

# FCC PART 15 CLASS B

## EMI MEASUREMENT AND TEST REPORT

For

### **Fu Kuang Hui Electronics Co., Ltd. (Shen Zhen)**

The second Industrial Park of Xia Village, Gongming Baoan District,  
Shenzhen City, Guangdong Province, China

**FCC ID: P2DMP305**

March 24, 2003

|                                                                                                                                                                                                                                           |                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>This Report Concerns:</b><br><input checked="" type="checkbox"/> Original Report                                                                                                                                                       | <b>Equipment Type:</b><br>Digital Media Player |
| <b>Test Engineer:</b> Davil Wang                                                                                                                                                                                                          |                                                |
| <b>Report Number:</b> RSZ03031606                                                                                                                                                                                                         |                                                |
| <b>Test Date:</b> March 16, 2003                                                                                                                                                                                                          |                                                |
| <b>Reviewed By:</b> _____                                                                                                                                                                                                                 |                                                |
| <b>Prepared By:</b> Bay Area Compliance Lab Corp. ShenZhen<br>Suite C, 41-D Electronics Science & Technology Building,<br>No. 2070 Shennanzhong Rd ShenZhen,<br>Guandong 518031, P.R. China<br>Tel: (755) 83296449<br>Fax: (755) 83273756 |                                                |

**Note:** The test report is specially limited to the use of the above client company and the product model. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government

**TABLE OF CONTENTS**

|                                                              |           |
|--------------------------------------------------------------|-----------|
| <b>1 - GENERAL INFORMATION.....</b>                          | <b>3</b>  |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) ..... | 3         |
| 1.2 OBJECTIVE .....                                          | 3         |
| 1.3 RELATED SUBMITTAL(S)/GRANT(S).....                       | 3         |
| 1.4 TEST METHODOLOGY .....                                   | 3         |
| 1.5 TEST FACILITY .....                                      | 4         |
| 1.6 TEST EQUIPMENT LIST .....                                | 5         |
| 1.7 HOST PC CONFIGURATION DETAIL AND LIST .....              | 5         |
| 1.8 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS.....            | 5         |
| 1.9 EXTERNAL I/O CABLING LIST AND DETAILS .....              | 5         |
| <b>2 - SYSTEM TEST CONFIGURATION.....</b>                    | <b>6</b>  |
| 2.1 JUSTIFICATION .....                                      | 6         |
| 2.2 EUT EXERCISE SOFTWARE .....                              | 6         |
| 2.3 SPECIAL ACCESSORIES.....                                 | 6         |
| 2.4 BLOCK DIAGRAM.....                                       | 6         |
| 2.5 EQUIPMENT MODIFICATIONS .....                            | 6         |
| 2.6 TEST SETUP CONFIGURATION .....                           | 7         |
| 2.7 TEST SETUP BLOCK DIAGRAM.....                            | 7         |
| <b>3 - CONDUCTED EMISSIONS TEST DATA.....</b>                | <b>8</b>  |
| 3.1 MEASUREMENT UNCERTAINTY .....                            | 8         |
| 3.2 EUT SETUP.....                                           | 8         |
| 3.3 SPECTRUM ANALYZER SETUP .....                            | 8         |
| 3.4 TEST PROCEDURE .....                                     | 9         |
| 3.5 SUMMARY OF TEST RESULTS .....                            | 9         |
| 3.6 CONDUCTED EMISSIONS TEST DATA .....                      | 9         |
| 3.7 PLOT OF CONDUCTED EMISSIONS TEST DATA .....              | 9         |
| <b>4 - RADIATED EMISSION DATA .....</b>                      | <b>11</b> |
| 4.1 MEASUREMENT UNCERTAINTY .....                            | 11        |
| 4.2 EUT SETUP.....                                           | 11        |
| 4.3 SPECTRUM ANALYZER SETUP .....                            | 11        |
| 4.4 TEST PROCEDURE .....                                     | 12        |
| 4.5 CORRECTED AMPLITUDE & MARGIN CALCULATION .....           | 12        |
| 4.6 SUMMARY OF TEST RESULTS .....                            | 12        |
| 4.7 RADIATED EMISSIONS TEST RESULT.....                      | 12        |

## 1 - GENERAL INFORMATION

---

### 1.1 Product Description for Equipment Under Test (EUT)

The *Fu Kuang Hui Electronics Co., Ltd. (Shen Zhen)*'s product, model MP305 or the "EUT" as referred to in this report is a Digital Media Player.

