EUROFINS ELECTRICAL TESTING SERVICE (SHANGHAI) CO., LTD.

EMC TEST- REPORT

TEST REPORT NUMBER: EFSH25060387-IE-02-E01

eurofins
Eurofins Electrical Testing Service (Shanghai) Co., Ltd.
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2 General Information

2.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter “EUT Information” and are not transferable to any other test items.

Eurofins Electrical Testing Service (Shanghai) Co., Ltd. is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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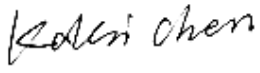
Operator:

2025-07-01		Crystal Liu/ Project Engineer	
Date	Eurofins-Lab.	Name / Title	Signature

Technical responsibility for area of testing:

2025-07-01		Kalsi Chen / Supervisor	
Date	Eurofins	Name / Title	Signature

2.2 Testing laboratory

Eurofins Electrical Testing Service (Shanghai) Co., Ltd.
Building 18, No. 2168 Chenhang Highway, Minhang District, Shanghai, P.R. China
Telephone : +86-21-36202800
Telefax : +86-21-61819180

Test location, where different:

Subcontractor	
Name	: Eurofins TA Technology (Shanghai) Co., Ltd.
Address	: Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
Telephone	: ./.
Fax	: ./.

Radiated emission and Radiated immunity tests were performed at Eurofins TA Technology (Shanghai) Co., Ltd.

2.3 Details of approval holder

Name	:	Ningbo Deli Tools Co., Ltd
Address	:	No.128, Chezhan West Road, Huangtan Town, NingHai County, Ningbo, Zhejiang, China
Telephone	:	./.
Fax	:	./.

2.4 Application details

Date of receipt of test item	:	2025-06-24
Date of test	:	2025-06-24 to 2025-06-30

2.5 EUT information

Product type	:	cordless nailer/stapler
Model name	:	DE750Z, DE750, DE750-X, EDE750Z, EDE750, EDE750-X
Brand name	:	Deli
Serial number	:	./.
Ratings	:	DC 20V 100/min
Test voltage	:	DC 20V
Additional information	:	

These appliances covered by this report are Wet/dry vacuum cleaner for household use.
According to the client's declaration, all models are identical except that the nail size and length are different.

After review, DE750Z was selected to full tests and the most unfavourable data was recorded.

2.6 Test standards

Technical standard :

EN IEC 55014-1: 2021

EN IEC 55014-2: 2021

3 Technical test

3.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

or

The deviations as specified were ascertained in the course of the tests performed. ☐

3.2 Test environment

Temperature	: 20	...	25°C
Relative humidity content	: 30	...	60%
Air pressure	: 100	...	103kPa

3.3 Test mode

Operating mode

3.4 Test equipment utilized

Measurement Equipment List				
No.	**Name:**	**Type:**	**Manufacturer:**	**Cal due date:**
1	EMI test receiver	ESR3	R&S	2026-05-14
2	Artificial mains	ENV216	R&S	2026-05-14
3	Click analyser	CL55C	AFJ	2025-09-08
4	Absorbing clamp	MDS 21B	TESEQ	2026-05-14
5	Single phase Harmonics & Flicker analyser	PACS-1	California Instruments	2026-05-14
6	AC Power Source	5001ix	California Instruments	2026-05-14
7	ESD Gun	NSG 437	TESEQ	2026-05-14
8	Ultra Compact Simulator	UCS 500N7	EMTEST	2026-05-14
9	Continuous wave simulator	CWS500N1	EMTEST	2026-05-14
10	Coupling/Decoupling Network	L 801 M2/M3	Luethi	2025-07-02
11	Attenuator	WA59-6-33	Weinschel	2026-05-14
12	Magnetic field coil	MS100	EMTEST	2026-05-14
13	Current transformer	MC2630	EMTEST	2026-05-14

Measurement Equipment List				
No.	**Name:**	**Type:**	**Manufacturer:**	**Cal due date:**
1	ESD Gun	NSG 437	TESEQ	2026-06-08
2	EMI test receiver	ESR	R&S	2025-09-17
3	EMI test receiver	ESR	R&S	2025-09-17
4	TRILOG Broadband Antenna	VULB 9163	Schwarzbeck	2026-09-12
5	TRILOG Broadband Antenna	VULB 9163	Schwarzbeck	2026-10-18
6	Software	ELEKTRA	R&S	/
7	Power Amplifier	BLWA 0830-160-100-40C	BONN	NA
8	Power Amplifier	BBA150	R&S	NA
9	RS antenna	HL046E	R&S	NA
10	Horn antenna	BBHA 9120E	Schwarzbeck	2026-06-11
11	Power meter	NRP	R&S	2026-05-10

3.5 Test results

☒ 1st test ☐ test after modification ☐ production test

Test case	Subclause	Required	Test passed	Test failed
Conducted Emission	Clause 4.3.2 & 4.3.3 of EN IEC 55014-1	☐	☐	☐
Disturbance power	Clause 4.3.4 of EN IEC 55014-1	☐	☐	☐
Radiated disturbance	Clause 4.3.4 of EN IEC 55014-1	☒	☒	☐
Radiated disturbance (1GHz to 6GHz)	Clause 4.3.5 of EN IEC 55014-1	☐	☐	☐
Magnetic field (equipment using IPT)	Clause 4.3.2 of EN IEC 55014-1	☐	☐	☐
Discontinuous disturbance	Clause 4.4.2 of EN IEC 55014-1	☐	☐	☐
Harmonic Current Emissions	EN IEC 61000-3-2	☐	☐	☐
Voltage Changes, Voltage Fluctuations and Flicker	EN 61000-3-3	☐	☐	☐
Electrostatic Discharge	Clause 5.1 of EN IEC 55014-2 & IEC 61000-4-2	☒	☒	☐
Electrical Fast Transients	Clause 5.2 of EN IEC 55014-2 & IEC 61000-4-4	☐	☐	☐
Injected currents	Clause 5.3 & 5.4 of EN IEC 55014-2 & IEC 61000-4-6	☐	☐	☐
Radio frequency electromagnetic fields	Clause 5.5 of EN IEC 55014-2 & IEC 61000-4-3	☒	☒	☐
Surges	Clause 5.6 of EN IEC 55014-2 & IEC 61000-4-5	☐	☐	☐
Voltage dips	Clause 5.7 of EN IEC 55014-2 & IEC 61000-4-11	☐	☐	☐

Note 1: The EUT is powered by battery, which will not connect to AC mains.
Note 2: Radiated disturbance test in the frequency range from 1 GHz to 6 GHz is not required as the highest clock frequency (Fx) of EUT is less than 108MHz.

