EMC Test Report

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Applicant: GUANGDONG OML TECHNOLOGY CO., LTD.

Product: LED Rope Light

Model: OML-2835-120P-230V-**-## (**=27, 40, 60, AM, YE, GR, BL or RE, indicates color of LED, 27=2700K White, 40=4000K White, 60=6000K White, AM= Amber, YE= Yellow, GR= Green, BL= Blue, RE= Red; ##=01-50, indicates length of rope light body 1-50m, in steps of 1m)

In accordance with EN IEC 55015, EN IEC 61000-3-2, EN 61000-3-3 and EN 61547

Prepared for: GUANGDONG OML TECHNOLOGY CO., LTD.
#38 Hetong Road, Dongfeng Town, 528425 Zhongshan, Guangdong, PEOPLE'S REPUBLIC OF CHINA

COMMERCIAL-IN-CONFIDENCE

Report Number: 68.740.20.0300.01

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Approved by	Dawi Xu		2021-03-10
Prepared by	Dickson Feng		2021-03-10

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service control rules.

EXECUTIVE SUMMARY
The product was tested and found to be in compliance with EN IEC 55015:2019/A11:2020, EN IEC 61000-3-2:2019, EN 61000-3-3:2013/A1:2019 and EN 61547:2009

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2021-03-10

1.2 Introduction

The information contained in this report is intended to show verification of the EMC Qualification Approval Testing of the requirements of the standards for the tests listed in Section 1.3.

Applicant	GUANGDONG OML TECHNOLOGY CO., LTD.
address	#38 Hetong Road, Dongfeng Town, 528425 Zhongshan, Guangdong, PEOPLE'S REPUBLIC OF CHINA
Factory	GUANGDONG OML TECHNOLOGY CO., LTD.
address	#38 Hetong Road, Dongfeng Town, 528425 Zhongshan, Guangdong, PEOPLE'S REPUBLIC OF CHINA
Model Number(s)	OML-2835-120P-230V-**-## (**=27, 40, 60, AM, YE, GR, BL or RE, indicates color of LED, 27=2700K White, 40=4000K White, 60=6000K White, AM= Amber, YE= Yellow, GR= Green, BL= Blue, RE= Red; ##=01-50, indicates length of rope light body 1-50m, in steps of 1m)
Product Type	LED Rope Light
Test Specification	EN IEC 55015:2019/A11:2020, EN IEC 61000-3-2:2019, EN 61000-3-3:2013/A1:2019, EN 61547:2009
Date of Receipt of EUT	2021-02-21
Start of Test	2021-02-21
Finish of Test	2021-02-24
Name of Engineer(s)	Dickson Feng

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with EN IEC 55015, EN IEC 61000-3-2, EN 61000-3-3 and EN 61547 is shown below.

Specification	Clause	Test Description	Result	Comments/Base Standard
EN IEC 55015:2019/A11:2020	4.3.1	Disturbance voltage at the electric power supply interface	Pass	N/A
EN IEC 55015:2019/A11:2020	4.3.2	Disturbance voltage at wired network interfaces other than power supply	N/A	N/A
EN IEC 55015:2019/A11:2020	4.4	Disturbance voltage of local wired ports	N/A	N/A
EN IEC 55015:2019/A11:2020	4.5.2	Radiated Disturbance (9KHz to 30MHz)	Pass	N/A
EN IEC 55015:2019/A11:2020	4.5.3	Radiated Disturbance (30MHz to 1000MHz)	Pass	N/A
EN IEC 61000-3-2:2019	7	Harmonic Current Emissions	Pass	N/A
EN 61000-3-3:2013/A1:2019	5	Flicker**	N/A	N/A
EN 61547:2009	5.2	Electrostatic discharge immunity test	Pass	IEC 61000-4-2
EN 61547:2009	5.3	Radiated, radio-frequency, electromagnetic field immunity test	Pass	IEC 61000-4-3
EN 61547:2009	5.4	Power frequency magnetic field immunity test	N/A	IEC 61000-4-8
EN 61547:2009	5.5	Electrical fast transient /burst immunity test	Pass	IEC 61000-4-4
EN 61547:2009	5.6	Immunity to conducted disturbances, induced by radio-frequency fields	Pass	IEC 61000-4-6
EN 61547:2009	5.7	Surge immunity test	Pass	IEC 61000-4-5
EN 61547:2009	5.8	Voltage dips, short interruptions and voltage variations immunity test	Pass	IEC 61000-4-11
EN 61547:2009	5.5	Electrical fast transient /burst immunity test on control lines	N/A	IEC 61000-4-4
EN 61547:2009	5.6	Immunity to conducted disturbances, induced by radio-frequency fields on control lines	N/A	IEC 61000-4-6

Note: "**" Limits are not specified when LED lamp luminaires with rating less than or equal to 600W (EN 61000-3-3:2013/A1:2019, Annex A (A.2))

1.4 Product Information

1.4.1 Technical Description

Rated Input : 220-240VAC; 50/60Hz; Other ratings: See “Model list” for details

Protection Class : II

General product information:

1. LED rope light for indoor or outdoor use.
2. All models have same construction, material except that length and rated power are different.
3. All models are intended for interconnection, max. 400 Watts / 50 Meters that may be interconnected for whole system.
4. Model list:

Model No.	Rated Input	Rated Power (W)	Rated Power/ Unit (W)	LED Quantities/ Unit (pcs)	Length / Unit (M)	Max. Interconnection Length (M)	Max. Interconnection Power (W)	LED type
OML-2835-120P-230V-**-##	220-240VAC; 50/60Hz	8-400	8	120	1	50	400	2835

OML-2835-120P-230V-**-## (**=27, 40, 60, AM, YE, GR, BL or RE, indicates color of LED, 27=2700K White, 40=4000K White, 60=6000K White, AM= Amber, YE= Yellow, GR= Green, BL= Blue, RE= Red; ##=01-50, indicates length of rope light body 1-50m, in steps of 1m)

5. Due to the similarity models, EMC full test were applied on model OML-2835-120P-230V-60-50; Other models are deemed to fulfill relevant EMC requirement without further testing.

1.4.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
AC Power cable	/	/	/	/
Control lines	/	/	/	/
Local wired ports	/	/	/	/

1.4.3 Test Configuration

Configuration	Description
AC Powered	230VAC, 50Hz

1.4.4 Modes of Operation

Mode	Description
Lighting	The LED Rope Light (EUT) was testing with LED light source load, to get the status 'Full load'.

1.4.5 Performance Criteria

Performance 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.

Performance 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.

Performance 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.

1.5 Test Location

Test Site 1:
Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Address: Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China

Test site 2:
Company name: Shenzhen QC Testing Laboratory Co., Ltd
Address: 1F, Building 10, Tiegang Reservoir Road, Xinghong Science Park, Xixiang Sub-district, Bao'an District, Shenzhen City, China.

Test site 3:
Company name: Shenzhen United Testing Technology Co.,Ltd.
Address: 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China.

Test Name	Name of Engineer(s)	Test site
Disturbance voltage at the electric power supply interface	Dickson Feng	2
Disturbance voltage at wired network interfaces other than power supply	N/A	N/A
Disturbance voltage of local wired ports	N/A	N/A
Radiated Disturbance (9KHz to 30MHz)	Dickson Feng	3
Radiated Disturbance (30MHz to 1000MHz)	Dickson Feng	2
Harmonic Current Emissions	Dickson Feng	2
Flicker	N/A	N/A
Electrostatic discharge immunity test	Dickson Feng	2
Radiated, radio-frequency, electromagnetic field immunity test	Dickson Feng	2
Power frequency magnetic field immunity test	N/A	N/A
Electrical fast transient /burst immunity test	Dickson Feng	2
Immunity to conducted disturbances, induced by radio-frequency fields	Dickson Feng	2
Surge immunity test	Dickson Feng	2
Voltage dips, short interruptions and voltage variations immunity test	Dickson Feng	2
Electrical fast transient /burst immunity test on control lines	N/A	N/A
Immunity to conducted disturbances, induced by radio-frequency fields on control lines	N/A	N/A

2 Test Details

2.1 Disturbance voltage at the electric power supply interface

2.1.1 Specification Reference

EN IEC 55015:2019/A11:2020, Clause 4.3.1

2.1.2 Equipment Under Test

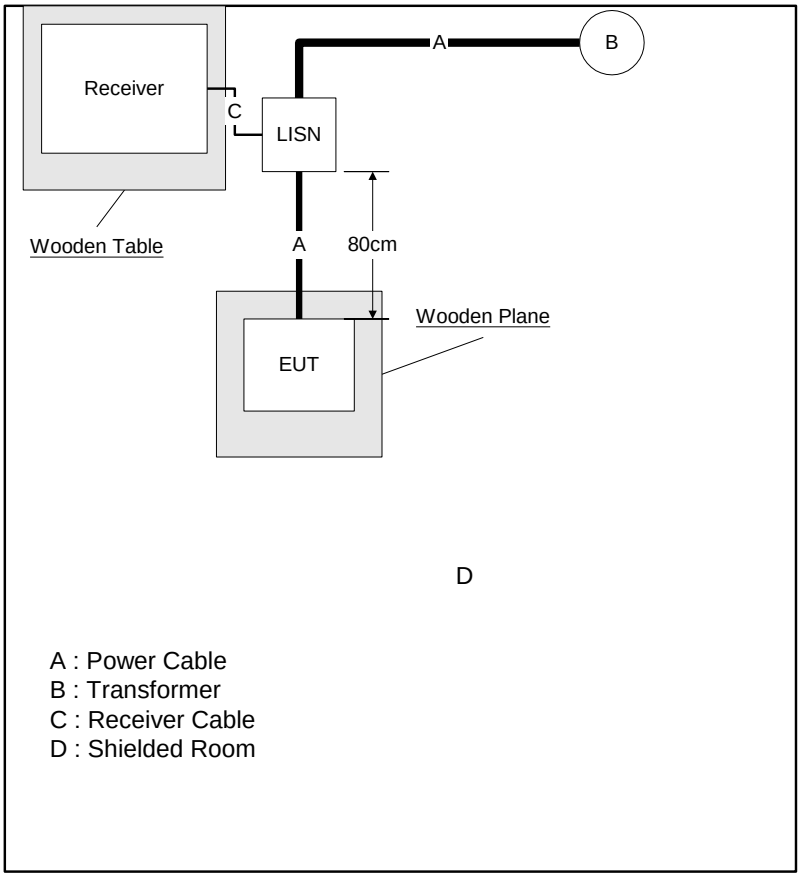
OML-2835-120P-230V-60-50

2.1.3 Date of Test

2021-02-22

2.1.4 Test Method

The disturbance voltage shall be measured at the main terminals of the lighting equipment by means of the arrangement described in Figure 5 and 6 for the relevant type of equipment.
The output terminals of the artificial mains network (AMN) and the terminals a-b shall be positioned 0,8m ± 20% apart and shall be connected by the two power conductors of a flexible three-core cable of 0,8m length.



