

# EMC UPDATE TEST REPORT

For

**Flat Panel Monitor with 12" Color TFT/LCD Display**

**Applicant** : Advantech Co., Ltd.  
**Trade Name** : Advantech  
**Model Number** : FPM-3120TV-XY (X=Null or T ; Y=Null or S)  
\*\*FPM-3120TXY-XXX  
**Date** : March 10, 2003  
**Date of Test** : March 7 ~ 8, 2003  
**Revision** : 00  
**Reference Standard** :

Standards	Results (Pass/Fail)
EN 55022: 1998	PASS
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998	PASS
EN 61000-3-3: 1995	PASS
EN 55024: 1998(following EN 61000-6-2:1999 test level)	PASS
- IEC 61000-4-2: 2001 (EN61000-4-2:1995)	PASS
- IEC 61000-4-3: 1995 (EN 61000-4-3:1995)	PASS
- IEC 61000-4-4: 1995 (EN 61000-4-4:1995)	PASS
- IEC 61000-4-5: 1995 (EN 61000-4-5:1995)	PASS
- IEC 61000-4-6: 1996 (EN 61000-4-6:1996)	PASS
- IEC 61000-4-8: 1993 (EN 61000-4-8:1993)	PASS
- IEC 61000-4-11: 1994 (EN 61000-4-11:1994)	PASS

## Description of Rev. 00:

1. Applicant adds one model number for marketing purpose only.  
(Please refer have \*\* mark items on this report)
2. Applicant adds one power adapter and touch screen panel circuit to re-test.  
(Please refer have \*\* mark items on this report)
3. Other information please refers to the 020405 (Rev.00) and this (Rev. 00) test report.

Approved by Authorized Signatory: \_\_\_\_\_

  
**Jonson Lee / EMC. Director**

## VERIFICATION OF COMPLIANCE

**Equipment Under Test:** Flat Panel Monitor with 12" Color TFT/LCD Display  
**Trade Name:** Advantech  
**Model Number:** FPM-3120TV-XY (X=Null or T ; Y=Null or S)  
\*\*FPM-3120TXY-XXX  
**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  
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998  
EN 61000-3-3: 1995  
EN 55024: 1998 (following EN61000-6-2:1999 test level)  
IEC 61000-4-2: 2001 (EN 61000-4-2:1995);  
IEC 61000-4-3: 1995 (EN 61000-4-3:1995);  
IEC 61000-4-4: 1995 (EN 61000-4-4:1995);  
IEC 61000-4-5: 1995 (EN 61000-4-5:1995);  
IEC 61000-4-6: 1996 (EN 61000-4-6:1996);  
IEC 61000-4-8: 1993 (EN 61000-4-8:1993);  
IEC 61000-4-11:1994 (EN 61000-4-11:1994)  
**File Number:** 030164-E  
**Date of Test:** March 7 ~ 8, 2003  
**Deviation:** None  
**Condition of Test Sample:** Normal  
**Final Result:** Pass  
**Worst Data:** See below

Test Item	Freq. (MHz)	Measured Data	Margin (Mî C)	Remark
Radiated Emission	800.14	34.8 (dB/m)	-2.2 dB ( $\pm$ 1.5758 dB)	
Conducted Emission	0.170	46.2 (dB)	-8.8 dB ( $\pm$ 2.8216 dB)	
<ul style="list-style-type: none"><li>● The negative sign in Margin cell means under the specific limit.</li><li>● This test result traceable to national or international standards.</li></ul>				

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

<b>Housing Type:</b>	Metal case
<b>EUT Power Rating:</b>	DCV from Power Adaptor
<b>AC power during Test:</b>	230VAC/ 50Hz
<b>AC Power Cord Type:</b>	Unshielded, 1.8m (Detachable) to Power Adapter
<b>DC Power Cable Type:</b>	Unshielded, 1.8m with a core (Undetectable) at Power Adaptor
<b>**DC Power Cable Type:</b>	Unshielded, 1.6m with a core (Undetectable) at Power Adaptor
<b>Power Adaptor Manufacturer:</b>	LIEN <b>Model:</b> LE-9702B
<b>**Power Adaptor Manufacturer:</b>	LIENARITY 1 <b>Model:</b> LAD6019AB4
<b>Power Adaptor Power Rating:</b>	I/P : 100-240VAC, 50 / 60Hz, 1.5A O/P : 12VDC, 4.0A
<b>OSC/Clock Frequencies:</b>	20MHz
<b>Serial Cable Type:</b>	Shielded, 1.8m (Non-detachable)
<b>VGA Cable Type:</b>	Shielded, 1.8m with a core (Non-detachable)
<b>PS/2 Cable Type:</b>	Shielded, 1.8m (Non-detachable)
<b>**Touch Screen Panel Manufacturer:</b>	SANYO <b>Model:</b> TM232SV-02L11

**I/O Port of EUT:**

I/O Port Type	Q'TY	Tested with
1. Serial Port	1	1
2. Video Port	1	1
4. PS/2 Keyboard	1	1
5. PS/2 Port	1	1

**Note:** 1. The means of “X” and “Y” (X=Null or T ; Y=Null or S) on the model number are listed as below:

“X” =Touchscreen Function: (Null: Without Touchscreen)  
(T: With resistive Touchscreen)

“Y” =Material of Front Panel (Null: Alumimun)  
(S: Stainless)

2. Client consigns only one Model sample to tested. (Model Number: FPM-3120TV-T)  
Therefore, the testing Lab. just guarantees the units, which have been tested.

