EMC Test Report

Applicant：	eten Technologies Inc.
Address of Applicant：	2F, No.6, Lane 497, Zhongzheng Road, Xindian Dist., New Taipei City 231, Taiwan, R.O.C.
Equipment Under Test：	1 Port PoE Injector
Model Number：	PS-101
Series：	N/A

Matrix Test Laboratory
2F, No.146, Jian Yi Rd., Chung-Ho Dist.,
New Taipei City, Taiwan, R.O.C.
TEL.：+886 2 2228-6610
FAX.：+886 2 2228-6580

Contents

Verification

Applicant：	eten Techologies Inc.
Manufacturer：	eten Techologies Inc.
Equipment Under Test：	1 Port PoE Injector
Model Number：	PS-101
Series：	N/A
Sample Received Date：	2013-12-12 (for EMI reevaluation)

Test Standard：

Emission:	**Immunity:**
☒ EN 55022:2010 Class A	☒ EN 55024:2010
☒ IEC 61000-3-2:2005 +A1:2008+A2:2009	☒ IEC 61000-4-2:2008
☒ IEC 61000-3-3:2008	☒ IEC 61000-4-3:2006+A1:2007+A2:2010
	☒ IEC 61000-4-4:2004+A1:2010
	☒ IEC 61000-4-5:2005
	☒ IEC 61000-4-6:2008
	☒ IEC 61000-4-8:2009
	☒ IEC 61000-4-11:2004

Remark:

The original report No.U10040802E is replaced by report No.U10040802E-A01.This report details the results of the test carried out on one sample. To fulfill the additional requirement on EN55022:2010, EMI tests have been reevaluated on 2013-12-18. EMS tests, on the other hand, do not need to be reevaluated. Therefore, original test result on U10040802E has been used. This report shows the EUT is technically compliant with the EN 55022 and EN 55024 official requirements. This report applies to the above sample only and shall not be reproduced in part without written approval of Matrix Test Laboratory.

Documented by: Jody Peng **Date:** 2013-12-26

Jody Peng/ ADM. Dept Staff

Tested by: Kidd Liao **Date:** 2013-12-18

Kidd Liao/ ENG. Dept. Staff

Approved by: Peter Chin **Date:** 2013-12-26

Peter Chin/ Head of Laboratory

Summary of Test Result

Emission			
Test Standard	**Test Item**	**Test Result**	**Remark**
EN55022 Class A	Conducted Emission	Pass	Highest Emission L:0.582MHz, Q.P.51.46dBuV, Margin -21.45 dB A.V.51.09dBuV, Margin -8.82 dB N:0.585MHz, Q.P.51.05dBuV, Margin -21.87 dB A.V.43.40dBuV, Margin -16.52 dB
EN55022 Class A	Conducted Disturbance (at Telecommunication Ports)	Pass	Highest Emission Voltage:2.931MHz, Q.P.62.05dBuV, Margin-15.32 dB A.V.62.80dBuV, Margin -1.57 dB
EN55022 Class A	Radiated Emission	Pass	Highest Emission H: 222.060MHz, 53.48dBuV, Margin-4.22 dB Antenna Height 3.36 m, Turntable Angle 318° V: 182.290MHz, 51.91dBuV, Margin-6.53 dB Antenna Height 1.99 m, Turntable Angle 70°
EN55022 Class A	Radiated Disturbance Test (Above 1GHz)	Pass	Highest Emission H: 1018.000MHz, 44.21dBuV, Margin-20.85dB Antenna Height 2.34 m, Turntable Angle 121° V: 1375.000MHz, 44.73dBuV, Margin-21.65 dB Antenna Height 1.87 m, Turntable Angle 341°
EN61000-3-2	Harmonic	Pass	Refer to Page 30
EN61000-3-3	Flicker	Pass	Refer to Page 32

Immunity				
Test Standard	**Test Item**	**Performance Criteria**	**Observed Result Class**	**Test Result**
IEC61000-4-2	Electrostatic Discharge	B	A	Pass
IEC61000-4-3	Radiated Susceptibility	A	A	Pass
IEC61000-4-4	Electrical Fast Transient	B	A	Pass
IEC61000-4-5	Surge	B	A	Pass
IEC61000-4-6	Conducted Susceptibility	A	A	Pass
IEC61000-4-8	Magnetic Field	A	A	Pass
IEC61000-4-11	Voltage Dips and Interruption	Dips >95% B	A	Pass
		Dips 30% C	A	
		Interruptions >95% C	B	

1 General Description

1.1 Description of EUT

Equipment Under Test	**:**	1 Port PoE Injector
Model Number	**:**	PS-101
Series	**:**	N/A
Applicant **Address of Applicant**	**:**	eten Technologies Inc. 2F, No.6, Lane 497, Zhongzheng Road, Xindian Dist., New Taipei City 231, Taiwan, R.O.C.
Manufacturer **Address of Manufacturer**	**:**	eten Technologies Inc. 2F, No.6, Lane 497, Zhongzheng Road, Xindian Dist., New Taipei City 231, Taiwan, R.O.C.
Power Supply	**:**	Input: 110~240Vac, 60 / 50Hz Output: 48Vdc
Data Cable	**:**	☒N/A
Description of EUT	**:**	**Dimensions :** 120 mm (L) X 50 mm (W) X 35 mm (H) **Weight :** 145 g **Highest Frequency of the Internal Source :** Above 108MHz **Position :** ☒Table-top / ☐Floor-standing **Intended Function :** The EUT is a 1 Port PoE Injector.

1.2 Test Instruments

Instruments Used for Emission Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration Date	Application
L.I.S.N.	Mess Tec	NNB-2/16Z	03/1006	2013-05-12	Conducted Emission
L.I.S.N.	EMCIS	LN2-16	LN04023	2013-02-08	Conducted Emission
Pulse Limiter	Mess Tec	PL10	N/A	2013-12-16	Conducted Emission
RF Cable	N/A	N/A	N/A	2013-05-11	Conducted Emission
EMI Receiver	R&S	ESCI	100615	2013-03-03	Conducted Emission Radiated Emission
Bilog Antenna	Teseq GmbH	CBL6111D	25769	2013-03-03	Radiated Emission
Pre-Amplifier	Schaffner	CPA9231A	N/A	2013-07-20	Radiated Emission
Spectrum Analyzer	HP	8595E	3829A03763	2013-07-19	Radiated Emission
Spectrum Analyzer	R & S	FSL6	100564	2013-12-05	Radiated Emission
RF Cable	MIYAZAKI	8D-F8	N/A	2013-07-20	Radiated Emission
Programmable AC Source	Chroma	6520	2048	2013-02-01	Harmonic, Flicker
Universal Power Analyzer	Chroma	6630	0597	2013-02-01	Harmonic, Flicker

Note: The instruments listed above are within their calibration period of 1 year.

Instruments Used for Immunity Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration Date	Application
ESD Simulator	Noiseken	TC-815R	ESS0868491	2009-12-17	Electrostatic Discharge
ESD Simulator	Noiseken	ESS-2002EX	ESS0868406	2009-12-17	Electrostatic Discharge
Antenna	FRANKONIA	BTA-H	030001H	2009-08-03	Radiated Immunity
Field Probe	EMCO	7201	N/A	2009-10-21	Radiated Immunity
Power Amplifier	IFI	CMX50	N/A	2009-10-21	Radiated Immunity
Signal Generator	R&S	SML03	103396	2010-01-29	Radiated Immunity
CDN	FRANKONIA	CDN M2+M3	A3011037	2010-03-03	Conducted Immunity
CDN	FRANKONIA	CDN M2+M3	A3011134	2010-03-03	Conducted Immunity
C.I. Test System	FRANKONIA	CIT-10/75	102C3208	2009-12-03	Conducted Immunity
Power Attenuator	FRANKONIA	75-A-FFN-06	0212	2009-12-03	Conducted Immunity
RF Cable	N/A	N/A	N/A	2009-05-07	Conducted Immunity
Antenna	EMC PARTNER	MF-1000-1	119	2009-11-04	Magnetic Field Disturbance
Transient 2000	EMC PARTNER	TRA-2000	449	2009-11-05	Electrostatic Discharge, Fast Transient, Surge, Magnetic Field Disturbance, Dips & Interruptions

Note: The instruments listed above are within their calibration period of 1 year.

1.3 Auxiliary Equipments

For Immunity test

Provided by Matrix Test Lab.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Power Cord
1.	PC No.1	HP Pavilion A1510TW	CNX6290BWF	FCC, BSMI	HP	Non-shielded, Detachable, 1.5m
2.	PC No.2	HP Pavilion A1510TW	CNX6290BXQ	FCC, BSMI	HP	Non-shielded, Detachable, 1.5m
3.	Monitor No. 3	SDM-HS75P	1500379	FCC BSMI	SONY	VGA CABLE Shielded, Detachable, 1.5m, With Core DVI CABLE Shielded, Detachable, 1.5m, With Core
4.	Monitor No. 5	VS11868	QRA074526459	CE FCC BSMI	VIEW SONIC	VGA CABLE Shielded, Detachable, 1.8m, With Core DVI CABLE Shielded, Detachable, 1.8m, With Core
5.	PS2 Key Board No. 2	Y-SU61	BT911DG4374	CE, FCC	LOGITECH	PS2 CABLE Non-shielded, Un-detachable, 1.7m, Without Core
6.	PS2 Key Board No. 5	Y-SU61	BT911DG4375	CE, FCC	LOGITECH	PS2 CABLE Non-shielded, Un-detachable, 1.7m, Without Core
7.	PS2 Mouse No. 2	M-SBF96	HC9070E036B	CE FCC	LOGITECH	PS2 CABLE Non-shielded, Un-detachable, 1.8m, Without Core
8.	PS2 Mouse No. 6	M-SBF96	HC9070E0343	CE, FCC	LOGITECH	PS2 CABLE Non-shielded, Un-detachable, 1.8m, Without Core
9.	Printer No. 1	EPSON STYLUS C61	EK5Y014949	3912E328	EPSON	PRINTER CABLE Non-shielded, Detachable, 1.8M
10.	Modem No. 1	1456VQE-C	1234A36998	3882B582	LEMEL	RS-232 CABLE Non-shielded, Detachable, 3M
11.	Load 14Ω	N/A	N/A	N/A	N/A	N/A

For Emission test

Provided by Matrix Test Lab.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Power Cord
12.	Notebook	N61J	N61JV-021A520M	CE,FCC, C-TICK N13219, BSMI R31018	ASUS	Adapter to Notebook Unshielded*1.8m AC to Adapter Unshielded*1.8m
13.	Load 29Ω	N/A	N/A	N/A	N/A	N/A

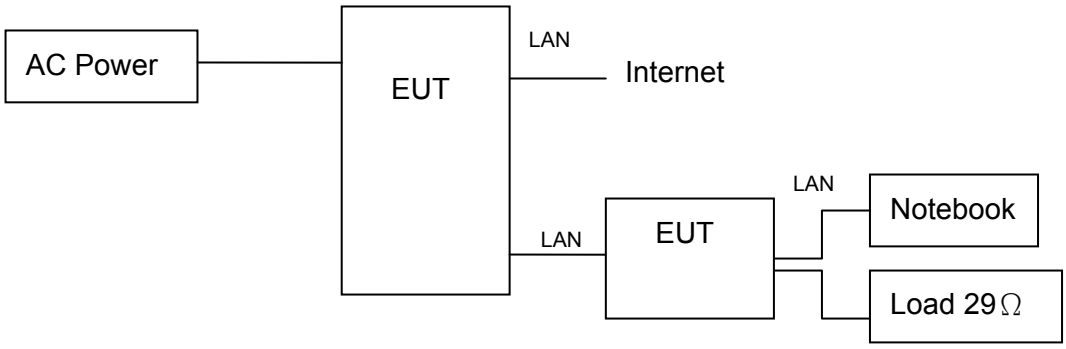
For Emission test

Provided by Manufacturer.

