



EMC TEST REPORT

For

Sundopt LED Lighting Co., Ltd.

Standing luminaires

Test Model: UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD

Additional Models : please refer to model list

Prepared for : Sundopt LED Lighting Co., Ltd.
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Prepared by : Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : November 10, 2023
Number of tested samples : 3
Serial number : Prototype
Date of Test : November 10, 2023 - November 30, 2023
Date of Report : November 30, 2023



**EMC TEST REPORT****EN IEC 55015:2019+A11:2020**

Emission - Electrical lighting and similar equipment

EN 61547:2009

Equipment for general lighting purposes - EMC immunity requirements

Report Number..... : LCSB11103010E

Date of Issue..... : November 30, 2023

Testing Laboratory Name..... : Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

Address..... : 101-201, No.39 Building,Xialang Industrial Zone, Heshuikou Community, Matian Street,Guangming District, Shenzhen, China.

Testing Procedure..... : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐**Applicant's Name..... : Sundopt LED Lighting Co., Ltd.**

Address..... : Warehouse No.1- YK Al Moayyed Building, Dubai Investment Park - 2, Dubai Investment Park - 2, Jebel Ali, 56874, Dubai, UAE

Test Specification:Standard..... : EN IEC 55015:2019+A11:2020
EN IEC 61000-3-2:2019+A1:2021
EN 61000-3-3:2013+A1:2019+A2:2021
EN 61547:2009

Test Report Form No..... : SLCSEMC-2.3

TRF Originator..... : Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

Master TRF..... : Dated 2016-08

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Equipment Under Test..... : Standing luminaires

Trademark..... : N/A

Test Model/Type..... : UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD

Rating..... : please refer to model list

Results : PASS**Compiled by:**

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EMC - TEST REPORT

Test Report No.....: LCSB11103010E

Applicant.....:	Sundopt LED Lighting Co., Ltd.
Address.....:	Warehouse No.1- YK Al Moayyed Building, Dubai Investment Park - 2, Dubai Investment Park - 2, Jebal Ali, 56874, Dubai, UAE
Telephone.....:	/
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Manufacturer.....:	Sundopt LED Lighting Co., Ltd.
Address.....:	Warehouse No.1- YK Al Moayyed Building, Dubai Investment Park - 2, Dubai Investment Park - 2, Jebal Ali, 56874, Dubai, UAE
Telephone.....:	/
Fax.....:	/
Factory.....:	Sundopt LED Lighting Co., Ltd.
Address.....:	Warehouse No.1- YK Al Moayyed Building, Dubai Investment Park - 2, Dubai Investment Park - 2, Jebal Ali, 56874, Dubai, UAE
Telephone.....:	/
Fax.....:	/

The applicant and manufacturer information, product name, model, trademark and other information in this report are all provided by the applicant, and this laboratory is not responsible for verifying its authenticity.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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ENVIRONMENTAL CONDITIONS

The climatic conditions during the test are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. the climatic conditions during the test were in the following Limits:

Ambient temperature	15°C - 30°C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa - 106 kPa

Climate values will be recorded and recorded separately if specifically required in the base standard or application product/product series standard.

POSSIBLE TEST CASE VERDICTS

Test cases does not apply to test object	N/A
Test object does meet requirement	P(Pass) / PASS
Test object does not meet requirement	F(Fail) / FAIL
Not measured	N/M

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

☒ Indicate that the conditions, standards or equipment listed is applicable to this report / test / EUT.
☐ Indicate that the conditions, standards or equipment listed is not applicable to this report / test / EUT.

REVISION HISTORY

Revision	Issue Date	Revision Content	Revised by
000	November 30, 2023	Initial Issue	-

Remark:
000) : “---”





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1. GENERAL INFORMATION

1.1. GENERAL DESCRIPTION OF THE ITEM(S)

Equipment Under Test	Standing luminaires
Test Model/Type	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD
Additional Models/Type	please refer to model list
Description of Model difference	please refer to model list
Rating	please refer to model list



**Model List:**

Declared by applicant as follows:

- All models of drives use the same circuit and PCB layout.
- All models have similar appearance and structure except power.
- This report after information review and verification, the model(s) “UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD” were chosen as the representative model to perform all the tests.

Model	Power	LED driver
UNF-2026030-KD	60W	BK-CJL080-2000AM
UNF-2026030-CDA	60W	BK-HGV100-48V0
UNF-2026030-CDS	60W	BK-CJL080-2000AM
UNF-2026030-TD	60W	BK-HGV100-48V0
UNF-2026030-TDC	60W	BK-HGV100-48V0
UNF-2028030-KD	80W	BK-KHL080-2000Am
UNF-2028030-CDA	80W	BK-HGV100-48V0
UNF-2028030-CDS	80W	BK-CJL080-2000AM
UNF-2028030-TD	80W	BK-HGV100-48V0
UNF-2028030-TDC	80W	BK-HGV100-48V0
UNF-20210030-KD	100W	BK-KHL080-2000Am BK-KHL050- 1300Am
UNF-20210030-CDA	100W	BK-HGV100-48V0
UNF-20210030-CDS	100W	BK-CJL080-2000AM BK-CJL050-1300AM
UNF-20210030-TD	100W	BK-HGV100-48V0
UNF-20210030-TDC	100W	BK-HGV100-48V0
UNF-20210015-TD	100W	BK-HGV100-48V0
UNF-20210015-TDC	100W	BK-HGV100-48V0
UNT-1296030-KD	60W	BK-KHL080-2000Am
UNT-1296030-CDA	60W	BK-HGV100-48V0
UNT-1296030-CDS	60W	BK-CJL080-2000AM
UNT-1296030-TD	60W	BK-HGV100-48V0
UNT-1296030-TDC	60W	BK-HGV100-48V0
UNT-1298030-KD	80W	BK-KHL080-2000Am
UNT-1298030-CDA	80W	BK-HGV100-48V0
UNT-1298030-CDS	80W	BK-CJL080-2000AM
UNT-1298030-TD	80W	BK-HGV100-48V0
UNT-1298030-TDC	80W	BK-HGV100-48V0
UNT-12910030-KD	100W	BK-KHL080-2000Am BK-KHL050- 1300Am
UNT-12910030-CDA	100W	BK-HGV100-48V0
UNT-12910030-CDS	100W	BK-CJL080-2000AM BK-CJL050-1300AM
UNT-12910030-TD	100W	BK-HGV100-48V0
UNT-12910030-TDC	100W	BK-HGV100-48V0
UNT-12910015-TD	100W	BK-HGV100-48V0
UNT-12910015-TDC	100W	BK-HGV100-48V0



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1.2. OPERATING MODE(S) USED OF TESTS

During the tests, the following operating mode(s) has(have) been used.

Operating Mode	Operating Mode description	Used for testing	
		Emission	Immunity
1	Lighting on mode	☒	☒
2	Maximum light	☐	☐
3	Minimum light	☐	☐
4	Full load	☐	☐

1.3. SUPPORT / AUXILIARY EQUIPMENT FOR THE EUT

EUT has been tested using the following auxiliary equipment :

Auxeq	Model/Type	Manufacturer	Supplied by
--			

1.4. DESCRIPTION OF TEST FACILITY

Test Location	Shenzhen Southern LCS Compliance Testing Laboratory Ltd. 101-201, No.39 Building,Xialang Industrial Zone, Heshuikou Community, Matian Street, Guangming District, Shenzhen, China. CNAS Registration Number is L10160.
Date of receipt of test item	November 10, 2023
Date(s) of performance of test	November 10, 2023 - November 30, 2023





2. STATEMENT OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. the reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. the measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods - Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. the manufacturer has the sole responsibility of continued compliance of the device.

Measurement	Uncertainty (U_{lab})
Conducted disturbance (9kHz - 30MHz)	± 2.80 dB
Magnetic field disturbance (9kHz - 30MHz)	± 3.46 dB
Radiated disturbance (30MHz - 200MHz)	± 4.66 dB
Radiated disturbance (200MHz - 1GHz)	± 4.64 dB

Supplementary information:

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.





3. MEASURING DEVICES AND TEST EQUIPMENT

CONDUCTED DISTURBANCE						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	No. 1 shielded Room	CHENGYU	843	/	2023-04-26	2026-04-25
2	EMI Test Receiver	R&S	ESCI	101142	2023-04-26	2024-04-25
3	10dB Attenuator	SCHWARZBECK	VTSD9561-F	9561-F159	2023-04-26	2024-04-25
4	Artificial Mains Network	SCHWARZBECK	NSLK 8163	00043	2023-09-04	2024-09-03
5	Impedance Stabilization Network	SCHWARZBECK	NTFM 8158	NTFM8158#120	2023-04-26	2024-04-25
6	Voltage Probe	SCHWARZBECK	KT 9420	9420401	2023-04-26	2024-04-25
7	EMI Test Software	EZ	EZ_EMC	N/A	/	/

RADIATED DISTURBANCE (9KHz - 30MHz)						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	No. 1 shielded Room	CHENGYU	843	/	2023-04-26	2026-04-25
2	EMI Test Receiver	R&S	ESCI	101142	2023-04-26	2024-04-25
3	10dB Attenuator	SCHWARZBECK	VTSD9561-F	9561-F159	2023-04-26	2024-04-25
4	Triple-loop Antenna	EVERFINE	LLA-2	11050003	2023-04-26	2024-04-25
5	EMI Test Software	EZ	EZ_EMC	N/A	/	/

RADIATED DISTURBANCE (above 30MHz)						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2021-05-28	2024-05-29
2	EMI Test Receiver	R&S	ESCI3	101010	2023-04-26	2024-04-25
3	Log-periodic Antenna	SCHWARZBECK	VULB9163	5094	2022-05-08	2025-05-07
4	Coupling Decoupling Network	SCHWARZBECK	CDNE M2	00251	2023-04-26	2024-04-25
5	Coupling Decoupling Network	SCHWARZBECK	CDNE M3	00248	2023-04-26	2024-04-25
6	EMI Test Software	EZ	EZ_EMC	N/A	/	/
7	Controller system	SKET	SKC1000	N/A	/	/

HARMONIC CURRENT & FLICKER						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Harmonic Current and Flicker Test System	HTEC	AC2000A	/	2023-04-26	2024-04-25
2	Linear variable frequency power supply	HTEC	HHF-5010	/	2023-04-26	2024-04-25

ELECTROSTATIC DISCHARGE						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	TESEQ	NSG 437	1615	2023-03-20	2024-03-19

ELECTRICAL FAST TRANSIENT / BURST						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date



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1	Electrical Fast Transient Generator	HTEC	HEFT51	162201	2023-04-26	2024-04-25
2	EFT Coupling Clamp	HTEC	H3C	163701	2023-04-26	2024-04-25

SURGE

Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Surge Generator	3CTEST	SG5006G	EC5581070	2023-04-26	2024-04-25
2	Coupling / Decoupling network	3CTEST	SGN-5010G	EC5591033	2023-04-26	2024-04-25

INJECTED CURRENTS (RADIO-FREQUENCY COMMON MODE)

Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	No. 2 shielded room	CHENGYU	743	/	2023-04-26	2026-04-25
2	Conducted Susceptibility Generator	HTEC	CDG6000	126A140012016	2023-04-26	2024-04-25
3	CDN	HTEC	CDN-M2+M3	A22/0382/2016	2023-04-26	2024-04-25
4	6dB attenuator	HTEC	ATT6	HA1601	2023-04-26	2024-04-25
5	Electromagnetic clamp	LUTHI	EM101	35535	2023-04-26	2024-04-25

POWER FREQUENCY MAGNETIC FIELD

Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Frequency Mag-Field Generator System	HTEC	HPFMF100	100-2400	2023-04-26	2024-04-25

VOLTAGE DIPS AND SHORT INTERRUPTIONS

Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Voltage Dips and up Generator	HTEC	HPFS161P	162202	2023-04-26	2024-04-25

RADIO-FREQUENCY ELECTROMAGNETIC FIELDS

Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2023-03-02	2026-03-01
2	RF signal generator	Agilent	8648B	3847M00804	2023-03-02	2024-03-01
3	Power amplifier	SKET	LPA 0810-150	202302457	2023-03-02	2024-03-01
4	Field generating antenna	SKET	STLP 9129 Plus	/	/	/
5	Power probe	R&S	NRP-Z11	115232	2023-03-02	2024-03-01
6	Power probe	R&S	NRP-Z11	117755	2023-03-02	2024-03-01
7	Test Software	SKET	EMC-S	N/A	/	/



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4. VERDICT SUMMARY SECTION

This chapter present an overview of the standards and results. Refer the next chapter for details of measured test results and applied test levels.

4.1. STANDARD(S)

EN IEC 55015:2019+A11:2020 - Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.

EN 61547:2009 - Equipment for general lighting purposes — EMC immunity requirements.

EN IEC 61000-3-2:2019+A1:2021 - Electromagnetic compatibility (EMC) Part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).

EN 61000-3-3:2013+A1:2019+A2:2021 - Electromagnetic compatibility (EMC) Part 3-3: Limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.



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4.2. OVERVIEW OF RESULTS

EMISSION TESTS - EN IEC 55015, EN IEC 61000-3-2, EN 61000-3-3		
Requirement - Test case	Limit	Verdict
Conducted Disturbance - electric power supply	Table 1, Table 4	PASS
Conducted Disturbance - wired network ports at other than power supply	Table 2, Table 3	N/A
Conducted Disturbance - local wired ports at other than electrical power supply interface of ELV lamp	Table 5, Table 6	N/A
Assessment of the enclosure port	---	---
Radiated Disturbance in the frequency range 9 kHz to 30 MHz	Table 8, Table 9	PASS
Radiated Disturbance in the frequency range 30 MHz to 1 GHz	Table 10	PASS
Harmonic Current	Clause 7	PASS
Voltage Fluctuations and Flicker ²	Clause 5	N/A
IMMUNITY TESTS - EN IEC 61547		
Requirement - Test case	Basic Standard(s)	Verdict
Electrostatic Discharge	IEC/EN 61000-4-2	PASS
Radio-Frequency Electromagnetic Fields	IEC/EN 61000-4-3	PASS
Electrical Fast Transient / Burst	IEC/EN 61000-4-4	PASS
Surge	IEC/EN 61000-4-5	PASS
Injected Currents (Radio-Frequency Common Mode)	IEC/EN 61000-4-6	PASS
Power Frequency Magnetic Field ¹	IEC/EN 61000-4-8	N/A
Voltage Dips and Short Interruptions	IEC/EN 61000-4-11	PASS

Supplementary information:

- 1) Only need to be applied to equipment containing components susceptible to magnetic fields.
- 2) According to EN 61000-3-3:2013+A1:2019+A2:2021 Clause A.2, Incandescent lamp luminaires with ratings less than or equal to 1000W and discharge and LED lamp luminaires with ratings less than or equal to 600W, are deemed to comply with the standard and are not required to be tested.





5. EMISSION TESTS

5.1. CONDUCTED DISTURBANCE

Standard	EN IEC 55015:2019+A11:2020
Basic Standard(s)	CISPR 16-2-1

Disturbance voltage limits at the electric power supply interface

Frequency range [MHz]	Limit: Quasi-peak [dB(μV)]	Limit: Average[dB(μV)]	IF BW
0,009 - 0,05	110	N/A	200 Hz
0,05 - 0,15	90 - 80	N/A	200 Hz
0,15 - 0,5	66 - 56	56 - 46	9 kHz
0,5 - 5,0	56	46	9 kHz
5,0 - 30	60	50	9 kHz

- 1) At the transition frequency, the lower limit applies.
- 2) The limit decreases linearly with the logarithm of the frequency in the ranges 50 kHz to 150 kHz and 150 kHz to 0,5 MHz.
- 3) If the EUT is non-restricted ELV lamps, the limits add 26dB.

Disturbance voltage limits at wired network interfaces other than power supply

Frequency range [MHz]	Limit: Quasi-peak [dB(μV)]	Limit: Average[dB(μV)]	IF BW
0,15 - 5,0	84 - 74	74 - 64	9 kHz
5,0 - 30	74	64	9 kHz

- 1) The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.
- 2) The disturbance voltage limits are derived for use with an artificial asymmetrical network (AAN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the measured interface.

Disturbance current limits at wired network interfaces other than power supply

Frequency range [MHz]	Limit: Quasi-peak [dB(μA)]	Limit: Average[dB(μA)]	IF BW
0,15 - 5,0	40 - 30	30 - 20	9 kHz
5,0 - 30	30	20	9 kHz

- 1) The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.5 MHz.

