

FCC PART 22H&24E


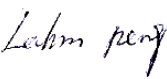

Measurement and Test Report

For

Verykool USA Inc

4350 Executive Dr. #100, San Diego

FCC ID: WA6R23

Report Concerns: Original Report	Equipment Type: GSM/GPRS Dual-band Mobile Phone
Model:	<u>R23</u>
Report No.:	<u>STR11098019I-1</u>
Test Date:	<u>2011-09-02 to 2011-09-08</u>
Issue Date:	<u>2011-09-16</u>
Tested By:	<u>Jason Chen / Engineer</u> 
Reviewed By:	<u>Lahm Peng / EMC Manager</u> 
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> 
Prepared By:	<p style="text-align: center;">SEM.Test Compliance Service Co., Ltd 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C. (518101) Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn</p>

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Verykool USA Inc
 Address of applicant: 4350 Executive Dr. #100, San Diego

Manufacturer: Verykool Wireless Technology Ltd.
 Address of manufacturer: Room 1701, Reward Building C, No.203, 2nd Section of Wangjing, Li Ze Zhong Yuan, ChaoYang District, Beijing, P.R. of China 100102

General Description of E.U.T

Items	Description
EUT Description:	GSM/GPRS Dual-band Mobile Phone
Trade Name:	verykool
Model No.:	R23
Rated Voltage:	Battery DC 3.7V with Power adaptor
IMEI:	358822020090960, 358822020090978
Hardware Version:	R23_HW_1.00
Software Version:	R23_VK_SW_0.07
Frequency range:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Max. RF Power(Conducted):	GSM 850: 32.95dBm GSM 1900: 29.38dBm
Max. RF Power(ERP/EIRP):	GSM 850: 31.96dBm GSM1900: 29.21dBm
Cellular Network Protocol:	GSM/GPRS
Modulation:	GMSK
Type of Emission:	GSM850: 255KGXW GPRS850: 255KG7W PCS1900: 255KGXW GPRS1900: 257KG7W
Antenna Gain:	GSM850: 0dBi, PCS1900: 1dBi
Type of Antenna:	Integral Antenna
Battery:	M/N: 553450AR; DC 3.7V/1050mAh
Power Adapter:	M/N: ASUCI-050050; Input: 100-240V ~ 50/60Hz, 0.3A

Note: The test data is gathered from a production sample, provided by the manufacture.

1.2 Test Standards

The following report is prepared on behalf of the Verykool USA Inc in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with TIA/EIA 603-C: 2004 and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

1.4 Test Facility

- **FCC – Registration No.: 994117**
SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.
- **Industry Canada (IC) Registration No.: 7673A**
The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.
- **CNAS Registration No.: L4062**
Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.1	Shielded	Without Core
Earphone Cable	1.5	Unshielded	Without Core

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 1.1307 § 2.1093	RF Exposure	Compliant
§ 22.913 (a), § 24.232 (c)	RF Output Power	Compliant
§ 22.917 (b), § 24.238 (b)	Emission Bandwidth	Compliant
§ 22.917 (a), § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§ 22.917 (a), § 24.238 (a)	Spurious Radiation Emissions	Compliant
§ 22.917 (a), § 24.238 (a)	Out of Band Emissions	Compliant
§ 22.355, § 24.235	Frequency Stability	Compliant

3. RF EXPOSURE

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complies with the requirement of the RF exposure, please see the SAR Report.

4. RF OUTPUT POWER

4.1 Standard Applicable

According to §22.913(a)(2), The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), no any case may the peak output power of mobile or portable station transmitter exceed 2 Watt EIRP.

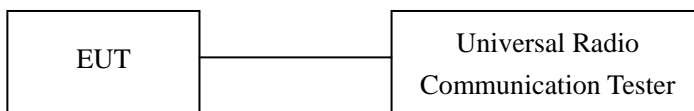
4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2010-12-20	2011-12-19
Signal Generator	R&S	SMR20	100047	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.3 Test Procedure

Conducted output power test method:



Radiated power test method:

- 1.The setup of EUT is according with per TIA/EIA Standard 603C and ANSI C63.4-2003 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution

antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

4.4 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

Radiated Power

ERP For GSM Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	30.15	1.5	0	H	1.5	0	28.65	38.45
824.2	32.28	1.5	0	V	1.5	0	30.78	38.45
Middle Channel								
836.6	31.62	1.5	0	H	1.5	0	30.12	38.45
836.6	32.14	1.5	0	V	1.5	0	30.64	38.45
High Channel								
848.8	31.69	1.5	0	H	1.5	0	30.19	38.45
848.8	33.46	1.5	0	V	1.5	0	31.96	38.45

EIRP For GSM Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	22.71	1.5	0	H	1.9	7.7	28.51	33
1850.2	23.39	1.5	0	V	1.9	7.7	29.19	33
Middle Channel								
1880.0	21.38	1.5	0	H	1.9	7.7	27.18	33
1880.0	22.08	1.5	0	V	1.9	7.7	27.88	33
High Channel								
1909.8	22.49	1.5	0	H	1.9	7.7	28.29	33
1909.8	22.90	1.5	0	V	1.9	7.7	28.70	33

ERP For GPRS Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	32.53	1.5	0	H	1.5	0	31.03	38.45
824.2	32.71	1.5	0	V	1.5	0	31.21	38.45
Middle Channel								
836.6	32.24	1.5	0	H	1.5	0	30.74	38.45
836.6	32.15	1.5	0	V	1.5	0	31.65	38.45
High Channel								
848.8	31.76	1.5	0	H	1.5	0	30.26	38.45
848.8	32.62	1.5	0	V	1.5	0	31.12	38.45

EIRP For GPRS Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	21.32	1.5	0	H	1.9	7.7	27.12	33
1850.2	22.58	1.5	0	V	1.9	7.7	28.38	33
Middle Channel								
1880.0	22.55	1.5	0	H	1.9	7.7	28.35	33
1880.0	23.41	1.5	0	V	1.9	7.7	29.21	33
High Channel								
1909.8	22.82	1.5	0	H	1.9	7.7	28.62	33
1909.8	22.59	1.5	0	V	1.9	7.7	28.39	33

Max. Conducted Output Power

For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 22.913 Limit (dBm)
GSM	Low Channel	824.2	32.82	38.45
	Middle Channel	836.6	32.91	38.45
	High Channel	848.8	32.95	38.45
GPRS	Low Channel	824.2	32.32	38.45
	Middle Channel	836.6	32.37	38.45
	High Channel	848.8	32.58	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	29.38	33
	Middle Channel	1880.0	29.33	33
	High Channel	1909.8	29.18	33
GPRS	Low Channel	1850.2	29.22	33
	Middle Channel	1880.0	29.20	33
	High Channel	1909.8	29.07	33

5. EMISSION BANDWIDTH

5.1 Standard Applicable

According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.2 Test Equipment List and Details

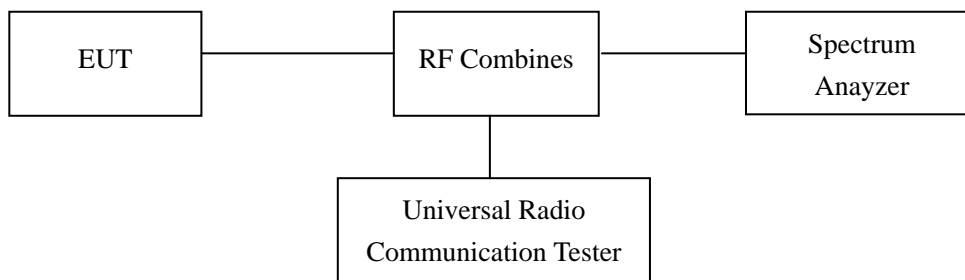
Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2010-12-20	2011-12-19
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



5.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	51%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

For Cellular Band

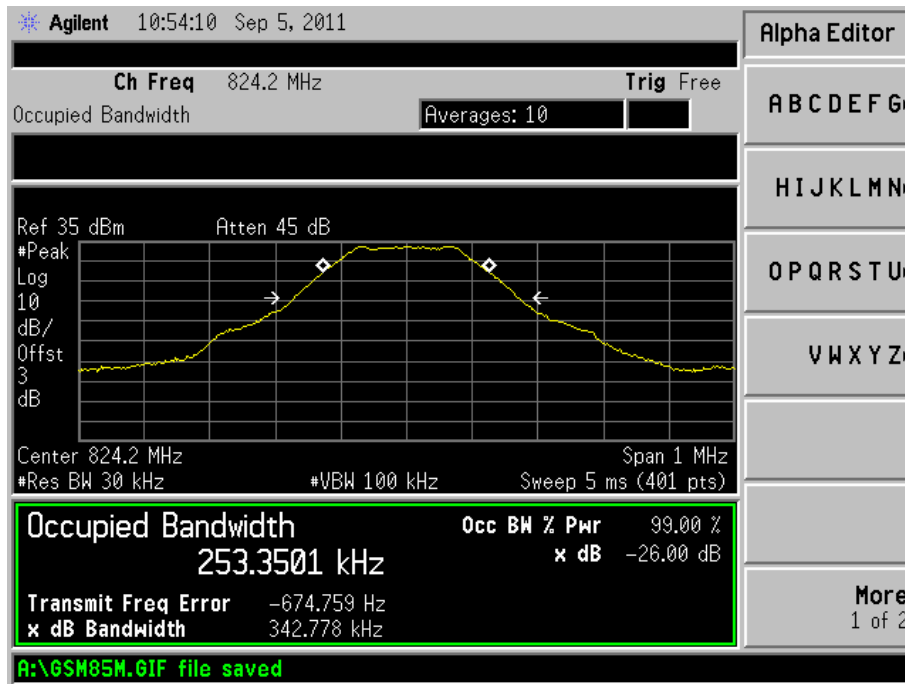
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	128	824.2	253.3501	342.778
	190	836.6	255.7451	341.941
	251	848.8	253.0859	340.429
GPRS	128	824.2	254.1767	341.694
	190	836.6	255.7162	342.519
	251	848.8	254.8146	338.479

For PCS Band

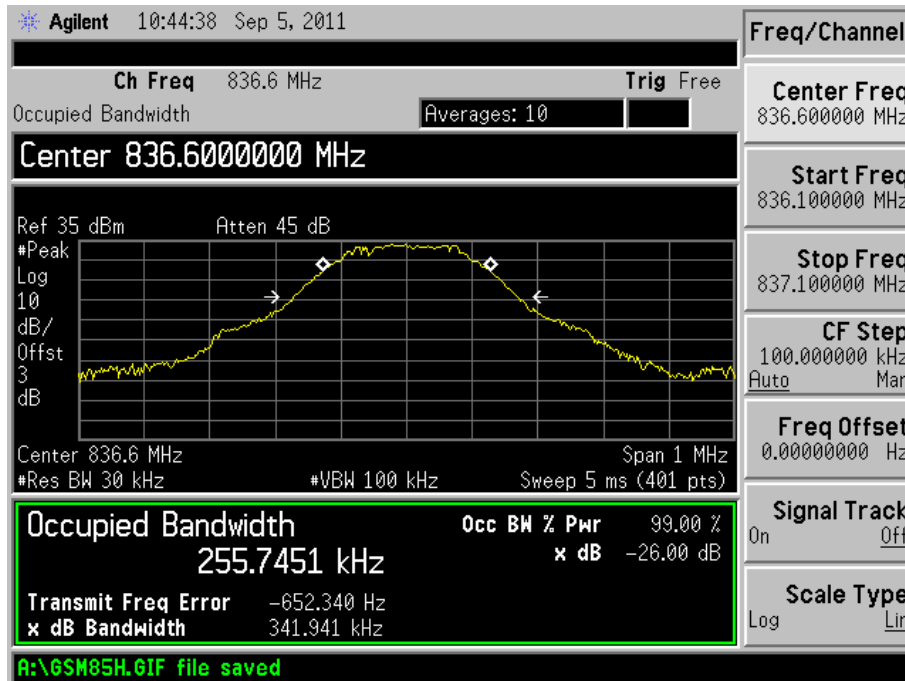
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	255.8670	342.895
	661	1880.0	255.7329	344.166
	810	1909.8	254.7853	344.272
GPRS	512	1850.2	256.2576	340.048
	661	1880.0	257.0922	341.310
	810	1909.8	256.2196	341.210

Please refer to the following test plots:

