

# Statement of Conformity

## Best Laboratory Co., Ltd.

No. 336, Ba Lian RD., Sec. 1, Hsi Chih City, Taipei Hsien, Taiwan, R.O.C.  
Telephone: 886-2-2646-2899 Facsimile: 886-2-2646-2870

### *EMC Certificate*

**Applicant** : Advantech Co., Ltd.  
**Address** : Fl.4, No. 108-3, Ming-Chuan Road,  
Shing-Tien City, Taipei, Taiwan, R.O.C.  
**Equipment** : 4-Port RS-422/ 485 High-Speed Module  
**Model** : PCM-3614-A

Has fully complied with the requirements set out in the council directive on the approximation of the law of the members states relating to Electromagnetic Compatibility Directive (89/336/EEC). For the evaluation regarding EMC, the following standards were applied:

EMI: EN 50081-2:1993 -> EN 55011:1999, EN 61000-3-2:2000, EN 61000-3-3:1995

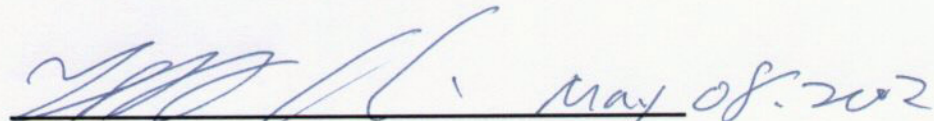
EMS: EN 61000-6-2:1999 -> EN 61000-4-2:1998, EN 61000-4-3:1998,  
EN 61000-4-4:1995, EN 61000-4-5:1995,  
EN 61000-4-6:1996, EN 61000-4-8:1993,  
EN 61000-4-11:1994,

**The date of the measurement: May 06, 2002**

**The date of the certification signed: May 08, 2002**

**The number of EMC Certificate: CER-A01-CE-701**

**Test Laboratory**

  
Quality Department Manager: JEFF CHIU



This verification is based on a single evaluation of one sample of above-mentioned products. It does not imply any assessment of the whole production and does not permit the use of the logo of the test laboratory.

# EMC TEST REPORT

Applicant : Advantech Co., Ltd.  
Equipment : 4-Port RS-422/485 High-Speed Module  
Model : PCM-3614-A

# Test Report Certification

## Best Laboratory Co., Ltd.

No. 336, Ba Lian Rd., Sec. 1, Hsi Chih City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2646-2899 Fax: 886-2-2646-2870

Applicant : Advantech Co., Ltd.

Address : Fl.4, No. 108-3, Ming-Chuan Road,  
Shing-Tien City, Taipei, Taiwan, R.O.C.

Equipment : 4-Port RS-422/ 485 High-Speed Module

Model : PCM-3614-A

Device's Class : Class A Device

Measurement Standard : EN 50081-2/1993, EN 61000-6-2/1999

Measurement Procedure : EN 55011/1999, EN 61000-3-2/2000, EN 61000-3-3/1995  
EN 61000-4-2/1998, EN 61000-4-3/1998, EN 61000-4-4/1995,  
EN 61000-4-5/1995, EN 61000-4-6/1996, EN 61000-4-8/1993  
EN 61000-4-11/1994

Operating Voltage : By PC

Test Result : **Compliance** (Detail showed in the test report)

Sample Received : Mar. 17, 2002

Test Date : May 06, 2002

Report Number : RE-A01-CE-701

Test Firm : No. 336, Ba Lian Rd., Sec. 1,  
Hsi Chih City, Taipei Hsien, Taiwan, R.O.C.

Remark:

- (1) The test report is only relating to the sample tested
- (2) The test report shall not be reproduced except in full, without the written approval of Best Laboratory Co., Ltd.
- (3) The test result of this report are traceable to the national or international standards.

Prepared : IVAN HSIEH

Approved : JEFF CHIU ( Title: Quality Department Manager )

Date Issued : May 06, 2002

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# 1. General Information

## 1.1 EUT Description

Applicant : Advantech Co., Ltd.

Address : Fl.4, No. 108-3, Ming-Chuan Road,  
Shing-Tien City, Taipei, Taiwan, R.O.C.

Equipment : 4-Port RS-422/ 485 High-Speed Module

Model : PCM-3614-A

Device's Class : Class A Device

Operation Voltage : By PC

Output Ports :  
Interior connector

40 pin connector : Each connected with one 9-pin RS-232 connector, via one rainbow cable, 0.3 meters long, non-shielded, no ferrite bead.

104 pin connector: Directly plugged on the I/O board. (PCA-6144)

Exterior connector

Serial port#1 : Connected with a 1.8 meters long, non-shielded, no ferrite bead, RS-232 cable to the serial port#2 of EUT.

Serial port#3 : Connected with a 1.8 meters long, non-shielded, no ferrite bead, RS-232 cable to the serial port#4 of EUT.

## 1.2 Test System Detail

**PC : HP**  
 Model No. : Vectra VE 4/66  
 Serial No. : SG52902164  
 FCC ID : HCJVECTRAVE4  
 Power Type : 100~127/200~240VAC, 50/60Hz, 1.5/3.0A, Switching  
 Power Cord : 180cm long, non-shielded, no ferrite bead.

**Monitor : Dynaview**  
 Model No. : VCDT321496-1D  
 Serial No. : HR94500066  
 FCC ID : DoC Approval  
 BSMI : 3882A702  
 Power Type : 100-240VAC, 50/60Hz, 1.5A, Switching  
 Power Cord : 180cm long, non-shielded, no ferrite bead.  
 Data Cable : 120cm long, shielded, with ferrite bead  
 Backshell : Metal  
 Connected Port : VGA Port

**Keyboard : Logitec**  
 Model No. : SK-720  
 Serial No. : N/A  
 FCC ID : GYUR49SK  
 BSMI : 3872A806  
 Power Type : By PC  
 Data Cable : 180cm long, shielded, no ferrite bead  
 Backshell : Metal  
 Connected Port : PS/2 Keyboard Port

**Mouse : Logitech**  
 Model No. : M-S48a  
 Serial No. : N/A  
 FCC ID : JNZ201213  
 BSMI : 4882A001  
 Power Type : By PC  
 Data Cable : 120cm long, non-shielded, no ferrite bead  
 Backshell : Metal  
 Connected Port : PS/2 Mouse Port

**Modem : ACEEX**  
 Model No. : XDM-9624  
 Serial No. : 0017884  
 FCC ID : IFAXDM-9624  
 Power Type : 230VAC, 50Hz / 9VAC, 1A  
 Power Core : 1.9meters long, non-shielded, no ferrite bead  
 Data Cable : RS-232, shielded, 1.2meters long, no ferrite bead  
                   RJ11C x 2, 7' long, non-shielded, no ferrite bead  
 Backshell : Metal  
 Connected Port : Serial Port.

**Printer : Epson**  
Model No. : P950  
Serial No. : BW9Y113923  
FCC ID : DoC Approval  
BSMI : 3872P001  
Power Type : 230VAC, 50Hz, 0.4A  
Power Core : 165cm long, non-shielded, no ferrite bead  
Data Cable : 120cm long, shielded, no ferrite bead  
Backshell : Metal  
Connected Port : Parallel Port



### 1.3 EUT Configuration

#### Interior connector

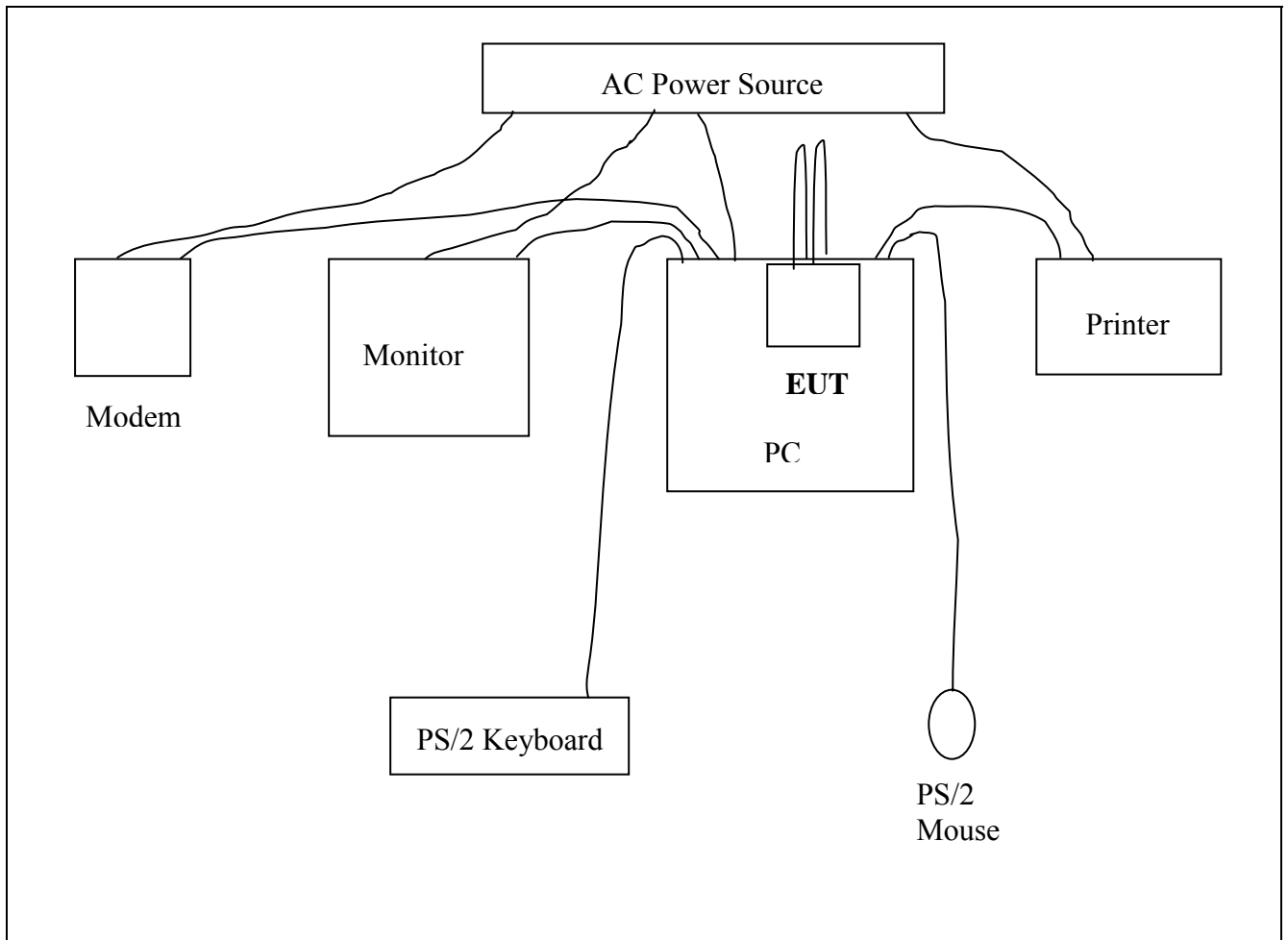
- (1) The 40 pin connector of EUT is connected with one 9-pin RS-232 connector via one rainbow cable.
- (2) The 104 pin connector is directly connected with on the I/O board. (PCA-6144)

