EN IEC 55014-1:2021
EN IEC 61000-3-2:2019/A1:2021
EN 61000-3-3:2013/A2:2021
EN IEC 55014-2:2021

TEST REPORT

For

cat litter box

MODEL NUMBER: SH2804

REPORT NUMBER: E04A24010663E00101

ISSUE DATE: Feb. 2, 2024

Prepared for

Shenghui ElectronicTechnology (Guangdong) Co., Ltd.
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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	Feb. 2, 2024	Initial Issue	

Summary of Test Results

Emission			
Standard	**Test Item**	**Limit**	**Result**
EN IEC 55014-1:2021	Conducted emissions from the AC mains power ports	Clause 4.3	Pass
	Radiated emissions(30 MHz-1 GHz)	Clause 4.3	Pass
EN IEC 61000-3-2:2019/A1:2021	Harmonic current emissions	Clause 7	N/A
EN 61000-3-3:2013/A2:2021	Voltage fluctuations and flicker	Clause 5	Pass

Immunity (EN IEC 55014-2:2021)				
Basic Standard	**Test Item**	**Test Specification**	**Criteria**	**Result**
IEC 61000-4-2:2008	Electrostatic discharge	Contact +/- 4 kV; Air +/- 8 kV	B	Pass
IEC 61000-4-4:2012	Electrical fast transients burst (AC mains power ports)	+/- 1.0 kV 5/50 ns, 5 kHz	B	Pass
IEC 61000-4-5:2014+A1:2017	Surges (AC mains power ports)	±1 kV line-to-line, ±2 kV line-to-earth	B	Pass
IEC 61000-4-6:2013	Continuous induced RF disturbances (AC mains power ports)	150 kHz-230 MHz; 1 kHz 80 % AM, 3 V r.m.s.	A	Pass
IEC 61000-4-11:2020	Voltage dips and interruptions (AC mains power ports)	Voltage dips: 0%, 0.5 cycle; 40%,10 and 12 cycles; 70%, 25 and 30 cycle	C	Pass

Note:
1. N/A: In this whole report not applicable.

*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
*The measurement result for the sample received is <Pass> according to <EN IEC 55014-1:2021, EN IEC 61000-3-2:2019/A1:2021, EN 61000-3-3:2013/A2:2021, EN IEC 55014-2:2021> when <Accuracy Method> decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Shenghui ElectronicTechnology (Guangdong) Co., Ltd.
Address:	Floor 2, Building B, No.50Shengye Road, Shebei Village,Huangjiang Town,Dongguan City,Guangdong Province

Manufacturer Information

Company Name:	Shenghui ElectronicTechnology (Guangdong) Co., Ltd.
Address:	Floor 2, Building B, No.50Shengye Road, Shebei Village,Huangjiang Town,Dongguan City,Guangdong Province

Factory Information

Company Name:	Shenghui ElectronicTechnology (Guangdong) Co., Ltd.
Address:	Floor 2, Building B, No.50Shengye Road, Shebei Village,Huangjiang Town,Dongguan City,Guangdong Province

EUT Information

Product Description:	cat litter box
Model:	SH2804
Sample Received Date:	Jan.17, 2024
Sample Status:	Normal
Sample ID:	A24010663 001,A24010663 004,A24010663 007
Date of Tested:	Jan.17, 2024 to Jan.29, 2024

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
EN IEC 55014-1:2021	**Pass**
EN IEC 61000-3-2:2019/A1:2021	**Pass**
EN 61000-3-3:2013/A2:2021	**Pass**
EN IEC 55014-2:2021	**Pass**

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2. TEST METHODOLOGY

All tests were performed in accordance with the standard EN IEC 55014-1:2021, EN IEC 61000-3-2:2019/A1:2021, EN 61000-3-3:2013/A2:2021, EN IEC 55014-2:2021

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 6947.01)** Guangdong Global Testing Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1343)** Guangdong Global Testing Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules **ISED (Company No.: 30714)** Guangdong Global Testing Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 30714 and the test lab Conformity Assessment Body Identifier (CABID) is CN0148.

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Measurement Frequency Range	K	U(dB)
Conducted emissions from the AC mains power ports	0.009 MHz - 30 MHz	2	3.37
Radiated emissions(30 MHz-1 GHz)	30 MHz -1 GHz	2	3.79
Note1: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		cat litter box
Model		SH2804
Ratings		cat litter box: Input:DC 5V Adapter: Input:100-240V~ 50/60Hz Output:DC 5V/1A
Power Supply	AC	230V/50Hz

5.2. TEST MODE

Test Mode	Description
M01	Operating(Maximum speed)+Adapter(A24010663 004)
M02	Operating(Maximum speed)+Adapter(A24010663 007)

5.3. SUPPORT UNITS FOR SYSTEM TEST

The EUT has been tested as an independent unit

6. MEASURING EQUIPMENT AND SOFTWARE USED

Test Equipment of Conducted emissions from the AC mains power ports					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Shielding Room 1	CHENG YU	8*5*4	N/A	2022/10/29	2025/10/28
LISN	R&S	ENV216	102843	2023/9/18	2024/9/17
EMI Test Receiver	R&S	ESR3	102647	2023/9/18	2024/9/17
LISN	Schwarzbeck	NNLK 8129 RC	5046	2023/9/18	2024/9/17
EZ-EMC	Farad	Ver/EMC-con-3A1 1+	N/A	N/A	N/A

Test Equipment of Radiated emissions(30 MHz-1 GHz)					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Chamber	ETS	9*6*6	Q2146	2022/8/30	2025/8/29
Receiver	R&S	ESCI3	101409	2023/9/18	2024/9/17
Loop Antenna	ETS	6502	243668	2022/3/30	2025/3/30
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2023/9/18	2024/9/17
Biconilog Antenna	Schwarzbeck	VULB 9168	1315	2022/10/10	2025/10/9
Biconilog Antenna	ETS	3142E	243646	2022/3/23	2025/3/22
EZ-EMC	Farad	Ver/FA-03A2 RE+	N/A	N/A	N/A

Test Equipment of Voltage fluctuations and flicker					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Harmonic and Fliker Analyzer	EMC PARTNER	Harmonics 1000-1P 230V	241	2023/9/18	2024/9/17
HARCS	EMC PARTNER AG	V5.0	N/A	N/A	N/A

Test Equipment of Electrostatic discharge					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
ESD Simulator	TESEQ	NSG437	336	2023/9/20	2024/9/19

Test Equipment of Electrical fast transients burst (AC mains power ports)					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
EFT Generator	Everfine	EMS61000-4B	G114921CA 1341115	2023/9/18	2024/9/17

Test Equipment of Surges (AC mains power ports)					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Immunity Teat System	EMC PARTNER	IMU3000 S-T	105684-2060	2023/9/18	2024/9/17

Test Equipment of Continuous induced RF disturbances (AC mains power ports)					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
EXG Analog Signal Generator	KEYSIGHT	N5171B	MY61252670	2023/9/18	2024/9/17
EPM Series Power Meter	KEYSIGHT	N1914A	MY50000188	2023/9/18	2024/9/17
Power Sensor	KEYSIGHT	E9304A	MY51180004	2023/9/18	2024/9/17
Power Sensor	KEYSIGHT	E9304A	MY51120019	2023/9/18	2024/9/17
Power Amplifier	AR	AR/100A 400M	305558	2023/9/18	2024/9/17
Double directional coupler	XIANGHUA	DDT0-1-40	221008732	2023/9/18	2024/9/17
COUPLING AND DECOUPLING NETWORK	Schwarzbeck	CDN M2/M3PE 16A	148	2023/9/18	2024/9/17
COUPLING AND DECOUPLING NETWORK	Schwarzbeck	CDN T8	53	2023/9/18	2024/9/17
Electromagnetic injection pliers	3ctest	EM CL100	EM C22060625	2023/9/18	2024/9/17
6 db attenuator	Huaxiang	WDTS	220831156	2023/9/18	2024/9/17
FASLAB-CS	HzEMC	V2/7/2/1	N/A	N/A	N/A

Test Equipment of Voltage dips and interruptions (AC mains power ports)					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
DIP Generator	Everfine	EMS61000-11K	G113317CA 8341117	2023/9/18	2024/9/17

7. EMISSION TEST

7.1. CONDUCTED EMISSIONS FROM THE AC MAINS POWER PORTS

LIMITS

General limits

Frequency range	Mains ports		Auxiliary ports			
	Disturbance voltage		Disturbance voltage		Disturbance current	
1	2	3	4	5	6	7
MHz	Quasi-peak dBμV	Average dBμV	Quasi-peak dBμV	Average dBμV	Quasi-peak dBμA	Average dBμA
0,15 to 0,50	Decreasing linearly with the logarithm of the frequency from:		80	70	Decreasing linearly with the logarithm of the frequency from:	
	66 to 56	59 to 46			40 to 30	30 to 20
0,50 to 5	56	46	74	64	30	20
5 to 30	60	50	74	64		
The lower limit applies at the transition frequencies. The test report shall state which test method was used and which limits were applied.						

Limits for mains port of tools

Frequency range	$P \leq 700$ W		700 W < $P \leq$ 1 000 W		$P >$ 1 000 W	
1	2	3	4	5	6	7
MHz	Quasi-peak dBμV	Average dBμV	Quasi-peak dBμV	Average dBμV	Quasi-peak dBμV	Average dBμV
0,15 to 0,35	Decreasing linearly with the logarithm of the frequency from:					
	66 to 59	59 to 49	70 to 63	63 to 53	76 to 69	69 to 59
0,35 to 5	59	49	63	53	69	59
5 to 30	64	54	68	58	74	64
The lower limit applies at the transition frequencies. **Key** P = rated power of the motor only.						

limits for induction cooking appliances

Frequency range	Appliances which are 100 V rated and without an earth connection		All other appliances	
MHz	dBμV Quasi-peak	dBμV Average	dBμV Quasi-peak	dBμV Average
0,009 to 0,050	122	–	110	–
0,050 to 0,150	Decreasing linearly with logarithm of frequency from 102 to 92	–	Decreasing linearly with logarithm of frequency from 90 to 80	–
0,150 to 0,5	Decreasing linearly with logarithm of frequency from			
	72 to 62	62 to 52	66 to 56	56 to 46
0,5 to 5	56	46	56	46
5 to 30	60	50	60	50
The lower limit applies at the transition frequencies.				

Note:
(1) The tighter limit applies at the band edges.
(2) The limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the horizontal ground plane and being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

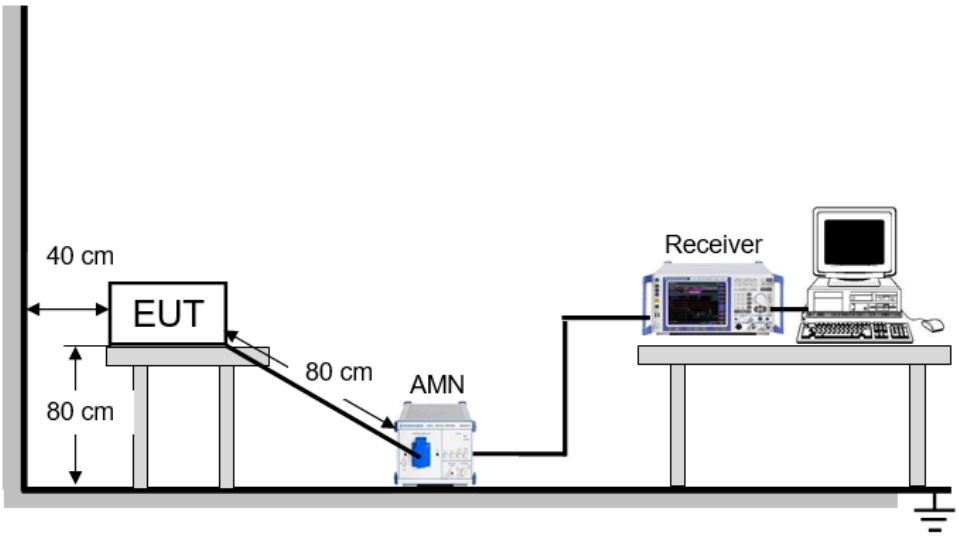
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

d. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.

e. LISN at least 80 cm from nearest part of EUT chassis.

f. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

TEST SETUP



TEST ENVIRONMENT

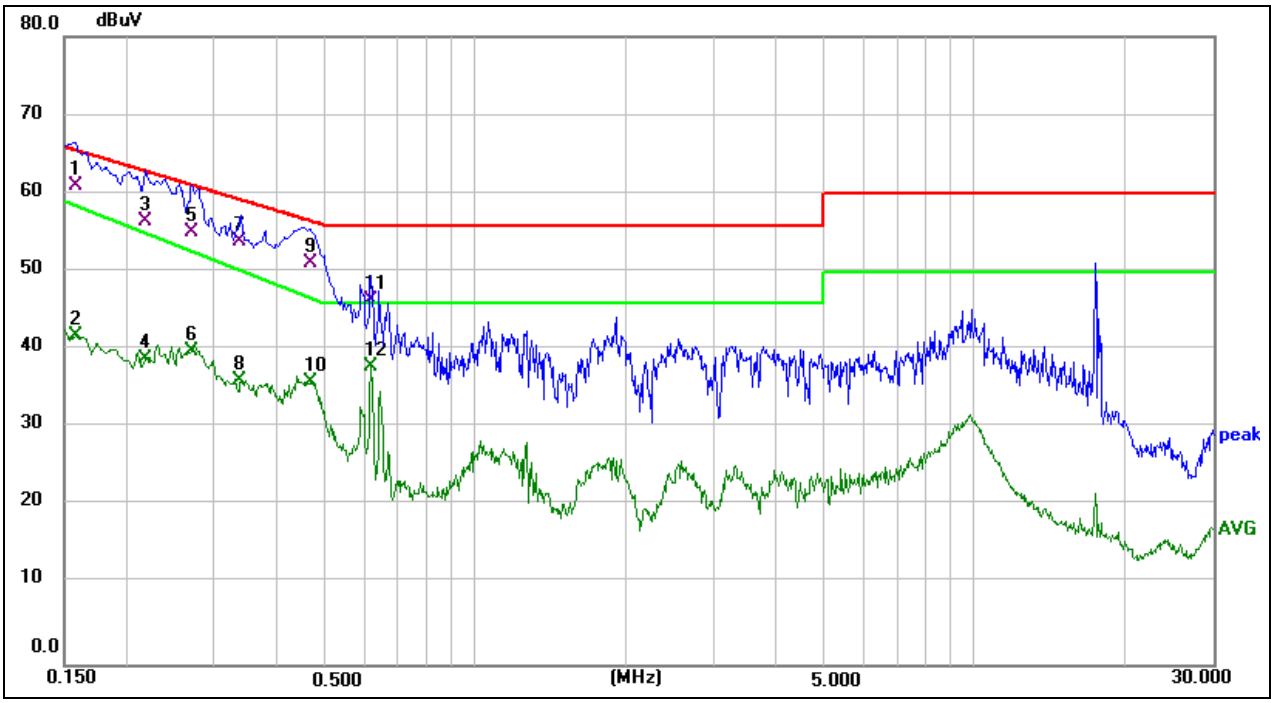
Temperature	24.3℃	Relative Humidity	52.6%
Atmosphere Pressure	101kPa		

TEST MODE

Pre-test Mode:	M01 ~ M02
Final Test Mode:	M01, M02

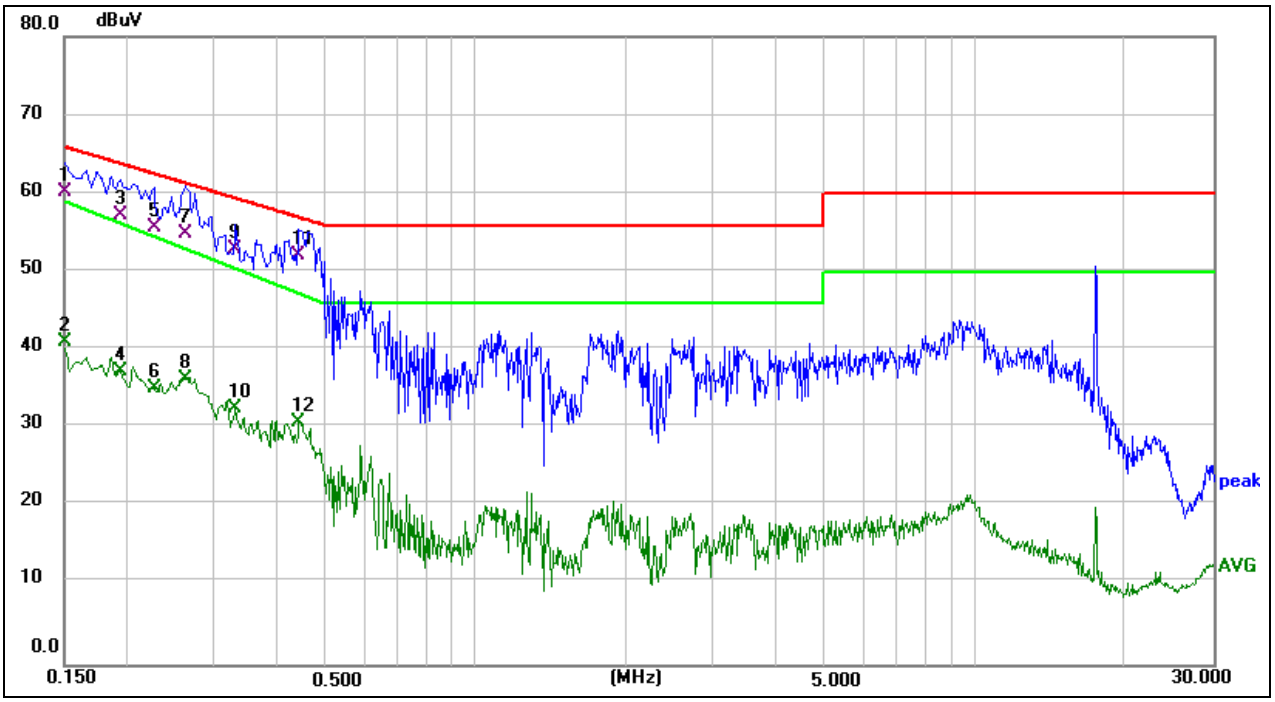
Note: All test modes had been tested, but only the worst data recorded in the report.

TEST RESULTS



Phase:L1	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector	Comment
1 *	0.1580	50.31	10.69	61.00	65.57	-4.57	QP	
2	0.1580	31.25	10.69	41.94	58.44	-16.50	AVG	
3	0.2180	45.77	10.83	56.60	62.89	-6.29	QP	
4	0.2180	28.22	10.83	39.05	54.96	-15.91	AVG	
5	0.2700	44.17	10.93	55.10	61.12	-6.02	QP	
6	0.2700	29.04	10.93	39.97	52.65	-12.68	AVG	
7	0.3379	42.93	11.07	54.00	59.25	-5.25	QP	
8	0.3379	25.23	11.07	36.30	50.23	-13.93	AVG	
9	0.4660	39.86	11.34	51.20	56.58	-5.38	QP	
10	0.4660	24.68	11.34	36.02	46.76	-10.74	AVG	
11	0.6180	34.85	11.65	46.50	56.00	-9.50	QP	
12	0.6180	26.39	11.65	38.04	46.00	-7.96	AVG	



Phase:N	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector	Comment
1	0.1500	49.59	10.61	60.20	66.00	-5.80	QP	
2	0.1500	30.48	10.61	41.09	59.00	-17.91	AVG	
3	0.1940	46.49	10.71	57.20	63.86	-6.66	QP	
4	0.1940	26.75	10.71	37.46	56.22	-18.76	AVG	
5	0.2260	45.01	10.79	55.80	62.60	-6.80	QP	
6	0.2260	24.48	10.79	35.27	54.57	-19.30	AVG	
7	0.2620	44.16	10.84	55.00	61.37	-6.37	QP	
8	0.2620	25.62	10.84	36.46	52.98	-16.52	AVG	
9	0.3300	42.04	10.98	53.02	59.45	-6.43	QP	
10	0.3300	21.76	10.98	32.74	50.49	-17.75	AVG	
11	0.4420	40.95	11.21	52.16	57.02	-4.86	QP	
12	0.4420	19.68	11.21	30.89	47.33	-16.44	AVG	

Remark: Result = Reading +Correct (Insertion Loss + Cable Loss + Attenuator Factor)
Margin = Result - Limit

7.2. RADIATED EMISSIONS(30 MHZ-1 GHZ)

LIMITS

30 MHz to 1 GHz

FREQUENCY (MHz)	At 10 m	At 3 m
	dB(μV/m)	dB(μV/m)
30 – 230	30	40
230 – 1000	37	47

Note:
(1) The limit for radiated test was performed according to EN IEC 55014-1
(2) The tighter limit applies at the band edges.
(3) Emission level (dBμV/m)=20log Emission level (μV/m).

TEST PROCEDURE

Below 1 GHz and above 30 MHz

The setting of the spectrum analyzer

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak and QP
Trace	Max hold

a. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp was used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

b. The EUT was placed on a turntable with 80 cm above ground.

c. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

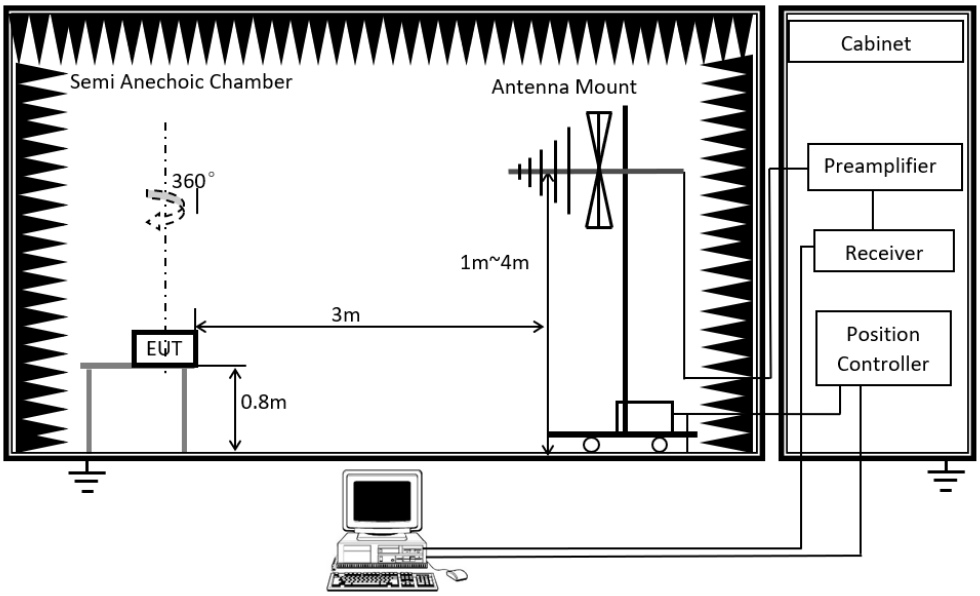
d. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

e. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.

f. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

g. For measurement below 1 GHz, the initial step in collecting Radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

TEST SETUP



TEST ENVIRONMENT

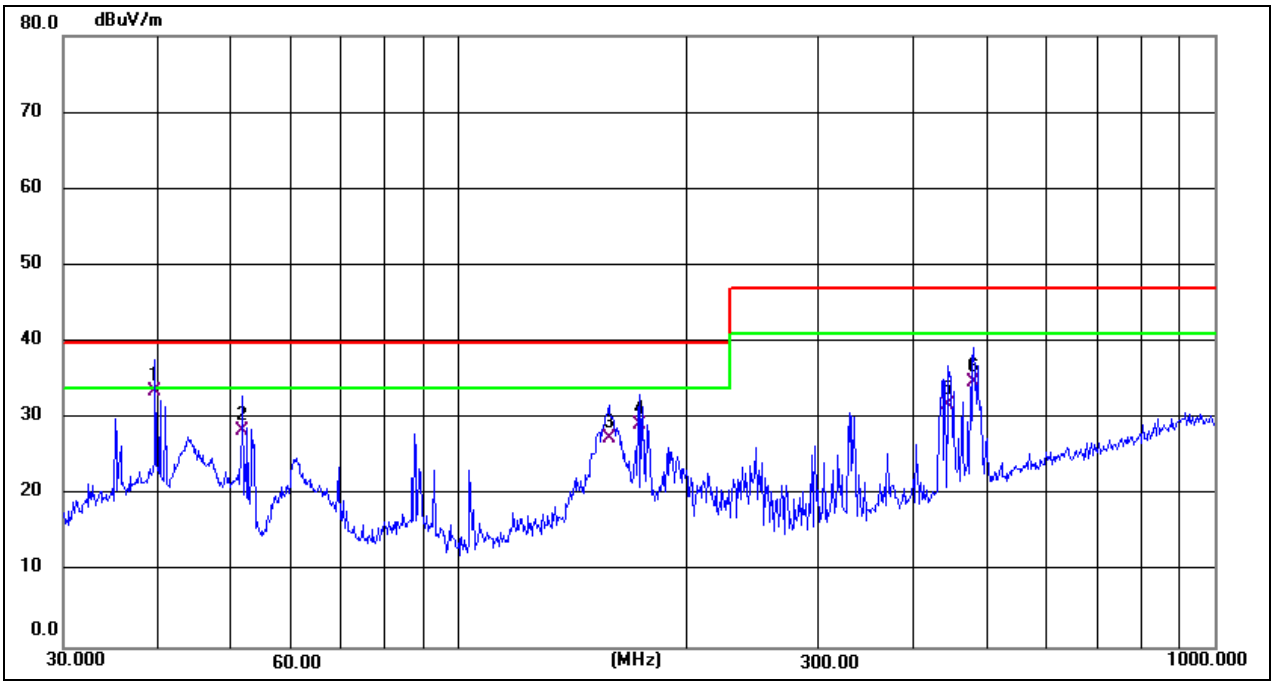
Temperature	24.1℃	Relative Humidity	53%
Atmosphere Pressure	101kPa		

