EMC UPDATE TEST REPORT

For

WEB Terminal

Applicant : Advantech Co., Ltd.
Trade Name : ADVANTECH
Model Number : TPC-642X-XXX (X=0~9, A~Z or Blank)
Date : January 25, 2002
Date of test : January 22 ~ 23, 2002
Revision : 00

Reference Standard:

Standards	Results (Pass/Fail)
EN 55022: 1998	PASS
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998 + A14: 2000	PASS
EN 61000-3-3: 1995	PASS
EN 55024: 1998	PASS
- IEC 61000-4-2: 1995 + A2: 2000	PASS
- IEC 61000-4-3: 1995	PASS
- IEC 61000-4-4: 1996	PASS
- IEC 61000-4-5: 1995	PASS
- IEC 61000-4-6: 1996	PASS
- IEC 61000-4-8: 1993	PASS
- IEC 61000-4-11: 1994	PASS

Description of Rev.00:

1. Applicant adds two PS/2 port to re-test.
   (Please refer to have ** mark items and photo on this report)
2. Other information please refer to report (010252 Rev.00) and this (020071) test report.

Approved by Authorized Signatory: Kurt Chen

Kurt Chen / Q. A. Manager

PRODUCT INFORMATION

Housing Type:	Plastic		
EUT Power Rating:	24VDC from Power Adapter		
AC Power during Test	230VAC/50Hz to Power Adapter		
CPU Manufacture:	Intel	**Type:**	StrongARM 1110 RISC
OSC/Clock Frequencies:	206MHz		
LCD Panel Manufacturer:	Kyocera	**Model:**	KCS3224ASTT-X6
Compact Flash Card Manufacturer:	ADVANTECH	**Install:**	16MB

I/O Port of EUT:

I/O PORT TYPES	Q'TY	TESTED WITH
1). Serial Port	2	2
2). LAN Port	1	1
3). **PS/2 Keyboard Port	1	1
4). **PS/2 Mouse Port	1	1

Note:

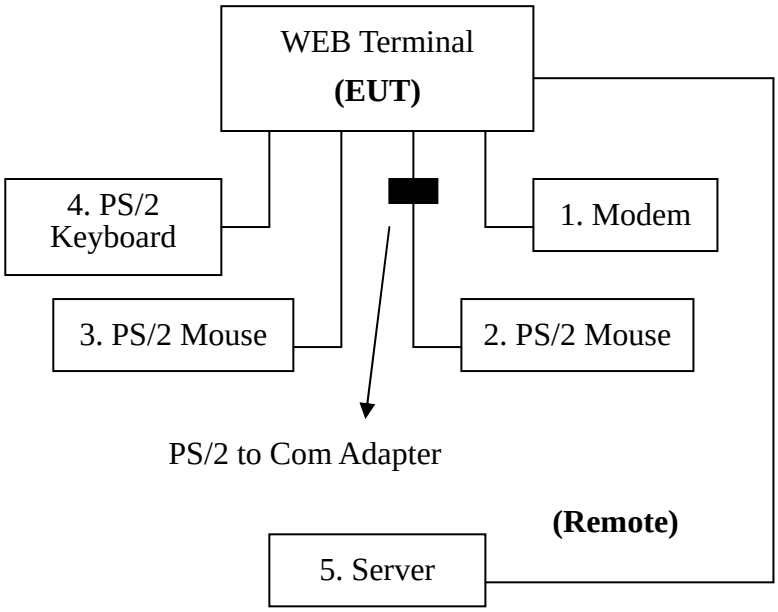
1. The means of "X-XXX" on model number is for marketing purpose only.
2. Client consigns only one model sample to test (Model Number: TPC-642S-CE). Therefore, the testing Lab. just guarantees the units, which have been tested. (For Rev. 00 report)

**3. Client consigns only one model sample to test (Model Number: TPC-642S). Therefore, the testing Lab. just guarantees the units, which have been tested. (For Rev. 01 report)

BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators

EUT: WEB Terminal
Trade Name: ADVANTECH
Model Number: TPC-642S
Power Cord: Unshielded, 1.8m



SUPPORT EQUIPMENT

No.	Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
1)	Modem	231AA	A26631083558	BFJ9D93108US	Hayes	Shielded, 1.8m	Unshielded, 1.8m
2)	PS/2 Mouse	M-CAA43	LZE11752129	FCC DoC	Logitech	Shielded, 1.8m	N/A
3)	PS/2 Mouse	G-ZA-PHI	PHB02400489	FCC DoC	Logitech	Shielded, 1.8m	N/A
4)	PS/2 Keyboard	SK-2800C	B1C790BCPJCN09	GYUR79SK	Compaq	Shielded, 1.8m	N/A
5)	Server **(Remote)**	NetServer LH Pro	N/A	N/A	HP	LAN Cable: Unshielded, 10m	Unshielded, 1.8m

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

TEST EQUIPMENT LIST (EMISSION)

Instrumentation: The following list contains equipment used at C & C Laboratory, Co., Ltd. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 9kHz to 1.0 / 2.0 GHz.

Equipment used during the tests:

Open Area Test Site: # 4

Open Area Test Site # 4					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	ADVANTEST	R3132	91700456	02/21/2001	02/20/2002
EMI Test Receiver	R&S	ESVS10	846285/016	04/16/2001	04/15/2002
Precision Dipole	SCHWAZBECK	VHAP	998/999	05/17/2001	05/16/2002
Precision Dipole	SCHWAZBECK	UHAP	981/982	05/17/2001	05/16/2002
Bilog Antenna	CHASE	CBL 6112B	2462	01/12/2002	01/11/2003
Turn Table	Chance most	N/A	N/A	N.C.R	N.C.R
Antenna Tower	Chance most	N/A	N/A	N.C.R	N.C.R
Controller	Chance most	N/A	N/A	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M51067	N.C.R	N.C.R
Site NSA	C&C Lab.	N/A	N/A	11/24/2001	11/23/2002

Conducted Emission Test Site: # 3

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESHS10	843743/015	12/19/2001	12/18/2002
LISN	R&S	ESH2-Z5	843285/010	12/10/2001	12/09/2002
LISN	EMCO	3825/2	9003-1628	07/16/2001	07/15/2002
2X2 WIRE ISN	R&S	ENY22	830661/027	04/06/2001	04/05/2002
FOUR WIRE ISN	R&S	ENY41	830663/024	04/04/2001	04/03/2002

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

TEST EQUIPMENT LIST

Power Harmonic & Voltage Fluctuation/Flicker Measurement (61000-3-2&-3-3)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Harmonic & Flicker Tester	HAEFELY TRENCH	PHF555	080 419-25	10/12/2001	10/11/2002
ESD test (61000-4-2)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
ESD Generator	HAEFELY TRENCH	PESD 1600	H710203	09/01/2001	08/31/2002
Radiated Electromagnetic Field immunity Measurement (61000-4-3)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Signal Generator	Maconi	2022D	119246/003	08/20/2001	08/19/2002
Power Amplifier	M2S	A00181/ 1000	9801-112	N/A	N/A
Power Amplifier	M2S	AC8113/ 800-250A	9801-179	N/A	N/A
Power Antenna	EMCO	93141	9712-1083	N/A	N/A
EM PROBE	GW	EMR-30	L-0013	03/13/2001	03/12/2002
Fast Transients/Burst test (61000-4-4)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Fast Transients/Burst Generator	HAEFELY TRENCH	PEFT- JUNIOR	583 333-117	08/21/2001	08/20/2002
Clamp	HAEFELY TRENCH	093 506.1	080 421.13	N/A	N/A
Surge Immunity test (61000-4-5)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Surge Tester	HAEFELY TRENCH	PSUGER 4010	583 334-71	09/01/2001	08/31/2002
CS test (61000-4-6)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Signal Generator	Maconi	2022D	119246/003	08/20/2001	08/19/2002
CDN	MEB	M3	3683	09/14/2001	09/13/2002
CDN	Lüthi	801-M3	1879	03/05/2001	03/04/2002
CDN	MEB	M2	A3002010	04/17/2001	04/16/2002
Power Amplifier	M2S	A00181/ 1000	9801-112	N/A	N/A
Clamp	MEB	KEMZ-801	13 602	N/A	N/A
Power Frequency Magnetic Field Immunity test (61000-4-8)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
TRIAX ELF Magnetic Field Meter	F.W.BELL	4090	9711	10/30/2001	10/29/2002
Magnetic Field Tester	HAEFELY TRENCH	MAG 100.1	080 938-01	N/A	N/A
Voltage Dips/Short Interruption and Voltage Variation Immunity test (61000-4-11)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Dips/Interruption and Variations Simulator	HAEFELY TRENCH	PLINE 1610	080 344-05	02/08/2001	02/07/2002

EUT Configuration during measurement:

1) Final-test mode are list as below:

Mode(s):

1. **Down Load Data from Web**

SUMMARY DATA

(LINE CONDUCTED TEST)

Model Number: TPC-642S

Tested by: Andy Yuan **Location:** Site # 4

Test Mode: Mode 1

Test Results: Passed

Temperature: 14°C **Humidity:** 69%RH

(The chart below shows the highest readings taken from the final data)

FREQ MHz	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
1.860	36.5	---	56.00	56.00	-19.5	---	L1
2.420	33.7	---	56.00	46.00	-22.3	---	L1
6.250	36.7	---	60.00	50.00	-23.3	---	L1
7.500	40.0	---	60.00	50.00	-20.0	---	L1
8.750	30.4	---	60.00	50.00	-29.6	---	L1
20.000	47.0	---	60.00	50.00	-13.0	---	L1
1.860	37.1	---	56.00	56.00	-18.9	---	L2
2.490	36.2	---	56.00	46.00	-19.8	---	L2
6.250	34.9	---	60.00	50.00	-25.1	---	L2
7.500	36.1	---	60.00	50.00	-23.9	---	L2
12.500	33.5	---	60.00	50.00	-26.5	---	L2
20.000	48.0	---	60.00	50.00	-12.0	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE: "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.**

SUMMARY DATA

(COMMON MODE CONDUCTED EMISSION MEASUREMENT)