\*\*3. The means of “XY-XXX” as below:

- The first “X” means LCD type. (V: Normal (MXS121022010), H: Hi Bright (TM121SV-02L11))
- The “Y” means material of front panel. (Null: Aluminum (Black color), S: Stainless, W: White color)
- The second “X” means touch screen function. (Null: Without touch screen, T: with touch screen)
- The third “X” means touch screen type. (Null: resistor type, C: capacity type)
- The last “X” means other option. (Power connector or OSD position)

\*\*4. Client consigns only one model sample to test. (Model Number: FPM-3120TH-TC)  
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.	PC	EVO D300	6K1BKF83F100	FCC DoC	Compaq	N/A	Unshielded, 1.8m
2.	Printer	2225C	2648S40021	DK467GSM24	HP	Shielded, 1.8m	Unshielded, 1.8m
3.	PS/2 Keyboard	SK-2800C	B1C790BCPJ73JM	GYUR79SK	Compaq	Shielded, 1.8m	N/A
4.	PS/2 Mouse	M-CAA43	LZE02801285	FCC DoC	Logitech	Shielded, 1.8m	N/A

**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

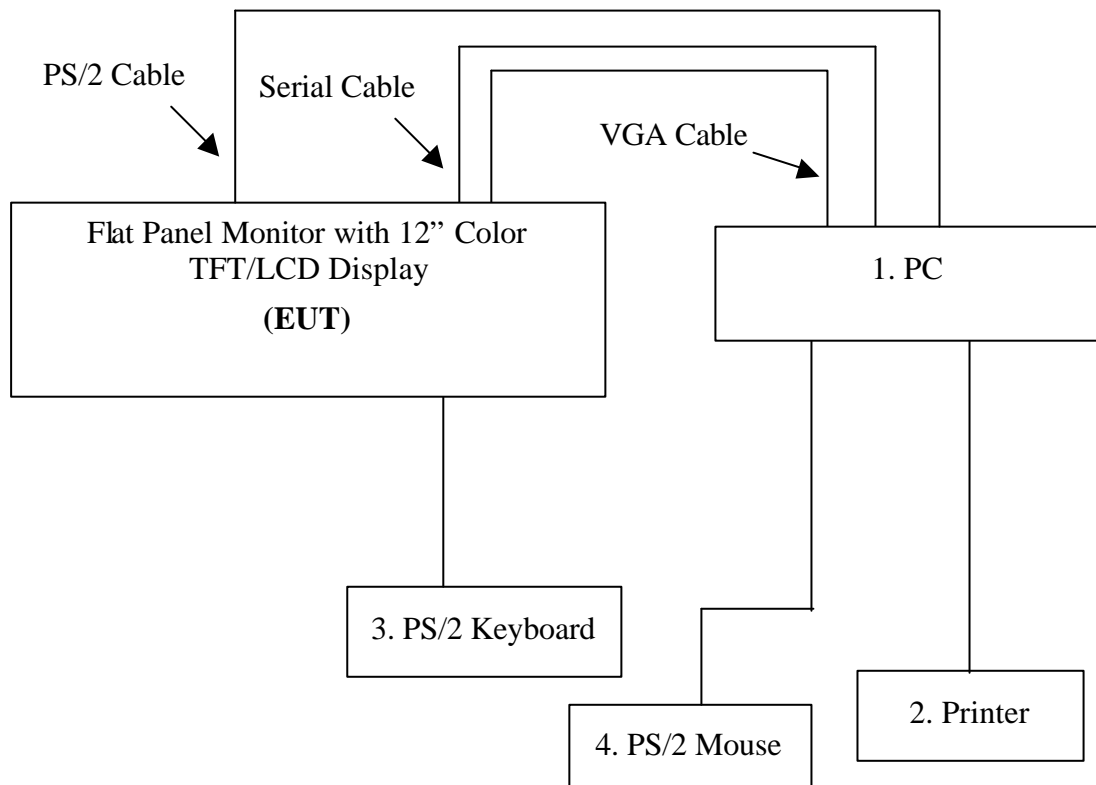
### System Diagram of Connections between EUT and Simulators

**EUT:** Flat Panel Monitor with 12" Color TFT/LCD Display

**Trade Name:** Advantech

**Model Number:** FPM-3120TH-TC

**AC Power Cord:** Unshielded, 1.8m to Power Adapter



## 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

**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	ESHS30	828144/003	08/08/2002	08/07/2003
LISN	R&S	ESH3-Z5	848773/014	10/17/2002	10/16/2003
LISN	EMCO	3825/2	9003/1382	02/26/2003	02/25/2004

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.

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
ESD test (61000-4-2)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
ESD Generator	NoiseKen	ESS-2001	ESS0210582	06/18/2002	06/17/2003
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	05/23/2002	05/22/2003
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	04/24/2002	04/23/2003
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
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	04/08/2002	04/07/2003

## EUT Configuration during measurement:

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

**Mode(s): (Customer defined)**

- 1. 800 x 600 + Touch Screen Panel + LINEARITY 1 Power Adapter**
- 2. 640 x 480 + Touch Screen Panel + LINEARITY 1 Power Adapter**

- 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:** FPM-3120TH-TC

**Location:** Site # 4

**Tested by:** Lung Tsai

**Test Mode:** Mode 1

**Test Results:** Passed

**Temperature:** 18°C

**Humidity:** 68% 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
0.170	53.60	46.20	65.00	55.00	-11.40	-8.80	L1
2.973	28.40	---	56.00	46.00	-27.60	---	L1
9.256	31.70	---	60.00	50.00	-28.30	---	L1
10.974	32.60	---	60.00	50.00	-27.40	---	L1
12.167	32.40	---	60.00	50.00	-27.60	---	L1
14.231	27.90	---	60.00	50.00	-32.10	---	L1
0.170	54.20	44.80	65.00	55.00	-10.80	-10.20	L2
3.024	26.10	---	56.00	46.00	-29.90	---	L2
10.891	28.30	---	60.00	50.00	-31.70	---	L2
12.487	30.10	---	60.00	50.00	-29.90	---	L2
13.347	27.40	---	60.00	50.00	-32.60	---	L2
15.804	27.10	---	60.00	50.00	-32.90	---	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

