

Date of Receipt:

Date of Test:

Date of Issue:

Test Result:



Report No.: THEM230700006301 Page: 1 of 54

# TEST REPORT

Job No.:	THEM2307000063RF
Applicant:	Skypoint Hospitality and Technology Co.,Ltd.
Address of Applicant:	99/380 Chokchai Village 7,Moo 5 Soi boonsamphan, Nongprue,
	Banglamung, Chonburi 20150, Thailand
Manufacturer:	Skypoint Hospitality and Technology Co.,Ltd.
Address of Manufacturer:	99/380 Chokchai Village 7,Moo 5 Soi boonsamphan, Nongprue
	Banglamung, Chonburi 20150, Thailand
Factory:	Skypoint Hospitality and Technology Co.,Ltd.
Address of Factory:	99/380 Chokchai Village 7,Moo 5 Soi boonsamphan, Nongprue
	Banglamung, Chonburi 20150, Thailand
Equipment Under Test (EUT)	
Name:	Ozone Water Machine
Model:	AURO₃RA 6
Trademark / Brand:	AURO₃RA 6
Standard(s):	EN IEC 61000-6-4:2019 EN IEC 61000-6-2:2019 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019+A2:2021

14-July-2023

15-July-2023 to 18-July-2023

20-Jul-2023

Pass \*

\* In the configuration tested, the equipment under test complied with the standards specified above.

Arnon To-anun **EMC Laboratory Section Head** 

The manufacturer should be ensuring that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record						
Version	Chapter	Date	Modifier	Remark		
01	-	20-Jul-2023	-	Original		

	Thethip	20-Jul-2023
	Thothip T. / Project Engineer	Date (DD-MMM-YYYY)
Autionzed for issue by	Arnon T.	20-Jul-2023
	Arnon T. / Reviewer	Date (DD-MMM-YYYY)

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SGS (Thailand) Limited Amata City Chonburi Industrial Estate, 700/693 Moo 7, Don Hua Roh Sub-District, Mueang Chonburi District, Chonburi Province 20000, Thailand Amata City Chonburi Laboratory Phone: +66(0)33 266 162-5, Fax: +66 (0)33 266 166, https://www.sgs.com



# 2 Test Summary

Emission Part						
Test Item	Test Standard	Test Method	Test Requirement	Result		
Conducted Emissions	EN IEC 61000-6-4 :2019	EN 55016-2-1:2014+A1:2017	Table 4 – Requirements for conducted emissions – low voltage AC mains port	Pass		
Radiated Emissions	EN IEC 61000-6-4 :2019	EN 55016-2-3:2017+A1:2019	Table 3 – Requirements for radiated emissions – enclosure port	Pass		
Harmonic Current Emissions	EN IEC 61000-3-2:2019+A1:2021	EN IEC 61000-3-2:2019+A1:2021	Table 1 - Limits for Class A equipment	Pass		
Voltage Changes, Voltage Fluctuations and Flicker	EN 61000-3- 3:2013+A1:2019+A2:2021	EN 61000-3- 3:2013+A1:2019+A2:2021	Clause 5 Limits	Pass		
	Im	munity Part				
Test Item	Test Standard	Test Method	Test Requirement	Result		
Electrostatic Discharge	EN IEC 61000-6-2:2019	EN 61000-4-2:2009	8 kV air discharge 4 kV contact discharge	Pass		
Radio Frequency Electromagnetic Fields	EN IEC 61000-6-2:2019	EN IEC 61000-4-3:2020	80 MHz - 1000 MHz 10 V/m (r.m.s.) (unmodulated) 1000 MHz - 6000 MHz 3 V/m (r.m.s.) (unmodulated)	Pass		
Fast transients	EN IEC 61000-6-2:2019	EN 61000-4-4:2012	2 kV (peak) 5/50 ns Tr/Td 5 kHz repetition frequency	Pass		
Surges	EN IEC 61000-6-2:2019	EN 61000-4-5:2014	$\begin{array}{l} 1.2/50 \ (8/20) \ \mu \text{s Tr/Td} \\ 2 \ \text{kV line to earth} \\ \text{with } 12 \ \Omega \ \text{Impedance} \\ 1 \ \text{kV line to line with } 2 \ \Omega \\ \text{Impedance} \end{array}$	Pass		
Injected currents	EN IEC 61000-6-2:2019	EN 61000-4-6:2014	150 kHz - 80 MHz 3 V(r.m.s.) (unmodulated) 150 Ω source impedance	Pass		
Voltage Dips and Voltage Interruptions	EN IEC 61000-6-2:2019	EN IEC 61000-4-11:2020	Volt Dips 0% UT = 1 cycles 40% UT = 10 70% UT = 25 interruption 0 % = 250 cycles	Pass		
Power frequency magnetic field	EN IEC 61000-6-2:2019	EN 61000-4-8:2010	30 A/m, 50 Hz	Pass		
Remark: -						

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# 4 General Information

#### 4.1 Details of Equipment Under Test

Power Supply:	Power Adapter Model: PC-120050
	INPUT: AC 100-240V~1.5A 50/60 Hz, OUTPUT: DC 12V (5A)
Test Voltage:	230 VAC / 50 Hz
Clock Frequency:	Less than 108 MHz
Cable:	AC input about 1.20 m. x 3 wires input plug.
	DC Output about 1.12 m to equipment under test

#### 4.2 Description of Support Units

The equipment under test has seen tested as an independent unit.

#### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
4	One destad Fraincise / Olish Data	±3.06 dB (9 kHz - 150 kHz)
1	Conducted Emission / Click Rate	±2.35 dB (150 kHz - 30 MHz)
		±4.30 dB (30 MHz - 200 MHz) Horizontal
		±4.50 dB (30 MHz - 200 MHz) Vertical
2	Radiated Emissions	±4.74 dB (200 MHz - 1 GHz) Horizontal
		±4.69 dB (200 MHz - 1 GHz) Vertical
		±5.70 dB (1 GHz - 6 GHz)
		±5.76 (6 GHz – 18 GHz)
3	Harmonic Current Emissions	±5.07 %
4	Voltage Changes, Voltage Fluctuations and Flicker	±4.94 %
5	Electrostatic Discharge	±15.00 %
6	Radio Frequency Electromagnetic Fields	±2.19 dB
7	Fast Transients	±6.20 %
8	Surges	±8.60 %
9	Injected Currents	±3.19 dB
10	Voltage Dips	±2.50 %
11	Power frequency magnetic field immunity Test (PFM)	±0.64 mV
12	Temperature	±0.36°C
13	Humidity	±2.3%

Remark:

The  $U_{lab}$  (lab Uncertainty) is less than  $U_{cispr}$  (CISPR Uncertainty), so the test results

- 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.

According to decision rule based on clause 4.2 of CISPR 16-4-2, the equipment under test complied with the standards specified above.

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## 4.4 Test Location

Test(s) were performed at:

SGS (Thailand) Limited.

700 / 693 Moo7, Don Hua Roh Sub-District, Mueang Chonburi District, Chonburi 20000, Thailand. Phone: +66(0)33 266 165, Fax: +66(0)33 266 166

Test(s) were subcontracted at: None

## 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Thai Industrial Standards Institute (TISI)

SGS (Thailand) Limited has been accepted by Thai Industrial Standards Institute (TISI) executive, on the recommendation of the accreditation advisory board, as a Thai Industrial Standards Institute (TISI) accredited laboratory, this laboratory meets the requirements of ISO/IEC 17025:2017 and it has been accredited for performing specific test as listed in the scope of accreditation within the test category of electrical and electronic products.

#### GCC Accreditation Center (GAC). (Accreditation No. ATL 0097)

SGS (Thailand) Limited is accredited by the GCC Accreditation Center (GAC) in accordance with the recognized International standard ISO/IEC 17025:2017: "General requirements for the competence of testing and calibration laboratories". This organization is accredited to provide the services specified in the scope of accreditation maintained on the GAC website www.gcc-accreditation.org

## 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None

## 4.8 Monitoring of Equipment Under Test for All Immunity Test

Visual: Monitoring LED of equipment under test. Audio: Abnormal sound of equipment under test. Other: Malfunction of equipment under test.

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# 5 Equipment List

Conducted Emissions Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration	
E2019001	EMI TEST RECEIVER	Rohde & Schwarz	ESR3	24-Feb-2023	23-Feb-2024	
P2019002	PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	21-Feb-2023	20-Feb-2024	
T2019008	TWO-LINE-V-NETWORK	Rohde & Schwarz	ENV216	30-Jun-2023	29-Jun-2024	

Radiated Emission						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration	
E2019001	EMI TEST RECEIVER	Rohde & Schwarz	ESR3	24-Feb-2023	23-Feb-2024	
D2023001	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	Rohde & Schwarz	HF907	15-Sep-2022	14-Sep-2023	
B2023002	BROADBAND COAXIAL PREAMPLIFIER	Schwarzbeck	BBV9718D	02-Mar-2023	01-Mar-2024	
B2023003	BROADBAND HORN ANTENNA	Schwarzbeck	BBHA9170	20-Feb-2023	19-Feb-2024	
B2023004	BROADBAND ANTENNA	Schwarzbeck	VULB9162	07-Feb-2023	06-Feb-2024	
B2023005	BROADBAND ANTENNA	Schwarzbeck	VULB9162	02-Feb-2023	01-Feb-2024	
S2023001	SIGNAL AND SPECTRUM ANALYZER	Rohde & Schwarz	FSV3044	11-Oct-2022	10-Oct-2023	

Harmonic Current Emissions Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration	
H2020023	HARMONICS AND FLICKER ANALYZER	Ametek	DPA 503N	06-Sep-2022	05-Sep-2023	

Voltage Changes, Voltage Fluctuations and Flicker Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration	
F2020005	FLICKER IMPEDANCES	Ametek	AIF 503N63.1	06-Sep-2022	05-Sep-2023	
H2020023	HARMONICS AND FLICKER ANALYZER	Ametek	DPA 503N	06-Sep-2022	05-Sep-2023	

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	Electrostatic Discharge Test						
Equipment Code	Equipment Name	Equipment Name Manufacturer Mode		Last Calibration	Next Calibration		
E2019002	ESD SIMULATOR	Teseq	NSG 437	06-Dec-2022	05-Dec-2023		

Radio Frequency Electromagnetic Fields Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration	
A2023003	AVERAGE POWER SENSOR	Rohde & Schwarz	NRP6A	07-Oct-2022	06-Oct-2023	
A2023004	AVERAGE POWER SENSOR	Rohde & Schwarz	NRP6A	08-Oct-2022	07-Oct-2023	
B2023006	BROADBAND AMPLIFIER	Rohde & Schwarz	BBA150-BC250	08-Oct-2022	07-Oct-2023	
B2023007	BROADBAND AMPLIFIER	Rohde & Schwarz	BBA150-D60E60	08-Oct-2022	07-Oct-2023	
D2023002	DOUBLE RIDGED BROADBAND HORN ANTENNA	Rohde & Schwarz	BBHA9120E	08-Oct-2022	07-Oct-2023	
E2023001	E-FIELD PROBE	Rohde & Schwarz	LSPROBE	10-Oct-2022	09-Oct-2023	
V2023001	VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMCV100B	07-Oct-2022	06-Oct-2023	

