SGS-CSTC Standards Technical Services Co., Ltd.

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Email: ee.guangzhou@sgs.com



# TEST REPORT

| | |
|---|---|
| **Application No:** | GZEM1208003541HS |
| **Applicant:** | HoMedics Group Ltd |
| **Product Name:** | Fat reduce, weight loss |
| **Product Description:** | Fat reduce, weight loss |
| **Model No:** | USL-1000-EU |
| **P.O. No.:** | PC0001156 |
| **Standards:** | EN 55011:2009+A1:2010,<br>EN 55014-2:1997+A1:2001+A2:2008,<br>EN 61000-3-2:2006+A1:2009+A2:2009,<br>EN 61000-3-3:2008. |
| **Date of Receipt:** | 2012-08-24 |
| **Date of Test:** | 2012-08-31 to 2012-09-14 |
| **Date of Issue:** | 2012-11-28 |
| **Test Result:** | **Pass*** |

* In the configuration tested, the EUT complied with the standards specified above.

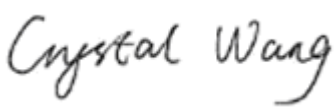
The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

SGS-CSTC STANDARDS TECHNICAL SERVICES CO., LTD. GUANGZHOU BRANCH 电子电气实验室

Richard Li
Manager

# 2 Version

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 00 | | 2012-11-28 | | Original |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Tested By** | |  **(Rain Yuan) / Project Engineer** | | 2012-08-31 to 2012-09-14 **Date** |
| **Prepared By** | |  **(Icy Chen) / Clerk** | | 2012-11-28 **Date** |
| **Checked By** | |  **(Crystal Wang) / Reviewer** | | 2012-11-28 **Date** |

# 3 Test Summary

| **Electromagnetic Interference (EMI)** | | | | |
|---|---|---|---|---|
| **Test** | **Test Requirement** | **Test Method** | **Class / Severity** | **Result** |
| Conducted Emission (150 kHz to 30 MHz) | EN 55011:2009 +A1:2010 | EN 55011:2009 +A1:2010 | Table 3 | PASS① |
| Radiated Emission (30 MHz to 1 GHz) | EN 55011:2009 +A1:2010 | EN 55011:2009 +A1:2010 | Table 5 | PASS② |
| Harmonic Emission on AC | EN 61000-3-2:2006 +A1:2009+A2:2009 | EN 61000-3-2:2006 +A1:2009+A2:2009 | Class A | PASS** |
| Flicker Emission on AC | EN 61000-3-3:2008 | EN 61000-3-3:2008 | Clause 5 of EN 61000-3-3 | PASS |
| **Electromagnetic Susceptibility(EMS)** | | | | |
| **Test** | **Test Requirement** | **Test Method** | **Class / Severity** | **Result** |
| Electrostatic Discharge (ESD) | EN 55014-2:1997 +A1:2001+A2:2008 | EN 61000-4-2:2009 | Contact ±4 kV<br>Air ±8 kV | PASS |
| Electrical Fast Transients (EFT) on AC | EN 55014-2:1997 +A1:2001+A2:2008 | EN 61000-4-4:2004 +A1:2010 | ± 0.5 kV ± 1.0kV | PASS |
| Surge Immunity on AC | EN 55014-2:1997 +A1:2001+A2:2008 | EN 61000-4-5:2006 | ±1 kV D.M.† | PASS③ |
| Injected Currents on AC (150 kHz to 230 MHz) | EN 55014-2:1997 +A1:2001+A2:2008 | EN 61000-4-6:2009 | 3V r.m.s (emf), 80%, 1kHz Amp. Mod. | PASS |
| Voltage Dips and Interruptions on AC | EN 55014-2:1997 +A1:2001+A2:2008 | EN 61000-4-11:2004 | 0 % $U_T$* for 0.5 per<br>40 % $U_T$* for 10 per<br>70 % $U_T$* for 25 per | PASS |
| **Remark :** | | | | |
| * $U_T$ is the nominal supply voltage | | | | |
| † D.M. – Differential Mode | | | | |
| **: Please refer to Section 7.3 of this report for details. | | | | |
| The EUT is classified as **Group 1, Class B** equipment according to the standard. | | | | |

***Group 1 equipment:*** group 1 contains all equipment in the scope of this standard which is not classified as group 2 equipment.

***Group 2 equipment:*** group 2 contains all ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used or only used, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purposes.

***Class A equipment*** is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Class A equipment shall meet class A limits.

**Warning:** Class A equipment is intended for use in an industrial environment. In the documentation for the user, a statement shall be included drawing attention to the fact that there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

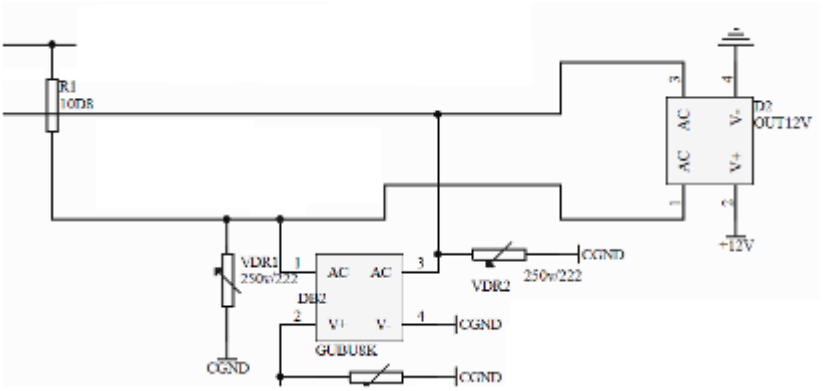
***Class B equipment*** is equipment suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Class B equipment shall meet class B limits.

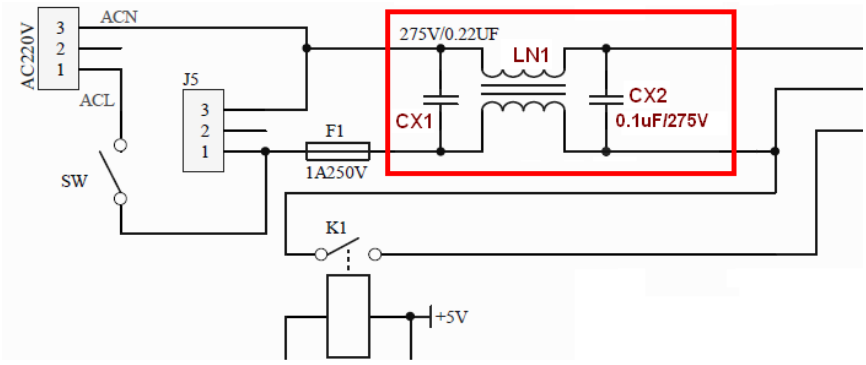
① ② ③: The EUT passed the Conducted Emission, Radiated Emission and Surge Immunity tests after modifications:

**Conducted Emission**

1. Delete one inductor T3 as the following figure shown.
2. Delete two capacitors C11 and C15 as the following figure shown.

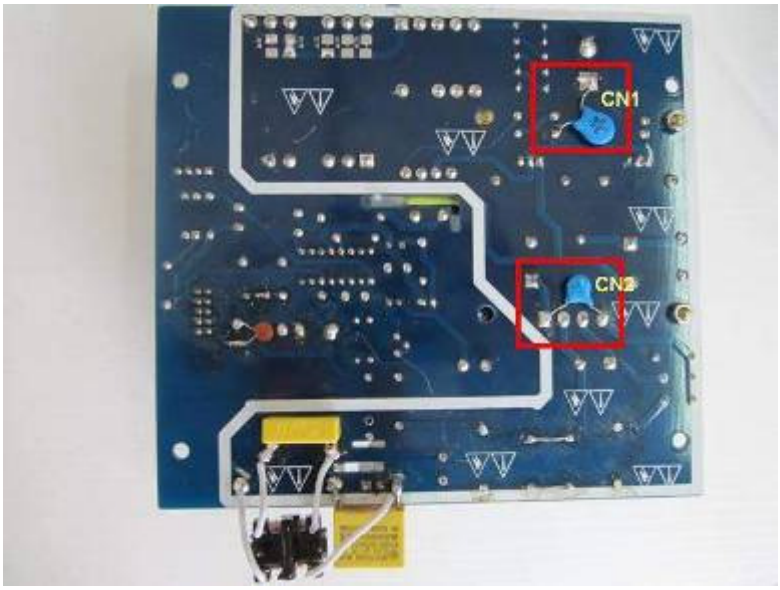


3. Add one inductor LN1 with new one which inductance is 64mH as the following figure shown.
4. Add one capacitor CX1 which capacitance is 0.22uF/275V as the following figure shown.
5. Add one capacitor CX2 which capacitance is 0.1uF/275V as the following figure shown.



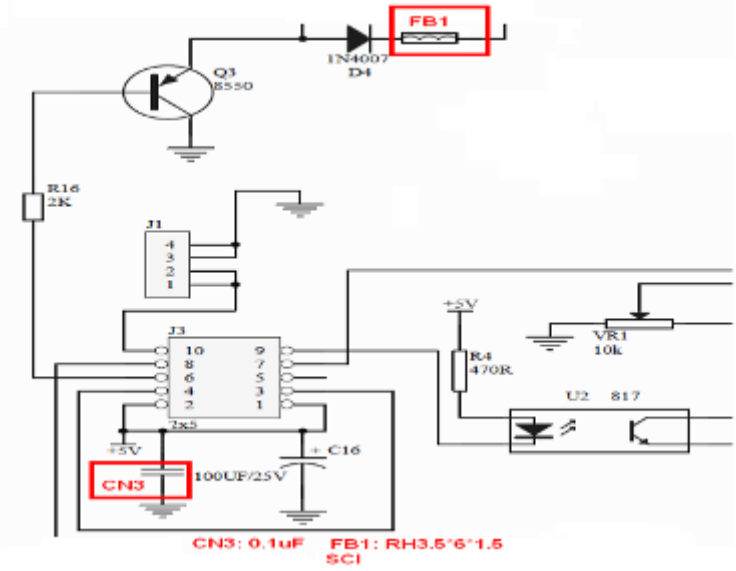

LN1: 64mH CX1: 0.22uF/275V
CX2: 0.1uF/275V

6. Add one capacitor CN1 which capacitance is 103/2kV as the following figure shown.
7. Add one capacitor CN2 which capacitance is 221/1kV as the following figure shown.

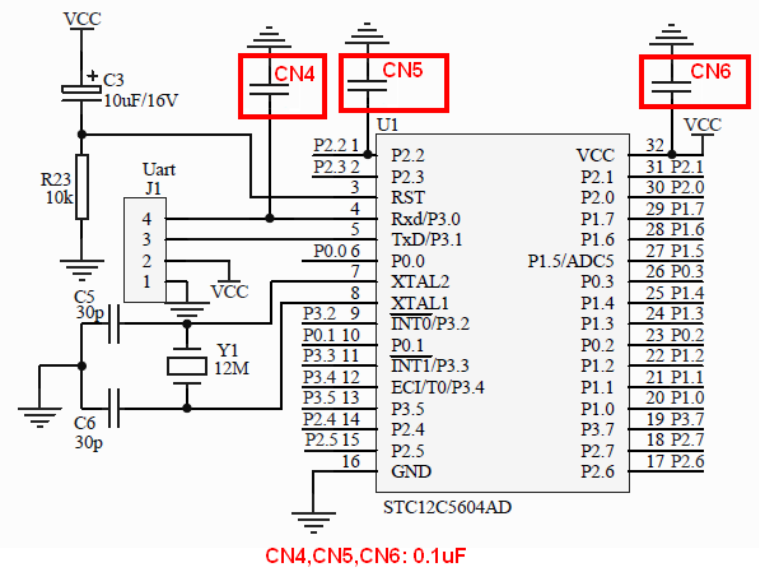


**Radiated Emission**

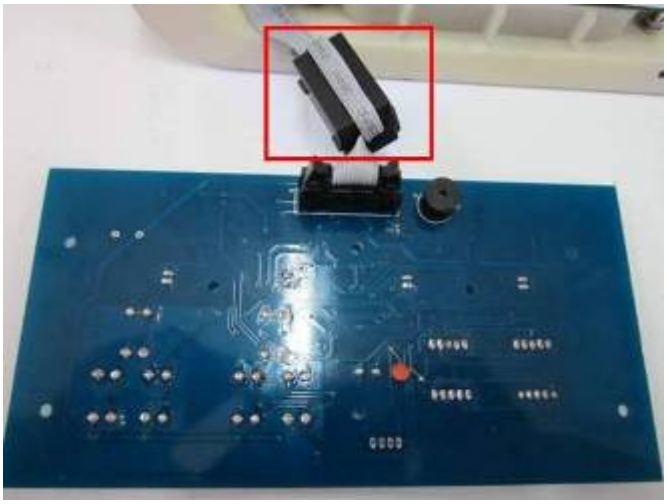
8. Add one capacitor CN3 which capacitance is 0.1uF as the following figure shown.
9. Add one ferrite bead FB1 as the following figure shown.




