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Appendix for Test Report SZEM150300144003

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The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

2 Content

3 Appendix A Effective (Isotropic) Radiated Power Output Data

Part I - Test Results

Part I – RF Conducted Power of Transmitter for GSM850

TEST CONDITIONS	RF Output Power(Conducted)					
	Channel128(L)		Channel190(M)		Channel251(H)	
	824.2MHz		836.6 MHz		848.8 MHz	
Tnom/ Vnom	Measured(dBm)	Limit (dBm)	Measured(dBm)	Limit (dBm)	Measured(dBm)	Limit (dBm)
GSM/TM1(GPRS)	32.17	38.5	32.27	38.5	32.26	38.5

Part 2– Effective Radiated Power of Transmitter (ERP) for GSM850

Test Mode	Freq. (MHz)	Meas. Level (dBm)	Substitution Antenna Type	SGP (dBm)	Substitution Gain(dBd)	Cable Loss (dB)	Substitution Level(ERP) / dBm	Limit (dBm)	Result
GSM/TM1 (GPRS)	824.2	32.02	Dipole	37.45	-4.90	0.6	31.95	38.5	Pass
GSM/TM1 (GPRS)	836.6	32.12	Dipole	37.70	-5.02	0.6	32.08	38.5	Pass
GSM/TM1 (GPRS)	848.8	32.11	Dipole	37.69	-5.00	0.6	32.09	38.5	Pass

Note:

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

ERP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBd]

b: SGP=Signal Generator Level

c: RBW > emission bandwidth, VBW > 3 x RBW.
Detector: RMS

Part I – RF Conducted Power of Transmitter for GSM1900

TEST CONDITIONS	RF Output Power(Conducted)					
	Channel128(L)		Channel190(M)		Channel251(H)	
	1850.2MHz		1880.0 MHz		1909.8 MHz	
Tnom/ Vnom	Measured(dBm)	Limit (dBm)	Measured(dBm)	Limit (dBm)	Measured(dBm)	Limit (dBm)
GSM/TM1 (GPRS)	27.23	33	27.44	33	28.26	33

Part 2– Effective Isotropic Radiated Power of Transmitter (EIRP) for GSM1900

Test Mode	Freq. (MHz)	Meas. Level (dBm)	Substitution Antenna Type	SGP (dBm)	Substitution Gain(dBi)	Cable Loss (dB)	Substitution Level(EIRP) / dBm	Limit (dBm)	Result
GSM/TM1 (GPRS)	1850.2	29.23	Horn Ant.	25.70	4.5	1	29.20	33	Pass
GSM/TM1 (GPRS)	1880.0	29.44	Horn Ant.	25.92	4.5	1	29.42	33	Pass
GSM/TM1 (GPRS)	1909.8	30.26	Horn Ant.	26.71	4.5	1	30.21	33	Pass

Note:

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

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

b, SGP=Signal Generator Level

c: RBW > emission bandwidth, VBW > 3 x RBW

Detector: RMS

4 Appendix B Peak-to-Average Ratio

Part I - Test Results

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
GSM850	GSM/TM1	LCH	0.10	13	PASS
		MCH	0.14	13	PASS
		HCH	0.18	13	PASS
GSM1900	GSM/TM1	LCH	0.11	13	PASS
		MCH	0.13	13	PASS
		HCH	0.12	13	PASS

5 Appendix C Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	241.70	314.20	PASS
		MCH	242.52	318.90	PASS
		HCH	241.75	316.40	PASS
GSM1900	GSM/TM1	LCH	245.42	322.20	PASS
		MCH	242.99	320.70	PASS
		HCH	245.46	321.30	PASS

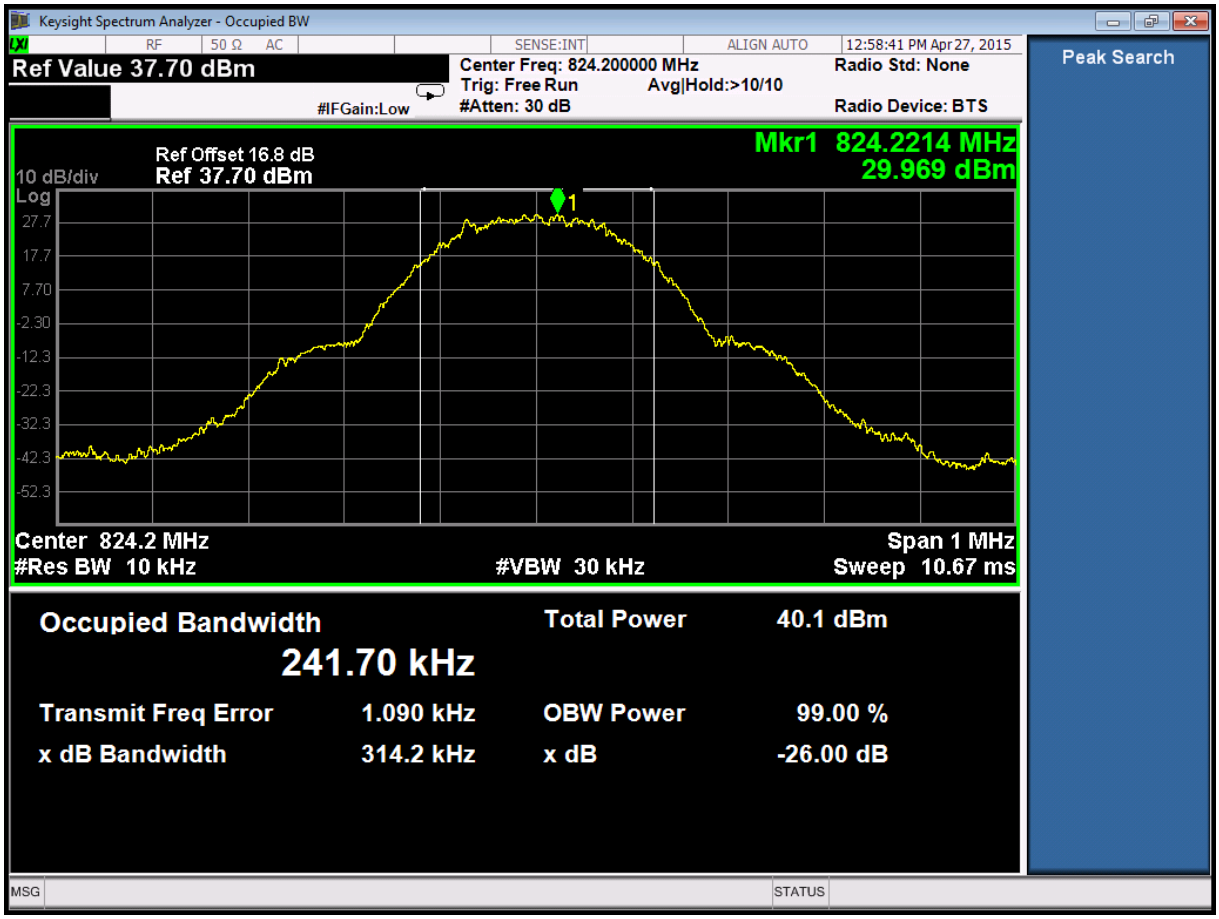
Part II - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

