



**FCC CFR47 PART 15 DIGITAL DEVICE**

**TEST REPORT**

**FOR**

**Xwave Thunder 3D™ PCI Audio Accelerator**

**MODEL: A481P2**

**FCC ID: LWHA481P2**

**REPORT NUMBER: 99E7994**

**ISSUE DATE: JULY 16, 1999**

*Prepared for*

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**LAB CODE: 200064-0**



**FCC, VCCI, CISPR, CE  
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## 1. VERIFICATION OF COMPLIANCE



COMPANY NAME: LABWAY CORPORATION  
6F, 788, CHUNG CHENG RD.,  
CHUNG HO CITY,  
TAIPEI HSIEN, TAIWAN, R. O. C.

CONTACT PERSON: CHRIS FONG / R&D MANAGER

TELEPHONE NO: (02) 3234-0222

MODEL NO/NAME: A481P2

SERIAL NO: N/A

DATE TESTED: JULY 13, 1999

|                                       |                                                                                                           |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------|
| TYPE OF EQUIPMENT:                    | INFORMATION TECHNOLOGY EQUIPMENT (ITE)                                                                    |
| MEASUREMENT DISTANCE:                 | ( ) 3 METER (× ) 10 METER                                                                                 |
| TECHNICAL LIMIT:                      | CLASS B                                                                                                   |
| FCC RULES:                            | PART 15                                                                                                   |
| MEASUREMENT PROCEDURE                 | ANSI C63.4:92 / EN55022                                                                                   |
| EQUIPMENT AUTHORIZATION PROCEDURE     | CERTIFICATION                                                                                             |
| MODIFICATION MADE ON EUT              | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO                                       |
| DEVIATIONS FROM MEASUREMENT PROCEDURE | <input type="checkbox"/> YES (refer to section 21 for comments)<br><input checked="" type="checkbox"/> NO |
| RADIATED EMISSION TEST RESULT         | -0.89 dB @ 172 MHz/VERTICAL                                                                               |
| CONDUCTED EMISSION TEST RESULT        | -20.79 dB @ 0.227 MHz/L2                                                                                  |

The above equipment was tested by Compliance Engineering Services, Inc. for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

*Approved By*

*Acknowledged By*

MIKE C.I. KUO / VICE PRESIDENT  
COMPLIANCE ENGINEERING SERVICES

CHRIS FONG / R&D MANAGER  
LABWAY CORPORATION

## 2. PRODUCT DESCRIPTION

|                                                    |                            |
|----------------------------------------------------|----------------------------|
| LIST OF EACH OSC. OR XTAL. FREQ.<br>(FREQ.>=1 MHz) | Y1=24.576MHZ, Y2=14.318MHZ |
| CHIPSET BRAND AND PART NO.                         | VLSI, UT21702DA            |
| NUMBER OF PCB LAYERS                               | 2 LAYERS                   |
| POWER REQUIREMENTS                                 | DC 5/12V                   |
| NO. OF EXTERNAL I/O CONNECTORS                     | 5                          |

## 3. TESTED SYSTEM DETAILS

The Model names for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

### Host Computer

| Device Type   | Manufacturer | Model Number | Serial Number | FCC ID / DoC |
|---------------|--------------|--------------|---------------|--------------|
| HOST COMPUTER | VIVA         | VIVA 686-350 | HS-11         | DOC          |
| HARD DRIVE    | Quantum      | ST3240AT     | HD-11         | N/A          |
| FLOPPY DRIVE  | TEAC         | FD-235HF     | FD-11         | N/A          |
| VGA CARD      | TEAC         | CD-532E      | CD-11         | DOC          |
| I/O CARD      | ASUS         | APG-V2740    | CV26          | N/A          |
| SOUND CARD    | BUILT-IN     | N/A          | N/A           | N/A          |

