SGS-CSTC Standards Technical Services Ltd.

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

Appendix B for Test Report SZEM141100609002

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

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

	RF Output Power(Conducted)					
TEST CONDITIONS	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	32.37	38.5	32.36	38.5	32.30	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	824.2	32.72	Dipole Ant.	38.18	-4.90	0.6	32.68	38.5	Pass
GSM/TM1	836.6	32.71	Dipole Ant.	38.32	-5.02	0.6	32.70	38.5	Pass
GSM/TM1	848.8	32.65	Dipole Ant.	38.22	-5.00	0.6	32.62	38.5	Pass

Note1:

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

Note2:

RBW > emission bandwidth, VBW > 3 x RBW.

Detector: RMS

Part I – RF Conducted Power of Transmitter for GSM1900

	RF Output Power(Conducted)					
TEST CONDITIONS	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	30.13	33	29.35	33	29.27	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	1850.2	32.63	Horn Ant.	29.08	4.5	1	32.58	33	Pass
GSM/TM1	1880.0	31.85	Horn Ant.	28.22	4.5	1	31.72	33	Pass
GSM/TM1	1909.8	31.77	Horn Ant.	28.19	4.5	1	31.69	33	Pass

Note1:

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

Note2:

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	0.07	13	PASS
GSM1900	GSM/TM1	LCH	0.11	13	PASS
		MCH	0.09	13	PASS
		HCH	0.12	13	PASS

5 Appendix_C: Modulation Characteristics

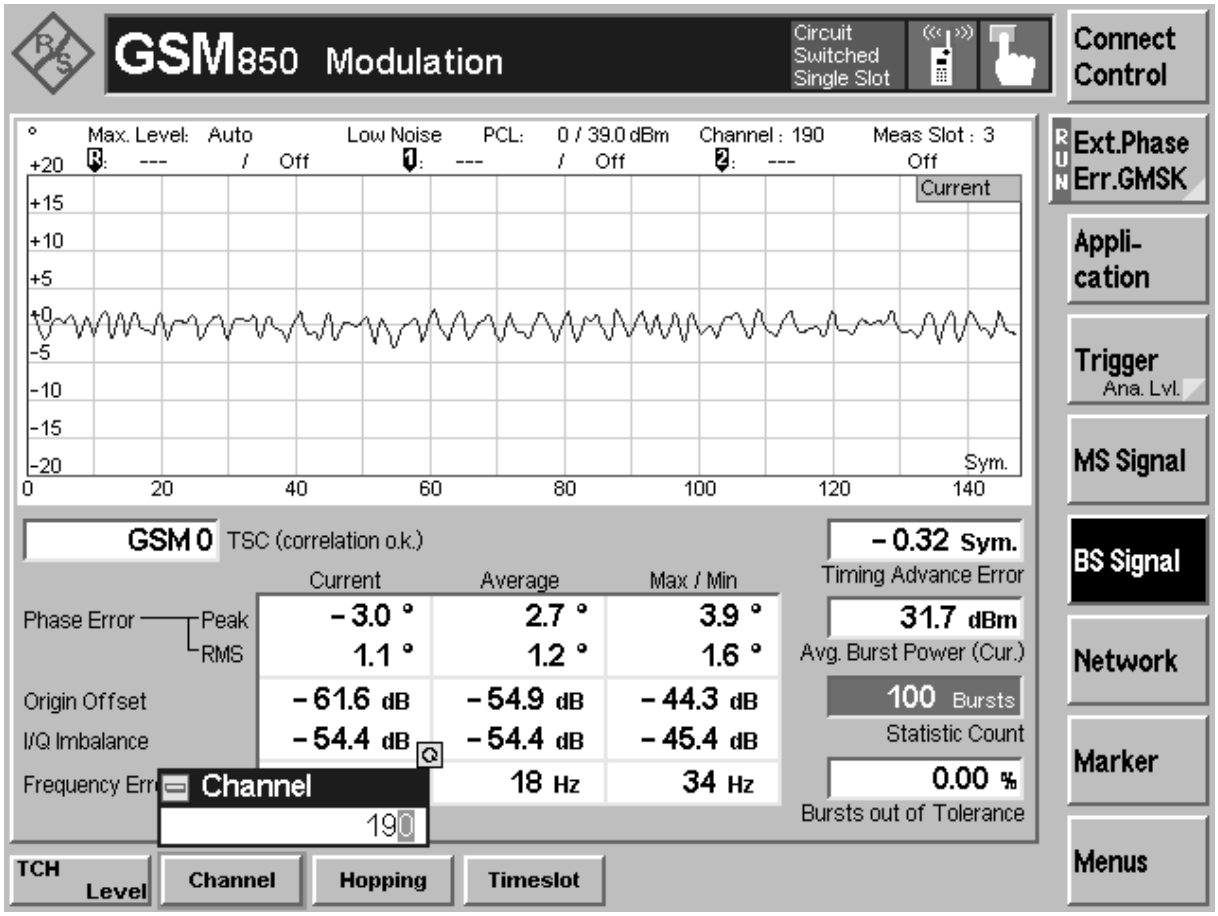
Part I - Test Plots

5.1 For GSM

5.1.1 Test Band = GSM850

5.1.1.1 Test Mode = GSM/TM1

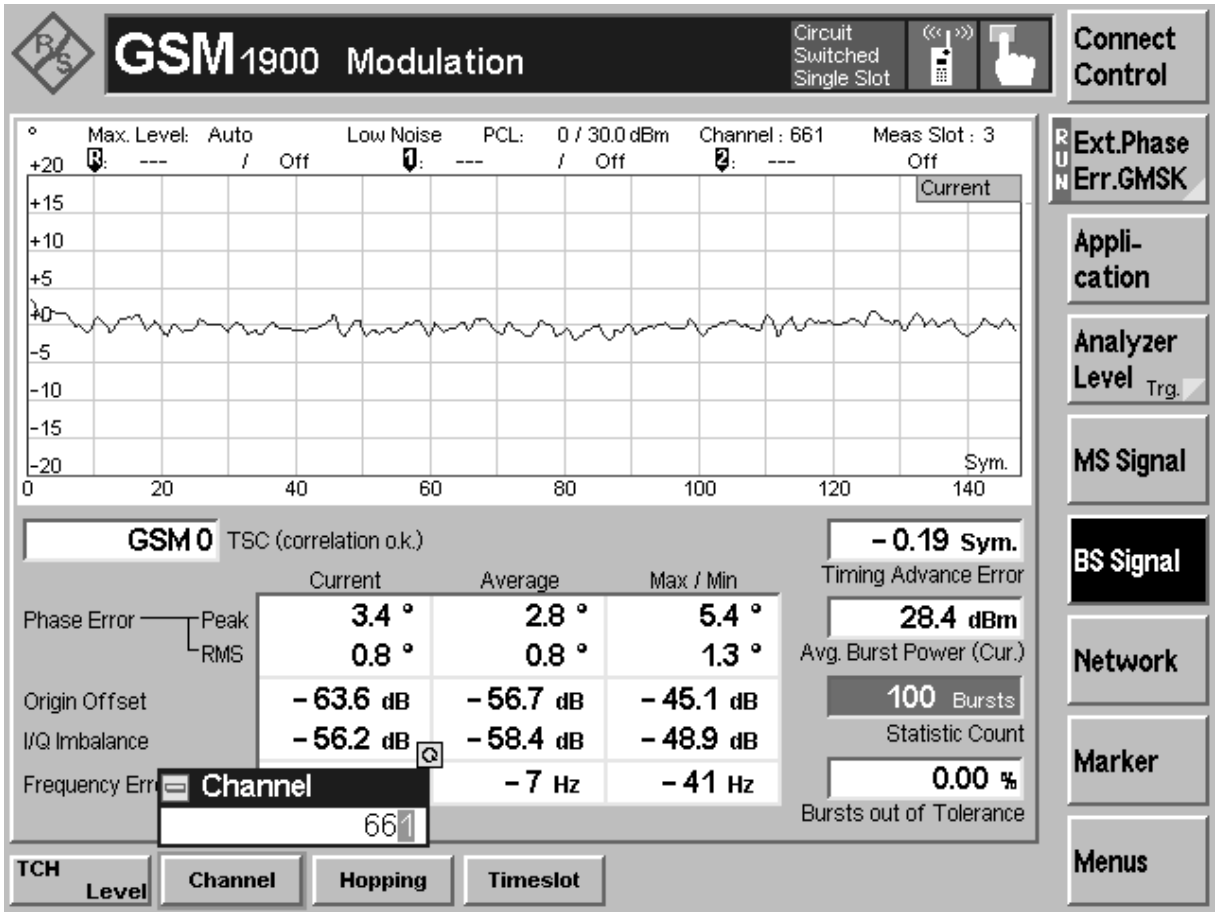
5.1.1.1.1 Test Channel = MCH



5.1.2 Test Band = GSM1900

5.1.2.1 Test Mode = GSM/TM1

5.1.2.1.1 Test Channel = MCH



6 Appendix_D: Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	241.0	315.4	PASS
		MCH	241.5	306.0	PASS
		HCH	241.4	315.9	PASS
GSM1900	GSM/TM1	LCH	243.0	313.6	PASS
		MCH	244.4	320.3	PASS
		HCH	241.6	309.0	PASS

