


EMS TEST REPORT

BelGISS Testing Center

№ 2018-263
EMC
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Product	LED luminaire
Name and address of the applicant	Ecocity S.R.L., 11, Mircha cel Batrin str., 2012, Chisinau, Moldova
Name and address of the Manufacturer	Ecocity S.R.L., 11, Mircha cel Batrin str., 2012, Chisinau, Moldova
Model / type	Pro - Street Quasar S SiO 80 C
Rating power	110 – 250 V~; 50-60 Hz; Rated power 80 W.
Brand names	 EcoCity
Serial №	---
EuT received	2018-06-22 No. 15348
Additional information	---

Applied Standards:

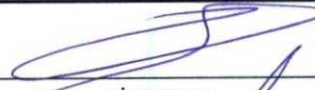

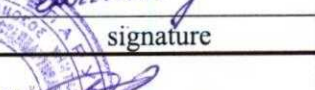
Product- or Generic Standards	Basic Standards
EN 55015:2013; EN 61547:2009; EN 61000-3-2:2014; EN 61000-3-3:2013.	EN 61000-4-2:2009; EN 61000-4-3:2006+A1:2008+A2:2010+IS1:2009+A1:2008; EN 61000-4-4:2012; EN 61000-4-5:2014; EN 61000-4-6:2014; EN 61000-4-11:2004.

Test result: PASSED

Tested in period 2018-07-04 – 2018-07-13
Issue date 2018-07-13

Revision _____ Copy № 3

Name of the testing laboratory		Accredited Test Laboratory BELGISS
Accreditation of the testing laboratory	 № BY/112 02.1.0.0085 from 1995-09-01	Accreditation is valid until 2019-12-01

Tested by	First rank engineer	MuraYOU A.A.	2018-07-13	
				signature
Verified by	Chief of the laboratory of Testing Centre BelGISS	Grinko V.V.	2018-07-13	
				signature
Authorized by	Deputy head of Testing Centre BelGISS	Vasileuski D.V.	2018-07-13	
				signature

Possible test case verdicts:

- test case does not apply to the test object: N.A. (Not applicable)
- test case meet the requirement: P(ass)
- test case does not meet the requirement: F(ail)

The test results presented in this report relate only to the object tested.

This report shall not reproduce except in full without approval of the head test centre BelGISS.

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1 Description of Equipment under Test (EuT)

Description of the EUT:

Type of EUTs:	LED luminaire
Model and/or type reference:	Pro - Street Quasar S SiO 80 C

Technical Data:

Rated voltage:	110 – 250 V ~	Protection class:	I
Rated current:	---	Maximum current:	---
Rated power:	80 W	Maximum power consumption:	---
Number of phases:	one	Rated frequency:	50-60 Hz

The classification of the EUT:

Production classification:	Electric domestic appliances
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Ports:

a) Power Input AC:

Designation/description	Voltage	Current	Type of shielding	Power
Mains	180 – 265 V ~	---	Unshielded	---

b) Load Terminals AC:

Designation/description	Voltage	Current	Type of shielding	Power
---	---	---	---	---

c) Power Input DC:

Designation/description	Voltage	Current	Type of shielding	Power
---	---	---	---	---

d) Load Terminals DC:

Designation/description	Voltage	Current	Type of shielding	Power
---	---	---	---	---

e) Additional Terminals:

Designation/description	Specified length	Type of shielding
---	---	---

Disturbance Sources/EMC-Measure:

Disturbance sources:	Electronic components.
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Operational modes investigated:

Working mode	Description
№ 1	Continuous operation in lighting mode

Support Equipment:

Device	Identification/Short description
---	---

Photos: see Appendix 1 on page 30.

2 Failure criteria for Immunity testing:

Performance criteria for Immunity testing to the EN 61547:2009.

Performance criteria	Description
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.
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.
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.

3 Summary of Immunity Test Result according to EN 61547:2009.

Results of the individual Tests:

Section of the Generic Standard	Test Parameters and severity Levels	Applied Basic Standard	Protocol Pages	Failure Criteria		Results					
				Standard	EUT						
Electrostatic discharge	Contact discharge: 4 kV Test voltage	EN 61000-4-2	5	B	A	Pass					
	Air discharge: 8 kV Test voltage			B	A	Pass					
Radio-frequency electromagnetic fields	80 MHz to 1 000 MHz 3 V/m (unmodulated) 1 kHz, 80 % AM, sine wave	EN 61000-4-3	7	A	A	Pass					
Power frequency magnetic fields	Field frequency 50/60 Hz Test level 3 A/m	EN 61000-4-8	9	A	-----	N.A. (note 1)					
Fast transients (Burst)	5/50 ns T_r/T_d 5 kHz rep. freq. ± 1 kV peak	EN 61000-4-4	10	B	A	Pass					
			-----	B	-----	N.A.					
			-----	B	-----	N.A.					
			-----	B	-----	N.A.					
			-----	B	-----	N.A.					
Surge Pulse	1,2/50 (8/20) T_r/T_d μ s line-to-line: ± 1 kV line-to-earth: ± 2 kV	EN 61000-4-5	13	C	A	Pass					
			13	C	A	Pass					
Injected RF currents	0,15 – 230 MHz 80% AM @ 1 kHz 150 Ω source impedance	EN 61000-4-6	11	A	A	Pass					
			-----	A	-----	N.A.					
			-----	A	-----	N.A.					
			-----	A	-----	N.A.					
			-----	A	-----	N.A.					
Voltage dips and interruptions	Residual % Unom.	EN 61000-4-11	periods								
							0 %:	0,5	B	B	Pass
							70 %:	10	C	B	Pass

1) Equipment doesn't contain components susceptible to magnetic fields, such as Hall elements or magnetic field sensors.

