Report No. : TSZ26EK030A01-01 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.	:	ZW 606090
Manufacturer	:	
Received Date	:	May 19, 2026
Test Period	:	May 19, 2026~May 22, 2026
Test Requested	:	Annex 1 of Regulation (EU) 2023/1542-Heavy Metals Content in batteries and waste batteries

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

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

Approved by:

Date: May 22, 2026

SHENZHEN TIANSU CALIBRATION AND TESTING CO., LTD
Inspection & Testing Services

ShenZhen Tiansu Calibration and Testing Co., Ltd.
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) (%)	Maximum permissible Limit(%)	Labelling Limit (%)
Li-ion Battery (ZW 606090)	Lead(Pb)	0.0005	N.D.	Portable batteries 0.0100	0.0040
	Cadmium(Cd)	0.0005	N.D.	Portable batteries 0.0020	0.0020
	Mercury(Hg)	0.0001	N.D.	0.0005	--

Note:

- % = percentage
- 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:

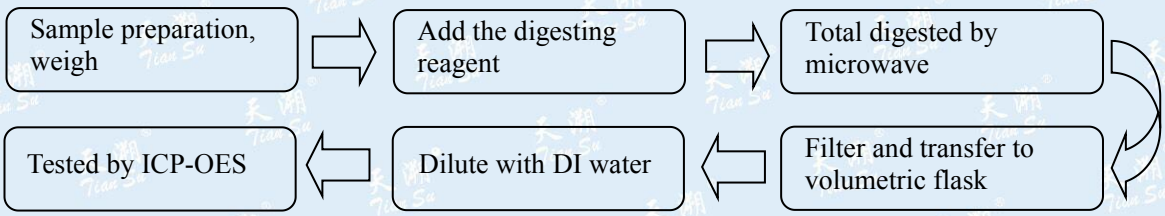
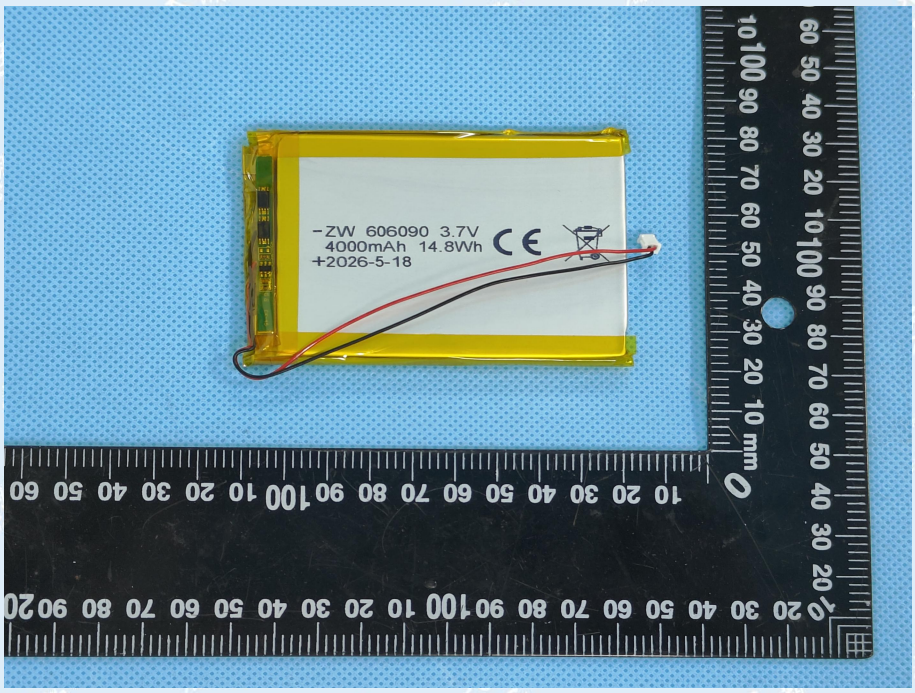


Photo of the sample



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.