2.1.5 Environmental Conditions

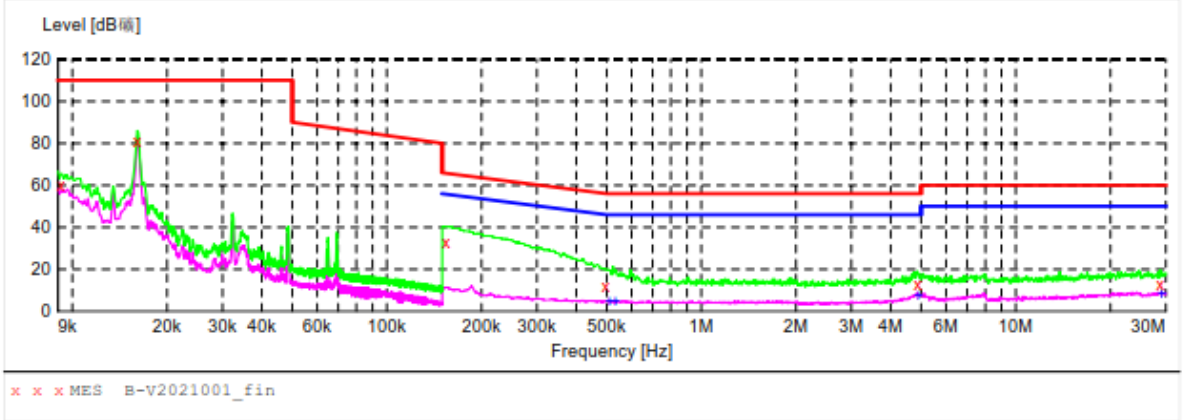
Ambient Temperature	25.1 °C
Relative Humidity	53.0 %
Atmospheric Pressure	1012.0 mbar

2.1.6 Specification Limits

Disturbance voltage limits at the electric power supply interface		
Frequency range	Limits dB(µV)	
	Quasi-peak	Average
9kHz to 50kHz	110	--
50kHz to 150kHz	90 to 80	--
150kHz to 0.5MHz	66 to 56	56 to 46
0.5MHz to 5.0MHz	56	46
5.0MHz to 30MHz	60	50

2.1.7 Test Results

M/N: OML-2835-120P-230V-60-50
Op Cond.: Lighting
Comment: AC 230V/50Hz
Line Under Test: Power Line, Live
Date of Test: 2021-02-22
Detailed results are shown below



MEASUREMENT RESULT: "B-V2021001_fin"

2021-2-22 8:32

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector
0.009200	60.60	7.8	110	49.4	QP
0.016100	81.00	7.8	110	29.0	QP
0.154500	32.70	7.4	66	33.1	QP
0.496500	12.10	7.8	56	44.0	QP
4.880000	13.20	8.5	56	42.8	QP
28.810000	13.10	11.5	60	46.9	QP

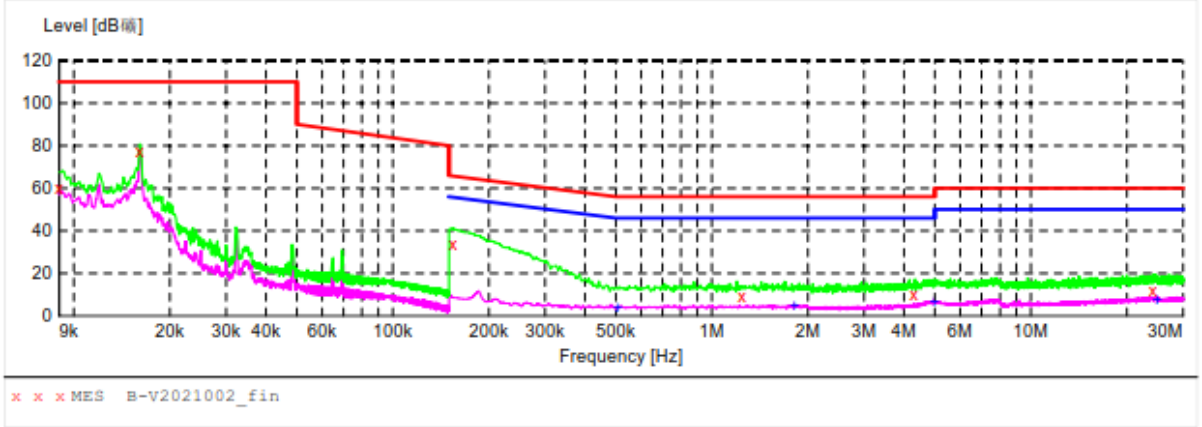
MEASUREMENT RESULT: "B-V2021001_fin2"

2021-2-22 8:32

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector
0.510000	4.60	7.8	46	41.4	AV
0.532500	4.50	7.8	46	41.5	AV
4.890000	7.40	8.5	46	38.6	AV
29.050000	8.10	11.5	50	41.9	AV

M/N:	OML-2835-120P-230V-60-50
Op Cond.:	Lighting
Comment:	AC 230V/50Hz
Line Under Test:	Power Line, Neutral
Date of Test:	2021-02-22

Detailed results are shown below



MEASUREMENT RESULT: "B-V2021002_fin"

2021-2-22 8:37

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector
0.009000	60.30	7.7	110	49.7	QP
0.016100	77.70	7.6	110	32.3	QP
0.154500	34.00	7.1	66	31.8	QP
1.243500	9.50	7.8	56	46.5	QP
4.300000	10.20	8.4	56	45.8	QP
24.130000	12.30	10.7	60	47.7	QP

MEASUREMENT RESULT: "B-V2021002_fin2"

2021-2-22 8:37

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector
0.505500	4.20	7.6	46	41.8	AV
1.810500	4.30	7.8	46	41.7	AV
4.970000	6.60	8.5	46	39.4	AV
24.770000	7.40	10.7	50	42.6	AV

Test Setup

2.1.8 Test Location

This test was carried out in conducted emission shielded room.

2.2 Radiated Disturbance (9KHz to 30MHz)

2.2.1 Specification Reference

EN IEC 55015:2019/A11:2020, Clause 4.5.2

2.2.2 Equipment Under Test

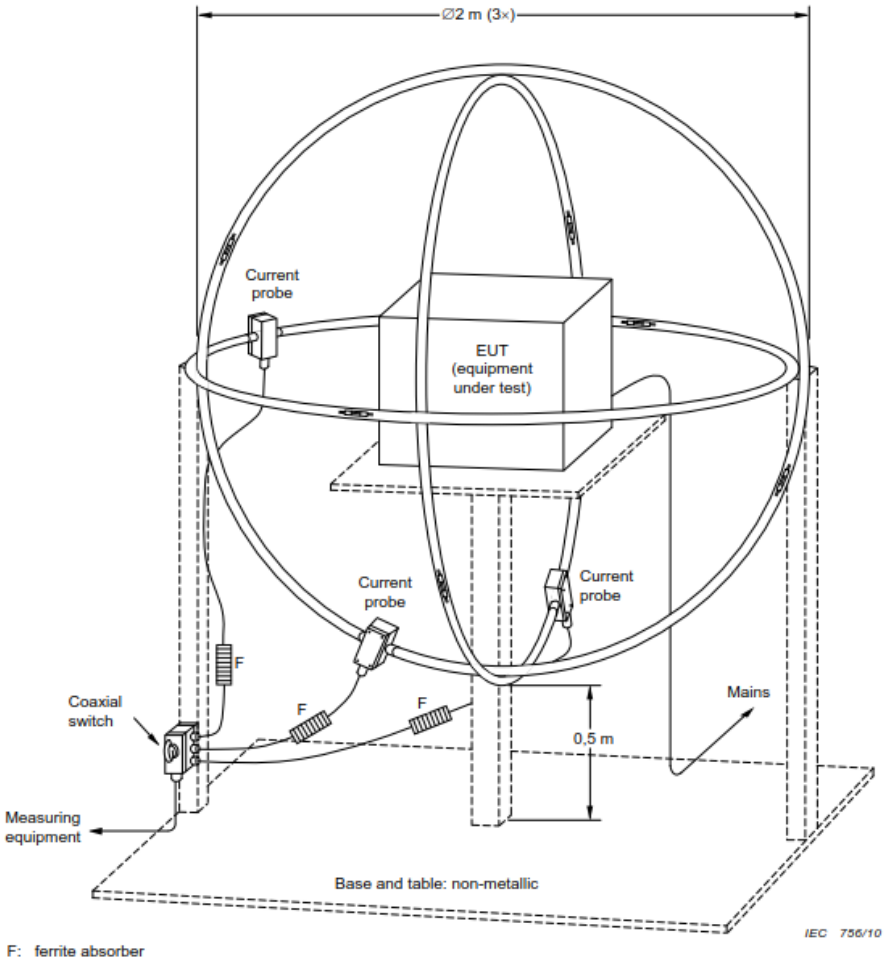
OML-2835-120P-230V-60-50

2.2.3 Date of Test

2021-02-22

2.2.4 Test Method

The magnetic component shall be measured by means of a loop antenna. The lighting equipment shall be placed in the center of the antenna.
The induced current in the loop antenna is measured by means of a current probe and the CISPR measuring receiver. By means of a coaxial switch, the three field directions can be measured in sequence.



F: ferrite absorber

2.2.5 Environmental Conditions

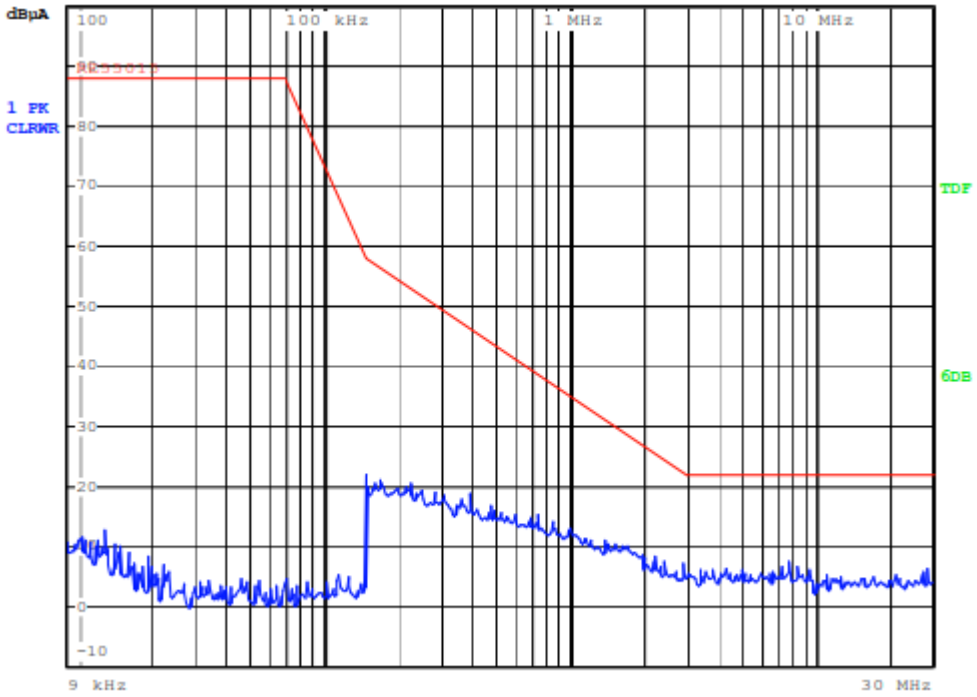
Ambient Temperature	25.2 °C
Relative Humidity	55.0 %
Atmospheric Pressure	1012.0 mbar

2.2.6 Specification Limits

Radiated disturbance limits in the frequency range 9kHz to 30MHz			
Frequency range	Limits dB(µA) for loop diameter		
	2 m	3 m	4 m
9kHz to 70kHz	88	81	75
70kHz to 150kHz	88 to 58	81 to 51	75 to 45
150kHz to 3.0MHz	58 to 22	51 to 15	45 to 9
3.0MHz to 30MHz	22	15 to 16	9 to 12