Fast Transients Test						
Equipment Code	Equipment Name	Manufacturer Model		Last Calibration	Next Calibration	
M2019004	MULTI-FUNCTION GENERATOR	Teseq	NSG 3040	08-May-2023	07-Nov-2023	
C2020002	COUPLING/DECOUPLING NETWORK SURGE/BURST	Teseq	CDN 3043-C32.1	08-May-2023	07-Nov-2023	

	Surges Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration		
M2019004	MULTI-FUNCTION GENERATOR	Teseq	NSG 3040	08-May-2023	07-Nov-2023		
C2020002	COUPLING/DECOUPLING NETWORK SURGE/BURST	Teseq	CDN 3043-C32.1	08-May-2023	07-Nov-2023		

	Injected Currents Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration		
C2019005	COMPACT IMMUNITY TEST SYSTEM	Teseq	NSG4070C-35	18-Apr-2023	17-Oct-2023		
C2019006	COUPLING DECOUPLING NETWORK	Teseq	CDN M016	03-Mar-2023	02-Mar-2024		
R2019003	RF ATTENUATORS	Teseq	100-A-FFN-06	03-Mar-2023	02-Mar-2024		

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	Voltage Dips and Voltage Interruptions Test						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration		
P2020013	POWER FAIL SIMULATOR	Ametek cts	PFS 503N32	02-Aug-2022	01-Aug-2023		
T2020042	TAPPED TRANSFORMER	Ametek	V3P4016DS	03-Aug-2022	02-Aug-2023		

Power frequency magnetic field immunity Test (PFM)						
Equipment Code	Equipment Name	Manufacturer	Model	Last Calibration	Next Calibration	
S2023003	SGS MAGNETIC COIL	-	-	14-Jun-2023	13-Jun-2024	

	General Use Equipment						
Equipment Code	Equipment Name	Manufacturer	Ifacturer Model Last Calibration		Next Calibration		
D2022002	DATA LOGGER	Lascar	EL-SIE-6+	02-Dec-2022	01-Dec-2023		
D2022003	DATA LOGGER	Lascar	EL-SIE-6+	02-Dec-2022	01-Dec-2023		

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# 6 Emission Test Results

## 6.1 Conducted Emissions Test

Test Requirement:	EN IEC 61000-6-4:2019
Test Method:	EN 55016-2-1:2014+A1:2017
Frequency Range:	150 kHz - 30 MHz
Limit:	
150 kHz - 500 kHz	79 dB(μV) quasi-peak, 66 dB(μV) average
500 kHz - 30 MHz	73 dB(μV) quasi-peak, 60 dB(μV) average
Detector:	Quasi-peak or average for pre-scan (9 kHz RBW) 150 kHz - 30 MHz
Remark:	RBW = resolution bandwidth.

## 6.1.1 Equipment Under Test Operation

 Operating Environment:
 Ambient Temperature 24.3 °C
 Relative Humidity 52.6 %
 Atmospheric Pressure 1008.3 mbar

 Operation Mode:
 The Equipment shall be operated continuously with turn-on mode.
 The Equipment shall be operated continuously with turn-on mode.

## 6.1.2 Test Setup Diagram



#### 6.1.3 Measurement Data

An initial pre-scan was performed with quasi-peak or average detector. Quasi-peak or average measurement were performed at the frequencies with maximized peak emission were detected.

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Line: Line



Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Correction [dB]	Line
0.161	55.45	79.00	23.55				19.53	L
0.164				45.49	66.00	20.51	19.53	L
0.614	38.81	73.00	34.19				19.61	L
0.618				32.51	60.00	27.49	19.61	L
2.121	26.74	73.00	46.26	21.68	60.00	38.32	19.84	L
4.835				31.82	60.00	28.18	20.00	L
5.127	37.41	73.00	35.59				20.01	L
6.122	39.24	73.00	33.76				20.03	L
6.146				33.92	60.00	26.08	20.03	L
23.937				45.93	60.00	14.07	20.38	L
23.955	50.19	73.00	22.81				20.38	L

#### Final Results

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Line: N



#### **Final Results**

Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Correction [dB]	Line
0.161	55.21	79.00	23.79				19.53	Ν
0.164				46.50	66.00	19.50	19.53	Ν
0.616	40.38	73.00	32.62				19.61	Ν
0.620				35.21	60.00	24.79	19.61	Ν
2.121	29.91	73.00	43.09	25.47	60.00	34.53	19.84	Ν
5.120	38.74	73.00	34.26				20.01	Ν
5.129				33.76	60.00	26.24	20.01	Ν
6.092				35.09	60.00	24.91	20.03	Ν
6.104	40.18	73.00	32.82				20.03	Ν
23.892				48.23	60.00	11.77	20.49	Ν
23.901	53.78	73.00	19.22				20.49	N

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## 6.2 Radiated Emissions Test

Test Requirement:		EN IEC 61000-6-4:2019
Test Method:		EN 55016-2-3:2017+A1:2019
Frequency Range:		30 MHz - 1 GHz
Limit:		
	30 MHz - 230 MHz 230 MHz - 1 GHz	50 dB (μV/m) quasi-peak 57 dB (μV/m) quasi-peak
Detector:		Peak for pre-scan (120 kHz RBW) 30 MHz - 1 GHz
Remark:		RBW = resolution bandwidth.

