



EMC COMPLIANCE TEST REPORT

for

Panel PC

Trade Name : ADVANTECH
Model Number : PPC-150T / PPC-150T-RT / PPC-150T-ST
Serial Number : Prototype
Report Number : 990300-E
Date : July 8, 1999
Regulations : See below

Standards	Results (Pass/Fail)
EN 55022: 1994	PASS
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998	PASS
EN 61000-3-3: 1995	PASS
EN 50082-2: 1995	PASS
EN 61000-4-2: 1995	PASS
ENV 50140: 1994	PASS
ENV 50204: 1995	PASS
EN 61000-4-4: 1995	PASS
EN 61000-4-5: 1995	PASS
ENV 50141: 1994	PASS
EN 61000-4-8: 1993	N/A
EN 61000-4-11: 1994	PASS

Prepared for :

Advantech Co., Ltd.

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 Taipei Hsien, Taiwan, R.O.C.

Prepared by :



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VERIFICATION OF COMPLIANCE

Equipment Under Test: Panel PC
Trade Name: ADVANTECH
Model Number: PPC-150T / PPC-150T-RT / PPC-150T-ST
Serial Number: Prototype
EUT Powered during test: 230VAC/50Hz
Applicant: **Advantech Co., Ltd.**
4th FL., No. 108-3 Ming-Chuan Road, Hsin-Tien City,
Taipei Hsien, Taiwan, R.O.C.
Manufacturer: **Advantech Co., Ltd.**
4th FL., No. 108-3 Ming-Chuan Road, Hsin-Tien City,
Taipei Hsien, Taiwan, R.O.C.
Type of Test: EMC Directive 89/336/EEC for CE Marking
Technical Standards: EN 55022: 1994, EN 61000-3-2: 1995 +A1: 1998 + A2: 1998,
EN 61000-3-3: 1995
EN 50082-2: 1995 (EN 61000-4-2: 1995, ENV 50140: 1994,
ENV 50204: 1995, EN 61000-4-4: 1995,
EN 61000-4-5: 1995, , ENV 50141: 1994
EN 61000-4-8: 1993, EN 61000-4-11: 1994)
File Number: 990300-E
Date of test: July 5 ~ 7, 1999
Tested by: Jack Chen
Deviation: N/A
Condition of Test Sample: Normal

The above equipment was tested by C&C Laboratory Co., Ltd. for compliance with the requirements set forth in EMC Directive 89/336/EEC and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Approved by Authorized Signatory: Kurt Chen

Kurt Chen / Q.A. Manager

GENERAL INFORMATION

Applicant: Advantech Co., Ltd.
4th FL., No. 108-3 Ming-Chuan Road, Hsin-Tien City,
Taipei Hsien, Taiwan, R.O.C.

Contact Person: John Chou

Phone Number: (02) 2218-4567 ext. 293

Fax Number: (02) 2218-0045

Manufacturer: Advantech Co., Ltd.
4th FL., No. 108-3 Ming-Chuan Road, Hsin-Tien City,
Taipei Hsien, Taiwan, R.O.C.

File Number: 990300-E

Date of Test: July 5 ~ 7, 1999

Equipment Under Test: Panel PC

Model Number: PPC-150T / PPC-150T-RT / PPC-150T-ST

Serial Number: Prototype

Technical Standards: EN 55022: 1994, EN 61000-3-2: 1995 +A1: 1998 + A2: 1998,
EN 61000-3-3: 1995
EN 50082-2: 1995 (EN 61000-4-2: 1995, ENV 50140: 1994,
ENV 50204: 1995, EN 61000-4-4: 1995,
EN 61000-4-5: 1995, , ENV 50141: 1994
EN 61000-4-8: 1993, EN 61000-4-11: 1994)

**Frequency Range
(EN 55022):** 150kHz to 30MHz for Line Conducted Test
30MHz to 1000MHz for Radiated Emission Test

Test Site **C & C LABORATORY CO., LTD.**
No. 15, 14 Lin, Chi Twu Chi, Lu-Chu Hsiang
Taoyuan, Taiwan, R. O. C.

SYSTEM DESCRIPTION

EUT Test Program:

1. EMI test program was loaded and executed in Windows mode
2. A communication software was loaded and executed to drive modem, then to communicate with remote side.
3. Data was sent to LCD Panel of EUT and CRT monitor, filling the screen with upper case of "H" patterns.
4. Test program sequentially exercised all related I/O's of EUT and send "H" patterns to all applicable ports of EUT.
5. Repeat 2 to 3. Test program is self-repeating throughout the test.

PRODUCT INFORMATION

Housing Type:	Coated Plastic		
EUT Power Rating:	85 ~ 264Vac, 50/60Hz, 80W		
AC power during Test:	230VAC/50Hz		
Power Supply Manufacturer:	SKYNET		
Power Supply Model Number:	SNP-8086		
AC Power Cord Type:	Unshielded, 1.8m (Non-detachable)		
DC Power Cable Type:	N/A		
Memory Capacity:	Max: 128MB	Installed:	32MB
CPU Manufacturer:	Intel	Model:	Pentium 233MMX
CPU Board Manufacturer:	ACL	Model:	PCM-5868 B2 01-2
Hard Drive Manufacturer:	IBM	Model:	DYKA-23240
Floppy Drive Manufacturer:	Y-E DATA	Model:	YD-702J
CD-ROM Drive Manufacturer:	Toshiba	Model:	XM-1702B
15" TFT LCD Panel Manufacturer:	Toshiba	Model:	LTM15C151A
	Samsung	Model:	LT150X1-051
LCD Inverter Manufacturer:	TDK	Model:	TAD233-1/TAD282
VGA Card Manufacturer:	On Board	Model:	65555 (chips)
Sound Card Manufacturer:	On Board	Model:	ES1869FC (chips)
T/S Board Manufacturer:	ELO	Model:	E281-2310/E271-2210
T/S Sensor Manufacturer:	ELO	Model:	7512EF15/65661-000

I/O PORT TYPES	Q'TY	TESTED WITH
1). Parallel Port	1	1
2). Serial Port	4	4
3). Video Port	1	1
4). PS/2 Keyboard 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:** One of the four serial port connected an open circuit shielded cable, which is 1.8m in length, and other three serial port connected with K/B and Modem.

Model No.	Difference Description
PPC-150T	Panel PC with 15" Toshiba / Samsung LCD Panel
PPC-150T-RT	Panel PC with 15" Samsung LCD Panel + Resistive touchscreen
PPC-150T-ST	Panel PC with 15" Toshiba LCD Panel + SAW (Surface Acoustic Wave) touchscreen

SUPPORT EQUIPMENT

Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
Monitor	GDM-17SE2T	7138048	AK8GDM17SE2T	SONY	Shielded, 1.5m with two cores	Unshielded, 1.8m
Printer	C2642A	TH86J1M2CQ	B94C2642X	HP	Shielded, 1.8m	AC I/P Unshielded, 0.9m DC O/P Unshielded, 1.9m
Modem	2400	94-364-176272	DK467GSM24	Computer Peripheral	Shielded, 1.5m	Unshielded, 1.8m
Modem	2400	94-364-176277	DK467GSM24	Computer Peripheral	Shielded, 1.8m	Unshielded, 1.8m
PS/2 Keyboard	KB-9000	9809053789	LFCACEKEY1	ACEKEY	Shielded, 1.5m	N/A
Mouse	Easy Mouse Serial	N/A	FSUGME3	KOM	Shielded, 1.5m	N/A
USB Mouse	SL-A 79111	U2-2	E6QMOUSE X31	JOW DAIN	Shielded, 1.4m	N/A
USB Mouse	SL-A 79111	U9-2	E6QMOUSE X31	JOW DAIN	Shielded, 1.4m	N/A
Walkman	YX-328	W1	N/A	YING-KO	Unshielded, 1.8m	N/A
Microphone	AY-125	I1	N/A	Diverse	Unshielded, 1.8m	N/A
Joystick	WINGMAN	LZB83456589	DZL211071	Logitech	Unshielded, 2.2m	N/A
Speaker	P-9A	E1	N/A	N/A	Unshielded, 1.1m	N/A
Panel PC (Remote)	PPC-150T	N/A	FCC DoC	Advantech	Unshielded, 20m	N/A

Note: All the above equipment and cables were placed in worse case positions to maximize emission signals.

