EMC TEST REPORT

Reference No. : WT09103522-S-E-E

Applicant : Gembird Electronics Ltd.
Address : 2F, B Bulding, Shifeng Science and technology Park, Huaning Road, Xinwei Village Dalang Street, Longhua, Bao An, Shenzhen, China

Equipment Under Test (EUT) :

Product Name : UPS
Model No. : UPS-PC-652A, UPS-PC-850AP, UPS-PC-1202AP

Standards : EN 62040-2:2006
EN 61000-3-2:2006
EN 61000-3-3:2008

Date of Test : Oct. 23~25, 2009
Date of Issue : Oct.27,2009
Test Engineer : Zero Zhou
Reviewed By : Philo zhou

Test Result :	**PASS ***

Prepared By:
Waltek Services (Shenzhen) Co., Ltd.
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* The sample detailed above has been tested to the requirements of Council Directives 2004/108/EC. The test results have been reviewed against the Directives above and found to meet their essential requirements.

1 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Mains Terminal Disturbance Voltage, 150kHz to 30MHz	EN 62040-2:2006	EN 62040-2:2006	Table 1of EN 62040-2	PASS
Radiation Emission, 30MHz to 1000MHz	EN 62040-2:2006	EN 62040-2:2006	Table 3 of EN 62040-2	PASS
Harmonic Emission on AC, 100Hz to 2kHz	EN 61000-3-2 : 2006	EN 61000-3-2 : 2006	Clause 7 of EN61000-3-2	PASS
Flicker Emission on AC	EN 61000-3-3:2008	EN 61000-3-3:2008	Clause 5 of EN61000-3-3	PASS
ESD	EN 62040-2:2006	EN 61000-4-2 :1995 + A1:1998+A2:2001	±4 kV Contact ±8 kV Air	PASS
Radiated Immunity (80MHz to 1GHz)	EN 62040-2:2006	EN 61000-4-3 :2006	3V/m, 80%, 1kHz, Amp. Mod.	PASS
Electrical Fast Transients (EFT) on AC and DC	EN 62040-2:2006	EN 61000-4-4 :2004	AC ±1.0kV	PASS
Surge Immunity on AC	EN 62040-2:2006	EN 61000-4-5 :2006	±1kV D.M.† ±2kV C.M.‡	PASS
Injected Currents on AC & DC, 150kHz to 80MHz	EN 62040-2:2006	EN 61000-4-6 2007	3Vrms(emf), 80%, 1kHz Amp. Mod.	PASS
Power frequency magnetic field immunity	EN 62040-2:2006	EN 61000-4-8 :1993+A1:2001	3A/m	N/A
Voltage Dips and Interruptions on AC	EN 62040-2:2006	EN 61000-4-11 :2004	＞95 % U_T* for 250per 70 % U_T* for 5per ＞95 % U_T* for 0.5per	N/A

Remark:

A.M. Amplitude Modulation.

P.M. Pulse Modulation.

† D.M. – Differential Mode

* U_T is the nominal supply voltage

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3 General Information

3.1 Client Information

Applicant: Gembird Electronics Ltd.
Address Of Applicant: 2F, B Bulding, Shifeng Science and technology Park, Huaning Road, Xinwei Village Dalang Street, Longhua, Bao An, Shenzhen, China

Manufacturer: Gembird Electronics Ltd.
Address Of Manufacturer: 2F, B Bulding, Shifeng Science and technology Park, Huaning Road, Xinwei Village Dalang Street, Longhua, Bao An, Shenzhen, China

3.2 General Description of E.U.T.

Product Name: UPS
Model No.: UPS-PC-652A, UPS-PC-850AP, UPS-PC-1202AP

Model Differences.:

<table>
<tr><td>sample</td><td colspan="6">AUPS-PC-850AP</td><td colspan="2">UPS-PC-1202AP</td></tr>
<tr><td>Spec.
Place</td><td>500VA</td><td>600VA</td><td>650VA</td><td>750VA</td><td>800VA</td><td>850VA</td><td>1000VA
/1200VA</td><td>1750VA
/1600VA
/1500VA</td></tr>
<tr><td>Power</td><td>500VA</td><td>600VA</td><td>650VA</td><td>750VA</td><td>800VA</td><td>850VA</td><td>1000VA
/1200VA</td><td>1750VA
/1600VA
/1500VA</td></tr>
<tr><td>Output Current(A)</td><td>1.36</td><td>1.6</td><td>1.8</td><td>2.0</td><td>2.2</td><td>2.3</td><td>2.7
/3.2</td><td>4.0
/4.2
/4.2</td></tr>
<tr><td>Power Factor</td><td colspan="7">0.6</td><td></td></tr>
<tr><td>BATTERY</td><td colspan="3">12V7AH*1</td><td colspan="3">12V8AH*1</td><td colspan="2">12V7AH*2</td></tr>
<tr><td>Transformer</td><td colspan="3">EI96*32</td><td colspan="3">EI96*50</td><td>EI105*50</td><td>EI114*60</td></tr>
<tr><td>Dimension W*H*D</td><td colspan="6">95*160*330</td><td colspan="2">125*220*335 OR
125*220*395</td></tr>
<tr><td rowspan="2">mainboard</td><td colspan="8">LCD: CE300</td></tr>
<tr><td colspan="6">LED: CE650 (CE1500.PCB)</td><td colspan="2">CE1500 . PCB</td></tr>
</table>

3.3 Details of E.U.T.

Power Supply: AC 220-240V, 50Hz

3.4 Test Instruction

The EMI pretests were performed in the condition of the power supply from 220 to 240V and 50Hz, compliance test in 230V/50Hz since no worst case be found.

3.5 Description of Support Units

The EUT has been tested as an independent unit.

3.6 Standards Applicable for Testing

The customer requested EMC tests for an UPS. The standards used were EN 62040-2, EN 61000-3-2 and EN 61000-3-3 for emissions & EN 62040-2 for immunity.

Table 1 : Tests Carried Out Under EN 62040-2:2006

Standard	Status	
EN 62040-2:2006	Radiation Emission, 30MHz to 1000MHz	√
EN 62040-2:2006	Mains Terminal Disturbance Voltage,150KHz to 30MHz	√

Table 2 : Tests Carried Out Under EN 61000-3-2: 2006 & EN 61000-3-3:2008

EN 61000-3-2:2006	Harmonic Emissions on AC	√
EN 61000-3-3:2008	Flicker Emissions on AC	√

√ Indicates that the test is applicable
× Indicates that the test is not applicable

Table 3 : Tests Carried Out Under EN 62040-2:2006

Standard	Status	
EN 61000-4-2:1995+ A1:1998+A2:2001	Electro-static discharge	√
EN 61000-4-3:2006	Radio frequency EM fields (80MHz to 1GHz)	√
EN 61000-4-4:2004	Fast transients	√
EN 61000-4-5:2006	Surges	√
EN 61000-4-6:2007	Radio frequency continuous conducted (150kHz to 80MHz)	√
EN 61000-4-8:1993+A1: 2001	Power-frequency magnetic field (50Hz)	×
EN 61000-4-11:2004	Voltage dips & interruptions	×

√ Indicates that the test is applicable
× Indicates that the test is not applicable

3.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **IC – Registration No.: 7760A**

  Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration No.:7760A, July 24, 2008

- **FCC – Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, June 24, 2008.

3.8 Test Location

All Emission tests were performed at:-

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd.,Songgang Street, Baoan District, Shenzhen, China.

Radiation immunity test was performed at:-

Solid Industrial (Shenzhen) Co., Ltd. at 333 Bulong Highway Buji Longgang, Shenzhen, Guangdong, China.

3.9 Abnormalities from Standard Conditions

None.

4 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY45114 943	W2008001	9k-26.5GHz	Aug-09	Aug-10	Wws200 81596	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZB ECK MESS-ELEKTROM/ VULB9163	336	W2008002	30-3000 MHz	Aug-09	Aug-10		±1dB
Broad-band Horn Antenna 1-18 GHz	SCHWARZB ECK MESS-ELEKTROM/ VULB9163	667	W2008003	1-18GHz	Aug-09	Aug-10		f＜10 GHz：±1dB 10GHz＜f＜18 GHz：±1.5dB
Broadband Preamplifier 0.5-18 GHz	SCHWARZB ECK MESS-ELEKTROM/ BBV 9718	9718-148	W2008004	0.5-18GHz	Aug-09	Aug-10		±1.2dB
10m Coaxial Cable with N-male Connectors usable up to 18GHz,	SCHWARZB ECK MESS-ELEKTROM/ AK 9515 H	-	-	-	Aug-09	Aug-10		-
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connector	SCHWARZB ECK MESS-ELEKTROM/ AK 9513				Aug-09	Aug-10		
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A		
Color Monitor	SUNSPO/ SP-14C				N/A	N/A		
Test Receiver	ROHDE&SC HWARZ/ ESPI	101155	W2005001	9k-3GHz	Aug-09	Aug-10	Wws200 80942	±1dB
EMI Receiver	Beijingkehuan	KH3931		9k-1GHz	Aug-09	Aug-10		
Two-Line V-Network	ROHDE&SC HWARZ/ ENV216	100115	W2005002	50Ω/50μH	Aug-09	Aug-10	Wws200 80941	±10%
V－LISN	SCHWARZB ECK MESS－ ELEKTRONI K	NSLK 8128	8128-259	9k-30MHz	Aug-09	Aug-10		
Absorbing Clamp	ROHDE&SC HWARZ/ MDS-21	100205	W2005003	impandance50Ω Loss: 17 dB	Aug-09	Aug-10	Wws200 80943	±1dB

