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Report No.: SHEM151100431401

Page: 1 of 50

1 Cover Page

TEST REPORT

Application No.:	SHEM1511004314LM
Applicant:	Ikanlite Electric Co., Limited
Equipment under Test (EUT)	
NOTE: The following sample(s) was/were submitted and identified by the client as.	
Product Name:	LED Outdoor Lamps
Model No.(EUT):	2601
Add Model No.:	1401, 1402, 1403, 1404, 1301, 1302, 1303, 1304, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1103, 1102, 1104, 1105, 1106, 1107, 1108, 1101, 2705, 2702, 2701, 2602, 2603, 2604, 2605, 2606, 2607, 250*S(*=1,2,3....9), 250*M(*=1,2,3....9), 240*S(*=1,2,3....9), 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2104, 2105
Standards:	EN 55015:2013, EN 61547:2009 EN 61000-3-2:2014, EN 61000-3-3:2013
Date of Receipt:	December 16, 2015
Date of Test:	December 23, 2015 to December 30, 2015
Date of Issue:	February 16, 2016
Test Result:	Pass*

* In the configuration tested, the EUT detailed in this report 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.



Parham Zhan
E&E Section Manager
SGS-CSTC (Shanghai) Co., Ltd.



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.

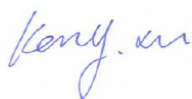
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		February 16, 2016		Original

Authorized for issue by:				
Engineer		Zenger Zhang _____ Print Name		 _____ Print Name
Clerk		Susie Liu _____ Print Name		 _____ Print Name
Reviewer		Keny Xu _____ Print Name		 _____ Print Name

3 Test Summary

ELECTROMAGNETIC INTERFERENCE (EMI)			
Test	Test Requirement	Test Method	Result
Conducted Emissions on mains terminals, 9 kHz to 30 MHz	EN 55015:2013	EN 55015:2013	PASS
Radiated Electromagnetic Disturbance 9 KHz to 30 MHz	EN 55015:2013	EN 55015:2013	PASS
Radiated Emission, 30 MHz to 300 MHz	EN 55015:2013	EN 55015:2013	PASS
Harmonic Emission on AC, 50 Hz	EN 61000-3-2:2014	EN 61000-3-2:2014	N/A*
Flicker Emission on AC	EN 61000-3-3:2013	EN 61000-3-3:2013	PASS
Electromagnetic Susceptibility(EMS)			
Test	Test Requirement	Test Method	Result
Electrostatic Discharge (ESD)	EN 61547:2009	EN 61000-4-2:2009	PASS
Radio-frequency electromagnetic fields, 80 MHz to 1 GHz	EN 61547:2009	EN 61000-4-3:2006+ A1:2008+A2:2010	PASS
Electrical Fast Transients (EFT) on AC	EN 61547:2009	EN 61000-4-4:2012	PASS
Surge Immunity on AC(≤25W)	EN 61547:2009	EN 61000-4-5:2014	PASS
Injected Currents on AC 150 kHz to 80 MHz	EN 61547:2009	EN 61000-4-6:2014	PASS
Power frequency magnetic fields	EN 61547:2009	EN 61000-4-8:2010	N/A**
Voltage Dip and Interruptions	EN 61547:2009	EN 61000-4-11:2004	PASS
Remark:			
EUT In this whole report EUT means equipment under test.			
N/A Not applicable			
Note1:* Please refer to the Section 7.4 of this report for details.			
Note2:** The Power-frequency magnetic field test will not apply to the equipment containing no components susceptible to magnetic fields, such as Hall elements or magnetic field sensors, according to EN 61547.			
Note3: There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model 2601 was tested since their differences were the model number, trade name and appearance.			

4 Contents

1	COVER PAGE	1
2	VERSION	2
3	TEST SUMMARY	3
4	CONTENTS	4
5	GENERAL INFORMATION	6
5.1	Client Information.....	6
5.2	Details of E.U.T.	6
5.3	E.U.T Operation Mode.....	6
5.4	E.U.T Operation Environment	6
5.5	Description of Support Units	6
5.6	Deviation from Standards	6
5.7	Abnormalities from Standard Conditions	6
5.8	Modification/Retest Record	6
5.9	Monitoring of EUT for All Immunity Test.....	7
5.10	Test Location.....	7
5.11	Test Facility.....	7
5.12	Measurement Uncertainty	8
6	EQUIPMENT LIST	9
7	EMISSION TEST RESULTS	13
7.1	Conducted Emissions on mains terminals.....	13
7.2	Radiated Electromagnetic Disturbance Test	17
7.3	Radiated Emissions	22
7.4	Harmonics Test Results.....	26
7.5	Flicker Test Results	28
8	IMMUNITY TEST RESULTS	30
8.1	Performance Criteria Description in Clause 4.2 of EN 61547	30
8.2	ESD	31
8.3	Radio-frequency electromagnetic fields	33
8.4	Electrical Fast Transients (EFT)	35
8.5	Surge	37
8.6	Injected currents.....	39
8.7	Voltage Dips and Interruptions	41
9	PHOTOGRAPHS (TEST SETUP FOR THE EUT).....	43



9.1	Conducted Emissions on Mains Terminals Test Setup.....	43
9.2	Radiated Electromagnetic Disturbance Test Setup	43
9.3	Radiated Emission Test Setup.....	44
9.4	Flicker Test Setup.....	44
9.5	ESD Test Setup	45
9.6	Radio-frequency electromagnetic fields Test Setup.....	45
9.7	EFT, Surge, Voltage Dip and Interruptions Test Setup.....	46
9.8	Injected currents Test Setup	46
10	EUT CONSTRUCTIONAL DETAILS	47
10.1	Exterior of EUT	47
10.2	Interior of EUT	49-50

5 General Information

5.1 Client Information

Applicant: Ikanlite Electric Co., Limited
Address of Applicant: 42, Zhengjiacao, Wuxing Village, Fengshan Street, Yuyao, Ningbo 315400, Zhejiang, China
Manufacturer: Ikanlite Electric Co., Limited
Address of Manufacturer: 42, Zhengjiacao, Wuxing Village, Fengshan Street, Yuyao, Ningbo 315400, Zhejiang, China
Factory: Ikanlite Electric Co., Limited
Address of Factory: 42, Zhengjiacao, Wuxing Village, Fengshan Street, Yuyao, Ningbo 315400, Zhejiang, China

5.2 Details of E.U.T.

Power Supply: AC 220/240V, 50/60Hz
Test voltage: AC 230V, 50Hz
Cable Type: 1.8m Length (2 wires) for AC input cable.
Rated Power: 12W

5.3 E.U.T Operation Mode

Functions/Modes: Lighting mode
Lighting mode: Keep EUT lighting.

5.4 E.U.T Operation Environment

Temperature Range: 20-25°C
Humidity Range: 30-60% RH
Atmospheric Pressure Range: 100-105kPa

5.5 Description of Support Units

The EUT has been tested independently.

5.6 Deviation from Standards

All Immunity tests to EN 61547 were performed in accordance with EN 61000-4-x and not IEC 61000-4-x. (x=2, 3, 4, 5, 6, 11).

5.7 Abnormalities from Standard Conditions

None.

5.8 Modification/Retest Record

None.

5.9 Monitoring of EUT for All Immunity Test

Audio: None.

Visual: Working status of the EUT

5.10 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

No.588 West Jindu Road, Songjiang District, Shanghai, China. 201612.

Tel: +86 21 6191 5666

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No tests were sub-contracted.

5.11 Test Facility

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2017-07-14.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2017-09-16.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1. Expiry Date: 2017-06-18.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868,C-4336,T-2221,G-830 respectively. Date of Expiry: 2017-11-16.

5.12 Measurement Uncertainty

According to CISPR 16-4-2.

Test Item	Frequency Range	Measurement Uncertainty	U_{CISPR}
Conducted Emission at mains port using AMN	9kHz-150kHz	3.2 dB	3.8 dB
Conducted Emission at mains port using AMN	150kHz-30MHz	3.0 dB	3.4 dB
Conducted Emission at mains port using VP	9kHz-30MHz	1.9 dB	3.9 dB
Conducted Emission at telecommunication port using AAN	150kHz-30MHz	2.4 dB	5.0 dB
Radiated Emission	30MHz-1000MHz	4.4 dB	6.3 dB
Radiated Emission	1GHz-18GHz	4.6 dB	5.2 dB (1GHz-6GHz)
			5.5 dB (6GHz-18GHz)
Disturbance Power	30MHz-300MHz	3.5 dB	4.5 dB
Remark: AMN – Artificial Mains Network VP – Voltage Probe ANN – Asymmetric Artificial Network			

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

6 Equipment list

Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2015-01-22	2016-01-21
2	Line impedance stabilization network	SCHWARZBE CK	NSLK812 7	8127-490	2015-01-22	2016-01-21
3	Line impedance stabilization network	EMCO	3816/2	00034161	2015-01-22	2016-01-21

Radiated Electromagnetic Disturbance

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	3-dimensional large loop	SCHWARZBE CK	HXYZ917 0	HXYZ917 0-136	2015-01-22	2016-01-21
2	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2015-01-22	2016-01-21

Radiated Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1.	EMI test receive	Rohde & Schwarz	ESR7	101391	2015-01-22	2016-01-21
2	CONTROLLER	INNCO	CO200	474	/	/
3	Broadband UHF-VHF ANTENNA	SCHWARZBE CK	VULB916 8	9168-313	2015-02-07	2016-02-06
4	Double ridged broadband horn ANTENNA	SCHWARZBE CK	BBHA912 0D	9120D-67 9	2015-02-07	2016-02-06
5	Amplifier	SCHWARZBE CK	SCU-F011 8-G40-BZ 4-CSS(F)	10001	2015-01-22	2016-01-21
6	Low noise amplifier	TESEQ	LNA6900	71033	/	/

