TEST REPORT

Product Name:	Lithium battery electric screwdriver
Trademark:	creationspace
Model Number:	ZPJ1802A
Prepared For:	SUZHOU CREATION SPACE INTELLIGENT TECHNOLOGY CO.,LTD.
Address:	2nd Floor of No.2 Workshop, No.50 Weiting Tonghe Road, Suzhou Industrial Park
Manufacturer:	SUZHOU CREATION SPACE INTELLIGENT TECHNOLOGY CO.,LTD.
Address:	2nd Floor of No.2 Workshop, No.50 Weiting Tonghe Road, Suzhou Industrial Park
Prepared By:	ShenZhen SJS Testing Technology Co., Ltd.
Address:	3rd Floor, Building A, Hongfenghua Creative Park, Huangtian Community, Hangcheng Street, Baoan District, Shenzhen, China
Sample Received Date:	Jul. 01, 2019
Sample tested Date:	Jul. 01, 2019 to Jul. 09, 2019
Issue Date:	Jul. 10, 2019
Report No.:	SJS20190700200E01
Test Standards	EN 55014-1:2017, EN 55014-2:2015
Test Results	PASS

Compiled by:	Reviewed by:	Approved by:
Cora Chan	Sam Zhu	Helen Lin/Manager

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
SJS20190700200E01	Jul. 10, 2019	Original	valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

EMISSION		
Standard	**Test Item**	**Test result**
EN 55014-1	Disturbance voltages(CE)	Pass
EN 55014-1	Discontinuous disturbance (Clicks)	N/A[1]
EN 55014-1	Disturbance power(DP)	N/A[2]
EN 55014-1	Magnetic field induced current in a 2m loop antenna(ME)	N/A[3]
EN 55014-1	Magnetic field strength	N/A[3]
EN 55014-1	Radiated disturbance (RE)	Pass

IMMUNITY (EN 55014-2)		
Standard	**Test Item**	**Test result**
IEC 61000-4-2	Electrostatic discharge immunity Test (ESD)	Pass
IEC 61000-4-3	Radio frequency electromagnetic fields(RS)	N/A[5]
IEC 61000-4-4	Fast transients immunity Test (EFT)	N/A[4]
IEC 61000-4-5	Surges immunity Test	N/A[4]
IEC 61000-4-6	Injected currents immunity Test (CS)	N/A[4]
IEC 61000-4-11	Voltage dips and interruptions immunity Test (DIPS)	N/A[4]

Remark:

1. The Product has no switching operations, automatic programme or other electrically controlled or operated functions
2. The Product shall be evaluated for emissions in the 30 MHz to 1 000 MHz range by testing in accordance with method b as described in clause 4.3.4.2 of EN55014-1.
3. It only apply to induction cooking appliances.
4. The EUT is powered by the DC by USB port, the test item is not applicable.
5. The Product is belong to category II.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Disturbance voltages (150K-30MHZ)	3.20
Disturbance power(DP)	3.70
Radiated disturbance (30MHz-1000MHz)	4.80

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Product Name	Lithium battery electric screwdriver	
Model Number	Input voltage (Vdc)	Current (A)
ZPJ1802A	5.0	1.0

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	ADAPTOR	UGREEN	CD122	---	---	---
2	ADAPTOR	RY	RY-1210	--	--	--

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Test Mode

Test item	Test Mode	Test Voltage
Disturbance voltages(150KHz-30MHz)	Working	AC 230V/50Hz*
Radiated disturbance(30MHz-1GHz)	Working	AC 230V/50Hz*
Electrostatic discharge (ESD) B ☒Air Discharge: ±8kV ☒Contact Discharge: ±4kV ☒HCP & VCP: ±4kV	Working	AC 230V/50Hz
All test mode were tested and passed, only Disturbance voltages, Radiated disturbance, shows (*) is the worst case mode which were recorded in this report.		

