

TEST REPORT EN 62133-2:2017/A1:2021/AC:2022-01 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems	
Report Number..... :	240617108GZC-001
Date of issue..... :	2024-08-14 (Modification 1: 2024-10-22)
Total number of pages	35
Name of Testing Laboratory preparing the Report	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Applicant's name	Jiaxing Banchen Technology Co., Ltd.
Address..... :	4th Floor, Building 2, No. 8, Guangjin Road, Guangchen Town, Pinghu City, Zhejiang Province, China
Test specification:	
Standard	EN 62133-2:2017/A1:2021/AC:2022-01
Test procedure	Test Report
Non-standard test method	N/A
TRF template used..... :	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No. :	IEC62133_2C
Test Report Form(s) Originator :	DEKRA Certification B.V.
Master TRF	Dated 2022-07-01
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General disclaimer:	
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Test item description :	Rechargeable Li-ion Battery Pack	
Trade Mark(s)		
Manufacturer	Same as applicant	
Model/Type reference	7.4V3000mAh (22.2Wh)	
Ratings	7.4V, 3000mAh, 22.2Wh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	Testing Laboratory:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Testing location/ address :		C2-1 Heping Xu, Yongning Street, Zengcheng District, Guangzhou, China
Tested by (name, function, signature) :		<div>Kilu Liang Engineer</div> <div><i>Kilu Liang</i></div>
Approved by (name, function, signature) ... :		<div>Carl Chen Reviewer</div> <div><i>Carl Chen</i></div>
☐	Testing procedure: CTF Stage 1:	N/A
Testing location/ address :		--
Tested by (name, function, signature) :		--
Approved by (name, function, signature) ... :		--
☐	Testing procedure: CTF Stage 2:	N/A
Testing location/ address :		--
Tested by (name + signature)		--
Witnessed by (name, function, signature) :		--
Approved by (name, function, signature) ... :		--
☐	Testing procedure: CTF Stage 3:	N/A
☐	Testing procedure: CTF Stage 4:	N/A
Testing location/ address :		--
Tested by (name, function, signature) :		--
Witnessed by (name, function, signature) :		--
Approved by (name, function, signature) ... :		--
Supervised by (name, function, signature) :		--

List of Attachments (including a total number of pages in each attachment): Including 5 pages of Appendix: Photos (Page 28~32). Including 1 page of Appendix: Circuit Diagram (Page 33). Including 1 page of Appendix: PCB Layout (Page 34). Including 1 page of Appendix: Safety instruction (Page 35).	
Summary of testing: From the result of our examination and tests in the submitted samples, conclude they comply with the requirements of the standard EN 62133-2:2017/A1:2021/AC:2022-01.	
Tests performed (name of test and test clause): 5.2 Insulation and wiring 7.3.2 External short circuit (battery) 7.3.3 Free fall 7.3.6 Over-charging of battery 7.3.8.1 Vibration 7.3.8.2 Mechanical shock	Testing location: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch C2-1 Heping Xu, Yongning Street, Zengcheng District, Guangzhou, China
Summary of compliance with National Differences (List of countries addressed): N/A	

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:**The artwork below may be only a draft.**

Rechargeable Li-ion Battery Pack
2IMR18/65-2

Product Model : 7.4V3000mAh (22.2Wh)
Rated Capacity: 3000mAh / 22.2Wh
Max.Charge Voltage: 8.4VDC

**BAN CHEN** **WARNING**

1. Do not reverse the connection of the positive and negative electrodes or use a metal object for short circuit.
2. Do not leave the battery near heat, open flames, flammable or explosive gases, Liquid and high temperature storage.
3. Do not pierce the battery pack housing with nails or other sharp objects.
4. It is strictly forbidden to disassemble the battery pack and battery in any way.
5. A dedicated lithium battery charger must be used when charging.

