

FCC/MELLON

DEC 28 1998

## FCC TEST REPORT

for

Part 15, Subpart B Class B

Equipment : LCD MONITOR  
Model No. : KX5  
FCC ID : HFSKX5  
Filing Type : Original Grant  
Applicant : **QUANTA COMPUTER INC.**  
7F, No. 116, Hou Kang St., Shih Lin Dist,  
Taipei, Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without the written authorization of the test lab., the Test Report may not be copied.

***SPORTON International Inc.***

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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**FCC TEST REPORT****1. General Description of Equipment under Test****1.1. Applicant**

QUANTA COMPUTER INC.  
7F, No. 116, Hou Kang St., Shih Lin Dist,  
Taipei, Taiwan, R.O.C.

**1.2. Manufacturer**

Same as 1.1.

**1.3. Basic Description of Equipment under Test**

Equipment : LCD MONITOR  
Model No. : KX5  
FCC ID : HFSKX5  
Trade Name : QUANTA  
Headphone, Line in DATA CABLE : Non-Shielded  
VGA DATA CABLE : Shielded  
Power Supply Type : Switching  
Power Input Cord : Non-Shielded  
Power Output Cord : Shielded

**1.4. Feature of Equipment under Test**

- LCD (Type) : 15.0 inch TFT color LCD module, 18-bit color, 0.297 mm pixel pitch.
- Input Signal (Video) : RGB analog (0.7 Vp-p, 75 ohms).
- Connectors :
  - Front : Headphone-Out 3.5 mm stereo phone jack.
  - Rear : Video-In Mini D-Sub 15 pin female
  - Line-In 3.5 mm stereo phone jack.
  - Power DC19V (AC adapter).
- Power Saving : On Green 35 WAC (video only).
- Power Adapter :
  - Input 100-240 VAC, 50/60 Hz.
  - Output 19 VDC, 50W.

## **2. Test Configuration of Equipment under Test**

### **2.1. Test Manner**

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The DELL PS/2 Keyboard, PRIMAX PS/2 Mouse, HP Printer, ACEEX Modem, AIWA Stereo Cassette Player, GAINWARD VGA card, J&S Earphone and EUT were connected to the FIC PC for EMI test.
- c. The Following display resolution were investigated during the compliance test:
  1. Horizontal frequency (640x480 to 1,024x768, 31.5 KHz to 60.1 KHz)
  2. Vertical frequency (60 Hz to 75 Hz)
- d. During testing, the monitor AC power cord was plugged into the PC computer-mounted AC outlet and a floor-mounted AC outlet to search the maximum emission.
- e. According to the above tests, we listed the following display modes as the worst cases:
  1. 1,024x768 (non-interlaced 60.1 KHz), refresh rate 75 Hz.
  2. 800x600 (non-interlaced 46.9 KHz), refresh rate 75 Hz.
- f. Frequency range investigated: conduction 450 KHz to 30 MHz, radiation 30 MHz to 1,000 MHz.

### **2.2. Description of Test System**

#### **Support Unit 1. -- PS/2 Keyboard (DELL)**

|                   |                                             |
|-------------------|---------------------------------------------|
| FCC ID            | : GYUM92SK                                  |
| Model No.         | : AT101(DE8M)                               |
| Power Supply Type | : N/A                                       |
| Serial No.        | : SP0054                                    |
| Data Cable        | : Shielded, 360 degree via metal backshells |

#### **Support Unit 2. -- PS/2 Mouse (PRIMAX)**

|                   |                                                     |
|-------------------|-----------------------------------------------------|
| FCC ID            | : EMJMUSJQ                                          |
| Model No.         | : MUS9J                                             |
| Power Supply Type | : N/A                                               |
| Serial No.        | : SP0045                                            |
| Data Cable        | : Braided-Shielded, 360 degree via metal backshells |

#### **Support Device 3. --- PRINTER (HP)**

|                   |                                                    |
|-------------------|----------------------------------------------------|
| FCC ID            | : B94C2642X                                        |
| Model No.         | : DESK JET 400                                     |
| Serial No.        | : SP1040                                           |
| Data Cable        | : Shielded, 360 degree via metal backshells, 1.35m |
| Power Supply Type | : Linear, Adapter                                  |
| Power Cord        | : Non-shielded                                     |

**Support Unit 4. -- Modem (ACEEX)**

FCC ID : IFAXDM1414  
Model No. : DM1414  
Power Supply Type : Linear  
Power Cord : N/A  
Serial No. : SP0059  
Data Cable : Braided-Shielded, 360 degree via metal backshells