### External Peripheral Devices

| Device Type      | Manufacturer | Model Number | Serial No. | FCC ID / DoC    |
|------------------|--------------|--------------|------------|-----------------|
| MONITOR          | COMPAQ       | MV500        | MT-04      | DOC             |
| KEYBOARD         | Acer         | 6511-TW      | KB-18      | JVPKBS-WIN      |
| MOUSE            | HP           | M-S34        | ME-09      | DZL211029       |
| PRINTER          | MATSUSHITA   | KX-P1080i    | PRN-01     | ACJ5Z6KX-P1080I |
| MICROPHONE       | KOKA         | DM-510       | MIC-01     | N/A             |
| PLAYER           | Panasonic    | RQ-L309GT    | PLY-04     | N/A             |
| SPEAKER          | J-S          | J-301        | SPK-05     | N/A             |
| SPEAKER          | SINGVOX      | SP-362       | SPK-09     | N/A             |
| JOYSTICK         | Rockfire     | QF-8ip       | JOY-10     | N/A             |
| SOUND CARD (EUT) | LABWAY       | A481P2       | N/A        | LWHA481P2       |

#### **4. TEST FACILITY**

The open area test sites and conducted measurement facilities used to collect the radiated data are located at No. 199, Chung Sheng Road, Hsin Tien City, Taipei, 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. ACCREDITATION AND LISTING**

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:200064-0 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 (reference no: 31040/SIT(1300F2))

#### **6. MEASUREMENT INSTRUMENTATION**

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, liner horn. EMI receivers were used for line conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

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

#### **7. 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.

## 8. UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dB(uV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(uV/m) by use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(uV).

The field strength is calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength  
RA = Receiver Amplitude  
AF = Antenna Factor  
CF = Cable Attenuation Factor  
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(32 \text{ dBuV/m})/20] = 39.8 \text{ uV/m}$$

## 9. ANTENNAS

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 10 meters from the leading edge of the turn table.

## 10. CLASSIFICATION OF DIGITAL DEVICE

Class A includes digital devices that are marketed for use in commercial, industrial or business environments, excluding devices which are marketed for use by the general public or are intended to be used in the home.

Class B includes digital devices that are marketed for use in residential environments, notwithstanding use in commercial, business and industrial environments.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as Class B device, and in fact is encouraged to do so provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

## 11. RADIATED EMISSION LIMITS

### FCC PART 15 CLASS B

| MEASURING DISTANCE OF 3 METER |                               |                         |
|-------------------------------|-------------------------------|-------------------------|
| FREQUENCY RANGE (MHz)         | FIELD STRENGTH (Microvolts/m) | FIELD STRENGTH (dBuV/m) |
| 30-88                         | 100                           | 40                      |
| 88-216                        | 150                           | 43.5                    |
| 216-960                       | 200                           | 46                      |
| Above 960                     | 500                           | 54                      |

### FCC CLASS B ALTERNATIVE DISTANCE (CISPR 22:1993)

| MEASURING DISTANCE OF 10 METER |                               |                         |
|--------------------------------|-------------------------------|-------------------------|
| FREQUENCY RANGE (MHz)          | FIELD STRENGTH (Microvolts/m) | FIELD STRENGTH (dBuV/m) |
| 30-88                          | 30                            | 29.5                    |
| 88-216                         | 45                            | 33.0                    |
| 216-960                        | 60                            | 35.6                    |
| 960-1000                       | 150                           | 43.5                    |
| ABOVE 1000                     | 150                           | 43.5                    |

Note: Limits extrapolated 20dB/decade

### FCC PART 15 CLASS A

| MEASURING DISTANCE OF 10 METER |                               |                         |
|--------------------------------|-------------------------------|-------------------------|
| FREQUENCY RANGE (MHz)          | FIELD STRENGTH (Microvolts/m) | FIELD STRENGTH (dBuV/m) |
| 30-88                          | 90                            | 39.1                    |
| 88-216                         | 150                           | 43.5                    |
| 216-960                        | 210                           | 46.4                    |
| Above 960                      | 300                           | 49.5                    |

## 12. CONDUCTED EMISSION LIMITS

### CLASS B

| FREQUENCY RANGE | FIELD STRENGTH<br>(Microvolts) | FIELD STRENGTH<br>(dBuV) |
|-----------------|--------------------------------|--------------------------|
| 450kHz-30MHz    | 250                            | 48                       |

### CLASS A

| FREQUENCY RANGE  | FIELD STRENGTH<br>(Microvolts) | FIELD STRENGTH<br>(dBuV) |
|------------------|--------------------------------|--------------------------|
| 450kHz-1.705MHz  | 1000                           | 60                       |
| 1.705MHz - 30MHz | 3000                           | 69.54                    |

## 13. CONDUCTED EMISSION TEST PROCEDURE

The EUT is located so that the distance between the boundary of the EUT and the closest surface to the LISN is 0.8m.

