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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..... : 250324071GZC-001

Date of issue : 14 Apr., 2025

Total number of pages : 37 pages

Name of Testing Laboratory preparing the Report : Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Applicant's name : CROWN MICRO FZCO.

Address : Plot No.S60806, Jafza South, Jebel Ali Free Zone, Dubai, United Arab Emirates.

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..... :	LFP Li-ion Battery	
Trademark(s) :		
Manufacturer :	HINAESS TECH CO., LTD No. 2, bonded warehouse in the fence of Gui'an Comprehensive Bonded Zone, Gui'an New District, Guizhou Province, China.	
Model/Type reference :	NURA-5KWH	
Ratings :	51.2V, 100Ah, 5.12kWh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Testing location/ address..... :		C2-1, Heping Xu, Yongning Street, Zengcheng District, Guangzhou, China
Tested by (name, function, signature)..... :		David Yao Engineer 
Approved by (name, function, signature).... :		Carl Chen Reviewer 
☐	Testing procedure: CTF Stage 1:	N/A
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature).... :		
☐	Testing procedure: CTF Stage 2:	N/A
Testing location/ address..... :		
Tested by (name + signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature).... :		
☐	Testing procedure: CTF Stage 3:	N/A
☐	Testing procedure: CTF Stage 4:	N/A
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):

Including 1 page of Appendix: Circuit diagram (Page 25).

Including 3 pages of Appendix: PCB layout (Page 26 to 28).

Including 1 page of Appendix: Specifications (Page 29).

Including 1 page of Appendix: User manual (Page 30).

Including 7 pages of Appendix: Photos (Page 31 to 37).

Summary of testing: From the result of our examination and tests in the submitted samples, conclude they comply with the requirements of the standard IEC 62619: 2022 and EN IEC 62619: 2022.

Tests performed (name of test, test clause and date test performed):

cl.7.2.3 Drop test (battery system);

cl.8.2.2 Overcharge control of voltage (battery system);

cl.8.2.3 Overcharge control of current (battery system);

cl.8.2.4 Overheating control (battery system)

The samples comply with the requirement of IEC 62619: 2022.

Testing location:

Intertek Testing Services Shenzhen Ltd.

Guangzhou Branch

C2-1, Heping Xu, Yongning Street, Zengcheng District, Guangzhou, China

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

Group and National differences of all CENELEC members have been considered but no deviation.

(No national deviation between IEC 62619: 2022 and EN IEC 62619:2022)

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

**Note:**

Date Code: XXXXXXXXYMXXXXX

Y: Represent year of manufacture;

M: Represent month of manufacture.

Year Code:

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	A	B	C	D	E	F	G	H	J	K	L	M

Month Code:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Code	N	P	Q	R	S	T	U	V	W	X	Y	Z

For example, "10201012CS00001" "BT" means Manufacture Date "2024-05"

Test item particulars.....:	
Classification of installation and use.....: To be defined in final system.	
Supply Connection Not directly connected 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 2025-03-24	
Date (s) of performance of tests 2025-03-24 to 2025-04-07	
General remarks:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(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. Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty. This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
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) : HINAESS TECH CO., LTD No. 2, bonded warehouse in the fence of Gui'an Comprehensive Bonded Zone, Gui'an New District, Guizhou Province, China	

General product information and other remarks:

The product covered in this report is a Li-ion Battery which contains 16 cells in 16S, and has overcharge, over-discharge, over-temperature, over current and short-circuits proof circuit.

Product name	Rechargeable Lithium ion Cell	LFP Li-ion Battery
Model	LFP48173150E-100Ah	NURA-5KWH
Configuration:	/	16S
Capacity [Ah]	100	100
Nominal voltage [V d.c.] :	3.2	51.2
Standard charge current [A].....	50	50
Standard discharge current [A]	50	50
Maximum continuous charge current [A]	100	100
Maximum continuous discharge current [A].....	100	100
Standard fully charge voltage [V d.c.]	3.65	57.2
Maximum charge voltage [V d.c.]	3.65	57.2
End of discharge voltage [V d.c.].....	2	45.6
Charging temperature range [°C].....	0 to 50	0 to 50
Discharging temperature range [°C].....	-20 to 55	-20 to 55
Storage temperature range [°C].....	-30 to 45	-10 to 35
Recommend charging method declared by the manufacturer.....	At constant current 50A till battery voltage reaches 3.65V, then switch to constant voltage 3.65V till charge current drops to 5.0A.	At constant current 50A till battery voltage reaches 57.2V, then switch to constant voltage 57.2V till charge current drops to 5.0A.
External dimensions	(150±0.6)mm × (173.9±0.5)mm × (48.3±0.5)mm	580mm × 165mm × 434mm
Battery designation	IFpP49/175/151/M/-20+50/95	IFpP49/175/151[16S]M/-20+50/95

This report is based on report 240321104GZC-001

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		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		P
	Encapsulation used to support cells within an outer casing		P
5.4	Temperature/voltage/current management		P
	The design prevents abnormal temperature-rise		P
	Voltage, current, and temperature limits of the 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
	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	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..... :	Listed in the specification of cell.	P
	Designation of battery system to comply with the cell operating region	Information mentioned in manufacturer's specifications	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 :	Reference: ISO 9001:2005 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
7.1	Charging procedure for test purposes		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The battery discharged to a specified final voltage prior to charging		P
	The cells or batteries charged using the method specified by the manufacturer :	The method mentioned in manufacturer's specifications.	P
7.2	Reasonably foreseeable misuse		P
7.2.1	External short-circuit test (cell or cell block)	Approved cell used.	N/A
	Short circuit with total resistance of $30\text{ m}\Omega \pm 10\text{ m}\Omega$ 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)	Approved cell used.	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)	Approved cell used.	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 system.	—
	Mass of the test unit (kg)..... :	55.45kg	—
	Height of drop (m)..... :	5cm	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)	Approved cell used.	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	Approved cell used.	N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion..... :	See Table 7.2.5.	N/A
7.2.6	Forced discharge test (cell or cell block)	Approved cell used.	N/A
	Cells connected in series in the battery system :		N/A

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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, 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	See Table 7.2.6.	N/A
7.3	Considerations for internal short-circuit – Design evaluation		P
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)	Approved cell used.	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	See Attachment # ____	—
	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	See Table 7.3.2.	N/A
7.3.3	Propagation test (battery system)		N/A
	Method to create a thermal runaway in one cell ...	See Annex B and C	N/A
	Results: No external fire from the battery system, no battery case rupture	See results in Table 7.3.3	N/A

8	BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)		P
8.1	General requirements		P
	Functional safety analysis for critical controls	Comply with Annex H of IEC 60730-1	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
8.2	Battery management system (or battery management unit)		P
8.2.1	Requirements for the BMS		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The safety integrity level (SIL) target of the BMS		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..... :	55 °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		N/A
	Battery system fulfil EMC requirements of the end-device application..... :	Should be considered in the end-device	N/A

