# FCC CFR 47 PART 15 SUBPART C

# TEST REPORT

**For**

**Wha Yu Industrial Co., Ltd.**

**Wireless Music Adapter**

**Model: M35C**

**Trade Name: M.gear**

*Prepared for*

**Wha Yu Industrial Co., Ltd.**
**No. 88-3, Shui-Li Road,**
**Hsinchu 300, Taiwan, R.O.C.**

*Prepared by*

**Compliance Certification Services Inc.**
**No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,**
**Taoyuan Hsien, (338) Taiwan, R.O.C.**
**TEL: 886-3-324-0332**
**FAX: 886-3-324-5235**

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# 1. TEST RESULT CERTIFICATION

**Applicant:** Wha Yu Industrial Co., Ltd.
No. 88-3, Shui-Li Road,
Hsinchu 300, Taiwan, R.O.C.

**Equipment Under Test:** Wireless Music Adapter

**Trade Name:** M.gear

**Model:** M35C

**Date of Test:** June 25 ~ August 11, 2004

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULT** |
| FCC Part 15 Subpart C | No non-compliance noted |

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 C63.4 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 Rules Part 15.239.

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

*Approved by:*

Harris W. Lai
Executive Vice President
Compliance Certification Services Inc.

*Reviewed by:*

James Lee
Section Manager
Compliance Certification Services Inc.

# 2. EUT DESCRIPTION

| | |
|---|---|
| **Product** | Wireless Music Adapter |
| **Trade Name** | M.gear |
| **Model** | M35C |
| **Power Supply** | Model: AD35-0904<br>I/P: 120VAC, 60Hz 0.1A<br>O/P: 9VDC, 400mA |
| **Operate Frequency** | 88.3MHz – 107.7MHz |
| **Transmit Power** | N/A |
| **Modulation Technique** | FM |
| **Number of Channels** | 205 Channel |

***Note:*** *The product is a Transmitter. This submittal(s) (test report) is intended for FCC ID: RUKM35C filing to comply with Section 15.239 of the FCC Part 15 Subpart C Rules.*

# 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 Part 15 Subpart C.

## 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 calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

## 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 7.1 of ANSI C63.4.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

**Radiated Emissions**

The EUT is a placed on as turntable, 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.

## 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | 322 - 335.4 | | |

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

## 3.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition and tested in continuous transmitting mode.

The field strength of spurious radiation emission was measured in the following position: EUT stand-up position (X mode), lie-down position (Y mode) and the position of the EUT being put onto the cradle. The following data show only the worst case setup.

The worst case (Y axis) was reported.

# 4. 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

# 5. FACILITIES AND ACCREDITATIONS

## 5.1 FACILITIES

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

☒ No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.

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

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 preselectors 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 LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200600-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: 93105 and 90471).

## 5.4 TABLE PF ACCREDITATIONS AND LISTINGS

| Country | Agency | Scope of Accreditation | Logo |
|---|---|---|---|
| USA | NVLAP* | EN 55011, EN 55014-1, AS/NZS 1044, CNS 13783-1, EN 55022, CNS 13438, EN 61000-3-2, EN 61000-3-3, ANSI C63.4, FCC OST/MP-5, AS/NZS CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11 | NVLAP® 200600-0 |
| USA | FCC | 3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements | FC 93105, 90471 |
| Japan | VCCI | 4 3/10 meter Open Area Test Sites to perform conducted/radiated measurements | VCCI 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 300 328-2, 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 | N ELA 124a ELA 124b ELA 124c |
| Taiwan | CNLA | EN 300 328-1/2, EN 300 220-1/2/3, EN 300 440-1/2, EN 61000-3-2, EN 61000-3-3, 47 CFR FCC Part 15 Subpart C/D/E, EN 55013, CNS 13439, EN 55014-1, CNS 13783-1, EN 55022, CNS 13438, CISPR 22, AS/NZS 3548, EN 61000-4-2/3/4/5/6/8/11, ENV 50204, IEEE Std 1528, FCC OET Bulletin, 65+Supplement C, EN50360, EN50361, EN50371, RSS102 | CNLA 0363 ILAC MRA |
| Taiwan | BSMI | CNS 13438, CNS 13783-1, CNS 13439, CNS 14115 | 商檢 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 | RSS212, Issue 1 | Canada IC 3991-3 IC 3991-4 |

** No part of this report may be used to claim or imply product endorsement by NVLAP 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 1 for the actual connections between EUT and support equipment.

## 6.2 SUPPORT EQUIPMENT

| Device Type | Model | Series No. | FCC ID | Brand | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| Notebook PC | COMPAQ | PP2150 | 1V31LDLZ20PG | FCC DoC | N/A | Unshielded, 1.8m |

***Notes:***

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 15.239 REQUIREMENTS

## 7.1 20 DB BANDWIDTH

### LIMIT

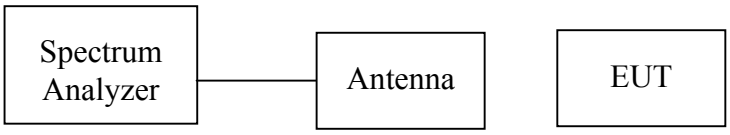
N/A

### MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 100112 | 08/03/2004 |
| Spectrum Analyzer | Agilent | E4446A | MY43360131 | 01/10/2005 |

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

**Test Configuration**




### TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10kHz, VBW = RBW, Span = 1MHz, Sweep = auto.
4. Mark the peak frequency and 20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

