



TEST REPORT

Reference No...... : WTF18F03104506E
Applicant..... : Normann Copenhagen ApS
Address..... : sterbrogade 70, 2100 Copenhagen, Denmark

Product Name..... : LED Portable luminaires
Model No..... : 50202*(=0,1), 50202*(=2,3)
Standards..... : EN 55015:2013
EN 55015:2013+A1:2015
EN 61547:2009
EN 61000-3-2:2014
EN 61000-3-3:2013
Date of Receipt sample : 2018-03-17
Date of Test : 2018-03-22 to 2018-05-17
Date of Issue..... : 2018-05-25
Test Report Form No...... : WEL-55015A-01A
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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1 Test Summary

EMISSION				
Test Item	Test Standard		Class / Severity	Result
Mains Terminal Disturbance Voltage, 9kHz to 30MHz	EN 55015:2013, EN 55015:2013+A1:2015		Clause 4.3.1	Pass
Radiated electromagnetic disturbance, 9kHz to 30MHz	EN 55015:2013, EN 55015:2013+A1:2015		Clause 4.4.1	Pass
Radiated Emission, 30MHz to 300MHz	EN 55015:2013, EN 55015:2013+A1:2015		Clause 4.4.2	Pass
Harmonic Current emission	EN 61000-3-2:2014		Class C	Pass***
Voltage Fluctuation and Flicker	EN 61000-3-3:2013		Clause 5	Pass**
IMMUNITY (EN 61547:2009)				
Test Item	Test Method	Class / Severity	Performance Criteria	Result
Electrostatic Discharge(ESD)	IEC 61000-4-2:2008	±4 kV Contact ±8 kV Air	B	Pass
Radio-frequency electromagnetic fields (80MHz to 1GHz)	IEC 61000-4-3:2010	3V/m, 80%, 1kHz, Amp. Mod.	A	Pass
Electrical Fast Transients (EFT)	IEC 61000-4-4:2012	AC ±1.0kV	B	Pass
Surge	IEC 61000-4-5:2005	±0.5kV D.M.†	C	Pass
Injected Currents, 0.15MHz to 80MHz	IEC 61000-4-6:2013	3Vr.m.s.(emf), 80%, 1kHz Amp. Mod.	A	Pass
Power-frequency magnetic field	IEC 61000-4-8:2009	3A/m	A	N/A
Voltage Dips and Interruptions	IEC 61000-4-11:2004	0 % U _T * for 0.5per	B	Pass
		70 % U _T * for 10per	C	Pass

Remark:

Pass Test item meets the requirement

Fail Test item does not meet the requirement

N/A Test case does not apply to the test object

A.M Amplitude Modulation

† Differential Mode

‡ Common Mode

* U_T is the nominal supply voltage

** According to EN 61000-3-3 which states: "Pst and Plt evaluations are required only for lighting equipment which is likely to produce flicker; for example: disco lighting and automatically regulated equipment." Incandescent lamp luminaires with ratings less than or equal to 1 000 W and discharge lamp luminaires with ratings less than or equal to 600 W and LED luminaires with ratings less than or equal to 200 W, are deemed to comply with the dmax limits in this standard and are not required to be tested.

*** According to EN 61000-3-2, no limit apply to the non-discharge lighting equipment with rated power less than or equal to 25W. Therefore, this equipment is deemed to fulfil this standard without any testing.



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3 General Information

3.1 General Description of E.U.T.

Product Name	:	LED Portable luminaires
Model No.	:	50202*(*=0,1), 50202*(*=2,3)>
Remark	:	All models use the same LED driver, only the size is different. Therefore the full EMC tests were performed on 50202*(*=0,1)

3.2 Details of E.U.T.

Technical Data.....	:	AC 220-240V, 50/60Hz, 7W
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3.3 Description of Support Units

The EUT has been tested as an independent unit. 50202*(*=0,1) is the test sample. The DV&RE tests were performed in the condition of AC 245V/50Hz input. The other tests were performed in the condition of AC 230V/50Hz input.

3.4 Standards Applicable for Testing

The tests were performed according to following standards:

EN 55015:2013	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
EN 55015:2013+A1:2015	
EN 61547:2009	Equipment for general lighting purposes — EMC immunity requirements
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase).
EN 61000-3-3:2013	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 ≤ 16 A per phase and not subject to conditional connection.



3.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 21895-1**

Waltek Services (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration IC number: 21895-1, Nov. 14, 2016.

- **FCC Test Site 1# – Registration No.: 880581**

Waltek Services (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2# – Registration No.: 328995**

Waltek Services (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

3.6 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items: ---

Lab information: ---

3.7 Abnormalities from Standard Conditions





None.



4 Equipment Used during Test

Mains Terminal Disturbance Voltage (Conducted Emission)					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver				Valid
2.	LISN				Valid
3.	LISN				Valid
4.	Cable				Valid
5.	Switch				Valid
Radiated electromagnetic disturbance(9kHz to 30MHz)					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver				Valid
2	Three Loops Antenna				Valid
Discontinuous Disturbance					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	Discontinues Disturbance Analyzer				Valid
2.	LISN				Valid
CDN method for Lighting Equipments' Radiated Disturbance					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1	EMI Test Receiver				Valid
2	CDN				Valid
3	Cable				Valid
Harmonics and Flicker Measuring System					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	Harmonics and Flicker Measuring System				Valid
ESD					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	ESD Simulator				Valid
Radio-frequency electromagnetic fields					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	RF Power Amplifier				Valid
2.	RF Power Amplifier				Valid
3.	Stacked double logarithmic periodic antenna				Valid



4.	Stacked double logarithmic periodic antenna		Valid		
5.	RF signal generator		Valid		
EFT & Voltage Dips and Interruptions					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMS test system				Valid
2.	Clamp				Valid
Surge					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	Surge Simulator				Valid
Injected Currents					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	Conducted Immunity test system				Valid
2.	CDN				Valid
3.	Clamp				Valid

4.1 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Mains Terminal Disturbance Voltage	150kHz~30MHz	±2.66dB	(1)
Radiated electromagnetic disturbance	9kHz to 30MHz	±3.00dB	(1)
Radiated Emission(CDN method)	30MHz~300MHz	±3.32dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



5 Emission Test Results

5.1 Mains Terminals Disturbance Voltage, 9kHz to 30MHz

Test Requirement..... : EN 55015 Clause 4.3.1

Test Method..... : EN 55015 Clause 8

Test Result..... : Pass

Frequency Range..... : 9kHz to 30MHz

Class/Severity..... : Table 2a of EN55015

5.1.1 E.U.T. Operation

Operating Environment:

Temperature : 23.1°C

Humidity..... : 42.0%RH

Atmospheric Pressure : 101.2kPa

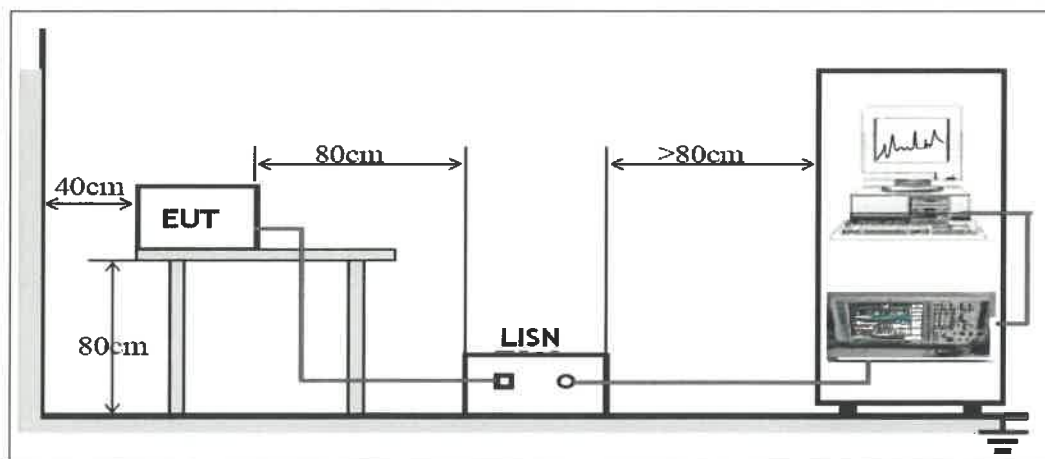
EUT Operation:

Input Voltage : AC 245V/50Hz

Operating Mode..... : Darkest lighting mode

5.1.2 Block Diagram of Test Setup

The Mains Terminals Disturbance Voltage tests were performed in accordance with the EN 55015.



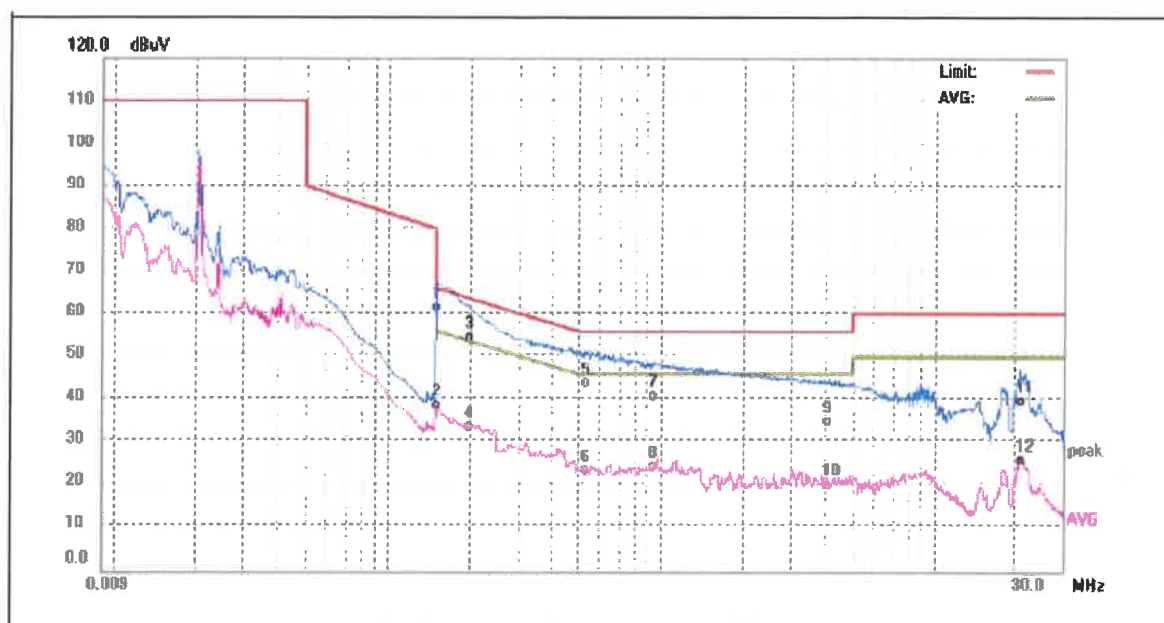


5.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.1.4 Mains Terminals Disturbance Voltage Test Data

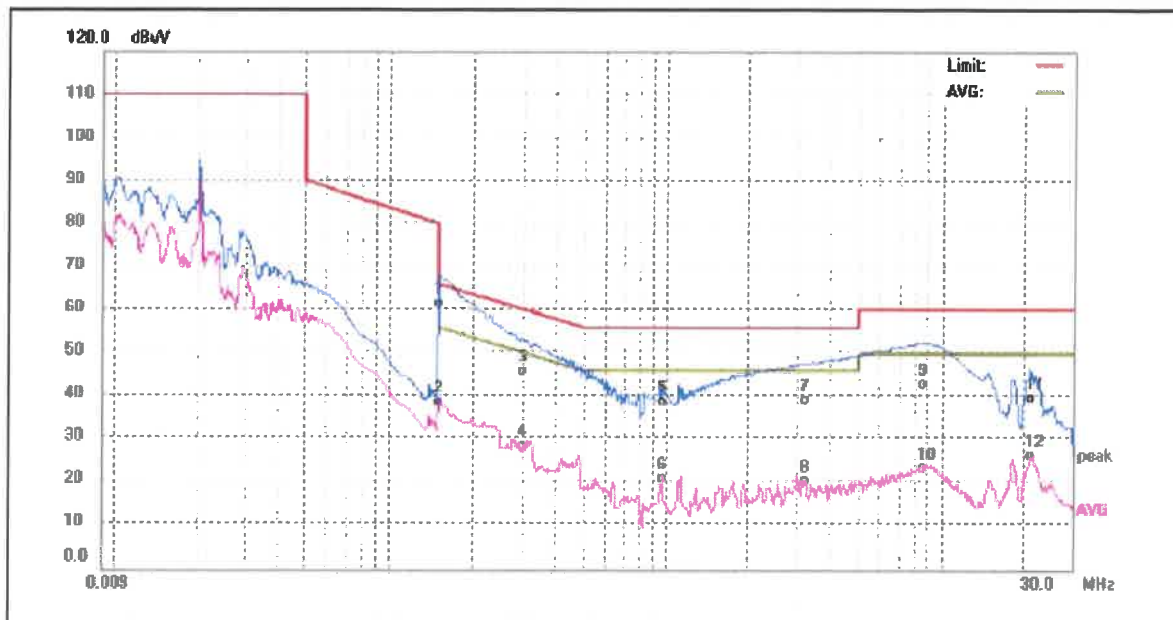
Live Line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.1500	52.00	9.78	61.78	65.99	-4.21	QP	
2	0.1500	29.12	9.78	38.90	55.99	-17.09	AVG	
3	0.1995	45.07	9.78	54.85	63.63	-8.78	QP	
4	0.1995	23.98	9.78	33.76	53.63	-19.87	AVG	
5	0.5340	34.18	9.79	43.97	56.00	-12.03	QP	
6	0.5340	13.71	9.79	23.50	46.00	-22.50	AVG	
7	0.9460	31.28	9.81	41.09	56.00	-14.91	QP	
8	0.9460	14.64	9.81	24.45	46.00	-21.55	AVG	
9	4.1300	25.13	9.92	35.05	56.00	-20.95	QP	
10	4.1300	10.41	9.92	20.33	46.00	-25.67	AVG	
11	21.1420	29.37	10.46	39.83	60.00	-20.17	QP	
12	21.1420	15.56	10.46	26.02	50.00	-23.98	AVG	



