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检测
TESTING
CNAS L13445

EMC TEST REPORT

For

Guangzhou HanSong Electric Technology Co., Ltd.

TOWEL WARMER

Test Model: HSTW-12

Additional Models : please refer to Model list

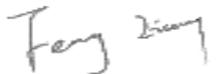
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Address : No. 1 Xiaotang, Tanbu Town, Huadu District, Guangzhou,
Guangdong, China

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Date of receipt of test sample : September 03, 2025
Number of tested samples : 1
Serial number : Prototype
Date of Test : September 03, 2025 - September 05, 2025
Date of Report : September 05, 2025



EMC TEST REPORT		
EN IEC 55014-1:2021		
EMC - Requirements for household appliances,electric tools and similar apparatus Part 1:Emission		
EN IEC 55014-2:2021		
EMC - Requirements for household appliances,electric tools and similar apparatus Part 2: Immunity		
Report Number	LCSE09025022E	
Date of Issue	September 05, 2025	
Testing Laboratory Name	Ningbo LCS Standard Technology Service Co., Ltd.	
Address	Room 101-106/202-206, Building 037, No. 166, Jinghua Road, Meixu Street, Ningbo High-tech Zone, Yinzhou District, Ningbo, Zhejiang, China	
Testing Procedure	Full application of Harmonised standards <input checked="" type="checkbox"/> Partial application of Harmonised standards <input type="checkbox"/> Other standard testing method <input type="checkbox"/>	
Applicant's Name	Guangzhou HanSong Electric Technology Co., Ltd.	
Address	No. 1 Xiaotang, Tanbu Town, Huadu District, Guangzhou, Guangdong, China.	
Test Specification:		
Standard	EN IEC 55014-1:2021 EN IEC 55014-2:2021 EN IEC 61000-3-2:2019+A1:2021+A2:2024 EN 61000-3-3:2013+A1:2019+A2:2021	
Test Report Form No	TRF-4-E-023 A/0	
TRF Originator	Ningbo LCS Standard Technology Service Co., Ltd.	
Master TRF	Dated 2019-03	
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Equipment Under Test	TOWEL WARMER	
Trademark	N/A	
Test Model/Type	HSTW-12	
Rating	AC 220-240V, 50-60Hz, Max: 400W	
Results	PASS	
Compiled by:	Supervised by:	Approved by:
		
Lorrain Li / Engineer	Wen Li / Technique Director	Feng Liang / Manager



EMC - TEST REPORT

Test Report No.....: LCSE09025022E

Applicant.....:	Guangzhou HanSong Electric Technology Co., Ltd.
Address.....:	No. 1 Xiaotang, Tanbu Town, Huadu District, Guangzhou, Guangdong, China
Telephone.....:	/
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Manufacturer.....:	Guangzhou HanSong Electric Technology Co., Ltd.
Address.....:	No. 1 Xiaotang, Tanbu Town, Huadu District, Guangzhou, Guangdong, China
Telephone.....:	/
Fax.....:	/
Factory.....:	Guangzhou HanSong Electric Technology Co., Ltd.
Address.....:	No. 1 Xiaotang, Tanbu Town, Huadu District, Guangzhou, Guangdong, China
Telephone.....:	/
Fax.....:	/

The applicant and manufacturer information, product name, model, trademark and other information in this report are all provided by the applicant, and this laboratory is not responsible for verifying its authenticity.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



ENVIRONMENTAL CONDITIONS

The climatic conditions during the test are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. the climatic conditions during the test were in the following Limits:

Ambient temperature	15°C - 30°C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa - 106 kPa

Climate values will be recorded and recorded separately if specifically required in the base standard or application product/product series standard.

POSSIBLE TEST CASE VERDICTS

Test cases does not apply to test object	N/A
Test object does meet requirement	P(Pass) / PASS
Test object does not meet requirement	F(Fail) / FAIL
Not measured	N/M

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

<input checked="" type="checkbox"/>	Indicate that the conditions, standards or equipment listed is applicable to this report / test / EUT.
<input type="checkbox"/>	Indicate that the conditions, standards or equipment listed is not applicable to this report / test / EUT.

REVISION HISTORY

Revision	Issue Date	Revision Content	Revised by
000	September 05, 2025	Initial Issue	-

Remark:
000) : “---”



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1. GENERAL INFORMATION

1.1. GENERAL DESCRIPTION OF THE ITEM(S)

Equipment Under Test	TOWEL WARMER
Test Model/Type	HSTW-12
Additional Models/Type	See Model list
Description of Model difference	-
Rating	AC 220-240V, 50-60Hz, Max: 400W
Highest internal frequency (Fx)	≤ 15 MHz

Information of the Equipment Under Test (EUT)

The EUT is general household appliances or electric tools equipment. the product contains electronic control circuits.

for more information refer to client's DoC letter.

Model	PCB	Rating	Series
HSTW-12, HSTW-1, HSTW-2, HSTW-3, HSTW-4, HSTW-5, HSTW-6, HSTW-7, HSTW-8, HSTW-9, HSTW-10, HSTW-11, HSTW-13, HSTW-14, HSTW-15, HSTW-16, HSTW-17, HSTW-18, HSTW-19, HSTW-20	Same PCB layout	AC 220-240V, 50-60Hz, Max: 400W	1

The applicant states:

- All models use the same circuit and PCB layout, only the naming method is different.
- This report after information review and verification, the model "HSTW-12" were chosen as the representative model to perform all the tests.



1.2. OPERATING MODE(S) USED OF TESTS

During the tests, the following operating mode(s) has(have) been used.

Operating Mode	Operating Mode description	Used for testing	
		Emission	Immunity
1	Working	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	High	<input type="checkbox"/>	<input type="checkbox"/>
3	Low	<input type="checkbox"/>	<input type="checkbox"/>
4	Full load	<input type="checkbox"/>	<input type="checkbox"/>

1.3. SUPPORT / AUXILIARY EQUIPMENT FOR THE EUT

EUT has been tested using the following auxiliary equipment :

Auxeq	Model/Type	Manufacturer	Supplied by
--			

1.4. DESCRIPTION OF TEST FACILITY

Test Location 1	Ningbo LCS Standard Technology Service Co., Ltd. Room 101-106/202-206, Building 037, No. 166, Jinghua Road, Meixu Street, Ningbo High-tech Zone, Yinzhou District, Ningbo, Zhejiang, China CNAS Registration Number is L13445.
Date of receipt of test item	September 03, 2025
Date(s) of performance of test	September 03, 2025 - September 05, 2025



2. STATEMENT OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. the reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. the measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods - Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. the manufacturer has the sole responsibility of continued compliance of the device.

Measurement	Uncertainty (U_{lab})	Uncertainty (U_{cispr})
Conducted Disturbance (9kHz - 150kHz)	± 2.63 dB	± 3.8 dB
Conducted Disturbance (150kHz - 30MHz)	± 2.35 dB	± 3.4 dB
Radiated disturbance (9kHz - 30MHz)	± 3.68 dB	-
Radiated disturbance (30MHz - 200MHz)	± 3.48 dB	± 5.3 dB
Radiated disturbance (200MHz - 1GHz)	± 3.48 dB	± 5.3 dB
Harmonic current	$\pm 0.510\%$	-
Voltage fluctuations & Flicker	$\pm 0.510\%$	-

Supplementary information:

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.



3. MEASURING DEVICES AND TEST EQUIPMENT

CONDUCTED DISTURBANCE						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	AUDIX	E3	N/A	/	/
2	EMI Test Receiver	R&S	ESR 3	102519	2025-05-09	2026-05-08
3	Artificial Mains	R&S	ENV216	102318	2025-05-09	2026-05-08
4	shielded room	MAORUI	843	160218835	2024-04-11	2027-04-10

RADIATED DISTURBANCE (9KHz - 30MHz)						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Large Loop Antenna	DAZE	ZN304401	17029	2025-05-09	2026-05-08
2	EMI Test Receiver	R&S	ESR 3	102519	2025-05-09	2026-05-08
3	EMI Test Software	AUDIX	E3	N/A	/	/
4	shielded room	MAORUI	843	160218835	2024-04-11	2027-04-10

RADIATED DISTURBANCE (30MHz - 1GHz)						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	AUDIX	E3	N/A	/	/
2	3m Semi Anechoic Chamber	MAORUI	9m*6m*6	160218849	2024-04-11	2027-04-10
3	By-log Antenna	SCHWARZBECK	VULB9168	9168-988	2025-04-13	2026-04-12
4	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-2049	2025-05-17	2026-05-16
5	EMI Test Receiver	R&S	ESRP	101372	2025-05-09	2026-05-08
6	AMPLIFIER	SCHWARZBECK	BBV9745	136	2025-05-09	2026-05-08
7	RF Cable	Hubber Suhner	CBL-RE	/	/	/
8	AMPLIFIER	SCHWARZBECK	BBV9718C	21	2025-05-09	2026-05-08

HARMONIC CURRENT & FLICKER						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Harmonic current and voltage scintillation measurement system	Li	AC2000A	311355	2025-05-09	2026-05-08

ELECTROSTATIC DISCHARGE						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD216	102318	2025-05-13	2026-05-12

ELECTRICAL FAST TRANSIENT / BURST						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	HTEC	HCOMPACT7/H V1P16T	190308/190402	2025-05-09	2026-05-08



SURGE						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	HTEC	HCOMPACT7/H V1P16T	190308/190402	2025-05-09	2026-05-08

INJECTED CURRENTS (RADIO-FREQUENCY COMMON MODE)						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	Emtest	CWS 500N1	V0934105079	2025-04-10	2026-04-09
2	CDN	Emtest	CDN M2/M3N	0809-68	2025-04-10	2026-04-09
3	6dB Attenuator	Emtest	ATT6/75	1208-27	2025-04-10	2026-04-09

VOLTAGEDIPS AND SHORT INTERRUPTIONS						
Item	Test equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	HTEC	HCOMPACT7/H V1P16T	190308/190402	2025-05-09	2026-05-08



4. VERDICT SUMMARY SECTION

This chapter present an overview of the standards and results. Refer the next chapter for details of measured test results and applied test levels.

4.1. STANDARD(S)

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

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

EN IEC 61000-3-2:2019+A1:2021+A2:2024* - Electromagnetic compatibility (EMC) Part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).

EN 61000-3-3:2013+A1:2019+A2:2021 - Electromagnetic compatibility (EMC)Part 3-3: Limits for 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.

Clause numbers with "*" were not within the scope of CNAS recognition.



4.2. OVERVIEW OF RESULTS

EMISSION TESTS - EN IEC 55014-1, EN IEC 61000-3-2, EN 61000-3-3		
Requirement - Test case	Limit	Verdict
Conducted Disturbance - Mains ports	Table 5, Table 6	PASS
Conducted Disturbance - Auxiliary ports	Table 5	N/A
Disturbance power in the frequency range 30 MHz to 300MHz ¹	Table 7	N/A
Radiated Disturbance in the frequency range 30 MHz to 1 GHz ¹	Table 9	PASS
Radiated Disturbance in the frequency range Above 1 GHz	Table 11	N/A
Discontinuous Disturbances - Click	Clause 4.2.2	N/A
Harmonic Current	Clause 7	PASS
Voltage Fluctuations and Flicker	Clause 5	PASS
IMMUNITY TESTS - EN IEC 55014-2		
Requirement - Test case	Basic Standard(s)	Verdict
Electrostatic Discharge	IEC/EN 61000-4-2	PASS
Radio-Frequency Electromagnetic Fields	IEC/EN 61000-4-3	N/A
Electrical Fast Transient / Burst	IEC/EN 61000-4-4	PASS
Surge	IEC/EN 61000-4-5	PASS
Injected currents	IEC/EN 61000-4-6	PASS
Voltage Dips and Short Interruptions	IEC/EN 61000-4-11	PASS

Supplementary information :

The EUT shall be assessed for emissions in the frequency range from 30 MHz to 1 000 MHz by testing in accordance with either method 1) or 2).

- 1) The limits for radiated disturbances in Table 9 for the selected test method shall be met.
- 2) The EUT shall be met disturbance power limits, But the EUT shall be also deemed to comply with the requirement of this document in the frequency range from 300 MHz to 1 000 MHz without further testing if both conditions below are fulfilled:

- the disturbance power emission from the EUT is lower than the limits of Table 7 reduced by the values of Table 8;
- the maximum clock frequency is less than 30 MHz.



5. EMISSION TESTS

5.1. CONDUCTED DISTURBANCE

Standard	EN IEC 55014-1:2021
Basic Standard(s)	EN 55016-2-1

General limits

Frequency range [MHz]	Mains ports		Auxiliary ports				IF BW
	Quasi-peak [dB(μV)]	Average [dB(μV)]	Quasi-peak [dB(μV)]	Average [dB(μV)]	Quasi-peak [dB(μA)]	Average [dB(μA)]	
0,15 - 0,5	66 -56	59 - 46	80	70	40 - 30	30 - 20	9 kHz
0,5 - 5,0	56	46	74	64	30	20	
5,0 - 30	60	50	74	64			

1) At the transition frequency, the lower limit applies.

Limits for the mains port of motor operated tools

Frequency range [MHz]	P ≤ 700W		700W < P ≤ 1000W		P > 1000W		IF BW
	Quasi-peak [dB(μV)]	Average [dB(μV)]	Quasi-peak [dB(μV)]	Average [dB(μV)]	Quasi-peak [dB(μA)]	Average [dB(μA)]	
0,15 - 0,35	66 -59	59 - 49	70 - 63	63 - 53	76 - 69	69 - 59	9 kHz
0,35 - 5,0	59	49	63	53	69	59	
5,0 - 30	64	54	68	58	74	64	

1) At the transition frequency, the lower limit applies.
2) P = rated power of the motor only.



