



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.....: CN23AZKT 001

Date of issue.....: 2023-10-30

Total number of pages.....: 24 pages

Name of Testing Laboratory preparing the Report.....: TÜV Rheinland (Shenzhen) Co., Ltd.

Applicant's name .....: Gobel Power Energy (Shenzhen) Co, Ltd.

Address .....: Block B, 806 809, Huameiju Building, Baoan District, Shenzhen City, Guangdong, P.R. China

**Test specification:**

Standard.....: IEC 62619:2022

Test procedure .....: CB Scheme

Non-standard test method .....: N/A

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

Test Report Form No. ....: IEC62619B

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

Master TRF.....: Dated 2023-02-24

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<b>Test item description</b> .....	Gobel Power Rechargeable Li-ion Battery	
<b>Trademark(s)</b> .....		
<b>Manufacturer</b> .....	Dongguan Zhongling Technology Co., Ltd No.902, Building 2, DIGITAL VALLEY, No. 3 Yongtai Road, Longbeiling, Tangxia Town, Dongguan City, Guangdong, P.R. China	
<b>Model/Type reference</b> .....	GP-SR1-PC200	
<b>Ratings</b> .....	51.2VDC, 280Ah, 14.3kWh	
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory</b>	TÜV Rheinland (Shenzhen) Co., Ltd.
<b>Testing location/ address</b> .....	1F East, 3F West - 4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China	
<b>Tested by (name, function, signature)</b> .....	Locs Lai (Engineer)	
<b>Approved by (name, function, signature)</b> ...	Alvin Zheng(Reviewer)	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 1:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name, function, signature)</b> .....		
<b>Approved by (name, function, signature)</b> ...		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name + signature)</b> .....		
<b>Witnessed by (name, function, signature)...</b>		
<b>Approved by (name, function, signature)</b> ...		
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name, function, signature)</b> .....		
<b>Witnessed by (name, function, signature)...</b>		
<b>Approved by (name, function, signature)</b> ...		
<b>Supervised by (name, function, signature) :</b>		

<b>List of Attachments (including a total number of pages in each attachment):</b>	
Attachment 1: Photo documentation (7 pages).	
<b>Summary of testing:</b>	
<b>Tests performed (name of test, test clause and date test performed):</b> cl.7.2.3.3 Edge and corner drop test (battery system, 2023-09-18); cl.8.2.2 Overcharge control of voltage (battery system, 2023-09-18); cl.8.2.3 Overcharge control of current (battery system, 2023-09-18); cl.8.2.4 Overheating control (battery system, 2023-09-18); The component cell (LF280K) used inside was complied with the requirement of IEC 62619:2022, certified by TÜV Rheinland, certificate No. JPTUV-147819. The samples comply with the requirement of IEC 62619: 2022.	<b>Testing location:</b> <b>TÜV Rheinland (Shenzhen) Co., Ltd.</b> 1F East & 3F West -4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China
<b>Summary of compliance with National Differences (List of countries addressed):</b>	
No EU Group Differences	
<input checked="" type="checkbox"/> <b>The product fulfils the requirements of <u>EN IEC 62619:2022</u>.</b>	
<b>Use of uncertainty of measurement for decisions on conformity (decision rule):</b>	
<input checked="" type="checkbox"/> 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"). <input type="checkbox"/> Other: N/A	
<b>Information on uncertainty of measurement:</b>	
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 IECCEE. IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECCEE 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.


The markings below are indicated on the Battery:

### Gobel Power Rechargeable Li-ion Battery

IFpP/73/174/208/[16S1P]M/-10+50/90


Model	GP-SR1-PC200
Battery Type	LiFePO4
Battery Energy	14.3kWh
Nominal Voltage	51.2VDC
Capacity	280Ah
Max Charge Voltage	58.4VDC
Max Charge Current	140A
Max Discharge Current	200A
Parallel Connection (Max)	15P
Series Connection	NO
Active Balance	4A
Ingress Protection	IP21
Operating Temperature Range	Charge: 0 - 55°C Discharge: -20 - 55°C

## CAUTION !

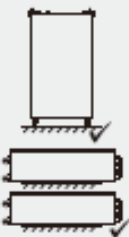


- Do not disassemble
- Do not short-circuit
- Do not place in fire or near hot source
- Please read user manual carefully


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www.gobelpower.com  
Made in China




IEC 62619  
UN 38.3  
CE







WARNING



Electrical Hazard.

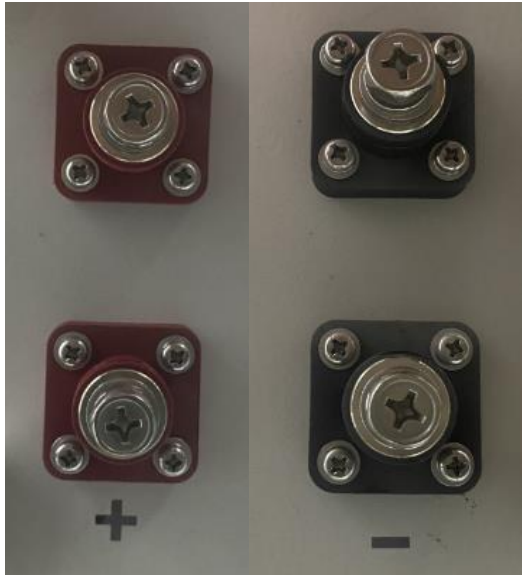
Label of QR Code:



GPEV280H230802R1006

Remark(s):

1. Polarity is marked near connector.



2. Disposal instructions and recommended charge instruction are supplied with product.

Dispose of the battery system in accordance with the locally applicable disposal regulations for electronic waste.

### 8.3. Recommended Charging Method

**Standard Charge:** Constant current charging with a voltage of 55.2V and a current of 0.25C (A) until the current cut-off 14A.

3. "230802" in "GPEV280H230802R1006" represents manufacture date "2023-08-02".

