



EMC Test Report



Applicant :	National Energy Technology Co., Ltd.
Address of Applicant :	3F, 48-1 Chun Shan RD., Tu-Cheng Industry Park, Tu-Cheng Dist., New Taipei City, Taiwan 23680 R.O.C
Equipment Under Test :	Intelligent Generator Starting System
Model Number :	APS28A1
Series :	N/A

Matrix Test Laboratory
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Verification

Applicant : National Energy Technology Co., Ltd.
Manufacturer : National Energy Technology Co., Ltd.
Equipment Under Test : Intelligent Generator Starting System
Model Number : APS28A1
Series : N/A
Sample Received Date : 2011-12-19
Test Standard :

Emission:	Immunity:
<input checked="" type="checkbox"/> EN 60204-2:2006	<input checked="" type="checkbox"/> EN 60204-2:2006
<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+A2:2010
	<input checked="" type="checkbox"/> IEC 61000-4-4:2004+A1:2010
	<input checked="" type="checkbox"/> IEC 61000-4-5:2005
	<input checked="" type="checkbox"/> IEC 61000-4-6:2008
	<input checked="" type="checkbox"/> IEC 61000-4-8:2009
	<input checked="" type="checkbox"/> IEC 61000-2-2:2002

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 60204-2 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: 2012-01-02

Jody Peng/ ADM. Dept Staff

Tested by: _____

Kidd Liao

Date: 2011-12-30

Kidd Liao/ ENG. Dept. Staff

Approved by: _____

Peter Chin

Date: 2012-01-02

Peter Chin/ Head of Laboratory

Summary of Test Result - Emission

Emission			
Test Standard	Test Item	Test Result	Remark
EN 60204-2 Category C2	Conducted Emission	Pass	Highest Emission L: 14.063MHz, Q.P.53.08dBuV, Margin -19.92 dB A.V.45.26dBuV, Margin -14.74 dB N: 1.359MHz, Q.P.48.82dBuV, Margin -24.18 dB A.V.45.52dBuV, Margin -14.48 dB
EN 60204-2 Category C2	Radiated Emission	Pass	Highest Emission H: 160.950MHz, 32.37dBuV, Margin-7.63 dB Antenna Height 2.59 m, Turntable Angle 102° V: 165.800MHz, 33.68dBuV, Margin-6.32 dB Antenna Height 1.31 m, Turntable Angle 115°
IEC61000-3-2	Harmonic	Pass	Refer to Page 20
IEC61000-3-3	Flicker	Pass	Refer to Page 23

Measurement Uncertainty – Emission

The following measurement uncertainty has been calculated for Emission Tests performed on the EUT as specified in CISPR 16-4-2:

Test Item		Uncertainty
Conducted Emission		± 3.61dB
Radiated Emission	Below 1GHz	± 5.04dB
	Above 1GHz	± 4.97dB

This reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately 95%.

Summary of Test Result – Immunity

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	B	A	Pass
IEC61000-2-2	Low Frequency Signals Immunity Test	A	A	Pass

Measurement Uncertainty – Immunity

It has been demonstrated that the test equipments for the above Immunity Tests meet the specified requirements in the standard with at least a 95% confidence.

1 General Description

1.1 Description of EUT

Equipment Under Test	:	Intelligent Generator Starting System
Model Number	:	APS28A1
Series	:	N/A
Applicant Address of Applicant	:	National Energy Technology Co., Ltd. 3F, 48-1 Chun Shan RD., Tu-Cheng Industry Park, Tu-Cheng Dist., New Taipei City, Taiwan 23680 R.O.C
Manufacturer Address of Manufacturer	:	National Energy Technology Co., Ltd. 3F, 48-1 Chun Shan RD., Tu-Cheng Industry Park, Tu-Cheng Dist., New Taipei City, Taiwan 23680 R.O.C
Power Supply	:	AC 230V, 50H Power Cord: 3 Pin <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
Data Cable	:	<input checked="" type="checkbox"/> N/A
Description of EUT	:	Dimensions : 420±2.5 mm (L) X 245±2.5 mm (W) X 380±2.5 mm (H) Weight : 30 Kg Position : <input checked="" type="checkbox"/> Table-top / <input type="checkbox"/> Floor-standing Category of Equipment : <input type="checkbox"/> C1 <input checked="" type="checkbox"/> C2 <input type="checkbox"/> C3 <input type="checkbox"/> C4 Intended Function : The EUT is a Intelligent Generator Starting System.

1.2 Test Facility

Conducted Emission, Harmonic, Flicker, Electrostatic Discharge, Electrical Fast Transient, Surge, Conducted Susceptibility, Low Frequency Signals Immunity Tests are performed at 2F, No.146, Jian Yi Rd., Chung-Ho District, New Taipei City, Taiwan, R.O.C.

Radiated Emission, Radiated Susceptibility, Magnetic Field Tests are performed at No. 15-1, Cweishuh Keng, Cweipin Village, Linkou, New Taipei City, Taiwan, R.O.C.

1.3 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	2011-05-12	Conducted Disturbance
L.I.S.N.	EMCIS	LN2-16	LN04023	2011-01-26	
Pulse Limiter	Mess Tec	PL10	N/A	2010-11-30	
RF Cable	N/A	N/A	N/A	2010-10-05	
Coupling AND Decoupling Network	SCHAFFNER	ISN T400	16832	2010-10-08	Conducted Disturbance at Telecommunication Port
RF Current Probe	FCC	F-33-4	53	2011-6-19	
EMI Receiver	R&S	ESCI	100615	2011-02-24	Conducted Disturbance Radiated Disturbance
Bilog Antenna	Teseq GmbH	CBL6111D	25769	2011-03-02	Radiated Disturbance
Pre-Amplifier	WIRELESS	FPA-6592G	60009	2011-07-08	
Spectrum Analyzer	R & S	FSL6	100564	2011-06-15	
RF Cable	MIYAZAKI	8D-F8	N/A	2011-02-08	
Programmable AC Source	Chroma	6520	2048	2011-01-24	Harmonic, Flicker
Universal Power Analyzer	Chroma	6630	0597	2011-01-24	

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

Instruments Used for Immunity Measurement

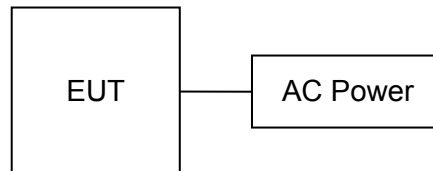
Instrument	Manufacturer	Model	Serial No.	Calibration Date	Application
ESD Simulator	Noiseken	TC-815R	ESS0868491	2011-12-13	Electrostatic Discharge
ESD Simulator	Noiseken	ESS-2002EX	ESS0868406	2011-12-13	
Antenna	EMCO	3142	9710-1221	2011-02-11	Radiated Immunity
Power Amplifier	IFI	CMX50	N/A	2011-02-25	
Signal Generator	R&S	SML03	103396	2011-01-19	
CDN	FRANKONIA	CDN M2+M3	A3011134	2011-02-26	Conducted Immunity
C.I. Test System	FRANKONIA	CIT-10/75	102C3208	2011-12-08	
Power Attenuator	FRANKONIA	75-A-FFN-06	0212	2011-12-08	
RF Cable	N/A	N/A	N/A	2011-11-30	
Antenna	FCC	F-1000-4-8/9/10-L-1M	9953	2011-03-02	Magnetic Field Disturbance
Advanced EMC Immunity Test System	KEYTEK	EMC PRO	0002255	2011-03-02	
Transient 2000	EMC PARTNER	TRA-2000	449	2010-11-08	Electrostatic Discharge, Fast Transient, Surge, Dips & Interruptions
Programmable AC Source	EXTECH	CFW-120	E990761	2011-02-08	Low Frequency Signals Immunity Test
Isolation Transformer	N/A	N/A	N/A	N/A	

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

1.4 Auxiliary Equipments

N/A

1.5 Block Diagram



1.6 Identifying the Final Test Mode (Worst Case)

1. Operation Mode 1 : Charging
2. Operation Mode 2 : Discharging

Note: After pre-test, we identified that the Operation Mode 1 (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.

