FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E

TEST REPORT

For

Mobile Phone

Model: WX245g, WX244

Trade Name: MOTOROLA

Issued to

Motorola Inc.
600 N. U.S. Highway 45 Libertyville,
Illinois United states 60048-5343

Issued by

Compliance Certification Services Inc.
No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan (R.O.C.)
http://www.ccsrf.com
service@ccsrf.com

Testing Laboratory
1309

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

Applicant:	Motorola Inc. 600 N. U.S. Highway 45 Libertyville, Illinois United states 60048-5343
Equipment Under Test:	Mobile Phone
Trade Name:	MOTOROLA
Model Number:	WX245g, WX244
Date of Test:	May 26 ~ 31, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C: 2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 Subpart H and PART 24 Subpart E.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Gina Lo
Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Mobile Phone
Trade Name	MOTOROLA
Model Number	WX245g, WX244
Model Discrepancy	All the specification and layout are identical except they come with different model numbers for marketing purposes.
Module Trade Name	MTK
Module Model Number	MTK6223D
Power Supply	1. Powered by Power Adapter Trade / Model: MOTOROLA / DCH3-050US-0303 I/P: 100-240VAC, 50-60Hz, 0.2A O/P: 5V, 550mA 2. Battery Model: BQ50 Rating: 3.7V, 910mAh
Frequency Range	GSM: 850: 824.2 ~ 848.8 MHz GSM: 1900: 1850.2 ~ 1909.8 MHz
Transmit Power (ERP & EIRP Power)	GSM 850: 30.29dBm GSM 1900: 29.56 dBm
Modulation Technique	GSM: GMSK
Type of Emission	GSM 850 MHz: 254KGXW--- GSM 1900 MHz: 252KGXW---
Antenna Gain	GSM 850 MHz: -4.18 dBi GSM 1900 MHz: -4.33 dBi
Antenna Type	Embedded inverted-F antenna

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **IHDP56LJ4** filing to comply with Part 22 and Part 24 of the FCC 47 CFR Rules.*

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4: 2003, TIA/EIA-603-C: 2004 and FCC CFR 47, Part 2, PART 22 SUBPART H AND PART 24 SUBPART E

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.

3.4 DESCRIPTION OF TEST MODES

The EUT (model: WX245g) had been tested under operating condition.

EUT staying in continuous transmitting mode was programmed.

GSM 850:
Channel Low (CH128), Channel Mid (CH190) and Channel High (CH251) were chosen for full testing.

GSM 1900:
Channel Low (CH512), Channel Mid (CH661) and Channel High (CH810) were chosen for full testing.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

Based on the above results from the different modulations, GSM850 / GSM1900 were determined to be the worst-case scenario for all tests.

The worst emission was found:
in lie-down (Y axis) for GSM 850 mode,
stand-up position (Z axis) for GSM 1900 mode.

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY43360131	03/03/2011
Power Meter	Agilent	E4416A	GB41291611	06/28/2010
Power Sensor	Agilent	E9327A	US40441097	06/28/2010
Temp. / Humidity Chamber	Terchy	MHG-150LF	930619	09/15/2010
DC Power Source	Agilent	E3640A	MY40001774	01/08/2011

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	US42510252	10/26/2010
EMI Test Receiver	R&S	ESCI	100064	02/04/2011
Pre-Amplifier	Mini-Circults	ZFL-1000LN	SF350700823	01/13/2011
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	1415367	11/20/2010
Bilog Antenna	Sunol Sciences	JB3	A030105	09/11/2010
Horn Antenna	EMCO	3117	00055165	12/07/2010
Loop Antenna	EMCO	6502	8905/2356	05/27/2011
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Site NSA	CCS	N/A	N/A	12/31/2010
Test S/W	EZ-EMC (CCS-3A1RE)			

Powerline Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESHS30	828144/003	12/06/2010
LISN	EMCO	3825/2	9106-1809	05/02/2011
LISN	SCHAFFNER	NNB 41	03/10013	12/03/2010
Test S/W	CCS-3A1-CE			

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.6202
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0606
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9979
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5790
3M Semi Anechoic Chamber / 8G~18G	+/- 2.5928
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7212
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9520

***Remark**: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	IC 2324G-1 IC 2324G-2

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
1.	8960 Series 10 Wireless Communication test set (Remote)	Agilent	E5515C	GB44051665	N/A	N/A	Unshielded, 1.8m

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

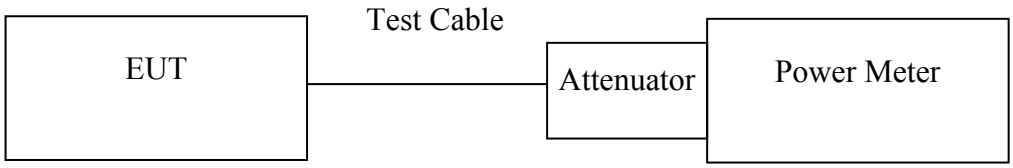
7. FCC PART 22 & 24 REQUIREMENTS

7.1 PEAK POWER

LIMIT

According to FCC §2.1046.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

TEST RESULTS

No non-compliance noted.

Test Data

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
GSM 850 (Class 10)	128	824.20	32.00	1.5849
	190	836.40	31.70	1.4791
	251	848.80	31.90	1.5488

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
GSM 1900 (Class 10)	512	1850.20	29.30	0.8511
	661	1880.00	29.70	0.9333
	810	1909.80	29.70	0.9333

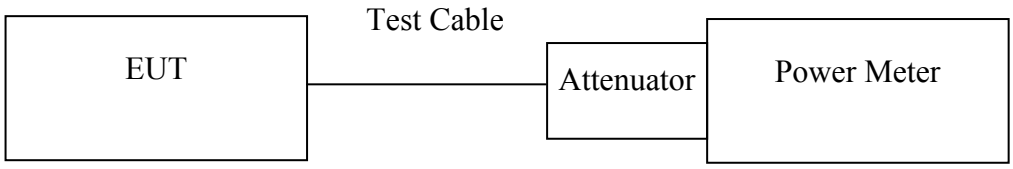
Remark: *The value of factor includes both the loss of cable and external attenuator*

7.2 AVERAGE POWER

LIMIT

For reporting purposes only.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

TEST RESULTS

No non-compliance noted.

TEST RESULTS

No non-compliance noted.

Test Data

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
GSM 850 (Class 10)	128	824.20	31.90	1.5488
	190	836.40	31.60	1.4454
	251	848.80	31.70	1.4791

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
GSM 1900 (Class 10)	512	1850.20	29.20	0.8318
	661	1880.00	29.50	0.8913
	810	1909.80	29.60	0.9120

Remark: *The value of factor includes both the loss of cable and external attenuator*

7.3 ERP & EIRP MEASUREMENT

LIMIT

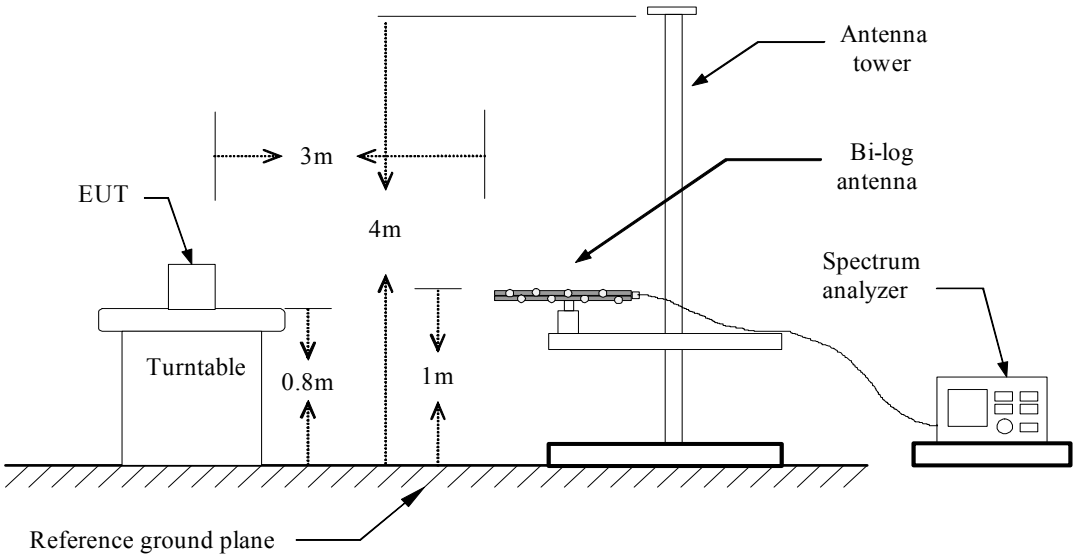
According to FCC §2.1046

FCC 22.913(a): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

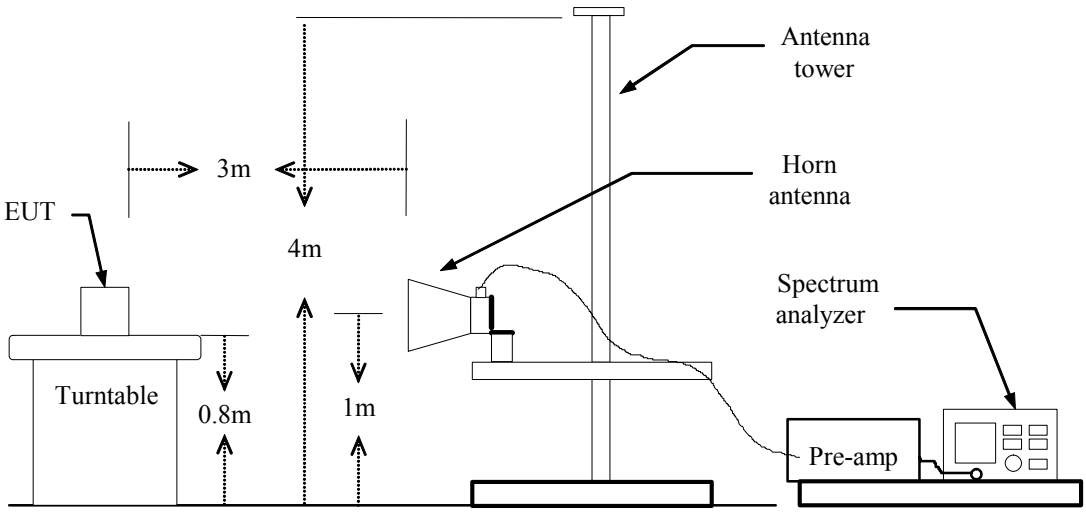
FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

