



NATIONAL TECHNICAL UNIVERSITY OF ATHENS
School of Electrical and Computer Engineering
High Voltage and Electrical Measurement Laboratory
High Voltage Service Providing Laboratory Unit
Associate Professor Ioannis F. Gonos
 9 Iroon Politechniou Str, GR 15780, Zografou Campus, Athens
 Tel.: +302107723539, Fax: +302107723504,
 e-mail: igonos@cs.ntua.gr
 web page: <http://highvoltages.ece.ntua.gr>



Tests
 Cert. No. 490

TEST AND MEASUREMENT REPORT

ELECTROMAGNETIC COMPATIBILITY AND IMMUNITY

Equipment under Test (EUT):
EMERGENCY LED LUMINAIRE
Model: “SLL-1003/WP”
Customer: “OLYMPIA ELECTRONICS
N. LAKASAS – P. ARVANITIDIS S.A.”

Athens, 10.12.2019

Approved by

(Ioannis F. Gonos)
 NTUA Associate Professor

The contents of this test report are related only to the individual item, which has been tested. This item has been sampled and delivered to the laboratory by the customer. This test report shall not be reproduced, except in full, without the written permission of testing laboratory.

2.0	10-12-2019	Test report number: 9263	Page 1 of 43
-----	------------	--------------------------	--------------

Contents

Contents..... 2

1. Customer..... 3

2. Description of Equipment Under Test..... 3

 2.1. Auxiliary equipment..... 3

 2.2. Ports identification..... 4

 2.3. Dates 4

Reference and Basic Standards 4

3. Summary of test results..... 5

4. Performance criteria and classification 6

 4.1. Performance criteria for immunity tests 6

 4.2. Classification of equipment under test..... 6

5. Measurement uncertainty 7

6. Description of test sites 7

7. Conducted Emissions..... 8

8. Radiated Emissions.....11

9. Radiated Magnetic Emissions16

10. Harmonic Current Emissions19

11. Voltage Fluctuations and Flicker.....22

12. Immunity to Electrostatic Discharge.....25

13. Immunity to RF Electromagnetic Radiated Field28

14. Immunity to Fast Transient (Burst).....31

15. Immunity to Surge33

16. Immunity to Electromagnetic Conducted Field.....36

17. Power Frequency Magnetic Fields.....38

18. Immunity to Voltage Dips and Short Interruptions.....39

19. Internal Electric Field (20kHz-10MHz)41

20. Photographs of Equipment Under Test.....42

1. Customer

Name	OLYMPIA ELECTRONICS N. LAKASAS – P. ARVANITIDIS S.A.
Address	72 km Old Highway Thessaloniki Katerini
City	Eginio – Pieria
Zip code	GR-60300
Contact person	Mr. Athanasios Voulgaris
Telephone	(+30) 2353051200
Fax	(+30) 2353051486
Web page	olympia-electronics.gr
e-mail	avoulgaris@olympia-electronics.gr

2. Description of Equipment Under Test

Description of EUT	EMERGENCY LED LUMINAIRE
Manufacturer	OLYMPIA ELECTRONICS N. LAKASAS – P. ARVANITIDIS S.A.
Trade-mark (model) of EUT	SLL-1003/WP
Manufacturing name of EUT	-
Serial number	-
Power supply manufacturer	-
Power supply model	-
Power supply serial number	-
Description of power supply	220-240Vac, 50Hz/60Hz

Internal battery	
Manufacturer	OLYMPIA ELECTRONICS N. LAKASAS – P. ARVANITIDIS S.A.
Model	B-1250/HT
Serial number	-
Description	4.8V/6000mAh

EMC environment	Domestic, commercial and light industrial (ELOT EN 61000-6-1)
EUT tested as	EMERGENCY LED LUMINAIRE / CEILING MOUNTED
EUT single or system	SINGLE

2.1. Auxiliary equipment

Description of auxiliary equipment	-
Manufacturer	-
Trade-mark (model)	-
Serial number	-

The auxiliary equipment does not exist.

2.2. Ports identification

	Port type ¹	Port description ²	Connector type ³	Cable type description ⁴	Cable length ⁵	Connected to ⁶	Tested ⁷
1	Enclosure of LED LUMINAIRE	Plastic enclosure with plastic transparent cover	-	-	-	-	Yes
2	AC input power of LED LUMINAIRE	Power supply cable with two conductors	Terminal Block	Unshielded Non-Detachable	~1m (custom made)	AC Mains	Yes

Port type ¹: Enclosure, Power, Display, etc.
Port description ²: AC Power, DC Power, Signal & control, Telecommunication, Antenna, etc.
Connector type ³: Plug, RJ45, RJ11, RS232, USB, Parallel, RCA jack, Jack, etc.
Cable type description ⁴: Detachable / Non detachable, Shielded / Unshielded.
Cable length ⁵: e.g. 1.8m.
Connected to ⁶: AC mains, Line Simulator, Monitor, Printer, Keyboard, etc.
Tested ⁷: Yes / No.

2.3. Dates

Date of receipt of EUT	02.12.2019
Beginning date of tests	03.12.2019
Ending date of tests	10.12.2019

Remarks: The initial warm-up time before each test was at least 10mins.

During immunity testing according to EN 61547 (except during Voltage Dips and Interruptions test) the EUT was tested in both operating modes (Normal Operating Mode* and Emergency Operating Mode).**

***Normal Operating Mode (NOM): AC Power: ON (230V / 50Hz).**

****Emergency Operating Mode (EOM): AC Power: OFF, Battery: ON.**

Reference and Basic Standards

REFERENCE STANDARDS

Standard	Title
ELOT EN 55015 E6: 2013+A1:2015	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
EN 61547 E2: 2009	Equipment for general lighting purpose – EMC immunity requirements
ELOT EN 61000-3-2 E4: 2014	Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)
ELOT EN 61000-3-3 E3: 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
ELOT EN 61000-6-1 E2: 2007	Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
ELOT EN 61000-6-3 E2: 2007+ A1: 2011	Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
ELOT EN 62493 E2: 2015	Assessment of lighting equipment related to human exposure to electromagnetic Field

BASIC STANDARDS

Standard	Title
ELOT EN 61000-4-2 E2: 2009	Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
ELOT EN 61000-4-3 E3: 2006+A1:2008+A2:2010 +IS1:2009	Electromagnetic compatibility (EMC) -- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
ELOT EN 61000-4-4 E3: 2012	Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
ELOT EN 61000-4-5 E3: 2014+A1:2017	Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test
ELOT EN 61000-4-6 E4: 2014	Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
ELOT EN 61000-4-8 E2: 2010	Electromagnetic compatibility (EMC) -- Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
ELOT EN 61000-4-11 E2: 2004+A1:2017	Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

3. Summary of test results

EMMISSIONS TEST

Standard	Description of Test	Port	Class	Result
EN 55015	Conducted emissions (9kHz-30MHz)	AC input power	Table 2a	Pass
EN 55015	Radiated emissions (30-300MHz)	Enclosure	Table 3b	Pass
EN 55015	Radiated magnetic emissions (9kHz-30MHz)	Enclosure	Table 3a	Pass
EN 61000-3-2	Harmonics current emissions	AC input power	C	Pass
EN 61000-3-3	Voltage fluctuations	AC input power	-	Pass

IMMUNITY TEST

Standard	Description of test	Port	Level	Criterion	Result	
					NOM	Pass (A)
EN 61000-4-2	Electrostatic discharge	Enclosure	±4kV contact ±8kV air	B	Pass (A)	Pass (A)
				B	Pass (A)	Pass (A)
EN 61000-4-3	RF radiated field	Enclosure	3V/m	A	Pass (A)	Pass (A)
				A	Pass (A)	Pass (A)
EN 61000-4-4	Burst	AC input power	±1kV	B	Pass (A)	Pass (A)
				B	Pass (A)	Pass (A)
EN 61000-4-4	Burst	Signal and telecom.	±0.5kV	B	N/A ²	
EN 61000-4-5	Surge (<25W)	AC input power	L - N ±0.5kV L,N - PE ±1kV	C	Pass (A)	N/A ²
				C	Pass (A)	N/A ²
EN 61000-4-6	RF conducted field	AC input power	3V	A	Pass (A)	Pass (A)
				A	Pass (A)	Pass (A)
EN 61000-4-6	RF conducted field	Signal and telecom.	3V	A	N/A ²	
EN 61000-4-8	Power frequency magnetic fields	Enclosure	3A/m	A	N/A ⁸	
EN 61000-4-11	Voltage dips and interruptions	AC input power	100% - 0.5 per. 30% - 10 per.	B	Pass (A)	Pass (A)
				C	Pass (A)	Pass (A)

INTERNAL ELECTRIC FIELD

Standard	Description of Test	Port	Class	Result
EN 62493	Assessment of lighting equipment related to human exposure to electromagnetic Field	Enclosure	Table A.1	N/A ⁹

Remarks:

N/A¹: EUT not tested because not required by used standard.

N/A²: Test not applicable because port does not exist.

N/A³: Test not applicable because port only for services.

N/A⁴: EUT not tested because it has not any external cable or has external cables, but with length less than 3 m.

N/A⁵: Not tested because not required by customer.

N/A⁶: For EUT with a rated power of $\leq 75W$, other than lighting equipment, not limits are specified in this edition of this standard.

N/A⁷: No test shall be made on EUT, which is unlikely to produce significant voltage fluctuations or flicker.

N/A⁸: EUT has no parts sensible to magnetic field.

N/A⁹: EUT not tested because not required by used standard as EUT is Led Luminaire (deemed to comply with the requirements of this standard without testing as it fulfils an inherent-compliance condition)

4. Performance criteria and classification

4.1. Performance criteria for immunity tests

The performance criteria given hereafter apply to lighting equipment. Performance criteria for immunity tests according EN 61547 §4.2 are:

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.

4.2. Classification of equipment under test

Classification of EUT according to EN 61000-3-2 §5:

Class A:

- balanced three-phase equipment;
- household appliances, excluding equipment identified as Class D;
- tools, excluding portable tools;
- dimmers for incandescent lamps; audio equipment.

Equipment not specified in one of the three other classes shall be considered as Class A equipment.

NOTE 1 Equipment that can be shown to have a significant effect on the supply system may be reclassified in a future edition of the standard. Factors to be taken into account include:

2.0	10-12-2019	Test report number: 9263	Page 6 of 43
-----	------------	--------------------------	--------------

- number of pieces of equipment in use;
- duration of use;
- simultaneity of use;
- power consumption;
- harmonic spectrum, including phase.

Class B:

- portable tools;
- arc welding equipment which is not professional equipment.

Class C:

- lighting equipment.

Class D:

Equipment having a specified power according to 6.2.2 (EN 61000-3-2) less than or equal to 600 W, of the following types:

- personal computers and personal computer monitors;
- television receivers;
- refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

NOTE 2 Class D limits are reserved for equipment that, by virtue of the factors listed in note 1, can be shown to have a pronounced effect on the public electricity supply system.

5. Measurement uncertainty

The uncertainty of the measurement equipment meets the specifications of CISPR 16 and the related European and national standards.

The measuring equipment used to perform the tests documented in this report is being calibrated at least once per two years, and is traceable under the IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories. The entire equipment is connected to the respective primary laboratory and therefore directly traceable to national and international standards.

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

6. Description of test sites

- Semi-anechoic chamber with dimensions 3.5m × 6.5m × 3.3m. It is covered with ferrite tiles and cone absorbers. It is used for radiated emission (EN 55015), radiated immunity (EN 61000-4-3) and internal electric field (EN 62493) tests. The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m Ø.
- Shielded room with dimensions 3.5m × 2.5m × 3.3m. It is used for conducted emissions (EN 55015) and conducted immunity (EN 61000-4-6) tests.
- Control room with dimensions 3,2m × 2,5m × 3,3m.
- Faraday cage with dimensions 3.0m × 3.5m × 2.2m. It is used for bursts (EN 61000-4-4), surges (EN 61000-4-5), harmonic current emissions (EN 61000-3-2), voltage fluctuations and flicker (EN 61000-3-3) and voltage dips and interruptions (EN 61000-4-11) tests.
- HV lab area: It is used for electrostatic discharge (EN 61000-4-2), radiated electromagnetic emissions (EN 55015) and magnetic fields (EN 61000-4-8) tests.

7. Conducted Emissions

Date of test	09.12.2019
Test result	PASS
Reference and basic standard	EN 55015
Range of test	9kHz – 30MHz
Classification	Table 2a
Measurement uncertainty	±3 dB
Tested by	Mr. Christos-Christodoulos. A. KOKALIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Conducted emissions limits

Frequency range MHz	Limits dB (µV) ^a	
	Quasi-Peak	Average
0.009 to 0.050	110	-
0.050 to 0.150	90 to 80 ^b	-
0.150 to 0.5	66 to 56 ^b	56 to 46 ^b
0.5 to 5	56 ^c	46 ^c
5 to 30	60	50

a) At the transition frequency, the lower limit applies.
 b) The limit decreases linearly with the logarithm of the frequency in the ranges 50kHz to 150kHz and 150kHz to 0.50 MHz.
 c) For electrodeless lamps and luminaires, the limit in the frequency range of 2.51MHz to 3 MHz is 73 dB (µV) quasi-peak and 63 dB (µV) average.