10	INFORMATION FOR SAFETY		P
	The cell manufacturer provides information about current, voltage and temperature limits of their products	Approved cell used.	N/A
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.		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	IFpP49/175/151[16S]M/-20+50/95	P
	Battery structure formulation	16S	P

12	PACKAGING AND TRANSPORT		N/A
	Refer to Annex D		N/A

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

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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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		N/A
	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		N/A
	Regulations concerning international transport of secondary lithium batteries		N/A

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⁾	
Enclosure	Dongguan New Magnesium Precision Hardware Co., Ltd	SA All-in-one	Material: SGCC, Minimum thickness 1.5mm	IEC 62619:2022	Tested with appliance	
Enclosure (Alternative)	Interchangeable	Interchangeable	Material: SGCC, Minimum thickness 1.2mm	IEC 62619:2022	Tested with appliance	
Power Connector	SU ZHOU YINGPUDA ELECTRONICS TECHNOLOGY CO.,LTD	RD100-01-V-RT-2+1P-RD, RD100-01-V-RT-2+1P-BK	600VDC, 100A	UL 1977	UL E499580	
Breaker	Projoy Electric Co.,Ltd.	PEBS-L	2P, 80VDC, 125A	EN 60947-1:2007+A2:2014	TUV R 50426350	
SWITCH	YUEQING QIANNIAN ELECTRONIC CO LTD	C-QN16-F	250V, 5A, 0~55°C	UL 61058-1	UL E489975	
Internal Power Wires B+-P+	DONGGUAN DEWEI ELECTRONIC CO LTD	3512	Minimum 25mm ² , minimum 600V, minimum 200°C	UL 758	UL E339716	
Internal Power Wires B+-P+ (Alternative)	Interchangeable	3512	Minimum 25mm ² , minimum 600V, minimum 200°C	UL 758	UL approval	
Internal Power Wires B-&P-	Dongguan Zelongkang Wire Co., Ltd	1015	Minimum 8AWG, minimum 600V, minimum 80°C	UL 758	UL E330488	
Internal Power Wires B-&P- (Alternative)	Interchangeable	1015	Minimum 8AWG, minimum 600V, minimum 80°C	UL 758	UL approval	
Internal BMS Power Wires	SHENZHEN MINGMOU TECHNOLOGY CO.,LTD	1015	Minimum 16AWG, minimum 600V, minimum 80°C	UL 758	UL E204893	
Internal BMS Power Wires (Alternative)	Interchangeable	1015	Minimum 16AWG, minimum 600V, minimum 80°C	UL 758	UL approval	

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⁾
Internal Signal Wire	DONGGUAN CHUANTAI WIRE PRODUCTS CO LTD	1332	Minimum 24AWG, minimum 300V, minimum 200°C	UL 758	UL E315628
Internal Signal Wire (Alternative)	Interchangeable	1332	Minimum 24AWG, minimum 300V, minimum 200°C	UL 758	UL approval
PC plate	SUZHOU DEJUCHUNTIAN MATERIALTECHNOLOGY CO.,LTD	DC42B	80°C, VTM-0	UL 746	UL E523474
Insulation sleeving	ShenZhen Woer Heat—Shrinkable Material Co.,Ltd.	HFT-2	600V, 125 °C, VW-1	UL 224	UL E236485
Insulation sleeving (Alternative)	Interchangeable	Interchangeable	600V, 125 °C, VW-1	UL 224	UL approval
Cell	Jiangsu Higee Energy Co., Ltd	LFP48173150 E-100Ah	3.2Vdc, 100Ah	IEC 62619:2022	CB SE-109830A1
BMS board (CN100GA02)					
PWB Board	HUIZHOU WELGAO ELECTRONICS CO LTD	W-1	130°C, V-0 °C	UL 796	UL E310226
PWB Board (Alternative)	Interchangeable	Interchangeable	130°C, V-0 °C	UL 796	UL approved
MCU(U1)	RENESAS	R7FA2L1AB2 DFP	Supply voltage:-0.5V~6.5V, TA=-40~105°C	IEC 62619:2022	Tested with appliance
AFE(U2)	SINO WEALTH	SH367309	VBAT: -0.3~70V, TA=-40~85°C	IEC 62619:2022	Tested with appliance
Discharge MOSFET(Q70, Q51, Q69, Q68, Q85, Q83, Q28, Q66, Q67, Q63)	MagnaChip Semiconductor Ltd.	MDE10N026RH	VDS=100V, VGS=±20V, ID=120A, TJ=-55~175°C	IEC 62619:2022	Tested with appliance
Charge MOSFET (Q80, Q81, Q82, Q77, Q78, Q79, Q73, Q72, Q71, Q61, Q84, Q76)	Wuxi NCE Power Co., Ltd.	NCEP039N10D	VDS=100V, VGS=±20V, ID=135A, TJ=-55~175°C	IEC 62619:2022	Tested with appliance

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⁾
Resister (R455, R445, R428, R469, R481, R437, R447, R459)	RALEC	LR2512-22R002F4	2mΩ, min. 2W	IEC 62619:2022	Tested with appliance
Resister (R455, R445, R428, R469, R481, R437, R447, R459) (Alternative)	Interchangeable	Interchangeable	2mΩ, min. 2W	IEC 62619:2022	Tested with appliance
MOSFET (Q2, Q3)	MagnaChip Semiconductor Ltd.	MDE1991	VDS=100V, VGS=±20V, ID=120A, TJ=-55~150°C	IEC 62619:2022	Tested with appliance
Resister (R27, R29)	RALEC	LR2512-22R010F4	10mΩ, min. 2W	IEC 62619:2022	Tested with appliance
Resister (R27, R29) (Alternative)	Interchangeable	Interchangeable	10mΩ, min. 2W	IEC 62619:2022	Tested with appliance
Capacitance (EC1, EC2, EC3)	samxon	ESK227M2AI20TCSNP-R	220μF, 100V, 105 °C	IEC 62619:2022	Tested with appliance
Capacitance (EC1, EC2, EC3) (Alternative)	Interchangeable	Interchangeable	220μF, 100V, 105 °C	IEC 62619:2022	Tested with appliance
Inductance (L1)	HUI ZHOU DELI ELECTRONICS CO., LTD	TCB106060-350M-LF	7.5μH, 130 °C	IEC 62619:2022	Tested with appliance
Inductance (L1) (Alternative)	Interchangeable	Interchangeable	7.5μH, 130 °C	IEC 62619:2022	Tested with appliance
PTC (F23)	Wayon Electronics Co Ltd	LP75-300F	75V, 3A	UL 1434	UL E202125
Precharge board (CN100GA01)					
PWB Board	CHONG QING BESTCHOICE ELECTRONICS CO.,LTD	YX-02	130°C, V-0 °C	UL 796	UL E526676
PWB Board (Alternative)	Interchangeable	Interchangeable	130°C, V-0 °C	UL 796	UL approved

