

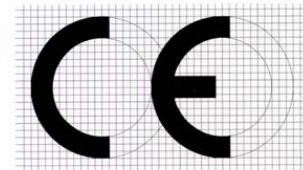
EMC TEST REPORT

Application No. : TB150410351
Applicant : Shenzhen Supernova Technology co.,Ltd
Equipment Under Test (EUT)
EUT Name : LED street light
Model No. : SV-STCSL30W
Series Model No. : Please see the page of 4
Brand Name : Supernova
Receipt Date : 2015-04-21
Test Date : 2015-04-21 to 2015-04-23
Issue Date : 2015-04-23
Standards : EN55015:2006+A1:2007+A2:2009
EN61000-3-2:2006+A1:2009+A2:2009
EN61000-3-3:2013
EN61547:2009
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above.
The EUT technically complies with the 2004/108/EC directive requirements.

Test/Witness Engineer :

Rebecca
Jinghui

Approved & Authorized :

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information

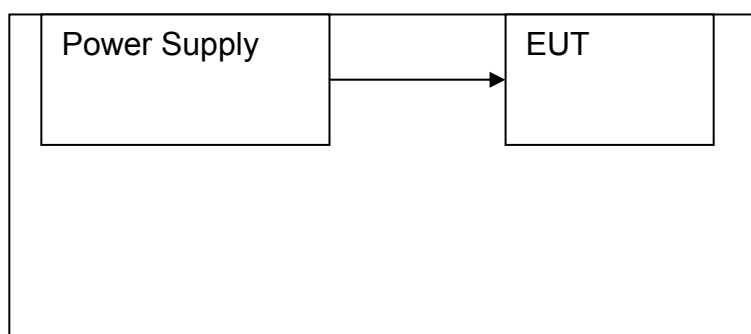
1.1. Client Information

Applicant	:	Shenzhen Supernova Technology co.,Ltd
Address	:	2rd Floor, 116 Xiangshan Avenue, Songgang Street, Baoan District,Shenzhen, china
Manufacturer	:	Shenzhen Supernova Technology co.,Ltd
Address	:	2rd Floor, 116 Xiangshan Avenue, Songgang Street, Baoan District,Shenzhen, china

1.2. General Description of EUT (Equipment Under Test)

EUT Name	:	LED street ligh
Model No.	:	SV-STCSL30W
Series Model No.	:	SV-STCSL50W,SV-STSWD50W,SV-STSWD100W,SV-STSWD150W,SV-STCBR50W,SV-STCBR100W,SV-STCBR150W,SV-STHP60W,SV-STHP90W,SV-STHP120W,SV-STHP150W,SV-STHP180W,SV-STCOB50W,SV-STCOB100W,SV-STCOB150W
Brand Name	:	Supernova
Power Supply	:	AC 90-305V 50/60Hz 180W
Remark: All above models are identical in schematic, structure and critical components except for different model number, color and different enclosure, therefore, EMI and EMS testing was performed with SV-STCSL30W only.		

1.3. Block Diagram Showing the Configuration of System Tested



1.4. Description of Support Units

The EUT has been tested as an independent unit.

1.5. Performance Criterion

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Criterion B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

Criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

1.6. Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.

2. Test Results Summary

Description of test item	Standards	Results
Conducted Disturbance at Mains Terminals	EN55015: 2006 +A1: 2007+ A2: 2009	Pass
Magnetic Emission	EN55015: 2006 +A1: 2007+ A2: 2009	Pass
Radiated Disturbance	EN55015: 2006 +A1: 2007+ A2: 2009	Pass
Harmonic Current Emissions	EN61000-3-2: 2006+ A1: 2009+A2: 2009	Pass
Voltage Fluctuation and Flicker	EN61000-3-3: 2013	Pass
Description of Test Item	Basic Standards	Results
Electrostatic Discharge (ESD)	EN61000-4-2: 2009	Pass
Radio-frequency, Continuous Radiated Disturbance	EN61000-4-3: 2006+A1:2008+ A2:2010	Pass
EFT/B Immunity	EN61000-4-4: 2004+A1:2010	Pass
Surge Immunity	EN61000-4-5: 2006	Pass
Conducted RF Immunity	EN61000-4-6: 2009	Pass
Power Frequency Magnetic Field	EN61000-4-8: 2010	Pass
Voltage Dips and Interruptions, 100% Reduction	EN61000-4-11:2004	Pass
Voltage Dips and Interruptions, 30% reduction		Pass

3. Test Equipment Used

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug.08, 2014	Aug.07, 2015
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 08, 2014	Aug.07, 2015
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 08, 2014	Aug.07, 2015
LISN	Rohde & Schwarz	ENV216	101131	Aug. 08, 2014	Aug.07, 2015
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug.07, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 08, 2014	Aug.07, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Magnetic Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 08, 2014	Aug.07, 2015
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 08, 2014	Aug.07, 2015
Triple-Loop Antenna	EVERFINE	LLA-2	1001003B	Aug. 08, 2014	Aug.07, 2015
Power Clamp Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 08, 2014	Aug.07, 2015

RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 08, 2014	Aug.07, 2015
Power Clamp	LUTHI	MDS21	3938	Aug.10, 2014	Aug.09, 2015
Harmonic Current and Voltage Fluctuation and Flicker Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Harmonic Flicker Test System	CI	5001ix-CTS-400	100321	Aug. 08, 2014	Aug.07, 2015
5K VA	CI	500IIX	59468	Aug. 08, 2014	Aug.07, 2015
Discharge Immunity Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
ESD Tester	TESEQ	NSG437	304	Aug. 10, 2014	Aug.09, 2015
ESD Generator	HAFELY	PESD 1610	H808671	Apr. 10, 2014	Apr. 09, 2015
Radiated Immunity Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Signal Generator	Rohde & Schwarz	SMT03	200754	Feb. 26, 2014	Feb. 25, 2015
Power Meter	Rohde & Schwarz	NRVD	110562	Feb. 26, 2014	Feb. 25, 2015
Voltage Probe	Rohde & Schwarz	URV5-Z2	12056	Feb. 26, 2014	Feb. 25, 2015
Voltage Probe	Rohde & Schwarz	URV5-Z2	12074	Feb. 26, 2014	Feb. 25, 2015
RF Amplifier	AR	50S1G4A	326720	Feb. 26, 2014	Feb. 25, 2015
Bilog Antenna	ETS	3142C	00047662	Feb. 26, 2014	Feb. 25, 2015
Horn Antenna	ARA	DRG-118A	16554	Feb. 26, 2014	Feb. 25, 2015
Electrical Fast Transient/ Surge/ Voltage Dip and Interruption Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Simulator	EMTEST	UCS500N5	V0948105575	Aug. 08, 2014	Aug.07, 2015
Auto-transformer	EMTEST	V4780S2	0109-41	Aug. 08, 2014	Aug.07, 2015
Coupling Clamp	EMTEST	HFK	1109-04	Aug. 08, 2014	Aug.07, 2015
Conducted Immunity Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
RF Generator	FRANKONIA	CIT-10/75	126B1126	Aug. 08, 2014	Aug.07, 2015
Attenuator	FRANKONIA	59-6-33	A413	Aug. 08, 2014	Aug.07, 2015
M-CDN	LUTHI	L-801 M2/M3	2599	Aug. 08, 2014	Aug.07, 2015
AF2-CDN	LUTHI	L-801:AF2	2538	Aug. 08, 2014	Aug.07, 2015
EM Injection Clamp	LUTHI	EM101	35958	Aug. 08, 2014	Aug.07, 2015
Power-frequency Magnetic Test					

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	EV008030	Mar. 20, 2014	Mar. 19, 2015

4. Conducted Emission Test

4.1. Test Standard and Limit

4.1.1. Test Standard

EN55015:2006+A1:2007+A2:2009.

