

Statement of Conformity

Best Laboratory Co., Ltd.

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

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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: NS Geode SBC

Model : PCM-5823

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 55022:1998 -> EN 50081-1:1992, EN 55011:1999,
EN 61000-3-2:1998, EN 61000-3-3:1995

EMS: EN 55024:1998 -> 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, EN 61000-6-2:1999

The date of the measurement: Aug. 28, 2000

The date of the certification signed: Aug. 29, 2000

The number of EMC Certificate: CER-A01-CE-062

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 : NS Geode SBC
Model : PCM-5823

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 : NS Geode SBC

Model : PCM-5823

Device's Class : Class A Device

Measurement Standard : EN 55022/1998, EN 55024/1998

Measurement Procedure : EN 50081-1/1992, EN 55022/1998, EN 55011/1999,
EN 61000-3-2/1998, 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 61000-4-8/1995, EN 61000-4-11/1995,
EN 55024/1998, EN 61000-6-2/1999

Operating Voltage : 230VAC, 50Hz

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

Sample Received : Aug. 16, 2000

Test Date : Aug. 28, 2000

Report Number : RE-A01-CE-062

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.

Prepared : Ken Wang
KEN WANG

Approved : Jeff Chiu (Title: Quality Department Manager)
JEFF CHIU

Date Issued : Aug. 29, 2000

Contain

1	General Information	
1.1	EUT Description.....	4
1.2	Test System Detail.....	5
1.3	Tested Configuration.....	6
1.4	EUT Exercise Software.....	7
1.5	Test Performed.....	7
2	Conducted Emission Measurement	
2.1	Test Equipment List.....	8
2.2	Test Set-Up.....	8
2.3	Limit	8
2.4	Test Procedure.....	9
2.5	Test Specification.....	9
2.6	Test Result.....	9
3	Radiated Emission Measurement	
3.1	Test Equipment List.....	10
3.2	Test Set-Up.....	10
3.3	Limit.....	11
3.4	Test Procedure.....	11
3.5	Test Specification.....	11
3.6	Test Result.....	11
4	Power Harmonic and Voltage Fluctuation	
4.1	Power Harmonic and voltage Fluctuation test Equipment List.....	12
4.2	Test Set-Up.....	12
4.3	Limit.....	12
4.4	Test Procedure.....	13
4.5	Test Specification.....	13
4.6	Test Result.....	13
5	Electrostatic Discharge (ESD)	
5.1	Test Equipment List.....	14
5.2	Test Set-Up.....	14
5.3	Test Level.....	14
5.4	Test Procedure.....	15
5.5	Test Specification.....	15
5.6	Test Result.....	15
6	Radiated Susceptibility (RS)	
6.1	Test Equipment List.....	16
6.2	Test Set-Up.....	16
6.3	Test Level.....	16
6.4	Test Procedure.....	17
6.5	Test Specification.....	17
6.6	Test Result.....	17
7	Electrical Fast Transient/Burst	
7.1	Test Equipment List.....	18
7.2	Test Set-Up.....	18
7.3	Test Level.....	18
7.4	Test Procedure.....	19
7.5	Test Specification.....	19
7.6	Test Result.....	19

8 Surge

8.1 Test Equipment List.....	20
8.2 Test Set-Up.....	20
8.3 Test Level.....	20
8.4 Test Procedure.....	21
8.5 Test Specification.....	21
8.6 Test Result.....	21

9 Conducted Susceptibility

9.1 Test Equipment List.....	22
9.2 Test Set-Up.....	22
9.3 Test Level.....	23
9.4 Test Procedure.....	23
9.5 Test Specification.....	23
9.6 Test Result.....	23

10 Power Frequency Magnetic Field

10.1 Test Equipment List.....	24
10.2 Test Set-Up.....	24
10.3 Test Level.....	24
10.4 Test Procedure.....	25
10.5 Test Specification.....	25
10.6 Test Result.....	25

11 Voltage DIPS and Interruption Measurement

11.1 Test Equipment List.....	26
11.2 Test Set-Up.....	26
11.3 Test Level.....	26
11.4 Test Procedure.....	27
11.5 Test Specification.....	27
11.6 Test Result.....	27

12 Modification List**13 Appendix**

Appendix A: Summary of Test Result.....	30
Appendix B: The Photograph of measurement.....	49
Appendix C: The Detail Photograph of EUT.....	56

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 : NS Geode SBC

Model No. : PCM-5823

Device's Class : Class A Device

Operation Voltage : 230VAC, 50Hz

Output Ports :

- Serial Port : connected with a combo mouse which data cable is 120cm long, non-shielded, no ferrite bead.
- PJ-45 Ports : connected with two RJ-45 cables which each one is 20meters long, non-shielded, no ferrite bead, connected to a Hub in far-end.
- VGA Port : via a 120cm long, shielded, with ferrite bead, data cable to the monitor.
- Power Port : via a 180cm long, non-shielded, with ferrite bead, power cable to the AC power source.
- USB #1 Port : connected with a USB keyboard which data cable is 1.2meters long, non-shielded, no ferrite bead,
- USB #2 Port : connected with a USB mouse which data cable is 1meter long, non-shielded, no ferrite bead,

Feature:

1. NS Geode GX1-300 or GXLV-200 Processor on board
2. Support 18-bit TFT LCD Panel
3. Dual 10/100Mbps PCI Ethernet interface
4. Support AC97 Audio interface for option Audio module
5. 2 USB interface compliant with USB rev. 1.0 on the front side
6. 62-levels watchdog timer, jumperless on-line setup supported
7. Support ATX Power Function

Remark:

This product contains two models. The difference between these two models is the brand of chip used for controlling the functions of LAN is different. The I of PCM-5823I means the brand is " Intel ", the R of PCM-5823R means the brand is Realtech.

