



# EMC UPDATE TEST REPORT

For

**Advantech Co., Ltd.**

**Industrial Workstation**

**Model: AWS-8248VTXX-X ("X" see as page 5);**  
**\*\*AWS-8148TPV-T**

**Trade Name: Advantech**

**Date of Test: August 26 ~ 31, 2004**

**Revision: 02**

## Description of Rev. 02:

1. Applicant adds one model numbers just for marketing purpose only.  
(Please refer to have \*\* mark items on this report)
2. Applicant adds one CPU, one Clock, one Memory, one Motherboard, one HDD and one Power Sources to re-test.  
(Please refer to have \*\* mark items on this report)
3. Other information, please refer to the 020949, B30612208 and this test report.

*Approved by:*

*Reviewed by:*

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Compliance Certification Services Inc.

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# 1 TEST RESULT CERTIFICATION

**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.

**Equipment Under Test:** Industrial Workstation

**Trade Name:** Advantech

**Model:** AWS-8248VTXX-X (“X” see as page 5);  
\*\*AWS-8148TPV-T

**Detailed EUT Description:** See Item 2 of this report

**Date of Test:** August 26 ~ 31, 2004

Applicable Standard	Class/Limit/Criterion	Test Result
EN 55022: 1998	Class A	No non-compliance noted
EN 61000-3-2: 2000	Class D	No non-compliance noted
EN 61000-3-3: 1995 + A1: 2001	Limit	No non-compliance noted
<b>EN 55024: 1998, including</b>		
IEC 61000-4-2: 1995 + A2: 2000	Criterion B	No non-compliance noted
IEC 61000-4-3: 1995 + A2: 2000	Criterion A	No non-compliance noted
IEC 61000-4-4: 1995 + A1: 2000	Criterion B	No non-compliance noted
IEC 61000-4-5: 1995 + A1: 2000	Criterion B	No non-compliance noted
IEC 61000-4-6: 1996 + A1: 2000	Criterion A	No non-compliance noted
IEC 61000-4-8: 1993 + A1: 2000	Criterion A	No non-compliance noted
IEC 61000-4-11: 1994 + A1: 2000	Criterion B/C/C	No non-compliance noted
<b>Deviation from Applicable Standard</b>		
According to applicant's declaration, this EUT is a class A product and to be market in industrial environment only.		

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in the EMC Directive 89/336/EEC and the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.



## 2 EUT DESCRIPTION

<b>Product</b>	Industrial Workstation		
<b>Trade Name</b>	Advantech		
<b>Model</b>	AWS-8248VTXX-X ("X" see as page 5); **AWS-8148TPV-T		
<b>Housing Type</b>	Metal case		
<b>EUT Power Rating</b>	DCV from Power Supply		
<b>AC Power Adapter Manufacturer</b>	DELTA	<b>Model</b>	DPS-2000PB-123D
<b>AC Power Cord Type</b>	Unshielded, 1.8m (Detachable)		
<b>CPU Manufacture</b>	Intel	<b>Type</b>	PIII 850MHZ ** Pentium 4 3.06GHz
<b>OSC/Clock Frequencies</b>	100MHz; **133		
<b>Memory Capacity</b>		<b>Install</b>	128MB; **256MB
<b>15" TFT XGA LCD Panel Manufacturer</b>	CPI	<b>Model</b>	CLAA150XG01
<b>HDD Manufacturer</b>	IBM	<b>Model</b>	IC35L040AVVN07-0
	** Quantum	<b>Model</b>	QMP20000AS-A
<b>FDD Manufacturer</b>	TEAC	<b>Model</b>	FD-235HF
<b>CD-ROM Manufacturer</b>	Quanta	<b>Model</b>	SCR-242
<b>Mother Board Manufacturer</b>	ADVANTECH	<b>Model</b>	PCA-6003
		**	PCA-6184E2
<b>Inverter Manufacturer</b>	BALLYTEC	<b>Model</b>	1501-A-1
<b>Chassis Manufacturer</b>	ADVANTECH	<b>Model</b>	AWS-8248VT
<b>Backplane Manufacturer</b>	ADVANTECH	<b>Model</b>	PCA-6114 PCA-6114P4
<b>Touch Screen Manufacture</b>	ADVANTECH	<b>Model</b>	PCA-6180E
<b>**Power Sources Manufacturer</b>	FSP	<b>Model</b>	FSP250-60ATV
<b>RS 232 Cable Type</b>	Shielded, 0.4m (Detachable)		
<b>VGA Cable Type</b>	Shielded, 0.4m (Detachable) with a core		
<b>PS/2 Cable Type</b>	Shielded, 0.4m (Detachable)		



**I/O Port of EUT:**

<b>I/O PORT TYPES</b>	<b>Q'TY</b>	<b>TESTED WITH</b>
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:**

1. 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)
2. Client consigns only one sample to test (Model Number: AWS-8248VTP-T). Therefore, the testing Lab. just guarantees the unit, which have been tested.
- \*\*3. Client consigns only one sample to test (Model Number: AWS-8248TPV-T). Therefore, the testing Lab. just guarantees the unit, which has been tested.



### 3 TEST METHODOLOGY

#### 3.1 DECISION OF FINAL TEST MODE

1. The following test mode(s) were scanned during the preliminary test:

Mode	Resolution	Mbps	CPU	Memory	HDD
1.	1600 x 1200	100	Intel Pentium 4 3.0GHz	256MB	Quantum QMP20000AS-A
2.	1600 x 1200	10			
3.	1024 x 768	100			
4.	640 x 480	100			

2. After preliminary test, found mode 1 producing the highest emission level, used this mode for all final test.

### 4 SETUP OF EQUIPMENT UNDER TEST

#### Setup Diagram

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

#### Support Equipment

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	AT Keyboard	5121	N/A	N/A	BTC	Shielded, 1.8m	N/A
2.	PS/2 Mouse	M-S34	HCA25200400	DZL211029	Logitech	Shielded, 1.8m	N/A
3.	Notebook PC (Remote)	M285	NU2503544	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 during emission test.*

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



## 5 INSTRUMENT AND CALIBRATION

### 5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

### 5.2 TEST AND MEASUREMENT EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective manual.

#### Equipment Used for Emission Measurement

Conducted Emission Test Site # 3				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	845552/030	03/14/2005
LISN	R&S	ESH2-Z5	843285/010	01/08/2005
LISN	EMCO	3825/2	9003-1628	07/26/2005

*Note: The measurement uncertainty is less than +/- 2.83dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