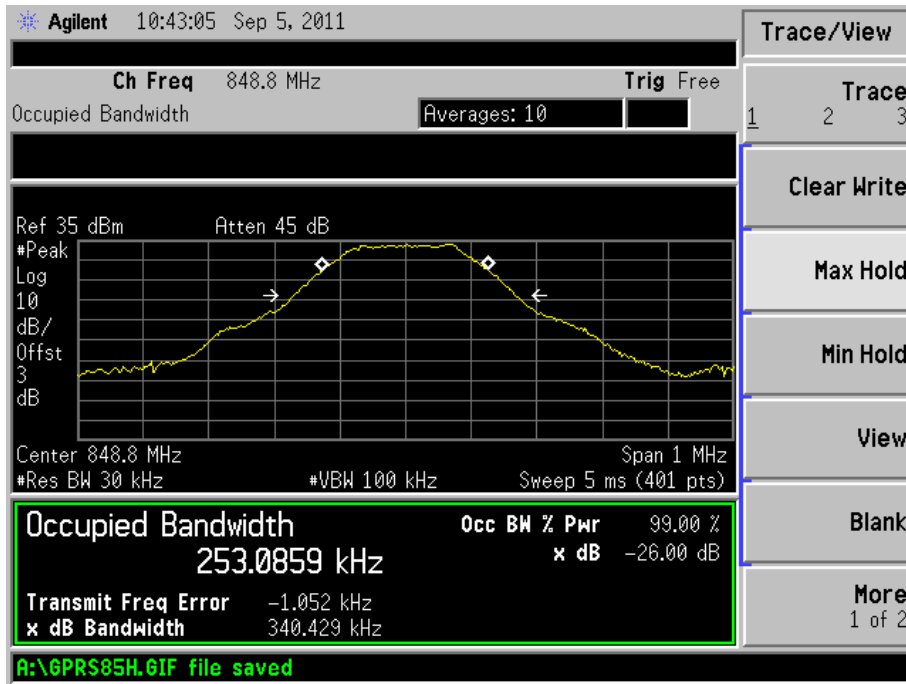
For Cellular Band
GSM Low Channel



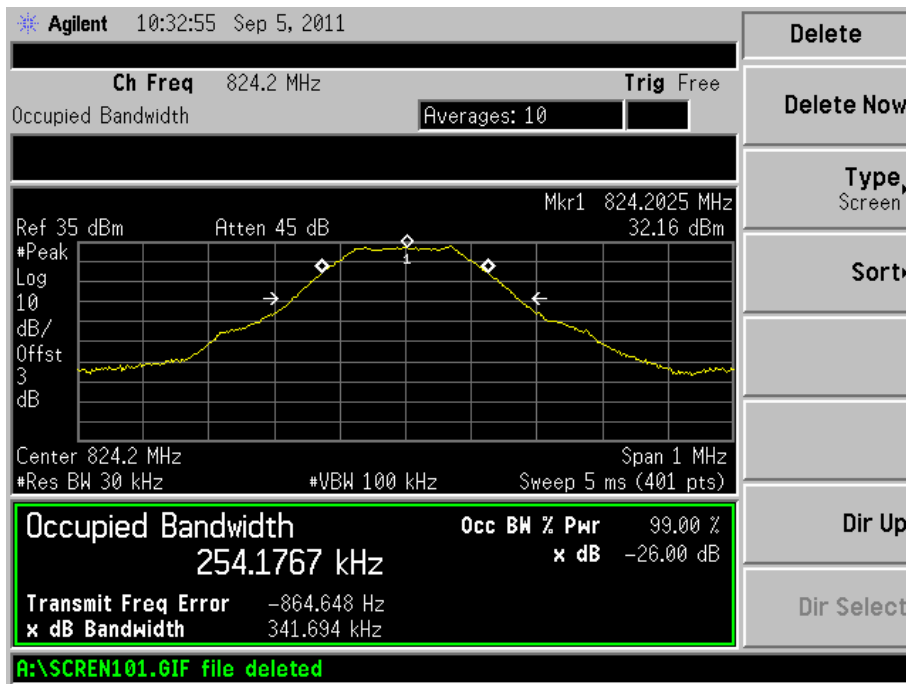
GSM Middle Channel



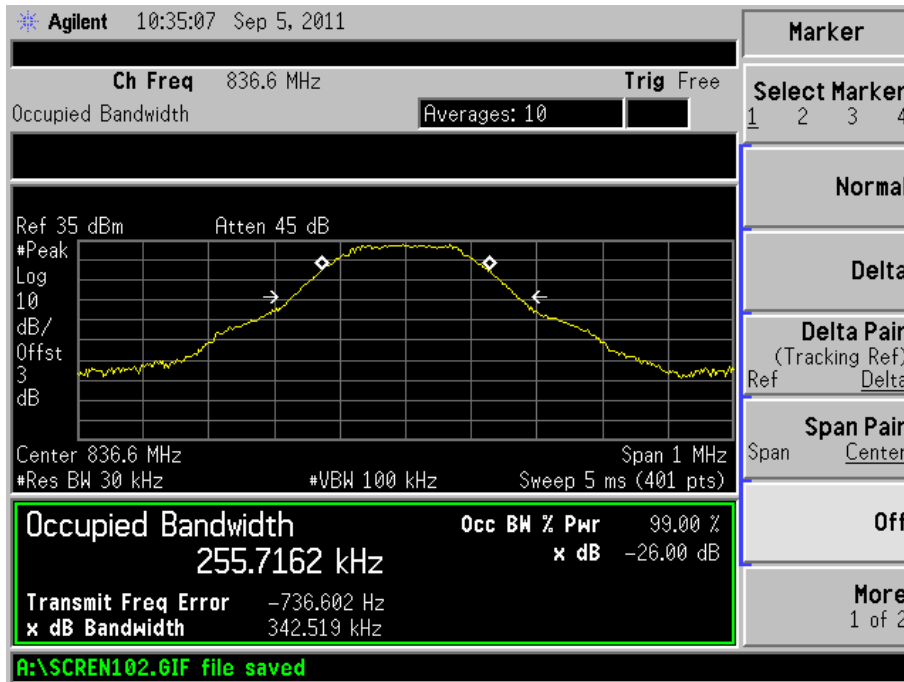
GSM High channel



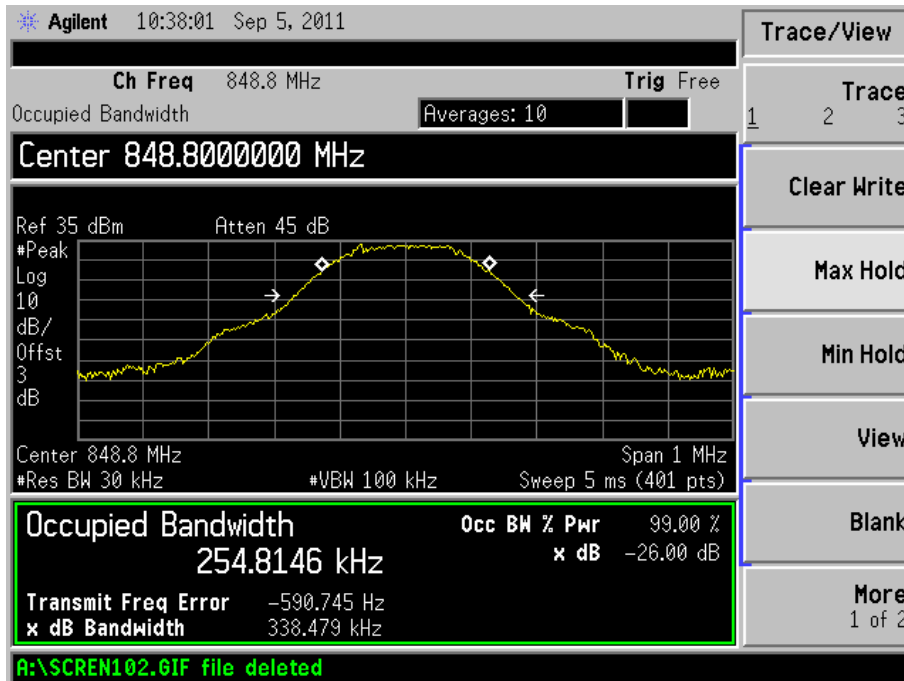
GPRS Low Channel



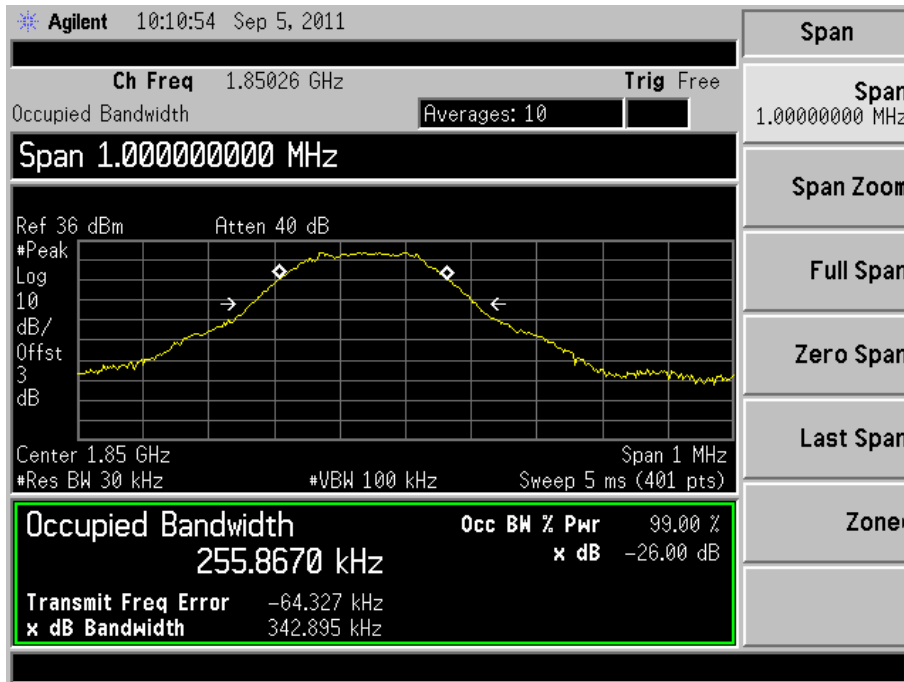
GPRS Middle Channel



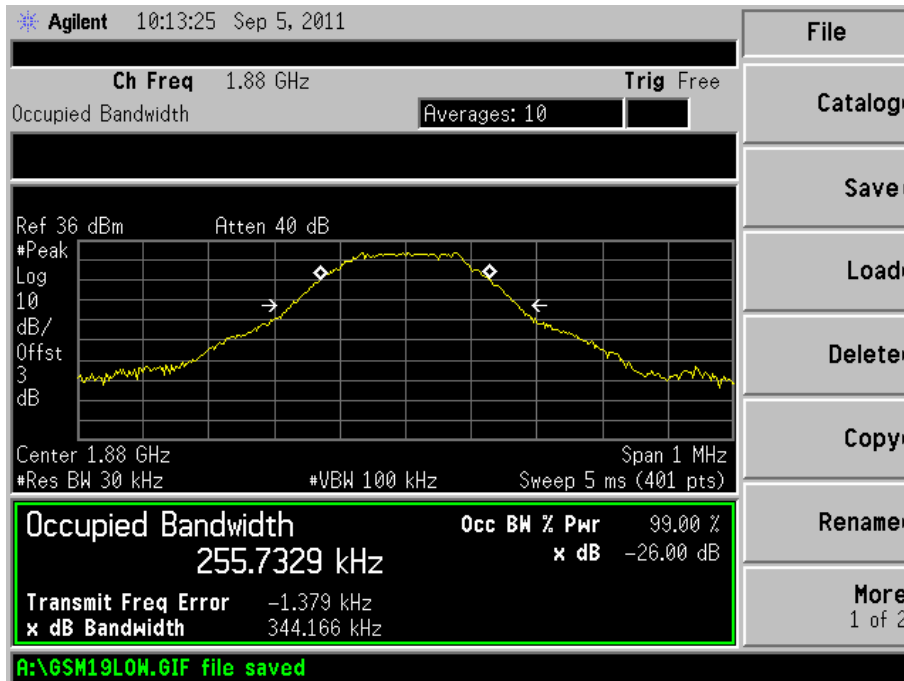
GPRS High Channel



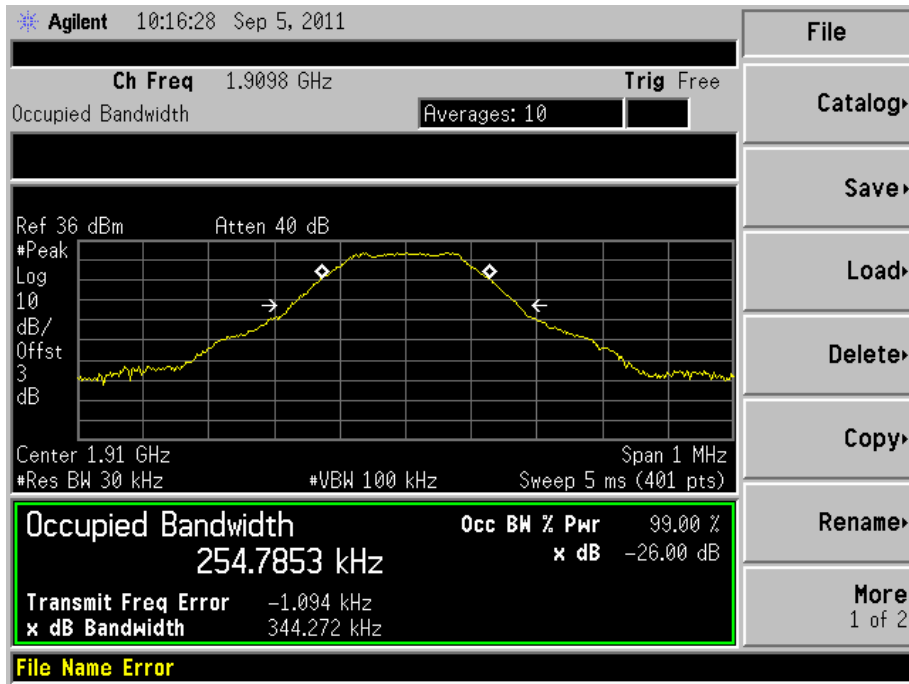
For PCS Band
GSM Low Channel



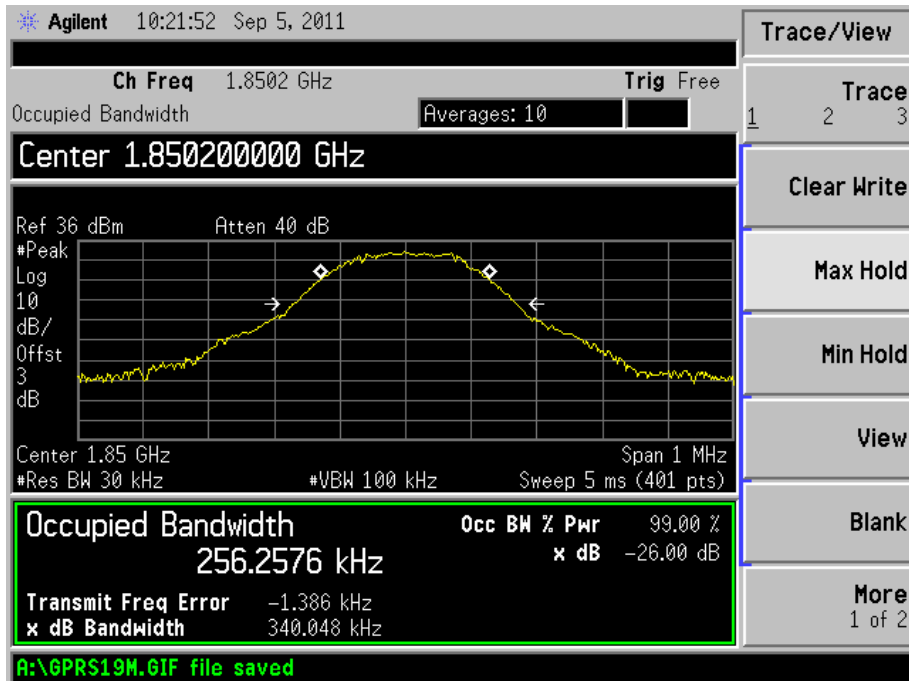
GSM Middle Channel



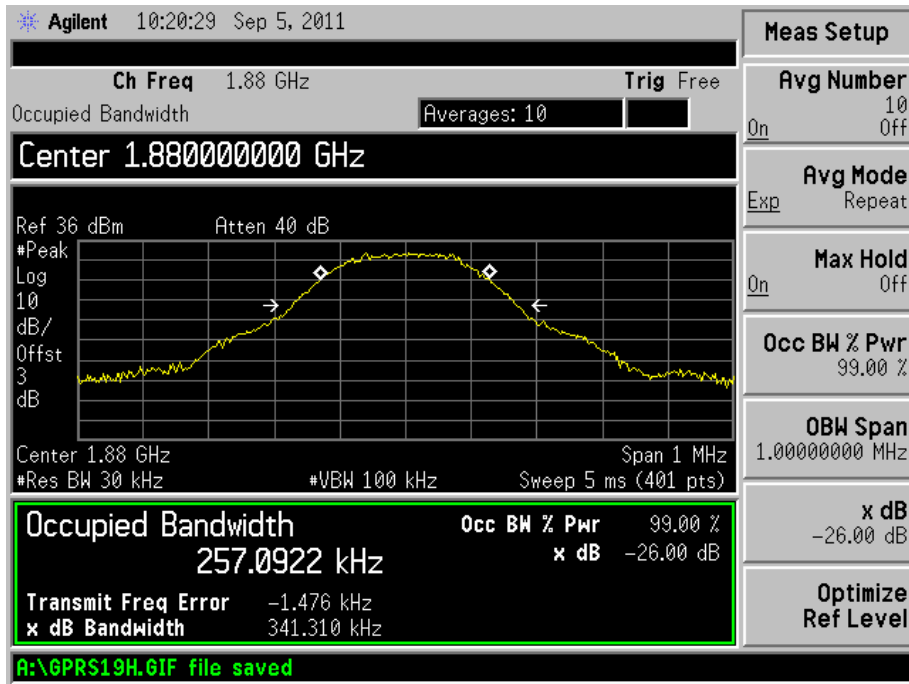
GSM High channel



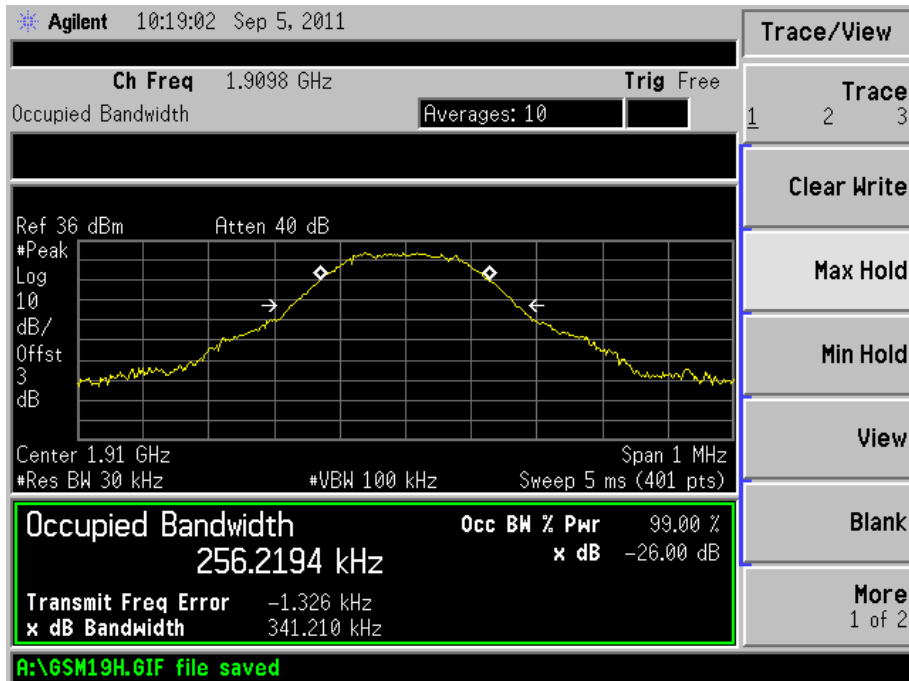
GPRS Low Channel



GPRS Middle Channel



GPRS High Channel



6. OUT OF BAND EMISSION AT ANTENNA TERMINAL

6.1 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

6.2 Test Equipment List and Details

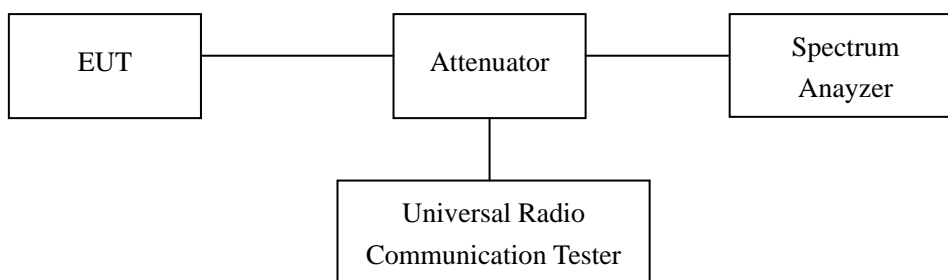
Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2010-12-20	2011-12-19
Rohde & Schwarz	Spectrum Analyzer	FSP	836079/035	2010-12-20	2011-12-19
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