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

Keyboard : Logitech

Model No. : Y-SA2
Serial No. : SCC93820639
FCC ID : GYUR49SK
BSMI : 3872A806
Power Type : By PC
Data Cable : 120cm long, shielded, no ferrite bead

USB Mouse : Logitech

Model No. : M-BB48
Serial No. : LZE92250126
FCC ID : DoC Approval
BSMI : 4872A221
Power Type : By PC
Data Cable : 120cm long, non-shielded, no ferrite bead

Chassis Name : MBPC-200

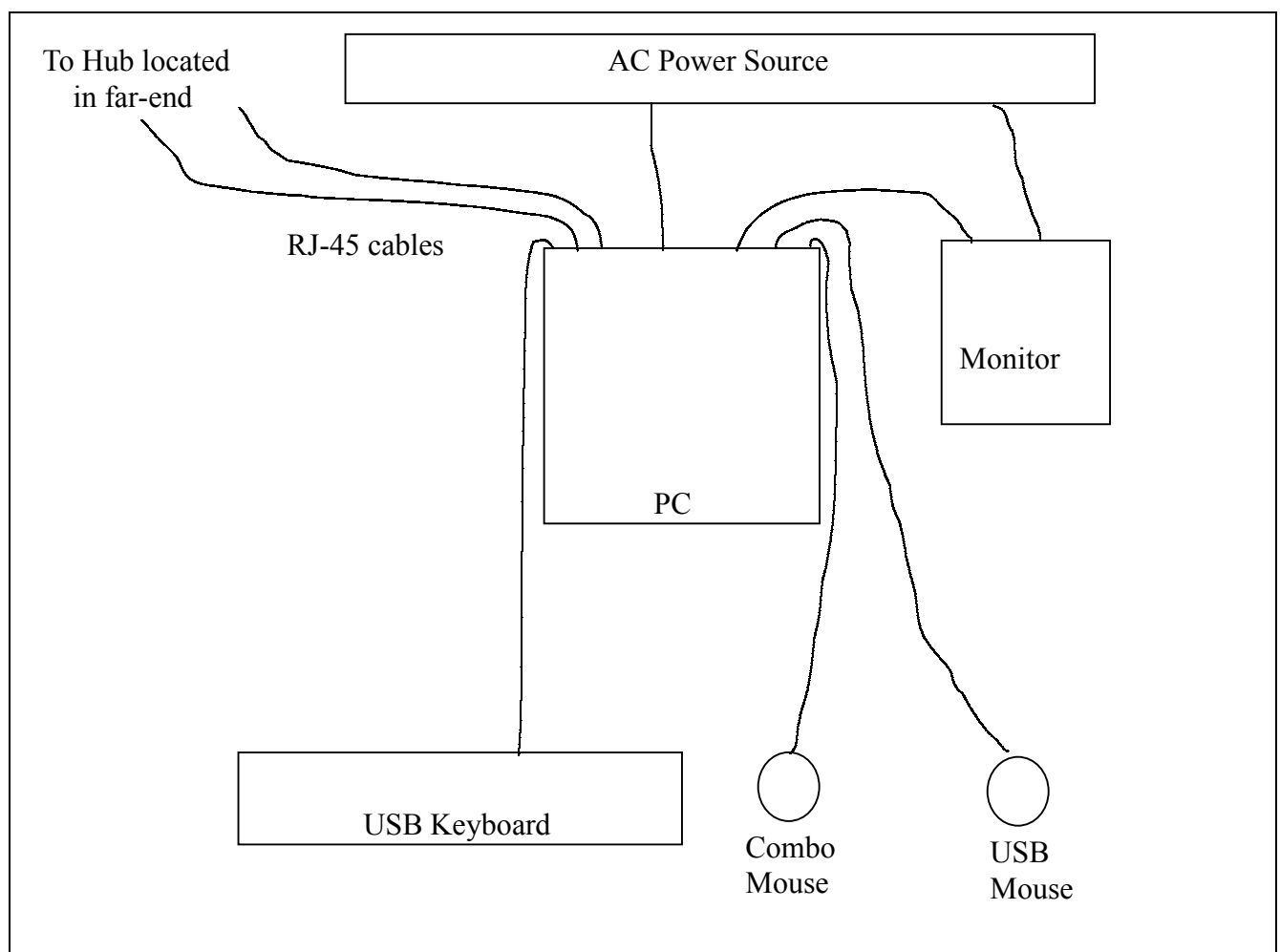
Power Supply : PS-50A

1.3 EUT Configuration

- (1) Install EUT in the case of IPC and screw it.
- (2) The power port of EUT is connected with the AC power source via a power cable.
- (3) The serial port of EUT is connected with a combo mouse.
- (4) The VGA port of EUT is connected with a monitor.
- (5) The two LAN ports of EUT are connected with two RJ-45 cables connected to a Hub in far-end.
- (6) The USB #1 port of EUT is connected with a USB keyboard.
- (7) The USB #2 port of EUT is connected with a USB mouse.

(***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 software will send an “ H “ pattern to the monitor and the “ H “ pattern will be shown on the monitor. It would be also sent to the parallel port and the printer will print out the “ H “ pattern. At the same time, the mouse and keyboard will be in continuously self-test mode and responded to the EUT. 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 10meters.

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

When the measurement was taken, the following video resolution modes were tested: 640 * 480, 800 * 600, 1024 * 768, 1280 * 1024.

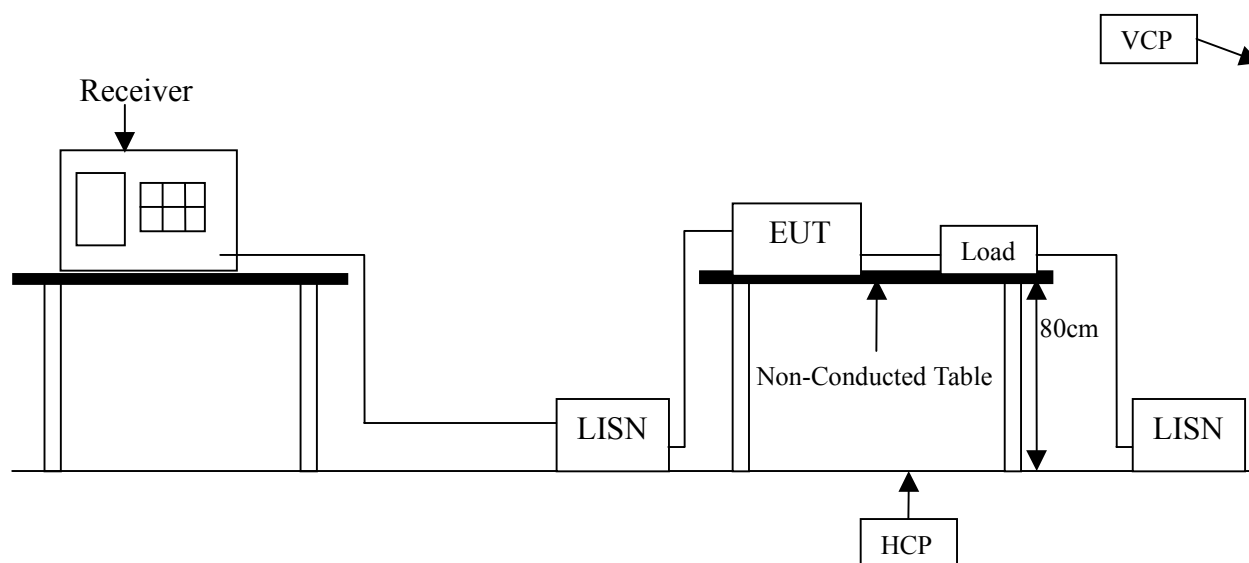
Because this product contains two models, there are two testing data contained within this testing report. PCM-5823R called “ Sample 1 ”, PCM-5823I called “ Sample 2 “.