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZBECK MESS-ELEKTROM/ AK 9514				Aug-09	Aug-10		
Digital Power Analyzer	Em Test AG/Switzerland/ DPA 500	V07451 03095	W2008012	Power：2000VA Vol-range：0-300V Freq_range：10-80Hz	Aug-09	Aug-10	Wwd200 81185	Voltage distinguish:0.025% Power_freq distinguish:0.02Hz
Power Source	Em Test AG/Switzerland/ ACS 500	V07451 03096	W2008013	Vol-range：0-300V Power_freq：10-80Hz				
Electrostatic Discharge Simulator	Em Test AG/Switzerland/DITO	V07451 03094	W2008005	Contact discharge：500V-10KV Air diacharge：500V-16.5KV	Aug-09	Aug-10	Wwc200 82400	7.5A current will be changed in V_m=1.5V
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range：9K-1GHz RF voltage：-60 dBm-+10dBm	Aug-09	Aug-10	Wws200 81890	Power_freq distinguish0.1Hz RFeletricity distinguish 0.1 B
CDN M-Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	Aug-09	Aug-10	Wwc200 82396	150K-80MHz：±1dB 80-230MHz:-2-+3dB
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range：0.15-1000 MHz	Aug-09	Aug-10	Wwc200 82397	0.3-400 MHz：±4dB Other freq：±5dB
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365			Aug-09	Aug-10	Wws200 81597	
All Modules Generator	SCHAFFNER /6150	34579	W2008006	voltage:200V-4.4KV Pulse current：100A-2.2KA	Aug-09	Aug-10	Wwc200 82401	voltage: ±10% Pulse current：±10%
Capacitive Coupling Clamp	SCHAFFNER / CDN 8014	25311			Aug-09	Aug-10	Wwc200 82398	-

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
Signal and Data Line Coupling Network	SCHAFFNER / CDN 117	25627	W2008011	1.2/50μS	Aug-09	Aug-10	Wwc20082399	-
AC Power Supply	TONGYUN/ DTDGC-4				Aug-09	Aug-10	Wws20080944	-
Exposure Level Tester ELT-400	Narda Safety TEST Solutions/2304/03	M-0155	w2008022	Test freq range：1－400kHz	Aug-09	Aug-10	Wwd20081191	Test uncertainly：1－120kHz:±1.83%, 120 kHz-400 kHz: ±4.06%
Magnetic Field Probe 100cm^2	Narda Safety TEST Solutions/2300/90.10	M-1070	w2008021	Test freq range：1－400kHz				Test uncertainly：1Hz-10Hz: ±16.2%, 10Hz - 120kHz:±2.2%, 120 kHz-400 kHz: ±4.7%
Active Loop Antenna Charger 10kHz-30MHz	Beijing Dazhi / ZN30900A	-	-	10kHz-30MHz	Aug-09	Aug-10		±1dB

5 Emission Test Results

5.1 Mains Terminals Disturbance Voltage, 150kHz to 30MHz

Test Requirement:	EN 62040-2
Test Method:	EN 62040-2
Frequency Range:	150kHz to 30MHz
Class/Severity:	Table 1 of EN62040-2
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

5.1.1 E.U.T. Operation

Operating Environment:

Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1012 mbar

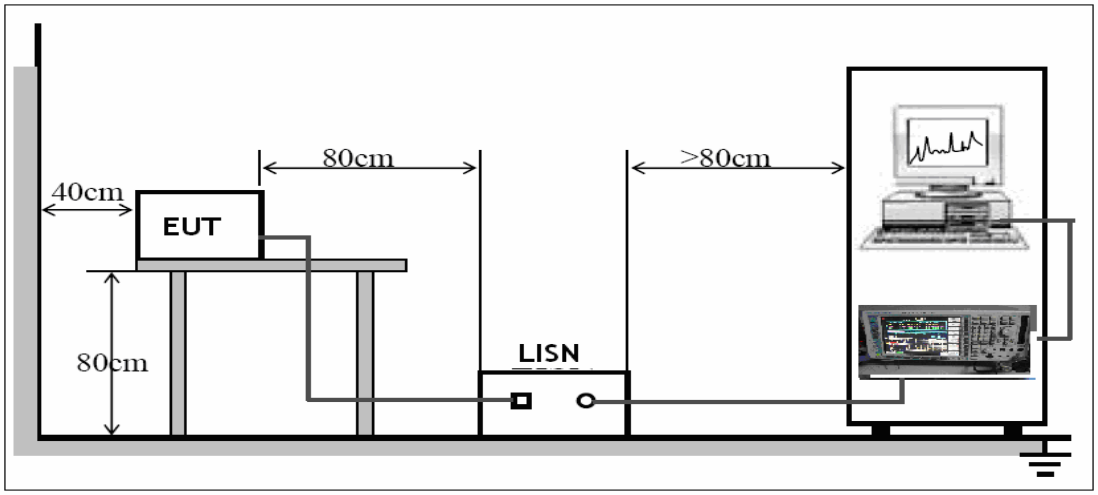
EUT Operation :

The EUT was placed on the test table in working mode.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.1.2 Conducted Test Setup

The conducted emission tests were performed using the setup accordance with the EN EN62040-2, The specification used in this report was the EN EN62040-2 Paragraph 6.4 Table 1 limits.



5.1.3 Measurement Data

An initial pre-scan was performed on the live and neutral lines.

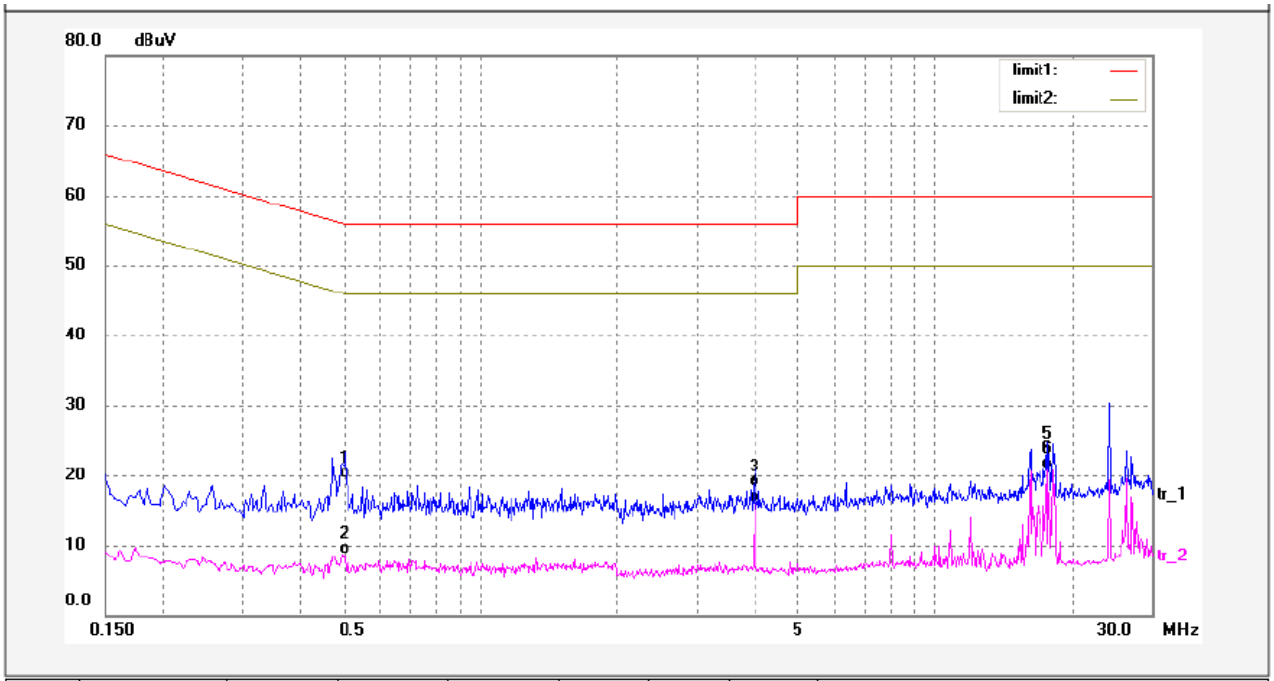
No futher quasi-peak or average measurements were performed since no peak emissions were detected within 10dB line below the average limit.

Please refer to the following peak scan graph for reference.