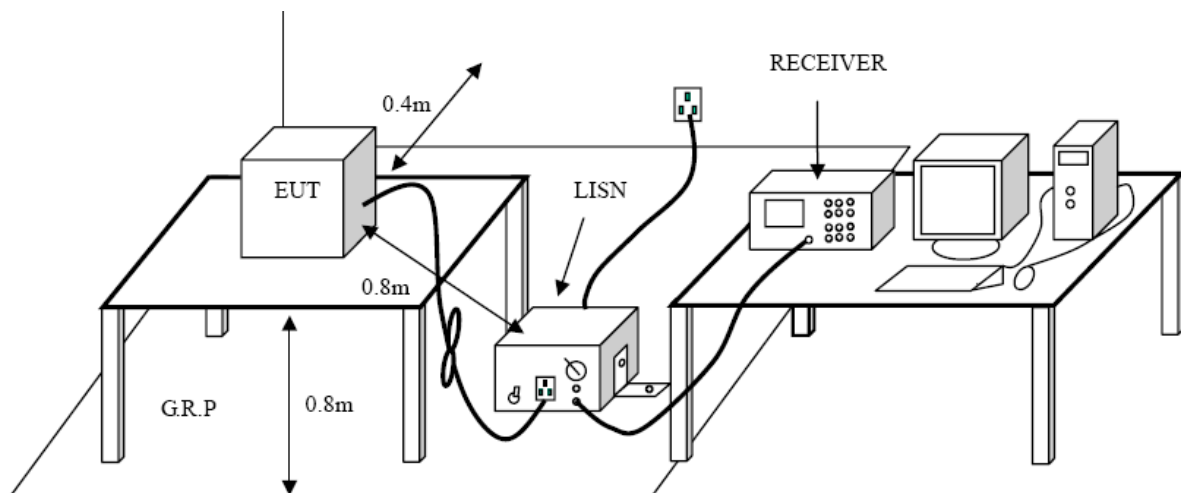
4.1.2. Test Limit

Conducted Disturbance Test Limit (Class B)

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
9kHz~50kHz	110	--
50kHz ~150kHz	90 to 80*	--
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Remark: 1. *Decreasing linearly with logarithm of the frequency
2. At the transition frequency, the lower limit applies.
3. For electrodeless lamps and luminaries, the limit in the frequency range of 2,51 MHz to 3,0 MHz is 73 dB(μ V) quasi-peak and 63 dB(μ V) average

4.2. Test Setup



4.3. Test Procedure

The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/

50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 200Hz for test frequency band 9KHz to 0.15MHz, and receiver bandwidth set 9kHz for test frequency band 0.15MHz to 30 MHz.

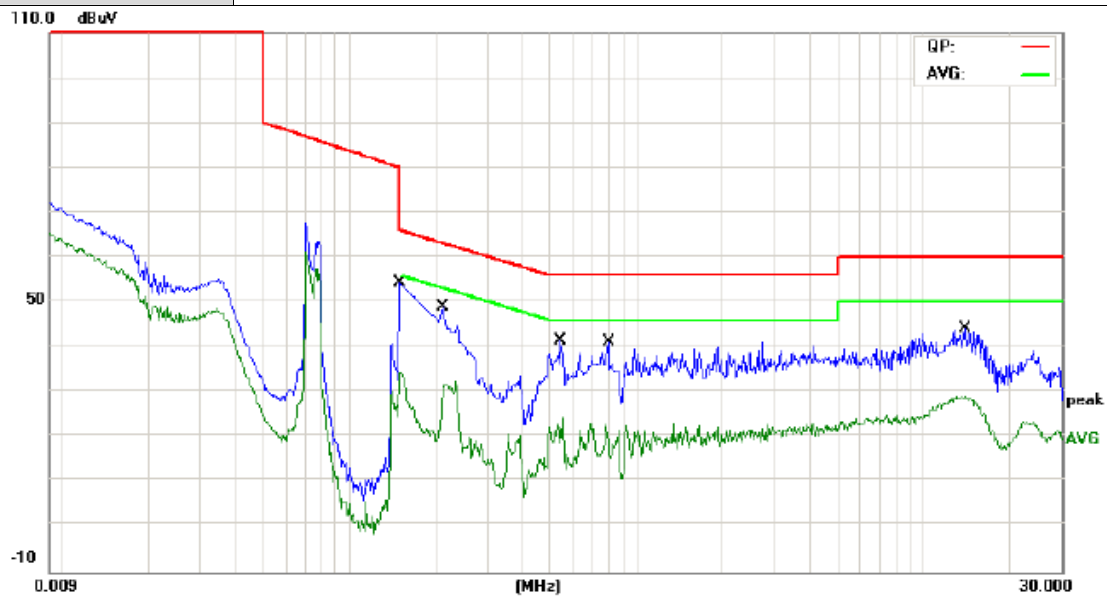
4.4. Test Condition

Temperature	:	25 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	AC 230V/50Hz

4.5. Test Data

Please refer to the following pages.

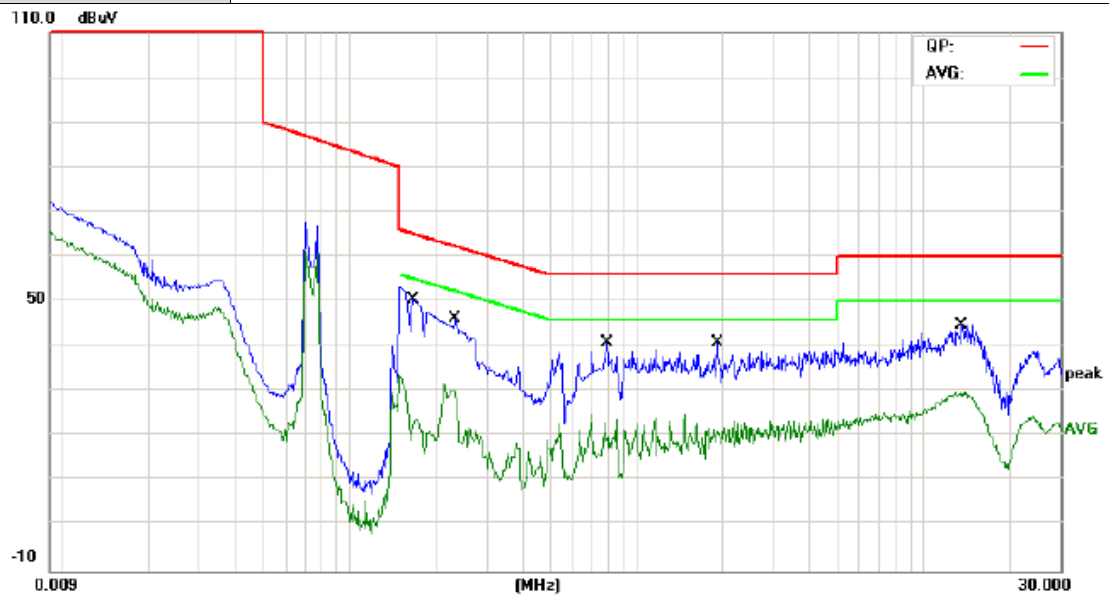
EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Terminal:	Line		
Test Mode:	Normal Mode		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.1500	41.66	10.12	51.78	65.99	-14.21	QP
2		0.1500	23.13	10.12	33.25	55.99	-22.74	AVG
3		0.2140	31.94	10.12	42.06	63.04	-20.98	QP
4		0.2140	22.16	10.12	32.28	53.04	-20.76	AVG
5		0.5420	25.84	10.02	35.86	56.00	-20.14	QP
6		0.5420	9.51	10.02	19.53	46.00	-26.47	AVG
7		0.7940	26.67	10.06	36.73	56.00	-19.27	QP
8		0.7940	8.68	10.06	18.74	46.00	-27.26	AVG
9		13.7900	26.10	10.08	36.18	60.00	-23.82	QP
10		13.7900	17.86	10.08	27.94	50.00	-22.06	AVG

Emission Level= Read Level+ Correct Factor

EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Terminal:	Neutral		
Test Mode:	Normal Mode		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.1660	37.30	10.12	47.42	65.15	-17.73	QP
2		0.1660	13.40	10.12	23.52	55.15	-31.63	AVG
3		0.2340	31.04	10.11	41.15	62.30	-21.15	QP
4		0.2340	18.32	10.11	28.43	52.30	-23.87	AVG
5		0.7900	24.91	10.06	34.97	56.00	-21.03	QP
6		0.7900	8.90	10.06	18.96	46.00	-27.04	AVG
7		1.9180	22.51	10.07	32.58	56.00	-23.42	QP
8		1.9180	9.49	10.07	19.56	46.00	-26.44	AVG
9		13.6180	26.78	10.09	36.87	60.00	-23.13	QP
10		13.6180	18.54	10.09	28.63	50.00	-21.37	AVG

Emission Level= Read Level+ Correct Factor

5. Magnetic field emission Measurement

5.1. Test Standard and Limit

5.1.1. Test Standard

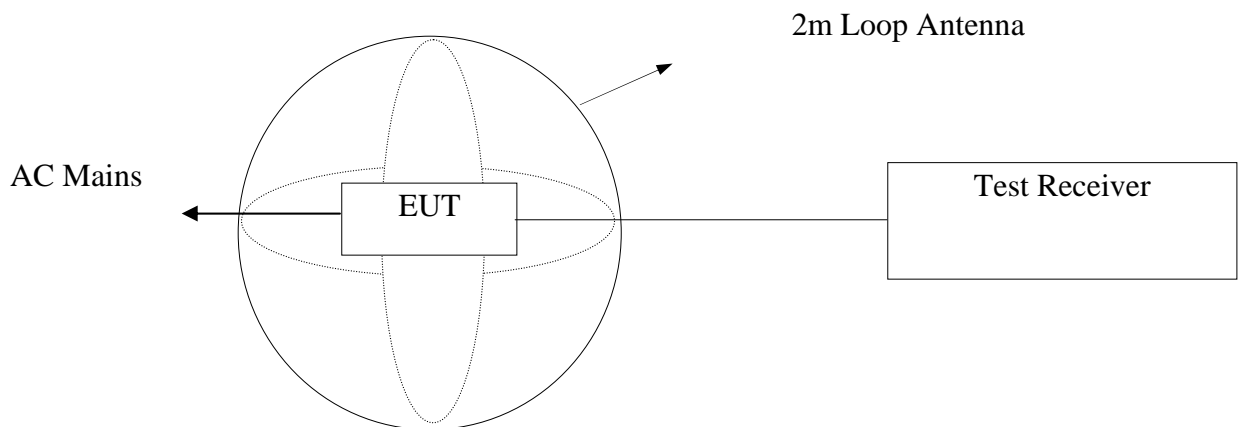
EN55015:2006+A1:2007+A2:2009.