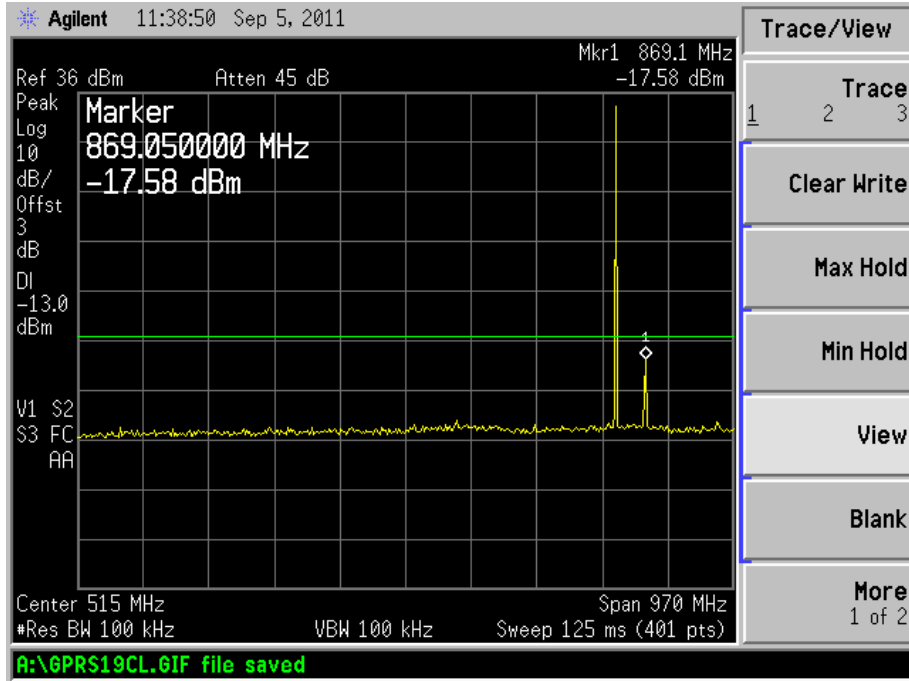
6.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1018 mbar

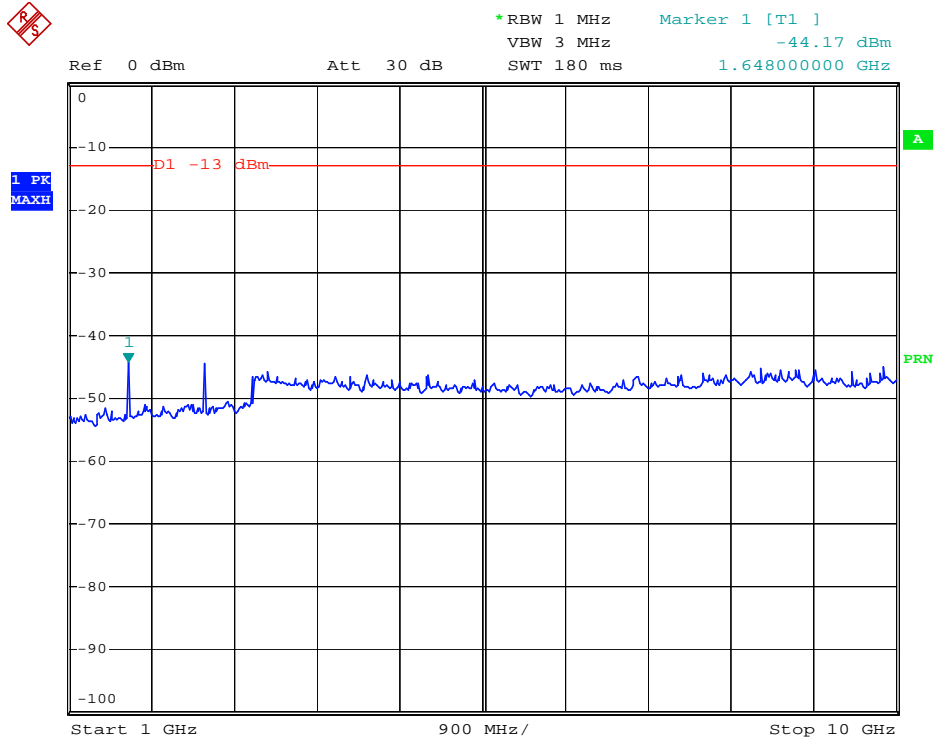
6.5 Summary of Test Results/Plots

Please refer to the following test plots

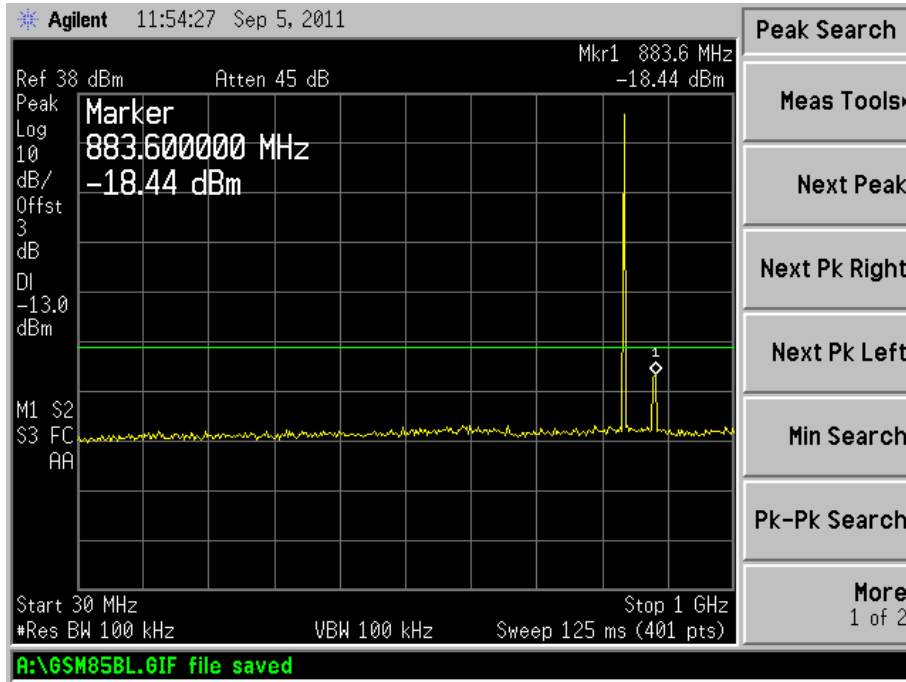
For Cellular Band
GSM Low Channel
30MHz to 1GHz



