

## 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..... : CMC250825003

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Applicant's name ..... : **Shenzhen Reenergy Power Technology Co., Ltd.**

Address..... : Unit 101, Buildings 2, 4, and 5 (excluding 201), Wandajie Industrial Park, No. 5 Yeda Road, Shahu Community, Biling Street, Pingshan District, Shenzhen, 518118, China.

Manufacturer's name..... : **Shenzhen Reenergy Power Technology Co., Ltd.**

Address..... : Unit 101, Buildings 2, 4, and 5 (excluding 201), Wandajie Industrial Park, No. 5 Yeda Road, Shahu Community, Biling Street, Pingshan District, Shenzhen, 518118, China.

**Test specification:**

Standard ..... : IEC 62619: 2022

Test procedure..... : Type approved

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

Test result..... : Pass

Test item description..... : Lithium Ion Battery(LiFePO4)

Trade Mark..... : N/A

Model/Type reference..... : RPES-51.2V314-W2(IP65)

Ratings..... : 51.2V, 314Ah, 16.08KWh

**General disclaimer:**

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 CMC. The authenticity of this Test Report and its contents can be verified by contacting the CMC, responsible for this Test Report.

**List of Attachments (including a total number of pages in each attachment):**

Attachment 1: Photo documentation (2 pages).

**Summary of testing:**

**Tests performed (name of test and test clause):**

cl.7.2.3.3 Edge and corner 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 component cell (LF280K) was evaluated according to IEC 62619-2022 by TUV Rheinland Test report No.: JPTUV-147819

Tests are made with the number of batteries specified in IEC 62619: 2022.

**Testing location:**

**CMC Testing International (Shenzhen) Co., Ltd.**  
 1-3F, Building 7, He'er Hongben Industrial Zone, Dawangshan Community, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

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

**The product fulfils the requirements of EN 62619: 2022.**

**Copy of marking plate:**

Lithium Ion Battery(LiFePO4)

RPES-51.2V314-W2(IP65)

51.2V, 314Ah, 16036.8Wh(IFpP73/174/208 [16S1P]/M/-20+55/90)

Recommend charge method: Charge at constant current 20A until voltage reaches 57.6V, then charge at constant voltage 57.6V till current reduced to 14A.

Shenzhen Renergy Power Technology Co., Ltd.

Date: YYYYMMDD      Made in China

Risk of Fire and Burns. Do Not Open, Crush, Heat Above 60°C/140°F or Incinerate. Follow Manufacturer's Instructions.



Remark:

Date code: YYYYMMDD

YYYY=Year, MM=Month, DD=Day

**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.

<b>Test item particulars..... :</b>	
Classification of installation and use .....	To be defined in final system.
Supply Connection.....	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>	
Date of receipt of test item.....	: 2024-09-30
Date (s) of performance of tests.....	: 2024-09-30 to 2024-10-17
Test Environment Condition .....	: Ambient temperature: 22.6°C~23.5°C
Sample No. ....	: SN240930025B001
<b>General remarks:</b>	
<p>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.          "(CXXX)" refers to sample number of cells, "X" is 0~9;          "(See Enclosure)" refers to additional information appended to the report.          "(See appended table)" refers to a table appended to the report.</p>	
<p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
<p>Name and address of factory (ies) ..... : Same as manufacturer</p>	

**General product information and other remarks:**

The Battery System is composed of a 1 battery packs. It contains electrochemical batteries, battery management units, signal terminals.

