



**FCC 47 CFR PART 24 SUBPART E**

**TEST REPORT**

**For**

**GSM HOME ALARM**

**Model: FY-HG030, FY-HG031**

**Trade Name:**



*Issued to*

**FUH YUAN ELECTRONICS DEVELOPMENT CO. LTD.  
20-5, CHIANG-SHI-TSU LANE, SHI-TUEN RD. SEC3,  
TAICHUNG TAIWAN R.O.C.**

*Issued by*

**Compliance Certification Services Inc.  
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## 1. TEST RESULT CERTIFICATION

**Applicant:** FUH YUAN ELECTRONICS DEVELOPMENT CO. LTD.  
20-5, CHIANG-SHI-TSU LANE, SHI-TUEN RD. SEC3,  
TAICHUNG TAIWAN R.O.C.

**Equipment Under Test:** GSM HOME ALARM

**Trade Name:**



**Model Number:** FY-HG030, FY-HG031

**Date of Test:** January 3 ~ 19, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR 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 ANSI/TIA/EIA-603-A-2001 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 24 Subpart E.

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

*Approved by:*

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Johnny Liu  
Section Manager  
Compliance Certification Services Inc.


*Reviewed by:*

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Amanda Wu  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	GSM HOME ALARM
<b>Trade Name</b>	
<b>Model Number</b>	FY-HG030, FY-HG031
<b>Model Discrepancy</b>	FY-HG030 with Lithium Battery and Charge Circuits FY-HG031 without Lithium Battery and Charge Circuits
<b>Power Supply</b>	Rechargeable battery: 3.7V, 900mAh Power Adapter: Model: PA1010-120HUB I/P: AC 100-240V, 50-60Hz, 0.4A O/P: DC 12V, 1.0A, 12W Max.
<b>Frequency Range</b>	TX: 1850.2 ~ 1909.8 MHz RX: 1930 ~ 1989.8 MHz
<b>Transmit Power (ERP &amp; EIRP Power)</b>	22.73 dBm
<b>Cellular Phone Protocol</b>	GMSK (TDMA)
<b>Type of Emission</b>	245KGXW--
<b>Antenna Type</b>	Dipole Antenna
<b>Antenna Specification</b>	0dBi

**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: **UTP-FYHG030** filing to comply with 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 and FCC CFR 47, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

#### **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. 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.

#### **3.4 DESCRIPTION OF TEST MODES**

The EUT (model: FY-HG030) had been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except powerline conducted emissions below 30MHz, which worst case was in normal link mode only.

EUT staying in continuous transmitting mode was programmed. Channel Low, Mid and High were chosen for full testing.

GSM1900: Channel Low (CH512), Channel Mid (CH661) and Channel High (CH810) were chosen for full testing.



## 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
Universal Radio Communication Tester	R&S	CMU200	1100.000.8.02	12/21/2007
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/30/2008
Power Meter	Agilent	E4416A	GB41291611	06/01/2008
Power Sensor	Agilent	E9327A	US40441097	06/01/2008

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Universal Radio Communication Tester	R&S	CMU200	1100.000.8.02	12/21/2007
Spectrum Analyzer	Agilent	E4446A	US42510252	08/02/2007
Test Receiver	Rohde&Schwarz	ESCI	100064	11/05/2007
Switch Controller	TRC	Switch Controller	SC94050010	05/04/2008
4 Port Switch	TRC	4 Port Switch	SC94050020	05/04/2008
Horn-Antenna	TRC	HA-0502	06	06/01/2008
Horn-Antenna	TRC	HA-0801	04	05/04/2008
Horn-Antenna	TRC	HA-1201A	01	07/04/2007
Horn-Antenna	TRC	HA-1301A	01	07/04/2007
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/08/2008
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC: 965860 IC: IC 6106	09/25/2008
Test S/W	LABVIEW (V 6.1)			

**Remark:** The measurement uncertainty is less than  $\pm 2.0065\text{dB}$  (30MHz ~ 1GHz),  $\pm 3.0958\text{dB}$  (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Universal Radio Communication Tester	R&S	CMU200	1100.000.8.02	12/21/2007
EMI TEST RECEIVER 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	10/31/2007
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/14/2007
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	03/19/2008
Test S/W	LABVIEW (V 6.1)			

**Remark:** The measurement uncertainty is less than  $\pm 2.81\text{dB}$ , which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at

☐ No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No. 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	A2LA	EN 55011, EN 55014-1/2, CISPR 11, CISPR 14-1/2, EN 55022, EN 55015, CISPR 22, CISPR 15, AS/NZS 3548, VCCI V3 (2001), CFR 47, FCC Part 15/18, CNS 13783-1, CNS 13439, CNS 13438, CNS 13803, CNS 14115, EN 55024, IEC 801-2, IEC 801-3, IEC 801-4, IEC/EN 61000-3-2, EIC/EN 61000-3-3, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 50081-1/ EN 61000-6-3, EN 50081-2/EN 61000-6-4, EN 50081-2/EN 61000-6-1: 2001	 0824-01
USA	FCC	3/10 meter Open Area Test Sites (93105, 90471) / 3M Semi Anechoic Chamber (965860) to perform FCC Part 15/18 measurements	 93105, 90471 965860
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 R-393/1066/725/879 C-402/747/912
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2	 ELA 124a ELA 124b ELA 124c
Taiwan	TAF	EN 300 328, EN 300 220-1, EN 300 220-2, EN 300 220-3, 47 CFR FCC Part 15 Subpart C, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 14115, CNS 13438, AS/NZS CISPR 22, CNS 13022-1, IEC 61000-4-2/3/4/5/6/8/11, CNS 13022-2/3	
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	 SL2-IS-E-0014 SL2-IN-E-0014 SL2-A1-E-0014 SL2-R1-E-0014 SL2-R2-E-0014 SL2-L1-E-0014
Canada	Industry Canada	3/10 meter Open Area Test Sites (IC 2324C-3, IC 2324C-5) / 3M Semi Anechoic Chamber (IC 6106) to perform RSS 212 Issue 1	 IC 2324C-3 IC 2324C-5 IC 6106

\* 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.	Notebook PC	Dell	PP05L	E2K5HCKT	7T390 A03	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

**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.



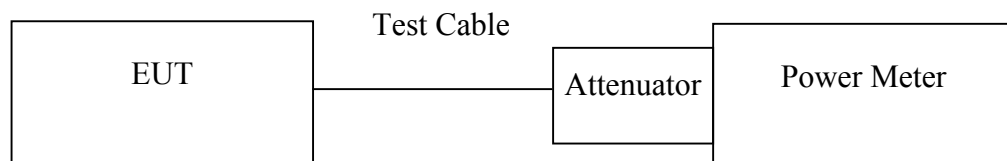
## 7. FCC PART 24 REQUIREMENTS

### 7.1 AVERAGE 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)	Power Meter Reading (dBm)	Attenuator (dB)	Average Power (dBm)
GSM 1900	512	1850.20	6.76	23.42	30.18
	661	1880.00	6.86		30.28
	810	1909.80	6.71		30.13

