



EN IEC 61000-6-3:2020
EN IEC 61000-6-1:2019

TEST REPORT

For

Rechargeable Li-ion Battery Pack

MODEL NUMBER: BA05G

REPORT NUMBER: TSZ24EA046A02-01

ISSUE DATE: Sep13, 2024

Prepared for

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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	09/13/2024	Initial Issue	--

Summary of Test Results

Emission				
Standard	Test Item	Limit	Result	
EN IEC 61000-6-3:2020	Conducted Emissions (AC mains power ports)	Clause 4	N/A (NOTE 1,5)	
	Discontinuous Conducted Emissions (Click)	Clause 4	N/A (NOTE 1,5)	
	Radiated emissions below 1GHz	Clause 3	Pass	
	Radiated emissions above 1GHz	Clause 3	N/A (NOTE 1, 2)	
Immunity (EN IEC 61000-6-1:2019)				
Basic Standard	Test Item	Test Specification	Criteria	Result
IEC 61000-4-2:2008	Electrostatic Discharge	Contact +/- 4 kV; Air +/- 2 kV; +/- 4 kV; +/- 8 kV	Table Clause 1.4	Pass
IEC 61000-4-3:2006 +A1:2007+A2:2010	Continuous RF electromagnetic field disturbances	3 V/m, 80%, 1 kHz, AM 80 MHz-1000 MHz, 1800 MHz,2600 MHz, 3500 MHz,5000 MHz	Table Clause 1.2, Table Clause 1.3	Pass
Note:				
(1) N/A=Not Applicable.				
(2) If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times of the highest frequency or 6 GHz, whichever is less.				
(3) This test report is only published to and used by the applicant, and it is not for evidence purpose in China.				
(4) The measurement result for the sample received is <Pass> according to <EN IEC 61000-6-3:2020, EN IEC 61000-6-1:2019> when <Accuracy Method> decision rule is applied.				
(5) According to the manufacturer's description, this device belongs to the component of the end-product.				



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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Huizhou Foryou Optoelectronics Technology Co., LTD
 Address: Building 5, District B, NO.1 North Shangxia Road, Dongjiang Hi-tech Industry Park, HUIZHOU GUANGDONG 516005.CHINA

Manufacturer Information

Company Name: Same As Applicant.
 Address: Same As Applicant.

Factory Information

Company Name: Same As Applicant.
 Address: Same As Applicant.

EUT Information

EUT Name: Rechargeable Li-ion Battery Pack
 Model: BA05G
 Series Model: /
 Brand: **ADAYO**
 Sample Received Date: 2024-07-18
 Sample Status: Normal
 Sample ID: LGT2407153-1
 Date of Tested: 2024-07-18~30

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
EN IEC 61000-6-3:2020	Pass
EN IEC 61000-6-1:2019	Pass



Prepared By:

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Project Handler

Checked By:

Joyce Li

Joyce Li

Project Handler

Approved By:

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Yam Shan

Engineering Manager

2. TEST METHODOLOGY

All tests were performed in accordance with the standard EN IEC 61000-6-3:2020, EN IEC 61000-6-1:2019

3. FACILITIES AND ACCREDITATION

Test Location	Shenzhen LGT Test Service Co., Ltd.
Address	Room 205, Building 13, Zone B, Chen Hsong Industrial Park, No.177 Renmin West Road, Jinsha Community, Kengzi Street, Pingshan New District, Shenzhen, China
Accreditation Certificate	A2LA Certificate No.: 6727.01 FCC Registration No.: 746540 CAB ID: CN0136

Remark:

- 1) The device described above was tested by Shenzhen LGT Test Service Co., Ltd. to determine the maximum emission levels emanated from the device and severity levels of the device endure and its performance criterion. The measurement results are contained in this test report and Shenzhen LGT Test Service Co., Ltd. assumes full responsibility for the accuracy and completeness of these measurements.
- 2) This report applies to the above sample only and shall not be reproduced in part without written approval of Shenzhen Tiansu Calibration and Testing Co., Ltd.

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 disturbance	0.009MHz ~ 30MHz	2	2.53
Radiated Emission Test	30MHz ~ 1000MHz	2	4.18

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	Rechargeable Li-ion Battery Pack
Model	BA05G
Series Model	/
Model Difference	/
EUT Classification	DC 51.2V 100Ah
Highest Internal Frequency	Below 108MHz
Ratings	DC 54V

5.2. TEST MODE

Test Mode	Description
M01	Working (Charging)
M02	Working (Discharge)

5.3. MONITORING OF EUT FOR ALL IMMUNITY TEST

Other	/
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5.4. EUT ACCESSORY

Adapter	
Model No.:	/
Input:	/
Output:	/
DC Cable:	/



5.5. SUPPORT UNITS FOR SYSTEM TEST

The following support units or accessories were used to form a representative test configuration during the tests.

Item	Accessory	Brand Name	Model Name	Description
1	AC-DC source	N/A	N/A	0~84V dc;0~10A

The following cables were used to form a representative test configuration during the tests.

