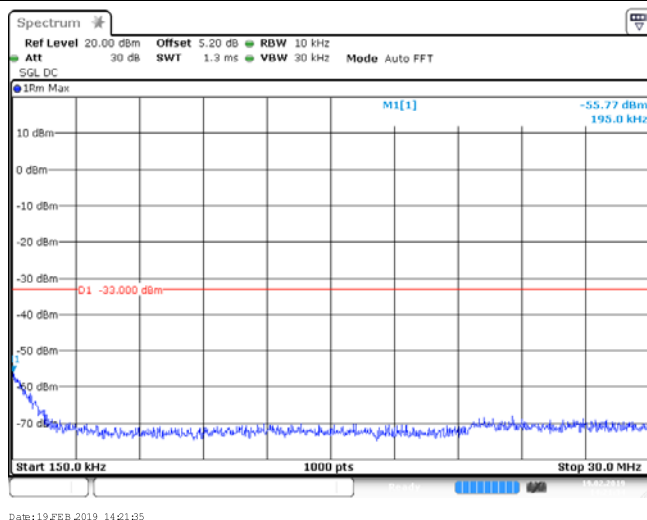
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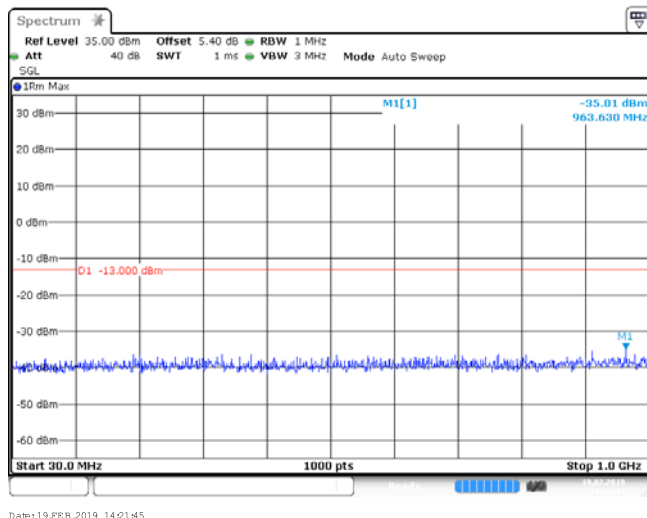
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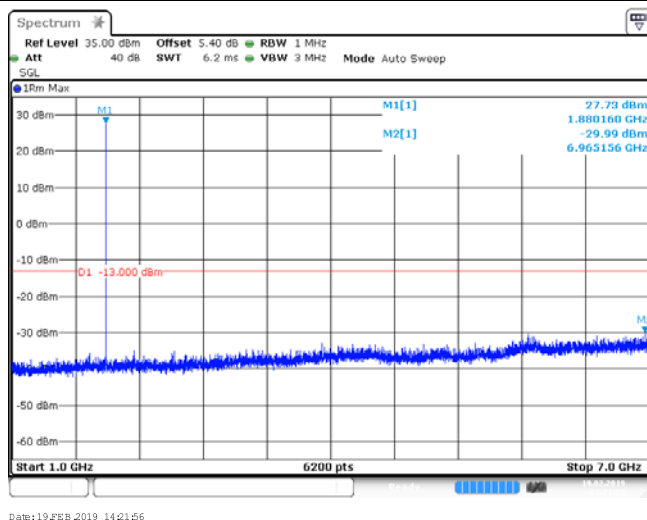
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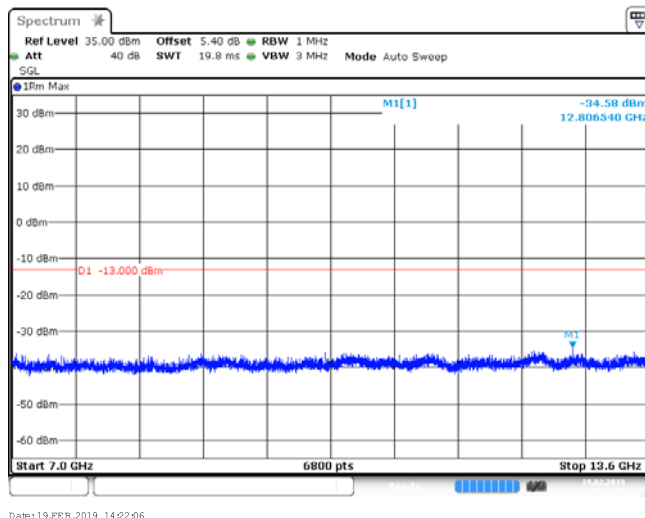


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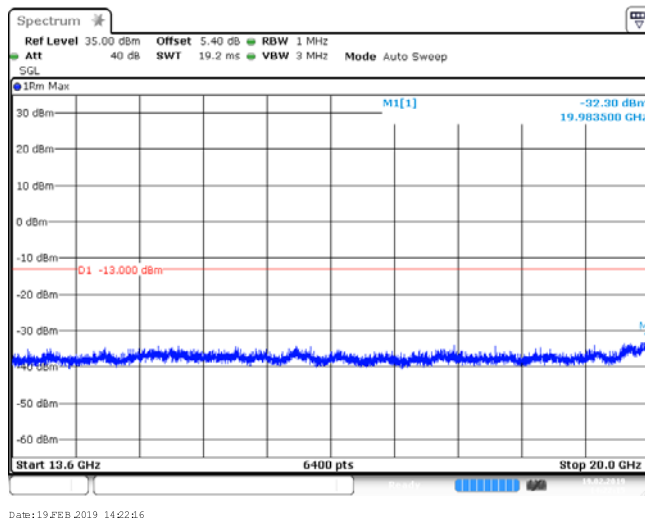