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

## 7.2 ERP & EIRP MEASUREMENT

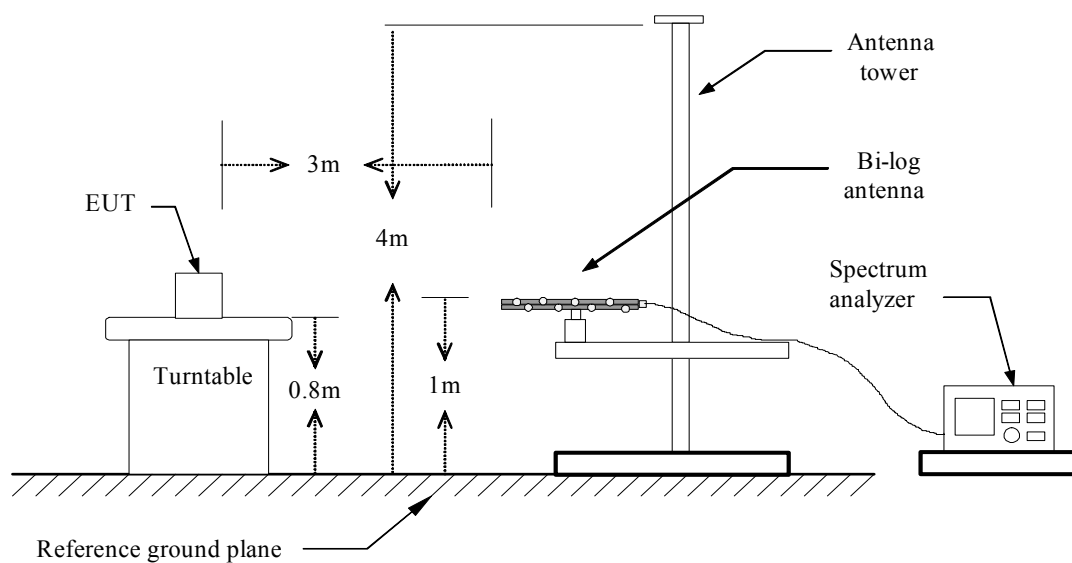
### LIMIT

According to FCC §2.1046

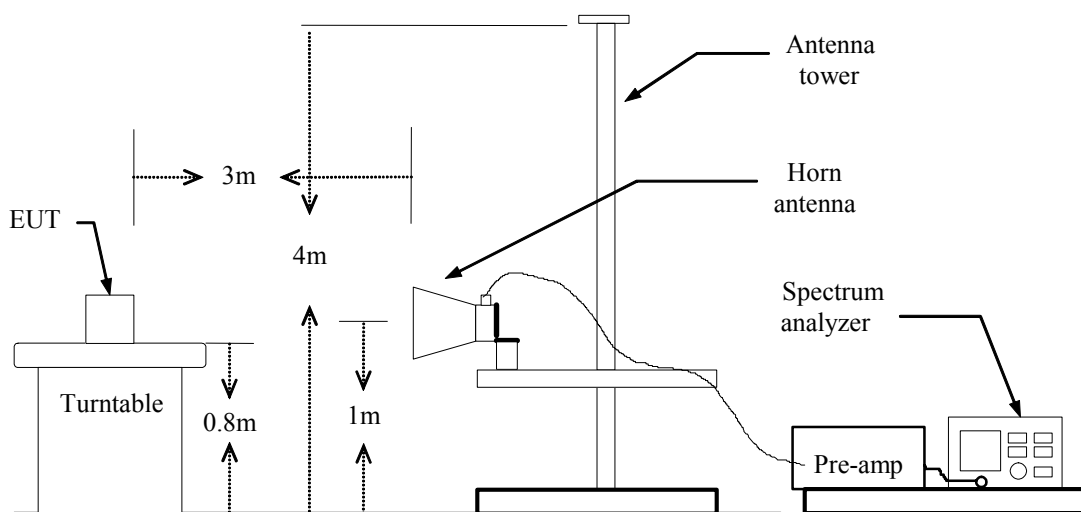
FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

### TEST CONFIGURATION

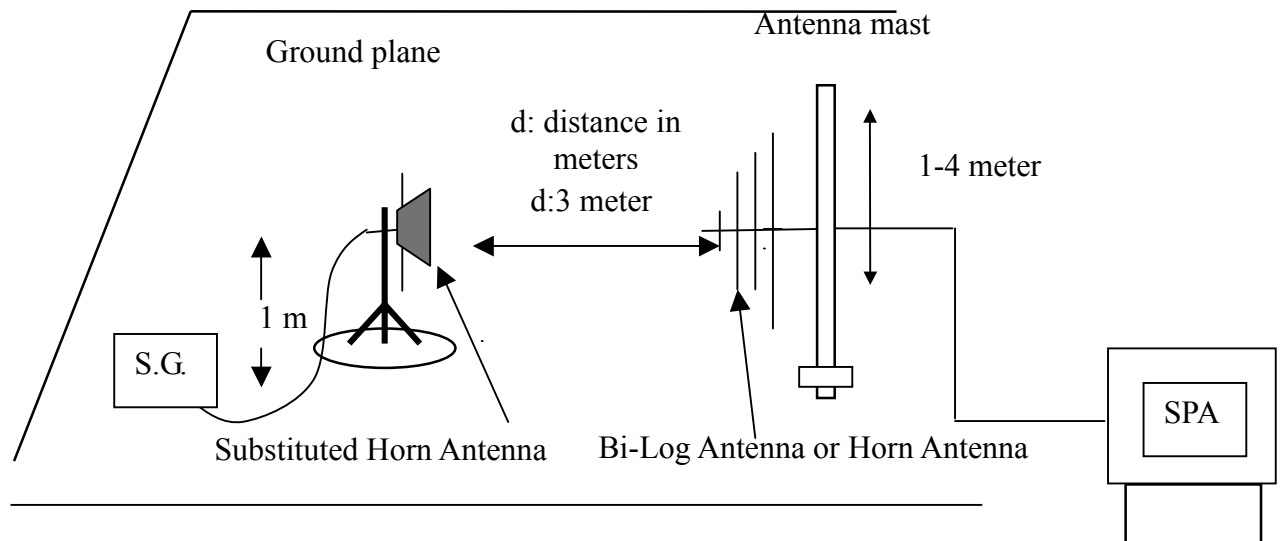
#### Below 1 GHz



#### Above 1 GHz



## For Substituted Method Test Set-UP



## TEST PROCEDURE

The EUT was placed on a 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:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

## TEST RESULTS

*No non-compliance noted.*

### GSM 1900 Test Data

Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
512	1850.20	V	21.22	1.51	<b>22.73</b>	33.00	-10.27
	1850.20	H	9.81	1.72	11.53	33.00	-21.47
661	1880.00	V	20.68	1.58	22.26	33.00	-10.74
	1880.00	H	9.29	1.79	11.09	33.00	-21.91
810	1909.80	V	19.98	1.66	21.64	33.00	-11.36
	1909.80	H	10.98	1.87	12.85	33.00	-20.15