Flicker

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Single phase harmonics & flicker analyzer	EM test	DPA500	V0507100125	2015-01-22	2016-01-21
2	AC SOURCE 6KVA	EM test	ACS500	V0507100126	2015-01-22	2016-01-21

Electrostatic Discharge Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Electrostatic Discharge Simulator	TESEQ	NSG 437	468	2015-08-25	2016-08-24

Radiated Immunity

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Single Generator	Rohde & Schwarz	SMJ100A	101394	2015-01-22	2016-01-21
2	Calibrated Stacked Logarithmic-Periodic Test-Antenna	SCHWARIBFC K	STLP 9128D	9128 D 055	/	/
3	Stacked DoubleLog-Per. Antenna	SCHWARIBFC K	STLP 9149	9149-187	/	/
4	Power Amplifiers	MILMEGA	80RF1000-250	1053058	/	/
5	Power Amplifiers	MILMEGA	AS0840-5 5-55	1053059	/	/
6	Power Meter	Rohde & Schwarz	NRP	101641	2015-01-22	2016-01-21
7	Electromagnetic Field Probe	ETS-Lindgren	HI-6113	00114591	2015-08-12	2016-08-11
8	Power sensor	Rohde & Schwarz	NRP-Z91	100647	2015-01-22	2016-01-21
9	Power sensor	Rohde & Schwarz	NRP-Z22	101096	2015-08-06	2016-08-05

EFT Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMS test machine	EMC Partner	TRA3000 F-S-D-V	1229	2016-01-02	2017-01-01

Surge Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMS test machine	EMC Partner	TRA3000 F-S-D-V	1229	2016-01-02	2017-01-01

Conducted Immunity Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	signal generator	Rohde & Schwarz	SMY01	101394	2015-01-22	2016-01-21
2	PAMP Conducted RF test system	HAEFFLY	PAMP250	151708	2015-01-22	2016-01-21
3	CDN impedance and K-factor	LUTHI	L-801 M1	2116	/	/
4	CDN impedance and K-factor	LUTHI	L-801 M2/M3	2117	2015-01-22	2016-01-21

Voltage dips and Interruption Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMS test machine	EMC Partner	TRA3000 F-S-D-V	1229	2016-01-02	2017-01-01



General Equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Digital pressure meter	YONGZHI	DYM3-01	101012	2015-04-13	2016-04-12
2	Temperature& humidity recorder	ShangHai weather meter work	ZJ 1-2B	84320600 803136, F3040201 53,20101 201FS10 0A6K,201 106117	2015-08-03	2016-08-02
3	Digital Multimeter	FLUKE	17B	19720439	2015-01-22	2016-01-21
4	Autoformer regulator	Guangzhou bao de	TDGC2-5K VA-	/	/	/
5	CLAMP METER	FLUKE	316	250303097 1	2015-01-22	2016-01-21

7 Emission Test Results

7.1 Conducted Emissions on mains terminals

Test Frequency: 9 kHz to 30 MHz
 Detector: Peak for pre-scan
 Quasi-Peak and Average for final test
 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

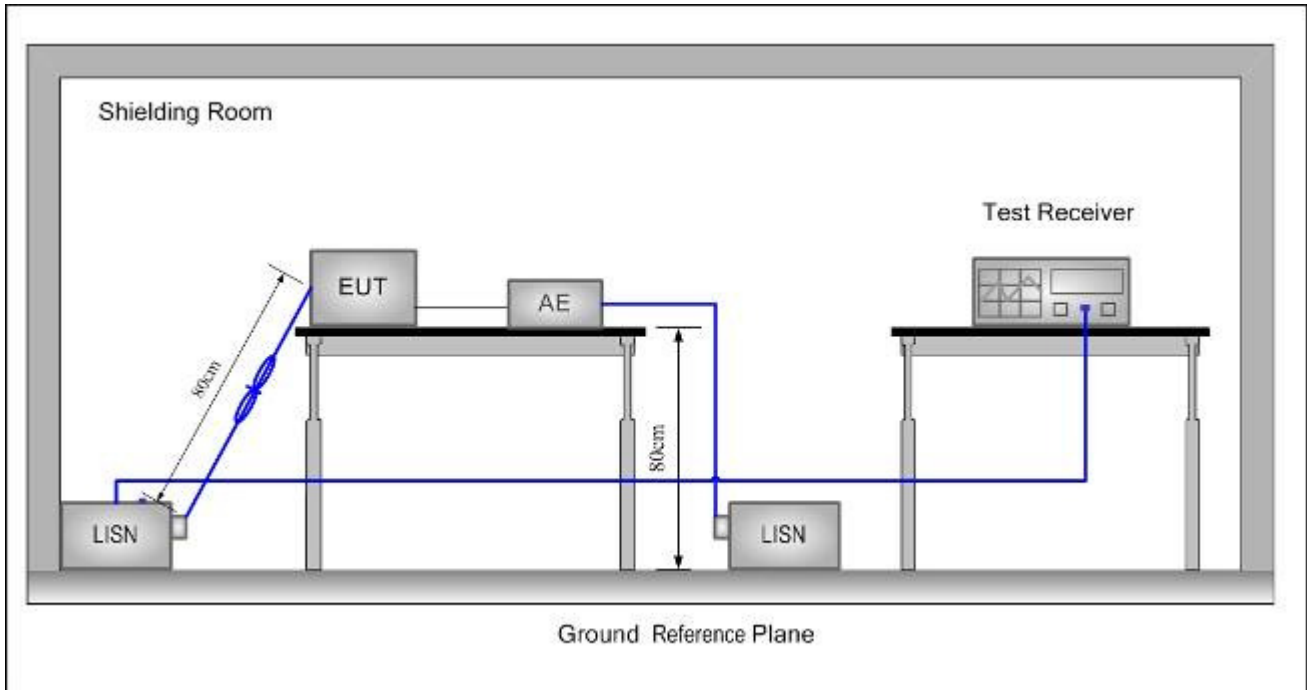
Test mode: Lighting mode

Note: According to the requirement of the standard, the supply voltage shall be within ±2% of the rated voltage. And pre-test at within 2% of each of the nominal supply voltages of the voltage range, compliance test at 230V 50Hz as no worse case was found.

Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected.

Please see the attached Quasi-peak and Average test results.

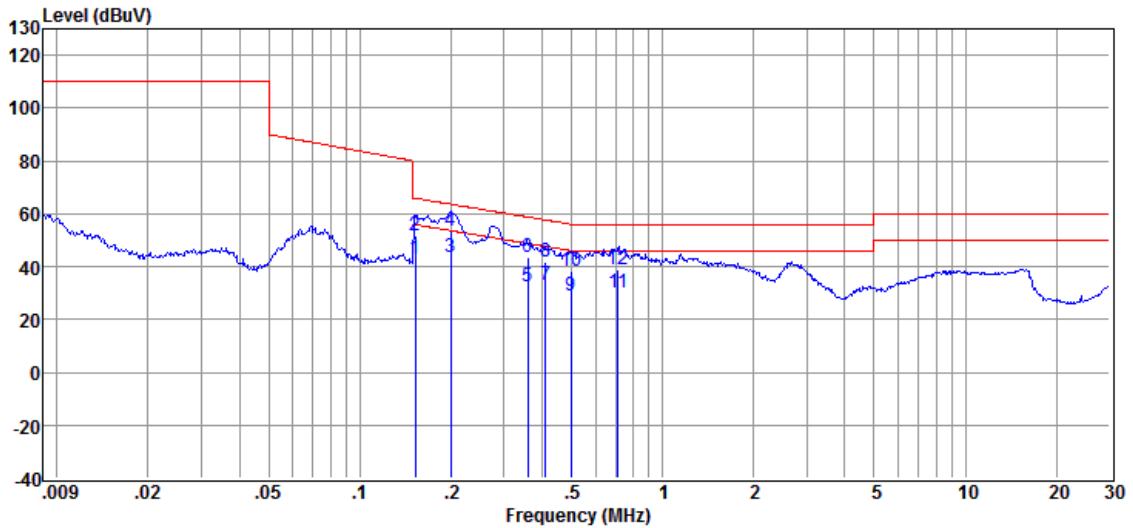
7.1.2 Test Setup and Procedure



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.
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.

