Test Report

Report No.	:	HA0123NB094289EM
Applicant	:	Yuyao Jinnan Electric Appliance Co., Ltd.
Address	:	No.1 Donggan South Road, Cao'e Village, Xiaocao'e Town, Yuyao City, Zhejiang , China
Trade Mark(s)	:	--
Manufacturer	:	Same as the applicant
Address	:	Same as the applicant
Manufacturing site	:	Same as the applicant
Address	:	Same as the applicant

Equipment Under Test (EUT):

EUT Name	:	Multifunctional Intelligent Digital Display Electric Inflator
Model/Type No.	:	JN-088, JN-058
Standards	:	Refer to page 2
Date of Receipt	:	September 19, 2023
Date of Test	:	September 21, 2023 to September 27, 2023
Date of Issue	:	September 28, 2023
Test Result	:	**PASS***

Prepared By:

Ningbo HATEK Co., Ltd.

6F, No. 65, Mujin Road, National Hi-Tech Zone, Ningbo, Zhejiang 315013, China

Tel: +86-574-87171888 E-mail: info@hatek.com.cn

Prepared By

Bill Dong

Engineer

Reviewed By

Miles Xie

Technical Manager

*The test results have been reviewed against the Directives above and found to meet their essential requirement. The results shown in this test report refer only to the sample(s) tested. This document cannot be reproduced except in full, without prior written approval of HATEK.

1 Test Summary

1.1 Test Items

Test Items	Result
Disturbance Voltage on Mains Terminal 0.15MHz- 30MHz	P
Discontinuous Disturbance Voltage/Click	N/A
Continuous Disturbance Power, 30MHz - 300MHz	N/A
Radiation Emission, 30MHz - 1000MHz	P
Harmonic Current	N/A
Voltage Fluctuations-Flicker	N/A
ESD	P
Radiated Immunity (80MHz - 1GHz)	P
Electrical Fast Transients (EFT)	P
Surge Immunity	P
Injected Currents, 0.15MHz - 230MHz	P
Voltage Dips and Interruptions	N/A
Remark:	P: Pass/ F: Fail/ N/A: Not Applicable

1.2 Test Specification

The equipment(s) comply with the requirements according to the following standards:

EN IEC 55014-1:2021 Electromagnetic compatibility-Requirements for household appliances, electric tools and similar apparatus Part1: Emission;

EN IEC 55014-2:2021 Electromagnetic compatibility-Requirements for household appliances, electric tools and similar apparatus Part2: Immunity;

Contents

2 General Information

2.1 Client Information

Applicant : Yuyao Jinnan Electric Appliance Co., Ltd.

Address : No.1 Donggan South Road, Cao'e Village, Xiaocao'e Town, Yuyao City, Zhejiang , China

2.2 General Description of E.U.T.

Rated input voltage	:	DC 5V by USB Port DC 7.4V by Battery
Protection class	:	Class III

2.3 Identifies and differences:

All models have the same circuit principle, but differ in appearance.

Therefore, we test JN-088 and the worst test data is listed in the report as representative.

2.4 Environment

☒ Residential (domestic) environment

☒ Commercial and light-industrial environment

☐ Industrial environment

☐ Medical environment.

2.5 Submitted Documents

Constructional Data Form for EMC

Circuit diagram, user's manual, labels and construction drawings etc.

3 Test Facility and Instrument list

3.1 Test Facility

All the tests done in this report are subcontracted to Shenzhen Most Technology Service Co., Ltd. (No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong. China)

3.2 Instrument list

Table 1: List of Test and Measurement Equipment of Laboratory

Shielding Room - Disturbance Voltage Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	R&S	ESR3	102043	08/25/2024
LISN	R&S	ENV216	102058	08/25/2024
Absorbing Clamp	R&S	MDS21	100789	06/10/2024
ESD Simulator	EM-TEST	ESD 30N	P1526159867	11/19/2023
3M Chamber & Accessory Equipment	TDK	SAC-3	----	---
Signal Generator	R&S	SMB100A	179680	08/25/2024
Stacked double Log.-Per. Antenna	R&S	HL046E	-----	N/A
Power Amplifier	R&S	BBA150-BC1000	102131	08/25/2024
Power Amplifier	BONN	1060-400/100D	1610682	N/A
Stacked Double Log-Per Antenna	SCHWARZBECK	STLP9149	9149435	N/A
Compact Generator	EM-TEST	UCS500N7	P1608172945	08/25/2024
coupling/decoupling network	EM-TEST	CNI503B7	P1626181212	08/25/2024
Motorized Variac	EM-TEST	MV2616	P1532162313	08/25/2024
Signal Generator	R&S	SMC100A	105636	08/25/2024
Power Amplifier	R&S	BBA150A200B250	102124	08/25/2024
Attenuator	Bird	300-A-FFN-06	1617	08/25/2024
CDN	FCC	FCC-801-M2/M3-16A	170209	08/25/2024
Harmonic & Flicker System	EM-TEST	DPA 503N& AIF 503N32.1	P1545166605 & P1613178045	08/25/2024
Muitifunction AC/DC Power Source	EM-TEST	NetWave 30-400	P1613178144	08/25/2024

3.3 Measurement Uncertainty

Conducted Emission (9-150KHz)	:	U = 3.6 dB
Conducted Emission (150K-30MHz)	:	U = 3.6 dB
Disturbance Power	:	U = 3.6 dB
Radiated Emission (30-1000MHz)	:	U = 4.5 dB
Radiated Emission (1- 6GHz)	:	U = 5.5dB

Expanded Measurement Uncertainty (K=2)

4 Test Results EMISSION

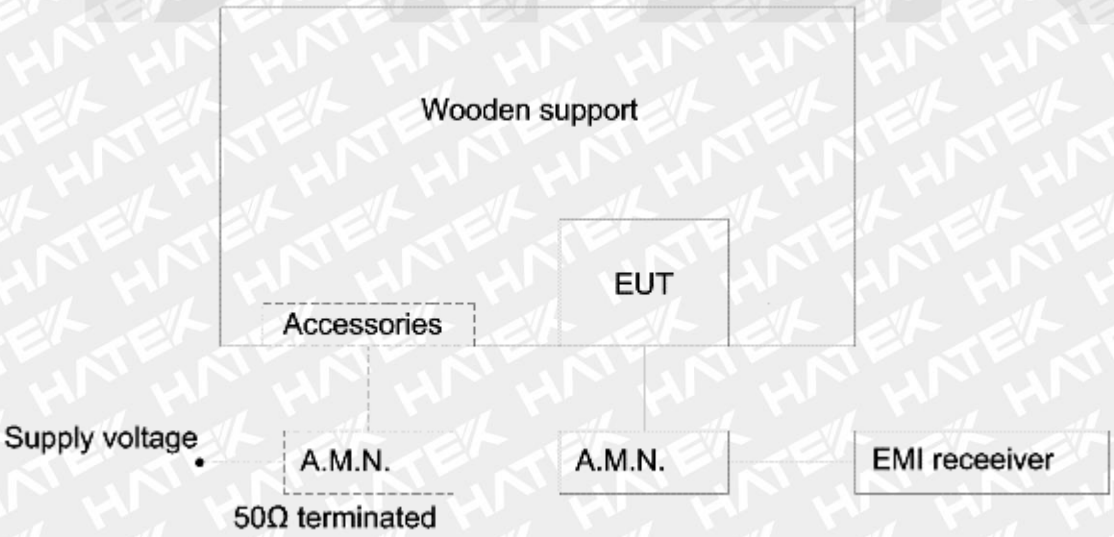
4.1 Emission in the Frequency Range from 0 kHz to 30 MHz

