Test Report

Report No.	:	HA0122NB030905EM
Applicant	:	Zhejiang Wipcool Refrigeration Equipment Co., Ltd.
Address	:	No. 2, Changye Road, Chengdong District, Wenling, Taizhou, Zhejiang, China, 317500
Trade Mark(s)	:	--
Manufacturer	:	Zhejiang Wipcool Refrigeration Equipment Co., Ltd.
Address	:	No. 2, Changye Road, Chengdong District, Wenling, Taizhou, Zhejiang, China, 317500
Manufacturing site	:	Zhejiang Wipcool Refrigeration Equipment Co., Ltd.
Address	:	No. 2, Changye Road, Chengdong District, Wenling, Taizhou, Zhejiang, China, 317500

Equipment Under Test (EUT):

EUT Name	:	Condensate Pump
Model/Type No.	:	P180, P580, PC-125A, PC-125L, PC-125S, PC-600A
Standards	:	Refer to page 2
Date of Receipt	:	March 22, 2022
Date of Test	:	March 25, 2022 to May 19, 2022
Date of Issue	:	May 20, 2022
Test Result	:	**PASS***

Prepared By:

Ningbo HATEK Co., Ltd.

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Prepared By

Bill Dong

Engineer

Reviewed By

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 Terminal0.15MHz- 30MHz	P
Discontinuous Disturbance Voltage/Click	N/A
Continuous Disturbance Power, 30MHz - 300MHz	P
Radiation Emission, 30MHz - 1000MHz	N/A
Harmonic Current	P
Voltage Fluctuations-Flicker	P
ESD	P
Radiated Immunity (80MHz - 1GHz)	N/A
Electrical Fast Transients (EFT)	P
Surge Immunity	P
Injected Currents, 0.15MHz - 230MHz	P
Power Frequency Magnetic Field Immunity	N/A
Voltage Dips and Interruptions	P
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;

EN IEC 61000-3-2:2019+A1 : Limits for harmonic current emissions (equipment input current ≤16 A per phase);

EN 61000-3-3:2013+A1+A2: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

Contents

2 General Information

2.1 Client Information

Applicant : Zhejiang Wipcool Refrigeration Equipment Co., Ltd.

Address : No. 2, Changye Road, Chengdong District, Wenling, Taizhou, Zhejiang, China, 317500

2.2 General Description of E.U.T.

Rated input voltage	:	220-240V~, 50-60Hz
Rated input wattage	:	60W
Protection class	:	Class I

2.3 Identifies and differences:

All models are same except appearance size.
Model **P180** were selected to conduct full tests.

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	08/27/2022
LISN	R&S	ENV216	102058	08/27/2022
Absorbing Clamp	R&S	MDS21	100789	06/12/2022
ESD Simulator	EM-TEST	ESD 30N	P1526159867	11/20/2022
3M Chamber & Accessory Equipment	TDK	SAC-3	----	---
Signal Generator	R&S	SMB100A	179680	08/27/2022
Stacked double Log.-Per. Antenna	R&S	HL046E	-----	N/A
Power Amplifier	R&S	BBA150-BC1000	102131	08/27/2022
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	08/27/2022
coupling/decoupling network	EM-TEST	CNI503B7	P1626181212	08/27/2022
Motorized Variac	EM-TEST	MV2616	P1532162313	08/27/2022
Signal Generator	R&S	SMC100A	105636	08/27/2022
Power Amplifier	R&S	BBA150A200B250	102124	08/27/2022
Attenuator	Bird	300-A-FFN-06	1617	08/27/2022
CDN	FCC	FCC-801-M2/M3-16A	170209	08/27/2022
Harmonic & Flicker System	EM-TEST	DPA 503N& AIF 503N32.1	P1545166605 & P1613178045	08/27/2022
Muitifunction AC/DC Power Source	EM-TEST	NetWave 30-400	P1613178144	08/27/2022

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 Harmonics on AC Mains

General test information

Temperature	:	25°C
Relative Humidity	:	51 %RH
Test procedure	:	EN IEC 61000-3-2:2019+A1
Test duration	:	2.5min
Harmonic order	:	2 – 40th
Frequency range	:	0 – 2kHz
Test result	:	Pass

Block Diagram of Test Set up

Test Procedure

The harmonics on AC Mains in the frequency from 0 to 2 kHz were measured in accordance with EN IEC 61000-3-2:2019+A1.
The measurement of Harmonics of the fundamental current were measured up to 40 order harmonics using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system. This equipment is in compliance with the requirements of EN IEC 61000-3-2:2019+A1.
The results indicated in the following tables and figures were those measured and recorded by an automatic measuring system.