5.2. RADIATED DISTURBANCE

Standard	EN IEC 55014-1:2021
Basic Standard(s)	EN 55016-2-3
Test method	Semi Anechoic Chamber (SAC)

SAC Radiated disturbance limit in the frequency range 30 MHz - 1000 MHz

Frequency range [MHz]	Limit: Quasi-peak [dB(μ V/m)]		IF BW
	3 m distance	10 m distance	
30 - 230	40	30	120 KHz
230 - 1000	47	37	

1) At the transition frequency, the lower limit applies.

Radiated disturbance limit in the frequency range 1 GHz - 6 GHz

Frequency range [MHz]	Limit (3 m distance)		IF BW
	Peak [dB(μ V/m)]	Average [dB(μ V/m)]	
1000 - 3000	70	50	1MHz
3000 - 6000	74	54	

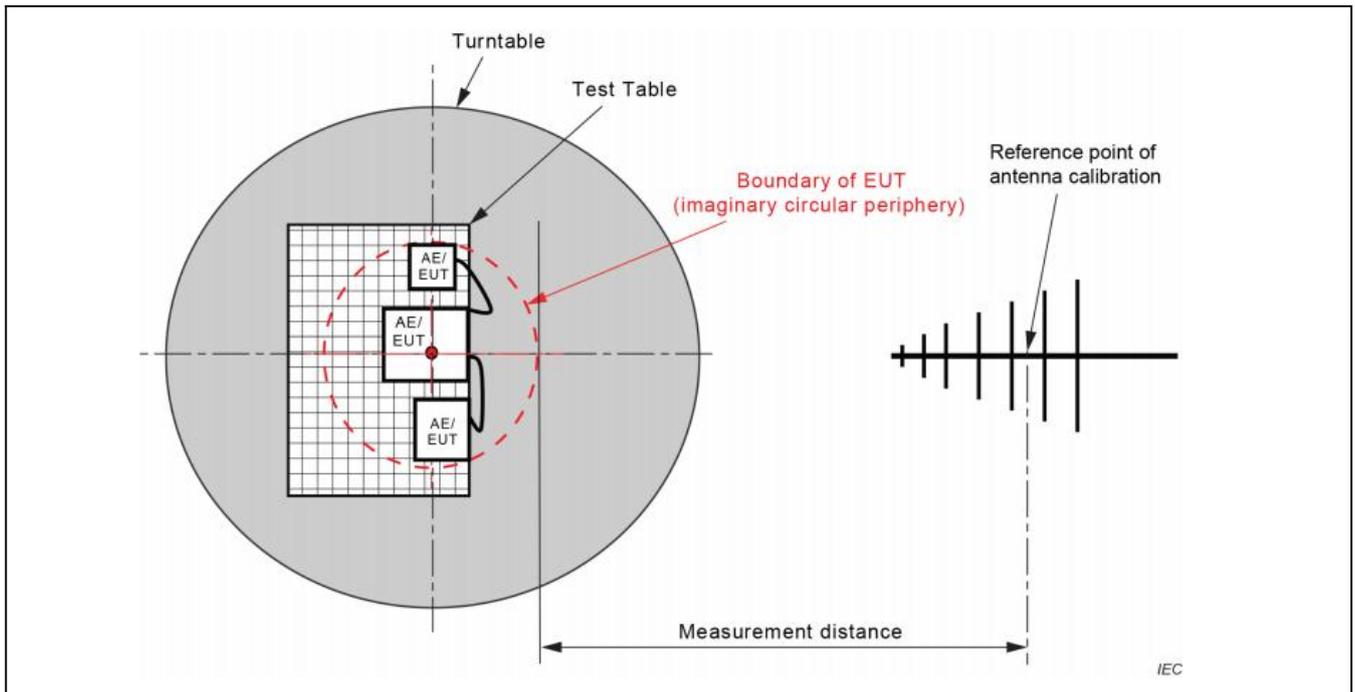
Required highest frequency for radiated measurement

Highest internal frequency (Fx)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz

1) F_x is highest fundamental frequency generated or used within the EUT or highest frequency at which it operates.



Test configuration



Test Procedure Description

The radiated disturbance test was conducted in a 3m Semi Anechoic Chamber and conforming to CISPR 16-2-3. the EUT is placed on a turntable, which is 0.8 meter high above the ground. the turntable can rotate 360 degrees to determine the position of the maximum emission level. the EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. the antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Log-periodic antenna or horn antenna is used as a receiving antenna. both horizontal and vertical polarization of the antenna is set on test.

Test Results refer to Annex A.2

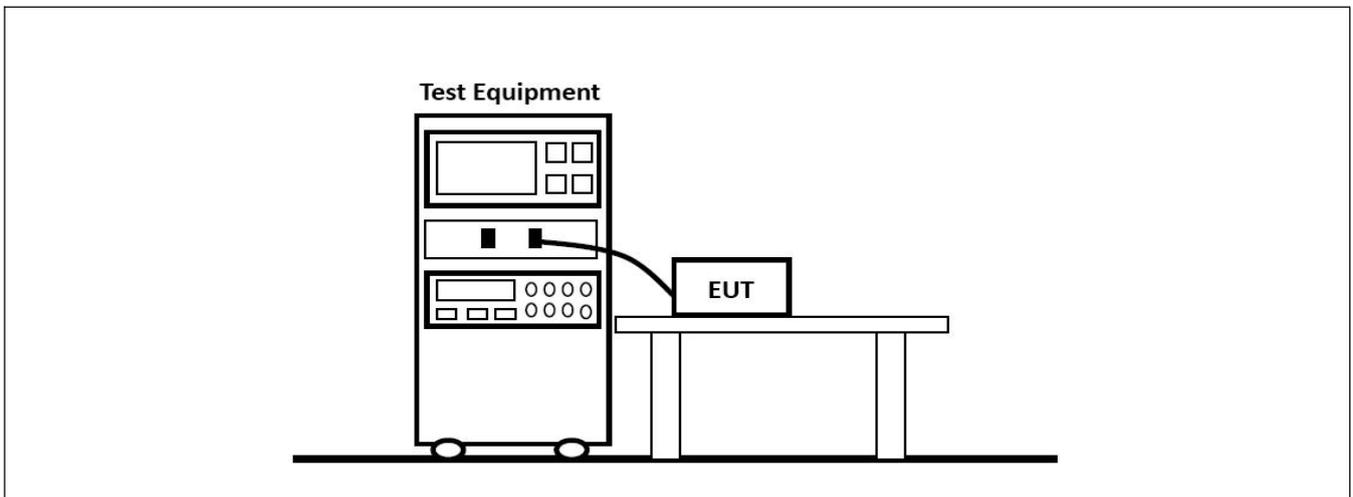


5.3. HARMONIC CURRENT

Standard	EN IEC 61000-3-2:2019+A1:2021+A2:2024	
Exclusions (For these categories of equipment, limits are not specified in the EN IEC 61000-3-2)	<input type="checkbox"/>	Systems with nominal voltages less than 220V _{AC} (line-to-neutral)
	<input type="checkbox"/>	Lighting equipment with rated power < 5 W
	<input type="checkbox"/>	Equipment with rated power of ≤ 75 W (other than lighting equipment)
	<input type="checkbox"/>	Professional equipment with a total rated power >1kW
	<input type="checkbox"/>	Symmetrically controlled heating elements with rated power ≤ 200 W
	<input type="checkbox"/>	Independent dimmers for incandescent lamps with rated power ≤ 1kW

Classification		
<input checked="" type="checkbox"/>	Class A	All equipment not specified as belonging to Class B, C or D
<input type="checkbox"/>	Class B	Portable tools
<input type="checkbox"/>	Class C	<input type="checkbox"/> Lighting equipment with active input power > 25W
		<input type="checkbox"/> Lighting equipment with active input power ≥ 5W and ≤ 25W
		<input type="checkbox"/> Table 3, column 2 (Power-related limits)
		<input type="checkbox"/> 3rd harmonic ≤ 86%, 5th harmonic ≤ 61% and waveform conditions
<input type="checkbox"/>		<input type="checkbox"/> THD ≤ 70%, Harmonic:3rd ≤ 35%, 5th ≤ 25%, 7th ≤ 30%, 9th and 11th ≤ 20%, 2nd ≤ 5%
<input type="checkbox"/>	Class D	Personal computers, television receivers, refrigerators and freezers having one or more variable-speed drives to control compressor

Test configuration



Test Results refer to Annex A.3



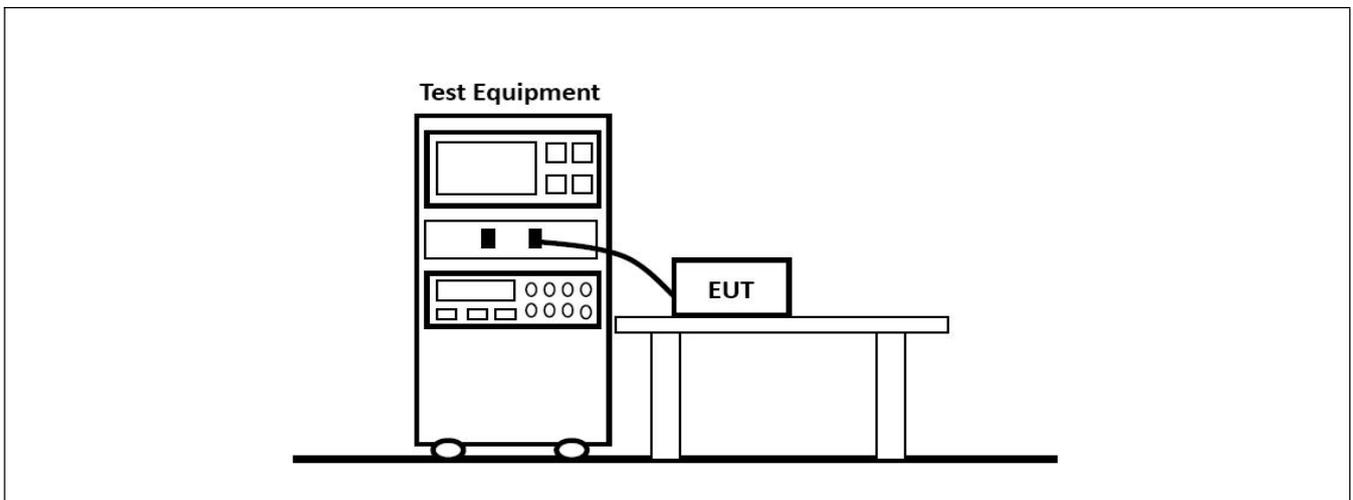
5.4. VOLTAGE FLUCTUATIONS & FLICKER

Standard	EN 61000-3-3:2013+A1:2019+A2:2021
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Limit

P _{st} (Short term flicker)	<input checked="" type="checkbox"/>	≤ 1	<input type="checkbox"/>	Not applicable
P _{lt} (Long-term flicker)	<input checked="" type="checkbox"/>	≤ 0,65	<input type="checkbox"/>	Not applicable
T _{max} (Accumulated time)	<input checked="" type="checkbox"/>	≤ 500 ms	<input type="checkbox"/>	Not applicable
d _c (Relative voltage change)	<input checked="" type="checkbox"/>	≤ 3.3%	<input type="checkbox"/>	Not applicable
d _{max} (Max.voltage change)	<input checked="" type="checkbox"/>	≤ 4%	<input type="checkbox"/>	≤ 6%
	<input type="checkbox"/>	≤ 7%	<input type="checkbox"/>	Not applicable

Test configuration



Test Results refer to Annex A.4



6. IMMUNITY TESTS

6.1. PERFORMANCE CRITERIA

Standard	EN IEC 55014-2:2021
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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. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if 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, however no change of actual operating state or stored data is allowed to persist after the test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

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.

Classification of apparatus		Tests and performance criteria							
		ESD	RS	PFMF	EFT	CS	Surge	Dips	Interruption
<input type="checkbox"/>	Category I	---	---	---	---	---	---	---	---
<input checked="" type="checkbox"/>	Category II	B	---	---	B	A	B	C	C
<input type="checkbox"/>	Category III	B	A	---	B	A	B	---	---
<input type="checkbox"/>	Category IV	B	A	---	B	A	B	C	C
<input type="checkbox"/>	Category V	B	A	---	B	A	B	C	C

Supplementary information:

Category I: Apparatus containing no electronic control circuit.

Category II: Mains operated equipment containing electronic control circuitry with no clock frequency higher than 15 MHz.

Category III: Battery operated equipment not included in Category I.

Category IV: Mains operated equipment containing electronic control circuitry with a highest clock frequency greater than 15MHz but less than or equal to 200MHz.

Category V: Mains operated equipment containing electronic control circuitry with a highest clock frequency greater than 200MHz.