Neutral Line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	51.99	9.78	61.77	65.99	-4.22	QP	
2	0.1500	29.22	9.78	39.00	55.99	-16.99	AVG	
3	0.3020	36.15	9.78	45.93	60.19	-14.26	QP	
4	0.3020	18.73	9.78	28.51	50.19	-21.68	AVG	
5	0.9740	29.02	9.81	38.83	56.00	-17.17	QP	
6	0.9740	11.41	9.81	21.22	46.00	-24.78	AVG	
7	3.2500	29.52	9.88	39.40	56.00	-16.60	QP	
8	3.2500	10.77	9.88	20.65	46.00	-25.35	AVG	
9	8.5260	32.84	10.10	42.94	60.00	-17.06	QP	
10	8.5260	13.58	10.10	23.68	50.00	-26.32	AVG	
11	21.1060	29.37	10.46	39.83	60.00	-20.17	QP	
12	21.1060	16.22	10.46	26.68	50.00	-23.32	AVG	



5.2 Radiated Electromagnetic Disturbance, 9kHz to 30MHz

Test Requirement..... : EN 55015 Clause 4.4.1

Test Method..... : EN 55015 Clause 9.1

Test Result..... : Pass

Frequency Range..... : 9kHz to 30MHz

Class/Severity..... : Table 3a of EN55015

5.2.1 E.U.T. Operation

Operating Environment:

Temperature : 16.8°C

Humidity : 42.0%RH

Barometric Pressure..... : 101.2kPa

EUT Operation:

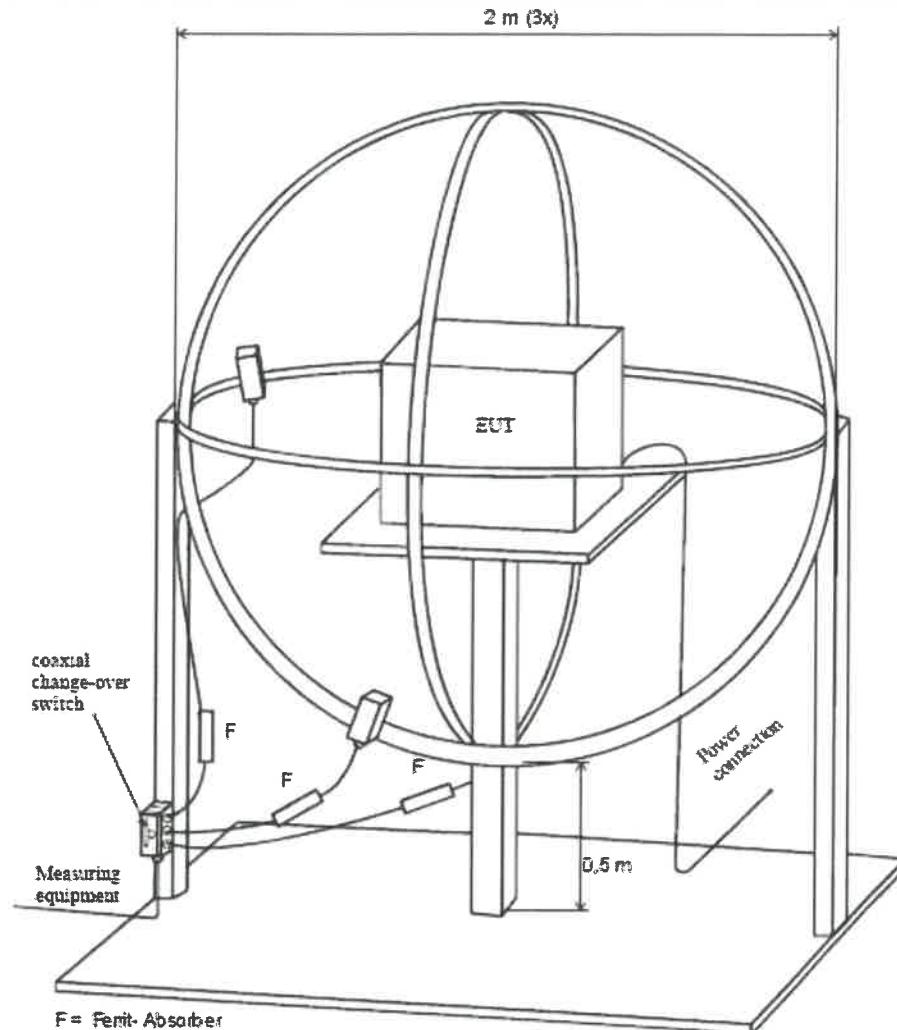
Input Voltage : AC 245V/50Hz

Operating Mode..... : Darkest lighting mode



5.2.2 Block Diagram of Test Setup

The Radiated Electromagnetic Disturbance (9kHz to 30MHz) test was performed in accordance with the EN 55015.



5.2.3 Measurement Data

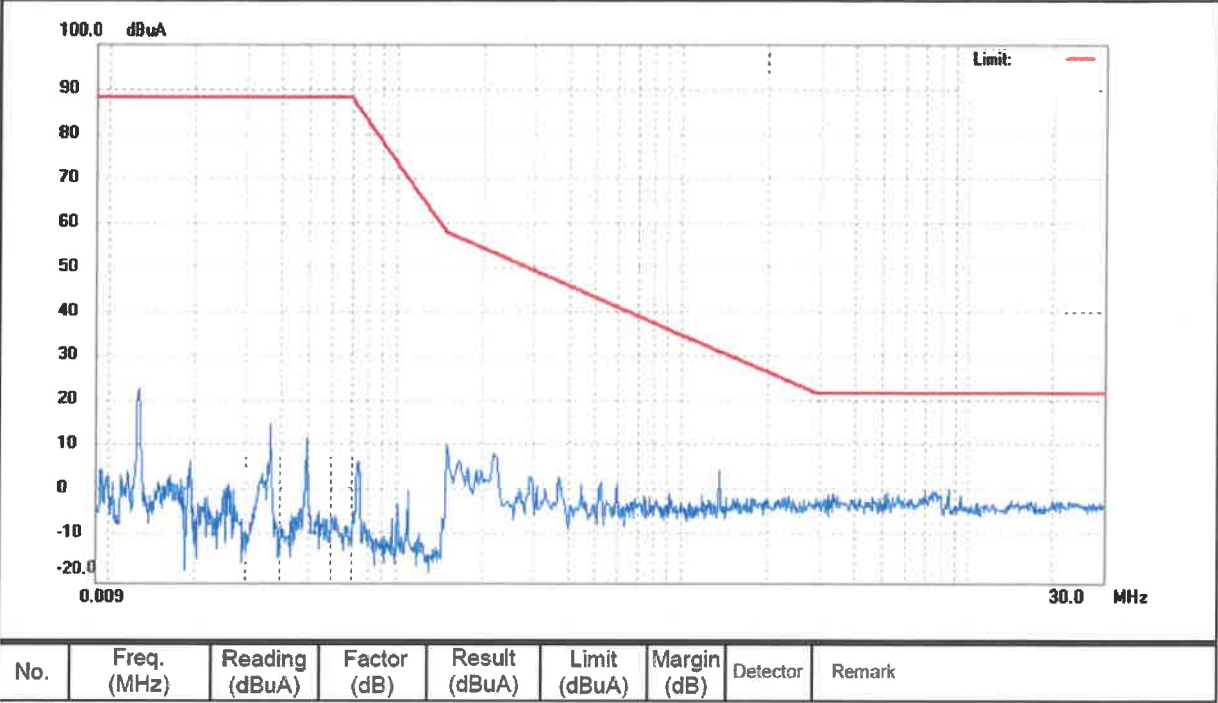
According to the data in section 5.2.4, the EUT complied with the EN55015 standards.

