



NATIONAL TECHNICAL UNIVERSITY OF ATHENS

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Testing/Calibration
No. of Certificate 490

TEST & MEASUREMENT REPORT

ELECTROMAGNETIC COMPATIBILITY & IMMUNITY

Equipment under Test (EUT)

Photovoltaic Panel

Model

Electromagnetic Spectrum Green Saver

Customer

LABOR S.A. for ELXIS ENERGY LTD.

The present report refers to the electromagnetic compatibility and immunity testing of the EUT “Photovoltaic Panel”, model: “Electromagnetic Spectrum Green Saver” for the company “LABOR S.A. for ELXIS ENERGY LTD.”.

The contents of this test report refer 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.

Athens, 25.02.2020

Approved by



Ioannis F. Gonos
NTUA Associate Professor

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1. Customer

Name	<i>LABOR S.A.</i>
Address	<i>84, Ethnikis Antistasis Str.</i>
City	<i>Pallini, ATTIKI</i>
Zip code	<i>GR-15351</i>
Contact person	<i>Mr. Antonios POLITIS</i>
Telephone	<i>+302106033377</i>
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Web page	<i>www.labor.gr</i>
e-mail	<i>labor@labor.gr</i>

for

Name	<i>ELXIS ENERGY LTD.</i>
Address	<i>55, Boulevard Aleksander Stamboliyski</i>
City	<i>Sofia, Bulgaria</i>
Zip code	<i>P.C. 1000</i>
Contact person	<i>Mr. Kosmas Koskinakis</i>
Telephone	-
Fax	-
Web page	<i>www.elxisenergy.com</i>
e-mail	<i>elxisenergy@gmail.com</i>

2. Description of Equipment Under Test

Equipment Under Test (EUT)	
Description	PHOTOVOLTAIC PANEL
Manufacturer	ELXIS ENERGY LTD.
Trade-mark (model)	Electromagnetic Spectrum Green Saver
Manufacturing name	-
Serial number	-
Highest internal source	-
Firmware version	-
Power Supply (PS)	
Manufacturer	-
Model	-
Serial number	-
Description	-
Internal battery	
Manufacturer	-
Model	-
Serial number	-
Description	-
EMC environment	DOMESTIC (residential, commercial and light industrial)
EUT tested as	TABLE TOP
EUT single or system	SINGLE

Peripheral	-
Manufacturer	-
Model	-
Serial number	-
Description	-

GPRS	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Manufacturer	-
Model	-
Serial number	-
Description	-

Bluetooth or Wi-Fi	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Manufacturer	-
Model	-
Serial number	-
Description	-

2.1 Auxiliary Equipment

Auxiliary equipment 1	Digital Multimeter
Manufacturer	FLUKE
Trade-mark (model)	289
Serial number	12530238
Description	-

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 EUT	Metallic enclosure with plastic surface	-	-	-	-	Yes
2	DC output power	DC power cable with 2-wired contacts	Plug	Unshielded Non-Detachable	~57cm	AE1	No

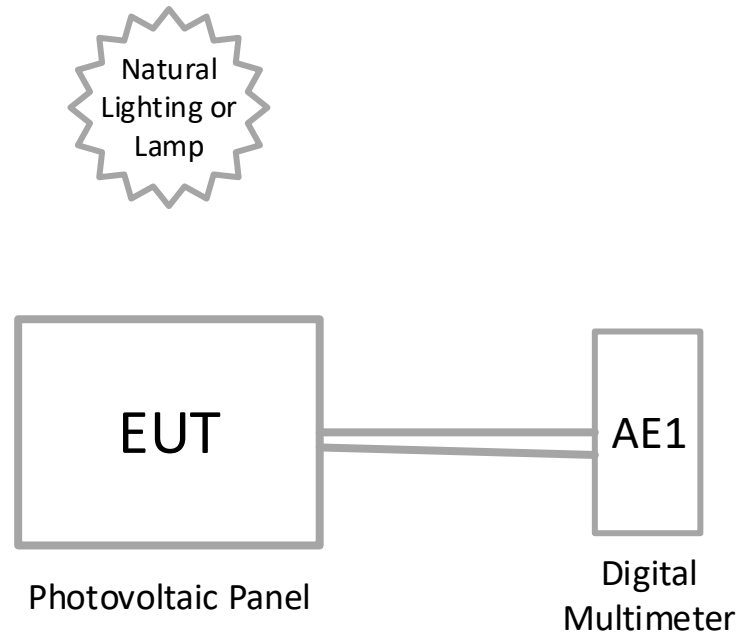
Port type ¹: Enclosure, Power, Display, etc.
Port description ²: AC Power, DC Power, Signal & control, Telecommunication, Antenna, etc.
Connector type ³: Plug, RJ45, RJ11, RS232, USB, Parallel, RCA jack, Jack, etc.
Cable type description ⁴: Detachable / Non detachable, Shielded / Unshielded.
Cable length 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	03.02.2020
Beginning date of tests	20.02.2020
Ending date of tests	25.02.2020

Remarks:

2.4 Setup - Configuration of EUT



The test setup used was chosen by the manufacturer. The Photovoltaic Panel was illuminated either by natural lighting inside the HV-Lab or by lamps inside the anechoic with a DC output value of $\sim 3V_{DC}$.

