

Statement of Conformity

Best Laboratory Co., Ltd.

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EMC Certificate

Applicant : Advantech Co., Ltd.

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

Equipment : PC/104 12-bit DAS Module with Programmable Gain

Model : PCM-3718H/3718HG

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 61000-6-4:2001->EN55011: 1998 /A2: 2002, 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: Jan. 13, 2004

The date of the certification signed: Jan. 16, 2004

The number of EMC Certificate: CER-A01-CE-93007

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 : PC/104 12-bit DAS Module with Programmable Gain

Model : PCM-3718H/3718HG

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 : PC/104 12-bit DAS Module with Programmable Gain

Model : PCM-3718H/3718HG

Device's Class : Class A Device

Measurement Standard : EN 61000-6-4:2001, EN 61000-6-2/1999

Measurement Procedure : EN 55011:1998/A2:2002, 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 : 230VAC, 50Hz

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

Sample Received : Jan. 09, 2004

Test Date : Jan. 13, 2004

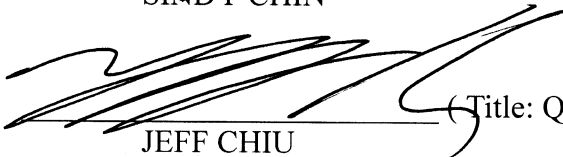
Report Number : RE-A01-CE-93007

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 : Sindy Chin
SINDY CHIN

Approved :  (Title: Quality Department Manager)
JEFF CHIU

Date Issued : Jan. 16, 2004

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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 : PC/104 12-bit DAS Module with Programmable Gain

Model : PCM-3718H/3718HG

Device's Class : Class A Device

Operating Voltage : 230VAC, 50Hz

Output Ports :

LAN Port : Via one RJ-45 cable, 30 meters long, non-shielded, no ferrite bead, to the far-end HUB.

Serial Port : Via a 40 cm long, non-shielded, no ferrite bead, RS-232 cable to the COM1 port of the industrial computer.

PS/2 Port : Connected with the PS/2 port of the industrial computer via one PS/2 cable which length is 60 cm long, non-shielded, no ferrite bead.

VGA Port : Connected with one monitor which data cable is 1.8 meters long, shielded, with ferrite bead.

Power Port : Via a 180 cm long, non-shielded, no ferrite bead, power cable to the AC power source.

Analog input connector: Connected with one dummy load which data cable is 1.2 meters long, no shielded, no ferrite bead.

Digital input/ output connector: Connected with one dummy load which data cable is 1.2 meters long, no shielded, no ferrite bead.

Remark:

- 16 single-ended or 8 differential analog input, jumper selectable
- 12-bit A/D converter, up to 100kHz sampling rate with DMA transfer
- Software Programmable gain value for each analog input channel
- Software selectable input range for each analog input channel
- Two 8-bit digital input/output channels, TTL compatible
- Flexible triggering options: software trigger, programmable pacer trigger and external pulse trigger
- Data transfer by program control, interrupt handler routine or DMA
- New-technology 160-pin 1.0µm CMOS ASIC chip

1.2 Test System Detail

Monitor : Viewsonic

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 : HP (Pavilion)

ModelNo. : 5183

Serial No. : BF33209698

FCC ID : DoC Approval

BSMI : R31213

Power Type : By PC

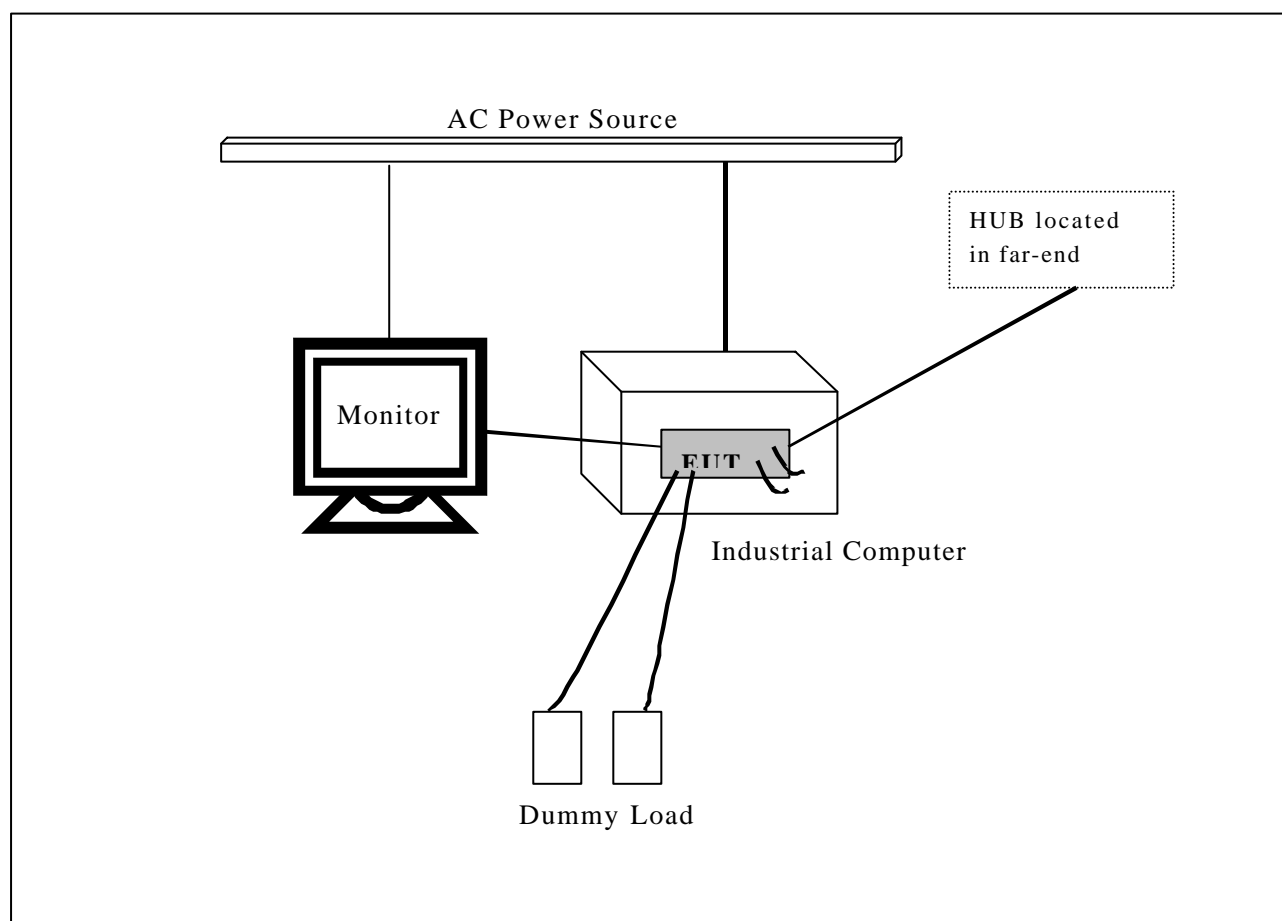
Data Cable : 180cm long, shielded, no ferrite bead

1.3 EUT Configuration

- (1) The serial port of EUT is connected with the COM1 port of the industrial computer.
- (2) The LAN port of EUT is connected with the HUB located in far-end.
- (3) The VGA port of EUT is connected with one monitor.
- (4) The PS/2 port of EUT is connected with the PS/2 port of the industrial computer via one PS/2 cable.
- (5) The power port of EUT is connected with the AC power source via one power cable.
- (6) The Analog input connector and Digital input/ output connector of EUT are each connected with one dummy load.

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

Drawing of Configuration



1.4 EUT Exercise Software

The testing software is provided by the applicant.