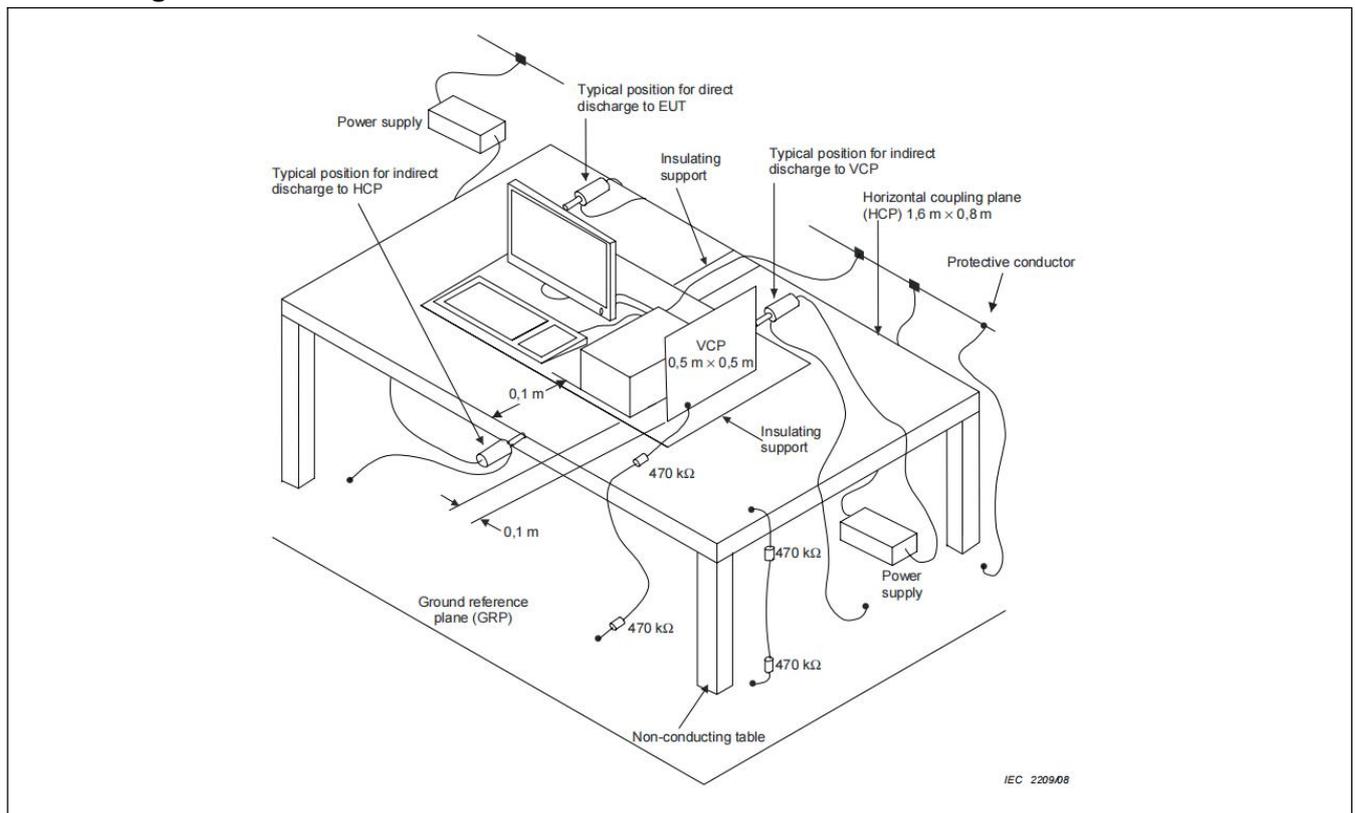
6.2. ELECTROSTATIC DISCHARGE

Electrostatic discharge (ESD) is the result of accumulated static electricity from a person or object, for example, walking on a synthetic carpet. ESD can indirectly affect the operation of equipment or damage its electronic components through direct discharge or coupling. Both effects were simulated during the test. Contact discharge is the preferred test method. Twenty discharges (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure (terminals are excluded). Air discharges shall be used where contact discharges cannot be applied. Discharges shall be applied on the horizontal or vertical coupling planes, taken into consideration when selecting test points, paying particular attention to keyboards, dialling pads, power switches, mice, drive slots, card slots, the areas around communication ports, etc.

Requirements

Standard	EN IEC 55014-2:2021							
Basic standard	EN 61000-4-2							
Port under test	Enclosure							
Contact discharge	<input checked="" type="checkbox"/>	± 2 kV	<input checked="" type="checkbox"/>	± 4 kV	<input type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Air discharge	<input checked="" type="checkbox"/>	± 2 kV	<input checked="" type="checkbox"/>	± 4 kV	<input checked="" type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Number of discharges	≥ 10 per polarity with ≥ 1 sec interval							

Test configuration



Test Results refer to Annex A.5



6.3. ELECTRICAL FAST TRANSIENT / BURST

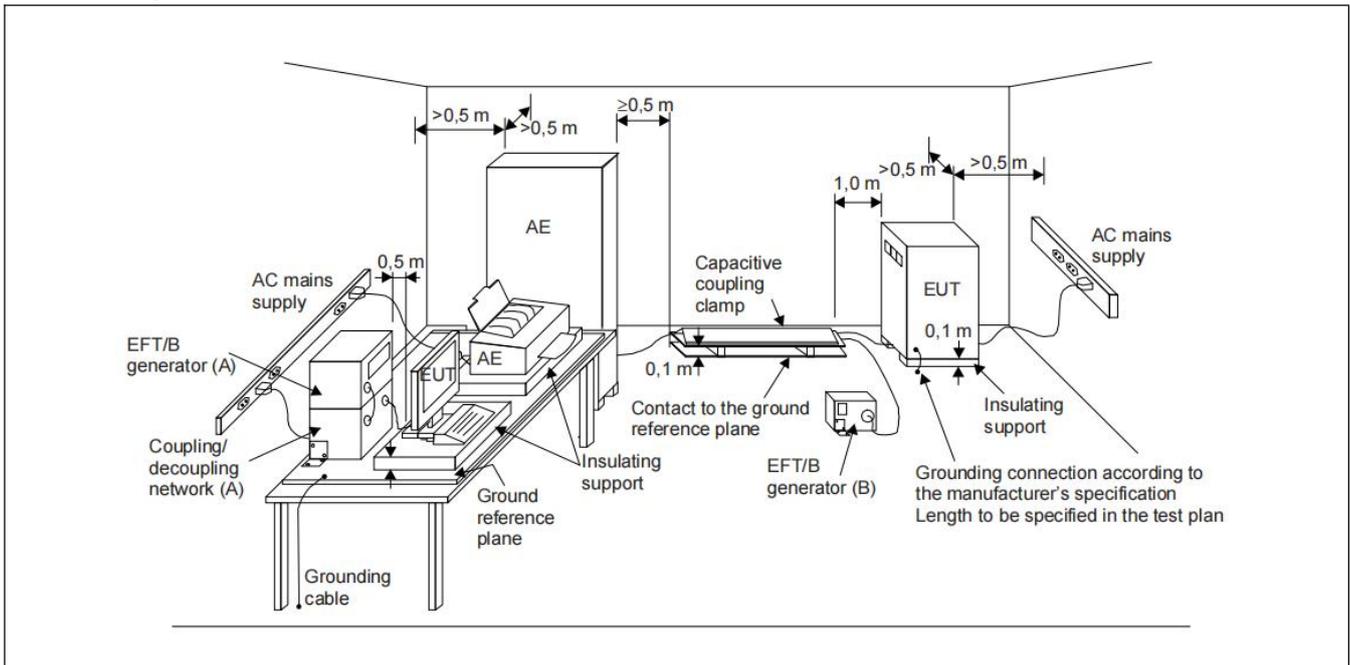
The EFT immunity test simulates the disturbances by caused of very short transient bursts.

The EUT is put on the Insulating support which is 0.1 meter high above the ground reference plane. the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5 m. both polarities of the test voltage should be applied during test, fast transients are carried out with a minimum duration of 2 min with a positive polarity and a minimum of 2 min with a negative polarity.

Requirements

Standard	EN IEC 55014-2:2021			
Basic standard	EN 61000-4-4			
Pulse characteristics	5/50ns			
Port under test	Test level	Repetition frequency	Duration	
<input checked="" type="checkbox"/> AC Input / Output power	± 1000 V	5 kHz	2 min / polarity	
<input type="checkbox"/> DC Input / Output power ¹	± 500 V	5 kHz	2 min / polarity	
<input type="checkbox"/> Signal / control / wired network ¹	± 500 V	5 kHz	2 min / polarity	
1) Only applicable to ports interfacing with cables whose whose total length may exceed 3 m.				

Test configuration



Test Results refer to Annex A.5



6.4. INJECTED CURRENTS

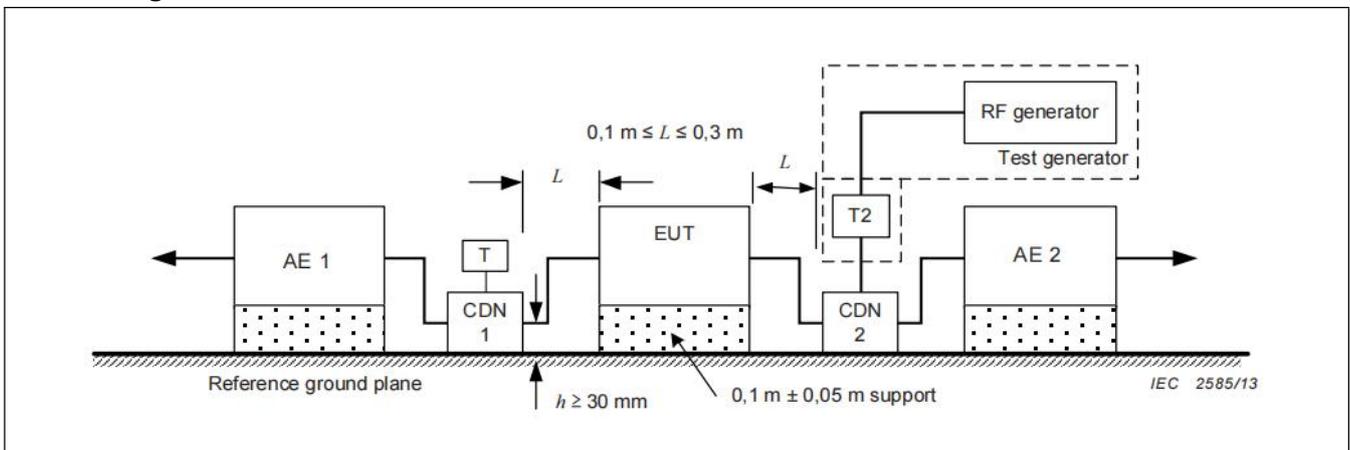
During the test the immunity of the EUT for conducted electromagnetic fields is checked .

The equipment to be tested is placed on an insulating support of $0,1 \text{ m} \pm 0,05 \text{ m}$ height above a reference ground plane. a non conductive roller/caster in the range of $0,1 \text{ m} \pm 0,05 \text{ m}$ above the reference ground plane can be used as an alternative to an insulating support. all cables exiting the EUT shall be supported at a height of at least 30 mm above the reference ground plane. The coupling and decoupling devices shall be placed on the reference ground plane, making direct contact with it at a distance of 0,1 m to 0,3 m from the EUT.

Requirements

Standard	EN IEC 55014-2:2021				
Basic standard	EN 61000-4-6				
Frequency range ²	0,15 - 230MHz				
Port under test	Test level	Modulation	Dwell time	Step size	
<input checked="" type="checkbox"/> AC Input / Output power	3 V	1 kHz, 80 % AM	$\geq 0,5 \text{ s}$	$\leq 1\%$	
<input type="checkbox"/> DC Input / Output power ¹	1 V	1 kHz, 80 % AM	$\geq 0,5 \text{ s}$	$\leq 1\%$	
<input type="checkbox"/> Signal / control / Wired network ¹	1 V	1 kHz, 80 % AM	$\geq 0,5 \text{ s}$	$\leq 1\%$	
<p>1) Only applicable to ports interfacing with cables whose whose total length may exceed 3 m. 2) Selection of the test frequency range : - Category II equipment the test frequency is 0,15 - 230MHz. - Other Classification of equipment the test frequency is 0,15 - 80MHz.</p>					

Test configuration



Test Results refer to Annex A.5



6.5. SURGE

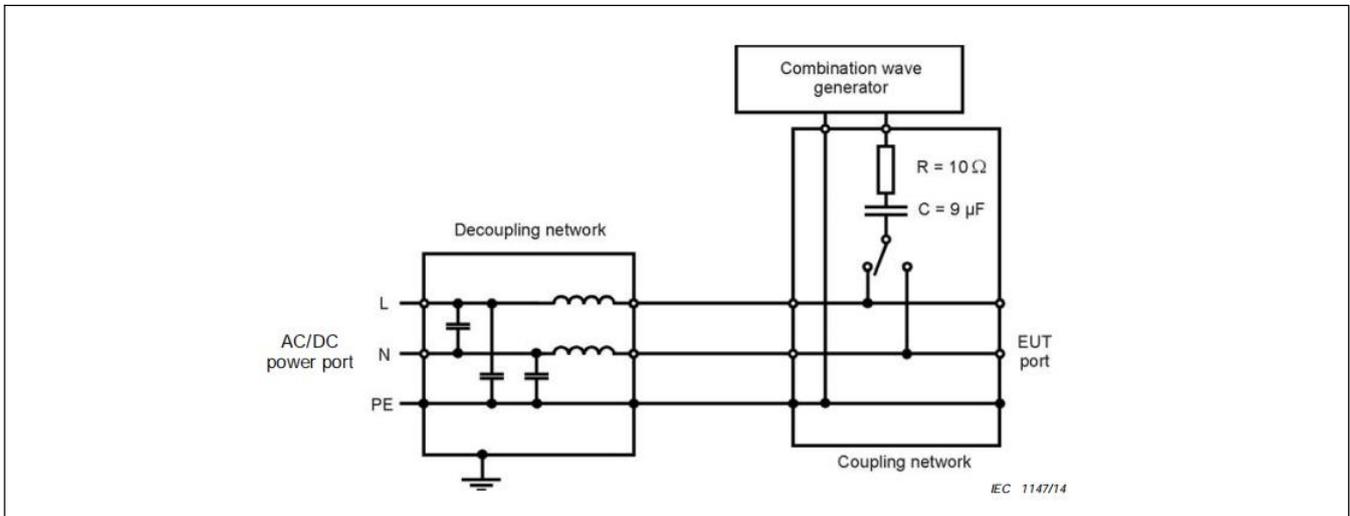
The surge immunity test simulates unidirectional surges caused by overvoltages from switching and lightning transients.

The surge is applied to the EUT power supply terminal via the capacitive coupling network, to the EUT power supply provide a 1,2/50 μ s voltage surge (at open-circuit condition), at least 5 positive and 5 negative tests with 1 min or less repetition rate are conducted during test. and phase angles is 90° and 270°.

Requirements

Standard		EN IEC 55014-2:2021		
Basic standard		EN 61000-4-5		
Pulse wave-shape		1,2/50 μ s		
Repetition rate		1 per minute or faster		
Number of pulses		5 pulses (at each polarity and phase angles)		
Port under test		Test Level	Coupling	Phase angle
☒	AC Input power	+ 1 kV	line - line	90°
		- 1 kV	line - line	270°
		+ 2 kV	line - ground ¹	90°
		- 2 kV	line - ground ¹	270°
1) No line-to-earth surges are applied to products which do not have provision for connection to earth.				