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

TEST FACILITY (EN 55022)

Location:	No. 15, 14 Line, Chin Twu Chi, Lu Chu Hsiang, Taoyuan, Taiwan, R.O.C.
Description:	There are three 3/10m open area test sites and three line conducted labs for final test, and one 3/10m open area test site for engineering lab. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.
Site Filing:	A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046. Registration also was made with Voluntary Control Council for Interference (VCCI).
Site Accreditation:	Accredited by NEMKO (Authorization #: ELA 124) for EMC & A2LA (Certificate #: 824.01) for Emission Also accredited by BSMI for the product category of Information Technology Equipment.
Instrument Tolerance:	All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
Ground Plane:	Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.
Site #1 & #3 Line Conducted Test Site:	Vertical ground plane (2.2m x 2.2m) Horizontal ground plane (2.5m x 2.5m)
Site #4 Line Conducted Test Site:	At Shielding Room

TEST EQUIPMENT

MEASURING INSTRUMENT SETTING

TEST TYPE	DETECTOR	FREQUENCY RANGE	RESOLUTION BANDWIDTH	VIDEO BANDWIDTH
Conducted	Peak/QP/Avg	150kHz-30MHz	9kHz	9kHz
Radiated	Peak	30MHz-1GHz	100kHz	100kHz
Radiated	QP	30MHz-1GHz	120kHz	120kHz
Radiated	Peak/Avg	Above 1GHz	1MHz	1MHz

Note: All readings on data pages are taken with the detector in peak mode unless otherwise stated.

UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dBuV/m, at a specified distance. The indicated readings on the spectrum analyzer are converted to dBuV/m by use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dBuV.

TEST EQUIPMENT LIST (EMISSION)

Instrumentation: The following list contains equipment used at C & C Laboratory, Co., Ltd. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10kHz to 1.0 / 2.0 GHz.

Equipment used during the tests:

Open Area Test Site: ☐ # 1 ; ☐ # 3 ; ☒ # 4

Open Area Test Site # 1					
EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
Spectrum Analyzer	HP	8568B	3001A05004	04/16/1999	04/15/2000
S.P.A Display	HP	85662A	3104A18846	04/16/1999	04/15/2000
RF Pre-selector	HP	85685A	2947A01064	04/16/1999	04/15/2000
Q.P Adaptor	HP	85650A	2811A01399	04/16/1999	04/15/2000
Precision Dipole	R&S	HZ-12	846932/0004	06/16/1999	06/16/2000
Precision Dipole	R&S	HZ-13	846556/0008	06/16/1999	06/16/2000
Horn Antenna	EMCO	3115	9602-4659	04/04/1999	04/04/2000
Bilog Antenna	CHASE	CBL6112A	2309	03/14/1999	03/14/2000
Turn Table	EMCO	2081-1.21	N/A	N/A	N/A
Antenna Tower	EMCO	2075-2	9707-2604	N/A	N/A
Controller	EMCO	2090	N/A	N/A	N/A
RF Switch	ANRITSU	MP59B	N/A	N/A	N/A
Site NSA	C&C	N/A	N/A	01/23/1999	01/23/2000

Open Area Test Site # 3					
EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
Spectrum Analyzer	ADVANTEST	R3261C	71720533	10/27/1998	10/26/1999
Pre-Amplifier	HP	8447D	2944A09173	01/28/1999	01/27/2000
EMI Test Receiver	R&S	ESVS20	838804/004	12/12/1998	12/11/1999
Precision Dipole	R&S	HZ-12	846932/0004	06/06/1999	06/06/2000
Precision Dipole	R&S	HZ-13	846556/0008	06/16/1999	06/16/2000
Horn Antenna	EMCO	3115	9602-4659	04/04/1999	04/04/2000
Bilog Antenna	CHASE	CBL6112A	2179	11/14/1998	11/14/1999
Turn Table	EMCO	2081-1.21	9709-1885	N/A	N/A
Antenna Tower	EMCO	2075-2	9707-2060	N/A	N/A
Controller	EMCO	2090	9709-1256	N/A	N/A
RF Switch	ANRITSU	MP59B	N/A	N/A	N/A
Site NSA	C&C	N/A	N/A	01/31/1999	01/31/2000

Open Area Test Site # 4					
EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
Spectrum Analyzer	ADVANTEST	R3261C	81720301	08/19/1998	08/18/1999
Pre-Amplifier	HP	8447F	2944A03748	10/22/1998	10/21/1999
EMI Test Receiver	R&S	ESVS10	846285/016	12/19/1998	12/18/1999
Turn Table	Chance most	N/A	N/A	N/A	N/A
Antenna Tower	Chance most	N/A	N/A	N/A	N/A
Controller	Chance most	N/A	N/A	N/A	N/A
Bilog Antenna	Chase	CBL 6112B	2462	01/01/1999	01/01/2000
Site NSA	C&C Lab.	N/A	N/A	12/27/19986D	12/27/1999

Conducted Emission Test Site: ☐ # 1 ; ☐ # 3 ; ☒ # 4

Conducted Emission Test Site # 1					
EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
Spectrum Analyzer	HP	8568B	3001A05004	04/16/1999	04/15/2000
S.P.A Display	HP	85662A	3104A18846	04/16/1999	04/15/2000
RF Pre-selector	HP	85685A	2947A01064	04/16/1999	04/15/2000
Q.P Adaptor	HP	85650A	2811A01399	04/16/1999	04/15/2000
LISN	EMCO	3825/2	9106-1809	08/14/1998	08/14/1999
LISN	EMCO	3825/2	9106-1810	08/14/1998	08/14/1999

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
Spectrum Analyzer	ADVANTEST	R3261A	91720031	03/25/1999	03/24/2000
EMI Test Receiver	R&S	ESHS10	843743/015	12/09/1998	12/08/1999
LISN	R&S	ESH3-Z5	848773/014	10/22/1998	10/21/1999
LISN	EMCO	3825/2	9003-1628	04/29/1999	04/28/2000

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
EMI Test Receiver	R&S	ESCS30	847793/012	12/19/1998	12/18/1999
LISN	R&S	ESH2-Z5	848773/014	12/04/1998	12/03/1999
LISN	EMCO	3825/2	9003-1628	01/09/1999	01/08/2000

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

TEST EQUIPMENT LIST

For Power Harmonic & Voltage Fluctuation/Flicker Measurement:

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
HAEFELY TRENCH Harmonic & Flicker Tester	PHF 555	080 419-25	Oct. 27, 1997	Oct. 26, 1999

For ESD test:

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
HAEFELY TRENCH/ Electrostatic Discharge Simulator	PESD 1600	H710203	Sep. 04, 1998	Sep. 03, 1999

For Radiated Electromagnetic Field immunity Measurement: (ENV 50140 and ENV 50204)

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
Maconi /Signal Generator	2022D	119246/003	Aug. 10, 1998	Aug. 10, 1999
M2S / Power Amplifier	A00181/1000	9801-112	N/A	N/A
M2S / Power Amplifier	AC8113/800-250A	9801-179	N/A	N/A
Wandel & Goltormann/ EM-Radiation Meter	EMR-30	L-0013	Dec. 11, 1998	Dec. 11, 1999
Wandel & Goltormann/ E- Field Sensor	TYP-8	H-0014	Dec. 11, 1998	Dec. 11, 1999
EMCO Power Antenna	3141	9712-1083	N/A	N/A

For Fast Transients/Burst test:

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
HAEFELY TRENCH/ Fast Transients/Burst Generator	PEFT-JUNIOR	583 333-117	Sep. 03, 1998	Sep. 02, 1999

For CS test:

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
M2S / Power Amplifier	A00181/1000	9801-112	N/A	N/A
Maconi /Signal Generator	2022D	119246/003	Aug. 10, 1998	Aug. 10, 1999

For Surge Immunity test:

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
HAEFELY TRENCH/ Surge Tester	PSURGE 4010	583 334-71	Sep. 03, 1998	Sep. 02, 1999

For Voltage Dips/Short Interruption and Voltage Variation Immunity test:

Manufacturer/Type	Model No.	Serial No.	Last Cal.	Cal. Due
HAEFELY TRENCH/ Dips/Interruption and Variations Simulator	PLINE 1610	080 334-05	Sep. 04, 1998	Sep. 03, 1999

SECTION 1 EN 55022 (LINE CONDUCTED & RADIATED EMISSION)**MEASUREMENT PROCEDURE
(PRELIMINARY LINE CONDUCTED EMISSION TEST)**

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022: 1994 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022: 1994.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022: 1994.
- 4) The EUT received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source of 230VAC/50Hz and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 110VAC/60Hz.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum analyzer connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to analyzer and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the analyzer.
- 7) Analyzer scanned from 150kHz to 30MHz for emissions in each of the test modes. Analyzer settings were stated on the Measuring Instrument Settings page.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test model(s) were scanned during the preliminary test:

Model(s):

- 1. PPC-150T-RT**
- 2. PPC-150T-ST**

- 10) After the preliminary scan, we found the following test model(s) producing the highest emission level.

