



Test Report issued under the responsibility of:



TEST REPORT

IEC 62619

Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications

Report Number.....: SZES241100822801

Date of issue.....: 2025-03-21

Total number of pages.....: 26 pages

Name of Testing Laboratory preparing the Report.....: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Applicant's name: Shenzhen EEnovance Energy Technology Co., Ltd.

Address: Room 401, Building 2, Yufenda Industrial Park, No. 1008 Guangqiao Avenue, Yulv Community, Yutang Streets, Guangming District, Shenzhen, Guangdong, China

Test specification:

Standard: IEC 62619:2022

Test procedure: CB Scheme

Non-standard test method: N/A

TRF template used: IECEE OD-2020-F1:2022, Ed.1.5

Test Report Form No.....: IEC62619B

Test Report Form(s) Originator: UL Solutions (Demko)

Master TRF: Dated 2023-02-24

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This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.

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Test item description..... :	Rechargeable Li-ion Battery	
Trademark(s)..... :	EENOVANCE	
Manufacturer..... :	Same as applicant	
Model/Type reference..... :	E-MATE-BATT-1*1P16S-100-A E-MATE-BATT-N*1P16S-100-A (N=2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17)	
Ratings..... :	Battery module: Rated voltage: 51,2 Vd.c., Rated capacity: 100 Ah The battery module can be used in series with high-voltage control box to form a battery high-voltage system, and the high-voltage control box could support up to 17 battery modules. See page 8 and 9.	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Testing location/ address.....:		No.2, Jianghao Industrial Factory Area, No. 430, Jihua Road, Bantian Street, Longgang District, Shenzhen, Guangdong, China
Tested by (name, function, signature).....:		Eric Cai Project Engineer 
Approved by (name, function, signature)....:		Dean Wang Report Reviewer 
☐	Testing procedure: CTF Stage 1:	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)....:		
☐	Testing procedure: CTF Stage 2:	
Testing location/ address.....:		
Tested by (name + signature)		
Witnessed by (name, function, signature)..:		
Approved by (name, function, signature)....:		
☐	Testing procedure: CTF Stage 3:	
☐	Testing procedure: CTF Stage 4:	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Witnessed by (name, function, signature)..:		

Approved by (name, function, signature)... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment): Attachment 1: 6 pages of Photos; Attachment 2: 2 pages of Information for safety; Attachment 3: 1 page of Packaging; Attachment 4: 4 pages of Product specification; Attachment 5: 1 page of ISO 9001 certificate.	
Summary of testing: The sample(s) tested complies with the requirements of IEC 62619:2022. The battery system consists of a high voltage control box and one to seventeen battery modules connected in series. Battery system with one high voltage control box and one battery modules connected in series (model: E-MATE-BATT-1*1P16S-100-A) was tested as representative model in cl. 8.2.2, cl.8.2.3, and cl.8.2.4. Cl. 7.2.3 was conducted on the battery module. All models are identical except for the number of battery modules in series and related electrical parameters, see page 8 and 9 for details. Remark: 1. Only battery system was evaluated in this report. The component cell has been certified according to IEC 62619:2022 by TÜV SÜD (CB Report No.: 64.280.22.60436.01, Certif. No.: B 104405 0006 Rev. 00). 2. The functional safety requirement in clause 8 was evaluated according to Annex H of IEC 60730-1:2022.	
Tests performed (name of test, test clause and date test performed): ☐ 7.2.1 External short-circuit test (cell or cell block) ☐ 7.2.2 Impact test (cell or cell block) ☒ 7.2.3 Drop test (cell or cell block, and battery system) 2025-01-10 ☐ 7.2.4 Thermal abuse test (cell or cell block) ☐ 7.2.5 Overcharge test (cell or cell block) ☐ 7.2.6 Forced discharge test (cell or cell block) ☐ 7.3.2 Internal short-circuit test (cell) ☐ 7.3.3 Propagation test (battery system) ☒ 8.2.2 Overcharge control of voltage (battery system) 2025-01-06 ☒ 8.2.3 Overcharge control of current (battery system) 2025-01-02 ☒ 8.2.4 Overheating control (battery system) 2025-01-03	Testing location: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch No.2, Jianghao Industrial Factory Area, No.430, Jihua Road, Bantian Street, Longgang District, Shenzhen, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

N/A

☒ The product fulfils the requirements of EN IEC 62619:2022 and BS EN IEC 62619:2022.

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other: ... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

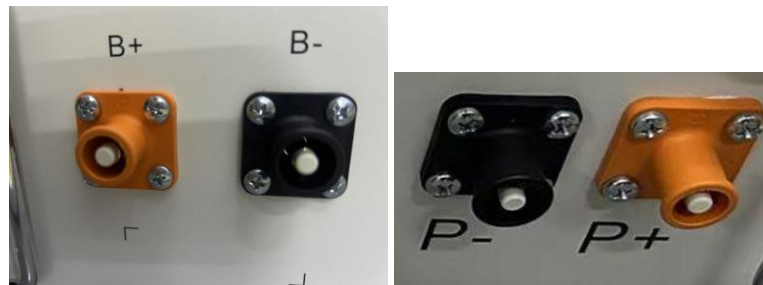
Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Model of E-MATE-BATT-1*1P16S-100-A

		Rechargeable Li-ion Battery	
IFpP54/150/120[(1P16S)1S]M/-20+45/95			
Model: E-MATE-BATT-1*1P16S-100-A		Ratings: 5120Wh/51.2V/100Ah	
Voltage Range: 40V~58.4V Ingress		Max. Output Power: 5.12kW	
Protection Rating: IP20		Protective Class:I	
• Do not disassemble • Do not short-circuit • Do not place in fire or near hot source • Please read user manual carefully • Disposal the battery must comply with the local applicable disposal regulations for electronic waste and used batteries		CAUTION!  	
Shenzhen EEnovance Energy Technology CO.,LTD Room 401, Building 2, Yufengda Industrial Park, No. 1008 Guangqiao Avenue, Yulv Community, Yutang Streets, Guangming District, SHENZHEN.PRC.		   UN38.3 MADE IN CHINA	

Connector

**Remark:**

1. Manufacture date will be reflect on SN code.

For Example: SSPR051100C0201**BA29**001” where the B represents production year, the A represents production month, and 29 represents production day. Specific coding rules are shown in the table below.

Year	A for 2023, B for 2024, and so on
Month	01 for January, 02 for February,, A for October, B for November, C for December
Day	01 to 31

2. Disposal instructions and recommended charge instructions are included in Battery Pack Specification, see attachment 2 and attachment 4 for details.
3. The marking plate of other models are identical with E-MATE-BATT-1*1P16S-100-A except for the model name, ratings, voltage range, max output power and designation code.

Test item particulars : --	
Classification of installation and use..... : To be defined in final products	
Supply Connection : Not directly connected to mains	
Possible test case verdicts: - test case does not apply to the test object..... : N/A - test object does meet the requirement..... : P (Pass) - test object does not meet the requirement..... : F (Fail)	
Testing :	
Date of receipt of test item..... : 2024-11-28	
Date (s) of performance of tests : 2025-01-02 to 2025-01-10	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☒ comma / ☐ point is used as the decimal separator. Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at https://www.sgs.com/en/Terms-and-Conditions . Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)..... : Dongguan EEnovance Energy Technology Co., Ltd. Room 501, Building 1, Songhu Zhigu Science and Technology Industrial Park, No. 11, Liaobu Yanhe Road, Liaobu Town, Dongguan, Guangdong, China	

General product information and other remarks:

Model name	Rated voltage	Rated energy	Designation
E-MATE-BATT-1*1P16S-100-A	51,2V	5120Wh	IFpP54/150/120[(1P16S)1S]M/-20+45/95
E-MATE-BATT-2*1P16S-100-A	102,4V	10240Wh	IFpP54/150/120[(1P16S)2S]M/-20+45/95
E-MATE-BATT-3*1P16S-100-A	153,6V	15360Wh	IFpP54/150/120[(1P16S)3S]M/-20+45/95
E-MATE-BATT-4*1P16S-100-A	204,8V	20480Wh	IFpP54/150/120[(1P16S)4S]M/-20+45/95
E-MATE-BATT-5*1P16S-100-A	256,0V	25600Wh	IFpP54/150/120[(1P16S)5S]M/-20+45/95
E-MATE-BATT-6*1P16S-100-A	307,2V	30720Wh	IFpP54/150/120[(1P16S)6S]M/-20+45/95
E-MATE-BATT-7*1P16S-100-A	358,4V	35840Wh	IFpP54/150/120[(1P16S)7S]M/-20+45/95
E-MATE-BATT-8*1P16S-100-A	409,6V	40960Wh	IFpP54/150/120[(1P16S)8S]M/-20+45/95
E-MATE-BATT-9*1P16S-100-A	460,8V	46080Wh	IFpP54/150/120[(1P16S)9S]M/-20+45/95
E-MATE-BATT-10*1P16S-100-A	512,0V	51200Wh	IFpP54/150/120[(1P16S)10S]M/-20+45/95
E-MATE-BATT-11*1P16S-100-A	563,2V	56320Wh	IFpP54/150/120[(1P16S)11S]M/-20+45/95
E-MATE-BATT-12*1P16S-100-A	614,4V	61440Wh	IFpP54/150/120[(1P16S)12S]M/-20+45/95
E-MATE-BATT-13*1P16S-100-A	665,6V	66560Wh	IFpP54/150/120[(1P16S)13S]M/-20+45/95
E-MATE-BATT-14*1P16S-100-A	716,8V	71680Wh	IFpP54/150/120[(1P16S)14S]M/-20+45/95
E-MATE-BATT-15*1P16S-100-A	768,0V	76800Wh	IFpP54/150/120[(1P16S)15S]M/-20+45/95
E-MATE-BATT-16*1P16S-100-A	819,2V	81920Wh	IFpP54/150/120[(1P16S)16S]M/-20+45/95
E-MATE-BATT-17*1P16S-100-A	870,4V	87040Wh	IFpP54/150/120[(1P16S)17S]M/-20+45/95