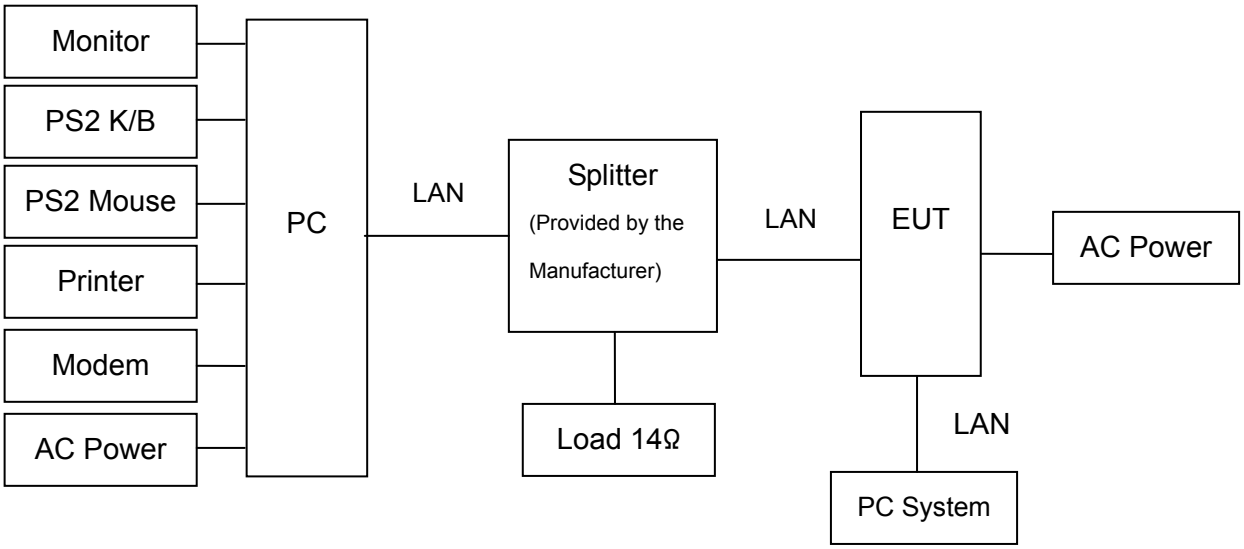
No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Power Cord
14.	Splitter	PD-2024	N/A	N/A	N/A	N/A

1.4 Block Diagram

Emission Test



Immunity test



1.5 Identifying the Final Test Mode (Worst Case)

1. Operation Mode

Note: After pre-test, we identified that the Operation Mode (the worst case) was most likely to cause maximum disturbance and most likely to be susceptible to disturbance. Therefore, the Final EMC Assessment was performed for the worst case.

1.6 Final Test Mode

Operation Mode

1.7 Condition of Power Supply

AC 230V, 50Hz

1.8 EUT Configuration

1. Setup the EUT as shown in Sec.1.4 Block Diagram.
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode.

1.9 Immunity Performance Classification

Class	Class Criterion
A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.
B	After the test, the equipment shall continue to operate as intended without operator intervention.
C	Lost of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the user in accordance with the manufacturer's instructions.

1.10 Test Facility

Site Description	**:**	All tests are completed by Matrix Test Laboratory. Radiated emission is performed at HongAn's open-site.
Name of Firm	**:**	Matrix Test Laboratory
Site Location	**:**	2F, No.146, Jian Yi Rd., Chung-Ho Dist., New Taipei City, Taiwan, R.O.C.

1.10.1 Test Methodology

All Emission Tests were performed according to the procedures specified in EN 55022. Radiated Emission Test was performed at 10 m distance from antenna to EUT. All Immunity Tests were performed according to the procedures specified in EN 55024.

2 Conducted Emission Test(at Mains Terminal)

2.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

2.2 Test Arrangement and Procedure

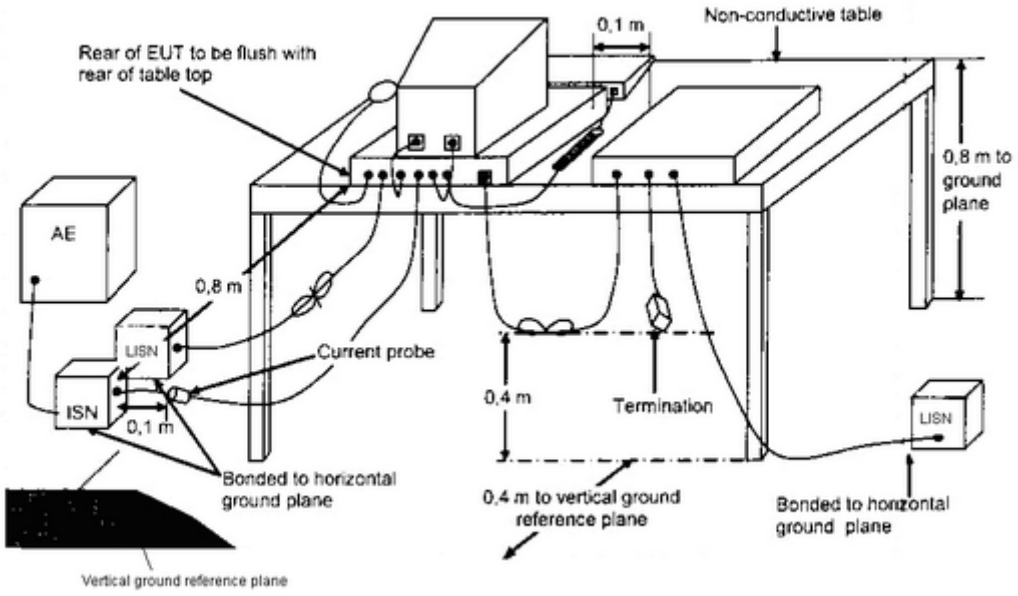


Table-top Equipment

- The EUT was placed on a non-conductive table which was 80 cm above the horizontal coupling plane. The rear of the EUT was 40 cm from the vertical coupling plane.
- The excess interface cables were folded at the cable center into a bundle no longer than 40 cm, so that the bundles were on the table.
- The EUT was connected to the main power through a L.I.S.N. This set up provided 50 ohm / 50 μH coupling impedance for the measuring equipment.
- All auxiliary equipment received power from a second L.I.S.N.
- The conducted emissions were measured between the Line Phase and the PE ground and between the Neutral Phase and the PE ground using an EMI Receiver.
- The values were recorded.

2.3 Conducted Limit

EN 55022

Frequency (MHz)	☒ Class A		☐ Class B	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.50	79	66	66 to 56	56 to 46
0.50 ~ 5.0	73	60	56	46
5.0 ~ 30	73	60	60	50

The EMI Receiver bandwidth was set at 9 kHz.

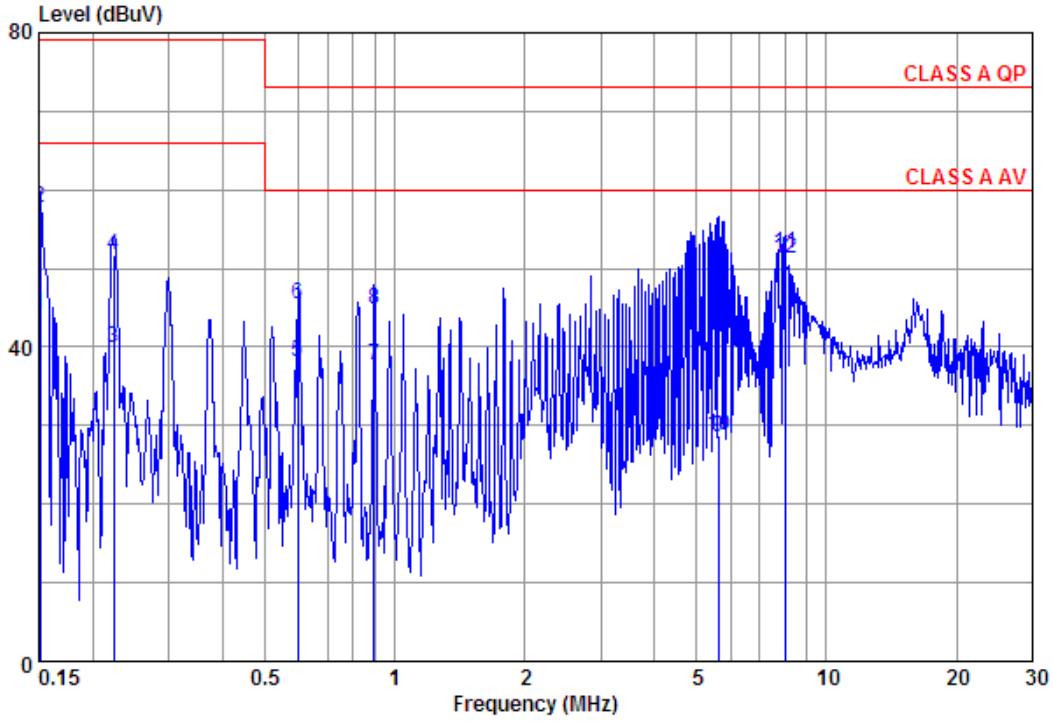
2.4 Test Result

PASS

The final test data are shown on the following page(s).

Conducted Emission Test Data

Test Date	:	2013-12-18	Power Line	:	Line
Temperature	:	22.7℃	Humidity	:	51%

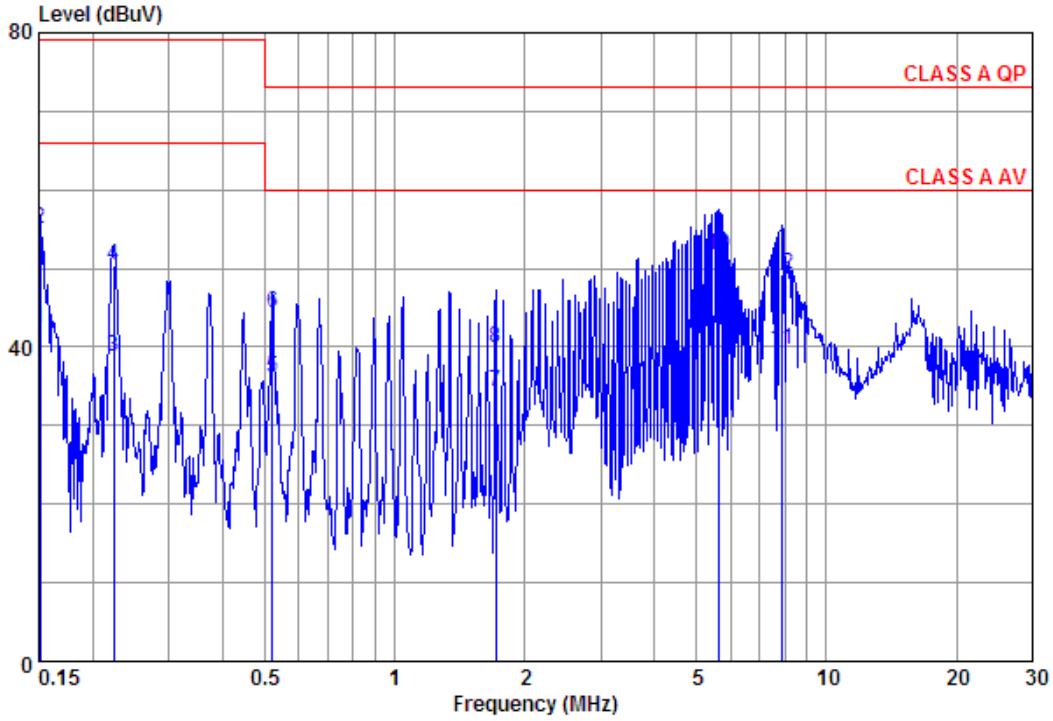


		Freq	Reading	C.F	Result	Limit	Margin	Remark
		MHz	dBuV	dBuV	dB	dBuV	dB	
1		0.151	43.89	0.18	44.07	66.00	-21.93	Average
2	@	0.151	57.49	0.18	57.67	79.00	-21.33	QP
3		0.223	39.68	0.10	39.78	66.00	-26.22	Average
4		0.223	51.69	0.10	51.79	79.00	-27.21	QP
5		0.598	38.06	0.09	38.15	60.00	-21.85	Average
6		0.598	45.45	0.09	45.54	73.00	-27.46	QP
7		0.894	37.58	0.11	37.69	60.00	-22.31	Average
8		0.894	44.74	0.11	44.85	73.00	-28.15	QP
9		5.623	28.28	0.25	28.53	60.00	-31.47	Average
10		5.623	28.58	0.25	28.83	73.00	-44.17	QP
11	*	8.054	51.62	0.32	51.94	60.00	-8.06	Average
12		8.054	50.98	0.32	51.30	73.00	-21.70	QP

Remark：All readings are Quasi-Peak and Average values.

Conducted Emission Test Data

Test Date	:	2013-12-18	Power Line	:	Neutral
Temperature	:	22.7℃	Humidity	:	51%



		Freq	Reading	C.F	Result	Limit	Margin	Remark
		MHz	dBuV	dBuV	dB	dBuV	dB	
1		0.151	42.09	0.17	42.26	66.00	-23.74	Average
2		0.151	54.97	0.17	55.14	79.00	-23.86	QP
3		0.223	38.78	0.09	38.87	66.00	-27.13	Average
4		0.223	50.36	0.09	50.45	79.00	-28.55	QP
5		0.521	36.10	0.08	36.18	60.00	-23.82	Average
6		0.521	44.26	0.08	44.34	73.00	-28.66	QP
7		1.716	34.29	0.12	34.41	60.00	-25.59	Average
8		1.716	39.74	0.12	39.86	73.00	-33.14	QP
9	*	5.653	51.99	0.25	52.24	60.00	-7.76	Average
10	@	5.653	51.38	0.25	51.63	73.00	-21.37	QP
11		7.893	39.28	0.31	39.59	60.00	-20.41	Average
12		7.893	48.85	0.31	49.16	73.00	-23.84	QP

Remark：All readings are Quasi-Peak and Average values.