**Support Unit 5. -- Stereo Cassette Player (AIWA)**

FCC ID : N/A  
Model No. : HS-J36  
Serial No. : SP0060  
Data Cable : Non-Shielded

**Support Unit 6. -- Earphone (J&S)**

Model No. : HS-102  
Serial No. : SP0123  
Data Cable : Non-Shielded, 1.2m

**Support Device 7. -- VGA CARD (GAINWARD)**

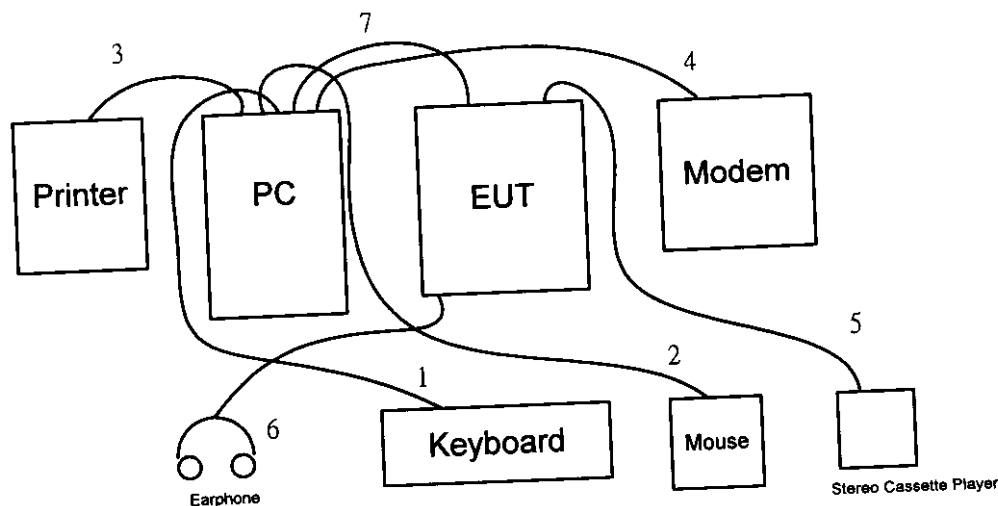
FCC ID : ICUVGA-GW802C  
Model No. : S3 Trio 3D  
Serial No. : SP1039  
Data Cable : Shielded, 1.7m

**Support Device 8. --- P.C. (FIC)**

FCC ID : N/A  
Model No. : P55T2P4  
Serial No. : SP1004  
Data Cable : Shielded  
Power Cord : Non-shielded  
Power Supply Type : Switching

( Remark : This support device was tested to comply with FCC standards and  
authorized under a declaration of conformity.)

### 2.3. Connection Diagram of Test System



1. The I/O cable is connected to the support unit 1.
2. The I/O cable is connected to the support unit 2.
3. The I/O cable is connected to the support unit 3.
4. The I/O cable is connected to the support unit 4.
5. The I/O cable is connected from EUT to the support unit 5.
6. The I/O cable is connected from EUT to the support unit 6.
7. The I/O cable is connected from EUT to the support unit 7.

### **3. Test Software**

An executive program, EMITEST.EXE & EMCTEST\Video Test under WIN 98, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the floppy disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H " messages to the modem.
- f. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- g. Repeat the steps from b to f.

## **4. General Information of Test**

### **4.1. Test Facility**

This test was carried out by SPORTON International Inc. in an openarea test site.

Openarea Test Site Location: No. 30-2, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang,

Taipei Hsien, Taiwan, R.O.C.

TEL : 886-2-2601-1640

FAX : 886-2-2601-1695

### **4.2. Standard for Methods of Measurement**

ANSI C63.4-1992

### **4.3. Test in Compliance with**

FCC Part 15, Subpart B Class B

### **4.4. Frequency Range Investigated**

- a. Conduction: from 450 kHz to 30 MHz
- b. Radiation : from 30 MHz to 1,000 MHz

### **4.5. Test Distance**

The test distance of radiated emission from antenna to EUT is 3 M.