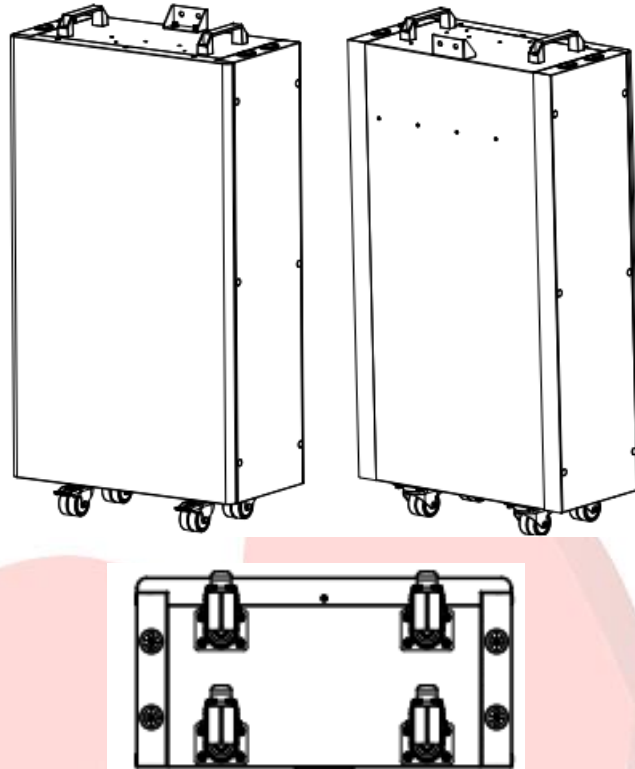
The battery consists of 16 Lithium Iron Phosphate cells connected in a 16P1S formation.

Not considered safety analysis, risk assessment or similar on battery system of cl 8.1 as client's request in this test report.

The main features of the battery are shown as below:

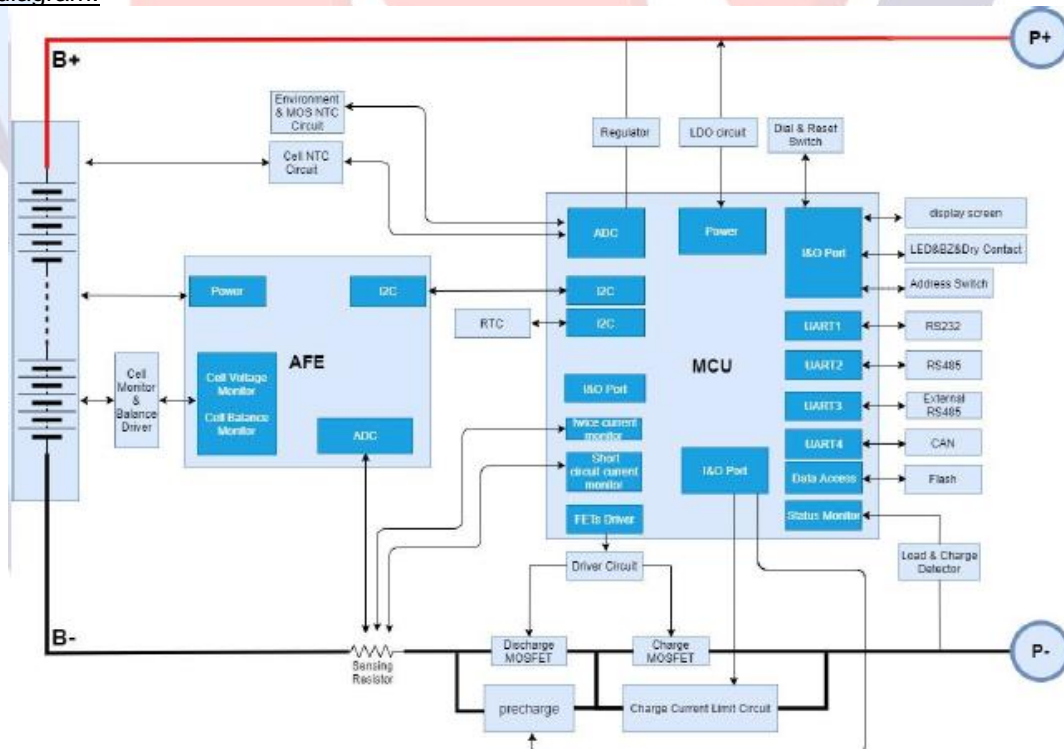
Product name	Component Cell used inside	Lithium Ion Battery(LiFePO4)
Model Designation	LF314K	RPES-51.2V314-W2(IP65)
Rated capacity (Ah)	314	314
Nominal voltage (V)	3.2	51.2
Maximum Charging Current (A)	314	150
Maximum Discharging Current (A)	314	150
Charge temperature Range (°C)	0 to 65	0 to 55
Discharge temperature Range (°C)	-20 to 65	-20 to 55
Standard Fully Charge Voltage (V)	3.65	57.6
Upper limit Charging Voltage (V)	3.65	58.4
End of discharge voltage (V)	2.5	46.0V
Weight (Kg)	(5.42±0.3)Kg	135.5kg
Battery configuration		
Cell in connection	16P1S	
Recommend charging method declared by the manufacturer	At constant current 20A till cell voltage reaches 57.6V, then switch to constant voltage 57.6 V till charge current drops to 14A.	
Recommend discharging method declared by the manufacturer	Discharging the cell with 50A constant current to discharge cut-off voltage 46V.	