*\* The test data was only good for the test sample. It may have deviation for other test sample.*

### 1.2 Objective

The following Class B report is prepared on behalf of *Fu Kuang Hui Electronics Co., Ltd. (Shen Zhen)* in accordance with Part 2, Subpart J, and Part 15.

The objective of the manufacturer is to demonstrate compliance with FCC Part 15 Class B limits for Information Technology Equipment.

### 1.3 Related Submittal(s)/Grant(s)

No Related Submittals

### 1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory Corporation. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## 1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the No. 3 building JingHua Courtyard, Shennanzhong Rd ShenZhen, Guandong 518031, P.R. C, Xinmiao District, Wuhou Avenue, Chengdu City, Sichuan Province, P. R. C, and 230 Commercial St. Ste. 2, Sunnyvale, CA 94085 USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1400F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

**1.6 Test Equipment List**

| Manufacturer      | Description          | Model                 | Serial Number | Cal. Due Date |
|-------------------|----------------------|-----------------------|---------------|---------------|
| R/S               | Spectrum Analyzer    | FSEM                  | 849720/019    | 08/05/2003    |
| R/S               | Receiver             | ESCS30                | 828304/014    | 09/05/2003    |
| HP                | Amplifier            | 8447D                 | 2944A09795    | 08/05/2003    |
| ETS               | Log Periodic Antenna | 3146                  | 9603-4421     | 09/05/2003    |
| ETS               | Biconical Antenna    | 3110B                 | 3360          | 08/05/2003    |
| Solar Electronics | LISN                 | TYPE 8012-50-R-24-BNC | 21162         | 09/05/2003    |
| Solar Electronics | LISN                 | TYPE 8012-50-R-25-BNC | 21163         | 10/05/2003    |

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

**1.7 Host PC Configuration Detail and List**

| Manufacturer | Description       | Model          | Serial Number  | FCC ID |
|--------------|-------------------|----------------|----------------|--------|
| LEGEND       | System PC         | Qitian1200     | N/A            | N/A    |
| Seagate      | Hard Drive        | ST 320410A     | 5FG2TFAX       | DOC    |
| Sony         | 3.5" Floppy Drive | FDD-MPF920-E   | 72930348       | DOC    |
| LEGEND       | Motherboard       | MS-6395        | N/A            | DOC    |
| TELTA        | SPS               | DPS-145PB-111F | Lup0219016447C | DOC    |

**1.8 Local Support Equipment List and Details**

| Manufacturer | Description          | Model           | Serial Number  | FCC ID |
|--------------|----------------------|-----------------|----------------|--------|
| SAMSUNG      | CRT Monitor          | Syncmaster 550s | DP15HVB419871T | DOC    |
| KTC          | CRT Monitor          | 7002FE          | N/A            | DOC    |
| SAST         | Modem                | AEM-2100        | 0293           | N/A    |
| LEGEND       | Keyboard             | SK-1688         | C2057790       | DOC    |
| Microsoft    | Mouse                | X04-72174       | 52463-IEM      | DOC    |
| HP           | Laser Jet 5L Printer | C3941A          | JPTV013237     | DOC    |

**1.9 External I/O Cabling List and Details**

| Cable Description      | Length (M) | From/Port  | To       |
|------------------------|------------|------------|----------|
| Shielded KB Cable      | 1.6        | KB         | Keyboard |
| Shielded Cable         | 1.5        | Mouse Port | Mouse    |
| Shielded Serial Cable  | 1.2        | Serial1    | Modem    |
| Shielded Printer Cable | 1.2        | Parallel   | Printer  |
| Unshielded Video Cable | 1.5        | VGA        | Monitor  |

## **2 - SYSTEM TEST CONFIGURATION**

---

### **2.1 Justification**

The system was configured for testing in a typical fashion (as normally used by a typical user).