## 6.2.1 Equipment Under Test Operation

Operating Environment: Ambient Temperature 24.3 °C Relative Humidity 52.6 % Atmospheric Pressure 1008.3 mbar Operation Mode:

# The Equipment shall be operated continuously with turn-on mode.

#### 6.2.2 Test Setup Diagram



#### 6.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasipeak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

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## Polarization: Vertical



#### Final Results

Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
30.132	46.88	50.00	3.12	20.08	V	152.6	1
30.288	47.25	50.00	2.75	20.03	V	97.1	1
98.898	45.06	50.00	4.94	21.81	V	40.6	1.226
101.623	46.91	50.00	3.09	22.00	V	360	1
121.008	37.90	50.00	12.10	19.44	V	134.6	1.037
124.594	37.22	50.00	12.78	18.96	V	59.5	1.262

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## Polarization: Horizontal



#### **Final Results**

Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
98.592	38.39	50.00	11.61	21.79	Н	59	2.5
99.872	37.15	50.00	12.85	21.94	Н	60	2.536
102.085	37.45	50.00	12.55	22.01	Н	59.5	2.725
104.209	35.03	50.00	14.97	21.94	Н	78.5	2.5
106.522	35.73	50.00	14.27	21.73	Н	60	2.5
213.540	30.80	50.00	19.20	20.96	Н	22	1.5

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## 6.3 Harmonic Current Emissions Test

Test Requirement:	EN IEC 61000-3-2:2019+A1:2021
Test Method:	EN IEC 61000-3-2:2019+A1:2021

## 6.3.1 Equipment Under Test Operation

Operating Environment: Ambient Temperature 23.3 °C Relative Humidity 54.3 %

Atmospheric Pressure 1009.8 mbar

The Equipment shall be operated continuously with turn-on mode.

## 6.3.2 Test Setup Diagram

**Operation Mode:** 



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## 6.3.3 Measurement Data

Standard Group:	Industry
Standard Name:	EN IEC 61000-3-2
	Limits for harmonic current emissions (equipment input current < 16 A per phase)
Device Under Test:	PASS
Power Source:	PASS
Connection Type:	L - N
Classification:	Class A
Appli. of Limits:	less than or equal to 150 % (Without POHC Enhancement)
Test Duration:	10 min

Standard Specific Results for EN IEC 61000-3-2

Check Harmonics 240				
First detected harmonic order > 150 %				
Line 1:	None			
Harmonics orders > 150 %				
Line 1:	None			
Harmonics orders with average > 100 %				
Line 1:	None			

Measured values				
Fundamental Current				
Line 1:	0.109 A			
Active input Power				
Line 1:	19.818 W *			
Circuit power factor				
Line 1:	0.398 *			
* Abcoluto valuo			·	

\* Absolute value.

Prerequisite for simplified m	ethod fulfilled			
First time window with THD	O(I) > 15 %			
Line 1:	None			
Time window with max THD(I) > 15 %				
Line 1:	None			
Current emission below 60	% of the applicable limits			
Line 1:	Yes			
Active Input Power				
Line 1:	20 W *			

\* Absolute value.

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### **Current Test Result**

	Average and Maximum harmonic current results								
		Ave	rage		Maximum				Harmonic
Hn	Ieff [A]	of Limit [%]	Limit [A]	Result	Ieff [A]	of Limit [%]	Limit [A]	Result	Result
1	0.106				0.109				
2	0.002	0.151	1.080	n/a	0.002	0.137	1.620	n/a	n/a
3	0.087	3.793	2.300	PASS	0.093	2.685	3.450	PASS	PASS
4	0.002	0.374	0.430	n/a	0.002	0.313	0.645	n/a	n/a
5	0.083	7.314	1.140	PASS	0.087	5.063	1.710	PASS	PASS
6	0.001	0.356	0.300	n/a	0.001	0.325	0.450	n/a	n/a
7	0.077	9.997	0.770	PASS	0.079	6.800	1.155	PASS	PASS
8	0.001	0.492	0.230	n/a	0.001	0.428	0.345	n/a	n/a
9	0.069	17.375	0.400	PASS	0.071	11.872	0.600	PASS	PASS
10	0.001	0.622	0.184	n/a	0.001	0.513	0.276	n/a	n/a
11	0.061	18.455	0.330	PASS	0.063	12.652	0.495	PASS	PASS
12	0.001	0.566	0.153	n/a	0.001	0.505	0.230	n/a	n/a
13	0.051	24.323	0.210	PASS	0.053	16.829	0.315	PASS	PASS
14	0.001	0.679	0.131	n/a	0.001	0.588	0.197	n/a	n/a
15	0.042	27.741	0.150	PASS	0.044	19.556	0.225	PASS	PASS
16	0.001	0.602	0.115	n/a	0.001	0.554	0.173	n/a	n/a
17	0.032	24.370	0.132	PASS	0.035	17.392	0.199	PASS	PASS
18	0.001	0.601	0.102	n/a	0.001	0.548	0.153	n/a	n/a
19	0.024	19.912	0.118	PASS	0.026	14.478	0.178	PASS	PASS
20	0.000	0.484	0.092	n/a	0.001	0.489	0.138	n/a	n/a
21	0.016	14.607	0.107	PASS	0.018	11.000	0.161	PASS	PASS
22	0.000	0.498	0.084	n/a	0.001	0.503	0.125	n/a	n/a
23	0.010	9.740	0.098	PASS	0.011	7.682	0.147	PASS	PASS
24	0.000	0.533	0.077	n/a	0.001	0.534	0.115	n/a	n/a
25	0.006	6.491	0.090	PASS	0.007	5.151	0.135	PASS	PASS

