EMC Test Report

Product: LED module

Models: See model list for detail

Applicant: Nanjing Holdlight Technologies Co., Ltd.

Rm 914, Building 4, No. 12, Xinghuo Road 211899
Nanjing, Jiangsu, P. R. C

Add value.
Inspire trust.

In accordance with

EN IEC 55015 and EN IEC 61547

COMMERCIAL-IN-CONFIDENCE

Issue Date: July 26, 2024
Report No. 708882404429-00

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Approved By	Yong ZHANG	Yong.ZHANG	July 29, 2024
Prepared By	Dengqing TANG	Dengqing TANG	July 29, 2024

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 test specification in chapter 1.2.

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.

Report No.	Description of Change	Date of Issue
708882404429-00	First Issue	07/26/2024

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	Nanjing Holdlight Technologies Co., Ltd.
Address	Rm 914, Building 4, No. 12, Xinghuo Road 211899 Nanjing, Jiangsu, P. R. C
Manufacturer	Same as above
Address	Same as above
Factory	Same as above
Address	Same as above
Model Number(s)	See model list for detail
Rated Voltage	24 Vdc,
Rated Power	See model list for detail
Standards	EN IEC 55015:2019/A11:2020, EN IEC 61547:2023
Sample Source	Samples delivered by manufacturer
Sample Number(s)	SHA-818038-2, SHA-818038-3,
Sample received	07/03/2024
Start of Test	07/04/2024
Finish of Test	07/18/2024
Name of Engineer(s)	Dengqing TANG

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

1.3 Test Specification and Results Summary

Summary of the tests is shown below:

No.	Standard/ Specification	Clause.	Test Item	Result	Basic Standard /Comment
1.	EN IEC 55015:2019/A11:2020	4.3.1	Conducted disturbance at the electric power supply interface	Pass (Min. Margin>6dB)	CISPR 16-2-1
2.	EN IEC 55015:2019/A11:2020	4.5.2	Radiated Disturbance (9 kHz to 30 MHz)	Pass (Min. Margin>6dB)	CISPR 16-2-3
3.	EN IEC 55015:2019/A11:2020	4.5.3	Radiated Disturbance (30MHz to 1000MHz)	Pass (Min. Margin:3.2dB)	CISPR 16-2-3
4.	EN IEC 61547:2023	5.2	Electrostatic discharge immunity	Pass	IEC 61000-4-2
5.	EN IEC 61547:2023	5.3	Radiated, radio-frequency, electromagnetic field immunity	Pass	IEC 61000-4-3
6.	EN IEC 61547:2023	5.5	Electrical fast transient /burst immunity	Pass	IEC 61000-4-4
7.	EN IEC 61547:2023	5.6	Immunity to conducted disturbances, induced by radio-frequency fields	Pass	IEC 61000-4-6
8.	EN IEC 61547:2023	5.7	Surge immunity	Pass	IEC 61000-4-5

1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) was a LED module.

According to the declaration from manufacturer, all the models are identical except the model name, PCB and rated power.

According to the declaration from manufacturer, the product is directly connected to the DC network.

Due to the similarity between them, models TFBL-24V-9310 and SL-18-1085 were selected for the full tests and the corresponding data is representative for the other models as well.

Remark:
1.Power frequency magnetic fields test need only to be applied to equipment containing components susceptible to magnetic fields, such as Hall elements or magnetic field sensors. (EN IEC 61547:2023 Clause 5.4).
The sample has no magnetically sensitive components, so the sample doesn't need to be the power frequency magnetic field test.

1.4.2 EUT Port/Cable Identification

Port	Specified Cable Length	Screened (Yes/No)
DC port	1.5 m	No

N/A= Not applicable.

1.4.3 Modes of Operation

Mode No.	Mode Description	Test Item
Mode 1	DC power on mode, 24 Vdc,	All tests,
Mode 2	Handling mode (The EUT wasn't powered)	Electrostatic discharge

Model list:

Model name	Rated Power(W)	PCB
TFBL-24V-1302	1.6	PCB 1
TFBL-24V-3304	3.2	PCB 1
TFBL-24V-4305	4	PCB 1
TFBL-24V-5306	4.8	PCB 1
TFBL-24V-9310	8	PCB 1
HGBL07-24V-140	1.8	PCB 1
HGBL07-24V-280	3.6	PCB 1
HGBL07-24V-420	5.4	PCB 1
HGBL07-24V-560	7.2	PCB 1
HGBL-24V-1302	1.6	PCB 1
HGBL-24V-3304	3.2	PCB 1
HGBL-24V-4305	4	PCB 1
HGBL-24V-5306	4.8	PCB 1
HGBL-24V-9310	8	PCB 1
HGBL-24V-1703	2.7	PCB 1
HGBL-24V-2404	3.6	PCB 1
HGBL-24V-3105	4.5	PCB 1
HGBL-24V-5208	7.2	PCB 1
SL-12-615	12	PCB 2
SL-18-960	18	PCB 2
SL-18-1085	18	PCB 2
SL3018-24V-945	18	PCB 2
SL3003-24V-160	3	PCB 2
SL3009-24V-450	9	PCB 2
SL3006-24V-300	6	PCB 2
SL3003-24V-150	3	PCB 2
SL3011-24V-570	11	PCB 2

1.4.4 Auxiliary Equipment (cable) Used during Test

Equipment	Brand	Model/Type No.	Remark
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--	--	--	--

1.4.5 Monitoring of Performance

The EUT works normally, the luminous density doesn't deviate by more than 15%.

1.4.6 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 (30 min for high pressure gas discharge

lamps). 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 light source(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.

The following additional requirement applies to lighting equipment incorporating a starting device: after the test, the lighting equipment is switched off for 30 min and back on again. The lighting equipment shall start and operate as intended.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 Environmental Conditions

Ambient Temperature	15-35 °C
Relative Humidity	30-60 %
Atmospheric Pressure	860-1060 hPa

1.7 Test Location

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai branch
No.16, Lane 1951, Duhui Road Shanghai, 201108, P.R.China

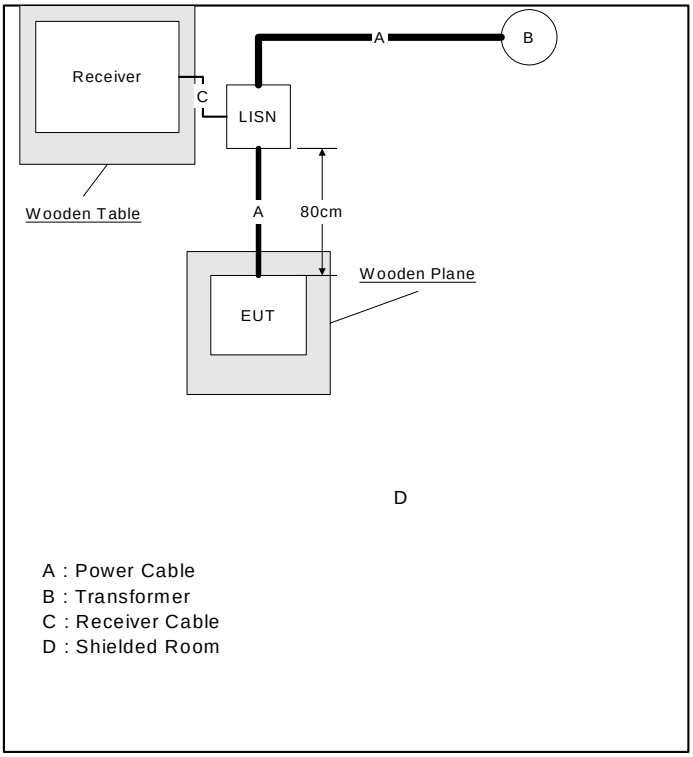
Test Name	Test date	Name of Engineer(s)	Test Area
Conducted Disturbance	07/04/2024	Zhengyang QIAO	Z119
Radiated Disturbance (3 loop)	07/04/2024	Zhengyang QIAO	Z120
Radiated Disturbance	07/04/2024	Zhengyang QIAO	Z116
Electrostatic discharge immunity test	07/18/2024	Zhengyang QIAO	Z118
Radiated, radio-frequency, electromagnetic field immunity test	07/15/2024	Zhengyang QIAO	Z114
Electrical fast transient /burst immunity test	07/18/2024	Zhengyang QIAO	Z118
Immunity to conducted disturbances, induced by radio-frequency fields	07/18/2024	Zhengyang QIAO	Z118

2 Test Description

2.1 Conducted disturbance at the electric power supply interface

2.1.1 Test Method

Table-top EUT shall be placed
– at a distance of 0,4 m from a RGP
– at a distance of 0,8 m from the AMN, and
– shall be kept at least 0,8 m from any other earthed conducting surface.
Floor standing EUT shall be:
– placed at a height of 0.1 m above a horizontal RGP,
– placed at a distance of 0,8 m from the AMN,
– kept at least 0,8 m from any other earthed conducting surface, and
Parts supporting the EUT and its parts at the required height shall be made of non-conductive material.



2.1.2 Specification Limits

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

2.1.3 Test Setup Photo

2.1.4 Test Results

9K-30MHz Conducted Disturbance Test

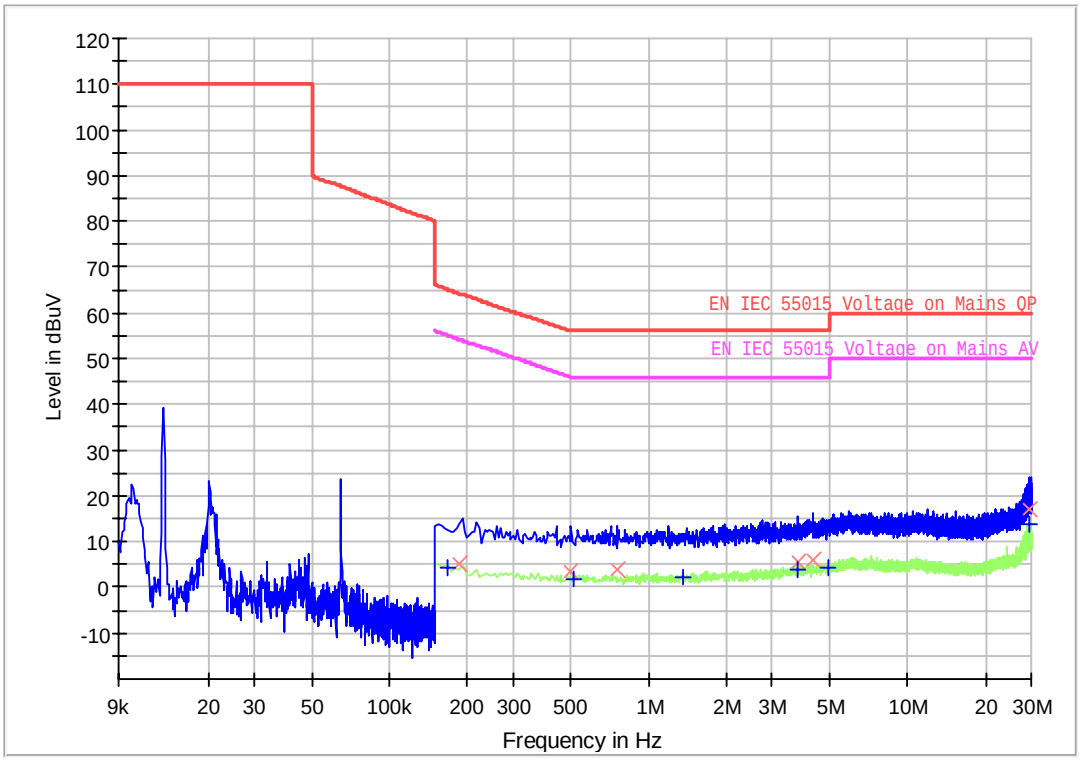
EUT Information

EUT Name:	LED module
Model	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond	Mode 1
Operator:	Zhengyang QIAO
Standard	EN IEC 55015
Comment:	+
Sample No.:	SHA-818038-2