TEST MODE

Pre-test Mode:	M01 ~ M02
Final Test Mode:	M01, M02

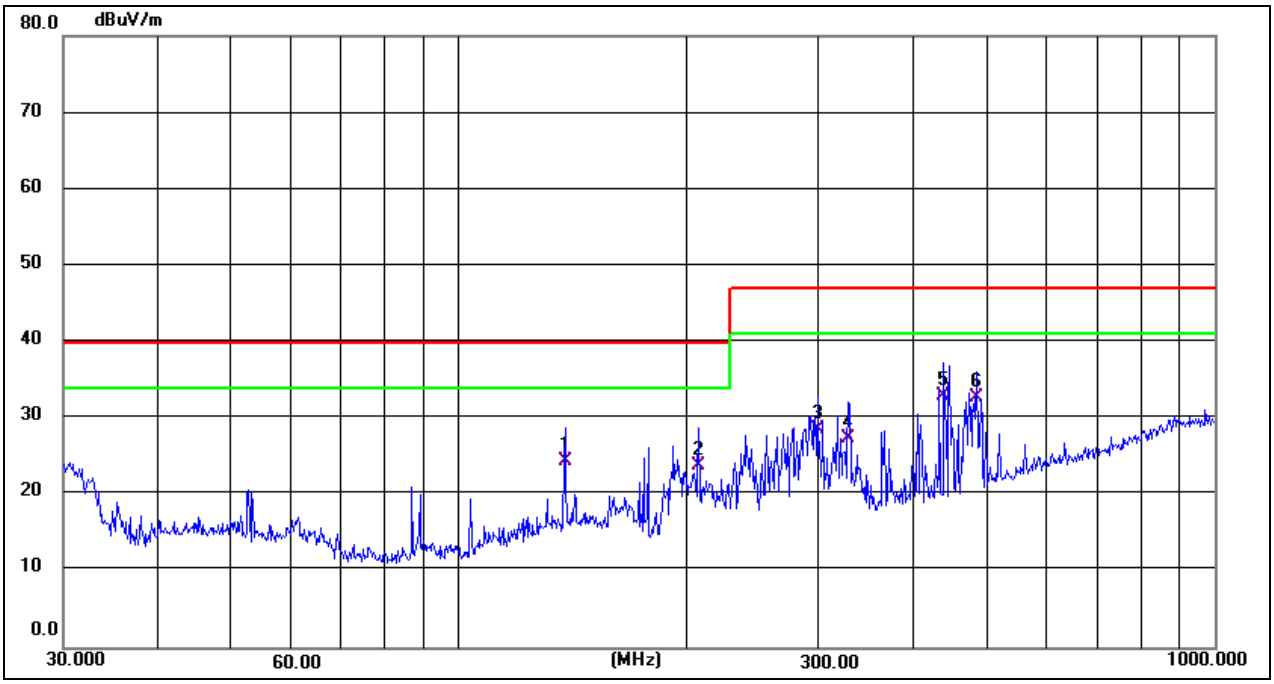
Note: All test modes had been tested, but only the worst data recorded in the report.

TEST RESULTS



Antenna::Vertical	Mode: M01

No.	Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Measure-Ment (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Comment
1 *	39.7146	46.69	-13.09	33.60	40.00	-6.40	QP	
2	51.8430	40.79	-12.38	28.41	40.00	-11.59	QP	
3	158.1123	38.95	-11.56	27.39	40.00	-12.61	QP	
4	173.2051	42.52	-13.22	29.30	40.00	-10.70	QP	
5	444.8514	40.46	-8.72	31.74	47.00	-15.26	QP	
6	480.5276	42.47	-7.81	34.66	47.00	-12.34	QP	



Antenna::Horizontal	Mode: M01

No.	Frequency (MHz)	Reading Level(dBuV)	Correct Factor(dB/m)	Measure-ment(dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Comment
1	138.3873	36.16	-11.74	24.42	40.00	-15.58	QP	
2	207.8501	39.23	-15.28	23.95	40.00	-16.05	QP	
3	298.2681	41.30	-12.66	28.64	47.00	-18.36	QP	
4	327.8873	39.29	-11.84	27.45	47.00	-19.55	QP	
5 *	438.6554	41.92	-8.88	33.04	47.00	-13.96	QP	
6	483.9094	40.54	-7.73	32.81	47.00	-14.19	QP	

Note: 1. Result = Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)
2. Margin = Result - Limit

7.3. VOLTAGE FLUCTUATIONS AND FLICKER

LIMITS

Test items	Limits (EN 61000-3-3)	Descriptions
P_{st}	≤1.0, T_p=10 min	short-term flicker indicator
P_{lt}	≤0.65, T_p=2 h	long-term flicker indicator
d_c	≤3.3 %	relative steady-state voltage change
d_{max}	≤4 %(or 6 %Note(1), 7 % Note(2))	maximum relative voltage change:
$d_{(t)}$	≤3.3 %, more than 500 ms	relative voltage change characteristic

Note:

(1)6 % for equipment which is:

a. switched manually, or

b. switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

(2)7 % for equipment which is

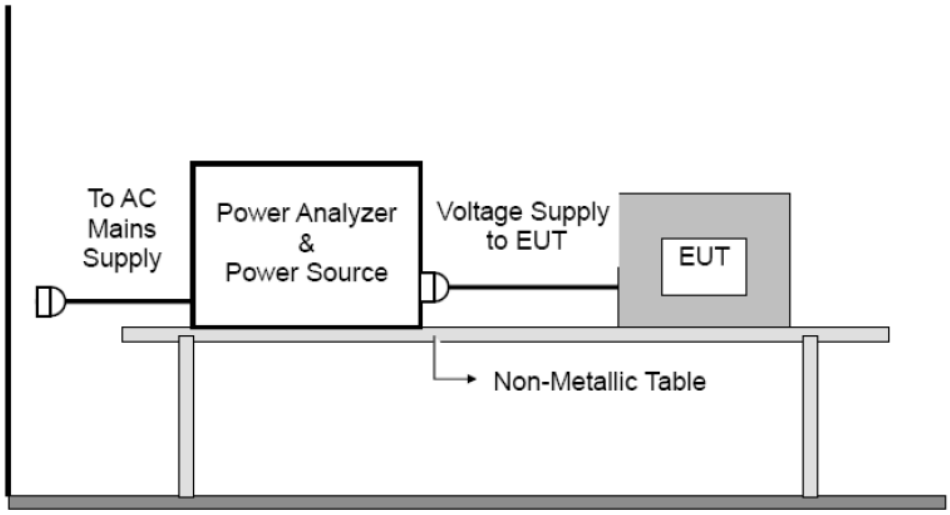
a. attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or

b. switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal Condition
b. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.
c. Tests was performed according to the Test Condition/Assessment of Voltage Fluctuations specified in Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.
d. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.7℃	Relative Humidity	49%
Atmosphere Pressure	101kPa		

TEST MODE

Pre-test Mode:	M01 ~ M02
Final Test Mode:	M01, M02

Note: All test modes had been tested, but only the worst data recorded in the report.

TEST RESULTS

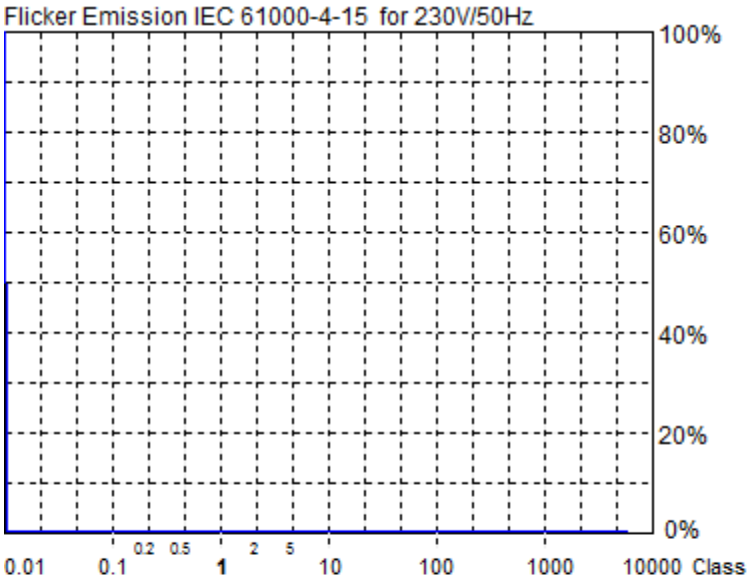
Flicker Emission - IEC 61000-3-3 , EN 61000-3-3

Comply: IEC 61000-3-3 Ed.3 - IEC 61000-4-15 Ed.2

Sheng Hui

HARCS Setup File : unnamed
HARCS Report File : unnamed

Operator	Fink
Unit	
Serial Number	
Remarks	M01



Actual Flicker (Fli):	**0.00**
Short-term Flicker (Pst):	**0.07**
Limit (Pst):	1.00
Long-term Flicker (Plt):	**0.07**
Limit (Plt):	0.65
Maximum Relative Volt. Change (dmax):	**0.00%**
Limit (dmax):	4.00%
Relative Steady-state Voltage Change (dc):	**0.00%**
Limit (dc):	3.30%
Tmax 3.30% (dt):	**0.00ms**
Limit (dt>Lim):	500ms

Flicker Emission - IEC 61000-3-3 , EN 61000-3-3

2024/1/18 13:14:04

Urms =	230.1	V	P =	2.804	W
Irms =	0.027	A	pf =	0.450	

Range:	Auto
V-nom:	230 V
TestTime:	10 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Full Bar : Actual Values
Empty Bar : Maximum Values
Circles : Average Values
Blue : Current , Green : Voltage , Red : Failed

Measurement

```
Sheng Hui                                        Date : 2024/1/18 13:14:04 V6.2

File :

Operator                          Fink
Unit
Serial Number                     SH2804
Remarks

Urms =  230.1V  Freq =  50.039  Range:  0.25 A
Irms =  0.027A  Ipk  =  0.147A  cf    =  5.437
P    =  2.804W  S    =  6.236VA pf    =  0.450

Test - Time :   10 x 1min = 10min       ( 100 %)

LIN (Line Impedance Network) :  L: 0.24ohm +j0.15ohm N: 0.16ohm +j0.10ohm

Limits :        Plt  :  0.65    Pst   : 1.00
                dmax :  4.00 %  dc    : 3.30 %
                dtLim:  3.30 %  dt>Lim: 500ms

Test completed, Result: PASSED
```

8. IMMUNITY TEST

8.1. PERFORMANCE CRITERIA

EN IEC 55014-2:2021

GENERAL PERFORMANCE CRITERIA

According to EN IEC 55014-2 standard, the general performance criteria as following:

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.
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.
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.

8.2. ELECTROSTATIC DISCHARGE

TEST SPECIFICATION

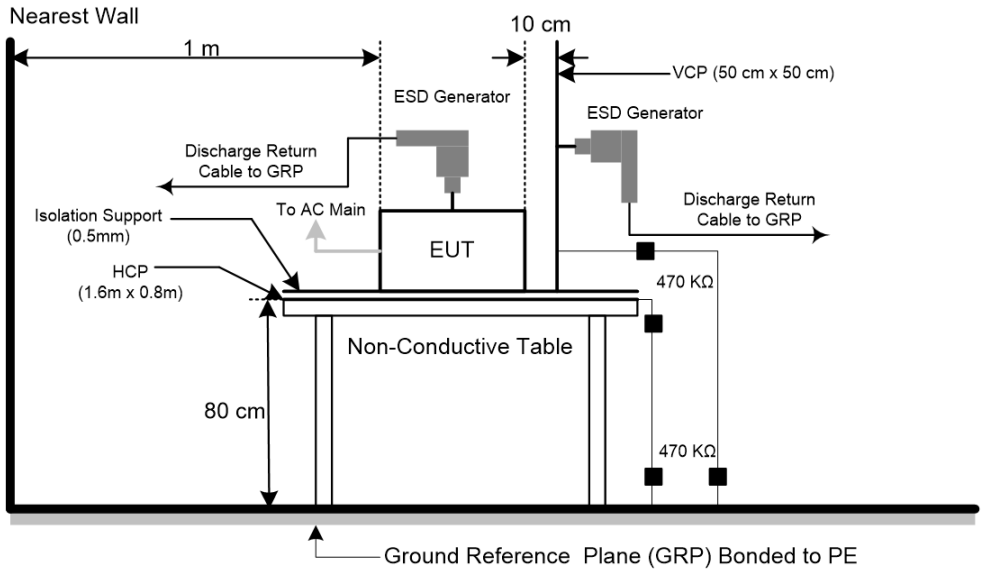
Standard:	EN IEC 55014-2:2021 IEC 61000-4-2:2008
Criterion Required:	Performance criteria B
Discharge Impedance:	330 Ω / 150 pF
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Test Level:	Contact discharge: ± 4 kV; Air discharge: ± 8 kV

TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT.
   During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.
   Vertical Coupling Plane (VCP):
   The coupling plane, of dimensions 0.5 m x 0.5 m, is placed parallel to, and positioned at a distance 0.1 m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
   Horizontal Coupling Plane (HCP):
   The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1 m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
b. Air discharges at insulation surfaces of the EUT.
   It was at least ten single discharges with positive and negative at the same selected point.
c. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.
d. For air discharge testing, the test shall be applied at all test levels 4 kV and 8 kV.
e. For the actual test configuration, please refer to the related Item: EUT Test Photos.

