Report No. : TSZ23110570-P01-R01 Page 1 of 3

Test Report

Client	:	
Address	:	

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client

Sample Name	:	Li-Ion Battery
Model/P.O. No.	:	18650 2000mAh/ 18650 1200mAh/ 18650 1500mAh/ 18650 1800mAh 18650 2200mAh/ 18650 2500mAh/ 18650-2P 3600mAh/ 18650-2P 4000mAh/ 18650-2P 5000mAh/ 18650-4P 7200mAh 21700 3000mAh/ 21700 4000mAh/ 21700 4500mAh/ 21700 4800mAh 21700 5000mAh/ 21700-2P 9000mAh/ 21700-2P 9600mAh 21700-2P 10000mAh/ 14500 500mAh/ 14500 800mAh
Manufacturer	:	
Received Date	:	Nov 23, 2023
Test Period	:	Nov 23, 2023~Nov 28, 2023
Test Requested	:	Regulation (EU) 2023/1542

Conclusion		
-	Lead(Pb), Cadmium(Cd), Mercury(Hg)	**PASS**

For Further Details, Please Refer To the Following Page(s)

Approved by: Jane. Liu

Date: Dec 06, 2023

SHENZHEN TIANSU CALIBRATION AND TESTING CO.,LTD. Report Seal (02-01)

Add: Building 1/4, No.2, Jinlong Road, Longgang District, Shenzhen, Guangdong, China. Post Code: 518116
Tel: 0755-89457984 Website: www.tiansu.org
E-mail: tsjc@tiansu.org

Test Methods

Test Items	Test Method	Equipment
Lead(Pb), Cadmium(Cd)	IEC 62321-5:2013	ICP-OES
Mercury(Hg)	IEC 62321-4:2013+AMD1:2017	ICP-OES

Test Results

Test components	Test Item(s)	MDL (%)	Result(s) (%)	Limit (%)
Li-Ion Battery	Lead(Pb)	0.0005	N.D.	0.0100
	Cadmium(Cd)	0.0005	N.D.	0.0020
	Mercury(Hg)	0.0001	N.D.	0.0005

Note:

- N.D.=Not Detected (<MDL); MDL=method detection limit.
- According to regulation (EU) 2023/1542, All batteries containing more than 0.002 % cadmium or more than 0.004 % lead, shall be marked with the chemical symbol for the metal concerned: Cd or Pb.
  The relevant chemical symbol indicating the heavy metal content shall be printed beneath the separate collection symbol and shall cover an area of at least one-quarter the size of that symbol.

Test Process:

Test Lead(Pb) ,Cadmium(Cd) , Mercury(Hg) concentration:

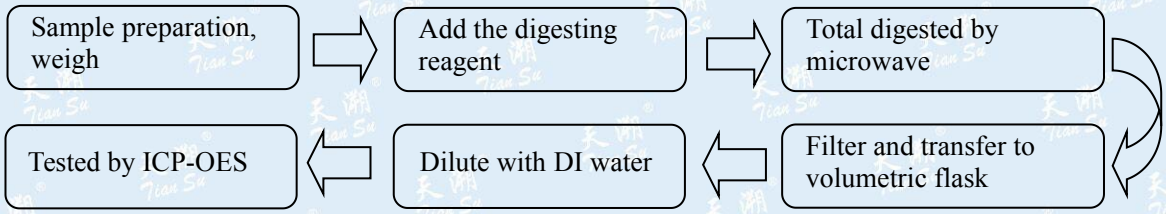

Photo of the sample

Sample

********** End of report **********

This report is invalid without the Special Seal of Tiansu. This report shall not be altered, increased or deleted. The results shown in this report refer only to the sample(s) tested.