Test Results:

According to the Clause 7 in the EN IEC 61000-3-2:2019+A1
For the following categories of equipment, limits are not specified in this standard:
– equipment with a rated power of 75 W or less, other than lighting equipment;
This product is not defined as lighting equipment, and has rated power less than 75W, therefore, no limit apply according to EN IEC 61000-3-2:2019+A1

4.1.2 Voltage changes, voltage fluctuations and flicker on AC mains

General test information

Test procedure	:	EN 61000-3-3:2013+A1+A2
Temperature	:	25°C
Relative Humidity	:	51 %RH
Test result	:	Pass

Block Diagram of Test Set up

Test Procedure

According to the A.10 of the EN 61000-3-3:2013+A1+A2:

"For hand-held hairdryers, P_{lt} shall not be evaluated."

According to the characteristics of the sample, as specified by clause 5 of the basic standard, following limits apply:

- the value of Pst shall not be greater than 1.0;
- the value of Plt shall not be greater than 0.65;
- the value of *d(t)* during a voltage change shall not exceed 3.3% for more than 500ms;
- the relative steady-state voltage change, d_c, shall not exceed 3.3%;
- the maximum relative voltage change d_{max}, shall not exceed 7%.

The measurement was carried in accordance with Annex B of the basic standard and the EUT was set to produce the most unfavorable sequence of voltage changes. Following are the measurement results obtained via an automatic testing system.

Table 2: Voltage fluctuations and flicker measurement results

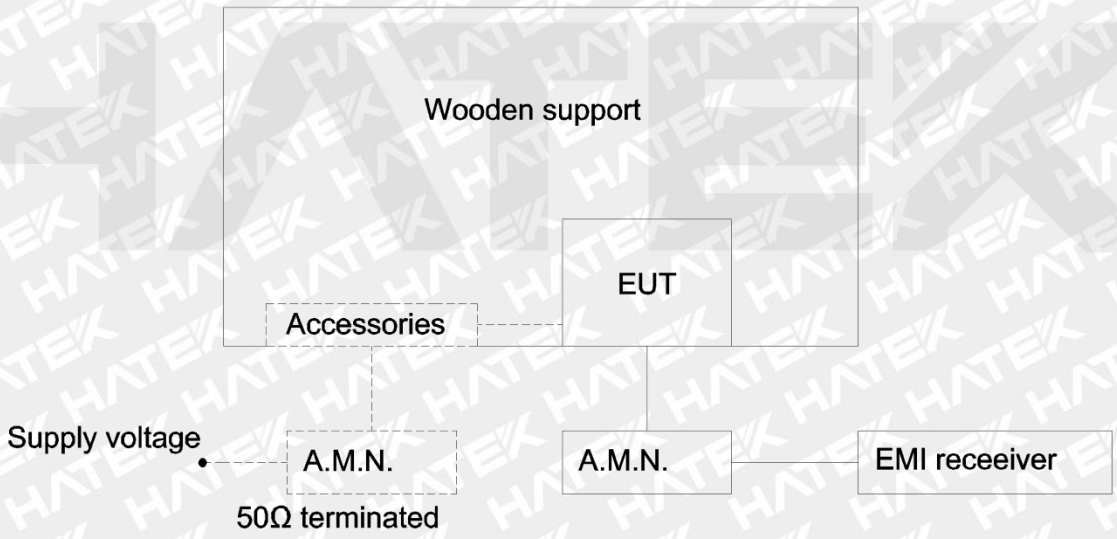
	d_c	d_{max}(average)	d(t)	P_{st}	P_{lt}
Limits	3.3%	7%	3.3%/500ms	1.0	N/A
Result	0.026%	0.032%	0.00ms	0.208	-

4.1.3 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	:	ON
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.