4.1.1 Mains Terminal Continuous Disturbance Voltage

General test information

Test procedure	:	EN IEC 55014-1:2021 and CISPR 16-1 series standards
Frequency range	:	0.15-30MHz
Kind of test site	:	EMC Chamber
Temperature	:	25 °C
Relative Humidity	:	51 %RH
Operational condition	:	Charging
Artificial hand	:	Yes
Earthing	:	Through artificial hand to AMN.
Test result	:	Pass

Block Diagram of Test Set up



☒For table top equipment, wooden support is 0.8m height.

☐ For floor standing equipment, wooden support is 0.1m height.

Test Procedure

The measurement setup was made according to EN IEC 55014-1:2021 in an EMC Chamber.

Prior to the measurements the test object operated about 15 minutes (warm-up) in order to stabilize its operating conditions and to ensure reliable measurement values.

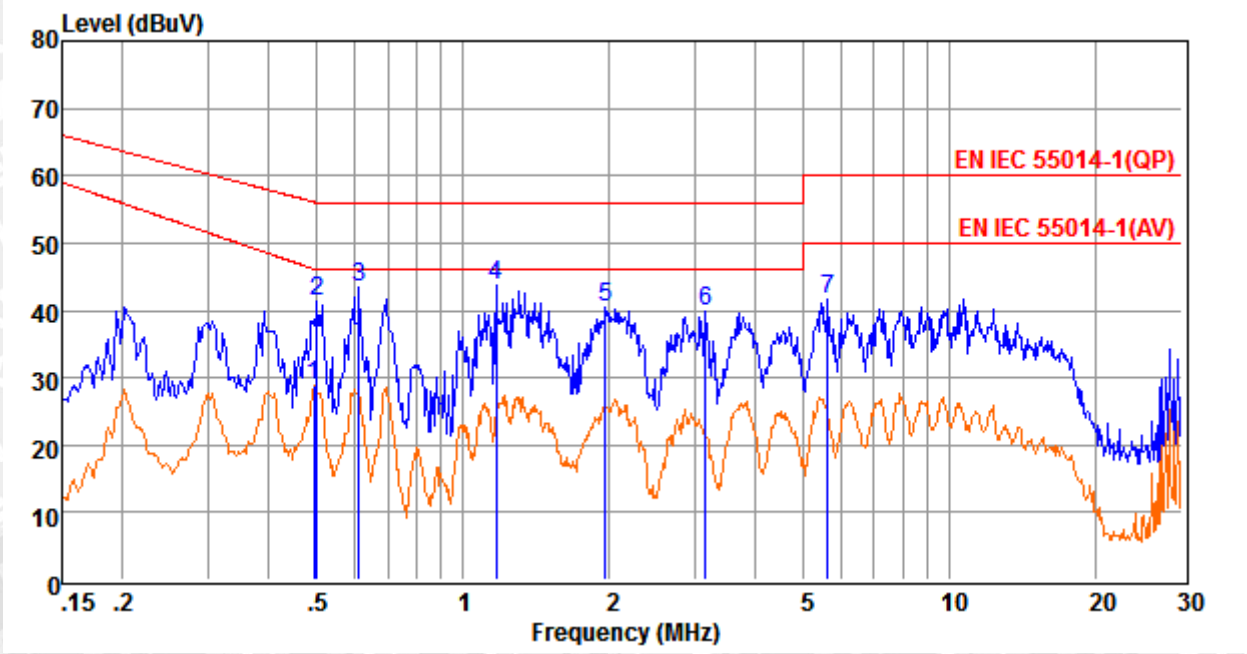
Furthermore an internal calibration with the test receiver was conducted prior to each measurement. And the measurement was made in the state the maximum disturbance was obtained.

The tested object was set-up on a wooden table. The length of the power cord of the tested object was about 1.5m. The EUT was set 0.8m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3m and 0.4m. The EUT (Equipment under Test) was wrapped with artificial hand that was earthed through the Artificial Mains Network (AMN).

The Interference Voltage was determined according to clause 5 of EN IEC 55014-1:2021 while measuring the line and neutral conductor by turns.

In the Figures, the symbol "+" means Quasi-Peak Value and the symbol "×" means Average Value which was measured in final measurement.

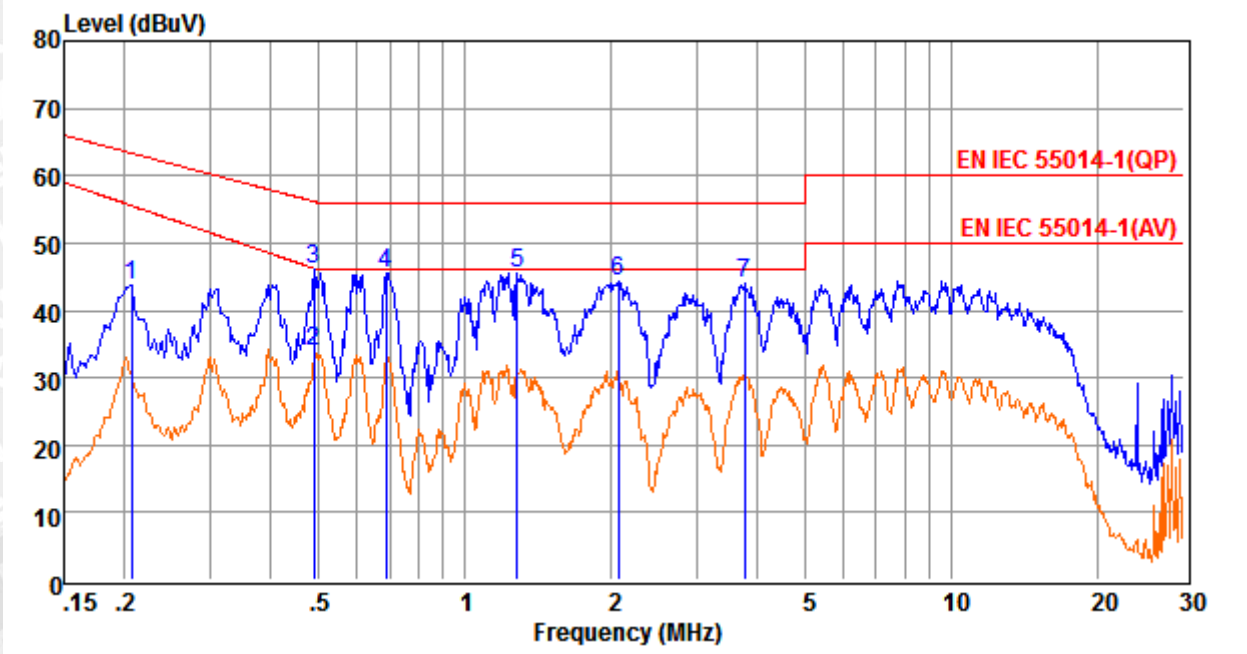
Figure 1: Test Curve of Conducted Emission in the frequency range of 150kHz - 30MHz, L line