3 Conducted Disturbance Test (at Telecommunication Ports)

3.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

3.2 Test Arrangement and Procedure

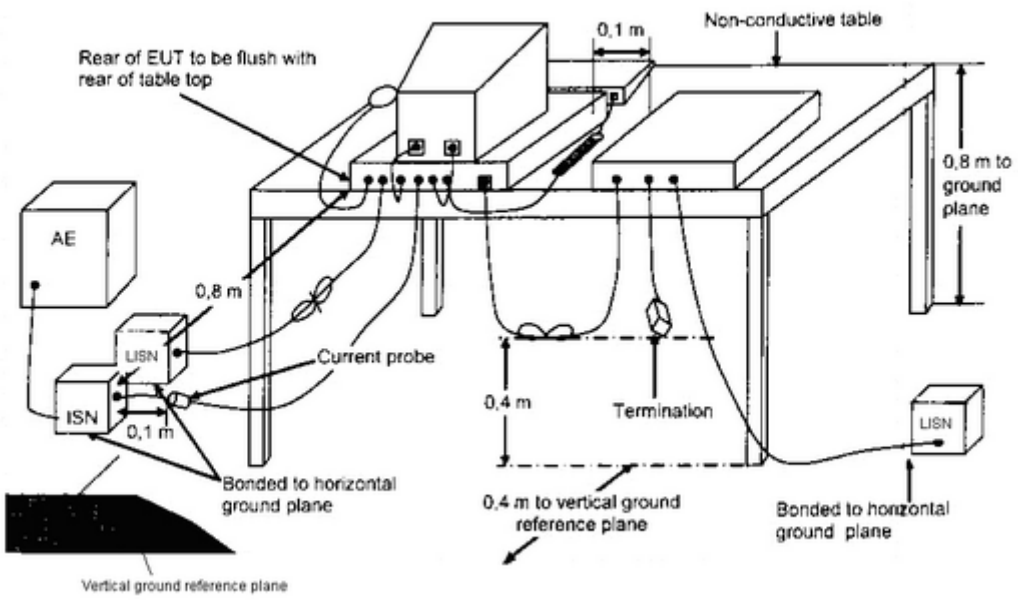


Table-top Equipment

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network(LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50μH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40cm to the ground plane shall be folded back and forth in the center forming a bundle no longer than 40cm.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1m.
- ISN at least 80cm from nearest part of EUT chassis.
- The communication function of EUT was executed and ISN was connected between EUT and associated equipment and the ISN was connected directly to reference ground plane.

3.3 Conducted Limit

☒ Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15MHz to 30MHz for class A equipment.

Frequency (MHz)	Voltage Limits dB(μV)		Current Limits dB(μA)	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	87	74	43	30
NOTE1: The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz. NOTE2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 log10 150/I=44dB)				

☐ Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15MHz to 30MHz for class B equipment.

Frequency (MHz)	Voltage Limits dB(μV)		Current Limits dB(μA)	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	74	64	30	20
NOTE1: The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz. NOTE2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 log10 150/I=44dB)				

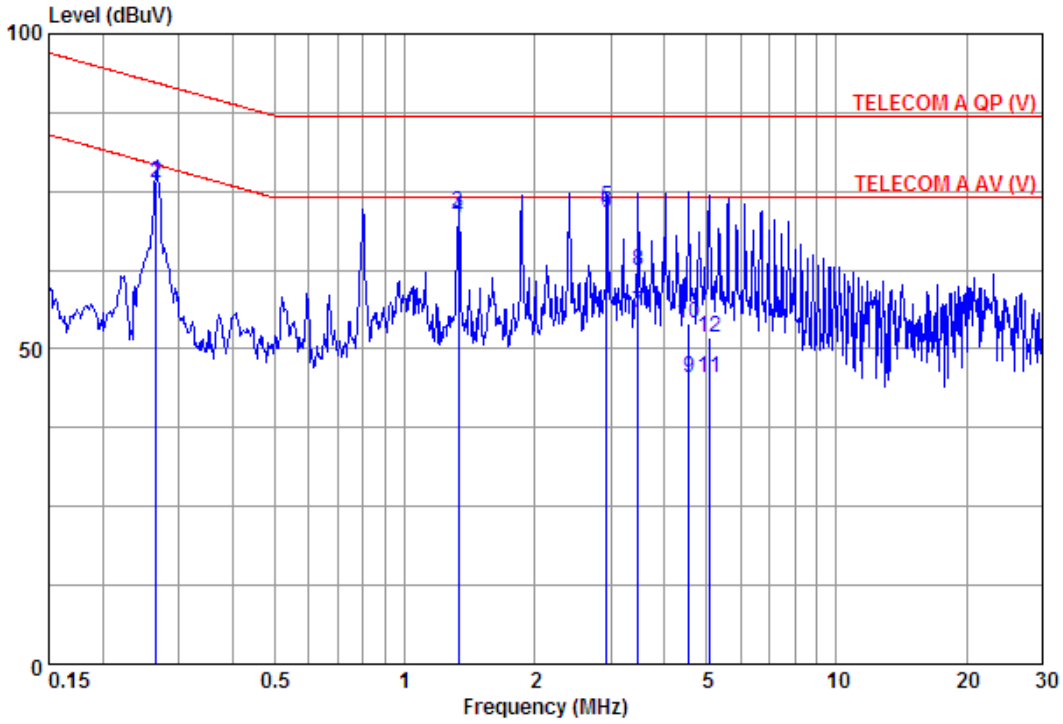
3.4 Test Result

PASS

The final test data are shown on the following page(s).

Conducted Disturbance Test Data

Test Date	:	2013-12-18	Measurement Method	:	Voltage
Temperature	:	22.7℃	Humidity	:	51%



		Freq	Reading	C.F	Result	Limit	Margin	Remark
		MHz	dBuV	dBuV	dB	dBuV	dB	
1		0.266	66.61	9.92	76.53	79.25	-2.72	Average
2		0.266	66.51	9.92	76.43	92.25	-15.82	QP
3		1.331	61.93	9.68	71.61	74.00	-2.39	Average
4		1.331	61.16	9.68	70.84	87.00	-16.16	QP
5	*	2.931	62.80	9.63	72.43	74.00	-1.57	Average
6	@	2.931	62.05	9.63	71.68	87.00	-15.32	QP
7		3.472	46.21	9.63	55.84	74.00	-18.16	Average
8		3.472	52.80	9.63	62.43	87.00	-24.57	QP
9		4.549	35.76	9.61	45.37	74.00	-28.63	Average
10		4.549	44.44	9.61	54.05	87.00	-32.95	QP
11		5.085	35.83	9.62	45.45	74.00	-28.55	Average
12		5.085	42.26	9.62	51.88	87.00	-35.12	QP

Remark：All readings are Quasi-Peak and Average values.

4 Radiated Disturbance Test – Below 1 GHz

4.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

4.2 Test Arrangement and Procedure

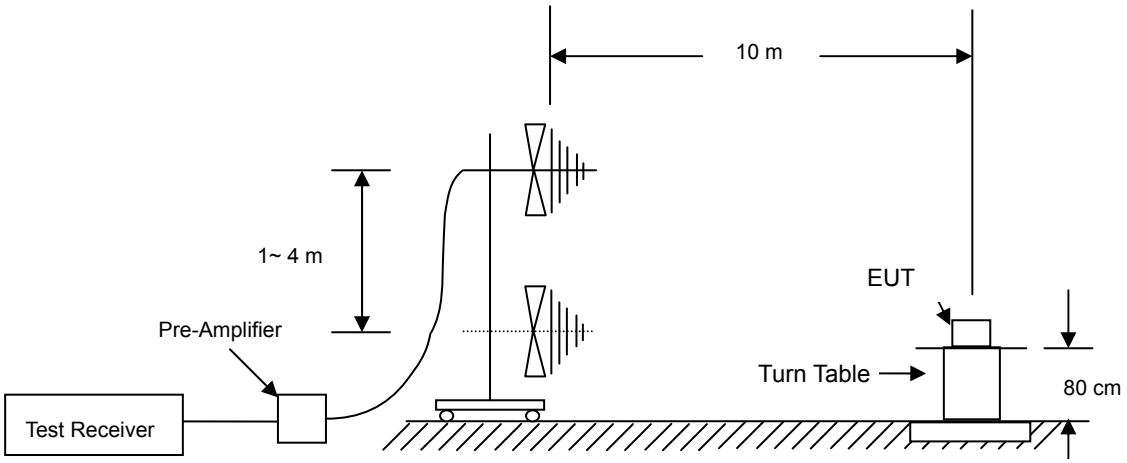


Table-top Equipment

- The EUT was place on a non-conductive turntable which was 80 cm above the horizontal ground plane. The EUT was set 10 m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1 m and 4 m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 3.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

4.3 Test Limit

☒ EN 55022

Frequency (MHz)	☒ Class A	☐ Class B
	Quasi-Peak (dBuV/m)	Quasi-Peak (dBuV/m)
30 ~ 230	40.0	30.0
230 ~ 1000	47.0	37.0

The EMI test receiver bandwidth was set at 120 kHz.

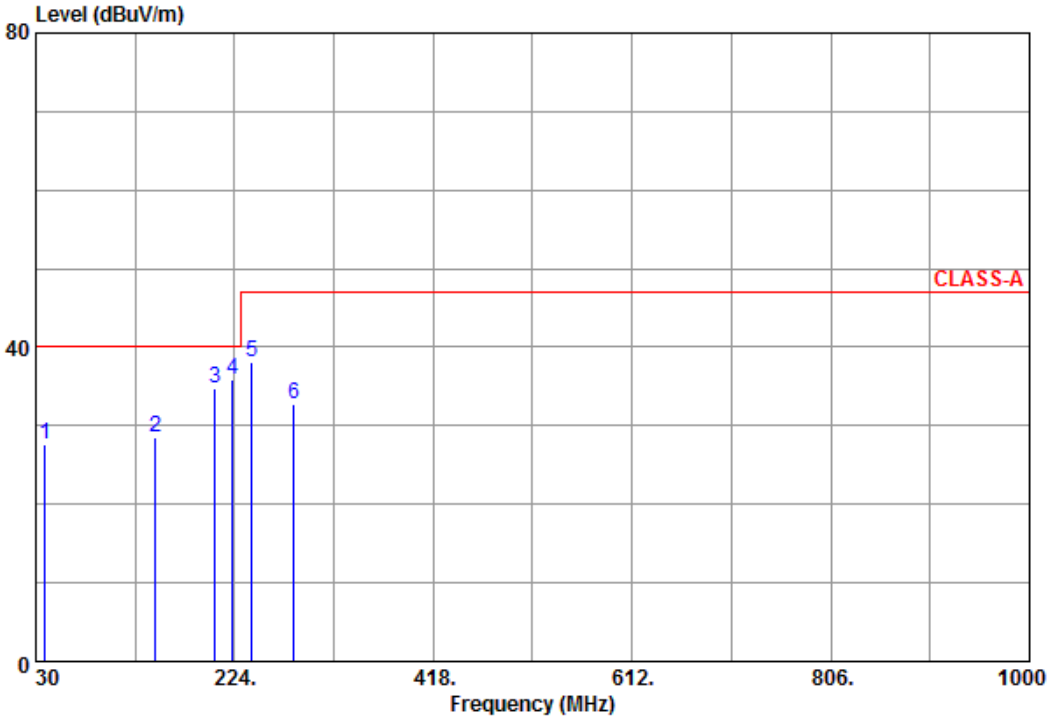
4.4 Test Result

PASS

The final test data are shown on the following page(s).