Disturbance voltage limits at local wired ports: local wired ports other than electrical power supply interface of ELV lamp

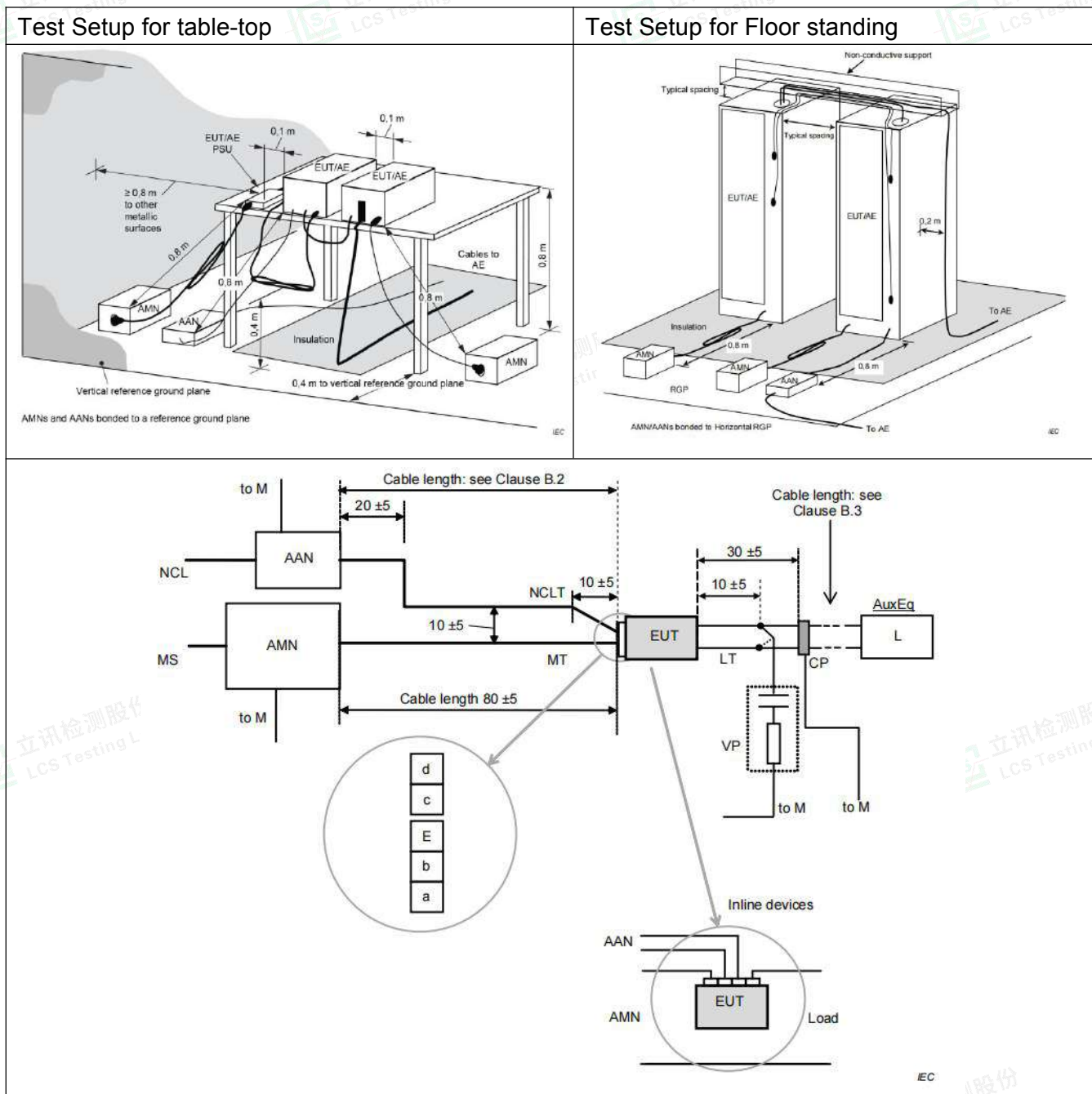
Frequency range [MHz]	Limit: Quasi-peak [dB(μV)]	Limit: Average[dB(μV)]	IF BW
0,15 - 5,0	80	70	9 kHz
5,0 - 30	74	64	9 kHz

- 1) At the transition frequency, the lower limit applies.





Test configuration



Test Procedure Description

For Table-top, EUT shall be placed at $(0,8 \pm 0,05)$ m above the reference plane of the test site selected for measurement. for Floor standing, EUT shall be placed at $(0,12 \pm 0,04)$ m above the reference plane of the test site selected for measurement. and connected to the AC mains through artificial mains network (LISN). EUT is powered by V-type artificial power network, and the distance from LISN or ANN is 0,8m. the part of the EUT power cord exceeding 0,8m folds in parallel to form a 0,3-0,4 m eights harness.

Test Results refer to Annex A.1





5.2. RADIATED DISTURBANCE (9KHz - 30MHz)

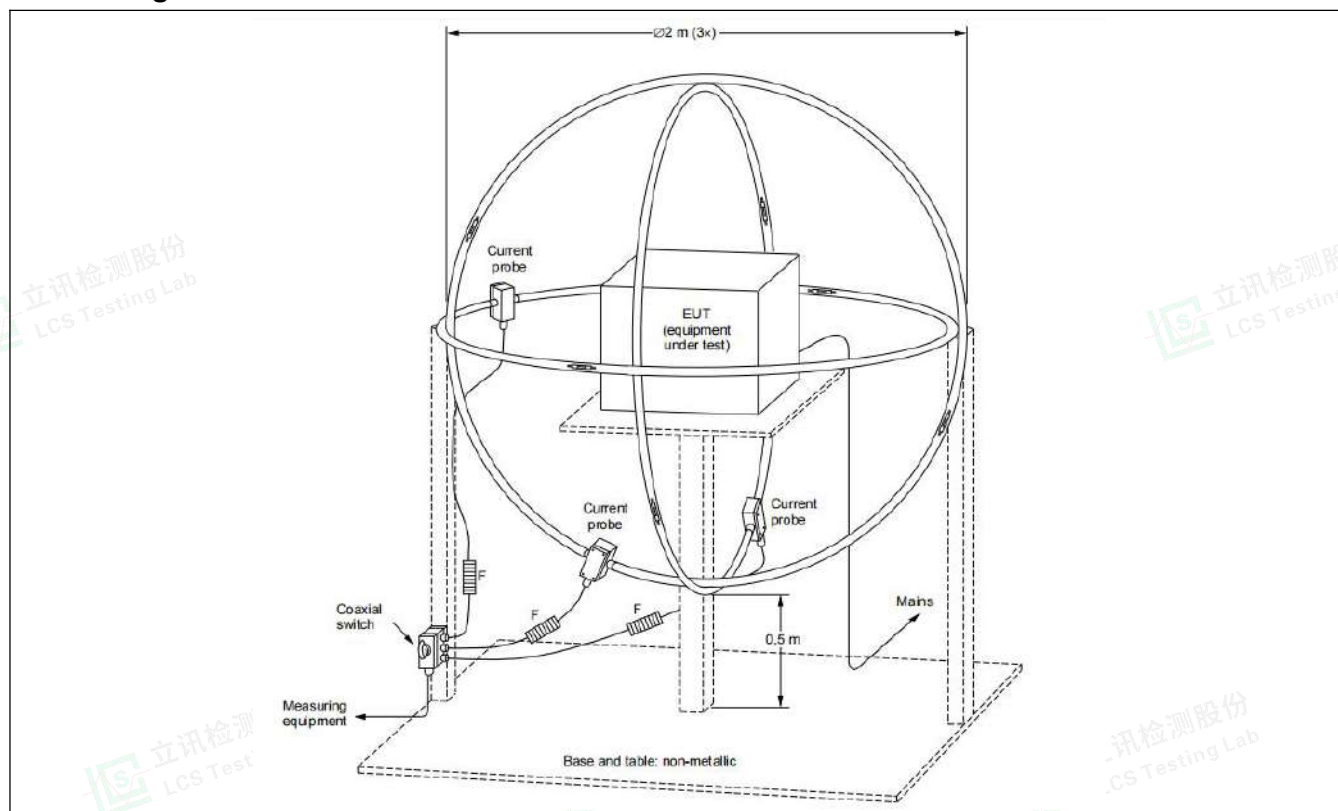
Standard	EN IEC 55015:2019+A11:2020
Basic Standard(s)	CISPR 16-2-3
Test method	Large Loop Antenna (LLA)

LLAS Radiated disturbance limits (2m)

Frequency range [MHz]	Limit: Quasi-peak [dB(μA)]	IF BW
0,009 - 0,07	88	200 Hz
0,07 - 0,15	88 - 58	200 Hz
0,15 - 3,0	58 - 22	9 kHz
3,0 - 30	22	9 kHz

1) At the transition frequency the lower limit applies.
2) Decreasing linearly with logarithm of the frequency.

Test configuration



Test Procedure Description

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.

Test Results refer to Annex A.2





5.3. RADIATED DISTURBANCE (30MHz - 1GHz)

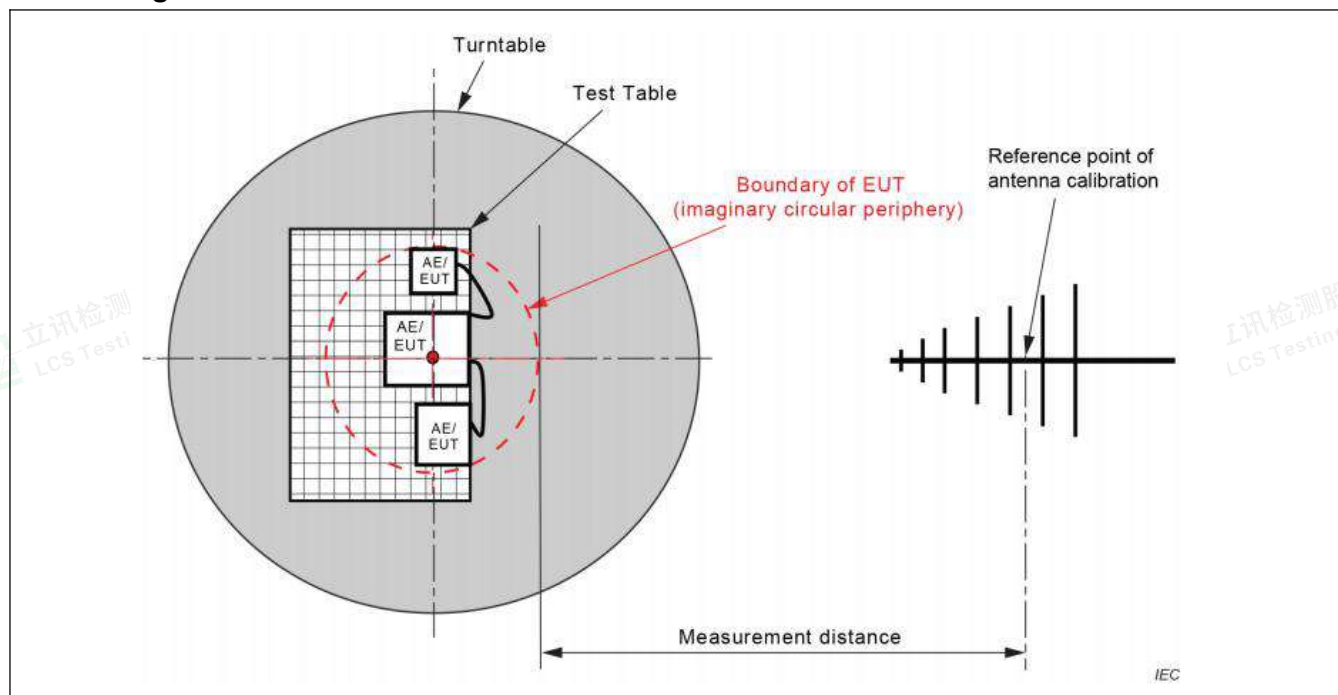
Standard	EN IEC 55015:2019+A11:2020
Basic Standard(s)	CISPR 16-2-3
Test method	Semi Anechoic Chamber (SAC)

SAC Radiated disturbance limit

Frequency range [MHz]	Limit: Quasi-peak [dB(μV/m)]		IF BW
	3 m distance	10 m distance	
30 - 230	40	30	120 KHz
230 - 1000	47	37	120 KHz

- 1) At the transition frequency, the lower limit applies.
- 2) Distance refers to the distance in meters between the measuring instrument antenna geometric center and the closed point of any part of the EUT.

Test configuration



Test Procedure Description

The radiated disturbance test was conducted in a 3m Semi Anechoic Chamber and conforming to CISPR 16-2-3. the EUT is placed on a turntable, which is 0.8 meter high above the ground. the turntable can rotate 360 degrees to determine the position of the maximum emission level. the EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. the antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Log-periodic Antenna (calibrated by Dipole antenna) is used as a receiving antenna. both horizontal and vertical polarization of the antenna is set on test.

Test Results refer to Annex A.3



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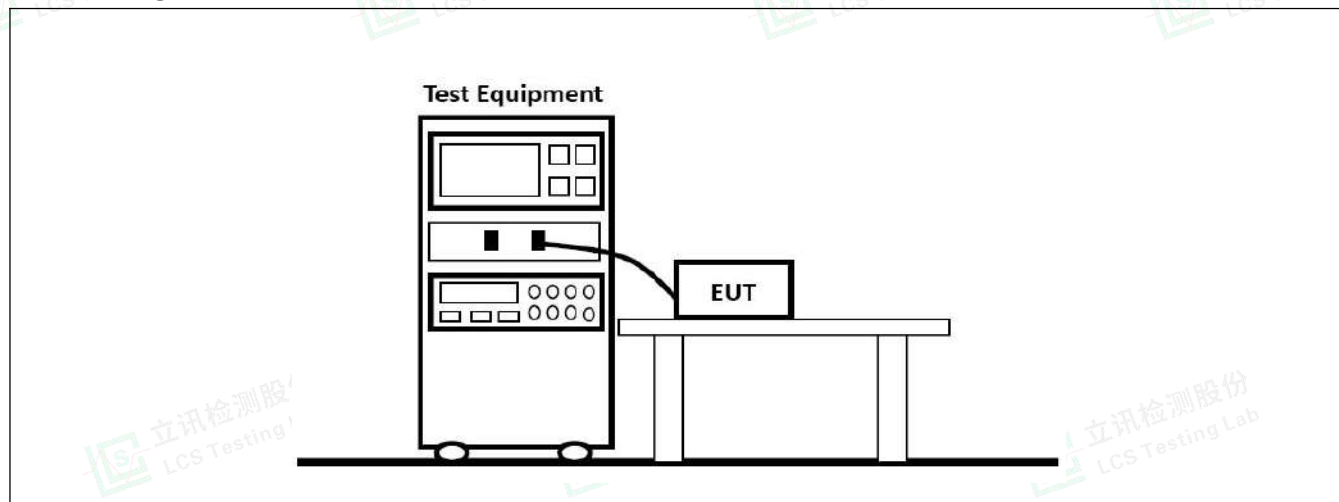


5.4. HARMONIC CURRENT

Standard	EN IEC 61000-3-2:2019+A1:2021	
Exclusions (For these categories of equipment, limits are not specified in the EN IEC 61000-3-2)	☐	Systems with nominal voltages less than 220V _{AC} (line-to-neutral)
	☐	Lighting equipment with rated power < 5 W
	☐	Equipment with rated power of ≤ 75 W (other than lighting equipment)
	☐	Professional equipment with a total rated power >1kW
	☐	Symmetrically controlled heating elements with rated power ≤ 200 W
	☐	Independent dimmers for incandescent lamps with rated power ≤ 1kW

Classification		
☐	Class A	All equipment not specified as belonging to Class B, C or D
☐	Class B	Portable tools
☒	Class C	☒ Lighting equipment with active input power > 25W
		☐ Lighting equipment with active input power ≥ 5W and ≤ 25W
		☐ Table 3, column 2 (Power-related limits)
		☐ 3rd harmonic ≤ 86%, 5th harmonic ≤ 61% and waveform conditions
		☐ THD ≤ 70%, Harmonic:3rd ≤ 35%, 5th ≤ 25%, 7th ≤ 30%, 9th and 11th ≤ 20%, 2nd ≤ 5%
☐	Class D	Personal computers, television receivers, refrigerators and freezers having one or more variable-speed drives to control compressor

Test configuration



Test Results refer to Annex A.4





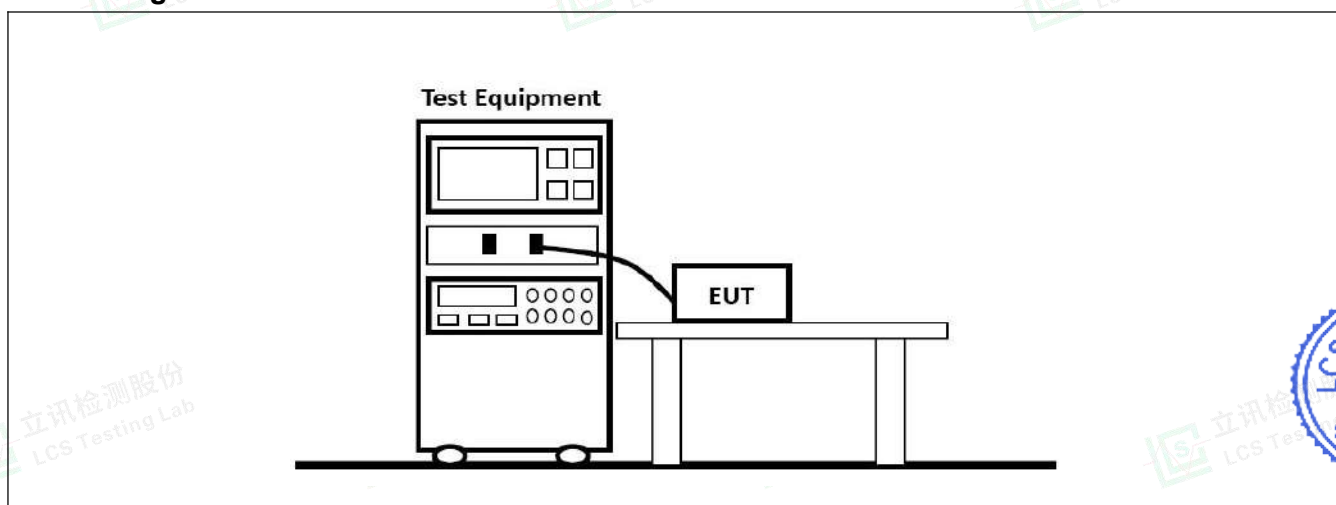
5.5. VOLTAGE FLUCTUATIONS & FLICKER

Standard	EN 61000-3-3:2013+A1:2019+A2:2021
----------	-----------------------------------

Limit

P _{st} (Short term flicker)	☐	≤ 1	☒	Not applicable
P _{lt} (Long-term flicker)	☐	≤ 0,65	☒	Not applicable
T _{max} (Accumulated time)	☐	≤ 500 ms	☒	Not applicable
d _c (Relative voltage change)	☐	≤ 3.3%	☒	Not applicable
d _{max} (Max.voltage change)	☐	≤ 4%	☐	≤ 6%
	☐	≤ 7%	☒	Not applicable

Test configuration





6. IMMUNITY TESTS

6.1. PERFORMANCE CRITERIA

Standard	EN 61547:2009
----------	---------------

For the various immunity tests that apply, the performance of the following functions shall be assessed, as far as applicable or specified by the manufacturer:

- the luminous intensity of the luminaire or of the light source(s);
- the control function, for example on/off switching, light level setting, colour adjustment, wireless control.

