

TEST REPORT

Applicant : GUANGDONG GOSPOWER ELECTRIC TECHNOLOGY CO., LTD.
Address : No.10 Xingda Road, SSL High-tech Industrial Development Zone, Dongguan, 523808 Guangdong P.R. China.
Manufacturer : GUANGDONG GOSPOWER ELECTRIC TECHNOLOGY CO., LTD.
Address : No.10 Xingda Road, SSL High-tech Industrial Development Zone, Dongguan, 523808 Guangdong P.R. China.
Product Name : LITHIUM IRON PHOSPHATE BATTERY PACK
Trade Mark :  or  or  UFO POWER
Model No. : GPMS-3250B
Ratings : 32V, 50Ah, 1.6kWh
PV Charge Voltage: 20~60V
PV Charge Max Current: 30A
Standard : Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications
IEC 62619:2022
Date of Receiver : March 19, 2024
Date of Test : March 20, 2024 to March 28, 2024
Date of Issue : April 01, 2024
Test Report Form No : NTCS-IEC62619-A1-IEC
Test Result : Pass *

This Test Report is Issued Under the Authority of:

Compiled by



Bettine Liao / Engineer

Approved by



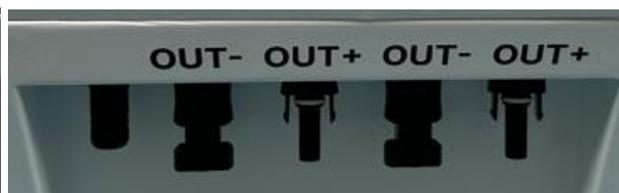
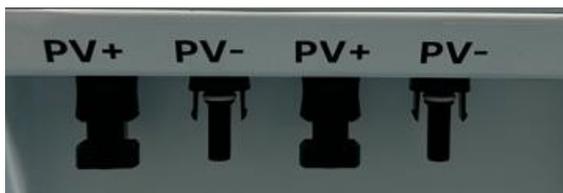
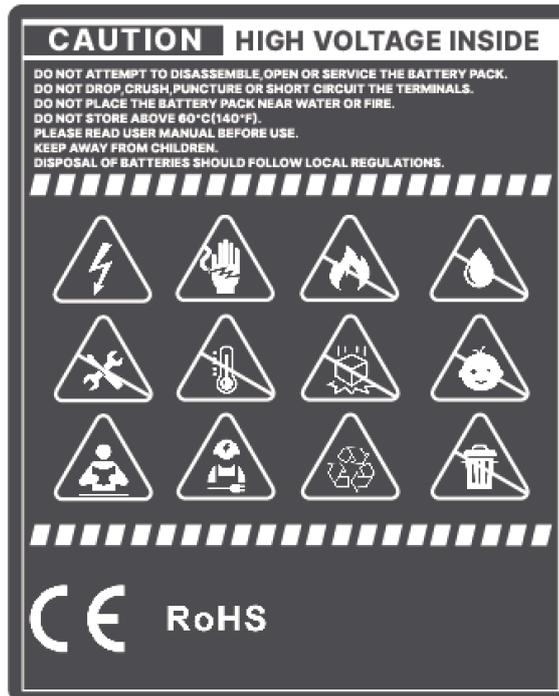
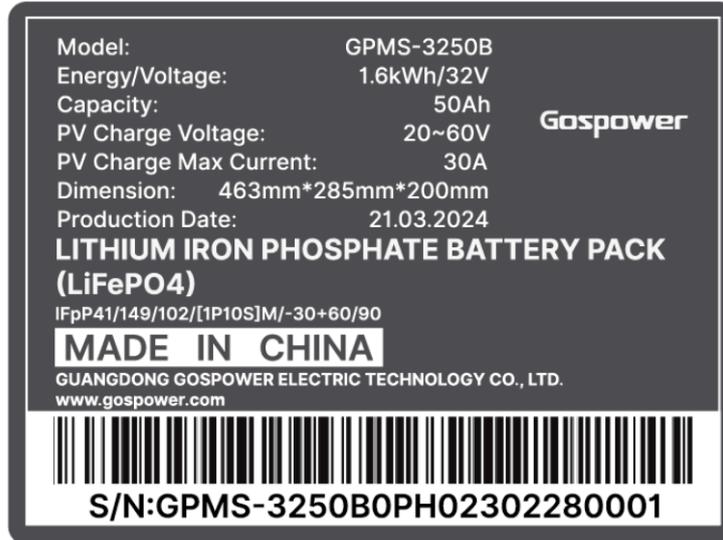
Ryan Luo / Authorized Signer

*Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of Dongguan Nore Testing Center Co., Ltd. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Copy of marking plate:

The artwork below may be only a draft.



Polarized markings are located on the side.

Summary of testing:

Tests performed (name of test and test clause):

- cl.7.2.3.3 Edge and corner drop test (cell or cell block, and 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 IEC62619:2022.

The component cell (GSP3914895F) was evaluated according to IEC 62619: 2022 by TÜV SUD CB Certificate No.: SG PSB-BT-03479M2, report No.: 085-282260328-200.

The product fulfils the requirement of EN IEC 62619:2022.

Test item particulars

Classification of installation and use To be defined in final product

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
- test object does not meet the requirement

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.

Name and address of factories DongGuan UFO Digital Power Technology Co.,Ltd.
No.5, Xingye Road, Songshan Lake Park, Dongguan,
Guangdong, China

General product information and other remarks:

The GPMS-3250B is a LITHIUM IRON PHOSPHATE BATTERY PACK with a nominal voltage of 32V and a nominal capacity of 50Ah which is used in energy storage applications.

According to applicant requirements, only the battery part is tested, and the component cell (GSP3914895F) was evaluated according to IEC 62619: 2022 by TÜV SUD CB Certificate No.: SG PSB-BT-03479M2, report No.: 085-282260328-200.

This battery is constructed with ten Li-ion cells in 10S1P, and has overcharge, over-discharge, over current and short-circuits proof circuit.