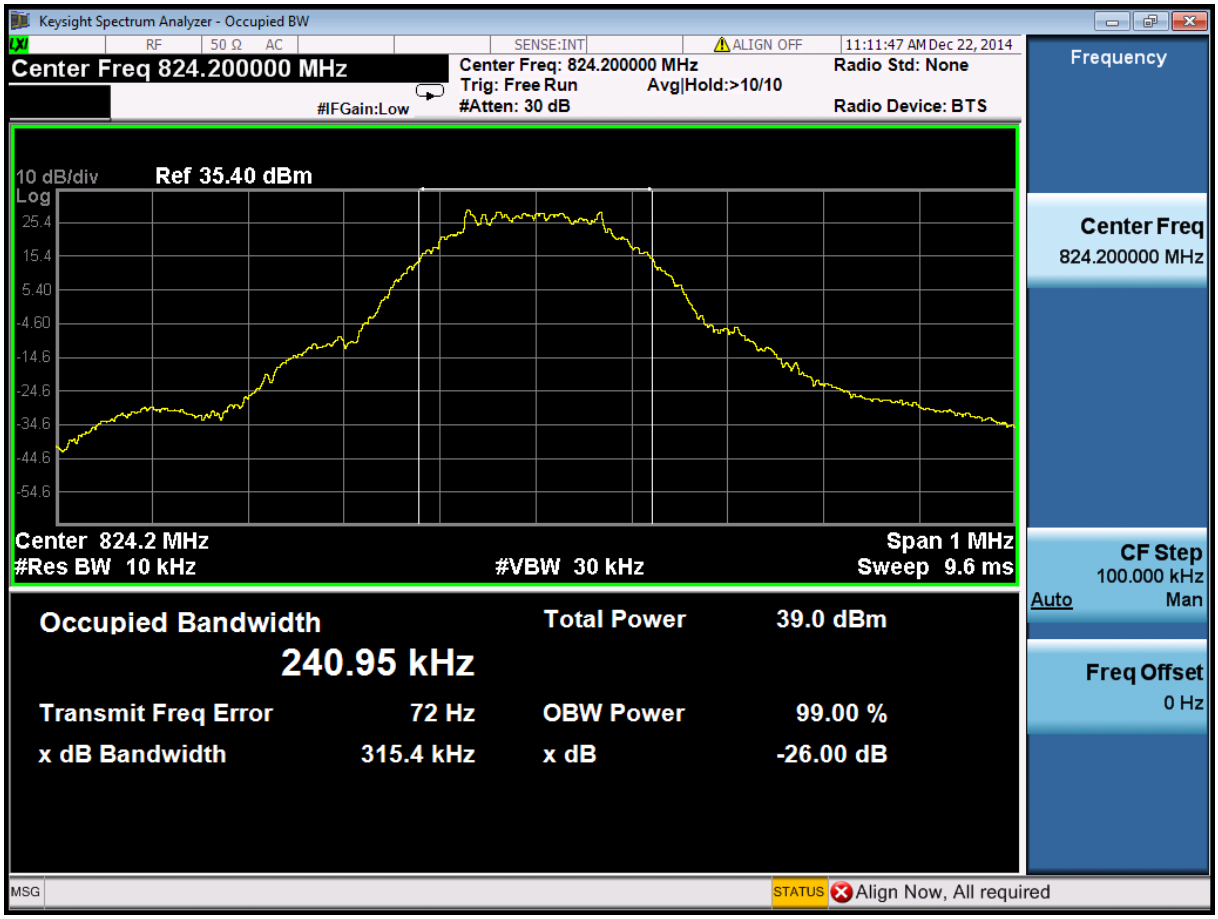
Part II - Test Plots

6.1 For GSM

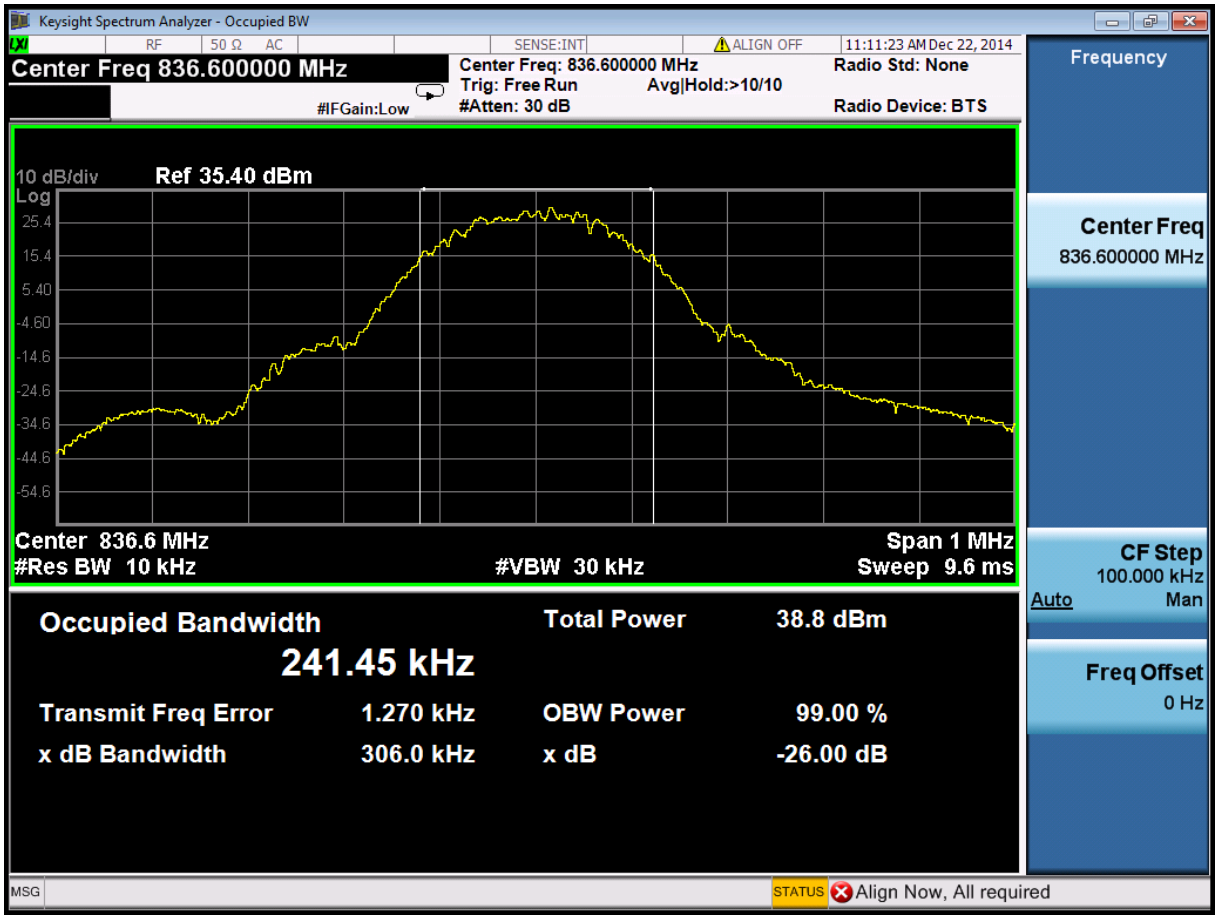
6.1.1 Test Band = GSM850

6.1.1.1 Test Mode = GSM/TM1

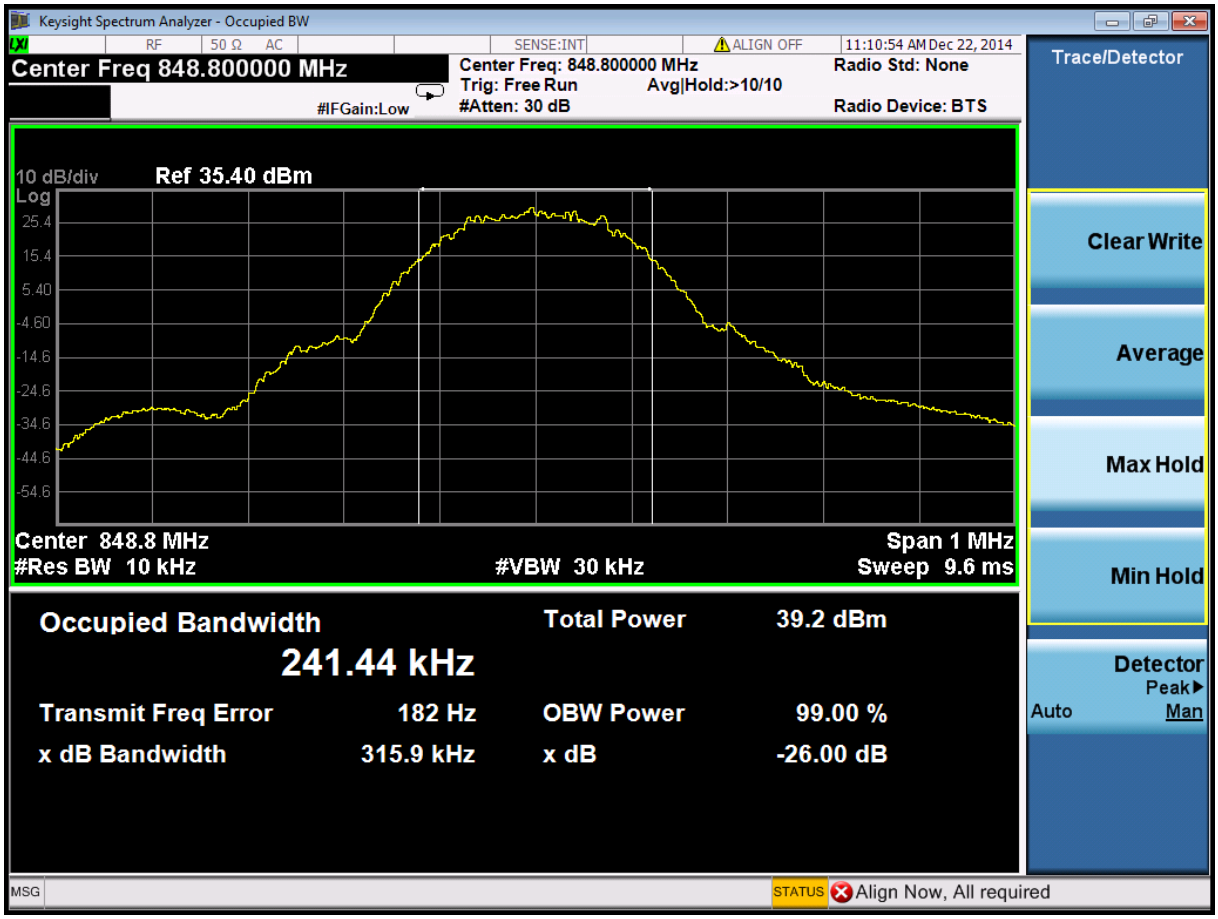
6.1.1.1.1 Test Channel = LCH



6.1.1.1.2 Test Channel = MCH



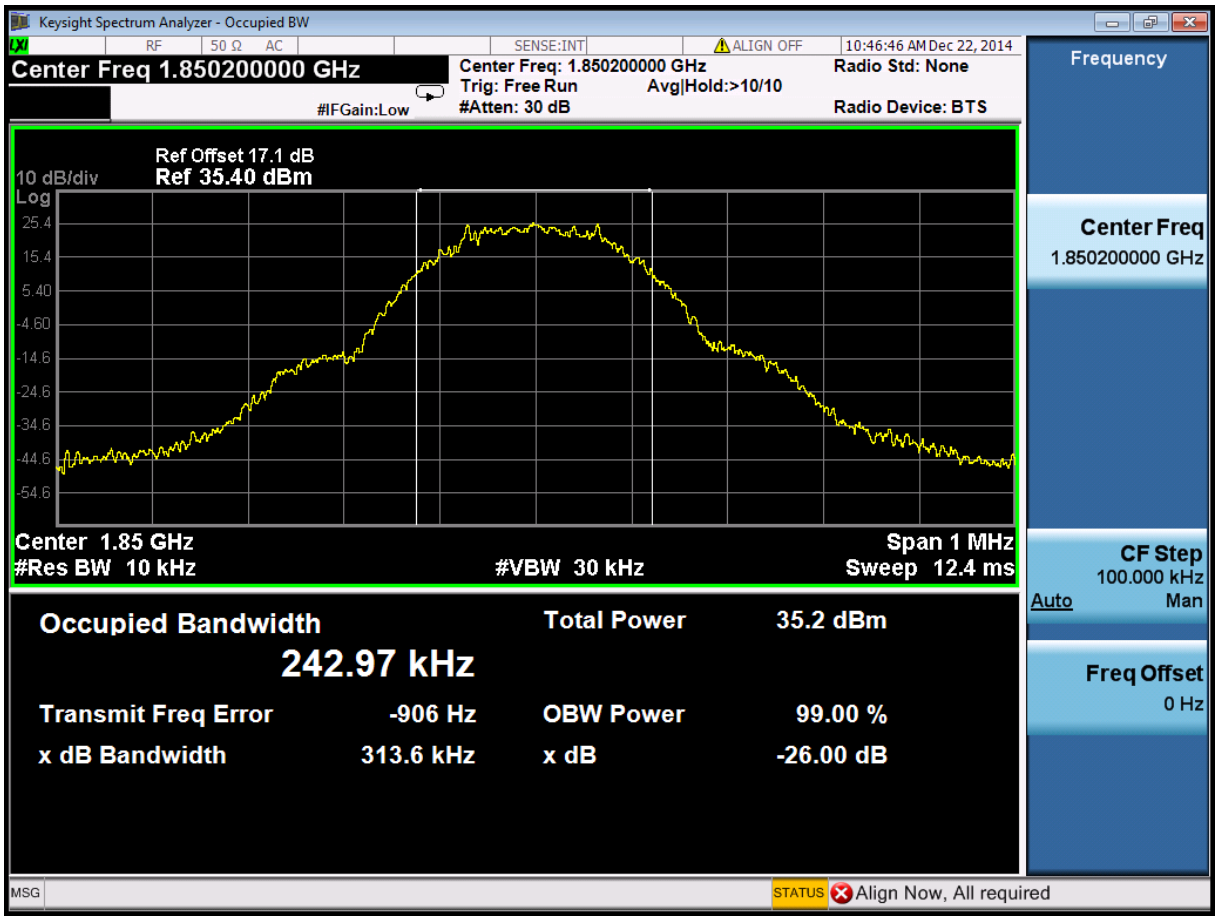
6.1.1.1.3 Test Channel = HCH



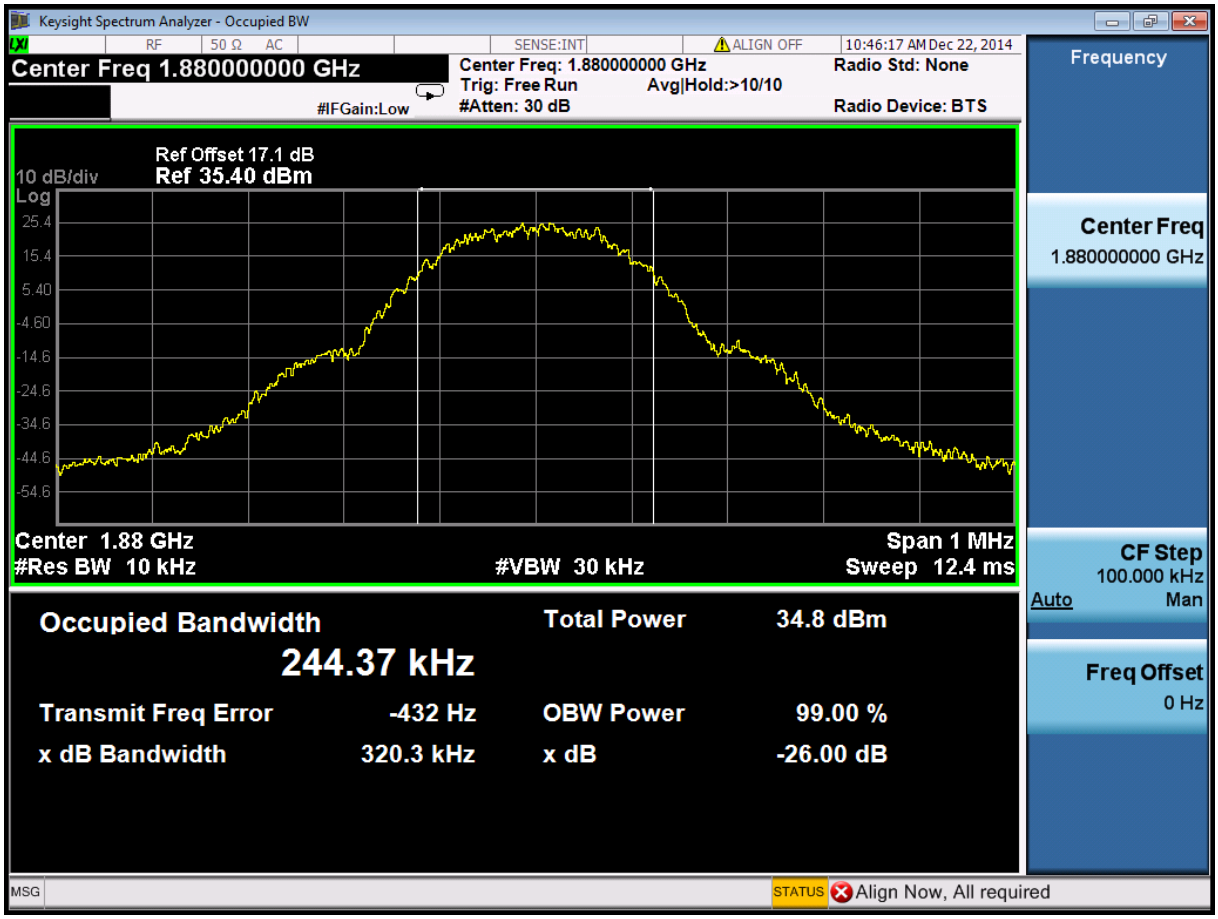