Test configuration



Test Results refer to Annex A.5



6.6. VOLTAGE DIPS AND SHORT INTERRUPTIONS

The surge immunity test simulates Voltage dips and short interruptions occur due to faults in a (public or non-public) network or in installations by sudden changes of large loads.

The EUT shall be connected to the test generator for testing using the shortest power cable specified by the EUT manufacturer and, if no cable length is specified, the shortest cable suitable for the EUT, each representative mode of operation shall be tested. For short interruptions to use 0° for one of the phases.

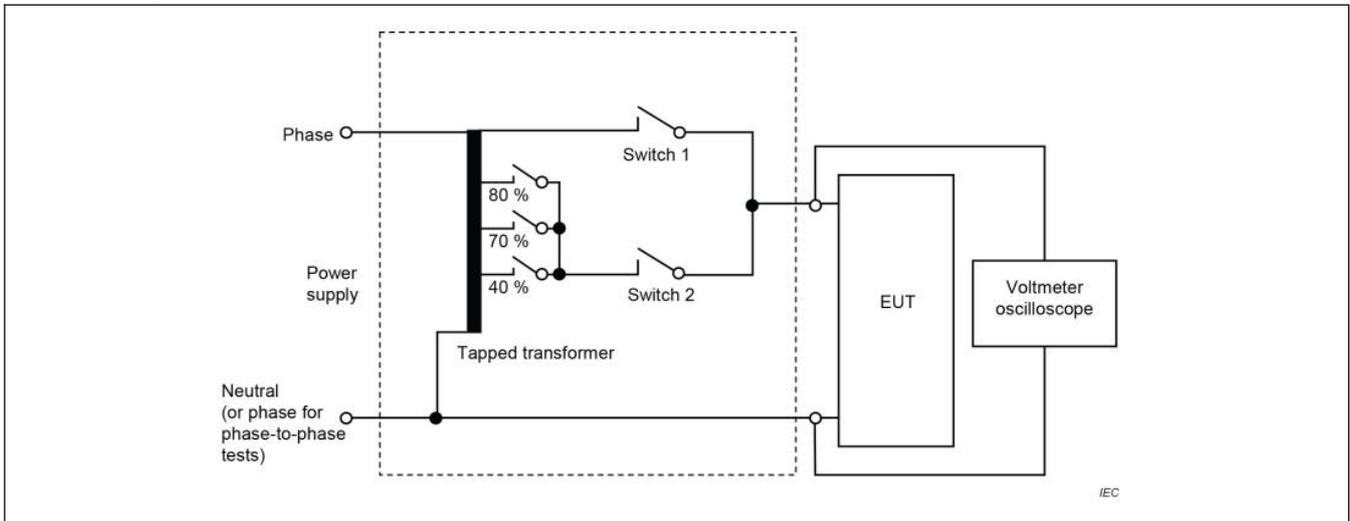
Requirements

Standard	EN IEC 55014-2:2021		
Basic standard	EN 61000-4-11		
# of dips / interruptions	3 dips / interruptions for each test level and phase angle		
Intervals between events	≥ 10 s		
Port under test	Test level ¹	Number of periods (cycles)	
		50Hz	60Hz
AC Input power	0% of U_{NOM}	0,5	0,5
	40% of U_{NOM}	10	12
	70% of U_{NOM}	25	30

1) Where the equipment has a rated voltage range the following shall apply:

- If the voltage range does not exceed 20 % of the lower voltage specified for the rated voltage range, a single voltage within that range may be specified as a basis for the test level specification.
- in all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.

Test configuration



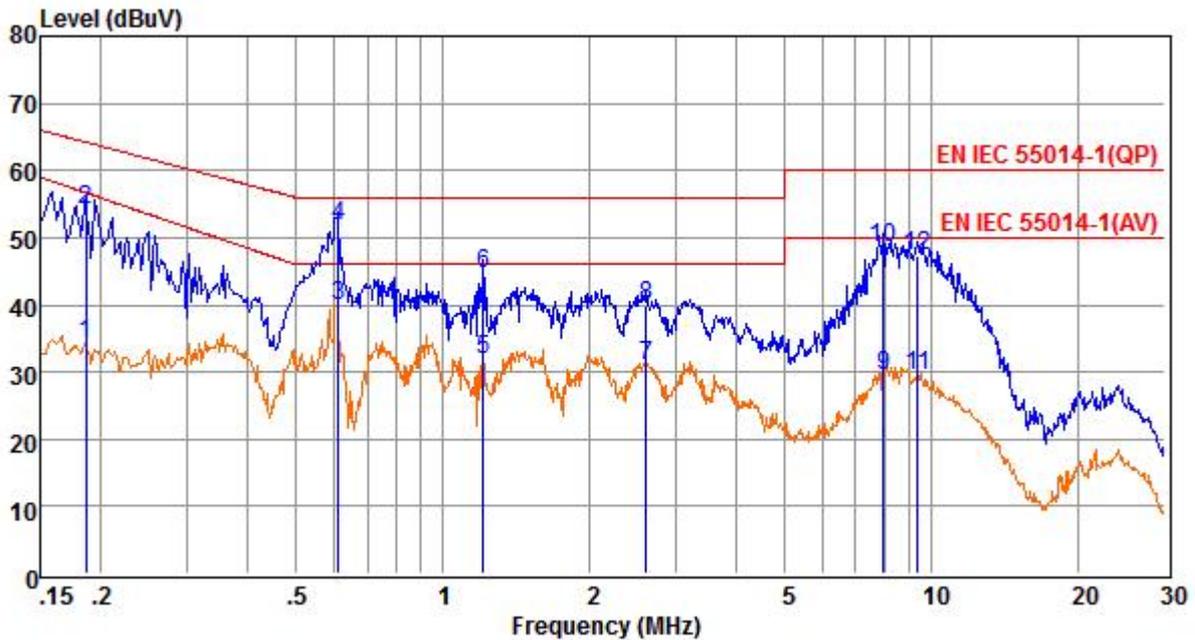
Test Results refer to Annex A.5



ANNEX A - TEST RESULTS

A.1. CONDUCTED DISTURBANCE TEST RESULTS

Environmental Conditions	22.7°C, 54% RH
Model	HSTW-12
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Wen Li
Pol	Line



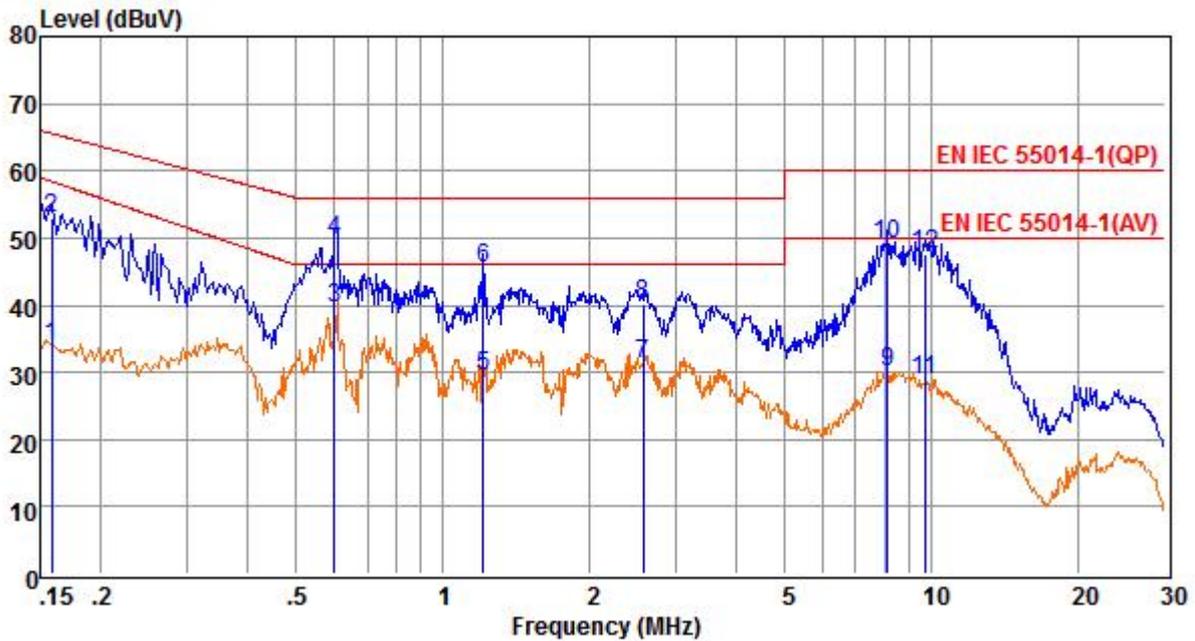
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.19	24.43	9.66	0.02	0.00	34.11	56.65	-22.54	Average
2	0.19	44.43	9.66	0.02	0.00	54.11	64.20	-10.09	QP
3	0.61	29.94	9.83	0.04	0.00	39.81	46.00	-6.19	Average
4	0.61	41.94	9.83	0.04	0.00	51.81	56.00	-4.19	QP
5	1.21	21.81	9.82	0.05	0.00	31.68	46.00	-14.32	Average
6	1.21	34.81	9.82	0.05	0.00	44.68	56.00	-11.32	QP
7	2.61	21.00	9.77	0.05	0.00	30.82	46.00	-15.18	Average
8	2.61	30.00	9.77	0.05	0.00	39.82	56.00	-16.18	QP
9	7.98	19.73	9.73	0.07	0.00	29.53	50.00	-20.47	Average
10	7.98	38.73	9.73	0.07	0.00	48.53	60.00	-11.47	QP
11	9.35	19.51	9.75	0.08	0.00	29.34	50.00	-20.66	Average
12	9.35	37.51	9.75	0.08	0.00	47.34	60.00	-12.66	QP

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
 2. The emission levels that are 20dB below the official limit are not reported.



Environmental Conditions	22.7°C, 54% RH
Model	HSTW-12
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Wen Li
Pol	Neutral



Pol: NEUTRAL

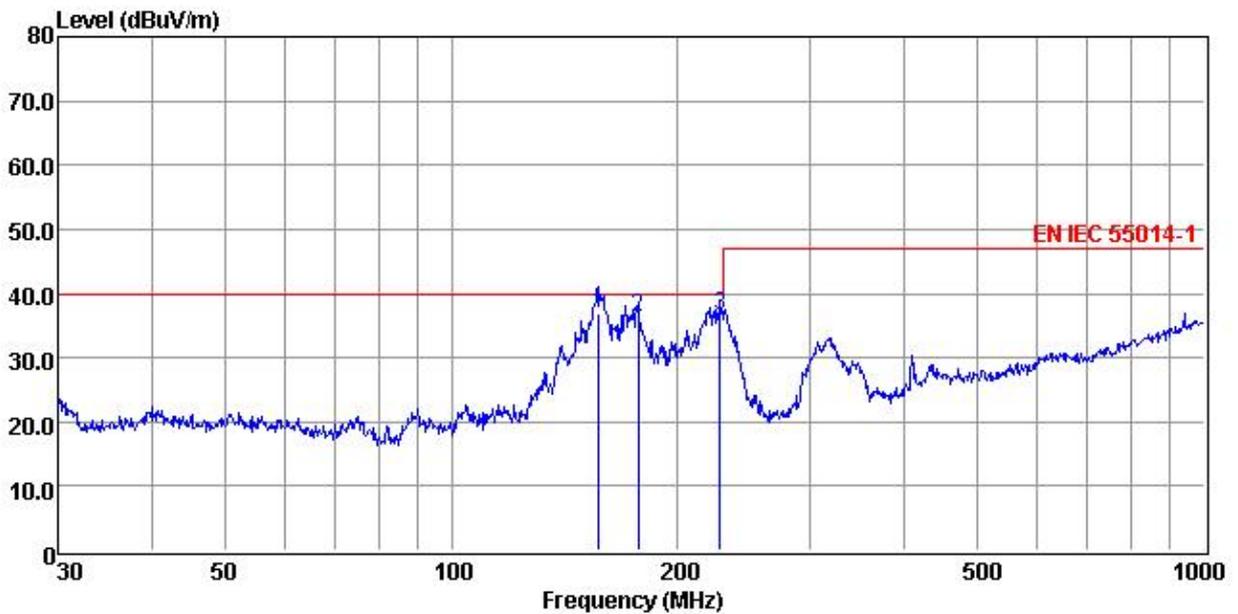
	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.16	24.31	9.69	0.02	0.00	34.02	58.43	-24.41	Average
2	0.16	43.31	9.69	0.02	0.00	53.02	65.56	-12.54	QP
3	0.60	29.67	9.87	0.04	0.00	39.58	46.00	-6.42	Average
4	0.60	39.67	9.87	0.04	0.00	49.58	56.00	-6.42	QP
5	1.21	19.65	9.80	0.05	0.00	29.50	46.00	-16.50	Average
6	1.21	35.65	9.80	0.05	0.00	45.50	56.00	-10.50	QP
7	2.57	21.36	9.77	0.05	0.00	31.18	46.00	-14.82	Average
8	2.57	30.36	9.77	0.05	0.00	40.18	56.00	-15.82	QP
9	8.15	20.24	9.75	0.07	0.00	30.06	50.00	-19.94	Average
10	8.15	39.24	9.75	0.07	0.00	49.06	60.00	-10.94	QP
11	9.71	18.93	9.71	0.08	0.00	28.72	50.00	-21.28	Average
12	9.71	37.93	9.71	0.08	0.00	47.72	60.00	-12.28	QP

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
 2. The emission levels that are 20dB below the official limit are not reported.