### TEST RESULTS

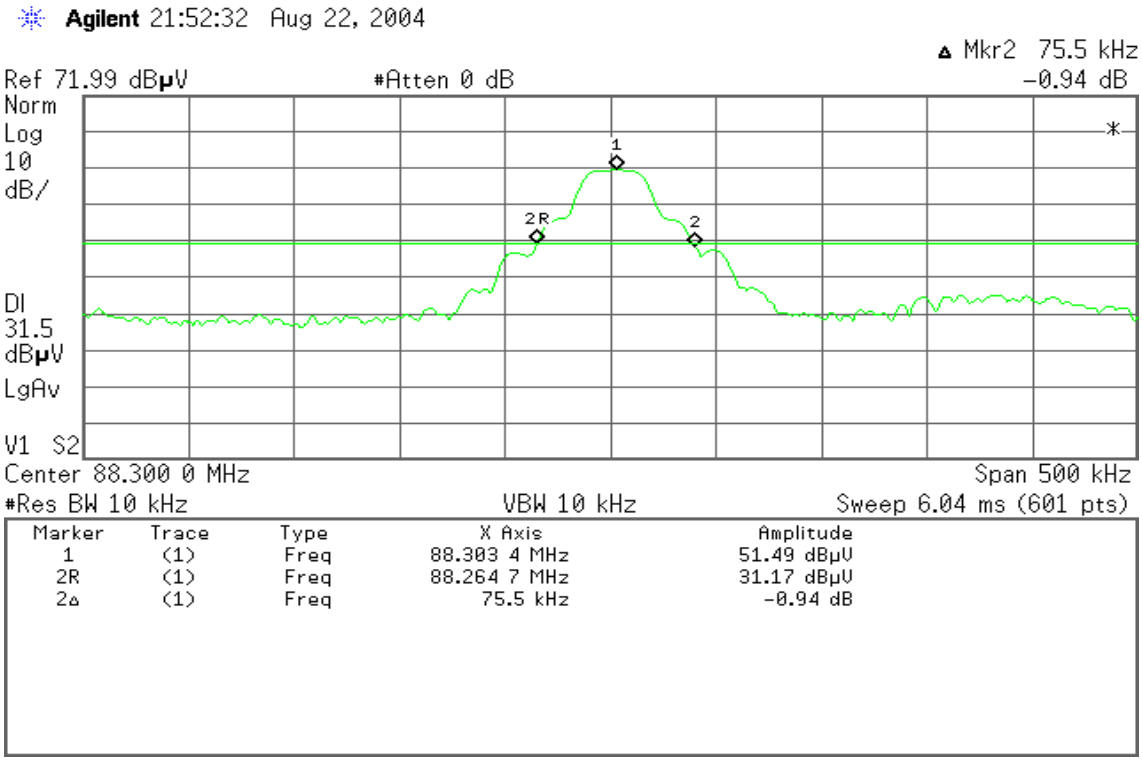
*No non-compliance noted*

**Test Data**

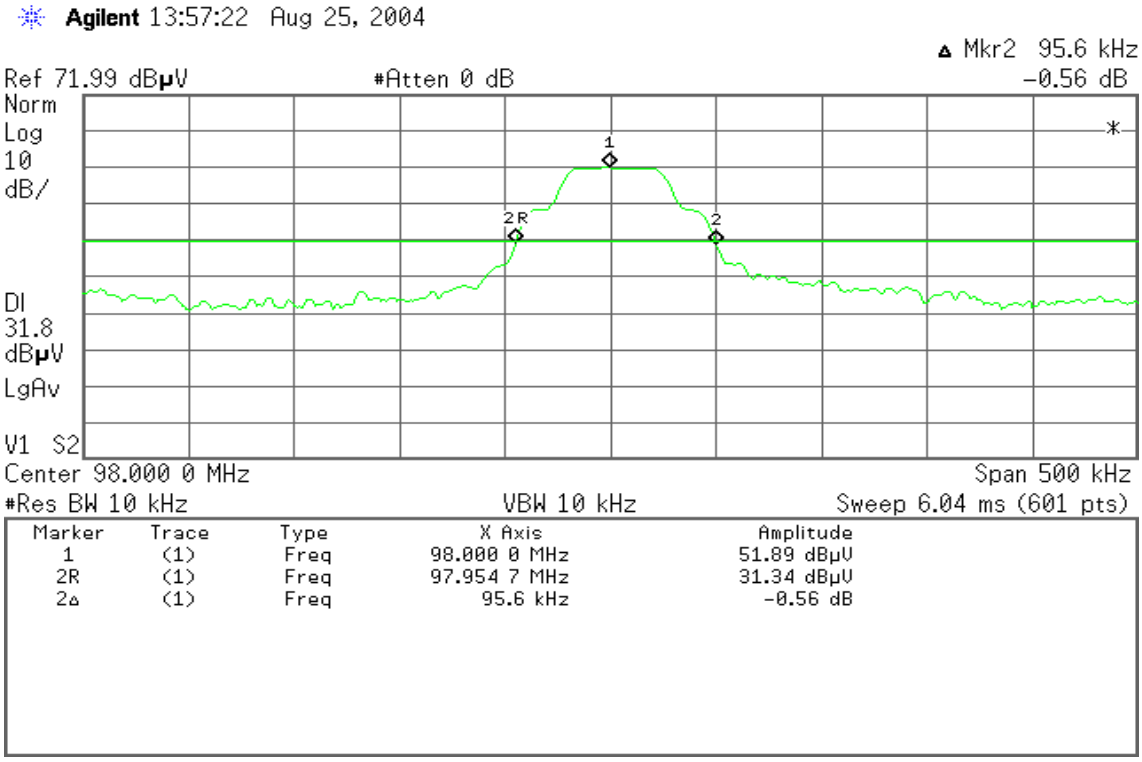
| Channel | Frequency (MHz) | Bandwidth (kHz) |
|---|---|---|
| Low | 88.3 | 75.50 |
| Mid | 98 | 95.60 |
| High | 107.7 | 97.20 |

