



EMC UPDATE TEST REPORT

For

Advantech Co., Ltd.

Panel PC

Model: PPC-154T

Trade Name: ADVANTECH

Date of Test: December 15, 2003 ~ February 04, 2004

Revision: 01

Description of Rev. 01:

1. Applicant adds one LCD Panel to re-test.
(Please refer to have ** mark items on this report)
2. Other information, please refer to the B31015203 and this test report.

Approved by:

Reviewed by:

Kurt Chen
Director of Linkou Laboratory
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, Taiwan, R.O.C.

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

Equipment Under Test: Panel PC

Trade Name: ADVANTECH

Model: PPC-154T

Detailed EUT Description: See Item 2 of this report

Date of Test: December 15, 2003 ~ February 04, 2004

Applicable Standard	Class/Limit/Criterion	Test Result
EN 55022: 1998	Class B	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
EN 55024: 1998, including		
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
Deviation from Applicable Standard		
None		

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in the EMC Directive 89/336/EMC 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

Product	Panel PC		
Trade Name	ADVANTECH		
Model	PPC-154T		
Housing Type	Plastic		
EUT Power Rating	AC 100-240V, 50-60Hz		
AC Power Supply Manufacturer	FSP	Model	FSP200-50PLA
AC Power Cord Type	Unshielded, 1.8m (Non-detachable)		
CPU Manufacturer	Intel	Model	P4 2.4GHz
OSC/Clock Frequencies	133MHz		
Memory Capacity	512MB		
HDD Manufacturer	Fujitsu	Model	MHT2020AT (20GB)
FDD Manufacturer	NEC	Model	FD3238T
CD-ROM Manufacturer	QSI	Model	SCR-242
LCD Panel Manufacturer	CHUNGHWA	Model	CLAA150XG01
	** AU	Model	M150XN07

I/O Port of EUT

I/O Port Type	Q'TY	TESTED WITH
1). Parallel Port	1	1
2). Serial Port	2	2
3). PS/2 Keyboard Port	1	1
4). PS/2 Mouse Port	1	1
5). Video Port (VGA)	1	1
6). Line In Port	1	1
7). Line Out Port	1	1
8). Microphone Port	1	1
9). LAN Port	1	1
10). USB Port	4	4
11). 1394 Port	2	2
12). S-Video Out Port	1	1



3 TEST METHODOLOGY

3.1 DECISION OF FINAL TEST MODE

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

Mode 1

1024 × 768 Resolution, 75Hz – 100Mbps with AU / M150XN07 LCD Panel

Mode 2

1024 × 768 Resolution, 75Hz – 10Mbps with AU / M150XN07 LCD Panel

2. After pre-scan, 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.	Monitor	959NF	AQ19H2RT706137Y	FCC DoC	SAMSUNG	Shielded, 1.8m with a core	Unshielded, 1.8m
2.	Modem	DM-1414	0304012269	IFAXDM1414	ACEEX	Shielded, 1.8m	Unshielded, 1.8m
3.	Printer	STYLUS C60	DR3K041995	FCC DoC	EPSON	Shielded, 1.8m	Unshielded, 1.8m
4.	PS/2 Keyboard	KB-0133	N/A	FCC DoC	Compaq	Shielded, 1.8m	N/A
5.	PS/2 Mouse	M-S69	N/A	FCC DoC	Compaq	Shielded, 1.8m	N/A
6.	Mouse	M-MM43	LZE94052791	FCC DoC	Logitech	Shielded, 1.8m	N/A
7.	USB Mouse	MO19UCA	020509310	FCC DoC	HP	Shielded, 1.8m	N/A
8.	USB 2.0 External HDD	F12-U	A0100214-31d0028	FCC DoC	TeraSyS	Shielded, 1.8m	N/A
9.	USB 2.0 External HDD	ME-911U2	N/A	FCC DoC	Portable	Shielded, 1.8m	N/A
10.	USB 2.0 External HDD	F12-U	A0100214-31d0014	FCC DoC	TeraSyS	Shielded, 1.8m	N/A
11.	V8	CCD-TRV310	N/A	FCC DoC	SONY	1394 Cable: Shielded, 1.8m S-Video Cable: Shielded, 1.8m	N/A
12.	DV	DCR-TRV18	N/A	FCC DoC	SONY	1394 Cable: Shielded, 1.8m	N/A
13.	Walkman	RQ-L10	HB004469	FCC DoC	Panasonic	Unshielded, 1.8m	N/A
14.	Multimedia Earphone	Axis-301	N/A	FCC DoC	Labtec	Unshielded, 2.2m	N/A
15.	HUB (Remote)	TL-5008DS	XT942040616	N/A	Link Pro	Unshielded, 20m	Unshielded, 1.8m
16.	Notebook PC (Remote)	M285	NU2503589	FCC DoC	LEO	LAN Cable: Unshielded, 1.5m	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

51 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 to recognized national standards.

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 # 4				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	845552/030	02/17/2004
LISN	R&S	ENV 4200	830326/016	03/04/2004
LISN	EMCO	3825/2	9003/1382	02/25/2004
Spectrum Analyzer	ADVANTEST	R3261AN	31720234	N.C.R
ISN	FCC	FCC-TLISN-T4	20065	05/08/2004

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	04/14/2004
Pre-Amplifier	Anritsu	MH648A	M18767	08/31/2004
Bilog Antenna	CHASE	CBL6112A	2309	02/27/2004
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	08/15/2004

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



Power Harmonic & Voltage Fluctuation/Flicker Measurement (EN 61000-3-2&-3-3)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
HARMONICS SYSTEM	EMC-PARTNER	HARMONICS-1000	094	10/26/2004

Equipment Used for Immunity Measurement

ESD Test Site (IEC/EN 61000-4-2)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESD Generator	EM TEST	P30C	0603-01	02/26/2004

Radiated Electromagnetic Field Immunity Test Site (IEC/EN 61000-4-3)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
S.G.	R&S	SMY02	100094	08/05/2004
Power Meter	R&S	NRVD	837794/029	N.C.R.
Power Amplifier	ar	150W1000	300300	N.C.R
Power Antenna	EMCO	93141	9712-1083	N.C.R