2 Conducted Emission Measurement

2.1 Test Equipment

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	LISN	Rolf Heine	NNB-2/16Z	99084	Dec. 14, 1999
2.	LISN	Rolf Heine	NNB-2/16Z	99086	Dec. 14, 1999
3.	EMI Receiver	Rohde & Schwarz	ESI 7	830154/001	Nov. 22, 1999

2.2 Test Set-Up



2.3 Limit

Frequency	Limit (dB μ 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 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 AC 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 55022/1998 regulation: The measurement procedure on conducted emission interference.

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

2.5 Test Specification

According to the EN 55022/1998

2.6 Test Result

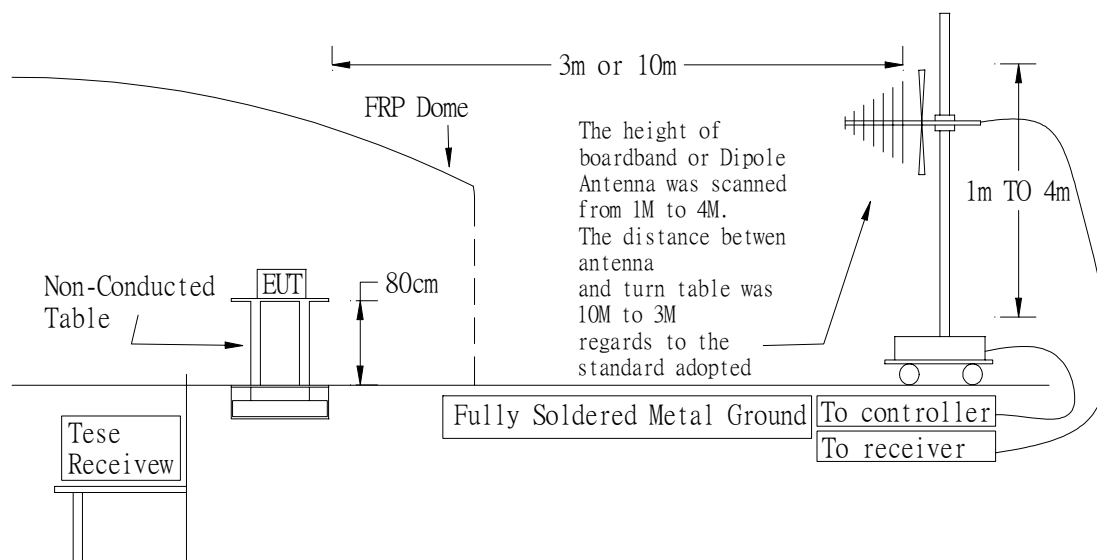
The emissions that come from the EUT were below the specified limits. The worst case of conducted emissions measurement are shown in the appendix A. The acceptance criterion was met and the EUT has pass the measurement.

3. Radiated Emission Measurement

3.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	Antenna	Mess-Elektronik	VULB 9160	9160-3078	Jan. 19, 2000
2.	EMI Receiver	Rohde & Schwarz	ESI 7	830154/001	Nov. 22, 1999

3.2 Test Setup



3.3 Limit

Frequency	Class A		Class B	
MHz	Distance (Meter)	Limit (dB μ V)	Distance (Meter)	Limit (dB μ V)
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

3.4 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 55022/1998 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

3.5 Test Specification

According to EN 55022/1998

3.6 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.

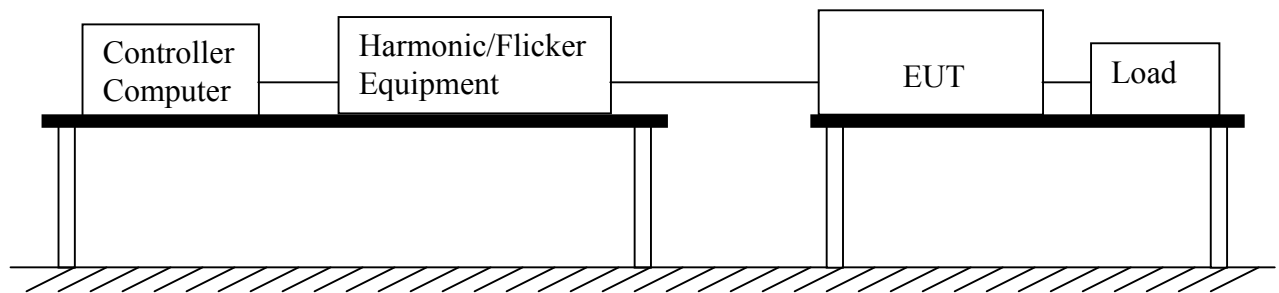
4. Power Harmonic and Voltage Fluctuation Measurement

4.1 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	Jun. 10, 2000

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

4.2 Test Setup



4.3 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		
$15 \leq n \leq 39$	$0.15 \times 15/n$		

4.4 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.

4.5 Test Specification

According to EN 61000-3-2/1998, EN 61000-3-3/1995

4.6 Test Result

The measurement of the power harmonics, which test at the extremes of EUT's supply range, was investigated and the test result was shown on the Appendix A. The acceptance criterion was met and the EUT has pass the measurement.