The product was tested on:

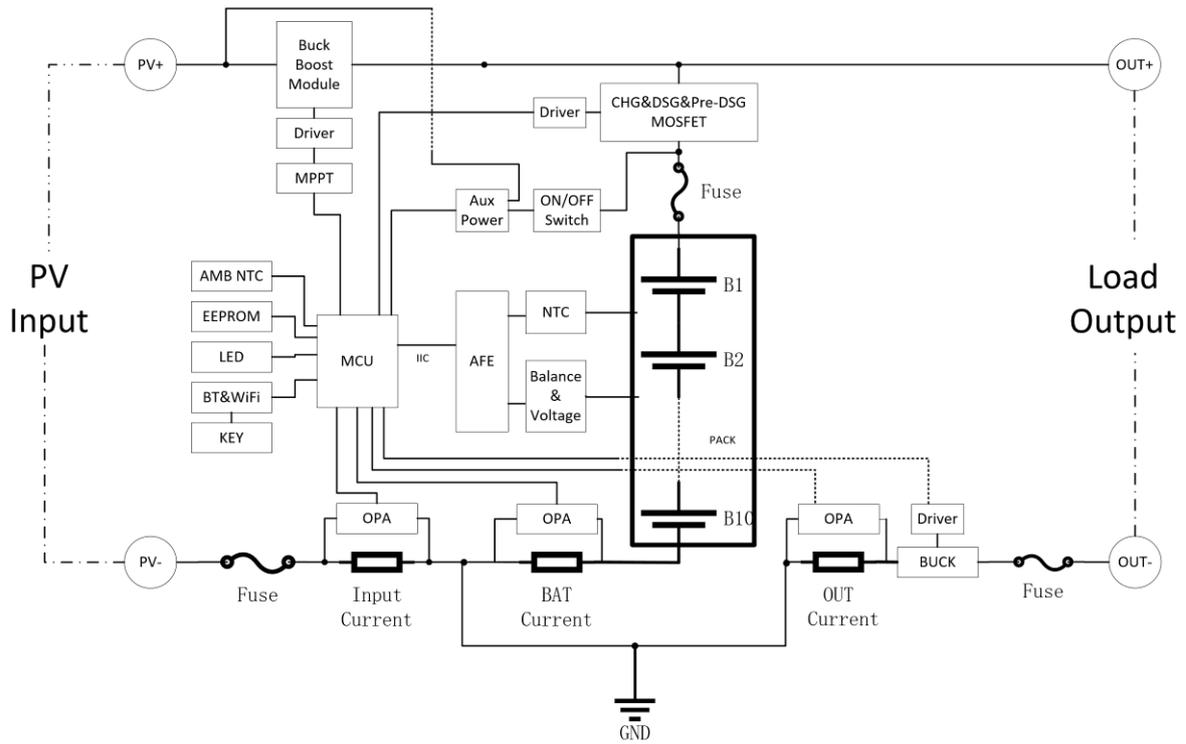
The Hardware version: G1705 PCB1 V0.1

The Software version: V1.01

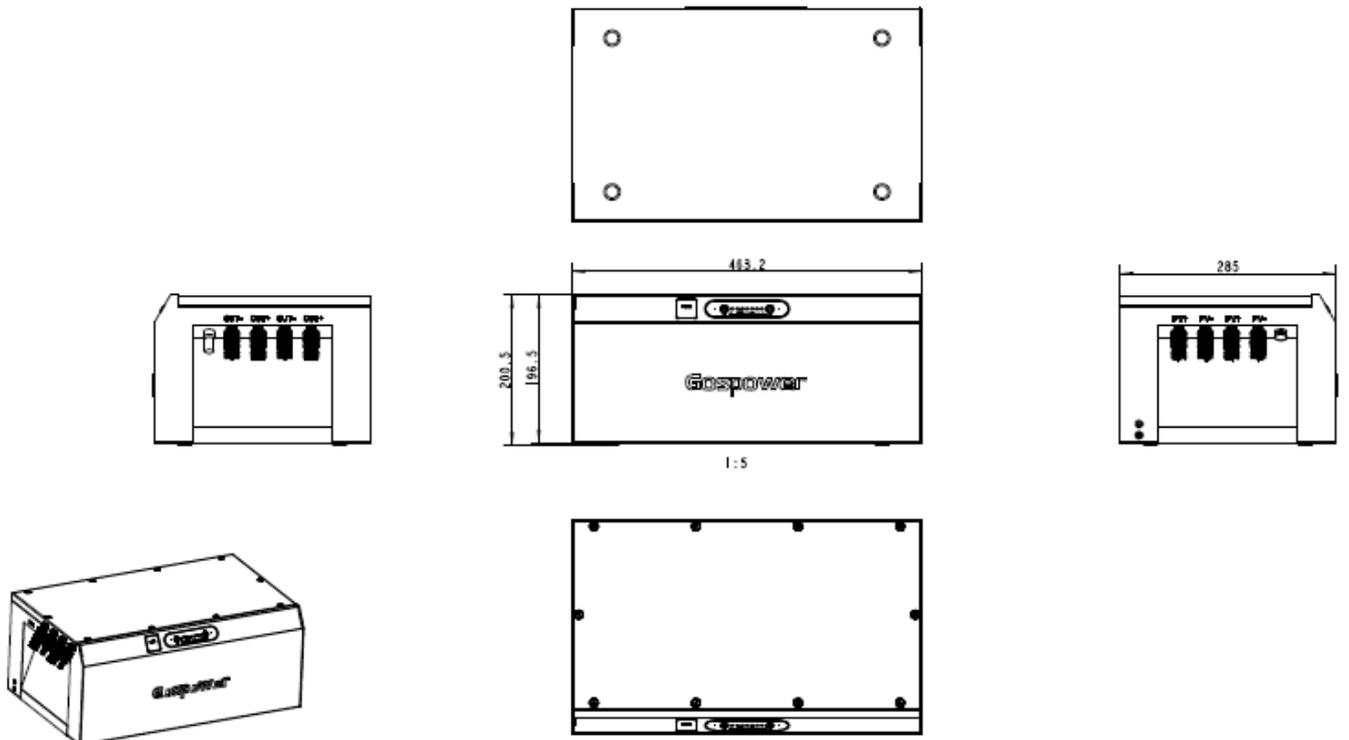
The main features of the battery are shown as below:

Model Designation	GPMS-3250B
Rated capacity	50Ah
Standard charge current	10A
Maximum charge current	25A
Standard continuous discharge current	10A
Maximum continuous discharge current	30A
End of Charging Current	2.5A
Nominal voltage	32V
Standard Full Charging Voltage	36.5V
Maximum Charging Voltage	36.5V
Discharge End Point Voltage	28V
Charge temperature range	0~50
Discharge temperature range	-20~55
PV Charge voltage	20~60V
PV Charge Max Current	30A

The topology diagram as following:



Dimensions (Unit: mm):



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	Vent design in cell.	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	Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 7 and 8.	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		P
	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)		N/A
	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	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)		N/A
	Non-resettable function to stop battery operation		N/A
	Manual with procedure for resetting of battery operation		N/A
	Emergency battery final discharge		N/A
5.9	Quality plan		P
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented.....	Reference: 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
7.1	Charging procedure for test purposes		P
	The battery discharged to a specified final voltage prior to charging		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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)		P
	Short circuit with total resistance of $30\text{ m}\Omega \pm 10\text{ m}\Omega$ at $25\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$		P
	Results: no fire, no explosion	See Table 7.2.1.	P
7.2.2	Impact test (cell or cell block)		P
	Cylindrical cell, longitudinal axis impact		N/A
	Prismatic cell, longitudinal axis and lateral axis impact	Prismatic cell	P
	Results: no fire, no explosion.		P
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	—
	Mass of the test unit (kg).....:	20.74kg	—
	Height of drop (m)	100mm	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)	CB approved cell used.	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	CB 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.....:		N/A
7.2.6	Forced discharge test (cell or cell block)	CB approved cell used.	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Discharge current for forced discharge, 1.0 It.....:		N/A
	Discharging time, $t = (1 It / Im) \times 90$ (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	CB approved cell used.	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 °C ± 5 °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)		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	Evaluated according to IEC 60730-1 Annex H	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
	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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.....:		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.....:	Intended for to be tested in the end use application.	N/A
10	INFORMATION FOR SAFETY		P
	The cell manufacturer provides information about current, voltage and temperature limits of their products	CB approved cell used.	N/A
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.		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.	See page 3	P
	Cell or battery system has clear and durable markings		P
	Cell designation	IFpP/41/149/102/M/-30+60/90	P
	Battery designation		N/A
	Battery structure formulation		N/A
12	PACKAGING AND TRANSPORT		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

	Refer to Annex D		P
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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		—
	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		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	– 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

5.1	TABLE: Critical components information					P
Object/part no.	Manufacturer/trademark	Type/model	Technical data	Standard	Mark(s) of conformity 1)	
Cell	Guangzhou Great Power Energy & Technology CO., Ltd.	GSP3914895F	3.2Vd.c., 50Ah	IEC/EN 62619: 2022	TÜV SUD CB Certificate No.: SG PSB-BT- 03479M2	
Input and output connection terminals	Dongguan Vaconn Electronics Technology Co Ltd	VP-xa-bcdefg series (x=D4, a=B, b=P, c= T, d=D or S, e=F or M, f=4, g=blank)	Rated Voltage: DC 1000V; Rated Current: Max.30A; Operating temperature: -40 to +85°C	UL 6703; IEC 62852:2014+A 1	UL E529142 R 50492180	
Output cable - connection terminals	Dongguan Maywah Electronics Co., Ltd.	PV-15MC	Rated Voltage: DC 1500V Rated Current: 30A	IEC 62852:2014; IEC 62852:2014/A DM1:2020	Test report no.: 7040722519 01-00	
Output cable - Electric Cables	Dongguan Slocable Photovoltaic Technology Co., Ltd.	H1Z2Z2-K	1x4mm ² ; Rated Voltage: DC 1500V; Operating temperature: -40 to +90°C	EN 50618:2014	Test report no.:6429019 0058701	
Bluetooth and WiFi antenna	Shenzhen Tengyufei Electronic Technology Co., Ltd.	2.4G113IPEX15 CM	Frequency point:2400-2483.5MHz	--	--	
Connector for J1	CIXI KEFA ELECTRONICS CO LTD	KF78C-13.0	300V/30A, -40°C to +105°C	UL 1059	UL E306245	
Connector for (J2, J3)	CIXI KEFA ELECTRONICS CO LTD	HB9500-9.5	300V/30A, -40°C to +105°C	UL 1059	UL E306245	
Connector for J4, J9	FUGANG	2.54mm, 180°2PIN	3A	--	--	
Connector for J7	FUGANG	2.54mm 6Pin 180°XHB-6A	250V/3A, -25 to +85°C	--	--	
Connector for J8	FUGANG	3.0mm 2X6Pin 180°	250V/5A, -25 to +85°C	--	--	
Connector for J10, J11	FUGANG	XHB-10A	250V/3A, -25 to +85°C	--	--	

