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Report No.: GZEM131200579901

Page: 1 of 53

TEST REPORT

Application No:	GZEM1312005799LM
Applicant:	ShenZhen Betop Electronics Co., Ltd.
Product Name:	LED Lamp
Product Description:	LED Light
Model No:	BT-ECO5W, BT-ECO6W ♣
♣	Please refer to section 3 of this report for further details.
Standards:	EN 55015:2006+A1:2007+A2:2009, EN 61547:2009, EN 61000-3-2:2006+A1:2009+A2:2009, EN 61000-3-3:2008.
Date of Receipt:	2013-12-10
Date of Test:	2013-12-12 to 2014-01-13
Date of Issue:	2014-01-17
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.



The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

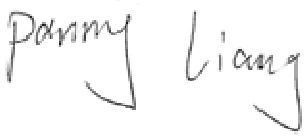
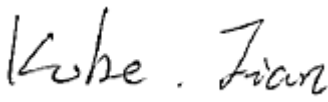
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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2014-01-17		Original

Authorized for issue by:			
Tested By	 (Panny Liang) / Project Engineer	2013-12-12 to 2014-01-13 Date	
Prepared By	 (Liky Chen) / Clerk	2014-01-17 Date	
Checked By	 (Kobe Jian) / Reviewer	2014-01-17 Date	

3 Test Summary

Electromagnetic Interference (EMI)				
Test	Test Requirement	Test Method	Class / Severity	Result
Conducted Emission on AC (9 kHz to 30 MHz)	EN 55015:2006 +A1:2007+A2:2009	EN 55015:2006 +A1:2007+A2:2009	Table 2a	PASS①
Radiated Electromagnetic Disturbance (9 KHz to 30 MHz)	EN 55015:2006 +A1:2007+A2:2009	EN 55015:2006 +A1:2007+A2:2009	Table 3a	PASS②
Radiated Emission (30 MHz to 300 MHz)	EN 55015:2006 +A1:2007+A2:2009	CISPR 22: 2008	Table 3b	PASS
Harmonic Emission on AC	EN 61000-3-2:2006 +A1:2009+A2:2009	EN 61000-3-2:2006 +A1:2009+A2:2009	Class C	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 61547:2009	EN 61000-4-2:2009	Contact: ± 4 kV Air: $\pm 2, 4, 8$ kV	PASS
Radiated Immunity (80 MHz to 1 GHz)	EN 61547:2009	EN 61000-4-3:2006 + A1:2008+ A2:2010	3 V/m, 80% 1 kHz, A.M.	PASS
Electrical Fast Transients (EFT) on AC	EN 61547:2009	EN 61000-4-4:2012	AC ± 1.0 kV	PASS
Surge Immunity on AC	EN 61547:2009	EN 61000-4-5:2006	± 0.5 kV D.M. †	PASS
Injected Currents on AC (150 kHz to 80 MHz)	EN 61547:2009	EN 61000-4-6:2009	3V r.m.s (emf), 80% 1 kHz, Amp. Mod.	PASS
Power Frequency Magnetic Field	EN 61547:2009	EN 61000-4-8:2010	50/60 Hz 3 A/m	N/A
Voltage Dips	EN 61547:2009	EN 61000-4-11:2004	0 % U_T^* for 0.5 per 70 % U_T^* for 10 per	PASS
* U_T is the nominal supply voltage.				
† D.M. – Differential Mode.				
EUT In this whole report EUT means Equipment Under Test.				



Remark :

N/A: Not applicable, please refer to section 8.7 of this report for details.

****:** please refer to section 7.4 of this report for details.

① ②: The EUT passed Conducted Emission & Radiated Emission test after the modification carried out by applicant.

♣ **Model No.:** BT-ECO5W, BT-ECO6W

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference being the rating power: BT-ECO5W: 5W, BT-ECO6W: 6W.

Therefore only one model **BT-ECO6W** was tested in this report.



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5 General Information

5.1 Client Information

Applicant: ShenZhen Betop Electronics Co., Ltd.
Address of Applicant: Building C-D, Yisong Ecological Science and Technology Park,
Jiejiabao Road No.9, ShiYan Town, Bao'an District, Shenzhen China

5.2 General Description of E.U.T.

Product Name: LED Lamp
Product Description: LED Light
Model No: BT-ECO6W

5.3 Details of E.U.T.

Rated Supply (Voltage): AC 230V 50/60Hz
Power Cable: 1 m x 2 wires unscreened AC mains cable (supplied by SGS).
Rated Power of Operation: Below 25W.

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Deviation from Standards

None.

5.6 General Test Climate During Testing

Temperature: 15-25 °C Humidity: 30-70 %RH Atmospheric Pressure: 860-1060 mbar

5.7 Abnormalities from Standard Conditions

The EUT passed Conducted Emission & Radiated Emission test after the modification carried out by applicant.

5.8 Monitoring of EUT for All Immunity Test

Audio: N/A
Visual: LED lighting 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, Sciencetech 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	Calibration Interval
					(YYYY-MM-DD)	
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	2014-03-04	1Y
EMC0102	LISN	SCHAFFNER CHASE	MN2050D/1	1421	2014-8-31	1Y
EMC2046	Artificial Mains Network (LISN)	AFJ Instruments	LT32C	S.N.320311201 50	2014-03-04	1Y
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2014-03-04	1Y
EMC0107	Coaxial Cable	SGS	2m	N/A	2014-07-25	2Y
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	1Y
EMC0120	8 Line ISN	Fischer Custom Communications	FCC-TLISN-T8-02	20550	2014-8-31	1Y
EMC0121	4 Line ISN	Fischer Custom Communications	FCC-TLISN-T4-02	20549	2014-8-31	1Y
EMC0122	2 Line ISN	Fischer Custom Communications	FCC-TLISN-T2-02	20548	2014-8-31	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	2015-01-04	1Y
EMC167	Conical metal housing	SGS-EMC	N/A	N/A	2014-2-16	2Y

RE LOOP						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC0701	Loop Antenna	Laplace Instruments	RF300	N/A	2014-09-06	2Y
EMC0409	Software	Rohde & Schwarz	ESK1	N/A	N/A	N/A
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2014-03-04	1Y



RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-08-30	2Y
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2014-05-06	1Y
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2014-03-04	1Y
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2014-05-09	1Y
EMC2025	Trilog Broadband Antenna 30-3000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9163	9163-450	2016-08-31	3Y
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2016-08-31	3Y
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-06-02	2Y
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2016-08-31	3Y
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2014-07-01	2Y
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2014-03-04	1Y
EMC2065	Amplifier	HP	8447F	N/A	2014-08-31	1Y
EMC2063	1-26GHz Pre Amplifier	Compliance Direction System Inc.	PAP-1G26-48	6279.628	2014-07-29	1Y
EMC0075	310N Amplifier	Sonoma	310N	272683	2014-03-04	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-ELEKTRONIK	BBHA 9170	9170-375	2014-06-01	3Y
EMC2069	2.4GHz filter	Micro-Tronics	BRM 50702	149	2014-06-05	1Y
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-04-27	2Y
EMC2041	Broad-Band Horn Antenna(14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9170	9170-375	2014/6/11	3Y

Harmonics / Flicker test						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC0608	AC Power Source	California	50001iX	56627	2014-03-04	1Y
EMC0607	Power Analyzer	California	PACS	72400	2014-03-04	1Y



Electrostatic Discharge						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC2071	ESD Simulator	TESEQ AG	NSG 435	6739	2014-5-27	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	2014-9-13	1Y

Radiated Immunity						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC0525	Compact 3m Semi-Anechoic Chamber	Changzhou zhongyu	N/A	N/A	2014-08-30	2Y
EMC0516	Signal Generator	Rohde & Schwarz	SMR20	100416	2014-05-06	1Y
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-06-02	2Y
EMC0915	Amplifier	EMPOWER	BBS2E4ALP	1007	2014-03-04	1Y
EMC0914	Amplifier	EMPOWER	BBS3Q5KIN	1006	2014-03-04	1Y
EMC0904	Power Meter	Rohde & Schwarz	NRVS	825770/074	2014-03-04	1Y
EMC0071	URV5-Z2 Insert. Unit	R&S	URV5-Z2	100309	2014-03-04	1Y
EMC0917	Dual Directional Coupler	EMCA	715-10-1.400	70031	2014-08-31	1Y
EMC0907	Electric Field Probe	Wandel & Goltermann	EMC-20	M-0063	2014-05-06	1Y
EMC2055	Oscilloscope	Tektronix	TDS3052C	C011815	2014-03-04	1Y
EMC0909	Monitor System	Mitsubishi Corp.	M-0552AB	91510185	N/A	N/A

EFT, Surge, Voltage dips and Interruption						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC2059	Modular Impulse Surge Generator	EMC PARTNER	MIG0603EN	259	2014-3-21	1Y
EMC2060	High speed signal Surge CDN	EMC PARTNER	CDN-UTP	CDN-UTP0089	2014-3-21	1Y
EMC2072	EMC Immunity Test System	TESEQ AG	NSG 3060&CDN306 1&INA 6502 CIB	1580&1466&22 2	2014-5-13	1Y
EMC2012	Power-Electronics Measurement System	Tektronix	TDS 744A	N/A	2014-03-04	1Y



Conducted Immunity						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date	Calibration Interval
					(YYYY-MM-DD)	
EMC1101	Signal Generator	Rohde & Schwarz	SMY01	825675/016	2014-08-31	1Y
EMC1102	Amplifier 0.15-230 MHz	Ophirrf	GRF5048	1003	2014-08-31	1Y
EMC1103	Power Meter	Rohde & Schwarz	NRVS	825770/079	2014-03-04	1Y
EMC0071	URV5-Z2 Insert. Unit	R&S	URV5-Z2	100309	2014-03-04	1Y
EMC1105	Dual Directional coupler	Werlatone Inc.	C1795	6635	2014-08-31	1Y
EMC2012	Oscilloscope	Tektronix	TDS 744A	N/A	2014-03-04	1Y
EMC2048	CDN	Elektronik- Feinmechanik	L-801:M2/M3	2738	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	Calibration Interval
					(YYYY-MM-DD)	
EMC0006	DMM	Fluke	73	70681569	2014-09-13	1Y
EMC0007	DMM	Fluke	73	70671122	2014-09-13	1Y

7 Emission Test Results

7.1 Conducted Emissions on mains terminals, 9 kHz to 30 MHz

Test Requirement: EN 55015

Test Method: EN 55015

Test Date: 2013-12-12 (initial test)
2014-01-13 (final test)

Power Supply: AC 230V 50Hz

Frequency Range: 9 kHz to 30 MHz

Class/Severity: Table 2a of EN 55015

Detector: Peak for pre-scan
Quasi-Peak and Average for final measurement
200 Hz resolution bandwidth between 9 kHz & 150 kHz
9 kHz resolution bandwidth between 150 kHz & 30 MHz

Limit:

Frequency range MHz	Limits dB (μV) ^a	
	Quasi-peak	Average
0.009 to 0.05	110	---
0.05 to 0.150	90-80 ^b	---
0.150 to 0.5	66-56 ^b	56-46 ^b
0.5 to 5.0	56 ^c	46 ^c
5.0 to 30	60	50

^a At the transition frequency, the lower limit applies.

^b The limit decreases linearly with the logarithm of the frequency in the ranges 50 kHz to 150 kHz and 150 kHz to 0.5 MHz.

^c For electrodeless lamps and luminaires, the limit in the frequency range of 2.51 MHz to 3.0 MHz is 73 dB(μV) quasi-peak and 63 dB(μV) average.