Fast Transients/Burst Test Site (IEC/EN 61000-4-4)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Fast Transients/Burst Generator	HAEFELY TRENCH	PEFT- JUNIOR	583 333-117	08/19/2004
Clamp	HAEFELY TRENCH	093 506.1	080 421.13	N.C.R

Surge Immunity Test Site (IEC/EN 61000-4-5)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Surge Tester	HAEFELY TRENCH	PSUGER 4010	583 334-71	08/19/2004



CS Test Site (IEC/EN 61000-4-6)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
S.G.	R&S	SMY02	100094	08/05/2004
Power Meter	R&S	NRVD	837794/029	N.C.R.
Power Amplifier	ar	500A100A	300299	N.C.R
CDN	Lüthi	801-M3	1879	02/25/2004
CDN	FRANKONIA	CDN-M2	A3002010	04/27/2004
CDN	SCHAFFNER	T400	16906	12/28/2004

Power Frequency Magnetic Field Immunity Test Site (IEC/EN 61000-4-8)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
TRIAX ELF Magnetic Field Meter	F.W.BELL	4090	9711	11/13/2004
Clamp Meter	National	300K	11-5980 K	12/04/2004
Magnetic Field Tester	HAEFELY TRENCH	MAG 100.1	080 938-01	N.C.R

Voltage Dips/Short Interruption and Voltage Variation Immunity Test Site (IEC/EN 61000-4-11)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Dips/Interruption and Variations Simulator	HAEFELY TRENCH	PLINE 1610	080 344-05	03/27/2004



6 TEST RESULTS

Line Conducted Emission

Model: PPC-154T**Test Mode:** Mode 1**Temperature:** 17°C**Humidity:** 63% RH**Tested by:** George Liao**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
0.198	53.80	49.00	63.69	53.69	-9.89	-4.69	L1
0.999	45.00	40.70	56.00	46.00	-11.00	-5.30	L1
6.807	41.40	---	60.00	50.00	-18.60	---	L1
7.540	41.00	---	60.00	50.00	-19.00	---	L1
9.861	40.10	---	60.00	50.00	-19.90	---	L1
10.766	48.00	35.50	60.00	50.00	-12.00	-14.50	L1
0.198	53.00	48.00	63.69	53.69	-10.69	-5.69	L2
0.998	45.20	40.60	56.00	46.00	-10.80	-5.40	L2
5.772	43.40	---	60.00	50.00	-16.60	---	L2
8.091	44.10	---	60.00	50.00	-15.90	---	L2
9.618	43.10	---	60.00	50.00	-16.90	---	L2
11.092	44.10	---	60.00	50.00	-15.90	---	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.

**Common Mode Conducted Emission****Model:** PPC-154T**Test Mode:** Mode 1**Temperature:** 17°C**Humidity:** 63% RH**Tested by:** George Liao**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
0.451	65.75	63.00	74.86	64.86	-9.11	-1.86	10Base
0.685	61.76	---	74.00	64.00	-12.24	--	10Base
1.807	64.18	56.43	74.00	64.00	-9.82	-7.57	10Base
6.305	58.88	---	84.00	74.00	-25.12	---	10Base
7.497	67.19	---	84.00	74.00	-16.81	---	10Base
13.695	60.10	---	84.00	74.00	-23.90	---	10Base
16.166	68.30	---	84.00	74.00	-15.70	---	100Base
16.227	69.40	---	84.00	74.00	-14.60	---	100Base
21.662	63.50	---	84.00	74.00	-20.50	---	100Base
23.127	70.00	---	84.00	74.00	-14.00	---	100Base
26.609	63.70	---	84.00	74.00	-20.30	---	100Base
29.112	65.30	---	84.00	74.00	-18.70	---	100Base

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

Note: 1. "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

2. According to Note 3 on table 4 of EN 55022: 1998 standard, the Limits allowed to relaxation of 10dB over at frequency range 6 MHz to 30MHz.

**Radiated Emission (A)****Model:** PPC-154T**Test Mode:** Mode 1**Temperature:** 22°C**Humidity:** 68% RH**Detector Function:** Quasi-peak.**Antenna:** Vertical at 10m**Tested by:** Bill Cheng**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)
40.20	11.4	14.8	26.2	30.0	-3.8
86.25	16.6	8.3	24.9	30.0	-5.1
130.03	12.6	12.0	24.6	30.0	-5.4
199.99	15.7	10.8	26.5	30.0	-3.5
249.98	12.0	13.4	25.4	37.0	-11.6
299.98	13.4	15.6	29.0	37.0	-8.0
374.99	13.7	18.9	32.6	37.0	-4.4
432.03	9.5	19.3	28.8	37.0	-8.2
455.09	10.2	19.2	29.4	37.0	-7.6

**Radiated Emission (B)****Model:** PPC-154T**Test Mode:** Mode 1**Temperature:** 22°C**Humidity:** 68% RH**Detector Function:** Quasi-peak.**Antenna:** Horizontal at 10m**Tested by:** Bill Cheng**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)
40.27	10.6	14.8	25.4	30.0	-4.6
79.55	17.2	6.9	24.1	30.0	-5.9
149.99	11.1	11.1	22.2	30.0	-7.8
199.99	15.2	10.8	26.0	30.0	-4.0
249.98	20.3	13.4	33.7	37.0	-3.3
260.01	10.8	14.5	25.3	37.0	-11.7
299.99	14.2	15.6	29.8	37.0	-7.2
432.06	10.0	19.3	29.3	37.0	-7.7
498.37	11.0	21.0	32.0	37.0	-5.0
799.98	8.3	26.6	34.9	37.0	-2.1