It is designed to exercise the EUT in a manner similar to a typical use. The testing software will link two LAN cards to transmit data, via two RJ-45 jacks. The test software will force industrial computer to send the data to the digital input/ output port, then make it feed back from its dummy load. The analog input port will be continuous received the data from its dummy load. The testing result will be continuous to be shown on the monitor. The FDD will continuously working sequence in the “Transmitting/Receiving” mode. 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.

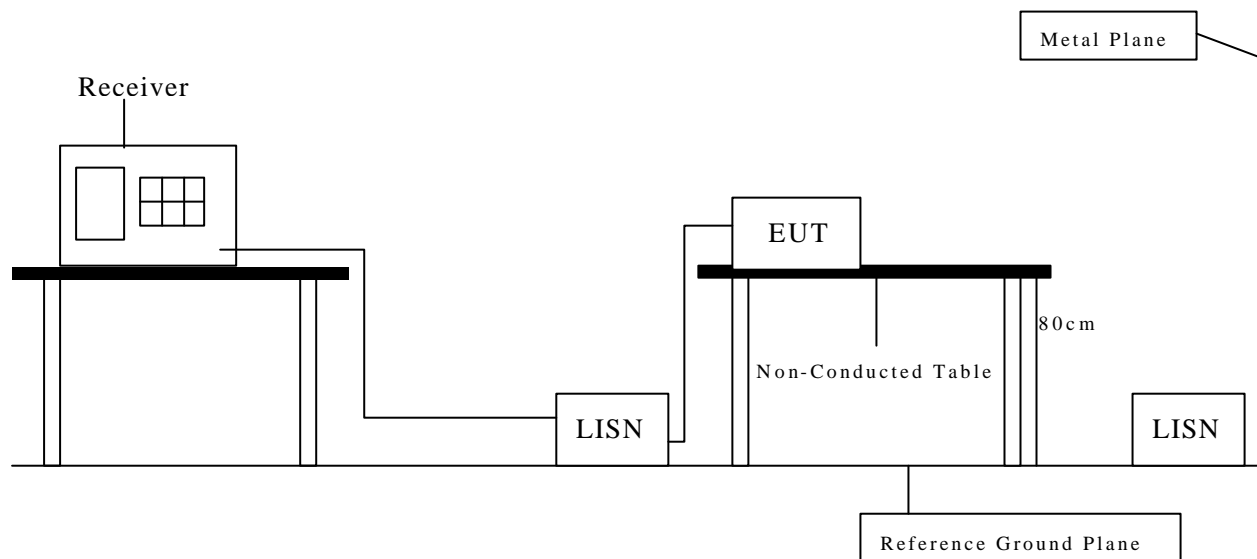
2 Conducted Emission Measurement at Mains Port

2.1 Test Equipment

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	LISN (EUT)	Rolf Heine	NNB-2/16Z	99084	May 14, 2003
2.	LISN (AXE)	Rolf Heine	NNB-2/16Z	99086	May 14, 2003
3.	EMI Receiver	Rohde & Schwarz	ESI 7	830154/001	June 27, 2003
4.	50 Ω Terminator	Amphenol	46650-51	N/A	Dec. 10, 2003
5.	RF Cable	Belden	M17/158	MIL-C-17	Jan. 20, 2003

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

2.2 Test Set-Up



2.3 Limit

Frequency (MHz)	Limit (dB μ V)			
	Class A		Class B	
	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 μ 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 μ 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 55011:1998/A2:2002 regulation: Industrial, scientific and medical (ISM) radio-frequency equipment-Electromagnetic disturbance characteristics – Limits and methods of measurement.

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

2.5 Test Specification

According to the EN 55011:1998/A2:2002

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 passed the measurement.

2.7 Deviation from the Test Method

No Deviation.

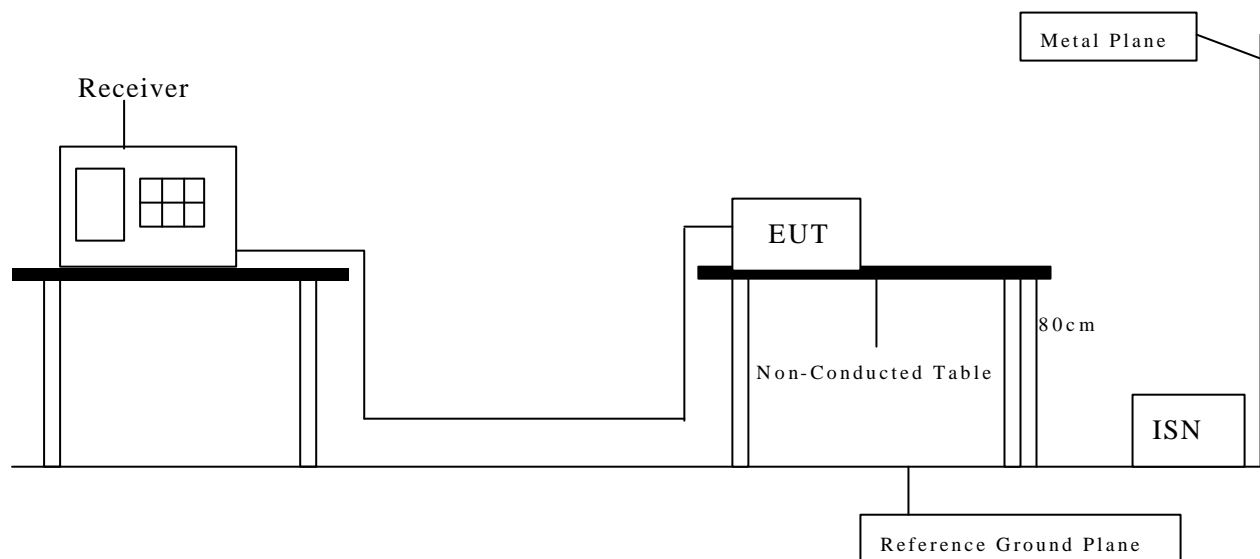
3 Conducted Emission Measurement at Telecommunication Port

3.1 Test Equipment

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	ISN (EUT)	Shaffner	ISN T411	200102-010	Feb. 24, 2003
2.	ISN Adapter	Shaffner	ADS T444	200102-032	Feb. 24, 2003
3.	EMI Receiver	Rohde & Schwarz	ESI 7	830154/001	Nov 22, 2003
4.	50Ω Terminator	Amphenol	46650-51	N/A	Dec. 10, 2003
5.	RF Cable	Belden	M17/158	MIL-C-17	Jan. 20, 2003

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 (MHz)	Limit (dBμV)		Limit (dBμA)	
	Voltage Limit		Currents Limits	
	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 (MHz)	Limit (dB μ V)		Limit (dB μ A)	
	Voltage Limit		Currents Limits	
	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 55011:1998/A2:2002 regulation: Industrial, scientific and medical (ISM) radio-frequency equipment-Electromagnetic disturbance characteristics – Limits and methods of measurement.