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⁾
Resister (RW1,RW2,RW3,RW4)	Guangdong Xiangsheng Electronic Technology Co., Ltd	SQP20W-10Ω±5%-AP	10Ω, min. 20W	IEC 62619:2022	Tested with appliance
Resister (RW1,RW2,RW3,RW4) (Alternative)	Interchangeable	Interchangeable	10Ω, min. 20W	IEC 62619:2022	Tested with appliance
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	
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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
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--	--	--	--	--	--	--
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	
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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	
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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	
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Method of cell failure ¹⁾		Location of target cell		Area for fire protection (m ²)		
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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	
S240321104-001	2.862~2.906	100	64.24V	3.633	A, D, F	
			Charge Voltage Applied Battery System: 1)			
			Whole		Part	
			√		--	
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

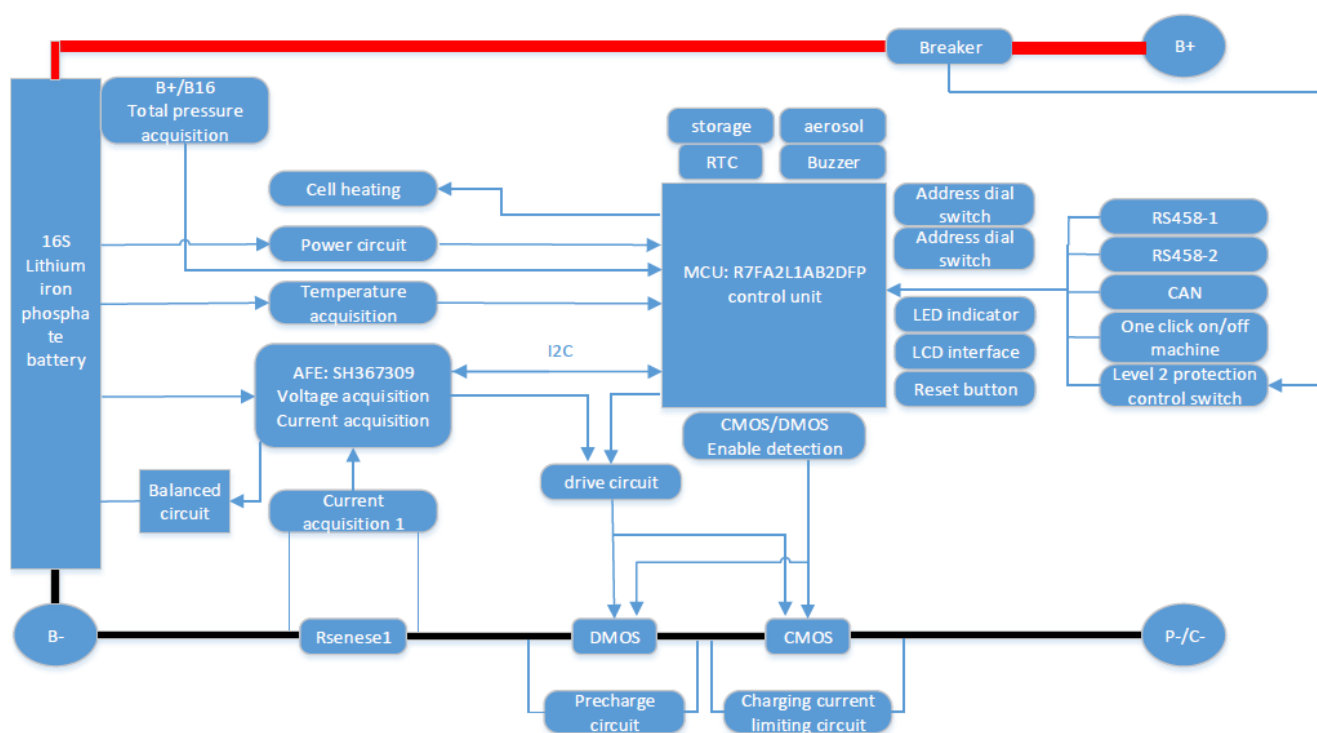
8.2.3	TABLE: Overcharge control of current (battery system)			P
Sample No.	OCV at start of test, (V dc)	Max. Charging Current, (A)	Max. Charging Voltage, (V dc)	Results
S240321104-001	46.538	120	57.2	A, D, F
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D – Overcurrent 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
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc	
NURA-5KWH	52.798	100	54.851	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
50.0		54.1	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): _____				

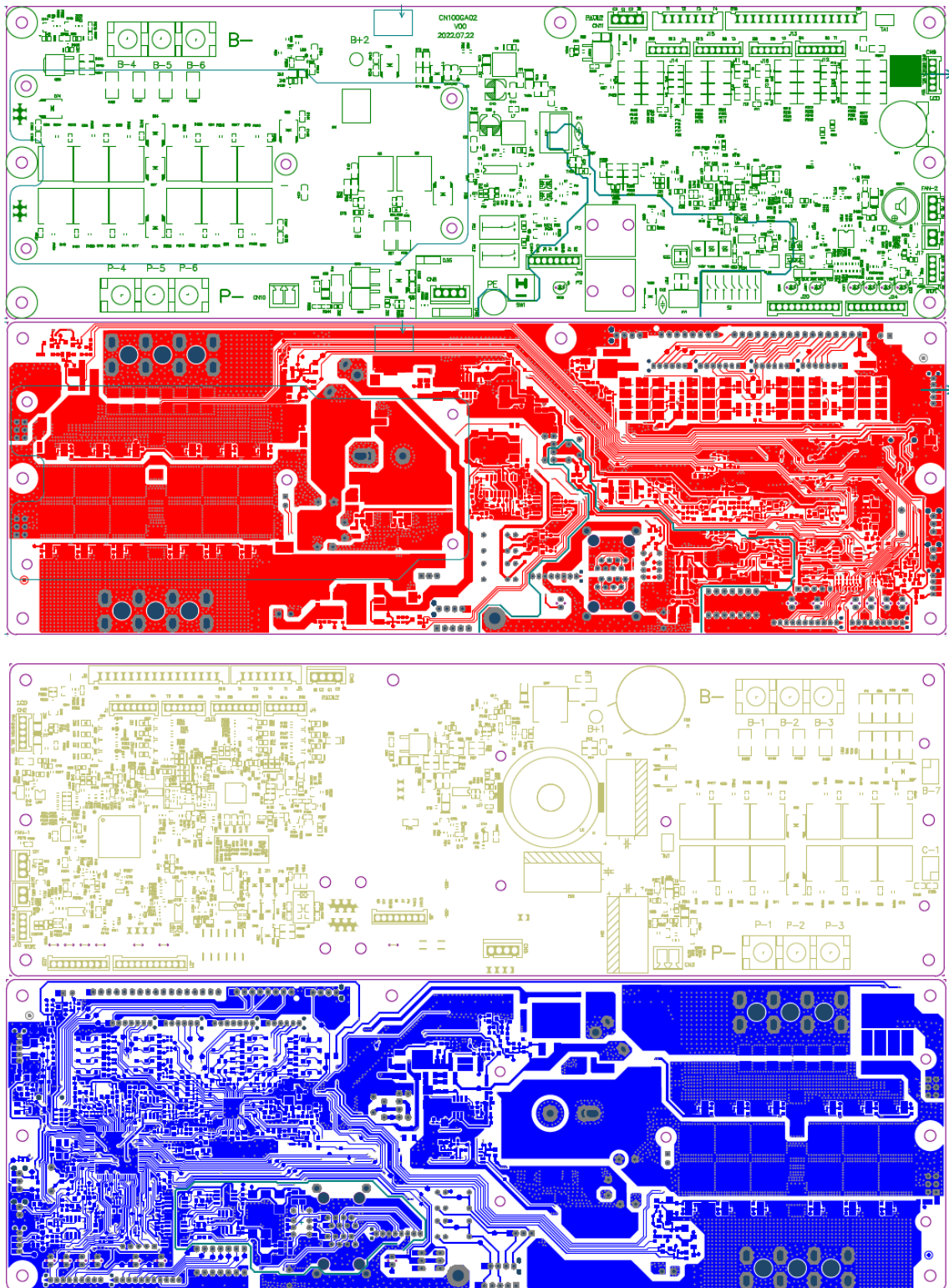
IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