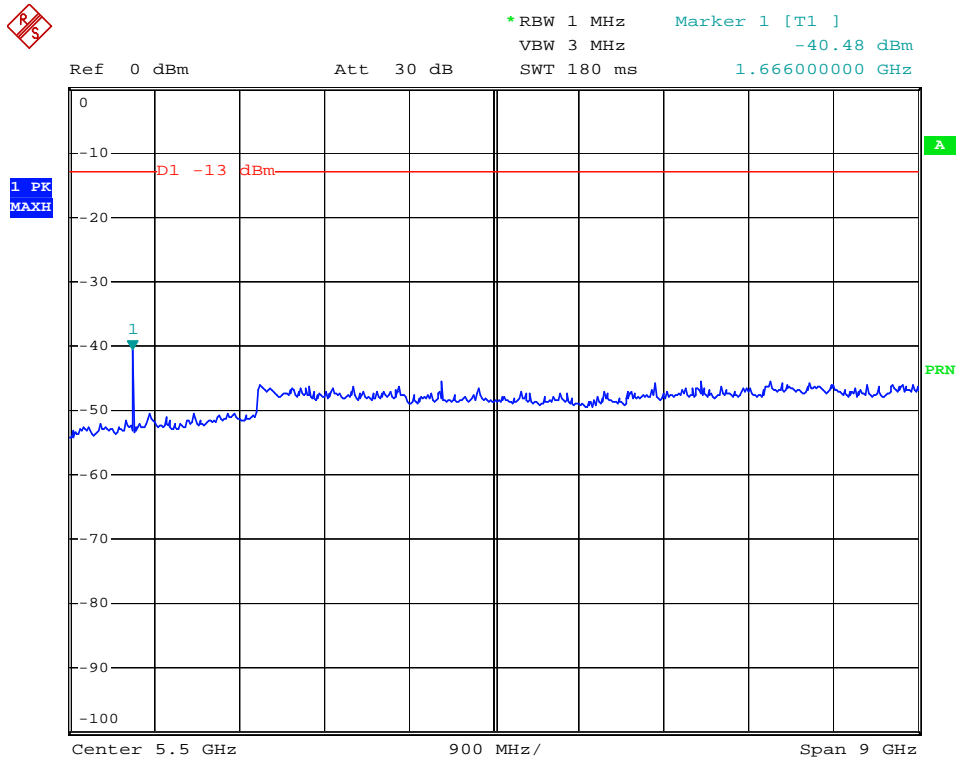
Above 1GHz



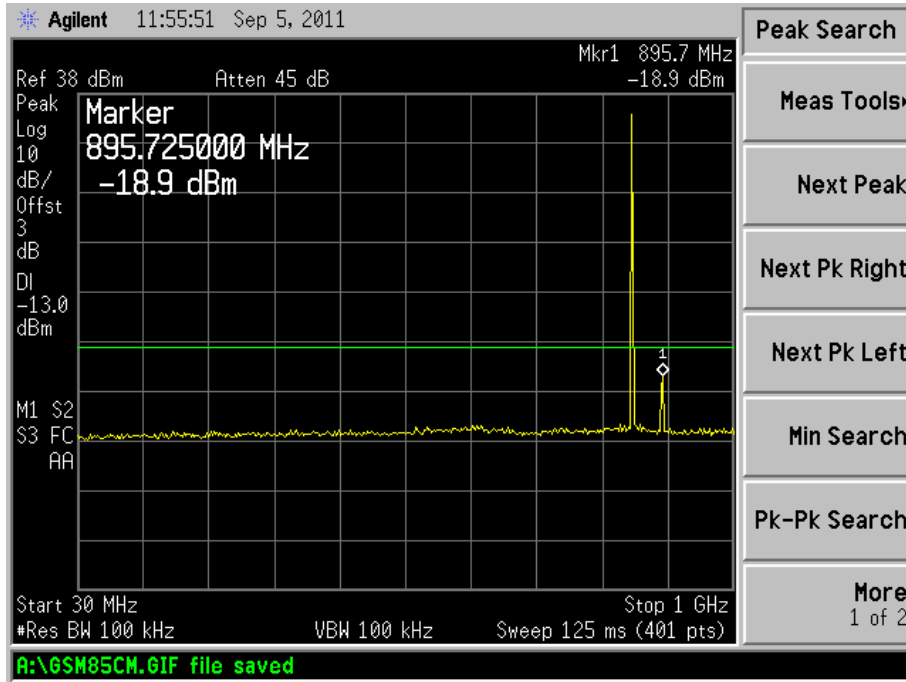
GSM Middle Channel
30MHz to 1GHz



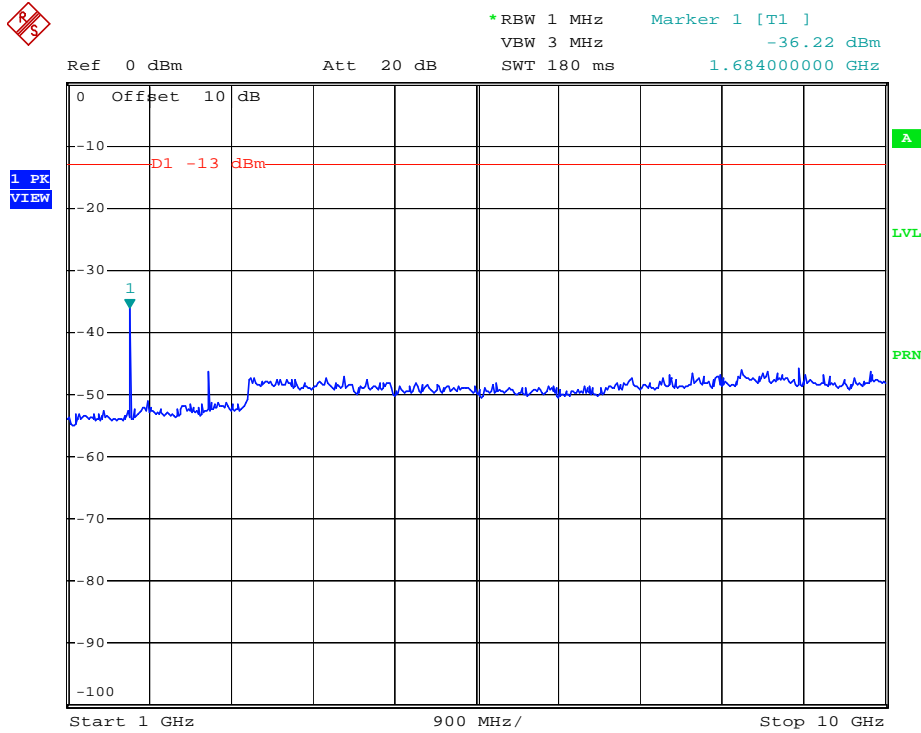
Above 1GHz



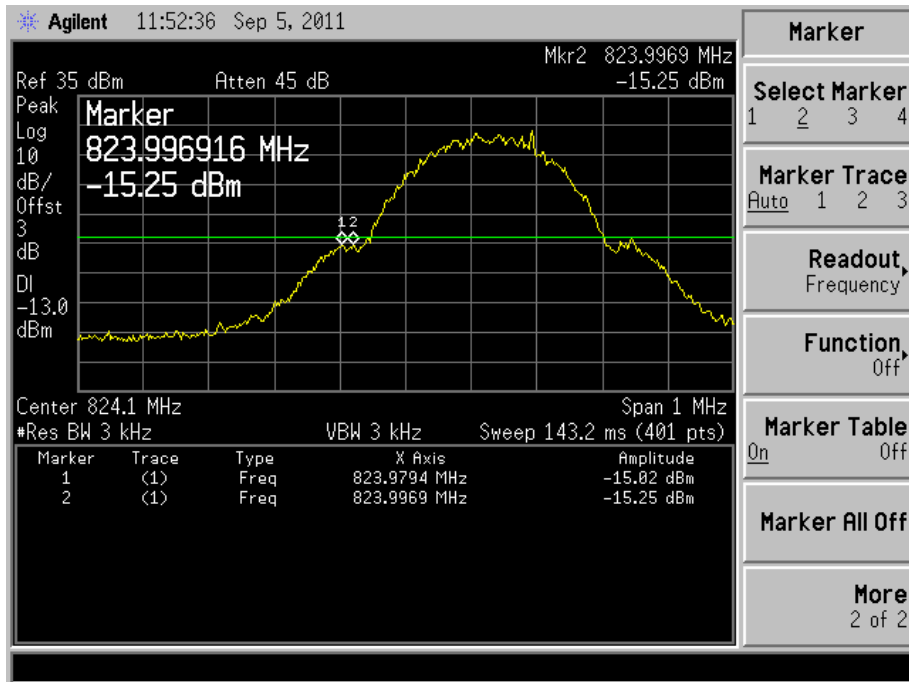
GSM High Channel
30MHz to 1GHz



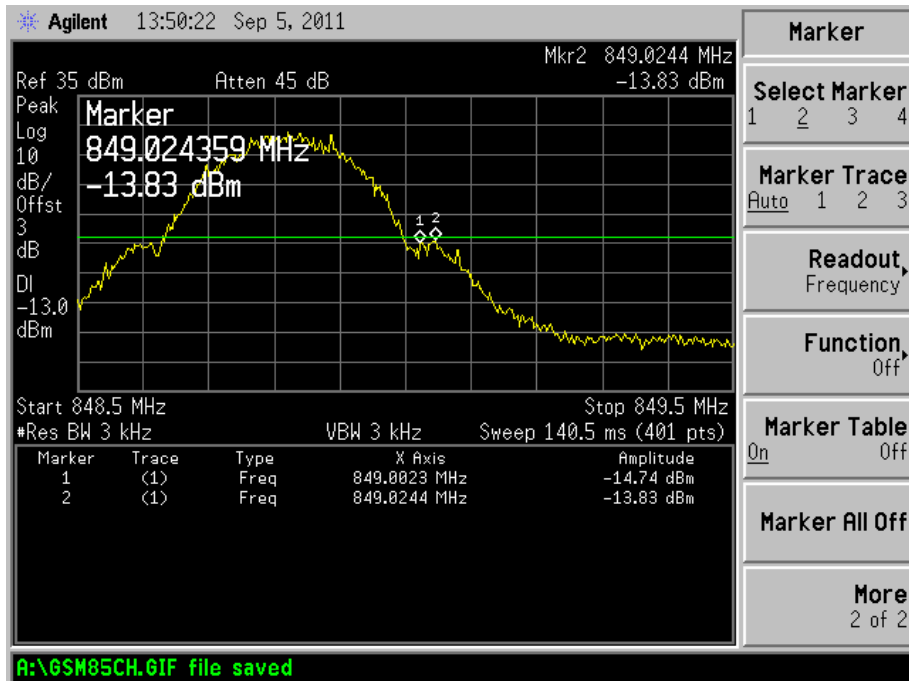
Above 1GHz



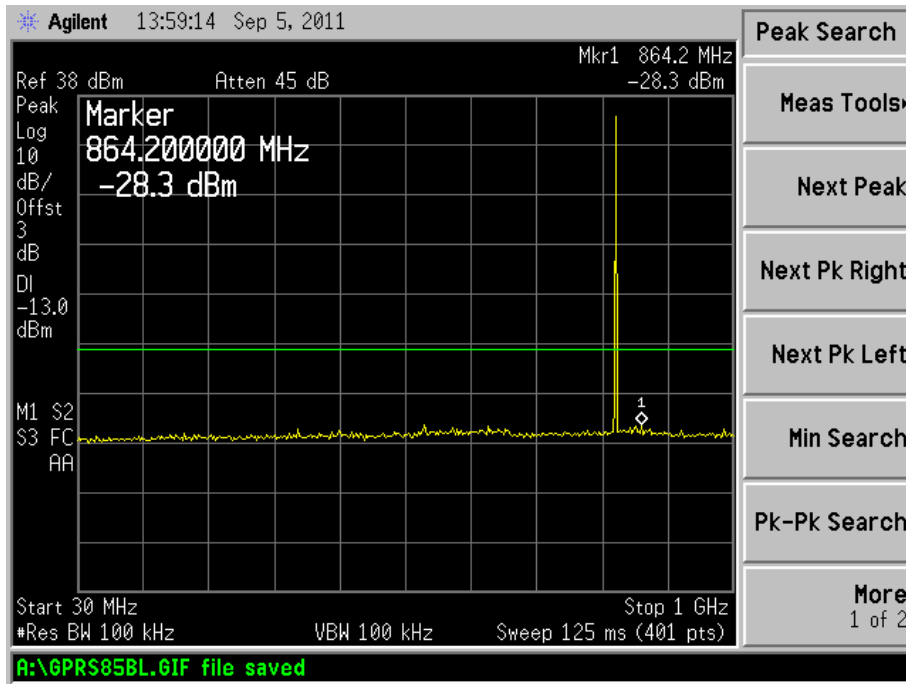
GSM Low Band Emission



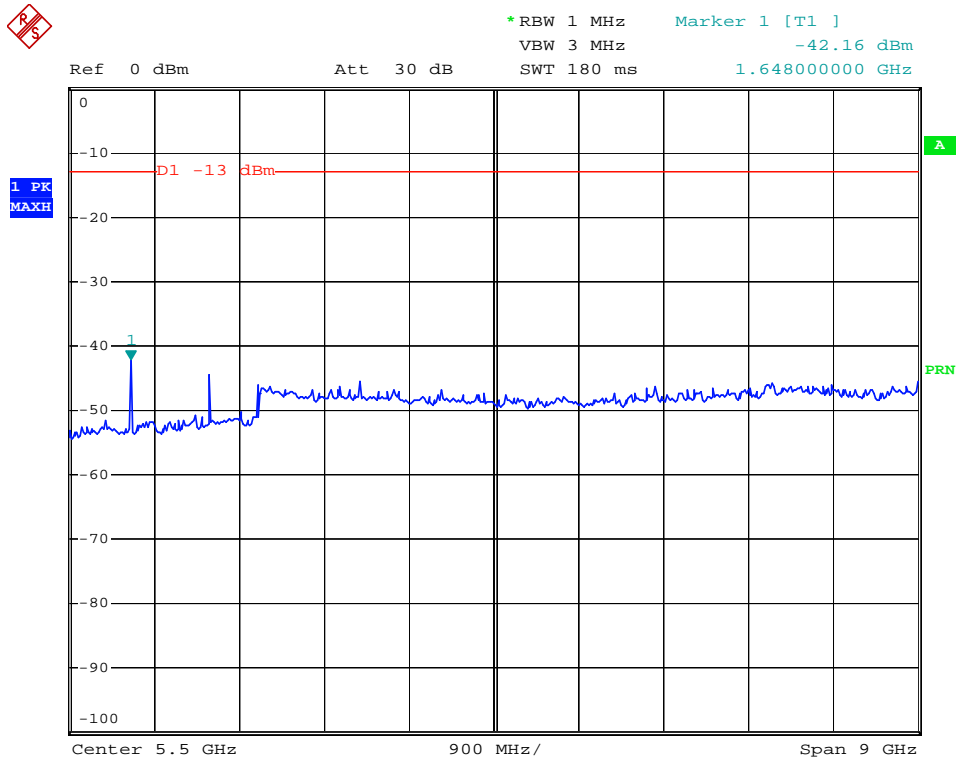
GSM High Band Emission



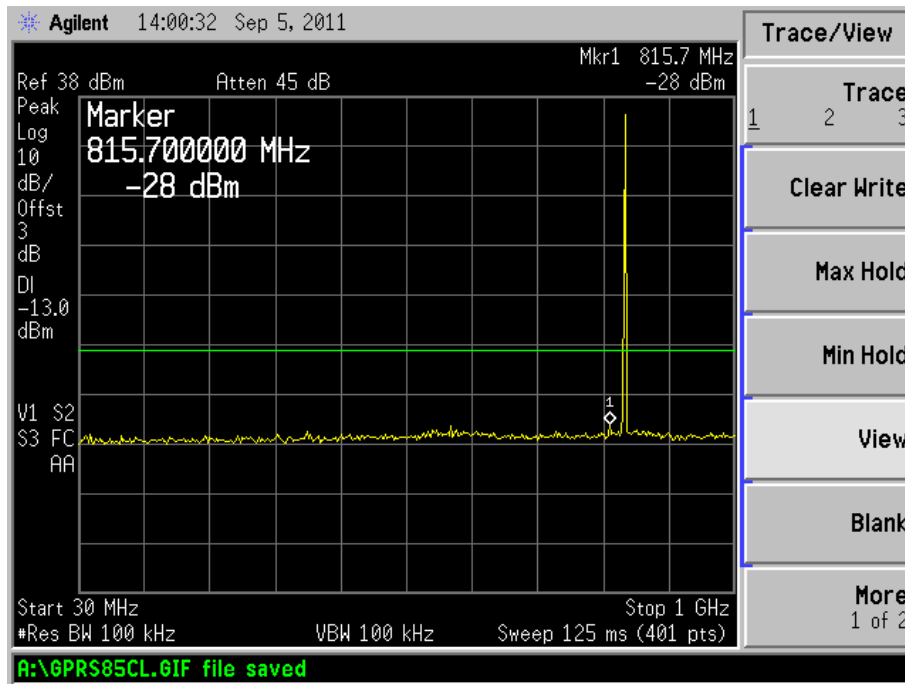
GPRS Low Channel
30MHz to 1GHz