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TESTING
CNAS L5138

TEST REPORT
IEC 62133-2
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.....:	TSZ21070123-P02-R01
Date of issue.....:	December 7,2023
Total number of pages.....:	23
Name of Testing Laboratory preparing the Report.....:	Shenzhen Tiansu Calibration and Testing Co.,Ltd
Applicant's name.....:	
Address.....:	
Test specification:	
Standard.....:	IEC 62133-2:2017
Non-standard test method.....:	N/A

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description.....:	Li-ion Battery
Trade Mark.....:	N/A
Manufacturer.....:	Same as applicant
Model/Type reference.....:	18650
Ratings.....:	2000mAh, 7.4Wh, 3.7V

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Shenzhen Tiansu Calibration and Testing Co.,Ltd	
Testing location/ address.....:		B/1,4, NO.2 Jinlong Road, Longgang District, Shenzhen, China	
Tested by (name, function, signature).....:		Wang wen tao \Test Engineer	Dove Tan
Approved by (name, function, signature)...:		Gong min \Technology supervisor	Gong Min
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature)..:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
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):

- Pages 1 to 23 for IEC 62133 TRF (main report)
- Attachment 1 (1 Page): Circuit diagram
- Attachment 2 (3 Pages): Product Photos

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
7.1 Charging procedure for test purposes; 7.2.1 Continuous charging at constant voltage (cells); 7.2.2 Case stress at high ambient temperature (battery); 7.3.1 External short circuit (cell); 7.3.2 External short circuit (battery); 7.3.3 Free fall (cell and battery); 7.3.4 Thermal abuse (cells); 7.3.5 Crush (cells); 7.3.6 Over-charging of battery; 7.3.7 Forced discharge (cells); 7.3.8 Mechanical test (batteries) 7.3.9 Design evaluation – Forced internal short circuit (cells)	Shenzhen Tiansu Calibration and Testing Co.,Ltd B/1,4, NO.2 Jinlong Road, Longgang District, Shenzhen, China

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

N/A

Copy of marking plate:

The artwork below may be only a draft.

Li-ion Battery 18650
3.7V 2000mAh 7.4Wh INP19/66
Lithium ion Polymer Battery
Red wire "+" Black wire "-"
Made in China YYYYMMDD
Caution：Risk of Fire and Burns
Follow Manufacturer's Instructions

Remark:
The code "YYYYMMDD" represents that:
"YYYY" means year of production
"MM" means month of production
"DD" means day of production

Test item particulars..... :	
Classification of installation and use.....:	To be defined in final product
Supply Connection.....:	DC Connector
Recommend charging method declared by the manufacturer.....:	400mA constant current charge to 4.2V, then constant voltage 4.2V charge till charge current declines to 20mA.
Discharge current (0,2 lt A).....:	400mA
Specified final voltage..... :	2.75V
Upper limit charging voltage per cell.....:	4.2V
Maximum charging current..... :	2000mA
Charging temperature upper limit.....:	55°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.....:	November 18, 2023
Date (s) of performance of tests.....:	November 18, 2023 to November 28, 2023

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

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

General product information and other remarks:

The product covered by this report is Li-ion Battery (model: 18650) consists of 1 Li-ion cell (model: 18650) in 1S1P which tested with appliance as per IEC 62133-2:2017 in the report.

Model no.	Cell: 18650	Battery: 18650
Recommend charging voltage	4.2V	4.2V
Upper limited charging voltage	4.2V	4.2V
Recommend charging current	400mA	400mA
Max. charging current	2000mA	2000mA
Charge cut-off current	20mA	20mA
Recommend discharging voltage	2.75V	2.75V
Recommend discharging current	400mA	400mA
Max. discharging current	2000mA	2000mA
Operation Temperature	0~55°C	0~55°C

IEC 62133-2			
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	No externally exposed metal surfaces.	N/A
	Insulation resistance (MΩ)..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearance 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	No outer casing.	N/A
5.4	**Temperature, voltage and current management**	See below	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	Cell specification and battery specification have been provided. The design of the battery refers to the parameters of the cell	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	Battery specifications have been provided.	P
5.5	**Terminal contacts**		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC connector used.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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-circuit		P
5.6	**Assembly of cells into batteries**		P
5.6.1	General		P
	Each battery have 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		N/A
	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 have 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	Current, voltage and temperature limits specified by cell manufacturer.	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	Battery without selective discharge function.	N/A
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	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	Cell upper limit of the charging voltage: 4.2V	P

IEC 62133-2			
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		N/A
	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 not be counted as an overcharge protection		N/A
	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		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer’s specified final voltage		P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries		N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	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		N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	**Quality plan**		N/A