3. Product and Test Standards

PRODUCT STANDARDS

In the following Tables and throughout the test report, the current valid versions of the applicable Product and Test Standards are stated. Editions and dates presented with an asterisk ("*") are the currently harmonized standard versions. In cases of controversy between editions of a standard regarding the measurement limits/methods/setup, the version required by the product standard or the harmonized standard version prevails.

Standard	Title
ELOT EN 55032 E2: 2015 ¹ <i>(EN 55032:2012 +AC:2013*)</i>	Electromagnetic compatibility of multimedia equipment - Emission Requirements
ELOT EN 55024 E2: 2010 + A1: 2015 ¹	Information technology equipment – Immunity characteristics – Limits and methods of measurement
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

¹: **The application of these Product Standards was requested by the customer.**

TEST 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

4. Summary of Test Results

EMMISSIONS TESTS

Standard	Description of Test	Frequency range	Port	Class	Result
EN 55032	Conducted emissions	0.15-30 MHz	DC input power	B	N/A ⁴
EN 55032	Conducted emissions	0.15-30 MHz	Wired Network Port	B	N/A ²
EN 55032	Radiated emissions	30-1000 MHz	Enclosure	B	Pass
EN 55032	Radiated emissions	1-6GHz	Enclosure	B	N/A ¹
EN 61000-3-2	Harmonics current emissions	0-2kHz	AC input power	A	N/A ²
EN 61000-3-3	Voltage fluctuations	-	AC input power	-	N/A ²

IMMUNITY TESTS

Standard	Description of test	Port	Level	Criterion	Result
EN 61000-4-2	Electrostatic discharge	Enclosure	±4kV contact	B	Pass (A)
			±8kV air	B	Pass (A)
EN 61000-4-3	RF radiated field up to 1GHz	Enclosure	3V/m	A	Pass (A)
EN 61000-4-3	RF radiated field 1GHz – 6GHz	Enclosure	3V/m	A	N/A ¹
EN 61000-4-4	Burst	DC input power	-	-	N/A ¹
EN 61000-4-4	Burst	Signal & telecom.	±0.5kV	B	N/A ²
EN 61000-4-5	Surge	DC input power	-	-	N/A ¹
EN 61000-4-5	Surge	Signal & telecom.	±1kV/±4kV	C	N/A ²
EN 61000-4-6	RF conducted field	DC input power	-	-	N/A ¹
EN 61000-4-6	RF conducted field	Signal & telecom.	0.15-80MHz 3V	A	N/A ²
EN 61000-4-8	Power frequency magnetic fields	Enclosure	1A/m	A	N/A ⁸
EN 61000-4-11	Voltage dips and interruptions	DC input power	-	-	N/A ¹

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 ≤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 does not contain devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors, etc.

N/A⁹: Test not applicable because port may not connect directly to outdoor cables.

N/A¹⁰: EUT not tested because it has indoor cables with length less than 30 m.

N/A¹¹: EUT not tested because not required by used standard as EUT is Class II.

5. Performance Criteria and Classification

5.1 Performance criteria for immunity test

Performance criteria for immunity test according to EN 55024 §7 are:

The manufacturer has the obligation to express the performance criteria in terms which relate to the performance of his specific product when used as intended. The following performance criteria are applicable, and shall only be evaluated when the functions referred to are implemented. Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

- essential operational modes and states;
- tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
- quality of software execution;
- quality of data display and transmission;
- quality of speech transmission.

Performance criterion A

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion B

After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion C

During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

5.2 Classification of equipment under test

Classification of EUT according to EN 55032 §4:

Class A equipment is equipment which meets the requirements given in Table A.2, Table A.3, Table A.9 and Table A.11 using the limitations defined in Table A.1 and Table A.8.

Class B equipment is equipment which meets the requirements given in Table A.4, Table A.5, Table A.6, Table A.7, Table A.10, Table A.12 and Table A.13 using the limitations defined in Table A.1 and Table A.8.

The Class B requirements for equipment are intended to offer adequate protection to broadcast services within the residential environment.

Equipment intended primarily for use in a residential environment shall meet the Class B limits. All other equipment shall comply with the Class A limits.

Broadcast receiver equipment is class B equipment.

NOTE Equipment meeting Class A requirements may not offer adequate protection to broadcast services within a residential environment.

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:

- 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.

6. 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%.

6.1 Measurement uncertainty of tests

Test	Measurement Uncertainty (U_{lab})	Measurement Uncertainty (U_{cispr})
Radiated Emissions (30MHz – 1GHz)	± 5 dB	± 6.3 dB

6.2 Compliance assessment

Radiated Emissions tests

According to §4.2 of EN55016-4-2:2011/A2:2018, if U_{lab} is less than or equal to U_{cispr} , then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

7. 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 55032) and radiated immunity (EN 61000-4-3) tests. The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m Ø.
- Control room with dimensions 3,2m × 2,5m × 3,3m.
- HV lab area: It is used for current harmonics (EN 61000-3-2), voltage fluctuations (EN61000-3-3), electrostatic discharge (EN 61000-4-2) bursts (EN 61000-4-4), surges (EN 61000-4-5), magnetic fields (EN 61000-4-8), voltage dips (EN 61000-4-11) and safety (EN 60950-1) tests.