(LAN Port)

Model Number: TPC-642S

Tested by: Andy Yuan **Location:** Site # 4

Test Mode: Mode 1

Test Results: Passed

Temperature: 14°C **Humidity:** 69%RH

(The chart below shows the highest readings taken from the final data)

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.805	54.4	---	74.0	64.0	-19.6	---	---
1.650	49.6	---	74.0	64.0	-24.4	---	---
2.410	52.2	---	74.0	64.0	-21.8	---	---
7.480	41.2	---	74.0	64.0	-32.8	---	---
9.370	44.4	---	74.0	64.0	-29.6	---	---
11.280	42.1	---	74.0	64.0	-31.9	---	---

****NOTE: "---" denotes the emission level was less –2 dB to the Average limit, so no re-check anymore.**

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: TPC-642S **Location:** Site # 4

Tested by: Andy Yuan **Polar:** Vertical--10m

Test Mode: Mode 1 **Test Results:** Passed

Detector Function: Quasi-Peak

Temperature: 13°C **Humidity:** 72%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
122.57	12.5	12.8	25.3	30.0	-4.7
173.99	17.3	10.7	28.0	30.0	-2.0
208.23	14.5	10.9	25.4	30.0	-4.6
334.20	8.5	15.8	24.3	37.0	-12.7
516.11	12.8	21.0	33.8	37.0	-3.2
687.20	12.3	21.7	34.0	37.0	-3.0

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: TPC-642S **Location:** Site # 4

Tested by: Andy Yuan **Polar:** Horizontal--10m

Test Mode: Mode 1 **Test Results:** Passed

Detector Function: Quasi-Peak

Temperature: 13°C **Humidity:** 72%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
67.98	13.4	6.5	19.9	30.0	-10.1
71.98	16.2	6.7	22.9	30.0	-7.1
74.22	17.1	7.1	24.2	30.0	-5.8
137.66	9.4	11.9	21.3	30.0	-8.7
150.50	11.0	11.4	22.4	30.0	-7.6
173.08	16.5	10.7	27.2	30.0	-2.8
209.74	13.2	10.9	24.1	30.0	-5.9
309.60	16.2	15.2	31.4	37.0	-5.6
516.00	11.4	21.0	32.4	37.0	-4.6

EN 61000-3-2 & EN 61000-3-3 (POWER HARMONICS & VOLTAGE FLUCTUATION / FLICKER)

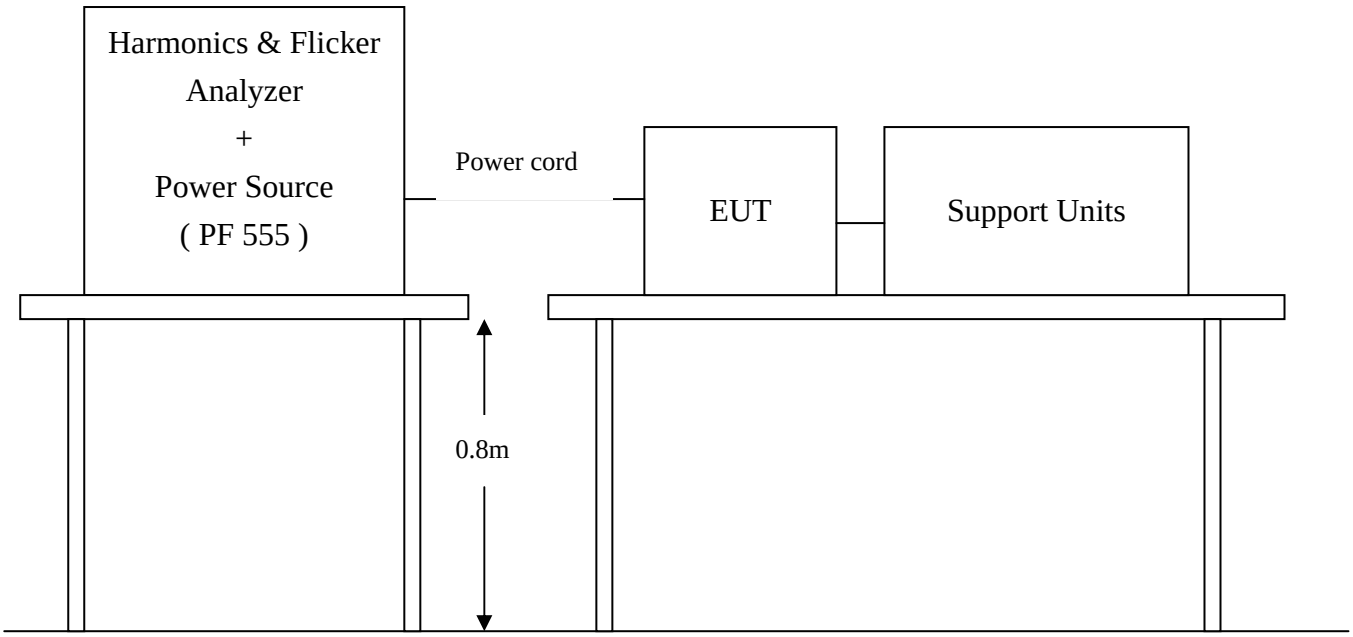
POWER HARMONICS MEASUREMENT

Port	**:** AC mains
Basic Standard	**:** EN 61000-3-2 (1995 + A1: 1998 + A2: 1998 + A14: 2000)
Limits	**:** [V] CLASS A ; [ ] CLASS D
Tester	**:** Andy Yuan
Temperature	**:** 13°C
Humidity	**:** 53%

VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

Port	**:** AC mains
Basic Standard	**:** EN 61000-3-3 (1995)
Limits	**:** §5 of EN 61000-3-3
Tester	**:** Andy Yuan
Temperature	**:** 13°C
Humidity	**:** 53%

Block Diagram of Test Setup:



Result:

Please see the attached test data.

0363

EN 61000-3-2 TEST REPORT 2002/1/22 11:38 AM

Unit: WEB TERMINAL

Model No.: TPC-642S

Remarks: TEMP:13℃ HUM:53%

Operator: ANDY YUAN

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TEST SETUP

Test Freq.:	50.00 Hz.	Test Voltage:	230.0 vac
Waveform :	SINE	Test Time:	2.5 min.
Classification :	CLASS A	Test Type:	STEADY-STATE

Prog. Zo Enabled: YES Prog. Zo: 0.000

Motor Driven with Phase Angle Control: NO
Impedance selected: DIRECT

Synthetic R+L Enabled: NO
Resistance: 0.380 Ohms Inductance: 460.000 uH

MAX WATTS: 14.8W

TEST DATA

Result: PASS

Harmonic Current Results

Hn	AMPS	LO Limit	HI Limit	Result
0	0.000	0.000	0.000	PASS
1	0.089	NaN	NaN	PASS
2	0.001	1.080	1.080	PASS
3	0.044	2.300	2.300	PASS
4	0.001	0.430	0.430	PASS
5	0.040	1.140	1.140	PASS
6	0.001	0.300	0.300	PASS
7	0.037	0.770	0.770	PASS
8	0.000	0.230	0.230	PASS
9	0.034	0.400	0.400	PASS
10	0.000	0.184	0.184	PASS
11	0.031	0.330	0.330	PASS
12	0.000	0.153	0.153	PASS
13	0.028	0.210	0.210	PASS
14	0.000	0.131	0.131	PASS
15	0.024	0.150	0.150	PASS
16	0.000	0.115	0.115	PASS
17	0.020	0.132	0.132	PASS
18	0.000	0.102	0.102	PASS
19	0.017	0.118	0.118	PASS
20	0.000	0.092	0.092	PASS

21	0.013	0.107	0.107	PASS
22	0.000	0.084	0.084	PASS
23	0.010	0.098	0.098	PASS
24	0.000	0.077	0.077	PASS
25	0.007	0.090	0.090	PASS
26	0.000	0.071	0.071	PASS
27	0.005	0.083	0.083	PASS
28	0.000	0.066	0.066	PASS
29	0.002	0.078	0.078	PASS
30	0.000	0.061	0.061	PASS
31	0.001	0.073	0.073	PASS
32	0.000	0.058	0.058	PASS
33	0.001	0.068	0.068	PASS
34	0.000	0.054	0.054	PASS
35	0.001	0.064	0.064	PASS
36	0.000	0.051	0.051	PASS
37	0.002	0.061	0.061	PASS
38	0.000	0.048	0.048	PASS
39	0.002	0.058	0.058	PASS
40	0.000	0.046	0.046	PASS

END OF REPORT

EN 61000-3-3 TEST REPORT 2002/1/22 11:54 AM

Unit: WEB TERMINAL

Model No.: TPC-642S (Continue)

Remarks: TEMP:13℃ HUM:53%

Operator: ANDY YUAN

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TEST SETUP

Test Freq.:	50.00 Hz.	Test Voltage:	230.0 vac
Waveform :	SINE		
Test Time:	10.0 min.	Tshort:	10.0 min.

Prog. Zo Enabled: YES Prog. Zo: 0.000

Voltage Change less than once per Hour: NO
Impedance selected: DIRECT

Synthetic R+L Enabled: NO
Resistance: 0.380 Ohms Inductance: 460.000 uH

TEST DATA

Result: PASS

	EUT Data	Limit	Result	Test Enabled
Pst max	0.001	1.00	PASS	true
Plt max	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	0.020	0.400	PASS	true
% THD	0.03	3.00	PASS	true

END OF REPORT

EN 61000-3-3 TEST REPORT 2002/1/22 12:16 PM

Unit: WEB TERMINAL

Model No.: TPC-642S (Manual Switch)

Remarks: TEMP:13℃ HUM:53%

Operator: ANDY

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TEST SETUP

Test Freq.:	50.00 Hz.	Test Voltage:	230.0 vac
Waveform :	SINE		
Test Time:	10.0 min.	Tshort:	10.0 min.