Test Configuration

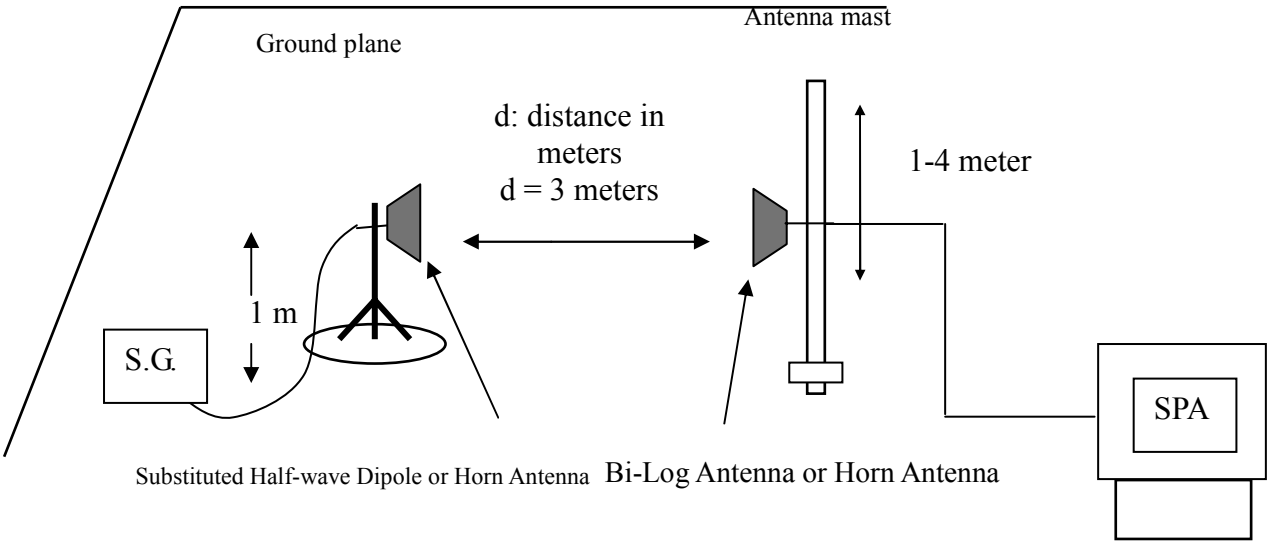
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



TEST PROCEDURE

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement of the EUT, the resolution bandwidth was set to 3MHz and the average bandwidth was set to 3MHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824-849MHz, and EIRP in frequency band 1851.25 –1910MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849MHz) or horn antenna (1851.25-1910MHz) connected to a signal generator. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable (dB)
EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)

TEST RESULTS

No non-compliance noted.

GSM 850 TEST DATA (CLASS 10)

EUT Pol.	Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
X	128	824.20	V	-11.27	34.62	23.35	38.50	-15.15
		824.20	H	-5.29	34.65	29.36	38.50	-9.14
	190	836.40	V	-9.69	34.53	24.84	38.50	-13.66
		836.40	H	-4.87	34.63	29.77	38.50	-8.73
	251	848.80	V	-9.88	34.64	24.76	38.50	-13.74
		848.80	H	-5.48	34.75	29.27	38.50	-9.23
Y	128	824.20	V	-11.53	34.62	23.09	38.50	-15.41
		824.20	H	-4.36	34.65	***30.29**	38.50	-8.21
	190	836.40	V	-11.11	34.53	23.42	38.50	-15.08
		836.40	H	-5.21	34.63	29.42	38.50	-9.08
	251	848.80	V	-11.75	34.64	22.88	38.50	-15.62
		848.80	H	-6.40	34.75	28.35	38.50	-10.15
Z	128	824.20	V	-5.51	34.62	29.11	38.50	-9.39
		824.20	H	-13.34	34.65	21.31	38.50	-17.19
	190	836.40	V	-4.46	34.52	30.06	38.50	-8.44
		836.40	H	-9.05	34.63	25.58	38.50	-12.92
	251	848.80	V	-6.16	34.64	28.48	38.50	-10.02
		848.80	H	-7.94	34.75	26.81	38.50	-11.69

GSM 1900 TEST DATA (CLASS 10)

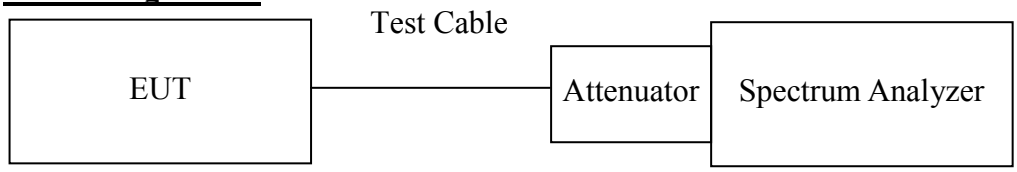
EUT Pol.	Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
X	512	1850.20	V	-19.36	41.17	21.81	33.00	-11.19
		1850.20	H	-13.38	40.79	27.41	33.00	-5.59
	661	1880.00	V	-19.44	41.23	21.79	33.00	-11.21
		1880.00	H	-13.37	41.15	27.78	33.00	-5.22
	810	1909.80	V	-20.89	41.30	20.42	33.00	-12.58
		1909.80	H	-13.52	41.37	27.86	33.00	-5.14
Y	512	1850.20	V	-12.73	41.17	28.44	33.00	-4.56
		1850.20	H	-19.06	40.79	21.73	33.00	-11.27
	661	1880.00	V	-12.78	41.23	28.45	33.00	-4.55
		1880.00	H	-18.90	41.14	22.24	33.00	-10.76
	810	1909.80	V	-12.61	41.30	28.69	33.00	-4.31
		1909.80	H	-19.57	41.37	21.80	33.00	-11.20
Z	512	1850.20	V	-17.05	41.17	24.12	33.00	-8.88
		1850.20	H	-12.57	40.79	28.22	33.00	-4.78
	661	1880.00	V	-16.43	41.23	24.80	33.00	-8.20
		1880.00	H	-11.58	41.14	***29.56**	33.00	-3.44
	810	1909.80	V	-16.12	41.30	25.19	33.00	-7.81
		1909.80	H	-11.82	41.38	29.56	33.00	-3.44

7.4 OCCUPIED BANDWIDTH MEASUREMENT

LIMIT

According to §FCC 2.1049.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW is set to 3 times the RBW, -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

No non-compliance noted

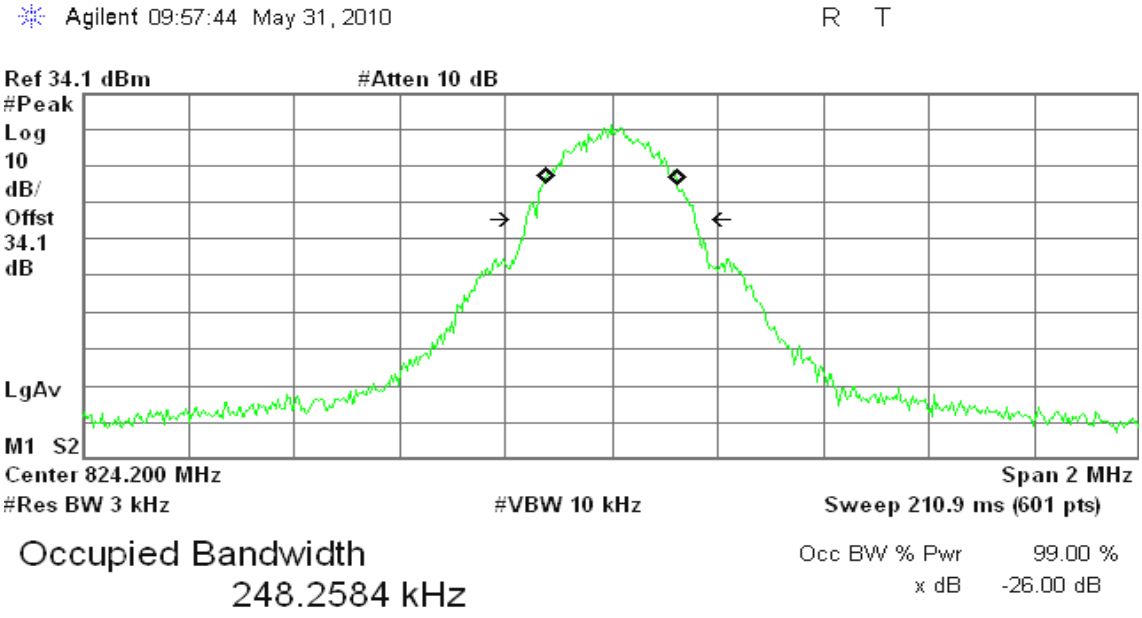
Test Data

Test Mode	CH	Frequency (MHz)	99% Bandwidth (kHz)
GSM 850 (Class 10)	128	824.200	248.2584
	190	836.600	250.9068
	251	848.800	254.0920

Test Mode	CH	Frequency (MHz)	99% Bandwidth (kHz)
GSM 1900 (Class 10)	512	1850.200	249.5741
	661	1880.000	249.2909
	810	1909.800	252.1441

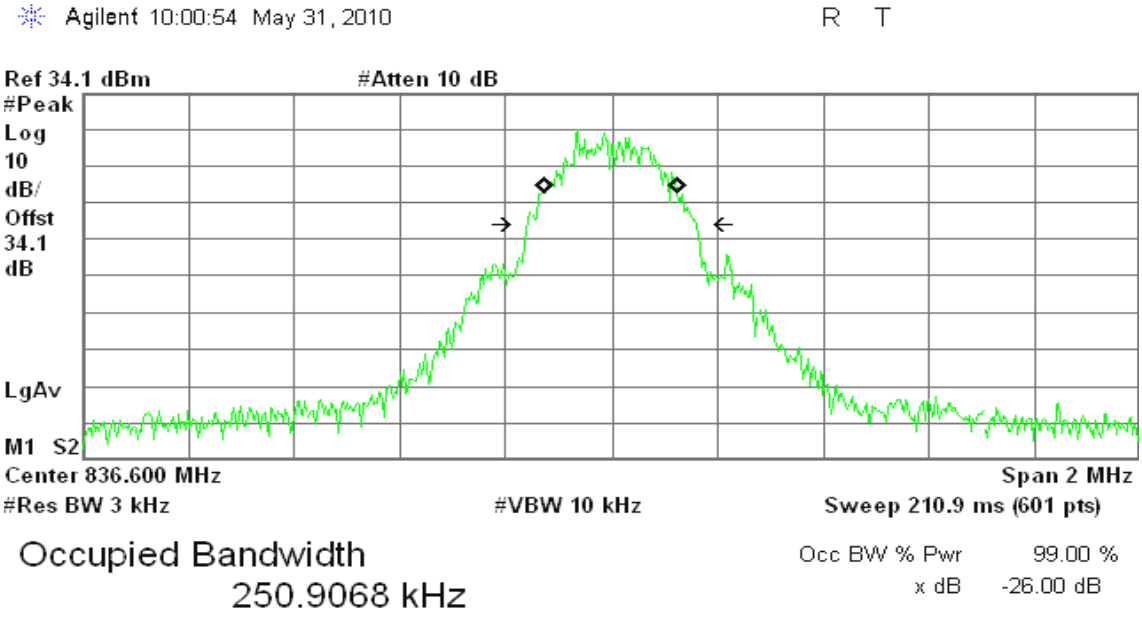
Test Plot

GSM 850 (CH Low)