1.7 Final Test Mode

Operation Mode 1

1.8 Condition of Power Supply

AC 230V ; 50Hz

1.9 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.

1.10 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.

1.11 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.

1.11.1 Test Methodology

All Emission Tests were performed according to the procedures specified in EN 62040-2. 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 62040-2.

2 Conducted Emission Test

2.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

2.2 Test Arrangement and Procedure

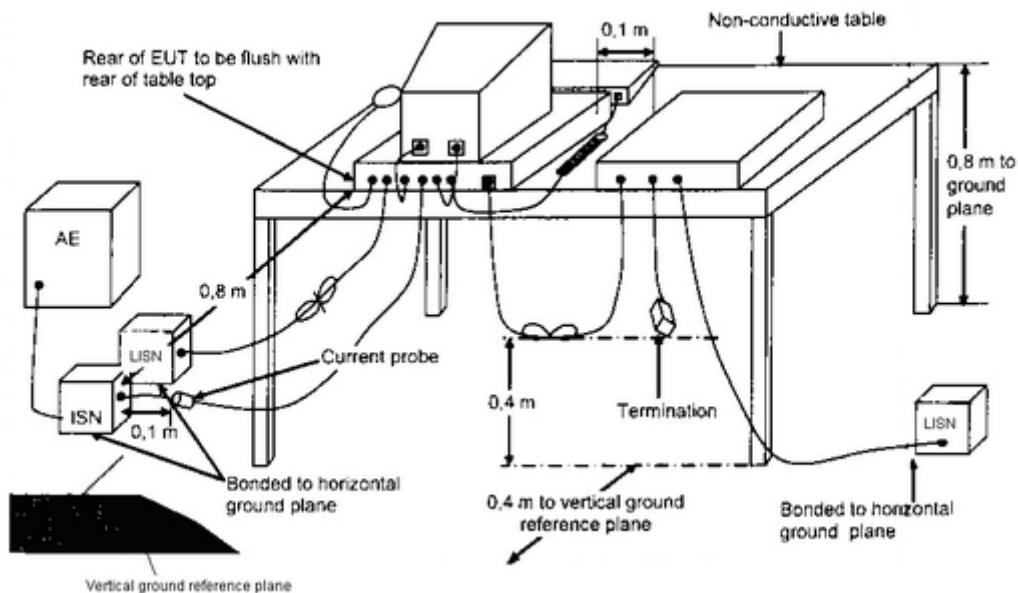


Table-top Equipment

- 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 60204-2

Frequency Range (MHz)	Limits dB(uV)			
	<input type="checkbox"/> Category C1 UPS		<input checked="" type="checkbox"/> Category C2 UPS	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.50	66 to 56	56 to 46	79	66
0.50 ~ 5.0	56	46	73	60
5.0 ~ 30	60	50	73	60

 Category C3 UPS

UPS rated output current A	Frequency Range (MHz)	Limits dB(uV)	
		Q.P. (Quasi-Peak)	A.V. (Average)
>16 - 100	0.15 ~ 0.50	100	90
	0.50 ~ 5.0	89	76
	5.0 ~ 30	90 to 70	80 to 60
>100	0.15 ~ 0.50	130	120
	0.50 ~ 5.0	125	115
	5.0 ~ 30	115	105

The EMI Receiver bandwidth was set at 9 kHz.

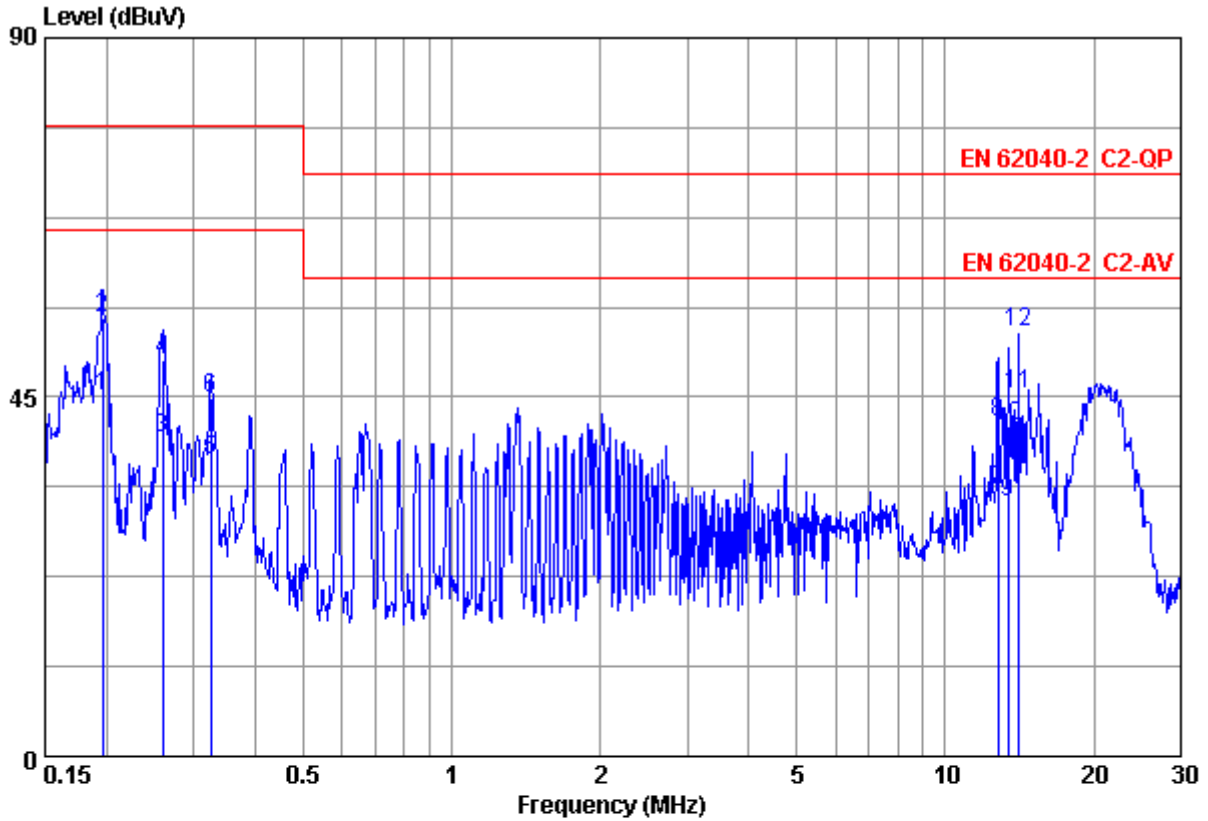
2.4 Test Result

PASS

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

Conducted Emission Test Data

Test Date : 2011-12-26 Power Line : Line
 Temperature : 23.5°C Humidity : 41%



	Freq	Level	Read Level	Over Level	Limit Line	Factor	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV	
1	0.197	45.25	34.94	-20.75	66.00	10.31	Average
2	0.197	54.92	44.61	-24.08	79.00	10.31	QP
3	0.260	39.95	29.64	-26.05	66.00	10.31	Average
4	0.260	49.70	39.39	-29.30	79.00	10.31	QP
5	0.325	37.00	26.70	-29.00	66.00	10.30	Average
6	0.325	44.85	34.55	-34.15	79.00	10.30	QP
7	12.784	33.31	22.81	-26.69	60.00	10.50	Average
8	12.784	41.83	31.33	-31.17	73.00	10.50	QP
9	13.408	31.94	21.43	-28.06	60.00	10.51	Average
10	13.408	41.33	30.82	-31.67	73.00	10.51	QP
11	* 14.063	45.26	34.74	-14.74	60.00	10.52	Average
12	@ 14.063	53.08	42.56	-19.92	73.00	10.52	QP