9	TABLE: EMC				N/A
Standard used for EMC test:					
Sample No.	EMC Test Item	Battery Condition	EMC Test Level/ Parameters	Compliance Criteria	Results
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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): ____					

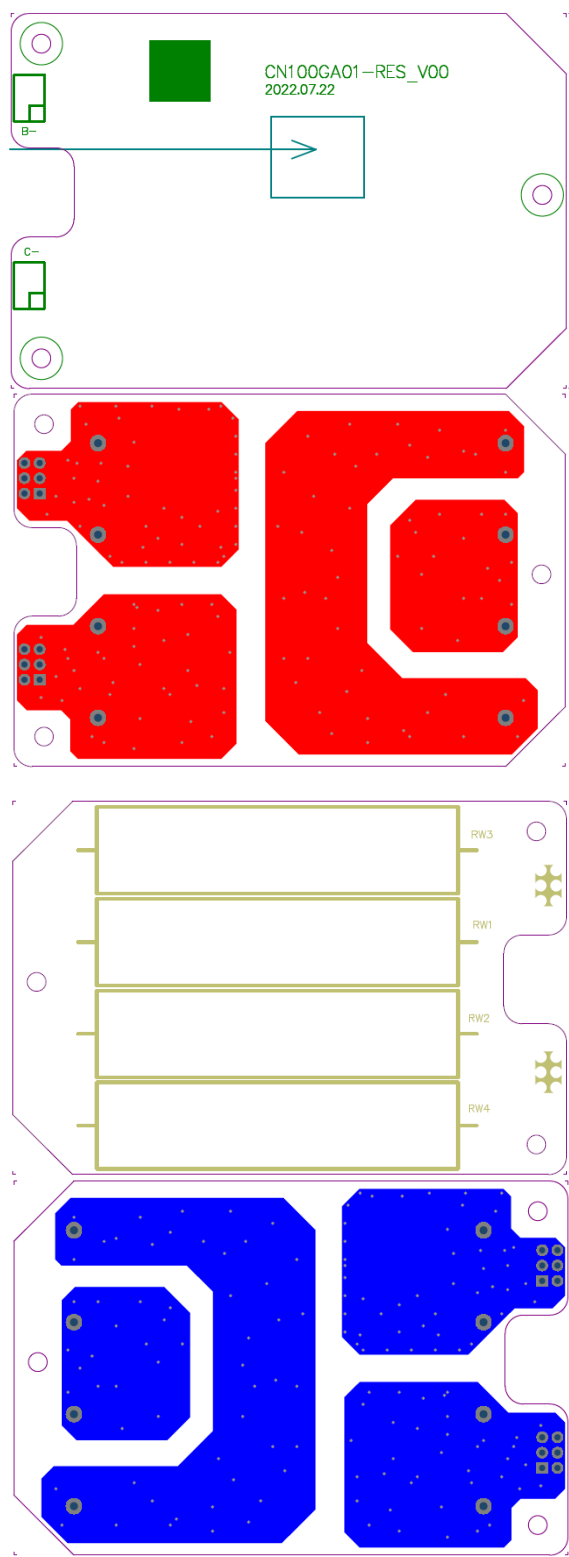
TRF No. IEC62619B



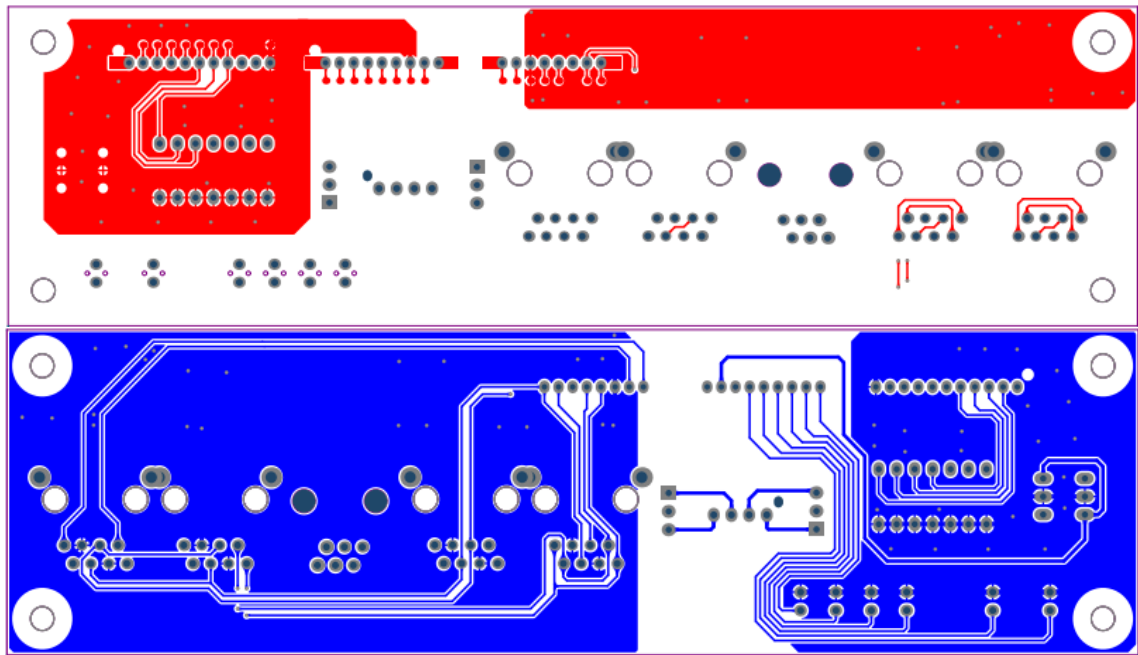
Appendix: PCB Layout



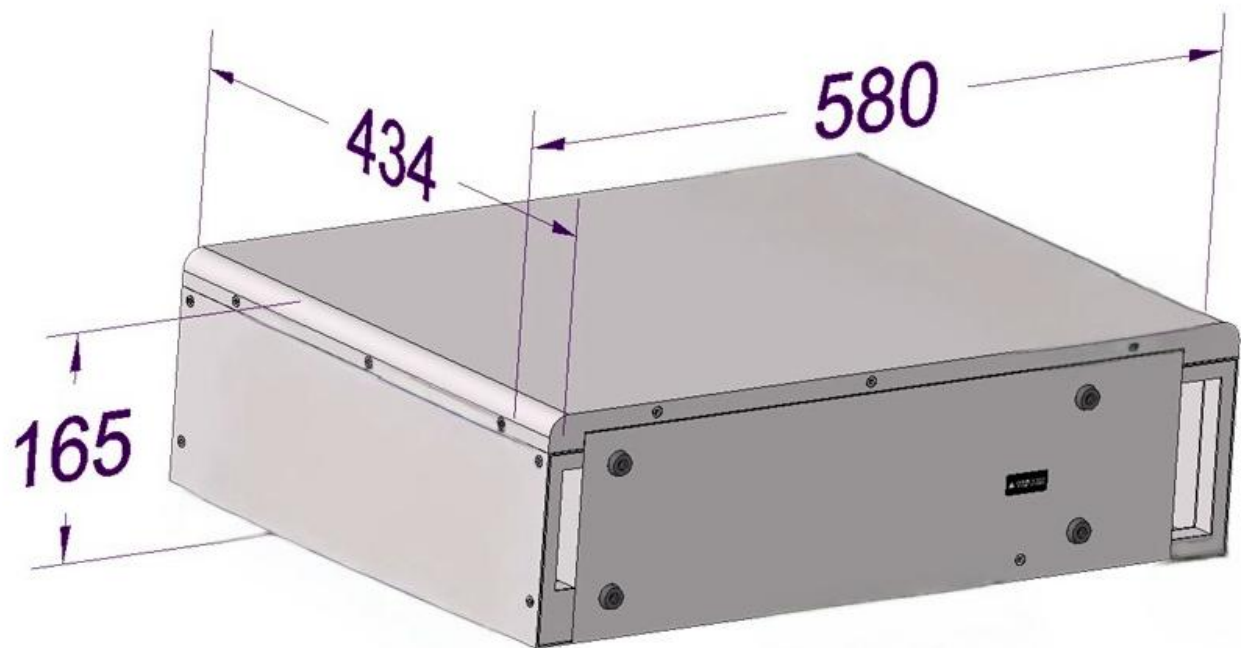
Appendix: PCB Layout



Appendix: PCB Layout



Appendix: Specifications



4 Use, maintenance and troubleshooting

4.1 Battery system usage and operation instructions

After completing the electrical installation, follow these steps to start the battery system.

1. Refer to the description of the DIP switch of 2.3.1 to prepare the battery module before starting up, then press down the SW button .
2. After the indicator self-test, the RUN indicator will light and the SOC indicator will be on according to actual SOC.
3. If you want to turn off the battery ,please stop the charge or discharge firstly,then turn off the SW button.