<b>Test item particulars</b> .....	
<b>Classification of installation and use</b> ..... : To be defined in final system.	
<b>Supply Connection</b> ..... : Not directly connected mains. ..... :	
<b>Possible test case verdicts:</b> - 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)	
<b>Testing</b> .....	
<b>Date of receipt of test item</b> ..... : 2023-08-14	
<b>Date (s) of performance of tests</b> ..... : 2023-08-14 to 2023-09-18	
<b>General remarks:</b>	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
<b>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</b>	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:</b>	
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"/> <b>Yes</b> <input checked="" type="checkbox"/> <b>Not applicable</b>
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies)</b> ..... : Same as manufacturer	

**General product information and other remarks:**

-The product has 16 lithium-ion cells in 16S1P connection and battery management system.

-The electric, electronic and software controls and systems for critical safety were subjected to analysis for functional safety according to IEC 60730-1 Annex H. Redundant protections need to communicate with the end device and relies on the end device to achieve.

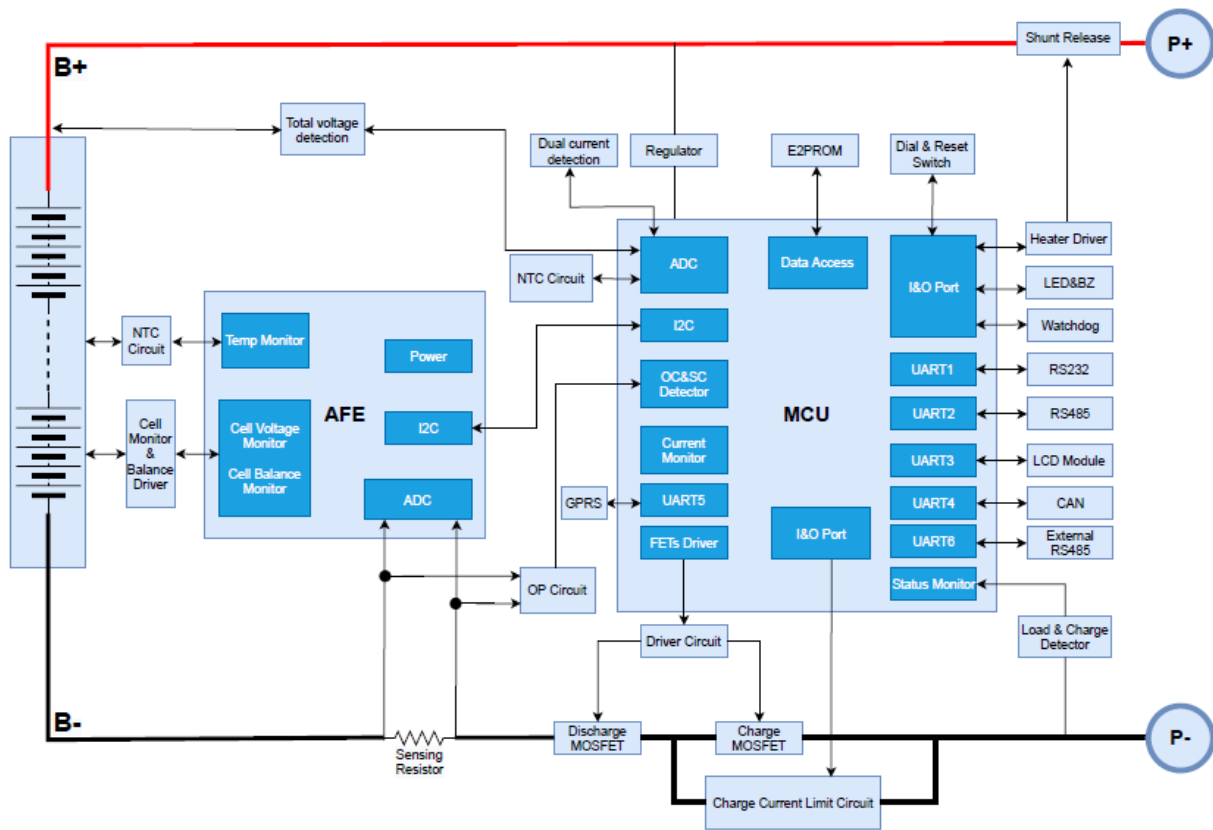
The main features of the battery are shown as below:

Product name .....	Gobel Power Rechargeable Li-ion Battery
Model .....	GP-SR1-PC200
Rated Capacity .....	280Ah
Nominal voltage .....	51.2VDC
Energy .....	14.3kWh
Maximum continuous Charging current .....	140A
Maximum continuous Discharging current .....	200A
Maximum Charge voltage .....	58.4VDC
End of Discharging voltage .....	44.0VDC
Upper Charge temperature limit .....	55°C
Lower Charge temperature limit .....	0°C
Upper Discharge temperature limit .....	55°C
Lower Discharge temperature limit .....	-20°C
Storage temperature range, recommended .....	-10°C ~ 50°C
Recommend Charging method declared by the Manufacturer .....	Charged with constant current 70A till battery voltage reaches 55.2VDC, then switch to constant voltage 55.2VDC till charging current drops to 14A, at 25±3°C.
Nominal mass .....	Approx. 118kg
External dimensions .....	Length: 482.6mm (max.) Width: 241.0mm (max.) Height: 882.5mm (max.)
Battery designation .....	IFpP/73/174/208/[16S1P]M/-10+40/90