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

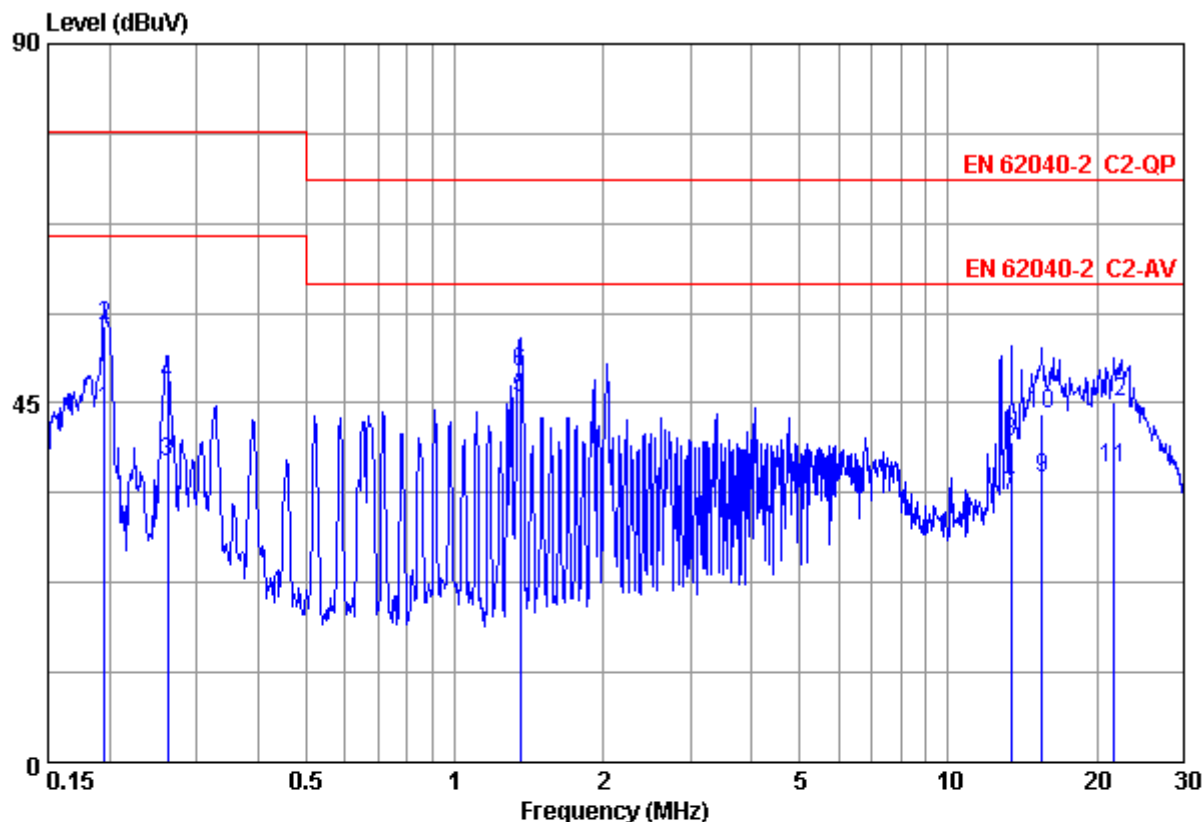
@ :Maximum QP * :Maximum AVG x :Over Limit ! :Over Margin
 Red Point(or Red Trace) For Average Detector
 Green Point(or Green Trace) For Quasipeak Detector

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 : 2011-12-26 Power Line : Neutral
 Temperature : 23.5°C Humidity : 41%



	Freq	Level	Read	Over	Limit	Factor	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV	
1	0.195	44.18	34.04	-21.82	66.00	10.14	Average
2	0.195	54.60	44.46	-24.40	79.00	10.14	QP
3	0.262	37.66	27.53	-28.34	66.00	10.13	Average
4	0.262	47.36	37.23	-31.64	79.00	10.13	QP
5	* 1.359	45.52	35.38	-14.48	60.00	10.14	Average
6	@ 1.359	48.82	38.68	-24.18	73.00	10.14	QP
7	13.408	33.44	23.08	-26.56	60.00	10.36	Average
8	13.408	40.21	29.85	-32.79	73.00	10.36	QP
9	15.470	35.53	25.12	-24.47	60.00	10.41	Average
10	15.470	43.64	33.23	-29.36	73.00	10.41	QP
11	21.715	36.84	26.28	-23.16	60.00	10.56	Average
12	21.715	45.12	34.56	-27.88	73.00	10.56	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

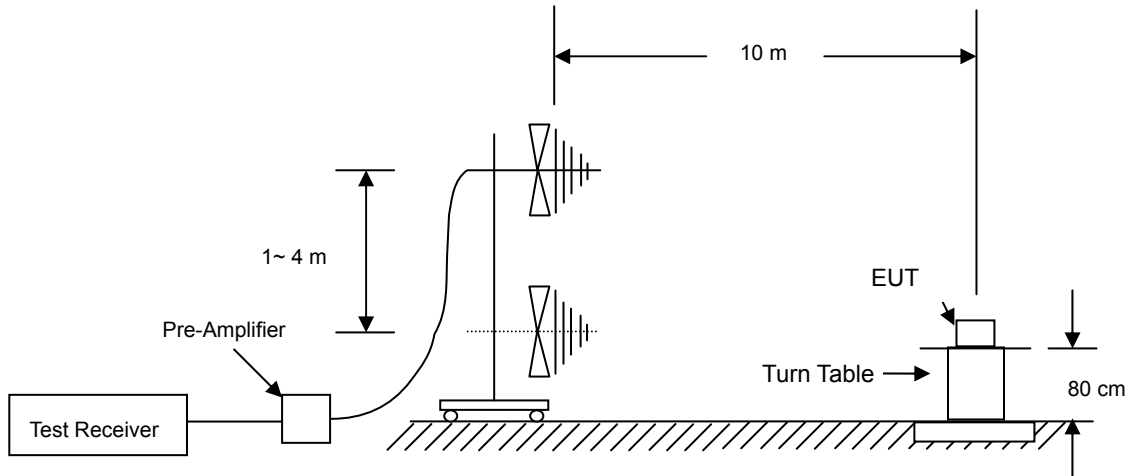


Table-top Equipment

- 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 62040-2

Frequency Range (MHz)	Quasi-Peak (dBuV/m)		
	<input type="checkbox"/> Category C1UPS	<input checked="" type="checkbox"/> Category C2UPS	<input type="checkbox"/> Category C3UPS
30 ~ 230	30	40	50
230 ~ 1000	37	47	60

The EMI test receiver bandwidth was set at 120 kHz.