10. Add one capacitor CN4 which capacitance is 0.1uF as the following figure shown.
11. Add one capacitor CN5 which capacitance is 0.1uF as the following figure shown.
12. Add one capacitor CN6 which capacitance is 0.1uF as the following figure shown.



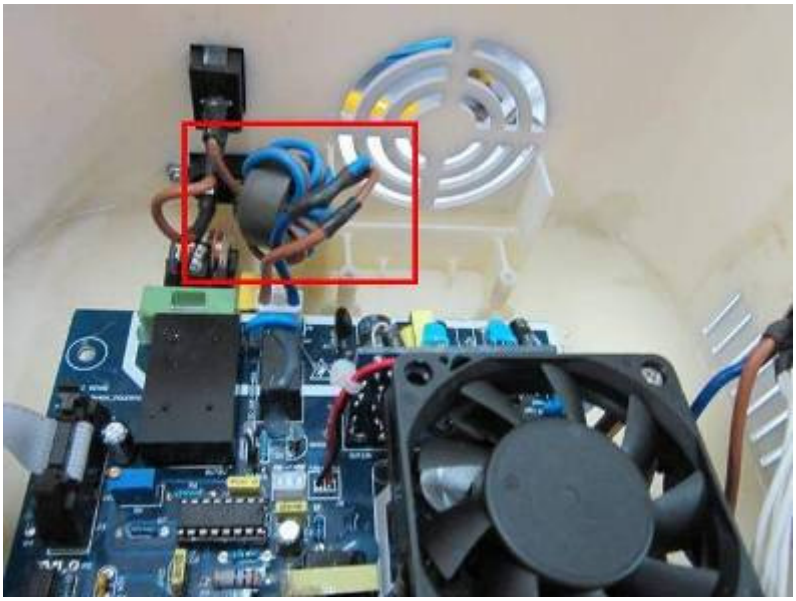
13. Add one ferrite core for cable which is twisted one circle as the following photo shown.



Ferrite Core Model No.: UF-65B

SCI

14. Add one ferrite core for the AC power cable which is twisted six circles as the following photo shown.



Ferrite Core Model No.: T25*12*15

SCI

**Surge**

15. Add one voltage-dependent RZ1 as the following figure shown.

RZ1: 14D471K

# 4 Contents

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | HoMedics Group Ltd |
| Address of Applicant: | HoMedics House, Somerhill Business Park, Five Oak Green Road, Tonbridge, Kent TN11 0GP England |

## 5.2 General Description of E.U.T.

| | |
|---|---|
| Product Name: | Fat reduce, weight loss |
| Product Description: | Fat reduce, weight loss |
| Model No.: | USL-1000-EU |

## 5.3 Details of E.U.T.

| | |
|---|---|
| Rated Supply (Voltage): | AC 220-240V 50Hz 30W |
| Power Cable: | 1.8m x 2 wires unscreened AC mains cable. |

## 5.4 Description of Support Units

The EUT has been tested with water as load.

## 5.5 Deviation from Standards

All Immunity tests to EN 55014-2 were performed in accordance with EN 61000-4-x and not IEC 61000-4-x. (x=2, 4, 5, 6, 11).

## 5.6 General Test Climate During Testing

Temperature: 15-30 °C Humidity: 30-70 %RH Atmospheric Pressure: 860-1060 mbar

## 5.7 Abnormalities from Standard Conditions

The EUT passed the Conducted Emission, Radiated Emission and Surge Immunity tests after modifications.

## 5.8 Monitoring of EUT for All Immunity Test

Audio: N/A

Visual: LED Lighting and LCD display of the EUT

## 5.9 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,

198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

## 5.10 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services 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 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

# 6 Equipment Used during Test

| Conducted Emission | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC0306 | Shielding Room | Zhong Yu | 8 x 3 x 3.8 $m^3$ | N/A | N/A | N/A |
| EMC0118 | Two-line v-netwok | R&S | ENV216 | 100359 | 2013-03-12 | 1Y |
| EMC0102 | LISN | SCHAFFNER CHASE | MN2050D/1 | 1421 | 2013-9-6 | 1Y |
| EMC2046 | Artificial Mains Network (LISN) | AFJ Instruments | LT32C | S.N.32031120150 | 2013-03-12 | 1Y |
| EMC0506 | EMI Test Receiver | Rohde & Schwarz | ESCS30 | 100085 | 2013-03-12 | 1Y |
| EMC0107 | Coaxial Cable | SGS | 2m | N/A | 2013-07-10 | 1Y |
| EMC0106 | Voltage Probe | SGS | N/A | N/A | N/A | 1Y |
| EMC0120 | 8 Line ISN | Fischer Custom Communications Inc. | FCC-TLISN-T8-02 | 20550 | 2013-11-5 | 1Y |
| EMC0121 | 4 Line ISN | Fischer Custom Communications Inc. | FCC-TLISN-T4-02 | 20549 | 2013-11-5 | 1Y |
| EMC0122 | 2 Line ISN | Fischer Custom Communications Inc. | FCC-TLISN-T2-02 | 20548 | 2013-11-5 | 1Y |
| EMC2047 | CDN | Elektronik-Feinmechanik | L-801:AF2 | 2793 | 2014-11-11 | 3Y |
| EMC2048 | CDN | Elektronik-Feinmechanik | L-801:M2/M3 | 2738 | 2014-11-11 | 3Y |
| EMC2062 | 6dB Attenuator | HP | 8491A | 24487 | 2013-01-11 | 1Y |
| EMC167 | Conical metal housing | SGS-EMC | N/A | N/A | 2013-02-16 | 1Y |

| RE in Chamber | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC0525 | Compact Semi-Anechoic Chamber | ChangZhou ZhongYu | N/A | N/A | 2014-08-30 | 2Y |
| EMC0522 | EMI Test Receiver | Rohde & Schwarz | ESIB26 | 100283 | 2013-06-29 | 1Y |
| EMC0056 | EMI Test Receiver | Rohde & Schwarz | ESCI | 100236 | 2013-03-12 | 1Y |
| EMC0528 | RI High frequency Cable | SGS | 20 m | N/A | 2013-06-01 | 1Y |
| EMC2025 | Trilog Broadband Antenna 30-3000MHz | SCHWARZBECK MESS-ELEKTRONIK | VULB 9163 | 9163-450 | 2013-12-17 | 2Y |
| EMC0524 | Bi-log Type Antenna | Schaffner -Chase | CBL6112B | 2966 | 2013-11-27 | 2Y |
| EMC0519 | Bilog Type Antenna | Schaffner -Chase | CBL6143 | 5070 | 2013-03-26 | 2Y |
| EMC2026 | Horn Antenna 1-18GHz | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120D | 9120D-841 | 2013-11-28 | 2Y |
| EMC0518 | Horn Antenna | Rohde & Schwarz | HF906 | 100096 | 2014-07-01 | 2Y |
| EMC0521 | 1-26.5 GHz Pre-Amplifier | Agilent | 8449B | 3008A01649 | 2013-03-12 | 1Y |
| EMC0049 | Amplifier | Agilent | 8447D | 2944A10862 | 2013-03-12 | 1Y |
| EMC0075 | 310N Amplifier | Sonama | 310N | 272683 | 2013-03-12 | 1Y |
| EMC0523 | Active Loop Antenna | EMCO | 6502 | 42963 | 2014-04-07 | 2Y |
| EMC2041 | Broad-Band Horn Antenna (14)15-26.5(40)GHz | SCHWARZBECK MESS-ELEKTRONI | BBHA 9170 | 9170-375 | 2014-06-01 | 3Y |
| EMC0530 | 10m Semi-Anechoic Chamber | ETS | N/A | N/A | 2014-04-27 | 2Y |

| Harmonics / Flicker test | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC0608 | AC Power Source | California | 50001iX | 56627 | 2013-03-12 | 1Y |
| EMC0607 | Power Analyzer | California | PACS | 72400 | 2013-03-12 | 1Y |

| Electrostatic Discharge | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC0809 | ESD Simulator | EM Test AG | Dito | V0735102864 | 2013-11-5 | 1Y |
| EMC0804 | ESD Ground Plane | SGS | 3m x 3m | N/A | N/A | N/A |
| EMC0078 | Temperature, & Humidity | Shanghai Meteorological Instrument factory Co., Ltd. | ZJ1-2B | 709131 | 2013-11-5 | 1Y |

| EFT, Surge, Voltage dips and Interruption | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC2059 | Modular Impulse Surge Generator | EMC PARTNER | MIG0603EN | 259 | 2013-06-13 | 1Y |
| EMC2060 | High speed signal Surge CDN | EMC PARTNER | CDN-UTP | CDN-UTP0089 | 2013-05-15 | 1Y |
| EMC1010 | EMC Immunity Test System | Thermo KeyTek | Pro-Plus | 501276 | 2013-03-12 | 1Y |
| EMC2012 | Power-Electronics Measurement System | Tektronix | TDS 744A | N/A | 2013-03-12 | 1Y |

| Conducted Immunity | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC1101 | Signal Generator | Rohde & Schwarz | SMY01 | 825675/016 | 2013-11-05 | 1Y |
| EMC1102 | Amplifier 0.15-230MHz | Ophirrf | GRF5048 | 1003 | 2013-11-05 | 1Y |
| EMC1103 | Power Meter | Rohde & Schwarz | NRVS | 825770/079 | 2013-03-12 | 1Y |
| EMC0071 | URV5-Z2 Insert. Unit | R&S | URV5-Z2 | 100309 | 2013-03-12 | 1Y |
| EMC1105 | Dual Directional coupler | Werlatone Inc. | C1795 | 6635 | 2013-11-05 | 1Y |
| EMC2012 | Oscilloscope | Tektronix | TDS 744A | N/A | 2013-03-12 | 1Y |
| EMC1108 | CDN M3 | Schaffner Chase | CDN-M3-16 | 9866 | 2014-11-11 | 3Y |
| EMC1107 | CDN M2 | Schaffner Chase | CDN-M2-16 | 9863 | 2014-11-11 | 3Y |
| EMC1116 | Current Probe | Schaffner Chase | CIP9136 | 1155 | 2014-11-11 | 3Y |
| EMC1117 | Current Probe | Schaffner Chase | CSP8445 | 18 | 2014-11-11 | 3Y |

| General used equipment | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date (YYYY-MM-DD) | Calibration Interval |
| EMC0006 | DMM | Fluke | 73 | 70681569 | 2013-11-5 | 1Y |
| EMC0007 | DMM | Fluke | 73 | 70671122 | 2013-11-5 | 1Y |

# 7 Electromagnetic Interference Test Results

## 7.1 Conducted Emissions on Mains Terminals, 150 kHz to 30MHz

Test Requirement: EN 55011

Test Method: EN 55011

Test Date: 2012-08-31 (initial test)
2012-09-10 (test after modification)

Test Voltage AC 230V 50Hz

Frequency Range: 150 kHz to 30 MHz

Class / Severity: Group 1, Class B

Detector: Peak for pre-scan
Quasi-Peak and Average for final measurement

Resolution Band Width: 9 KHz (150 kHz to 30 MHz)

Limit: Table 3 of EN 55011

| Frequency range | At mains terminals | |
|---|---|---|
| MHz | dB (μV) | |
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.5 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

