EMC TEST REPORT

No. ETA24010007S-002

Applicant	:	Hangzhou Longlux Electronic Technology Co., ltd The Western Science Park, Hangzhou City, China
Manufacturing site Name & Address	:	Hangzhou Longlux Electronic Technology Co., ltd The Western Science Park, Hangzhou City, China
Equipment	:	Fixed luminaire with LED
Type/Mode	:	LLX-TriProof-SS-118-XX, LLX-TriProof-SS-218-XX, LLX-TriProof-SS-136-XX, LLX-TriProof-SS-236-XX, LLX-TriProof-SS-158-XX, LLX-TriProof-SS-258-XX

SUMMARY

The equipment complies with the requirements according to the following standards:

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 purposed EMC immunity requirements

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

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

Date of issue: January 22, 2024

Prepared by:	Approved by:
Danny Zhou (*Project engineer*)	Sean Wan (Reviewer)

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1. GENERAL INFORMATION

1.1 Description of Equipment under Test (EUT)

EUT	:	Fixed luminaire with LED
Description of EU	:	These products are fixed light fixtures with LED for indoor or outdoor use. All models have the similar construction except shape, model name, wattage. All relevant tests were performed on models LLX-TriProof-SS-258-XX, which gives the most unfavourable test result.
Model number	:	LLX-TriProof-SS-118-XX, LLX-TriProof-SS-218-XX, LLX-TriProof-SS-136-XX, LLX-TriProof-SS-236-XX, LLX-TriProof-SS-158-XX, LLX-TriProof-SS-258-XX
Rating	:	85V-265V~, 50/60Hz, IP65 LLX-TriProof-SS-118-XX:18W; LLX-TriProof-SS-218-XX: 36W LLX-TriProof-SS-136-XX:36W; LLX-TriProof-SS-236-XX:72W LLX-TriProof-SS-158-XX: 58W; LLX-TriProof-SS-258-XX:116W
Brand name	:	Longlux
Mains lead	:	0 m
Data cable	:	None
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	January 10, 2024
Date of test	:	January 10, 2024 — January 22, 2024

1.2 Description of Test Facility

Name	Hangzhou ETA Testing Technology Co., Ltd
Address	8/F., Building A, The Western Science Park, Yuhang District, Hangzhou, Zhejiang, China
Telephone	86 571 88610058
Telefax	86 571 88610058

2. TEST SPECIFICATIONS

2.1 Standards

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 purposed EMC immunity requirements

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

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

2.2 Mode of operation during the test

2.2.1 Description of operation

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency is specified if used.

2.2.2 Test Peripherals

Equipment description (Including Brand name)	Model & Serial	Cable description (List Length, Type & Purpose)
-	-	-

2.3 Test Summary

This report is for the exclusive use of ETA's Client and is provided pursuant to the agreement between ETA and its Client. ETA's responsibility and liability are limited to the terms and conditions of the agreement. ETA assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the ETA name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by ETA. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an ETA certification program.

TEST ITEM	RESULT	NOTE
Mains terminal continuous disturbance voltage	Pass	
Radio frequency magnetic field emission	Pass	
Insertion loss	NA	
Radiated Emission	Pass	
Harmonics	Pass	
Voltage fluctuation-Flicker	Pass	
Electrostatic Discharge (ESD)	Pass	
Electric Fast Transient /Burst (EFT/B)	Pass	
Surge	Pass	
Injected Current	Pass	
RF electromagnetic field susceptibility	Pass	
Voltage dips and interruption	Pass	

Notes:

1. NA =Not Applicable.
2. Margin to the limit is within the uncertainty interval of the measured value.

Emission Test

3. Mains/Load/Control Terminal Continuous Disturbance Voltage

Test result: PASS

3.1 Terminal Voltage Limits for the frequency range 9kHz to 30MHz

3.1.1 Disturbance voltage limits at mains terminals

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.009 ~ 0.05	110	-
0.05 ~ 0.15	90 ~ 80 *	-
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5.0	56	46
5.0 ~ 30	60	50

Notes:

1. * means the limit decreasing linearly with the logarithm of the frequency in the range 0.05MHz ~ 0.15MHz and 0.15MHz to 0.5MHz.
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

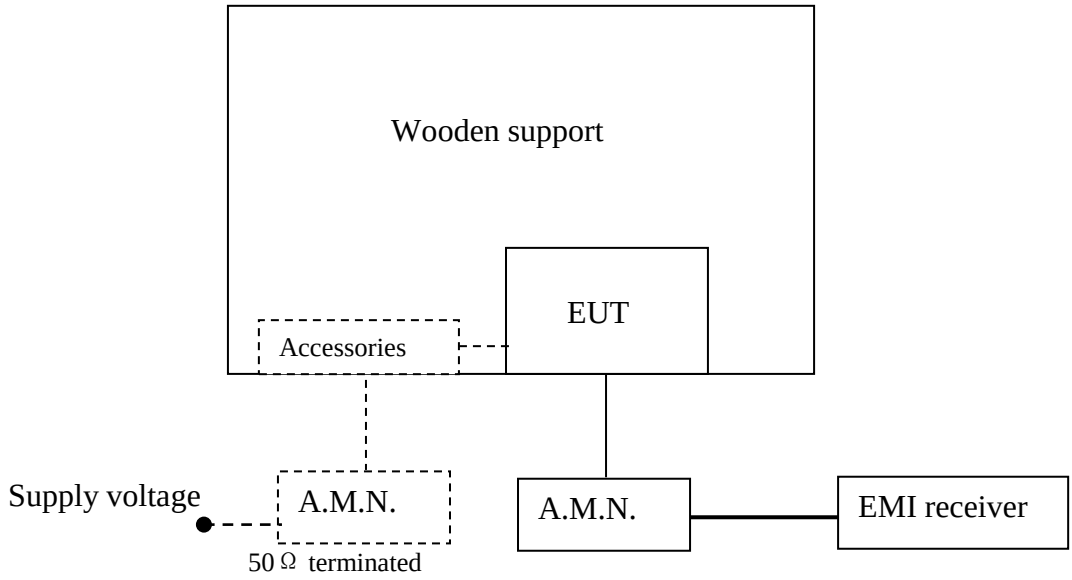
3.1.2 Disturbance voltage limits at load and control terminals

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	80	70
0.5 ~ 5	74	64
5 ~ 30	74	64

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

3.2 Block Diagram of Test Setup

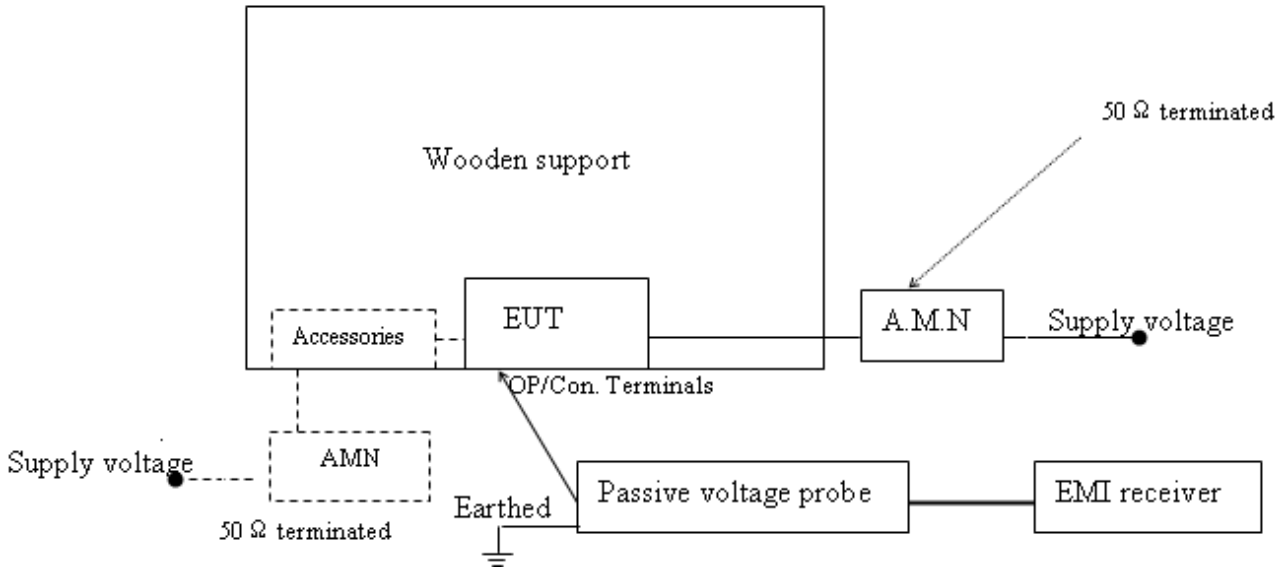
☒ At mains terminal



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

☐ At output and control terminals



Note: ——— : power line

——— : signal line

- - - - - - - - : means the test setup while available

3.3 Test Setup and Test Procedure

3.3.1 Test setup

Detailed test procedure and arrangement was following clause 8 of EN IEC 55015.
Operation conditions of EUT were according to clause 6 of EN IEC 55015.
Measurement was carried out with lamps which have been in operation for:

2h for incandescent lamps;
100h for fluorescent lamps.

Prior to a measurement, the lamps were operated until stabilization has been reached, and the following stabilization time was observed:

5 min for incandescent lamp;
15 min for fluorescent lamp;
30 min for other discharge lamps.

3.3.2 Test procedure

All measurements were according to clause 8.1.1, 8.1.2, 8.1.3, 8.1.4 and 8.1.5 of EN IEC 55015 and For:

☒ Indoor luminaires
The measurement was carried in accordance with clause 8.2 of EN IEC 55015

☐ Outdoor luminaires
The measurement was carried in accordance with clause 8.2 of EN IEC 55015

☐ Independent light regulating devices
The measurement was carried in accordance with clause 8.3 of EN IEC 55015

☐ Independent transformers and convertors for incandescent lamps or LED light sources
The measurement was carried in accordance with clause 8.4 of EN IEC 55015

☐ Independent ballasts for fluorescent and other discharge lamps
The measurement was carried in accordance with clause 8.5 of EN IEC 55015

☐ Self-ballasted lamps and semi-luminaires
The measurement was carried in accordance with clause 8.6 of EN IEC 55015

☐ UV and IR radiation appliances
The measurement was carried in accordance with clause 8.7 of EN IEC 55015

☐ Self-contained emergency lighting luminaires
The measurement was carried in accordance with clause 8.8 of EN IEC 55015

☐ Independent starters and igniters for fluorescent and other discharge lamps
The measurement was carried in accordance with clause 8.9 of EN IEC 55015

The frequency from 9kHz to 30MHz was checked.
The bandwidth of test receiver was set on 200Hz (from 9kHz to 150kHz) and 9kHz (from 150kHz to 30MHz).