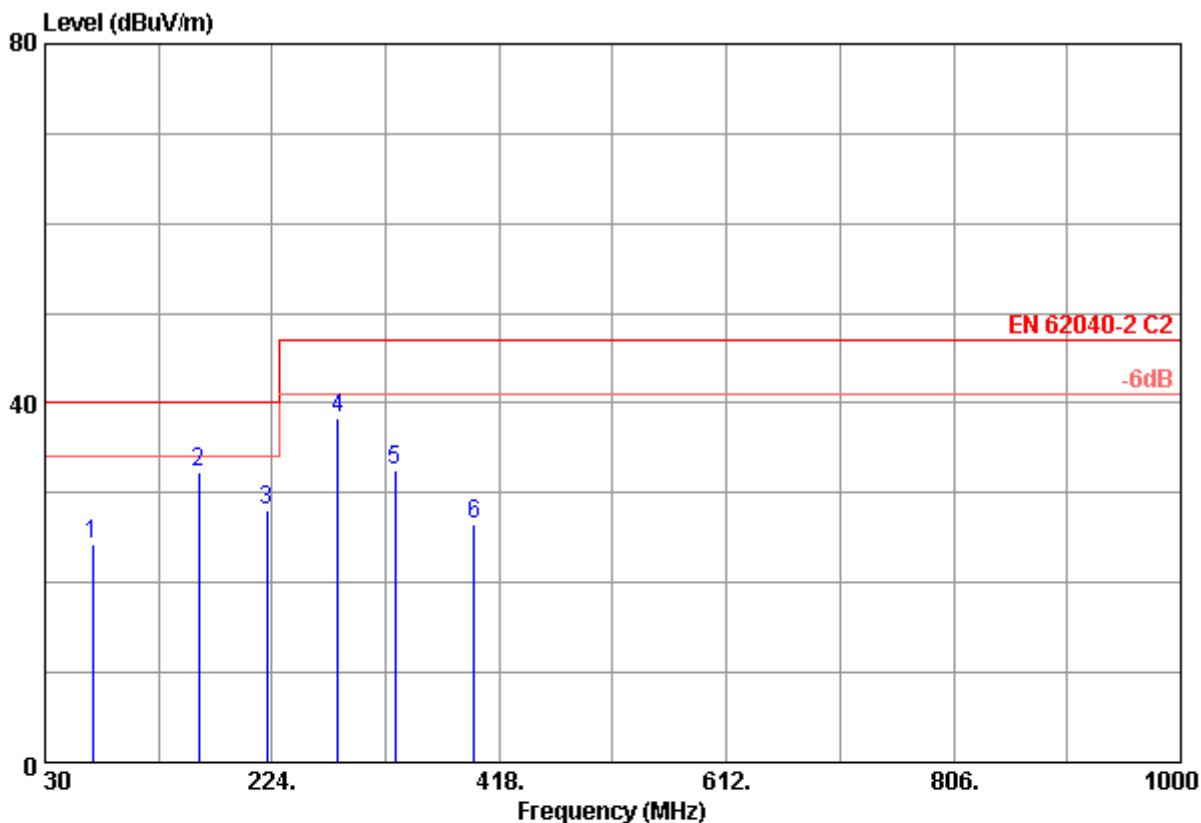
3.4 Test Result

PASS

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

Radiated Emission Test Data

Test Date : 2011-12-26 Polarization : Horizontal
 Temperature : 23.5°C Humidity : 41%



	Freq	Level	Read Level	Over Level	Limit Line	Factor	A/pos	T/pos	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV			
1	70.740	24.32	47.11	-15.68	40.00	-22.79	215	69	
2 @	160.950	32.37	55.97	-7.63	40.00	-23.60	259	102	
3	219.150	28.04	47.14	-11.96	40.00	-19.10	280	130	
4	280.260	38.41	58.06	-8.59	47.00	-19.65	312	159	
5	328.760	32.60	49.87	-14.40	47.00	-17.27	325	185	
6	396.660	26.50	42.22	-20.50	47.00	-15.72	358	219	

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

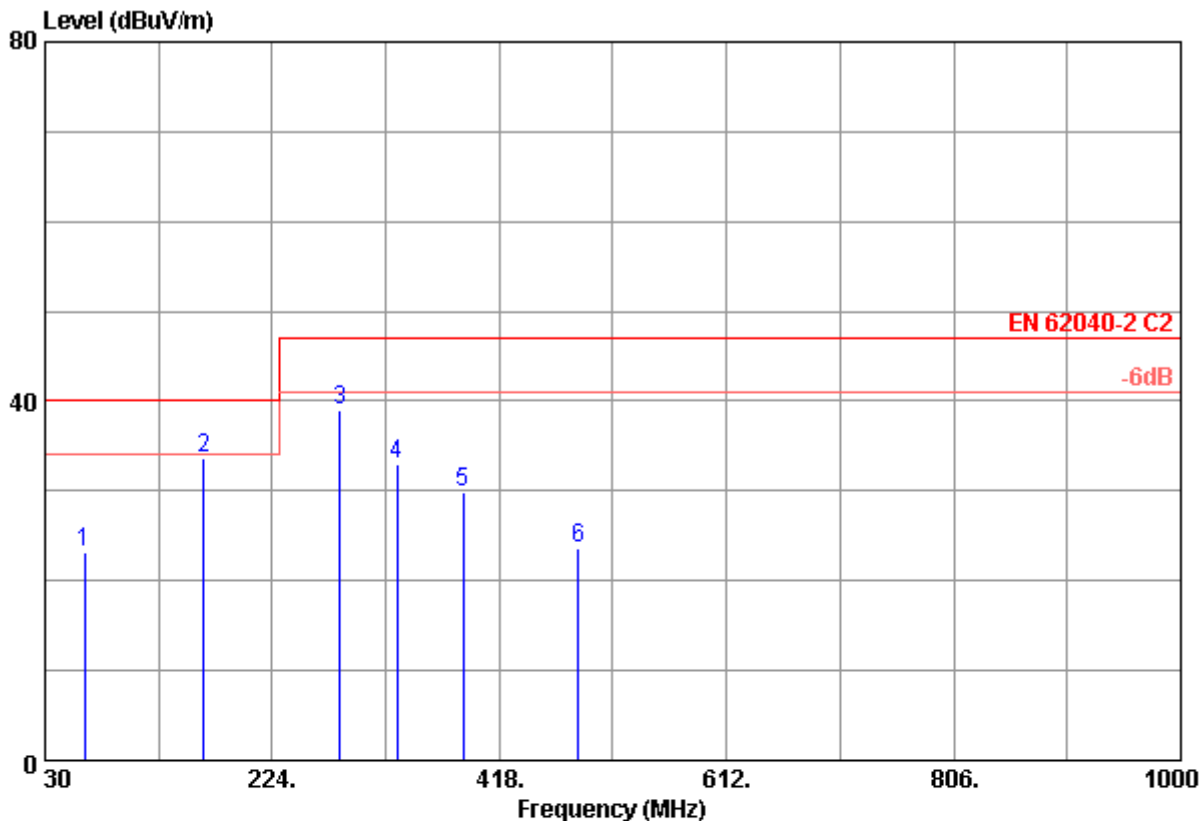
@ :Maximum Data x :Over Limit ! :Over Margin

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

Remark : All readings are Quasi-Peak values.

