

EMC UPDATE TEST REPORT

For

Industrial Workstation

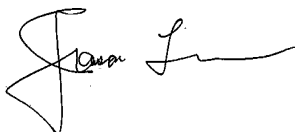
Applicant : Advantech Co., Ltd.
Trade Name : Advantech
Model Number : AWS-8248VTXX-X
("X" see as page 4)
Date : July 1, 2003
Data of Test : June 17 ~ 26, 2003
Revision : 01
Reference Standard :

Standards	Results (Pass/Fail)
EN 55022: 1998 + A1: 2000 (Class A)	PASS
EN 55011:1998 (Group 1, Class A)	N/A
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

Description of Rev. 01:

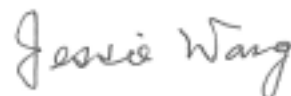
1. Applicant upgrades EUT function to re-test, the detail description please refer the product information on this report.
(Please refer to have ** mark items on this report)
2. Other information, please refer to the Rev.00 and this (Rev.01) test report.

Approved by:



Jonson Lee / EMC Director

Reviewed by:



Jessie Wang / Section Manager

VERIFICATION OF COMPLIANCE

Equipment Under Test: Industrial Workstation
Trade Name: Advantech
Model Number: AWS-8248VTXX-X ("X" see as page 4)
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 + A1: 2000 (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: 020949-E
Date of Test: June 17 ~ 26, 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	123.00	37.6 (dB/m)	-2.4 dB (\pm 2.1422 dB)	
Conducted Emission	0.200	51.3 (dB)	-27.7 dB (\pm 2.8216 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.

PRODUCT INFORMATION

Housing Type:	Metal case		
EUT Power Rating:	DCV form Power Supply		
AC Power during Test	230VAC/50Hz to Power Supply		
Power Supply Manufacturer:	DELTA		
Power Supply Model Number:	DPS-2000PB-123D		
AC Power Cord Type:	Unshielded, 1.8m (Detachable)		
CPU Manufacture:	Intel	Type:	PIII 850MHz
OSC/Clock Frequencies:	100MHz		
Memory Capacity:		Install:	128MB
15" TFT XGA LCD Panel Manufacturer:	CPI	Model:	CLAA150XG01
HDD Manufacturer:	IBM	Model:	IC35L040AVVN07-0
FDD Manufacturer:	TEAC	Model:	FD-235HF
CD-ROM Manufacturer:	Quanta	Model:	SCR-242
Mother Board Manufacturer:	ADVANTECH	Model:	PCA-6003
Inverter Manufacturer:	BALLYTEC	Model:	1501-A-1
Chassis Manufacturer:	ADVANTECH	Model:	AWS-8248VT
Backplane Manufacturer:	ADVANTECH	Model:	PCA-6114
			** PCA-6114P4
**Touch Screen Manufacture:	ADVANTECH	Model:	PCA-6180E
RS 232 Cable Type:	Shielded, 0.4m (Detachable)		
VGA Cable Type:	Shielded, 0.4m (Detachable) with a core		
PS/2 Cable Type:	Shielded, 0.4m (Detachable)		

I/O Port of EUT

I/O PORT TYPES	Q'TY	TESTED WITH
1). Serial Port	2	2
2). PS/2 Keyboard Port	3	3
3). Video Port	2	2
4). Audio Out Port	1	1
5). LAN Port	1	1
6). AT Keyboard Port	1	1
7). **USB Port	4	4
8). **PS/2 Mouse Port	1	1

Note:

- The means of "XX-X" on model number is list as below:
 - The first "X" = Type of Backplane (Null : PCA-6114 14 ISA Bus Slot Backplane)
(P : PCA-6114P4 4PCI + 8ISA + 2CPU)
 - The second "X" = Version (Null : Version A)
(B,C,..... : Version B,C...)
 - The third "X" =Touch Screen Function (Null : Without Touch screen)
(T : With resistive Touch screen)
- Client consigns only one model samples to tested. (Model Number: AWS-8248VTP-T)
Therefore, the testing Lab. just guarantees the unite, which have been tested.

SUPPORT EQUIPMENT

No.	Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
1.	PS/2 Keyboard	Y-SP29	SYU30272826	FCC DoC	Logitech	Shielded, 1.8m	N/A
2.	PS/2 Mouse	M-CAA43	LZE02801285	FCC DoC	Logitech	Shielded, 1.8m	N/A
3.	USB Mouse	MO19UCA	020509258	FCC DoC	HP	Shielded, 1.8m	N/A
4.	USB Mouse	MO19UCA	020509275	FCC DoC	HP	Shielded, 1.8m	N/A
5.	USB Mouse	MO19UCA	020509282	FCC DoC	HP	Shielded, 1.8m	N/A
6.	USB Mouse	MO19UCA	020509264	FCC DoC	HP	Shielded, 1.8m	N/A
7.	AT Keyboard	5121	N/A	N/A	BTC	Shielded, 1.8m	N/A
8.	Notebook PC (Remote)	M285	NU2503589	FCC DoC	LEO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

