



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: SZES251000868501
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Name of Testing Laboratory preparing the Report.....: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Applicant’s name: ZhuHai Sepicn Electronics And Technology Co., Ltd.
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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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Test item description :	Rechargeable Li-ion Battery Pack	
Trademark(s) :		
Manufacturer :	Same as applicant	
Model/Type reference :	SK48V100N	
Ratings :	Rated Voltage: 51,2 Vd.c. Rated Capacity: 100 Ah	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	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	<i>Eric Cai</i>
Approved by (name, function, signature) ...:	Dean Wang Report Reviewer	<i>Dean Wang</i>
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address:		
Tested by (name, function, signature):		
Approved by (name, function, signature) ...:		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address:		
Tested by (name + signature)		
Witnessed by (name, function, signature) ..:		
Approved by (name, function, signature) ...:		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	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) :		

<p>List of Attachments (including a total number of pages in each attachment):</p> <p>Attachment 1: 5 pages of Photos; Attachment 2: 3 pages of Information for safety; Attachment 3: 1 page of Packaging; Attachment 4: 1 page of Product specification; Attachment 5: 1 page of ISO 9001 certificate.</p>	
<p>Summary of testing:</p> <p>The sample(s) tested complies with the requirements of IEC 62619:2022.</p> <p>Remark:</p> <ol style="list-style-type: none"> 1. Only battery pack was evaluated in this report. The component cell has been certified according to IEC 62619:2022 by TÜV Rheinland (CB report No. CN23BLOY 001, Cert. No. JPTUV-147063); 2. The functional safety requirement in clause 8 was evaluated according to Annex H of IEC 60730-1:2022. 	
<p>Tests performed (name of test, test clause and date test performed):</p> <p><input type="checkbox"/> 7.2.1 External short-circuit test (cell or cell block)</p> <p><input type="checkbox"/> 7.2.2 Impact test (cell or cell block)</p> <p><input checked="" type="checkbox"/> 7.2.3 Drop test (cell or cell block, and battery system), 2025-11-19</p> <p><input type="checkbox"/> 7.2.4 Thermal abuse test (cell or cell block)</p> <p><input type="checkbox"/> 7.2.5 Overcharge test (cell or cell block)</p> <p><input type="checkbox"/> 7.2.6 Forced discharge test (cell or cell block)</p> <p><input type="checkbox"/> 7.3.2 Internal short-circuit test (cell)</p> <p><input type="checkbox"/> 7.3.3 Propagation test (battery system)</p> <p><input checked="" type="checkbox"/> 8.2.2 Overcharge control of voltage (battery system), 2025-11-17</p> <p><input checked="" type="checkbox"/> 8.2.3 Overcharge control of current (battery system), 2025-11-19</p> <p><input checked="" type="checkbox"/> 8.2.4 Overheating control (battery system), 2025-11-17</p>	<p>Testing location:</p> <p>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</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <p>N/A</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of EN IEC 62619:2022 and BS EN IEC 62619:2022.</p>	

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.



Manual



Rechargeable Li-ion Battery Pack

Model: SK48V100N

Rated Voltage: 51.2V

Rated Capacity: 100Ah

Rated Energy: 5.12kwh

Rated Charge/Discharge Current: 50A

Max charge current: 90A

Max discharge current: 100A

Max short current&Duration: 1000A/10mS

IP Grade:IP20

IFpP51/161/119/[16S]M/-20+50/90

CERTIFIED

UN38.3

Example of SN number

SK48V100NAC0400001

Charge and discharge connector



Remark:

1. Manufacture date is included in SN number.
For example: SK48V100NAC**04**00001. The “**A**” represents manufacture year, “**C**” represents manufacture month and “**04**” represents manufacture date.

Specific coding rules are shown in the table below.

Year	A for 2025, B for 2026, and so on, after the end of the 26-letter cycle, continue with A
Month	1 for January, 2 for February,, A for October, B for November, C for December
Day	Exact 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.

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 : 2025-10-30	
Date (s) of performance of tests : 2025-11-17 to 2025-11-19	
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 <input checked="" type="checkbox"/> comma / <input type="checkbox"/> 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.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : Guangdong BAK Benhoo Technology Co., Ltd. 3F, Building A, Chuangyitong Industrial Park, No. 55 Zengkeng Road, Qiuchang Town, Huiyang District, Huizhou, Guangdong, China	

General product information and other remarks:

Product description:	Rechargeable Li-ion Battery Pack
Model of battery pack:	SK48V100N
Nominal voltage:	51,2 V
Upper limit charging voltage:	57,6 V
Recommend cut off voltage:	44,8 V
Rated capacity:	100 Ah
Maximum charge current:	90 A
Maximum discharge current:	100 A
Number of cells in battery pack:	16S
Designation of battery pack:	IFpP51/161/119/[16S]M/-20+50/95
Charge operating temperature of battery pack:	-25 to 50 °C (With heating film, will keep the cell temperature higher than 0 °C)
Discharge operating temperature of battery pack:	-20 to 55 °C