Radiated Emission Test Data

Test Date : 2011-12-26 Polarization : Vertical
 Temperature : 23.5°C Humidity : 41%



	Freq	Level	Read Level	Over Level	Limit Line	Factor	A/pos	T/pos	Remark
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV			
1	63.950	23.18	43.68	-16.82	40.00	-20.50	112	70	
2 @	165.800	33.68	57.20	-6.32	40.00	-23.52	131	115	
3	282.200	38.91	58.46	-8.09	47.00	-19.55	152	150	
4	330.700	32.97	50.11	-14.03	47.00	-17.14	165	180	
5	386.960	29.79	45.54	-17.21	47.00	-15.75	176	216	
6	485.900	23.70	38.08	-23.30	47.00	-14.38	188	250	

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)

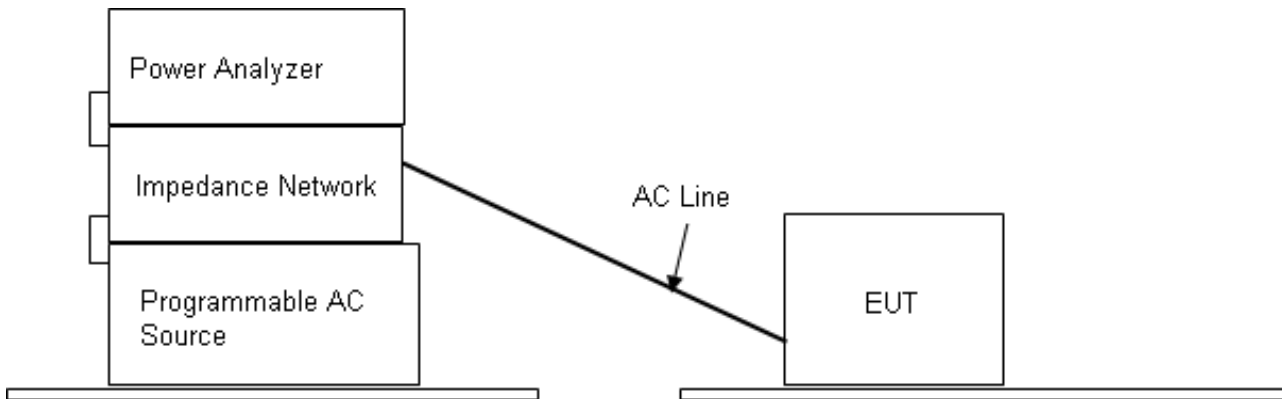
Remark : All readings are Quasi-Peak values.

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
24°C	45%RH	1023mbar

4.4 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
$15 \leq n \leq 39$	$0.15 * 15 / n$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 * 8 / n$

4.5 Test Result

PASS

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



ANALYZER 6630

2011.12.23 10:01:42

Current Harmonics

Setup: CLASSA Gen setting: 1(1) U : 229.27 V fu: 50.000 Hz
 Live Analysed periods: 4 I : 2.414 A P: 0.525 kW
 Module: M1 Limit: Class A (IEC1000) I1: 2.355 A
 Note:
 THD=22.46 % (PF=0.949) PASSED

No	A	Lim A	No	A	Lim A	No	A	Lim A
1	2.355		15	0.044	0.150	29	0.026	0.078
2	0.001	1.000	16	0.000	0.115	30	0.001	0.061
3	0.489	2.300	17	0.048	0.132	31	0.032	0.073
4	0.000	0.430	18	0.001	0.102	32	0.001	0.058
5	0.066	1.140	19	0.034	0.118	33	0.029	0.068
6	0.000	0.300	20	0.000	0.092	34	0.001	0.054
7	0.090	0.770	21	0.029	0.107	35	0.026	0.064
8	0.000	0.230	22	0.001	0.084	36	0.001	0.051
9	0.039	0.400	23	0.040	0.098	37	0.025	0.061
10	0.000	0.184	24	0.001	0.077	38	0.001	0.048
11	0.071	0.330	25	0.052	0.090	39	0.022	0.058
12	0.000	0.153	26	0.001	0.071	40	0.001	0.046
13	0.077	0.210	27	0.036	0.083			
14	0.000	0.131	28	0.001	0.066			

Current range: 10 Ap

Next measure

Change to bar graph

Relative current

Write to disk



Appl: CLASSA&B

(1212_00)

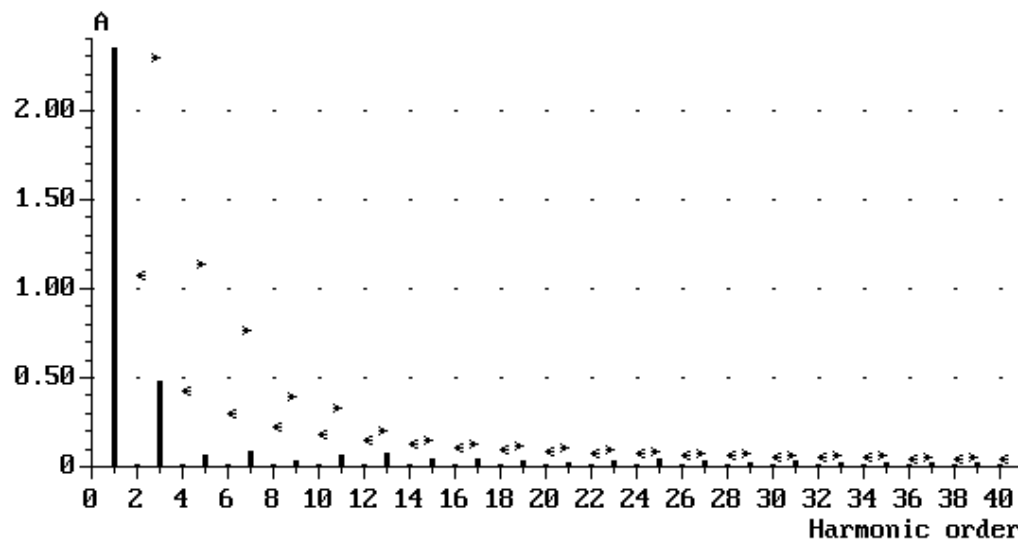


ANALYZER 6630

2011.12.23 10:01:59

Current Harmonics

Setup: CLASSA Gen setting: 1(1) U : 229.27 V fu: 50.000 Hz
 Live Analysed periods: 4 I : 2.414 A P: 0.525 kW
 Module: M1 Limit: Class A (IEC1000) I1: 2.355 A
 Note:
 THD=22.46 % (PF=0.949) PASSED



Next measure

Change to table

Relative current

Log scale

Write to disk



Appl: CLASSA&B

(1212_01)

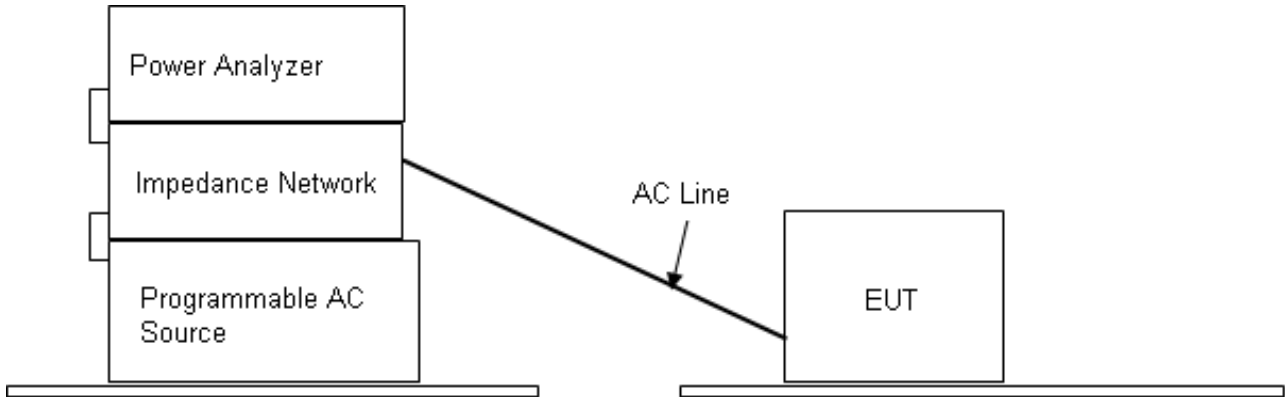
Note: The EUT power level is below 75watts therefore has no defined limits.