IEC 62133-2			
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		N/A
5.8	**Battery safety components**		N/A
	According annex F		N/A
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	Tests are performed according to specified in Table 1 of this standard. The samples are not more than six months old.	P
	Coin cells with resistance ≤ 3 Ω (measured according annex D) are tested according table 1	Not coin cell.	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C ± 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 overdischarge protection		N/A
	When conducting the short-circuit test, consideration 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 ± 5 °C, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, 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 voltage charging method	Charging temperature specified by client is 0-55°C, 55°C and 0°C were used as highest test temperature and lowest test temperature during tests. The upper limit charging voltage is 4.2V. The maximum charging current is 2000mA.	P
7.2	**Intended use**		P
7.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	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		P
	Results: No fire. No explosion. No leakage..... :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)		N/A
	Oven temperature (°C)..... :		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	**Reasonably foreseeable misuse**		P
7.3.1	External short-circuit (cells)	Tested complied.	P
	The cells 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
	Results: No fire. No explosion..... :	(See appended table7.3.1)	P
7.3.2	External short-circuit (battery)	Test complied.	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	Applies to samples in normal conditions	P
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test	Single fault conducted on four samples.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor	Single fault applies on MOSFET U2	P
	Results: No fire. No explosion..... :	(See appended table7.3.2)	P
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion		P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)..... :	130	—
	Results: No fire. No explosion		P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery	Tested complied.	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	5.88V used for test.	P
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- 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 table7.3.6)	P
7.3.7	Forced discharge (cells)	Tested complied.	P
	If 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
	If 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		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)	Tested complied.	P
7.3.8.1	Vibration		P
	Results: No fire, no explosion, no rupture, no leakage or venting.....:		P
7.3.8.2	Mechanical shock	Tested complied.	P
	Results: No leakage, no venting, no rupture, no explosion and no fire.....:		P
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P
	The cells complied with national requirement for.....:	France, Japan, Republic of Korea, Switzerland	—
	The pressing was stopped upon:		P
	- 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	800N for cylindrical cells.	P
	Results: No fire..... :	(See appended table 7.3.9)	P
8	**INFORMATION FOR SAFETY**		P
8.1	**General**		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards	Information for safety mentioned in manufacturer's specifications	P
	Systems analyses 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 provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	**Small cell and battery safety information**		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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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**	The final product is battery.	N/A
	Cells 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 marked as specified in IEC 61960, except for coin batteries	The battery is marked in according with IEC61960.	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement	Not coin battery.	N/A
	Terminals have clear polarity marking on the external surface of the battery	See page 4.	P
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	**Caution for ingestion of small cells and batteries**		N/A
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2	Not coin cells and batteries.	N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N/A
9.4	**Other information**		P
	Storage and disposal instructions		P
	Recommended charging instructions		P
10	**PACKAGING AND TRANSPORT**		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P
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	Upper limit charging voltage of cell is 4.2V.	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N/A
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	Charging temperature range declared by client is 0-55°C	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N/A
A.4.3	High temperature range	55°C applied.	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		N/A
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	0°C applied	N/A
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint		N/A
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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**		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		N/A
A.5.5	Insertion of nickel particle in cylindrical cell		P
A.5.5.1	Insertion of nickel particle in winding core		P
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		P
A.5.6	Insertion of nickel particle in prismatic cell		P
A.6	**Experimental procedure of the forced internal short-circuit test**		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
ANNEX B	**RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS**		P
ANNEX C	**RECOMMENDATIONS TO THE END-USERS**		P
ANNEX D	**MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS**		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
D.1	**General**		N/A
D.2	**Method**		N/A
	A sample size of three coin cells is required for this measurement.....:	(See appended table D.2)	N/A
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
ANNEX E	**PACKAGING AND TRANSPORT**		**N/A**
ANNEX F	**COMPONENT STANDARDS REFERENCES**		**N/A**