4 Emission Test

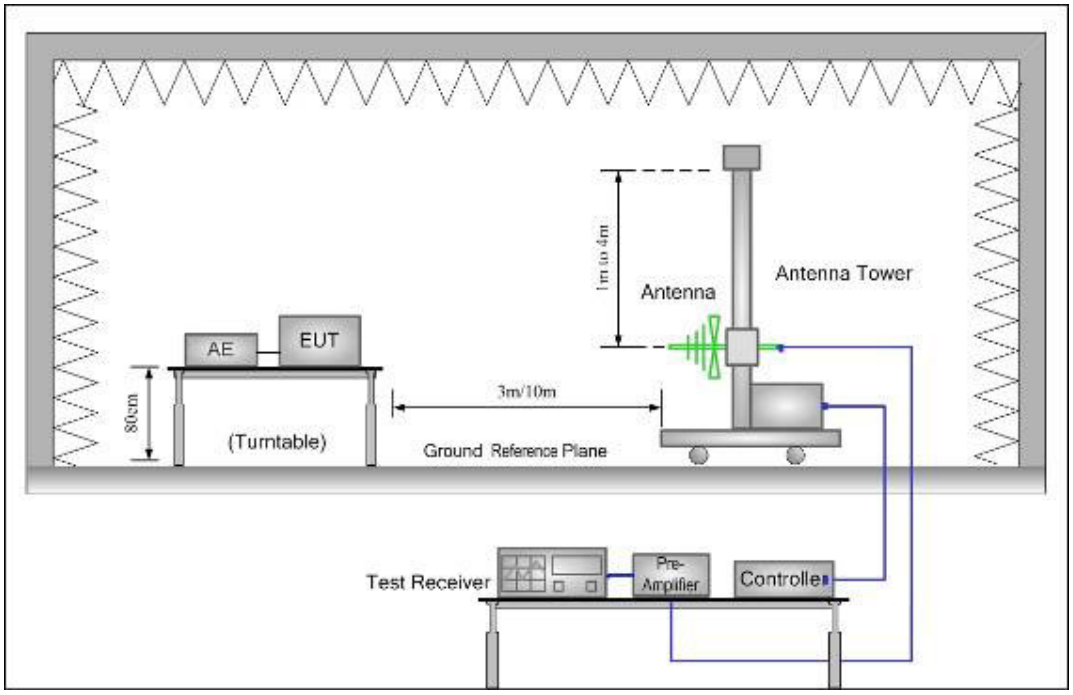
4.1 Radiated disturbance

This clause lays down the general requirements for the measurement of Radiated disturbance produced at the space of apparatus.

4.1.1 Limits

Frequency range	Quasi-peak limits at 10m	Quasi-peak limits at 3m
MHz	dB (μV/m)	dB (μV/m)
30 to 230	30	40
230 to 1000	37	47
At transitional frequencies the lower limit applies.		

4.1.2 Measurement procedure



1. The radiated emissions test was conducted in a semi-anechoic chamber. The EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

2. Before get the final emission results with quasi-peak (QP) detector, a pre-scan was performed with the peak (PK) detector to find out the maximum emission data plots of the EUT.

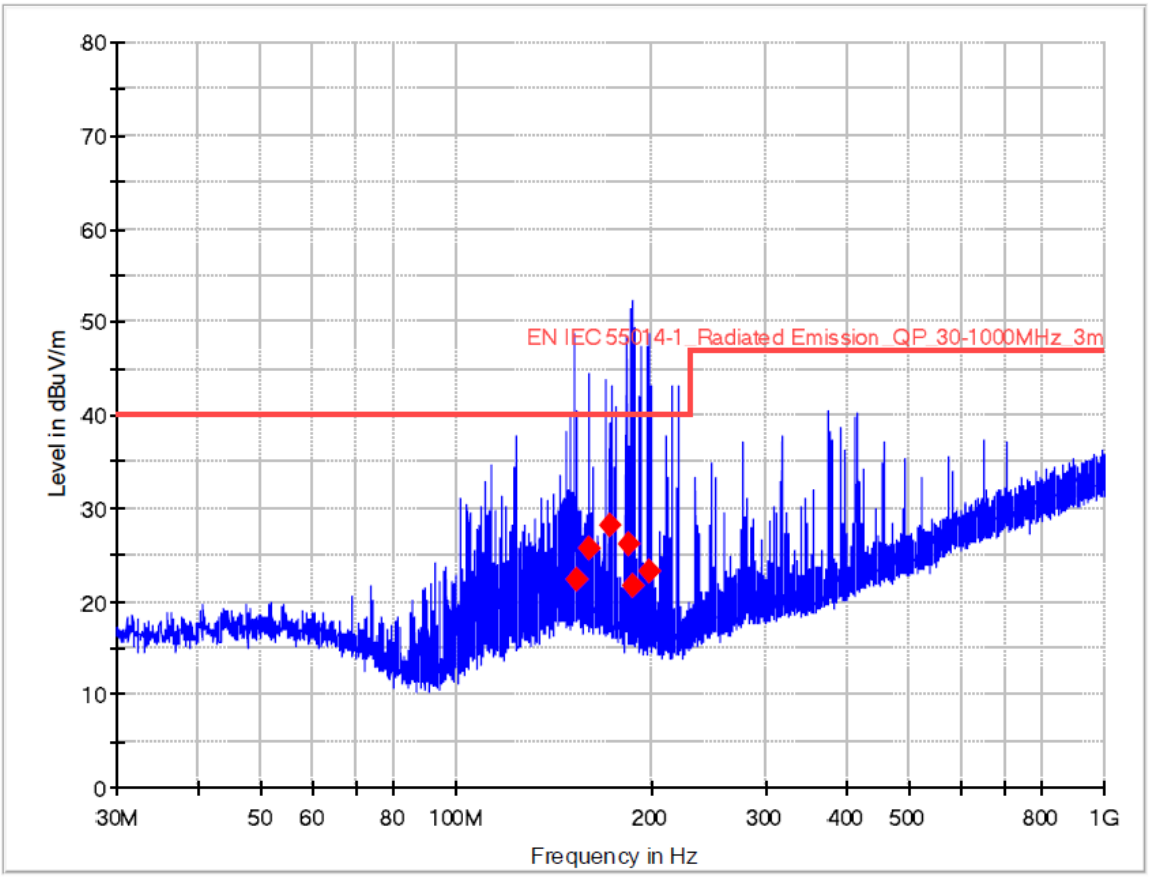
3. The frequencies of maximum emission were determined in the final radiated emissions measurement, the physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization. Test was performed on subcontractor at 10 m distance.