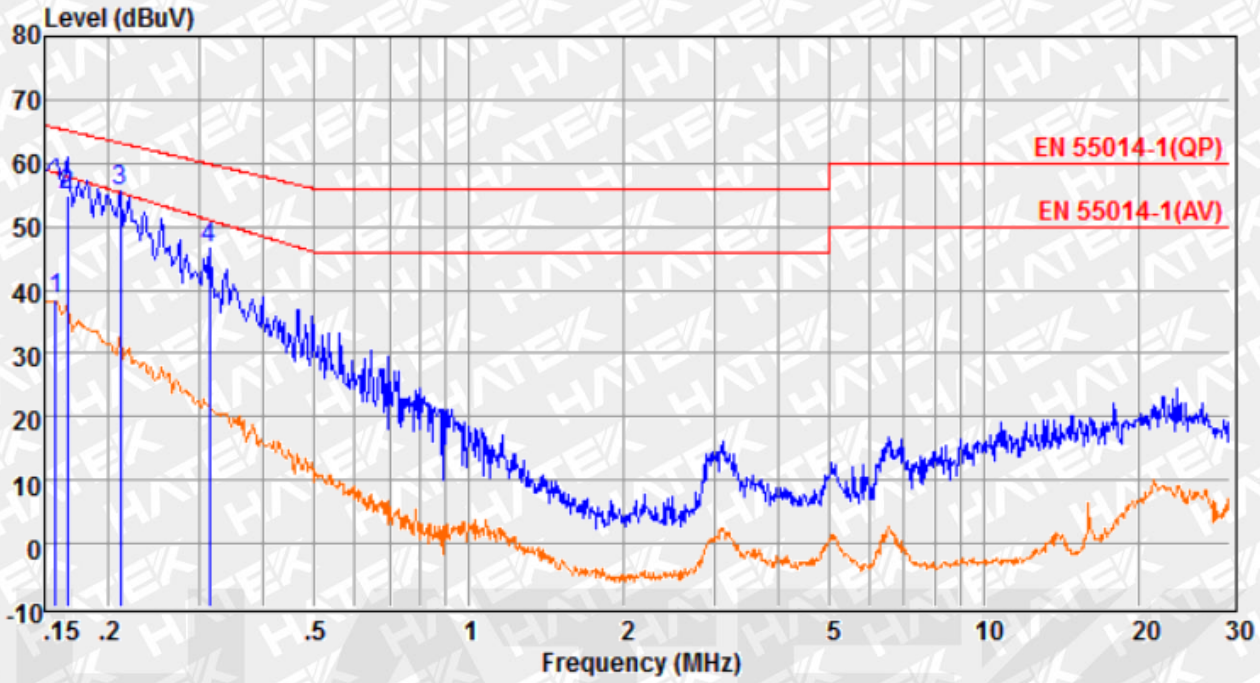
Furthermore an internal calibration with the test receiver was conducted prior to each measurement. And the measurement was made in the state the maximum disturbance was obtained.

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.