TEST SETUP



TEST ENVIRONMENT

Temperature	20.1℃	Relative Humidity	53%
Atmosphere Pressure	101kPa	Test Voltage	

TEST MODE

Test Mode:	M01, M02

TEST RESULTS

Mode	Level(kV)	Polarity	Test Point	Criteria	Result	Judgement
Air Discharge	8	+	All Slot	B	A	Pass
Air Discharge	8	-	All Slot	B	A	Pass
Contact Discharge	4	+	All Metal	B	A	Pass
Contact Discharge	4	-	All Metal	B	A	Pass
Horizontal Coupling	4	+	Front,rear,left,right	B	A	Pass
Horizontal Coupling	4	-	Front,rear,left,right	B	A	Pass
Vertical Coupling	4	+	Front,rear,left,right	B	A	Pass
Vertical Coupling	4	-	Front,rear,left,right	B	A	Pass
Air Discharge	15	+	All Slot	/	/	/
Air Discharge	15	-	All Slot	/	/	/
Contact Discharge	8	+	All Metal	/	/	/
Contact Discharge	8	-	All Metal	/	/	/

Observation:
A: No observable change.
Conclusion: The EUT met the requirements of the standard

8.3. ELECTRICAL FAST TRANSIENTS BURST (AC MAINS POWER PORTS)

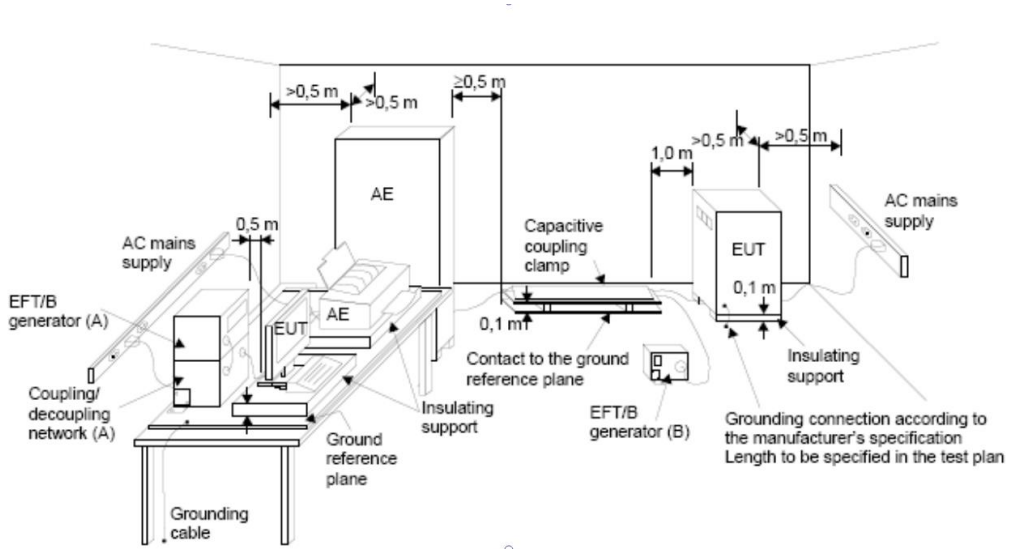
TEST SPECIFICATION

Standard:	EN IEC 55014-2:2021 IEC 61000-4-4:2012
Criterion Required:	Performance criteria B
Polarity:	Positive & Negative
Test Level:	± 1 kV (peak)
Repetition frequency	5 kHz
Impulse Wave shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	2 minute per level & polarity

TEST PROCEDURE

a. Both positive and negative polarity discharges were applied.
b. 2 min with a positive polarity and for 2 min with a negative polarity
c. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.
d. Multi conductor cables shall be tested as a single cable. Cables shall not be split or divided into groups of conductors for this test.

TEST SETUP



TEST ENVIRONMENT

Temperature	20.1℃	Relative Humidity	53%
Atmosphere Pressure	101kPa	Test Voltage	

TEST MODE

Test Mode:	M01, M02

TEST RESULTS

Coupling Line	Test Levels(kV)	Polarity	Criteria	Results	Judgement
L, N	1	+	B	A	Pass
L, N	1	-	B	A	Pass
Analogue/Digital data ports	0.5	+	B	/	/
Analogue/Digital data ports	0.5	-	B	/	/
DC network power ports	0.5	+	B	/	/
DC network power ports	0.5	-	B	/	/

Observation:
A: No observable change.
Conclusion: The EUT met the requirements of the standard

8.4. SURGES (AC MAINS POWER PORTS)

TEST SPECIFICATION

Standard:	EN IEC 55014-2:2021 IEC 61000-4-5:2014+A1:2017
Criterion Required:	Performance criteria C
Wave Shape:	1.2/50 (8/20) μs
Test Level:	AC Power ports: 1 kV line-to-line; 2 kV line-to-earth
Polarity:	Positive & Negative
Interval:	1 per minute
Phase Angle:	5 positive at 90°and 5 negative at 270

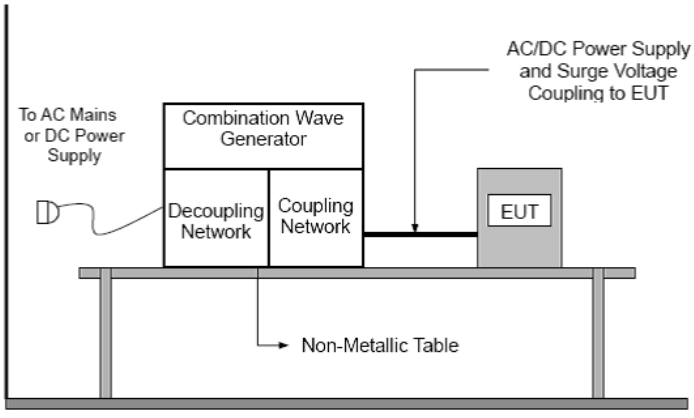
TEST PROCEDURE

a. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).

b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

c. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

TEST SETUP



TEST ENVIRONMENT

Temperature	20.2℃	Relative Humidity	53%
Atmosphere Pressure	101kPa	Test Voltage	

TEST MODE

Test Mode:	M01, M02

TEST RESULTS

Coupling Line	Voltage(kV)	Polarity	Phase	Criteria	Result	Judgment
L-N	1	+	90°	B	A	Pass
L-N	1	-	90°	B	A	Pass
L-N	1	+	270°	B	A	Pass
L-N	1	-	270°	B	A	Pass

Observation:
A: No observable change.
Conclusion: The EUT met the requirements of the standard

8.5. CONTINUOUS INDUCED RF DISTURBANCES (AC MAINS POWER PORTS)

TEST SPECIFICATION

Standard:	EN IEC 55014-2:2021 IEC 61000-4-6:2013
Criterion Required:	Performance criteria A
Frequency range:	Category Ⅱ：0.15 MHz to 230 MHz; Category Ⅲ：0.15 MHz to 80 MHz
Test Level:	AC power ports:3 V r.m.s. (unmodulated)
Modulation:	1 kHz, 80 % AM, sine wave
Step Size:	1% increment
Dwell Time:	1 seconds

TEST PROCEDURE

a. The EUT shall be tested within its intended operating and climatic conditions.

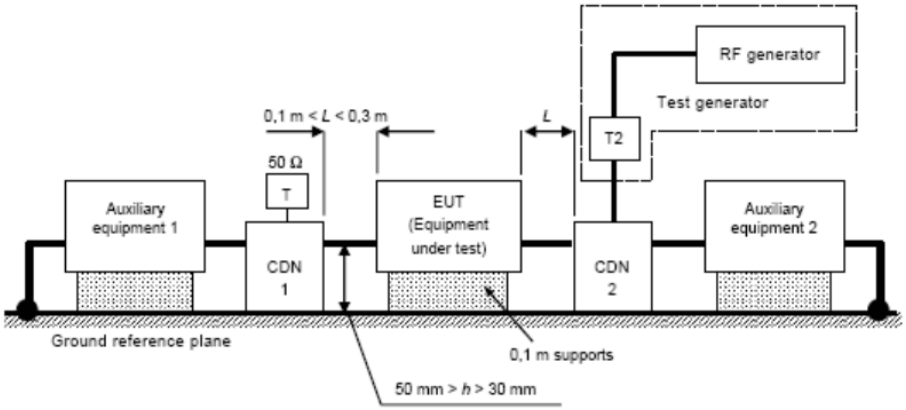
b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

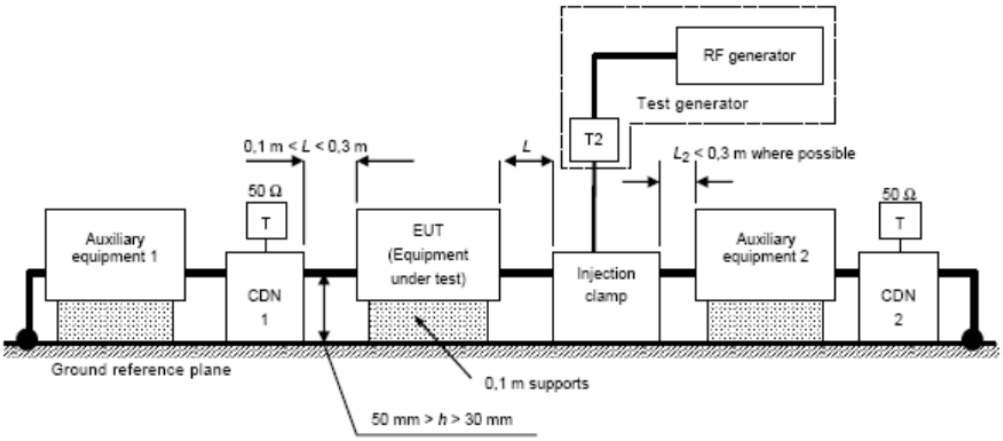
c. The frequency range is swept from 150 kHz to 230 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1 % of the start and thereafter 1 % of the preceding frequency value where the frequency is swept incrementally.

d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.

e. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

TEST SETUP





TEST ENVIRONMENT

Temperature	20.5℃	Relative Humidity	53%
Atmosphere Pressure	101kPa	Test Voltage	

TEST MODE

Test Mode:	M01, M02

TEST RESULTS

Test Ports (Mode)	Freq.Range (MHz)	Field Strength (unmodulated,r.m.s)	Criteria	Results	Judgment
AC mains power ports	0.15---230	3 V	A	A	Pass
DC network power ports	0.15---230	3 V	A	/	/
Analogue/digital data ports	0.15---230	3 V	A	/	/
Observation: A: No observable change. **Conclusion:** The EUT met the requirements of the standard					

8.6. VOLTAGE DIPS AND INTERRUPTIONS (AC MAINS POWER PORTS)

TEST SPECIFICATION

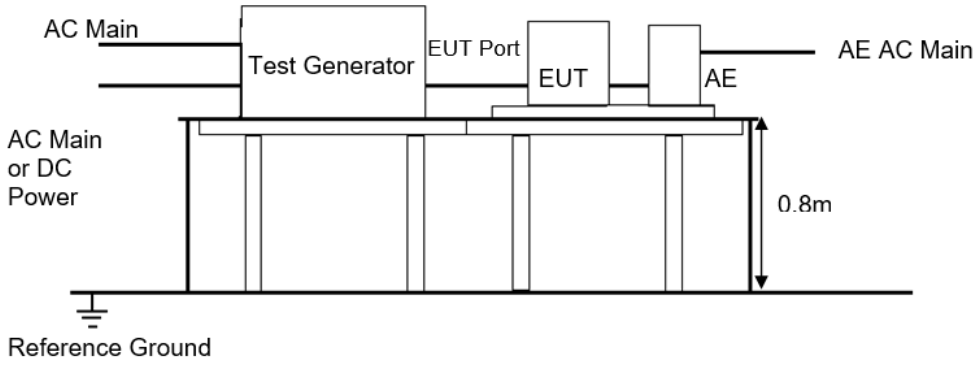
Standard:	EN IEC 55014-2:2021 IEC 61000-4-11:2020
Criterion Required:	Performance criteria C
Test level in % Ut:	Voltage dips 1) 0%, 0.5 cycle for 50 Hz/60 Hz; 2) 40%,10 cycles for 50 Hz, 12 cycles for 60 Hz; 3) 70%, 25 cycles for 50 Hz, 30 cycles for 60 Hz
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°