5.1.2. Test Limit

Frequency			Limits for loop diameter (dB μ A)
			2m
9KHz	~	70KHz	88
70KHz	~	150KHz	88 ~ 58*
150KHz	~	2.2MHz	58 ~ 26*
2.2MHz	~	3.0MHz	58
3.0MHz	~	30MHz	22

Remark: 1. At the transition frequency the lower limit applies.
2. * Decreasing linearly with logarithm of the frequency.

5.2. Test Setup



5.3. Test Procedure

The EUT is placed on a wood table in the center of a loop antenna. The induced current in the loop antenna is measured by means of a current probe and the test receiver. Three field components are checked by means of a coaxial switch.

The frequency range from 9KHz to 30MHz is investigated. The receiver is measured with the quasi-peak detector. For frequency band 9KHz to 150KHz, the bandwidth of the field strength meter is set at 200Hz. For frequency band 150KHz to 30MHz, the bandwidth is set at 9KHz.

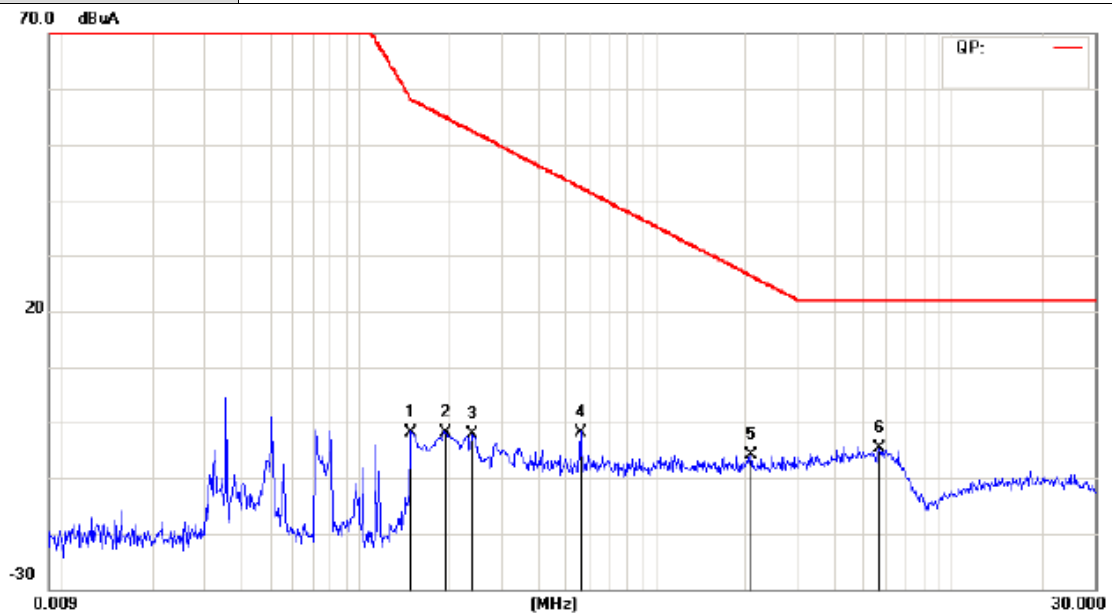
5.4. Test Condition

Temperature	:	25 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	AC 230V/50Hz

5.5. Test Data

Please refer to the following pages.

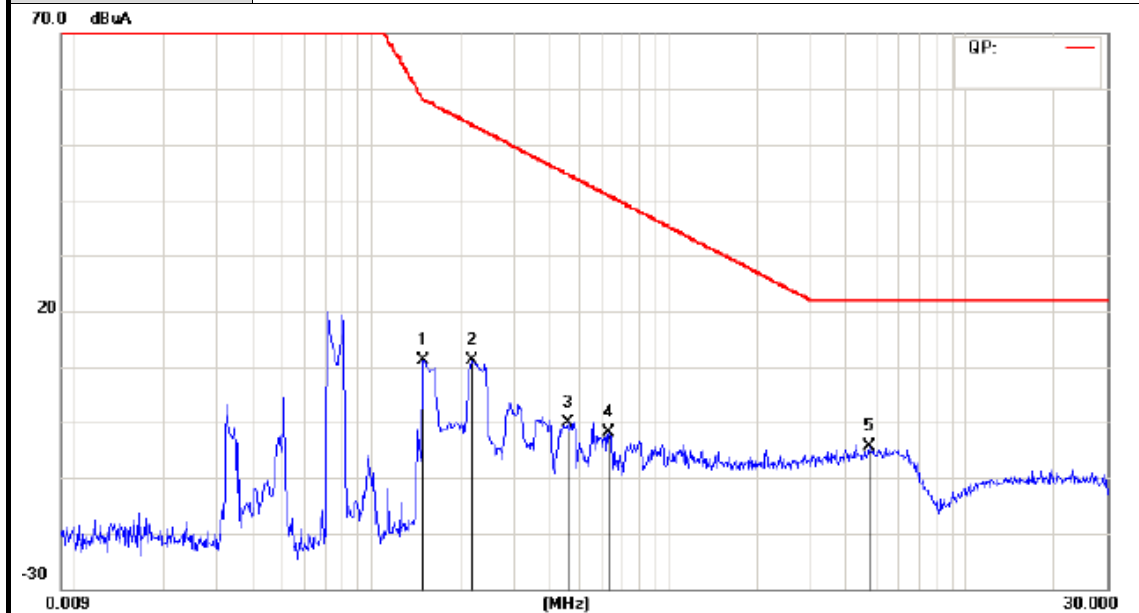
EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Polarization	X Direction		
Test Mode:	Normal Mode		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector
1		0.1500	-21.55	19.80	-1.75	57.99	-59.74	peak
2		0.1947	-22.03	20.16	-1.87	54.86	-56.73	peak
3		0.2420	-22.52	20.28	-2.24	52.25	-54.49	peak
4		0.5580	-22.51	20.76	-1.75	42.21	-43.96	peak
5		2.0900	-26.52	20.64	-5.88	26.34	-32.22	peak
6	*	5.6700	-27.22	22.59	-4.63	22.00	-26.63	peak

Emission Level= Read Level+ Correct Factor

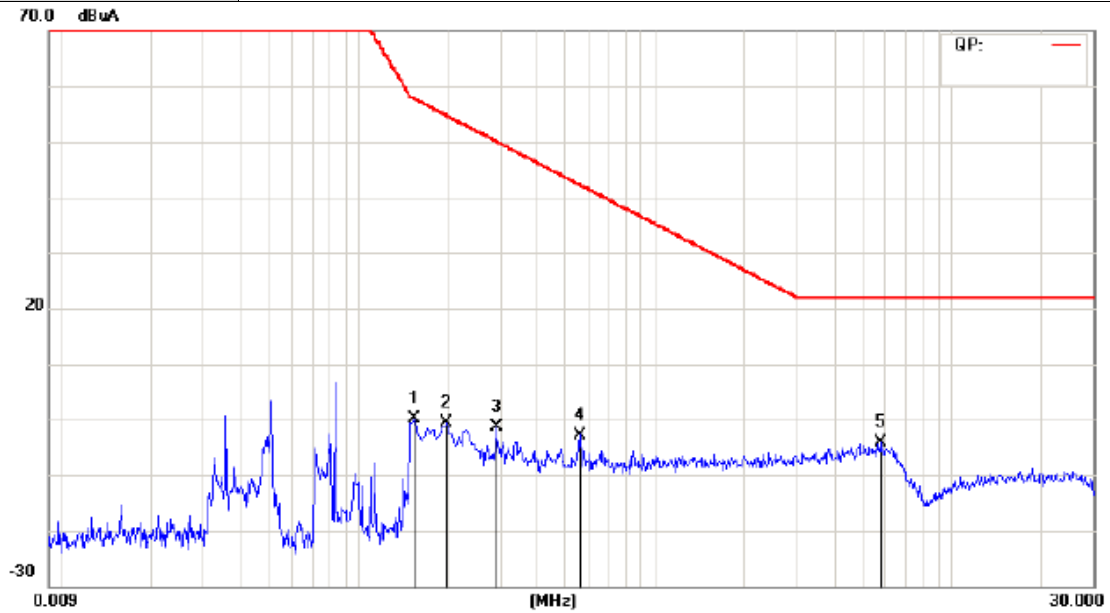
EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Polarization	Y Direction		
Test Mode:	Normal Mode		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector
1		0.1500	-8.58	19.70	11.12	57.99	-46.87	peak
2		0.2180	-9.10	20.15	11.05	53.50	-42.45	peak
3		0.4580	-20.70	20.63	-0.07	44.58	-44.65	peak
4		0.6300	-22.61	20.70	-1.91	40.75	-42.66	peak
5	*	4.7380	-26.73	22.27	-4.46	22.00	-26.46	peak