5.1.1.1.1 Test Channel = LCH



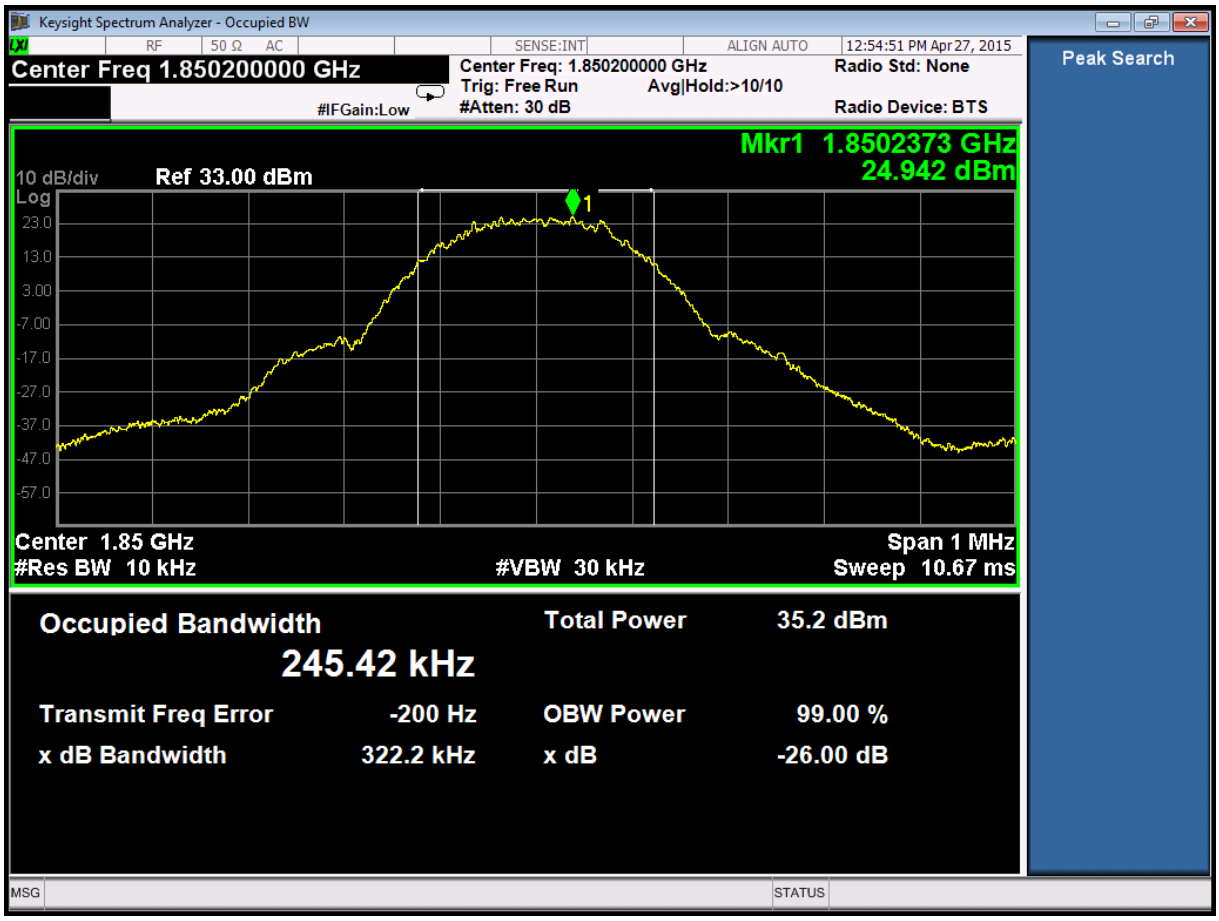
5.1.1.1.2 Test Channel = MCH

5.1.1.1.3 Test Channel = HCH

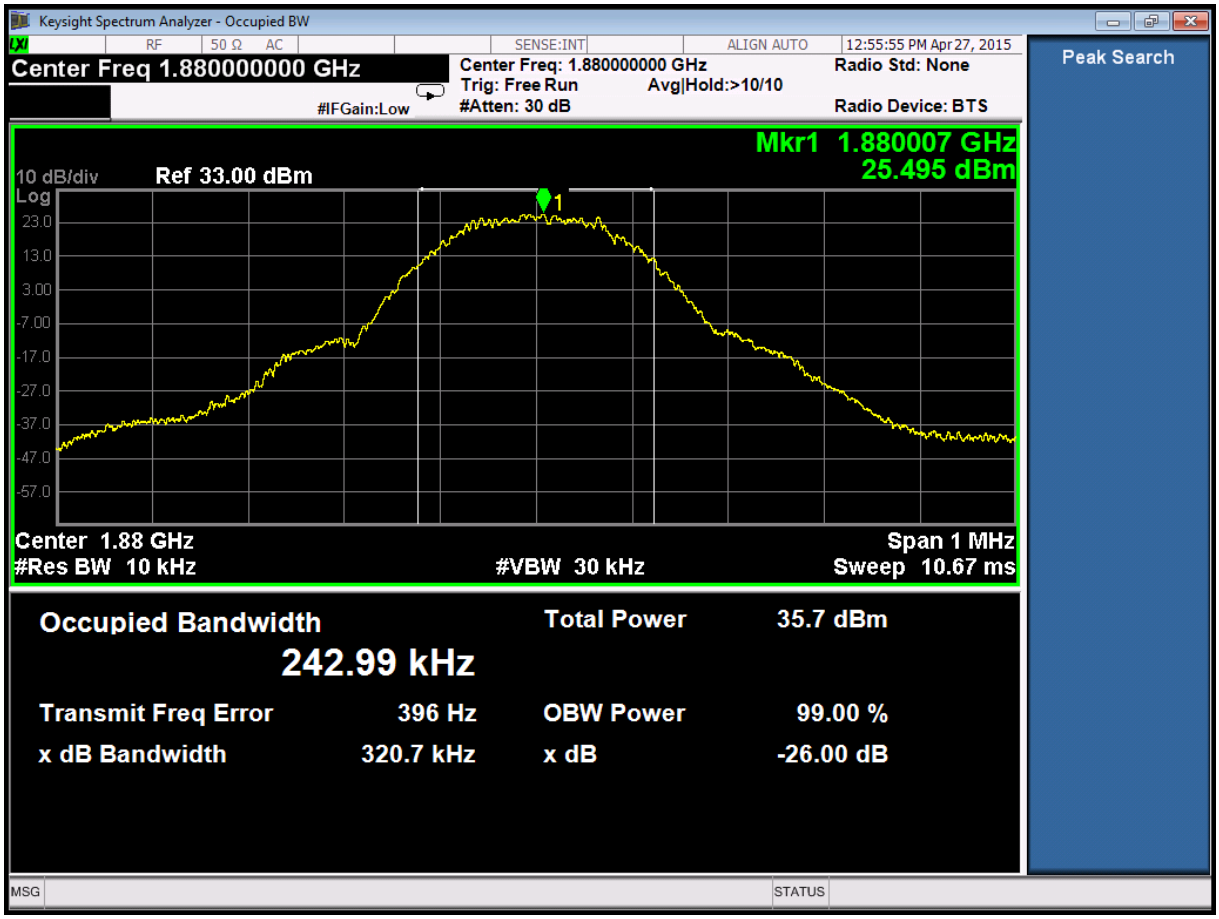
5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