8. Radiated Emissions (Below 1GHz)

Date of test	20.02.2020
Test result	PASS
Test and Product Standards	EN 55032
Range of test	30MHz – 1GHz
Classification	Class B
Distance	3m
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	-

Radiated emission limits for measuring distance 3m

Frequency range	Limit Quasi-peak dB(μ V/m)	
	Class A	Class B
30 MHz to 230 MHz	50	40
230 MHz to 1 GHz	57	47

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	514594/6	05.11.2019
N-Type cable (4m length)	Huber+Suhner / Sucoflex 106	514595/6	05.11.2019
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	-	-	-	Semi-anechoic Chamber
Measured	22.5 \pm 0.5	40.5 \pm 0.5	986	Chamber

Typical set up of the test

The EUT was setup as shown in Fig. 8.1 and Photo 8.1 according to EN 55032 Annex D (Fig. D.1).

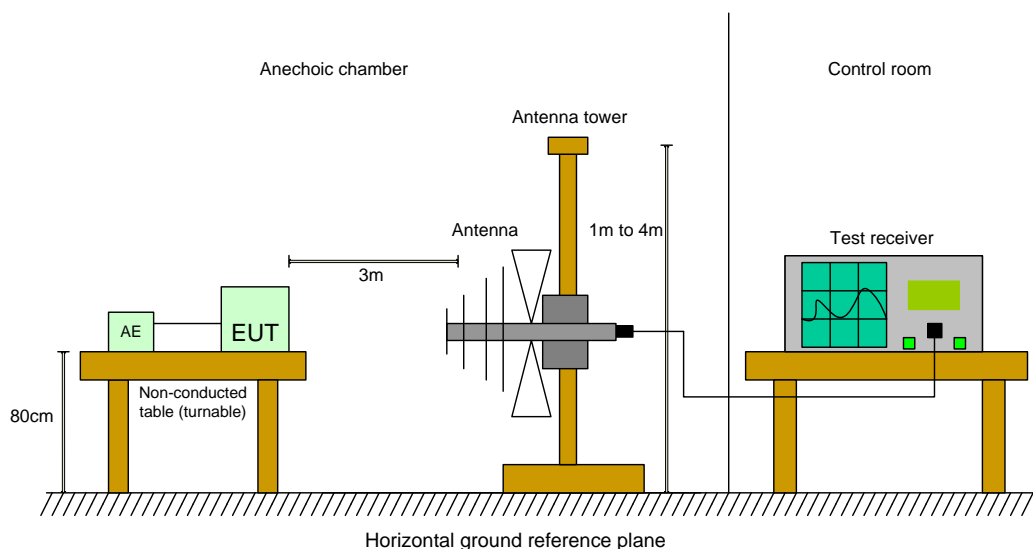


Fig. 8.1: Setup for radiated emissions test (30MHz-1GHz)



Photo 8.1: Setup for radiated emissions test (30MHz-1GHz)

Test procedure: According to EN 55032 Annex C.3.4 (Table A1.1, Table A.4). The variation of the antenna height was between 1.00m and 2.20m.

Operating Mode: The EUT was in normal operating mode during the test (DC Output= $\sim 3V_{DC}$).

Analytical Results

Antenna polarization	Angle [°]	Height [m]	Quasi-Peak		Results
			Figure	Table	
Horizontal	0	1.00-2.20	8.2	8.1	Pass
Vertical	0	1.00-2.20			Pass
Horizontal	90	1.00-2.20	8.3	8.2	Pass
Vertical	90	1.00-2.20			Pass
Horizontal	180	1.00-2.20	8.4	8.3	Pass
Vertical	180	1.00-2.20			Pass
Horizontal	270	1.00-2.20	8.5	8.4	Pass
Vertical	270	1.00-2.20			Pass

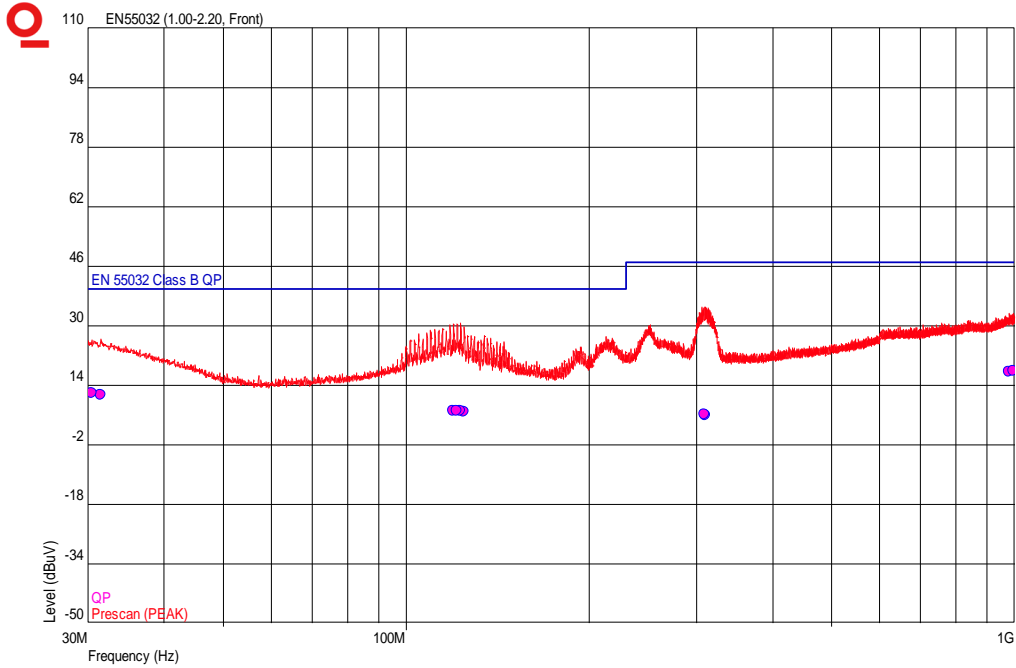


Fig. 8.2: Results for front side (0°), frequency range: 30MHz-1GHz.