Remark: The 850VA and 1600VA are tested samples, the EUT operation is in charging mode, and the 1600VA charging mode is the worse case

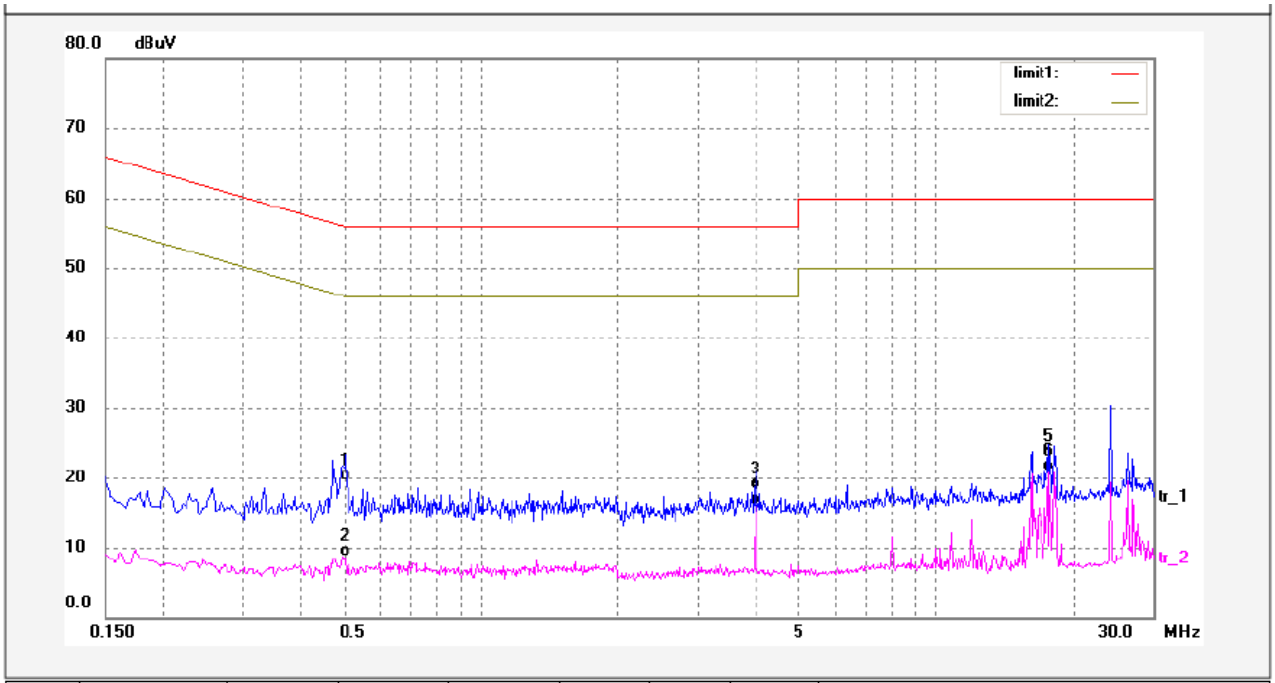
5.1.4 Conducted Emissions Test Data

Live Line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.5060	9.06	10.35	19.41	56.00	-36.59	QP	
2	0.5060	-1.59	10.35	8.76	46.00	-37.24	AVG	
3	4.0180	7.84	10.39	18.23	56.00	-37.77	QP	
4	4.0180	5.64	10.39	16.03	46.00	-29.97	AVG	
5	17.6940	12.46	10.45	22.91	60.00	-37.09	QP	
6	17.6940	10.46	10.45	20.91	50.00	-29.09	AVG	

Neutral Line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.5060	9.06	10.35	19.41	56.00	-36.59	QP	
2	0.5060	-1.59	10.35	8.76	46.00	-37.24	AVG	
3	4.0180	7.84	10.39	18.23	56.00	-37.77	QP	
4	4.0180	5.64	10.39	16.03	46.00	-29.97	AVG	
5	17.6940	12.46	10.45	22.91	60.00	-37.09	QP	
6	17.6940	10.46	10.45	20.91	50.00	-29.09	AVG	

5.1.5 Photograph – Mains Terminal Disturbance Voltage on AC Test Setup



5.2 Radiation Emission Data

Test Requirement:	EN 62040-2
Test Method:	EN 62040-2
Frequency Range:	30MHz to 1000MHz
Class/Severity:	Table 3 of EN 62040-2
Detector:	Peak for pre-scan (120kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

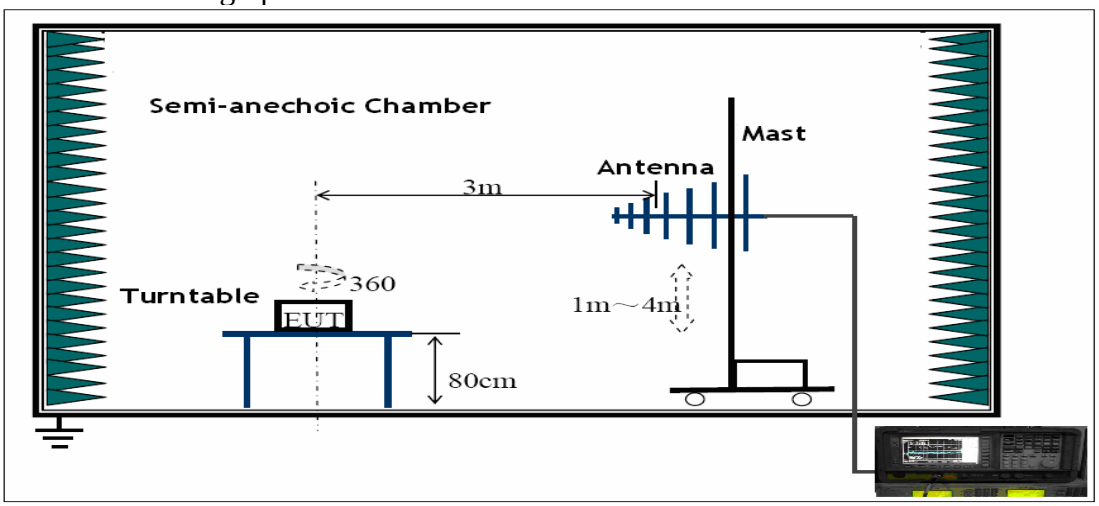
5.2.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is ±5.03 dB

5.2.2 Radiated Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the EN 62040-2, The specification used in this report was the EN 62040-2 Paragraph 6.5.1 Table 3 limits.



5.2.3 Spectrum Analyzer Setup

According to EN 62040-2 Class B Rules, the system was tested to 1000 MHz.

Start Frequency..... 30 MHz
Stop Frequency..... 1000 MHz
Sweep Speed Auto
IF Bandwidth..... 120kHz
Video Bandwidth..... 100KHz
Quasi-Peak Adapter Bandwidth ..... 120 kHz
Quasi-Peak Adapter Mode ..... Normal
Resolution Bandwidth 100KHz

5.2.4 Test procedure

The radiated emissions test.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.
The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

5.2.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Class B Limit

5.2.6 Summary of Test Results

According to the data in section 5.2.7, the EUT complied with the EN 62040-2 standards, and had the worst margin of:

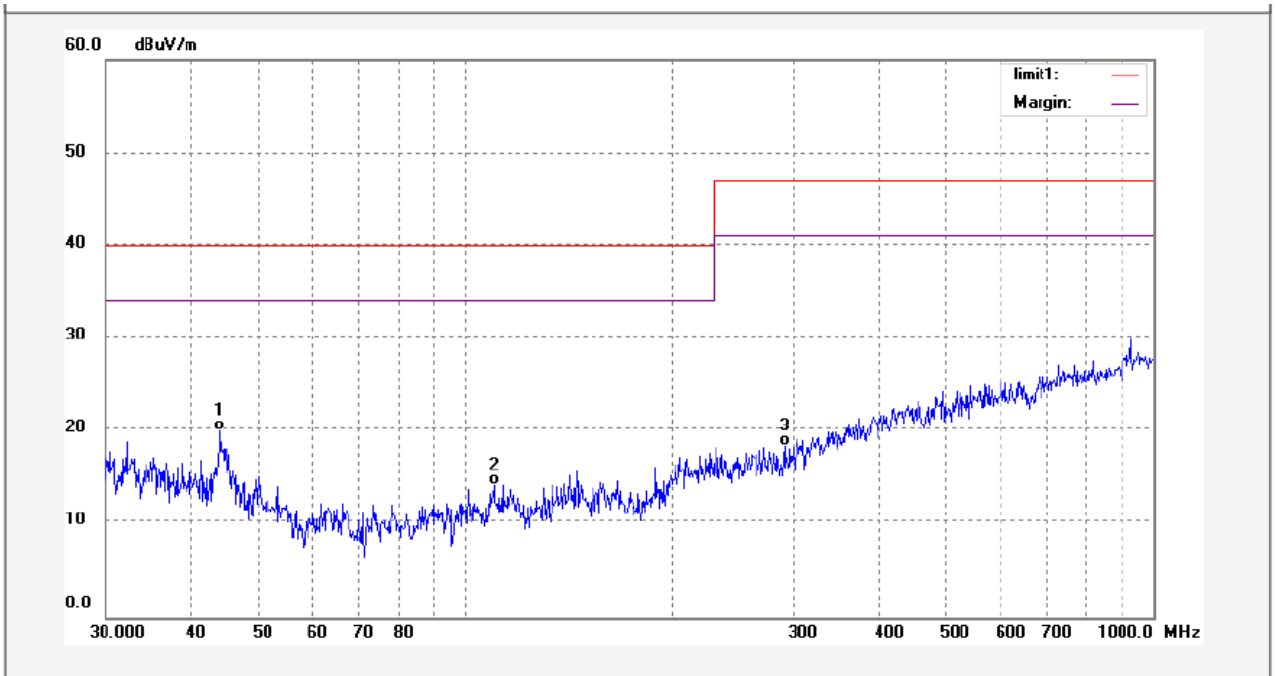
Remark: The 850VA and 1600VA are tested samples, the EUT operation is in charging mode, discharging mode connected with incandescent lamp.

And the 1600VA Discharging mode is the worse case.