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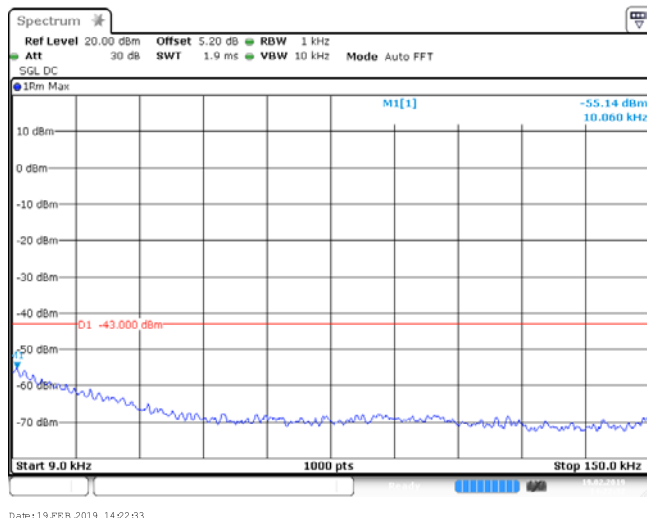
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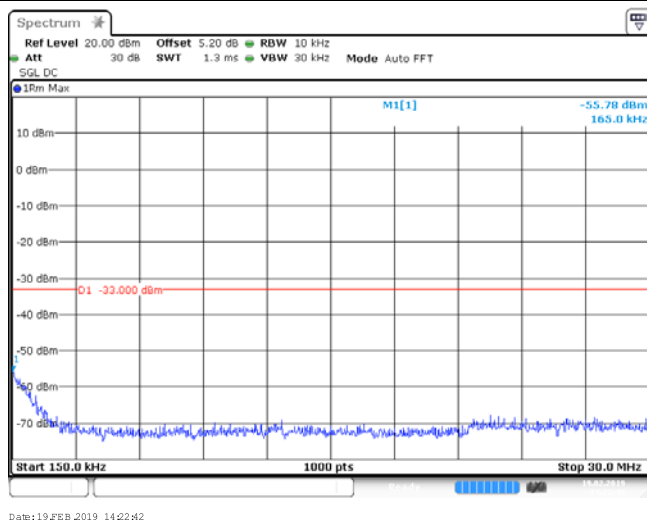
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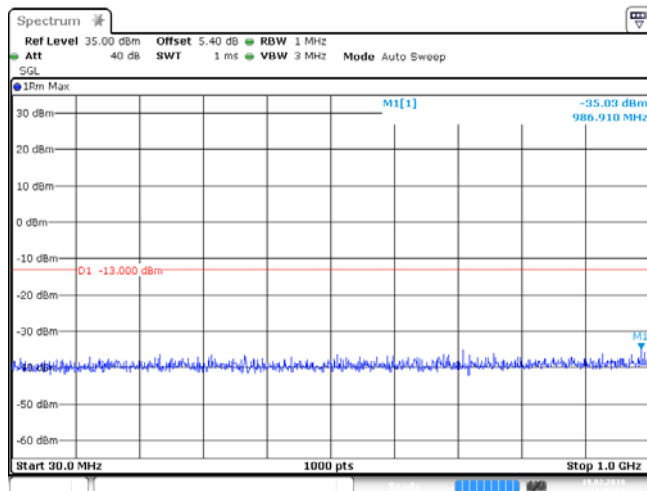


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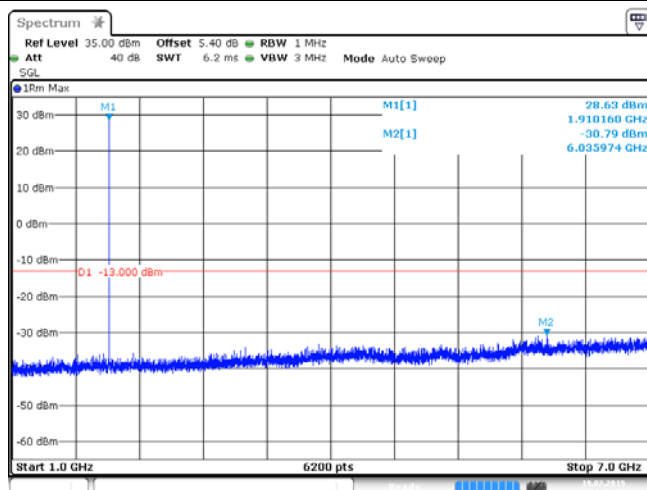


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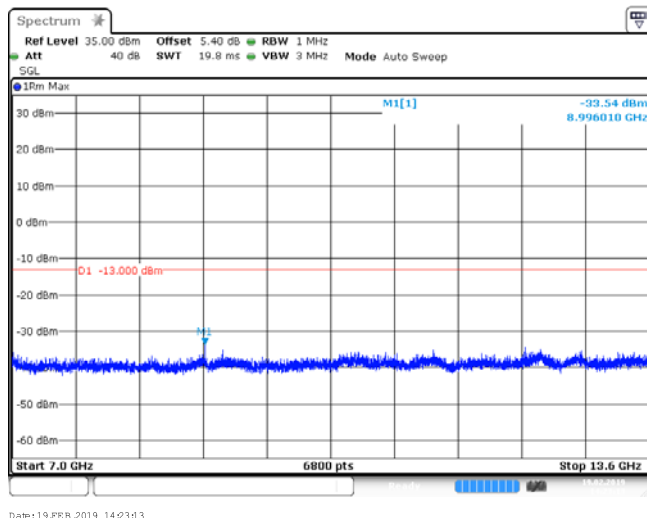


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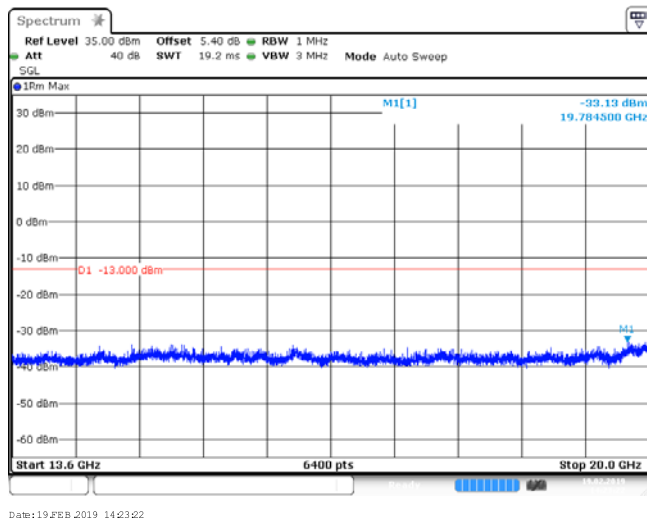