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.49	19.01	9.74	0.00	28.75	46.13	-17.38	Average
2	0.50	31.56	9.74	0.00	41.30	56.00	-14.70	Peak
3	0.61	33.82	9.73	0.00	43.55	56.00	-12.45	Peak
4	1.17	33.81	9.76	0.00	43.57	56.00	-12.43	Peak
5	1.96	30.64	9.83	0.00	40.47	56.00	-15.53	Peak
6	3.16	30.00	9.75	0.00	39.75	56.00	-16.25	Peak
7	5.62	31.99	9.77	0.00	41.76	60.00	-18.24	Peak

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.

Figure 2: Test Curve of Conducted Emission in the frequency range of 150kHz - 30MHz, N line



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.21	33.93	9.75	0.00	43.68	63.36	-19.68	Peak
2	0.49	24.01	9.82	0.00	33.83	46.24	-12.41	Average
3	0.49	36.28	9.82	0.00	46.10	56.19	-10.09	Peak
4	0.69	35.79	9.77	0.00	45.56	56.00	-10.44	Peak
5	1.28	35.61	9.86	0.00	45.47	56.00	-10.53	Peak
6	2.07	34.38	9.85	0.00	44.23	56.00	-11.77	Peak
7	3.76	34.20	9.76	0.00	43.96	56.00	-12.04	Peak

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.

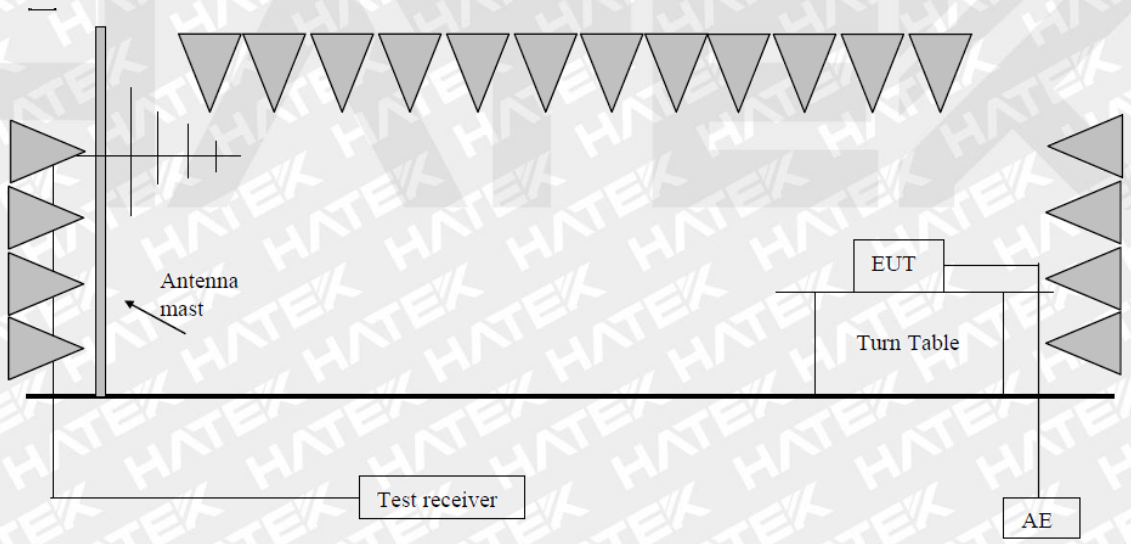
4.2 Emission in the Frequency Range from 30 MHz to 1000 MHz

4.2.1 Radiated disturbance

General test information

Frequency Range	:	30 – 1000MHz
Kind of test site	:	EMC Chamber
Temperature	:	25 °C
Relative Humidity	:	51 %RH
Operational condition	:	Charging+Working
Port	:	Mains
Limit	:	EN IEC 55014-1:2021, Table 3, Household and similar appliances
Test result	:	Pass

Block Diagram of Test Set up



☒ For table top equipment, wooden support is 0.8m height.

☐ For floor standing equipment, wooden support is 0.1m height.

Measuring configuration and description

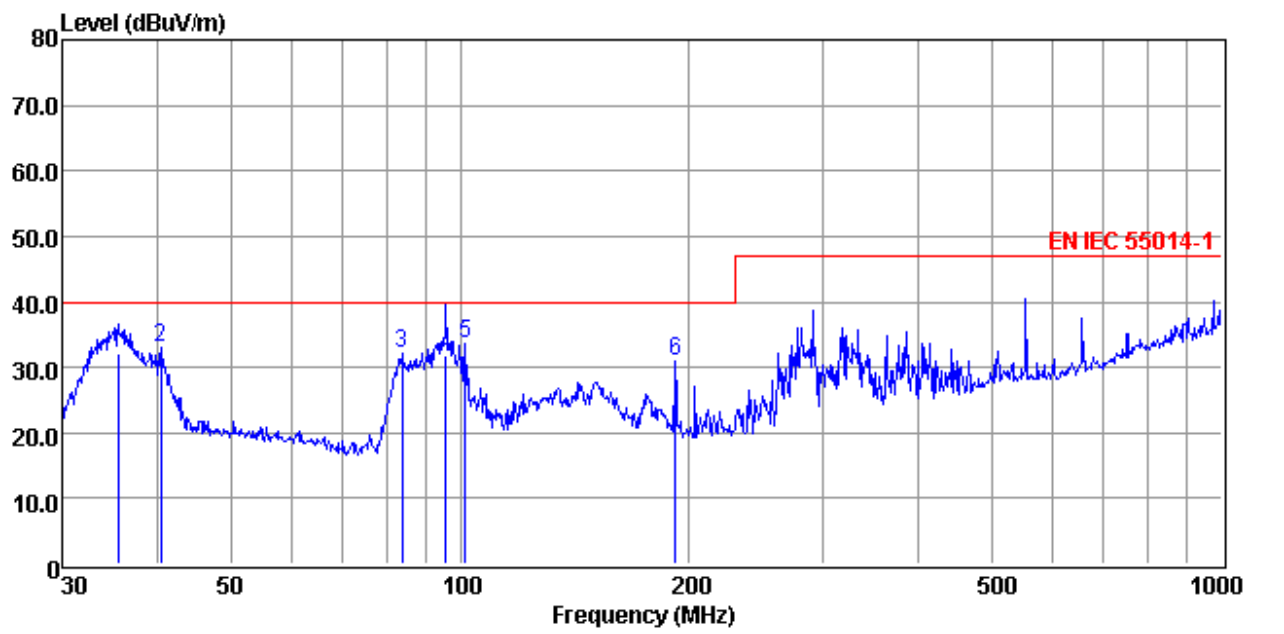
The measurement was applied in a semi-anechoic chamber. Measurement was performed according to CISPR 22. Setting of EUT is according to clause 7 of EN 55014-1. The bandwidth setting on Test Receiver was 120kHz. The frequency range from 30MHz to 1000MHz was checked.