Prog. Zo Enabled: YES Prog. Zo: 0.000

Voltage Change less than once per Hour: NO
Impedance selected: DIRECT

Synthetic R+L Enabled: NO
Resistance: 0.380 Ohms Inductance: 460.000 uH

TEST DATA

Result: PASS

	EUT Data	Limit	Result	Test Enabled
Pst max	0.001	1.00	PASS	true
Plt max	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	0.020	0.400	PASS	true
% THD	0.03	3.00	PASS	true

END OF REPORT

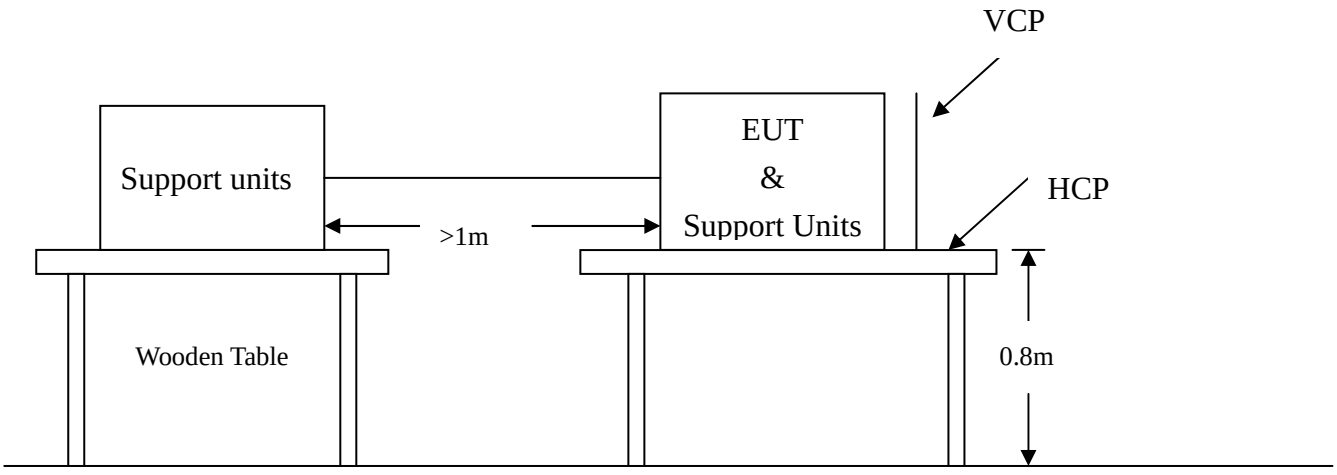
SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

Port	**:**	Enclosure
Basic Standard	**:**	IEC 61000-4-2
Test Level	**:**	± 8 kV (Air Discharge) ± 4 kV (Contact Discharge) ± 4 kV (Indirect Discharge)
Performance Criteria	**:**	B (Standard require)
Tester	**:**	Andy Yuan
Temperature/Humidity:		15°C/50%

Block Diagram of Test Setup:

(The 470 k ohm resistors are installed per standard requirement)



Ground Reference Plane

Test Procedure:

1. The EUT was located in 0.1 m minimum away from all side of the HCP.
2. The support units were located 1 m minimum away from the EUT.
3. A scroll H test program was loaded and executed in Windows mode.
4. The EUT sent above message to Monitor and related peripherals through the test.
5. Selecting appropriate points of EUT for Contact discharge and put a mark on EUT to show tested point(s).
6. Other than contact discharge point(s); the Air discharge was scanned and put a mark on EUT to show tested point(s).
7. The following test condition was followed during the tests.

Note: As per the A2 to IEC 61000-4-2, a bleed resistor cable is connected between the EUT and HCP during the test.

The electrostatic discharges were applied as follows:

Amount of Discharges	Voltage	Coupling	Result (Pass/Fail)
Mini 25 / Point	+/- 4kV	Contact Discharge	Pass
Mini 10 / Point	+/- 8kV	Air Discharge	Pass
Mini 25 / Point	+/- 4kV	Indirect Discharge HCP (Front)	Pass
Mini 25 / Point	+/- 4kV	Indirect Discharge VCP (Back)	N/A
Mini 25 / Point	+/- 4kV	Indirect Discharge VCP (Right)	Pass
Mini 25 / Point	+/- 4kV	Indirect Discharge VCP (Left)	Pass

**** The tested points to EUT, please refer to attached pages.**

(Blue arrow mark for Contact discharge, red arrow mark for Air discharge)

Performance & Result:

☑ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☑ ***PASS*** ☐ ***FAILED***
Observation: No any function degraded during the tests.

The Tested Points of EUT:

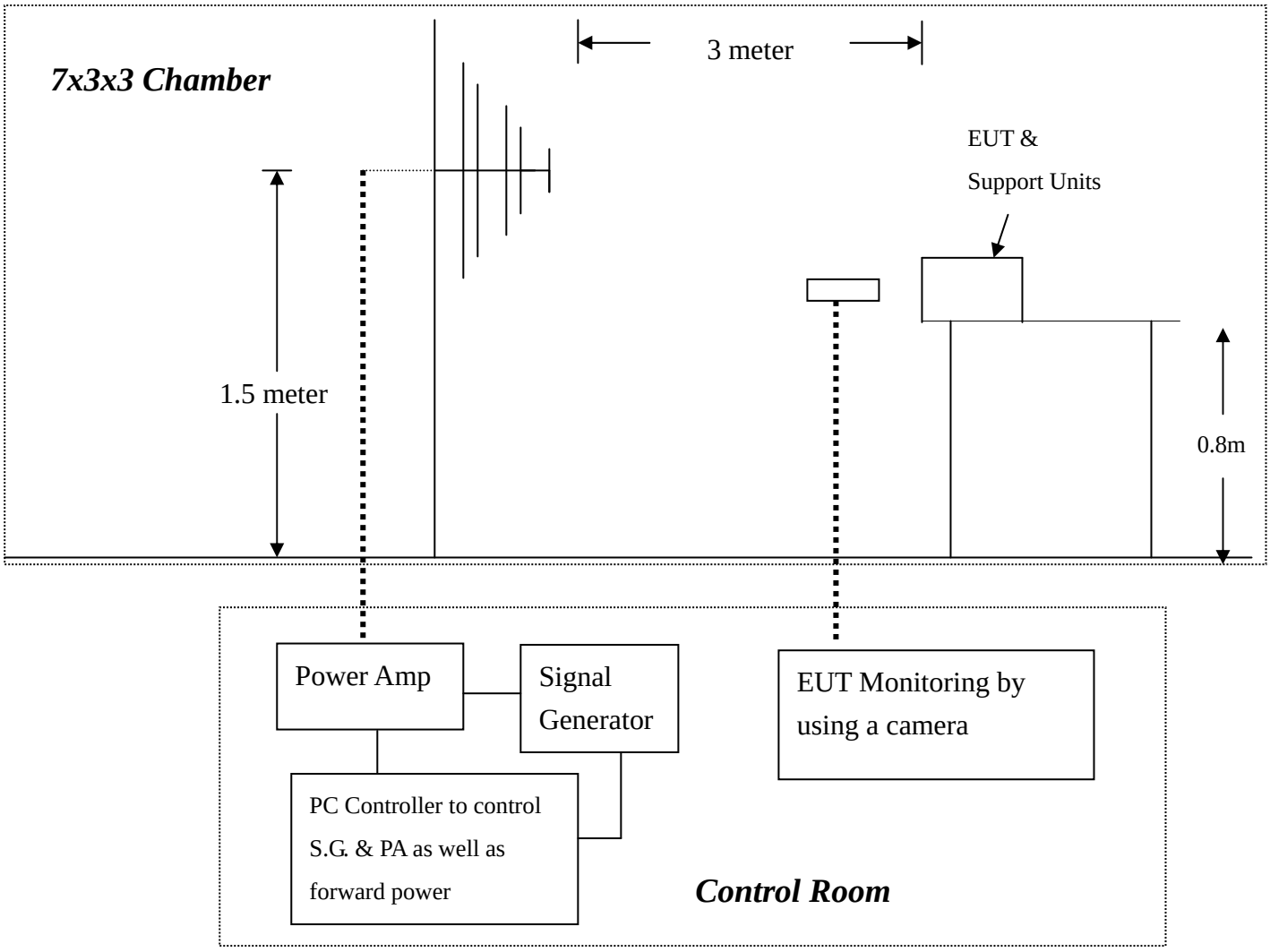
(Photo 1 of 1)

SECTION 4 IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

Port	**:** Enclosure
Basic Standard	**:** IEC 61000-4-3
Requirements	**:** 3 V/m / with 80% AM. 1kHz Modulation.
Performance Criteria	**:** A (Standard require)
Tester	**:** Stan Lin
Temperature	**:** 17^{o}C
Humidity	**:** 58%

Block Diagram of Test Setup:



Test Procedure:

1. The EUT and support units were located at the edge of supporting table keep 3 meter away from transmitting antenna, it just in the calibrated square area of field uniformity.
2. Adjusting the cables to be exposed to the electromagnetic filed as possible.
3. Performing a Radiated Emission Scan in range of 30 to 1000 MHz prior to do RS test and records the more higher emission frequencies for the reference of RS test, due to antenna effectiveness.
4. H messages were displayed on screen of Monitor.
5. Adjusting the monitoring camera to monitor the H message as clear as possible.
6. Setting the testing parameters of RS test software per IEC 61000-4-3.
7. Referring to the tested data of step 3 to performing the RS test from 80 to 1000 MHz.
8. Recording the test result in following table.
9. Changing the EUT to the other side and repeat step 3 to 7, until 4 sides of EUT were verified.

IEC 61000-4-3 Preliminary test conditions:

Test level : 6V/m
Steps : 4 % of fundamental
Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Polarity	Position (°)	Result (Pass/Fail)
80-1000	6V	Yes	H	Front	Pass
80-1000	6V	Yes	V	Front	Pass
80-1000	6V	Yes	H	Right	Pass
80-1000	6V	Yes	V	Right	Pass
80-1000	6V	Yes	H	Back	Pass
80-1000	6V	Yes	V	Back	Pass
80-1000	6V	Yes	H	Left	Pass
80-1000	6V	Yes	V	Left	Pass

IEC 61000-4-3 Final test conditions:

Test level : 3V/m
Steps : 1 % of fundamental
Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Polarity	Position (°)	Result (Pass/Fail)
80-1000	3V	Yes	H	Front	Pass
80-1000	3V	Yes	V	Front	Pass

Performance & Result:

[V] **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

[ ] **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

[ ] **Criteria C:** Temporary loss of function is allowed, provided the functions self-recoverable or can be restored by the operation of controls.