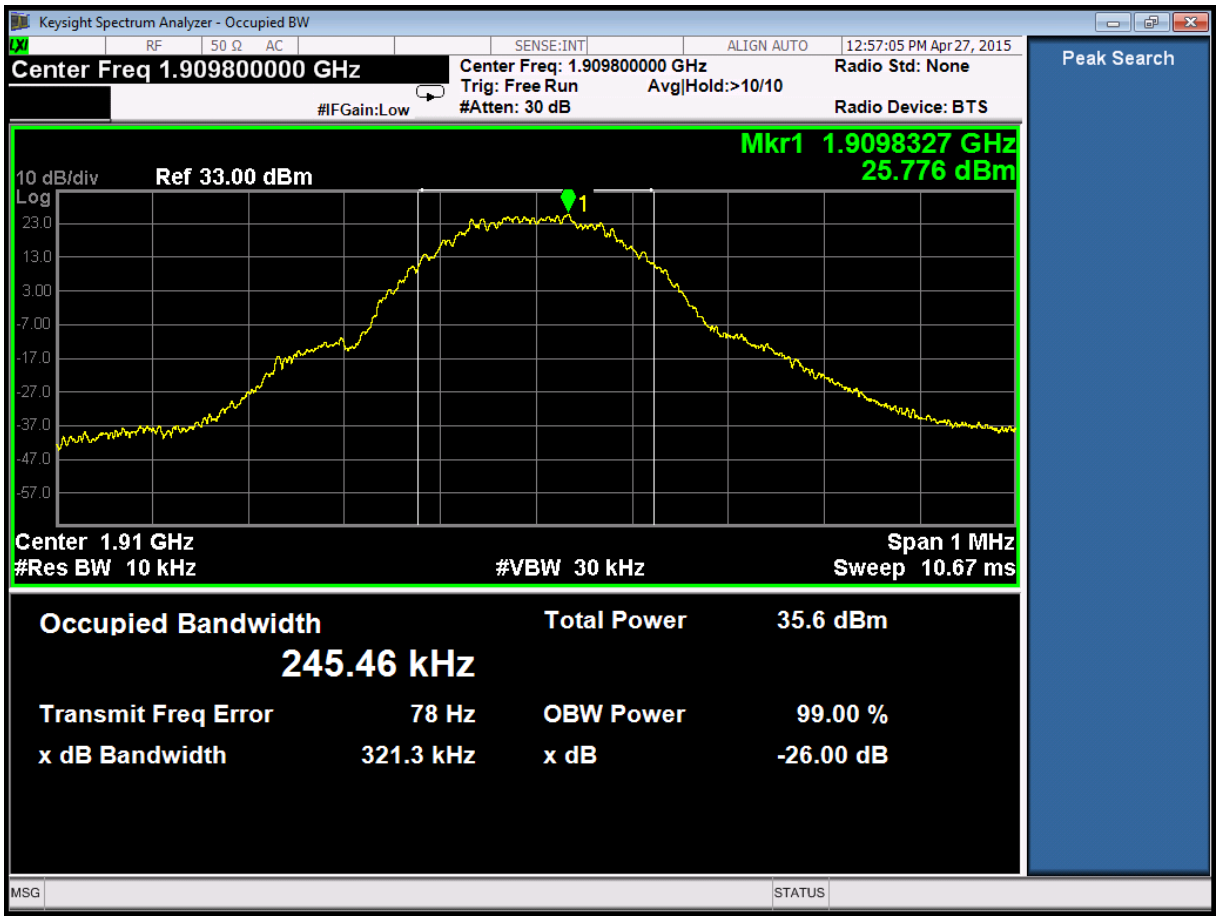
5.1.2.1.1 Test Channel = LCH



5.1.2.1.2 Test Channel = MCH



5.1.2.1.3 Test Channel = HCH



6 Appendix D Band Edges Compliance

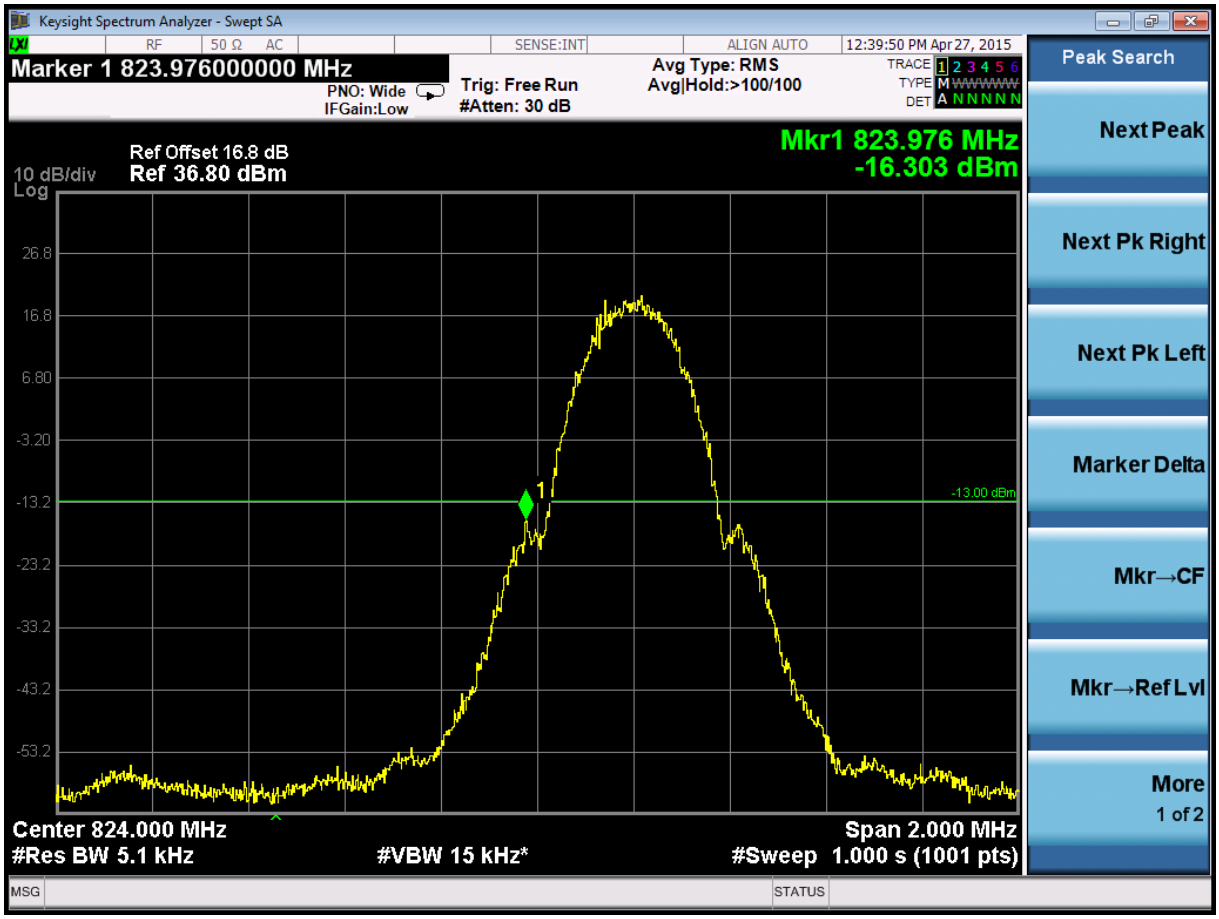
Part I - Test Plots

6.1 For GSM

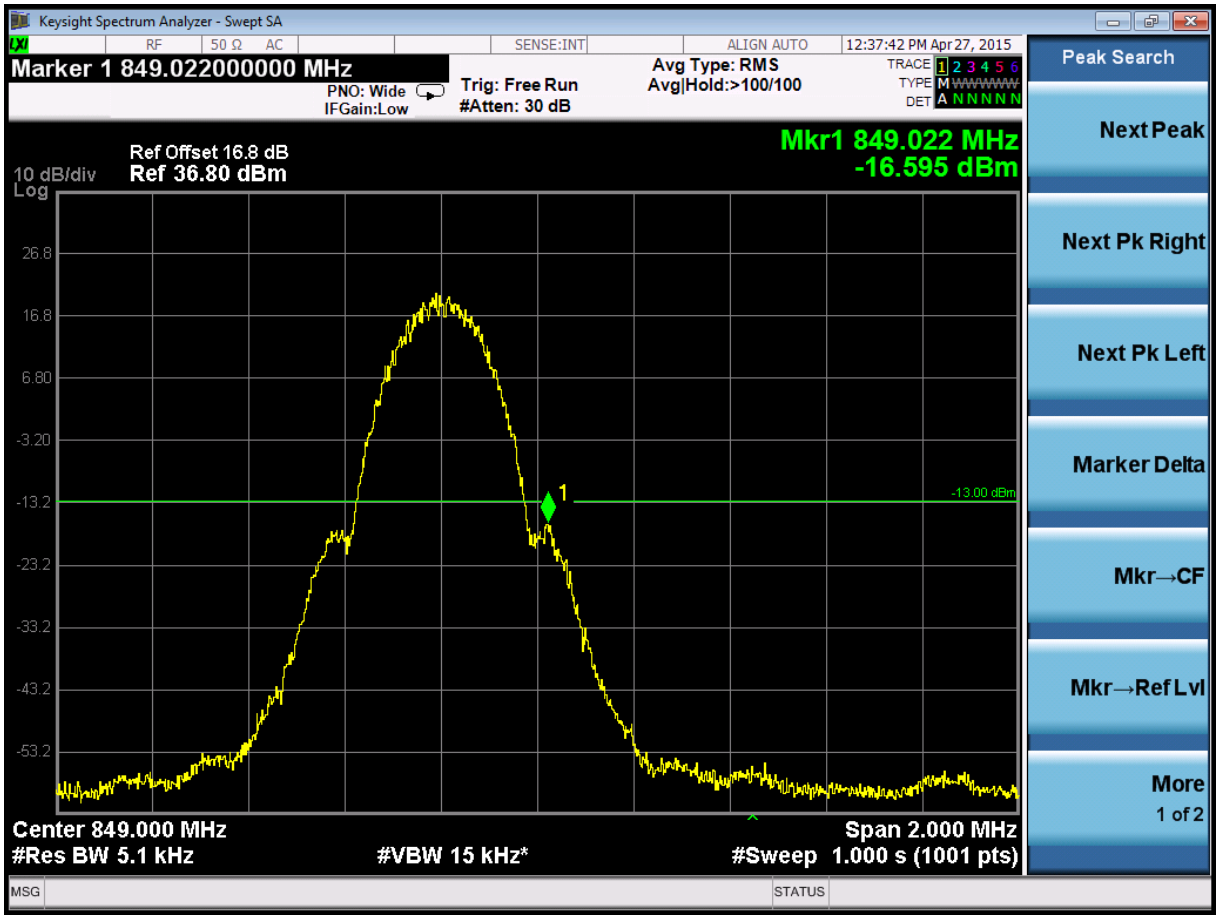