## Test Plot

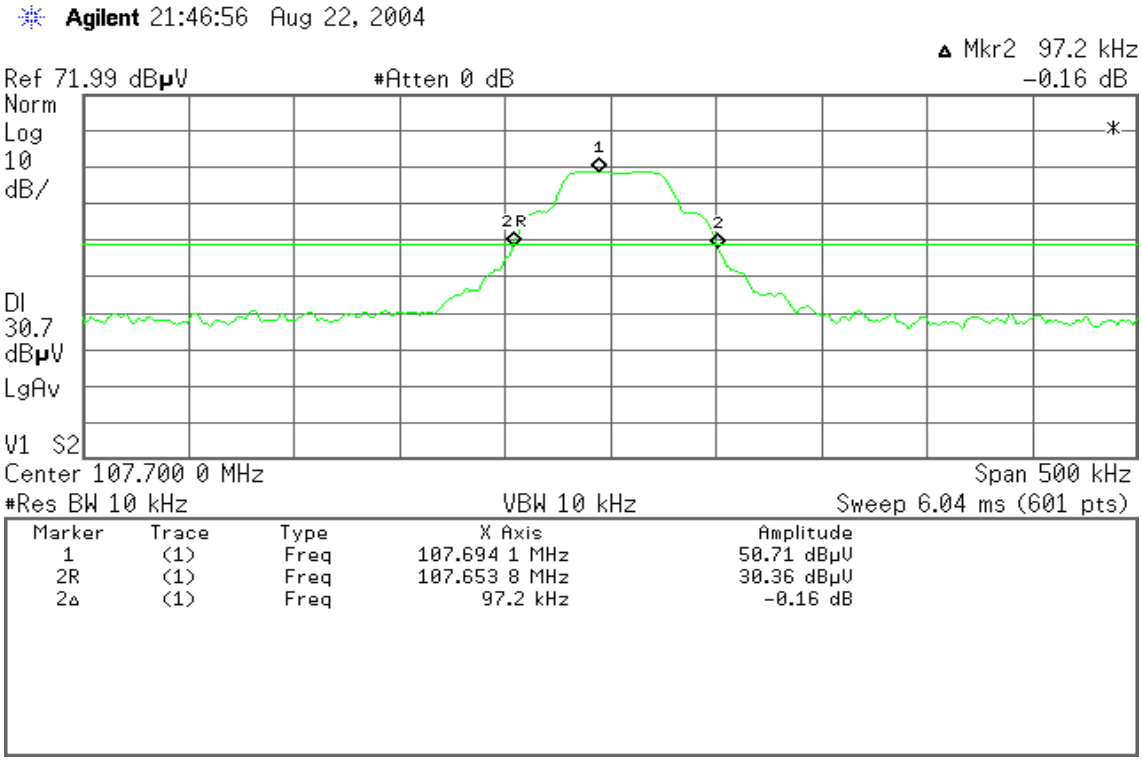
## CH Low




## CH Mid



## CH High


Agilent 21:46:56 Aug 22, 2004
Mkr2 97.2 kHz
Ref 71.99 dBμV
#Atten 0 dB
-0.16 dB
Norm
Log
10
dB/
1
2R
2
Dl
30.7
dBμV
LgAv
V1 S2
Center 107.700 0 MHz
Span 500 kHz
#Res BW 10 kHz
VBW 10 kHz
Sweep 6.04 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 107.694 1 MHz 50.71 dBμV
2R (1) Freq 107.653 8 MHz 30.36 dBμV
2Δ (1) Freq 97.2 kHz -0.16 dB

## 7.2 BAND EDGES MEASUREMENT

### LIMIT

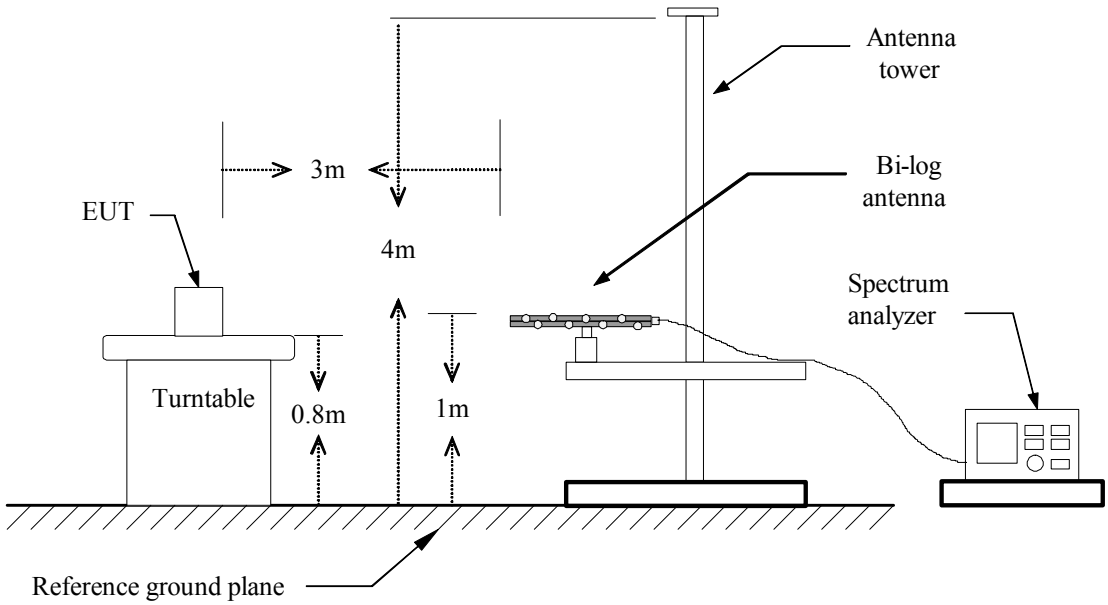
According to §15.239(a), emissions from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108MHz.