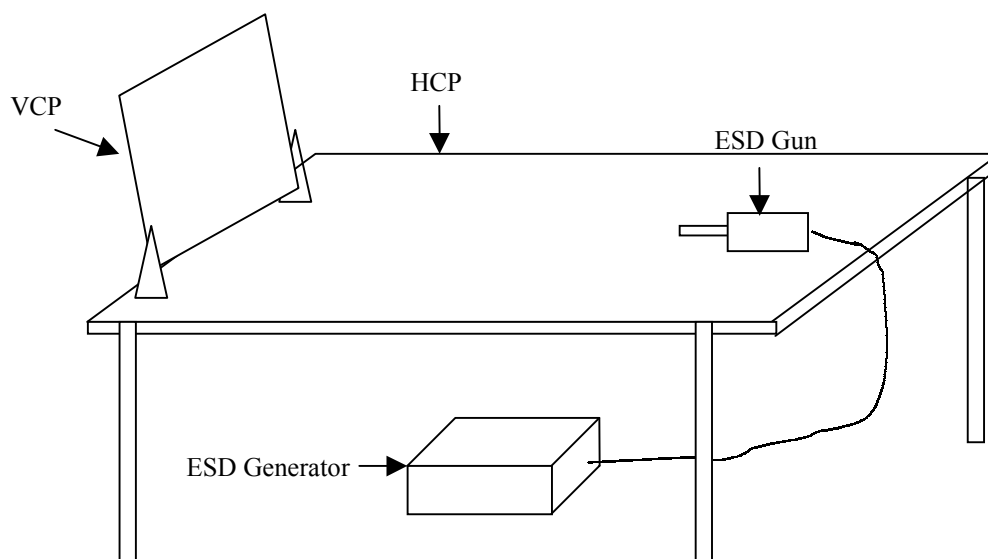
5. Electrostatic Discharge (ESD)

5.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	ESD Emulator	Noiseken	ESS-100L	0199C02380	Feb. 02, 2000

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

5.2 Test Setup



5.3 Test Level

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

5.4 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.

5.5 Test Specification

According to EN 61000-4-2/1998

5.6 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.

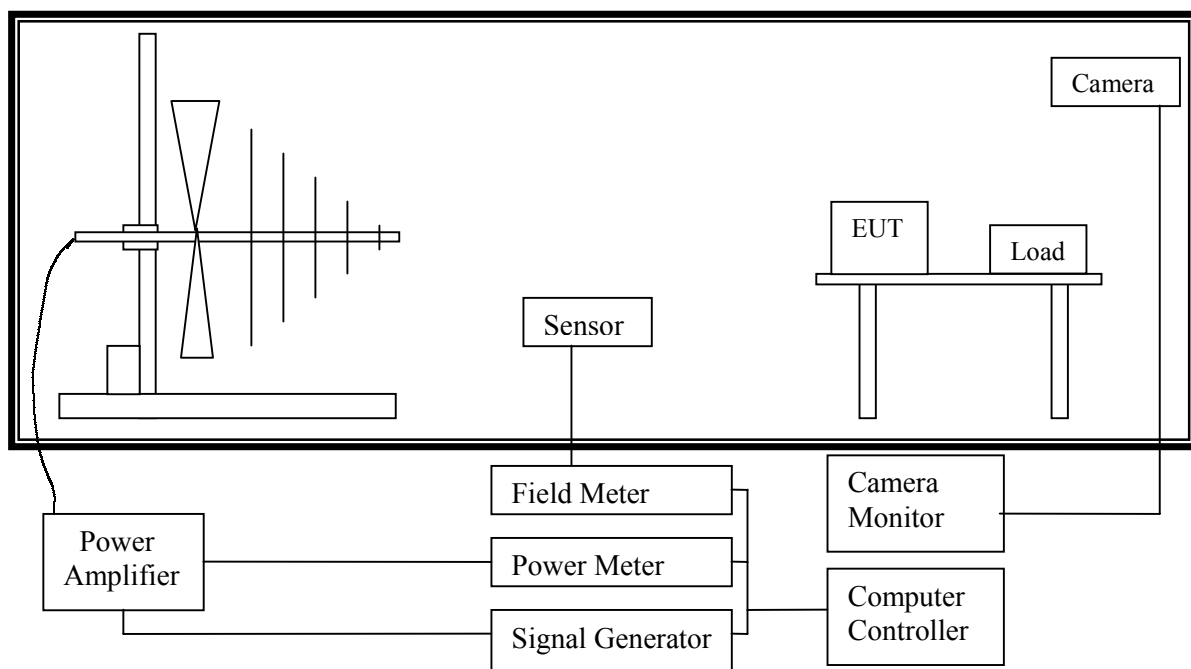
6. Radiated Susceptibility (RS)

6.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	Signal Generator	Rohde & Schwarz	SMY 02	845069/018	May 02, 1999
2.	Amplifier	Amplifier Research	100W1000M1A	20638	May 01, 1999
3.	Field Monitor	Amplifier Research	FM 2000	20391	Mar. 03, 1999

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

6.2 Test Setup



6.2 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	

6.3 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

***** The above measurement was performed in HomeTek Technology Inc. *****

6.4 Specification

According to EN 61000-4-3/1998

6.5 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.

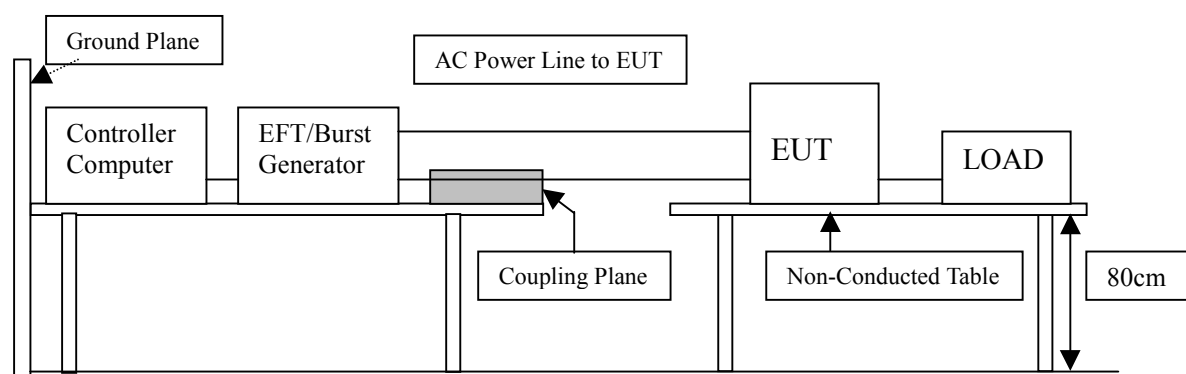
7. Electrical Fast Transient/Burst (EFT/B)

7.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	EMC Test System	EMC Partner	Transient-1000	TR1000-341	Aug. 25, 1999
2.	Absorbing Clamp	EMC Partner	Transient-1000	CNEFT1000-176	Aug. 25, 1999

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

7.2 Test Setup



7.3 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	

7.4 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 least 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.