Item	Type of cable	Shielded Type	Ferrite Core	Specification
C-1	NO	NO	NO	NO



6. MEASURING EQUIPMENT AND SOFTWARE USED

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	101427	2023.9.25	2024.9.24
Bi-log Antenna	TESEQ	CBL6111D	45873	2023.9.27	2024.9.26
Pre-amplifier(0.1M-3GHz)	EM	EM330	060665	2024.2.23	2025.2.22
Spectrum Analyzer	Agilent	N9020A	MY49100060	2023.9.26	2024.9.25
RE Cable (9K-1G)	N/A	R01	N/A	2023.9.25	2024.9.24
Temperature & Humidity	Mieo	HH660	N/A	2023.9.28	2024.9.27
SAC	ChengYu	9*6*6	N/A	2023.9.05	2026.9.06
Testing Software	EZ-EMC(Ver.STSLAB-03A1 RE)				

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
ESD TEST GENERATOR	TESEQ	NSG438	1175	2023.9.27	2024.9.26
Temperature & Humidity	N/A	WS1066	N/A	2024.2.22	2025.2.21



Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Power Meter	Agilent	E4419B	QB43312265	2023.9.25	2024.9.24
Power Sensor	hp	E9300A	US39210170	2023.9.25	2024.9.24
Power Sensor	hp	E9300A	US39210476	2023.9.25	2024.9.24
Signal Generator	Agilent	N5181A	MY56144718	2023.9.25	2024.9.24
Power Amplifier	MICOTOP	MPA-80-1000-250	MPA1711489	2023.9.25	2024.9.24
Power Amplifier	MICOTOP	MPA-1000-6000-100	MPA1904132	2023.9.25	2024.9.24
RS Test Antenna (80-1GHz)	SCHWARZBECK	VULP 9118E	000999	N/A	N/A
RS Test Antenna (1G-10GHz)	SCHWARZBECK	STLP 9149	000648	N/A	N/A
Universal Radio Communication Tester	R&S	CMU200	116337	2024.2.25	2025.2.24
Audio Analyzer	R&S	UPL	100689	2024.3.20	2025.3.19
Audio Breakthrough Shielding Box	SKET	SB_ABT/C35	N/A	N/A	N/A
Ear Simulator	SKET	AE_ABT/C35	N/A	N/A	N/A
Mouth Simulator	SKET	AM_ABT/C35	N/A	N/A	N/A
1KHz Standard Source	SKET	MSC_ABT/C35	N/A	2023.9.28	2024.9.27
Field Probe	Narda	EP601	611WX80261	2024.2.23	2025.2.22
Temperature & Humidity	Mieo	HH660	N/A	2023.9.28	2024.9.27
Testing Software	EMC-S V1.4.0.53				

7. EMISSION TEST

7.1. RADIATED EMISSIONS

LIMITS

Test Requirement: EN IEC 61000-6-3
 Test Method: CISPR 32
 Test Date:
 Test voltage: DC 54V
 Frequency Range: 30 MHz to 1000 MHz
 Measurement Distance: 10m or 3m
 Detector: Peak for pre-scan
 Quasi-Peak for final test (120 kHz resolution bandwidth)

Limit:

For 3m

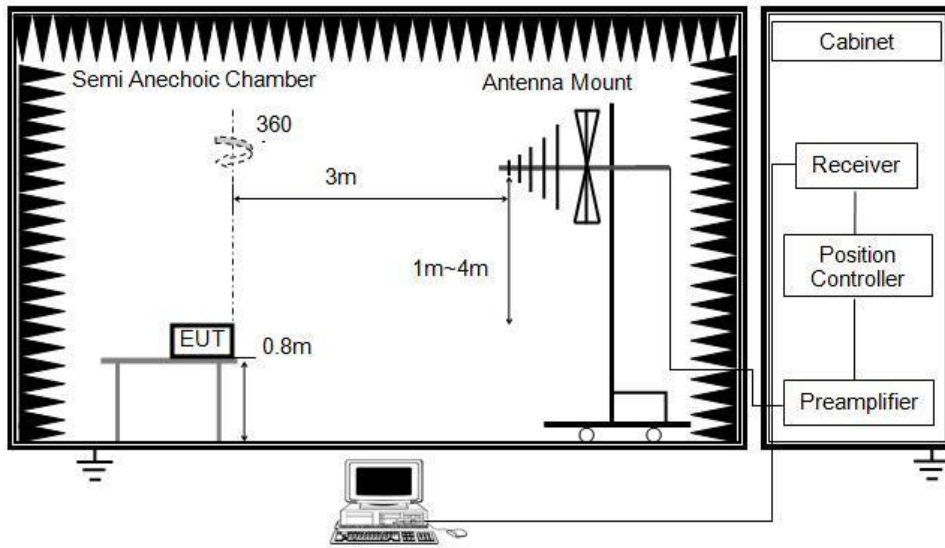
Frequency range MHz	Quasi-peak limits dB (μV/m)
30 to 230	40
230 to 1000	47
At transitional frequencies the lower limit applies.	