Model name	Operating voltage range	Charge operating temperature	Discharge operating temperature	Maximum charging/discharging current
E-MATE-BATT-1*1P16S-100-A	40V to 58,4V	0 to 45°C	-20 to 45°C	100A/128A
E-MATE-BATT-2*1P16S-100-A	80V to 116,8V			
E-MATE-BATT-3*1P16S-100-A	120V to 175,2V			
E-MATE-BATT-4*1P16S-100-A	160V to 233,6V			
E-MATE-BATT-5*1P16S-100-A	200V to 292,0V			
E-MATE-BATT-6*1P16S-100-A	240V to 350,4V			
E-MATE-BATT-7*1P16S-100-A	280V to 408,8V			
E-MATE-BATT-8*1P16S-100-A	320V to 467,2V			
E-MATE-BATT-9*1P16S-100-A	360V to 525,6V			
E-MATE-BATT-10*1P16S-100-A	400V to 584,0V			
E-MATE-BATT-11*1P16S-100-A	440V to 642,4V			
E-MATE-BATT-12*1P16S-100-A	480V to 700,8V			
E-MATE-BATT-13*1P16S-100-A	520V to 759,2V			
E-MATE-BATT-14*1P16S-100-A	560V to 817,6V			
E-MATE-BATT-15*1P16S-100-A	600V to 876,0V			
E-MATE-BATT-16*1P16S-100-A	640V to 934,4V			
E-MATE-BATT-17*1P16S-100-A	680V to 992,8V			
Model of component cell:	CB56			
Cell description:	Rechargeable Prismatic Lithium-ion Cell			
Rated voltage:	3,2 V			
Recommended charging voltage by manufacture:	3,65 V			
Upper limit charging voltage:	3,65 V			
End of discharge voltage:	2,5 V			
Lower limit discharging voltage:	2,0 V			
Rated capacity:	100 Ah			
Maximum charge current:	100 A			
Maximum discharge current:	150 A			
Designation of cell:	IFpP54/150/120/M/-20+60/95			
Charge operating temperature:	-10°C to 60 °C			
Discharge operating temperature:	-20°C to 60 °C			

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P

5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse....:	Clause 6, Clause 7.2.3.2, 8.1, and 8.2. See also table 5.1 for Critical components information.	P
	Reduce the risk of injuries from moving parts		P
5.2	Insulation and wiring		P
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors and live parts at different voltages or between live parts and non-current-carrying accessible parts		P
	Protect from hazardous live parts, including during installation		P
	The mechanical integrity of internal connections		P
5.3	Venting		P
	Pressure relief function	Metal enclosure secured by screws, with aperture as the venting mechanism of battery system.	P
	Encapsulation used to support cells within an outer casing		P
5.4	Temperature/voltage/current management		P
	The design prevents abnormal temperature-rise	BMS was used to prevent abnormal temperature rise.	P
	Voltage, current, and temperature limits of the cells	Battery system was designed within voltage, current and temperature limits of component cells.	P
	Specifications and charging instructions for equipment manufacturers		P
5.5	Terminal contacts of the battery pack and/or battery system		P
	Polarity marking(s)		P
	Polarity marking not provided for keyed external connector		N/A
	Capability to carry the maximum anticipated current		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

	External terminal contact surfaces		P
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	Assembly of cells, modules, or battery packs into battery systems		P
5.6.1	General		P
	Independent control and protection method(s)		P
	Recommendations of cell operating limits, mounting advice, storage conditions and other design recommendations by the cell manufacturer		P
	Batteries designed for the selective discharge of a portion of their series connected cells		N/A
	Protective circuit component(s) and consideration to the end-device application		P
5.6.2	Battery system design		P
	The voltage control function		P
	Maximum charging/discharging current of the cell are not exceeded		P
5.7	Operating region of lithium cells and battery systems for safe use		P
	The cell operating region..... :	See page 9 for details.	P
	Designation of battery system to comply with the cell operating region		P
5.8	System lock (or system lock function)		P
	Non-resettable function to stop battery operation		P
	Manual with procedure for resetting of battery operation		P
	Emergency battery final discharge		N/A
5.9	Quality plan		P
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented..... :	ISO 9001 certificate was provided.	P
	The process capabilities and the process controls		P

6	TYPE TEST CONDITIONS		P
6.1	General		P
6.2	Test items		P
	Cells or batteries that are not more than six months old (See Table 1 of IEC 62619)		P
	Capacity confirmation of the cells or batteries		P
	Default ambient temperature of test, 25 °C ± 5 °C		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
	The battery discharged to a specified final voltage prior to charging		P
	The cells or batteries charged using the method specified by the manufacturer	Battery module: Constant current 100 A charge to 58,4 V constant voltage, 5 A cut off.	P
7.2	Reasonably foreseeable misuse		P
7.2.1	External short-circuit test (cell or cell block)		N/A
	Short circuit with total resistance of 30 m $\pm$ 10 m at 25 °C $\pm$ 5 °C		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)		N/A
	Cylindrical cell, longitudinal axis impact		N/A
	Prismatic cell, longitudinal axis and lateral axis impact		N/A
	Results: no fire, no explosion.		N/A
7.2.3	Drop test (cell or cell block, and battery system)		P
7.2.3.1	General		P
7.2.3.2	Whole drop test (cell or cell block, and battery system)		N/A
	Description of the Test Unit.....:		—
	Mass of the test unit (kg).....:		—
	Height of drop (m).....:		—
	Results: no fire, no explosion		N/A
7.2.3.3	Edge and corner drop test (cell or cell block, and battery system)		P
	Description of the Test Unit.....:	Battery module	—
	Mass of the test unit (kg).....:	Approx. 46kg	—
	Height of drop (m).....:	100mm	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)		N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)		N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: no fire, no explosion		N/A
7.2.6	Forced discharge test (cell or cell block)		N/A
	Cells connected in series in the battery system		N/A
	Redundant or single protection for discharge voltage control provided in battery system		N/A
	Target Voltage.....		N/A
	Maximum discharge current of the cell, I_m		N/A
	Discharge current for forced discharge, 1.0 I_t		N/A
	Discharging time, $t = (1 I_t / I_m) \times 90$ (min.).....		N/A
	Results: no fire, no explosion		N/A
7.3	Considerations for internal short-circuit – Design evaluation		N/A
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)		N/A
	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017		N/A
	Tested per 7.3.2 b) in an ambient temperature of $25\text{ °C} \pm 5\text{ °C}$.		N/A
	The appearance of the short-circuit location recorded by photograph or other means.....		—
	The pressing was stopped - When a voltage drop of 50 mV was detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached		N/A
	Results: no fire		N/A
7.3.3	Propagation test (battery system)	Internal short-circuit test has been considered in cell CB report	N/A
	Method to create a thermal runaway in one cell ...		N/A
	Results: No external fire from the battery system, no battery case rupture.....		N/A

8	BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)		P
8.1	General requirements		P
	Functional safety analysis for critical controls	The functional safety requirement in clause 8 was evaluated according to Annex H of IEC 60730-1:2022.	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process		P
	Conduct of risk assessment and mitigation of the battery system		P
8.2	Battery management system (or battery management unit)		P
8.2.1	Requirements for the BMS		P
	The safety integrity level (SIL) target of the BMS	Class B per Annex H of IEC 60730-1:2022	P
	The charge control evaluated by tests in clauses 8.2.2 to 8.2.4		P
8.2.2	Overcharge control of voltage (battery system)		P
	The exceeded charging voltage applied to the whole battery system		P
	The exceeded charging voltage applied to only a part of the battery system, such as the cell(s)		N/A
	Results: no fire, no explosion	See Table 8.2.2.	P
	The BMS terminated the charging before exceeding the upper limit charging voltage		P
8.2.3	Overcharge control of current (battery system)		P
	Results: no fire, no explosion	See Table 8.2.3.	P
	The BMS detected the overcharging current and controlled the charging to a level below the maximum charging current		P
8.2.4	Overheating control (battery system)		P
	The cooling system, if provided, was disconnected		P
	Elevated temperature for charging, 5 °C above maximum operating temperature.....	Max. charge temperature: 45°C	P
	Results: no fire, no explosion	See Table 8.2.4.	P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P

9	EMC		P
	Battery system fulfil EMC requirements of the end-device application.....	See SGS-CSTC report (Report No.: SZCR241200466401) for detail EMC report. (EN IEC 61000-6-4:2019, EN IEC 61000-6-2:2019)	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

10	INFORMATION FOR SAFETY		P
	The cell manufacturer provides information about current, voltage and temperature limits of their products		P
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.	See attachment 2.	P

11	MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)		P
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.		P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation		P
	Battery structure formulation		P

12	PACKAGING AND TRANSPORT		P
	Refer to Annex D	See attachment 3	P

ANNEX A	OPERATING REGION OF CELLS FOR SAFE USE		P
A.1	General		P
A.2	Charging conditions for safe use		P
A.3	Consideration on charging voltage		P
A.4	Consideration on temperature		P
A.5	High temperature range		P
A.6	Low temperature range		P
A.7	Discharging conditions for safe use		P
A.8	Example of operating region		P

