



TEST REPORT

Product Name: Lithium Polymer Battery
Testing type/mode: LP573450
Additional type /model: All Akyga prismatic type of Lithium polymer rechargeable battery

Prepared For: Ropla Elektronik sp. z o.o.
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Sample Received Date: Nov. 23, 2018
Sample tested Date: Nov. 23, 2018 to Nov. 30, 2018
Issue Date: Nov. 30, 2018

Test Standards EN 61000-6-1:2007, EN 61000-6-3:2007+A1:2011
Test Results PASS

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Approved by:



Carson Zhang/Manager



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(Note: N/A means not applicable)



1. VERSION

Report No.	Issue Date	Description	Approved
Confidential	Nov. 30, 2018	Original	Valid



2. TEST SUMMARY

The Product has been tested according to the following specifications:

EMISSION		
Standard	Test Item	Test result
EN 61000-6-3	Conducted Emission	N/A ¹
EN 61000-6-3	Radiated Emission	Pass

IMMUNITY (EN 61000-6-1)		
Standard	Test Item	Test result
IEC 61000-4-2	Electrostatic discharge (ESD)	Pass
IEC 61000-4-3	Radio-frequency electromagnetic field(RS)	Pass
IEC 61000-4-4	Fast transients (EFT)	N/A ¹
IEC 61000-4-5	Surges	N/A ¹
IEC 61000-4-6	Radio-frequency common mode(CS)	N/A ¹
IEC 61000-4-8	Power-frequency magnetic fields (PFMF)	N/A ²
IEC 61000-4-11	Voltage dips and voltage interruptions (DIPS)	N/A ¹

Remark:

1. The EUT is powered by the DC only , the test item is not applicable
2. The Product doesn't contain any device susceptible to magnetic fields.



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)
Conducted Emission (150kHz-30MHz)	3.20
Radiated Emission(30MHz~1GHz)	4.80
Radiated Emission(1GHz~6GHz)	4.90



4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Ratings: DC 3.7V

The highest frequency of the internal sources of the EUT is (less than 108)MHz:

- less than 108 MHz, the measurement shall only be made up to 1 GHz.
- between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.
- between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.
- above 1 GHz, the measurement shall be made up to 6 GHz.

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.	---	---	---	---	---	---

Notes:

- All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 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
Radiated emission(30MHz-1GHz)	Working	DC 3.7V
Electrostatic discharge (ESD) B <input checked="" type="checkbox"/> Air Discharge: ±2,4,8kV <input checked="" type="checkbox"/> Contact Discharge: ±4kV <input checked="" type="checkbox"/> HCP & VCP: ±4kV	Working	DC 3.7V
Radio-frequency electromagnetic field(RS) A 80MHz-1000MHz&1.4-2GHz,3V, 80%, 2-2.7GHz,1V/m,80%	Working	DC 3.7V
All test mode were tested and passed, only Conducted Emissions, Radiated Emissions Harmonic Current Emissions and Voltage Fluctuations and Flicker 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 BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an 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

Radiated Emission Test (966 chamber)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	Mar. 03, 2018	Mar. 02, 2019
Receiver	R&S	ESR	102075	Jun. 20, 2018	Jun.19, 2019
Receiver	R&S	ESRP	101154	Jun. 20, 2018	Jun.19, 2019
Amplifier	Schwarzbeck	BBV9718	9718-309	Jun. 20, 2018	Jun.19, 2019
Amplifier	Schwarzbeck	BBV9744	9744-0037	Jun. 20, 2018	Jun.19, 2019
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Jun. 23, 2018	Jun.22, 2019
Horn Antenna	SCHWARZBECK	BBHA9120 D	1201	Jun. 23, 2018	Jun.22, 2021
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Electrostatic discharge Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
ESD Tester	KIKISUI	KES4201 A	UH002321	Jun. 22, 2018	Jun. 21, 2019