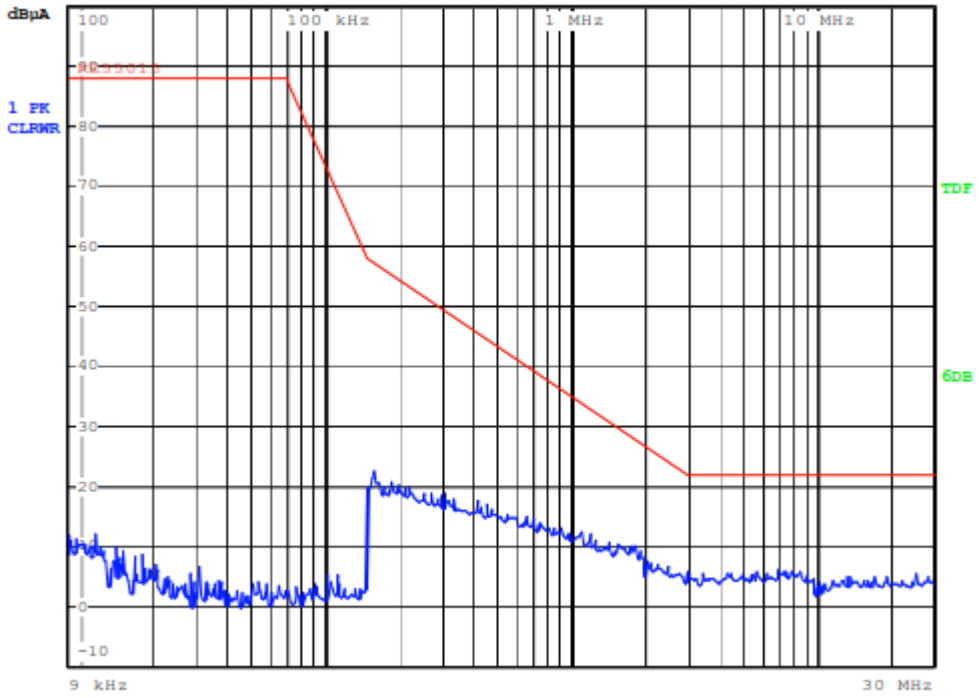
2.2.7 Test Results

M/N: OML-2835-120P-230V-60-50
Op Cond.: Lighting
Comment: AC 230V/50Hz
Test Spec.: X
Date of Test: 2021-02-22
Detailed results are shown below



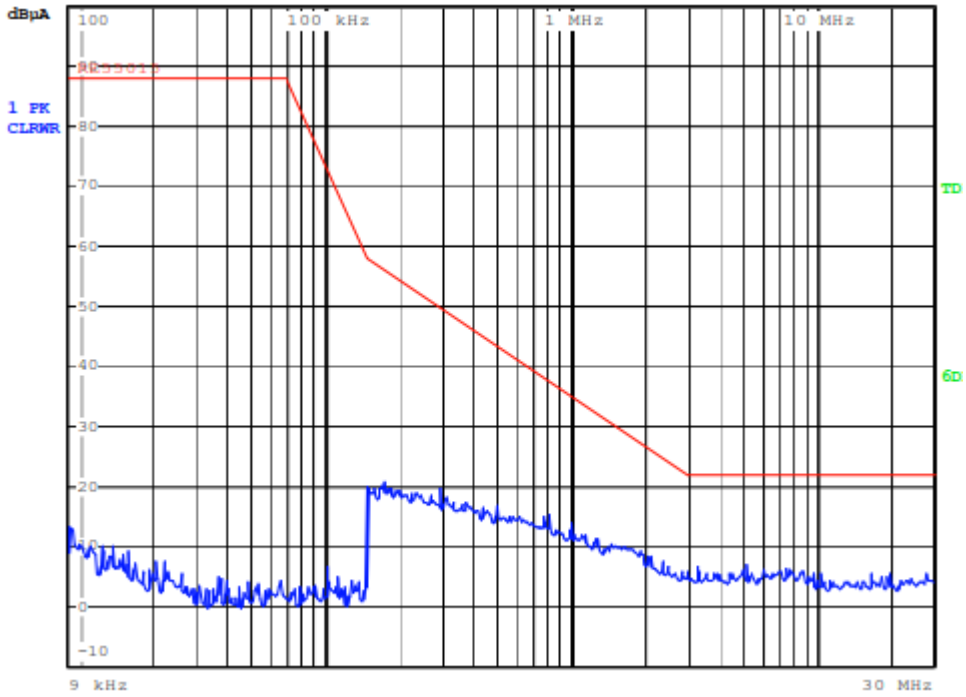
M/N:	OML-2835-120P-230V-60-50
Op Cond.:	Lighting
Comment:	AC 230V/50Hz
Test Spec.:	Y
Date of Test:	2021-02-22

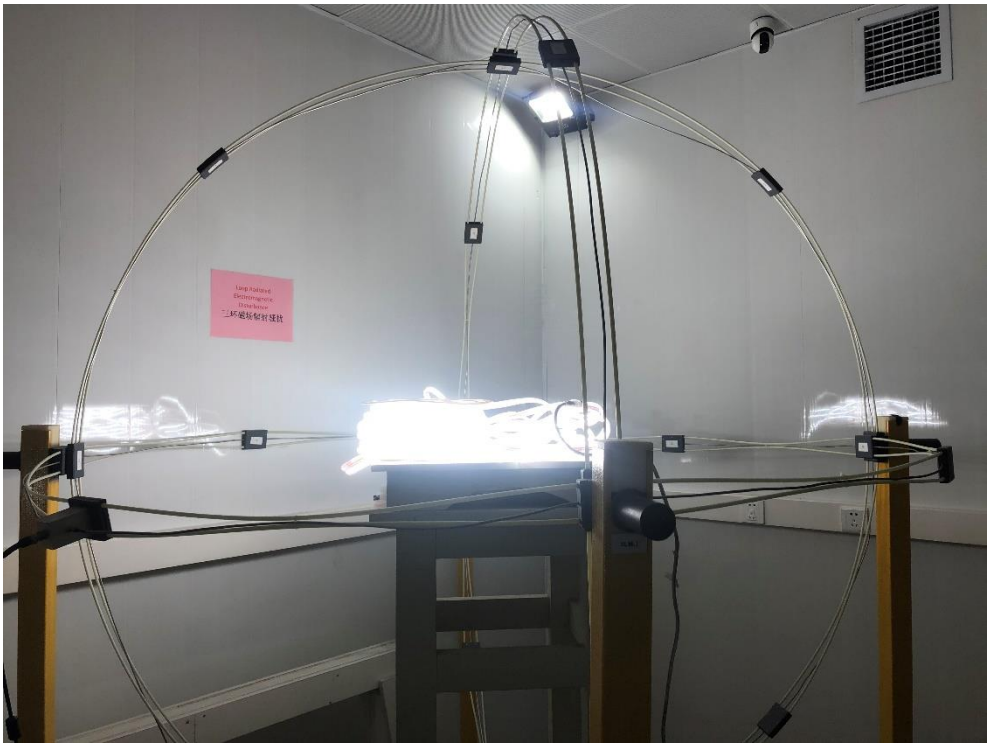
Detailed results are shown below



M/N:	OML-2835-120P-230V-60-50
Op Cond.:	Lighting
Comment:	AC 230V/50Hz
Test Spec.:	Z
Date of Test:	2021-02-22

Detailed results are shown below





Test Setup

2.2.8 Test Location

This test was carried out in conducted emission shielded room.

2.3 Radiated Disturbance (30MHz to 1000MHz)

2.3.1 Specification Reference

EN IEC 55015:2019/A11:2020, Clause 4.5.3

2.3.2 Equipment Under Test

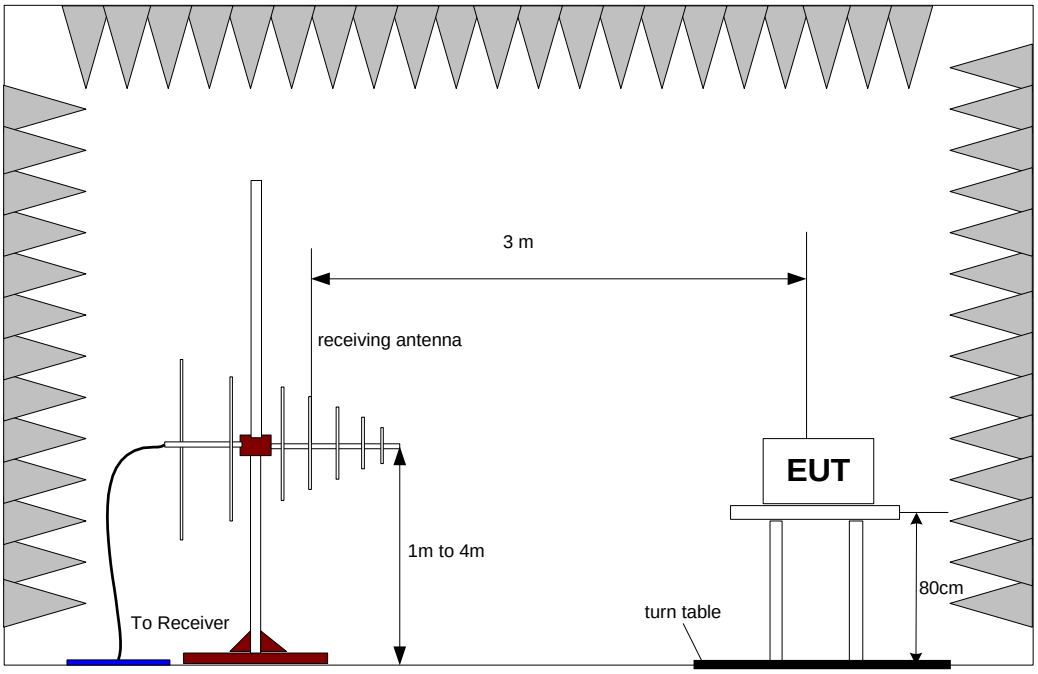
OML-2835-120P-230V-60-50

2.3.3 Date of Test

2021-02-22

2.3.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive. Guidance on how to arrange the luminaire during the measurements can be found in Annex C.
A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m distance. Using the prescan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using a Quasi-Peak detector. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification.



2.3.5 Environmental Conditions

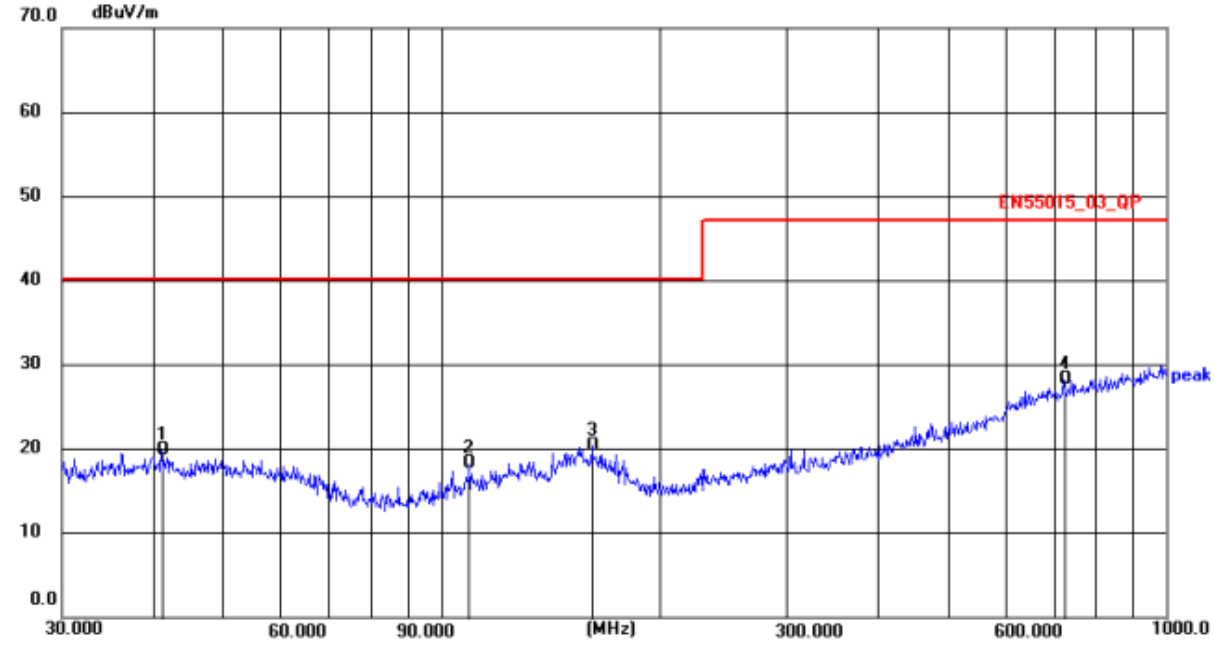
Ambient Temperature	25.0 °C
Relative Humidity	53.3 %
Atmospheric Pressure	1012.0 mbar