3.5 Test Specification

According to the EN 55011:1998/A2:2002

3.6 Test Result

N / A

3.7 Deviation from the Test Method

N / A

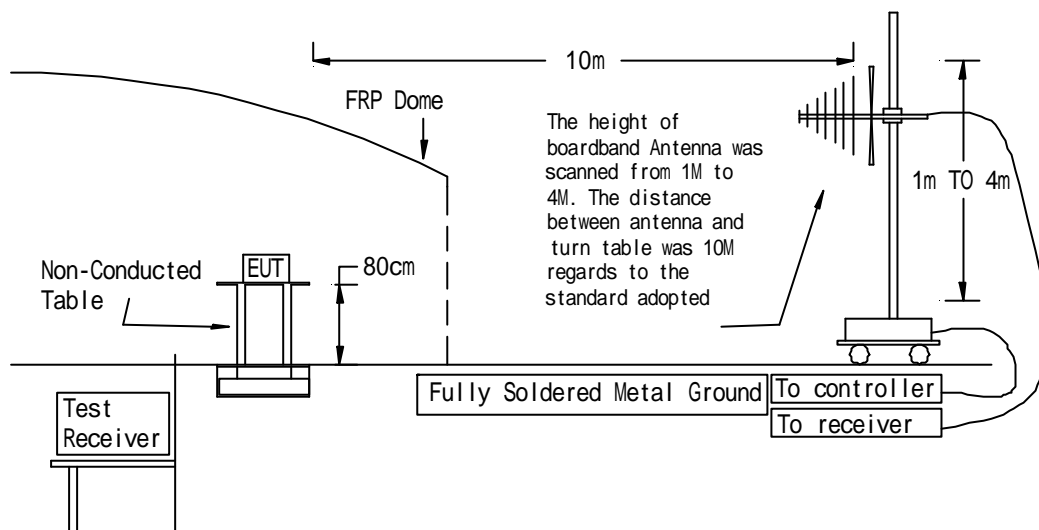
4. Radiated Emission Measurement

4.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
11.	Antenna	Mess-Elektronik	VULB 9160	9160-3078	Jan. 19, 2003
2.	EMI Receiver	Rohde & Schwarz	ESI 7	830154/001	June 27, 2003
3.	RF Cable	Adventest	AD-N-CA-01	2000-0220	Jan. 20, 2003
4.	OATS	Bestlab	N/A	OATS#1	May 28, 2003

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

4.2 Test Setup



4.3 Limit

Frequency (MHz)	Class A		Class B	
	Distance (Meter)	Limit (dB μ V/m)	Distance (Meter)	Limit (dB μ 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 55011:1998/A2:2002 regulation: Industrial, scientific and medical (ISM) radio-frequency equipment-Electromagnetic disturbance characteristics – Limits and methods of measurement.

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

4.5 Test Specification

According to EN 55011:1998/A2:2002

4.6 Test Result

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

4.7 Deviation from the Test Method

No Deviation.

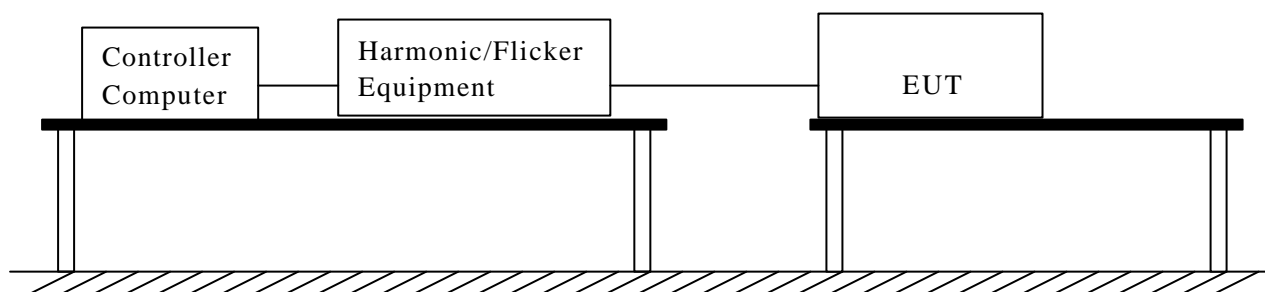
5. Power Harmonic and Voltage Fluctuation Measurement

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, 2003

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

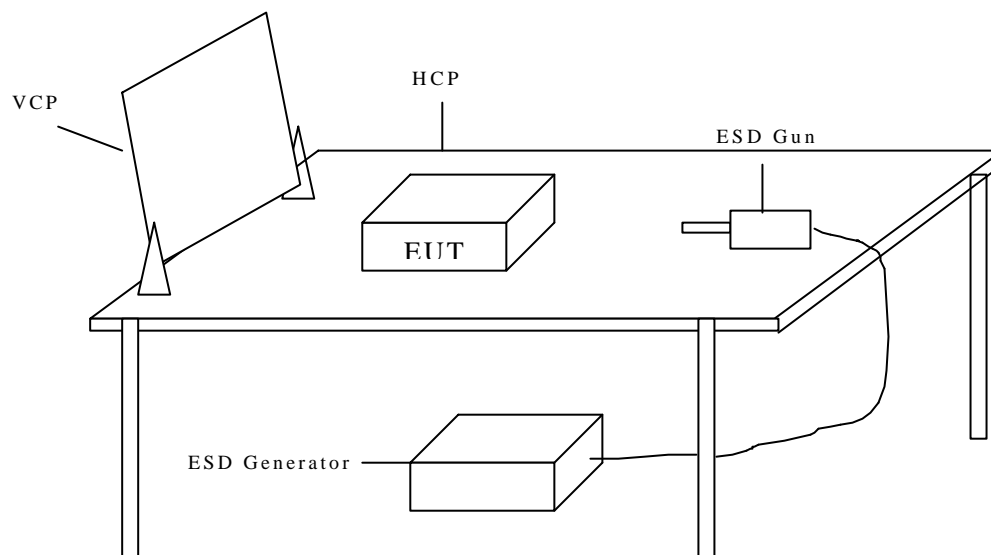
6 .Electrostatic Discharge (ESD)

6.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	ESD Emulator	Noiseken	ESS-100L	0199C02380	Sep. 05, 2003

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) 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.

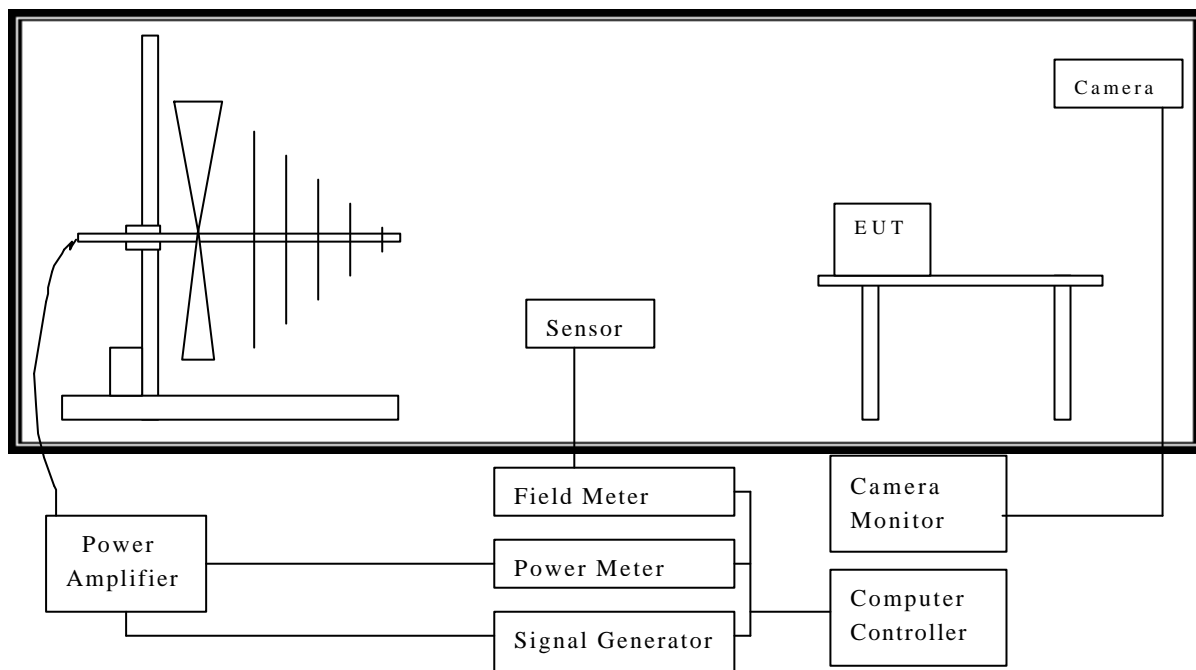
7. Radiated Susceptibility (RS)

7.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	Signal Generator	Rohde & Schwarz	SMY 02	845069/018	May 02, 2003
2.	Amplifier	Amplifier Research	100W1000M1A	20638	May 01, 2003
3.	Field Monitor	Amplifier Research	FM 2000	20391	Mar 03, 2003

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 Δf	1%
6. The rate of swept of frequency	1.5×10^{-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.