### MEASUREMENT EQUIPMENT USED

| Open Area Test Site # 3 | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| Spectrum Analyzer | ADVANTEST | R3261A | N/A | 03/18/2005 |
| EMI Test Receiver | R&S | ESVS20 | 838804/004 | 01/04/2005 |
| Pre-Amplifier | HP | 8447D | 2944A09173 | 03/03/2005 |
| Bilog Antenna | SCHWAZBECK | VULB9163 | 145 | 07/05/2004 |
| Turn Table | EMCO | 2081-1.21 | 9709-1885 | N.C.R |
| Antenna Tower | EMCO | 2075-2 | 9707-2060 | N.C.R |
| Controller | EMCO | 2090 | 9709-1256 | N.C.R |
| RF Switch | ANRITSU | MP59B | M53867 | N.C.R |
| Site NSA | C&C | N/A | N/A | 09/06/2004 |
| Horn antenna | Schwarzbeck | BBHA 9120 | D210 | 02/23/2005 |
| Loop Antenna | EMCO | 6502 | 2356 | 07/10/2004 |
| Pre-Amplifier | HP | 8449B | 3008B00965 | 10/02/2004 |

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

**Test Configuration**




## TEST PROCEDURE

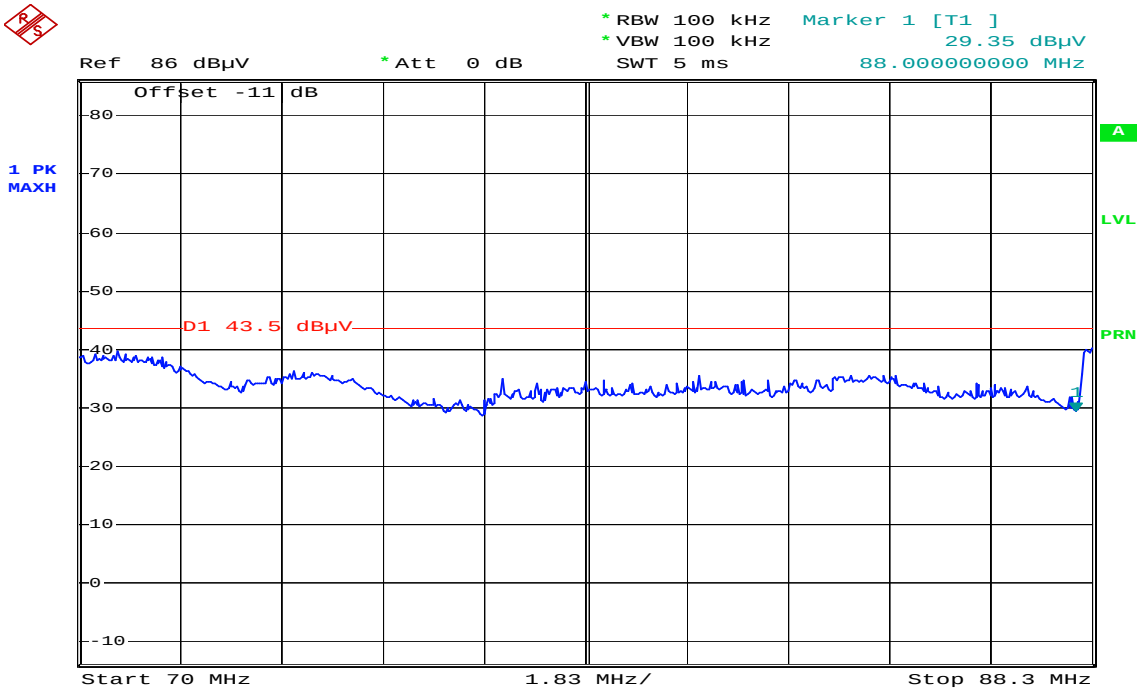
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal form an external generator.
2. Position the EUT as shown in figure 1 and measurement the turn on the EUT. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 10kHz and 100kHz respectively with a convenient frequency span including 200kHz bandwidth of the emission.
4. Mark the bandwidth of 200kHz points and plot the graph on spectrum analyzer.
5. Repeat the procedures until all measured frequencies were complete.

## TEST RESULTS

Refer to attach spectrum analyzer data chart.