Model(s): 1.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

MEASUREMENT PROCEDURE

(FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 10 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. MHz	Q.P. Raw dBuV	Average Raw dBuV	Q.P. Limit dBuV	Average Limit dBuV	Q.P. Margin dB	Average Margin dB	Note
x.xx	43.95	---	56	46	-12.05	-2.05	L 1

Freq.

= Emission frequency in MHz

Raw dBuV

= Uncorrected Analyzer/Receiver reading

Limit dBuV

= Limit stated in standard

Margin dB

= Reading in reference to limit

Note

= Current carrying line of reading

“---”

= The emission level complied with the Average limits, with at least 2 dB margin, so no further recheck.

LINE CONDUCTED EMISSION LIMIT

Frequency	Maximum RF Line Voltage	
	Q.P.	AVERAGE
150kHz-500kHz	66-56dBuV	56-46dBuV
500kHz-5MHz	56dBuV	46dBuV
5MHz-30MHz	60dBuV	50dBuV

Note: The lower limit shall apply at the transition frequency.

MEASUREMENT PROCEDURE

(PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55022: 1994 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022: 1994.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022: 1994.
- 4) The EUT received 230VAC/50Hz power source from the outlet socket under the turntable. All support equipment received 110VAC/60Hz power from another socket under the turntable.
- 5) The antenna was placed at 10 meter away from the EUT as stated in EN 55022: 1994. The antenna connected to the analyzer via a cable and at times a pre-amplifier would be used.
- 6) The analyzer quickly scanned from 30MHz to 1000MHz. Analyzer settings were stated on the Measuring Instrument Settings page. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test model(s) were scanned during the preliminary test:

Model(s):

1. PPC-150T-RT

2. PPC-150T-ST

- 8) After the preliminary scan, we found the following test model(s) producing the highest emission level.

Model(s): 1.

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for final testing.

MEASUREMENT PROCEDURE

(FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- 2) The analyzer scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. (MHz)	Raw Data (dB)	Corr. Factor (dBuV)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
xx.xx	14.0	11.2	26.2	30	-3.8

Freq.	= Emission frequency in MHz
Raw Data (dB)	= Uncorrected Analyzer / Receiver reading
Corr. Factor (dBuV)	= Correction factors of antenna factor and cable loss
Emiss. Level	= Raw reading converted to dBuV and CF added
Limit dBuV/m	= Limit stated in standard
Margin dB	= Reading in reference to limit

RADIATED EMISSION LIMIT

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBu V/m/ Q.P.)
30-230	10	30
230-1000	10	37

Note: The lower limit shall apply at the transition frequency.

BLOCK DIAGRAM OF TEST SETUP

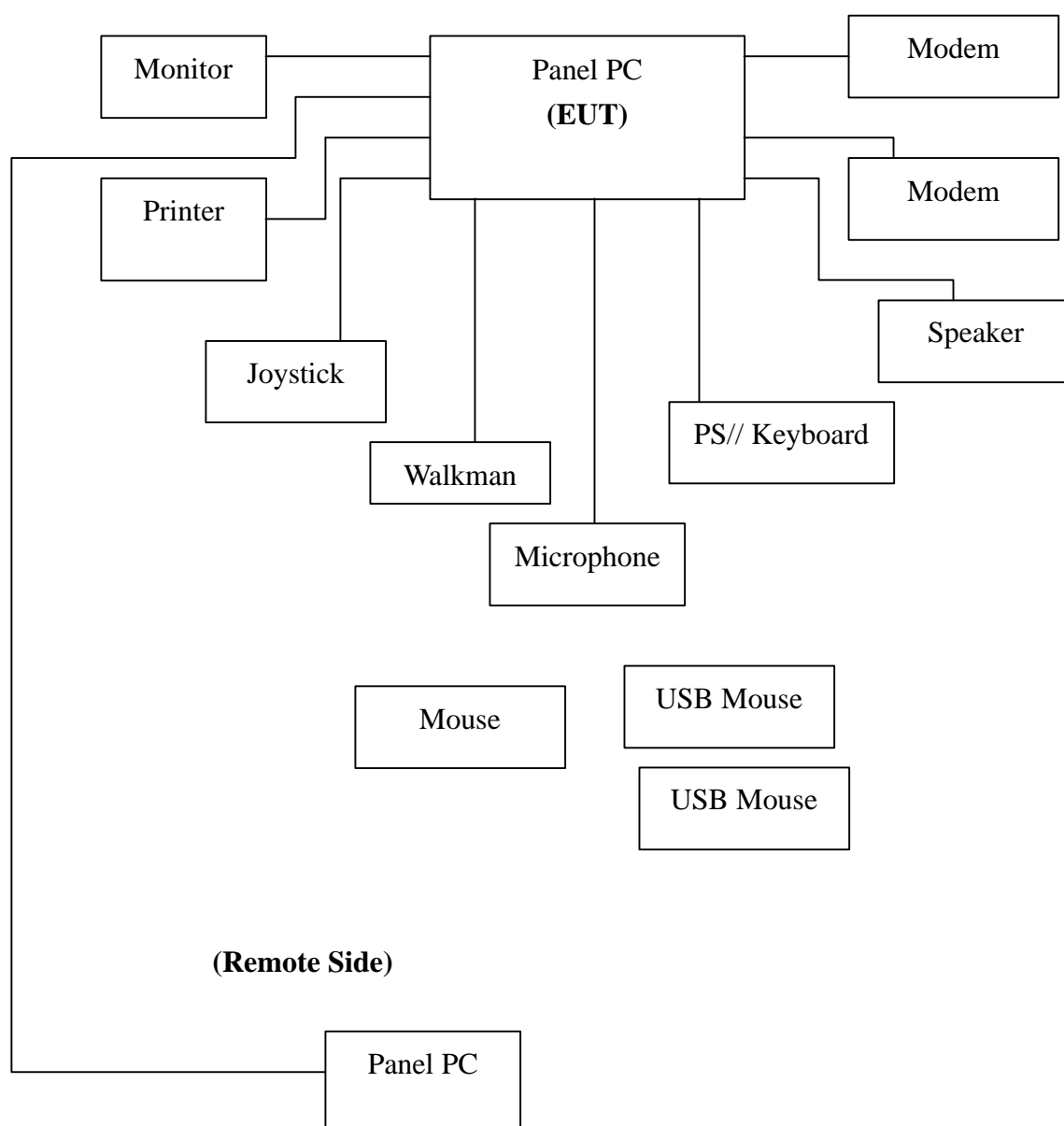
SYSTEM DIAGRAM OF CONNECTIONS BETWEEN EUT AND SIMULATORS

EUT: Panel PC

Trade Name: ADVANTECH

Model Number: PPC-150T-RT

Power Cord: Unshielded, 1.8m



SUMMARY DATA**(LINE CONDUCTED TEST)****Model Number:** PPC-150T-RT**Location:** Site # 4**Tested by:** Jack Chen**Test Mode:** Video resolution: 1024 x 768.**Test Results:** Passed**Temperature:** 24 degree C**Humidity:** 60% RH

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

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.185	42.5	---	64.2	54.2	-21.7	---	L1
0.190	52.3	35.3	64.0	54.0	-11.7	-18.7	L1
0.255	39.8	---	61.0	51.0	-21.2	---	L1
0.520	25.8	---	56.0	46.0	-30.2	---	L1
0.640	30.2	---	56.0	46.0	-25.8	---	L1
22.805	34.3	---	60.0	50.0	-25.7	---	L1
0.185	48.5	---	64.2	54.2	-15.7	---	L2
0.190	56.1	---	64.0	54.0	-7.9	---	L2
0.255	42.4	---	61.5	51.5	-19.1	---	L2
0.320	31.7	---	59.7	49.7	-28.0	---	L2
22.805	33.2	---	60.0	50.0	-26.8	---	L2
25.855	28.1	---	60.0	50.0	-31.9	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE: “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.**

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: PPC-150T-RT

Location: Site # 4

Tested by: Jack Chen

Test Mode: Video resolution: 1024 x 768.