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
EMI Receiver	Schaffner / SMR 4518	25	29.03.2019
LISN (Artificial – Main Network)	R&S / ESH2-Z5	1000442	09.09.2019
N-Type cable (2m length)	Huber+Suhner / Sucoflex 106	508722/6	21.11.2017
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 25	-	-	Shielded Room
Measured	20	45	990.5±0.5	

Typical set up of the test

The EUT was setup as shown in Fig. 8.1 and Photo 8.1, according to EN 55015 §8.

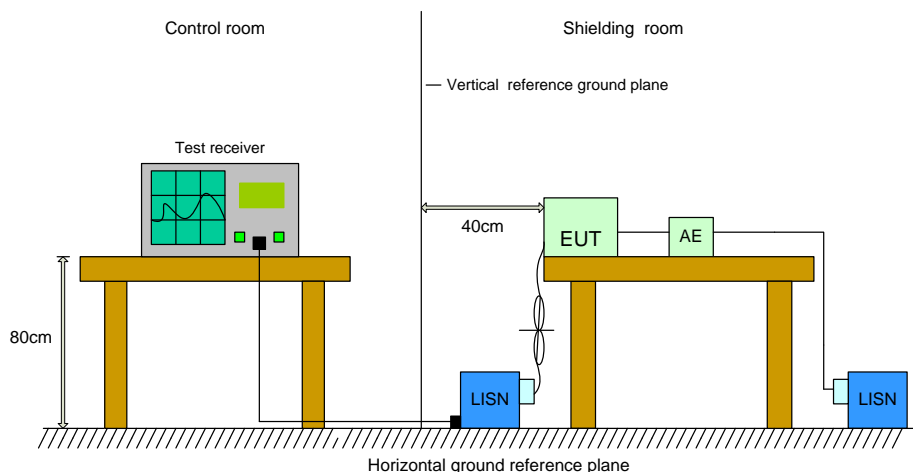


Fig. 8.1: Setup for conducted emissions test



Photo 8.1: Setup for conducted emissions test

Test procedure: According to EN 55015 §8.

Operating Mode: The EUT was in Normal Operating Mode (NOM) during the test. Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Point of measurement	Peak		Quasi-Peak		Average		Results
	Figure	Table	Figure	Table	Figure	Table	
Phase (L1)	8.2	-	8.2	-	8.2	8.1	Pass
Neutral (L2)	8.2	-	8.2	-	8.2	8.2	Pass

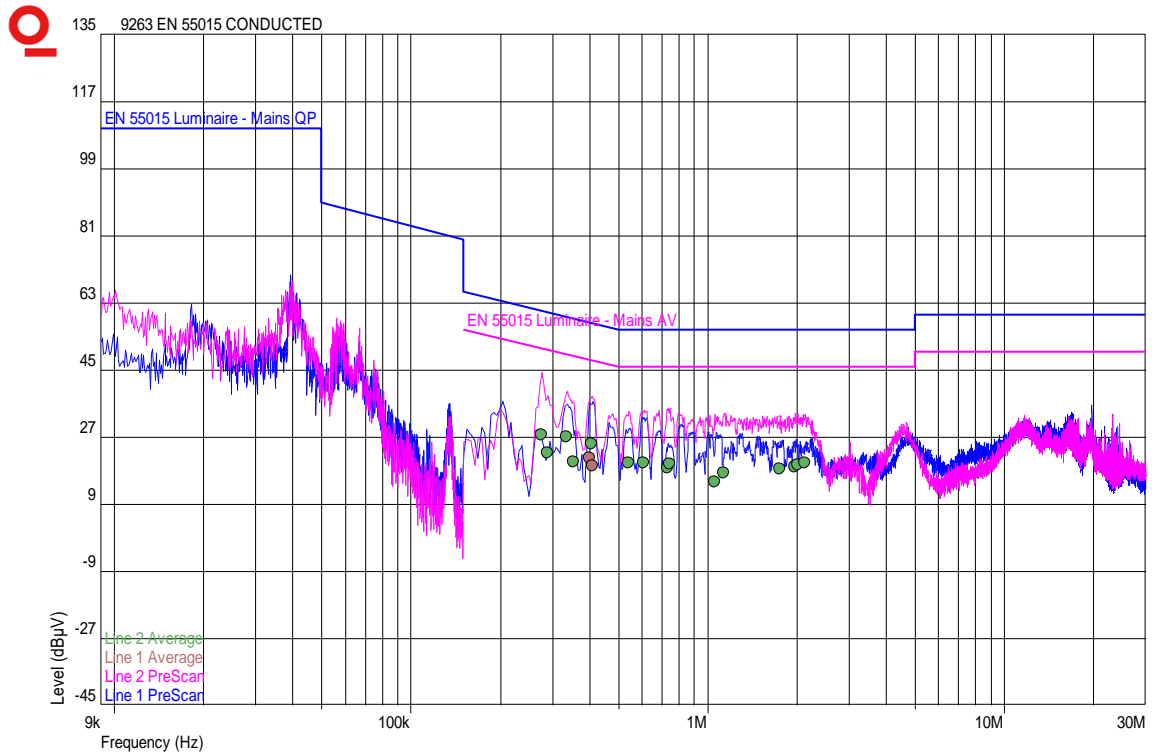


Fig. 8.2: Results for Phase (L1) and Neutral (L2)

Frequency [kHz]	Limit Average [dBµV]	Level [dBµV]	Detector
402.0	47.81	21.44	Average
411.0	47.63	19.27	Average

Table 8.1: Results (Average) for Phase (L1)

Frequency	Limit Average [dBµV]	Level [dBµV]	Detector
276.0 kHz	50.94	27.58	Average
289.5 kHz	50.54	22.71	Average
334.5 kHz	49.34	27.15	Average
352.5 kHz	48.90	20.40	Average
406.5 kHz	47.72	25.23	Average
541.5 kHz	46.00	20.27	Average
609.0 kHz	46.00	20.13	Average
735.0 kHz	46.00	18.90	Average
744.0 kHz	46.00	19.81	Average
1.0545 MHz	46.00	15.02	Average
1.1355 MHz	46.00	17.42	Average
1.7565 MHz	46.00	18.49	Average
1.968 MHz	46.00	19.12	Average
2.0085 MHz	46.00	19.62	Average
2.1345 MHz	46.00	20.04	Average

Table 8.2: Results (Average) for Neutral (L2)

Remarks: The performance of the EUT was within the conducted emissions limits (Table 2a) specified by EN 55015.

8. Radiated Emissions

Date of test	09.12.2019
Test result	PASS
Reference and basic standard	EN 55015
Range of test	30MHz – 300MHz
Classification	Table 3b
Distance	3m
Measurement uncertainty	±7 dB
Tested by	Mr. Christos-Christodoulos. A. KOKALIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKOUDIS

Radiated emission limits for measuring distance 3m

Frequency range	Limit Quasi-peak dB(µV/m) ^a
30 MHz to 230 MHz	40
230 MHz to 300 MHz	47

^{a)} At the transition frequency, the lower limit applies.

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
EMI Receiver	Schaffner / SMR 4518	25	29.03.2019
Antenna BILOG	Schaffner / CBL 6111D	22266	14.08.2019
N-Type cable (2m length)	Huber+Suhner / Sucoflex 106	508722/6	21.11.2017
N-Type cable (4m length)	Huber+Suhner / Sucoflex 106	508723/6	21.11.2017
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 25	-	-	Semi-anechoic Chamber
Measured	20.5±0.5	45	989.5±0.5	

Typical set up of the test

The EUT was setup as shown in Fig. 8.1 and Photo 8.1, according to EN 55015 §9.

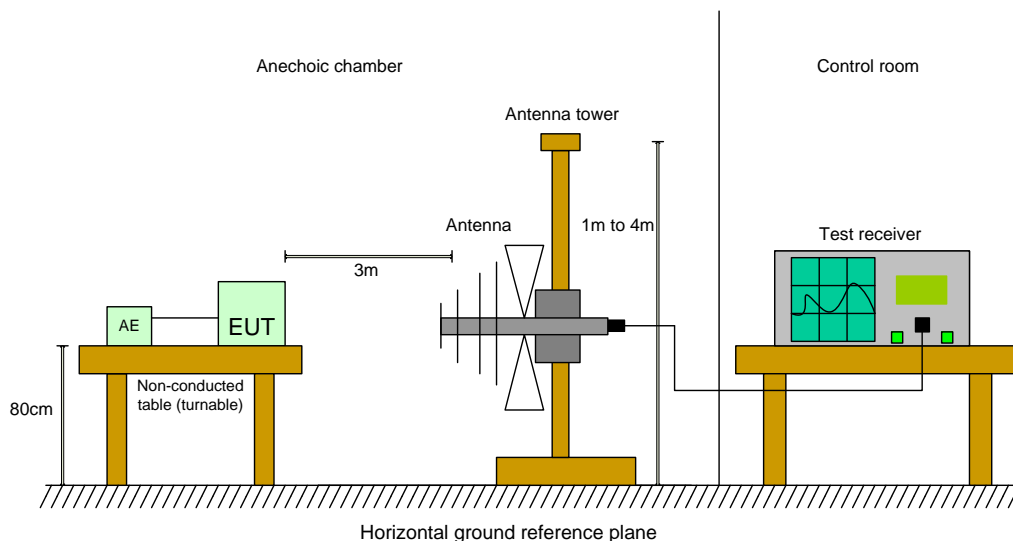


Fig. 8.1: Setup for radiated emissions test



Photo 8.1: Setup for radiated emissions test

Test procedure: According to EN 55015 §9. The variation of the antenna height was between 1.00m and 2.20m.

Operating Mode: The EUT was in Normal Operating Mode (NOM) during the test. Warm-up time at least 10 mins. There was visual monitoring of the EUT via a video camera system.

Analytical Results

Antenna polarization	Angle [°]	Height [m]	Peak		Quasi-Peak		Results
			Figure	Table	Figure	Table	
Horizontal	0	1.00	8.2	8.1	8.2	8.1	Pass
Vertical	0	1.00					Pass
Horizontal	90	1.00	8.3	8.2	8.3	8.2	Pass
Vertical	90	1.00					Pass
Horizontal	180	1.00	8.4	8.3	8.4	8.3	Pass
Vertical	180	1.00					Pass
Horizontal	270	1.00	8.5	8.4	8.5	8.4	Pass
Vertical	270	1.00					Pass

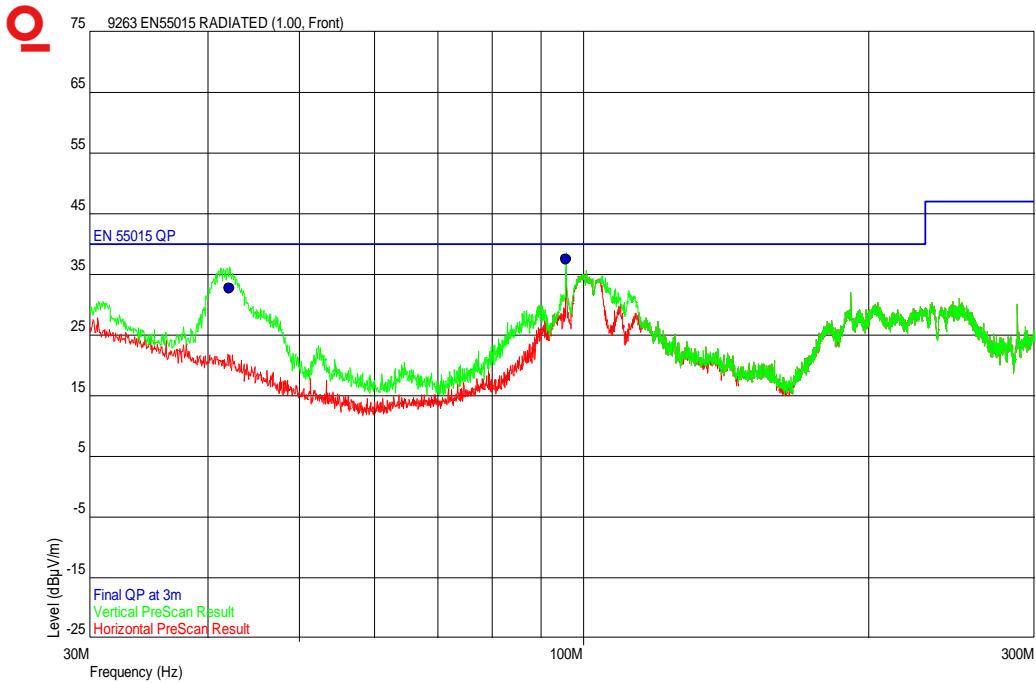


Fig. 8.2: Results for front side (0°)

