



## EMC UPDATE TEST REPORT

For

**Advantech Co., Ltd.**

**Panel PC with Touch Screen**

**Model: PPC-V106**

**Trade Name: ADVANTECH**

**Date of Test: August 20 ~ September 3, 2004**

**Revision: 01**

### **Description of Rev.01:**

1. Applicant adds two DC power source (DC 12V and DC 48V) to re-test.  
(Please refer to have \*\* mark items on this report)
2. Other information, please refer to the 40614203 and this test report.

**Approved by:**

**Reviewed by:**

Kurt Chen  
Director of Linkou Laboratory  
Compliance Certification Services Inc.

Jessie Wang  
Section Manager of Linkou Laboratory  
Compliance Certification Services Inc.

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## **TABLE OF CONTENTS**

1	TEST RESULT CERTIFICATION .....	3
2	EUT DESCRIPTION.....	4
3	TEST METHODOLOGY.....	6
3.1	DECISION OF FINAL TEST MODE.....	6
4	SETUP OF EQUIPMENT UNDER TEST.....	6
5	INSTRUMENT AND CALIBRATION.....	7
5.1	MEASURING INSTRUMENT CALIBRATION.....	7
5.2	TEST AND MEASUREMENT EQUIPMENT .....	7
6	TEST RESULTS .....	9
7	ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST .....	13
8	RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST .....	19
9	FAST TRANSIENTS/BURST IMMUNITY TEST.....	22
10	SURGE IMMUNITY TEST.....	24
11	CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST .....	26
12	POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST.....	28
	APPENDIX I - PHOTOGRAPHS OF TEST SETUP .....	30



# 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 with Touch Screen

**Trade Name:** ADVANTECH

**Model:** PPC-V106

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

**Date of Test:** August 20 ~ September 3, 2004

Applicable Standard	Class/Limit/Criterion	Test Result
EN 55022: 1998	Class B	No non-compliance noted
EN 61000-3-2: 2000	Class D	N/A
EN 61000-3-3: 1995 + A1: 2001	Limit	N/A
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	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/EEC and the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.



## 2 EUT DESCRIPTION

<b>Product</b>	Panel PC with Touch Screen		
<b>Trade Name</b>	ADVANTECH		
<b>Model</b>	PPC-V106		
<b>Housing Type</b>	Metal Case		
<b>AC Power Supply Manufacturer</b>	Skynet	<b>Model</b>	ADT-9563
<b>DC Power Supply Manufacturer</b>	Sunpower	<b>Model</b>	SDL-075BQ1
		**	SDL-075CQ1
		**	SDL-065AQ1
<b>Power Adapter Manufacturer</b>	SINPRO	<b>Model</b>	SPU65-108
	LE	<b>Model</b>	LE-9702B-06
<b>Power Supply Power Rating</b>	For Sunpower/ SDL-075BQ1 DC I/P: 18-36V, 5.9A O/P: +5V/8A, +12V/12A, -12V/0.5A, -5V/0.5A ** For Sunpower/ SDL-075CQ1 (48V) DC I/P: 36-72V, 3A O/P: +5V/0.8A, +12V/2.5A, -5V/0.5A, -12V/0.5A ** For Sunpower/ SDL-065AQ1 (12V) DC I/P: 9.5-18V, 10A O/P: +5V/7.0A, +12V/2.0A, -5V/0.3A, -12V/0.5A For Skynet/ ADT-9563 I/P: 100-250VAC, 47-63Hz, 2-1A O/P: +5V/5A, +12V/3A		
<b>Power Adapter Power Rating</b>	For SINPRO/ SPU65-108 I/P: 100-240VAC, 47-63Hz, 1.9A O/P: 21-27VDC, 80W		
	For LE/ LE-9702B-06 I/P: 100-240VAC, 50-60Hz, 1.8A O/P: 19VDC, 72W		
<b>AC Power Cord Type</b>	Unshielded, 1.8m (Detachable) to Power Adapter		
<b>DC Power Cable Type</b>	For SINPRO/ SPU65-108 Unshielded, 1.8m (Non-Detachable) at Power Adapter with two cores		
	For LE/ LE-9702B-06 Unshielded, 1.8m (Non-Detachable) at Power Adapter with a core		