4.1.3 Measurement uncertainty

The maximum measurement uncertainty is evaluated as:
Radiated Emission 30MHz – 200MHz: 4.17 dB
Radiated Emission 200MHz – 1GHz: 4.84 dB

4.1.4 Results

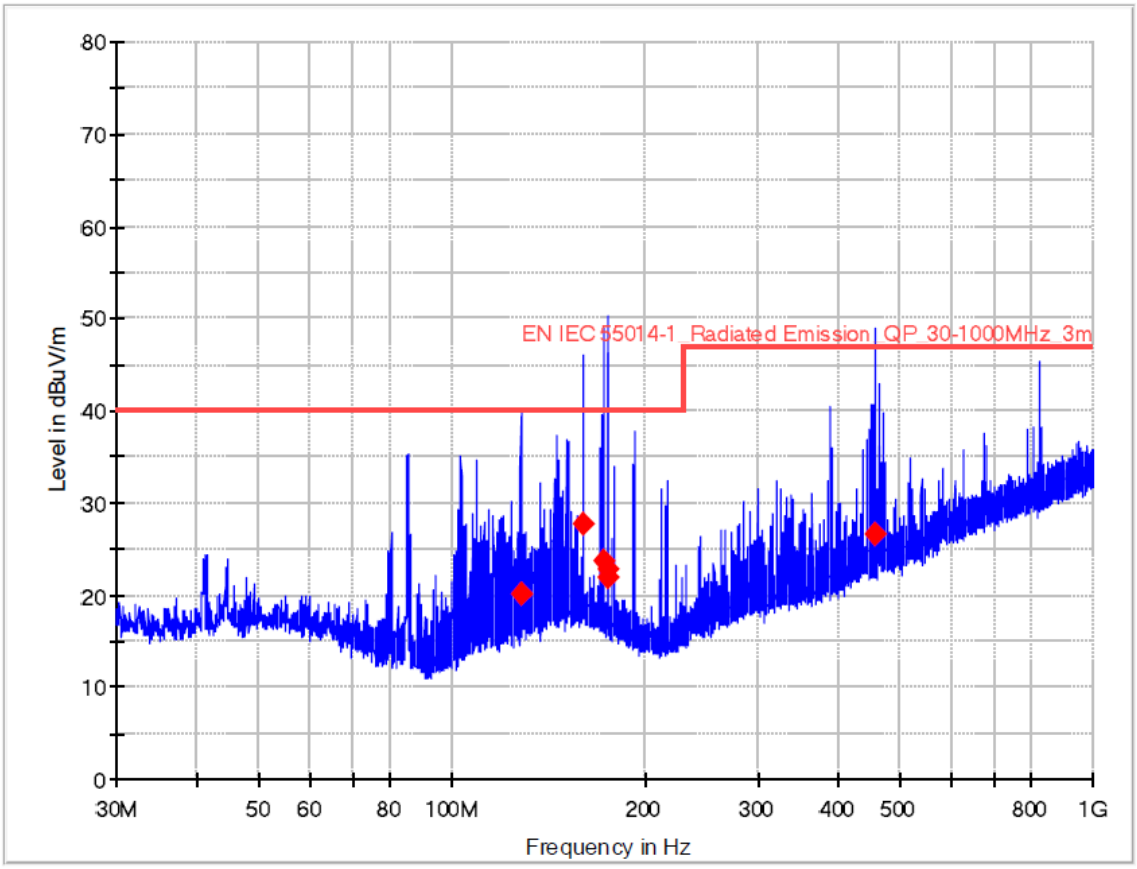
Horizontal
Level



Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
153.305000	22.32	40.00	17.68	1000.0	120.000	100.0	H	234.0	22.6
160.101847	25.63	40.00	14.37	1000.0	120.000	200.0	H	205.0	22.6
172.814500	28.19	40.00	11.81	1000.0	120.000	200.0	H	136.0	21.9
183.781291	26.14	40.00	13.86	1000.0	120.000	100.0	H	319.0	20.7
187.752500	21.70	40.00	18.30	1000.0	120.000	200.0	H	177.0	20.3
197.996804	23.19	40.00	16.81	1000.0	120.000	100.0	H	113.0	19.6

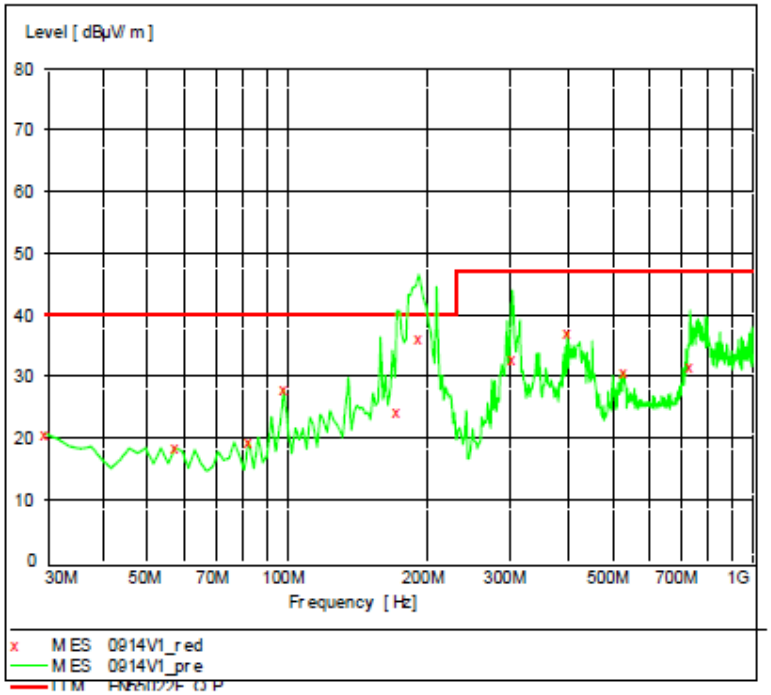
Vertical
Level



Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
128.618500	20.01	40.00	19.99	1000.0	120.000	200.0	V	206.0	20.9
160.219059	27.64	40.00	12.36	1000.0	120.000	200.0	V	256.0	22.6
172.850500	23.65	40.00	16.35	1000.0	120.000	100.0	V	286.0	21.9
175.122568	22.87	40.00	17.13	1000.0	120.000	100.0	V	286.0	21.7
175.201378	21.80	40.00	18.20	1000.0	120.000	200.0	V	29.0	21.7
455.830876	26.50	47.00	20.50	1000.0	120.000	100.0	V	133.0	27.9

Vertical



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB
30.000000	20.70	18.6	40.0	19.3
57.214429	18.40	7.3	40.0	21.6
82.484970	19.50	8.3	40.0	20.5
98.036072	27.90	11.5	40.0	12.1
171.903808	24.40	10.7	40.0	15.6
191.342685	36.10	10.8	40.0	3.9
304.088176	32.80	14.9	47.0	14.2
399.338677	37.20	17.5	47.0	9.8
529.579158	30.60	19.9	47.0	16.4
733.687375	31.70	21.8	47.0	15.3

5 Immunity Test

5.1 Performance Criteria Description in Clause 6 of EN IEC 55014-2

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. 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.