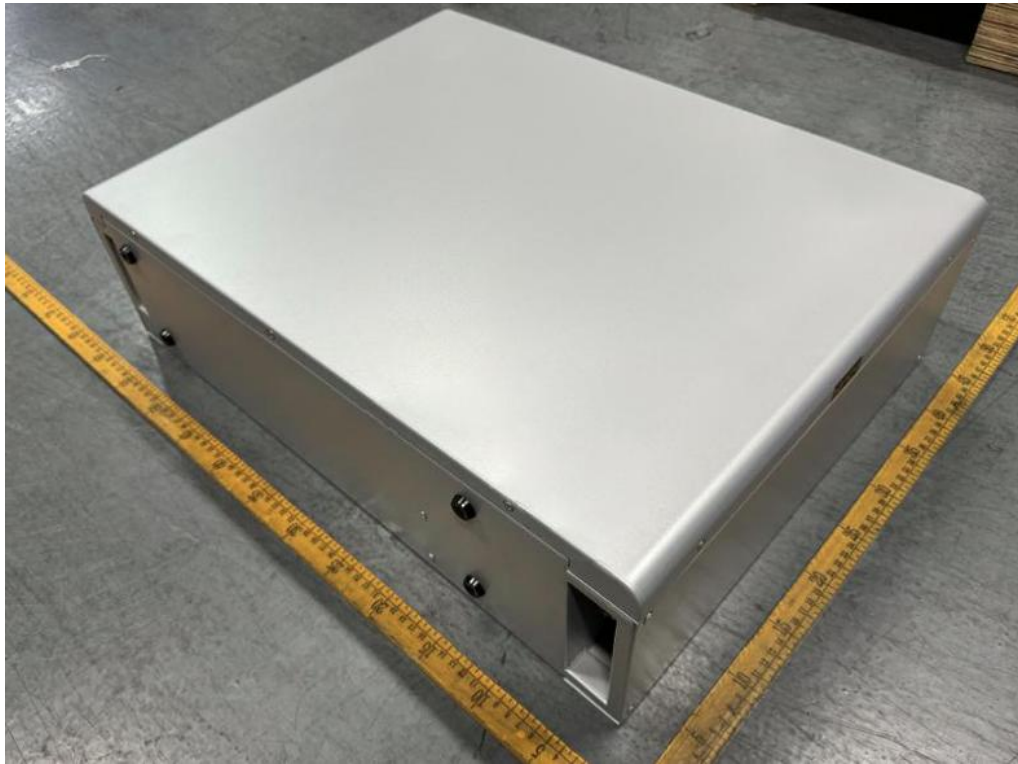
Figure4-1



Caution:

1. After waking up the battery, if the ALM light is flashing or on, please refer to the "4.2 Alarm description and processing ". If the failure cannot be eliminated, please contact the dealer timely.
2. Use a voltmeter to measure whether the voltage of the circuit breaker battery access terminal is higher than 44.8V, and check whether the voltage polarity is consistent with the inverter input polarity. If the circuit breaker battery input terminal has a voltage output and is greater than 44.8V, then the battery begun to work normally.
3. After confirming that the battery output voltage and polarity are correct, turn on the DC breaker.
4. Check if the indicator of the inverter and battery connection (communication indicator and battery access status indicator) is normal. If it is normal, successfully complete the connection between the battery and the inverter. If the indicator light is abnormal, please refer to the inverter manual for the cause or contact the dealer.