Limit:

For 10m

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

TEST SETUP



Below 1 GHz and above 30 MHz

- 1) The radiated emissions test was conducted in a semi-anechoic chamber.
- 2) The mains cables shall drape to the ground reference plane.
- 3) The tabletop 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.
- 4) Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum signature data plots of the EUT.
- 5) 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 ENVIRONMENT

Temperature	26.9°C	Relative Humidity	56%
Atmosphere Pressure	1.003kPa		

TEST DATE / ENGINEER

Test Date	2024-07-25	Test By	Liu Hui
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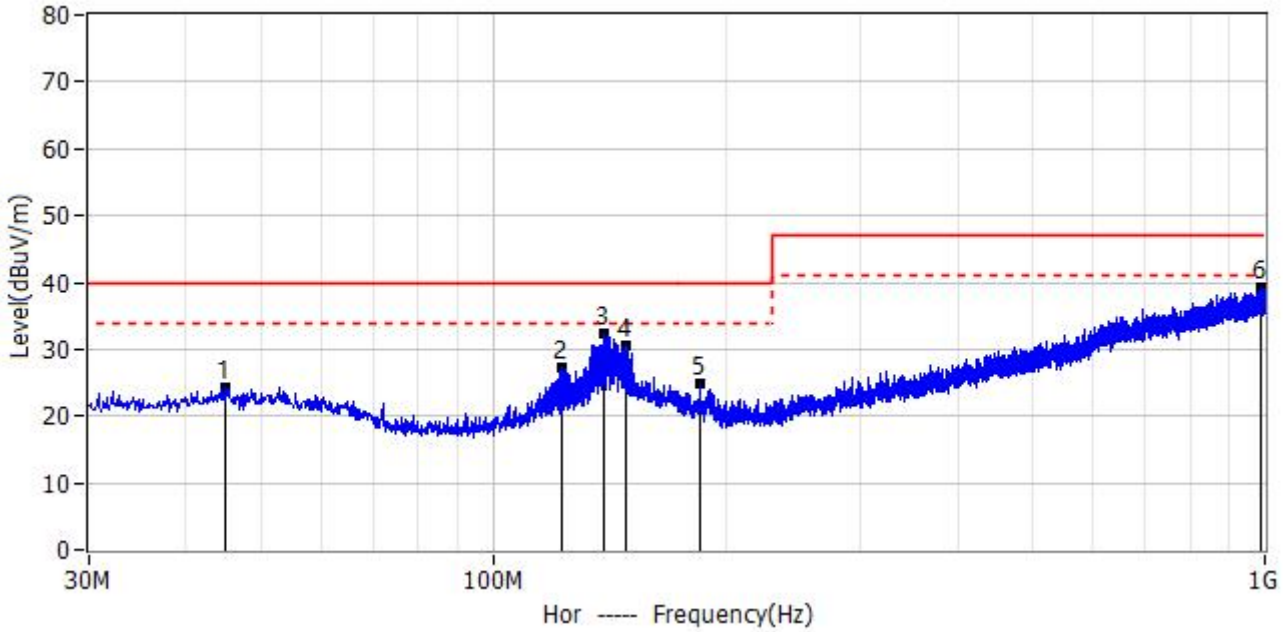
TEST MODE

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

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

TEST RESULTS

Project: TSZ24EA046A02
Polarization: Hor
M/N: BA05G
Test Voltage: DC 54V



No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	44.914	3.68	20.45	24.13	40.00	-15.87	QP	Hor
2*	122.514	7.89	19.26	27.15	40.00	-12.85	QP	Hor
3*	139.125	11.40	20.95	32.35	40.00	-7.65	QP	Hor
4*	148.704	9.14	21.53	30.67	40.00	-9.33	QP	Hor
5*	185.200	6.65	18.35	25.00	40.00	-15.00	QP	Hor
6*	990.906	5.38	33.77	39.15	47.00	-7.85	QP	Hor