6.1.1 Test Band = GSM850

6.1.1.1 Test Mode = GSM/TM1

6.1.1.1.1 Test Channel = LCH



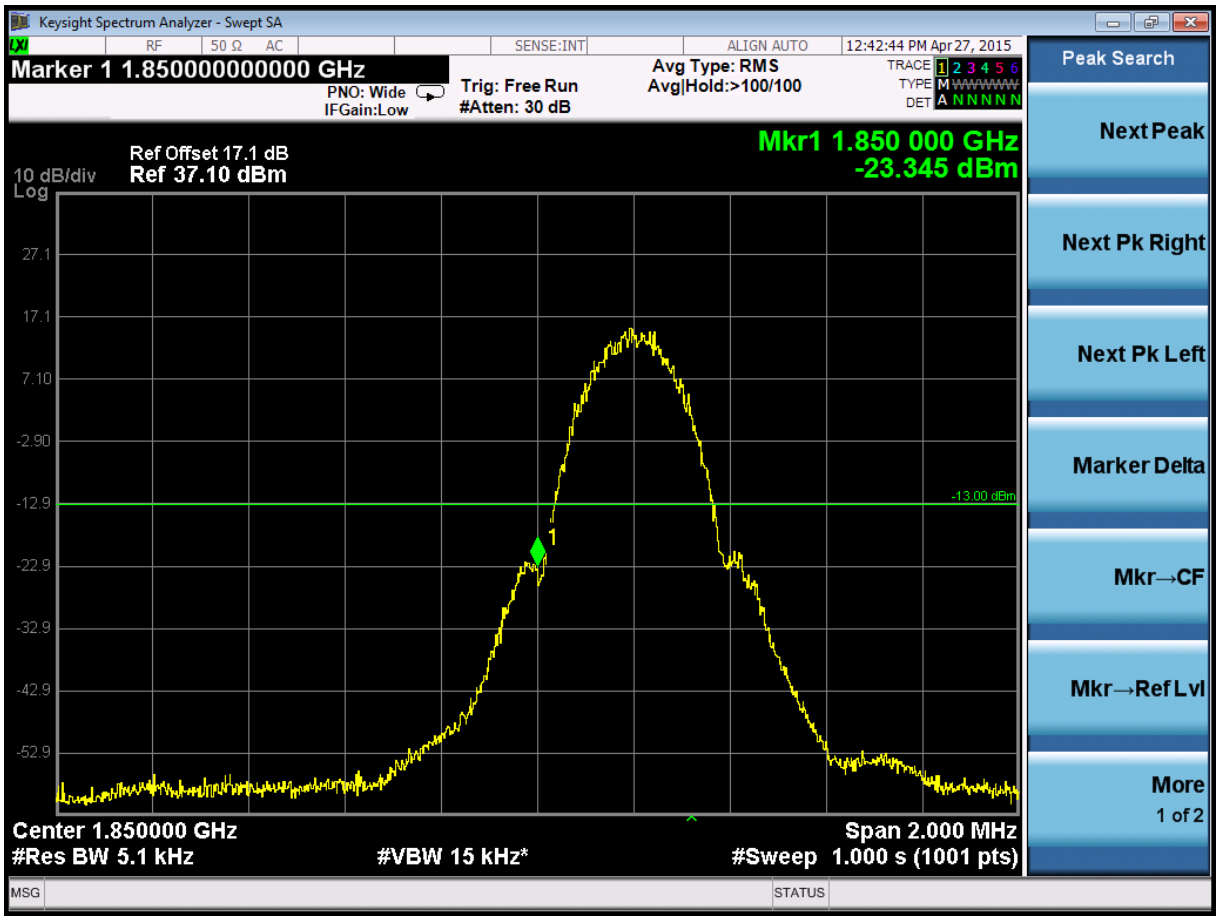
6.1.1.1.2 Test Channel = HCH



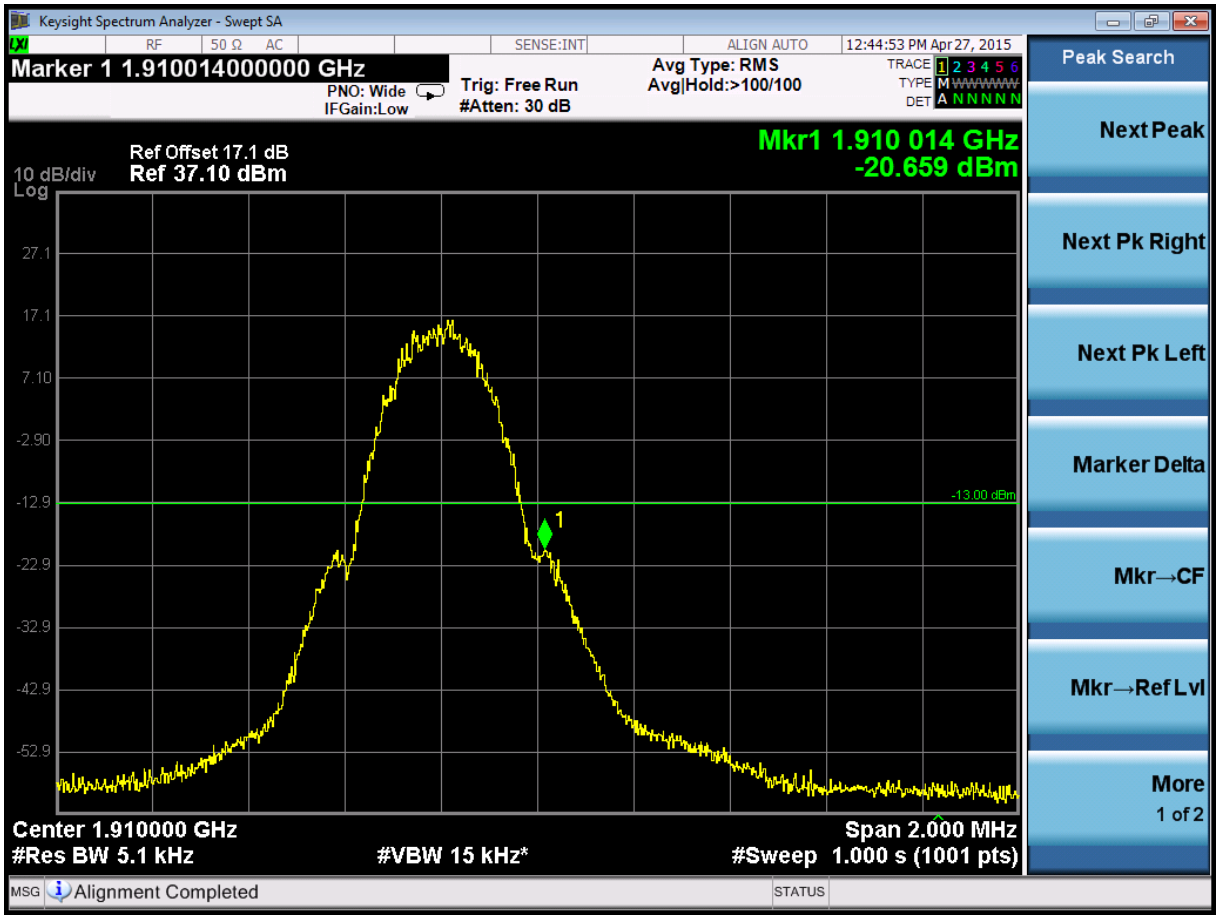
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