Result: PASS

3.1 Electrostatic Discharge according to EN 61000-4-2:2009.

Information concerning the test:

Tested by:	Murauyou A.A.	Ambient temperature:	21,2 °C
Test date:	2018-07-04	Rel. humidity:	45,6 %
		Atmospheric pressure:	99,4 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-4-2

Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.

Test set-up

A ground reference plane is located on the floor, and connected to earth via a low impedance connection. The return cable of the EFT generator is connected to the reference plane.

EuT is placed on a wooden table 10 cm above the reference plane, and all cables attached to the EuT is isolated the same way.

A vertical coupling plane (VCP) of 50x50 cm is placed 10 cm from the EuT's exterior. This VCP is connected to the reference plane via a cable with two 470 kΩ resistors located one in each end of the cable.

Procedure

The test was done by applying contact and air discharge to the EuT itself, and contact discharge to the HCP and VCP. When applying the discharges to VCP the tip of the generator was located at middle edge of the VCP. VCP was located 10 cm from each side of the EuT.

Contact discharges of ± 4 kV were applied to the various points of the EuT at conductive surfaces, and to the HCP and VCP. Air discharges of ± 8 kV were applied to the various points of the EuT at non-conductive surfaces.

Test results can be found in the following pages.

Record:

See page: 6

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
308	ESD-Generator	EMC Partner	ESD 3000	2018-12-15
---	VCP (0,5m x 0,5m)	Made in Belarus	---	---
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Соча 004	2018-10-02

Test modes: 1.

Contact discharges

Points of Discharging	Polarity	Number	Discharge Voltage [kV]	Performance Criteria	Result	Remark
VCP (0,5m x 0,5m)	positive	40	4.0	B	Criteria A fulfilled	
	negative	40	4.0	B	Criteria A fulfilled	
HCP (2,0m x 1,0m)	positive	40	4.0	B	Criteria A fulfilled	
	negative	40	4.0	B	Criteria A fulfilled	
Enclosure front side	positive	20	4.0	B	Criteria A fulfilled	
	negative	20	4.0	B	Criteria A fulfilled	
Enclosure top side	positive	20	4.0	B	Criteria A fulfilled	
	negative	20	4.0	B	Criteria A fulfilled	
Enclosure left side	positive	20	4.0	B	Criteria A fulfilled	
	negative	20	4.0	B	Criteria A fulfilled	
Enclosure right side	positive	20	4.0	B	Criteria A fulfilled	
	negative	20	4.0	B	Criteria A fulfilled	
Enclosure rear side	positive	20	4.0	B	Criteria A fulfilled	
	negative	20	4.0	B	Criteria A fulfilled	

Air discharges

Points of Discharging	Polarity	Number	Discharge Voltage [kV]	Criteria	Result	Remark
Non-conductive surfaces	positive	50	8.0	B	Criteria A fulfilled	
	negative	50	8.0	B	Criteria A fulfilled	

Result: PASSED

3.2 Radio-frequency electromagnetic fields to EN 61000-4-3:2006+A1:2008+A2:2010+IS: 2009.

Information concerning the test:

Tested by:	Murauyou A.A.	Ambient temperature:	23,4 °C
Test date:	2018-07-04	Rel. humidity:	45,6 %
		Atmospheric pressure:	99,4 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-4-3 Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test.

Test set-up

Tests were carried out in a semi anechoic chamber.

EUT is not bulky, and according to p.7.2 EN 61000-4-3 was taken on a wooden table height of 0.8 meters.

Wiring between the EUT and auxiliary equipment as follows :

- the manufacturer's specified wiring types and connectors was used;
- length of cables to auxiliary equipment 3 meters;
- wires was arranged parallel to the uniform area of the field to minimize immunity.

Procedure

The EuT is exposed to a RF electromagnetic field generated by one log-periodic antenna. The field is applied with the antennas facing each of the four faces of the EuT (0°, 90°, 180°, 270°). The polarization of the field requires testing each side of the EuT twice, once with the antenna horizontally and again with the antenna vertically. The antenna height during test is 150 cm. A field level and type as specified below is applied in the defined frequency range. The frequency is swept through the range with a step width and a dwell time per frequency as specified below. Performance is evaluated them according to the defined performance criteria.

Test results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
MY47420048	Signal Generator	Agilent	N5181A	2019-04-05
325513	RF Amplifier	Amplifier Research	250W1000A	---
1007	RF Amplifier	OPHIR	5263FE	---
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02
00060032	Log-periodic antenna	ETS Lindgren	3142C	2019-04-02
117161	Tape-measure	---	P-10	2018-11-30
r. 208	Semi anechoic chamber	Made in Belarus	---	2019-02-20
---	Rotation platform	Made in Belarus	---	---
---	Antenna control device	Made in Belarus	---	---

Record:

See page: 8

TEST PARAMETERS

Port: Enclosure
Basic Standard: EN 61000-4-3
Frequency range: 80 – 1000 MHz
Frequency Step: 1,0 %
Test Level: 3 V/m