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at SJS 3rd Floor, Building A, Hongfenghua Creative Park, Huangtian Community, Hangcheng Street, Baoan District, Shenzhen, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Disturbance voltages and Discontinuous disturbance Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR	102075	Aug. 14, 2018	Aug. 13, 2019
LISN	R&S	ENV216	101375	Aug. 14, 2018	Aug. 13, 2019
ISN	HPX	ISN T800	S1509001	Aug. 14, 2018	Aug. 13, 2019

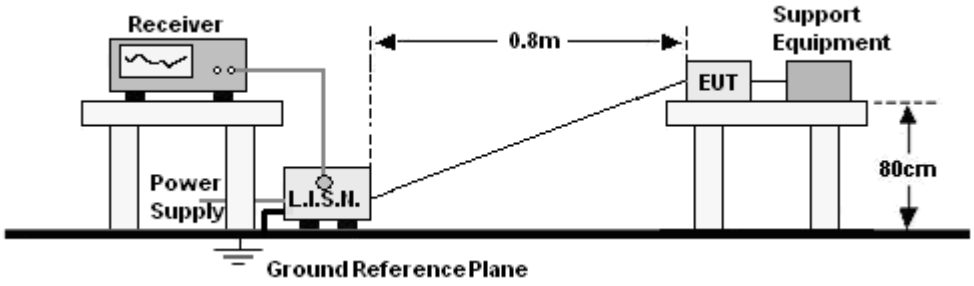
Radiated disturbance Test (966 chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	Aug. 25, 2018	Aug. 24, 2019
Receiver	R&S	ESR	101154	Aug. 14, 2018	Aug. 13, 2019
Amplifier	Schwarzbeck	BBV9718	9718-309	Aug. 14, 2018	Aug. 13, 2019
Amplifier	Schwarzbeck	BBV9744	9744-0037	Aug. 14, 2018	Aug. 13, 2019
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Aug. 13, 2018	Aug. 12, 2019
Horn Antenna	SCHWARZBECK	BBHA9120D	1201	Aug. 16, 2018	Aug. 15, 2019

Electrostatic discharge immunity Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
ESD Tester	KIKISUI	KES4201A	UH002321	Aug. 15, 2018	Aug. 14, 2019

6. DISTURBANCE VOLTAGES

6.1 Block Diagram Of Test Setup

For mains ports:



6.2 Limit

At mains ports Limits for Household Appliance

Frequency (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0,15 ~ 0,50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

6.3 Test procedure

For mains ports:

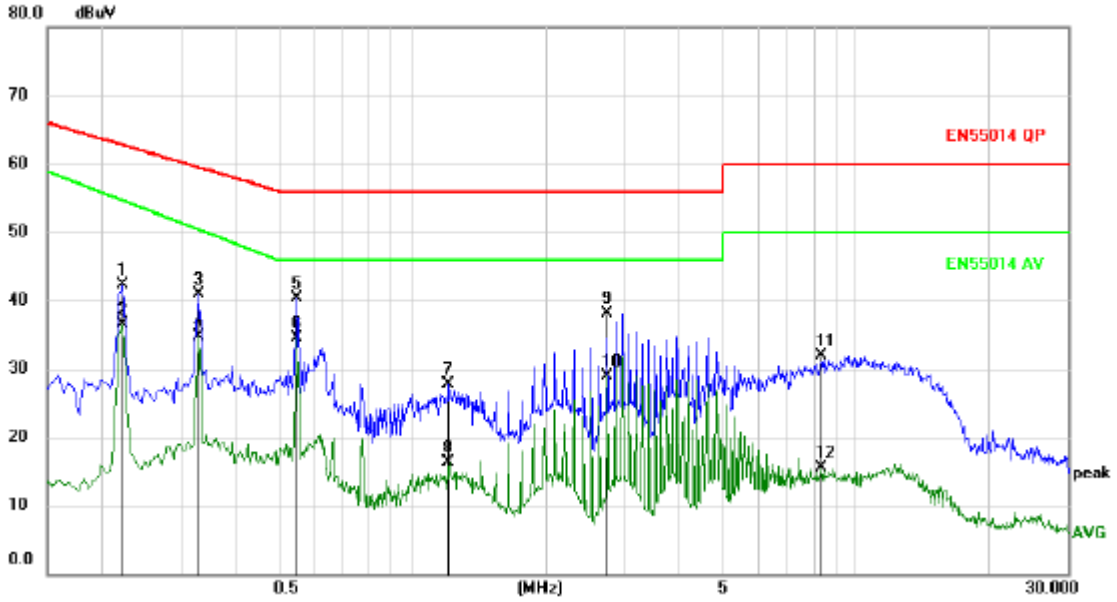
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).

