



EMC Test Report



Applicant :	KOUKAAM a.s.
Address of Applicant :	Kaplanova 2252/8, 148 00 Prague 4, Czech Republic
Equipment Under Test :	NVR (Network Video Recorder)
Model Number :	KNR-090
Series :	N/A

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

Contents

1	General Description	7
1.1	Description of EUT	7
1.2	Test Instruments	8
1.3	Auxiliary Equipments	10
1.4	Block Diagram	10
1.5	Identifying the Final Test Mode (Worst Case)	10
1.6	Final Test Mode	11
1.7	Condition of Power Supply	11
1.8	EUT Configuration	11
1.9	Immunity Performance Classification	11
1.10	Test Facility	11
2	Conducted Emission Test	12
2.1	Test Instruments	12
2.2	Test Arrangement and Procedure	12
2.3	Conducted Limit	13
2.4	Test Result	13
3	Radiated Emission Test	16
3.1	Test Instruments	16
3.2	Test Arrangement and Procedure	16
3.3	Radiated Limit	16
3.4	Test Result	16
4	Harmonic Current Emission Measurement	19
4.1	Test Instruments	19
4.2	Test Configuration and Procedure	19
4.3	EUT Operation Condition	19
4.4	Test Limit	19
4.5	Test Result	20
5	Voltage Fluctuations and Flicker Measurement	22
5.1	Test Instruments	22
5.2	Test Configuration and Procedure	22
5.3	EUT Operation Condition	22
5.4	Test Limit	22
5.5	Test Result	22
6	Electrostatic Discharge Immunity Test	24

6.1	Test Instruments	24
6.2	Test Configuration and Procedure	24
6.3	Test Result	25
7	Radio-frequency, Electromagnetic Field Immunity Test	26
7.1	Test Instruments	26
7.2	Test Configuration and Procedure	26
7.3	Test Result	27
8	Electrical Fast Transient Test	28
8.1	Test Instrument	28
8.2	Test Configuration and Procedure	28
8.3	Test Result	29
9	Surge Immunity Test	30
9.1	Test Instrument	30
9.2	Test Configuration and Procedure	30
9.3	Test Result	31
10	Radio-frequency, Conducted Disturbances Immunity Test	32
10.1	Test Instruments	32
10.2	Test Configuration and Procedure	32
10.3	Test Result	33
11	Power Frequency Magnetic Field Immunity Test	34
11.1	Test Instruments	34
11.2	Test Configuration and Procedure	34
11.3	Test Result	35
12	Voltage Dips, Short Interruptions Immunity Test	36
12.1	Test Instrument	36
12.2	Test Configuration and Procedure	36
12.3	Test Result	37
13	Photographs of Test	38
13.1	Power Line Conducted Test	38
13.2	Radiated Emission Test	39
13.3	Harmonic Current & Voltage Fluctuations and Flicker Measurement	40
13.4	Electrostatic Discharge Immunity Test	40
13.5	Radio-frequency, Electromagnetic Field Immunity Test	41
13.6	Electrical Fast Transient / Burst Immunity Test	41
13.7	Surge Immunity Test	42
13.8	Radio-frequency, Conducted Disturbances Immunity Test	42
13.9	Power Frequency Magnetic Field Immunity Test	43

13.10	Voltage Dips, Short Interruptions Immunity Test	43
14	Photographs of EUT	44
15	Photographs of ESD Test Points	48

Verification

Applicant : KOUKAAM a.s.
Manufacturer : KOUKAAM a.s.
Equipment Under Test : NVR (Network Video Recorder)
Model Number : KNR-090
Series : N/A
Sample Received Date : 2010-07-15
Test Standard :

Emission:	Immunity:
<input checked="" type="checkbox"/> EN 55022:2006+A1:2007 Class B	<input checked="" type="checkbox"/> EN 55024:1998+A1:2001+A2:2003
<input checked="" type="checkbox"/> IEC 61000-3-2:2005 +A1:2008+A2:2009	<input checked="" type="checkbox"/> IEC 61000-4-2:2008
<input checked="" type="checkbox"/> IEC 61000-3-3:2008	<input checked="" type="checkbox"/> IEC 61000-4-3:2006+A1:2007
	<input checked="" type="checkbox"/> IEC 61000-4-4:2004
	<input checked="" type="checkbox"/> IEC 61000-4-5:2005
	<input checked="" type="checkbox"/> IEC 61000-4-6:2008
	<input checked="" type="checkbox"/> IEC 61000-4-8:1993+A1:2000
	<input checked="" type="checkbox"/> IEC 61000-4-11:2004

Remark:

This report details the results of the test carried out on one sample. 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: _____

Date: 2010-08-06

Jody Peng/ ADM. Dept Staff

Tested by: _____

Date: 2010-08-05

Eason Hsieh/ ENG. Dept. Staff

Approved by: _____

Date: 2010-08-06

Peter Chin/ Head of Laboratory

Summary of Test Result

Emission			
Test Standard	Test Item	Test Result	Remark
EN55022 Class B	Conducted Emission	Pass	Highest Emission L: 0.661MHz, Q.P.40.59dBuV, Margin -15.41 dB A.V.40.71dBuV, Margin -5.29 dB N: 4.900MHz, Q.P.46.88dBuV, Margin -9.12 dB
EN55022 Class B	Radiated Emission	Pass	Highest Emission H: 652.74MHz, 35dBuV, Margin-2.00 dB Antenna Height 1.5 m, Turntable Angle 170° V: 903MHz, 35.61dBuV, Margin-1.39 dB Antenna Height 1.5 m, Turntable Angle 180°
EN61000-3-2	Harmonic	Pass	Refer to Page 19
EN61000-3-3	Flicker	Pass	Refer to Page 22

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	C	

1 General Description

1.1 Description of EUT

Equipment Under Test	:	NVR (Network Video Recorder)
Model Number	:	KNR-090
Series	:	N/A
Applicant	:	KOUKAAM a.s.
Address of Applicant	:	Kaplanova 2252/8, 148 00 Prague 4, Czech Republic
Manufacturer	:	KOUKAAM a.s.
Address of Manufacturer	:	Kaplanova 2252/8, 148 00 Prague 4, Czech Republic
Power Supply	:	<p>Switch Adapter</p> <p>Manufacturer: Sunny Model No.: Sys1308-2412-W2E</p> <p>Part No.: SYS1308-2412</p> <p>EMC Approval: CE</p> <p>Input: 100-240Vac, 1A, 60 / 50Hz</p> <p>Output: 12Vdc, 2A</p> <p>Power Cord: 2 Pin</p> <p> <input type="checkbox"/>Shielded <input checked="" type="checkbox"/>Non-Shielded <input checked="" type="checkbox"/>Detachable, 1.8m <input type="checkbox"/>Un-Detachable <input type="checkbox"/>w Ferrite Core <input checked="" type="checkbox"/>w/o Ferrite Core </p>
Data Cable	:	<p><input checked="" type="checkbox"/>RJ45 Cable</p> <p> <input type="checkbox"/>Shielded <input checked="" type="checkbox"/>Non-Shielded <input checked="" type="checkbox"/>Detachable, 1.5m <input type="checkbox"/>Un-Detachable <input type="checkbox"/>w Ferrite Core <input checked="" type="checkbox"/>w/o Ferrite Core </p>
Description of EUT	:	<p>Dimensions : 145 cm (L) X 21 cm (W) X 4 cm (H)</p> <p>Weight : 600 g</p> <p>Position : <input checked="" type="checkbox"/>Table-top / <input type="checkbox"/>Floor-standing</p> <p>Intended Function : The EUT is a NVR (Network Video Recorder).</p>

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	2010-05-12	Conducted Emission
L.I.S.N.	EMCIS	LN2-16	LN04023	2010-02-08	Conducted Emission
Pulse Limiter	Mess Tec	PL10	N/A	2009-12-16	Conducted Emission
RF Cable	N/A	N/A	N/A	2010-06-25	Conducted Emission
EMI Receiver	R&S	ESCI	100615	2010-03-03	Conducted Emission Radiated Emission
Bilog Antenna	Teseq GmbH	CBL6111D	25769	2010-03-03	Radiated Emission
Pre-Amplifier	Schaffner	CPA9231A	N/A	2009-07-20	Radiated Emission
Spectrum Analyzer	HP	8595E	3829A03763	2009-07-19	Radiated Emission
Spectrum Analyzer	R & S	FSL6	100564	2009-12-05	Radiated Emission
RF Cable	MIYAZAKI	8D-F8	N/A	2009-07-20	Radiated Emission
Programmable AC Source	Chroma	6520	2048	2010-02-01	Harmonic, Flicker
Universal Power Analyzer	Chroma	6630	0597	2010-02-01	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	2010-06-25	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