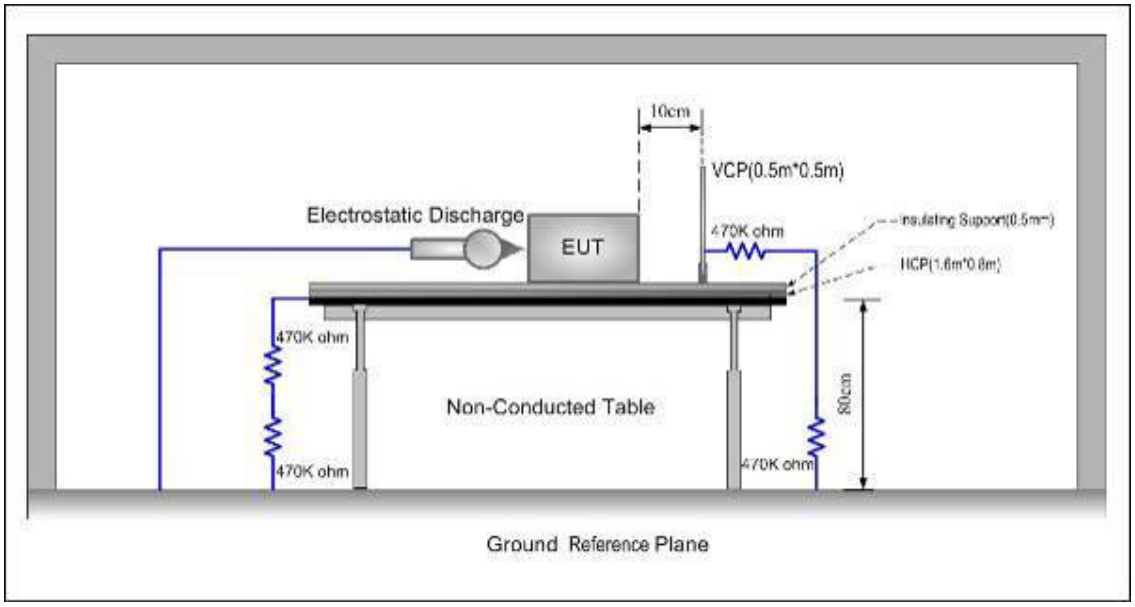
5.2 Classification of apparatus

Category I:	equipment containing no electronic control circuitry.
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. This category also includes equipment provided with rechargeable batteries, which can be charged, directly or indirectly, from the mains. Accordingly, this equipment shall also be subjected to the test requirements for mains operated equipment but only when testing the charging function If the equipment can operate its intended functions when connected, directly or indirectly to the mains, then it is not battery operated. Accordingly, it shall be classified as Category II, Category IV or Category V, as applicable, and subjected to the corresponding test requirements when in mains operation.
Category IV:	mains operated equipment containing electronic control circuitry with a highest clock frequency greater than 15 MHz but lower than or equal to 200 MHz.
Category V:	mains operated equipment containing electronic control circuitry with a highest clock frequency greater than 200 MHz.

The EUT belongs to Category III.

5.3 Electrostatic Discharge

5.3.1 Test Procedures



1. Contact discharge was applied only to conductive surfaces of the EUT. Air discharge was applied only to non-conducted surfaces of the EUT.
2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
3. A horizontal coupling plane (HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thickness as that of the GRP and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surfaces excepted the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode was touching the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

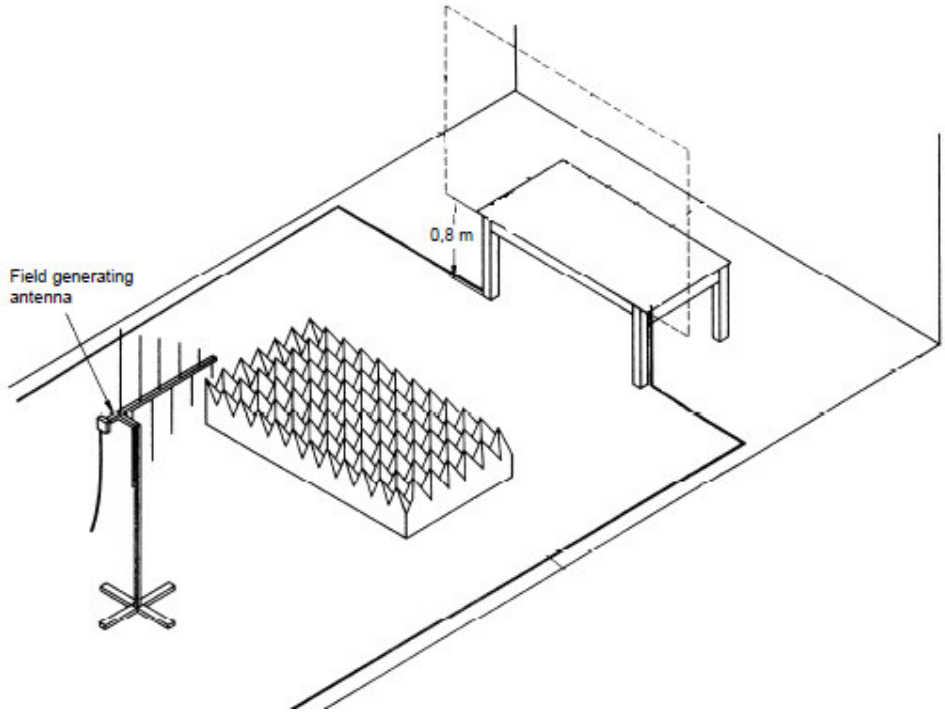
5.3.2 Results

Test point	Table (T) Floor (F)	Contact (C) Air (A)	Voltage (kV)	Number of discharge	Polarity (+ / -)	Opinion
Air discharge	T	A	8	20	+ / -	A
Contact discharge	T	C	4	20	+ / -	A
HCP	T	C	4	20	+ / -	A
VCP	T	C	4	20	+ / -	A

A: no loss of function.

5.4 Radio frequency electromagnetic fields

5.4.1 Measurement procedure



1 The EUT was placed on 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP. The tests normally shall be performed with the generating antenna facing each of four sides of the EUT. When equipment can be used in different orientations (e.g. vertical or horizontal) the test shall be performed on all possible sides of the EUT.

2 The tests are carried out with a field strength by 3 V/m (measured in the unmodulated field) with amplitude modulated signal by a depth of 80 % by a sinusoidal audio signal of 1 kHz. The logarithmic step was 1% and the dwell time was 3s dependent of the EUT cycle time.

3 The EUT shall be positioned so that the four sides of the EUT shall be exposed to the electromagnetic field in sequence. In each position the performance of the EUT will be investigated. In the case where the most sensitive surface side of the EUT is known throughout the frequency range (for example, via preliminary tests), testing may be restricted to that surface side only. Test was performed on subcontractor.

5.4.2 Results

Frequency Range	Field Strength	Modulation	Opinion
80MHz-1GHz	3V/m	80% AM 1kHz	A

A: no loss of function.