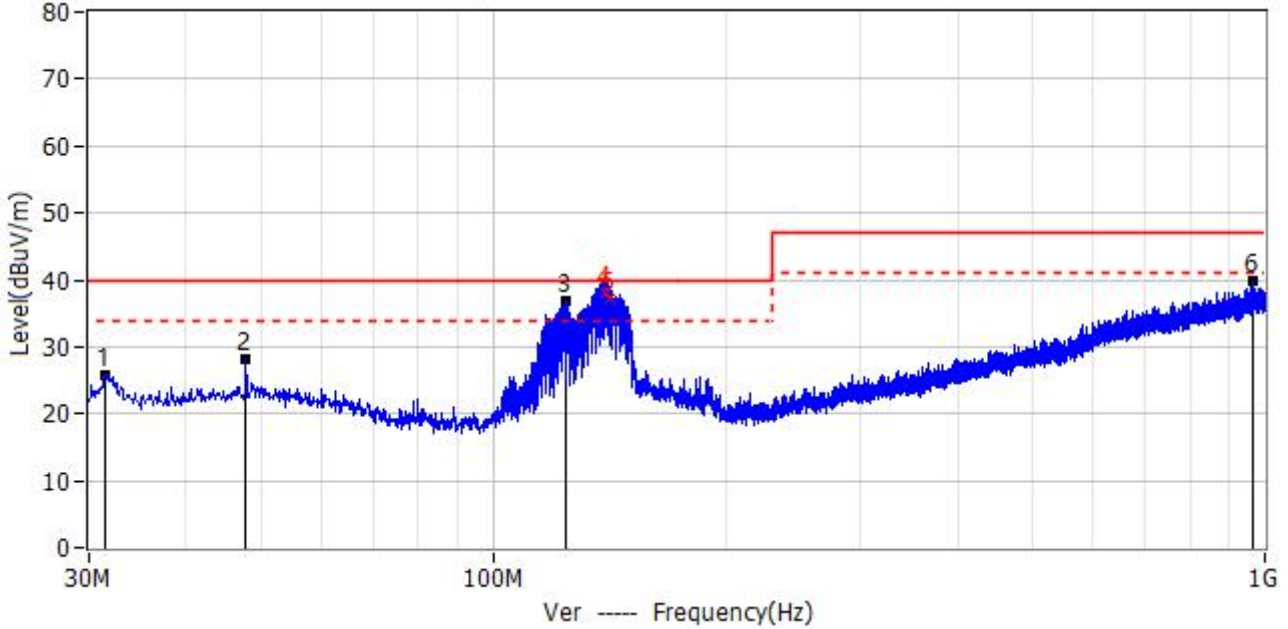
Note: /

Remark

Result = Reading +Correct

Margin = Result – Limit

Project: TSZ24EA046A02
Polarization: Ver
M/N: BA05G
Test Voltage: DV 54V



No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	31.455	6.34	19.38	25.72	40.00	-14.28	QP	Ver
2*	47.945	8.05	20.25	28.30	40.00	-11.70	QP	Ver
3*	124.090	17.16	19.70	36.86	40.00	-3.14	QP	Ver
4	139.884	16.91	21.00	37.91	40.00	-2.09	QP	Ver
5	141.466	15.98	21.10	37.08	40.00	-2.92	QP	Ver
6*	966.171	6.19	33.59	39.78	47.00	-7.22	QP	Ver

Note: /

Remark

Result = Reading +Correct

Margin = Result – Limit

8. IMMUNITY TEST

8.1. PERFORMANCE CRITERIA

GENERAL PERFORMANCE CRITERIA

According to EN IEC 61000-6-1:2019 standard, the general performance criteria as following:

<p>Criteria A</p>	<p>The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<p>Criteria B</p>	<p>During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.</p> <p>After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<p>Criteria C</p>	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.</p> <p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

8.2. ELECTROSTATIC DISCHARGE

TEST SPECIFICATION

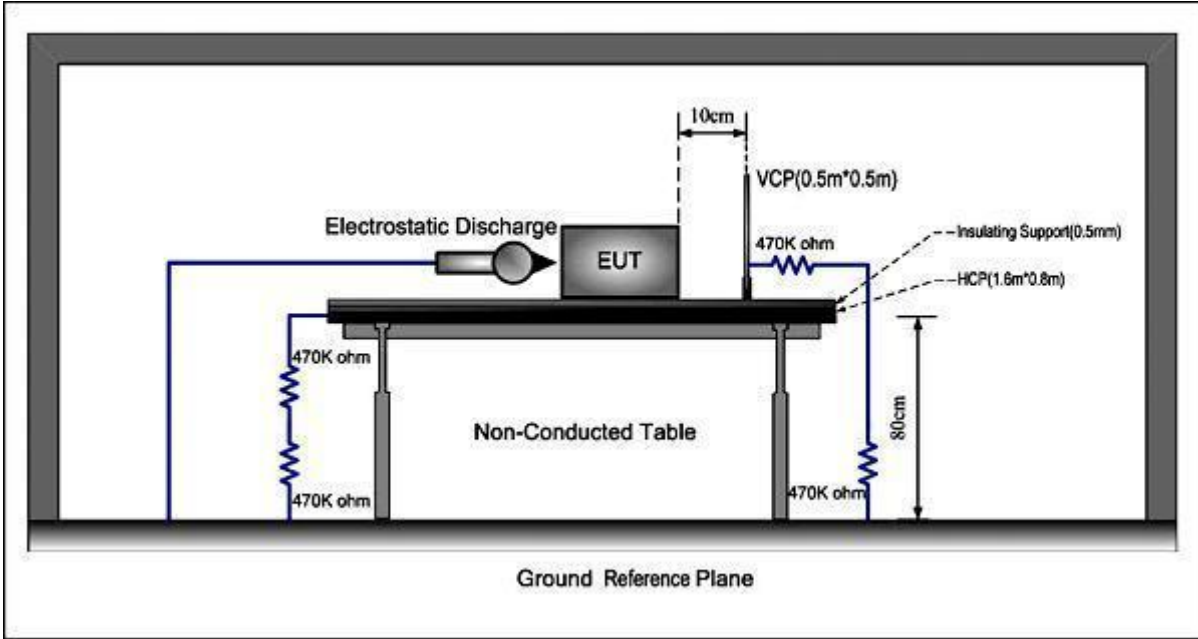
Standard:	EN IEC 61000-6-1 EN IEC 61000-6-3
Criterion Required:	Performance criteria B
Discharge Impedance:	330(1±10 %)Ω / 150(1±10 %) pF
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Test Level:	Air Discharge: 2 kV, 4 kV, 8 kV (Direct); Contact Discharge: 4 kV (Direct/Indirect)

TEST PROCEDURE

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

- 1) 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.
- 2) 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 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.
- 3) 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.
- 4) Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.
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.
For air discharge testing, the test shall be applied at all test levels 2 kV, 4 kV and 8 kV. For the actual test configuration, please refer to the related Item: EUT Test Photos.