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup:	Voltage with 2-Line-LISN
Receiver:	[ESR 3]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.168000	---	4.23	55.06	50.83	1000.0	9.000	+	19.4
0.186000	5.28	---	64.21	58.93	1000.0	9.000	+	19.4
0.501000	3.65	---	56.00	52.35	1000.0	9.000	+	19.4
0.514500	---	1.95	46.00	44.05	1000.0	9.000	+	19.4
0.757500	3.79	---	56.00	52.21	1000.0	9.000	+	19.5
1.369500	---	2.03	46.00	43.97	1000.0	9.000	+	19.5
3.772500	5.37	---	56.00	50.63	1000.0	9.000	+	19.6
3.795000	---	3.69	46.00	42.31	1000.0	9.000	+	19.6
4.281000	5.77	---	56.00	50.23	1000.0	9.000	+	19.6
4.947000	---	4.32	46.00	41.68	1000.0	9.000	+	19.6
29.400000	---	13.59	50.00	36.41	1000.0	9.000	+	21.2
29.701500	17.03	---	60.00	42.97	1000.0	9.000	+	21.2

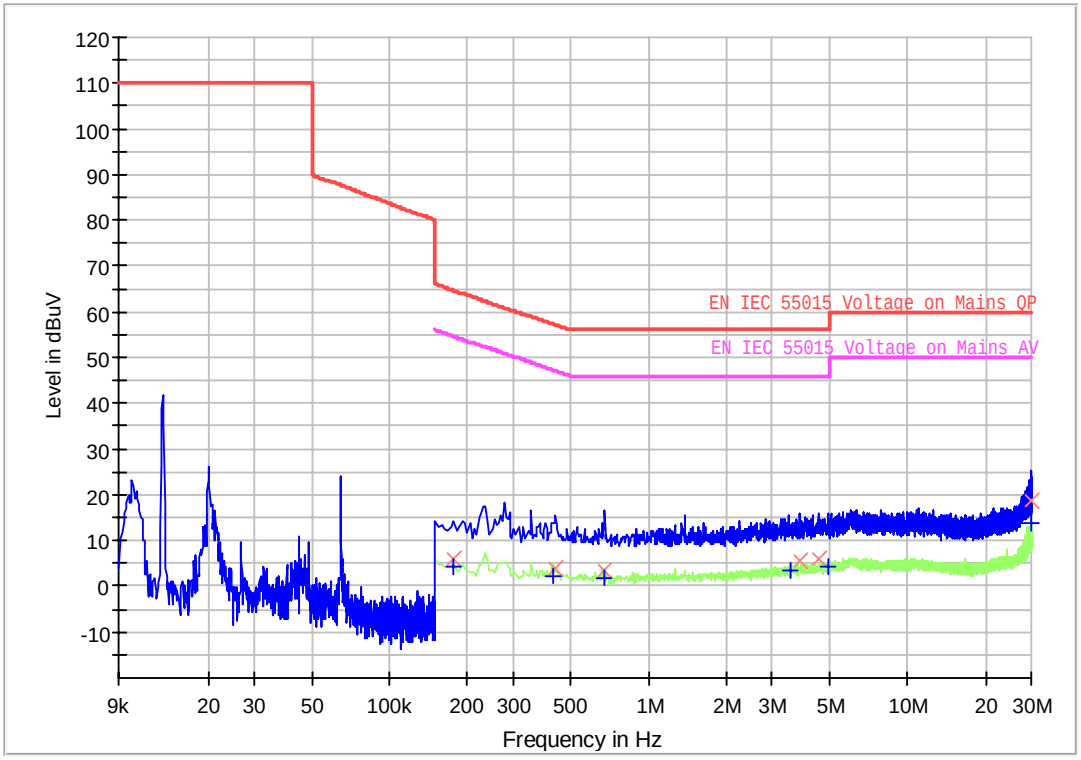
EUT Information

EUT Name:	LED module
Model	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond	Mode 1
Operator:	Zhengyang QIAO
Standard	EN IEC 55015
Comment:	-
Sample No.:	SHA-818038-2

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup:	Voltage with 2-Line-LISN
Receiver:	[ESR 3]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	---	4.29	54.63	50.34	1000.0	9.000	-	19.4
0.177000	5.83	---	64.63	58.80	1000.0	9.000	-	19.4
0.429000	---	2.04	47.27	45.23	1000.0	9.000	-	19.5
0.438000	3.95	---	57.10	53.15	1000.0	9.000	-	19.5
0.672000	---	1.80	46.00	44.20	1000.0	9.000	-	19.4
0.676500	3.47	---	56.00	52.53	1000.0	9.000	-	19.4
3.516000	---	3.63	46.00	42.37	1000.0	9.000	-	19.5
3.840000	5.39	---	56.00	50.61	1000.0	9.000	-	19.6
4.555500	5.89	---	56.00	50.11	1000.0	9.000	-	19.6
4.929000	---	4.20	46.00	41.80	1000.0	9.000	-	19.6
29.940000	18.87	---	60.00	41.13	1000.0	9.000	-	20.7
30.000000	---	13.58	50.00	36.42	1000.0	9.000	-	20.8

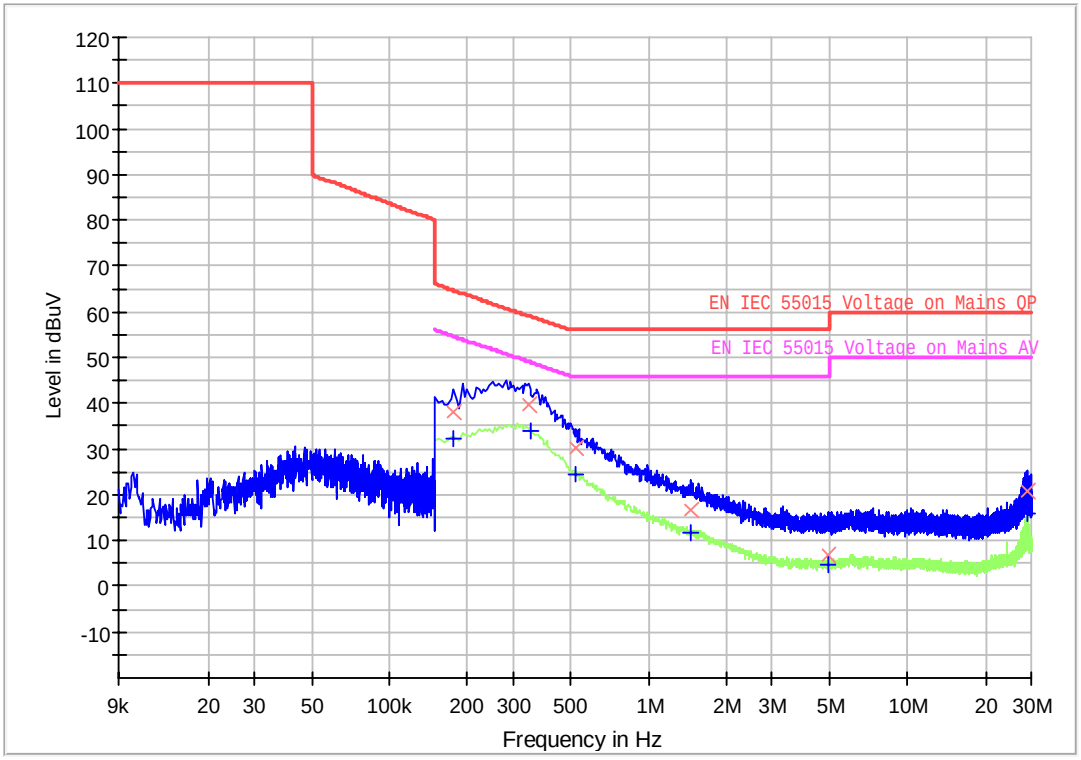
EUT Information

EUT Name:	LED module
Model	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond	Mode 1
Operator:	Zhengyang QIAO
Standard	EN IEC 55015
Comment:	+
Sample No.:	SHA-818038-3

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup:	Voltage with 2-Line-LISN
Receiver:	[ESR 3]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	---	32.48	54.63	22.15	1000.0	9.000	+	19.4
0.177000	38.20	---	64.63	26.43	1000.0	9.000	+	19.4
0.343500	39.78	---	59.12	19.34	1000.0	9.000	+	19.5
0.348000	---	33.86	49.01	15.15	1000.0	9.000	+	19.5
0.528000	---	24.56	46.00	21.44	1000.0	9.000	+	19.4
0.528000	30.16	---	56.00	25.84	1000.0	9.000	+	19.4
1.446000	16.63	---	56.00	39.37	1000.0	9.000	+	19.5
1.450500	---	11.83	46.00	34.17	1000.0	9.000	+	19.5
4.942500	6.91	---	56.00	49.09	1000.0	9.000	+	19.6
4.942500	---	4.86	46.00	41.14	1000.0	9.000	+	19.6
28.918500	20.76	---	60.00	39.24	1000.0	9.000	+	21.2
28.981500	---	15.96	50.00	34.04	1000.0	9.000	+	21.2