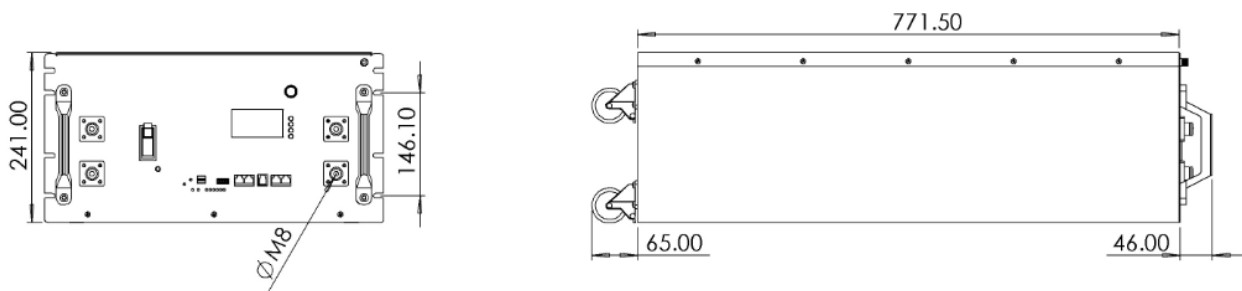
**Internal cell operating region:**

Product name .....	Rechargeable Lithium ion cell
Model .....	LF280K
Capacity .....	280Ah
Nominal voltage .....	3.2V
Maximum continuous charging current .....	280A
Maximum continuous discharging current .....	280A
Standard fully Charge Voltage .....	3.65V
Maximum Charge Voltage .....	3.65V
End of discharging voltage .....	2.5V
Charge temperature range .....	0°C to 65°C
Discharge temperature range .....	-20°C to 66°C
Cell designation .....	IFpP/73/174/208/M/-10+50/90

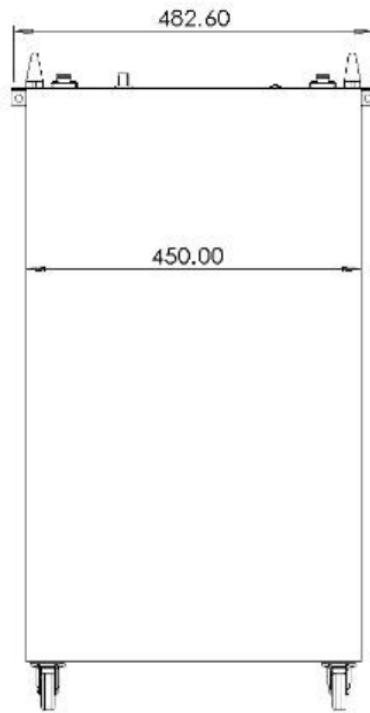
Tropology Diagram:



Construction unit(mm):







IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>PARAMETER MEASUREMENT TOLERANCES</b>		<b>P</b>
	Parameter measurement tolerances		P
<b>5</b>	<b>GENERAL SAFETY CONSIDERATIONS</b>		<b>P</b>
<b>5.1</b>	<b>General</b>		<b>P</b>
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse ... :		P
	Reduce the risk of injuries from moving parts		N/A
<b>5.2</b>	<b>Insulation and wiring</b>		<b>P</b>
	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	The battery system was less than 60 VDC, should be re-evaluated in final system.	P
	Protect from hazardous live parts, including during installation		N/A
	The mechanical integrity of internal connections		P
<b>5.3</b>	<b>Venting</b>		<b>P</b>
	Pressure relief function		
	Encapsulation used to support cells within an outer casing		P
<b>5.4</b>	<b>Temperature/voltage/current management</b>		<b>P</b>
	The design prevents abnormal temperature-rise	Integrated in BMS.	P
	Voltage, current, and temperature limits of the cells		P
	Specifications and charging instructions for equipment manufacturers		P
<b>5.5</b>	<b>Terminal contacts of the battery pack and/or battery system</b>		<b>P</b>
	Polarity marking(s)	Marking near the terminal.	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
<b>5.6</b>	<b>Assembly of cells, modules, or battery packs into battery systems</b>		<b>P</b>
5.6.1	<b>General</b>		<b>P</b>
	Independent control and protection method(s)		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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	No such design.	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	Integrated in BMS.	P
	Maximum charging/discharging current of the cell are not exceeded		P
<b>5.7</b>	<b>Operating region of lithium cells and battery systems for safe use</b>		<b>P</b>
	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
<b>5.8</b>	<b>System lock (or system lock function)</b>		<b>P</b>
	Non-resettable function to stop battery operation		P
	Manual with procedure for resetting of battery operation		P
	Emergency battery final discharge	No such design.	N/A
<b>5.9</b>	<b>Quality plan</b>		<b>P</b>
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented .....	Quality plan Implemented.	P
	The process capabilities and the process controls		P
<b>6</b>	<b>TYPE TEST CONDITIONS</b>		<b>P</b>
<b>6.1</b>	<b>General</b>		<b>P</b>
<b>6.2</b>	<b>Test items</b>		<b>P</b>
	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	Tests were carried out in an ambient temperature of 25°C ± 5°C	P
<b>7</b>	<b>SPECIFIC REQUIREMENTS AND TESTS</b>		<b>P</b>
<b>7.1</b>	<b>Charging procedure for test purposes</b>		<b>P</b>
	The battery discharged to a specified final voltage prior to charging	0.2 It to end off discharge voltage 44.0VDC	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
<b>7.2</b>	<b>Reasonably foreseeable misuse</b>		<b>P</b>
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. The mass of battery system is more than 20 kg.	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) .....	122.8kg	—
	Height of drop (m) .....	2.5cm	—
	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		N/A
	Results: no fire, no explosion .....		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
	Redundant or single protection for discharge voltage control provided in battery system.....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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 It / Im ) x 90 (min.) ..... :		N/A
	Results: no fire, no explosion ..... :		N/A
<b>7.3</b>	<b>Considerations for internal short-circuit – Design evaluation</b>		<b>N/A</b>
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 °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)	Alternate test item clause.7.3.2 of cell was performed.	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
<b>8</b>	<b>BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)</b>		<b>P</b>
<b>8.1</b>	<b>General requirements</b>		<b>P</b>
	Functional safety analysis for critical controls		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
<b>8.2</b>	<b>Battery management system (or battery management unit)</b>		<b>P</b>
8.2.1	Requirements for the BMS		P
	The safety integrity level (SIL) target of the BMS	Class B according to IEC 60730-1 Annex H.	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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 .....		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 .....		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	No cooling system.	N/A
	Elevated temperature for charging, 5 °C above maximum operating temperature .....		P
	Results: no fire, no explosion .....		P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P
<b>9</b>	<b>EMC</b>		<b>N/A</b>
	Battery system fulfil EMC requirements of the end-device application .....	Relay on final system.	N/A
<b>10</b>	<b>INFORMATION FOR SAFETY</b>		<b>P</b>
	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	<b>MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)</b>		<b>P</b>
	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	IFpP/73/174/208/[16S1P]M/-10+40/90	P
	Battery structure formulation	16S1P	P