TEST PROCEDURE

a. The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

b. Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

TEST SETUP



TEST ENVIRONMENT

Temperature	20.2℃	Relative Humidity	53%
Atmosphere Pressure	101kPa	Test Voltage	

TEST MODE

Test Mode:	M01, M02

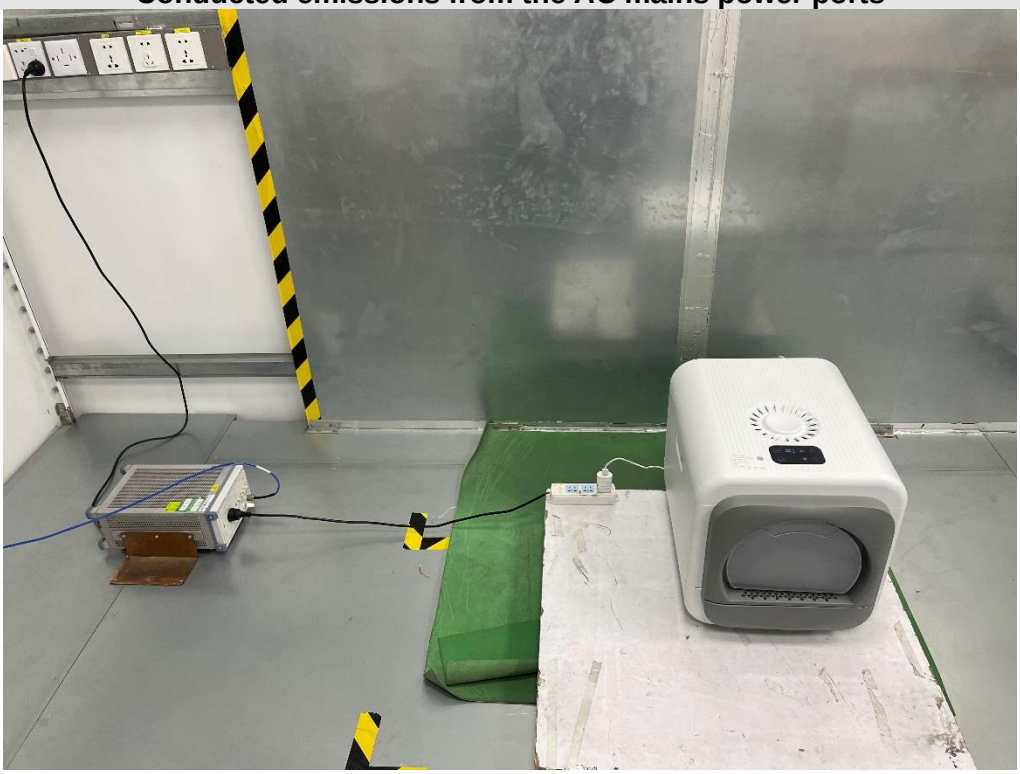
TEST RESULTS

Voltage （AC)	Interruption & Dips	Durations(T)	Test level in % Ut	Perform Criteria	Results	Judgment
230V 50Hz	Voltage dips	0.5 Cycles	0%	C	A	Pass
230V 50Hz	Voltage dips	10 Cycles	40%	C	A	Pass
230V 50Hz	Voltage dips	25 Cycles	70%	C	C	Pass
100V 60Hz	Voltage dips	0.5 Cycles	0%	C	A	Pass
100V 60Hz	Voltage dips	12 Cycles	40%	C	A	Pass
100V 60Hz	Voltage dips	30 Cycles	70%	C	C	Pass

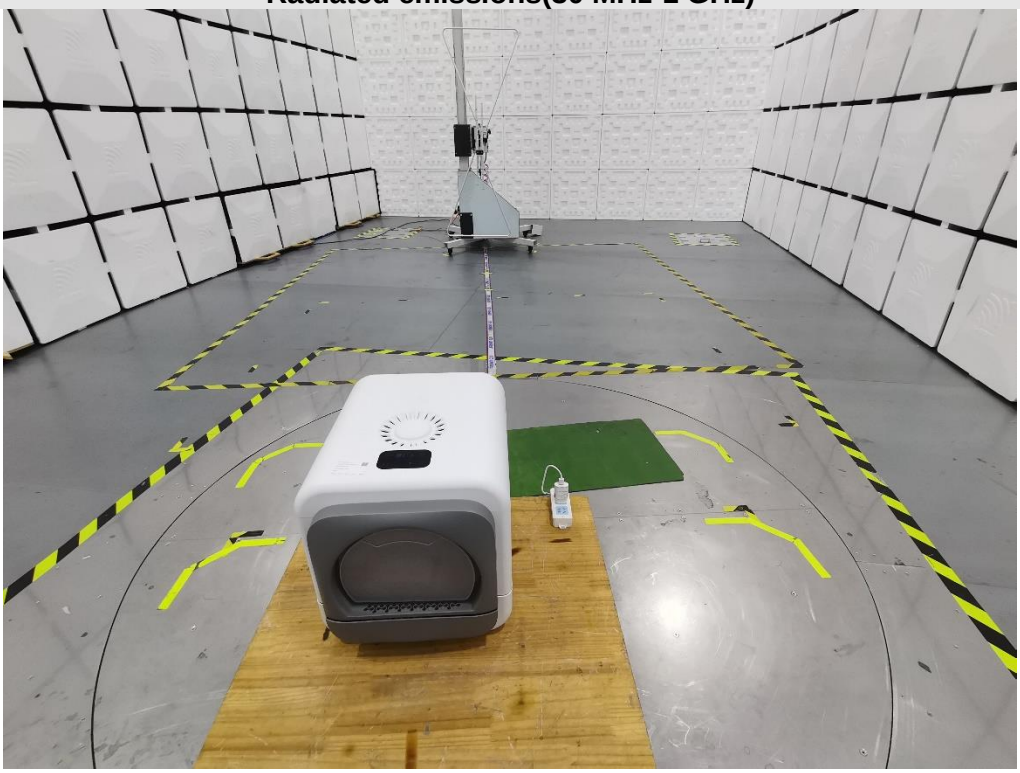
Observation:
A: No observable change.
C:C indicates that the EUT cannot work properly during the test and cannot recover automatically after the test is complete. The EUT can work properly only after manual operation.
Conclusion: The EUT met the requirements of the standard

APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

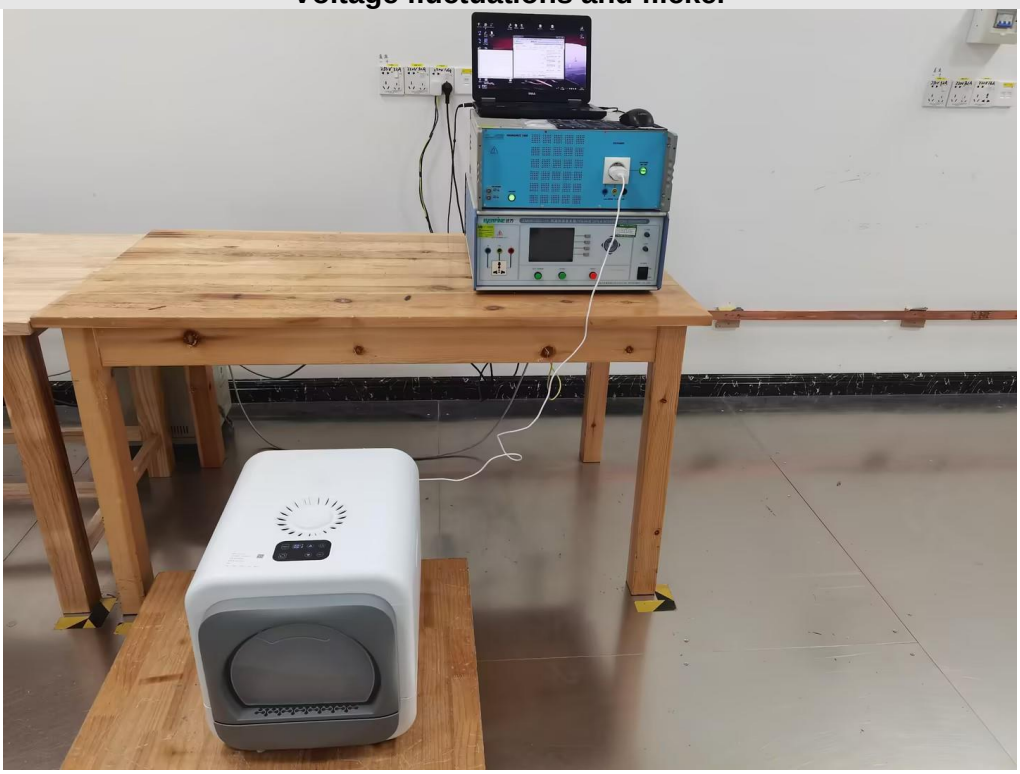
Conducted emissions from the AC mains power ports



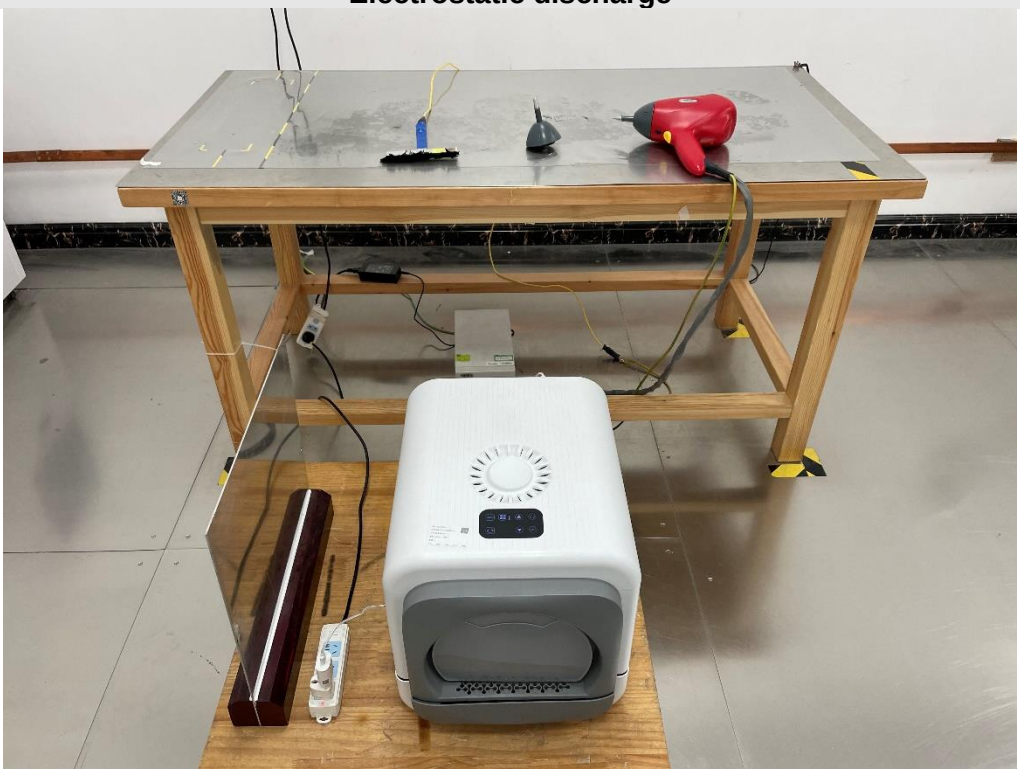
Radiated emissions(30 MHz-1 GHz)