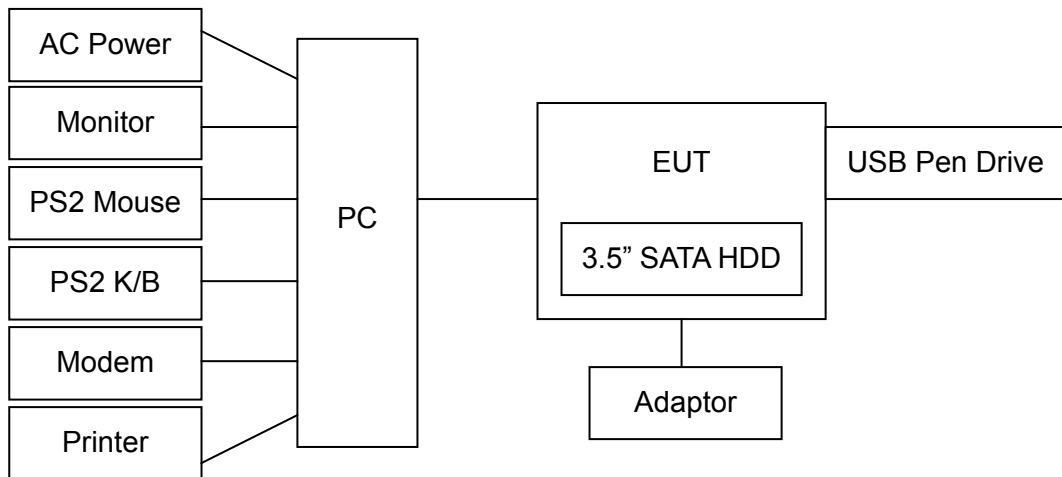
Note: The instruments listed above are within their calibration period of 1 year.

1.3 Auxiliary Equipments

Provided by Matrix Test Lab.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Power Cord
1.	PC No.7	HP Pavilion T278D	TWL33500K2	FCC, BSMI	HP	Non-shielded, Detachable, 1.5m
2.	Monitor No. 1	E2210Hc	CN-0G337R-6418 0-021-0FNL	CE FCC BSMI	DELL	VGA CABLE Shielded, Detachable, 1.5m, With Core DVI CABLE Shielded, Detachable, 1.5m, With Core
3.	PS2 Key Board No. 2	Y-SU61	BT911DG4374	CE, FCC	LOGITECH	PS2 CABLE Non-shielded, Un-detachable, 1.7m, Without Core
4.	PS2 Mouse No. 2	M-SBF96	HC9070E036B	CE FCC	LOGITECH	PS2 CABLE Non-shielded, Un-detachable, 1.8m, Without Core
5.	Printer No. 1	EPSON STYLUS C61	EK5Y014949	3912E328	EPSON	PRINTER CABLE Non-shielded, Detachable, 1.8M
6.	Modem No. 1	1456VQE-C	1234A36998	3882B582	LEMEL	RS-232 CABLE Non-shielded, Detachable, 3M
7.	Pen Drive No. 12	SDK-USM8GL(B) 09728KEDV	N/A	CE, FCC	SONY	N/A
8.	3.5" SATA HDD No. 3	WD1600AAJS-OOB4A O	WCAT20009583	CE, BSMI	WD	N/A

1.4 Block Diagram



1.5 Identifying the Final Test Mode (Worst Case)

1. Standby Mode
2. 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 City, Taipei Hsien, 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

2.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

2.2 Test Arrangement and Procedure

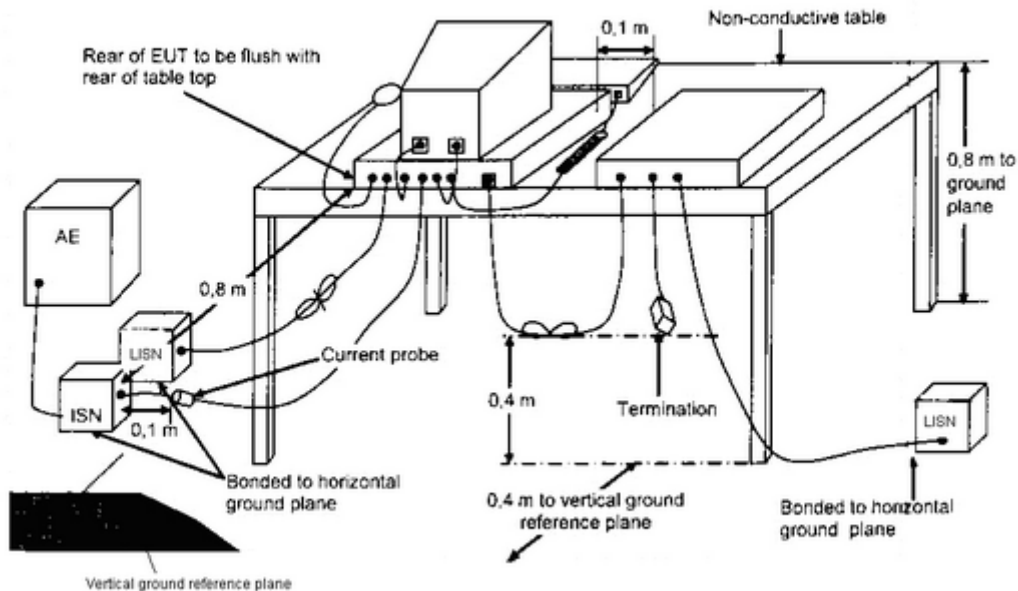


Table-top Equipment

- 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 μ H 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)	<input type="checkbox"/> Class A		<input checked="" type="checkbox"/> 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.

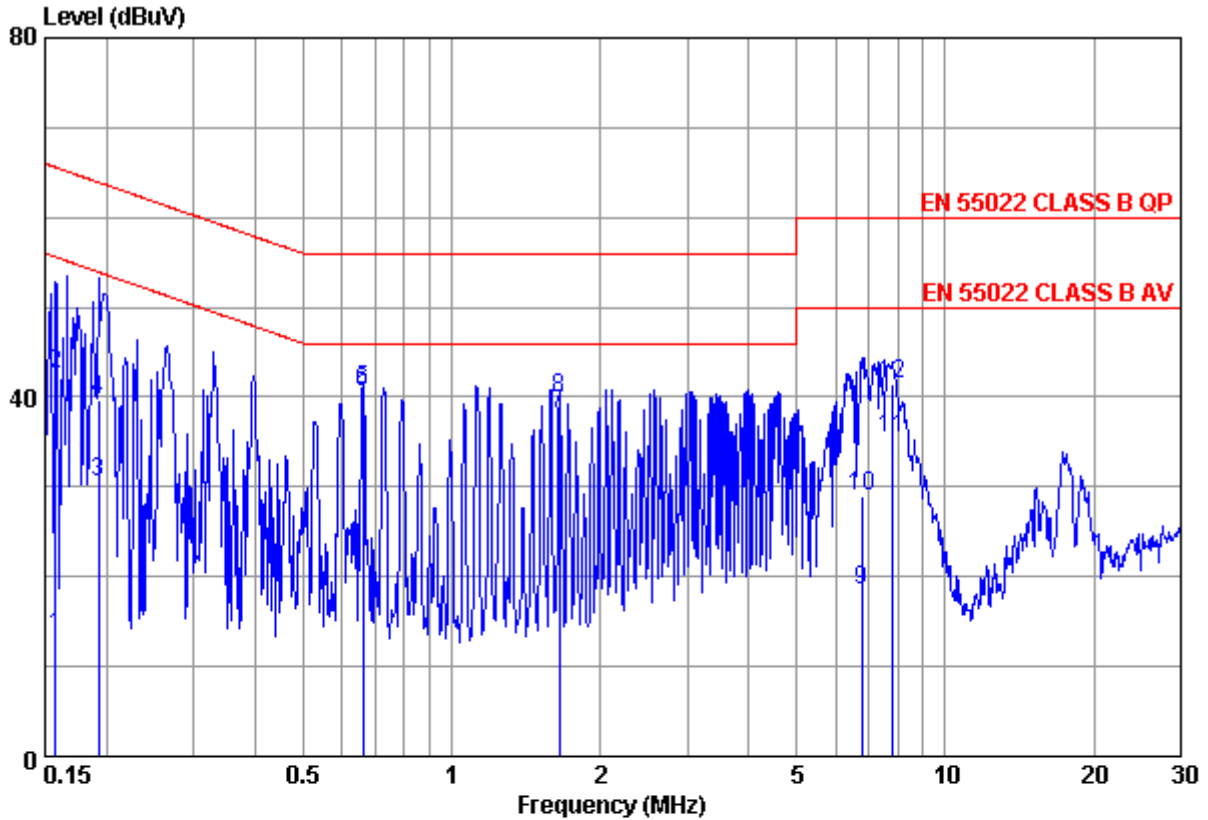
2.4 Test Result

PASS

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

Conducted Emission Test Data

Test Date : 2010-07-20 Power Line : Line
 Temperature : 29°C Humidity : 30%



	Freq	Level	Read	Over	Limit	Factor	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV	
1	0.157	13.36	3.29	-42.24	55.60	10.07	Average
2	0.157	42.57	32.50	-23.03	65.60	10.07	QP
3	0.192	30.62	20.59	-23.31	53.93	10.03	Average
4	0.192	39.75	29.72	-24.18	63.93	10.03	QP
5	* 0.661	40.71	30.65	-5.29	46.00	10.06	Average
6	@ 0.661	40.59	30.53	-15.41	56.00	10.06	QP
7	1.654	38.00	27.90	-8.00	46.00	10.10	Average
8	1.654	39.95	29.85	-16.05	56.00	10.10	QP
9	6.769	18.55	8.48	-31.45	50.00	10.07	Average
10	6.769	28.92	18.85	-31.08	60.00	10.07	QP
11	7.810	35.39	25.31	-14.61	50.00	10.08	Average
12	7.810	41.38	31.30	-18.62	60.00	10.08	QP