Frequency [MHz]	Limit [dBµV/m]	Level [dBµV/m]	Detector	Level [dBµV/m]	Detector
42.18	40.00	36.74	PEAK	32.76	QP
95.76	40.00	39.64	PEAK	37.47	QP

Table 8.1: Results for front side (0°)

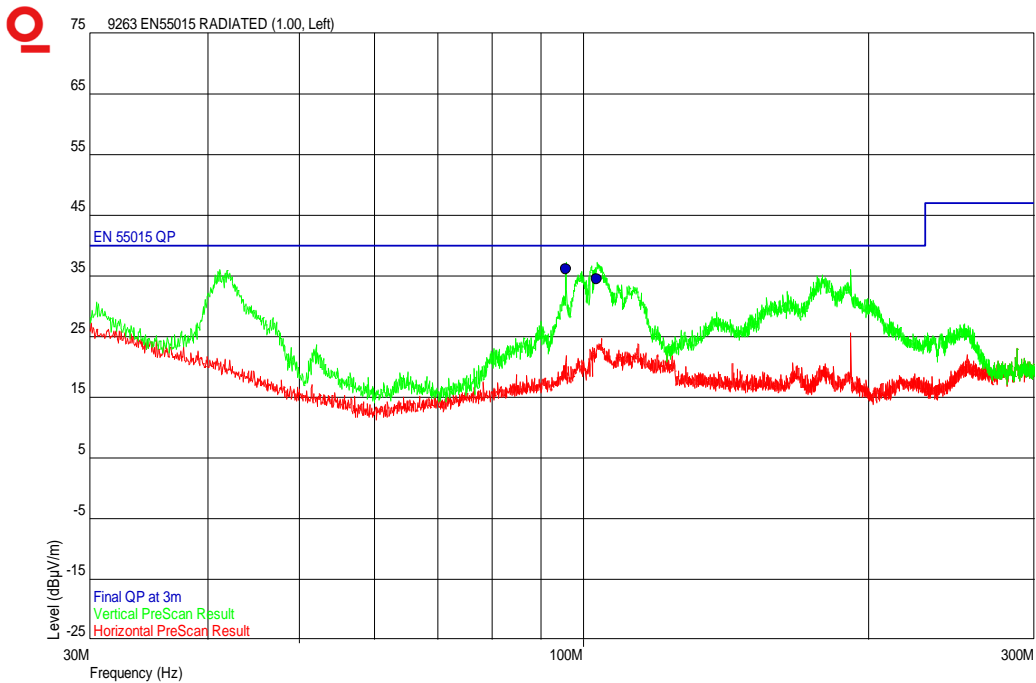


Fig. 8.3: Results for left side (90°)

Frequency [MHz]	Limit [dBµV/m]	Level [dBµV/m]	Detector	Level [dBµV/m]	Detector
95.76	40.00	37.83	PEAK	36.06	QP
103.32	40.00	36.82	PEAK	34.49	QP

Table 8.2: Results for left side (90°)

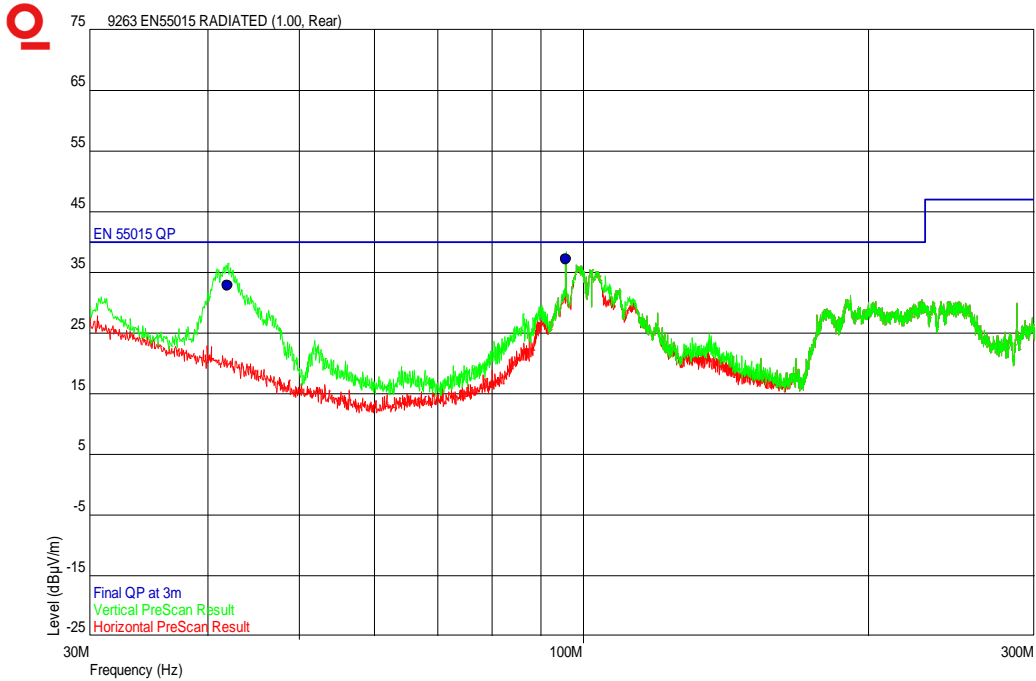


Fig. 8.4: Results for rear side (180°)

Frequency [MHz]	Limit [dBµV/m]	Level [dBµV/m]	Detector	Level [dBµV/m]	Detector
42.0	40.00	36.50	PEAK	32.83	QP
95.76	40.00	38.95	PEAK	37.14	QP

Table 8.3: Results for rear side (180°)

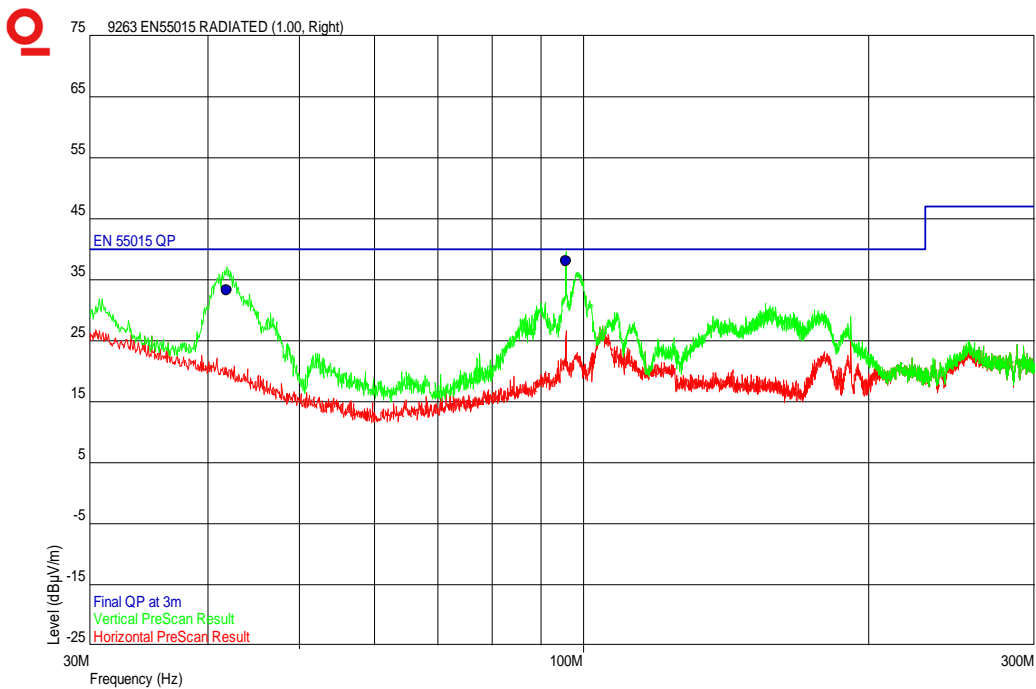


Fig. 8.5: Results for right side (270°)

Frequency [MHz]	Limit [dB μ V/m]	Level [dB μ V/m]	Detector	Level [dB μ V/m]	Detector
41.88	40.00	37.32	PEAK	33.31	QP
95.76	40.00	40.19	PEAK	38.11	QP

Table 8.4: Results for right side (270°)

Remarks: The performance of the EUT was within the radiated emissions limits (Table 3b) specified by EN 55015.

9. Radiated Magnetic Emissions

Date of test	09.12.2019
Test result	PASS
Reference and basic standard	EN 55015
Range of test	9kHz – 30MHz
Classification	Table 3a (2m loop diameter)
Measurement uncertainty	-
Tested by	Mr. Christos-Christodoulos. A. KOKALIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Radiated emissions limits

Frequency range MHz	Limits for loop diameter dB (μA) ^a		
	2m	3m	4m
0.009 to 0.070	88	81	75
0.070 to 0.150	88 to 58 ^b	81 to 51 ^b	75 to 45 ^b
0.150 to 3	58 to 22 ^b	51 to 15 ^b	45 to 9 ^b
3 to 30	22	15 to 16 ^c	9 to 12 ^c

a) At the transition frequency, the lower limit applies.
 b) Decreasing linearly with the logarithm of the frequency. For electrodeless lamps and luminaires, the limit in the frequency range of 2.2MHz to 3.0 MHz is 58 dB (μA) for 2m, 51 dB (μA) for 3m and 45 dB (μA) for 4m.
 c) Increasing linearly with the logarithm of the frequency.

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
EMI Receiver	Schaffner / SMR 4518	25	29.03.2019
Large Loop antenna	Chase / LLA6142	1021	11.03.1997
N-Type cable (10m length)	Huber + Suhner / Sucofeed	18416621	21.11.2017
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 25	-	-	HV Lab
Measured	24	42	987	

Typical set up of the test

The EUT was setup as shown in Fig. 9.1 and Photo 9.1, according to EN 55015 §9.

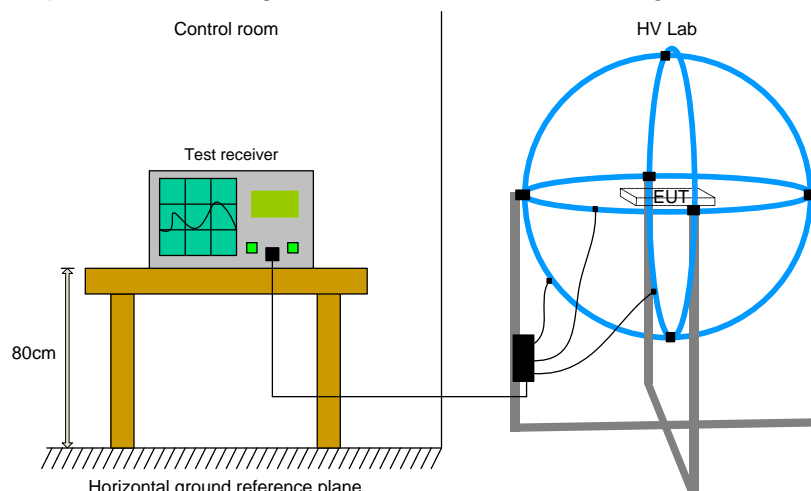


Fig. 9.1: Setup for radiated magnetic emissions test (9kHz-30MHz)



Photo 9.1: Setup for radiated magnetic emissions test (9kHz-30MHz)

Test procedure: According to EN 55015 §9.