3.4 Test Protocol

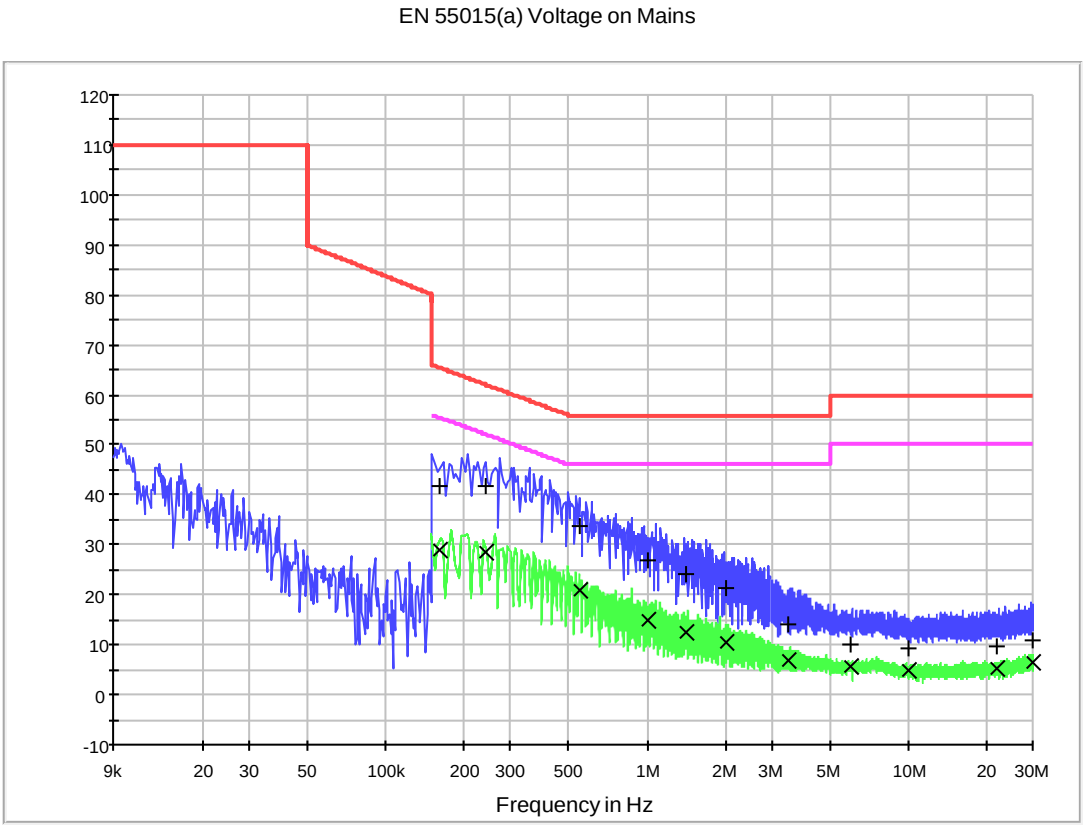
Temperature : 24°C

Relative Humidity : 52 %

For mains terminal: Pass

For LLX-TriProof-SS-258-XX

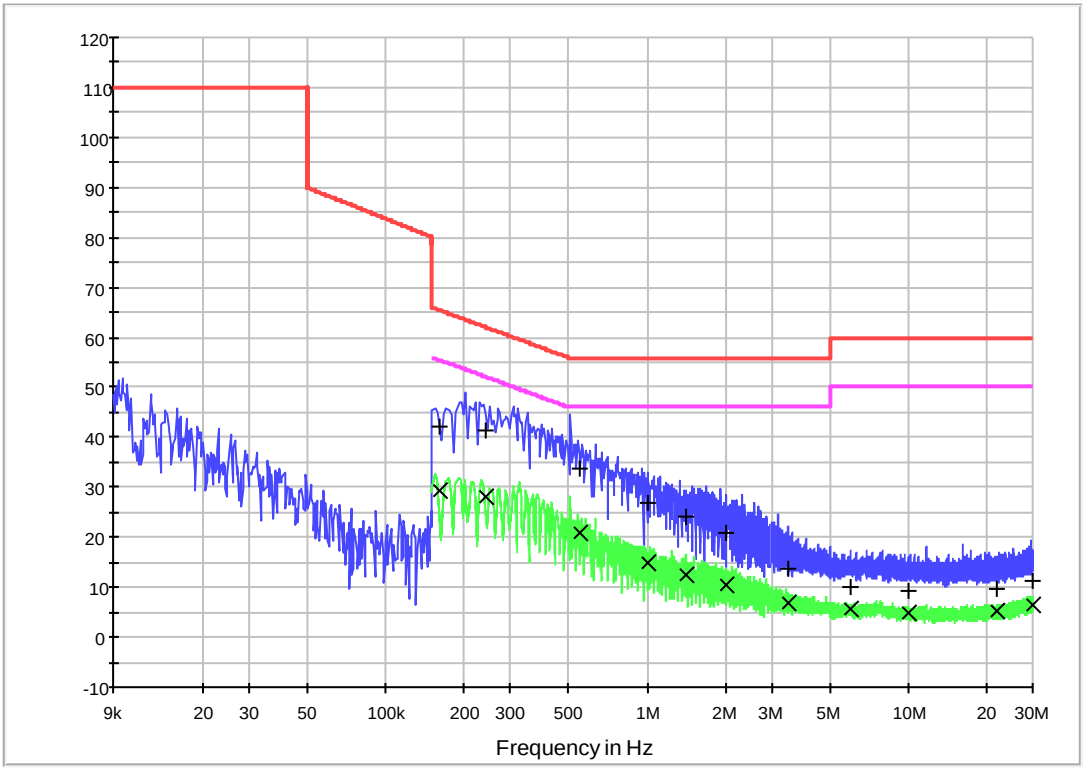
L-Line



Frequency (MHz)	QuasiPeak (dBµV)	Margin - QPK (dB)	Limit - QPK (dBµV)	CAverage (dBµV)	Margin - AV (dB)	Limit - AV (dBµV)
0.160000	41.78	23.68	65.46	29.07	26.40	55.46
0.240000	41.59	20.51	62.10	28.45	23.65	52.10
0.550000	33.76	22.24	56.00	20.81	25.19	46.00
1.000000	26.96	29.04	56.00	14.91	31.09	46.00
1.400000	24.22	31.78	56.00	12.66	33.34	46.00
2.000000	21.16	34.84	56.00	10.37	35.63	46.00
3.500000	13.93	42.07	56.00	6.84	39.16	46.00
6.000000	10.09	49.91	60.00	5.81	44.19	50.00
10.000000	9.22	50.78	60.00	4.81	45.20	50.00
22.000000	9.73	50.27	60.00	5.37	44.63	50.00
30.000000	11.05	48.95	60.00	6.47	43.53	50.00

N-Line

EN 55015(a) Voltage on Mains



Frequency (MHz)	QuasiPeak (dB¦ìV)	Margin - QPK (dB)	Limit - QPK (dB¦ìV)	CAverage (dB¦ìV)	Margin - AV (dB)	Limit - AV (dB¦ìV)
0.160000	42.31	23.16	65.46	29.19	26.27	55.46
0.240000	41.43	20.67	62.10	28.30	23.80	52.10
0.550000	33.84	22.16	56.00	20.81	25.19	46.00
1.000000	27.04	28.96	56.00	15.04	30.96	46.00
1.400000	24.11	31.89	56.00	12.65	33.35	46.00
2.000000	21.00	35.00	56.00	10.32	35.68	46.00
3.500000	13.54	42.46	56.00	6.67	39.33	46.00
6.000000	9.90	50.10	60.00	5.52	44.48	50.00
10.000000	9.41	50.59	60.00	4.81	45.19	50.00
22.000000	9.69	50.31	60.00	5.13	44.87	50.00
30.000000	11.20	48.80	60.00	6.65	43.36	50.00

For load/control terminal: NA

Frequency (MHz)	Quasi-peak		Average	
	Disturbance level dB(⎾V)	Permitted limit dB(⎾V)	Disturbance level dB(⎾V)	Permitted limit dB(⎾V)
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
Note: * means the emission level 20dB below the relevant limit.				

3.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty at mains terminal: ±2.96dB (0.15MHz-30MHz), ±3.32dB (9kHz-150kHz)

Measurement uncertainty at load/control terminal: ±2.61/±3.38dB.

The measurement uncertainty is given with a confidence of 95%, k=2.

3.6 Additions, Deviations and Exclusions from Standards

None.

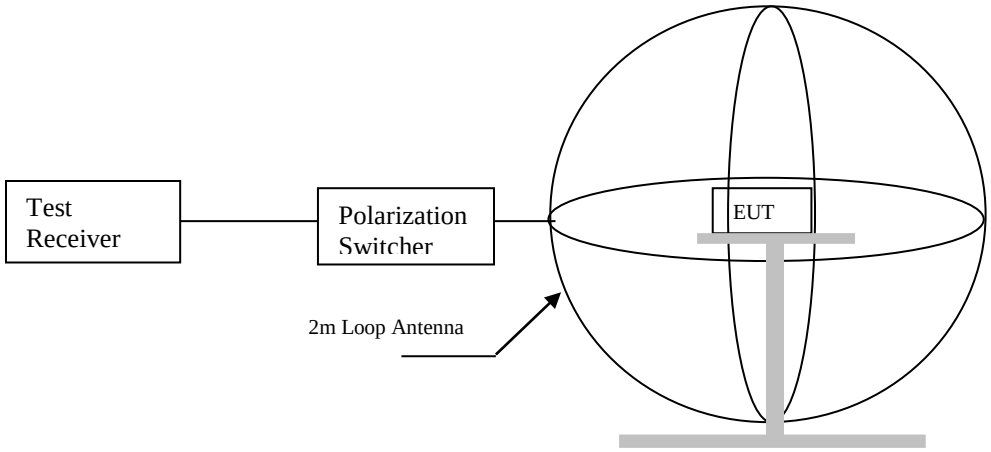
4. Radiated Electromagnetic Disturbance

Test result: PASS

4.1 Radiated Electromagnetic Disturbance Limit for frequency range 9kHz to 30MHz

Frequency Range	Limits for loop diameter dB(μA) (a)		
	2m	3m	4m
9kHz – 70kHz	88	81	75
70kHz - 150kHz	88 to 58 (b)	81 to 51 (b)	75 to 45(b)
150kHz – 3.0MHz	58 to 22 (b)	51 to 15 (b)	45 to 9 (b)
3.0MHz – 30MHz	22	15 to 16 (c)	9 to 12 (c)
Notes: a: At the transition frequency, the lower limit applies. b: Decreasing linearly with the logarithm of the frequency. c: Increasing linearly with the logarithm of the frequency.			

4.2 Block Diagram of Test Setup



4.3 Test Setup and Test Procedure

Measurement was performed in shielded room, and instruments used were following clause 9.1.1 of EN IEC 55015 .

Detailed test procedure and arrangement was following clause 9 of EN IEC 55015 .

Frequency range 9kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 200Hz (from 9kHz to 150kHz) and 9kHz (from 150kHz to 30MHz).