## **5. Test of Conducted Powerline**

Conducted Emissions were measured from 450 kHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

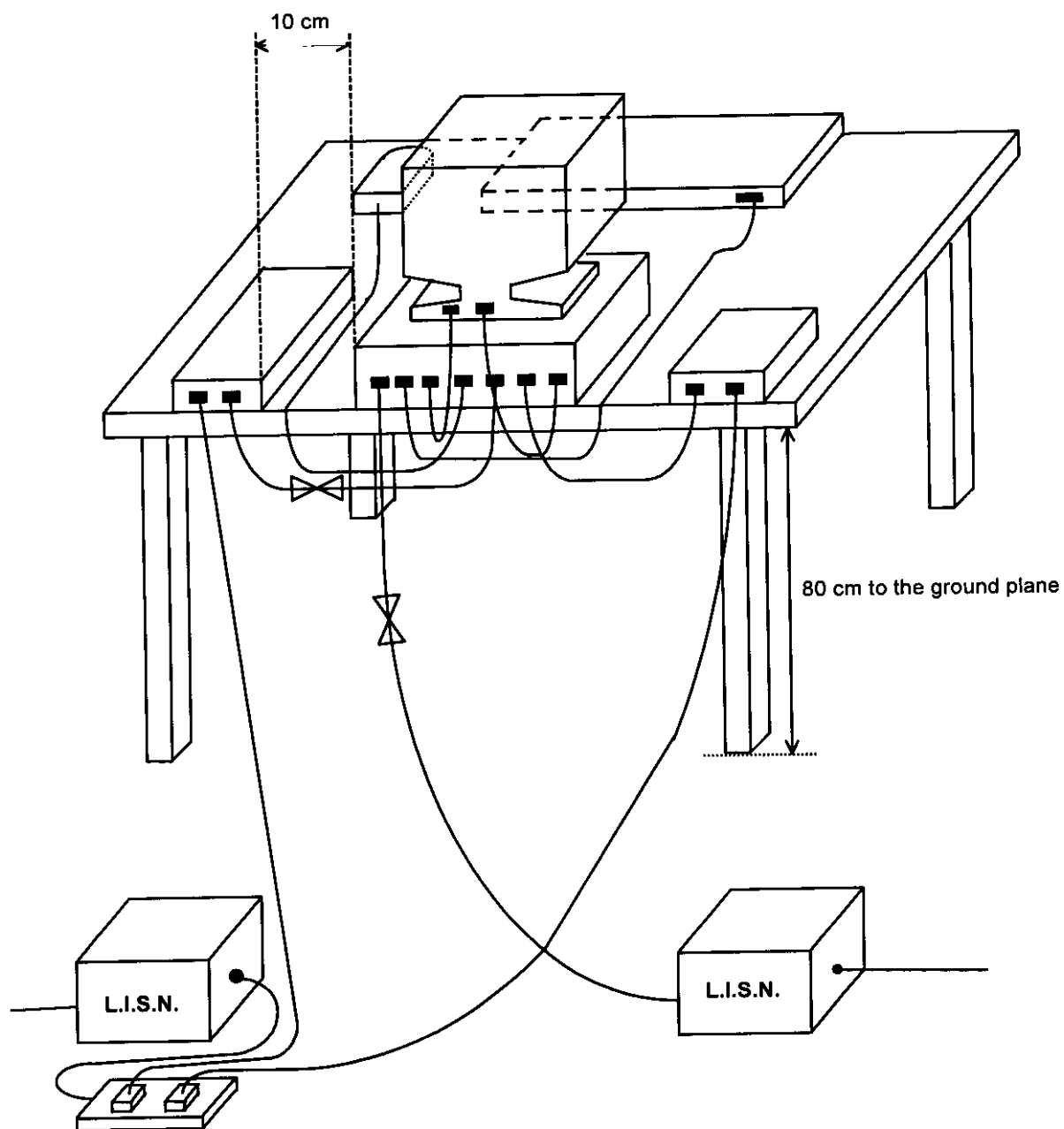
### **5.1. Major Measuring Instruments**

|                 |           |
|-----------------|-----------|
| Test Receiver   | HP 8591EM |
| Attenuation     | 0 dB      |
| Start Frequency | 0.45 MHz  |
| Stop Frequency  | 30 MHz    |
| Step MHz        | 0.007 MHz |
| IF Bandwidth    | 9 kHz     |

**5.2. Test Procedures**

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 450 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- i. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be retested one by one using the quasi-peak method and reported.