12	<b>PACKAGING AND TRANSPORT</b>		<b>N/A</b>
	Refer to Annex D	Informative.	N/A

ANNEX A	<b>OPERATING REGION OF CELLS FOR SAFE USE</b>		<b>P</b>
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	<b>PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION</b>		<b>N/A</b>
<b>B.1</b>	<b>General</b>		<b>N/A</b>
<b>B.2</b>	<b>Test conditions</b>		<b>N/A</b>
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		N/A
	Output power of laser irradiation .....		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A

<b>ANNEX C PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER</b>			<b>N/A</b>
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 .....		—

<b>ANNEX D PACKAGING AND TRANSPORT</b>			<b>N/A</b>
	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	Informative.	N/A
	Regulations concerning international transport of secondary lithium batteries	Informative.	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 <sup>1)</sup>	
Cell	EVE POWER Co., Ltd.	LF280K	3.2V, 280Ah	IEC 62619: 2022	TÜV Rh JPTUV-147819	
Metal Enclosure	Shenzhen He Changxin Hardware Equipment Co., Ltd	GP-SR1	Cold Rolled Steel, Min. thickness: 1.5mm	IEC 62619: 2022	Tested with appliance	
Power connector (Red, Black)	Shenzhen Connector Electronic Co., Ltd	ACTB135-M8	1500VDC, 35mm <sup>2</sup>	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/AMD2:2014	TÜV SUD Certif. No.: B 108338 0003 Rev. 01	
Internal power wires (Red)	DONGGUAN DEWEI ELECTRONIC CO LTD	3512	2AWG, 200°C, 600Vac	UL 758	UL E339716	
Internal power wires (Alternative)	Interchangeable	Interchangeable	Minimum 2AWG, minimum 200°C, minimum 600Vac	UL 758	UL approved	
Internal power wires (Black)	DONGGUAN DEWEI ELECTRONIC CO LTD	3512	4AWG, 200°C, 600Vac	UL 758	UL E339716	
Internal power wires (Alternative)	Interchangeable	Interchangeable	Minimum 4AWG, minimum 200°C, minimum 600Vac	UL 758	UL approved	
NTC (NTC1 to NTC4)	MURATA MFG CO LTD	NCU18XH103@F6RB	Tmax (°C): 125	UL 1434 UL 60730-1	UL E137188	
DC circuit - breaker	Yeshui Intelligent Technology (Zhejiang) Co., Ltd.	YSM1-250Z/1300	250A, 250V	EN 60947-2: 2017+A1:2020	ECM certificate No.: 0P230329.HJ TUQ41	
PCB for BMS						

IEC 62619					
Clause	Requirement + Test			Result - Remark	Verdict
PCB	Jiangxi ZHONG XIN HUA Electronics Industry Co Ltd	ZXH-2	V-0, 130°C	UL 94	UL E331298
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130°C	UL 94	UL approved
IC (U41)	Nations Technologies Inc.	N32G455VEL7	V <sub>DD</sub> -V <sub>SS</sub> : -0.3 to 4.0V, Operating temperature range: -40 to 105°C	IEC 62619: 2022	Tested with appliance
IC (U43)	mps	MP2797DFP	V <sub>TOP</sub> Voltage: 18 to 75.2V, T <sub>J</sub> : -40 to 85°C	IEC 62619: 2022	Tested with appliance
IC (UX2)	3PEAK	TP3232N	V <sub>CC</sub> to GND: -0.3 to 6V, T <sub>OPR</sub> : -40 to 125°C	IEC 62619: 2022	Tested with appliance
IC (UU1)	Unisonic Technologies Co., Ltd	TL494	V <sub>CC</sub> : 41V, T <sub>OPR</sub> : -25 to 85°C	IEC 62619: 2022	Tested with appliance
Fuse (PF1)	SHENZHEN LANSON ELECTRONICS CO LTD	24E	250V, 7A	UL 248-1 UL 248-14	UL E221465
MOSFET (QP1~QP40, QP66, QP67, QP69, QP70, QP72, QP73, QP75, QP76)	China Resources Microelectronics (Chongqing) Limited	CRSS028N10N	V <sub>DS</sub> : 100V, I <sub>D</sub> : 180A, V <sub>GS</sub> : ±20V, T <sub>J</sub> , T <sub>STG</sub> : -55 to 150°C	IEC 62619: 2022	Tested with appliance
Current Sensing Resistor (RP36, RP39, RP42, RP45, RP46, RP49, RP51, RP53, RP56, RP57, RP64, RP69, RP72, RP82, RP92, RP96, RP103, RP134, RP136, RP138)	Psonmei Microelectronics Technology (Suzhou) Co., LTD	LMP25MF3P0R 002	2mΩ±1%, Operating Temperature Range: -55 to 170°C	IEC 62619: 2022	Tested with appliance