Frequency [MHz]	Height [m]	Antenna Polarization	Limit [dBµV/m]	Level [dBµV/m]	Detector
30.42	2.20	Vertical	40.00	11.86	QP
31.5	2.20	Horizontal	40.00	11.41	QP
119.64	1.30	Horizontal	40.00	7.10	QP
121.2	1.30	Horizontal	40.00	7.12	QP
122.82	1.30	Horizontal	40.00	7.10	QP
124.56	1.30	Horizontal	40.00	7.05	QP
309.18	1.00	Horizontal	47.00	6.12	QP
309.9	1.00	Horizontal	47.00	6.12	QP
978.24	1.00	Horizontal	47.00	17.71	QP
995.82	1.90	Horizontal	47.00	18.01	QP

Table 8.1: Results for front side (0°), frequency range: 30MHz-1GHz.

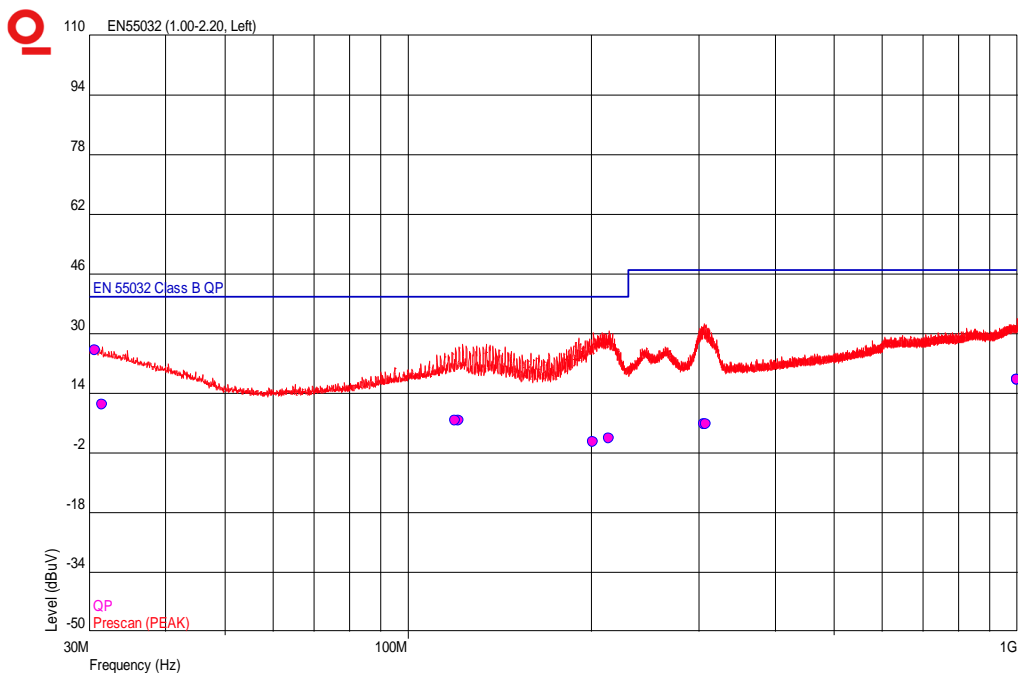


Fig. 8.3: Results for left side (90°), frequency range: 30MHz-1GHz.

Frequency [MHz]	Height [m]	Antenna Polarization	Limit [dB μ V/m]	Level [dB μ V/m]	Detector
30.66	1.30	Vertical	40.00	25.63	QP
31.5	1.30	Horizontal	40.00	11.08	QP
119.4	2.20	Horizontal	40.00	6.70	QP
121.26	2.20	Horizontal	40.00	6.75	QP
201.42	2.20	Horizontal	40.00	1.05	QP
213.54	2.20	Horizontal	40.00	2.03	QP
305.58	2.20	Horizontal	47.00	5.65	QP
307.62	2.20	Horizontal	47.00	5.73	QP
997.38	2.20	Horizontal	47.00	17.64	QP
998.82	1.00	Horizontal	47.00	17.67	QP

Table 8.2: Results for left side (90°), frequency range: 30MHz-1GHz.