<b>CPU Manufacturer</b>	VIA	<b>Model</b>	C3/ 800MHz
<b>OSC/Clock Frequencies</b>	133MHz x 6		
<b>Memory Capacity</b>		<b>Installed</b>	256MB DDR
<b>CPU Board Manufacturer</b>	Advantech	<b>Model</b>	PCM-9677
<b>LCD Panel Manufacturer</b>	AU	<b>Model</b>	G104SN03 (For DC Type)
			B104SN01 (For AC Type)
<b>HDD Manufacturer</b>	Fujitsu	<b>Model</b>	MHT2020AT (20GB)

**I/O Port of EUT**

<b>I/O PORT TYPES</b>	<b>Q'TY</b>	<b>TESTED WITH</b>
1). Parallel Port	1	1
2). Serial Port	3	3
3). Video Out Port (VGA)	1	1
4). PS/2 Keyboard Port	1	1
5). PS/2 Mouse Port	1	1
6). Earphone Port	1	1
7). LAN Port	1	1
8). USB Port	2	2



### 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 x 600 Resolution with DC Power Supply / (SDL-075CQ1)

**Mode 2**

640 x 480 Resolution with DC Power Supply / (SDL-075CQ1)

**Mode 3**

800 x 600 Resolution with DC Power Supply / (SDL-065AQ1)

**Mode 4**

640 x 480 Resolution with DC Power Supply / (SDL-065AQ1)

2. After preliminary test, found mode 1,3 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	AQ19H2RT706126P	FCC DoC	SAMSUNG	Shielded, 1.8m with two cores	Unshielded, 1.8m
2.	Modem	DM-1414	304012264	IFAXDM1414	ACEEX	Unshielded, 1.5m	Unshielded, 1.8m
3.	Printer	STYLUS C60	DR3K043129	FCC DoC	EPSON	Shielded, 1.8m	Unshielded, 1.8m
4.	PS/2 Keyboard	Y-SP29	YU30272819	FCC DoC	Logitech	Shielded, 1.8m	N/A
5.	PS/2 Mouse	M-CAA43	LZA11750895	FCC DoC	Logitech	Shielded, 1.8m	N/A
6.	Mouse	M-MM43	LZE93353074	FCC DoC	Logitech	Shielded, 1.8m	N/A
7.	Mouse	M-MM43	LZE94052791	FCC DoC	Logitech	Shielded, 1.8m	N/A
8.	USB 2.0 External HDD	F12-UF	A0100214-43b0011	FCC DoC	TeraSys	Shielded, 1.8m	N/A
9.	USB 2.0 External HDD	F12-UF	A0100214-43b0015	FCC DoC	TeraSys	Shielded, 1.8m	N/A
10.	Multimedia Earphone	Axis-301	N/A	FCC DoC	Labtec	Unshielded, 1.8m	N/A
11.	Notebook PC (Remote)	M285	NU2503544	FCC DoC	LEO	LAN Cable Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
12.	DC Power Supply	N/A	N/A	N/A	All Power	N/A	I/P: Unshielded, 1.8m O/P: Unshielded, 1.8m

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

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



## 5 INSTRUMENT AND CALIBRATION

### 5.1 MEASURING INSTRUMENT CALIBRATION

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

### 5.2 TEST AND MEASUREMENT EQUIPMENT

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

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

#### Equipment Used for Emission Measurement

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

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

#### 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	08/01/2005



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

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

<b>Surge Immunity Test Site (IEC/EN 61000-4-5)</b>				
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Due</b>
Surge Tester	HAEFELY TRENCH	PSUGER 4010	583 334-71	08/19/2005

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

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





## 6 TEST RESULTS

### Radiated Emission (A)

**Model:** PPC-V106**Test Mode:** Mode 1**Temperature:** 29°C**Humidity:** 50% RH**Detector Function:** Quasi-peak.**Antenna:** Vertical at 10m**Tested by:** Carl Chang**Test Results:** Pass