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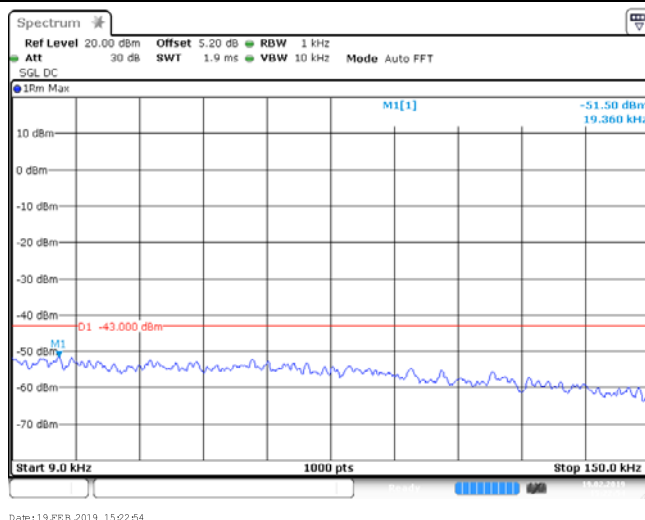


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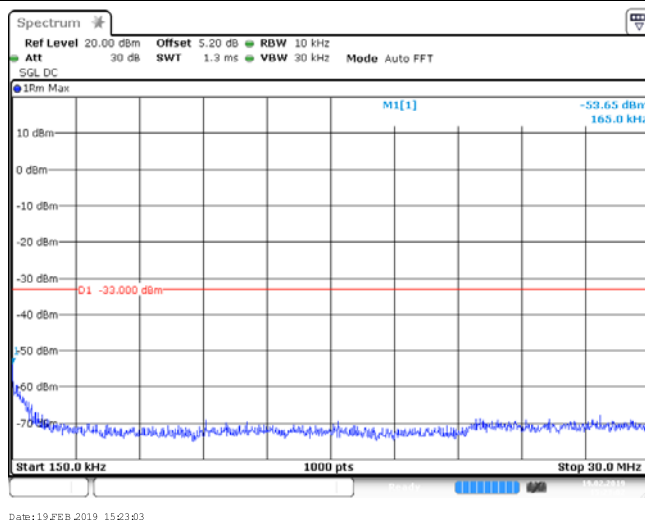


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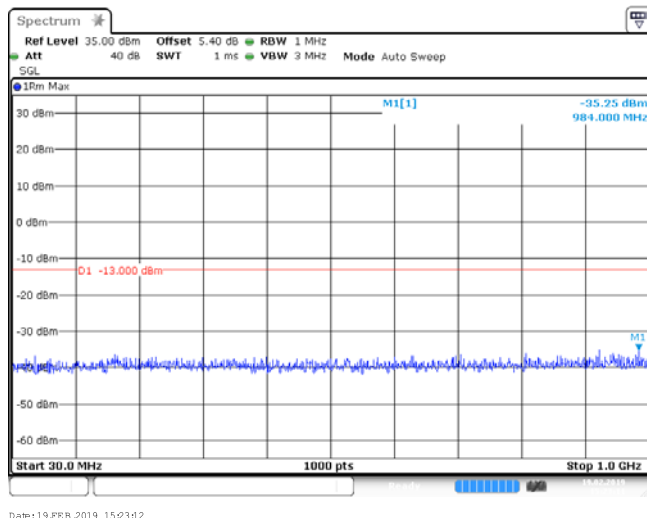


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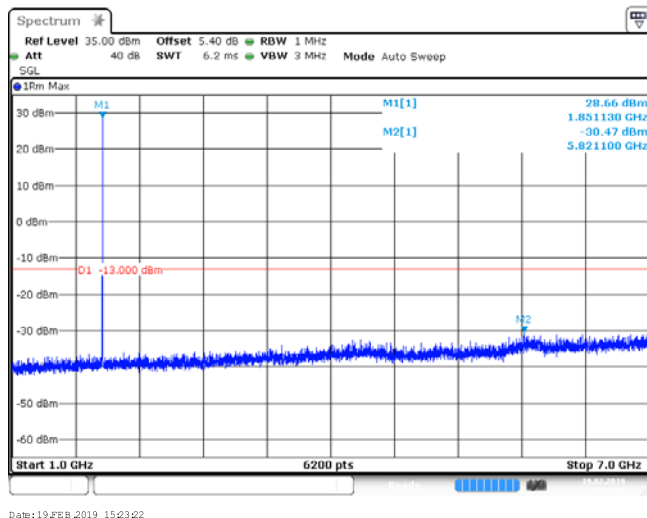


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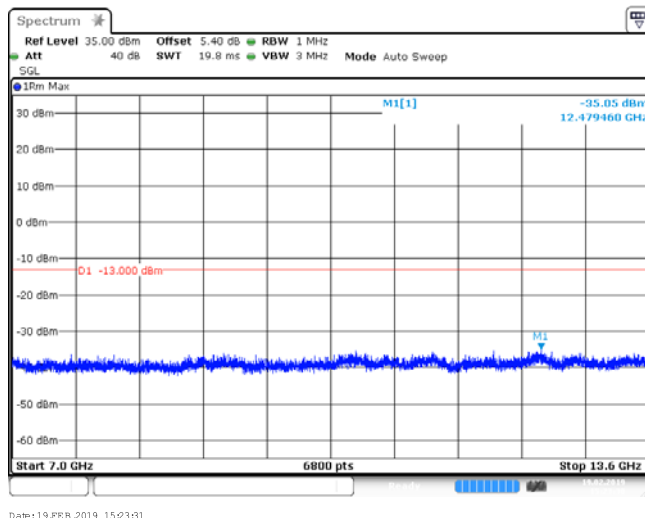


