



EMC UPDATE TEST REPORT

For

Advantech Co., Ltd.

Panel PC

Model: PPC-123T; PPC-123T-12; PPC-123T-24

Trade Name: Advantech

Date of Test: October 7, 2003

Revision: 03

Description of Rev. 03:

1. Applicant adds two DC power supplies final test data (used DC Power Supply) in this report as per customer requested.
(Please refer to have ** mark items on this report)
2. Other information, please refer to the 990624, 000761, 030018, B30603023 and this test report.

Approved by:

Jonson Lee
Director of Linkou Laboratory
Compliance Certification Services Inc.

Reviewed by:

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TABLE OF CONTENTS

1	TEST RESULT CERTIFICATION	3
2	EUT DESCRIPTION.....	4
3	TEST METHODOLOGY.....	7
3.1	DECISION OF FINAL TEST MODE.....	7
4	SETUP OF EQUIPMENT UNDER TEST.....	8
5	INSTRUMENT AND CALIBRATION.....	9
5.1	MEASURING INSTRUMENT CALIBRATION.....	9
5.2	TEST AND MEASUREMENT EQUIPMENT	9
6	TEST RESULTS	12
7	ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST	16
8	RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST	20
9	FAST TRANSIENTS/BURST IMMUNITY TEST	23
10	SURGE IMMUNITY TEST.....	25
11	CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST	27
12	POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST.....	29
	APPENDIX I - PHOTOGRAPHS OF TEST SETUP	31



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: Panel PC

Trade Name: Advantech

Model: PPC-123T; PPC-123T-12; PPC-123T-24

Detailed EUT Description: See Item 2 of this report

Date of Test: October 7, 2003

Deviation: None

Applicable Standard	Class/Limit/Criterion	Test Result
EN 55022: 1998	Class B	No non-compliance noted
EN 61000-3-2:1995 + A1: 1998 + A2: 1998	Class A/ D	N/A
EN 61000-3-3:1995	Limit	N/A
EN 55024:1998, including		
IEC 61000-4-2: 2001	Criterion B	No non-compliance noted
IEC 61000-4-3: 1995	Criterion A	No non-compliance noted
IEC 61000-4-4: 1995	Criterion B	No non-compliance noted
IEC 61000-4-5: 1995	Criterion B	No non-compliance noted
IEC 61000-4-6: 1996	Criterion A	No non-compliance noted
IEC 61000-4-8: 1993	Criterion A	No non-compliance noted
IEC 61000-4-11: 1994	Criterion B/C/C	N/A
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-123T; PPC-123T-12; PPC-123T-24		
Housing Type	Plastic		
EUT Power Rating	100~250VAC, 47/63Hz, 3A		
Power Supply Manufacturer	SKYNET	Model	SNP-8086 (AC)
			DC12-8081 (DC 12V)
			DC36-8081 (DC 24V)
Power Supply Power Rating	1) For SNP-8086 I/P: 100-250VAC, 47-63Hz, 3A O/P: DC 5V, 16A; DC 12V, 1.5A 2) For D12-8081 I/P: DC 12V O/P: DC +5V, 10A; DC +12V, 1.5A; 3) For DC36-8081 I/P: DC 18-56V, 7A O/P: DC +5V, 10A; DC +12V; 1.5A; DC –12VDC, 0.5A		
Power Adapter Manufacturer	SKYNET	Model	SNP-A127
			SNP-A109
Power Adapter Power Rating	1) For SNP-A127 I/P: 100-250VAC, 47-63Hz, 3A O/P: DC 12V, 9A 2) For SNP-A109 I/P: 115-230VAC, 50/60Hz, 1.5 / 0.8A O/P: DC 24V, 2.3A (40°C Ambient) DC 24V, 2.0A (50°C Ambient)		
AC Power Cord Type	Unshielded, 1.8m (Detachable)		
DC Power Cable Type	Unshielded, 1.8m (Detachable) (For Power Supply) Unshielded, 1.8m (Non-detachable) (For Power Adapter)		
Memory Capacity	Max: 128MB		