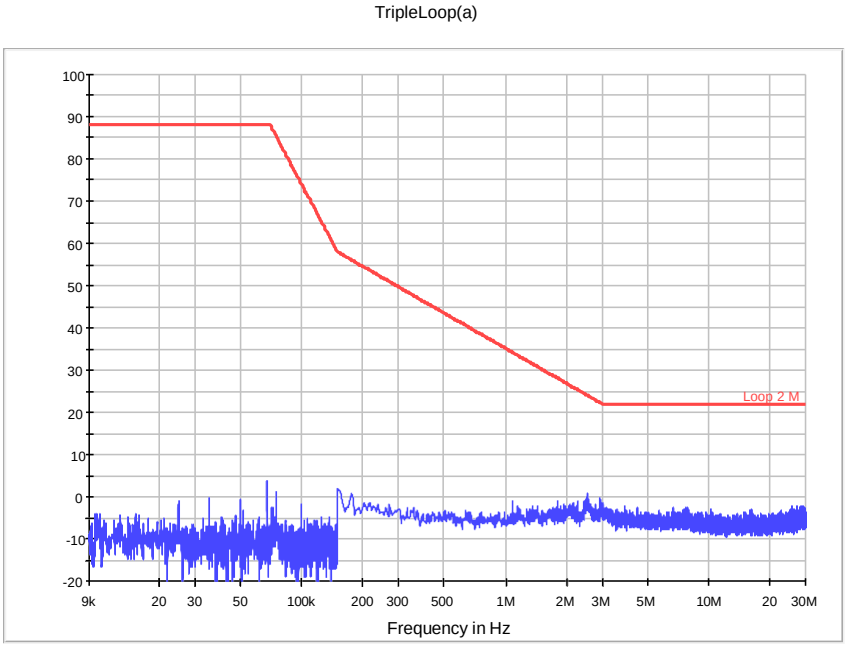
4.4 Test Protocol

Temperature : 24 °C

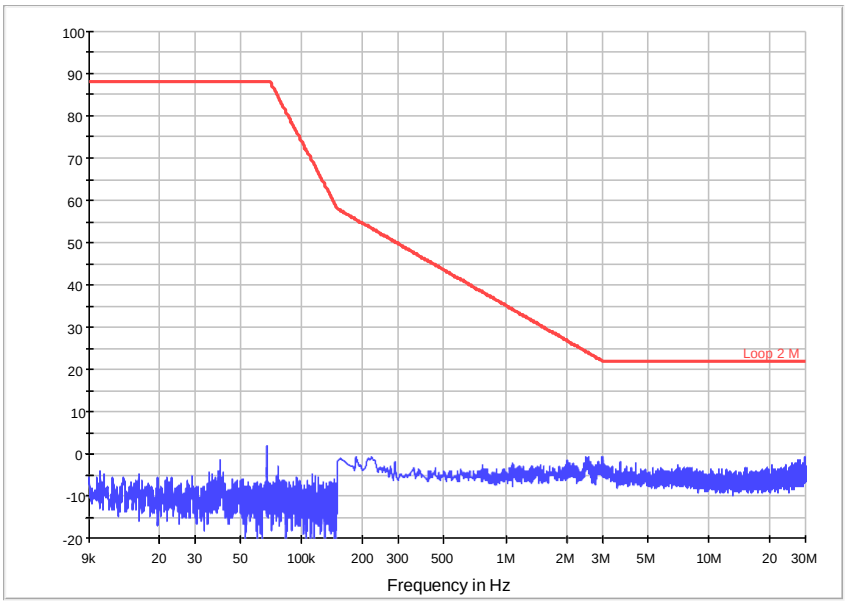
Relative Humidity : 48%

The worst testing data is listed in the report as representative.

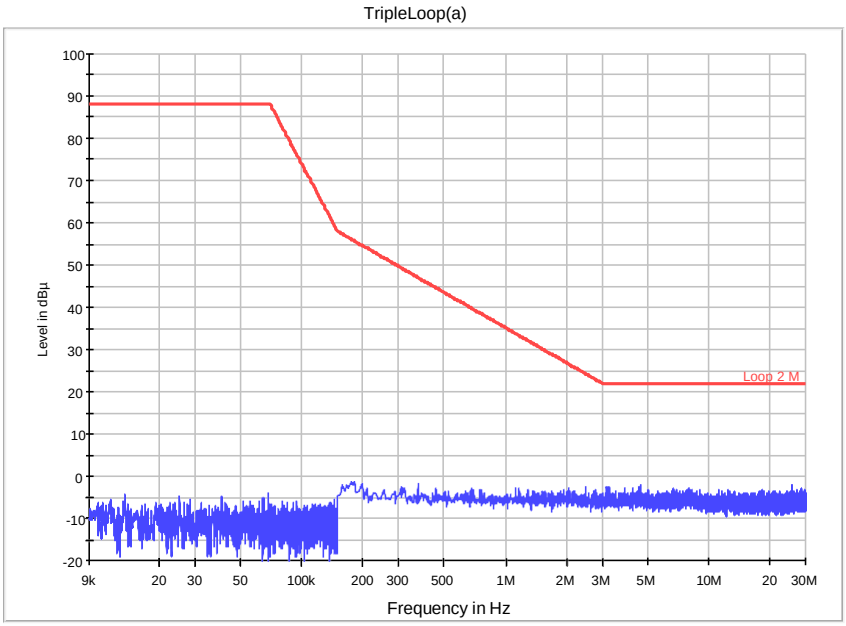
X direction



Y direction



Z direction



Frequency /MHz	Quasi-peak (dBµA) Disturbance level X direction	Y direction	Z direction	Permitted limit
0.009	*	*	*	88.00
0.05	*	*	*	88.00
0.10	*	*	*	73.96
0.24	*	*	*	52.40
0.55	*	*	*	42.52
1.00	*	*	*	35.39
1.40	*	*	*	31.39
2.00	*	*	*	27.14
3.50	*	*	*	22.00
6.00	*	*	*	22.00
10.00	*	*	*	22.00
22.00	*	*	*	22.00
30.00	*	*	*	22.00
Notes: * means the radiated electromagnetic disturbance level 10dB lower than the relevant limit.				

4.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of radiated disturbance: ±2.82dB (0.15MHz-30MHz), ±2.91dB(9kHz - 150kHz).

The measurement uncertainty is given with a confidence of 95%, k=2.

4.6 Additions, Deviations and Exclusions from Standards

None.

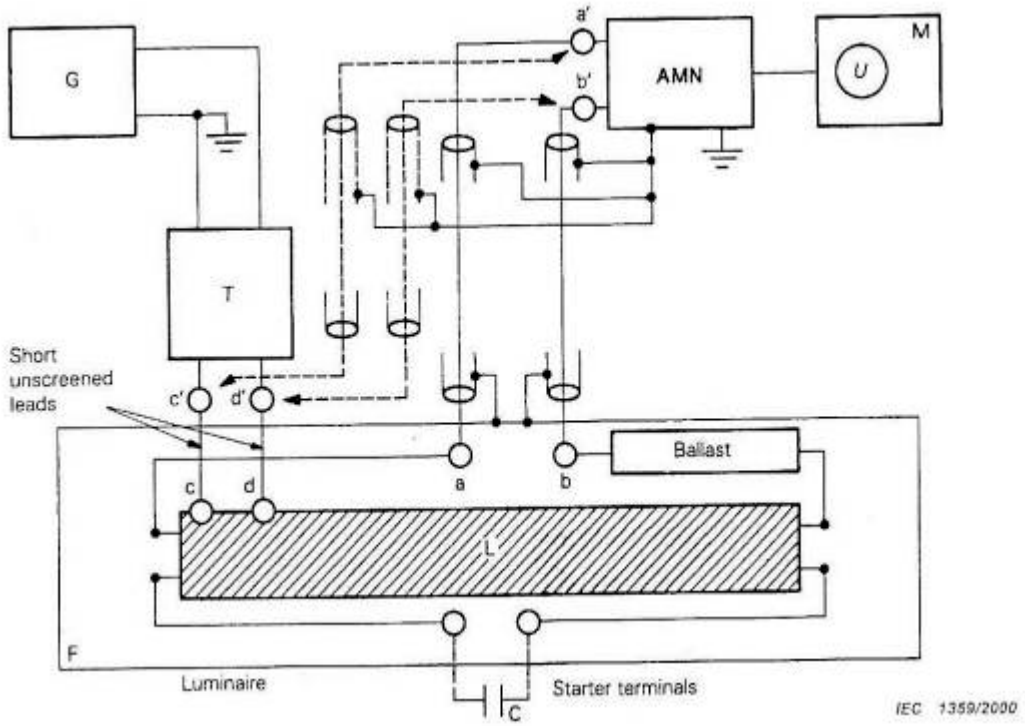
5. Insertion Loss

Test result: NA

5.1 Insertion loss limit

Frequency range (kHz)	Minimum Values (dB)
150 to 160	28
160 to 1400	28 to 20*
1400 to 1605	20
Note: *means decreasing linearly with the logarithm of frequency.	

5.2 Block diagram of test set up

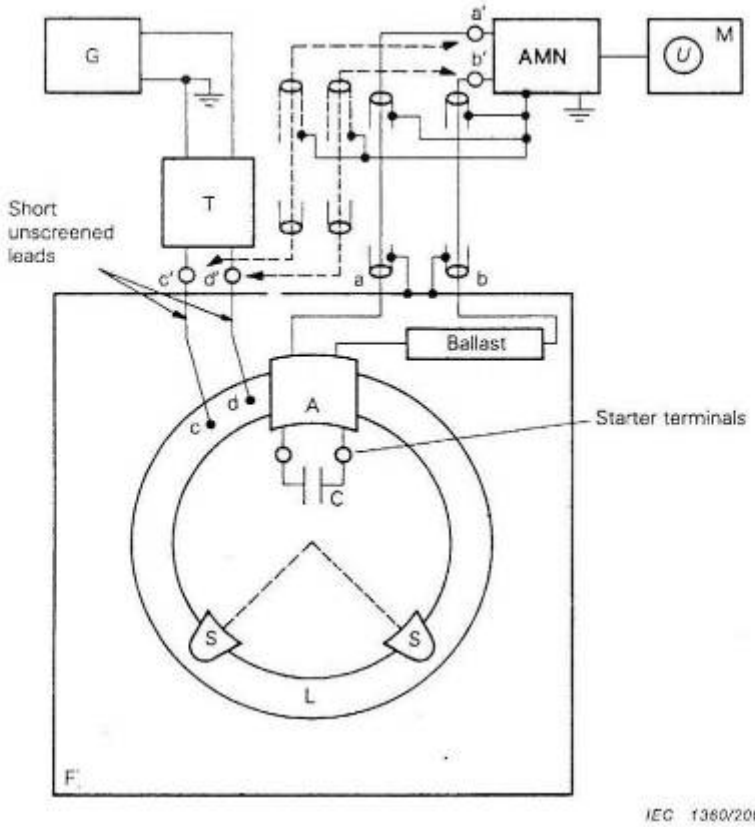


Key

G	=	r.f. generator
T	=	balance-to-unbalance transformer
AMN	=	50 Ω/50 µH + 5 Ω (or 50 Ω/50 µH) artificial mains network as specified in CISPR 16-1
M	=	r.f. millivoltmeter or measuring receiver
L	=	dummy lamp
F	=	luminaire
C	=	capacitor
a – b	=	mains terminals
a' – b'	=	input terminals of the measuring network AMN
c – d	=	r.f. terminals of dummy lamp L
c' – d'	=	output terminals of T
a – a' and b – b'	=	connections by coaxial cables (Z_0 = 75 Ω), with the respective ends of the screens connected to the reference earth of AMN and F not exceeding 50 cm in length
c – c' and d – d'	=	connections of the transformer to the dummy lamp shall be made with unscreened leads not exceeding 100 mm in length

NOTE When measuring U-type lamp luminaires, the same circuit arrangement is used, but the linear dummy lamp should be replaced by the U-type dummy lamp.