### **2.2 EUT Exercise Software**

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

### **2.3 Special Accessories**

As shown in section 2.5, all interface cables used for compliance testing are shielded as normally supplied by *Fu Kuang Hui Electronics Co., Ltd. (Shen Zhen)*, and from their respective support equipment manufacturers. The VGA monitor, the printer, the modem and all other peripherals featured shielded metal connectors.

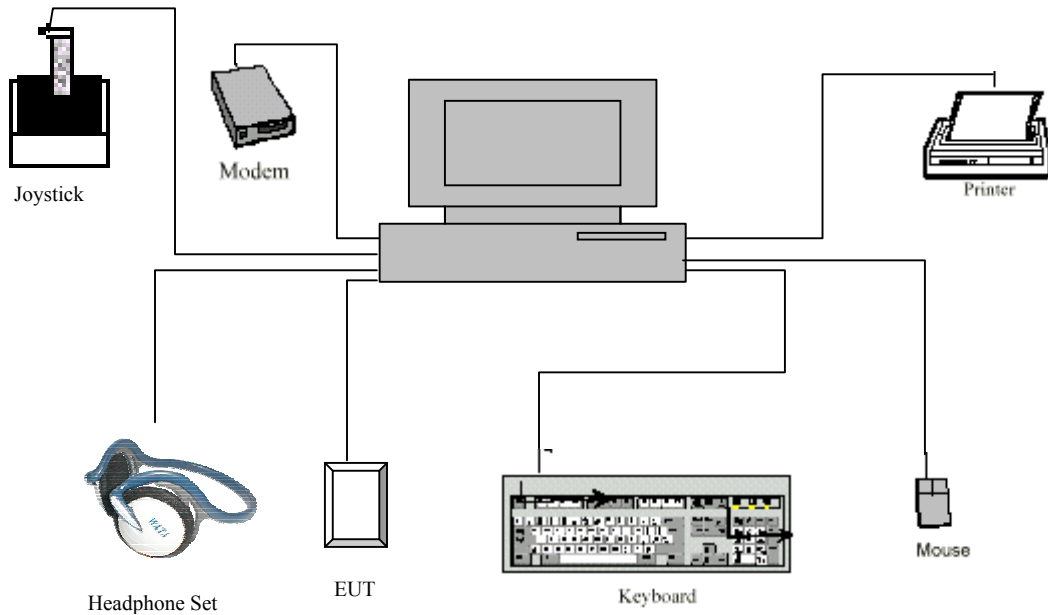
### **2.4 Block Diagram**

Please refer to the Appendix D.