Radiated Emission Test Data

Test Date	:	2013-12-18	Polarization	:	Horizontal
Temperature	:	22.7℃	Humidity	:	51%



	Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1	38.730	41.50	-13.82	27.68	40.00	-12.32	236	205	
2	146.400	44.91	-16.42	28.49	40.00	-11.51	257	114	
3	204.600	53.31	-18.49	34.82	40.00	-5.18	313	78	
4 @	222.060	53.48	-17.70	35.78	40.00	-4.22	336	318	
5	240.490	53.98	-15.88	38.10	47.00	-8.90	362	230	
6	282.200	46.91	-14.08	32.83	47.00	-14.17	389	137	

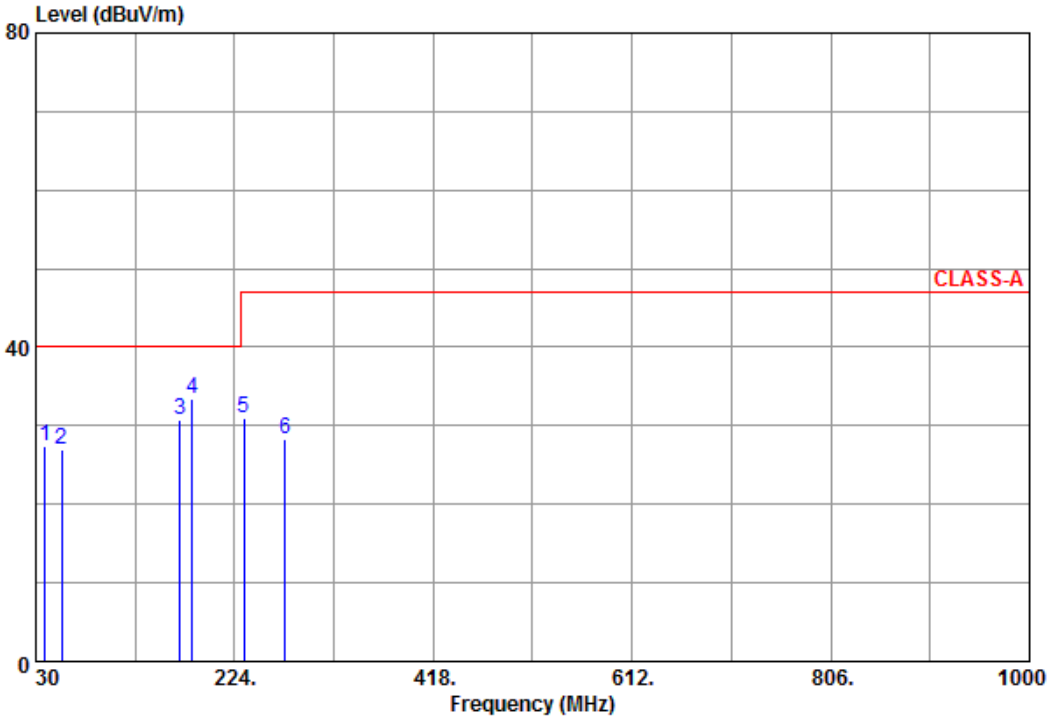
C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

@ :Maximum Data x :Over Limit

Remark：All readings are Quasi-Peak values.

Radiated Emission Test Data

Test Date	:	2013-12-18	Polarization	:	Vertical
Temperature	:	22.7℃	Humidity	:	51%



	Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1	38.730	41.27	-13.82	27.45	40.00	-12.55	134	230	
2	55.220	48.21	-21.26	26.95	40.00	-13.05	154	232	
3	170.650	48.69	-17.84	30.85	40.00	-9.15	186	346	
4 @	182.290	51.91	-18.44	33.47	40.00	-6.53	199	70	
5	232.730	47.59	-16.73	30.86	47.00	-16.14	134	208	
6	273.470	42.70	-14.33	28.37	47.00	-18.63	159	117	

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

@ :Maximum Data x :Over Limit

Remark：All readings are Quasi-Peak values.

5 Radiated Disturbance Test – Above 1 GHz

5.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

5.2 Test Configuration and Procedure

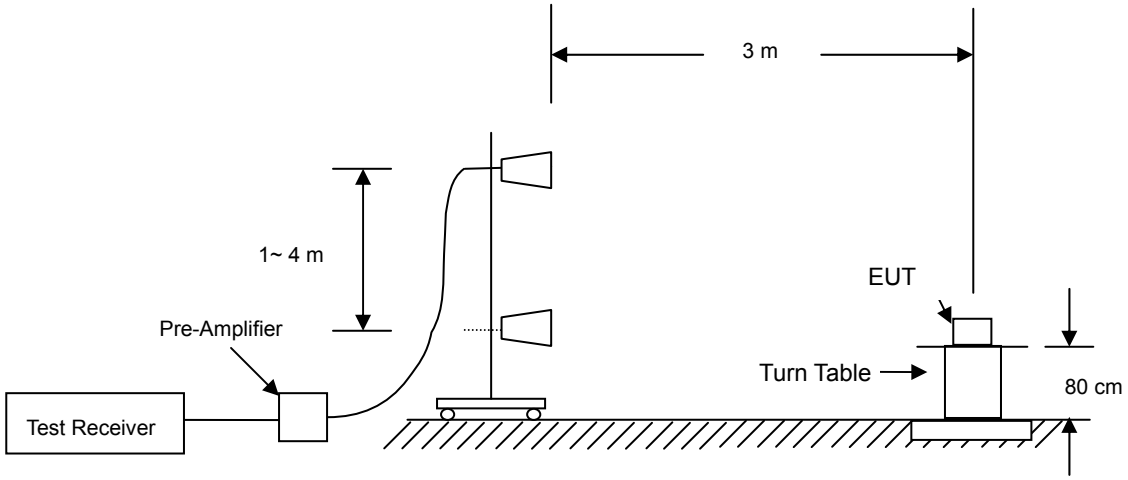


Table-top Equipment

- The EUT was place on a non-conductive turntable which was 80cm above the horizontal ground plane. The EUT was set 3m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1m and 4m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 4.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

5.3 Test Limit

☒ EN55022 Class A ITE at a measurement distance of 3m

Frequency GHz	Average limit dB(μV/m)	Peak limit dB(μV/m)
1 to 3	56	76
3 to 6	60	80
NOTE The lower limit applies at the transition frequency.		

☐ EN55022 Class B ITE at a measurement distance of 3m

Frequency GHz	Average limit dB(μV/m)	Peak limit dB(μV/m)
1 to 3	50	70
3 to 6	54	74
NOTE The lower limit applies at the transition frequency.		

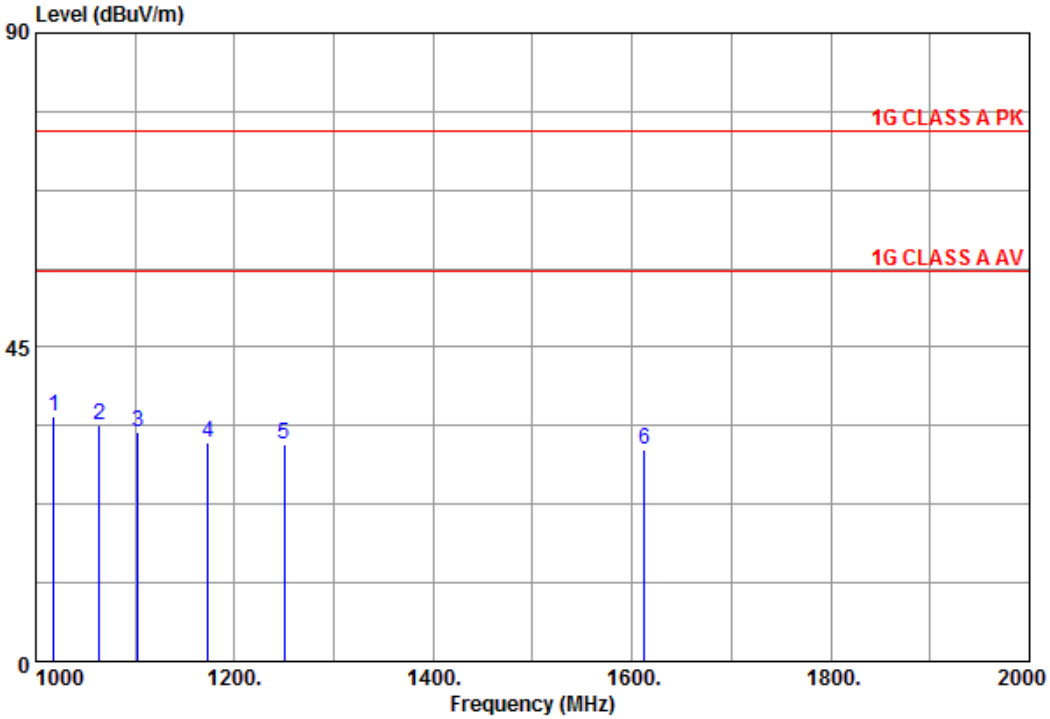
5.4 Test Result

PASS

The final tests data are shown on the following page(s).

Radiated Emission Test Data

Test Date	:	2013-12-18	Polarization	:	Horizontal
Temperature	:	22.7℃	Humidity	:	51%



	Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1	@1018.000	44.21	-9.06	35.15	56.00	-20.85	234	121	Peak
2	1064.000	43.05	-9.25	33.80	56.00	-22.20	259	334	Peak
3	1103.000	42.29	-9.38	32.91	56.00	-23.09	302	147	Peak
4	1173.000	41.01	-9.62	31.39	56.00	-24.61	339	312	Peak
5	1250.000	40.94	-9.94	31.00	56.00	-25.00	357	99	Peak
6	1612.000	40.62	-10.35	30.27	56.00	-25.73	386	268	Peak

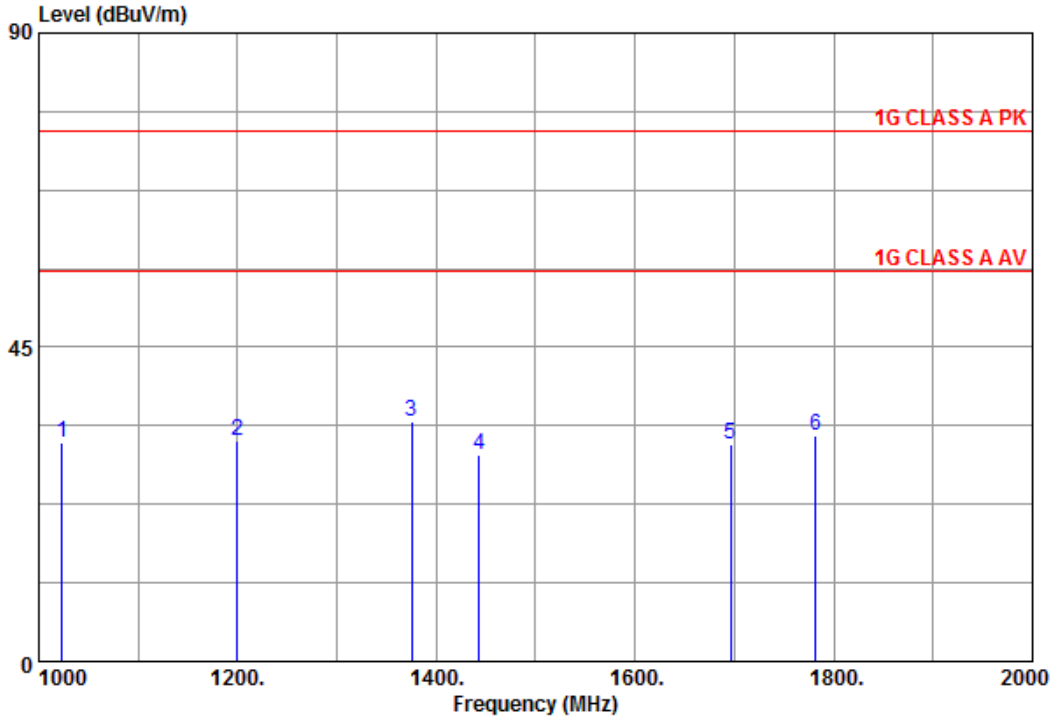
C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

@ :Maximum Data x :Over Limit

Remark：All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.

Radiated Emission Test Data

Test Date	:	2012-12-18	Polarization	:	Vertical
Temperature	:	22.7℃	Humidity	:	51%



	Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1	1023.000	40.43	-9.06	31.37	56.00	-24.63	112	326	Peak
2	1200.000	41.43	-9.75	31.68	56.00	-24.32	152	225	Peak
3	@1375.000	44.73	-10.38	34.35	56.00	-21.65	187	341	Peak
4	1443.000	40.21	-10.62	29.59	56.00	-26.41	199	65	Peak
5	1696.000	41.07	-10.02	31.05	56.00	-24.95	126	147	Peak
6	1782.000	42.06	-9.70	32.36	56.00	-23.64	158	260	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

@ :Maximum Data x :Over Limit

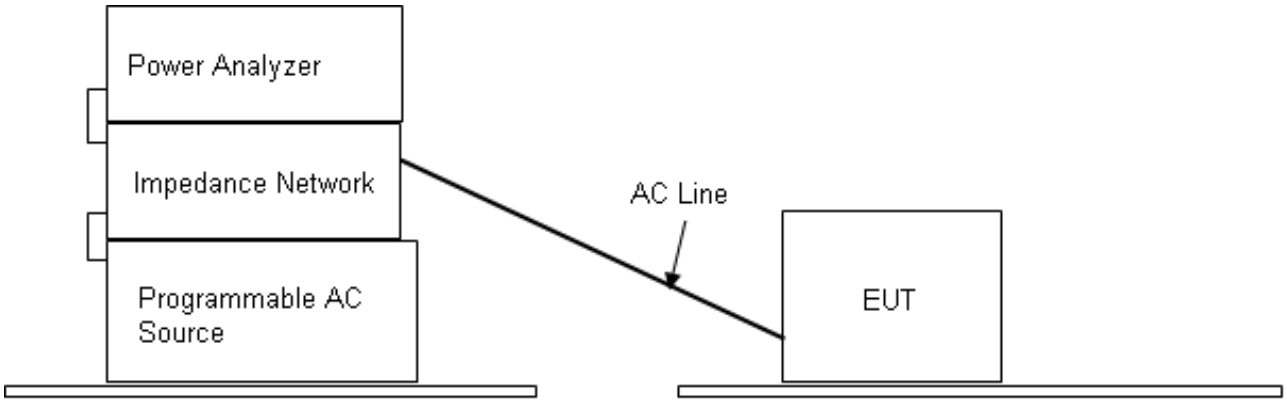
Remark：All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.