5.2.7 Radiated Emissions Test Data

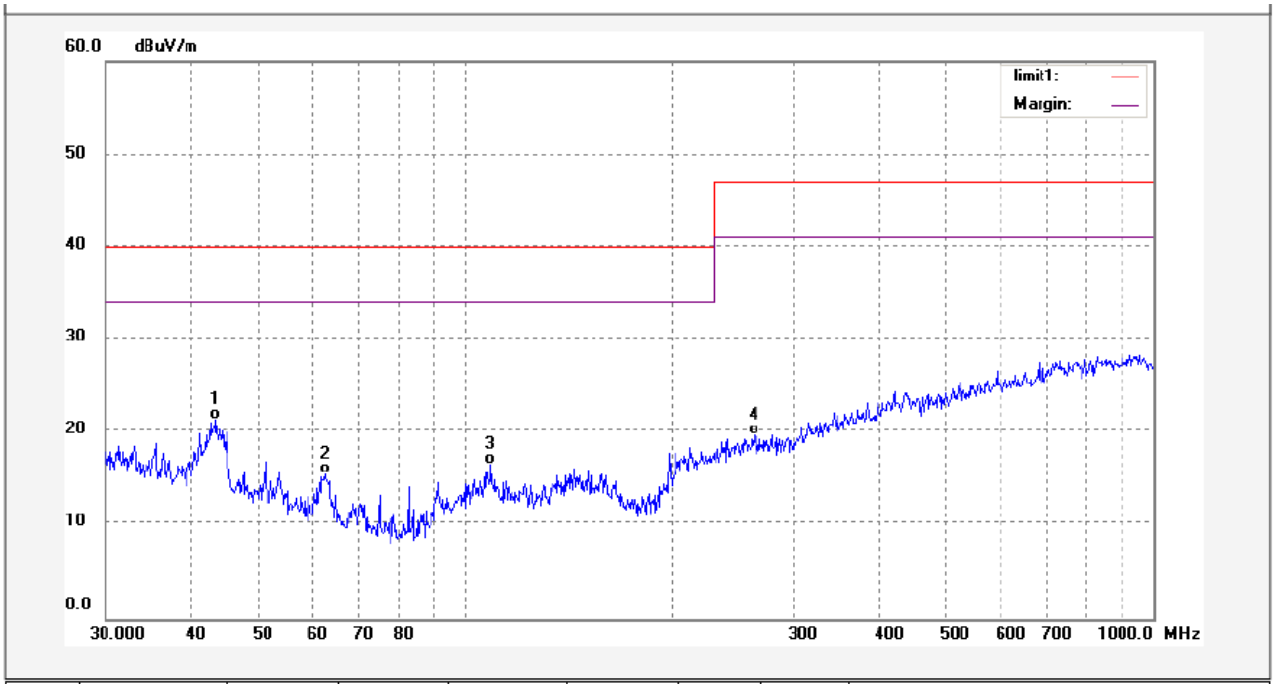
Discharging Mode:

Polarization:Horizontal



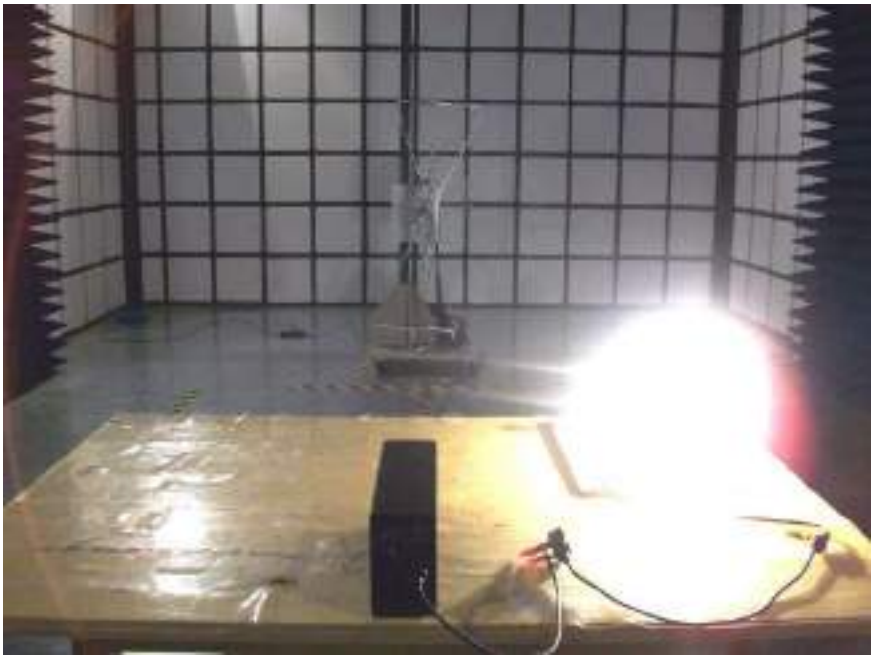
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	43.9995	5.18	14.82	20.00	40.00	-20.00	QP	
2	110.0818	0.83	13.41	14.24	40.00	-25.76	QP	
3	291.3388	0.64	17.79	18.43	47.00	-28.57	QP	

Polarization:Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	43.3854	6.30	15.02	21.32	40.00	-18.68	QP	
2	62.5231	4.24	11.29	15.53	40.00	-24.47	QP	
3	108.9276	3.20	13.37	16.57	40.00	-23.43	QP	
4	263.1155	1.66	18.04	19.70	47.00	-27.30	QP	

5.2.8 Photograph – Radiation Emission Test Setup



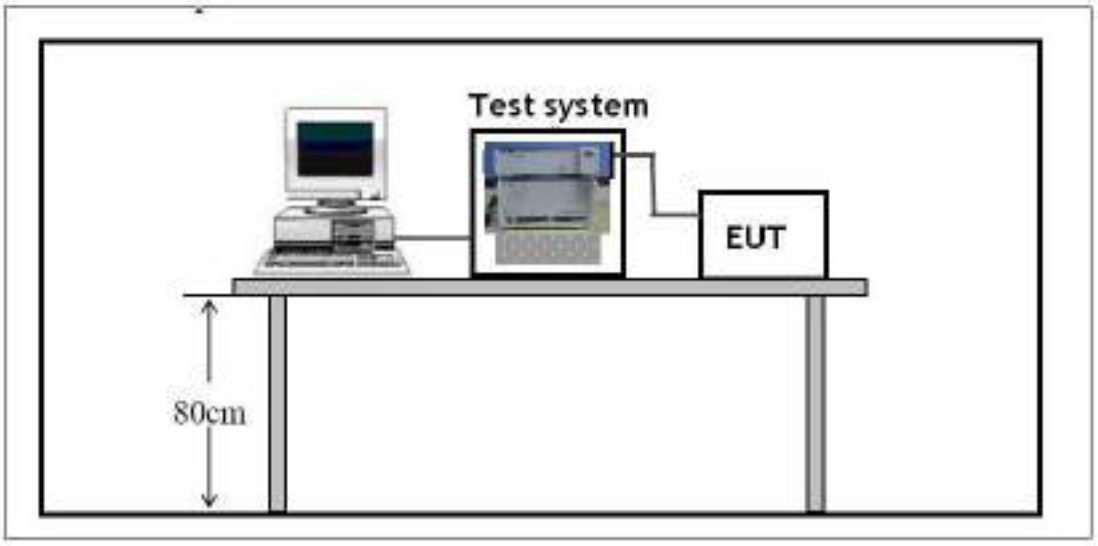
5.3 Harmonics Test Results

Test Requirement: EN 61000-3-2
Test Method: EN 61000-3-2
Frequency Range: 100Hz to 2kHz
Test Result: PASS

-

5.3.1 Test Setup

The Harmonics Test steup accordance with the EN 61000-3-2, The Specification used in this report was the EN61000-3-2 Paragraph 3 limits.



Remark: The 850VA and 1600VA are tested samples, the EUT operation is in charging mode, and the 1600VA charging mode is the worse case.

Standard used:	EN/IEC 61000-3-2 Ed.3 Short cyclic
	Equipment class A <= 150% of the limit
Observation time:	150s
Windows width:	10 periods - (EN/IEC 61000-4-7 Edition 2002)

Test Result	
E. U. T.:	PASS
Power Source:	PASS

Power and THD results

True power P:	1118W	Apparent power S:	1118VA
Reactiv power Q:	23.73var	Power factor:	1.000
THD (U):	0.001	THD (I):	0.015
Crest Factor (U):	1.414	Crest Factor (I):	1.432

E. U. T. Result

Check harmonics 2..40 [exception odd 21..39]:

Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 100%:	
Order (n):	None

Check odd harmonics 21..39:

All Partial Odd Harmonics below partial limits.	
Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 150%:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