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26	0.000	0.550	0.071	n/a	0.001	0.540	0.106	n/a	n/a
27	0.005	6.399	0.083	PASS	0.006	4.708	0.125	PASS	PASS
28	0.000	0.671	0.066	n/a	0.001	0.650	0.099	n/a	n/a
29	0.007	8.807	0.078	PASS	0.008	6.498	0.116	PASS	PASS
30	0.000	0.729	0.061	n/a	0.001	0.714	0.092	n/a	n/a
31	0.008	10.677	0.073	PASS	0.008	7.435	0.109	PASS	PASS
32	0.000	0.841	0.058	n/a	0.001	0.753	0.086	n/a	n/a
33	0.008	11.484	0.068	PASS	0.008	7.963	0.102	PASS	PASS
34	0.000	0.909	0.054	n/a	0.001	0.822	0.081	n/a	n/a
35	0.007	11.308	0.064	PASS	0.008	8.036	0.096	PASS	PASS
36	0.000	0.897	0.051	n/a	0.001	0.828	0.077	n/a	n/a
37	0.006	10.322	0.061	PASS	0.007	7.682	0.091	PASS	PASS
38	0.000	0.844	0.048	n/a	0.001	0.780	0.073	n/a	n/a
39	0.005	8.176	0.058	n/a	0.006	6.526	0.087	PASS	PASS
40	0.000	0.728	0.046	n/a	0.000	0.688	0.069	n/a	n/a

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

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#### **Voltage Source Verification**

Harmonic voltage results						
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result		
1	231.174	100.510				
2	0.032	0.014	0.200	PASS		
3	0.053	0.023	0.900	PASS		
4	0.042	0.018	0.200	PASS		
5	0.098	0.043	0.400	PASS		
6	0.022	0.009	0.200	PASS		
7	0.027	0.012	0.300	PASS		
8	0.020	0.009	0.200	PASS		
9	0.040	0.018	0.200	PASS		
10	0.015	0.006	0.200	PASS		
11	0.049	0.021	0.100	PASS		
12	0.023	0.010	0.100	PASS		
13	0.036	0.016	0.100	PASS		
14	0.025	0.011	0.100	PASS		
15	0.029	0.012	0.100	PASS		
16	0.019	0.008	0.100	PASS		
17	0.014	0.006	0.100	PASS		
18	0.011	0.005	0.100	PASS		
19	0.058	0.025	0.100	PASS		
20	0.011	0.005	0.100	PASS		
21	0.006	0.003	0.100	PASS		
22	0.011	0.005	0.100	PASS		
23	0.040	0.017	0.100	PASS		
24	0.007	0.003	0.100	PASS		
25	0.022	0.010	0.100	PASS		
26	0.012	0.005	0.100	PASS		
27	0.023	0.010	0.100	PASS		

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28	0.008	0.003	0.100	PASS
29	0.029	0.013	0.100	PASS
30	0.007	0.003	0.100	PASS
31	0.011	0.005	0.100	PASS
32	0.010	0.004	0.100	PASS
33	0.023	0.010	0.100	PASS
34	0.006	0.003	0.100	PASS
35	0.011	0.005	0.100	PASS
36	0.009	0.004	0.100	PASS
37	0.027	0.012	0.100	PASS
38	0.012	0.005	0.100	PASS
39	0.017	0.007	0.100	PASS
40	0.008	0.003	0.100	PASS

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#### Maximum / Average Values

	Line 1
Maximum Values	
Frequen	cy 50 Hz
Voltage Ri	1S 231.2 V
Current Ri	1S 0.2227 A
Peak Curre	nt 0.8957 A
Fundamental Curre	nt 0.1099 A
Current Crest Fact	or 4.075
	-
Active Power	P 20.19 W
Power Fact	or 0.4042
I otal Harmonic Current (TH	-
Partial Odd Harmonic Current (POH	C) 0.02845 A
I otal Harmonic Distortion Current (IHD	-
Average Values	
Total Harmonic Current (TH	C)
Partial Odd Harmonic Current (POH	C) 0.02613 A
Total Harmonic Distortion Current (THD	C) -

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## **Maximum Harmonics**

#### Maximum Harmonics (Line 1)

Hn	Frequency	Current					
	[Hz]	eff [A]	eff[%]	of Limit [%]	Limit [A]	Time Window	
1	50.0	0.109	100.00	-	-	3701	
2	100.0	0.002	2.04	0.14	1.62	2794	
3	150.0	0.093	85.28	2.69	3.45	1533	
4	200.0	0.002	1.86	0.31	0.65	2714	
5	250.0	0.087	79.70	5.06	1.71	1532	
6	300.0	0.001	1.35	0.32	0.45	2739	
7	350.0	0.079	72.30	6.80	1.16	3598	
8	400.0	0.001	1.36	0.43	0.35	3669	
9	450.0	0.071	65.58	11.87	0.60	3591	
10	500.0	0.001	1.30	0.51	0.28	3224	
11	550.0	0.063	57.65	12.65	0.50	3583	
12	600.0	0.001	1.07	0.50	0.23	2483	
13	650.0	0.053	48.80	16.83	0.32	3586	
14	700.0	0.001	1.07	0.59	0.20	3355	
15	750.0	0.044	40.51	19.56	0.23	3591	
16	800.0	0.001	0.88	0.55	0.17	2718	
17	850.0	0.035	31.79	17.39	0.20	3592	
18	900.0	0.001	0.77	0.55	0.15	2529	
19	950.0	0.026	23.68	14.48	0.18	3607	
20	1000.0	0.001	0.62	0.49	0.14	3584	
21	1050.0	0.018	16.27	11.00	0.16	3679	
22	1100.0	0.001	0.58	0.50	0.13	580	
23	1150.0	0.011	10.38	7.68	0.15	3677	
24	1200.0	0.001	0.57	0.53	0.12	3364	
25	1250.0	0.007	6.40	5.15	0.14	3469	
26	1300.0	0.001	0.53	0.54	0.11	2690	
27	1350.0	0.006	5.42	4.71	0.13	6	
28	1400.0	0.001	0.59	0.65	0.10	1968	
29	1450.0	0.008	6.96	6.50	0.12	107	
30	1500.0	0.001	0.61	0.71	0.09	1670	
31	1550.0	0.008	7.45	7.44	0.11	842	
32	1600.0	0.001	0.60	0.75	0.09	3139	
33	1650.0	0.008	7.50	7.96	0.10	3643	
34	1700.0	0.001	0.61	0.82	0.08	1631	
35	1750.0	0.008	7.13	8.04	0.10	3343	