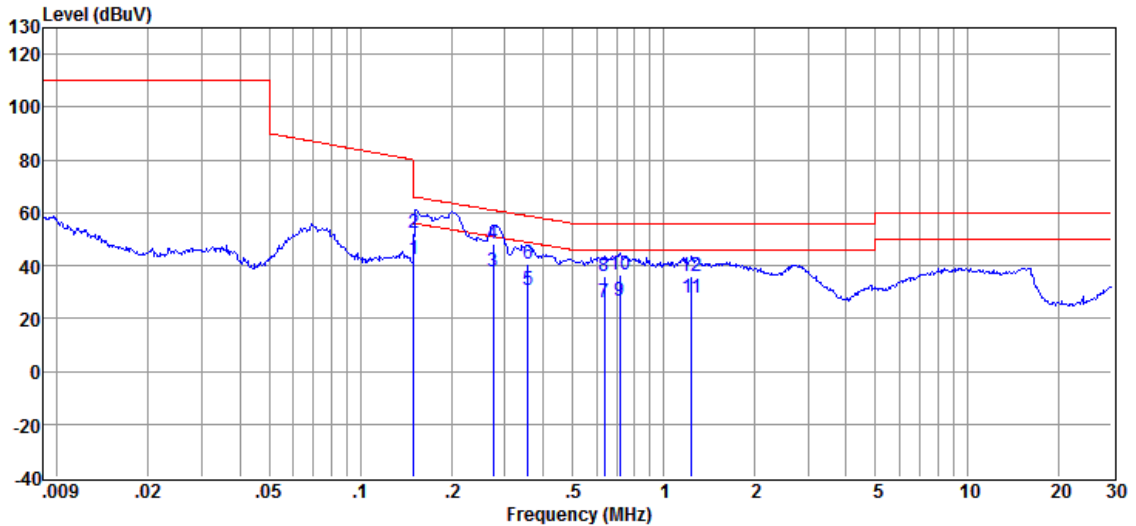
7.1.3 Measurement Data

Live Line:



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB)	(dB)	(dBμV)	(dBμV)	(dB)	
1	0.152	32.60	0.33	9.86	42.79	55.87	-13.08	Average
2	0.152	41.51	0.33	9.86	51.70	65.87	-14.17	QP
3	0.199	33.45	0.26	9.86	43.57	53.63	-10.06	Average
4	0.199	43.26	0.26	9.86	53.38	63.63	-10.25	QP
5	0.358	22.44	0.25	9.86	32.55	48.77	-16.22	Average
6	0.358	33.49	0.25	9.86	43.60	58.77	-15.17	QP
7	0.411	22.68	0.25	9.86	32.79	47.64	-14.85	Average
8	0.411	31.51	0.25	9.86	41.62	57.64	-16.02	QP
9	0.499	18.79	0.25	9.86	28.90	46.02	-17.12	Average
10	0.499	28.28	0.25	9.86	38.39	56.02	-17.63	QP
11	0.714	19.76	0.22	9.86	29.84	46.00	-16.16	Average
12	0.714	28.79	0.22	9.86	38.87	56.00	-17.13	QP

Neutral Line:



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB)	(dB)	(dBμV)	(dBμV)	(dB)	
1	0.150	32.33	0.34	9.86	42.53	56.00	-13.47	Average
2	0.150	42.05	0.34	9.86	52.25	66.00	-13.75	QP
3	0.274	27.35	0.29	9.86	37.50	50.99	-13.49	Average
4	0.274	38.26	0.29	9.86	48.41	60.99	-12.58	QP
5	0.357	20.72	0.30	9.86	30.88	48.79	-17.91	Average
6	0.357	30.71	0.30	9.86	40.87	58.79	-17.92	QP
7	0.636	16.08	0.22	9.86	26.16	46.00	-19.84	Average
8	0.636	26.04	0.22	9.86	36.12	56.00	-19.88	QP
9	0.715	16.78	0.19	9.86	26.83	46.00	-19.17	Average
10	0.715	26.43	0.19	9.86	36.48	56.00	-19.52	QP
11	1.233	17.14	0.47	9.87	27.48	46.00	-18.52	Average
12	1.233	25.75	0.47	9.87	36.09	56.00	-19.91	QP

Level = Read Level + LISN/ISN Factor + Cable Loss

7.2 Radiated Electromagnetic Disturbance Test

Test Frequency: 9 kHz -30 MHz
Detector: Peak for pre-scan
Quasi-Peak for final test
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 loop diameter.

7.2.1 E.U.T. Operation

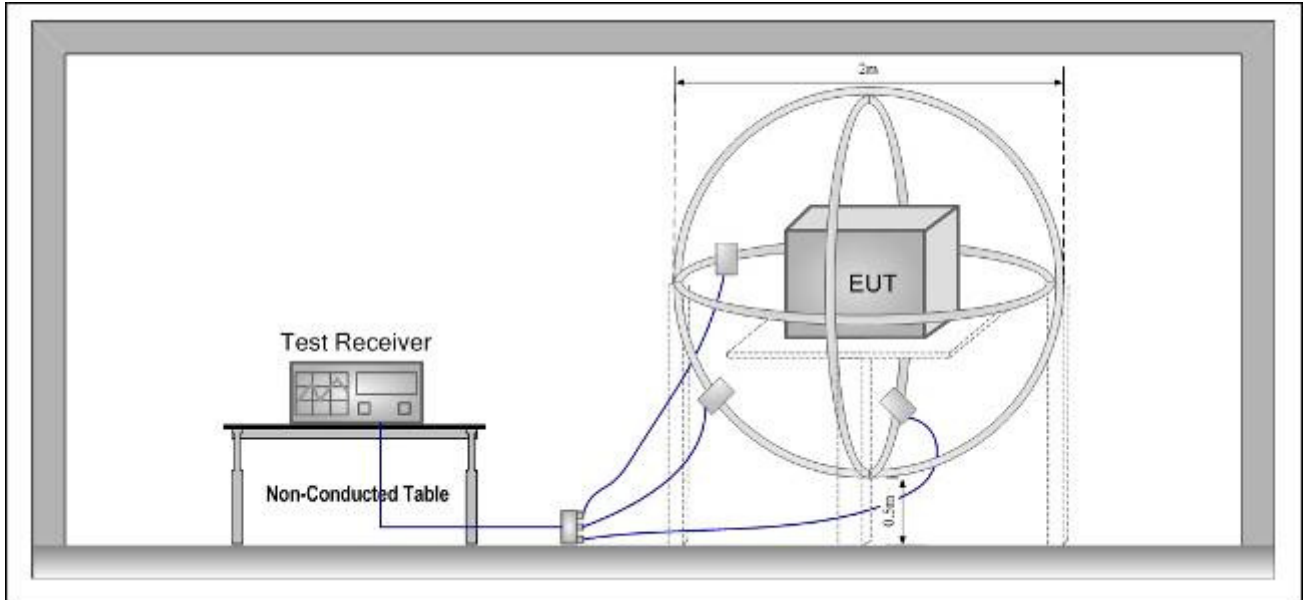
Test mode: Lighting mode

Note: According to the requirement of the standard, the supply voltage shall be within ±2% of the rated voltage. And pre-test at within 2% of each of the nominal supply voltages of the voltage range, compliance test at 230V 50Hz as no worse case was found.

Pre-scan was performed with peak detected on all ports, Quasi-peak measurements were performed at the frequencies at which maximum peak emission level were detected.

Please see the attached Quasi-peak test results.

7.2.2 Test Setup and Procedure



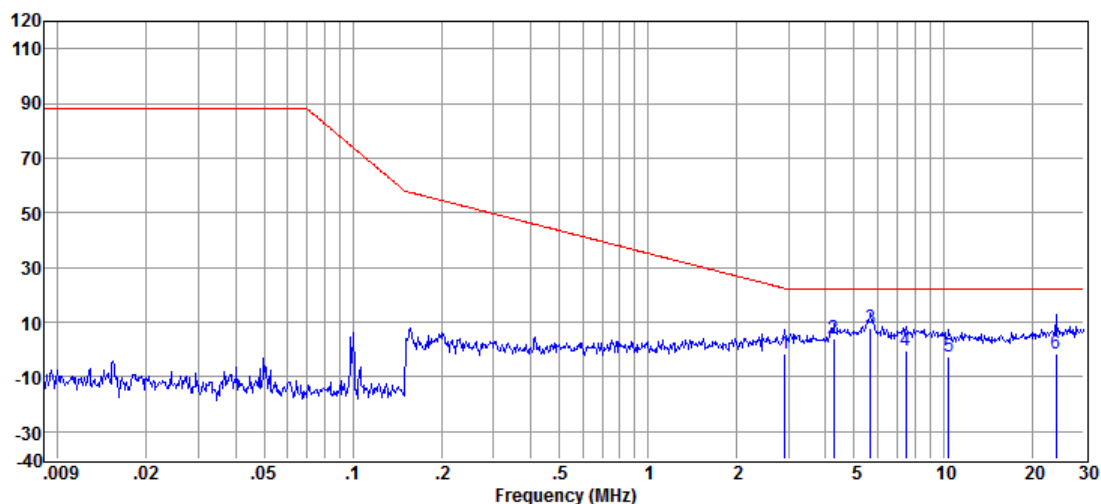
1. The magnetic component was measured by means of a loop antenna. The lighting equipment was placed in the centre of the antenna. The position of the mains lead was optimized for maximum current induction.
2. The induced current in the loop antenna was measured by means of a current probe (1 V/A) and 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 fulfill 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 2 m loop antenna using the spectrum analyser in peak detection mode. The EUT was measured for X(A), Y(B), Z(C) polarities. (EN 55015 Table 3a column 2).