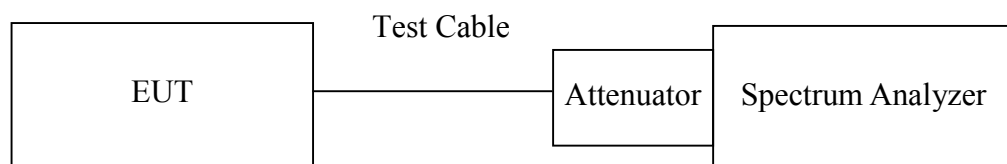


## 7.3 OCCUPIED BANDWIDTH MEASUREMENT

### 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)	Bandwidth (kHz)
GSM 1900	512	1850.20	245.0338
	661	1880.00	243.6933
	810	1909.80	242.6556

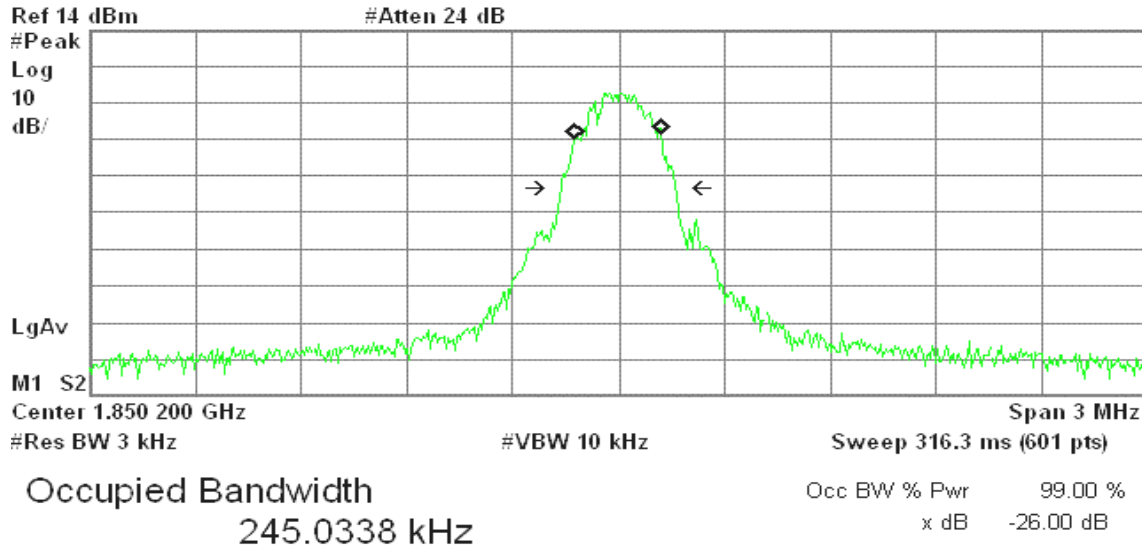


## Test Plot

### GSM 1900 (CH Low)

Agilent 13:55:08 Jan 11, 2007

T

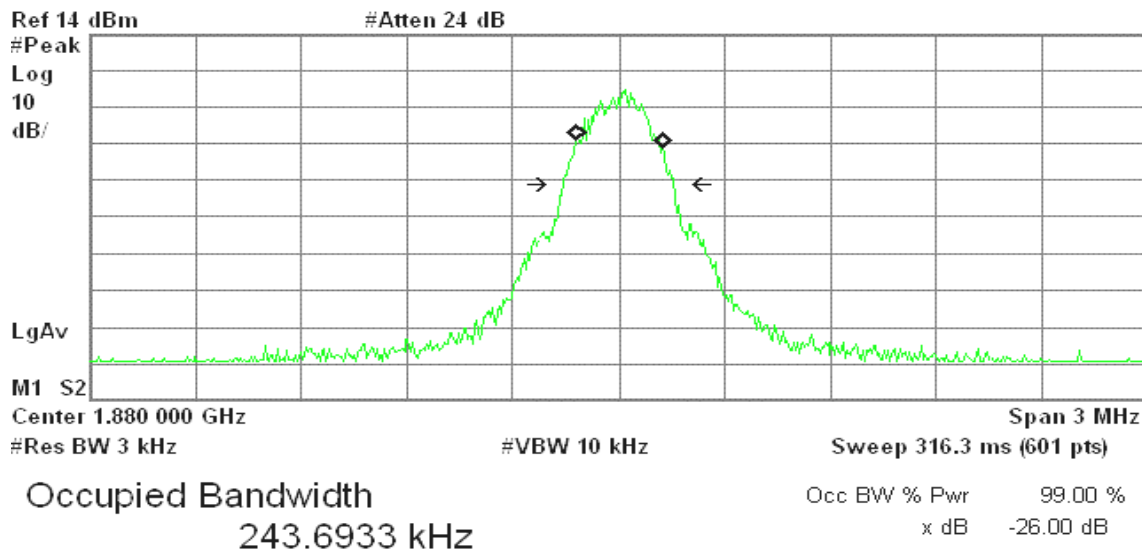


Transmit Freq Error -967.295 Hz  
x dB Bandwidth 323.282 kHz

### GSM 1900 (CH Mid)

Agilent 13:54:13 Jan 11, 2007

T



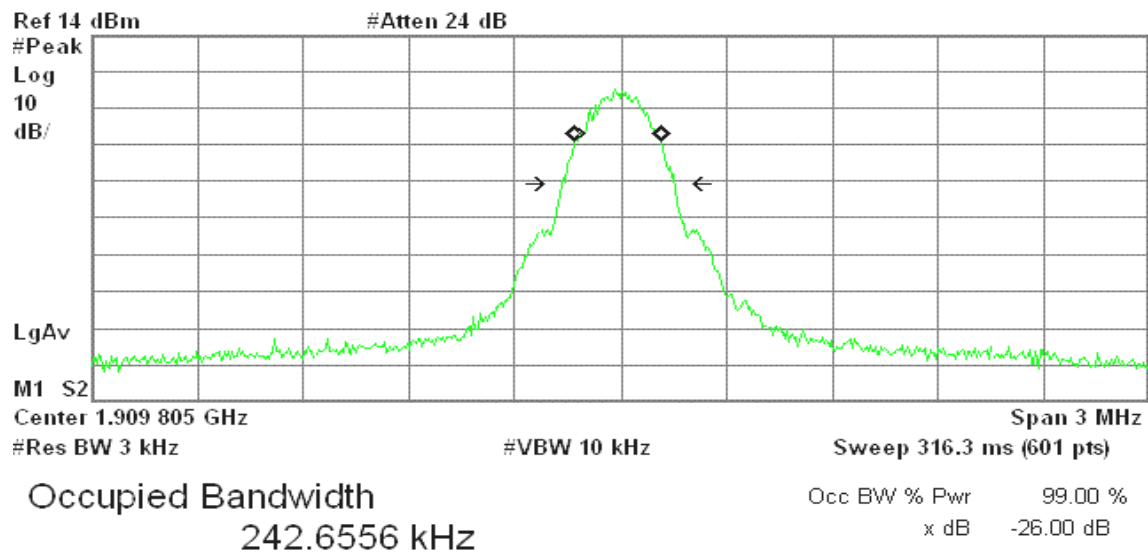
Transmit Freq Error 997.356 Hz  
x dB Bandwidth 314.174 kHz