TEST SETUP



TEST ENVIRONMENT

Temperature	26.1°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 54V

TEST DATE / ENGINEER

Test Date	2024.07.24	Test By	Liu Hui
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TEST MODE

Test Mode:	M01, M02
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**TEST RESULTS**

Mode	Level(kV)	Polarity	Test Point	Criteria	Result	Judgement
Air Discharge	2,4,8	+	All Slot	B	A	Pass
Air Discharge	2,4,8	-	All Slot	B	A	Pass
Contact Discharge	4	+	All Metal	B	/	N/A
Contact Discharge	4	-	All Metal	B	/	N/A
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. CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES

TEST SPECIFICATION

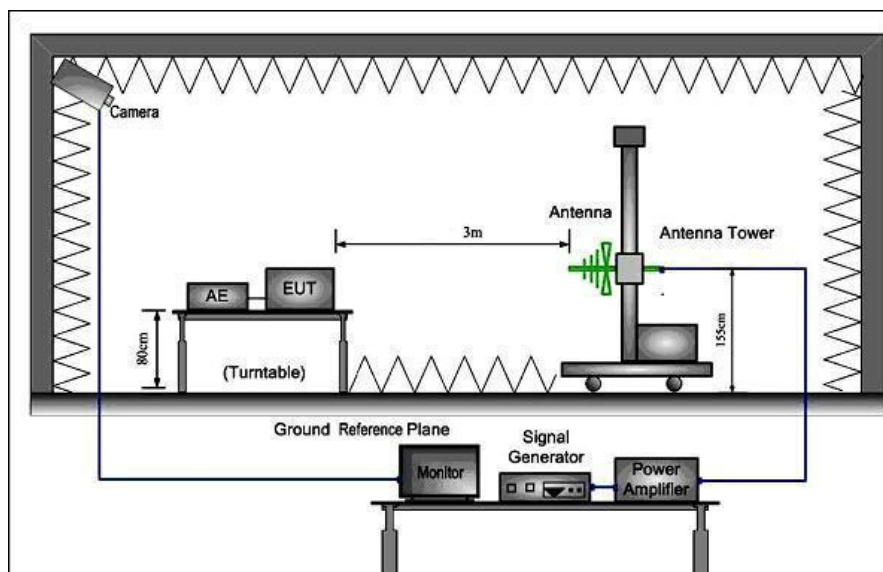
Standard:	EN IEC 61000-6-1 EN IEC 61000-6-3
Criterion Required:	Performance criteria A
Spot test:	80~6000 MHz
Test Level:	Level 2: 3 V/m (measured unmodulated)
Modulation:	The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 6 000 Hz.
Frequency Step:	1 % of fundamental
Dwell time:	1 seconds
Antenna Polarization:	Horizontal and vertical

TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-3.

- 1) The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- 2) The disturbance test signal shall be 80 % amplitude modulated by a sine wave, preferably having a frequency of 1 kHz. A frequency other than 1 kHz may be used where permitted within EN 61547 (for example Clause G.3).
- 3) 1 % step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4 % of the previous frequency with a test level of twice the value of the specified test level.
- 4) The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time should not exceed 5 s at each of the frequencies during the scan.
- 5) The test was performed with the EUT exposed to both vertically and horizontally polarized fields.

TEST SETUP



**TEST ENVIRONMENT**

Temperature	26.1°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 54V

TEST DATE / ENGINEER

Test Date	2024.07.25	Test By	Star
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TEST MODE

Test Mode:	M01, M02
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TEST RESULTS

Freq.Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m) (unmodulated,r.m.s)	Criterion	Result	Judgment
80-6000	0°	H&V	3 V/m	A	A	Pass
80-6000	90°	H&V	3 V/m	A	A	Pass
80-6000	180°	H&V	3 V/m	A	A	Pass
80-6000	270°	H&V	3 V/m	A	A	Pass

Observation:

A: No observable change.

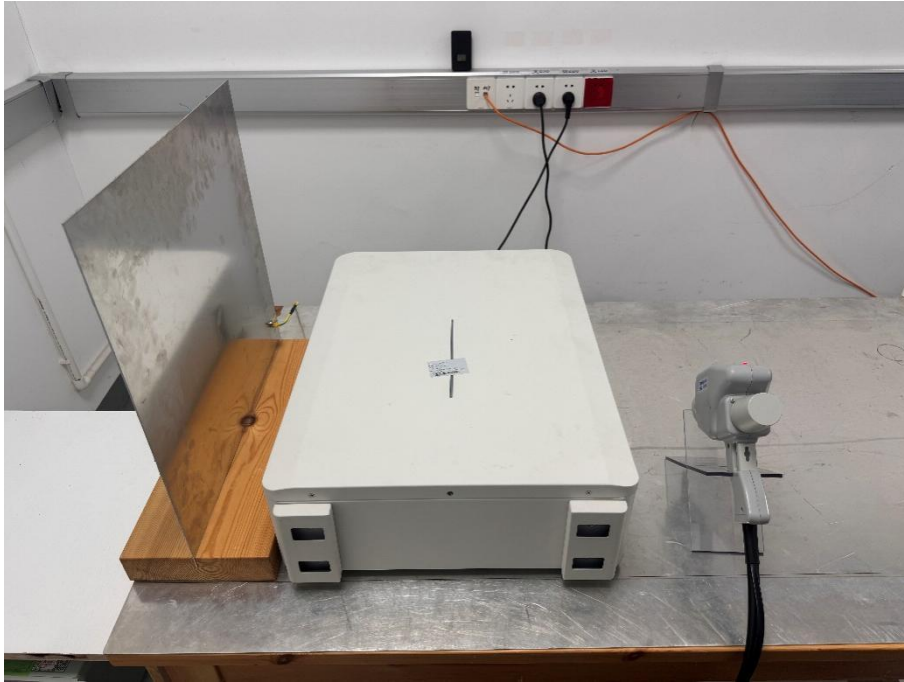
Conclusion: The EUT met the requirements of the standard

APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

Radiated Emission



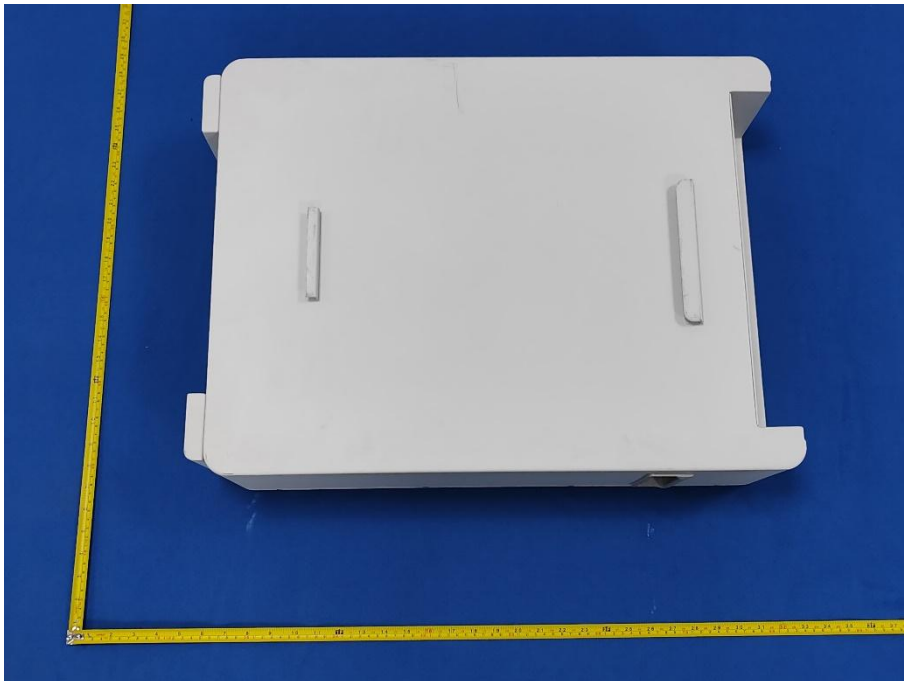
ESD

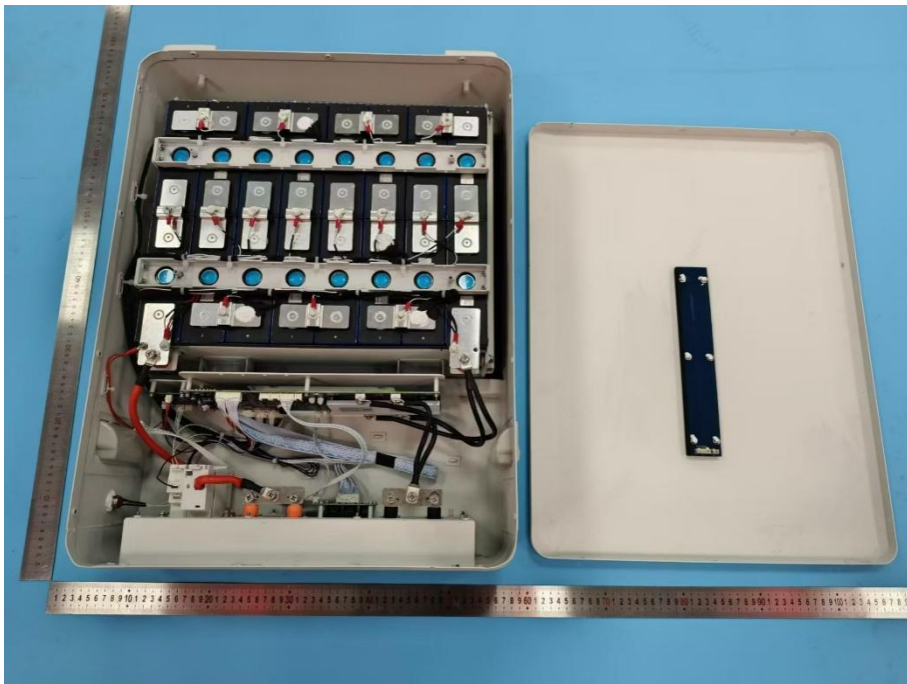
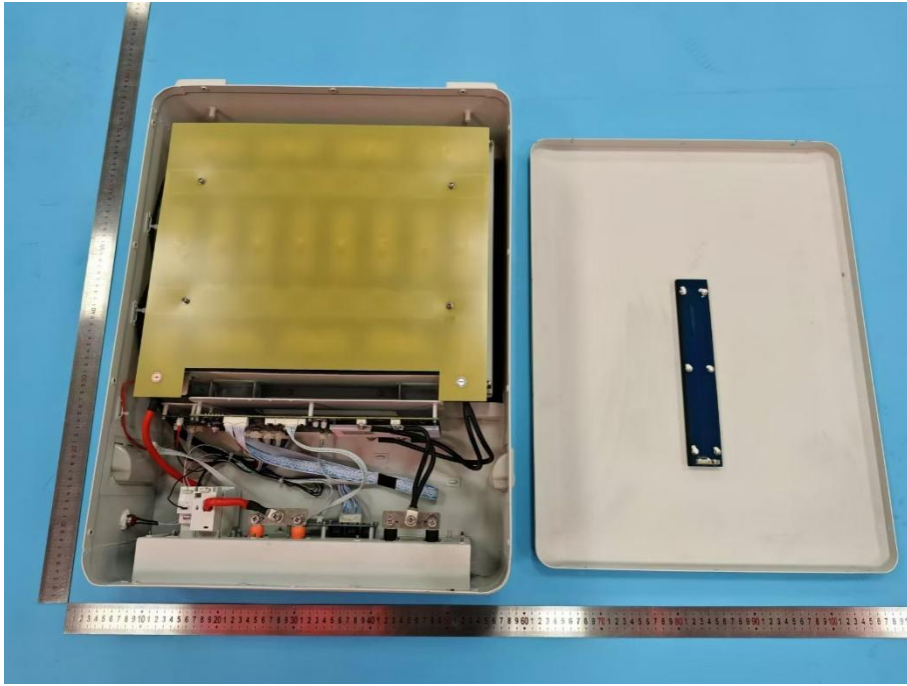