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 : Michael Chen

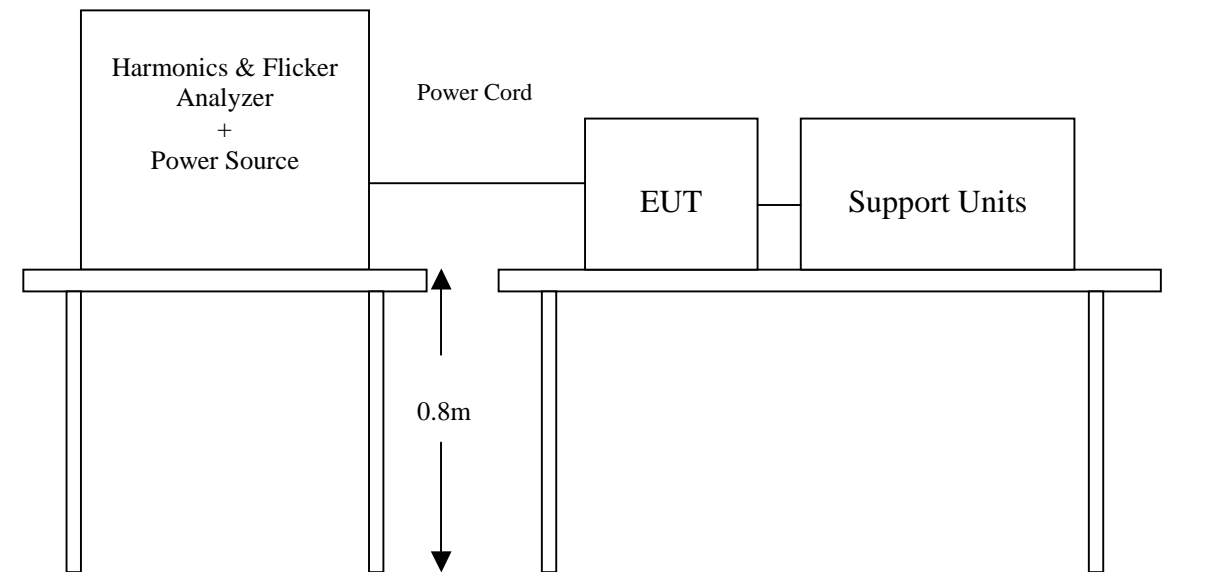
Temperature : 19°C

Humidity : 56% RH

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)**PASS****FAIL**

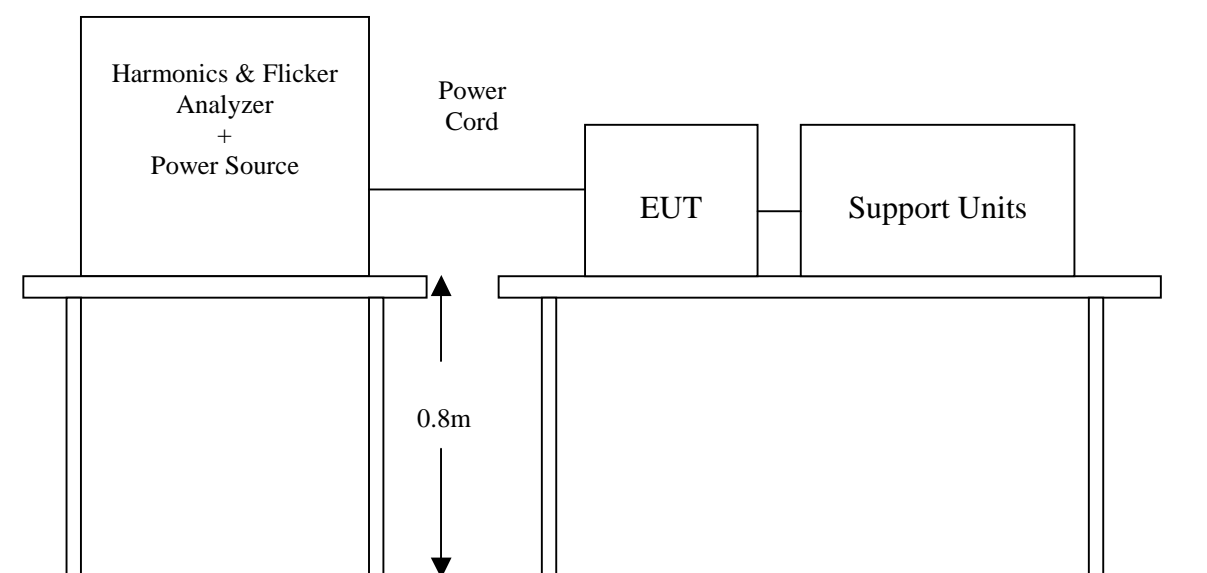
8 POWER VOLTAGE FLUCTUATION / FLICKER TEST

Port : AC mains
Basic Standard : EN 61000-3-3 (1995 + A1: 2001)
Limits : §5 of EN 61000-3-3
Tested by : Michael Chen
Temperature : 19°C
Humidity : 56% RH

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 (%)	0.08%	3.3%	Pass

** Manual Switch

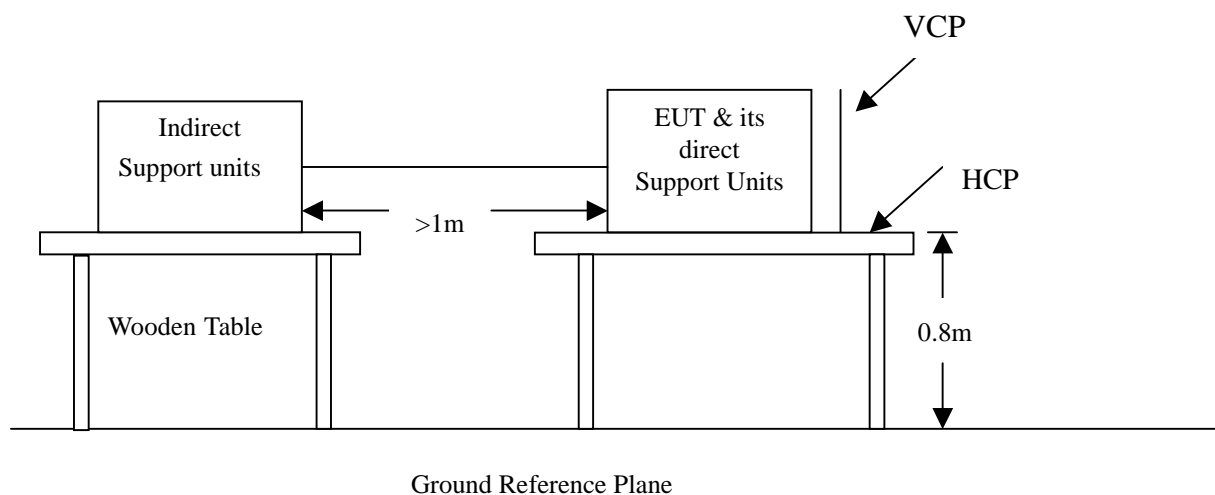
Test Parameter	Measurement Value	Limit	Result
P _{st}	0.072	1.0	Pass
P _{lt}	0.072	0.65	Pass
T _{dt} (ms)	0.56	500	Pass
d _{max} (%)	0%	4%	Pass
dc (%)	0.14%	3.3%	Pass