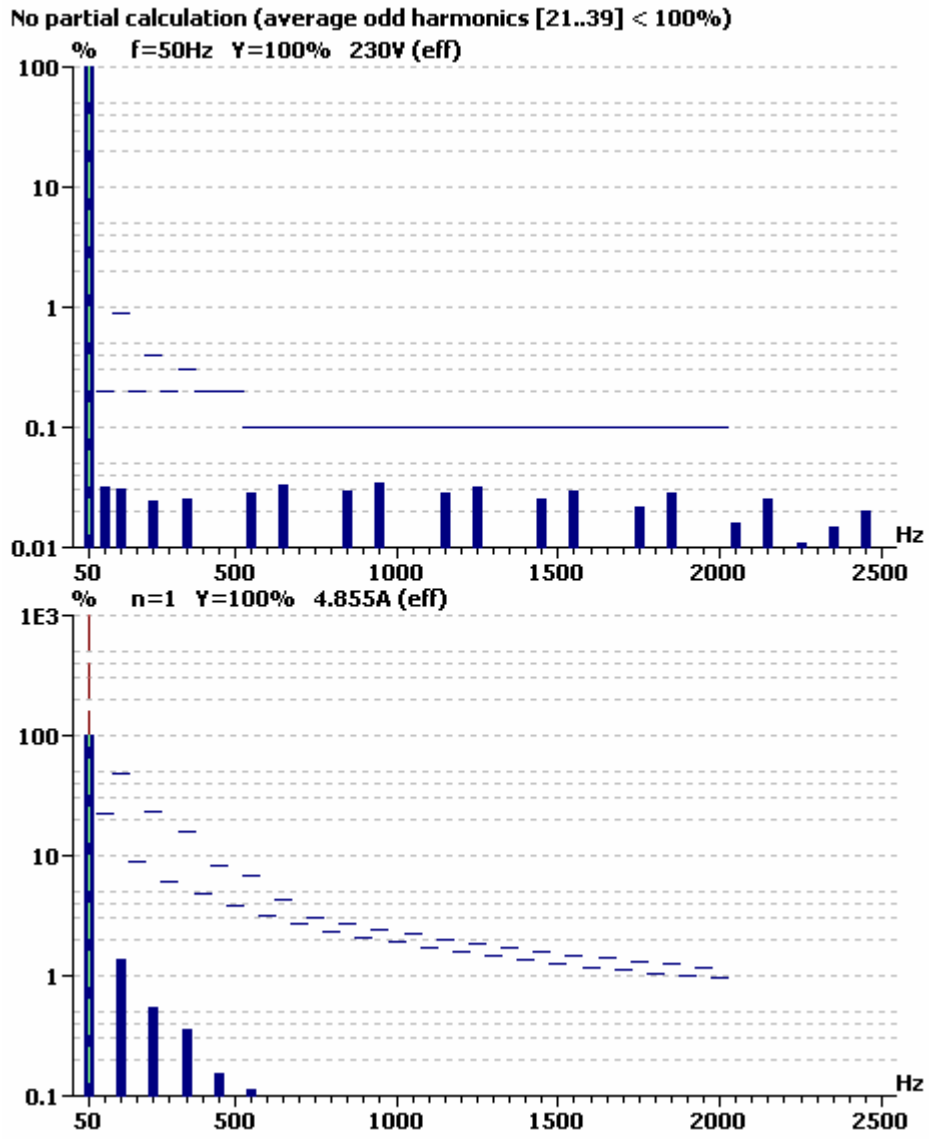
Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	4.860	100.000		
2	1.116E-3	0.023	1.08	PASS
3	67.220E-3	1.383	2.30	PASS
4	2.840E-3	0.058	430.00E-3	PASS
5	26.373E-3	0.543	1.14	PASS
6	708.636E-6	0.015	300.00E-3	PASS
7	17.402E-3	0.358	770.00E-3	PASS
8	706.762E-6	0.015	230.00E-3	PASS
9	7.253E-3	0.149	400.00E-3	PASS
10	666.320E-6	0.014	184.00E-3	PASS
11	5.431E-3	0.112	330.00E-3	PASS
12	750.213E-6	0.015	153.33E-3	PASS
13	3.841E-3	0.079	210.00E-3	PASS
14	699.222E-6	0.014	131.43E-3	PASS
15	2.692E-3	0.055	150.00E-3	PASS
16	666.641E-6	0.014	115.00E-3	PASS
17	1.661E-3	0.034	132.35E-3	PASS
18	1.018E-3	0.021	102.22E-3	PASS
19	2.504E-3	0.052	118.42E-3	PASS
20	692.646E-6	0.014	92.00E-3	PASS
21	1.067E-3	0.022	160.71E-3	PASS
22	1.011E-3	0.021	83.64E-3	PASS
23	881.265E-6	0.018	146.74E-3	PASS
24	679.619E-6	0.014	76.66E-3	PASS
25	2.139E-3	0.044	135.00E-3	PASS
26	978.628E-6	0.020	70.77E-3	PASS
27	768.277E-6	0.016	124.99E-3	PASS
28	694.934E-6	0.014	65.71E-3	PASS
29	797.417E-6	0.016	116.39E-3	PASS
30	712.991E-6	0.015	61.33E-3	PASS
31	1.890E-3	0.039	108.87E-3	PASS
32	676.007E-6	0.014	57.50E-3	PASS
33	790.268E-6	0.016	102.27E-3	PASS
34	755.956E-6	0.016	54.12E-3	PASS
35	1.416E-3	0.029	96.44E-3	PASS
36	685.645E-6	0.014	51.11E-3	PASS
37	1.325E-3	0.027	91.21E-3	PASS
38	699.885E-6	0.014	48.42E-3	PASS
39	876.278E-6	0.018	86.53E-3	PASS
40	746.965E-6	0.015	46.00E-3	PASS

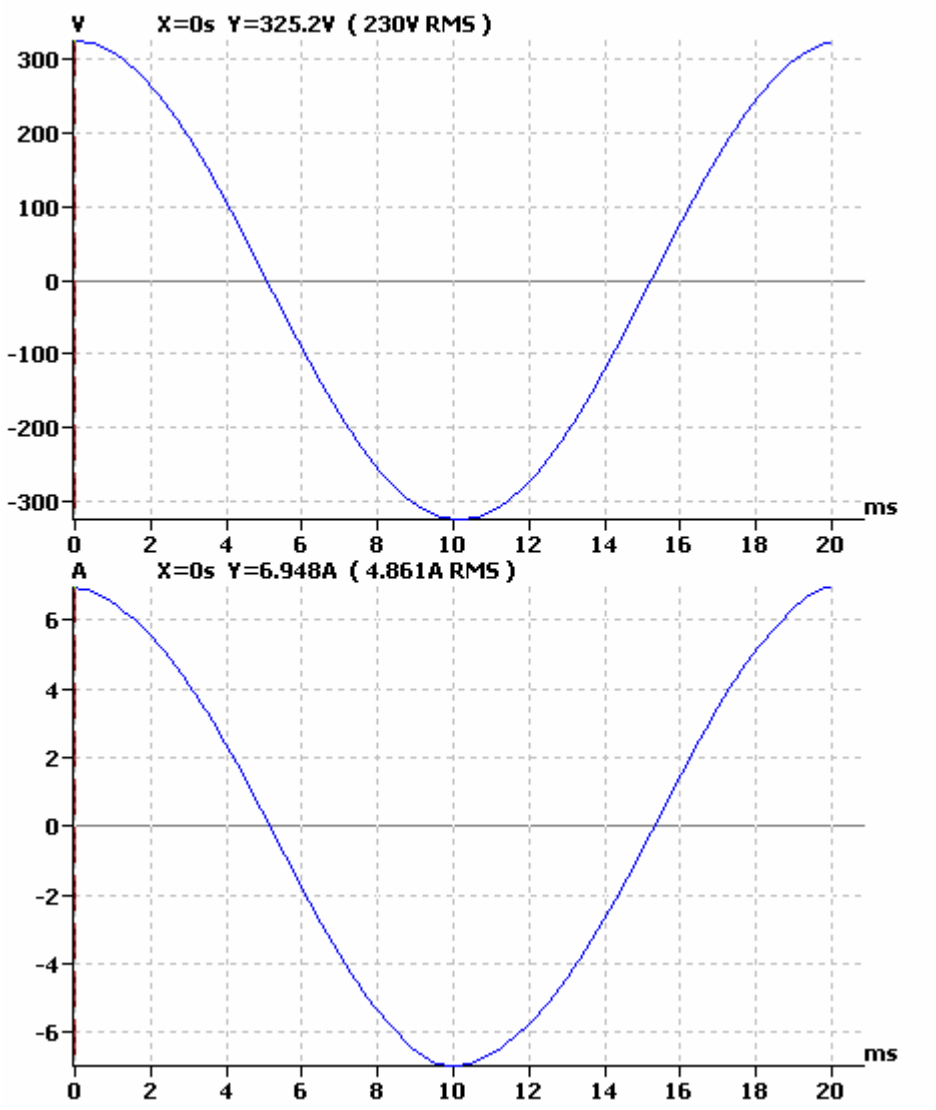
Maximum harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	4.860	100.000		
2	1.172E-3	0.024	1.62	PASS
3	67.551E-3	1.390	3.45	PASS
4	2.993E-3	0.062	645.00E-3	PASS
5	26.477E-3	0.545	1.71	PASS
6	763.971E-6	0.016	450.00E-3	PASS
7	17.489E-3	0.360	1.15	PASS
8	761.072E-6	0.016	345.00E-3	PASS
9	7.333E-3	0.151	600.00E-3	PASS
10	731.782E-6	0.015	276.00E-3	PASS
11	5.523E-3	0.114	495.00E-3	PASS
12	791.467E-6	0.016	229.99E-3	PASS
13	3.908E-3	0.080	315.00E-3	PASS
14	747.102E-6	0.015	197.15E-3	PASS
15	2.751E-3	0.057	225.00E-3	PASS
16	738.690E-6	0.015	172.50E-3	PASS
17	1.754E-3	0.036	198.52E-3	PASS
18	1.107E-3	0.023	153.33E-3	PASS
19	2.577E-3	0.053	177.63E-3	PASS
20	749.243E-6	0.015	138.00E-3	PASS
21	1.120E-3	0.023	160.71E-3	PASS
22	1.080E-3	0.022	125.46E-3	PASS
23	949.514E-6	0.020	146.74E-3	PASS
24	790.899E-6	0.016	114.99E-3	PASS
25	2.225E-3	0.046	135.00E-3	PASS
26	1.041E-3	0.021	106.16E-3	PASS
27	887.169E-6	0.018	124.99E-3	PASS
28	746.539E-6	0.015	98.57E-3	PASS
29	846.594E-6	0.017	116.39E-3	PASS
30	756.343E-6	0.016	92.00E-3	PASS
31	1.968E-3	0.040	108.87E-3	PASS
32	736.156E-6	0.015	86.25E-3	PASS
33	896.731E-6	0.018	102.27E-3	PASS
34	845.443E-6	0.017	81.18E-3	PASS
35	1.592E-3	0.033	96.44E-3	PASS
36	749.125E-6	0.015	76.66E-3	PASS
37	1.444E-3	0.030	91.21E-3	PASS
38	785.464E-6	0.016	72.63E-3	PASS
39	909.734E-6	0.019	86.53E-3	PASS
40	827.526E-6	0.017	69.00E-3	PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	229.99	99.996		
2	77.99E-3	0.034	0.2	PASS
3	73.74E-3	0.032	0.9	PASS
4	12.43E-3	0.005	0.2	PASS
5	58.42E-3	0.025	0.4	PASS
6	8.68E-3	0.004	0.2	PASS
7	65.69E-3	0.029	0.3	PASS
8	9.20E-3	0.004	0.2	PASS
9	15.99E-3	0.007	0.2	PASS
10	11.71E-3	0.005	0.2	PASS
11	70.69E-3	0.031	0.1	PASS
12	13.95E-3	0.006	0.1	PASS
13	79.97E-3	0.035	0.1	PASS
14	8.61E-3	0.004	0.1	PASS
15	19.42E-3	0.008	0.1	PASS
16	6.88E-3	0.003	0.1	PASS
17	76.02E-3	0.033	0.1	PASS
18	5.01E-3	0.002	0.1	PASS
19	87.41E-3	0.038	0.1	PASS
20	7.81E-3	0.003	0.1	PASS
21	18.81E-3	0.008	0.1	PASS
22	7.59E-3	0.003	0.1	PASS
23	70.55E-3	0.031	0.1	PASS
24	8.17E-3	0.004	0.1	PASS
25	79.33E-3	0.034	0.1	PASS
26	6.02E-3	0.003	0.1	PASS
27	20.69E-3	0.009	0.1	PASS
28	6.70E-3	0.003	0.1	PASS
29	62.00E-3	0.027	0.1	PASS
30	5.91E-3	0.003	0.1	PASS
31	70.55E-3	0.031	0.1	PASS
32	5.80E-3	0.003	0.1	PASS
33	22.74E-3	0.010	0.1	PASS
34	5.55E-3	0.002	0.1	PASS
35	55.46E-3	0.024	0.1	PASS
36	5.77E-3	0.003	0.1	PASS
37	66.64E-3	0.029	0.1	PASS
38	5.17E-3	0.002	0.1	PASS
39	20.62E-3	0.009	0.1	PASS
40	6.82E-3	0.003	0.1	PASS