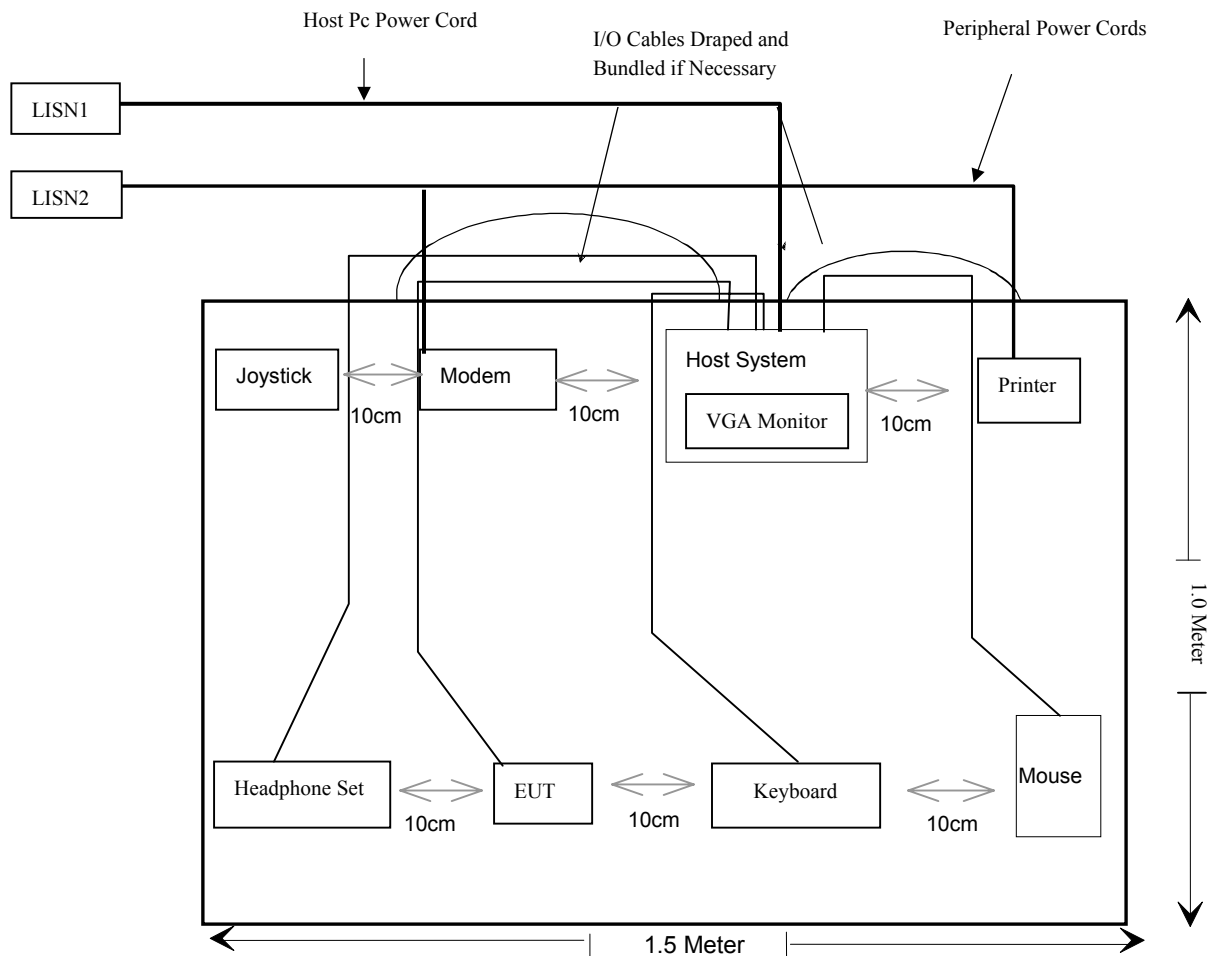
### **2.5 Equipment Modifications**

No modifications were made by BACL to ensure EUT to comply with the applicable limits and requirements.

## 2.6 Test Setup Configuration



## 2.7 Test Setup Block Diagram



### 3 - CONDUCTED EMISSIONS TEST DATA

---

#### 3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is  $\pm 2.4$  dB.

#### 3.2 EUT Setup

The measurement was performed at the **Open Area Test Site**, using the same setup per ANSI C63.4 - 2000 measurement procedure. The specification used was the FCC Part 15 Class B limits.

The Host PC system was placed on the center back edge of the test table with the monitor on its top. The joystick and the modem were put on the left side of the PC. The printer was put on the right side of the PC.

The keyboard was placed directly in front of the monitor, flushed with the front of the host PC. The mouse was placed on the right side of the keyboard. The EUT and the headphone set were placed on the left side of the keyboard.

The external I/O cables were draped along the test table and flushed if necessary.

The spacing between the peripherals was 10 cm.

The host PC was connected to a 120 VAC/ 60Hz power source.

#### 3.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations:

|                                    |         |
|------------------------------------|---------|
| Start Frequency.....               | 150 kHz |
| Stop Frequency.....                | 30 MHz  |
| Sweep Speed.....                   | Auto    |
| IF Bandwidth.....                  | 10 kHz  |
| Video Bandwidth.....               | 10 kHz  |
| Quasi-Peak Adapter Bandwidth ..... | 9 kHz   |
| Quasi-Peak Adapter Mode.....       | Normal  |

### 3.4 Test Procedure

During the conducted emission test, the power cord of the host system and the EUT was connected to the auxiliary outlet of the first LISN. The VGA monitor and all other support equipment power cords were connected to the auxiliary outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB $\mu$ V of specification limits). Quasi-peak readings are distinguished with a "Qp".