Open Area Test Site # 1				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	ADVANTEST	R3261C	71720533	N.C.R
EMI Test Receiver	R&S	ESVS10	834468/006	04/16/2005
Pre-Amplifier	Anritsu	MH648A	M18767	08/31/2005
Bilog Antenna	CHASE	CBL6112A	2309	01/30/2005
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	EMCO	2075-2	9707-2604	N.C.R
Controller	EMCO	2090	N/A	N.C.R
RF Switch	Anritsu	MP59B	M54367	N.C.R
Site NSA	C&C	N/A	N/A	08/06/2005

*Note: The measurement uncertainty is less than +/- 3.36dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*



<b>Power Harmonic &amp; Voltage Fluctuation/Flicker Measurement (EN 61000-3-2&amp;-3-3)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
EMC-PARTNER	EMC Emission Tester	HARMONICS-1000	019	04/02/2005

### **Equipment Used for Immunity Measurement**

<b>ESD Test Site (IEC/EN 61000-4-2)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
ESD Generator	EM TEST	P30C	0603-01	08/01/2005

<b>Radiated Electromagnetic Field Immunity Test Site (IEC/EN 61000-4-3)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
S.G.	R&S	SMY02	100094	08/05/2005
Power Meter	R&S	NRVD	837794/029	08/06/2005
Power Sensor	R&S	URV5-Z2	835640/015	08/06/2005
Power Sensor	R&S	URV5-Z2	835640/016	08/06/2005
Power Amplifier	ar	150W1000	300300	N.C.R
Power Antenna	EMCO	93141	9712-1083	N.C.R

<b>Fast Transients/Burst Test Site (IEC/EN 61000-4-4)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
Fast Transients/Burst Generator	HAEFELY TRENCH	PEFT- JUNIOR	583 333-117	08/25/2005
Clamp	HAEFELY TRENCH	093 506.1	080 421.13	N.C.R

<b>Surge Immunity Test Site (IEC/EN 61000-4-5)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
Surge Tester	HAEFELY TRENCH	PSUGER 4010	583 334-71	08/25/2005



<b>CS Test Site (IEC/EN 61000-4-6)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
S.G.	R&S	SMY02	100094	08/05/2005
Power Meter	R&S	NRVD	837794/029	08/06/2005
Power Sensor	R&S	URV5-Z2	835640/015	08/06/2005
Power Sensor	R&S	URV5-Z2	835640/016	08/06/2005
Power Amplifier	ar	500A100A	300299	N.C.R
CDN	Lüthi	801-M3	1879	03/03/2005
CDN	FRANKONIA	CDN-M2	A3002010	08/06/2005
CDN	SCHAFFNER	T400	16906	12/28/2004

<b>Power Frequency Magnetic Field Immunity Test Site (IEC/EN 61000-4-8)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
TRIAX ELF Magnetic Field Meter	F.W.BELL	4090	9711	11/13/2004
Magnetic Field Tester	HAEFELY TRENCH	MAG 100.1	080 938-01	N.C.R

<b>Voltage Dips/Short Interruption and Voltage Variation Immunity Test Site (IEC/EN 61000-4-11)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
Dips/Interruption and Variations Simulator	HAEFELY TRENCH	PLINE 1610	080 344-05	03/27/2005



## 6 TEST RESULTS

### Line Conducted Emission

**Model:** AWS-8248TPV-T

**Test Mode:** Mode 1

**Temperature:** 25°C

**Humidity:** 61% RH

**Tested by:** Georeg Kuo

**Test Results:** Pass

(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
0.150	47.60	---	79.00	66.00	-31.40	---	L1
0.944	39.70	---	73.00	60.00	-33.30	---	L1
3.111	31.60	---	73.00	60.00	-41.40	---	L1
4.045	31.10	---	73.00	60.00	-41.90	---	L1
5.617	29.70	---	73.00	60.00	-43.30	---	L1
14.323	48.90	---	73.00	60.00	-24.10	---	L1
0.150	46.70	---	79.00	66.00	-32.30	---	L2
0.927	39.70	---	73.00	60.00	-33.30	---	L2
2.764	31.70	---	73.00	60.00	-41.30	---	L2
3.957	27.60	---	73.00	60.00	-45.40	---	L2
5.858	25.90	---	73.00	60.00	-47.10	---	L2
14.327	41.80	---	73.00	60.00	-31.20	---	L2

L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

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



**Radiated Emission (A)**

**Model:** AWS-8248TPV-T

**Test Mode:** Mode 1

**Temperature:** 29°C

**Humidity:** 50% RH

**Detector Function:** Quasi-peak.

**Antenna:** Vertical at 10m

**Tested by:** Carl Chang

**Test Results:** Pass

(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 (dBuV/m)	Margin (dB)
110.52	21.9	11.6	33.5	40.0	-6.5
113.99	23.9	11.7	35.6	40.0	-4.4
131.70	17.6	12.1	29.7	40.0	-10.3
214.52	20.0	10.5	30.5	40.0	-9.5
319.24	18.1	16.4	34.5	47.0	-12.5
325.30	13.4	16.7	30.1	47.0	-16.9
330.50	9.7	16.9	26.6	47.0	-20.4
372.70	12.7	18.8	31.5	47.0	-15.5
402.71	8.2	20.0	28.2	47.0	-18.8
451.69	5.4	19.0	24.4	47.0	-22.6
536.30	4.5	22.1	26.6	47.0	-20.4
602.60	3.3	22.1	25.4	47.0	-21.6
684.00	0.0	23.7	23.7	47.0	-23.3
716.30	10.3	24.5	34.8	47.0	-12.2
859.00	4.7	28.6	33.3	47.0	-13.7



**Radiated Emission (B)**

**Model:** AWS-8248TPV-T

**Test Mode:** Mode 1

**Temperature:** 29°C

**Humidity:** 50% RH

**Detector Function:** Quasi-peak.

**Antenna:** Horizontal at 10m

**Tested by:** Carl Chang

**Test Results:** Pass

(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 (dBuV/m)	Margin (dB)
110.49	16.7	11.6	28.3	40.0	-11.7
114.29	11.5	11.7	23.2	40.0	-16.8
131.20	18.3	12.1	30.4	40.0	-9.6
214.53	18.2	10.5	28.7	40.0	-11.3
319.24	10.6	16.4	27.0	47.0	-20.0
336.70	8.0	17.2	25.2	47.0	-21.8
372.70	12.9	18.8	31.7	47.0	-15.3
407.64	12.0	19.9	31.9	47.0	-15.1
433.14	13.4	19.3	32.7	47.0	-14.3
492.09	12.6	20.8	33.4	47.0	-13.6
532.30	2.2	22.0	24.2	47.0	-22.8
660.90	-9	23.6	22.7	47.0	-24.3
722.30	4.2	24.7	28.9	47.0	-18.1
800.30	.3	26.7	27.0	47.0	-20.0
852.10	2.1	28.9	31.0	47.0	-16.0