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

Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
51.66	10.5	10.9	21.4	30.0	-8.6
83.57	13.5	7.8	21.3	30.0	-8.7
117.57	8.4	11.7	20.1	30.0	-9.9
146.83	8.5	11.5	20.0	30.0	-10.0
167.96	13.3	10.5	23.8	30.0	-6.2
187.96	13.4	11.2	24.6	30.0	-5.4
344.60	9.7	17.5	27.2	37.0	-9.8
399.00	4.8	20.0	24.8	37.0	-12.2
537.10	6.3	22.1	28.4	37.0	-8.6
651.10	7.2	23.6	30.8	37.0	-6.2

**Radiated Emission (B)****Model:** PPC-V106**Test Mode:** Mode 1**Temperature:** 29°C**Humidity:** 50% RH**Detector Function:** Quasi-peak.**Antenna:** Horizontal at 10m**Tested by:** Carl Chang**Test Results:** Pass

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

Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
66.79	17.0	5.6	22.6	30.0	-7.4
75.25	17.6	6.3	23.9	30.0	-6.1
80.99	16.1	7.2	23.3	30.0	-6.7
115.71	9.0	11.7	20.7	30.0	-9.3
139.63	7.9	12.3	20.2	30.0	-9.8
158.11	13.9	10.1	24.0	30.0	-6.0
266.53	17.3	15.3	32.6	37.0	-4.4
544.10	5.0	22.3	27.3	37.0	-9.7
624.80	.2	22.8	23.0	37.0	-14.0
686.80	3.2	23.7	26.9	37.0	-10.1
805.90	.9	26.9	27.8	37.0	-9.2
906.10	-.3	26.7	26.4	37.0	-10.6

**Radiated Emission (A)****Model:** PPC-V106**Test Mode:** Mode 3**Temperature:** 29°C**Humidity:** 50% RH**Detector Function:** Quasi-peak.**Antenna:** Vertical at 10m**Tested by:** Carl Chang**Test Results:** Pass

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

Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
51.66	10.5	10.9	21.4	30.0	-8.6
83.57	13.5	7.8	21.3	30.0	-8.7
117.57	8.4	11.7	20.1	30.0	-9.9
146.83	8.5	11.5	20.0	30.0	-10.0
167.96	13.3	10.5	23.8	30.0	-6.2
187.96	13.4	11.2	24.6	30.0	-5.4
344.60	9.7	17.5	27.2	37.0	-9.8
399.00	4.8	20.0	24.8	37.0	-12.2
418.90	12.4	19.6	32.0	37.0	-5.0
537.10	6.3	22.1	28.4	37.0	-8.6
548.30	9.0	22.4	31.4	37.0	-5.6
651.10	7.2	23.6	30.8	37.0	-6.2

**Radiated Emission (B)****Model:** PPC-V106**Test Mode:** Mode 3**Temperature:** 29°C**Humidity:** 50% RH**Detector Function:** Quasi-peak.**Antenna:** Horizontal at 10m**Tested by:** Carl Chang**Test Results:** Pass