b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.

c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

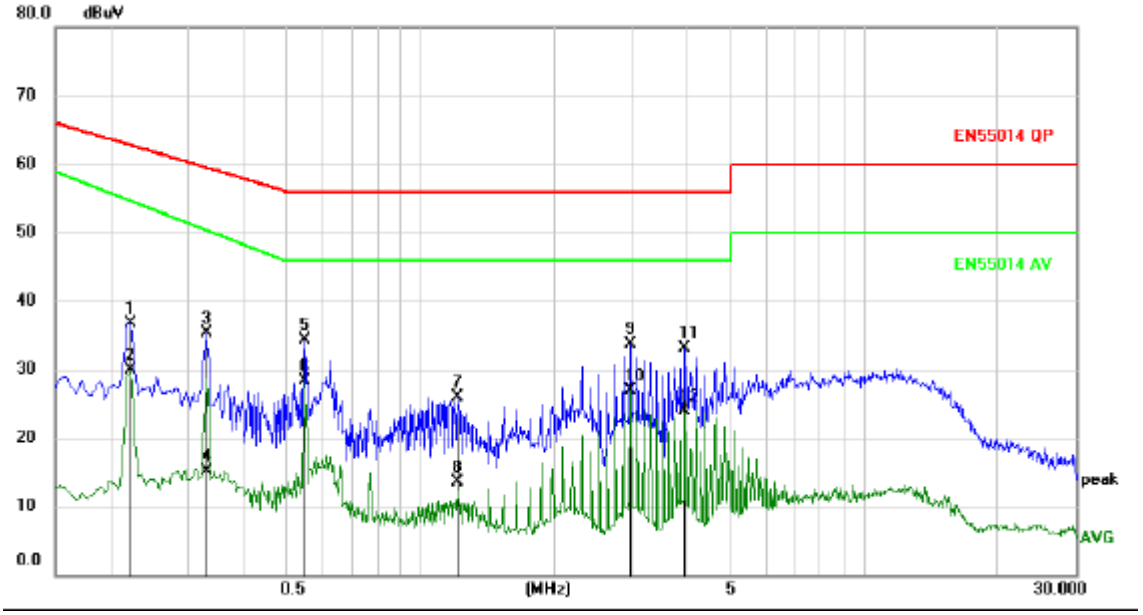
6.4 Test Result

Temperature:	26 ℃	Relative Humidity:	54 %
Pressure:	101kPa	Phase :	Line
Test Voltage :	DC 5V from adapter Input AC230V/50Hz	Test Mode:	Working



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2220	32.47	9.76	42.23	62.74	-20.51	QP	
2		0.2220	26.65	9.76	36.41	54.77	-18.36	AVG	
3		0.3300	31.18	9.76	40.94	59.45	-18.51	QP	
4		0.3300	24.90	9.76	34.66	50.49	-15.83	AVG	
5		0.5505	30.38	10.00	40.38	56.00	-15.62	QP	
6	*	0.5505	24.42	10.00	34.42	46.00	-11.58	AVG	
7		1.2075	17.96	9.77	27.73	56.00	-28.27	QP	
8		1.2075	6.54	9.77	16.31	46.00	-29.69	AVG	
9		2.7510	28.19	9.82	38.01	56.00	-17.99	QP	
10		2.7510	19.11	9.82	28.93	46.00	-17.07	AVG	
11		8.3670	22.02	9.91	31.93	60.00	-28.07	QP	
12		8.3670	5.56	9.91	15.47	50.00	-34.53	AVG	

Temperature:	26 ℃	Relative Humidity:	54 %
Pressure:	101kPa	Phase :	Neutral
Test Voltage :	DC 5V from adapter Input AC230V/50Hz	Test Mode:	Working