6.1.2 Test Band = GSM1900

6.1.2.1 Test Mode = GSM/TM1

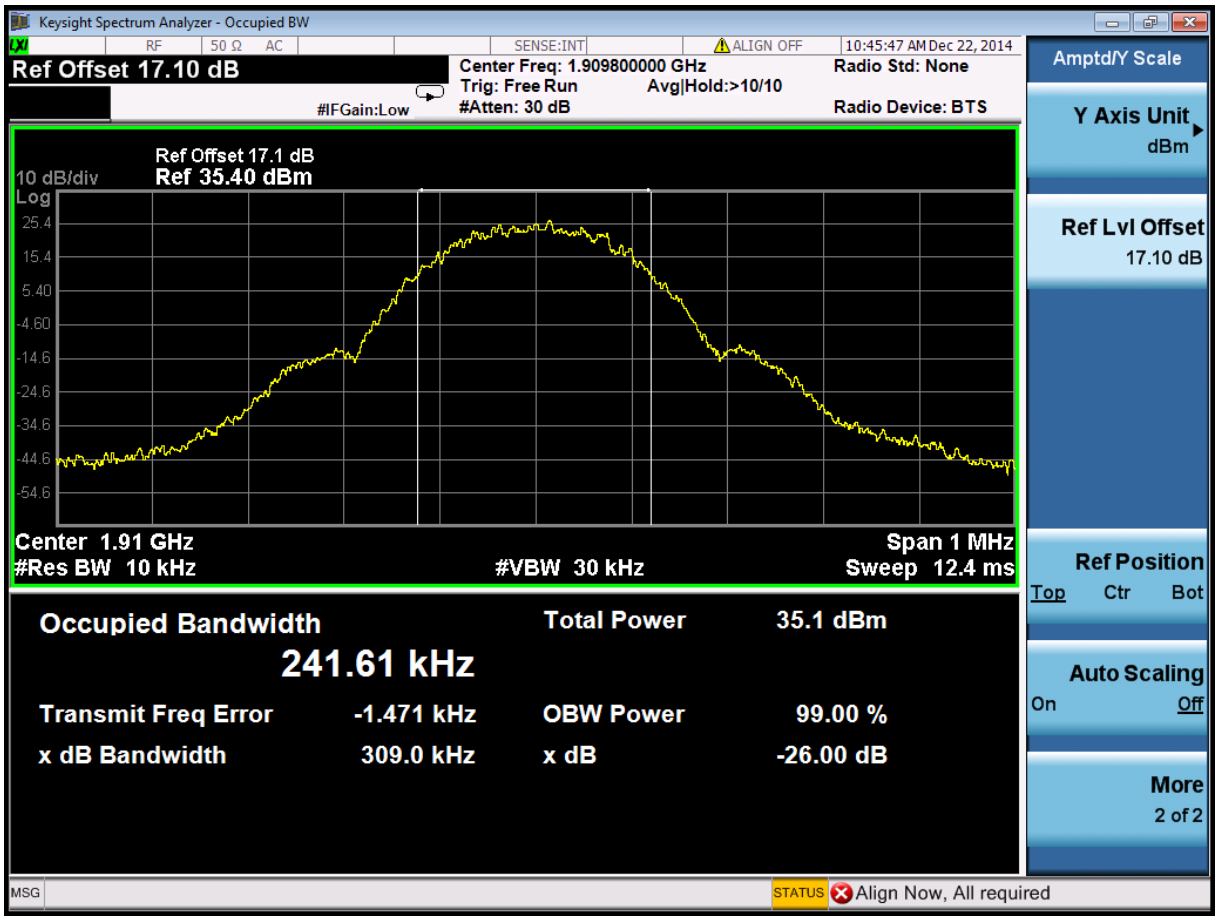
6.1.2.1.1 Test Channel = LCH



6.1.2.1.2 Test Channel = MCH



6.1.2.1.3 Test Channel = HCH



7 Appendix_E: Band Edges Compliance

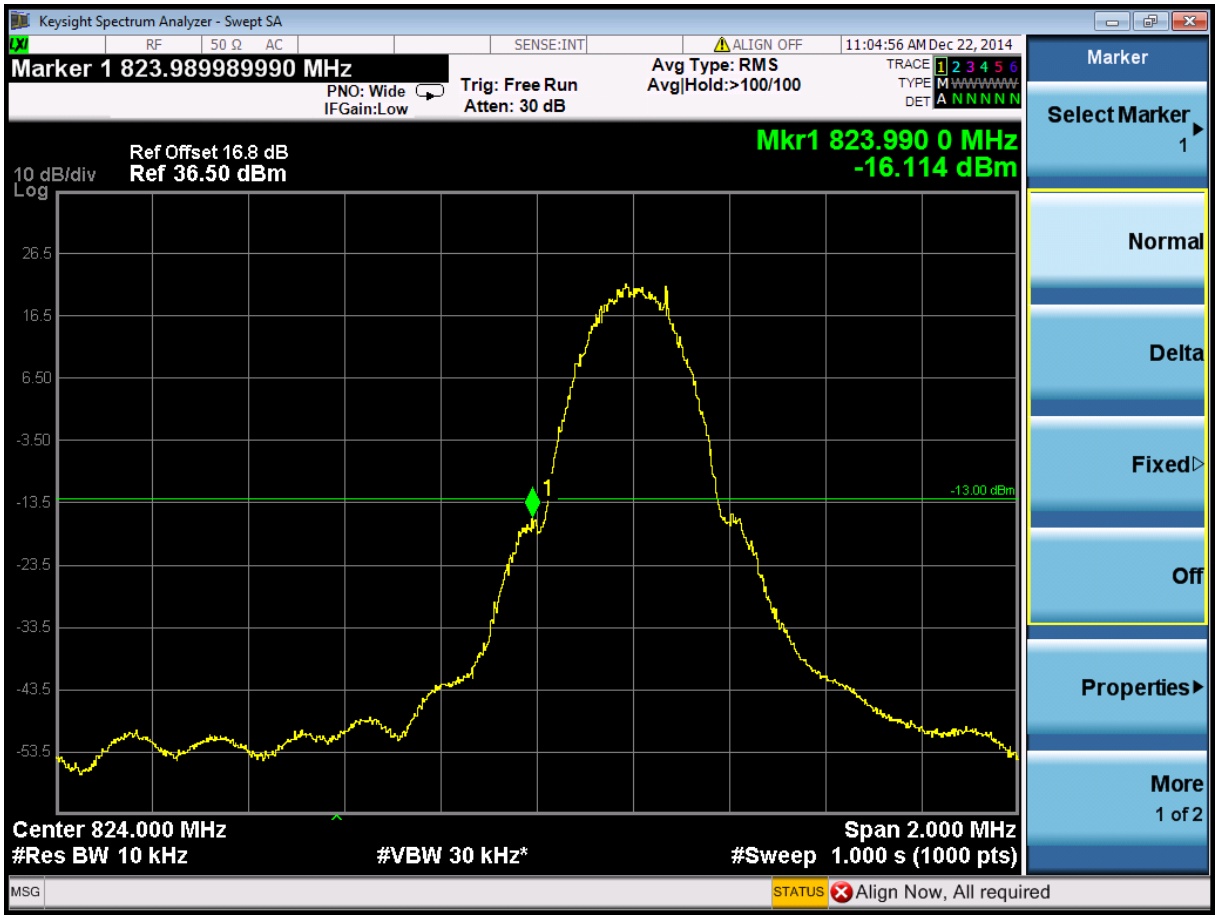
Part I - Test Plots

7.1 For GSM

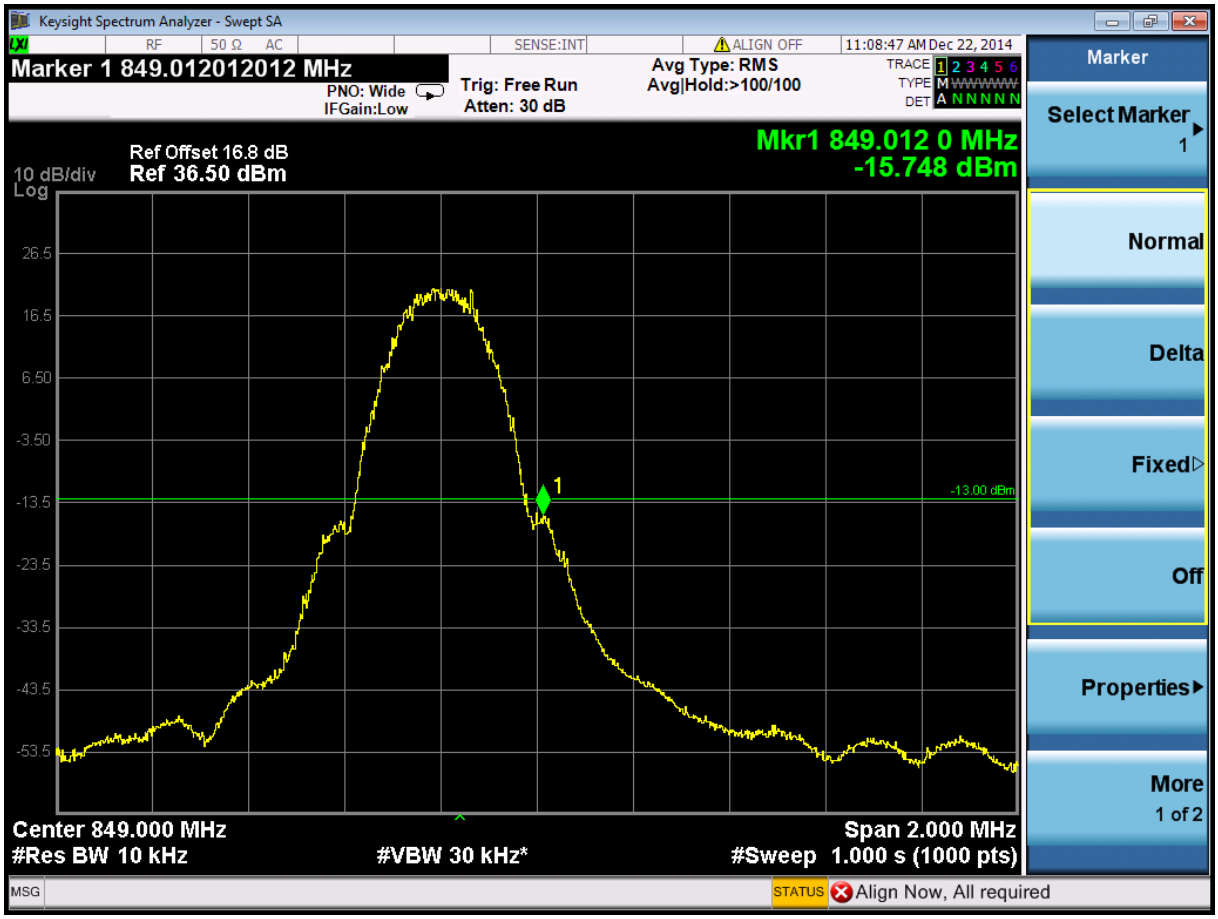
7.1.1 Test Band = GSM850

7.1.1.1 Test Mode = GSM/TM1