Level(dBuV) = Read Level(dBuV) + Factor(dBuV)
 Factor(dBuV) = LISN Factor(dBuV) + Cable Loss + PLUSE Limiter(dBuV)

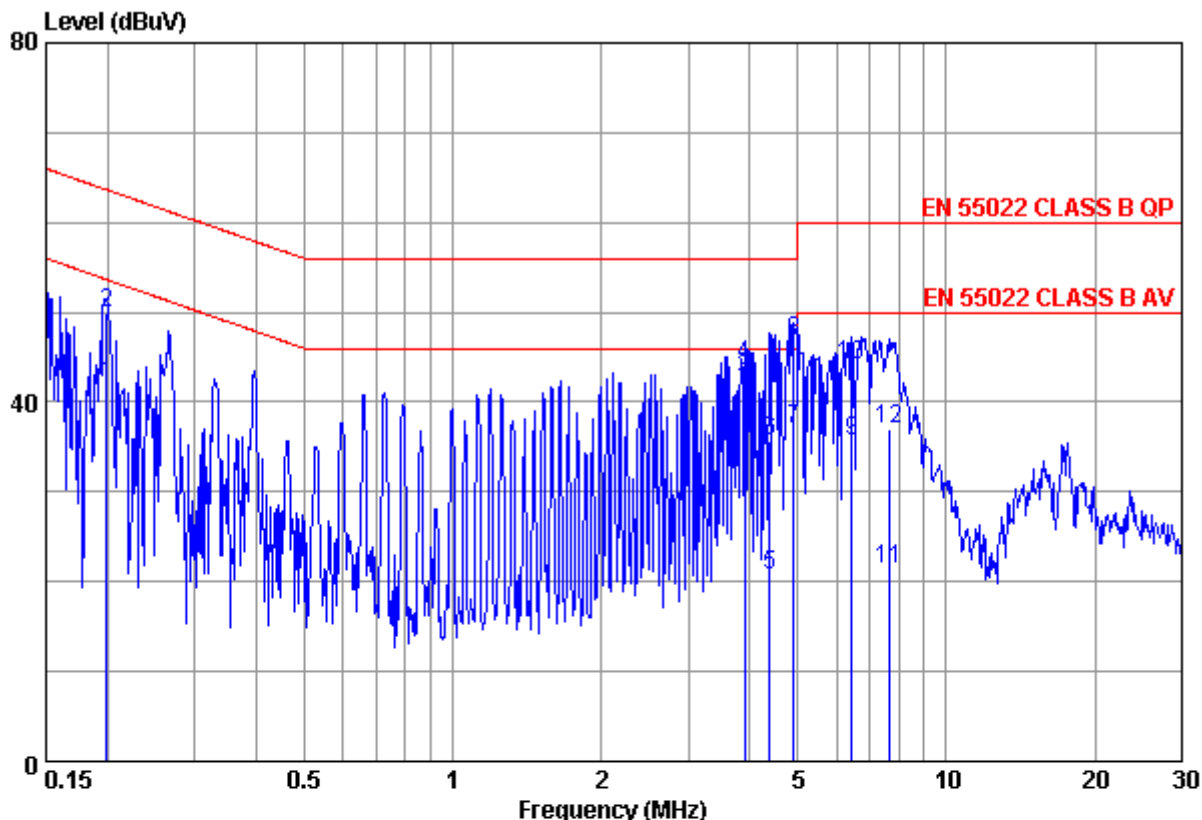
@ :Maximum QP * :Maximum AVG x :Over Limit ! :Over Margin
 Red Point(or Red Trace) For Average Detector
 Green Point(or Green Trace) For Quasipeak Detector

Receiver : R&S ESCI
 LISN : Messtec NNB - 2/16 Z
 Pluse Limiter : Messtec PL10

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

Conducted Emission Test Data

Test Date : 2010-07-20 Power Line : Neutral
 Temperature : 29°C Humidity : 30%



	Freq	Level	Read Level	Over Level	Limit Line	Factor	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV	
1	0.199	41.97	31.82	-11.70	53.67	10.15	Average
2	0.199	49.98	39.83	-13.69	63.67	10.15	QP
3	* 3.901	42.50	32.32	-3.50	46.00	10.18	Average
4	3.901	44.20	34.02	-11.80	56.00	10.18	QP
5	4.384	20.67	10.50	-25.33	46.00	10.17	Average
6	4.384	35.64	25.47	-20.36	56.00	10.17	QP
7	4.900	36.92	26.76	-9.08	46.00	10.16	Average
8	@ 4.900	46.88	36.72	-9.12	56.00	10.16	QP
9	6.420	35.58	25.37	-14.42	50.00	10.21	Average
10	6.420	44.09	33.88	-15.91	60.00	10.21	QP
11	7.687	21.39	11.16	-28.61	50.00	10.23	Average
12	! 7.687	37.05	26.82	-22.95	60.00	10.23	QP

Level(dBuV) = Read Level(dBuV) + Factor(dBuV)
 Factor(dBuV) = LISN Factor(dBuV) + Cable Loss + PLUSE Limiter(dBuV)

@ :Maximum QP * :Maximum AVG x :Over Limit ! :Over Margin
 Red Point(or Red Trace) For Average Detector
 Green Point(or Green Trace) For Quasipeak Detector

Receiver : R&S ESCI
 LISN : MessTec NNB - 2/16 Z
 Pluse Limiter : MessTec PL10

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

3 Radiated Emission Test

3.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

3.2 Test Arrangement and Procedure

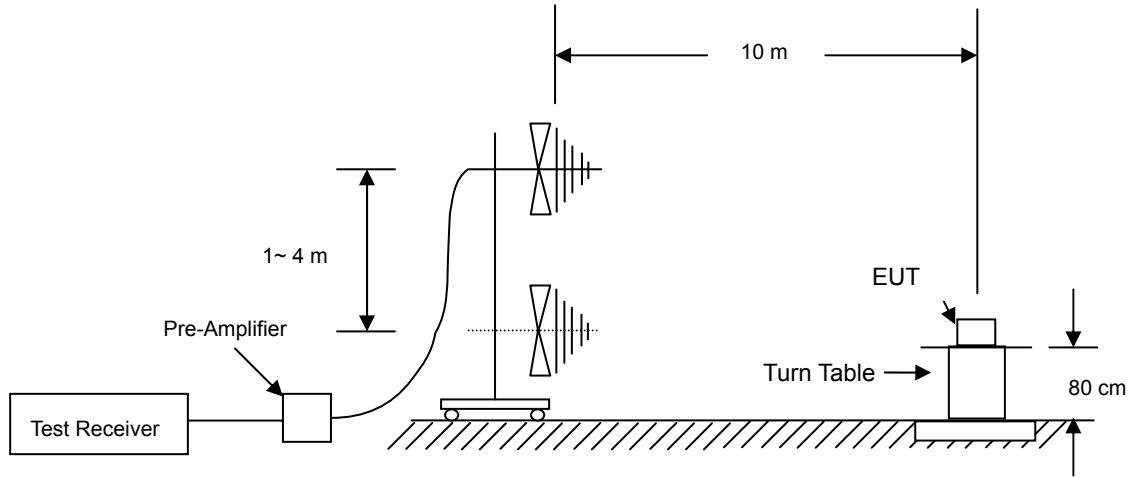


Table-top Equipment

- The EUT was placed 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.

3.3 Radiated Limit

EN 55022

Frequency (MHz)	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> 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.