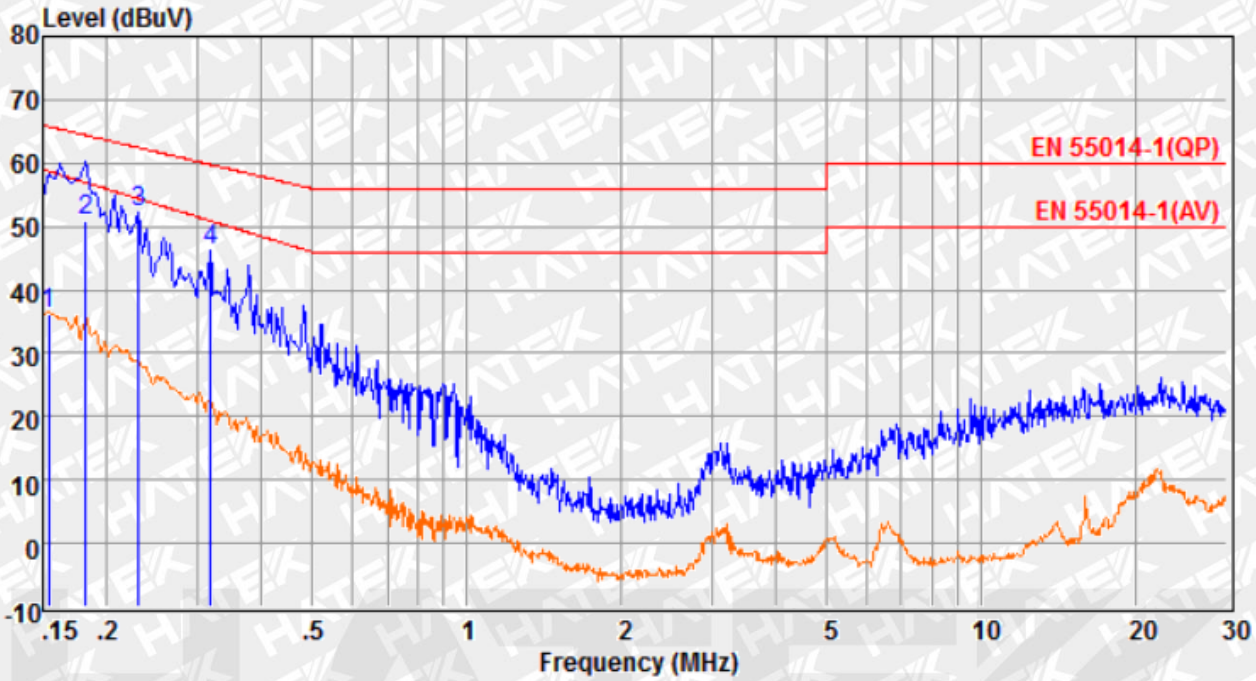
Figure 1: Test Curve of Conducted Emission in the frequency range of 150kHz - 30MHz, L line



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.16	28.85	9.71	0.00	38.56	58.49	-19.93	Average
2	0.17	45.10	9.73	0.00	54.83	65.16	-10.33	QP
3	0.21	45.79	9.78	0.00	55.57	63.18	-7.61	Peak
4	0.31	36.57	9.81	0.00	46.38	59.88	-13.50	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	0.15	26.53	9.69	0.00	36.22	58.71	-22.49	Average
2	0.18	41.30	9.72	0.00	51.02	64.42	-13.40	QP
3	0.23	42.56	9.76	0.00	52.32	62.44	-10.12	Peak
4	0.32	36.50	9.81	0.00	46.31	59.75	-13.44	Peak

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

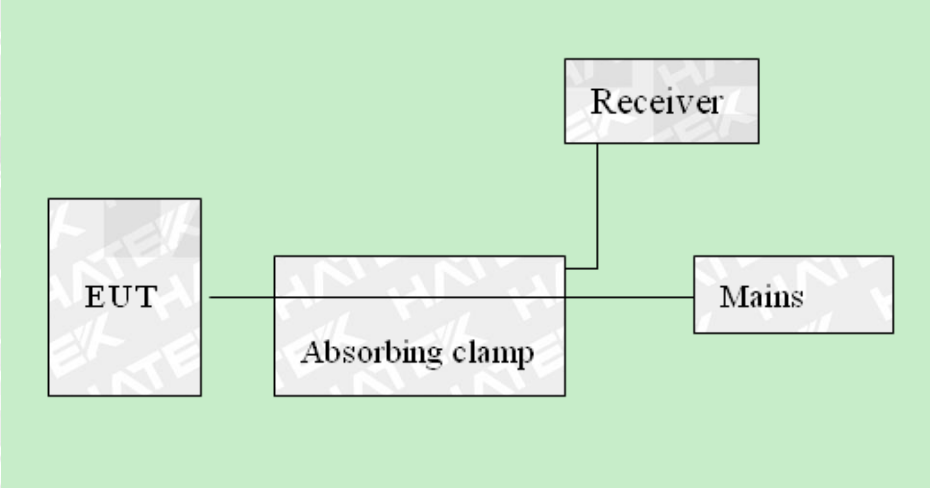
4.2 Emission in the Frequency Range from 30 MHz to 1000 MHz