Construction:



Maximum: T: 250.0mm, W:520.0mm, L: 880.0mm  
Battery

Circuit diagram:



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.. :	See also table 5.1 for Critical components information	P
	Reduce the risk of injuries from moving parts		P
<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		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	Explosion-proof safety valve for venting exists, and vent design in cell.	P
	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		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
	Capability to carry the maximum anticipated current		N/A
	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>
<b>5.6.1</b>	<b>General</b>		<b>P</b>
	Independent control and protection method(s)	No more assembly battery system.	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	No such design.	N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	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
<b>5.7</b>	<b>Operating region of lithium cells and battery systems for safe use</b>		<b>P</b>
	The cell operating region .....		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 .....	Complied. Quality control plan provided.	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 IEC62619)		P
	Capacity confirmation of the cells or batteries		P
	Default ambient temperature of test, 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		P
	The cells or batteries charged using the method specified by the manufacturer .....	See page 5.	P
<b>7.2</b>	<b>Reasonably foreseeable misuse</b>		<b>N/A</b>
7.2.1	External short-circuit test (cell or cell block)	CB Approved Cell	N/A
	Short circuit with total resistance of 30 mΩ ± 10 mΩ at 25 °C ± 5 °C		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)	CB Approved Cell	N/A
	Cylindrical cell, longitudinal axis impact		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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)		N/A
7.2.3.1	General		N/A
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 system	—
	Mass of the test unit (kg)..... :	135.5Kg	—
	Height of drop (m)..... :	0.025m	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)	CB Approved Cell	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	CB Approved Cell	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	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..... :		-
	Maximum discharge current of the cell, $I_m$ ..... :		-
	Discharge current for forced discharge, 1.0 $I_t$ ..... :		-
	Discharging time, $t = (1 I_t / I_m) \times 90$ (min.)..... :		-
	Results: no fire, no explosion..... :		N/A
<b>7.3</b>	<b>Considerations for internal short-circuit – Design evaluation</b>		N/A
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)	Refer to cell CB report No.: CN23O0C7 001	N/A
	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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 .....		N/A
	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, no explosion .....		N/A
7.3.3	Propagation test (battery system)	Alternate, 7.3.2 for cell have tested.	N/A
	Method to create a thermal runaway in one cell ... :		N/A
	Results: No external fire from the battery system or no battery case rupture .....		N/A