CPU Manufacturer	Intel	Model	Celeron™ 466 MHz
			Pentium III 850MHz
			Pentium III 1.26GHz
CPU Board Manufacturer	ADVANTECH	Model	PCM 9571
			PCM-9672
OSC/Clock Frequencies	100MHz / 133MHz		
HDD Manufacturer	IBM	Model	DBCA-204860
	Fujitsu		MHR2010AT (10GB)
FDD Manufacturer	Y-E DATA	Model	YD-702J
CD-ROM Manufacturer	Toshiba	Model	XM-1902B
	ASUS		SCD-2400
LCD Panel Manufacturer	Toshiba	Model	LTM12C275C
	IBM	Model	M121-SOHR
	SANYO	Model	LM121SV-02L01
			TM121SV-22L11A
VGA Card Manufacturer	SILICON MOTION INC.	Model	Lynx SMI 710
Audio Card Manufacturer	ESS TECH.	Model	1946S

**I/O Port of EUT**

I/O Port Type	Q'TY	TESTED WITH
1). Parallel Port	1	1
2). Serial Port	4	4
3). Video Port	1	1
4). PS/2 Keyboard / Mouse Port	1	1
5). Game Port	1	1
6). Microphone Port	1	1
7). Line-in Port	1	1
8). Line-out Port	1	1
9). LAN Port	1	1
10). USB Port	2	2

Note: The difference between of three model numbers (list on this report) are identical, all specification are identical with original mode number except power source (AC or DC power) as per customer declaration.



3 TEST METHODOLOGY

3.1 DECISION OF FINAL TEST MODE

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

Mode 1

800 × 600 Resolution / 100 Mbps + CPU Intel Pentium III 1.26GHz +
Advantech CPU Board + Sanyo TM121SV-22L11A LCP Panel – PPC-123T-12

Mode 2

800 × 600 Resolution / 100 Mbps + CPU Intel Pentium III 1.26GHz +
Advantech CPU Board + Sanyo TM121SV-22L11A LCP Panel – PPC-123T-24

2. After pre-scan, found mode 1 and 2 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 two cores	Unshielded, 1.8m
2.	Modem	DM-1414	0304012269	IFAXDM1414	ACEEX	Shielded, 1.8m	Unshielded, 1.8m
3.	Modem	DM-1414	0304012270	IFAXDM1414	ACEEX	Shielded, 1.8m	Unshielded, 1.8m
4.	Printer	STYLUS C60	DR3K041995	FCC DoC	EPSON	Shielded, 1.8m	Unshielded, 1.8m
5.	PS/2 Keyboard (One To Two Adapter)	KB-0133	N/A	FCC DoC	Compaq	Shielded, 1.8m	N/A
6.	PS/2 Mouse (One To Two Adapter)	M-S69	N/A	FCC DoC	Compaq	Shielded, 1.8m	N/A
7.	USB Mouse	MO19UCA	020440967	FCC DoC	HP	Shielded, 1.8m	N/A
8.	USB Mouse	MO19UCA	020509282	FCC DoC	HP	Shielded, 1.8m	N/A
9.	Mouse	M-S34	HCA25200251	DZL211029	Logitech	Shielded, 1.8m	N/A
10.	Mouse	M-S34	HCA25200353	DZL211029	Logitech	Shielded, 1.8m	N/A
11.	Walkman	RQ-L10	HB004471	FCC DoC	Panasonic	Unshielded, 1.8m	N/A
12.	Multimedia Headset	Axis-301	N/A	FCC DoC	Labtec	Unshielded, 1.8m	N/A
13.	Joystick	G-ZA-PHI	PHB01600992	FCC DoC	Logitech	Unshielded, 1.8m	N/A
14.	Notebook PC (Remote)	M285	NU2503544	FCC DoC	LEO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 0.8m DC O/P: Unshielded, 1.2m with a Core
	DC Power Supply (Remote)	ISR80-30	N/A	N/A	ALL Power	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 2.5m

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

Open Area Test Site # 1				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	SCHAFFNER	SCR3501	410	02/02/2004
Spectrum Analyzer	Agilent	E4411B	MY41440314	N.C.R
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	08/14/2004
Pre-Amplifier	Anritsu	MH648A	M18767	08/31/2004