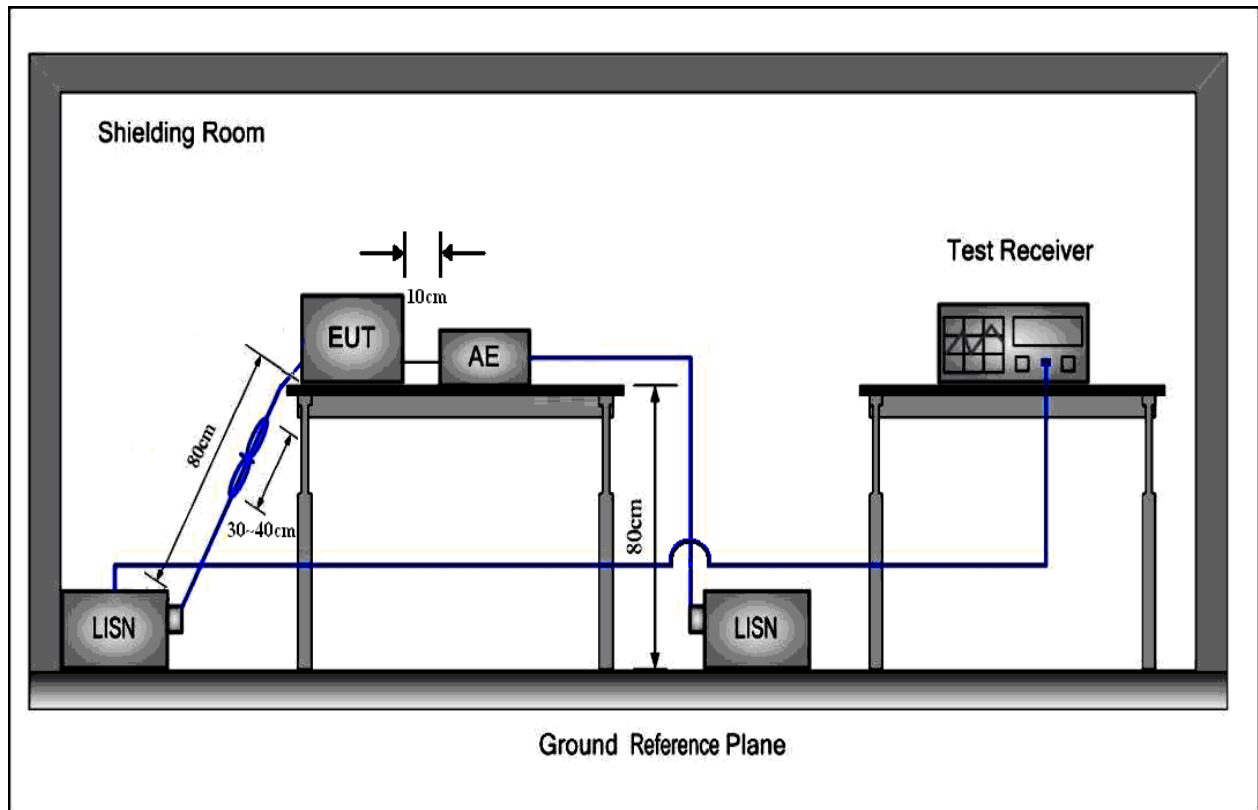
7.1.1 E.U.T. Operation

Test the EUT in LED lighting mode.

Pre-test the EUT supply voltage shall be within $\pm 2\%$ of the rated voltage. In the case of a voltage range, measurement shall be carried out within $\pm 2\%$ of each of the nominal supply voltages of that range.

In order to check the level of disturbance varies considerably with the supply voltage, compliance test at AC 230V as no worse case was found.

7.1.2 Test Setup and Procedure



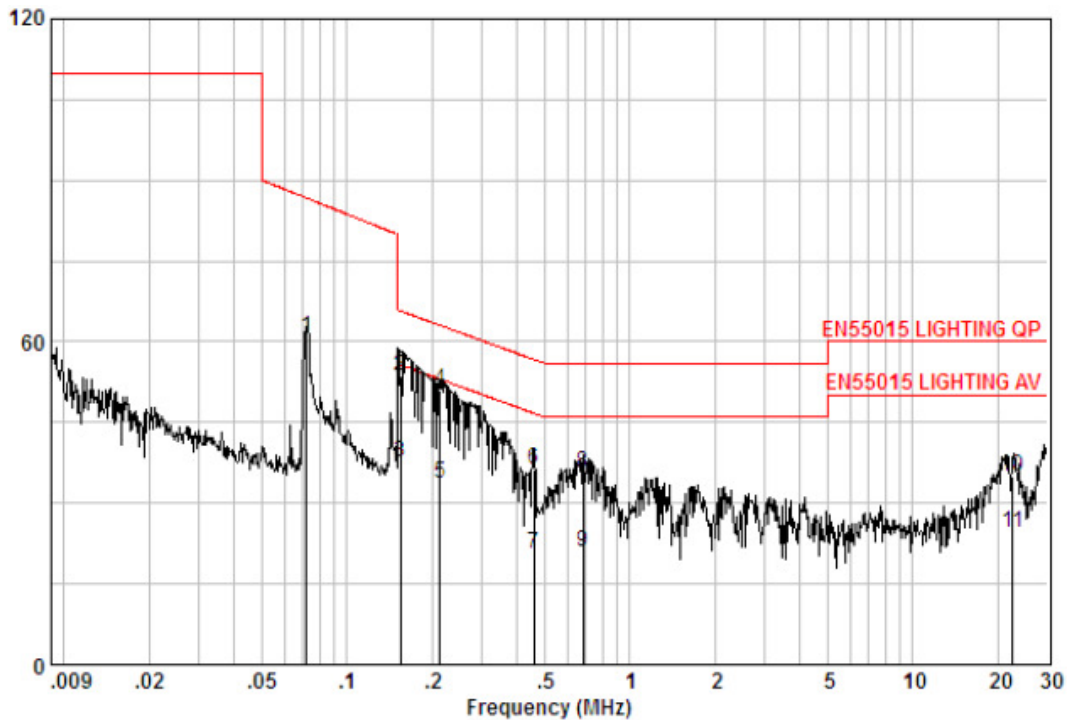
1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. For Load terminal voltage measurement, a voltage probe was used on the load terminals. Measurement at control terminals were carried out by means of an impedance stabilization network (ISN). The ISN was bounded to ground.
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 EUT kept a distance of at least 0.8m from any other earthed conducting surface. The Artificial Mains Network was situated at a distance of 0.8m from 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.

7.1.3 Measurement Data

Live Line:

Peak Scan:

Level (dBμV)



Quasi-peak and Average measurement:

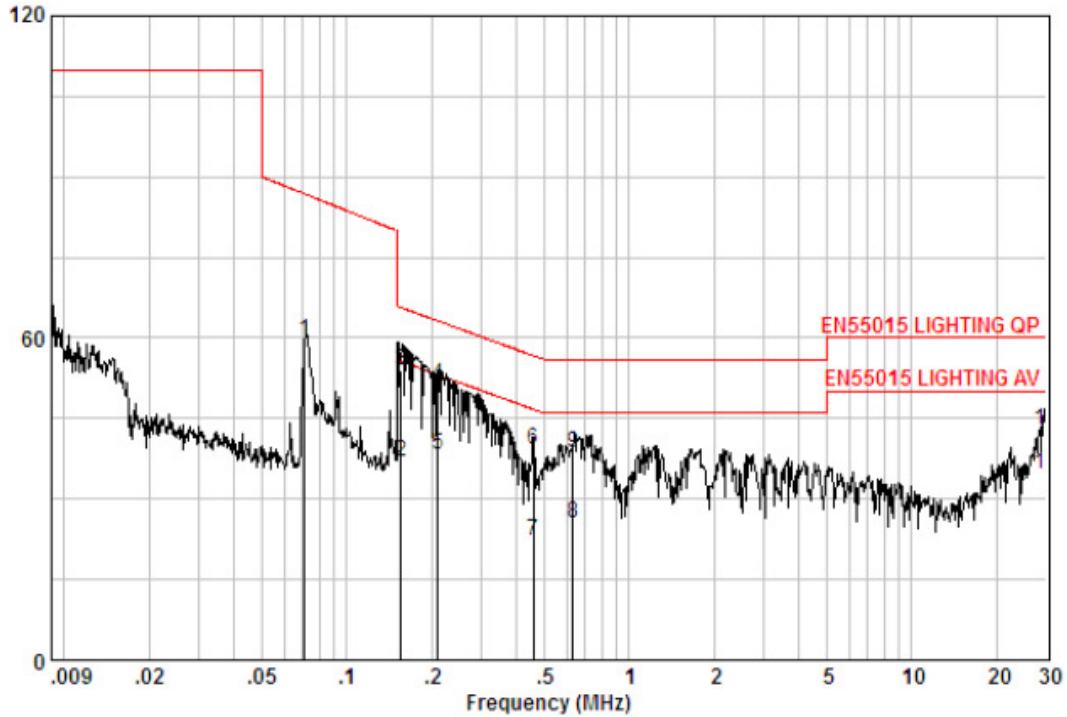
Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBμV	dB	dB	dBμV	dBμV	dB	
0.072	51.53	0.00	9.43	60.96	86.68	-25.72	QP
0.155	44.01	0.08	9.48	53.57	65.74	-12.17	QP
0.155	28.04	0.08	9.48	37.60	55.74	-18.14	AVERAGE
0.213	41.24	0.12	9.50	50.86	63.10	-12.24	QP
0.213	24.12	0.12	9.50	33.74	53.10	-19.36	AVERAGE
0.459	26.77	0.07	9.53	36.37	56.71	-20.35	QP
0.459	10.98	0.07	9.53	20.58	46.71	-26.14	AVERAGE
0.683	26.14	0.06	9.54	35.74	56.00	-20.26	QP
0.683	11.21	0.06	9.54	20.81	46.00	-25.19	AVERAGE
22.655	24.96	0.31	9.86	35.13	60.00	-24.87	QP
22.655	14.52	0.31	9.86	24.69	50.00	-25.31	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	dBμV	dB	dB	dBμV	dBμV	dB	
0,071	50,22	0,00	9,44	59,66	86,84	-27,18	QP
0,156	27,52	0,08	9,51	37,11	55,69	-18,59	AVERAGE
0,156	44,39	0,08	9,51	53,98	65,69	-11,72	QP
0,211	41,59	0,12	9,53	51,23	63,18	-11,95	QP
0,211	28,71	0,12	9,53	38,35	53,18	-14,83	AVERAGE
0,459	29,45	0,07	9,56	39,08	56,71	-17,64	QP
0,459	12,50	0,07	9,56	22,13	46,71	-24,59	AVERAGE
0,634	15,75	0,07	9,57	25,39	46,00	-20,61	AVERAGE
0,634	29,05	0,07	9,57	38,69	56,00	-17,31	QP
29,841	23,58	0,45	10,57	34,60	50,00	-15,40	AVERAGE
29,841	31,94	0,45	10,57	42,96	60,00	-17,04	QP

Level = Read Level + LISN Factor + Cable Loss.

7.2 Radiated Electromagnetic Disturbance Test: 9 KHz to 30 MHz

Test Requirement: EN 55015

Test Method: EN 55015

Test Date: 2013-12-12

Power Supply: AC 230V 50Hz

Frequency Range: 9 kHz to 30 MHz

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

200 Hz resolution bandwidth between 9 kHz & 150 kHz
9 kHz resolution bandwidth between 150 kHz & 30 MHz

Limit:

Frequency range MHz	Limits for loop diameter limits 2m dB (μA) ^a
0.009 to 0.070	88
0.070 to 0.150	88 to 58 ^b
0.150 to 3.0	58 to 22 ^b
3.0 to 30.0	22

^a At the transition frequency, the lower limit applies.

^b Decreasing linearly with the logarithm of the frequency. For electrodeless lamps and luminaires, the limit in the frequency range of 2.2 MHz to 3.0 MHz is 58 dB(μA) for 2 m, 51 dB(μA) for 3 m and 45 dB(μA) for 4 m loop diameter.