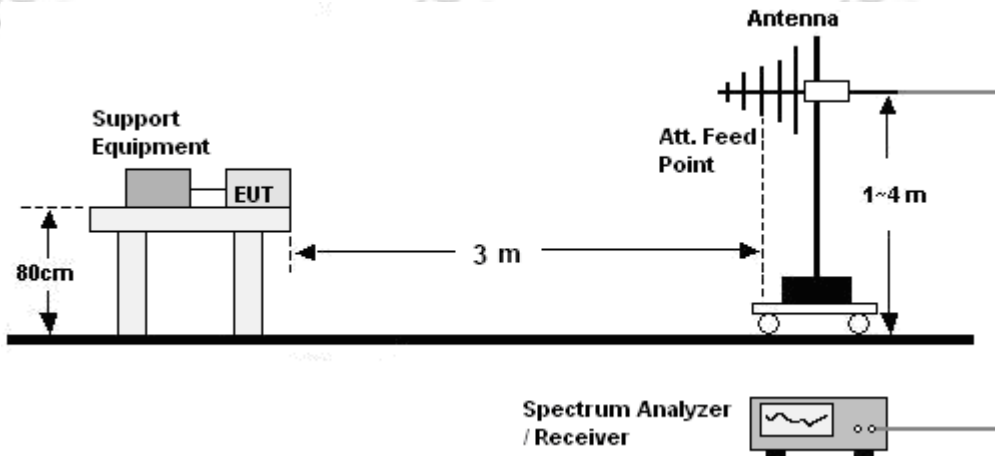


Radio-frequency electromagnetic field Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Power meter	Keysight	E4419	GB4242144 0	Apr. 15, 2018	Apr. 14, 2019
Power sensor	Keysight	E9300A	US3921130 5	Apr. 15, 2018	Apr. 14, 2019
Power sensor	Keysight	E9300A	US3921165 9	Apr. 15, 2018	Apr. 14, 2019
Amplifier	SKET	HAP-8010 00M-250W	/	Aug. 13, 2018	Aug. 12, 2019
Amplifier	SKET	HAP-8010 00M-75W	/	Aug. 13, 2018	Aug. 12, 2019
Amplifier	SKET	HAP-8010 00M-50W	/	Aug. 12, 2018	Aug. 11, 2019
Stacked double Log.-Per. Antenna	Schwarzbeck	STLP 9129	077	Apr. 15, 2018	Apr. 14, 2019
Field Probe	Narda	EP-601	80256	Jun. 23, 2018	Jun. 22, 2019
Signal Generator	Agilent	N5181A	MY5014374 8	Jun. 20, 2018	Jun. 19, 2019
Software	SKET	EMC-S	1.2.0.18	\	\

6. RADIATED EMISSION TEST

6.1 Block Diagram Of Test Setup

30MHz ~ 1GHz:



6.2 Limits

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

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

6.3 Test Procedure

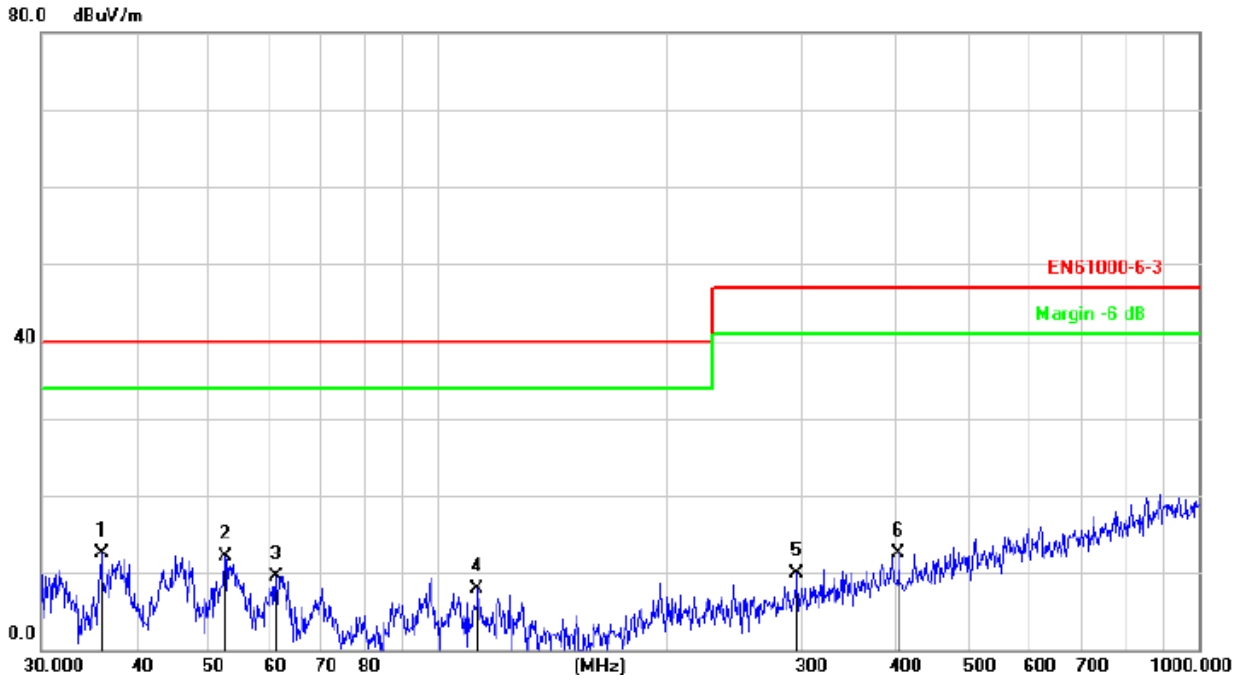
30MHz ~ 1GHz:

- The Product was placed on the nonconductive turntable 0.8 m above the ground in a semi anechoic chamber.
- 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.
- 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

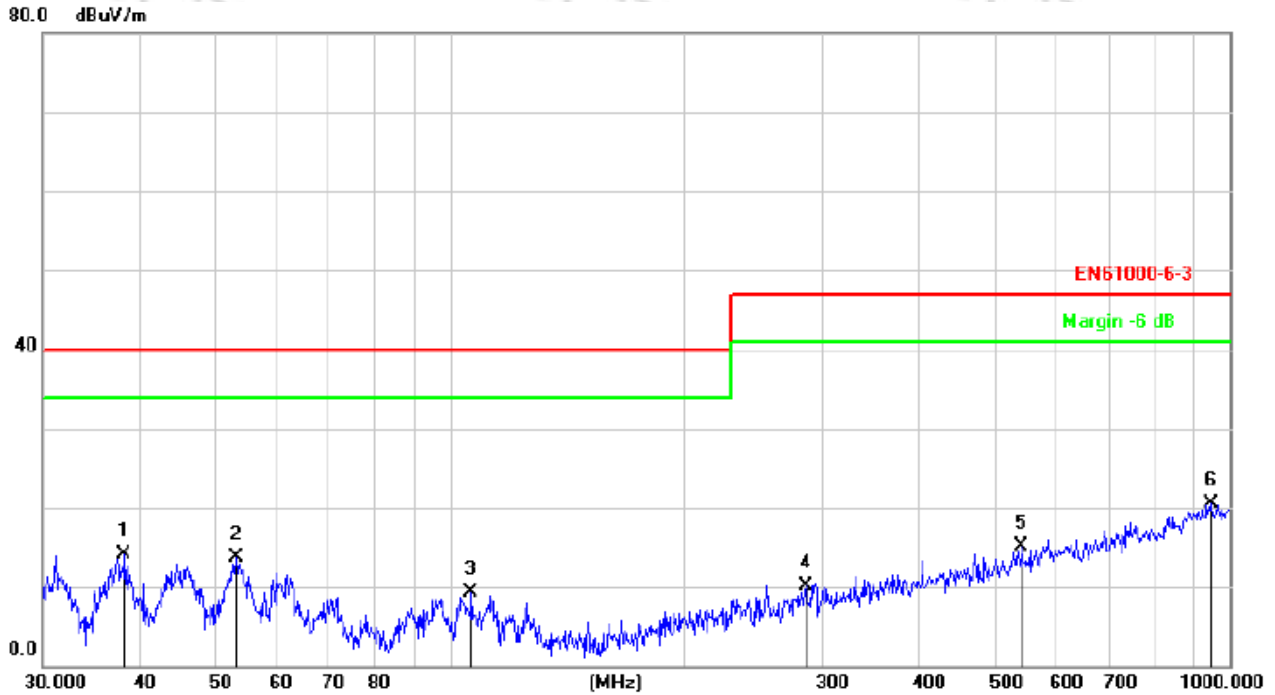
Radiation Emission Test Data			
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Horizontal
Test Voltage :	DC 3.7V	Test Mode:	Working



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	36.0007	28.61	-16.16	12.45	40.00	-27.55	QP			
2		52.3912	27.19	-15.10	12.09	40.00	-27.91	QP			
3		61.1315	25.76	-16.17	9.59	40.00	-30.41	QP			
4		112.5243	25.02	-17.09	7.93	40.00	-32.07	QP			
5		296.1836	23.55	-13.72	9.83	47.00	-37.17	QP			
6		403.2500	23.51	-11.02	12.49	47.00	-34.51	QP			



Radiation Emission Test Data			
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Vertical
Test Voltage :	DC 3.7V	Test Mode:	Working