ANNEX B	PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION		N/A
B.1	General		N/A
B.2	Test conditions		N/A
B.2.1	Cell test (preliminary test)		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The cell fully charged according to the manufacturer recommended conditions..... :		—
	Laser irradiation point on the cell..... :		—
	Output power of laser irradiation..... :		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A
	Repeat of cell test for 3 times		N/A
B.2.2	Battery system test (main test)		N/A
	The battery system fully charged according to the manufacturer recommended conditions..... :		—
	Target cell to be laser irradiated :		—
	The irradiation point on the target cell same or similar as that on the cell test		
	Output power of laser irradiation..... :		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A

ANNEX C	PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER		N/A
C.1	General		N/A
C.2	Test conditions:		N/A
	– The battery fully charged according to the manufacturer recommended conditions..... :		—
	– Target cell forced into thermal runaway :		—
	– A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing..... :		—
C.3	Method used for initiating the thermal runaway. 1) Heater (Heater, Burner, Laser, Inductive heating 2) Overcharge 3) Nail penetration of the cell 4) Combination of above methods 5) Other methods :		—

ANNEX D	PACKAGING AND TRANSPORT		P
	The materials and pack design chosen in a way as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P
	Regulations concerning international transport of secondary lithium batteries		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
Battery Module						
Cell	REPT BATTERO Energy Co., Ltd.	CB56	3,2V, 100Ah	IEC 62619:2022	TÜV SÜD (Cert. No.: B 104405 0006 Rev.00)	
High voltage connector (B+)	DEGSON TECHNOLOGY CO., LTD	ESS-120A-25-B/S-OR-00	120A, 1500V, Topr: -40 to 125°C	UL 4128	UL (E526028)	
High voltage connector (B-)	DEGSON TECHNOLOGY CO., LTD	ESS-120A-25-B/S-BK-00	120A, 1500V, Topr: -40 to 125°C	UL 4128	UL (E526028)	
Fan	SHENZHEN HUAXIA HENGTAI ELECTRONIC CO LTD	DA08025B24 XA	5,04W, 24VDC	UL 507	UL (E254715)	
Plastic sheet	CHENGDU KANGLONGXIN PLASTICS CO LTD	KLX FRPC-1860B	VTM-0, 80°C	UL 94	UL (E315185)	
Heat-shrinkable tubing	SHENZHEN WORK HEAT-SHRINKABLE MATERIAL CO LTD	SBRS-(3X)H	125°C, 600V, 15KV, VW-1	UL 224	UL (E203950)	
Lead wires (For B+, B-)	WUXI XINHONGYE WIRE & CABLE CO LTD	10269	AWG: 3 AWG Fire rating: VW-1 Tmax: 105°C Vmax: 1000Vac	UL 758	UL (E248566)	
Metal Enclosure	--	--	SGCC Min. Thickness: 1,0mm	--	--	
PCB	SHENZHEN KING BROTHER ELECTRONICS TECHNOLOGY CO LTD	KB-04	V-0, 130°C	UL 796	UL (E225430)	
-Plastic enclosure of BMU board	HENAN SHENMA HUAWEI PLASTIC ENGINEERING CO LTD	27GF(a)	V-0, Min thickness: 1,5mm, 65°C	UL 94	UL (E318518)	
-Coating material	Guangdong Raise BT Technology Co Ltd	BT51	V-0, 130°C	UL 746E	UL (E531378)	

IEC 62619					
Clause	Requirement + Test		Result - Remark		Verdict
-AFE chip (U6)	BYD	BF8915A	Vin: 0 to 5 V, Topr: -40 to 125°C	--	--
-NTC	TDK ELECTRONICS GMBH & CO OG	B57331V5103 F360	Resistance at 25°C: 10kohm, Tmax: 125°C	UL 1434	UL (E69802)
High voltage control box					
PCB	SHENZHEN KING BROTHER ELECTRONICS TECHNOLOGY CO LTD	KB-04	V-0 ,130°C	UL 796	UL (E225430)
-Plastic enclosure of BCU board	Henan Shenma Huawei Plastic Co., Ltd	27GF(a)	V-0, Min thickness: 1,5mm, 65°C	UL 94	UL (E318518)
-Coating material	Guangdong Raise BT Technology Co Ltd	BT51	V-0, 130°C	UL 746E	UL (E531378)
-DC/DC power (U1)	SCT	SCT2430	Voltage range: 3,8 to 40V, Topr: -40°C to 125°C	--	--
-LDO power for MCU (U7)	AMS	AMS1117-3.3	Voltage range: 4,7 to 10V, Topr: -40 to 125°C	--	--
-IC for MCU (U16)	Beijing Zhixin Microelectronics Technology Co., Ltd	SCM620L144 MJA0	Supply voltage: 3,0 to 3,6V, Topr: -40 to 105°C	--	--
Molded case circuit breaker	ProJoy Electric Co., Ltd.	PEMC-250	160A, 1000VDC	EN 60947-2:2017/A1:2020	TÜV SÜD (Cert. No.: N8A 123375 0006 Rev.00)
Miniature circuit breaker	ProJoy Electric Co., Ltd.	PEBS-S-80	16A, 900VDC	EN 60947-2:2017+A1	TÜV Rheinland (Cert. No.: R 50604688)
Fuse (FU1)	Xi'an Sinofuse Electric Co Ltd	RS306-01	200A, 1250VDC	UL 248-1	UL (E353337)
Fuse (FU3)	Xi'an Sinofuse Electric Co Ltd	FGB-A-3E10A	10A, 690VAC	UL 248-1	UL (E353337)
Fuse base (FU3)	Xi'an Sinofuse Electric Co Ltd	TSA1038-SZ	30A, 1000VAC	UL 4248-1	UL (E493529)
Fuse (FU2)	Xi'an Sinofuse Electric Co Ltd	RS308-PV	6A, 1500VDC	UL 248-1	UL (E493628)
Fuse base (FU2)	Xi'an Sinofuse Electric Co Ltd	TSA1451-B	32A, 1500VDC	UL 4248-1	UL (E493529)
Contactor (KM1, KM2)	Join Electric (Shanghai) Co., Ltd.	EVHB150A-24B-2	1500V, 150ADC	UL 60947-4-1	UL (E514589)
Contactor (KM3)	Join Electric (Shanghai) Co., Ltd.	EVHC50-24S-1	1500V, 50ADC	UL 60947-4-1	UL (E514589)

IEC 62619					
Clause	Requirement + Test		Result - Remark		Verdict
DC-DC Converter	ATAZ Guangzhou Science & Technology Co., Ltd.	HVA200-15DB24-PCS-01	200W, 300 to 1500VDC	IEC 62109-1:2010	TÜV Rheinland (Cert. No.: DE 2-042888)
AC-DC Converter	MORNSUN GUANGZHOU SCIENCE & TECHNOLOGY CO., LTD.	LM200-22B24R2-CQ	200W, 220VAC	IEC 62368-1:2018	UL (Cert. No.: DK-136861-UL)
High voltage connector (P+)	DEGSON TECHNOLOGY CO., LTD	ESS-120A-25-B/S-OR-00	120A, 1500V, Topr: -40 to 125°C	UL 4128	UL (E526028)
High voltage connector (P-)	DEGSON TECHNOLOGY CO., LTD	ESS-120A-25-B/S-BK-00	120A, 1500V, Topr: -40 to 125°C	UL 4128	UL (E526028)
Appliance switch	LANBOO Intelligent Technology Co., Ltd.	LB19E	10A, 250VAC	IEC 61058-1:2016 IEC 61058-1:2016	SGS (Cert. No.: BE-41712)
Aluminum Housed Resistor	Shenzhen ZENITHSUN Electronics Tech. Co., Ltd.	ASZ6030-200W	50Ω, 200W, 1500VDC	--	--
Current Sensor	SINOMAGS TECHNOLOGY CO., LTD	STB-CAB500	250mA, DC12V, ±500A, Topr: -40 to 85°C	--	--
Heat-shrinkable tubing	SHENZHEN WORK HEAT-SHRINKABLE MATERIAL CO LTD	SBRS-(3X)H	125°C, 600V, 15KV, VW-1	UL 224	UL (E203950)
Insulating Tape	HEBEI YONGLE TAPE CO LTD	808	105°C, 600VDC	UL 510	UL (E174965)
Insulation column	Guangdong Wolf Polymer Material Technology Co., Ltd	WF88	V-0, 130°C	UL 94	UL (E488513)
Lead wires (For P+, P-)	WUXI XINHONGYE WIRE & CABLE CO LTD	10269	AWG: 3 AWG Fire rating: VW-1 Tmax: 105°C Vmax: 1000Vac	UL 758	UL (E248566)
Metal Enclosure	--	--	SGCC Min. Thickness: 1,2mm	--	--
Supplementary information: ¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: External short-circuit test (cell or cell block)					N/A
Sample No.	Ambient (at 25°C ± 5°C)	OCV at start of test (V dc)	Resistance of Circuit (mΩ)	Maximum Case Temperature Rise ΔT (°C)	Results	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
Supplementary information: A – No fire or Explosion B – Fire C – Explosion D – The test was completed after 6 h E – The test was completed after the cell casing cooled to 20% of the maximum temperature rise F – Other (Please explain): ____						