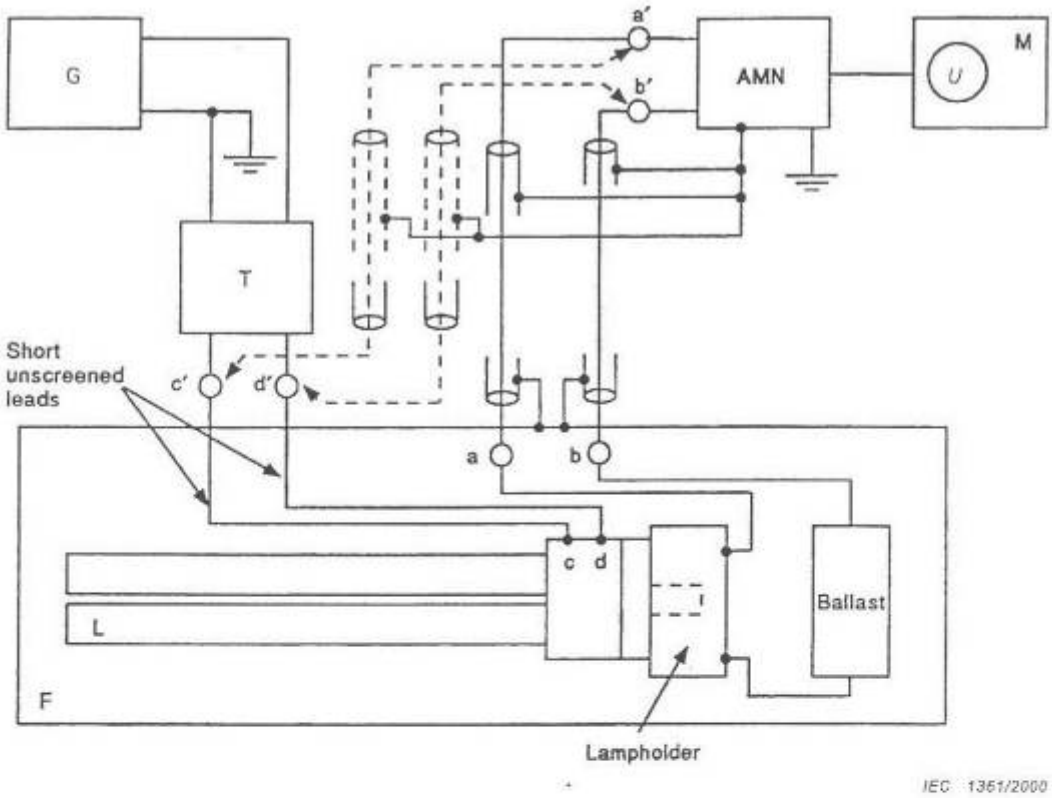
Figure 1 – Insertion loss measurement on linear and U-type fluorescent lamp luminaires



Key

G	=	r.f. generator
T	=	balance-to-unbalance transformer
AMN	=	50 Ω/50 µH + 5 Ω (or 50 Ω/50 µH) artificial mains network as specified in CISPR 16-1
M	=	r.f. millivoltmeter or measuring receiver
L	=	dummy lamp
F	=	luminaire
C	=	capacitor
A	=	lampholder
S	=	supports of insulating material
a – b	=	mains terminals
a' – b'	=	input terminals of the measuring network AMN
c – d	=	r.f. terminals of dummy lamp L
c' – d'	=	output terminals of T
a – a' and b – b'	=	connections by coaxial cables (Z_0 = 75 Ω), with the respective ends of the screens connected to the reference earth of AMN and F, not exceeding 50 cm in length
c – c' and d – d'	=	connections of the transformer to the dummy lamp shall be made with unscreened leads not exceeding 100 mm in length

Figure 2 – Insertion loss measurement on circular fluorescent lamp luminaires



Key

G	=	r.f. generator
T	=	balance-to-unbalance transformer
AMN	=	50 Ω/50 µH + 5 Ω (or 50 Ω/50 µH) artificial mains network as specified in CISPR 16-1
M	=	r.f. millivoltmeter or measuring receiver
L	=	dummy lamp
F	=	luminaire
a – b	=	mains terminals
a' – b'	=	input terminals of the measuring network AMN
c – d	=	r.f. terminals of dummy lamp L
c' – d'	=	output terminals of T
a – a' and b – b'	=	connections by coaxial cables (Z_0 = 75 Ω), with the respective ends of the screens connected to the reference earth of AMN and F, not exceeding 50 cm in length
c – c' and d – d'	=	connections of the transformer to the dummy lamp shall be made with unscreened leads not exceeding 100 mm in length

Figure 3 – Insertion loss measurement on luminaires for single-capped fluorescent lamps with integrated starter

5.3 Test Procedure

Detailed test procedure and arrangement was following clause 7.2 and clause 7.4 of EN IEC 55015.

5.4 Test Protocol

Temperature	:	°C
Relative Humidity	:	%

5.5 Additions, Deviations and Exclusions from Standards

None.

6. Radiated emission/Conducted RF emission

Test result: **PASS**

6.1 Limit

☐ 6.1.1 Radiated emission limit from frequency range 30MHz – 300MHz

Frequency (MHz)	Permitted limit in dBμV/m (Quasi-peak) of Measurement Distance 3m	Permitted limit in dBμV/m (Quasi-peak) of Measurement Distance 10m
30-230	40	30
230-300	47	37

Notes:
1. For the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.
2. The gray rows are selected items.

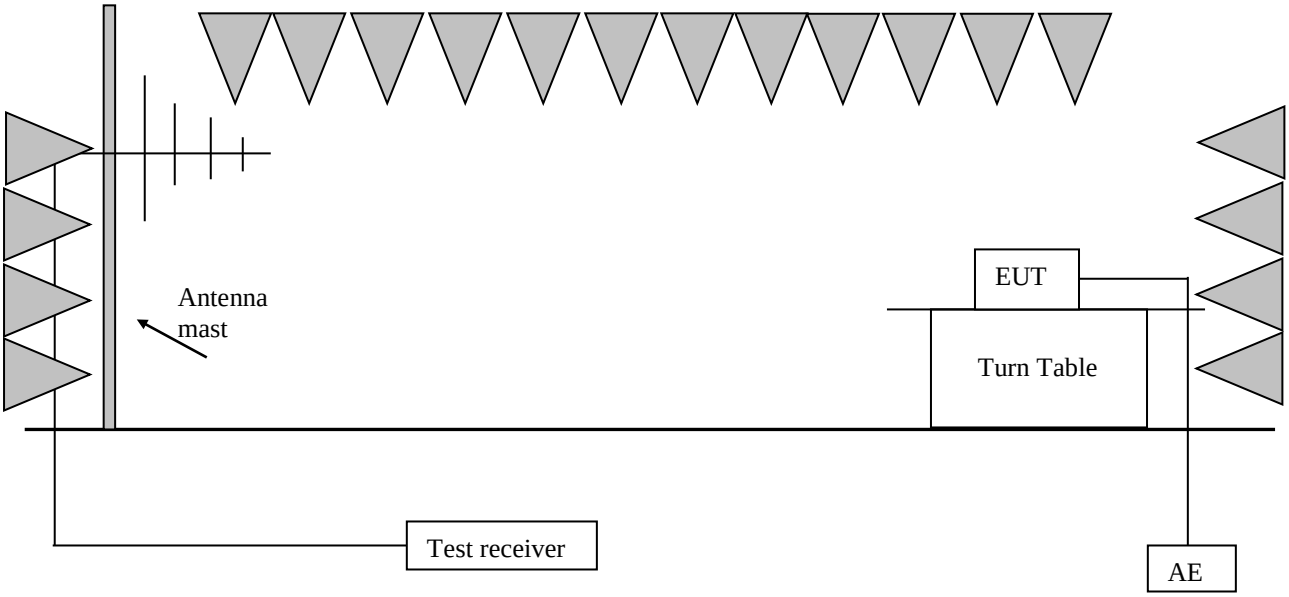
☒ 6.1.2 Common mode terminal voltage limits 30MHz – 300MHz

Frequency (MHz)	Quasi-peak limits dB(μV)
30-100	64 to 45*
100-230	54
230-300	61

Notes:
1. At the transition frequency, the lower limit applies.
2. The limit decreases linearly with the logarithm of the frequency.

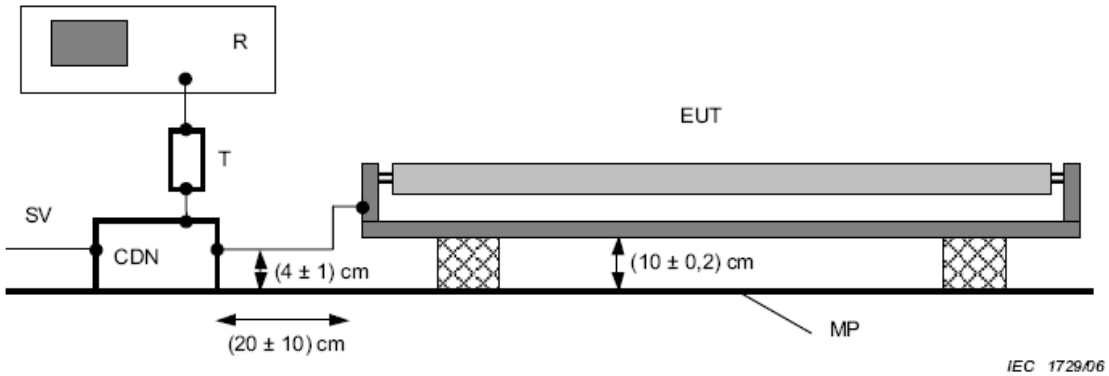
6.2 Block diagram and test set up

☐For radiated method



The measurement was applied in a semi-anechoic chamber.
Measurement was performed according to clause 10 of CISPR 22.
Setting of EUT is according to clause 9.2 & Annex C of EN IEC 55015 .
The bandwidth setting on test receiver was 120kHz.
The frequency range from 30MHz to 300MHz was checked.

☒For conducted method



Components

R	Measuring receiver	CDN	Coupling-decoupling network
SV	Supply voltage	EUT	Equipment under test
MP	Earthed metal plate	T	6 dB, 50 Ω attenuator

Measurement and setting of EUT were performed according to Annex B of EN IEC 55015.
The frequency range from 30MHz to 300MHz was checked.