2.3.6 Specification Limits

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 3 m	
Frequency range MHz	Quasi-peak limits dB(µV/m)
30 to 230	40
230 to 1000	47

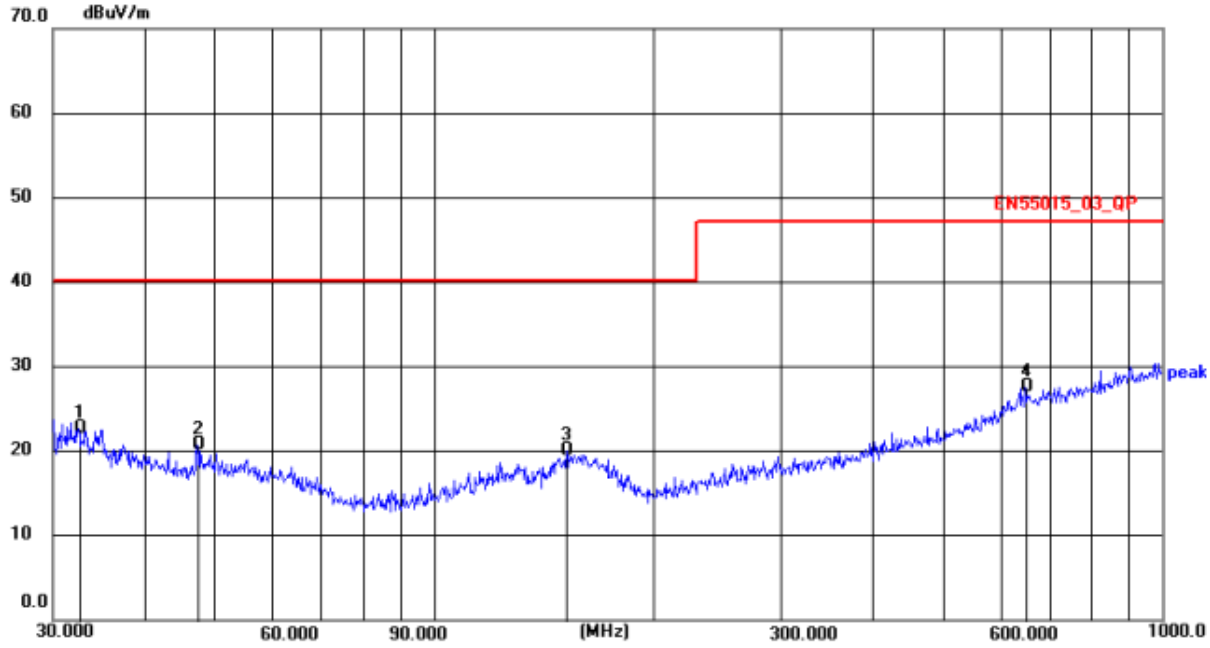
2.3.7 Test Results

M/N: OML-2835-120P-230V-60-50
Op Cond.: Lighting
Comment: AC 230V/50Hz
Test Spec.: Horizontal
Date of Test: 2021-02-22
Detailed results are shown below



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	41.1320	4.66	15.25	19.91	40.00	20.09	QP
2	109.4116	5.43	12.88	18.31	40.00	21.69	QP
3	161.4742	4.49	15.85	20.34	40.00	19.66	QP
4 *	721.7259	6.15	22.19	28.34	47.00	18.66	QP

M/N: OML-2835-120P-230V-60-50
Op Cond.: Lighting
Comment: AC 230V/50Hz
Test Spec.: Vertical
Date of Test: 2021-02-22
Detailed results are shown below



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	32.5198	8.14	14.51	22.65	40.00	17.35	QP
2	47.3255	5.87	14.93	20.80	40.00	19.20	QP
3	152.1297	4.07	16.00	20.07	40.00	19.93	QP
4	649.6597	5.95	21.62	27.57	47.00	19.43	QP

Test Setup

2.3.8 Test Location

This test was carried out in 3m anechoic chamber.

2.4 Harmonic current emission

2.4.1 Specification Reference

EN IEC 61000-3-2:2019, Clause 7

2.4.2 Equipment Under Test

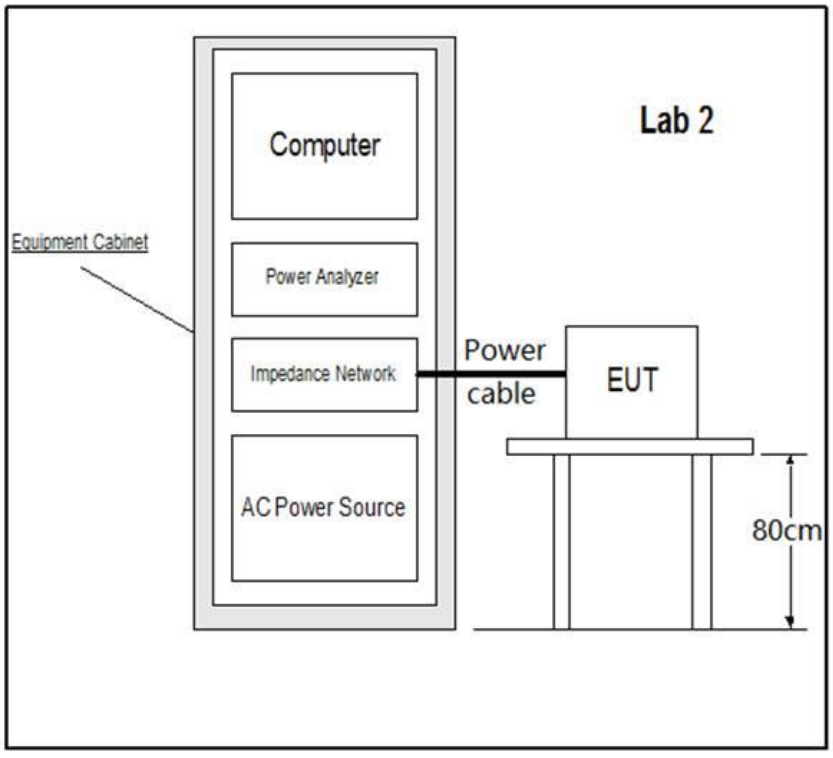
OML-2835-120P-230V-60-50

2.4.3 Date of Test

2021-02-22

2.4.4 Test Method

Harmonic current test should be conducted with the user's operation control or automatic programs set to the mode expected to produce the maximum total harmonic current under normal operating conditions.
Specific test conditions for the measurement of harmonic currents associated with some types of equipment are given in test equipment list.



2.4.5 Environmental Conditions

Ambient Temperature	24.7 °C
Relative Humidity	57.9 %
Atmospheric Pressure	1010 mbar

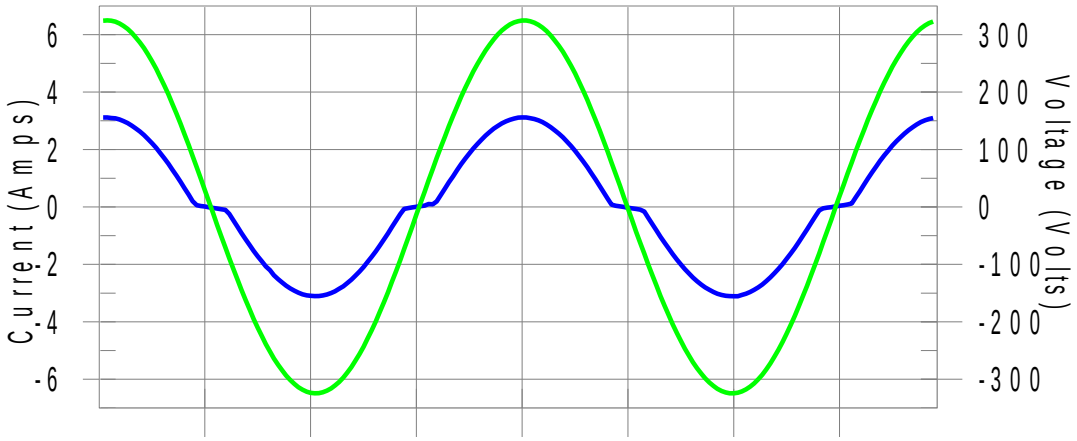
2.4.6 Specification Limits

Limits for class C Equipment active input power	
Harmonic order	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency
n	%
2	2
3	$30 \cdot \lambda^a$
5	10
7	7
9	5
$11 \leq h \leq 39$	3
(odd harmonics only)	
a λ is the circuit power factor.	

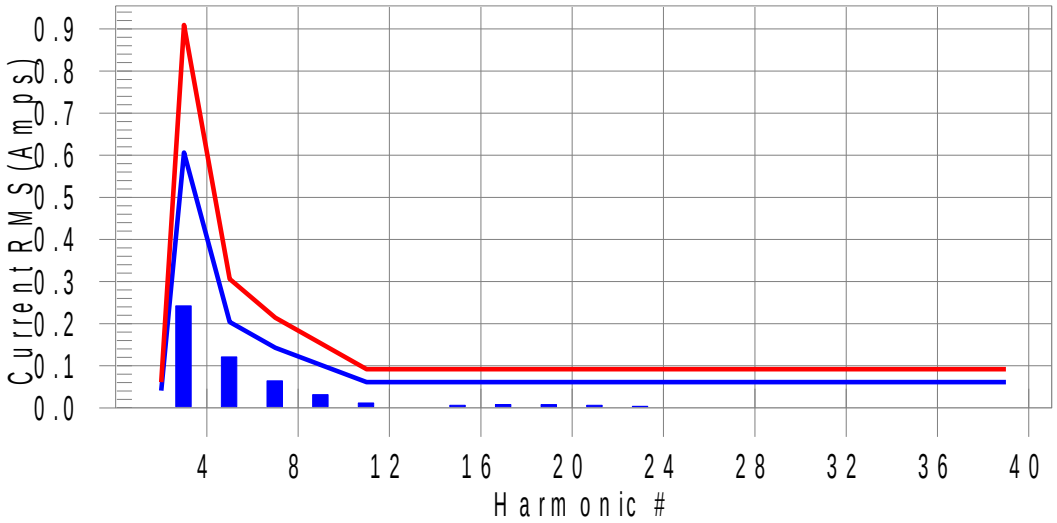
2.4.7 Test Results

M/N: OML-2835-120P-230V-60-50
Op Cond.: Lighting
Comment: AC 230V/50Hz
Date of Test: 2021-02-22
Detailed results are shown below
Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class C limit line **European Limits**



Test result: Pass **Worst harmonics H5-39.7% of 150% limit, H5-59.3% of 100% limit**