Connector for J12	FUGANG	2*5PIN,2.0mm, 180°	1.5A, -40 to +105°C	--	--
Connector for J13	FUGANG	2*3PIN,2.0mm, 180°	1.5A, -40 to +105°C	--	--
Switch (SW1, SW2)	FUGANG	6X6X10H	12V,10mA; Operating temperature: -20~+70°C	--	--
Fuse (F1, F2, F3, F4, F5, F6)	SHENZHEN VICTORS INDUSTRIAL CO., LTD.	RT303-40A80VCX	80V, 40A	--	--
NTC (NTC1)	NEW PRODUCT INTEGRATION SOLUTIONS	103F3435FBL120	10KΩ, ±1%, -40~120°C	UL 508A	UL E332385
NTC (NTC2)	NANJING SHIHENG ELECTRONICS CO LTD	MF52A103Y3950	10KΩ, ±1%, -55~125°C	UL 1434	UL E240991
Varistor (RV1, RV2, RV3, RV4, RV5, RV6)	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	10D101K	Volts: 60V, Vn: 100V, -40 to 125°C	UL 1449	UL E330837
Varistor (RV1, RV2, RV3, RV4, RV5, RV6) (Alternative)	Guangdong Fenghua Advanced Technology Holding Co., Ltd.	FNR-10K101	Volts: 60V, Vn: 100V, min. 105°C	UL 1449	UL E325462
Varistor (RV1, RV2, RV3, RV4, RV5, RV6) (Alternative)	CERGLASS MFG INC	10D101K	Volts: 60V, Vn: 100V, min. 105°C	UL 1449	UL E317616
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49)	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	CY	Rated for each max. 1000pF, min. 250Vac, 125°C, Y1 type	UL 60384-14	UL E208107
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49) (Alternative)	SHAANXI HUAXING ELECTRONIC DEVELOPMENT CO LTD	CT7Y1	Rated for each max. 1000pF, 400Vac, 125°C, Y1 type	UL 60384-14	UL E217400
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49)	DONGGUAN EASY-GATHER ELECTRONIC CO LTD	DCF	Rated for each max. 1000pF, min. 250Vac, 125°C, Y1 type	UL 60384-14	UL E252221

(Alternative)					
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49) (Alternative)	HSUAN TAI ELECTRONICS CO LTD	CY Series	Rated for each max. 1000pF, 400Vac, 125°C, Y1 type	UL 60384-14	UL E199069
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49) (Alternative)	XIAMEN FARATRONIC CO LTD	MKP63	Rated for each max. 1000pF, min. 250Vac, 110°C, Y2 type	UL 60384-14	UL E186600
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49) (Alternative)	XIAMEN FARATRONIC CO LTD	MKP67	Rated for each max. 1000pF, min. 400Vac, 110°C, Y1 type	UL 60384-14	UL E186600
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49) (Alternative)	TDK CORPORATION	CD	Rated for each max. 1000pF, min. 250Vac, 125°C, Y1 type	UL 60384-14	UL E37861
Safety capacitor (C3, C4, C7, C12, C21, C24, C36, C49) (Alternative)	Walsin Technology Corp	SYW	Rated for each max. 1000pF, min. 250Vac, 125°C, Y1 type	UL 60384-14	UL E146544
IC for Rectifier controller (U6)	JOULWATT	JWH5140ESOP #TR	100V, 0.6A, Operating temperature: -40 to 125°C	--	--
IC for voltage adjuster (U7)	JIANGSU CHANGJIANG ELECTRONICS TECHNOLOGY CO., LTD	CJ78D05	5V, 1A, Operating temperature: -25 to 125°C	--	--
Isolation IC (U1, U20)	NOVOSENSE	NSi6801B-DSWFR	5A, 5.7KV, Operating temperature: -40 to 125°C	--	--
Isolation IC (U18)	EVERLIGHT	EL3H7B-G	Output voltage: 80V max; V _i : 1.2V, I _f : 50mA; Operating temperature: -55 to 110°C	--	--
IC for EEPROM (U13, U21)	Shanghai Belling Co., Ltd.	BL24C512A	Power supplies: 2.5V to 5.5V;	--	--

			Operating temperature: -40 to 85°C		
IC for NorFlash (U1)	Macronix	MX25V1606	Power supplies: 2.3V to 3.6V; Operating temperature: -40 to 85°C	--	--
IC for operational amplifier (U8, U9, U10, U11)	SGMICRO	SGM8255B-2	Power supplies: 4.5V to 36V; Operating temperature: -40 to 125°C	--	--
IC for operational amplifier (U12)	SGMICRO	SGM8212-2	Support single or Dual power supplies: 2.7V to 36V or ±1.35V to ±18V; Operating temperature: -40 to 125°C	--	--
IC for MCU (U14)	ST	STM32G474RB T6	Operating voltage range: 1.71~3.6V; Operating temperature: -40 to 85°C	--	--
IC for MCU (U2)	Artery	AT32F425F8P7	Operating voltage range: 2.4~3.6V; Operating temperature: -40 to 105°C	--	--
IC for PWM Controllers (U5)	ONSEMI	UC3845B	Operating voltage range: 8.5~30V; Operating temperature: -25 to 85°C	--	--
IC for MOS Driver (U3, U4)	Texas Instruments	UCC27282DRM R	Operating voltage range: 5.5~16V; Operating temperature: -40 to 140°C	--	--
IC for MOS Driver (U2)	STMicroelectronics	PM8834	Operating voltage range: 5~18V; Operating temperature: -40 to 105°C	--	--

IC for voltage adjuster (U15)	SGMICRO	SGM803-SXN3L/TR	2.93V,0.02A	--	--
IC for Rectifier controller (U16)	JOULWATT	JW5392SOTI#TR	18V, 2A, DC-DC,600KHz, Operating temperature: -40 to 125°C	--	--
IC for voltage reference (U17)	BCD	AZ431AN-ATRE1	2.5V, 0.4%	--	--
IC for datacom chip (U19)	SINO WEALTH	SH367309U	Overcharge Detection Voltage: 3.7V, Operating temperature: -40 to 85°C	--	--
MOSFET for charge and discharge (Q3, Q4, Q5, Q6, Q7, Q8, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19)	NCEPOWER	NCEP039N10D	V _{DS} = 100V, V _{GS} = ±20V, I _D = 135A, T _C = 25°C), T _J = -55 to 175°C	--	--
MOSFET for pre-discharge (Q1)	NCEPOWER	NCE01P30K	V _{DS} : 100V; I _D : 30A(TC= 25°C); V _{GS} : 20V; T _j : -55 to 175°C	--	--
High-frequency drive transformer (T1, T2)	Shenzhen Wanzhiyu Technology Co., Ltd.	LT02279V00	240uH min; Operating temperature: -25~+100°C	--	--
L1, L2, L6	CHANGSHEN	LL02348V00	18.6uH±10%, 500Vdc, 130°C	--	--
L3, L8	BAOHUI	LL02220V00	0.7mH 3.0mΩ 1500Vdc	--	--
Bluetooth & WiFi Module (U4)	Hi-Link	HLK-B35	Operating voltage range: 2.1~3.6V;	--	--
G1705 PCB1	SHENZHEN SHENKAI ELECTRONICS CO LTD	SK-4	V-0, 150°C	UL 94 UL 796	UL E319204
G1705 PCB1 (Alternative)	Interchangeable	Interchangeable	V-0, 150°C	UL 94 UL 796	UL approved