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36	1800.0	0.001	0.58	0.83	0.08	2860
37	1850.0	0.007	6.45	7.68	0.09	3678
38	1900.0	0.001	0.52	0.78	0.07	2827
39	1950.0	0.006	5.20	6.53	0.09	3564
40	2000.0	0.000	0.44	0.69	0.07	1181



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#### **Average Harmonics**

#### Average Harmonics (Line 1)

Hn	Frequency	Current				
	[Hz]	eff [A]	eff[%]	of Limit [%]	Limit [A]	
1	50.0	0.106	97.32	-	-	
2	100.0	0.002	1.50	0.15	1.08	
3	150.0	0.087	80.33	3.79	2.30	
4	200.0	0.002	1.48	0.37	0.43	
5	250.0	0.083	76.77	7.31	1.14	
6	300.0	0.001	0.98	0.36	0.30	
7	350.0	0.077	70.87	10.00	0.77	
8	400.0	0.001	1.04	0.49	0.23	
9	450.0	0.070	63.98	17.38	0.40	
10	500.0	0.001	1.05	0.62	0.18	
11	550.0	0.061	56.07	18.46	0.33	
12	600.0	0.001	0.80	0.57	0.15	
13	650.0	0.051	47.03	24.33	0.21	
14	700.0	0.001	0.82	0.68	0.13	
15	750.0	0.042	38.32	27.75	0.15	
16	800.0	0.001	0.64	0.60	0.12	
17	850.0	0.032	29.71	24.38	0.13	
18	900.0	0.001	0.57	0.60	0.10	
19	950.0	0.024	21.72	19.92	0.12	
20	1000.0	0.000	0.41	0.48	0.09	
21	1050.0	0.016	14.42	14.62	0.11	
22	1100.0	0.000	0.38	0.50	0.08	
23	1150.0	0.010	8.78	9.75	0.10	
24	1200.0	0.000	0.38	0.53	0.08	
25	1250.0	0.006	5.38	6.50	0.09	
26	1300.0	0.000	0.36	0.55	0.07	
27	1350.0	0.005	4.91	6.40	0.08	
28	1400.0	0.000	0.41	0.67	0.07	
29	1450.0	0.007	6.29	8.80	0.08	
30	1500.0	0.000	0.41	0.73	0.06	
31	1550.0	0.008	7.13	10.68	0.07	
32	1600.0	0.000	0.44	0.84	0.06	
33	1650.0	0.008	7.21	11.48	0.07	
34	1700.0	0.000	0.45	0.91	0.05	
35	1750.0	0.007	6.69	11.31	0.06	

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36	1800.0	0.000	0.42	0.90	0.05
37	1850.0	0.006	5.78	10.33	0.06
38	1900.0	0.000	0.38	0.84	0.05
39	1950.0	0.005	4.35	8.18	0.06
40	2000.0	0.000	0.31	0.73	0.05



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## 6.4 Voltage Fluctuations and Flicker Test

Test Requirement:	EN 61000-3-3:2013+A1:2019+A2:2021
Test Method:	EN 61000-3-3:2013+A1:2019+A2:2021

## 6.4.1 Equipment Under Test Operation

Operating Environment:

Ambient Temperature 23.3 °CRelative Humidity 54.7 %Atmospheric Pressure 1007.8 mbarOperation Mode:

The Equipment shall be operated continuously with turn-on mode.

#### 6.4.2 Test Setup Diagram

Test PC	Test Equipment	EUT	AE
		EUT	AE

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## 6.4.3 Measurement Data

Flicker Results						
	Standard Specific Results for EN 61000-3-3					
Standard Group:	Industry					
Standard Name:	EN 61000-3-3 Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current $\leq$ 16 A per phase and not subject to conditional connection					
Test Condition:	General Test Conditions					
Analysis Status:	PASS					

Flicker Measurements Settings					
Main line:	230V, 50Hz				
Flicker Meter:	230V / 50Hz				
Flicker Impedance:	Zref				
Observation Time:	12 × 10 min				
Measurements done:	12				

Flicker Measurements						
	Last V <sub>rms</sub> [V]	P <sub>lt</sub>	Max P <sub>st</sub>	Max D <sub>c</sub> [%]	Max D <sub>max</sub> [%]	Max T <sub>max</sub> [s]
Line 1:	231.211	0.136	0.137	0	< 0.2	0
Limits:		0.65	1	3.3	4	0.5
Results:		PASS	PASS	PASS	PASS	PASS

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# 7 Immunity Test Results

Performance Criteria Description of EN IEC 61000-6-2.

- Criterion A: The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
- Criterion B: The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed 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. However, during the test degradation of performance is allowed but no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
- Criterion C: Temporary loss of function is allowed during the test, provided the function is self-recoverable or can be restored by the operation of the controls.