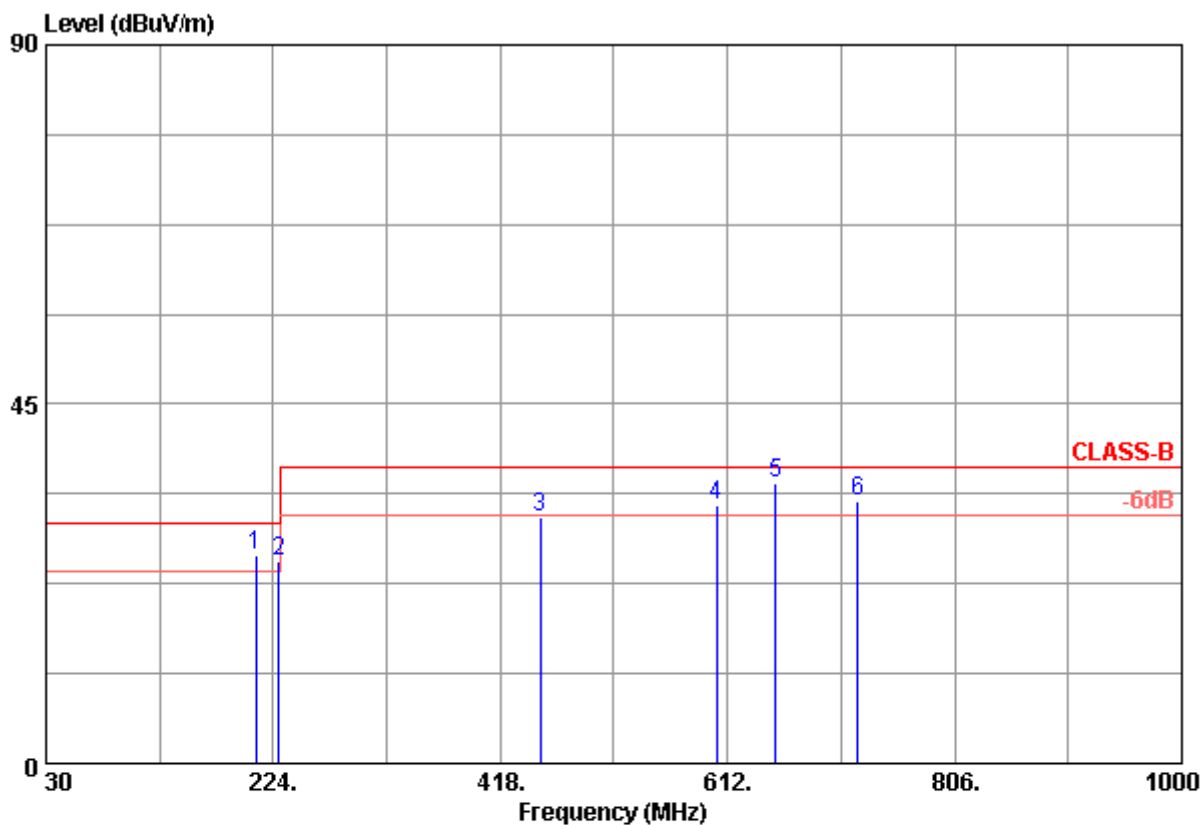
3.4 Test Result

PASS

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

Radiated Emission Test Data

Test Date : 2010-08-05 Polarization : Horizontal
 Temperature : 27°C Humidity : 36%



Freq	Level	Read Level	Over Level	Limit Line	Factor	A/pos	T/pos	Remark
MHz	dBuV	dBuV	dBuV	dBuV	dBuV			
1 ! 209.450	26.17	44.83	-3.83	30.00	-18.66	100	10	
2 ! 228.850	25.43	45.02	-4.57	30.00	-19.59	100	10	
3 451.950	30.78	45.66	-6.22	37.00	-14.88	150	100	
4 ! 602.300	32.33	44.13	-4.67	37.00	-11.80	150	170	
5 @ 652.740	35.00	46.01	-2.00	37.00	-11.01	150	170	
6 ! 723.550	32.89	42.29	-4.11	37.00	-9.40	150	200	

Level(dBuV) = Read Level(dBuV) + Factor(dBuV)
 Factor(dBuV) = Antenna Factor(dBuV) + Cable Loss(dBuV) + Preamp(dBuV)

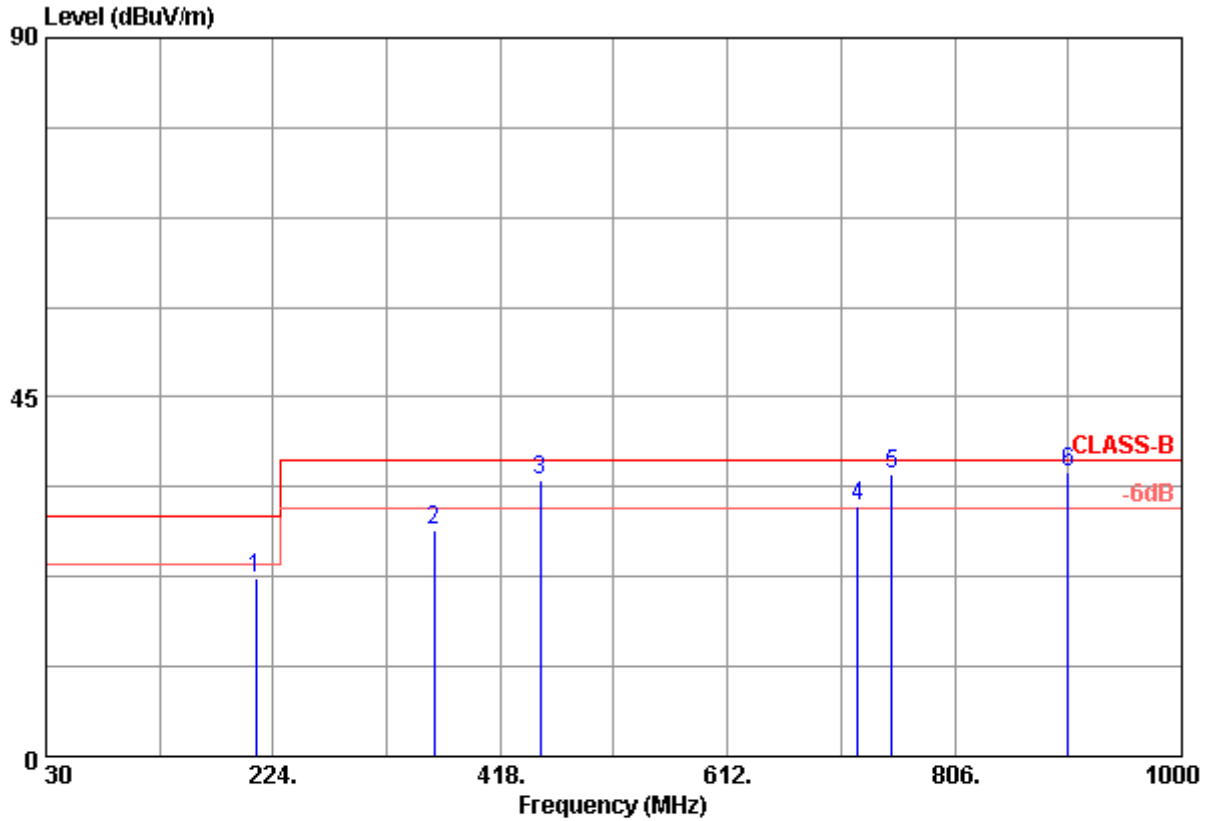
@ :Maximum Data x :Over Limit ! :Over Margin

SPECTRUM : hp 8590L
 ANTENNA & TABLE CONTROLLER : CM886(1.00)

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data

Test Date : 2010-08-05 Polarization : Vertical
 Temperature : 27°C Humidity : 36%



	Freq	Level	Read Level	Over Level	Limit Line	Factor	A/pos	T/pos	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV			
1	209.450	22.38	41.04	-7.62	30.00	-18.66	150	10	
2	361.740	28.31	44.65	-8.69	37.00	-16.34	100	80	
3	! 451.950	34.55	49.43	-2.45	37.00	-14.88	150	100	
4	! 723.550	31.26	40.66	-5.74	37.00	-9.40	150	200	
5	! 752.650	35.46	44.62	-1.54	37.00	-9.16	100	180	
6	@ 903.000	35.61	42.75	-1.39	37.00	-7.14	150	180	

Level(dBuV) = Read Level(dBuV) + Factor(dBuV)
 Factor(dBuV) = Antenna Factor(dBuV) + Cable Loss(dBuV) + Preamp(dBuV)

@ :Maximum Data x :Over Limit ! :Over Margin

SPECTRUM : hp 8590L
 ANTENNA & TABLE CONTROLLER : CM886(1.00)