G1705 PCB2	SHENZHEN SHENKAI ELECTRONICS CO LTD	SK-2	V-0, 150°C	UL 94 UL 796	UL E319204
G1705 PCB2 (Alternative)	Interchangeable	Interchangeable	V-0, 150°C	UL 94 UL 796	UL approved
G1691 PCB1	SHENZHEN SHENKAI ELECTRONICS CO LTD	SK-4	V-0, 150°C	UL 94 UL 796	UL E319204
G1691 PCB1 (Alternative)	Interchangeable	Interchangeable	V-0, 150°C	UL 94 UL 796	UL approved
Internal Wire for J2, J3	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	UL1015	12AWG, 105°C, 600V	UL 758	UL E473509
Internal Wire for J1	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	UL3530	10AWG, 200°C, 600V	UL 758	UL E473509
Internal Wire Connector for J1	CHANGZHOU AMASS ELECTRONIC CO LTD	XT90H-F XT90H-M	UL94-V0, DC600V, 30A	UL 1977	UL E482722
Internal Wire for J8	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	UL1015	24AWG, 105°C, 600V	UL 758	UL E473509
Internal Wire for J10	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	UL1015	24AWG, 105°C, 600V	UL 758	UL E473509
Internal Wire for J4	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	UL1015	24AWG, 105°C, 600V	UL 758	UL E473509
NTC for J7	NANJING SHIHENG ELECTRONICS CO LTD	MF52A103Y3950	22AWG, 30-105°C	UL 1434	UL E240991
Lead wire (BAT+, BAT-)	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	3530	10AWG, 200°C, 600Vac	UL 758	UL E473509
Lead wire (BAT+, BAT-) (Alternative)	Interchangeable	Interchangeable	Min. 10AWG, 200°C, 600Vac	UL 758	UL E473509
Lead wire (PV+, PV-, OUT+, OUT-)	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	1015	12AWG, 105°C, 600Vac	UL 758	UL E473509

Lead wire (PV+, PV-, OUT+, OUT-) (Alternative)	Interchangeable	Interchangeable	Min. 12AWG, 105°C, 600Vac	UL 758	UL approved
LED cord and QR cord	DONGGUAN CITY MINGHE ELECTRONIC CO LTD	1015	24AWG, 105°C, 600Vac	UL 758	UL E473509
LED cord and QR cord (Alternative)	Interchangeable	Interchangeable	Min. 24AWG, 105°C, 600Vac	UL 758	UL approved
Supplementary information:					

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): _____

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): _____

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): __

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 (m²)		

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): __

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	

2311-5645	30.28V	19.80	60.0	36.24V	A, D, F
			Charge Voltage Applied Battery System: 1)		
			Whole	Part	
			60.0V	40.15V	

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
2403-1227	30.33	36.0	35.40	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
2403-1227	32.46	20.0	60.00
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results
50		63.9	P