7.2.5	TABLE: Overcharge test (cell or cell block)					N/A
Sample No.	OCV at start of test (V dc)	OCV at end of test (V dc)	Measured Maximum Charging Current (A)	Measured Maximum Charging Voltage (V dc)	Max. Cell Case Temperature, (°C)	Results
--	--	--	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D – Test concluded when temperature reached a steady state condition E – Test concluded when temperature returned to ambient F – Other (Please explain): ____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.6	TABLE: Forced discharge test (cell or cell block)				N/A
Sample No.	OCV before applying reverse charge, (V dc)	Target Voltage (V dc)	Measured Reverse Charge Current I_t , (A)	Total Time for Reversed Charge Application (min)	Results
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D – Other (Please explain): ____					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: Internal short-circuit test (cell)				N/A
Sample No.	OCV at start of test, (V dc)	Particle location ¹⁾	Maximum applied pressure, (N)	Results	
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
Supplementary information: ¹⁾ Identify one of the following: 1: Nickel particle inserted between positive and negative (active material) coated area. 2: Nickel particle inserted between positive aluminium foil and negative active material coated area.					
Results: A – No fire or explosion B – Fire C – Explosion D – Test concluded when 50 mV voltage drop occurred prior to reaching force limit E – Test concluded when 800/400 N pressure was reached and 50 mV voltage drop was not achieved F – Test was concluded when fire or explosion occurred G – Other (Please explain): ____					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.3	TABLE: Propagation test (battery system)					N/A
Sample No.	OCV of Battery System Before Test, (V dc)	OCV of Target Cell Before Test, (V dc)	Maximum Cell Case Temperature, (°C)	Maximum DUT Enclosure Temperature, (°C)	Results	
--	--	--	--	--	--	
--	--	--	--	--	--	
--	--	--	--	--	--	
Method of cell failure ¹⁾		Location of target cell		Area for fire protection (m ²)		
--		--		--		
--		--		--		
--		--		--		
Supplementary information:						
1) Cell can be failed through laser exposure, applied heat, overcharge, nail penetration or combinations of these failures or other acceptable methods. See supporting documentation for details on cell failure method						
2) If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.						
Results:						
A – No fire external to DUT enclosure or area for fire protection or no battery case rupture						
B – Fire external to DUT enclosure or area for fire protection						
C – Explosion						
D – Battery case rupture						
E – Other (Please explain): ____						

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.2	TABLE: Overcharge control of voltage (battery system)				P
Sample No.	OCV at start of test for Cell/Cell Blocks, (V dc)	Maximum Charging Current, (A)	Max. Charging Voltage, (V dc)	Max. Voltage of Cell/Cell Blocks, (V dc)	Results
M1	3,022 to 3,044	100,0	58,4	3,647	A, D, F
			Charge Voltage Applied Battery System: 1)		
			Whole	Part	
			64,24 V	--	
Supplementary information: 1) The exceeded voltage can be applied to only a part of the system such as the cell(s) in the battery system per Figure 6 of IEC 62619, if it is difficult to do it in using the whole battery system. Results: A – No Fire or Explosion B – Fire C – Explosion D – The voltage of the measured cells or cell blocks did not exceed the upper limit charging voltage E – The voltage of the measured cells or cell blocks did exceed the upper limit charging voltage F – All function of battery system did operate as intended during the test. G – All function of battery system did not operate as intended during the test. H – Other (Please explain):					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.3	TABLE: Overcharge control of current (battery system)				P
Sample No.	OCV at start of test, (V dc)	Max. Charging Current, (A)	Max. Charging Voltage, (V dc)	Results	
M1	49,403	120,0	58,4	A, D, F	
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D – Overcurrent sensing function of BMU did operate and then charging stopped E – Overcurrent sensing function of BMU did not operate and then charging stopped F – All function of battery system did operate as intended during the test. G – All function of battery system did not operate as intended during the test. H – Other (Please explain):					

8.2.4	TABLE: Overheating control (battery system)			P
Sample No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc	
M1	52,2	100,0	52,6	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
45,0		47,1	A, D, F	
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D – Temperature sensing function of BMU did operate and then charging stopped E – Temperature sensing function of BMU did not operate and then charging stopped F – All function of battery system did operate as intended during the test. G – All function of battery system did not operate as intended during the test. H – Other (Please explain):				

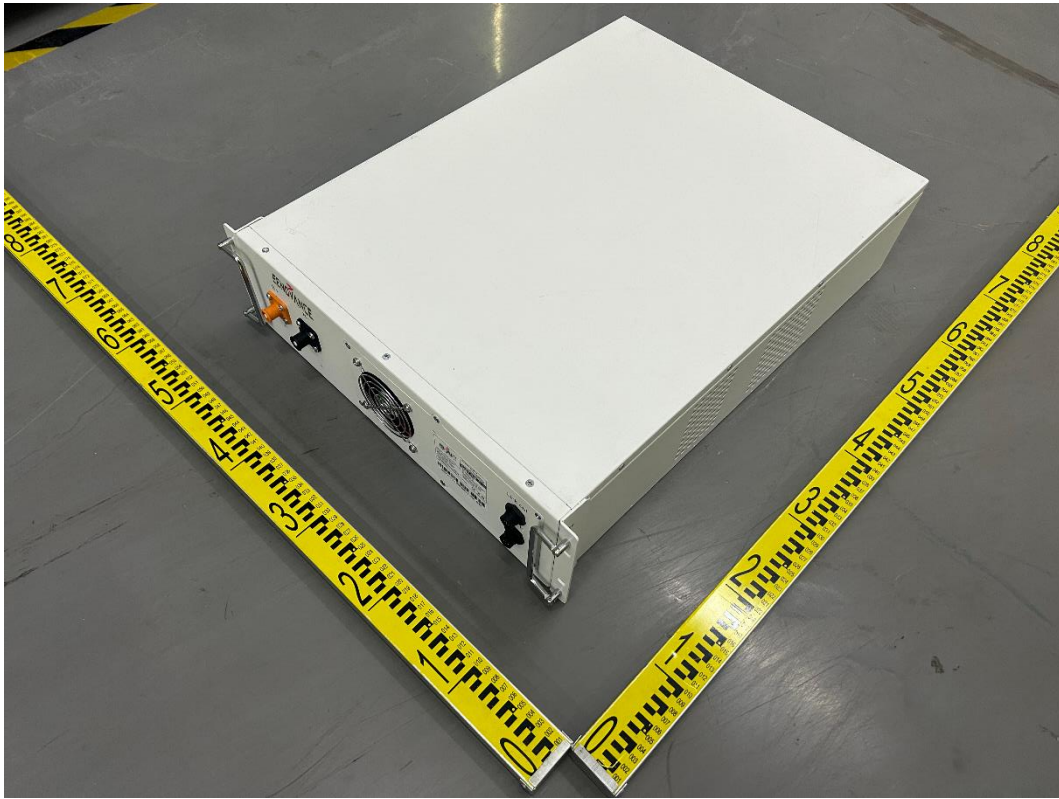
IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

9	TABLE: EMC				N/A
Standard used for EMC test:					
Sample No.	EMC Test Item	Battery Condition	EMC Test Level/ Parameters	Compliance Criteria	Results
--	--	--	--	--	--
Supplementary information: Battery Condition During EMC test 1 – In Operation Mode, [] Supplied at ____, [] Load at ____ 2 – In non-operation Mode, Battery state of charge (SOC) before test at around ____ Compliance Criteria and Test Results: A – No fire or Explosion B – Fire C – Explosion D – Battery system did operate as intended during the test. E - All function of battery system did operate as intended after the test. F - All function of battery system did not operate as intended during the test, (Please explain): ____ G - Other (Please explain): ____					