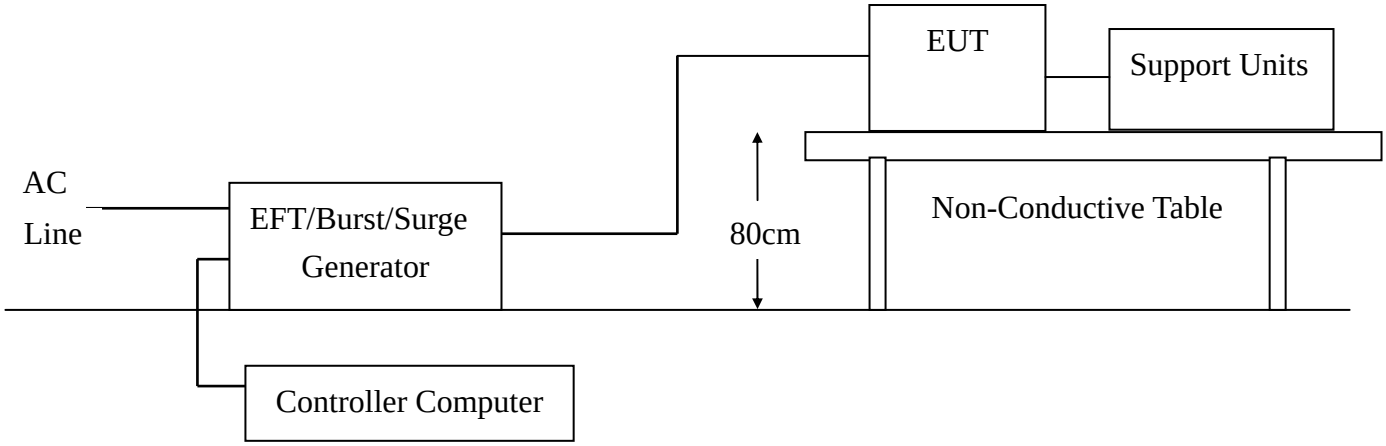
[V] ***PASS*** [ ] ***FAILED***
Observation: No any function degraded during the tests.

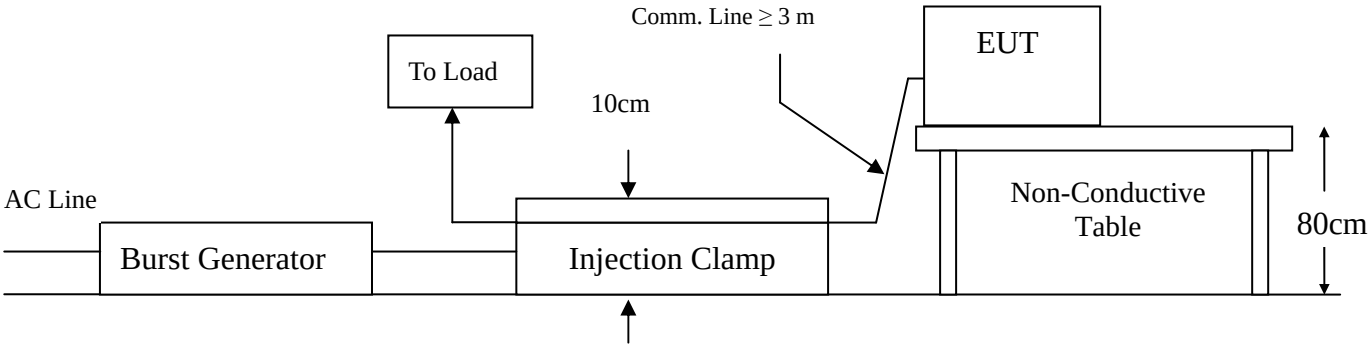
SECTION 5 IEC 61000-4-4 (FAST TRANSIENTS/BURST)

FAST TRANSIENTS/BURST IMMUNITY TEST

Port	**:** On Power Supply Lines and LAN Cable
Basic Standard	**:** IEC 61000-4-4
Requirements	**:** +/- 1kV for Power Supply Lines +/- 0.5kV for LAN Cable
Performance Criteria	**:** B (Standard require)
Tester	**:** Andy Yuan
Temperature	**:** 15°C
Humidity	**:** 50%

Block Diagram of Test Setup:





Test Procedure:

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The support units were located 1 m minimum away from the EUT.
3. A scroll H test program was loaded and executed in DoS mode at Windows environment.
4. The EUT sent above message to Monitor and related peripherals through the test.
5. The following test condition was followed during the tests.

Test conditions:
Impulse Frequency: 5kHz
Tr/Th: 5/50ns
Burst Duration: 15ms
Burst Period: 3Hz

Inject Line	Voltage kV	Inject Method	Result (Pass/Fail)
L1	+/- 1	Direct	Pass
N	+/- 1	Direct	Pass
PE	+/- 1	Direct	Pass
L1+N	+/- 1	Direct	Pass
L1+PE	+/- 1	Direct	Pass
N+PE	+/- 1	Direct	Pass
L1 + N + PE	+/- 1	Direct	Pass
LAN Cable	+/- 0.5	Clamp	Pass

Performance & Result:

[V] **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

[ ] **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

[ ] **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

[V] ***PASS*** [ ] ***FAILED***

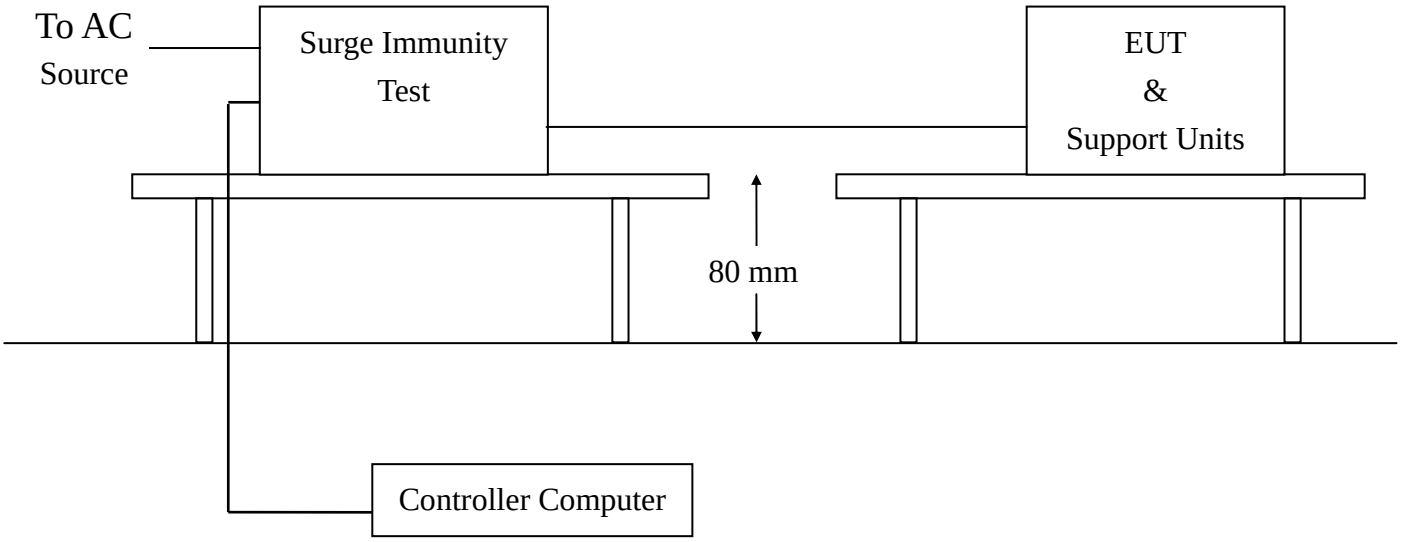
Observation: No any function degraded during the tests.

SECTION 6 IEC 61000-4-5 (SURGE IMMUNITY)

SURGE IMMUNITY TEST

Port	**:** Power Cord
Basic Standard	**:** IEC 61000-4-5
Requirements	**:** +/- 1kV (Line to Line)
	: +/- 2kV (Line to Ground)
Performance Criteria	**:** B (Standard require)
Tester	**:** Andy Yuan
Temperature	**:** 15°C
Humidity	**:** 50%

Block Diagram of Test Setup:



Test Procedure:

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The support units were located 1 m minimum away from the EUT.
3. A scroll H test program was loaded and executed in DoS mode at Windows environment.
4. The EUT sent above message to Monitor and related peripherals through the test.
5. The following test condition was followed during the tests.