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## 7.1 Electrostatic Discharge Test

Test Requirement:	EN IEC 61000-6-2:2019	
Test Method:	EN 61000-4-2:2009	
Criterion Required:	В	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge	8 kV
	Contact Discharge	4 kV
	Vertical Coupling Plane	4 kV
Number of Discharge:	Minimum 10 times at each	test point
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	

## 7.1.1 Equipment Under Test Operation

 Operating Environment:
 Ambient Temperature 25.8 °C
 Relative Humidity 55.0 %
 Atmospheric Pressure 1008.3 mbar

 Operation Mode:
 The Equipment shall be operated continuously with turn-on mode.
 The Equipment shall be operated continuously with turn-on mode.

## 7.1.2 Test Setup Diagram



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## 7.1.3 Test Results

## Operation Mode: Standby

Discharge Type	Level	Polarity	Test Point	Results (Performance Criteria)
Air Discharge	8 kV	+	1	А
Air Discharge	8 kV	-	1	А
Contact Discharge	4 kV	+	2	А
Contact Discharge	4 kV	-	2	А
Vertical Coupling Plane	4 kV	+	3	А
Vertical Coupling Plane	4 kV	-	3	А

## Operation Mode: On

Discharge Type	Level	Polarity	Test Point	Results (Performance Criteria)
Air Discharge	8 kV	+	1	А
Air Discharge	8 kV	-	1	А
Contact Discharge	4 kV	+	2	А
Contact Discharge	4 kV	-	2	А
Vertical Coupling Plane	4 kV	+	3	А
Vertical Coupling Plane	4 kV	-	3	А

Results (Performance Criteria):

A = No degradation in the performance of the equipment under test was observed.

Remark:

Test Point:

1 = All insulated enclosure & seams.

2 = All accessible metal parts of the enclosure.

3 = All side.

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## 7.2 Radio Frequency Electromagnetic Fields Test

Test Requirement:	EN IEC 61000-6-2:2019	
Test Method:	EN IEC 61000-4-3:2020	
Criterion Required:	A	
Test Level:	Frequency 80 MHz - 1000 MHz	: 10 V/m
	Frequency 1000 MHz - 6000 MHz	: 3 V/m
Antenna Distance:	3 m	
Antenna Polarity:	Vertical & Horizontal	
Modulation:	-	
Remark:	-	

## 7.2.1 Equipment Under Test Operation

Operating Environment:Ambient Temperature 25.3 °CRelative Humidity 55.4 %Atmospheric Pressure 1008.6 mbarOperation Mode:

The Equipment shall be operated continuously with turn-on mode.

## 7.2.2 Test Setup Diagram



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## 7.2.3 Test Results

Operation Mode: Standby

Frequency Range	Test Level	Step Size	Dwell Time	Results (Performance Criteria)
80.0 MHz – 1.0 GHz	10 V/m	1%	1s	А
1.0 GHz – 6.0 GHz	3 V/m	1%	1s	A

Operation Mode: On

Frequency Range	Test Level	Step Size	Dwell Time	Results (Performance Criteria)
80.0 MHz – 1.0 GHz	10 V/m	1%	1s	A
1.0 GHz – 6.0 GHz	3 V/m	1%	1s	A

Results (Performance Criteria):

A = No degradation in the performance of the equipment under test was observed.

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## 7.3 Fast Transients Test

Test Requirement:	EN IEC 61000-6-2:2019
Test Method:	EN 61000-4-4:2012
Criterion Required:	В
Test Level:	2.0 kV
Repetition Frequency:	5 kHz
Burst Duration:	300 ms

## 7.3.1 Equipment Under Test Operation

Operating Environment: Ambient Temperature 25.3 °C Rela Operation Mode:

Relative Humidity 55.4 %

Atmospheric Pressure 1009.1 mbar

The Equipment shall be operated continuously with turn-on mode.

## 7.3.2 Test Setup Diagram



#### 7.3.3 Test Results

Operation Mode: Standby

Line Under Test	Level	Polarity	Coupling	Results (Performance Criteria)
A.C. Mains Ports	2.0 kV	±	CDN	А

#### Operation Mode: On

Line Under Test	Level	Polarity	Coupling	Results (Performance Criteria)
A.C. Mains Ports	2.0 kV	±	CDN	А

Results (Performance Criteria):

A = No degradation in the performance of the equipment under test was observed.

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## 7.4 Surges Test

Test Requirement:	EN IEC 61000-6-2:2019
Test Method:	EN 61000-4-5:2014
Criterion Required:	В
Test Level:	1 kV Line to Neutral with 2 $\Omega$ Impedance
	2 kV Line to Earth and Neutral to Earth with 12 $\Omega$ Impedance
Surge Interval:	60 second between each surge
No. of Surges:	5 positive at 90° and 5 negative at 270°

## 7.4.1 Equipment Under Test Operation

Operating Environment: Ambient Temperature 26.5 °C Relative Humidity 58.5 % Atmospheric Pressure 1009.1 mbar Operation Mode: The Equipment shall be operated continuously with turn-on mode.

## 7.4.2 Test Setup Diagram



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## 7.4.3 Test Results

## Operation Mode: Standby

Line Under Test	Level	Polarity	Phase	Results (Performance Criteria)
Line – Neutral	1 kV	+	90°	А
Line – Neutral	1 kV	-	270°	А
Line – Earth	2 kV	+	90°	А
Line – Earth	2 kV	-	270°	А
Neutral – Earth	2 kV	+	90°	А
Neutral – Earth	2 kV	-	270°	А

## Operation Mode: On

Line Under Test	Level	Polarity	Phase	Results (Performance Criteria)
Line – Neutral	1 kV	+	90°	А
Line – Neutral	1 kV	-	270°	А
Line – Earth	2 kV	+	90°	А
Line – Earth	2 kV	-	270°	А
Neutral – Earth	2 kV	+	90°	А
Neutral – Earth	2 kV	-	270°	А

Results (Performance Criteria):

A = No degradation in the performance of the equipment under test was observed.