6.1.2.1.1 Test Channel = LCH



6.1.2.1.2 Test Channel = HCH



7 Appendix E 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.

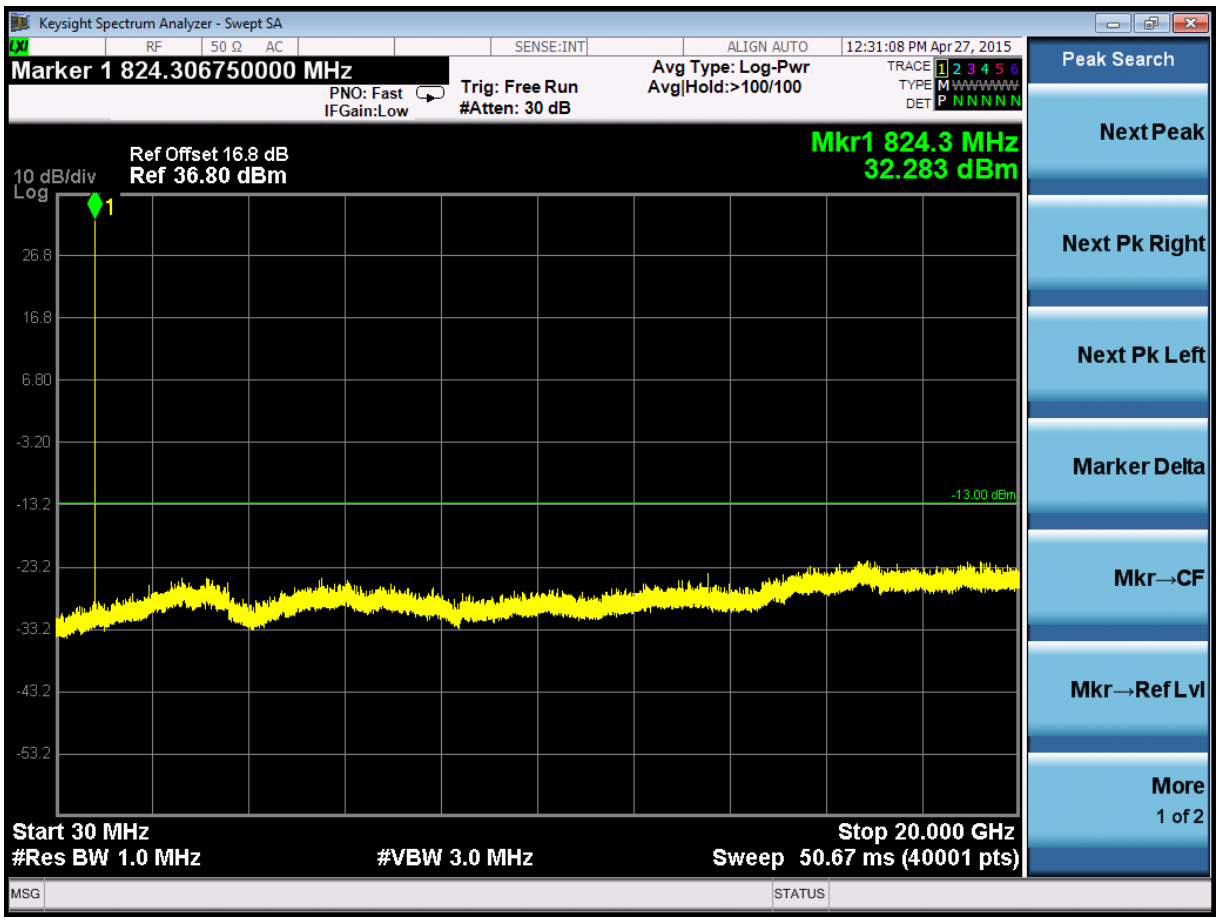
Part I - Test Plots

7.1 For GSM

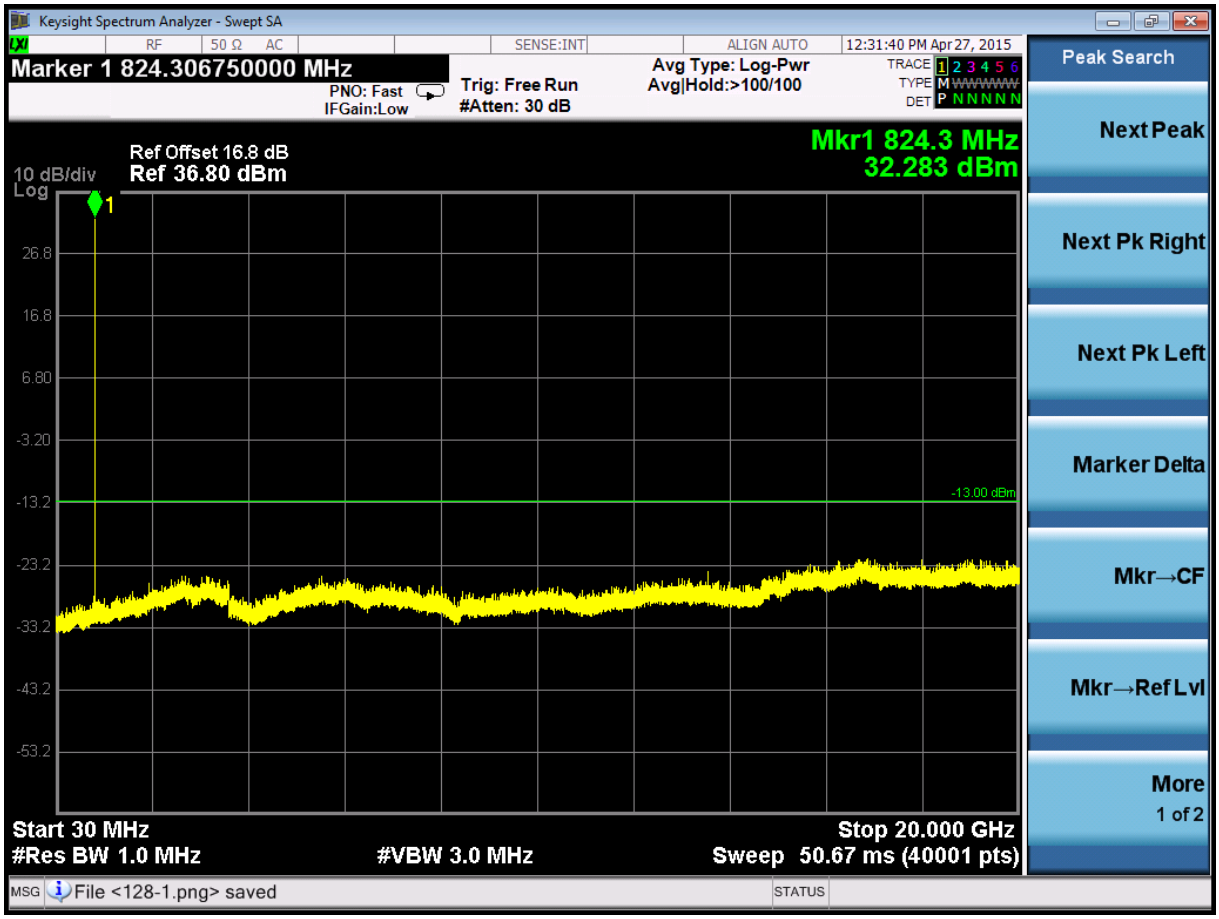
7.1.1 Test Band = GSM850

7.1.1.1 Test Mode = GSM/TM1

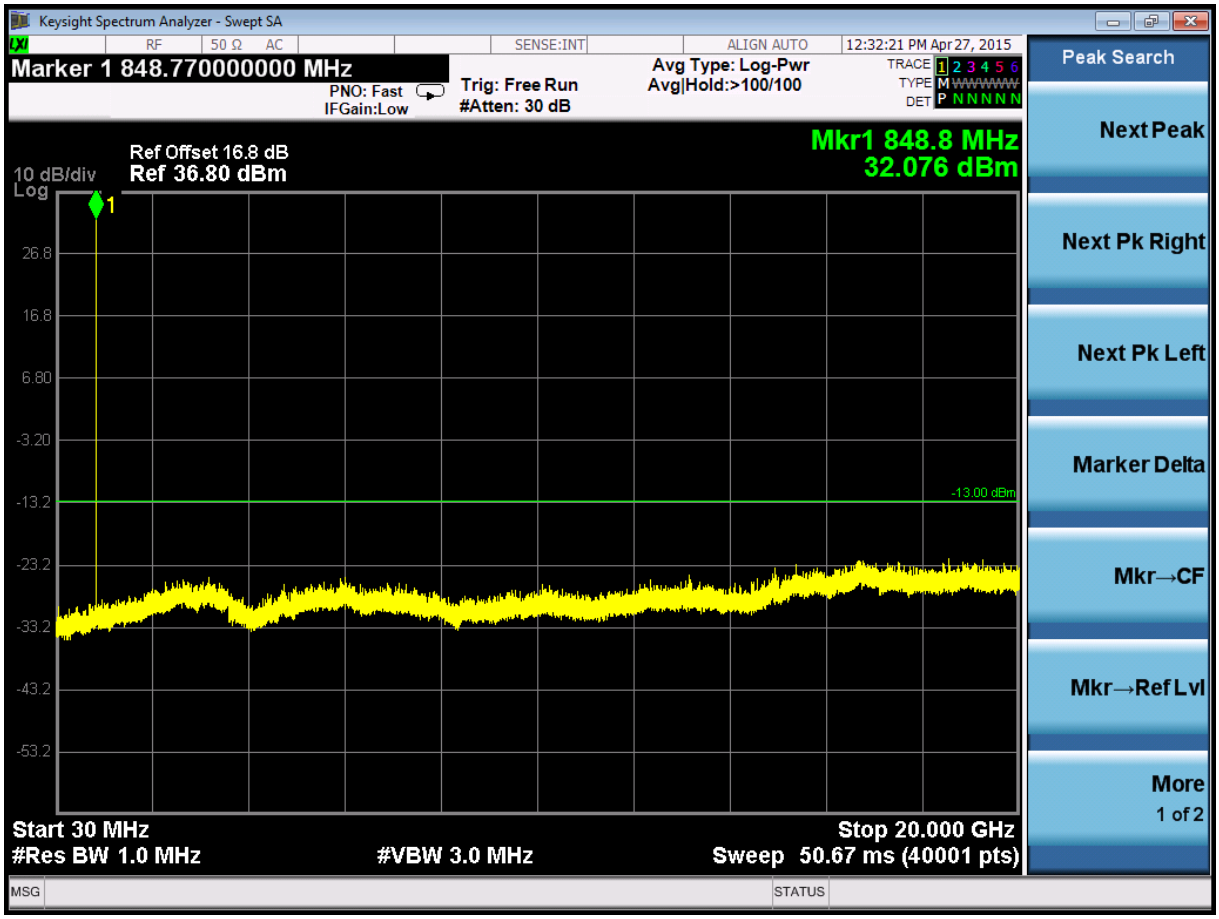
7.1.1.1.1 Test Channel = LCH



7.1.1.1.2 Test Channel = MCH



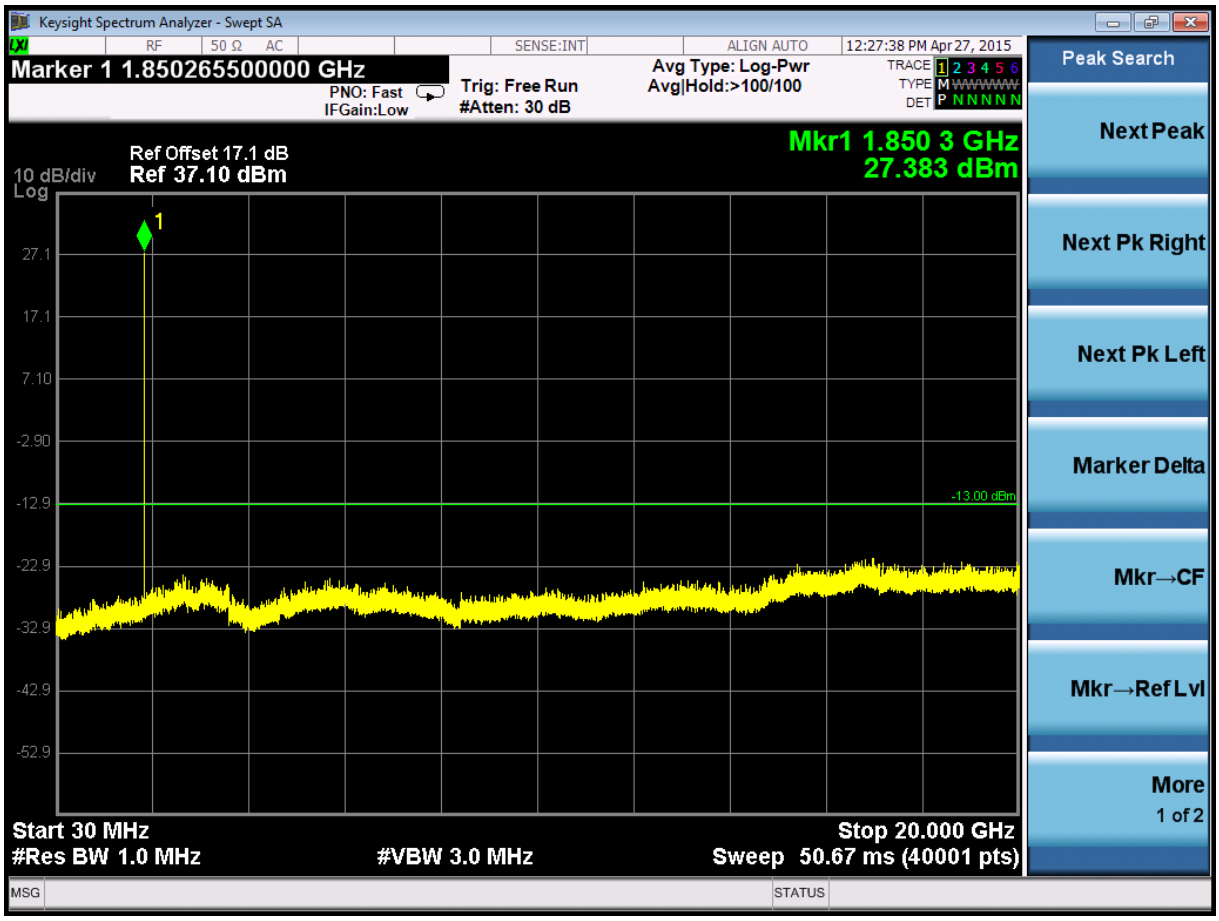
7.1.1.1.3 Test Channel = HCH



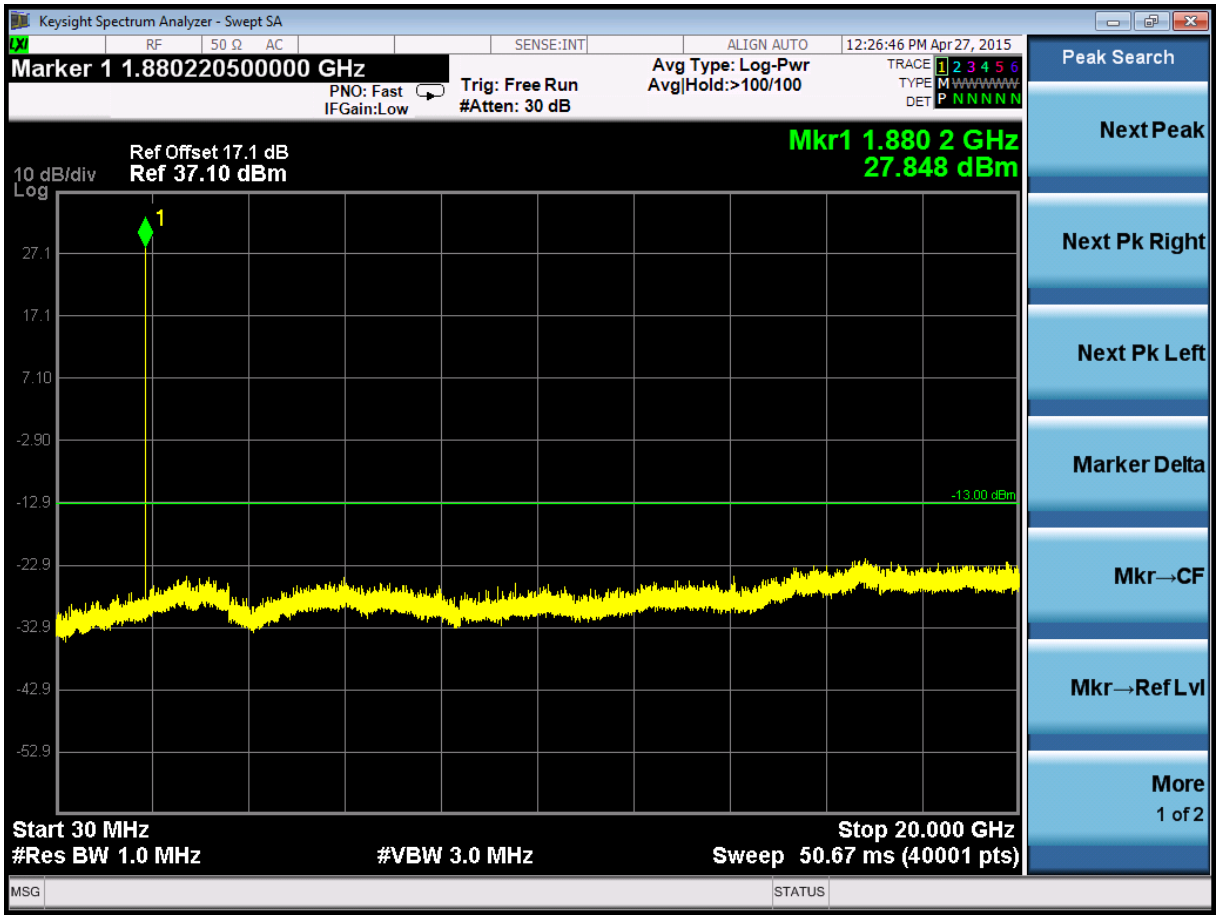
7.1.2 Test Band = GSM1900

7.1.2.1 Test Mode = GSM/TM1

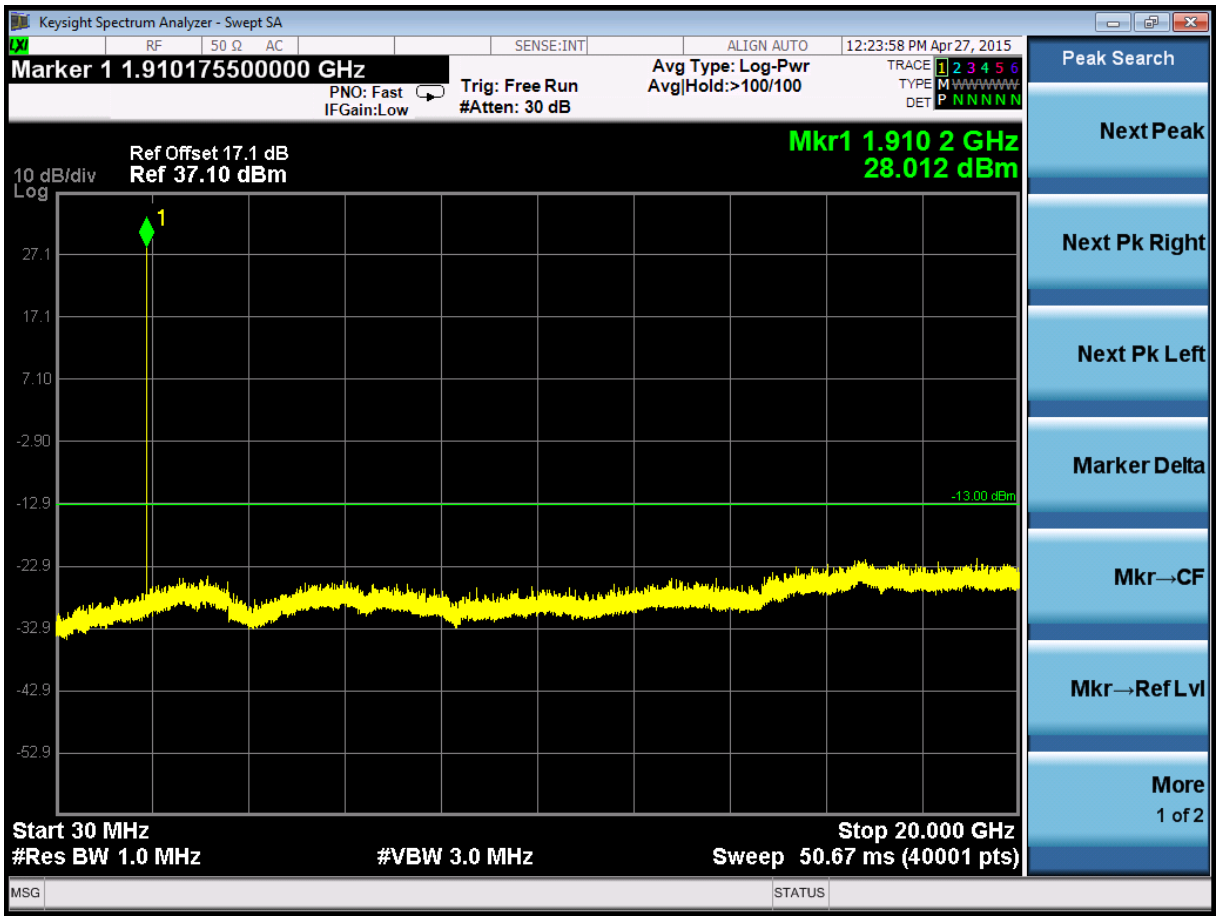
7.1.2.1.1 Test Channel = LCH



7.1.2.1.2 Test Channel = MCH



7.1.2.1.3 Test Channel = HCH



8 Appendix F Field Strength of Spurious Radiation

Part I - Test Plots

8.1 For GSM

8.1.1 Test Band = GSM850

8.1.1.1 Test Mode = GSM/TM1

8.1.1.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
44.850	-72.6	-13.0	-59.6	Vertical
74.550	-67.8	-13.0	-54.8	Vertical
142.860	-70.3	-13.0	-57.3	Vertical
279.480	-69.0	-13.0	-56.0	Vertical
502.230	-64.4	-13.0	-51.4	Vertical
733.890	-61.1	-13.0	-48.1	Vertical
1648.650	-43.3	-13.0	-30.3	Vertical
2474.310	-42.8	-13.0	-29.8	Vertical
3294.000	-36.6	-13.0	-23.6	Vertical
4120.000	-43.7	-13.0	-30.7	Vertical