9 ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

Port	: Enclosure
Basic Standard	: IEC/EN 61000-4-2
Test Level	: ± 8 kV (Air Discharge) ± 4 kV (Contact Discharge) ± 4 kV (Indirect Discharge)
Performance Criterion	: B (Standard Required)
Tested by	: Michael Chen
Temperature	: 19°C
Humidity	: 56% RH
Pressure	: 1014mbar

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 Notebook PC at remote side 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 25 /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)	**N/A

****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 4



Photo 2 of 4

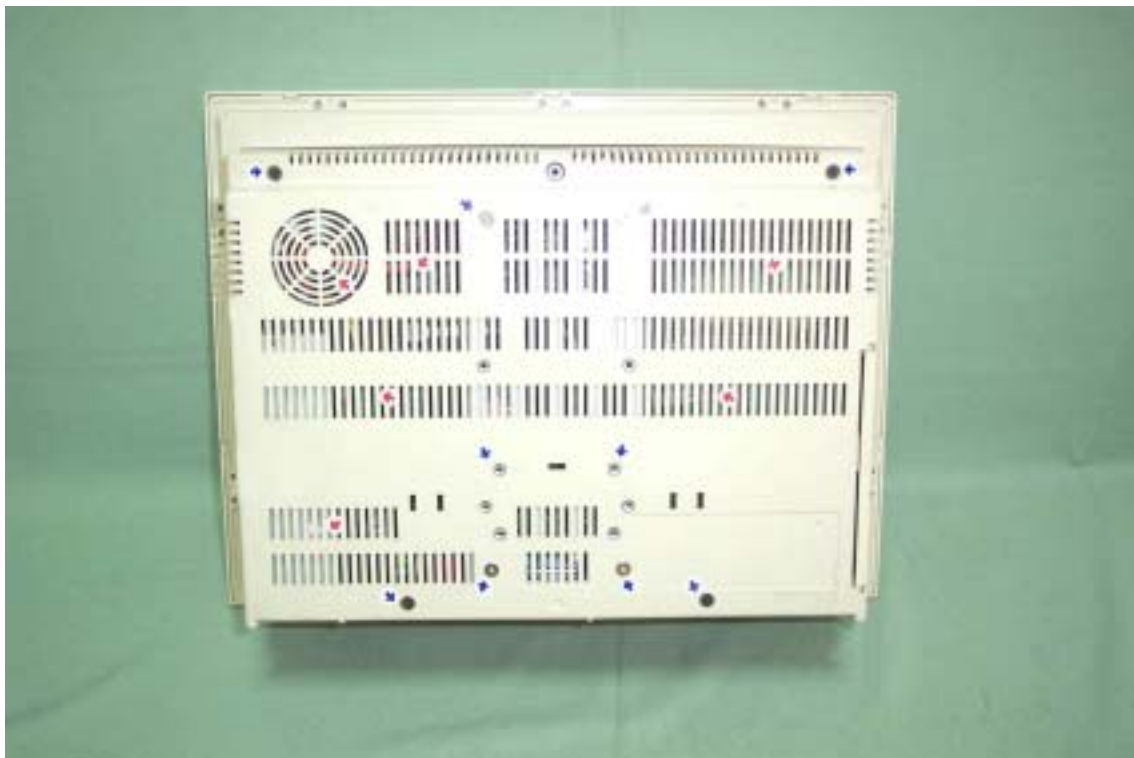


Photo 3 of 4



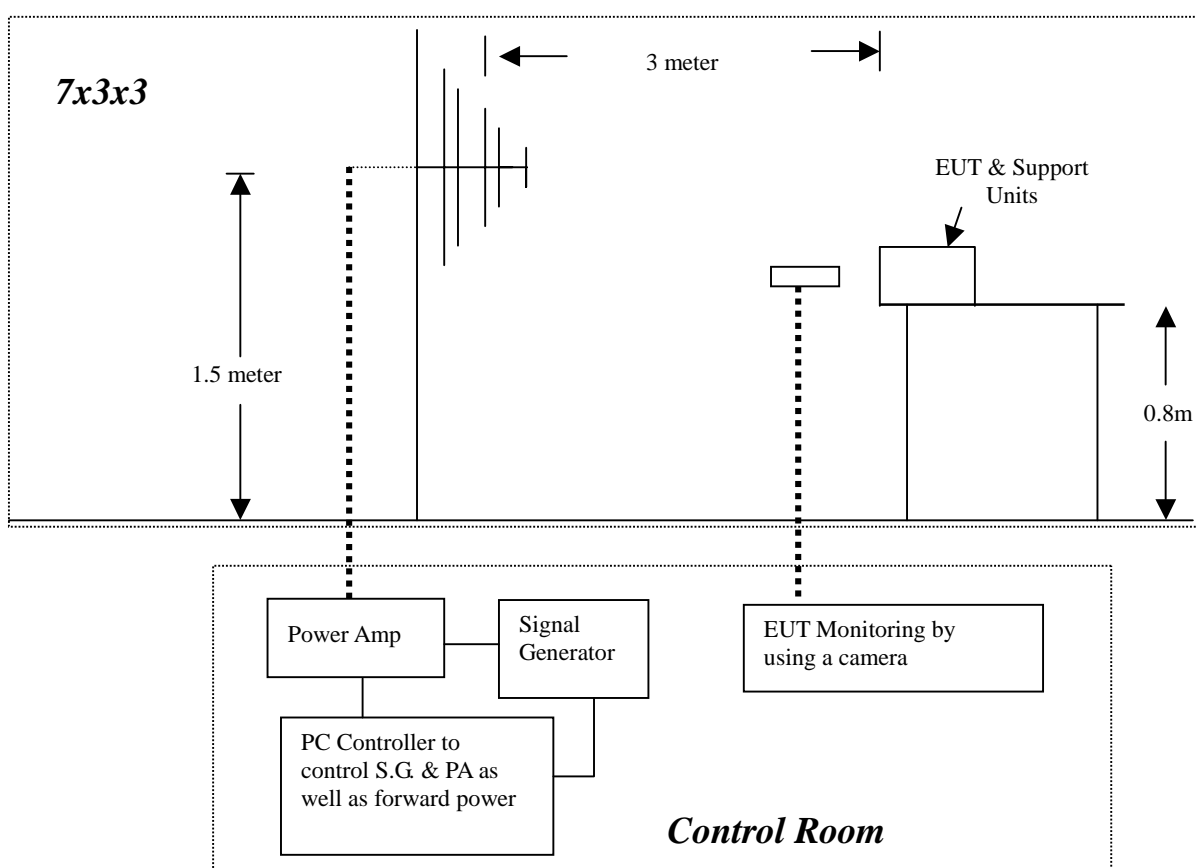
Photo 4 of 4



10 RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC/EN 61000-4-3
Requirements : 3 V/m / with 80% AM. 1kHz Modulation.