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 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.

Electronic lighting equipment		Tests and performance criteria							
		5.2 (ESD)	5.3 (RS)	5.4 (PFMF)	5.5 (EFT)	5.6 (CS)	5.7 (Surge)	5.8 (Dips)	5.8 (Interruption)
☐	Self-ballasted lamps	B	A	A	B	A	C	C	B
☒	Lighting equipment (excluding self-ballasted lamps) Module in host	B	A	A	B	A	C	C	B ¹
☐	Luminaire for emergency lighting	B ²	A	A	B ²	A	B ²	See ³	See ³

Supplementary information:

- 1) For ballasts where the lamp is not able to restart within 1 min, due to the physical constraints of the lamp, performance criterion C applies.
- 2) Luminaires for emergency lighting shall be tested in both the normal and emergency mode of operation.
- 3) These tests do not apply as they are covered by the test in IEC 60598-2-22.
- 4) For emergency luminaires designed to operate in high-risk task areas, after the test, the luminous intensity shall be restored to its initial value within 0,5 s.





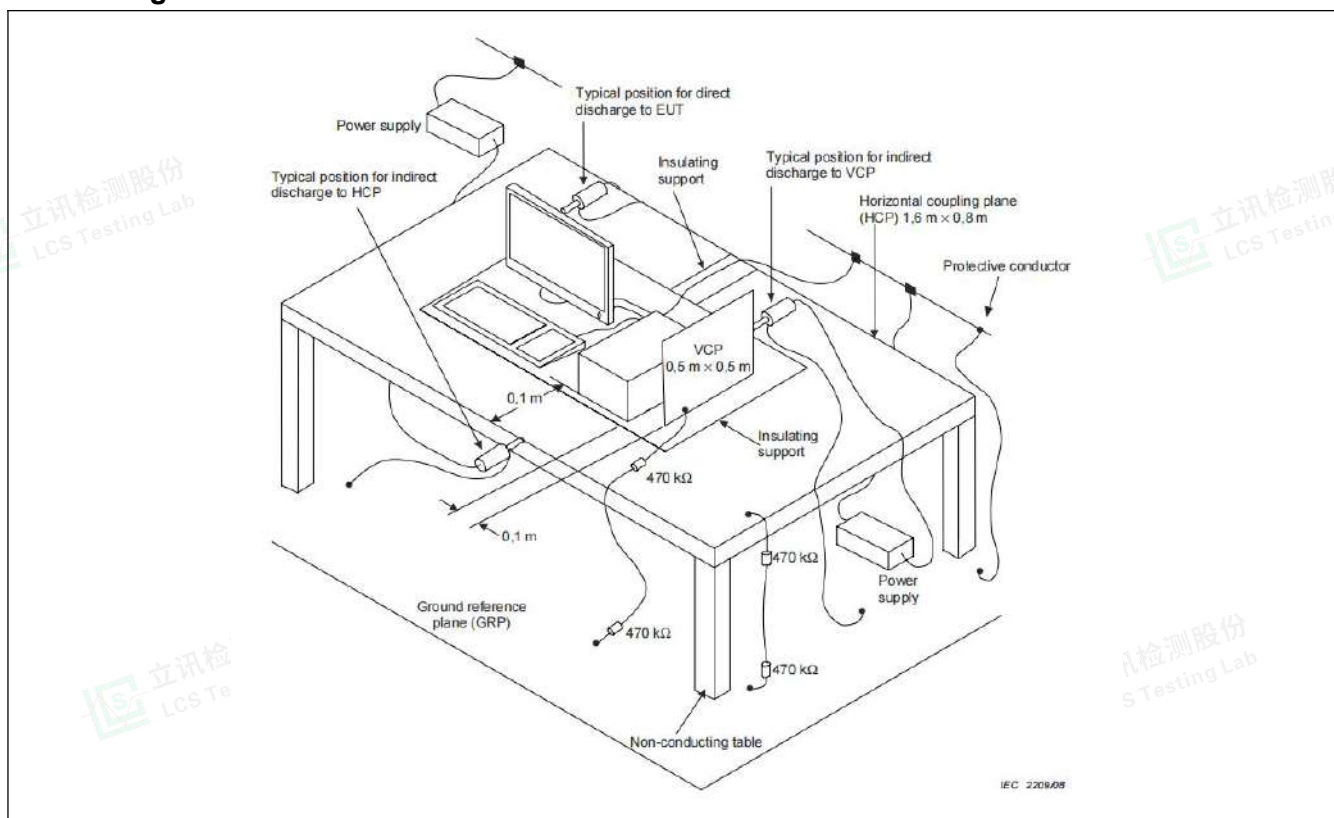
6.2. ELECTROSTATIC DISCHARGE

Electrostatic discharge (ESD) is the result of accumulated static electricity from a person or object, for example, walking on a synthetic carpet. ESD can indirectly affect the operation of equipment or damage its electronic components through direct discharge or coupling. both effects were simulated during the test. contact discharge is the preferred test method. twenty discharges (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure (terminals are excluded). air discharges shall be used where contact discharges cannot be applied. discharges shall be applied on the horizontal or vertical coupling planes.

Requirements

Standard	EN 61547:2009							
Basic standard	EN 61000-4-2							
Port under test	Enclosure							
Contact discharge	☒	± 2 kV	☒	± 4 kV	☐	±8 kV	☐	±15 kV
Air discharge	☒	± 2 kV	☒	± 4 kV	☒	±8 kV	☐	±15 kV
Number of discharges	≥ 10 per polarity with ≥ 1 sec interval							

Test configuration



Test Results refer to Annex A.5





6.3. RADIO-FREQUENCY ELECTROMAGNETIC FIELDS

During the test it is verified if the EUT has sufficient immunity against radiated electromagnetic fields.

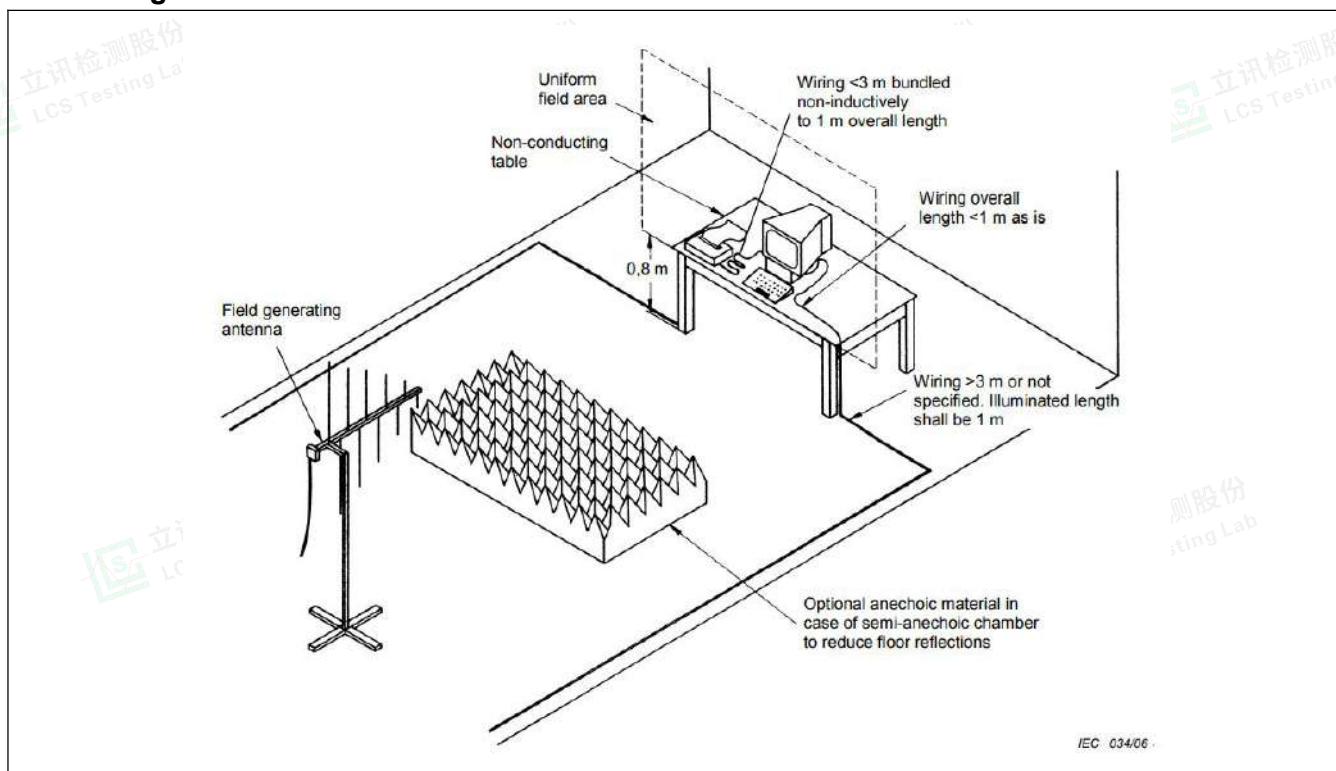
The test was carried out in a half-wave anechoic chamber with absorbent material attached to a reflective ground plate. Before the test, the test field strength needs to be calibrated. during the calibration, the corresponding relationship between the target field strength and the forward power applied to the transmitting antenna is established. during the test, except for EUT, the indoor layout is consistent with the calibration.

The EUT and its simulators are placed on a turn table which is 0,8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. both horizontal and vertical polarization of the antenna are set on test. each of the four sides of EUT must be faced this transmitting antenna and measured individually. in order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

Requirements

Standard	EN 61547:2009			
Basic standard	EN 61000-4-3			
Port under test	Enclosure			
Frequency range	Test level	Modulation	Dwell time	Step size
80 - 1000 MHz	3 V/m	1 kHz, 80 % AM	≥ 0,5 s	≤ 1%

Test configuration



Test Results refer to Annex A.5



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6.4. ELECTRICAL FAST TRANSIENT / BURST

The EFT immunity test simulates the disturbances by caused of very short transient bursts.

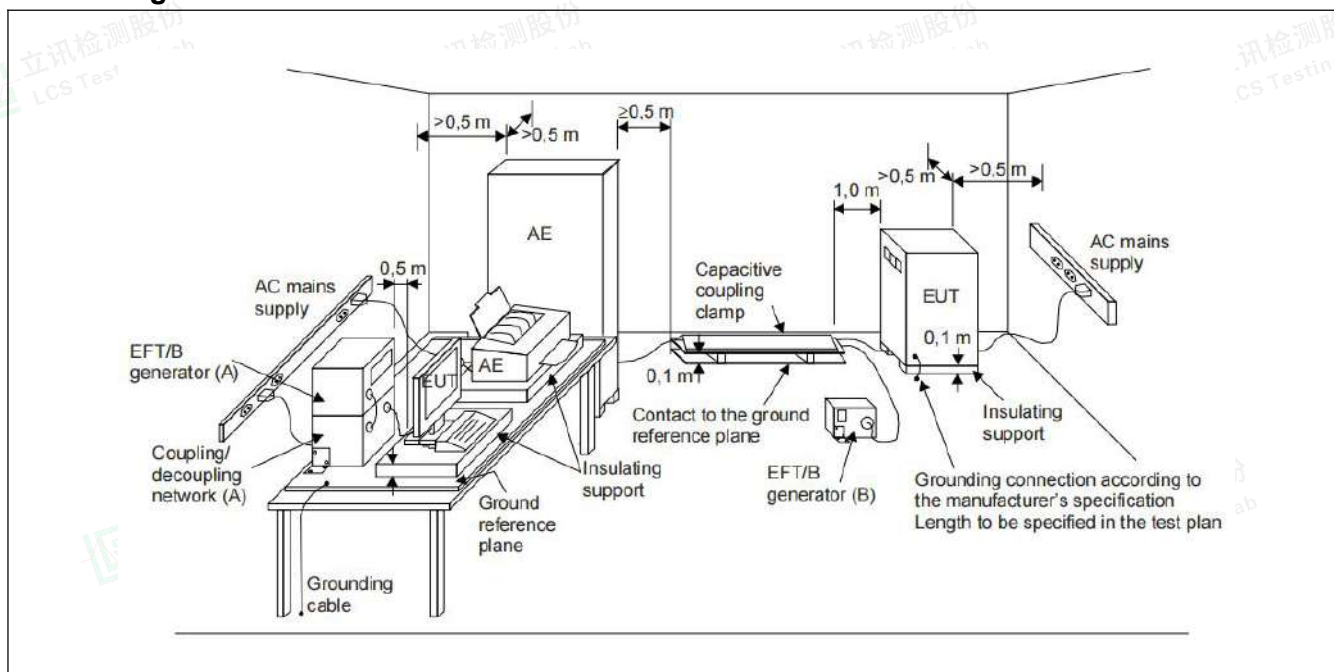
The EUT is put on the Insulating support which is 0.1 meter high above the ground reference plane. the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5 m. both polarities of the test voltage should be applied during test, fast transients are carried out with a minimum duration of 2 min with a positive polarity and a minimum of 2 min with a negative polarity.

Requirements

Standard	EN 61547:2009			
Basic standard	EN 61000-4-4			
Pulse characteristics	5/50 ns			
Port under test	Test level	Repetition frequency	Duration	
☒ AC input / output power	$\pm 1000 \text{ V}$	5 kHz	2 min / polarity	
☐ DC input / output power ²	$\pm 500 \text{ V}$	5 kHz	2 min / polarity	
☐ Signal / control lines and load ¹ ports	$\pm 500 \text{ V}$	5 kHz	2 min / polarity	

1) Only applicable to ports interfacing with cables whose whose total length may exceed 3 m.
2) Not applicable to equipment not connected to the mains while in use.

Test configuration



Test Results refer to Annex A.5



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6.5. INJECTED CURRENTS (RADIO-FREQUENCY COMMON MODE)

During the test the immunity of the EUT for conducted electromagnetic fields is checked .

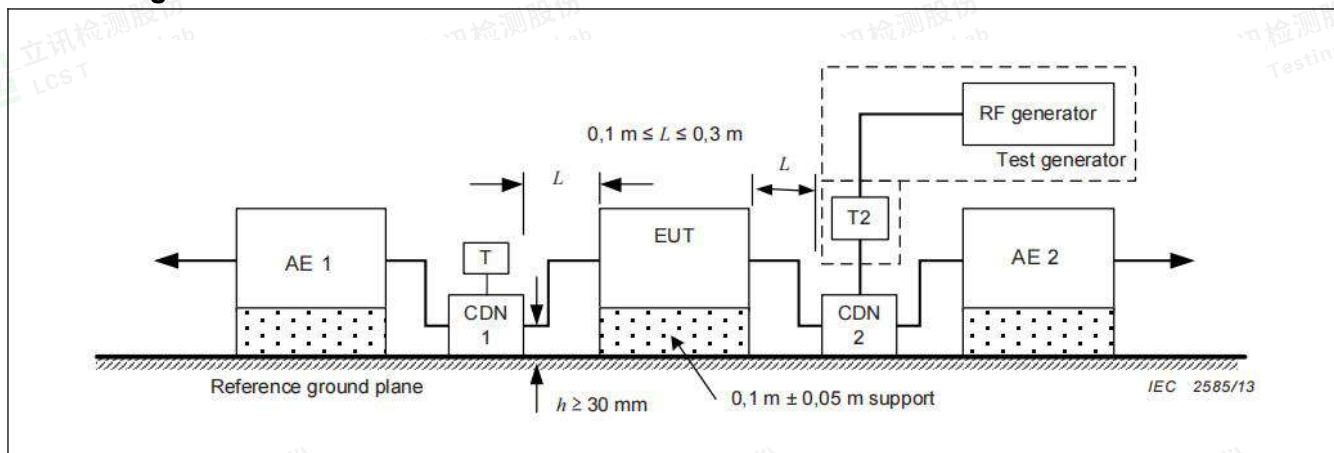
The equipment to be tested is placed on an insulating support of $0,1 \text{ m} \pm 0,05 \text{ m}$ height above a reference ground plane. a non conductive roller / caster in the range of $0,1 \text{ m} \pm 0,05 \text{ m}$ above the reference ground plane can be used as an alternative to an insulating support. all cables exiting the EUT shall be supported at a height of at least 30 mm above the reference ground plane. The coupling and decoupling devices shall be placed on the reference ground plane, making direct contact with it at a distance of 0.1 m to 0.3 m from the EUT.

Requirements

Standard		EN 61547:2009			
Basic standard		EN 61000-4-6			
Frequency range		0,15 - 80 MHz			
Port under test		Test level	Modulation	Dwell time	Step size
☒	AC input / output power	3 V	1 kHz, 80 % AM	≥ 0,5 s	≤ 1%
☐	DC input / output power ^{1 2}	3 V	1 kHz, 80 % AM	≥ 0,5 s	≤ 1%
☐	Signal / control line ²	3 V	1 kHz, 80 % AM	≥ 0,5 s	≤ 1%

1) Not applicable to equipment not connected to the mains while in use.
2) Only applicable to ports interfacing with cables whose whose total length may exceed 3 m.

Test configuration



Test Results refer to Annex A.5





6.6. SURGE

The surge immunity test simulates unidirectional surges caused by overvoltages from switching and lightning transients.