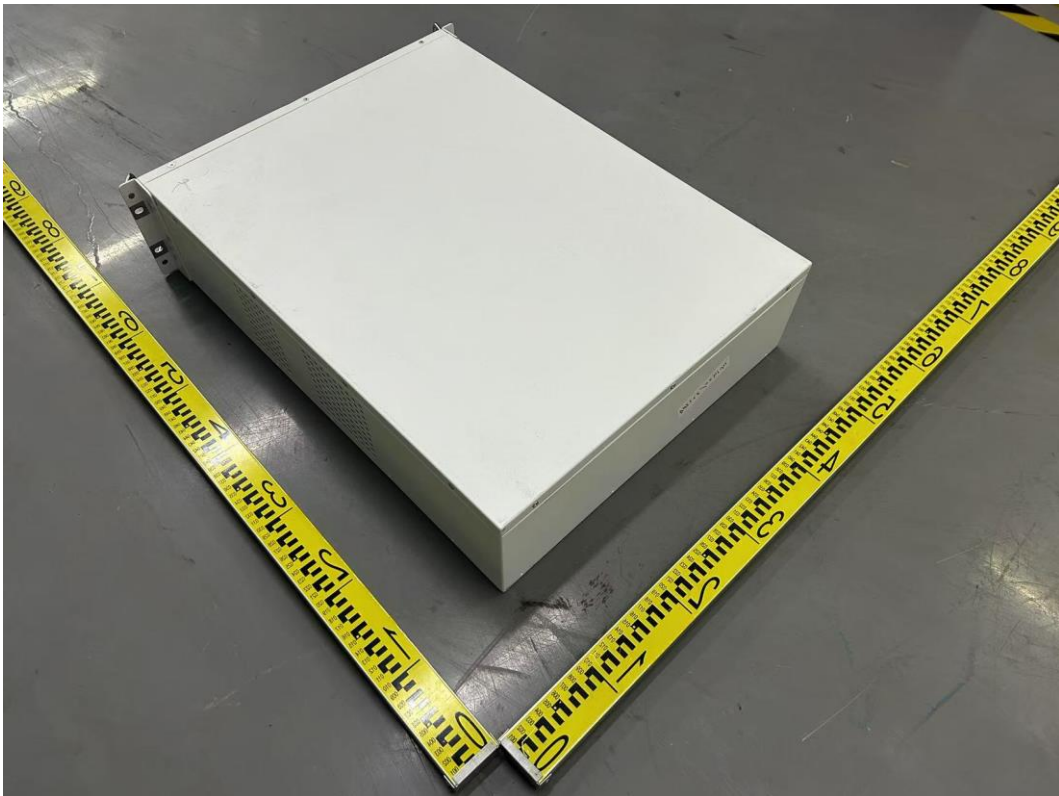
---End of Report---

Attachment 1 Photo documentation

View of battery module



View of battery module

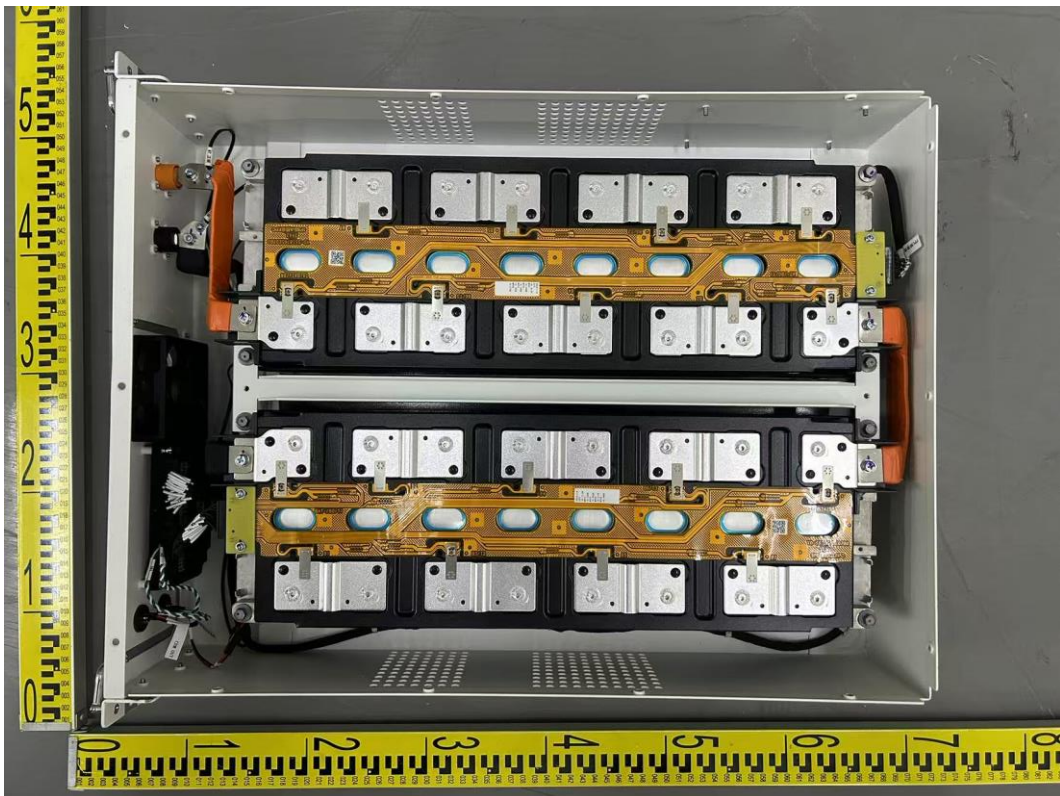


Attachment 1 Photo documentation

View of battery module

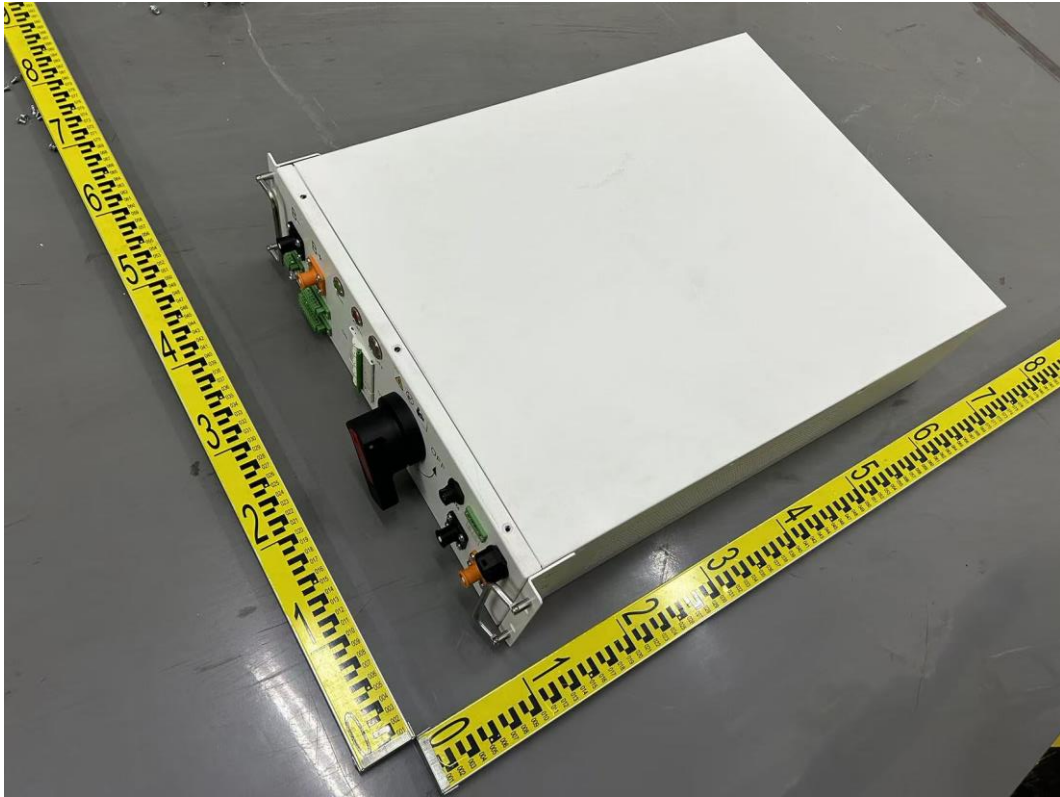


View of battery module