A.2. RADIATED DISTURBANCE TEST RESULTS

Environmental Conditions	25.9°C, 58% RH
Model	HSTW-12
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Wen Li
Pol	Vertical



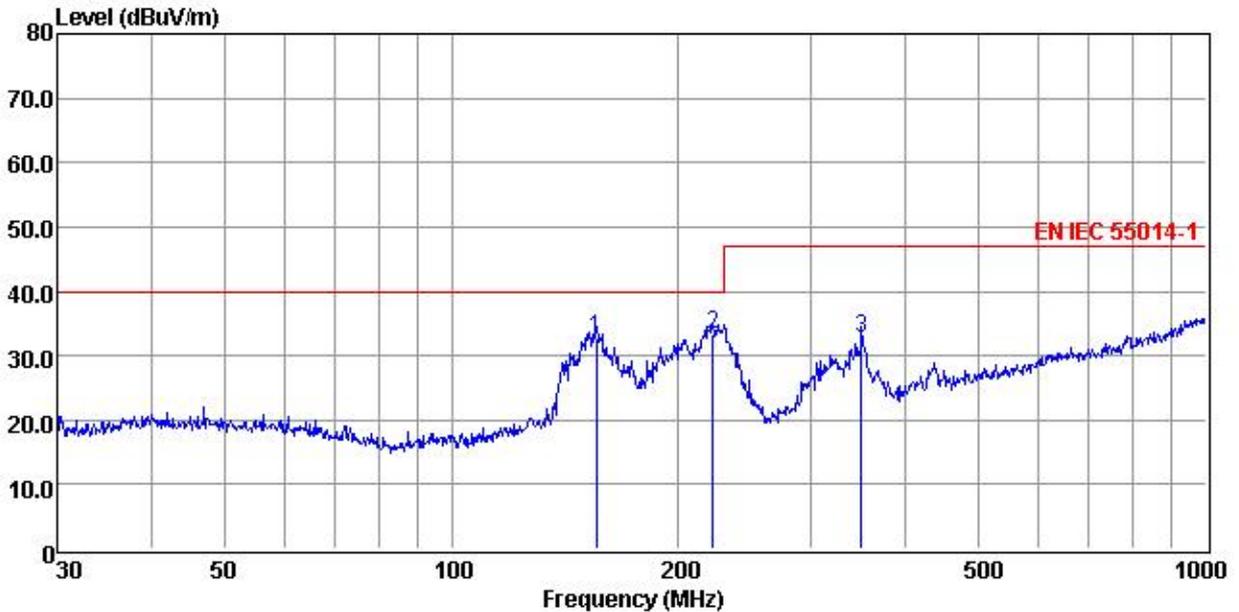
Site : 3m chamber
 Condition : EN IEC 55014-1 3m VULB9168 NB 4 VERTICAL

	Read	Cable	Antenna	Preamp	Limit	Over		
Freq	Level	Loss	Factor	Factor	Level	Line	Limit	
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	157.01	49.79	3.62	13.90	30.36	36.95	40.00	-3.05 QP
2	176.89	50.71	3.82	12.22	30.39	36.36	40.00	-3.64 QP
3	227.69	52.68	4.21	10.21	30.55	36.55	40.00	-3.45 QP

- Note: 1. All Levels are Quasi-peak values.
 2. Level= Read Level + Antenna Factor + Cable Loss - Preamp Factor
 3. The emission that are 20db below the official limit are not reported



Environmental Conditions	25.9°C, 58% RH
Model	HSTW-12
Operating mode	Mode 1 (worst case)
Test voltage	AC 230V,50Hz
Test engineer	Wen Li
Pol	Horizontal



Site : 3m chamber

Condition : EN IEC 55014-1 3m VULB9168 NB 4 HORIZONTAL

	Read	Cable	Antenna	Preamp	Limit	Over	
Freq	Level	Loss	Factor	Factor	Level	Line	Limit Remark
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	155.36	45.29	3.60	14.10	30.36	32.63	40.00 -7.37 QP
2	222.17	49.55	4.15	9.99	30.52	33.17	40.00 -6.83 QP
3	349.25	43.82	5.19	14.59	31.02	32.58	47.00 -14.42 QP

Note: 1. All Levels are Quasi-peak values.

2. Level= Read Level + Antenna Factor + Cable Loss - Preamp Factor

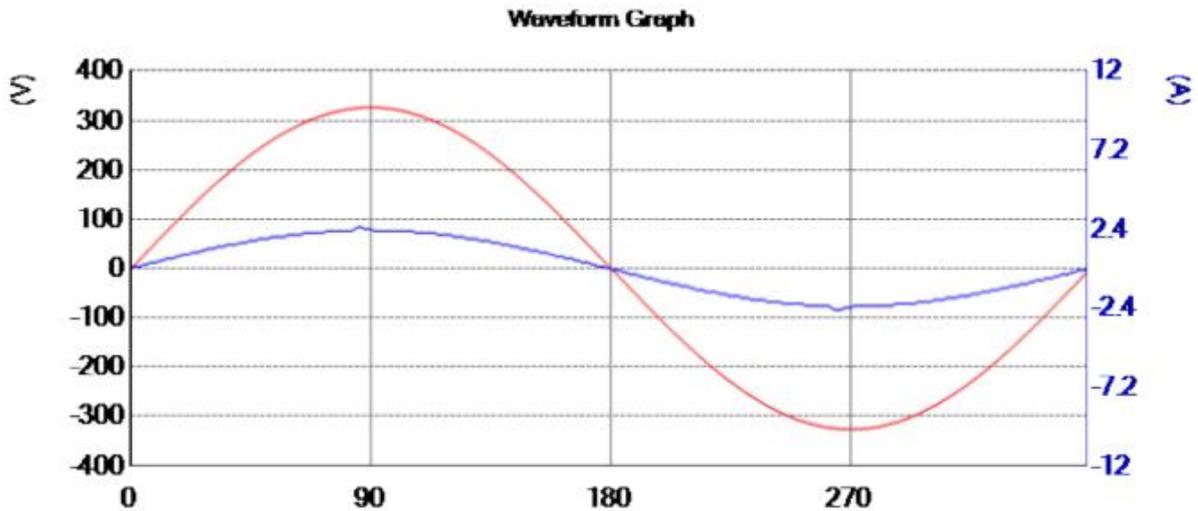
3. The emission that are 20db below the official limit are not reported



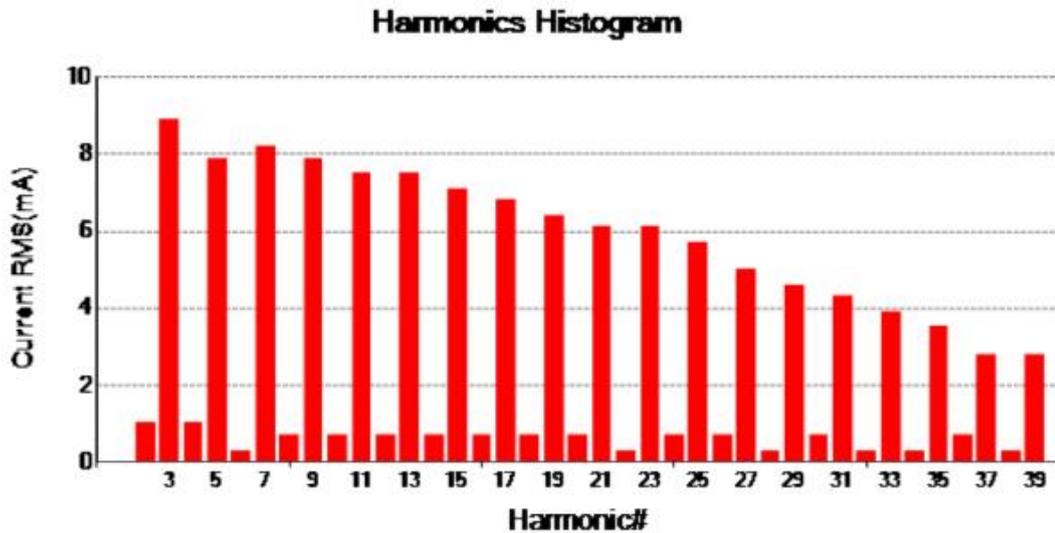
A.3. HARMONIC CURRENT TEST RESULTS

Model	HSTW-12
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Wen Li

Current & voltage waveforms



Harmonics and Class A



Model	HSTW-12						
Operating mode	Mode 1						
Test voltage	AC 230V,50Hz						
Test engineer	Wen Li						
<p>THC(mA): 27.300 I - THD(%): 1.6 POHC(mA):14.700 POHC Limit(mA):251.353</p> <p>Parameter values during test: V_RMS (Volts): 231.0 Frequency(Hz): 50.0 I_RMS(A): 1.7 Crest Factor: 1.498 Power (Watts): 389.4 Power Factor: 1.000</p>							
Harm#	Harms(filtered) (mA)	Limit (mA)	Harms(avg) (mA)	100%Limit	Harms(max) (mA)	150%Limit	Status
L_Fund	1662.100						
2	1.000	1080.000	1.000	0.093	1.400	0.086	Pass
3	8.900	2300.000	9.300	0.404	9.700	0.281	Pass
4	1.000	430.000	1.000	0.233	1.400	0.217	Pass
5	7.900	1140.000	8.000	0.702	8.200	0.480	Pass
6	0.300	300.000	0.600	0.200	0.700	0.156	Pass
7	8.200	770.000	8.200	1.065	8.600	0.745	Pass
8	0.700	230.000	0.600	0.261	1.000	0.290	Pass
9	7.900	400.000	7.900	1.975	8.200	1.367	Pass
10	0.700	184.000	0.600	0.326	1.000	0.362	Pass
11	7.500	330.000	7.700	2.333	7.900	1.596	Pass
12	0.700	153.300	0.600	0.391	1.000	0.435	Pass
13	7.500	210.000	7.400	3.524	7.500	2.381	Pass
14	0.700	131.400	0.600	0.457	1.000	0.507	Pass
15	7.100	150.000	7.000	4.667	7.100	3.156	Pass
16	0.700	115.000	0.600	0.522	1.000	0.580	Pass
17	6.800	132.400	7.000	5.287	7.100	3.575	Pass
18	0.700	102.200	0.600	0.587	0.700	0.457	Pass
19	6.400	118.400	6.400	5.405	6.800	3.829	Pass
20	0.700	92.000	0.600	0.652	1.000	0.725	Pass
21	6.100	107.100	6.200	5.789	6.400	3.984	Pass
22	0.300	83.600	0.600	0.718	1.000	0.797	Pass
23	6.100	97.800	5.900	6.033	6.100	4.158	Pass
24	0.700	76.700	0.600	0.782	0.700	0.608	Pass
25	5.700	90.000	5.500	6.111	5.700	4.222	Pass
26	0.700	70.800	0.600	0.847	1.000	0.942	Pass
27	5.000	83.300	5.000	6.002	5.300	4.242	Pass
28	0.300	65.700	0.600	0.913	1.000	1.015	Pass
29	4.600	77.600	4.800	6.186	5.000	4.296	Pass
30	0.700	61.300	0.600	0.979	0.700	0.761	Pass
31	4.300	72.600	4.400	6.061	4.600	4.224	Pass
32	0.300	57.500	0.600	1.043	1.000	1.159	Pass
33	3.900	68.200	3.800	5.572	4.300	4.203	Pass
34	0.300	54.100	0.600	1.109	1.000	1.232	Pass
35	3.500	64.300	3.800	5.910	3.900	4.044	Pass
36	0.700	51.100	0.500	0.978	0.700	0.913	Pass
37	2.800	60.800	3.100	5.099	3.200	3.509	Pass
38	0.300	48.400	0.600	1.240	1.000	1.377	Pass
39	2.800	57.700	2.800	4.853	3.200	3.697	Pass
40	0.300	46.000	0.600	1.304	1.000	1.449	Pass



Model	HSTW-12
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Wen Li

Measurements are compliant with IEC/EN61000-3-2 Ed. 5 & IEC/EN61000-4-7 Ed. 2.1

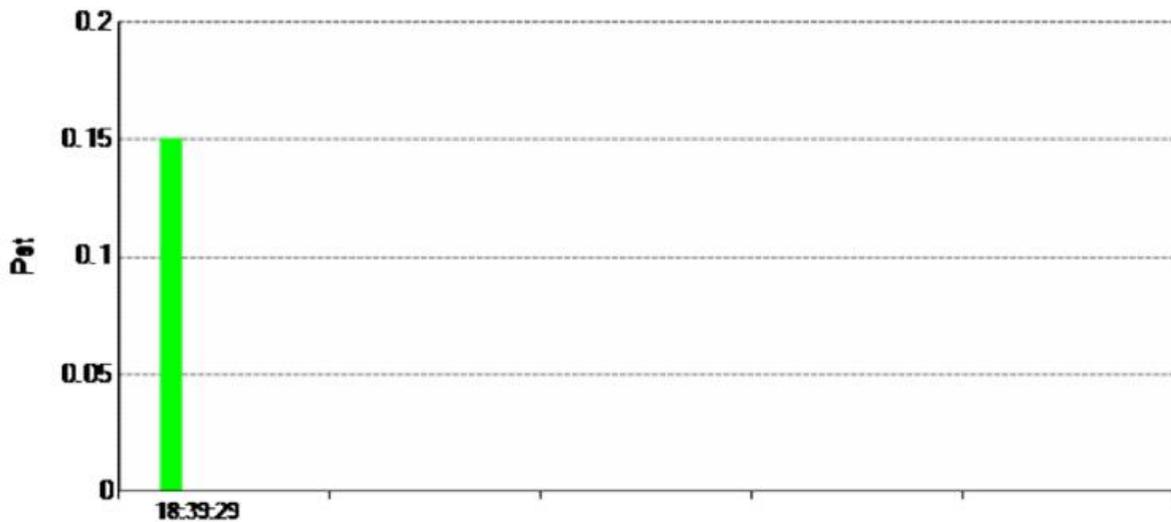
	Nominal	Measured		Deviation	Allowed Deviation	Result
		Low	High			
Supply Voltage	230	230.95	231.02	1.02	4.6	Pass
Supply Frequency	50	50.0	50.0	0.0	0.25	Pass
Crest Phase	90.0	89.2	89.9	0.8	87 - 93	N/A
Crest Factor	1.414	1.414	1.416	0.002	1.40 - 1.42	N/A
Fundamental Voltage	231.00	-	-	-	-	-