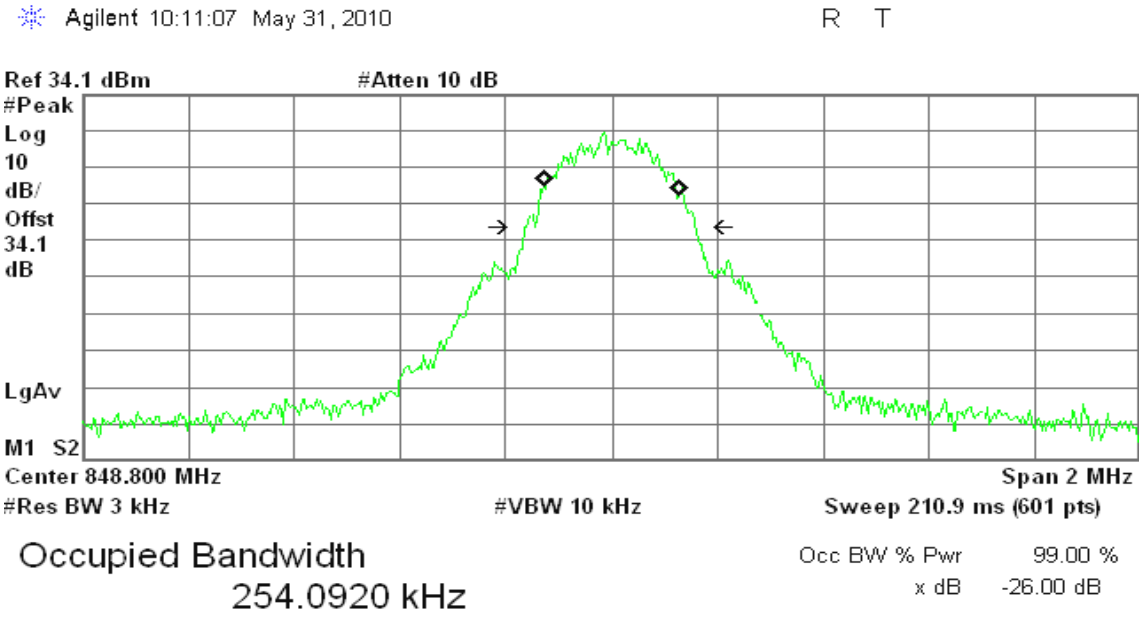
Transmit Freq Error	-637.642 Hz
x dB Bandwidth	318.041 kHz

GSM 850 (CH Mid)



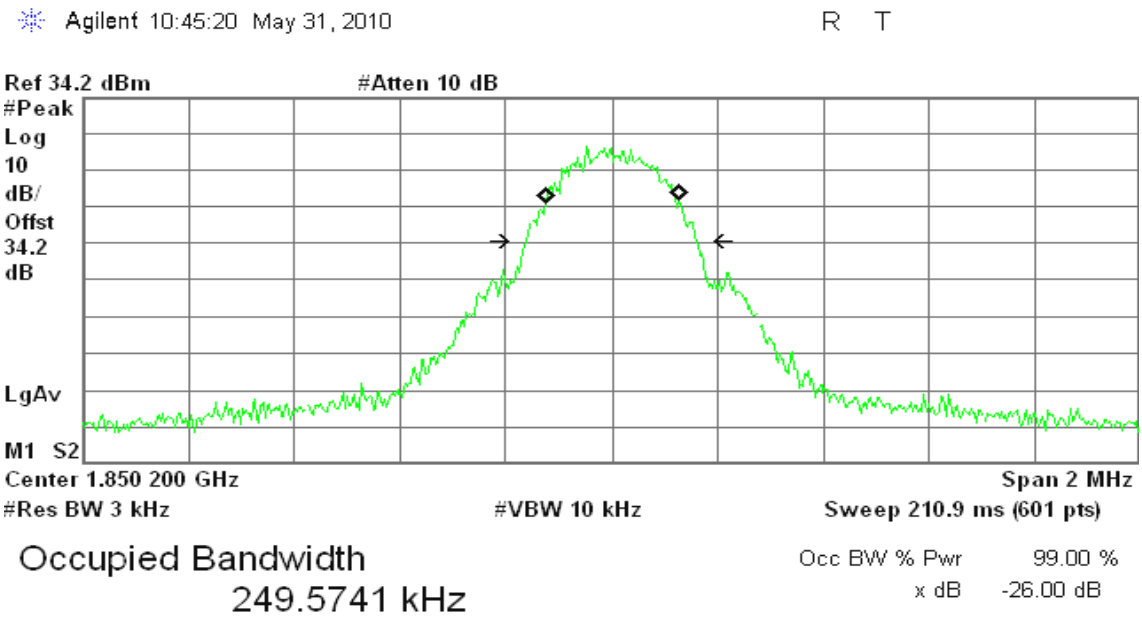
Transmit Freq Error	-1.865 kHz
x dB Bandwidth	318.370 kHz

GSM 850 (CH High)



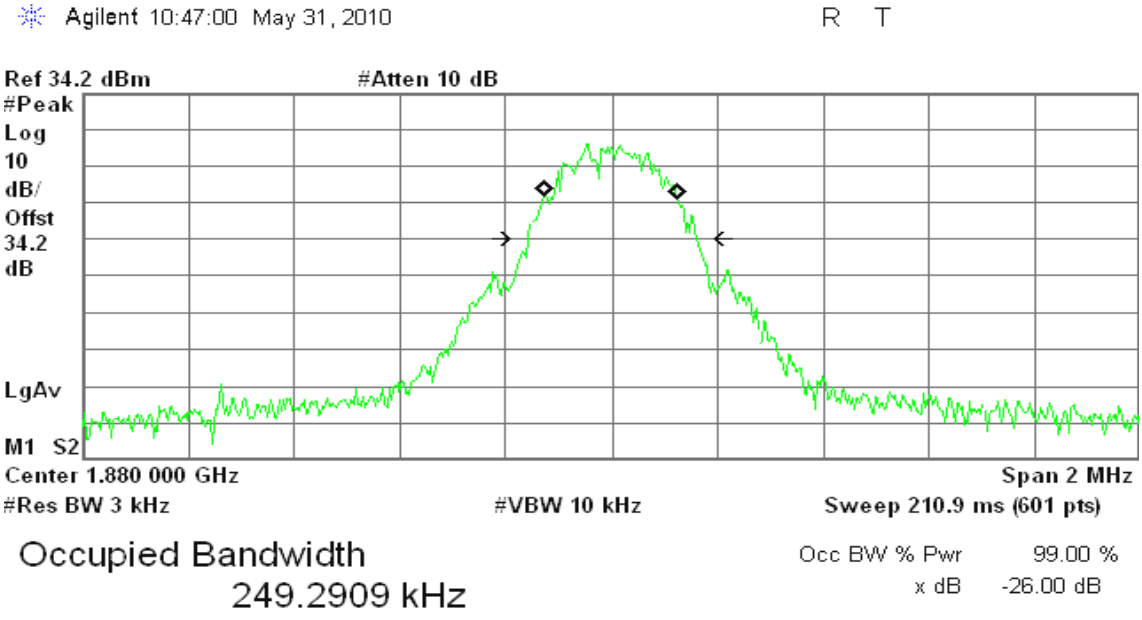
Transmit Freq Error	997.644 Hz
x dB Bandwidth	322.184 kHz

GSM 1900 (CH Low)



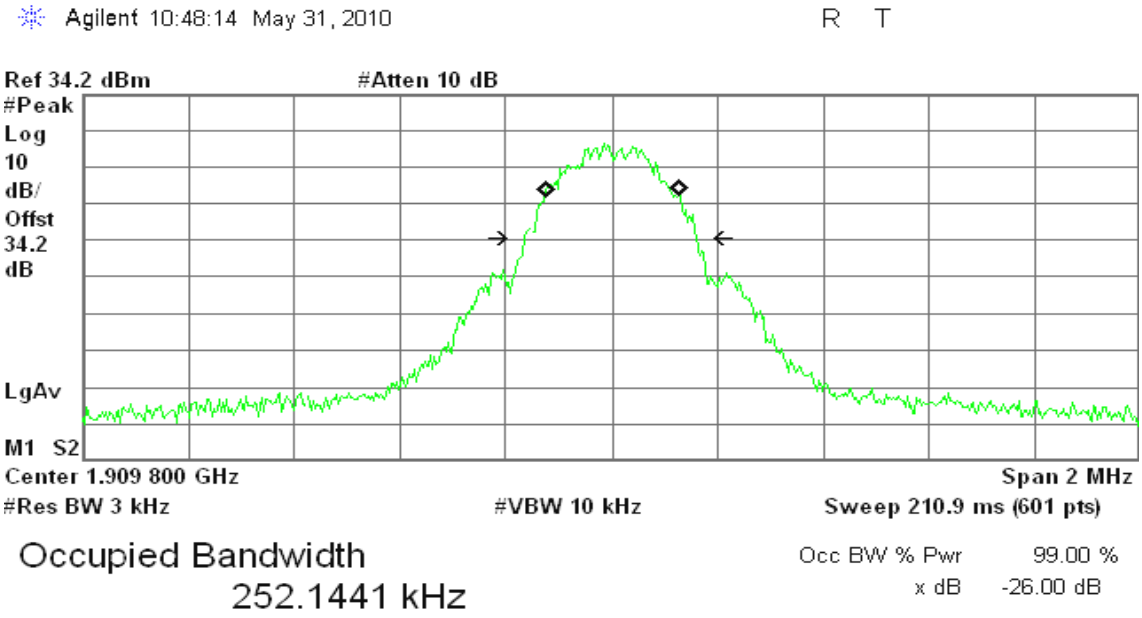
Transmit Freq Error	1.278 kHz
x dB Bandwidth	318.959 kHz

GSM 1900 (CH Mid)



Transmit Freq Error	-414.833 Hz
x dB Bandwidth	317.795 kHz

GSM 1900 (CH High)



Transmit Freq Error	1.321 kHz
x dB Bandwidth	324.430 kHz

7.5 OUT OF BAND EMISSION AT ANTENNA TERMINALS

LIMIT

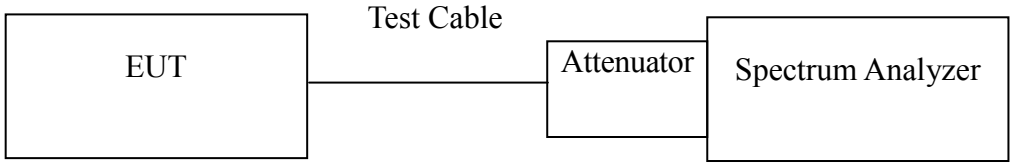
According to FCC §2.1051, FCC §22.917, FCC §24.238(a).

Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at lease 43 + 10 log P dB.

Mobile Emissions in Base Frequency Range: The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed –80 dBm at the transmit antenna connector.
Band Edge Requirements: In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at lease 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

Test Configuration

Out of band emission at antenna terminals:



TEST PROCEDURE

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10 th harmonic. Limit = -13dBm

Band Edge Requirements (824 MHz and 849 MHz /1850MHz and 1910MHz): In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

TEST RESULTS

No non-compliance noted.

Test Data

Mode	CH	Location	Description
GSM 850 (Class 10)	128	Figure 7-1	Conducted spurious emissions, 30MHz - 20GHz
	190	Figure 7-2	Conducted spurious emissions, 30MHz - 20GHz
	251	Figure 7-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
GSM 1900 (Class 10)	512	Figure 8-1	Conducted spurious emissions, 30MHz - 20GHz
	661	Figure 8-2	Conducted spurious emissions, 30MHz - 20GHz
	810	Figure 8-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
GSM 850 (Class 10)	128	Figure 9-1	Band Edge emissions
	251	Figure 9-2	Band Edge emissions

Mode	CH	Location	Description
GSM 1900 (Class 10)	512	Figure 10-1	Band Edge emissions
	810	Figure 10-2	Band Edge emissions

Test Plot

GSM 850

Figure 7-1: Out of Band emission at antenna terminals – GSM CH Low

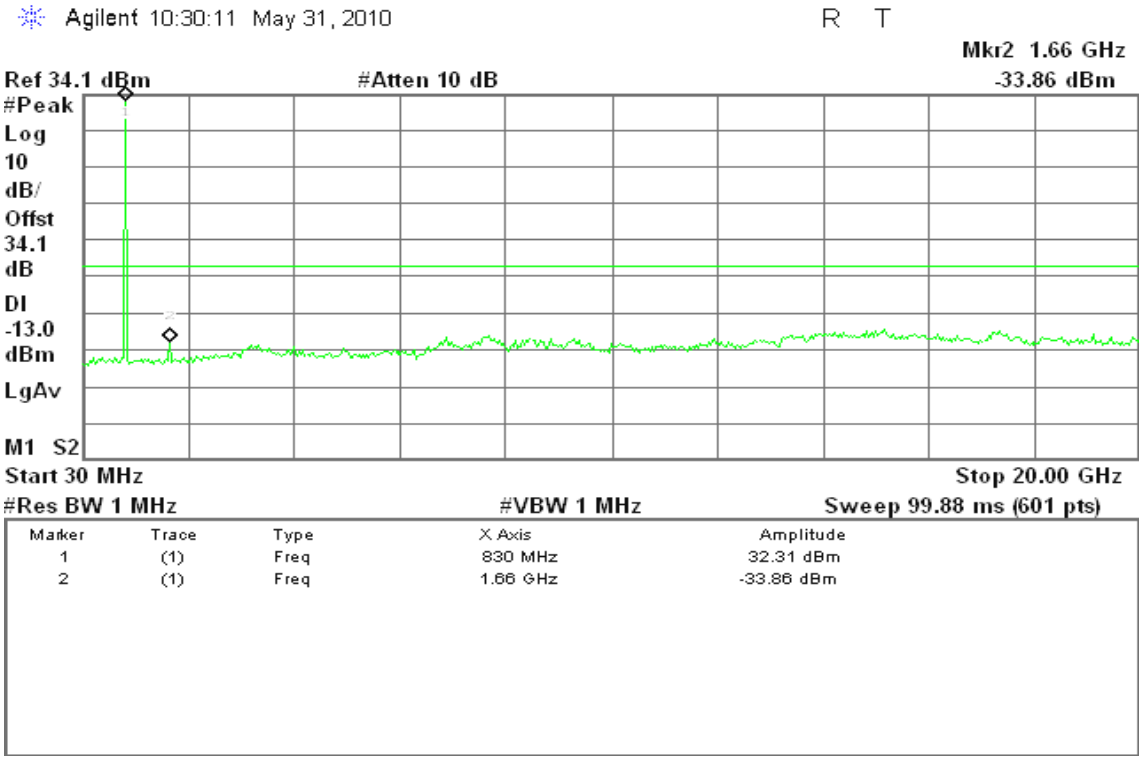


Figure 7-2: Out of Band emission at antenna terminals – GSM CH Mid

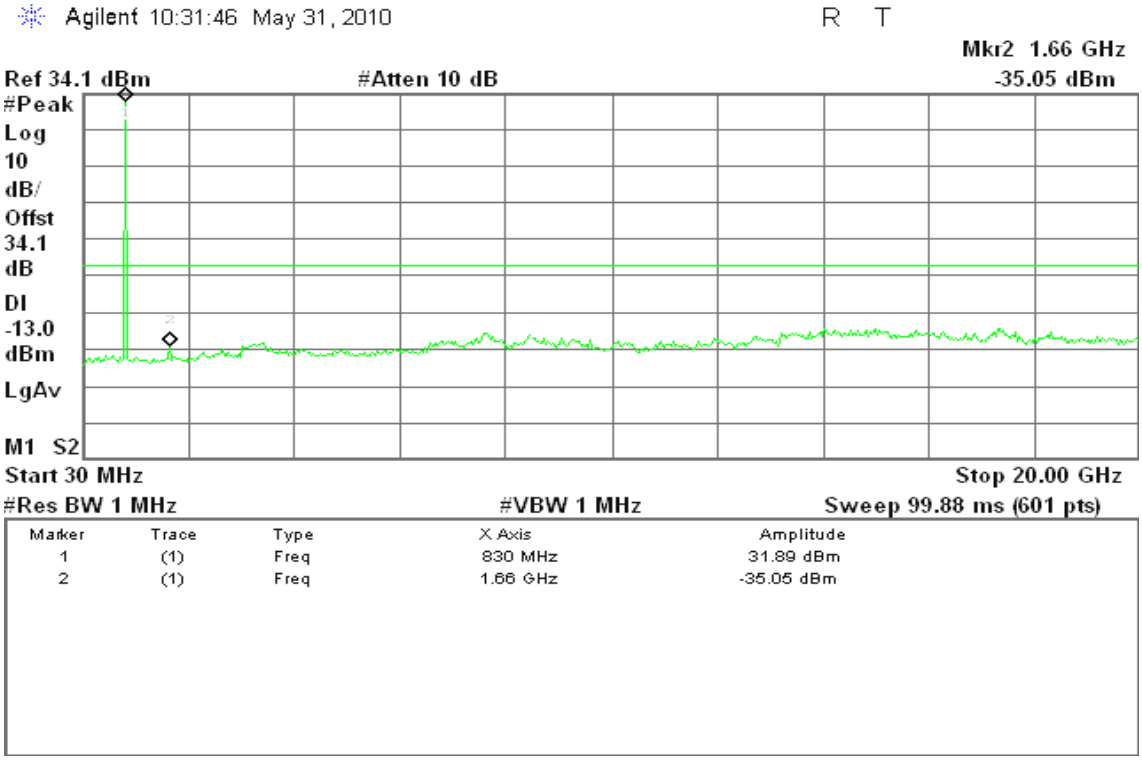
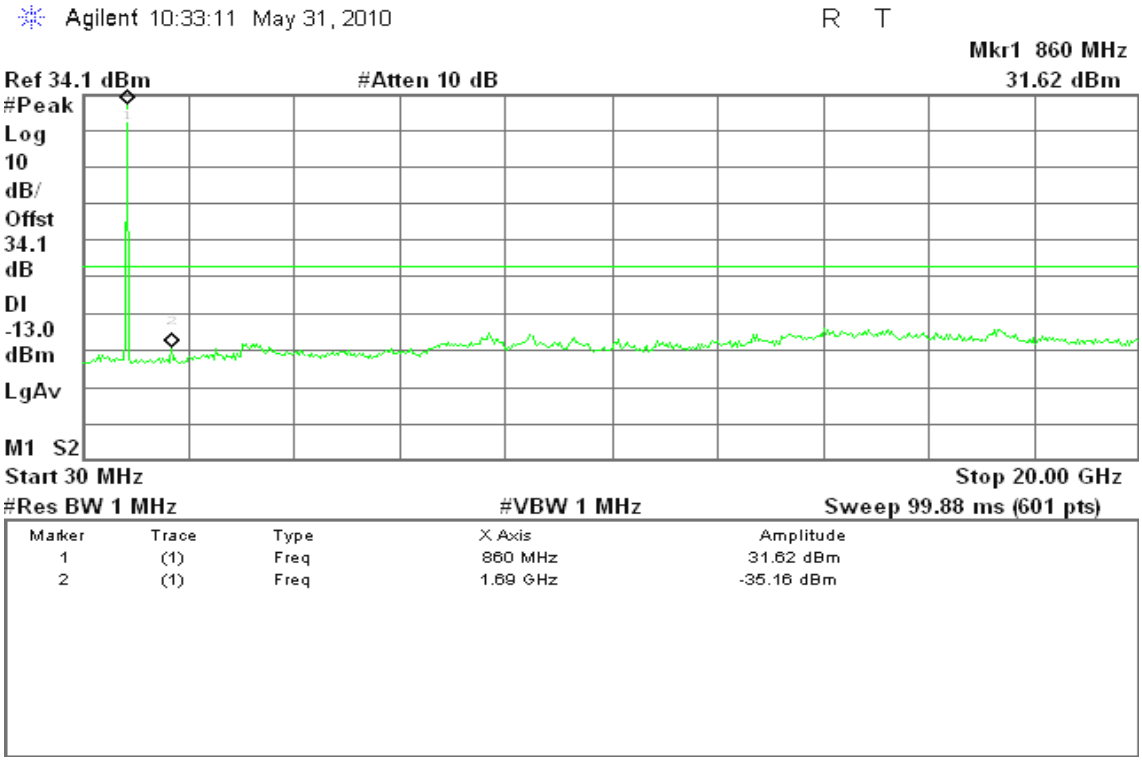