6 Test Setup Photos

Radiated disturbance

Electrostatic Discharge

Radio frequency electromagnetic fields

7 EUT Photos

Photo 1
Description: Overall view

Photo 2
Description: Overall view

Photo 3
Description: Overall view

Photo 4
Description: Internal view

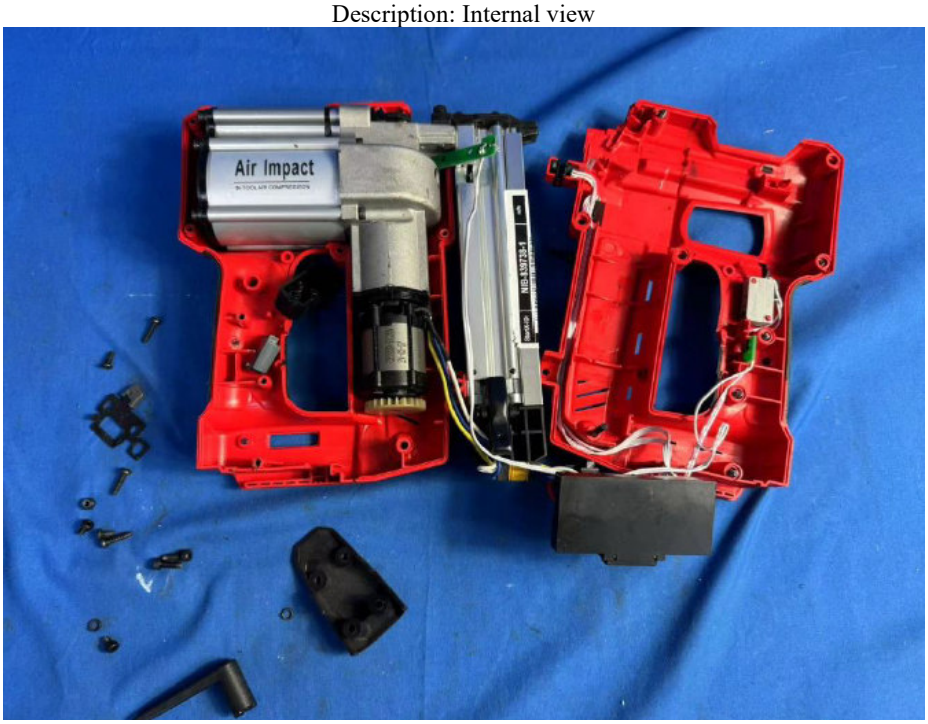


Photo 5
Description: Motor view