5730.000	-45.2	-13.0	-32.2	Vertical
8033.000	-43.3	-13.0	-30.3	Vertical

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
45.616	-72.9	-13.0	-59.9	Horizontal
92.370	-71.1	-13.0	-58.1	Horizontal
133.950	-71.9	-13.0	-58.9	Horizontal
193.350	-69.6	-13.0	-56.6	Horizontal
327.000	-68.9	-13.0	-55.9	Horizontal
487.380	-64.5	-13.0	-51.5	Horizontal
1648.650	-43.4	-13.0	-30.4	Horizontal
2474.310	-38.5	-13.0	-25.5	Horizontal
3294.000	-43.6	-13.0	-30.6	Horizontal
4673.000	-44.5	-13.0	-31.5	Horizontal
6640.000	-38.4	-13.0	-25.4	Horizontal
8705.000	-41.4	-13.0	-28.4	Horizontal

8.1.1.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
56.730	-70.6	-13.0	-57.6	Vertical
98.310	-68.1	-13.0	-55.1	Vertical
151.770	-70.6	-13.0	-57.6	Vertical
249.780	-68.8	-13.0	-55.8	Vertical
392.340	-67.3	-13.0	-54.3	Vertical
549.750	-63.6	-13.0	-50.6	Vertical
1672.410	-45.5	-13.0	-32.5	Vertical
2679.240	-42.4	-13.0	-29.4	Vertical
3343.000	-40.0	-13.0	-27.0	Vertical
4183.000	-42.9	-13.0	-29.9	Vertical
5625.000	-45.4	-13.0	-32.4	Vertical
6976.000	-41.4	-13.0	-28.4	Vertical

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
50.790	-72.2	-13.0	-59.2	Horizontal
92.370	-69.9	-13.0	-56.9	Horizontal
151.770	-72.1	-13.0	-59.1	Horizontal
228.990	-69.1	-13.0	-56.1	Horizontal