Appendix: Photos



Overall View 1 of battery pack



Overall View 2 of battery pack

Appendix: Photos

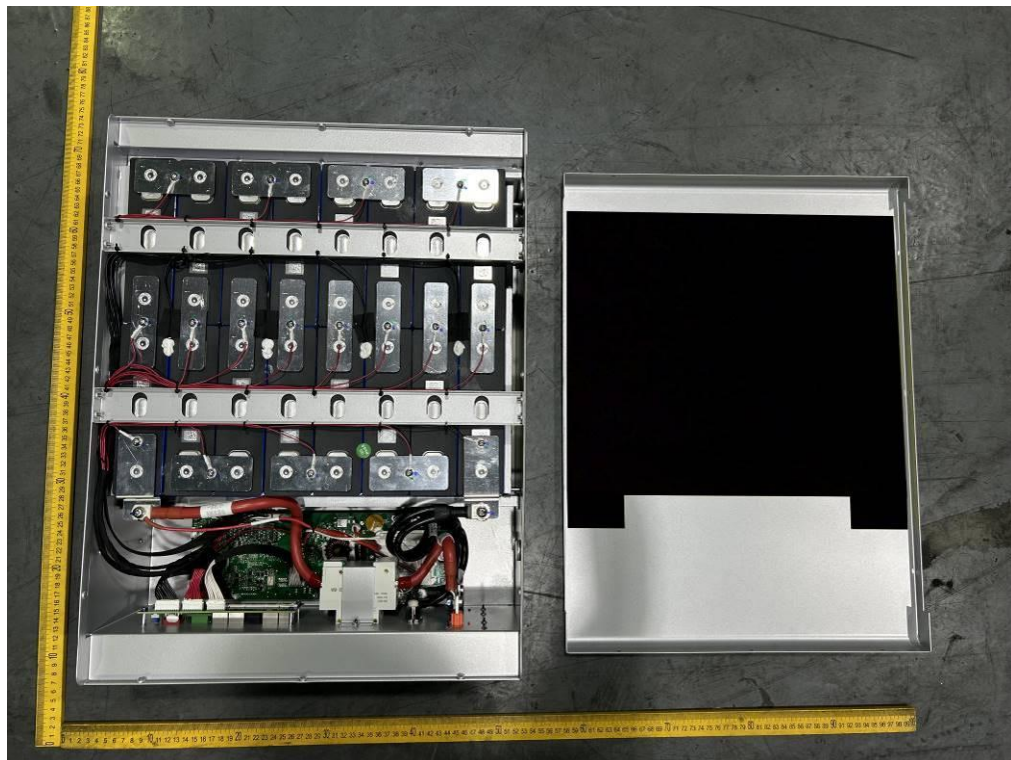


Overall View 1 of connection port

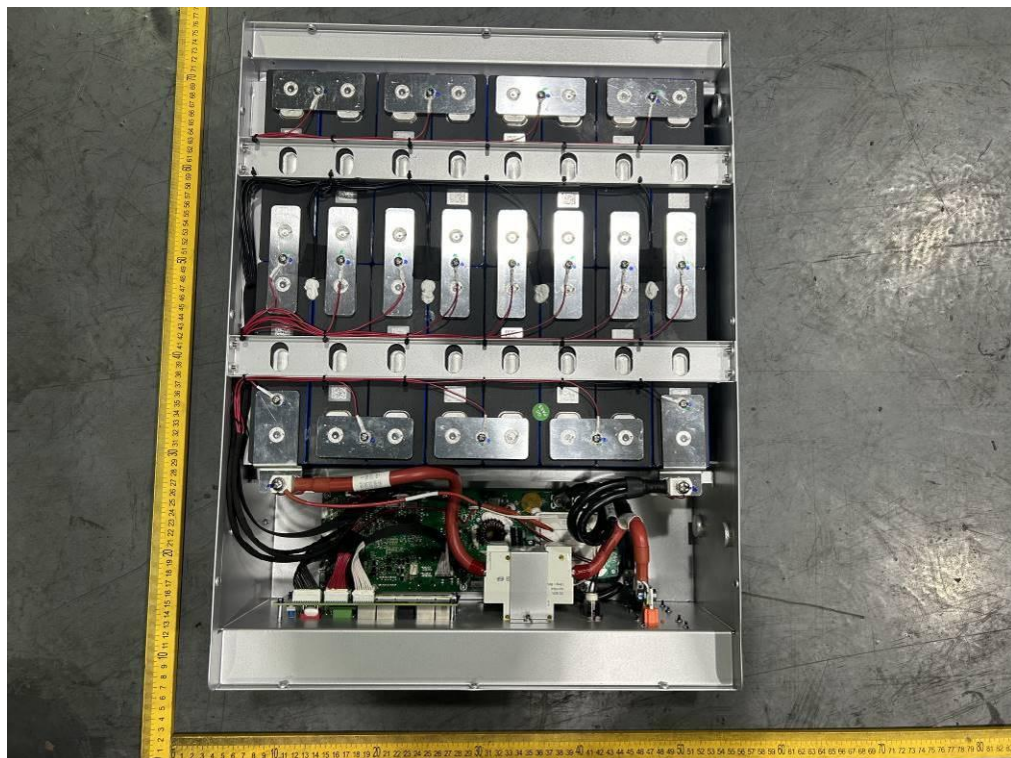


Overall View 2 of connection port

Appendix: Photos



Internal View 1 of battery pack