The radiated disturbance test was performed in a 3m semi-anechoic chamber. The test distance is 3m. The 10m radiated emission limits are converted to 3m radiated emission limits by an inverse proportionality of 20 dB per decade. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 0.8m high wooden support above the reference ground plane. The turntable was rotated 360° around and the antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

The following figures were those measured and recorded by a test receiver. The curves in the figure were those measured with a Peak detector. The symbol "◆" in the figures are those of QP value which were measured in final measurement. Quasi-peak measurements were only performed at those critical frequencies obtained during the test with Peak Detector.

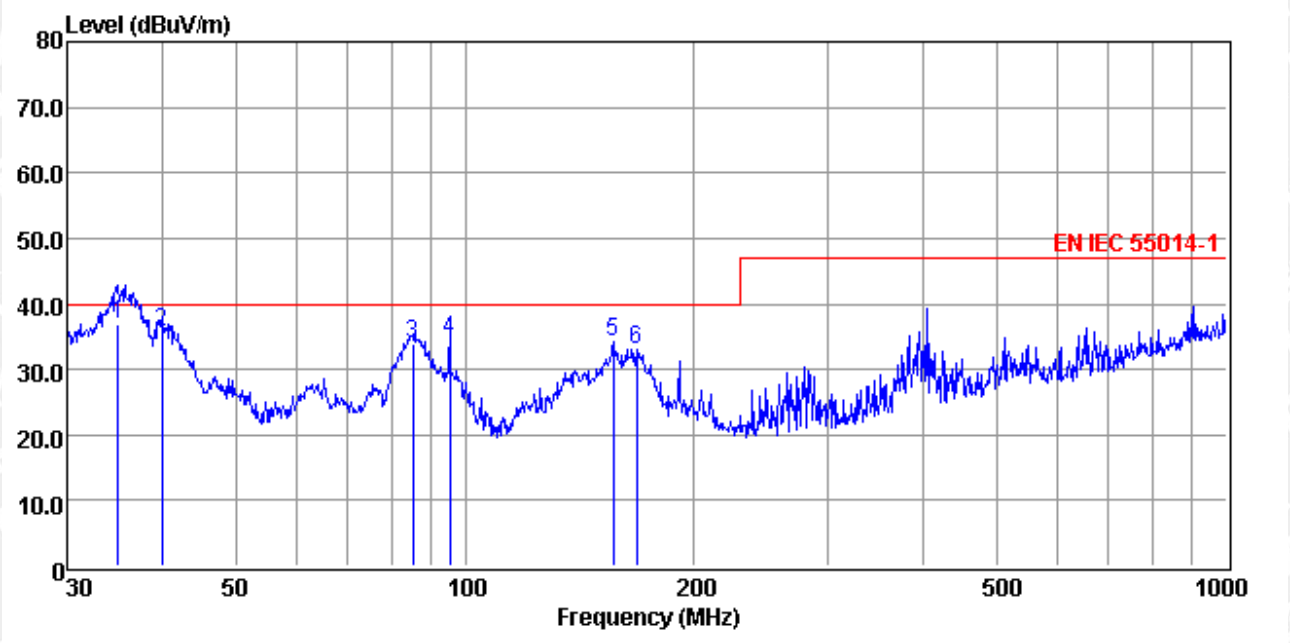
Remark: AC mode and DC mode were both tested, and most unfavorable test data of AC mode is recorded. And all the tests were carried out using AC/DC transformer for power supply.

Figure 3: Test Curve of Radiated Emission in the frequency range of 30-1000MHz, Horizontal (Charging)



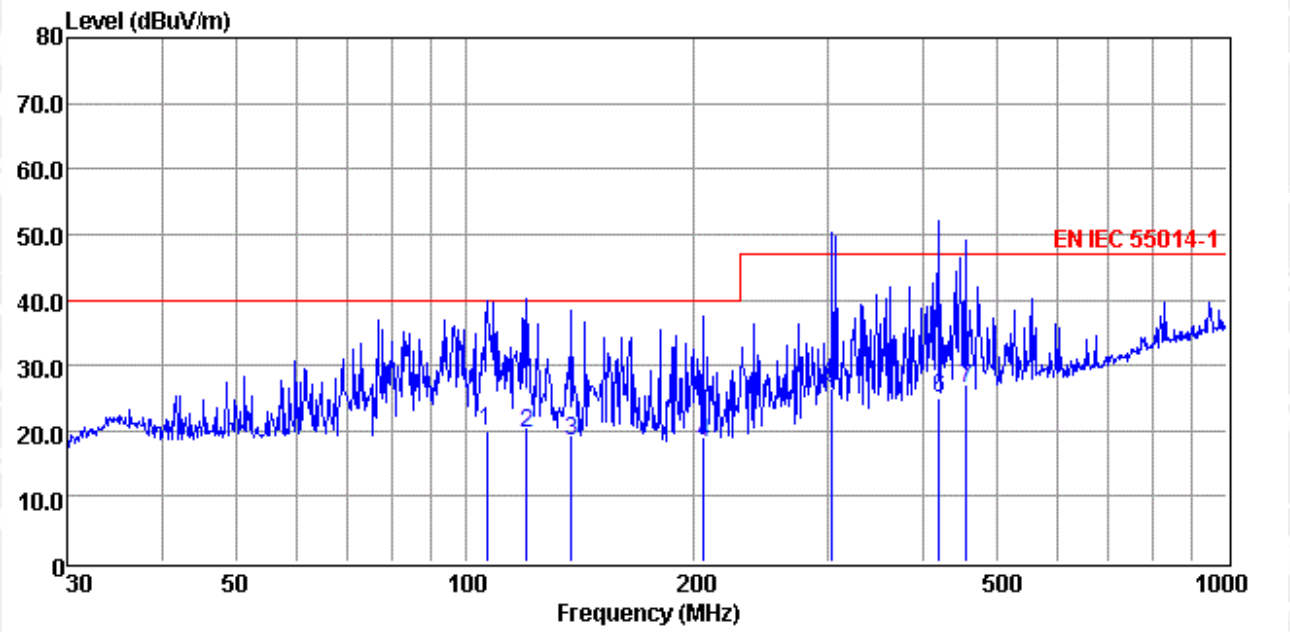
	Freq	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	35.50	44.00	2.18	15.43	29.64	31.97	40.00	-8.03	QP
2	40.42	47.23	2.27	13.21	29.63	33.08	40.00	-6.92	Peak
3	83.82	50.01	2.90	8.98	29.82	32.07	40.00	-7.93	Peak
4	95.76	49.60	3.04	9.21	29.88	31.97	40.00	-8.03	QP
5	101.64	50.76	3.09	9.66	29.90	33.61	40.00	-6.39	Peak
6	191.75	46.56	3.95	10.14	29.81	30.84	40.00	-9.16	Peak