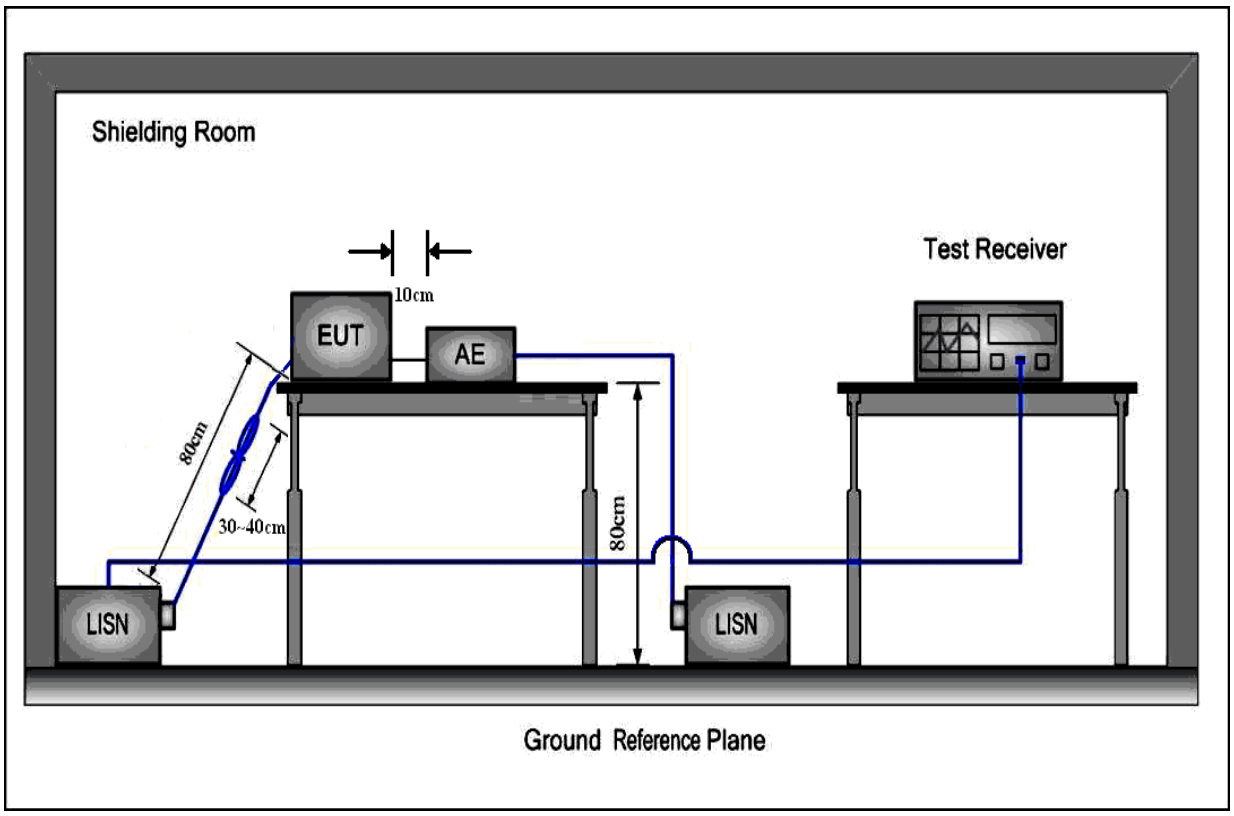
Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

Note2: The lower limit is applicable at the transition frequency.

### 7.1.1 E.U.T. Operation

EUT Operation: Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Pre-test the EUT in mode 1 to mode 3 in order to find the worst case.
Test the EUT in mode 1 as the worst case was found.

### 7.1.2 Test Setup and Procedure



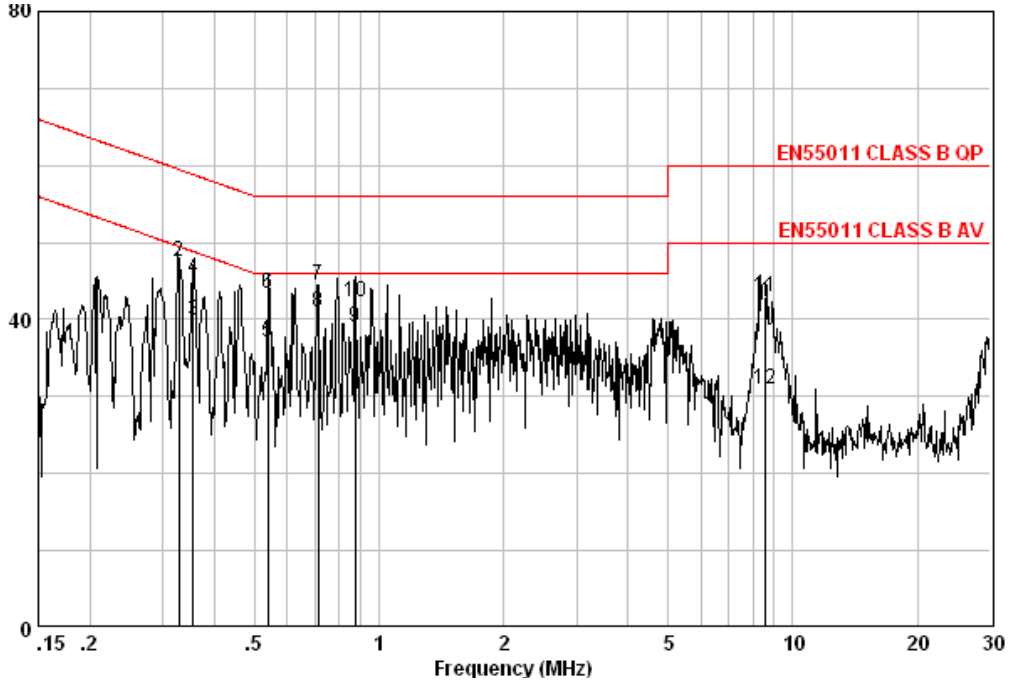

1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT was connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment was at least 0.8m from the LISN.

### 7.1.3 Measurement Data

Live Line:

Peak Scan:

Level (dBµV)




Quasi-peak and Average measurement:

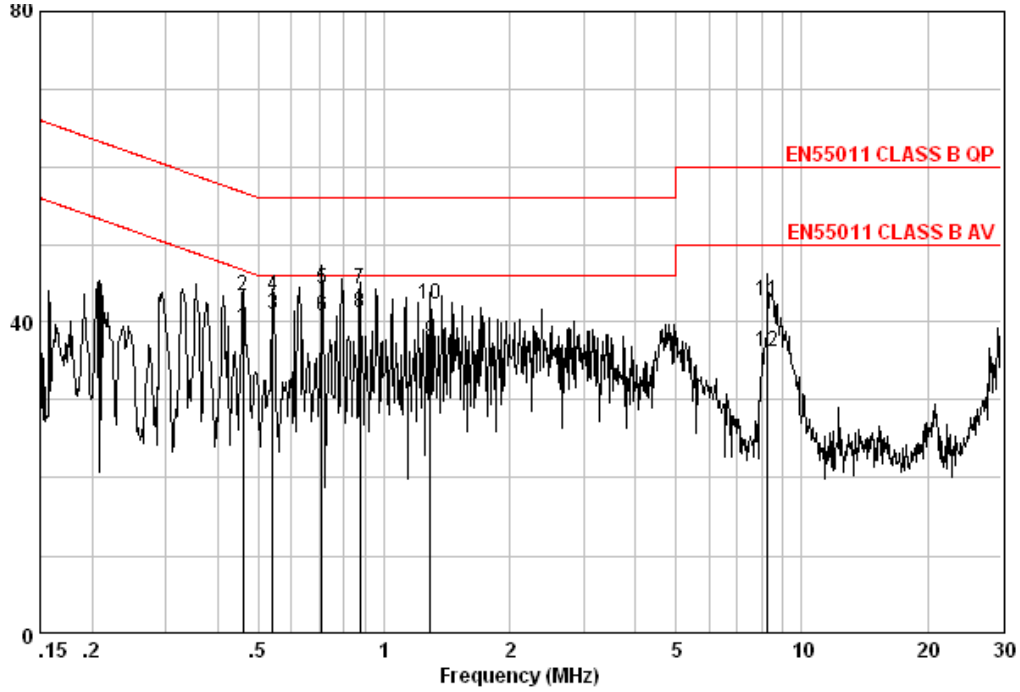
| Freq | Read Level | Cable Loss | LISN Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 0,329 | 36,42 | 0,07 | 9,63 | 46,12 | 49,49 | -3,37 | AVERAGE |
| 0,329 | 37,74 | 0,07 | 9,63 | 47,44 | 59,49 | -12,05 | QP |
| 0,356 | 30,13 | 0,06 | 9,63 | 39,82 | 48,83 | -9,01 | AVERAGE |
| 0,356 | 35,76 | 0,06 | 9,63 | 45,45 | 58,83 | -13,38 | QP |
| 0,538 | 27,35 | 0,05 | 9,63 | 37,03 | 46,00 | -8,97 | AVERAGE |
| 0,538 | 33,65 | 0,05 | 9,63 | 43,33 | 56,00 | -12,67 | QP |
| 0,712 | 34,76 | 0,04 | 9,63 | 44,43 | 56,00 | -11,57 | QP |
| 0,712 | 31,36 | 0,04 | 9,63 | 41,03 | 46,00 | -4,97 | AVERAGE |
| 0,876 | 29,32 | 0,05 | 9,69 | 39,06 | 46,00 | -6,94 | AVERAGE |
| 0,876 | 32,68 | 0,05 | 9,64 | 42,37 | 56,00 | -13,63 | QP |
| 8,546 | 33,00 | 0,17 | 9,87 | 43,04 | 60,00 | -16,96 | QP |
| 8,546 | 20,94 | 0,17 | 9,87 | 30,98 | 50,00 | -19,02 | AVERAGE |

**Level = Read Level + LISN Factor + Cable Loss.**

Neutral Line

Peak Scan:

Level (dBµV)




Quasi-peak and Average measurement:

| Freq | Read Level | Cable Loss | LISN Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 0,459 | 29,45 | 0,05 | 9,66 | 39,16 | 46,71 | -7,56 | AVERAGE |
| 0,459 | 33,67 | 0,05 | 9,66 | 43,38 | 56,71 | -13,34 | QP |
| 0,541 | 31,35 | 0,05 | 9,67 | 41,07 | 46,00 | -4,93 | AVERAGE |
| 0,541 | 33,61 | 0,05 | 9,67 | 43,33 | 56,00 | -12,67 | QP |
| 0,708 | 34,62 | 0,04 | 9,68 | 44,34 | 56,00 | -11,66 | QP |
| 0,708 | 30,99 | 0,04 | 9,68 | 40,71 | 46,00 | -5,29 | AVERAGE |
| 0,876 | 34,60 | 0,05 | 9,69 | 44,34 | 56,00 | -11,66 | QP |
| 0,876 | 31,38 | 0,05 | 9,69 | 41,12 | 46,00 | -4,88 | AVERAGE |
| 1,289 | 27,85 | 0,03 | 9,70 | 37,58 | 46,00 | -8,42 | AVERAGE |
| 1,289 | 32,49 | 0,03 | 9,70 | 42,22 | 56,00 | -13,78 | QP |
| 8,279 | 32,68 | 0,16 | 9,89 | 42,73 | 60,00 | -17,27 | QP |
| 8,279 | 26,21 | 0,16 | 9,89 | 36,26 | 50,00 | -13,74 | AVERAGE |

**Level = Read Level + LISN Factor + Cable Loss.**

## 7.2 Radiated Emissions, 30 MHz to 1 GHz

Test Requirement: EN 55011

Test Method: EN 55011

Test Date: 2012-08-29 (initial test)
2012-09-13 (test after modification)