The maximised peak emissions from the EUT was scanned and measured for three loops. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



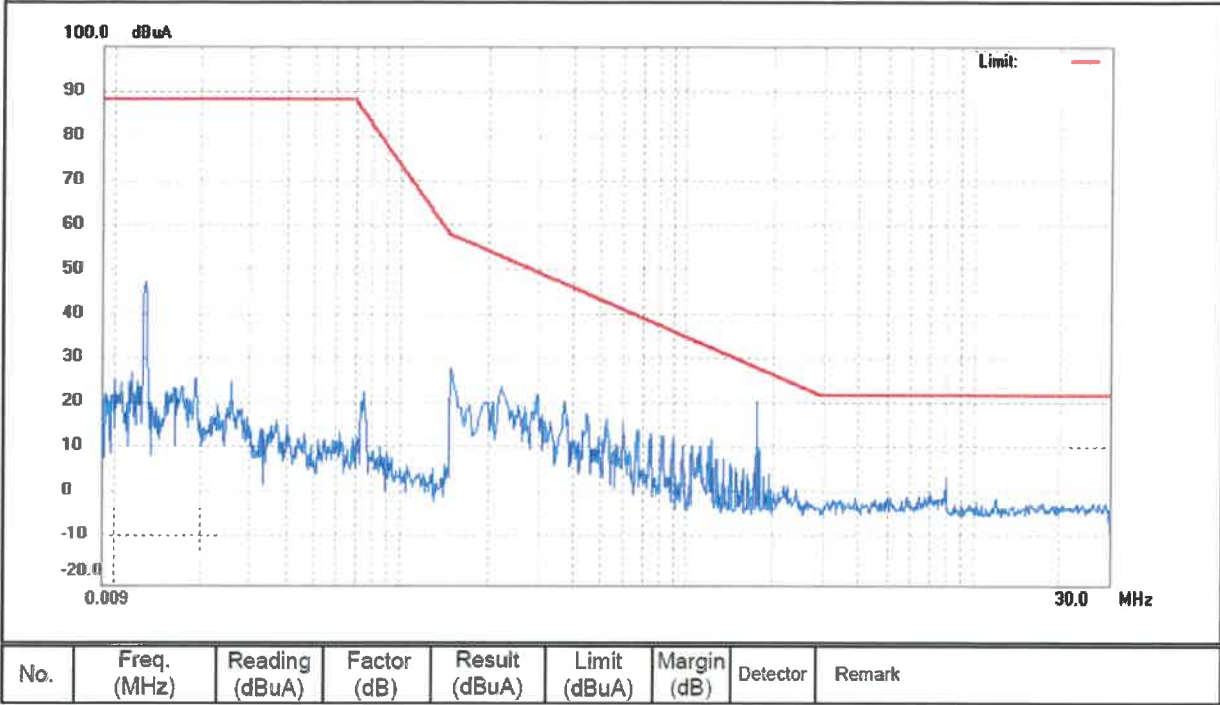
5.2.4 Radiated Electromagnetic Disturbance test data, 9kHz to 30MHz

Loop X:



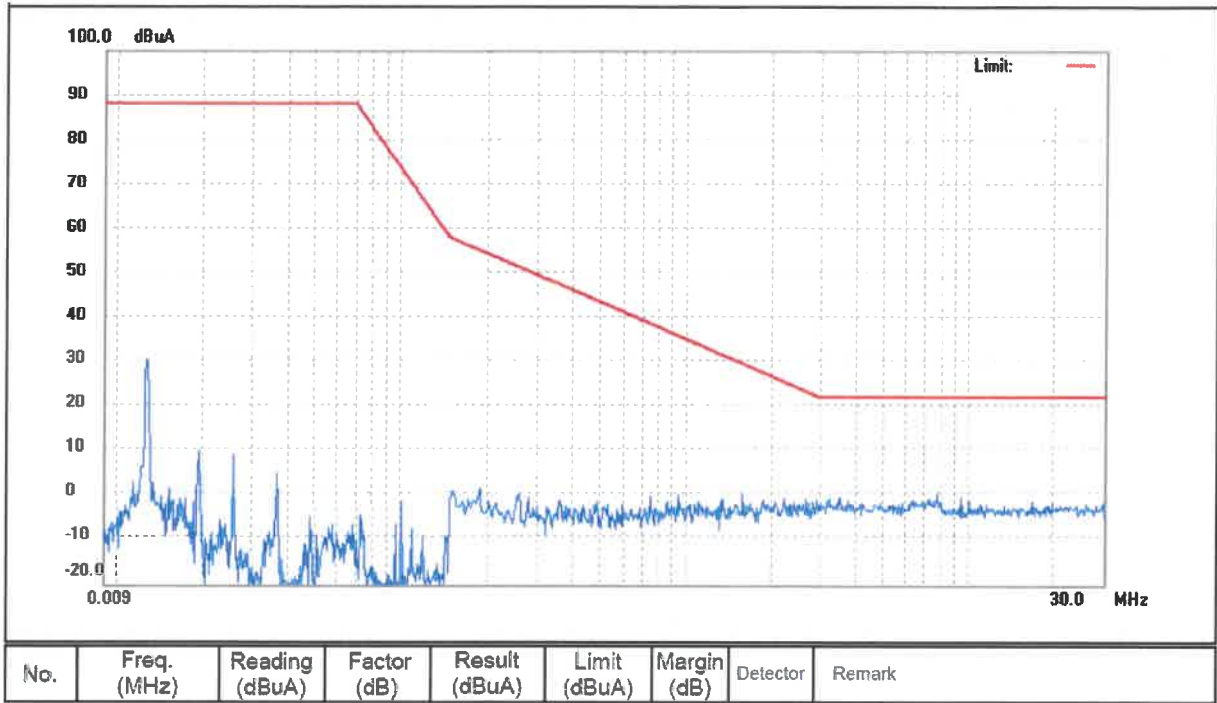


Loop Y:





Loop Z:



5.3 Radiated Emission, 30MHz to 300MHz

Test Requirement..... : EN 55015 Clause 4.4.2

Test Method..... : EN 55015 Annex B

Test Result..... : Pass

Frequency Range..... : 30MHz to 300MHz

Class/Severity..... : Table B.1 of EN55015

5.3.1 E.U.T. Operation

Operating Environment:

Temperature : 16.8°C

Humidity..... : 42.0%RH

Atmospheric Pressure : 101.2kPa

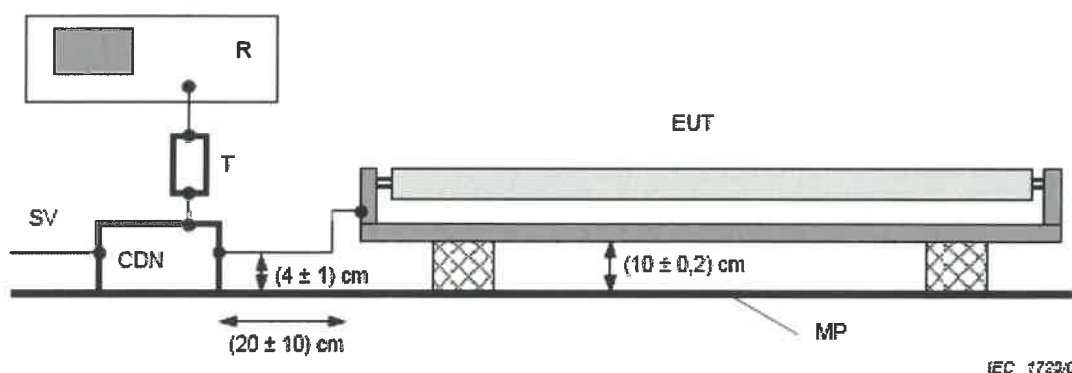
EUT Operation :

Input Voltage : AC 245V/50Hz

Operating Mode..... : Darkest lighting mode

5.3.2 Block Diagram of Setup

The Radiated Emission test was performed in accordance with EN55015 Annex B.

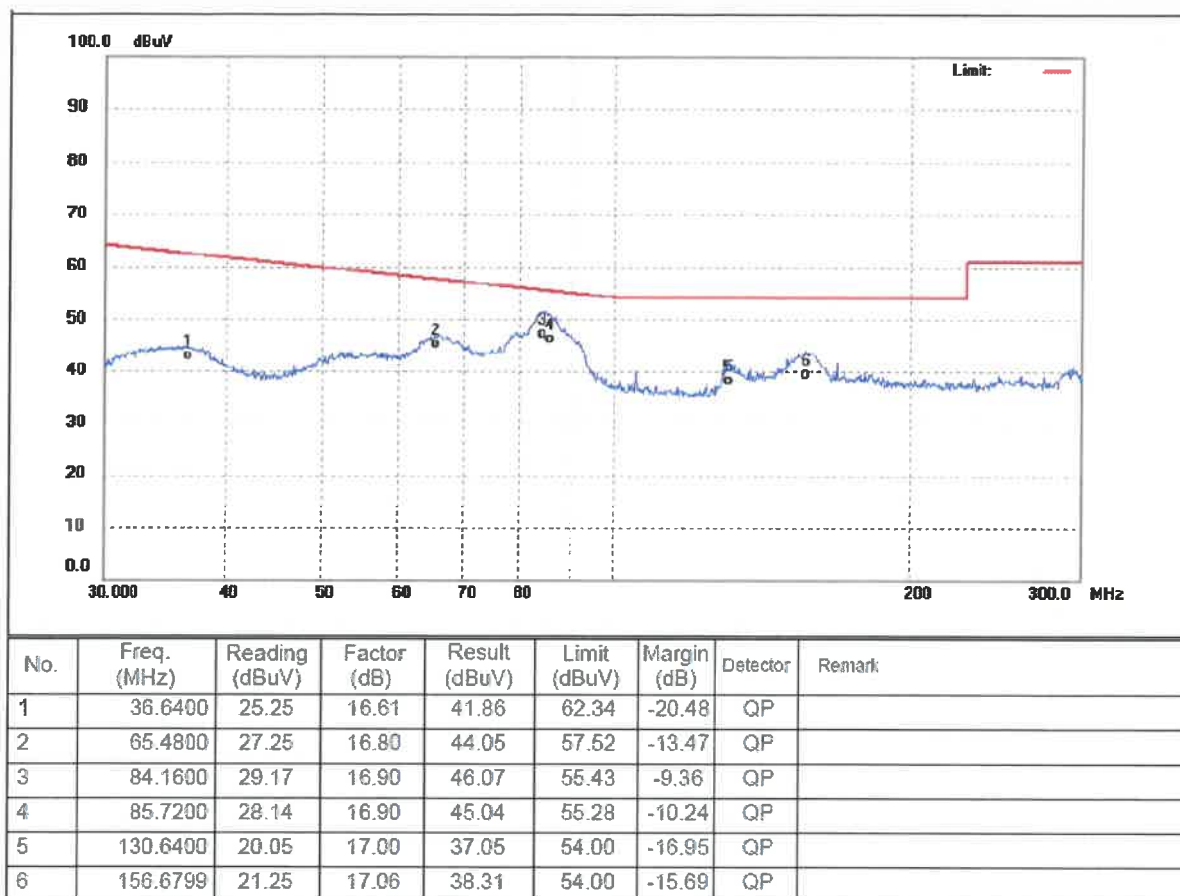


5.3.3 Measurement Data

If the lighting equipment complies with the requirements of this annex, it is deemed to comply with the radiated disturbances requirements in the frequency range 30 MHz to 300 MHz specified in 4.4.2 of this standard.



5.3.4 Radiated Emission test data, 30MHz to 300MHz





6 Immunity Test Results

6.1 Performance Criteria

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

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

Performance criterion C: During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control.

6.2 Electrostatic Discharge (ESD)

Test Requirement.....	:	EN 61547
Test Method	:	IEC 61000-4-2
Test Result.....	:	Pass
Discharge Impedance.....	:	330Ω / 150pF
Discharge Voltage.....	:	Air Discharge: ±8kV Contact Discharge: ±4kV HCP & VCP: ±4kV
Polarity	:	Positive & Negative
Number of Discharge.....	:	Minimum 10 times at each test point
Discharge Mode	:	Single Discharge
Discharge Period	:	1 second minimum



6.2.1 E.U.T. Operation

Operating Environment:

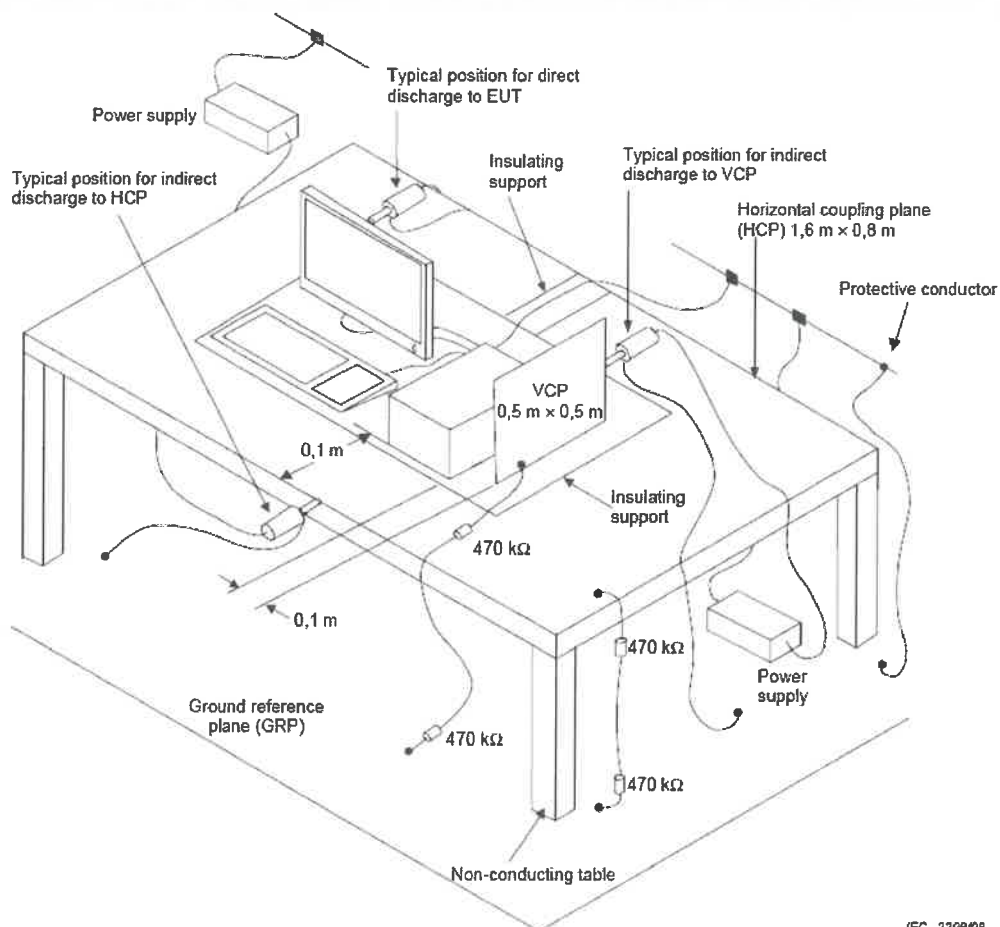
Temperature : 23.1°C
 Humidity : 42.0%RH
 Barometric Pressure : 100.8kPa

EUT Operation:

Input Voltage..... : AC 230V/50Hz
 Operating Mode : On mode

6.2.2 Block Diagram of Setup

The ESD test was performed in accordance with the IEC 61000-4-2.



IEC 2209/08



6.2.3 Direct Discharge Test Results

Observations:

Test points:

1. All Exposed Surface & Seams;
2. All metallic part

Direct Discharge			Test Results	
Applied Voltage (kV)	Performance Criterion	Test Point	Contact Discharge	Air Discharge
±8	B	1	N/A	Pass*
±4	B	2	Pass*	N/A

Remark:

- * During the test no deviation was detected to the selected operation mode(s)

6.2.4 Indirect Discharge Test Results

Observations:

Test points:

1. All sides.

Indirect Discharge			Test Results	
Applied Voltage (kV)	Performance Criterion	Test Point	Horizontal Coupling	Vertical Coupling
±4	B	1	Pass*	Pass*

Remark:

- * During the test no deviation was detected to the selected operation mode(s)

6.3 Radio-frequency electromagnetic fields, 80MHz to 1GHz

Test Requirement.....	:	EN 61547
Test Method	:	IEC 61000-4-3
Test Result	:	Pass
Frequency Range	:	80MHz to 1GHz
Test level	:	3V/m
Modulation	:	80%, 1kHz Amplitude Modulation.
Face of EUT	:	Front, Back, Left, Right
Antenna polarisation	:	Horizontal& Vertical



6.3.1 E.U.T. Operation

Operating Environment:

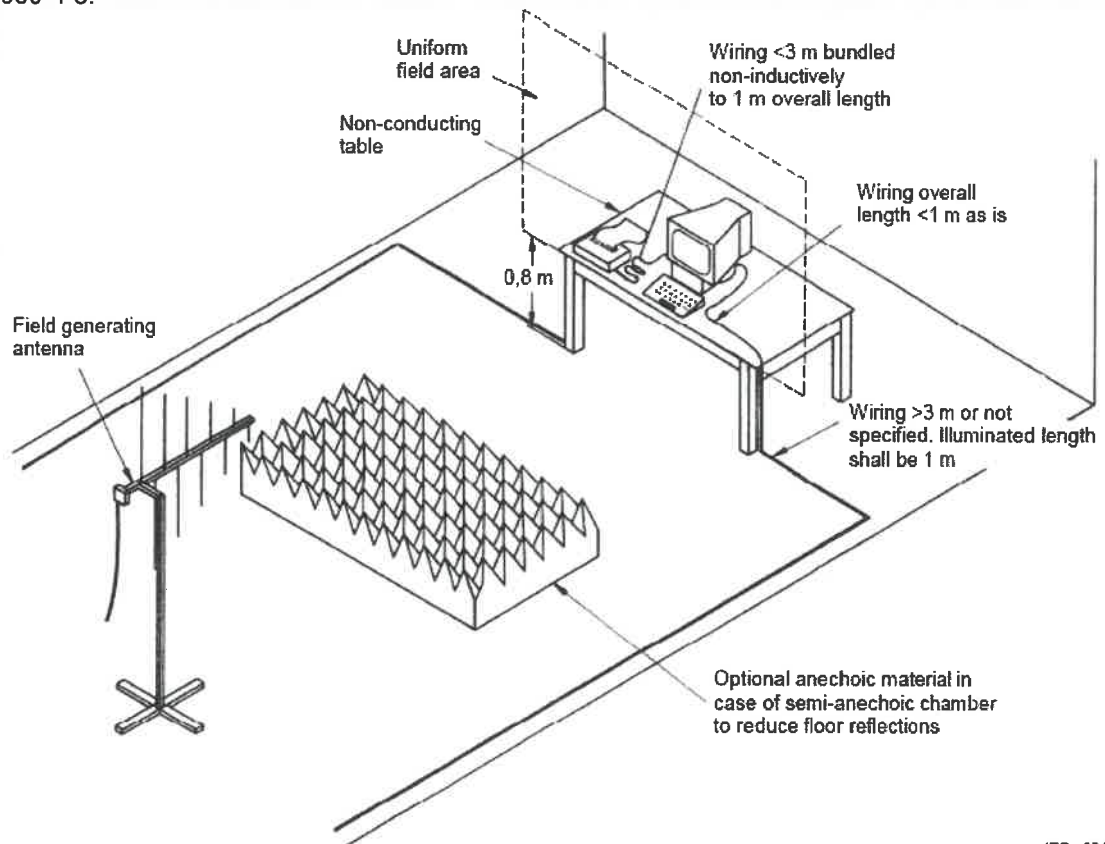
Temperature : 23.1°C
Humidity : 42.0%RH
Barometric Pressure..... : 100.8kPa

EUT Operation:

Input Voltage : AC 230V/50Hz
Operating Mode..... : On mode

6.3.2 Block Diagram of Setup

The Radio-frequency electromagnetic fields Immunity test was performed in accordance with the IEC 61000-4-3.