X:

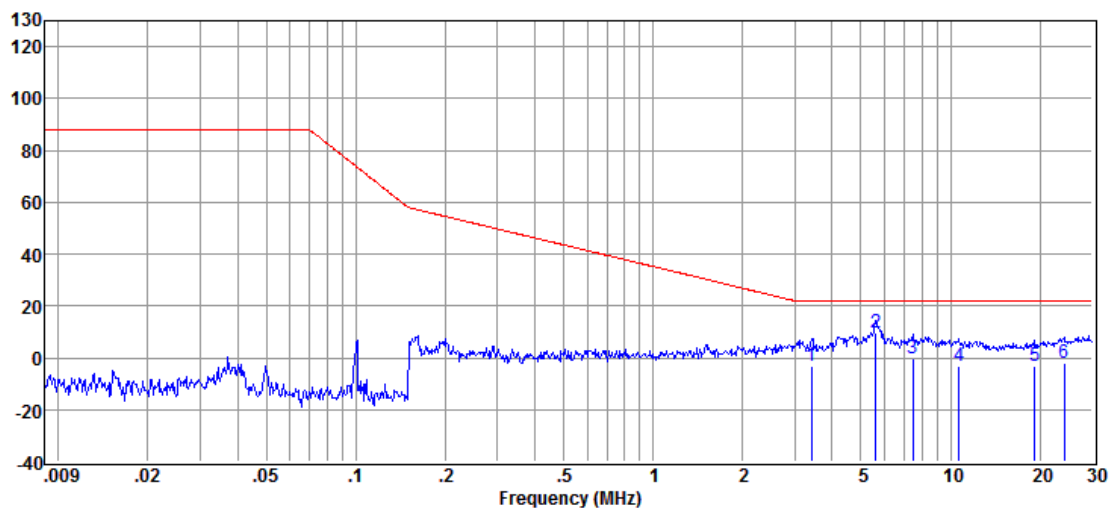
Level (dBuA)



Item	Freq.	Read Level	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB)	(dBuA)	(dBuA)	(dB)	
1	2.901	-2.12	0.34	-1.78	22.40	-24.18	QP
2	4.247	3.61	0.38	3.99	22.00	-18.01	QP
3	5.688	7.44	0.44	7.88	22.00	-14.12	QP
4	7.494	-1.15	0.50	-0.65	22.00	-22.65	QP
5	10.451	-3.16	0.50	-2.66	22.00	-24.66	QP
6	24.099	-2.31	0.76	-1.55	22.00	-23.55	QP

Y:

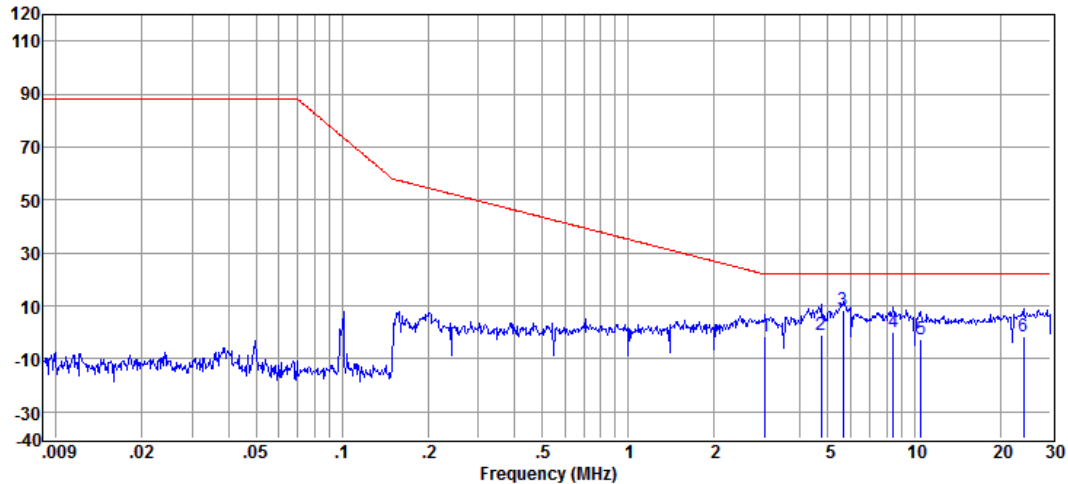
Level (dBuA)



Item	Freq.	Read Level	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB)	(dBuA)	(dBuA)	(dB)	
1	3.412	-3.72	0.36	-3.36	22.00	-25.36	QP
2	5.596	9.31	0.43	9.74	22.00	-12.26	QP
3	7.494	-0.96	0.50	-0.46	22.00	-22.46	QP
4	10.708	-3.56	0.50	-3.06	22.00	-25.06	QP
5	19.203	-4.08	0.59	-3.49	22.00	-25.49	QP
6	24.099	-2.79	0.76	-2.03	22.00	-24.03	QP

Z:

Level (dBuA)



Item	Freq.	Read Level	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB)	(dBuA)	(dBuA)	(dB)	
1	3.021	-1.79	0.35	-1.44	22.00	-23.44	QP
2	4.720	-1.24	0.39	-0.85	22.00	-22.85	QP
3	5.642	7.82	0.44	8.26	22.00	-13.74	QP
4	8.464	-0.51	0.50	-0.01	22.00	-22.01	QP
5	10.536	-3.25	0.50	-2.75	22.00	-24.75	QP
6	24.099	-2.30	0.76	-1.54	22.00	-23.54	QP

Level = Read Level + Cable Loss

7.3 Radiated Emissions

Test Frequency: 30 MHz to 300 MHz
Detector: Peak for pre-scan (120 kHz resolution bandwidth)
Quasi-Peak for final test (120 kHz resolution bandwidth)
Limit: For 3m

Frequency range (MHz)	Quasi-peak limits (dB (μV/m))
30 to 230	40
230 to 300	47
At transitional frequencies the lower limit applies.	

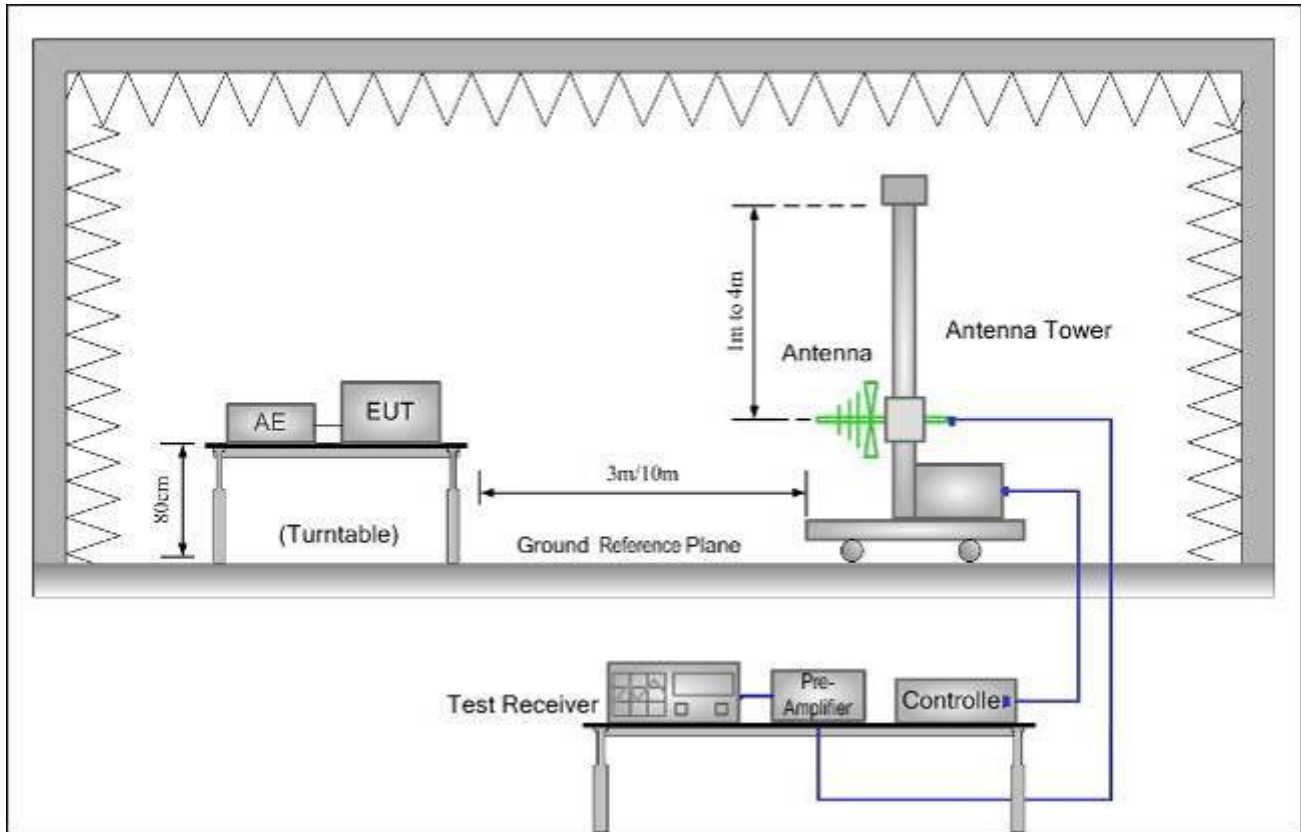
7.3.1 E.U.T. Operation

Test mode: Lighting mode
Note: According to the requirement of the standard, the supply voltage shall be within $\pm 2\%$ of the rated voltage. And pre-test at within 2% of each of the nominal supply voltages of the voltage range, compliance test at 230V 50Hz as no worse case was found.

Pre-scan was performed with peak detected on all ports, Quasi-peak measurements was performed at the frequencies at which maximum peak emission level were detected.

Please see the attached Quasi-peak test results.