Note: The measurement uncertainty is less than $\pm 3.36\text{dB}$, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

**Equipment Used for Immunity Measurement**

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

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

Fast Transients/Burst Test Site (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/A

Surge Immunity Test Site (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 (EN 61000-4-6)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
S.G.	R&S	SMY02	100094	08/07/2003
Power Amplifier	ar	500A100A	300299	N/A
CDN	Lüthi	801-M3	1879	02/25/2004
CDN	MEB	M2	A3002010	04/27/2004
CDN	SCHAFFNER	T400	16906	10/16/2003

Power Frequency Magnetic Field Immunity Test Site (61000-4-8)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
TRIAX ELF Magnetic Field Meter	F.W.BELL	4090	9711	10/20/2003
Clamp Meter	National	300K	11-5980 K	11/18/2003
Magnetic Field Tester	HAEFELY TRENCH	MAG 100.1	080 938-01	N/A



6 TEST RESULTS

Radiated Emission (A)

Model: PPC-123T-12**Test Mode:** Mode 1**Temperature:** 29°C**Humidity:** 62% 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)
45.92	11.3	13.2	24.5	30.0	-5.5
56.45	14.0	8.0	22.0	30.0	-8.0
64.43	15.5	5.7	21.2	30.0	-8.8
72.45	16.7	5.9	22.6	30.0	-7.4
84.86	9.6	8.0	17.6	30.0	-12.4
113.69	5.6	11.7	17.3	30.0	-12.7
133.53	10.1	12.1	22.2	30.0	-7.8
165.95	7.0	10.4	17.4	30.0	-12.6
176.18	6.2	11.2	17.4	30.0	-12.6
185.05	3.7	11.4	15.1	30.0	-14.9
233.46	9.5	11.4	20.9	37.0	-16.1
266.88	6.7	15.3	22.0	37.0	-15.0
400.40	8.3	20.0	28.3	37.0	-8.7
667.35	5.2	23.6	28.8	37.0	-8.2

**Radiated Emission (B)****Model:** PPC-123T-12**Test Mode:** Mode 1**Temperature:** 29°C**Humidity:** 62% 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)
34.40	7.2	18.4	25.6	30.0	-4.4
45.45	9.4	13.3	22.7	30.0	-7.3
52.56	12.6	10.3	22.9	30.0	-7.1
67.19	12.6	5.6	18.2	30.0	-11.8
76.09	12.5	6.4	18.9	30.0	-11.1
133.46	9.9	12.1	22.0	30.0	-8.0
165.68	8.7	10.3	19.0	30.0	-11.0
188.66	8.9	11.2	20.1	30.0	-9.9
200.45	9.4	10.8	20.2	30.0	-9.8
233.25	6.6	11.3	17.9	37.0	-19.1
400.53	9.1	20.0	29.1	37.0	-7.9
532.01	3.9	22.0	25.9	37.0	-11.1
667.36	4.0	23.6	27.6	37.0	-9.4
934.55	-.8	27.1	26.3	37.0	-10.7

**Radiated Emission (A)****Model:** PPC-123T-24**Test Mode:** Mode 2**Temperature:** 29°C**Humidity:** 62% 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)
45.55	12.4	13.3	25.7	30.0	-4.3
57.21	15.6	7.5	23.1	30.0	-6.9
64.91	17.4	5.7	23.1	30.0	-6.9
73.39	18.5	6.0	24.5	30.0	-5.5
84.08	10.9	7.9	18.8	30.0	-11.2
113.21	7.5	11.7	19.2	30.0	-10.8
133.25	12.7	12.1	24.8	30.0	-5.2
165.75	8.6	10.4	19.0	30.0	-11.0
176.68	7.1	11.3	18.4	30.0	-11.6
185.76	5.5	11.3	16.8	30.0	-13.2
229.10	3.7	10.8	14.5	30.0	-15.5
233.69	11.2	11.4	22.6	37.0	-14.4
247.92	2.6	13.2	15.8	37.0	-21.2
400.50	10.5	20.0	30.5	37.0	-6.5
667.06	7.8	23.6	31.4	37.0	-5.6