Test voltage AC 230V 50Hz

Frequency Range: 30 MHz to 1 GHz

Measurement Distance: 10m

Class: Group 1, Class B

Detector: Peak for pre-scan
Quasi-Peak for final measurement

Limit: Table 5 of EN 55011

For 10m

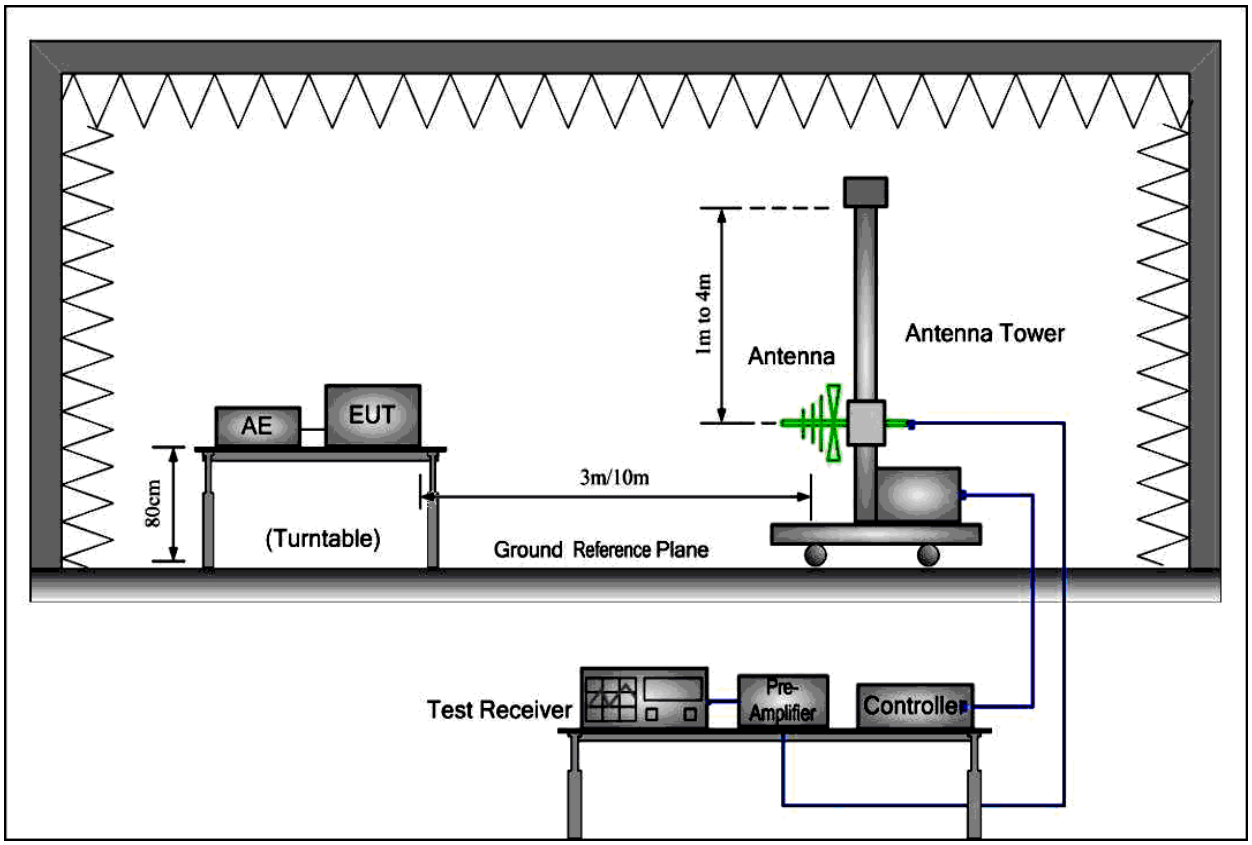
| Frequency range | Quasi-peak Limits |
|---|---|
| MHz | dB (μV/m) |
| 30 to 230 | 30 |
| 230 to 1000 | 37 |

On a test site, class B equipment can be measured at a distance of 3m or 10m. An inverse proportionality factor of 20 dB per decade shall be used to normalize the measured data to the specified distance for determining compliance.
At the transition frequency, the more stringent limit shall apply.

### 7.2.1 E.U.T. Operation

EUT Operation: Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Pre-test the EUT in mode 1 to mode 3 in order to find the worst case.
Test the EUT in mode 1 as the worst case was found.

### 7.2.2 Test Setup and Procedure



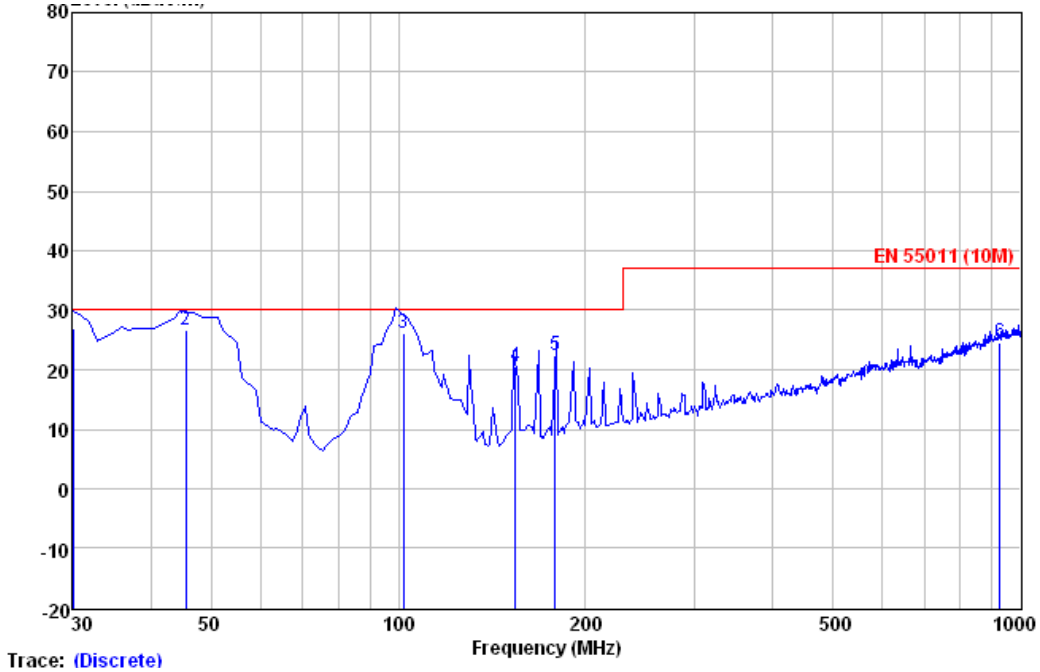

1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The mains cables shall drape to the ground reference plane.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum signature data plots of the EUT.
5. The frequencies of maximum emission were determined in the final radiated emissions measurement, The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

### 7.2.3 Measurement Data

Vertical:

Peak scan

Level (dBµV/m)




Quasi-peak measurement

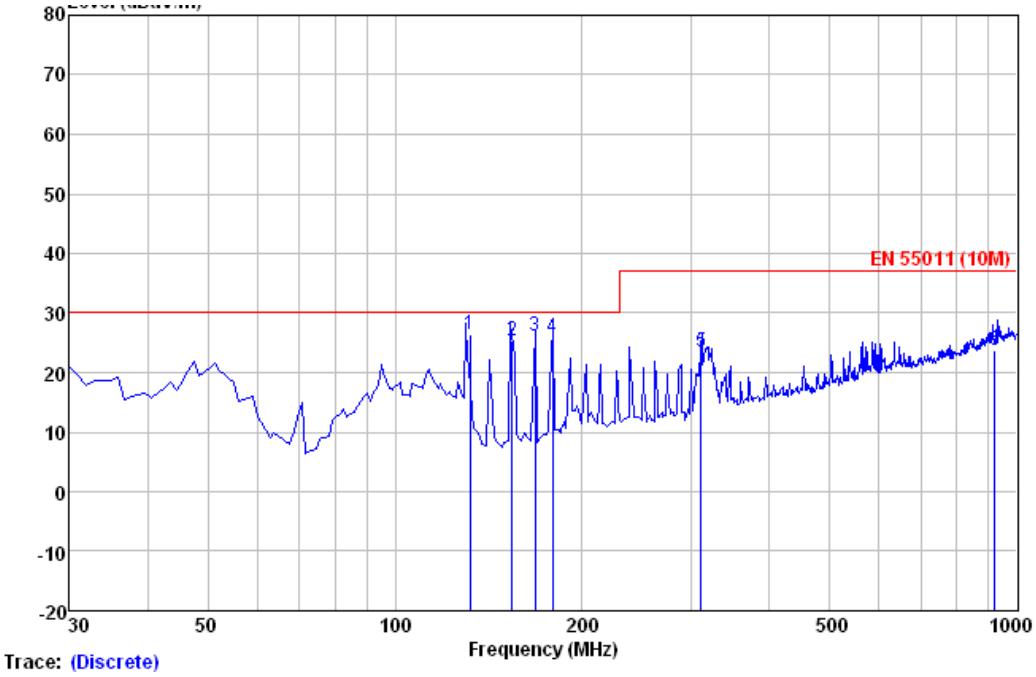
| Freq | ReadLevel | Antenna Factor | Cable Loss | Preamp Factor | Level | Over Limit | Limit Line | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dB | dBuV/m | |
| 30.000 | 44.15 | 11.48 | 0.83 | 29.50 | 26.96 | -3.04 | 30.00 | QP |
| 45.520 | 42.54 | 12.66 | 0.97 | 29.50 | 26.67 | -3.33 | 30.00 | QP |
| 101.780 | 42.34 | 12.11 | 1.44 | 29.70 | 26.19 | -3.81 | 30.00 | QP |
| 154.160 | 40.58 | 7.92 | 1.73 | 29.68 | 20.55 | -9.45 | 30.00 | QP |
| 178.410 | 40.85 | 9.24 | 1.81 | 29.58 | 22.32 | -7.68 | 30.00 | QP |
| 925.310 | 26.49 | 22.04 | 4.15 | 28.08 | 24.60 | -12.40 | 37.00 | QP |

**Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.**

Horizontal:

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Over Limit | Limit Line | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dB | dBuV/m | |
| 132.010 | 46.30 | 8.06 | 1.62 | 29.70 | 26.28 | -3.72 | 30.00 | QP |
| 154.160 | 45.46 | 7.92 | 1.73 | 29.68 | 25.43 | -4.57 | 30.00 | QP |
| 167.740 | 45.49 | 8.51 | 1.78 | 29.62 | 26.16 | -3.84 | 30.00 | QP |
| 179.380 | 44.20 | 9.31 | 1.82 | 29.58 | 25.75 | -4.25 | 30.00 | QP |
| 310.330 | 37.35 | 13.42 | 2.39 | 29.60 | 23.56 | -13.44 | 37.00 | QP |
| 921.430 | 25.73 | 22.01 | 4.15 | 28.11 | 23.78 | -13.22 | 37.00 | QP |

**Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.**

## 7.3 Harmonics Test Result

Test Requirement: EN 61000-3-2

Test Method: See Remark Below

Frequency Range: 100 Hz to 2 kHz

Remark:
Since the EUT was belong to exception of clause 7 and Annex C, according to EN 61000-3-2 figure 1, it was deemed to conform to the requirements of this standard without further testing.

"7 Harmonic current limits
The procedure for applying the limits and assessing the results is shown in Figure 1.
For the following categories of equipment, limits are not specified in this standard:
NOTE 1 Limits may be defined in a future amendment or revision of the standard.
– equipment with a rated power of 75 W or less, other than lighting equipment;
NOTE 2 This value may be reduced from 75 W to 50 W in the future, subject to approval by National Committees at that time.
– professional equipment with a total rated power greater than 1 kW.
– symmetrically controlled heating elements with a rated power less than or equal to 200 W.
– independent dimmers for incandescent lamps with a rated power less than or equal to 1 kW.
NOTE 3 See also C.5.3."
and
No limit applies for all LED lighting equipments with active input power ≤25 W except Discharge lighting equipment (refer to 7.3 b）)

Please read clause 7 & Annex C of this standard for reference.