Performance Criterion : A (Standard Required)
Tested by : Michael Chen
Temperature : 20°C
Humidity : 59% RH
Pressure : 1014mbar

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

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

Final test conditions:

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

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

Port : On Power Supply Lines and LAN Cable

Basic Standard : IEC/EN 61000-4-4

Requirements : ± 1 kV for Power Supply Line
 ± 0.5 kV for LAN/Line Cable

Performance Criteria : B (Standard Required)

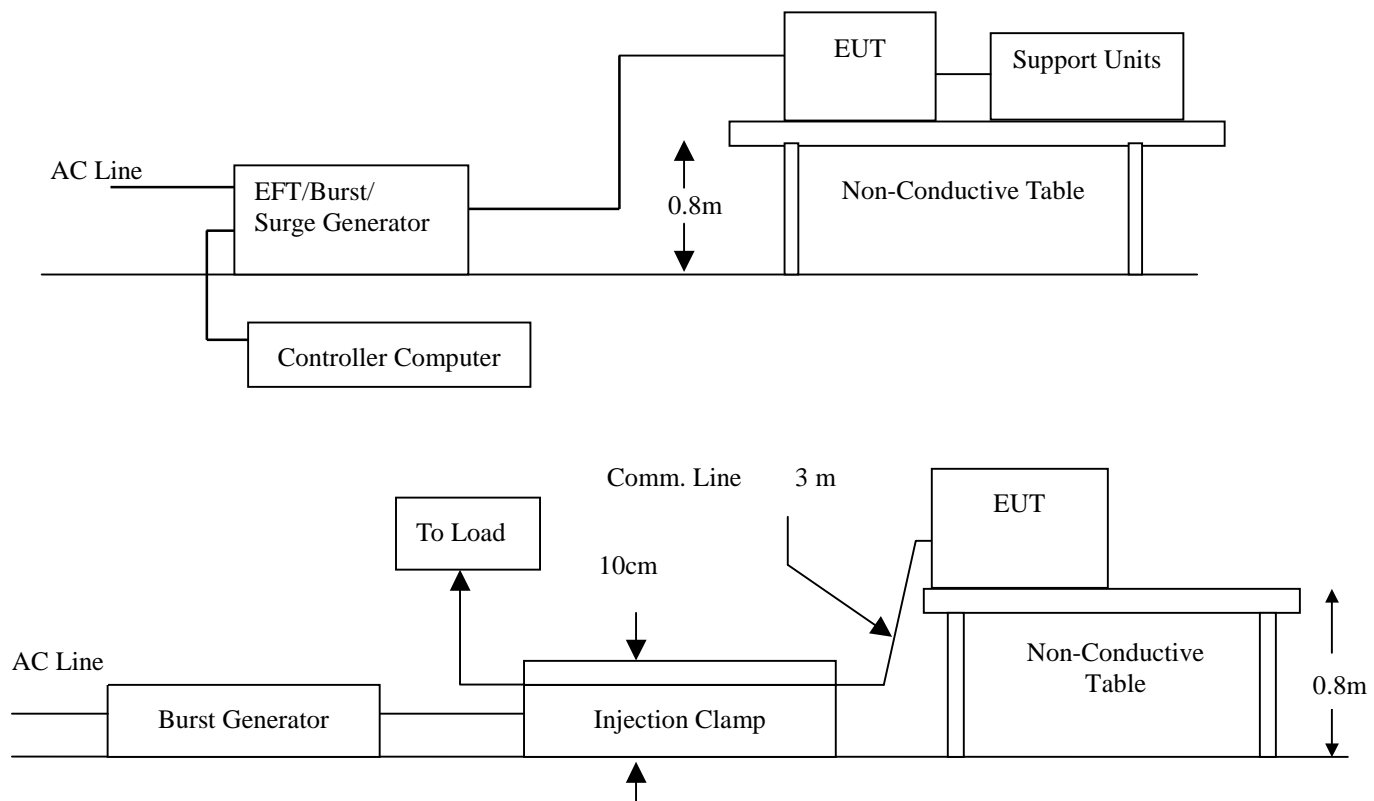
Tested by : Michael Chen

Temperature : 19°C

Humidity : 52% RH

Pressure : 1014mbar

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	± 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
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.