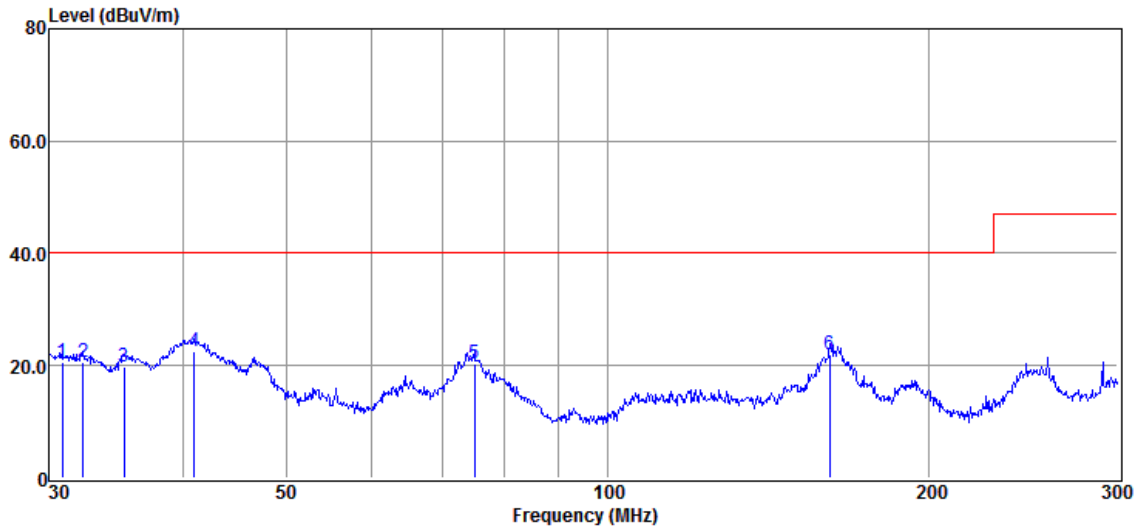
7.3.2 Test Setup and Procedure



1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The EUT was connected to AC power source through a mains power outlet which was bonded to the ground reference plane; 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.

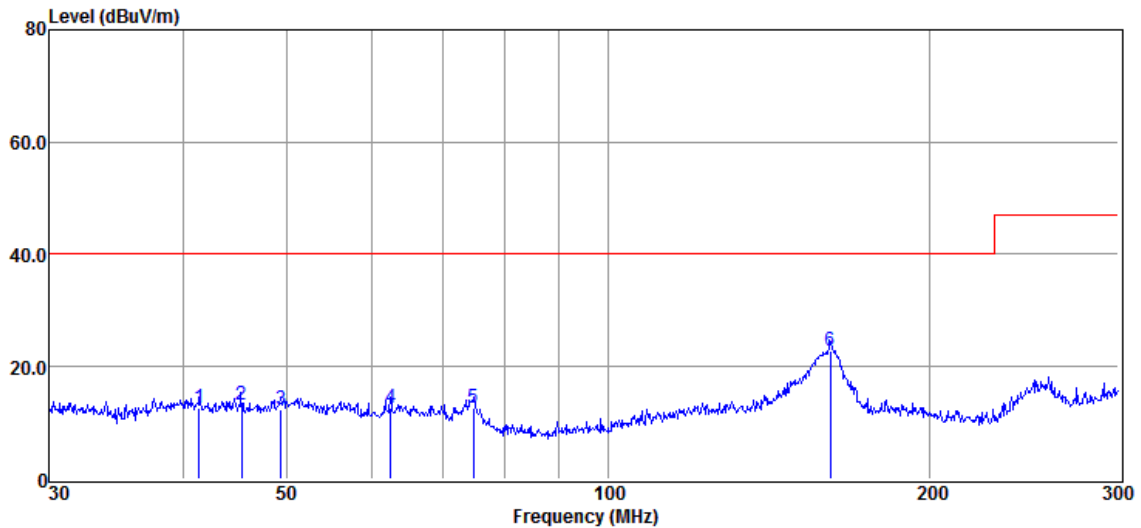
7.3.3 Measurement Data

Vertical:



Item	Freq.	Read Level	Antenna Factor	Preamplifier Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	30.84	31.55	12.58	23.72	0.12	20.53	40.00	-19.47	QP
2	32.29	31.46	12.64	23.71	0.14	20.53	40.00	-19.47	QP
3	35.24	30.83	12.55	23.71	0.19	19.86	40.00	-20.14	QP
4	41.01	32.38	13.70	23.70	0.27	22.65	40.00	-17.35	QP
5	75.05	33.13	10.34	23.67	0.64	20.44	40.00	-19.56	QP
6	161.31	32.27	12.11	23.63	1.24	21.99	40.00	-18.01	QP

Horizontal:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	41.40	22.14	13.78	23.70	0.29	12.51	40.00	-27.49	QP
2	45.36	23.40	13.23	23.70	0.33	13.26	40.00	-26.74	QP
3	49.36	21.90	13.83	23.69	0.40	12.44	40.00	-27.56	QP
4	62.60	23.35	12.41	23.68	0.54	12.62	40.00	-27.38	QP
5	74.81	25.15	10.40	23.67	0.64	12.52	40.00	-27.48	QP
6	161.17	33.04	12.11	23.63	1.22	22.74	40.00	-17.26	QP

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

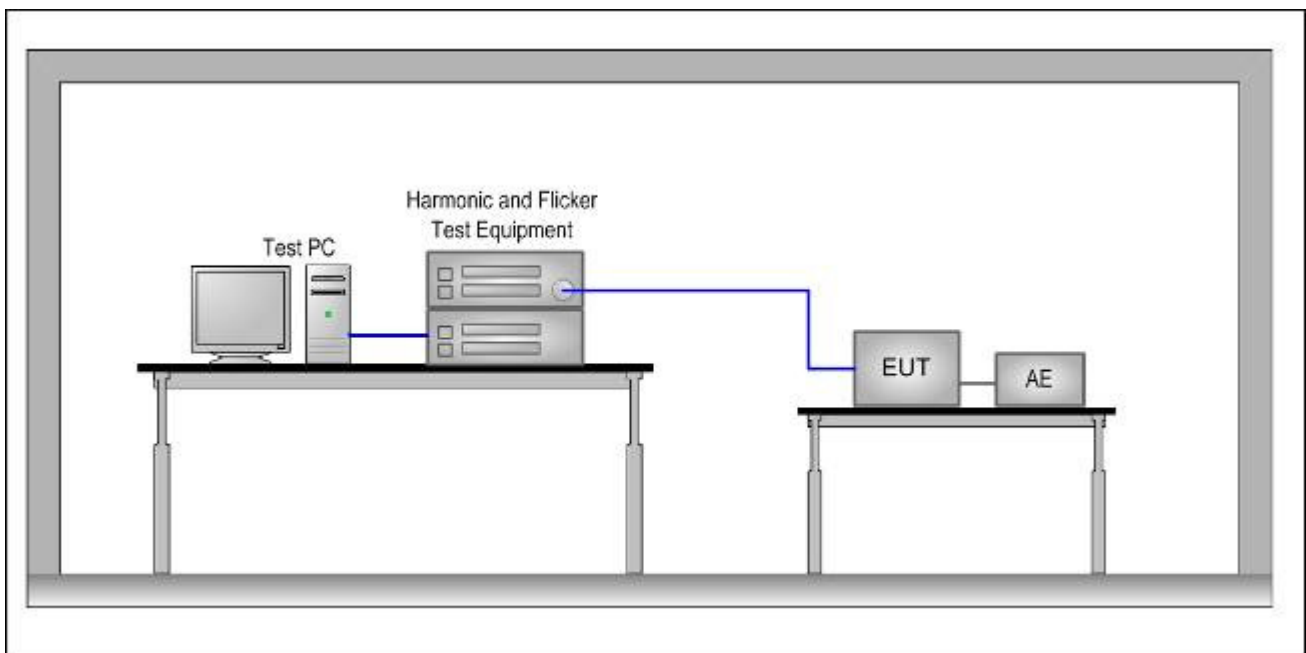
7.4 Harmonics Test Results

Measurement Time: 2.5mins
Class/Severity: Class C
Detector: As per EN 61000-3-2

7.4.1 E.U.T. Operation

Test mode: N/A

7.4.2 Test Setup and Procedure



1. Measurements were made in a draught-free atmosphere and at an ambient temperature within the range from 20 °C to 27 °C. During measurement the temperature was not vary by more than 1 K.
2. Lamps was aged for at least 100 h at rated voltage. They were operated for at least 15 min before a series of measurements is made. During ageing and measurement, lamps were installed as in normal use.
3. The measurements were carried out under steady conditions. When a piece of EUT is brought into operation or is taken out of operation, manually or automatically, harmonic currents and power are not taken into account at first 10s following the switching event. EUT shall not be in standby mode for more than 10% of any observation period.
4. Harmonics of the fundamental current were measured using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system.
5. For each harmonic order, measure the 1,5 s smoothed r.m.s. harmonic current in each DFT time window and calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period. Each harmonic order, all 1.5 s smoothed r.m.s. harmonic current values and the average values for the individual harmonic currents, taken over the entire test observation period shall be less than or equal to the applicable limits.

7.4.3 Measurement Data

Test Requirement: EN 61000-3-2
Test Method: N/A: See Remark Below
Frequency Range: 100 Hz to 2 kHz

There is no need for Harmonics test to be performed on this LED lighting with rated power less than 25W since it is not the discharge lighting (active input power $\leq 25\text{W}$) in accordance with EN 61000-3-2.

Or

There is no need for Harmonics test to be performed on this product (rated voltages less than 220V) in accordance with EN 61000-3-2.