Performance Criteria: A
Dwell time: 3 sec
Modulation: 80 % AM @ 1 kHz

TEST RESULTS

Frequency range	Frequency step	Dwell time	EUT position	Test level	Antenna polarization	Criteria	Result
80 – 1000 MHz	1,0 %	3 sec	0°	3 V/m	Vertical	A	Criteria A fulfilled
		3 sec	90°	3 V/m	Vertical	A	Criteria A fulfilled
		3 sec	180°	3 V/m	Vertical	A	Criteria A fulfilled
		3 sec	270°	3 V/m	Vertical	A	Criteria A fulfilled
		3 sec	0°	3 V/m	Horizontal	A	Criteria A fulfilled
		3 sec	90°	3 V/m	Horizontal	A	Criteria A fulfilled
		3 sec	180°	3 V/m	Horizontal	A	Criteria A fulfilled
		3 sec	270°	3 V/m	Horizontal	A	Criteria A fulfilled

Result: PASSED

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3.3 Power frequency magnetic fields to EN 61000-4-8:2010.

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	21,2 °C
Test date:	2018-07-04	Rel. humidity:	45,6 %
		Atmospheric pressure:	99,4 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-4-8:2010

Electromagnetic compatibility (EMC) -Part 4-8: Testing and measurement techniques -Power frequency magnetic field immunity test

Result: N.A. (Equipment doesn't contain components susceptible to magnetic fields, such as Hall elements or magnetic field sensors).

3.4 Fast Transient/Burst according to EN 61000-4-4:2012.

Information concerning the test:

Tested by:	Murayou A.A.	Ambient temperature:	23,2 °C
Test date:	2018-07-05	Rel. humidity:	46,7 %
		Atmospheric pressure:	99,9 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-4-4

Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test.

Test set-up

A ground reference plane is located on the floor, and connected to earth via a low impedance connection. The burst generator reference ground is connected to the reference plane. EuT is placed on a wooden table 10 cm above the reference plane, and all cables attached to the EuT is isolated the same way.

Procedure

The Burst were applied simultaneously between a ground reference plane and all of the power supply terminals.

Test results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
1125	Noise generator	EMC Partner	TRA2000	2019-06-30
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Burst parameters:

Tr/Th, Repetition rate: 5/50 ns, 5 kHz
Burst-duration and -period: $T_D = 15$ ms, $T_r = 300$ ms

Record:

Terminal	Operation Mode	Test Voltage [V]	Polarity	Coupling	Duration [min]	Required Criteria	Result
Mains	Test Mode: 1	1000	+	L1+N+PE	2	B	Criterion A fulfilled
Mains	Test Mode: 1	1000	-	L1+N+PE	2	B	Criterion A fulfilled

Result: PASSED

3.5 Conductive disturbances, inducted by radio-frequency fields according to EN 61000-4-6:2014

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	22,6 °C
Test date:	2018-07-05	Rel. humidity:	46,4 %
		Atmospheric pressure:	99,9 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

Test Procedure:

Method

EN 61000-4-6

Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields”.

Test set-up

EUT is positioned on a 0,1 m wooden support on 2*1 m metallic ground reference plane. The unwanted signal is then inducted successively into mains supply terminals. The performance is evaluated them according to the defined performance criteria.

Procedure

The unwanted signal is then inducted successively into electromagnetic clamp. Cable for mains is isolated from the reference ground plane by a 5 cm isolating support. A signal level/type as specified below is applied in the defined frequency range. The frequency is swept through the range with a step width and a dwell time per frequency as specified below.

Test results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
MY47420048	Signal Generator	Agilent	N5181A	2019-04-05
325513	RF Amplifier	Amplifier Research	100A400	N.A.
101133	Electromagnetic clamp	“Fischer Custom Communications Inc.”	F-2031-23	2019-01-11
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Record:

See page: 12

3.6 Surge Pulse according to EN 61000-4-5:2014

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	22,7 °C
Test date:	2018-07-05	Rel. humidity:	45,9 %
		Atmospheric pressure:	99,9 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-4-5

Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test.

Test set-up

A ground reference plane is located on the floor, and connected to earth via a low impedance connection. The surge-generator and coupling/decoupling network reference ground is connected to the ground reference plane. EuT is placed on a wooden table 10 cm above the reference plane, and all cables attached to the EuT is isolated the same way.

Procedure

The surge test was applicable to AC mains (between each phase and ground and between the phases). Test results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
1125	Noise generator	EMC Partner	TRA2000	2019-06-30
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Surge parameters:

Tr/Th: 1,2/50 (8/20) μ s
Repetition rate: 1 pulse per minute

Record:

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Terminal	Operation Mode	Test Voltage [V]	Polarity	Coupling	Phase	Number of Impulses	Required Criteria	Comments/Remarks
Line-to-line								
Mains	Test mode: 1	1000	-	L1-N	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	+	L1-N	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	-	L1-N	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	+	L1-N	270 °	5	C	Criterion A fulfilled.
Line-to-earth								
Mains	Test mode: 1	1000	-	L1-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	+	L1-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	-	L1-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	+	L1-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	-	N-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	+	N-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	-	N-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	1000	+	N-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	-	L1-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	+	L1-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	-	L1-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	+	L1-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	-	N-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	+	N-PE	90 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	-	N-PE	270 °	5	C	Criterion A fulfilled.
Mains	Test mode: 1	2000	+	N-PE	270 °	5	C	Criterion A fulfilled.

Result: PASSED

3.7 Voltage dip/short interruption according to EN 61000-4-11:2004.

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	22,7 °C
Test date:	2018-07-05	Rel. humidity:	45,9 %
		Atmospheric pressure:	99,9 kPa

Working mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-4-11

Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests.