4.2.1 Disturbance Power on Mains

General test information

Frequency Range	:	30 – 300MHz
Kind of test site	:	EMC Chamber
Temperature	:	25 °C
Relative Humidity	:	51 %RH
Operational condition	:	ON
Port	:	Mains
Limit	:	EN IEC 55014-1:2021, clause 4.1.2.1, 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.

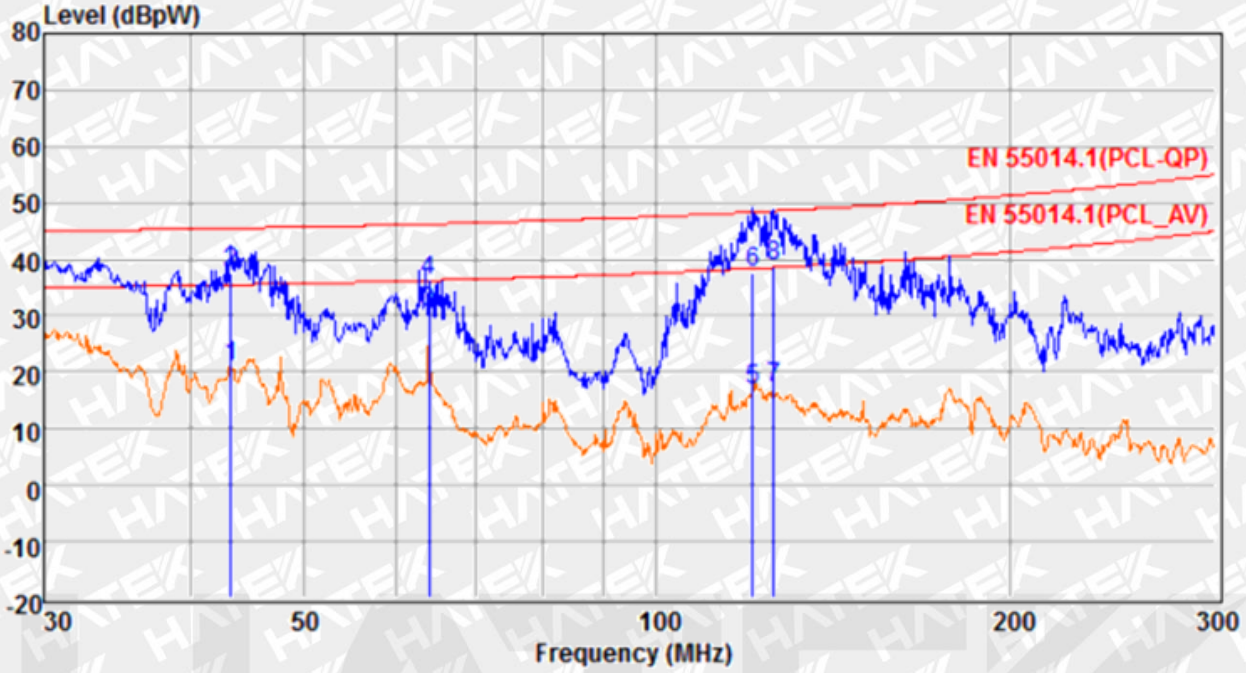
Test Procedure

Furthermore an internal calibration with the test receiver was conducted prior to each measurement.

The tested object was set-up on a wooden bench. The length of the power cord of the test object was about 1.5m. The length of power cord of EUT plus that of the extension cord was approximately 6.0m.