### (RADIATED EMISSION TEST)

**Model Number:** FPM-3120TH-TC

**Location:** Site # 4

**Tested by:** Lung Tsai

**Polar:** Vertical--10m

**Test Mode:** Mode 1

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 18°C

**Humidity:** 68%RH

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

Freq. (MHz)	Raw Data ( dBuV/m )	Corr. Factor (dB)	Emiss. Level ( dBuV/m )	Limits	Margin (dB)
35.71	12.6	15.0	27.6	30.0	-2.4
43.32	15.6	12.0	27.6	30.0	-2.4
63.36	16.4	7.7	24.1	30.0	-5.9
69.45	14.8	8.5	23.3	30.0	-6.7
120.99	13.2	14.5	27.7	30.0	-2.3
600.09	8.3	24.2	32.5	37.0	-4.5
800.11	9.4	25.1	34.5	37.0	-2.5

## SUMMARY DATA

### (RADIATED EMISSION TEST)

**Model Number:** FPM-3120TH-TC

**Location:** Site # 4

**Tested by:** Lung Tsai

**Polar:** Horizontal--10m

**Test Mode:** Mode 1

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 18°C

**Humidity:** 68%RH

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

Freq. (MHz)	Raw Data ( dBuV/m )	Corr. Factor (dB)	Emiss. Level ( dBuV/m )	Limits	Margin (dB)
80.44	17.3	9.3	26.6	30.0	-3.4
84.47	15.4	10.2	25.6	30.0	-4.4
120.56	12.3	14.6	26.9	30.0	-3.1
228.25	14.3	13.3	27.6	30.0	-2.4
232.15	14.5	13.9	28.4	37.0	-8.6
720.89	7.2	25.4	32.6	37.0	-4.4
800.14	9.7	25.1	34.8	37.0	-2.2

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

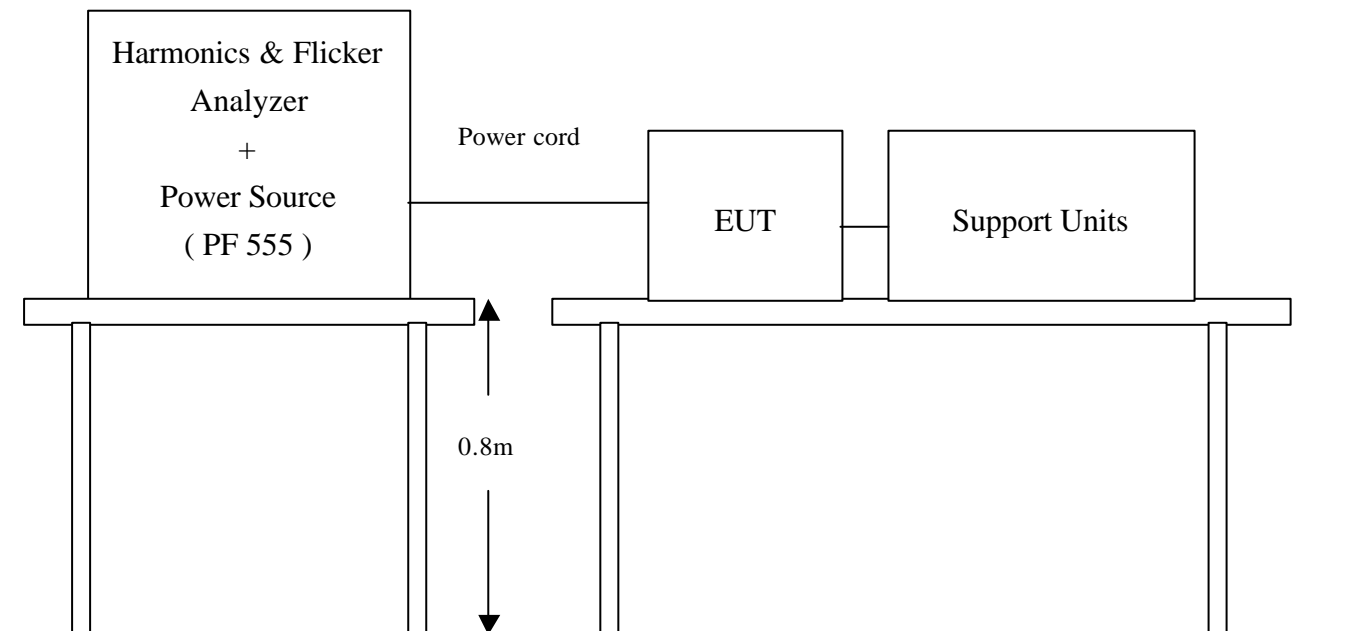
### POWER HARMONICS MEASUREMENT

Port : AC mains  
Basic Standard : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998)  
Limits : ☒ CLASS A ; ☐ CLASS D  
Tester : Hank Huang  
Temperature : 17°C  
Humidity : 75%

### 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 : 17°C  
Humidity : 75%

### Block Diagram of Test Setup:



### Result:

Please see the attached test data.

-----  
EN 61000-3-2 TEST REPORT 2003/3/7 02:01 PM  
-----

Unit: Flat Panel Monitor with 12" Color TFT/LCD Display

Model No.: FPM-3120TH-TC

Remarks: TEMP:17°C HUM:75%

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:33.4W

## TEST DATA

-----

Result:        PASS

## Harmonic Current Results

-----

Hn	AMPS	LO Limit	HI Limit	Result
0	0.000	0.000	0.000	PASS
1	0.104	NaN	NaN	PASS
2	0.001	1.080	1.080	PASS
3	0.079	2.300	2.300	PASS
4	0.001	0.430	0.430	PASS
5	0.071	1.140	1.140	PASS
6	0.000	0.300	0.300	PASS
7	0.064	0.770	0.770	PASS
8	0.000	0.230	0.230	PASS
9	0.056	0.400	0.400	PASS
10	0.000	0.184	0.184	PASS
11	0.047	0.330	0.330	PASS
12	0.000	0.153	0.153	PASS
13	0.037	0.210	0.210	PASS
14	0.000	0.131	0.131	PASS
15	0.028	0.150	0.150	PASS
16	0.000	0.115	0.115	PASS
17	0.019	0.132	0.132	PASS
18	0.000	0.102	0.102	PASS
19	0.012	0.118	0.118	PASS
20	0.000	0.092	0.092	PASS