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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)
Electrolyte	Dong guan tian feng power material co. LTD	TF-022	Composition: LiPF6+DEC+EC+PC.etc, Conductivity (Ms/cm2): 9	--	--
Separator	FOSHAN JINHUI HI-TECK OPOELECTRONIC MATERIAL CO.,LTD	16um	Material: PE, Air permeability (s/100Ml): 120±50, Porosity (%): ≥45%, Tensile strength (MPa):100, Shutdown temperature (°C): 135	--	--
Positive electrode	Qingdao Qianyun High-tech New Materials Co., Ltd.	QY-901	Material:$LiNi_{(0.5)}Co_{(0.2)}Mn_{(0.3)}O_2$, Particle size D50(μm): 8±5, Specific surface area (m2/g): 1.0±0.5, Tap density (g/cm3): ≥ 2.0	-	Tested with Battery
Negative electrode	Jiangxi zichen technology co. LTD	FT-1	Material: Graphite, C Particle size D50(μm): 15~28	--	--
Aluminum-plastic film	Sshowa denko ALF	C4-480	Nylon, Aluminum, CPP	--	--
PCB	Shenzhen Sayea Circuit Technology Co.,Ltd.	SY-D	V-0, 130°C, Minimum thickness: 0.6 mm	UL 94 UL 796	UL E476823
IC (U1)	ShenZhen Puolop Electronics co.,LTD.	DW01	Overcharge detection voltage: 4.30±0.05V, Over-discharge detection voltage: 2.50±0.10 V, Operating temperature range: -20°C to +55°C	--	Tested with Battery
MOSFET (U2)	ShenZhen Puolop Electronics co.,LTD.	8205	VDS: 20V, VGS: ±12V, ID: 6A, TJ,TSTG: -20°C to +55°C	--	Tested with Battery
Wire	LTK Electric Wire (Huizhou)Ltd	1007	26AWG, V-0, 80°C, 300V	UL 758	UL E148000
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039. 2) Client did not provide relevant information.					

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Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous charging at constant voltage (cells)			P
Sample no.	**Recommended charging voltage Vc (Vdc)**	**Recommended charging current I_{rec} (A)**	**OCV before test (Vdc)**	**Results**
C1#	4.20	0.40	4.188	P
C2#	4.20	0.40	4.187	P
C3#	4.20	0.40	4.185	P
C4#	4.20	0.40	4.187	P
C5#	4.20	0.40	4.187	P

Supplementary information:

- No fire or explosion
- No leakage
- The ambient temperature is 23.5°C

7.3.1	TABLE: External short-circuit (cells)				P
Sample no.	**Ambient T (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature rise ΔT (K)**	**Results**
Samples charged at charging temperature upper limit[1)]					
C6#	54.5	4.158	80.4	63.7	P
C7#	54.5	4.152	81.2	62.8	P
C8#	54.5	4.153	80.5	63.8	P
C9#	54.5	4.157	81.3	62.9	P
C10#	54.5	4.155	80.8	62.3	P
Samples charged at charging temperature lower limit[2)]					
C11#	54.7	4.089	80.7	63.6	P
C12#	54.7	4.087	81.2	64.5	P
C13#	54.7	4.089	80.7	63.7	P
C14#	54.7	4.087	80.8	64.3	P
C15#	54.7	4.087	80.7	64.4	P

Supplementary information:

- No fire or explosion

[1)] Cells charged at 55°C
[2)] Cells charged at 0°C

IEC 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**
B4#	23.2	4.181	81.3	0.6	Normal	P
B5#	23.1	4.179	80.8	88.1	SC U2	P
B6#	23.1	4.178	81.7	89.4	SC U2	P
B7#	23.2	4.181	81.2	89.9	SC U2	P
B8#	23.3	4.180	80.9	88.8	SC U2	P

Supplementary information:
- No fire or explosion
- SC means short-circuit

7.3.5	TABLE: Crush (cells)			P
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[1)]				
C29#	4.155	4.155	13.10	P
C30#	4.160	4.160	13.03	P
C31#	4.158	4.158	13.07	P
C32#	4.157	4.157	13.08	P
C33#	4.156	4.156	13.10	P
Samples charged at charging temperature lower limit[2)]				
C34#	4.089	4.089	13.11	P
C35#	4.087	4.087	13.03	P
C36#	4.084	4.084	13.03	P
C37#	4.083	4.083	13.10	P
C38#	4.087	4.087	13.12	P

Supplementary information:
- No fire or explosion

1) Cells charged at 55°C

2) Cells charged at 0°C

- The ambient temperature is 23.4°C

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery		P
Constant charging current (A).....:		4.0	—
Supply voltage (Vdc).....:		5.88	—

Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
B12#	3.158	83.3	45.4	P
B13#	3.149	83.6	46.3	P
B14#	3.157	83.4	45.8	P
B15#	3.163	82.8	46.7	P
B16#	3.155	83.1	48.9	P

Supplementary information:

- No fire or explosion
- The ambient temperature is 23.5°C

7.3.7	TABLE: Forced discharge (cells)			P

Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Lower limit discharge voltage (Vdc)	Results
C39#	3.167	2.0	-1.312	P
C40#	3.187	2.0	-1.211	P
C41#	3.166	2.0	-1.138	P
C42#	3.158	2.0	-1.214	P
C43#	3.169	2.0	-1.211	P

Supplementary information:

- No fire or explosion
- The ambient temperature is 23.5°C

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
B17#	4.178	4.172	45.181	45.178	P
B18#	4.174	4.165	45.183	45.180	P
B19#	4.172	4.163	45.180	45.177	P

Supplementary information:

- No fire or explosion
- No rupture
- No leakage
- No venting
- The ambient temperature is 23.4°C

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Clause	Requirement + Test	Result - Remark	Verdict

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**
B20#	4.177	4.175	45.179	45.177	P
B21#	4.181	4.179	45.183	45.181	P
B22#	4.180	4.177	45.185	45.183	P

Supplementary information:

- No fire or explosion
- No rupture
- No leakage
- No venting
- The ambient temperature is 23.4°C

7.3.9	TABLE: Forced internal short circuit (cells)				P
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[2)]					
C44#	55.0	4.155	1	804.5	P
C45#	55.0	4.158	1	803.1	P
C46#	55.0	4.157	1	803.8	P
C47#	55.0	4.159	1	804.2	P
C48#	55.0	4.161	1	801.5	P
Samples charged at charging temperature lower limit[3)]					
C49#	0.0	4.089	1	802.3	P
C50#	0.0	4.087	1	801.4	P
C51#	0.0	4.089	1	803.8	P
C52#	0.0	4.087	1	802.1	P
C53#	0.0	4.088	1	803.5	P

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.

[2)] Cells charged at 55°C

[3)] Cells charged at 0°C

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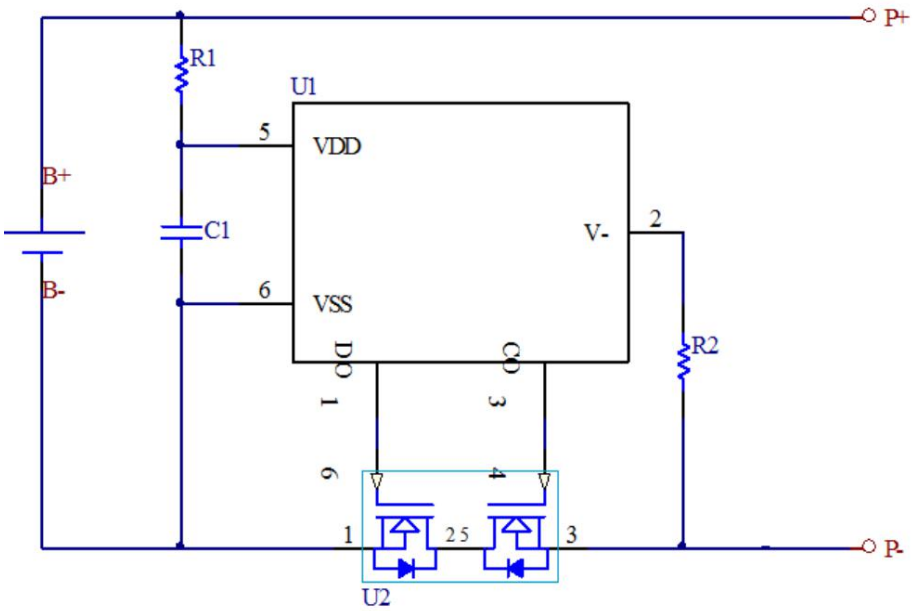
Clause	Requirement + Test	Result - Remark	Verdict

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:

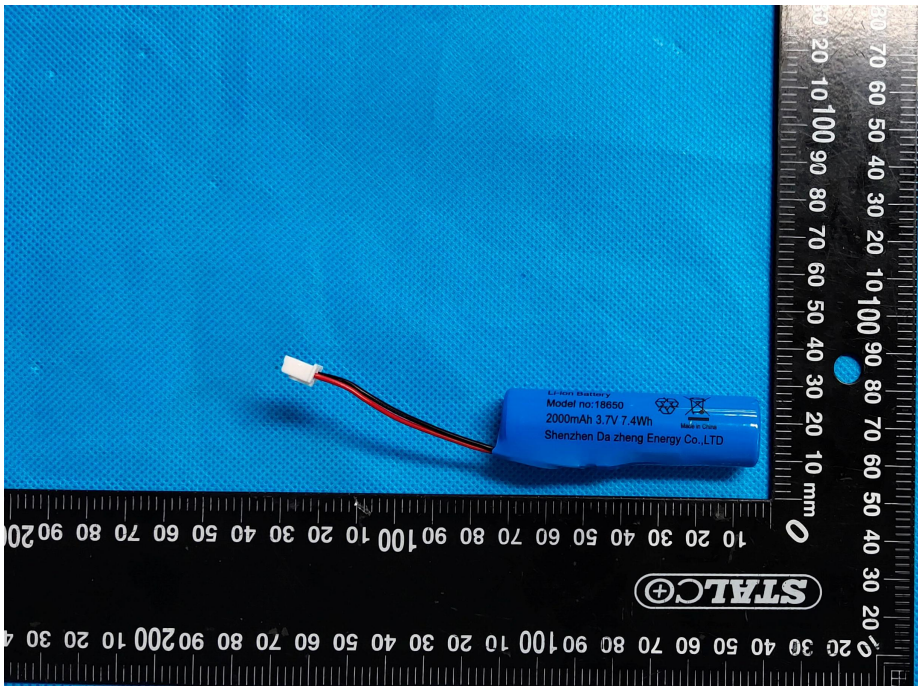
[1)] Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