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

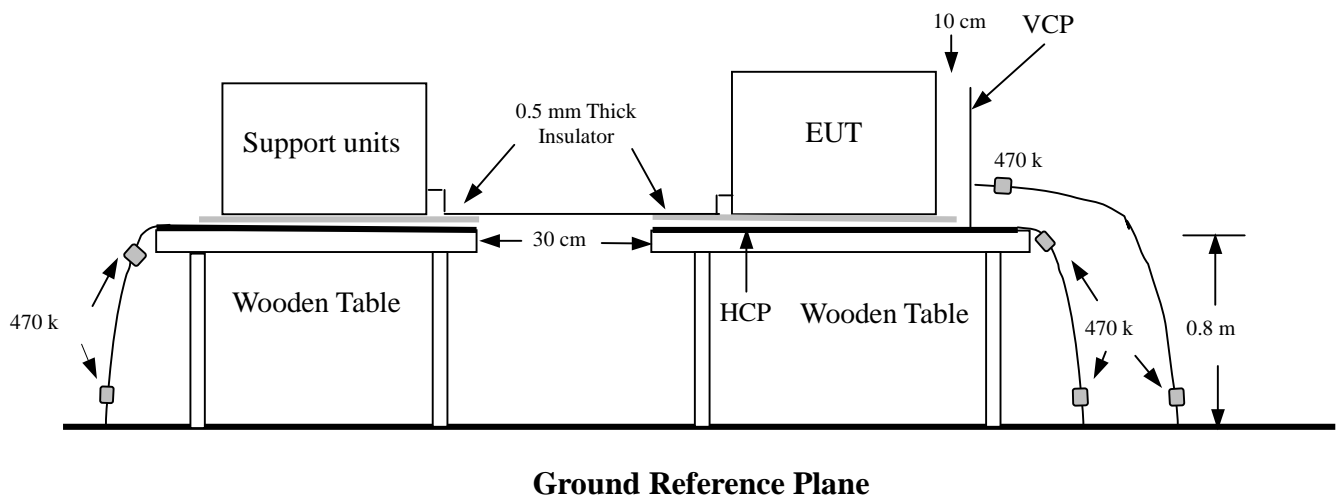
Freq. (MHz)	Raw Data (dBuV)	Corr. Factor (dB/m)	Emiss. Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
66.79	17.0	5.6	22.6	30.0	-7.4
75.25	17.6	6.3	23.9	30.0	-6.1
115.71	9.0	11.7	20.7	30.0	-9.3
158.11	13.9	10.1	24.0	30.0	-6.0
266.53	17.3	15.3	32.6	37.0	-4.4
544.10	5.0	22.3	27.3	37.0	-9.7
624.80	.2	22.8	23.0	37.0	-14.0
686.80	3.2	23.7	26.9	37.0	-10.1
805.90	.9	26.9	27.8	37.0	-9.2
906.10	-.3	26.7	26.4	37.0	-10.6

## 7 ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

<b>Port</b>	: Enclosure
<b>Basic Standard</b>	: IEC/EN 61000-4-2
<b>Test Level</b>	: $\pm 8$ kV (Air Discharge) $\pm 4$ kV (Contact Discharge) $\pm 4$ kV (Indirect Discharge)
<b>Performance Criterion</b>	: B (Standard Required)
<b>Tested by</b>	: Ken Jung
<b>Temperature</b>	: 26, 27°C
<b>Humidity</b>	: 57, 56% RH
<b>Pressure</b>	: 1019mbar
<b>Test Mode</b>	: Mode 1, 3

### **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 CE mode.
4. The EUT sent above message to 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 10 /Point	± 4 kV	Contact Discharge	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge HCP	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge VCP (Right)	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge VCP (Left)	Pass
Mini 25 /Point	± 4 kV	Indirect Discharge VCP (Back)	Pass