<b>8</b>	<b>BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)</b>		<b>N/A</b>
<b>8.1</b>	<b>General requirements</b>	Not considered safety analysis	<b>N/A</b>
	Functional safety analysis for critical controls		N/A
	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process		N/A
	Conduct of risk assessment and mitigation of the battery system		N/A
<b>8.2</b>	<b>Battery management system (or battery management unit)</b>		<b>P</b>
8.2.1	Requirements for the BMS		<b>P</b>
	The safety integrity level (SIL) target of the BMS		N/A
	The charge control evaluated by tests in clauses 8.2.2 to 8.2.4		<b>P</b>
8.2.2	Overcharge control of voltage (battery system)		<b>P</b>
	The exceeded charging voltage applied to the whole battery system		<b>P</b>
	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 .....		<b>P</b>
	The BMS terminated the charging before exceeding the upper limit charging voltage	See Table 8.2.2.	<b>P</b>
8.2.3	Overcharge control of current (battery system)		<b>P</b>
	Results: no fire, no explosion .....		<b>P</b>
	The BMS detected the overcharging current and controlled the charging to a level below the maximum charging current	See Table 8.2.3.	<b>P</b>
8.2.4	Overheating control (battery system)		<b>P</b>
	The cooling system, if provided, was disconnected		<b>P</b>

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Clause	Requirement + Test	Result - Remark	Verdict
	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	Complied.	P

<b>9</b>	<b>EMC</b>		<b>N/A</b>
	Battery system fulfil EMC requirements of the end-device application .....		N/A

<b>10</b>	<b>MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)</b>		<b>P</b>
	The cell manufacturer provides information about current, voltage and temperature limits of their products		P
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.		P

<b>11</b>	<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	The final product is battery	N/A
	Battery designation	IFpP73/174/208 [16S1P]/M/-20+55/90	P
	Battery structure formulation		P

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

<b>ANNEX A</b>	<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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

<b>ANNEX B</b>	<b>PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION</b>		<b>N/A</b>
<b>B.1</b>	<b>General</b>		N/A
<b>B.2</b>	<b>Test conditions:</b>		N/A
	The cell fully charged according to the manufacturer recommended conditions .....		—
	Laser irradiation point on the cell .....		—
	Output power of laser irradiation .....		—
	Repeat of cell test for 3 times		N/A
<b>B.2.2</b>	<b>Battery system test (main test)</b>		N/A
	The battery system fully charged according to the manufacturer recommended conditions .....		N/A
	Target cell to be laser irradiated.....		—
	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</b>	<b>PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER</b>		<b>N/A</b>
<b>C.1</b>	<b>General</b>		N/A
<b>C.2</b>	<b>Test conditions:</b>		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.....		—
<b>C.3</b>	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</b>	<b>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		N/A
	Regulations concerning international transport of secondary lithium batteries		N/A

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, 314Ah	IEC 62619: 2022	CB Certif. No.: JPTUV- 147819	
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6160A	V-0, 130°C	UL 94 UL 796	UL E123995	
MCU (UM1)	HUADA	HC32F460PET B	V <sub>BAT</sub> =1.8~3.6V, T <sub>A</sub> =-40~105°C, LQFP100-0.5-14X14, Operating temperature range: -40~ 125°C	--	Tested with appliance	
IC for AFE (UA1)	SINO WEALTH ELECTRONIC LTD.	SH367309U/04 8UR	Supply voltage: V <sub>bat</sub> = 8.5 V~65V T <sub>opr</sub> : -40°C ~ 85°C	--	Tested with appliance	
MOSFET for charge and discharge (QP1, QP2, QP3, QP4, QP5, QP6, QP7, QP8, QP9, QP10, QP11, QP12, QP13, QP14, QP15, QP16, QP17, QP18, QP19, QP20, QP21, QP22, QP23, QP24)	CRMICRO	CRSS028N10N	V <sub>DS</sub> =100V, V <sub>GS</sub> =±20V, I <sub>D</sub> =180A, T <sub>J</sub> =-55~150°C	--	Tested with appliance	
MOSFET (QC1, QC2, QC3, QC4)	CRMICRO	CRSS057N10N	V <sub>DS</sub> =100V, V <sub>GS</sub> =±20V, I <sub>D</sub> =120A, T <sub>J</sub> =-55~150°C	--	Tested with appliance	
NTC Resistor for power MOS (RT1)	SHENZHEN SUNLORD ELECTRONICS CO LTD	SNGR1103F34 35FB	R <sub>25</sub> =10KΩ±1%, B <sub>25/85</sub> =3435K±1%, T <sub>moa</sub> : 200°C, T <sub>opr</sub> : -40°C~125°C	UL 1434	UL E352242	
NTC Resistor for environment RT2	SHENZHEN SUNLORD ELECTRONICS CO LTD	SDNT1608X10 3α3450βTF	R <sub>25</sub> =10KΩ±1%, B <sub>25/85</sub> =3435K±1%, T <sub>moa</sub> : 125°C, T <sub>opr</sub> : -40°C~125°C	UL 1434	UL E352242	
PPTC (FPL1, FPA1)	SHENZHEN JINKE SPECIAL MATERIALS CO LTD	JK-nSMD005	V <sub>max</sub> : 60Vdc, V <sub>r</sub> : 60Vdc, I <sub>h</sub> : 50A, I <sub>t</sub> : 150A, I <sub>max</sub> : 100A, I <sub>sc</sub> : 100A	UL 60730-1	UL E217453	