Circuit diagram

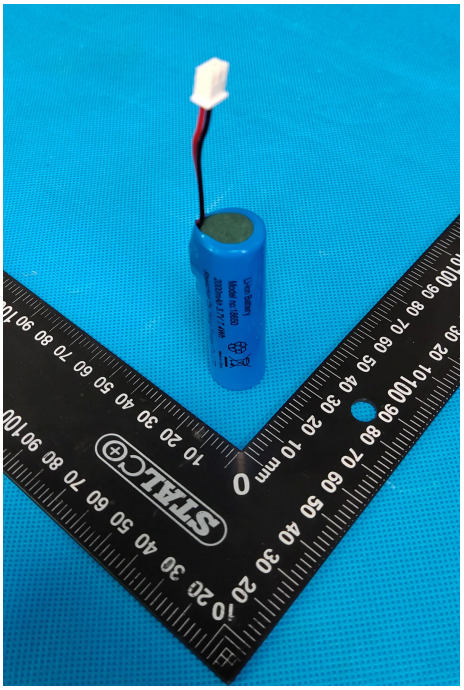


Circuit diagram

Product Photos

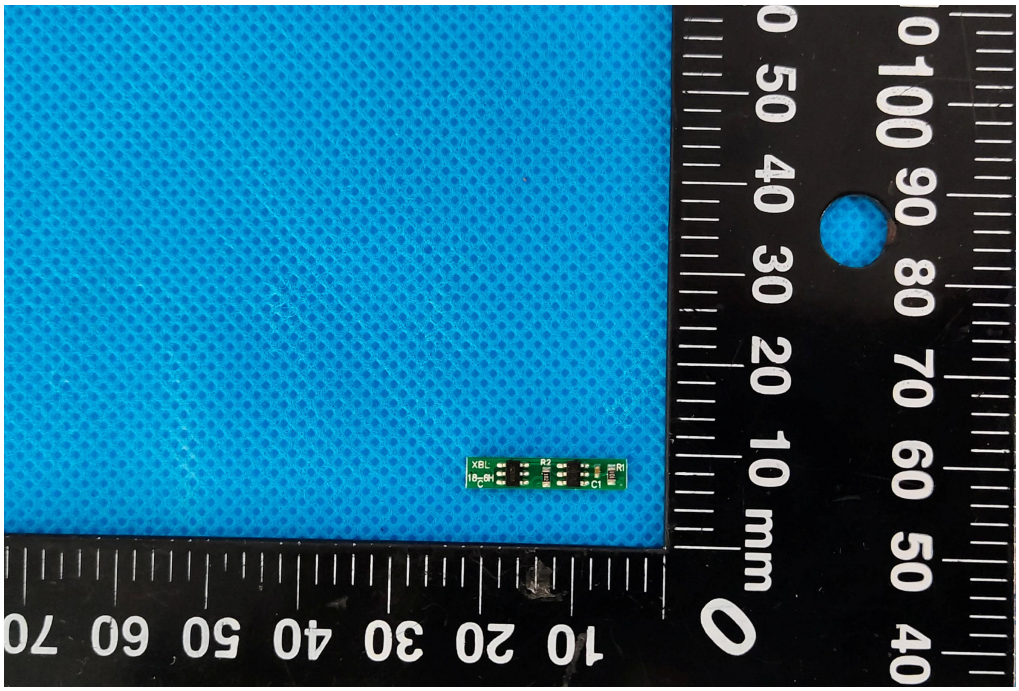


Front view of battery

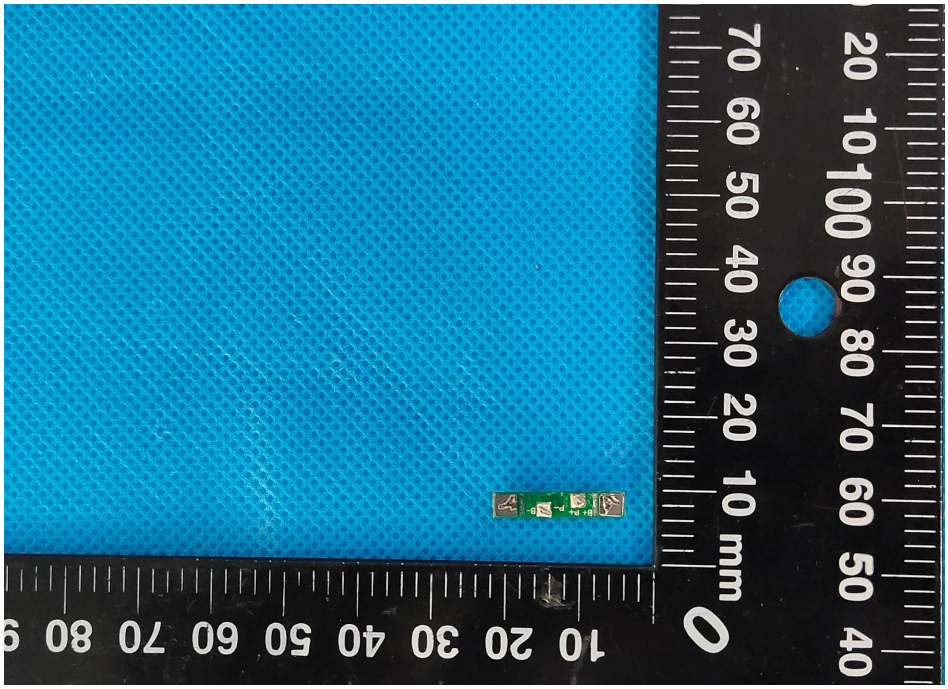


Back view of battery

Product Photos



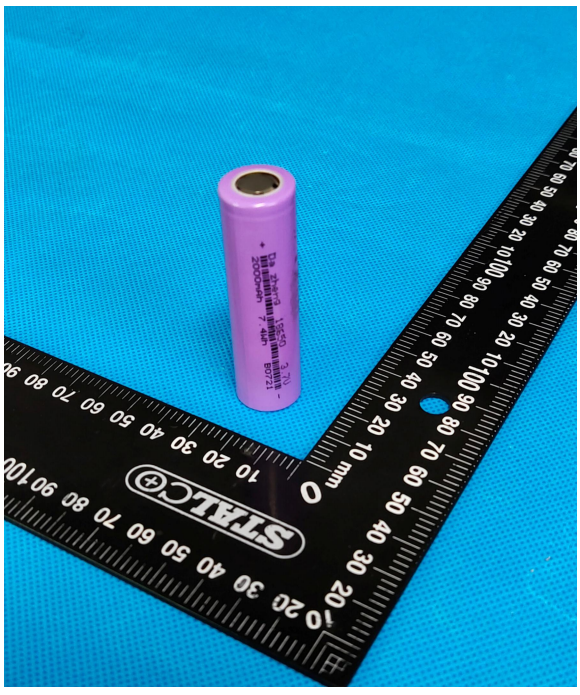
Front view of PCM



Back view of PCM

Product Photos

Front view of cell



Back view of cell