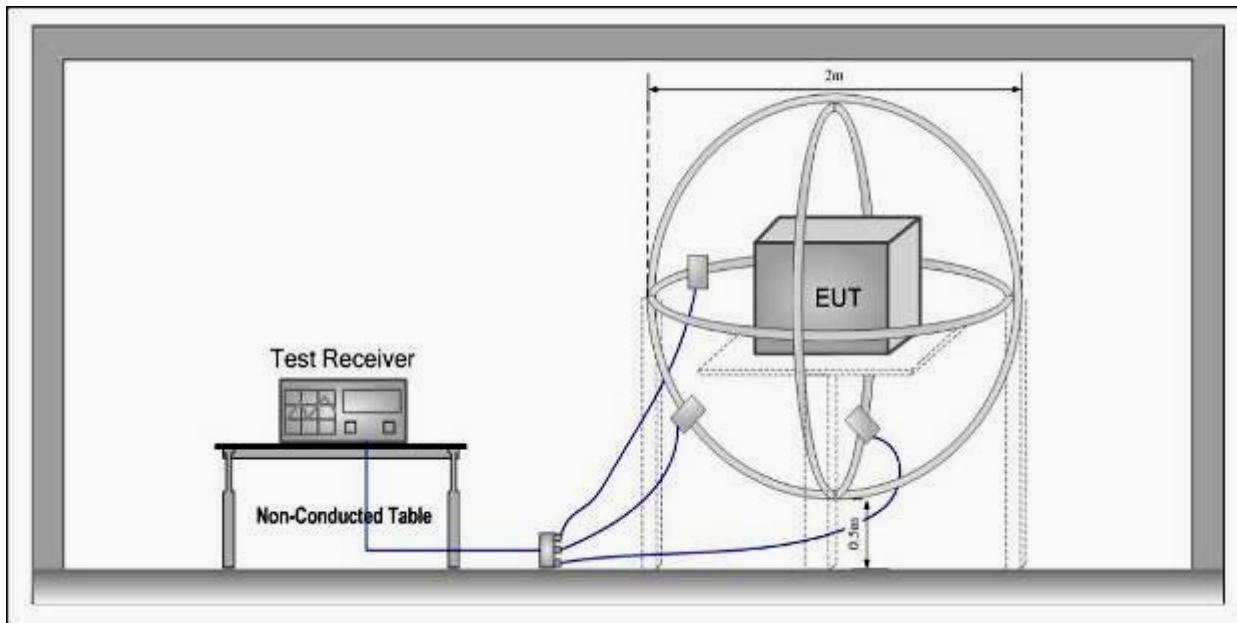
7.2.1 E.U.T. Operation

Test the EUT in LED lighting mode.

Pre-test the EUT supply voltage shall be within $\pm 2\%$ of the rated voltage. In the case of a voltage range, measurement shall be carried out within $\pm 2\%$ of each of the nominal supply voltages of that range.

In order to check the level of disturbance varies considerably with the supply voltage, compliance test at AC 230V as no worse case was found.

7.2.2 Test Setup and Procedure



1. The magnetic component was measured by means of a loop antenna. The lighting equipment was placed in the centre of the antenna. The position of the mains lead was optimized for maximum current induction.
2. The induced current in the loop antenna was measured by means of a current probe (1 V/A) and the CISPR measuring receiver. During the measurements the EUT remains in a fixed position. By means of a coaxial switch, The currents in the three large loop antennas, originating from the three mutually orthogonal magnetic field components, were measured in sequence. Each value was fulfil the requirements given.
3. There were no special instructions for the supply wiring.
4. The distance between the outer perimeter of the LAS(Loop Antenna System) and nearby objects, such as floor and walls, was at least 0.5 m.
5. To avoid unwanted capacitive coupling between the EUT and the LAS, the maximum dimensions of the EUT allowed a distance of at least 0.20 m between the EUT and the standardized 2 m large loop antennas of the LAS.

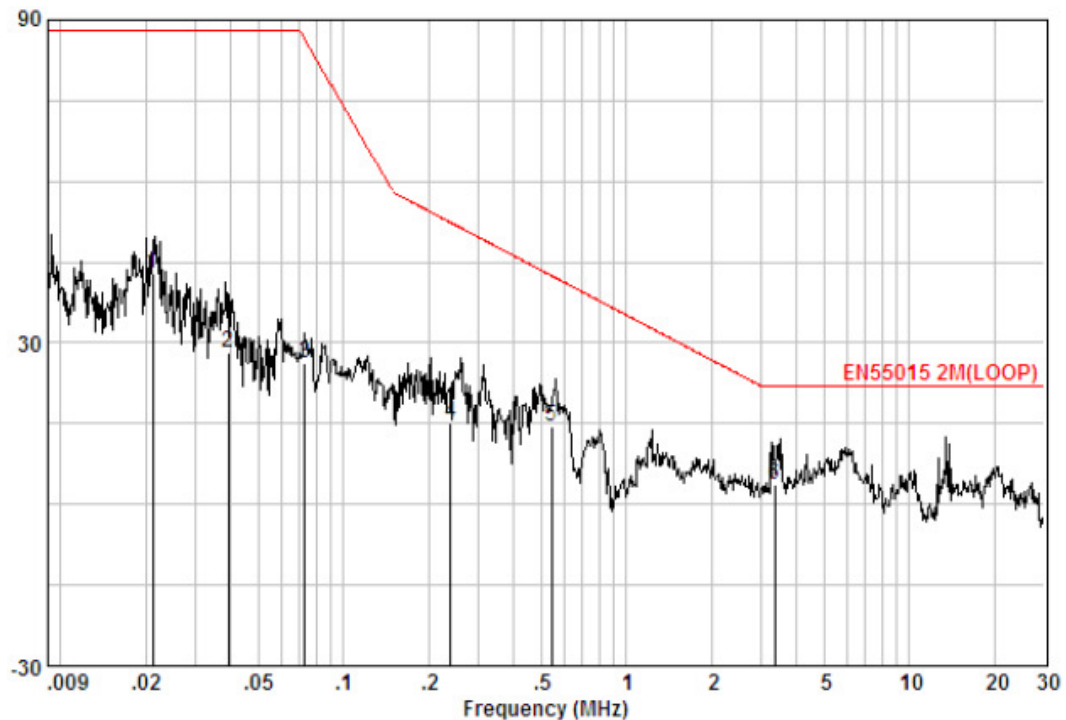
7.2.3 Measurement Data

An initial pre-scan was performed in the 2m loop antenna using the spectrum analyser in peak detection mode. The EUT was measured for X(A), Y(B), Z(C) polarities.

Peak Measurement Data of A_Loop Peak Scan

Peak Scan:

Level (dBμA)

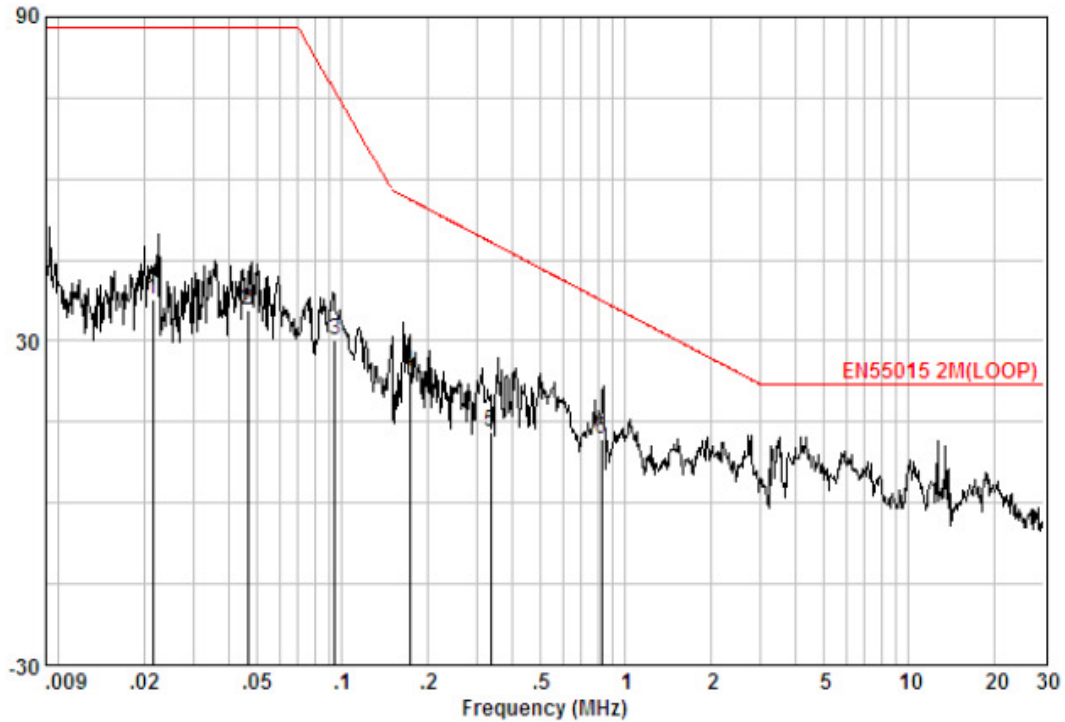


Frequency MHz	Read Level dBμA	Trans ducer dB	Measured Level dBμA	Limit Line dBμA	Over Limit dB	Remark
0,021	42,56	0,37	42,93	88,00	-45,07	QP
0,039	32,38	-4,22	28,16	88,00	-59,84	QP
0,073	35,61	-9,44	26,17	86,36	-60,20	QP
0,238	33,64	-18,58	15,06	52,43	-37,37	QP
0,546	38,99	-24,38	14,61	42,48	-27,87	QP
3,357	30,69	-26,85	3,83	22,00	-18,17	QP

Peak Measurement Data of B_Loop Peak Scan

Peak Scan:

Level (dBμA)

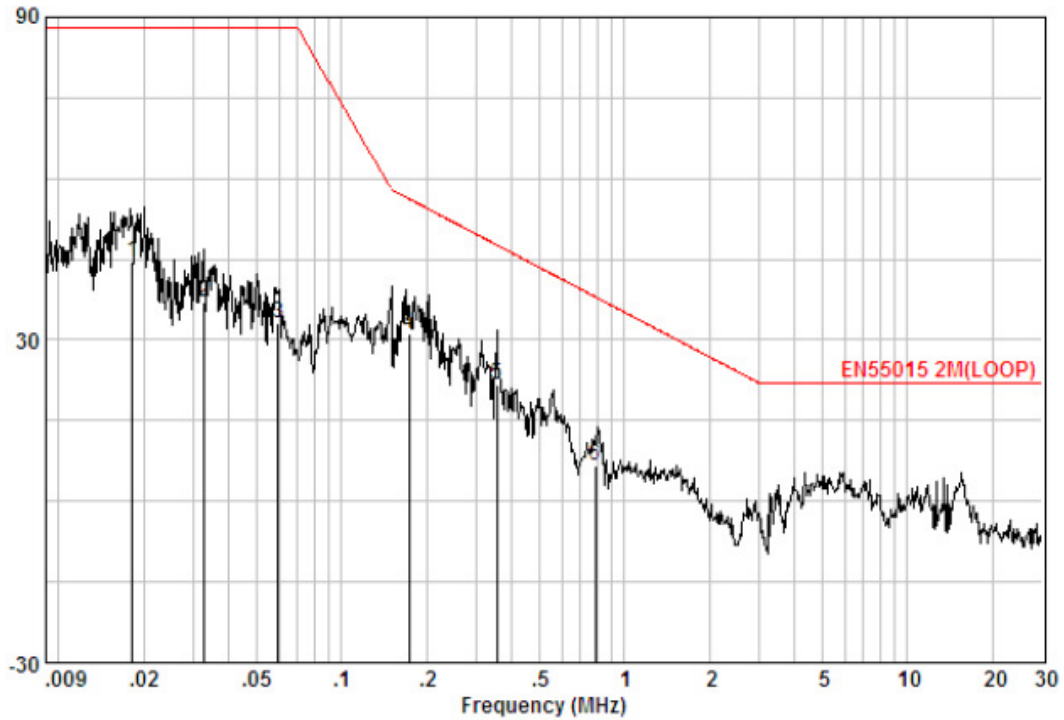


Frequency MHz	Read Level dBμA	Trans ducer dB	Measured Level dBμA	Limit Line dBμA	Over Limit dB	Remark
0,021	37,43	0,25	37,68	88,00	-50,32	QP
0,046	41,23	-5,63	35,61	88,00	-52,39	QP
0,095	41,77	-11,62	30,15	76,15	-46,00	QP
0,174	40,49	-16,22	24,27	56,23	-31,96	QP
0,335	34,20	-21,13	13,07	48,33	-35,27	QP
0,825	37,62	-25,69	11,94	37,51	-25,57	QP

Peak Measurement Data of C_Loop Peak Scan

Peak Scan:

Level (dBμA)



Frequency MHz	Read Level dBμA	Trans ducer dB	Measured Level dBμA	Limit Line dBμA	Over Limit dB	Remark
0,018	43,23	1,45	44,68	88,00	-43,32	QP
0,033	39,83	-2,89	36,94	88,00	-51,06	QP
0,060	40,71	-7,74	32,97	88,00	-55,03	QP
0,174	47,49	-16,22	31,27	56,23	-24,96	QP
0,355	43,31	-21,55	21,75	47,65	-25,90	QP
0,792	32,11	-25,56	6,55	38,00	-31,45	QP

7.3 Radiated Emission: 30 MHz to 300 MHz

Test Requirement: EN 55015

Test Method: CISPR 22

Test Date: 2013-12-12 (initial test)
2014-01-10 (final test)

Power Supply: AC 230V 50Hz

Frequency Range: 30 MHz to 300 MHz

Measurement Distance: 10m

Detector: Peak for pre-scan
Quasi-Peak for final test (120 kHz resolution bandwidth)

Limit:

Frequency range MHz	Quasi-peak limits dB (μV/m)
30 to 230	30
230 to 300	37
At transitional frequencies the lower limit applies.	