☒ **PASS** ☐ **FAIL****Observation:** No function degraded during the tests.

12 SURGE IMMUNITY TEST

Port : Power Cord and Signal/

Basic Standard : IEC/EN 61000-4-5

Requirements : ± 1 kV (Line to Line)
 ± 2 kV (Line to Ground)

Performance Criteria : B (Standard Required)

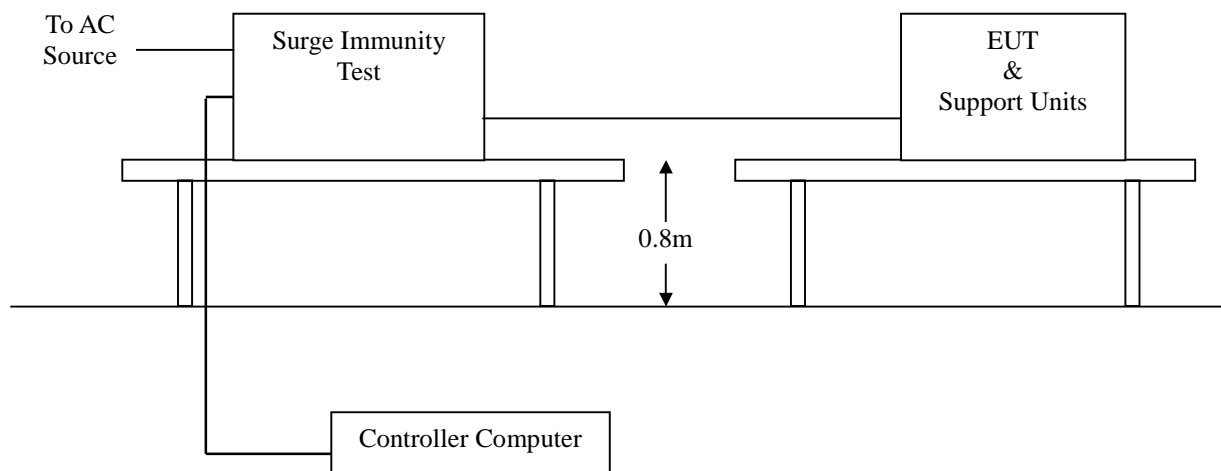
Tested by : Michael Chen

Temperature : 20°C

Humidity : 53% RH

Pressure : 1014mbar

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 μ s
Current Waveform : 8/20 μ s
Polarity : Positive/Negative
Phase angle : 0°, 90°, 270°
Number of Test : 5

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

Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS** ☐ **FAIL**

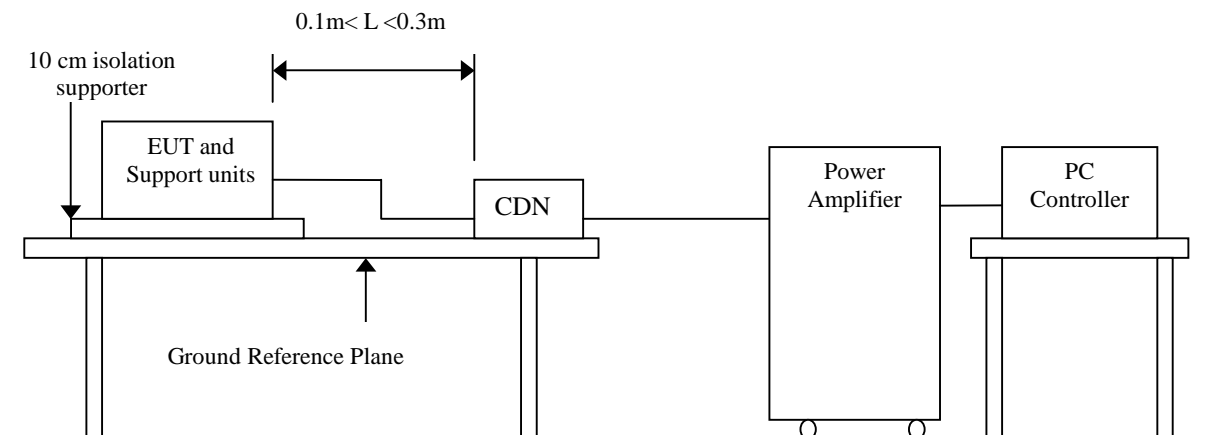
Observation: No function degraded during the tests.

13 CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

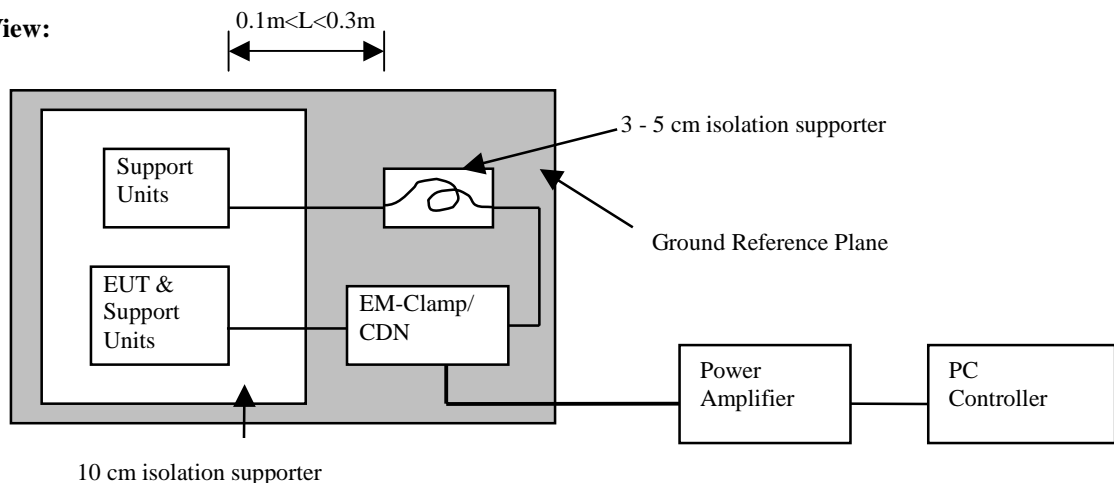
Port	: AC Port and LAN Cable
Basic Standard	: IEC/EN 61000-4-6
Requirements	: 3 V with 80% AM. 1kHz Modulation.
Injection Method	: CDN-M3 for Power Cord CDN-T4 for LAN Cable
Performance Criterion	: A (Standard Required)
Tested by	: Michael Chen
Temperature	: 20°C
Humidity	: 59% RH
Pressure	: 1014mbar