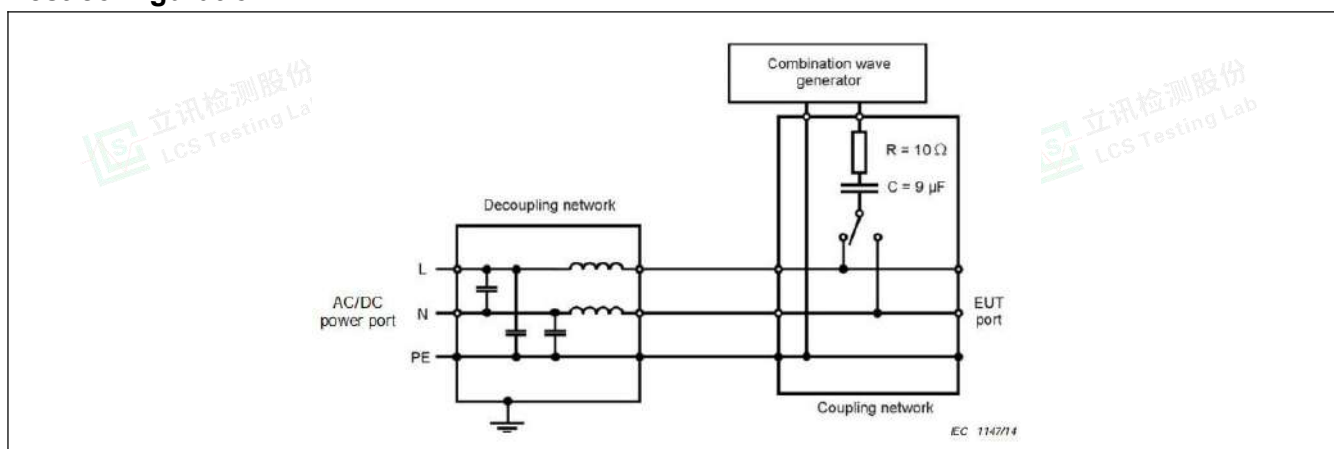
The surge is applied to the EUT power supply terminal via the capacitive coupling network, to the EUT power supply provide a 1,2/50 μ s voltage surge (at open-circuit condition), at least 5 positive and 5 negative tests with 1 min or less repetition rate are conducted during test. and phase angles is 90° and 270°.

Requirements

Standard		EN 61547:2009			
Basic standard		EN 61000-4-5			
Pulse wave-shape		1,2/50 μ s			
Repetition rate		1 per minute or faster			
Number of pulses		5 pulses (at each polarity and phase angles)			
Classification		Port under test	Test Level	Coupling	Phase angle
☒	Luminaires and independent auxiliaries Input power >25W	AC input power	+ 1 kV	line - line	90°
			- 1 kV	line - line	270°
			+ 2 kV	line - ground	90°
			- 2 kV	line - ground	270°
☐	Luminaires and independent auxiliaries Input power $\leq$ 25W	AC input power	+ 0,5 kV	line - line	90°
			- 0,5 kV	line - line	270°
			+ 1 kV	line - ground	90°
			- 1 kV	line - ground	270°
☐	Self-ballasted lamps and semi-luminaires	AC input power	+ 0,5 kV	line - line	90°
			- 0,5 kV	line - line	270°
			+ 1 kV	line - ground	90°
			- 1 kV	line - ground	270°

1) In addition to the specified test level, all lower test levels as detailed in EN 61000-4-5 should also be satisfied.

Test configuration



Test Results refer to Annex A.5





6.7. VOLTAGE DIPS AND SHORT INTERRUPTIONS

The surge immunity test simulates Voltage dips and short interruptions occur due to faults in a (public or non-public) network or in installations by sudden changes of large loads.

The EUT shall be connected to the test generator for testing using the shortest power cable specified by the EUT manufacturer and, if no cable length is specified, the shortest cable suitable for the EUT, each representative mode of operation shall be tested. for short interruptions to use 0° for one of the phases.

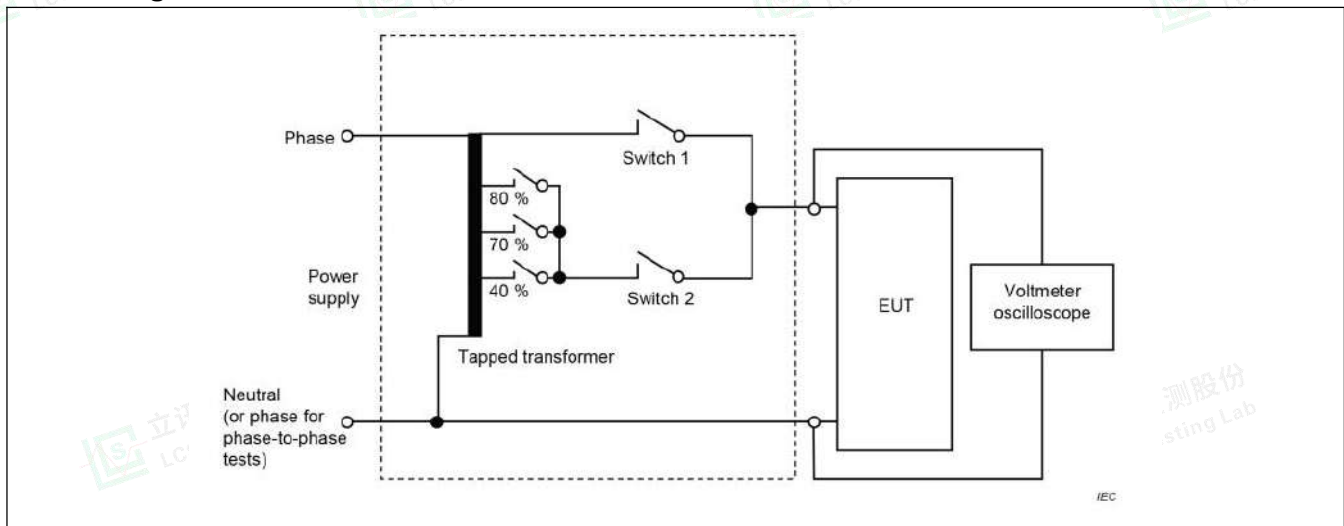
Requirements

Standard	EN 61547:2009		
Basic standard	EN 61000-4-11		
# of dips / interruptions	3 dips / interruptions for each test level and phase angle		
Intervals between events	≥ 10 s		
Port under test	Test level ¹	Number of periods (cycles)	
		50Hz	60Hz
AC input power	70% of U_{NOM}	10	12
	0% of U_{NOM}	0,5	0,5

1) Where the equipment has a rated voltage range the following shall apply:

- If the voltage range does not exceed 20 % of the lower voltage specified for the rated voltage range, a single voltage within that range may be specified as a basis for the test level specification.
- in all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.

Test configuration



Test Results refer to Annex A.5



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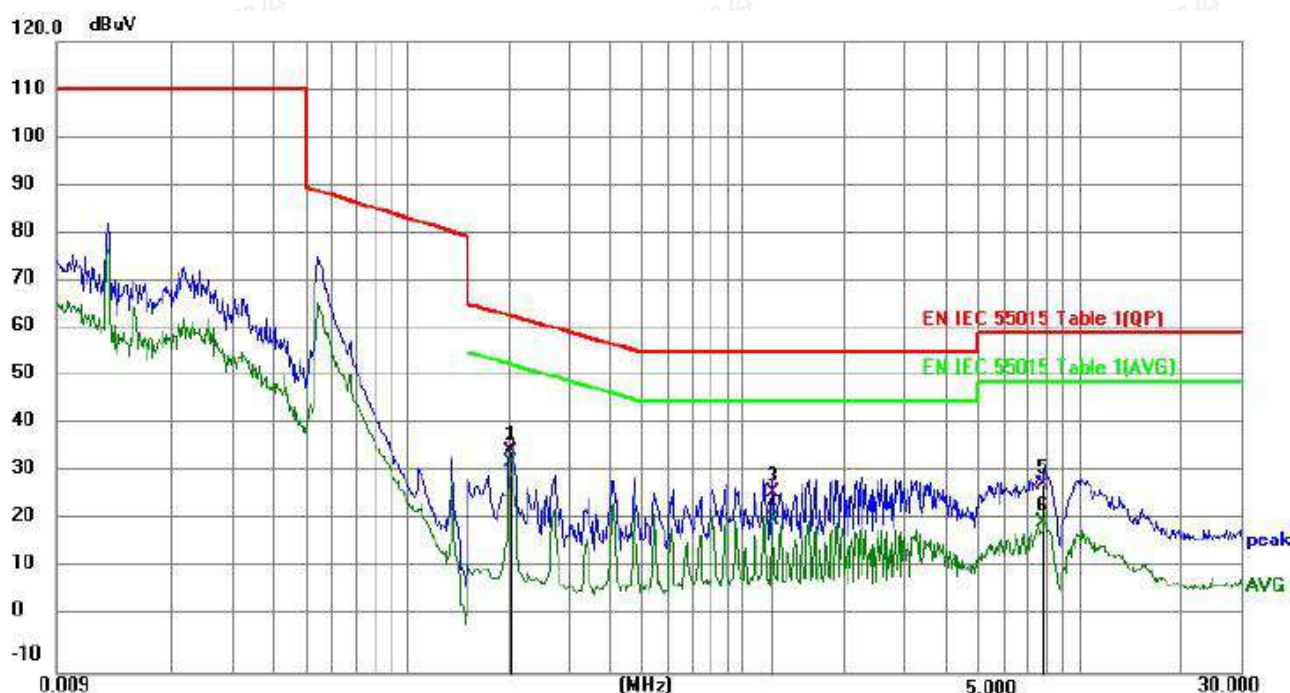
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ANNEX A - TEST RESULTS

A.1. CONDUCTED DISTURBANCE TEST RESULTS

Environmental Conditions	24.4°C, 54% RH
Model	UNF-2028030-KD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V, 50Hz
Test engineer	Aru Yang
Pol	Line

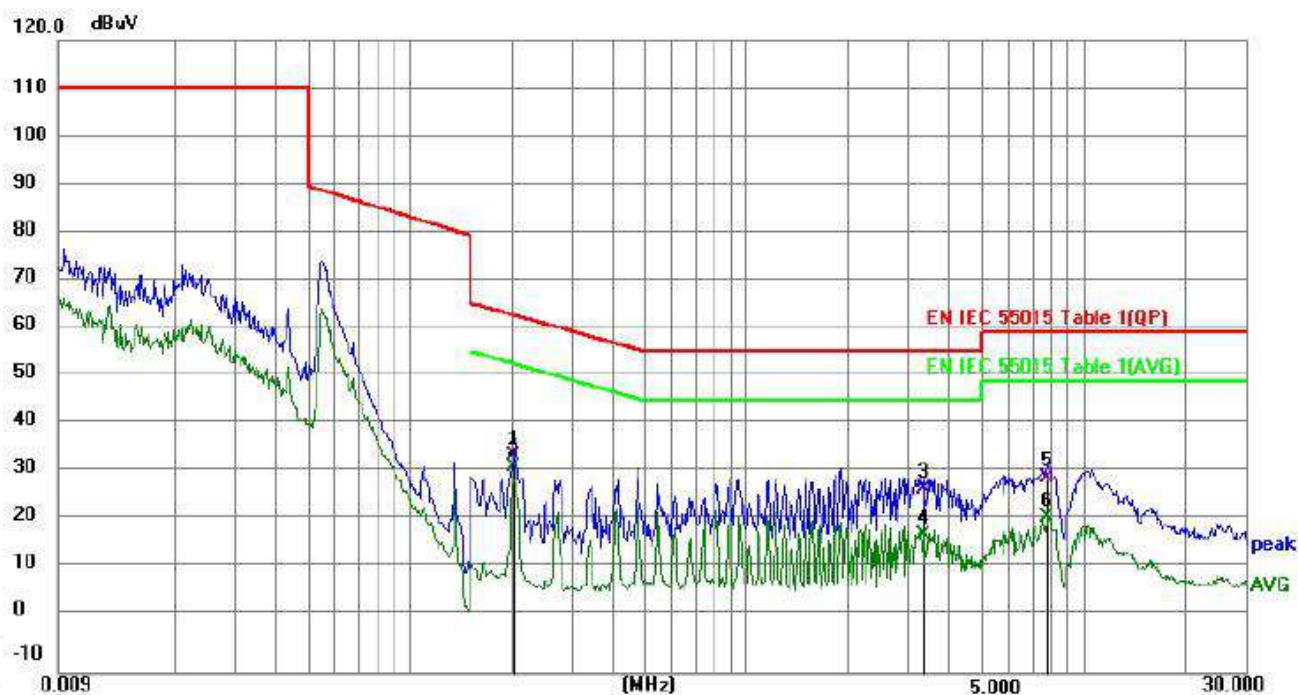


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2024	25.32	10.28	35.60	63.51	-27.91	QP	
2	*	0.2024	23.01	10.28	33.29	53.51	-20.22	AVG	
3		1.2190	16.77	10.38	27.15	56.00	-28.85	QP	
4		1.2190	11.26	10.38	21.64	46.00	-24.36	AVG	
5		7.7830	18.06	10.65	28.71	60.00	-31.29	QP	
6		7.7830	10.44	10.65	21.09	50.00	-28.91	AVG	





Environmental Conditions	24.4℃, 54% RH
Model	UNF-2028030-KD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Neutral

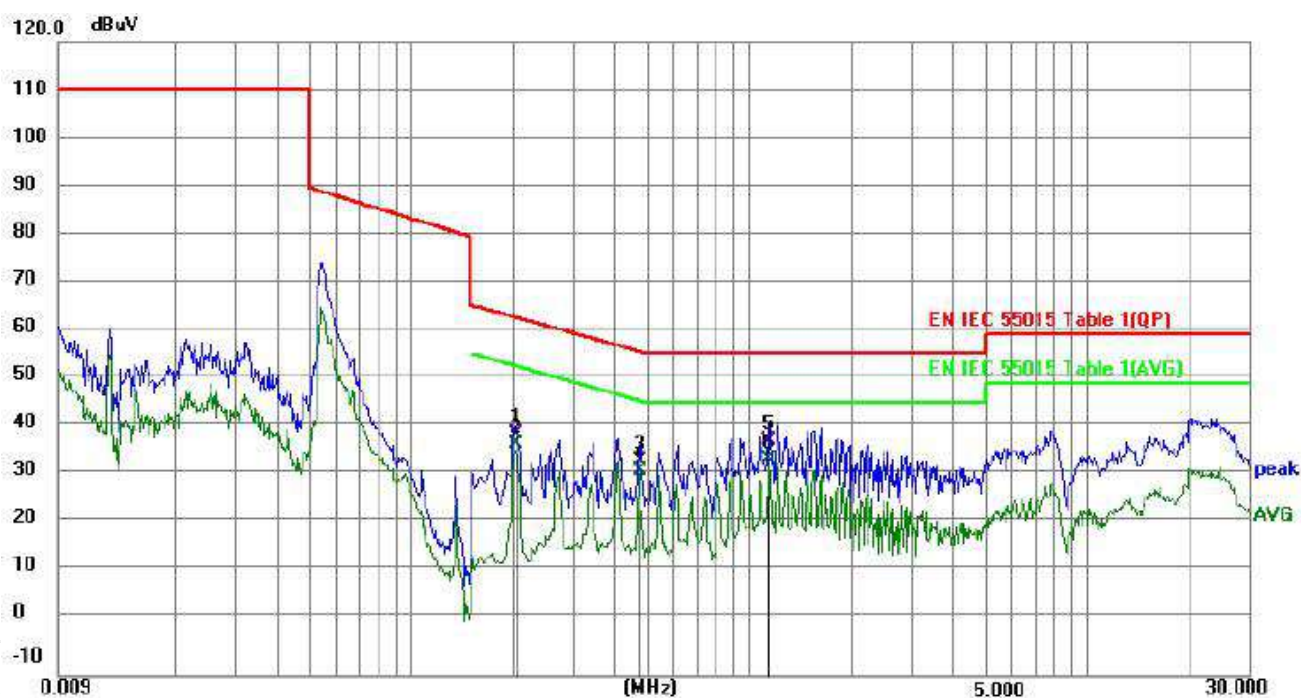


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2021	24.43	10.28	34.71	63.52	-28.81	QP	
2	*	0.2021	22.18	10.28	32.46	53.52	-21.06	AVG	
3		3.3229	17.39	10.43	27.82	56.00	-28.18	QP	
4		3.3229	8.09	10.43	18.52	46.00	-27.48	AVG	
5		7.7954	19.37	10.65	30.02	60.00	-29.98	QP	
6		7.7954	11.34	10.65	21.99	50.00	-28.01	AVG	





Environmental Conditions	24.4℃, 54% RH
Model	UNF-2028030-CDS
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Line