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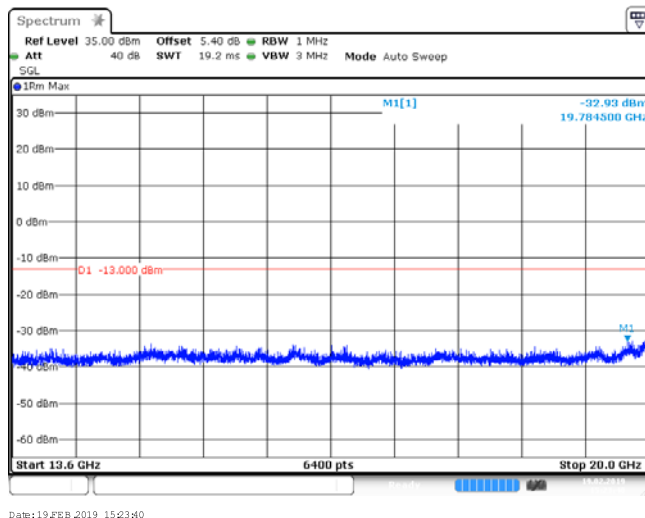


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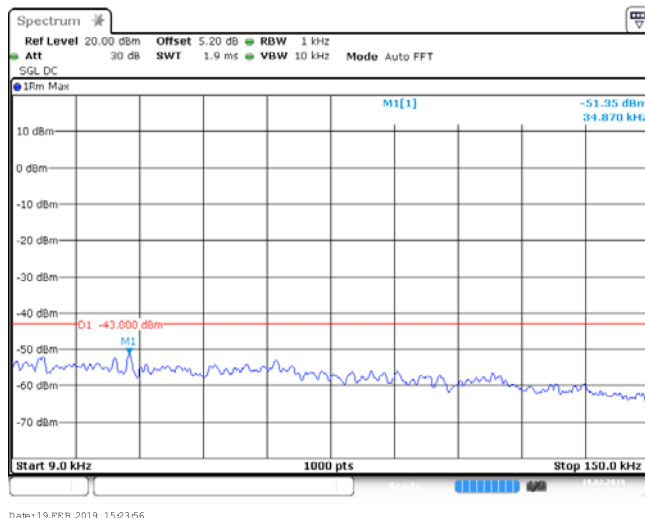


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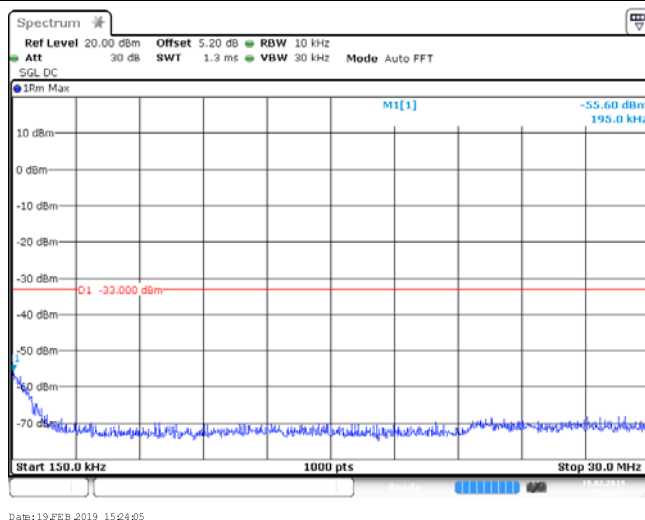


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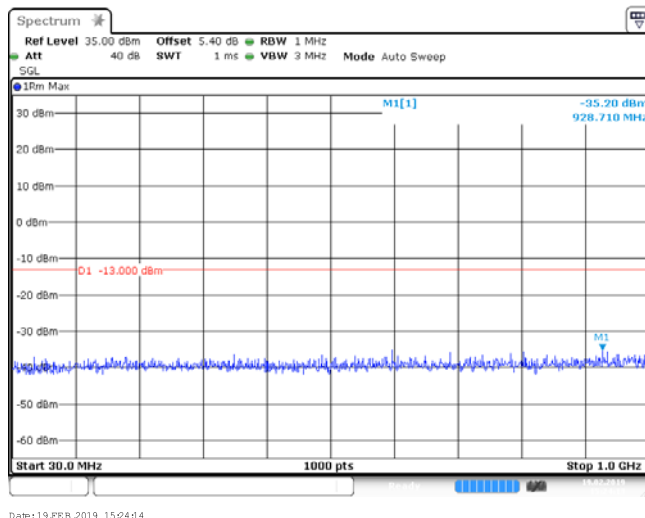


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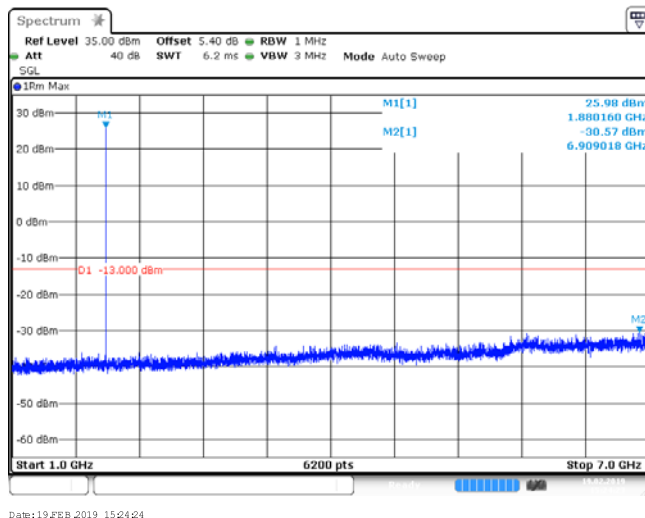