7.5 Test Specification

According to EN 61000-4-4/1995

7.6 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.

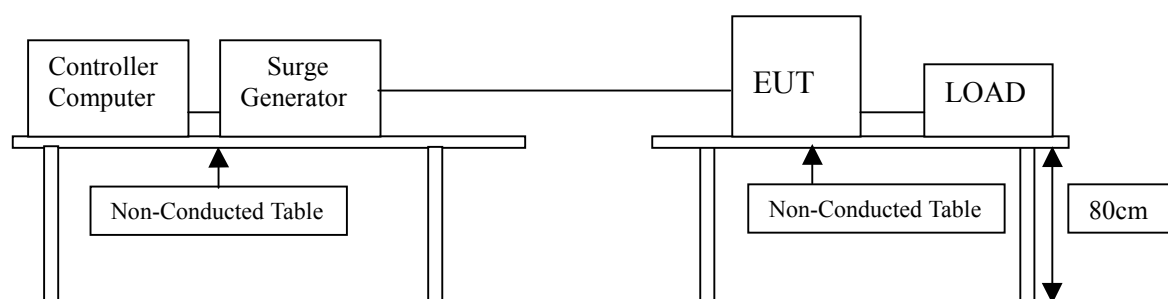
8. Surge

8.1 Test Equipment List

No	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	EMC Test System	EMC Partner	Transient-1000	TR1000-341	Aug. 25, 1999

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

8.2 Test Setup



8.3 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	± 4	
	Line to Line	KV	± 2	

8.4 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.

8.5 Test Specification

According to EN 61000-4-5/1995

8.6 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.

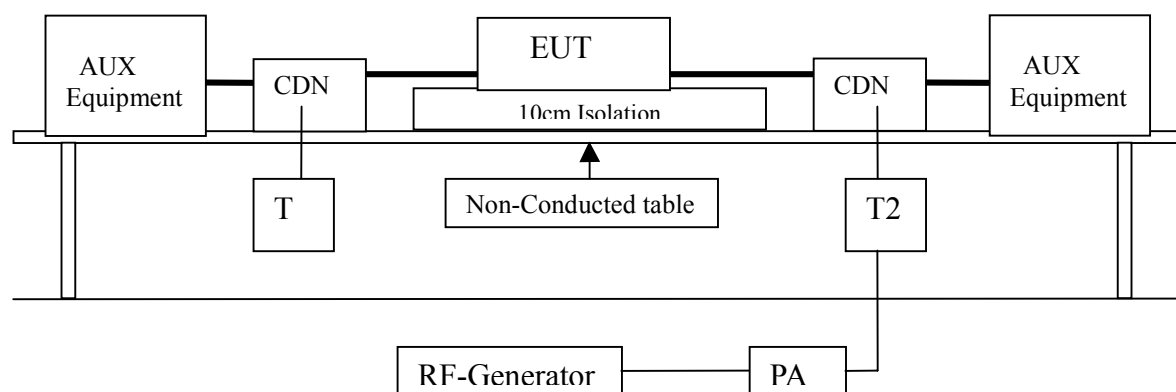
9. Conducted Susceptibility

9.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	Signal Generator	Rohde & Schwarz	SMY 02	845069/018	May 02, 1999
2.	Power Amplifier	Amplifier Research	100W1000M1A	20638	May 01, 1999
4.	Directional Coupler	Amplifier Research	DC2600	20508	Aug. 23, 1999
5.	CDN	FCC	FCC-801-M3-25A	9993	Aug. 23, 1999

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

9.2 Test Setup



9.3 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	

9.4 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 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

***** The above measurement was performed in HomeTek Technology Inc. *****

9.5 Test Specification

According to EN 61000-4-6/1995

9.6 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.

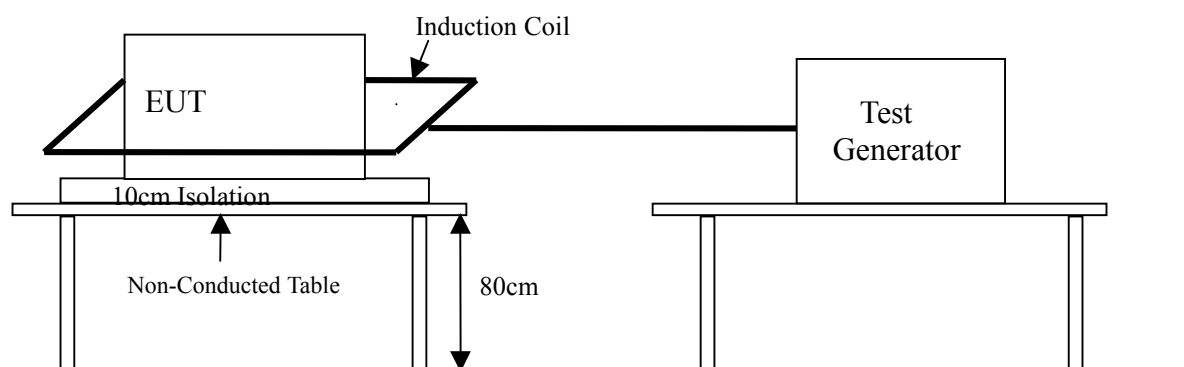
10 Power Frequency Magnetic Field

10.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	EMC Test System	EMC Partner	Transient-1000	TR1000-341	Aug. 25, 1999
2.	Magnetic Coil	EMC Partner	MF-1000	MF1000-1-51	Aug. 25, 1999

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

10.2 Test Setup



10.3 Test Level

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

10.4 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 meter 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).

10.5 Test Specification

According to EN 61000-4-8/1995

10.6 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.