389.370	-66.6	-13.0	-53.6	Horizontal
609.150	-62.5	-13.0	-49.5	Horizontal
1672.410	-45.3	-13.0	-32.3	Horizontal
2509.950	-37.3	-13.0	-24.3	Horizontal
3343.000	-46.3	-13.0	-33.3	Horizontal
4183.000	-45.4	-13.0	-32.4	Horizontal
5513.000	-43.2	-13.0	-30.2	Horizontal
6997.000	-36.9	-13.0	-23.9	Horizontal

8.1.1.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
50.790	-70.7	-13.0	-57.7	Vertical
86.430	-67.6	-13.0	-54.6	Vertical
151.770	-69.5	-13.0	-56.5	Vertical
223.050	-69.6	-13.0	-56.6	Vertical
350.850	-67.4	-13.0	-54.4	Vertical
514.110	-64.3	-13.0	-51.3	Vertical
1699.140	-47.8	-13.0	-34.8	Vertical
2622.810	-44.5	-13.0	-31.5	Vertical
3392.000	-42.6	-13.0	-29.6	Vertical
4344.000	-47.4	-13.0	-34.4	Vertical
5562.000	-45.8	-13.0	-32.8	Vertical
6962.000	-41.3	-13.0	-28.3	Vertical

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
42.966	-73.1	-13.0	-60.1	Horizontal
86.430	-71.8	-13.0	-58.8	Horizontal
151.770	-71.7	-13.0	-58.7	Horizontal
249.780	-67.4	-13.0	-54.4	Horizontal
371.550	-67.4	-13.0	-54.4	Horizontal
603.210	-62.4	-13.0	-49.4	Horizontal
1699.140	-46.3	-13.0	-33.3	Horizontal
2548.560	-41.9	-13.0	-28.9	Horizontal
3392.000	-47.8	-13.0	-34.8	Horizontal
4239.000	-45.5	-13.0	-32.5	Horizontal
5527.000	-43.3	-13.0	-30.3	Horizontal
6955.000	-37.7	-13.0	-24.7	Horizontal