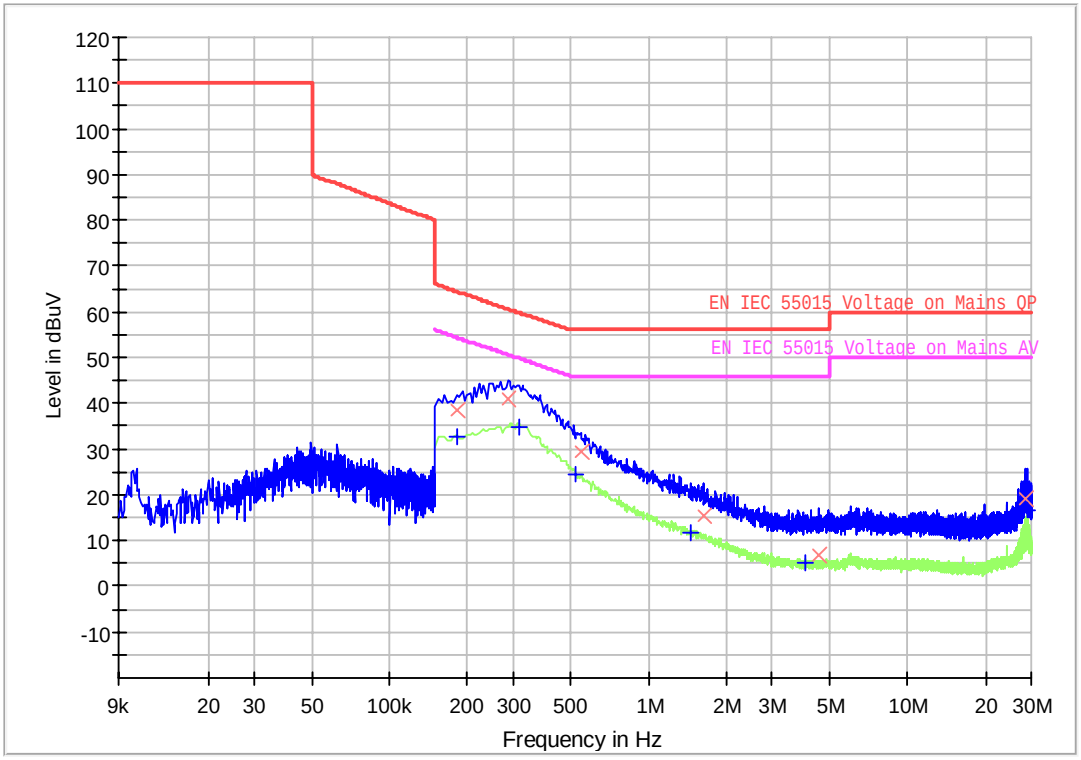
EUT Information

EUT Name:	LED module
Model	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond	Mode 1
Operator:	Zhengyang QIAO
Standard	EN IEC 55015
Comment:	-
Sample No.:	SHA-818038-3

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup:	Voltage with 2-Line-LISN
Receiver:	[ESR 3]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



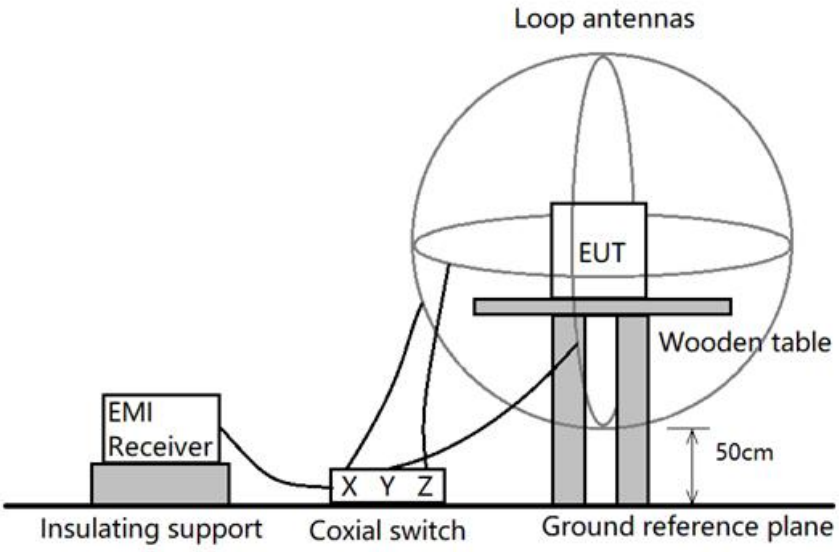
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.181500	---	32.58	54.42	21.84	1000.0	9.000	-	19.4
0.181500	38.29	---	64.42	26.13	1000.0	9.000	-	19.4
0.285000	40.92	---	60.67	19.75	1000.0	9.000	-	19.5
0.316500	---	34.91	49.80	14.89	1000.0	9.000	-	19.5
0.528000	---	24.65	46.00	21.35	1000.0	9.000	-	19.5
0.550500	29.26	---	56.00	26.74	1000.0	9.000	-	19.5
1.459500	---	11.73	46.00	34.27	1000.0	9.000	-	19.5
1.630500	15.24	---	56.00	40.76	1000.0	9.000	-	19.5
4.056000	---	4.95	46.00	41.05	1000.0	9.000	-	19.6
4.501500	6.94	---	56.00	49.06	1000.0	9.000	-	19.6
28.441500	19.03	---	60.00	40.97	1000.0	9.000	-	20.7
28.860000	---	16.60	50.00	33.40	1000.0	9.000	-	20.7

2.2 Radiated disturbance (9 kHz to 30 MHz)

2.2.1 Test Method

The EUT shall be placed in the center of the LLAS. The current induced in the LLAS is measured in accordance with CISPR 16-2-3. By means of a coaxial switch, the three field directions of the EUT can be measured in sequence. The measurement results for each direction shall comply with the limits.



2.2.2 Specification Limits

LLAS radiated disturbance limits in the frequency range 9 kHz to 30 MHz	
Frequency range	Quasi-peak limits for three loop diameters dB(µA)
	2 m loop diameter
9 kHz to 70 kHz	88
70 kHz to 150 kHz	88 to 58
150 kHz to 3.0 MHz	58 to 22
3.0 MHz to 30 MHz	22

2.2.3 Test Setup Photos

2.2.4 Test Results

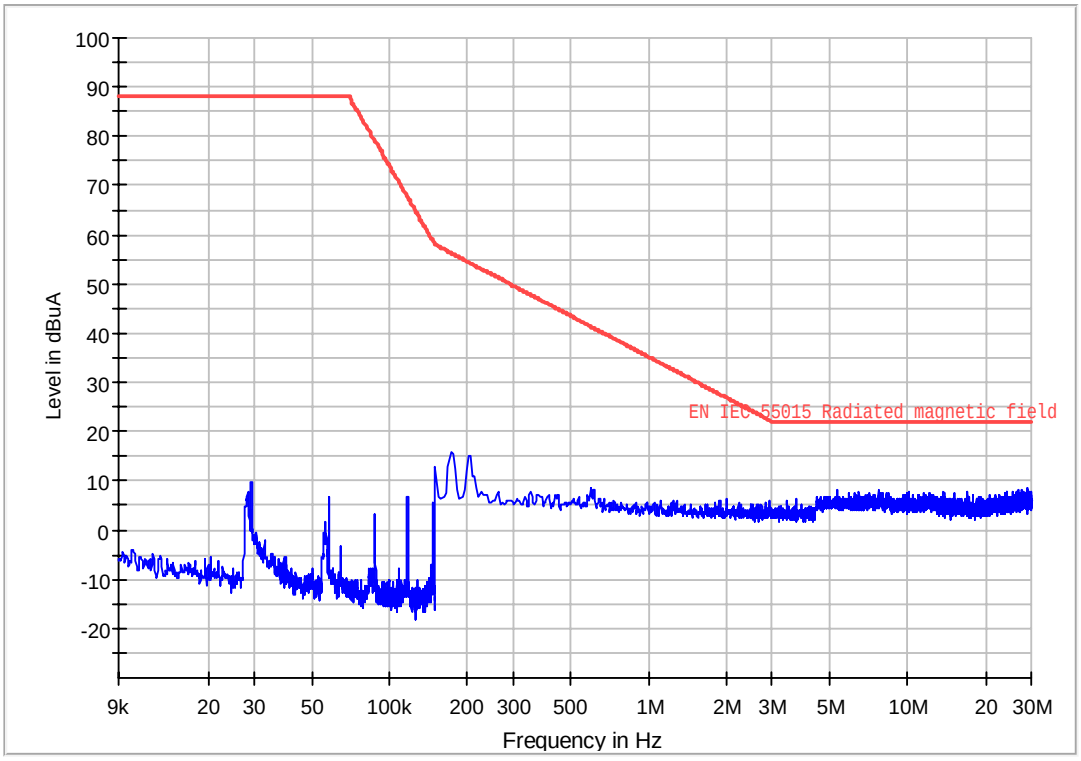
EUT Information

EUT Name:	LED module
Model:	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op cond:	Mode 1
Tester	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	X
Sample No.:	SHA-818038-2

Scan Setup: TripleLoop max [EMI radiated]

Hardware Setup:	TripleLoop
Receiver:	[ESR 3]
Level Unit:	dBuA

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.01 s	0 dB



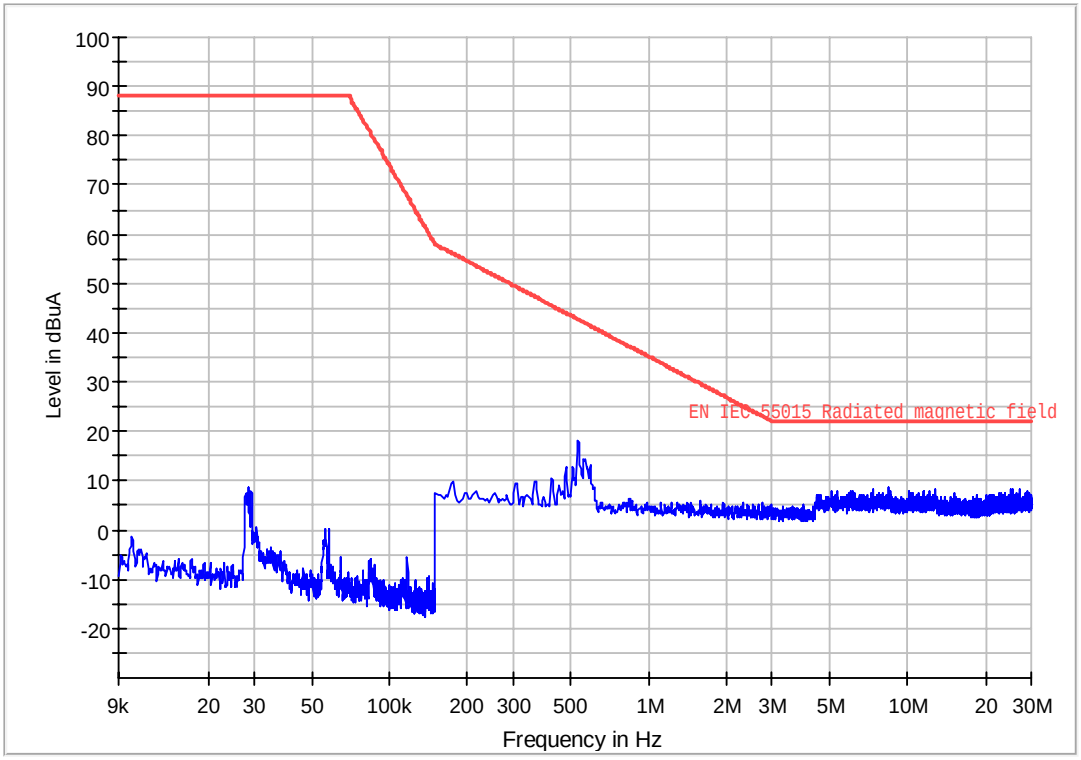
EUT Information

EUT Name:	LED module
Model:	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op cond:	Mode 1
Tester	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Y
Sample No.:	SHA-818038-2

Scan Setup: TripleLoop max [EMI radiated]