EUT test configuration is according to Section 7 of ANSI C63.4/1992.

Conducted disturbance shall be measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz shall be investigated.

Set the EMI receiver to PEAK detector setting and sweep continuously over the frequency range to be investigated. Set resolution bandwidth to 9kHz minimum. Connect EMI receiver input cable to LINE 1 RF measurement connection on the LISN. Connect a 50ohm terminator to the unused RF connection on the LISN. For each mode of EUT operation, maximize emissions readings by manipulating cable and wire positions. Record the configuration for each EUT power cord which produces emissions closest to the limit. Repeat the same procedure for LINE 2 of each EUT power cord.

## 14. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment are placed on a wooden table 80 cm above the ground screen. Antenna to EUT distance is either 3 meters or 10 meters (Class B or Class A). During the test, the table is rotated 360 degrees to maximize emissions, and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambients. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

## 15. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

|             | Radiated Emission | Conducted Emission |
|-------------|-------------------|--------------------|
| Temperature | 28°C              | 27°C               |
| Humidity    | 76%               | 74%                |

## 16. SYSTEM TEST CONFIGURATION

The equipment under test was configured and operated in a manner which tended to maximize its emission characteristics in a typical application. Power and signal distribution, ground, interconnecting cabling and physical placement of equipment simulated the typical application and usage insofar as practicable.

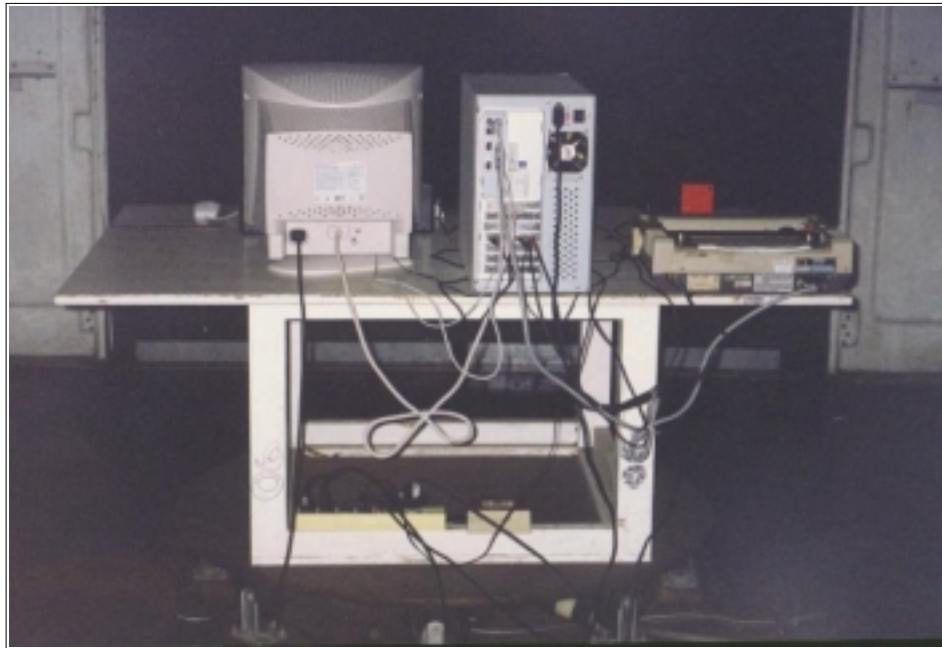
| SOFTWARE USED DURING THE TESTS |                                                                                                                                                                                         |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating System               | WINDOWS 98                                                                                                                                                                              |
| File Name                      | CDPLAYER.EXE AND EMITEST.EXE                                                                                                                                                            |
| Program Sequence               | 1. WINDOWS 98 BOOTS SYSTEM.<br>2. RUN CDPLAYER.EXE TO EXECUTE CD-ROM DRIVE AND PLAY MUSIC.<br>3. RUN EMITEST.EXE TO ACTIVATE ALL PERIPHERALS AND DISPLAY "H" PATTERN ON MONITOR SCREEN. |