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): _____

Photo documentation

Photo 1 Overview of battery



Photo 2 Overview of battery



Photo 3 Overview of battery



Photo 4 Overview of battery



Photo 5 Internal of battery



Photo 6 Internal of battery

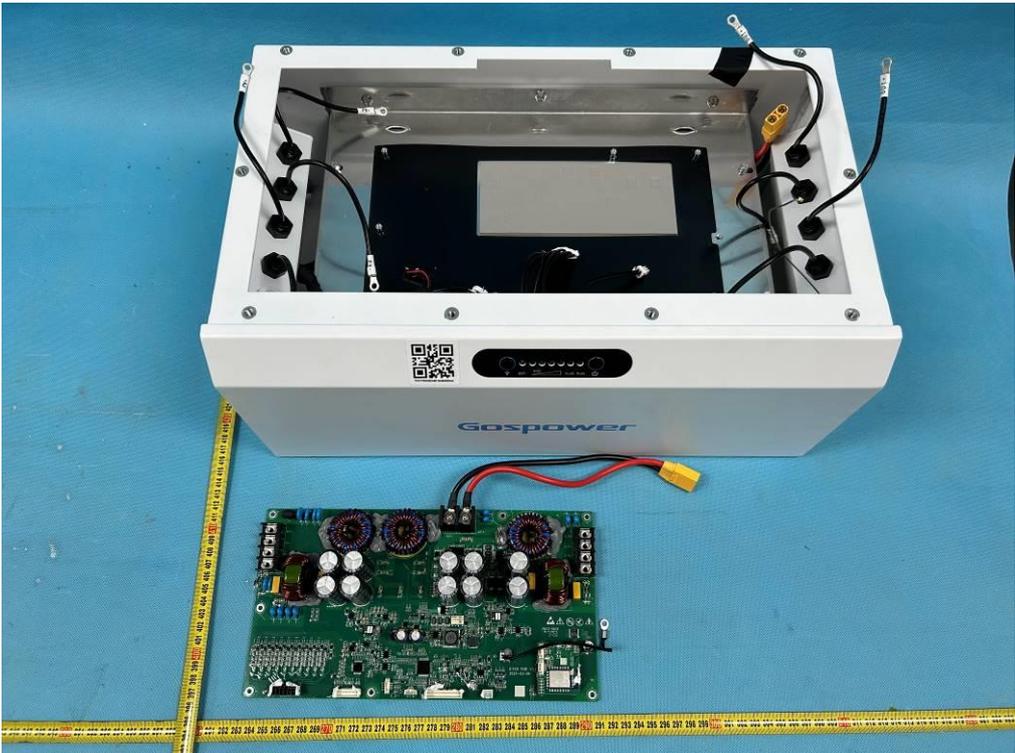


Photo 7 Internal of battery