### 5.3. Typical Test Setup Layout of Conducted Powerline



**5.4. Test Result of AC Powerline Conducted Emission**

5.4.1. Test mode : 1024x768 75Hz/60.1K

- Temperature : 24°C
- Relative Humidity : 59 %
- Test Date : Nov. 20, 1998

**The Conducted Emission test was passed at minimum margin****LINE 3.770 MHz / 44.70 dBuV.**

| Freq.<br>(MHz) | Line/<br>Neutral | Meter Reading<br>(dBuV) | (uV)   | Limits<br>(dBuV) | (uV)   | Margin<br>(dB) |
|----------------|------------------|-------------------------|--------|------------------|--------|----------------|
| 3.770          | L                | 44.70                   | 171.79 | 48.00            | 251.19 | -3.30          |
| 4.370          | L                | 44.30                   | 164.06 | 48.00            | 251.19 | -3.70          |
| 2.780          | N                | 43.90                   | 156.68 | 48.00            | 251.19 | -4.10          |
| 3.570          | N                | 42.80                   | 138.04 | 48.00            | 251.19 | -5.20          |
| 4.170          | N                | 41.00                   | 112.20 | 48.00            | 251.19 | -7.00          |
| 4.760          | N                | 44.00                   | 158.49 | 48.00            | 251.19 | -4.00          |

Test Engineer : Benny Lee  
Benny Lee

**5.4.2. Test mode : 800x600 75Hz/46.9K**

- Temperature : 24°C
- Relative Humidity : 59 %
- Test Date : Nov. 20, 1998

**The Conducted Emission test was passed at minimum margin**

**LINE 3.380 MHz / 44.10 dBuV.**

| Freq.<br>(MHz) | Line/<br>Neutral | Meter Reading<br>(dBuV) | Meter Reading<br>(uV) | Limits<br>(dBuV) | Limits<br>(uV) | Margin<br>(dB) |
|----------------|------------------|-------------------------|-----------------------|------------------|----------------|----------------|
| 3.380          | L                | 44.10                   | 160.32                | 48.00            | 251.19         | -3.90          |
| 3.970          | L                | 41.80                   | 123.03                | 48.00            | 251.19         | -6.20          |
| 4.170          | L                | 44.00                   | 158.49                | 48.00            | 251.19         | -4.00          |
| 5.360          | L                | 43.90                   | 156.68                | 48.00            | 251.19         | -4.10          |
| 3.970          | N                | 41.60                   | 120.23                | 48.00            | 251.19         | -6.40          |
| 4.170          | N                | 41.20                   | 114.82                | 48.00            | 251.19         | -6.80          |

Test Engineer : Benny Lee  
Benny Lee

## **6. Test of Radiated Emission**

Radiated emissions from 30 MHz to 1,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

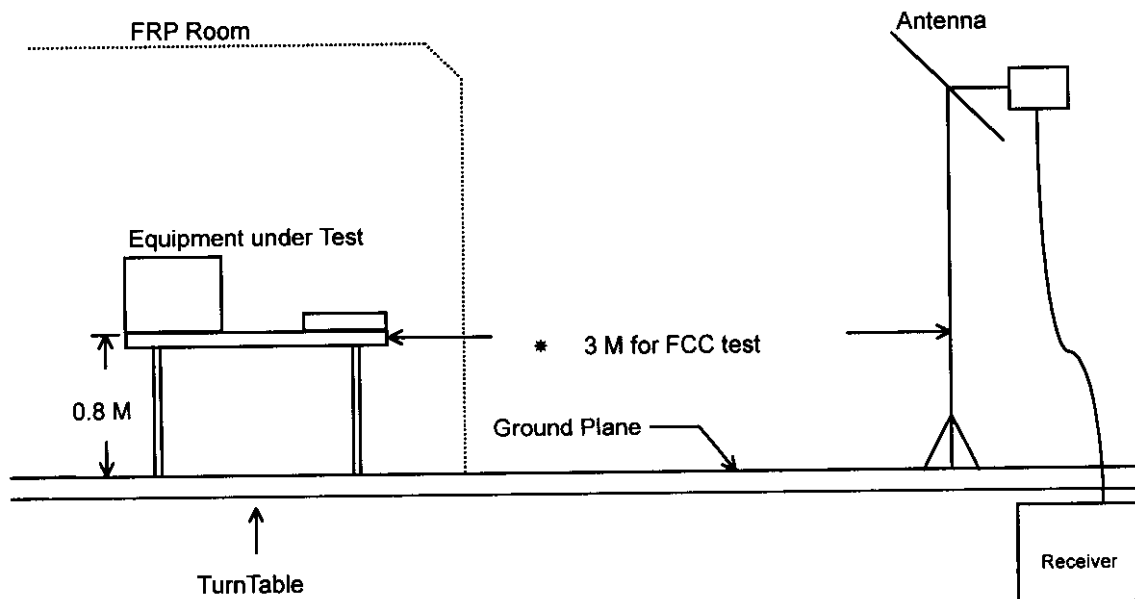
### **6.1. Major Measuring Instruments**