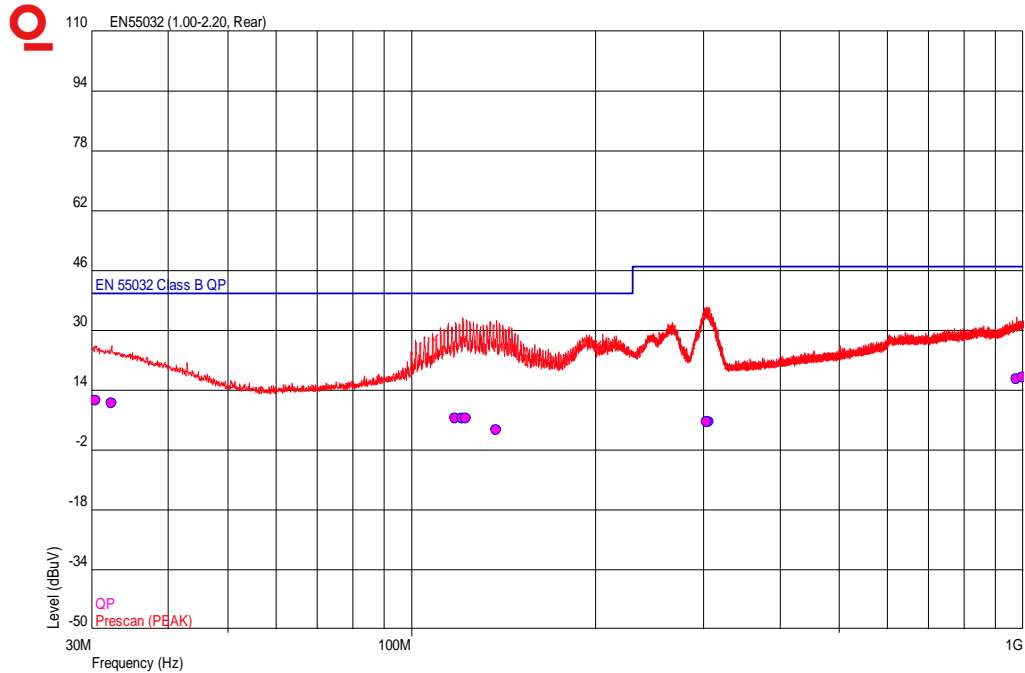


Fig. 8.4: Results for rear side (180°), frequency range: 30MHz-1GHz.

Frequency [MHz]	Height [m]	Antenna Polarization	Limit [dB μ V/m]	Level [dB μ V/m]	Detector
30.48	1.30	Vertical	40.00	11.28	QP
32.34	1.00	Horizontal	40.00	10.52	QP
117.9	1.30	Horizontal	40.00	6.37	QP
121.26	1.60	Horizontal	40.00	6.59	QP
122.82	1.60	Horizontal	40.00	6.57	QP
137.64	1.60	Horizontal	40.00	3.42	QP
304.14	1.00	Horizontal	47.00	5.45	QP
306.24	1.00	Horizontal	47.00	5.49	QP
973.98	1.30	Horizontal	47.00	17.07	QP
997.38	1.00	Vertical	47.00	17.44	QP

Table 8.3: Results for rear side (180°), frequency range: 30MHz-1GHz.

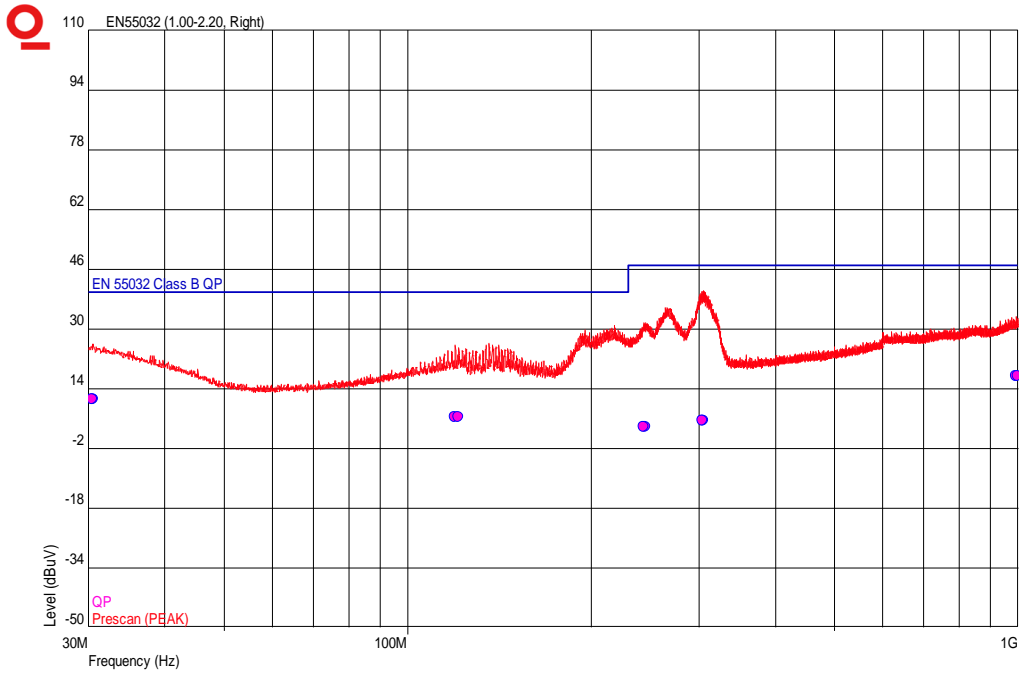


Fig. 8.5: Results for right side (270°), frequency range: 30MHz-1GHz.

