



EMC COMPLIANCE TEST REPORT

for

3U/6U CompactPCI 4-port RS-232/422/485

Trade Name : Advantech
Model Number : MIC-3612
Serial Number : N/A
Report Number : B30523010-E
Date : June 9, 2003
Regulations : See below

Standards	Results (Pass/Fail)
EN 55022: 1998 (Class A)	PASS
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998	PASS
EN 61000-3-3: 1995	PASS
EN 55024: 1998	PASS
- IEC 61000-4-2: 2001	PASS
- IEC 61000-4-3: 1995	PASS
- IEC 61000-4-4: 1995	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

Prepared for:

Advantech Co., Ltd.
No. 1, Alley 20, Lane 26, Rueiguang Road,
Neihu District, Taipei 114, R.O.C.

Prepared by:



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1 VERIFICATION OF COMPLIANCE

Equipment Under Test: 3U/6U CompactPCI 4-port RS-232/422/485
Trade Name: Advantech
Model Number: MIC-3612
Serial Number: N/A
Applicant: **Advantech Co., Ltd.**
No. 1, Alley 20, Lane 26, Rueiguang Road,
Neihu District, Taipei 114, R.O.C.
Manufacturer: **Advantech Co., Ltd.**
No. 1, Alley 20, Lane 26, Rueiguang Road,
Neihu District, Taipei 114, R.O.C.
Type of Test: EMC Directive 89/336/EEC for CE Marking
Technical Standards: EN 55022: 1998 (Class A)
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998
EN 61000-3-3: 1995
EN 55024: 1998 (IEC 61000-4-2: 2001, IEC 61000-4-3: 1995,
IEC 61000-4-4: 1995, IEC 61000-4-5: 1995,
IEC 61000-4-6: 1996, IEC 61000-4-8: 1993,
IEC 61000-4-11: 1994)
File Number: B30523010-E
Date of Test: May 29 ~ June 2, 2003
Deviation: According to applicant's declaration this EUT is a class A product, and to
be market in industrial environment only.
Condition of Test Sample: Normal
Final Result: Pass
Worst Data: See below

Test Item	Freq. (MHz)	Measured Data	Margin (M μ C)	Remark
Radiated Emission	585.20	39.3 (dB/m)	-7.7 dB (\pm 1.6672 dB)	
Conducted Emission	0.160	47.1 (dB)	-31.9 dB (\pm 2.8104 dB)	

- The negative sign in Margin cell means under the specific limit.
- This test result traceable to national or international standards.

The above equipment was tested by C&C Laboratory Co., Ltd. for compliance with the requirements set forth in EMC Directive 89/336/EEC and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Approved by:



Jonson Lee / EMC Director

Reviewed by:



Susan Su / Section Manager

2 GENERAL INFORMATION

Applicant: Advantech Co., Ltd.
No. 1, Alley 20, Lane 26, Rueiguang Road,
Neihu District, Taipei 114, R.O.C.

Contact Person: John Chou

Manufacturer: Advantech Co., Ltd.
No. 1, Alley 20, Lane 26, Rueiguang Road,
Neihu District, Taipei 114, R.O.C.

File Number: B30523010-E

Date of Test: May 29 ~ June 2, 2003

Equipment Under Test: 3U/6U CompactPCI 4-port RS-232/422/485

Model Number: MIC-3612

Serial Number: N/A

Type of Test: EMC Directive 89/336/EEC for CE Marking

Technical Standards: EN 55022: 1998 (Class A)
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998
EN 61000-3-3: 1995
EN 55024: 1998 (IEC 61000-4-2: 2001, IEC 61000-4-3: 1995,
IEC 61000-4-4: 1995, IEC 61000-4-5: 1995,
IEC 61000-4-6: 1996, IEC 61000-4-8: 1993,
IEC 61000-4-11: 1994)

**Frequency Range
(EN 55022):** 150kHz to 30MHz for Line Conducted Test
30MHz to 1000MHz for Radiated Emission Test

Test Site: C&C LABORATORY CO., LTD.
No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang,
Taoyuan, Taiwan, R.O.C.

3 SYSTEM DESCRIPTION

EUT Test Program:

1. Installed the EUT into a vacant PCI slot in Host PC.
2. EMI test program was loaded and executed Windows 2000 mode.
3. The I/O port of EUT e terminal by Host PC.
4. EMI test program sequentially exercised all related I/O's and accessories of Host PC.
5. Repeat 2 to 4 Test program is self-repeating throughout the test.

4 PRODUCT INFORMATION

Housing Type: N/A

EUT Power Rating: DCV from Slot of Host PC

AC Power during Test 230VAC/50Hz to Host PC

AC Power Cord Type: Unshielded, 1.8m (Detachable) to Host PC

OSC/Clock Frequencies: 14.7456MHz

I/O Port of EUT:

I/O PORT TYPES	Q'TY	TESTED WITH
1) PCI Port	1	1



5 SUPPORT EQUIPMENT

No.	Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
1.	Monitor	959NF	AQ19H2RT706139P	FCC DoC	SAMSUNG	Shielded, 1.8m with a core	Unshielded, 1.8m
2.	Modem	DM-1414	0304012267	IFAXDM1414	ACEEX	Unshielded, 1.8m	Unshielded, 1.8m
3.	Printer	STYLUS C60	DR3K039099	FCC DoC	EPSON	Unshielded, 1.8m	Unshielded, 1.8m
4.	PS/2 Keyboard	KB-0133	N/A	FCC DoC	Compaq	Shielded, 1.8m	N/A
5.	PS/2 Mouse	M-S69	N/A	FCC DoC	Compaq	Shielded, 1.8m	N/A

PC Configuration:

Power Supply Manufacturer:	PRT	Model:	PSA 300M
Memory Capacity:		Install:	128MB
CPU Manufacture:	Intel	Type:	Celeron 600 MHz
HDD Manufacturer:	Seagate	Model:	ST380021A (80GB)
CPU Card Manufacturer:	ADVANTECH	Model:	MIC-3365
Chassis Manufacturer:	ADVANTECH	Model:	MIC-3033

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.