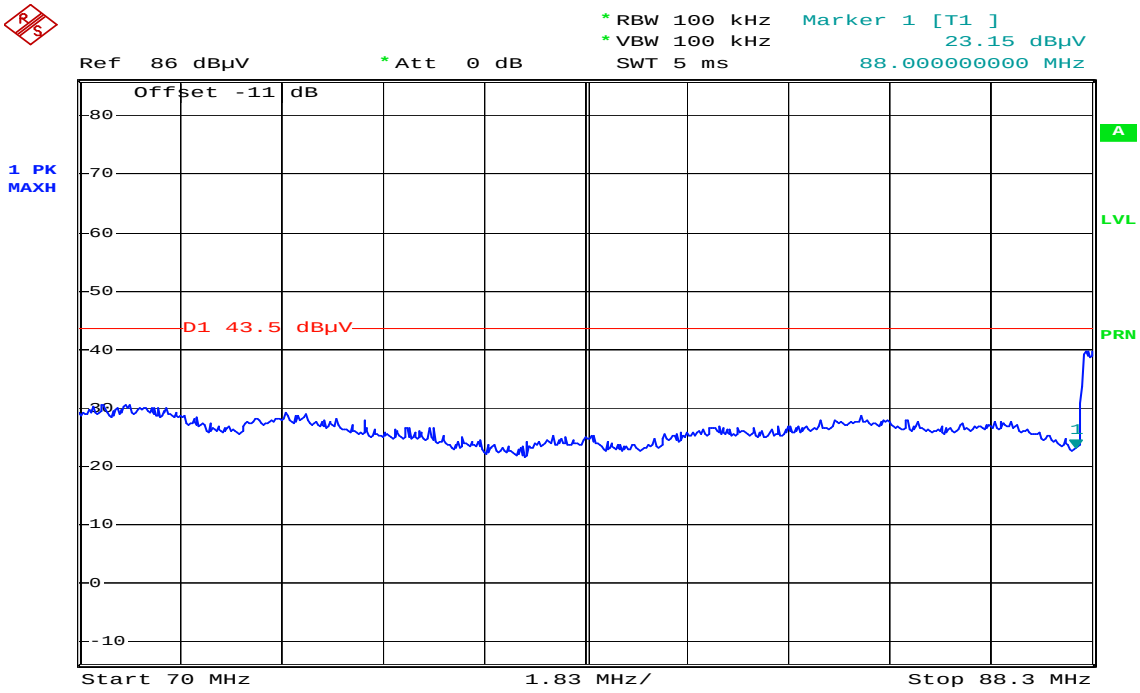
## Band Edges (CH Low)

## Polarity: Vertical




Date: 11.AUG.2004 19:18:17

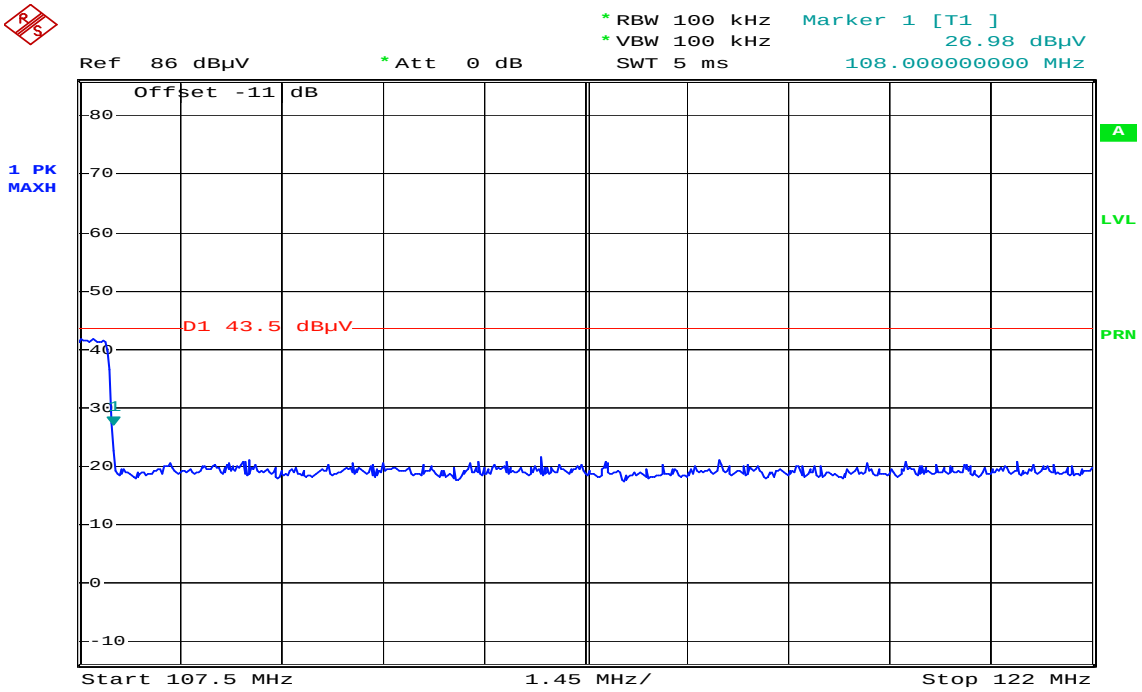
## Polarity: Horizontal




Date: 11.AUG.2004 19:16:12

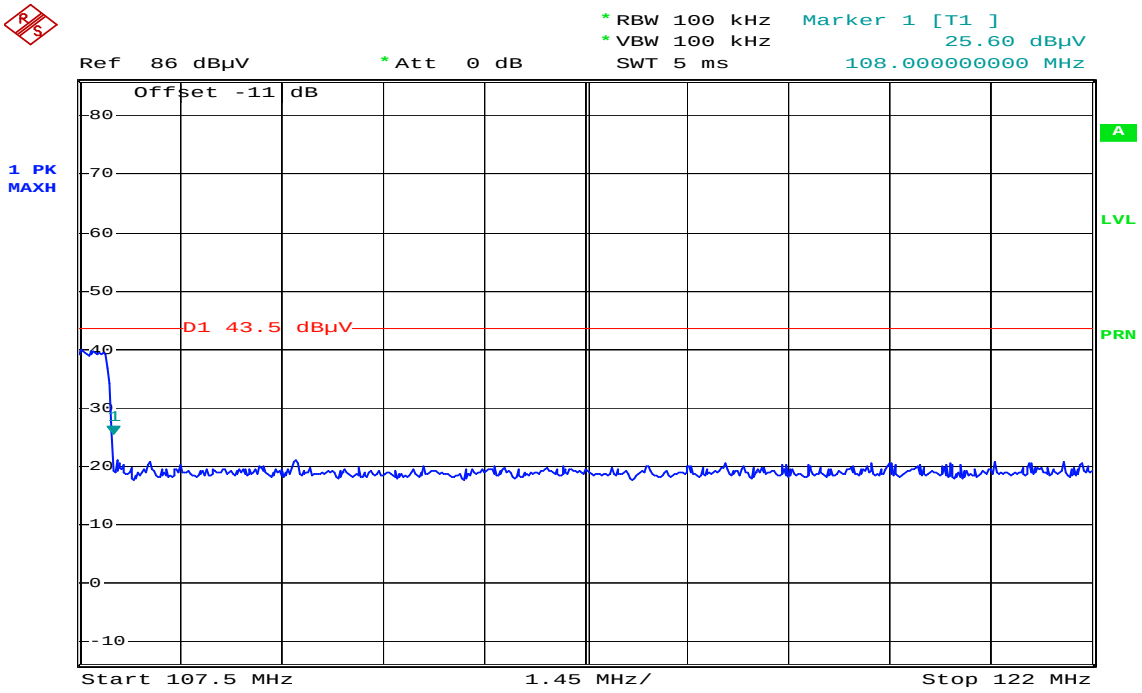
## Band Edges (CH High)