***For the tested points to EUT, please refer to attached page.***

***(Blue arrow mark for Contact Discharge and red arrow mark for Air Discharge)***



**Performance & Result:**

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



**PASS**



**FAIL**

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

## *The Tested Points of EUT*

*Photo 1 of 6*



*Photo 2 of 6*







***Photo 3 of 6***



***Photo 4 of 6***





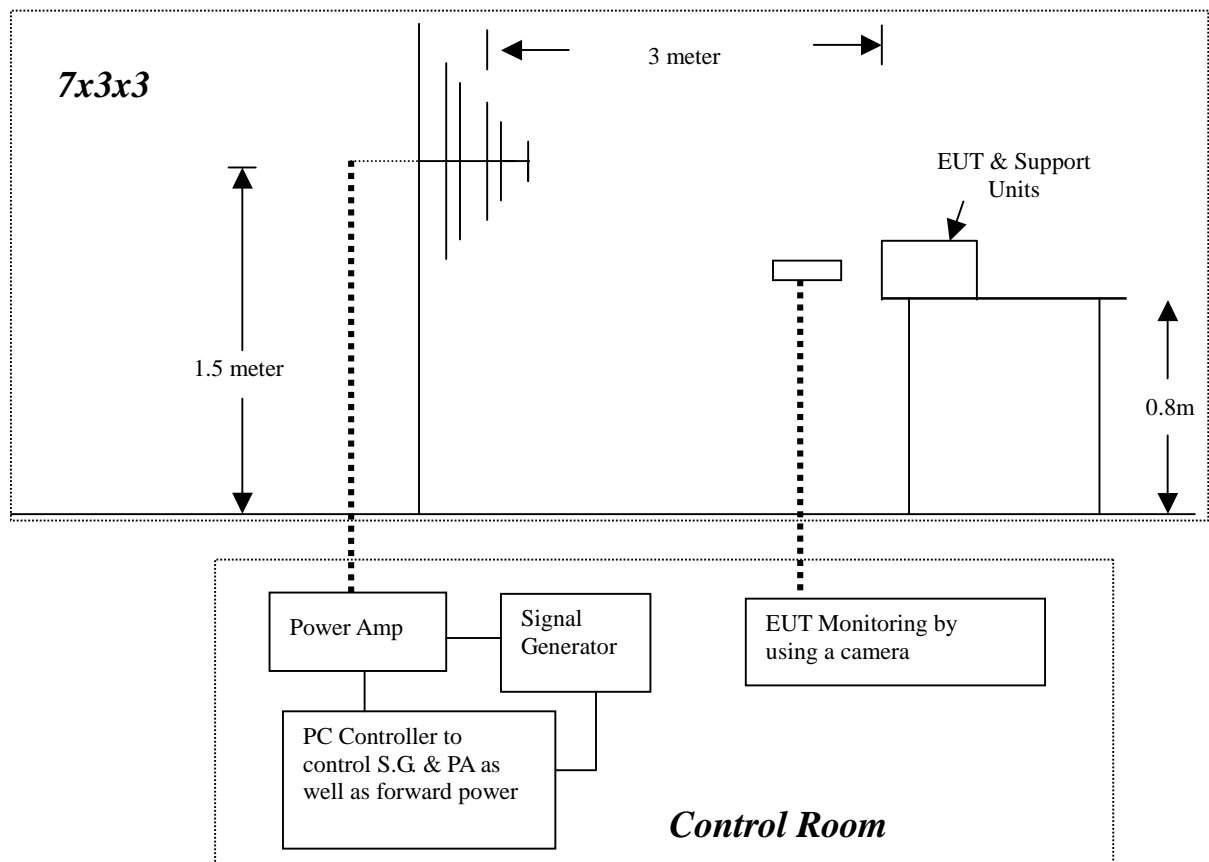
*Photo 5 of 6*



## 8 RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

<b>Port</b>	: Enclosure
<b>Basic Standard</b>	: IEC/EN 61000-4-3
<b>Requirements</b>	: 3 V/m / with 80% AM. 1kHz Modulation.
<b>Performance Criterion</b>	: A (Standard Required)
<b>Tested by</b>	: Ken Jung
<b>Temperature</b>	: 26, 28°C
<b>Humidity</b>	: 59, 56% RH
<b>Pressure</b>	: 1019mbar
<b>Test Mode</b>	: Mode 1, 3