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

Figure 3: Test Curve of Power Disturbance in the frequency range of 30–300MHz, AC line



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	43.36	-11.71	7.74	24.75	20.78	35.51	-14.73	Average
2	43.36	5.10	7.74	24.75	37.59	45.51	-7.92	QP
3	63.99	1.48	6.00	23.00	30.48	36.27	-5.79	Average
4	63.99	7.31	6.00	23.00	36.31	46.27	-9.96	Peak
5	120.82	-11.07	5.32	22.37	16.62	38.37	-21.75	Average
6	120.82	9.99	5.32	22.37	37.68	48.37	-10.69	QP
7	125.93	-10.83	5.42	22.66	17.25	38.56	-21.31	Average
8	125.93	10.50	5.42	22.66	38.58	48.56	-9.98	QP

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

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.

Date of testing	:	November 02, 2015 to November 09, 2015
Room temperature	:	24-26 °C
Relative Humidity	:	45-58%

Conclusion： Pass

5.1 Enclosure

5.1.1 Electrostatic Discharge

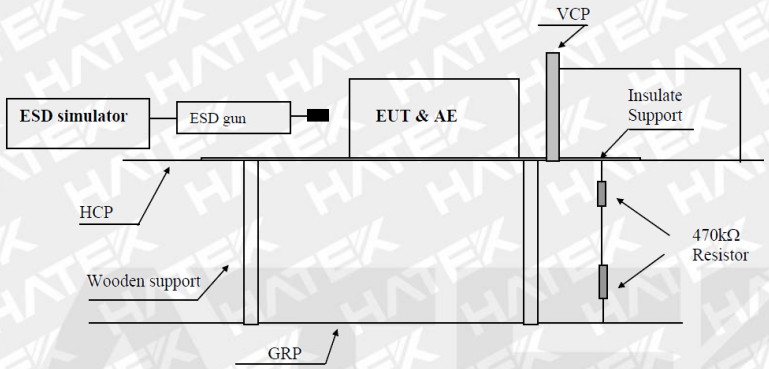
Charge voltage : 4.0kV (Conducted Discharge)
8.0kV (Air Discharge)

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 3: ESD, Positive / Negative Polarity

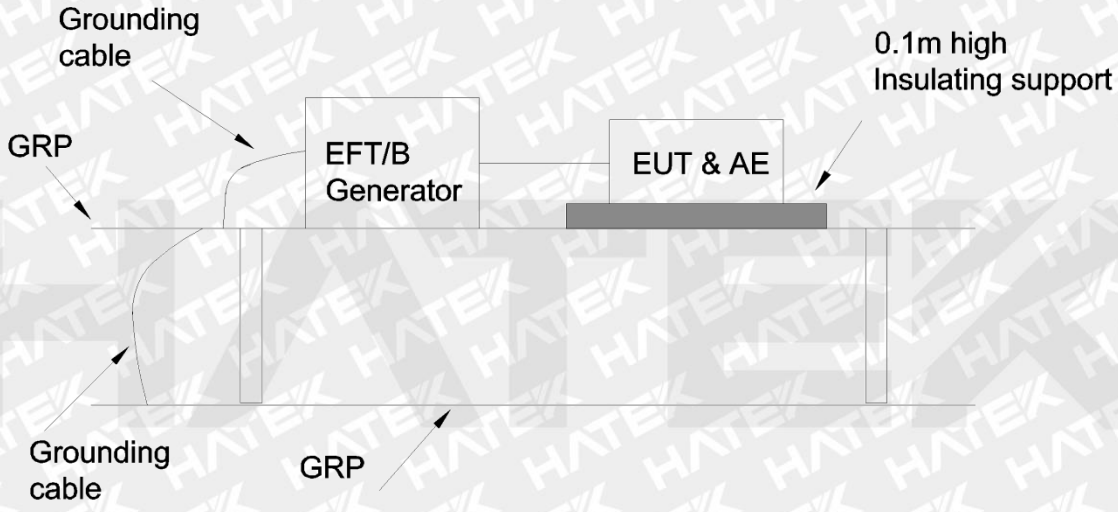
Position	Kind of Discharge	Remarks	Result
Accessible nonmetal Enclosure	Air discharge ±8kV	No change of function	Pass
Metal Enclosure	Contact discharge ±4kV	No change of function	Pass
Coupling plane (Both HCP and VCP)	Contact discharge ±4kV	No change of function	Pass

5.2 Input and Output AC Power Ports

5.2.1 Fast Transients on AC 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 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.