## 7 POWER HARMONICS TEST

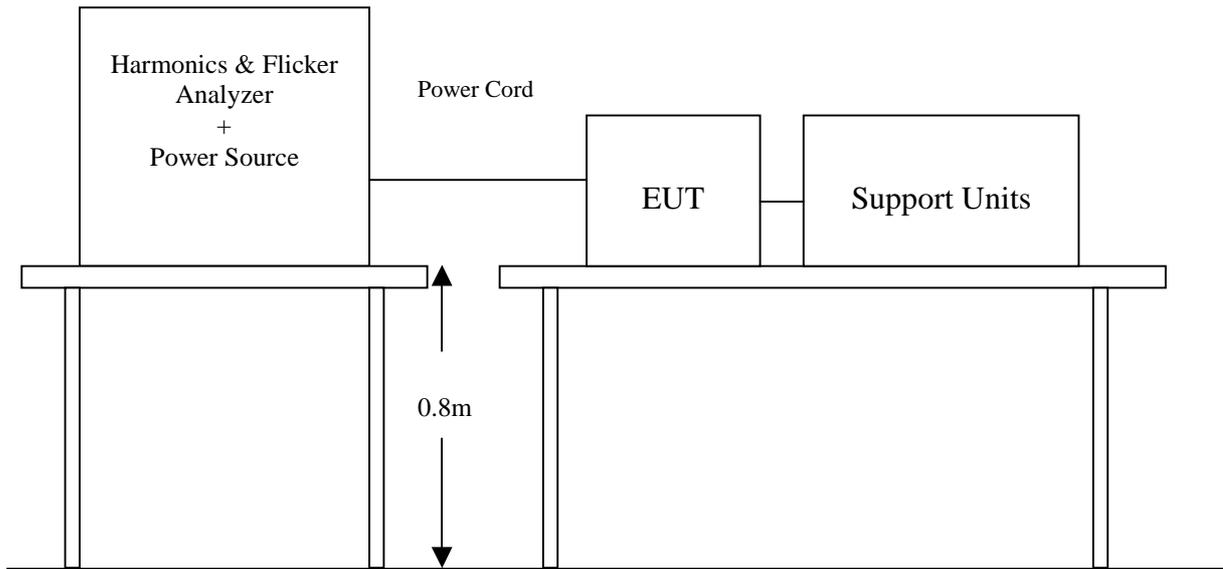
**Port** : AC mains  
**Basic Standard** : EN 61000-3-2 (2000)  
**Limits** :  CLASS A ;  CLASS B;  CLASS C ;  CLASS D  
**Tested by** : Grant Chen  
**Temperature** : 26°C  
**Humidity** : 61%

### Limit:

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd Harmonics only		
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15<=n<=39	3.85/n	0.15x15/n

**Block Diagram of Test Setup:**



**Test Procedure:**

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- b. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

**Test Result:** (See Appendix II for details)

<input checked="" type="checkbox"/> <b>PASS</b> <input type="checkbox"/> <b>FAIL</b>
--

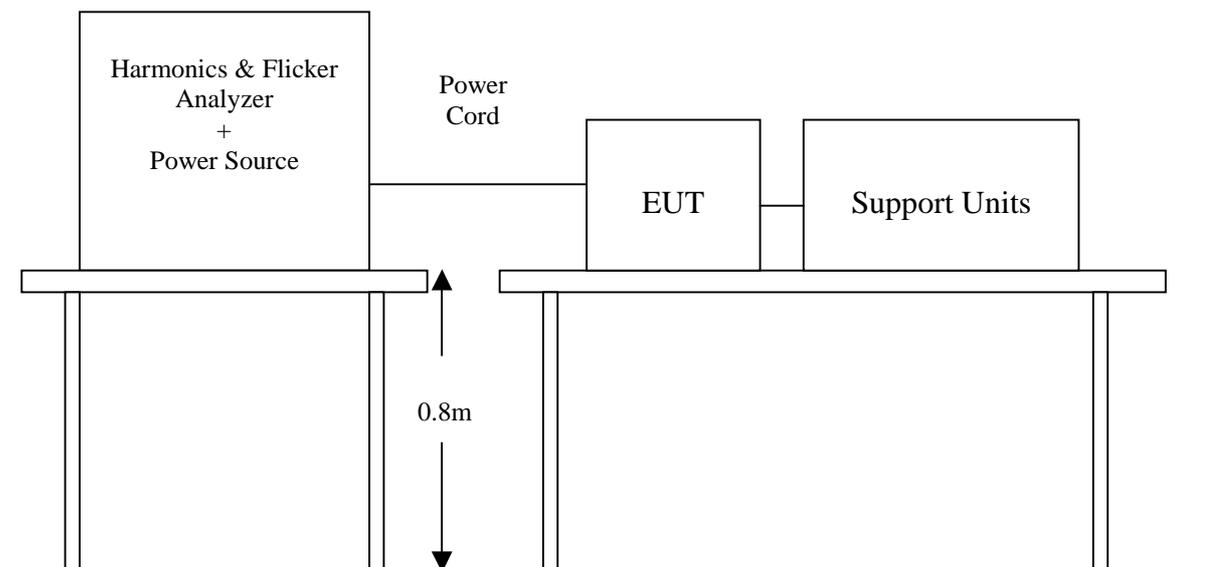
## 8 POWER VOLTAGE FLUCTUATION / FLICKER TEST

**Port** : AC mains  
**Basic Standard** : EN 61000-3-3 (1995 + A1: 2001)  
**Limits** : §5 of EN 61000-3-3  
**Tested by** : Grant Chen  
**Temperature** : 26 °C  
**Humidity** : 55 %

### Limit:

TEST ITEM	LIMIT	REMARK
$P_{st}$	1.0	$P_{st}$ means short-term flicker indicator.
$P_{lt}$	0.65	$P_{lt}$ means long-term flicker indicator.
$T_{dt}$ (ms)	500	$T_{dt}$ means maximum time that dt exceeds 3 %.
$d_{max}$ (%)	4%	$d_{max}$ means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

### Block Diagram of Test Setup:



**Test Procedure:**

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- b. During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