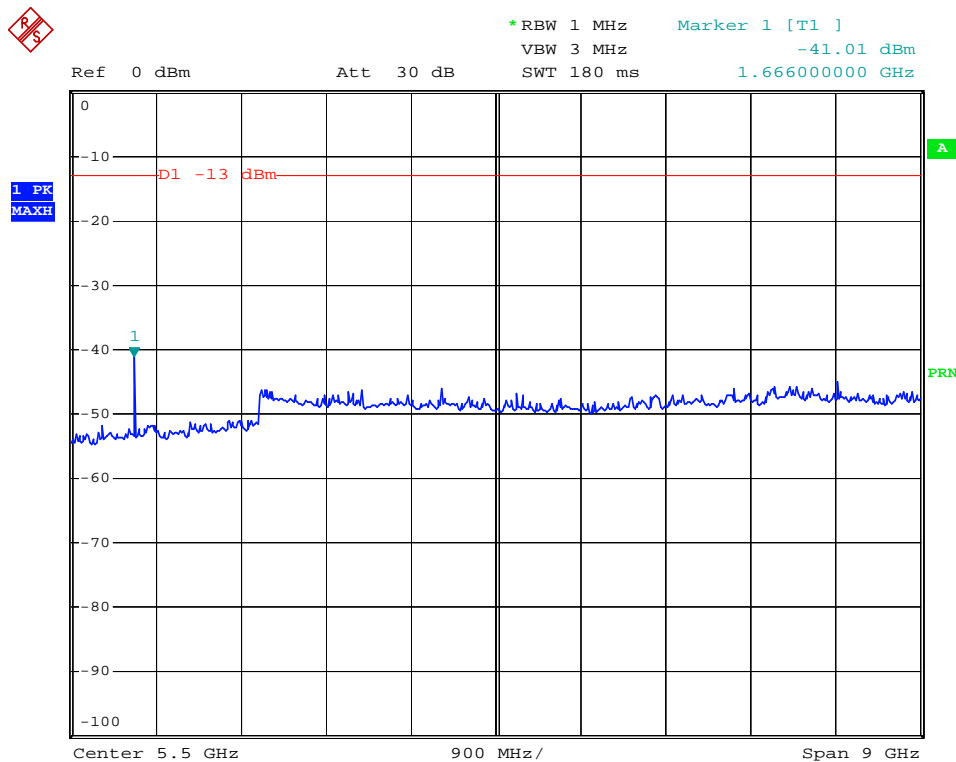
Above 1GHz



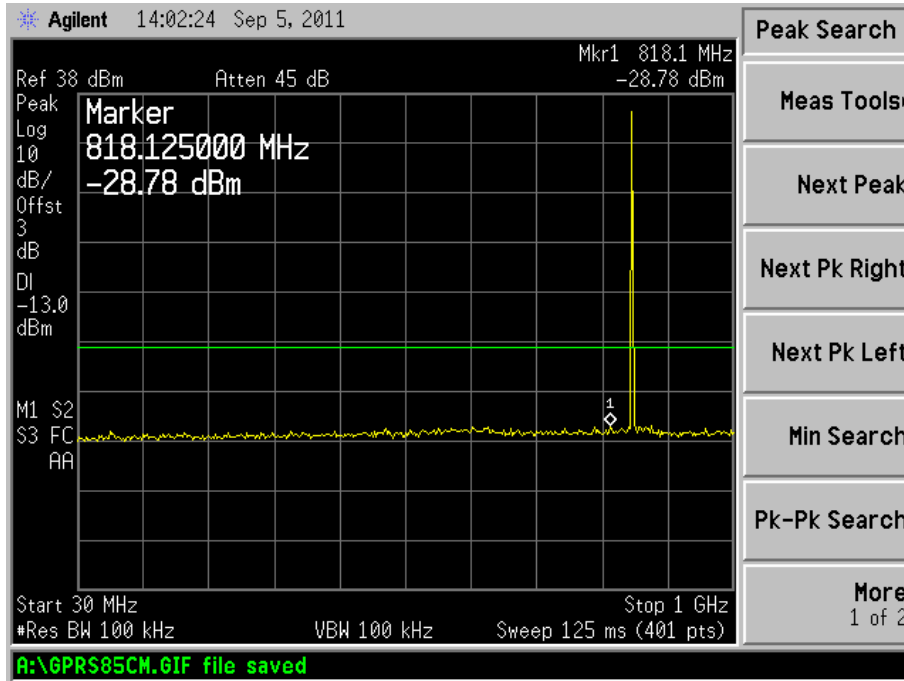
GPRS Middle Channel
30MHz to 1GHz



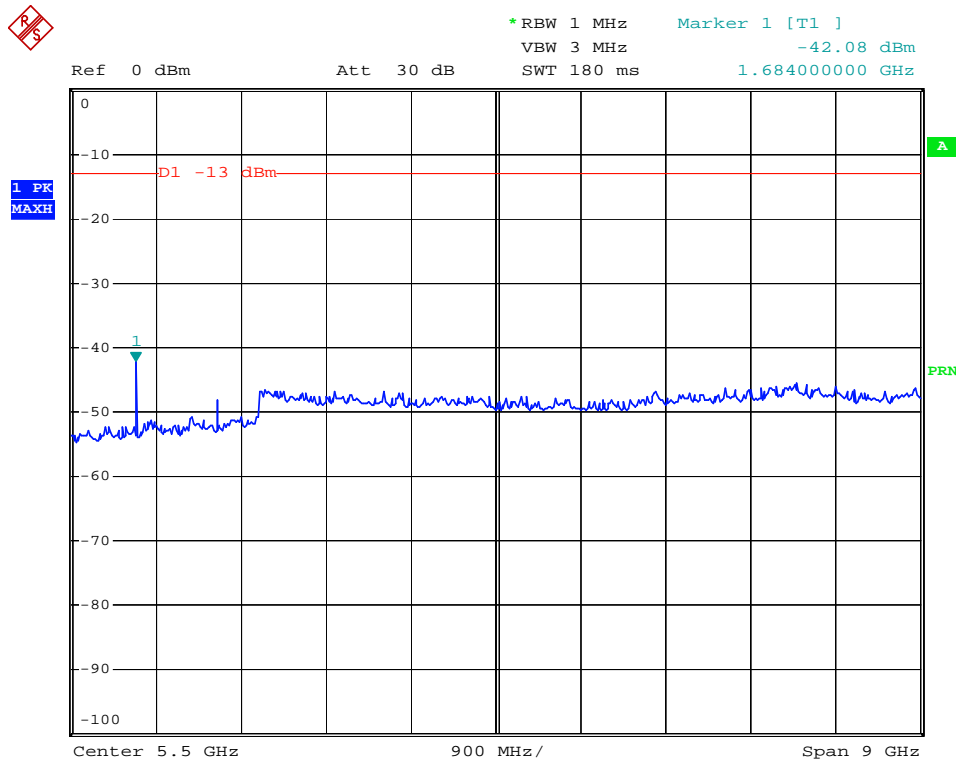
Above 1GHz



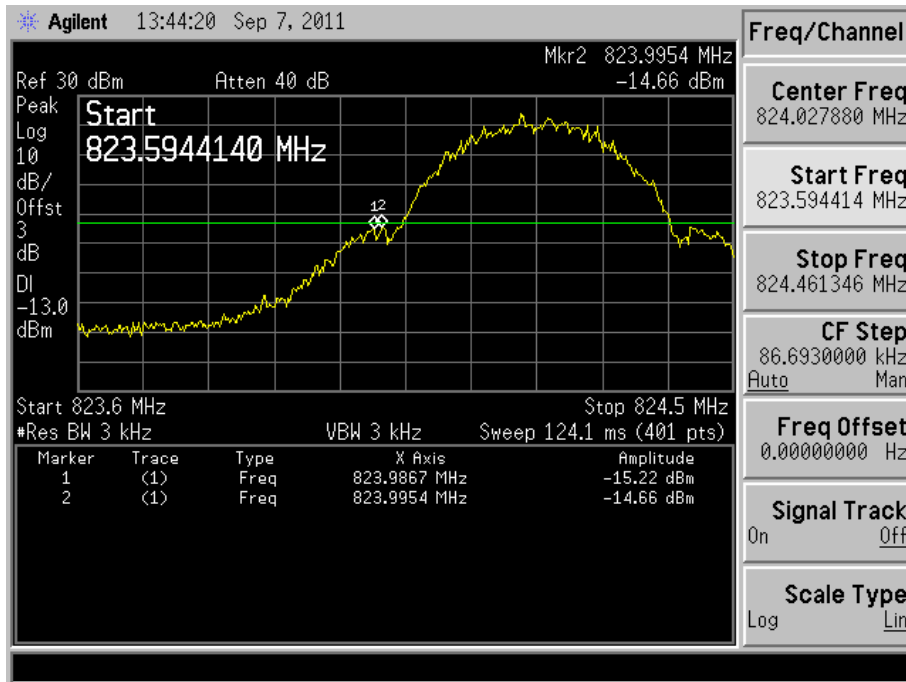
GPRS High Channel
30MHz to 1GHz



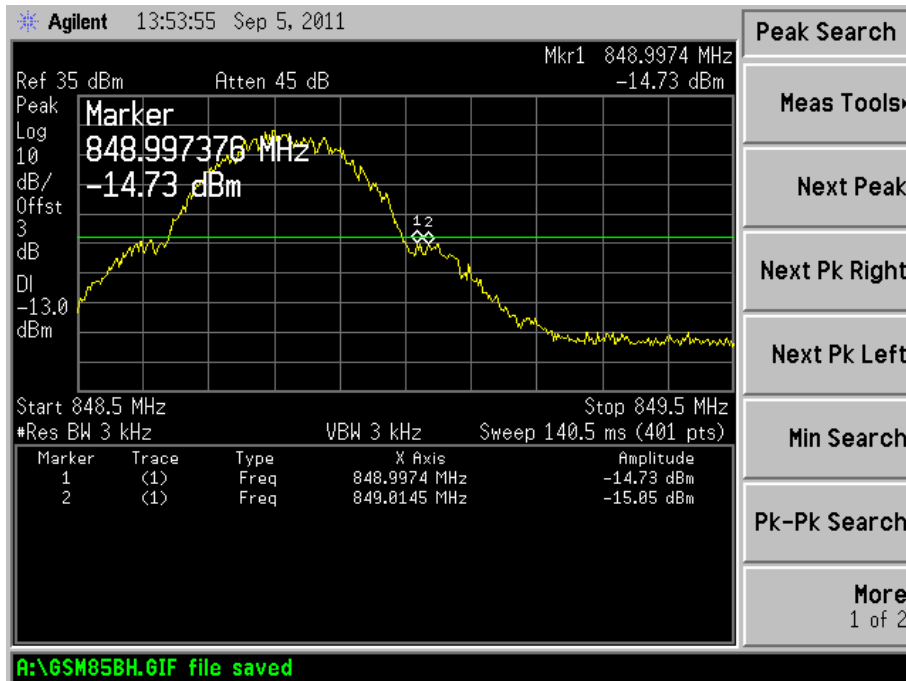
Above 1GHz



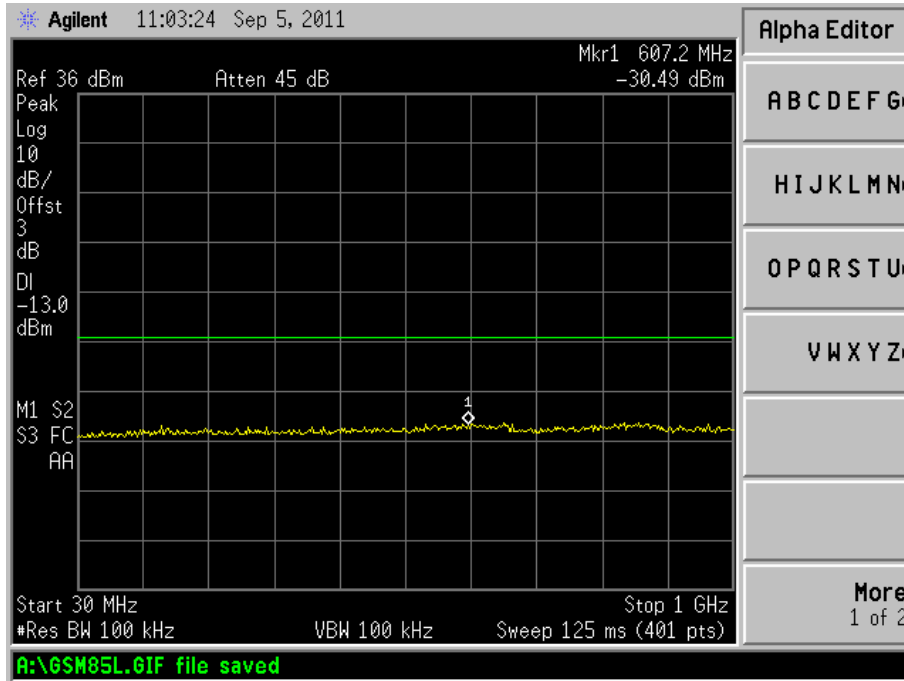
GPRS Low Band Emission



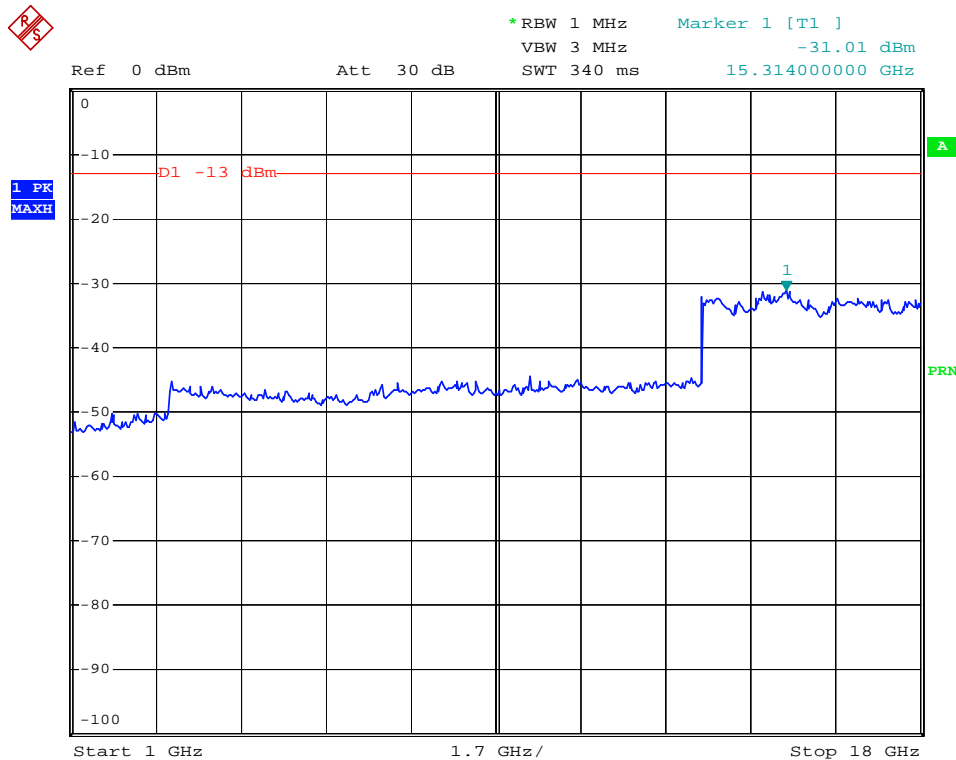
GPRS High Band Emission



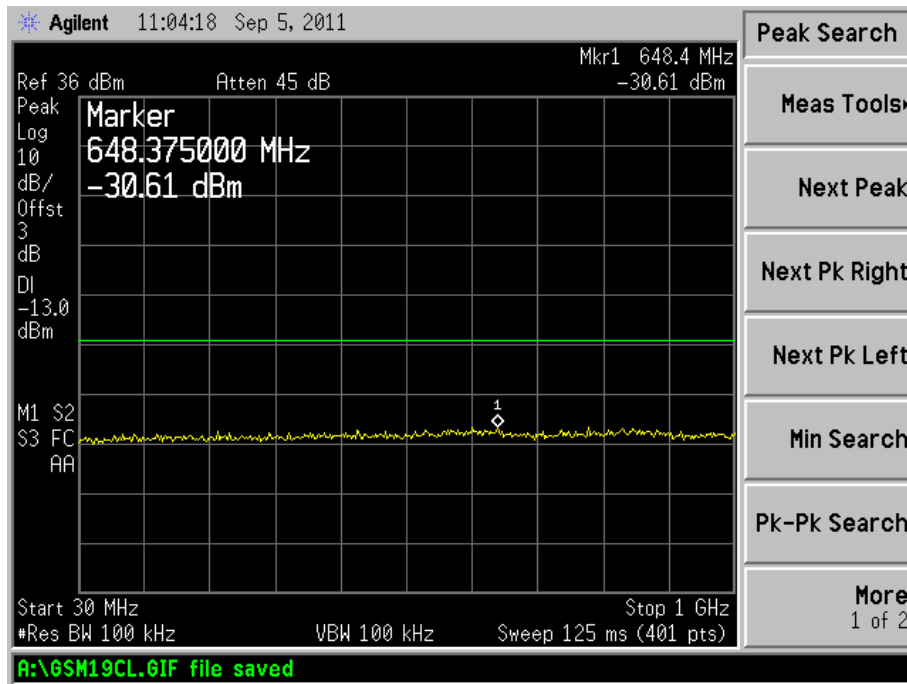
For PCS Band
GSM Low Channel
30MHz to 1GHz