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	3V	Yes	Pass

Performance & Result:

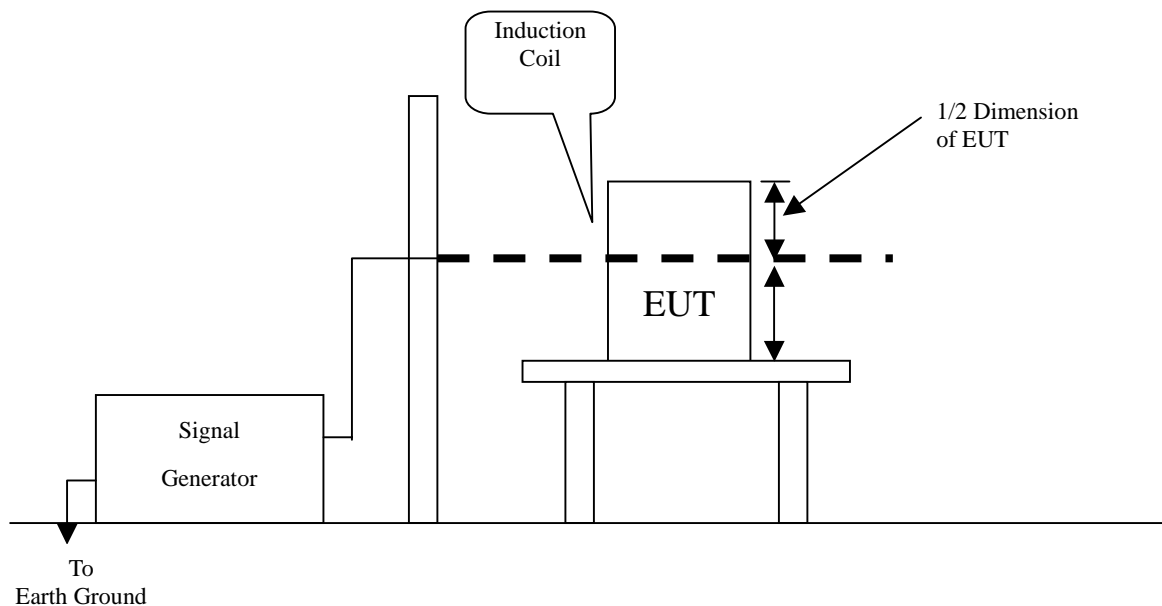
- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of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

☒ **PASS** ☐ **FAIL****Observation:** No function degraded during the tests.

14 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC/EN 61000-4-8
Requirements : 1 A/m
Performance Criterion : A (Standard Required)
Tested by : Michael Chen
Temperature : 18°C
Humidity : 52% RH
Pressure : 1014mbar

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: 1A/m
Power Freq.: 50Hz
Orientation: X, Y, Z

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

Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS** ☐ **FAIL**

Observation: 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.

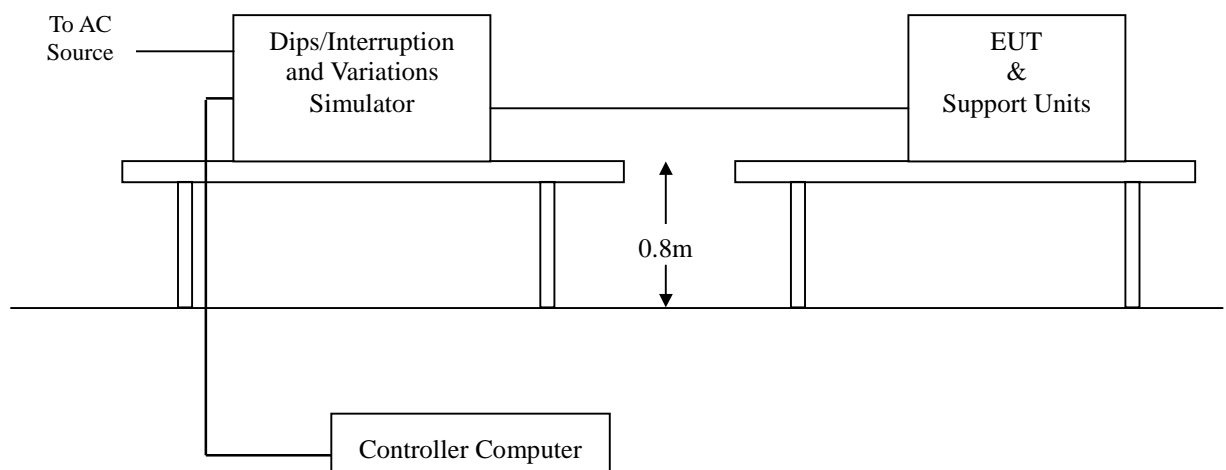
Tested by : Michael Chen

Temperature : 19°C

Humidity : 54% RH

Pressure : 1014mbar

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 _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.