## GSM 1900 (CH High)

Agilent 13:53:00 Jan 11, 2007

R T



Transmit Freq Error -6.398 kHz  
x dB Bandwidth 319.303 kHz



## 7.4 OUT OF BAND EMISSION AT ANTENNA TERMINALS

### LIMIT

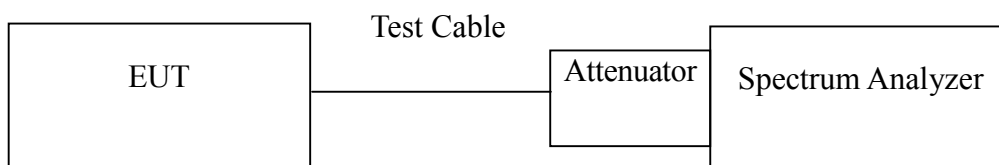
According to FCC §2.1051, FCC §2.2917(f), FCC §24.238(a).

**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 least  $43 + 10 \log P$  dB.

**Band Edge Requirements:** In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 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 (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 1900	512	Figure 8-1	Conducted spurious emissions, 30MHz - 20 GHz
	661	Figure 8-2	Conducted spurious emissions, 30MHz - 20 GHz
	810	Figure 8-3	Conducted spurious emissions, 30MHz - 20 GHz