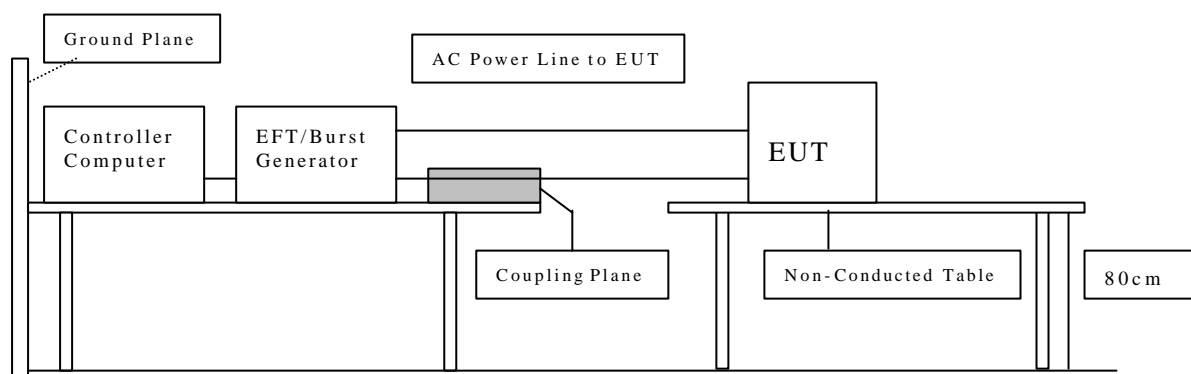
8 Electrical Fast Transient/Burst (EFT/B)

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, 2003
2.	Absorbing Clamp	EMC Partner	Transient-1000	CNEFT1000-176	Aug. 15, 2003

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	KV (Peak)	1	
	Mode	Tr/Ts (ns)	5/50	
		Rep. Frequency (KHz)	5	
DC Input and DC Output Power Ports				B
	Fast Transients Common	KV (Peak)	2	
	Mode	Tr/Ts (ns)	5/50	
		Rep. Frequency (KHz)	5	
Input and Output AC Power Ports				B
	Fast Transients Common	KV (Peak)	2	
	Mode	Tr/Ts (ns)	5/50	
		Rep. Frequency (KHz)	5	
Functional Earth Ports				B
	Fast Transients Common	KV (Peak)	1	
	Mode	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.

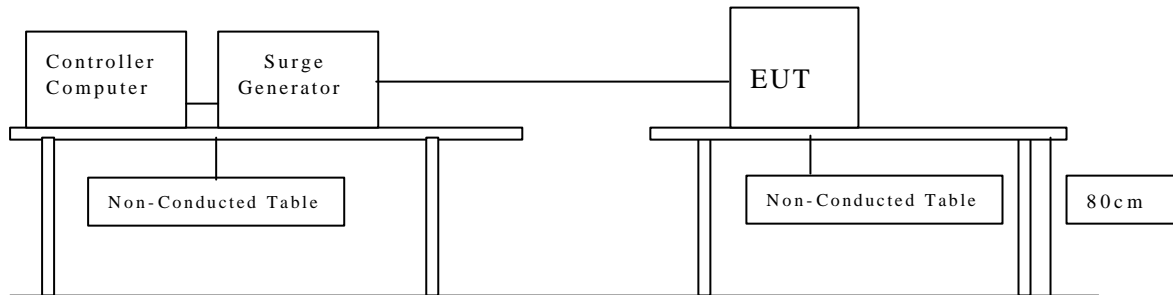
9. Surge

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, 2003

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 (μ s)	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 (μ s)	1.2/50(8/20)	B
	Line to Ground	KV	± 2	
	Line to Line	KV	± 1	

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.

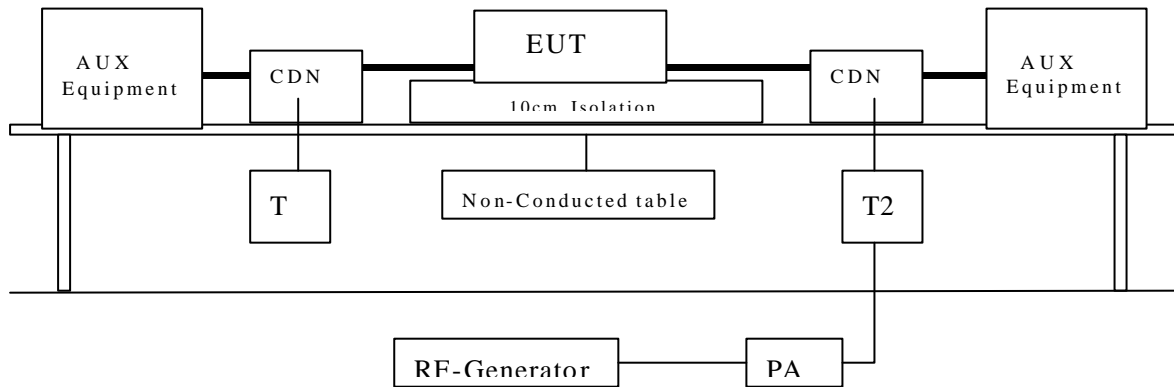
10. Conducted Susceptibility

10.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	Signal Generator	Rohde & Schwarz	SMY 02	845069/018	May 02, 2003
2.	Power Amplifier	Amplifier Research	100W1000M1A	20638	May 01, 2003
4.	Directional Coupler	Amplifier Research	DC2600	20508	Aug. 23, 2003
5.	CDN	FCC	FCC-801-M3-25A	9993	Aug. 23, 2003

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
	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
	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-M3 for three wires.

For Signal 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 Δf	1%
6. The rate of Swept of Frequency	1.5×10^{-3} decades/s

10.5 Test Specification

According to EN 61000-4-6/1996

10.6 Test Result

The data cable used in this measurement is “Shielding Twist Pair” cable winded serially with two ferrite cores (Brand: EROCORE, Model No: FH1300B) for one and half turn.

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.

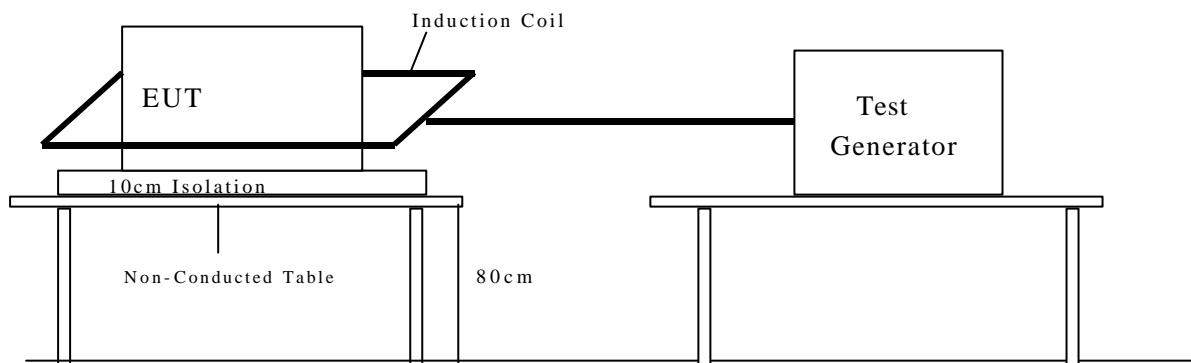
11 Power Frequency Magnetic Field

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, 2003
2.	Magnetic Coil	EMC Partner	MF-1000	MF1000-1-51	Aug. 15, 2003

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.