Frequency [MHz]	Height [m]	Antenna Polarization	Limit [dB μ V/m]	Level [dB μ V/m]	Detector
30.42	2.20	Vertical	40.00	11.31	QP
30.54	1.00	Horizontal	40.00	11.18	QP
119.58	1.60	Horizontal	40.00	6.52	QP
121.14	1.90	Horizontal	40.00	6.55	QP
243.84	1.00	Horizontal	47.00	3.74	QP
245.04	1.00	Horizontal	47.00	3.79	QP
304.44	1.00	Horizontal	47.00	5.43	QP
305.1	1.00	Horizontal	47.00	5.41	QP
991.98	2.20	Horizontal	47.00	17.36	QP
999.0	1.60	Vertical	47.00	17.44	QP

Table 8.4: Results for right side (270°), frequency range: 30MHz-1GHz.

Remarks: The EUT was within the radiated emissions limits specified by EN 55032.

9. Immunity to Electrostatic Discharge

Date of test	25.02.2020
Test result	PASS (A/A)
Test and Product Standards	EN 61000-4-2, EN 55024
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 55024 Table 1)
Tested by	Mr. Christos-Christodoulos A. KOKALIS, Dipl. El. Eng.
Present during the test	-

Test equipment list

EQUIPMENT	MANUFACTURER / MODEL	S.N.	CALIBRATION
Electrostatic Generator	Schaffner / NSG 438	273	02.01.2020
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	20	40.5 \pm 0.5	993	

Typical set up of the test

The EUT was setup as shown in Fig. 9.1 and Photo 9.1, according to EN 61000-4-2 §7.

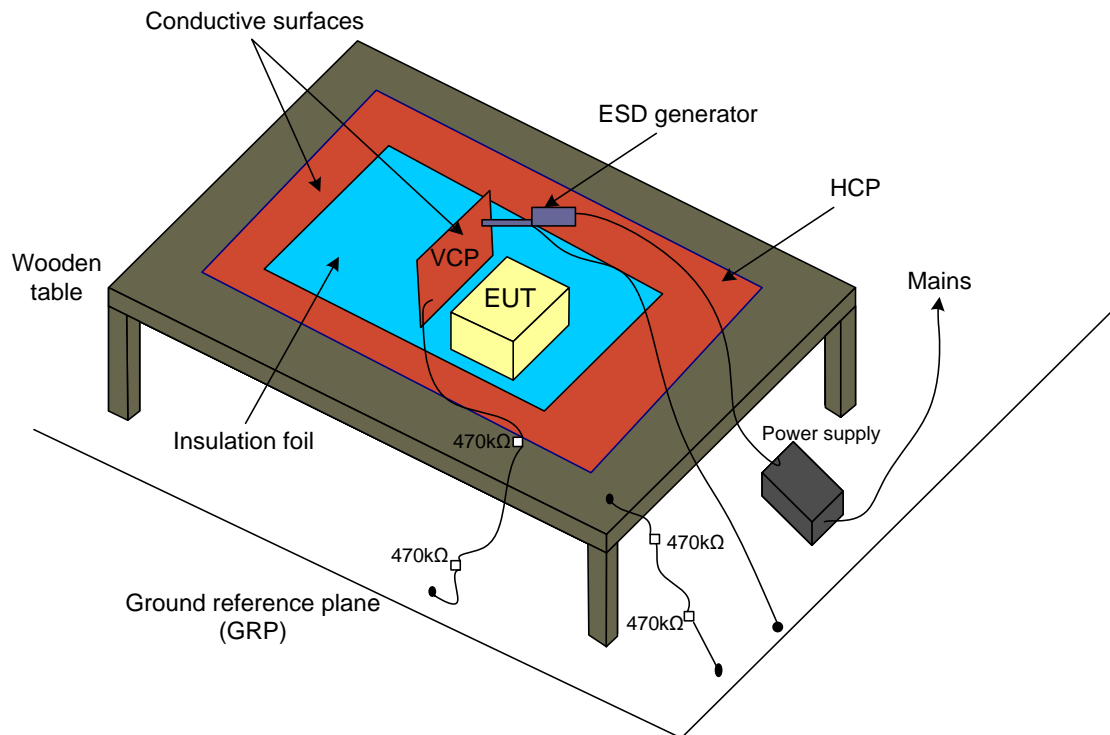


Fig. 9.1: Setup for electrostatic discharge test



Photo 9.1: Setup for electrostatic discharge test

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

Operating Mode: The EUT was in normal operating mode during the test (DC Output= $\sim 3V_{DC}$). There was visual control of EUT.

Analytical Results

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

Contact discharges

Point		Voltage (kV)								Remarks
		+2	-2	+4	-4	+6	-6	+8	-8	
Horizontal Coupling plane	G	N/A	N/A	A	A	N/A	N/A	N/A	N/A	Pass (A)
Vertical Coupling plane	G	N/A	N/A	A	A	N/A	N/A	N/A	N/A	Pass (A)
(4) screws on metallic enclosure	U	N/A	N/A	A	A	N/A	N/A	N/A	N/A	Pass (A)
Metallic enclosure	U	N/A	N/A	A	A	N/A	N/A	N/A	N/A	Pass (A)
DC output plug	U	N/A	N/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 surface	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 55024 and EN 61000-4-2.