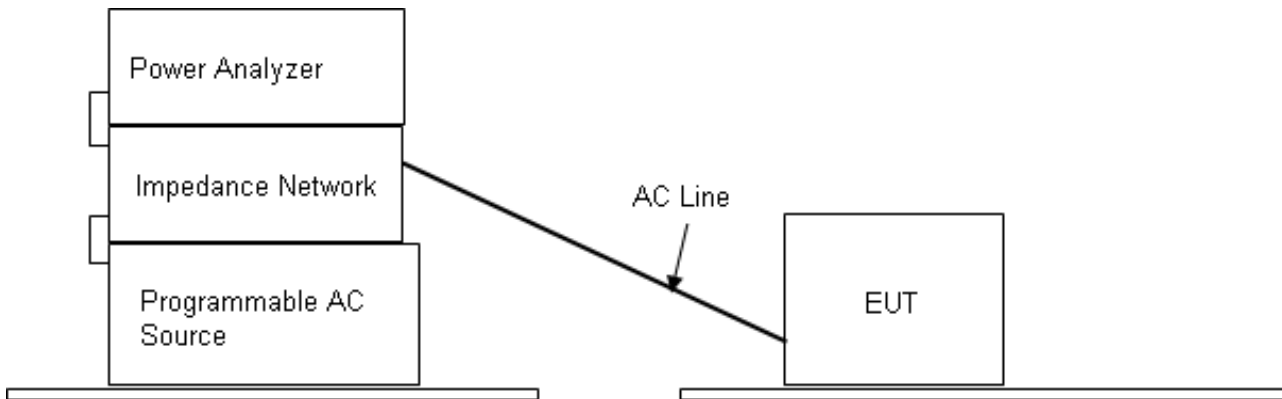
Remark : All readings are Quasi-Peak values.

4 Harmonic Current Emission Measurement

4.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

4.2 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.

4.3 EUT Operation Condition

Environment Condition

Temperature	Humidity	Atmospheric Pressure
29°C	30%RH	1010.3mbar

4.4 Test Limit

Class D Equipment

Harmonics order	Maximum permissible harmonic current per watt (mA/W)	Maximum permissible harmonic current A
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.44
11	0.35	0.33
13 ≤ n ≤ 39 (Odd Harmonics Only)	3.85 / n	See IEC61000-3-2 Class A Limit

4.5 Test Result

PASS

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



ANALYZER 6630

2010.07.20 10:20:24

Current Harmonics

Setup: CLASS D Gen setting: 1(1) U : 230.41 V fu: 50.001 Hz
 Live Analysed periods: 4 I : 166.1 mA P: 14.3 W
 Module: M1 Limit: Class D (IEC1000) I1: 65.3 mA

Note:
 THD=233.45 % (PF=0.372) PASSED
 P < 75 W

No	mA	Lim mA	No	mA	Lim mA	No	mA	Lim mA
1	65.3		15	39.9		29	10.0	
2	0.4		16	0.4		30	0.4	
3	61.1		17	34.9		31	7.9	
4	0.4		18	0.5		32	0.4	
5	59.3		19	30.0		33	6.5	
6	0.4		20	0.5		34	0.4	
7	56.6		21	25.2		35	5.8	
8	0.4		22	0.5		36	0.3	
9	53.2		23	20.6		37	5.5	
10	0.4		24	0.5		38	0.3	
11	49.3		25	16.5		39	5.2	
12	0.4		26	0.5		40	0.2	
13	44.8		27	12.9				
14	0.4		28	0.5				

Current range: 1 Ap

Next measure

Change to bar graph

Relative current

Write to disk

Appl: CLASS C&D (1212_00)



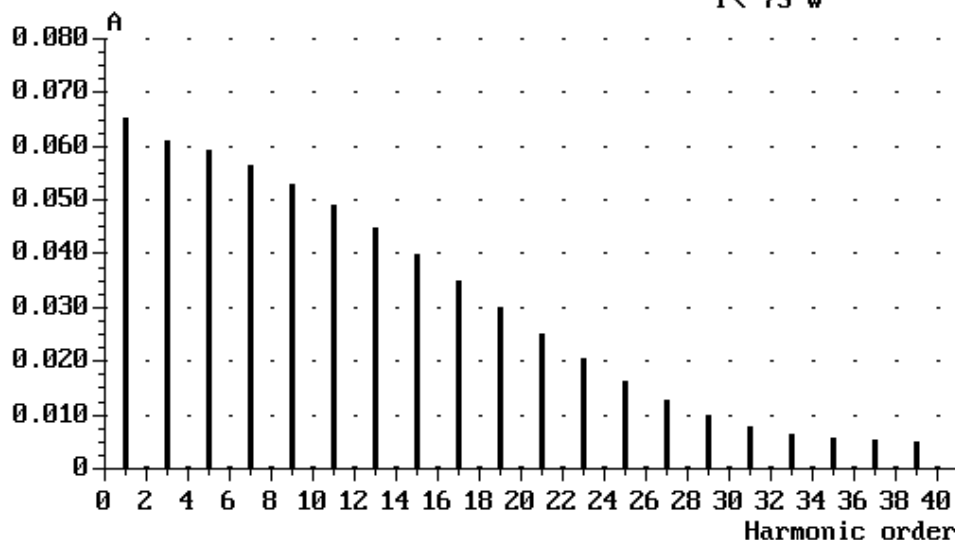
ANALYZER 6630

2010.07.20 10:20:36

Current Harmonics

Setup: CLASS D Gen setting: 1(1) U : 230.41 V fu: 50.001 Hz
 Live Analysed periods: 4 I : 166.1 mA P: 14.3 W
 Module: M1 Limit: Class D (IEC1000) I1: 65.3 mA

Note:
 THD=233.45 % (PF=0.372) PASSED
 P < 75 W



Next measure

Change to table

Relative current

Log scale

Write to disk

Appl: CLASS C&D (1212_01)

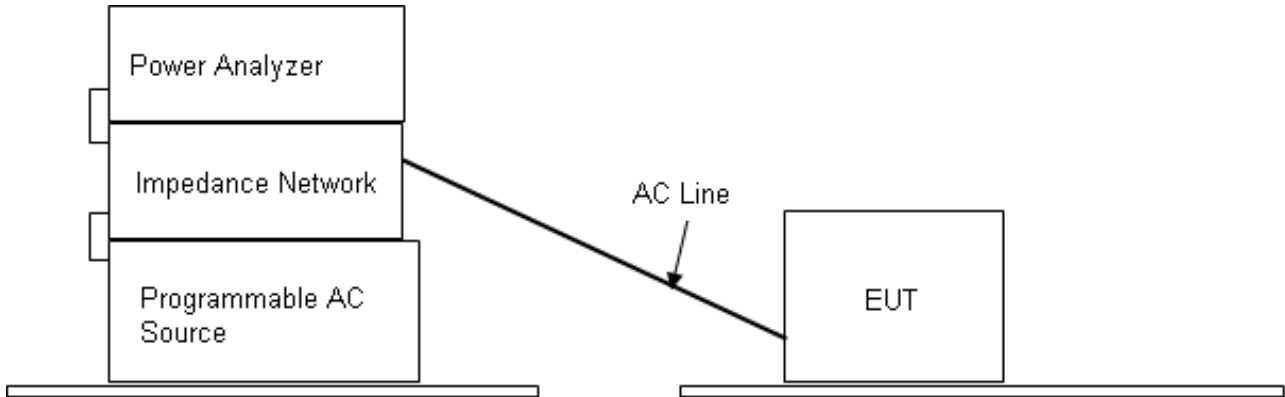
Note: The EUT power level is below 75watts therefore has no defined limits.

5 Voltage Fluctuations and Flicker Measurement

5.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

5.2 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.

5.3 EUT Operation Condition

Environment Condition

Temperature	Humidity	Atmospheric Pressure
29°C	30%RH	1010.3mbar

5.4 Test Limit

Test Item	Limit	Remark
Pst	1.0	Pst means short-term flicker indicator. $T_p=10$ min
Plt	0.65	Plt means long-term flicker indicator. $T_p=2$ hrs
dt (%)	3.3	For more than 500ms
dmax (%)	4	dmax means relative maximum voltage change.
dc (%)	3.3	dc means relative steady-state voltage change.