Model of component cell:	PF160-100A
Cell description:	Lithium-iron Cell
Rated voltage:	3,2 V
Upper charging voltage:	3,75 V
End of discharge voltage:	2,5 V
Rated capacity:	100 Ah
Maximum charge current:	100 A
Maximum discharge current:	150 A
Charge operating temperature:	0 to 55 °C
Discharge operating temperature:	-30 to 55 °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, 8.1, and 8.2. See also table 5.1 for Critical components information	P
	Reduce the risk of injuries from moving parts		N/A
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 pressure relief valve as the venting mechanism of battery pack.	P
	Encapsulation used to support cells within an outer casing		N/A
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 pack 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
	External terminal contact surfaces		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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 7 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 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
7	SPECIFIC REQUIREMENTS AND TESTS		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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 pack: Constant current 90 A charge to 57,6 V	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 $30\text{ m} \pm 10\text{ m}$ at $25\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$		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 pack	—
	Mass of the test unit (kg)	Approx. 48,0 kg	—
	Height of drop (m)	100 mm	—
	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		—
	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Redundant or single protection for discharge voltage control provided in battery system		N/A
	Target Voltage.....		N/A
	Maximum discharge current of the cell, Im.....		N/A
	Discharge current for forced discharge, 1.0 It.....		N/A
	Discharging time, $t = (1 \text{ It} / I_m) \times 90$ (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 $25 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$.		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
	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
	Elevated temperature for charging, 5 °C above maximum operating temperature.....	Max charging temperature: 50°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 fulfils EMC requirements of the end-device application.....	Evaluated per EN IEC 61000-6-3:2021, EN IEC 61000-6-1:2019 (Reference: SGS test report No. SZEM251000989701)	P
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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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
	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 :		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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⁾
Cell	CORNEX NEW ENERGY CO., LTD.	PF160-100A	Nominal Voltage: 3,2 V, Rated Capacity: 100Ah	IEC 62619:2022	TÜV Rheinland (CB report No. CN23BLOY 001, Cert. No. JPTUV-147063)
Lead wires (charge & discharge)	DONGGUAN ZHONGZHEN ENERGY TECHNOLOGY CO., LTD	3512	AWG: 7 AWG, Tmax: 200 °C, Vmax: 600 Vac	UL 758	UL (E355578)
Heat shrinkable tubing	DONGGUAN QUANTAI INDUSTRIAL CO LTD	T-2	Max Vrms: 600 V, Max Oper Temp: 125 °C, Fire rating: VW-1	UL 224	UL (E227336)
Battery enclosure	ShiHang	--	Material: SPCC, Dimension: 482*132*460 mm, Min. Thickness: 1 mm	--	--
Connector	Shenzhen Connection Electronic Co., Ltd.	BRTB100	Rated current: 120 A, Rated voltage: 600 V	EN 60947-7-1:2009, EN IEC 60947-1:2021, EN 60947-1:2007/A2:2014, IEC 60947-7-1:2009, IEC 60947-1:2020, IEC 60947-1:2007/AM D2:2014	TÜV SÜD (Cert. No.: B 108338 0003 Rev. 05)
Epoxy board	SHENGYI TECHNOLOG CO LTD	SP168GN	Min thickness: 0,2 mm, Fire rating: V-0, Tmax: 130°C	UL 94, UL 746B	UL (E109769)
Mylar sheet	Aerogel Technology (Hubei) Co Ltd	AG-ST-POF	Min thickness: 0,8 mm, Fire rating: V-0	UL 94, UL 746B	UL (E532768)
Circuit breaker	Shanghai Liangxin Electrical Co., Ltd.	NDB1-125C125/1	Rated Current: 125 A, Rated Voltage: 60 VDC, Rated interruption current: 10 kA	EN 60947-2:2017+A1 BS EN 60947-2:2017+A1	TÜV Rheinland (Cert. No.: AQ 50524064)
Link of B+, B-	Shenzhen Fengcai New Material Technology Co Ltd	FC-0118	Min thickness: 3,0 mm, Fire rating: V-0, Tmax: 130°C	UL 94, UL 746B	UL (E508451)