6 Harmonic Current Emission Measurement

6.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

6.2 Test Configuration and Procedure



- The EUT was set in series with the Power Analyzer through an Impedance Network for the measurement of harmonic currents.
- The supply voltage and frequency setting on the Programmable AC Source was programmed as the rated voltage and frequency of the EUT.
- Classify the EUT class in accordance with the IEC61000-3-2 for the purpose of harmonic current limitation. The measurement was automatically performed by test software. The test result was collected and analyzed by the computer.

6.3 EUT Operation Condition

Environment Condition

Temperature	Humidity	Atmospheric Pressure
22.7℃	51%RH	1019mbar

6.4 Test Limit

Class A Equipment

Harmonic Order (n)	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21

15 ≤ n ≤ 39	0.15 * 15 / n
Even harmonics	
2	1.08
4	0.43
6	0.30
8 ≤ n ≤ 40	0.23 * 8 / n

6.5 Test Result

PASS

The measured result is shown on the following page(s).

Chroma ANALYZER 6630 2013.12.16 14:46:04

Current Harmonics

Setup: CLASSA
Live
Module: M1

Gen setting: 1(1) U : 230.05 V fu: 50.001 Hz
Analysed periods: 4 I : 0.2676 A P: 27.8 W
Limit: Class A (IEC1000) I1: 0.1231 A
Note:
THD=192.86 % (PF=0.451) PASSED

No	A	Lim A	No	A	Lim A	No	A	Lim A
1	0.123		15	0.041	0.150	29	0.015	0.078
2	0.000	1.080	16	0.001	0.115	30	0.000	0.061
3	0.119	2.300	17	0.031	0.132	31	0.012	0.073
4	0.000	0.430	18	0.001	0.102	32	0.000	0.058
5	0.110	1.140	19	0.025	0.118	33	0.009	0.068
6	0.000	0.300	20	0.001	0.092	34	0.000	0.054
7	0.098	0.770	21	0.022	0.107	35	0.008	0.064
8	0.000	0.230	22	0.001	0.084	36	0.000	0.051
9	0.084	0.400	23	0.021	0.098	37	0.007	0.061
10	0.000	0.184	24	0.001	0.077	38	0.000	0.048
11	0.069	0.330	25	0.019	0.090	39	0.006	0.058
12	0.000	0.153	26	0.001	0.071	40	0.000	0.046
13	0.055	0.210	27	0.018	0.083			
14	0.000	0.131	28	0.001	0.066			

Current range: 3 Ap

Next measure | Change to bar graph | Relative current | Write to disk

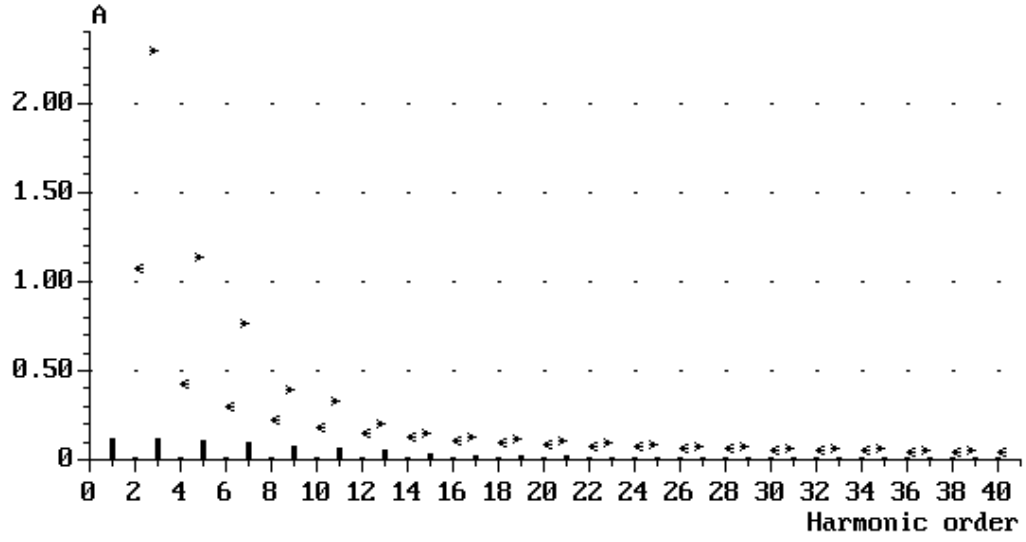
Appl: CLASSA&B (1212_00)

Chroma ANALYZER 6630 2013.12.16 14:46:16

Current Harmonics

Setup: CLASSA
Live
Module: M1

Gen setting: 1(1) U : 230.05 V fu: 50.001 Hz
Analysed periods: 4 I : 0.2676 A P: 27.8 W
Limit: Class A (IEC1000) I1: 0.1231 A
Note:
THD=192.86 % (PF=0.451) PASSED



Next measure | Change to table | Relative current | Log scale | Write to disk

Appl: CLASSA&B (1212_01)

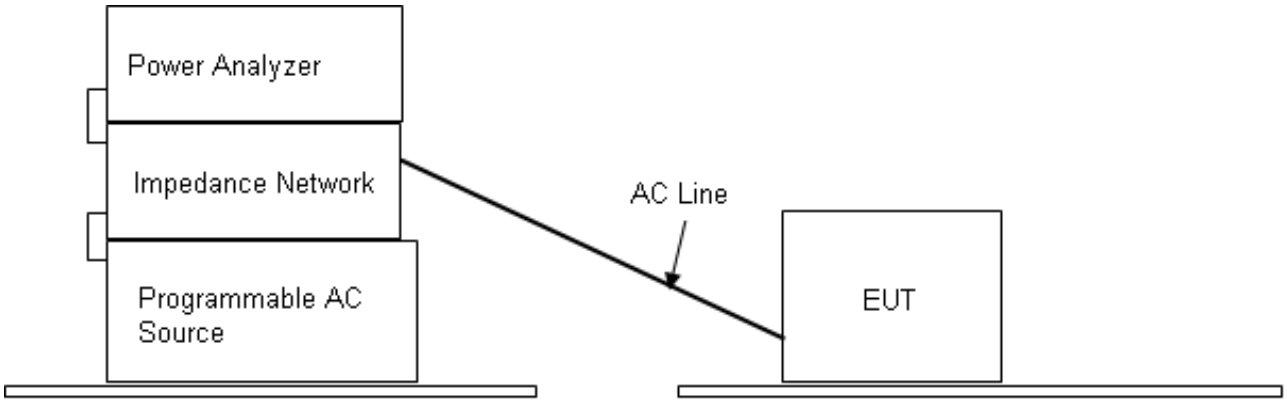
Note: The EUT power level is below 75watts therefore has no defined limits.

7 Voltage Fluctuations and Flicker Measurement

7.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

7.2 Test Configuration and Procedure



- The EUT was set in series with the Power Analyzer through an Impedance Network for the measurement of Flicker Voltage.
- The supply voltage and frequency setting on the Programmable AC Source was programmed as the rated voltage and frequency of the EUT.
- The measurement was automatically performed by test software. The test result was collected and analyzed by the computer.

7.3 EUT Operation Condition

Environment Condition

Temperature	Humidity	Atmospheric Pressure
22.7℃	51%RH	1019mbar

7.4 Test Limit

Test Item	Limit	Remark
P_{st}	1.0	P_{st} means short-term flicker indicator. T_p=10 min
P_{lt}	0.65	P_{lt} means long-term flicker indicator. T_p=2 hrs
d_t (%)	3.3	For more than 500ms
d_{max} (%)	4	d_{max} means relative maximum voltage change.
d_c (%)	3.3	d_c means relative steady-state voltage change.

7.5 Test Result

PASS

The measured result is shown on the following page(s).

Chroma ANALYZER 6630 2013.12.16 14:59:00

Extreme Flicker-I M1

Note:
Numerical Reference Impedance
U: 230.1 V I: 0.2681 A f: 0.000 Hz PF: 0.451

EVALUATION:----------

Type of observation period		Short	Long	Limit
Observation time	Tp :	10	10 min	
Maximum relative voltage change	dmax:		0.00 %	4
Max rel steady state voltage change	dc :		0.00 %	3
Duration of d(t) > 3 %	t :		0.00 s	0.2
Short term flicker severity	Pst :		0.00	1.00
Long term flicker severity	Plt :	---	0.00	0.65

Based on 1 (1) short term cycles

PASSED

Measurement completed

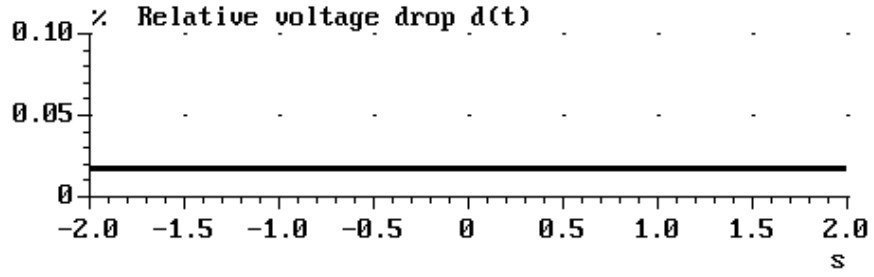
Next measure | Extreme time graph | Change to histogram | Write to disk | Select module

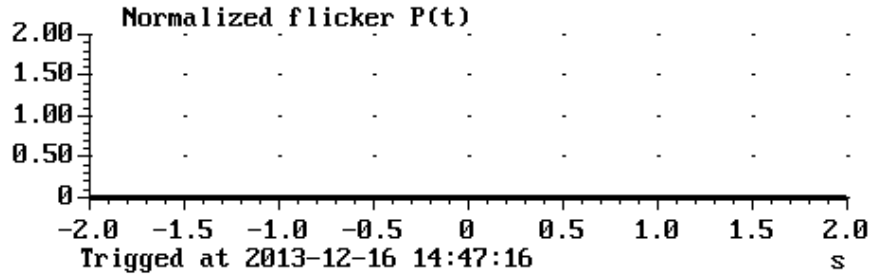
Appl: CLASSA&B (1311_00)

Chroma ANALYZER 6630 2013.12.16 14:59:18

Extreme Flicker-I M1

Note:
Numerical Reference Impedance
U: 230.1 V I: 0.2681 A f: 0.000 Hz PF: 0.451





Next measure | Change to table | Refresh time graph | Write to disk | Select module

Appl: CLASSA&B (13113_00)