Figure 7-3: Out of Band emission at antenna terminals – GSM CH High



GSM 1900

Figure 8-1: Out of Band emission at antenna terminals – GSM CH Low

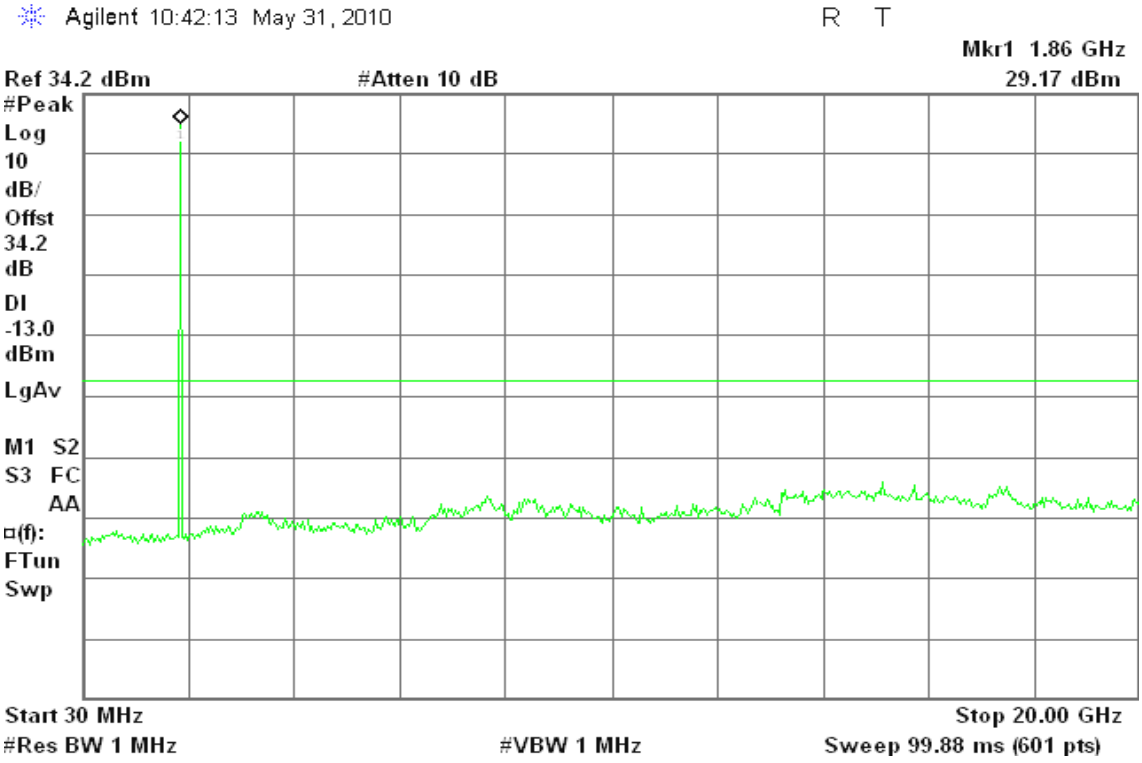


Figure 8-2: Out of Band emission at antenna terminals – GSM CH Mid

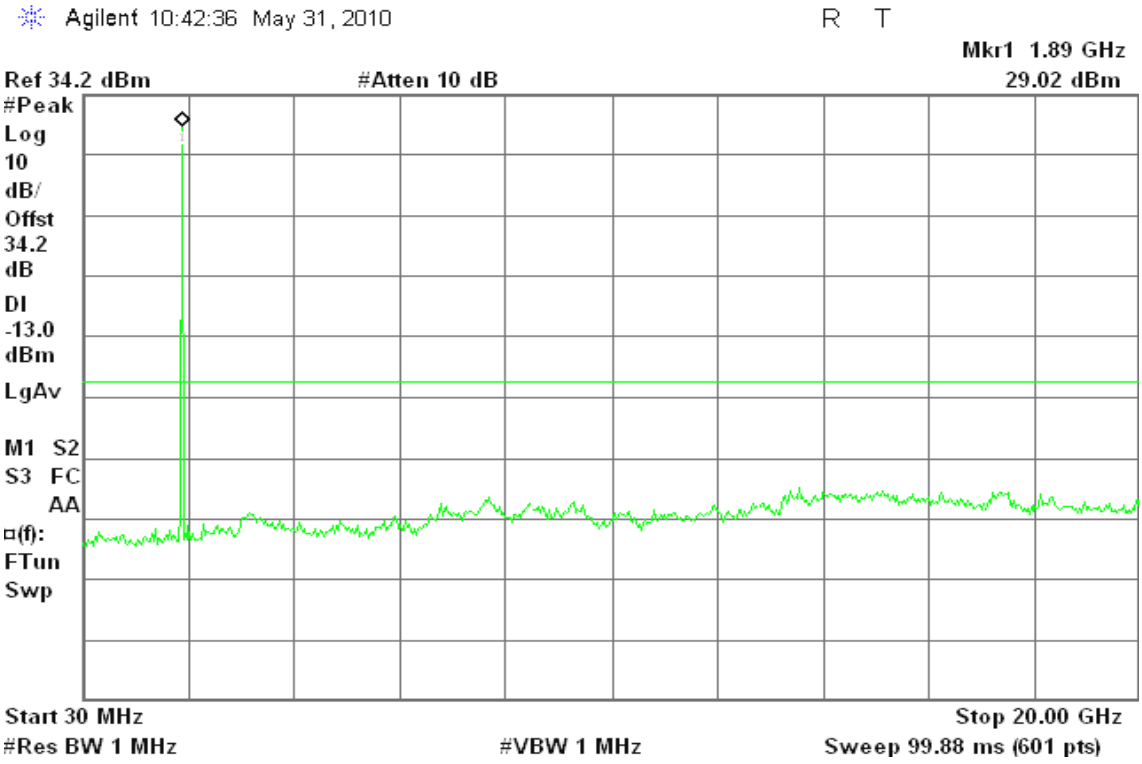
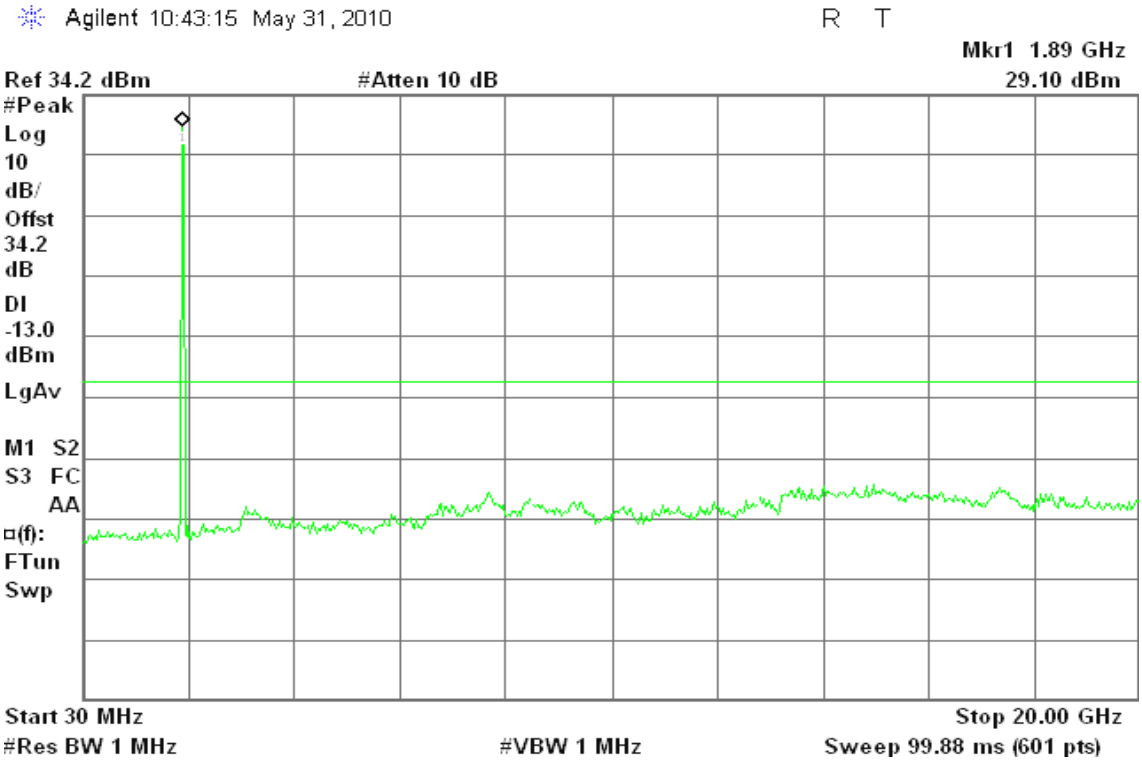