**Radiated Emission (B)****Model:** PPC-123T-24**Test Mode:** Mode 2**Temperature:** 29°C**Humidity:** 62% 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)

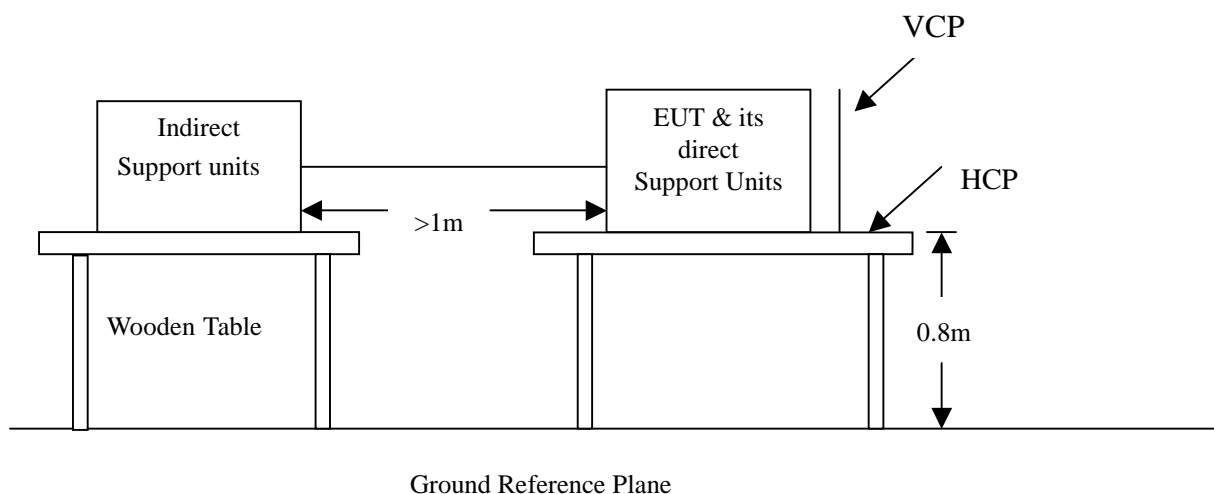
Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
45.54	11.6	13.3	24.9	30.0	-5.1
52.20	13.5	10.5	24.0	30.0	-6.0
66.41	14.8	5.6	20.4	30.0	-9.6
76.13	15.3	6.4	21.7	30.0	-8.3
133.35	11.1	12.1	23.2	30.0	-6.8
166.70	10.3	10.4	20.7	30.0	-9.3
190.84	11.9	11.1	23.0	30.0	-7.0
200.26	10.3	10.8	21.1	30.0	-8.9
233.44	9.7	11.4	21.1	37.0	-15.9
400.18	10.7	20.0	30.7	37.0	-6.3
530.83	4.6	22.0	26.6	37.0	-10.4
667.18	7.0	23.6	30.6	37.0	-6.4
934.04	3.4	27.1	30.5	37.0	-6.5

7 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	: Arno Hsieh
Temperature	: 27°C
Humidity	: 49% RH
Pressure	: 1018mbar
Mode	: 1, 2

Block Diagram of Test Setup:

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



**Test Procedure:**

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The indirect support units were located 1 m minimum away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
3. A scroll 'H' test program was loaded and executed in Windows 98 mode.
4. The EUT sent above message to LCD Panel of EUT and monitor and related peripherals through the test.
5. Active the communication function if the EUT with such port(s).
6. As per the requirement of EN 55024; applying direct contact discharge at the sides other than front of EUT at minimum 50 discharges (25 positive and 25 negative) if applicable, can't be applied direct contact discharge side of EUT then the indirect discharge shall be applied. One of the test points shall be subjected to at least 50 indirect discharge (contact) to the front edge of horizontal coupling plane.
7. Other parts of EUT where it is not possible to perform contact discharge then selecting appropriate points of EUT for air discharge, a minimum of 10 single air discharges shall be applied.
8. The application of ESD to the contact of open connectors is not required.
9. The 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 (Front)	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge VCP (Right)	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge VCP (Left)	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge VCP (Back)	N/A