Polar: Vertical -- 10m

Detector Function: Quasi-Peak

Test Results: Passed

Temperature: 24 degree C

Humidity: 60%RH

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

Freq. (MHz)	Raw Data (dB)	Corr. Factor (dBuV)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
58.04	18.8	6.6	25.4	30.0	-4.6
120.50	13.1	14.0	27.1	30.0	-2.9
130.15	11.0	14.3	25.3	30.0	-4.7
152.96	14.0	13.7	27.7	30.0	-2.3
185.45	14.6	11.8	26.4	30.0	-3.6
195.24	15.6	11.7	27.3	30.0	-2.7

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: PPC-150T-RT

Location: Site # 4

Tested by: Jack Chen

Test Mode: Video resolution: 1280 x 1024.

Polar: Horizontal -- 10m

Detector Function: Quasi-Peak

Test Results: Passed

Temperature: 24 degree C

Humidity: 60%RH

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

Freq. (MHz)	Raw Data (dB)	Corr. Factor (dBuV)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
152.99	12.1	11.9	24.0	30.0	-6.0
195.28	16.5	10.7	27.2	30.0	-2.8
227.81	13.2	11.3	24.5	30.0	-5.5
501.26	10.9	21.2	32.1	37.0	-4.9
651.36	10.2	23.0	33.2	37.0	-3.8
735.09	6.7	24.0	30.7	37.0	-6.3

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

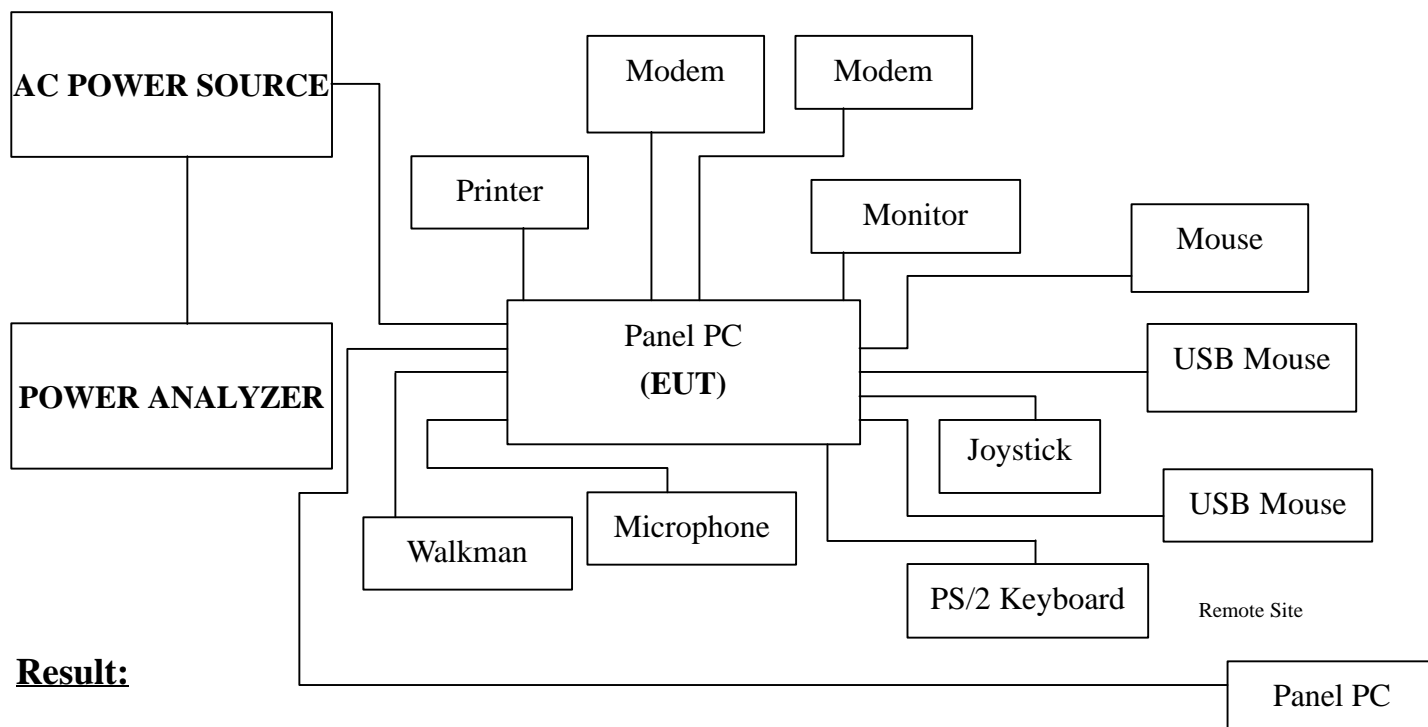
POWER HARMONICS MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-2 (1995)
Limits : ☒ Class A, ☐ Class B
Temperature : 24 degree C
Humidity : 60%

VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-3 (1995)
Limits : Section 5 of EN 61000-3-3
Temperature : 24 degree C
Humidity : 60%

Block Diagram of Test Setup:



Result:

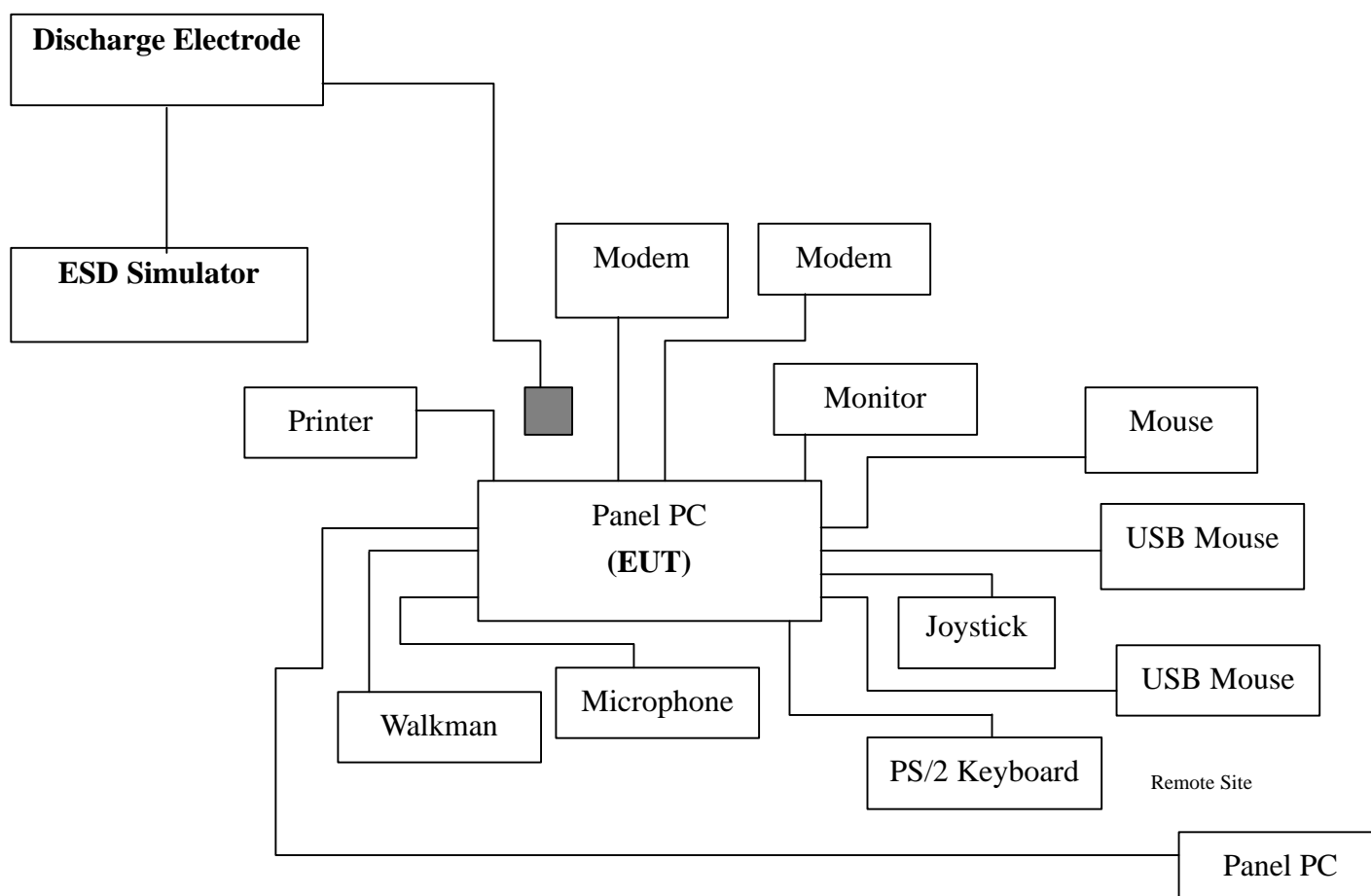
Please see the attached test data.