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

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

BLOCK DIAGRAM OF TEST SETUP

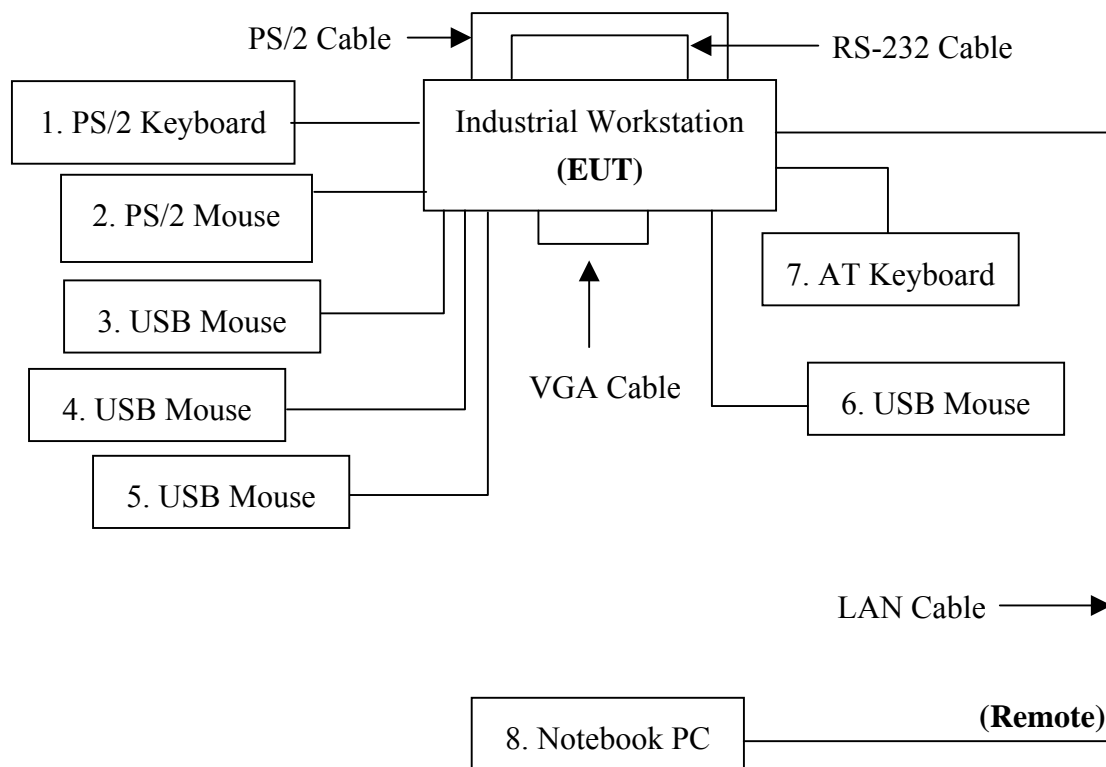
System Diagram of Connections between EUT and Simulators

EUT: Industrial Workstation

Trade Name: Advantech

Model Number: AWS-8248VTP-T

Power Cord: Unshielded, 1.8m to Power Supply



TEST EQUIPMENT LIST

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: # 2

Open Area Test Site # 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3261C	81720301	08/28/2002	08/27/2003
EMI Test Receiver	R&S	ESVS10	834468/006	04/15/2003	04/14/2004
Pre-Amplifier	HP	8447D	2944A08780	07/15/2002	07/14/2003
Bilog Antenna	SCHWAZBECK	VULB9163	147	05/21/2003	05/20/2004
Turn Table	Chance Most	CM-T003-1	T807-6	N.C.R	N.C.R
Antenna Tower	Chance Most	CM-A003-1	A807-6	N.C.R	N.C.R
Controller	Chance Most	N/A	N/A	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M76890	N.C.R	N.C.R
Site NSA	C&C Lab.	N/A	N/A	08/31/2002	08/30/2003
Decoupling Network	FISCHER CUSTOM COMMUNICATION INC.	F-201-DCN-5-6 MM	12	04/21/2003	04/21/2004

Conducted Emission Test Site # 4

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	845552/030	02/18/2003	02/17/2004
LISN	R&S	ENV 4200	830326/016	03/05/2003	03/04/2004
LISN	EMCO	3825/2	9003/1382	02/26/2003	02/25/2004
2X2 WIRE ISN	R&S	ENY22	100020	06/28/2003	06/27/2004
FOUR WIRE ISN	R&S	ENY41	100006	06/28/2003	06/27/2004

Power Harmonic & Voltage Fluctuation/Flicker:

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. According to C&C quality policy, the period of calibration tolerance is \pm one month.

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 test (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
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
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	09/03/2002	09/02/2003
CDN	HAEFELY TRENCH	IP6.2	148342	N/A	N/A
CDN	HAEFELY TRENCH	DEC1A	148050	N/A	N/A
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
CDN	SCHAFFNER	T400	16906	10/17/2002	10/16/2003
Power Frequency Magnetic Field Immunity test (61000-4-8)					
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

EUT Configuration during measurement:

1) Pre-scan mode(s) are list as below:

Mode(s):

- 1. 1024 x 768 Resolution / 100Mbps + Touch Screen PCA-6180E + Blackplane PCA-6114P4**
- 2. 1024 x 768 Resolution / 10Mbps + Touch Screen PCA-6180E + Blackplane PCA-6114P4**
- 3. 800 x 600 Resolution / 100Mbps + Touch Screen PCA-6180E + Blackplane PCA-6114P4**
- 4. 640 x 480 Resolution / 100Mbps+ Touch Screen PCA-6180E + Blackplane PCA-6114P4**

2) After pre-scan, found mode 1 producing the highest emission level, used this mode for all final test.

SUMMARY DATA

(LINE CONDUCTED TEST)

Model Number: AWS-8248VTP-T

Location: Site # 4

Tested by: Vic Wang

Test Mode: Mode 1

Test Results: Passed

Temperature: 22°C

Humidity: 61%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
0.200	51.30	---	79.00	66.00	-27.70	---	L1
0.952	30.50	---	73.00	60.00	-42.50	---	L1
19.956	33.20	---	73.00	60.00	-39.80	---	L1
25.937	31.10	---	73.00	60.00	-41.90	---	L1
27.937	37.60	---	73.00	60.00	-35.40	---	L1
29.938	35.10	---	73.00	60.00	-37.90	---	L1
0.200	50.10	---	79.00	66.00	-28.90	---	L2
17.603	31.80	---	73.00	60.00	-41.20	---	L2
18.096	30.60	---	73.00	60.00	-42.40	---	L2
25.937	32.30	---	73.00	60.00	-40.70	---	L2
27.936	38.10	---	73.00	60.00	-34.90	---	L2
29.939	34.10	---	73.00	60.00	-38.90	---	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: AWS-8248VTP-T