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.....:	TSZ26DH025A01-01
Date of issue.....:	2026-05-09
Total number of pages.....:	24
Applicant's name.....:	
Address.....:	
Test specification	
Standard.....:	IEC 62133-2:2017/AMD1:2021

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 laboratory.

Test item description.....:	Li-ion Battery
Trade Mark.....:	N/A
Manufacturer.....:	Same as applicant
Model/Type reference.....:	ZW 606090
Ratings.....:	3.7V, 4000mAh, 14.8Wh

Testing Laboratory.....:	Shenzhen Tiansu Calibration and Testing Co., Ltd.	
Testing location/ address.....:	No.2, Jinlong Avenue, Longgang District, Shenzhen, Guangdong, China	
Tested by (name, signature).....:	Aria Zhou \Test Engineer	
Checked by(name, signature).....:	Evan Zhong \Reviewer	
Approved by (name, signature).....:	Diamond Duan \Technology supervisor	

SHENZHEN TIANSU CALIBRATION AND TESTING CO., LTD. Inspection & Testing Services

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

Attachment 1 (1 Pages): Circuit diagram

Attachment 2 (4 Pages): Product Photos

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
cl.7.1 Charging procedure for test purposes; cl.7.2.1 Continuous charging at constant voltage (cells); cl.7.2.2 Case stress at high ambient temperature (batteries); cl.7.3.1 External short circuit (cells); cl.7.3.2 External short circuit (batteries); cl.7.3.3 Free fall (cells and batteries); cl.7.3.4 Thermal abuse (cells); cl.7.3.5 Crush (cells); cl.7.3.6 Over-charging of battery; cl.7.3.7 Forced discharge (cells); cl.7.3.8 Mechanical tests (batteries); cl.7.3.9 Design evaluation – Forced internal short circuit (cells). cl.8.2 Small cell and battery safety information Tests are made with the number of cells and batteries specified in IEC 62133-2:2017/AMD1:2021 Table 1.	Shenzhen Tiansu Calibration and Testing Co., Ltd. No.2, Jinlong Avenue, Longgang District, Shenzhen, Guangdong, China

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

N/A

☒ **The product fulfils the requirements of EN 62133-2: 2017+A1:2021**

Copy of marking plate:

The artwork below may be only a draft.

Li-ion Battery
Model: ZW 606090
3.7V, 4000mAh, 14.8Wh
1INP6/61/91 YYYY-M-DD
Caution:
RISK OF FIRE, EXPLOSION OR BURNING
DO NOT SHORT CIRCUIT
DO NOT DISASSEMBLE

Remark:

1. The date code consists of the following: YYYY-M-DD

"YYYY" represent manufacture year;

"M" represent manufacture month of this year;

"DD" represent manufacture day of this month.

For example: 2026-4-18 represent the battery production date on April 18, 2026.

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.....:	Charging the battery with 800mA constant current and 4.2V constant voltage until the current reduces to 80mA at ambient 20°C±5°C.
Discharge current (0,2 It A).....:	800mA (Cell), 800mA (Battery)
Specified final voltage..... :	2.75V (Cell), 2.75V(Battery)
Upper limit charging voltage per cell..... :	4.25V
Maximum charging current..... :	4000mA (Cell), 2000mA (Battery)
Charging temperature upper limit.....:	45°C (Cell), 45°C (Battery)
Charging temperature lower limit..... :	0°C (Cell), 0°C (Battery)
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.....:	2026-04-20
Date (s) of performance of tests..... :	2026-04-21 to 2026-05-06
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.**	
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:

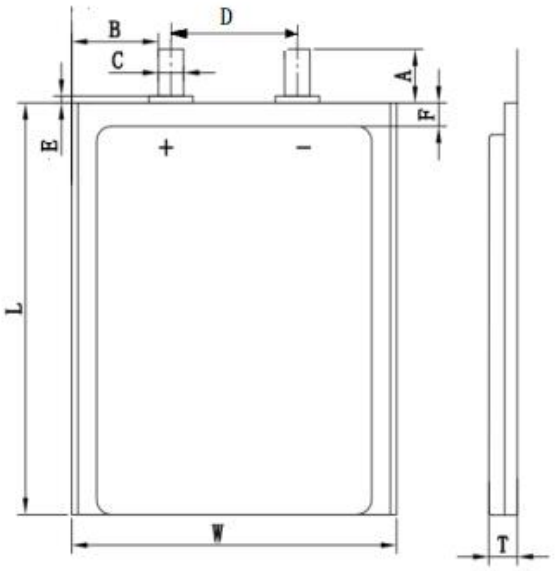
This battery is constructed with single lithium-ion cell (1S1P), and has overcharge, over-discharge, over current and short-circuits proof circuit.

The applicant and manufacturer information, product name, model, trademark and other information in this report are all provided by the applicant, and this laboratory is not responsible for verifying its authenticity.

Detailed information of the battery and the cell built in the battery, as following:

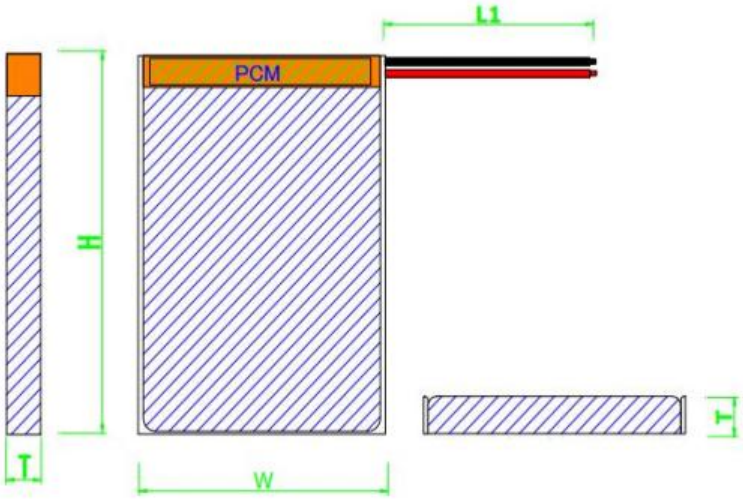
Type	Cell	Battery
Model	ZW 606090	ZW 606090
Rated Capacity	4000mAh	4000mAh
Nominal Voltage	3.7V	3.7V
Recommend Charging Voltage	4.2V	4.2V
Upper Limit Charging Voltage	4.25V	4.25V
Recommend Charging Current	2000mA	800mA
Maximum Charging Current	4000mA	2000mA
Recommend Discharging Current	2000mA	800mA
Maximum Discharging Current	4000mA	2000mA
End-of-discharge Voltage	2.75V	2.75V
End-of-charge Current	80mA	80mA
Operation Charge Temperature	0~45°C	0~45°C

Construction:



T*W*L(MAX)= 6.0mm*60.5mm*90.8mm

Cell (Unit: mm)



T*W*H(MAX)= 6.2mm*60.5mm*93.5mm

Battery (Unit: mm)