Made in China



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2024-09-30

Test item particulars: --	
Classification of installation and use: Portable appliance	
Supply Connection: --	
Recommend charging method declared by the manufacturer	CC/CV 900mA / 8.4V
Discharge current (0,2 It A)	600mA
Specified final voltage	6.0V
Upper limit charging voltage per cell	4.2V
Maximum charging current	1500mA for Battery Pack
Charging temperature upper limit	45°C
Charging temperature lower limit	0°C
Polymer cell electrolyte type	☐ gel polymer ☐ solid polymer ☒ N/A
Possible test case verdicts:	
- test case does not apply to the test object.....: N/A	
- test object does meet the requirement.....: P (Pass)	
- test object does not meet the requirement.....: F (Fail)	
Testing:	
Date of receipt of test item	2024-10-9
Date (s) of performance of tests	2024-10-10 to 2024-10-14

General remarks:

The test results presented in this report relate only to the object tested.

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"(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.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

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The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

(Modification 1):

This report is based on and superseded the original test report 240617108GZC-001 (issued on 2024-08-14) with below modifications:

-Update the label.

-Change the Test item description from "LI-ION Battery" to "Rechargeable Li-ion Battery Pack".

- Updated critical component information, added information for QC1, QD1, QC3, QD3.

-Updated photos due to added MOS and resistor base on original PCB.

Per evaluating, clauses 7.3.2 and 7.3.6 were reconsidered.

Name and address of factory (ies) : Same as applicant

General product information and other remarks:

The product covered by this test report is a Rechargeable Li-ion Battery Pack. The battery consisting of 4 Li-ion cells (2 series 2 parallel), and has overcharge, over-discharge, over current and short-circuits protection circuit.

The control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region shall be provided within the charger or the end product.

Cell model IMR18650-1500mAh inside the battery have CB certificate according to IEC62133-2:2017, IEC62133-2:2017/AMD1:2021 (CB Certificate No. JPTUV-135193, Report No. CN22W7G3 001).

The main features of the battery and cell are shown as below:

Parameter	Li-ion cell	Li-ion Battery
Model	IMR18650-1500mAh	7.4V3000mAh (22.2Wh)
Nominal voltage	3.7V	7.4V
Capacity	1500mAh	3000mAh
Charging voltage	4.2V	8.4V
Upper limited charging voltage	4.2V	8.4V
Standard charging current	300mA	900mA
Max. charging current	750mA	1500mA
Discharge cut-off voltage	3.0V	6.0V
Standard discharging current	300mA	600mA
Charging temperature	0~45°C	0~45°C