Test conditions:
Voltage Waveform : 1.2/50 *u*s
Current Waveform : 8/20 *u*s
Polarity : Positive/Negative
Phase angle : 0^o, 90^o, 270^o
Number of Test : 5

Coupling Line	Voltage (kV)	Polarity	Coupling Method	Result (Pass/Fail)
L1-L2	1	Positive	Capacitive	Pass
L1-PE	2	Positive	Capacitive	Pass
L2-PE	2	Positive	Capacitive	Pass
L1-L2	1	Negative	Capacitive	Pass
L1-PE	2	Negative	Capacitive	Pass
L2-PE	2	Negative	Capacitive	Pass

Performance & Result:

[V] **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

[ ] **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

[ ] **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

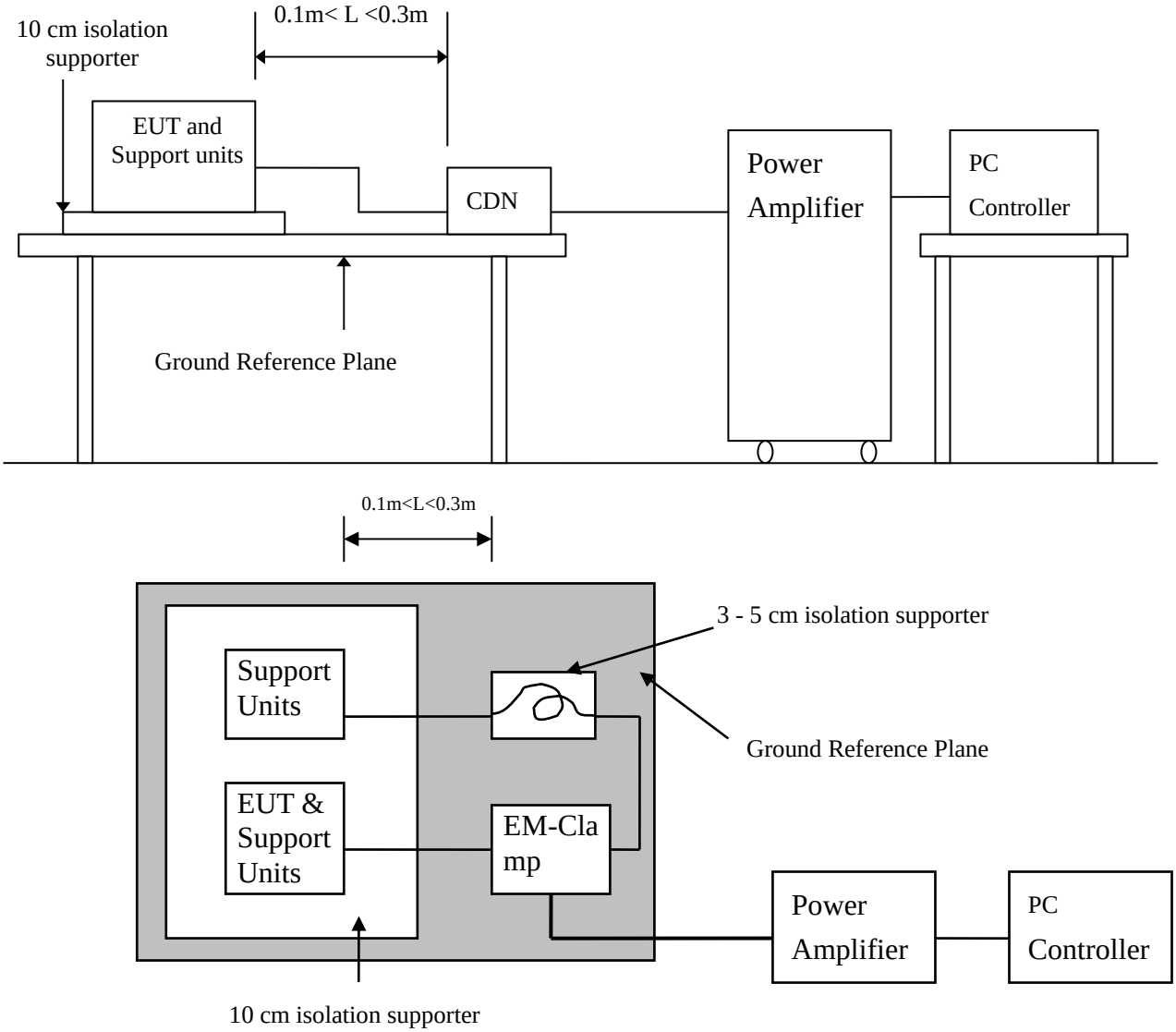
[V] ***PASS*** [ ] ***FAILED***

Observation: No any function degraded during the tests.

SECTION 7 IEC 61000-4-6 (CONDUCTED DISTRBANCE/INDUCED BY RADIO-FREQUENCY FIELD)

Port	**:** AC Port and LAN Cable
Basic Standard	**:** IEC 61000-4-6
Requirements	**:** 3V with modulated
Injection Method	**:** CDN-M3 for Power Cord
	EM-Clamp for LAN Cable
Performance Criteria	**:** A (Standard require)
Tester	**:** Stan Lin
Temperature	**:** 17°C
Humidity	**:** 58%

Block Diagram of Test Setup:



Test Procedure:

1. The EUT and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
2. A 'H' messages were displayed on Monitor.
3. Adjusting the monitoring camera to monitor the H message as clear as possible.
4. Setting the testing parameters of CS test software per IEC 61000-4-6.
5. Recording the test result in following table.

Test conditions:

Frequency Range : 0.15MHz-80MHz
Frequency Step : 1% of fundamental
Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Result (Pass/Fail)
0.15-80	3V	Yes	Pass

Performance & Result:

[V] **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

[ ] **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

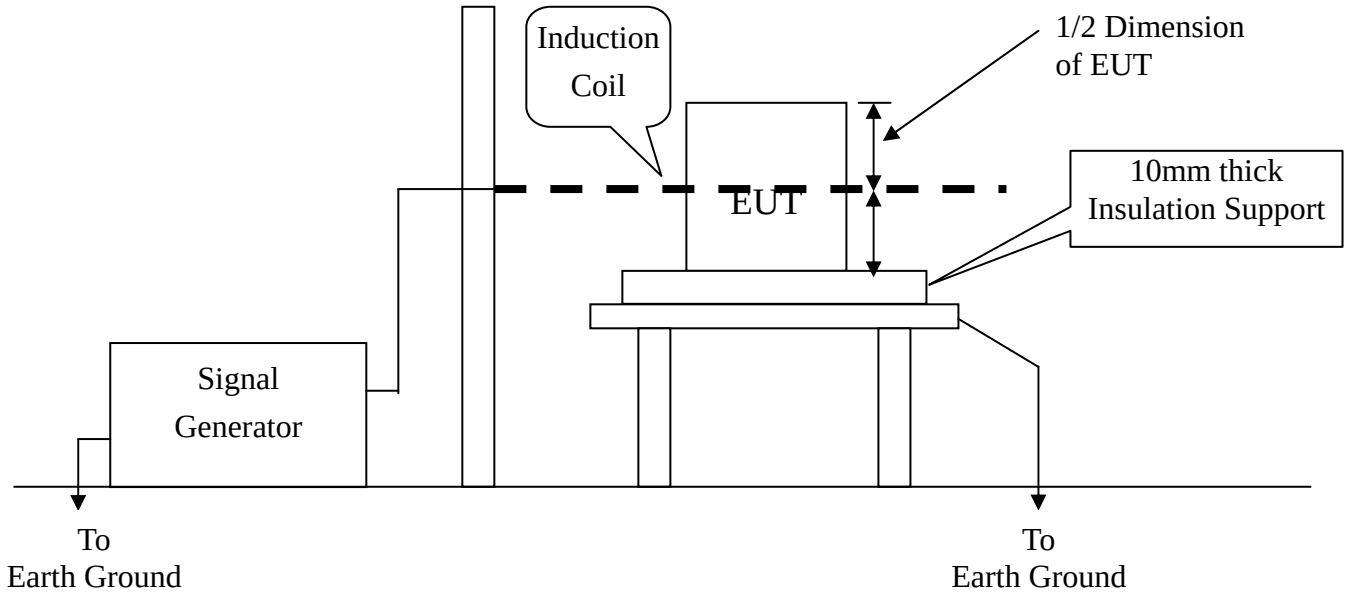
[ ] **Criteria C:** Temporary loss of function is allowed, provided the functions self-recoverable or can be restored by the operation of controls.

[V] ***PASS*** [ ] ***FAILED***
Observation: No any function degraded during the tests.

SECTION 8 IEC 61000-4-8 (POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST)

Port	**:** Enclosure
Basic Standard	**:** IEC 61000-4-8
Requirements	**:** 1 A/m
Performance Criteria	**:** A (Standard Required)
Tester	**:** Andy Yuan
Temperature	**:** 15 °C
Temperature / Humidity	**:** 50%

Block Diagram of Test Setup:



Test Procedure:

1. The EUT and support units were located on Ground Reference Plane with the interposition of a 0.1 m thickness insulation support.
2. Putting the induction coil on horizontal direction.(X direction)
3. A test program was loaded and executed in Windows mode.
4. The data was sent to the screen of EUT and filling the screen with upper case of "H" patterns.
5. The test program exercised related support units sequentially.
6. Repeating step 3 to 5 through the test.
7. Recording the test result as shown in following table.
8. Rotating the induction coil by 90° (Y direction) then repeat step 3 to 7.
9. Rotating the induction coil by 90° again (Z direction) then repeat step 3 to 7.

*. Test conditions:
Field Strength: 1A/m
Power Freq.: 50Hz
Orientation: X, Y, Z

Orientation	Field	Result (Pass/Fail)	Remark
X	1A	Pass	
Y	1A	Pass	
Z	1A	Pass	

Performance & Result:

☑ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☑ *PASS* ☐ *FAILED*
Observation: No any function degraded during the tests.