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





## Test Plot

### GSM 1900

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

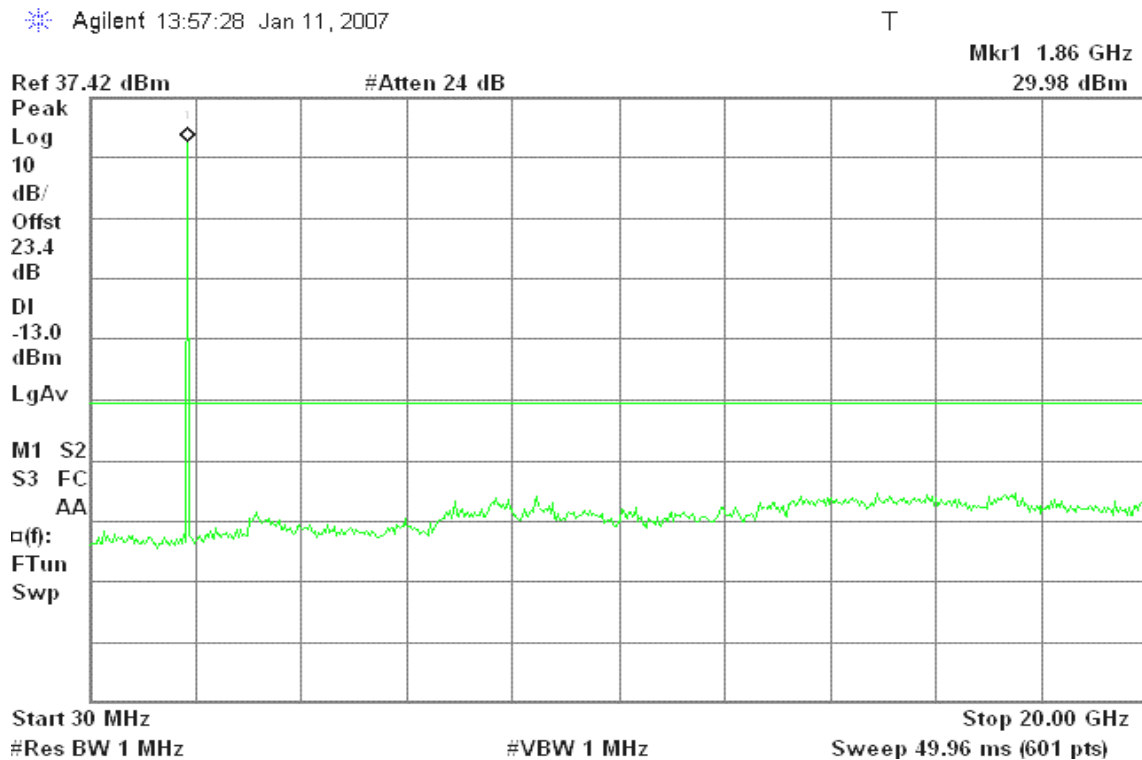


Figure 8-2: Out of Band emission at antenna terminals – GSM CH Mid

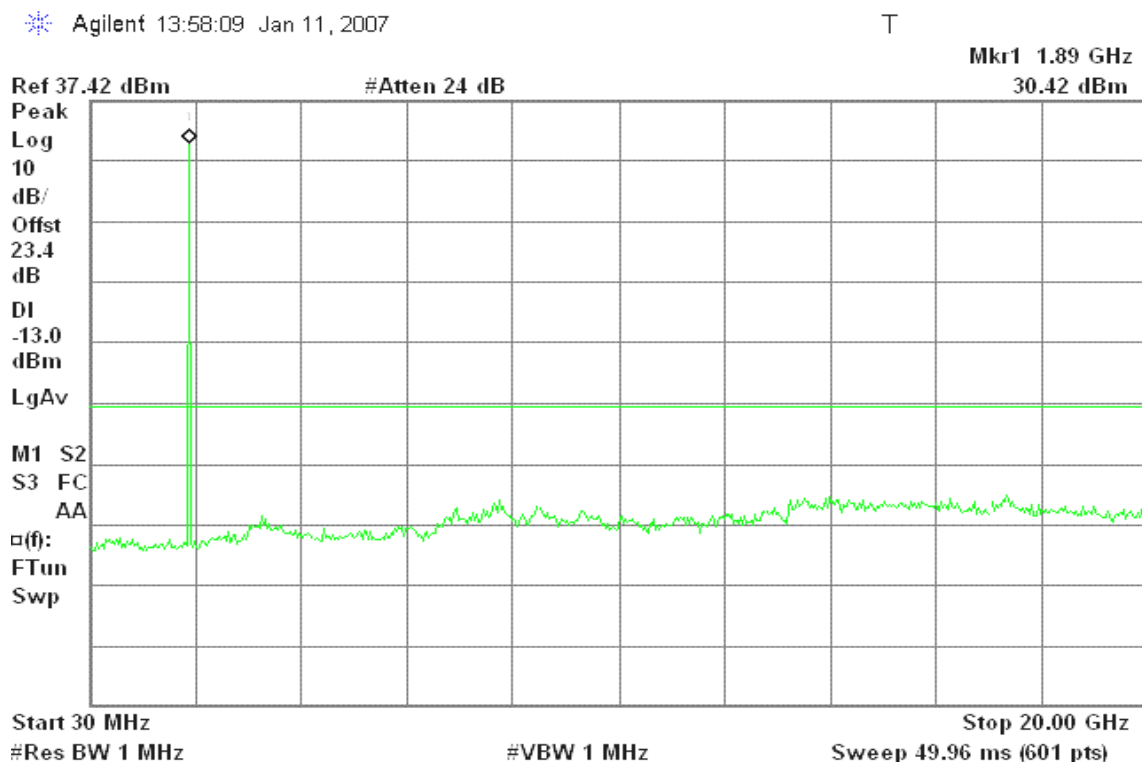




Figure 8-3: Out of Band emission at antenna terminals – GSM CH High

Agilent 13:59:05 Jan 11, 2007

T

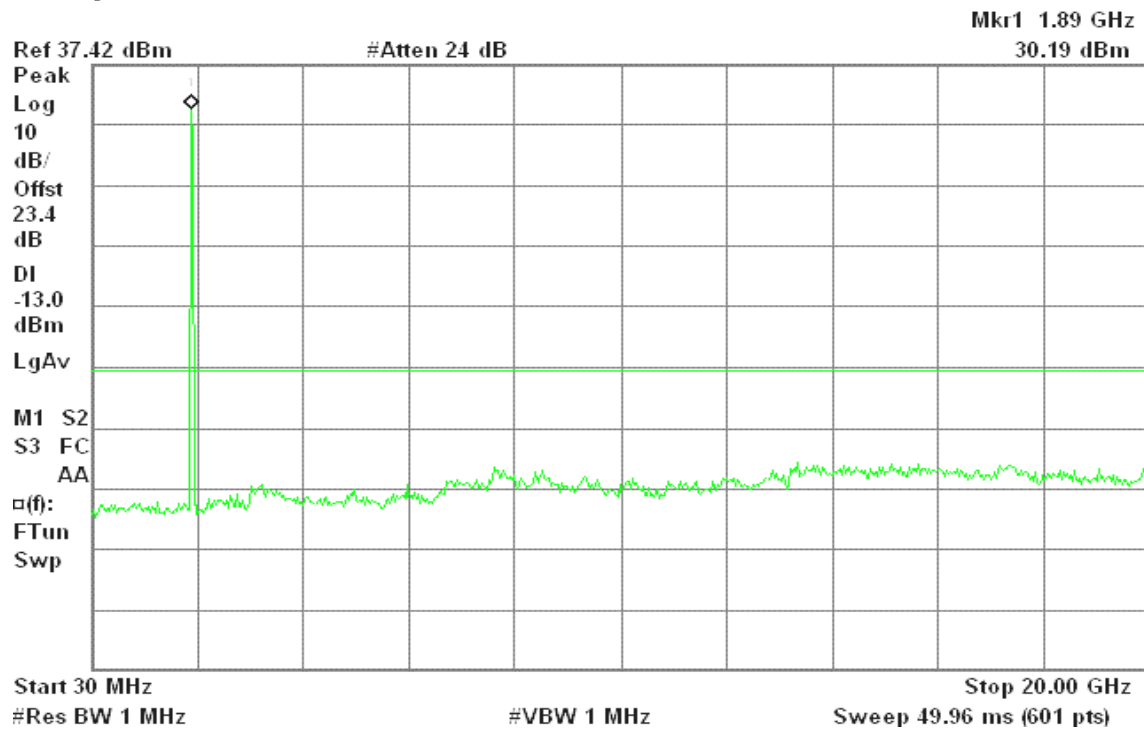




Figure 10-1: Band Edge emissions – GSM CH Low

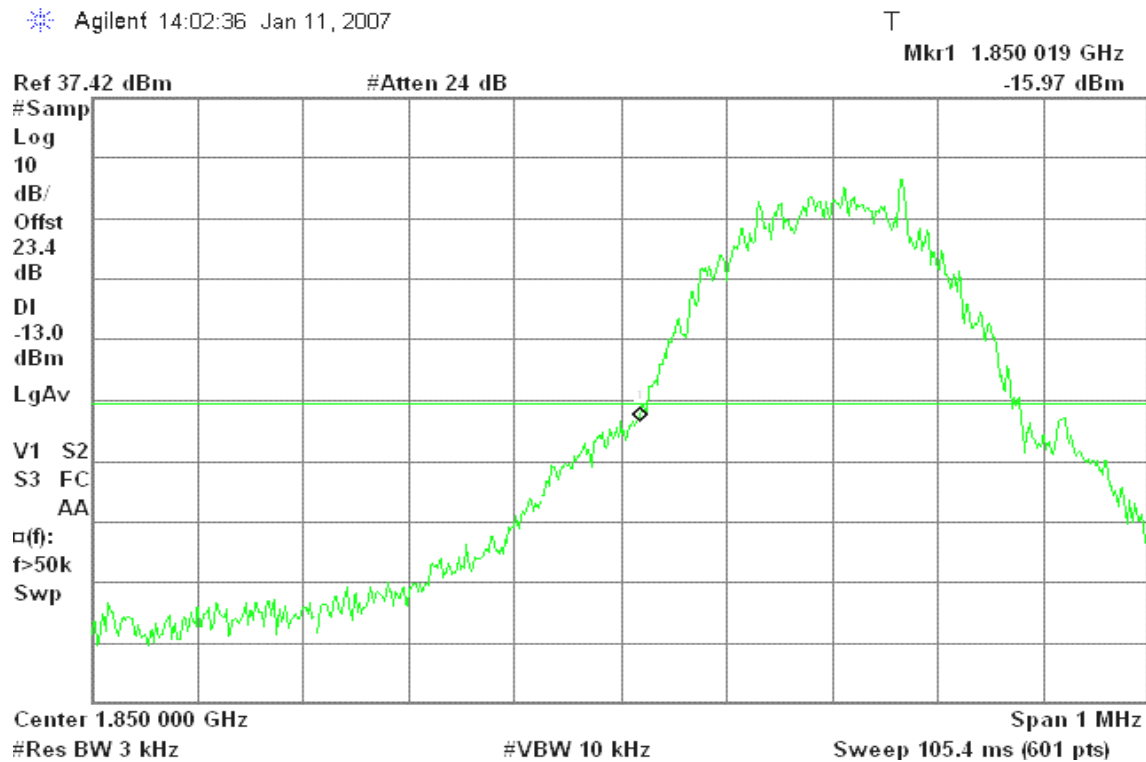
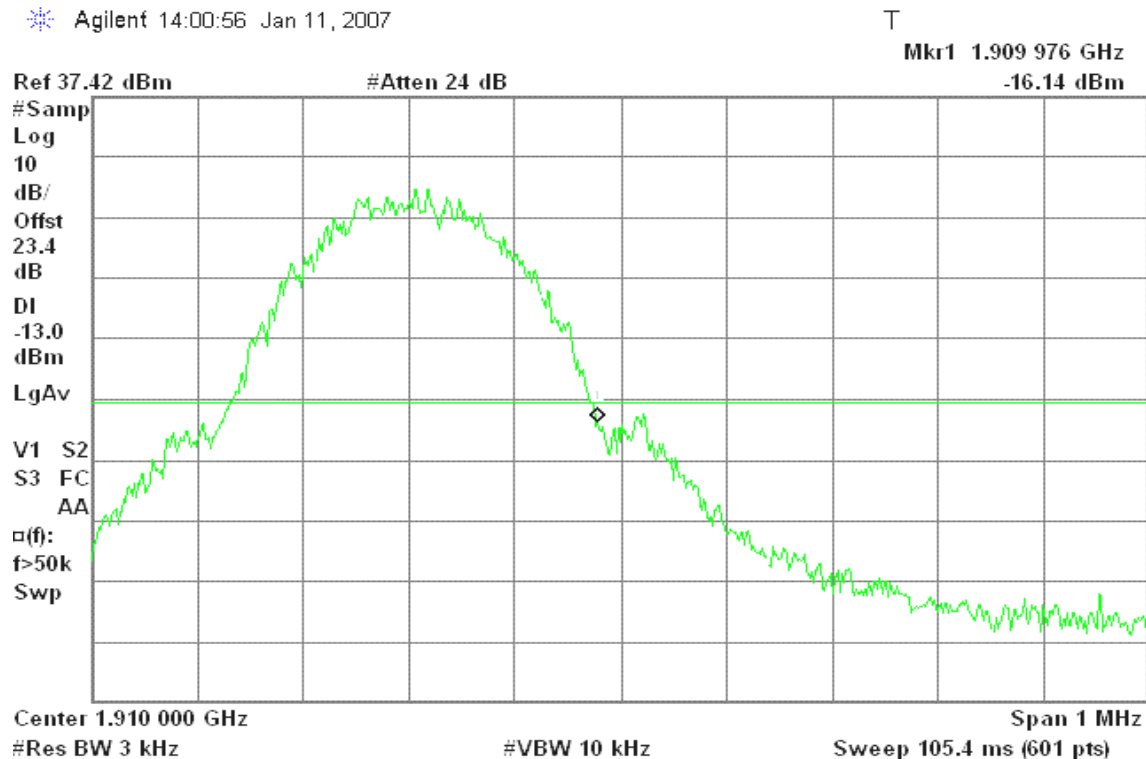