6 TEST FACILITY

- Location:** No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R. O. C.
- Description:** There are four 3/10m open area test sites and three line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 16 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
- Registration also was made with Voluntary Control Council for Interference (VCCI).
- Site Accreditation:** Accredited by NEMKO (Authorization #: ELA 124) for EMC & A2LA (Certificate #: 824.01) for Emission
- Accredited by NVLAP (Certificate #: 200600-0)
- Also accredited by BSMI for the product category of Information Technology Equipment.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
- Ground Plane:** Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

Site # 3 & # 4 Line Conducted Test Site: At Shielding Room

7 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	N/A	N/A
EMI Test Receiver	R&S	ESCS30	845552/030	02/18/2003	02/17/2004
Bilog Antenna	CHASE	CBL 6112B	2462	01/11/2003	01/10/2004
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	08/17/2002	08/16/2003

Common Mode Conducted Emission Test Site: # 3

Common Mode Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
EMI Test Receiver	R&S	ESCS30	847793/012	12/21/2002	12/20/2003
LISN	R&S	ESH2-Z5	843285/010	12/16/2002	12/15/2003
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003

Power Harmonic & Voltage Fluctuation/Flicker Measurement:

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	10/14/2002	10/13/2003

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.

8 TEST EQUIPMENT LIST (IMMUNITY)

ESD test (61000-4-2)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
ESD Generator	SCHAFFNER	NSG438	170	04/24/2003	04/23/2004
Radiated Electromagnetic Field immunity Measurement (61000-4-3)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
S.G.	R&S	SMY02	100094	08/08/2002	08/07/2003
Power Amplifier	ar	150W1000	300300	N/A	N/A
Power Antenna	EMCO	93141	9712-1083	N/A	N/A
EM PROBE	GW	EMR-30	L-0013	05/23/2003	05/22/2004
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	08/22/2002	08/21/2003
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	09/03/2002	09/02/2003
CS test (61000-4-6)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
S.G.	R&S	SMY02	100094	08/08/2002	08/07/2003
Power Amplifier	ar	500A100A	300299	N/A	N/A
CDN	Lüthi	801-M3	1879	02/26/2003	02/25/2004
CDN	MEB	M2	A3002010	04/28/2003	04/27/2004
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	10/21/2002	10/20/2003
Clamp Meter	National	300K	11-5980 K	11/19/2002	11/18/2003
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	03/28/2003	03/27/2004

9 SECTION 1 EN 55022 (LINE CONDUCTED & RADIATED EMISSION)

9.1 MEASUREMENT PROCEDURE (PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 110VAC/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode was scanned during the preliminary test:

Mode:

1. Data Transmit

- 10) After the preliminary scan, we found the following test mode producing the highest emission level.

Mode: 1.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

MEASUREMENT PROCEDURE (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 10 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Q.P. mode, then the emission signal was re-checked using an A.V. detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. MHz	Q.P. Raw dBuV	Average Raw dBuV	Q.P. Limit dBuV	Average Limit dBuV	Q.P. Margin dB	Average Margin dB	Note
x.xx	43.95	---	79	66	-35.05	---	L1

Freq.	= Emission frequency in MHz
Raw dBuV	= Uncorrected Analyzer/Receiver reading + Insertion loss of LISN, if it > 0.5 dB
Limit dBuV	= Limit stated in standard
Margin dB	= Reading in reference to limit
Note	= Current carrying line of reading
“---“	= The emission level complied with the Average limits, with at least 2dB margin limits, so no further recheck.

Calculation example:

$$\text{Margin (dB)} = \text{RAW (dBuV)} - \text{Limit (dBuV)}$$

LINE CONDUCTED EMISSION LIMIT (EN 55022)

Frequency	Maximum RF Line Voltage	
	Q.P.	AVERAGE
150kHz-500kHz	79dBuV	66dBuV
500kHz-5MHz	73dBuV	60dBuV
5MHz-30MHz	73dBuV	60dBuV

Note: The lower limit shall apply at the transition frequency.

9.2 MEASUREMENT PROCEDURE (PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power source from the outlet socket under the turntable. All support equipment received 110VAC/60Hz power from another socket under the turntable, if any.
- 5) The antenna was placed at 10 meter away from the EUT as stated in EN 55022. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test mode was scanned during the preliminary test:

Mode:

1. Data Transmit

- 8) After the preliminary scan, we found the following test mode producing the highest emission level.

Mode: 1.

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for final testing.

MEASUREMENT PROCEDURE (FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
xx.xx	14.0	11.2	26.2	40	-13.8

Freq.	= Emission frequency in MHz
Raw Data (dBuV)	= Uncorrected Analyzer / Receiver reading
Corr. Factor (dB)	= Antenna factor + Cable loss – Amplifier gain
Emiss. Level (dBuV/m)	= Raw reading converted to dBuV/m and CF added
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Reading in reference to limit
P	= Peak Reading
Q	= Quasi-peak Reading
A	= Average Reading

Calculation example:

$$\text{Margin (dB)} = \text{Emiss. Level (dBuV/m)} - \text{Limits (dBuV/m)}$$

$$\text{Emission Level (dBuV/m)} = \text{Raw Data (dBuV)} + \text{Corr Factor (dB)}$$

RADIATED EMISSION LIMIT

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBu V/m/ Q.P.)
30-230	10	40
230-1000	10	47

Note: The lower limit shall apply at the transition frequency.