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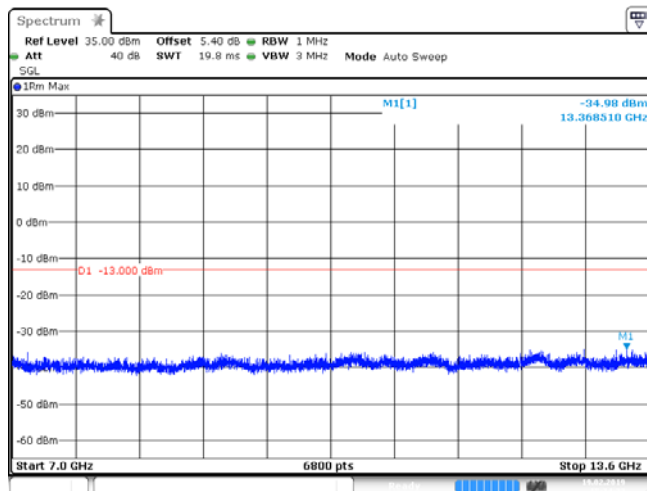


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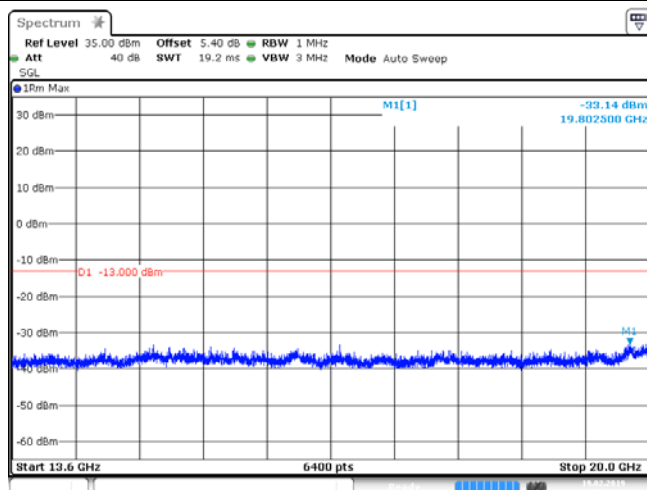
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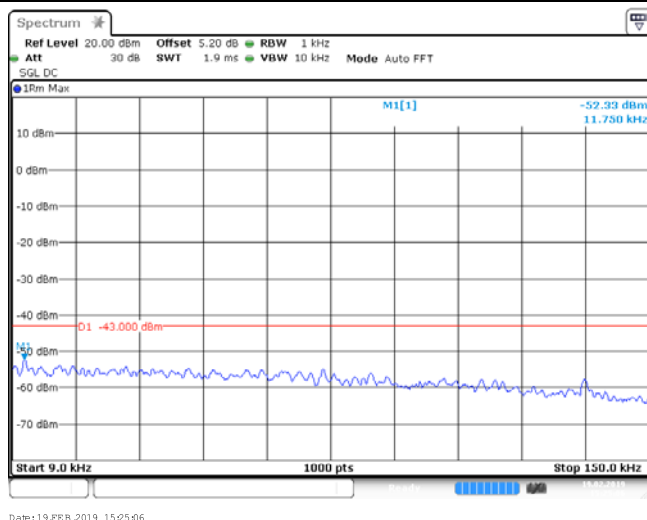
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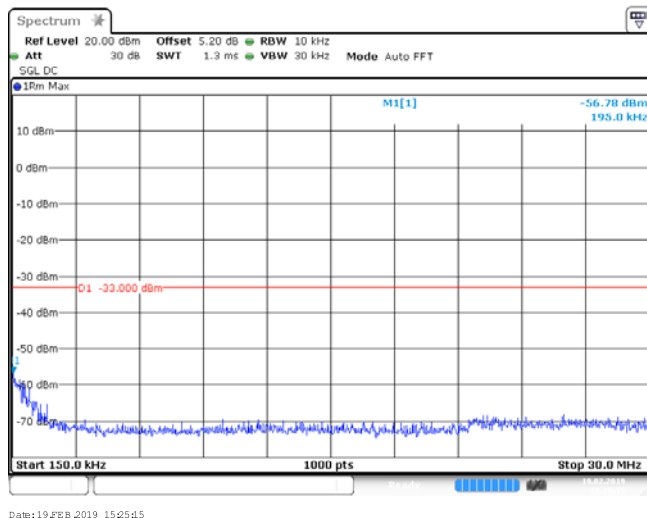
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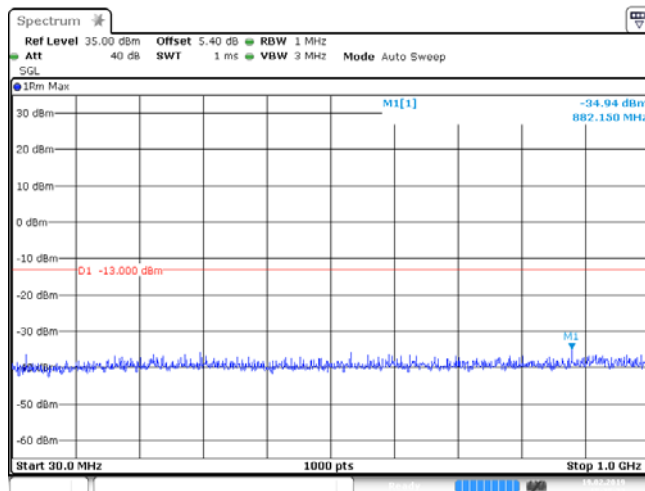