6.3 Test Protocol

Test is performed while employing:

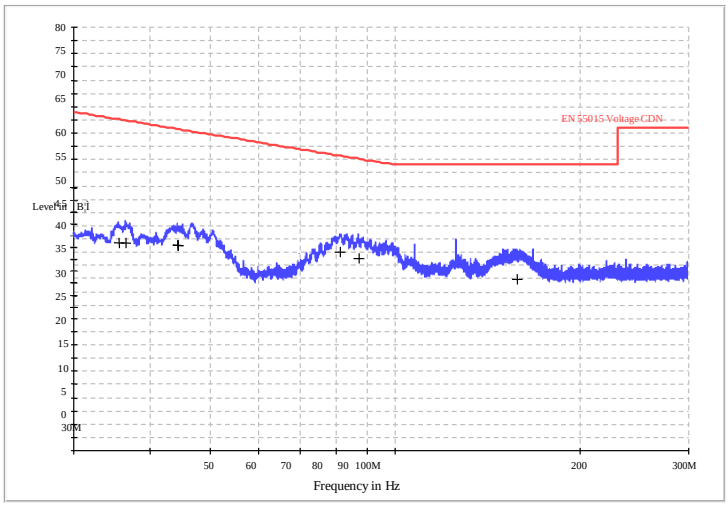
☐ Radiated method (EN IEC 55015 Annex C)

☒ Conducted method (EN IEC 55015 Annex B)

Temperature : 24°C

Relative humidity : 46%

For LLX-TriProof-SS-258-XX



Frequency (MHz)	QuasiPeak (dBµV)	Margin - QPK (dB)	Limit - QPK (dBµV)
35.600000	39.37	23.20	62.58
44.320000	38.85	21.90	60.76
81.600000	37.60	18.09	55.69
87.400000	36.40	18.72	55.12
157.600000	32.46	21.54	54.00

6.4 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of radiated method/conducted method is: ± 4.90/± 3.96dB.

The measurement uncertainty is given with a confidence of 95%, k=2.

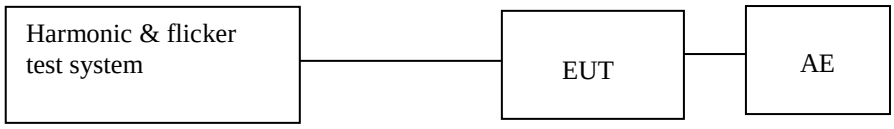
6.5 Additions, Deviations and Exclusions from Standards

None.

7. Harmonics

Test result: PASS

7.1 Block Diagram of Test Setup



7.2 Test Setup and Test Procedure

Harmonics of the fundamental current were measured up to 40 order harmonics using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system. The measurements were carried out under steady conditions.

7.3 Test Protocol

Temperature : 23°C
Relative Humidity : 52%

Power and THD results - DS: 116

True power P:	110.45W	Apparent power S:	27.98VA
Reactiv power Q:	6.895var	Power factor:	0.878
THD (U):	0.001	THD (I):	0.123
Crest Factor (U):	1.414	Crest Factor (I):	1.343

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [%]	Result
1	141.168E-3	99.568		
2	530.468E-6	0.374		PASS
3	15.541E-3	10.962	29.35	PASS
4	1.074E-3	0.757		PASS
5	2.824E-3	1.992		PASS
6	754.907E-6	0.532		PASS
7	3.084E-3	2.175		PASS
8	739.286E-6	0.521		PASS
9	1.688E-3	1.191		PASS
10	741.150E-6	0.523		PASS
11	1.589E-3	1.121		PASS
12	670.491E-6	0.473		PASS
13	1.327E-3	0.936		PASS
14	1.004E-3	0.708		PASS
15	1.691E-3	1.193		PASS
16	651.378E-6	0.459		PASS
17	2.075E-3	1.464		PASS
18	971.507E-6	0.685		PASS
19	2.357E-3	1.662		PASS

20	634.659E-6	0.448		PASS
21	1.619E-3	1.142		PASS
22	650.790E-6	0.459		PASS
23	1.676E-3	1.182		PASS
24	663.640E-6	0.468		PASS
25	1.705E-3	1.203		PASS
26	706.486E-6	0.498		PASS
27	1.232E-3	0.869		PASS
28	717.168E-6	0.506		PASS
29	691.955E-6	0.488		PASS
30	603.823E-6	0.426		PASS
31	1.429E-3	1.008		PASS
32	834.624E-6	0.589		PASS
33	1.977E-3	1.394		PASS
34	590.155E-6	0.416		PASS
35	1.008E-3	0.711		PASS
36	617.539E-6	0.436		PASS
37	1.300E-3	0.917		PASS
38	595.014E-6	0.420		PASS
39	771.233E-6	0.544		PASS
40	643.493E-6	0.454		PASS

Maximum harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [%]	Result
1	141.780E-3	100.000		
2	867.482E-6	0.612		PASS
3	16.053E-3	11.323	44.02	PASS
4	1.378E-3	0.972		PASS
5	3.058E-3	2.157		PASS
6	1.124E-3	0.793		PASS
7	3.324E-3	2.344		PASS
8	943.064E-6	0.665		PASS
9	1.825E-3	1.287		PASS
10	834.452E-6	0.589		PASS
11	1.879E-3	1.325		PASS
12	938.716E-6	0.662		PASS
13	1.502E-3	1.059		PASS
14	1.184E-3	0.835		PASS
15	1.873E-3	1.321		PASS
16	808.203E-6	0.570		PASS
17	2.169E-3	1.530		PASS
18	1.146E-3	0.808		PASS
19	2.483E-3	1.751		PASS
20	758.916E-6	0.535		PASS
21	1.735E-3	1.224		PASS
22	841.339E-6	0.593		PASS
23	1.927E-3	1.359		PASS
24	822.009E-6	0.580		PASS
25	1.821E-3	1.284		PASS
26	802.072E-6	0.566		PASS
27	1.355E-3	0.956		PASS
28	873.830E-6	0.616		PASS
29	777.007E-6	0.548		PASS
30	729.771E-6	0.515		PASS
31	1.576E-3	1.111		PASS
32	986.549E-6	0.696		PASS
33	2.142E-3	1.511		PASS
34	718.438E-6	0.507		PASS
35	1.142E-3	0.805		PASS
36	772.598E-6	0.545		PASS

37	1.404E-3	0.990	PASS
38	687.704E-6	0.485	PASS
39	877.244E-6	0.619	PASS
40	718.913E-6	0.507	PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

7.4 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

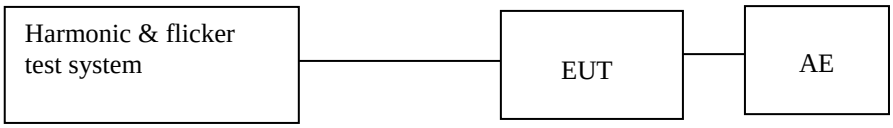
Measurement uncertainty of harmonic test is: ± 3.03%

The measurement uncertainty is given with a confidence of 95%, k=2.

8. Voltage Fluctuations-Flicker

Test result: **PASS**

8.1 Block Diagram of Test Setup



8.2 Test Setup and Test Procedure

8.2.1 Definition

Flicker: impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

Pst: Short-term flicker severity.

Plt: long-term flicker severity.

dc: maximum steady state voltage changes during an observation period.

dmax: maximum absolute voltage changes during an observation period.

d(t): time function of the relative r.m.s. voltage change evaluated as a single value for each successive half period between zero-crossings of the source voltage, except during time interval in which the voltage is a steady-state condition for at least 1s.

8.2.2 Test condition

The EUT was set to produce the most unfavorable sequence of voltage changes.

8.3 Test Protocol

The tested object operated under the operating condition specified in EN 61000-3-3
The following limits apply

- the value of Pst shall not be greater than 1,0.
- the value of Plt shall not be greater than 0,65.
- Tmax, the accumulated time value of d(t) with a deviation exceeding 3,3 % during a single voltage change at the EUT terminals, shall not exceed 500 ms.
- the maximum relative steady-state voltage change, dc, shall not exceed 3,3 %.
- the maximum relative voltage change dmax, shall not exceed:

☐ 4% without additional conditions.

☐ 6 % for equipment which is:
– switched manually, or
– switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

☐ 7 % for equipment which is:
– attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
– switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

☐ for manual switch, dmax is measured in accordance with Annex B of standard, average dmax is calculated from 24 times measurement.

☒According to EN 61000-3-3 clause 6.1 & A.2, the EUT is either unlikely to produce significant voltage fluctuations/flicker or no limit and test were required by technical analysis and sample evaluation on the product.

Temperature : °C

Relative Humidity : %

8.4 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of voltage fluctuation and flicker is: ± 11.77%.
The measurement uncertainty is given with a confidence of 95%, k=2.

Immunity Test

Performance criteria

The performance criteria are based on the general criteria of the standard and derived from the product specification

Performance criterion A:
During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B:
During the test the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C:
During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control.
Additional requirement for lighting equipment incorporating a starting device: After the test, the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.

Basic EMC standard for immunity test
IEC 61000-4-2:2008: Electromagnetic Compatibility (EMC) – Part 4- 2: testing and measurement techniques – electrostatic discharge immunity test

IEC 61000-4-3: 2006/+A1:2007: Electromagnetic Compatibility (EMC) – Part 4- 3: testing and measurement techniques – radiated, radio frequency, electromagnetic field immunity test

IEC 61000-4-4:2004: Electromagnetic Compatibility (EMC) – Part 4- 4: testing and measurement techniques – electric fast transient/burst immunity test

IEC 61000-4-5:2005: Electromagnetic Compatibility (EMC) – Part 4- 5: testing and measurement techniques – section 5: surge immunity test

IEC 61000-4-6:2008: Electromagnetic Compatibility (EMC) – Part 4- 6: testing and measurement techniques – section 6: immunity to conducted disturbance, induced by radio frequency field

IEC 61000-4-8:1993/+A1:2000: Electromagnetic compatibility (EMC) — Part 4-8: Testing and measurement techniques —Power frequency magnetic field immunity test.

IEC 61000-4-11:2004: Electromagnetic Compatibility (EMC) – Part 4- 11: testing and measurement techniques –voltage dips, short interruption and voltage variations immunity test

Note: there are no magnetic sensitive components included in this EUT and magnetic field immunity test according to EN 61000-4-8 is therefore not required.

9. Electrostatic Discharge (ESD)

Test result: **PASS**

9.1 Severity Level and Performance Criterion

9.1.1 Test level

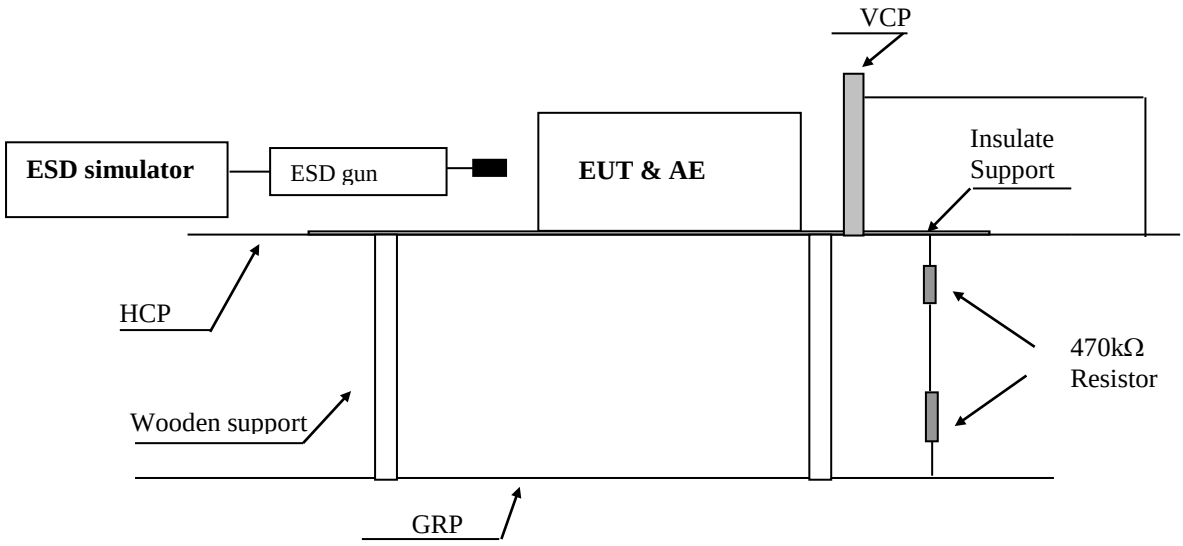
1a – Contact discharge		1b – Air discharge	
Level	Test voltage kV	Level	Test voltage kV
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	X	Special
Notes: 1."X" is an open level. The level has to be specified in the dedicated equipment specification. If higher voltages than those shown are specified, special test equipment may be needed. 2. The gray rows were the selected test level.			