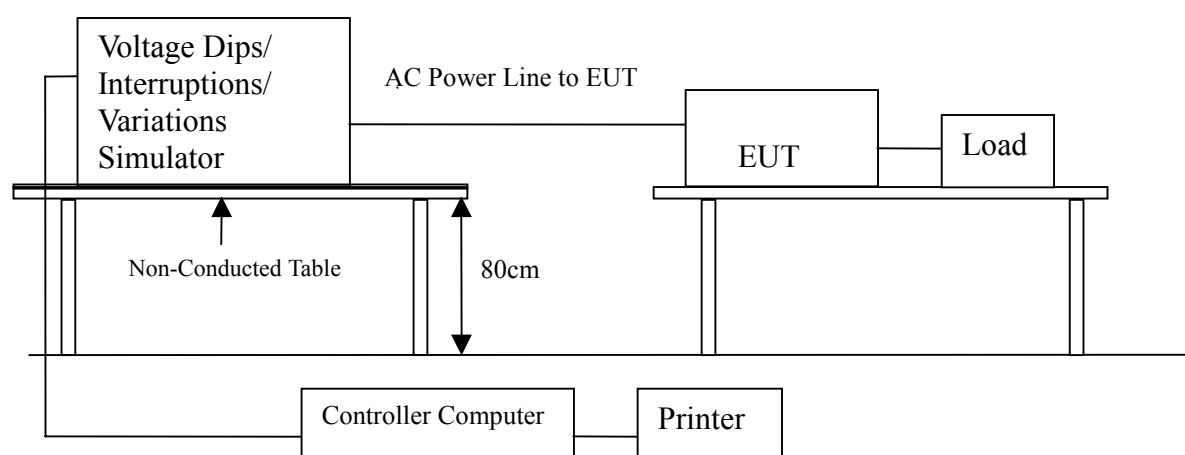
11. Voltage Dips and Interruption Measurement

11.1 Test Equipment List

No.	Instrument	Manufacture	Model	Serial No.	Last Calibrate
1.	EMC Test System	EMC Partner	Transient-1000	TR1000-341	Aug. 25, 1999

Remark: All equipment upon which need to calibrated are with calibration period of 1.5 year.

11.2 Test setup



11.3 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	

11.4 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.

11.5 Test Specification

According to EN 61000-4-11/1995

11.6 Test Result

The Measurement of the Voltage Dips and Interruption 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 Modification List for EMC Complying Test

There is no any modification.

13 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: | <±2.0dB |
| * Uncertainty in the Field Strength measurement: | <±4.0dB |

Conducted Emission Test

Date Measurement Performed: Aug. 26, 2000
 EUT : NS Geode SBC
 Testing Sample : Sample 1
 Testing Mode : Video Resolution→640 x 480
 Temperature : 27°C
 Humidity : 60%RH

Line 1:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
174.650	41.88	***	***	79.00	66.00	-24.12
491.700	43.36	***	***	79.00	66.00	-22.64
524.850	42.76	***	***	73.00	60.00	-17.24
3515.000	37.50	***	***	73.00	60.00	-22.50
9080.000	38.68	***	***	73.00	60.00	-21.32
10400.000	37.45	***	***	73.00	60.00	-22.55
22568.000	32.61	***	***	73.00	60.00	-27.39

Line 2:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
172.950	42.67	***	***	79.00	66.00	-23.33
456.850	42.51	***	***	79.00	66.00	-23.49
491.700	43.19	***	***	79.00	66.00	-22.81
524.000	42.98	***	***	73.00	60.00	-17.02
563.100	43.11	***	***	73.00	60.00	-16.89
3510.000	37.45	***	***	73.00	60.00	-22.55
9144.000	39.87	***	***	73.00	60.00	-20.13
22568.000	31.46	***	***	73.00	60.00	-28.54

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

Conducted Emission Test

Date Measurement Performed: Aug. 26, 2000

EUT : NS Geode SBC

Testing Sample : Sample 1

Testing Mode : Video Resolution→ 800 x 600

Temperature : 29°C

Humidity : 58%RH

Line 1:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
174.650	42.43	***	***	79.00	66.00	-23.57
207.800	42.55	***	***	79.00	66.00	-23.45
489.150	45.18	***	***	79.00	66.00	-20.82
526.550	44.85	***	***	73.00	60.00	-15.15
3540.000	37.83	***	***	73.00	60.00	-22.17
9048.000	37.78	***	***	73.00	60.00	-22.22
21496.000	30.73	***	***	73.00	60.00	-29.27
22568.000	32.10	***	***	73.00	60.00	-27.90

Line 2:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
171.250	42.73	***	***	79.00	66.00	-23.27
208.650	43.93	***	***	79.00	66.00	-22.07
488.300	45.40	***	***	79.00	66.00	-20.60
524.850	44.95	***	***	73.00	60.00	-15.05
3750.000	36.71	***	***	73.00	60.00	-23.29
9144.000	38.12	***	***	73.00	60.00	-21.88
21496.000	34.10	***	***	73.00	60.00	-25.90

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

Conducted Emission Test

Date Measurement Performed: Aug. 26, 2000

EUT : NS Geode SBC

Testing Sample : Sample 1

Testing Mode : Video Resolution→1024 x 768

Temperature : 29°C

Humidity : 58%RH

Line 1:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
211.200	42.49	***	***	79.00	66.00	-23.51
245.200	41.80	***	***	79.00	66.00	-24.20
492.550	42.26	***	***	79.00	66.00	-23.74
524.850	43.55	***	***	73.00	60.00	-16.45
563.950	41.80	***	***	73.00	60.00	-18.20
3480.000	37.43	***	***	73.00	60.00	-22.57
9112.000	36.26	***	***	73.00	60.00	-23.74
10080.000	35.81	***	***	73.00	60.00	-24.19
22568.000	32.92	***	***	73.00	60.00	-27.08

Line 2:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
174.650	43.55	***	***	79.00	66.00	-22.45
212.050	42.98	***	***	79.00	66.00	-23.02
529.100	45.51	***	***	73.00	60.00	-14.49
3515.000	37.58	***	***	73.00	60.00	-22.42
9176.000	37.17	***	***	73.00	60.00	-22.83
10304.000	37.55	***	***	73.00	60.00	-22.45
21496.000	35.52	***	***	73.00	60.00	-24.48

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

Conducted Emission Test

Date Measurement Performed: Aug. 26, 2000
 EUT : NS Geode SBC
 Testing Sample : Sample 2
 Testing Mode : Video Resolution→640 x 480
 Temperature : 30°C
 Humidity : 56%RH