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	38.2120	29.87	-15.74	14.13	40.00	-25.87	QP		
2		53.1313	28.89	-15.18	13.71	40.00	-26.29	QP		
3		106.3850	26.05	-16.69	9.36	40.00	-30.64	QP		
4		285.9778	24.17	-14.03	10.14	47.00	-36.86	QP		
5		541.3724	23.08	-7.90	15.18	47.00	-31.82	QP		
6		945.4398	21.72	-1.15	20.57	47.00	-26.43	QP		

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



7. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA

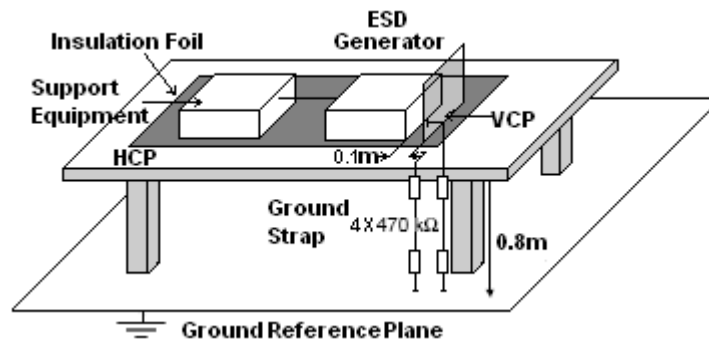
Product Standard	EN 61000-6-1:2007 Clause4
CRITERION A	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and 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 specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. 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, either of these may be derived from the product description and documentation and 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.

8. ELECTROSTATIC DISCHARGE (ESD)

8.1 Test Specification

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

8.2 Block Diagram of Test Setup



8.3 Test Procedure

- Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- 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.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- 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.
- 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.

8.4 Test Results

Temperature:	23 °C	Relative Humidity:	54%
Pressure:	101kPa	Test Mode:	Working
Test Voltage :	DC 3.7V		

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

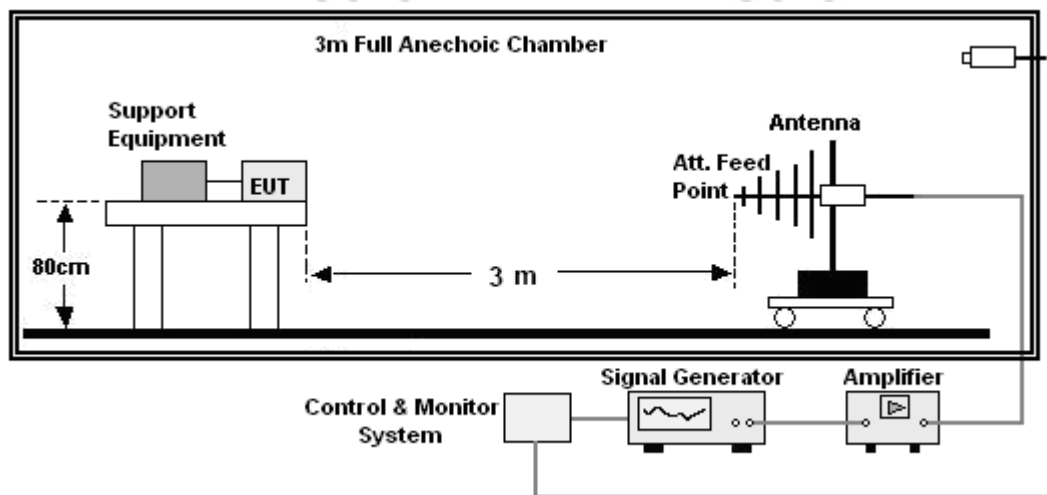
9. RADIO-FREQUENCY ELECTROMAGNETIC FIELD (RS)

9.1 Test Specification

Test Port	: Enclosure port
Step Size	: 1%
Modulation	: 1kHz, 80% AM
Dwell Time	: 1 second
Polarization	: Horizontal & Vertical

9.2 Block Diagram of Test Setup

Below 1GHz:



9.3 Test Procedure

- The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3m or 1m from the Product.
- The frequency range is swept from 80MHz to 1000MHz and 1400MHz to 2700MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1%.
- The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.