Photo 6
Description: PCB view

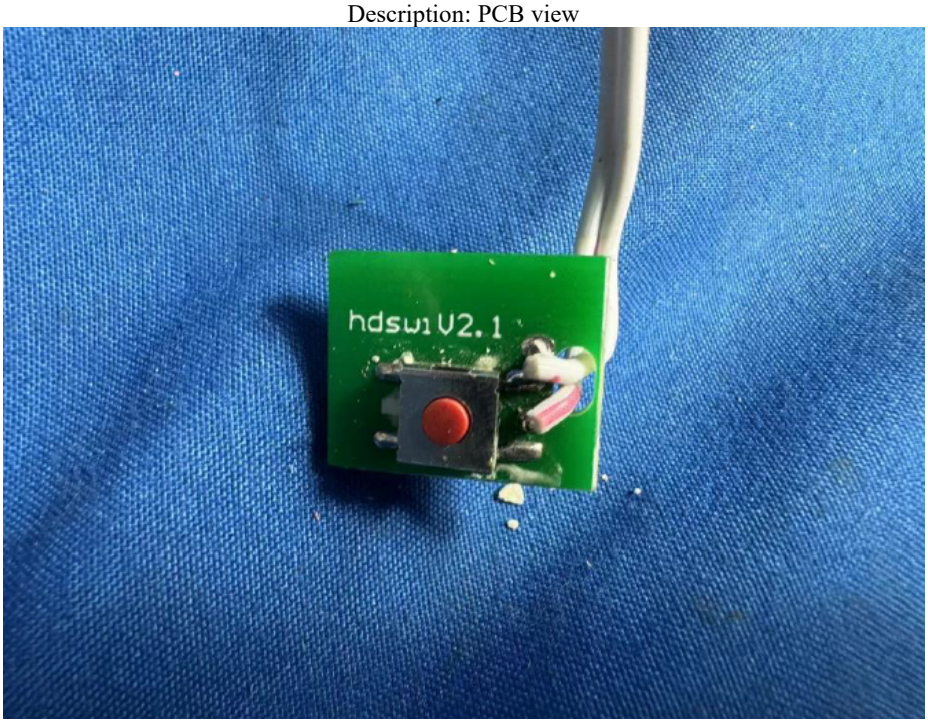


Photo 7
Description: PCB view

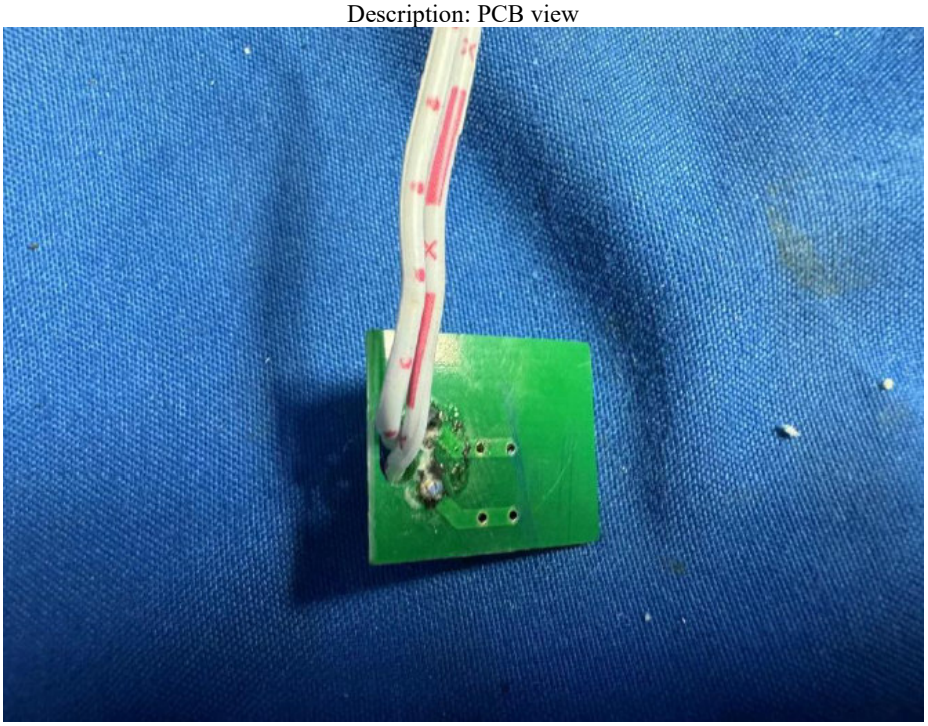


Photo 8
Description: Switch view

Photo 9
Description: PCB view

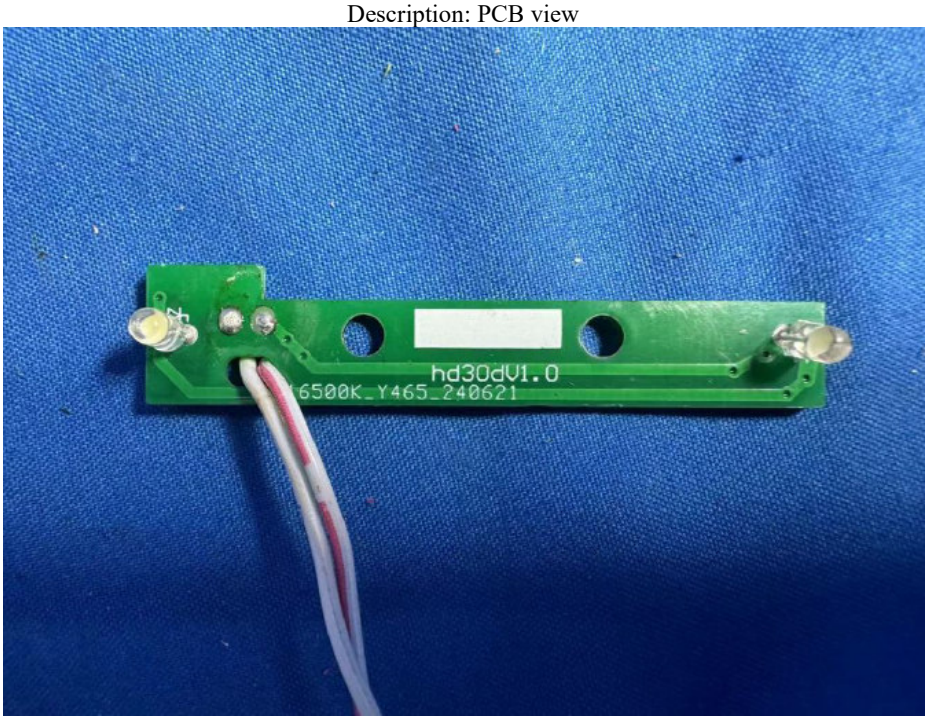


Photo 10
Description: PCB view

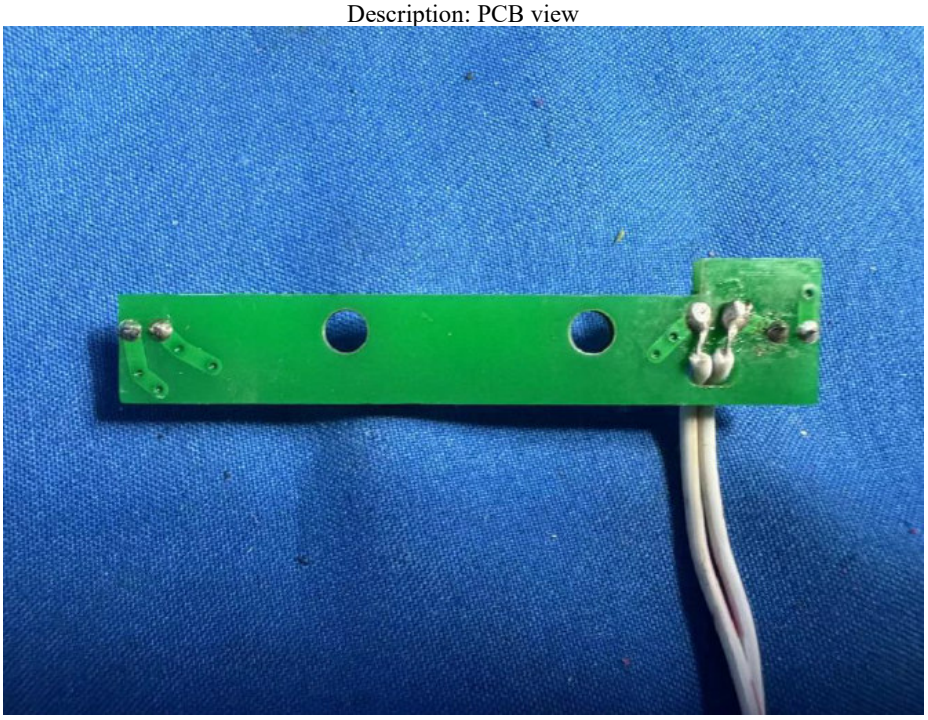