No partial calculation (average odd harmonics [21..39] < 100%)
% f=50Hz Y=100% 230V (eff)
100
10
1
0.1
0.01
50
500
1000
1500
2000
2500
Hz
% n=1 Y=100% 4.855A (eff)
1E3
100
10
1
0.1
50
500
1000
1500
2000
2500
Hz

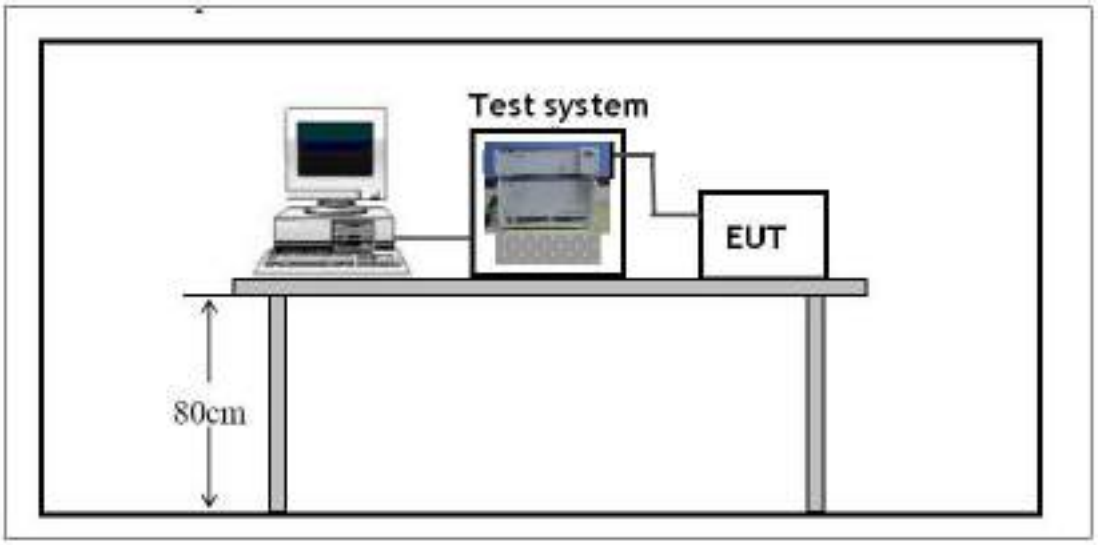

V
X=0s Y=325.2V (230V RMS)
300
200
100
0
-100
-200
-300
ms
0 2 4 6 8 10 12 14 16 18 20
A
X=0s Y=6.948A (4.861A RMS)
6
4
2
0
-2
-4
-6
ms
0 2 4 6 8 10 12 14 16 18 20

5.4 Flicker Test Result

Test Requirement: EN 61000-3-3
Test Method: EN 61000-3-3
Test Result: PASS

5.4.1 Test Setup

The Flicker Test steup accordance with the EN 61000-3-3, The Specification used in this report was the EN61000-3-3 Paragraph 5 limits.



Remark: The 850VA and 1600VA are tested samples, the EUT operation is in charging mode, and the 1600VA charging mode is the worse case.

Standard used:	EN/IEC 61000-3-3 Flicker
Observation time:	10 min (1 Flicker measurement)

Test Result	PASS

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.502	1.00	PASS
Plt	0.502	0.65	PASS
dc [%]	2.243	3.30	PASS
dmax [%]	2.346	4.00	PASS
dt [s]	0.000	0.50	PASS

5.4.2 Photograph – Harmonics & Flicker Test Setup



6 Immunity Test Results

6.1 Performance Criteria Description

Criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C: Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

For further details, please refer to of EN 62040-2.

6.2 ESD

Test Requirement:	EN 62040-2	
Test Method:	EN 61000-4-2	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	+/-8 kV
	Contact Discharge:	+/-4 kV
	HCP & VCP:	+/-4 kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum 10 times at each test point	
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	

6.2.1 E.U.T. Operation

Operating Environment:

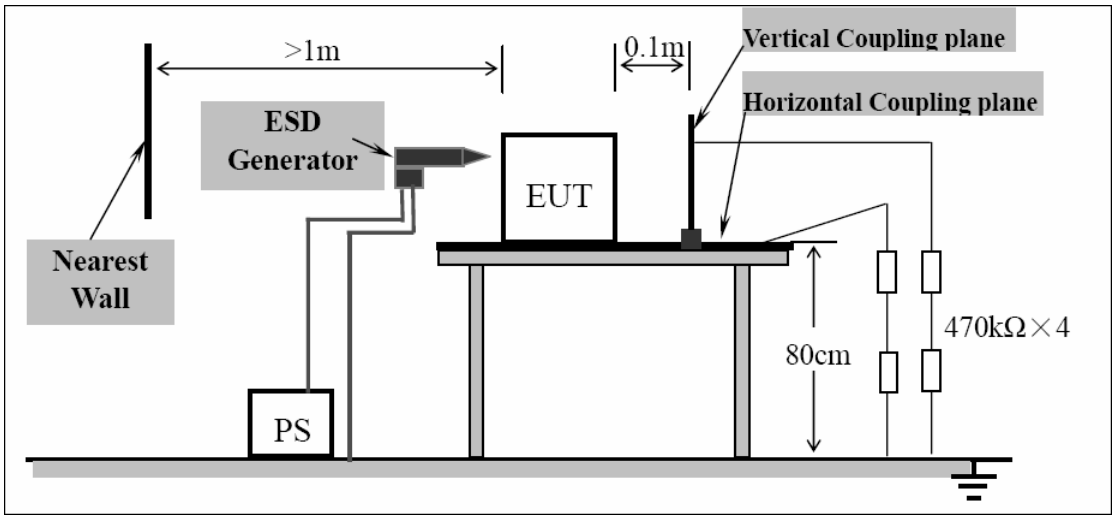
Temperature :	24.0 °C
Humidity :	52 % RH
Barometric Pressure :	1012 mbar

EUT Operation:

The EUT was placed on the test table in charging mode and discharging mode connected with incandescent lamp.

6.2.2 Test Setup

The ESD Test steup accordance with the EN 61000-4-2, The Specification used in this report was the EN 62040-2 Table 5 requirements



6.2.3 Direct Application Test Results

Observations : Test points : 1. All Exposed Surface & Seams;
2. All metallic part

Direct Application			Test Results	
Discharge Level (kV)	**Polarity (+/-)**	**Test Point**	**Contact Discharge**	**Air Discharge**
8	+/-	1	N/A	A
4	+/-	2	A	N/A

Results

A: No degradation in the performance of the E.U.T. was observed.
N/A: Not applicable.

6.2.4 Indirect Application Test Results

Observations : Test points : 1. All sides.

Indirect Application			Test Results	
Discharge Level (kV)	**Polarity (+/-)**	**Test Point**	**Horizontal Coupling**	**Vertical Coupling**
4	+/-	1	A	A

Results

A: No degradation in the performance of the E.U.T. was observed.