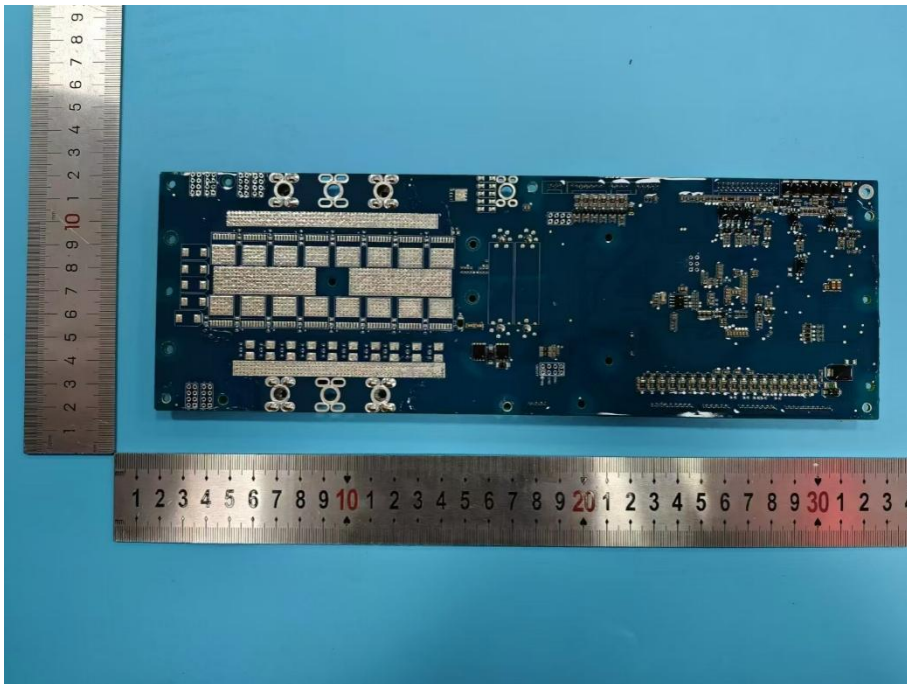
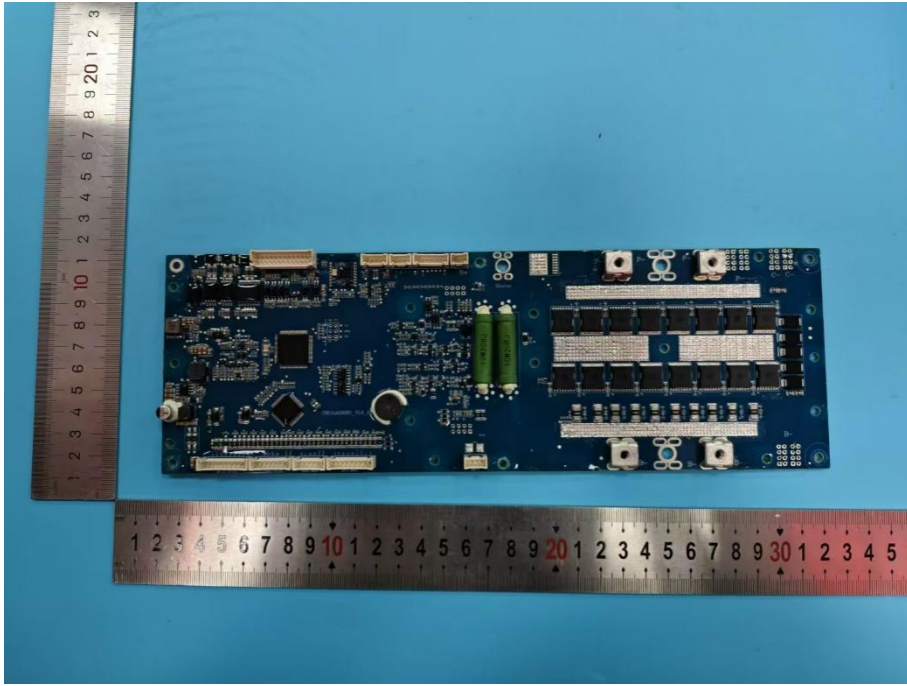
Radiated Immunity