10. Immunity to RF Electromagnetic Radiated Field (Below 1GHz)

Date of test	24.02.2020
Test result	PASS (A)
Test and Product Standards	EN 61000-4-3, EN 55024
Test Level	2
Test Specification	3V/m, Modulated, 80MHz-1GHz, 80%AM, Step=1%, Dwell time=3sec
Acceptance Criterion	A (EN 55024, Table 1)
Tested by	Mr. Panagiotis K. PAPASTAMATIS, Dipl. El. Eng.
Present during the test	-

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	06.03.2018
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	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	-	-	-	Semi-anechoic Chamber
Measured	21.5±0.5	36.5±1.5	990.5±0.5	Chamber

Typical set up of the test

The EUT was setup as shown in Fig. 10.1 and Photo 10.1, according to EN 61000-4-3 §7.

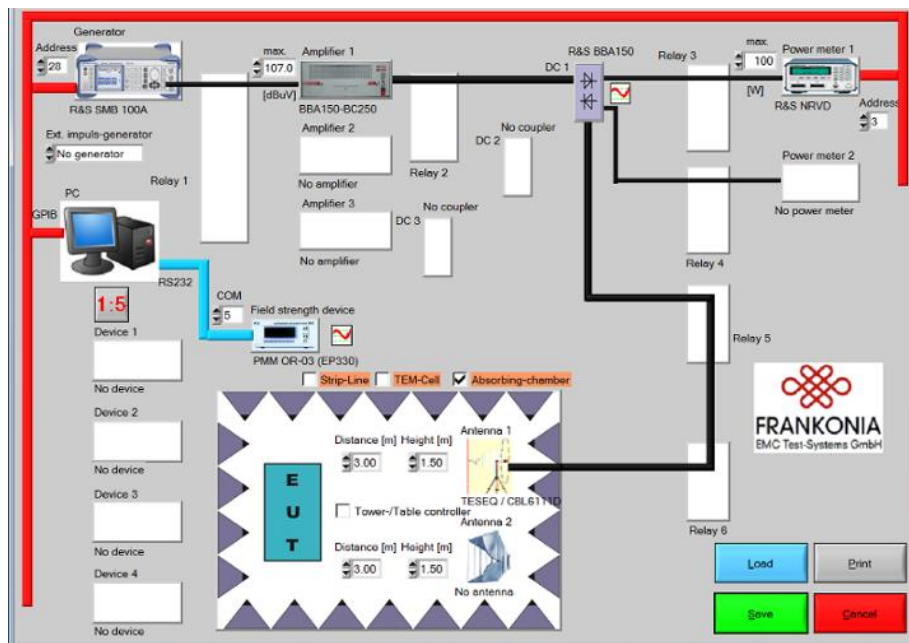


Fig. 10.1: Setup for RF electromagnetic field test (80MHz-1GHz)



Photo 10.1: Setup for RF electromagnetic field test (80MHz-1GHz)

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. 10.2.

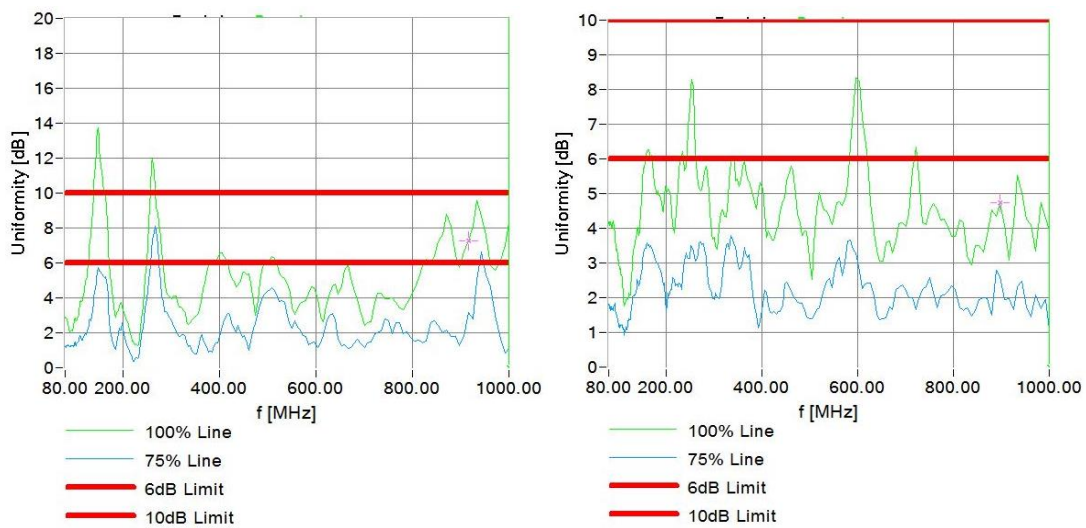


Fig. 10.2: Uniformity for Horizontal (left) and Vertical (right) polarization of antenna (80MHz-1GHz)

Operating Mode: The EUT was in normal operating mode during the test (DC Output= $\sim 3V_{DC}$). There was visual monitoring of the EUT via a video camera system.