Fuse (F1)	ShenZhen JinRui Electronic Material Co.,Ltd	JK60-500	V <sub>max</sub> : 60Vdc, I <sub>trip</sub> : 10A, I <sub>h</sub> : 5A	EN 602691:2 007/A2:2 014 EN60269 4:2009/A 2:2016	TUV Rheinland certif. No.: R 50254784
Wiring for Connector (J30 B+)	SHENZHEN SHUNJIA ELECTRICAL TECHNOLOGY CO LTD	3135	16AWG, 200°C, 600Vac	UL 758	UL E490463
Connector (J26, J27, J28, J29)	Dongguan Telian Electronics Co., Ltd	TLS5446-T-H	120A, T <sub>opr</sub> : -40°C~120°C	--	Tested with appliance
Cell (BT1)	Shenzhen Lidea Battery Co Ltd	CR1220	3V, 40mAh	UL 1642	UL MH60145
Internal wire link to Input & Output terminal	PUTIAN DUORONG OPTICS ELECTRONIC CO LTD	1015	6AWG, 105°C, 600Vac	UL 758	UL E334567
Internal wire link to Input & Output terminal (Alt.)	Interchangeable	Interchangeable	6AWG, 105°C, 600Vac	UL 758	UL approved
Input and output DC connector	General Connectivity System Co., Ltd.	PSR6XBB	1000Vdc. 120A, Operating temperature: -40 ~ +105°C	EN 61984:20 09	TÜV Rheinland Certif. No.: 50420157
Metal enclosure	Guangdong Yesen Trade Development Co., Ltd.	1.5×1250×C	Min. thickness: 1.5mm, SPCC	--	Tested with appliance

**Supplementary information:**

 1) **Provided evidence ensures the agreed level of compliance.**



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	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
<b>Supplementary information:</b> - No fire or Explosion						

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
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
<b>Supplementary information:</b> - No fire or Explosion						

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	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
<b>Supplementary information:</b> - No fire or Explosion						

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	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	
Supplementary information:					

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 <sup>1)</sup>		Location of target cell		Area for fire protection (m <sup>2</sup> )	
-		-		-	
Supplementary information:					

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
SN240930023B 001	2.925~2.946	150	57.703	3.610	P
			Charge Voltage Applied Battery System: 1)		
			Whole	Part	
			64.24	N/A	
Supplementary information:					
<sup>1)</sup> 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.					
<b>Results:</b> <ul style="list-style-type: none"> <li>- No Fire or Explosion</li> <li>- The voltage of the measured cells or cell blocks did not exceed the upper limit charging voltage</li> <li>- All function of battery system did operate as intended during the test</li> </ul>					

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	
SN240930023B001	43.875	180	43.886	P	
<b>Supplementary information:</b>					
<b>Results:</b>					
<ul style="list-style-type: none"> <li>- No fire or Explosion</li> <li>- Overcurrent sensing function of BMU did operate and then charging stopped</li> <li>- All function of battery system did operate as intended during the test</li> </ul>					