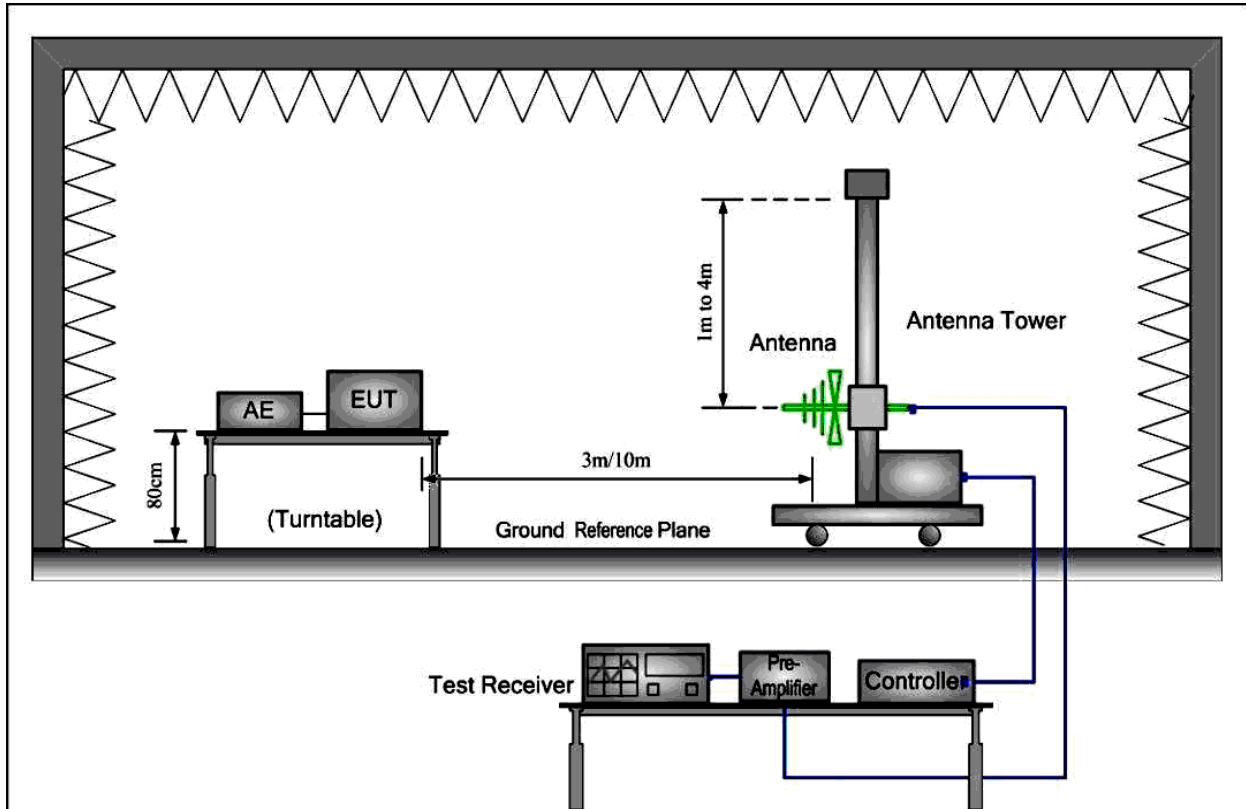
7.3.1 E.U.T. Operation

Test the EUT in LED lighting mode.

Pre-test the EUT supply voltage shall be within $\pm 2\%$ of the rated voltage. In the case of a voltage range, measurement shall be carried out within $\pm 2\%$ of each of the nominal supply voltages of that range.

In order to check the level of disturbance varies considerably with the supply voltage, compliance test at AC 230V as no worse case was found.

7.3.2 Test Setup and Procedure

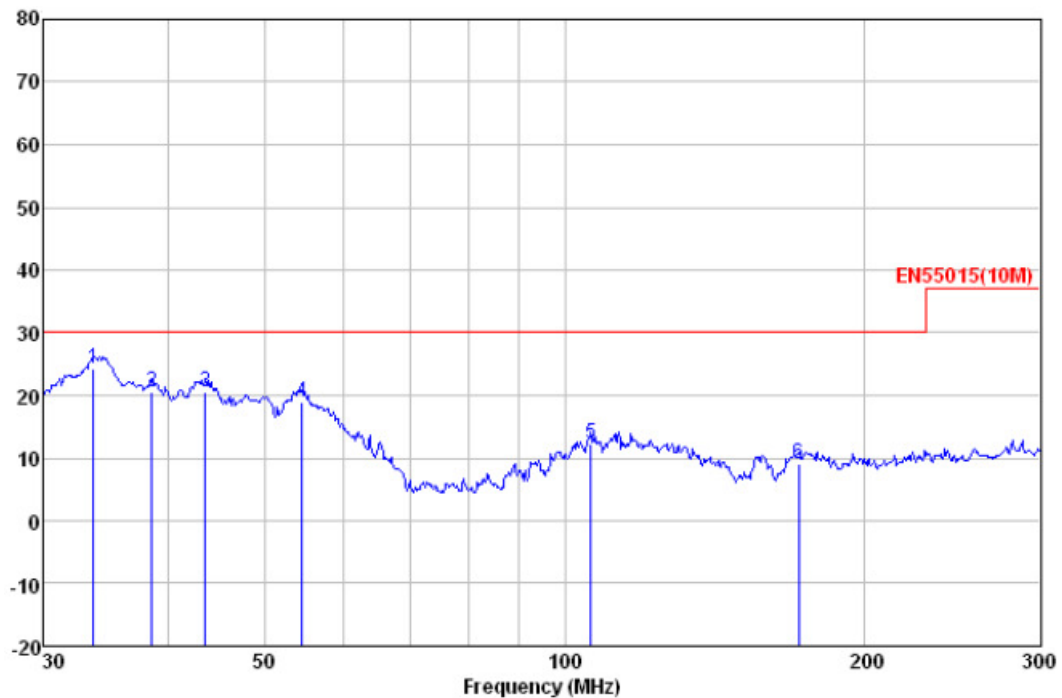


1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The mains cables shall drape to the ground reference plane.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal 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.

7.3.3 Measurement Data

Vertical:

Peak scan

Level (dB μ V/m)

Quasi-peak measurement

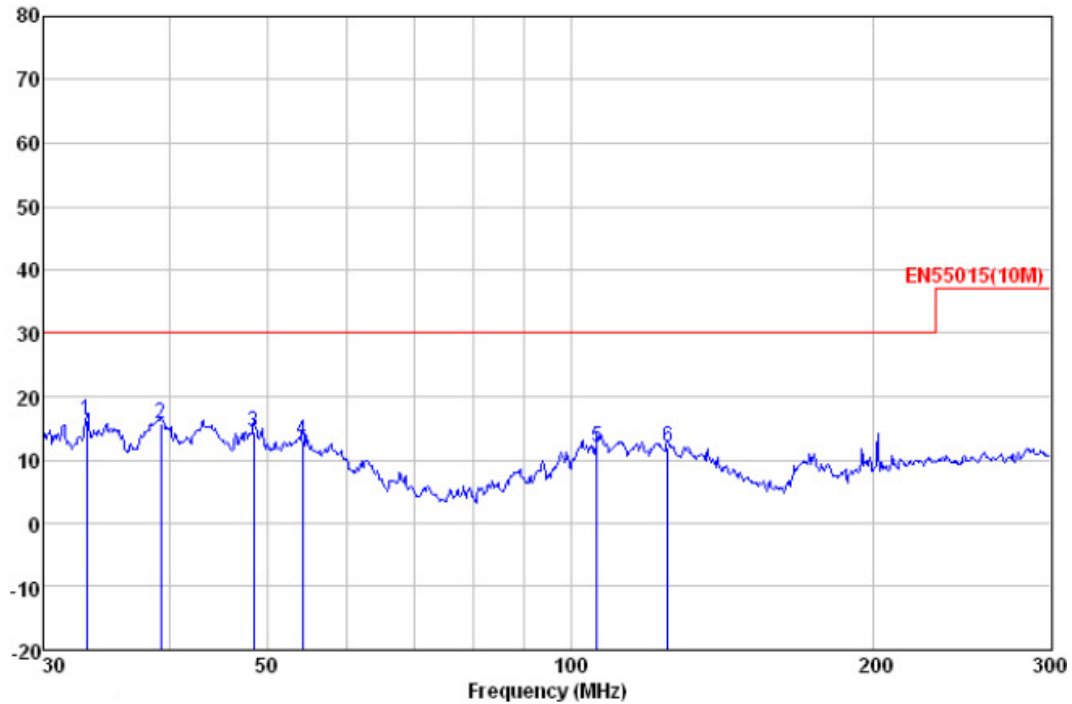
Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
33.661	36.47	18.43	0.87	31.60	24.17	30.00	-5.83	QP
38.470	32.13	19.20	0.92	31.60	20.65	30.00	-9.35	QP
43.563	31.68	19.48	0.96	31.60	20.52	30.00	-9.48	QP
54.465	32.89	16.58	1.06	31.60	18.93	30.00	-11.07	QP
106.199	26.47	15.90	1.47	31.59	12.25	30.00	-17.75	QP
171.839	26.85	11.68	1.79	31.34	8.98	30.00	-21.02	QP

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

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Read Freq	Antenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
33.046	28.84	18.29	0.86	31.60	16.39	30.00	-13.61	QP
39.185	27.23	19.20	0.92	31.60	15.75	30.00	-14.25	QP
48.431	26.58	18.47	0.99	31.60	14.44	30.00	-15.56	QP
54.215	26.93	16.64	1.05	31.60	13.02	30.00	-16.98	QP
106.199	26.28	15.90	1.47	31.59	12.06	30.00	-17.94	QP
124.773	27.03	14.81	1.58	31.53	11.89	30.00	-18.11	QP

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

7.4 Harmonics Test Results

Test Requirement: EN 61000-3-2
Test Method: See Remark Below
Frequency range: 100Hz to 2kHz

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.

7.5 Flicker Test Results

Test Requirement:	EN 61000-3-3
Test Method:	EN 61000-3-3
Test Date:	2013-12-13
Power Supply:	AC 230V 50Hz
Class/Severity:	Clause 5 of EN 61000-3-3
Measurement Time:	10 mins
Detector:	As per EN 61000-3-3

7.5.1 E.U.T. Operation

Test the EUT in LED lighting mode.

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."