9.1.2 Performance Criterion

Performance criterion: **B (**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 0.5s.)

9.2 Block Diagram of Test Setup

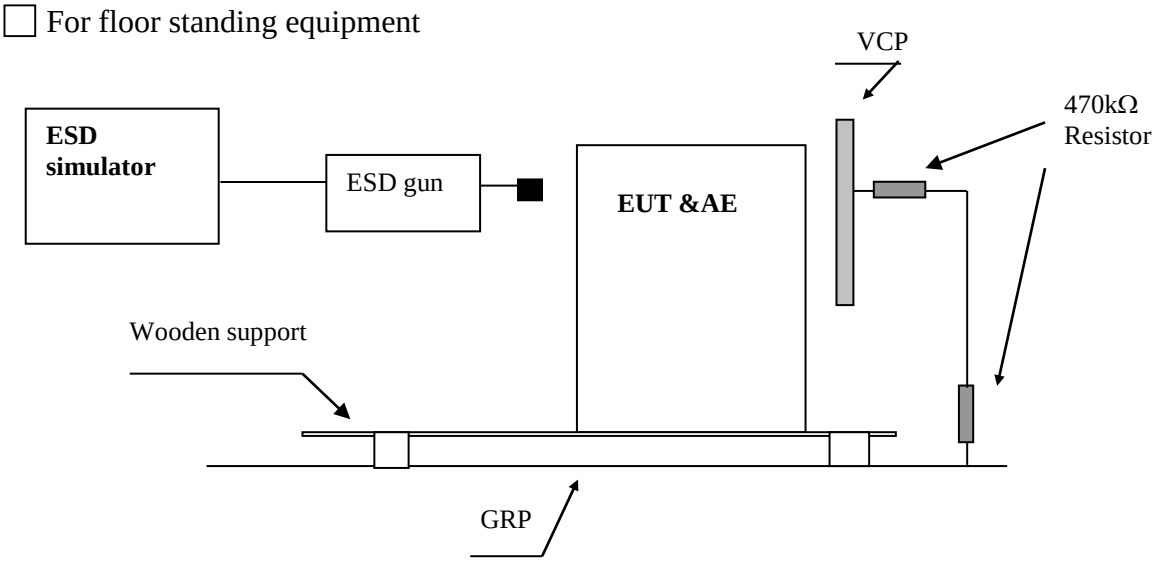
☒ For table-top equipment



Note: HCP means Horizontal Coupling Plane

VCP means Vertical Coupling Plane
GRP means Ground Reference Plane
Wooden support is a 0.8m height table

☐ For floor standing equipment



Note: VCP means Vertical Coupling Plane
GRP means Ground Reference Plane
Wooden support is a 0.1m height rack

9.3 Test Setup and Test Procedure

Measurement was performed in shielded room.
Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-2.
The test method and equipment was specified by IEC 61000-4-2 with the modifications by clause 5.2 of EN 61547.

9.4 Test Protocol

Temperature : 23°C
Relative Humidity: 52%
Air Pressure: 100.5kPa

Direct discharges were applied at the following selected points:

Test point #	Test level [kV]	Air/ Contact	Polarity (+/-)	Result	Comment
A	2/4	Contact	+/-	Pass	All touchable screws of enclosure
B	2/4	Contact	+/-	Pass	Accessible metal parts of the EUT
C	2/4/8	Air	+/-	Pass	Air gap of the switch, button

D	2/4/8	Air	+/-	Pass	The air in-taking opening
E	2/4/8	Air	+/-	Pass	Slots around the EUT

Indirect contact discharges were applied to the VCP and the HCP at the following selected points:

☒ For table top equipment

Point	Description	Point	Result
HCP f	0,1m from the front of the EUT	Edge of centre, corner on HCP	Pass
HCP b	0,1m from the back of the EUT	Edge of centre, corner on HCP	Pass
HCP r	0,1m from the right side of the EUT	Edge of centre, corner on HCP	Pass
HCP l	0,1m from the left side of the EUT	Edge of centre, corner on HCP	Pass
VCP f	0,1m from the front of the EUT	Edge of centre, corner on VCP	Pass
VCP b	0,1m from the back of the EUT	Edge of centre, corner on VCP	Pass
VCP r	0,1m from the right of the EUT	Edge of centre, corner on VCP	Pass
VCP l	0,1m from the left of the EUT	Edge of centre, corner on VCP	Pass

☐ For floor standing equipment

Point	Description	Point	Result
VCP f	0,1m from the front of the EUT	Edge of centre, corner on VCP	-
VCP b	0,1m from the back of the EUT	Edge of centre, corner on VCP	-
VCP r	0,1m from the right of the EUT	Edge of centre, corner on VCP	-
VCP l	0,1m from the left of the EUT	Edge of centre, corner on VCP	-

Observation: All the functions were operated as normal during and after test.
Conclusion: The EUT met the requirements of the standard.

9.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of ESD test is: ± 6.65%
The measurement uncertainty is given with a confidence of 95%, k=2.

9.6 Additions, Deviations and Exclusions from Standards

None.

10. Electromagnetic field susceptibility

Test result: **PASS**

10.1 Severity Level and Performance Criterion

10.1.1 Test level

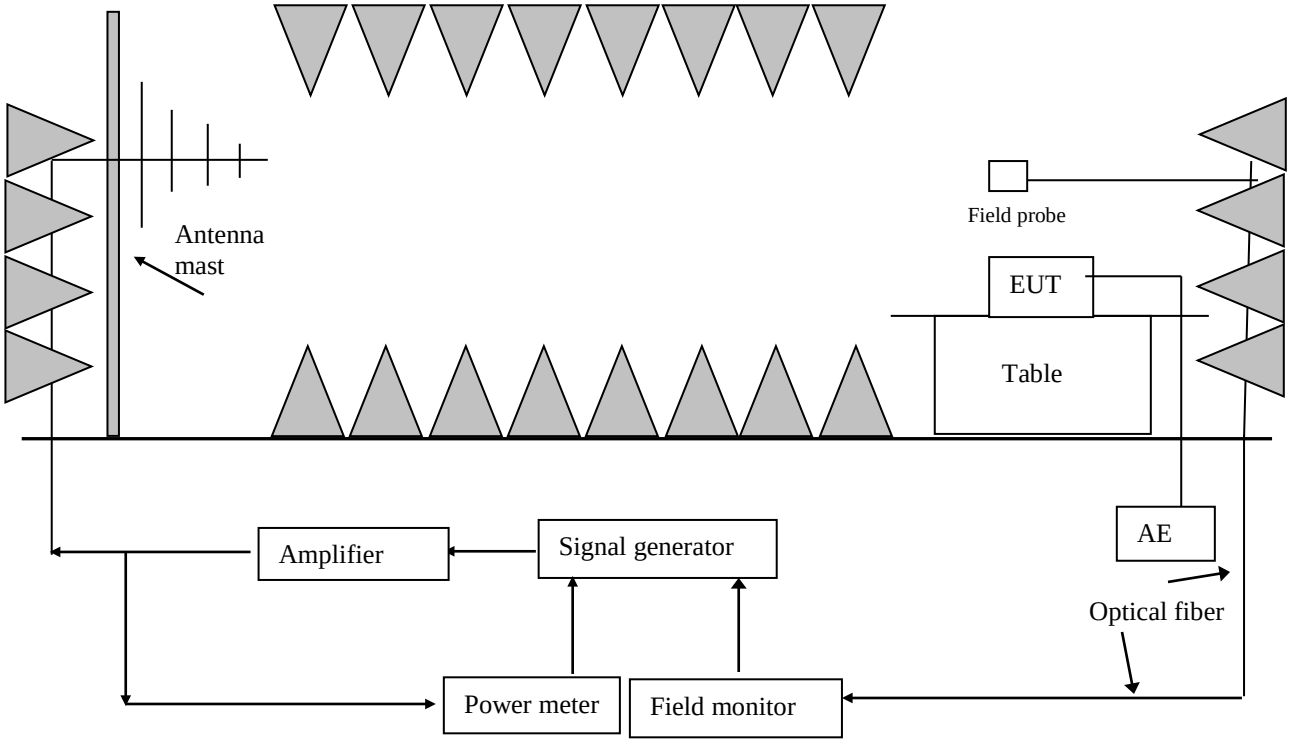
Level	Test field strength V/m
1	1
2	3
3	10
X	Special

Notes:
1. X is an open test level. This level may be given in the product specification.
2. The gray row is the selected test level.

10.1.2 Performance Criterion

Performance criterion: **A**

10.2 Block diagram of test setup



10.3 Test Setup and Test Procedure

Measurement was performed in full-anechoic chamber.
Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-3.
The test method and equipment was specified by IEC 61000-4-3 with additions and modifications by clause 5.3 of EN61547.

10.4 Test Protocol

Temperature : 24°C
Relative Humidity: 48%

Test no.:	Frequency (MHz)	Polarization	Test level V/m	Modulation	Exposed location	Result	Comment
1	80-1000	H & V	3	1kHz, 80%, SW, AM, 1% step size	All sides	Pass	-

Observation: All the functions were operated as normal during and after test.
Conclusion: The EUT met the requirements of standard.

10.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of radiated susceptibility test is: ± 2.38dB
The measurement uncertainty is given with a confidence of 95%, k=2.

10.6 Additions, deviations and exclusions from standards

None.

11. Electric Fast Transient/Burst Immunity Test

Test result: **PASS**

11.1 Severity Level and Performance Criterion

11.1.1 Test level

Open circuit output test voltage (±10%) and repetition rate of the impulses (±20%)				
Level	On power supply ports PE		On I/O (input & output) signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1	0.5	5 or 100	0.25	5 or 100
2	1	5 or 100	0.5	5 or 100
3	2	5 or 100	1	5 or 100
4	4	5 or 100	2	5 or 100
X	Special	Special	Special	Special
Notes: 1. “X” is an open level. The level has to be specified in the dedicated equipment specification. 2. The gray rows were the selected test level.				