Figure 10-2: Band Edge emissions – GSM CH High



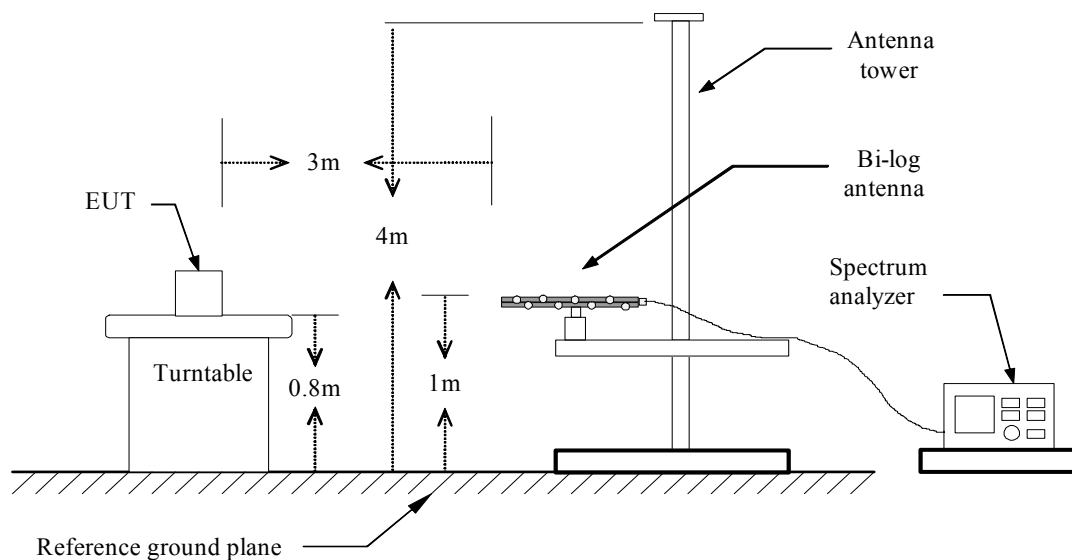
## 7.5 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