## 17. EQUIPMENT MODIFICATIONS

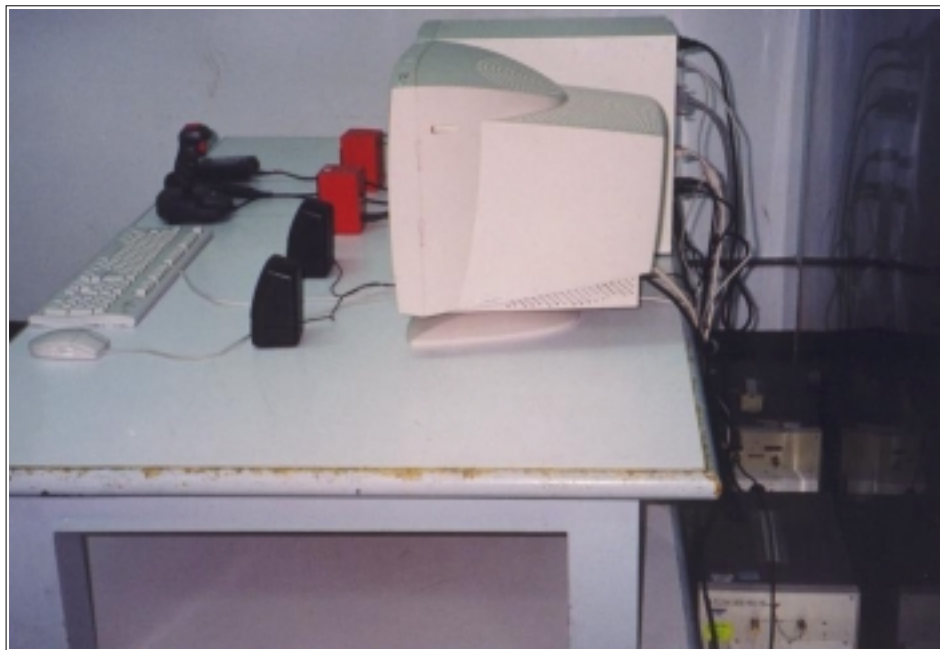
To achieve compliance to CLASS B levels, the following change(s) were made during compliance testing:

Mod.#1      Added Four Capacitors (470pF) at 1, 4 Pin With Ground Of J3&J4.

## 18. EUT SETUP PHOTOS



**Radiated Emission Setup Photos (Worst Emission Position)**



**Conducted Emission Setup Photos (Worst Emission Position)**

## 19. TEST EQUIPMENT LIST

| Equipment           | Manuf.           | Model No.             | Serial No. | Site | Cal Date | Due Date |
|---------------------|------------------|-----------------------|------------|------|----------|----------|
| EMI TEST DISPLAY    | ROHDE & SCHWARZ  | DSAI-D<br>804.8932.52 | 827832/001 | D    | 10/98    | 10/99    |
| EMI TEST RF UNIT    | ROHDE & SCHWARZ  | ESBI-RF/1005.4300.52  | 827832/003 | D    | 10/98    | 10/99    |
| AMPLIFIER           | TEST EQUIPMENT   | PA-102                | 43685      | D    | 9/98     | 9/99     |
| ANTENNA             | CHASE            | CBL 6111A             | 1547       | D    | 12/98    | 12/99    |
| LISN                | EMCO             | 3825/2                | 1842       | D    | 1/99     | 1/00     |
| LISN(EUT)           | EMCO             | 3825/2                | 1435       | D    | 1/99     | 1/00     |
| CABLE               | TALLEY           | HELIX FSJ4-50B        | D0301      | D    | 9/98     | 9/99     |
| CABLE               | TIME MICROWAVE   | LMR-400-2             | D1001      | D    | 9/98     | 9/99     |
|                     |                  |                       |            |      |          |          |
| SPECTRUM ANALYZER   | H.P.             | 8568B                 | 2928A04814 | E    | 2/99     | 2/00     |
| SPECTRUM DISPLAY    | H.P.             | 85662A                | 2848A18276 | E    | 2/99     | 2/00     |
| QUASI-PEAK DETECTOR | H.P.             | 85650A                | 2811A01439 | E    | 2/99     | 2/00     |
| AMPLIFIER           | H.P.             | 8447D B               | 1644A02328 | E    | 5/99     | 5/00     |
| ANTENNA             | EMC TEST SYSTEMS | 3142                  | 1310       | E    | 8/98     | 2/00     |
| TEST RECEIVER       | ROHDE & SCHWARZ  | ESHS20                | 840455/006 | E    | 2/99     | 2/00     |
| LISN                | SOLAR            | 8012-50-R-24-BNC      | 8305114    | E    | 7/99     | 7/00     |
| LISN(EUT)           | FISCHER          | FCC-LISN-50/250-25-2  | 107        | E    | 7/99     | 7/00     |
| CABLE               | TIME MICROWAVE   | LMR-400-2             | E1001      | E    | 5/99     | 5/00     |
| CABLE               | TALLEY           | HELIX FSJ4-50B        | E0301      | E    | 5/99     | 5/00     |