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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 so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	Insulation and wiring		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ		P
	Insulation resistance (MΩ) :	> 50 GΩ	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearances and creepage distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		P
5.4	Temperature, voltage and current management		P
	Batteries are designed such that abnormal temperature rise conditions are prevented		P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified		P
5.5	Terminal contacts		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	Assembly of cells into batteries		P
5.6.1	General		P
	Each battery has an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		P
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery has protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		P
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation		P
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		P
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage are not counted as an overcharge protection		P
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		P
	It is recommended that the cells and cell blocks are not discharged beyond the cell manufacturer's specified final voltage		P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry are incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries		P
	Mechanical protection for cells, cell connections and control circuits within the battery are provided to prevent damage as a result of intended use and reasonably foreseeable misuse		P
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		P
	The battery case and compartments housing cells are designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		P
	For batteries intended for building into a portable end product, testing with the battery installed within the end product is considered when conducting mechanical tests		P
5.7	Quality plan		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Manufacturer provided Quality Manual.	P
5.8	Battery safety components		P
6	TYPE TEST AND SAMPLE SIZE		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old		P
	The internal resistance of coin cells are measured in accordance with Annex D. Coin cells with internal resistance less than or equal to 3 Ω are tested in accordance with Table 1	Not coin cell.	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C $\pm$ 5 °C		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and over discharge protection		P
	When conducting the short-circuit test, consideration is given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test		P
7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of 20 °C $\pm$ 5 °C, using the method declared by the manufacturer		P
	Prior to charging, the battery has been discharged at 20 °C $\pm$ 5 °C at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		N/A
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h to 4 h, at an ambient temperature of the highest test temperature and the lowest test temperature, respectively, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant current to constant voltage charging method		N/A
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)	Cell have CB certificate	N/A
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		N/A
	Results: no fire, no explosion, no leakage..... :		N/A
7.2.2	Case stress at high ambient temperature (battery)		P
	Oven temperature (°C) : 70		—
	Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells		P
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Cell have CB certificate	N/A
	The cells were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	Results: no fire, no explosion..... :		N/A
7.3.2	External short-circuit (battery)		P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	A single fault in the discharge protection circuit is conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A single fault applies to protective component parts such as MOSFET (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor		P
	Results: no fire, no explosion..... :	(See appended table 7.3.2)	P
7.3.3	Free fall	Only Battery conduct this test	P
	Results: no fire, no explosion		P
7.3.4	Thermal abuse (cells)	Cell have CB certificate	N/A
	Oven temperature (°C)..... :		—
	Results: no fire, no explosion		N/A
7.3.5	Crush (cells)	Cell have CB certificate	N/A
	The crushing force was released upon:		N/A
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: no fire, no explosion..... :		N/A
7.3.6	Over-charging of battery		P
	The supply voltage which is:		P
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		P
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		P
	Test was continued until the temperature of the outer casing:		P
	- Reached steady state conditions (less than 10 °C change in 30-minute period); or		N/A
	- Returned to ambient		P
	Results: no fire, no explosion..... :	(See appended table 7.3.6)	
7.3.7	Forced discharge (cells)	Cell have CB certificate	N/A
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		N/A
	The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- The discharge voltage reaches the negative value of upper limit charging voltage within the testing duration. The voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	- The discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration. The test is terminated at the end of the testing duration		N/A
	Results: no fire, no explosion..... :		N/A
7.3.8	Mechanical tests (batteries)		P
7.3.8.1	Vibration		P
	Results: no fire, no explosion, no rupture, no leakage or venting. :	(See appended table 7.3.8.1)	P
7.3.8.2	Mechanical shock		P
	Results: no leakage, no venting, no rupture, no explosion and no fire :	(See appended table 7.3.8.2)	P
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Cell have CB certificate	N/A
	The cells complied with national requirement for :	France, Japan, Korea, Switzerland	—
	The pressing was stopped upon:		N/A
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached		N/A
	Results: no fire..... :		N/A

8	INFORMATION FOR SAFETY		p
8.1	General		P
	Manufacturers of secondary cells provides information about current, voltage and temperature limits of their products		P
	Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users		P
	Systems analyses are performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis is provided to the end user		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information	Not Small battery	N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A
9	MARKING		P
9.1	Cell marking		N/A
	Cells are marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		N/A
9.2	Battery marking		P
	Batteries are marked as specified in IEC 61960, except for coin batteries		P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity		N/A
	Batteries are marked with an appropriate caution statement		P
	- Terminals have clear polarity marking on the external surface of the battery, or		N/A
	- Not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		P
9.3	Caution for ingestion of small cells and batteries	Not Small battery	N/A
	Coin cells and batteries identified as small batteries include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion is given on the immediate package		N/A
9.4	Other information		P
	The following information are marked on or supplied with the battery:		P
	- Storage and disposal instructions	Information for disposal instructions given in manufacturer's specifications.	P
	- Recommended charging instructions	Information for disposal instructions given in manufacturer's specifications.	P
10	PACKAGING AND TRANSPORT		N/A
	Packaging for coin cells are not be small enough to fit within the limits of the ingestion gauge of Figure 3		N/A
ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		P
A.1	General		P
A.2	Safety of lithium ion secondary battery		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.2V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range		P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature declared by client is 0~45°C.	P
A.4.3	High temperature range		P
A.4.3.1	General		P
A.4.3.2	Explanation of safety viewpoint		P