IEC 62619					
Clause	Requirement + Test		Result - Remark	Verdict	
BMS board					
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6165F	V-0, 130°C	UL 796	UL (E123995)
Alt.	SHENGYI TECHNOLOGY CO LTD	S1000H	V-0, 130°C	UL 796	UL (E109769)
-AFE (U2)	SINO WEALTH	SH367309	Supply voltage: 8,5V to 65V, Topr: -40 to 85°C	--	--
-MCU (U1)	Shenzhen Zhongweixin Technology Co., Ltd.	LX32E103VET6	Supply voltage: 2,4 to 3,6 V, Topr.: -55 to +150°C	--	--
-MOSFET (Q34, Q36, Q38, Q40, Q46, Q50, Q52)	China Resources Microelectronics (Chongqing) Limited	CRSZ016N10N4Z	V _{DS} : 100V, V _{GS} : ±20V, I _D : 320A (T _A =25°C), T _J : -55 to 150°C	--	--
-MOSFET (Q29, Q33, Q35, Q39, Q45, Q49, Q55)	China Resources Microelectronics (Chongqing) Limited	CRST074N10L2	V _{DS} :100 V, V _{GS} : ±20 V, I _D : 80A (T _C =25°C), T _J : -55 to 150°C	--	--
-NTC	THINKING ELECTRONIC INDUSTRIAL CO LTD	TSM1A103	Resistance at 25°C: 10kΩ, Tmax: 125°C	UL 1434	UL (E138827)
-Relay (REL1, REL2)	XIAMEN HONGFA ELECTROACO USTIC CO LTD	HFD23/012-1ZS	Rated Current: 0,5 A, Rated Voltage: 125 VDC, Operation temperature: -30 to 70 °C, Rated coil voltage: 12 VDC	IEC 60947-4-1	UL (E133481)
Current limited board					
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6165F	V-0, 130°C	UL 796	UL (E123995)
Alt.	SHENGYI TECHNOLOGY CO LTD	S1000H	V-0, 130°C	UL 796	UL (E109769)
-PTC (F2)	Wayon Electronics Co., Ltd.	LP75-300F	rated valtage DC:75V, rated current: 3A, Tmax: 85°C	UL 1434	UL (E355868)
-Resistor (RW1, RW2, RW3, RW4)	Guang Dong VIC0 Electronic Technology Co.,Ltd	SQP20W-10Ω±5%-AP	P: 20W, Vmax: 750V	--	--
-Current sampling resistor	RALEC Electronic Corp.	LR2512-22R002F4	Power: 2W, Rated current: 81,65 A Topr: -55 to 170°C	--	--

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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 It, (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
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
<p>Supplementary information:</p> <p>¹⁾ Identify one of the following:</p> <p>1: Nickel particle inserted between positive and negative (active material) coated area.</p> <p>2: Nickel particle inserted between positive aluminium foil and negative active material coated area.</p> <p>Results:</p> <p>A – No fire or explosion</p> <p>B – Fire</p> <p>C – Explosion</p> <p>D – Test concluded when 50 mV voltage drop occurred prior to reaching force limit</p> <p>E – Test concluded when 800/400 N pressure was reached and 50 mV voltage drop was not achieved</p> <p>F – Test was concluded when fire or explosion occurred</p> <p>G – Other (Please explain): __</p>				

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:					
<p>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</p> <p>2) If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.</p> <p>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): ___</p>					

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	3,036 to 3,052	90,0	57,6	3,632	A, D, F
			Charge Voltage Applied Battery System: 1)		
			Whole	Part	
			66,0 VDC	--	
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):					

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	48,294	108,0	57,6	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):				

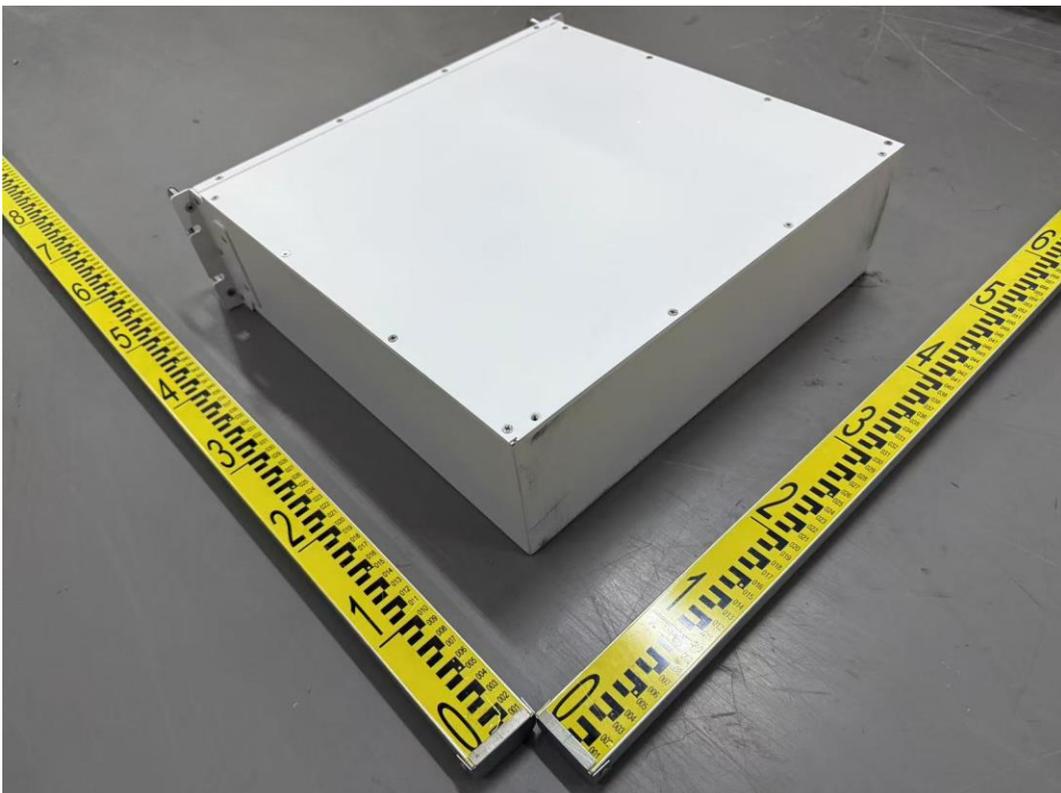
IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.4	TABLE: Overheating control (battery system)		P
Sample No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc
M1	52,950	90,0	53,515
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results
50,0		54,7	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---