Figure 4: Test Curve of Radiated Emission in the frequency range of 30-1000MHz, Vertical (Charging)



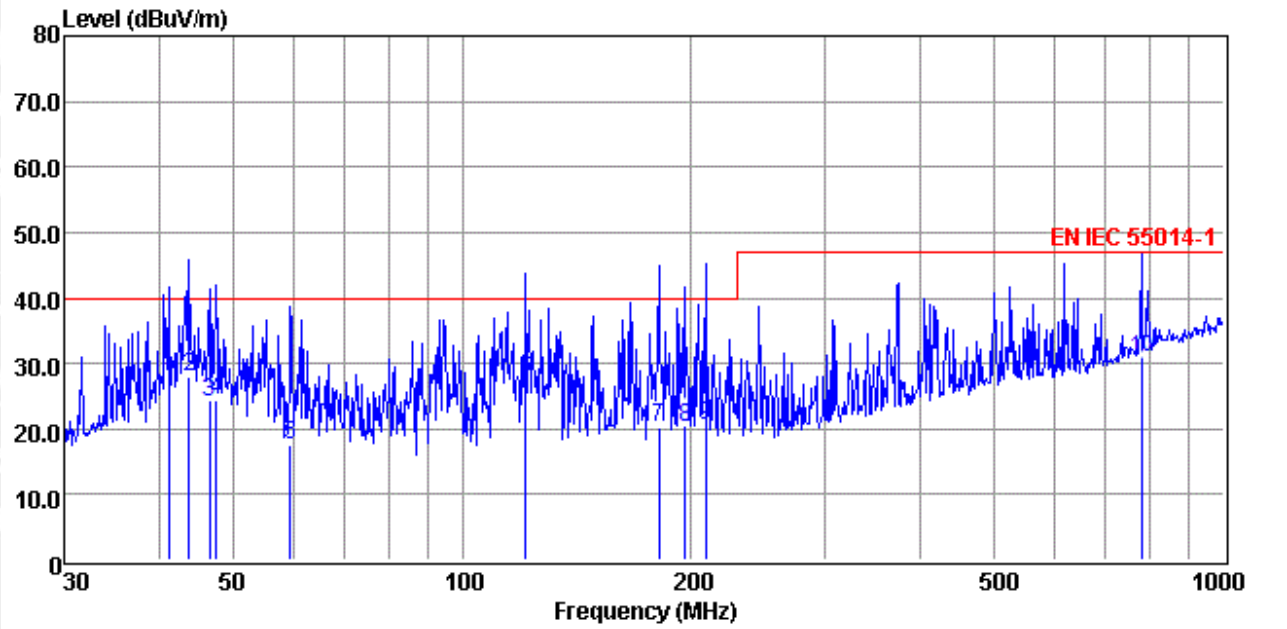
	Freq	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	35.00	48.80	2.17	15.70	29.64	37.03	40.00	-2.97	QP
2	39.99	50.01	2.26	13.20	29.63	35.84	40.00	-4.16	QP
3	85.30	51.99	2.92	8.94	29.83	34.02	40.00	-5.98	QP
4	95.43	52.30	3.03	9.19	29.88	34.64	40.00	-5.36	QP
5	156.46	47.35	3.61	13.10	29.84	34.22	40.00	-5.78	Peak
6	167.82	47.14	3.73	12.11	29.83	33.15	40.00	-6.85	Peak

Figure 5: Test Curve of Radiated Emission in the frequency range of 30-1000MHz, Horizontal (Working)



	Freq	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	106.76	36.60	3.13	10.15	29.89	19.99	40.00	-20.01	QP
2	120.28	35.39	3.23	11.32	29.87	20.87	40.00	-19.13	QP
3	137.90	32.38	3.42	12.47	29.85	18.42	40.00	-21.58	QP
4	204.96	33.17	4.05	10.08	29.82	17.48	40.00	-22.52	QP
5	303.54	38.80	4.84	12.82	30.12	26.34	47.00	-20.66	Peak
6	419.11	33.81	5.35	16.16	30.37	24.95	47.00	-22.05	QP
7	454.31	36.78	5.44	17.14	30.43	28.93	47.00	-18.07	QP

Figure 6: Test Curve of Radiated Emission in the frequency range of 30-1000MHz, Vertical (Working)



	Freq	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	41.13	38.32	2.28	13.24	29.62	26.45	40.00	-13.55	QP
2	43.81	41.91	2.32	13.32	29.62	27.93	40.00	-12.07	QP
3	46.50	42.10	2.36	13.40	29.61	24.65	40.00	-15.35	QP
4	47.49	38.10	2.38	13.43	29.61	24.30	40.00	-15.70	QP
5	59.44	32.10	2.56	12.46	29.67	17.45	40.00	-22.55	QP
6	121.12	42.90	3.24	11.38	29.87	27.65	40.00	-12.35	QP
7	181.28	35.69	3.86	10.46	29.81	20.20	40.00	-19.80	QP
8	195.82	35.43	3.98	10.02	29.80	20.76	40.00	-19.24	QP
9	208.58	35.99	4.07	10.21	29.83	20.44	40.00	-19.56	QP
10	779.61	40.66	6.69	22.29	30.88	31.76	47.00	-15.24	QP

5 Test Results I M M U N I T Y

Performance criterion:

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Room temperature	:	24-26 °C
Relative Humidity	:	45-58%

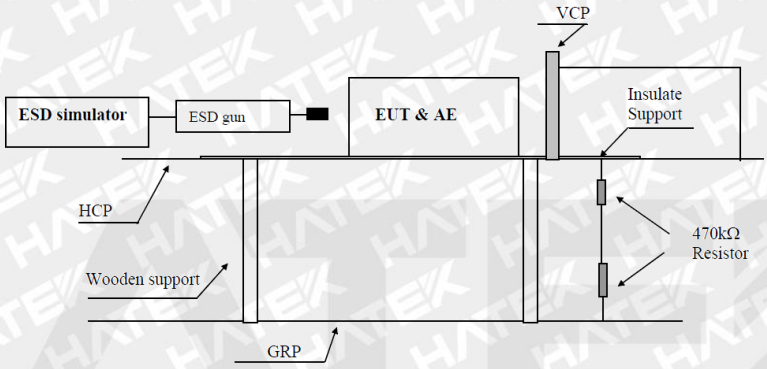
Conclusion： Pass

5.1 Enclosure

5.1.1 Electrostatic Discharge

Charge voltage	:	±4.0kV (Conducted Discharge)
		±8.0kV (Air Discharge)
Polarity	:	positive / negative
Number of discharges	:	>10
Performance criteria	:	B

Block Diagram of Test Set up



☒ For table top equipment, wooden support is 0.8m height.