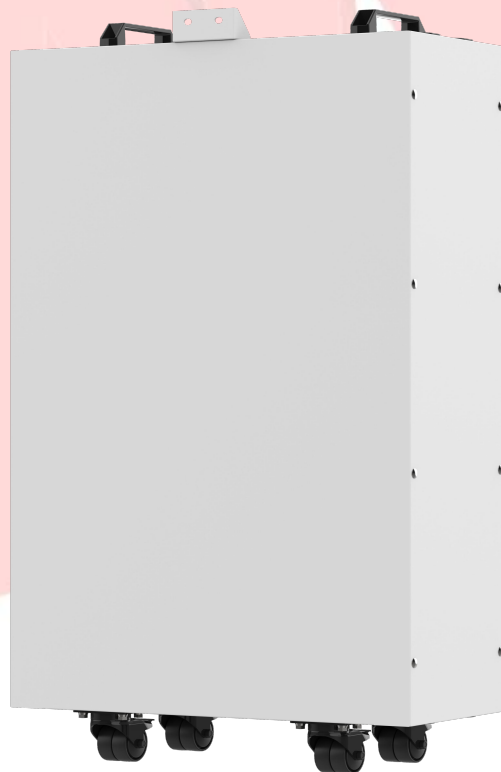
8.2.4	TABLE: Overheating control (battery system)			P	
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured maximum Charging Voltage, V dc		
SN240930023B001	49.575	150	53.839		
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results		
55.0		58.5	P		
<b>Supplementary information:</b>					
The charging temperature limit of the internal cell is 55.0°C					
<ul style="list-style-type: none"> <li>- No fire or Explosion</li> <li>- Temperature sensing function of BMU did operate and then charging stopped</li> <li>- All function of battery system did operate as intended during the test</li> </ul>					