**Test Result:** (See Appendix II for details)**Continue**

Test Parameter	Measurement Value	Limit	Result
$P_{st}$	0.072	1.0	Pass
$P_{lt}$	0.072	0.65	Pass
$T_{dt}$ (ms)	0	500	Pass
$d_{max}$ (%)	0%	4%	Pass
dc (%)	0.01%	3.3%	Pass

**Manual Switch**

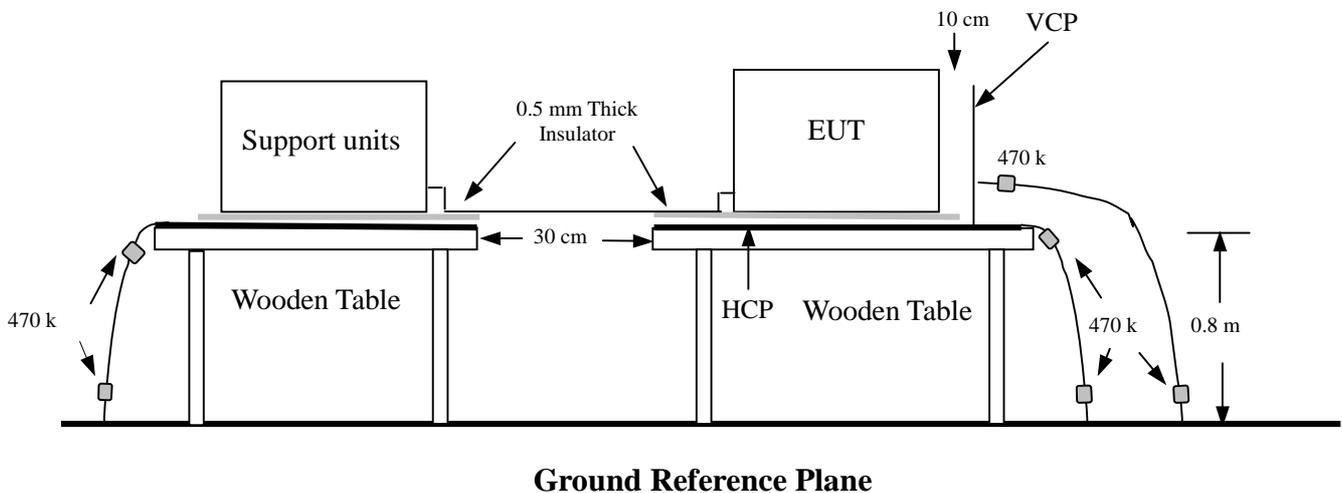
Test Parameter	Measurement Value	Limit	Result
$P_{st}$	0.072	1.0	Pass
$P_{lt}$	0.072	0.65	Pass
$T_{dt}$ (ms)	0	500	Pass
$d_{max}$ (%)	0%	4%	Pass
dc (%)	0.04%	3.3%	Pass

## 9 ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

<b>Port</b>	: Enclosure
<b>Basic Standard</b>	: IEC/EN 61000-4-2
<b>Test Level</b>	: $\pm 8$ kV (Air Discharge) : $\pm 4$ kV (Contact Discharge) : $\pm 4$ kV (Indirect Discharge)
<b>Performance Criterion</b>	: B (Standard Required)
<b>Tested by</b>	: Arno Hsieh
<b>Temperature</b>	: 26°C
<b>Humidity</b>	: 45% RH
<b>Pressure</b>	: 1018mbar

### 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 2000 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 IEC/EN 61000-4-2, 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 discharge	Voltage	Coupling	Result (Pass/Fail)
Mini 10 /Point	± 8 kV	Air Discharge	Pass
Mini 10 /Point	± 4 kV	Contact Discharge	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge HCP	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)	Pass