#### Exterior connector

- (1) The serial port#1 of EUT is connected with one RS-232 cable to the serial port#2 of EUT.
- (2) The serial port#3 of EUT is connected with one RS-232 cable to the serial port#4 of EUT.

(\*\*\*PS: Please refers to the Photograph\*\*\*)

#### Drawing of Configuration



## 1.4 EUT Exercise Software

The testing software is provided by the applicant.

The testing software is designed to exercise the EUT in a manner similar to a typical use. The testing software will force PC to transmit the data from the channel#1 of EUT to the channel#2 of EUT, the same as from the channel#3 to the channel#4. The software will enable all functions of EUT.

## 1.5 Test Performed

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver which bandwidth is set at 9KHz.

Radiated emissions were investigated over the frequency range from 30MHz to 1000MHz using a receiver which bandwidth is set at 120KHz. Radiated measurement was performed at distance that from an antenna to EUT is 10 meters.

The testing result of pretest was shown out that the “Transmitting/Receiving” mode is worse than the “ Standby “ mode. So, the final measurement was made on the “Transmitting/Receiving” mode.

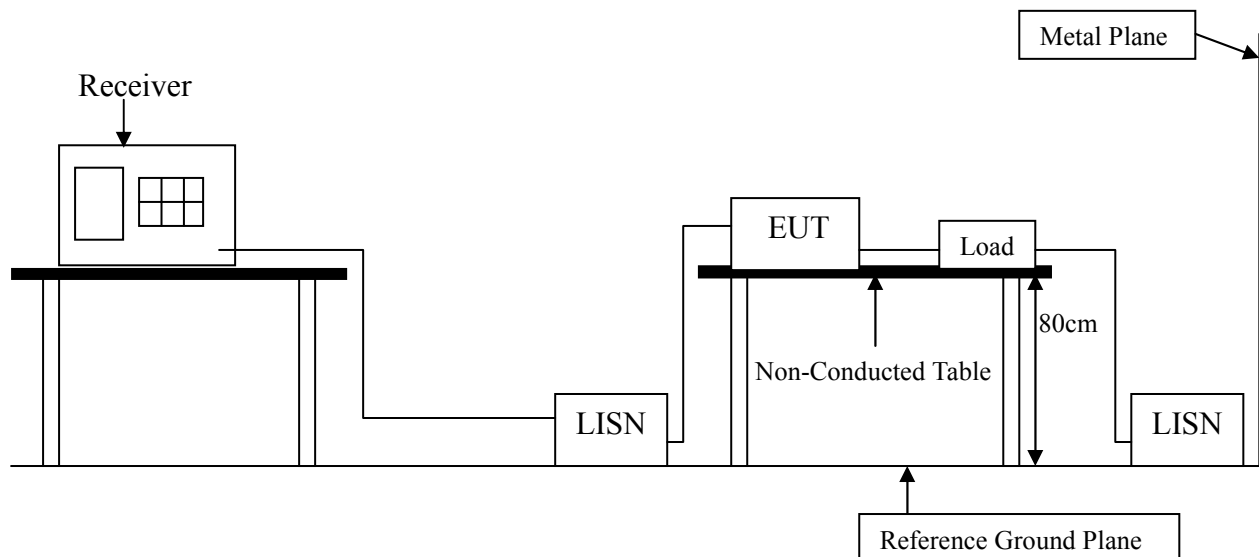
## 2 Conducted Emission Measurement at Mains Port

### 2.1 Test Equipment

| No. | Instrument             | Manufacture     | Model     | Serial No. | Last Calibrate |
|-----|------------------------|-----------------|-----------|------------|----------------|
| 1.  | LISN (EUT)             | Rolf Heine      | NNB-2/16Z | 99084      | May 14, 2001   |
| 2.  | LISN (AXE)             | Rolf Heine      | NNB-2/16Z | 99086      | May 14, 2001   |
| 3.  | EMI Receiver           | Rohde & Schwarz | ESI 7     | 830154/001 | June 27, 2001  |
| 4.  | 50 $\Omega$ Terminator | Amphenol        | 46650-51  | N/A        | Dec. 10, 2001  |
| 5.  | RF Cable               | Belden          | M17/158   | MIL-C-17   | Jan. 20, 2002  |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 2.2 Test Set-Up



### 2.3 Limit

| Frequency   | Limit (dB $\mu$ V) |         |            |         |
|-------------|--------------------|---------|------------|---------|
|             | Class A            |         | Class B    |         |
| MHz         | Quasi Peak         | Average | Quasi Peak | Average |
| 0.15 ~ 0.50 | 79                 | 66      | 66 ~ 56    | 56 ~ 46 |
| 0.50 ~ 5.0  | 73                 | 60      | 56         | 46      |
| 5.0 ~ 30.0  | 73                 | 60      | 60         | 50      |

Remark: In the above table, the tighter limit applies at the band edges.

## 2.4 Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). It provides a 50 ohm / 50  $\mu$ H coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm / 50  $\mu$ H coupling impedance with 50 ohm termination. (Please refers to the block diagram of the test setup and photograph.)

Both sides of DC line are checked for the maximum conducted emission interference. In order to find the maximum emissions, the relating positions of equipment and all of the interference cables must be changed according to EN 55011/1999 regulation: The measurement procedure on conducted emission interference.

The resolution bandwidth of the field strength meter ( Rohde & Schwarz ) is set at 9KHz.

## 5 Test Specification

According to the EN 55011/1999

## 2.6 Test Result

The emissions that come from the EUT were below the specified limits. The worst case of conducted emissions measurement are shown in the appendix A. The acceptance criterion was met and the EUT has pass the measurement.

## 2.7 Deviation from the Test Method

No Deviation.

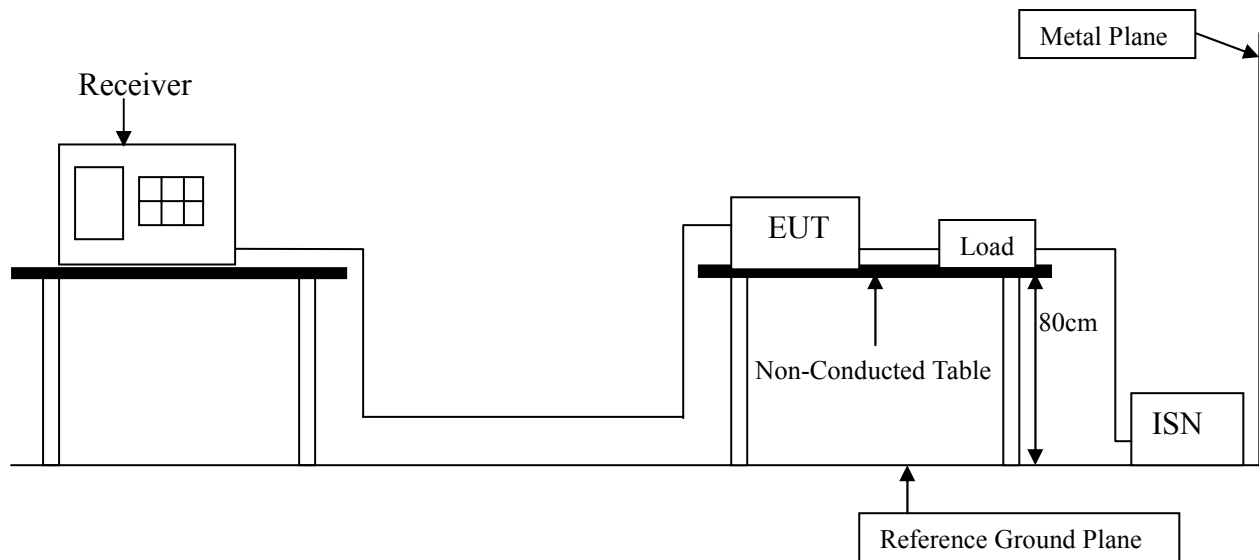
### 3 Conducted Emission Measurement at Telecommunication Port