SECTION 9 IEC 61000-4-11 (VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS)

VOLTAGE DIPS / SHORT INTERRUPTIONS

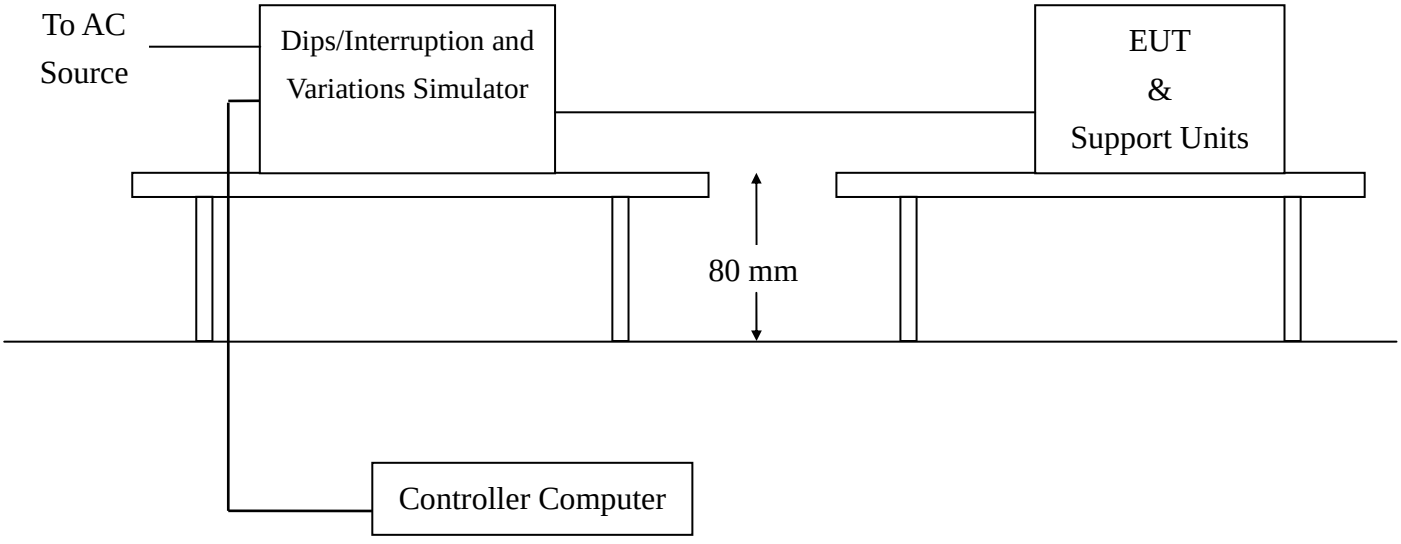
Port **:** AC mains
Basic Standard **:** IEC 61000-4-11 (1994)
Requirement **:** PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

	Test Level % U_T	Reduction (%)	Duration (periods)	Performance Criteria
Voltage Dips	<5	>95	0.5	B
	70	30	25	C

	Test Level % U_T	Reduction (%)	Duration (periods)	Performance Criteria
Voltage Interceptions	<5	>95	250	C

Test Interval **:** Min. 10 sec.
Tester **:** Andy Yuan
Temperature **:** 15°C
Humidity **:** 50%

Block Diagram of Test Setup:



Test Procedure:

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. A test program was loaded and executed in Windows mode.
3. The test program exercised related support units sequentially.
4. Setting the parameter of tests and then executed the test software of test simulator.
5. Repeating step 3 to 4 through the test.
6. Recording the test result in test record form.

Test conditions:

The duration with a sequence of three dips/interruptions with interval of 10 s minimum (Between each test event)

Voltage Dips:

Test Level % U_T	Reduction (%)	Duration (periods)	Observation	Meet Performance Criteria
0	100	0.5	Normal	A
70	30	25	Normal	A

Voltage Interruptions:

Test Level % U_T	Reduction (%)	Duration (periods)	Observation	Meet Performance Criteria
0	100	250	EUT shut down, but can be auto recovered by manual as the events disappear.	B

Normal: No any functions degrade during and after the test.

Performance & Result:

Criteria A: The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

Criteria B: The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

Criteria C: Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

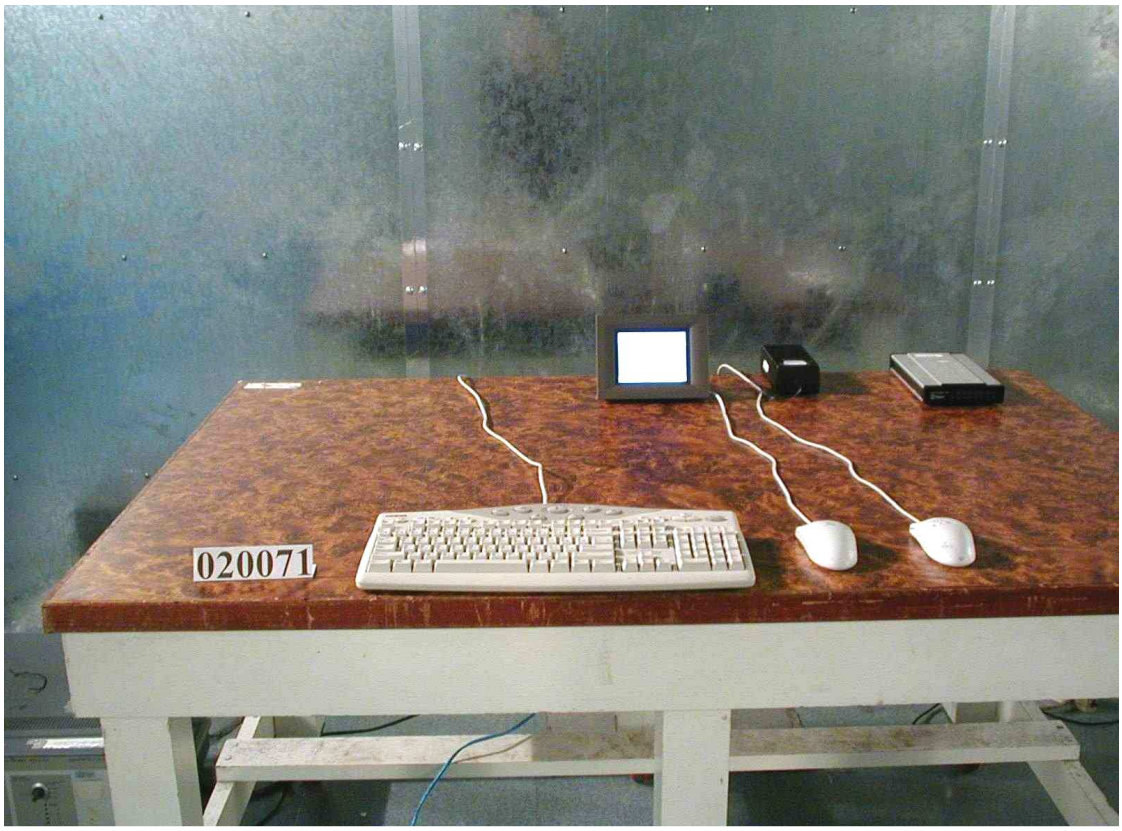
[V] ***PASS***	[ ] ***FAILED***

APPENDIX 1

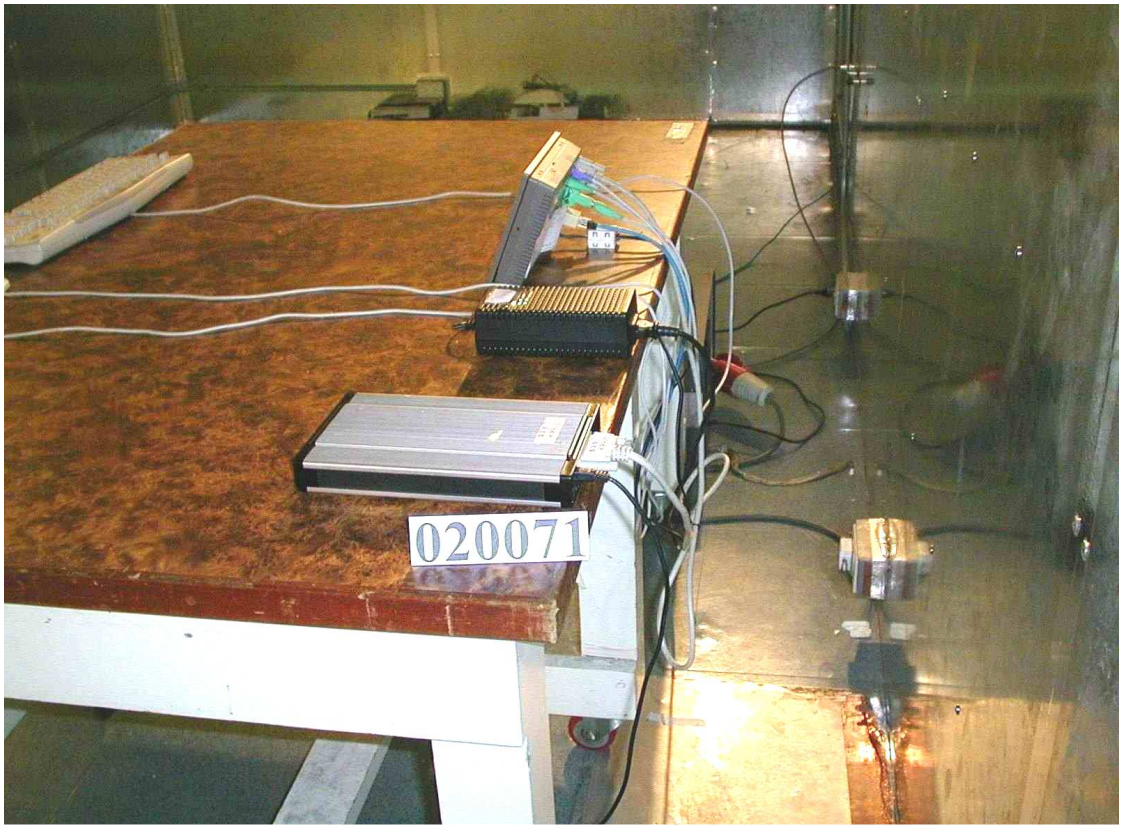
PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST (EN55022)