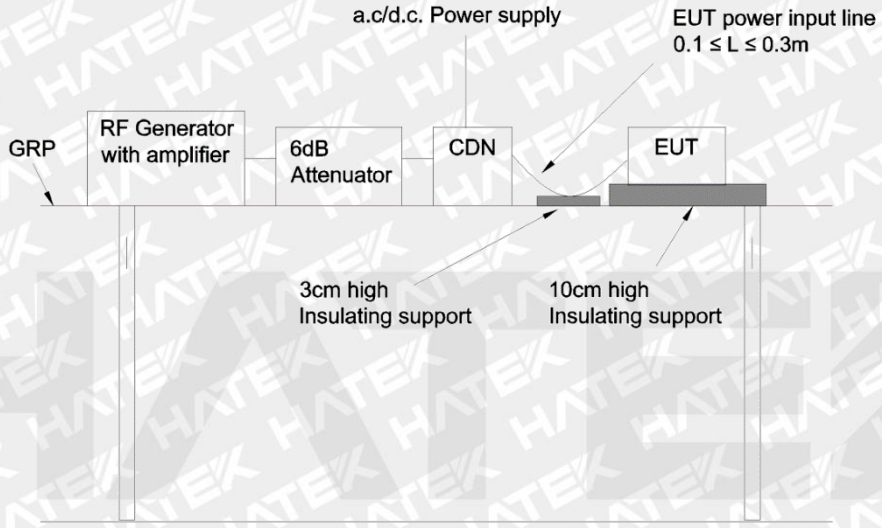
Table 4: Burst, AC Power lines, Positive and Negative Polarity

Line	Result	Remark
AC Input (L+N+PE)	±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.

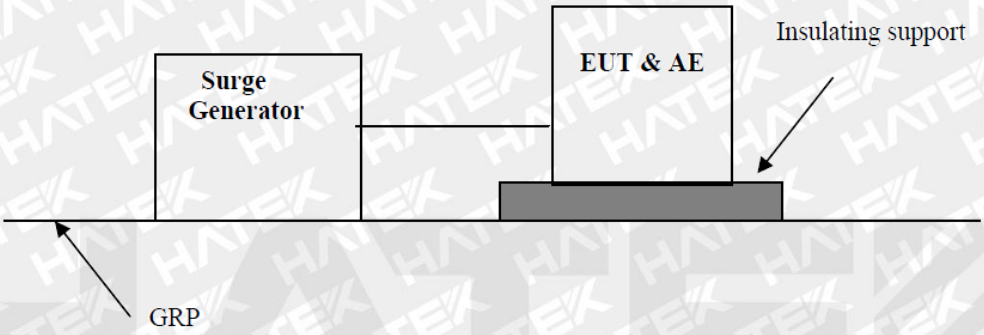
Table 5: Injected current, AC Power Port

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.

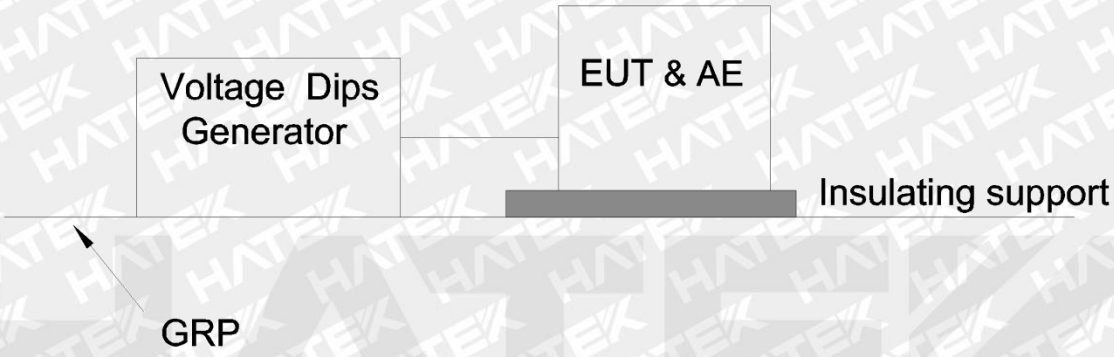
Table 6: Surges to AC Power lines, positive/negative