Operating Mode: The EUT was in Normal Operating Mode (NOM) during the test. Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Point of measurement	Peak		Quasi-Peak		Results
	Figure	Table	Figure	Table	
Loop 1 (X)	9.2	-	9.2	9.1	Pass
Loop 2 (Y)	9.2	-	9.2	9.2	Pass
Loop 3 (Z)	9.2	-	9.2	9.3	Pass

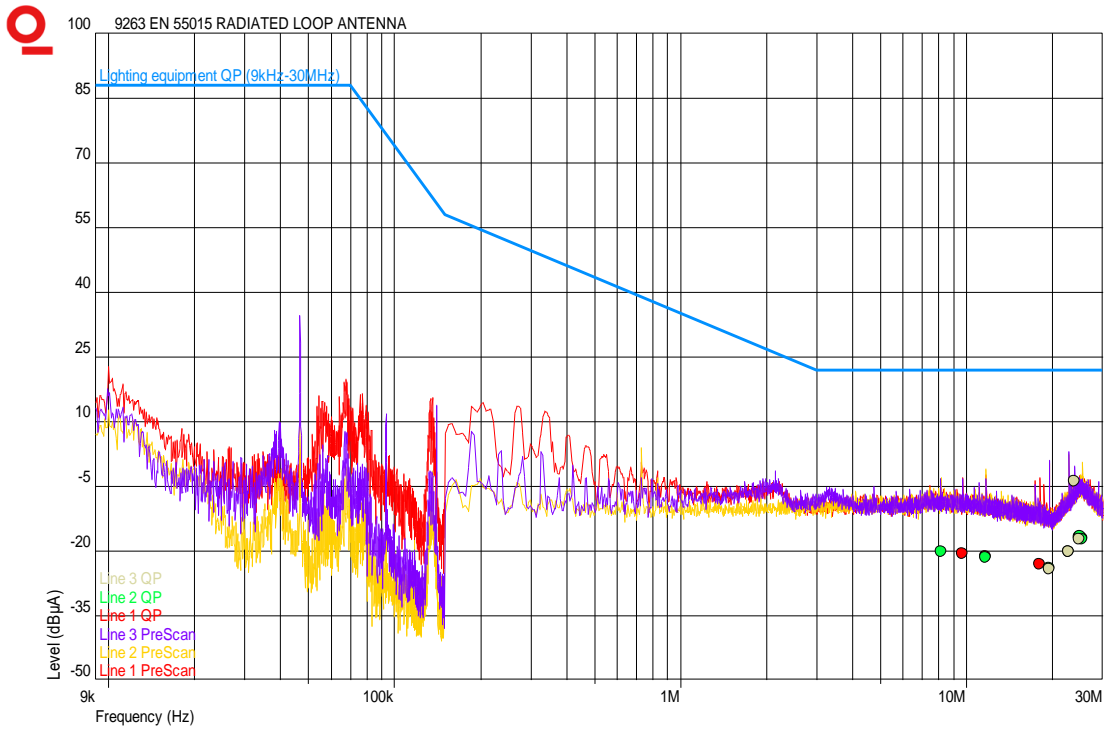


Fig. 9.2: Results for loop 1 (X), loop 2 (Y) and loop 3 (Z)

Frequency [MHz]	Limit QP [dBµA]	Level [dBµA]	Detector
9.717	22.00	-20.54	QP
11.706	22.00	-21.20	QP
18.1005	22.00	-22.94	QP
24.846	22.00	-16.77	QP
25.314	22.00	-16.89	QP

Table 9.1: Results (QP) for Loop 1 (X)

Frequency [MHz]	Limit QP [dBµA]	Level [dBµA]	Detector
8.133	22.00	-20.07	QP
11.7015	22.00	-21.39	QP
19.437	22.00	-23.96	QP
22.794	22.00	-20.20	QP
24.9045	22.00	-16.59	QP
25.431	22.00	-17.21	QP

Table 9.2: Results (QP) for Loop 2 (Y)

Frequency [MHz]	Limit QP [dBµA]	Level [dBµA]	Detector
19.4325	22.00	-24.22	QP
22.7895	22.00	-20.20	QP
23.8245	22.00	-3.84	QP
24.738	22.00	-17.21	QP

Table 9.3: Results (QP) for Loop 3 (Z)

Remarks: The performance of the EUT was within the radiated disturbance limits (Table 3a) specified by EN 55015. The laboratory is not accredited according to EN 17025 for this measurement.

10. Harmonic Current Emissions

Date of test	09.12.2019
Test result	PASS
Reference and basic standard	EN 61000-3-2
Classification	Class C
Measurement uncertainty	±2 %
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Harmonics, Flicker & Power Analyser	Thurlby Thandar / HA1600A	444113	03.09.2018
Low Distortion Power Source	Thurlby Thandar / AC1000A	444360	03.09.2018
AC Power Source	California Instruments / 801P-232	10172	N/A
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	20-27	-	-	Faraday Cage
Measured	19	45	999	

Typical set up of the test

The EUT was setup as shown in Fig. 10.1 and Photo 10.1, according to EN 61000-3-2 §6.2.1.

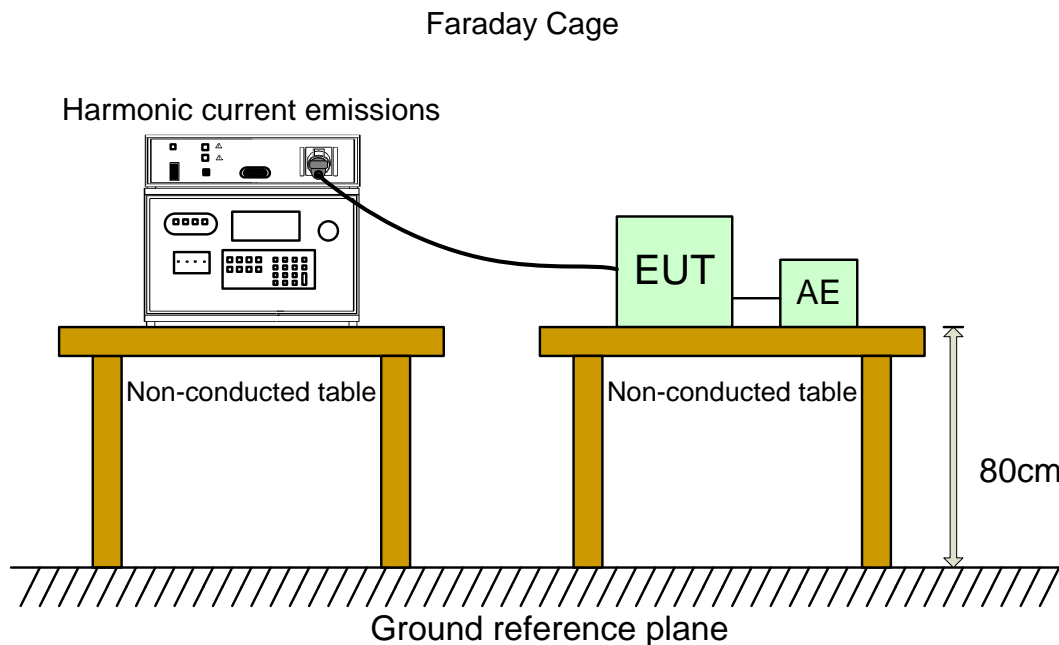


Fig. 10.1: Setup for harmonic current emissions test

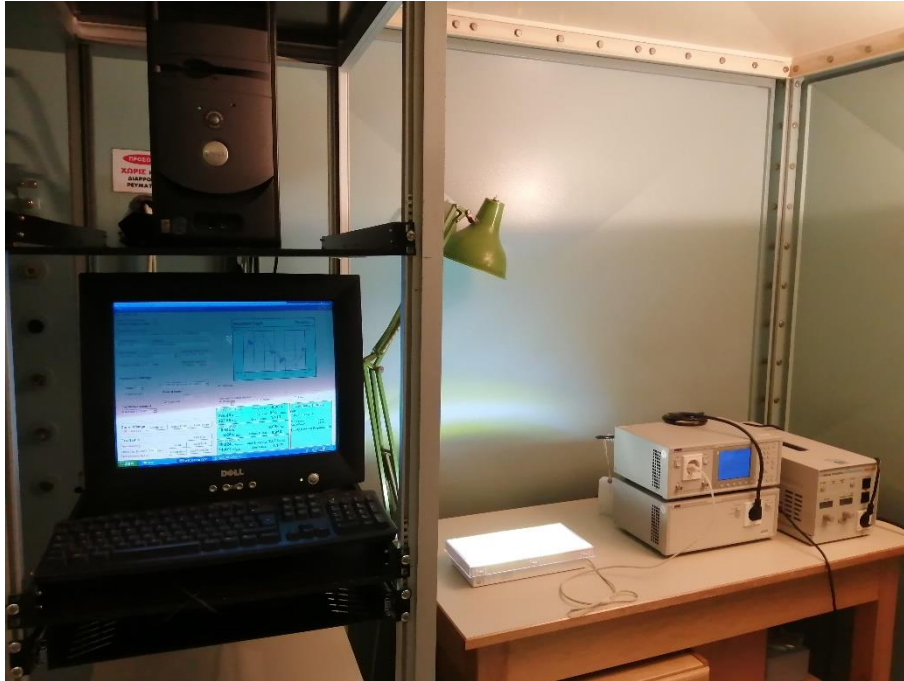


Photo 10.1: Setup for harmonic current emissions test

Test Procedure: According to EN 61000-3-2 §6.2.2, using HA-PC Link Plus version 3.02.

Operating Mode: The EUT was in Normal Operating Mode (NOM) during the test. Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Test duration: 10 min.

Supply Voltage: 230.3 Vrms @ 326.0 Vpk Frequency : 50.01 Hz
Supply Meets EN Requirements

Load Power: 8.664 W 9.084 VA Power Factor 0.952
Load Current: 39.4 to 39.5 mArms 43.0 to 45.1 mApk Crest Factor 1.112

Measurement Standard: EN61000-4-7:2002+A1:2009
Limits Applied: EN61000-3-2:2014 Class C<25W Limits

Harmonic Number	Limit Current mA	Average (filtered) mA	% Limit	max. Value (Filtered) mA	% Limit	Assessment
Fundamental		37.9				
2	-	0.6	-	0.609	-	-
3	29.5	2.1	7.1	2.247	7.6	Pass
4	-	0.2	-	0.191	-	-
5	16.5	1.2	7.3	1.233	7.5	Pass
6	-	0.1	-	0.205	-	-
7	8.7	7.1	81.6	7.125	81.9	Pass
8	-	0.1	-	0.171	-	-
9	4.3	4	93	4.093	95.2	Pass
10	-	0.1	-	0.115	-	-
11	3	1.2	40	1.247	41.6	Pass
12	-	0.1	-	0.132	-	-
13	2.6	2.7	103.8	2.683	103.2	Fail
14	-	0.1	-	0.179	-	-
15	2.2	2.5	113.6	2.568	116.7	Fail
16	-	0.1	-	0.151	-	-
17	2	1.1	55	1.076	53.8	Pass
18	-	0.1	-	0.14	-	-
19	1.8	1.4	77.8	1.444	80.2	Pass
20	-	0.1	-	0.143	-	-
21	1.6	2.2	137.5	2.247	140.4	Pass
22	-	0.1	-	0.146	-	-
23	1.5	1.1	73.3	1.174	78.3	Pass
24	-	0.1	-	0.132	-	-
25	1.3	0.3	23.1	0.309	23.8	Pass
26	-	0.1	-	0.098	-	-
27	1.2	1.4	116.7	1.418	118.2	Pass
28	-	0.1	-	0.143	-	-
29	1.2	1.4	116.7	1.455	121.3	Pass
30	-	0.1	-	0.118	-	-
31	1.1	0.3	27.3	0.362	32.9	Pass
32	-	0.1	-	0.089	-	-
33	1	0.8	80	0.854	85.4	Pass
34	-	0.1	-	0.123	-	-
35	1	1.2	120	1.222	122.2	Pass
36	-	0.1	-	0.129	-	-
37	0.9	0.7	77.8	0.764	84.9	Pass
38	-	0.1	-	0.089	-	-
39	0.9	0.2	22.2	0.224	24.9	Pass
40	-	0.1	-	0.098	-	-
21 - 39	3.7	3.6	97.3	3.68	99.5	Pass

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

The EUT complies with the requirements of EN 61000-3-2.

11. Voltage Fluctuations and Flicker

Date of test	09.12.2019
Test result	PASS
Reference and basic standard	EN 61000-3-3
Limits	§5
Measurement uncertainty	±9 %
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Harmonics, Flicker & Power Analyser	Thurlby Thandar / HA1600A	444113	03.09.2018
Low Distortion Power Source	Thurlby Thandar / AC1000A	444360	03.09.2018
AC Power Source	California Instruments / 801P-232	10172	N/A
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	-	-	-	Faraday Cage
Measured	19	45	999	

Typical set up of the test

The EUT was setup as shown in Fig. 11.1 and Photo 11.1, according to EN 61000-3-3 §6.