21	0.006	0.107	0.107	PASS
22	0.000	0.084	0.084	PASS
23	0.003	0.098	0.098	PASS
24	0.000	0.077	0.077	PASS
25	0.005	0.090	0.090	PASS
26	0.000	0.071	0.071	PASS
27	0.006	0.083	0.083	PASS
28	0.000	0.066	0.066	PASS
29	0.007	0.078	0.078	PASS
30	0.000	0.061	0.061	PASS
31	0.006	0.073	0.073	PASS
32	0.000	0.058	0.058	PASS
33	0.005	0.068	0.068	PASS
34	0.000	0.054	0.054	PASS
35	0.004	0.064	0.064	PASS
36	0.000	0.051	0.051	PASS
37	0.002	0.061	0.061	PASS
38	0.000	0.048	0.048	PASS
39	0.001	0.058	0.058	PASS
40	0.000	0.046	0.046	PASS

END OF REPORT

-----  
EN 61000-3-3 TEST REPORT 2003/3/7 02:16 PM  
-----

Unit: Flat Panel Monitor with 12" Color TFT/LCD Display

Model No.: FPM-3120TH-TC (Continue)

Remarks: TEMP:17°C HUM:75%

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	0.001	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	0.021	0.400	PASS	true
% THD	0.03	3.00	PASS	true

END OF REPORT

-----  
EN 61000-3-3 TEST REPORT 2003/3/7 02:31 PM  
-----

Unit: Flat Panel Monitor with 12" Color TFT/LCD Display

Model No.: FPM-3120TH-TC (Manual Switch)

Remarks: TEMP:17°C HUM:75%

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	0.001	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	0.021	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)**

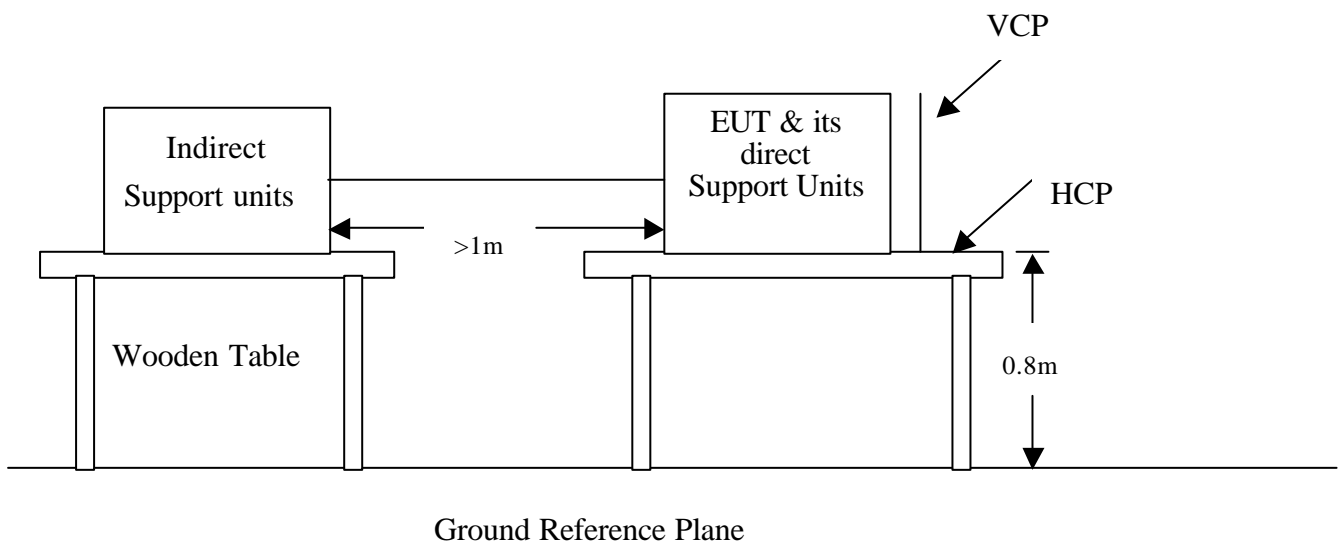
## IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

### ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

<b>Port</b>	: Enclosure
<b>Basic Standard</b>	: IEC 61000-4-2
<b>Test Level</b>	: $\pm 8$ kV (Air Discharge) $\pm 4$ kV (Contact Discharge) $\pm 4$ kV (Indirect Discharge)
<b>Performance Criteria</b>	: B ( Standard require )
<b>Tester</b>	: Lung Tsai
<b>Temperature</b>	: 18°C
<b>Humidity</b>	: 48%
<b>Pressure</b>	: 1020mbar

#### 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 Host PC sent above message to 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 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	$\pm 8$ kV	Air Discharge	Pass
Mini 25 /Point	$\pm 4$ kV	Contact Discharge	Pass
Mini 25 /Point	$\pm 4$ kV	Indirect Discharge HCP (Front)	Pass
Mini 25 /Point	$\pm 4$ kV	Indirect Discharge VCP (Right)	N/A
Mini 25 /Point	$\pm 4$ kV	Indirect Discharge VCP (Left)	N/A
Mini 25 /Point	$\pm 4$ 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 4*