10 BLOCK DIAGRAM OF TEST SETUP

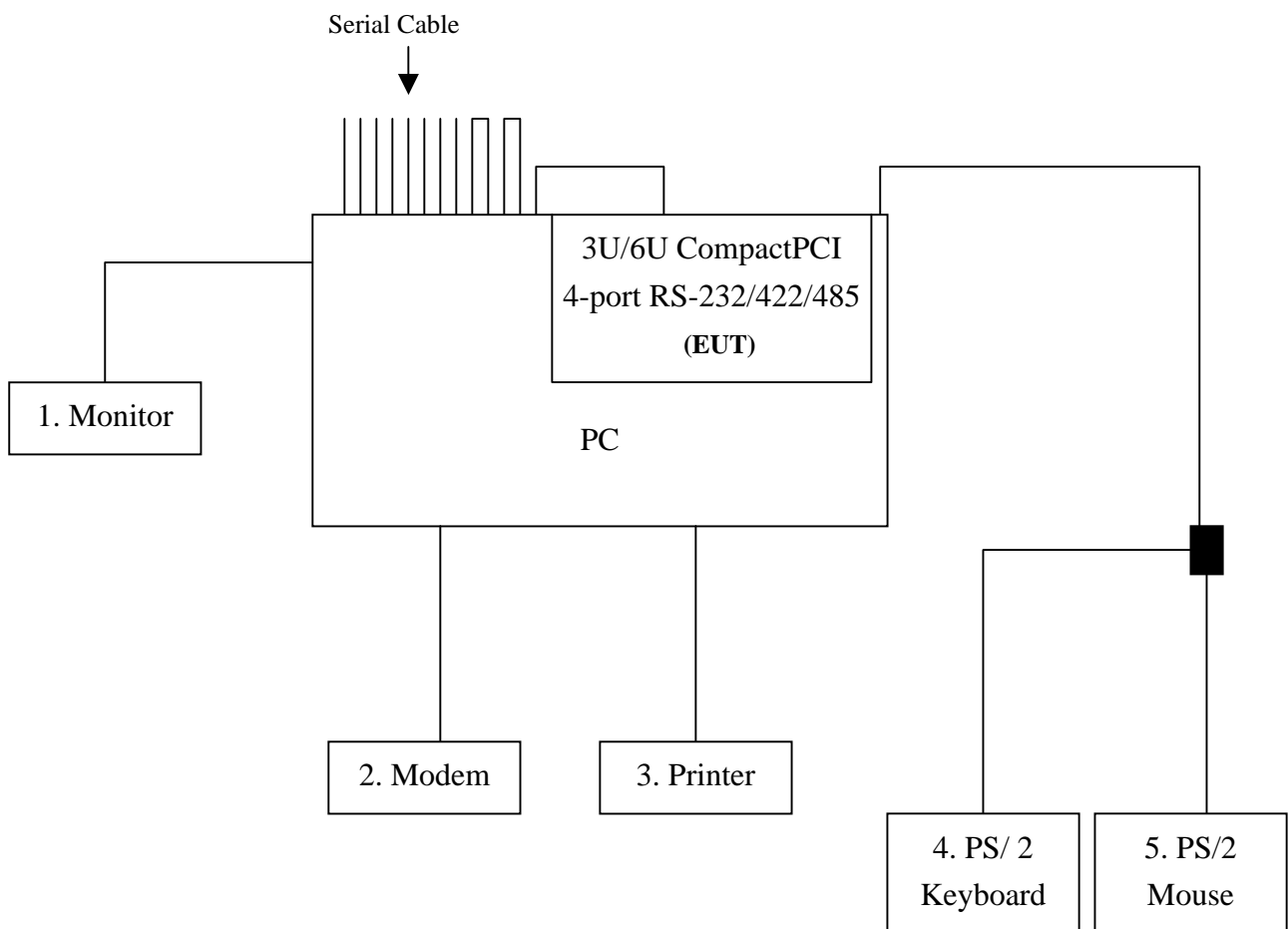
System Diagram of Connections between EUT and Simulators

EUT: 3U/6U CompactPCI 4-port RS-232/422/485

Trade Name: Advantech

Model Number: MIC-3612

Power Cord: Unshielded, 1.8m to Host PC



11 SUMMARY DATA

(LINE CONDUCTED TEST)

Model Number: MIC-3612

Location: Site # 3

Tested by: Vic Wang

Test Mode: Mode 1

Test Results: Passed

Temperature: 22°C

Humidity: 60%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
0.160	46.00	---	79.00	66.00	-33.00	---	L1
10.068	33.60	---	73.00	60.00	-39.40	---	L1
22.117	28.60	---	73.00	60.00	-44.40	---	L1
22.568	26.10	---	73.00	60.00	-46.90	---	L1
26.247	27.30	---	73.00	60.00	-45.70	---	L1
27.653	29.60	---	73.00	60.00	-43.40	---	L1
0.160	47.10	---	79.00	66.00	-31.90	---	L2
1.068	34.20	---	73.00	60.00	-38.80	---	L2
16.587	26.80	---	73.00	60.00	-46.20	---	L2
22.116	27.30	---	73.00	60.00	-45.70	---	L2
26.567	25.70	---	73.00	60.00	-47.30	---	L2
27.651	28.50	---	73.00	60.00	-44.50	---	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

(RADIATED EMISSION TEST)

Model Number: MIC-3612

Location: Site # 4

Tested by: George Liao

Polar: Vertical--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 32°C

Humidity: 70%RH

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

Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
66.83	10.4	8.1	18.5	40.0	-21.5
166.88	9.7	13.0	22.7	40.0	-17.3
233.88	6.6	14.2	20.8	47.0	-26.2
334.10	10.0	18.0	28.0	47.0	-19.0
585.20	14.8	24.5	39.3	47.0	-7.7
615.30	9.2	24.4	33.6	47.0	-13.4

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: MIC-3612

Location: Site # 4

Tested by: George Liao

Polar: Horizontal--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 32°C

Humidity: 70%RH

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

Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
112.49	9.1	14.2	23.3	40.0	-16.7
135.19	2.1	14.2	16.3	40.0	-23.7
166.82	12.0	13.0	25.0	40.0	-15.0
233.87	7.3	14.2	21.5	47.0	-25.5
501.09	9.6	23.1	32.7	47.0	-14.3
735.05	8.4	25.5	33.9	47.0	-13.1

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

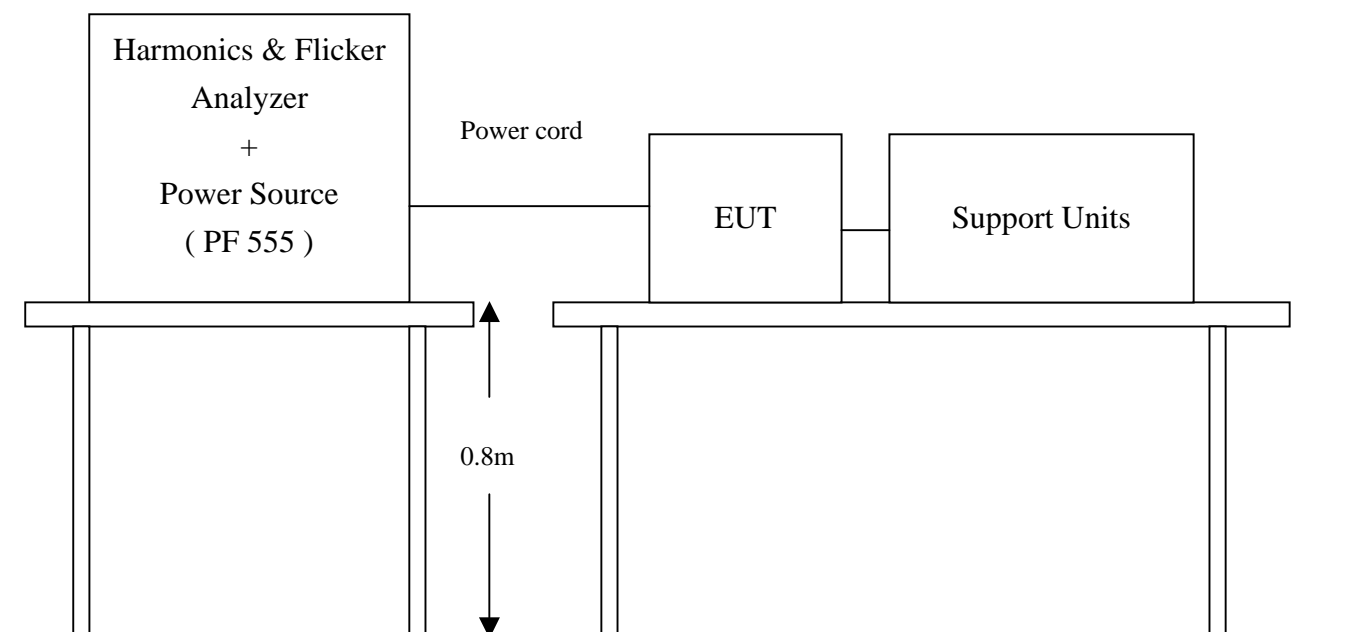
POWER HARMONICS MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998)
Limits : ☒ CLASS A ; ☐ CLASS D
Tester : Hank Huang
Temperature : 28°C
Humidity : 53%
Input Current Wave : Without special wave shape

VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-3 (1995)
Limits : § 5 of EN 61000-3-3
Tester : Hank Huang
Temperature : 28°C
Humidity : 53%

Block Diagram of Test Setup:



Result:

Please see the attached test data.



EN 61000-3-2 TEST REPORT 2003/6/2 08:36 PM

Unit: 3U/6U CompactPCI 4-port RS-232/422/485

Model No.: MIC-3612

Remarks: Temp: 28°C Humid: 53%

Operator: Hank Huang

=====

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: 80.3W



TEST DATA

Result: PASS

Harmonic Current Results

Hn	AMPS	LO Limit	HI Limit	Result
0	0.000	0.000	0.000	PASS
1	0.38	NaN	NaN	PASS
2	0.068	1.080	1.080	PASS
3	0.234	2.300	2.300	PASS
4	0.021	0.430	0.430	PASS
5	0.171	1.140	1.140	PASS
6	0.012	0.300	0.300	PASS
7	0.154	0.770	0.770	PASS
8	0.008	0.230	0.230	PASS
9	0.129	0.400	0.400	PASS
10	0.010	0.184	0.184	PASS
11	0.107	0.330	0.330	PASS
12	0.008	0.153	0.153	PASS
13	0.085	0.210	0.210	PASS
14	0.005	0.131	0.131	PASS
15	0.066	0.150	0.150	PASS
16	0.004	0.115	0.115	PASS
17	0.049	0.132	0.132	PASS
18	0.004	0.102	0.102	PASS
19	0.036	0.118	0.118	PASS
20	0.004	0.092	0.092	PASS



21	0.023	0.107	0.107	PASS
22	0.004	0.084	0.084	PASS
23	0.014	0.098	0.098	PASS
24	0.004	0.077	0.077	PASS
25	0.011	0.090	0.090	PASS
26	0.004	0.071	0.071	PASS
27	0.010	0.083	0.083	PASS
28	0.003	0.066	0.066	PASS
29	0.010	0.078	0.078	PASS
30	0.003	0.061	0.061	PASS
31	0.009	0.073	0.073	PASS
32	0.002	0.058	0.058	PASS
33	0.006	0.068	0.068	PASS
34	0.002	0.054	0.054	PASS
35	0.003	0.064	0.064	PASS
36	0.002	0.051	0.051	PASS
37	0.003	0.061	0.061	PASS
38	0.002	0.048	0.048	PASS
39	0.005	0.058	0.058	PASS
40	0.002	0.046	0.046	PASS

END OF REPORT



EN 61000-3-3 TEST REPORT 2003/6/2 09:05 PM

Unit: 3U/6U CompactPCI 4-port RS-232/422/485

Model No.: MIC-3612 (Continue)

Remarks: Temp: 28°C Humid: 53%

Operator: Hank Huang

=====

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	0.009	1.00	PASS	true
Plt max	0.009	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	0.021	0.400	PASS	true
% THD	0.03	3.00	PASS	true

END OF REPORT



EN 61000-3-3 TEST REPORT 2003/6/2 09:20 PM

Unit: 3U/6U CompactPCI 4-port RS-232/422/485

Model No.: MIC-3612 (Manual Switch)

Remarks: Temp: 28°C Humid: 53%

Operator: Hank Huang

=====

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	0.011	1.00	PASS	true
Plt max	0.011	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	0.021	0.400	PASS	true
% THD	0.03	3.00	PASS	true

END OF REPORT

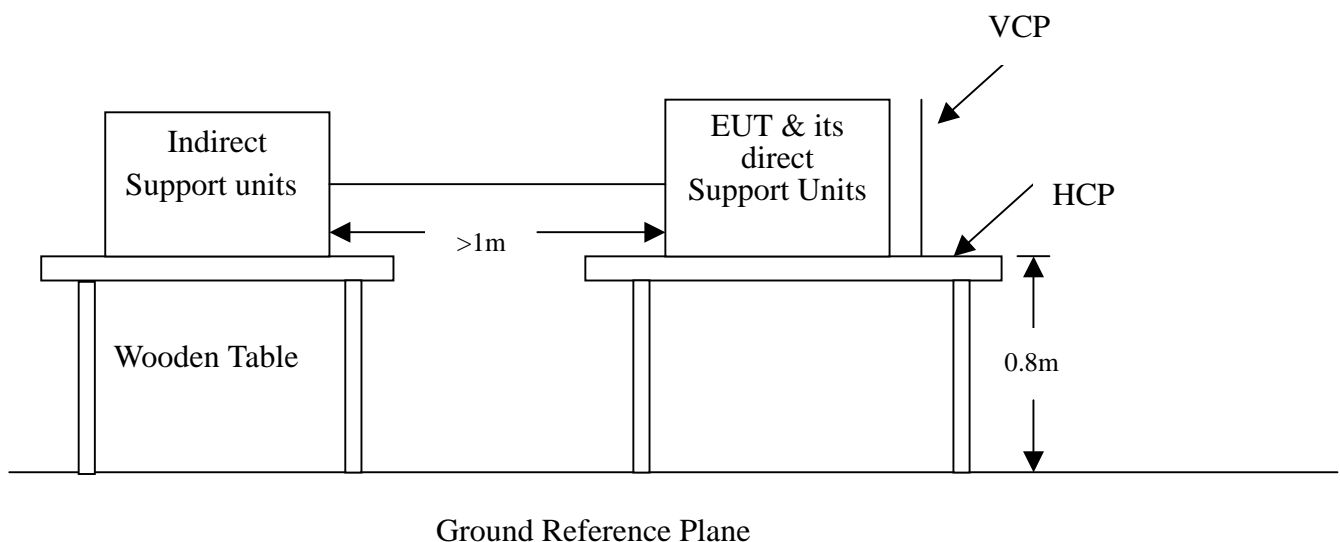
13 SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