Location: Site # 4

Tested by: Vic Wang

Test Mode: Mode 1

Test Results: Passed

Temperature: 22°C

Humidity: 61%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
4.967	59.20	---	87.00	74.00	-27.80	---	10Base
6.188	60.70	---	87.00	74.00	-26.30	---	10Base
9.102	59.60	---	87.00	74.00	-27.40	---	10Base
9.548	66.90	---	87.00	74.00	-20.10	---	10Base
10.603	63.50	---	87.00	74.00	-23.50	---	10Base
12.656	59.20	---	87.00	74.00	-27.80	---	10Base
18.236	65.20	---	87.00	74.00	-21.80	---	100Base
21.657	66.30	---	87.00	74.00	-20.70	---	100Base
23.128	68.50	---	87.00	74.00	-18.50	---	100Base
24.346	66.30	---	87.00	74.00	-20.70	---	100Base
26.606	67.20	---	87.00	74.00	-19.80	---	100Base
27.159	65.50	---	87.00	74.00	-21.50	---	100Base

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: AWS-8248VTP-T

Location: Site # 2

Tested by: Arno Hsieh

Polar: Vertical--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 28°C

Humidity: 61%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)
36.92	19.2	14.7	33.9	40.0	-6.1
45.56	17.7	16.5	34.2	40.0	-5.8
63.16	14.3	13.2	27.5	40.0	-12.5
123.00	26.2	11.4	37.6	40.0	-2.4
181.96	20.9	12.1	33.0	40.0	-7.0
227.00	22.7	13.7	36.4	40.0	-3.6
298.99	20.4	14.9	35.3	47.0	-11.7
353.70	12.6	17.8	30.4	47.0	-16.6
447.23	12.7	20.7	33.4	47.0	-13.6

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: AWS-8248VTP-T

Location: Site # 2

Tested by: Arno Hsieh

Polar: Horizontal--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 28°C

Humidity: 61%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)
117.03	22.8	11.6	34.4	40.0	-5.6
123.00	21.7	11.4	33.1	40.0	-6.9
227.00	22.3	13.7	36.0	40.0	-4.0
298.00	29.5	14.9	44.4	47.0	-2.6
398.69	12.3	19.3	31.6	47.0	-15.4
452.54	11.3	20.8	32.1	47.0	-14.9

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

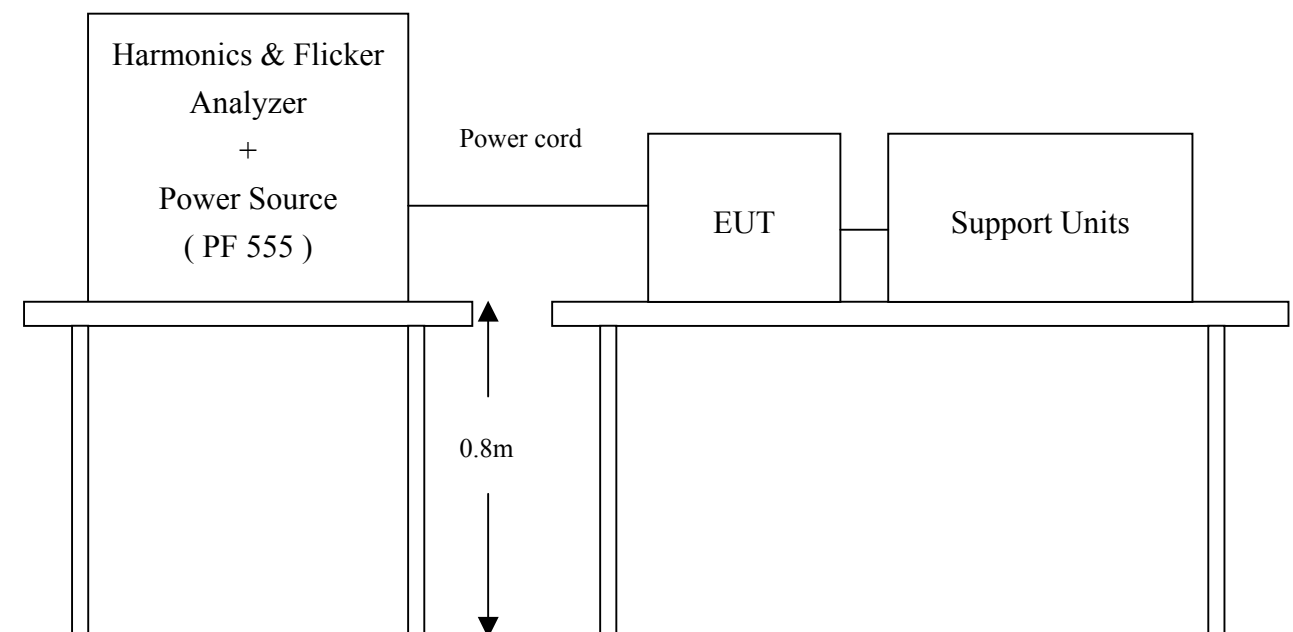
POWER HARMONICS MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998)
Limits : ☐ CLASS A ; ☒ CLASS D
Tester : Vic Wang
Temperature : 24°C
Humidity : 51%
Input Current Wave : With 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 : Vic Wang
Temperature : 24°C
Humidity : 51%

Block Diagram of Test Setup:



Result:

Please see the attached test data.

EN 61000-3-2 TEST REPORT 2003//6/26 03:26 PM

Unit: Industrial Workstation

Model No.: AWS-8248VTP-T

Remarks: Temp: 24°C Hum: 51%

Operator: Vic Wang

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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 D	Test Type:	STEADY-STATE

Prog. Zo Enabled:	YES	Prog. Zo:	0.000
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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: 85.7W



TEST DATA

Result: PASS

Harmonic Current Results

Hn	AMPS	LO Limit	HI Limit	Result
0	0.000	0.000	0.000	PASS
1	0.374	NaN	NaN	PASS
2	0.001	NaN	NaN	PASS
3	0.268	0.274	0.274	PASS
4	0.001	NaN	NaN	PASS
5	0.122	0.162	0.162	PASS
6	0.000	NaN	NaN	PASS
7	0.036	0.085	0.085	PASS
8	0.000	NaN	NaN	PASS
9	0.029	0.043	0.043	PASS
10	0.000	NaN	NaN	PASS
11	0.015	0.027	0.027	PASS
12	0.000	NaN	NaN	PASS
13	0.012	0.025	0.025	PASS
14	0.000	NaN	NaN	PASS
15	0.009	0.021	0.021	PASS
16	0.000	NaN	NaN	PASS
17	0.007	0.019	0.019	PASS
18	0.000	NaN	NaN	PASS
19	0.006	0.017	0.017	PASS
20	0.000	NaN	NaN	PASS