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
24°C	45%RH	1023mbar

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

2011.12.23 10:13:11

Extreme Flicker-I M1

Note:

Numerical Reference Impedance
U: 229.4 V I: 2.093 A f: 50.000 Hz PF: 0.940

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

Appl: CLASSA&B

(1311_00)

Next measure

Extreme time graph

Change to histogram

Write to disk

Select module



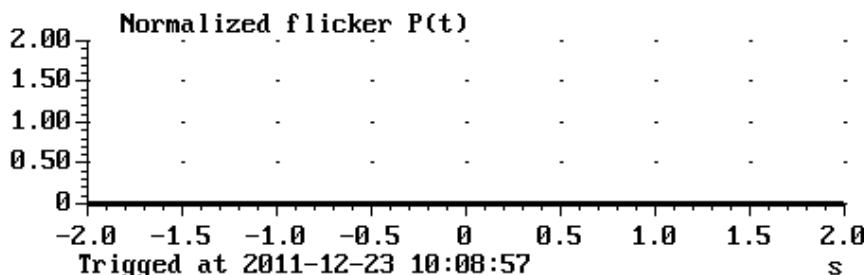
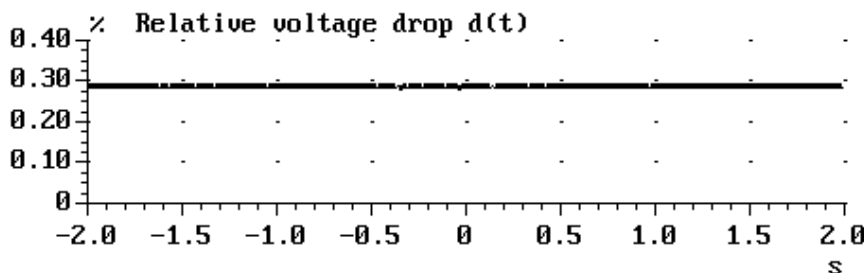
ANALYZER 6630

2011.12.23 10:13:26

Extreme Flicker-I M1

Note:

Numerical Reference Impedance
U: 229.4 V I: 2.093 A f: 50.000 Hz PF: 0.940



Appl: CLASSA&B

(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

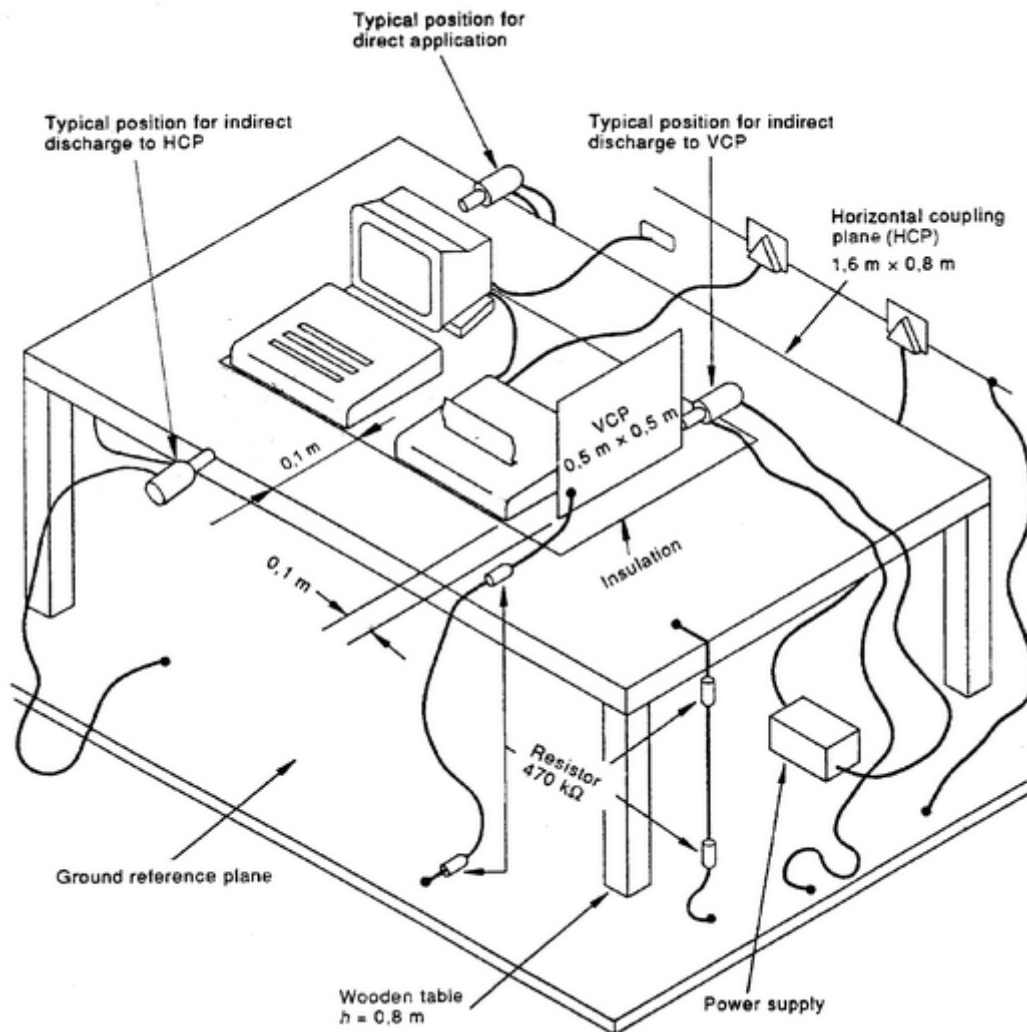


Table-top Equipment

- 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
23.5°C	41%RH	1026mbar

6.3.2 Observation of Direct Discharge

Test Points: 1. Surface of Case. 2. Junction of Case. 3. Screws. 4. LED Indicator. 5. Buttons.
6. Display.

Type of Discharge	Test Specifications				Performance Required by EN62040-2	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
Air Discharge	2,4,8 (kV)	±	1~6	20/ per point	B	A	Pass
Contact Discharge	2,4 (kV)	±	1~3	20/ 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 EN62040-2	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
HCP Application	2,4 (kV)	±	1~4	20/ per point	B	A	Pass
VCP Application	2,4 (kV)	±	1~4	20/ 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 62040-2.

7 Radio-frequency, Electromagnetic Field Immunity Test

7.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

7.2 Test Configuration and Procedure

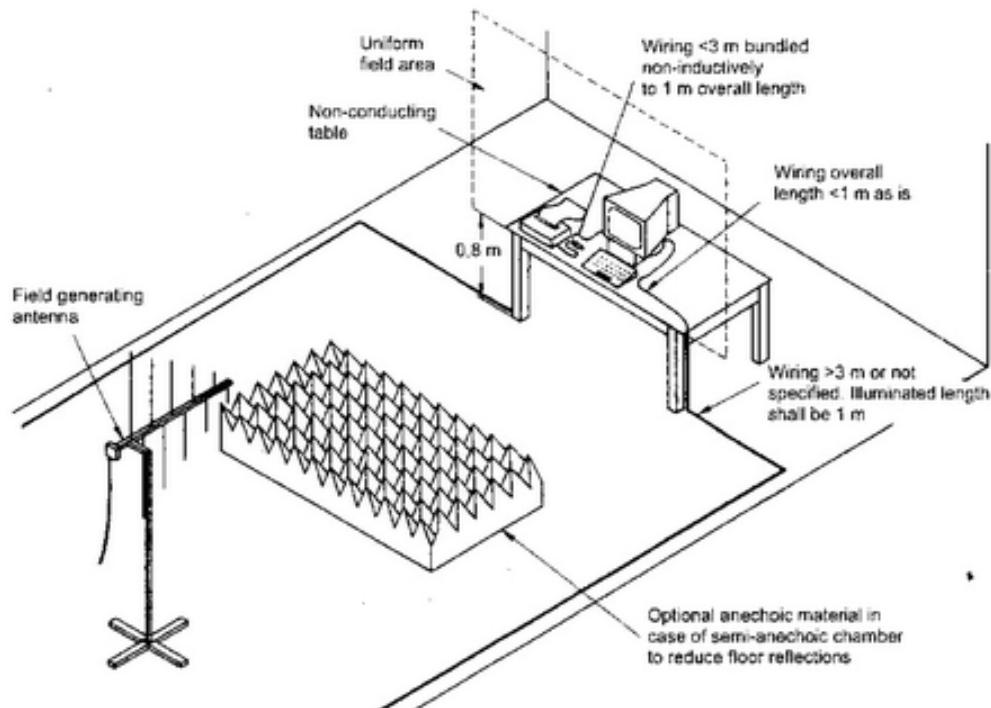


Table-top Equipment

- 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
23.55°C	41%RH	1026mbar

7.3.2 Observation of Test

Type of Modulation	Test Specifications			Performance Required by EN62040-2	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 62040-2.