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 Required)
Tester : Hank Huang
Temperature : 28°C
Humidity : 53%
Pressure : 1024mbar

Block Diagram of Test Setup:

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



Test Procedure:

1. The Host PC (included EUT) was located 0.1 m minimum from all side of the HCP.
2. The indirect support units were located 1m minimum away from the EUT, but direct support unit was/ were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
3. A scroll 'H' test program was loaded and executed in Windows 2000 mode.
4. The Host PC (included EUT) sent above message to monitor and related peripherals through the test.
5. Active the communication function if the EUT with such port(s).
6. As per the requirement of EN 55024; applying direct contact discharge at the sides other than front of EUT at minimum 50 discharges (25 positive and 25 negative) if applicable, can't be applied direct contact discharge side of EUT then the indirect discharge shall be applied. One of the test points shall be subjected to at least 50 indirect discharge (contact) to the front edge of horizontal coupling plane.
7. Other parts of EUT where it is not possible to perform contact discharge then selecting appropriate points of EUT for air discharge, a minimum of 10 single air discharges shall be applied.
8. The application of ESD to the contact of open connectors is not required.
9. The Host PC (included EUT) direct connection units also need to be applied ESD at the port of EUT cable connected
10. Putting a mark on EUT to show tested points. The following test condition was followed during the tests.

Note: As per IEC 61000-4-2:2001, with two 470k bleed resistors cable is connected between the EUT and HCP during the test applicable for power ungrounded or battery operating unit only.

The electrostatic discharges were applied as follows:

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

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

(Blue arrow mark for Contact Discharge and 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 3)



(Photo 2 of 3)



(Photo 3 of 3)

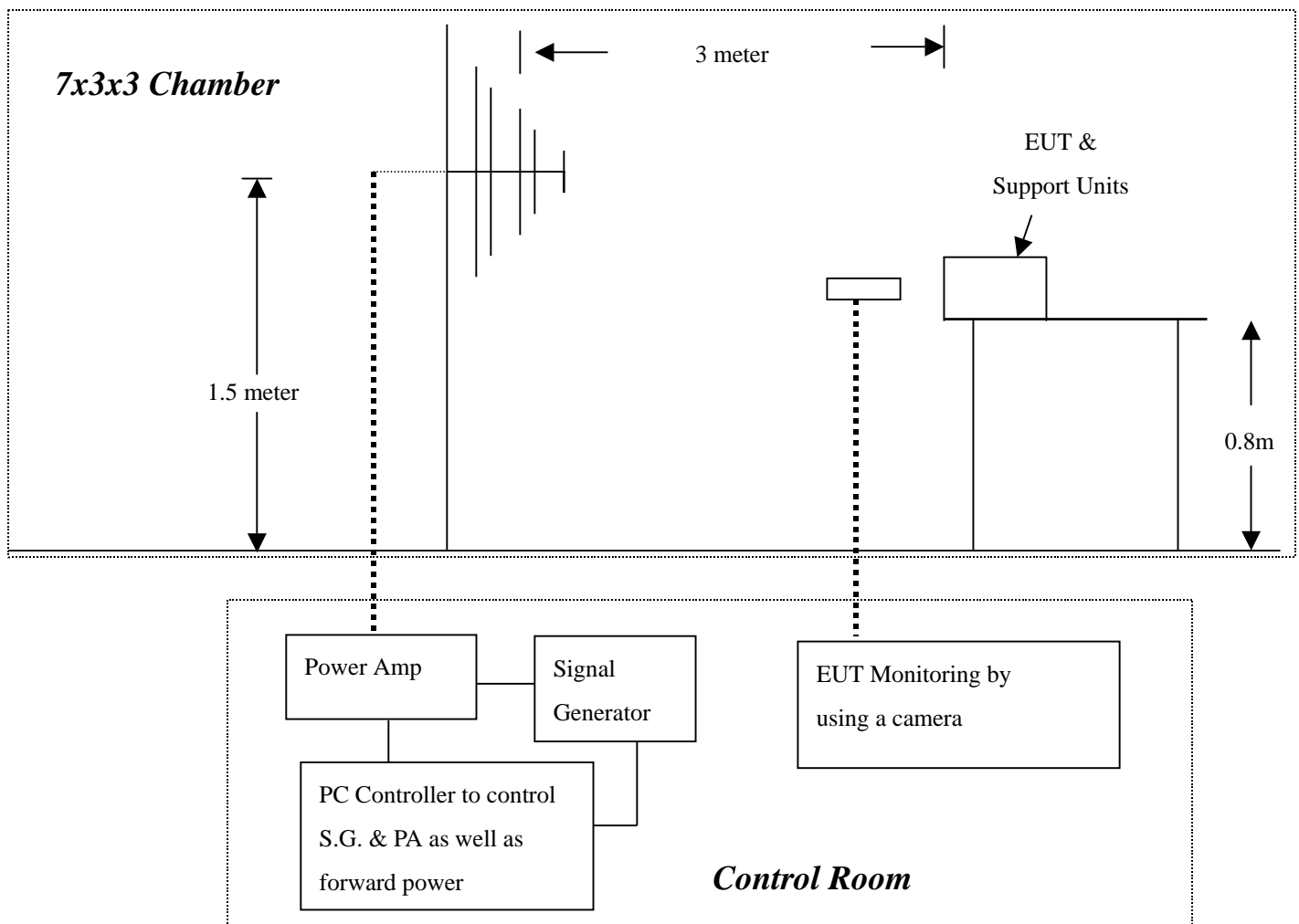


14 SECTION 4 IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

Port	: Enclosure
Basic Standard	: IEC 61000-4-3
Requirements	: 10 V/m / with 80% AM. 1kHz Modulation. (Customer Requested)
Performance Criteria	: A (Standard Required)
Tester	: Hank Huang
Temperature	: 28°C
Humidity	: 53%
Pressure	: 1024mbar

Block Diagram of Test Setup:



Test Procedure:

1. The Host PC (included EUT) and support units were located at the edge of supporting table keep 3 meter away from transmitting antenna, it just the calibrated square area of field uniformity.
2. Adjusting the cables to be exposed to the electromagnetic field 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. A '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 Host PC (included EUT) to the other side and repeat step 3 to 7, until 4 sides of EUT were verified.
10. It is not necessary to perform test as per annex A of EN 55024:1998 if the EUT doesn't belong to ITE product.