Test set-up

EuT was placed on the reference plane on 10 cm of insulating support.

Procedure

EUT was connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

Test results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
1125	Noise generator	EMC Partner	TRA2000	2019-06-30
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сочна 004	2018-10-02

Record:

Test Parameters:

Operation Mode	Residual % Unom	Periods	Start Phase	Repeat	Gap (s)	Delay (s)	Failure Criteria	Result
Test mode: 1	0	0,5	0	10	10	10	B	Criterion B fulfilled
	70	10	0	10	10	10	C	Criterion B fulfilled

Result: PASSED

4 Summary of Emission Test Result according to EN 55015:2013.

Results of the individual Tests:

Section of the Generic Standard		Frequency Range	Applied Basic Standard	Reference to Protocol Pages	Results
4.2	Insertion loss	150 kHz – 1 605 kHz	CISPR 15:2013	---	N.A.
4.3	Disturbance voltages				
4.3.1	Mains terminals	9 kHz – 30 MHz	CISPR 15:2013	17	Complied
4.3.2	Load terminals			---	N.A.
4.3.3	Control terminals			---	N.A.
4.4	Radiated electromagnetic disturbances				
4.4.1	Enclosure	9 kHz – 30 MHz	CISPR 15:2013	19	Complied
4.4.2		30 MHz – 300 MHz	CISPR 32:2012	21	Complied

Result: PASSED

4.1 Terminal Disturbance Voltage Measurement according to EN 55015:2013.

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	23,6 °C
Test date:	2018-07-09	Rel. humidity:	48,2 %
		Atmospheric pressure:	99,8 kPa

Operating modes of the sample used for testing

No.	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 55015:2013

Test Procedure:

The disturbance voltage measured at the mains terminals of the lighting equipment by means of the arrangement described in Figure 6 EN 55015:2013.

The output terminals of the artificial mains network (V-network) and the terminals a-b shall be positioned 0,8 m ± 20 % apart and shall be connected by the two power conductors of a flexible three-core cable of 0,8 m length.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
02404	Test receiver	VEB MESSELEKTRONIK	SMV-11	2018-10-30
09472	Artificial Mains Network	VEB MESSELEKTRONIK	NNB-111	2018-09-14
C011230	Oscilloscope	Tektronix	TDS3052C	2018-10-04
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Record:

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Test mode 1:

Frequency, kHz	Test results, dB(μV)		Limit, dB(μV)		Remarks
	QP	AV	QP	AV	
	N	N			
10	85	---	110,0		Pass
58	75	---	88,7		Pass
117	45	---	82,3		Pass
150	43	---	66,0	56,0	Pass
178	48	---	64,6	54,6	Pass
289	46	---	60,6	50,6	Pass
297	48	---	60,3	50,3	Pass
355	47	---	58,9	48,9	Pass
504	38	---	56,0	46,0	Pass
1000	35	---	56,0	46,0	Pass
1528	32	---	56,0	46,0	Pass
2000	30	---	56,0	46,0	Pass
3500	21	---	56,0	46,0	Pass
6000	24	---	60,0	50,0	Pass
10000	28	---	60,0	50,0	Pass
13500	25	---	60,0	50,0	Pass
16000	21	---	60,0	50,0	Pass
20000	21	---	60,0	50,0	Pass
22000	18	---	60,0	50,0	Pass
24000	15	---	60,0	50,0	Pass
30000	23	---	60,0	50,0	Pass

Frequency, kHz	Test results, dB(μV)		Limit, dB(μV)		Remarks
	QP	AV	QP	AV	
	L1	L1			
10	85	---	110,0		Pass
58	75	---	88,7		Pass
117	46	---	82,3		Pass
150	42	---	66,0	56,0	Pass
178	47	---	64,6	54,6	Pass
289	47	---	60,6	50,6	Pass
297	49	---	60,3	50,3	Pass
355	48	---	58,9	48,9	Pass
504	36	---	56,0	46,0	Pass
1000	35	---	56,0	46,0	Pass
1528	32	---	56,0	46,0	Pass
2000	30	---	56,0	46,0	Pass
3500	27	---	56,0	46,0	Pass
6000	29	---	60,0	50,0	Pass
10000	32	---	60,0	50,0	Pass
13500	31	---	60,0	50,0	Pass
16000	25	---	60,0	50,0	Pass
20000	23	---	60,0	50,0	Pass
22000	24	---	60,0	50,0	Pass
24000	20	---	60,0	50,0	Pass
30000	23	---	60,0	50,0	Pass

Result: PASSED

4.2 Radiated electromagnetic disturbances in frequency range from 9 kHz to 30 MHz according to EN 55015:2013.

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	23,7 °C
Test date:	2018-07-09	Rel. humidity:	48,5 %
		Atmospheric pressure:	99,8 kPa

Operating modes of the sample used for testing

No.	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

According to EN 55015:2013.