5.5 Test Result

PASS

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



ANALYZER 6630

2010.07.20 10:32:29

Extreme Flicker-I M1

Note:

Physical Reference Impedance

U: 230.5 V I: 166.5 mA f: 50.000 Hz PF: 0.373

EVALUATION:-----

Type of observation period	Short	Long	Limit
Observation time	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 :	---	0.65

Based on 1 (1) short term cycles

PASSED

Measurement completed

App1: CLASS C&D

(1311_00)

Next measure

Extreme time graph

Change to histogram

Write to disk

Select module



ANALYZER 6630

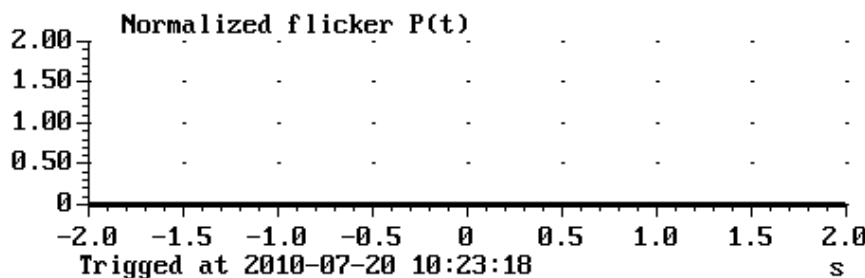
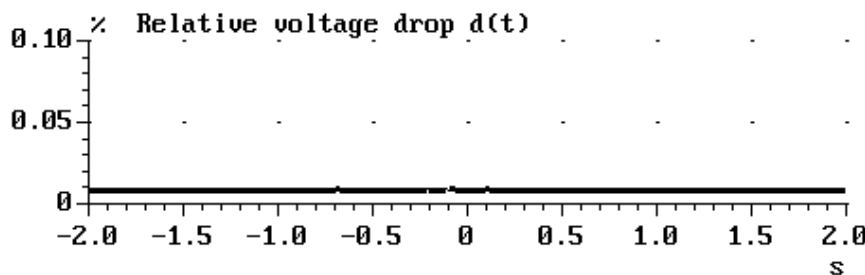
2010.07.20 10:32:42

Extreme Flicker-I M1

Note:

Physical Reference Impedance

U: 230.5 V I: 166.5 mA f: 50.000 Hz PF: 0.373



App1: CLASS C&D

(13113_00)

Next measure

Change to table

Refresh time graph

Write to disk

Select module



6 Electrostatic Discharge Immunity Test

6.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

6.2 Test Configuration and Procedure

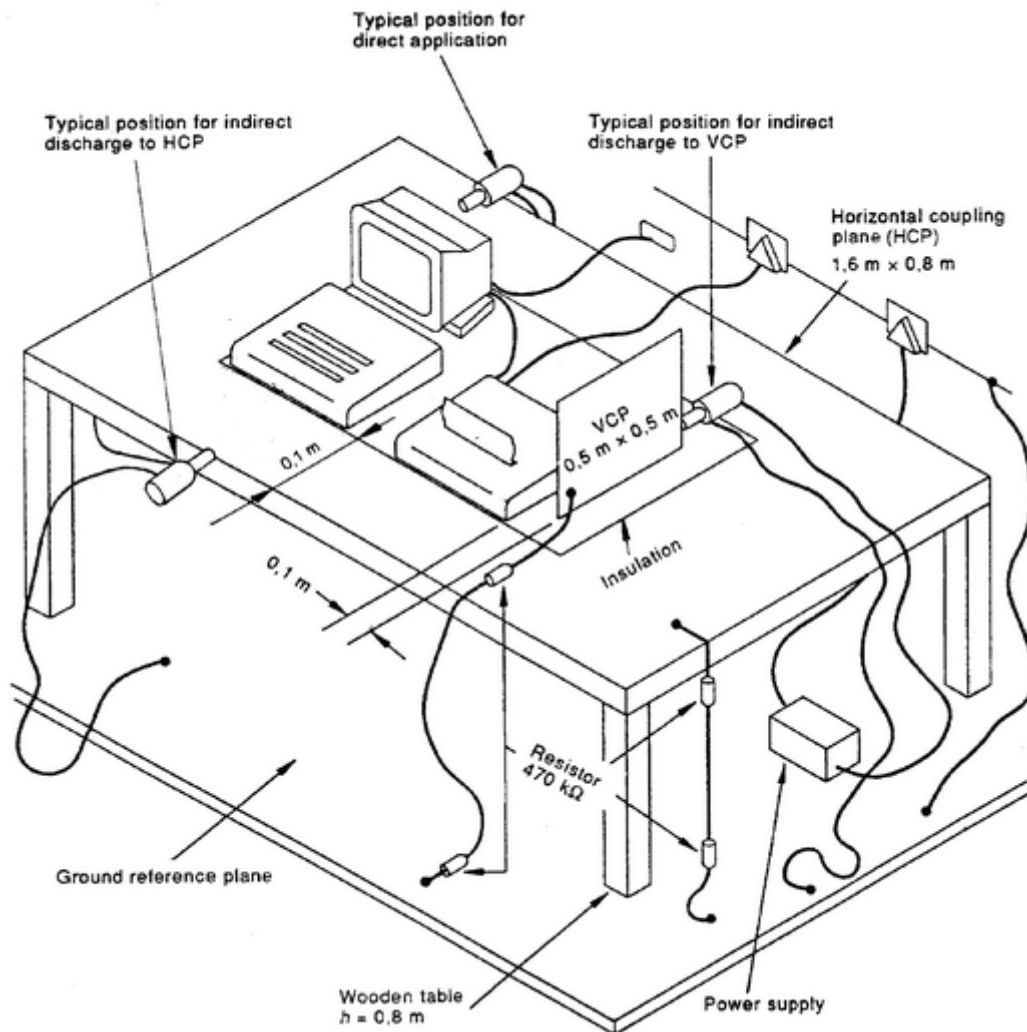


Table-top Equipment

- 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.

6.3 Test Result

6.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
27°C	36%RH	1003.7mbar

6.3.2 Observation of Direct Discharge

Test Points: 1. Surface of Case. 2. Junction of Case. 3. Screws. 4. RJ45 Jack. 5. USB Jack.
6. DC Power Jack. 7. Button. 8. Switch. 9. LED Indicators.

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)	±	1~9	20/ per point	B	A	Pass
Contact Discharge	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 air discharge. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of contact discharge.						

6.3.3 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.

7 Radio-frequency, Electromagnetic Field Immunity Test

7.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

7.2 Test Configuration and Procedure

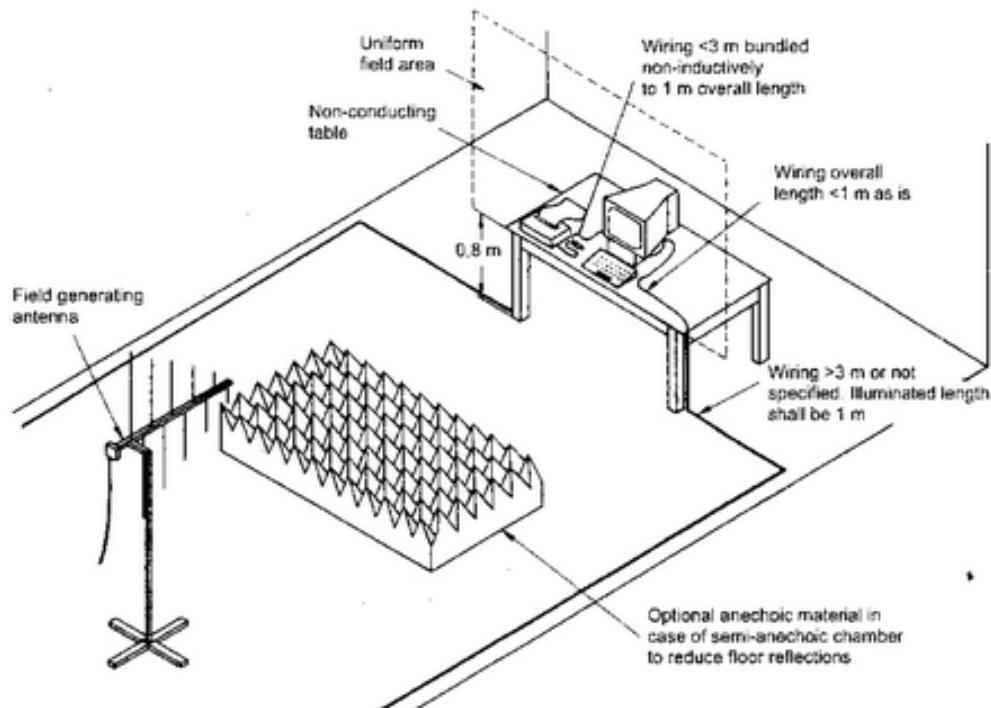


Table-top Equipment

- 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..

7.3 Test Result

7.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
25.1°C	34%RH	1007.5mbar

7.3.2 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.