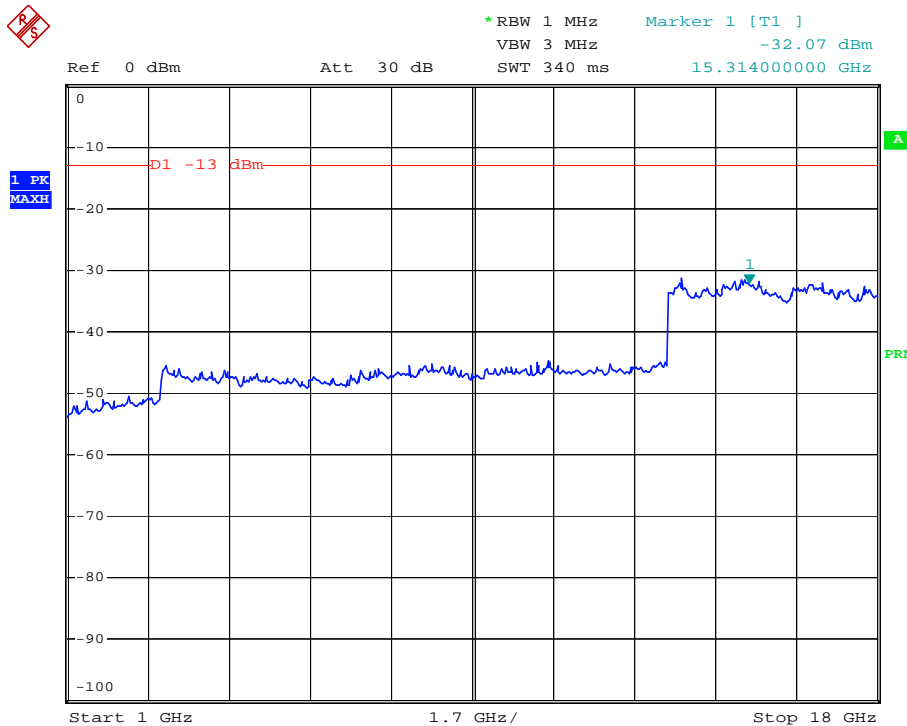
Above 1GHz



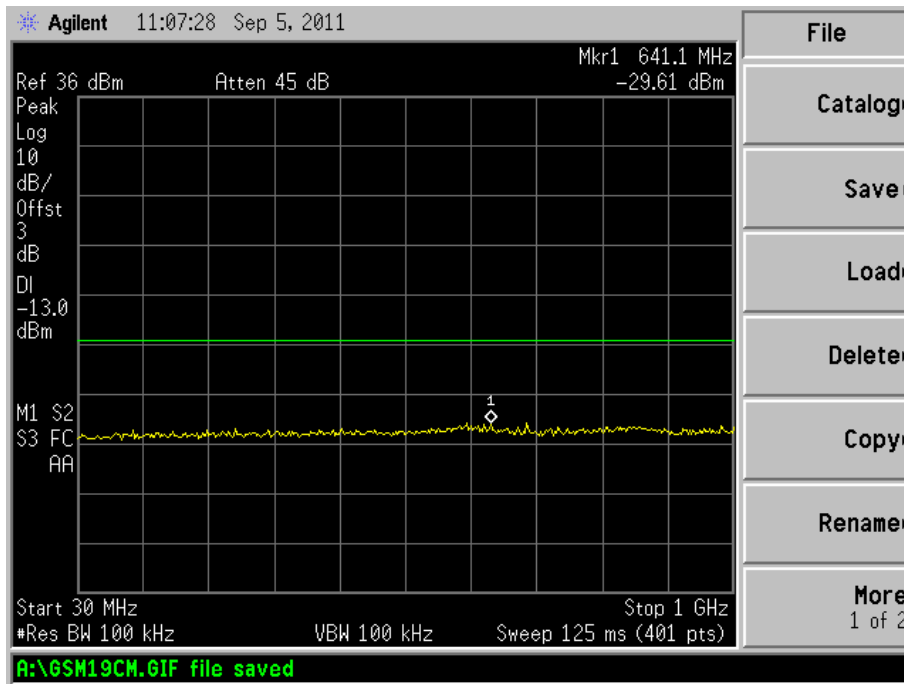
GSM Middle Channel
30MHz to 1GHz



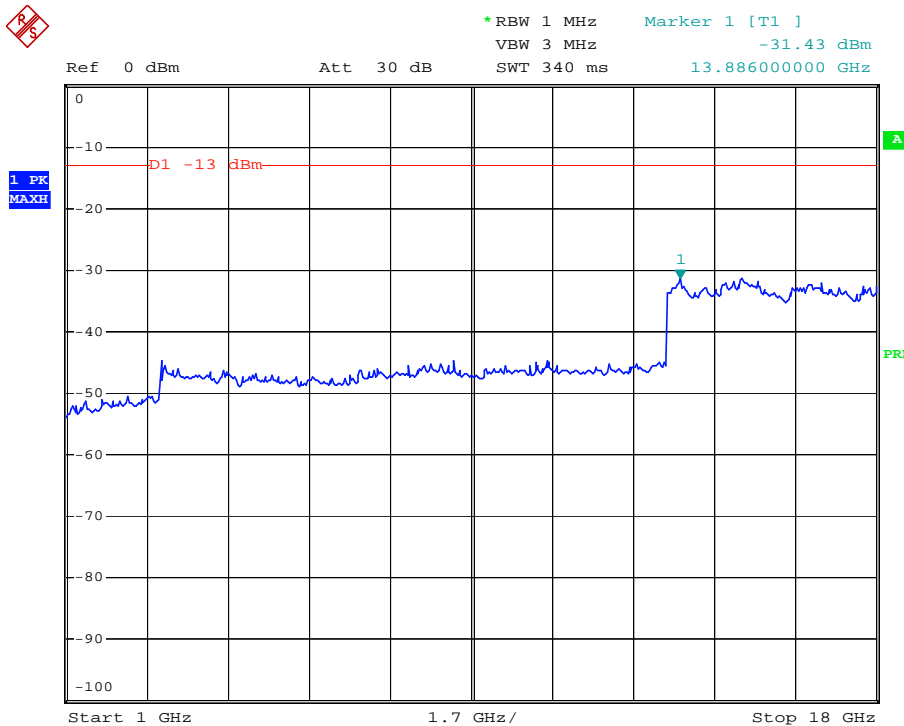
Above 1GHz



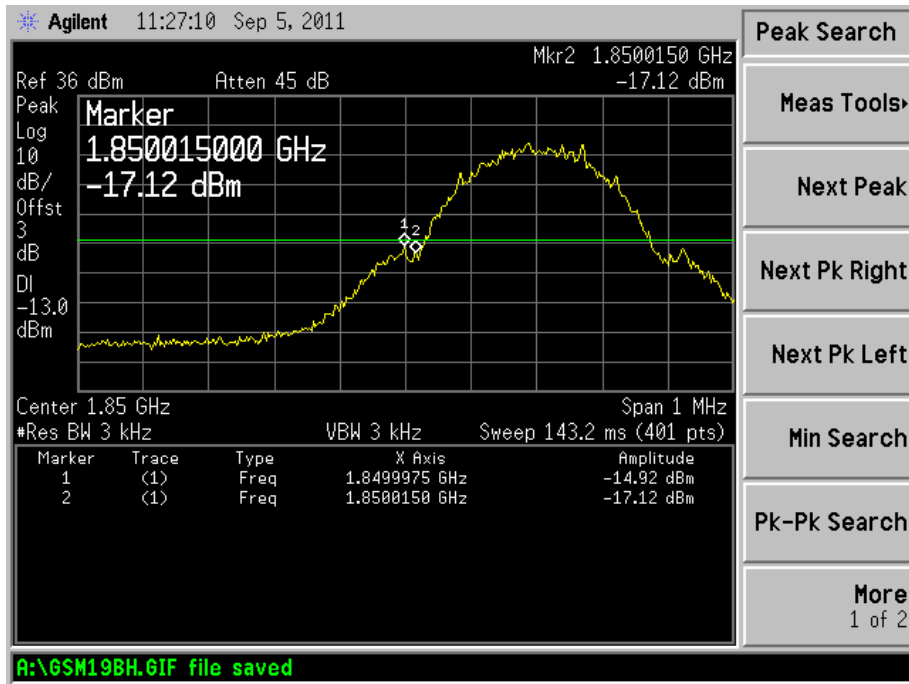
GSM High Channel
30MHz to 1GHz



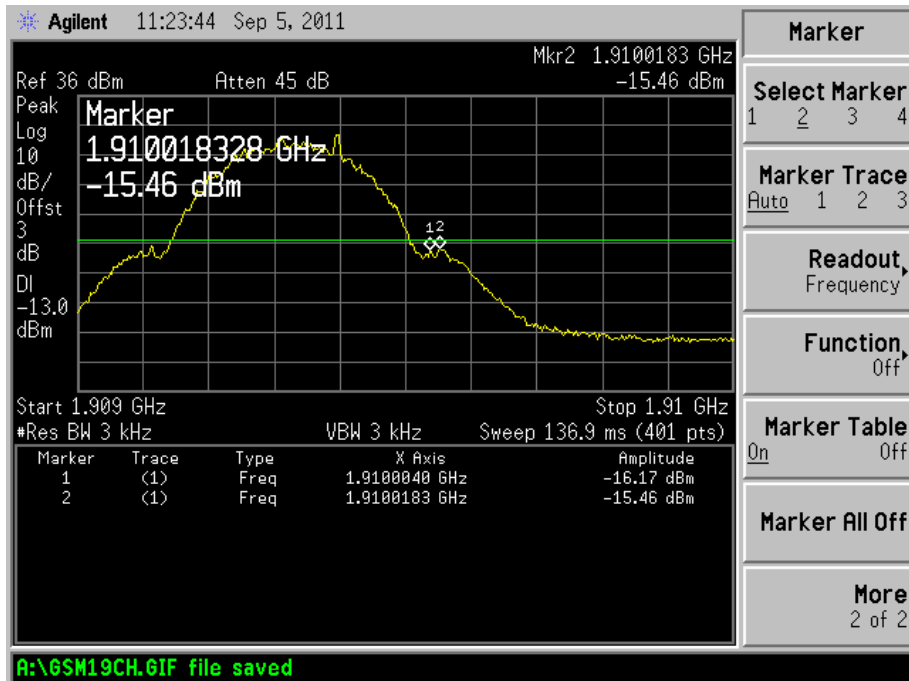
Above 1GHz



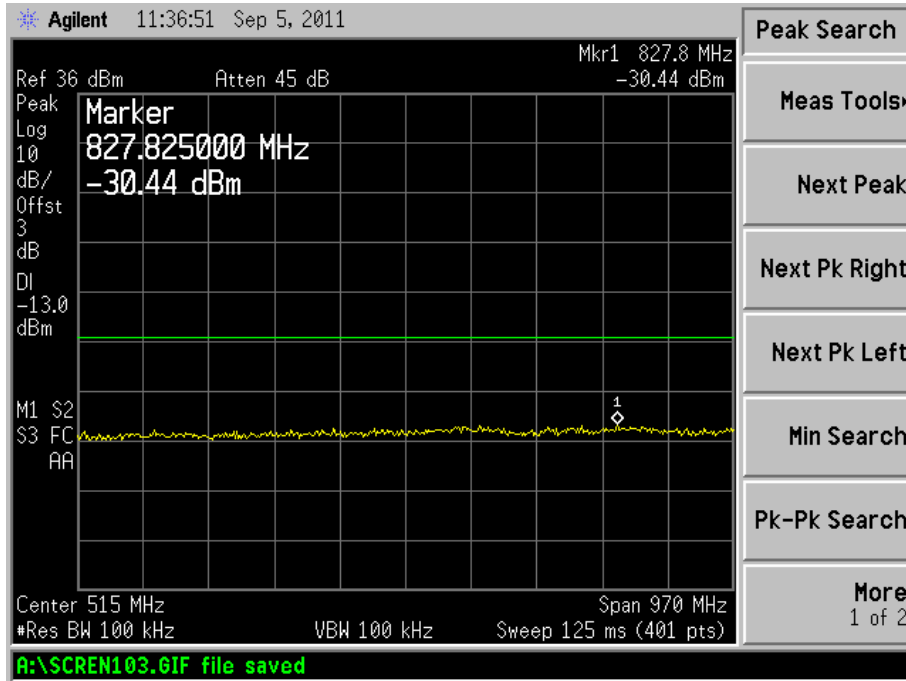
GSM Low Band Emission



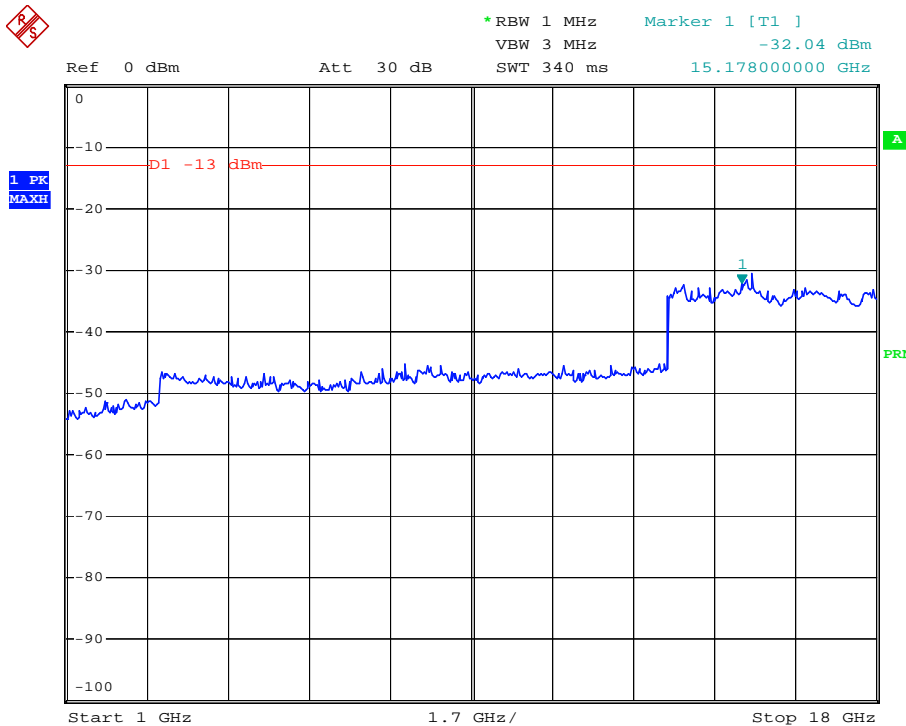
GSM High Band Emission



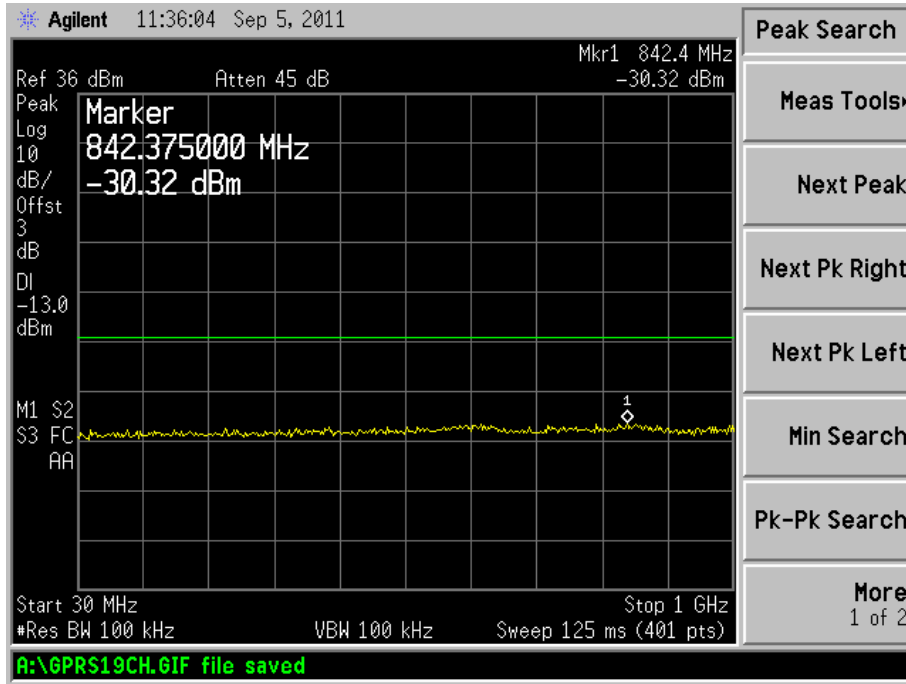
GPRS Low Channel
30MHz to 1GHz



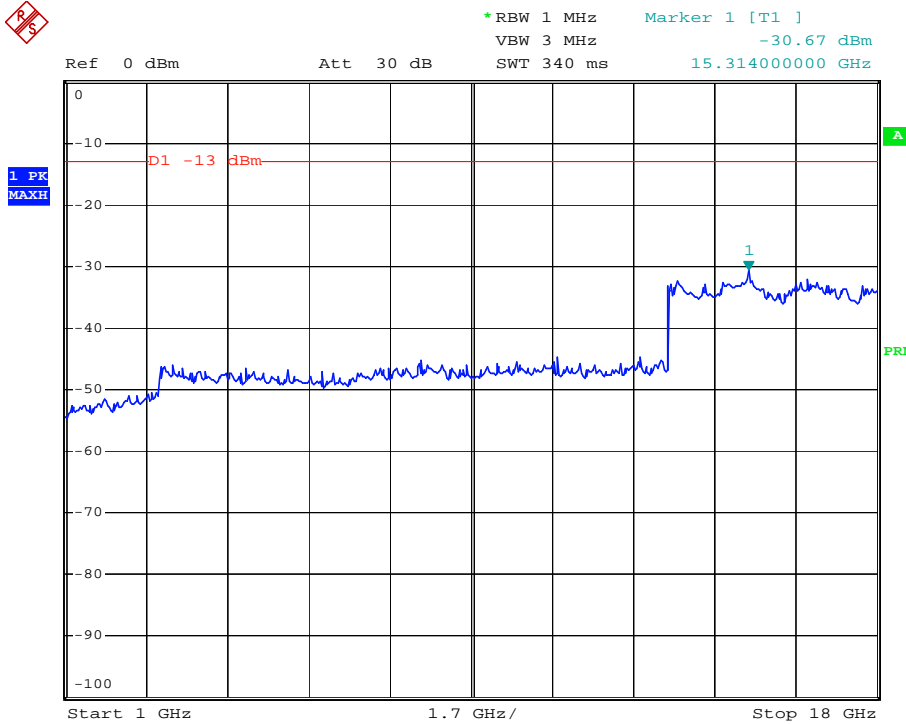
Above 1GHz



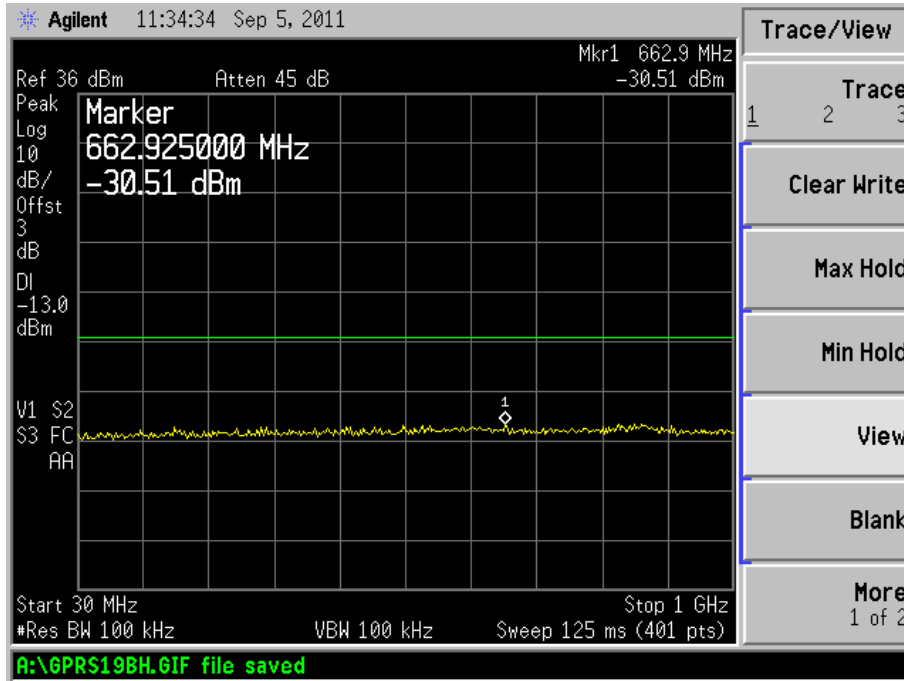
GPRS Middle Channel
30MHz to 1GHz



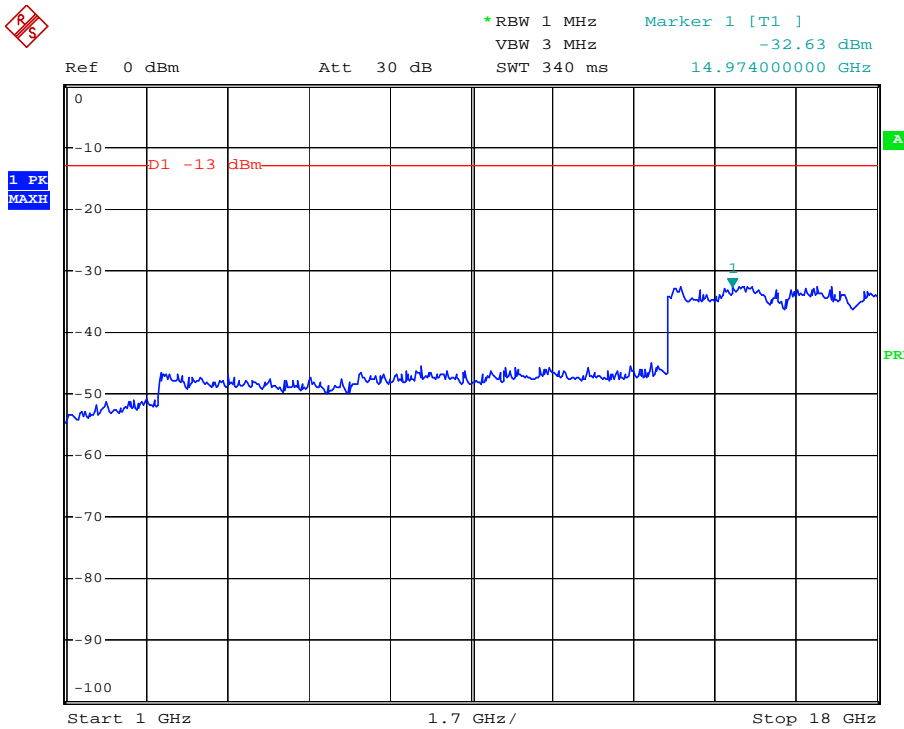
Above 1GHz



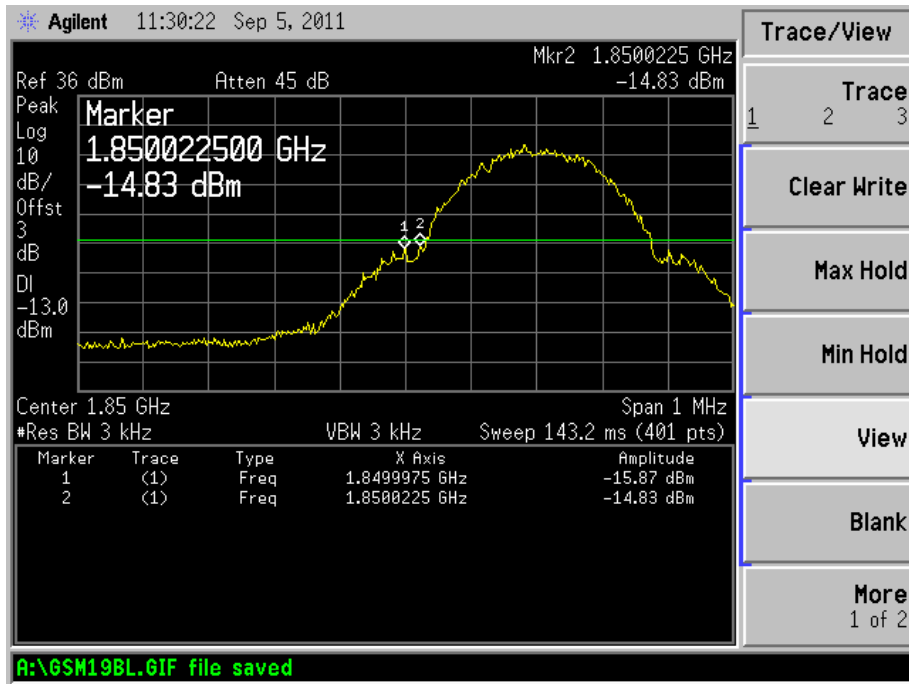
GPRS High Channel
30MHz to 1GHz



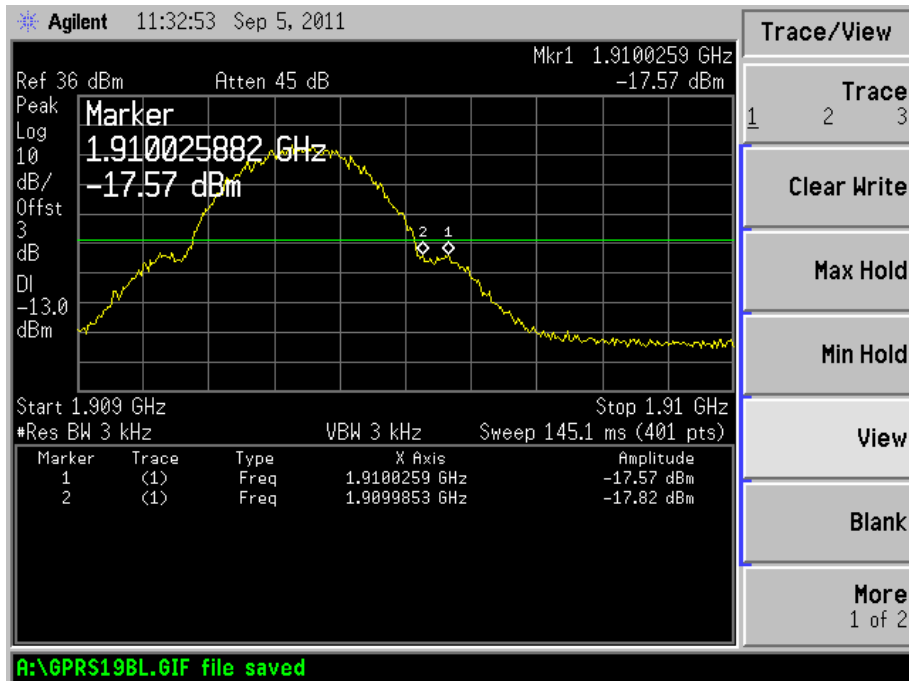
Above 1GHz



GPRS Low Band Emission



GPRS High Band Emission



7. SPURIOUS RADIATION EMISSIONS

7.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 5.20 dB.