## Polarity: Vertical




Date: 11.AUG.2004 19:10:13

## Polarity: Horizontal




Date: 11.AUG.2004 19:12:33

## 7.3 RADIATED EMISSIONS

### LIMIT

1. The field strength of any emission within this band (section 15.239 frequency between 88 MHz –108 MHz) shall not exceed 250 microvolts /meter at 3 meters. (48dBµV/m at 3m) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

   The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit), as below.

| Frequency (MHz) | Field Strength (mV/m) | Measurement Distance (m) |
|---|---|---|
| 1.705-30 | 30 | 30 |
| 30-88 | 100* | 3 |
| 88-216 | 150* | 3 |
| 216-960 | 200* | 3 |
| Above 960 | 500 | 3 |

   ***Note:*** *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2. In the above emission table, the tighter limit applies at the band edges.

| Frequency (Hz) | Field Strength (µV/m at 3-meter) | Field Strength (dBµV/m at 3-meter) |
|---|---|---|
| 1.705-30 | 30 | 69.54 |
| 30-88 | 100 | 40 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46 |
| Above 960 | 500 | 54 |

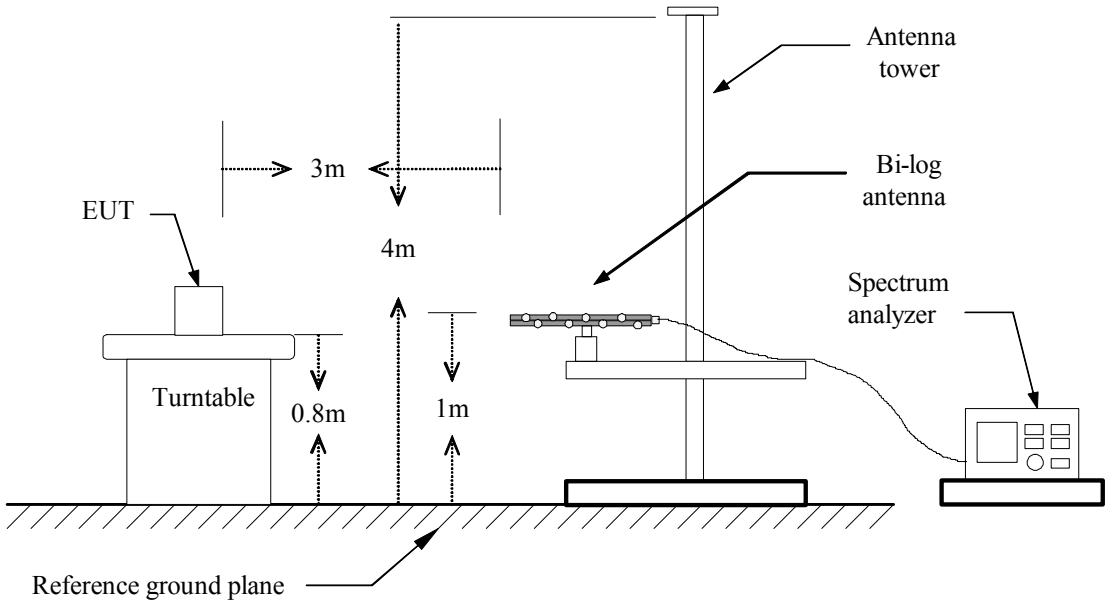
## MEASUREMENT EQUIPMENT USED

| Open Area Test Site # 3 | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| Spectrum Analyzer | ADVANTEST | R3261A | N/A | 03/18/2005 |
| EMI Test Receiver | R&S | ESVS20 | 838804/004 | 01/04/2005 |
| Pre-Amplifier | HP | 8447D | 2944A09173 | 03/03/2005 |
| Bilog Antenna | SCHWAZBECK | VULB9163 | 145 | 07/05/2004 |
| Turn Table | EMCO | 2081-1.21 | 9709-1885 | N.C.R |
| Antenna Tower | EMCO | 2075-2 | 9707-2060 | N.C.R |
| Controller | EMCO | 2090 | 9709-1256 | N.C.R |
| RF Switch | ANRITSU | MP59B | M53867 | N.C.R |
| Site NSA | C&C | N/A | N/A | 09/06/2004 |
| Horn antenna | Schwarzbeck | BBHA 9120 | D210 | 02/23/2005 |
| Loop Antenna | EMCO | 6502 | 2356 | 07/10/2004 |
| Pre-Amplifier | HP | 8449B | 3008B00965 | 10/02/2004 |