IEC 034/06



6.3.3 Test Results

Frequency	Face of EUT	Antenna polarisation	Test Level	Step Size	Dwell Time	Performance Criterion	Result
80 to 1000MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
80 to 1000MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass*

Remark:

- * During the test no deviation was detected to the selected operation mode(s)

6.4 Electrical Fast Transients (EFT)

Test Requirement..... : EN 61547
Test Method : IEC 61000-4-4
Test Result..... : Pass
Test Level..... : 1.0kV on AC Mains
Polarity : Positive & Negative
Repetition Frequency : 5kHz
Burst Duration : 300ms
Test Duration..... : 2 minutes per level & polarity

6.4.1 E.U.T. Operation

Operating Environment:

Temperature : 23.1°C
Humidity..... : 42.0%RH
Barometric Pressure : 100.8kPa

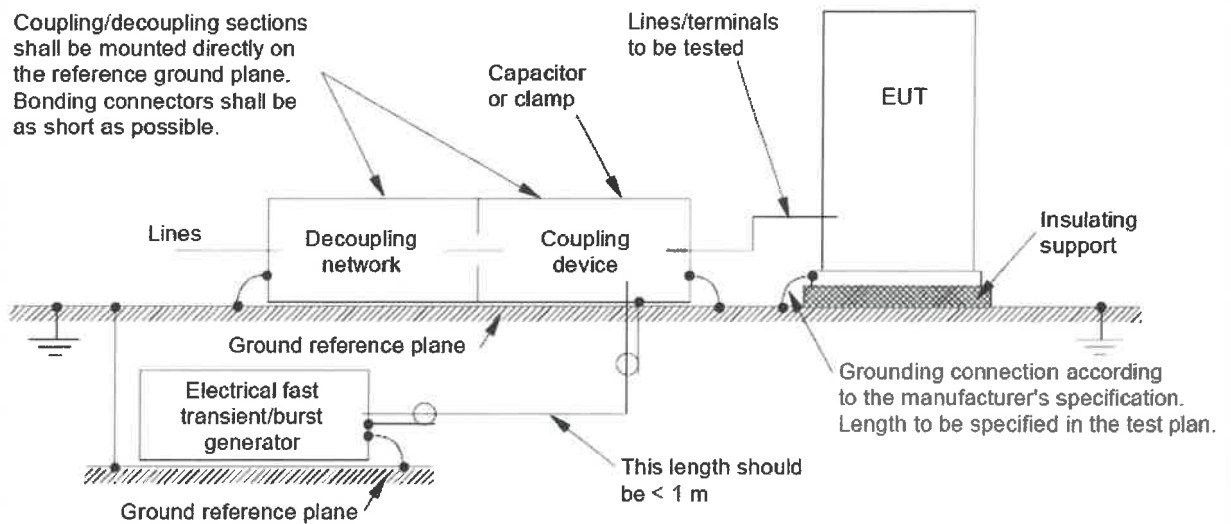
EUT Operation:

Input Voltage : AC 230V/50Hz
Operating Mode..... : On mode



6.4.2 Block Diagram of Setup

The Electrical Fast Transients Immunity test was performed in accordance with the IEC 61000-4-4.



IEC 900/04

6.4.3 Test Results

Test Port	Test Level(kV)	Performance Criterion	Result
Line-Neutral	± 1.0	B	Pass*

Remark:

- * During the test no deviation was detected to the selected operation mode(s)



6.5 Surge

Test Requirement	:	EN 61547
Test Method	:	IEC 61000-4-5
Test Result	:	Pass
Test level	:	Table 10 of EN61547
Interval	:	60s between each surge
No. of surges	:	5 positive at 90°, 5 negative at 270°.

6.5.1 E.U.T. Operation

Operating Environment:

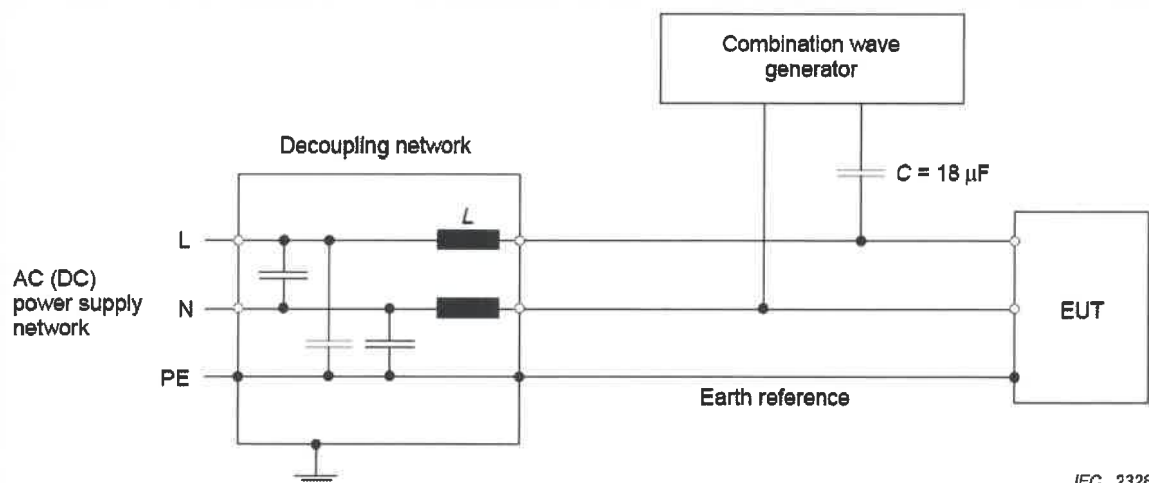
Temperature	:	23.1°C
Humidity	:	42.0%RH
Barometric Pressure	:	100.8kPa

EUT Operation:

Input Voltage	:	AC 230V/50Hz
Operating Mode	:	On mode

6.5.2 Block Diagram of Setup

The Surge Immunity test was performed in accordance with the IEC 61000-4-5.



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6.5.3 Test Results

Test Port	Applied Voltage (kV)	Performance criterion	Result
Between Phase And Phase	± 1	C	N/A
Between Live And Neutral	± 0.5	C	Pass*
Between Live And Earth	± 2	C	N/A
Between Neutral And Earth	± 2	C	N/A

Remark:

- * During the test no deviation was detected to the selected operation mode(s)

6.6 Injected Currents Immunity 0.15MHz to 80MHz

Test Requirement..... : EN 61547
Test Method : IEC 61000-4-6
Test Result..... : Pass
Frequency Range : 0.15MHz to 80MHz
Test level : 3V r.m.s. (unmodulated emf into 150 Ω)
Modulation : 80%, 1kHz Amplitude Modulation.