Figure 8-3: Out of Band emission at antenna terminals – GSM CH High



GSM 850

Figure 9-1: Band Edge emissions – GSM CH Low

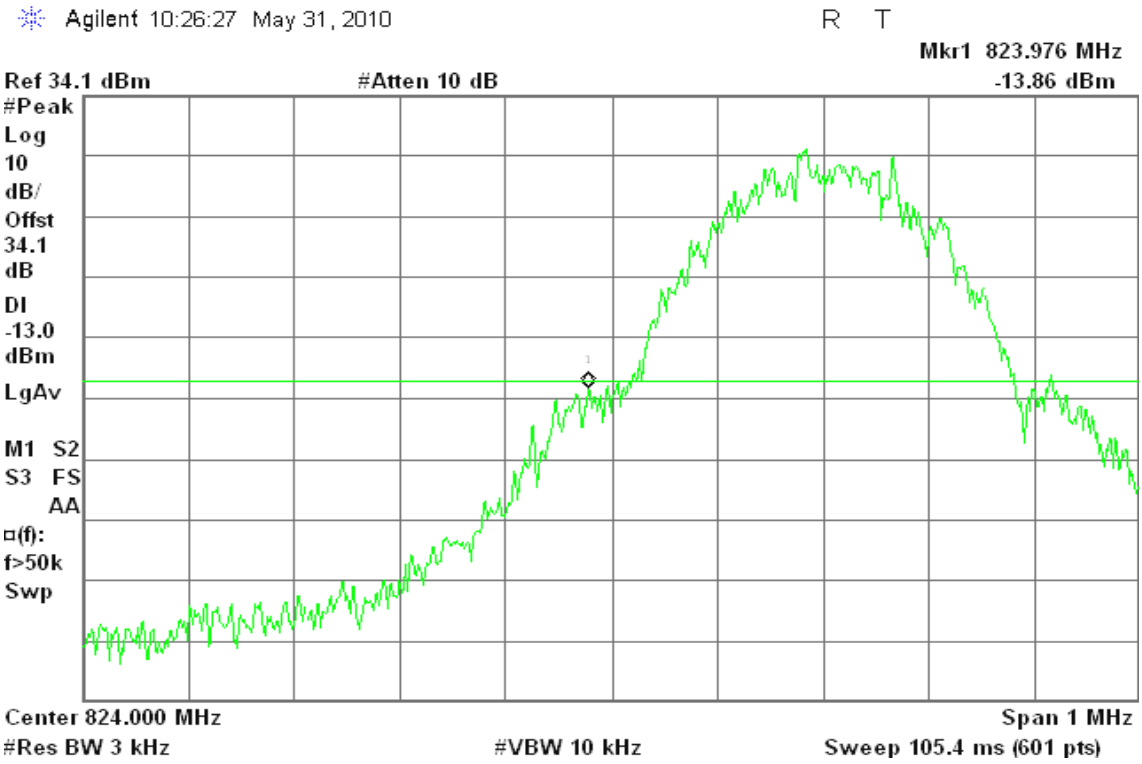
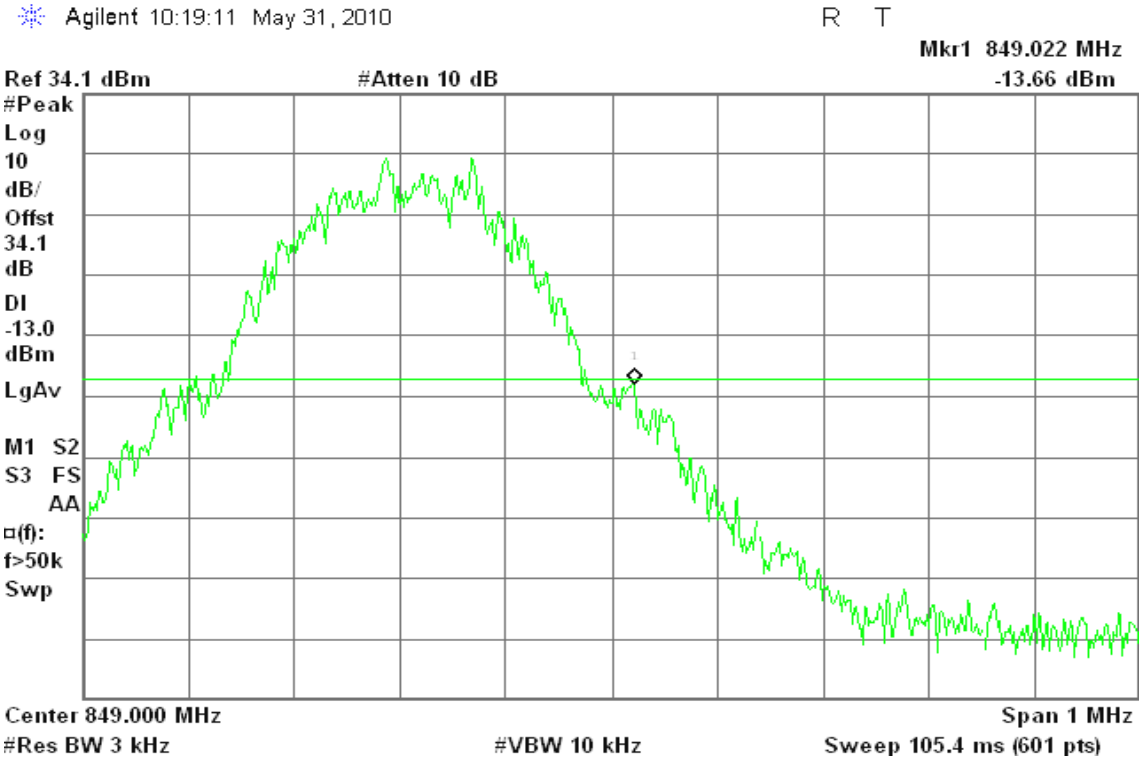


Figure 9-2: Band Edge emissions – GSM CH High



GSM 1900

Figure 10-1: Band Edge emissions – GSM CH Low

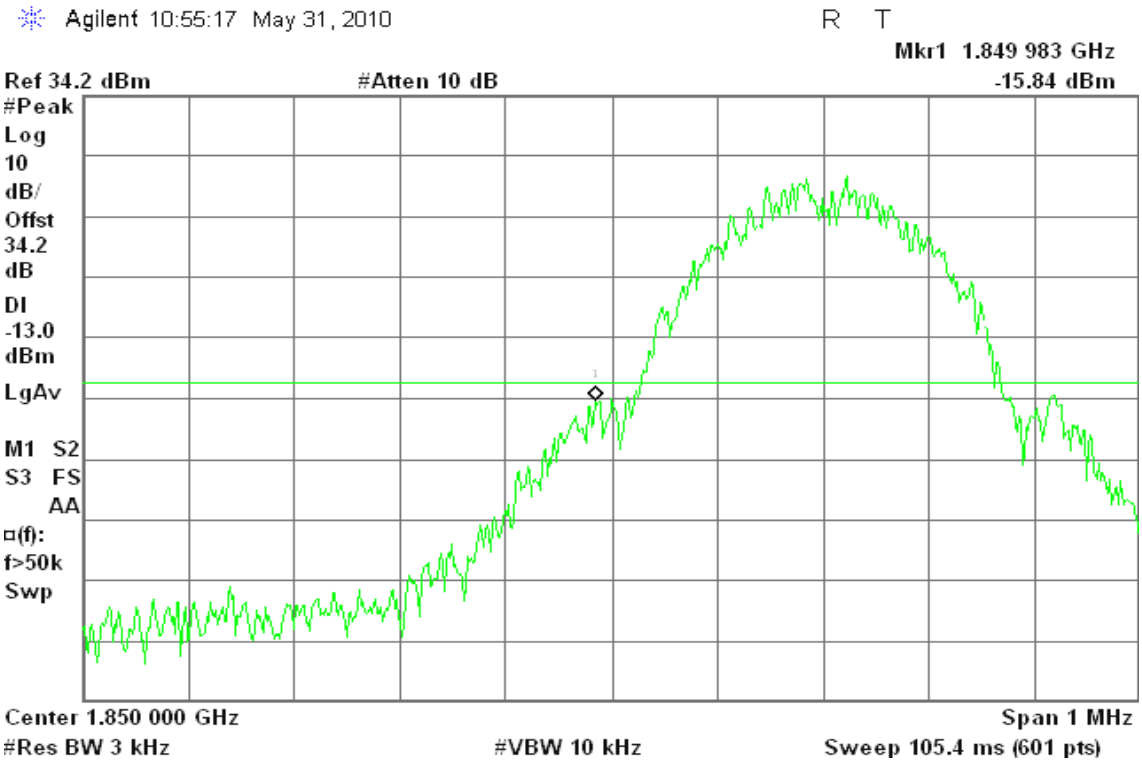
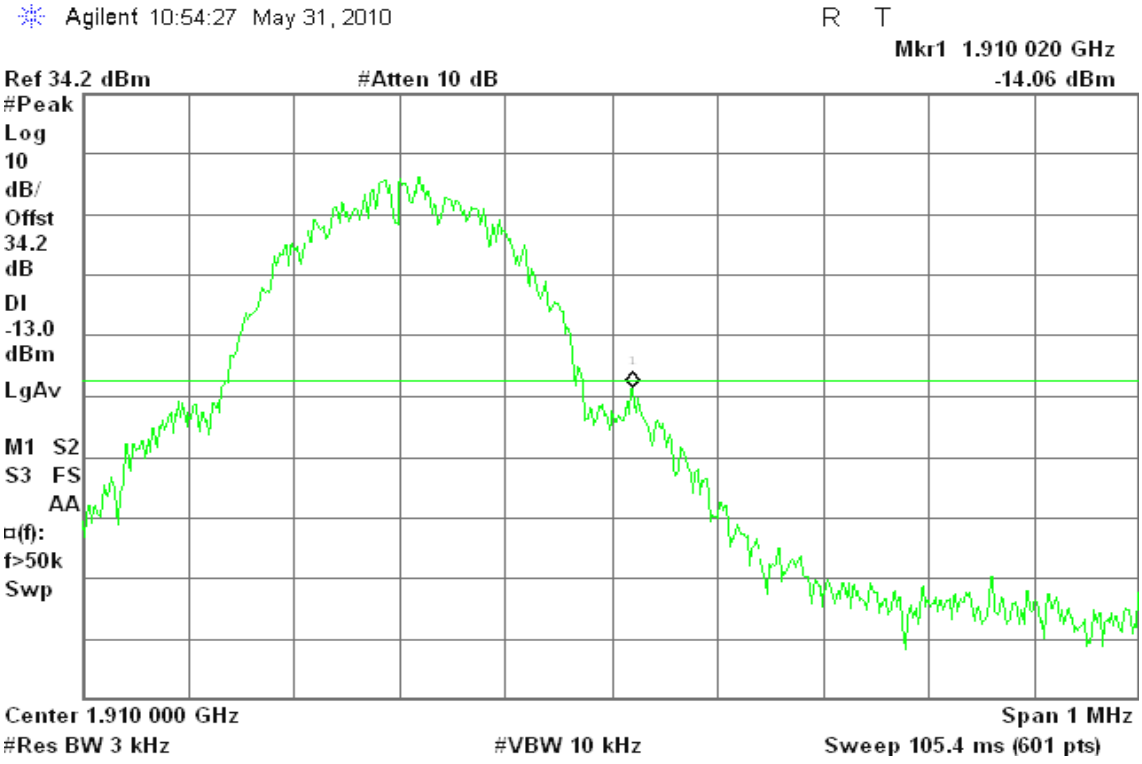


Figure 10-2: Band Edge emissions – GSM CH High



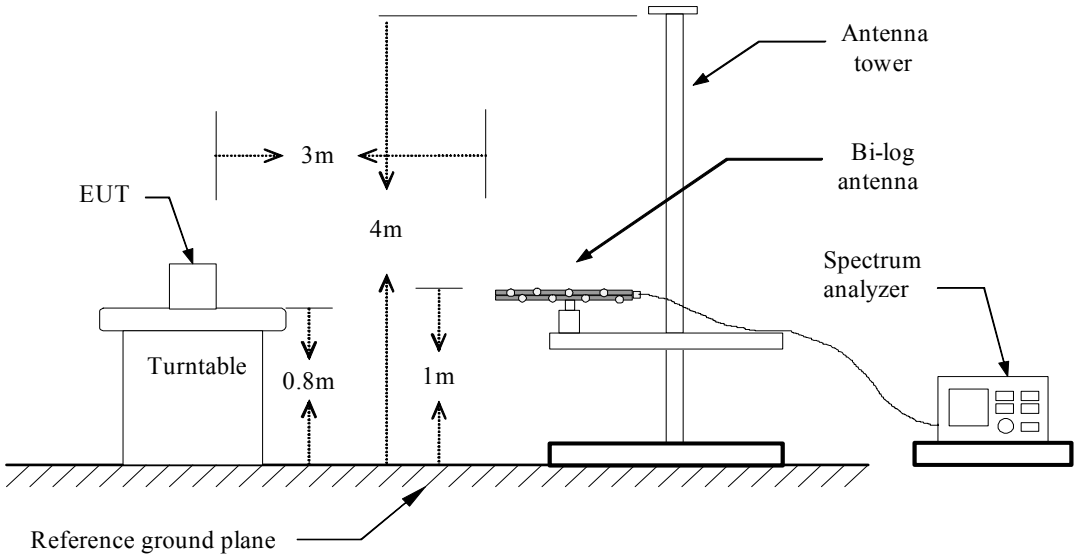
7.6 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