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Clause	Requirement + Test	Result - Remark	Verdict
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		P
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A
A.4.4	Low temperature range		P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		P
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		N/A
A.5.1	General		N/A
A.5.2	Insertion procedure for nickel particle to generate internal short		N/A
A.5.3	Disassembly of charged cell		N/A
A.5.4	Shape of nickel particle		N/A
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	Experimental procedure of the forced internal short-circuit test		N/A
A.6.1	Material and tools for preparation of nickel particle		N/A
A.6.2	Example of a nickel particle preparation procedure		N/A
A.6.3	Positioning (or placement) of a nickel particle		N/A
A.6.4	Damaged separator precaution		N/A
A.6.5	Caution for rewinding separator and electrode		N/A
A.6.6	Insulation film for preventing short-circuit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
A.6.7	Caution when disassembling a cell		N/A
A.6.8	Protective equipment for safety		N/A
A.6.9	Caution in the case of fire during disassembling		N/A
A.6.10	Caution for the disassembling process and pressing the electrode core		N/A
A.6.11	Recommended specifications for the pressing device		N/A
ANNEX B	RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS		P
ANNEX C	RECOMMENDATIONS TO THE END-USERS		N/A
ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A
D.1	General		N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing	(See appended table D.2)	N/A
	Coin cells with an internal resistance less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
ANNEX E	PACKAGING AND TRANSPORT		N/A
ANNEX F	COMPONENT STANDARDS REFERENCES		P

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous charging at constant voltage (cells)				N/A
Sample No.	Recommended charging voltage V _c (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
Supplementary information: - No fire or explosion - No leakage - Others (please explain)					

7.3.1	TABLE: External short circuit (cell)					N/A
Sample No.	Ambient (°C)	OCV at start of test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Results	
Samples charged at charging temperature upper limit						
Samples charged at charging temperature lower limit						
Supplementary information:						
- No fire or explosion						
- Others (please explain)						

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: External short circuit (battery)					P
Sample No.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Component single fault condition	Results
S240913084-006	20.6	8.234	83.43	1.6	Short circuit MOSFET QC2 Pin S to D	A, C
S240913084-007	20.6	8.266	83.71	1.3	Short circuit MOSFET QC4 Pin S to D	A, C
S240913084-008	20.6	8.259	83.69	1.0	Short circuit MOSFET QD2 Pin S to D	A, C
S240913084-009	20.6	8.217	83.27	0.7	Short circuit RS2	A, C
S240913084-010	20.6	8.283	83.55	0.7	Normal	A, C
Supplementary information: A - No fire or explosion B - Battery surface temperature declines by 20 % of the maximum temperature rise C - Battery remain on test for an additional one hour after the current reaches a low end steady state condition						

7.3.5	TABLE: Crush (cells)				N/A
Sample No.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
Samples charged at charging temperature upper limit					
Samples charged at charging temperature lower limit					

EN 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
Supplementary information: - No fire or explosion - Others (please explain)				

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery			P
Constant charging current (A)		6		—
Supply voltage (Vdc)		10.08		—
Sample No.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
S240913084-001	6.478	120	39.1	A, B
S240913084-002	6.601	120	37.8	A, B
S240913084-003	6.556	120	38.7	A, B
S240913084-004	6.426	120	38.4	A, B
S240913084-005	6.613	120	38.5	A, B
Supplementary information: A - No fire or explosion B - The temperature of the outer casing returns to ambient				

7.3.7	TABLE: Forced discharge (cells)			N/A
Sample No.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Lower limit discharge voltage (Vdc)	Results
Supplementary information: - No fire or explosion - Others (please explain)				

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.8.1	TABLE: Vibration					P
Sample No.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
S240617108-018	8.272	8.263	262.54	262.52	A, B, C, D	
S240617108-019	8.276	8.245	262.77	262.76	A, B, C, D	
S240617108-020	8.273	8.237	263.73	263.72	A, B, C, D	
Supplementary information: A - No fire or explosion B - No rupture C - No leakage D - No venting						

7.3.8.2	TABLE: Mechanical shock					P
Sample No.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
S240617108-021	8.247	8.247	263.53	263.53	A, B, C, D	
S240617108-022	8.265	8.265	264.74	264.74	A, B, C, D	
S240617108-023	8.267	8.265	263.78	263.78	A, B, C, D	
Supplementary information: A - No fire or explosion B - No rupture C - No leakage D - No venting						

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.9	TABLE: Forced internal short circuit (cells)					N/A
Sample No.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results	
Samples charged at charging temperature upper limit						
Samples charged at charging temperature lower limit						
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. - No fire - Others (please explain)						

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results ¹⁾	
Supplementary information: ¹⁾ Coin cells with an internal resistance less than or equal to 3 Ω, see test result on corresponding tables according to Clause 6 and Table 1.					