## 20. CORRECTION FACTOR

### OATS NO. D

| FREQ<br>(MHZ) | ANTENNA 3 METER |       |                    | ANTENNA 10 METER |       |                    | SITE D           |
|---------------|-----------------|-------|--------------------|------------------|-------|--------------------|------------------|
|               | HORI.           | VERT. | CABLE LOSS<br>(dB) | HORI.            | VERT. | CABLE LOSS<br>(dB) | AMP GAIN<br>(dB) |
| 30            | 20.05           | 18.37 | 0.41               | 17.80            | 16.30 | 0.64               | 21.45            |
| 35            | 17.24           | 16.40 | 0.46               | 16.00            | 15.05 | 0.61               | 21.68            |
| 40            | 14.52           | 12.68 | 0.56               | 13.27            | 12.58 | 0.73               | 21.70            |
| 45            | 11.90           | 10.73 | 0.59               | 10.59            | 10.08 | 0.71               | 21.73            |
| 50            | 9.72            | 8.44  | 0.58               | 8.56             | 8.24  | 0.76               | 21.75            |
| 60            | 6.61            | 5.60  | 0.71               | 6.02             | 5.06  | 0.99               | 21.67            |
| 70            | 6.30            | 6.38  | 0.78               | 6.34             | 5.87  | 0.96               | 21.70            |
| 80            | 7.90            | 7.89  | 0.81               | 7.45             | 7.91  | 0.97               | 21.73            |
| 90            | 9.35            | 10.17 | 0.81               | 8.61             | 9.20  | 1.07               | 21.72            |
| 100           | 11.15           | 11.51 | 0.92               | 10.12            | 10.05 | 1.20               | 21.70            |
| 120           | 12.31           | 12.86 | 1.09               | 11.75            | 12.13 | 1.27               | 21.59            |
| 125           | 12.46           | 13.09 | 1.07               | 11.87            | 11.82 | 1.30               | 21.65            |
| 140           | 12.25           | 13.11 | 1.19               | 11.97            | 12.03 | 1.42               | 21.57            |
| 150           | 11.65           | 12.50 | 1.17               | 11.34            | 11.27 | 1.45               | 21.49            |
| 160           | 11.08           | 11.56 | 1.30               | 10.44            | 10.77 | 1.60               | 21.48            |
| 175           | 9.99            | 10.51 | 1.32               | 9.65             | 9.62  | 1.62               | 21.42            |
| 180           | 9.72            | 10.00 | 1.27               | 9.21             | 9.58  | 1.47               | 21.42            |
| 200           | 10.75           | 10.26 | 1.42               | 8.98             | 10.06 | 1.67               | 21.35            |
| 250           | 12.90           | 12.75 | 1.57               | 12.21            | 12.46 | 1.93               | 21.25            |
| 300           | 14.04           | 13.70 | 1.88               | 13.33            | 13.59 | 2.27               | 21.20            |
| 400           | 16.87           | 16.33 | 2.11               | 16.24            | 16.20 | 2.69               | 21.10            |
| 500           | 18.05           | 18.36 | 2.33               | 17.97            | 17.81 | 2.79               | 21.12            |
| 600           | 20.06           | 20.03 | 2.54               | 19.64            | 19.52 | 3.12               | 20.79            |
| 700           | 21.24           | 21.61 | 2.77               | 20.61            | 20.87 | 3.46               | 20.56            |
| 800           | 22.52           | 22.59 | 2.92               | 21.98            | 21.89 | 3.45               | 20.53            |
| 900           | 23.50           | 23.58 | 3.32               | 22.76            | 22.98 | 3.98               | 20.23            |
| 1000          | 24.71           | 25.04 | 3.40               | 24.37            | 24.30 | 4.19               | 19.67            |
| 1100          | 25.33           | 25.46 | 3.83               | 24.62            | 24.94 | 4.24               | 20.28            |
| 1200          | 26.89           | 26.32 | 3.98               | 25.32            | 25.45 | 4.98               | 20.06            |
| 1300          | 29.05           | 28.56 | 3.86               | 27.78            | 28.07 | 4.82               | 20.38            |
| 1400          | 27.35           | 27.51 | 4.70               | 26.53            | 26.99 | 5.21               | 19.44            |
| 1500          | 29.70           | 30.09 | 5.28               | 27.94            | 28.16 | 5.82               | 19.39            |
| 1600          | 28.07           | 27.82 | 5.03               | 27.71            | 27.98 | 5.64               | 19.67            |
| 1700          | 31.93           | 31.40 | 5.24               | 29.00            | 29.42 | 5.41               | 20.25            |
| 1800          | 31.56           | 31.91 | 4.57               | 30.06            | 30.42 | 5.99               | 19.70            |
| 1900          | 32.49           | 32.73 | 5.18               | 31.85            | 30.72 | 6.53               | 20.33            |
| 2000          | 31.12           | 30.32 | 6.12               | 30.97            | 30.46 | 4.90               | 19.87            |