6.2.5 Photograph - ESD Test Setup



6.3 Radiated Immunity

Test Requirement:	EN 62040-2
Test Method:	EN 61000-4-3
Frequency Range:	80MHz–1GHz
Face Under Test:	Three Mutually Orthogonal Faces
Severity:	3V/m, 1kHz, 80% Amp. Mod. from 80MHz to 1GHz

6.3.1 E.U.T. Operation

Operating Environment:

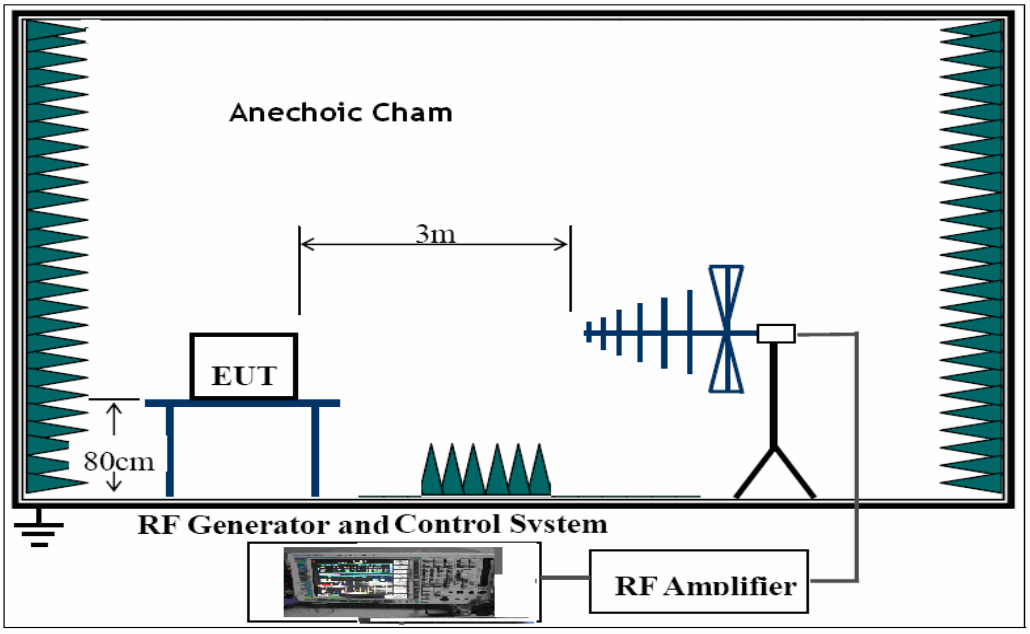
Temperature:	24.0 °C
Humidity:	52 % RH
Barometric Pressure:	1012 mbar

EUT Operation:

The EUT was placed on the test table in charging mode and discharging mode connected with incandescent lamp.

6.3.2 Test Setup

The Radiated Immunity test steup accordance with the EN 61000-4-3, The Specification used in this report was the EN 62040-2 Table 5 requirements.



6.3.3 Test Results

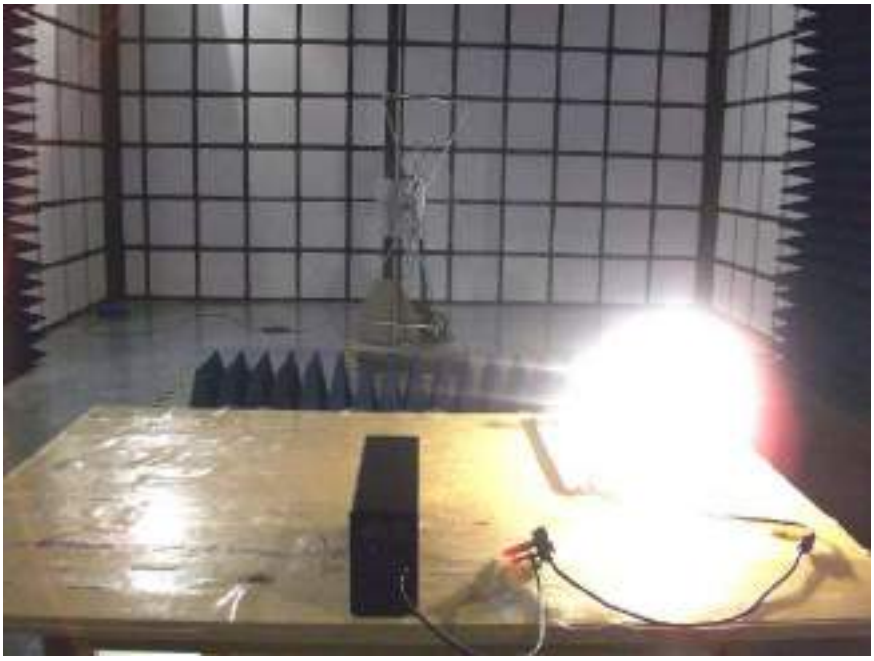
Frequency	Level	Modulation	EUT Face	Result / Observations
80MHz-1GHz	3V/m	1kHz, 80%, Amp. Mod.	X Y Z	During test, After test EUT normal (A).

Remarks:
AM : Amplitude Modulation.
PM : Pulse Modulation.
X : EUT as per photograph in section 6.3.4 of this report.
Y : As X, but rotate EUT by 90° clockwise.
Z : As Y, but rotate EUT by 90° vertically.

Results

A: No degradation in the performance of the E.U.T. was observed.

6.3.4 Photograph - Radiated Immunity Test Setup For X-Direction



6.4 Electrical Fast Transients

Test Requirement:	EN 62040-2
Test Method:	EN 61000-4-4
Test Level:	1.0kV on AC
Polarity:	Positive & Negative&PE
Repetition Frequency:	5kHz
Burst Duration:	300ms
Test Duration:	2 minutes per level & polarity
Test Ports:	AC Input & Output Ports

6.4.1 E.U.T. Operation

Operating Environment:

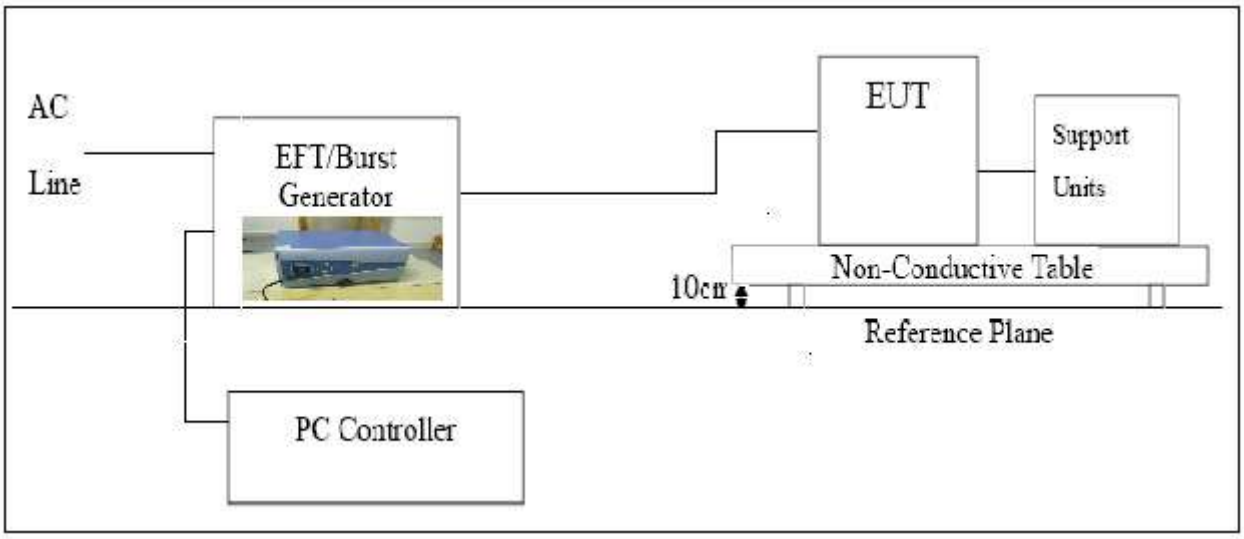
Temperature:	24.0 °C
Humidity:	52 % RH
Barometric Pressure:	1012 mbar

EUT Operation:

Compliance test was performed test in charging mode.

6.4.2 Test Setup

The Radiated Immunity test steup accordance with the EN 61000-4-4, The Specification used in this report was the EN 62040-2 Table 5 requirements.



6.4.3 Test Results

Lead under Test	Level (±kV)	Coupling Direct/Clamp	EUT operating mode	Observations (Performance Criterion)
AC Live	±1.0	Direct	ON and Idle mode	B
AC Neutral	±1.0	Direct	ditto	B
Live & Neutral	±1.0	Direct	ditto	B
AC Live&PE	±1.0	Direct	ditto	B
AC Neutral&PE	±1.0	Direct	ditto	B
AC Live&AC Neutral&PE	±1.0	Direct	ditto	B
PE	±1.0	Direct	ditto	B

Results

B: During test, This was within the minimum performance criteria.
Please refer to section 6.1 of this report for further details.