#### 3.1 Test Equipment

| No. | Instrument             | Manufacture     | Model    | Serial No. | Last Calibrate |
|-----|------------------------|-----------------|----------|------------|----------------|
| 1.  | ISN (EUT)              | Shaffner        | ISN T411 | 200102-010 | Feb. 24, 2002  |
| 2.  | ISN Adapter            | Shaffner        | ADS T444 | 200102-032 | Feb. 24, 2002  |
| 3.  | EMI Receiver           | Rohde & Schwarz | ESI 7    | 830154/001 | Nov 22, 2001   |
| 4.  | 50 $\Omega$ Terminator | Amphenol        | 46650-51 | N/A        | Dec. 10, 2001  |
| 5.  | RF Cable               | Belden          | M17/158  | MIL-C-17   | Jan. 20, 2002  |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

#### 3.2 Test Set-Up



#### 3.3 Limit

Class A ITE

| Frequency   | Limit (dB $\mu$ V) |         | Limit (dB $\mu$ A) |         |
|-------------|--------------------|---------|--------------------|---------|
|             | Voltage Limits     |         | Currents Limits    |         |
| MHz         | Quasi Peak         | Average | Quasi Peak         | Average |
| 0.15 ~ 0.50 | 97 ~ 87            | 84 ~ 74 | 53 ~ 43            | 40 ~ 30 |
| 0.50 ~ 5.0  | 87                 | 74      | 43                 | 30      |
| 5.0 ~ 30.0  | 87                 | 74      | 43                 | 30      |

Remark: In the above table, the tighter limit applies at the band edges.

## Class B ITE

| Frequency   | Limit (dB $\mu$ V) |         | Limit (dB $\mu$ A) |         |
|-------------|--------------------|---------|--------------------|---------|
|             | Voltage Limits     |         | Currents Limits    |         |
| MHz         | Quasi Peak         | Average | Quasi Peak         | Average |
| 0.15 ~ 0.50 | 84 ~ 74            | 74 ~ 64 | 40 ~ 30            | 30 ~ 20 |
| 0.50 ~ 5.0  | 74                 | 64      | 30                 | 20      |
| 5.0 ~ 30.0  | 74                 | 64      | 30                 | 20      |

Remark: In the above table, the tighter limit applies at the band edges.

### 3.4 Test Procedure

The characteristics of LCL of ISN:

150KHz ~ 1.5MHz: 80dB  $\pm$  3dB

1.5MHz ~ 30MHz: (80dB to 55dB)  $\pm$  3dB, decreasing linearly with the logarithm of the frequency

The ISN is connected to the communication port through a cable. The common-mode terminating impedance of this ISN observed from the communication ports when the disturbance is measured shall apply with the regulation. The ISN shall be inserted between the EUT and the auxiliary equipment that is required for operation of the EUT through the signal cable

Two sides of telecommunication ports are checked for the maximum conducted emission interference. In order to find the maximum emissions, the relating positions of equipment and all of the interference cables must be changed according to EN 55011/1999 regulation: The measurement procedure on conducted emission interference.

### 3.5 Test Specification

According to the EN 55011/1999

### 3.6 Test Result

N / A

### 3.7 Deviation from the Test Method

N / A

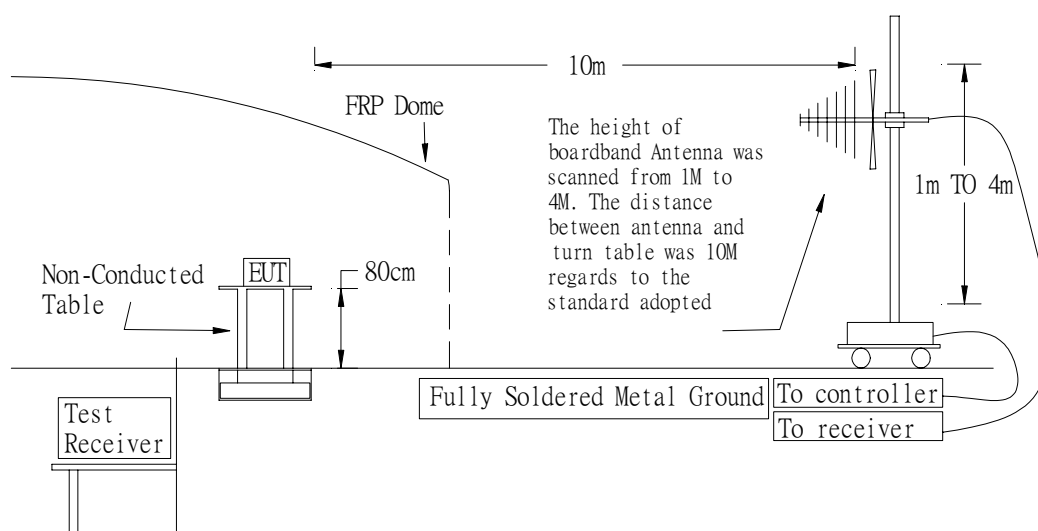
## 4. Radiated Emission Measurement

### 4.1 Test Equipment List

| No. | Instrument   | Manufacture     | Model      | Serial No. | Last Calibrate |
|-----|--------------|-----------------|------------|------------|----------------|
| 11. | Antenna      | Mess-Elektronik | VULB 9160  | 9160-3078  | Jan. 19, 2002  |
| 2.  | EMI Receiver | Rohde & Schwarz | ESI 7      | 830154/001 | June 27, 2001  |
| 3.  | RF Cable     | Adventest       | AD-N-CA-01 | 2000-0220  | Jan. 20, 2002  |
| 4.  | OATS         | Bestlab         | N/A        | OATS#1     | May 28, 2001   |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 4.2 Test Setup



### 4.3 Limit

| Frequency  | Class A             |                         | Class B             |                         |
|------------|---------------------|-------------------------|---------------------|-------------------------|
| MHz        | Distance<br>(Meter) | Limit<br>(dB $\mu$ V/m) | Distance<br>(Meter) | Limit<br>(dB $\mu$ V/m) |
| 30 ~ 230   | 10                  | 40                      | 10                  | 30                      |
| 230 ~ 1000 | 10                  | 47                      | 10                  | 37                      |

Remark: In the above table, the tighter limit applies at the band edges

### 4.4 Test Procedure

The EUT and its simulators are placed on turn table, non-ducted and wooden, which is 0.8 meter above ground. The turn table rotates 360 degree to determine the position of the maximum emission level. The EUT was positioned such that distance from antenna to the EUT is 10 meters.

The antenna is moved up and down between 1 meter to 4 meter to receive the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interference cables must be manipulated according to EN 55011/1999 regulation: the test procedure of the radiated emission measurement.

The bandwidth set on the field strength is 120KHz when the frequency range is below 1GHz

### 4.5 Test Specification

According to EN 55011/1999

### 4.6 Test Result

The emissions that come from the EUT was below the specified limits. The worst case of conducted emissions measurement are shown in the appendix A. The acceptance criterion was met and the EUT has pass the measurement.

### 4.7 Deviation from the Test Method

No Deviation.



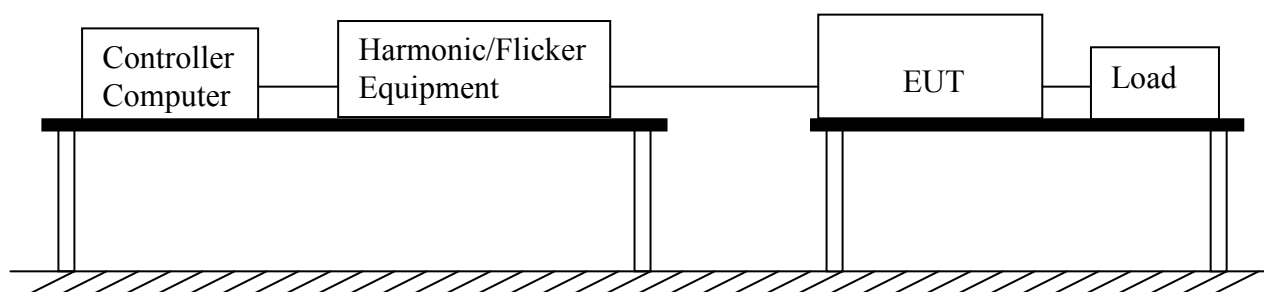
## 5. Power Harmonic and Voltage Fluctuation Measurement

### 5.1 Power Harmonic and Voltage Fluctuation Test Equipment List

| No. | Instrument      | Manufacture | Model         | Serial No. | Last Calibrate |
|-----|-----------------|-------------|---------------|------------|----------------|
| 1.  | H/F Test System | EMC Partner | Harmonic-1000 | 325807     | May. 10, 2001  |

Remark: All equipment upon which need to calibrated are with calibration period of 1 year.

### 5.2 Test Setup



### 5.3 Limit of Harmonic Current

Limit of Harmonic Currents

| Harmonic Order      | Maximum Permissible Harmonic Current (Ampere) | Harmonic Order     | Maximum Permissible Harmonic Current (Ampere) |
|---------------------|---|--------------------|---|
| Odd Harmonic        |   | Even Harmonic      |   |
| 3                   | 2.30  | 2                  | 1.08  |
| 5                   | 1.14  | 4                  | 0.43  |
| 7                   | 0.77  | 6                  | 0.30  |
| 9                   | 0.40  | $8 \leq n \leq 40$ | $0.23 \times 8/n$                             |
| 11                  | 0.33  |                    |   |
| 13                  | 0.21  |                    |   |
| $15 \leq n \leq 39$ | $0.15 \times 15/n$                            |                    |   |

## **5.4 Test Procedure**

The EUT is supplied in series with power analyzer from a power source has the same normal voltage and frequency as the rated supply voltage and the equipment under test. The rated voltage at the supply voltage of EUT of 0.94 times and 1.06 times shall be performed.