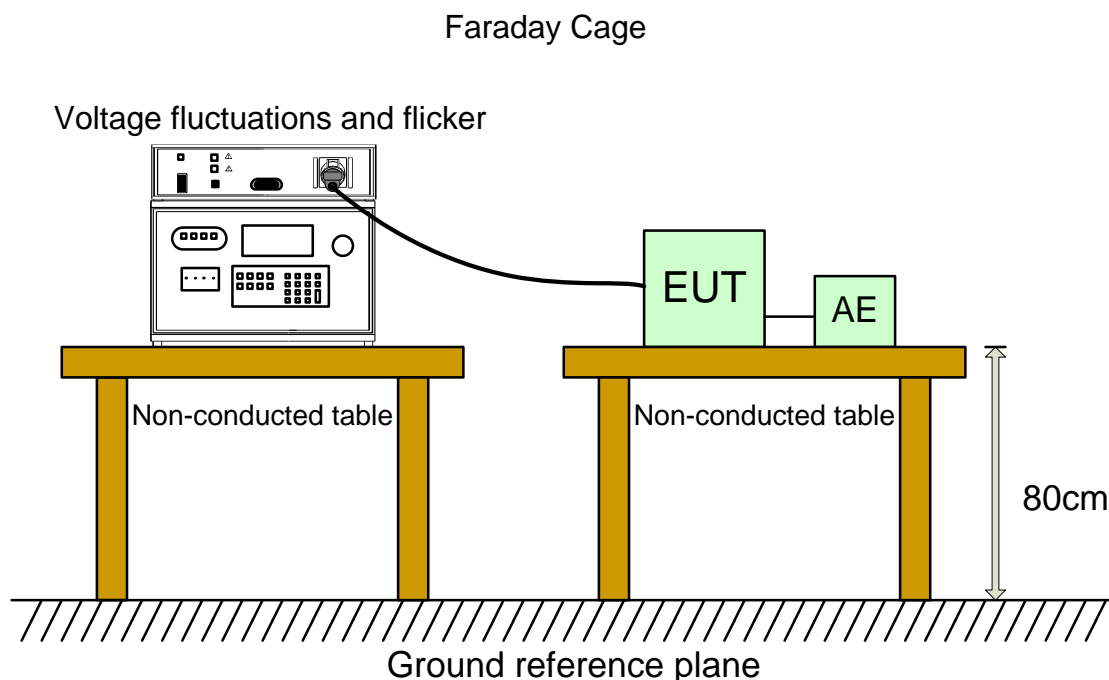


Fig. 11.1: Setup for voltage fluctuations test

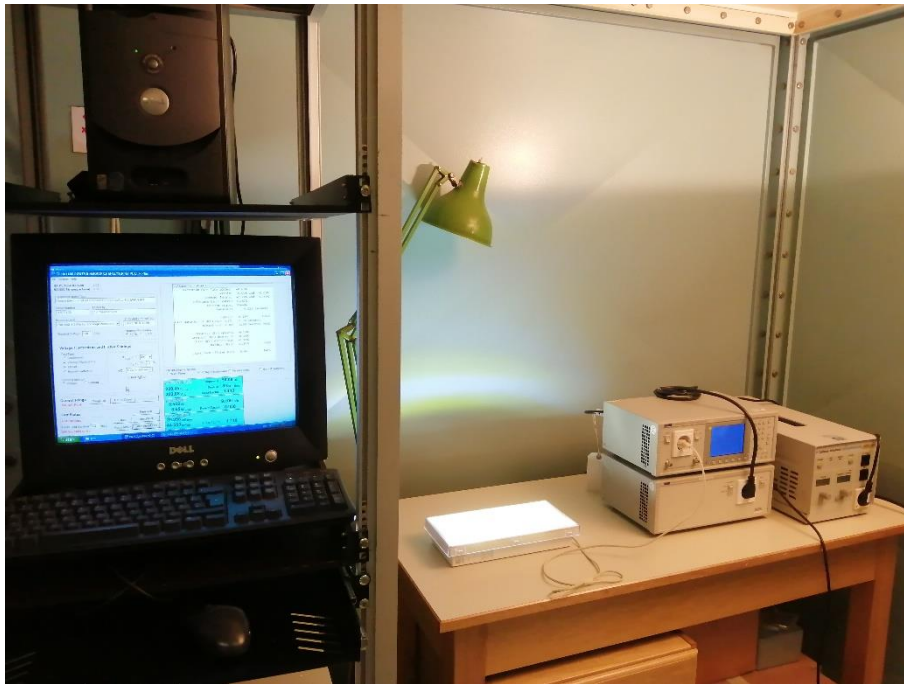


Photo 11.1: Setup for voltage fluctuations test

Test procedure: According to EN 61000-3-3 §6, using HA-PC Link Plus version 3.01.

Operating Mode: The EUT was in normal operating mode (switched on) during the test. Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Test duration: 10 min.

Load Power: 8.666 W 9.111 VA Power Factor 0.951
Load Current: 39.4 to 39.6 mArms 44.4 mApk Crest Factor 1.113

EN 61000-3-3:2013 - Voltage reduction is positive

Voltage Variations

Nominal Voltage: 230 Vrms
Highest Half-cycle level: -0.18%
Lowest Half-cycle level: -0.07%

d(max): 0.00% Limit: 4% PASS
t(max): 0.00seconds Limit: 500ms PASS

Steady State definition: >1000ms within +/- 0.2%
Largest d(c) change down: 0.00%
Largest d(c) change up: +0.00%
Largest d(c) change: 0.00% Limit: 3.3% PASS

Flicker

Pst Classifier	
Duration	Flicker
0.1%	0.00
0.7%	0.00
1.0%	0.00
1.5%	0.00
2.2%	0.00
3%	0.00
4%	0.00
6%	0.00
8%	0.00
10%	0.00
13%	0.00
17%	0.00
30%	0.00
50%	0.00
80%	0.00

Remarks: The EUT complies with the requirements of EN 61000-3-3.

12. Immunity to Electrostatic Discharge

Date of test	09.12.2019
Test result	Normal Operating Mode: PASS (A/A)
	Emergency Operating Mode: PASS (A/A)
Reference and basic standard	EN 61547 and EN 61000-4-2
Test Level	Contact discharge: 2, Air discharge: 3
Test Specification	Contact discharge $\pm 4\text{kV}$, Air discharge $\pm 8\text{kV}$
Acceptance Criterion	B/B (EN 61547, §6.3.4 Table 15)
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Electrostatic Generator	Schaffner / NSG 438	273	04.01.2019
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019
Horizontal Coupling plane			N/A
Vertical Coupling plane			N/A

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 35	30 - 60	860 - 1060	HV Lab
Measured	21	46.5 \pm 0.5	987	

Typical set up of the test

The EUT was setup as shown in Fig. 12.1 and Photo 12.1, according to EN 61000-4-2 §7.

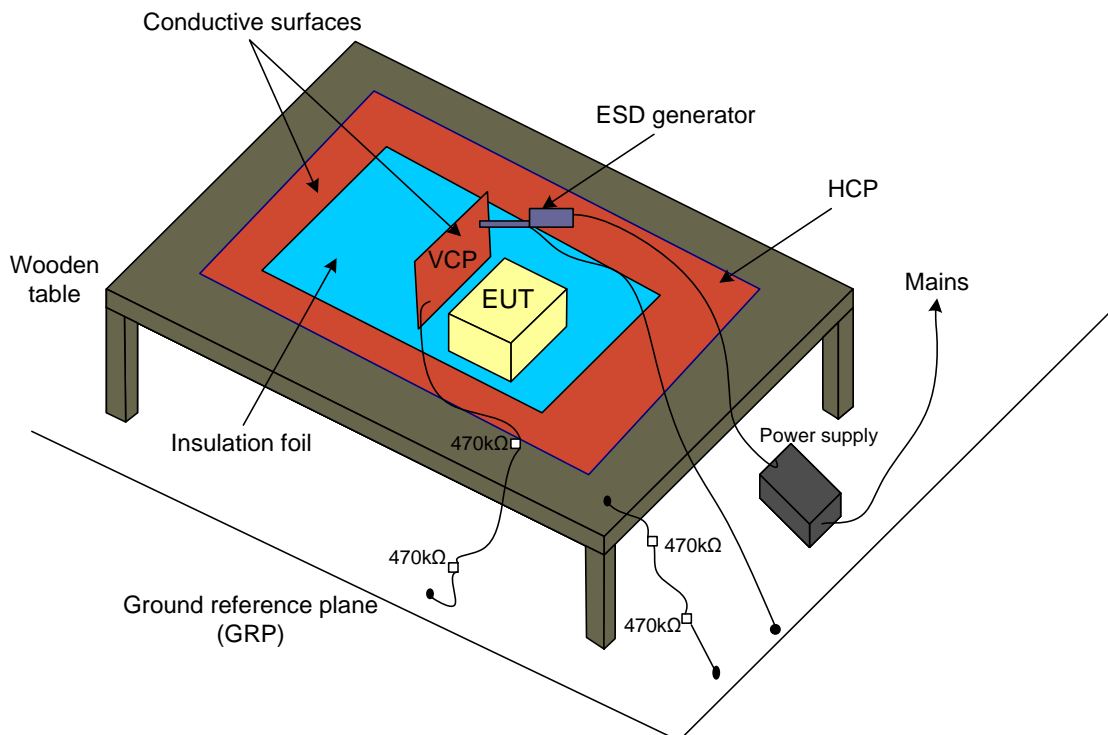


Fig. 12.1: Setup for electrostatic discharge test

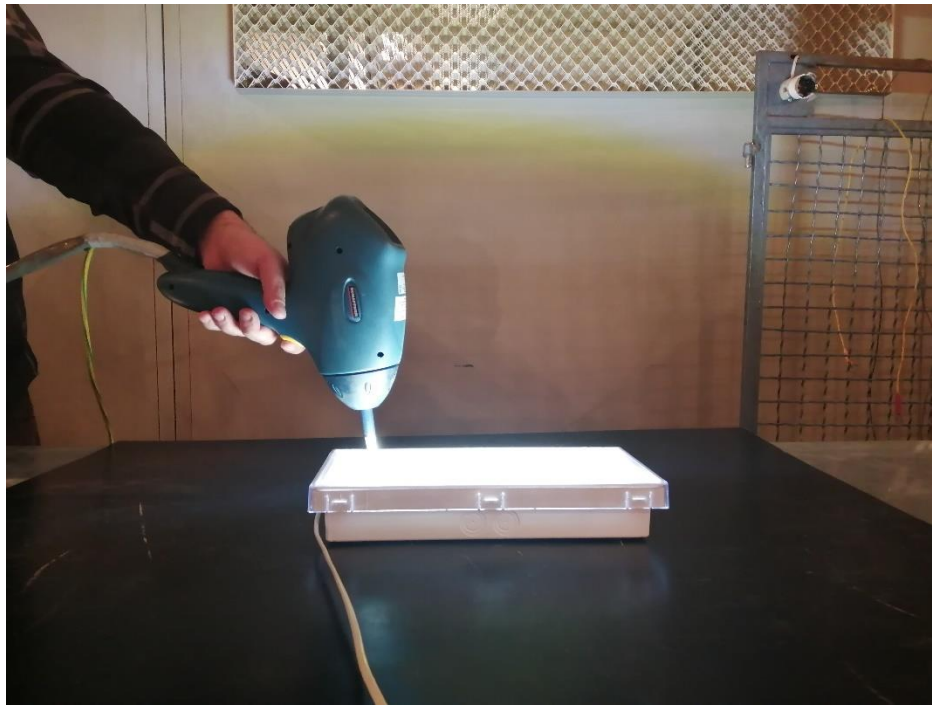


Photo 12.1: Setup for electrostatic discharge test

Test procedure: According to EN 61000-04-02 §8.

Operating Mode: The EUT was tested in both operating modes (Normal and Emergency). Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Ten (10) discharges of each polarity were applied on each point, at each voltage level. Minimum time interval between discharges is 1s.

Normal Operating Mode

Contact discharges

Point		Voltage (kV)								Remarks
		+2	-2	+4	-4	+6	-6	+8	-8	
Horizontal Coupling plane	G	A	A	A	A	N/A	N/A	N/A	N/A	Pass (A)
Vertical Coupling plane	G	A	A	A	A	N/A	N/A	N/A	N/A	Pass (A)

G: Means that the point is grounded.

U: Means that the point is ungrounded.

Air Discharge

Point		Voltage (kV)								Remarks
		+2	-2	+4	-4	+8	-8	+15	-15	
Plastic enclosure		A	A	A	A	A	A	N/A	N/A	Pass (A)
Plastic transparent cover		A	A	A	A	A	A	N/A	N/A	Pass (A)

A: The EUT satisfies performance criterion A in this test level.

B: The EUT satisfies performance criterion B in this test level.

C: The EUT satisfies performance criterion C in this test level.

N/A: This test level is not applicable to this EUT.

Emergency Operating Mode

Contact discharges

Point		Voltage (kV)								Remarks
		+2	-2	+4	-4	+6	-6	+8	-8	
Horizontal Coupling plane	G	A	A	A	A	N/A	N/A	N/A	N/A	Pass (A)
Vertical Coupling plane	G	A	A	A	A	N/A	N/A	N/A	N/A	Pass (A)

G: Means that the point is grounded.

U: Means that the point is ungrounded.

Air Discharge

Point		Voltage (kV)								Remarks
		+2	-2	+4	-4	+8	-8	+15	-15	
Plastic enclosure		A	A	A	A	A	A	N/A	N/A	Pass (A)
Plastic transparent cover		A	A	A	A	A	A	N/A	N/A	Pass (A)

A: The EUT satisfies performance criterion A in this test level.

B: The EUT satisfies performance criterion B in this test level.

C: The EUT satisfies performance criterion C in this test level.

N/A: This test level is not applicable to this EUT.

Remarks: The EUT as tested met the requirements of EN 61547 and EN 61000-4-2.