8 Electrostatic Discharge Immunity Test

8.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

8.2 Test Configuration and Procedure

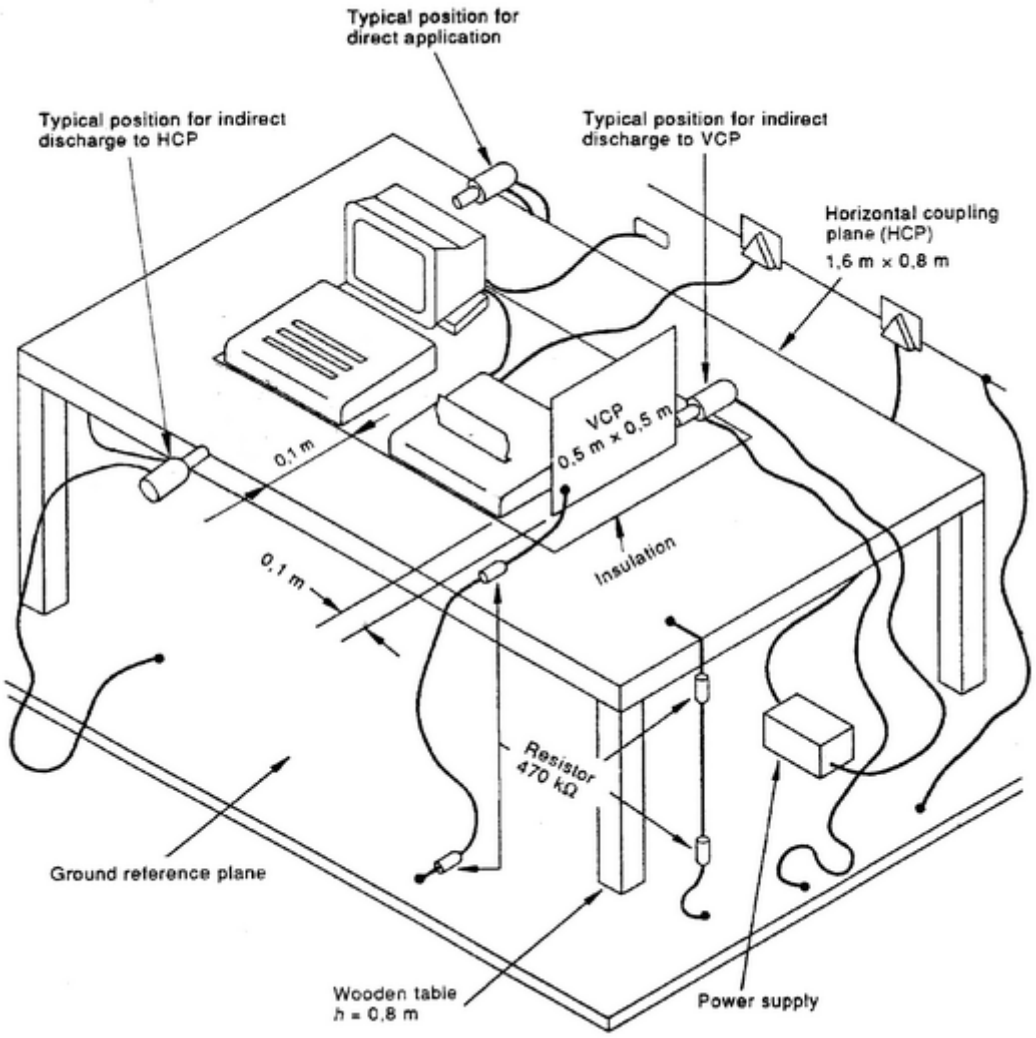


Table-top Equipment

- The EUT was located on a 0.8 m high wooden table standing on the ground reference plane with a 1.6 * 0.8 m horizontal coupling plane on the top. The EUT and cables was isolated from the coupling plane by an insulating support 0.5 mm thick.
- In Contact Discharge, the EUT was exposed to minimum 200 discharges, 100 each at negative and positive polarity on the selected test points (the selected test points were marked with red labels on the EUT)
- In Air Discharge, the EUT exposed to minimum of 10 single discharges on the selected test points.
- The result was observed and analyzed.

8.3 Test Result

8.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48%RH	1022.1mbar

8.3.2 Observation of Direct Discharge

Test Points: 1. Junction of Case. 2. LED Indicator. 3. AC Jack. 4. LAN Jacks.

Type of Discharge	Test Specifications				Performance Required by EN55024	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
Air Discharge	2,4,8 (kV)	±	1~4	20/ per point	B	A	Pass
Contact Discharge	2,4 (kV)	±	4	50/ per point	B	A	Pass
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire time interval of air discharge. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of contact discharge.						

8.3.3 Observation of Indirect Discharge

Test Points: 1. Front Side. 2. Rear Side. 3. Left Side. 4. Right Side.

Type of Discharge	Test Specifications				Performance Required by EN55024	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
HCP Application	2,4 (kV)	±	1~4	50/ per point	B	A	Pass
VCP Application	2,4 (kV)	±	1~4	50/ per point	B	A	Pass
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire time interval of HCP application. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of VCP application.						

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

9 Radio-frequency, Electromagnetic Field Immunity Test

9.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

9.2 Test Configuration and Procedure

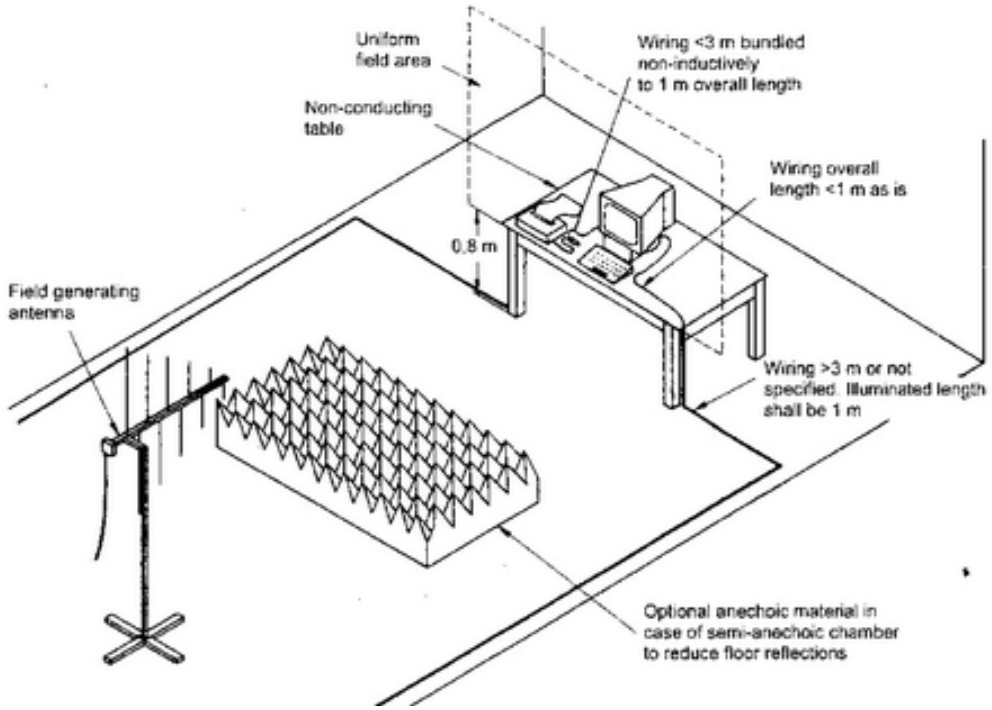


Table-top Equipment

- The field calibration was executed to create a uniform field area (UFA), 3 m away from the antenna, to ensure the validity of the test results.
- The EUT was placed on a non-conductive table 0.8 m high in the UFA.
- The EUT was then connected to power and signal wires according to relevant installation instruction.
- The EUT was positioned so that the four sides of the EUT were exposed to the electromagnetic field in sequence. In each position, the performance of the EUT was investigated and monitored by a CCD camera..

9.3 Test Result

9.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48%RH	1022.1mbar

9.3.2 Observation of Test

Type of Modulation	Test Specifications			Performance Required by EN55024	Observed Result	Verdict
	Field Strength	Frequency Range	Modulation			
Amplitude Modulation	3V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	A	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.					

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

10 Electrical Fast Transient Test

10.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

10.2 Test Configuration and Procedure

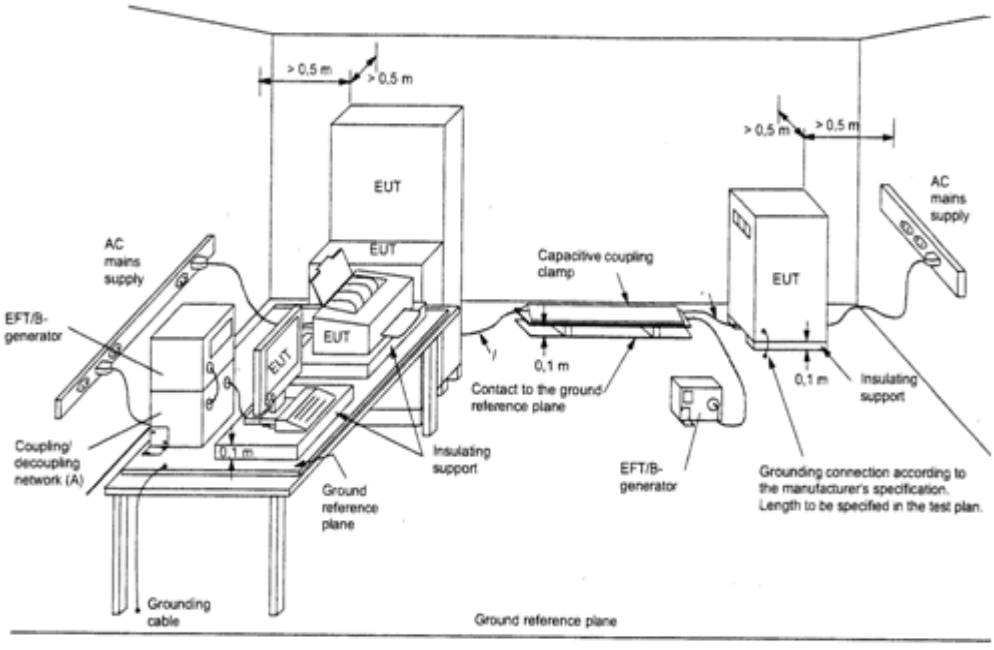


Table-top Equipment

- The EUT was placed on a table of 0.8 m height above the 1 * 1 m metallic ground reference plane, which projected beyond the EUT by at least 0.1 m on all sides.
- The ground plane was connected to the protective earth.
- The distance between the EUT and all other conductive structures, except the ground plane beneath the EUT was more than 0.5 m.
- The length of the signal and power lies between the coupling device and the EUT was 0.5 m.
- All cables to the EUT were placed on the insulation support 0.1 m above the ground reference plane.
- The EUT was connected to the power mains through a coupling device that directly coupled the EFT interference signal. Each of the Line, Neutral and Protective Earth conductors was injected with burst for 1 minute. The test time was broken down into six 10 s bursts separated by a 10 s pause for avoiding synchronization. Both voltage polarities were applied for each test level.
- Operating condition was shown on the monitor and observed.

10.3 Test Result

10.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48％RH	1022.1mbar

10.3.2 Observation of Power Supply Port

Coupling Selection	Test Specifications				Performance Required by EN 55024	Observed Result	Verdict
	Voltage (kV)	Test Duration (Sec)	Repetition Rate (kHz)	Tr/ Td (nS)			
L	±1	60	5	5/50	B	A	Pass
N	±1	60	5	5/50	B	A	Pass
PE	±1	60	5	5/50	B	A	Pass
L + N	±1	60	5	5/50	B	A	Pass
L + PE	±1	60	5	5/50	B	A	Pass
N + PE	±1	60	5	5/50	B	A	Pass
L + N +PE	±1	60	5	5/50	B	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.						
Note	Phase Shifting:0º,90º,180º,270º,360º						

10.3.3 Observation of I/O, communication ports (Applicable only to cable length >3m)

There was no I/O and communication cable longer than 3 meter; therefore, no test has been required.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

11 Surge Immunity Test

11.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

11.2 Test Configuration and Procedure

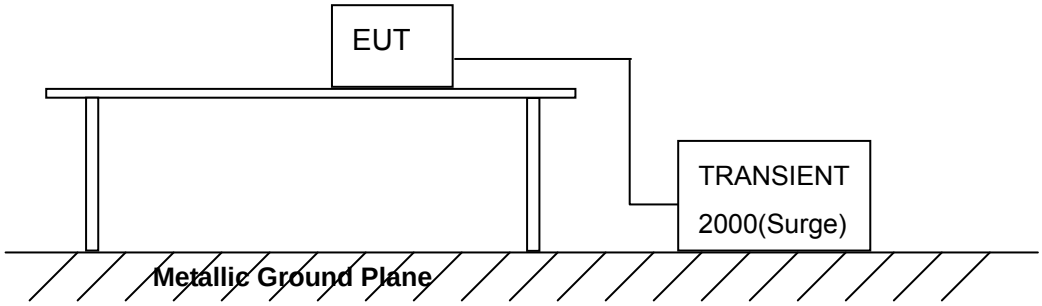


Table-top Equipment

- The EUT was placed on a table of 0.8 m height above the 1 * 1 m metallic ground reference plane, which projected beyond the EUT by at least 0.1 m on all sides.
- The ground plane was connected to the protective earth.
- The length of power cord between the coupling device and the EUT is less than 2 m (provided by the manufacturer).
- The EUT was connected to the power mains through a coupling device that directly couples the Surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.
- Operating condition was shown on the monitor and observed.

11.3 Test Result

11.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48％RH	1022.1mbar

11.3.2 Observation of Power Supply Port

Coupling Selection	Test Specifications			Performance Required by EN 55024	Observed Result	Verdict
	Voltage (kV)	Min. of Surge at Each Polarity	Repetition Rate (per min)			
L ►N	±0.5, 1	5	1	B	A	Pass
L ►PE	±0.5, 1,2	5	1	B	A	Pass
N ►PE	±0.5, 1,2	5	1	B	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.					