Emission Level= Read Level+ Correct Factor

EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Polarization	Z Direction		
Test Mode:	Normal Mode		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector
1		0.1539	-19.69	19.73	0.04	57.68	-57.64	peak
2		0.1980	-20.68	20.08	-0.60	54.66	-55.26	peak
3		0.2900	-21.74	20.28	-1.46	50.07	-51.53	peak
4		0.5580	-23.41	20.66	-2.75	42.21	-44.96	peak
5	*	5.8100	-26.77	22.69	-4.08	22.00	-26.08	peak

Emission Level= Read Level+ Correct Factor

6. Radiated Disturbance Test

6.1. Test Standard and Limit

6.1.1. Test Standard

EN55015:2006+A1:2007+A2:2009

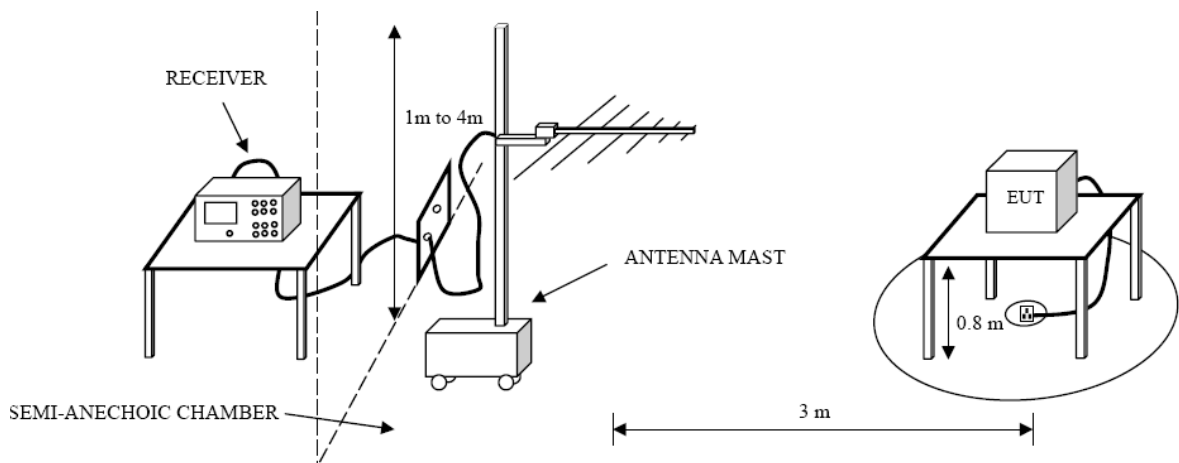
6.1.2. Test Limit

Radiated Disturbance Test Limit (Class B)

Frequency	Limit (dB μ V/m)
	Quasi-peak Level
30MHz~230MHz	40
230MHz~300MHz	47

Remark: 1. The lower limit shall apply at the transition frequency.
2. The test distance is 3m.

6.2. Test Setup



6.3. Test Procedure

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

6.4. Test Condition

Temperature	:	25 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	AC 230V/50Hz

6.5. Test Data

Please refer to the following pages.

EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Ant. Pol.	Horizontal		
Test Mode:	Normal Mode		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		133.3894	49.56	-22.12	27.44	40.00	-12.56	peak
2		167.5411	54.78	-21.02	33.76	40.00	-6.24	peak
3	!	185.4049	57.25	-20.75	36.50	40.00	-3.50	QP
4	*	193.6963	58.02	-20.72	37.30	40.00	-2.70	QP

Emission Level= Read Level+ Correct Factor

EUT:	LED street light	Model Name :	SV-STCSL30W
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Ant. Pol.	Vertical		
Test Mode:	Normal Mode		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		42.8668	46.74	-21.37	25.37	40.00	-14.63	peak
2		97.7510	47.55	-22.02	25.53	40.00	-14.47	peak
3		146.9336	52.52	-21.42	31.10	40.00	-8.90	peak
4	*	192.3629	55.59	-20.78	34.81	40.00	-5.19	peak

Emission Level= Read Level+ Correct Factor

7. Harmonic Current Emission Test

7.1. Test Standard and Limit

7.1.1. Test Standard

EN 61000-3-2: 2006+A1:2009+A2: 2009

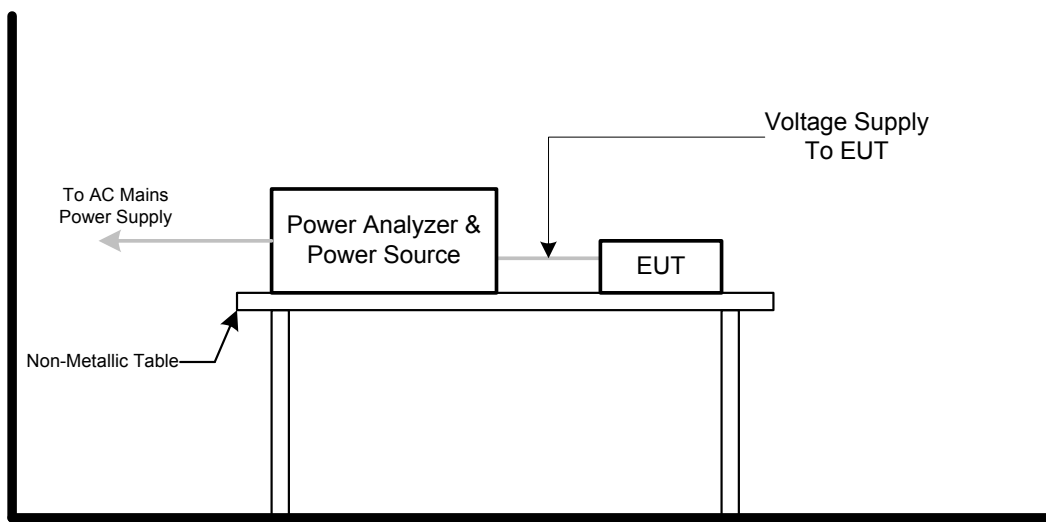
7.1.2. Limits

Harmonic Current Test Limit (Class C)

Harmonic order (n)	Maximum permissible harmonic current Expressed as a percentage of the input Current at the fundamental frequency %
2	2
3	$30.\lambda$
5	10
7	7
9	5
$15 \leq n \leq 39$ (odd harmonics only)	3

Remark: λ is the circuit power factor

7.2. Test Setup



7.3. Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

7.4. Test Condition

Temperature	:	25 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	AC 230V/50Hz

7.5. Test Data

Please refer to the following pages.

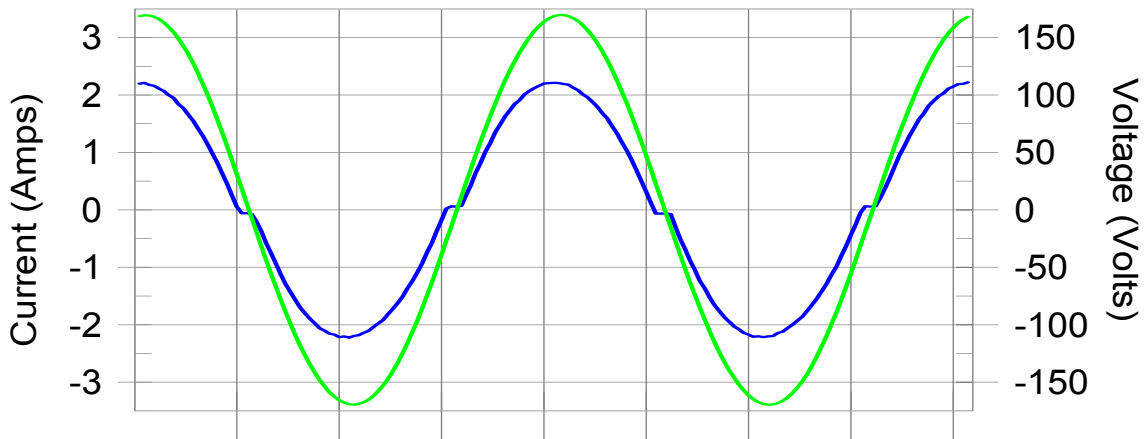
Harmonics – Class-C per Ed. 3.0 (2006)(Run time)

EUT: LED street light
 Test category: Class-C per Ed. 3.0 (2006) (European limits)
 Test date: 2015-04-21
 Test duration (min): 10
 Comment: SV-STCSL30W
 Customer: Customer information