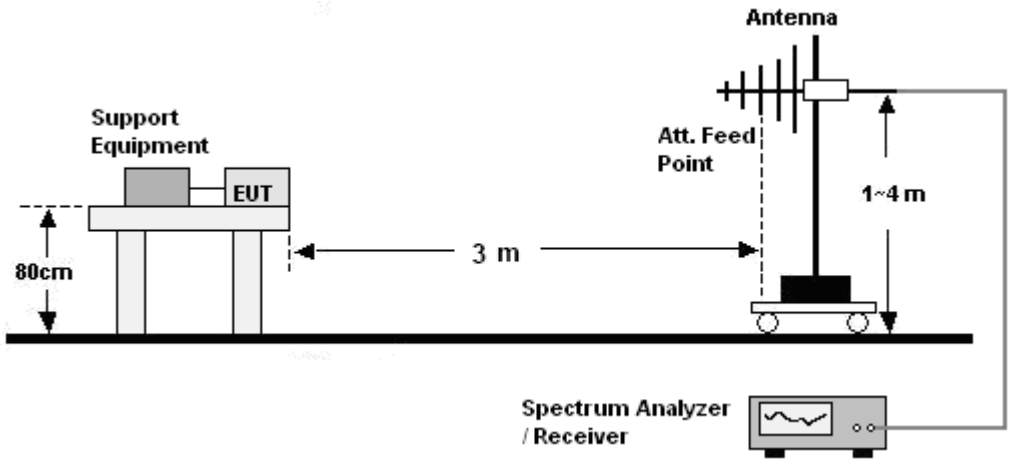


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2220	27.01	9.76	36.77	62.74	-25.97	QP	
2		0.2220	20.10	9.76	29.86	54.77	-24.91	AVG	
3		0.3300	25.45	9.76	35.21	59.45	-24.24	QP	
4		0.3300	5.42	9.76	15.18	50.49	-35.31	AVG	
5		0.5505	24.38	10.00	34.38	56.00	-21.62	QP	
6	*	0.5505	18.23	10.00	28.23	46.00	-17.77	AVG	
7		1.2120	16.16	9.77	25.93	56.00	-30.07	QP	
8		1.2120	3.83	9.77	13.60	46.00	-32.40	AVG	
9		2.9715	23.93	9.83	33.76	56.00	-22.24	QP	
10		2.9715	17.07	9.83	26.90	46.00	-19.10	AVG	
11		3.9615	23.25	9.86	33.11	56.00	-22.89	QP	
12		3.9615	14.03	9.86	23.89	46.00	-22.11	AVG	

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

7. RADIATED DISTURBANCE TEST

7.1 Block Diagram Of Test Setup



7.2 Limits

Frequency (MHz)	Quasi-peak limits at 3m dB(μV/m)
30-230	40
230-1000	47

Note: The lower limit shall apply at the transition frequencies.

7.3 Test Procedure

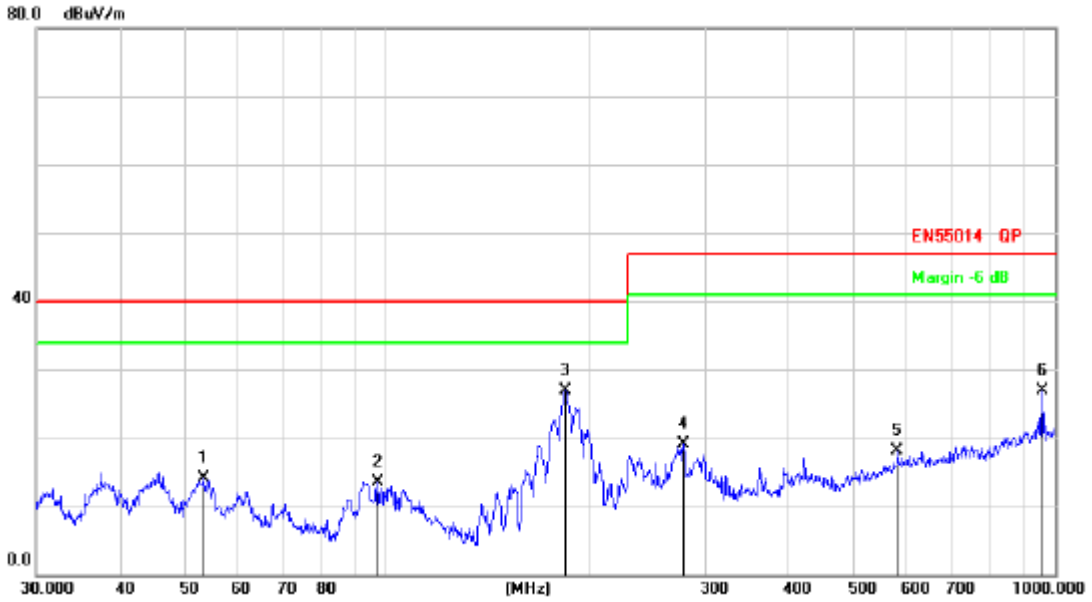
a. The Product was placed on the nonconductive turntable 0.8 m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