7.1.1.1.1 Test Channel = LCH



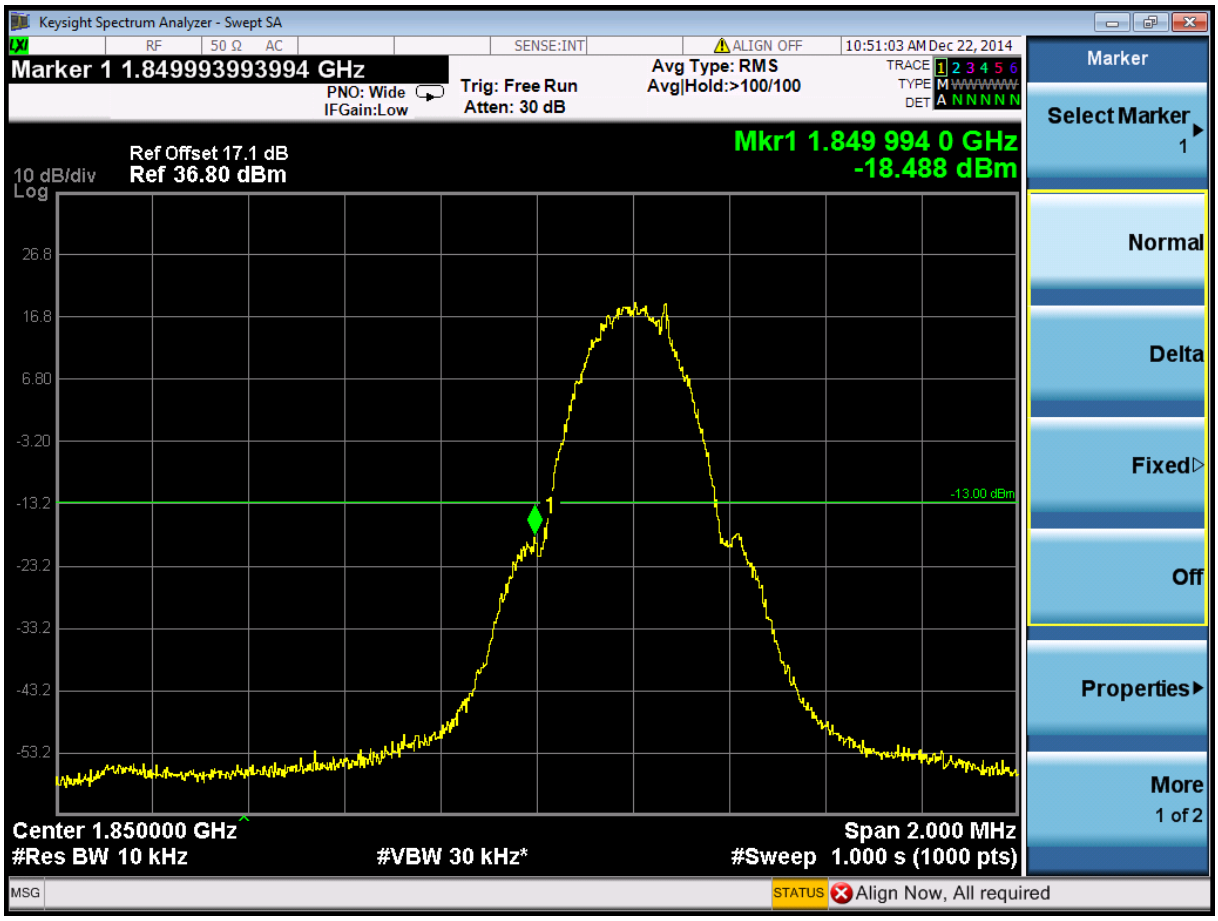
7.1.1.1.2 Test Channel = HCH



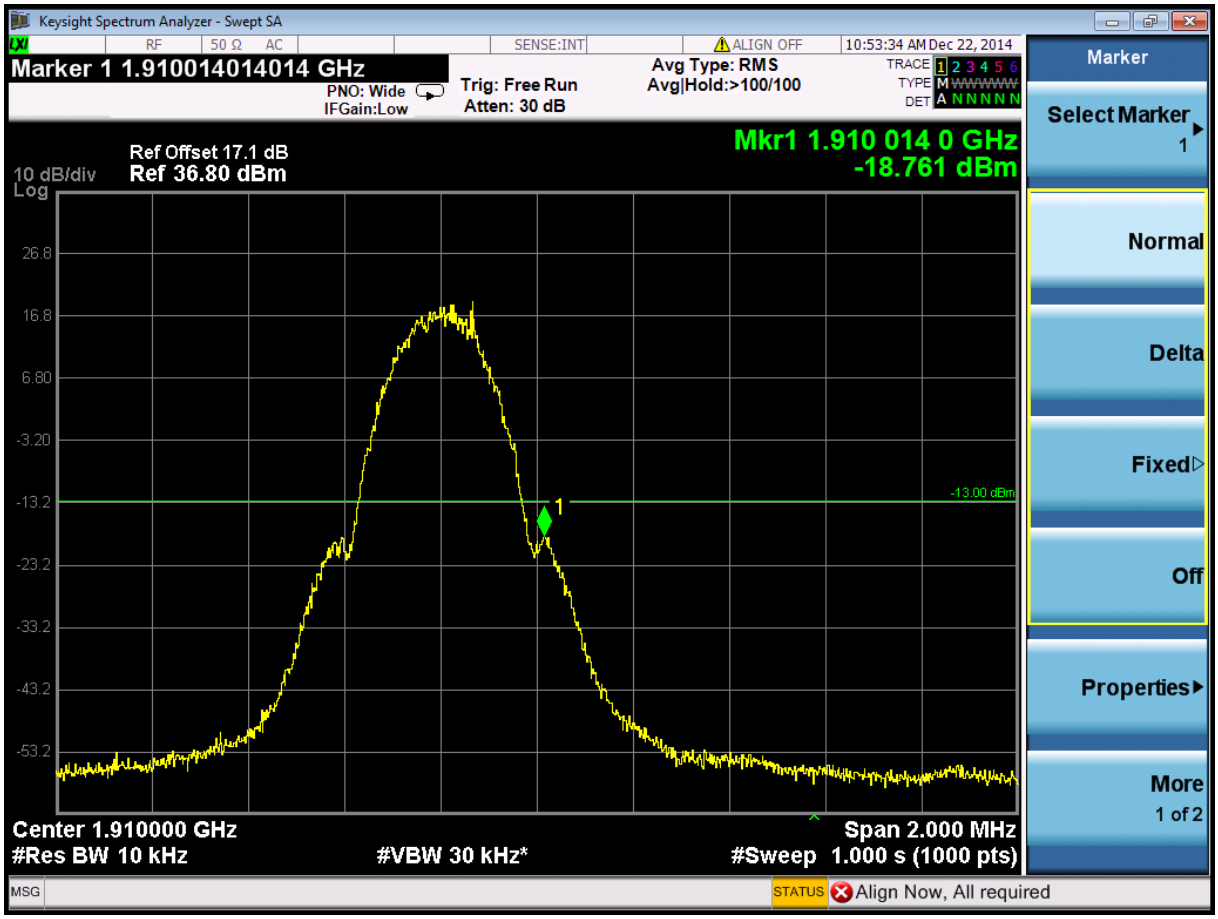
7.1.2 Test Band = GSM1900

7.1.2.1 Test Mode = GSM/TM1

7.1.2.1.1 Test Channel = LCH



7.1.2.1.2 Test Channel = HCH



8 Appendix_F: 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.

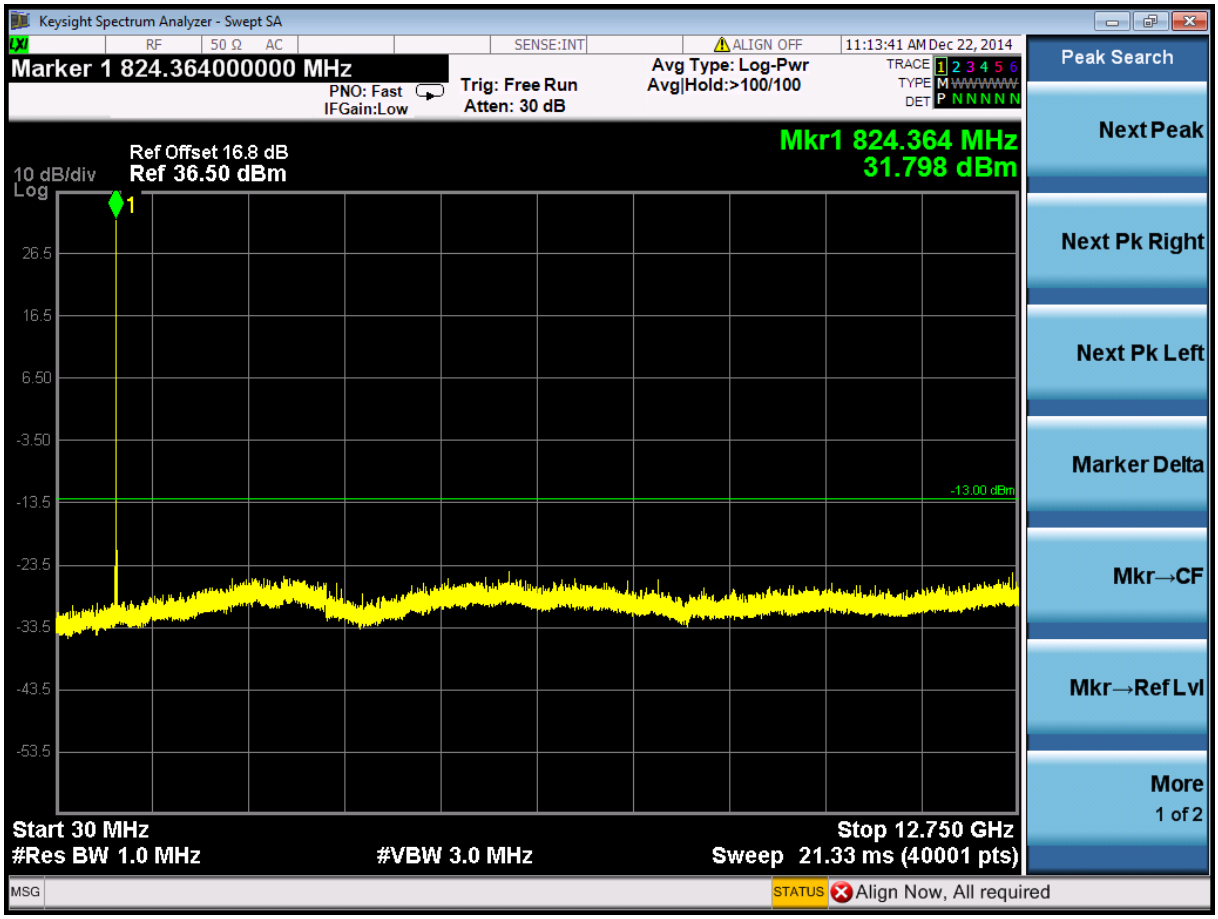
Part I - Test Plots