Test Procedure:

The magnetic component measured by means of a loop antenna as described in 4.7 of CISPR 16-1-4. The lighting equipment was placed in the center of the antenna shown in Annex C of CISPR 16-1-4:2010. The induced current in the loop antenna is measured by means of a current probe (1 V/A) and the CISPR measuring receiver (or equivalent). By means of a coaxial switch, the three field directions measured in sequence. Each value shall fulfill the requirements given.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
02404	Test receiver	VEB MESSELEKTRONIK	SMV-11	2018-10-30
TPA00407	Three-axis frame antenna	ROHDE & SCHWARZ	TRA-002	2019-02-24
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сочна 004	2018-10-02

Record:

See page: 20

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IF Bandwidth	Frequency, kHz	Measured value, dB(μ A)			Limit dB(μ A)	Results
		Loop 1	Loop 2	Loop 3		
0,2 kHz	9	< 10	< 10	< 10	88,0	Pass
	25	< 10	< 10	< 10	88,0	Pass
	50	< 10	< 10	< 10	88,0	Pass
	100	< 10	< 10	< 10	74,0	Pass
9 kHz	150	< 10	< 10	< 10	58,0	Pass
	240	< 10	< 10	< 10	52,4	Pass
	500	< 10	< 10	< 10	43,7	Pass
	1000	< 10	< 10	< 10	35,4	Pass
	1400	< 10	< 10	< 10	31,4	Pass
	2000	< 10	< 10	< 10	27,2	Pass
	6000	< 10	< 10	< 10	22,0	Pass
	10000	< 10	< 10	< 10	22,0	Pass
	22000	< 10	< 10	< 10	22,0	Pass
30000	< 10	< 10	< 10	22,0	Pass	

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4.3 Radiated electromagnetic disturbances in frequency range from 30 MHz to 300 MHz according to EN 55015:2013.

Information concerning the test:

Tested by:	MuraYOU A.A.	Ambient temperature:	21,1 °C
Test date:	2018-07-10	Rel. humidity:	49,3 %
		Atmospheric pressure:	99,7 kPa

Operating modes of the sample used for testing

No.	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

According to EN 55015:2013.

Test Procedure:

EuT was placed on a wooden support 0.8 m parallel to the floor. The distance during measurements between antenna and the boundary of the EUT was 3 m using proportionality factor of 20 dB per decade to normalize the measured data to the specified distance for determining compliance. The antenna adjusted between 1 m and 4 m in height above ground plane for maximum meter reading at each test frequency. The measurements was applied with the antennas facing around the EuT with horizontal and vertical polarization.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
00060032	Log-periodic antenna	ETS Lindgren	3142C	2019-04-02
1311002	Test receiver	GAUSS INSTRUMENTS	TDEMI 26G	2019-06-07
117161	Tape-measure	---	P-10	2018-11-30
---	Open area test site	---	---	2019-10-16
---	Rotation platform	Made in Belarus	---	---
---	Antenna control device	Made in Belarus	---	---
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Record:

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Scan1: 30.0 MHz, 50.0 kHz, 300.0 MHz; IF:120 kHz, 1.0 s QP, Att AutodB, Horizontal Polarization

f	Magnitude dB μ V/m	Limit	Difference	Name	Result
30.079 MHz	30.74	40.00	9.26	EN55015,QP	Pass
46.183 MHz	22.29	40.00	17.71	EN55015,QP	Pass
72.919 MHz	33.89	40.00	6.11	EN55015,QP	Pass
93.669 MHz	23.76	40.00	16.24	EN55015,QP	Pass
104.616 MHz	31.78	40.00	8.22	EN55015,QP	Pass
111.231 MHz	20.24	40.00	19.76	EN55015,QP	Pass
143.006 MHz	20.21	40.00	19.79	EN55015,QP	Pass
159.189 MHz	21.36	40.00	18.64	EN55015,QP	Pass
174.546 MHz	24.35	40.00	15.65	EN55015,QP	Pass
175.609 MHz	24.29	40.00	15.71	EN55015,QP	Pass
201.242 MHz	23.45	40.00	16.55	EN55015,QP	Pass
223.961 MHz	23.58	40.00	16.42	EN55015,QP	Pass
238.727 MHz	24.45	47.00	22.55	EN55015,QP	Pass
247.901 MHz	25.16	47.00	21.84	EN55015,QP	Pass
264.714 MHz	25.23	47.00	21.77	EN55015,QP	Pass
288.379 MHz	26.08	47.00	20.92	EN55015,QP	Pass

Scan1: 30.0 MHz, 50.0 kHz, 300.0 MHz; IF:120 kHz, 1.0 s QP, Att AutodB, Vertical Polarization

f	Magnitude dB μ V/m	Limit	Difference	Name	Result
36.969 MHz	35.41	40.00	4.59	EN55015,QP	Pass
46.656 MHz	26.77	40.00	13.23	EN55015,QP	Pass
93.709 MHz	27.83	40.00	12.17	EN55015,QP	Pass
104.616 MHz	32.01	40.00	7.99	EN55015,QP	Pass
114.026 MHz	20.26	40.00	19.74	EN55015,QP	Pass
142.770 MHz	20.15	40.00	19.85	EN55015,QP	Pass
154.898 MHz	21.96	40.00	18.04	EN55015,QP	Pass
172.223 MHz	25.09	40.00	14.91	EN55015,QP	Pass
190.847 MHz	22.41	40.00	17.59	EN55015,QP	Pass
192.028 MHz	22.46	40.00	17.54	EN55015,QP	Pass
223.371 MHz	23.23	40.00	16.77	EN55015,QP	Pass
240.026 MHz	24.25	47.00	22.75	EN55015,QP	Pass
256.209 MHz	24.42	47.00	22.58	EN55015,QP	Pass
271.566 MHz	24.67	47.00	22.33	EN55015,QP	Pass
288.024 MHz	25.55	47.00	21.45	EN55015,QP	Pass

5 Summary of Exposure Test Result according to EN 62493:2015.

Results of the individual Tests:

Section of the Generic Standard		Frequency Range	Applied Basic Standard	Reference to Protocol Pages	Results
4.2	The weighted and total induced current density due to the electric field created by the lighting equipment	20 kHz – 10 MHz	EN 62493:2015	24	Complied

Result: PASSED

5.1 The weighted and total induced current density due to the electric field created by the lighting equipment in frequency range from 20 kHz – 10 MHz according to EN 62493:2015.