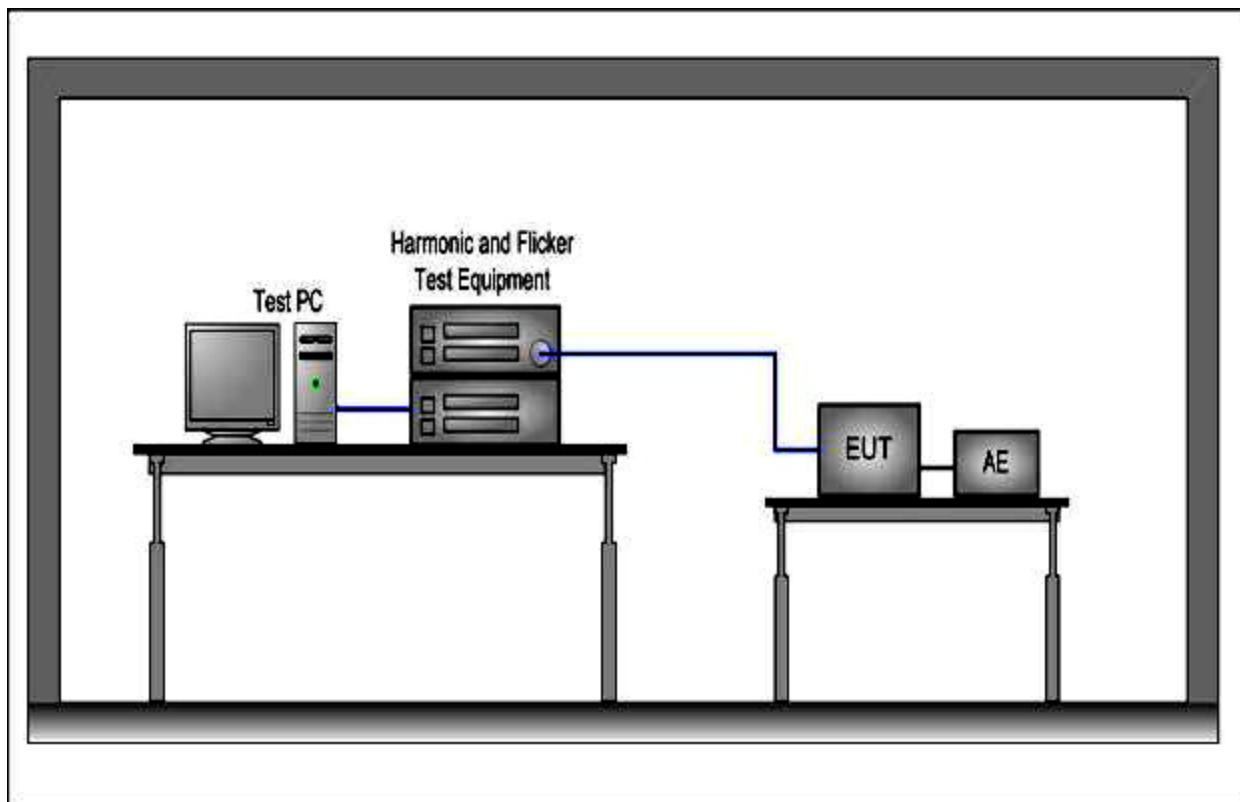
Please also refer to Annex A (Application of limits and type test conditions) for details in EN 61000-3-3.

--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.

7.5.2 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 $\pm 2\%$ of the nominal value. The frequency was $50\text{ Hz} \pm 0.5\%$.
2. The EUT was tested with a lamp of that power for which the equipment was rated. If lighting equipment includes more than one lamp, all lamps shall be in use. Pst and Plt evaluations are required only for lighting equipment which is likely to produce flicker.
3. The voltage fluctuations and flicker were measured at the supply terminals of the EUT.
4. The observation period, T_p , for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method was:
 - for Pst, $T_p = 10\text{ min}$.
 - for Plt, $T_p = 2\text{ h}$.

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



7.5.3 Measurement Data

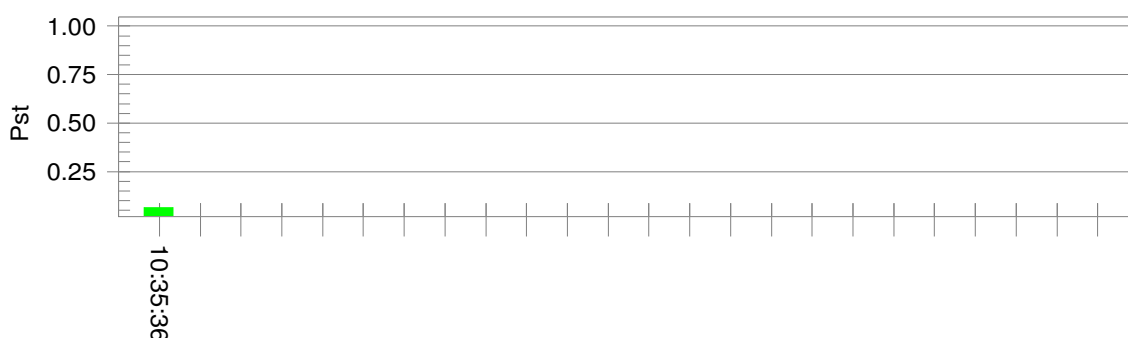
Flicker Test Summary per EN 61000-3-3 (Run time)

Test Result: Pass

Status: Test Completed

Pst and limit line

European Limits



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.20

Highest dt (%)	0.00	Test limit (%)	3.30	Pass
Time(mS) > dt:	0.00	Test limit (mS):	500.0	Pass
Highest dc (%)	0.00	Test limit (%)	3.30	Pass
Highest dmax (%)	0.00	Test limit (%)	4.00	Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass

8 Immunity Test Results

8.1 Performance Criteria Description in Clause 4.2 of EN 61547

Criterion A:
During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.
Criterion B:
During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.
Criterion C:
During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.



8.2 Electrostatic Discharge (ESD)

Test Requirement:	EN 61547
Test Method:	EN 61000-4-2
Criterion Required:	B
Test Date:	2013-12-13
Power Supply:	AC 230V 50Hz
Discharge Impedance:	330 Ω / 150 pF
Discharge Voltage:	Air Discharge: 2, 4, 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:

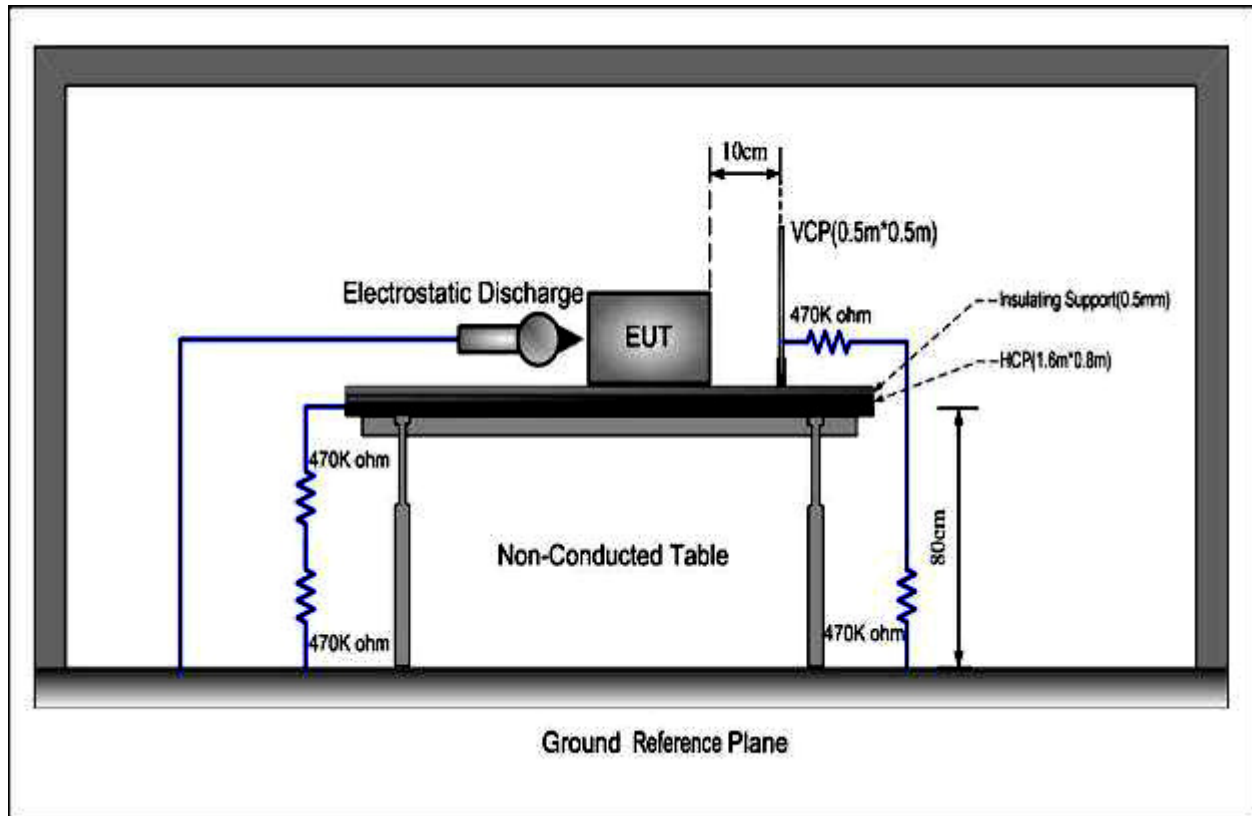
Temperature: 24°C

Humidity: 57% RH

Atmospheric Pressure: 1009 mbar

Test the EUT in LED lighting mode.

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 with discharge resistor used.

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
2, 4, 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 (not required by Standard).



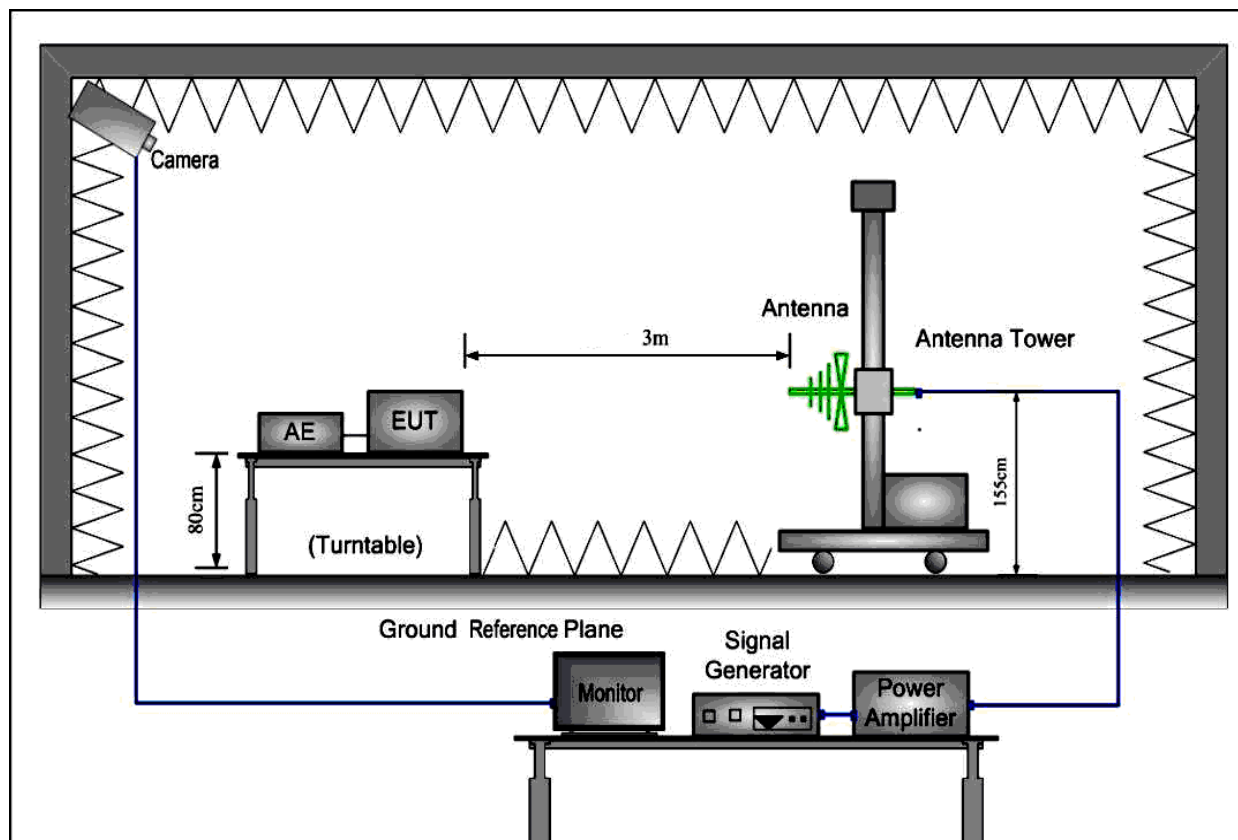
8.3 Radiated Immunity 80 MHz to 1000 MHz

Test Requirement:	EN 61547
Test Method:	EN 61000-4-3
Criterion Required:	A
Test Date:	2013-12-14
Power Supply:	AC 230V 50Hz
Frequency Range:	80 MHz to 1 GHz
Test level:	3 V/m on enclosure
Modulation:	80%, 1 kHz Amplitude Modulation

8.3.1 E.U.T. Operation

Test the EUT in LED lighting mode.