Hardware Setup:	TripleLoop
Receiver:	[ESR 3]
Level Unit:	dBuA

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.01 s	0 dB



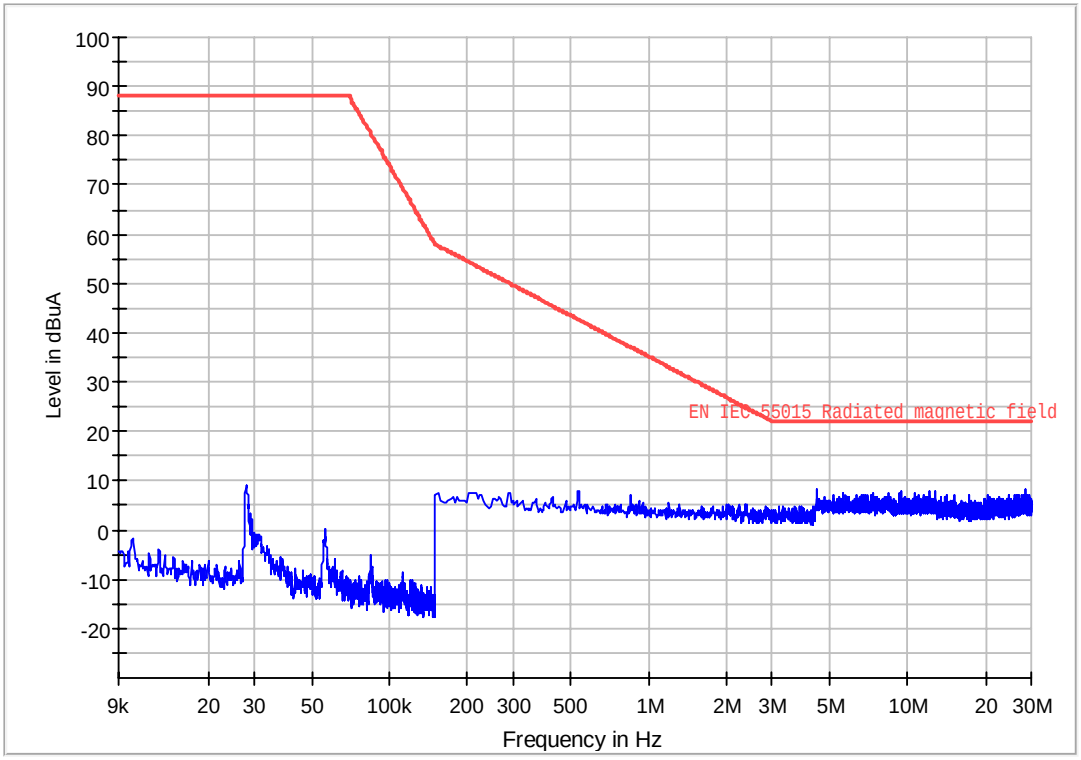
EUT Information

EUT Name:	LED module
Model:	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op cond:	Mode 1
Tester	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Z
Sample No.:	SHA-818038-2

Scan Setup: TripleLoop max [EMI radiated]

Hardware Setup:	TripleLoop
Receiver:	[ESR 3]
Level Unit:	dBuA

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.01 s	0 dB



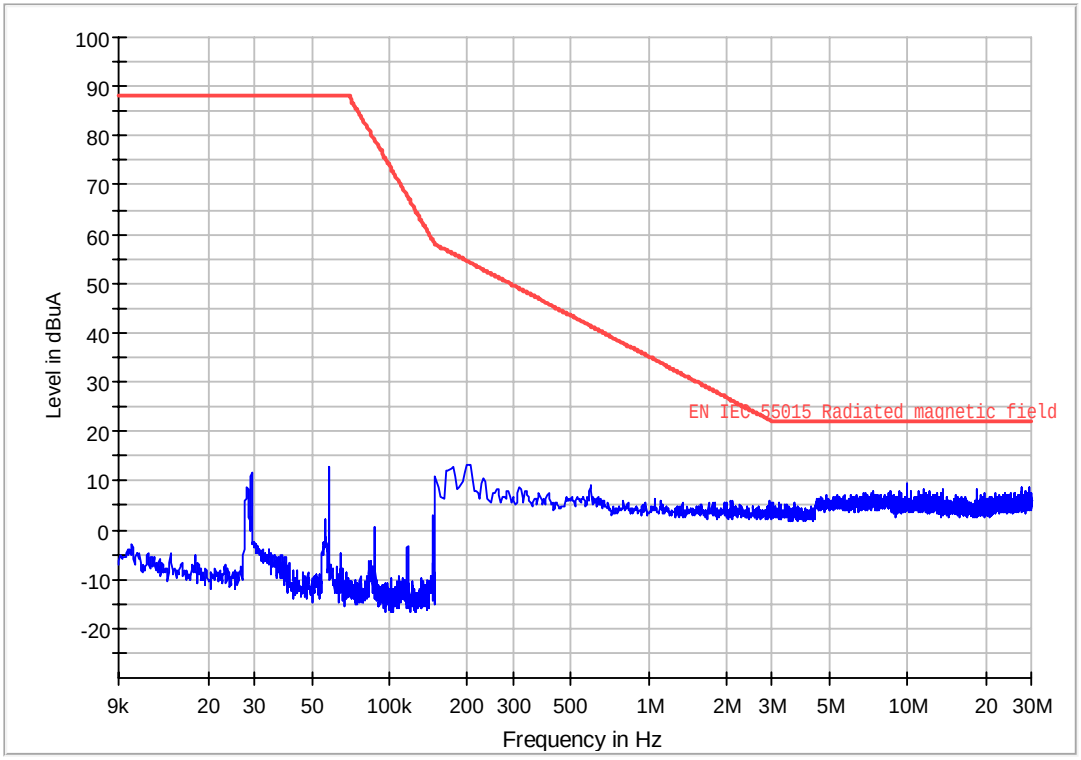
EUT Information

EUT Name:	LED module
Model:	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op cond:	Mode 1
Tester	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	X
Sample No.:	SHA-818038-3

Scan Setup: TripleLoop max [EMI radiated]

Hardware Setup:	TripleLoop
Receiver:	[ESR 3]
Level Unit:	dBuA

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.01 s	0 dB



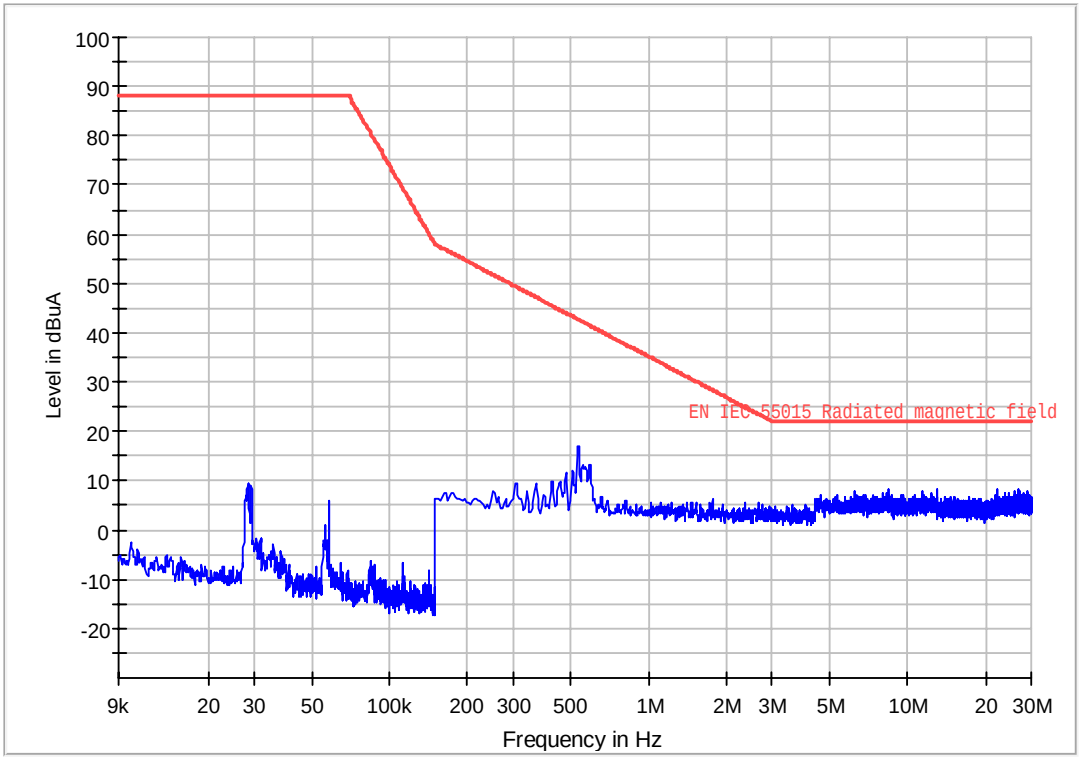
EUT Information

EUT Name:	LED module
Model:	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op cond:	Mode 1
Tester	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Y
Sample No.:	SHA-818038-3

Scan Setup: TripleLoop max [EMI radiated]

Hardware Setup:	TripleLoop
Receiver:	[ESR 3]
Level Unit:	dBuA

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.01 s	0 dB



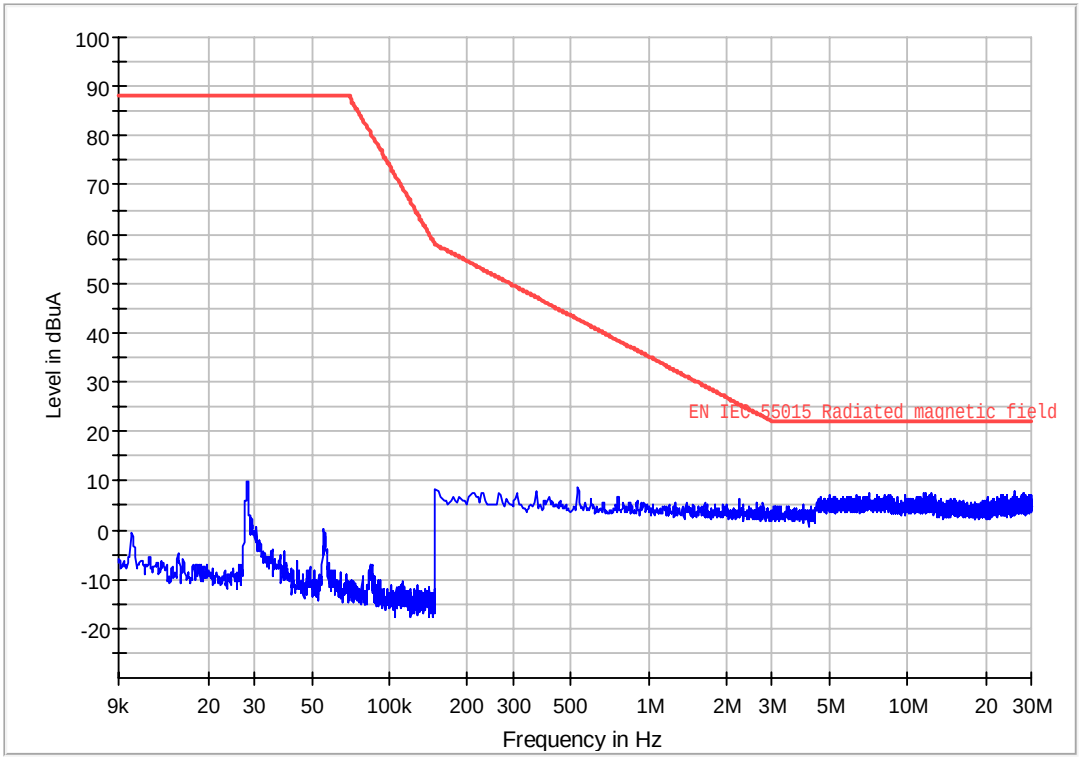
EUT Information

EUT Name:	LED module
Model:	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op cond:	Mode 1
Tester	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Z
Sample No.:	SHA-818038-3