21	0.005	0.016	0.016	PASS
22	0.000	NaN	NaN	PASS
23	0.004	0.014	0.014	PASS
24	0.000	NaN	NaN	PASS
25	0.003	0.013	0.013	PASS
26	0.000	NaN	NaN	PASS
27	0.003	0.012	0.012	PASS
28	0.000	NaN	NaN	PASS
29	0.002	0.011	0.011	PASS
30	0.000	NaN	NaN	PASS
31	0.002	0.011	0.011	PASS
32	0.000	NaN	NaN	PASS
33	0.002	0.009	0.009	PASS
34	0.000	NaN	NaN	PASS
35	0.002	0.009	0.009	PASS
36	0.000	NaN	NaN	PASS
37	0.002	0.008	0.008	PASS
38	0.000	NaN	NaN	PASS
39	0.001	0.008	0.008	PASS
40	0.000	NaN	NaN	PASS

END OF REPORT



EN 61000-3-3 TEST REPORT 2003/6/17 09:56 PM

Unit: Industrial Workstation

Model No.: AWS-8248VTP-T (Continue)

Remarks: Temp: 24°C Humid: 51%

Operator: Vic Wang

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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	3.000	PASS	true

END OF REPORT



EN 61000-3-3 TEST REPORT 2003/6/17 10:09 PM

Unit: Industrial Workstation

Model No.: AWS-8248VTP-T (Manual Switch)

Remarks: Temp: 24°C Hum: 51%

Operator: Vic Wang

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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 1 - IMMUNITY TESTS (EN 55024:1998)

Electrostatic discharge (ESD) immunity test (IEC 61000-4-2)

Radiated electromagnetic field (RS) immunity test (IEC 61000-4-3)

Fast transient / Burst (EFT) immunity test (IEC 61000-4-4)

Surge immunity test (IEC 61000-4-5)

Conducted disturbances inducted by radio-frequency fields, (CS) immunity test (IEC 61000-4-6)

Power frequency magnetic field immunity test (IEC 61000-4-8)

Voltage dips, short interruption and voltage variation immunity test (IEC 61000-4-11)

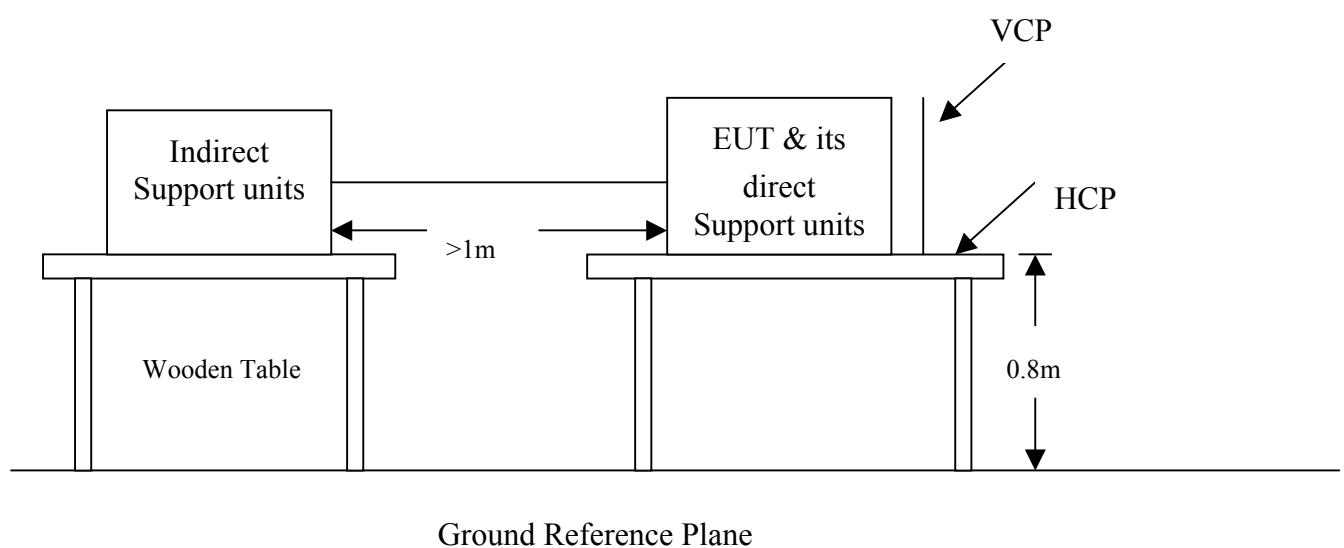
IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

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	: Lung Tsai
Temperature	: 26°C
Humidity	: 43%
Pressure	: 1017mbar

Block Diagram of Test Setup:

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



Test Procedure:

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The indirect support units were located 1 m 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 98" mode.
4. The EUT sent above message to LCD Panel of EUT 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 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 the 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 25 /Point	± 4kV	Contact Discharge	Pass
Mini 25 /Point	± 4kV	Indirect Discharge HCP (Front)	Pass
Mini 25 /Point	± 4kV	Indirect Discharge VCP (Left)	N/A
Mini 25 /Point	± 4kV	Indirect Discharge VCP (Back)	N/A
Mini 25 /Point	± 4kV	Indirect Discharge VCP (Right)	N/A
Mini 10 /Point	± 8kV	Air Discharge	Pass

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

(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.