☐ For floor standing equipment, wooden support is 0.1m height.

Test Procedure

The immunity against electrostatic discharge was tested in accordance with EN IEC 55014-2:2021. Test setup and ESD-Generator are according to EN 61000-4-2 which is specified by EN IEC 55014-2:2021.

The EUT is placed on 0,8m wood table above the ground plane. And the minimum distance between the EUT and all other conductive structures except the ground plane beneath the EUT is more than 0,5m. The reference ground plane is an aluminium sheet of 0,25mm minimum thickness. The reference ground plane is connected to the protective earth. The size of the ground plane is 2m × 2m.

A horizontal coupling plane (HCP), 1,6m × 0,8m, is placed on the table and isolated from the EUT and cables by an insulating support 0,5mm thick. Vertical coupling plane (VCP) of dimensions 0,5m × 0,5m is placed parallel to and positioned at a distance of 0,1m from the EUT.

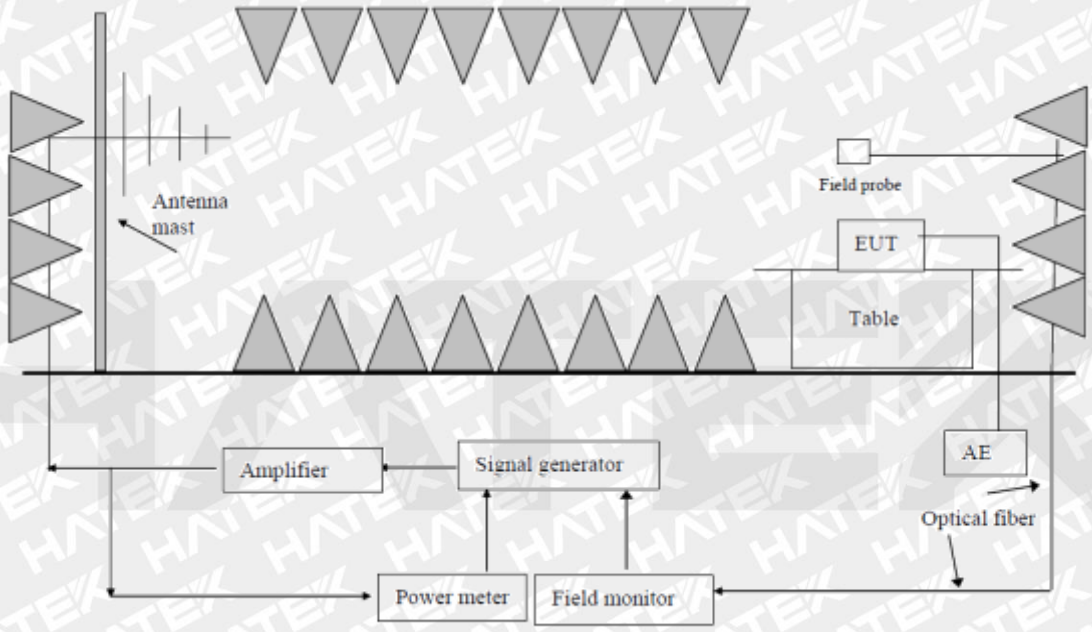
Table 2: ESD, Positive / Negative Polarity

Position	Kind of Discharge	Remarks	Result
Accessible nonmetal Enclosure	Air discharge ±8kV	No change of function	Pass
Metal Enclosure	Contact discharge ±4kV	No change of function	Pass
Coupling plane (Both HCP and VCP)	Contact discharge ±4kV	No change of function	Pass

5.1.2 Radio Frequency Electromagnetic Field

Test Level	:	3V/m
Frequency Range	:	80-1000MHz
Modulation	:	80%AM, 1kHz
Frequency Sweep Speed	:	0.005 octave/s (1.5×1E-3 decades/s)
Performance Criteria	:	A

Block Diagram of Test Set up



Test Procedure

The immunity against radio-frequency electromagnetic fields in the frequency range between 80MHz to 1000MHz was tested in accordance to IEC 61000-4-3 which is specified by Table 11 in EN IEC 55014-2:2021.

The test was performed inside a 3m modified semi-anechoic chamber. During the test the part of the ground plane between the field generating antenna and the equipment under test was covered by absorbing material. The distance between the tip of the antenna and the side of the system tested is 3m. The field uniformity of the 1.5mx1.5m plane where the surface of the EUT tested coincides with is regularly calibrated to ensure the 0-6dB field uniformity criterion as specified by IEC 61000-4-3 is met.

Table 3: Radiated Susceptibility, Field Strength 3V/m, Frequency 80MHz to 1000MHz

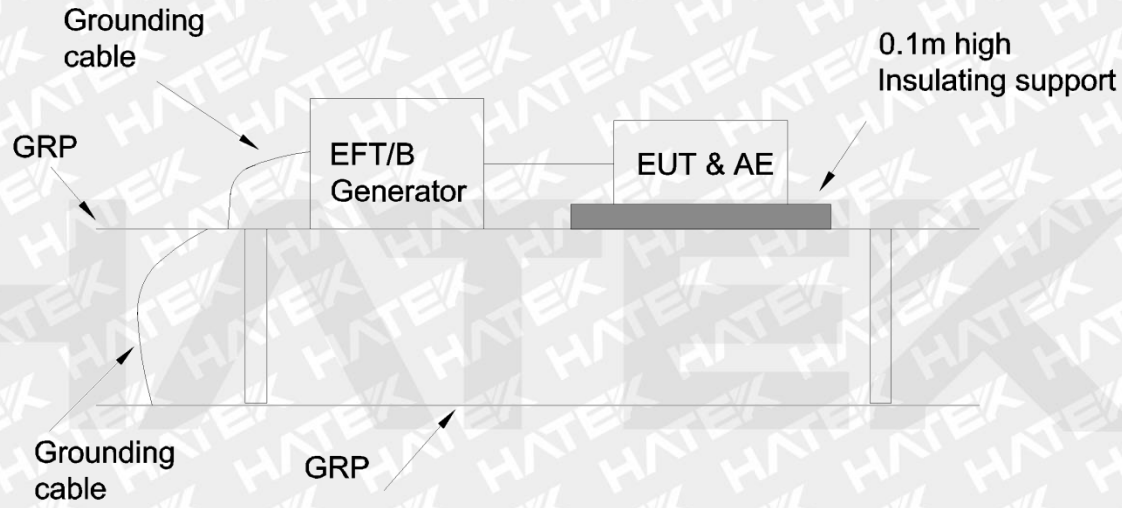
Position	Result	Remarks	Performance criterion
EUT in vertical orientation	Pass	No disturbance of function	A
EUT in horizontal orientation	Pass	No disturbance of function	A