Scan Setup: TripleLoop max [EMI radiated]

Hardware Setup:	TripleLoop
Receiver:	[ESR 3]
Level Unit:	dBuA

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	0 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.01 s	0 dB

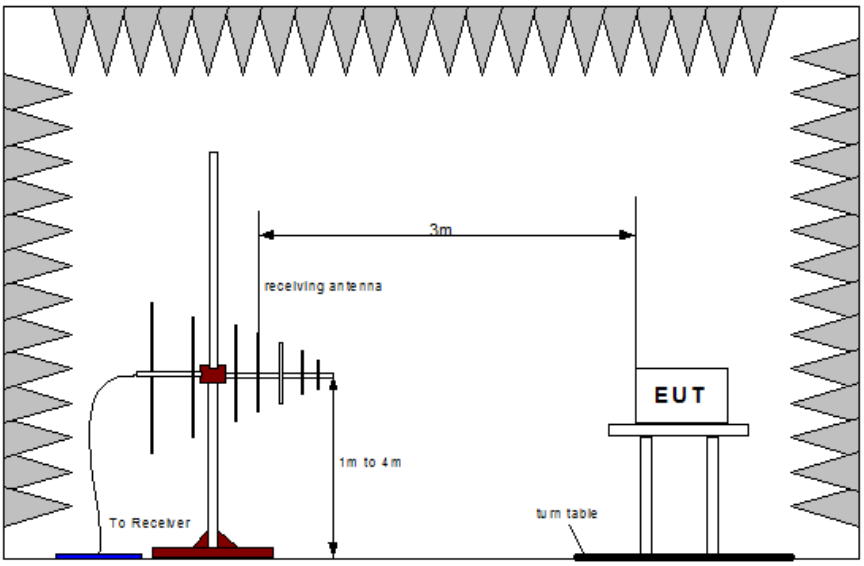


2.3 Radiated disturbance (30 MHz to 1 GHz)

2.3.1 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable. Table top EUT was placed at 0,8 m above the reference plane. Floor standing EUT was placed at 0.1 m above the reference plane.

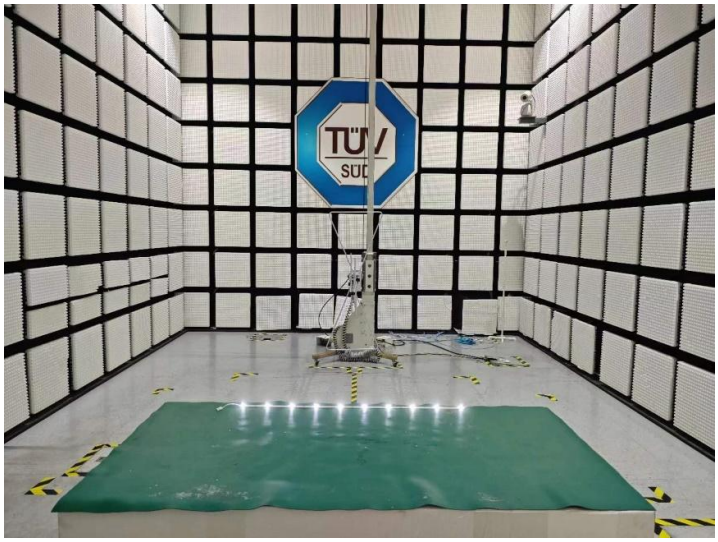
A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m distance. Using the prescan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT 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.



2.3.2 Specification Limits

Radiated disturbance limits for 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

2.3.3 Test Setup Photos



2.3.4 Test Results

30-1000MHz Radiated Disturbance Test

EUT Information

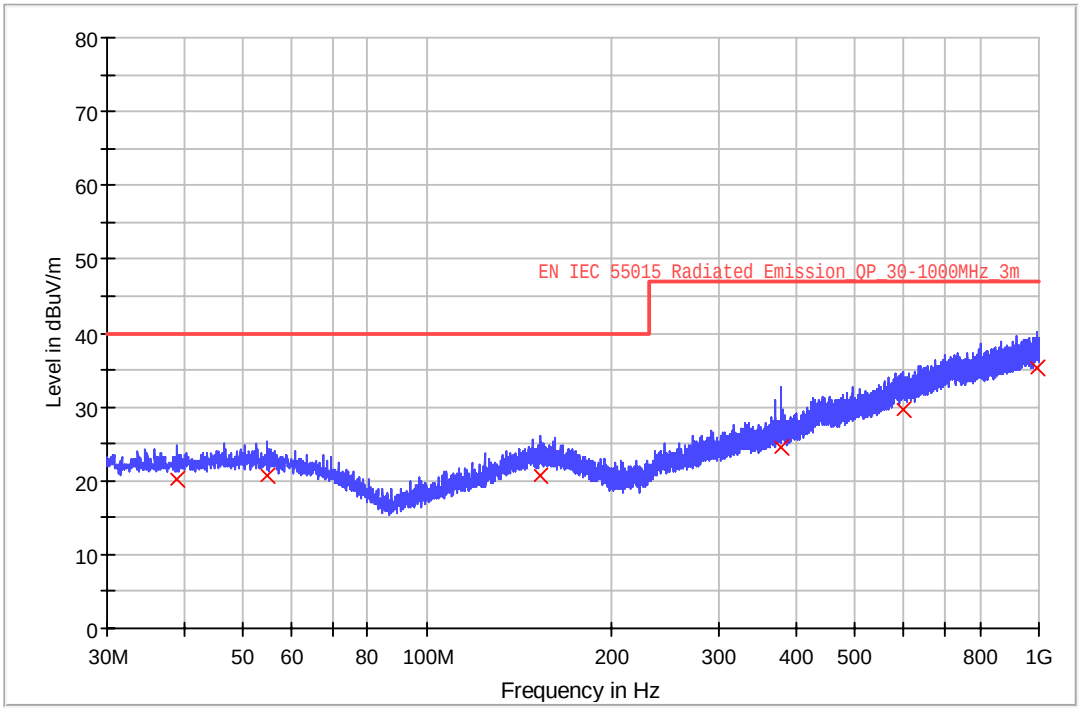
EUT Name:	LED module
Model:	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond:	Mode 1
Operator:	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Horizontal
Sample No:	SHA-818038-2

Sweep Setup: RE_VULB9168_pre_Cont_EN IEC 55015 30-1000 [EMI radiated]

Hardware Setup:	RE_VULB9168
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB

RE_VULB9168_pre_Cont_EN IEC 55015 30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/
39.040000	20.2	1000.0	120.000	127.0	H	1.0	19.9	19.8	40.0
54.680000	20.6	1000.0	120.000	113.0	H	96.0	20.4	19.4	40.0
152.960000	20.7	1000.0	120.000	175.0	H	356.0	21.0	19.3	40.0
378.800000	24.5	1000.0	120.000	232.0	H	182.0	23.7	22.5	47.0
601.280000	29.8	1000.0	120.000	194.0	H	199.0	29.1	17.3	47.0
991.840000	35.2	1000.0	120.000	155.0	H	265.0	34.5	11.8	47.0

EUT Information

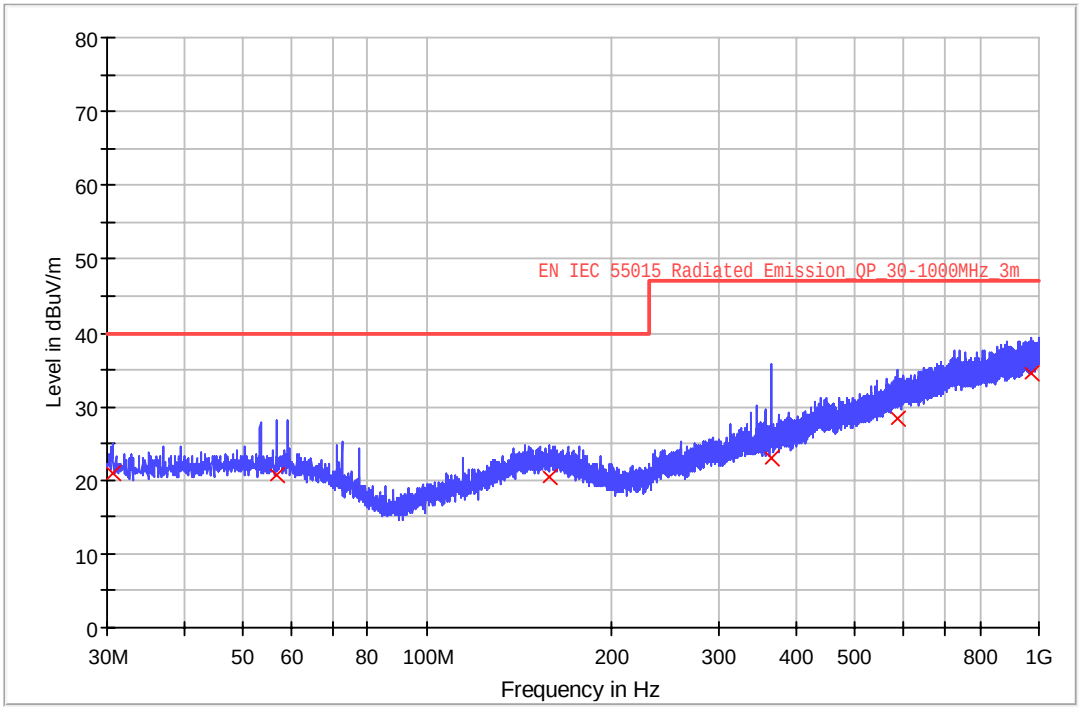
EUT Name:	LED module
Model:	TFBL-24V-9310
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond:	Mode 1
Operator:	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Vertical
Sample No:	SHA-818038-2

Sweep Setup: RE_VULB9168_pre_Cont_EN IEC 55015 30-1000 [EMI radiated]

Hardware Setup:	RE_VULB9168
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB