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

The Tested Points of EUT

(Photo 1 of 5)



(Photo 2 of 5)



(Photo 3 of 5)



(Photo 4 of 5)



(Photo 5 of 5)

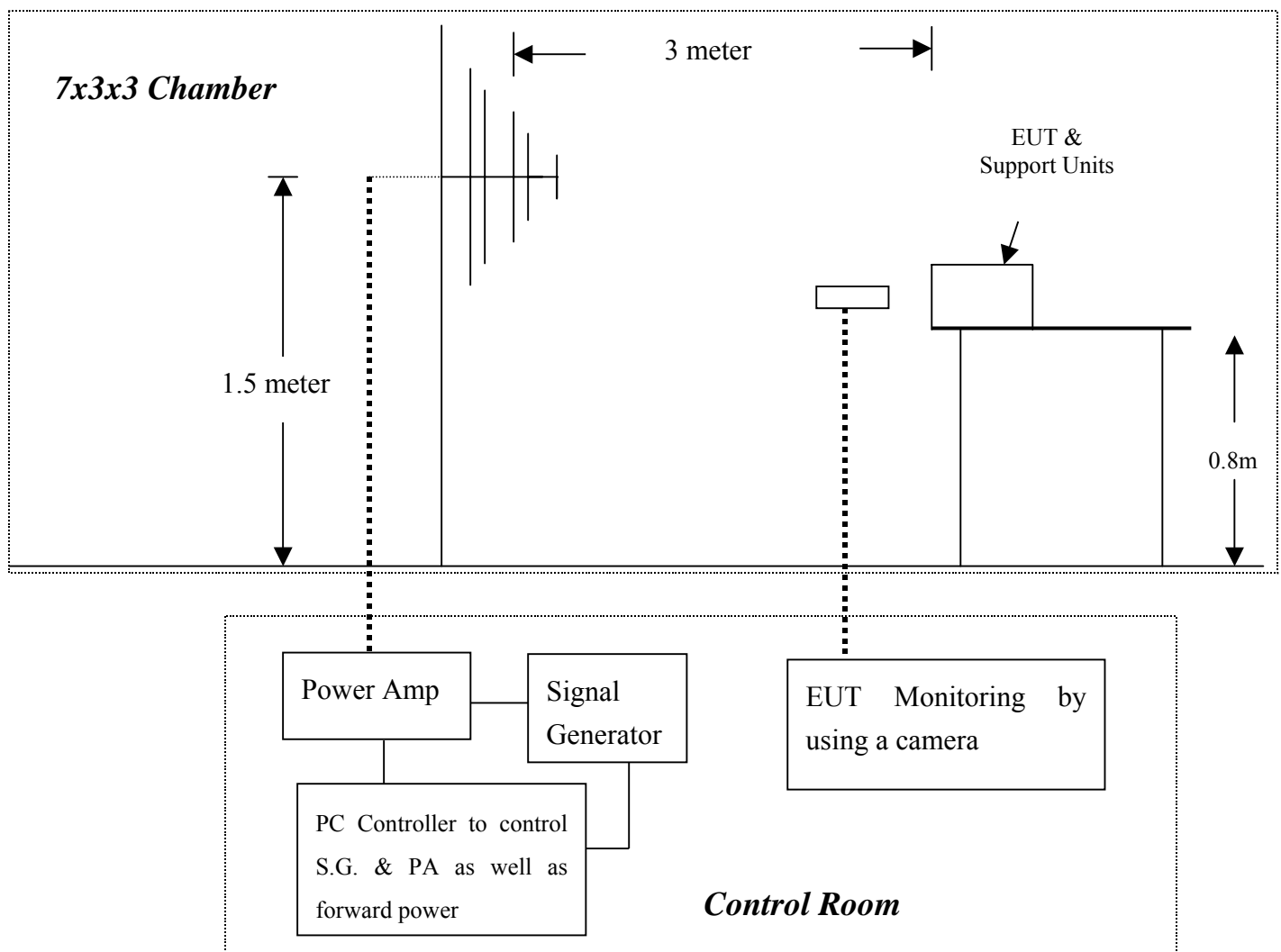


IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

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 Require)
Tester	: Lung Tsai
Temperature	: 26°C
Humidity	: 43%
Pressure	: 1017mbar

Block Diagram of Test Setup:



Test Procedure:

1. The EUT was located at the edge of supporting table keep 3 meter away from transmitting antenna, it just the calibrated square area of field uniformity. The support units were located outside of the uniformity area, but the cable(s) connected with EUT were exposed to the calibrated field as per IEC 61000-4-3.
2. A scroll 'H' messages were displayed on part of screen of EUT and an enlarged 'H' characters were displayed on the other part of screen of EUT.
3. Adjusting the monitoring camera to monitor the 'H' message as clear as possible.
4. Setting the testing parameters of RS test software per IEC 61000-4-3.
5. Performing the pre-test at each side of with double specified level (6V/m) at 4% steps.
6. From the result of pre-test in step 5, choice the worst side of EUT for final test from 80 MHz to 1000 MHz at 1% steps.
7. Recording the test result in following table.
8. It is not necessary to perform test as per annex A of EN 55024 if the EUT doesn't belong to ITE product.

IEC 61000-4-3 Preliminary 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.