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## 7.5 Injected Currents Test

Test Requirement:	EN IEC 61000-6-2:2019
Test Method:	EN 61000-4-6:2014
Frequency Range:	150 kHz - 80 MHz
Criterion Required:	A
Test level:	10 Vr.m.s (Unmodulated) with $150\Omega$ source impedance
Modulation:	1 kHz, 80% Amplitude Modulation
Step Size:	1 %

## 7.5.1 Equipment Under Test Operation

 Operating Environment:
 Ambient Temperature 26.5 °C
 Relative Humidity 55.7 %
 Atmospheric Pressure 1010.2 mbar

 Operation Mode:
 The Equipment shall be operated continuously with turn-on mode.
 Example 100.2 mbar

## 7.5.2 Test Setup Diagram



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## 7.5.3 Test Results

## Operation Mode: Standby

Line Under Test	Test Level	Coupling	Dwell time	Results (Performance Criteria)
A.C. Mains Ports	10 Vr.m.s	CDN	1 s	A

#### **Operation Mode: On**

Line Under Test	Test Level	Coupling	Dwell time	Results (Performance Criteria)
A.C. Mains Ports	10 Vr.m.s	CDN	1 s	А

Results (Performance Criteria):

A = No degradation in the performance of the equipment under test was observed.

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## 7.6 Voltage Dips and Voltage Interruptions Test

Test Requirement:	EN IEC 61000-6-2:2019		
Test Method:	EN IEC 61000-4-11:2020		
Criterion Required:	Voltage dip:	0% of UT	= B
	Voltage dip:	40% of UT	= C
	Voltage dip:	70% of UT	= C
	Voltage interruption:	0% of UT	= C
Test level:	Voltage dip:	0% of UT for	1.0 Cycle
	Voltage dip:	40% of UT fo	r 10 Cycle
	Voltage dip:	70% of UT fo	r 25 Cycle
	Voltage interruption:	0% of UT for	250 Cycle
Time between dropouts:	10 second		

#### 7.6.1 Equipment Under Test Operation

 Operating Environment:
 Ambient Temperature 25.9 °C
 Relative Humidity 53.6 %
 Atmospheric Pressure 1012.2 mbar

 Operation Mode:
 The Equipment shall be operated continuously with normal mode.
 Example 100 -

#### 7.6.2 Test Setup Diagram



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## 7.6.3 Test Results

## Operation Mode: Standby

%UT	Phase	Duration	No. of Dips / Interruptions	Results (Performance Criteria)
0	0°,180°	1 cycle	3	А
40	0°,180°	10 cycles	3	А
70	0°,180°	25 cycles	3	А
Interruptions 0	0°,180°	250 cycles	3	A

## Operation Mode: On

%U⊤	Phase	Duration	No. of Dips / Interruptions	Results (Performance Criteria)
0	0°,180°	1 cycle	3	А
40	0°,180°	10 cycles	3	А
70	0°,180°	25 cycles	3	А
Interruptions 0	0°,180°	250 cycles	3	В

Results (Performance Criteria):

- A = No degradation in the performance of the equipment under test was observed.
- B = Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

Remark: U<sub>T</sub> = 230 V

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## 7.7 Power frequency magnetic field (PFM) Immunity Test

Test Requirement:	EN IEC 61000-6-2:2019
Test Method:	EN 61000-4-8:2010
Power Frequency:	50 Hz
Criterion Required:	А
Test level:	4
Magnetic Field Strength:	30 A/m
Magnetic Field Orientation:	X, Y, Z

## 7.7.1 Equipment Under Test Operation

Operating Environment: Ambient Temperature 25.9 °C Relative Humidity 53.6 % Operation Mode: The Equipment shall be operated continuously with turn-on mode.

Atmospheric Pressure 1012.2 mbar





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## 7.7.3 Test Results

## Operation Mode: Standby

Magnetic Field Orientation	Magnetic Field (A/M)	Results (Performance Criteria)
X-axis	30	А
Y-axis	30	А
Z-axis	30	А

## Operation Mode: On

Magnetic Field Orientation	Magnetic Field (A/M)	Results (Performance Criteria)
X-axis	30	A
Y-axis	30	A
Z-axis	30	А

Remark:

Results (Performance Criteria):

A = No degradation in the performance of the equipment under test was observed.

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## 8 Photographs

## 8.1 Equipment Under Test Constructional Details



Front Side



Right Side

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Left Side



Rear Side

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Power Adapter components



Inside product components #1

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Inside product components #2



Inside product components #3

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## 8.2 Conducted Emissions Test Setup



#### 8.3 Radiated Emissions Test Setup



Frequency range 30 MHz – 1.0 GHz

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## 8.4 Harmonic Current Emissions Test Setup



8.5 Voltage Changes, Voltage Fluctuations and Flicker Test Setup



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## 8.6 Electrostatic Discharge Test Setup



## 8.7 Radio Frequency Electromagnetic Fields Test Setup



Frequency range 80.0 MHz – 1.0 GHz

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Frequency range 1.0 MHz - 6.0 GHz

## 8.8 Fast Transients Test Setup



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#### 8.9 Surges Test Setup



#### 8.10 Injected Currents Test Setup



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## 8.11 Voltage Dips and Voltage Interruptions Test Setup



#### 8.12 Power frequency magnetic field Test Setup



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