Internal View 2 of battery pack

Appendix: Photos

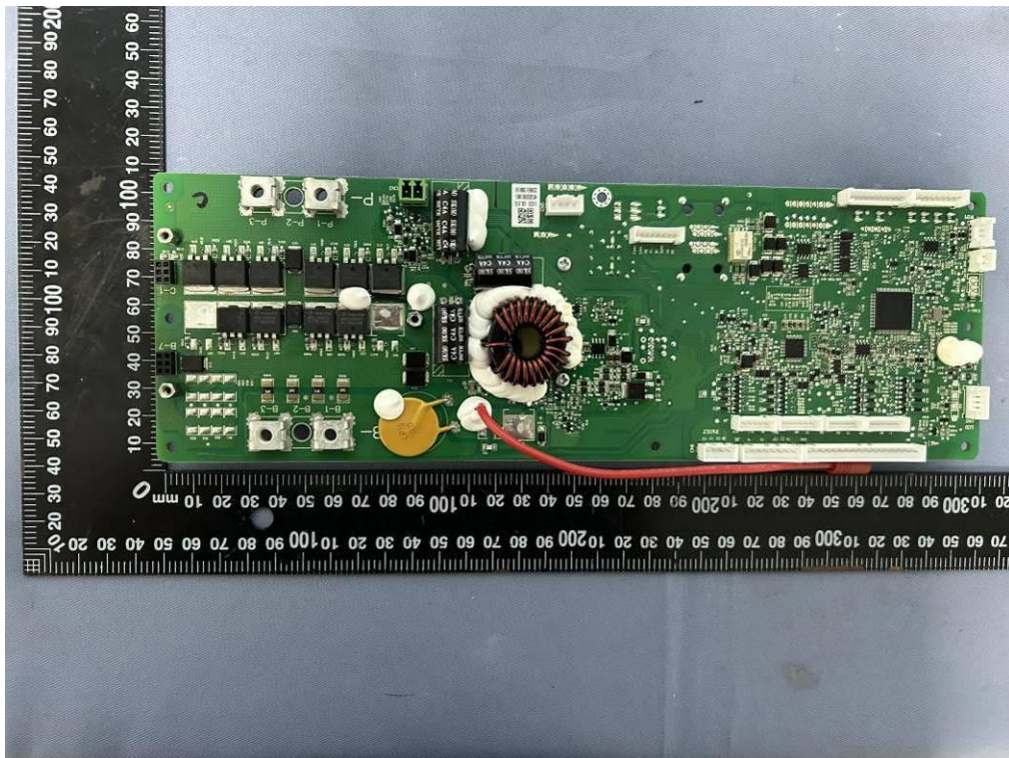


Overall View 1 of the battery

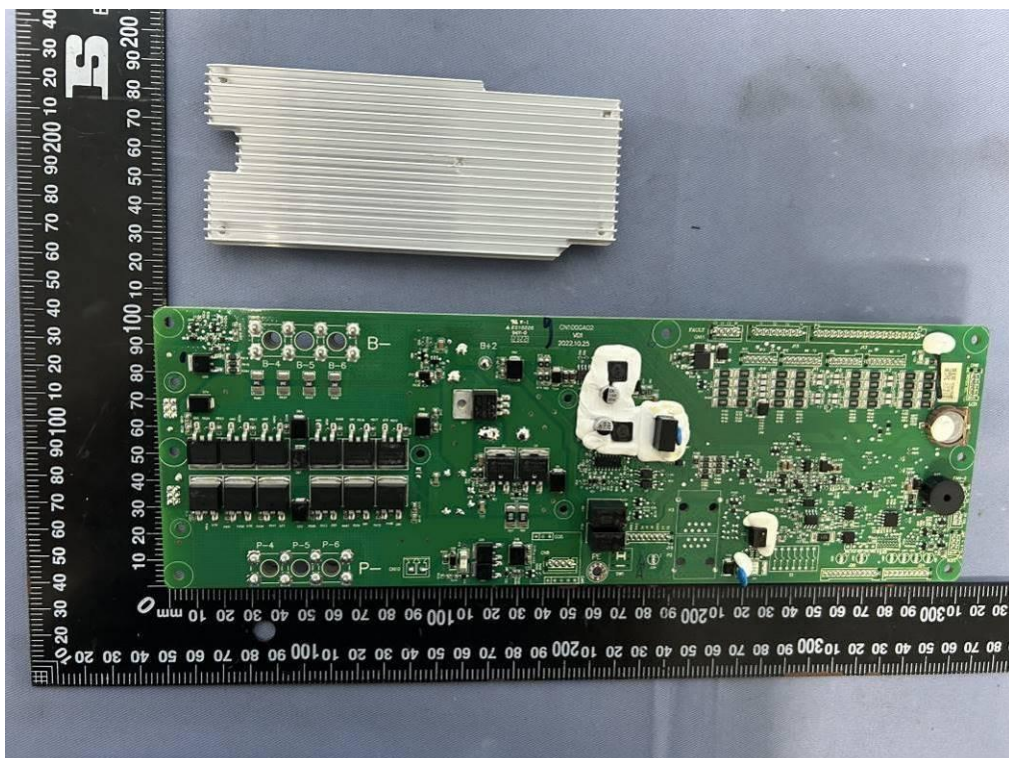


Overall View 2 of the battery

Appendix: Photos

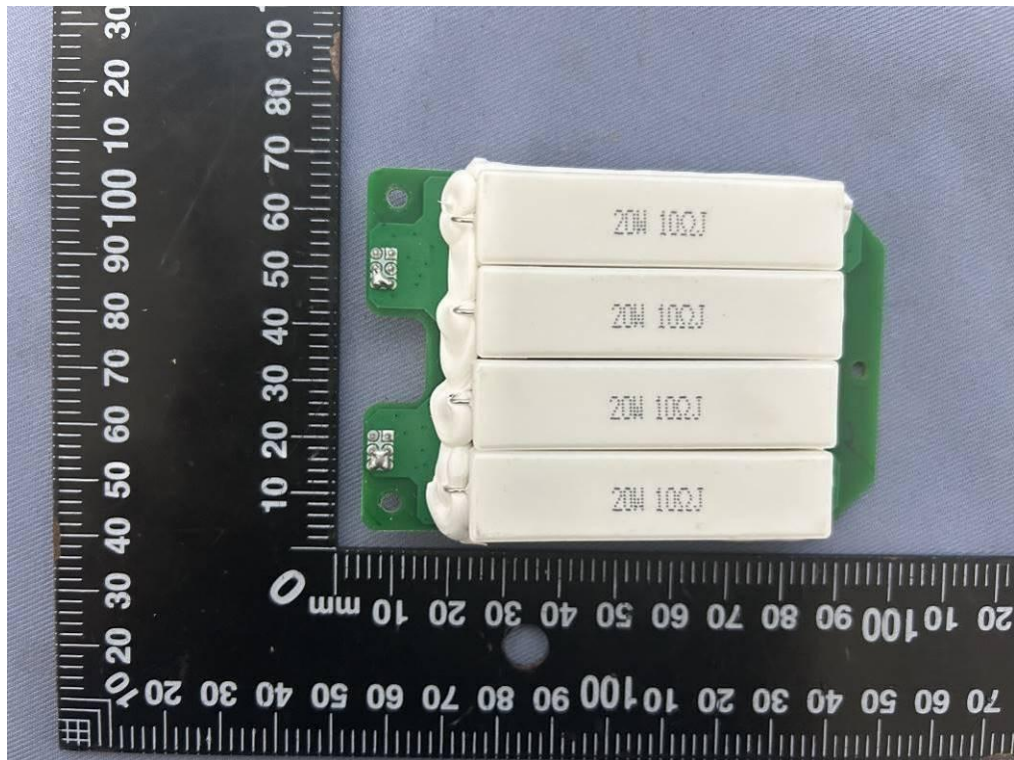


Overall View 1 of BMS board

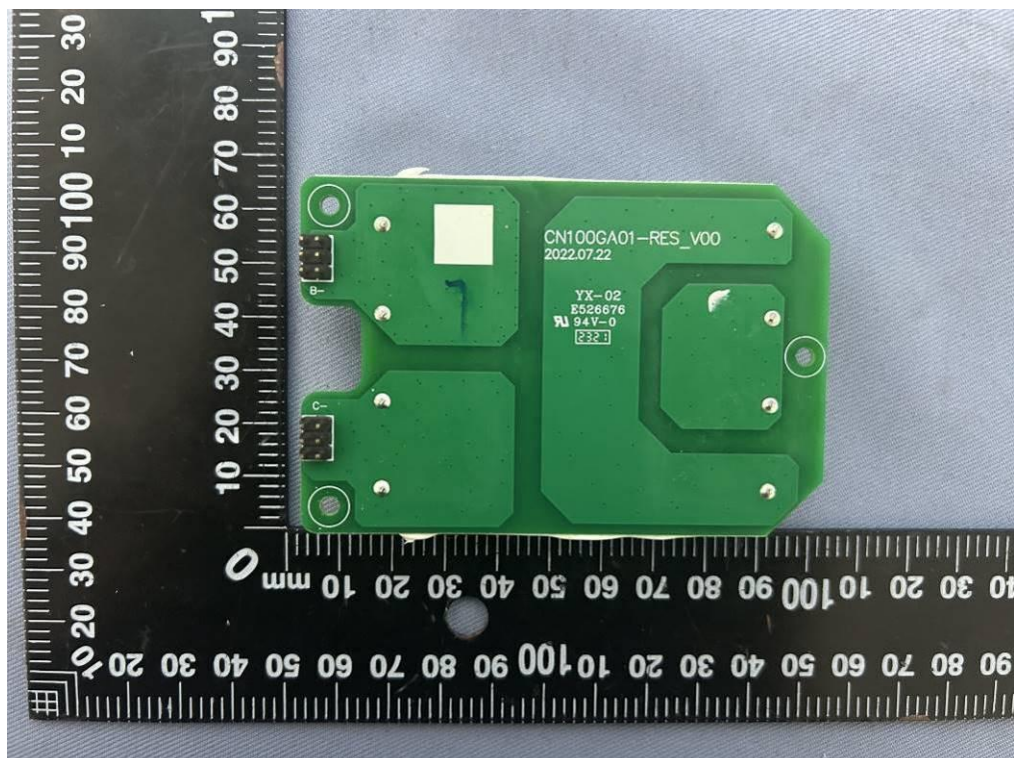