Information concerning the test:

Tested by:	Murayou A.A.	Ambient temperature:	22,6 °C
Test date:	2018-07-10	Rel. humidity:	47,3 %
		Atmospheric pressure:	99,7 kPa

Operating modes of the sample used for testing

No.	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

According to Annex E EN 62493:2015.

Test Procedure:

According to Annex E EN 62493:2015.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
134	"Van der Houfden" test head	SCHWARZBECK	VDHH 9502	2018-07-04
1311002	Test receiver	GAUSS INSTRUMENTS	TDEMI 26G	2019-06-07
117161	Tape-measure	---	P-10	2018-11-30
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Record:

Type of equipment	Measuring distance, cm	The measured value of the weighted and total induced current density (F) due to the electric field created by the lighting equipment in the frequency range from 20 kHz to 10 MHz	Coefficient F limit	Result
Lighting equipment for roads and street lighting	200	0,051	0,85	Pass

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6 Harmonic Currents emissions according to EN 61000-3-2:2014.

Information concerning the test:

Tested by:	Murauyou A.A.	Ambient temperature:	23,1 °C
Test date:	2018-07-11	Rel. humidity:	48,3 %
		Atmospheric pressure:	99,1 kPa

Test mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-3-2

Test Procedure:

According to clause 6.2 EN 61000-3-2

Measurement results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
1347A00836/ 1343A00428/ 1347A02705	The AMETEK MX15-CTSHL measuring complex consists of AMETEK PACS-1 power analyzer, AMETEK MX15-1Pi programmable power supply, programmable AMETEK OMNI 1-37 network impedance	«Ametek»	AMETEK PACS-1/ MX15-1Pi/ OMNI 1-37	2018-12-21
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сочна 004	2018-10-02

Record:

Result: PASSED

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ИЦ БелГИСС
Аттестат аккредитации
№ ВУ/112 02.1.0.0085

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Harmonics – Class-C per Ed. 4.0 (2014)(Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits)

Test Margin: 100

Test date: 09.07.2018

Start time: 13:50:00

End time: 13:52:41

Test duration (min): 2,5

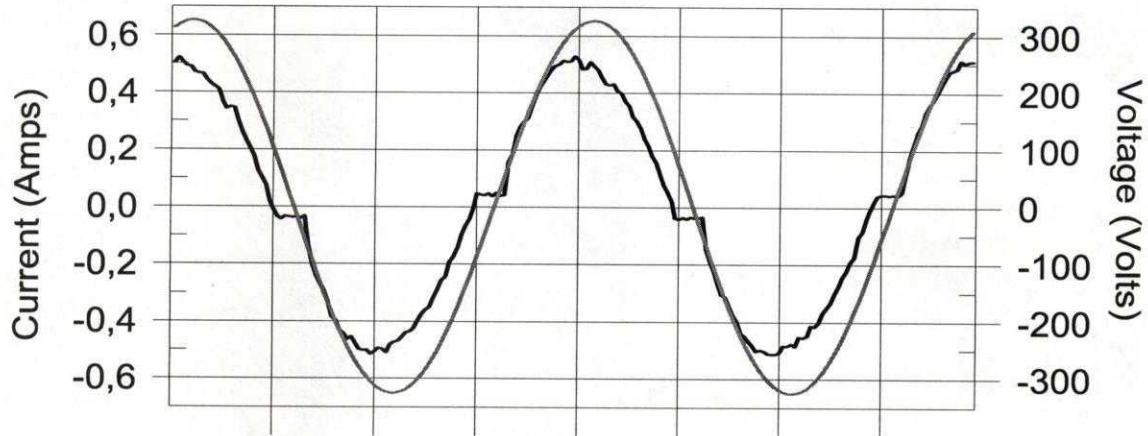
Data file name: H-000371.cts_data

Comment: Comment

Customer: Customer information

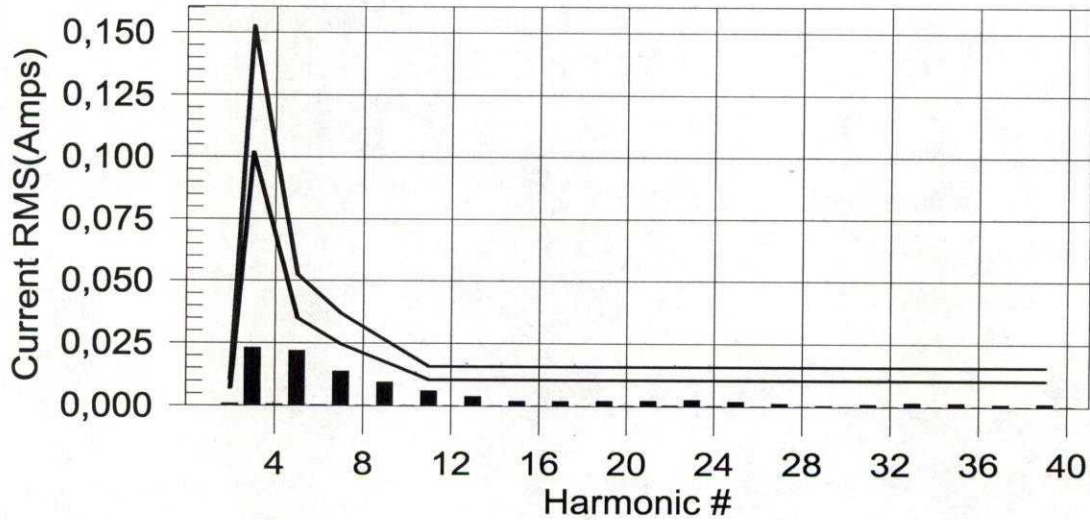
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class C limit line