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

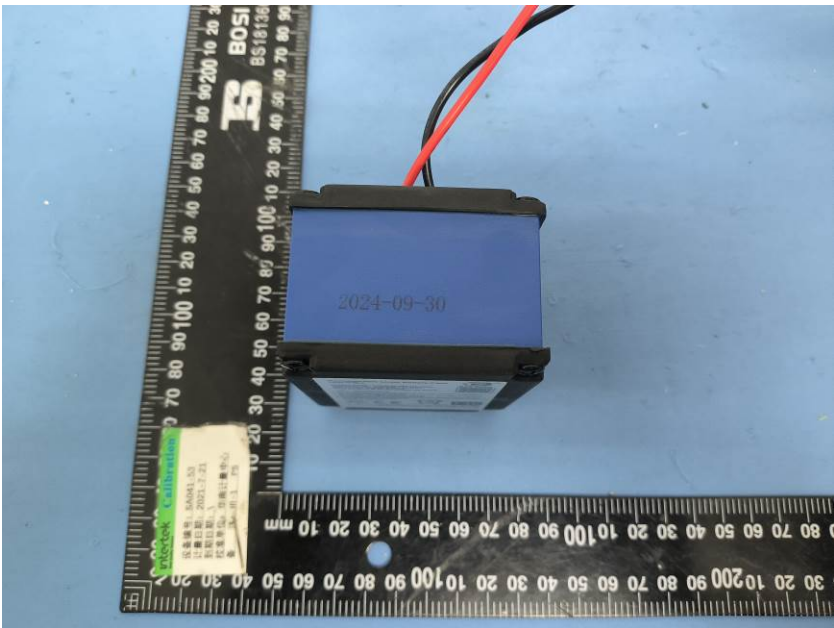
TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Black EVA foam	Huizhou Fan-zhong Bao Rubber and Plastic Foam Factory Co.LTD	--	Plate-like solids, Temperature resistance: soften at 65°C, shrink and melt at 90°C	--	Tested with appliance
Lead wire	SHANGHAI CHENGXING WIRE FACTORY	No. 18 white copper wire	Material: copper clad aluminum Min.32AWG	--	Tested with appliance
Connector	Yueqing Honglei Plastics Co., Ltd.	FRNC101	Material: PA6 Nylon	--	Tested with appliance
Metal Enclosure	Jiaxing Xin Aluminium Metal Material Co., Ltd	JXXLV6063-80*36MM	Material: ALU6063T5(Coating Plastic powder thickness: 60~80mm), Minimum Thickness: 1mm, Size: 36*60*80mm	--	Tested with appliance
Plastic Enclosure (Top and bottom)	Jiaxing Banchen Technology Co., Ltd	BC-GB-001	Material: Nylon plus fiberglass Size: 83*63*9mm, Minimum Thicknes:1mm	--	Tested with appliance
Plastic holder	Jiaxing Banchen Technology Co., Ltd	BC-ZJ-001	Material: PP, Minimum Thickness: 1mm	--	Tested with appliance
Fuse (F1)	ZHONG SHAN LANBAO ELECTRICAL APPLIANCES CO LTD	1206TD	24Vdc, Interrupting Rating 200A, Current Rating 10A	UL 248-1	UL E213695
IC (U1, U2)	Toll Microelectronic Co. LTD	CW1035BLAP	--	--	Tested with appliance
MOSFET (QC1, QC2, QD1, QD2)	SHENZHEN NEWTOP SEMICONDUCTOR CO., LTD	XR90N02F	--	--	Tested with appliance
MOSFET (QC3, QC4, QD3, QD4)	Shenzhen Puolop Electronics Co., Ltd.	PTN90N02	--	--	Tested with appliance

EN 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
PCB	ShenZhen Shengweixing Technology CO., LTD	SWX-BC-2S6326UL-V1.0	Size: 63.0*26.0*3.5mm	--	Tested with appliance
Cells	Xinxiang Hongli supply Source Technology Co., Ltd.	IMR18650-1500mAh	3.7V, 1500mAh	IEC62133-2:2017, IEC62133-2/2017/AMD1:2021	CB Certificate No. JPTUV-135193
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