IEC 62619					
Clause	Requirement + Test		Result - Remark		Verdict
Balanced resistance (RA1, RA5, RA9, RA13, RA17, RA23, RA27, RA31, RA2, RA6, RA10, RA14, RA18, RA24, RA28, RA32)	Uniroyal Electronics Global Co., Ltd	25121WJ0430T 4E	43Ω±5%, Operating Temperature Range: -55 to 155°C	IEC 62619: 2022	Tested with appliance
NTC (RM9)	SHENZHEN SUNLORD ELECTRONICS CO LTD	SNGR1103F34 35FB	Resistance at 25°C (kohm): 10, Tmoa (°C): 200	UL1434	UL E352242
PCB for LCD display					
PCB	Jiangxi ZHONG XIN HUA Electronics Industry Co Ltd	ZXH-2	V-0, 130°C	UL 94	UL E331298
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130°C	UL 94	UL approved
PCB for communication					
PCB	SHENZHEN XING ZHI GUANG INDUSTRIAL DEVELOPMENT CO LTD	XZG-1	V-0, 130°C	UL 94	UL E350388
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130°C	UL 94	UL approved
<b>Supplementary information:</b>					
1) Provided evidence ensures the agreed level of compliance. See OD-2039. License available upon request.					

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:****Results:**

A - No fire or Explosion

B - Fire

C - Explosion

D - The test was completed after 6 h

E - The test was completed after the cell casing cooled to 20% of the maximum temperature rise

F - Other (Please explain): \_\_\_\_

7.2.5	TABLE: Overcharge test (cell or cell block)					N/A
Sample No.	OCV at start of test (V dc)	OCV at end of test (V dc)	Measured Maximum Charging Current (A)	Measured Maximum Charging Voltage (V dc)	Max. Cell Case Temperature, (°C)	Results
--	--	--	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--

**Supplementary information:****Results:**

A - No fire or Explosion

B - Fire

C - Explosion

D - Test concluded when temperature reached a steady state condition

E - Test concluded when temperature returned to ambient

F - Other (Please explain): \_\_\_\_\_

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.6	TABLE: Forced discharge test (cell or cell block)					N/A
Sample No.	OCV before applying reverse charge, (V dc)	Target Voltage (V dc)	Measured Reverse Charge Current I <sub>t</sub> , (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 <sup>1)</sup>	Maximum applied pressure, (N)	Results	
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--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
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**Supplementary information:**  
<sup>1)</sup> 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

<b>7.3.3</b>	<b>TABLE: Propagation test (battery system)</b>				<b>N/A</b>
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 <sup>1)</sup>		Location of target cell		Area for fire protection (m <sup>2</sup> )	
--		--		--	
--		--		--	
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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	
A1#	2.905~2.947	140	57.90	3.641	A, D, F	
			<b>Charge Voltage Applied Battery System: 1)</b>			
			<b>Whole</b>	<b>Part</b>		
			64.24	N/A		

**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.

The upper charge voltage limit of cell is 3.65V.

**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	
A1#	48.42	168.0	52.61	A, D, F	
A1#	47.19	282.8	51.88	A, D, F	
A1#	52.41	336.0	56.21	A, D, F	

**Supplementary information:**

The maximum charging current of cell is 280A.

**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

<b>8.2.4</b>	<b>TABLE: Overheating control (battery system)</b>			<b>P</b>
Sample No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc	
A1#	52.64	140	55.29	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
55		55	A, D, F	
<b>Supplementary information:</b>				
The upper charge temperature limit of cell is 65°C.				
<b>Results:</b>				
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): _____				

<b>9</b>	<b>TABLE: EMC</b>				<b>N/A</b>
Standard used for EMC test:					
Sample No.	EMC Test Item	Battery Condition	EMC Test Level/Parameters	Compliance Criteria	Results
--	--	--	--	--	--
<b>Supplementary information:</b>					
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 _____					
<b>Compliance Criteria and Test Results:</b>					
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 test report -