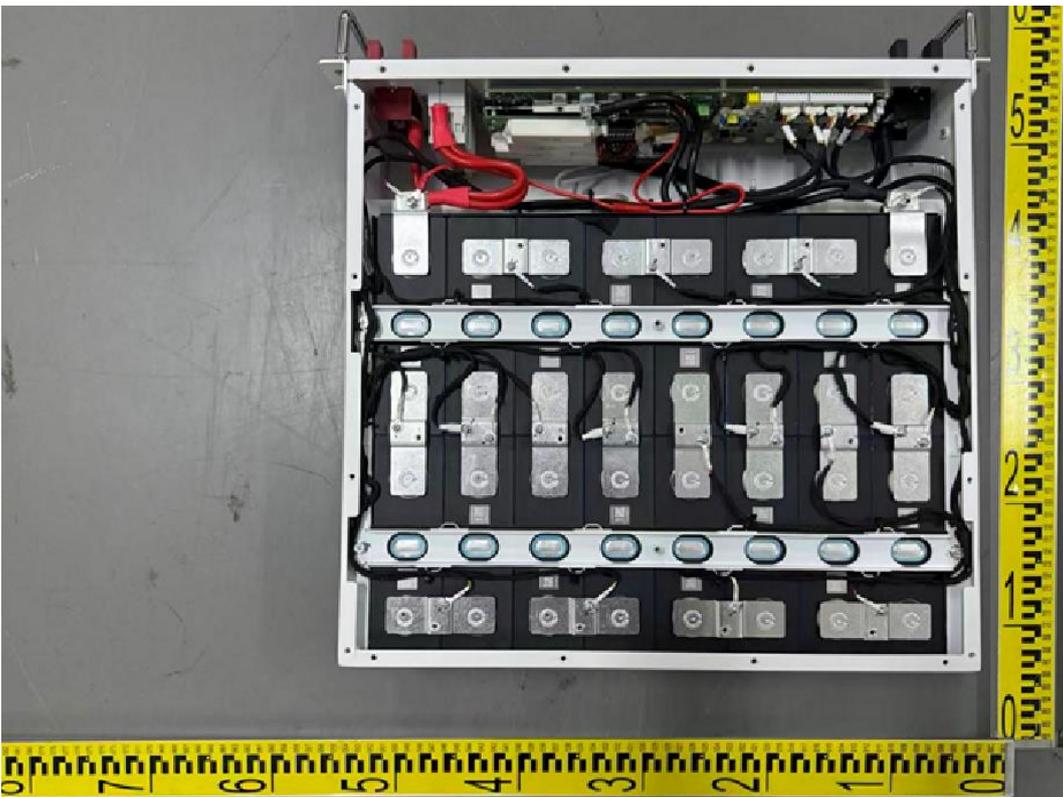
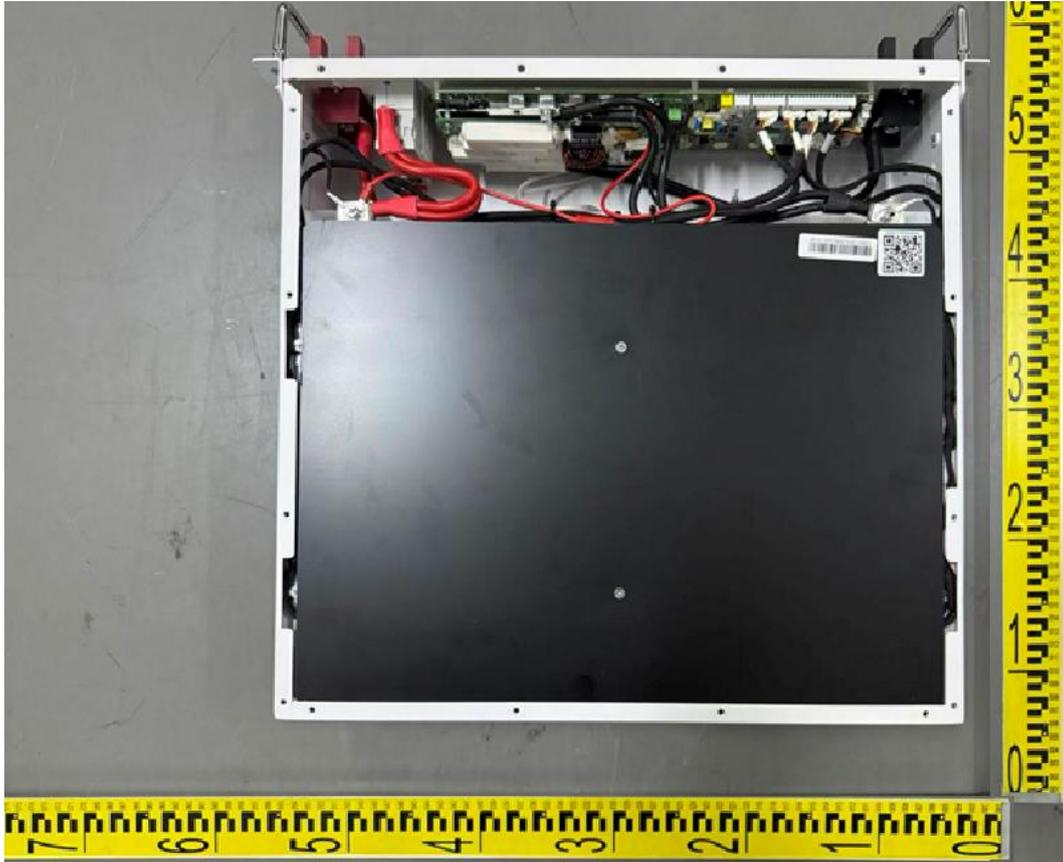
Attachment 1 Photo documentation