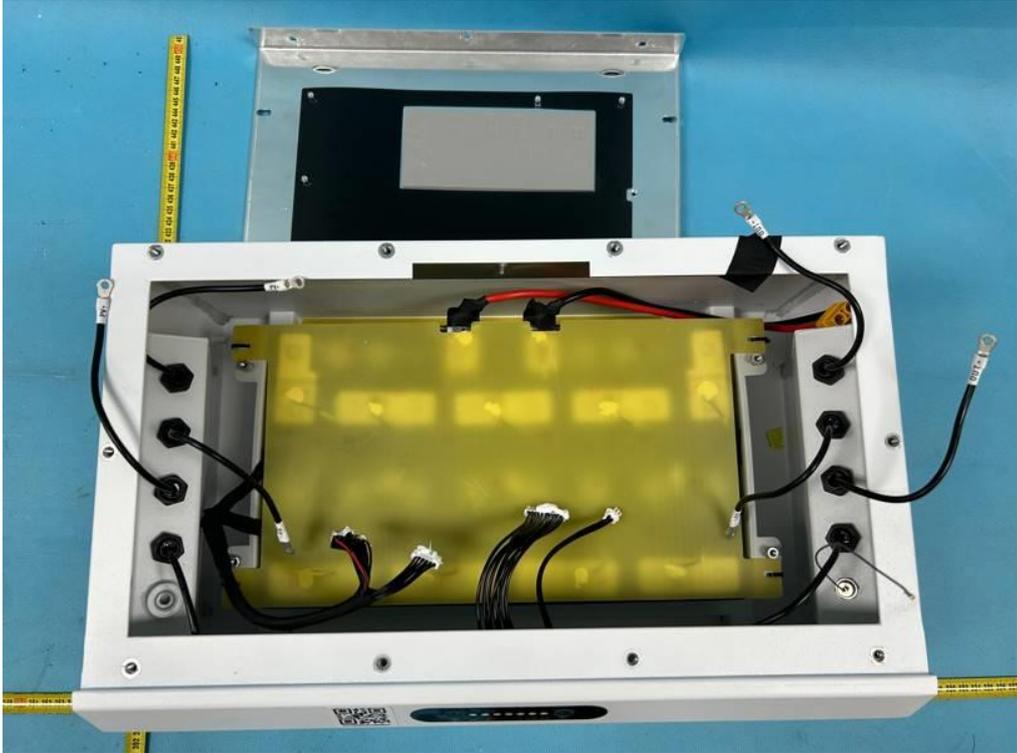


Photo 8 Internal of battery



Photo 9 Internal of battery



Photo 10 Internal of battery

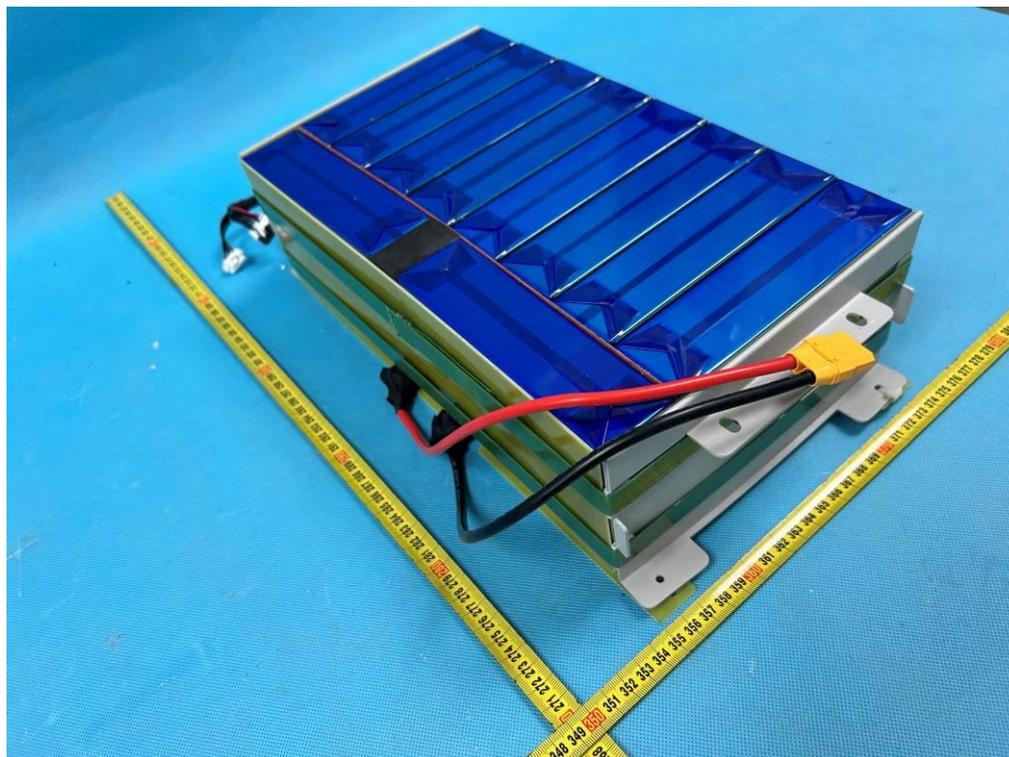


Photo 11 Front view of G1705 PCB1

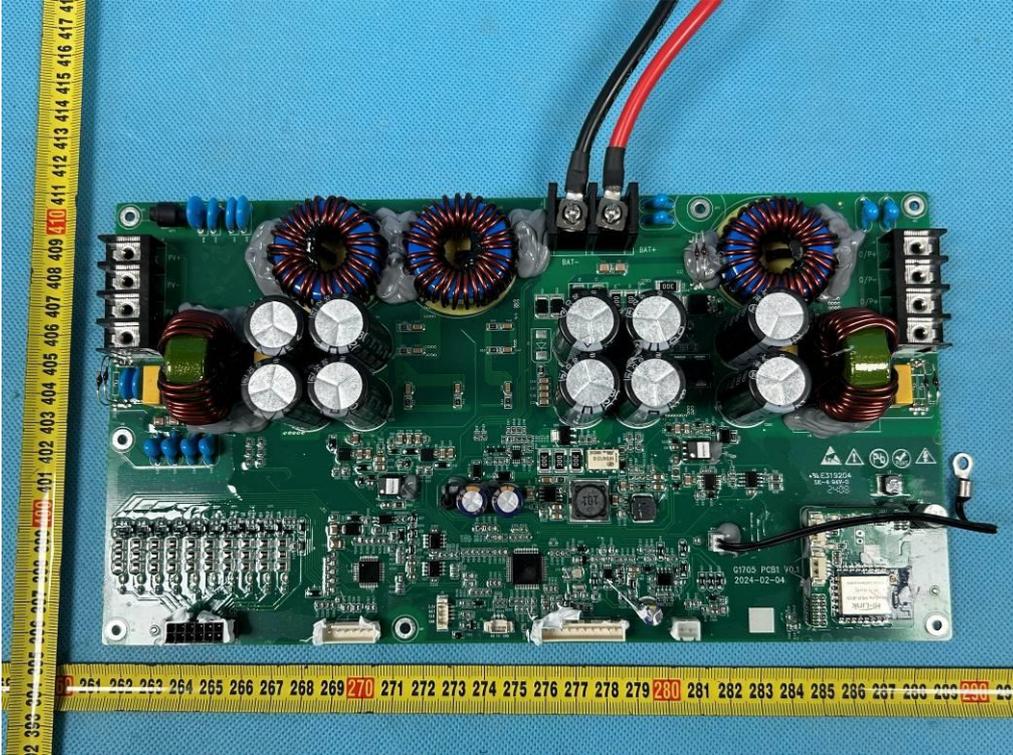


Photo 12 Back view of G1705 PCB1

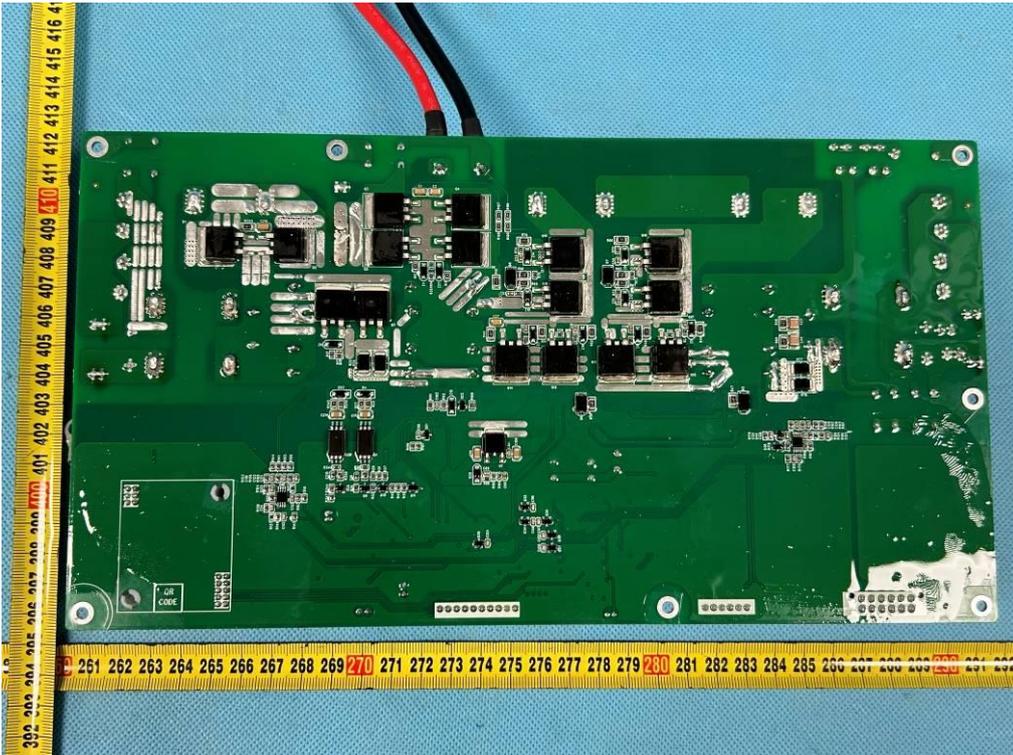