## 7.4 Flicker Test Result

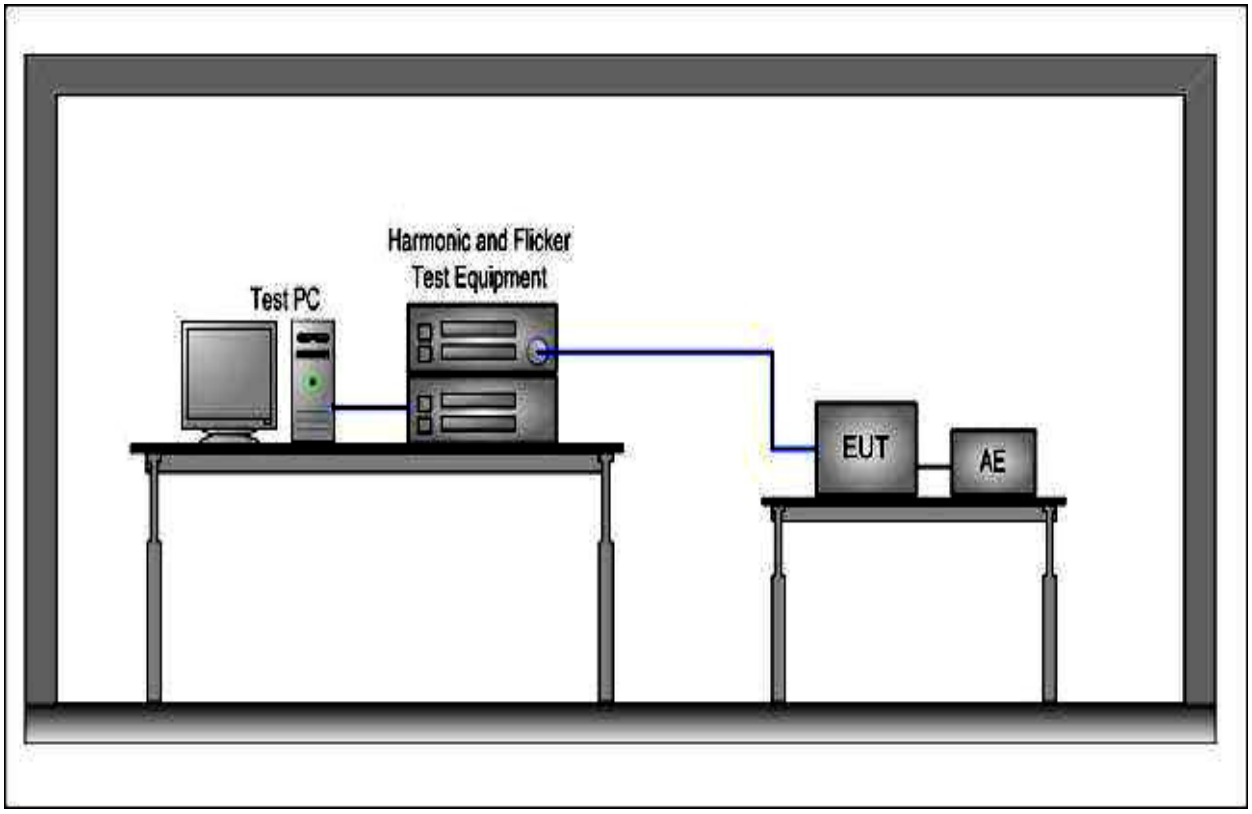
| | |
|---|---|
| Test Requirement: | EN 61000-3-3 |
| Test Method: | EN 61000-3-3 |
| Test Date: | 2012-08-29 |
| Test Voltage | AC 230V 50Hz |
| Measurement Time: | 10 mins |
| Class / Severity: | Clause 5 of EN 61000-3-3 |

### 7.4.1 E.U.T. Operation

EUT Operation: Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Pre-test the EUT in mode 1 to mode 3 in order to find the worst case.
Test the EUT in mode 1 as the worst case was found.

Note: "Pst and Plt requirements shall not be applied to voltage changes caused by manual switching.
The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions."
Please also refer to Annex A (Application of limits and type test conditions) for details in EN 61000-3-3.
--No limits shall apply to lamps.
--Incandescent lamp luminaires with ratings less than or equal to 1 000 W and discharge lamp luminaires with ratings less than or equal to 600 W, are deemed to comply with the dmax limits in this standard and are not required to be tested.
--Ballasts are deemed to be part of luminaires and are not required to be tested.

### 7.4.2 Test Setup and Procedure




1. The test supply voltage (open-circuit voltage) was the rated voltage of the EUT. The test voltage was maintained within ±2 % of the nominal value. The frequency was 50 Hz ±0.5 %.
2. The voltage fluctuations and flicker were measured at the supply terminals of the EUT.
3. The observation period, Tp, for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method was:

   — for Pst, Tp = 10 min.
   — for Plt, Tp = 2 h.

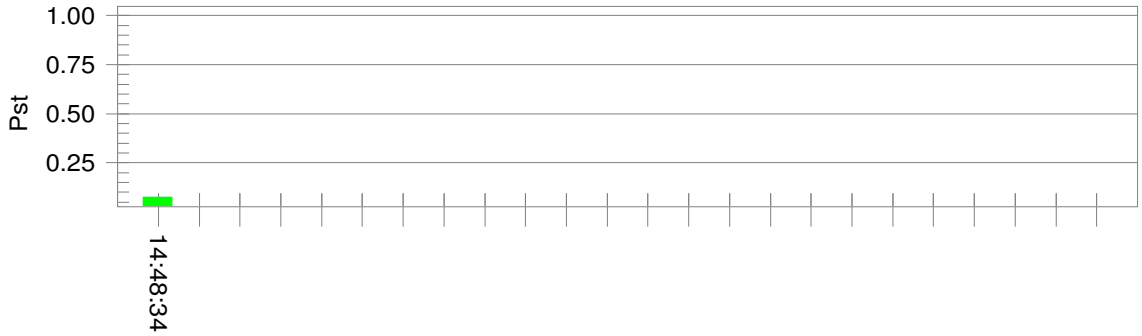
   The observation period included that part of the whole operation cycle in which the EUT produces the most unfavourable sequence of voltage changes.

## 7.4.3 Measurement Data

**Flicker Test Summary per EN 61000-3-3 (Run time)**

**Test Result: Pass** **Status: Test Completed**

**Psti and limit line** **European Limits**




**Parameter values recorded during the test:**

| | | | | |
|---|---|---|---|---|
| **Vrms at the end of test (Volt):** | **230.07** | | | |
| **Highest dt (%):** | **0.20** | **Test limit (%):** | **3.30** | **Pass** |
| **Time(mS) > dt:** | **0.0** | **Test limit (mS):** | **500.0** | **Pass** |
| **Highest dc (%):** | **0.00** | **Test limit (%):** | **3.30** | **Pass** |
| **Highest dmax (%):** | **0.08** | **Test limit (%):** | **4.00** | **Pass** |
| **Highest Pst (10 min. period):** | **0.073** | **Test limit:** | **1.000** | **Pass** |

# 8 Electromagnetic Susceptibility Test Results

## 8.1 Performance Criteria Description in Clause 6 of EN 55014-2

| | |
|---|---|
| **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 (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if 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 (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and from what the user may reasonably expect from the apparatus if 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, or by any operation specified in the instructions for use. |

## 8.2 ESD

| | | |
|---|---|---|
| Test Requirement: | EN 55014-2 | |
| Test Method: | EN 61000-4-2 | |
| Criterion Required: | B | |
| Test Date: | 2012-08-29 | |
| Test voltage | AC 230V 50Hz | |
| Discharge Impedance: | 330 Ω / 150 pF | |
| Discharge Voltage: | Air Discharge: | 8 kV |
| | Contact Discharge: | 4 kV |
| | VCP/HCP: | 4 kV |
| Polarity: | Positive & Negative | |
| Number of Discharge: | Minimum 10 times at each test point | |
| Discharge Mode: | Single Discharge | |
| Discharge Period: | 1 second minimum | |

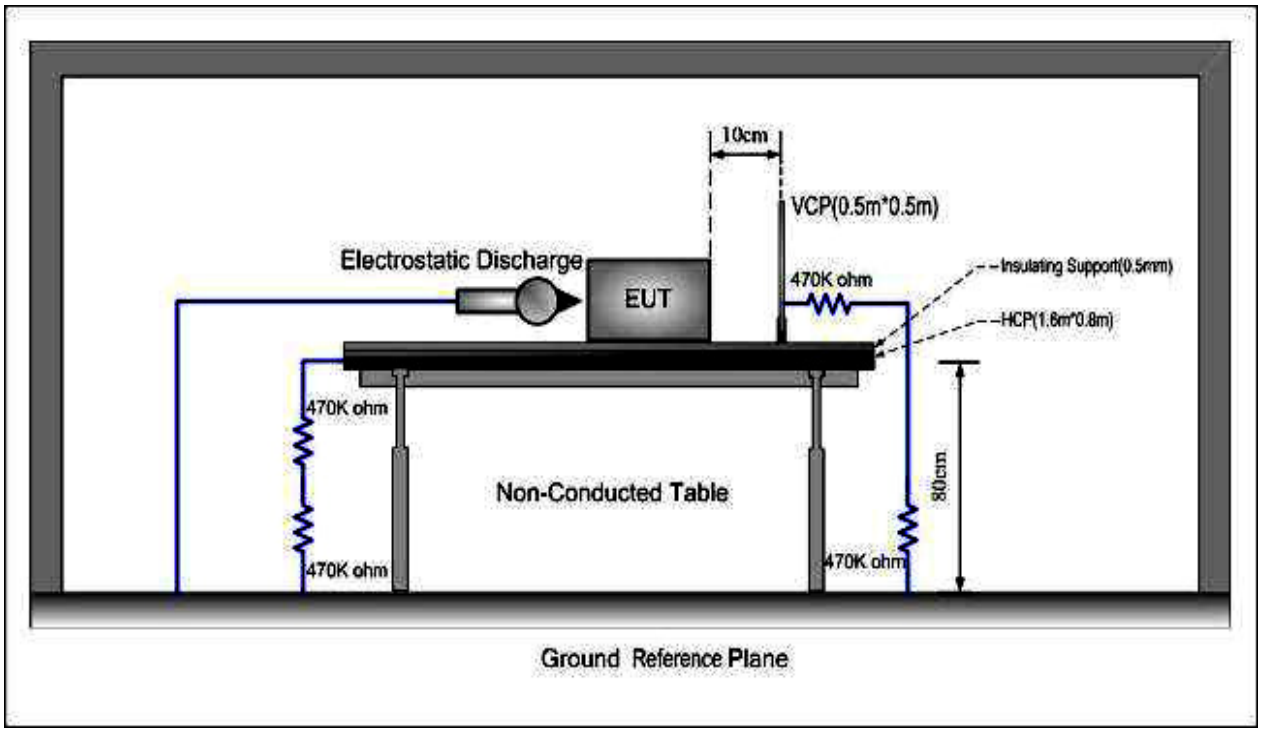
### 8.2.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1005 mbar

EUT Operation: Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Mode 4: idle mode.
Test the EUT in mode 1 to mode 4.

## 8.2.2 Test Setup and Procedure



1. Contact discharge was applied only to conductive surfaces of the EUT. Air discharge was applied only to non-conducted surfaces of the EUT.
2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thickness as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surfaces except the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode touched the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.
5. After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

### 8.2.3 Test Results

**Direct Application Test Results**

Observations: Test Point:

1. All insulated enclosure & seams.
2. All accessible metal parts of the enclosure.

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

**Indirect Application Test Results**

Observations: Test Point:

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 EUT was observed.

N/A: Not applicable (floor mounted EUT or not requested by Standard).

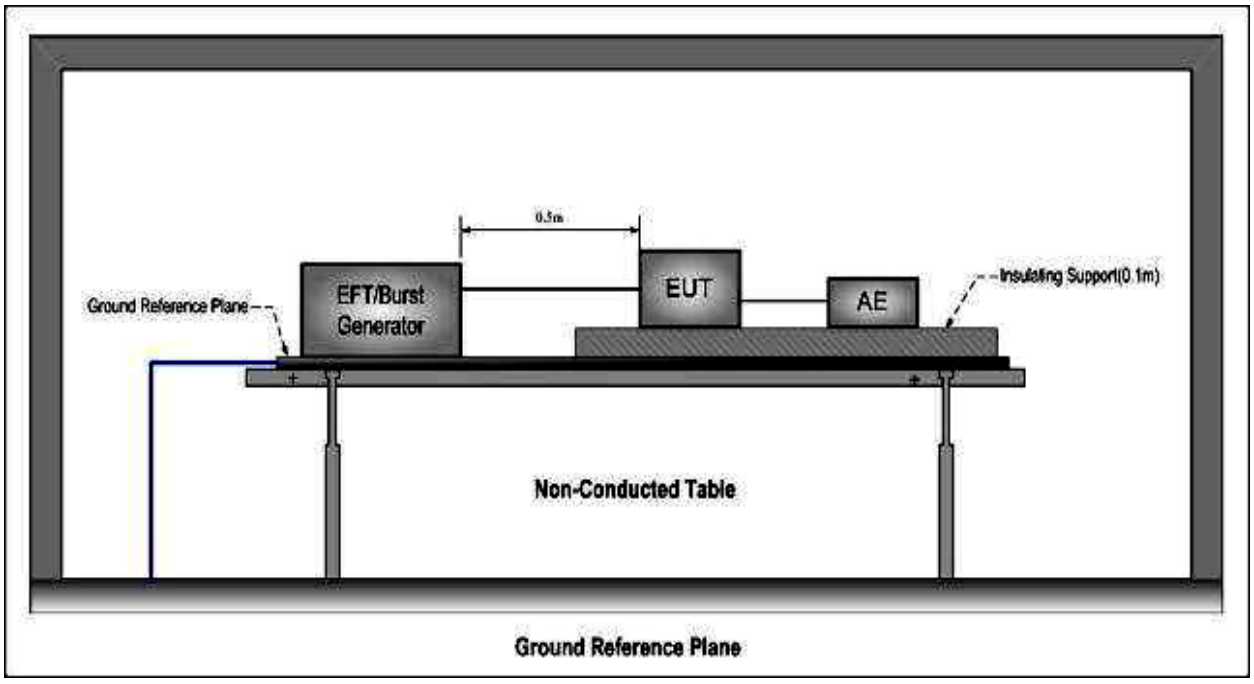
## 8.3 Electrical Fast Transients (EFT)

| | |
|---|---|
| Test Requirement: | EN 55014-2 |
| Test Method: | EN 61000-4-4 |
| Criterion Required: | B |
| Test Date: | 2012-08-31 |
| Test voltage | AC 230V 50Hz |
| Test Level: | 0.5, 1.0 kV on AC |
| Polarity: | Positive & Negative |
| Repetition Frequency: | 5 kHz |
| Burst Duration: | 300ms |
| Test Duration: | 2 minute per level & polarity |

### 8.3.1 E.U.T. Operation

EUT Operation: Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Mode 4: idle mode.
Test the EUT in mode 1 to mode 4.