8.1.2 Test Band = GSM1900

8.1.2.1 Test Mode = GSM/TM1

8.1.2.1.1 Test Channel = LCH

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
53.760	-71.0	-13.0	-58.0	Vertical
92.370	-68.5	-13.0	-55.5	Vertical
145.830	-71.3	-13.0	-58.3	Vertical
228.990	-69.6	-13.0	-56.6	Vertical
401.250	-67.0	-13.0	-54.0	Vertical
698.250	-61.2	-13.0	-48.2	Vertical
3975.000	-50.2	-13.0	-37.2	Vertical
5040.000	-47.5	-13.0	-34.5	Vertical
5775.000	-45.1	-13.0	-32.1	Vertical
6990.000	-41.8	-13.0	-28.8	Vertical
8895.000	-40.9	-13.0	-27.9	Vertical
10545.000	-38.1	-13.0	-25.1	Vertical

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
44.850	-73.1	-13.0	-60.1	Horizontal
86.430	-71.8	-13.0	-58.8	Horizontal
149.665	-73.0	-13.0	-60.0	Horizontal
255.720	-68.7	-13.0	-55.7	Horizontal
496.290	-64.7	-13.0	-51.7	Horizontal
947.730	-58.6	-13.0	-45.6	Horizontal
3765.000	-51.5	-13.0	-38.5	Horizontal
4800.000	-47.3	-13.0	-34.3	Horizontal
5910.000	-45.1	-13.0	-32.1	Horizontal
6675.000	-38.2	-13.0	-25.2	Horizontal
9225.000	-40.5	-13.0	-27.5	Horizontal
11220.000	-36.7	-13.0	-23.7	Horizontal

8.1.2.1.2 Test Channel = MCH

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
59.700	-69.9	-13.0	-56.9	Vertical
92.370	-68.3	-13.0	-55.3	Vertical
145.830	-70.7	-13.0	-57.7	Vertical
228.990	-68.3	-13.0	-55.3	Vertical
475.500	-66.0	-13.0	-53.0	Vertical
748.740	-61.3	-13.0	-48.3	Vertical
2438.670	-42.2	-13.0	-29.2	Vertical
3795.000	-50.2	-13.0	-37.2	Vertical
4695.000	-49.9	-13.0	-36.9	Vertical
5700.000	-46.5	-13.0	-33.5	Vertical
6915.000	-42.4	-13.0	-29.4	Vertical
8895.000	-40.8	-13.0	-27.8	Vertical

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
56.730	-72.4	-13.0	-59.4	Horizontal
98.310	-70.8	-13.0	-57.8	Horizontal
199.290	-71.6	-13.0	-58.6	Horizontal
338.880	-67.3	-13.0	-54.3	Horizontal
710.130	-62.1	-13.0	-49.1	Horizontal
1081.380	-56.9	-13.0	-43.9	Horizontal
2872.290	-40.9	-13.0	-27.9	Horizontal
4155.000	-49.3	-13.0	-36.3	Horizontal
5100.000	-46.2	-13.0	-33.2	Horizontal
5865.000	-45.7	-13.0	-32.7	Horizontal
7860.000	-43.1	-13.0	-30.1	Horizontal
10560.000	-36.8	-13.0	-23.8	Horizontal

8.1.2.1.3 Test Channel = HCH

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
50.248	-71.8	-13.0	-58.8	Vertical
86.430	-68.3	-13.0	-55.3	Vertical
145.830	-70.2	-13.0	-57.2	Vertical
276.510	-68.2	-13.0	-55.2	Vertical
481.440	-65.3	-13.0	-52.3	Vertical
766.560	-60.7	-13.0	-47.7	Vertical
2964.360	-41.9	-13.0	-28.9	Vertical
3810.000	-50.0	-13.0	-37.0	Vertical
5025.000	-46.3	-13.0	-33.3	Vertical
5775.000	-46.4	-13.0	-33.4	Vertical
6990.000	-41.9	-13.0	-28.9	Vertical
10605.000	-37.2	-13.0	-24.2	Vertical

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
44.850	-72.7	-13.0	-59.7	Horizontal
100.721	-70.6	-13.0	-57.6	Horizontal
151.770	-73.1	-13.0	-60.1	Horizontal
273.540	-68.2	-13.0	-55.2	Horizontal
484.410	-64.5	-13.0	-51.5	Horizontal
760.620	-60.7	-13.0	-47.7	Horizontal
3810.000	-50.7	-13.0	-37.7	Horizontal
4590.000	-47.4	-13.0	-34.4	Horizontal
5940.000	-44.8	-13.0	-31.8	Horizontal
6975.000	-38.0	-13.0	-25.0	Horizontal
9150.000	-40.4	-13.0	-27.4	Horizontal
11130.000	-37.5	-13.0	-24.5	Horizontal

NOTE:

1) 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.
2) Pretest was performed at the EUT in low, middle, high channel, but only the worst test channel(Channel 192 for GSM850 and Channel 661 for GSM1900)and only the data of the worst case show in the test report.

9 Appendix G Frequency Stability

9.1 For GSM

9.1.1 Frequency Error VS. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM850	GSM/TM1	LCH	TN	VL	-3.17	-0.00385	PASS
				VN	-8.07	-0.00979	PASS
				VH	0.45	0.00055	PASS
		MCH	TN	VL	-7.81	-0.00934	PASS
				VN	-6.59	-0.00788	PASS
				VH	-5.23	-0.00625	PASS
		HCH	TN	VL	-0.87	-0.00102	PASS
				VN	-5.59	-0.00659	PASS
				VH	-9.12	-0.01074	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-12.56	-0.00679	PASS
				VN	-9.91	-0.00536	PASS
				VH	-8.36	-0.00452	PASS
		MCH	TN	VL	-2.22	-0.00118	PASS
				VN	-1.51	-0.00080	PASS
				VH	-7.20	-0.00383	PASS
		HCH	TN	VL	-1.16	-0.00061	PASS
				VN	-8.39	-0.00439	PASS
				VH	-19.04	-0.00997	PASS

9.1.2 Frequency Error VS. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Verdict
GSM850	GSM/TM1	LCH	VN	-30	-2.16	-0.00262	PASS
				-20	-1.45	-0.00176	PASS
				-10	-1.77	-0.00215	PASS
				0	-3.71	-0.00450	PASS
				10	1.07	0.00130	PASS
				20	2.30	0.00279	PASS
				30	2.39	0.00290	PASS
				40	1.34	0.00163	PASS
				50	6.44	0.00781	PASS
		MCH	VN	-30	0.50	0.00060	PASS
				-20	3.21	0.00384	PASS
				-10	-0.36	-0.00043	PASS
				0	-1.71	-0.00204	PASS
				10	0.68	0.00081	PASS
				20	-0.87	-0.00104	PASS
				30	1.19	0.00142	PASS
				40	1.77	0.00212	PASS
				50	2.61	0.00312	PASS
		HCH	VN	-30	0.57	0.00067	PASS
				-20	5.22	0.00615	PASS
				-10	-0.43	-0.00051	PASS
				0	-0.88	-0.00104	PASS
				10	-0.62	-0.00073	PASS
				20	-0.88	-0.00104	PASS
				30	-1.08	-0.00127	PASS
				40	-1.98	-0.00233	PASS
				50	0.09	0.00011	PASS

GSM1900	GSM/TM1	LCH	VN	-30	-14.91	-0.00806	PASS
				-20	-8.84	-0.00478	PASS
				-10	-14.01	-0.00757	PASS
				0	-2.19	-0.00118	PASS
				10	1.68	0.00091	PASS
				20	-5.03	-0.00272	PASS
				30	-13.81	-0.00746	PASS
				40	-10.39	-0.00562	PASS
				50	1.36	0.00074	PASS
		MCH	VN	-30	-5.74	-0.00305	PASS
				-20	-7.36	-0.00391	PASS
				-10	-13.10	-0.00697	PASS
				0	-0.42	-0.00022	PASS
				10	-15.08	-0.00802	PASS
				20	-7.39	-0.00393	PASS
				30	2.68	0.00143	PASS
				40	-8.62	-0.00459	PASS
				50	-11.66	-0.00620	PASS
		HCH	VN	-30	-14.43	-0.00756	PASS
				-20	-5.21	-0.00273	PASS
				-10	-6.76	-0.00354	PASS
				0	-11.73	-0.00614	PASS
				10	1.05	0.00055	PASS
				20	2.60	0.00136	PASS
				30	-6.31	-0.00330	PASS
				40	-13.61	-0.00713	PASS
				50	-2.18	-0.00114	PASS

The End