8.1 For GSM

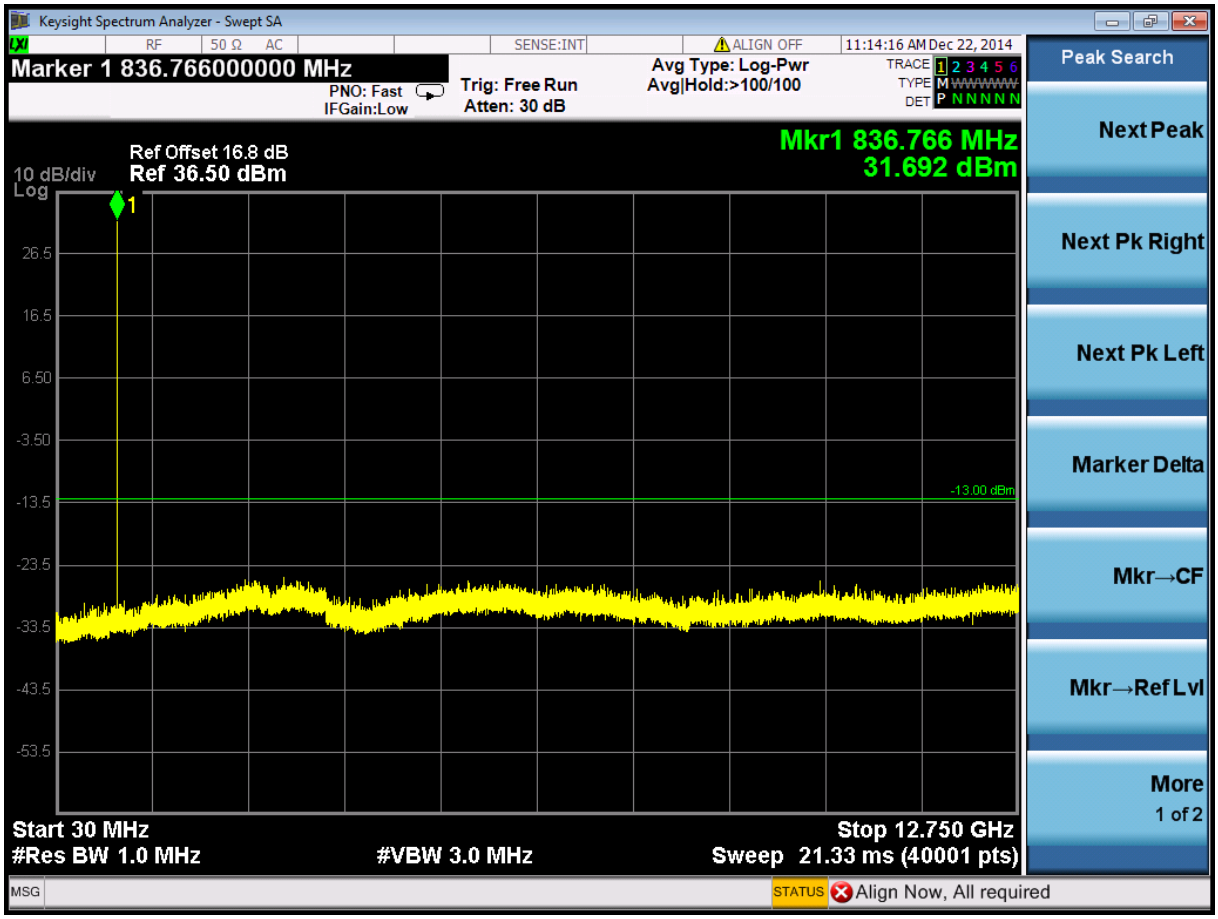
8.1.1 Test Band = GSM850

8.1.1.1 Test Mode = GSM/TM1

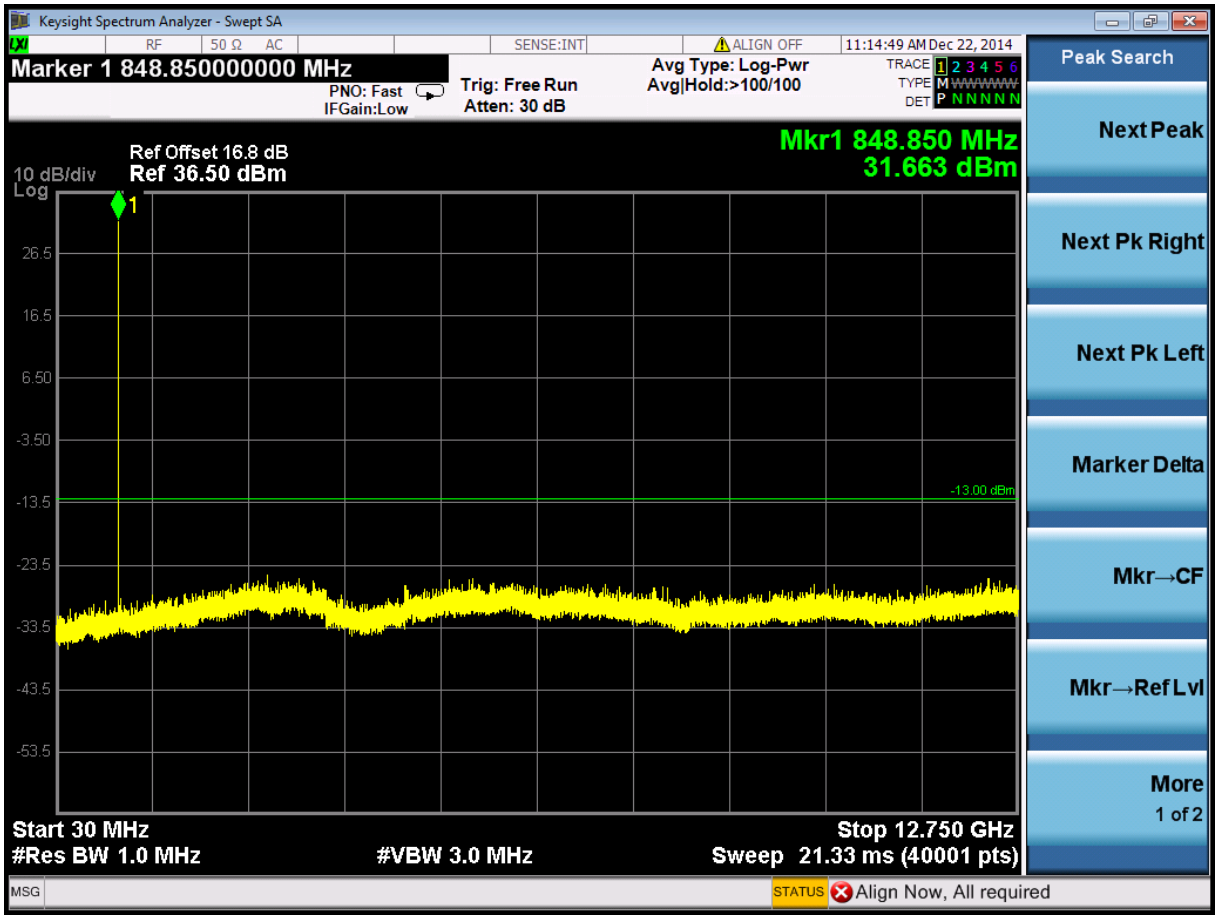
8.1.1.1.1 Test Channel = LCH



8.1.1.1.2 Test Channel = MCH



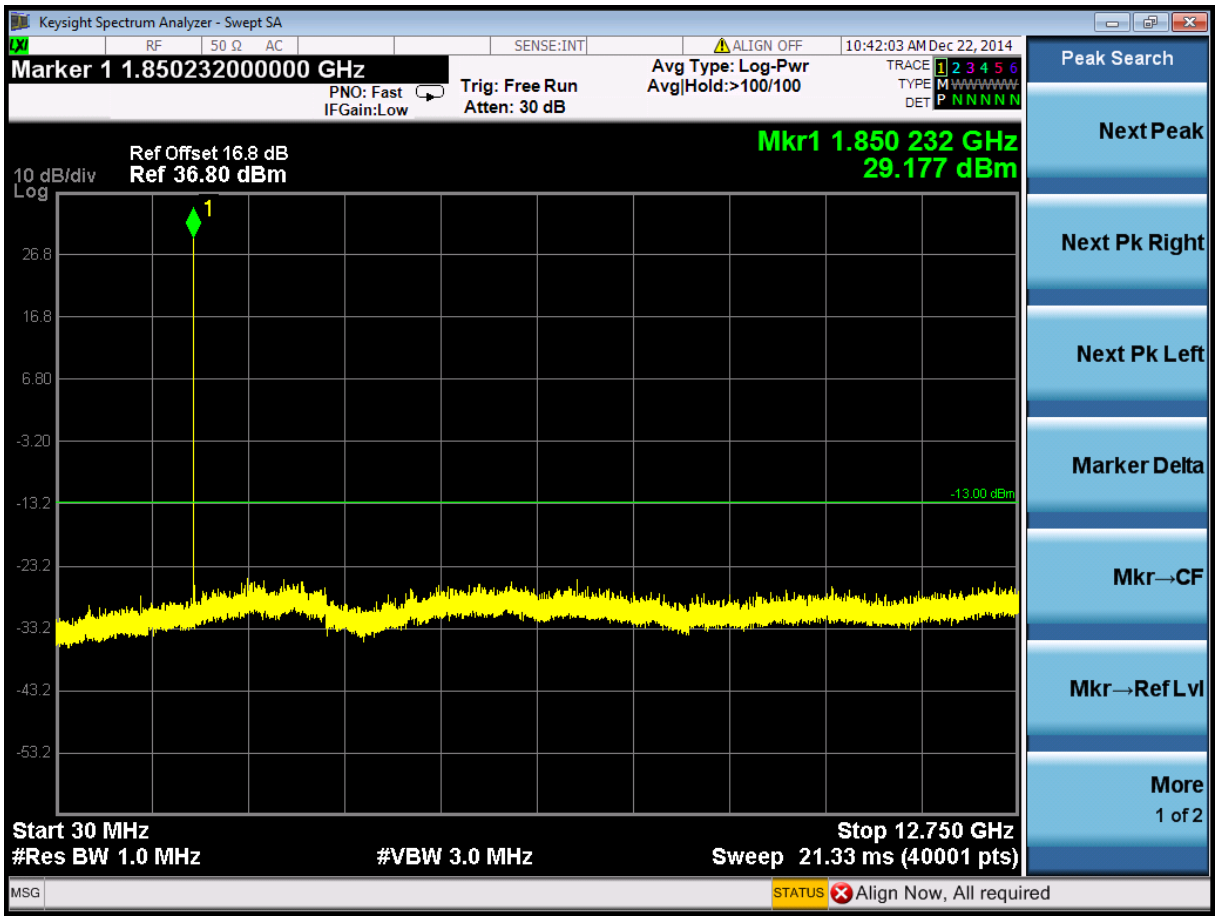
8.1.1.1.3 Test Channel = HCH



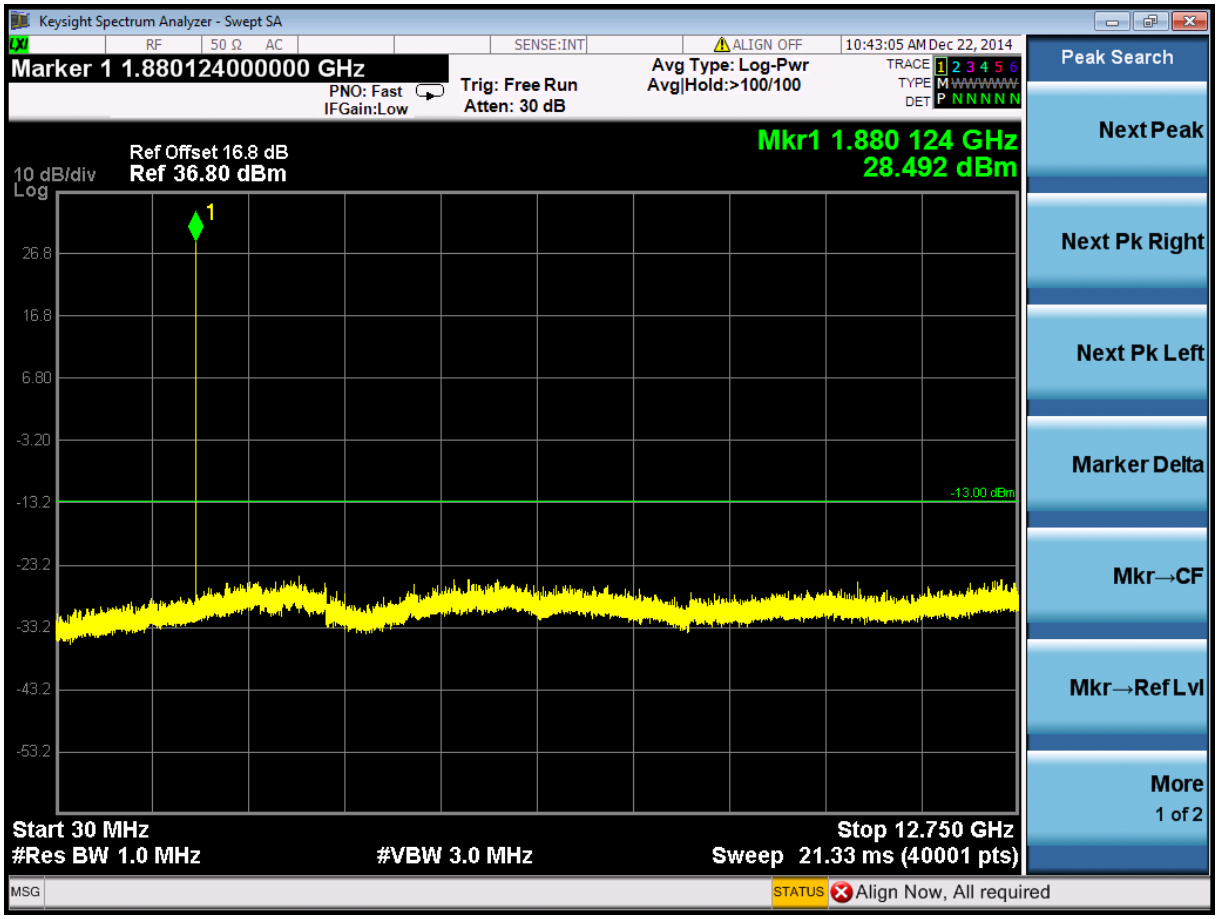
8.1.2 Test Band = GSM1900

8.1.2.1 Test Mode = GSM/TM1