Harm#	Harmonics Voltage	Harmonic Ratio	Limit	Result
2	0.110	0.054	0.200	Pass
3	0.150	0.098	0.900	Pass
4	0.030	0.036	0.200	Pass
5	0.050	0.049	0.400	Pass
6	0.040	0.020	0.200	Pass
7	0.070	0.042	0.300	Pass
8	0.010	0.009	0.200	Pass
9	0.020	0.018	0.200	Pass
10	0.010	0.004	0.100	Pass
11	0.030	0.018	0.100	Pass
12	0.010	0.008	0.100	Pass
13	0.010	0.008	0.100	Pass
14	0.000	0.003	0.100	Pass
15	0.020	0.017	0.100	Pass
16	0.000	0.003	0.100	Pass
17	0.010	0.015	0.100	Pass
18	0.000	0.003	0.100	Pass
19	0.010	0.011	0.100	Pass
20	0.000	0.003	0.100	Pass
21	0.010	0.009	0.100	Pass
22	0.000	0.003	0.100	Pass
23	0.010	0.010	0.100	Pass
24	0.000	0.000	0.100	Pass
25	0.010	0.010	0.100	Pass
26	0.000	0.003	0.100	Pass
27	0.000	0.008	0.100	Pass
28	0.000	0.000	0.100	Pass
29	0.010	0.008	0.100	Pass
30	0.000	0.000	0.100	Pass
31	0.010	0.008	0.100	Pass
32	0.000	0.000	0.100	Pass
33	0.010	0.010	0.100	Pass
34	0.000	0.003	0.100	Pass
35	0.010	0.010	0.100	Pass
36	0.000	0.000	0.100	Pass
37	0.010	0.005	0.100	Pass
38	0.000	0.003	0.100	Pass
39	0.010	0.008	0.100	Pass
40	0.000	0.000	0.100	Pass



A.4. VOLTAGE FLUCTUATIONS & FLICKER TEST RESULTS

Model	HSTW-12
Operating mode	Mode 1
Test voltage	AC 230V,50Hz
Test engineer	Wen Li

Psti and limit line European Limits**Result:**

T-max (ms):	0.00	Test limit (ms):	500.00	Pass
Highest dc (%):	0.67	Test limit (%):	3.30	Pass
Highest dmax (%):	0.62	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.15	Test limit:	1.00	Pass



A.5. IMMUNITY TEST RESULTS

ELECTROSTATIC DISCHARGE IMMUNITY TEST RESULTS					
Standard	<input checked="" type="checkbox"/> EN IEC 55014-2:2021		<input checked="" type="checkbox"/> EN 61000-4-2		
EUT	TOWEL WARMER	Temperature	25.0°C		
M/N	HSTW-12	Humidity	57%		
Test Mode	MODE 1	Pressure	-		
Input voltage	AC 230V,50Hz	Test Results	Pass		
Test engineer	Wen Li				
Discharge Mode	Test Points	Test Voltage (kV) & polarity	Number of discharges/polarity	Discharge interval (s)	Performance Criteria
Contact Discharge	-	± 2&4	10	1	B
Air Discharge	-	± 2&4&8	10	1	B
VCP	-	± 4	10	1	B
HCP	-	± 4	10	1	B
Note :					



ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST RESULTS

Standard	<input checked="" type="checkbox"/> EN IEC 55014-2:2021		<input checked="" type="checkbox"/> EN 61000-4-4	
EUT	TOWEL WARMER		Temperature	25.5°C
M/N	HSTW-12		Humidity	55%
Test Mode	MODE 1		Pressure	-
Input voltage	AC 230V,50Hz		Test Results	Pass
Test engineer	Wen Li			
Port under test	Test Level & polarity	Repetition Frequency	Test duration / polarity	Performance Criteria
AC Input / Output power	± 1 kV	5 kHz	2min	B
DC Input / Output power				
Signal / control / wired network				

Note:



INJECTED CURRENTS TEST RESULTS				
Standard	<input checked="" type="checkbox"/> EN IEC 55014-2:2021		<input checked="" type="checkbox"/> EN 61000-4-6	
EUT	TOWEL WARMER		Temperature	25.5°C
M/N	HSTW-12		Humidity	55%
Test Mode	MODE 1		Pressure	-
Input voltage	AC 230V,50Hz		Test Results	Pass
Frequency range	0,15 - 230 MHz		Test engineer	Wen Li
Port under test	Test Level	Coupling method	Dwell time	Performance Criteria
AC Input / Output power	3 V	CDN	3 seconds	A
DC Input / Output power				
Signal / control / wired network				



SURGE IMMUNITY TEST RESULTS						
Standard	<input checked="" type="checkbox"/> EN IEC 55014-2:2021		<input checked="" type="checkbox"/> EN 61000-4-5			
EUT	TOWEL WARMER			Temperature	25.5°C	
M/N	HSTW-12			Humidity	55%	
Test Mode	MODE 1			Pressure	-	
Input voltage	AC 230V,50Hz			Test Results	Pass	
Test engineer	Wen Li					
Port under test	Coupling	Test Level & polarity(kV)	Phase angle (°)	Number of surges	Repetition rate(s)	Performance criteria
AC Input power	L - N	+ 1.0	90	5	60	B
		- 1.0	270	5	60	B
AC Input power	L -PE	+ 2.0	90	5	60	B
		- 2.0	270	5	60	B
AC Input power	N - PE	+ 2.0	90	5	60	B
		- 2.0	270	5	60	B
AC Input power						
AC Input power						
Note:						



VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST RESULTS

Standard	<input checked="" type="checkbox"/> EN IEC 55014-2:2021		<input checked="" type="checkbox"/> EN 61000-4-11		
EUT	TOWEL WARMER		Temperature	25.5°C	
M/N	HSTW-12		Humidity	55%	
Test Mode	MODE 1		Pressure	-	
Input voltage	AC 230V,50Hz		Test Results	Pass	
Test engineer	Wen Li				
U _{NOM} (Vac)	Test Level (% U _{NOM})	Number of periods		Phase angle (°)	Performance criteria
		50Hz			
230	0	0.5		0	C
230	40	10		0, 90, 180, 270	C
230	70	25		0, 90, 180, 270	C

Note:

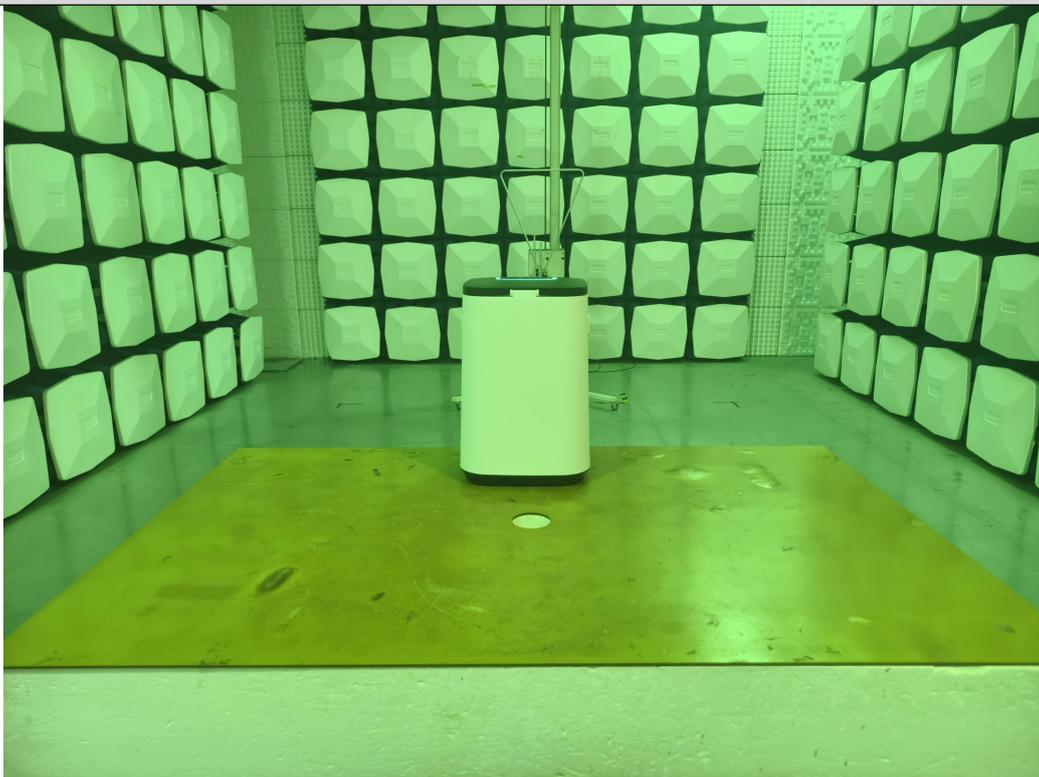


ANNEX B - TEST PHOTOS

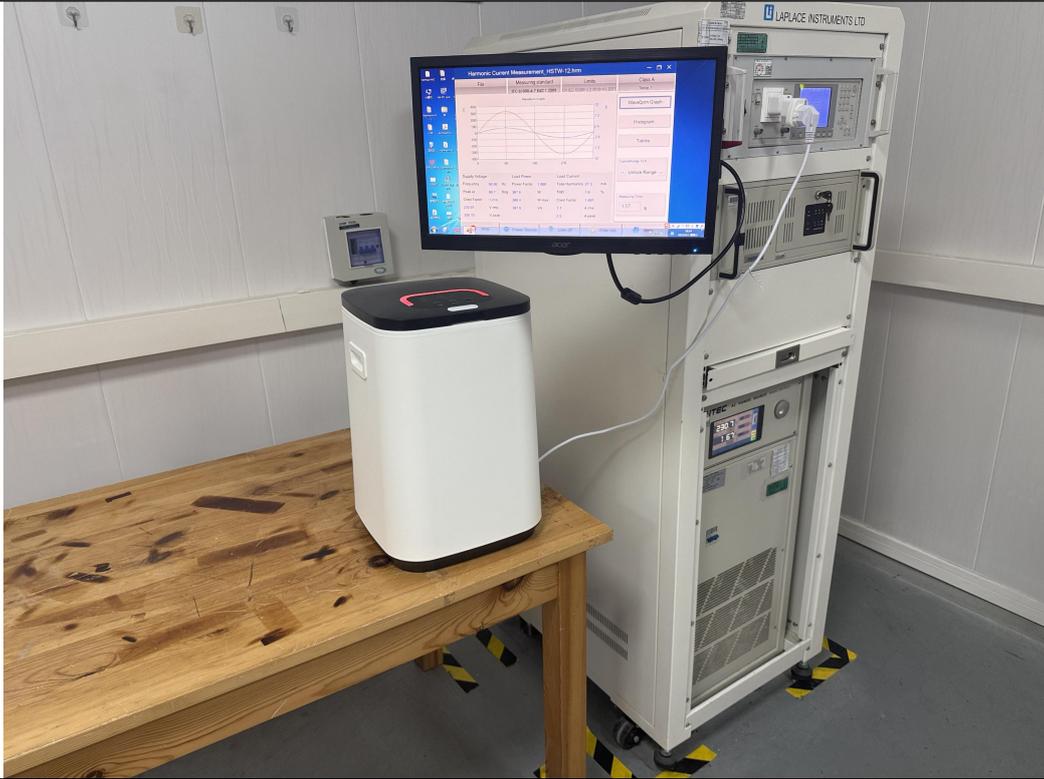
B.1. Conducted Disturbance at Mains Port



B.2. Radiated Disturbance



B.3. Harmonic Current&Flicker



B.4. Injected Currents



B.5. Electrical Fast Transient / Burst & Surge



B.6. Electrostatic Discharge



ANNEX C - EXTERNAL AND INTERNAL PHOTOS OF THE EUT

The photographs show the equipment under test.