7.5 Flicker Test Results

Measurement Time: 10 mins
Class / Severity: Clause 5 of EN 61000-3-3

7.5.1 E.U.T. Operation

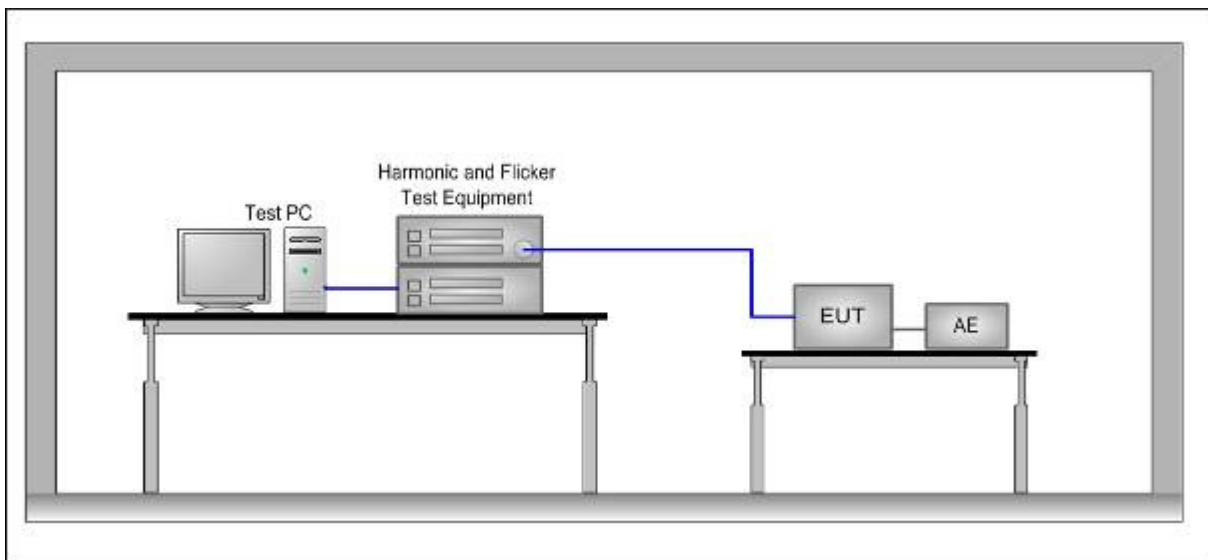
Test mode: Lighting mode

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.

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

Maximum Flicker results

	EUT values	Limit	Result
dc [%]	0.000	3.30	PASS
dmax [%]	0.047	4.00	PASS
Tmax [s]	0.000	0.50	PASS

8 Immunity Test Results

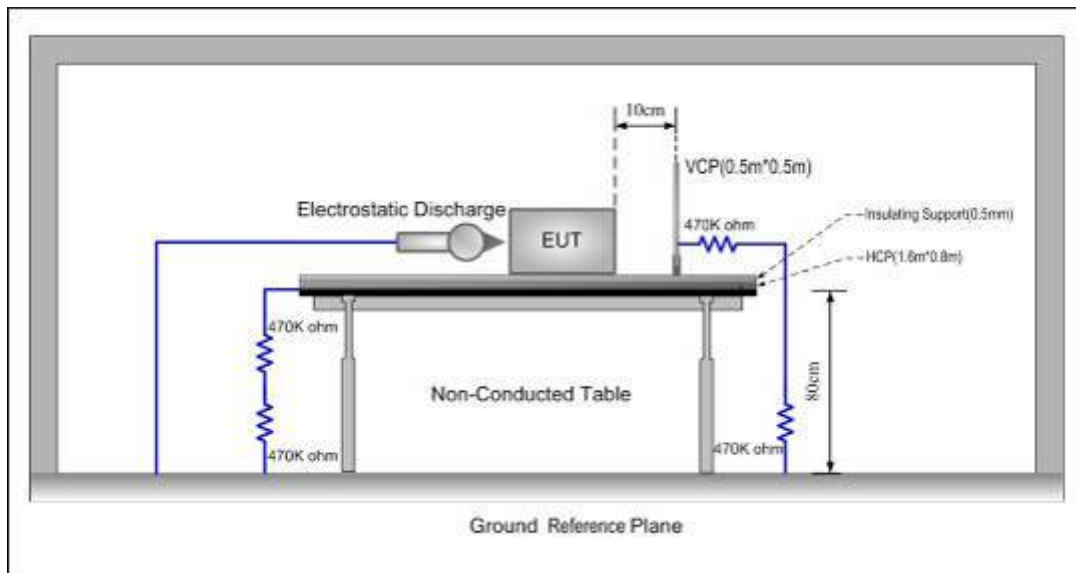
8.1 Performance Criteria Description in Clause 4.2 of EN 61547

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 ESD

Discharge Voltage:	Air Discharge:	8 kV
	Contact Discharge:	4 kV
	HCP:	4 kV
	VCP:	4 kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum 10 times at each test point	
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	

8.2.1 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 surface excepted the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode was touch 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 were used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

8.2.2 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	Test Mode	Contact Discharge	Air Discharge
8	+/-	1	Lighting mode	N/A	A
4	+/-	2		N/A	N/A

Indirect Application Test Results

- Observations: Test Point:
1. All sides.

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

Results:

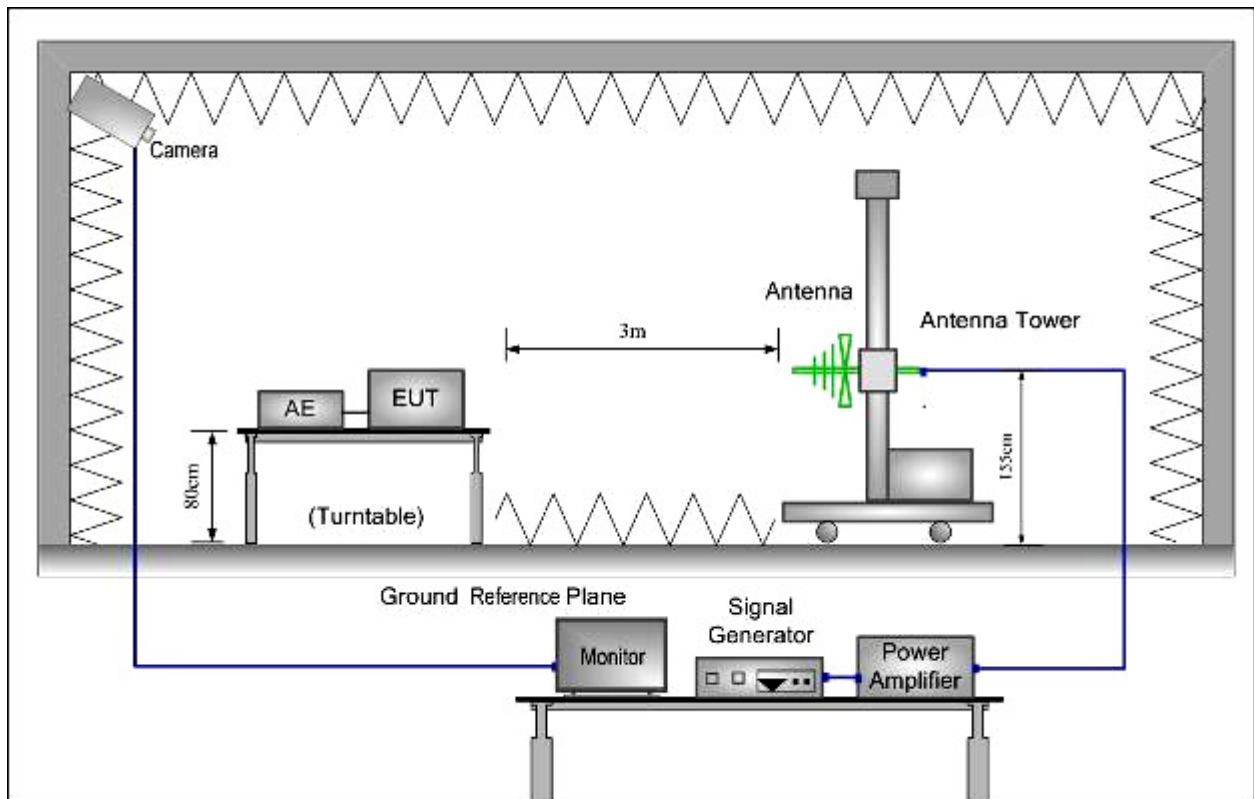
A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

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

8.3 Radio-frequency electromagnetic fields

Frequency Range: 80 MHz to 1 GHz
Antenna Polarization: Horizontal & Vertical
Test level: 3 V/m on enclosure
Modulation: 80%, 1 kHz Amplitude Modulation

8.3.1 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. Here the frequency range was swept incrementally, the step size was 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 a audio monitor were used to monitor the performance of the EUT.

8.3.2 Test Results

Frequency	Level	Modulation	Dwell Time	Test Mode	Antenna Polarization	EUT Face	Result / Observations
80MHz-1GHz	3 V/m	1 kHz, 80% Amp. Mod, 1 % increment	3s	Lighting mode	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: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

N/A: Not applicable.