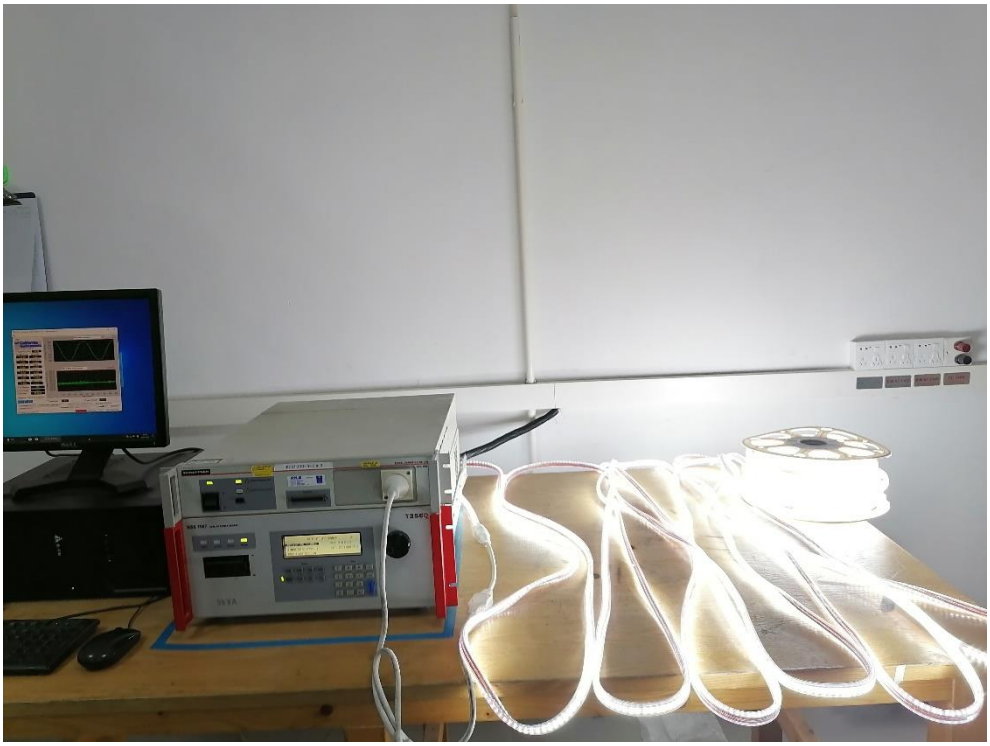
Test Result: Pass **Source qualification: Normal**
THC(A): 0.281 **I-THD(%): 13.8** **POHC(A): 0.009** **POHC Limit(A): 0.194**

Highest parameter values during test:

V_RMS (Volts):	**229.81**	**Frequency(Hz):**	**50.00**
I_Peak (Amps):	**3.228**	**I_RMS (Amps):**	**2.060**
I_Fund (Amps):	**2.040**	**Crest Factor:**	**1.568**
Power (Watts):	**468.8**	**Power Factor:**	**0.991**

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.041	N/A	0.002	0.061	N/A	Pass
3	0.242	0.606	40.0	0.244	0.909	26.8	Pass
4	0.001	0.000	N/A	0.001	0.000	N/A	Pass
5	0.121	0.204	59.3	0.122	0.306	39.7	Pass
6	0.001	0.000	N/A	0.001	0.000	N/A	Pass
7	0.064	0.143	45.0	0.065	0.214	30.1	Pass
8	0.000	0.000	N/A	0.000	0.000	N/A	Pass
9	0.031	0.102	30.7	0.031	0.153	20.5	Pass
10	0.000	0.000	N/A	0.000	0.000	N/A	Pass
11	0.012	0.061	N/A	0.012	0.092	N/A	Pass
12	0.000	0.000	N/A	0.000	0.000	N/A	Pass
13	0.000	0.061	N/A	0.000	0.092	N/A	Pass
14	0.000	0.000	N/A	0.000	0.000	N/A	Pass
15	0.006	0.061	N/A	0.006	0.092	N/A	Pass
16	0.000	0.000	N/A	0.000	0.000	N/A	Pass
17	0.008	0.061	N/A	0.008	0.092	N/A	Pass
18	0.000	0.000	N/A	0.000	0.000	N/A	Pass
19	0.008	0.061	N/A	0.008	0.092	N/A	Pass
20	0.000	0.000	N/A	0.000	0.000	N/A	Pass
21	0.006	0.061	N/A	0.006	0.092	N/A	Pass
22	0.000	0.000	N/A	0.000	0.000	N/A	Pass
23	0.004	0.061	N/A	0.004	0.092	N/A	Pass
24	0.000	0.000	N/A	0.000	0.000	N/A	Pass
25	0.001	0.061	N/A	0.001	0.092	N/A	Pass
26	0.000	0.000	N/A	0.000	0.000	N/A	Pass
27	0.001	0.061	N/A	0.001	0.092	N/A	Pass
28	0.000	0.000	N/A	0.000	0.000	N/A	Pass
29	0.002	0.061	N/A	0.002	0.092	N/A	Pass
30	0.000	0.000	N/A	0.000	0.000	N/A	Pass
31	0.003	0.061	N/A	0.003	0.092	N/A	Pass
32	0.000	0.000	N/A	0.000	0.000	N/A	Pass
33	0.002	0.061	N/A	0.002	0.092	N/A	Pass
34	0.000	0.000	N/A	0.000	0.000	N/A	Pass
35	0.002	0.061	N/A	0.002	0.092	N/A	Pass
36	0.000	0.000	N/A	0.000	0.000	N/A	Pass
37	0.001	0.061	N/A	0.001	0.092	N/A	Pass
38	0.000	0.000	N/A	0.000	0.000	N/A	Pass
39	0.000	0.061	N/A	0.000	0.092	N/A	Pass
40	0.000	0.000	N/A	0.000	0.000	N/A	Pass

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.



Test setup

2.4.8 Test Location

This test was carried out in Harmonic Flicker Test area.

2.5 Electrostatic discharge immunity test

2.5.1 Specification Reference

EN 61547:2009, Clause 5.2

2.5.2 Equipment Under Test

OML-2835-120P-230V-60-50

2.5.3 Date of Test

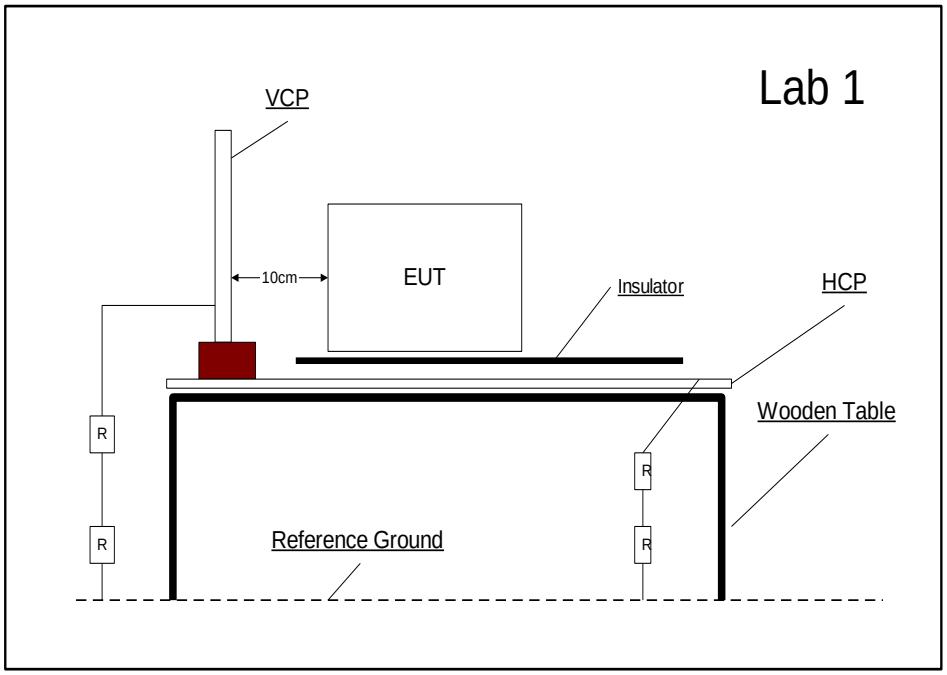
2021-02-23

2.5.4 Test Method

The equipment under test including associated cabling was configured on but insulted from, using a 0.5mm isolator, a horizontal coupling plane fitted to the top of a 0.8m non-conductive table for table-top equipment; and on a 0.1m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

During this testing any anomalies in the equipment under tests performance was recorded.



2.5.5 Environmental Conditions

Ambient Temperature	25.3 °C
Relative Humidity	51.0 %
Atmospheric Pressure	1009.0 mbar

2.5.6 Specification Limits

Required Test Levels				Performance Criteria
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	
	Positive	Negative		
Air – Direct	2, 4 and 8	2, 4 and 8	<10>	B
Contact – Direct	2 and 4	2 and 4	<10>	B
Contact – Indirect	2 and 4	2 and 4	<10>	B

2.5.7 Test Results

Results for Configuration and Mode: Lighting.

Performance assessment of the EUT made during this test: Pass (Performance: A).

Detailed results are shown below.

ID	Test Point	Discharge	Results									
			2kV		4kV		6kV		8kV		15kV	
			+	-	+	-	+	-	+	-	+	-
	HCP	Contact	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
	VCP	Contact	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
	Each conductive location touchable by hand	Contact	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
	Each nonconductive location touchable by hand	Air	✓	✓	✓	✓	N/A	N/A	✓	✓	N/A	N/A

Key to Results	
✓	The EUTs performance was not impacted when the ESD pulse was applied.
N/A	Not Applicable

Test Setup

2.5.8 Test Location

This test was carried out in ESD room.

2.6 Radiated, radio-frequency, electromagnetic field immunity test

2.6.1 Specification Reference

EN 61547:2009, Clause 5.3

2.6.2 Equipment Under Test

OML-2835-120P-230V-60-50

2.6.3 Date of Test

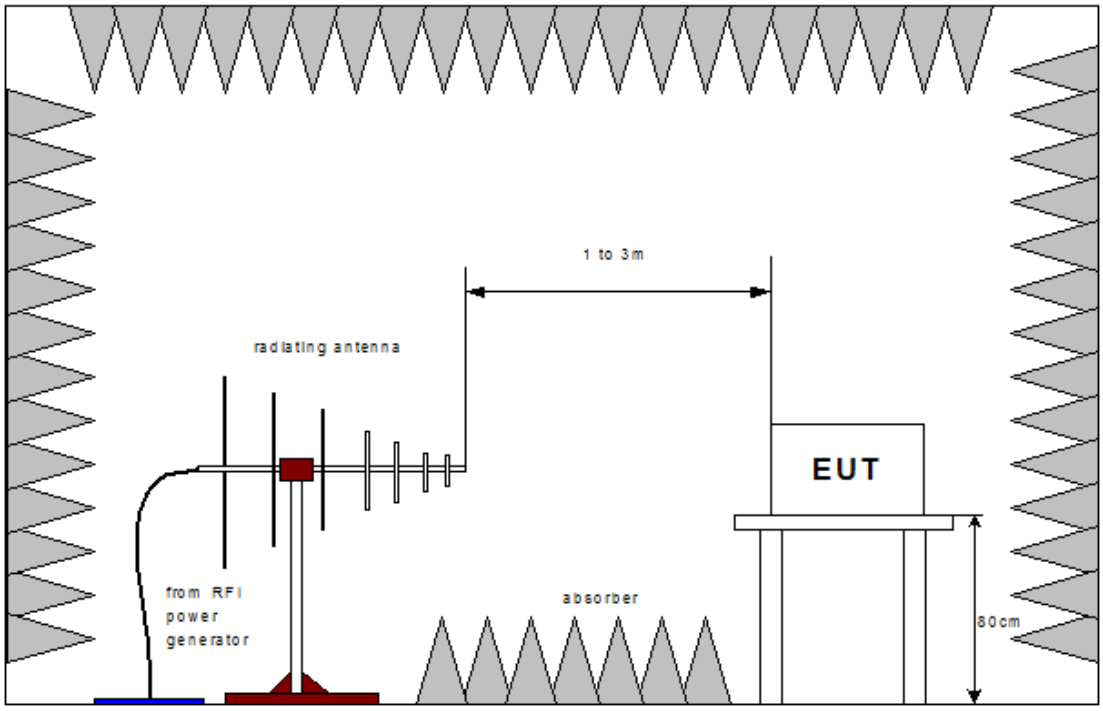
2021-02-23

2.6.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four side of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this testing any anomalies in the equipment under tests performance was recorded.