## **5.5 Test Specification**

According to EN 61000-3-2/2000, EN 61000-3-3/1995

## **5.6 Test Result**

N / A

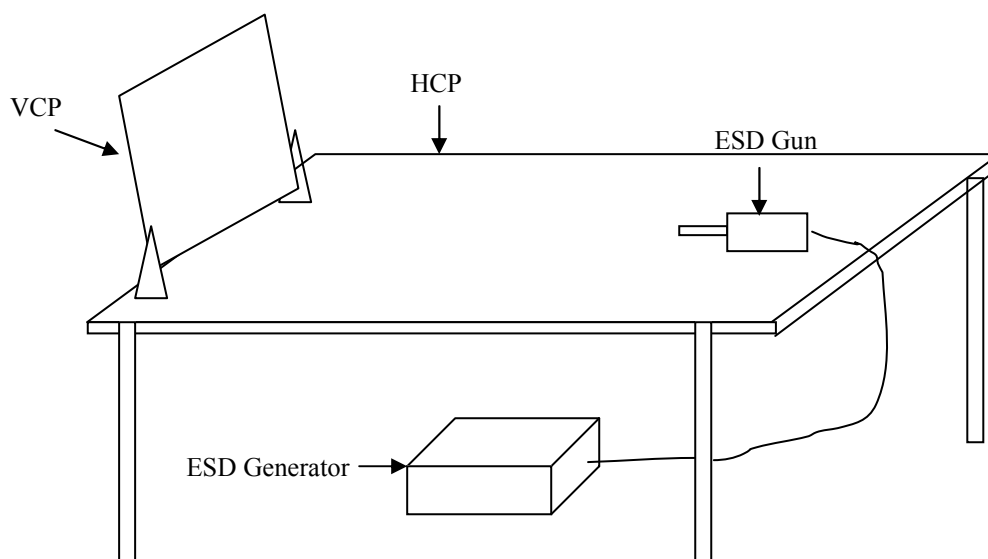
## 6 .Electrostatic Discharge (ESD)

### 6.1 Test Equipment List

| No. | Instrument   | Manufacture | Model    | Serial No. | Last Calibrate |
|-----|--------------|-------------|----------|------------|----------------|
| 1.  | ESD Emulator | Noiseken    | ESS-100L | 0199C02380 | Mar. 02, 2002  |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 6.2 Test Setup



### 6.3 Test Level

| Item           | Environment             | Unit               | Test Specification                         | Performance Criteria |
|----------------|-------------------------|--------------------|--|----------------------|
| Enclosure Room | Electrostatic Discharge | KV(Charge Voltage) | 8 (Air Discharge)<br>4 (Contact Discharge) | B                    |

## 6.4 Test Procedure

Direct applicant of discharge to the EUT:

Contact discharge was applied only to the conducted surfaces of the EUT.

Air discharge was applied only to the non-conductive surfaces of the EUT.

When the measurement was taken, The ESD discharger was performed in single discharge. For the single discharge time between successive single discharges will keep on one second. It was at least ten single discharges with positive and negative at the same selected pointed. The selected pointed, which was performed with electrostatic discharge, was marked on the red label on the EUT.

Indirect applicant of discharge to the EUT:

Vertical Coupling Plane (VCP)

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to , and positioned at a distance 0.1m from, the EUT, with the discharge electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least ten single discharges with positive and negative at the same selected point.

Horizontal Coupling Plane (HCP)

The coupling plane is placed under the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the discharge electrode touching the coupling.

The four faces of the EUT will be performed with electrostatic discharge. It was at least ten single discharges with positive and negative at the same selected pointed.

## 6.5 Test Specification

According to EN 61000-4-2/1998

## 6.6 Test Result

The measurement of the electrostatic discharge was investigated and the test result was shown on the Appendix A. The acceptance criterion was met and the EUT has passed the measurement.

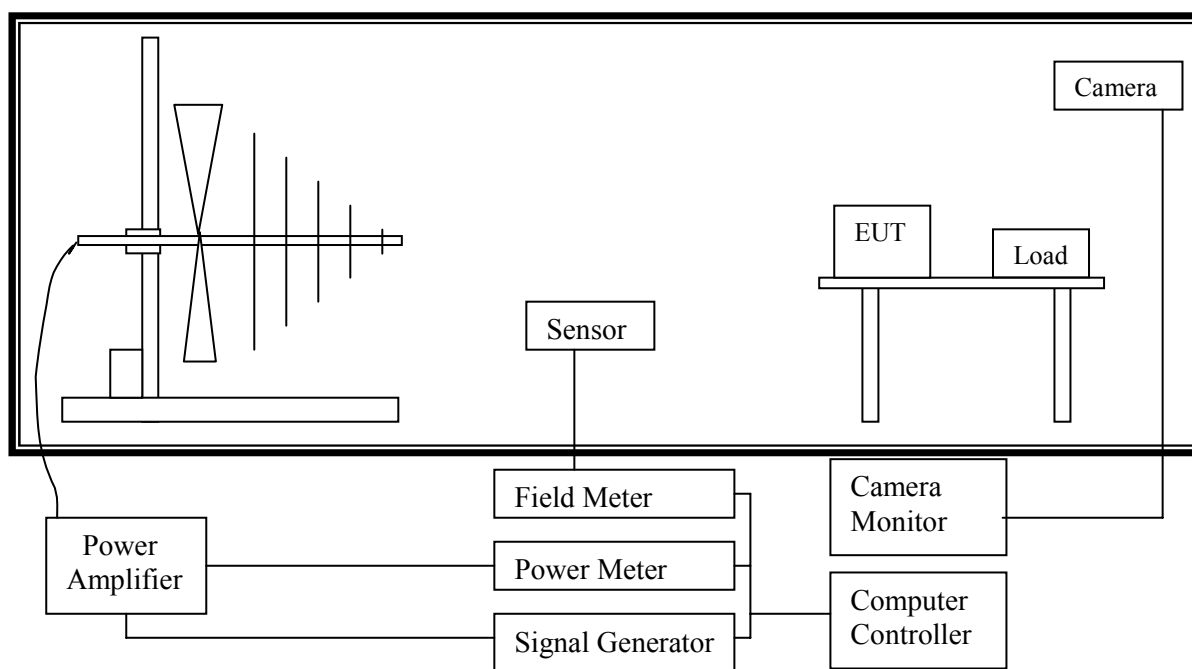
## 7. Radiated Susceptibility (RS)

### 7.1 Test Equipment List

| No. | Instrument       | Manufacture        | Model       | Serial No. | Last Calibrate |
|-----|------------------|--------------------|-------------|------------|----------------|
| 1.  | Signal Generator | Rohde & Schwarz    | SMY 02      | 845069/018 | May 02, 2001   |
| 2.  | Amplifier        | Amplifier Research | 100W1000M1A | 20638      | May 01, 2001   |
| 3.  | Field Monitor    | Amplifier Research | FM 2000     | 20391      | Mar 03, 2002   |

Remark: All equipment upon which need to calibrated are with calibration period of one and half year.

### 7.2 Test Setup



### 7.3 Test Level

| Item           | Environment           | Unit                   | Test Specification | Performance Criteria |
|----------------|-----------------------|------------------------|--------------------|----------------------|
| Enclosure Room |                       |                        |                    |                      |
|                | Radio –Frequency      | MHz                    | 80 ~ 1000          | A                    |
|                | Electromagnetic Field | V/m (unmodulated, rms) | 10                 |                      |
|                | Amplitude Modulated   | %AM (1KHz)             | 80                 |                      |

## 7.4 Test Procedure

The EUT and load, which are placed on a wooden table that the height is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT is 3 meters.

Both horizontal and vertical polarization of the antenna position and four sides of the EUT are set on measurement.

In order to judge the EUT performance, a CCD camera is used to monitor the situation of EUT. All the scanning conditions are as follows:

| Condition of Test                 | Remarks                        |
|-----------------------------------|--------------------------------|
| EN 61000-4-3/1998                 |                                |
| 1. Field Strength                 | 10V/M; Level 3                 |
| 2. Radiated Signal                | AM 80% modulated with 1KHz     |
| 3. Scanning Frequencies           | 80MHz ~ 1000MHz                |
| 4. Dwell Time                     | 3 seconds                      |
| 5. Frequency step size $\Delta f$ | 1%                             |
| 6. The rate of swept of frequency | $1.5 \times 10^{-3}$ decades/s |

## 7.5 Specification

According to EN 61000-4-3/1998

## 7.6 Test Result

The measurement of the radiated susceptibility was investigated and the test result was shown on the appendix A. The acceptance criterion was met and the EUT has passed the measurement.