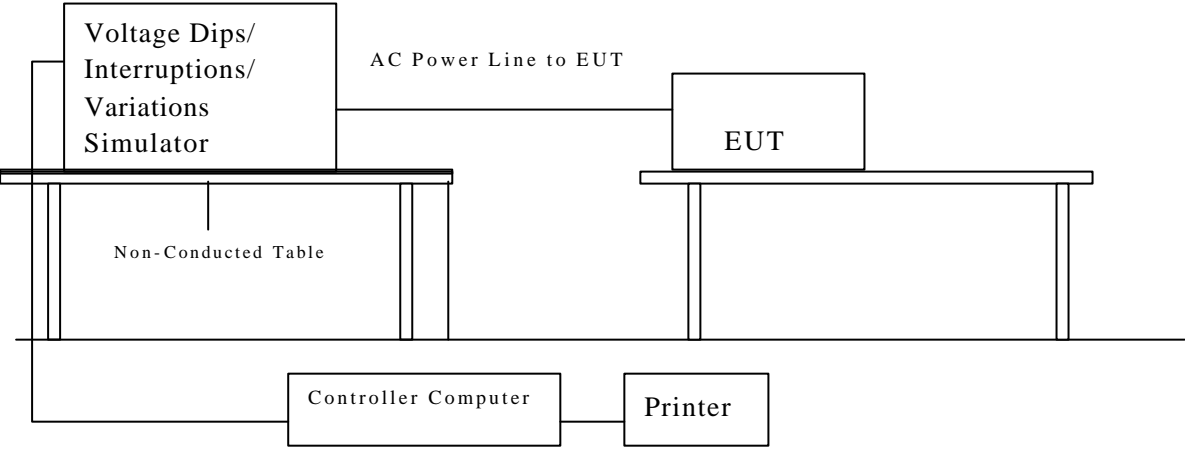
12. Voltage Dips and Interruption Measurement

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, 2003

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 results in the radiated emissions test and the conducted emissions test are performed according to the requirement of measurement standards and procedures. Best Laboratory Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. The test data of the radiated emissions test and the conducted emissions test are listed as the appendix data. All these tests are carried out with the EUT in normal operation, which was defined as:

******* EMC Test Result: The EUT has been passed all tests. *******

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

⇒ Emission Test

- * Uncertainty in the Conducted Emission Measurement: $<\pm 2.0\text{dB}$
- * Uncertainty in the Radiated Emission Measurement: $<\pm 4.0\text{dB}$

Conducted Emission Test

Test Date : Jan. 09, 2004
 EUT : PC/104 12-bit DAS Module with Programmable Gain
 Testing Mode : Transmitting/Receiving
 Temperature : 22°C
 Humidity : 59% RH

Line:

Frequency (KHz)	Emission Level (dBμV)			Limit (dBμV)		Margin (dB)	
	Peak	QP	Avg.	QP	Avg.	QP	Avg.
206.1000	49.80	***	***	79.00	66.00	***	-16.20
309.8000	40.94	***	***	79.00	66.00	***	-25.06
335.3000	38.52	***	***	79.00	66.00	***	-27.48
447.5000	34.09	***	***	79.00	66.00	***	-31.91
720.3500	35.84	***	***	73.00	60.00	***	-24.16
1130.0000	32.94	***	***	73.00	60.00	***	-27.06
5860.0000	34.30	***	***	73.00	60.00	***	-25.70
10176.0000	35.92	***	***	73.00	60.00	***	-24.08
15792.0000	42.05	***	***	73.00	60.00	***	-17.95
17944.0000	42.69	***	***	73.00	60.00	***	-17.31

Nature:

Frequency (KHz)	Emission Level (dBμV)			Limit (dBμV)		Margin (dB)	
	Peak	QP	Avg.	QP	Avg.	QP	Avg.
206.1000	48.53	***	***	79.00	66.00	***	-17.47
310.6500	40.15	***	***	79.00	66.00	***	-25.85
445.8000	34.20	***	***	79.00	66.00	***	-31.80
618.3500	33.34	***	***	73.00	60.00	***	-26.66
720.3500	35.84	***	***	73.00	60.00	***	-24.16
2155.0000	35.11	***	***	73.00	60.00	***	-24.89
4010.0000	33.70	***	***	73.00	60.00	***	-26.30
5940.0000	33.87	***	***	73.00	60.00	***	-26.13
10056.0000	37.47	***	***	73.00	60.00	***	-22.53
17656.0000	40.13	***	***	73.00	60.00	***	-19.87

Remark:

1. The above Emission Level are all under the Average Limit.
2. The “ Correction Factor ” contains: Insertion Loss of LISN, cable loss.
3. The formula of “ Emission Level ” is as follow:
 Reading Amplitude (dBμV) + Correction Factor (dB) = Emission Level (dBμV).
4. The formula of “ Margin ” is as follow:
 Emission Level (dBμV) – Limit (dBμV) = Margin (dB).

Radiated Emission Test

Test Date : Jan. 09, 2004
 EUT : PC/104 12-bit DAS Module with Programmable Gain
 Testing Mode : Transmitting/Receiving
 Polarity : Vertical
 Temperature : 26°C
 Humidity : 69% RH

Frequency (MHz)	Reading Amplitude (dBμ V)	Table Degree (°)	Antenna Height (Meter)	Correction Factor (dB/m)	Emission Level (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)
62.300	30.67	290	14.00	5.97	36.64	40.00	-3.36
128.874	9.26	4	1.00	12.40	21.67	40.00	-18.33
135.034	16.88	128	1.00	12.16	29.04	40.00	-10.96

Remark:

1. The “ Correction Factor ” contains antenna factor, cable loss.
2. The formula of “Emission Level “ is as follow:

$$\text{Reading Amplitude (dB}\mu\text{ v)} + \text{Correction Factor (dB/m)} = \text{Emission Level (dB}\mu\text{ V/m)}.$$
3. The formula of “ Margin ” is as follow:

$$\text{Emission Level (dB}\mu\text{ V/m)} - \text{Limit (dB}\mu\text{ V/m)} = \text{Margin (dB)}.$$

Radiated Emission Test

Test Date : Jan. 09, 2004
 EUT : PC/104 12-bit DAS Module with Programmable Gain
 Testing Mode : Transmitting/Receiving
 Polarity : Horizontal
 Temperature : 27°C
 Humidity : 62% RH

Frequency (MHz)	Reading Amplitude (dBμ V)	Table Degree (°)	Antenna Height (Meter)	Correction Factor (dB/m)	Emission Level (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)
64.448	27.77	229	4.00	6.23	34.00	40.00	-6.00
66.052	24.53	128	4.00	6.43	30.96	40.00	-9.04
136.027	23.13	176	4.00	12.11	35.24	40.00	-4.76

Remark:

1. The “ Correction Factor ” contains antenna factor, cable loss.
2. The formula of “Emission Level “ is as follow:

$$\text{Reading Amplitude (dB}\mu\text{ v)} + \text{Correction Factor (dB/m)} = \text{Emission Level (dB}\mu\text{ V/m)}.$$
3. The formula of “ Margin ” is as follow:

$$\text{Emission Level (dB}\mu\text{ V/m)} - \text{Limit (dB}\mu\text{ V/m)} = \text{Margin (dB)}.$$

Power Harmonic / Fluctuation Test

The testing result is as attached:

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protocol

Date : 2004/1/13 上午 11:06 V3.16

→6-1/51

File : C:\Program Files\EMC-Partner\Harcos\Data\PCM-3718-H.hsu

Operator : Robert Wang
 Unit : Industrial Computer
 Serialnumber : RE-A01-CE-93007
 Remarks : PCM-3718HG-A