**For 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**       **FAIL**

**Observation:** No function degraded during the tests.

## *The Tested Points of EUT*

*Photo 1 of 6*



*Photo 2 of 6*





*Photo 3 of 6*



*Photo 4 of 6*





*Photo 5 of 6*



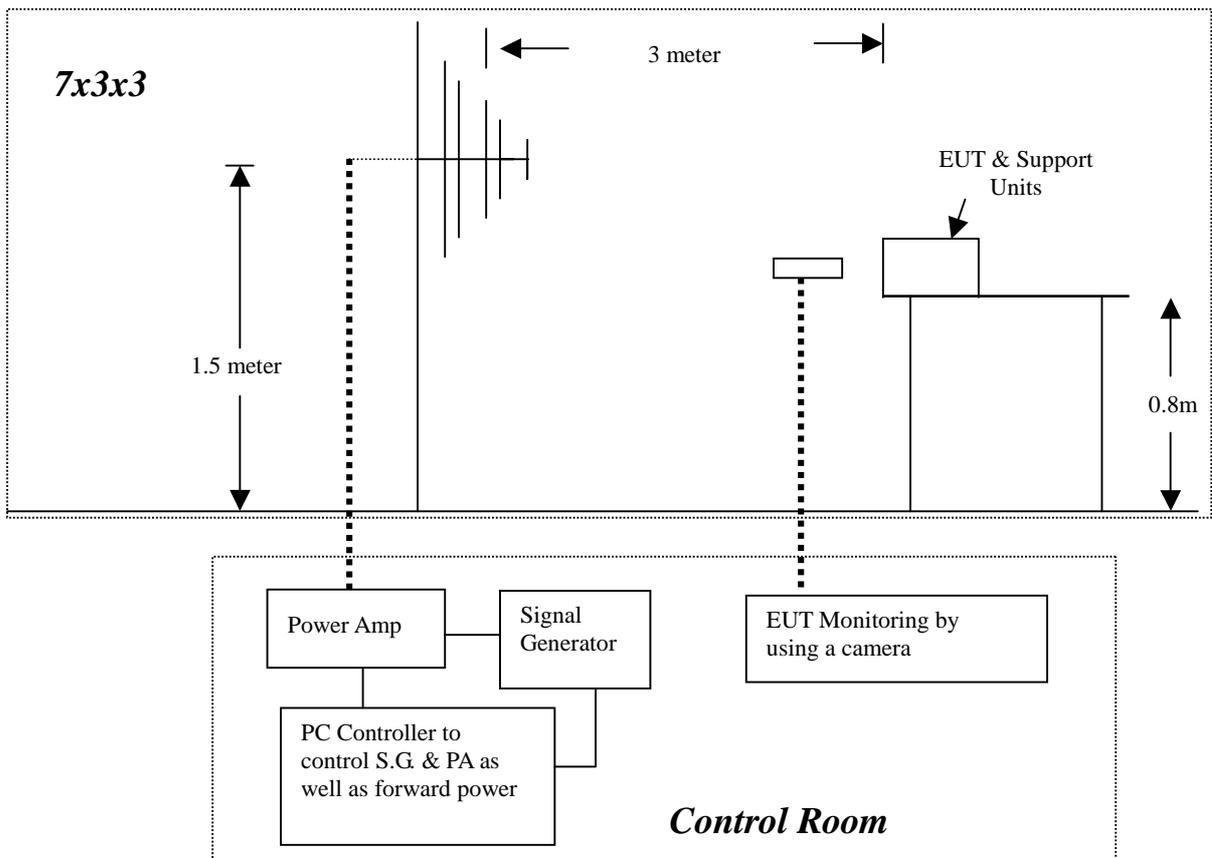
*Photo 6 of 6*



## 10 RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

<b>Port</b>	: Enclosure
<b>Basic Standard</b>	: IEC/EN 61000-4-3
<b>Requirements</b>	: 10 V/m / with 80% AM. 1kHz Modulation. (Customer Requested)
<b>Performance Criterion</b>	: A (Standard Required)
<b>Tested by</b>	: Arno Hsieh
<b>Temperature</b>	: 24°C
<b>Humidity</b>	: 43% RH
<b>Pressure</b>	: 1011mbar

### 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/EN 61000-4-3.
2. Setting the testing parameters of RS test software per IEC/EN 61000-4-3.
3. Performing the pre-test at each side of with double specified level (6V/m) at 4% steps.
4. 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.
5. Recording the test result in following table.
6. It is not necessary to perform test as per annex A of EN 55024 if the EUT doesn't belong to ITE product.

**Preliminary test conditions:**

Test level : 10V/m  
 Steps : 4 % 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

**Final 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	Back	Pass
80-1000	10V/m	Yes	V	Back	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.

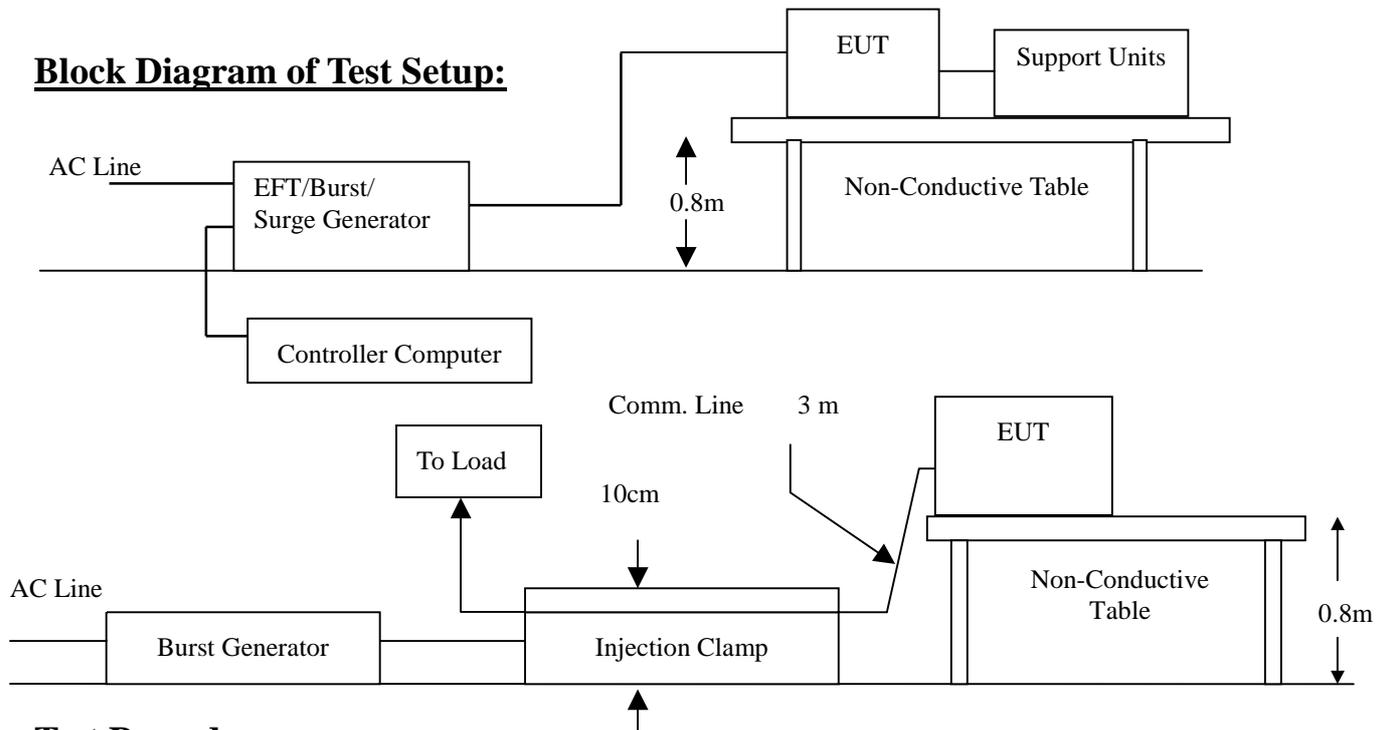
**PASS**       **FAIL**

**Observation:** No function degraded during the tests.

## 11 FAST TRANSIENTS/BURST IMMUNITY TEST

<b>Port</b>	: On Power Supply Lines and LAN Cable
<b>Basic Standard</b>	: IEC/EN 61000-4-4
<b>Requirements</b>	: $\pm 2$ kV for Power Supply Line (Customer Requested) $\pm 0.5$ kV for LAN Cable
<b>Performance Criteria</b>	: B (Standard Required)
<b>Tested by</b>	: Arno Hsieh
<b>Temperature</b>	: 26°C
<b>Humidity</b>	: 45% RH
<b>Pressure</b>	: 1018mbar

### 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. Injected test voltage to the EUT ports from minimum to standard request or client request.
5. 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	± 2	Direct	Pass
N	± 2	Direct	Pass
PE	± 2	Direct	Pass
L + N	± 2	Direct	Pass
L + PE	± 2	Direct	Pass
N + PE	± 2	Direct	Pass
L + N + PE	± 2	Direct	Pass
RJ 45 Port (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.