Appendix: Photos

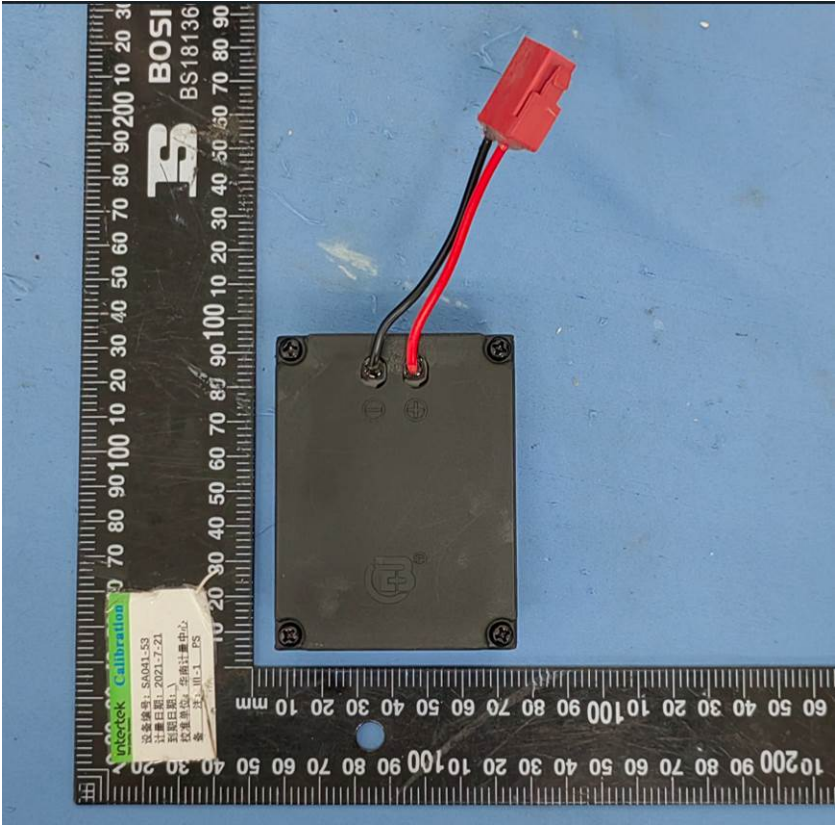


Battery view



Battery view

Appendix: Photos

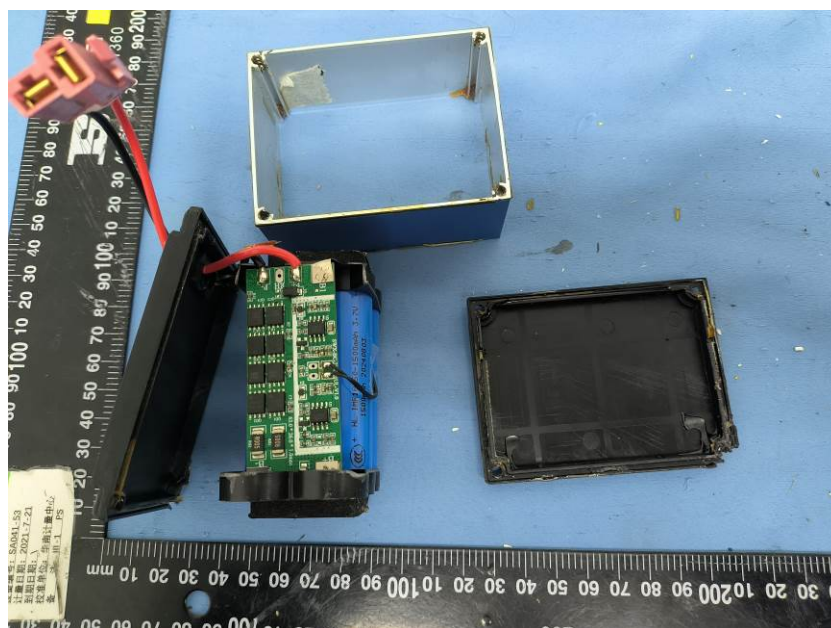


Battery view



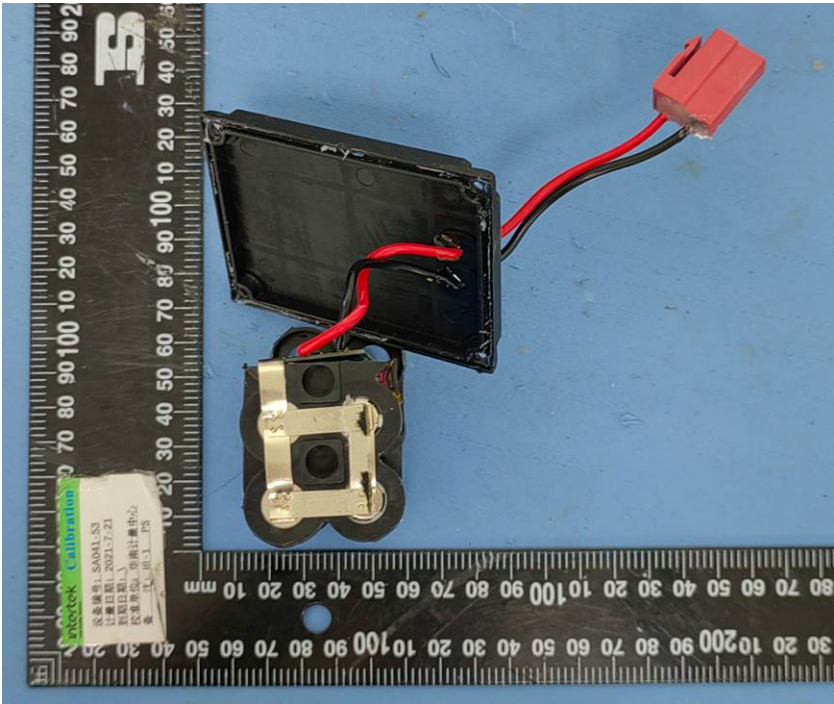