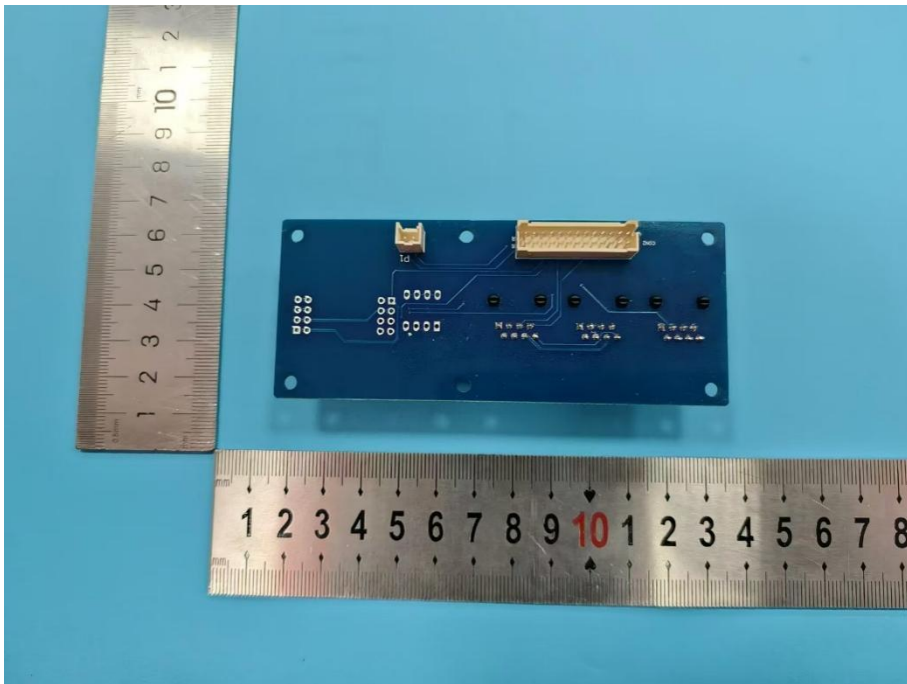


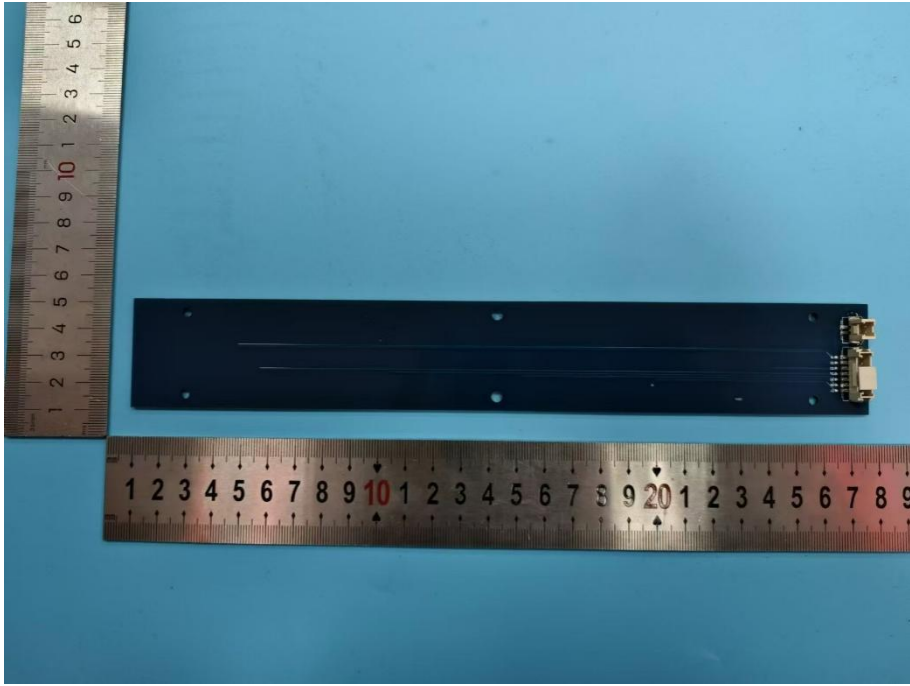
APPENDIX: PHOTOGRAPHS OF THE EUT












APPENDIX: NAMEPLATE OF THE EUT

Name: Rechargeable Li-ion Battery Pack		ADAYO
Model: BA05G		
Battery Cell	IFpP/51/16 1/120/[1P16S]M/-10+60/90	
Cell Technology	Li-ion(LFP)	
Capacity (Ah)	100	
Battery Parameters		
Nominal Voltage (Vdc)	51.2	
Rated Capacity (Ah)	100	
Rated Energy (kwh)	5.12	
Max Voltage (Vdc)	58.4	
Max Charge Voltage (Vdc)	58.4	
Discharge Cut-off Voltage (Vdc)	40	
Standard Charge Current (A)	50	
Max Charge Current (A)	95	
Standard Discharge Current (A)	50	
Max Discharge Current (A)	100	
Others		
IP inclosure	IP21	
Dimension (mm)	620±1*470±1*165±1	
Communication	RS485/CAN	
Operative Ambient Temperatures	Charge:0°C--55°C Discharge:-20°C--55°C	
Storage Temperature (°C)	-20~60	
Humidity	<45%	
Altitude (m)	<2	
 <p>Warnings</p> <ul style="list-style-type: none"> -Do not use and leave the battery near a heat source as fire or heat. -Do not reverse the positive and negative terminals. -Do not directly solder the battery and pierce the battery with a nail or other sharp object. <p>Disposal method</p> <ul style="list-style-type: none"> -Comply with local regulations. 		

END OF REPORT