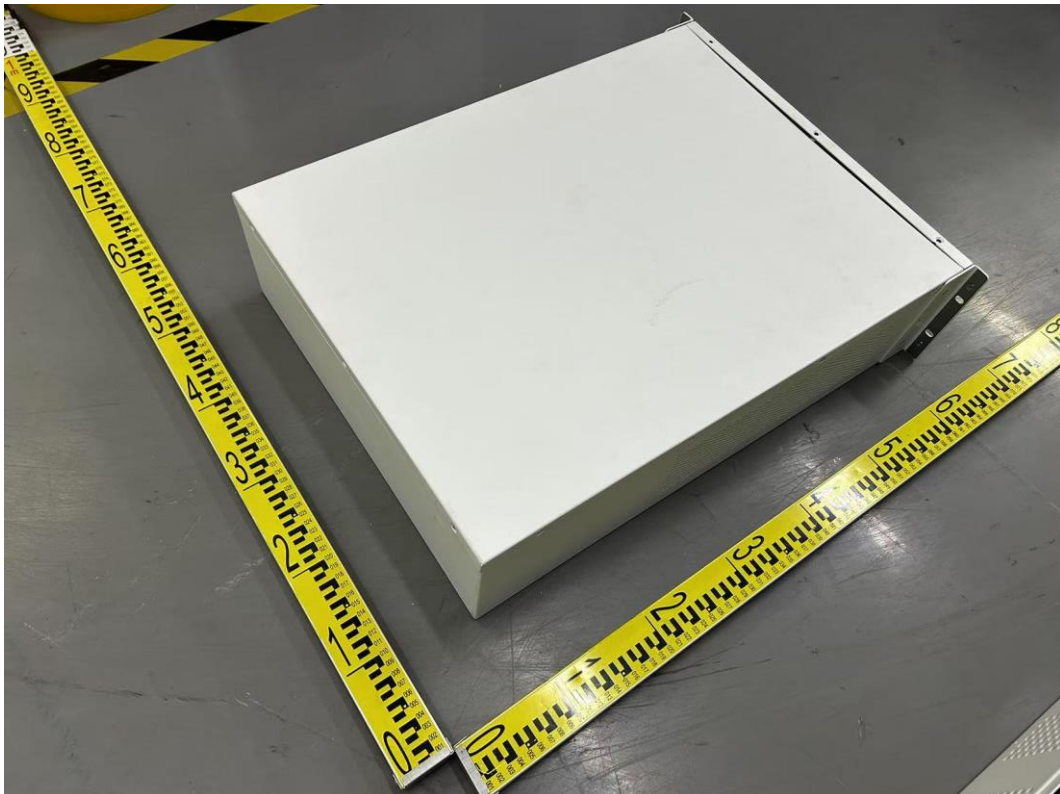


Attachment 1 Photo documentation

View of control box

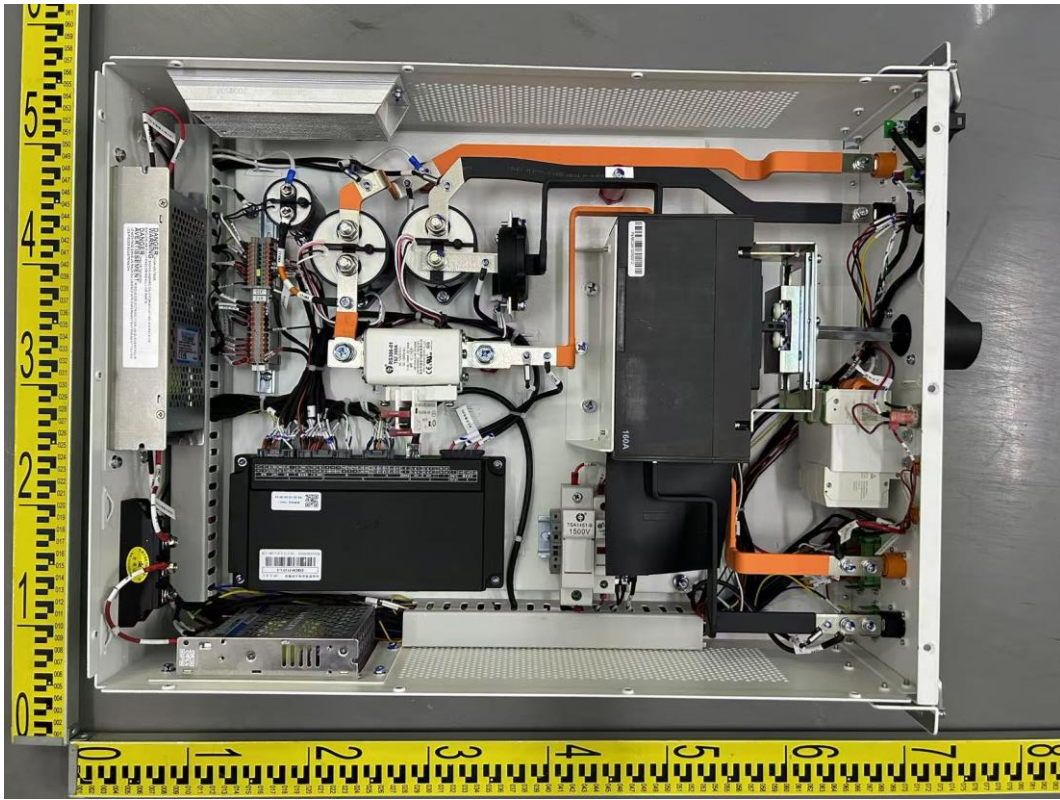


View of control box

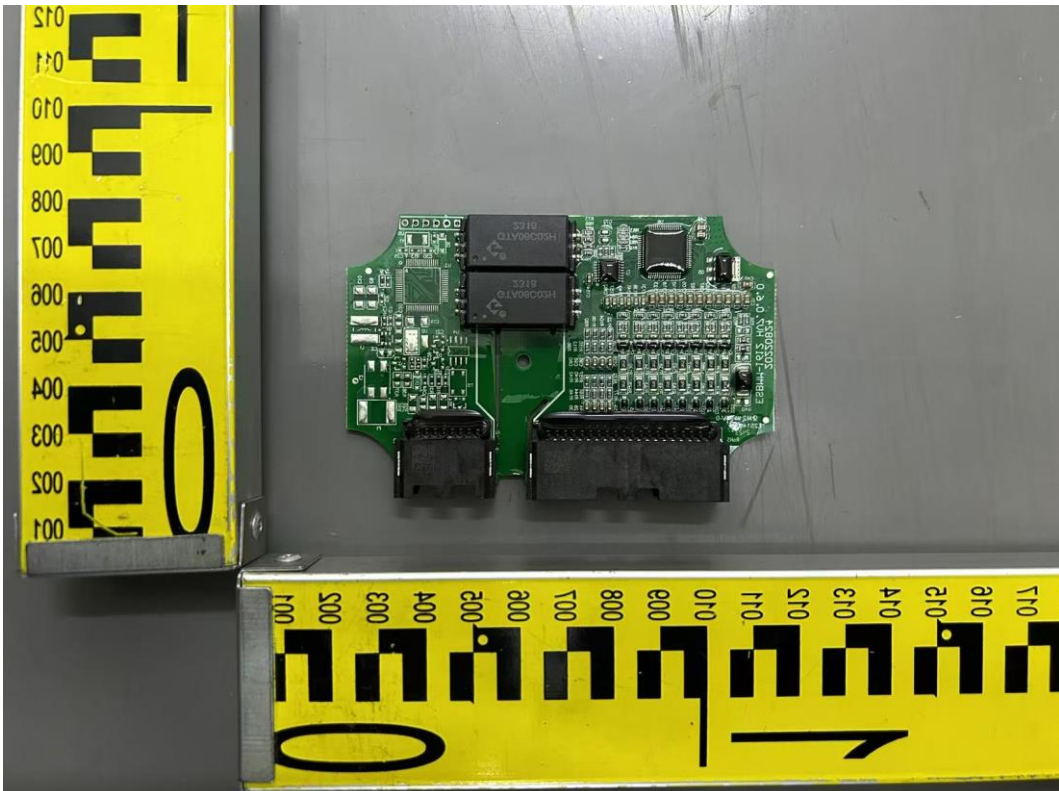


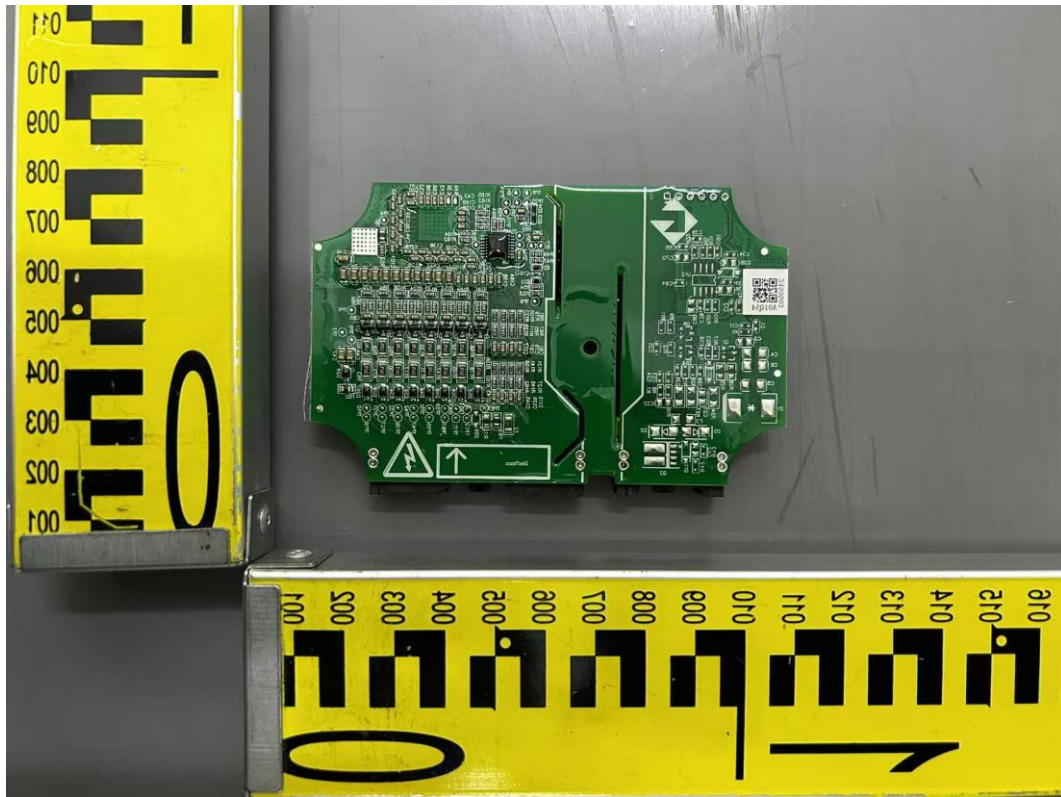
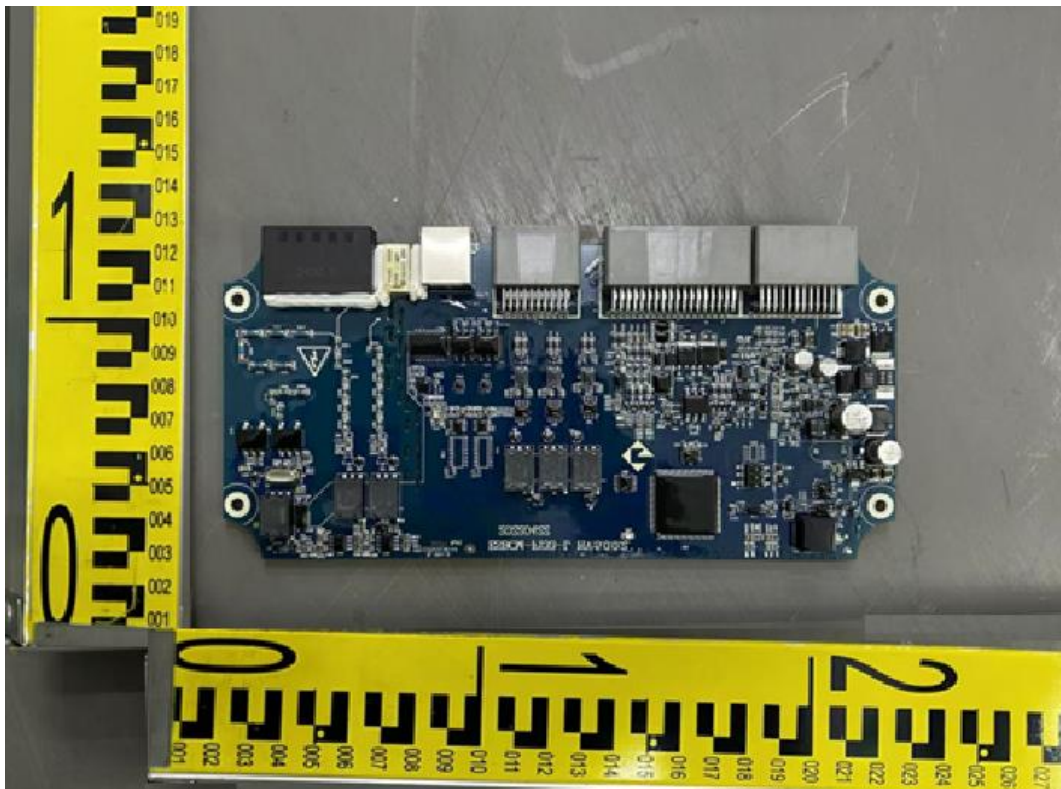
Attachment 1 Photo documentation