### LIMIT

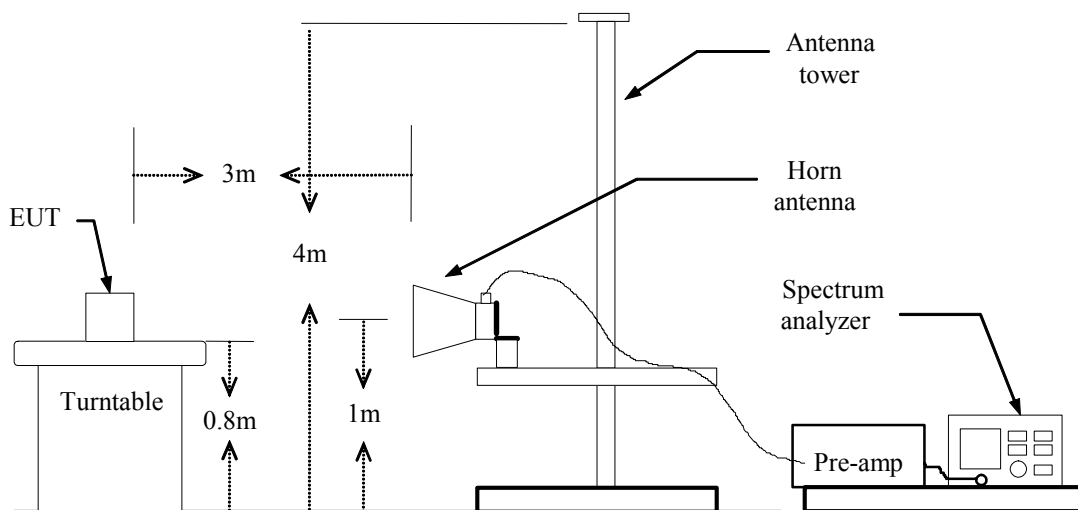
According to FCC §2.1053

### Test Configuration

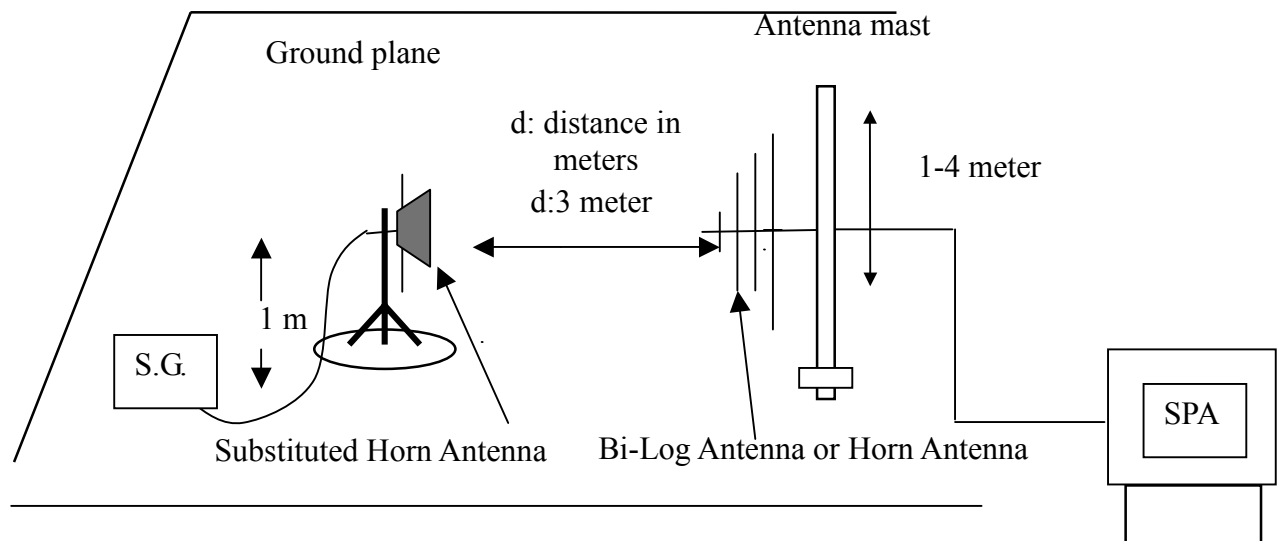
#### Below 1 GHz



#### 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.

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

## TEST RESULTS

*Refer to the attached tabular data sheets.*

**Radiated Spurious Emission Measurement Result****Below 1GHz****Operation Mode:** GSM 1900 / TX / CH 512**Test Date:** January 3, 2007**Temperature:** 25°C**Tested by:** Ryan Chen**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
44.55	V	-58.21	-5.36	-63.57	-13.00	-50.57
207.51	V	-52.14	-16.25	-68.40	-13.00	-55.40
317.12	V	-53.55	-13.56	-67.11	-13.00	-54.11
384.05	V	-56.32	-11.97	-68.30	-13.00	-55.30
634.31	V	-57.93	-6.82	-64.75	-13.00	-51.75
950.53	V	-57.93	-2.83	-60.76	-13.00	-47.76
47.46	H	-62.66	-6.59	-69.25	-13.00	-56.25
260.86	H	-51.46	-15.05	-66.50	-13.00	-53.50
317.12	H	-52.53	-14.05	-66.58	-13.00	-53.58
634.31	H	-56.10	-6.81	-62.90	-13.00	-49.90
950.53	H	-57.26	-2.88	-60.14	-13.00	-47.14
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:** January 3, 2007**Temperature:** 25°C**Tested by:** Ryan Chen**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
44.55	V	-58.56	-5.36	-63.92	-13.00	-50.92
209.45	V	-52.91	-16.15	-69.06	-13.00	-56.06
317.12	V	-54.05	-13.56	-67.60	-13.00	-54.60
383.08	V	-56.70	-12.01	-68.70	-13.00	-55.70
634.31	V	-57.06	-6.82	-63.89	-13.00	-50.89
950.53	V	-58.31	-2.83	-61.14	-13.00	-48.14
39.70	H	-62.79	-6.25	-69.04	-13.00	-56.04
257.95	H	-51.44	-14.89	-66.33	-13.00	-53.33
317.12	H	-53.63	-14.05	-67.68	-13.00	-54.68
506.27	H	-60.79	-8.39	-69.18	-13.00	-56.18
634.31	H	-56.02	-6.81	-62.83	-13.00	-49.83
950.53	H	-56.73	-2.88	-59.61	-13.00	-46.61

**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:** January 3, 2007**Temperature:** 25°C**Tested by:** Ryan Chen**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
44.55	V	-58.73	-5.36	-64.09	-13.00	-51.09
206.54	V	-52.17	-16.31	-68.47	-13.00	-55.47
317.12	V	-54.15	-13.56	-67.71	-13.00	-54.71
386.96	V	-55.76	-11.88	-67.63	-13.00	-54.63
634.31	V	-57.53	-6.82	-64.36	-13.00	-51.36
950.53	V	-58.13	-2.83	-60.96	-13.00	-47.96
44.55	H	-62.60	-6.01	-68.61	-13.00	-55.61
260.86	H	-51.94	-15.05	-66.98	-13.00	-53.98
317.12	H	-53.28	-14.05	-67.33	-13.00	-54.33
505.30	H	-60.15	-8.39	-68.53	-13.00	-55.53
634.31	H	-55.81	-6.81	-62.62	-13.00	-49.62
950.53	H	-56.32	-2.88	-59.20	-13.00	-46.20

**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 1900 / TX / CH 512**Test Date:** January 3, 2007**Temperature:** 25°C**Tested by:** Ryan Chen**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1854.00	V	-46.94	1.52	-45.42	-13.00	-32.42
3702.00	V	-35.02	6.97	-28.05	-13.00	-15.05
N/A						
1854.00	H	-43.85	1.73	-42.12	-13.00	-29.12
3702.00	H	-36.65	7.21	-29.44	-13.00	-16.44
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:** January 3, 2007**Temperature:** 25°C**Tested by:** Ryan Chen**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1882.00	V	-42.90	1.59	-41.31	-13.00	-28.31
3758.00	V	-35.01	7.06	-27.95	-13.00	-14.95
N/A						
1882.00	H	-46.84	1.80	-45.04	-13.00	-32.04
3758.00	H	-35.47	7.28	-28.19	-13.00	-15.19
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:** GPRS 1900 / TX / CH 810**Test Date:** January 3, 2007**Temperature:** 25°C**Tested by:** Ryan Chen**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1910.00	V	-43.21	1.66	-41.55	-13.00	-28.55
3821.00	V	-39.55	7.17	-32.38	-13.00	-19.38
N/A						
1910.00	H	-48.12	1.87	-46.25	-13.00	-33.25
3821.00	H	-41.98	7.36	-34.62	-13.00	-21.62
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.

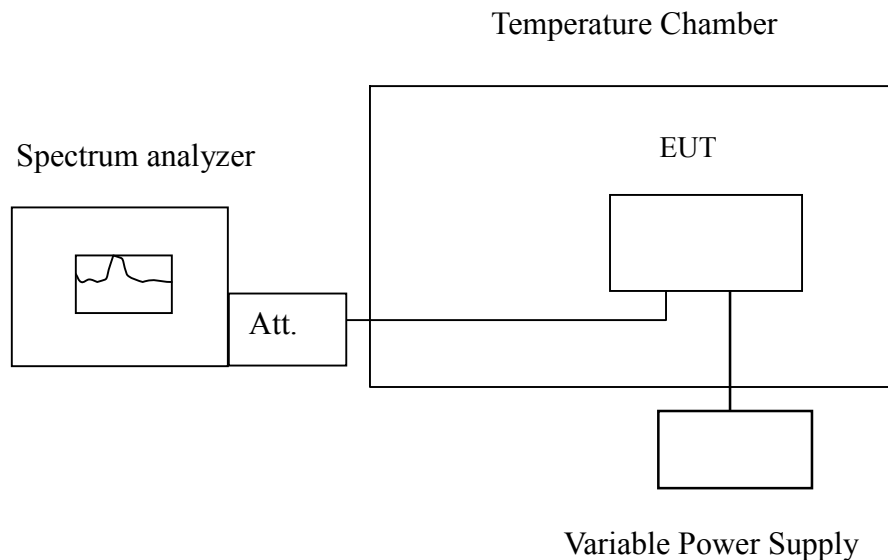
## 7.6 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