8 Electrical Fast Transient Test

8.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

8.2 Test Configuration and Procedure

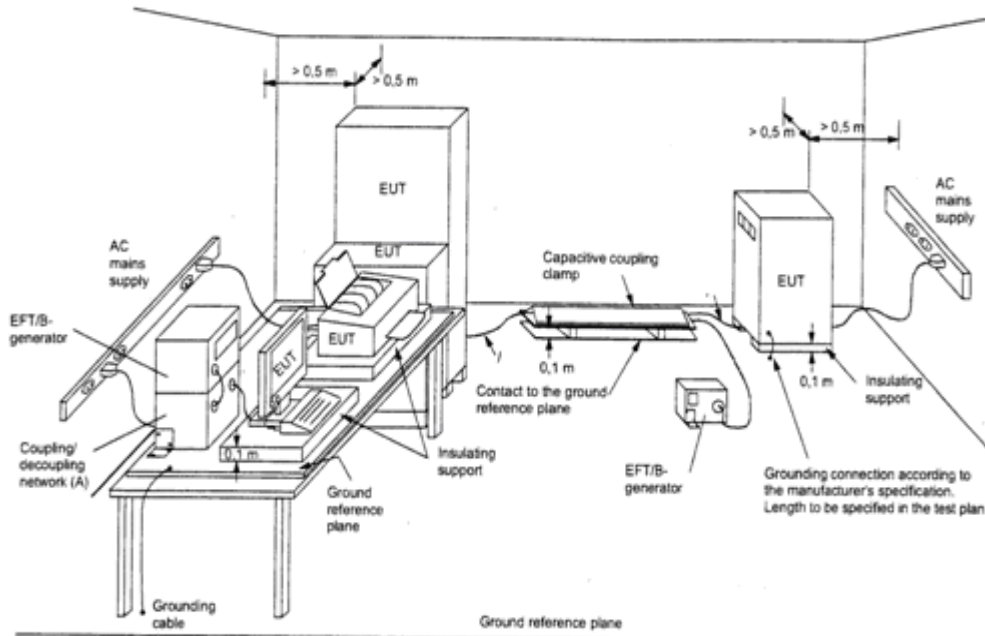


Table-top Equipment

- 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 lines 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.

8.3 Test Result

8.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
25.1°C	34%RH	1007.5mbar

8.3.2 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	N/A	N/A
L + N	±1	60	5	5/50	B	A	Pass
L + PE	±1	60	5	5/50	B	N/A	N/A
N + PE	±1	60	5	5/50	B	N/A	N/A
L + N +PE	±1	60	5	5/50	B	N/A	N/A
Remark	No temporary degradation or loss of function has been observed throughout the entire test.						
Note	Phase Shifting:0°,90°,180°,270°,360°						

8.3.3 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.

9 Surge Immunity Test

9.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

9.2 Test Configuration and Procedure

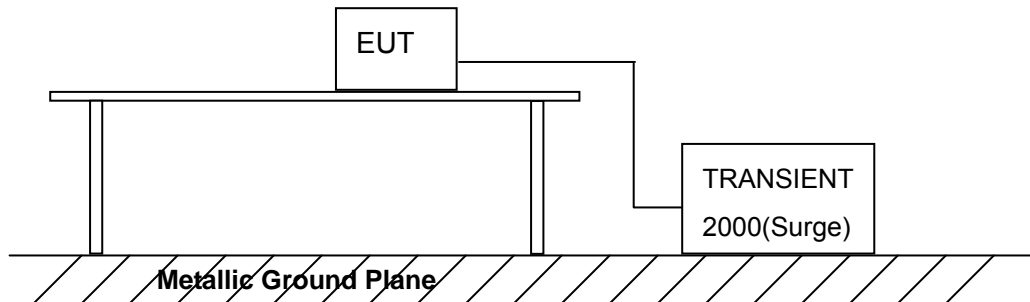


Table-top Equipment

- 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.

9.3 Test Result

9.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
25.1°C	34%RH	1007.5mbar

9.3.2 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	N/A	N/A
N ► PE	±0.5, 1,2	5	1	B	N/A	N/A
Remark	No temporary degradation or loss of function has been observed throughout the entire test.					

9.3.3 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

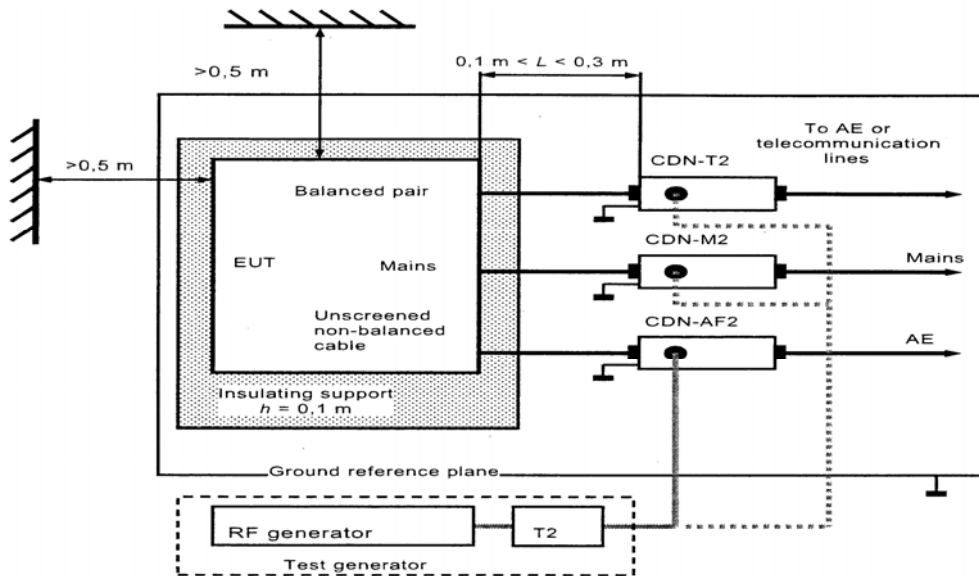
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

10 Radio-frequency, Conducted Disturbances Immunity Test

10.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

10.2 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.

10.3 Test Result

10.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
25.1°C	34%RH	1007.5mbar

10.3.2 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/ 130dB μ V	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:0°,90°,180°,270°,360°					

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 Power Frequency Magnetic Field Immunity Test

11.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

11.2 Test Configuration and Procedure

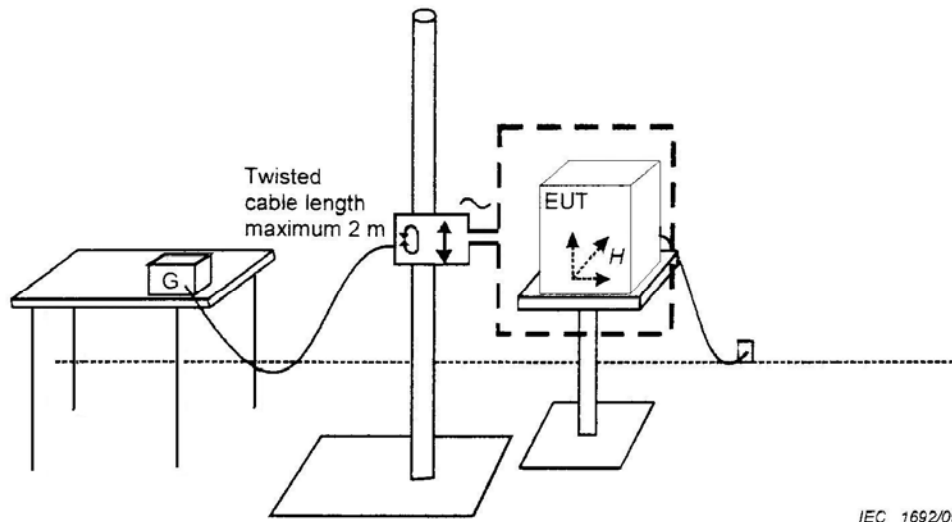


Table-top Equipment

- 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.

11.3 Test Result

11.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
25.1°C	34%RH	1007.5mbar

11.3.2 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

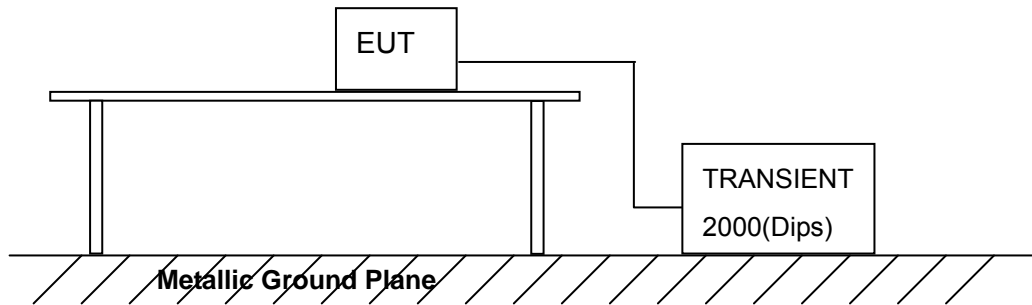
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

12 Voltage Dips, Short Interruptions Immunity Test

12.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

12.2 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.

12.3 Test Result

12.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
25.1°C	34%RH	1007.5mbar

12.3.2 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	C	Pass
Remark	When testing Voltage Dip with residual voltage 4% of normal power supply, the EUT shut down automatically. When the supply voltage became normal, the EUT required operator intervention to recover its function.					