### 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 Line and LAN Cable

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

**Requirements** :  $\pm 1$  kV for Power Supply Line  
 $\pm 0.5$  kV for LAN Cable

**Performance Criteria** : B (Standard Required)

**Tested by** : Ken Jung

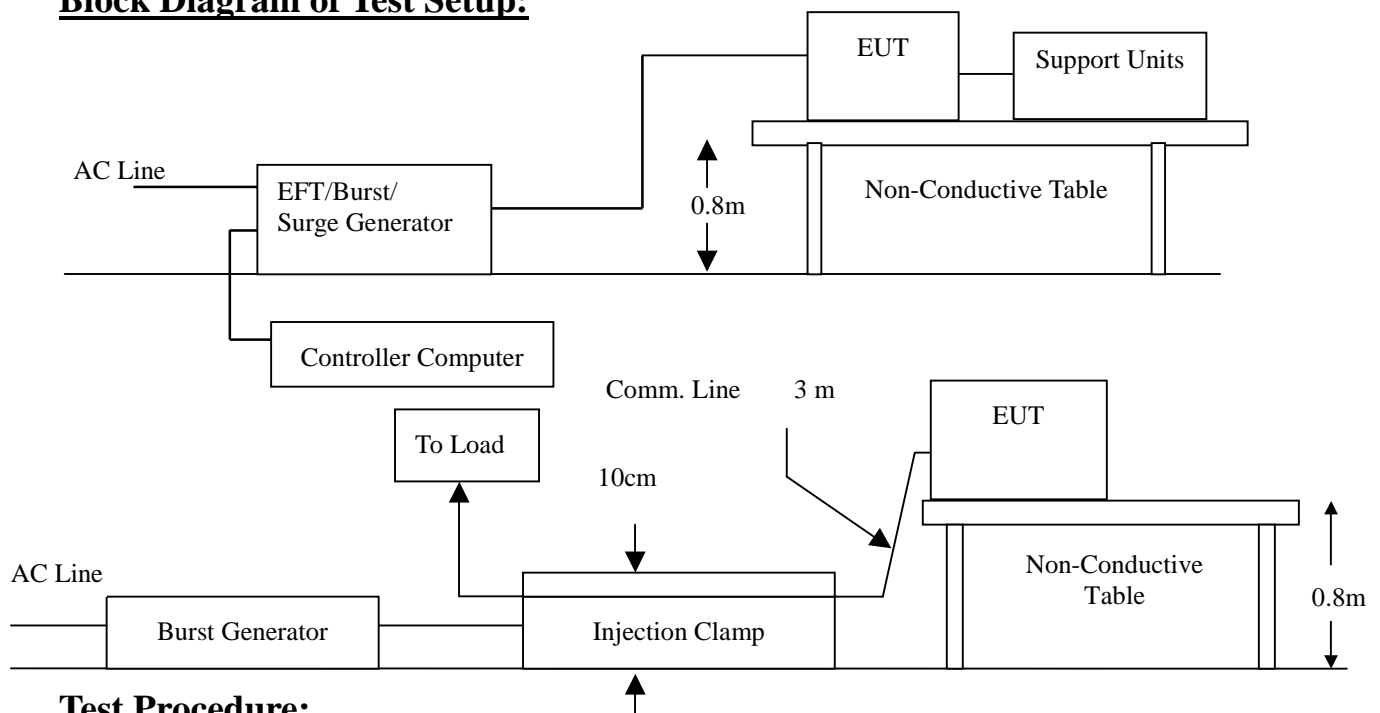
**Temperature** : 26°C

**Humidity** : 57% RH

**Pressure** : 1019mbar

**Test Mode** : Mode 1, 3

### 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	$\pm 1$	Direct	Pass
N	$\pm 1$	Direct	Pass
L + N	$\pm 1$	Direct	Pass
RJ 45 Port (LAN Cable)	$\pm 0.5$	Clamp	Pass

**Performance & Result:**

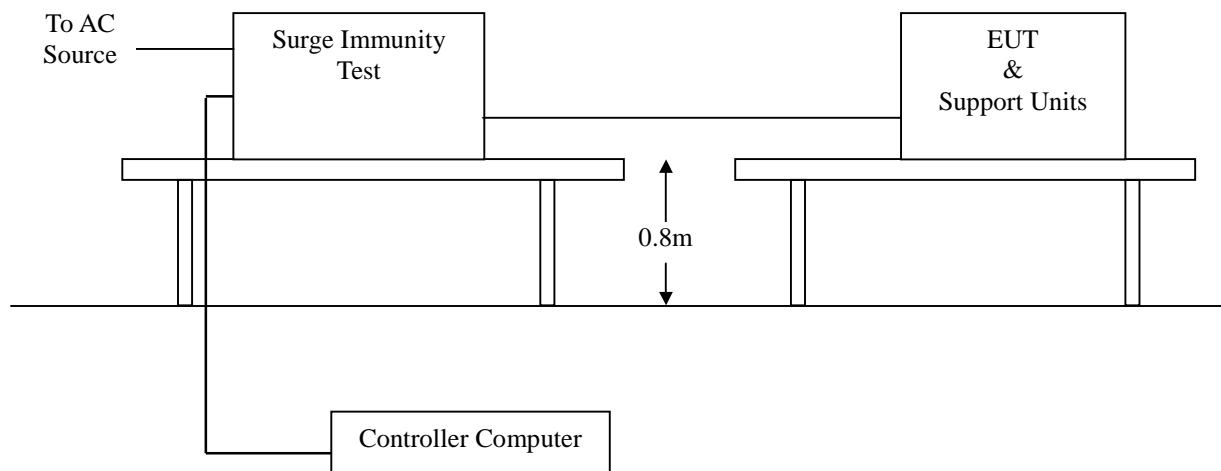
- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of 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	: $\pm 1$ kV (Line to Line)
Performance Criteria	: B (Standard Required)
Tested by	: Ken Jung
Temperature	: 26°C
Humidity	: 56, 57% RH
Pressure	: 1019mbar
Test Mode	: Mode 1, 3