LIMIT

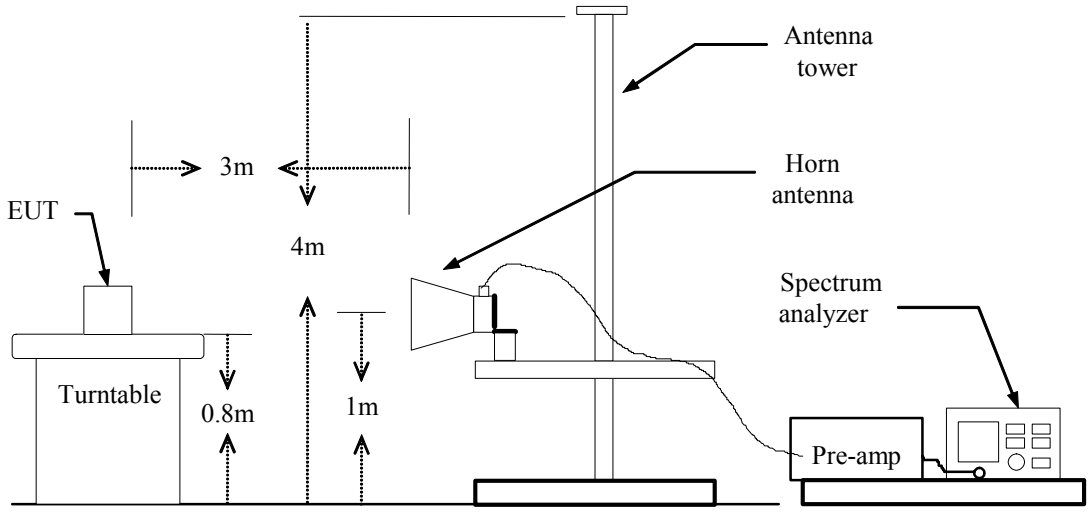
According to FCC §2.1053

Test Configuration

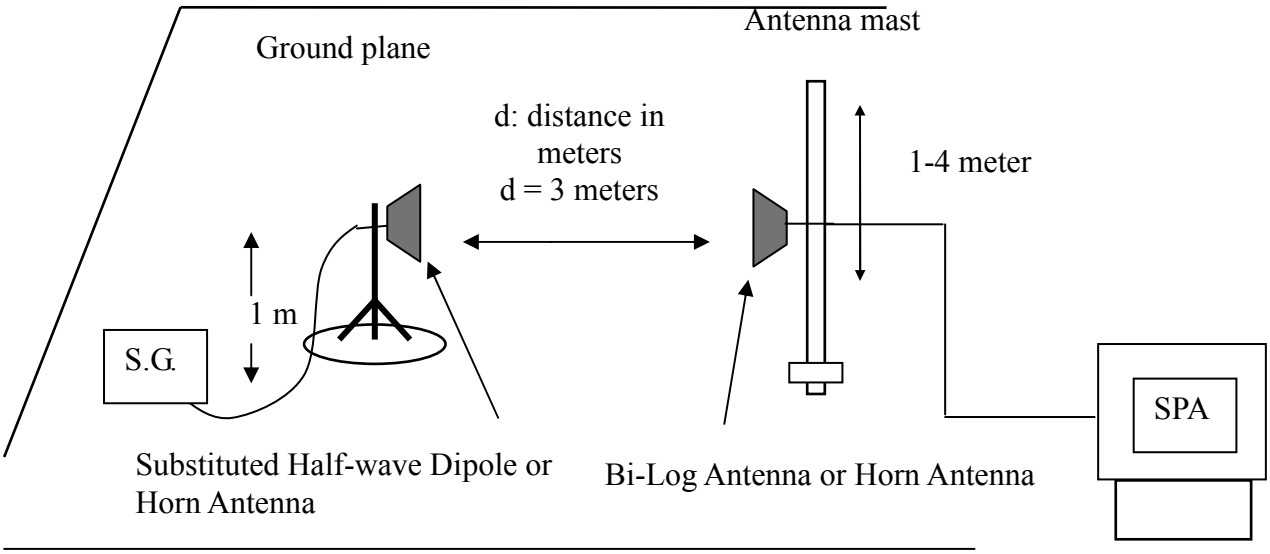
Below 1 GHz



Above 1 GHz



Substituted Method Test Set-up



TEST PROCEDURE

The EUT was placed on a non-conductive, the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission were identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable (dB)

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)

TEST RESULTS

Refer to the attached tabular data sheets.

Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode: GSM 850 / TX / CH 128 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Wolf Huang

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
40.67	V	-56.08	-12.66	-68.73	-13.00	-55.73
61.04	V	-48.57	-16.02	-64.59	-13.00	-51.59
194.90	V	-63.66	-14.79	-78.45	-13.00	-65.45
288.99	V	-66.83	-12.08	-78.90	-13.00	-65.90
408.30	V	-66.00	-11.56	-77.55	-13.00	-64.55
640.13	V	-67.81	-6.62	-74.43	-13.00	-61.43
31.94	H	-47.77	-17.36	-65.13	-13.00	-52.13
60.07	H	-56.05	-16.59	-72.63	-13.00	-59.63
212.36	H	-57.49	-15.24	-72.74	-13.00	-59.74
321.00	H	-54.25	-14.20	-68.45	-13.00	-55.45
357.86	H	-63.57	-13.15	-76.72	-13.00	-63.72
750.71	H	-67.19	-5.64	-72.83	-13.00	-59.83

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 850 / TX / CH 190 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
36.79	V	-52.32	-14.41	-66.73	-13.00	-53.73
62.01	V	-49.05	-15.98	-65.03	-13.00	-52.03
154.16	V	-65.49	-13.57	-79.06	-13.00	-66.06
269.59	V	-66.08	-12.88	-78.96	-13.00	-65.96
649.83	V	-67.77	-6.73	-74.50	-13.00	-61.50
787.57	V	-68.69	-5.18	-73.88	-13.00	-60.88
32.91	H	-54.81	-16.57	-71.38	-13.00	-58.38
60.07	H	-58.45	-16.59	-75.04	-13.00	-62.04
136.70	H	-65.62	-14.51	-80.12	-13.00	-67.12
198.78	H	-66.68	-13.47	-80.15	-13.00	-67.15
367.56	H	-66.17	-12.68	-78.85	-13.00	-65.85
520.82	H	-68.38	-8.54	-76.92	-13.00	-63.92

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 850 / TX / CH 251 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
35.82	V	-54.07	-14.95	-69.02	-13.00	-56.02
62.01	V	-49.31	-15.98	-65.29	-13.00	-52.29
279.29	V	-67.51	-12.18	-79.69	-13.00	-66.69
320.03	V	-66.55	-13.59	-80.14	-13.00	-67.14
457.77	V	-64.49	-9.83	-74.32	-13.00	-61.32
591.63	V	-68.12	-7.80	-75.92	-13.00	-62.92
43.58	H	-62.98	-11.71	-74.69	-13.00	-61.69
61.04	H	-57.26	-16.71	-73.98	-13.00	-60.98
188.11	H	-65.75	-14.32	-80.08	-13.00	-67.08
290.93	H	-66.71	-13.23	-79.94	-13.00	-66.94
577.08	H	-68.66	-7.86	-76.52	-13.00	-63.52
634.31	H	-69.03	-6.69	-75.72	-13.00	-62.72

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 1900 / TX / CH 512 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
35.82	V	-51.70	-14.95	-66.65	-13.00	-53.65
62.01	V	-52.86	-15.98	-68.84	-13.00	-55.84
275.41	V	-66.34	-12.45	-78.78	-13.00	-65.78
469.41	V	-54.50	-9.40	-63.90	-13.00	-50.90
624.61	V	-67.97	-6.86	-74.82	-13.00	-61.82
814.73	V	-63.85	-4.82	-68.66	-13.00	-55.66
32.91	H	-54.29	-16.57	-70.86	-13.00	-57.86
43.58	H	-63.19	-11.71	-74.90	-13.00	-61.90
61.04	H	-61.76	-16.71	-78.48	-13.00	-65.48
285.11	H	-66.87	-13.10	-79.97	-13.00	-66.97
469.41	H	-57.40	-9.30	-66.70	-13.00	-53.70
814.73	H	-63.30	-4.92	-68.22	-13.00	-55.22

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 1900 / TX / CH 661 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
36.79	V	-52.25	-14.41	-66.66	-13.00	-53.66
61.04	V	-54.20	-16.02	-70.22	-13.00	-57.22
128.94	V	-65.91	-12.83	-78.74	-13.00	-65.74
417.03	V	-67.26	-11.01	-78.27	-13.00	-65.27
518.88	V	-53.06	-8.45	-61.51	-13.00	-48.51
859.35	V	-57.77	-4.45	-62.22	-13.00	-49.22
31.94	H	-56.54	-17.36	-73.90	-13.00	-60.90
60.07	H	-60.44	-16.59	-77.03	-13.00	-64.03
195.87	H	-66.60	-13.76	-80.36	-13.00	-67.36
407.33	H	-67.18	-11.28	-78.46	-13.00	-65.46
518.88	H	-55.34	-8.56	-63.91	-13.00	-50.91
859.35	H	-58.37	-4.43	-62.80	-13.00	-49.80

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 1900 / TX / CH 810 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
35.82	V	-51.60	-14.95	-66.55	-13.00	-53.55
61.04	V	-54.76	-16.02	-70.78	-13.00	-57.78
195.87	V	-65.66	-14.67	-80.33	-13.00	-67.33
279.29	V	-68.03	-12.18	-80.21	-13.00	-67.21
569.32	V	-62.02	-7.94	-69.96	-13.00	-56.96
903.97	V	-54.01	-3.83	-57.84	-13.00	-44.84
34.85	H	-54.72	-14.98	-69.70	-13.00	-56.70
61.04	H	-62.05	-16.71	-78.77	-13.00	-65.77
169.68	H	-65.55	-13.75	-79.30	-13.00	-66.30
568.35	H	-65.22	-7.82	-73.04	-13.00	-60.04
707.06	H	-68.71	-6.48	-75.19	-13.00	-62.19
903.97	H	-55.69	-3.75	-59.43	-13.00	-46.43