### 3.5 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 Conducted margin for a Class B device, and these test results is deemed as satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

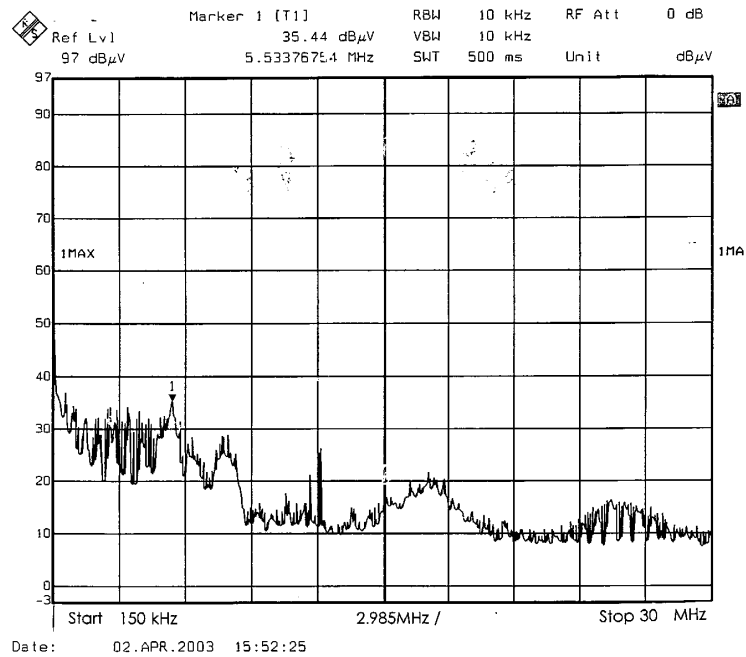
**-14.8B $\mu$ V at 0.15 MHz in the Line mode**

### 3.6 Conducted Emissions Test Data

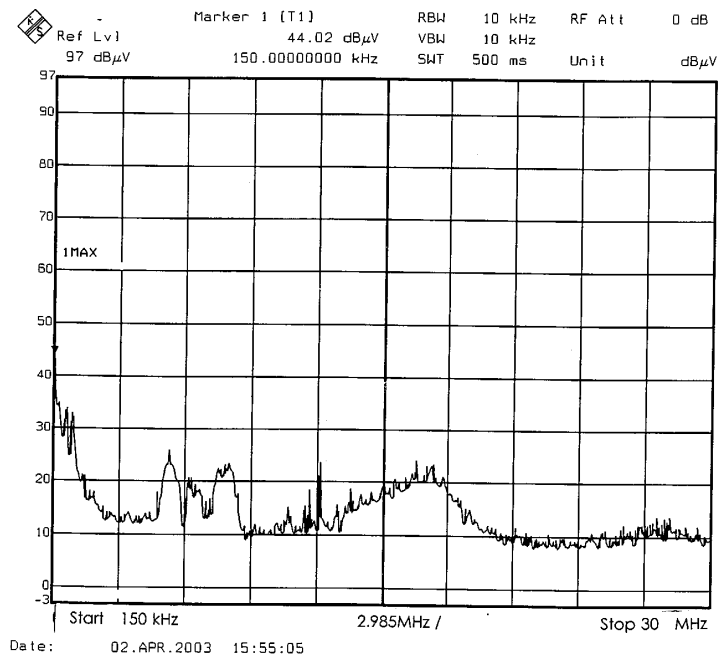
| LINE CONDUCTED EMISSIONS |            |             |              | FCC PART 15 CLASS B |        |
|--------------------------|------------|-------------|--------------|---------------------|--------|
| Frequency                | Amplitude  | Detector    | Phase        | Limit               | Margin |
| MHz                      | dB $\mu$ V | QP/Ave/Peak | Line/Neutral | dB $\mu$ V          | dB     |
| 0.15                     | 51.2       | QP          | Line         | 66                  | -14.8  |
| 0.15                     | 41.1       | Ave         | Neutral      | 56                  | -14.9  |
| 3.02                     | 30.0       | Ave         | Neutral      | 46                  | -16.0  |
| 0.75                     | 37.3       | QP          | Line         | 56                  | -18.7  |
| 0.98                     | 25.3       | Ave         | Line         | 46                  | -20.7  |
| 0.75                     | 25.0       | Ave         | Line         | 46                  | -21.0  |
| 0.15                     | 44.0       | QP          | Neutral      | 66                  | -22.0  |
| 0.75                     | 33.9       | QP          | Neutral      | 56                  | -22.1  |
| 5.47                     | 36.4       | QP          | Line         | 60                  | -23.6  |
| 5.29                     | 26.0       | Ave         | Neutral      | 50                  | -24.0  |
| 0.15                     | 24.0       | Ave         | Line         | 56                  | -32.0  |
| 5.41                     | 25.9       | QP          | Neutral      | 60                  | -34.1  |