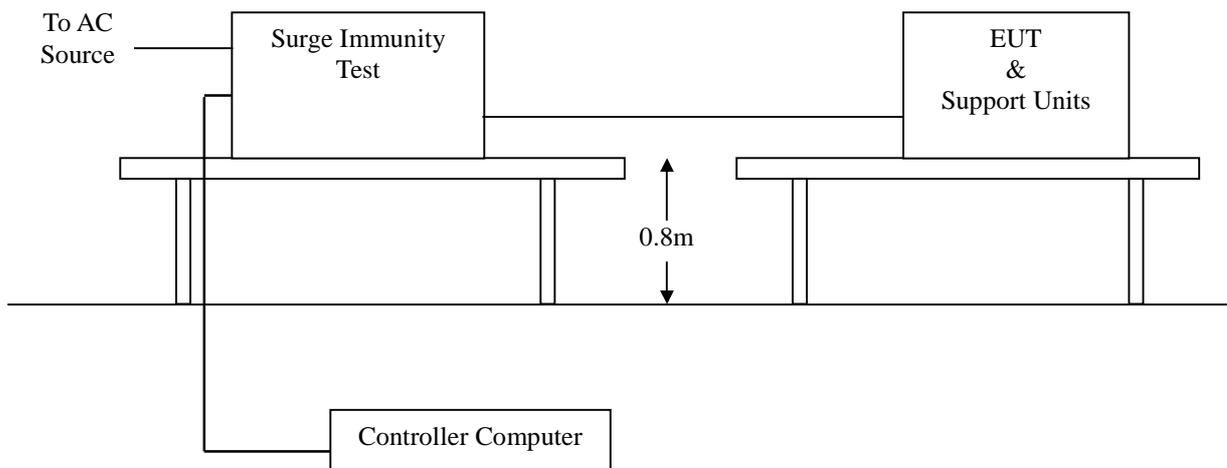
<input checked="" type="checkbox"/> <b>PASS</b> <input type="checkbox"/> <b>FAIL</b>
--

<p><b>Observation:</b> No function degraded during the tests.</p>
---

## 12 SURGE IMMUNITY TEST

<b>Port</b>	: Power Cord
<b>Basic Standard</b>	: IEC/EN 61000-4-5
<b>Requirements</b>	: $\pm 1$ kV (Line to Line) $\pm 2$ kV (Line to Ground)
<b>Performance Criteria</b>	: B (Standard Required)
<b>Tested by</b>	: Arno Hsieh
<b>Temperature</b>	: 26°C
<b>Humidity</b>	: 45% RH
<b>Pressure</b>	: 1018mbar

### 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. Injected test voltage to the EUT ports from minimum to standard request or client request.
3. 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**       **FAIL**

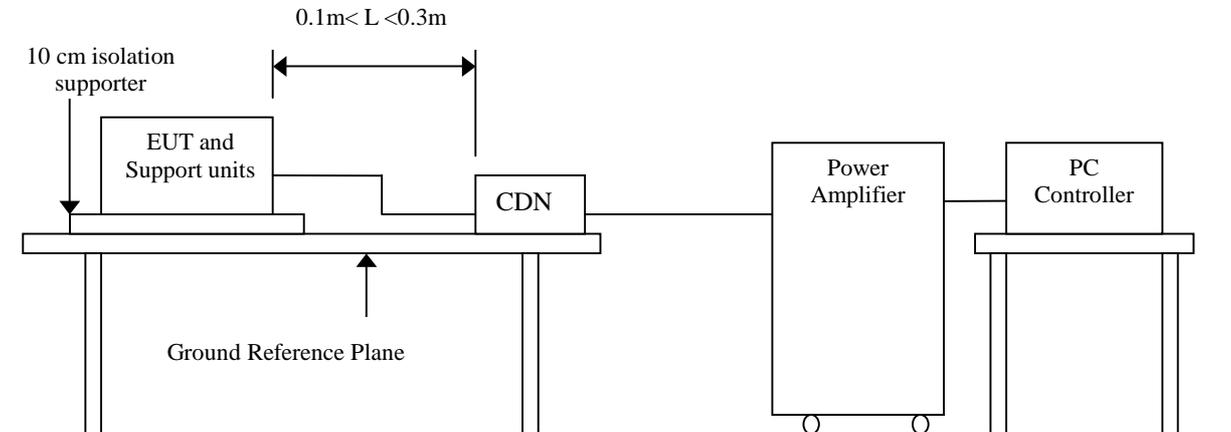
**Observation:** No function degraded during the tests.

### 13 CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

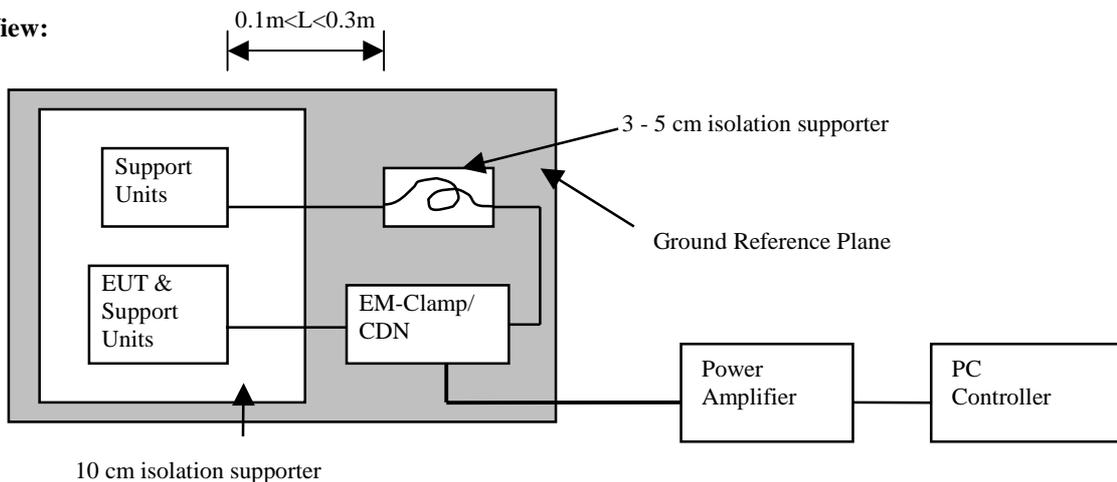
- Port** : AC Port and LAN Cable
- Basic Standard** : IEC/EN 61000-4-6
- Requirements** : 10 V with 80% AM. 1kHz Modulation. (Customer Requested)
- Injection Method** : CDN-M3 for Power Cord  
CDN-T4 for LAN Cable
- Performance Criterion** : A (Standard Required)
- Tested by** : Arno Hsieh
- Temperature** : 24°C
- Humidity** : 43% RH
- Pressure** : 1011mbar