**PASS****FAIL**

APPENDIX I - 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



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

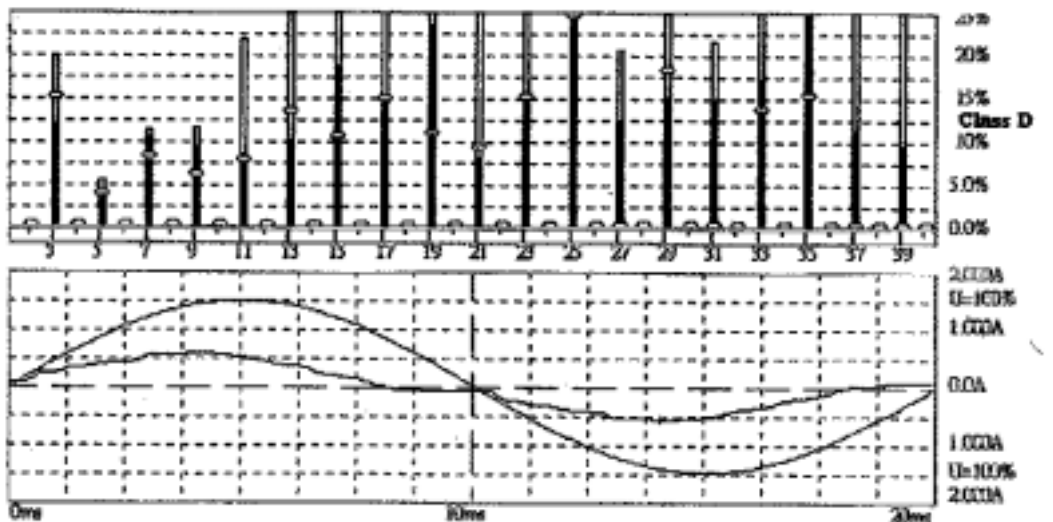
Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

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

ADVANTECH

Report No.: unnamed
Report Title: unnamed

Operator : Michael Chen
EUT : Panel PC
Model No. PPC-154T
Remarks TEMP:19 HUMD:56



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

2004/2/3 AM 11:10:50

Ume = 200.1 V P = 23.87 W THC = 0.054 A Range: 2 A
Ims = 0.354 A pf = 0.905 Pmax = 147.8 W Vnom: 230 V
TestTime: 5 min (100%)

Panel PC

Test completed, Result: PASSED

TEMP:19 HUMD:56

EN61000-3-2, Class D

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

Measurement

ADVANTECH

Date : 2004/2/3 AM 11:10:50 V3.15

File :

Operator : Michael Chen
EUT : Panel PC
Model No. PPC-154T
Remarks TEMP:19 HUMD:56



Urms = 230.1V Freq = 49.987 Range: 2 A
Irms = 0.354A IpK = 0.627A cf = 1.769
P = 73.87W Pap = 81.57VA pf = 0.906
THDi = 18.2 % THDu = 0.10 % Class D

Test - Time : 5min (100 %)

Limit Reference: Pmax = 147.84W

Test completed, Result: PASSED

Order	Freq. [Hz]	I _{max} [A]	I _{max} % [%]	I _{max} %L [%]	Limit [A]	Status
1	50	1.7867	504.03			
2	100	0.0024	0.6887			
3	150	0.0986	27.824	19.623	0.5026	
4	200	0.0002	0.0689			
5	250	0.0145	4.0978	5.1716	0.2809	
6	300	0.0004	0.1033			
7	350	0.0165	4.6488	11.147	0.1478	
8	400	0.0004	0.1033			
9	450	0.0084	2.3760	11.395	0.0739	
10	500	0.0002	0.0689			
11	550	0.0111	3.1336	21.468	0.0517	
12	600	0.0004	0.1033			
13	650	0.0135	3.8223	30.948	0.0438	
14	700	0.0004	0.1033			
15	750	0.0101	2.8581	26.702	0.0379	
16	800	0.0005	0.1377			
17	850	0.0095	2.6860	28.439	0.0335	
18	900	0.0007	0.2066			
19	950	0.0107	3.0303	35.859	0.0300	
20	1000	0.0006	0.1722			
21	1050	0.0096	2.7204	35.581	0.0271	
22	1100	0.0006	0.1722			
23	1150	0.0110	3.0992	44.395	0.0247	
24	1200	0.0005	0.1377			
25	1250	0.0138	3.8912	60.588	0.0228	
26	1300	0.0005	0.1377			
27	1350	0.0043	1.2052	20.267	0.0211	
28	1400	0.0004	0.1033			
29	1450	0.0129	3.6501	65.928	0.0196	
30	1500	0.0002	0.0689			
31	1550	0.0039	1.1019	21.275	0.0184	
32	1600	0.0002	0.0689			
33	1650	0.0073	2.0661	42.465	0.0172	
34	1700	0.0002	0.0689			
35	1750	0.0073	2.0661	45.039	0.0163	
36	1800	0.0002	0.0689			
37	1850	0.0050	1.4118	32.535	0.0154	
38	1900	0.0002	0.0689			
39	1950	0.0049	1.3774	33.457	0.0146	
40	2000	0.0002	0.0689			

Calculation of Individual Harmonic Limits

For Class D the Limits are related to Pmax which is the Maximum Active Power consumption of the EUT during the test time.

Pmax = 73.93 W (measured over test time)



ADVANTECH

Date : 2004/2/3 AM 11:31:21 V3.15

File :

Operator:

Michael Chen

EUT :

Panel PC

Model No.

PPC-154T

Remarks

TEMP:19 HUMD:56

Urms = 230.3V Freq = 49.987 Range: 2 A
Irms = 0.605A IpK = 1.171A cf = 1.710
P = 151.3W Pap = 157.7VA pf = 0.960

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

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

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLin: 3.30 % dt>Lin: 500ns

Test completed, Result: PASSED

Plt = 0.072

	Pst	dmax	dc	dt>Lin	Fail
		[%]	[%]	[ns]	
1	0.072	0.000	0.000	0.000	



ADVANTECH

Date : 2004/2/3 AM 11:48:41 U3.15

File :

Operator :

Michael Chen

EUT :

Panel PC

Model No.

PPC-154T

Remarks

TEMP:19 HUMID:56 (MANUALSWITCH)

Urms = 230.3V Freq = 49.987 Range: 2 A
Irms = 0.684A Ipk = 1.150A cF = 1.683
P = 151.2W Pap = 157.4VA pF = 0.961

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 %
dtLin: 3.30 % dt>Lim: 500ns

Test completed, Result: PASSED

Plt = 0.072

	Pst	dmax	dc	dt>Lim	Fail
		[%]	[%]	[ns]	
1	0.072	0.560	0.140	0.000	