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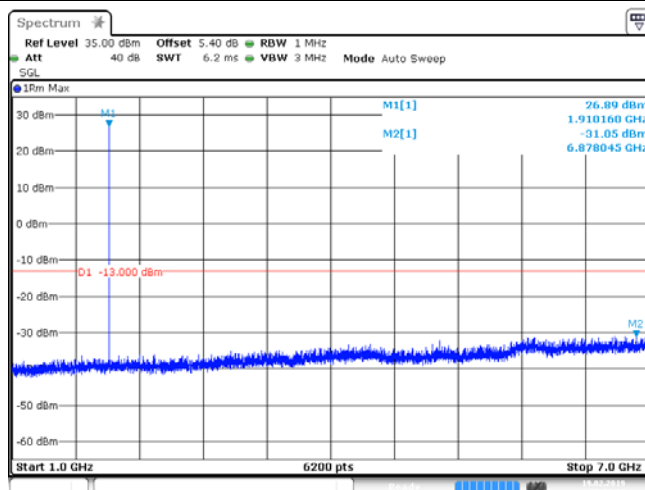
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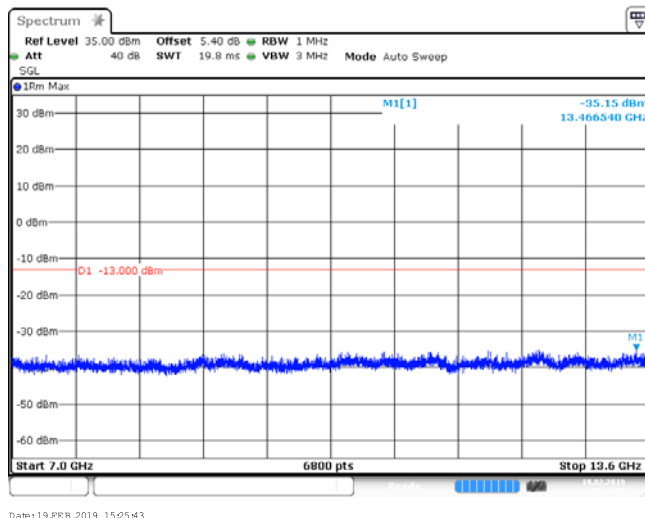
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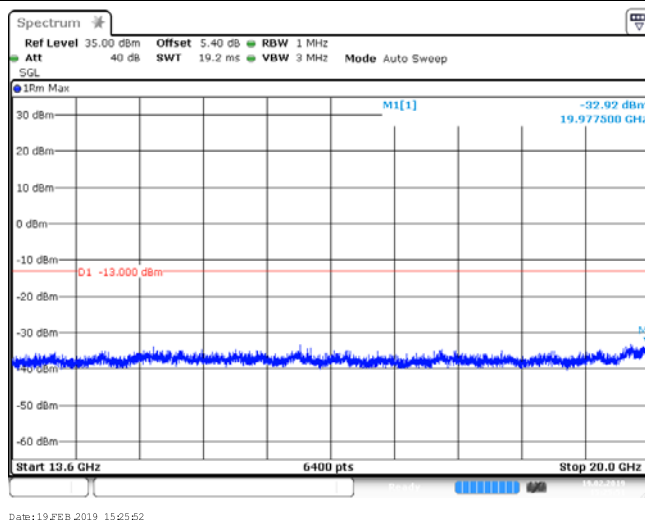


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7. Field Strength of Spurious Radiation

7.1. Test Band = GSM 1900

7.1.1. Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
66.1828	-66.63	-13.00	53.63	Vertical
111.1931	-65.53	-13.00	52.53	Vertical
671.7841	-63.64	-13.00	50.64	Vertical
3700.5234	-55.14	-13.00	42.14	Vertical
5550.5850	-39.90	-13.00	26.90	Vertical
17991.9997	-31.01	-13.00	18.01	Vertical
41.2526	-61.90	-13.00	48.90	Horizontal
164.3032	-65.72	-13.00	52.72	Horizontal
501.7831	-66.42	-13.00	53.42	Horizontal
2701.5403	-36.64	-13.00	23.64	Horizontal
5550.5850	-51.25	-13.00	38.25	Horizontal
16392.9464	-36.03	-13.00	23.03	Horizontal

7.1.2. Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
68.4624	-66.23	-13.00	53.23	Vertical
113.8607	-65.28	-13.00	52.28	Vertical
750.1640	-62.39	-13.00	49.39	Vertical
3760.0253	-47.68	-13.00	34.68	Vertical
5640.0880	-40.72	-13.00	27.72	Vertical
17988.4996	-30.88	-13.00	17.88	Vertical
41.2526	-62.76	-13.00	49.76	Horizontal
149.0250	-67.35	-13.00	54.35	Horizontal
388.3844	-67.20	-13.00	54.20	Horizontal
2701.1402	-36.75	-13.00	23.75	Horizontal
5640.0880	-46.98	-13.00	33.98	Horizontal
17990.9997	-35.68	-13.00	22.68	Horizontal

7.1.3. Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
69.5295	-65.87	-13.00	52.87	Vertical
119.1475	-65.14	-13.00	52.14	Vertical
729.5505	-62.20	-13.00	49.20	Vertical
3819.5273	-48.74	-13.00	35.74	Vertical



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5729.5910	-44.25	-13.00	31.25	Vertical
17997.4999	-30.29	-13.00	17.29	Vertical
41.2526	-64.34	-13.00	51.34	Horizontal
150.4315	-63.39	-13.00	50.39	Horizontal
499.7945	-66.55	-13.00	53.55	Horizontal
2697.9396	-36.36	-13.00	23.36	Horizontal
5729.5910	-47.32	-13.00	34.32	Horizontal
17986.4996	-35.43	-13.00	22.43	Horizontal

7.1.4. Spot Check worse mode

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
48.5279	-70.28	-13.00	57.28	Vertical
108.7194	-63.20	-13.00	50.20	Vertical
501.9771	-65.67	-13.00	52.67	Vertical
3760.0253	-52.79	-13.00	39.79	Vertical
5640.0880	-36.32	-13.00	23.32	Vertical
17993.4998	-33.30	-13.00	20.30	Vertical
44.2597	-63.39	-13.00	50.39	Horizontal
150.7710	-65.16	-13.00	52.16	Horizontal
247.4364	-66.63	-13.00	53.63	Horizontal
5640.0880	-48.37	-13.00	35.37	Horizontal
11247.2749	-48.32	-13.00	35.32	Horizontal
17909.9970	-39.19	-13.00	26.19	Horizontal