Figure. 1 (HSTW-12)



Figure. 2 (HSTW-12)





Figure. 3 (HSTW-12)



Figure. 4 (HSTW-12)





Figure. 5 (HSTW-12)



Figure. 6 (HSTW-12)





Figure. 7 (HSTW-12)



Figure. 8 (HSTW-12)



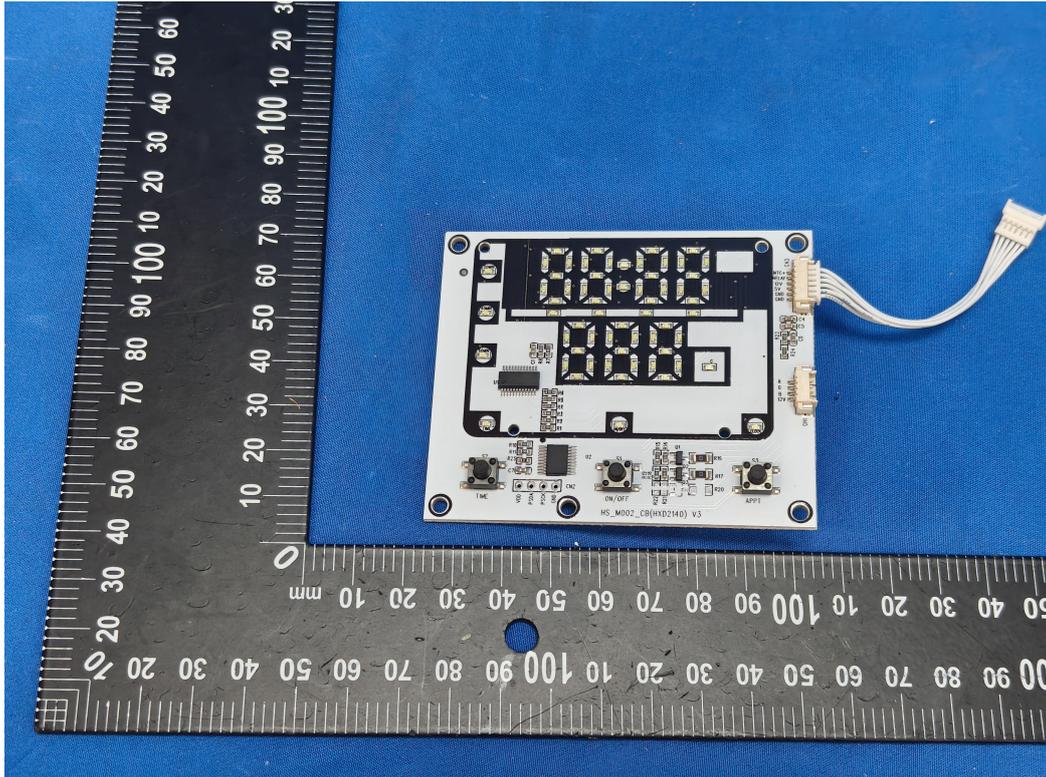


Figure. 9 (HSTW-12)

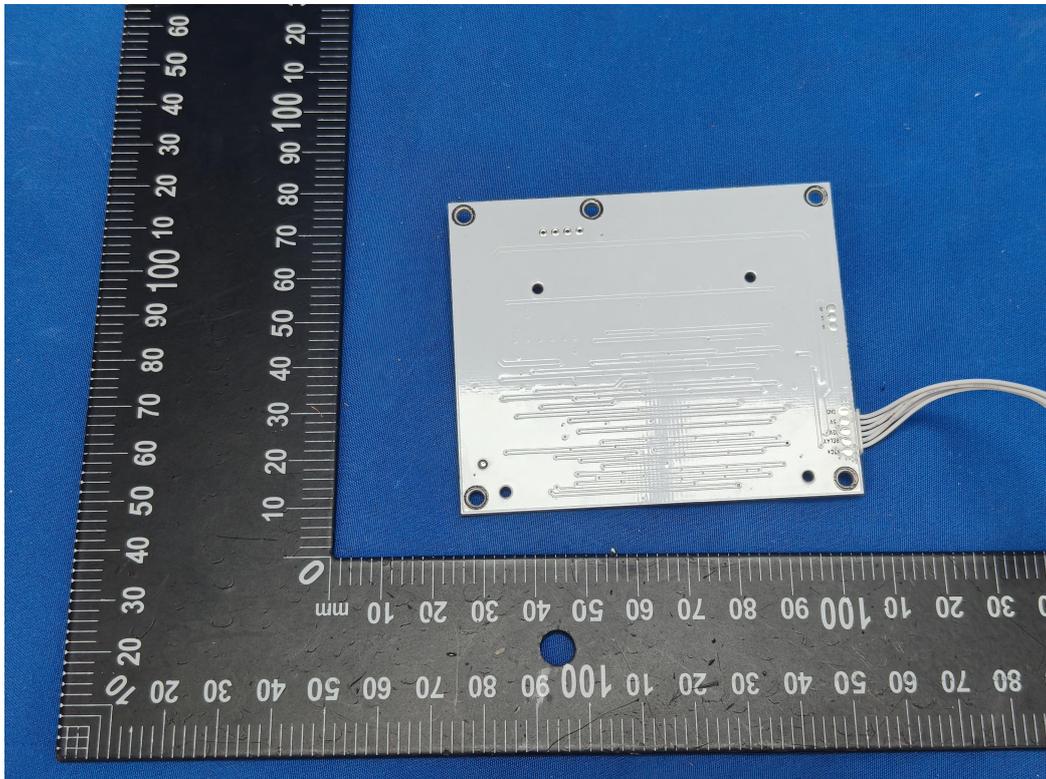


Figure. 10 (HSTW-12)



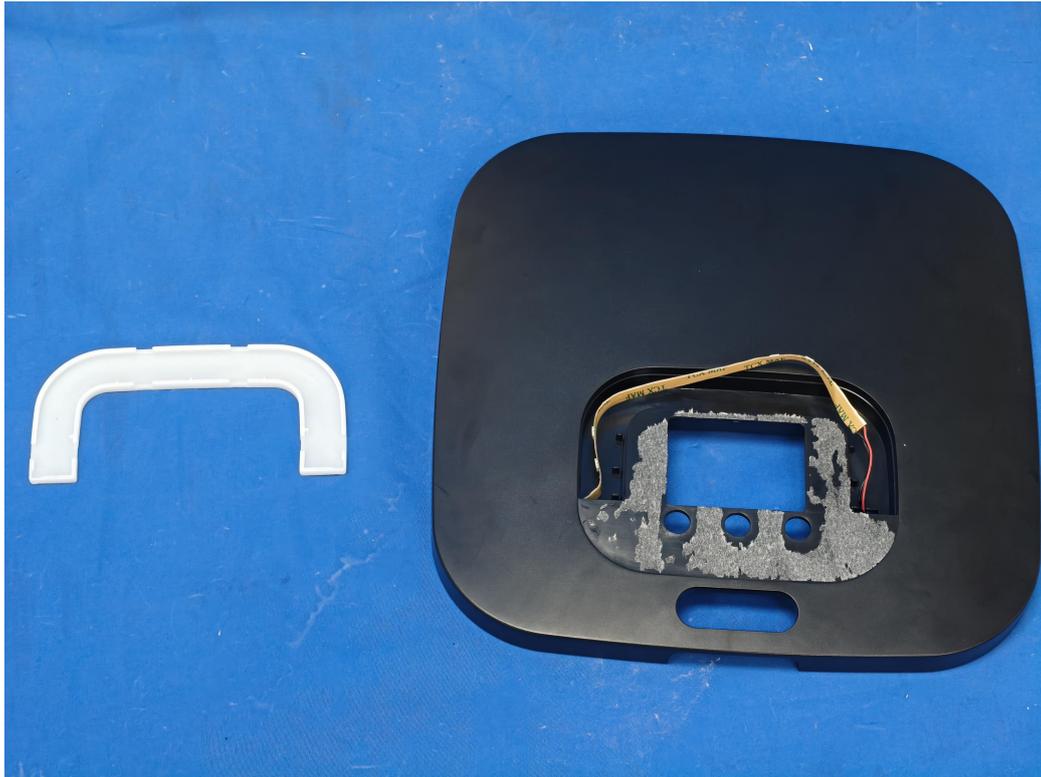


Figure. 11 (HSTW-12)



Figure. 12 (HSTW-12)





Figure. 13 (HSTW-12)

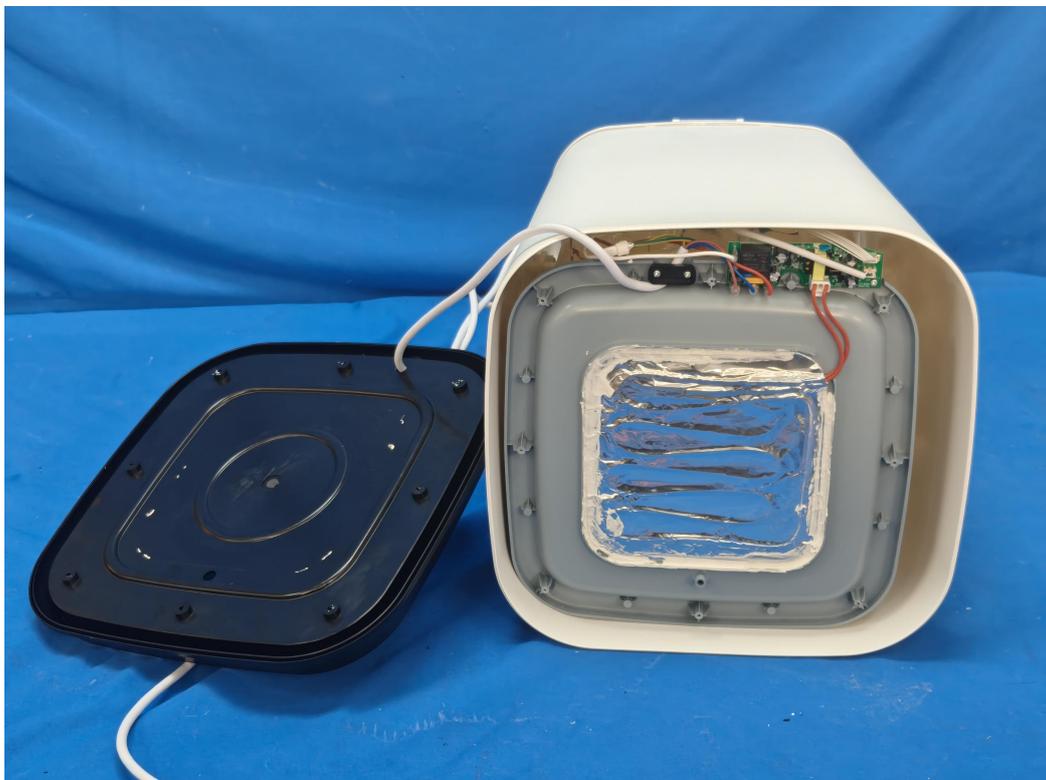


Figure. 14 (HSTW-12)





Figure. 15 (HSTW-12)



Figure. 16 (HSTW-12)



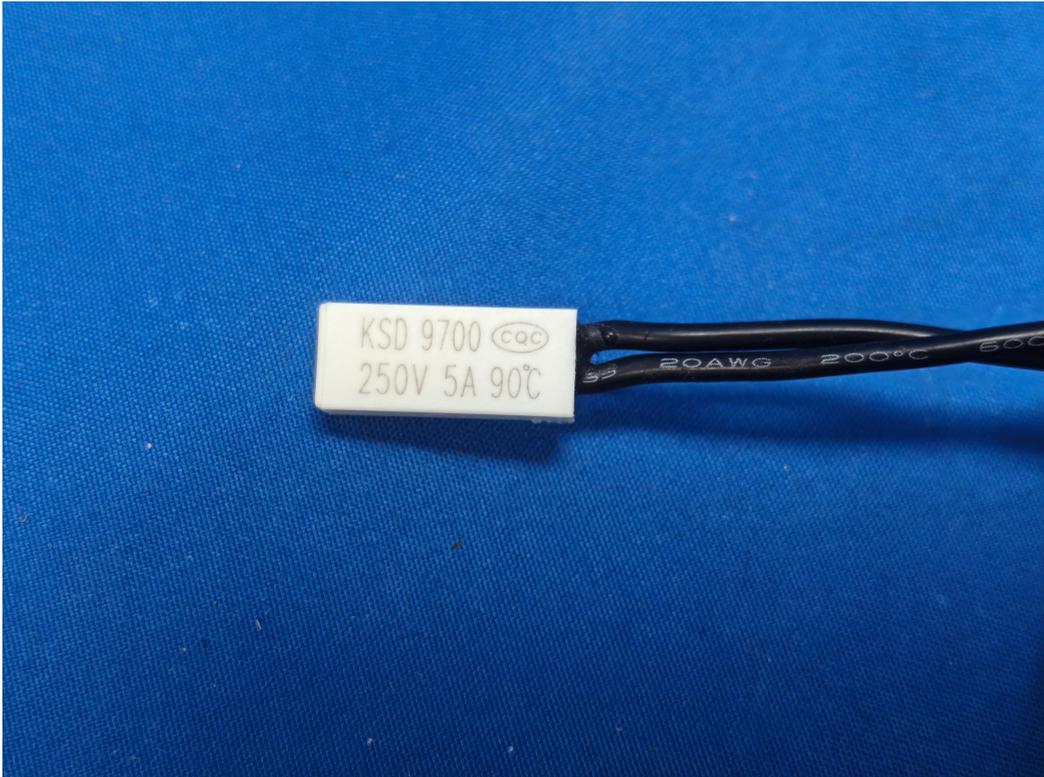


Figure. 17 (HSTW-12)

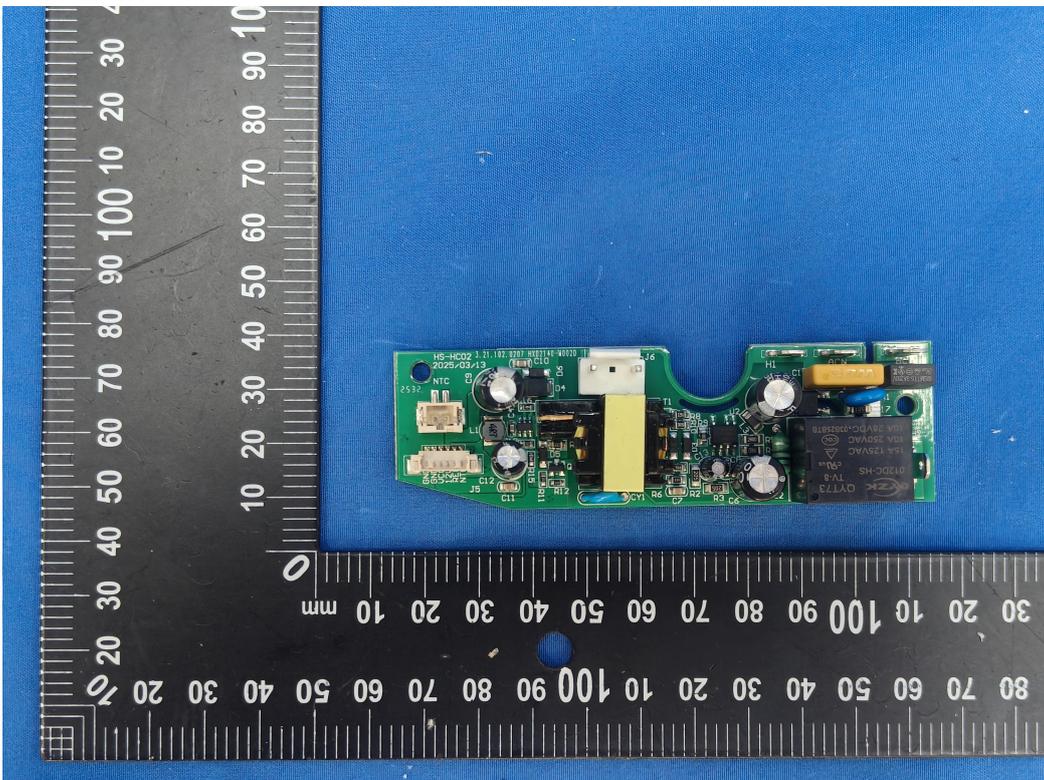


Figure. 18 (HSTW-12)