*Photo 2 of 4*



*Photo 3 of 4*



*Photo 4 of 4*

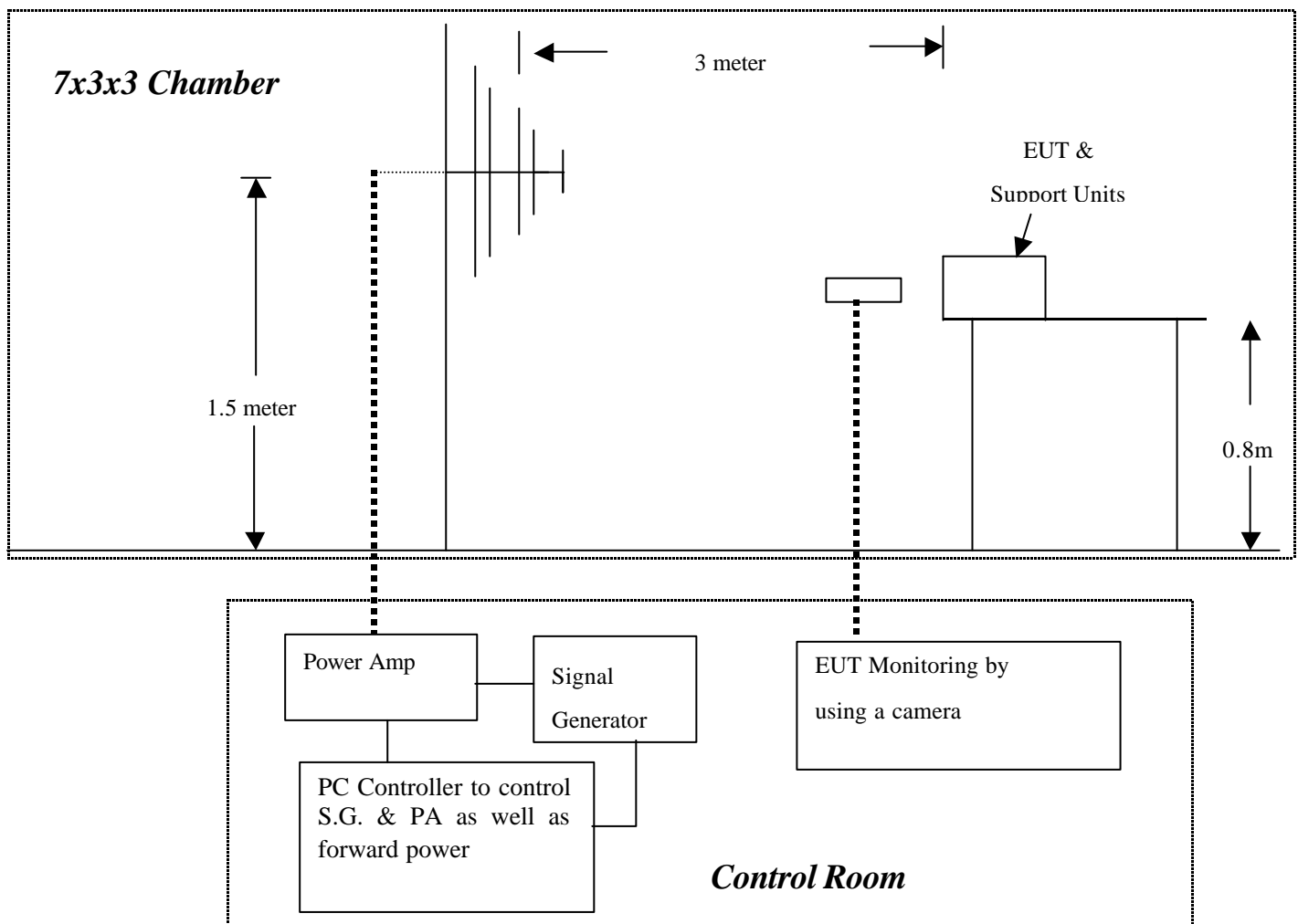


## IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

### RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

**Port** : Enclosure  
**Basic Standard** : IEC 61000-4-3  
**Requirements** : 10 V/m / with 80% AM. 1kHz Modulation.  
**Performance Criteria** : A ( Standard require )  
**Tester** : Lung Tsai  
**Temperature** : 18°C  
**Humidity** : 48%  
**Pressure** : 1020mbar

#### 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 test at each side of with specified level from 80MHz to 1000MHz at 1% steps.
6. Recording the test result in following table.
7. 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	Yes	H	Front	Pass
80-1000	10V	Yes	V	Front	Pass
80-1000	10V	Yes	H	Right	Pass
80-1000	10V	Yes	V	Right	Pass
80-1000	10V	Yes	H	Back	Pass
80-1000	10V	Yes	V	Back	Pass
80-1000	10V	Yes	H	Left	Pass
80-1000	10V	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**

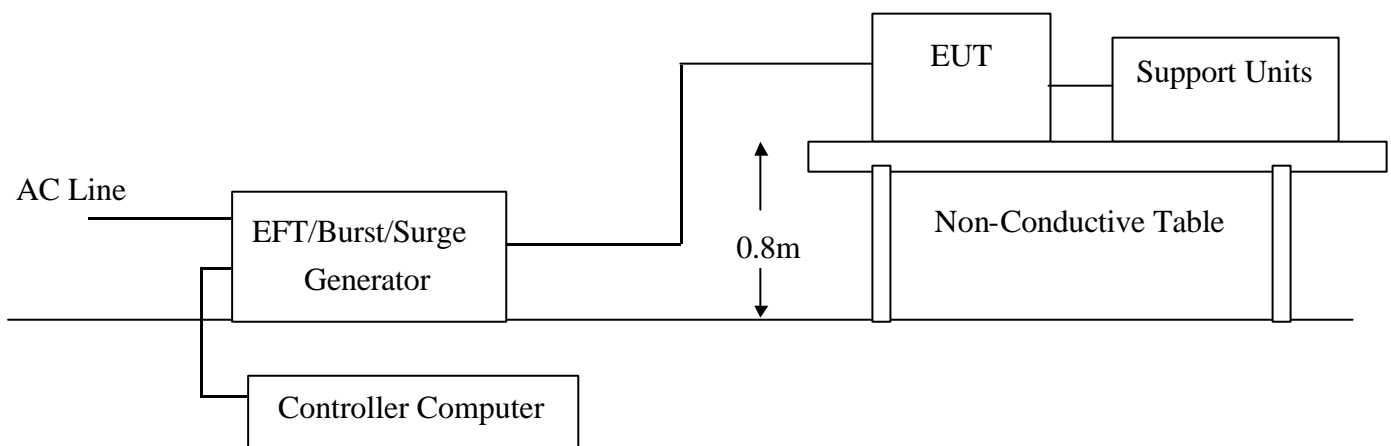
**Observation: No any function degraded during the tests.**