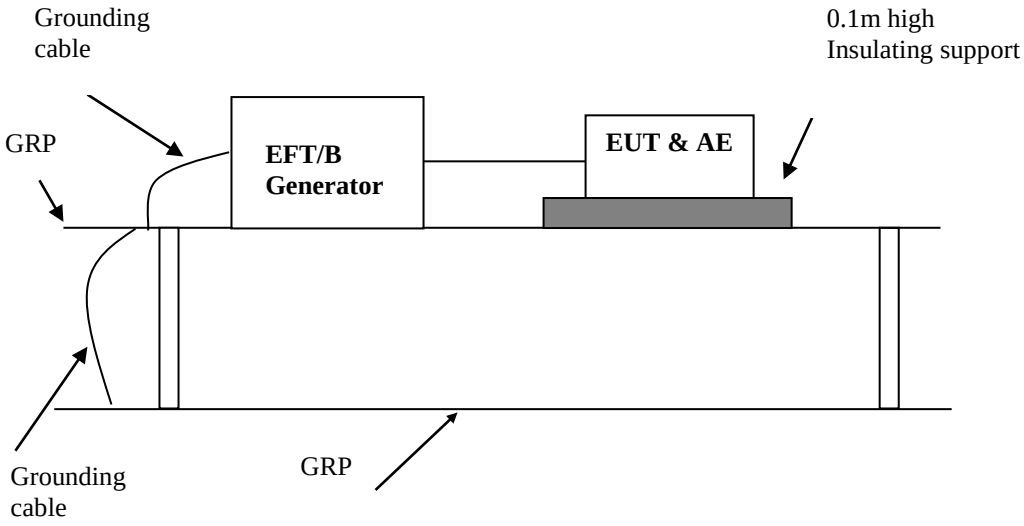
11.1.2 Performance Criterion

Performance criterion **B (**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 0.5s.)

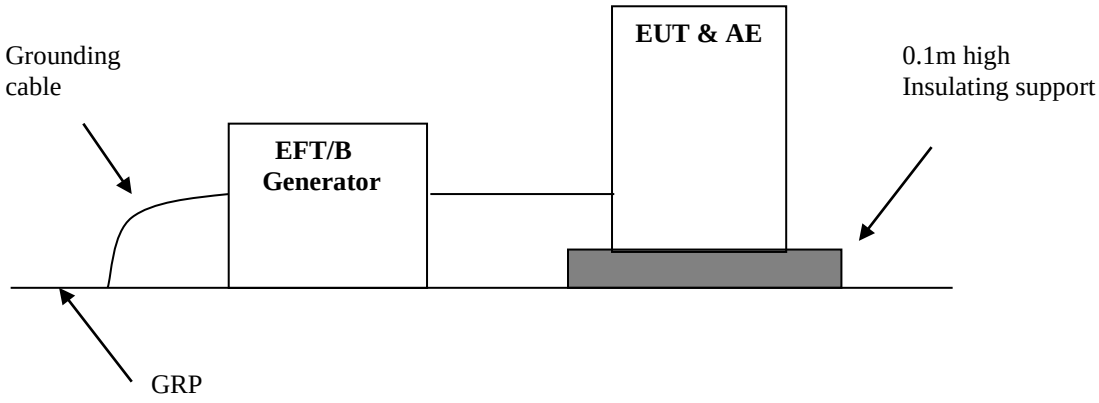
11.2 Block Diagram of Test Setup

11.2.1 Block Diagram for input a.c./d.c. power line

☒ For table-top equipment

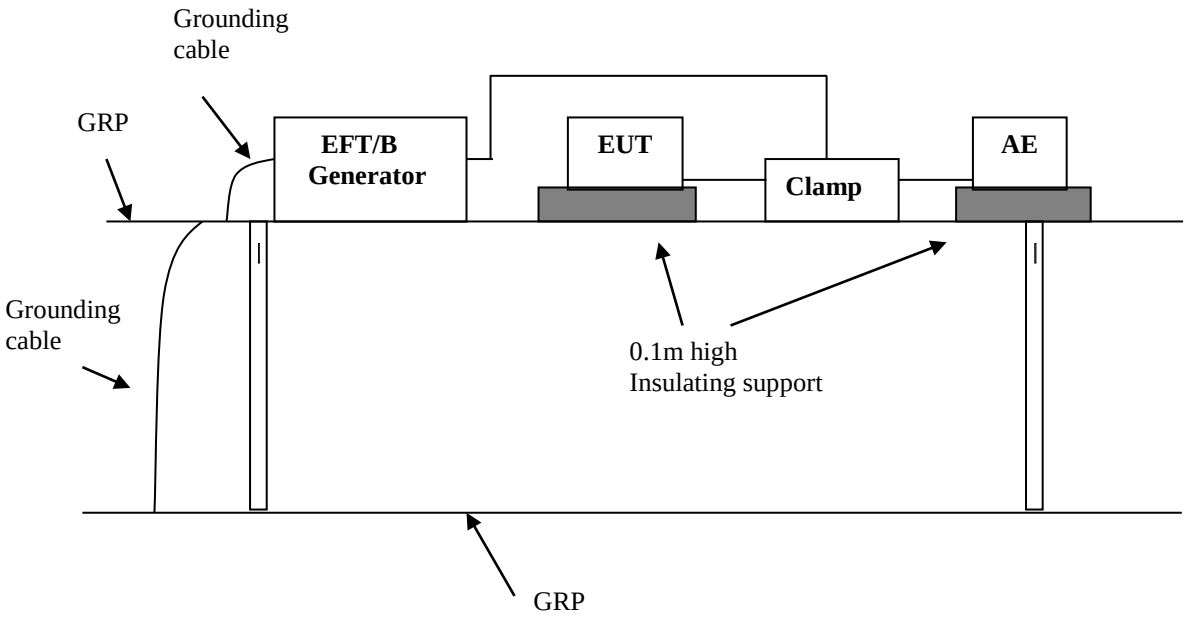


☐ For floor standing equipment

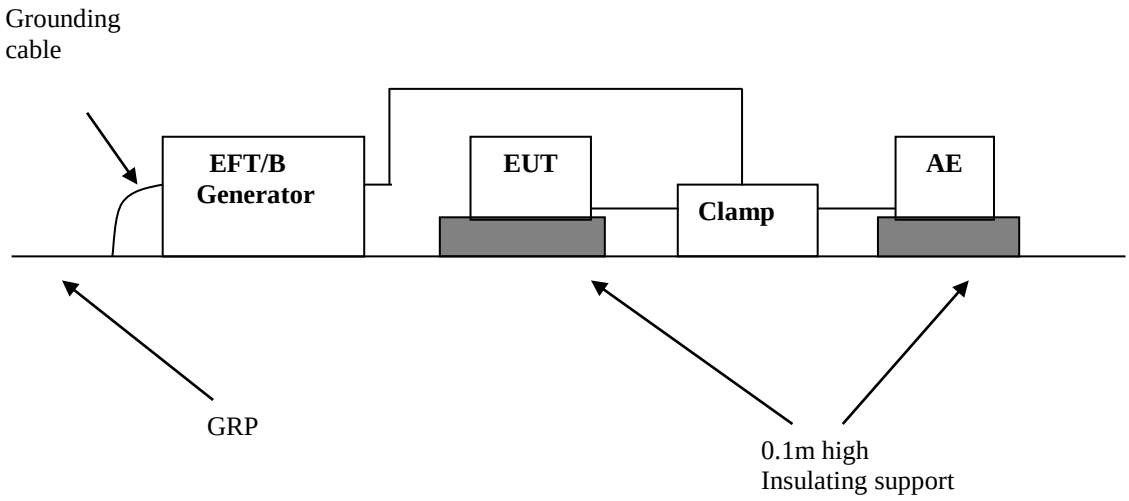


11.2.2 Block Diagram for output a.c./d.c. power line or signal/control lines

☒ For table-top equipment



☐ For floor standing equipment



11.3 Test Setup and Test Procedure

Measurement was performed in shielded room.

Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-4.

The test method and equipment was specified by IEC 61000-4-4 with additions and modifications by clause 5.5 of EN 61547.

11.4 Test Protocol

Temperature : 24°C
Relative Humidity: 48%

Test No.	Level [kV]	Polarity +/-	Repetition rate kHz	Line for test	Pass/ Fail
1	0.5	+/-	5	Signal lines and control lines	NA
2	0.5	+/-	5	d.c. power ports	NA
3	1	+/-	5	a.c. power ports	Pass
Notes: “NA” means not applicable.					

Observation: All the functions were operated as normal during and after test.
Conclusion: The EUT met the requirements of the standard.

11.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of EFT test at main terminal is: ± 18.33%
Measurement uncertainty of EFT test at signal/telecom terminal is: ± 18.36%
The measurement uncertainty is given with a confidence of 95%, k=2.

11.6 Additions, Deviations and Exclusions from Standards

None.

12. Surge Immunity Test

Test result: **PASS**

12.1 Severity Level and Performance Criterion

12.1.1 Test level

Level	Open-circuit test voltage ±10% kV
1	0.5
2	1.0
3	2.0
4	4.0
X*	Special

Notes:
1.”X” is an open class. This level can be specified in the product Specification
2. The gray rows are the selected level.

12.1.2 Performance Criterion

Performance criterion **B:** Luminaires for emergency lighting**. (**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 0.5s.)

Performance criterion **C:** Others

12.2 Block Diagram of Test Setup

12.2.1 Block Diagram for input a.c. power line



12.3 Test Setup and Test Procedure

Measurement was performed in shielded room.
Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-5.
The test method and equipment was specified by IEC 61000-4-5 with modifications by clause 5.7 of EN 61547.

12.4 Test Protocol

Temperature : 25°C
Relative Humidity: 51%

Test No.	Level [kV]	Polarity +/-	Angle	Line for test	Pass/ Fail
1	0.5	+	90º	a.c. Mains (line to line)	Pass
2	0.5	-	270º	a.c. Mains (line to line)	Pass
3	1	+	90º	a.c. Mains (line to earth)	Pass
4	1	-	270º	a.c. Mains (line to earth)	Pass
5	1	+	90º	a.c. Mains (line to line)	Pass
6	1	-	270º	a.c. Mains (line to line)	Pass
7	2	+	90º	a.c. Mains (line to earth)	Pass
8	2	-	270º	a.c. Mains (line to earth)	Pass
Notes: 1. “NA” means not applicable.					

Observation: During test, the light has some flashing. Once the interference is removed, it recovered its normal mode.

Conclusion: The EUT met the requirements of the standard.

12.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of surge test at main terminal is: ±11.57%.

The measurement uncertainty is given with a confidence of 95%, k=2.

12.6 Additions, Deviations and Exclusions from Standards

None.

13. Immunity to Conducted Disturbances, Induced by Radio-frequency Fields

Test result: **PASS**

13.1 Severity Level and Performance Criterion

13.1.1 Test level

Frequency range 150kHz – 80MHz		
Level	Voltage level (e.m.f.) U_0 [dB(uV)]	U_0 (V)
1	120	1
2	130	3
3	140	10
X	Special	Special
Notes: 1. "X" is an open level. 2. The gray row is the selected test level.		