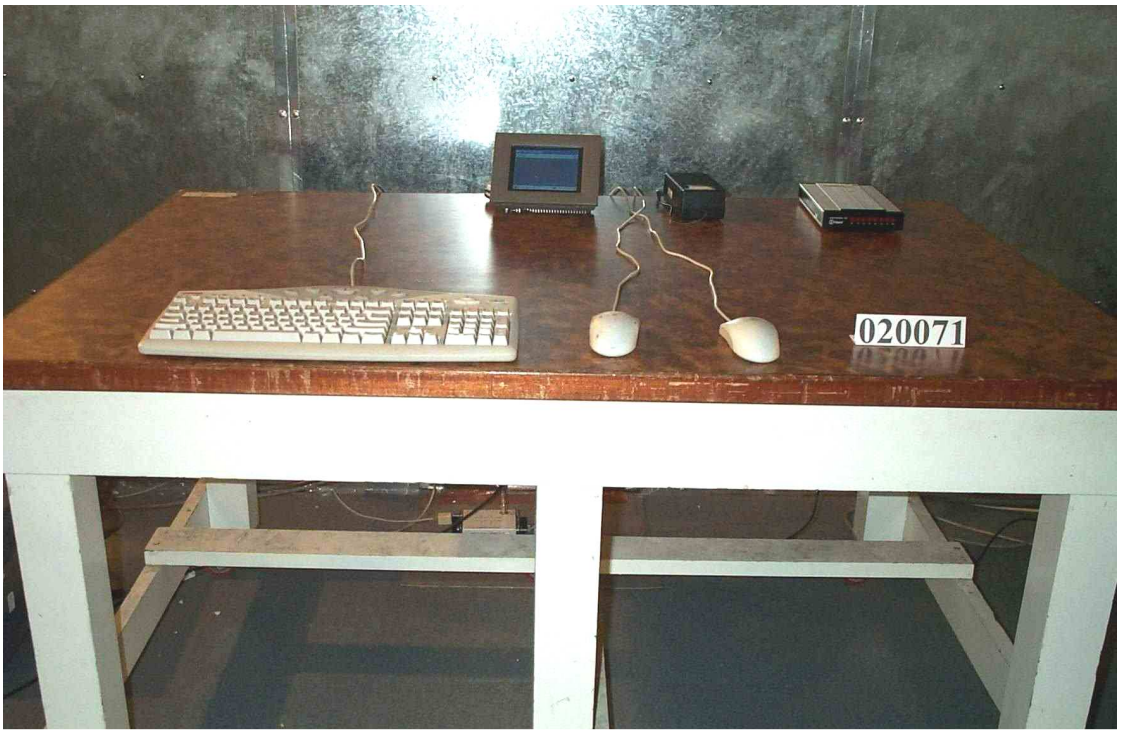
Front View



Back View



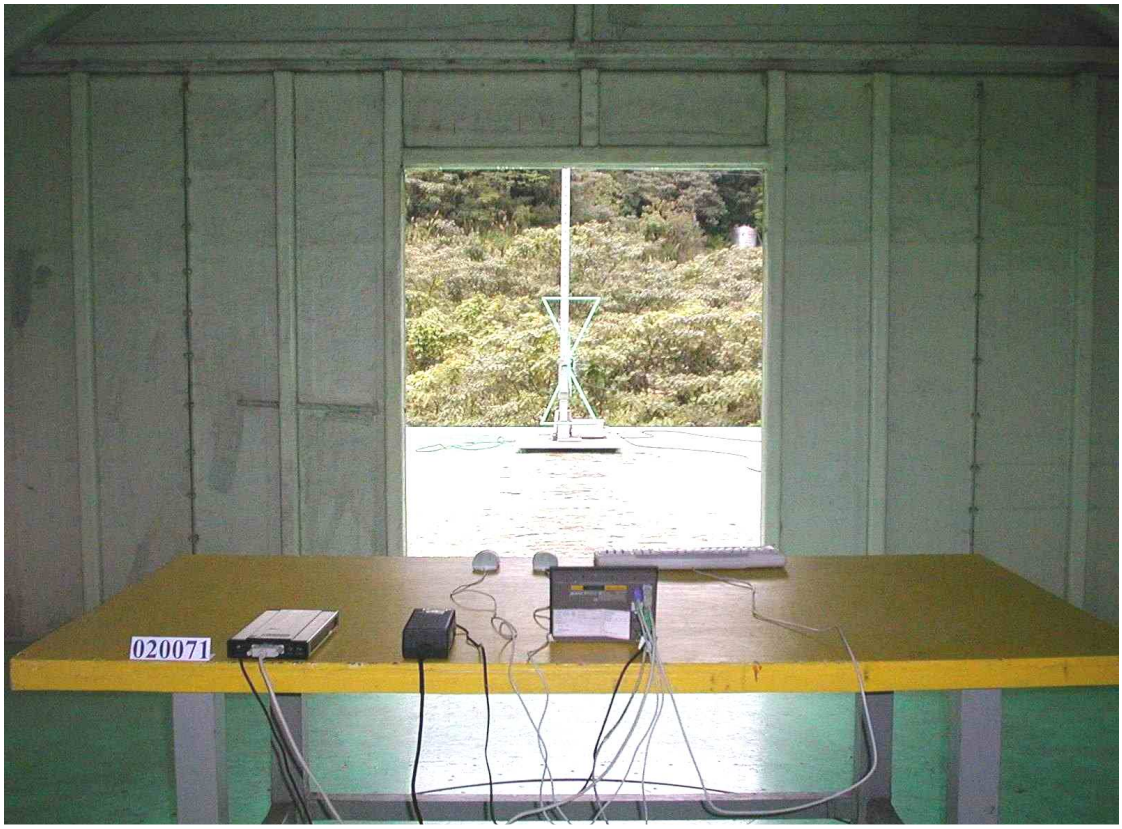
COMMON MODE CONDUCTED EMISSION TEST



RADIATED EMISSION TEST (EN55022)

Front View

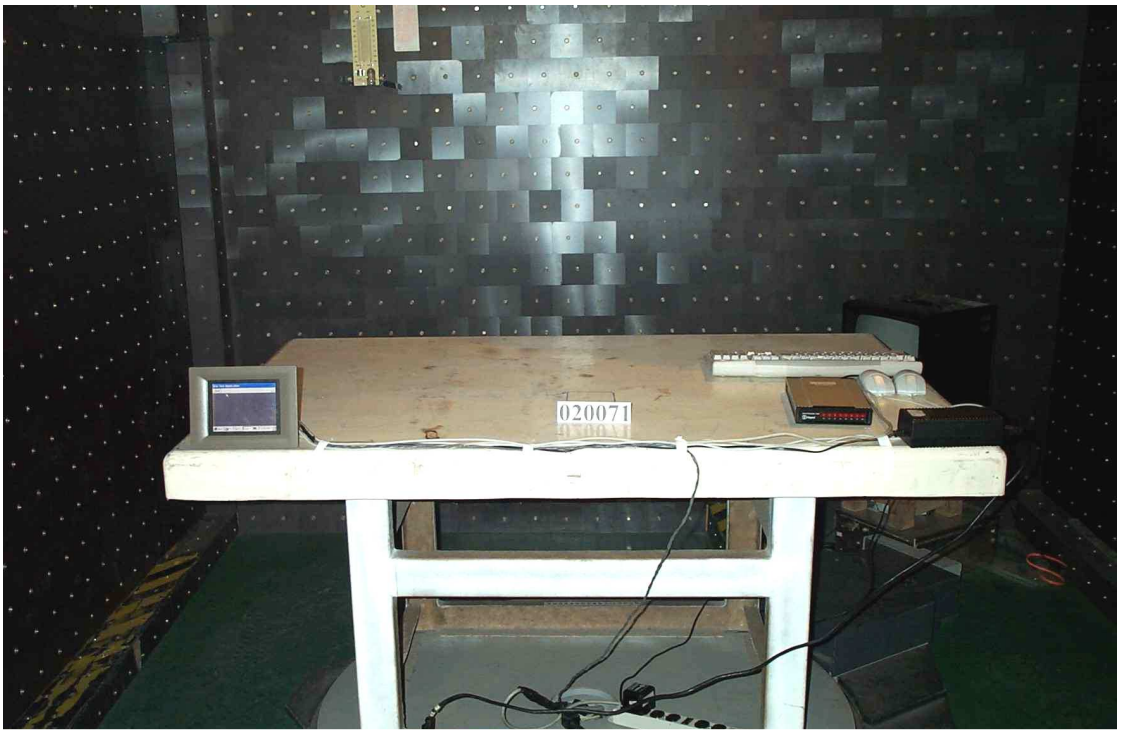
Back View



POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST (EN 61000-3-2; EN 61000-3-3)

ELECTROSTATIC DISCHARGE TEST (IEC 61000-4-2)

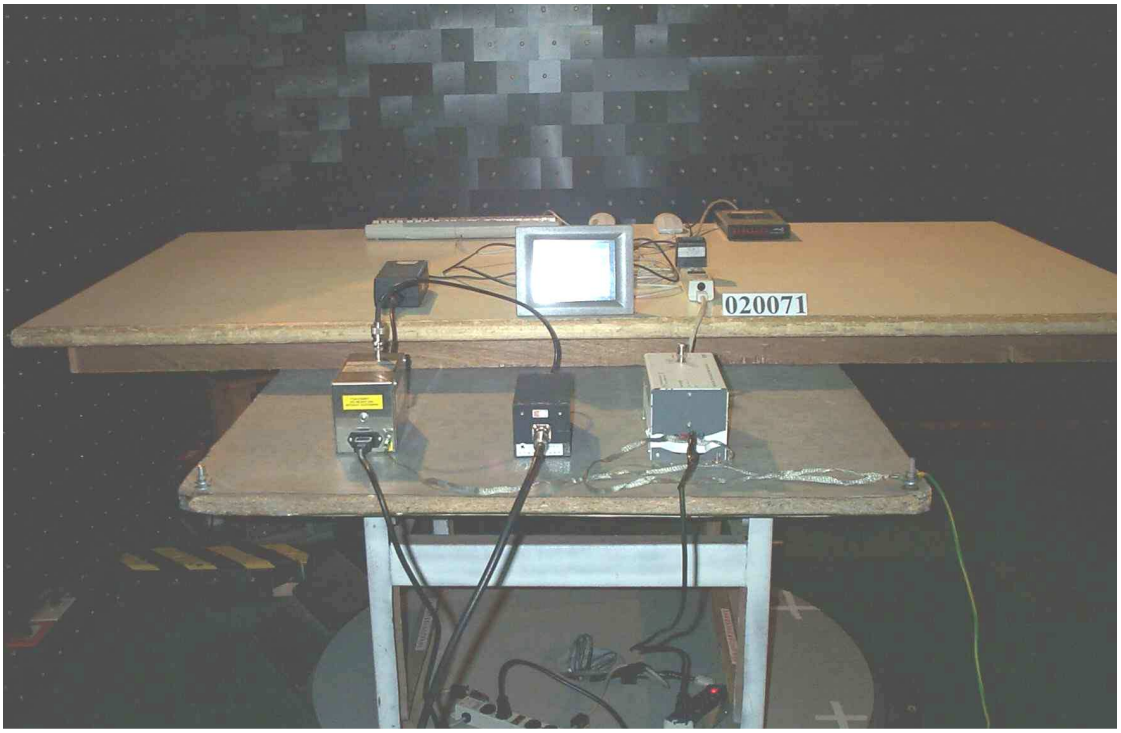
RADIATED ELECTROMAGNETIC FIELD (IEC 61000-4-3)