2.6.5 Environmental Conditions

Ambient Temperature	24.4 °C
Relative Humidity	50.0 %
Atmospheric Pressure	1009.0 mbar

2.6.6 Specification Limits

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 1000	3	AM (80 %,1 kHz, sine wave)	1	>1	A
Note 1. EUT powered at one of the Nominal input voltages and frequencies					

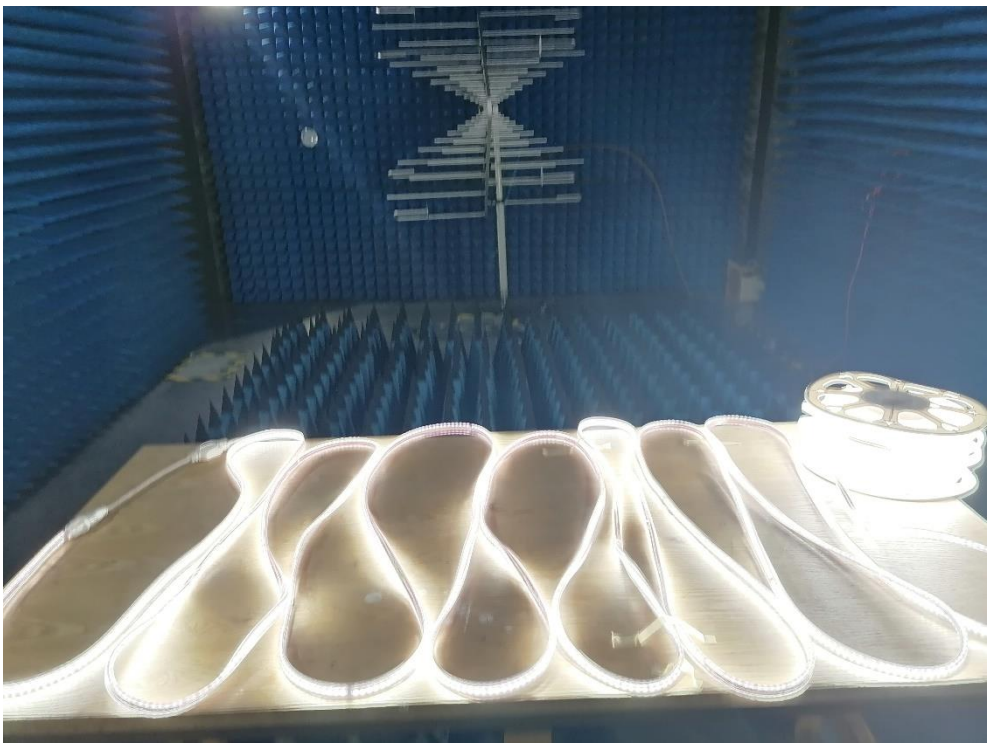
2.6.7 Test Results

Results for Configuration and Mode: Lighting.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field 80 - 1000 MHz				
Side of the equipment under test	Antenna polarization	Test Level	Dwell Time	Result
All sides	horizontal	3 V/m	3 s	A
All sides	vertical	3 V/m	3 s	A



Test Setup

2.6.8 Test Location

This test was carried out in 3m anechoic chamber.

2.7 Electrical fast transient /burst immunity test

2.7.1 Specification Reference

EN 61547:2009, Clause 5.5

2.7.2 Equipment Under Test

OML-2835-120P-230V-60-50

2.7.3 Date of Test

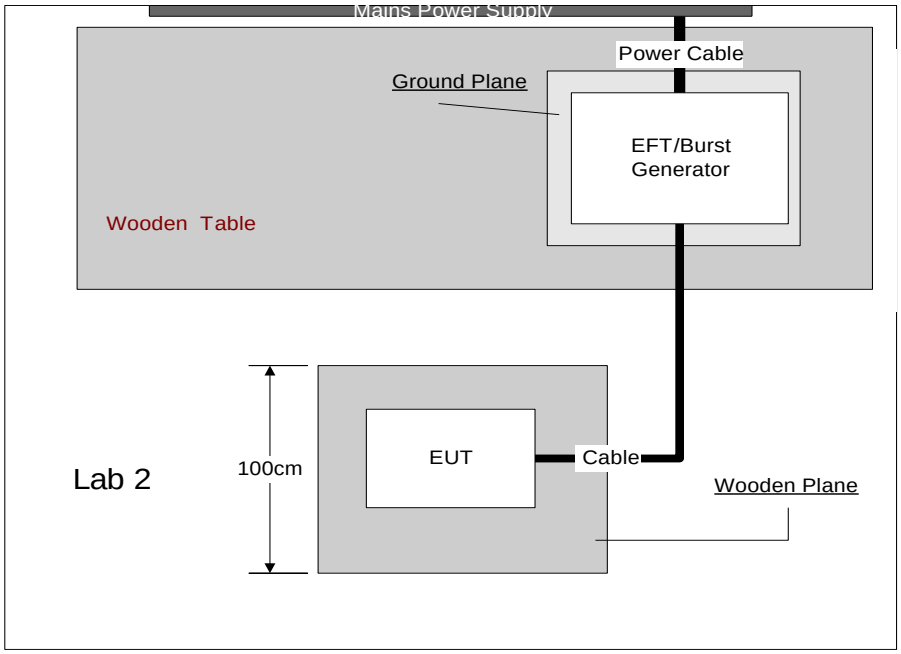
2021-02-23

2.7.4 Test Method

The equipment under test including associated cabling was configured on but insulted from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using a CDN for power ports, capacitive coupling clamp for signal and control ports and a 33nF coupling capacitor for earth ports, the required fast transient burst voltage levels in both voltage polarities were applied at the detailed pulse repartition rate and duration of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.7.5 Environmental Conditions

Ambient Temperature	23.4 °C
Relative Humidity	58.4 %
Atmospheric Pressure	1007.0 mbar

2.7.6 Specification Limits

Required Test Levels at input and output a.c. power port					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
AC Power Port	± 1	5 kHz	2 min per polarity	Direct	B
Note 1. EUT powered at one of the Nominal input voltages and frequencies					

Required Test Levels at input and output d.c. power ports					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
DC Power Port	± 0.5	5 kHz	1 min per polarity	Direct	B
Note Not applicable to equipment not connected to the mains while in use.					

Required Test Levels at ports for signal and control lines					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
signal and control Port	± 0.5	5 kHz	1 min per polarity	Direct	B
Note 1. Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3m. Note 2 Change of state commands are not applied during the test.					

2.7.7 Test Results

Results for Configuration and Mode: Lighting.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Fast Transient Burst Immunity					
Line under test	Test Level (kV)	Repetition Rate	Test Duration	Coupling Method	Result
power line	±1.0	5 kHz	2 min	CDN	A

Test Setup

2.7.8 Test Location

This test was carried out in EMS Test Location.

2.8 Immunity to conducted disturbances, induced by radio-frequency fields

2.8.1 Specification Reference

EN 61547:2009, Clause 5.6

2.8.2 Equipment Under Test

OML-2835-120P-230V-60-50

2.8.3 Date of Test

2021-02-23

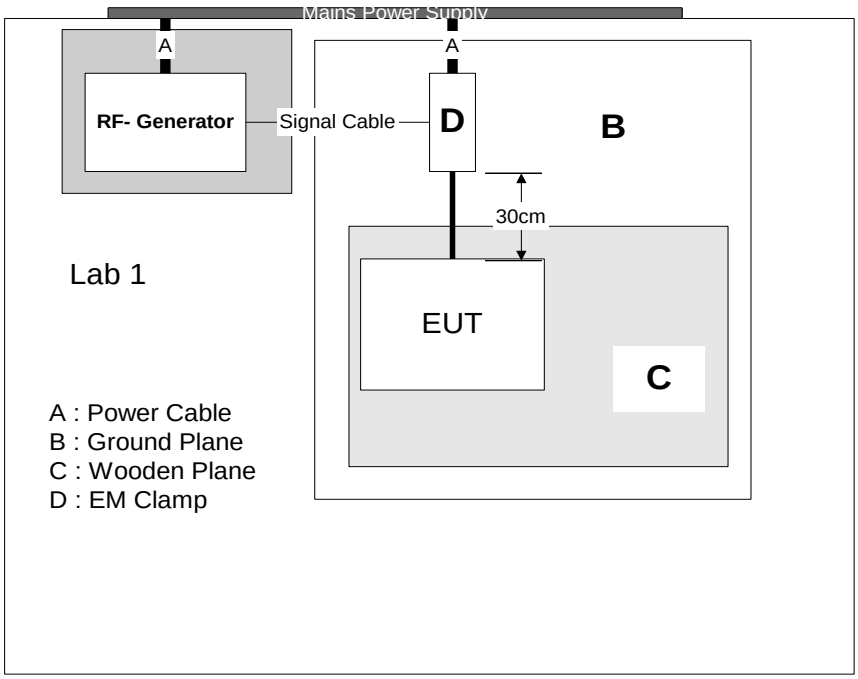
2.8.4 Test Method

The equipment under test was configured, on but insulted from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

All associated cabling was configured, on but insulted from, using a 50 mm isolator, the same horizontal coupling plane as the equipment under test.

Using CDNs, EM Clamps or current clamps as appropriate, the power ports and applicable signal and control ports were subjected to the required, pre calibrated RF injected signal strength, modulated as described, swept over the frequency range of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.8.5 Environmental Conditions

Ambient Temperature	24.3 °C
Relative Humidity	57.3 %
Atmospheric Pressure	1007.0 mbar

2.8.6 Specification Limits

Required Test Levels at ports for signal and control lines						
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	Performance Criteria
Signal and control lines	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	3	A
Note Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3m						

Required Test Levels at input and output d.c. power ports						
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	Performance Criteria
DC power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	3	A
Note Only applicable to equipment that is connected to the mains while in use.						