11.3.3 Observation of other supply/ signal lines: (Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables)

N/A

PASS

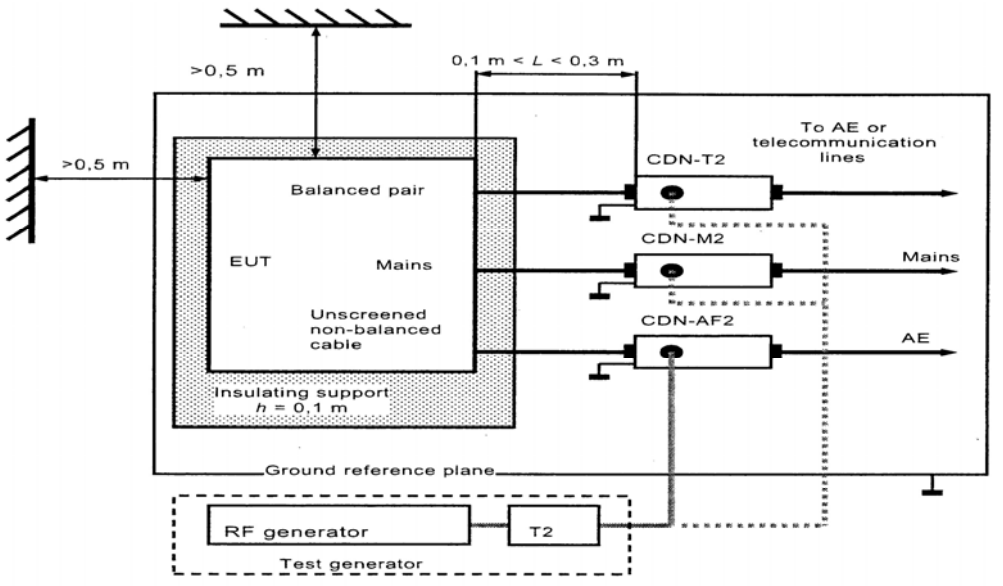
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

12 Radio-frequency, Conducted Disturbances Immunity Test

12.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

12.2 Test Configuration and Procedure



- The EUT was placed on an insulating support of 0.1 m height above a ground reference plane. All cables exiting the EUT was supported at a height of 30 mm above the ground reference plane.
- The EUT was connected to the power mains through a Coupling and Decoupling Networks (CDN).
- The CDN was located 0.3 m from the EUT as indicated in the diagram above.
- The test was performed with the test generator connected to each of the CDN in turn while the other non-excited RF input ports of the coupling devices were terminated by a 50 Ω terminator.
- The conducted disturbance was applied on the EUT from 150 kHz to 80 MHz using the signal levels established during the setting process. .
- Operating condition was shown on the monitor and observed.

12.3 Test Result

12.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48％RH	1022.1mbar

12.3.2 Observation of Test

Type of Modulation	Test Specifications			Performance Required by EN 55024	Observed Result	Verdict
	Voltage Level (emf) U_0	Frequency Range	Modulation			
Amplitude Modulation	3V/ 130dBμV	0.15 to 80MHz	80%, 1kHz, sinusoidal	A	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.					
Note	Phase Shifting:0º,90º,180º,270º,360º					

12.3.3 Observation of I/O, communication ports (Applicable only to cable length >3m)

There was no I/O and communication cable longer than 3 meter; therefore, no test has been required.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

13 Power Frequency Magnetic Field Immunity Test

13.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

13.2 Test Configuration and Procedure

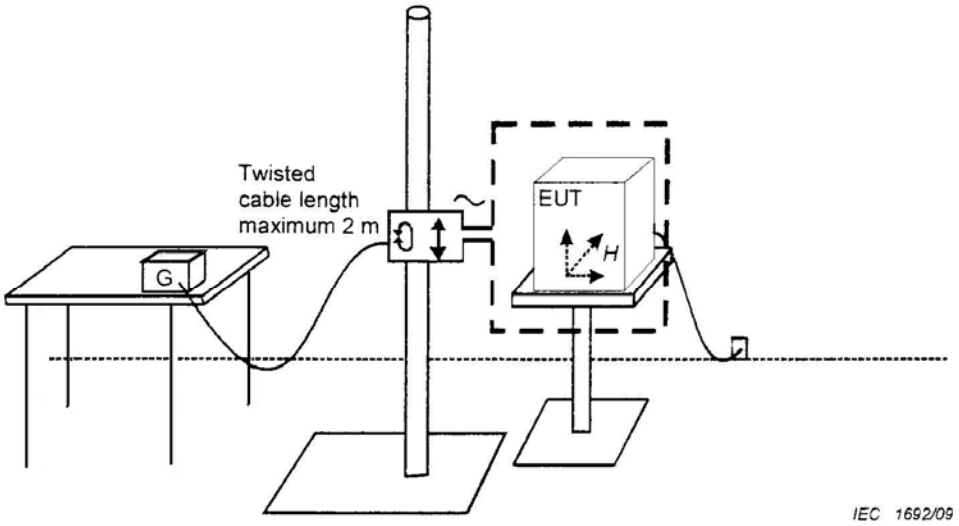


Table-top Equipment

- The EUT was placed on a non-magnetic metal ground plane of 0.25 mm thickness with the interposition of a 0.1 m thickness insulating support. The ground plane was connected to the protected earth.
- The EUT was placed at the center of the 1 * 1 m induction coil with the test generator placed within 3 m distance.
- The test was operated by moving and shifting the induction coil to expose to the test field.
- The operation condition was observed and analyzed.
- The induction coil was then rotated by 90° to expose the EUT to the test field with different orientations and the same procedure.

13.3 Test Result

13.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48％RH	1022.1mbar

13.3.2 Observation of Test

Level (A/m)	Frequency (Hz)	Performance Required by EN55024	Observed Result	Verdict
1	50	A	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.			

PASS

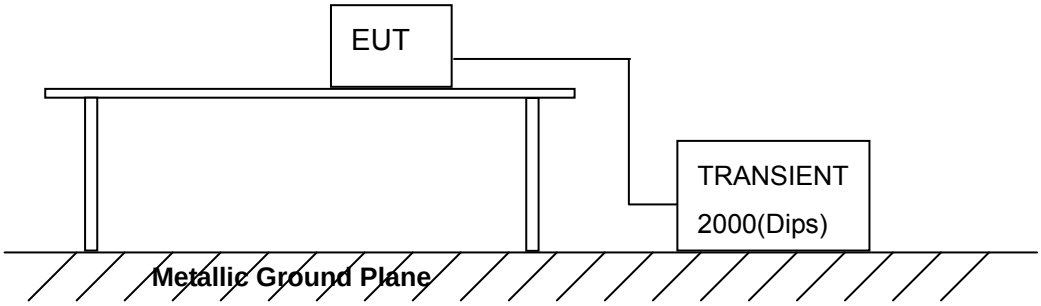
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

14 Voltage Dips, Short Interruptions Immunity Test

14.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

14.2 Test Configuration and Procedure



- The EUT was tested with (Ⅰ) >95% voltage dip of supplied voltage with a duration of 10 ms (Ⅱ) 30% voltage dip of supplied voltage with duration 500 ms (Ⅲ) A 95% voltage interruption of supplied voltage with duration of 5000 ms,
- For each selected combination of test level and duration with a sequence of three dips / interruptions with intervals of 10 s.
- For Voltage Dips, changes in supply voltage occurred at zero crossings of the voltage.
- For Short Interruptions, changes in supply voltage also occurred at zero crossings of the voltage.
- The performance of the EUT was monitored and recorded.

14.3 Test Result

14.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
21℃	48%RH	1022.11mbar

14.3.2 Observation of Power Supply Port

Voltage Dips

Voltage Reduction (%)	Test Specifications			Performance Required by EN 55024	Observed Result	Verdict
	Duration Periods	No. of Reductions	Interval between Each Duration (sec.)			
>95	0.5	3	≥ 10	B	A	Pass
30	25	3	≥ 10	C	A	Pass
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire test. 2. No temporary degradation or loss of function has been observed throughout the entire test.					

Voltage Interruptions

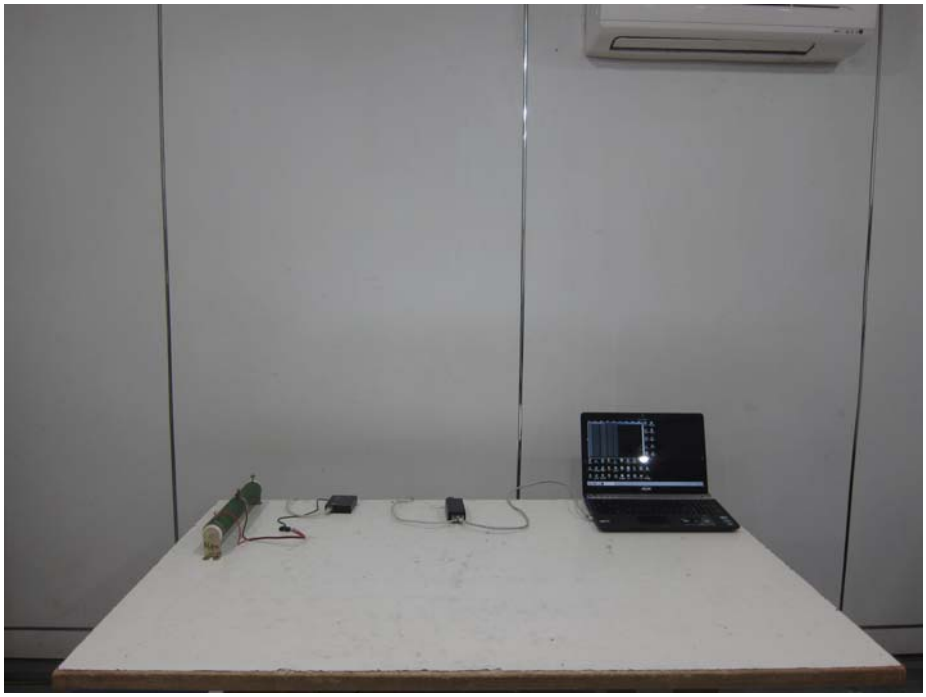
Voltage Reduction (%)	Test Specifications			Performance Required by EN 55024	Observed Result	Verdict
	Duration Periods	No. of Reductions	Interval between Each Duration (sec.)			
>95	250	3	≥ 10	C	B	Pass
Remark	When testing Voltage Dip with 4% of the normal power supply voltage, the power indicator went off. After testing, it self-recovered.					

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

15 Photographs of Test

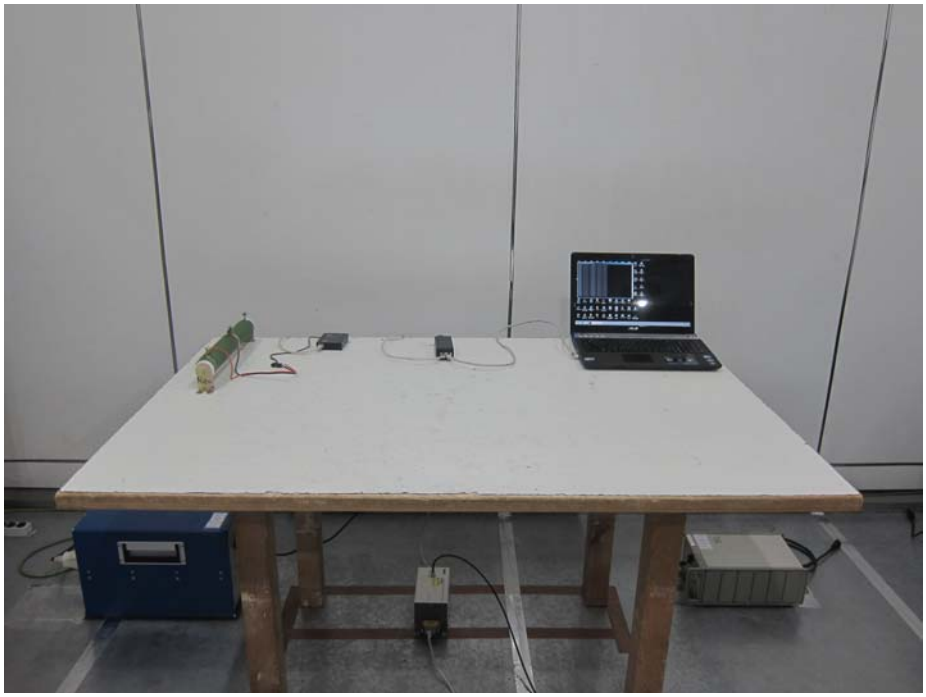
15.1 Conducted Disturbance Test(at Mains Terminals)