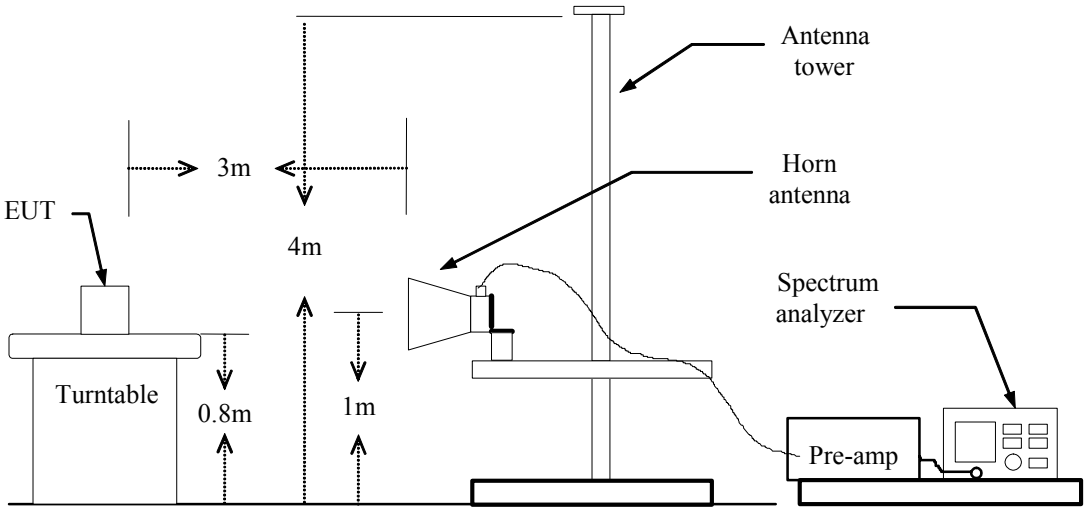
***Remark:*** *Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration

**Below 1 GHz**



**Above 1 GHz**




## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

   RBW=100kHz / VBW=300kHz / Sweep=AUTO

   Above 1GHz:

   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

# TEST RESULTS

## Test Data

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH Low / X Mode | **Test Date:** | June 28, 2004 |
| **Temperature:** | 20°C | **Tested by:** | Chris Hsien |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/AVG) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 88.30 | V | Peak | 50.75 | -11.90 | 38.85 | 48.00 | -9.15 |
| 176.57 | V | Peak | 44.00 | -14.72 | 29.28 | 43.50 | -14.22 |
| 255.64 | V | Peak | 45.00 | -10.75 | 34.25 | 46.00 | -11.75 |
| --- | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 88.30 | H | Peak | 51.75 | -11.90 | 39.85 | 48.00 | -8.15 |
| 176.57 | H | Peak | 48.25 | -14.72 | 33.53 | 43.50 | -9.97 |
| 257.65 | H | Peak | 39.75 | -10.75 | 29.00 | 46.00 | -17.00 |
| --- | | | | | | | |
| | | | | | | | |
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***Notes:***

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.*

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH Mid / X Mode | **Test Date:** | June 28, 2004 |
| **Temperature:** | 20°C | **Tested by:** | Chris Hsien |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/AVG) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 98.00 | V | Peak | 55.75 | -10.84 | 44.91 | 48.00 | -3.09 |
| 196.24 | V | Peak | 44.00 | -14.07 | 29.93 | 43.50 | -13.57 |
| 287.65 | V | Peak | 47.75 | -14.58 | 33.17 | 46.00 | -12.83 |
| --- | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| 98.00 | H | Peak | 52.17 | -10.84 | 41.33 | 48.00 | -6.67 |
| 196.24 | H | Peak | 42.25 | -10.84 | 31.41 | 43.50 | -12.09 |
| 287.65 | H | Peak | 47.85 | -14.58 | 33.27 | 46.00 | -12.73 |
| --- | | | | | | | |
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***Notes:***

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.*

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH High / X Mode | **Test Date:** | June 28, 2004 |
| **Temperature:** | 20°C | **Tested by:** | Chris Hsien |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/AVG) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 107.70 | V | Peak | 53.50 | -9.53 | 43.97 | 48.00 | -4.03 |
| 215.14 | V | Peak | 47.25 | -13.85 | 33.40 | 43.50 | -10.10 |
| 438.00 | V | Peak | 46.03 | -10.46 | 35.57 | 46.00 | -10.43 |
| --- | | | | | | | |
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| | | | | | | | |
| 107.70 | H | Peak | 50.75 | -9.53 | 41.22 | 48.00 | -6.78 |
| 215.52 | H | Peak | 49.75 | -13.85 | 35.90 | 43.50 | -7.60 |
| 429.00 | H | Peak | 50.00 | -10.46 | 39.54 | 46.00 | -6.46 |
| --- | | | | | | | |
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***Notes:***

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.*

## 7.4 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.

### MEASUREMENT EQUIPMENT USED

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCS30 | 847793/012 | 12/20/2003 |
| LISN | R&S | ESH2-Z5 | 843285/010 | 12/15/2003 |
| LISN | EMCO | 3825/2 | 9003-1628 | 07/25/2003 |