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

### FAST TRANSIENTS/BURST IMMUNITY TEST

**Port** : On Power Supply Lines  
**Basic Standard** : IEC 61000-4-4  
**Requirements** :  $\pm 1$  kV for Power Supply Line  
**Performance Criteria** : B ( Standard require )  
**Tester** : Lung Tsai  
**Temperature** : 18°C  
**Humidity** : 48%  
**Pressure** : 1020mbar

#### 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)
L1	$\pm 1$	Direct	Pass
N	$\pm 1$	Direct	Pass
PE	$\pm 1$	Direct	Pass
L1 + N	$\pm 1$	Direct	Pass
L1 + PE	$\pm 1$	Direct	Pass
N + PE	$\pm 1$	Direct	Pass
L1 + N + PE	$\pm 1$	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.

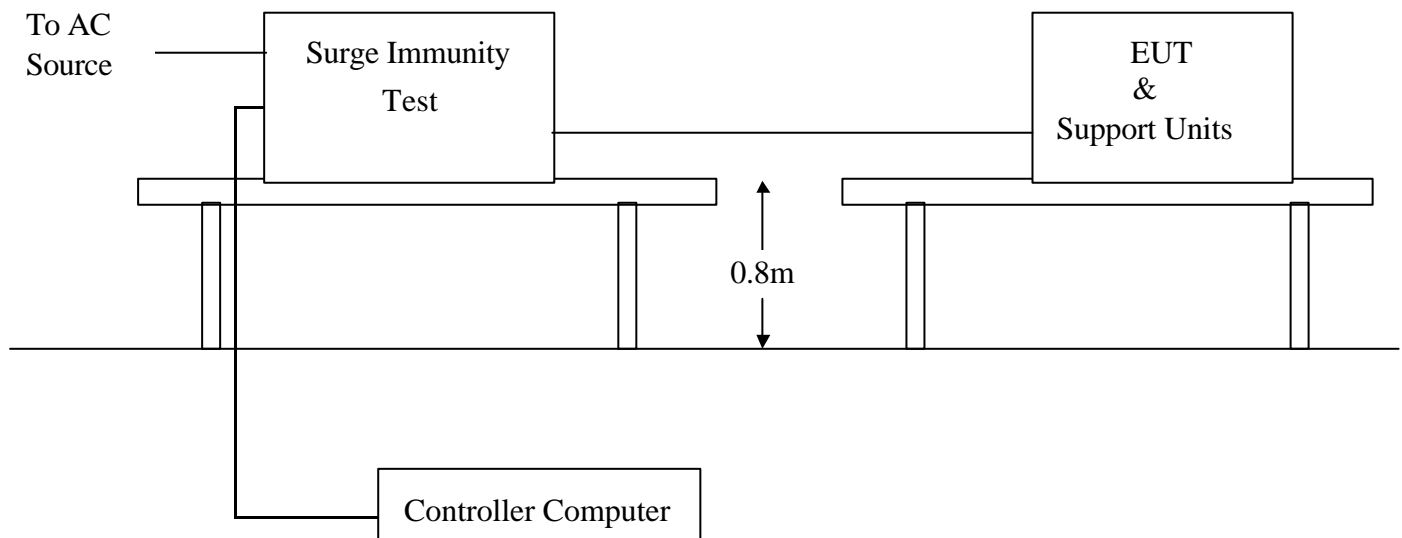
<input checked="" type="checkbox"/> <b>PASS</b>	<input type="checkbox"/> <b>FAILED</b>
<b>Observation: No any function degraded during the tests.</b>	

## IEC 61000-4-5 (SURGE IMMUNITY)

### SURGE IMMUNITY TEST

<b>Port</b>	: Power Cord
<b>Basic Standard</b>	: IEC 61000-4-5
<b>Requirements</b>	: $\pm 1$ kV (Line to Line) $\pm 2$ kV (Line to Ground)
<b>Performance Criteria</b>	: B ( Standard require )
<b>Tester</b>	: Lung Tsai
<b>Temperature</b>	: 18°C
<b>Humidity</b>	: 48%
<b>Pressure</b>	: 1020mbar

### 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  $\mu$ s  
Current Waveform : 8/20  $\mu$ 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.

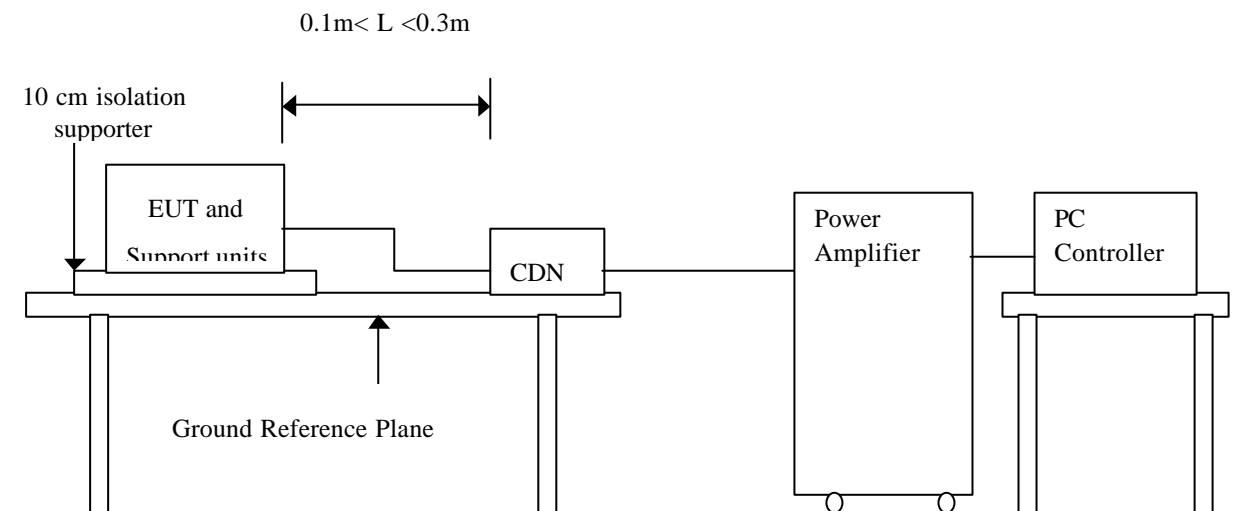
<input checked="" type="checkbox"/> <b>PASS</b> <input type="checkbox"/> <b>FAILED</b>
<b>Observation: No any function degraded during the tests.</b>