External view



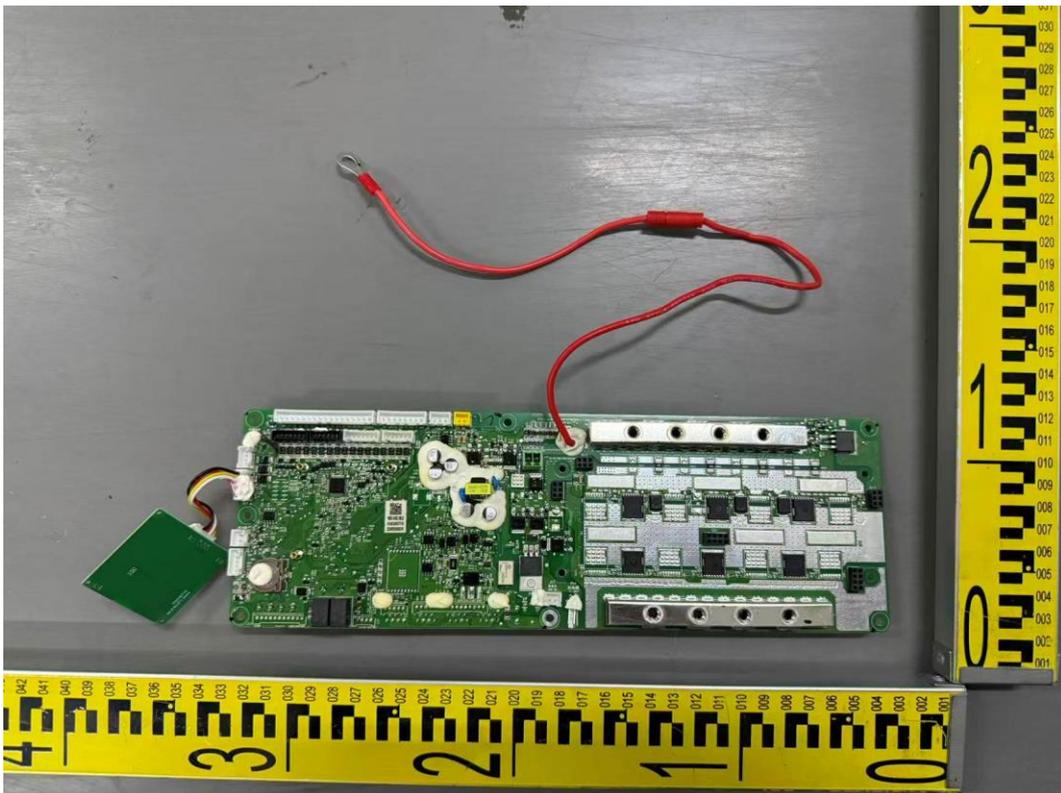
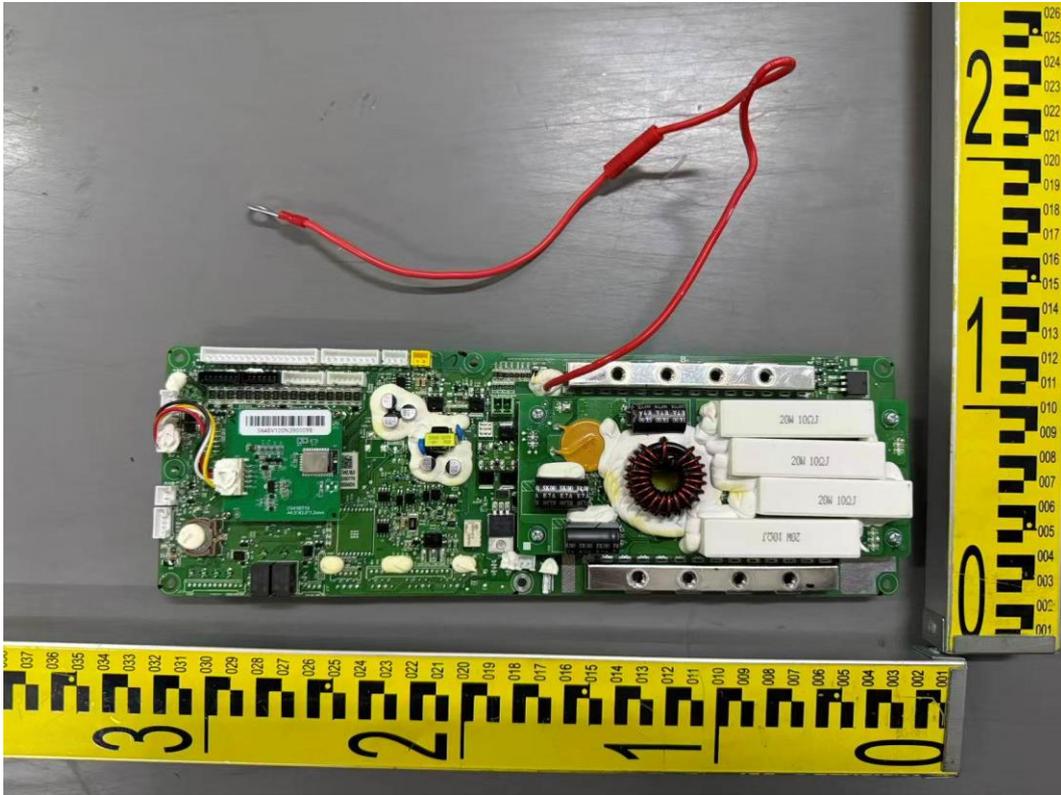
Attachment 1 Photo documentation