8.3.2 Test Setup and Procedure



1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range was swept incrementally, the step size did not exceed 1% of the preceding frequency value.
5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.
6. The test normally was performed with the generating antenna facing each side of the EUT.
7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or an audio monitor were used to monitor the performance of the EUT.

8.3.3 Test Results:

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Result / Observations
80 MHz-1 GHz	3 V/m	1 kHz, 80% Amp. Mod, 1% increment	V	Front	A
			H		A
			V	Rear	A
			H		A
			V	Left	A
			H		A
			V	Right	A
			H		A
			V	Top	A
			H		A
			V	Bottom	A
			H		A

Remarks:

Front: The front of the EUT faces to transmitting antenna (refer to Radiated Immunity test setup photo).

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

8.4 Electrical Fast Transients (EFT)

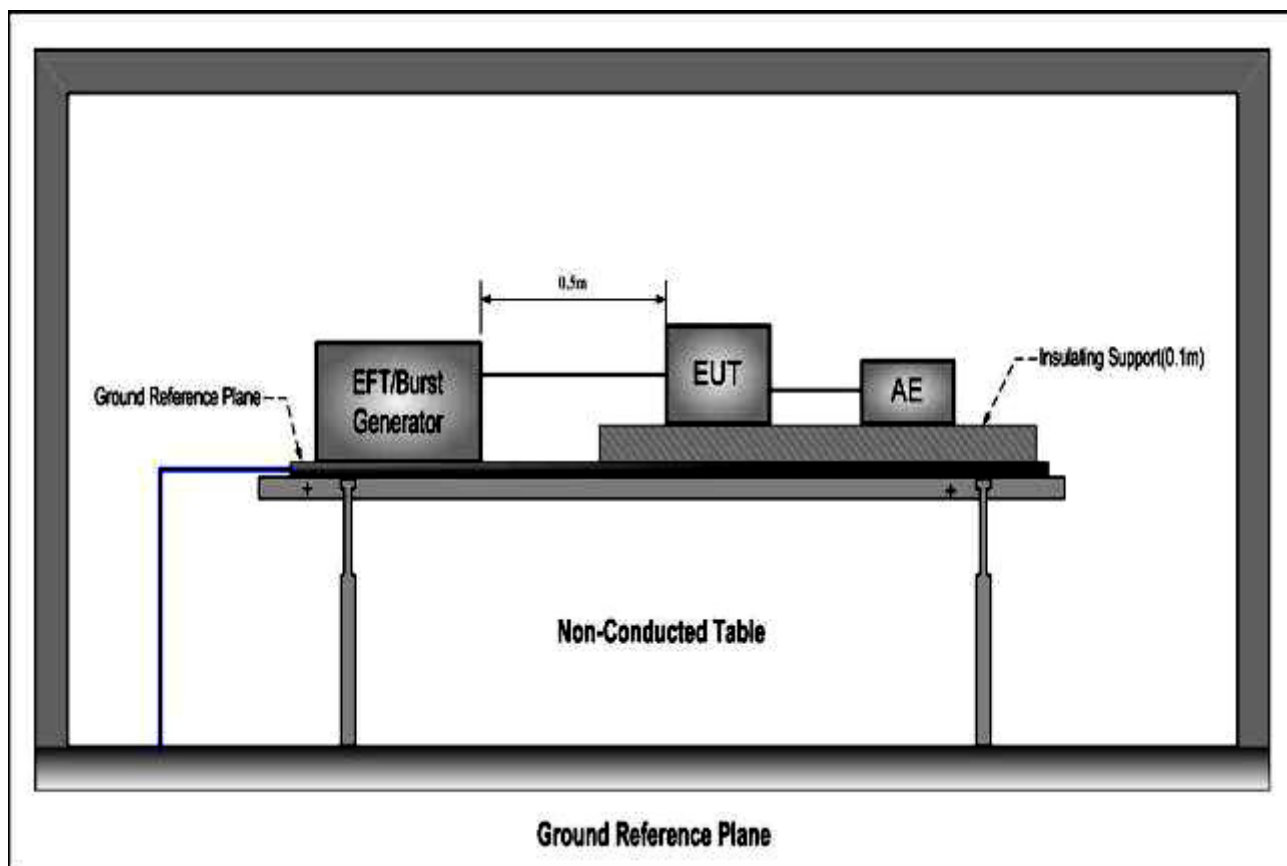
Test Requirement:	EN 61547
Test Method:	EN 61000-4-4
Criterion Required:	B
Test Date:	2013-12-16
Power Supply:	AC 230V 50Hz
Test Level:	1.0kV on AC
Polarity:	Positive & Negative
Repetition Frequency:	5 kHz
Burst Duration:	300ms
Test Duration:	2 minute per level & polarity

8.4.1 E.U.T. Operation

Test the EUT in LED lighting mode.

8.4.2 Test Setup and Procedure

For AC port



1. The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m 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 GRP and be insulated from it by an insulating support with a thickness of 0.1 m.
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 were placed on the insulation support 0.1m above GRP. Cables not subject to EFT were routed as far as possible from cable under test to minimize the coupling between the cables.
3. The distance between any coupling devices and the EUT shall be $(0,5 - 0/+0,1)$ m for tabletop equipment testing, and $(1,0 \pm 0,1)$ m for floor standing equipment. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be bundled and situated at a distance of 0.1m above the GRP.
4. The EUT was conducted the below specified level voltage test for line to neutral or line to neutral to earth (for clamp coupling is for the signal line), 120 seconds duration.
5. If the equipment contains identical ports, only one was tested; multi-conductor cables, such as a 50-pair telecommunication cable, were tested as a single cable. Cables did not be split or divided into groups of

8.4.3 Test Results

Lead under Test	Level ($\pm$ kV)	Coupling Direct/Clamp	Observations (Performance Criterion)
Live + Neutral	1.0	Direct	(A)

A: No loss of function.

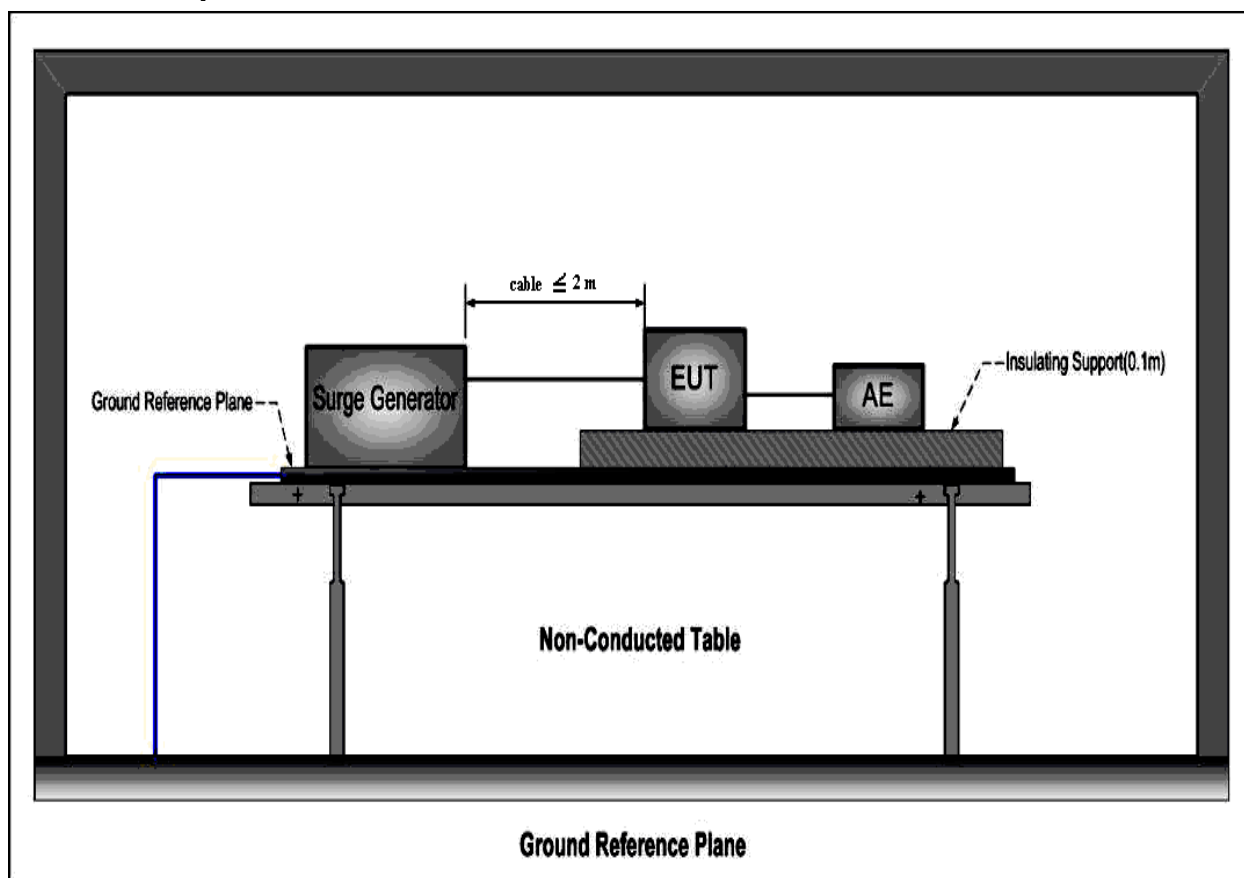
8.5 Surge

Test Requirement:	EN 61547
Test Method:	EN 61000-4-5
Criterion required:	C
Test Date:	2013-12-16
Power Supply:	AC 230V 50Hz
Test Level:	± 0.5 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° .

8.5.1 E.U.T. Operation

Test the EUT in LED lighting mode.

8.5.2 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 μ s 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 did 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 2 Ω generator source impedance for power supply terminals and 40 Ω output impedance for interconnection lines. The tests were done at repetition rate 1 per minute.

8.5.3 Test Results:

Pulse No	Line-Line	Level (kV)	Surge Interval	Phase (deg)	Observation (Performance Criterion)
1–5	L-N	+0.5	60s	90°	(B)
6–10	L-N	-0.5	60s	270°	(B)

Remark:

B: During test there some flick of the EUT, it could recover automatically after test.

Performance B is within the acceptable criterion for Surge test.