Required Test Levels at input and output a.c. power ports						
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	Performance Criteria
AC power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	3	A
Note Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3m						

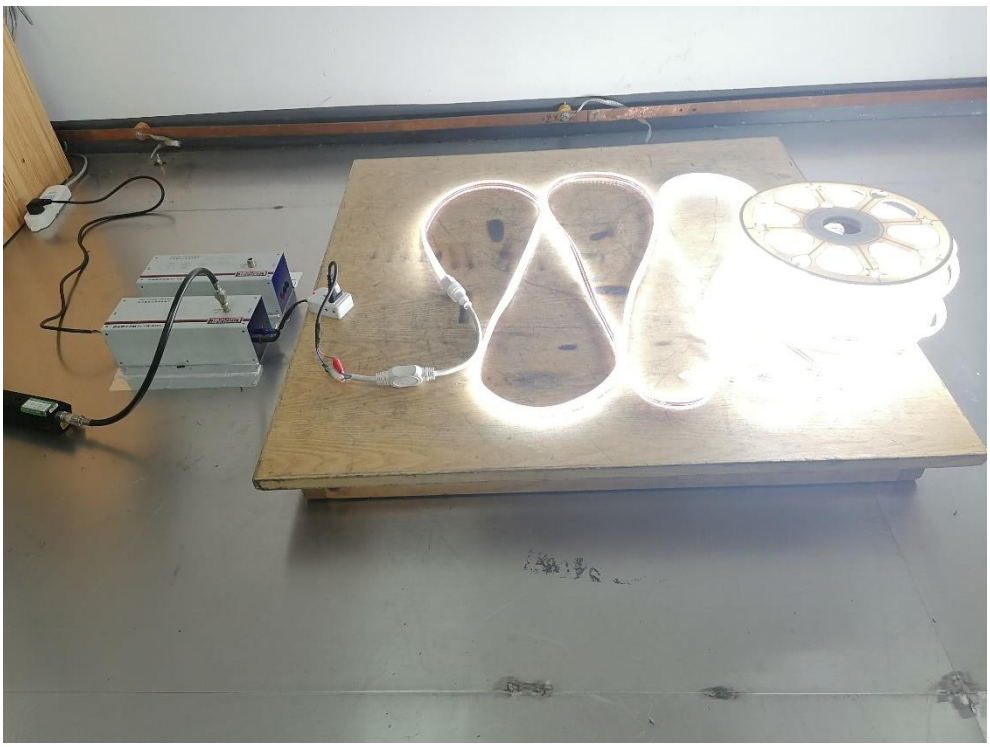
2.8.7 Test Results

Results for Configuration and Mode: Lighting.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Injected current						
Line under test	Test Level	Step	Dwell Time	Coupling Method	Modulation	Result
power line	3V	1%	3S	CDN	1KHZ 80%	A



Test Setup

2.8.8 Test Location

This test was carried out in EMS Test Location.

2.9 Surge immunity test

2.9.1 Specification Reference

EN 61547:2009, Clause 5.7

2.9.2 Equipment Under Test

OML-2835-120P-230V-60-50

2.9.3 Date of Test

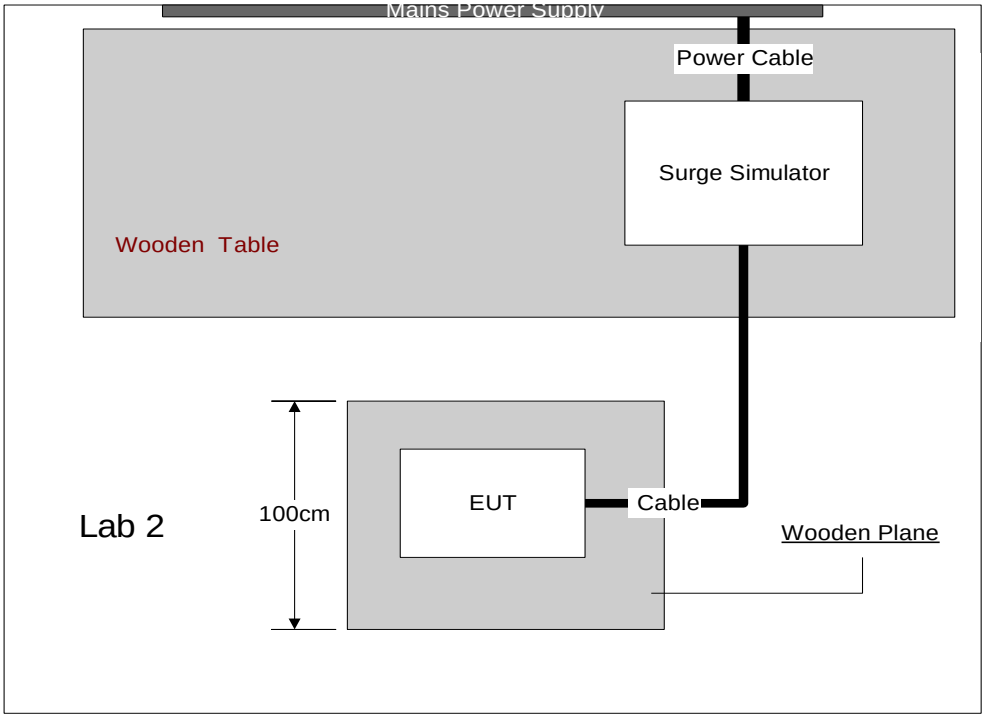
2021-02-23

2.9.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using CDNs for power ports and appropriate coupling methods for applicable signal and control ports, the required number of surges was applied for each surge voltage level using both positive and negative surge voltage polarities. Surges were applied at the power line frequency phase angles and repartition rates detailed.

During this testing any anomalies in the equipment under tests performance was recorded.



2.9.5 Environmental Conditions

Ambient Temperature	24.3 °C
Relative Humidity	57.4 %
Atmospheric Pressure	1007.0 mbar

2.9.6 Specification Limits

Characteristics	Test Levels			Performance Criteria
	Device			
	Self-ballasted lamps And semi-luminaires	Luminaires and independent auxiliaries		
		Input power		
		≤25W	>25W	
Wave- shape data Test levels line to line line to ground	1.2/50 µs ± 0.5 kV ±1.0 kV	1.2/50 µs ± 0.5 kV ±1.0 kV	1.2/50 µs ± 1.0 kV ±2.0 kV	B
Note in addition to the specified test level, all lower levels as detailed in IEC 61000-4-5 should also be satisfied**.**				

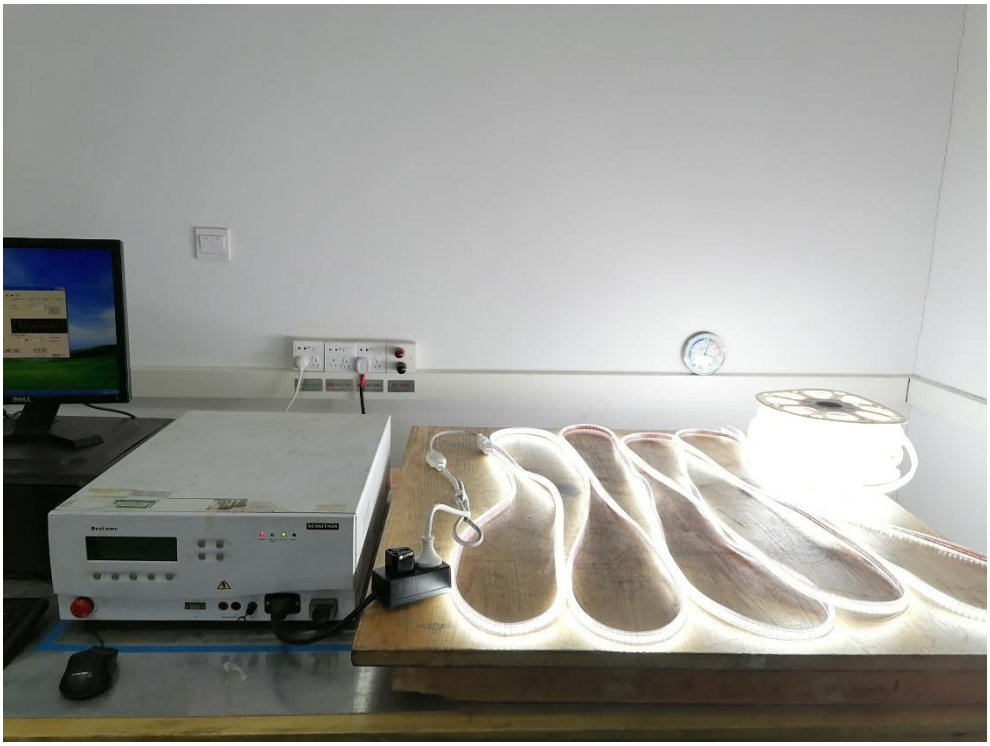
2.9.7 Test Results

Results for Configuration and Mode: Lighting.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Surge Immunity (Power Ports)							
Line Name	Coupling	Level	Polarity	Phase Angle	No of Pulses	Repetition Rate	Result
power line	Live to Neutral	1.0kV	NEGATIVE	270 deg	5	60 sec	A
power line	Live to Neutral	1.0kV	POSITIVE	90 deg	5	60 sec	A



Test Setup

2.9.8 Test Location

This test was carried out in EMS Test Location.

2.10 Voltage dips, short interruptions and voltage variations immunity test

2.10.1 Specification Reference

EN 61547:2009, Clause 5.8

2.10.2 Equipment Under Test

OML-2835-120P-230V-60-50

2.10.3 Date of Test

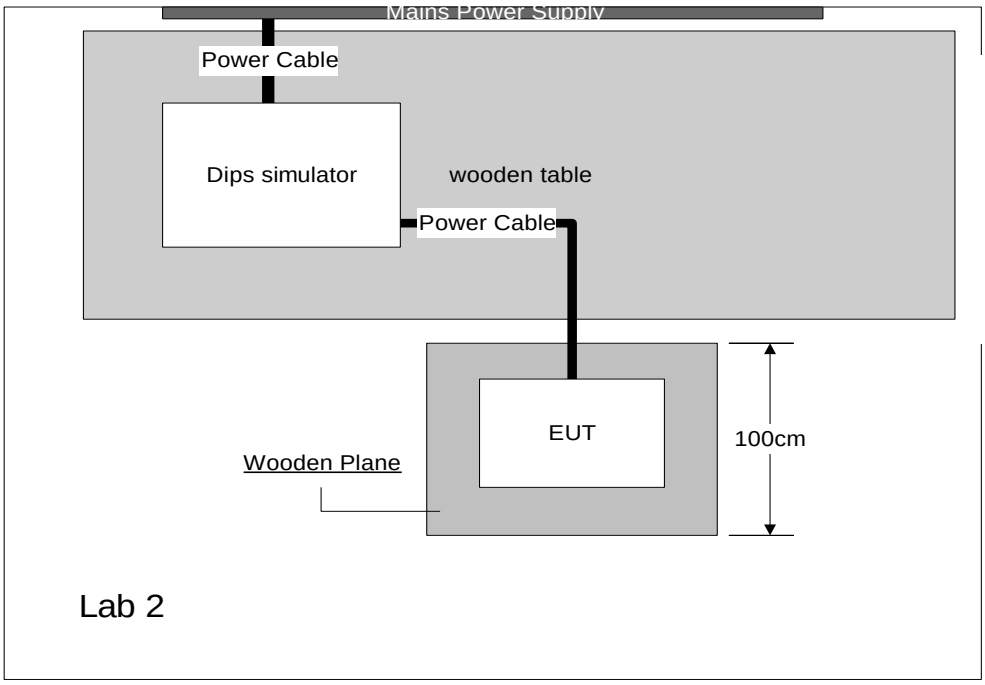
2021-02-23

2.10.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using a programmable power supply the equipment under test was subjected to the detailed supply voltage dips and interruptions. The required supply phase synchronization and test repetition rate, detailed, was controlled by the programmable power supply.

During this testing any anomalies in the equipment under tests performance was recorded.