IEC 61000-4-3 test conditions:

Test level : 10V/m
Steps : 1 % of fundamental
Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Polarity	Position (°)	Result (Pass/Fail)
80-1000	10V/m	Yes	H	Front	Pass
80-1000	10V/m	Yes	V	Front	Pass
80-1000	10V/m	Yes	H	Right	Pass
80-1000	10V/m	Yes	V	Right	Pass
80-1000	10V/m	Yes	H	Back	Pass
80-1000	10V/m	Yes	V	Back	Pass
80-1000	10V/m	Yes	H	Left	Pass
80-1000	10V/m	Yes	V	Left	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**

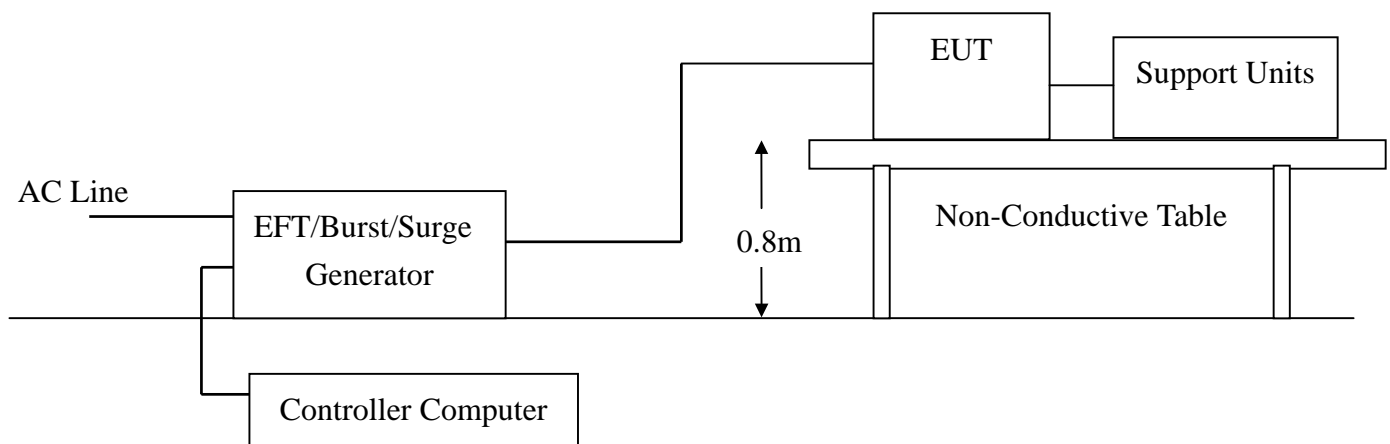
Observation: No any function degraded during the tests.

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

FAST TRANSIENTS/BURST IMMUNITY TEST

Port	: On Power Supply Lines
Basic Standard	: IEC 61000-4-4
Requirements	: ± 1 kV for Power Supply Line on PC
Performance Criteria	: B (Standard Required)
Tester	: Hank Huang
Temperature	: 28°C
Humidity	: 53%
Pressure	: 1024mbar

Block Diagram of Test Setup:



Test Procedure:

1. The Host PC (included EUT) and support units were located on a wooden table 0.8 m away from ground reference plane.
2. A test program was loaded and executed in Windows 2000 mode.
3. The data was sent to the screen of monitor and filling the screen with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Repeating step 3 to 4 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
6. Recording the test result as shown in following table.

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

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**

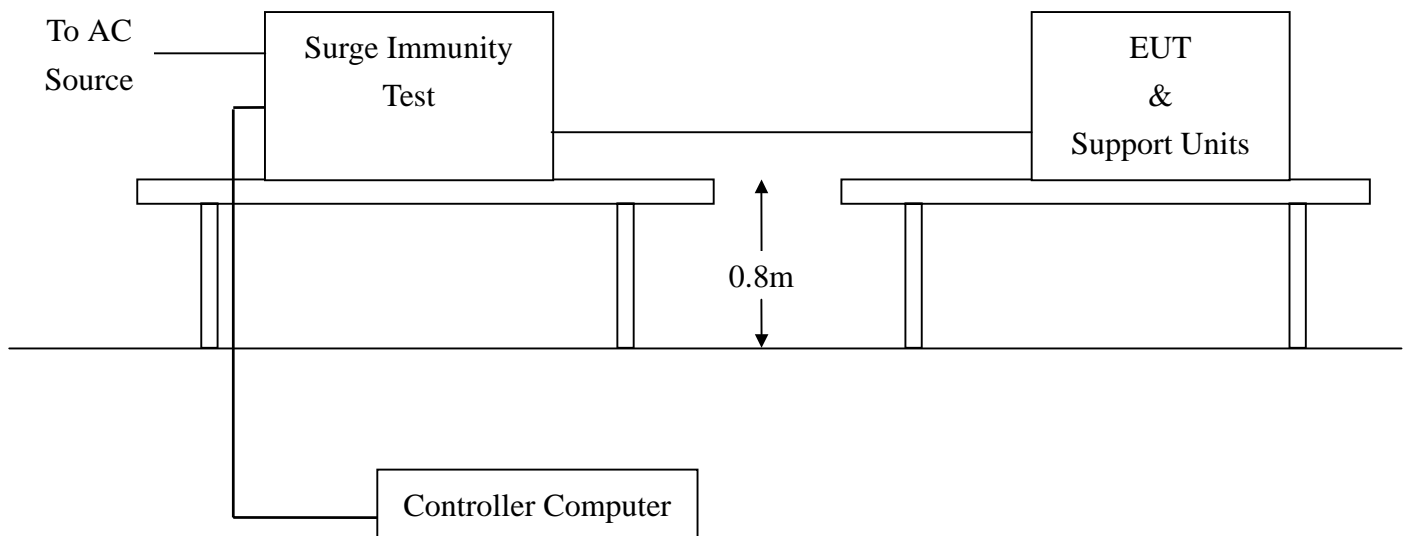
Observation: No any function degraded during the tests.