13. Immunity to RF Electromagnetic Radiated Field

Date of test	09.12.2019 & 10.12.2019
Test result	Normal Operating Mode: PASS (A)
	Emergency Operating Mode: PASS (A)
Reference and basic standard	EN 61547 and EN 61000-4-3
Test Level	2
Test Specification	3V/m, Modulated, 80MHz-1GHz, 80%AM, Step=1%, Dwell time=3sec
Acceptance Criterion	A (EN 61547, §6.3.4 Table 15)
Tested by	Mr. Christos-Christodoulos. A. KOKALIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
HF Generator	Rohde Schwarz / SMB 100A	102231	06.08.2019
Amplifier	Rohde Schwarz / BBA 150-BC250	101878	06.03.2018
Amplifier	Rohde Schwarz / BBA 150-D60E60	101870	
Power Meter	Rohde Schwarz / NRVD	826224/021	12.08.2019
Voltage sensors	Rohde Schwarz / URV5-Z7	826222/08&09	12.08.2019
Antenna	Schaffner / CBL 6111D	22266	14.08.2019
Pressure meter	Testo / 511	39106014/109	12.11.2018
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	-	-	-	Semi-anechoic Chamber
Measured	22±1	47±2	986.5±2.5	

Typical set up of the test

The EUT was setup as shown in Fig. 13.1 and Photo 13.1, according to EN 61000-4-3 §7.

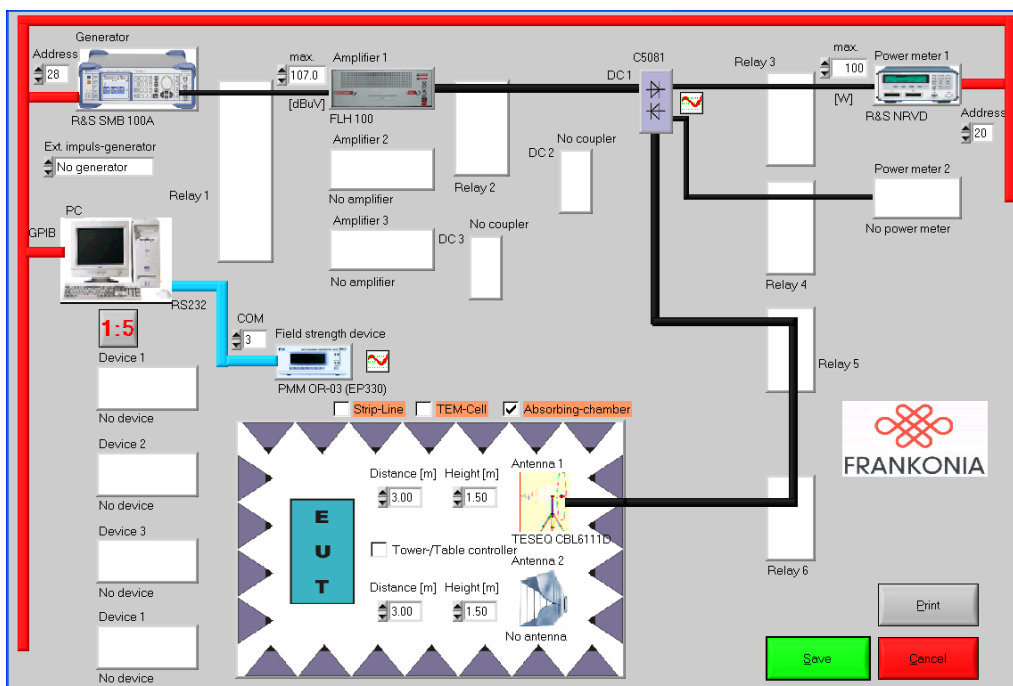


Fig. 13.1: Setup for RF electromagnetic field test



Photo 13.1: Setup for RF electromagnetic field test

Test procedure: According to EN 61000-4-3 §8, using Frankonia RF-LAB V5.008. The height of the antenna was 1.5m. The uniformity of the field is presented in Fig. 13.2.

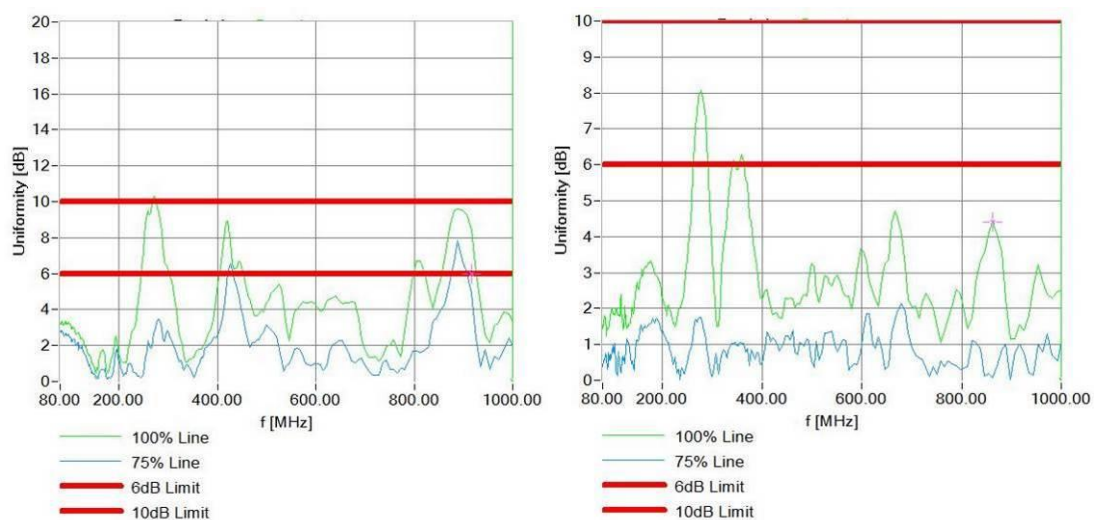


Fig. 13.2: Uniformity for Horizontal (left) and Vertical (right) polarization of antenna

Operating Mode: The EUT was tested in both operating modes (Normal and Emergency). Warm-up time at least 10 mins. There was visual monitoring of the EUT via a video camera system.

Analytical Results

Normal Operating Mode

Frequency [MHz]	Modulation 1kHz, 80% AM	Level [V/m]	Distance [m]	Antenna Polarization	Side of EUT	Remarks
80-1000	Yes	3	3	Horizontal	Front	Pass (A)
80-1000	Yes	3	3	Vertical	Front	Pass (A)
80-1000	Yes	3	3	Horizontal	Left	Pass (A)
80-1000	Yes	3	3	Vertical	Left	Pass (A)
80-1000	Yes	3	3	Horizontal	Rear	Pass (A)
80-1000	Yes	3	3	Vertical	Rear	Pass (A)
80-1000	Yes	3	3	Horizontal	Right	Pass (A)
80-1000	Yes	3	3	Vertical	Right	Pass (A)

A: The EUT satisfies performance criterion A in this test level.

Emergency Operating Mode

Frequency [MHz]	Modulation 1kHz, 80% AM	Level [V/m]	Distance [m]	Antenna Polarization	Side of EUT	Remarks
80-1000	Yes	3	3	Horizontal	Front	Pass (A)
80-1000	Yes	3	3	Vertical	Front	Pass (A)
80-1000	Yes	3	3	Horizontal	Left	Pass (A)
80-1000	Yes	3	3	Vertical	Left	Pass (A)
80-1000	Yes	3	3	Horizontal	Rear	Pass (A)
80-1000	Yes	3	3	Vertical	Rear	Pass (A)
80-1000	Yes	3	3	Horizontal	Right	Pass (A)
80-1000	Yes	3	3	Vertical	Right	Pass (A)

A: The EUT satisfies performance criterion A in this test level.

Remarks: The EUT as tested met the requirements of EN 61547 and EN 61000-4-3.

14. Immunity to Fast Transient (Burst)

Date of test	03.12.2019
Test result	Normal Operating Mode: PASS (A)
	Emergency Operating Mode: PASS (A)
Reference and basic standard	EN 61547 and EN 61000-4-4
Test Level	2
Test Specification	a.c. power port: ±1kV, 5kHz, 2 Min signal and telecommunication ports: - kV, 5kHz, 2 Min
Acceptance Criterion	B (EN 61547, §6.3.4 Table 15)
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	-

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Basic Unit	Schaffner / NSG 2050	200313-127AR	03.01.2019
Burst Generator	Schaffner / PNW 2225	200320-504LU	
Coupling Network	Schaffner / CDN 131/151	34306	03.01.2019
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 35	25 - 75	860 - 1060	Faraday Cage
Measured	20	41	990	

Typical set up of the test

The EUT was setup as shown in Fig. 14.1 and Photo 14.1, according to EN 61000-4-4 §7.

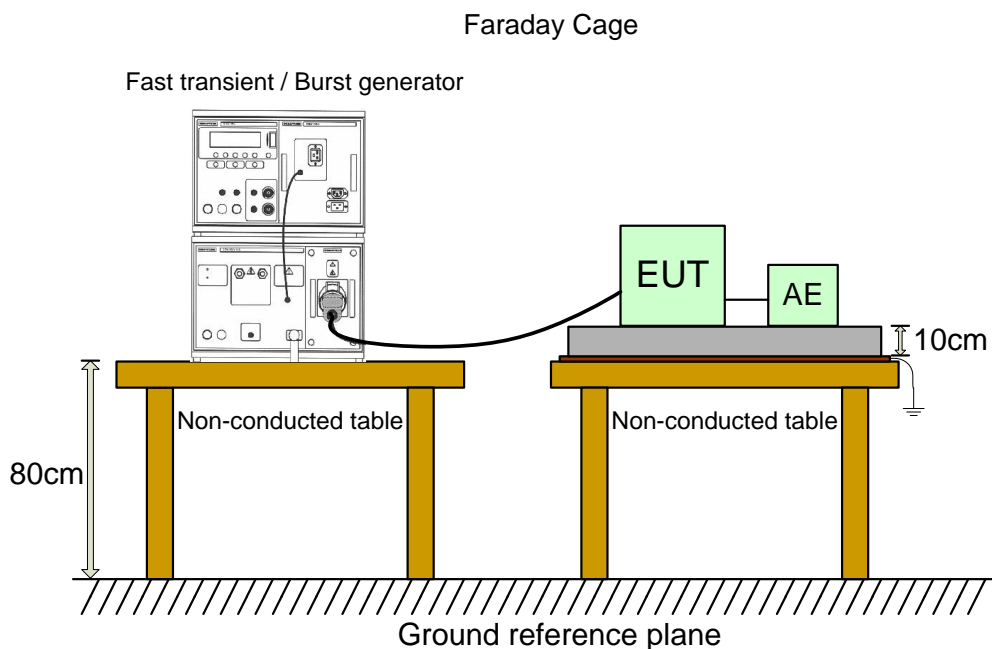


Fig. 14.1: Setup for burst test

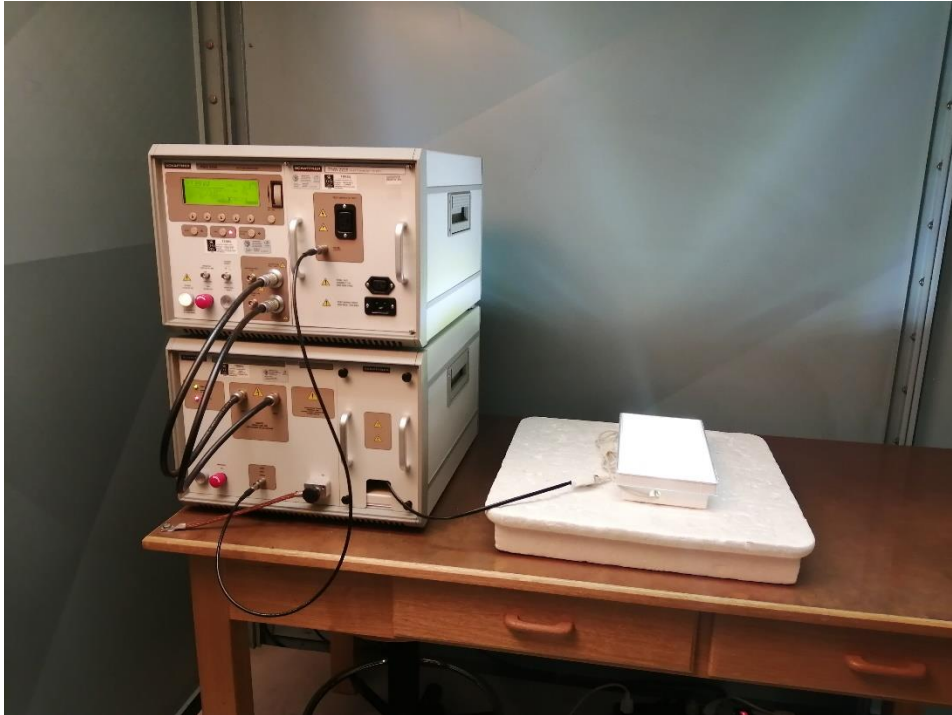


Photo 14.1: Setup for burst test

Test procedure: According to EN 61000-04-04 §8.