## 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. 1kHz Modulation.  
**Injection Method** : CDN-M3  
**Performance Criteria** : A (Standard require)  
**Tester** : Lung Tsai  
**Temperature** : 18°C  
**Humidity** : 48%  
**Pressure** : 1020mbar

### Block Diagram of Test Setup:



## **Test Procedure:**

1. The EUT and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
2. A 'H' messages were displayed on 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.

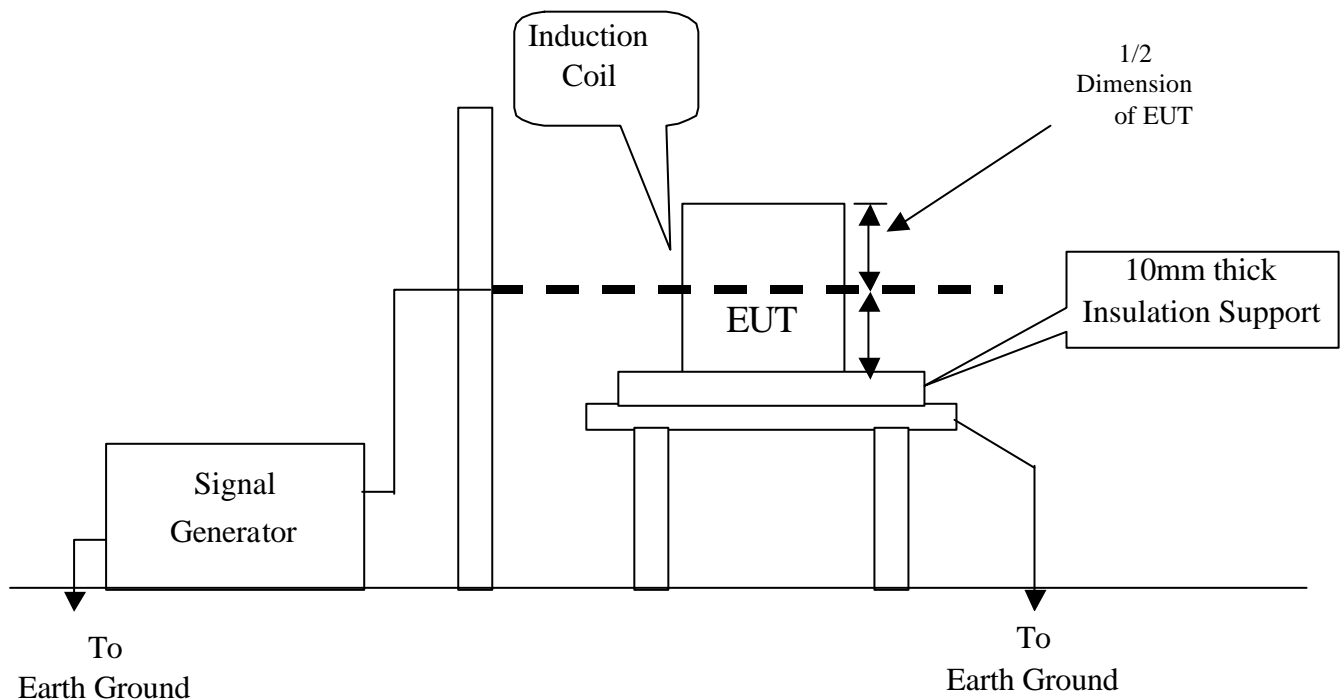
<input checked="" type="checkbox"/> <b>PASS</b> <input type="checkbox"/> <b>FAILED</b>
<b>Observation: No any function degraded during the tests.</b>

## 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  
**Performance Criteria** : A (Standard Required)  
**Tester** : Lung Tsai  
**Temperature** : 18°C  
**Humidity** : 48%  
**Pressure** : 1020mbar

#### 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	Pass	
Y	30A	Pass	
Z	30A	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 test.**

## 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

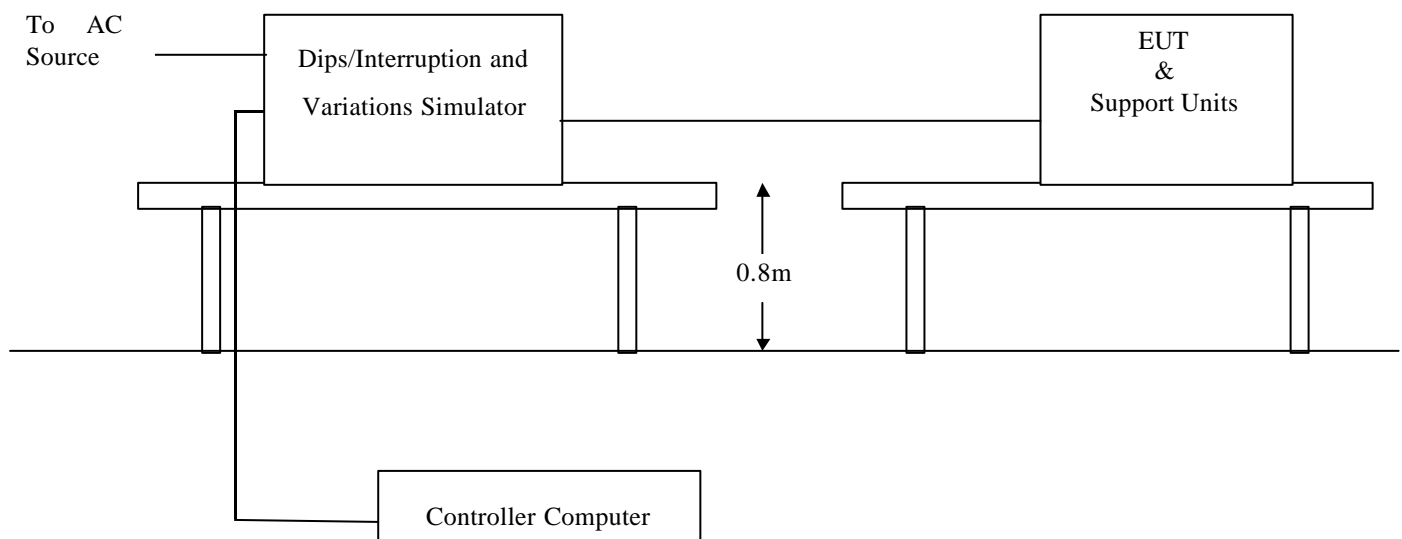
Voltage Dips (EN55024)	Test Level % $U_T$	Reduction (%)	Duration (Periods)	Performance Criteria
	<5	>95	0.5	B
	70	30	25	C