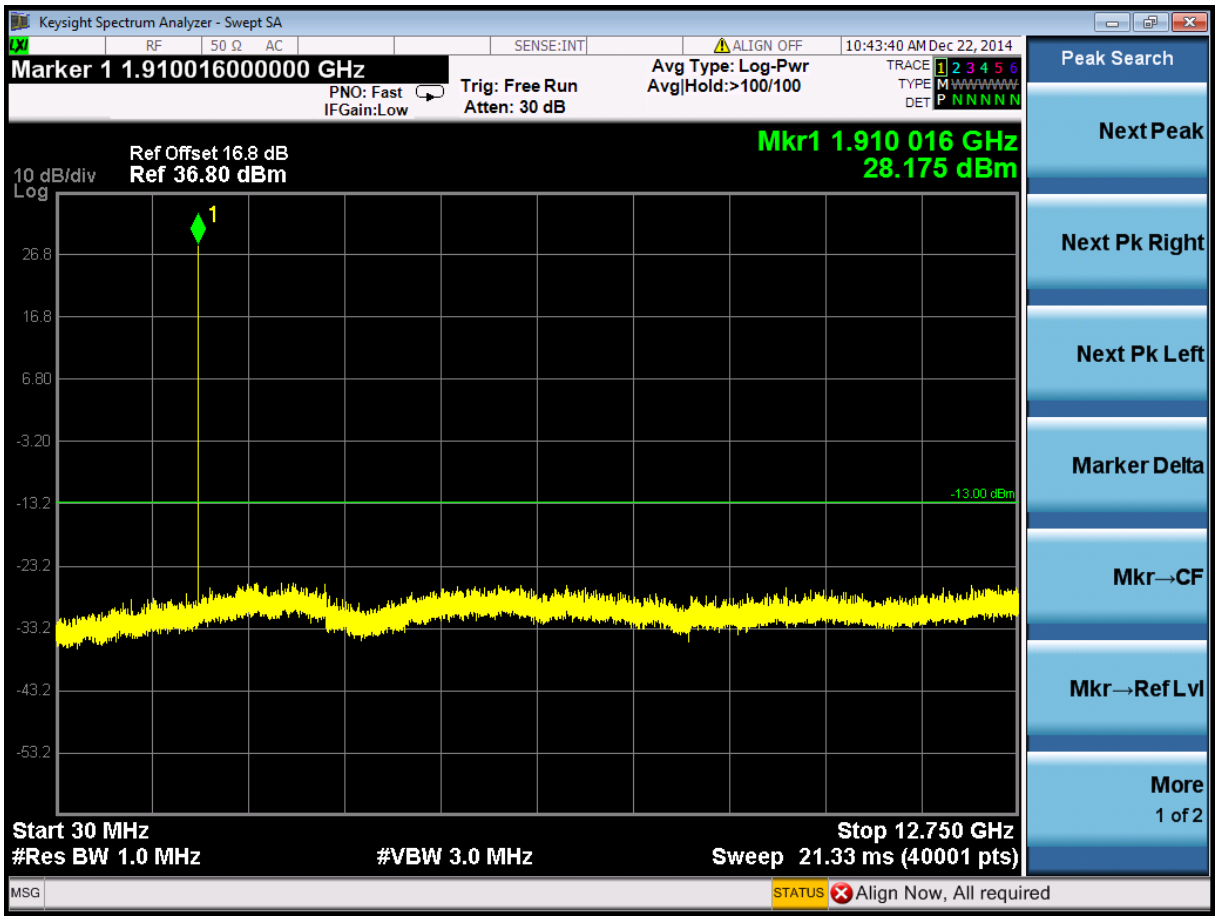
8.1.2.1.1 Test Channel = LCH



8.1.2.1.2 Test Channel = MCH



8.1.2.1.3 Test Channel = HCH



9 Appendix_G: Field Strength of Spurious Radiation

Part I - Test Plots

9.1 For GSM

9.1.1 Test Band = GSM850

9.1.1.1 Test Mode = GSM/TM1

Frequency (MHz)	**Level (dBuV/m)**	**Limit Line (dBuV/m)**	**Over Limit (dB)**	**Polarization**
33.433	-65.1	-13.0	-52.1	Vertical
51.741	-64.4	-13.0	-51.4	Vertical
80.866	-60.8	-13.0	-47.8	Vertical
238.181	-69.4	-13.0	-56.4	Vertical
511.868	-62.6	-13.0	-49.6	Vertical
729.731	-60.2	-13.0	-47.2	Vertical
1673.978	-43.3	-13.0	-30.3	Vertical
2509.725	-39.7	-13.0	-26.7	Vertical
4183.536	-35.6	-13.0	-22.6	Vertical
5860.756	-40.7	-13.0	-27.7	Vertical
7384.531	-38.2	-13.0	-25.2	Vertical
8842.855	-35.8	-13.0	-22.8	Vertical