### 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  $\mu$ 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-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**

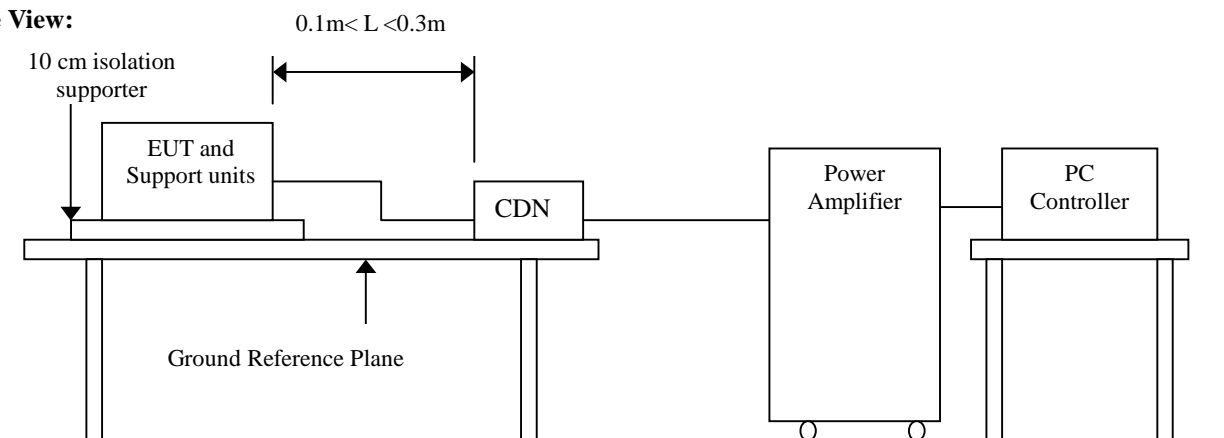
**Observation:** No function degraded during the tests.

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

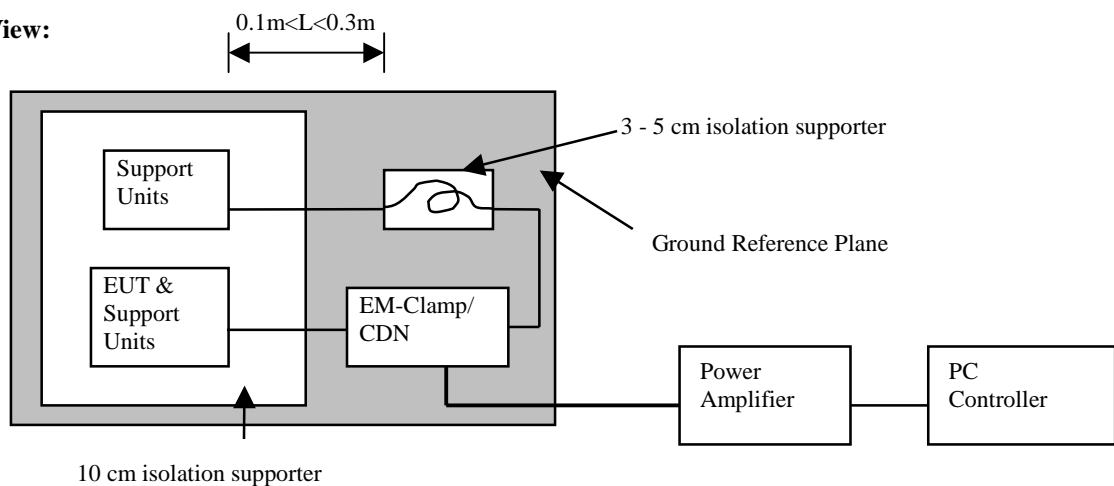
<b>Port</b>	: AC Port and LAN Cable
<b>Basic Standard</b>	: IEC/EN 61000-4-6
<b>Requirements</b>	: 3 V with 80% AM. 1kHz Modulation.
<b>Injection Method</b>	: CDN-M2 for Power Cord CDN-T4 for LAN Cable
<b>Performance Criterion</b>	: A (Standard Required)
<b>Tested by</b>	: Ken Jung
<b>Temperature</b>	: 26, 27°C
<b>Humidity</b>	: 57, 58% RH
<b>Pressure</b>	: 1019mbar
<b>Test Mode</b>	: Mode 1, 3