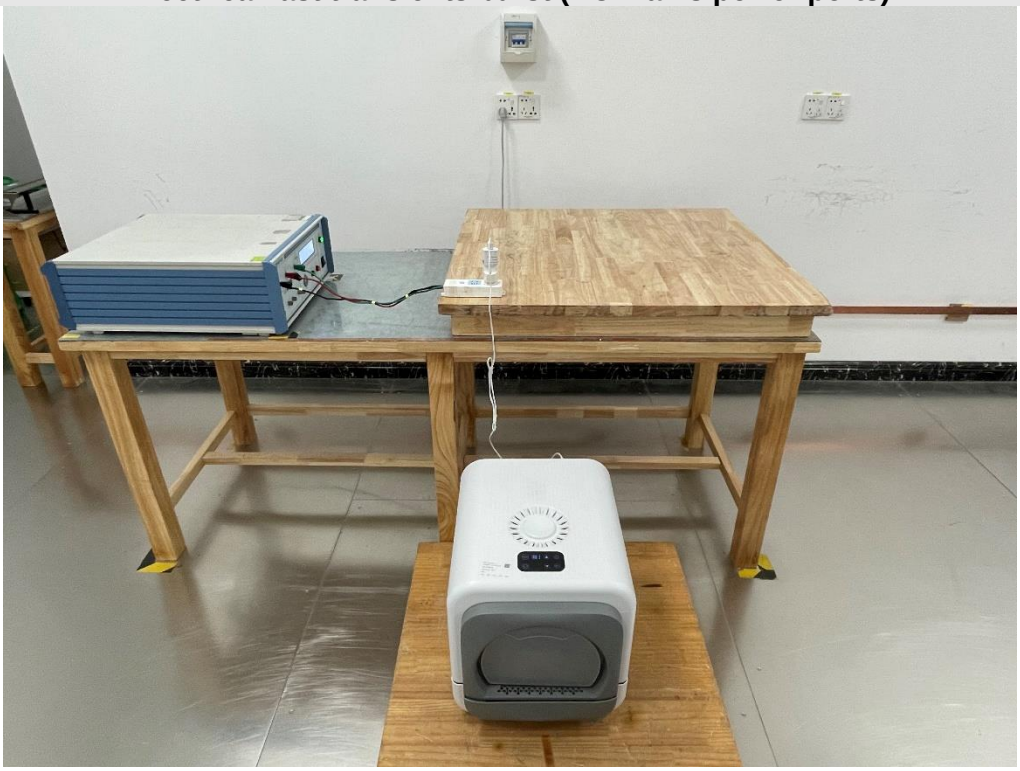
Voltage fluctuations and flicker



Electrostatic discharge



Electrical fast transients burst (AC mains power ports)



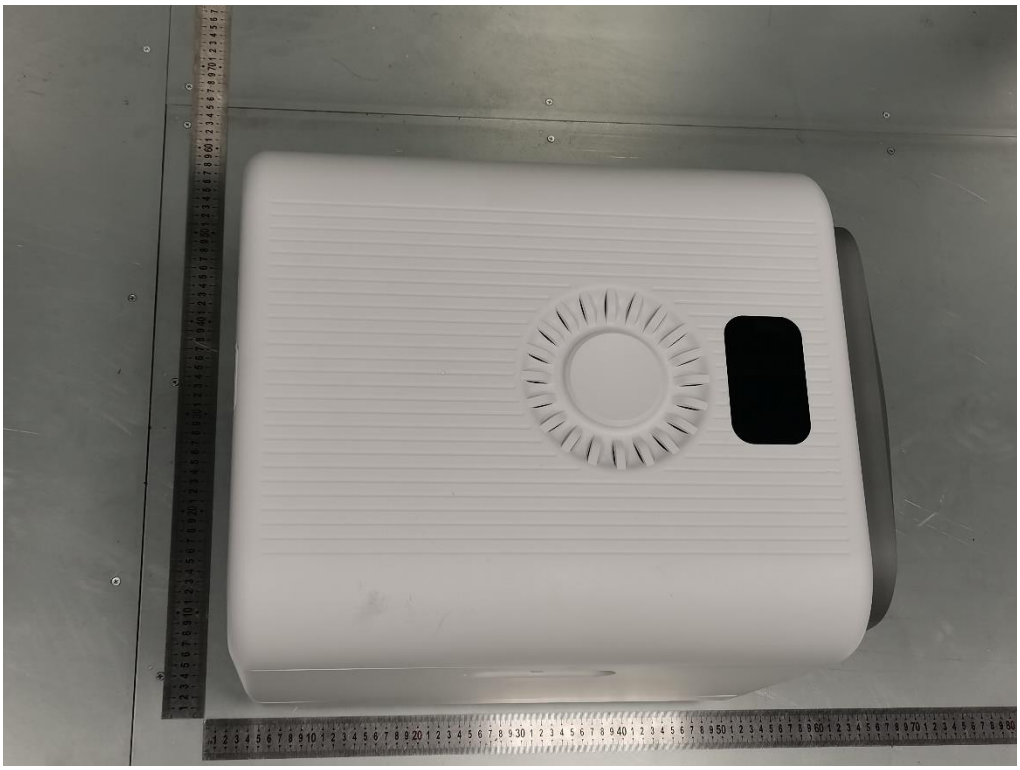
Surges (AC mains power ports)

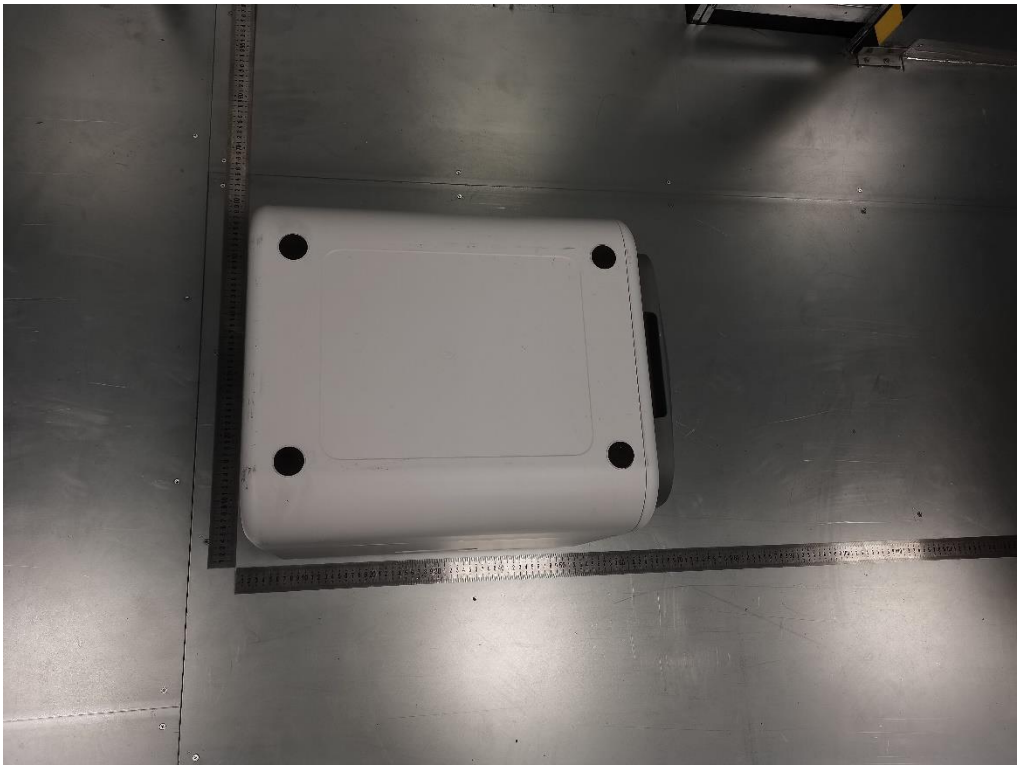
Continuous induced RF disturbances (AC mains power ports)

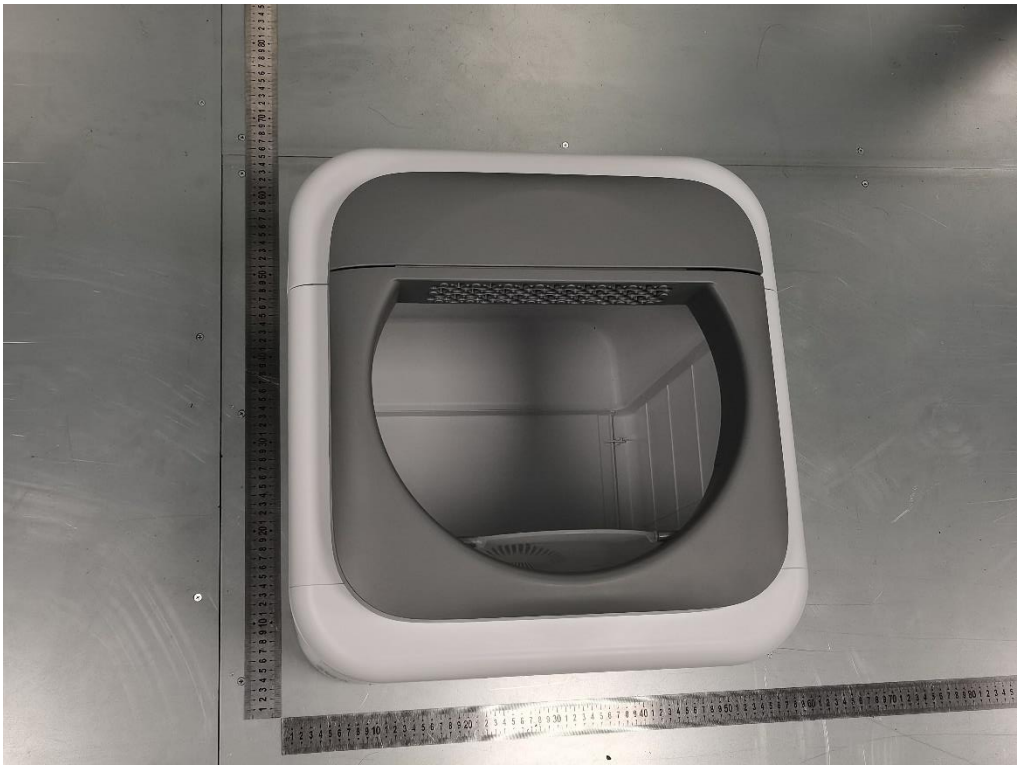
Voltage dips and interruptions (AC mains power ports)

APPENDIX: PHOTOGRAPHS OF THE EUT

External



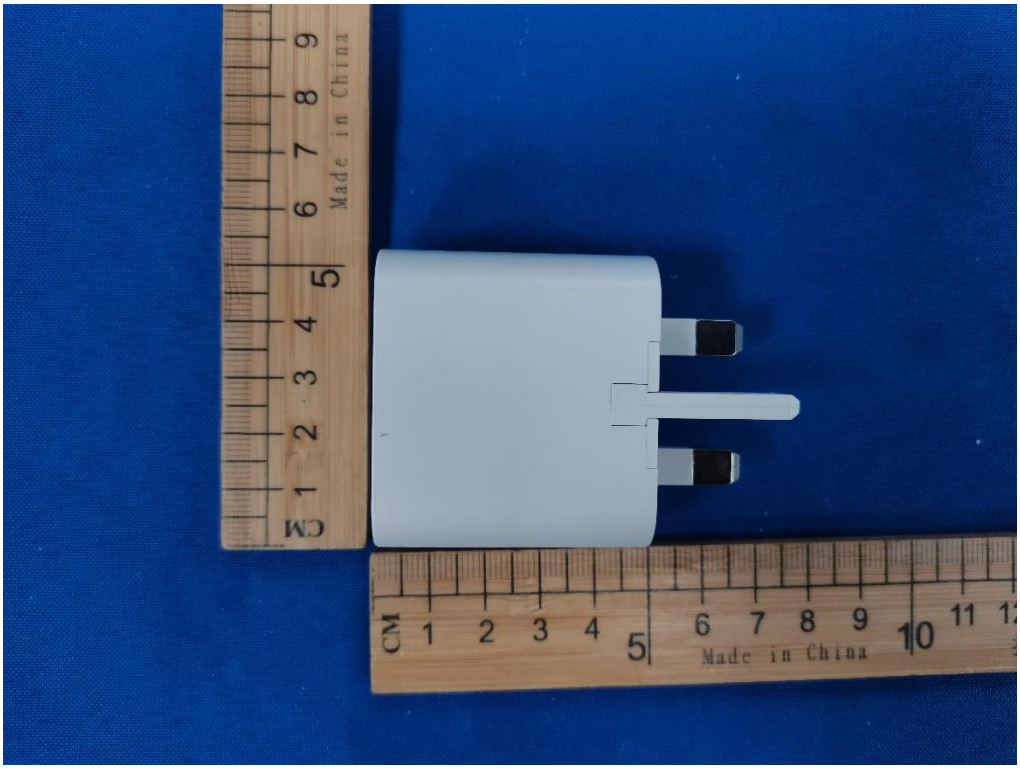





AC/DC ADAPTER
MADE IN CHINA
Zhongshan MLS Electrical Appliance Co., Ltd.
Made in China