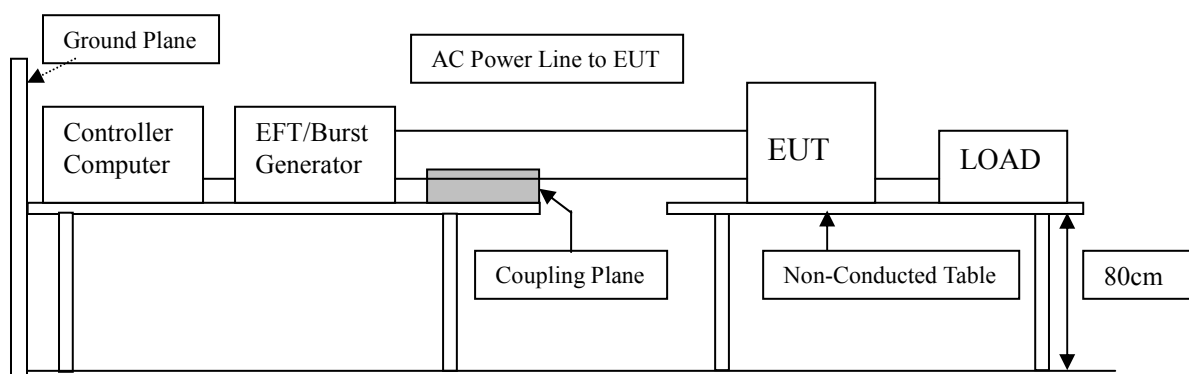
## 8 Electrical Fast Transient/Burst (EFT/B)

### 8.1 Test Equipment List

| No. | Instrument      | Manufacture | Model          | Serial No.    | Last Calibrate |
|-----|-----------------|-------------|----------------|---------------|----------------|
| 1.  | EMC Test System | EMC Partner | Transient-1000 | TR1000-341    | Aug 15, 2001   |
| 2.  | Absorbing Clamp | EMC Partner | Transient-1000 | CNEFT1000-176 | Aug 15, 2001   |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 8.2 Test Setup



### 8.3 Test Level

| Item                                     | Environment                 | Unit                 | Test Specification | Performance Criteria |
|--|-----------------------------|----------------------|--------------------|----------------------|
| Ports for signal Lines and Control Lines |                             |                      |                    | B                    |
|  | Fast Transients Common Mode | KV (Peak)            | 1                  |                      |
|  |                             | Tr/Ts (ns)           | 5/50               |                      |
|  |                             | Rep. Frequency (KHz) | 5                  |                      |
| DC Input and DC Output Power Ports       |                             |                      |                    | B                    |
|  | Fast Transients Common Mode | KV (Peak)            | 2                  |                      |
|  |                             | Tr/Ts (ns)           | 5/50               |                      |
|  |                             | Rep. Frequency (KHz) | 5                  |                      |
| Input and Output AC Power Ports          |                             |                      |                    | B                    |
|  | Fast Transients Common Mode | KV (Peak)            | 2                  |                      |
|  |                             | Tr/Ts (ns)           | 5/50               |                      |
|  |                             | Rep. Frequency (KHz) | 5                  |                      |
| Functional Earth Ports                   |                             |                      |                    | B                    |
|  | Fast Transients Common Mode | KV (Peak)            | 1                  |                      |
|  |                             | Tr/Ts (ns)           | 5/50               |                      |
|  |                             | Rep. Frequency (KHz) | 5                  |                      |

## 8.4 Test Procedure

The EUT and load are placed on a wooden table that is 0.8meter height above a metal ground plane dimension is 1m x 1m and thickness is at least 0.2mm. It also projected beyond the EUT by at lease 0.1meter on all sides.

For Input and Output AC power or DC Input and DC Output Power Ports:

The EUT is connected with the power mains through a coupling device that directly couples the EFT interference signal.

Each of the line and nature conductors is impressed with burst noise for 1 minute.  
For Functional Earth Port:

The EUT is connected to the power mains through a coupling device that directly couples the EFT interference signal.

The protective earth line (PE) is impressed with burst noise for 1 minute.

The length of power cord between the coupling device and the EUT shall be 1 meter.  
For signal Lines and Control Lines Test:

The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT with burst noise for 1 minute.

## 8.5 Test Specification

According to EN 61000-4-4/1995

## 8.6 Test Result

The measurement of the Electrical Fast Transient/Burst was investigated and test result was shown on the appendix A. The acceptance criterion was met and the EUT has passed the measurement.



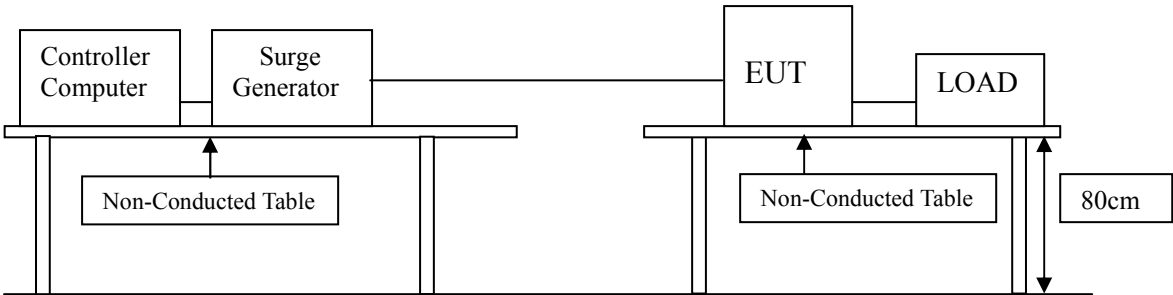
9. Surge

9.1 Test Equipment List

| No | Instrument      | Manufacture | Model          | Serial No. | Last Calibrate |
|----|-----------------|-------------|----------------|------------|----------------|
| 1. | EMC Test System | EMC Partner | Transient-1000 | TR1000-341 | Aug 15, 2001   |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

9.2 Test Setup



9.3 Test Level

| Item                               | Environment    | Unit       | Test Specification | Performance Criteria |
|------------------------------------|----------------|------------|--------------------|----------------------|
| Dc Input and DC Output Power Ports |                |            |                    |                      |
|                                    | Surge          | Tr/Ts (μs) | 1.2/50(8/20)       | B                    |
|                                    | Line to Ground | KV         | ±0.5               |                      |
|                                    | Line to Line   | KV         | ±0.5               |                      |
| AC Input and AC Output Power Ports |                |            |                    |                      |
|                                    | Surge          | Tr/Ts (μs) | 1.2/50(8/20)       | B                    |
|                                    | Line to Ground | KV         | ±4                 |                      |
|                                    | Line to Line   | KV         | ±2                 |                      |

## 9.4 Test Procedure

The EUT and its load are placed on a table which is 0.8 meter height above a metal ground plane dimension is 1 meter x 1 meter and the thickness is 0.5 mm. It's also projected beyond the EUT at least 0.1 meter on all sides. The length of power cord between the coupling device and the EUT shall be 2meter or less.

For Input and Output AC Power or DC Input and Dc Output Power Ports:

The EUT is connected to the power mains through a coupling device that directly couples the Surge interference signal.

The Surge noise shall be applied synchronized to the voltage phase at 0°, 90°, 180°, 270° and the peak value of the AC voltage wave. (Positive and Negative)

Each of line-earth and line-line is impressed with a sequence of five surge voltages with interval of 1 minute.

## 9.5 Test Specification

According to EN 61000-4-5/1995

## 9.6 Test Result

The Measurement of the Surge was investigated and the test result was shown on the appendix A. The acceptance criterion was met and the EUT has passed the test.

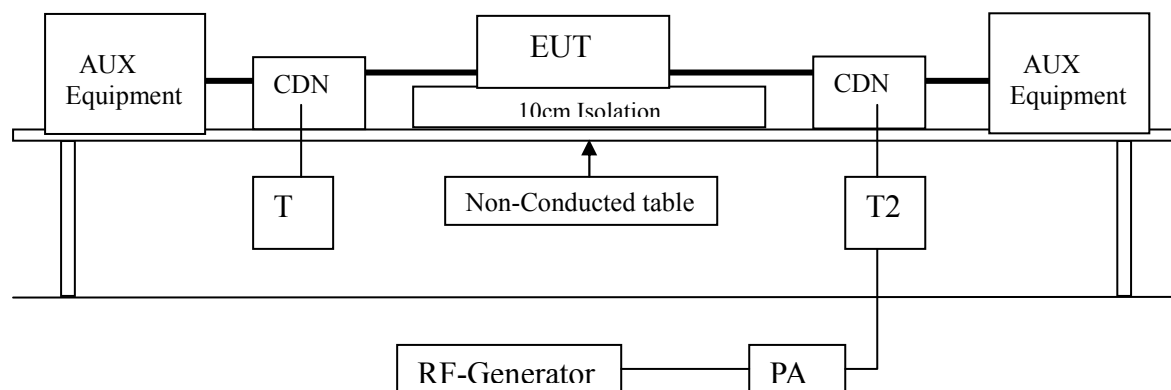
## 10. Conducted Susceptibility

### 10.1 Test Equipment List

| No. | Instrument          | Manufacture        | Model          | Serial No. | Last Calibrate |
|-----|---------------------|--------------------|----------------|------------|----------------|
| 1.  | Signal Generator    | Rohde & Schwarz    | SMY 02         | 845069/018 | May 02, 2001   |
| 2.  | Power Amplifier     | Amplifier Research | 100W1000M1A    | 20638      | May 01, 2001   |
| 4.  | Directional Coupler | Amplifier Research | DC2600         | 20508      | Aug 23, 2001   |
| 5.  | CDN                 | FCC                | FCC-801-M3-25A | 9993       | Aug 23, 2001   |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 10.2 Test Setup



### 10.3 Test Level

| Item   | Environment         | Unit                 | Test Specification | Performance Criteria |
|--|---------------------|----------------------|--------------------|----------------------|
| Ports for Signal Lines and Data Buses, not involved in process control, etc.       |                     |                      |                    |                      |
|  | Radio-Frequency     | MHz                  | 0.15 ~ 80          | A                    |
|  | Common Mode         | V (rms, Unmodulated) | 10                 |                      |
|  | Amplitude Modulated | %AM (1KHz)           | 80                 |                      |
|  |                     | Source Impedance     | 150                |                      |
| Ac Input and AC Output and DC Input and DC output Ports and Functional Earth Ports |                     |                      |                    |                      |
|  | Radio-Frequency     | MHz                  | 0.15 ~ 80          | A                    |
|  | Common Mode         | V (rms, Unmodulated) | 10                 |                      |
|  | Amplitude Modulated | %AM (1KHz)           | 80                 |                      |
|  |                     | Source Impedance     | 150                |                      |

## 10.4 Test Procedure

The EUT are placed on a table which is 0.8meter height and a ground reference plane on the table, the EUT are placed upon table and use a 10cm insulation between the EUT and ground reference plane.