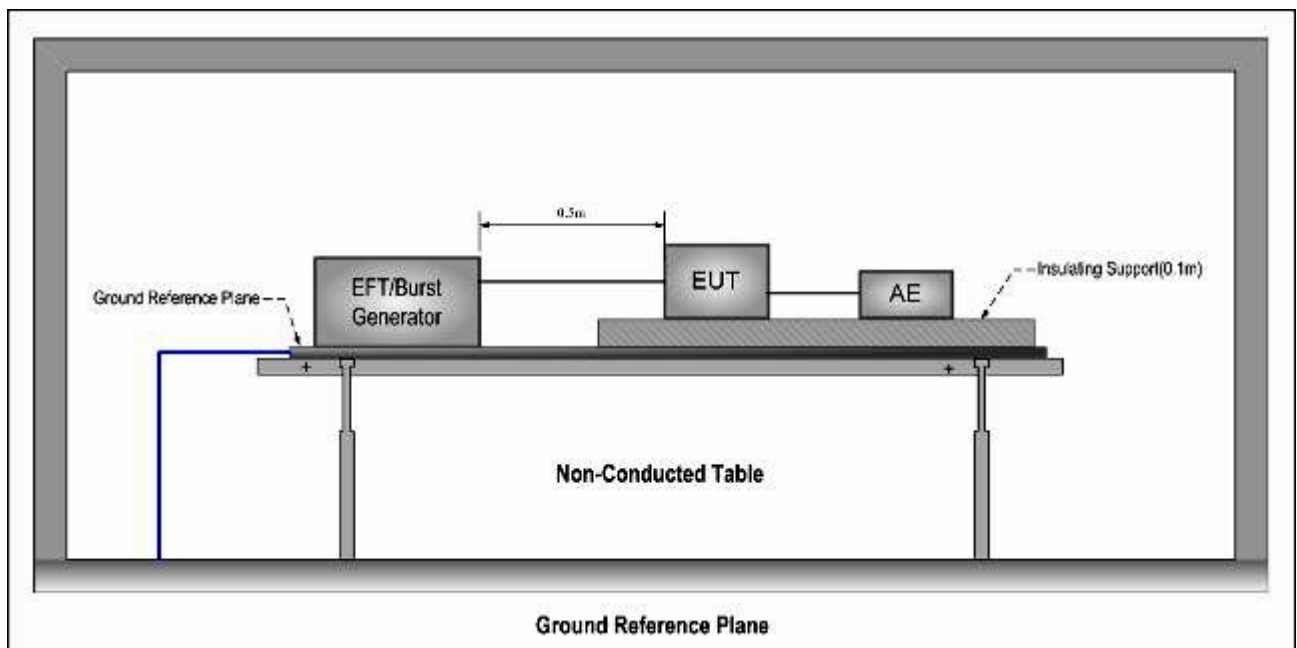
The EUT does meet the Radiated Immunity requirements of Standard.

8.4 Electrical Fast Transients (EFT)

Test Level:	1.0kV on AC
Polarity:	Positive & Negative
Repetition Frequency:	5kHz
Burst Duration:	300ms
Test Duration:	2 minute per level & polarity

8.4.1 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 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 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 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 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; multiconductor cables, such as a 50-pair telecommunication cable, were 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.

8.4.2 Test Results On AC Supply

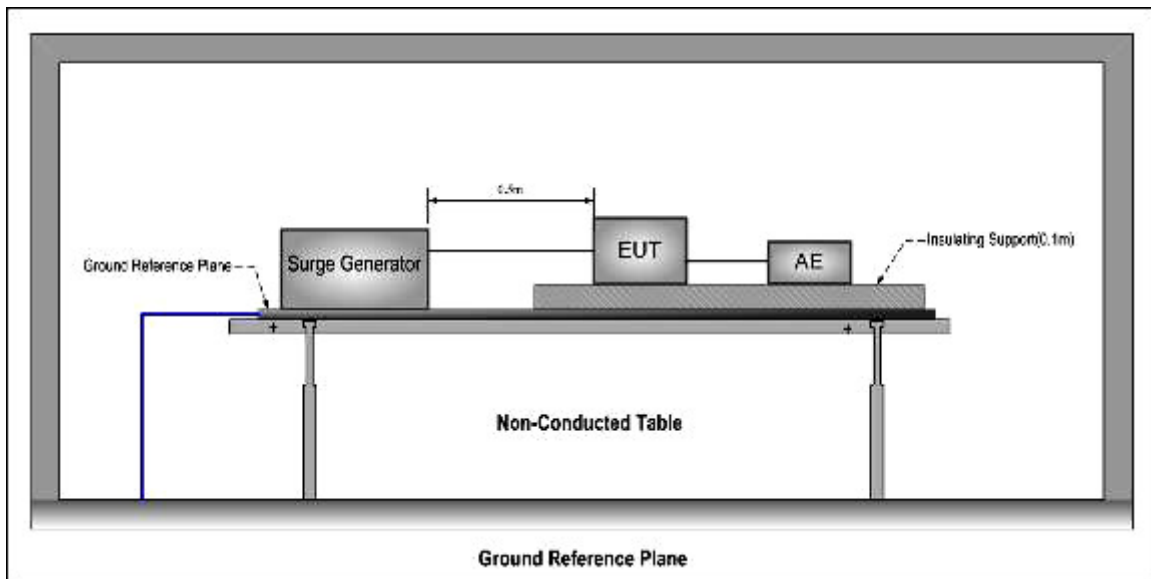
Lead under Test	Level ($\pm$ kV)	Coupling Direct/Clamp	Test mode	Observations (Performance Criterion)
Live + Neutral	± 1.0	Direct	Lighting mode	(A)

A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

8.5 Surge

Test Level:	$\leq 25W$ $\pm 0.5kV$ Live to Neutral: Differential mode
Polarity:	Positive & Negative
Generator source impedance:	Line to Line: 2Ω
Trigger Mode:	Internal
No. of surges:	5 positive at 90° , 5 negative at 270° .

8.5.1 Test Setup and Procedure



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 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 was not exceeding 2 m in length. The interconnection line between the EUT and the coupling/decoupling network shall not exceed 2 m in length.
4. The EUT was conducted 0.5kV and 1kV test voltage for live to neutral and line to neutral and conducted 0.5kV, 1kV and 2kV test voltage for line to earth and neutral to earth, five positive pulses at 90° and five negative pulses 270° for a.c. power ports. The test levels were applied on the EUT with a 2Ω generator source impedance for power supply terminals. The tests were done at repetition rate one per minute.



8.5.2 Test Results

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

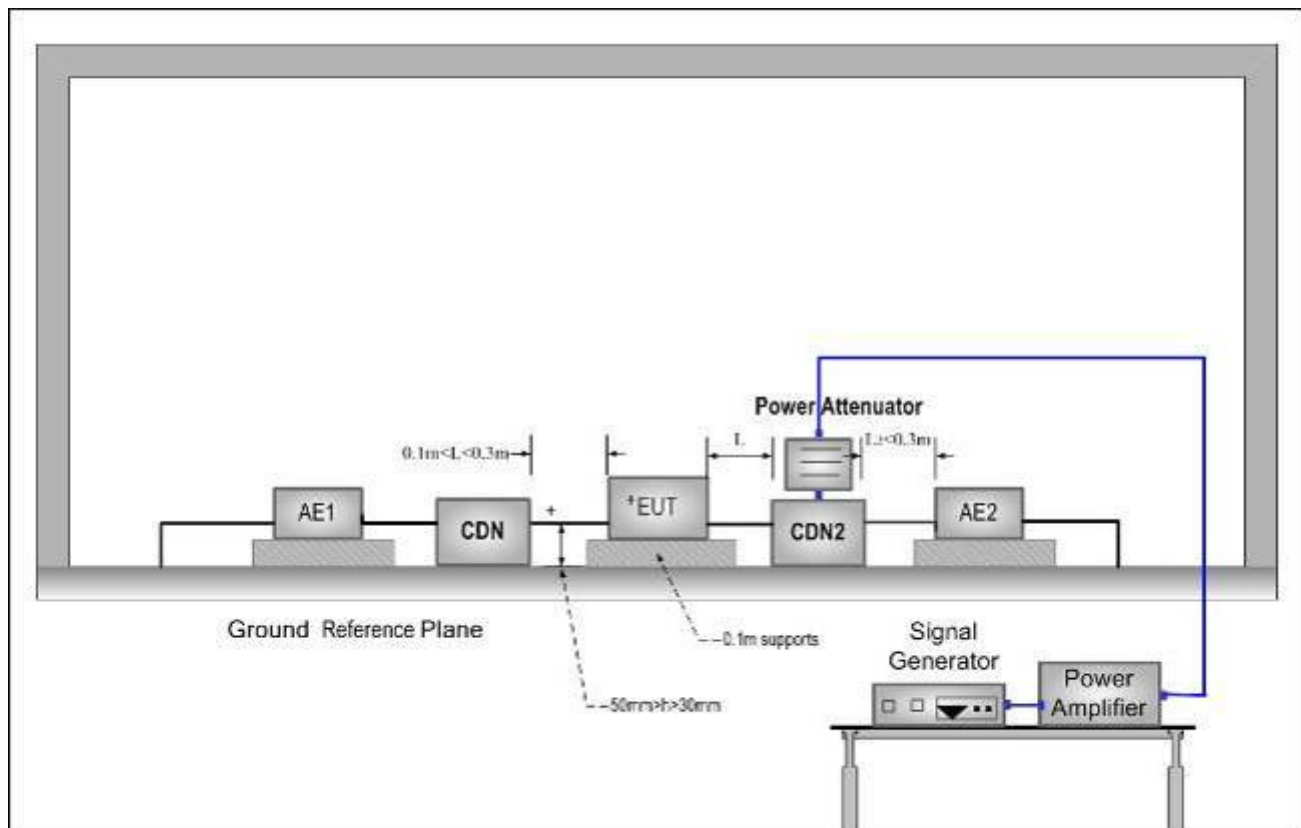
B: During test, the EUT goes flicker, after test, it recovered automatically.

8.6 Injected currents

Test Frequency:	0.15 MHz to 80 MHz
Test level:	3V r.m.s on AC Ports (unmodulated emf into 150 Ω)
Modulation:	80%, 1kHz Amplitude Modulation

8.6.1 Test Setup and Procedure

For AC port



1. The EUT was placed on an insulating support of 0.1 m 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 0,1 m and 0,3 m 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 0,1 m 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 0,3 m 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 do 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.