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

#### 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.

**Test Data**

| | | | |
|---|---|---|---|
| **Operation Mode:** | TX + RX mode | **Test Date:** | June 25, 2004 |
| **Temperature:** | 30°C | **Humidity:** | 50 % RH |
| **Power source:** | 110VAC / 60Hz | **Tested by:** | Chris Hsien |

| Freq. (MHz) | Q.P. Raw (dBuV) | AVG Raw (dBuV) | Q.P. Limit (dBuV) | AVG Limit (dBuV) | Q.P. Margin (dB) | AVG Margin (dB) | Note |
|---|---|---|---|---|---|---|---|
| 0.150 | 41.8 | --- | 66.00 | --- | -24.20 | --- | L1 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 0.155 | 42.0 | --- | 65.70 | --- | -23.70 | --- | L2 |
| 0.920 | 27.30 | --- | 56.00 | --- | -28.70 | --- | L2 |
| | | | | | | | |
| | | | | | | | |
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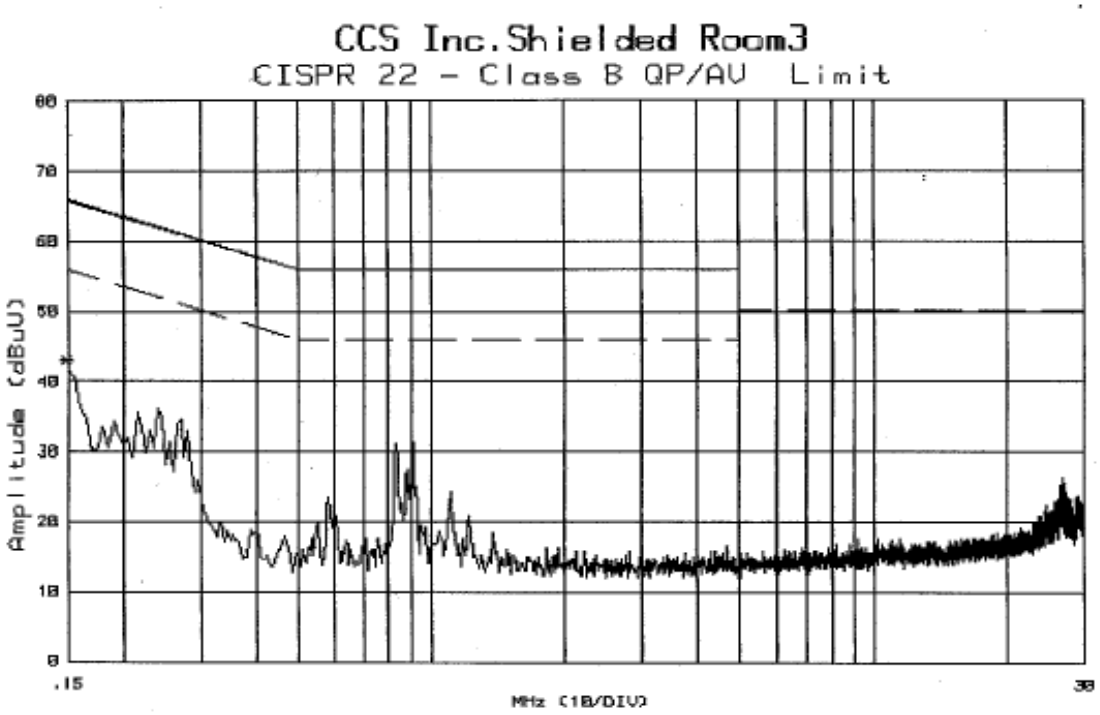
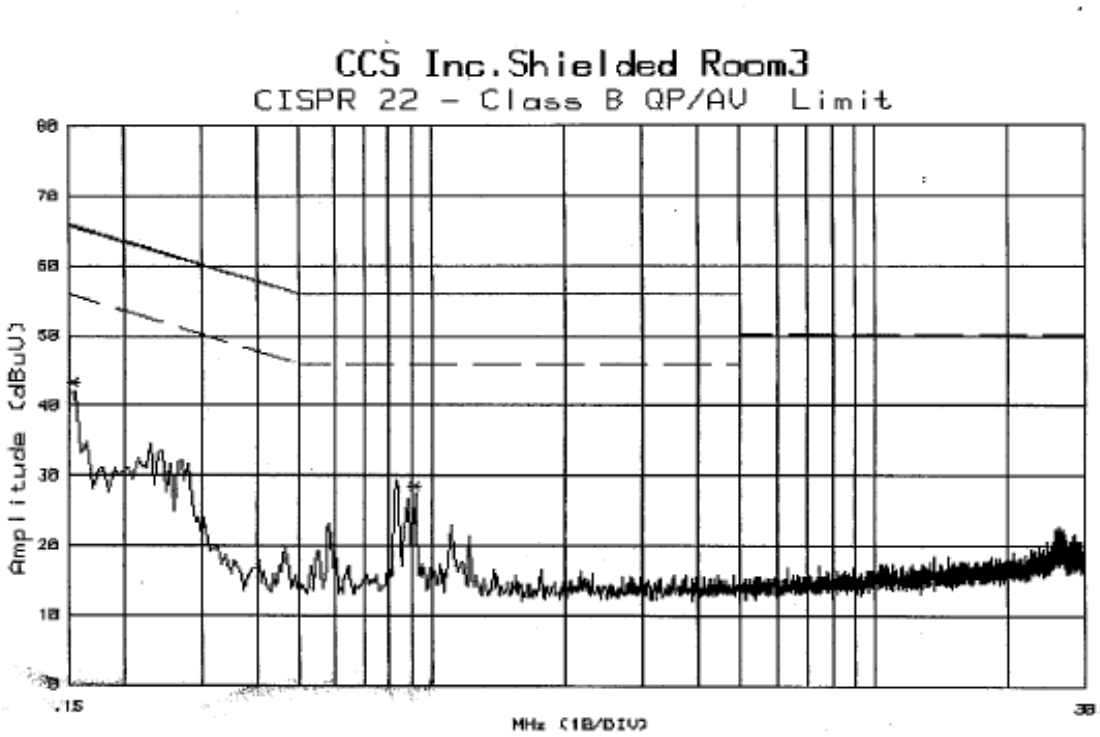
***Note:***

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. *"---" denotes the emission level was or more than 2dB below the Average limit*
4. *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;*
5. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

**Test Plots**

***Conducted emissions (Line 1)***




***Conducted emissions (Line 2)***