#### 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. Setting the testing parameters of CS test software as per IEC/EN 61000-4-6.
3. 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:**

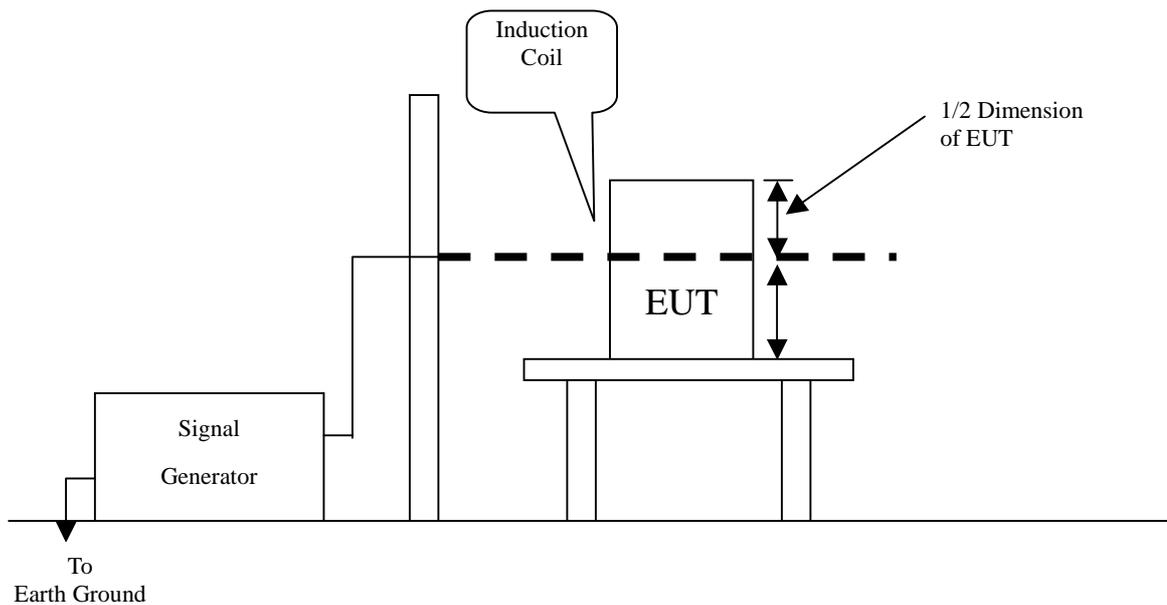
- Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- 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"/> <b>PASS</b> <input type="checkbox"/> <b>FAIL</b>
<b>Observation:</b> No function degraded during the tests.

## 14 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

<b>Port</b>	: Enclosure
<b>Basic Standard</b>	: IEC/EN 61000-4-8
<b>Requirements</b>	: 30 A/m (Customer Requested)
<b>Performance Criterion</b>	: A (Standard Required)
<b>Tested by</b>	: Arno Hsieh
<b>Temperature</b>	: 26°C
<b>Humidity</b>	: 49% RH
<b>Pressure</b>	: 1018mbar

### 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. Rotating the induction coil by 90° ( Y direction )
4. Rotating the induction coil by 90° again ( Z direction )
5. Recording the test result as shown in following table.



**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.

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

## 15 VOLTAGE DIPS / SHORT INTERRUPTIONS

**Port** : AC mains

**Basic Standard** : IEC/EN 61000-4-11

**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.

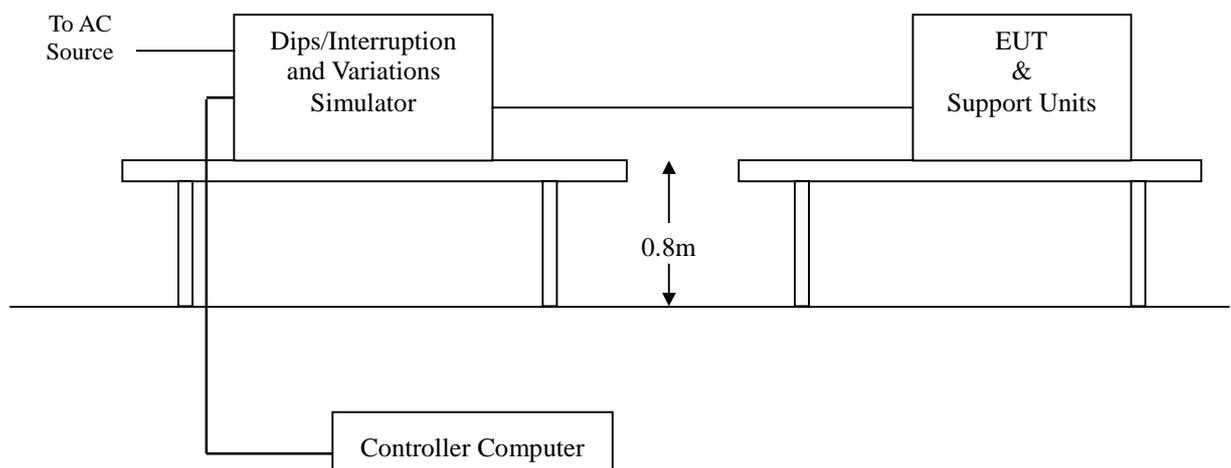
**Tested by** : Arno Hsieh

**Temperature** : 26°C

**Humidity** : 45% RH

**Pressure** : 1018mbar

### 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. Setting the parameter of tests and then Perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. 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 <sub>T</sub>	Reduction (%)	Duration (periods)	Observation	Meet Performance Criteria
0	100	0.5	Normal	A
70	30	25	Normal	A

**Voltage Interruptions:**

Test Level % U <sub>T</sub>	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"/> <b>PASS</b> <input type="checkbox"/> <b>FAIL</b>
--