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Report No.: CN23AZKT 001

Product: Gobel Power Rechargeable Li-ion Battery

Type Designation: GP-SR1-PC200



Figure 1 Overall view 1 of battery

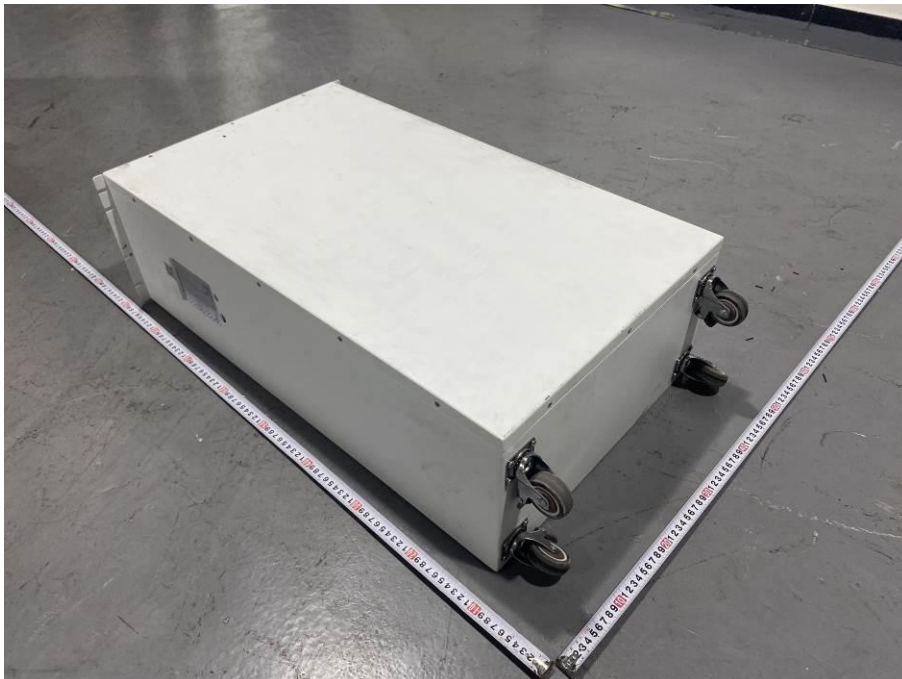


Figure 2 Overall view 2 of battery

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Report No.: CN23AZKT 001

Product: Gobel Power Rechargeable Li-ion Battery

Type Designation: GP-SR1-PC200



Figure 3 Overall view of function display

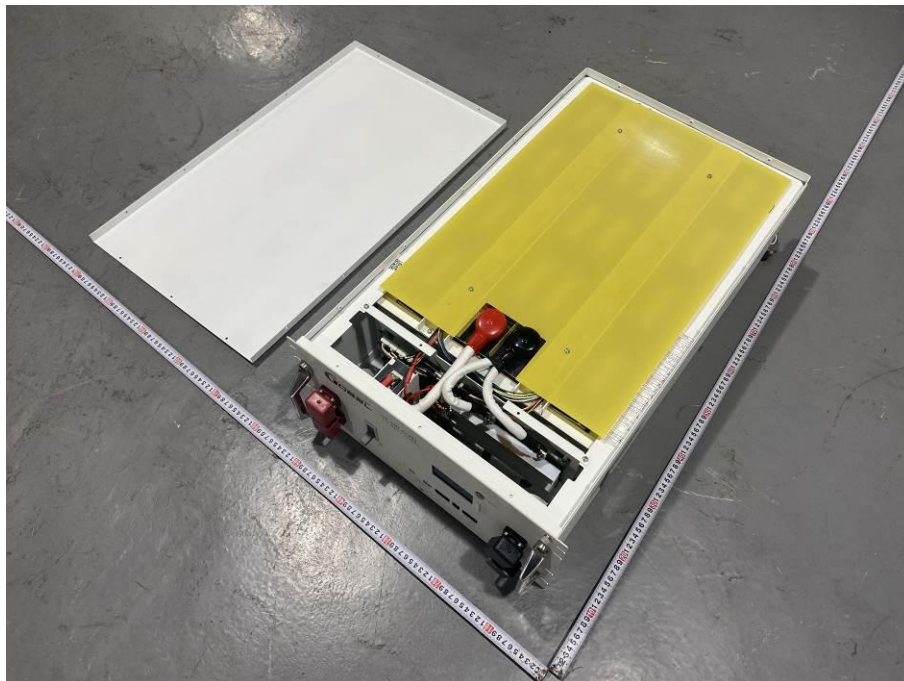


Figure 4 Internal view 1 of battery

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Product: Gobel Power Rechargeable Li-ion Battery

Type Designation: GP-SR1-PC200

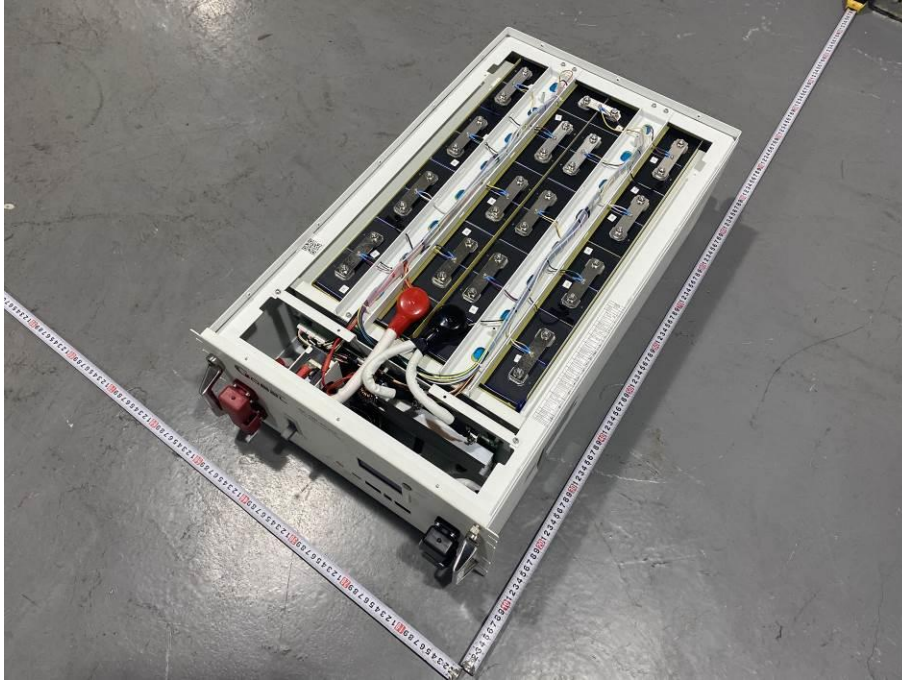


Figure 5 Internal view 2 of battery

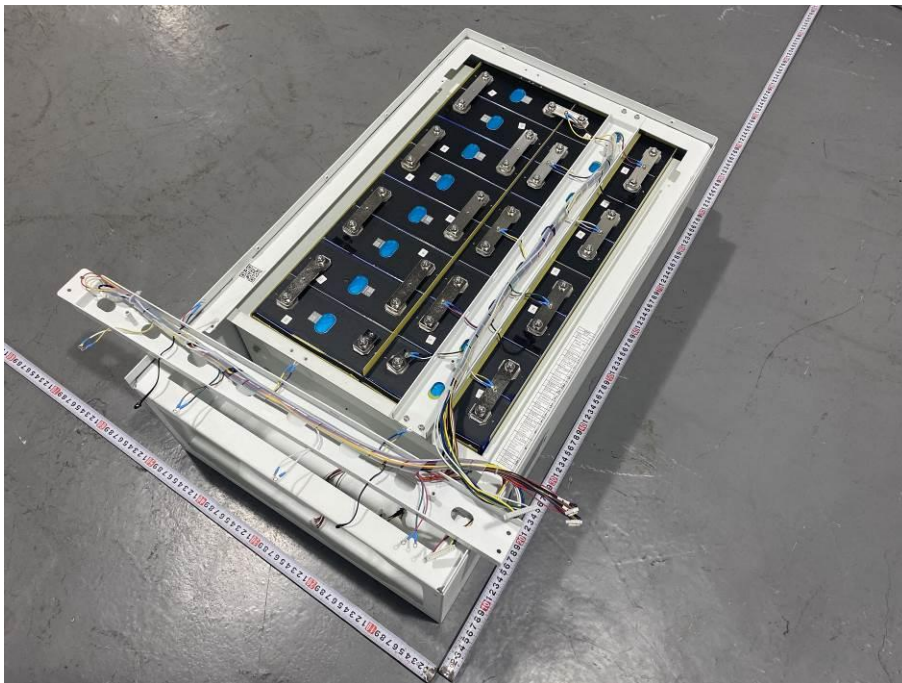


Figure 6 Internal view 3 of battery

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Product: Gobel Power Rechargeable Li-ion Battery