### 8.3.2 Test Setup and Procedure




1. The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0.1m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT was placed on the insulation support 0.1m above GRP. Cables not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables.
3. The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP.
4. The EUT was conducted the below specified test voltages for line and neutral or line, neutral and earth simultaneously (for signal line with capacitive coupling clamp), 120 seconds duration. If the equipment contains identical ports, only one was tested; multiconduct or cables, such as a 50-pair telecommunication cable, was tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

### 8.3.3 Test Results On AC Supply

| Lead under Test | Level (±kV) | Coupling Direct/Clamp | EUT operating mode | Observations (Performance Criterion) |
|---|---|---|---|---|
| Live + Neutral | ± 0.5, 1.0 | Direct | All modes | (A) |

A: No loss of function.

## 8.4 Surge

| | |
|---|---|
| Test Requirement: | EN 55014-2 |
| Test Method: | EN 61000-4-5 |
| Criterion Required: | B |
| Test Date: | 2012-08-31 (initial test)<br>2012-09-14 (test after modification) |
| Test voltage | AC 230V 50Hz |
| Test Level: | ±1 kV Live to Neutral |
| Polarity: | Positive & Negative |
| Generator source impedance: | 2Ω |
| Trigger Mode: | Internal |
| No. of surges: | 5 positive at 90°, 5 negative at 270°. |

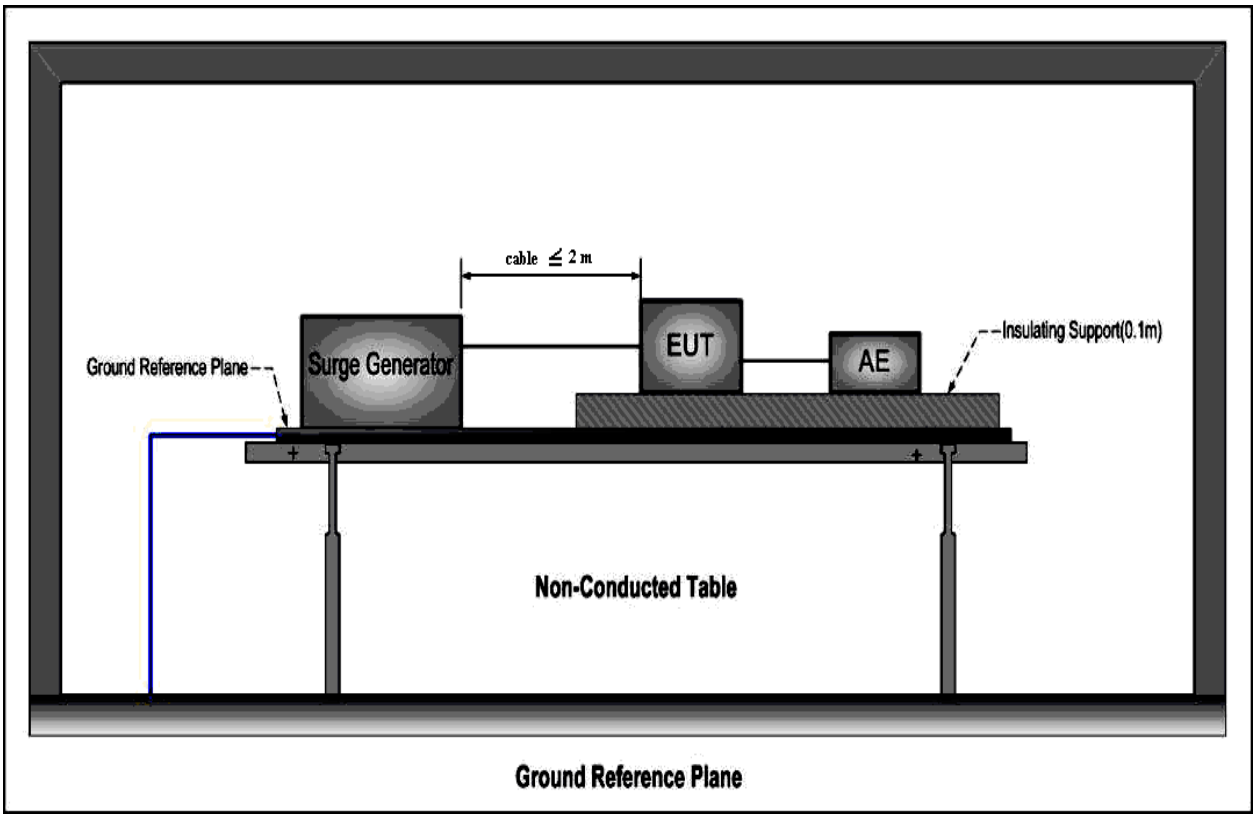
### 8.4.1 E.U.T. Operation

EUT Operation:

Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Mode 4: idle mode.

Test the EUT in mode 1 to mode 4.

## 8.4.2 Test Setup and Procedure



1. The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0.1m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The 1,2/50 μs surge was to be applied to the EUT power supply terminals via the capacitive coupling network .Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be applied on the lines under test.
3. The power cord between the EUT and the coupling/decoupling network do not exceed 2m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2m in length.
4. The EUT was conducted the below specified test voltages for line to line and line to neutral and line to earth and neutral to earth, five positive pulses at 90° and five negative pulses 270° for a.c. power ports and five positive pulses and five negative surge pulses for d.c. power ports. The test levels were applied on the EUT with a 2Ω generator source impedance for power supply terminals and 40Ω output impedance for interconnection lines. The tests were done at repetition rate 1 per minute.

### 8.4.3 Test Results:

| Pulse No | Line-Line | Level (kV) | Surge Interval | Phase (deg) | Observation (Performance Criterion) |
|---|---|---|---|---|---|
| 1–5 | L-N | +1 | 60s | 90° | (A) |
| 6–10 | L-N | -1 | 60s | 270° | (A) |

A: No loss of function.

## 8.5 Conducted Immunity 0.15 MHz to 230 MHz

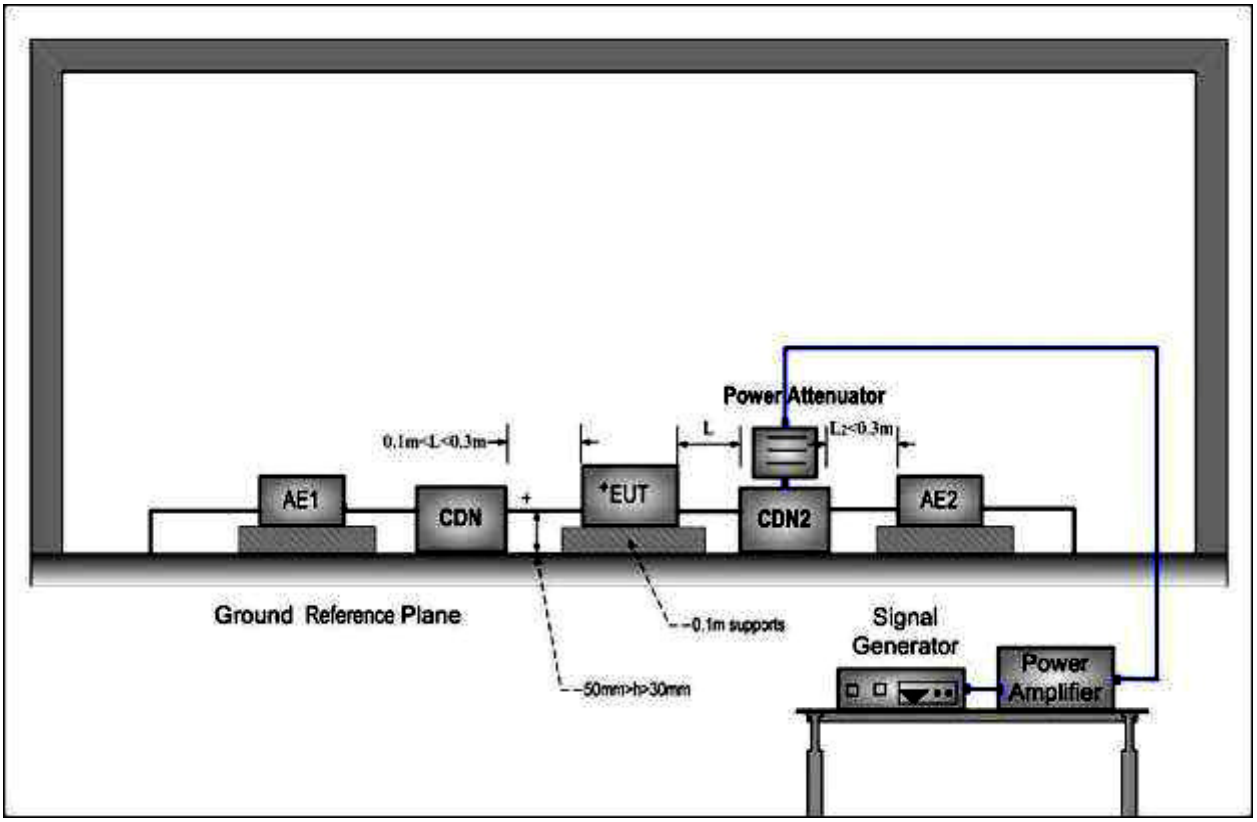
| | |
|---|---|
| Test Requirement: | EN 55014-2 |
| Test Method: | EN 61000-4-6 |
| Criterion Required: | A |
| Test Date: | 2012-08-31 |
| Test voltage | AC 230V 50Hz |
| Frequency Range: | 0.15 MHz to 230 MHz |
| Test level: | 3V r.m.s on AC Ports (unmodulated emf into 150 Ω) |
| Modulation: | 80%, 1kHz Amplitude Modulation |

### 8.5.1 E.U.T. Operation

EUT Operation: Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Mode 4: idle mode.
Test the EUT in mode 1 to mode 4.