### 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:**

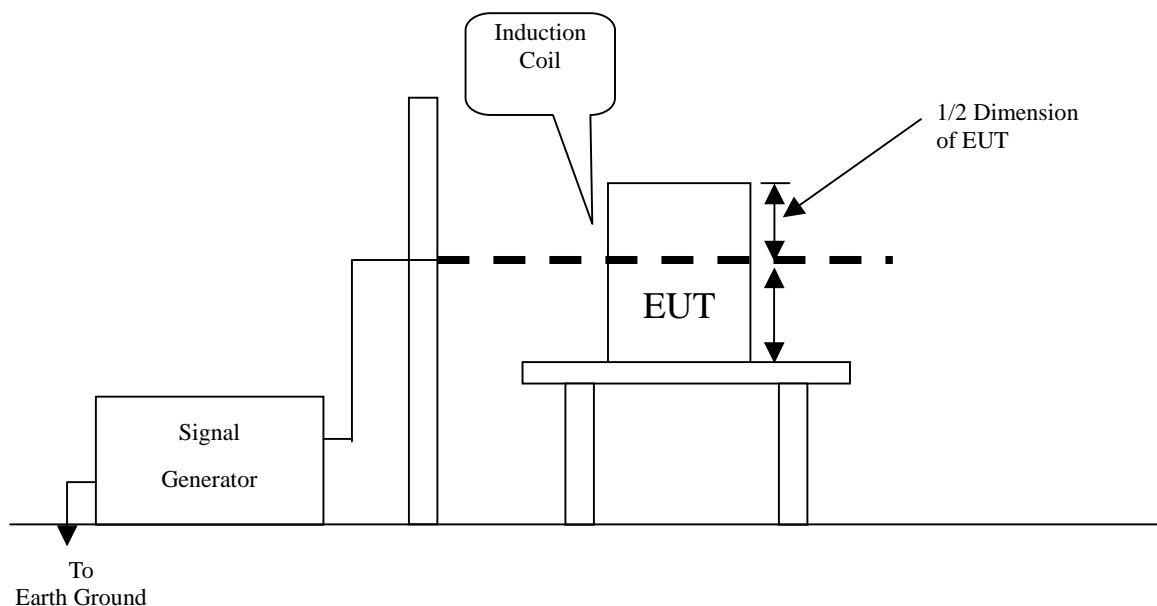
- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of 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** : Ken Jung  
**Temperature** : 27°C  
**Humidity** : 57% RH  
**Pressure** : 1019mbar  
**Test Mode** : Mode 1, 3

### 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)**

#### ***Mode 1***



**Mode 3**





## ELECTROSTATIC DISCHARGE TEST

### *Mode 1*





*Mode 3*



## **RADIATED ELECTROMAGNETIC FIELD TEST**

### ***Mode 1***



### ***Mode 3***



## FAST TRANSIENTS/BURST TEST

### Mode 1





**Mode 3**

## **SURGE IMMUNITY TEST**

### ***Mode 1***



### ***Mode 3***



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

### *Mode 1*





**Mode 3**

## POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

### *Mode 1*



### *Mode 3*