8.3 Test Result

8.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
23.5°C	41%RH	1026mbar

8.3.2 Observation of Power Supply Port

Coupling Selection	Test Specifications				Performance Required by EN 62040-2	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: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 62040-2.

9 Surge Immunity Test

9.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

9.2 Test Configuration and Procedure

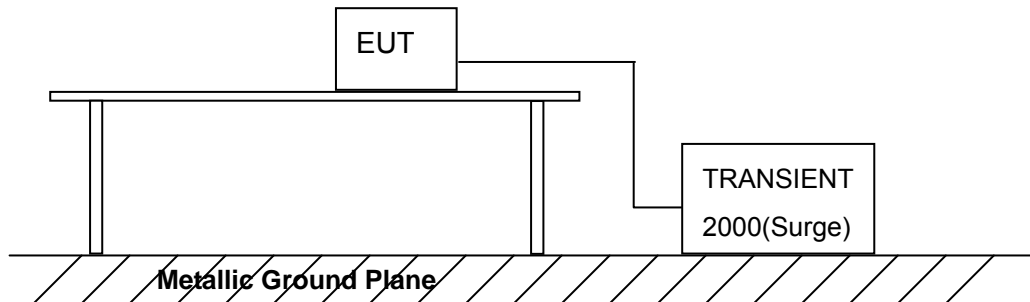


Table-top Equipment

- 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
23.5°C	41%RH	1026mbar

9.3.2 Observation of Power Supply Port

Coupling Selection	Test Specifications			Performance Required by EN 62040-2	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.					

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

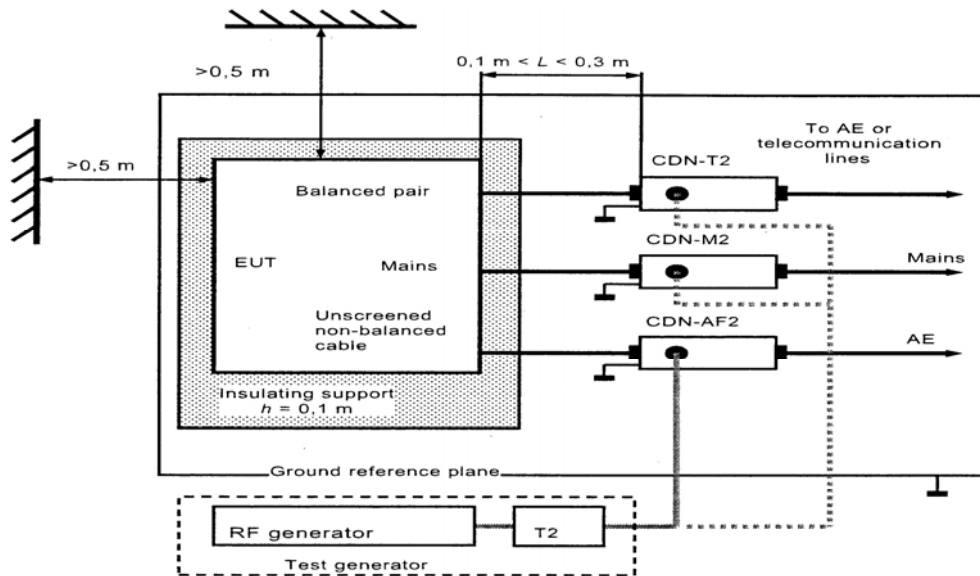
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 62040-2.

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
23.5°C	41%RH	1026mbar

10.3.2 Observation of Test

Type of Modulation	Test Specifications			Performance Required by EN 62040-2	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 62040-2.

11 Power Frequency Magnetic Field Immunity Test

11.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

11.2 Test Configuration and Procedure

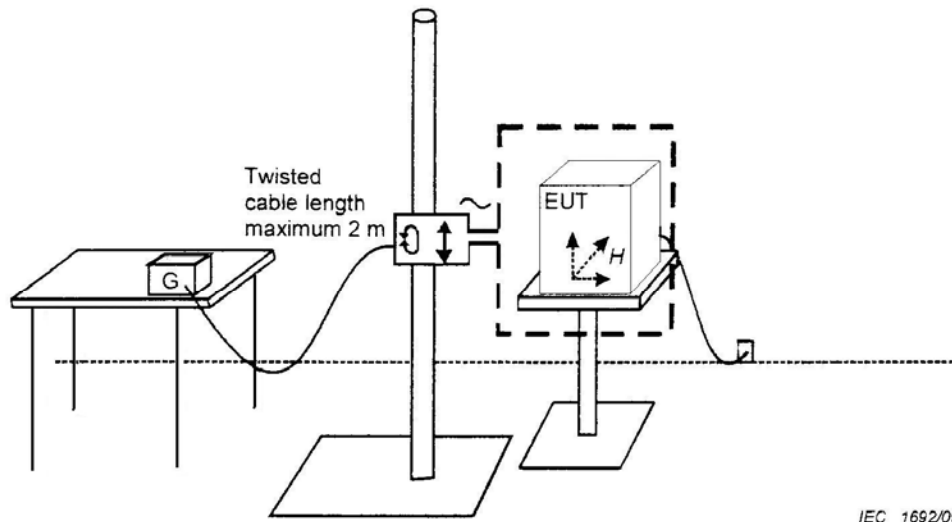


Table-top Equipment

- 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
23.5°C	41%RH	1026mbar

11.3.2 Observation of Test

Level (A/m)	Frequency (Hz)	Performance Required by EN62040-2	Observed Result	Verdict
30	50	B	A	Pass
Remark	No temporary degradation or loss of function has been observed throughout the entire test.			

PASS

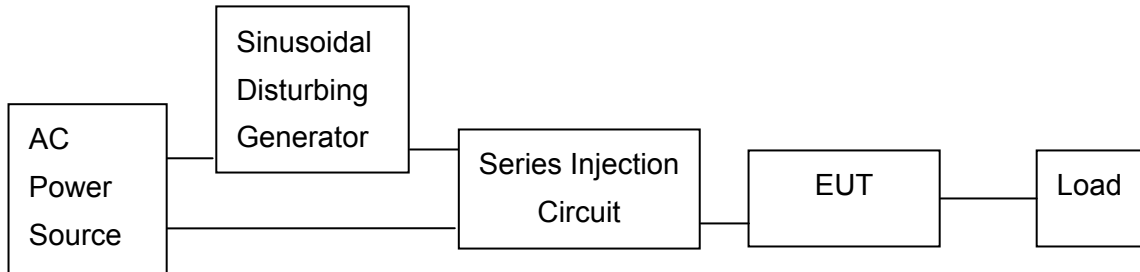
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 62040-2.