Voltage Dips (EN61000-6-2)	Test Level % $U_T$	Reduction (%)	Duration (Periods)	Performance Criteria
	70	30	0.5 (10ms)	B
	40	60	5 (100ms) and 50 (1000ms)	C

Voltage Interceptions (EN55024) (EN61000-6-2)	Test Level % $U_T$	Reduction (%)	Duration (Periods)	Performance Criteria
	<5	>95	250 (5000ms)	C

**Test Interval** : Min. 10 sec.  
**Tester** : Lung Tsai  
**Temperature** : 18°C  
**Humidity** : 48%  
**Pressure** : 1020mbar

### 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 <sub>T</sub>	Reduction (%)	Duration (Periods)	Observation	Meet Performance Criteria
0	100	0.5	Normal	A
70	30	25	Normal	A
70	30	0.5 (10ms)	Normal	A
40	60	5 (100ms)	Normal	A
40	60	50 (1000ms)	Normal	A

### **Voltage Interruptions:**

Test Level % U <sub>T</sub>	Reduction (%)	Duration (Periods)	Observation	Meet Performance Criteria
0	100	250 (5000ms)	EUT shut down, but can be recovered by manual, as the events disappear.	C
0	100	250 (5000ms)	Normal	A

**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.

☒ **PASS**

☐ **FAILED**

## **APPENDIX 1**

### **PHOTOGRAPHS OF TEST SETUP**

## LINE CONDUCTED EMISSION TEST (EN 55022)

*Front View*



*Back View*



## RADIATED EMISSION TEST (EN 55022)

*Front View*



*Back View*



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



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



## **RADIATED ELECTROMAGNETIC FIELD (IEC 61000-4-3)**



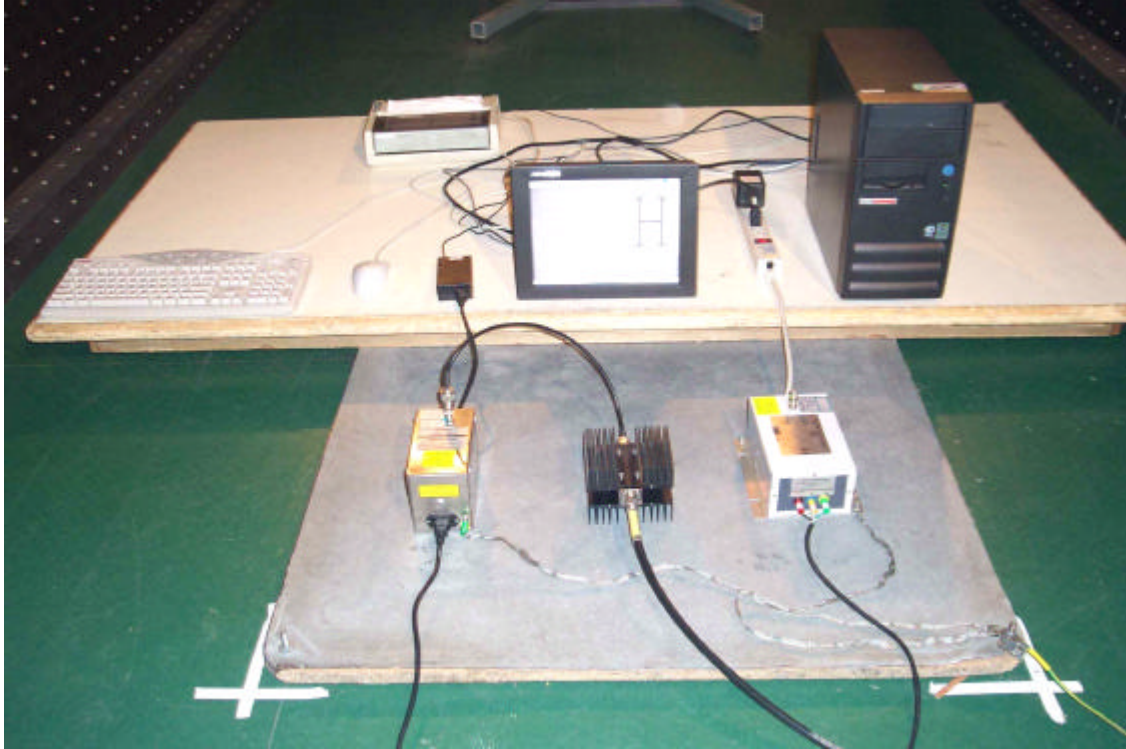
## FAST TRANSIENTS/BURST TEST (IEC 61000-4-4)



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



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



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



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



## **APPENDIX 2**

### **PHOTOGRAPHS OF EUT**

*Front View of EUT*



*Back View of EUT*



*Left View of EUT*



*Right View of EUT*





*Front View of Power Adapter*



*Back View of Power Adapter*