7.2 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

7.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2010-12-20	2011-12-19
Signal Generator	R&S	SMR20	100047	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

7.4 Test Procedure

1. The setup of EUT is according with per TIA/EIA Standard 603C and ANSI C63.4-2003 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

$$\text{Spurious attenuation limit in dB} = 43 + 10 \log_{10}(\text{power out in Watts})$$

7.5 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48%
ATM Pressure:	1012 mbar

7.6 Summary of Test Results/Plots

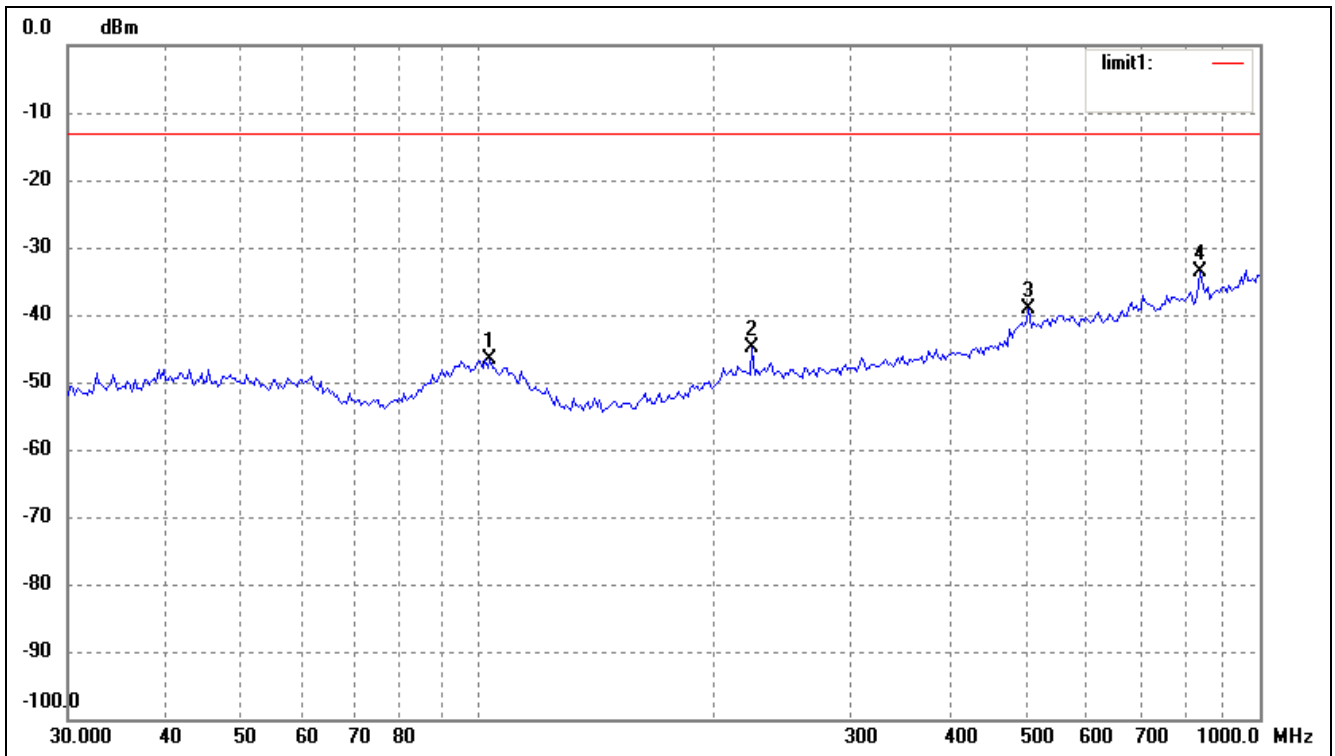
According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

-16.82 dBm at 1648.4 MHz in the Vertical polarization for GSM Band, 30 MHz to 18GHz.

Spurious Emission From 30MHz to 1GHz

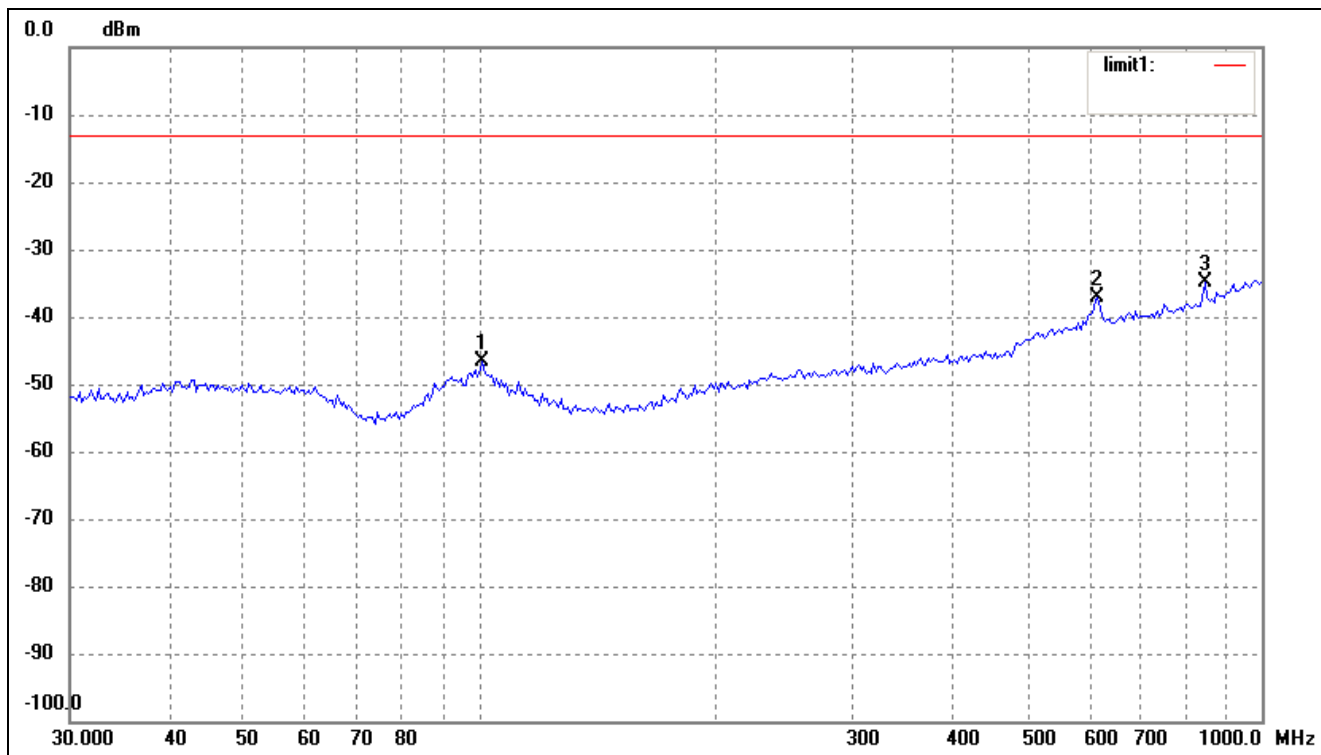
For Cellular Band_GSM Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	103.8055	-66.50	19.91	-46.59	-13.00	-33.59	ERP
2	224.5193	-64.25	19.35	-44.90	-13.00	-31.90	ERP
3	506.4791	-65.58	26.35	-39.23	-13.00	-26.23	ERP
4	839.1818	-65.26	31.55	-33.71	-13.00	-20.71	ERP

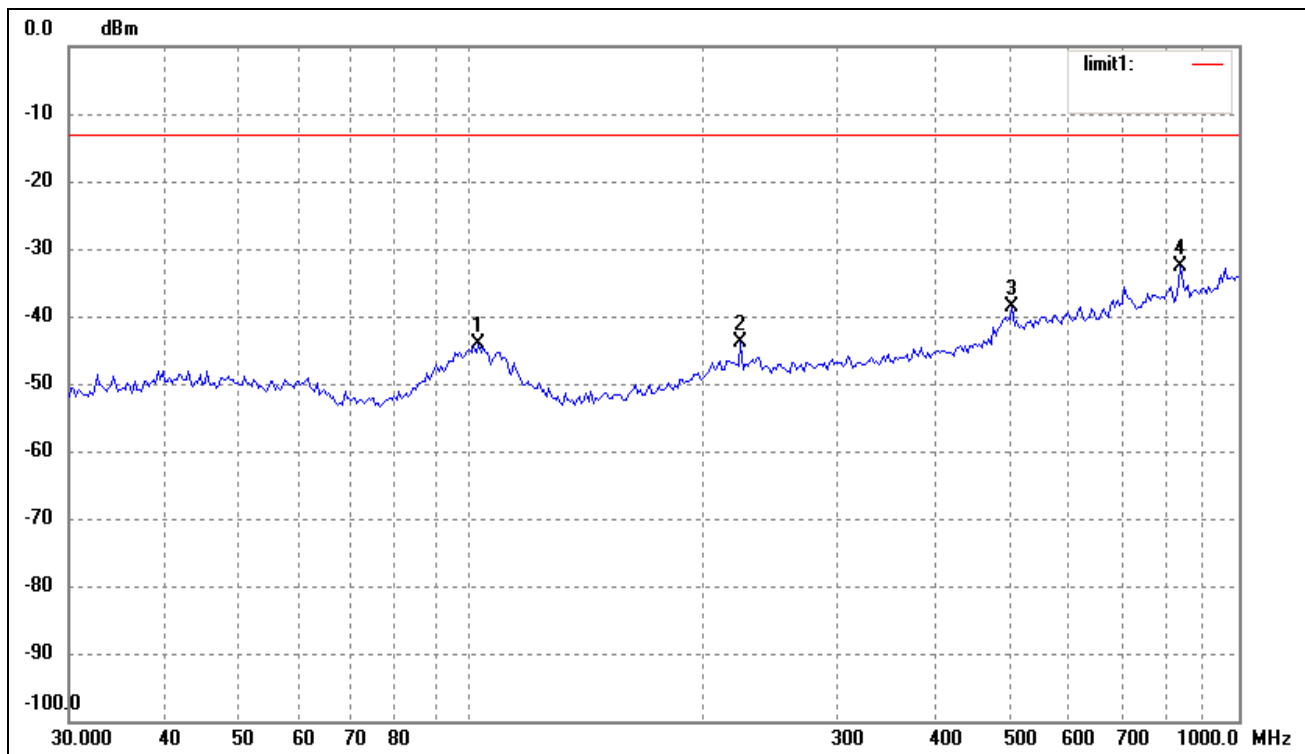
Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	100.9340	-66.81	20.14	-46.67	-13.00	-33.67	ERP
2	616.3718	-65.72	28.60	-37.12	-13.00	-24.12	ERP
3	845.0878	-66.48	31.66	-34.82	-13.00	-21.82	ERP

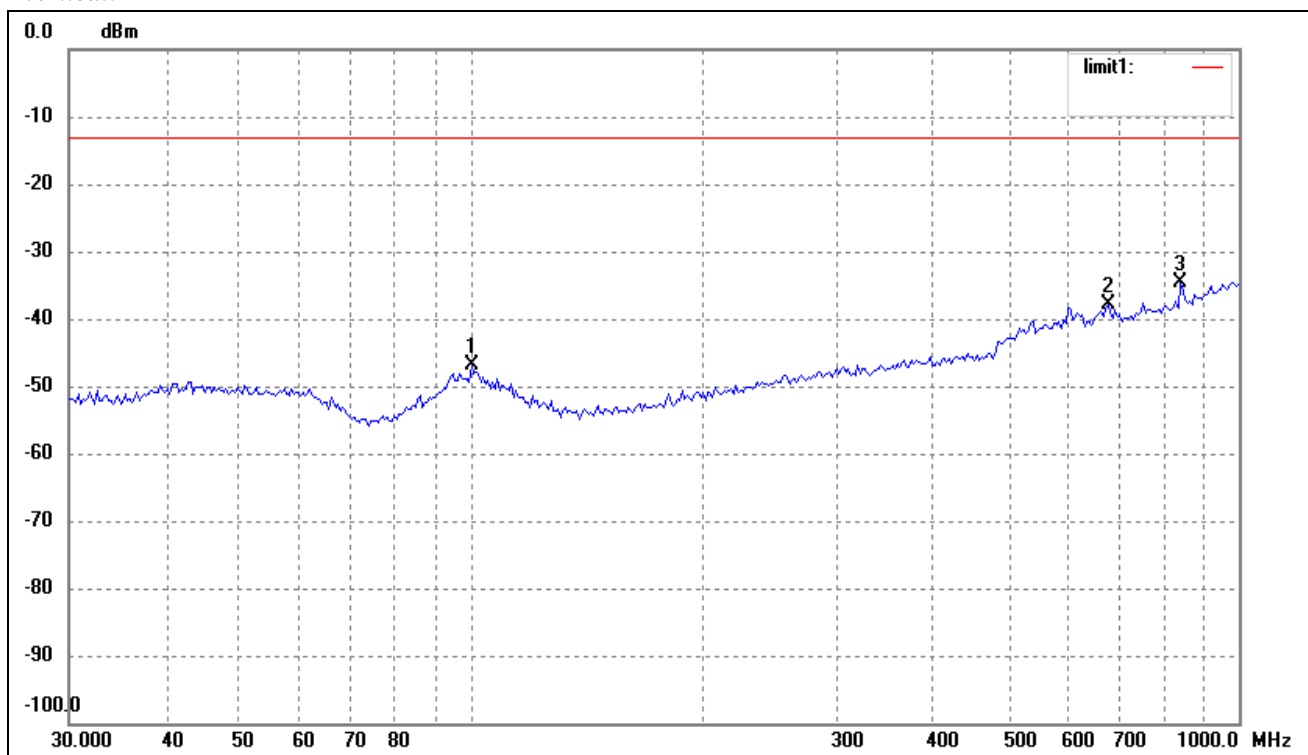
For Cellular Band_GPRS Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	102.3597	-64.25	20.03	-44.22	-13.00	-31.22	ERP
2	224.5193	-63.25	19.35	-43.90	-13.00	-30.90	ERP
3	506.4791	-65.08	26.35	-38.73	-13.00	-25.73	ERP
4	839.1818	-64.26	31.55	-32.71	-13.00	-19.71	ERP

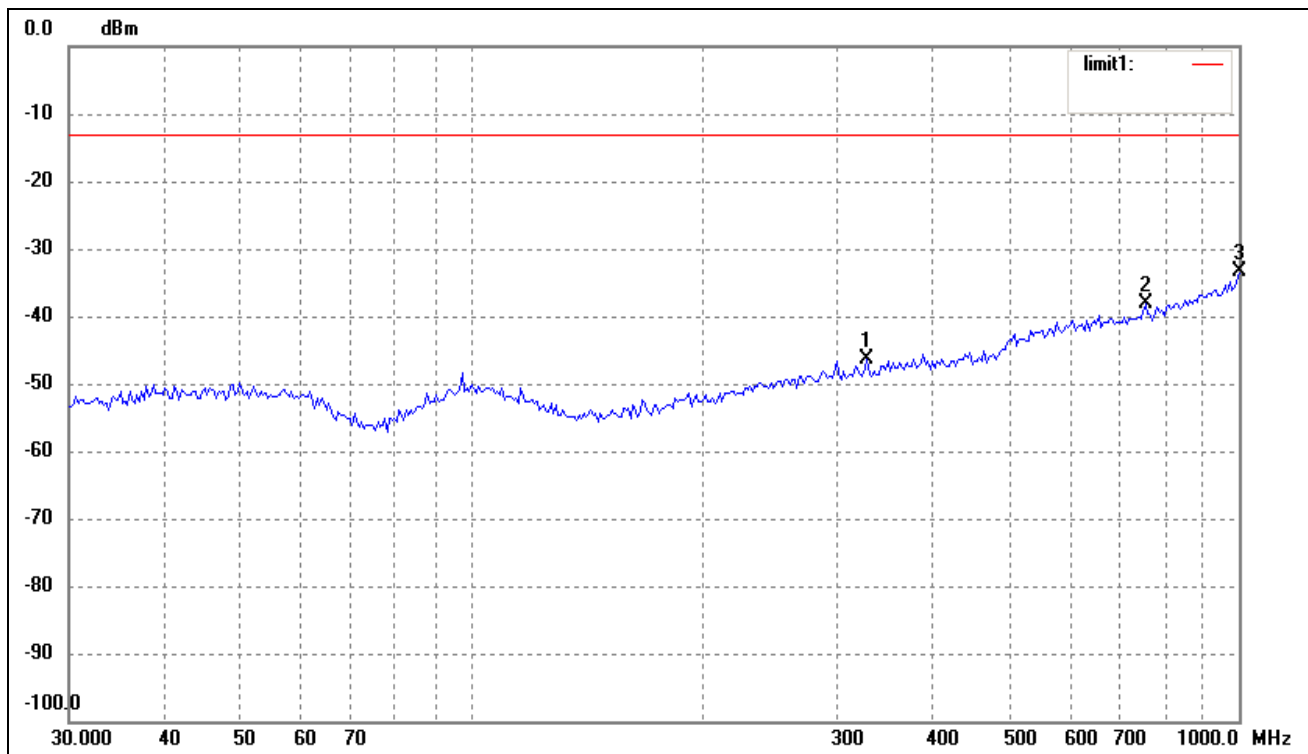
Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	100.2286	-67.00	20.21	-46.79	-13.00	-33.79	ERP
2	675.2079	-66.99	29.09	-37.90	-13.00	-24.90	ERP
3	839.1817	-66.13	31.55	-34.58	-13.00	-21.58	ERP