### 8.5.2 Test Setup and Procedure

For AC port :



1. The EUT was placed on an insulating support of 0.1m height above a ground reference Plane,arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.
2. The coupling and decoupling devices were required, they were located between 0.1m and 0.3m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.
3. Each AE, used with clamp injection, shall be placed on an insulating support 0.1m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0.3m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane.
4. The frequency range was swept from 150 kHz to 230 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size was not exceed 1% of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

### 8.5.3 Test Results:

| Frequency | Line | Test Level | Modulation | Step Size | Dwell Time | Observation (Performance Criterion) |
|---|---|---|---|---|---|---|
| 150 kHz to 230 MHz | 2 Wires AC Supply Cable | 3V r.m.s | 80%, 1 kHz Amp. Mod. | 1% | 1s | No Loss of Function (A) |

## 8.6 Voltage Dips and Interruptions

| | |
|---|---|
| Test Requirement: | EN 55014-2 |
| Test Method: | EN 61000-4-11 |
| Criterion Required: | C |
| Test Date: | 2012-08-31 |
| Test voltage | AC 230V 50Hz |
| Test Level: | 0% of $U_T$ (Supply Voltage) for 0.5 Periods |
| | 40 % of $U_T$ (Supply Voltage) for 10 Periods |
| | 70 % of $U_T$ (Supply Voltage) for 25 Periods |
| No. of Dips / Interruptions: | 3 per Level |

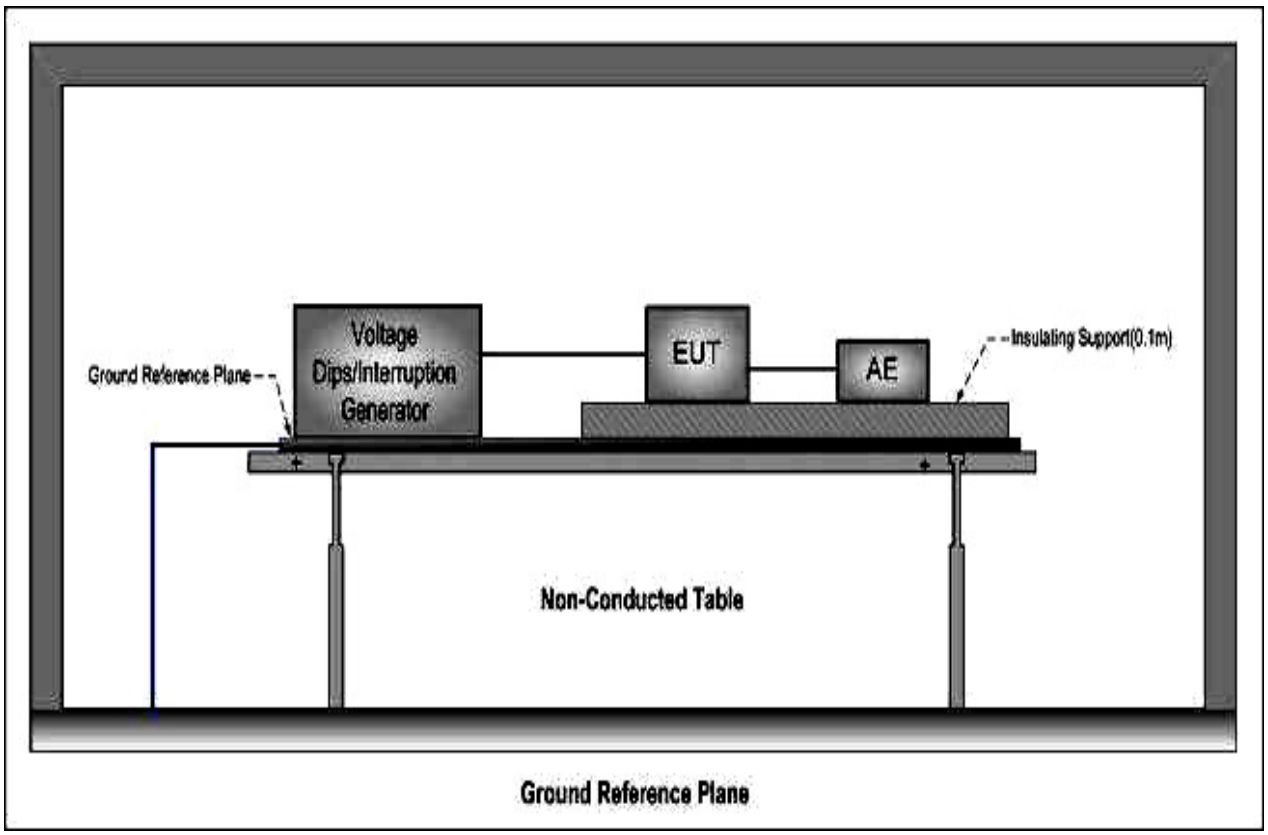
### 8.6.1 E.U.T. Operation

EUT Operation:

Mode 1: ultrasonic mode with maximum power.
Mode 2: ultrasonic mode with medium power.
Mode 3: ultrasonic mode with minimum power.
Mode 4: idle mode.

Test the EUT in mode 1 to mode 4.

## 8.6.2 Test Setup and Procedure




1. The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0.1m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
3. The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
4. For EUT with more than one power cord, each power cord was tested individually.

### 8.6.3 Test Results

$U_{T=}$ AC 230V 50Hz

| Test Level % $U_T$ | Phase | Duration of drop out in Periods | No of drop out | Time between drop out | Observations (Performance Criterion) |
|---|---|---|---|---|---|
| 0 | 0° | 0.5 | 3 | 10s | (A) |
| 40 | 0° | 10 | 3 | 10s | (A) |
| 70 | 0° | 25 | 3 | 10s | (C) |

Remark:

$U_{T=}$ The nominal supply voltage.

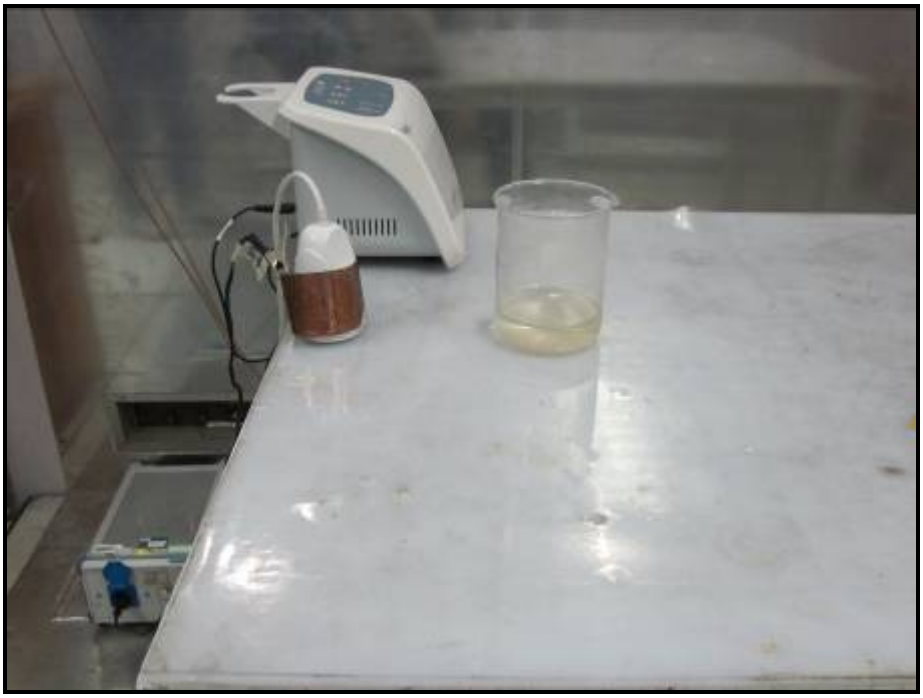
A: No Loss of Function.

C: During test the EUT restarted, it could recover by operation after test.

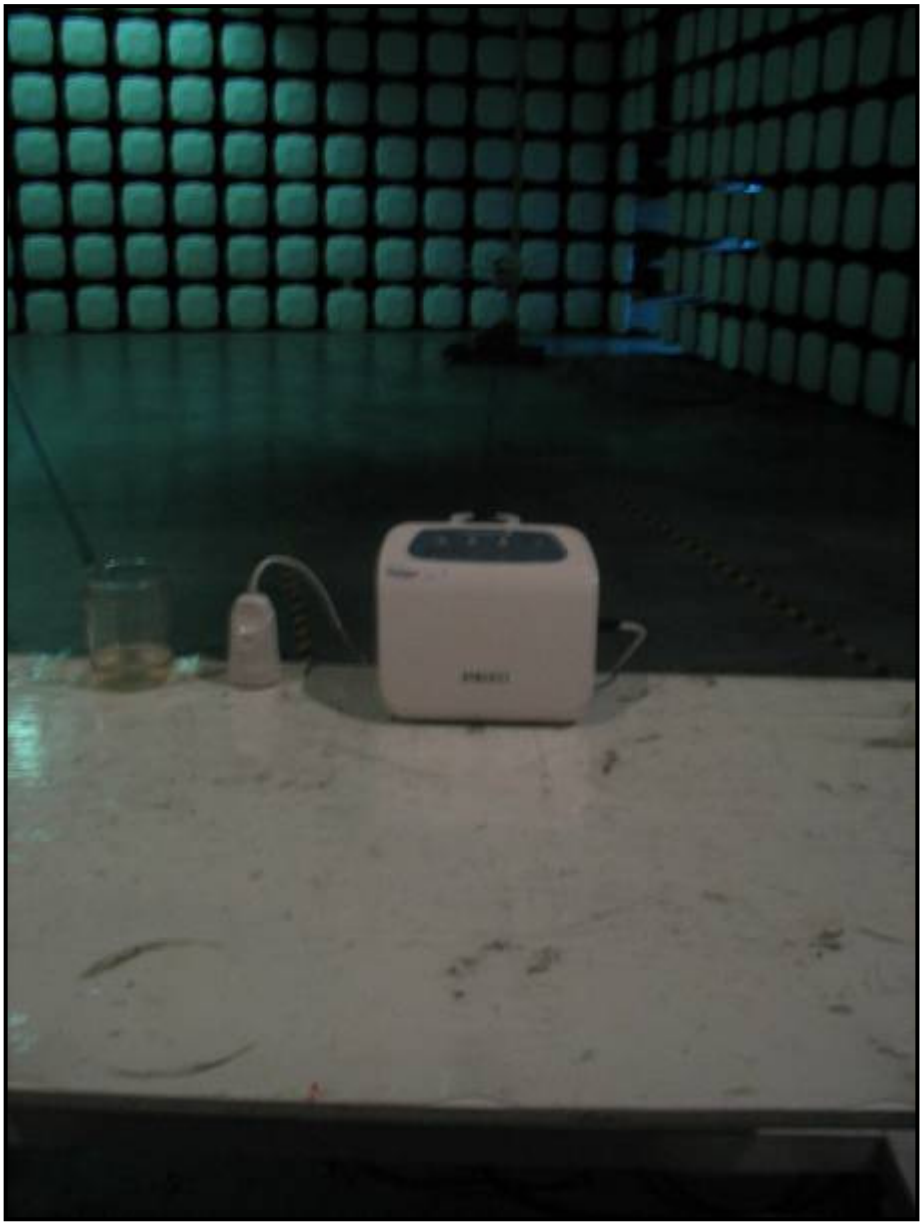
**Performance B is within the acceptable criterion for Voltage Dips and Interruption test.**