View of control box



View of BMU



Attachment 1 Photo documentationView of BMUView of BCU

Attachment 1 Photo documentation

View of BCU



--- End of Attachment 1 ---

Attachment 2 Information for safety

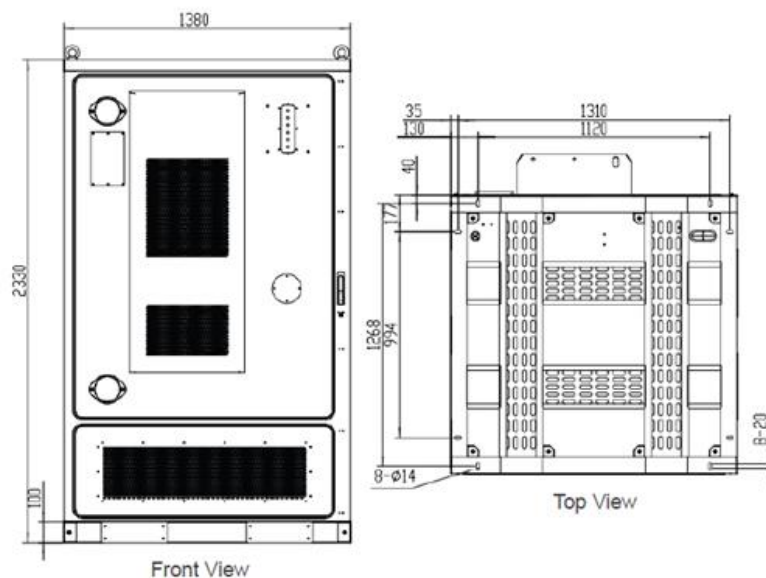
1. Improper use and storage of batteries may cause fire, explosion and burn. Do not decompose, do not crush, do not incinerate, do not heat or throw batteries into fire;
2. If batteries need to be replaced, use batteries from the same manufacturer. Mixing batteries from different manufacturers may cause performance deterioration, and even risk of fire and explosion;
3. Do not immerse the battery in water or allow it to get wet;
4. Do not short-circuit, overcharge or over discharge the battery;
5. Do not install use or store battery storage devices near heat sources (such as fire or heater);
6. Do not pierce the battery shell. Do not hit, throw, strike, trample, weigh or roll the battery;
7. Do not dismantle, repair or modify battery products in any way without authorization;
8. If the battery emits peculiar smell, heat, deformation, discoloration, or any other abnormal phenomenon, stop using the battery immediately and transfer the abnormal battery component to the emergency disposal site;
9. If the battery catches fire, cut off the high and low voltage circuit immediately and use dry powder fire extinguisher or sad to extinguish the fire. If water is used for fire extinguishing, be sure to use an absolutely sufficient amount of water for a long time. It is strictly forbidden to use on insufficient amount of water sprinkle battery devices.

6.2 Product Storage

5. Products must be stored way from fire and heat sources. It is recommended to adjust to 25%~40%SOC before storage. If static storage for more than two months , perform maintenance every two months.

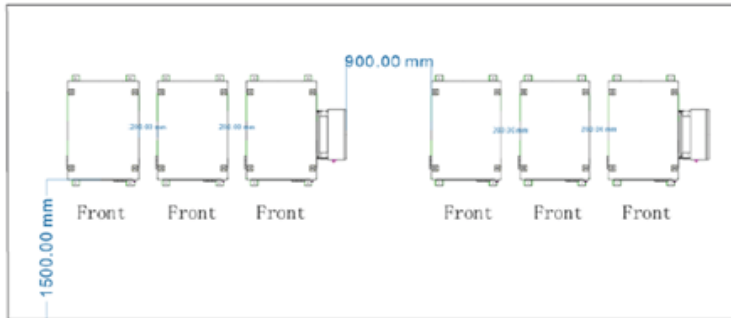
7 Installation & Layout

1. Dimension of Energy storage cabinet

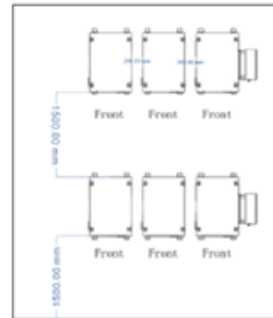


Attachment 2 Information for safety

2. Recommended Installation Method



Linear Installation



Back to Back Installation

- - - End of Attachment 2 - - -

Attachment 3 Packaging



- - - End of Attachment 3 - - -

Attachment 4 Product specification

Specification of Battery System

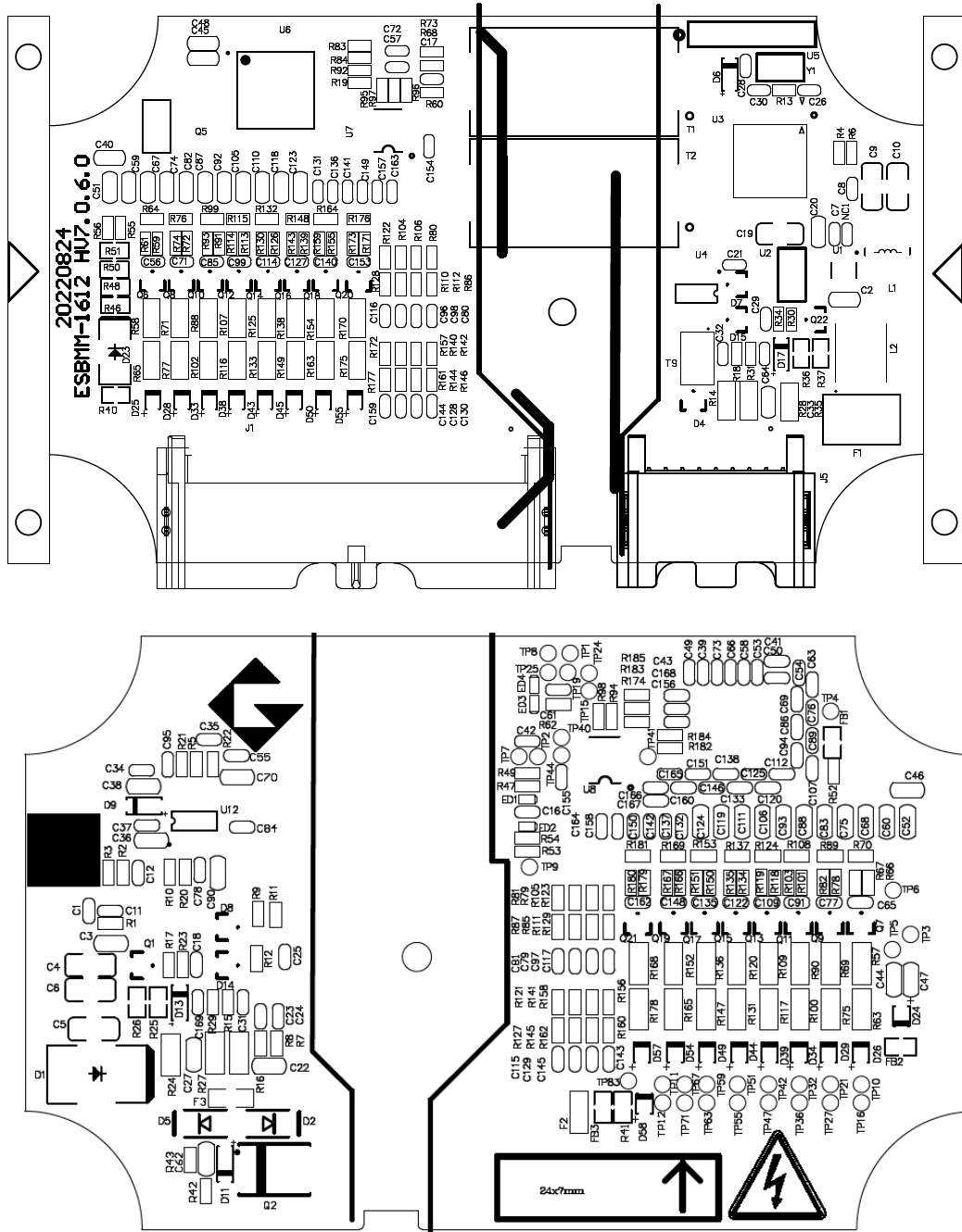
Model name	Rated voltage	Rated energy	Designation
E-MATE-BATT-1*1P16S-100-A	51,2V	5120Wh	IFpP54/150/120[(1P16S)1S]M/-20+45/95
E-MATE-BATT-2*1P16S-100-A	102,4V	10240Wh	IFpP54/150/120[(1P16S)2S]M/-20+45/95
E-MATE-BATT-3*1P16S-100-A	153,6V	15360Wh	IFpP54/150/120[(1P16S)3S]M/-20+45/95
E-MATE-BATT-4*1P16S-100-A	204,8V	20480Wh	IFpP54/150/120[(1P16S)4S]M/-20+45/95
E-MATE-BATT-5*1P16S-100-A	256,0V	25600Wh	IFpP54/150/120[(1P16S)5S]M/-20+45/95
E-MATE-BATT-6*1P16S-100-A	307,2V	30720Wh	IFpP54/150/120[(1P16S)6S]M/-20+45/95
E-MATE-BATT-7*1P16S-100-A	358,4V	35840Wh	IFpP54/150/120[(1P16S)7S]M/-20+45/95
E-MATE-BATT-8*1P16S-100-A	409,6V	40960Wh	IFpP54/150/120[(1P16S)8S]M/-20+45/95
E-MATE-BATT-9*1P16S-100-A	460,8V	46080Wh	IFpP54/150/120[(1P16S)9S]M/-20+45/95
E-MATE-BATT-10*1P16S-100-A	512,0V	51200Wh	IFpP54/150/120[(1P16S)10S]M/-20+45/95
E-MATE-BATT-11*1P16S-100-A	563,2V	56320Wh	IFpP54/150/120[(1P16S)11S]M/-20+45/95
E-MATE-BATT-12*1P16S-100-A	614,4V	61440Wh	IFpP54/150/120[(1P16S)12S]M/-20+45/95
E-MATE-BATT-13*1P16S-100-A	665,6V	66560Wh	IFpP54/150/120[(1P16S)13S]M/-20+45/95
E-MATE-BATT-14*1P16S-100-A	716,8V	71680Wh	IFpP54/150/120[(1P16S)14S]M/-20+45/95
E-MATE-BATT-15*1P16S-100-A	768,0V	76800Wh	IFpP54/150/120[(1P16S)15S]M/-20+45/95
E-MATE-BATT-16*1P16S-100-A	819,2V	81920Wh	IFpP54/150/120[(1P16S)16S]M/-20+45/95
E-MATE-BATT-17*1P16S-100-A	870,4V	87040Wh	IFpP54/150/120[(1P16S)17S]M/-20+45/95