****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 2



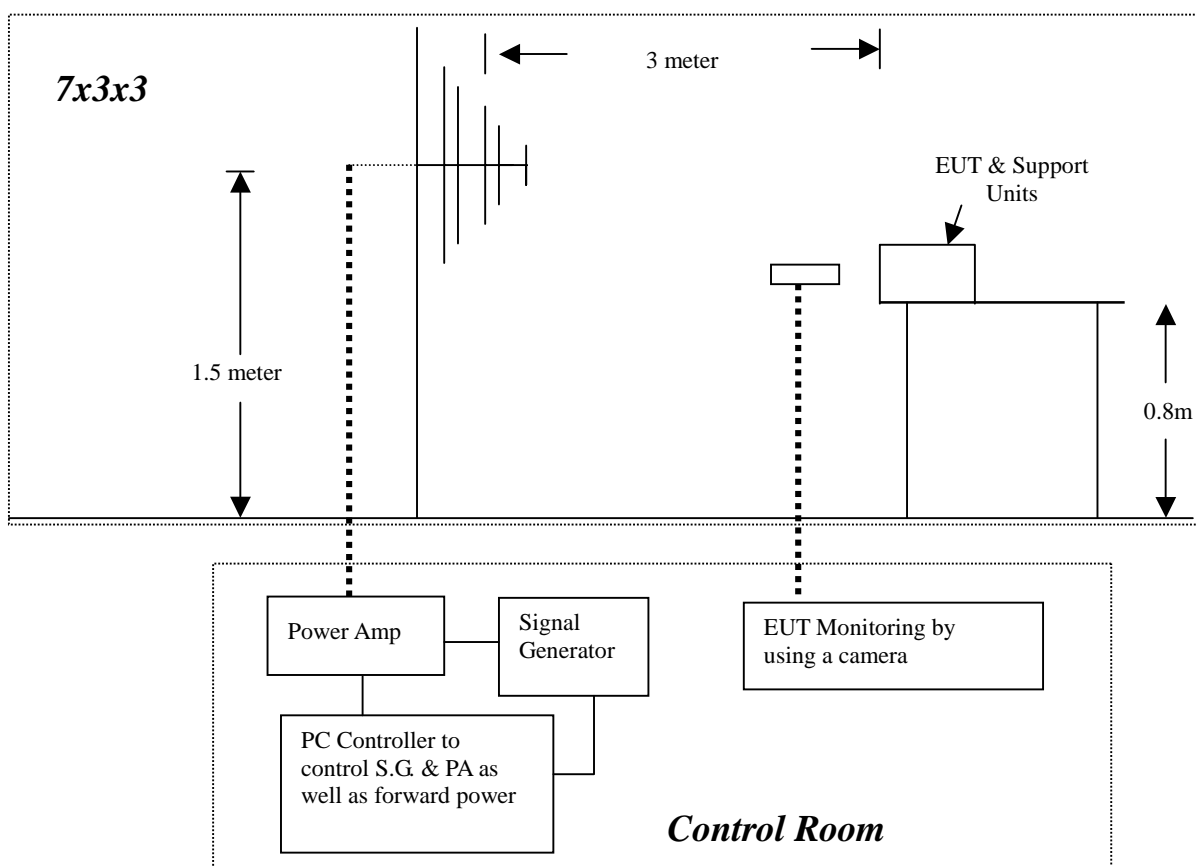
Photo 2 of 2



8 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	: Arno Hsieh
Temperature	: 27°C
Humidity	: 49% RH
Pressure	: 1018mbar
Mode	: 1, 2

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.

9 FAST TRANSIENTS/BURST IMMUNITY TEST

Port : On Power Supply Lines and Data Cable

Basic Standard : IEC/EN 61000-4-4

Requirements : ± 1 kV for Power Supply Line
 ± 0.5 kV for LAN Cables

Performance Criteria : B (Standard Required)