Internal view

Appendix: Photos



Internal view

Appendix: Photos



Cells connection view



Cells connection view

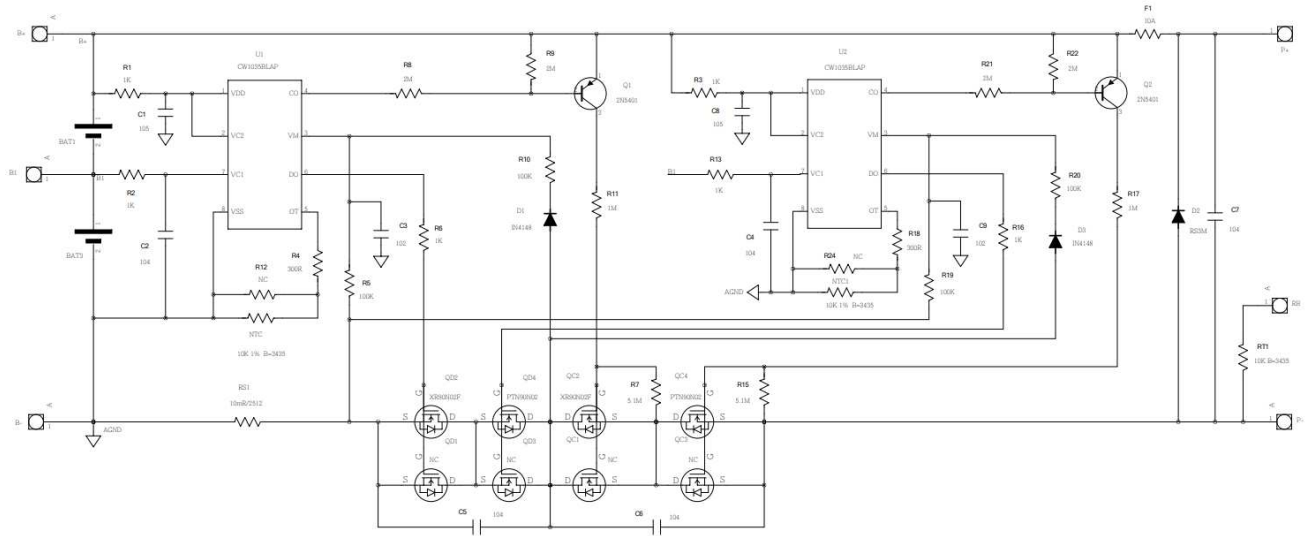
Intertek Calibration
Best Quality. Never.