SECTION 3 EN 61000-4-2 (ELECTROSTATIC DISCHARGE)

ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

Port : Enclosure
Basic Standard : EN 61000-4-2
Requirements : ± 8 kV (Air Discharge)
 ± 4 kV (Contact Discharge)
 ± 4 kV (Indirect Discharge)
Performance Criteria : B (Standard require)
Temperature/Humidity: 24 degree C /60%

Block Diagram of Test Setup:



The electrostatic discharges were applied as follows:

Amount of Discharges	Voltage	Coupling	Result (Pass/Fail)
1 100/Point	± 4kV	Contact Discharge	Pass
1 100/Point	± 8kV	Air Discharge	Pass
1 100/Point	± 4kV	Indirect Discharge HCP (Front)	Pass
1 100/Point	± 4kV	Indirect Discharge HCP (Left)	Pass
1 100/Point	± 4kV	Indirect Discharge HCP (Back)	Pass
1 100/Point	± 4kV	Indirect Discharge HCP (Right)	Pass
1 100/Point	± 4kV	Indirect Discharge VCP (Front)	Pass
1 100/Point	± 4kV	Indirect Discharge VCP (Left)	Pass
1 100/Point	± 4kV	Indirect Discharge VCP (Back)	Pass
1 100/Point	± 4kV	Indirect Discharge VCP (Right)	Pass

**** The tested points to EUT, please refer to attached pages.**

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.

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

The Tested Points of EUT

(Photo 1 of 3)



(Photo 2 of 3)



(Photo 3 of 3)



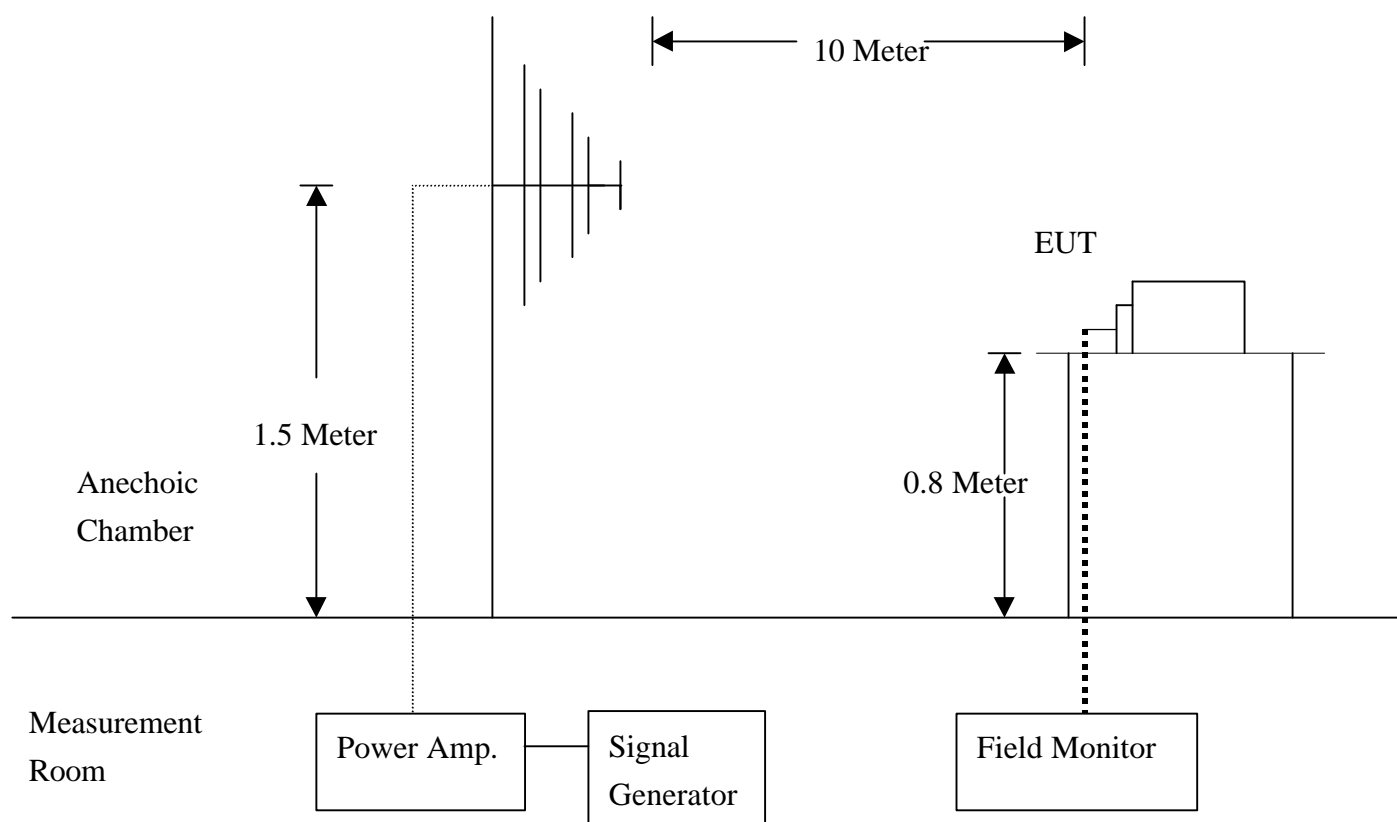
SECTION 4 ENV 50140 (RADIATED ELECTROMAGNETIC FIELD)

RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

Port	: Enclosure
Basic Standard	: ENV 50140
Requirements	: 10 V/m / Modulated
Performance Criteria	: A (Standard Required)
Temperature	: 24 degree C
Humidity	: 60%

Block Diagram of Test Setup:

Same as Section 1 EN 55022 Test.



Test Procedure:

Frequency Range : 80MHz-1000MHz
Frequency Step : 1% of fundamental
Dwell Time : 1 sec

ENV 50140

Range (MHz)	Field	Modulation	Polarity	Position (°)	Result (Pass/Fail)
80-1000	10V	Yes	H	0	Pass
80-1000	10V	Yes	V	0	Pass
80-1000	10V	Yes	H	90	Pass
80-1000	10V	Yes	V	90	Pass
80-1000	10V	Yes	H	180	Pass
80-1000	10V	Yes	V	180	Pass
80-1000	10V	Yes	H	270	Pass
80-1000	10V	Yes	V	270	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.