Operating Mode: The EUT was tested in both operating modes (Normal and Emergency). Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

The duration of pulses in each voltage level and polarity was 2 minutes.

Port	Voltage (kV)								Remarks
	+0.5	-0.5	+1	-1	+2	-2	+4	-4	
Line L-N (NOM)	A	A	A	A	N/A	N/A	N/A	N/A	Pass (A)
Line L-N (EOM)	A	A	A	A	N/A	N/A	N/A	N/A	Pass (A)

- A: The EUT satisfies performance criterion A in this test level.
- B: The EUT satisfies performance criterion B in this test level.
- N/A: This test level is not applicable to this EUT.

Remarks: The EUT as tested met the requirements of EN 61547 and EN 61000-4-4.

15. Immunity to Surge

Date of test	03.12.2019
Test result	Normal Operating Mode: PASS (A/(N/A))
	Emergency Operating Mode: PASS (A/(N/A))
Reference and basic standard	EN 61547 and EN 61000-4-5
Test Level	2 (Table 10, §5.7 EN 61547)
Test Specification	a.c. power port (<25W): ±0.5kV line to line, ±1kV line to earth (1,2/50) signal and telecommunication ports: -kV (10/700)
Acceptance Criterion	C/C (EN 61547, §6.3.4 Table 15)
Tested by	Mr. Panagiotis K. PASTAMATIS, Dipl. El. Eng.
Present during the test	-

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Basic Unit	Schaffner / NSG 2050	200313-127AR	03.01.2019
Surge Generator	Schaffner / PNW 2050	200329-515LU	
Coupling Network	Schaffner / CDN 131/151	34306	03.01.2019
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 35	10 - 75	860 - 1060	Faraday Cage
Measured	20	41	990	

Typical set up of the test

The EUT was setup as shown in Fig. 15.1 and Photo 15.1, according to EN 61000-4-5 §7.

Faraday Cage

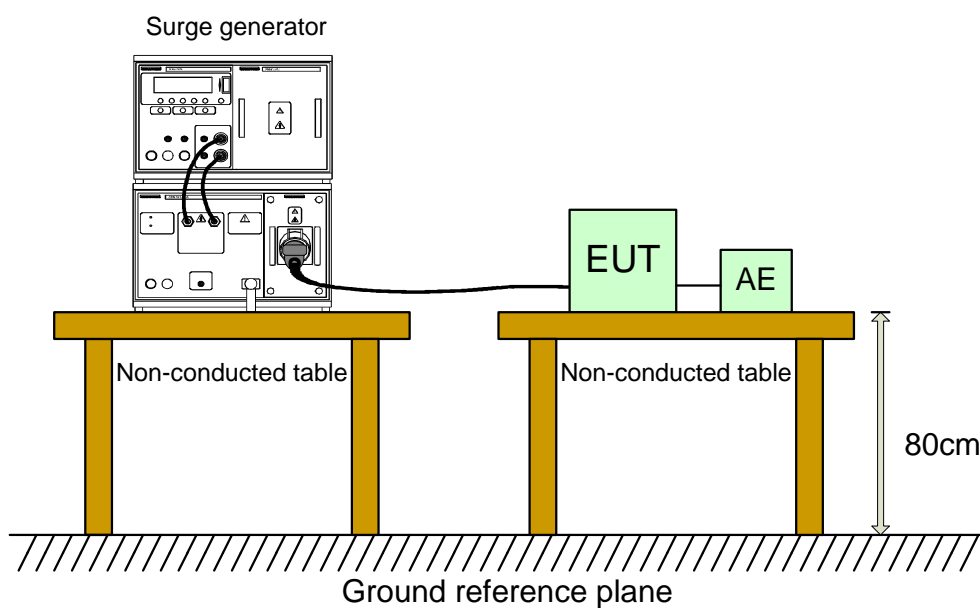


Fig. 15.1: Setup for surge test



Photo 15.1: Setup for surge test

Test procedure: According to EN 61000-4-5 §8.

Operating Mode: The EUT was tested in both operating modes (Normal and Emergency). Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Five (5) discharges of each polarity were applied at each voltage level. Minimum time interval between discharges was 60s.

Normal Operating Mode

Port	Angle [°]	Voltage [kV]								Remarks
		+0.5	-0.5	+1	-1	+2	-2	+4	-4	
Lines L-N	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines L-PE	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines N-PE	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines L-N	90	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Pass (A)
Lines L-PE	90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines N-PE	90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines L-N	180	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines L-PE	180	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines N-PE	180	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines L-N	270	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	Pass (A)
Lines L-PE	270	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines N-PE	270	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- A: The EUT satisfies performance criterion A in this test level.
- B: The EUT satisfies performance criterion B in this test level.
- N/A: This test level is not applicable to this EUT.

Emergency Operating Mode

Port	Angle [°]	Voltage [kV]								Remarks
		+0.5	-0.5	+1	-1	+2	-2	+4	-4	
Lines L-N	-	A	A	N/A	N/A	N/A	N/A	N/A	N/A	Pass (A)
Lines L-PE	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lines N-PE	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A: The EUT satisfies performance criterion A in this test level.

B: The EUT satisfies performance criterion B in this test level.

N/A: This test level is not applicable to this EUT.

Remarks: The EUT as tested met the requirements of EN 61547 and EN 61000-4-5.

16. Immunity to Electromagnetic Conducted Field

Date of test	09.12.2019 & 10.12.2019
Test result	Normal Operating Mode: PASS (A)
	Emergency Operating Mode: PASS (A)
Reference and basic standard	EN 61547 and EN 61000-4-6
Test Level	2
Test Specification	a.c. power port: 3V, 80%AM, 0,15-80MHz signal and telecom. ports: -V, 80%AM, 0,15-80MHz
Acceptance Criterion	A (EN 61547, §6.3.4 Table 15)
Tested by	Mr. Christos-Christodoulos. A. KOKALIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKLOUDIS

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
HF Generator	Rohde Schwarz / SMB 100A	102231	06.08.2019
Amplifier	Frankonia / FLL-75	0029	27.07.2018
Attenuator -6dB / 75 Watt	TESEQ / ATN 6075	42456	10.09.2018
Coupling Network (CDN M2)	TESEQ / M216	48181	15.08.2018
Power Meter	Rohde Schwarz / NRVD	826224/021	12.08.2019
Voltage sensors	Rohde Schwarz / URV5-Z2	10483	12.08.2019
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	-	-	-	Shielded Room
Measured	23±2	45.5±4.5	985.5±1.5	

Typical set up of the test

The EUT was setup as shown in Fig. 16.1 and Photo 16.1, according to EN 61000-4-6 §7.

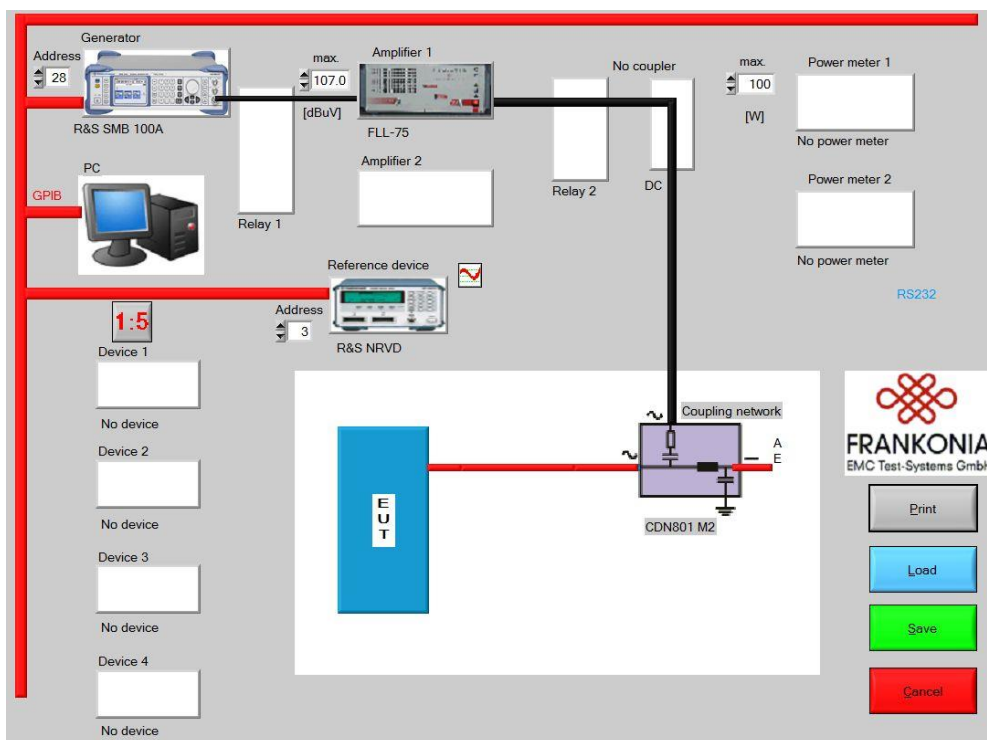


Fig. 16.1: Setup for electromagnetic conducted field test

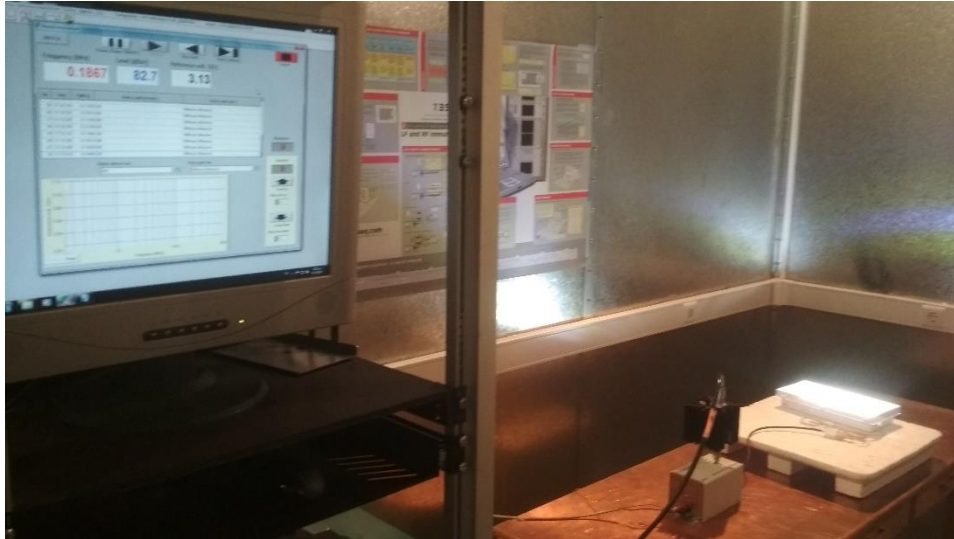


Photo 16.1: Setup for electromagnetic conducted field test

Test procedure: According to EN 61000-4-6 §8, using Frankonia CD-LAB V5.008. The reference measurements are presented in Fig. 16.2.

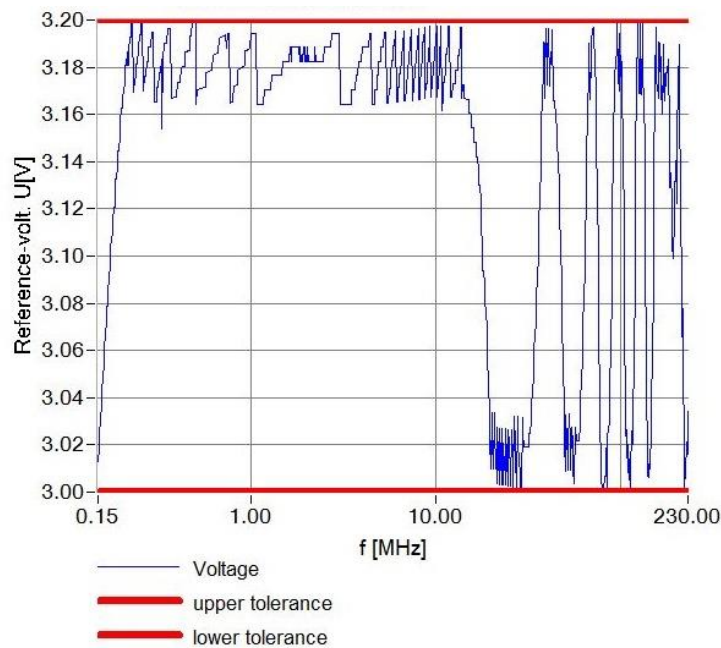


Fig. 16.2: Reference measurement

Operating Mode: The EUT was tested in both operating modes (Normal and Emergency). Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Frequency [MHz]	Modulation 1kHz, 80% AM	Voltage [V]	Port	Result	Remarks
0.150 - 80	Yes	3	AC mains (NOM)	A	Pass (A)
0.150 - 80	Yes	3	AC mains (EOM)	A	Pass (A)

A: The EUT satisfies performance criterion A in this test level.