RE_VULB9168_pre_Cont_EN IEC 55015 30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/
30.640000	20.9	1000.0	120.000	102.0	V	254.0	19.3	19.1	40.0
56.840000	20.7	1000.0	120.000	186.0	V	197.0	20.3	19.3	40.0
158.320000	20.6	1000.0	120.000	139.0	V	348.0	20.9	19.5	40.0
365.920000	23.1	1000.0	120.000	215.0	V	86.0	23.2	23.9	47.0
588.400000	28.4	1000.0	120.000	127.0	V	359.0	28.5	18.6	47.0
973.000000	34.4	1000.0	120.000	163.0	V	125.0	33.9	12.6	47.0

EUT Information

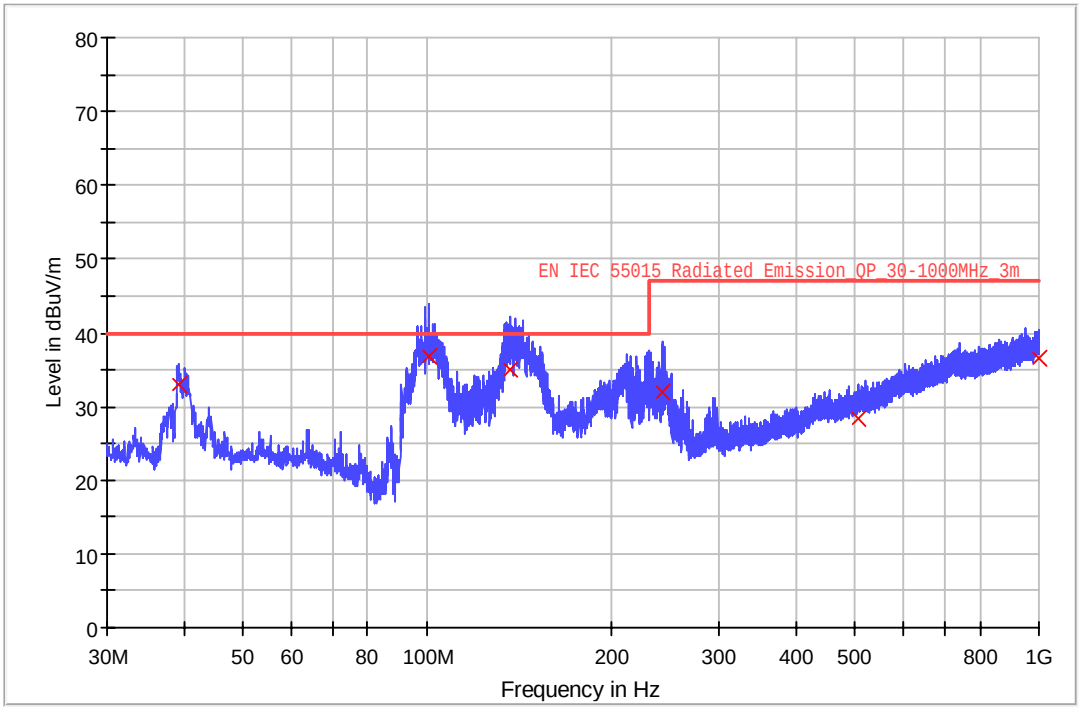
EUT Name:	LED module
Model:	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond:	Mode 1
Operator:	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Horizontal
Sample No:	SHA-818038-3

Sweep Setup: RE_VULB9168_pre_Cont_EN IEC 55015 30-1000 [EMI radiated]

Hardware Setup:	RE_VULB9168
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB

RE_VULB9168_pre_Cont_EN IEC 55015 30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/
39.280000	33.0	1000.0	120.000	143.0	H	0.0	19.9	7.0	40.0
101.000000	36.8	1000.0	120.000	189.0	H	359.0	16.2	3.2	40.0
137.040000	35.1	1000.0	120.000	195.0	H	1.0	20.1	4.9	40.0
242.520000	32.0	1000.0	120.000	226.0	H	182.0	19.7	15.0	47.0
505.200000	28.4	1000.0	120.000	108.0	H	259.0	26.7	18.6	47.0
996.560000	36.5	1000.0	120.000	114.0	H	97.0	34.6	10.5	47.0

EUT Information

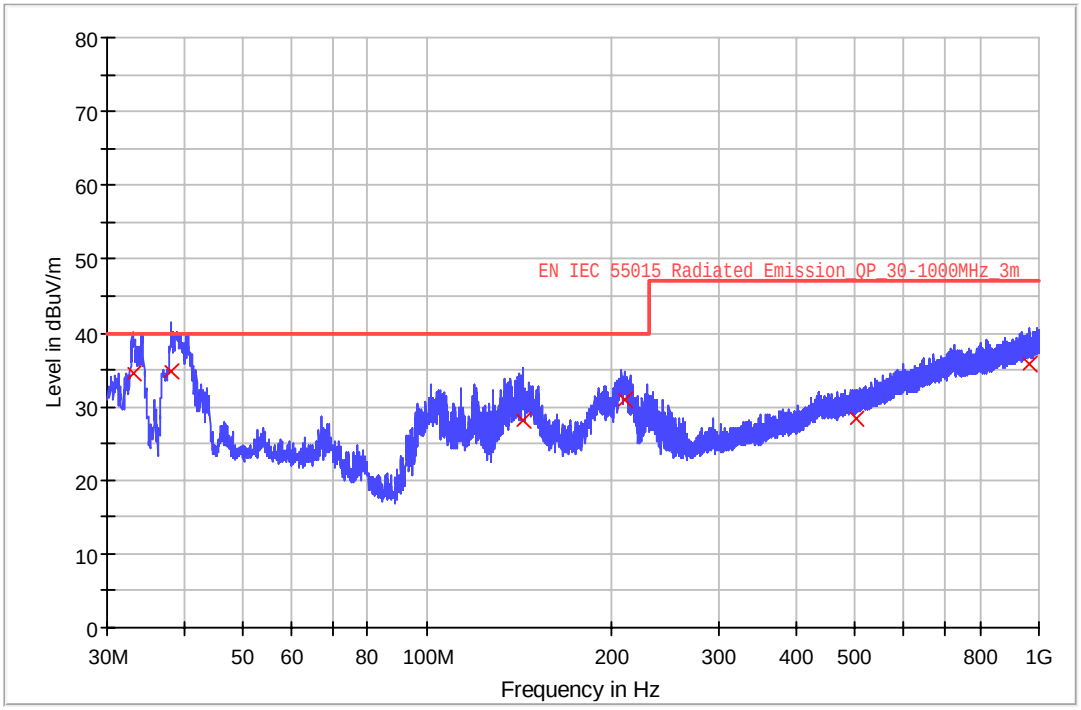
EUT Name:	LED module
Model:	SL-18-1085
Client:	Nanjing Holdlight Technologies Co., Ltd
Op Cond:	Mode 1
Operator:	Zhengyang QIAO
Test Spec:	EN IEC 55015
Comment:	Vertical
Sample No:	SHA-818038-3

Sweep Setup: RE_VULB9168_pre_Cont_EN IEC 55015 30-1000 [EMI radiated]

Hardware Setup:	RE_VULB9168
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	0.2 s	20 dB

RE_VULB9168_pre_Cont_EN IEC 55015 30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/
33.040000	34.4	1000.0	120.000	187.0	V	1.0	19.4	5.6	40.0
38.160000	34.8	1000.0	120.000	196.0	V	359.0	19.7	5.3	40.0
143.360000	28.2	1000.0	120.000	135.0	V	186.0	20.6	11.8	40.0
210.520000	30.9	1000.0	120.000	154.0	V	184.0	17.6	9.1	40.0
502.400000	28.3	1000.0	120.000	217.0	V	255.0	26.6	18.7	47.0
967.600000	35.8	1000.0	120.000	205.0	V	78.0	34.1	11.3	47.0

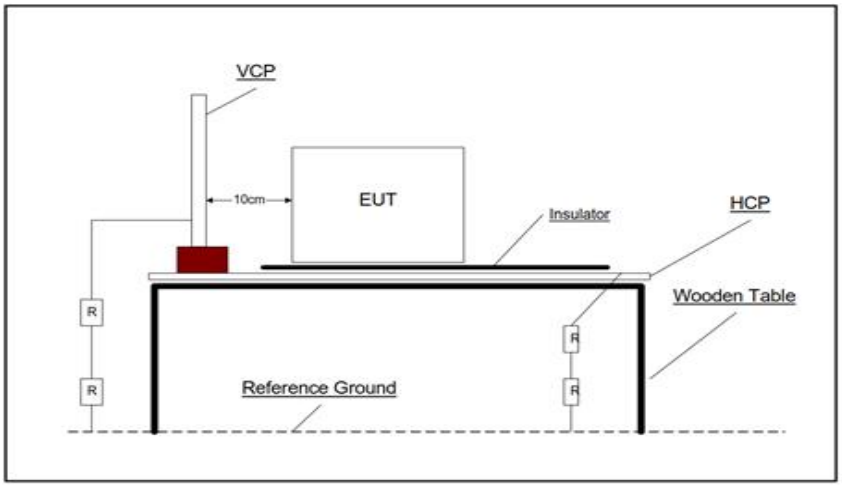
2.4 Electrostatic discharge immunity test

2.4.1 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.

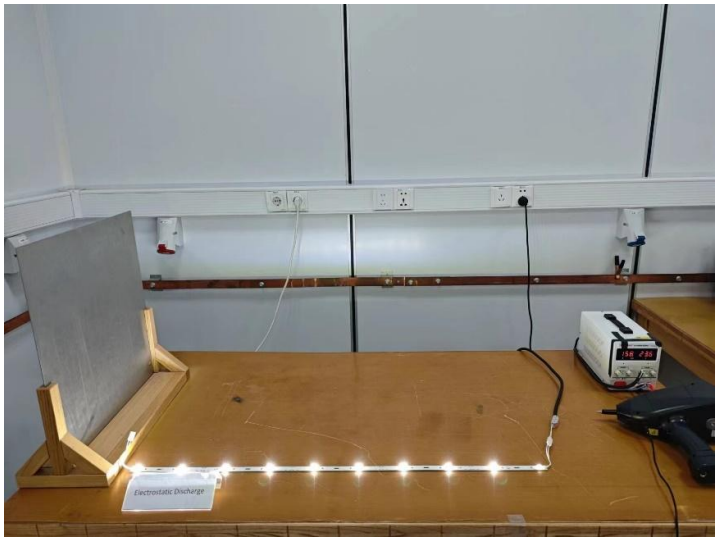
During this testing any anomalies in the equipment under tests performance was recorded.



2.4.2 Specification Limits

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

2.4.3 Test Setup Phots



Model 1

Mode 2

2.4.4 Test Results

Tested Point	Contact or Air Discharge	Discharge Voltage (kV)	No. of Discharge	Results
Indirect Discharge (HCP)	Contact	±2, ±4	10	Pass PC A
Indirect Discharge (VCP)	Contact	±2, ±4	10	Pass PC A
Metal PIN (Handing)	Contact	±2, ±4	10	Pass PC A
Metal shell	Contact	±2, ±4	10	Pass PC A
Light	Air	±2, ±4, ±8	10	Pass PC A
Plastic shell	Air	±2, ±4, ±8	10	Pass PC A
Remark: No observable change during and after testing.				