Tested by : Arno Hsieh

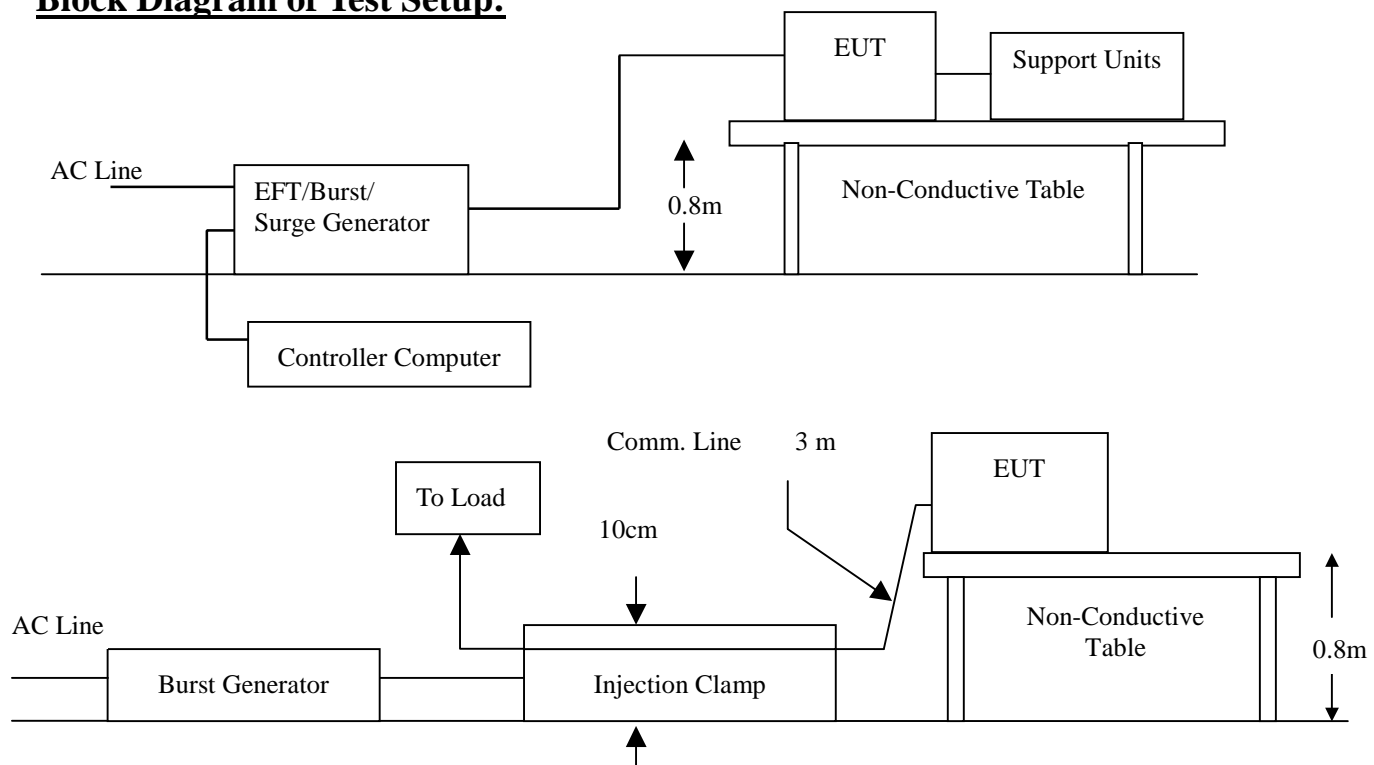
Temperature : 27°C

Humidity : 49% RH

Pressure : 1018mbar

Mode : 1, 2

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
L + N	± 1	Direct	Pass
RJ 45 Port (LAN Cable)	± 0.5	Clamp	Pass

Performance & Result:

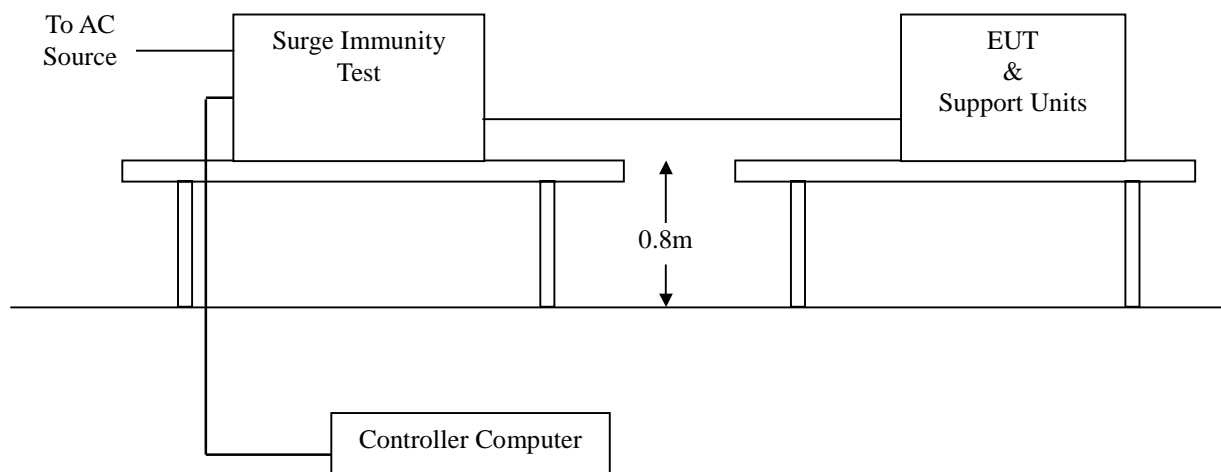
- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of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

10 SURGE IMMUNITY TEST

Port	: Power Cord
Basic Standard	: IEC/EN 61000-4-5
Requirements	: ± 1 kV (Line to Line) (Customer Required)
Performance Criteria	: B (Standard Required)
Tested by	: Arno Hsieh
Temperature	: 27°C
Humidity	: 49% RH
Pressure	: 1018mbar
Mode	: 1, 2

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-L2	1	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.

11 CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

Port : AC Port and Signal/ Telecommunication Lines

Basic Standard : IEC/EN 61000-4-6

Requirements : 3 V with 80% AM. 1kHz Modulation.

Injection Method : CDN-M2
CDN-T4 for LAN Cable

Performance Criterion : A (Standard Required)