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

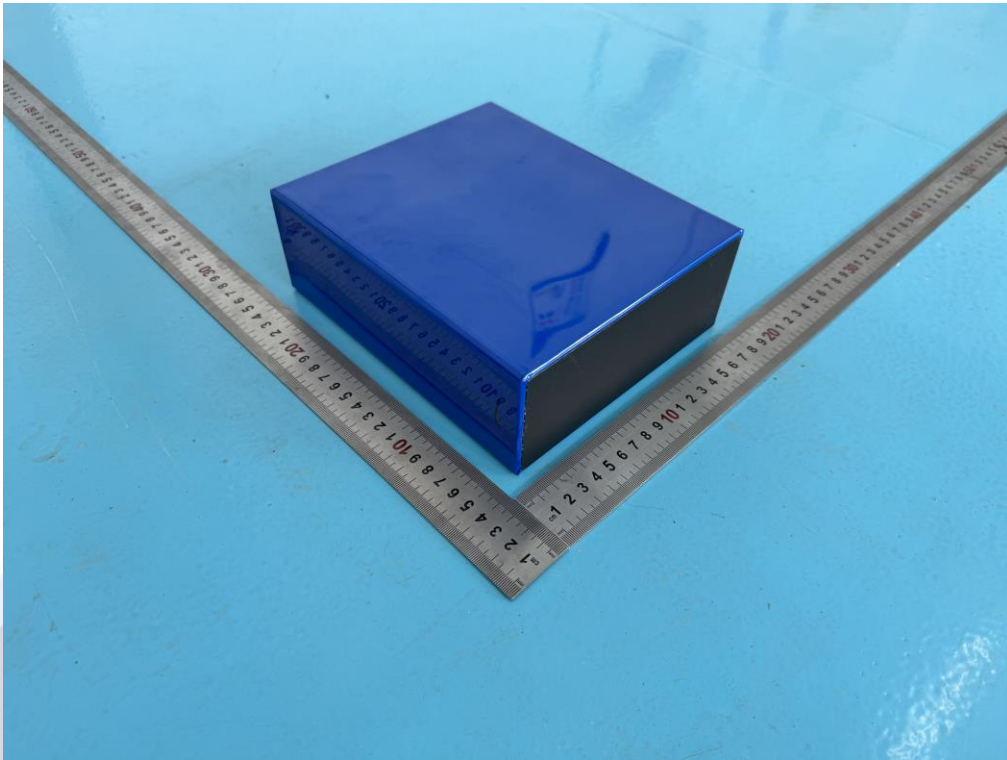
Attachment 1: Photo documentation



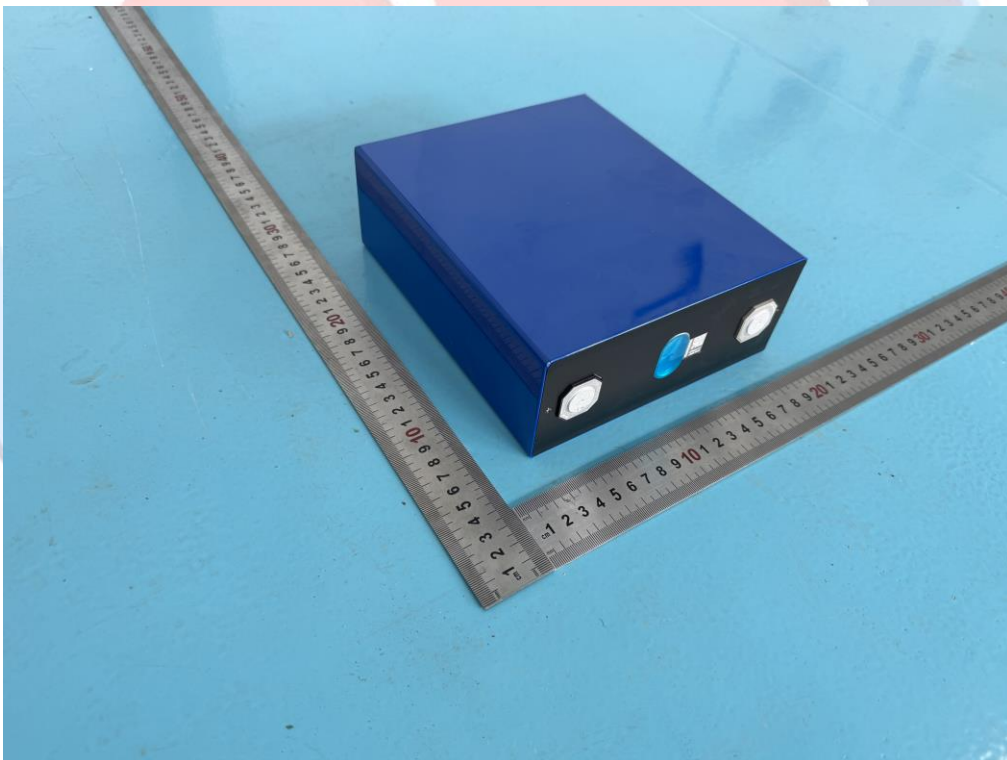
Picture 1. Front view of Battery



Picture 2. Back view of Battery



Picture 3. Front view of cell



Picture 4. Back view of cell

## Important

1. The test report is invalid if it is not affixed the official seal of the laboratory to it.
2. Copies of the test report without the official seal of the laboratory are invalid.
3. It is forbidden to copy the test report partially without the written approval of the laboratory.
4. The test report is invalid without the signatures of Approver, Reviewer and Testing engineer.
5. The test report is invalid if it is blotted out.
6. Objections to the test report must be submitted to CMC within 15 days.
7. The test report is valid for the tested samples only.
8. As for the Verdict, “-” means “no need for judgement”, “P” means “pass”, “F” means “fail” and “N/A” means “not applicable”.

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**-- End of Report --**