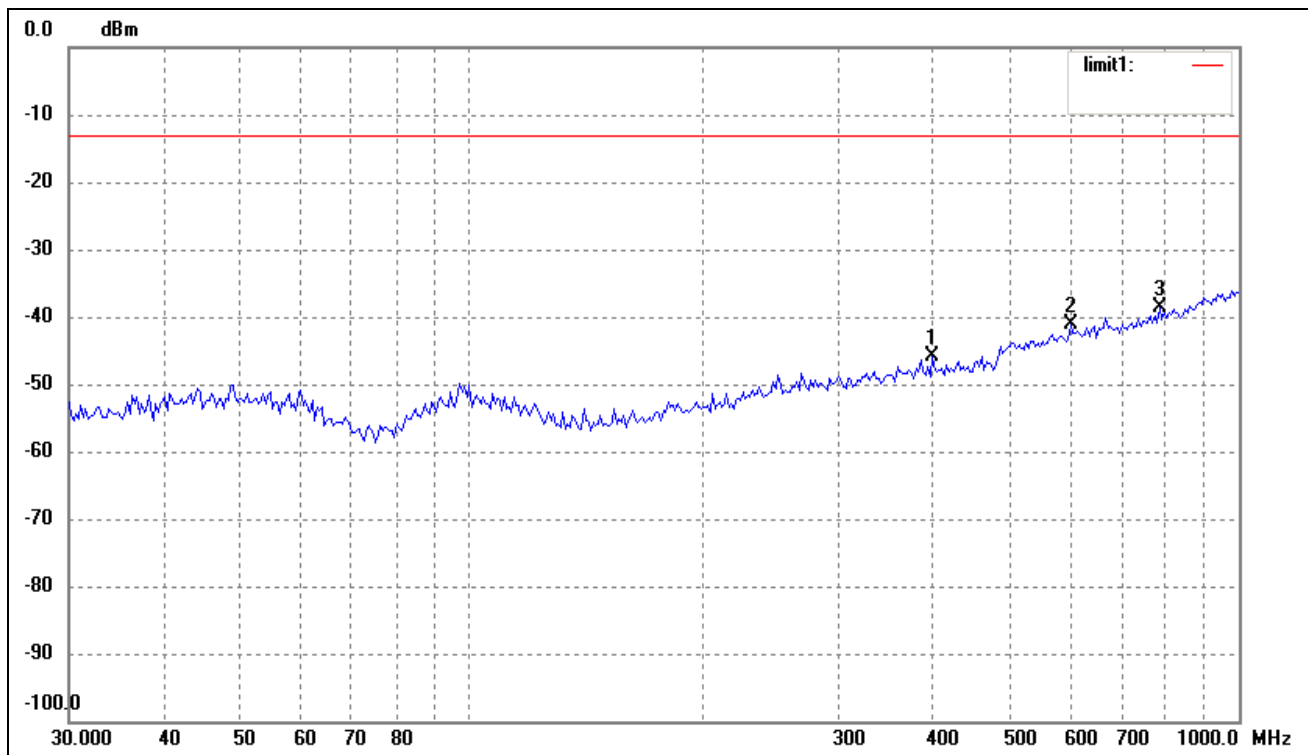
For PCS Band_GSM Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	327.8873	-68.23	21.97	-46.26	-13.00	-33.26	ERP
2	755.3873	-68.23	30.14	-38.09	-13.00	-25.09	ERP
3	1000.0000	-67.83	34.54	-33.29	-13.00	-20.29	ERP

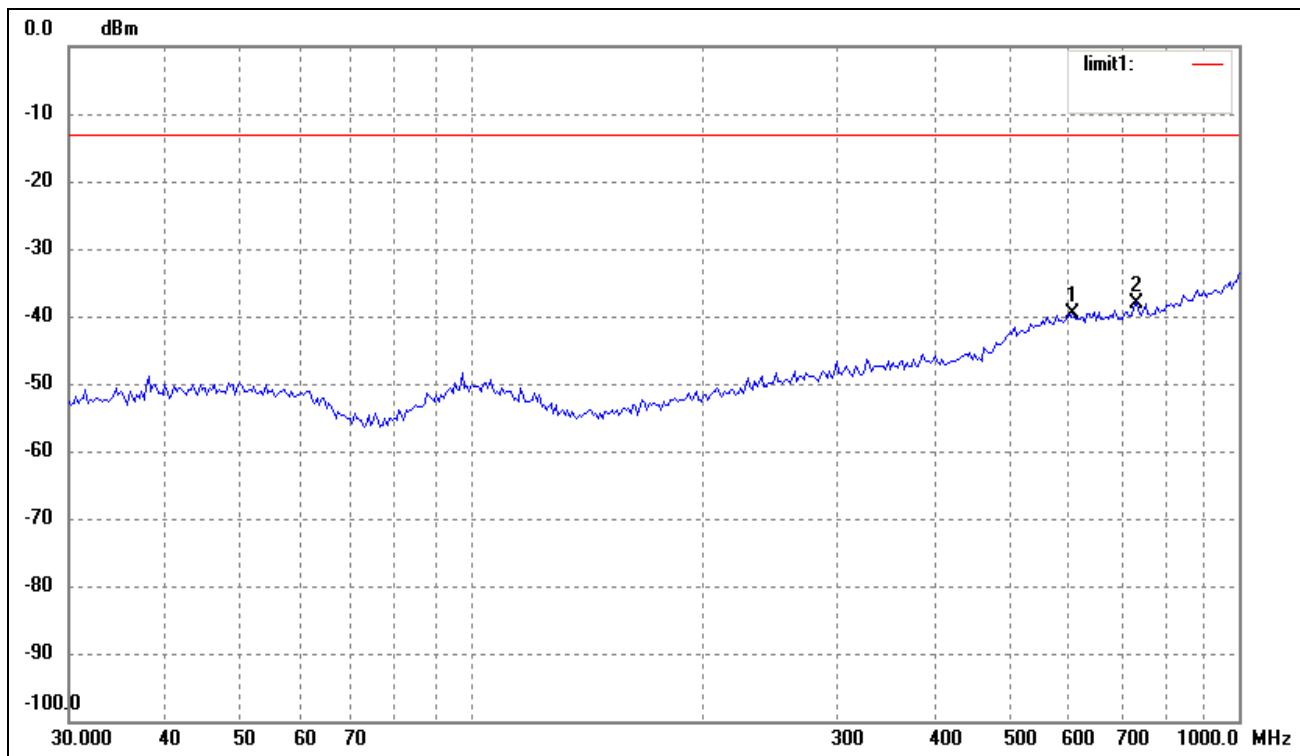
Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	399.0302	-69.19	23.20	-45.99	-13.00	-32.99	ERP
2	603.5392	-69.51	28.50	-41.01	-13.00	-28.01	ERP
3	787.8513	-69.34	30.63	-38.71	-13.00	-25.71	ERP

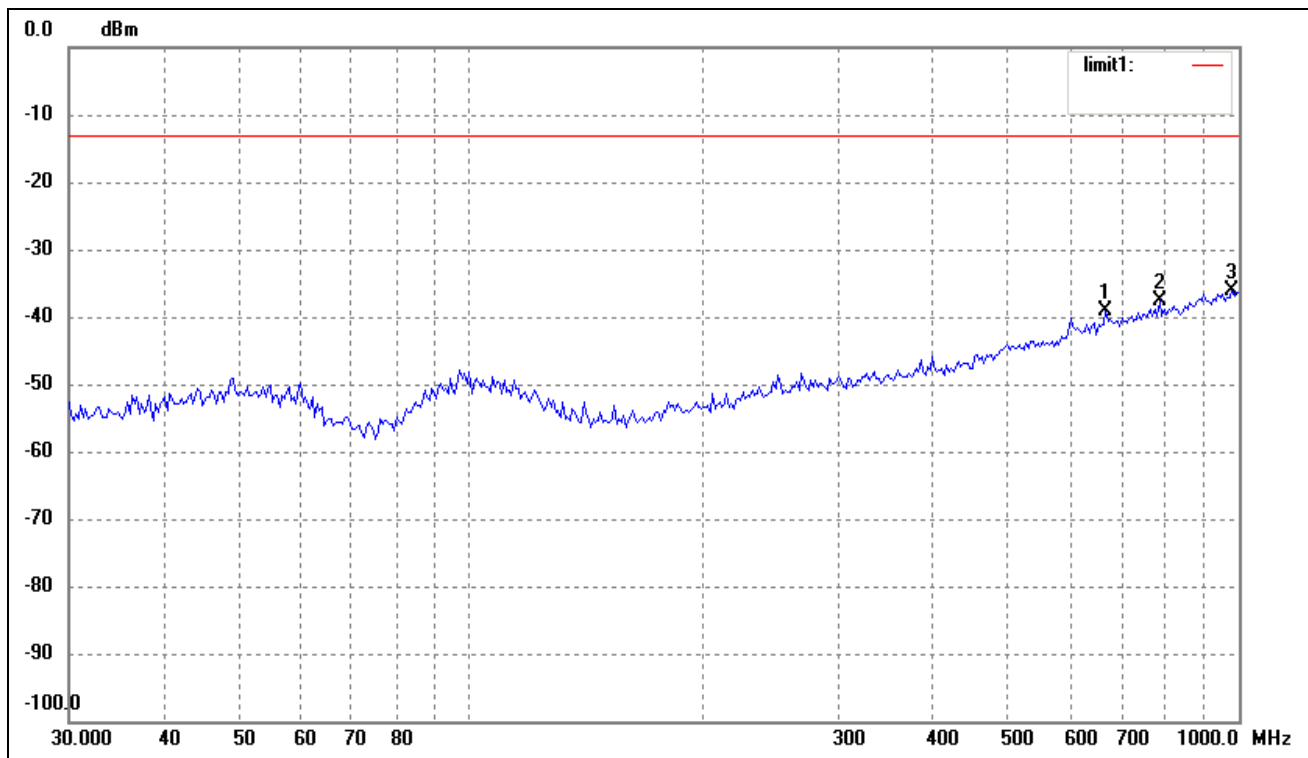
For PCS Band_GPRS Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	607.7867	-68.10	28.53	-39.57	-13.00	-26.57	ERP
2	734.4913	-67.82	29.82	-38.00	-13.00	-25.00	ERP

Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	670.4892	-68.11	29.06	-39.05	-13.00	-26.05	ERP
2	787.8513	-68.34	30.63	-37.71	-13.00	-24.71	ERP
3	979.1803	-70.29	34.16	-36.13	-13.00	-23.13	ERP

*Spurious Emissions Above 1GHz
For Cellular Band_GSM Mode*

Frequency	SG Reading	Height	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 22H	
							Limit	Margin
MHz	dBm	Meter	H / V	dB	dB	dBm	dBm	dB
Low Channel (824.2MHz)								
1648.4	-35.62	1.5	V	1.8	7.6	-29.82	-13	-16.82
2472.6	-43.86	1.5	V	2.4	7.9	-38.36	-13	-25.36
1648.4	-41.67	2.0	H	1.8	7.6	-35.87	-13	-22.87
2472.6	-45.94	2.0	H	2.4	7.9	-40.44	-13	-27.44
Middle Channel (836.6MHz)								
1673.2	-37.86	1.5	V	1.9	7.6	-32.16	-13	-19.16
2509.8	-39.68	1.5	V	2.5	7.9	-34.28	-13	-21.28
1673.2	-41.56	2.0	H	1.9	7.6	-35.86	-13	-22.86
2509.8	-43.86	2.0	H	2.5	7.9	-38.46	-13	-25.46
High Channel (848.8MHz)								
1697.6	-35.98	1.5	V	2.0	7.6	-30.38	-13	-17.38
2546.4	-37.26	1.5	V	2.6	7.9	-31.96	-13	-18.96
1697.6	-41.68	2.0	H	2.0	7.6	-36.08	-13	-23.08
2546.4	-42.91	2.0	H	2.6	7.9	-37.61	-13	-24.61

For PCS Band_GSM Mode

Frequency	SG Reading	Height	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 24E	
							Limit	Margin
MHz	dBm	Meter	H / V	dB	dB	dBm	dBm	dB
Low Channel (1850.2MHz)								
3700.4	-36.58	1.5	V	2.9	8.3	-31.18	-13	-18.18
5550.6	-41.23	1.5	V	3.7	8.6	-36.33	-13	-23.33
3700.4	-43.89	2.0	H	2.9	8.3	-38.49	-13	-25.49
5550.6	-45.78	2.0	H	3.7	8.6	-40.88	-13	-27.88
Middle Channel (1880MHz)								
3760	-36.86	1.5	V	2.9	8.4	-31.36	-13	-18.36
5640	-42.98	1.5	V	3.7	8.7	-37.98	-13	-24.98
3760	-41.63	2.0	H	2.9	8.4	-36.13	-13	-23.13
5640	-45.82	2.0	H	3.7	8.7	-40.82	-13	-27.82
High Channel (1909.8MHz)								
3819.6	-36.53	1.5	V	2.9	8.4	-31.03	-13	-18.03
5729.4	-42.16	1.5	V	3.7	8.7	-37.16	-13	-24.16
3819.6	-44.86	2.0	H	2.9	8.4	-39.36	-13	-26.36
5729.4	-47.62	2.0	H	3.7	8.7	-42.62	-13	-29.62

For Cellular Band_GPRS Mode

Frequency	SG	Height	Polar	Cable loss	Antenna	Corrected Ampl.	FCC Part 22H	
	Reading				Gain		Limit	Margin
MHz	dBm	Meter	H / V	dB	dB	dBm	dBm	dB
Low Channel (824.2MHz)								
1648.4	-37.62	1.5	V	1.8	7.6	-31.82	-13	-18.82
2472.6	-44.95	1.5	V	2.4	7.9	-39.45	-13	-26.45
1648.4	-43.28	2.0	H	1.8	7.6	-37.48	-13	-24.48
2472.6	-47.16	2.0	H	2.4	7.9	-41.66	-13	-28.66
Middle Channel (836.6MHz)								
1673.2	-35.68	1.5	V	1.9	7.6	-29.98	-13	-16.98
2509.8	-41.26	1.5	V	2.5	7.9	-35.86	-13	-22.86
1673.2	-43.49	2.0	H	1.9	7.6	-37.79	-13	-24.79
2509.8	-48.53	2.0	H	2.5	7.9	-43.13	-13	-30.13
High Channel (848.8MHz)								
1697.6	-36.23	1.5	V	2.0	7.6	-30.63	-13	-17.63
2546.4	-41.08	1.5	V	2.6	7.9	-35.78	-13	-22.78
1697.6	-42.17	2.0	H	2.0	7.6	-36.57	-13	-23.57
2546.4	-47.39	2.0	H	2.6	7.9	-42.09	-13	-29.09

For PCS Band_GPRS Mode

Frequency	SG	Height	Polar	Cable loss	Antenna	Corrected Ampl.	FCC Part 24E	
	Reading				Gain		Limit	Margin
MHz	dBm	Meter	H / V	dB	dB	dBm	dBm	dB
Low Channel (1850.2MHz)								
3700.4	-36.23	1.5	V	2.9	8.3	-30.83	-13	-17.83
5550.6	-44.10	1.5	V	3.7	8.6	-39.2	-13	-26.2
3700.4	-42.56	2.0	H	2.9	8.3	-37.16	-13	-24.16
5550.6	-51.68	2.0	H	3.7	8.6	-46.78	-13	-33.78
Middle Channel (1880MHz)								
3760	-38.94	1.5	V	2.9	8.4	-33.44	-13	-20.44
5640	-47.60	1.5	V	3.7	8.7	-42.6	-13	-29.6
3760	-44.26	2.0	H	2.9	8.4	-38.76	-13	-25.76
5640	-50.38	2.0	H	3.7	8.7	-45.38	-13	-32.38
High Channel (1909.8MHz)								
3819.6	-39.56	1.5	V	2.9	8.4	-34.06	-13	-21.06
5729.4	-44.78	1.5	V	3.7	8.7	-39.78	-13	-26.78
3819.6	-46.23	2.0	H	2.9	8.4	-40.73	-13	-27.73
5729.4	-53.29	2.0	H	3.7	8.7	-48.29	-13	-35.29

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 10th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

8. FREQUENCY STABILITY

8.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

8.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B-ESA	US41192821	2010-12-20	2011-12-19
Rohde & Schwarz	Universal Radio Communication	CMU200	112012	2010-12-20	2011-12-19
GONGWEN	Moisture Test Chamber	GDS-150	SEMT-0013	2011-07-16	2012-07-15

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

8.3 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	85-115% of declared nominal voltage
-30°C to +50°C	Normal

8.4 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

8.5 Summary of Test Results/Plots

For Cellular Band_GSM Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
50	3.7	31	0.03705
40	3.7	28	0.03346
30	3.7	21	0.02510
20	3.7	14	0.01673
10	3.7	10	0.01195
0	3.7	-5	-0.00597
-10	3.7	-8	-0.00956
-20	3.7	-9	-0.01075
-30	3.7	-12	-0.01434

For Cellular Band_GPRS Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
50	3.7	29	0.03466
40	3.7	24	0.02868
30	3.7	18	0.02151
20	3.7	14	0.01673
10	3.7	7	0.00836
0	3.7	2	0.00239
-10	3.7	-7	-0.00836
-20	3.7	-12	-0.01434
-30	3.7	-16	-0.01912

For PCS Band_GSM Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
50	3.7	51	0.02712
40	3.7	48	0.02253
30	3.7	40	0.02127
20	3.7	34	0.01808
10	3.7	21	0.01117
0	3.7	10	0.00531
-10	3.7	1	0.00053
-20	3.7	-5	-0.00265
-30	3.7	-9	-0.00478

For PCS Band_GPRS Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
50	3.7	32	0.01702
40	3.7	23	0.01223
30	3.7	19	0.01010
20	3.7	13	0.00691
10	3.7	6	0.00316
0	3.7	-3	-0.00159
-10	3.7	-10	-0.00531
-20	3.7	-17	-0.00904
-30	3.7	-24	-0.01276

So, Frequency Stability Versus Input Voltage is:

GSM Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
20	3.3V	10	0.01195
	3.7V	14	0.01673
	4.2V	16	0.01912
Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
20	3.3V	28	0.01489
	3.7V	34	0.01808
	4.2V	38	0.02021

GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
20	3.3V	8	0.00956
	3.7V	14	0.01673
	4.2V	17	0.02032
Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency error (Hz)	Error (ppm)
20	3.3V	6	0.003191
	3.7V	13	0.006914
	4.2V	19	0.010106

***** END OF REPORT *****