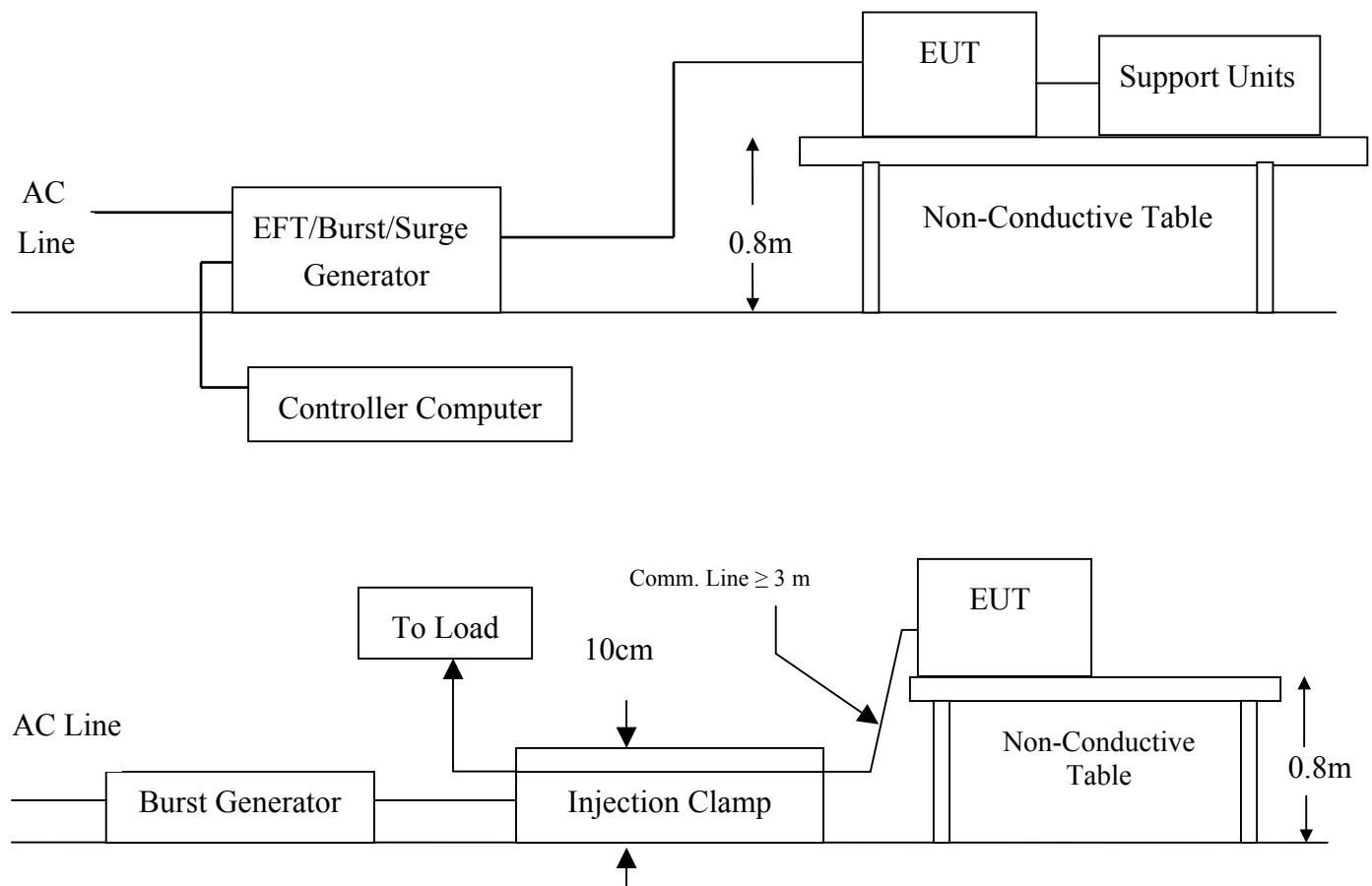
<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAILED
Observation: No any function degraded during the tests.	

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	: $\pm 1\text{ kV}$ for Power Supply Lines $\pm 0.5\text{ kV}$ to LAN Cable
Performance Criteria	: B (Standard Require)
Tester	: Lung Tsai
Temperature	: 26°C
Humidity	: 47%
Pressure	: 1017mbar

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 reference plane.
2. A 1.0 meter long power cord was attached to EUT during the test.
3. The length of communication cable between communication port and clamp was keeping within 1 meter.
4. A test program was loaded and executed in "Windows 98" mode.
5. The data was sent to EUT filling the screens with upper case of "H" patterns.
6. The test program exercised related support units sequentially.
7. Repeating step 3 to 6 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
8. 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)
L	± 1	Direct	Pass
N	± 1	Direct	Pass
PE	± 1	Direct	Pass
L + N	± 1	Direct	Pass
L + PE	± 1	Direct	Pass
N + PE	± 1	Direct	Pass
L + N + PE	± 1	Direct	Pass
LAN Cable	± 0.5	Clamp	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**

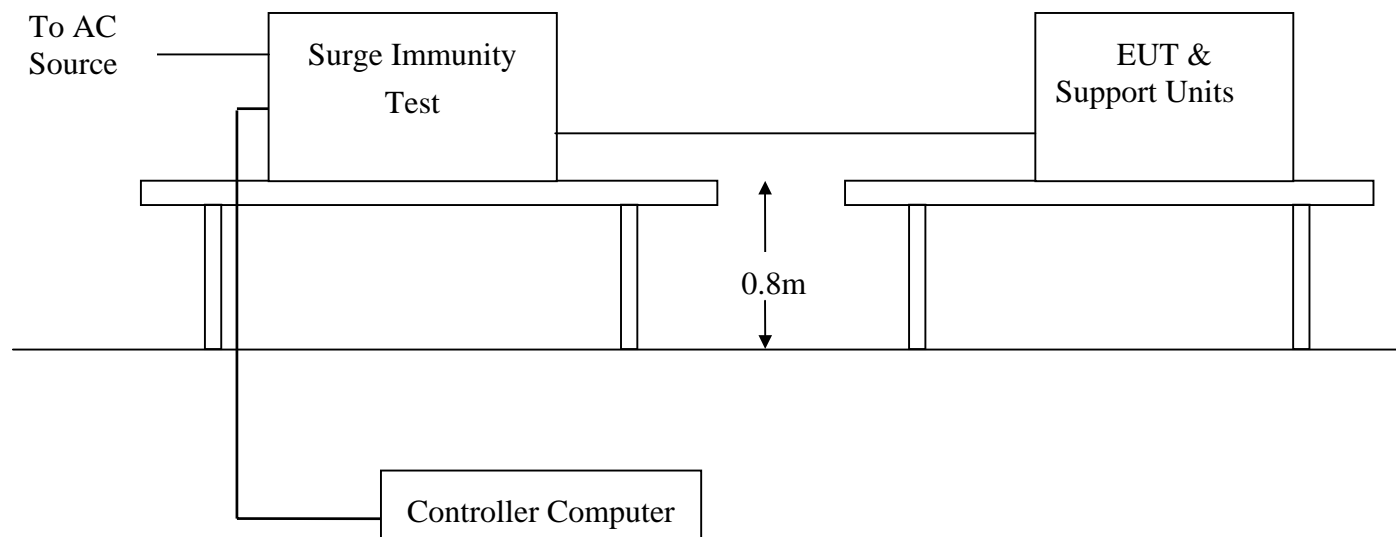
Observation: No any function degraded during the tests.