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

SURGE IMMUNITY TEST

Port : Power Cord
Basic Standard : IEC 61000-4-5
Requirements : ± 1 kV (Line to Line) on PC
 ± 2 kV (Line to Ground)
Performance Criteria : B (Standard require)
Tester : Hank Huang
Temperature : 28°C
Humidity : 53%
Pressure : 1024mbar

Block Diagram of Test Setup:



Test Procedure:

1. The Host PC (included 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 2000 mode.
3. The data was sent to the screen of Monitor and filling the screen with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Repeating step 3 to 4 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
6. Recording the test result as shown in following table.

Test conditions:

Voltage Waveform : 1.2/50 μ s
Current Waveform : 8/20 μ s
Polarity : Positive/Negative
Phase angle : 0°, 90°, 270°
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:

- ☒ **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**

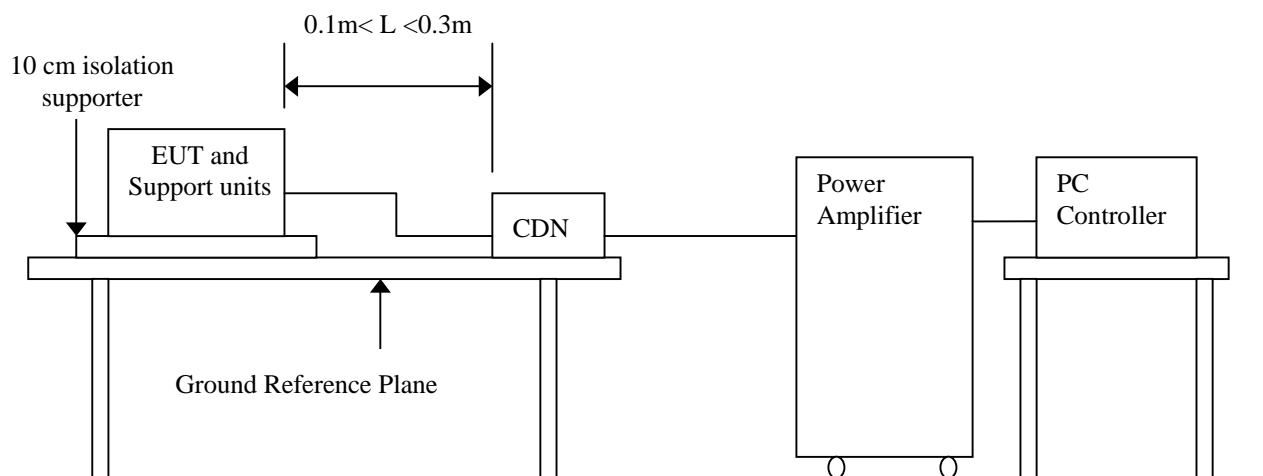
Observation: No any function degraded during the tests.

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

CONDUCTED DISTRBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

Port	: AC Port
Basic Standard	: IEC 61000-4-6
Requirements	: 10V with 80% Am, modulated (Customer Required)
Injection Method	: CDN-M3 for Power Cord on PC
Performance Criteria	: A (Standard Required)
Tester	: Hank Huang
Temperature	: 28°C
Humidity	: 53%
Pressure	: 1024mbar

Block Diagram of Test Setup:



Test Procedure:

1. The Host PC (included 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 Screen of 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	10V	Yes	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.

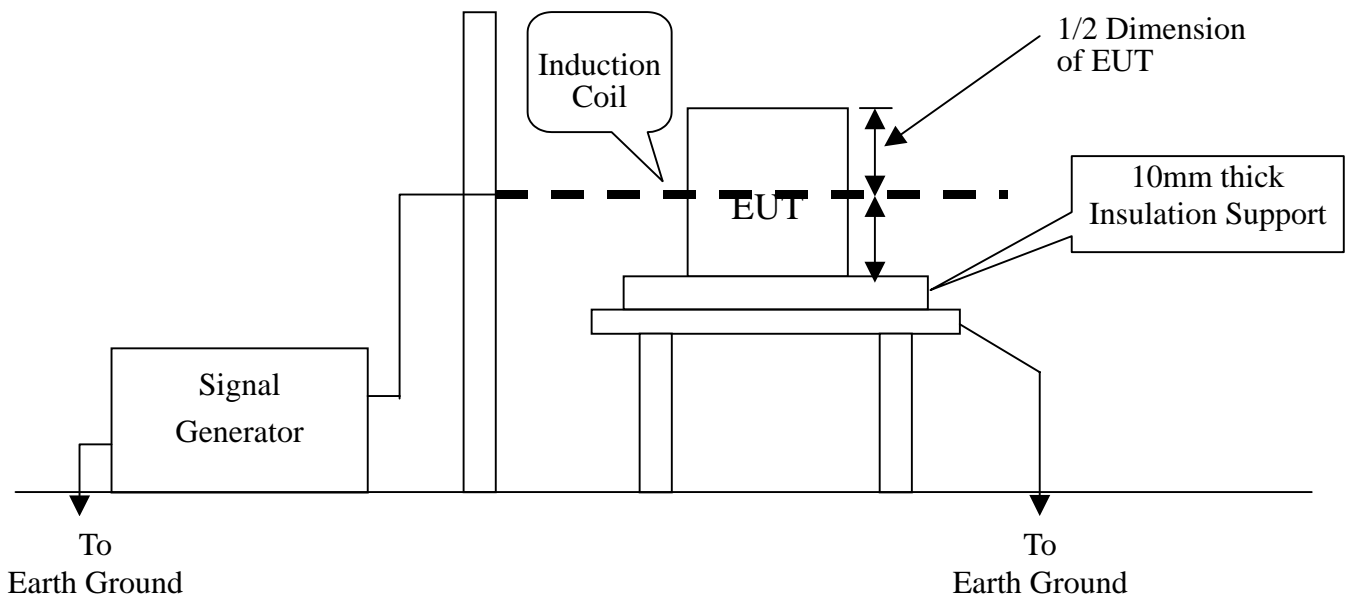
<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAILED
Observation: No any function degraded during the tests.

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

POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC 61000-4-8
Requirements : 1 A/m
Performance Criteria : A (Standard Required)
Tester : Hank Huang
Temperature : 28°C
Humidity : 53%
Pressure : 1024mbar

Block Diagram of Test Setup:



Test Procedure:

1. The Host PC (included 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 2000 mode.
4. A 'H' messages were displayed on Screen of Monitor.
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/m	Pass	
Y	1A/m	Pass	
Z	1A/m	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.