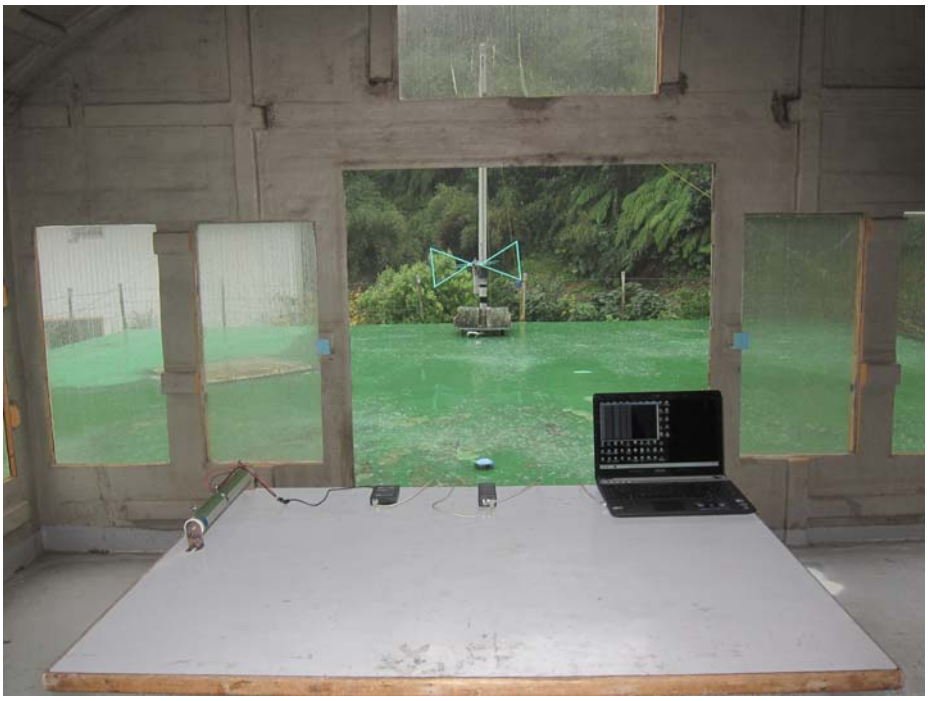
Front View

Rear View

15.2 Telecommunication Port Conducted Test



15.3 Radiated Disturbance Test – Below 1 GHz



Front View

Rear View

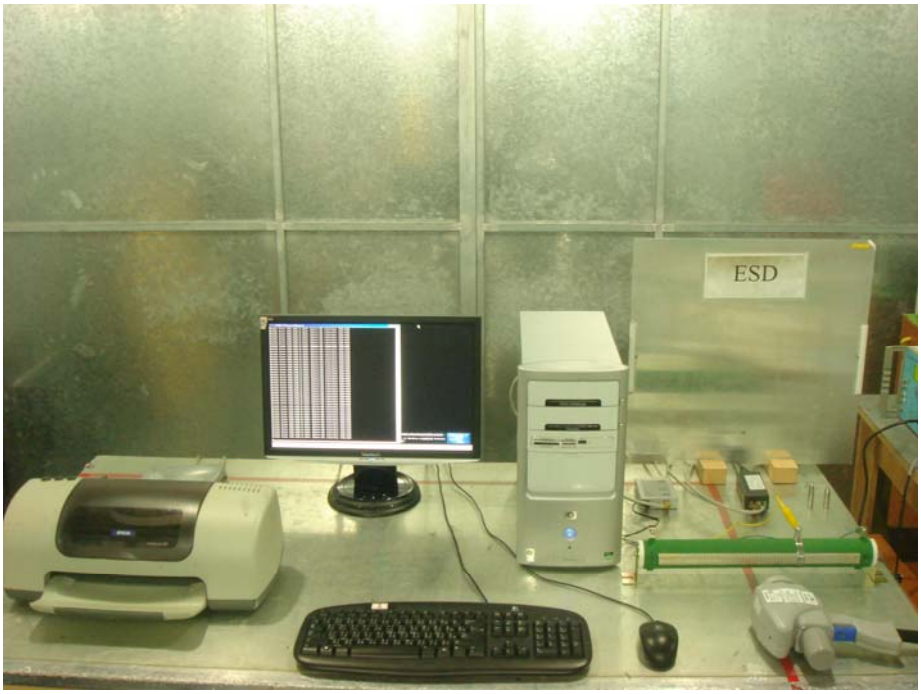
15.4 Radiated Disturbance Test – Above 1 GHz

Front View

Rear View

15.5 Harmonic Current & Voltage Fluctuations and Flicker Measurement

15.6 Electrostatic Discharge Immunity Test

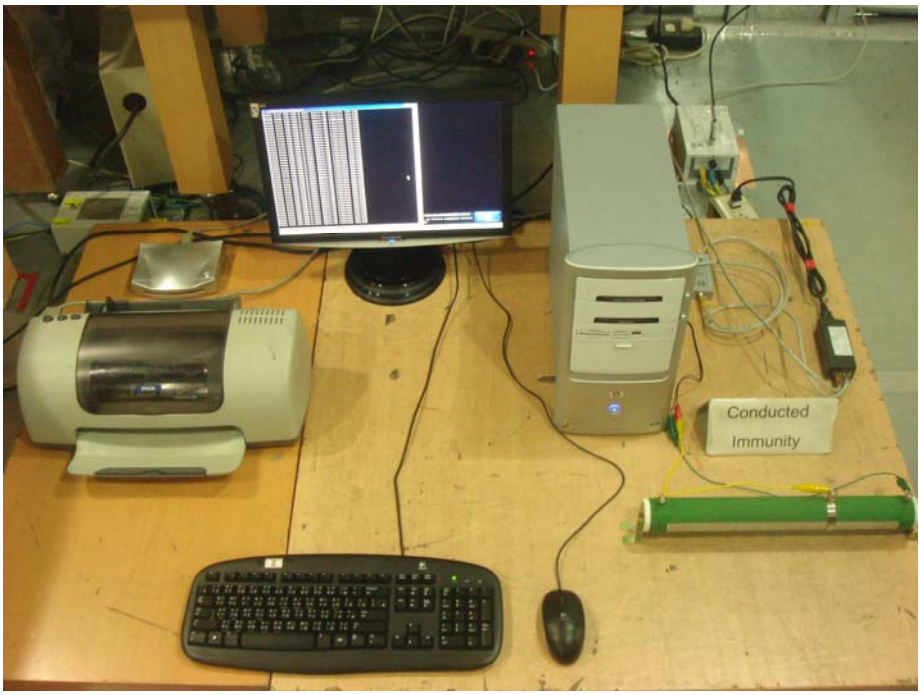


15.7 Radio-frequency, Electromagnetic Field Immunity Test

15.8 Electrical Fast Transient / Burst Immunity Test

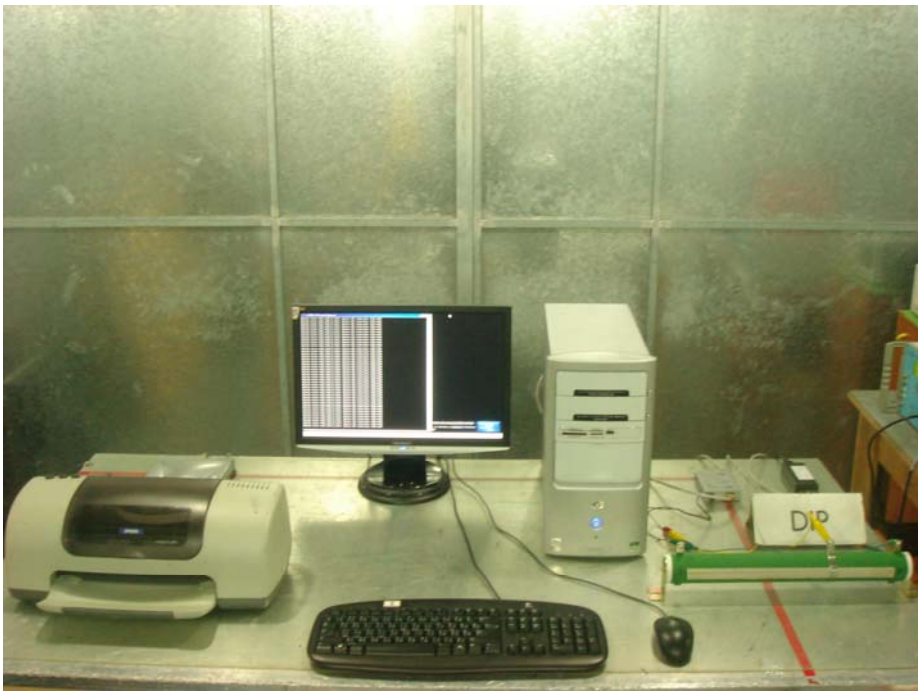
15.9 Surge Immunity Test

15.10 Radio-frequency, Conducted Disturbances Immunity Test



15.11 Power Frequency Magnetic Field Immunity Test

15.12 Voltage Dips, Short Interruptions Immunity Test

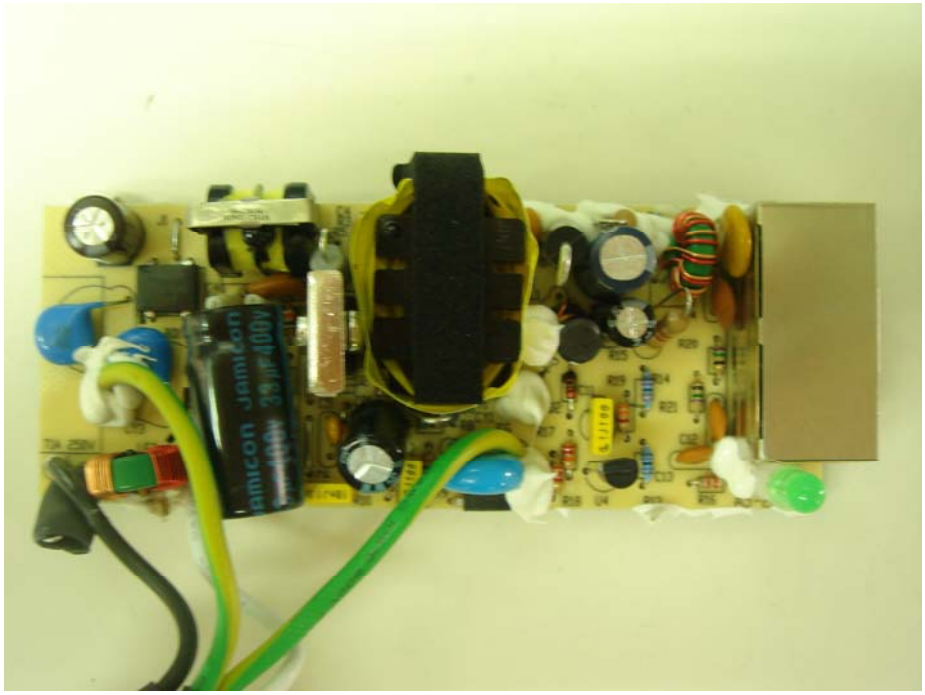


16 Photographs of EUT

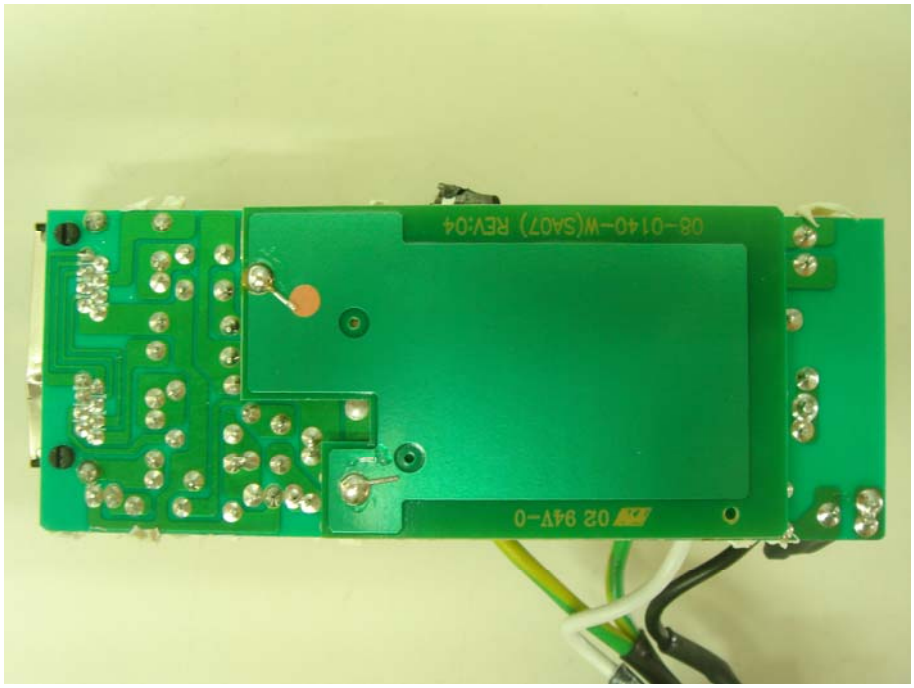
Front View of the EUT

Rear View of the EUT

Inside View of the EUT



Front View of the PCB



Rear View of the PCB

View of the Power Cable

17 Photographs of ESD Test Points

View of ESD Test Points

View of ESD Test Point

View of ESD Test Point

View of ESD Test Point