IEC 61000-4-5 (SURGE IMMUNITY)

SURGE IMMUNITY TEST

Port	: Power Cord
Basic Standard	: IEC 61000-4-5
Requirements	: $\pm 1\text{kV}$ (Line to Line) : $\pm 2\text{kV}$ (Line to Ground)
Performance Criteria	: B (Standard Require)
Tester	: Lung Tsai
Temperature	: 26°C
Humidity	: 47%
Pressure	: 1017mbar

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 98 mode.
3. The data was sent to EUT filling the screens 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 *us*
Current Waveform : 8/20 *us*
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.

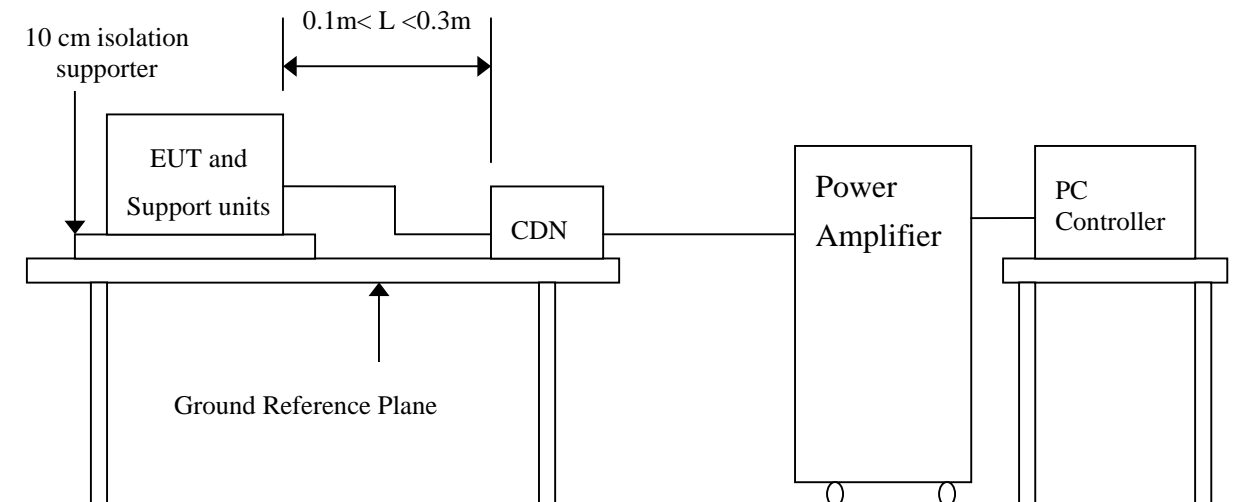
IEC 61000-4-6 (CONDUCTED DISTRBANCE/INDUCED RADIO-FREQUENCY FIELD)

CONDUCTED DISTRBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

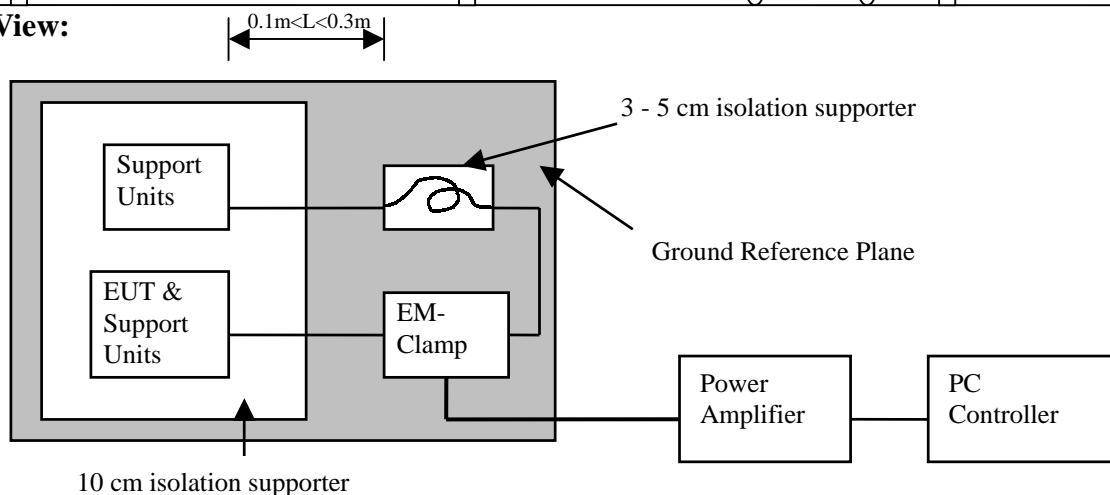
Port	: AC Port and LAN Cable
Basic Standard	: IEC 61000-4-6
Requirements	: 10 V with 80% AM. 1kHz Modulation (Customer Requested)
Injection Method	: CDN-M3 for Power Cord EM-Clamp for LAN Cable
Performance Criteria	: A (Standard Require)
Tester	: Lung Tsai
Temperature	: 26°C
Humidity	: 47%
Pressure	: 1017mbar

Block Diagram of Test Setup:

Side View:



Top View:



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 screen of EUT.
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.