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

VOLTAGE DIPS / SHORT INTERRUPTIONS

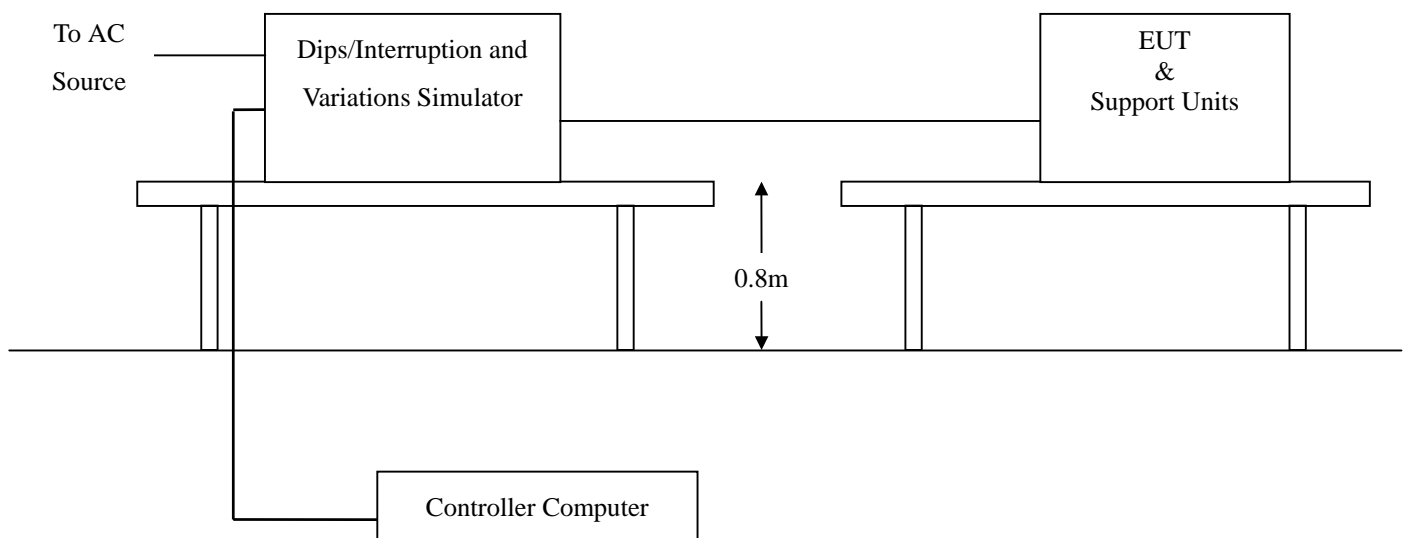
Port : AC mains
Basic Standard : IEC 61000-4-11 (1994)
Requirement : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

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

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

Test Interval : Min. 10 sec.
Tester : Hank Huang
Temperature : 28°C
Humidity : 53%
Pressure : 1024mbar

Block Diagram of Test Setup:



Test Procedure:

1. The Host PC (included 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 data was sent to the screen of monitor and filling the screen with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Setting the parameter of tests and then Perform the test software of test simulator.
6. Repeating step 3 to 4 through the test.
7. 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 recovered by manual, as the events disappear.	C

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.

<input checked="checked" type="checkbox"/> PASS	<input type="checkbox"/> FAILED
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20 APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

20.1 LINE CONDUCTED EMISSION TEST (EN 55022)

Front View



Back View



20.2 RADIATED EMISSION TEST (EN 55022)

Front View



Back View



20.3 POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST

(EN 61000-3-2, EN 61000-3-3)



20.4 ELECTROSTATIC DISCHARGE TEST (IEC 61000-4-2)



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



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



20.7 SURGE IMMUNITY TEST (IEC 61000-4-5)



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



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



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



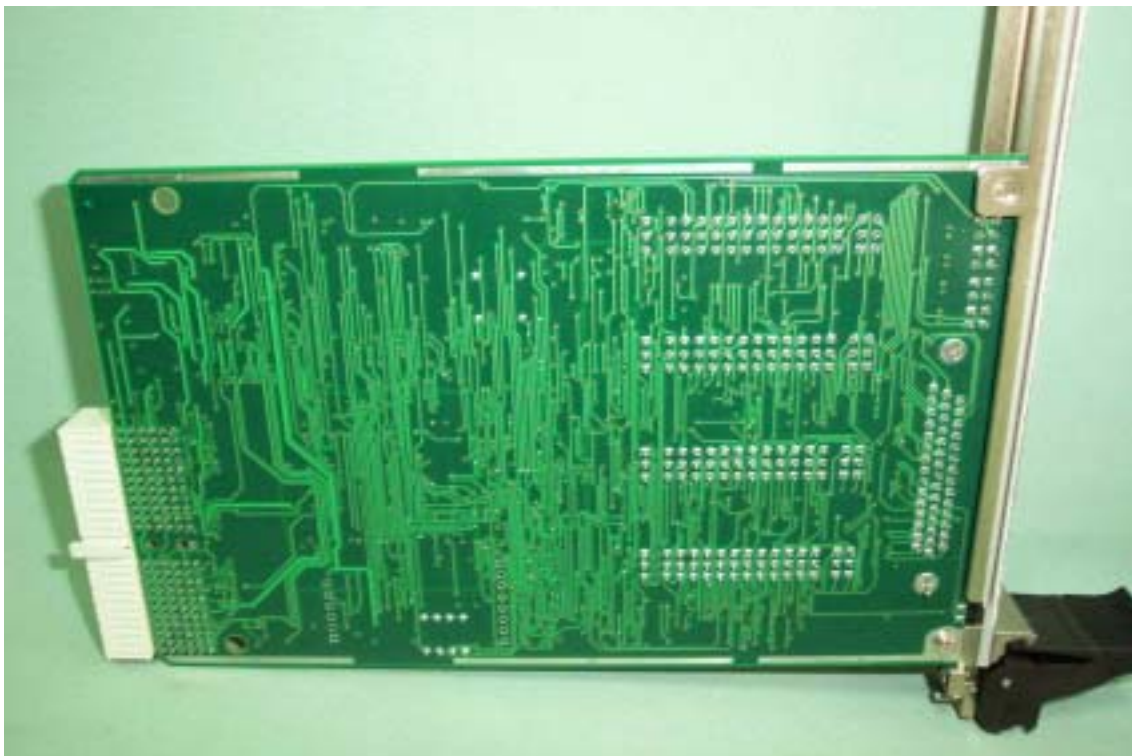


21 APPENDIX 2 PHOTOGRAPHS OF EUT

Front View of EUT



Back View of EUT



I/O Port of EUT