Internal view

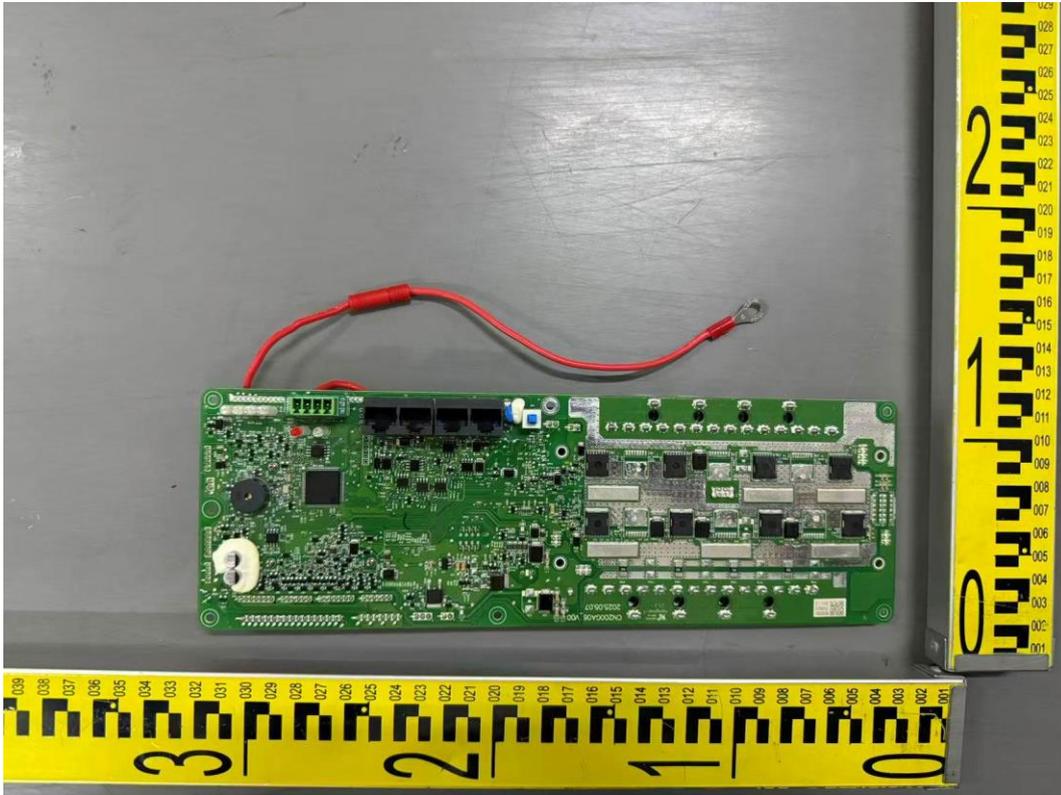


Attachment 1 Photo documentation

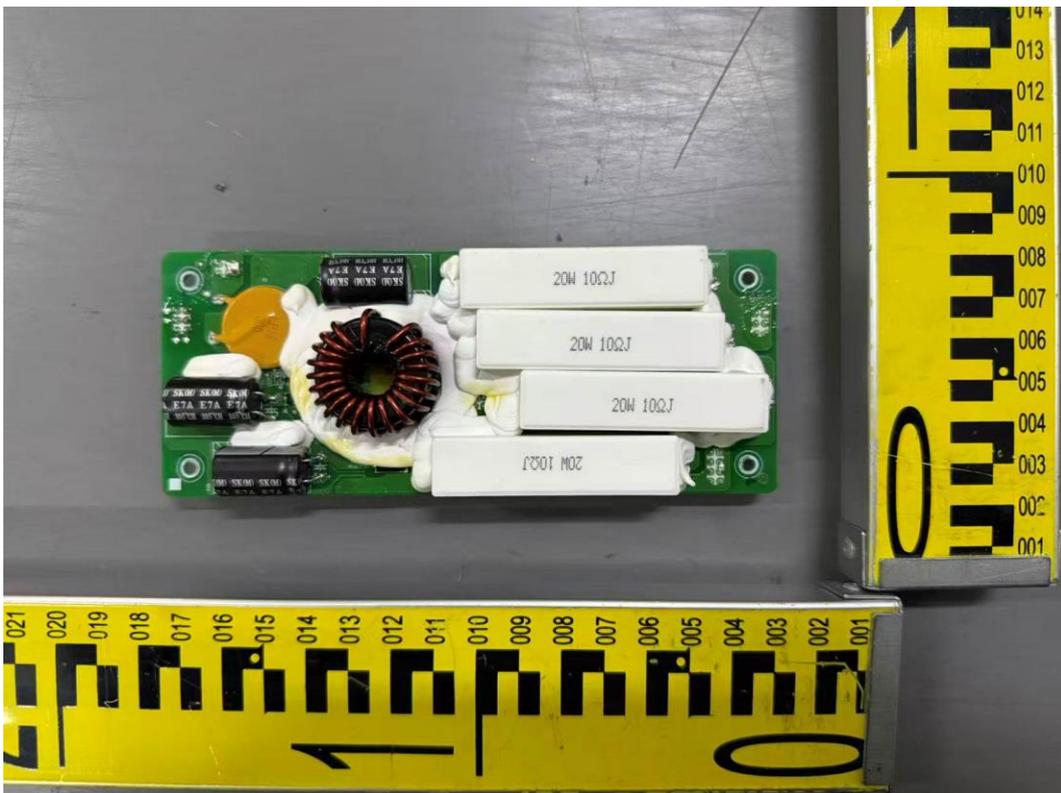
BMS board



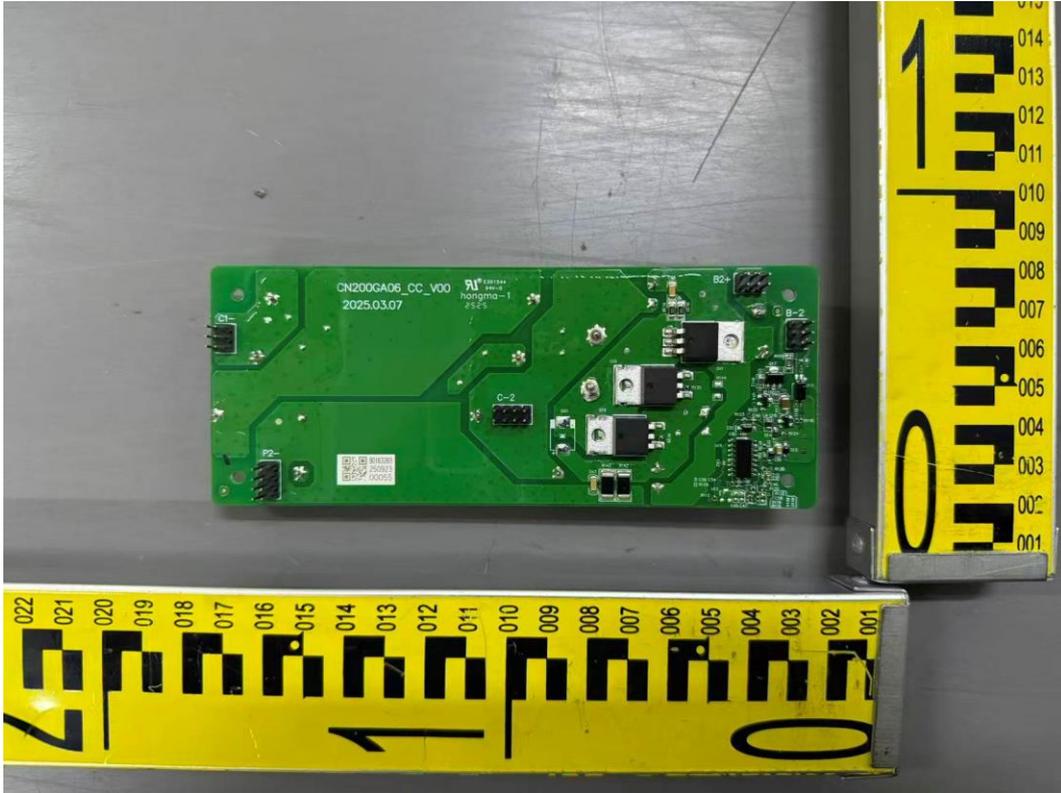
Attachment 1 Photo documentation



Current limited board



Attachment 1 Photo documentation



--- End of Attachment 1 ---

Attachment 2 Information for safety

1.2 Safety

Statement

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The "NOTICE", "WARNING", and "DANGER" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. SOK will not be liable for any consequence caused by the violation of general safety requirements or design, production, and usage safety standards.

 DANGER

- Never dispose of the battery pack in fire.
- Avoid subjecting the battery to heavy impacts.
- Refrain from compressing or puncturing the battery pack

 WARNING

- Keep the battery away from heat sources, such as fireplaces.
- Avoid exposing the battery pack to direct sunlight or rain.
- Do not expose the battery pack to temperatures exceeding 85°C.

 CAUTION

- Avoid handling the battery pack with wet hands.
- Only qualified personnel should disassemble the battery pack.
- Keep the battery pack away from moisture or liquid environments.

Attachment 2 Information for safety

3 Installation

Please strictly follow the local safety regulations along with product technical specifications and installation requirements.