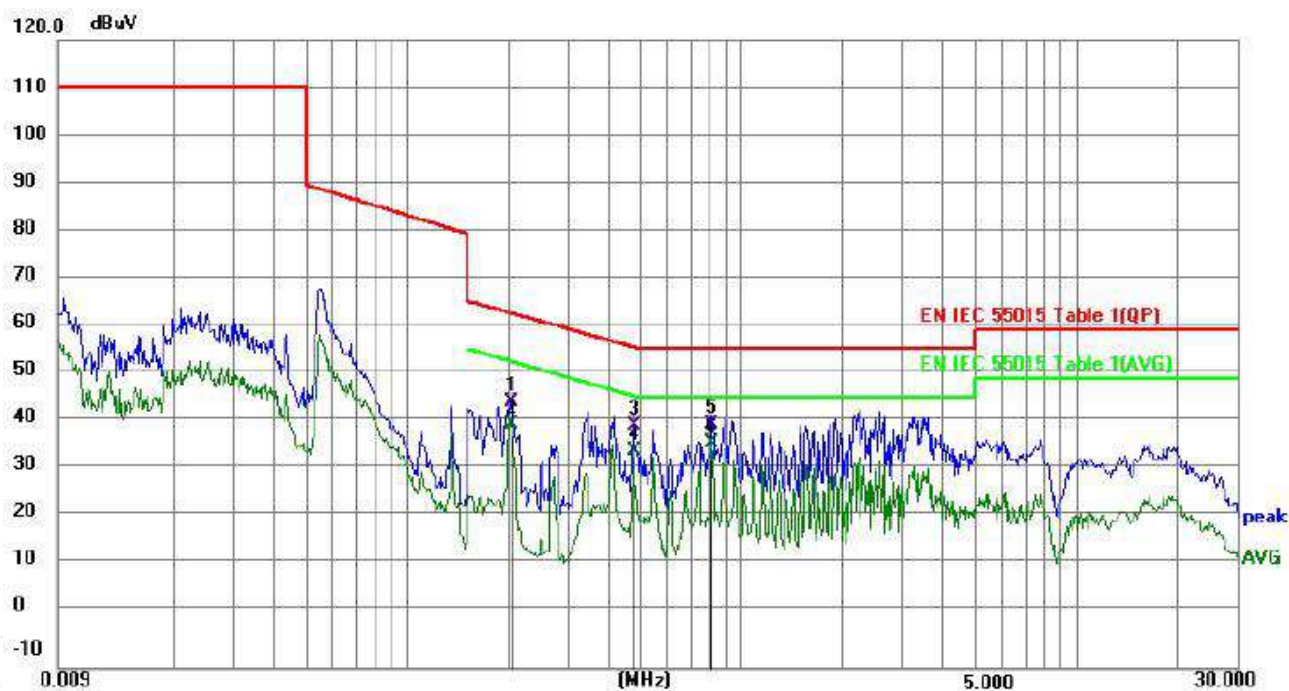


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2044	29.24	10.28	39.52	63.43	-23.91	QP	
2		0.2044	27.29	10.28	37.57	53.43	-15.86	AVG	
3		0.4714	23.80	10.36	34.16	56.49	-22.33	QP	
4		0.4714	21.82	10.36	32.18	46.49	-14.31	AVG	
5		1.1413	27.84	10.38	38.22	56.00	-17.78	QP	
6	*	1.1413	23.82	10.38	34.20	46.00	-11.80	AVG	





Environmental Conditions	24.4℃, 54% RH
Model	UNF-2028030-CDS
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Neutral

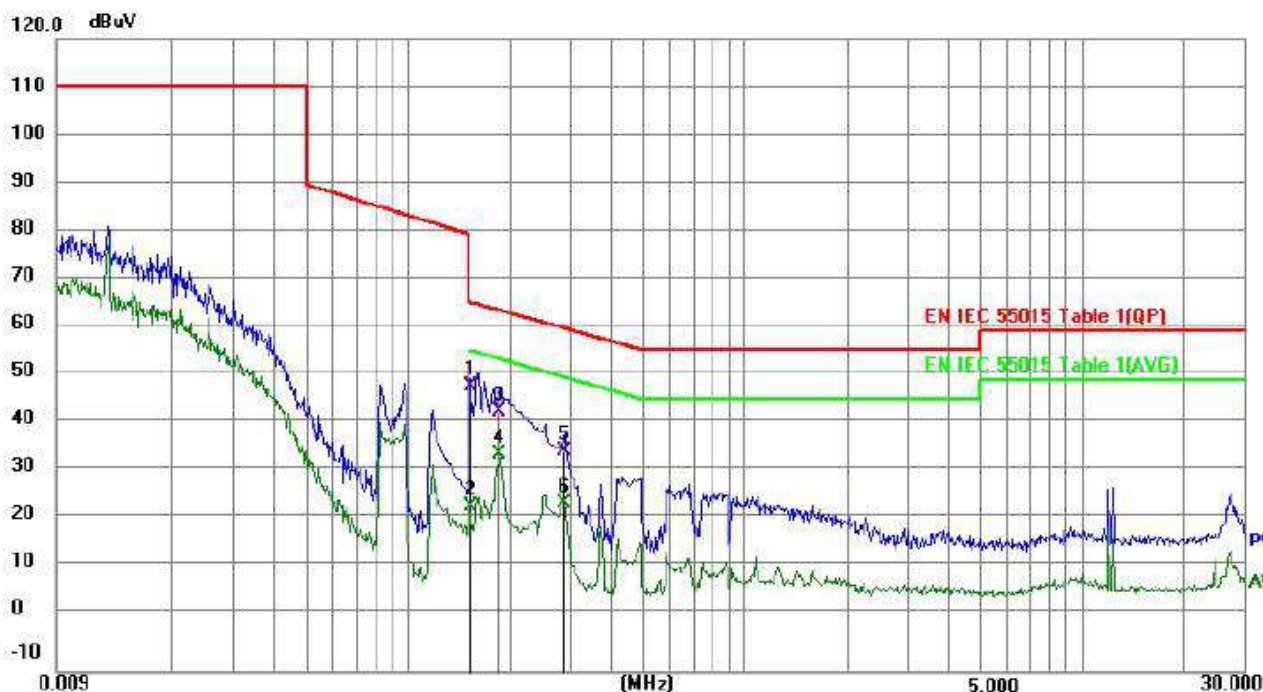


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2040	34.83	10.28	45.11	63.45	-18.34	QP	
2		0.2040	30.16	10.28	40.44	53.45	-13.01	AVG	
3		0.4740	29.80	10.36	40.16	56.44	-16.28	QP	
4		0.4740	24.64	10.36	35.00	46.44	-11.44	AVG	
5		0.8114	30.07	10.38	40.45	56.00	-15.55	QP	
6	*	0.8114	26.37	10.38	36.75	46.00	-9.25	AVG	





Environmental Conditions	24.4℃, 54% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Line

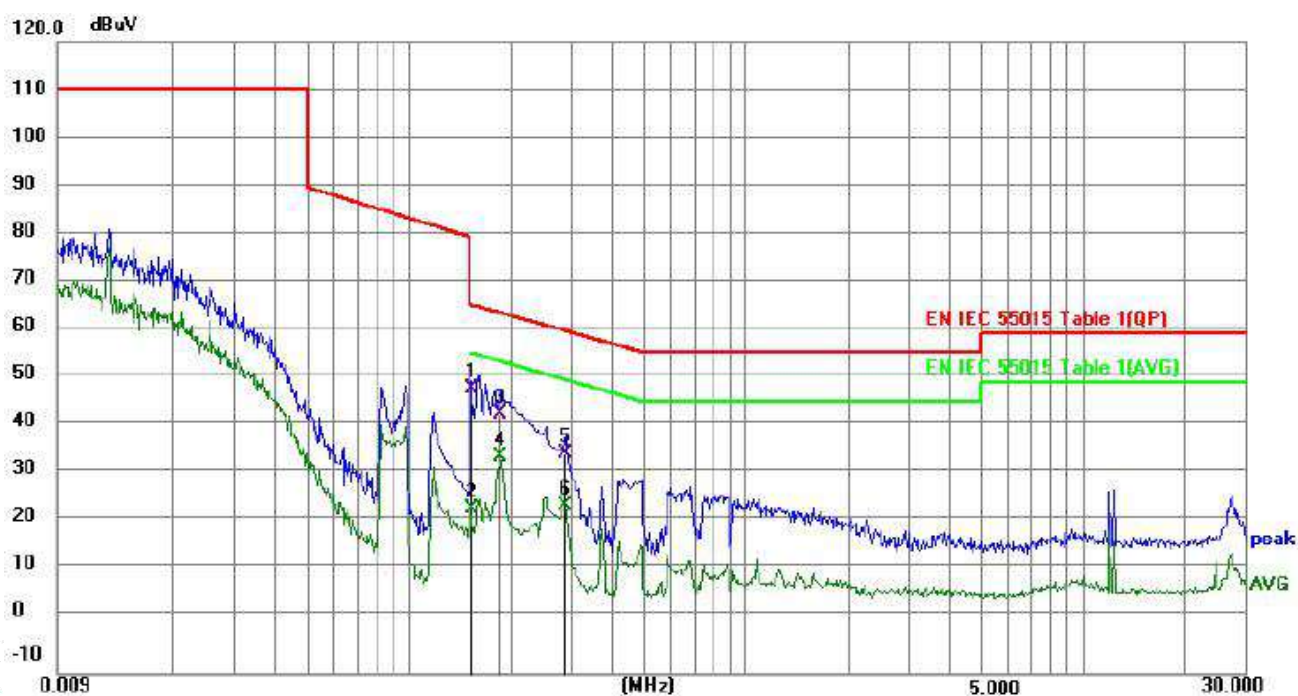


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1516	38.25	10.29	48.54	65.91	-17.37	QP	
2		0.1516	13.71	10.29	24.00	55.91	-31.91	AVG	
3		0.1840	33.28	10.28	43.56	64.30	-20.74	QP	
4		0.1840	24.42	10.28	34.70	54.30	-19.60	AVG	
5		0.2881	24.99	10.31	35.30	60.58	-25.28	QP	
6		0.2881	14.43	10.31	24.74	50.58	-25.84	AVG	





Environmental Conditions	24.4°C, 54% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V, 50Hz
Test engineer	Aru Yang
Pol	Neutral

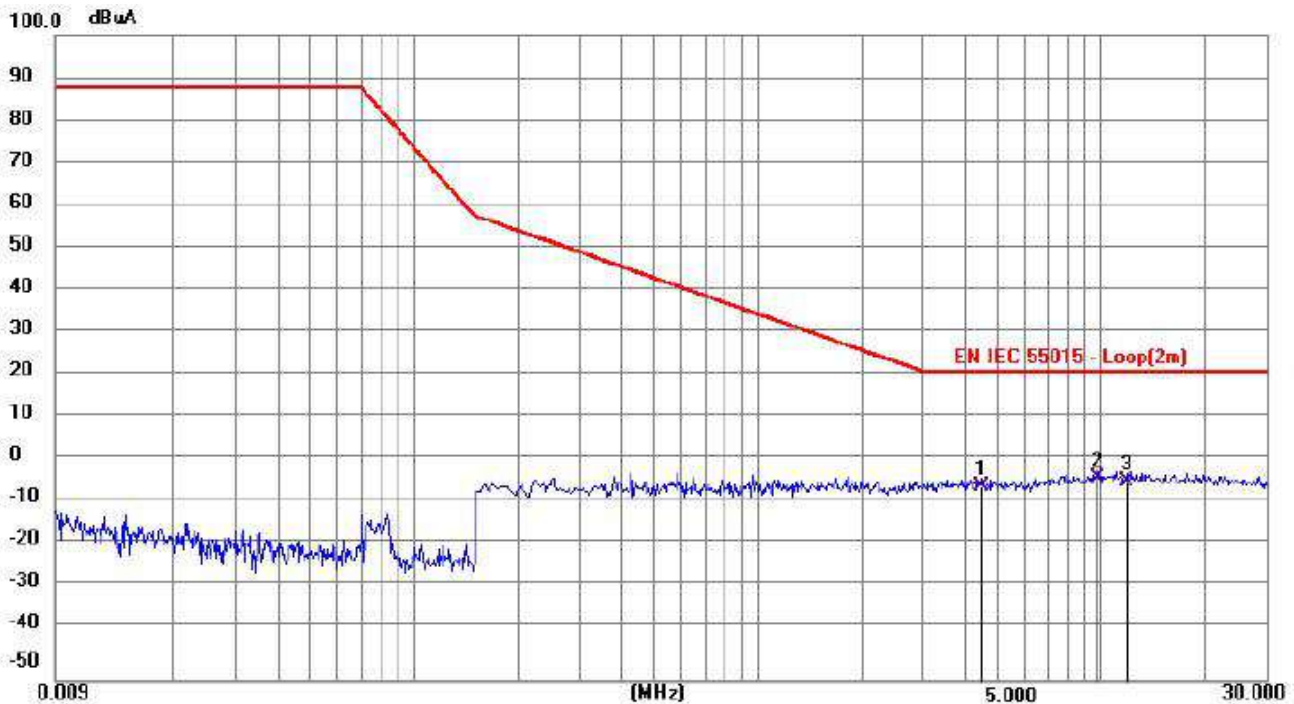


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1516	38.25	10.29	48.54	65.91	-17.37	QP	
2		0.1516	13.71	10.29	24.00	55.91	-31.91	AVG	
3		0.1840	33.28	10.28	43.56	64.30	-20.74	QP	
4		0.1840	24.42	10.28	34.70	54.30	-19.60	AVG	
5		0.2881	24.99	10.31	35.30	60.58	-25.28	QP	
6		0.2881	14.43	10.31	24.74	50.58	-25.84	AVG	



**A.2. RADIATED DISTURBANCE TEST RESULTS (9kHz - 30MHz)**

Environmental Conditions	24.4℃, 54% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V, 50Hz
Test engineer	Aru Yang
Pol	X



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1		4.4250	-29.97	25.16	-4.81	22.00	-26.81	QP	
2	*	9.6450	-29.06	26.02	-3.04	22.00	-25.04	QP	
3		11.7690	-29.80	26.02	-3.78	22.00	-25.78	QP	



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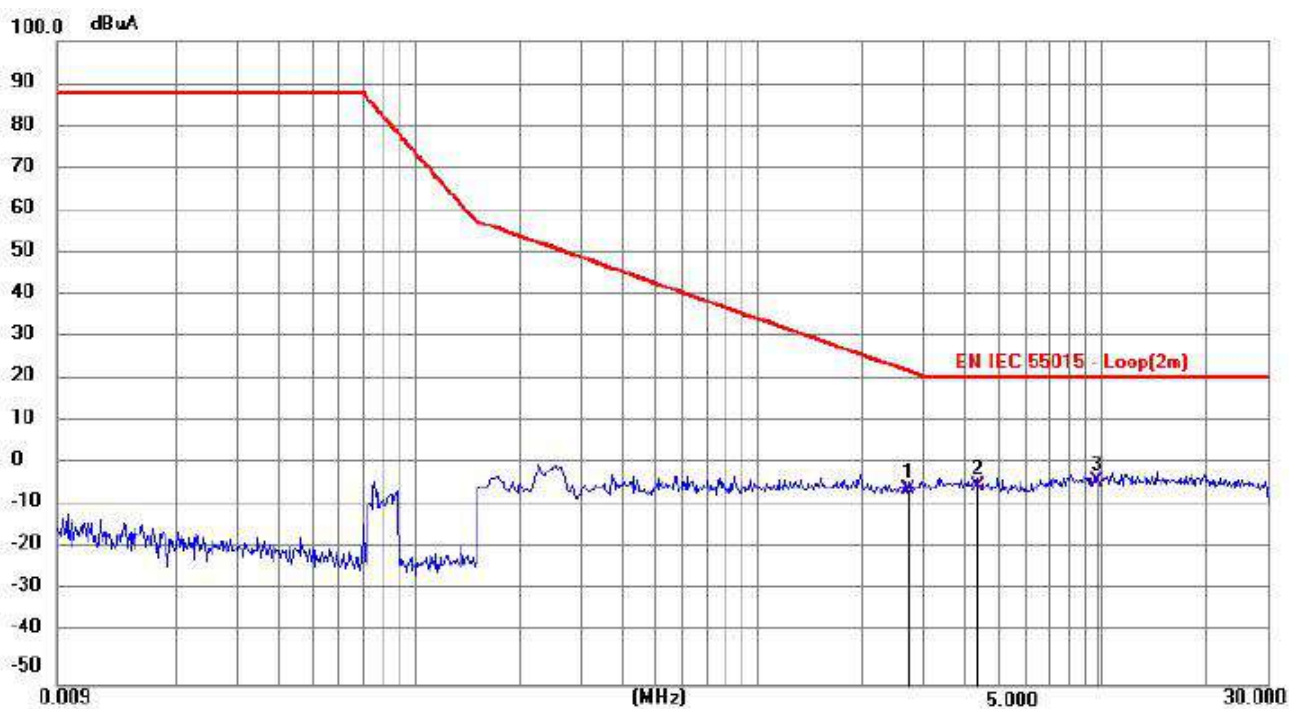
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Environmental Conditions	24.4℃, 54% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Y