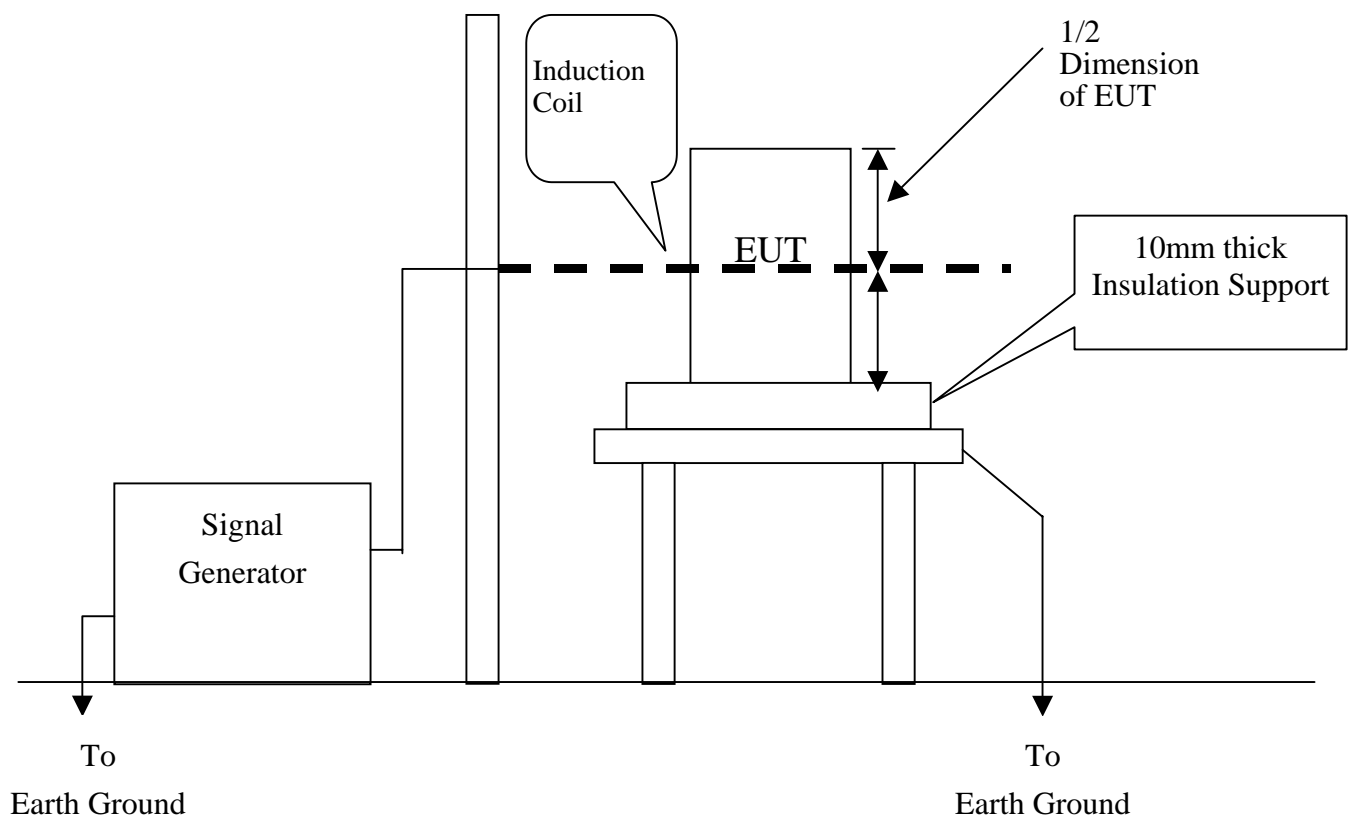
<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAILED
Observation: No any function degraded during the tests.	

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 : 30 A/m (Customer Requested)
Performance Criteria : A (Standard Require)
Tester : Lung Tsai
Temperature : 26°C
Humidity : 47%
Pressure : 1017mbar

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 98 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: 30A/m

Power Freq.: 50Hz

Orientation: X, Y, Z

Orientation	Field	Result (Pass/Fail)	Remark
X	30A/m	Pass	
Y	30A/m	Pass	
Z	30A/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.

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

VOLTAGE DIPS / SHORT INTERRUPTIONS

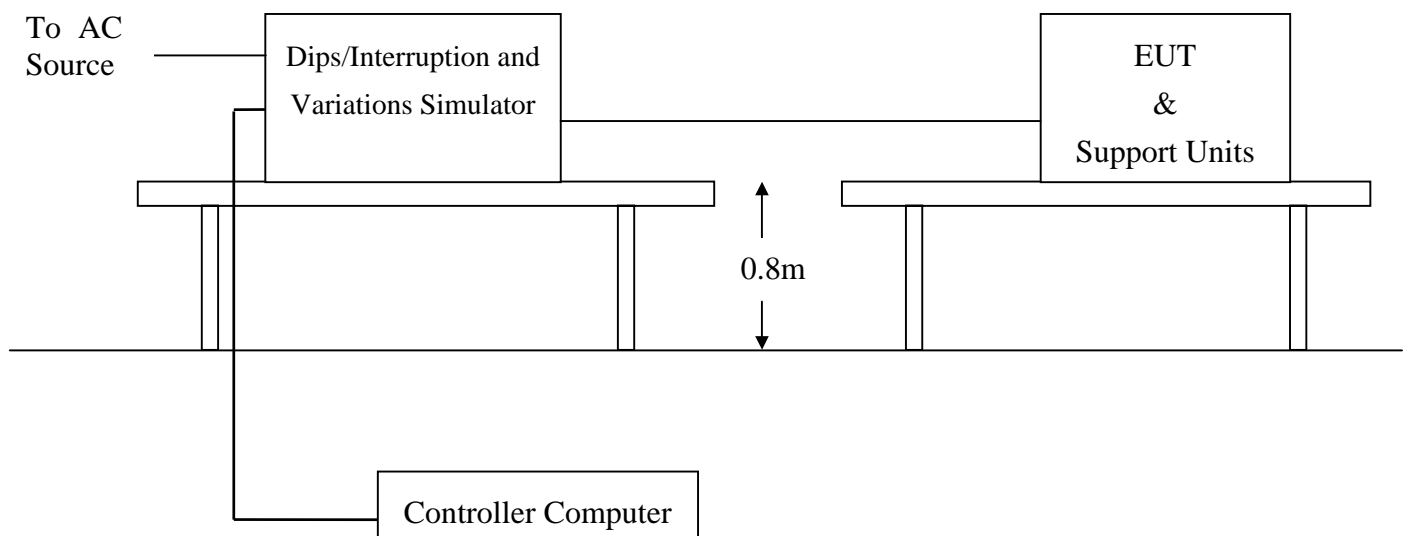
Port : AC mains
Basic Standard : IEC 61000-4-11 (1994)
Requirement : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

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 : Lung Tsai
Temperature : 26°C
Humidity : 47%
Pressure : 1017mbar

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 98" mode.
3. The data was sent to EUT filling the screens 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. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
7. Repeating step 3 to 4 through the test.
8. 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="" type="checkbox"/> PASS <input type="checkbox"/> FAILED
--



APPENDIX 1

PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST (EN 55022)



COMMON MODE CONDUCTED EMISSION TEST



RADIATED EMISSION TEST (EN 55022)



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



I/O Port of EUT