Vrms = 230.1V Freq = 49.987 Range: 2 A
 Irms = 0.299A Ipk = 1.113A cf = 3.725
 P = 34.56W Pap = 68.76VA pf = 0.503
 THDi = 86.4 % THDu = 0.10 % Class A

Test - Time : 5min (100 %)

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Iavg%L [%]	Irms [A]	Imax [A]	Imax%L [%]	Limit [A]	Status
1	50	0.1676		0.1534	0.6847			
2	100	0.0000	0.0000	0.0027	0.0028	0.2600	1.0800	
3	150	0.1425	6.1937	0.1418	0.1427	6.2044	2.3000	
4	200	0.0000	0.0000	0.0024	0.0026	0.5962	0.4300	
5	250	0.1309	11.479	0.1304	0.1310	11.490	1.1400	
6	300	0.0000	0.0000	0.0021	0.0022	0.7324	0.3000	
7	350	0.1143	14.839	0.1140	0.1145	14.870	0.7700	
8	400	0.0000	0.0000	0.0017	0.0017	0.7430	0.2300	
9	450	0.0946	23.651	0.0946	0.0948	23.712	0.4000	
10	500	0.0000	0.0000	0.0012	0.0013	0.7298	0.1840	
11	550	0.0734	22.232	0.0735	0.0736	22.306	0.3300	
12	600	0.0000	0.0000	0.0011	0.0011	0.7165	0.1533	
13	650	0.0525	24.995	0.0529	0.0529	25.170	0.2100	
14	700	0.0000	0.0000	0.0011	0.0011	0.8359	0.1314	
15	750	0.0334	22.298	0.0338	0.0338	22.542	0.1500	
16	800	0.0000	0.0000	0.0010	0.0011	0.9533	0.1150	
17	850	0.0176	13.281	0.0179	0.0179	13.558	0.1324	
18	900	0.0000	0.0000	0.0010	0.0011	1.0748	0.1022	
19	950	0.0056	4.7418	0.0060	0.0060	5.0510	0.1184	
20	1000	0.0000	0.0000	0.0009	0.0010	1.0615	0.0920	
21	1050	0.0000	0.0000	0.0032	0.0035	3.3040	0.1071	
22	1100	0.0000	0.0000	0.0006	0.0007	0.8757	0.0836	
23	1150	0.0076	7.7366	0.0073	0.0076	7.7366	0.0978	
24	1200	0.0000	0.0000	0.0004	0.0005	0.6369	0.0767	
25	1250	0.0088	9.7656	0.0087	0.0089	9.9013	0.0900	
26	1300	0.0000	0.0000	0.0001	0.0002	0.3450	0.0708	
27	1350	0.0078	9.3750	0.0078	0.0079	9.5215	0.0833	
28	1400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0657	
29	1450	0.0056	7.2374	0.0056	0.0057	7.3948	0.0776	
30	1500	0.0000	0.0000	0.0001	0.0001	0.1990	0.0613	
31	1550	0.0000	0.0000	0.0031	0.0032	4.3728	0.0726	
32	1600	0.0000	0.0000	0.0001	0.0001	0.2123	0.0575	
33	1650	0.0000	0.0000	0.0015	0.0015	2.1484	0.0682	
34	1700	0.0000	0.0000	0.0001	0.0002	0.4511	0.0541	
35	1750	0.0000	0.0000	0.0022	0.0023	3.6078	0.0643	
36	1800	0.0000	0.0000	0.0000	0.0001	0.2388	0.0511	
37	1850	0.0000	0.0000	0.0031	0.0032	5.2192	0.0608	
38	1900	0.0000	0.0000	0.0000	0.0001	0.2521	0.0484	
39	1950	0.0000	0.0000	0.0031	0.0031	5.2897	0.0577	
40	2000	0.0000	0.0000	0.0000	0.0001	0.2654	0.0460	

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protocol

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Date : 2004/1/13 上午 11:19 V3.16

File : C:\Program Files\EMC-Partner\Harcos\Data\PCM-3718-F.hsu

Operator Robert Wang
Unit Industrial Computer
Serialnumber RE-A01-CE-93007
Remarks PCM-3718HG-A

Urms = 230.3V Freq = 50.000 Range: 2 A
Irms = 0.300A lpk = 1.112A cf = 3.710
P = 34.56W Pap = 69.05VA pf = 0.500

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.15ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

Plt = 0.072

	Pst	P3s	Fli
1	0.072	0.010	0.000

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

(X) 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 (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/m)	Required Criteria	Complied 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:

- (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

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 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	Magnetic Strength	Required Criteria	Complied Criteria	Result
	(Hz)	(A/M)			
X Orientation	50	30	A	A	Pass
Y Orientation	50	30	A	A	Pass
Z Orientation	50	30	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

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:

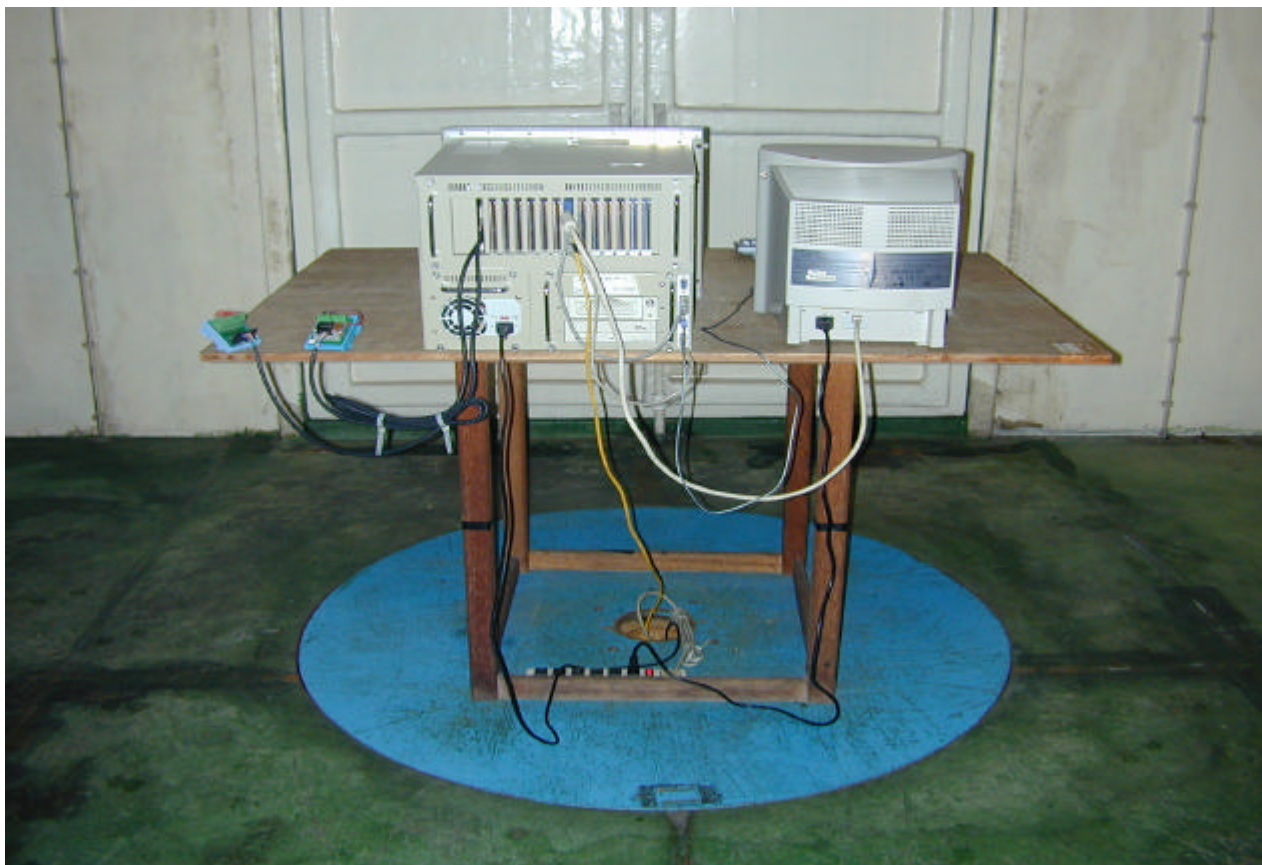
- () Criteria A: Operation as intended during and after the measurement
- (X) Criteria B: Operation as Intended after the test (Test Mode: 30%)
- (X) Criteria C: Malfunction during and after, need manual reset(Test Mode: 60%, >95%)
- () Criteria D: The sample is damaged