Photo 13 Front view of G1705 PCB2

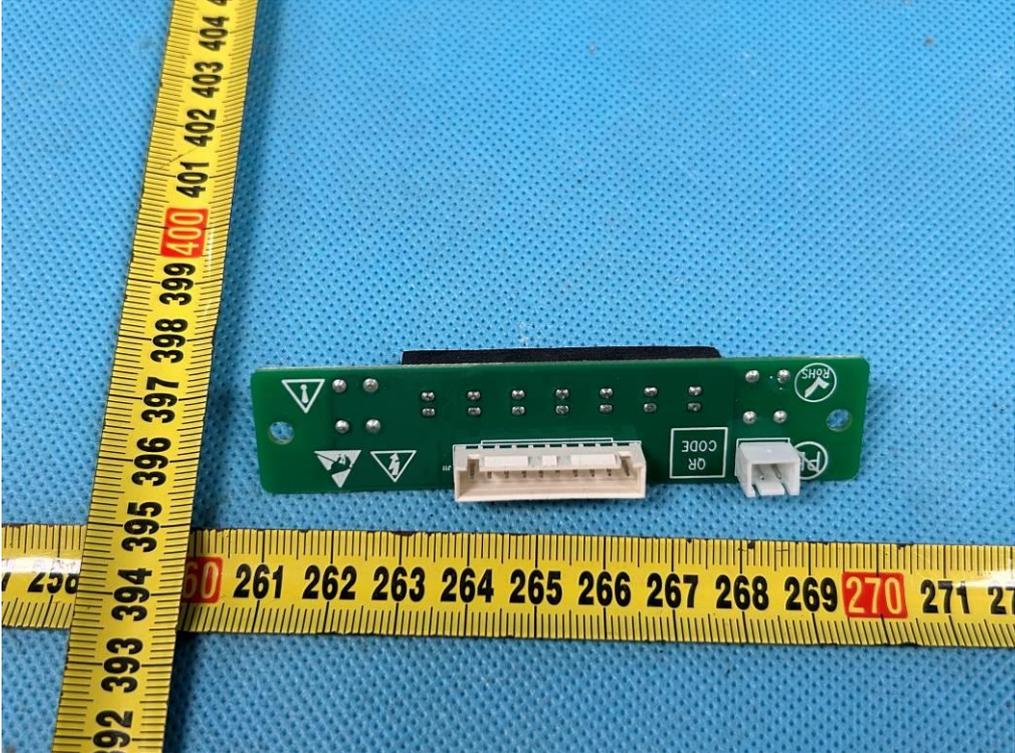


Photo 14 Back view of G1705 PCB2



Photo 15 Front view of G1691 PCB1



Photo 16 Back view of G1691 PCB1

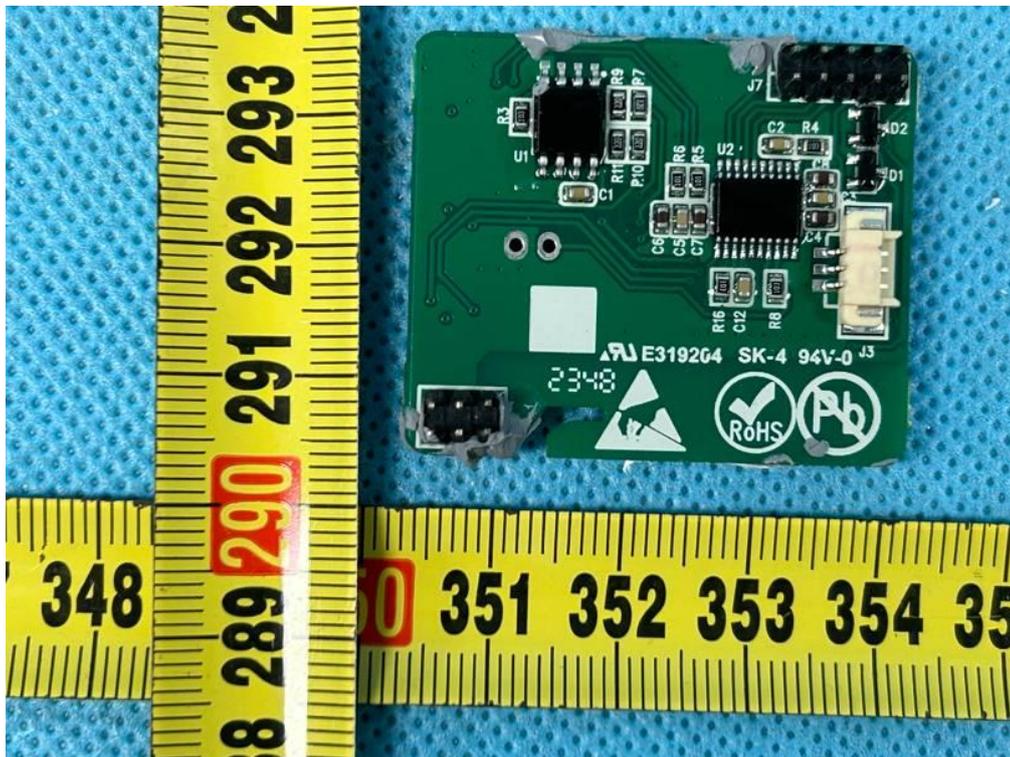


Photo 17 Over view of cell

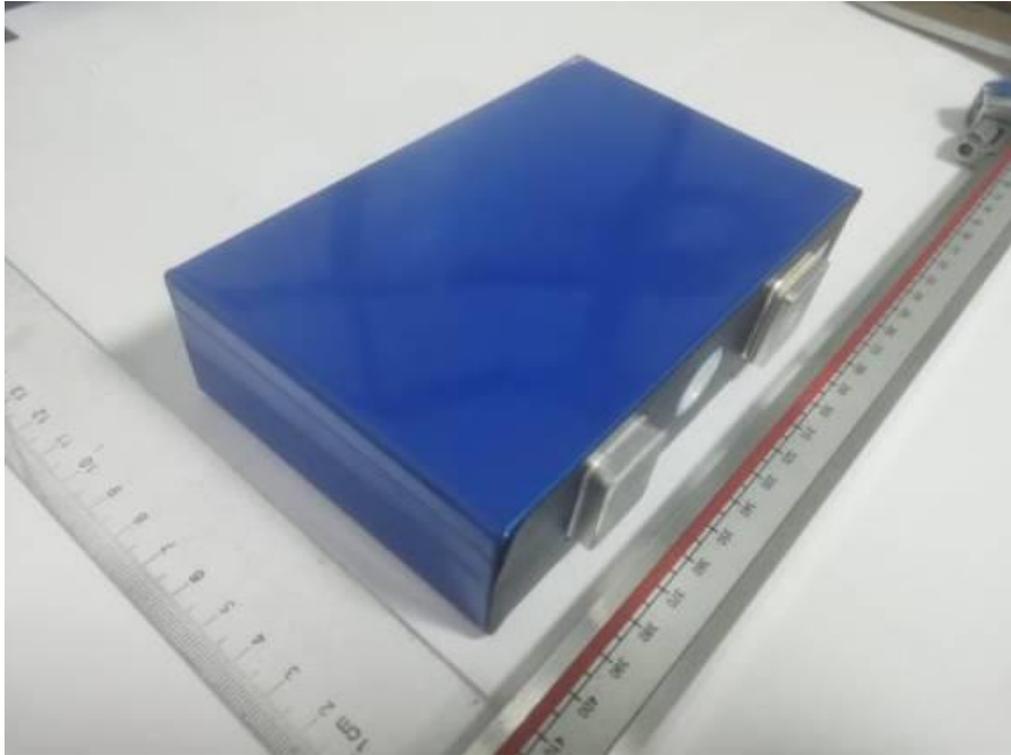


Photo 18 Over view of cell