PASS

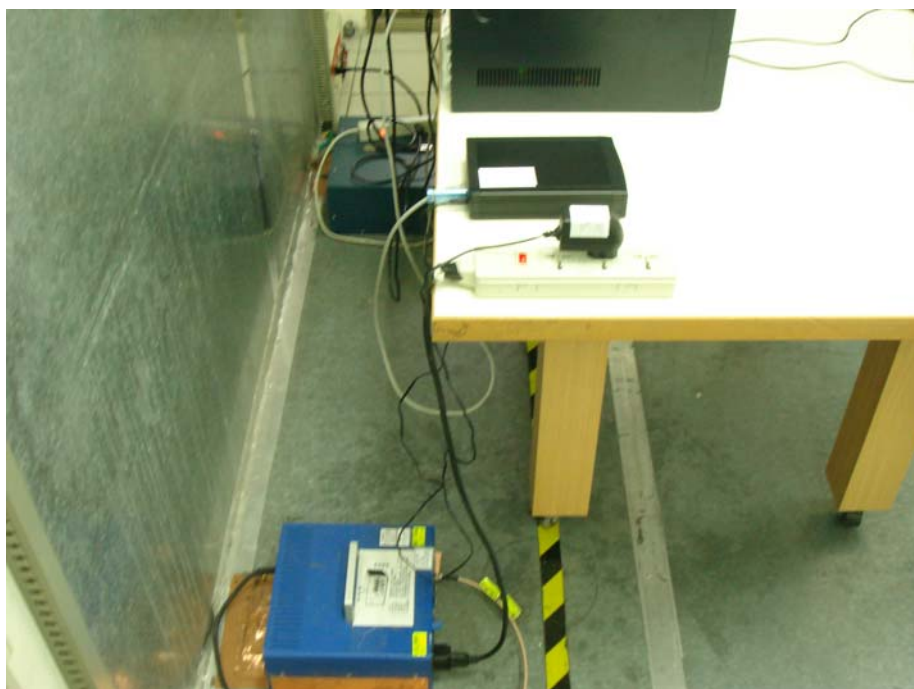
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 55024.

13 Photographs of Test

13.1 Power Line Conducted Test



Front View



Rear View

13.2 Radiated Emission Test



Front View



Rear View

13.3 Harmonic Current & Voltage Fluctuations and Flicker Measurement



13.4 Electrostatic Discharge Immunity Test



13.5 Radio-frequency, Electromagnetic Field Immunity Test



13.6 Electrical Fast Transient / Burst Immunity Test



13.7 Surge Immunity Test



13.8 Radio-frequency, Conducted Disturbances Immunity Test



13.9 Power Frequency Magnetic Field Immunity Test



13.10 Voltage Dips, Short Interruptions Immunity Test



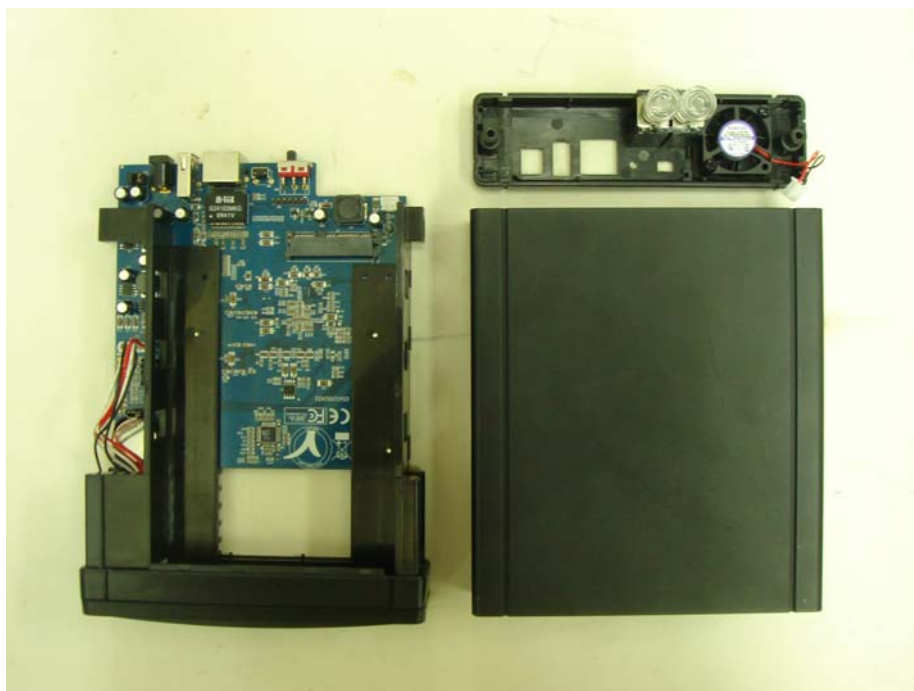
14 Photographs of EUT



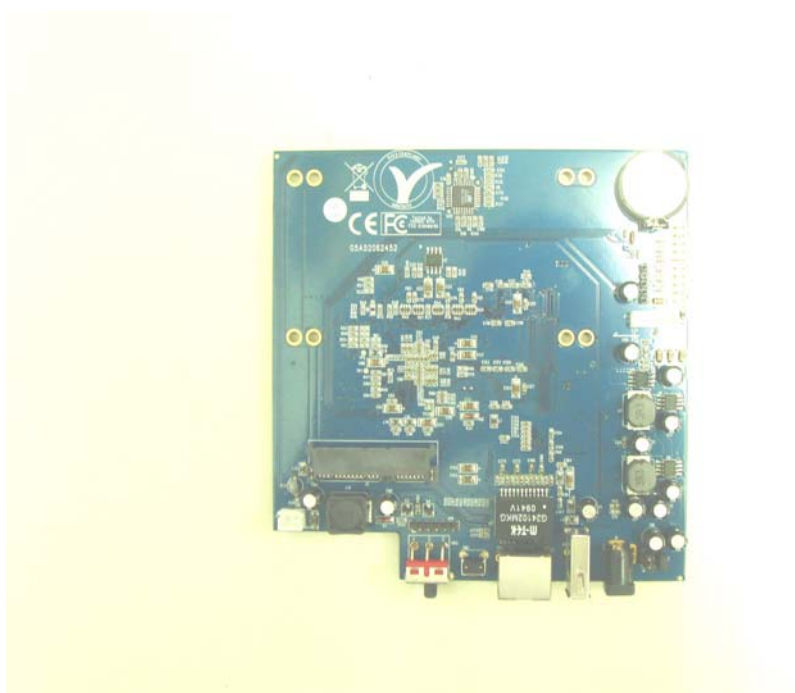
Front View of the EUT



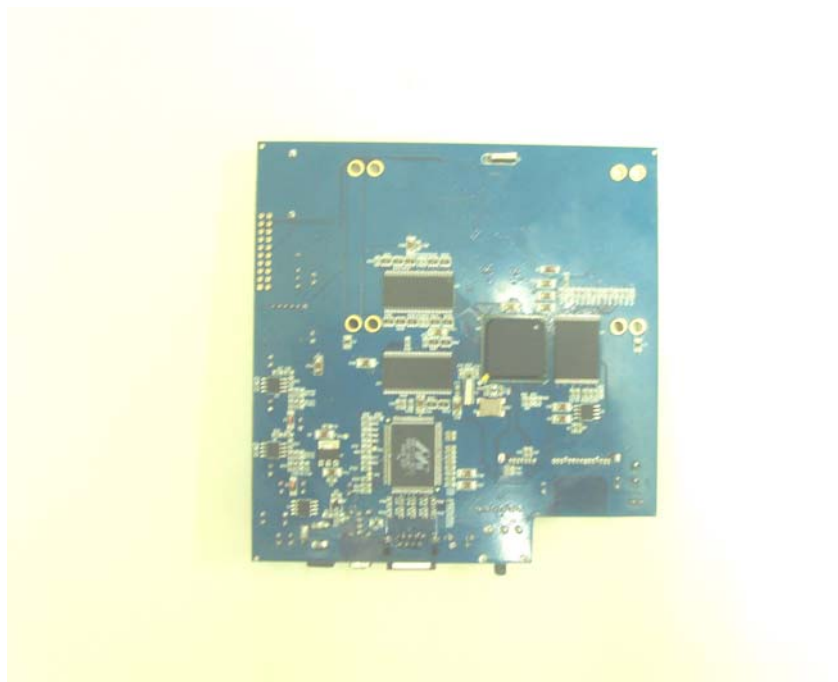
Rear View of the EUT



Inside View of the EUT



Front View of the PCB



Rear View of the PCB



View of the EUT's Adapter



View of the EUT's Fan



View of the RJ45 Cable

15 Photographs of ESD Test Points



View of ESD Test Points



View of ESD Test Points



View of ESD Test Points