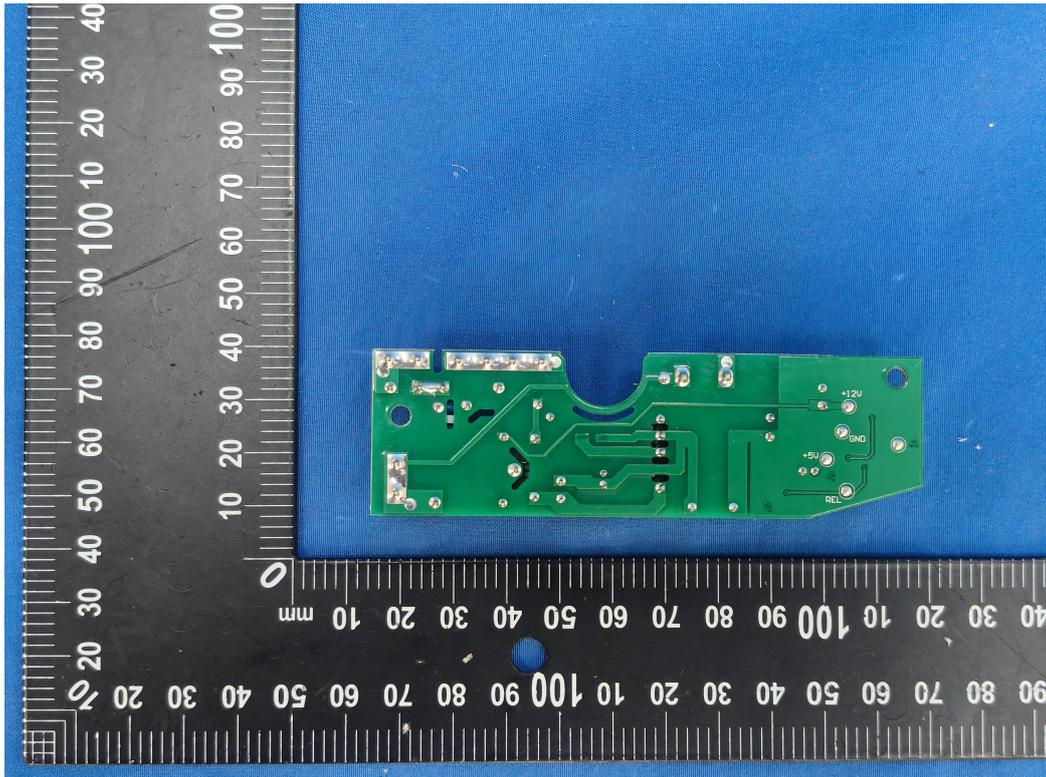


Figure. 19 (HSTW-12)

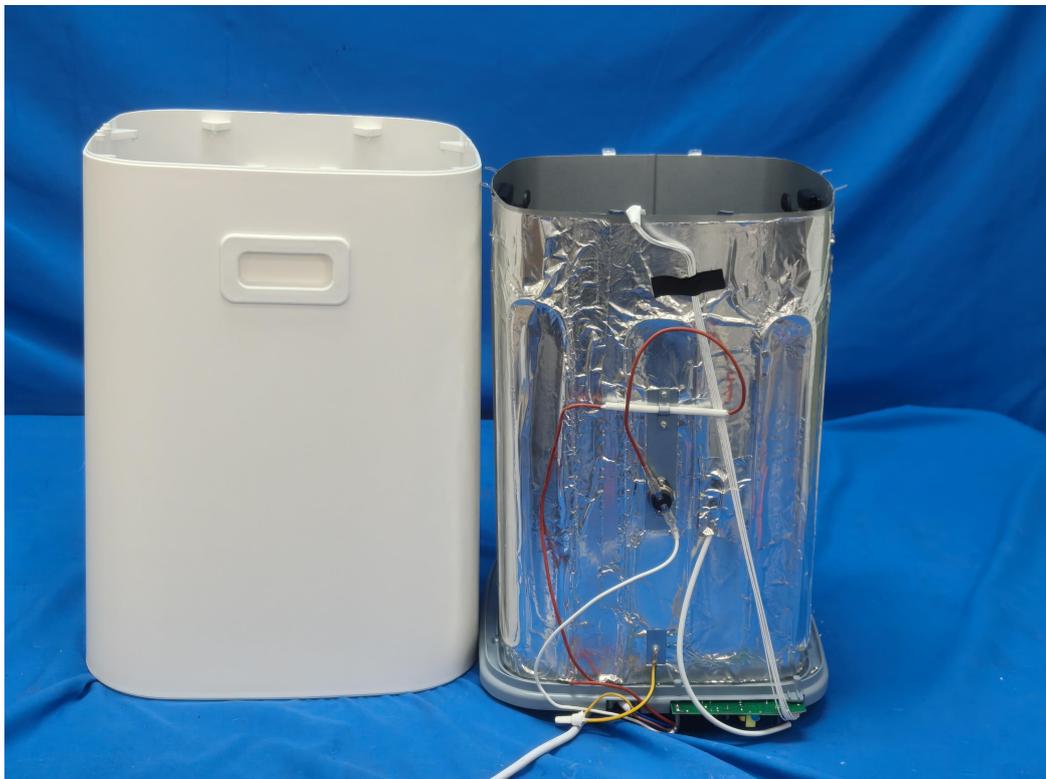


Figure. 20 (HSTW-12)



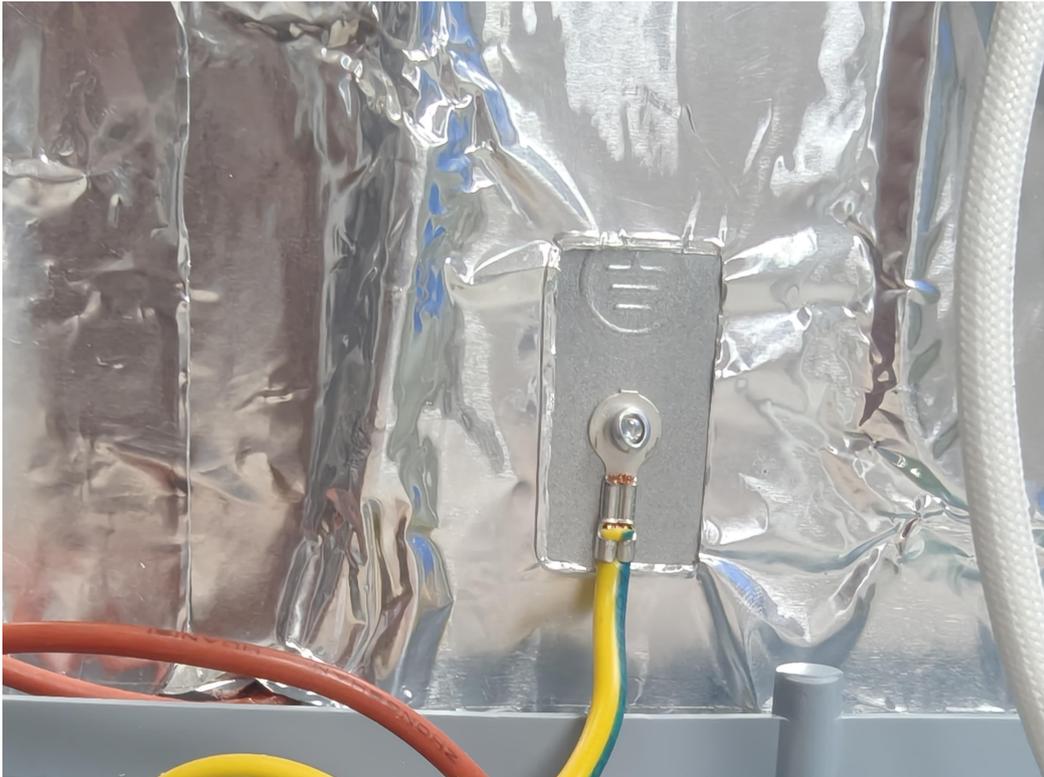


Figure. 21 (HSTW-12)

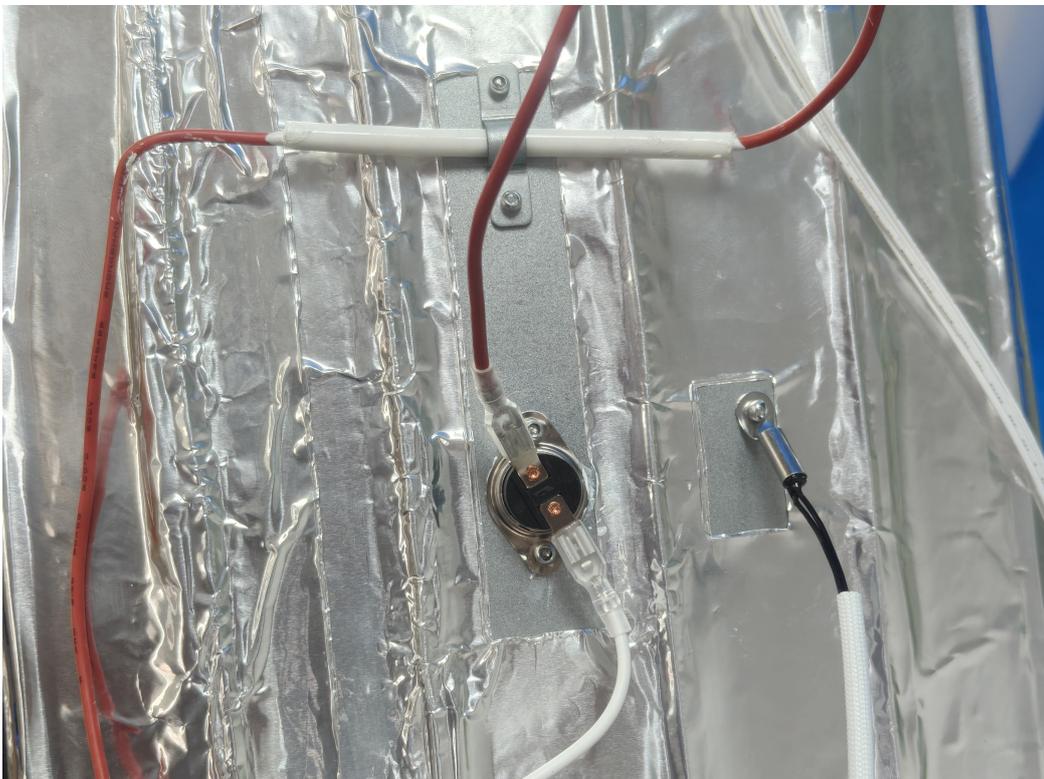


Figure. 22 (HSTW-12)





Figure. 23 (HSTW-12)

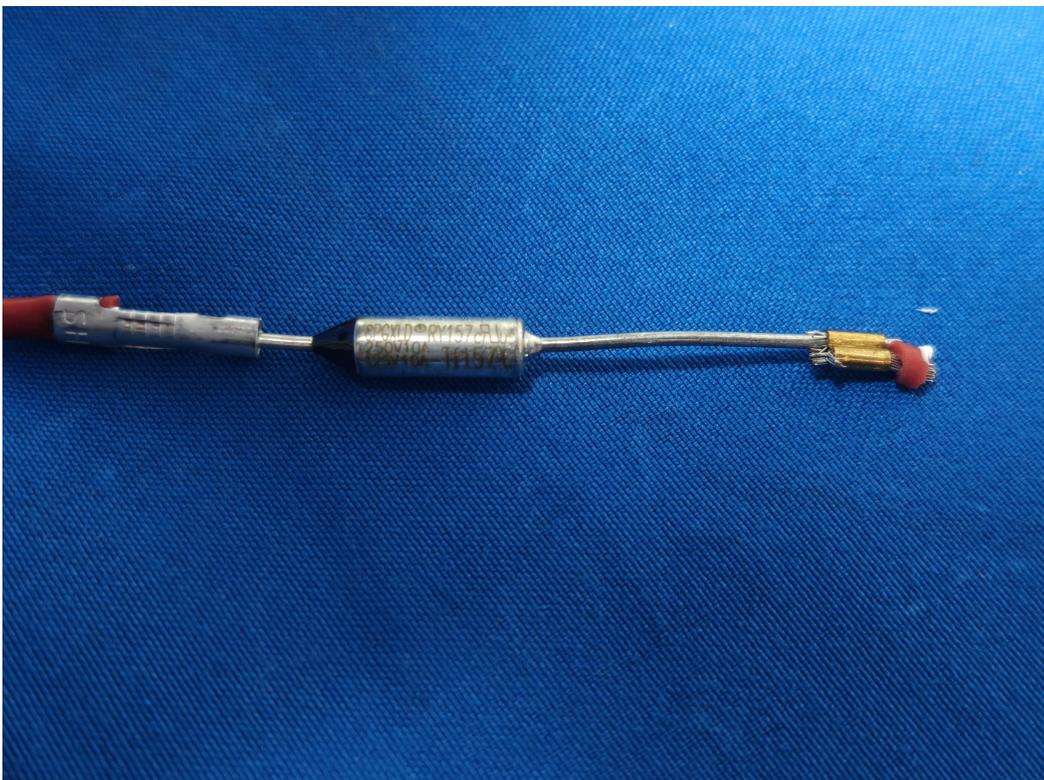


Figure. 24 (HSTW-12)





Figure. 25 (HSTW-12)



Figure. 26 (HSTW-12)





Figure. 27 (HSTW-12)



Figure. 28 (HSTW-12)

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