7.4 Test Results

Temperature:	26 ℃	Relative Humidity:	54 %
Pressure:	101kPa	Phase :	Horizontal
Test Voltage :	DC 5V from adapter Input AC230V/50Hz	Test Mode:	Working



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		53.3179	28.66	-14.49	14.17	40.00	-25.83	QP			
2		97.1148	29.63	-16.09	13.54	40.00	-26.46	QP			
3	*	185.1379	44.40	-17.57	26.83	40.00	-13.17	QP			
4		278.0668	33.87	-14.69	19.18	47.00	-27.82	QP			
5		580.7026	25.04	-6.99	18.05	47.00	-28.95	QP			
6		955.4381	28.86	-1.96	26.90	47.00	-20.10	QP			

Temperature:	26 ℃	Relative Humidity:	54 %
Pressure:	101kPa	Phase :	Vertical
Test Voltage :	DC 5V from adapter Input AC230V/50Hz	Test Mode:	Working

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		32.0667	35.91	-16.69	19.22	40.00	-20.78	QP			
2		62.2128	32.53	-16.03	16.50	40.00	-23.50	QP			
3		93.1132	35.03	-16.85	18.18	40.00	-21.82	QP			
4	*	185.7882	42.72	-17.50	25.22	40.00	-14.78	QP			
5		501.1790	25.68	-9.29	16.39	47.00	-30.61	QP			
6		955.4381	29.36	-1.96	27.40	47.00	-19.60	QP			

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

8. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA

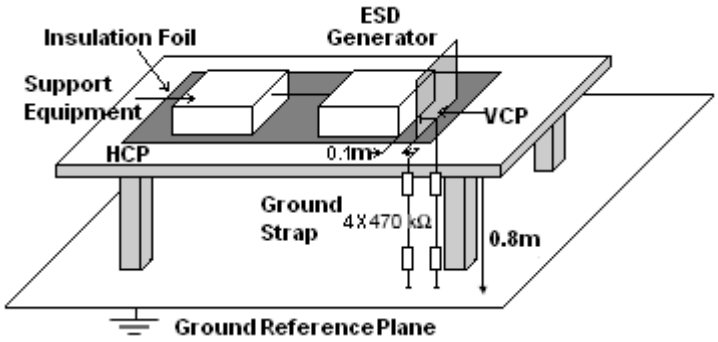
Product Standard	EN 55014-2:2015
CRITERION A	The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. 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 resonably 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.

9. ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

9.1 Test Specification

Test Port	:	Enclosure port
Discharge Impedance	:	330 ohm / 150 pF
Discharge Mode	:	Single Discharge
Discharge Period	:	one second between each discharge

9.2 Block Diagram of Test Setup



9.3 Test Procedure

a. Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the Product.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the Product. The ESD generator was positioned

vertically at a distance of 0.1 meters from the Product with the discharge electrode touching the HCP.

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the Product were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the Product.