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Above 1GHz

Operation Mode: GSM 850 / TX / CH 128 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1651.00	V	-47.43	1.61	-45.81	-13.00	-32.81
2470.00	V	-56.98	4.41	-52.57	-13.00	-39.57
N/A						
1651.00	H	-46.83	1.42	-45.41	-13.00	-32.41
2470.00	H	-56.84	4.43	-52.40	-13.00	-39.40
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 850 / TX / CH 190 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1672.00	V	-48.07	1.63	-46.45	-13.00	-33.45
N/A						
1672.00	H	-44.83	1.40	-43.42	-13.00	-30.42
2512.00	H	-58.95	4.69	-54.26	-13.00	-41.26
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 850 / TX / CH 251 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1700.00	V	-45.94	1.64	-44.29	-13.00	-31.29
2547.00	V	-52.87	4.76	-48.11	-13.00	-35.11
N/A						
1700.00	H	-46.33	1.38	-44.94	-13.00	-31.94
2547.00	H	-52.00	4.82	-47.18	-13.00	-34.18
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 1900 / TX / CH 512 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
3702.00	V	-52.98	9.11	-43.88	-13.00	-30.88
N/A						
3702.00	H	-55.41	8.89	-46.52	-13.00	-33.52
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 1900 / TX / CH 661 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
3758.00	V	-51.73	8.98	-42.76	-13.00	-29.76
N/A						
3758.00	H	-48.73	8.76	-39.97	-13.00	-26.97
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GSM 1900 / TX / CH 810 **Test Date:** May 26, 2010

Temperature: 24°C **Tested by:** Lawrence Lee

Humidity: 47 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
3821.00	V	-48.30	8.83	-39.47	-13.00	-26.47
N/A						
3821.00	H	-45.06	8.62	-36.45	-13.00	-23.45
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

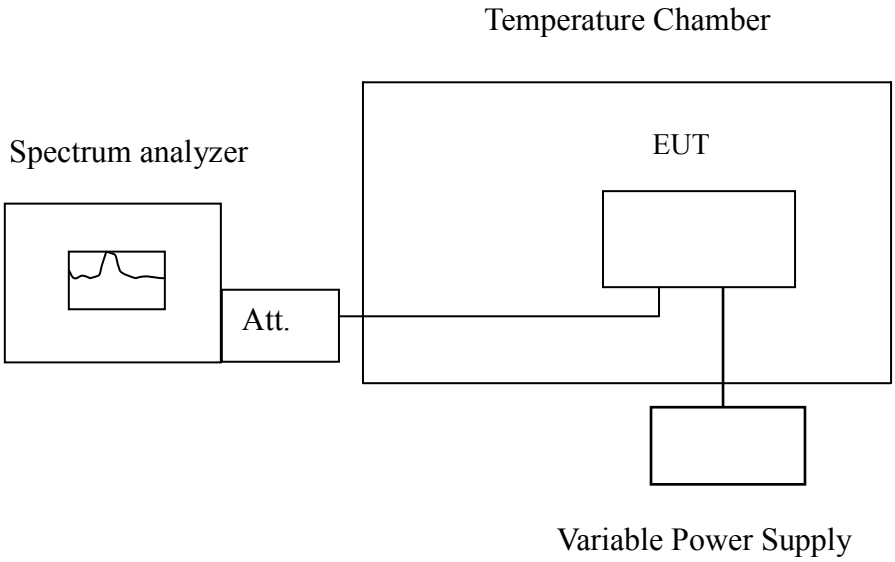
7.7 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §22.355, .FCC §24.235.

Frequency Tolerance: 2.5 ppm

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

TEST RESULTS

No non-compliance noted.

Reference Frequency: GSM Mid Channel 836.6 MHz @ 20°C				
Limit: ± 2.5 ppm = 2090 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	50	836600003	12	2090
	40	836600006	15	
	30	836600011	20	
	20	836599991	0	
	10	836599973	-18	
	0	836600011	20	
	-10	836600002	11	
	-20	836600003	12	
	-30	836600005	14	

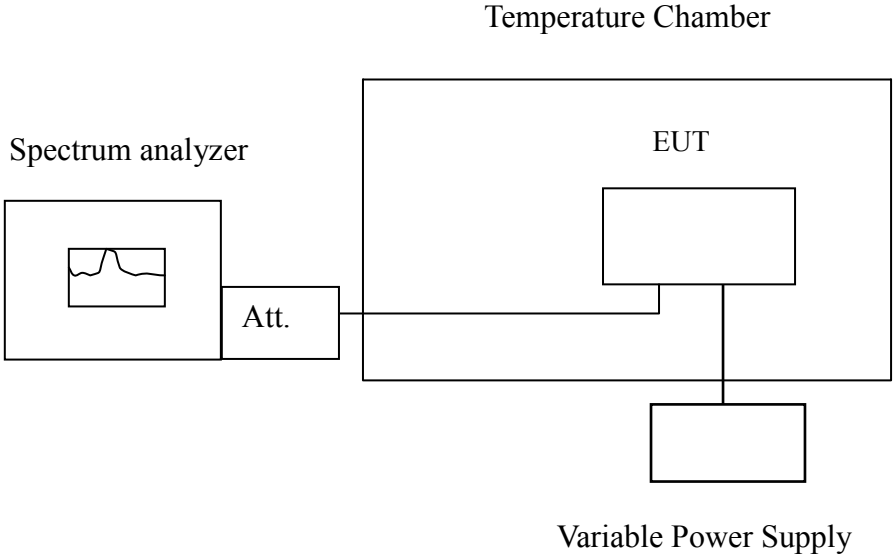
Reference Frequency: GSM Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	50	1880000012	16	4700
	40	1880000017	21	
	30	1880000013	17	
	20	1879999996	0	
	10	1880000011	15	
	0	1880000015	19	
	-10	1880000022	26	
	-20	1880000013	17	
	-30	1880000010	14	

7.8 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §22.355, .FCC §24.235,

Test Configuration



Remark: *Measurement setup for testing on Antenna connector.*

TEST PROCEDURE

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (± 15%) and endpoint, record the maximum frequency change.

TEST RESULTS

No non-compliance noted.

Reference Frequency: GSM Mid Channel 836.6 MHz @ 20°C				
Limit: ± 2.5 ppm = 2090Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.255	20	836599988	-3	2090
3.7		836599991	0	
3.145		836599984	-7	
2.9 (End Point)		836599632	-352	

Reference Frequency: GSM Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.255	20	1880000016	20	4700
3.7		1879999996	0	
3.145		1879999983	-13	
2.9 (End Point)		1879999720	-276	

7.9 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Operation Mode:	Normal Link	**Test Date:**	May 27, 2010
Temperature:	26°C	**Tested by:**	Wolf Huang
Humidity:	60% RH		

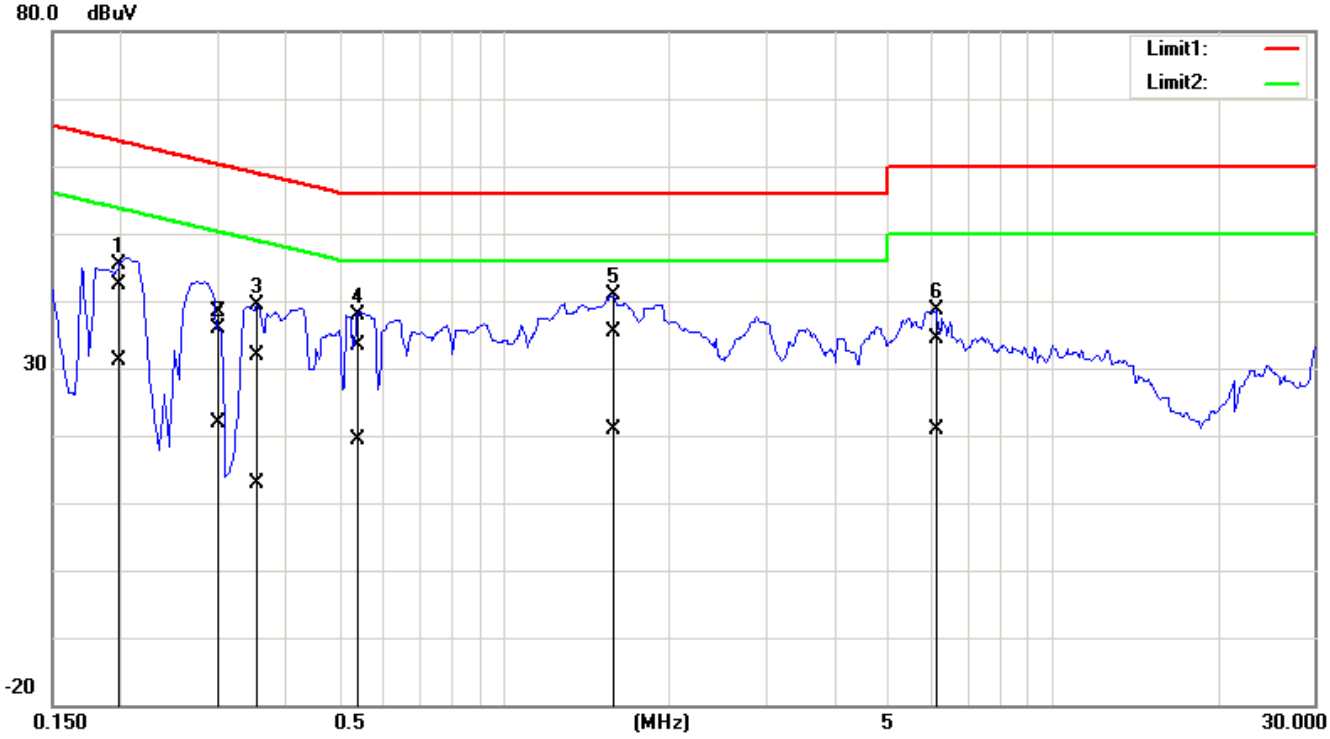
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1969	42.26	31.16	0.04	42.30	31.20	63.74	53.74	-21.44	-22.54	L1
0.3030	38.27	21.77	0.03	38.30	21.80	60.16	50.16	-21.86	-28.36	L1
0.3550	31.88	12.88	0.02	31.90	12.90	58.84	48.84	-26.94	-35.94	L1
0.5322	33.28	19.38	0.02	33.30	19.40	56.00	46.00	-22.70	-26.60	L1
1.5800	35.38	20.78	0.02	35.40	20.80	56.00	46.00	-20.60	-25.20	L1
6.1300	34.46	20.96	0.04	34.50	21.00	60.00	50.00	-25.50	-29.00	L1
0.1719	50.04	30.44	0.06	50.10	30.50	64.86	54.87	-14.76	-24.37	L2
0.2250	36.56	19.76	0.04	36.60	19.80	62.63	52.63	-26.03	-32.83	L2
0.3553	40.78	28.58	0.02	40.80	28.60	58.84	48.84	-18.04	-20.24	L2
1.0750	33.99	16.49	0.01	34.00	16.50	56.00	46.00	-22.00	-29.50	L2
1.4700	27.69	13.59	0.01	27.70	13.60	56.00	46.00	-28.30	-32.40	L2
1.7500	24.88	1.98	0.02	24.90	2.00	56.00	46.00	-31.10	-44.00	L2

Remark:

1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz and 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)