12 Low Frequency Signals Immunity Test

12.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

12.2 Test Configuration and Procedure



- Let U.P.S. to be under charging and line status
- Adjust programmable AC source to output a 10Vrms (sine wave from 140 to 360Hz) that can be induced 10Vrms to link between AC source and U.P.S.(through the isolation transformer).
- The induced signals shall mixed in normal AC source and U.P.S. shall withstand it and no performances shall be reduced

12.3 Test Result

12.3.1 Environment Condition

Temperature	Humidity	Atmospheric Pressure
23.5°C	41%RH	1026mbar

12.3.2 Observation

Frequency Range (Hz)	Strength	Required by EN 62040-2	Observed Result	Verdict
140~360	10V (rms) Sinusoidal	A	A	Pass
Remark: No temporary degradation or loss of function has been observed throughout the entire test.				

PASS

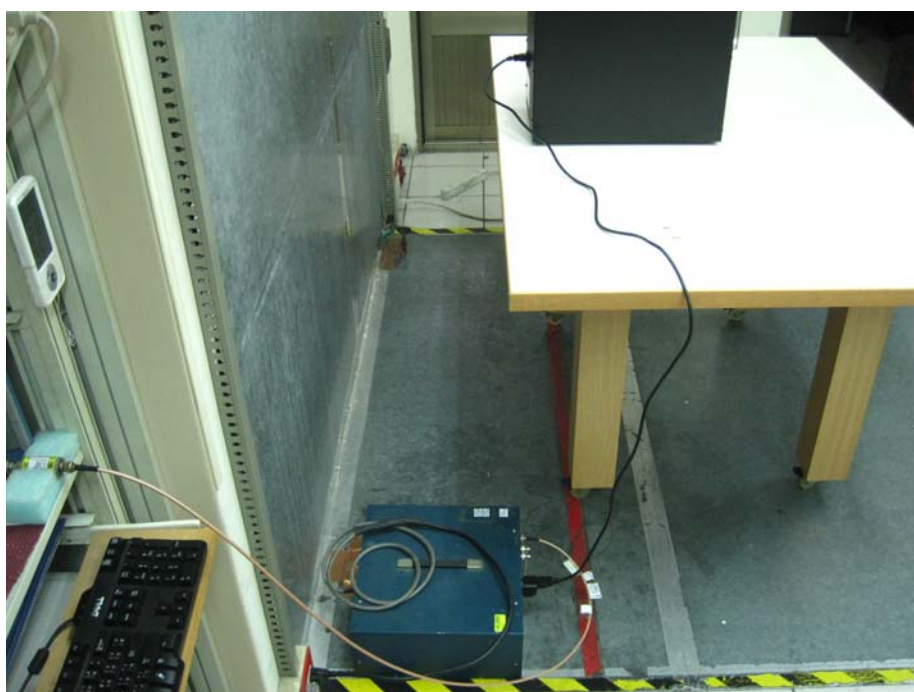
The test result shows that the EUT is in compliance with the test performance criteria specified in EN 62040-2.

13 Photographs of Test

13.1 Power Line Conducted Test



Front View



Rear View

13.2 Radiated Emission Test

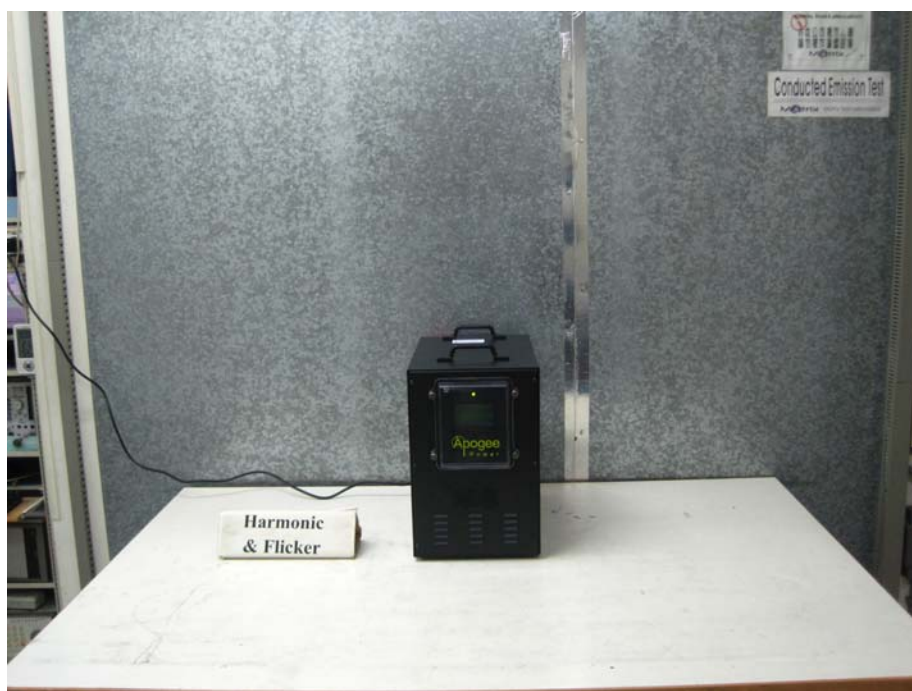


Front View



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 Low Frequency Signals Immunity Test

14 Photographs of EUT



Front View of the EUT



Rear View of the EUT



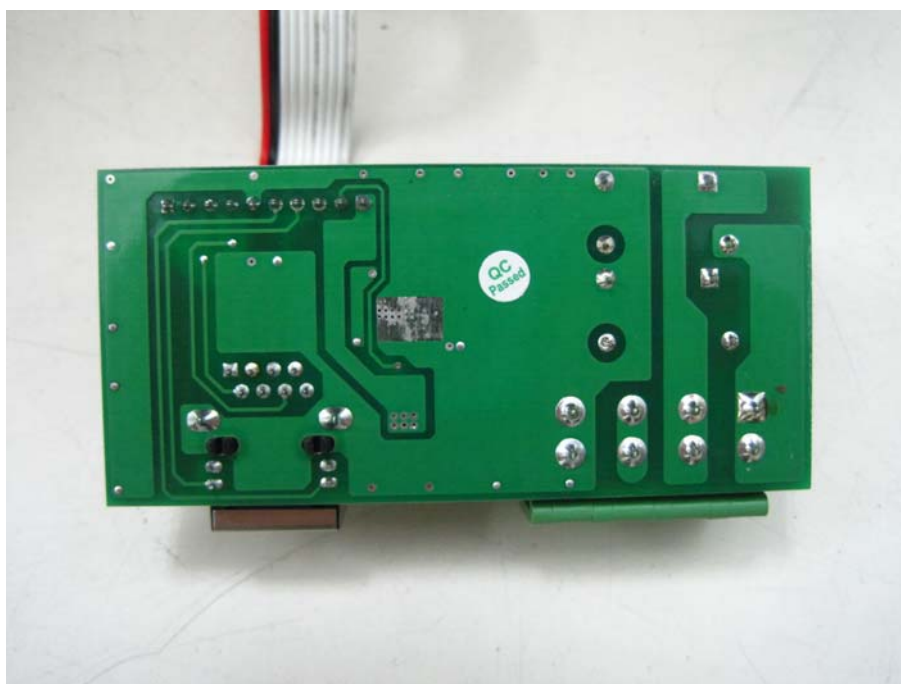
Inside View of the EUT-1



Inside View of the EUT-2



Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2



View of the Power Cable

15 Photographs of ESD Test Points



View of ESD Test Points



View of ESD Test Points



View of ESD Test Points



View of ESD Test Points