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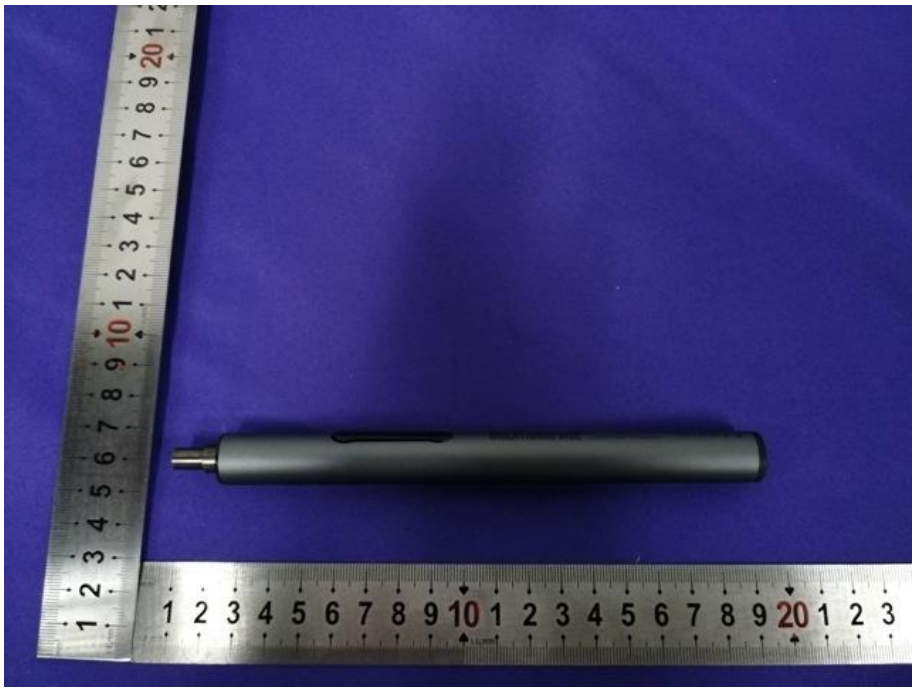
9.4 Test Results

Temperature:	26 ℃	Relative Humidity:	54 %
Pressure:	101kPa	Test Mode:	Working
Test Voltage :	DC 12V and DC 5V from adapter Input AC230V/50Hz		

Discharge Method	Discharge Position	Voltage (±kV)	Min. No. of Discharge per polarity (Each Point)	Required Level	Performance Criterion
Contact Discharge	Conductive Surfaces	4	10	B	A
	Indirect Discharge HCP	4	10	B	A
	Indirect Discharge VCP	4	10	B	A
Air Discharge	Slots, Apertures, and Insulating Surfaces	8	10	B	A
Note: N/A					