Tested by : Arno Hsieh

Temperature : 27°C

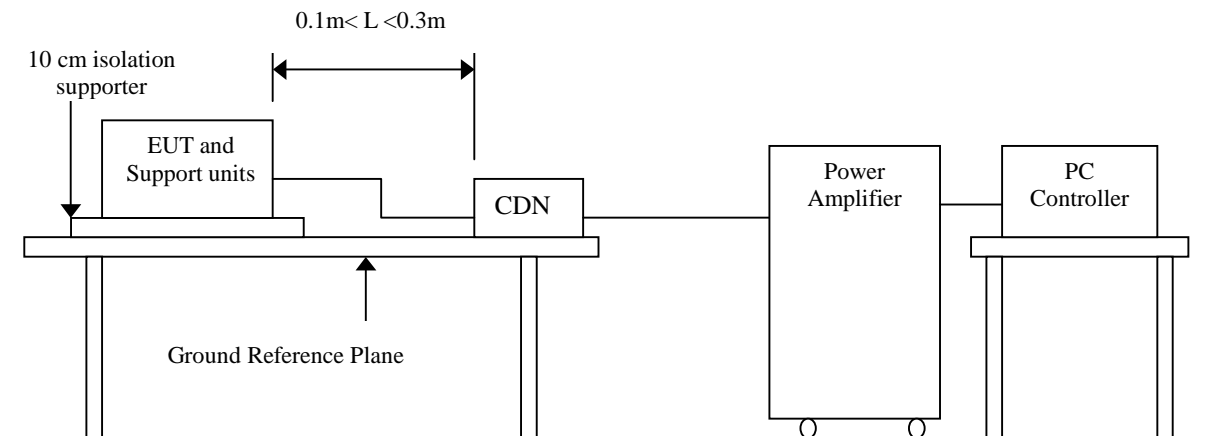
Humidity : 49% RH

Pressure : 1018mbar

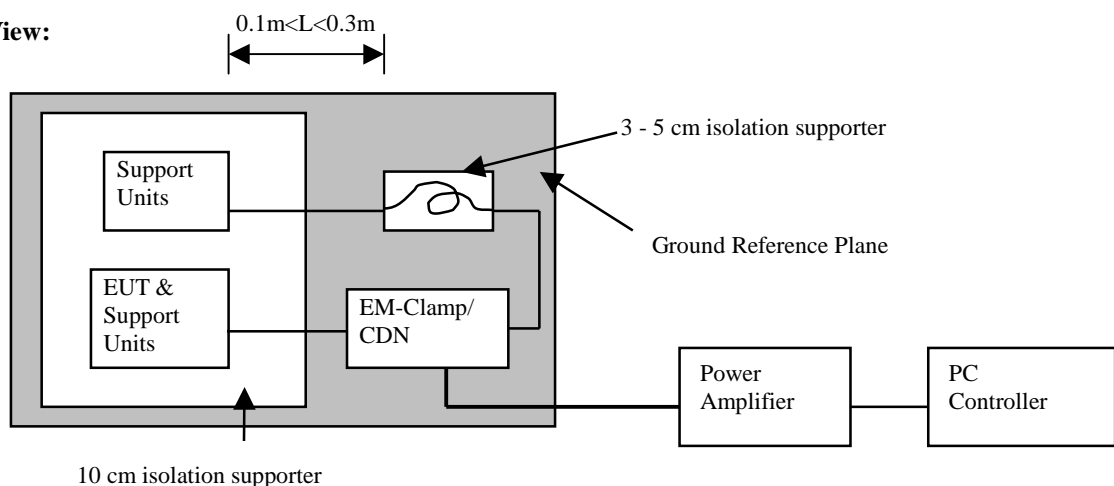
Mode : 1, 2

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:

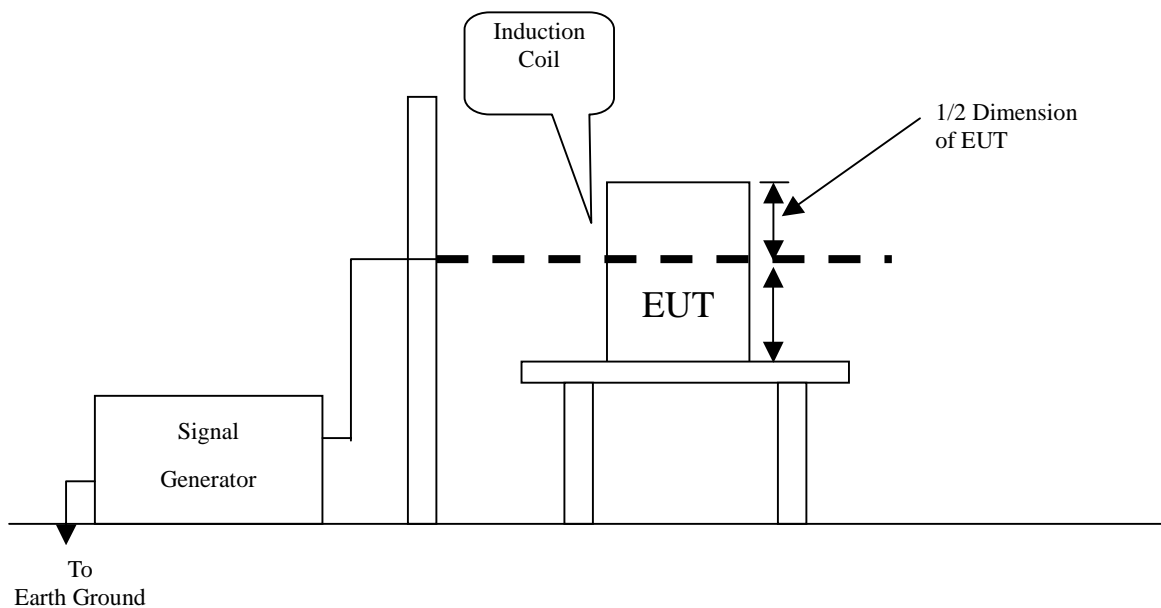
- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of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

12 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 : Arno Hsieh
Temperature : 27°C
Humidity : 49% RH
Pressure : 1018mbar
Mode : 1, 2

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.

APPENDIX I - PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST (EN 55022)



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