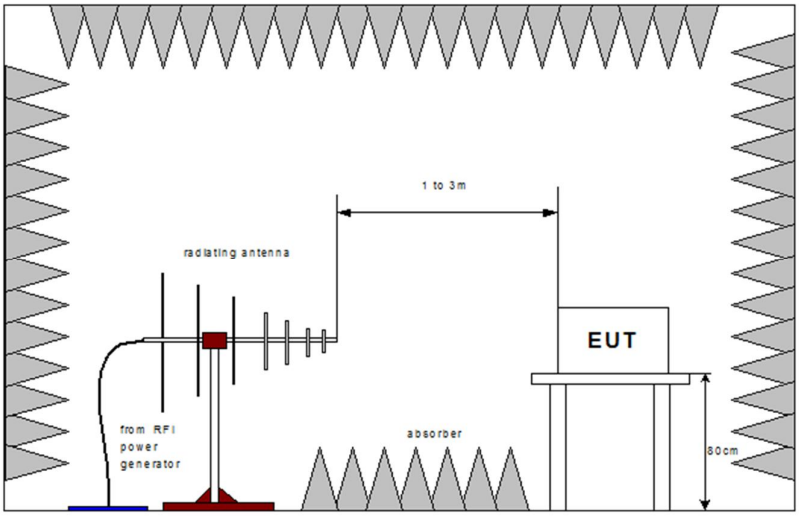
2.5 Radiated, radio-frequency, electromagnetic field immunity test

2.5.1 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.



2.5.2 Specification Limits

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

2.5.3 Test Setup Photos

Mode 1

2.5.4 Test Results

Frequency Range	Test Level	Sides of EUT	Antenna Polarization	Modulation	Step Size	Dwell Time	Result
80MHz-1GHz	3V/m	Four sides	Hor. & Ver.	AM 80% (1kHz)	1%	3s	Pass PC A
Remark: No observable change during and after testing.							

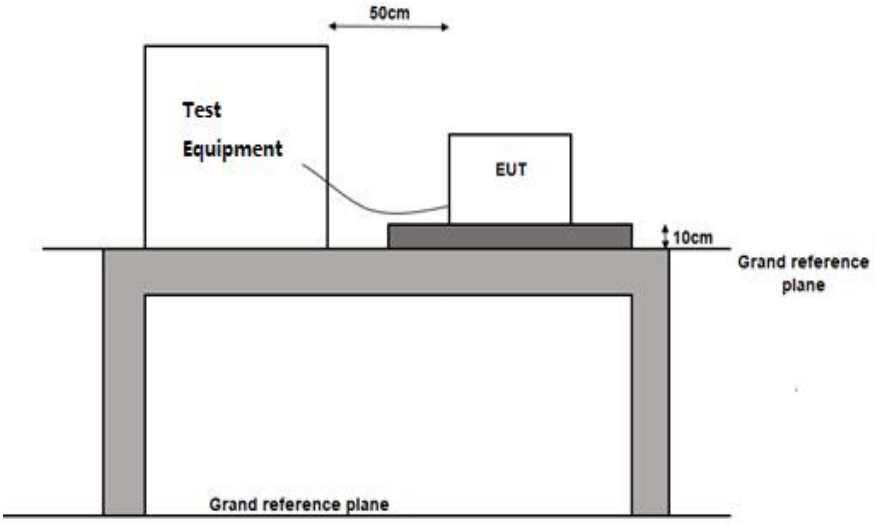
2.6 Electrical fast transient /burst immunity test

2.6.1 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.

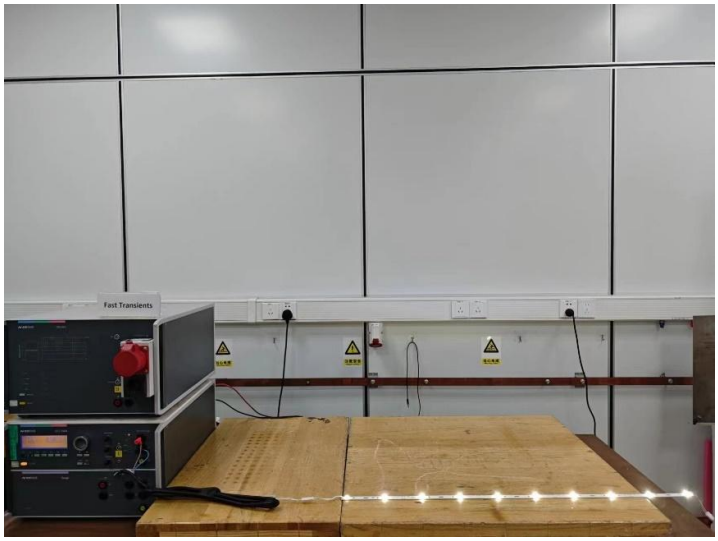
During this testing any anomalies in the equipment under tests performance was recorded.



2.6.2 Specification Limits

Required Test Levels at input and output a.c. power ports					Performance Criteria
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	
AC Power Port	± 1	5 kHz	2 min per polarity	CDN	B

2.6.3 Test Setup Photos



2.6.4 Test Results

Line under test	Test Level & Polarity (kV)	Repetition Rate	Test Duration	Coupling Method	Result
Power line	± 1	5 kHz	2 min	CDN	Pass PC A
Remark: No observable change during and after testing.					

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

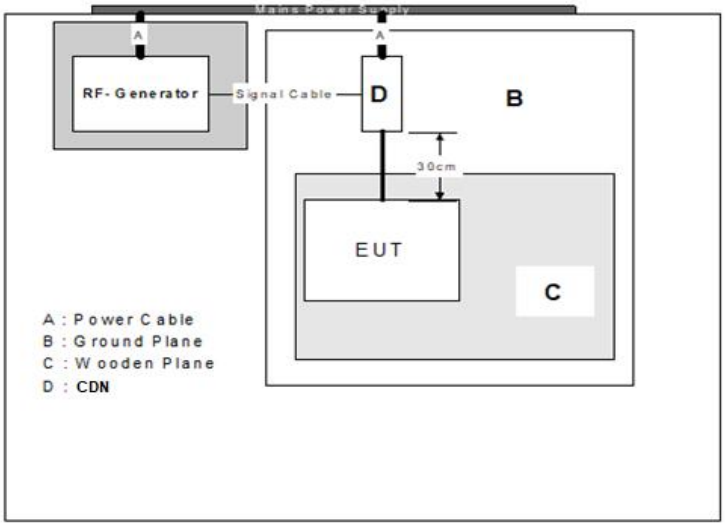
2.7.1 Test Method

The equipment under test was placed on an insulating support 0,1 m above the reference ground plane.

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.



2.7.2 Specification Limits

Required Test Levels at input and output a.c. power ports						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	
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, can exceed 3m.						

2.7.3 Test Setup Photos

2.7.4 Test Results

Line under test	Frequency Range	Test Level	Modulation	Step Size	Dwell Time	Result
Power Line	0.15-80MHz	3V	AM 80% (1kHz)	1%	3s	Pass PC A
Remark: No observable change during and after testing.						

3 Test Equipment and Software Information

Instrument	Manufacturer	Type No	TE No	Calibration Date	Calibration Due
Conducted Disturbance					
EMI test receiver	R & S	ESR3	S1503001-YQ-EMC	2023.8.1	2024.7.31
2-Line V-network	R & S	ENV216	S1503103-YQ-EMC	2023.8.1	2024.7.31
Software	R & S	EMC32 V9.15.03	NA	NA	NA
Radiated Disturbance (9kHz to 30MHz)					
EMI test receiver	R & S	ESR3	S1503101-YQ-EMC	2023.8.1	2024.7.31
Triple loop antenna	R & S	HM020	S1503115-YQ-EMC	2024.7.10	2025.7.9
Software	R & S	EMC32 V9.15.03	NA	NA	NA
Radiated Disturbance (30MHz to 1000MHz)					
EMI test receiver	R & S	ESR3	S1503109-YQ-EMC	2023.8.1	2024.7.31
Trilog super broadband test antenna	SCHWARZBECK	VULB 9168	S1808296-YQ-EMC	2021.9.23	2024.9.22
3 meter semi-anechoic chamber	TDK	3m	S1503231-YQ-EMC	2024.5.8	2027.5.7
Coupling and decoupling network	SCHWARZBECK	CDNE M2	S1804289-YQ-EMC	2023.8.1	2024.7.31
Software	R & S	EMC32 V10.50.40	NA	NA	NA

Instrument	Manufacturer	Type No	TE No	Calibration Date	Calibration Due
Electrostatic discharge immunity test					
ESD Simulator	HAEFELY	ONYX 16	S1905298-YQ-EMC	2024.7.10	2025.7.9
T/H record	Shanghai meteorological instrument	ZJ1-2A	S1503201-YQ-EMC	2024.6.7	2025.6.6
Horizontal Coupling Plane	TÜV Product Service	---	---	---	---
Vertical Coupling Plane	TÜV Product Service	---	---	---	---
Radiated, radio-frequency, electromagnetic field immunity test					
Signal generator	R&S	SMB 100A	S1503055-YQ-EMC	2023.8.1	2024.7.31
Power meter	R&S	NRP2	S1503062-YQ-EMC	2023.8.1	2024.7.31
Average power sensor	R&S	NRP-Z91	S1503068-YQ-EMC	2023.8.1	2024.7.31
Average power sensor	R&S	NRP-Z91	S1503069-YQ-EMC	2023.8.1	2024.7.31
Amplifier	AR	200W1000M7A	S2111427b-YQ-EMC	2024.2.19	2025.2.18
Dual directional coupler	AR	DC6180AM1	S2111428b-YQ-EMC	2024.2.19	2025.2.18
High gain log-periodic antenna	R&S	HL046E	S1503083-SB-EMC	NA	NA
Software	R&S	EMC32 V 10.50.40	NA	NA	NA
Electrical fast transient/burst immunity test					
Ultra compact simulator	EM test	UCS 500N5T	S1503171-YQ-EMC	2023.8.1	2024.7.31
Software	EM test	Iec.control V5.3.7	NA	NA	NA
Immunity to conducted disturbances, induced by radio-frequency field					
Continuous wave generator	CWS 500 N2.2	EM test	S1503159-YQ-EMC	2023.8.1	2024.7.31
6dB attenuator	EM test	ATT 6/80	S1503180-SB-EMC	--	--
Coupling and decoupling network	EM test	CDN M2/M3	S1503186-YQ-EMC	2023.8.1	2024.7.31
Software	EM test	Icd.control V5.3.12	NA	NA	NA