6.6.1 E.U.T. Operation

Operating Environment:

Temperature : 23.1°C
Humidity..... : 42.0%RH
Barometric Pressure..... : 100.8kPa

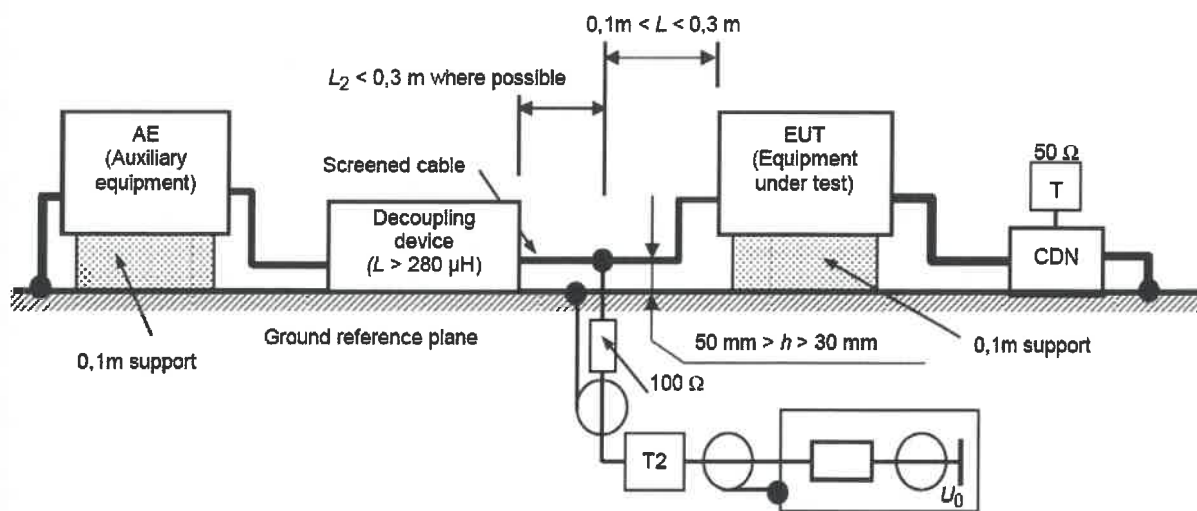
EUT Operation:

Input Voltage : AC 230V/50Hz
Operating Mode..... : On mode



6.6.2 Block Diagram of Setup

The Injected Currents Immunity test was performed in accordance with the IEC 61000-4-6.



6.6.3 Test Results

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Performance Criterion	Result
0.15MHz to 80MHz	2 Wire AC Supply Cables	3Vr.m.s.	80%, 1kHz Amp. Mod.	1%	1s	A	Pass*

Remark:

- * During the test no deviation was detected to the selected operation mode(s)



6.7 Voltage Dips and Interruptions

Test Requirement.....	EN 61547
Test Method.....	IEC 61000-4-11
Test Result.....	Pass
Test Level(Voltage reduction)	0%&70 % of U_T (Supply Voltage)
No. of Dips / Interruptions.....	1 per Level at 20ms intervals

6.7.1 E.U.T. Operation

Operating Environment:

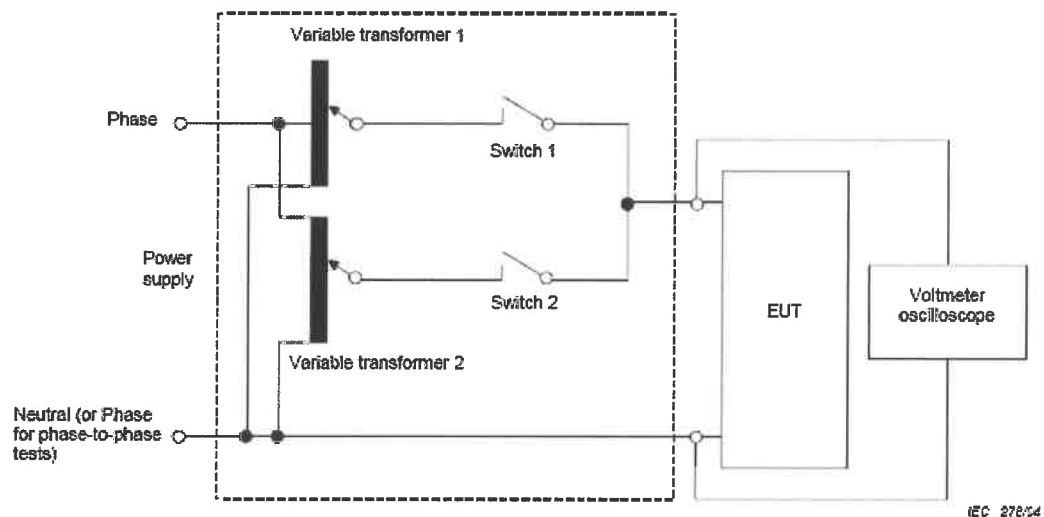
Temperature	23.1°C
Humidity	42.0%RH
Barometric Pressure.....	100.8kPa

EUT Operation:

Input Voltage	AC 230V/50Hz
Operating Mode.....	On mode

6.7.2 Block Diagram of Setup

The Voltage Dips and Interruptions Immunity test was performed in accordance with the IEC 61000-4-11.



**6.7.3 Test Results**

Test Level in %U _T	Phase	Performance criterion	Duration	Result
0	0°	B	0.5	Pass*
	180°			Pass*
70	0°	C	10	Pass*
	180°			Pass*

Remark:

- * During the test no deviation was detected to the selected operation mode(s)



7 Photographs – Test Setup

7.1 Photograph – Mains Terminal Disturbance Voltage Test Setup



7.2 Photograph – Radiated electromagnetic disturbance Test Setup, 9kHz to 30MHz

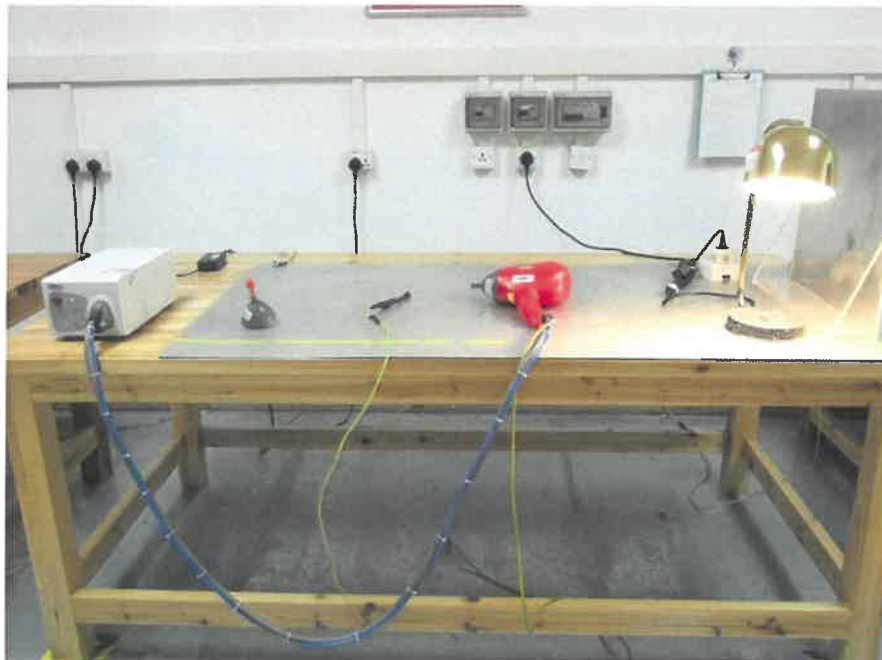




7.3 Photograph – Radiated Emission(CDN method) Test Setup, 30MHz to 300MHz



7.4 Photograph – ESD Immunity Test Setup





7.5 Photograph – Radio-frequency electromagnetic fields Immunity Test Setup



7.6 Photograph – EFT Immunity Test Setup





7.7 Photograph – Surge Immunity Test Setup



7.8 Photograph – Injected Currents Immunity Test Setup





7.9 Photograph – Voltage Dips and Interruptions Immunity Test Setup





8 Photographs – Constructional Details

8.1 EUT – Front View



8.2 EUT – Back View



===== End of Report =====