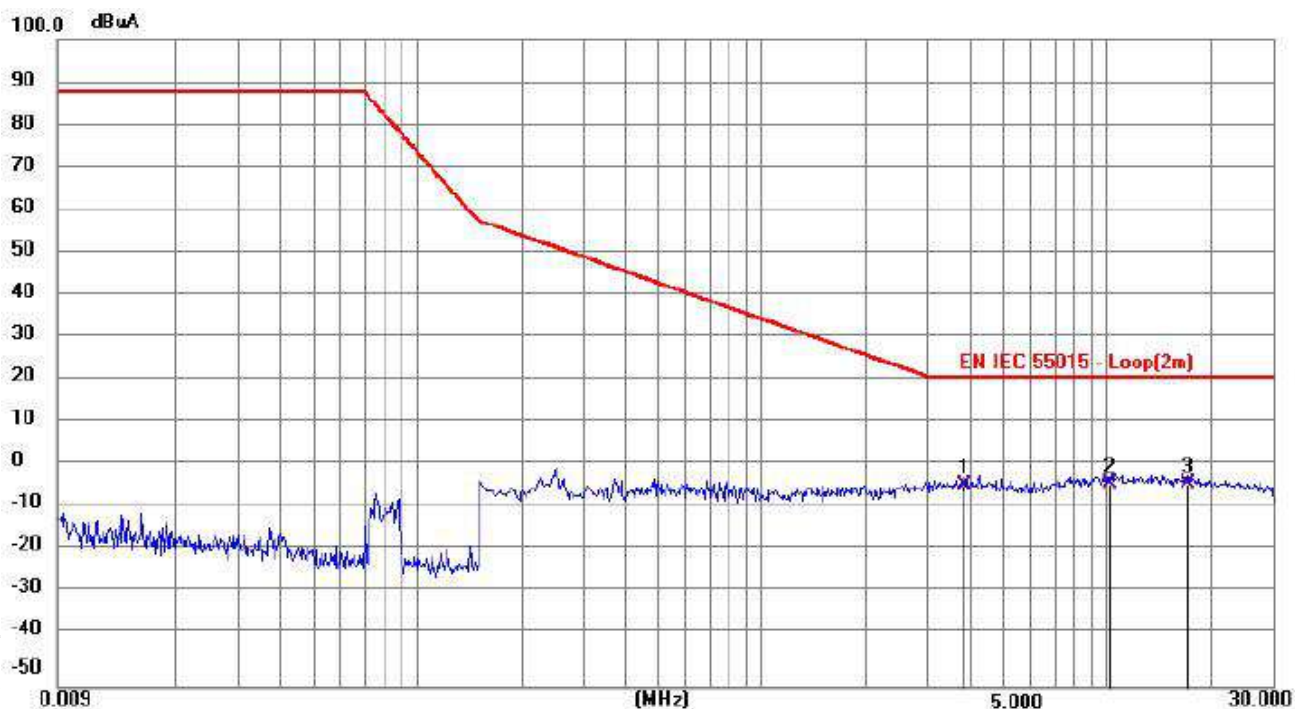


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1		2.7015	-30.18	25.65	-4.53	23.26	-27.79	QP	
2		4.3125	-29.57	25.94	-3.63	22.00	-25.63	QP	
3	*	9.6180	-29.06	26.34	-2.72	22.00	-24.72	QP	





Environmental Conditions	24.4℃, 54% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Z



No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector	Comment
1		3.8310	-29.83	26.40	-3.43	22.00	-25.43	QP	
2	*	10.2299	-29.74	26.97	-2.77	22.00	-24.77	QP	
3		17.0610	-29.11	26.15	-2.96	22.00	-24.96	QP	





A.3. RADIATED DISTURBANCE TEST RESULTS (30MHz - 1GHz)

Environmental Conditions	23.1℃, 55% RH
Model	UNF-2028030-KD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V, 50Hz
Test engineer	Aru Yang
Pol	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		49.6632	4.93	12.48	17.41	40.00	-22.59	QP		
2		128.5630	7.60	11.00	18.60	40.00	-21.40	QP		
3	*	212.6420	8.96	11.69	20.65	40.00	-19.35	QP		



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Environmental Conditions	23.1℃, 55% RH
Model	UNF-2028030-KD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		96.1407	4.48	11.04	15.52	40.00	-24.48	QP		
2		174.8834	6.04	10.87	16.91	40.00	-23.09	QP		
3	*	208.8547	8.88	11.37	20.25	40.00	-19.75	QP		



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Environmental Conditions	23.1℃, 55% RH
Model	UNF-2028030-CDS
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Detector	Comment
1	*	41.7129	21.35	12.09	33.44	40.00	-6.56			QP	
2		44.8416	18.12	12.24	30.36	40.00	-9.64			QP	
3		189.1572	10.64	11.03	21.67	40.00	-18.33			QP	





Environmental Conditions	23.1℃, 55% RH
Model	UNF-2028030-CDS
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Horizontal

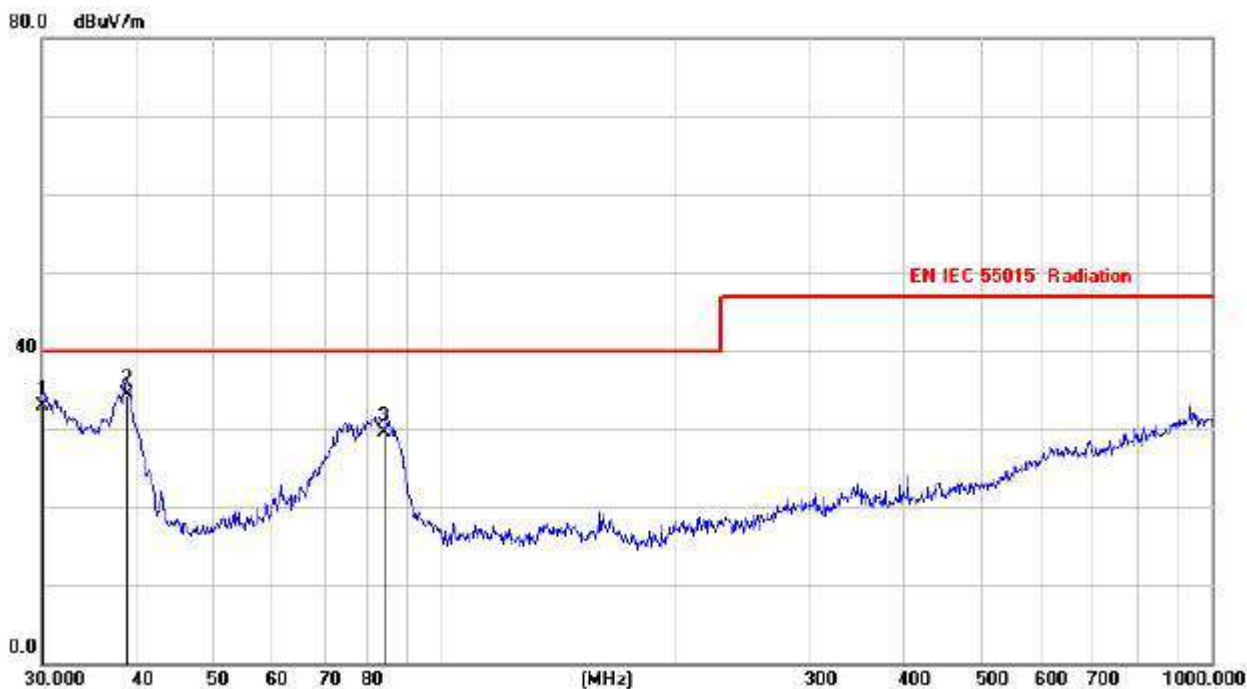


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		41.6035	8.27	12.30	20.57	40.00	-19.43	QP		
2		45.0189	8.28	12.50	20.78	40.00	-19.22	QP		
3	*	190.1547	10.85	11.06	21.91	40.00	-18.09	QP		





Environmental Conditions	23.1℃, 55% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Vertical

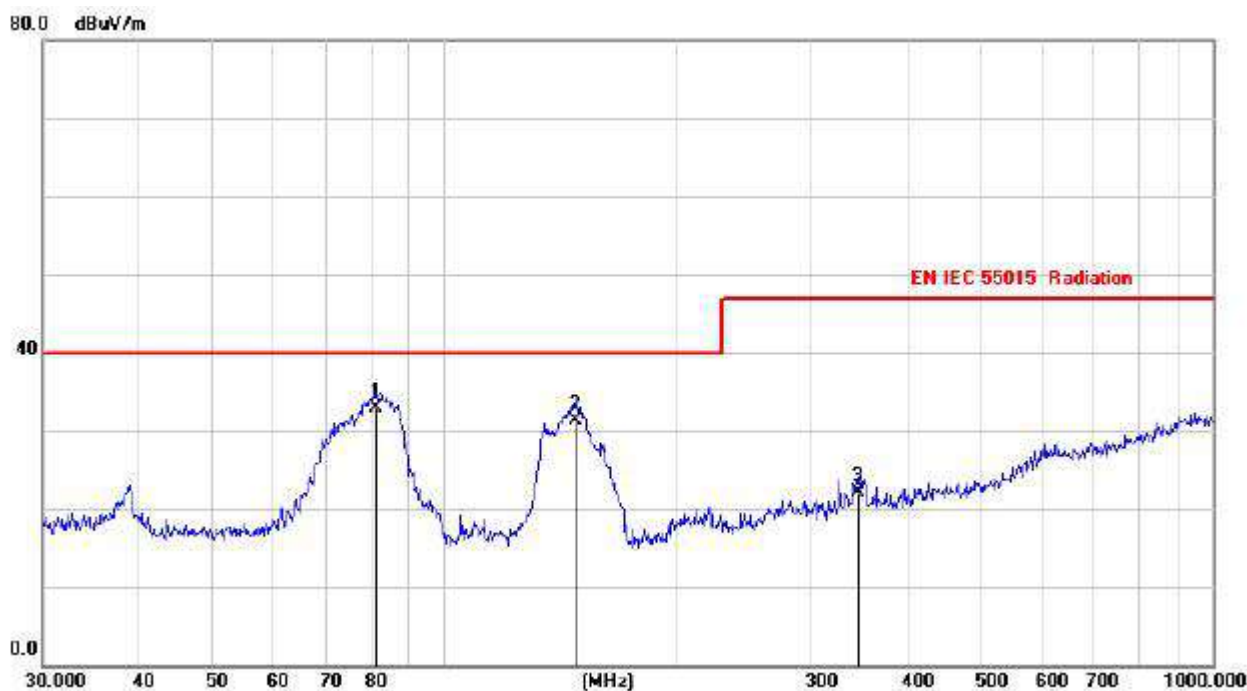


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Comment
1		30.1318	22.55	10.42	32.97	40.00	-7.03	QP		
2	*	38.7008	22.56	11.79	34.35	40.00	-5.65	QP		
3		83.7421	19.77	9.75	29.52	40.00	-10.48	QP		





Environmental Conditions	23.1℃, 55% RH
Model	UNF-20210015-TD
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang
Pol	Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree degree	Comment
1	*	81.2830	23.68	9.23	32.91	40.00	-7.09	QP		
2		148.3110	20.47	10.91	31.38	40.00	-8.62	QP		
3		344.3855	6.69	15.44	22.13	47.00	-24.87	QP		



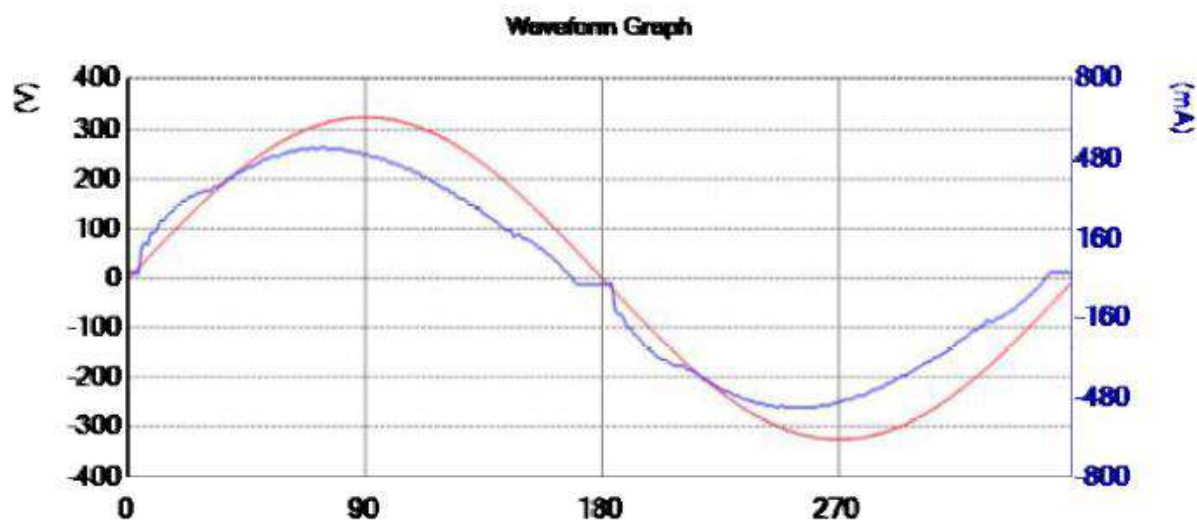


A.4. HARMONIC CURRENT TEST RESULTS

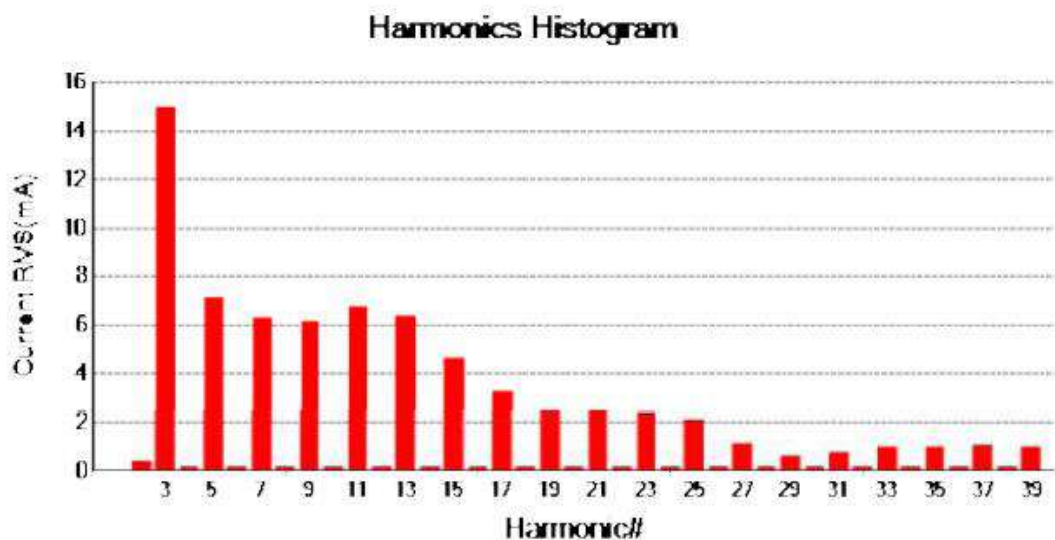
Model	UNF-2028030-KD
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Test Result: **Pass**Source qualification(Power On Load): **Idle - Pass**

Current & voltage waveforms



Harmonics and Class C limit line (>25W)



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Model	UNF-2028030-KD
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Test Result: **Pass**Source qualification(Power On Load): **Idle - Pass**

THC(mA): 22.370

I - THD(%): 6.6

POHC(mA):4.870

POHC Limit(mA):32.398

Parameter values during test:

V RMS (Volts): 229.9

Frequency(Hz): 50.0

I RMS(mA): 342.7

Crest Factor: 1.425

Power (Watts): 77.0

Power Factor: 0.978

Harm#	Harms(filtered) (mA)	Limit (mA)	Harms(avg) (mA)	100%Limit	Harms(max) (mA)	150%Limit	Status
I Fund	341.500						
2	0.350	6.830	0.400	5.857	0.440	4.295	Pass
3	14.990	92.205	15.500	16.810	16.220	11.727	Pass
4	0.150	-	0.200	-	0.220	-	N/A
5	7.100	34.150	7.000	20.498	7.120	13.899	Pass
6	0.150	-	0.200	-	0.200	-	N/A
7	6.270	23.905	6.300	26.354	6.400	17.848	Pass
8	0.170	-	0.200	-	0.170	-	N/A
9	6.150	17.075	6.200	36.310	6.200	24.207	Pass
10	0.150	-	0.200	-	0.170	-	N/A
11	6.740	10.245	6.800	66.374	6.810	44.314	Pass
12	0.150	-	0.200	-	0.150	-	N/A
13	6.380	10.245	6.400	62.470	6.490	42.232	Pass
14	0.150	-	0.200	-	0.170	-	N/A
15	4.600	10.245	4.600	44.900	4.650	30.259	Pass
16	0.150	-	0.200	-	0.170	-	N/A
17	3.300	10.245	3.300	32.211	3.320	21.604	Pass
18	0.150	-	0.100	-	0.170	-	N/A
19	2.490	10.245	2.500	24.402	2.490	16.203	Pass
20	0.150	-	0.200	-	0.170	-	N/A
21	2.450	10.245	2.500	24.402	2.510	16.333	Pass
22	0.130	-	0.200	-	0.200	-	N/A
23	2.420	10.245	2.500	24.402	2.600	16.919	Pass
24	0.170	-	0.200	-	0.170	-	N/A
25	2.090	10.245	2.100	20.498	2.200	14.316	Pass
26	0.150	-	0.200	-	0.170	-	N/A
27	1.120	10.245	1.200	11.713	1.210	7.874	Pass
28	0.150	-	0.200	-	0.170	-	N/A
29	0.600	10.245	0.600	5.857	0.600	3.904	Pass
30	0.150	-	0.200	-	0.170	-	N/A
31	0.740	10.245	0.700	6.833	0.780	5.076	Pass
32	0.150	-	0.200	-	0.170	-	N/A
33	0.980	10.245	1.000	9.761	1.010	6.572	Pass
34	0.150	-	0.200	-	0.170	-	N/A
35	0.980	10.245	1.000	9.761	1.010	6.572	Pass
36	0.150	-	0.200	-	0.170	-	N/A
37	1.010	10.245	1.000	9.761	1.070	6.963	Pass
38	0.150	-	0.200	-	0.170	-	N/A
39	0.940	10.245	1.000	9.761	1.010	6.572	Pass
40	0.150	-	0.200	-	0.170	-	N/A



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Model	UNF-2028030-KD
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Source qualification(Power On Load): **Pass**

Measurements are compliant with IEC/EN61000-3-2 Ed. 5 & IEC/EN61000-4-7 Ed. 2.1

	Nominal	Measured	Measured	Deviation	Allowed	Result
		Low	High		Deviation	
Supply Voltage	230	229.69	229.87	0.31	4.6	Pass
Supply Frequency	50	50.0	50.0	0.0	0.25	Pass
Crest Phase	90.0	89.2	89.5	0.8	87 - 93	Pass
Crest Factor	1.414	1.414	1.415	0.001	1.40 - 1.42	Pass
Fundamental Voltage	229.71	-	-	-	-	-