Photo 11
Description: PCB view

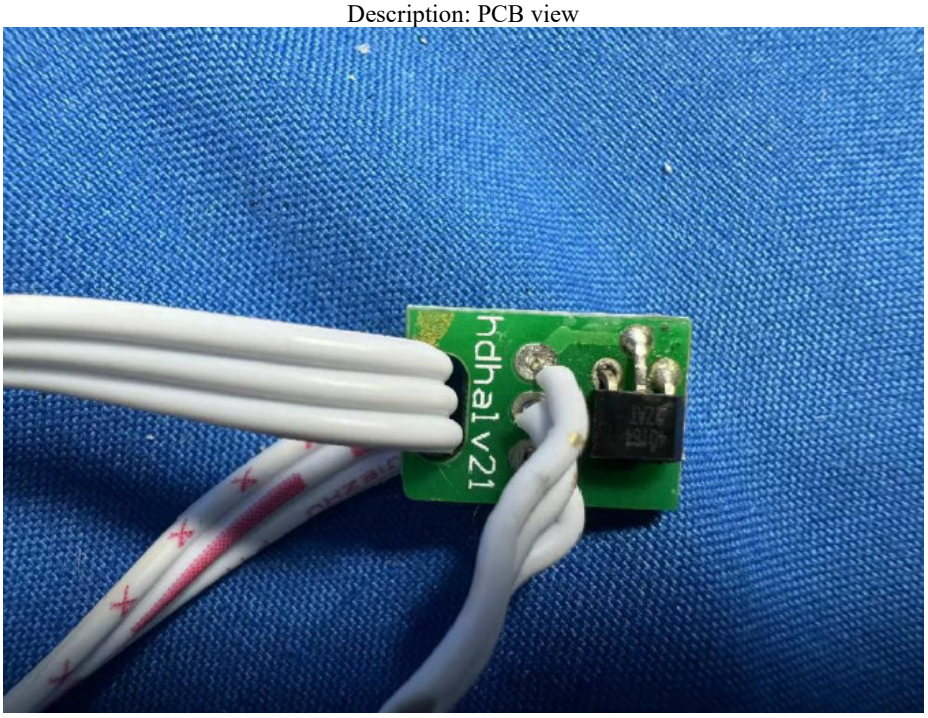


Photo 12
Description: PCB view

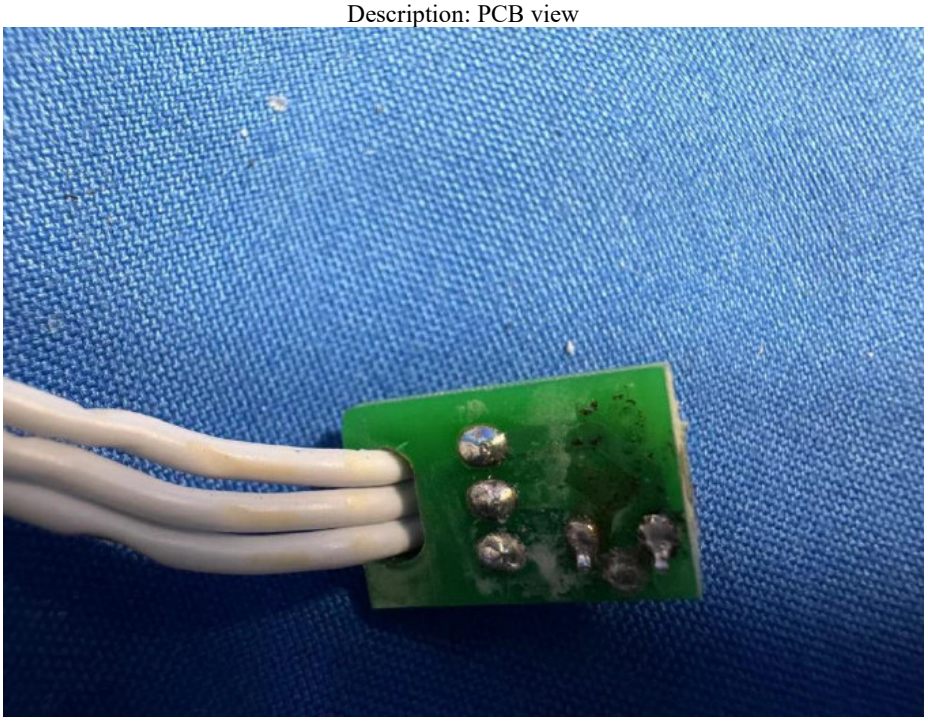


Photo 13
Description: PCB view

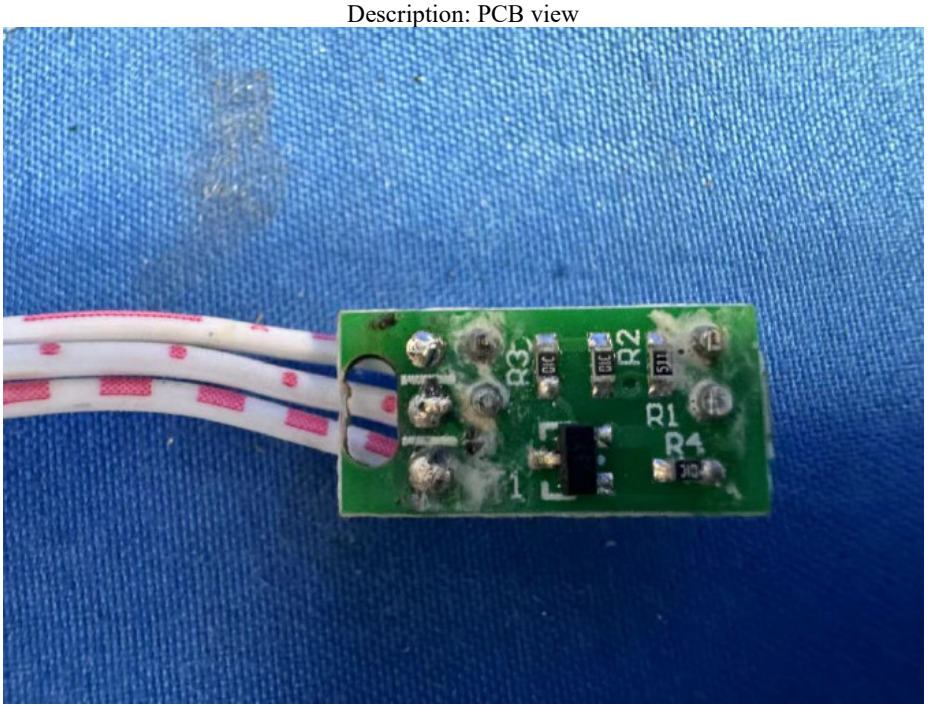


Photo 14
Description: PCB view

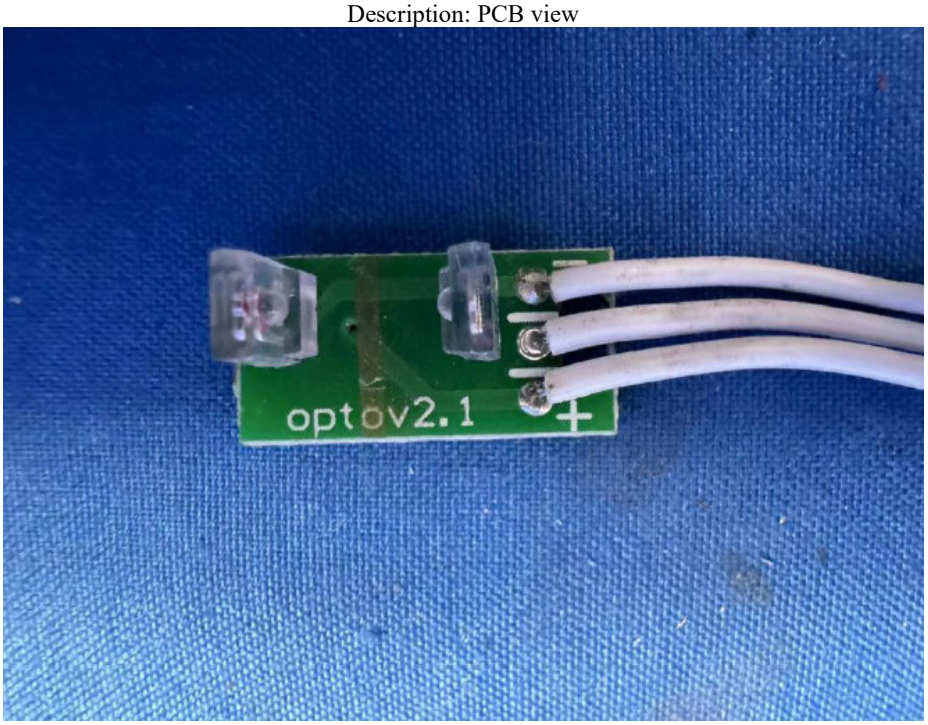


Photo 15