Attachment 4 Product specification

Model name	Operating voltage range	Charge operating temperature	Discharge operating temperature	Maximum charging/discharging current
E-MATE-BATT-1*1P16S-100-A	40V to 58,4V	0 to 45°C	-20 to 45°C	100A/128A
E-MATE-BATT-2*1P16S-100-A	80V to 116,8V			
E-MATE-BATT-3*1P16S-100-A	120V to 175,2V			
E-MATE-BATT-4*1P16S-100-A	160V to 233,6V			
E-MATE-BATT-5*1P16S-100-A	200V to 292,0V			
E-MATE-BATT-6*1P16S-100-A	240V to 350,4V			
E-MATE-BATT-7*1P16S-100-A	280V to 408,8V			
E-MATE-BATT-8*1P16S-100-A	320V to 467,2V			
E-MATE-BATT-9*1P16S-100-A	360V to 525,6V			
E-MATE-BATT-10*1P16S-100-A	400V to 584,0V			
E-MATE-BATT-11*1P16S-100-A	440V to 642,4V			
E-MATE-BATT-12*1P16S-100-A	480V to 700,8V			
E-MATE-BATT-13*1P16S-100-A	520V to 759,2V			
E-MATE-BATT-14*1P16S-100-A	560V to 817,6V			
E-MATE-BATT-15*1P16S-100-A	600V to 876,0V			
E-MATE-BATT-16*1P16S-100-A	640V to 934,4V			
E-MATE-BATT-17*1P16S-100-A	680V to 992,8V			

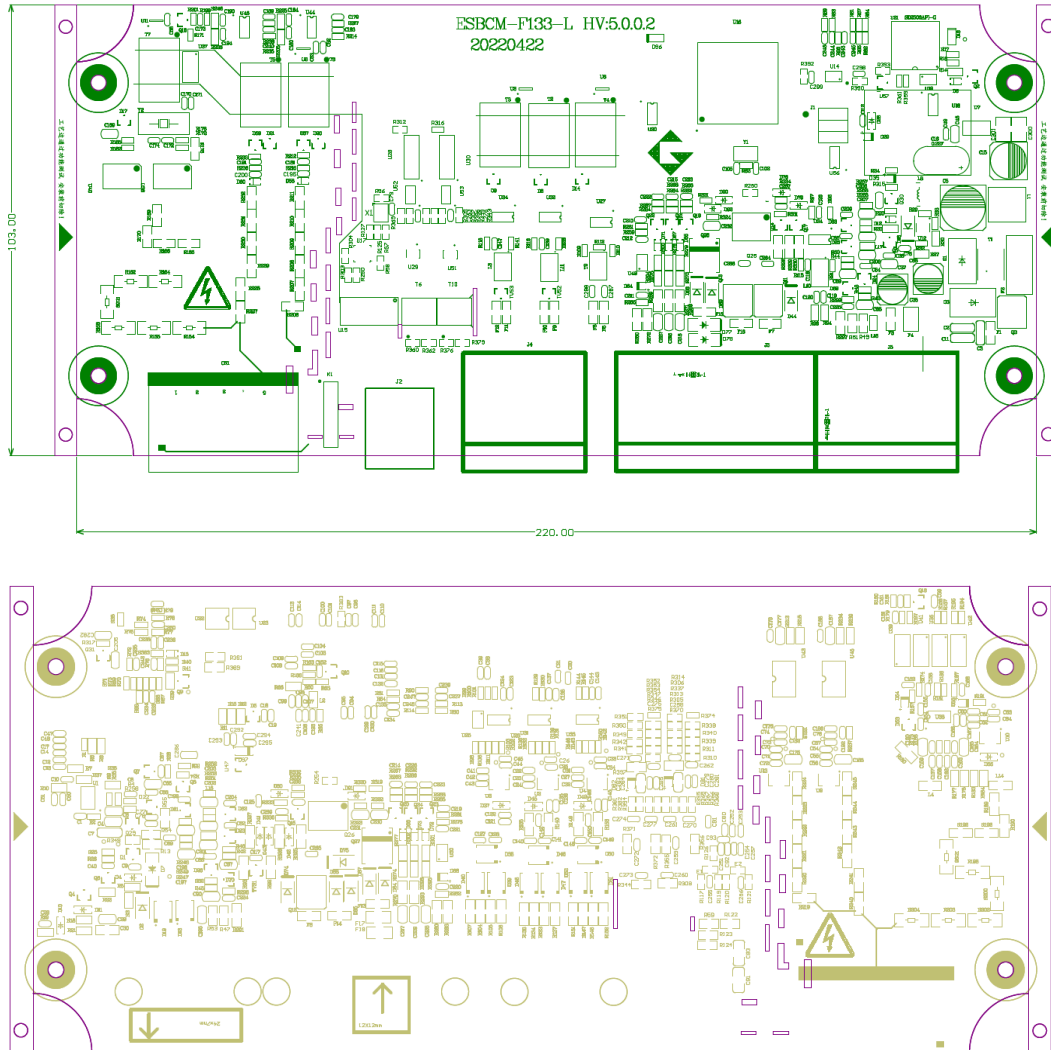
Attachment 4 Product specification

BMU PCB Layout



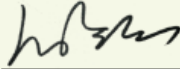
Attachment 4 Product specification

BCU PCB Layout



- - - End of Attachment 4 - - -

Attachment 5 ISO 9001 certificate

		
CERTIFICATE		
Quality Management System GB/T 19001-2016 / ISO 9001:2015		
DONGGUAN EENOVANCE ENERGY TECHNOLOGY CO.,LTD.		
Certificate No.:	24CN34513194Q	
Unified social credit code:	91441900MABRY5LH3A	
Registered Address:	Room 501, Building 1, Songhu Zhigu Science and Technology Industrial Park, No. 11, Yanhe South Road Liaobu Town, Dongguan, Guangdong Province	
Office & Production Address:	Room 102, 2F, 3F and 5F, Building 1, Songhu Zhigu Science and Technology Industrial Park, No. 11, Yanhe South Road, Liaobu Town, Dongguan, Guangdong Province, China.	
Certification Scope:	R & D, Production and Sales of Energy Storage System	
IAF 19 This is to certify that the quality management system established and implemented by the above organization meets the standard requirements. During the validity period of the certificate, the surveillance audit should be carried out once a year and pass the audit, the certificate will continue to be valid. The certificate can be checked out at the certification body website (www.acmchina.com) and CNCA website (www.cnca.gov.cn).		
Date of first registration	22/12/2022	
Date of this certificate	10/12/2024	
Date of expiry	21/12/2025	
 Certificate query		
		 General Manager
ACM INTERNATIONAL CERTIFICATION LIMITED 41 Devonshire Street, Ground Floor, Office 1 London, United Kingdom, W1G 7AJ Local Office-ACM (CHINA) LIMITED, Rm B201, Building 2, No 352, Waihuan Road, Minhang District, Shanghai 201199, China T: +86 21-64305860 F: +86 21-64881096 W: www.acmchina.com E: info@acmcert.com.cn		

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