Appendix B: The Test Photograph of EUT

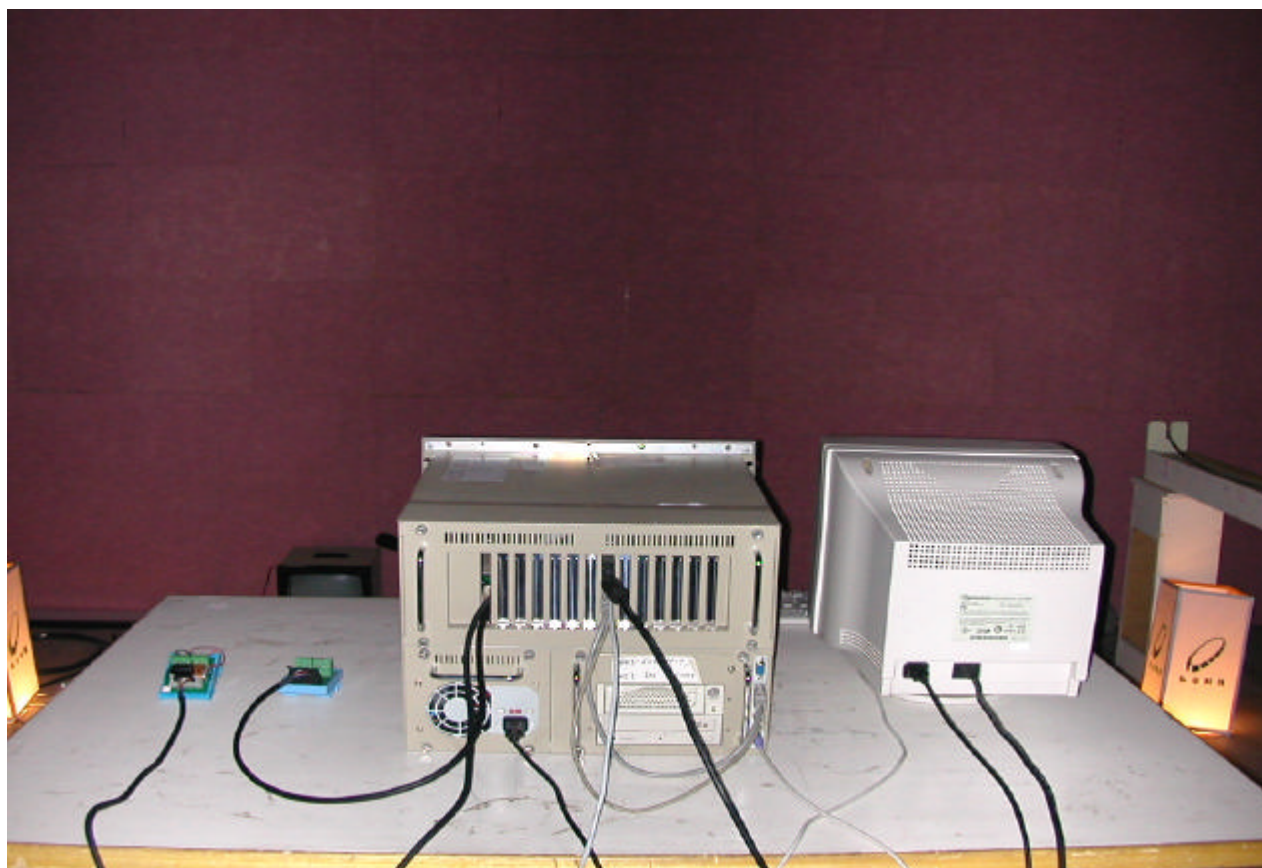
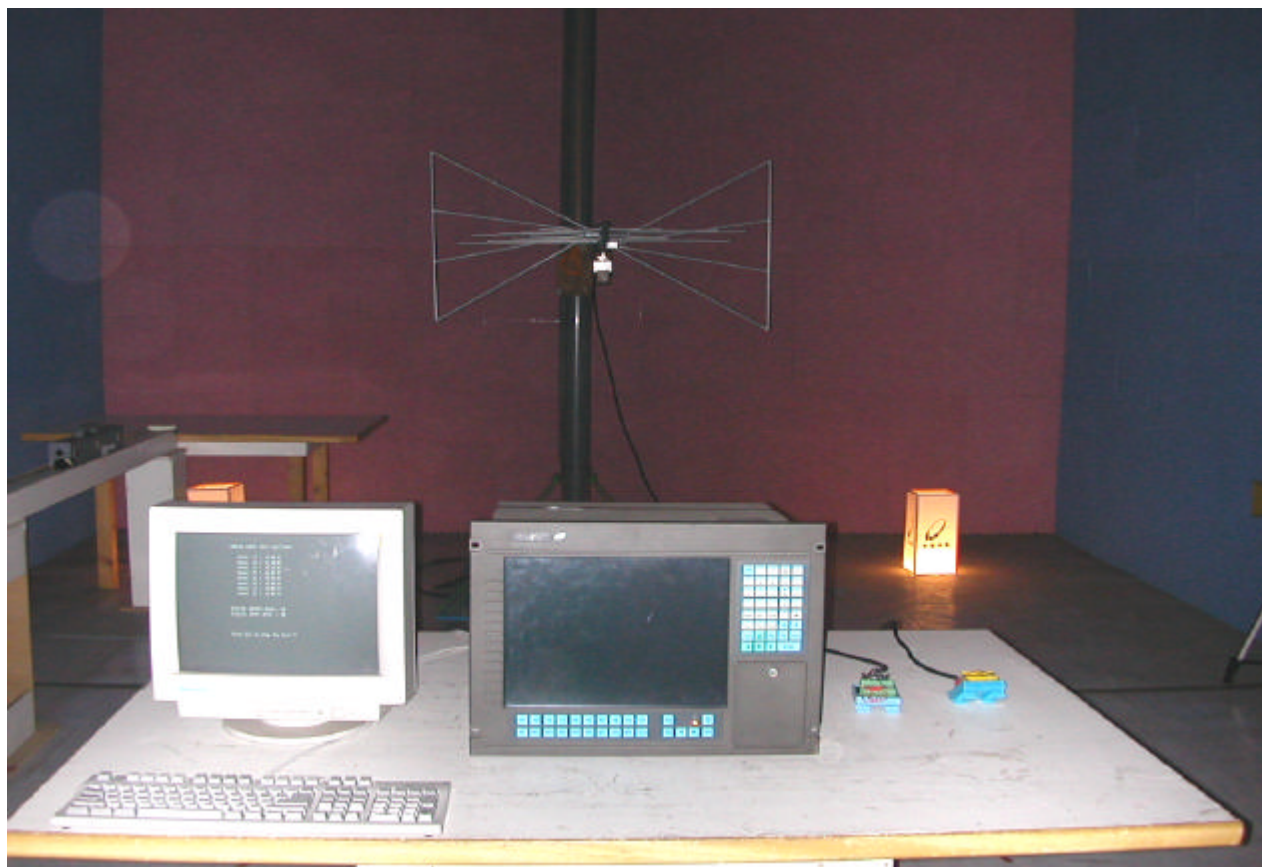
The Photograph of Conducted Emission Test