6.4.4 Photograph-EFT Test Setup For EUT On AC Cable



6.5 Surge

Test Requirement:	EN 62040-2
Test Method:	EN 61000-4-5
Test level:	±1kV Live to Neutral, ±2kV L&N-PE
Interval:	60s between each surge
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.
Test Ports:	AC Input & Output Ports

6.5.1 E.U.T. Operation

Operating Environment:

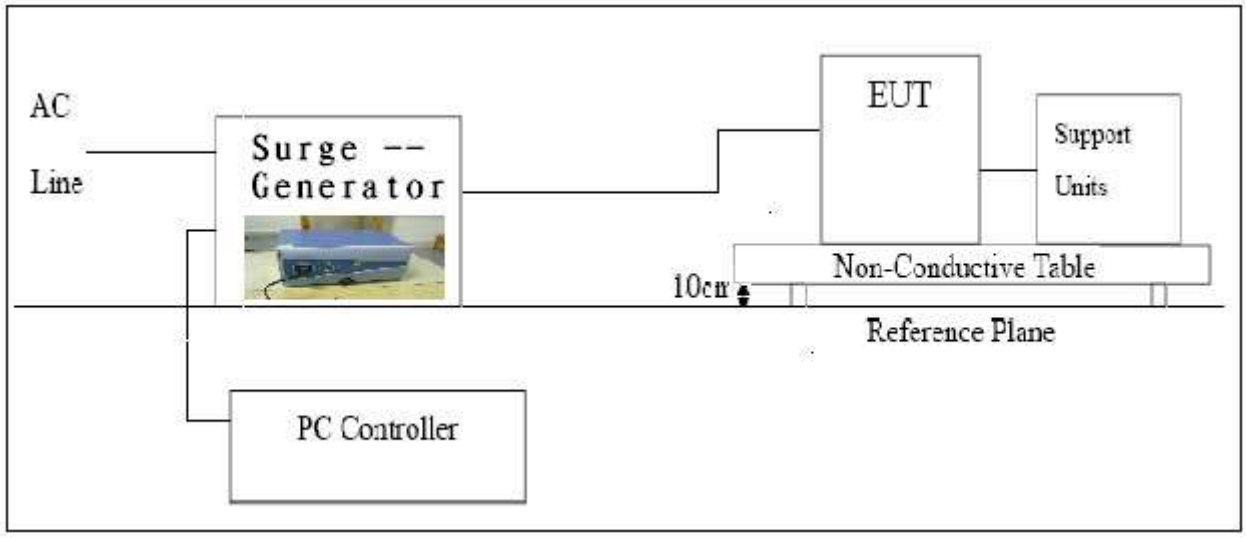
Temperature:	24.0 °C
Humidity:	52 % RH
Barometric Pressure:	1012 mbar

EUT Operation:

Compliance test was performed test in charging mode.

6.5.2 Test Setup

The Radiated Immunity test steup accordance with the EN 61000-4-5, The Specification used in this report was the EN 62040-2 Table 5 requirements.



6.5.3 Test Results

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	L-N, L-PE, N-PE	/	/
2	1kV	±	L-N	B	/
3	2kV	±	L-PE, N-PE,	B	/
4	4kV	±	L-N, L-PE, N-PE	/	/

Results

B: During test, This was within the minimum performance criteria
Please refer to section 6.1 of this report for further details.

6.5.4 Photograph- Surge Test Setup



6.6 Conducted Immunity 0.15MHz to 80MHz

Test Requirement:	EN 62040-2
Test Method:	EN 61000-4-6
Frequency Range:	0.15MHz to 80MHz
Test level:	3V rms (unmodulated emf into 150 Ω)
Modulation:	80%, 1kHz Amplitude Modulation.
Test Ports:	AC Input & Output Ports

6.6.1 E.U.T. Operation

Operating Environment:

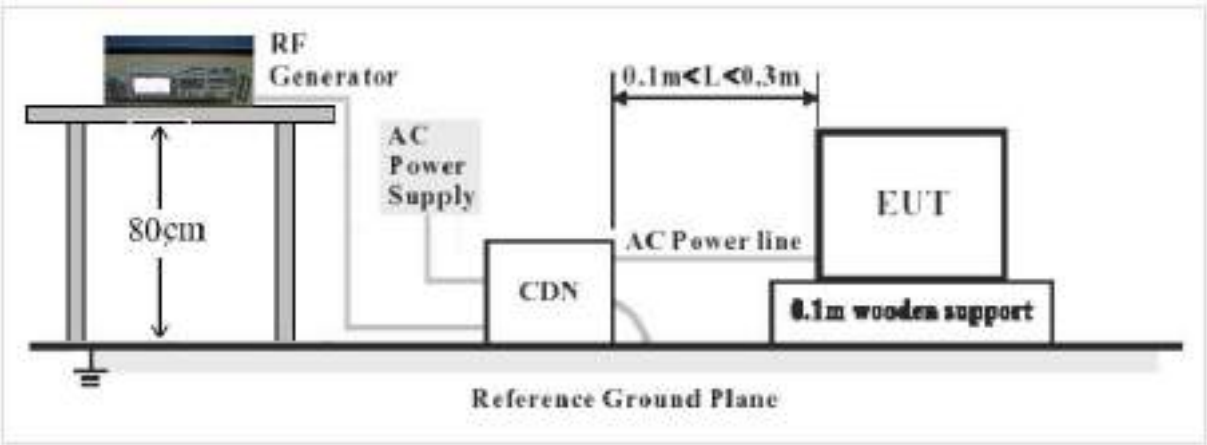
Temperature:	24.0 °C
Humidity:	52 % RH
Barometric Pressure:	1012 mbar

EUT Operation:

Compliance test was performed test in charging mode.

6.6.2 Test Setup

The Radiated Immunity test steup accordance with the EN 61000-4-6, The Specification used in this report was the EN 62040-2 Table 5 requirements.



6.6.3 Test Results

Frequency Line		Test Level	Modulation	Step Size	Dwell Time	Observation (Performance Criterion)
150kHz to 80MHz	2 Wire AC Supply Cable	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	During test, After test EUT normal (A).

Results

A: No degradation in the performance of the E.U.T. was observed.

6.6.4 Photograph- Conducted Immunity Test Setup On AC Cable



7 Photographs - Constructional Details

7.1 UPS-PC-850AP - Front View



7.2 UPS-PC-850AP - Back View



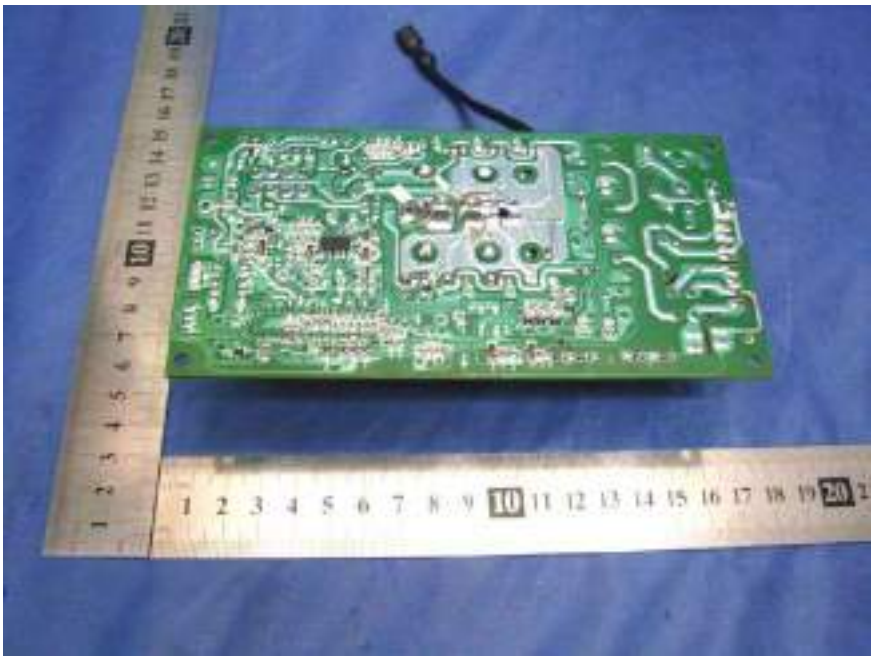
7.3 UPS-PC-850AP - Open View



7.4 UPS-PC-850AP - PCB- Front View



7.5 UPS-PC-850AP - PCB - BackView



7.6 UPS-PC-1202AP - Front View



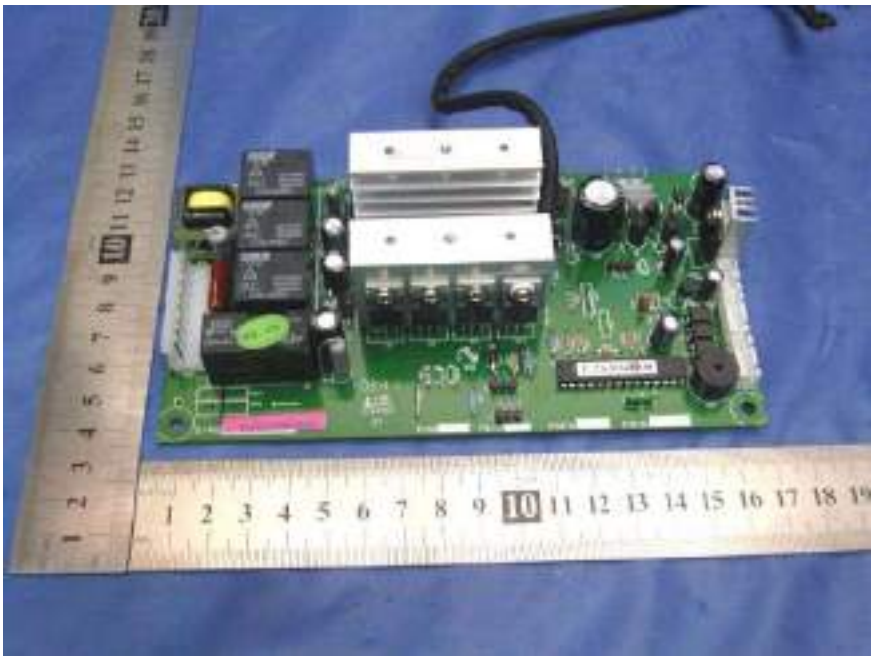
7.7 UPS-PC-1202AP - Back View



7.8 UPS-PC-1202AP - Open View



7.9 UPS-PC-1202AP- PCB - Front View



7.10 UPS-PC-1202AP- PCB -- Back View



8 CE Label

1. The CE conformity marking must consist of the initials ‘CE’ taking the following form:
   If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.
4. The CE marking must be affixed visibly, legibly and indelibly.
   It must have the same height as the initials ‘CE’

Proposed Label Location on EUT

EUT Bottom View/proposed CE Mark Location