8.6 Conducted Immunity

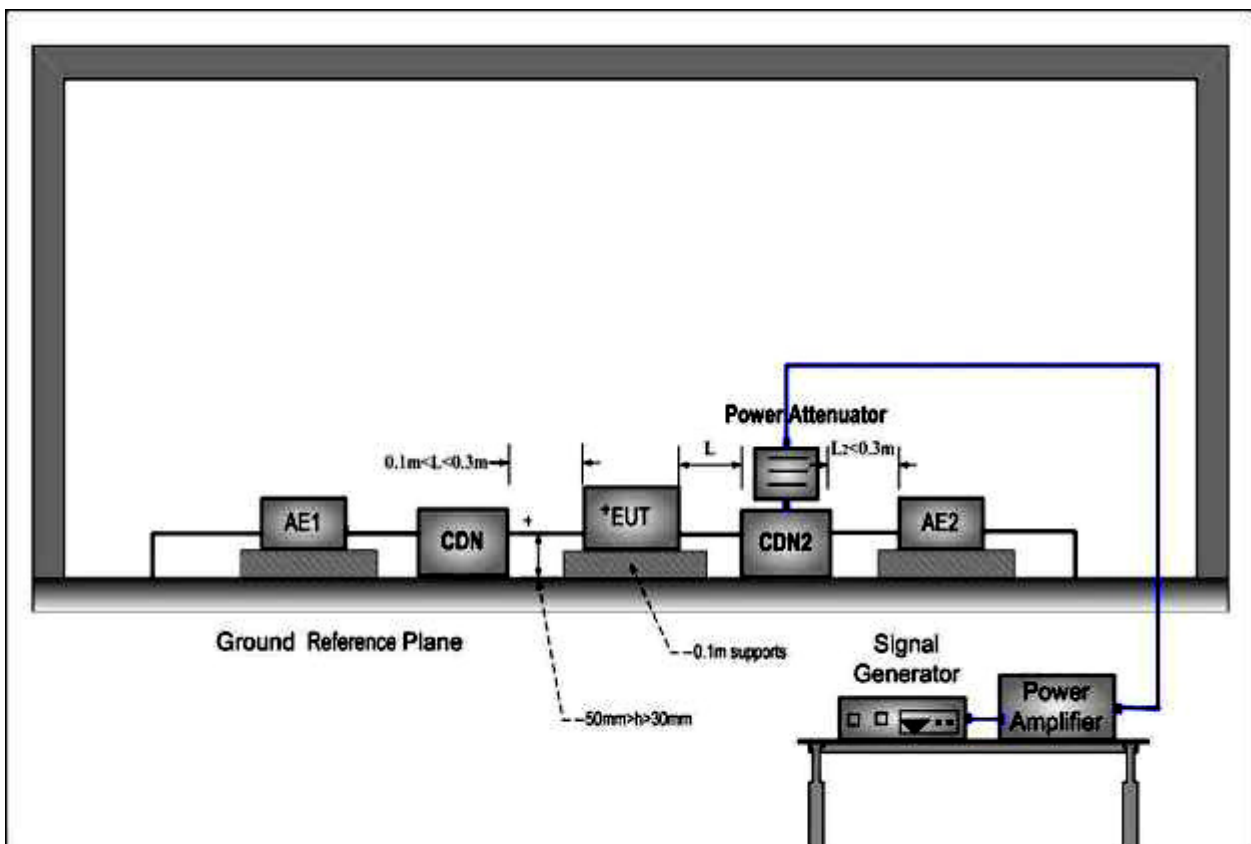
Test Requirement:	EN 61547
Test Method:	EN 61000-4-6
Criterion Required:	A
Test Date:	2013-12-16
Power Supply:	AC 230V 50Hz
Frequency Range:	0.15 MHz to 80 MHz
Test level:	3V r.m.s on AC Ports (unmodulated emf into 150 Ω)
Modulation:	80%, 1 kHz Amplitude Modulation

8.6.1 E.U.T. Operation

Test the EUT in LED lighting mode.

8.6.2 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 80 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 did 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.

8.6.3 Test Results:

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



8.7 Power Frequency Magnetic Field Immunity

Test Requirement: EN 61547

Criterion Required: A

Test Date: N/A: See Remark Below

Remark:

There is no need for Power Frequency Magnetic Field Immunity test to be performed on this product in accordance with EN 61547:2009 because this product does not contain any component susceptible to magnetic fields.

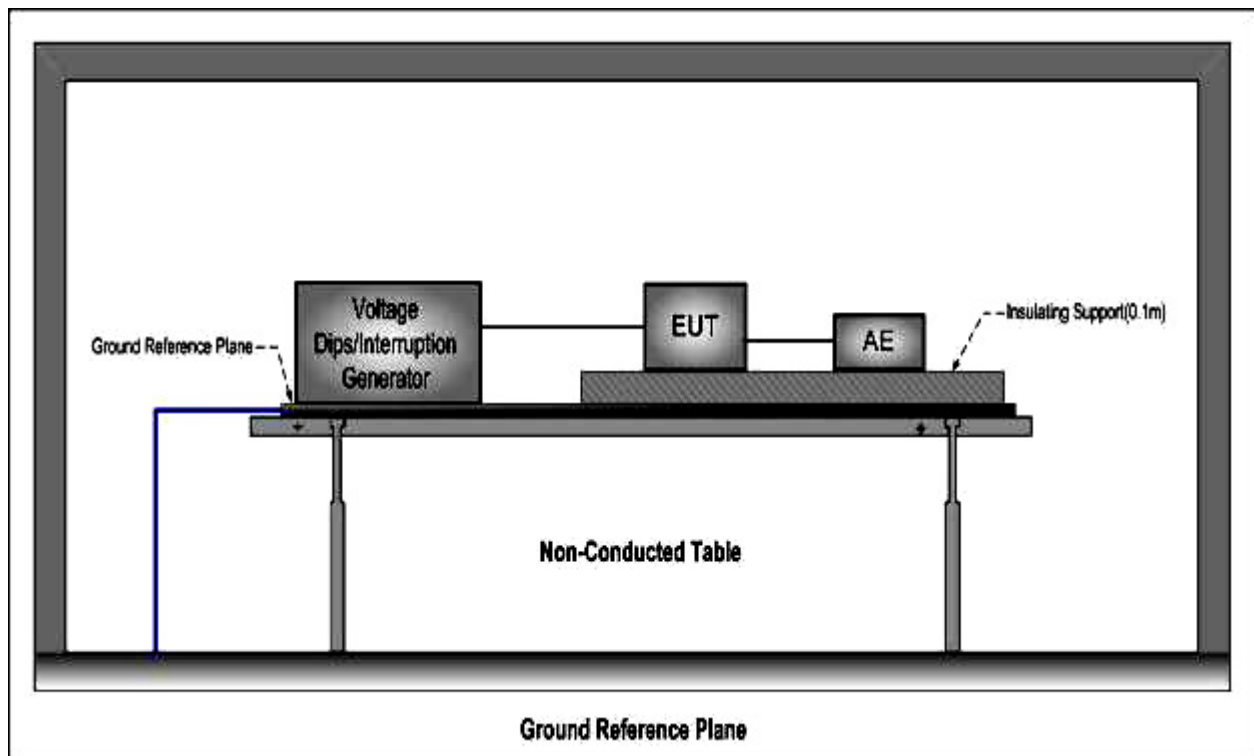
8.8 Voltage Dips and Interruptions

Test Requirement:	EN 61547
Test Method:	EN 61000-4-11
Criterion Required:	70 % VD:C, 0 % VD:B
Test Date:	2013-12-16
Power Supply:	AC 230V 50Hz
Test Level:	0 % of U_T (Supply Voltage) for 0.5 Periods 70 % of U_T (Supply Voltage) for 10 Periods
No. of Dips / Interruptions:	3 per Level

8.8.1 E.U.T. Operation

Test the EUT in LED lighting mode.

8.8.2 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.

8.8.3 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	No Loss of Function (A)
70	0°	10	3	10s	No Loss of Function (A)

Remark:

U_T= the nominal supply voltage.

9 Photographs

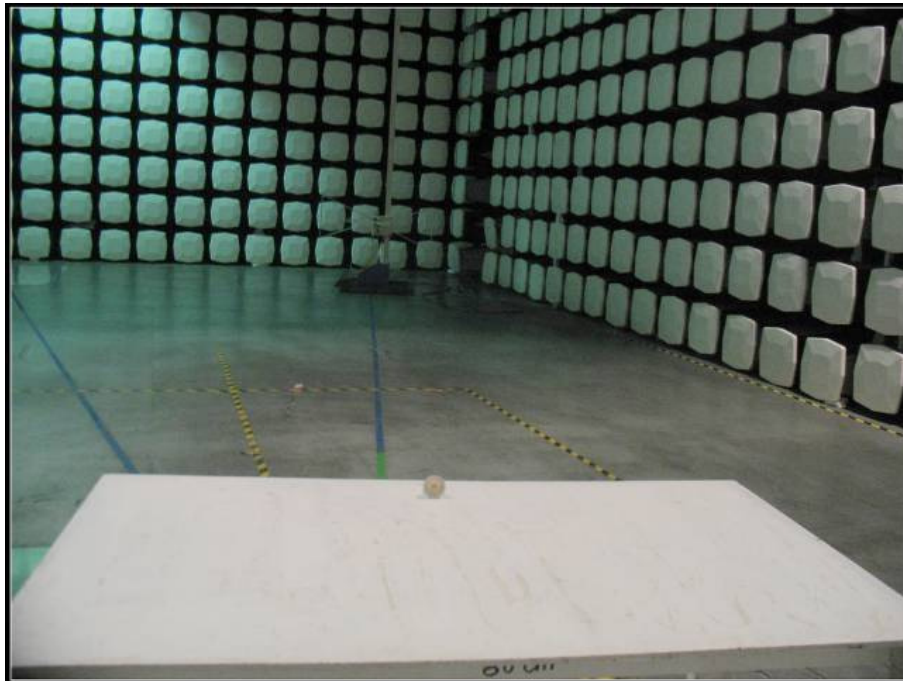
9.1 Conducted Emissions on mains terminals Test Setup