For AC Input and AC Output Power or DC Input and DC Output Power Ports:

The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. It also directly couples the disturbance signal into EUT.

Use CDN-M2 for two wires or CDN-3 for three wires.

For Signal Lines Lines and Control Lines Test:

The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and control lines of the EUT.

All scanning frequencies conditions are as following:

| Condition of Test                 | Remarks:                       |
|-----------------------------------|--------------------------------|
| 1. Field Strength                 | 10V, Level 3                   |
| 2. Radiated Signal                | AM 80% modulated with 1KHz     |
| 3. Scanning frequencies           | 0.15MHz ~ 80MHz                |
| 4. Dwell Time                     | 3 seconds                      |
| 5. Frequency step size $\Delta f$ | 1%                             |
| 6. The rate of Swept of Frequency | $1.5 \times 10^{-3}$ decades/s |

## 10.5 Test Specification

According to EN 61000-4-6/1996

## 10.6 Test Result

The Measurement of the Conducted Susceptibility was investigated and the test result was shown on the appendix A. The acceptance criterion was met and the EUT has passed the test.

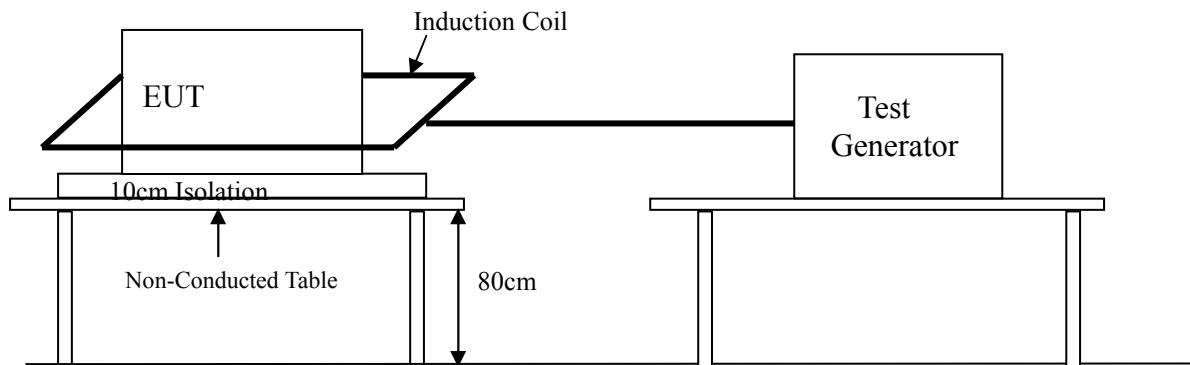
## 11 Power Frequency Magnetic Field

### 11.1 Test Equipment List

| No. | Instrument      | Manufacture | Model          | Serial No.  | Last Calibrate |
|-----|-----------------|-------------|----------------|-------------|----------------|
| 1.  | EMC Test System | EMC Partner | Transient-1000 | TR1000-341  | Aug 15, 2001   |
| 2.  | Magnetic Coil   | EMC Partner | MF-1000        | MF1000-1-51 | Aug 15, 2001   |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 11.2 Test Setup



### 11.3 Test Level

| Item            | Environment | Unit | Test Specification | Performance Criteria |
|-----------------|-------------|------|--------------------|----------------------|
| Enclosure Room  |             |      |                    |                      |
| Power-Frequency |             | 50   | Hz                 | A                    |
| Magnetic Field  |             | 30   | A/M                |                      |

## 11.4 Test Procedure

The EUT and its load are placed on a table that is 0.8 meter above the metal ground plane dimension is at least 1 meter x 1 meter. The test magnetic field shall be placed at least than 3 meters distance from the induction coil.

The test magnetic field shall be applied by the immersion method to the EUT. The induction coil shall be rotated by 90° in order to expose the EUT to the test field with different orientation (X, Y, Z orientation).

## 11.5 Test Specification

According to EN 61000-4-8/1993

## 11.6 Test Result

The Measurement of the Power Frequency Magnetic Field was investigated and the test result was shown on the appendix A. The acceptance criterion was met and the EUT has passed the test.

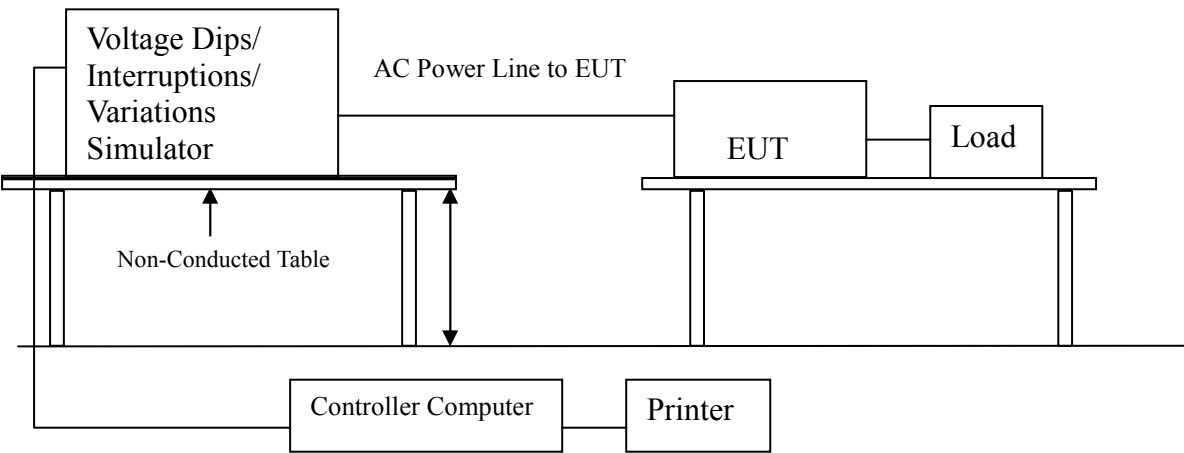
## 12. Voltage Dips and Interruption Measurement

### 12.1 Test Equipment List

| No. | Instrument      | Manufacture | Model          | Serial No. | Last Calibrate |
|-----|-----------------|-------------|----------------|------------|----------------|
| 1.  | EMC Test System | EMC Partner | Transient-1000 | TR1000-341 | Aug 15, 2001   |

Remark: All equipment upon which need to calibrated are with calibration period of one year.

### 12.2 Test setup



### 12.3 Test Level

| Item                               | Environment | Unit | Test Specification | Performance Criteria |
|------------------------------------|-------------|------|--------------------|----------------------|
| Ac Input and AC Output Power Ports |             |      |                    |                      |
| Voltage Dips                       |             | 30   | % Reduction        | B                    |
|                                    |             | 10   | ms                 |                      |
|                                    |             | 60   | % reduction        | C                    |
|                                    |             | 100  | ms                 |                      |
|                                    |             | >95% | Reduction          | C                    |
| Voltage Interruption               |             | 5000 | ms                 |                      |

## 12.4 Test Procedure

The EUT and its load are placed on a wooden table which is 0.8 meter above a metal ground plane which dimension is 1 meter x 1 meter, the thickness is 0.65mm. It projected beyond the EUT by at least 0.1 meter on all sides. The power cord shall be used the shortest power cord as specified by the manufacturer.

For Voltage Dips / Interruption Test:

The EUT is connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

The EUT shall be tested for 30% voltage dips of supplied voltage and duration time is 10ms, for 60% voltage dips of supplied voltage and duration time is 100ms with a sequence of three voltage dips with intervals of 10 seconds, and for 95% voltage interruption of supplied voltage and the duration time is 5000ms with a sequence of three voltage interruptions with intervals of 10 seconds.

Voltage phase shifting are shall occur at 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° of the voltage.

## 12.5 Test Specification

According to EN 61000-4-11/1994

## 12.6 Test Result

N / A



## **13 Modification List for EMC Complying Test**

The modification is solely made by the applicant.

## **14 Appendix**

Appendix A: Summary of Test Result

Appendix B: The test photograph of EUT

Appendix C: The Detail Photograph of EUT

## Appendix A: Summary of Test Result

The test result in the emission and immunity were performed according to the requirement of measurement standard and procedures. Best Laboratory is assumed full responsibility for the accuracy and completeness of these measurements. The Test data of the emissions and immunity are listed as the appendix data.