Line 1:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
280.050	54.66	***	***	79.00	66.00	-11.34
478.950	50.87	***	***	79.00	66.00	-15.13
799.400	50.57	***	***	73.00	60.00	-9.43
1155.000	43.34	***	***	73.00	60.00	-16.66
2210.000	40.26	***	***	73.00	60.00	-19.74
12920.000	35.09	***	***	73.00	60.00	-24.91

Line 2:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
176.350	55.08	***	***	79.00	66.00	-10.92
199.300	52.55	***	***	79.00	66.00	-13.45
547.800	49.92	***	***	73.00	60.00	-10.08
732.250	43.27	***	***	73.00	60.00	-16.73
1230.000	37.84	***	***	73.00	60.00	-22.16
12920.000	35.41	***	***	73.00	60.00	-24.59
24120.000	28.98	***	***	73.00	60.00	-31.02

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

Conducted Emission Test

Date Measurement Performed: Aug. 26, 2000

EUT : NS Geode SBC

Testing Sample : Sample 2

Testing Mode : Video Resolution→ 800 x 600

Temperature : 30°C

Humidity : 56%RH

Line 1:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
176.350	45.01	***	***	79.00	66.00	-20.99
455.150	42.99	***	***	79.00	66.00	-23.01
492.550	43.12	***	***	79.00	66.00	-22.88
529.100	44.08	***	***	73.00	60.00	-15.92
2920.000	34.25	***	***	73.00	60.00	-25.75
12672.000	34.75	***	***	73.00	60.00	-25.25
19248.000	32.53	***	***	73.00	60.00	-27.47

Line 2:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
195.900	59.77	***	***	79.00	66.00	-6.23
335.300	48.69	***	***	79.00	66.00	-17.31
497.650	48.90	***	***	79.00	66.00	-17.10
970.250	42.41	***	***	73.00	60.00	-17.59
2335.000	36.16	***	***	73.00	60.00	-23.84
5605.000	39.20	***	***	73.00	60.00	-20.80
13040.000	36.03	***	***	73.00	60.00	-23.97

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

Conducted Emission Test

Date Measurement Performed: Aug. 26, 2000

EUT : NS Geode SBC

Testing Sample : Sample 2

Testing Mode : Video Resolution→1024 x 768

Temperature : 30°C

Humidity : 56%RH

Line 1:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
178.050	44.55	***	***	79.00	66.00	-21.45
212.050	42.72	***	***	79.00	66.00	-23.28
247.750	42.20	***	***	79.00	66.00	-23.80
461.100	42.35	***	***	79.00	66.00	-23.65
495.100	45.29	***	***	79.00	66.00	-20.71
529.950	44.12	***	***	73.00	60.00	-15.88
2505.000	36.26	***	***	73.00	60.00	-23.74
24992.000	32.23	***	***	73.00	60.00	-27.77

Line 2:

Frequency (KHz)	Corrected Amplitude (dBμV/m)			Limit (dBμV/m)		Margin dB
	Peak	QP	Avg.	QP	Avg.	
178.050	44.30	***	***	79.00	66.00	-21.70
494.250	44.51	***	***	79.00	66.00	-21.49
529.950	44.83	***	***	73.00	60.00	-15.17
564.800	43.06	***	***	73.00	60.00	-16.94
12392.000	32.07	***	***	73.00	60.00	-27.93
24992.000	33.68	***	***	73.00	60.00	-26.32

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

Field Strength Measurement

Date Measurement Performed: Aug. 28, 2000

EUT : NS Geode SBC

Testing Sample : Sample 1

Testing Mode : Video Resolution→ 640 x 480

Polarity : Vertical

Temperature : 29°C

Humidity : 59%RH

Frequency (MHz)	Reading Amplitude (dBμV/m)	Table Degree (°)	Antenna Height (Meter)	Correction Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
48.530	42.00	172	1.00	11.99	30.01	40.00	-9.99
199.220	42.23	166	1.00	10.19	32.04	40.00	-7.96
336.071	45.13	105	1.00	14.79	30.34	47.00	-16.66
498.733	50.97	245	1.00	18.45	32.52	47.00	-14.48
531.972	54.46	228	1.00	19.13	35.33	47.00	-11.67
864.460	60.61	164	2.00	24.33	36.28	47.00	-10.72
931.430	62.69	142	1.00	25.28	37.41	47.00	-9.59
998.020	63.34	182	1.00	26.20	37.14	47.00	-9.86

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: Aug. 28, 2000

EUT : NS Geode SBC

Testing Sample : Sample 1

Testing Mode : Video Resolution→ 640 x 480

Polarity : Horizontal

Temperature : 29°C

Humidity : 59%RH

Frequency (MHz)	Reading Amplitude (dBμV/m)	Table Degree (°)	Antenna Height (Meter)	Correction Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
199.246	46.27	122	2.00	10.19	36.08	40.00	-3.92
336.050	46.95	148	2.00	14.79	32.16	47.00	-14.84
432.240	47.10	144	3.00	16.99	30.11	47.00	-16.89
498.740	51.18	45	2.00	18.45	32.93	47.00	-14.07
531.972	56.23	0	2.00	19.13	37.10	47.00	-9.90
664.990	58.72	110	2.00	21.81	36.91	47.00	-10.09
864.460	60.59	169	2.00	24.33	36.26	47.00	-10.74

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: Aug. 28, 2000
 EUT : NS Geode SBC
 Testing Sample : Sample 2
 Testing Mode : Video Resolution→1280 * 1024
 Polarity : Vertical
 Temperature : 30°C
 Humidity : 53%RH

Frequency (MHz)	Reading Amplitude (dBμV/m)	Table Degree (°)	Antenna Height (Meter)	Correction Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
132.995	37.91	163	2.00	12.23	25.67	40.00	-14.33
158.525	35.12	10	3.00	13.44	21.68	40.00	-18.32
162.044	46.75	46	3.00	13.31	33.44	40.00	-6.56
279.998	44.32	350	1.00	13.06	31.26	47.00	-15.74
739.789	58.43	40	2.00	22.90	35.53	47.00	-11.47
758.878	57.55	235	1.00	23.11	34.44	47.00	-12.56
797.974	62.39	69	2.00	23.94	38.44	47.00	-8.56

Remark:

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

Field Strength Measurement

Date Measurement Performed: Aug. 28, 2000
 EUT : NS Geode SBC
 Testing Sample : Sample 2
 Testing Mode : Video Resolution→1280 * 1024
 Polarity : Horizontal
 Temperature : 31°C
 Humidity : 52%RH