Overall View 2 of BMS board

Appendix: Photos

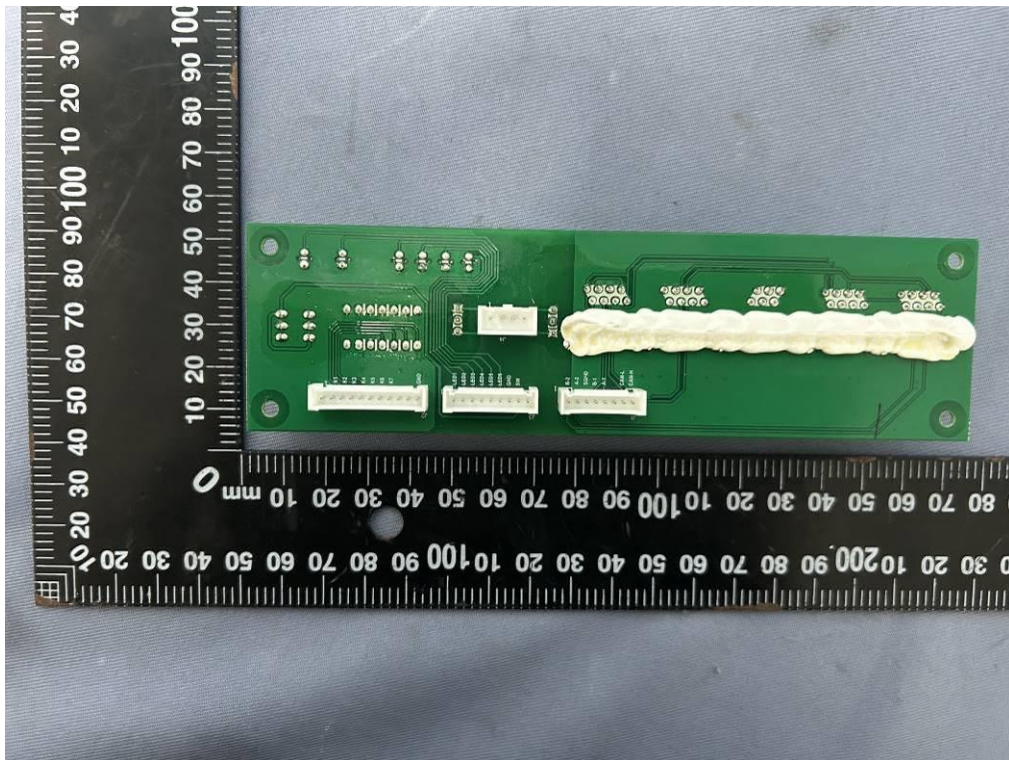


Overall View 1 of Pre-charge board

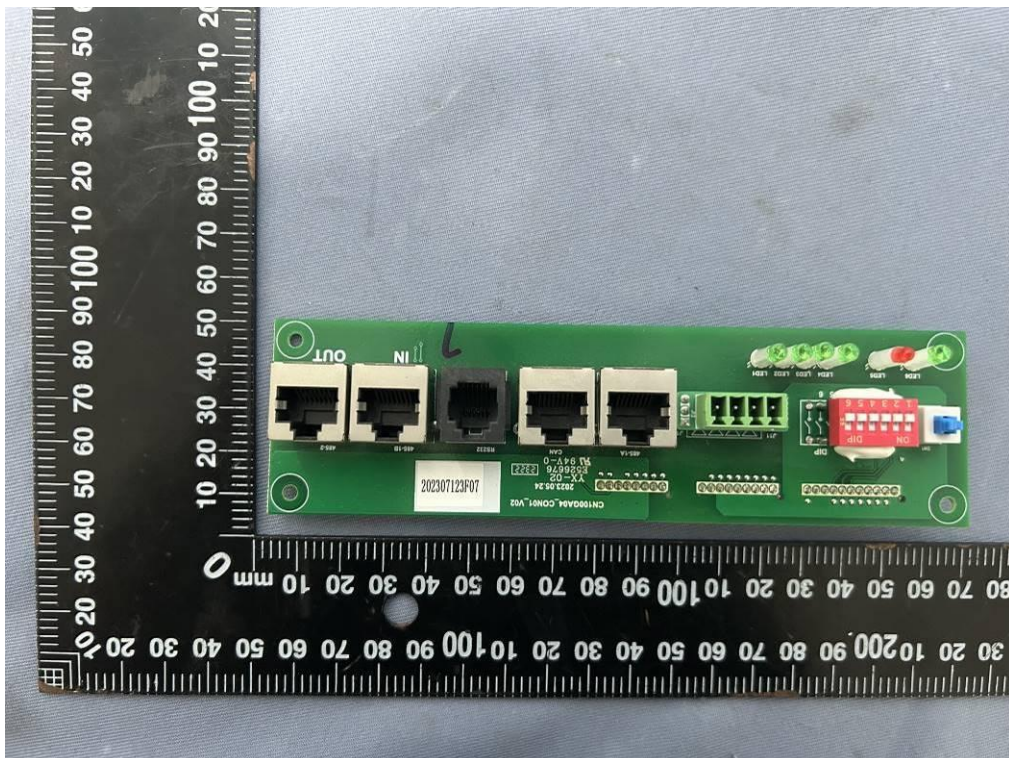


Overall View 2 of Pre-charge board

Appendix: Photos



Overall View 1 of communication board



Overall View 2 of communication board