European Limits



Test result: Pass Worst harmonics H5-42,8% of 150% limit, H5-62,8% of 100% limit

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Current Test Result Summary (Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 09.07.2018 Start time: 13:50:00 End time: 13:52:41
 Test duration (min): 2,5 Data file name: H-000371.cts_data
 Comment: Comment
 Customer: Customer information

Test Result: Pass Source qualification: Normal
 THC(A): 0,037 I-THD(%): 10,7 POHC(A): 0,005 POHC Limit(A): 0,033

Highest parameter values during test:

V_RMS (Volts):	230,55	Frequency(Hz):	50,00
I_Peak (Amps):	0,551	I_RMS (Amps):	0,352
I_Fund (Amps):	0,350	Crest Factor:	1,573
Power (Watts):	78,7	Power Factor:	0,972

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0,001	0,007	0,0	0,001	0,010	0,0	Pass
3	0,023	0,102	22,6	0,025	0,153	16,3	Pass
4	0,001	0,000	0,0	0,001	0,000	0,0	Pass
5	0,022	0,035	62,8	0,022	0,052	42,8	Pass
6	0,000	0,000	0,0	0,000	0,000	0,0	Pass
7	0,014	0,024	56,1	0,014	0,037	38,6	Pass
8	0,000	0,000	0,0	0,000	0,000	0,0	Pass
9	0,010	0,017	54,5	0,010	0,026	36,9	Pass
10	0,000	0,000	0,0	0,000	0,000	0,0	Pass
11	0,006	0,010	58,0	0,006	0,016	39,6	Pass
12	0,000	0,000	0,0	0,000	0,000	0,0	Pass
13	0,004	0,010	0,0	0,004	0,016	0,0	Pass
14	0,000	0,000	0,0	0,000	0,000	0,0	Pass
15	0,002	0,010	0,0	0,002	0,016	0,0	Pass
16	0,000	0,000	0,0	0,000	0,000	0,0	Pass
17	0,002	0,010	0,0	0,002	0,016	0,0	Pass
18	0,000	0,000	0,0	0,000	0,000	0,0	Pass
19	0,002	0,010	0,0	0,002	0,016	0,0	Pass
20	0,000	0,000	0,0	0,000	0,000	0,0	Pass
21	0,002	0,010	0,0	0,003	0,016	0,0	Pass
22	0,000	0,000	0,0	0,000	0,000	0,0	Pass
23	0,003	0,010	0,0	0,003	0,016	0,0	Pass
24	0,000	0,000	0,0	0,000	0,000	0,0	Pass
25	0,002	0,010	0,0	0,002	0,016	0,0	Pass
26	0,000	0,000	0,0	0,000	0,000	0,0	Pass
27	0,001	0,010	0,0	0,001	0,016	0,0	Pass
28	0,000	0,000	0,0	0,000	0,000	0,0	Pass
29	0,001	0,010	0,0	0,001	0,016	0,0	Pass
30	0,000	0,000	0,0	0,000	0,000	0,0	Pass
31	0,001	0,010	0,0	0,001	0,016	0,0	Pass
32	0,000	0,000	0,0	0,000	0,000	0,0	Pass
33	0,002	0,010	0,0	0,002	0,016	0,0	Pass
34	0,000	0,000	0,0	0,000	0,000	0,0	Pass
35	0,002	0,010	0,0	0,002	0,016	0,0	Pass
36	0,000	0,000	0,0	0,000	0,000	0,0	Pass
37	0,001	0,010	0,0	0,001	0,016	0,0	Pass
38	0,000	0,000	0,0	0,000	0,000	0,0	Pass
39	0,001	0,010	0,0	0,001	0,016	0,0	Pass
40	0,000	0,000	0,0	0,000	0,000	0,0	Pass

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Voltage Source Verification Data (Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 09.07.2018 Start time: 13:50:00 End time: 13:52:41
 Test duration (min): 2,5 Data file name: H-000371.cts_data
 Comment: Comment
 Customer: Customer information

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	230,55	Frequency(Hz):	50,00
I_Peak (Amps):	0,551	I_RMS (Amps):	0,352
I_Fund (Amps):	0,350	Crest Factor:	1,573
Power (Watts):	78,7	Power Factor:	0,972