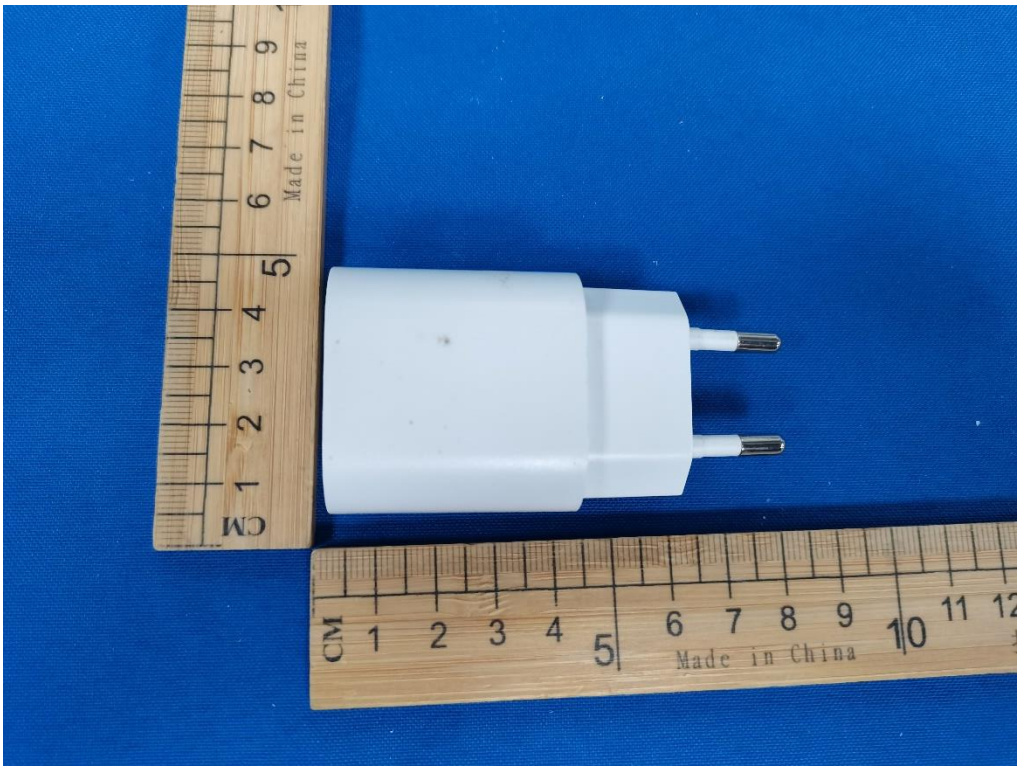

Made in China


Power Adapter
Model:TPA-38A050100BU01
Input:100-240V~50/60Hz 0.15A
Output:5.0V⎓1.0A 5.0W
SHENZHEN TIANYIN ELECTRONICS CO., LTD.
Made in China
Made in China

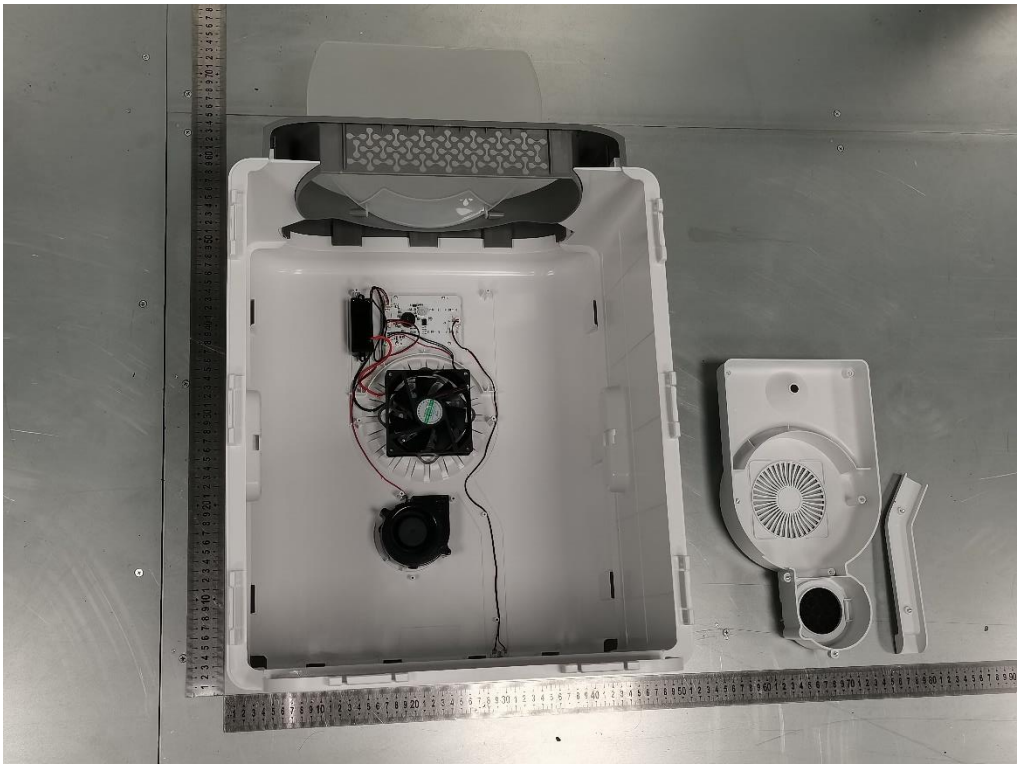

Made in China
Made in China

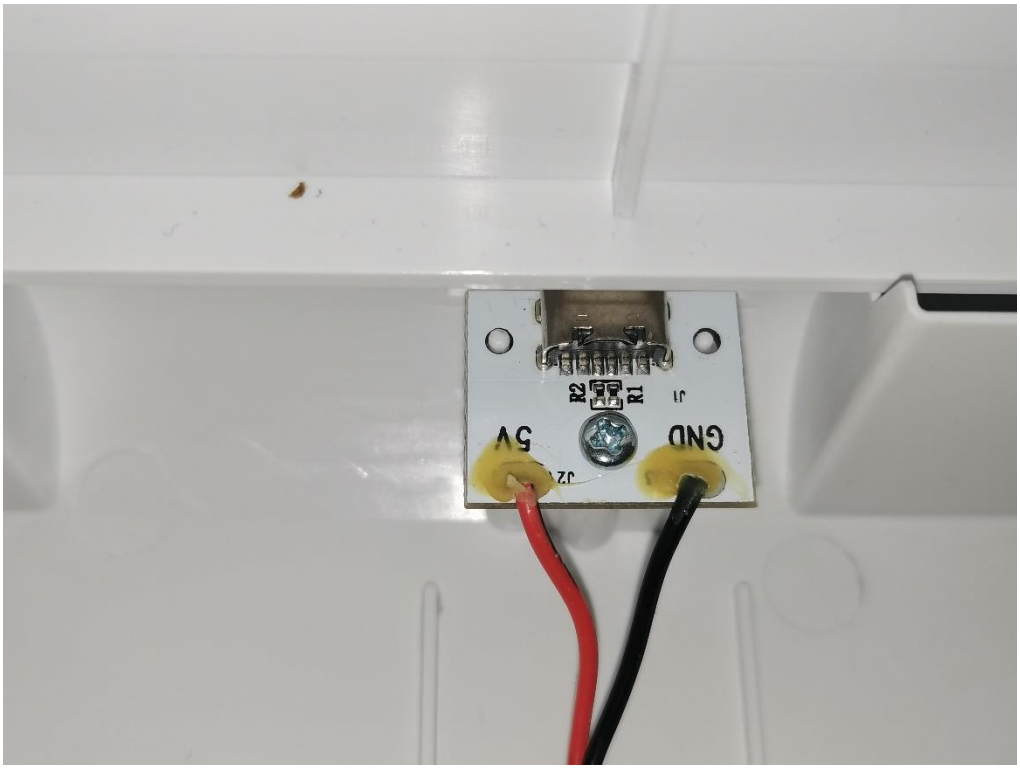
A24010663 004:

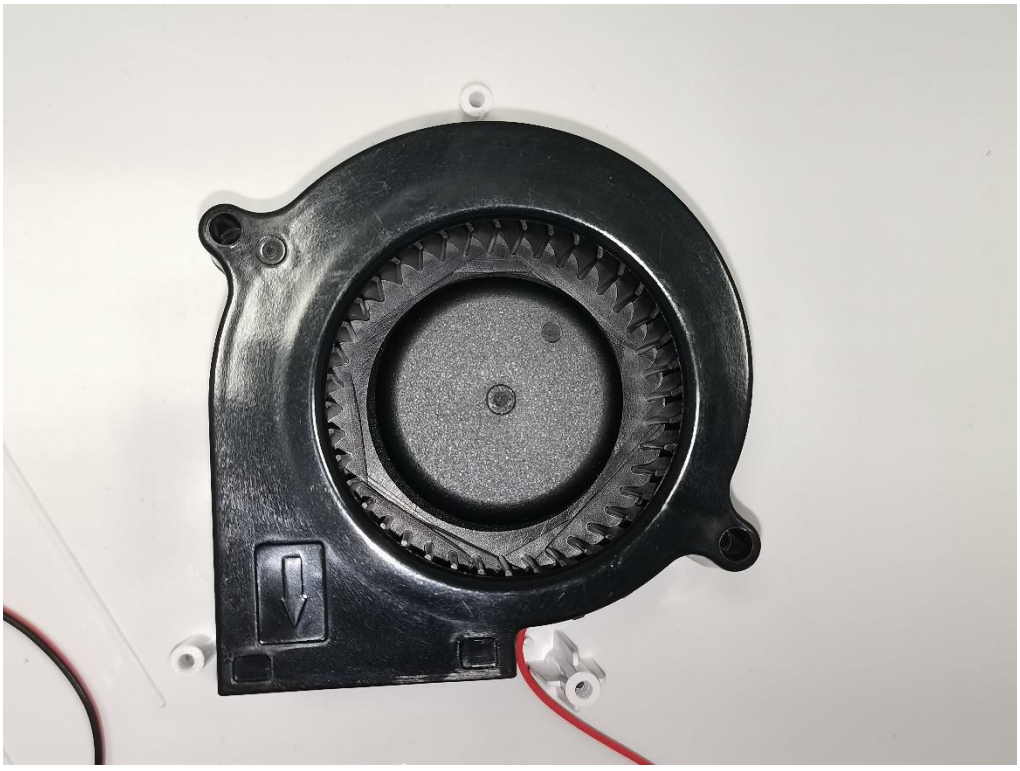
A24010663 007:

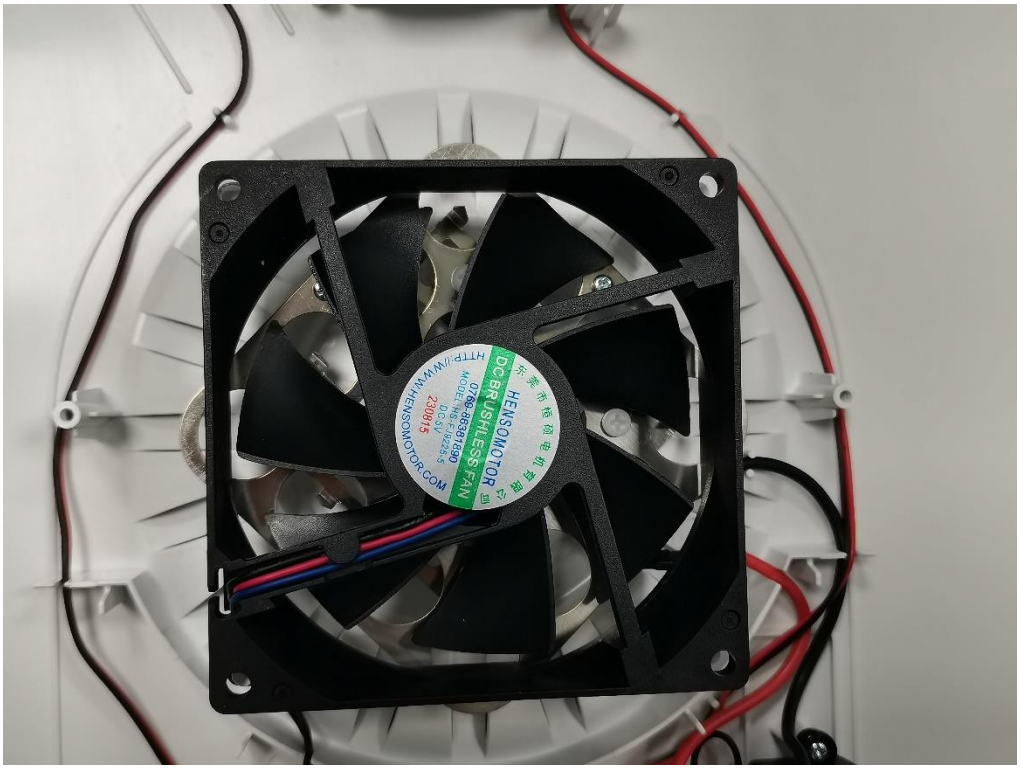


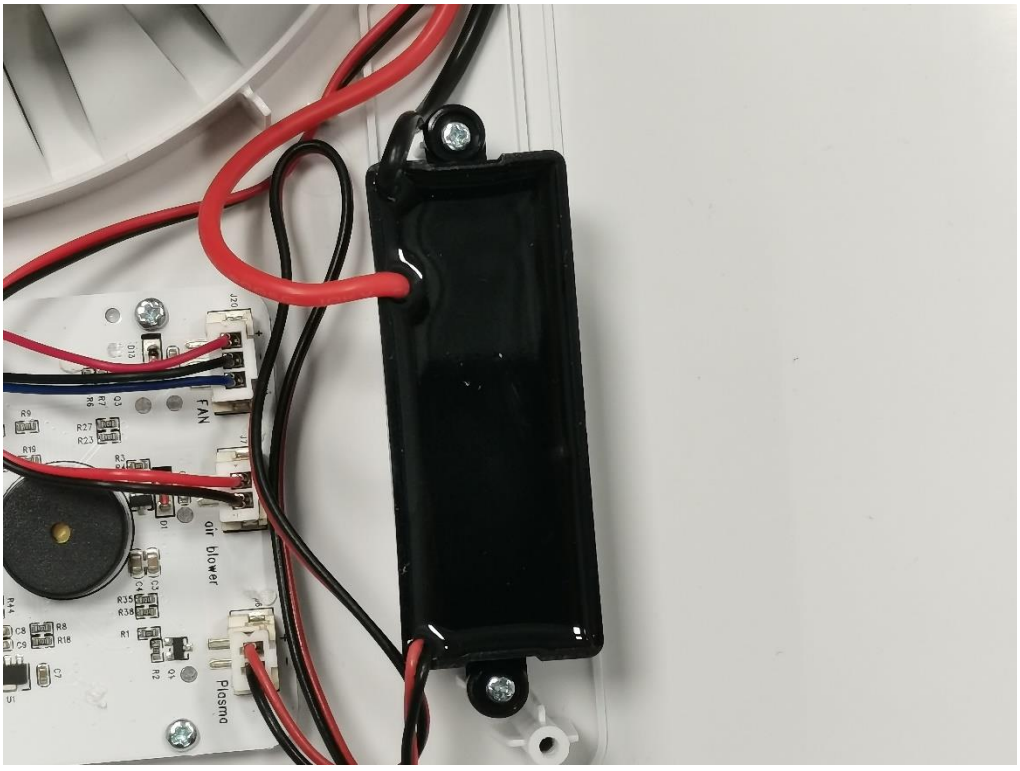
Internal



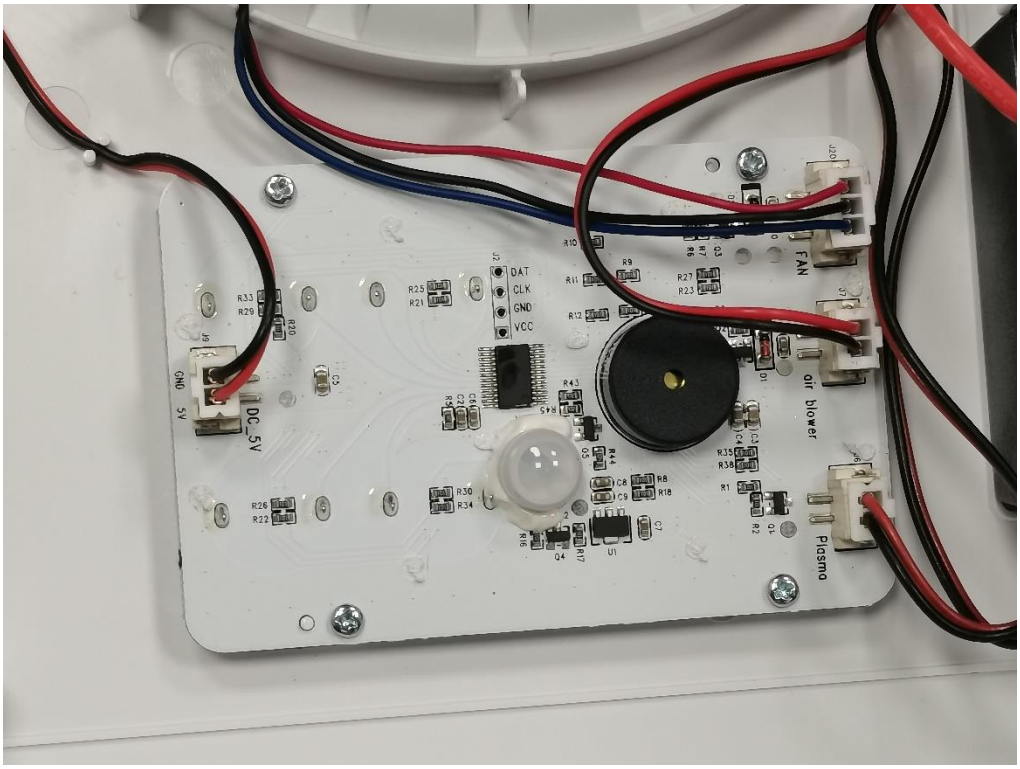

5V
GND

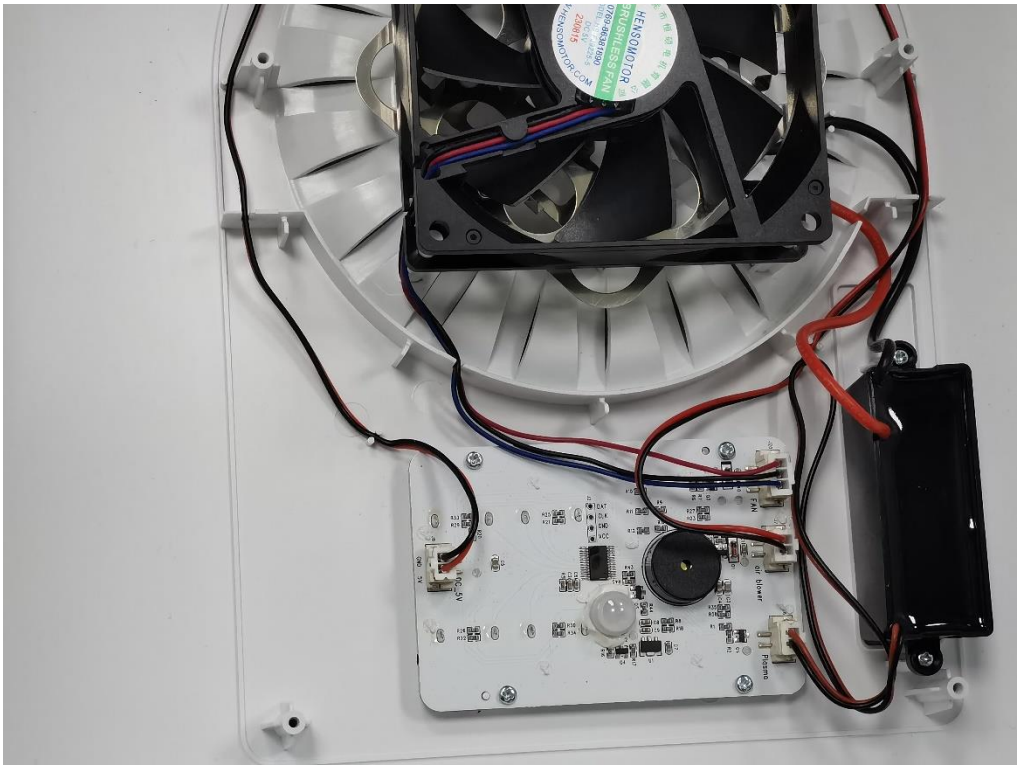


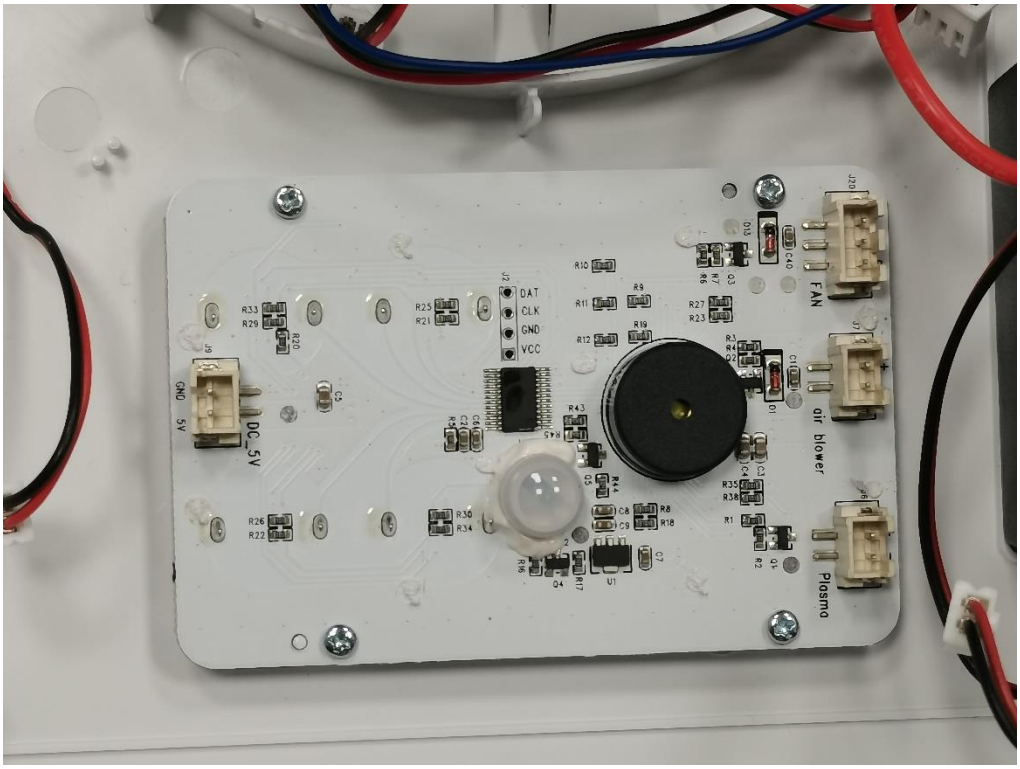

DC BRUSHLESS FAN
HENSOMOTOR
HTTP://WWW.HENSOMOTOR.COM

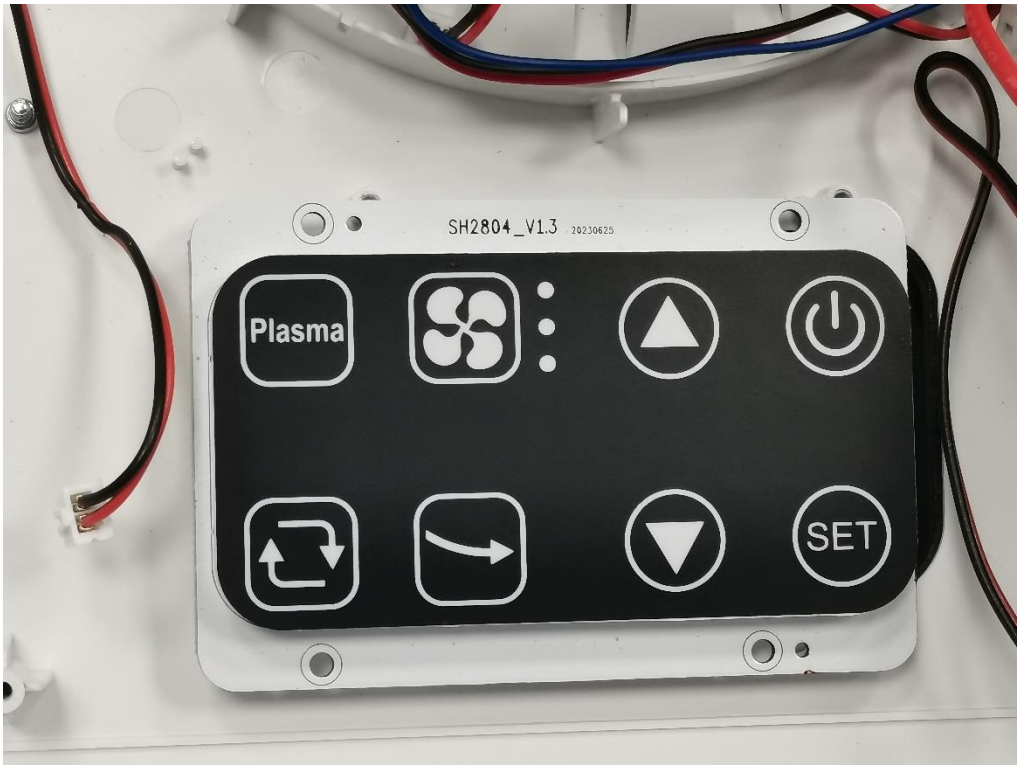

FAN
air blower
Plasma


Plasma Generator
DC5V<1W
Red"+" Black"-"


DAT
CLK
GND
VCC
FAN
air blower
Plasma
DC_5V
GND
5V


HENGMOTOR
BRUSHLESS FAN
FAN
air blower
Plasma
DC_5V


DAT
CLK
GND
VCC
FAN
air blower
Plasma
DC_5V
GND
5V



END OF REPORT