## 21. TEST RESULT SUMMARY

**Preliminary Radiated Emission Tests** were performed at the 10 meter open area test site. CCS test procedure no:CCSUE2001B and the procedure listed in ANSI C63.4 /1992 section 8.3.1.1. were used. The following preliminary tests were conducted to determine the worst mode of operation and configuration.

| Preliminary Radiated Emission Test |          |                    |                                     |
|------------------------------------|----------|--------------------|-------------------------------------|
| Frequency Range Investigated       |          | 30 MHz TO 1000 MHz |                                     |
| Mode of operation                  | Date     | Data Report No.    | Worst Mode                          |
| NORMAL MODE                        | 07/13/99 | 7994D#(03, 04)     | <input checked="" type="checkbox"/> |

**Final Radiated Emission Test** was conducted by operating the worst mode as indicated above.

|                                        |                            |                                   |                                  |                    |                |                           |             |
|----------------------------------------|----------------------------|-----------------------------------|----------------------------------|--------------------|----------------|---------------------------|-------------|
| OATS No:<br>D / 10 M                   |                            | Data Report No.<br>7994D#(03, 04) |                                  | Date<br>07/13/99   |                | Tested By:<br>JACKY CHENG |             |
| Six Highest Radiated Emission Readings |                            |                                   |                                  |                    |                |                           |             |
| Frequency Range Investigated           |                            |                                   |                                  | 30 MHz TO 1000 MHz |                |                           |             |
| Freq<br>(MHz)                          | Meter<br>Reading<br>(dBuV) | C.F.<br>(dB/m)                    | Corrected<br>Reading<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Reading<br>Type<br>P/Q/A  | Pol.<br>H/V |
| 85.906                                 | 33.03                      | -5.80                             | 27.23                            | 30.00              | -2.77          | P                         | V           |
| 172.000                                | 33.03                      | -3.92                             | 29.11                            | 30.00              | -0.89          | Q                         | V           |
| 187.993                                | 30.54                      | -3.98                             | 26.56                            | 30.00              | -3.44          | P                         | V           |
| 196.585                                | 31.00                      | -3.76                             | 27.24                            | 30.00              | -2.76          | P                         | V           |
| 85.907                                 | 33.18                      | -6.35                             | 26.83                            | 30.00              | -3.17          | P                         | H           |
| 172.009                                | 31.43                      | -3.98                             | 27.45                            | 30.00              | -2.55          | P                         | H           |

C.F.(Correction Factor)=Antenna Factor+Cable Loss+Attenuator(6dB)  
-Amplifier Gain

Corrected Reading = Metering Reading + C.F.