设备编号: SA041-53
计量日期: 2021-7-21
到期日期: \u2199
校准单位: 华南计量中心
备注: III-1 PS

446897A_Y1759_240716

TRF No. IEC62133_2C

Appendix: Circuit diagram

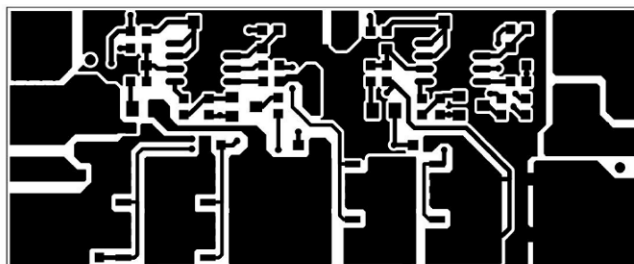


SWX-BC-286326UL-V1.0

63.0 * 26.0 * 1.0mm

The PCB layout includes various components and their locations:

- Top Left:** B1 (large rectangle), D2 (diagonal symbol), P+ (circular pad), RT1 (rectangle), P- (circular pad), R15 (rectangle).
- Top Center:** SWX-BC-286326UL-V1.0 (title), U2 (rectangle), R3 (rectangle), R19 (rectangle), C9 (rectangle), R20 (rectangle), Q1 (rectangle), R13 (rectangle), C4 (rectangle), R16 (rectangle), R18 (rectangle), R17 (rectangle), Q2 (rectangle), NTC (rectangle), NTC1 (rectangle), R24 (rectangle), D1 (rectangle).
- Top Right:** B+ (large rectangle), C1 (rectangle), R2 (rectangle), C2 (rectangle), R12 (rectangle), R4 (rectangle), R6 (rectangle), R8 (rectangle), R9 (rectangle), Q1 (rectangle), R11 (rectangle), F1 (rectangle).
- Bottom Left:** Q3 (rectangle), Q4 (rectangle), Q1 (rectangle), Q2 (rectangle), R7 (rectangle).
- Bottom Center:** C6 (rectangle), C5 (rectangle), Q3 (rectangle), Q2 (rectangle).
- Bottom Right:** B- (large rectangle), RS1 (rectangle), RS2 (rectangle).



Bottom

Appendix: Instruction (partial)

8.Warning and cautions when using the battery↵

In order to prevent the possible leakage, heat, explosion of the battery, please pay attention to the following preventive measures:↵

Warning !↵

- Do not immerse the battery in seawater or water. Keep it in a cool and dry environment when not in use.↵
- Do not leave the battery near the heat source, such as fire, heater, etc.↵
- Please use a lithium-ion battery charger when charging.↵
- It is strictly forbidden to use batteries upside down.↵
- It is forbidden to insert the positive and negative ends of the battery directly into the power outlet.↵
- Do not throw batteries into a fire or heater.↵
- It is forbidden to connect the positive and negative electrodes of the battery directly with metal.↵
- It is forbidden to transport or store batteries with metal, such as hairpins, necklaces, etc.↵
- Don't hit or throw, step on batteries, etc.↵
- Do not directly weld the battery or pierce it with nails or other sharp objects.↵

Be careful !↵

- Do not use or place batteries at high temperatures (in the hot sun or in very hot cars) as they may overheat, catch fire, or fail to function and reduce battery life.↵
- It is forbidden to use in the place with strong static electricity and strong magnetic field, otherwise it will easily destroy the safety protection device of the battery and bring the hidden danger of insecurity.↵
- If the battery is leaking and the electrolyte enters the eyes, please do not rub, rinse the eyes with water and get medical treatment immediately, otherwise it will hurt the eyes.↵
- If the battery gives off an unusual smell, heats up, discolours, deforms or does anything unusual during use, storage or charging, remove the battery from the device or charger immediately and stop using it.↵
- If the electrodes are dirty, clean them with a dry cloth before use, otherwise it may lead to poor contact function failure↵
- Waste batteries should be insulated with paper around the electrodes to prevent fire and explosion.↵