9.4 Test Results

Temperature:	23 °C	Relative Humidity:	54%
Pressure:	101kPa	Test Mode:	Working
Test Voltage :	DC 3.7V		

Frequency	Position	Field Strength (V/m)	Required Level	Performance Criterion
80 - 1000	Front, Right, Back, Left	3	A	A
1400 - 2000	Front, Right, Back, Left	3	A	A
2000 - 2700	Front, Right, Back, Left	1	A	A
Note: N/A				

10. EUT PHOTOGRAPHS

EUT Photo 1



EUT Photo 2



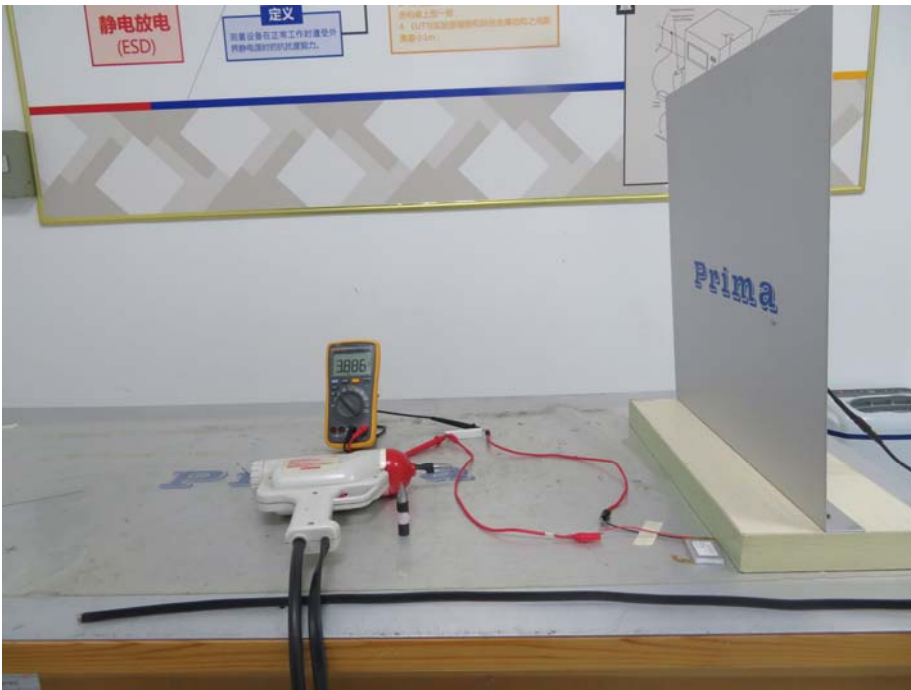


11. EUT TEST SETUP PHOTOGRAPHS

Radiated emission

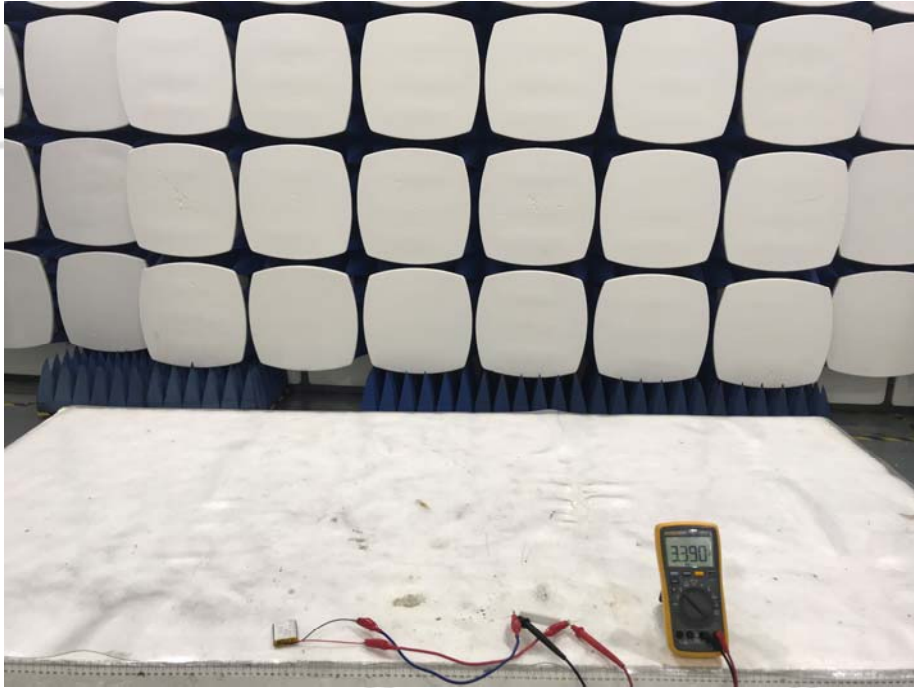


ESD





RS



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