- Amplifier ( HP 8447D )
  - Attenuation 0 dB
  - RF Gain 20 dB
  - Signal Input 0.1 MHz to 1.3 GHz
  
- Spectrum Analyzer ( HP 8568B )
  - Attenuation 0 dB
  - Start Frequency 30 MHz
  - Stop Frequency 1000 MHz
  - Resolution Bandwidth 1 MHz
  - Video Bandwidth 1 MHz
  - Signal Input 100 Hz to 1.5 GHz
  
- Quasi-Peak Adapter ( HP 85650A )
  - Resolution Bandwidth 120 KHz
  - Frequency Band 30 MHz to 1 GHz
  - Quasi-Peak Detector ON for Quasi-Peak Mode  
OFF for Peak Mode

**6.2. Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be repeated one by one using the quasi-peak method and reported.

### 6.3. Typical Test Setup Layout of Radiated Emission



## 6.4. Test Result of Radiated Emission

6.4.1. Test mode : 1024x768 75Hz/60.1K

- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity : 77 %
- Test Date : Nov. 16, 1998
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

The Radiated Emission test was passed at minimum margin

303.200 MHz / 42.20 dBuV (VERTICAL) Antenna Height 2 Meter, Turntable Degree 186 °.

| Frequency<br>(MHz) | Polarity | Antenna<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Limits |        | Emission<br>(dBuV) | Level<br>(uV) | Margin<br>(dB) |
|--------------------|----------|---------------------------|-----------------------|-------------------|--------|--------|--------------------|---------------|----------------|
|                    |          |                           |                       |                   | (dBuV) | (uV)   |                    |               |                |
| 303.200            | V        | 12.88                     | 3.65                  | 25.67             | 46.00  | 199.53 | 42.20              | 128.82        | -3.80          |
| 400.800            | V        | 15.51                     | 4.41                  | 20.94             | 46.00  | 199.53 | 40.86              | 110.41        | -5.14          |
| 434.230            | V        | 15.98                     | 4.74                  | 20.49             | 46.00  | 199.53 | 41.21              | 114.95        | -4.79          |
| 452.800            | V        | 16.27                     | 4.89                  | 20.98             | 46.00  | 199.53 | 42.14              | 127.94        | -3.86          |
| 500.800            | V        | 17.43                     | 4.81                  | 19.59             | 46.00  | 199.53 | 41.83              | 123.45        | -4.17          |
| 70.400             | V        | 5.15                      | 1.80                  | 26.41             | 40.00  | 100.00 | 33.36              | 46.56         | -6.64          |

Test Engineer : William Lee  
WILLIAM LEE

**6.4.2. Test mode : 800x600 75Hz/46.9K**

- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity : 77 %
- Test Date : Nov. 16, 1998
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**493.600 MHz / 42.46 dBuV (VERTICAL) Antenna Height 2 Meter, Turntable Degree 194 °.**

| Frequency<br>(MHz) | Polarity | Antenna<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Limits |        | Emission<br>(dBuV) | Level<br>(uV) | Margin<br>(dB) |
|--------------------|----------|---------------------------|-----------------------|-------------------|--------|--------|--------------------|---------------|----------------|
|                    |          |                           |                       |                   | (dBuV) | (uV)   |                    |               |                |
| 432.800            | H        | 15.96                     | 4.73                  | 21.73             | 46.00  | 199.53 | 42.42              | 132.13        | -3.58          |
| 494.400            | H        | 17.27                     | 4.81                  | 20.21             | 46.00  | 199.53 | 42.29              | 130.17        | -3.71          |
| 53.900             | H        | 6.17                      | 1.50                  | 28.11             | 40.00  | 100.00 | 35.78              | 61.52         | -4.22          |
| 311.200            | V        | 13.08                     | 3.77                  | 25.40             | 46.00  | 199.53 | 42.25              | 129.57        | -3.75          |
| 439.200            | V        | 16.05                     | 4.79                  | 20.82             | 46.00  | 199.53 | 41.66              | 121.06        | -4.34          |
| 493.600            | V        | 17.25                     | 4.81                  | 20.40             | 46.00  | 199.53 | 42.46              | 132.74        | -3.54          |