All these tests are were carried out with the EUT in normal operation, which was defined as:

**\*\*\*\*\* EMC Test Result: The EUT has been passed the all measurements. \*\*\*\*\***

The uncertainty is calculated in accordance with NAMAS NIS 81, the total uncertainty for this test is as follows:

⇒ Emission Test

- \* Uncertainty in the Conducted Emission Test:  $<\pm 2.0\text{dB}$
- \* Uncertainty in the Field Strength measurement:  $<\pm 4.0\text{dB}$

**Conducted Emission Test**

Date Measurement Performed: Apr. 22, 2002

EUT : 4-Port RS-422/ 485 High-Speed Module

Testing Mode : Transmitting/ Receiving

Temperature : 28°C

Humidity : 66%RH

**Line 1:**

| Frequency<br>(KHz) | Corrected Amplitude<br>(dBμV) |     |      | Limit<br>(dBμV) |       | Margin<br>dB |
|--------------------|-------------------------------|-----|------|-----------------|-------|--------------|
|                    | Peak                          | QP  | Avg. | QP              | Avg.  |              |
| 150.0000           | 39.38                         | *** | ***  | 79.00           | 66.00 | -26.62       |
| 202.7000           | 40.70                         | *** | ***  | 79.00           | 66.00 | -25.30       |
| 252.0000           | 38.56                         | *** | ***  | 79.00           | 66.00 | -27.44       |
| 315.7500           | 38.82                         | *** | ***  | 79.00           | 66.00 | -27.18       |
| 659.1500           | 33.79                         | *** | ***  | 73.00           | 60.00 | -26.21       |
| 4635.0000          | 36.77                         | *** | ***  | 73.00           | 60.00 | -23.23       |
| 6296.0000          | 35.26                         | *** | ***  | 73.00           | 60.00 | -24.74       |
| 10464.0000         | 44.40                         | *** | ***  | 73.00           | 60.00 | -15.60       |
| 11000.0000         | 43.86                         | *** | ***  | 73.00           | 60.00 | -16.14       |
| 25056.0000         | 23.01                         | *** | ***  | 73.00           | 60.00 | -36.99       |

**Line 2:**

| Frequency<br>(KHz) | Corrected Amplitude<br>(dBμV) |     |      | Limit<br>(dBμV) |       | Margin<br>dB |
|--------------------|-------------------------------|-----|------|-----------------|-------|--------------|
|                    | Peak                          | QP  | Avg. | QP              | Avg.  |              |
| 150.0000           | 39.43                         | *** | ***  | 79.00           | 66.00 | -26.57       |
| 314.0500           | 38.72                         | *** | ***  | 79.00           | 66.00 | -27.28       |
| 378.6500           | 37.77                         | *** | ***  | 79.00           | 66.00 | -28.23       |
| 563.9500           | 33.60                         | *** | ***  | 73.00           | 60.00 | -26.40       |
| 660.8500           | 32.77                         | *** | ***  | 73.00           | 60.00 | -27.23       |
| 4510.0000          | 37.45                         | *** | ***  | 73.00           | 60.00 | -22.55       |
| 5735.0000          | 35.35                         | *** | ***  | 73.00           | 60.00 | -24.65       |
| 10528.0000         | 44.46                         | *** | ***  | 73.00           | 60.00 | -15.54       |
| 10936.0000         | 45.34                         | *** | ***  | 73.00           | 60.00 | -14.66       |
| 25056.0000         | 22.85                         | *** | ***  | 73.00           | 60.00 | -37.15       |

\*\*\* Remark: The above corrected amplitudes are all under the average limit. \*\*\*

## Field Strength Test

Date Measurement Performed: Apr. 23, 2002

EUT : 4-Port RS-422/ 485 High-Speed Module

Testing Mode : Transmitting/ Receiving

Polarity : Vertical

Temperature : 23°C

Humidity : 52%RH

| Frequency<br>(MHz) | Reading<br>Amplitude<br>(dBμV/m) | Table<br>Degree<br>(°) | Antenna<br>Height<br>(Meter) | Correction<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|----------------------------------|------------------------|------------------------------|--------------------------------|------------------------------------|-------------------|----------------|
| 66.816             | 22.70                            | 71                     | 3.00                         | 6.52                           | 29.22                              | 40.00             | -10.78         |
| 83.022             | 16.82                            | 140                    | 1.00                         | 8.93                           | 25.75                              | 40.00             | -14.25         |
| 133.631            | 12.57                            | 158                    | 1.00                         | 12.23                          | 24.80                              | 40.00             | -15.20         |
| 167.041            | 9.84                             | 296                    | 1.00                         | 10.51                          | 20.34                              | 40.00             | -19.66         |
| 200.447            | 14.60                            | 361                    | 3.00                         | 10.15                          | 24.74                              | 40.00             | -15.26         |
| 272.035            | 8.61                             | 128                    | 1.00                         | 13.91                          | 22.52                              | 47.00             | -24.48         |
| ***                |                                  |                        |                              |                                |                                    |                   |                |
|                    |                                  |                        |                              |                                |                                    |                   |                |
|                    |                                  |                        |                              |                                |                                    |                   |                |
|                    |                                  |                        |                              |                                |                                    |                   |                |

Remark:

1. The “ Correction Factor “ contains antenna factor, cable loss.
2. The formula of “ Corrected Amplitude “ is as follow”  
 Reading Amplitude + Correction Factor = Corrected Amplitude.

## Field Strength Measurement

Date Measurement Performed: Apr. 23, 2002

EUT : 4-Port RS-422/ 485 High-Speed Module

Testing Mode : Transmitting/ Receiving

Polarity : Horizontal

Temperature : 27°C

Humidity : 74%RH

| Frequency<br>(MHz) | Reading<br>Amplitude<br>(dBμV/m) | Table<br>Degree<br>(°) | Antenna<br>Height<br>(Meter) | Correction<br>Factor<br>(dB/m) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|----------------------------------|------------------------|------------------------------|--------------------------------|------------------------------------|-------------------|----------------|
| 66.815             | 18.70                            | 288                    | 3.00                         | 6.52                           | 25.23                              | 40.00             | -14.77         |
| 83.519             | 18.81                            | 106                    | 4.00                         | 9.03                           | 27.83                              | 40.00             | -12.17         |
| 100.223            | 12.55                            | 286                    | 4.00                         | 11.73                          | 24.28                              | 40.00             | -15.72         |
| 133.632            | 6.64                             | 215                    | 1.00                         | 12.23                          | 18.87                              | 40.00             | -21.13         |
| 200.447            | 16.40                            | 315                    | 2.00                         | 10.15                          | 26.55                              | 40.00             | -13.45         |
| 300.669            | 9.79                             | 349                    | 3.00                         | 14.47                          | 24.26                              | 47.00             | -22.74         |
| 534.536            | 1.44                             | 301                    | 2.00                         | 19.30                          | 20.74                              | 47.00             | -26.26         |
| 768.364            | -1.41                            | 328                    | 4.00                         | 21.30                          | 19.88                              | 47.00             | -27.12         |
| ***                |                                  |                        |                              |                                |                                    |                   |                |
|                    |                                  |                        |                              |                                |                                    |                   |                |

Remark:

1. The “ Correction Factor “ contains antenna factor, cable loss.
2. The formula of “ Corrected Amplitude “ is as follow”  
 Reading Amplitude + Correction Factor = Corrected Amplitude.

## Power Harmonic / Fluctuation Test

### Power Harmonic:

Operating Environment:

Temperature : 26°C  
Humidity : 68%RH  
Atmosphere : 1010mBar

Test Condition:

EUT Position : Table Top

Result:

Summary of the test result: Pass

### Fluctuation Test:

Test Frequency : 50Hz  
Test Time : 10 min.

Test Voltage : 230VAC  
Tshort : 5.0 min

| EUT      | Data  | Limit | Result | Test Enable |
|----------|-------|-------|--------|-------------|
| Pst      | 0.001 | 1.00  | Pass   | True        |
| Plt      | 0.001 | 0.65  | Pass   | True        |
| dc %     | 0.00  | 3.00  | Pass   | True        |
| dmax %   | 0.00  | 4.00  | Pass   | True        |
| d(t) sec | 0.00  | 0.20  | Pass   | True        |

#### Power Source Data

|                |       |       |      |      |
|----------------|-------|-------|------|------|
| Source Pst max | 0.022 | 0.400 | Pass | True |
| % THD          | 0.02  | 3.00  | Pass | True |

## Electrostatic Discharge Test

| Item               | Amount of Discharge | Voltage | Required Criteria | Complied to Criteria | Results |
|--------------------|---------------------|---------|-------------------|----------------------|---------|
| Air Discharge      | 10                  | +2KV    | B                 | B                    | Pass    |
|                    | 10                  | -2KV    | B                 | B                    | Pass    |
|                    | 10                  | +4KV    | B                 | B                    | Pass    |
|                    | 10                  | -4KV    | B                 | B                    | Pass    |
|                    | 10                  | +8KV    | B                 | B                    | Pass    |
|                    | 10                  | -8KV    | B                 | B                    | Pass    |
| Contact Discharge  | 25                  | +2KV    | B                 | B                    | Pass    |
|                    | 25                  | -2KV    | B                 | B                    | Pass    |
|                    | 25                  | -4KV    | B                 | B                    | Pass    |
|                    | 25                  | -4KV    | B                 | B                    | Pass    |
| Indirect Discharge | 25                  | +2KV    | B                 | B                    | Pass    |
|                    | 25                  | -2KV    | B                 | B                    | Pass    |
|                    | 25                  | +4KV    | B                 | B                    | Pass    |
|                    | 25                  | -4KV    | B                 | B                    | Pass    |

Remark:

- ☐ Criteria A: Operation as intended during and after the measurement
- ☒ Criteria B: Operation as Intended after the test
- ☐ Criteria C: Malfunction during and after, need manual reset
- ☐ Criteria D: The sample is damaged



## Radiated Susceptibility

| Frequency<br>(MHz) | Position<br>(Angle) | Polarity<br>(H or V) | Field Strength<br>(V/m) | Required<br>Criteria | Complied<br>Criteria | Result |
|--------------------|---------------------|----------------------|-------------------------|----------------------|----------------------|--------|
| 80 ~ 1000          | 0                   | H                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 0                   | V                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 90                  | H                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 90                  | V                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 180                 | H                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 180                 | V                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 270                 | H                    | 10                      | A                    | A                    | Pass   |
| 80 ~ 1000          | 270                 | V                    | 10                      | A                    | A                    | Pass   |