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
phase/neutral to PE	+2 kV, +π/2 (5 times) -2 kV, –π/2 (5 times)	90° 270°	No disturbance of function	Pass

5.2.4 Voltage dips and interruptions to AC Power Port

Performance criteria	:	C	
Test level (in % UT) and	:	0	0.5/0.5 periods(50/60Hz)
duration (in periods of the rated frequency)	:	40	10/12 periods(50/60Hz)
		70	25/30 periods(50/60Hz)

Block Diagram of Test Set up



Test Procedure

The immunity against voltage dips and interruptions to AC power port was tested in accordance to EN IEC 55014-2:2021. Test setup and the test generator are according to EN 61000-4-11 which is specified by EN IEC 55014-2:2021. The EUT was placed directly on the table of aluminum.

Table 7: Test condition and Test Result for Voltage dips and Short interruptions

Test level (in % UT)	Duration	Performance criteria	Remarks	Result
0	0,5 (10ms)	C	No disturbance of function	Pass
40	10 (200ms)	C	No disturbance of function	Pass
70	25 (0.5s)	C	No disturbance of function	Pass

6 Photographs of the EUT

Photograph 1: Overall view of EUT for P180

Photograph 2: Overall view of EUT for P180

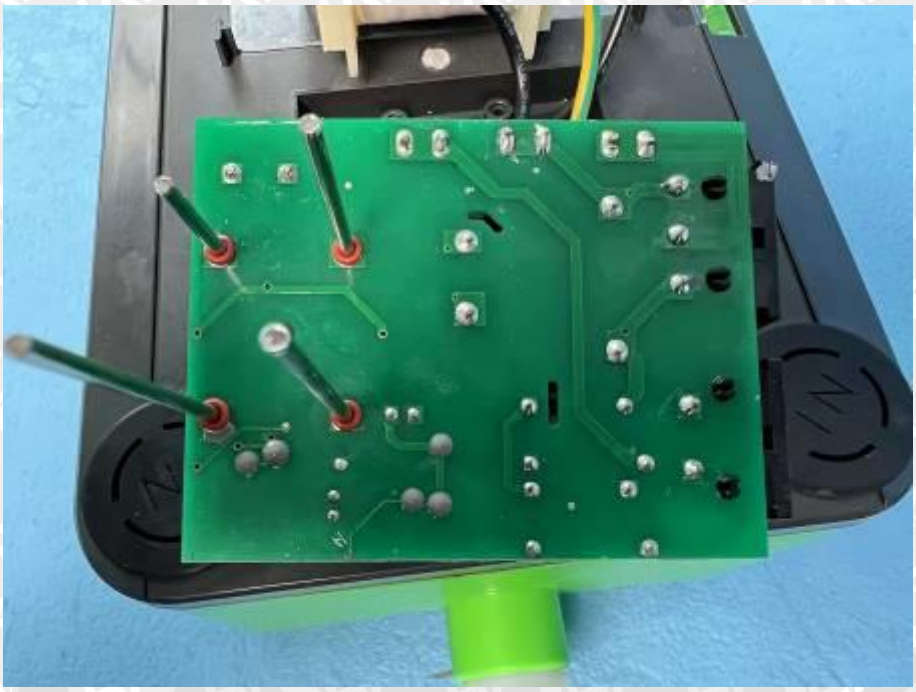
Photograph 3: Overall view of EUT for P180

Photograph 4: Internal view of EUT for P180

Photograph 5: Internal view of EUT for P180

Photograph 6: Internal view of EUT for P180

Photograph 7: Internal view of EUT for P180



Photograph 8: Internal view of EUT for P180

Photograph 9: Internal view of EUT for P580

Photograph 10: Overall view of EUT for PC-125A and PC-125L

Photograph 11: Overall view of EUT for PC-125S

7 List of Tables

8 List of Figures

9 List of Photographs

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