Remarks: The EUT as tested met the requirements of EN 61547 and EN 61000-4-6.

17. Power Frequency Magnetic Fields

Date of test	03.12.2019
Test result	PASS (N/A ⁸)
Reference and basic standard	EN 61547 and EN 61000-4-8
Test Specification	3A/m, 50Hz
Acceptance Criterion	A (EN 61547, §6.3.4 Table 15)
Tested by	-
Present during the test	-

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Signal Conditioning Unit – Lumped Impedance	Schaffner / CCN 1000-1	72204	25.01.2018
AC Power Source	Schaffner / NSG 1007	55529	25.01.2018
Magnetic Loop Coil	Schaffner / INA 702	112	22.01.2018
Induction Coil Interface	Schaffner / INA 2141	6014	22.01.2018
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 35	25 - 75	860 - 1060	Faraday Cage
Measured	-	-	-	

Typical set up of the test

The EUT setup is shown in Fig. 17.1 according to EN 61000-4-8 §7.

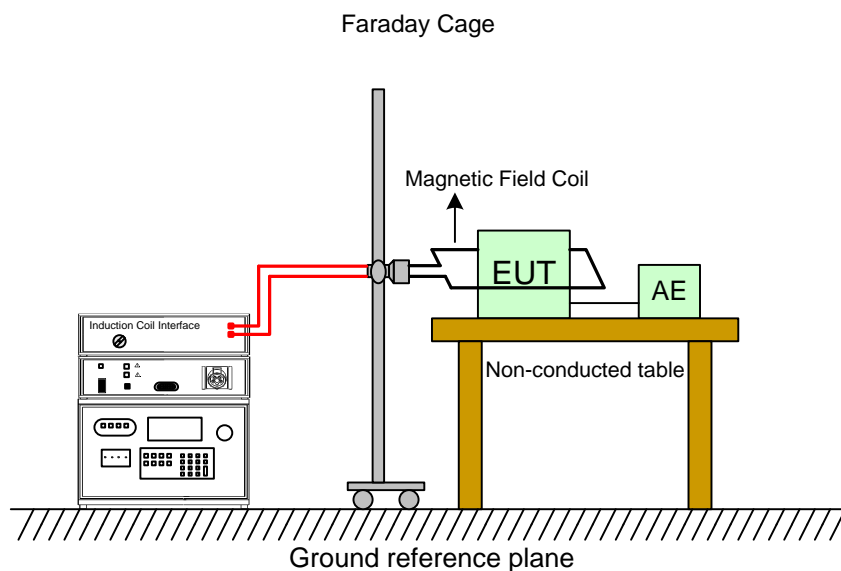


Fig. 17.1: Setup for power frequency magnetic fields test

Test procedure: According to EN 61000-04-8 §8, using Schaffner Proline WIN2120, V5.00.

Remarks: According to the declaration of the manufacturer, the EUT does not contain devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors, etc.

18. Immunity to Voltage Dips and Short Interruptions

Date of test	09.12.2019
Test result	PASS (A/A)
Reference and basic standard	EN 61547 and EN 61000-4-11
Test Specification	Voltage dips: 100% for 0.5 Periods – 30% for 10 Periods
Acceptance Criterion	Criterion B - Criterion C (EN 61547, §6.3.4 Table 15)
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	Mr. Apostolos STAVRAKOUDIS

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Transient Generator	EMC-PARTNER / Transient 3000	TRA3000 F-S-S-V 1288	19.03.2019
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	-	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15 - 35	25 - 75	860 - 1060	HV Lab
Measured	21	47	987	

Typical set up of the test

The EUT was setup as shown in Fig. 18.1 and Photo 18.1, according to EN 61000-4-11 §7.

HV Lab

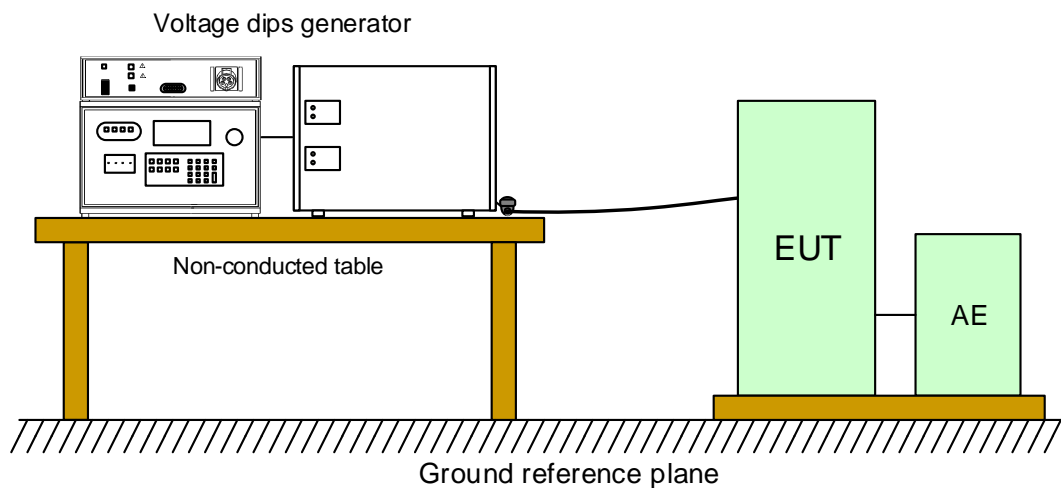


Fig. 18.1: Setup for voltage dips and short interruptions test



Photo 18.1: Setup for voltage dips and short interruptions test

Test procedure: According to EN 61000-04-11 §8.

Operating Mode: The EUT was tested in Normal Operating Mode (NOM). Warm-up time at least 10 mins. The performance was monitored during and after the test.

Analytical Results

Each test was repeated 3 times with 10s interval.

Test	Reduction	Voltage	Periods	Criterion	Result	Remarks
Voltage interruptions	100%	0V	0.5	B	A	Pass (A)
Voltage dips	30%	161V	10	C	A	Pass (A)

- A: The EUT satisfies performance criterion A in this test level.
- B: The EUT satisfies performance criterion B in this test level.
- C: The EUT satisfies performance criterion C in this test level.

Remarks: The EUT as tested met the requirements of EN 61547 and EN 61000-4-11.

19. Internal Electric Field (20kHz-10MHz)

Date of test	03.12.2019
Test result	PASS (N/A ⁹)
Reference and basic standard	EN 62493
Range of test	20kHz – 10MHz
Type of lighting equipment	LED Luminaire
Tested by	-
Present during the test	-

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
EMI Receiver	Schaffner / SMR 4518	25	29.03.2019
Van der Hoofden Test Head with Protection Network	Schwarzbeck Mess-Elektronik / VDHH 9502	9502-133	22.11.2018
N-Type cable (2m length)	Huber+Suhner / Sucoflex 106	508722/6	21.11.2017
N-Type cable (4m length)	Huber+Suhner / Sucoflex 106	508723/6	21.11.2017
Multimeter	FLUKE / 289	12530234	30.05.2019
Variac 0-270V, 7A	Iskra	003780	-
Pressure meter	Testo / 511	39106014/109	04.06.2019
Temperature and Humidity meter	Greisinger / GMH 3330	DK9301	04.06.2019

Environmental conditions

	Temperature [°C]	Relative humidity [%]	Pressure [mbar]	Test location
Requirement	15-35	-	-	Semi-anechoic Chamber
Measured	-	-	-	

Typical set up of test: The EUT was setup as shown in Fig. 20.1, according to EN 62493 §6.4, Table A.1.

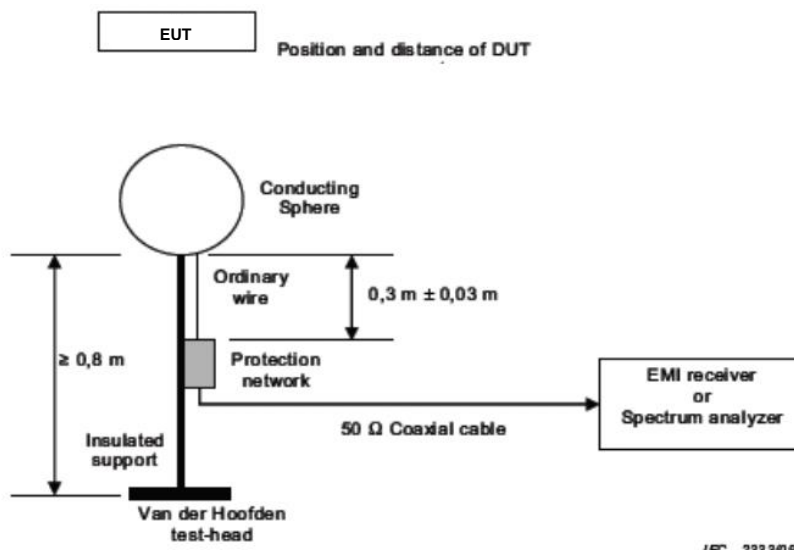


Fig. 20.1: Setup for internal electric field test

Test procedure: According to EN 62493 §6 and Annex E, using TESEQ Compliance 5 Emission, V5.26.43.

Remarks: The EUT is deemed to comply with the requirements of this standard without testing, as it fulfills an inherent-compliance condition according to §4.2.2 and Annex H: it is a LED-light-source technology.

20. Photographs of Equipment Under Test



Rear side of EUT (180°)



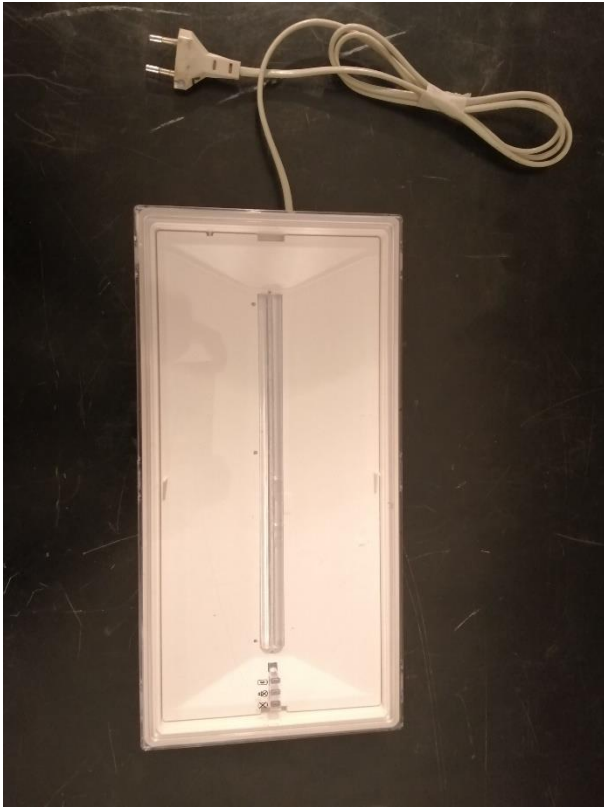
Left side of EUT (90°)



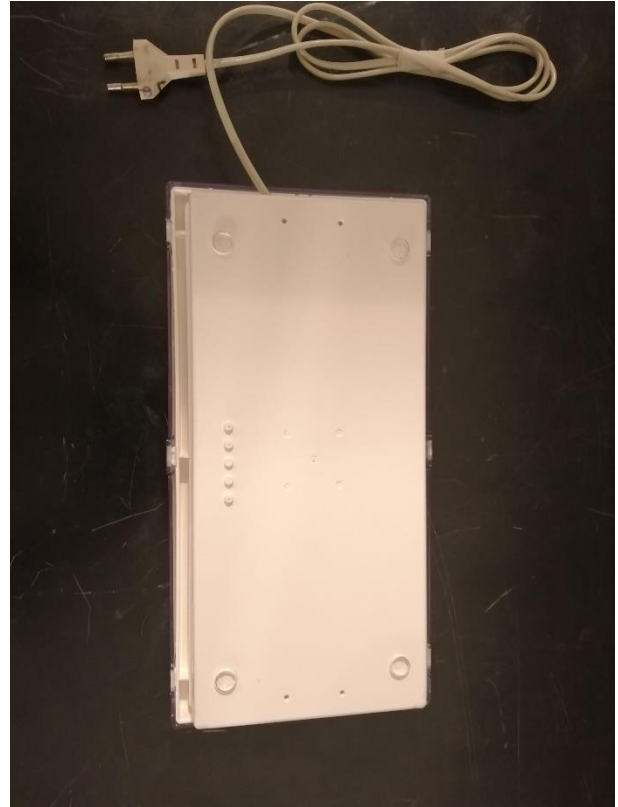
Right side of EUT (270°)



Front side of EUT (0°)



Top of EUT



Bottom of EUT



Label of EUT