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

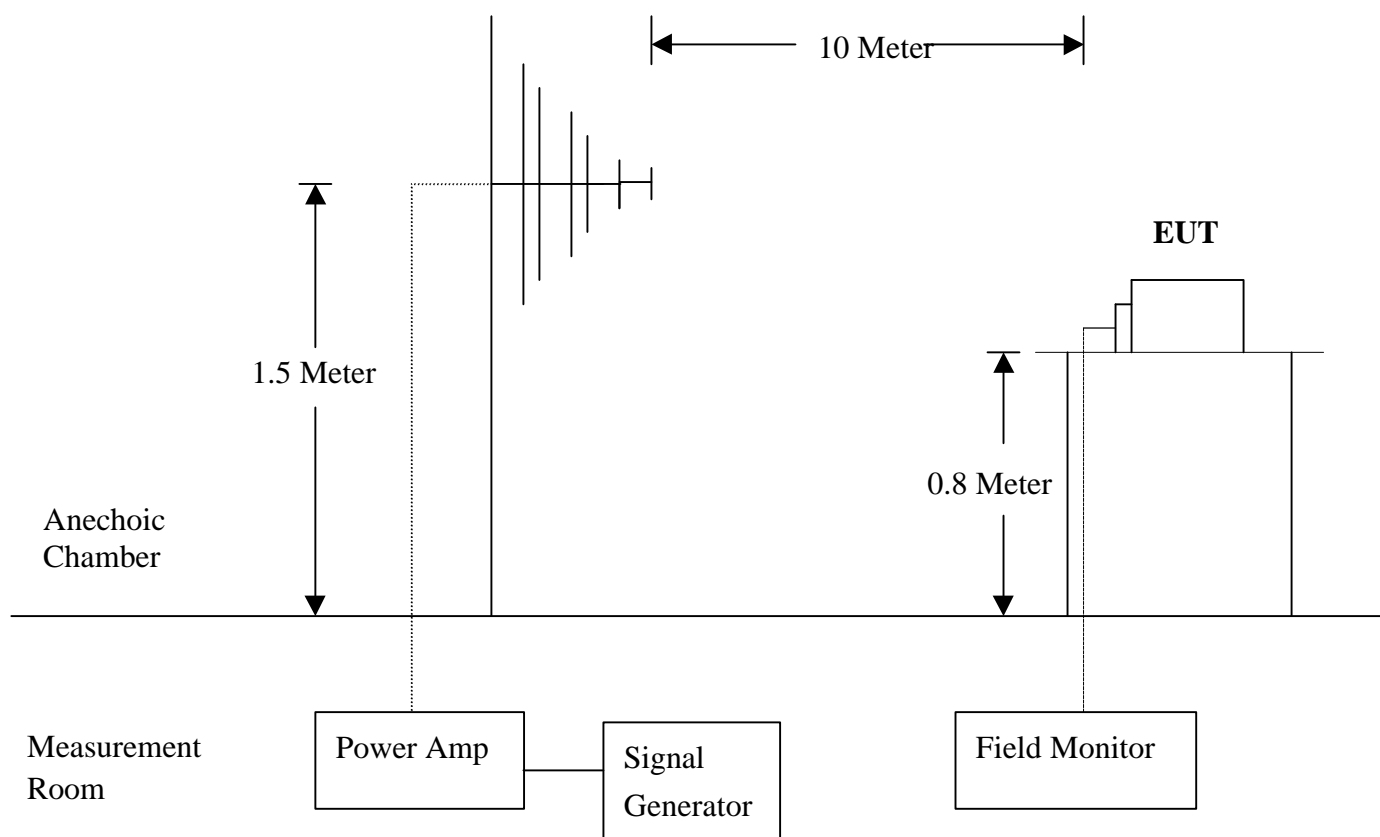
SECTION 5 ENV 50204 (RADIATED ELECTROMAGNETIC FIELD FROM DIGITAL TELEPHONES)

Radiated Electromagnetic Field From Digital Telephones Immunity Test

Port	: Enclosure
Basic Standard	: ENV 50204
Requirements	: 10 V/m, with modulated
Performance Criteria	: A (Standard Required)
Temperature	: 24 degree C
Humidity	: 60%

Block Diagram of Test Setup:

Same as Section 1 EN 55022 Test Setup:



Test Procedure:

Spot Frequency : 900 MHz \pm 5MHz

Modulated Frequency : 200 Hz

Duty cycle : 50%

Range (MHz)	Field	Modulation	Polarity	Position (C) X	Result (Pass/Fail)
900	10V	Yes	H	0	Pass
900	10V	Yes	V	0	Pass
900	10V	Yes	H	90	Pass
900	10V	Yes	V	90	Pass
900	10V	Yes	H	180	Pass
900	10V	Yes	V	180	Pass
900	10V	Yes	H	270	Pass
900	10V	Yes	V	270	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.

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

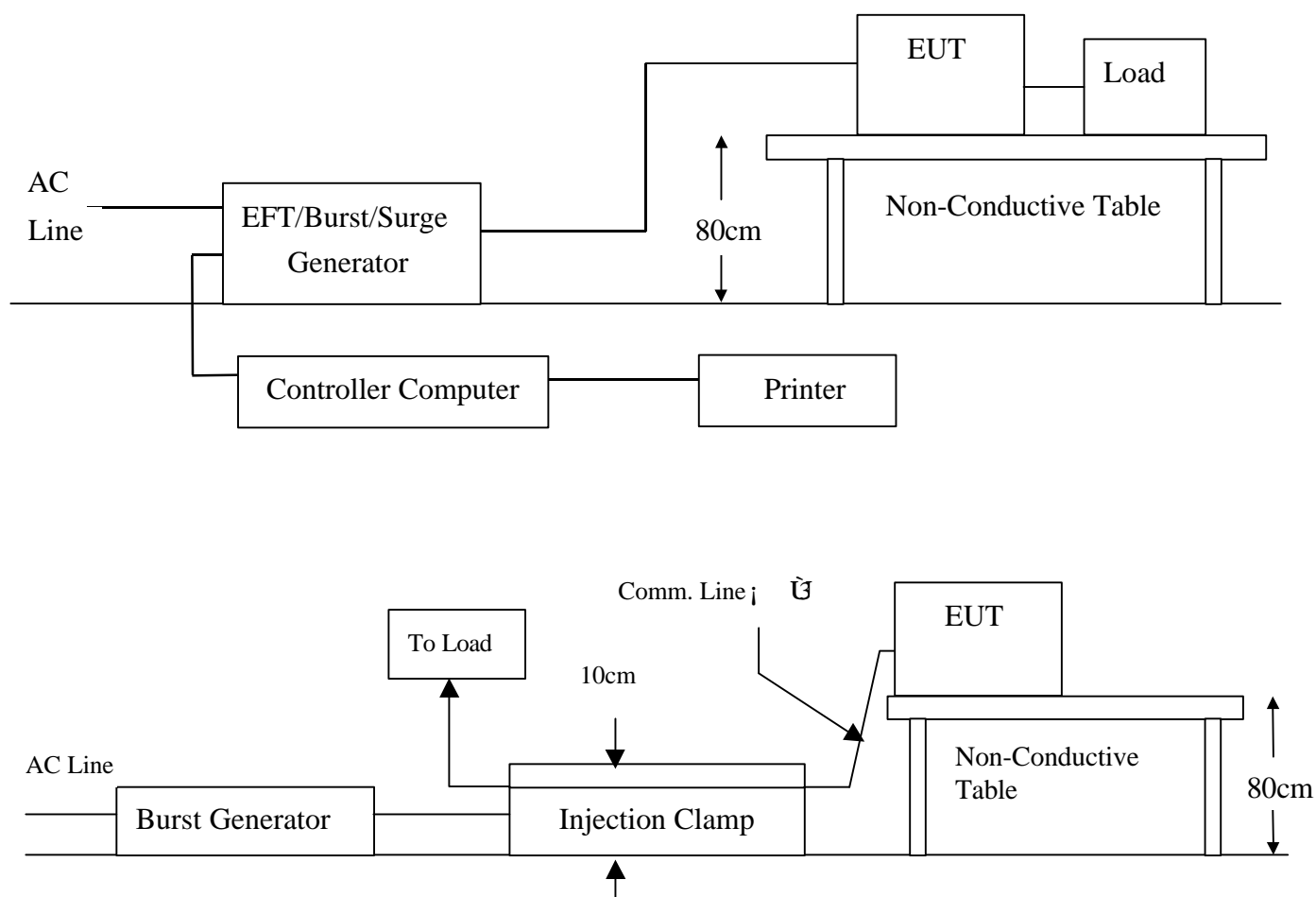
SECTION 6 EN 61000-4-4 (FAST TRANSIENTS/BURST)

FAST TRANSIENTS/BURST IMMUNITY TEST

Port	: On Power Supply Lines and Data Cable
Basic Standard	: EN 61000-4-4
Requirements	: $\pm 2\text{kV}$ for Power Supply Lines $\pm 1\text{kV}$ for Data Cable
Performance Criteria	: B (Standard require)
Temperature	: 24 degree C
Humidity	: 60%

Block Diagram of Test Setup:

Same as Section 1 EN 55022 Test.