Frequency (MHz)	Reading Amplitude (dBμV/m)	Table Degree (°)	Antenna Height (Meter)	Correction Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
66.857	39.51	200	1.00	10.03	29.48	40.00	-10.52
158.525	33.98	0	4.00	13.44	20.53	40.00	-19.47
325.238	50.61	241	4.00	14.40	36.22	47.00	-10.78
739.773	56.02	133	2.00	22.90	33.12	47.00	-13.88
758.886	55.46	78	1.00	23.11	32.35	47.00	-14.65
814.589	56.95	104	1.00	24.11	32.84	47.00	-14.16
998.065	59.40	251	4.00	26.20	33.20	47.00	-13.80

Remark:

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

Power Harmonic / Fluctuation Test

Test Frequency	: 50Hz	Test Voltage	: 230VAC
Test Time	: 10 min.	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	+8KV	B	B	Pass
	10	-8KV	B	B	Pass
Contact Discharge	10	+4KV	B	B	Pass
	10	-4KV	B	B	Pass
Indirect Discharge (HCP)	10	+4KV	B	B	Pass
	10	-4KV	B	B	Pass
Indirect Discharge (VCP Front)	10	+4KV	B	B	Pass
	10	-4KV	B	B	Pass
Indirect Discharge (VCP left)	10	+4KV	B	B	Pass
	10	-4KV	B	B	Pass
Indirect Discharge (VCP Rear)	10	+4KV	B	B	Pass
	10	-4KV	B	B	Pass
Indirect Discharge (VCP Right)	10	+4KV	B	B	Pass
	10	-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 (MHz)	Position (Angle)	Polarity (H or V)		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)		Required Criteria	Complied Criteria	Result
L+N	±	0	2KV	60	Direct	B	B	Pass
L+N	±	90	2KV	60	Direct	B	B	Pass
L+N	±	180	2KV	60	Direct	B	B	Pass
L+N	±	270	2KV	60	Direct	B	B	Pass
L+PE	±	0	4KV	60	Direct	B	B	Pass
L+PE	±	90	4KV	60	Direct	B	B	Pass
L+PE	±	180	4KV	60	Direct	B	B	Pass
L+PE	±	270	4KV	60	Direct	B	B	Pass
N+PE	±	0	4KV	60	Direct	B	B	Pass
N+PE	±	90	4KV	60	Direct	B	B	Pass
N+PE	±	180	4KV	60	Direct	B	B	Pass
N+PE	±	270	4KV	60	Direct	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

Conducted Susceptibility

Inject Line	Field Strength V	Inject Method	Required Criteria	Complied Criteria	Result
AC Line	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 (Hz)	Magnetic Strength (A/M)	Required Criteria	Complied 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
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	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
>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

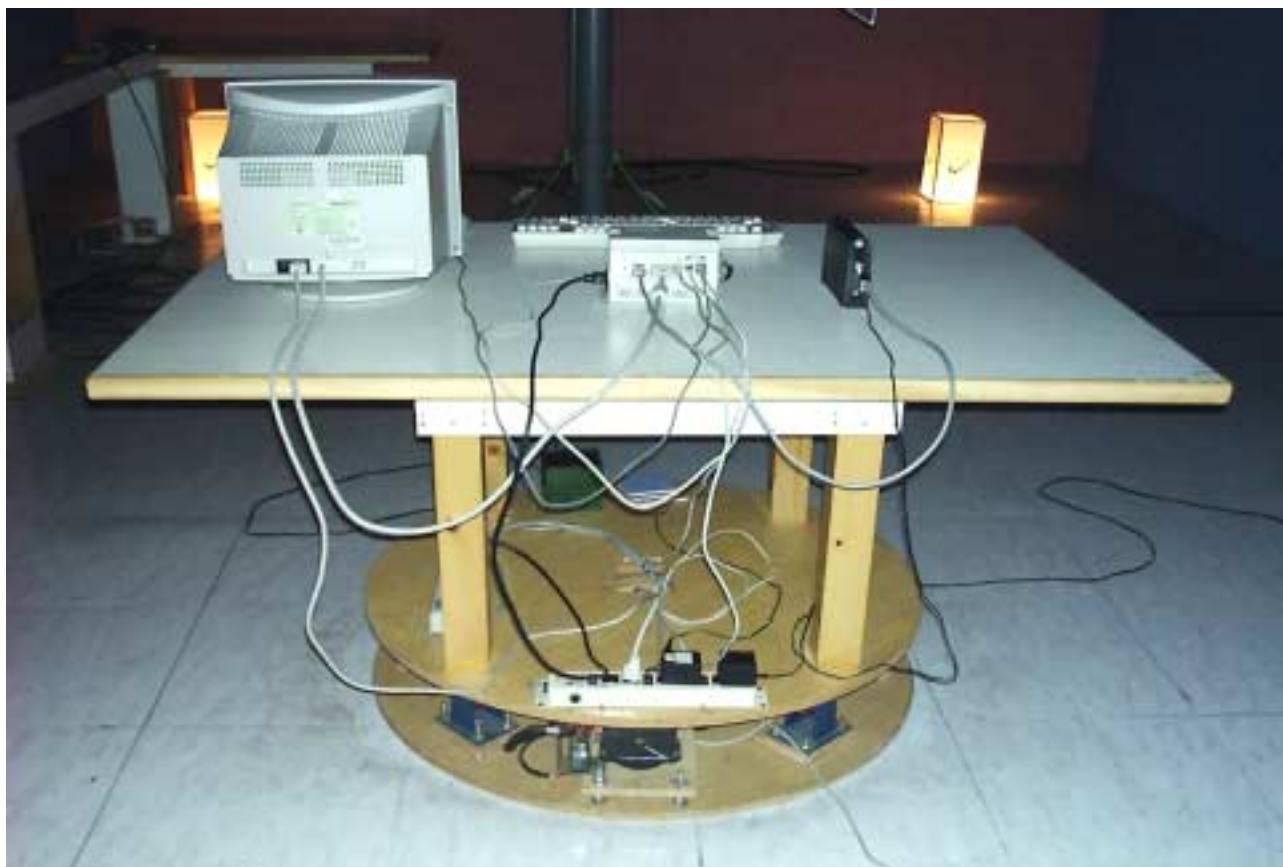
The Photograph of Conducted Emission Test



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