Analytical Results

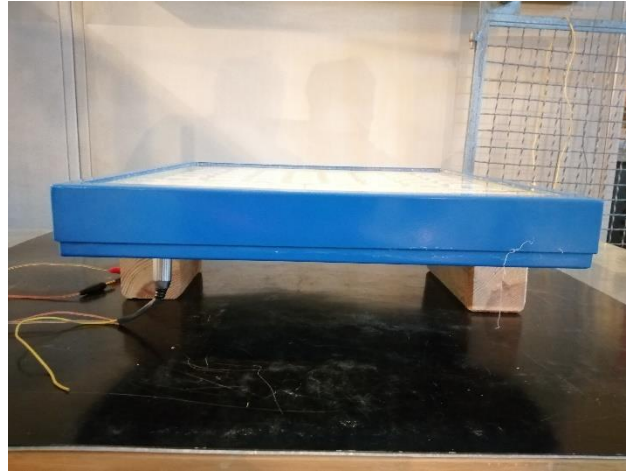
Frequency [MHz]	Modulation 1kHz, 80% AM	Level [V/m]	Distance [m]	Antenna Polarization	Side of EUT	Remarks
80-1000	Yes	3	3	Horizontal	Front	Pass (A)
80-1000	Yes	3	3	Vertical	Front	Pass (A)
80-1000	Yes	3	3	Horizontal	Left	Pass (A)
80-1000	Yes	3	3	Vertical	Left	Pass (A)
80-1000	Yes	3	3	Horizontal	Rear	Pass (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 55024 and EN 61000-4-3.

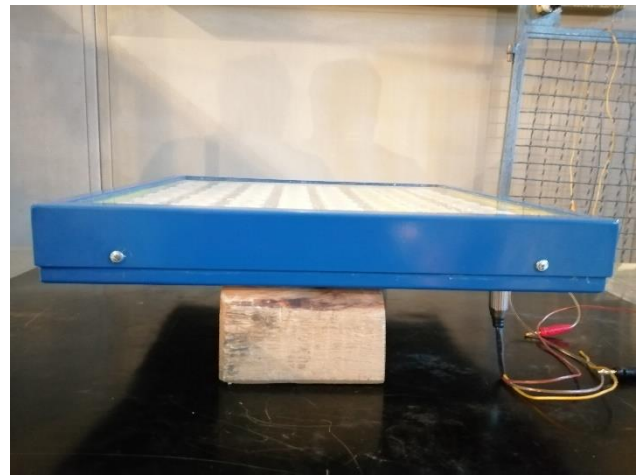
11. Photographs of Equipment Under Test



Rear side (180°)



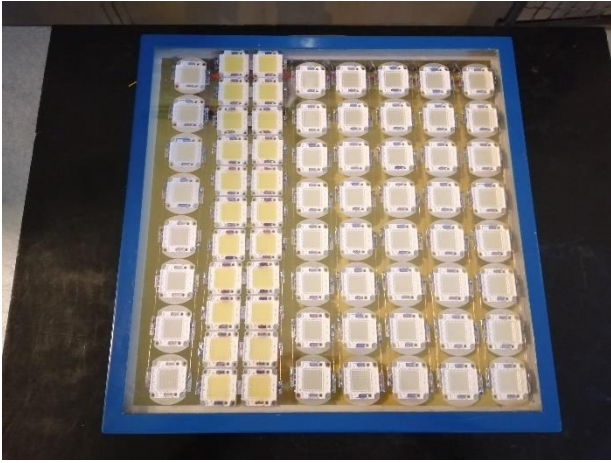
Left side (90°)



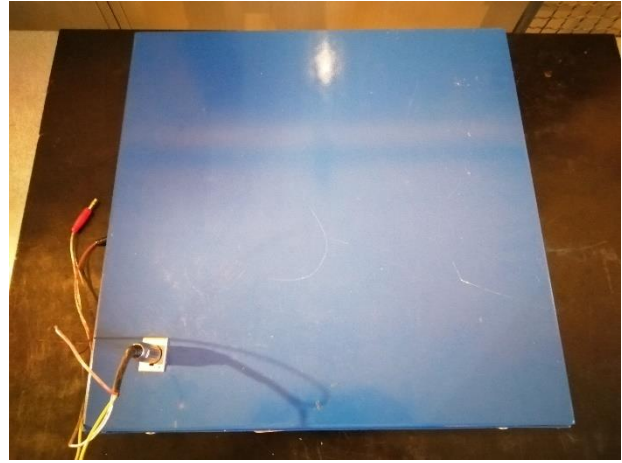
Right side (270°)



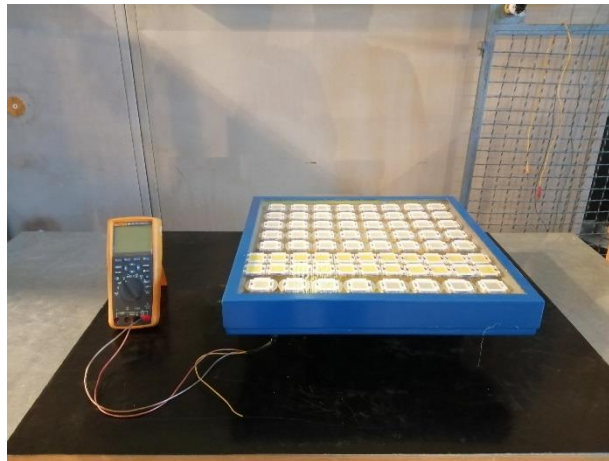
Front side (0°)



Top of EUT



Bottom of EUT



View of test setup (EUT + AE1)