Frequency (MHz)	**Level (dBuV/m)**	**Limit Line (dBuV/m)**	**Over Limit (dB)**	**Polarization**
41.934	-64.8	-13.0	-51.8	Horizontal
87.209	-62.0	-13.0	-49.0	Horizontal
185.581	-64.6	-13.0	-51.6	Horizontal
405.429	-65.0	-13.0	-52.0	Horizontal
587.556	-61.7	-13.0	-48.7	Horizontal
746.697	-59.0	-13.0	-46.0	Horizontal
1673.978	-34.2	-13.0	-21.2	Horizontal
2509.725	-39.5	-13.0	-26.5	Horizontal
3348.556	-38.5	-13.0	-25.5	Horizontal
4183.536	-28.4	-13.0	-15.4	Horizontal
6050.147	-39.9	-13.0	-26.9	Horizontal
8861.624	-36.3	-13.0	-23.3	Horizontal

9.1.2 Test Band = GSM1900

9.1.2.1 Test Mode = GSM/TM1

Frequency (MHz)	**Level (dBuV/m)**	**Limit Line (dBuV/m)**	**Over Limit (dB)**	**Polarization**
34.323	-67.6	-13.0	-54.6	Vertical
51.402	-68.1	-13.0	-55.1	Vertical
79.028	-60.5	-13.0	-47.5	Vertical
273.400	-69.3	-13.0	-56.3	Vertical
485.672	-65.4	-13.0	-52.4	Vertical
870.619	-56.9	-13.0	-43.9	Vertical
3759.831	-29.0	-13.0	-16.0	Vertical
5636.772	-35.4	-13.0	-22.4	Vertical
7521.645	-34.1	-13.0	-21.1	Vertical
9893.956	-34.0	-13.0	-21.0	Vertical
11357.628	-32.1	-13.0	-19.1	Vertical
12466.700	-29.4	-13.0	-16.4	Vertical

Frequency (MHz)	**Level (dBuV/m)**	**Limit Line (dBuV/m)**	**Over Limit (dB)**	**Polarization**
38.126	-66.7	-13.0	-53.7	Horizontal
47.663	-66.2	-13.0	-53.2	Horizontal
88.652	-64.3	-13.0	-51.3	Horizontal
213.723	-67.5	-13.0	-54.5	Horizontal
492.092	-62.9	-13.0	-49.9	Horizontal
876.391	-57.0	-13.0	-44.0	Horizontal
3070.699	-44.6	-13.0	-31.6	Horizontal
3759.831	-23.9	-13.0	-10.9	Horizontal
6088.229	-38.8	-13.0	-25.8	Horizontal
7616.578	-37.3	-13.0	-24.3	Horizontal
10629.089	-31.5	-13.0	-18.5	Horizontal
12466.700	-29.2	-13.0	-16.2	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.

10 Appendix_H: Frequency Stability

10.1 For GSM

10.1.1 Frequency Error VS. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict
GSM850	GSM/TM1	LCH	TN	VL	-2.91	-0.00353	±2.5	PASS
				VN	-7.81	-0.00948	±2.5	PASS
				VH	0.71	0.00086	±2.5	PASS
		MCH	TN	VL	-7.55	-0.00902	±2.5	PASS
				VN	-6.33	-0.00757	±2.5	PASS
				VH	-4.97	-0.00594	±2.5	PASS
		HCH	TN	VL	-1.03	-0.00121	±2.5	PASS
				VN	-5.75	-0.00677	±2.5	PASS
				VH	-9.17	-0.0108	±2.5	PASS
GSM1900	GSM/TM1	LCH	TN	VL	-12.79	-0.00691	±2.5	PASS
				VN	-10.14	-0.00548	±2.5	PASS
				VH	-8.59	-0.00464	±2.5	PASS
		MCH	TN	VL	-2.45	-0.0013	±2.5	PASS
				VN	-1.74	-0.00093	±2.5	PASS
				VH	-7.43	-0.00395	±2.5	PASS
		HCH	TN	VL	-1.10	-0.00058	±2.5	PASS
				VN	-8.33	-0.00436	±2.5	PASS
				VH	-18.98	-0.00994	±2.5	PASS

10.1.2 Frequency Error VS. Temperature:

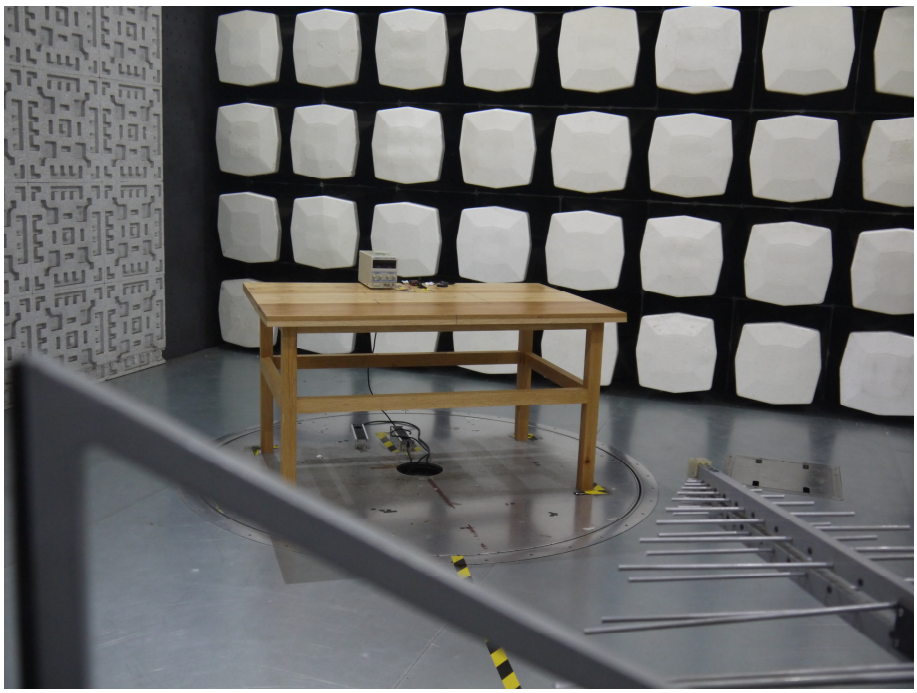
Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Limit [ppm]	Verdict
GSM850	GSM/TM1	LCH	VN	-30	-1.81	-0.00220	±2.5	PASS
				-20	-1.10	-0.00133	±2.5	PASS
				-10	-1.42	-0.00172	±2.5	PASS
				0	-3.36	-0.00408	±2.5	PASS
				10	1.42	0.00172	±2.5	PASS
				20	2.65	0.00322	±2.5	PASS
				30	2.32	0.00281	±2.5	PASS
				40	0.84	0.00102	±2.5	PASS
				50	5.94	0.00721	±2.5	PASS
		MCH	VN	-30	0.00	0.00000	±2.5	PASS
				-20	2.71	0.00324	±2.5	PASS
				-10	-0.52	-0.00062	±2.5	PASS
				0	-1.87	-0.00224	±2.5	PASS
				10	0.52	0.00062	±2.5	PASS
				20	-1.03	-0.00123	±2.5	PASS
				30	1.03	0.00123	±2.5	PASS
				40	1.61	0.00192	±2.5	PASS
				50	2.45	0.00293	±2.5	PASS
		HCH	VN	-30	0.26	0.00031	±2.5	PASS
				-20	4.91	0.00578	±2.5	PASS
				-10	-0.71	-0.00084	±2.5	PASS
				0	-1.16	-0.00137	±2.5	PASS
				10	-0.90	-0.00106	±2.5	PASS
				20	-1.16	-0.00137	±2.5	PASS
				30	-1.36	-0.00160	±2.5	PASS
				40	-2.26	-0.00266	±2.5	PASS
				50	-0.19	-0.00022	±2.5	PASS

GSM1900	GSM/TM1	LCH	VN	-30	-14.85	-0.00803	±2.5	PASS
				-20	-8.78	-0.00475	±2.5	PASS
				-10	-13.95	-0.00754	±2.5	PASS
				0	-2.13	-0.00115	±2.5	PASS
				10	1.74	0.00094	±2.5	PASS
				20	-4.97	-0.00269	±2.5	PASS
				30	-13.75	-0.00743	±2.5	PASS
				40	-10.33	-0.00558	±2.5	PASS
				50	1.42	0.00077	±2.5	PASS
		MCH	VN	-30	-5.68	-0.00302	±2.5	PASS
				-20	-7.30	-0.00388	±2.5	PASS
				-10	-13.04	-0.00694	±2.5	PASS
				0	-0.58	-0.00031	±2.5	PASS
				10	-15.24	-0.00811	±2.5	PASS
				20	-7.55	-0.00402	±2.5	PASS
				30	2.52	0.00134	±2.5	PASS
				40	-8.78	-0.00467	±2.5	PASS
				50	-11.82	-0.00629	±2.5	PASS
		HCH	VN	-30	-14.59	-0.00764	±2.5	PASS
				-20	-5.10	-0.00267	±2.5	PASS
				-10	-6.65	-0.00348	±2.5	PASS
				0	-11.62	-0.00608	±2.5	PASS
				10	1.16	0.00061	±2.5	PASS
				20	2.71	0.00142	±2.5	PASS
				30	-6.20	-0.00325	±2.5	PASS
				40	-13.50	-0.00707	±2.5	PASS
				50	-2.07	-0.00108	±2.5	PASS

11 Appendix I: Test Setup

RF Conducted Test:

Tx below 1GHz



Tx above 1GHz

The End