### 3.7 Plot of Conducted Emissions Test Data

Plot of Conducted Emissions Test Data is presented hereinafter as reference.



L  
ob



N  
ob

## 4 - RADIATED EMISSION DATA

### 4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is  $\pm 4.0$  dB.

### 4.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4 - 2000. The specification used was the FCC Part 15 Class B limits.

The Host PC system was placed on the center back edge of the test table with the monitor on its top. The joystick and the modem were put on the left side of the PC. The printer was put on the right side of the PC.

The keyboard was placed directly in front of the monitor, flushed with the front of the host PC. The mouse was placed on the right side of the keyboard. The EUT and the headphone set were placed on the left side of the keyboard.

The external I/O cables were draped along the test table and flushed if necessary.

The spacing between the peripherals was 10 cm.

The host PC was connected to a 120 VAC/ 60Hz power source.

### 4.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the system was tested to 1000 MHz.

The spectrum analyzer was set with the following configurations during the radiated emission test:

|                                   |          |
|-----------------------------------|----------|
| Start Frequency .....             | 30 MHz   |
| Stop Frequency .....              | 1000 MHz |
| Sweep Speed .....                 | Auto     |
| IF Bandwidth .....                | 100 kHz  |
| Video Bandwidth .....             | 1 MHz    |
| Quasi-Peak Adapter Bandwidth..... | 120 kHz  |
| Quasi-Peak Adapter Mode .....     | Normal   |
| Resolution Bandwidth.....         | 1MHz     |

#### 4.4 Test Procedure

For the radiated emissions test, the power cord of the host system, VGA monitor and all support equipment was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB $\mu$ V of specification limits), and are distinguished with a "Qp" in the data table.

#### 4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB $\mu$ V means the emission is 7dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Class B Limit}$$

#### 4.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the FCC Part 15 Class B standards, and had the worst margin of:

**-5.2dB $\mu$ V at 147.563 MHz in the Horizontal polarization, 30 – 1000MHz, 3 meters**

#### 4.7 Radiated Emissions Test Result

| INDICATED |              | TABLE  | ANTENNA |       | CORRECTION FACTOR |       |      | CORRECTED AMPLITUDE | FCC PART 15 CLASS B |        |
|-----------|--------------|--------|---------|-------|-------------------|-------|------|---------------------|---------------------|--------|
| Frequency | Ampl.        | Angle  | Height  | Polar | Antenna           | Cable | Amp. | Corr. Ampl.         | Limit               | Margin |
| MHz       | dB $\mu$ V/m | Degree | Meter   | H/ V  | dB $\mu$ V/m      | dB    | dB   | dB $\mu$ V/m        | dB $\mu$ V/m        | dB     |
| 98.382    | 40.79        | 45     | 1.1     | v     | 10.4              | 8.7   | 25   | 34.9                | 43.5                | -8.6   |
| 98.382    | 41.29        | 45     | 1.9     | h     | 10.4              | 8.7   | 25   | 35.4                | 43.5                | -8.1   |
| 49.288    | 39.07        | 0      | 1.1     | v     | 11.3              | 8.1   | 25   | 33.5                | 40                  | -6.5   |
| 147.542   | 40.22        | 270    | 1.8     | h     | 13.4              | 9.2   | 25   | 37.8                | 43.5                | -5.7   |
| 49.288    | 40.18        | 0      | 2.0     | h     | 11.3              | 8.1   | 25   | 34.6                | 40                  | -5.4   |
| 147.542   | 41.27        | 45     | 1.0     | v     | 13.4              | 9.2   | 25   | 38.9                | 43.5                | -4.6   |