Description: PCB view

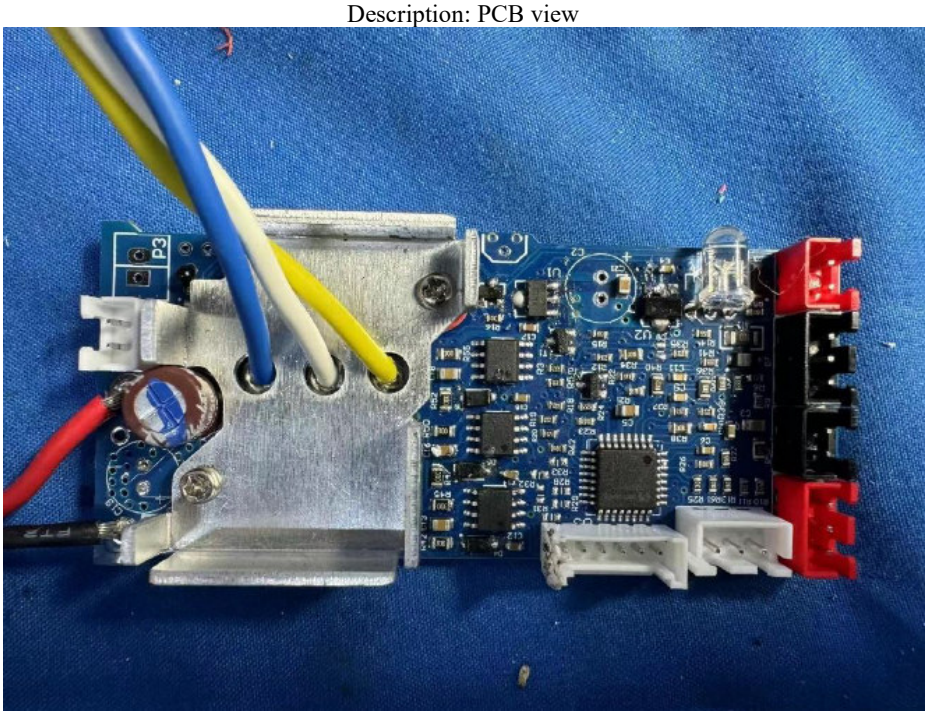


Photo 16
Description: PCB view

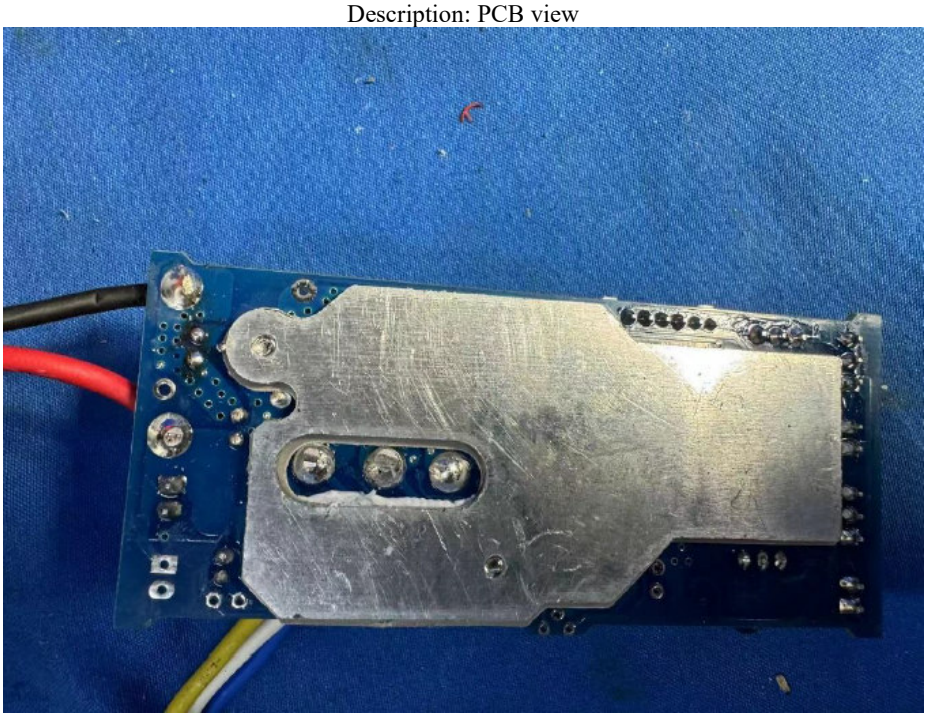


Photo 17
Description: PCB view

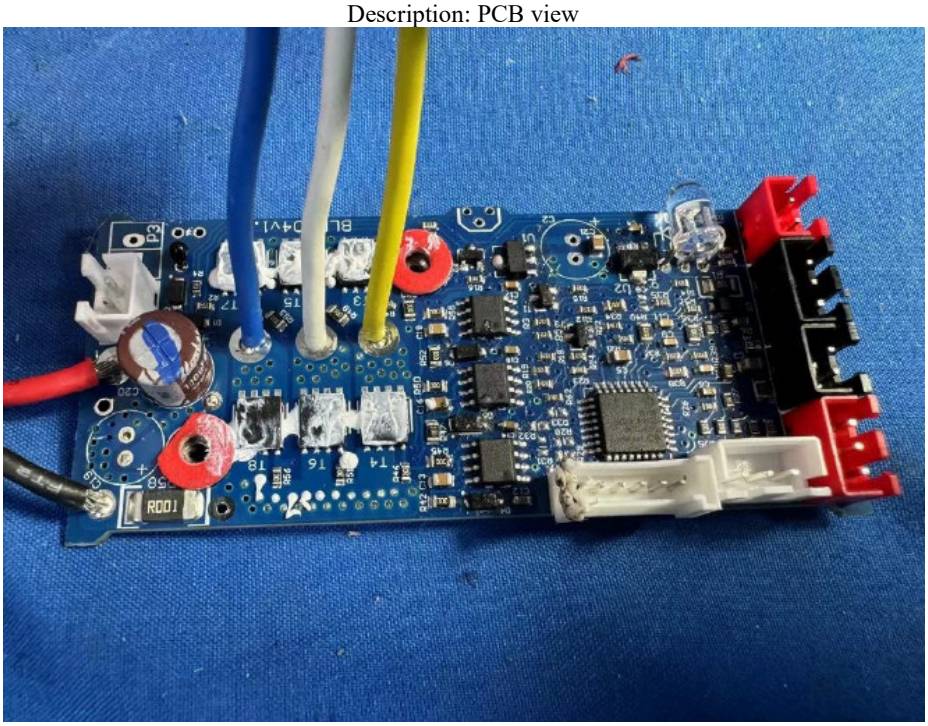


Photo 18
Description: PCB view

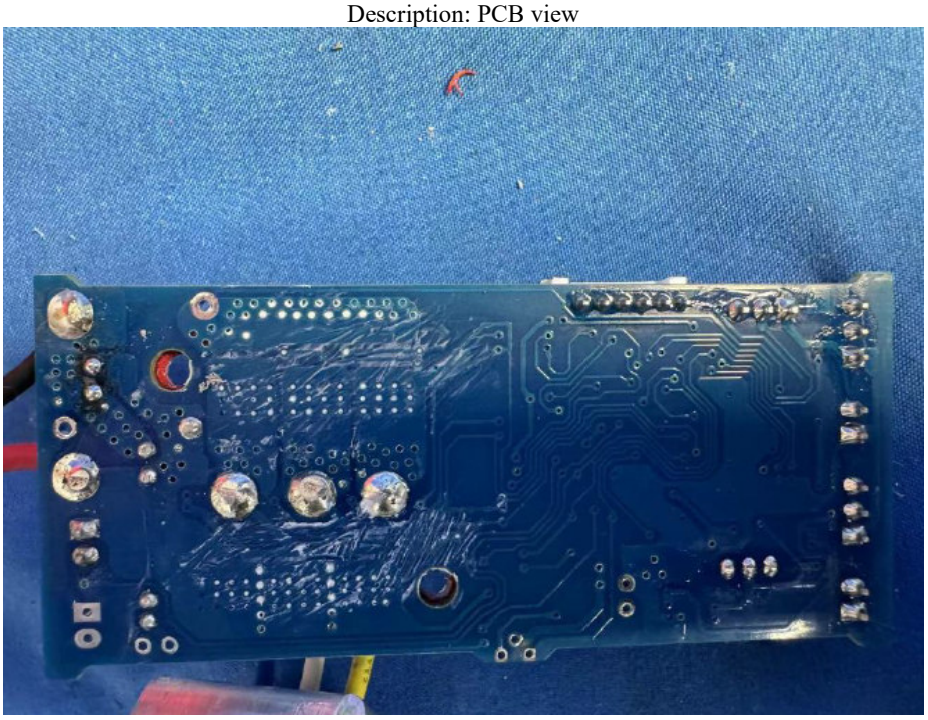


Photo 19
Description: Battery pack view