### Remark:

- ☒ Criteria A: Operation as intended during and after the measurement
- ☐ Criteria B: Operation as Intended after the test
- ☐ Criteria C: Malfunction during and after, need manual reset
- ☐ Criteria D: The sample is damaged

**Electrical Fast Transient / Burst**

| Inject Line | Polarity | Voltage (KV) | Inject Time (Second) | Inject Method | Required Criteria | Complied Criteria | Result |
|-------------|----------|--------------|----------------------|---------------|-------------------|-------------------|--------|
| L           | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| N           | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| PE          | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| L+N+PE      | ±        | 2KV          | 60                   | Direct        | B                 | B                 | Pass   |
| Clamp       | ±        | 1KV          | 60                   | Couple        | B                 | B                 | Pass   |

Remark:

- ☐ Criteria A: Operation as intended during and after the measurement  
☒ Criteria B: Operation as Intended after the test  
☐ Criteria C: Malfunction during and after, need manual reset  
☐ Criteria D: The sample is damaged

## Surge Test

| Inject Line | Polarity | Angle | Voltage (KV) | Inject Time (Second) | Inject Method | Required Criteria | Complied Criteria | Result |
|-------------|----------|-------|--------------|----------------------|---------------|-------------------|-------------------|--------|
| L+N         | ±        | 0     | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 90    | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 180   | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 270   | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 0     | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 90    | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 180   | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+N         | ±        | 270   | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 0     | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 90    | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 180   | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 270   | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 0     | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 90    | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 180   | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 270   | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 0     | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 90    | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 180   | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| L+PE        | ±        | 270   | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 0     | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 90    | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 180   | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 270   | 0.5KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 0     | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 90    | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 180   | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 270   | 1.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 0     | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 90    | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 180   | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |
| N+PE        | ±        | 270   | 2.0KV        | 60                   | Direct        | B                 | B                 | Pass   |

### Remark:

- ☐ Criteria A: Operation as intended during and after the measurement
- ☒ Criteria B: Operation as Intended after the test
- ☐ Criteria C: Malfunction during and after, need manual reset
- ☐ Criteria D: The sample is damaged

Conducted Susceptibility

| Inject Line | Field Strength<br>V | Inject Method | Required Criteria | Complied Criteria | Result |
|-------------|---------------------|---------------|-------------------|-------------------|--------|
| AC Line     | 10V                 | CDN           | A                 | A                 | Pass   |
| Data Cable  | 10V                 | CDN           | A                 | A                 | Pass   |

Remark:

- ( X ) Criteria A: Operation as intended during and after the measurement
- (   ) Criteria B: Operation as Intended after the test
- (   ) Criteria C: Malfunction during and after, need manual reset
- (   ) Criteria D: The sample is damaged

## Power Frequency Magnetic Field Test

| Polarization  | Frequency<br>(Hz) | Magnetic<br>Strength<br>(A/M) | Required<br>Criteria | Complied<br>Criteria | Result |
|---------------|-------------------|-------------------------------|----------------------|----------------------|--------|
| X Orientation | 50                | 30                            | A                    | A                    | Pass   |
| Y Orientation | 50                | 30                            | A                    | A                    | Pass   |
| Z Orientation | 50                | 30                            | A                    | A                    | Pass   |

Remark:

- ☒ Criteria A: Operation as intended during and after the measurement
- ☐ Criteria B: Operation as Intended after the test
- ☐ Criteria C: Malfunction during and after, need manual reset
- ☐ Criteria D: The sample is damaged

## Voltage Dips and Interruption Test

| Voltage Dips and Interruption Reduction (%) | Angle (Degree) | Test Duration (ms) | Required Criteria | Complied Criteria | Result |
|---|----------------|--------------------|-------------------|-------------------|--------|
| DIP   |                |                    |                   |                   |        |
| 30  | 0              | 10                 | B                 | B                 | Pass   |
| 30  | 45             | 10                 | B                 | B                 | Pass   |
| 30  | 90             | 10                 | B                 | B                 | Pass   |
| 30  | 135            | 10                 | B                 | B                 | Pass   |
| 30  | 180            | 10                 | B                 | B                 | Pass   |
| 30  | 225            | 10                 | B                 | B                 | Pass   |
| 30  | 270            | 10                 | B                 | B                 | Pass   |
| 30  | 315            | 10                 | B                 | B                 | Pass   |
| 60  | 0              | 100                | C                 | C                 | Pass   |
| 60  | 45             | 100                | C                 | C                 | Pass   |
| 60  | 90             | 100                | C                 | C                 | Pass   |
| 60  | 135            | 100                | C                 | C                 | Pass   |
| 60  | 180            | 100                | C                 | C                 | Pass   |
| 60  | 225            | 100                | C                 | C                 | Pass   |
| 60  | 270            | 100                | C                 | C                 | Pass   |
| 60  | 315            | 100                | C                 | C                 | Pass   |
| Interruption                                |                |                    |                   |                   |        |
| >95   | 0              | 5000               | C                 | C                 | Pass   |
| >95   | 45             | 5000               | C                 | C                 | Pass   |
| >95   | 90             | 5000               | C                 | C                 | Pass   |
| >95   | 135            | 5000               | C                 | C                 | Pass   |
| >95   | 180            | 5000               | C                 | C                 | Pass   |
| >95   | 225            | 5000               | C                 | C                 | Pass   |
| >95   | 270            | 5000               | C                 | C                 | Pass   |
| >95   | 315            | 5000               | C                 | C                 | Pass   |

### Remark:

- ( ) Criteria A: Operation as intended during and after the measurement
- ( X ) Criteria B: Operation as Intended after the test (Test Mode: 30%)
- ( X ) Criteria C: Malfunction during and after, need manual reset(Test Mode: 60%, >95%)
- ( ) Criteria D: The sample is damaged

## **Appendix B: The Test Photograph of EUT**

The Photograph of Conducted Emission Test --- Mains Port

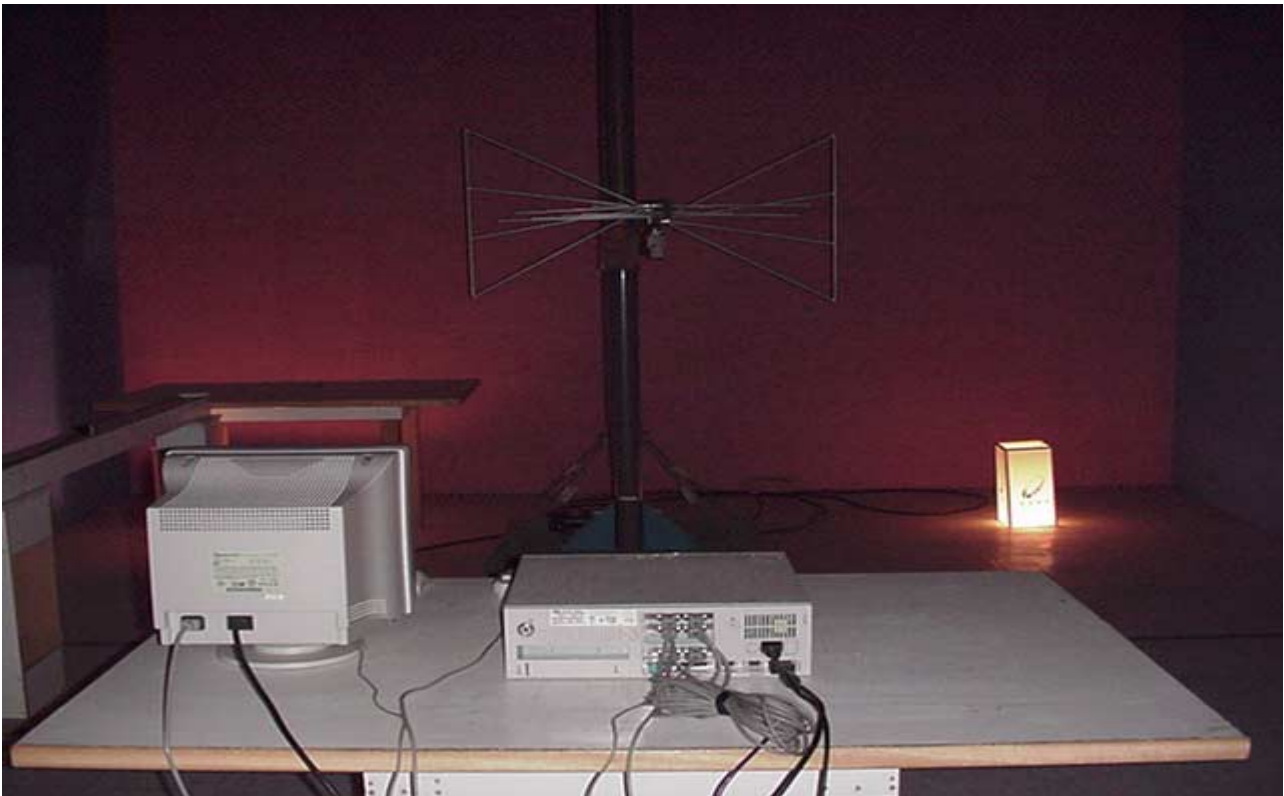




## The Photograph of Radiated Emission Test



## The Photograph of Radiation Susceptibility Test



### The Photograph of Electrical Fast Transient/Burst Test



### The Photograph of Electrostatic Discharge Test





## The Photograph of Surge Test



## The Photograph of Conducted Susceptibility Test



## The Photograph of Power Frequency Magnetic Field Test



## The Photograph of Voltage Dips and Interruption Test



## **Appendix C: The Detail Photograph of EUT**