### LIMIT

According to FCC §2.1055, 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 1880 MHz @ 20°C				
Limit: $\pm 2.5$ ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
12	50	1879999971	-18	4700
	40	1879999979	-10	
	30	1880000011	22	
	20	1879999989	0	
	10	1880000033	44	
	0	1880000036	47	
	-10	1880000027	38	
	-20	1880000025	36	
	-30	1880000023	34	

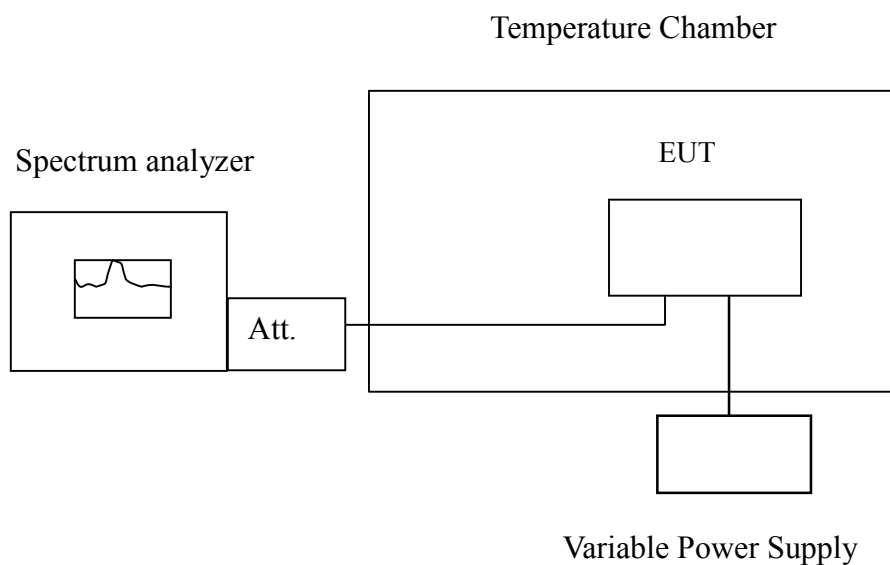
## 7.7 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

### LIMIT

According to FCC §2.1055, FCC §24.235,

Frequency Tolerance: 2.5 ppm.

### 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 ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

**TEST RESULTS**

*No non-compliance noted.*

Reference Frequency: GSM Mid Channel 1880 MHz @ 20°C				
Limit: $\pm 2.5$ ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.25	20	1880000022	33	4700
3.70		1879999989	0	
3.15		1880000015	26	

## 7.8 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	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

\* Decreases with the logarithm of the frequency.

### Test Configuration

See test photographs attached in Appendix 1 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:** January 19, 2007  
**Temperature:** 25°C      **Tested by:** Steven Young  
**Humidity:** 55% 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
0.258	40.810	39.560	0.100	40.910	39.660	61.496	51.496	-20.586	-11.836	L1
0.520	37.590	34.440	0.100	37.690	34.540	56.000	46.000	-18.310	-11.460	L1
0.655	37.650	33.740	0.100	37.750	33.840	56.000	46.000	-18.250	-12.160	L1
1.048	36.630	31.930	0.100	36.730	32.030	56.000	46.000	-19.270	-13.970	L1
1.310	30.580	25.680	0.100	30.680	25.780	56.000	46.000	-25.320	-20.220	L1
1.442	29.990	22.430	0.100	30.090	22.530	56.000	46.000	-25.910	-23.470	L1
0.262	36.480	35.750	0.100	36.580	35.850	61.368	51.368	-24.788	-15.518	L2
0.390	27.860	21.360	0.100	27.960	21.460	58.064	48.064	-30.104	-26.604	L2
0.504	5.580	2.840	0.100	5.680	2.940	56.000	46.000	-50.320	-43.060	L2
0.655	33.980	21.280	0.100	34.080	21.380	56.000	46.000	-21.920	-24.620	L2
0.787	30.070	27.190	0.100	30.170	27.290	56.000	46.000	-25.830	-18.710	L2
0.915	31.970	28.790	0.100	32.070	28.890	56.000	46.000	-23.930	-17.110	L2

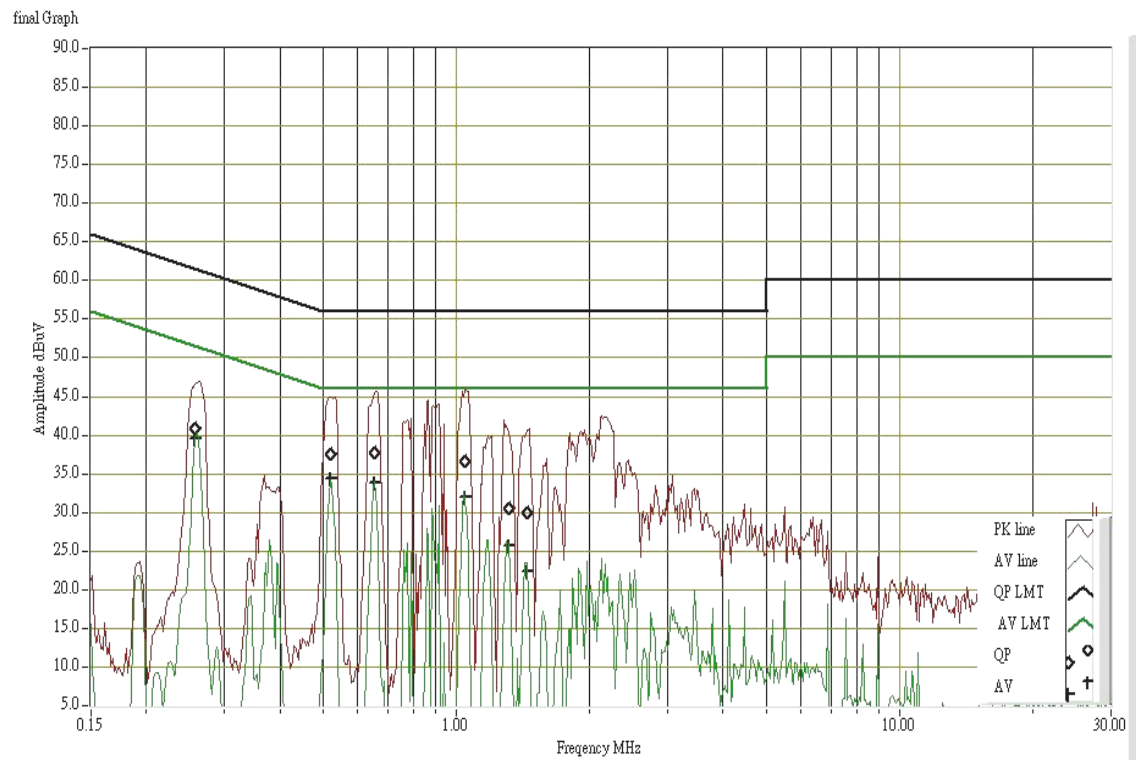
**Remark:**

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 to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)