Test Procedure:

Impulse Frequency: 5kHz

Tr/Tn: 5/50ns

Burst Duration: 15ms

Burst Period: 3Hz

Inject Line	Voltage kV	Inject Method	Result (Pass/Fail)
L1	± 2	Direct	Pass
N	± 2	Direct	Pass
PE	± 2	Direct	Pass
L1 + N	± 2	Direct	Pass
L1 + PE	± 2	Direct	Pass
N + PE	± 2	Direct	Pass
L1 + N + PE	± 2	Direct	Pass
LAN	± 1	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.

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

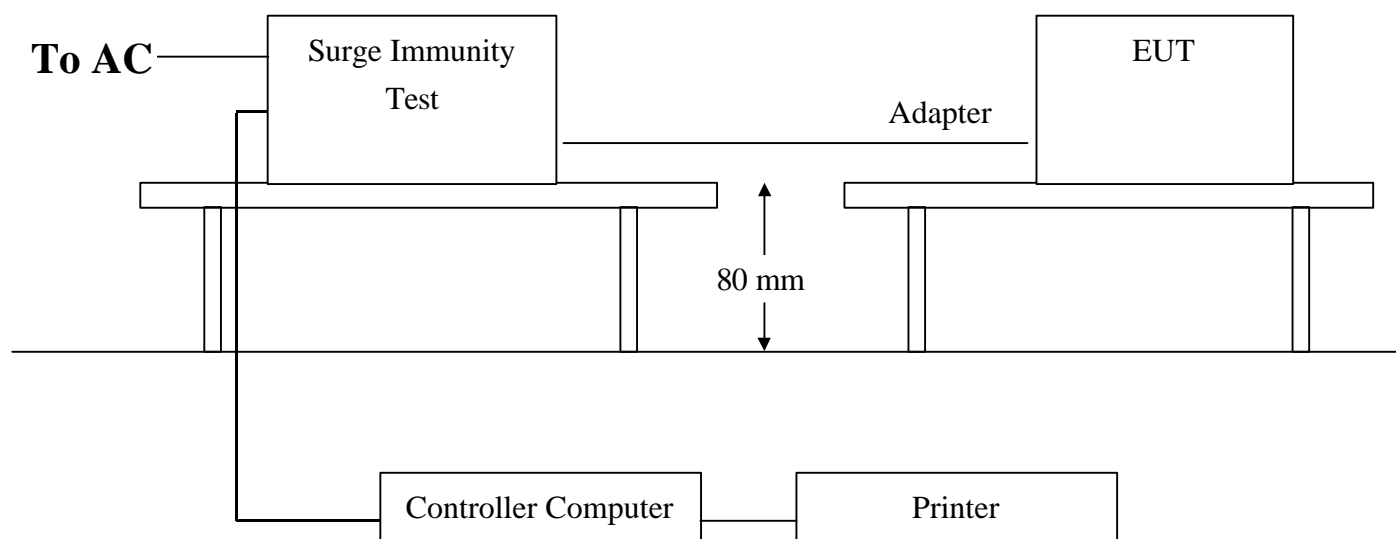
SECTION 7 EN 61000-4-5 (SURGE IMMUNITY)

SURGE IMMUNITY TEST

Port	: Power Cord
Basic Standard	: EN 61000-4-5
Requirements	: $\pm 1\text{kV}$ (Dif.) (Line to Line) $\pm 2\text{kV}$ (Com.) (Line to PE)
Performance Criteria	: B (Standard require)
Temperature	: 24 degree C
Humidity	: 60%

Block Diagram of Test Setup:

Same as Section 1 EN 55022 Test Setup:



Test Procedure:

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 + N	1	Positive	Capacitive	Pass
L1+ PE	2	Positive	Capacitive	Pass
N + PE	2	Positive	Capacitive	Pass
L1+ N	1	Negative	Capacitive	Pass
L1 + PE	2	Negative	Capacitive	Pass
N + PE	2	Negative	Capacitive	Pass

- ☒ **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.

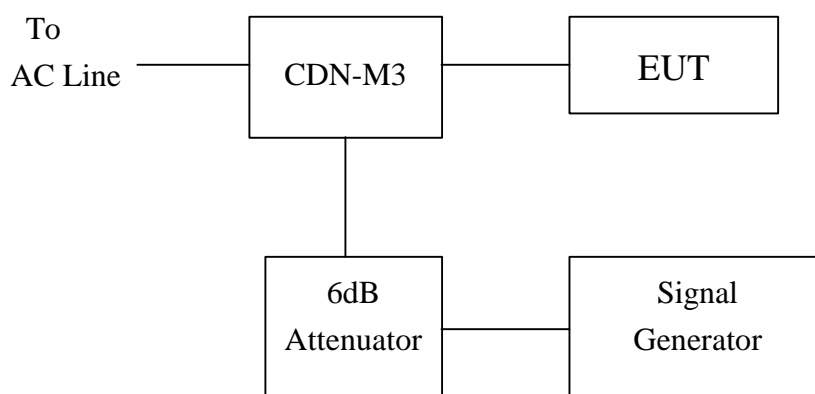
****Observation:** No any function degraded during the tests.

SECTION 8 ENV 50141 (CONDUCTED DISTURBANCE/INDUCED BY RADIO-FREQUENCY FIELD)

Port	: Power cord
Basic Standard	: ENV 50141
Requirements	: 10 V with modulated
Injection Method	: CDN-M3
Deviation	: None
Performance Criteria	: A (Standard require)
Temperature	: 24 degree C
Humidity	: 60%

Block Diagram of Test Setup:

Same as Section 1 EN 55022 Test Setup:



Test Procedure:

Frequency Range : 0.15MHz-80MHz

Frequency Step : 1% of fundamental

Dwell Time : 1 sec

Range (MHz)	Field	Modulation	Result (Pass/Fail)
0.15-80	10V	Yes	Pass

Performance & Result:

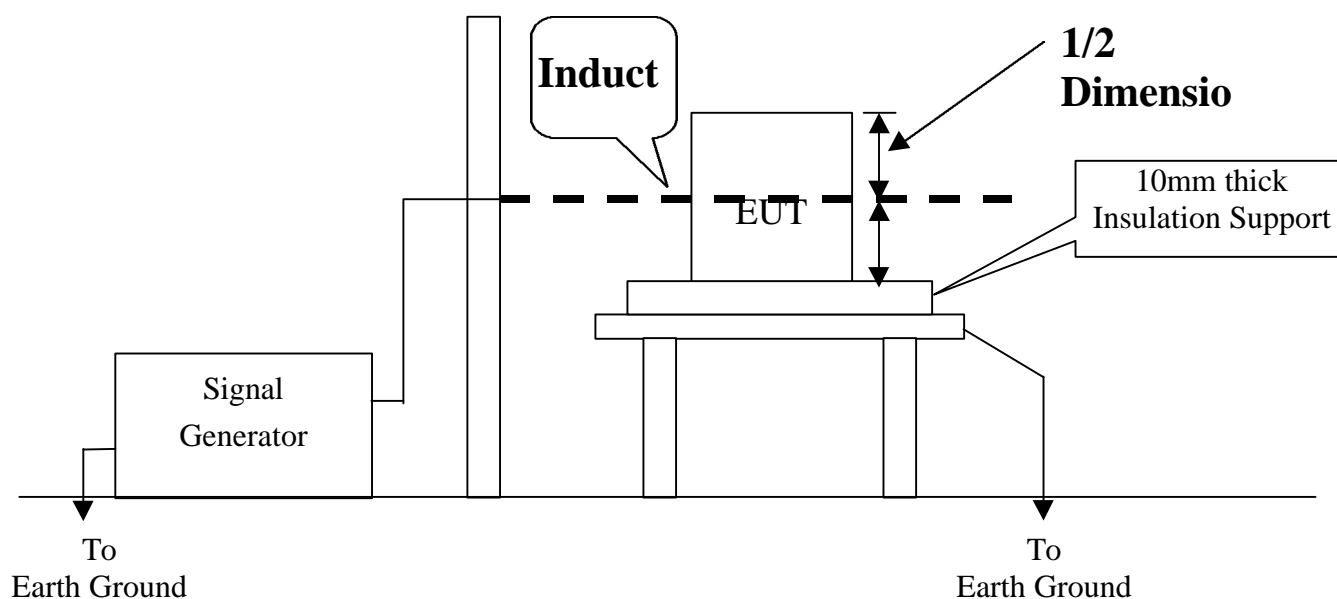
- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of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