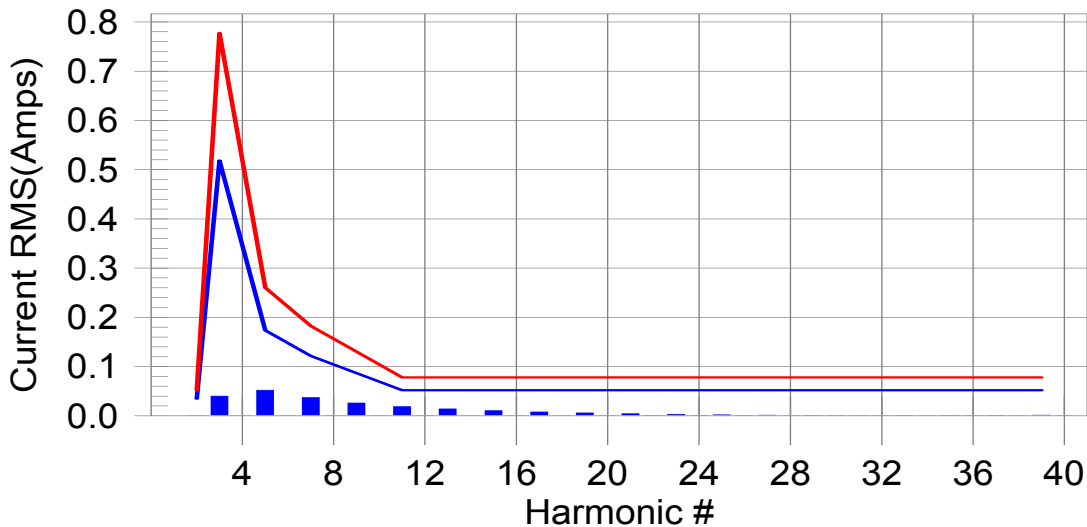
Tested by: toby
 Test Margin: 100
 End time: 10:21:06
 Data file name: H-000048.cts_data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class C limit line European Limits



Test result: Pass Worst harmonics H11-35.91% of 100% limit, H11-24.06% of 150% limit.

Current Test Result Summary (Run time)

EUT: LED street light Tested by: toby
 Test category: Class-C per Ed. 3.0 (2006) (European limits) Test Margin: 100
 Test date: 2015-04-21 Start time: 10:10:45 End time: 10:21:06
 Test duration (min): 10 Data file name: H-000048.cts_data
 Comment: SV-STCSL30W
 Customer: Customer information

Test Result: Pass Source qualification: Normal
 THC(A): 0.08 I-THD(%): 5.39 POHC(A): 0.000 POHC Limit(A): 0.165

Highest parameter values during test:

V_RMS (Volts): 120.00	Frequency(Hz): 60.00
I_Peak (Amps): 2.241	I_RMS (Amps): 1.561
I_Fund (Amps): 1.736	Crest Factor: 1.438
Power (Watts): 186.4	Power Factor: 0.996

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.000	0.035	0.0	0.000	0.052	0.00	Pass
3	0.040	0.519	7.7	0.041	0.778	5.23	Pass
4	0.000						
5	0.052	0.174	29.8	0.052	0.260	20.14	Pass
6	0.000						
7	0.037	0.122	30.3	0.037	0.182	20.30	Pass
8	0.000						
9	0.026	0.087	29.7	0.026	0.130	19.87	Pass
10	0.000						
11	0.019	0.052	35.9	0.019	0.078	24.06	Pass
12	0.000						
13	0.014	0.052	26.6	0.014	0.078	17.92	Pass
14	0.000						
15	0.010	0.052	19.8	0.011	0.078	13.45	Pass
16	0.000						
17	0.008	0.052	15.0	0.008	0.078	10.21	Pass
18	0.000						
19	0.006	0.052	11.1	0.006	0.078	7.64	Pass
20	0.000						
21	0.004	0.052	0.0	0.004	0.078	0.00	Pass
22	0.001						
23	0.003	0.052	0.0	0.003	0.078	0.00	Pass
24	0.001						
25	0.002	0.052	0.0	0.002	0.078	0.00	Pass
26	0.001						
27	0.001	0.052	0.0	0.001	0.078	0.00	Pass
28	0.000						
29	0.001	0.052	0.0	0.001	0.078	0.00	Pass
30	0.000						
31	0.000	0.052	0.0	0.000	0.078	0.00	Pass
32	0.000						
33	0.001	0.052	0.0	0.001	0.078	0.00	Pass
34	0.000						
35	0.001	0.052	0.0	0.001	0.078	0.00	Pass
36	0.000						
37	0.001	0.052	0.0	0.001	0.078	0.00	Pass
38	0.000						
39	0.001	0.052	0.0	0.001	0.078	0.00	Pass
40	0.000						

Note: Dynamic limits were applied for this test. The highest harmonics values in the above table may not occur at the same window as the maximum harmonics/limit ratio.

Voltage Source Verification Data (Run time)

EUT: LED street light Tested by: toby
 Test category: Class-C per Ed. 3.0 (2006) (European limits) Test Margin: 100
 Test date: 2015-04-21 Start time: 10:10:45 End time: 10:21:06
 Test duration (min): 10 Data file name: H-000048.cts_data
 Comment: SV-STCSL30W
 Customer: Customer information

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 120.00	Frequency(Hz): 60.00
I_Peak (Amps): 2.241	I_RMS (Amps): 1.561
I_Fund (Amps): 1.736	Crest Factor: 1.438
Power (Watts): 186.4	Power Factor: 0.996

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.014	0.240	5.82	OK
3	0.327	1.080	30.31	OK
4	0.010	0.240	4.33	OK
5	0.050	0.480	10.36	OK
6	0.012	0.240	4.87	OK
7	0.010	0.360	2.76	OK
8	0.003	0.240	1.10	OK
9	0.013	0.240	5.37	OK
10	0.010	0.240	4.06	OK
11	0.009	0.120	7.29	OK
12	0.004	0.120	3.70	OK
13	0.007	0.120	6.08	OK
14	0.003	0.120	2.25	OK
15	0.007	0.120	6.17	OK
16	0.005	0.120	4.26	OK
17	0.007	0.120	5.68	OK
18	0.005	0.120	3.79	OK
19	0.006	0.120	5.08	OK
20	0.004	0.120	3.45	OK
21	0.003	0.120	2.73	OK
22	0.002	0.120	1.82	OK
23	0.003	0.120	2.43	OK
24	0.002	0.120	1.83	OK
25	0.003	0.120	2.89	OK
26	0.002	0.120	1.62	OK
27	0.002	0.120	2.06	OK
28	0.002	0.120	2.06	OK
29	0.002	0.120	1.72	OK
30	0.002	0.120	2.01	OK
31	0.003	0.120	2.24	OK
32	0.002	0.120	1.67	OK
33	0.003	0.120	2.67	OK
34	0.002	0.120	1.51	OK
35	0.002	0.120	1.93	OK
36	0.002	0.120	1.48	OK
37	0.004	0.120	3.63	OK
38	0.002	0.120	1.77	OK
39	0.003	0.120	2.15	OK
40	0.002	0.120	1.52	OK

8. Voltage Fluctuation and Flicker test

8.1. Test Standard and Limit

8.1.1. Test Standard

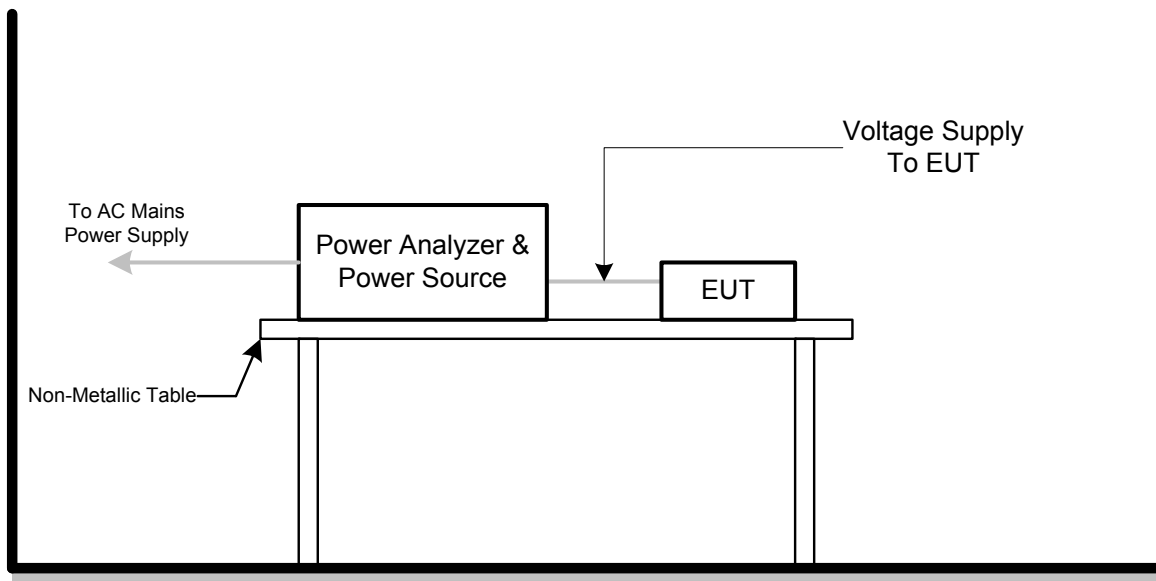
EN 61000-3-3:2013

8.1.2. Limit

Voltage Fluctuation and Flicker Test Limit

Test Items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

8.2. Test Setup



8.3. Test Procedure

8.3.1. Harmonic Current Test:

Test was performed according to the procedures specified in Clause 5.0 of IEC555-2 and/or Sub-clause 6.2 of IEC/EN 61000-3-2 depend on which standard adopted for compliance measurement.