9.2 Radiated Electromagnetic Disturbance Test Setup



9.3 Radiated Emission Test Setup



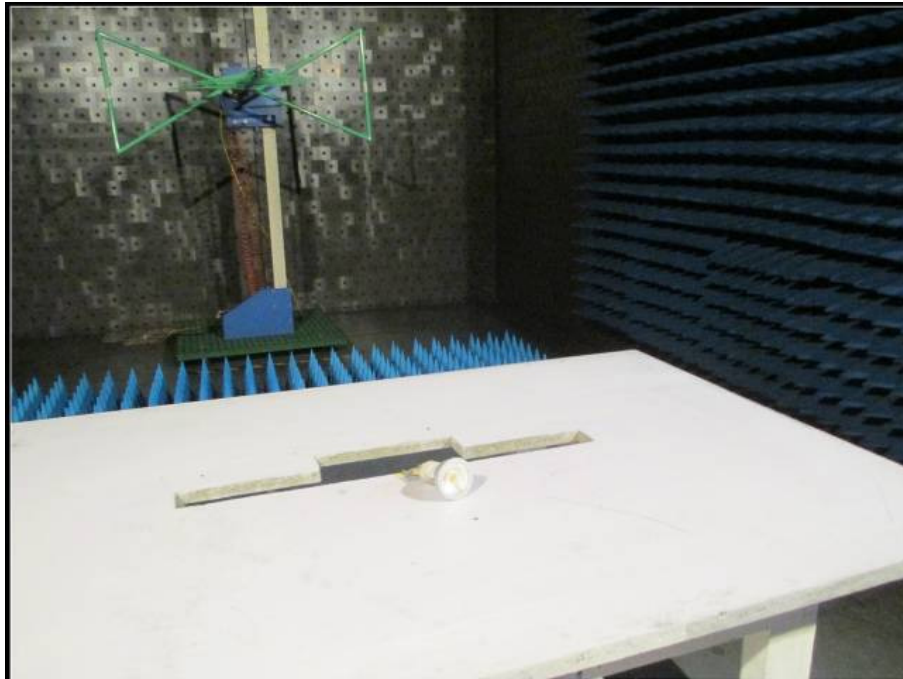
9.4 Flicker Test Setup



9.5 ESD Test Setup



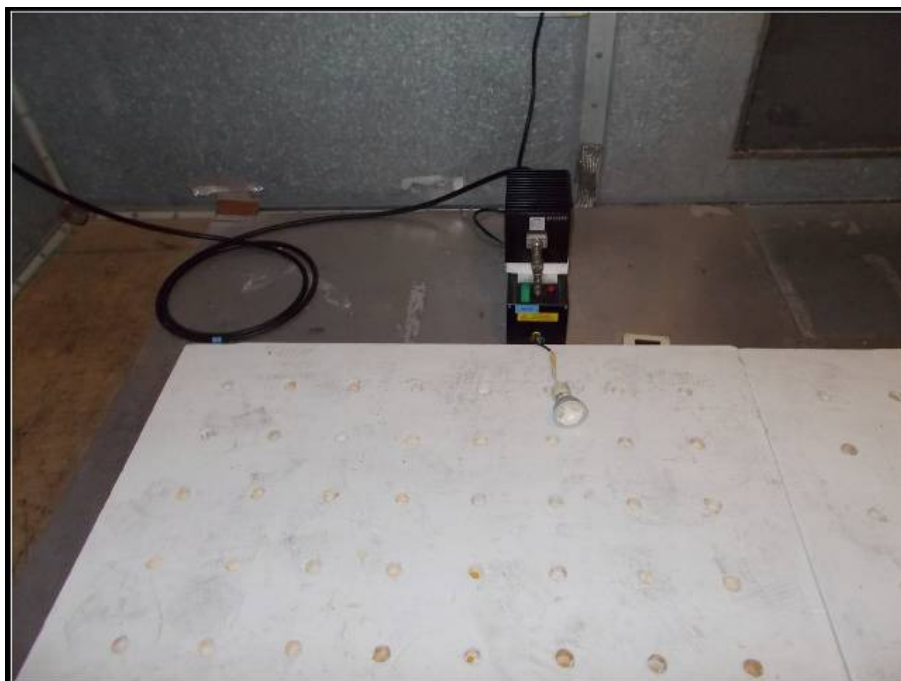
9.6 Radiated Immunity Test Setup



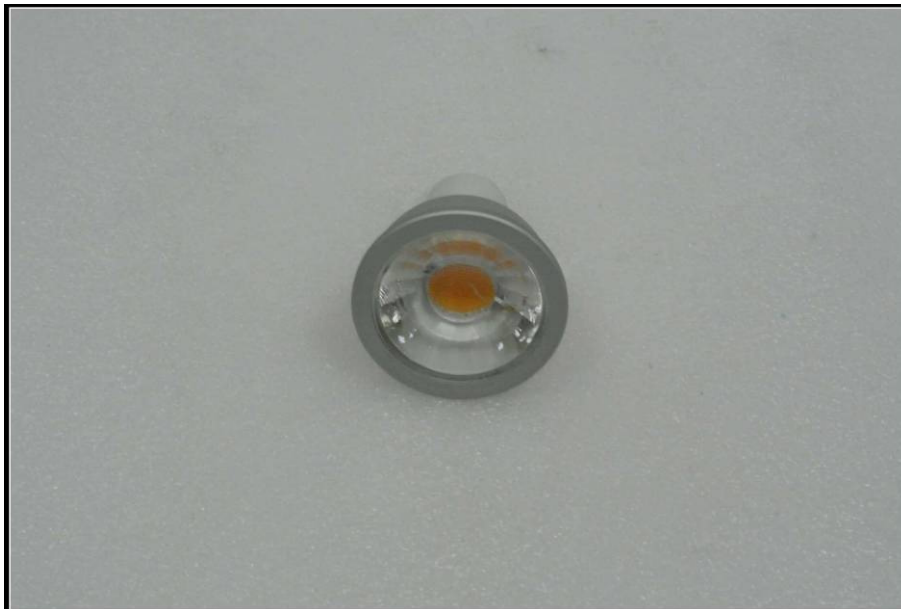
9.7 EFT, Surge, Voltage Dip and Interruptions Test Setup

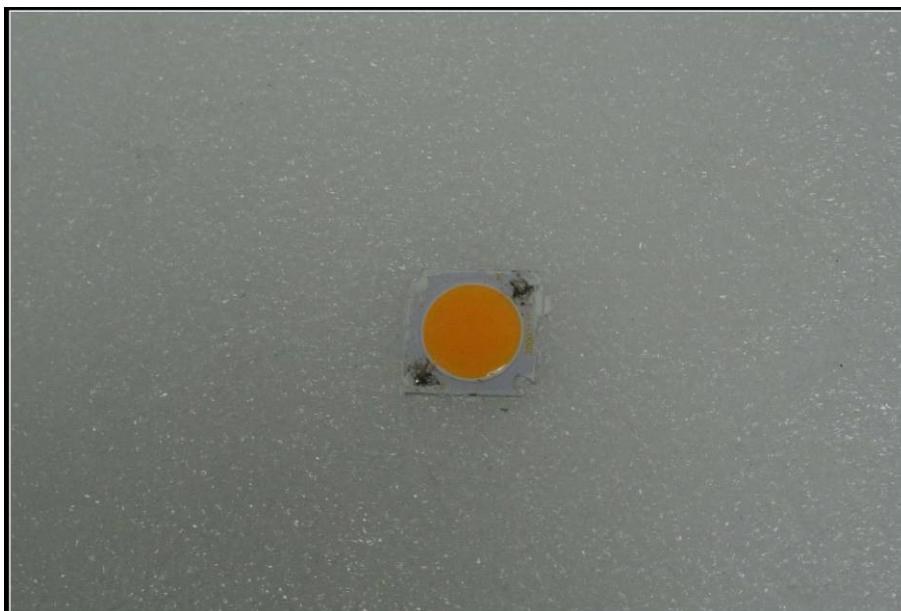
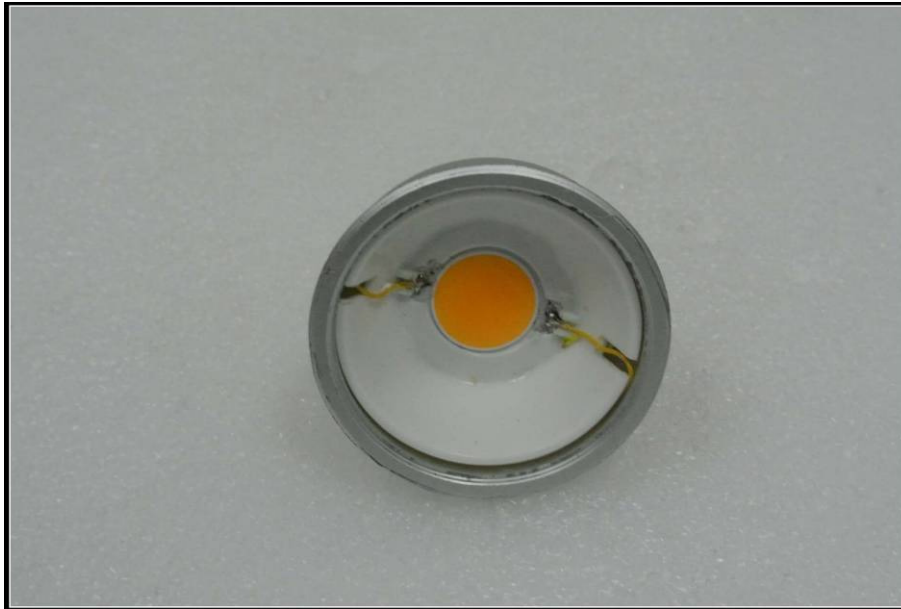


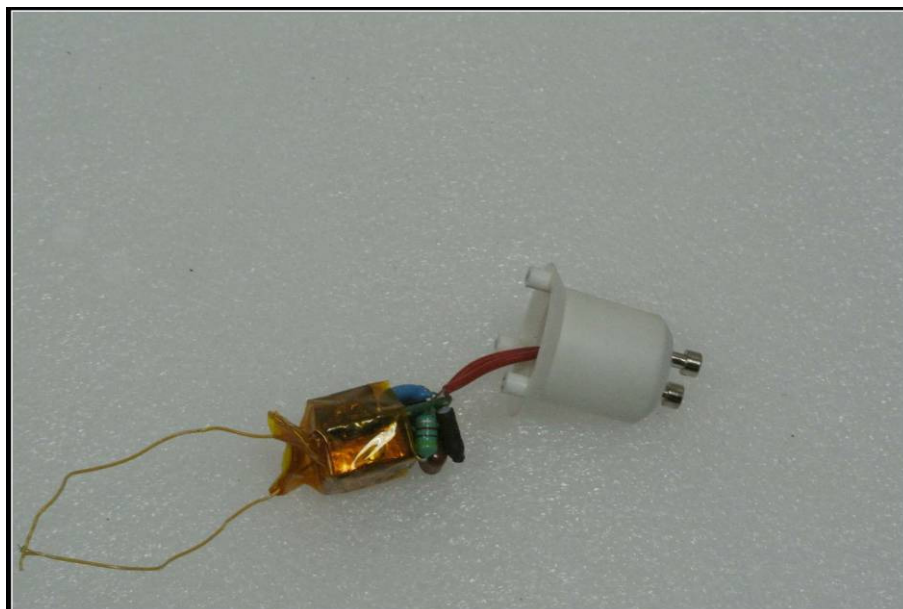
9.8 Conducted Immunity Test Setup

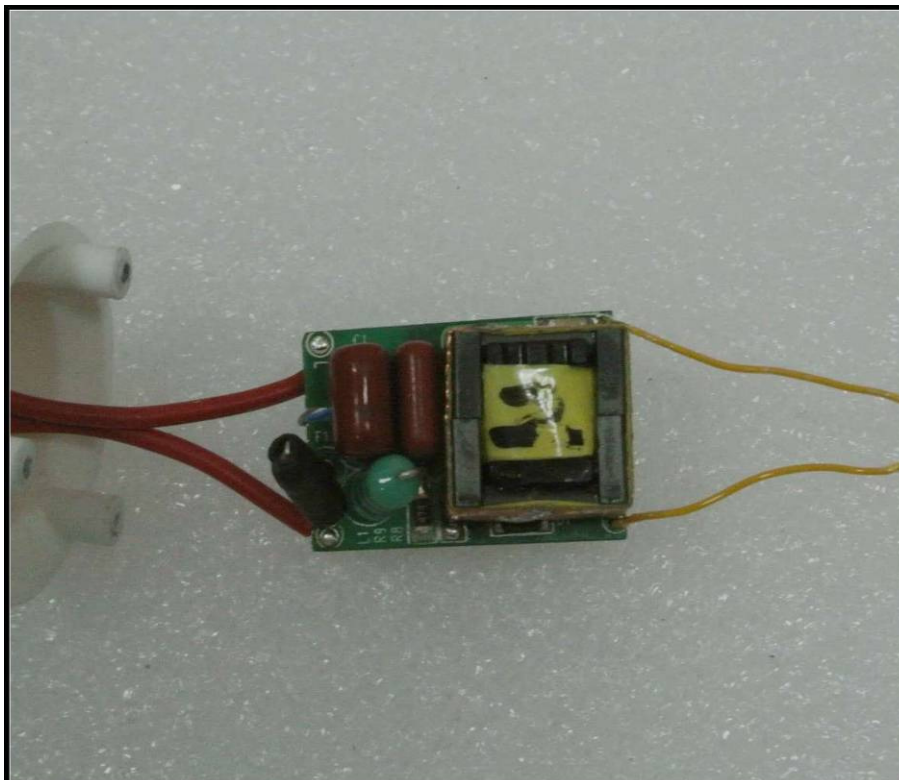
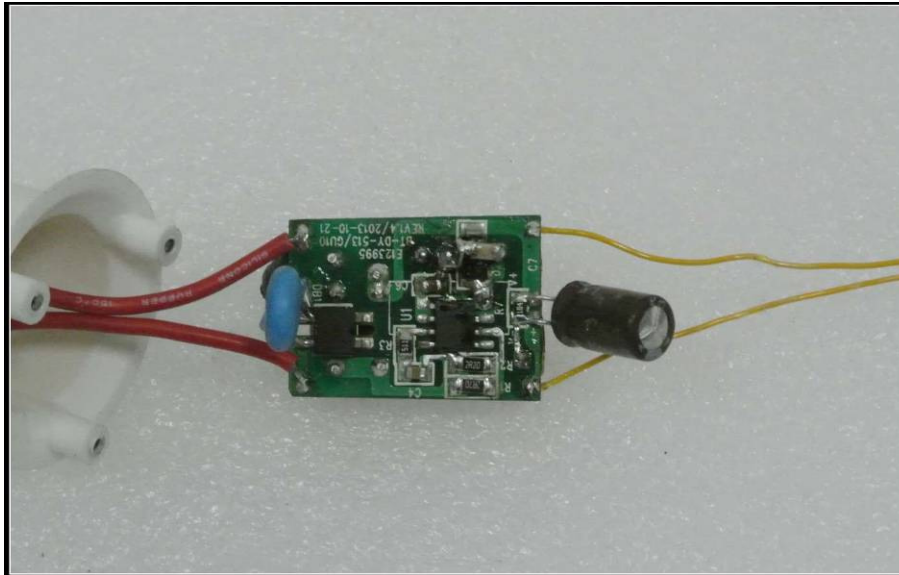


9.9 EUT Constructional Details









--End of Report--