4 Measurement Uncertainty

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

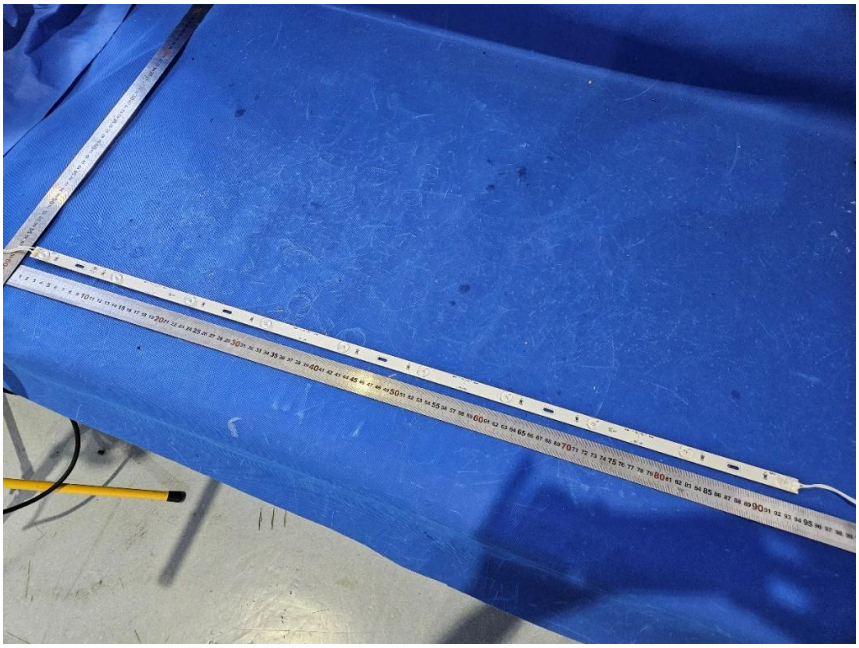
Test Name	Measurement Uncertainty
Conducted Disturbance	9kHz to 30MHz, 3.16dB (AMN)
Radiated Disturbance (LLAS)	9kHz to 30MHz, 2.78 dB
Radiated Disturbance	9kHz to 30MHz, 3.52dB 30MHz to 1GHz, 5.03dB (Horizontal) 5.12dB (Vertical)

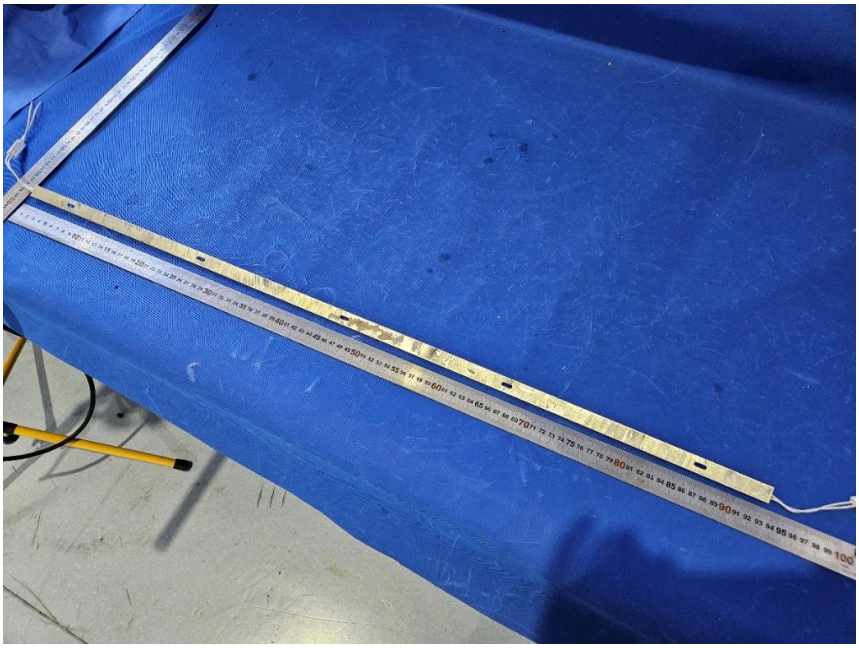
Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3

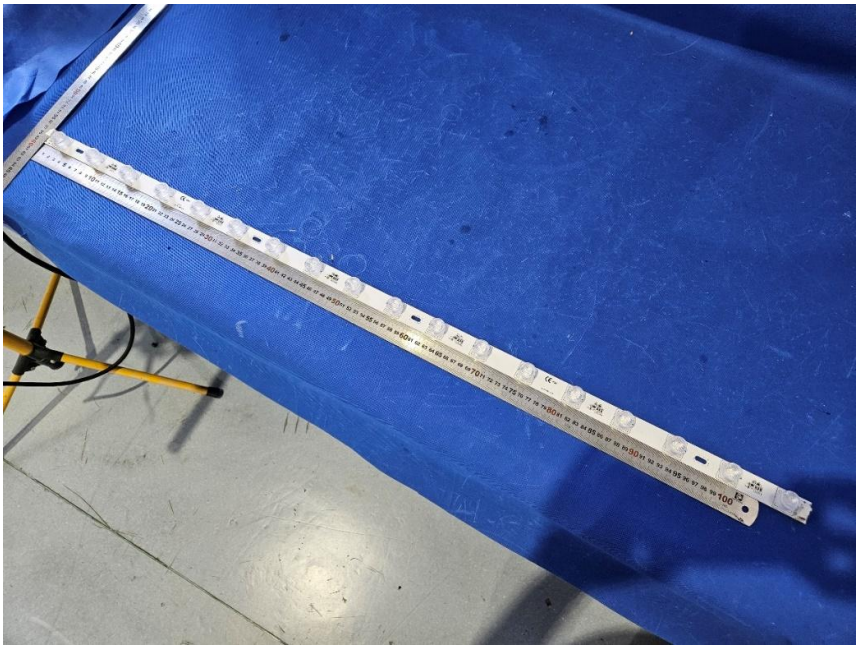
5 Photographs

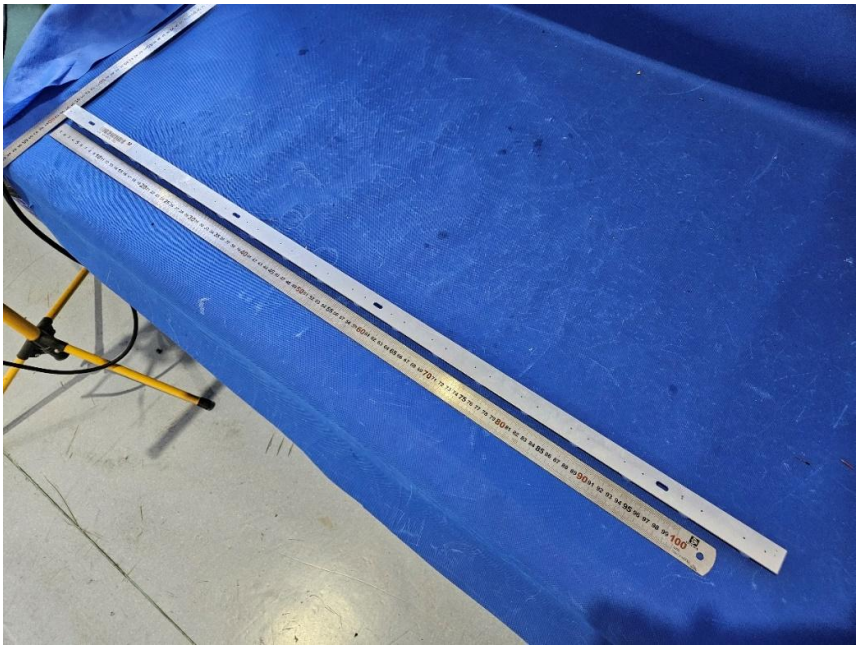
5.1 EUT Photo

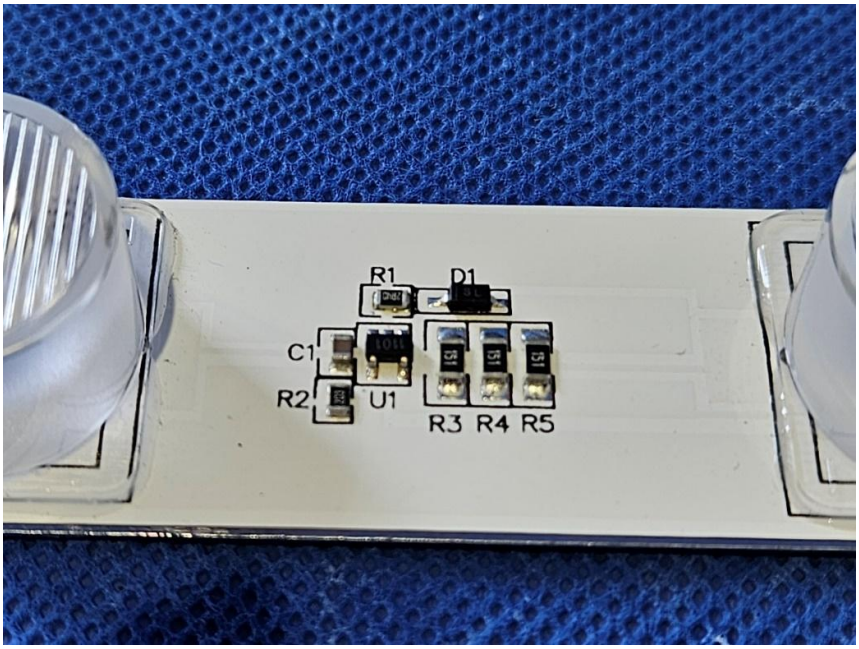


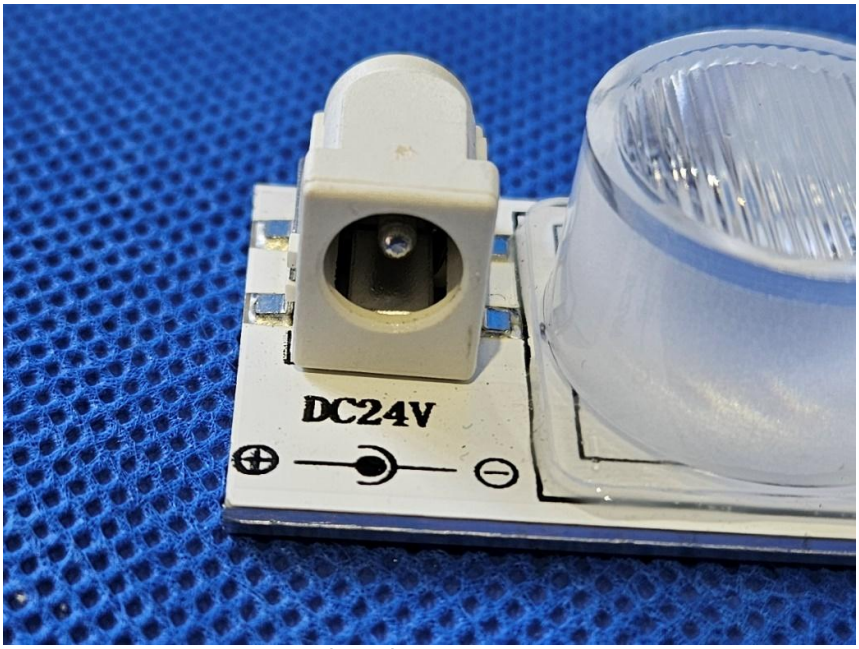


Above is TFBL-24V-9310






R1
D1
C1
R2
U1
R3 R4 R5



Above is SL-18-1085

----------End of Test Report----------