Type Designation: GP-SR1-PC200

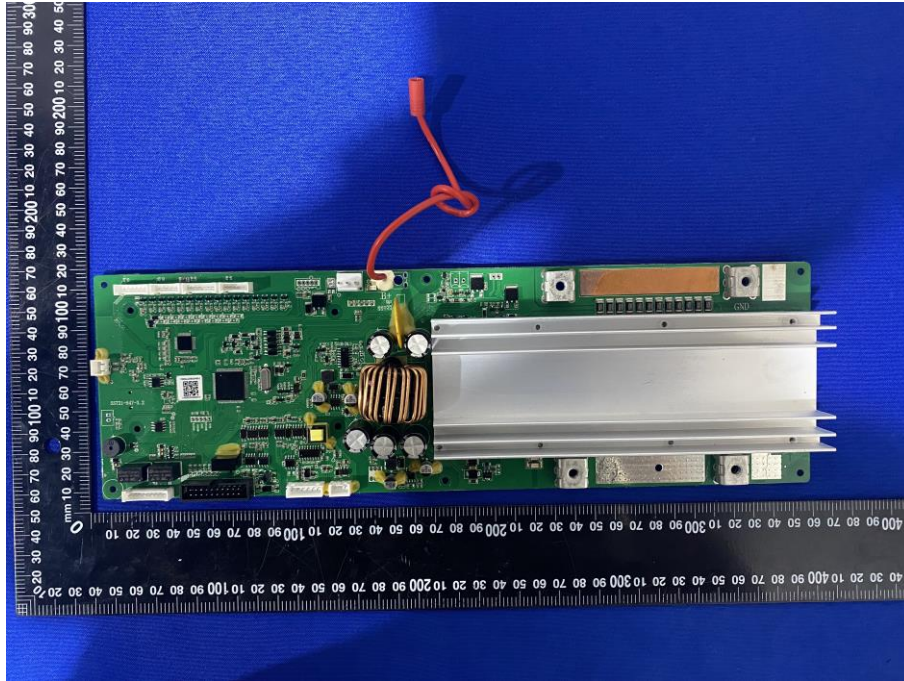


Figure 7 Front view 1 of PCB for BMS



Figure 8 Front view 2 of PCB for BMS

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Product: Gobel Power Rechargeable Li-ion Battery