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

SECTION 8 EN 61000-4-8 (POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST)

Port	: Enclosure
Basic Standard	: EN 61000-4-8
Requirements	: 3 A/m
Performance Criteria	: A (Standard Required)
Temperature	: N/A
Humidity	: N/A

Block Diagram of Test Setup:



Test Procedure:

Field Strength: 3A/m
Power Freq.: 50Hz
Orientation: X, Y, Z

Orientation	Field	Result (Pass/Fail)	Remark

****Note:** Not application. Because no any component can be influenced by power magnetic fields.

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.

****Observation:** N/A

SECTION 9 EN 61000-4-11 (VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS)

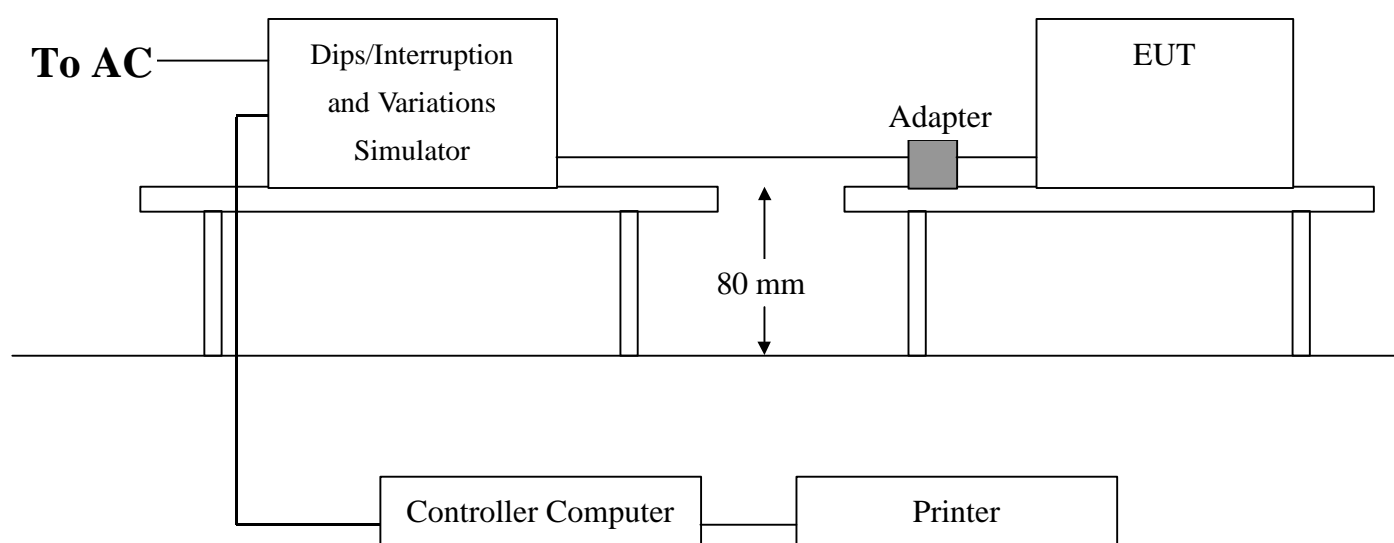
VOLTAGE DIPS / SHORT INTERRUPTIONS

Port : AC mains
Basic Standard : EN 61000-4-11 (1994)
Requirement : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

Test Level % U_T	Voltage Dip and Interrupt Reduction(%)	Duration (ms)	Performance Criteria
<0	>95	5000	C
70	30	10	B
40	60	100	C

Test Interval : Min. 10 sec.
Temperature : 24 degree C
Humidity : 60%

Block Diagram of Test Setup:



Test Procedure:

The duration with a sequence of three dips/interruptions with interval of 10 s minimum

(Between each test event)

Test Level % U_T	Voltage Dip and Interrupt Reduction(%)	Duration (ms)	Observation	Meet Performance Criteria
<0	>95	5000	EUT Shot down, but can be recovered as the events disappear.	C
70	30	10	Normal	A
40	60	100	Normal	A

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.

Test Result: PASS

APPENDIX 1

PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST (EN 55022)



RADIATED EMISSION TEST (EN 55022)



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



ELECTROSTATIC DISCHARGE TEST (EN 61000-4-2)



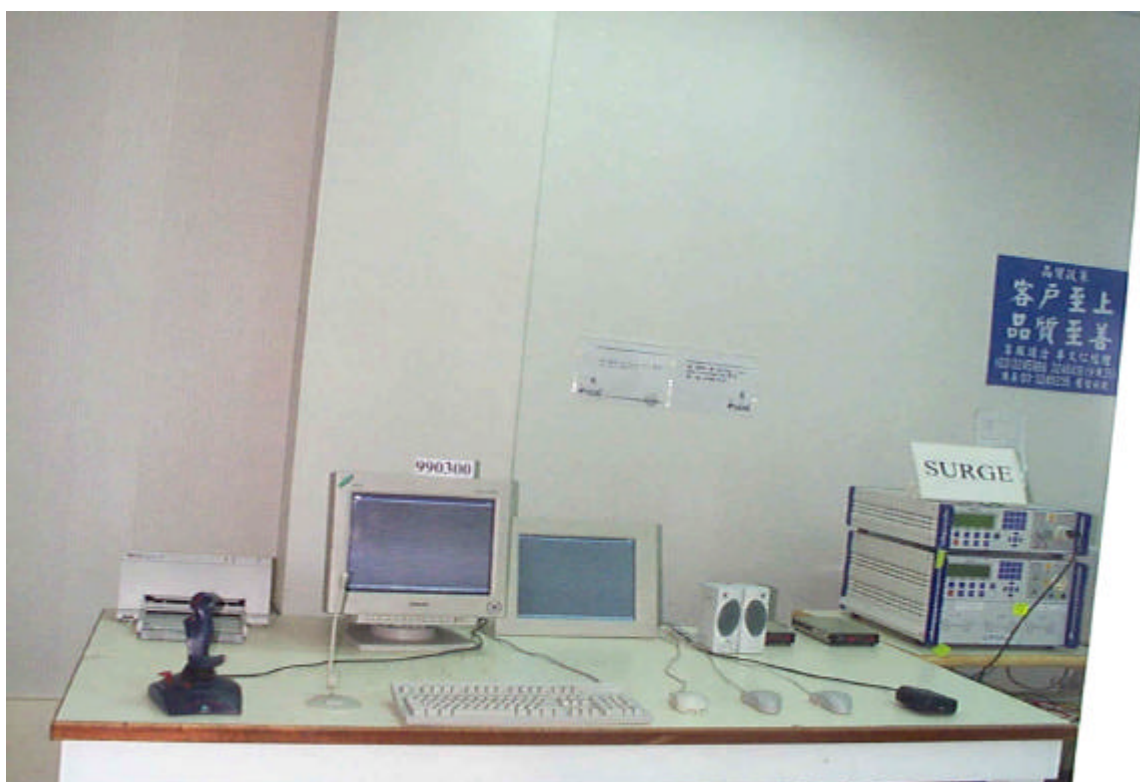
RADIATED ELECTROMAGNETIC FIELD (ENV 50140 & ENV 50204)



FAST TRANSIENTS/BURST TEST (EN 61000-4-4)



SURGE IMMUNITY TEST (EN 61000-4-5)



CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST (ENV 50141)



VOLTAGE DIP/INTERRUPTION TEST (EN 61000-4-11)



APPENDIX 2

PHOTOGRAPHS OF EUT