8.3.2. Fluctuation and Flickers Test:

Tests was performed according to the Test Conditions/Assessment of Voltage

Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

- 8.3.3. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.
- 8.3.4. For the actual test configuration, please refer to the related Item –Block Diagram of system tested (please refer to 1.3).

8.4. Test Condition

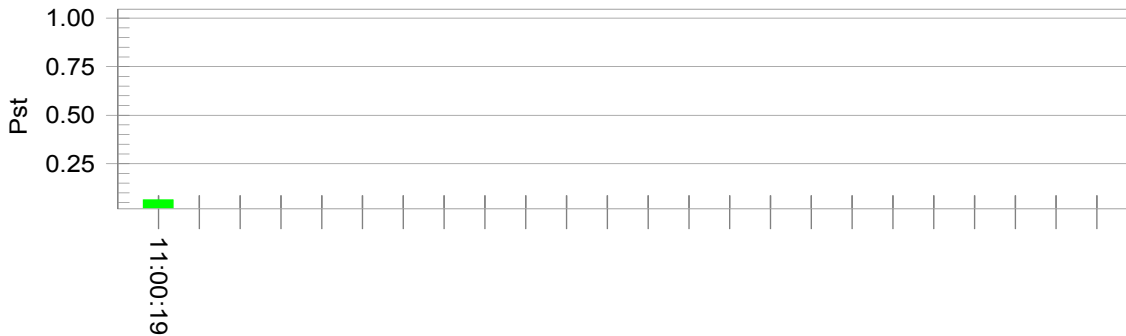
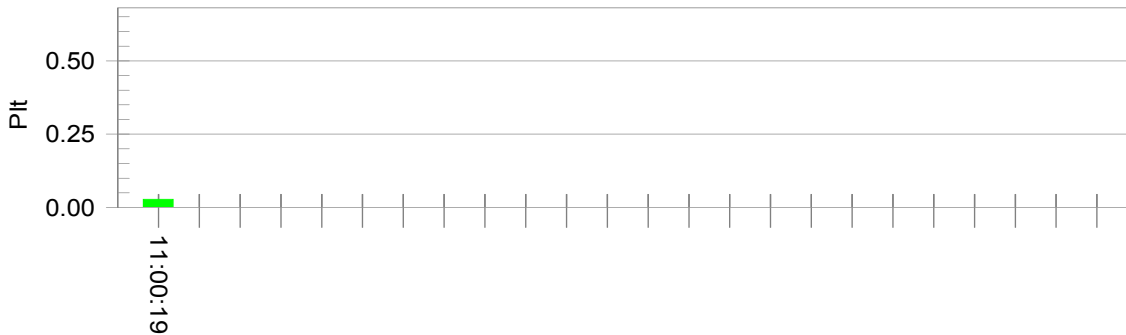
Temperature	:	25 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	AC 230V/50Hz

8.5. Test Data

Please refer to the following page.

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: LED street light	Tested by: TOBY
Test category: All parameters (European limits)	Test Margin: 100
Test date: 2015-04-21	Start time: 10:49:59
Test duration (min): 10	End time: 11:00:21
Comment: SV-STCSL30W	Data file name: F-000049.cts_data
Customer: Customer information	

Test Result: Pass
Status: Test Completed
Pst_i and limit line
European Limits

Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.79		
Highest dt (%):	0.00	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

9. Electrostatic Discharge Immunity Test

9.1. Test Requirements

9.1.1. Test Standard

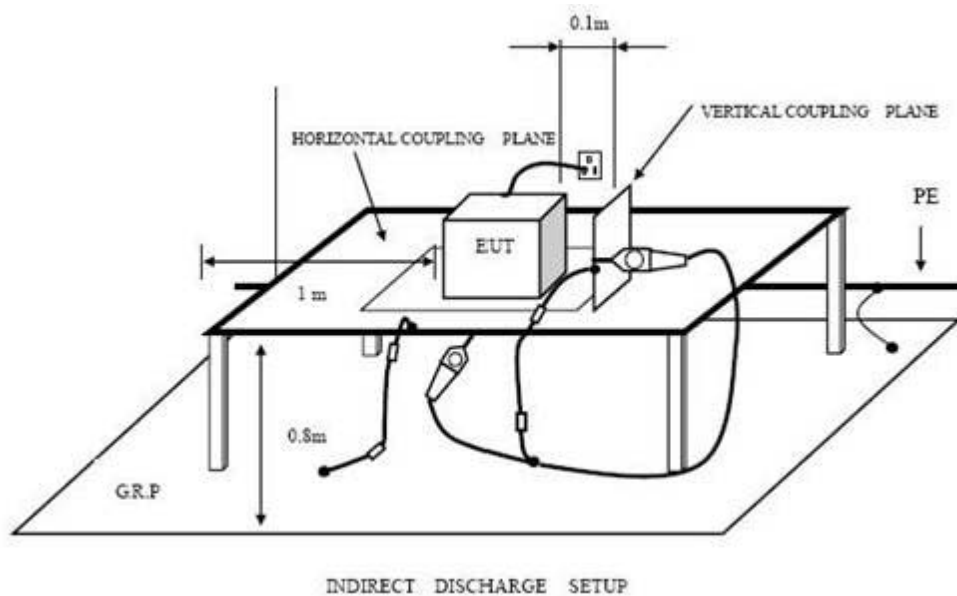
EN 61547: 2009 (EN 61000-4-2:2009)

9.1.2. Test Level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

9.1.3. Performance criterion: **B**

9.2. Test Setup



9.3. Test Procedure

9.3.1. Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge,

the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.3.2. Contact Discharge:

All the procedure shall be same as air discharge. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.3.3. Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.3.4. Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.4. Test Data

Please refer to the following page.

Electrostatic Discharge Test Result

EUT : <u>LED street light</u>	M/N : <u>SV-STCSL30W</u>	
Temperature : <u>22°C</u>	Humidity : <u>50%</u>	
Power supply : <u>AC 230V/50Hz</u>	Test Mode : <u>ON</u>	
Criterion: B		
Air Discharge: $\pm 8\text{kV}$ Contact Discharge: $\pm 4\text{kV}$		
For each point positive 10 times and negative 10 times discharge.		
Location	Kind A-Air Discharge C-Contact Discharge	Result
Slots	A	PASS
Nonconductive Enclosure	A	PASS
Conductive Enclosure	C	PASS
HCP	C	PASS
VCP of front	C	PASS
VCP of rear	C	PASS
VCP of left	C	PASS
VCP of right	C	PASS
Remark:		

10. Radiated Electromagnetic Field Immunity Test

10.1. Test Requirements

10.1.1. Test Standard

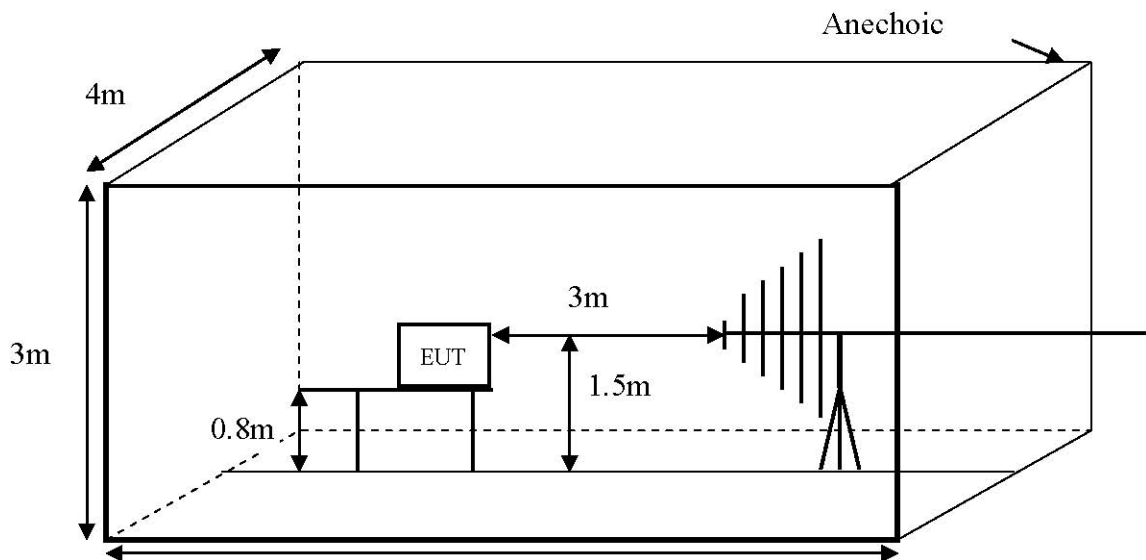
EN 61547: 2009 (EN 61000-4-3:2006+A1:2008+A2:2010)

10.1.2. Test Level

Level	Field Strength V/m
1	1
2	3
3	10
X	Special

10.1.3. Performance criterion: A

10.2. Test Setup



10.3. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
Fielded strength	3V/m (Severity Level 2)
Radiated signal	Modulated
Scanning frequency	80-1000MHz
Sweep time of radiated	0.0015 Decade/s
Dwell time	1 Sec.