2.10.5 Environmental Conditions

Ambient Temperature	24.3 °C
Relative Humidity	57.3 %
Atmospheric Pressure	1007.0 mbar

2.10.6 Specification Limits

Required Test Levels			Performance Criteria
Test	Test Level	Duration	
Voltage Dip	0 % of Vnom	½ cycle	B
Voltage Dip	70 % of Vnom	10 cycles	C
Note: EUT powered at one of the Nominal input voltages and frequencies			

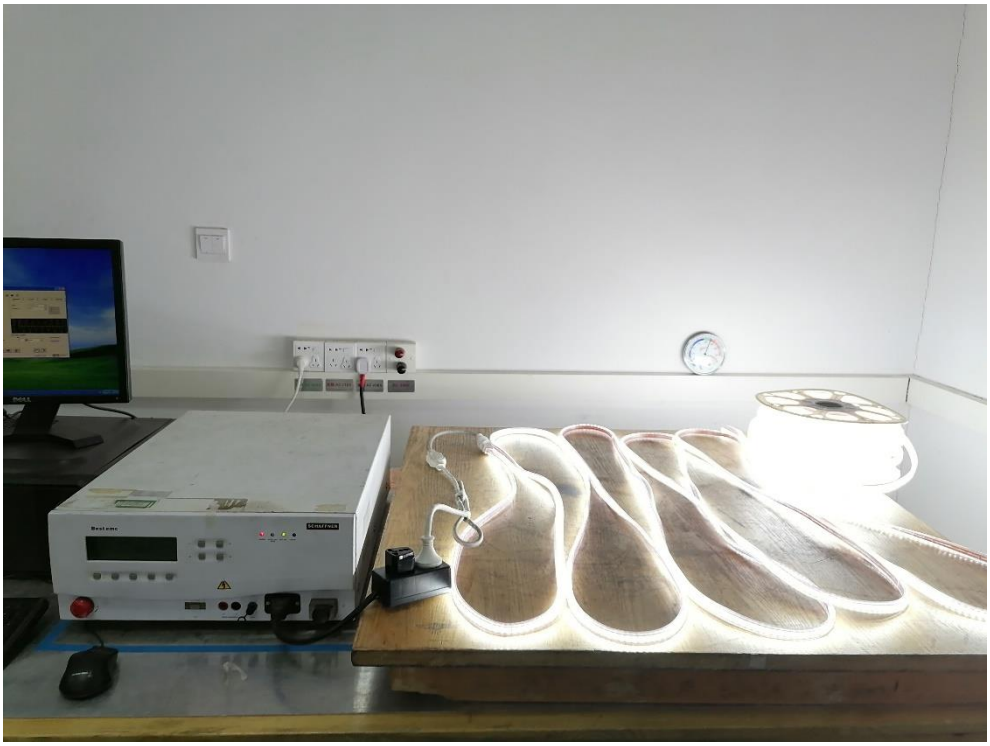
2.10.7 Test Results

Results for Configuration and Mode: Lighting.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Voltage Dip and Short Interruption					
Line under test	Vnom	Operating Frequency	Test Level	Duration	Result
power line	230 Vac	50 Hz	0% of Vnom	½ cycle	B
power line	230 Vac	50 Hz	70% of Vnom	10 cycles	B



Test Setup

2.10.8 Test Location

This test was carried out in EMS Test Location.

3 Test Equipment Information

General Test Equipment Used

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Disturbance voltage at the electric power supply interface				
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 7	2277573376	2021.07.29
Artificial Main network	SCHWARZBECK	NSLK8126	8126200	2022.01.13
PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100058	2022.01.13
Radiated Disturbance (9KHz to 30MHz)				
Loop Antenna	daze	ZN30401	13015	2021.10.15
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESR3	101891	2021.10.15
Radiated Emission (30MHz to 1000MHz)				
Logarithmic compound broadband antenna	SCKWARZBECK	VULB9168	VULB9168-588	2022.01.11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 7	2277573376	2021.07.29
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESPI3	101131	2022.01.13
Harmonic current emission				
Harmonic Analyzer	SCHAFFNER	CCN 1000-1	72336	2021.07.29
5KVAPower Source	TESEQ	NSG1007	59534	2021.07.29
Electrostatic Discharge Test				
`Electrostatic Discharge Simulator	SCHAFFNER	NSG 438	785	2021.07.31

Radiated Immunity Test				
Signal generator	Agilent	E4428C	MY49070124	2022.01.13
RF power amplifier	Ophir	5227-002F	1594321	2022.01.13
Power meter	Agilent	E4419B	MY45102879	2022.01.13
Power probe	Agilent	E9304A H18	MY41498117	2022.01.13
Power probe	Agilent	E9304A H18	MY52120033	2022.01.13
Directional coupler	Ophir	C10117-12	/	2022.01.13
Power antenna	SCHWARZBECK	9128ES	9128ES-3066	2022.01.13
RF power amplifier	Ophir	5245F/5273R	1594320	2022.01.13
Directional coupler	Ophir	CUP00259	/	2022.01.13
Power antenna	SCHWARZBECK	BBHA9120 J	BBHA9120 J 143	2022.01.13
Electrical Fast Transient				
EMC comprehensive tester	SCHAFFNER	BEST EMC V2.7	200234-010SC	2022.01.13
Conducted Immunity Test				
Signal generator	Agilent	E4428C	MY49070124	2022.01.13
Amplifier	AR	75A250A	302944	2022.01.13
Coupling/decoupling network	LIONCEL	CDN-M3-16	CDNM316 0170201	2022.01.13
Coupling/decoupling network	LIONCEL	CDN-M2-16	CDNM216 0170201	2022.01.13
6dB attenuator	Bird	75-A-MFN-06	0051504	2022.01.13
Injection Clamp	XIELI	KT-30	545	2021.07.29
Surge				
EMC comprehensive tester	SCHAFFNER	BEST EMC V2.7	200234-010SC	2022.01.13
Voltage dips, short interruptions and voltage variations immunity tests				
EMC comprehensive tester	SCHAFFNER	BEST EMC V2.7	200234-010SC	2022.01.13

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Disturbance at Mains Terminals	2.42dB
Uncertainty for Radiated Disturbance (9KHz to 30MHz)	1.6dB
Uncertainty for Radiated Disturbance 30MHz to 1000MHz)	3.1dB

5 Photographs

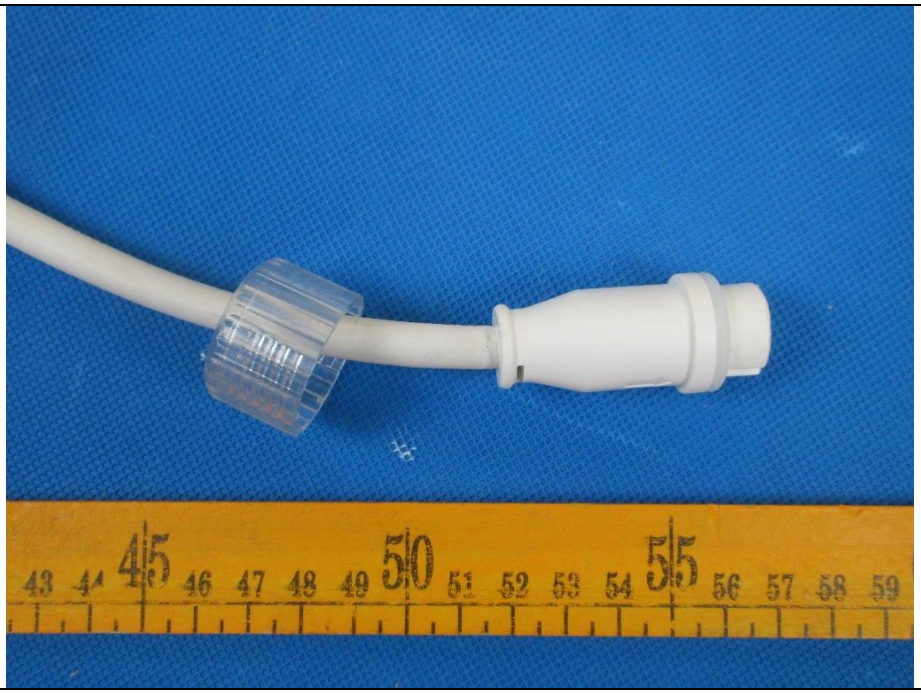
Details of: Overall view

Details of: Overall view

Details of: Body view

Details of: Female connector and male connector

Details of: Female connector on power supply

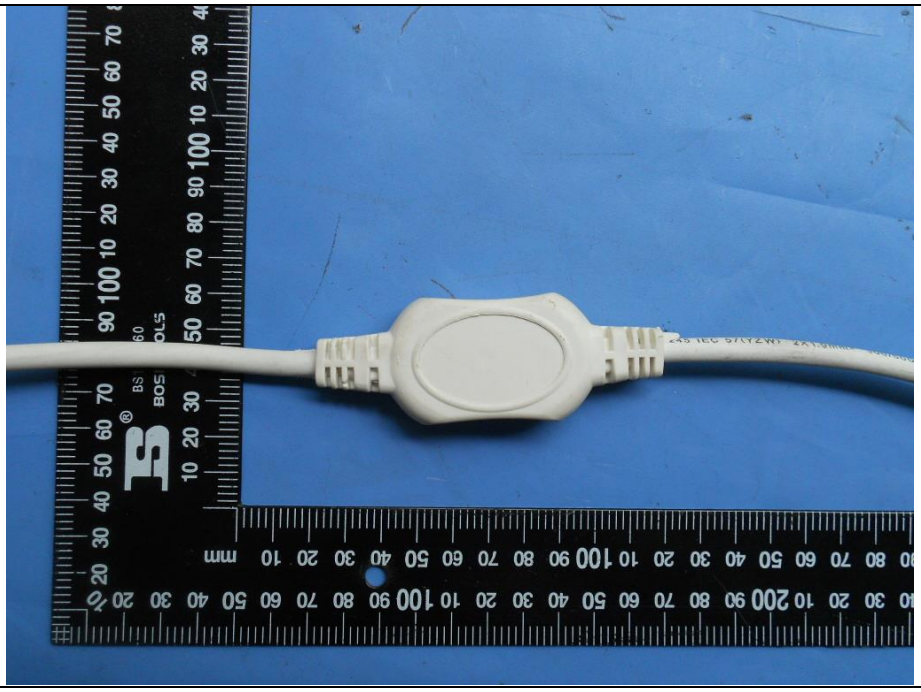


Details of: Male connector on input rope light body

Details of: Female connector on output rope light body

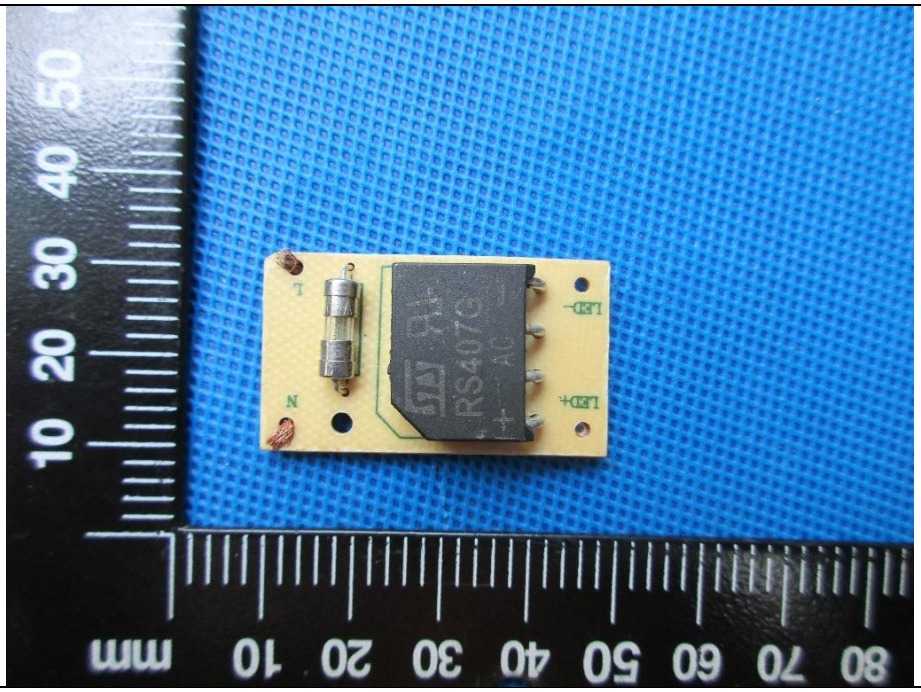
Details of: Female connector on output rope light body

Details of: Rectifier view



Details of: Rectifier internal view

Details of: Rectifier PCB view



Details of: Rectifier PCB view