10. EUT PHOTOGRAPHS

EUT Photo 1



EUT Photo 2

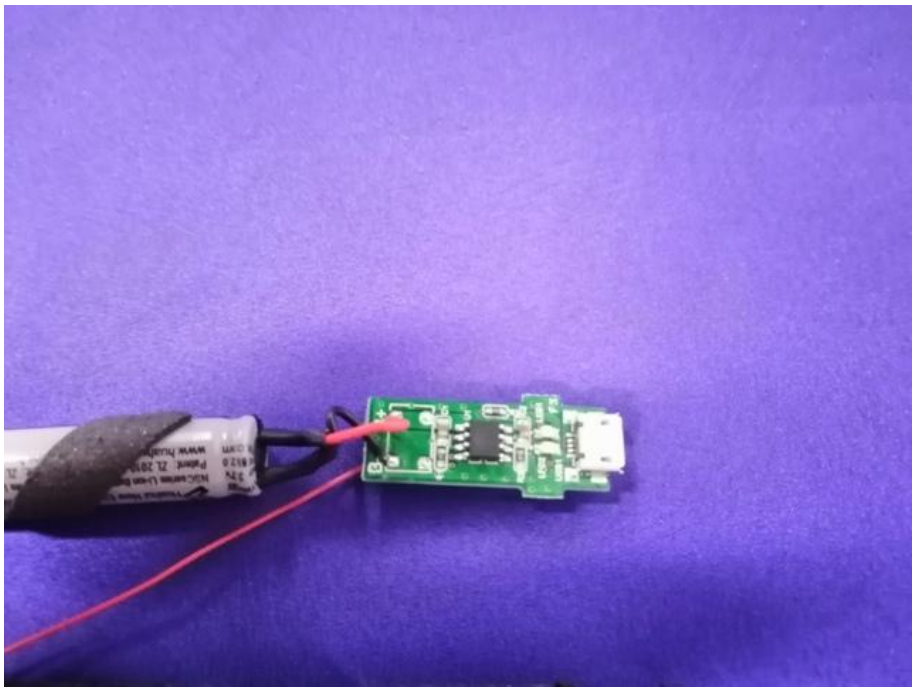
EUT Photo 3

EUT Photo 4

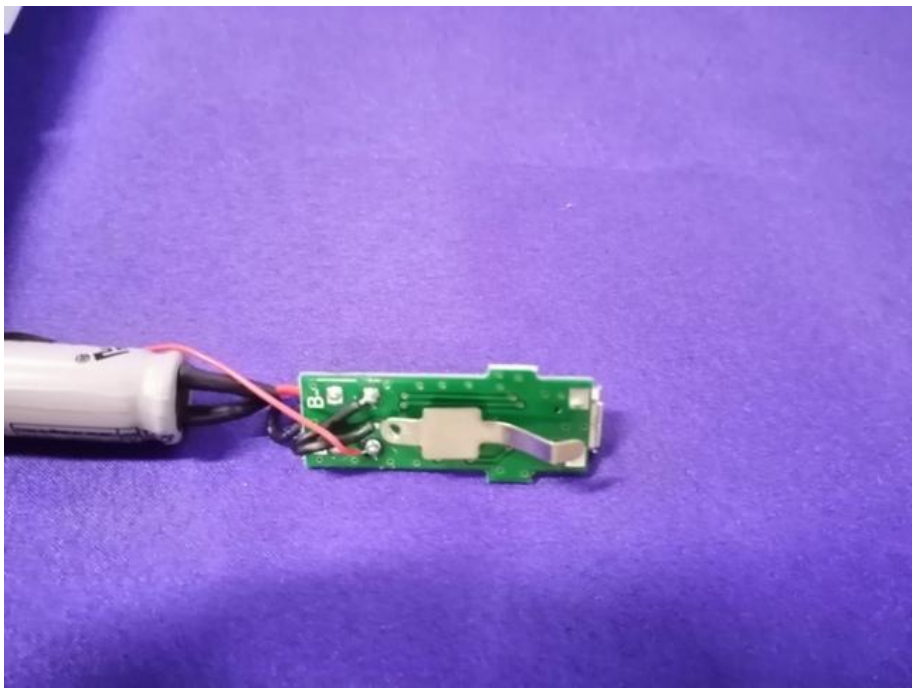
EUT Photo 5

EUT Photo 6

EUT Photo 7

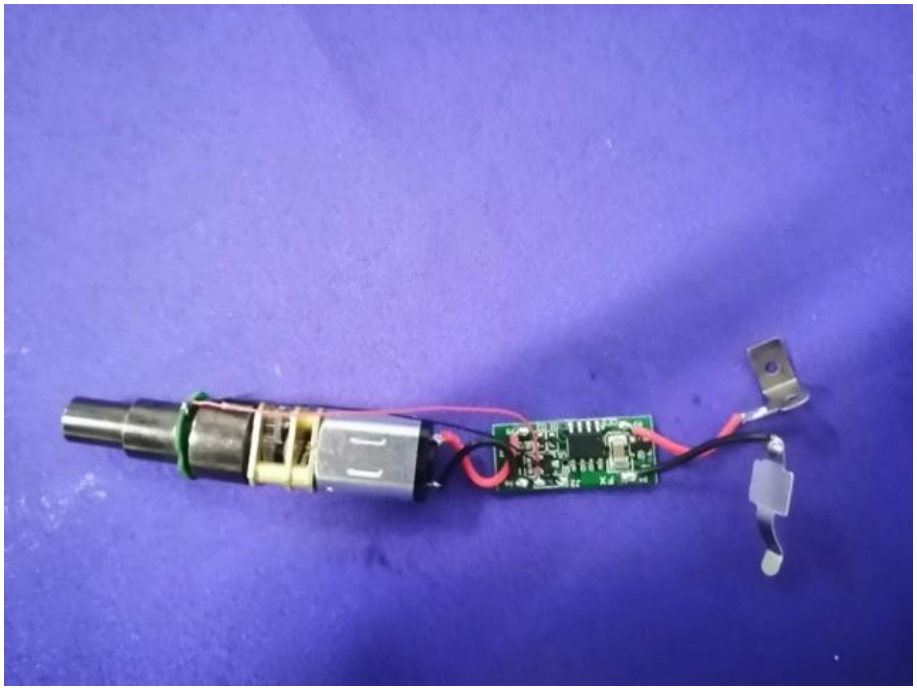


EUT Photo 8



EUT Photo 9

EUT Photo 10



11. EUT TEST SETUP PHOTOGRAPHS

Radiated emission

ESD

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