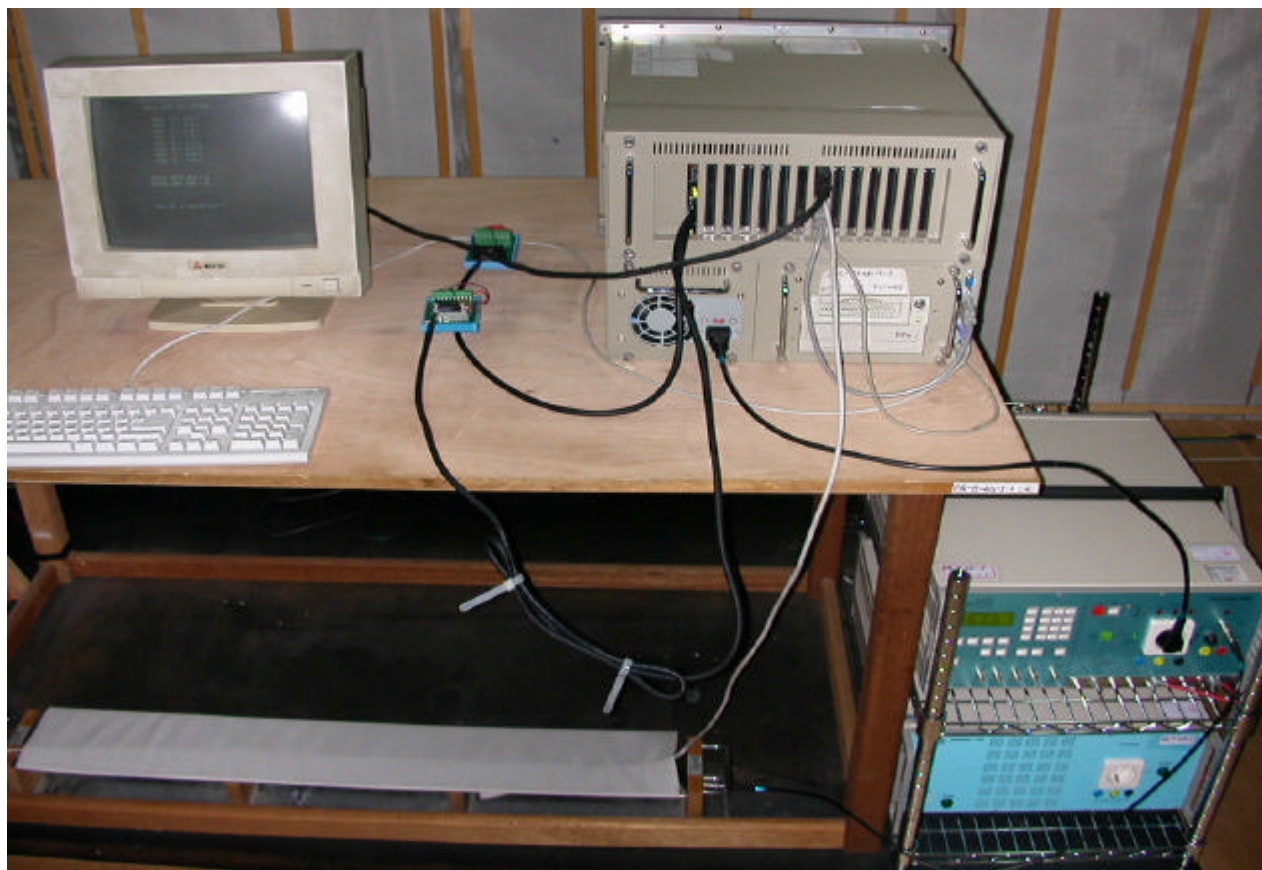
The Photograph of Radiated Emission Test



The Photograph of Radiation Susceptibility Test



The Photograph of Electrical Fast Transient/Burst Test



The Photograph of Electrostatic Discharge Test



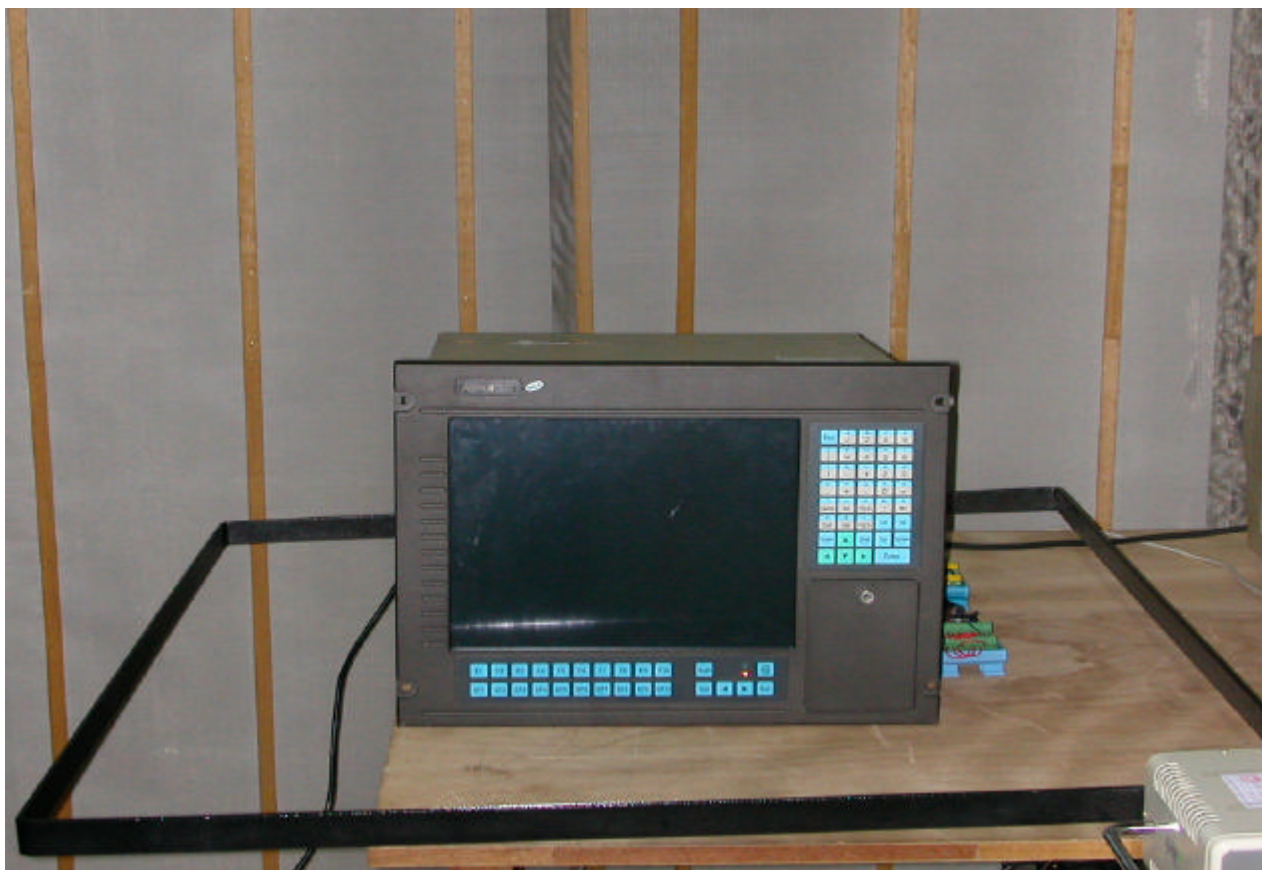
The Photograph of Surge Test



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