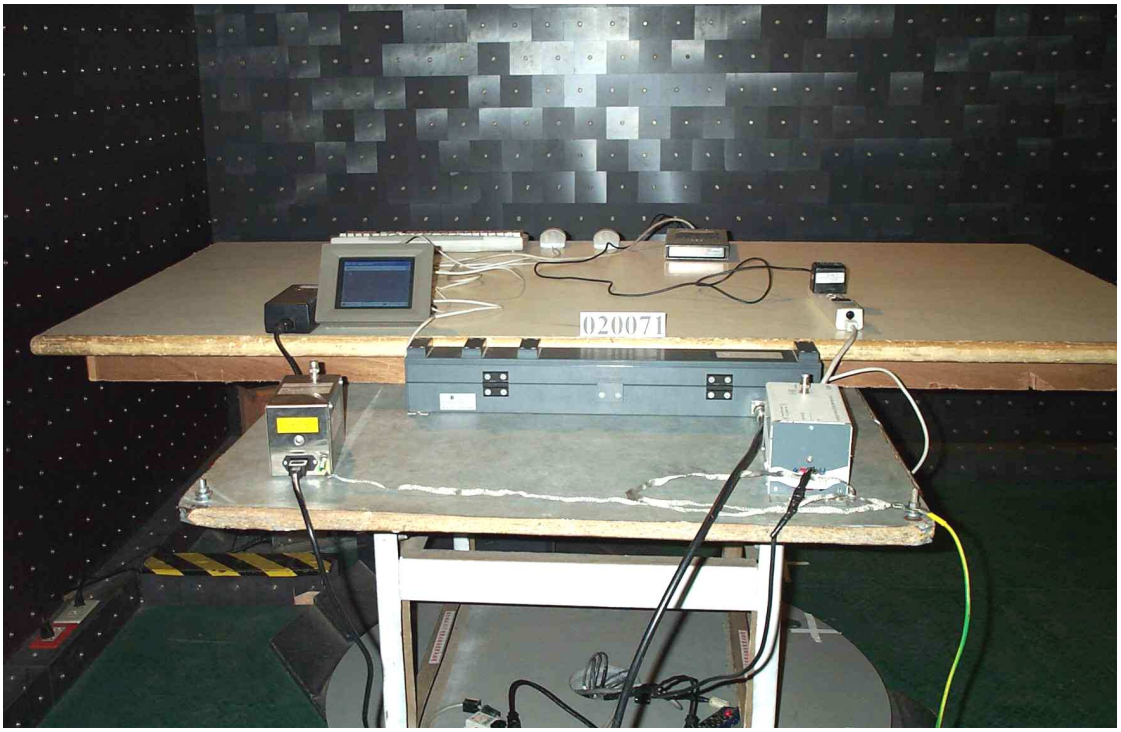


FAST TRANSIENTS/BURST TEST (IEC 61000-4-4)

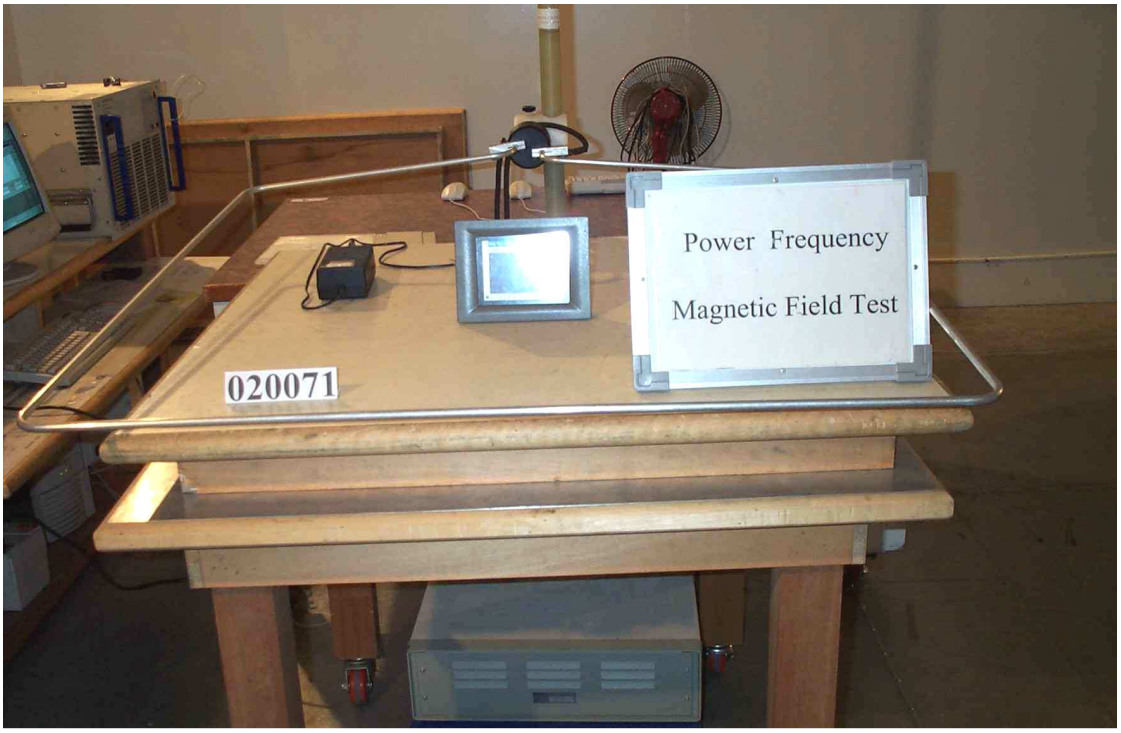
SURGE IMMUNITY TEST (IEC 61000-4-5)

CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST (IEC 61000-4-6)

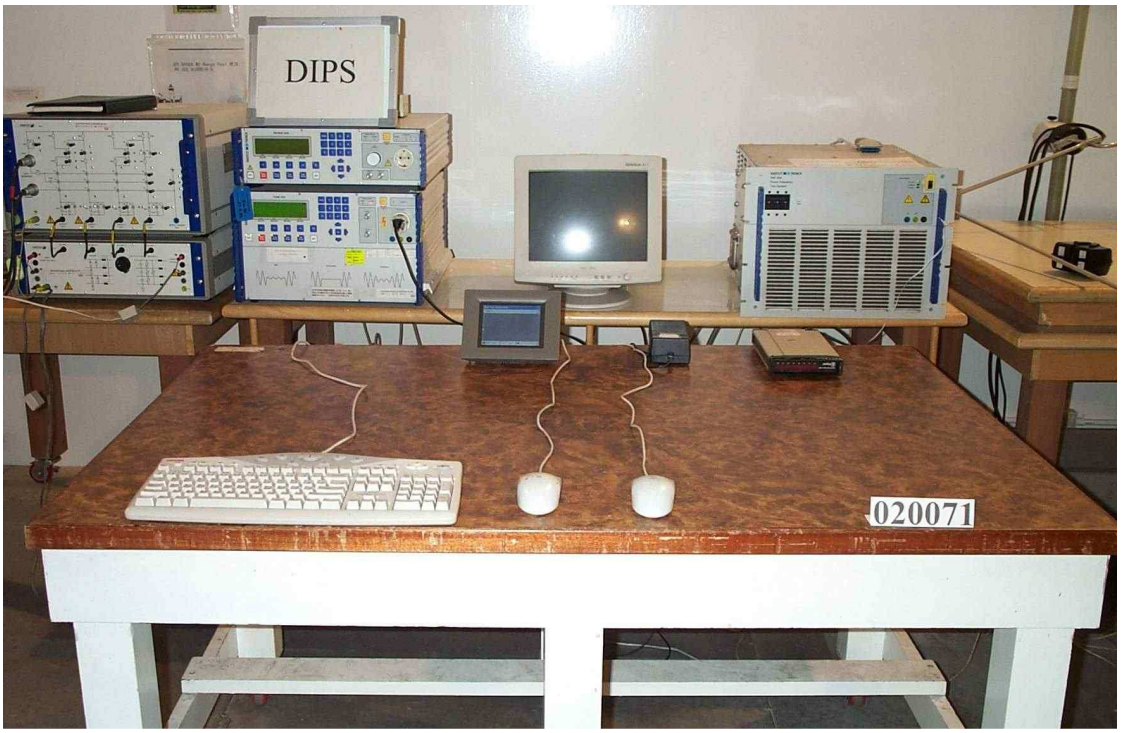




POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST
(IEC 61000-4-8)



VOLTAGE DIPS / INTERRUPTION TEST (IEC 61000-4-11)



APPENDIX 2

PHOTOGRAPHS OF EUT

Front View of EUT

Back View of EUT

Left View of EUT

Right View of EUT

LABEL of EUT


CAUTION
COMPACT FLASH
TURN OFF POWER BEFORE INSERTING OR REMOVING
Fl.4, No. 108-3, Ming-Chung Rd. Shing-Tien City, Taipei, Taiwan, R.O.C.
MADE IN TAIWAN
ADVANTECH
MODEL: TPC-642S
INPUT: 24Vdc 1.5A
Tested To Comply With FCC Standards FOR HOME OR OFFICE USE
S/N :
This device complies with the requirments in part 15 of the FCC rule. Operation is subject to the following two conditons: (1) this device may not cause harmful interference, and (2) this device must accepet any interference received, including interference that may cause undesired operation.
CM
MADE IN TAIWAN