Margin=Corrected Reading - Limits

P=Peak Reading

H=Horizontal Polarization/Antenna

Q=Quasi-peak

V=Vertical Polarization/Antenna

A=Average Reading

Comments: N/A

**Preliminary Conducted Emission Tests** were performed according to CCS test procedure no:CCSUE2002B and ANSI C63.4/1992 section 7.2.3. The following preliminary tests were conducted to determine the worst mode of operation.

| Preliminary Conducted Emission Test |          |                   |                                     |
|-------------------------------------|----------|-------------------|-------------------------------------|
| Frequency Range Investigated        |          | 150 kHz TO 30 MHz |                                     |
| Mode of operation                   | Date     | Data Report No.   | Worst Mode                          |
| NORMAL MODE                         | 07/13/99 | 7994D#(12, 20)    | <input checked="" type="checkbox"/> |

**Final Conducted Emission Test** was conducted by operating the worst mode as indicated above.

|                                         |                      |                                   |                            |                   |             |                           |              |
|-----------------------------------------|----------------------|-----------------------------------|----------------------------|-------------------|-------------|---------------------------|--------------|
| Conducted Room                          |                      | Data Report No.<br>7994D#(12, 20) |                            | Date<br>07/13/99  |             | Tested By:<br>JACKY CHENG |              |
| Six Highest Conducted Emission Readings |                      |                                   |                            |                   |             |                           |              |
| Frequency Range Investigated            |                      |                                   |                            | 150 kHz TO 30 MHz |             |                           |              |
| Freq (MHz)                              | Meter Reading (dBuV) | C.F. (dB)                         | Corrected Reading (dBuV/m) | Limits (dBuV/m)   | Margin (dB) | Reading Type (P/Q/A)      | Line (L1/L2) |
| 0.150                                   | 42.80                | 0                                 | 42.80                      | 66.00             | -23.20      | P                         | L1           |
| 0.227                                   | 37.57                | 0                                 | 37.57                      | 62.57             | -25.00      | P                         | L1           |
| 0.150                                   | 42.72                | 0                                 | 42.72                      | 66.00             | -23.28      | P                         | L2           |
| 0.227                                   | 41.78                | 0                                 | 41.78                      | 62.57             | -20.79      | P                         | L2           |
| 0.243                                   | 39.19                | 0                                 | 39.19                      | 62.00             | -22.81      | P                         | L2           |
| 17.291                                  | 34.62                | 0                                 | 34.62                      | 60.00             | -25.38      | P                         | L2           |

C.F.(Correction Factor)=Insertion Loss + Cable Loss  
Corrected Reading = Metering Reading + C.F.  
Margin=Corrected Reading - Limits  
P=Peak Reading                      L1=Hot  
Q=Quasi-peak                      L2=Neutral  
A=Average Reading

Comments: N/A

## **APPENDICES**

EXTERNAL I/O CABLE CONSTRUCTION DESCRIPTION

CONFIGURATION BLOCK DIAGRAM

CONDUCTED EMISSION PLOT

RADIATED EMISSION DATA

EUT PHOTOGRAPHS

### External I/O Cable Construction Description

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| CABLE NO: 1                         | Number of I/O ports of this type: 1    |
| I/O Port: <b>MIDI/JOYSTICK</b>      | Connector Type: <b>DB15</b>            |
| Capture Type: <b>Snap In</b>        | Type of Cable used: <b>Un-Shielded</b> |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.5M</b>              |
| Bundled During Tests: <b>No</b>     | Data Traffic Generated: <b>Yes</b>     |
| Remarks: <b>N/A</b>                 |                                        |

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| CABLE NO: 2                         | Number of I/O ports of this type: 1   |
| I/O Port: <b>PS/2 Mouse</b>         | Connector Type: <b>Mini Din-6 Pin</b> |
| Capture Type: <b>Screw In</b>       | Type of Cable used: <b>Shielded</b>   |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.8 M</b>            |
| Bundled During Tests: <b>No</b>     | Data Traffic Generated: <b>Yes</b>    |
| Remarks: <b>N/A</b>                 |                                       |