Test Engineer : William Lee  
WILLIAM LEE

## 7. Antenna Factor & Cable Loss

| Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) |
|-----------------|---------------------|-----------------|
| 30              | 18.1                | 1.2             |
| 35              | 15.2                | 1.3             |
| 40              | 12.6                | 1.3             |
| 45              | 9.9                 | 1.5             |
| 50              | 7.5                 | 1.5             |
| 55              | 5.8                 | 1.5             |
| 60              | 5.0                 | 1.6             |
| 65              | 4.8                 | 1.6             |
| 70              | 5.1                 | 1.8             |
| 75              | 5.7                 | 1.8             |
| 80              | 6.7                 | 1.8             |
| 85              | 7.8                 | 1.7             |
| 90              | 8.8                 | 1.9             |
| 95              | 9.3                 | 1.9             |
| 100             | 10.0                | 2.1             |
| 110             | 11.2                | 2.0             |
| 120             | 11.3                | 2.2             |
| 130             | 11.3                | 2.5             |
| 140             | 10.7                | 2.5             |
| 150             | 9.9                 | 2.5             |
| 160             | 9.3                 | 2.6             |
| 170             | 8.5                 | 2.6             |
| 180             | 8.4                 | 2.8             |
| 190             | 8.2                 | 2.8             |
| 200             | 8.3                 | 2.7             |
| 220             | 8.4                 | 2.9             |
| 240             | 10.9                | 3.0             |
| 260             | 13.0                | 3.3             |
| 280             | 12.4                | 3.6             |
| 300             | 12.8                | 3.6             |
| 320             | 13.3                | 3.9             |
| 340             | 13.8                | 4.0             |
| 360             | 14.4                | 4.2             |
| 380             | 15.0                | 4.4             |
| 400             | 15.5                | 4.4             |
| 450             | 16.2                | 4.9             |
| 500             | 17.4                | 4.8             |
| 550             | 19.1                | 5.3             |
| 600             | 18.4                | 5.4             |
| 650             | 18.9                | 6.0             |
| 700             | 18.9                | 6.1             |
| 750             | 19.7                | 6.6             |
| 800             | 19.7                | 6.5             |
| 850             | 20.4                | 6.5             |
| 900             | 20.5                | 6.8             |
| 950             | 20.9                | 7.5             |
| 1000            | 21.2                | 7.3             |
| 2000            | 26.4                | 9.7             |

**8. List of Measuring Equipments Used**

| Instrument                           | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark     |
|--------------------------------------|--------------|-----------|------------|-----------------|------------------|------------|
| EMC Receiver<br>(site 1)             | HP           | 8591EM    | 3536A00672 | 9 KHz - 18 GHz  | Aug. 27, 1998    | Conduction |
| LISN (site 1)                        | EMCO         | 3850/2    | 9510-1035  | 50 ohm / 50 uH  | Oct. 23, 1998    | Conduction |
| LISN (site 1)                        | KYORITSU     | KNW-47    | 8-693-10   | 50 ohm / 50 uH  | Oct. 23, 1998    | Conduction |
| EMI Filter (site 1)                  | CORCOM       | MRI-2030  | N/A        | 480 VAC / 30 A  | N/A              | Conduction |
| Quasi-peak Adapter<br>(site 3)       | HP           | 85650A    | 2811A01116 | 9KHz -1 GHz     | Jul. 19, 1998    | Radiation  |
| Amplifier (Site 3)                   | HP           | 8447D     | 2944A09068 | 0.1MHz -1.3GHz  | Aug. 27, 1998    | Radiation  |
| Spectrum Analyzer<br>(site 3)        | HP           | 8568B     | 2732A04100 | 100Hz - 1.5GHz  | July 19, 1998    | Radiation  |
| Bilog Antenna<br>(Site 3)            | CHASE        | CBL6112A  | 2320       | 30MHz -2GHz     | Sep. 10, 1998    | Radiation  |
| Half-wave dipole<br>antenna (Site 3) | EMCO         | 3121C     | 9705-1285  | 28 M - 1GHz     | May 19, 1998     | Radiation  |
| Turn Table (site 3)                  | EMCO         | 2080      | 9711-2022  | 0 ~ 360 degree  | N/A              | Radiation  |
| Antenna Mast<br>(site 3)             | EMCO         | 2075      | 9710-2101  | 1 m- 4 m        | N/A              | Radiation  |