10.4. Test Data

Please refer to the following page.

RF Field Strength Susceptibility Test Results

EUT	: LED street light	M/N	: SV-STCSL30W	
Temperature	: 22°C	Humidity	: 50%	
Power supply	: AC 230V/50Hz	Test Mode	: ON	
Criterion: A				
Modulation: Unmodulated				
Pulse: AM 1KHz 80%				
	Frequency Range 1		Frequency Range 2	
	80~1000MHz			
	Horizontal	Vertical	Horizontal	Vertical
Front	PASS	PASS	/	/
Right	PASS	PASS	/	/
Rear	PASS	PASS	/	/
Left	PASS	PASS	/	/
Remark:				

11. Electrical Fast Transient/Burst Test

11.1. Test Requirements

11.1.1. Test Standard

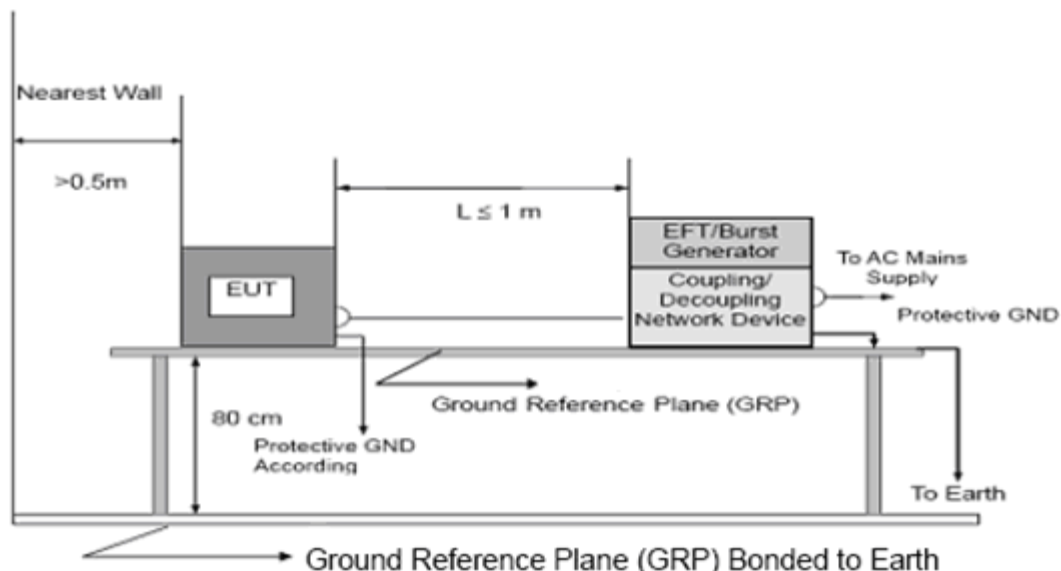
EN 61547: 2009 (EN 61000-4-4: 2004+A1:2010)

11.1.2. Level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Switching Adapter Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

11.1.3. Performance criterion: **B**

11.2. Test Setup



11.3. Test Procedure

11.3.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples

the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.3.2. For signal lines and control lines ports:

A coupling clamp is use to couple the EFT interference signal to the signal and control lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.3.3. For DC input and DC output power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.4. Test Data

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

EUT : <u>LED street light</u>	M/N : <u>SV-STCSL30W</u>		
Temperature : <u>22°C</u>	Humidity : <u>50%</u>		
Power supply : <u>AC 230V/50Hz</u>	Test Mode : <u>ON</u>		
Criterion: B			
Line : <input checked="" type="checkbox"/> AC Mains Coupling : <input checked="" type="checkbox"/> Direct			
Line : <input type="checkbox"/> Signal <input type="checkbox"/> I/O Cable Coupling : <input type="checkbox"/> Capacitive			
Line	Voltage(kV)	Result(+)	Result(-)
L	1	PASS	PASS
N	1	PASS	PASS
L-N	1	PASS	PASS
PE	1	PASS	PASS
L-PE	1	PASS	PASS
N-PE	1	PASS	PASS
L-N-PE	1	PASS	PASS

12. Surge Immunity Test

12.1. Test Requirements

12.1.1. Test Standard

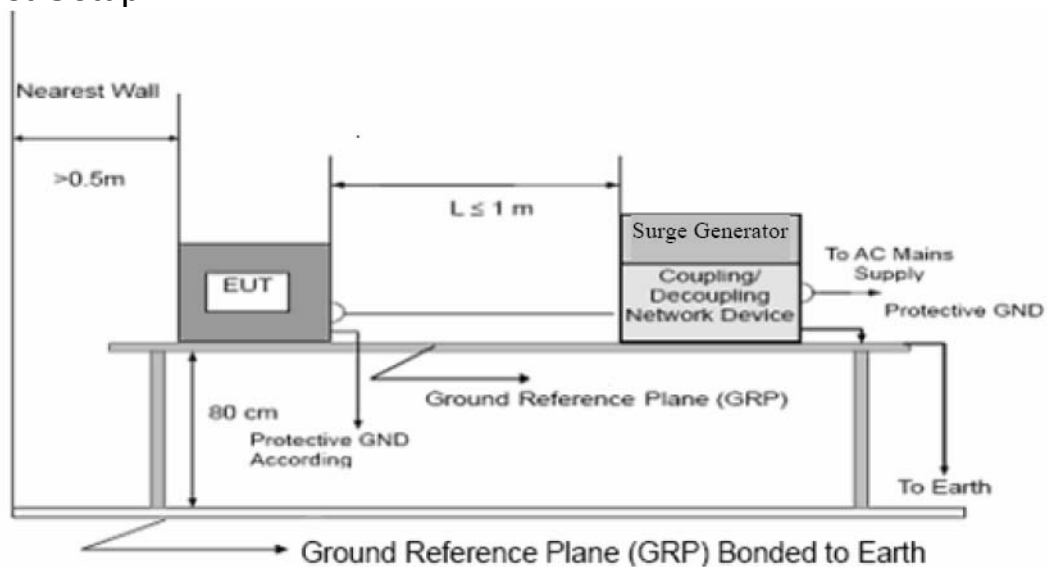
EN 61547: 2009 (EN 61000-4-5:2006)

12.1.2. Level

Characteristics	Test levels		
	Device		
	Self-ballasted lamps and semi-luminaires	Luminaires and independent auxiliaries	
		Input power	
	≤25W	>25W	
Wave-shape data	1,2/50	1,2/50	1,2/50
Test level: line to line	0,5kV	0,5kV	1,0kV
line to ground	1,0kV	1,0kV	2,0kV

12.1.3. Performance criterion: C

12.2. Test Setup



12.3. Test Procedure

12.3.1. Set up the EUT and test generator.

12.3.2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge

12.3.3. (at open-circuit condition) and 8/20us current surge to EUT selected points.

12.3.4. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

12.3.5. Different phase angles are done individually.

12.3.6. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.4. Test Data

Please refer to the following page.