5.2 Input and Output AC Power Ports

5.2.1 Fast Transients on AC and DC Power Lines

Test Voltage	:	±1kV
Polarity	:	negative/positive
Repetition frequency	:	5kHz
Test duration	:	≥120sec
Tr/Tn	:	5ns/50ns
Performance criteria	:	B

Block Diagram of Test Set up



Test Procedure

The immunity against fast transients on AC and DC power lines was tested in accordance to EN IEC 55014-2:2021. Test setup and the fast transient noise generator are according to EN 61000-4-4 which is specified by EN IEC 55014-2:2021.

The EUT is placed on 0,1m wood table above the ground plane. And the minimum distance between the EUT and all other conductive structures except the ground reference plane is more than 0,5m.

The length between the coupling device and the EUT is less than 1m. The cord length more than 1m, the excess length of the cable shall gathered into a flat coil with a 0,4m diameter, and situated at a distance of 0,1m above the ground reference plane.

The reference ground plane is an aluminium sheet of 0,25mm minimum thickness. The reference ground plane is connected to the protective earth. The size of the ground plane is 2m × 2m.

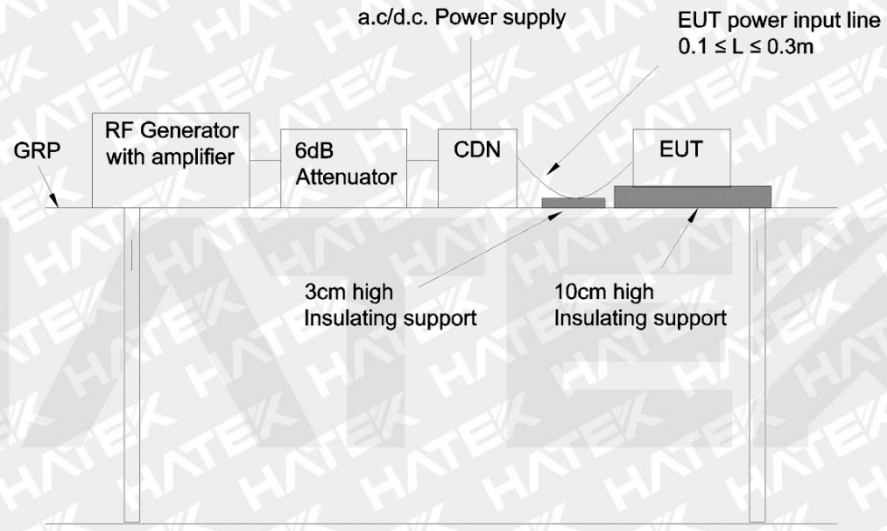
Table 4: Burst, AC Power lines, Positive and Negative Polarity

Line	Result	Remark
AC Input (L+N)	±1kV Pass	No disturbance of function

5.2.2 Injected Current into AC Power Port

Voltage Level	:	3V(rms)(unmodulated)
Environmental phenomena	:	r.f. current, common mode, 1kHz, 80%AM
Source impedance	:	150Ω
Frequency range	:	0.15-230 MHz
Sweeping rate	:	≤1,5 × 10^{-3} decades/s
Performance criteria	:	A

Block Diagram of Test Set up



Test Procedure

The immunity against injected current into AC power port was tested according to EN IEC 55014-2:2021 in a shielded room. The Test setup and the test generator are according to EN 61000-4-6 which is specified by EN IEC 55014-2:2021.
The EUT is placed on 0,1m wood table above the ground plane. And the minimum distance between the EUT and all other conductive structures except the reference ground plane is more than 0,5m. The EUT comprised a single unit. The coupling and decoupling networks were inserted on the power supply connection. The coupling and decoupling networks was placed on the ground reference plane, making direct contact with it at about 0,1-0,3 meter from EUT. The cable between EUT and CDN is as short as possible and not bundled nor wrapped. The height of cable between the EUT and the coupling and decoupling networks above the ground reference plane was 50mm.

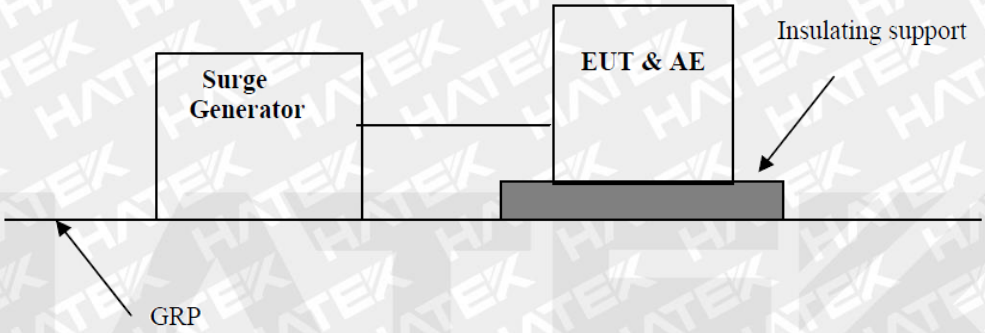
Table 5: Injected current, AC Power Port

Line	Coupling Method:	Remark	Result
AC Power Lines	CDN M-3	No disturbance of function	Pass

5.2.3 Surges to AC Power Port

Test Level	:	phase to neutral ±1kV phase/neutral to PE ±2KV
Tr/Tn	:	1.2/50μs (open-circuit voltage) 8/20μs (short-circuit current)
Test numbers	:	5 positive and 5 negative pulses
Repitition rate	:	1 surge/min
Performance criteria	:	B

Block Diagram of Test Set up



Test Procedure

The immunity against surges to AC power port was tested in accordance to EN IEC 55014-2:2021. Test setup and the Combination Wave Generator (CWG) are according to EN 61000-4-5 which is specified by EN IEC 55014-2:2021.
The EUT is placed on 0,1m wood table above the ground plane.