## APPENDIX I - PHOTOGRAPHS OF TEST SETUP

### LINE CONDUCTED EMISSION TEST (EN 55022)



### RADIATED EMISSION TEST (EN 55022)





## POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST



## ELECTROSTATIC DISCHARGE TEST





## **RADIATED ELECTROMAGNETIC FIELD TEST**



## FAST TRANSIENTS/BURST TEST





## **SURGE IMMUNITY TEST**



## CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST



## **POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST**



## **VOLTAGE DIPS / INTERRUPTION TEST**





# APPENDIX II – TEST RESULT OF EN 61000-3-2/-3

## Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

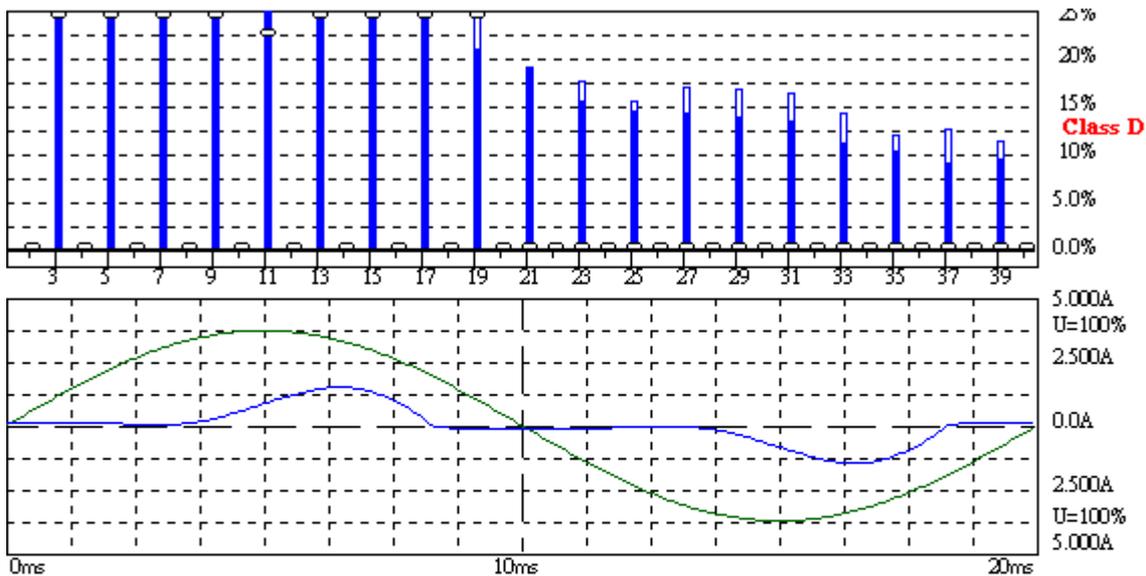
Comply: IEC 61000-3-2 Ed.2.1 :2001 (incl. Amd.14) - IEC 61000-4-7 Ed.1.0 :1991

### ADVANTECH

HARCS Setup File : [unnamed](#)

HARCS Report File : [unnamed](#)

Operator : Grant Chen  
 EUT : Industrial Workstation  
 Model No. : AWS-8248TPV-T  
 Remarks : TEMP:26 HUMD:61



#### Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

2004/8/26 AM 11:09:1

U <sub>rms</sub> = 230.1 V	P = 125.4 W	THC = 0.411 A	Range: 5 A
I <sub>rms</sub> = 0.696 A	pf = 0.783	P <sub>max</sub> = 167.5 W	V <sub>nom</sub> : 230 V
			TestTime: 5 min (100%)

Industrial Workstation  
TEMP:26 HUMD:61

**Test completed, Result: PASSED**

B4R-1000 EMC-Print

Full Bar : Actual Values  
 Empty Bar : Maximum Values  
 Blue : Current , Green : Voltage , Red : Failed



Measurement

ADVANTECH

Date : 2004/8/26 AM 11:09:1 V3.15

File :

Operator : Grant Chen
EUT : Industrial Workstation
Model No. AWS-8248TPV-T
Remarks TEMP:26 HUMD:61

Urms = 230.1V Freq = 49.987 Range: 5 A
Irms = 0.696A Ipk = 1.519A cf = 2.182
P = 125.4W Pap = 160.1VA pf = 0.783
THDi = 58.8 % THDu = 0.10 % Class D

Test - Time : 5min ( 100 %)

Limit Reference: Pmax = 167.47W

Test completed, Result: PASSED

Table with 7 columns: Order, Freq. [Hz], Imax [A], Imax% [%], Imax%L [%], Limit [A], Status. Contains 14 rows of test data.



15	750	0.0217	3.1140	50.409	0.0430
16	800	0.0000	0.0000		
17	850	0.0137	1.9737	36.209	0.0379
18	900	0.0000	0.0000		
19	950	0.0089	1.2719	26.080	0.0339
20	1000	0.0000	0.0000		
21	1050	0.0058	0.8333	18.886	0.0307
22	1100	0.0000	0.0000		
23	1150	0.0049	0.7018	17.418	0.0280
24	1200	0.0000	0.0000		
25	1250	0.0040	0.5702	15.383	0.0258
26	1300	0.0000	0.0000		
27	1350	0.0040	0.5702	16.614	0.0239
28	1400	0.0000	0.0000		
29	1450	0.0037	0.5263	16.472	0.0222
30	1500	0.0000	0.0000		
31	1550	0.0034	0.4825	16.140	0.0208
32	1600	0.0000	0.0000		
33	1650	0.0027	0.3947	14.058	0.0195
34	1700	0.0000	0.0000		
35	1750	0.0021	0.3070	11.596	0.0184
36	1800	0.0000	0.0000		
37	1850	0.0021	0.3070	12.259	0.0174
38	1900	0.0000	0.0000		
39	1950	0.0018	0.2632	11.076	0.0165
40	2000	0.0000	0.0000		



ADVANTECH

Date : 2004/8/26 AM 11:29:1 V3.15

File :

Operator : Grant Chen  
 EUT : Industrial Workstation  
 Model No. AWS-8248TPV-T  
 Remarks TEMP:26 HUMD:55

Urms = 230.1V Freq = 49.987 Range: 2 A  
 Irms = 0.688A Ipk = 1.502A cf = 2.182  
 P = 123.5W Pap = 158.4VA pf = 0.780

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

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

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

Test completed, Result: PASSED

Plt = 0.072

	Pst	dmax	dc	dt>Lim	Fail
		[%]	[%]	[ms]	
1	0.072	0.000	0.010	0.000	



ADVANTECH

Date : 2004/8/26 AM 11:41:0 V3.15

File :

Operator : Grant Chen  
 EUT : Industrial Workstation  
 Model No. AWS-8248TPV-T  
 Remarks TEMP:26 HUMD:55

Urms = 230.1V Freq = 49.974 Range: 2 A  
 Irms = 0.531A Ipk = 1.186A cf = 2.232  
 P = 94.09W Pap = 122.2VA pf = 0.770

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

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

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

Test completed, Result: PASSED

Plt = 0.072

	Pst	dmax	dc	dt>Lim	Fail
		[%]	[%]	[ms]	
1	0.072	0.000	0.040	0.000	