Type Designation: GP-SR1-PC200

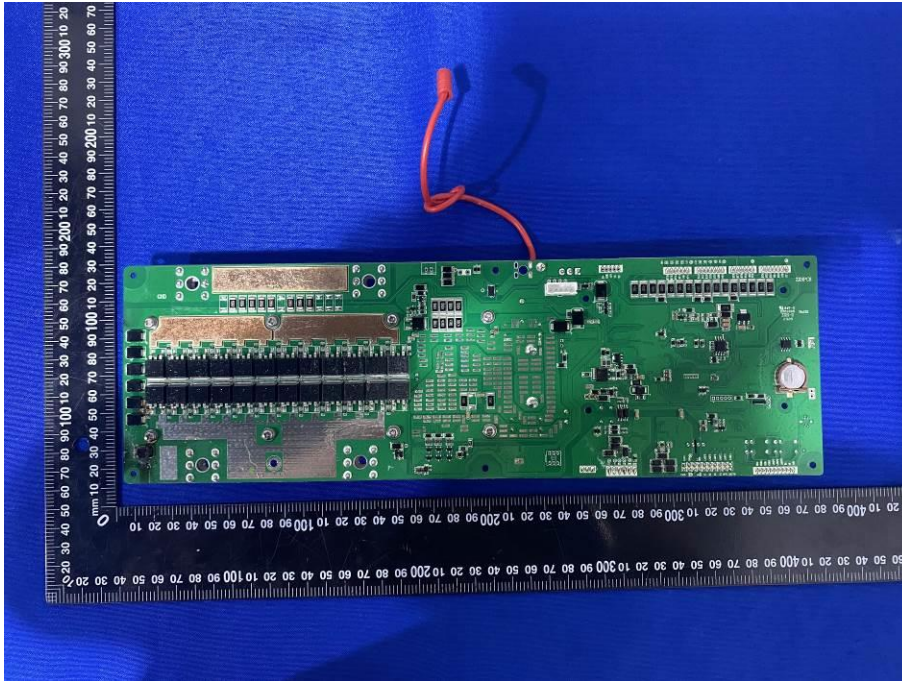


Figure 9 Back view 1 of PCB for BMS

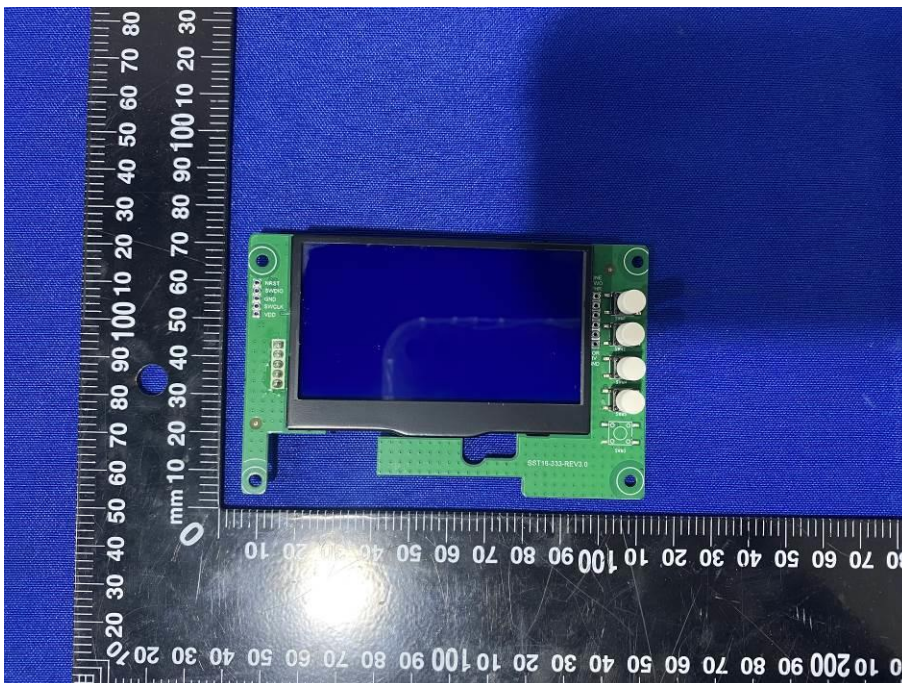


Figure 10 Front view of PCB for LCD display

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Product: Gobel Power Rechargeable Li-ion Battery

Type Designation: GP-SR1-PC200

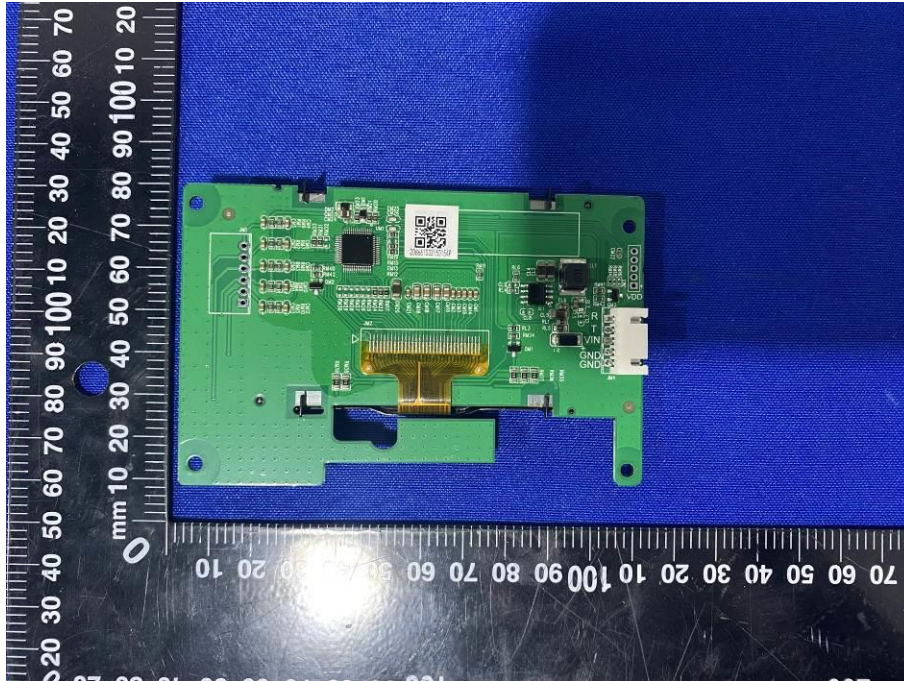


Figure 11 Back view of PCB for LCD display



Figure 12 Front view of PCB for communication

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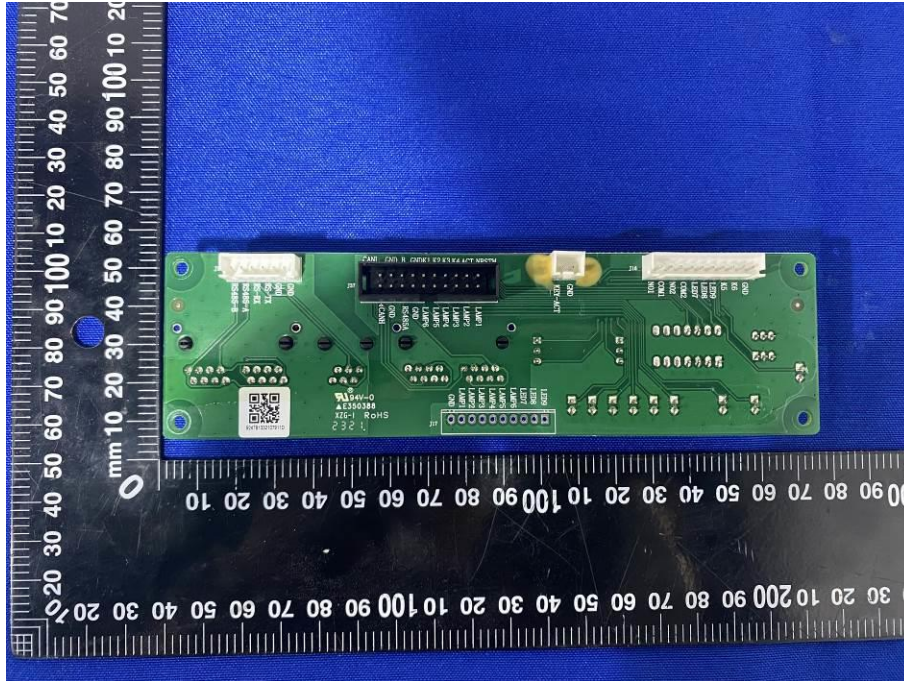


Figure 13 Back view of PCB for communication