Harm#	Harmonics Voltage	Harmonic Ratio	Limit	Result
2	0.090	0.060	0.200	Pass
3	0.140	0.065	0.900	Pass
4	0.010	0.029	0.200	Pass
5	0.020	0.018	0.400	Pass
6	0.010	0.015	0.200	Pass
7	0.010	0.009	0.300	Pass
8	0.010	0.008	0.200	Pass
9	0.000	0.007	0.200	Pass
10	0.010	0.013	0.100	Pass
11	0.020	0.013	0.100	Pass
12	0.000	0.003	0.100	Pass
13	0.010	0.008	0.100	Pass
14	0.000	0.003	0.100	Pass
15	0.010	0.005	0.100	Pass
16	0.000	0.003	0.100	Pass
17	0.010	0.005	0.100	Pass
18	0.000	0.000	0.100	Pass
19	0.000	0.003	0.100	Pass
20	0.000	0.000	0.100	Pass
21	0.000	0.002	0.100	Pass
22	0.000	0.000	0.100	Pass
23	0.000	0.003	0.100	Pass
24	0.000	0.000	0.100	Pass
25	0.000	0.001	0.100	Pass
26	0.000	0.000	0.100	Pass
27	0.000	0.000	0.100	Pass
28	0.000	0.000	0.100	Pass
29	0.000	0.000	0.100	Pass
30	0.000	0.000	0.100	Pass
31	0.000	0.000	0.100	Pass
32	0.000	0.000	0.100	Pass
33	0.000	0.000	0.100	Pass
34	0.000	0.000	0.100	Pass
35	0.000	0.000	0.100	Pass
36	0.000	0.000	0.100	Pass
37	0.000	0.000	0.100	Pass
38	0.000	0.000	0.100	Pass
39	0.000	0.000	0.100	Pass
40	0.000	0.000	0.100	Pass



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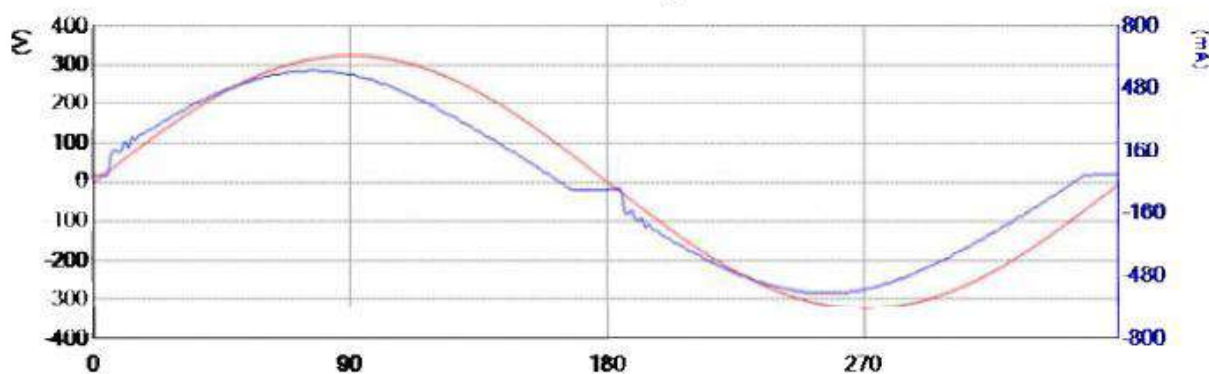
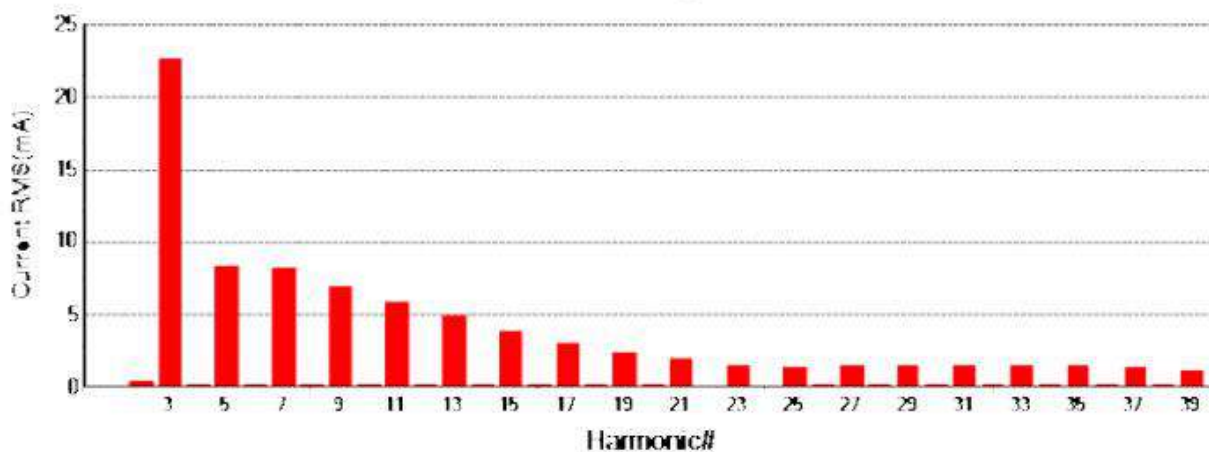
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Model	UNF-2028030-CDS
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Test Result: **Pass**Source qualification(Power On Load): **Idle - Pass****Current & voltage waveforms****Waveform Graph****Harmonics and Class C limit line (>25W)****Harmonics Histogram**

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Model	UNF-2028030-CDS
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Test Result: **Pass**Source qualification(Power On Load): **Idle - Pass**

THC(mA): 28.410

I - THD(%): 7.9

POHC(mA):4.470

POHC Limit(mA):34.285

Parameter values during test:

V RMS (Volts): 230.1

Frequency(Hz): 50.0

I RMS(mA): 363.3

Crest Factor: 1.479

Power (Watts): 81.4

Power Factor: 0.973

Harm#	Harms(filtered) (mA)	Limit (mA)	Harms(avg) (mA)	100%Limit	Harms(max) (mA)	150%Limit	Status
I Fund	361.400						
2	0.330	7.228	0.300	4.151	0.380	3.505	Pass
3	22.740	97.578	22.700	23.263	22.740	15.536	Pass
4	0.130	-	0.100	-	0.150	-	N/A
5	8.270	36.140	8.300	22.966	8.310	15.329	Pass
6	0.060	-	0.100	-	0.110	-	N/A
7	8.240	25.298	8.200	32.414	8.270	21.794	Pass
8	0.060	-	0.100	-	0.080	-	N/A
9	6.810	18.070	6.800	37.631	6.830	25.198	Pass
10	0.060	-	0.100	-	0.080	-	N/A
11	5.790	10.842	5.800	53.496	5.820	35.787	Pass
12	0.040	-	0.000	-	0.040	-	N/A
13	4.810	10.842	4.800	44.272	4.850	29.822	Pass
14	0.040	-	0.000	-	0.060	-	N/A
15	3.880	10.842	3.900	35.971	3.910	24.042	Pass
16	0.020	-	0.000	-	0.040	-	N/A
17	3.050	10.842	3.100	28.593	3.070	18.877	Pass
18	0.020	-	0.000	-	0.060	-	N/A
19	2.330	10.842	2.400	22.136	2.420	14.880	Pass
20	0.040	-	0.000	-	0.040	-	N/A
21	1.790	10.842	1.800	16.602	1.820	11.191	Pass
22	0.000	-	0.000	-	0.020	-	N/A
23	1.410	10.842	1.400	12.913	1.460	8.977	Pass
24	0.000	-	0.000	-	0.020	-	N/A
25	1.300	10.842	1.300	11.990	1.320	8.117	Pass
26	0.020	-	0.000	-	0.040	-	N/A
27	1.340	10.842	1.300	11.990	1.390	8.547	Pass
28	0.020	-	0.000	-	0.040	-	N/A
29	1.410	10.842	1.400	12.913	1.430	8.793	Pass
30	0.020	-	0.000	-	0.020	-	N/A
31	1.460	10.842	1.500	13.835	1.480	9.100	Pass
32	0.020	-	0.000	-	0.020	-	N/A
33	1.430	10.842	1.400	12.913	1.460	8.977	Pass
34	0.020	-	0.000	-	0.020	-	N/A
35	1.370	10.842	1.400	12.913	1.410	8.670	Pass
36	0.020	-	0.000	-	0.020	-	N/A
37	1.280	10.842	1.300	11.990	1.300	7.994	Pass
38	0.020	-	0.000	-	0.020	-	N/A
39	1.100	10.842	1.100	10.146	1.160	7.133	Pass
40	0.020	-	0.000	-	0.020	-	N/A

Note: All harmonics are below the minimum limits and are ignored.



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Model	UNF-2028030-CDS
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Source qualification(Power On Load): **Pass**

Measurements are compliant with IEC/EN61000-3-2 Ed. 4 & IEC/EN61000-4-7 Ed. 2.1

	Nominal	Measured		Deviation	Allowed Deviation	Result
		Low	High			
Supply Voltage	230	230.00	230.10	0.10	4.6	Pass
Supply Frequency	50	50.0	50.0	0.0	0.25	Pass
Crest Phase	90.0	89.4	89.7	0.6	87 - 93	Pass
Crest Factor	1.414	1.414	1.415	0.001	1.40 - 1.42	Pass
Fundamental Voltage	229.99	-	-	-	-	-

Harm#	Harmonics Voltage	Harmonic Ratio	Limit	Result
2	0.130	0.065	0.200	Pass
3	0.150	0.071	0.900	Pass
4	0.030	0.020	0.200	Pass
5	0.020	0.011	0.400	Pass
6	0.020	0.018	0.200	Pass
7	0.020	0.013	0.300	Pass
8	0.010	0.008	0.200	Pass
9	0.010	0.010	0.200	Pass
10	0.020	0.013	0.100	Pass
11	0.020	0.013	0.100	Pass
12	0.000	0.003	0.100	Pass
13	0.010	0.009	0.100	Pass
14	0.000	0.003	0.100	Pass
15	0.000	0.003	0.100	Pass
16	0.000	0.003	0.100	Pass
17	0.000	0.003	0.100	Pass
18	0.000	0.001	0.100	Pass
19	0.000	0.003	0.100	Pass
20	0.000	0.000	0.100	Pass
21	0.000	0.003	0.100	Pass
22	0.000	0.000	0.100	Pass
23	0.000	0.003	0.100	Pass
24	0.000	0.000	0.100	Pass
25	0.000	0.003	0.100	Pass
26	0.000	0.000	0.100	Pass
27	0.000	0.003	0.100	Pass
28	0.000	0.000	0.100	Pass
29	0.000	0.003	0.100	Pass
30	0.000	0.000	0.100	Pass
31	0.000	0.003	0.100	Pass
32	0.000	0.000	0.100	Pass
33	0.000	0.000	0.100	Pass
34	0.000	0.000	0.100	Pass
35	0.000	0.003	0.100	Pass
36	0.000	0.000	0.100	Pass
37	0.000	0.000	0.100	Pass
38	0.000	0.000	0.100	Pass
39	0.000	0.000	0.100	Pass
40	0.000	0.000	0.100	Pass



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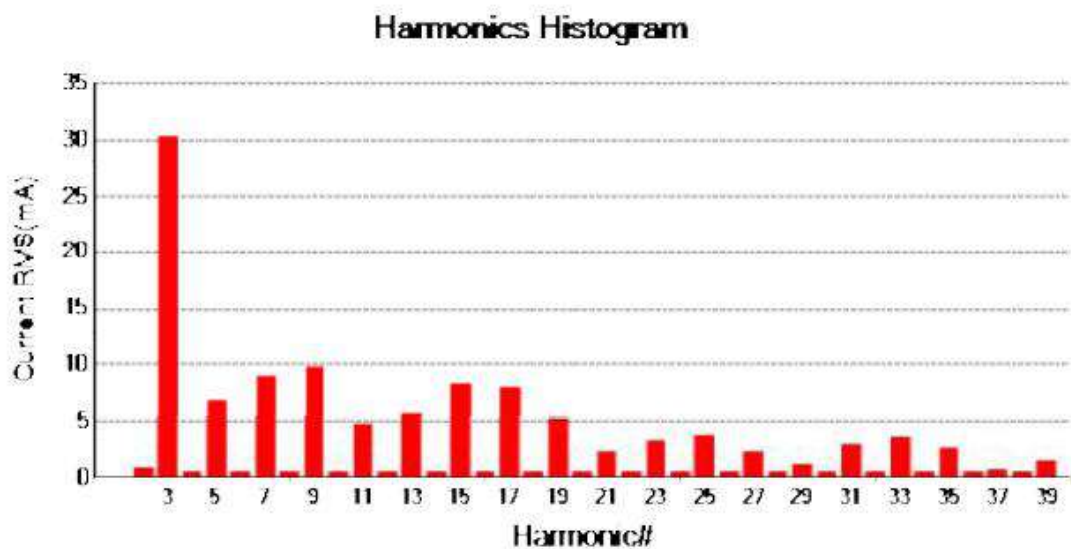
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Model	UNF-20210015-TD
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Test Result: **Pass**Source qualification(Power On Load): **Idle - Pass**Current & voltage waveformsHarmonics and Class C limit line (>25W)

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Model	UNF-20210015-TD
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Test Result: **Pass**Source qualification(Power On Load): **Idle - Pass**

THC(mA): 37.720

I - THD(%): 8.6

POHC(mA):8.240

POHC Limit(mA):41.467

Parameter values during test:

V_RMS (Volts): 229.6

Frequency(Hz): 50.0

I_RMS(mA): 438.6

Crest Factor: 1.482

Power (Watts): 99.4

Power Factor: 0.985

Harm#	Harms(filtered) (mA)	Limit (mA)	Harms(avg) (mA)	100%Limit	Harms(max) (mA)	150%Limit	Status
I Fund	437.100						
2	0.780	8.742	0.800	9.151	0.940	7.168	Pass
3	30.300	118.017	30.000	25.420	30.390	17.167	Pass
4	0.560	-	0.600	-	0.650	-	N/A
5	6.740	43.710	6.800	15.557	6.990	10.661	Pass
6	0.560	-	0.600	-	0.650	-	N/A
7	8.850	30.597	8.700	28.434	8.920	19.435	Pass
8	0.530	-	0.500	-	0.620	-	N/A
9	9.660	21.855	9.700	44.383	9.750	29.741	Pass
10	0.530	-	0.500	-	0.620	-	N/A
11	4.690	13.113	4.700	35.842	4.810	24.454	Pass
12	0.510	-	0.500	-	0.600	-	N/A
13	5.680	13.113	5.500	41.943	5.820	29.589	Pass
14	0.510	-	0.500	-	0.600	-	N/A
15	8.290	13.113	8.200	62.533	8.400	42.706	Pass
16	0.530	-	0.500	-	0.600	-	N/A
17	8.000	13.113	8.000	61.008	8.150	41.435	Pass
18	0.510	-	0.500	-	0.600	-	N/A
19	5.120	13.113	5.300	40.418	5.500	27.962	Pass
20	0.490	-	0.500	-	0.580	-	N/A
21	2.330	13.113	2.400	18.302	2.450	12.456	Pass
22	0.490	-	0.500	-	0.580	-	N/A
23	3.250	13.113	3.100	23.641	3.340	16.981	Pass
24	0.470	-	0.500	-	0.560	-	N/A
25	3.730	13.113	3.600	27.454	3.820	19.421	Pass
26	0.470	-	0.500	-	0.560	-	N/A
27	2.200	13.113	2.200	16.777	2.360	11.998	Pass
28	0.470	-	0.500	-	0.530	-	N/A
29	1.160	13.113	1.000	7.626	1.230	6.253	Pass
30	0.470	-	0.500	-	0.510	-	N/A
31	2.960	13.113	2.800	21.353	3.050	15.506	Pass
32	0.470	-	0.500	-	0.510	-	N/A
33	3.640	13.113	3.600	27.454	3.660	18.607	Pass
34	0.470	-	0.400	-	0.490	-	N/A
35	2.620	13.113	2.700	20.590	2.850	14.489	Pass
36	0.440	-	0.400	-	0.490	-	N/A
37	0.710	13.113	0.900	6.863	1.070	5.440	Pass
38	0.420	-	0.400	-	0.490	-	N/A
39	1.500	13.113	1.300	9.914	1.550	7.880	Pass
40	0.400	-	0.400	-	0.490	-	N/A



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Model	UNF-20210015-TD
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Aru Yang

Source qualification(Power On Load): **Pass**

Measurements are compliant with IEC/EN61000-3-2 Ed. 5 & IEC/EN61000-4-7 Ed. 2.1

	Nominal	Measured		Deviation	Allowed Deviation	Result
		Low	High			
Supply Voltage	230	0.00	0.00	0.00	0.0	Pass
Supply Frequency	50	0.0	0.0	0.0	0.25	Pass
Crest Phase	90.0	0.0	0.0	0.0	87 - 93	Pass
Crest Factor	1.414	0.000	0.000	0.000	1.40 - 1.42	Pass
Fundamental Voltage	0.00	-	-	-	-	-