# 9 Photographs

## 9.1 Conducted Emissions on Mains Terminals Test Setup

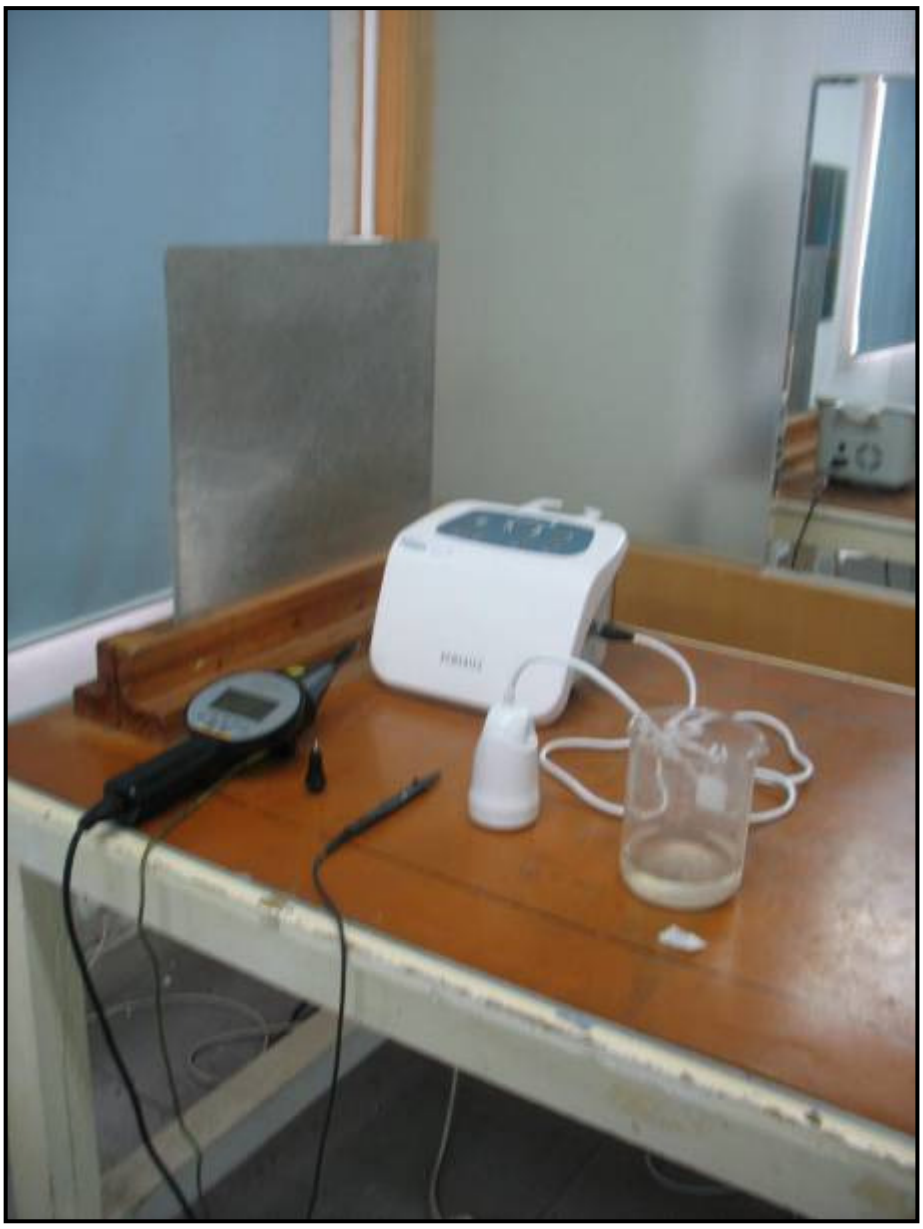


## 9.2 Radiated Emission Test Setup



## 9.3 Flicker Test Setup

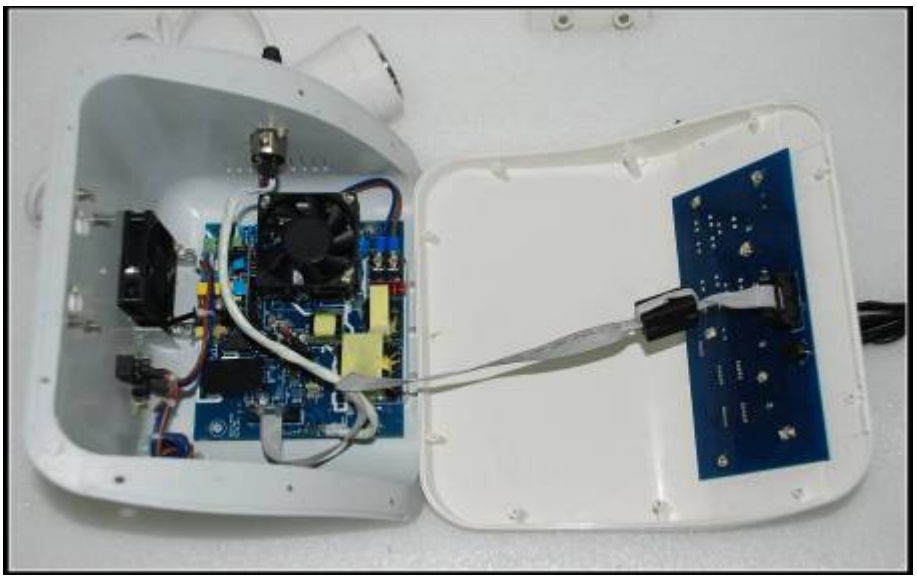
## 9.4 ESD Test Setup

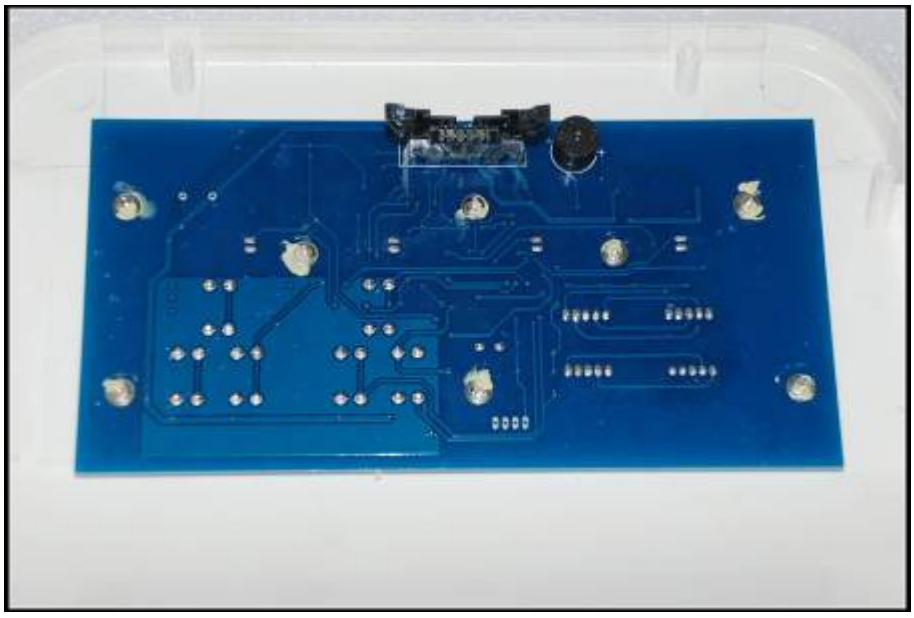


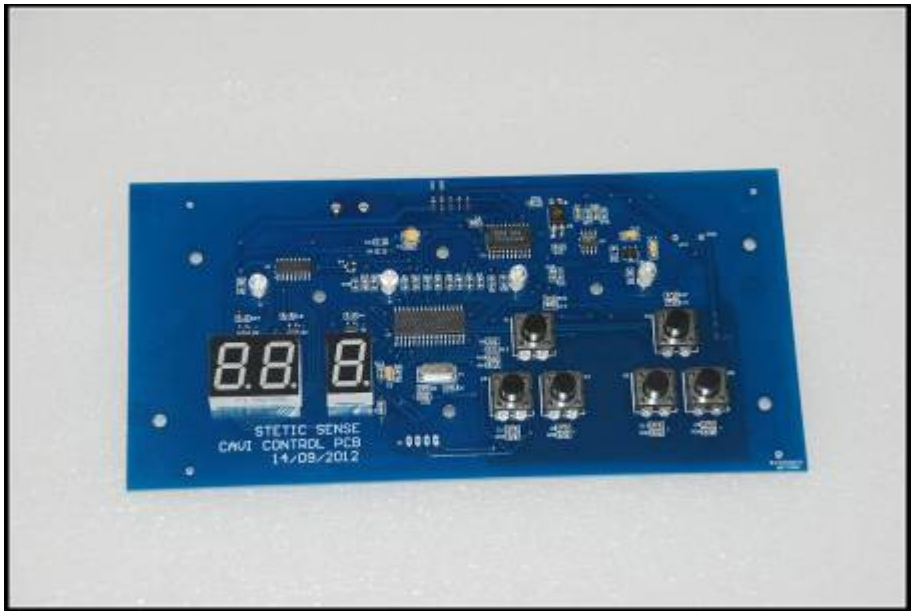
## 9.5 EFT, Surge, Voltage Dip and Interruptions Test Setup

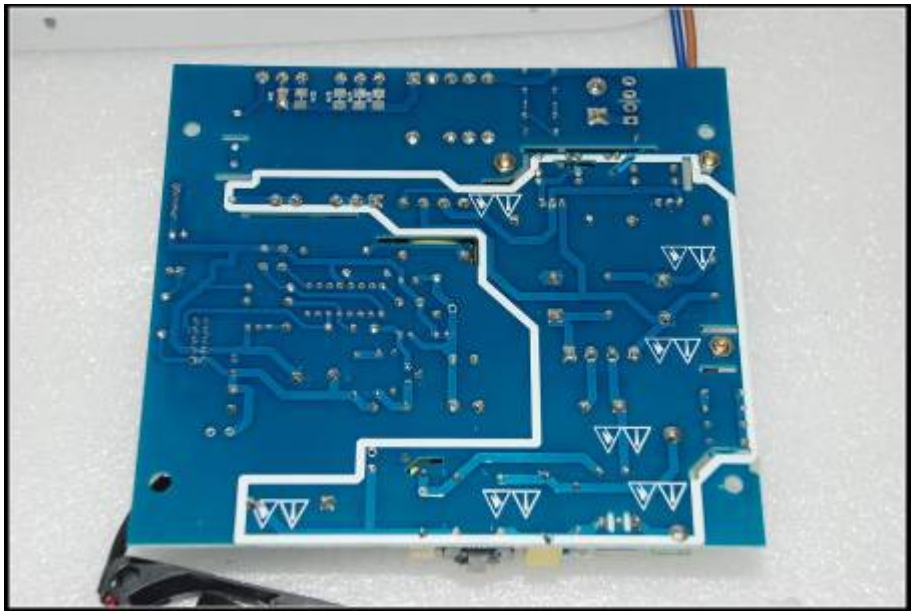
## 9.6 Conducted Immunity Test Setup

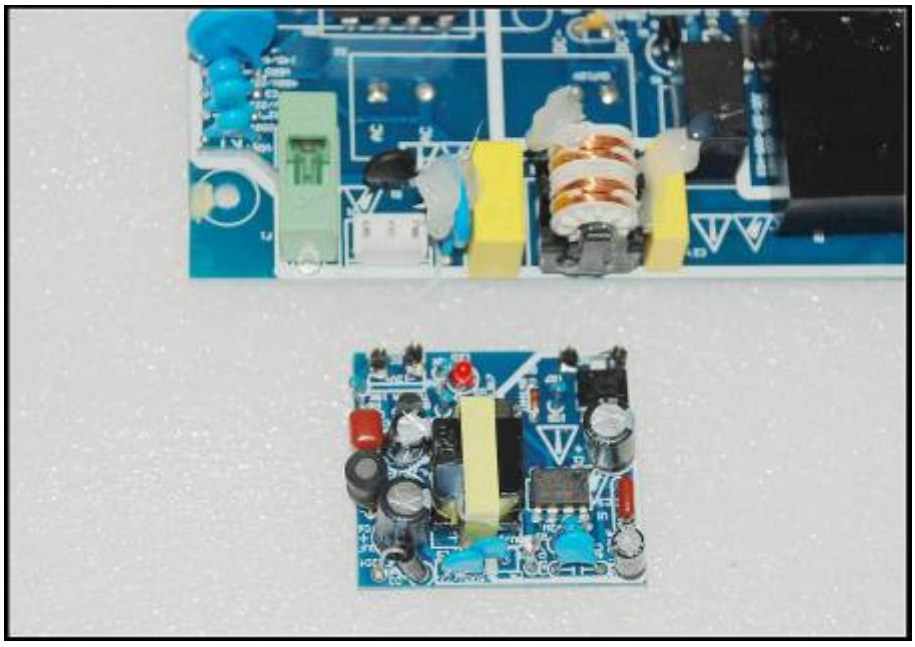
## 9.7 EUT Constructional Details

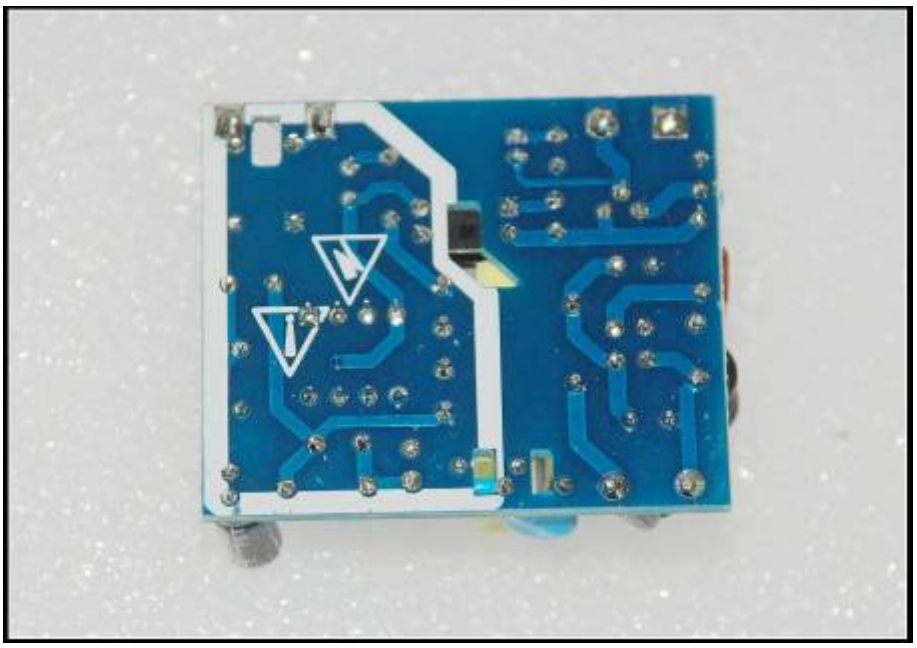











**--End of Report--**