7.2. Test Band = GSM 850

7.2.1. Test Channel = LCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
75.6408	-64.57	-13.00	51.57	Vertical
111.6781	-65.60	-13.00	52.60	Vertical
531.7091	-66.93	-13.00	53.93	Vertical
1648.1296	-56.49	-13.00	43.49	Vertical
2472.6945	-41.43	-13.00	28.43	Vertical
17999.0000	-30.97	-13.00	17.97	Vertical
41.0101	-64.31	-13.00	51.31	Horizontal
150.5770	-67.48	-13.00	54.48	Horizontal
233.2252	-68.65	-13.00	55.65	Horizontal
1648.1296	-45.20	-13.00	32.20	Horizontal
2472.6945	-36.09	-13.00	23.09	Horizontal
17992.4998	-35.48	-13.00	22.48	Horizontal



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7.2.2. Test Channel = MCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
74.9132	-64.01	-13.00	51.01	Vertical
108.0889	-65.42	-13.00	52.42	Vertical
386.7353	-67.84	-13.00	54.84	Vertical
1673.3347	-53.41	-13.00	40.41	Vertical
2509.9020	-46.76	-13.00	33.76	Vertical
17989.9997	-31.00	-13.00	18.00	Vertical
46.6848	-63.85	-13.00	50.85	Horizontal
152.1291	-66.74	-13.00	53.74	Horizontal
235.0198	-66.54	-13.00	53.54	Horizontal
1673.3347	-50.70	-13.00	37.70	Horizontal
2509.9020	-41.77	-13.00	28.77	Horizontal
17981.9994	-35.81	-13.00	22.81	Horizontal

7.2.3. Test Channel = HCH

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
75.8833	-61.85	-13.00	48.85	Vertical
109.0105	-65.52	-13.00	52.52	Vertical
458.2764	-67.76	-13.00	54.76	Vertical
1697.3395	-51.54	-13.00	38.54	Vertical
2547.1094	-48.92	-13.00	35.92	Vertical
17987.9996	-30.64	-13.00	17.64	Vertical
41.2041	-64.32	-13.00	51.32	Horizontal
150.0435	-67.87	-13.00	54.87	Horizontal
230.5090	-68.37	-13.00	55.37	Horizontal
1697.7395	-48.83	-13.00	35.83	Horizontal
2546.3093	-42.71	-13.00	29.71	Horizontal
17980.4994	-35.42	-13.00	22.42	Horizontal

7.2.4. Spot Check worse mode

Frequency (MHz)	Level (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
56.9188	-69.11	-13.00	56.11	Vertical
79.1815	-64.62	-13.00	51.62	Vertical
390.1305	-66.52	-13.00	53.52	Vertical
1672.9346	-53.07	-13.00	40.07	Vertical
2509.9020	-44.39	-13.00	31.39	Vertical
17994.9998	-33.88	-13.00	20.88	Vertical
44.2597	-63.04	-13.00	50.39	Horizontal
150.7710	-65.52	-13.00	52.16	Horizontal



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247.4364	-66.50	-13.00	53.63	Horizontal
5640.0880	-45.80	-13.00	35.37	Horizontal
11247.2749	-39.87	-13.00	35.32	Horizontal
17909.9970	-38.37	-13.00	26.19	Horizontal

Remark:

- 1) The disturbance above 12.75GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the worst case data had been displayed.
- 2) We have tested all modulation and all Bandwidth , but only the worst case data presented in this report.



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Shenzhen Branch Testing Center EEC Laboratory

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8. Frequency Stability

8.1. Frequency Error Vs Voltage

Voltage							
BAND	Channel	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
GSM850	128	VL	TN	12.79	0.015512	±2.5	PASS
GSM850	128	VN	TN	16.08	0.019508	±2.5	PASS
GSM850	128	VH	TN	18.44	0.022367	±2.5	PASS
GSM850	190	VL	TN	6.75	0.008066	±2.5	PASS
GSM850	190	VN	TN	7.43	0.008876	±2.5	PASS
GSM850	190	VH	TN	9.04	0.010806	±2.5	PASS
GSM850	251	VL	TN	8.17	0.009623	±2.5	PASS
GSM850	251	VN	TN	9.75	0.011487	±2.5	PASS
GSM850	251	VH	TN	10.23	0.012058	±2.5	PASS
EGPRS850	128	VL	TN	20.76	0.025188	±2.5	PASS
EGPRS850	128	VN	TN	23.15	0.028087	±2.5	PASS
EGPRS850	128	VH	TN	21.99	0.026676	±2.5	PASS
EGPRS850	190	VL	TN	20.82	0.024892	±2.5	PASS
EGPRS850	190	VN	TN	22.18	0.026513	±2.5	PASS
EGPRS850	190	VH	TN	21.02	0.025123	±2.5	PASS
GSM1900	512	VL	TN	2.45	0.001326	±2.5	PASS
GSM1900	512	VN	TN	-0.65	-0.000349	±2.5	PASS
GSM1900	512	VH	TN	-4.00	-0.002164	±2.5	PASS
GSM1900	661	VL	TN	-3.39	-0.001803	±2.5	PASS
GSM1900	661	VN	TN	-3.65	-0.001941	±2.5	PASS
GSM1900	661	VH	TN	-1.03	-0.000550	±2.5	PASS
GSM1900	810	VL	TN	3.20	0.001674	±2.5	PASS
GSM1900	810	VN	TN	6.49	0.003398	±2.5	PASS
GSM1900	810	VH	TN	4.00	0.002096	±2.5	PASS
EGPRS1900	512	VL	TN	2.39	0.001291	±2.5	PASS
EGPRS1900	512	VN	TN	10.65	0.005758	±2.5	PASS
EGPRS1900	512	VH	TN	9.78	0.005287	±2.5	PASS
EGPRS1900	661	VL	TN	11.88	0.006320	±2.5	PASS
EGPRS1900	661	VN	TN	13.56	0.007213	±2.5	PASS