Harm#	Harmonics Voltage	Harmonic Ratio	Limit	Result
2	0.000	0.000	0.200	Pass
3	0.000	0.000	0.900	Pass
4	0.000	0.000	0.200	Pass
5	0.000	0.000	0.400	Pass
6	0.000	0.000	0.200	Pass
7	0.000	0.000	0.300	Pass
8	0.000	0.000	0.200	Pass
9	0.000	0.000	0.200	Pass
10	0.000	0.000	0.100	Pass
11	0.000	0.000	0.100	Pass
12	0.000	0.000	0.100	Pass
13	0.000	0.000	0.100	Pass
14	0.000	0.000	0.100	Pass
15	0.000	0.000	0.100	Pass
16	0.000	0.000	0.100	Pass
17	0.000	0.000	0.100	Pass
18	0.000	0.000	0.100	Pass
19	0.000	0.000	0.100	Pass
20	0.000	0.000	0.100	Pass
21	0.000	0.000	0.100	Pass
22	0.000	0.000	0.100	Pass
23	0.000	0.000	0.100	Pass
24	0.000	0.000	0.100	Pass
25	0.000	0.000	0.100	Pass
26	0.000	0.000	0.100	Pass
27	0.000	0.000	0.100	Pass
28	0.000	0.000	0.100	Pass
29	0.000	0.000	0.100	Pass
30	0.000	0.000	0.100	Pass
31	0.000	0.000	0.100	Pass
32	0.000	0.000	0.100	Pass
33	0.000	0.000	0.100	Pass
34	0.000	0.000	0.100	Pass
35	0.000	0.000	0.100	Pass
36	0.000	0.000	0.100	Pass
37	0.000	0.000	0.100	Pass
38	0.000	0.000	0.100	Pass
39	0.000	0.000	0.100	Pass
40	0.000	0.000	0.100	Pass



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**A.5. IMMUNITY TEST RESULTS**

ELECTROSTATIC DISCHARGE IMMUNITY TEST RESULTS					
Standard	☒ EN 61547:2009 ☒ EN 61000-4-2				
EUT	Standing luminaires	Temperature	23.5℃		
M/N	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD	Humidity	52%		
Test Mode	Mode 1	Pressure	1008mbar		
Input voltage	AC 230V,50Hz	Test Results	Pass		
Test engineer	Aru Yang				
Discharge Mode	Test Points	Test Voltage (kV) & polarity	Number of discharges/polarity	Discharge interval (s)	Performance Criteria
Contact Discharge	Conductive surfaces	± 4	10	1	B
Air Discharge	Insulating surfaces	± 2&4&8	10	1	B
VCP	-	± 4	10	1	B
HCP	-	± 4	10	1	B
Note:					



**RADIO-FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST RESULTS**

Standard	☒ EN 61547:2009		☒ EN 61000-4-3	
EUT	Standing luminaires		Temperature	22.5°C
M/N	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD		Humidity	55%
Test Mode	Mode 1		Pressure	1008mbar
Input voltage	AC 230V,50Hz		Test engineer	Aru Yang
Modulation	1 kHz, 80 % AM		Test Results	Pass
Steps	1%			
Angle of EUT	Antenna polarization	Frequency Range	Test Level	Performance Criteria
0°	Vertical Horizontal	80 - 1000 MHz	3 V/m	A
90°	Vertical Horizontal	80 - 1000 MHz	3 V/m	A
180°	Vertical Horizontal	80 - 1000 MHz	3 V/m	A
270°	Vertical Horizontal	80 - 1000 MHz	3 V/m	A

Note :



**ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST RESULTS**

Standard	☒ EN 61547:2009		☒ EN 61000-4-4	
EUT	Standing luminaires		Temperature	23.6℃
M/N	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD		Humidity	52%
Test Mode	Mode 1		Pressure	1008mbar
Input voltage	AC 230V,50Hz		Test Results	Pass
Test engineer	Aru Yang			
Port under test	Test Level & polarity	Repetition Frequency	Test duration / polarity	Performance Criteria
AC input / output power	± 1 kV	5 kHz	2min	B
DC input / output power				
Signal / control lines and load ports				

Note:



**INJECTED CURRENTS (RADIO-FREQUENCY COMMON MODE) TEST RESULTS**

Standard	☒ EN 61547:2009		☒ EN 61000-4-6	
EUT	Standing luminaires		Temperature	23.6℃
M/N	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD		Humidity	52%
Test Mode	Mode 1		Pressure	1008mbar
Input voltage	AC 230V,50Hz		Test Results	Pass
Frequency range	0,15 - 80 MHz		Test engineer	Aru Yang
Port under test	Test Level	Coupling method	Dwell time	Performance Criteria
AC input / output power	3 V	CDN	1 seconds	A
DC input / output power				
Signal / control line				



**SURGE IMMUNITY TEST RESULTS**

Standard	☑ EN 61547:2009			☑ EN 61000-4-5		
EUT	Standing luminaires			Temperature	23.6℃	
M/N	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD			Humidity	52%	
Test Mode	Mode 1			Pressure	1008mbar	
Input voltage	AC 230V,50Hz			Test Results	Pass	
Test engineer	Aru Yang					
Port under test	Coupling	Test Level & polarity(kV)	Phase angle (°)	Number of surges	Repetition rate(s)	Performance criteria
AC Input power	L - N	+ 1	90	5	60	C
		- 1	270	5	60	C
	L - PE	+ 2	90	5	60	C
		- 2	270	5	60	C
	N - PE	+ 2	90	5	60	C
		- 2	270	5	60	C
	L&N - PE	+ 2	90	5	60	C
		- 2	270	5	60	C

Note:



**VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST RESULTS**

Standard	☒ EN 61547:2009		☒ EN 61000-4-11		
EUT	Standing luminaires		Temperature	23.6℃	
M/N	UNF-2028030-KD, UNF-2028030-CDS, UNF-20210015-TD		Humidity	52%	
Test Mode	Mode 1		Pressure	1008mbar	
Input voltage	AC 230V,50Hz		Test Results	Pass	
Test engineer	Aru Yang				
U _{NOM} (Vac)	Test Level (% U _{NOM})	Number of periods		Phase angle (°)	Performance criteria
		50Hz	60Hz		
230	70	10	12	0, 90, 180, 270	C
	0	0,5	0,5	0	B

Note:

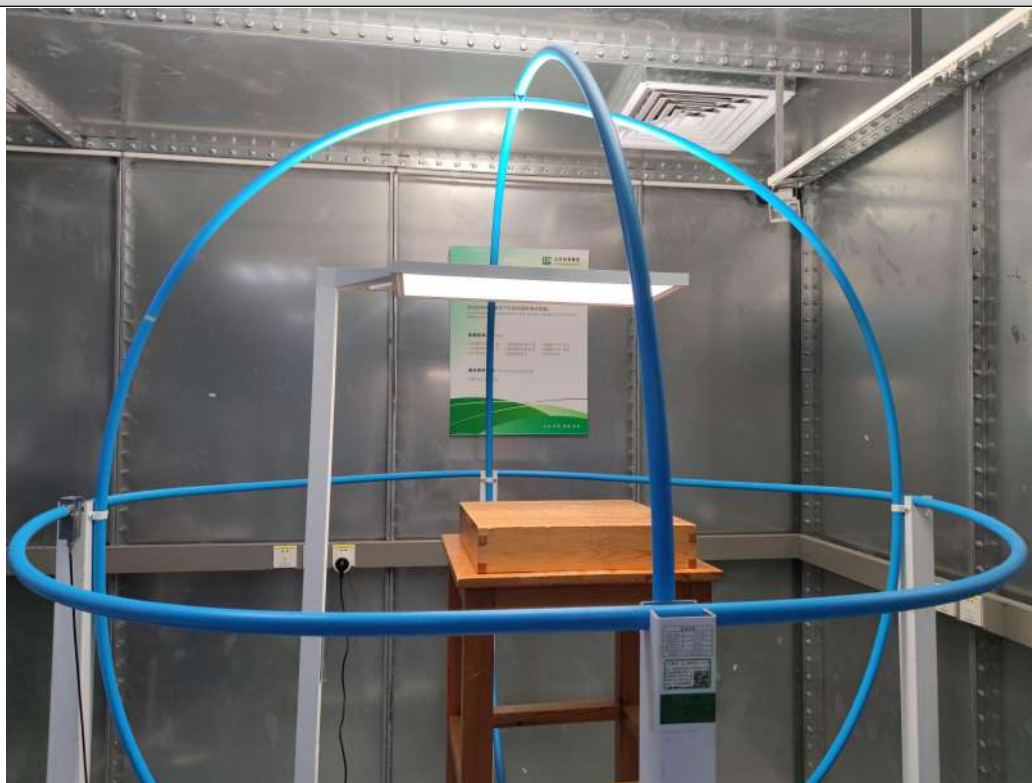


ANNEX B - TEST PHOTOS

B.1. Conducted Disturbance



B.2. Radiated Disturbance (9kHz - 30MHz)



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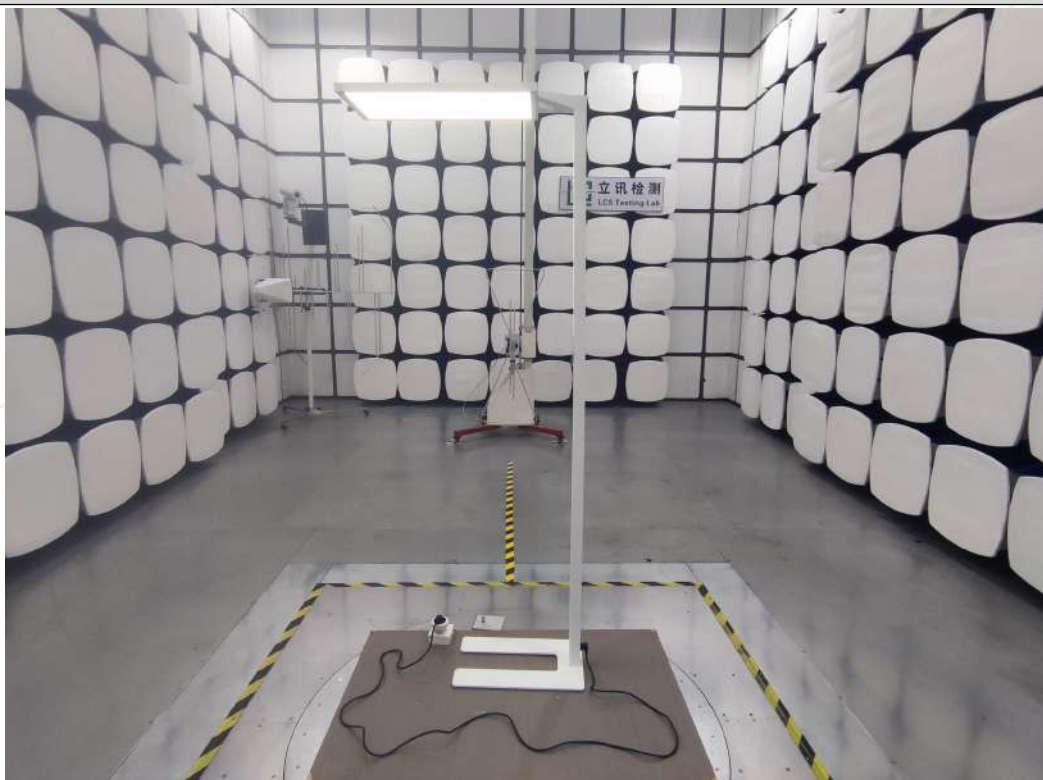
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B.3. Radiated Disturbance (30MHz to 1GHz) & Radio-Frequency Electromagnetic Fields



B.4. Harmonic Current



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B.5. Electrostatic Discharge



B.6. Electrical Fast Transient / Burst





B.7. Injected Currents (Radio-Frequency Common Mode)



B.8. Surge



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B.9. Voltage Dips and Short Interruptions





ANNEX C - EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Photo.1 UNF-20210030-CDA



Photo.2





Photo.3



Photo.4





Photo.5



Photo.6





Photo.7



Photo.8





Photo.9



Photo.10 LED driver: BK-HGV100-48V0





Photo.11



Photo.12





Photo.13



Photo.14



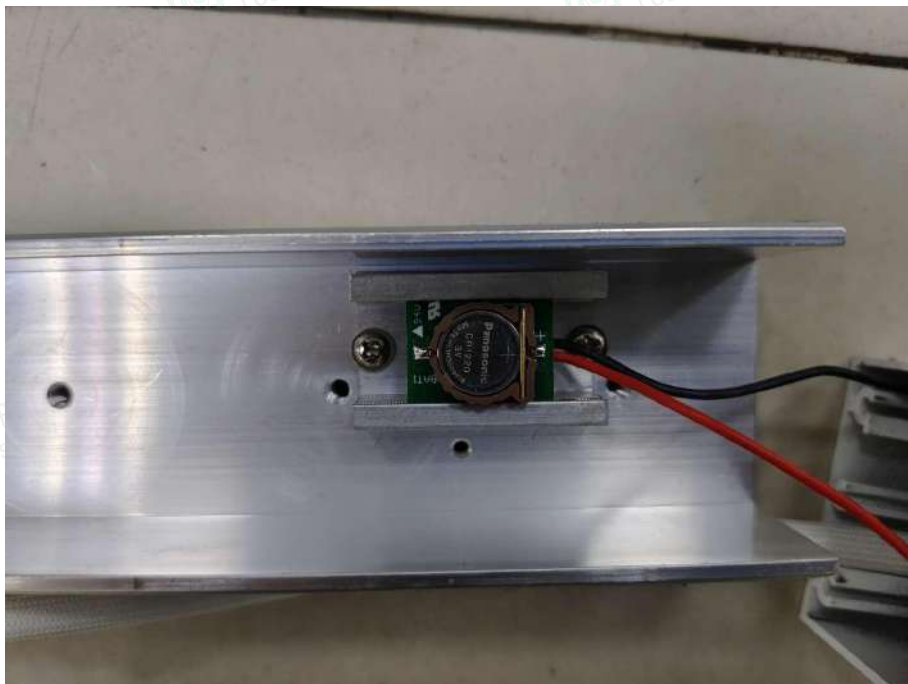


Photo.15



Photo.16



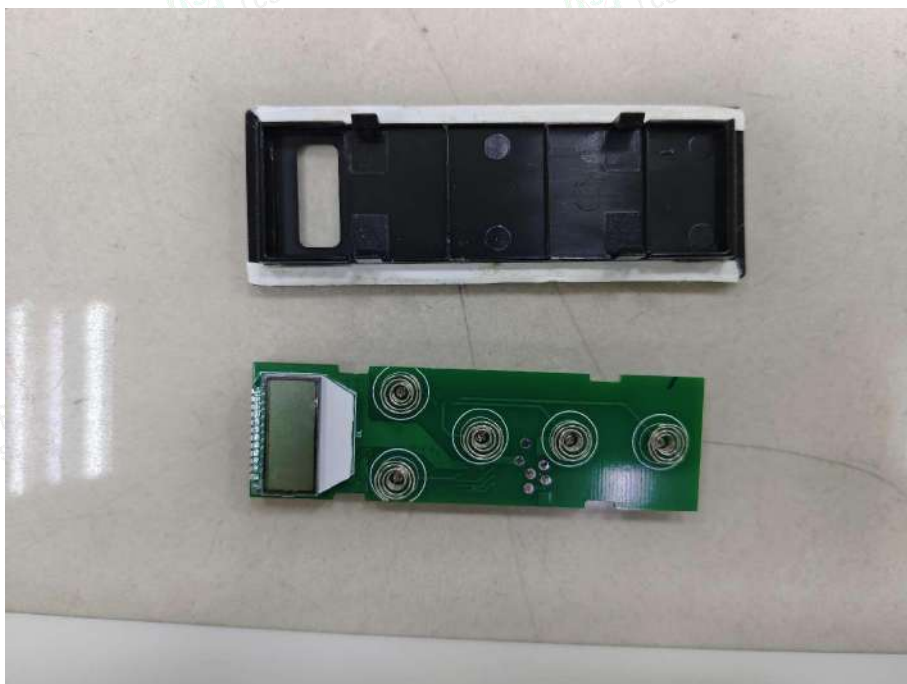


Photo.17



Photo.18





Photo.19



Photo.20





Photo.21



Photo.22





Photo.23



Photo.24





Photo.25 UNF-2028030-KD



Photo.26



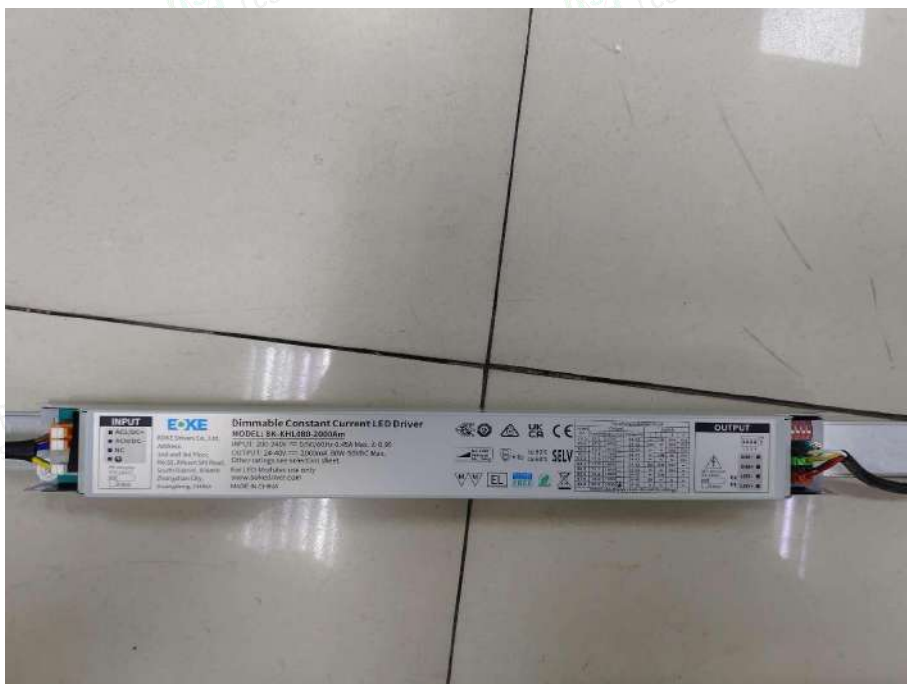


Photo.27 LED driver: BK-KHL080-2000Am



Photo.28



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Photo.29

----- END -----