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0,075	0,461	16,21	OK
3	0,140	2,075	6,73	OK
4	0,036	0,461	7,78	OK
5	0,066	0,922	7,11	OK
6	0,018	0,461	3,98	OK
7	0,047	0,691	6,84	OK
8	0,006	0,461	1,32	OK
9	0,021	0,461	4,51	OK
10	0,009	0,461	2,04	OK
11	0,010	0,231	4,25	OK
12	0,010	0,231	4,36	OK
13	0,013	0,231	5,78	OK
14	0,005	0,231	2,01	OK
15	0,012	0,231	5,30	OK
16	0,005	0,231	2,12	OK
17	0,008	0,231	3,65	OK
18	0,005	0,231	2,29	OK
19	0,006	0,231	2,72	OK
20	0,010	0,231	4,20	OK
21	0,011	0,230	4,65	OK
22	0,004	0,231	1,81	OK
23	0,008	0,230	3,44	OK
24	0,004	0,231	1,61	OK
25	0,008	0,231	3,60	OK
26	0,004	0,231	1,54	OK
27	0,009	0,231	3,92	OK
28	0,003	0,231	1,46	OK
29	0,008	0,231	3,37	OK
30	0,003	0,231	1,37	OK
31	0,005	0,231	2,22	OK
32	0,003	0,231	1,34	OK
33	0,005	0,231	2,16	OK
34	0,004	0,230	1,58	OK
35	0,009	0,231	4,09	OK
36	0,003	0,231	1,51	OK
37	0,004	0,231	1,77	OK
38	0,003	0,231	1,30	OK
39	0,009	0,231	4,08	OK
40	0,005	0,231	2,37	OK

7 Voltage fluctuations and flicker according to EN 61000-3-3:2013.

Information concerning the test:

Tested by:	Murauyou A.A.	Ambient temperature:	23,1 °C
Test date:	2018-07-11	Rel. humidity:	48,3 %
		Atmospheric pressure:	99,1 kPa

Test mode	Description
№ 1	Continuous operation in lighting mode

TEST DESCRIPTION:

Method

EN 61000-3-3

Test Procedure:

According to clause 6 EN 61000-3-3.

Measurement results can be found in the following pages.

Used test equipment:

Factory Number	Type	Manufacturer	Model	Calibration Due
1347A00836/ 1343A00428/ 1347A02705	The AMETEK MX15-CTSHL measuring complex consists of AMETEK PACS-1 power analyzer, AMETEK MX15-1Pi programmable power supply, programmable AMETEK OMNI 1-37 network impedance	«Ametek»	AMETEK PACS-1/ MX15-1Pi/ OMNI 1-37	2018-12-21
13450	Aneroid barometer	Made in Belarus	БАММ-1	2019-01-31
3000	Temperature and Humidity Meter	Made in Belarus	Сосна 004	2018-10-02

Record:

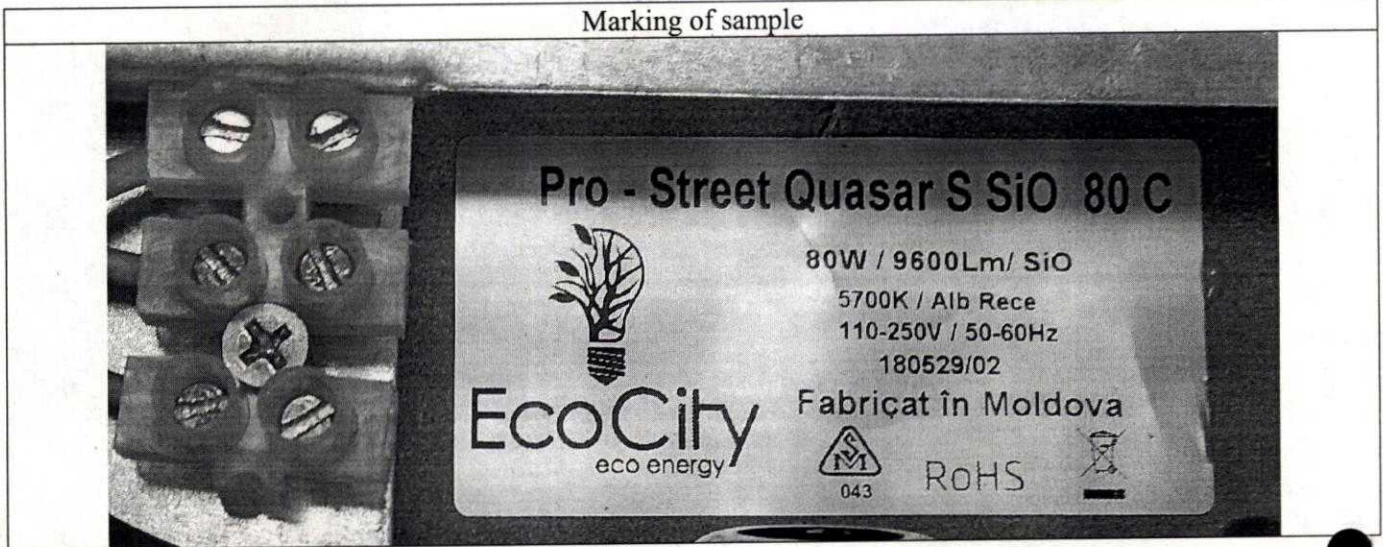
Test mode 1:

Parameter	Measured value	Limit	Result
Vrms at the end of test (Volt)	230,31		
Highest dt (%)	0,00	N/A	N/A
T-max (mS)	0,00	500,0 mS	Pass
Highest dc (%)	0,00	3,30 %	Pass
Highest dmax (%)	< 0,10	6,00 %	Pass
Highest Pst (10 min. period)	< 0,10	1,000	Pass
Highest Plt (2 hr. period)	< 0,10	0,650	Pass

Result: PASSED

Appendix 1 (Photos of the EuT)

Marking of sample



Marking of power supply



Sample appearance