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| CABLE NO: 3, 13                     | Number of I/O ports of this type: 2    |
| I/O Port: <b>Speaker</b>            | Connector Type: <b>Phone Jack</b>      |
| Capture Type: <b>Snap In</b>        | Type of Cable used: <b>Un-Shielded</b> |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.1 M, 1.1 M</b>      |
| Bundled During Tests: <b>No</b>     | Data Traffic Generated: <b>Yes</b>     |
| Remarks: <b>N/A</b>                 |                                        |

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| CABLE NO: 4                         | Number of I/O ports of this type: 1   |
| I/O Port: <b>PS/2 KB</b>            | Connector Type: <b>Mini Din-6 Pin</b> |
| Capture Type: <b>Snap In</b>        | Type of Cable used: <b>Shielded</b>   |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.1 M</b>            |
| Bundled During Tests: <b>No</b>     | Data Traffic Generated: <b>Yes</b>    |
| Remarks: <b>N/A</b>                 |                                       |

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| CABLE NO: 5                         | Number of I/O ports of this type: 1    |
| I/O Port: <b>LINE IN</b>            | Connector Type: <b>Phone Jack</b>      |
| Capture Type: <b>Snap In</b>        | Type of Cable used: <b>Un-Shielded</b> |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.8 M</b>             |
| Bundled During Tests: <b>No</b>     | Data Traffic Generated: <b>Yes</b>     |
| Remarks: <b>N/A</b>                 |                                        |

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| CABLE NO: 6                         | Number of I/O ports of this type: 1    |
| I/O Port: <b>MIC IN</b>             | Connector Type: <b>Phone Jack</b>      |
| Capture Type: <b>Snap In</b>        | Type of Cable used: <b>Un-Shielded</b> |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>2.9 M</b>             |
| Bundled During Tests: <b>Yes</b>    | Data Traffic Generated: <b>Yes</b>     |
| Remarks: <b>N/A</b>                 |                                        |

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| CABLE NO: 7                         | Number of I/O ports of this type: 1 |
| I/O Port: <b>Parallel Printer</b>   | Connector Type: <b>DB25</b>         |
| Capture Type: <b>Screw In</b>       | Type of Cable used: <b>Shielded</b> |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.8 M</b>          |
| Bundled During Tests: <b>Yes</b>    | Data Traffic Generated: <b>Yes</b>  |
| Remarks: <b>N/A</b>                 |                                     |

|                                                        |                                     |
|--------------------------------------------------------|-------------------------------------|
| CABLE NO: 8                                            | Number of I/O ports of this type: 1 |
| I/O Port: <b>VGA</b>                                   | Connector Type: <b>DB15</b>         |
| Capture Type: <b>Screw In</b>                          | Type of Cable used: <b>Shielded</b> |
| Cable Connector Type: <b>Molded</b>                    | Cable Length: <b>1.5 M</b>          |
| Bundled During Tests: <b>Yes</b>                       | Data Traffic Generated: <b>Yes</b>  |
| Remarks: <b>A Ferrite bead on the cable of PC end.</b> |                                     |

|                                                                       |                                        |
|-----------------------------------------------------------------------|----------------------------------------|
| CABLE NO: 9~11                                                        | Number of I/O ports of this type: 3    |
| I/O Port: <b>Power Cord</b>                                           | Connector Type: <b>AC Inlet</b>        |
| Capture Type: <b>Snap In</b>                                          | Type of Cable used: <b>Un-Shielded</b> |
| Cable Connector Type: <b>Molded</b>                                   | Cable Length: <b>1.8 M</b>             |
| Bundled During Tests:<br><b>NO (Radiation), YES (Line Conduction)</b> | Data Traffic Generated: <b>No</b>      |
| Remarks: <b>N/A</b>                                                   |                                        |

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| CABLE NO: 12                        | Number of I/O ports of this type: 1    |
| I/O Port: <b>Power Cord</b>         | Connector Type: <b>AC Inlet</b>        |
| Capture Type: <b>Snap In</b>        | Type of Cable used: <b>Un-Shielded</b> |
| Cable Connector Type: <b>Molded</b> | Cable Length: <b>1.8 M</b>             |
| Bundled During Tests: <b>No</b>     | Data Traffic Generated: <b>No</b>      |
| Remarks: <b>N/A</b>                 |                                        |

### Configuration Block Diagram