Table 6: Surges to AC Power lines, positive/negative

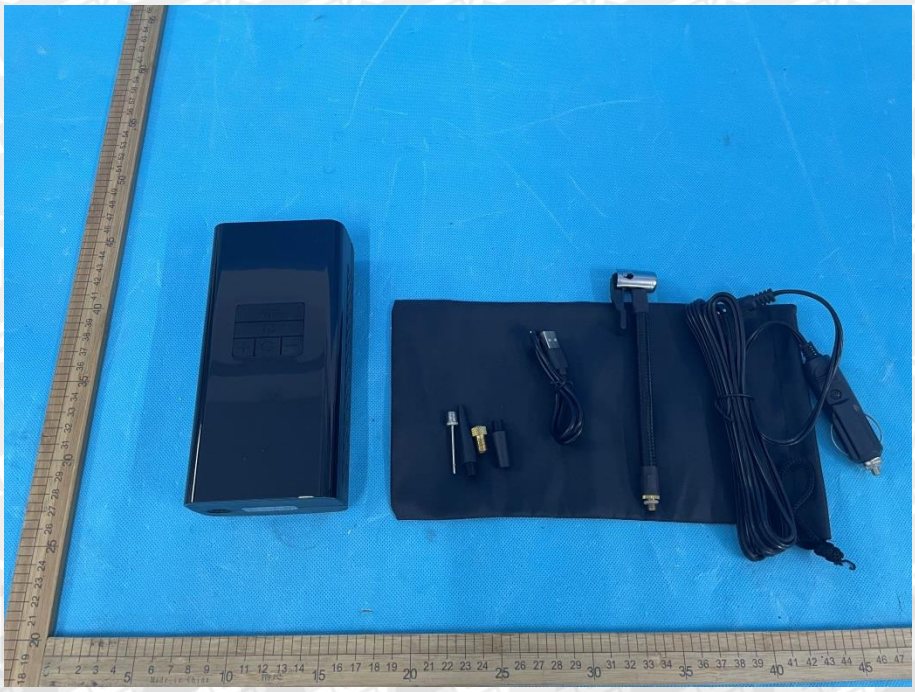
Line	Tested voltage/coupling phase	Test angle	Observation	Result
Phase to neutral	+1 kV, +π/2 (5 times) -1 kV, –π/2 (5 times)	90° 270°	No disturbance of function	Pass Pass

6 Photographs of the EUT

Photograph 1: Set-up for Disturbance Voltage

Photograph 2: Set-up for Radiated Emission

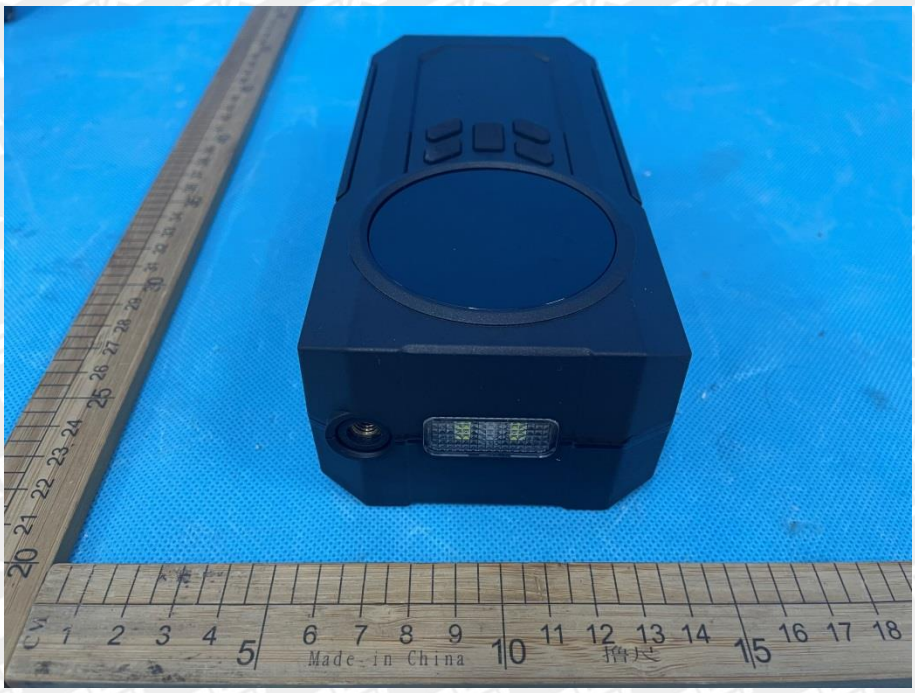
Photograph 3: Overall view of EUT (JN-058)



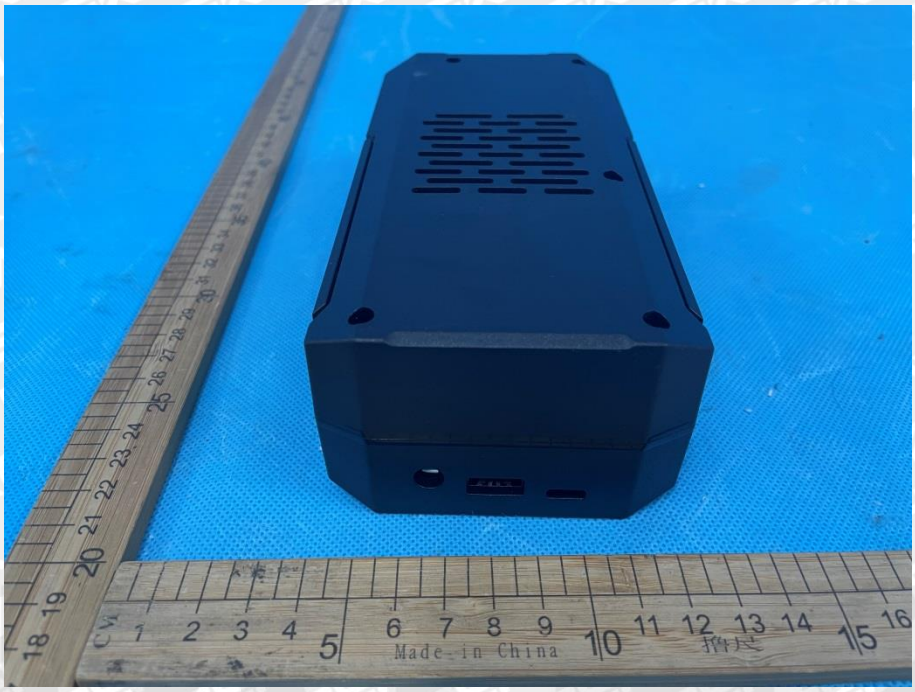
Photograph 4: Overall view of EUT (JN-058)

Photograph 5: Overall view of EUT (JN-088)

Photograph 6: Overall view of EUT (JN-088)



Photograph 7: Overall view of EUT (JN-088)



Photograph 8: Overall view of EUT (JN-088)

Photograph 9: Overall view of EUT (JN-088)

7 List of Tables

8 List of Figures

9 List of Photographs

---------- End of Test Report ----------