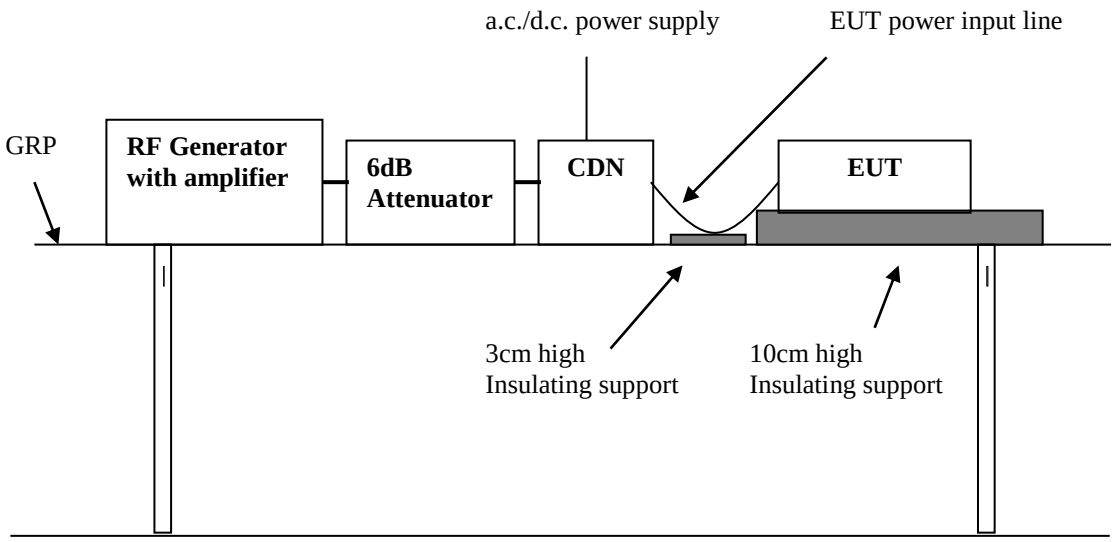
13.1.2 Performance Criterion

Performance criterion **A**

13.2 Block Diagram of Test Setup

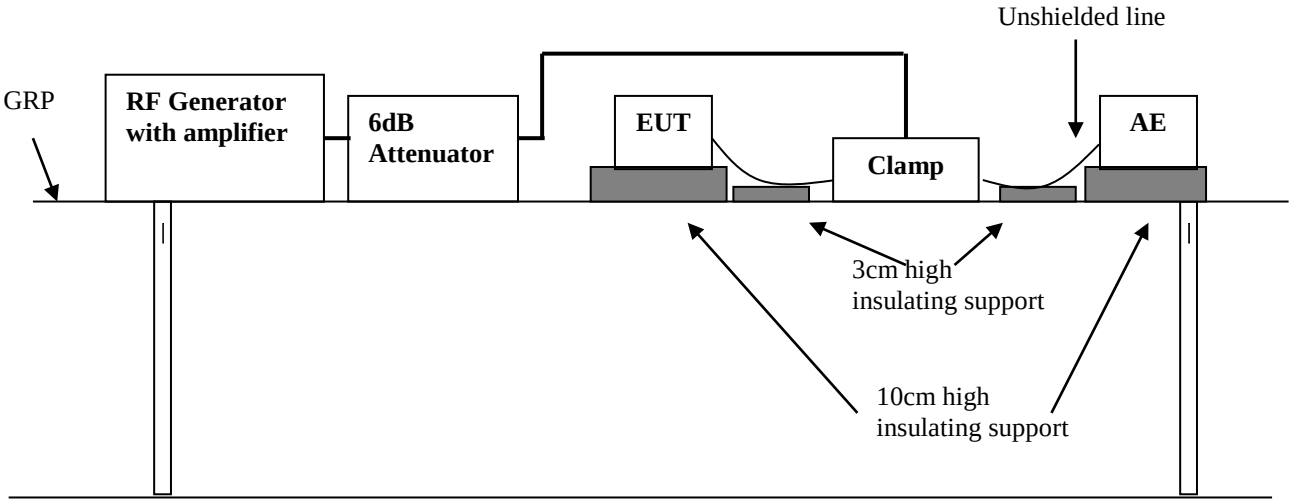
13.2.1 Block Diagram for a.c./d.c. input power line

☒ Block Diagram for a.c./d.c. input power line

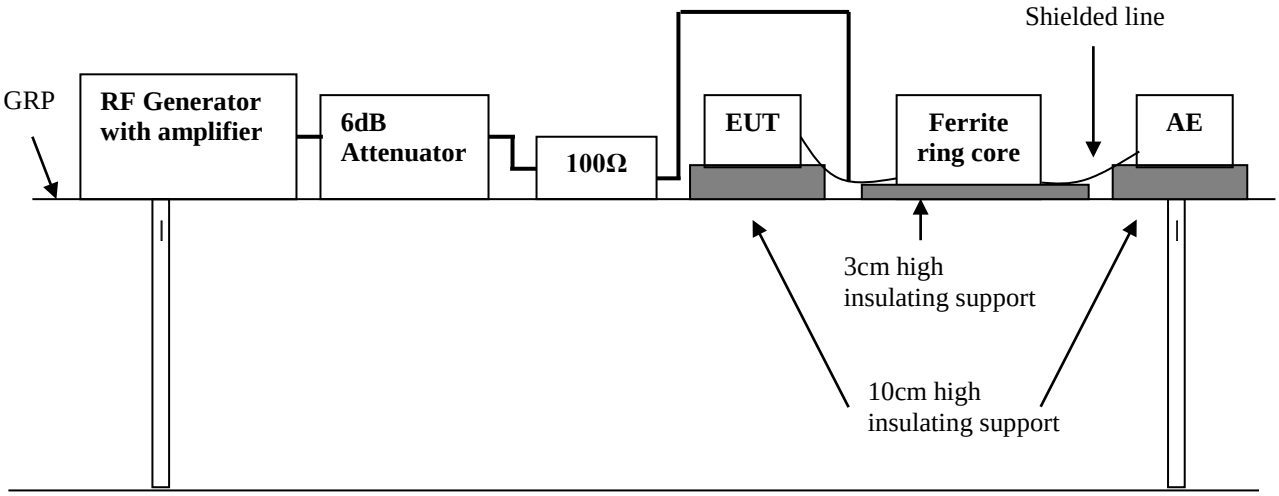


13.2.2 Block Diagram for output a.c./d.c. power line or signal/control lines

☐ Unshielded line



☐ Shielded line



13.3 Test Setup and Test Procedure

Measurement was performed in shielded room.
Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-6.
The test method and equipment was specified by IEC 61000-4-6 with additions and modifications by clause 5.6 of EN61547.

13.4 Test Protocol

Temperature : 25°C
Relative Humidity: 51%

Test No.	Frequency (MHz)	Level V (r.m.s.)	Modulation	Injected point	Result
1	0.15~80	3	1kHz, 80%, SW, AM, 1% step size	a.c. Mains	Pass
2	0.15~80	1	1kHz, 80%, SW, AM, 1% step size	d.c. power ports	-
3	0.15~80	1	1kHz, 80%, SW, AM, 1% step size	signal lines and control lines	-
Note: “NA” means not applicable.					

Observation: All the functions were operated as normal during and after test.
Conclusion: The EUT met the requirements of the standard.

13.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of injected current test at main terminal is ± 2.59dB.
Measurement uncertainty of injected current test at unshielded signal terminal is ± 3.01dB.
Measurement uncertainty of injected current test at shielded signal terminal is under consideration.
The measurement uncertainty is given with a confidence of 95%, k=2.

13.6 Additions, Deviations and Exclusions from Standards

None.

14. Voltage Dips, Short Interruptions and Voltage Variations Immunity Test

Test result: **PASS**

☐ As luminaire for emergency lighting, these tests do not apply as they are covered by the test in IEC 60598-2-22.

14.1 Severity Level and Performance Criterion

14.1.1 Test level

Test level % U_T	Voltage dip and short interruptions % U_T	Duration (in period)
0	100	0.5*
		250
40	60	25
		10
70	30	0.5
		10
		X **

Notes:

1.“*” for 0.5 period, the test shall be made in positive and negative polarity, i.e. starting at 0° and 180°, respectively.

2. “**” means “x” is an open duration. This duration can be given in the product specification. Utilities in Europe have measured dips and short interruptions of duration between ½ a period and 3000 periods, but duration less than 50 periods are most common.

3. If the EUT is tested for voltage dips of 100%, it is generally unnecessary to test for other levels for the same durations. However, for some cases (safeguard systems or electro-mechanical devices) it is not true. The product specification or product committee shall give an indication of the applicability of this note.

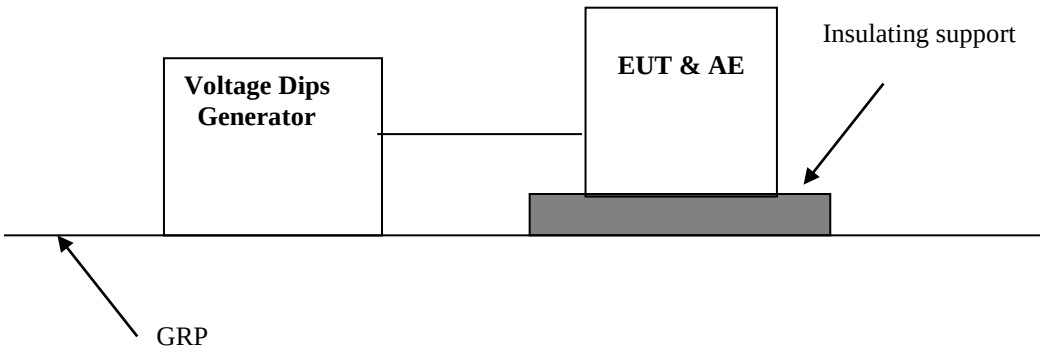
4. The gray rows are selected test level.

14.1.2 Performance Criterion

Performance criterion C at the test level 70%.

Performance criterion B at the test level 0%. (For ballasts where the lamp is not able to restart within 1 min, due to the physical constrains of the lamp performance criterion C applies. For luminaires where the lamp is not able to restart within 1 min, due to the physical constraints of the lamp, performance criterion C applies.)

14.2 Block diagram of test setup



14.3 Test Setup and Test Procedure

Measurement was performed in shielded room.
Measurement and setting of EUT was applied according to clause 7 of IEC 61000-4-11.
The test method and equipment was specified by IEC 61000-4-11 with additions and modifications by clause 5.8 of EN 61547.

14.4 Test Protocol

Temperature : 25 °C
Relative Humidity: 51 %

Test no.	Test level % U_T	Voltage dip and short interruptions % U_T	Duration (in periods)	Result	Comment
1	70	30%	10 cycles	Pass	-
2	0	100% pos half cycle	0,5 cycle	Pass	-
3	0	100% neg half cycle	0,5 cycle	Pass	-

Observation: At test level of 70%, the EUT worked unsteadily. Once the interference is removed, it recovered its normal mode at once.

Conclusion: The EUT met the requirements of the standard.

14.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of voltage dips and interruption test is: ±11.57%.
The measurement uncertainty is given with a confidence of 95%, k=2.

14.6 Additions, deviations and exclusions from standards

None.

Appendix I: photograph

Overview

For LLX-TriProof-SS-118-XX; LLX-TriProof-SS-218-XX; LLX-TriProof-SS-136-XX; LLX-TriProof-SS-236-XX; LLX-TriProof-SS-158-XX; LLX-TriProof-SS-258-XX