Surge Immunity Test Results

EUT	: LED street light	M/N	: SV-STCSL30W	
Temperature	: 22°C	Humidity	: 50%	
Power supply	: AC 230V/50Hz	Test Mode	: ON	
Criterion: C				
Injected Line	Voltage(kV)	Phase	Result	
			(+)	(-)
L-N	1.0	0°	PASS	PASS
		90°	PASS	PASS
		180°	PASS	PASS
		270°	PASS	PASS
L-PE	2.0	0°	PASS	PASS
		90°	PASS	PASS
		180°	PASS	PASS
		270°	PASS	PASS
N-PE	2.0	0°	PASS	PASS
		90°	PASS	PASS
		180°	PASS	PASS
		270°	PASS	PASS
L-N-PE	2.0	0°	PASS	PASS
		90°	PASS	PASS
		180°	PASS	PASS
		270°	PASS	PASS

13. Conducted Immunity Test

13.1. Test Requirements

13.1.1. Test Standard

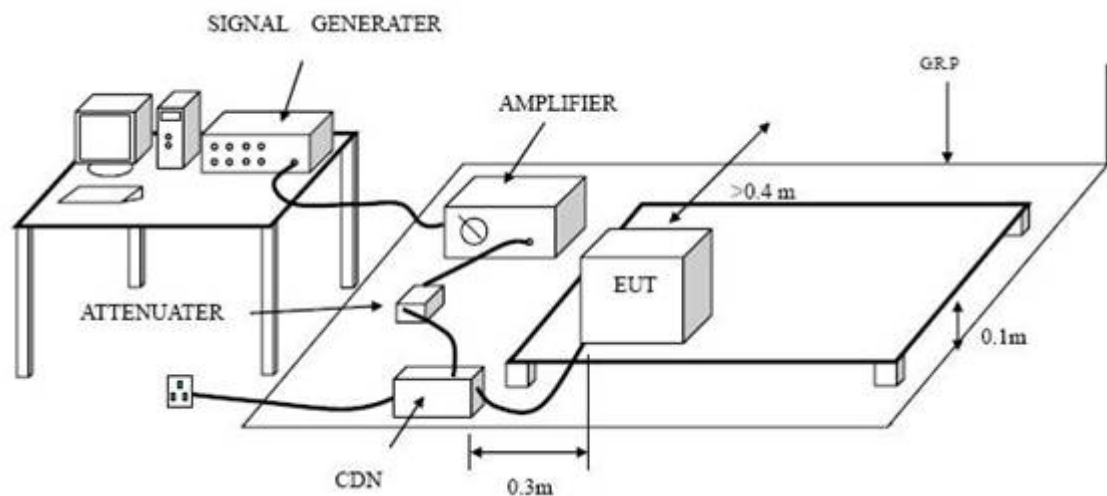
EN 61547: 2009 (EN 61000-4-6:2009)

13.1.2. Level

Level	Voltage Level (e.m.f.) V
1	1
2	3
3	10
X	Special

13.1.3. Performance criterion: **A**

13.2. Test Setup



13.3. Test Procedure

13.3.1. Set up the EUT, CDN and test generators.

13.3.2. Let the EUT work in test mode and test it.

13.3.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

- 13.3.4. The disturbance signal description below is injected to EUT through CDN.
- 13.3.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 13.3.6. The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 13.3.7. The rate of sweep shall not exceed $1.5 \cdot 10^{-3}$ decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 13.3.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

13.4. Test Data

Please refer to the following page.

Injected Currents Susceptibility Test Results

EUT : <u>LED street light</u>	M/N : <u>SV-STCSL30W</u>																		
Temperature : <u>22°C</u>	Humidity : <u>50%</u>																		
Power supply : <u>AC 230V/50Hz</u>	Test Mode : <u>ON</u>																		
Criterion: A																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Frequency Range (MHz)</th> <th style="width: 25%;">Injected Position</th> <th style="width: 25%;">Voltage Level (e.m.f.)</th> <th style="width: 25%;">Result</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 80</td> <td>AC Mains</td> <td>3V(rms), Unmodulated</td> <td>PASS</td> </tr> <tr> <td>0.15 ~ 80</td> <td>DC Mains</td> <td>3V(rms), Unmodulated</td> <td>/</td> </tr> <tr> <td>0.15 ~ 80</td> <td>Signal Line</td> <td>3V(rms), Unmodulated</td> <td>/</td> </tr> </tbody> </table>				Frequency Range (MHz)	Injected Position	Voltage Level (e.m.f.)	Result	0.15 ~ 80	AC Mains	3V(rms), Unmodulated	PASS	0.15 ~ 80	DC Mains	3V(rms), Unmodulated	/	0.15 ~ 80	Signal Line	3V(rms), Unmodulated	/
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0.15 ~ 80	Signal Line	3V(rms), Unmodulated	/																

14. Power frequency Magnetic Field Immunity Test

14.1. Test Requirements

14.1.1. Test Standard

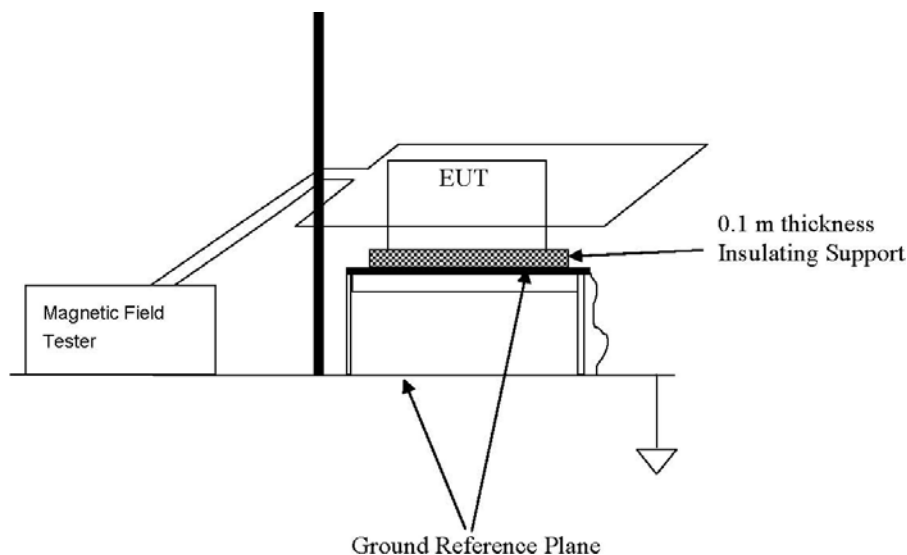
EN 61547:2009 (EN61000-4-8: 2010)

14.1.2. Level

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

14.1.3. Performance criterion: A

14.2. Test Setup



14.3. Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. The X, Y and Z polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

14.4. Test Data

Magnetic Field Immunity Test Results

EUT : <u>LED street light</u>	M/N : <u>SV-STCSL30W</u>		
Temperature : <u>22°C</u>	Humidity : <u>50%</u>		
Power supply : <u>AC 230V/50Hz</u>	Test Mode : <u>ON</u>		
Criterion: A			
Test Level	Testing Duration	Coil Orientation	Result
3A/m	5 mins	X	PASS
3A/m	5 mins	Y	PASS
3A/m	5 mins	Z	PASS

15. Voltage Dips and Interruptions Immunity Test

15.1. Test Requirements

15.1.1. Test Standard

EN 61547: 2009 (EN 61000-4-11:2004)

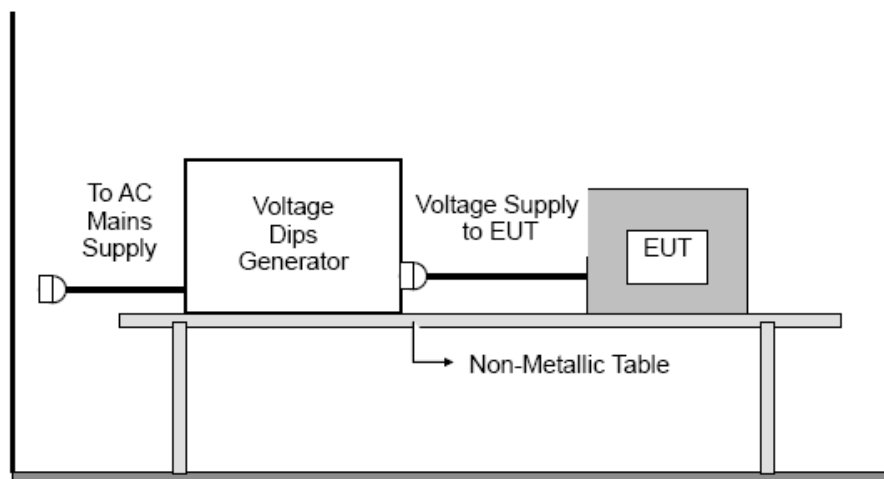
15.1.2. Level

Test Level for Voltage Dips and Interruptions

Test Level %U _T	Voltage dip and short interruptions %U _T	Duration (in period)
0	100	0.5
70	30	10

15.1.3. Performance criterion: **B&C**

15.2. Test Setup



15.3. Test Procedure

Set up the EUT and test generator as shown above. The EUT is tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10s minimum.

15.4. Test Data

Voltage Dips and Interruptions Test Results

EUT : <u>LED street light</u>	M/N : <u>SV-STCSL30W</u>			
Temperature : <u>22°C</u>	Humidity : <u>50%</u>			
Power supply : <u>AC 230V/50Hz</u>	Test Mode : <u>ON</u>			
Criterion: B&C				
Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in period)	Phase Angle	Result
0	100	0.5P	0°~360°	PASS
70	30	10P	0°~360°	PASS
<p>Remark: U_T is the rated voltage for the equipment.</p>				

16. Photographs - Constructional Details

Photo 1 Appearance of EUT



Photo 2 Appearance of EUT