8.6.2 Test Results

AC Port:

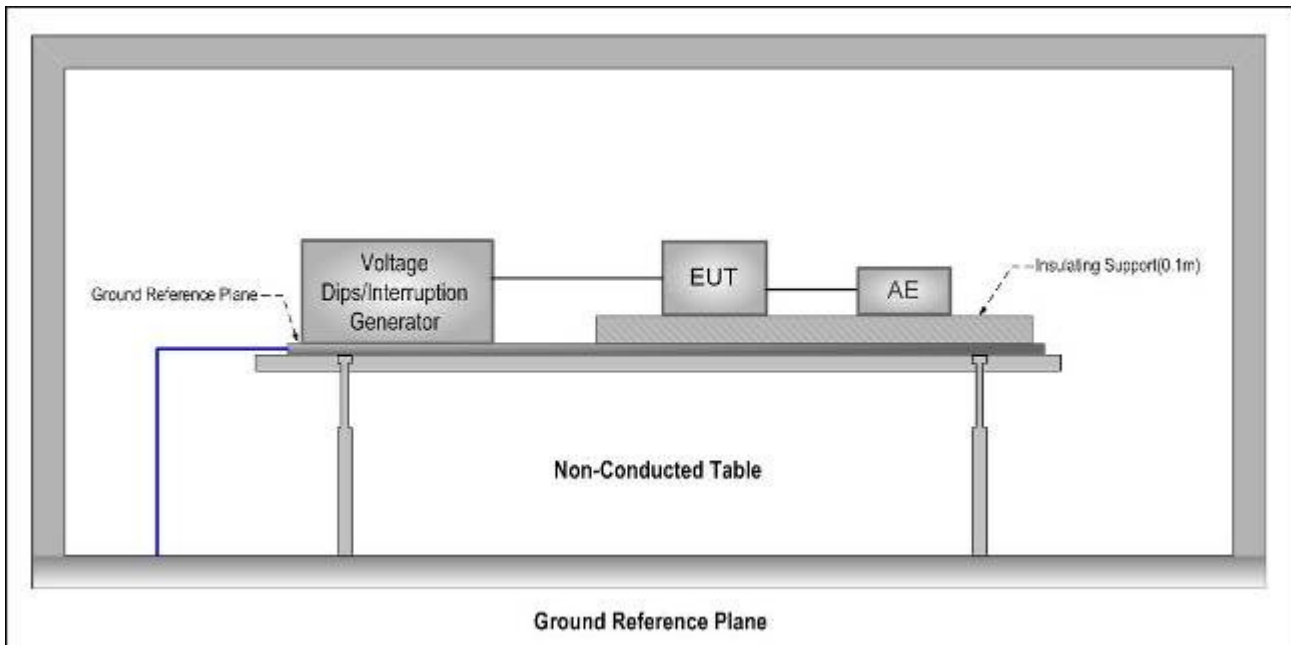
Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Test Mode	Observation (Performance Criterion)
150 kHz to 80 MHz	2 Wires Supply Cable	3V r.m.s	80%, 1 kHz Amp. Mod.	1%	3s	Lighting mode	No Loss of Function (A)

A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

8.7 Voltage Dips and Interruptions

Test voltage:	Refer to U_T
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

8.7.1 Test Setup and Procedure



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 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.

8.7.2 Test Results

$U_{T=}$ AC 230V

Test Level % U_T	Phase	Duration of drop out in Periods	No of drop out	Time between drop out	Test Mode	OBSERVATIONS (PERFORMANCE CRITERION)
0	0°,180°	0.5	3	10s	Lighting mode	(A)
70	0°,180°	10	3	10s		(A)

Remark:

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

A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

The EUT does meet the Voltage Dips and Interruptions requirements of Standard.

9 Photographs (Test Setup For the EUT)

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 Radio-frequency electromagnetic fields Test Setup



9.7 EFT, Surge, Voltage Dip and Interruptions Test Setup

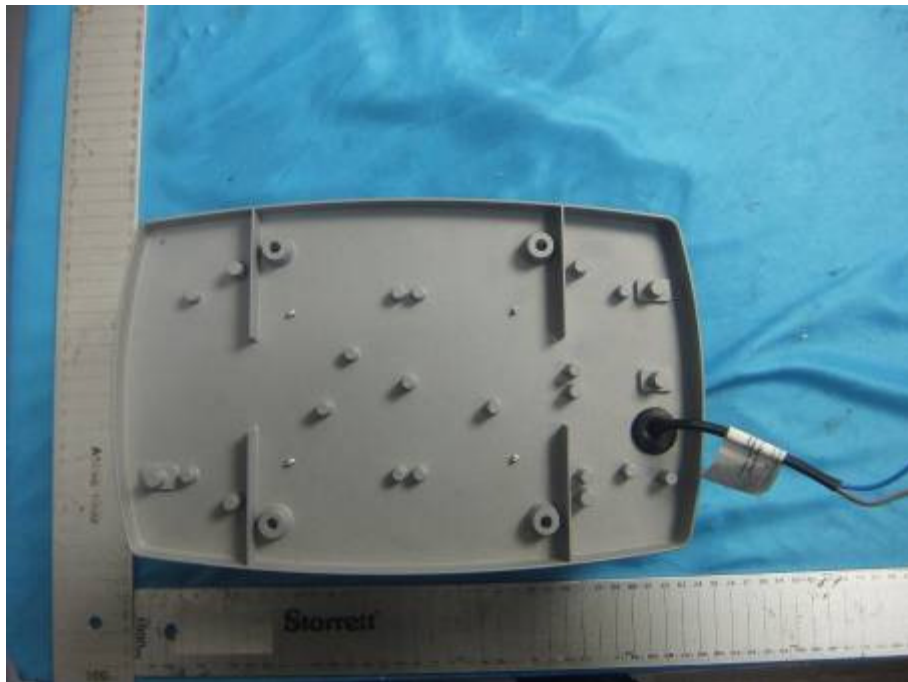


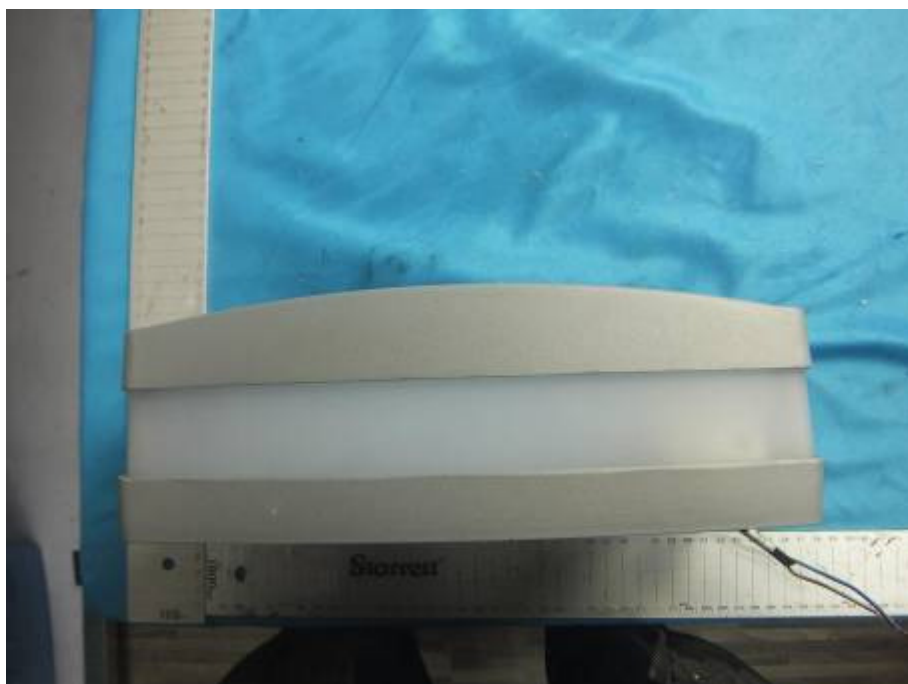
9.8 Injected currents Test Setup



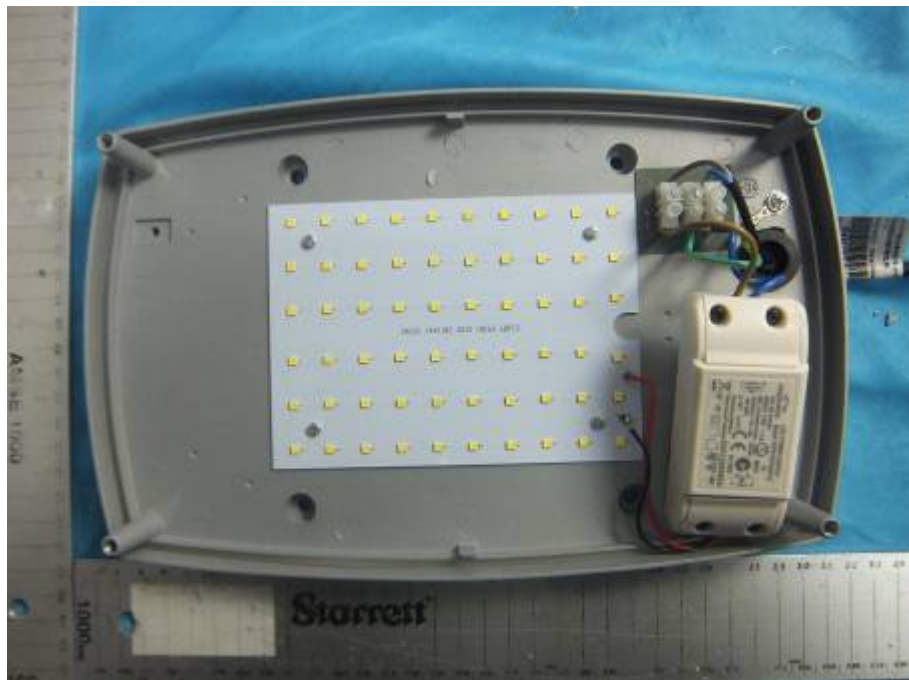
10 EUT Constructional Details

10.1 Exterior of EUT





10.2 Interior of EUT





--End of the Report--