8.2. Frequency Error Vs Temperature

Temperature							
BAND	Channel	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	±2.5	Verdict
GSM850	128	VN	-30	15.14	0.018372	±2.5	PASS
GSM850	128	VN	-20	15.24	0.018489	±2.5	PASS
GSM850	128	VN	-10	12.88	0.015630	±2.5	PASS
GSM850	128	VN	0	6.94	0.008422	±2.5	PASS



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GSM850	128	VN	10	5.20	0.006307	±2.5	PASS
GSM850	128	VN	20	4.13	0.005014	±2.5	PASS
GSM850	128	VN	30	6.07	0.007364	±2.5	PASS
GSM850	128	VN	40	4.16	0.005053	±2.5	PASS
GSM850	128	VN	50	1.36	0.001645	±2.5	PASS
GSM850	190	VN	-30	8.10	0.009687	±2.5	PASS
GSM850	190	VN	-20	8.23	0.009841	±2.5	PASS
GSM850	190	VN	-10	10.65	0.012735	±2.5	PASS
GSM850	190	VN	0	8.17	0.009764	±2.5	PASS
GSM850	190	VN	10	7.81	0.009339	±2.5	PASS
GSM850	190	VN	20	5.88	0.007024	±2.5	PASS
GSM850	190	VN	30	4.71	0.005634	±2.5	PASS
GSM850	190	VN	40	7.65	0.009146	±2.5	PASS
GSM850	190	VN	50	5.49	0.006561	±2.5	PASS
GSM850	251	VN	-30	9.85	0.011601	±2.5	PASS
GSM850	251	VN	-20	6.20	0.007303	±2.5	PASS
GSM850	251	VN	-10	8.33	0.009814	±2.5	PASS
GSM850	251	VN	0	7.91	0.009319	±2.5	PASS
GSM850	251	VN	10	10.59	0.012476	±2.5	PASS
GSM850	251	VN	20	7.97	0.009395	±2.5	PASS
GSM850	251	VN	30	10.65	0.012552	±2.5	PASS
GSM850	251	VN	40	6.30	0.007417	±2.5	PASS
GSM850	251	VN	50	8.59	0.010118	±2.5	PASS
EGPRS850	128	VN	-30	23.79	0.028870	±2.5	PASS
EGPRS850	128	VN	-20	21.47	0.026050	±2.5	PASS
EGPRS850	128	VN	-10	20.95	0.025423	±2.5	PASS
EGPRS850	128	VN	0	23.18	0.028126	±2.5	PASS
EGPRS850	128	VN	10	24.31	0.029497	±2.5	PASS
EGPRS850	128	VN	20	19.79	0.024013	±2.5	PASS
EGPRS850	128	VN	30	23.83	0.028909	±2.5	PASS
EGPRS850	128	VN	40	23.34	0.028322	±2.5	PASS
EGPRS850	128	VN	50	21.28	0.025815	±2.5	PASS
GSM1900	512	VN	-30	0.39	0.000209	±2.5	PASS
GSM1900	512	VN	-20	-4.88	-0.002635	±2.5	PASS
GSM1900	512	VN	-10	-3.52	-0.001902	±2.5	PASS
GSM1900	512	VN	0	1.19	0.000646	±2.5	PASS
GSM1900	512	VN	10	-1.10	-0.000593	±2.5	PASS
GSM1900	512	VN	20	1.74	0.000942	±2.5	PASS
GSM1900	512	VN	30	-0.77	-0.000419	±2.5	PASS
GSM1900	512	VN	40	-4.81	-0.002600	±2.5	PASS
GSM1900	512	VN	50	-3.03	-0.001640	±2.5	PASS
GSM1900	661	VN	-30	1.13	0.000601	±2.5	PASS
GSM1900	661	VN	-20	-1.19	-0.000635	±2.5	PASS
GSM1900	661	VN	-10	-1.29	-0.000687	±2.5	PASS
GSM1900	661	VN	0	-7.49	-0.003984	±2.5	PASS
GSM1900	661	VN	10	-5.13	-0.002731	±2.5	PASS
GSM1900	661	VN	20	-7.14	-0.003795	±2.5	PASS



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GSM1900	661	VN	30	-4.33	-0.002301	±2.5	PASS
GSM1900	661	VN	40	-7.20	-0.003830	±2.5	PASS
GSM1900	661	VN	50	-9.52	-0.005066	±2.5	PASS
GSM1900	810	VN	-30	2.97	0.001555	±2.5	PASS
GSM1900	810	VN	-20	-1.65	-0.000862	±2.5	PASS
GSM1900	810	VN	-10	-2.65	-0.001386	±2.5	PASS
GSM1900	810	VN	0	-1.29	-0.000676	±2.5	PASS
GSM1900	810	VN	10	2.58	0.001352	±2.5	PASS
GSM1900	810	VN	20	-1.81	-0.000947	±2.5	PASS
GSM1900	810	VN	30	-7.30	-0.003821	±2.5	PASS
GSM1900	810	VN	40	-10.11	-0.005291	±2.5	PASS
GSM1900	810	VN	50	3.45	0.001809	±2.5	PASS
EGPRS1900	512	VN	-30	13.69	0.007399	±2.5	PASS
EGPRS1900	512	VN	-20	11.14	0.006020	±2.5	PASS
EGPRS1900	512	VN	-10	12.43	0.006718	±2.5	PASS
EGPRS1900	512	VN	0	12.62	0.006823	±2.5	PASS
EGPRS1900	512	VN	10	13.30	0.007189	±2.5	PASS
EGPRS1900	512	VN	20	10.17	0.005497	±2.5	PASS
EGPRS1900	512	VN	30	12.43	0.006718	±2.5	PASS
EGPRS1900	512	VN	40	13.50	0.007294	±2.5	PASS
EGPRS1900	512	VN	50	10.04	0.005427	±2.5	PASS

The End