3.1 Installation environment

The operating environment shall meet the following requirements:

Type	Description
Temperature	-20°C-60°C(maximum operating range)
Humidity	5%RH ~ 90%RH
Altitude	0 ~ 4000m (In the 3000m to 4000m environment, derating is required)
Safety requirement	<ul style="list-style-type: none"> • Do not expose the battery to direct sunlight, rain and snow. • Do not place the battery in reach of children or pets. • Do not place the battery near heat source and flammable material. • Do not drop, deform, impact, cut, drill or modify the battery enclosure. • Do not store anything on top of the battery. • Do not disassemble the battery without Manufacturer's permission. • If the battery does not function, contact your dealer or SOK Support.

5 Disposal of battery

Disposal of battery must comply with the local applicable disposal regulations for electronic waste and used batteries, please review your local Battery recycling or management regulations.

Attachment 2 Information for safety

6 Storage

- Store batteries in a dry, clean, dark, and well-ventilated indoor environment. The recommended storage temperature range is 10–35°C.
- Ensure the storage area is free from harmful gases, flammable/explosive materials, and corrosive chemicals.
- Avoid violent shaking, impacts, or compression during transportation. Protect the battery from exposure to sunlight and rain.
- Handle with care during loading/unloading: prevent dropping, rolling, or heavy pressure.
- Maintain batteries at approximately 50% state of charge (SOC) for storage and transport. Avoid long-term storage at SOC exceeding 70%.
- For extended periods of non-use, recharge batteries every 6 months.
- If do not use for a long time, the battery needs to be charged every 6 months.
- Prevent falls during handling. Do not stack battery units over 6 layers, and always keep them upright.

- - - End of Attachment 2 - - -

Attachment 3 Packaging



--- End of Attachment 3 ---

Attachment 4 Product specification

Specification of Battery Pack

Product description:	Rechargeable Li-ion Battery Pack
Model of battery pack:	SK48V100N
Nominal voltage:	51,2 V
Upper limit charging voltage:	57,6 V
Recommend cut off voltage:	44,8 V
Rated capacity:	100 Ah
Maximum charge current:	90 A
Maximum discharge current:	100 A
Number of cells in battery pack:	16S
Designation of battery pack:	IFpP51/161/119/[16S]M/-20+50/95
Charge operating temperature of battery pack:	-25 to 50 °C (With heating film, will keep the cell temperature higher than 0 °C)
Discharge operating temperature of battery pack:	-20 to 55 °C

- - -End of Attachment 4 - - -

Attachment 5 ISO 9001 certificate