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 metal (excluding electrical contact surfaces) exists on the battery 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 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	Venting mechanism exists on the narrow side of the pouch cell.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	**Temperature, voltage and current management**		P
	Batteries are designed such that abnormal temperature rise conditions are prevented	Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 7.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	See above.	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.5	**Terminal contacts**		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC connector complied with the requirements.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	Complied.	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	Protective circuit equipped on battery.	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	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		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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	1S1P, Max. charging voltage of per component cell: 4.25V, not exceed 4.25V specified in Clause 7.1.2, Table 2.	P
	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 are not 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 are not discharged beyond the cell manufacturer’s specified final voltage	Final voltage of per component cell: 2.75V, not exceed the final voltage specified by cell manufacturer.	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		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The battery case and compartments housing cells are 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 is considered when conducting mechanical tests		N/A
5.7	**Quality plan**		P
	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	Complied. Quality plan provided.	P
5.8	**Battery safety components**		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		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 cells	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 over discharge protection		N/A
	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	See clause 7.3.2.	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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 has 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
	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	Charge temperature 0~45°C declared. 45°C used for upper limit tests, 0°C used for lower limit tests.	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)	Test for reference.	P
	Oven temperature (°C)..... :	70°C	—
	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)	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 table 7.3.1)	P
7.3.2	External short-circuit (battery)	Tested complied.	P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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		P
	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	Single fault conducted on four samples.	P
	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	(See appended table 7.3.2)	P
	Results: no fire, no explosion.....:	(See appended table 7.3.2)	P
7.3.3	Free fall	Tested complied.	P
	Results: no fire, no explosion	No fire. No explosion	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C).....:	130°C	—
	Results: no fire, no explosion	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	5.95V applied.	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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)	P
7.3.7	Forced discharge (cells)	Tested complied.	P
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		P
	The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage		P
	- 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		P
	Results: no fire, no explosion.....:		P
7.3.8	Mechanical tests (batteries)		P
7.3.8.1	Vibration	Tested complied.	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	Tested complied.	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)	Tested complied.	P
	The cells complied with national requirement for.....:	France, Japan, 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	400N for prismatic 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 provides information about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users	Information for safety mentioned in manufacturer's specifications.	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
	Do not allow children to replace batteries without adult supervision		N/A
8.2	**Small cell and battery safety information**	Not small cell and 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**	The final product is battery.	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	See marking plate on page 3.	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity	Not coin batteries.	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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 cell and 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	Not coin cells and batteries.	N/A
	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		P
	- Recommended charging instructions		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**	Complied.	P
A.3	**Consideration on charging voltage**	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.25V applied.	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	See A.4.2.2.	P
A.4.2.1	General		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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	Not higher than the temperature specified in this standard.	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	Not lower than the temperature specified in this standard.	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
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		P
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		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

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Clause	Requirement + Test	Result - Remark	Verdict
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**		N/A
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**	Not coin cells	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 greater than 3 Ω require no further testing..... :		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**		N/A

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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
C01	4.20	2.0	4.172	A, B
C02	4.20	2.0	4.175	A, B
C03	4.20	2.0	4.171	A, B
C04	4.20	2.0	4.169	A, B
C05	4.20	2.0	4.173	A, B

Supplementary information:

A - No fire or explosion

B - No leakage

C - Others (please explain)

7.3.1	TABLE: External short-circuit (cell)	P

Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature ~~rise ΔT~~, (°C)	Results
Samples charged at charging temperature upper limit (45°C)					
C06	52.4	4.208	85	119.3	A, B
C07	52.4	4.203	80	121.2	A, B
C08	52.4	4.198	83	118.4	A, B
C09	52.4	4.211	79	116.8	A, B
C10	52.4	4.213	81	120.5	A, B
Samples charged at charging temperature lower limit (0°C)					
C11	53.8	4.101	85	117.4	A, B
C12	53.8	4.106	83	120.3	A, B
C13	53.8	4.112	79	115.6	A, B
C14	53.8	4.103	81	120.8	A, B
C15	53.8	4.109	80	116.5	A, B

Supplementary information:

A - No fire or explosion

B - The test was completed after the cell casing declines by 20% of the maximum temperature rise.

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: External short-circuit (batteries)					P
Sample no.	**Ambient (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature ~~rise ΔT (K)~~, (°C)**	**Component single fault condition**	**Results**
B04	23.4	4.169	82	23.8	--	A, D
B05	23.4	4.174	85	118.3	MOSFET(U2) Short circuit	A, C
B06	23.4	4.171	81	115.6	MOSFET(U2) Short circuit	A, C
B07	23.4	4.168	83	116.5	MOSFET(U2) Short circuit	A, C
B08	23.4	4.173	80	118.8	MOSFET(U2) Short circuit	A, C

Supplementary information:

A - No fire or explosion

B - The test ends after 24 hours

C - The case temperature declined by 20% of the maximum temperature rise

D - Rapid decline in short circuit current, the battery pack should remain on test for an additional one hour after the current reaches a low end steady state condition.

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Clause	Requirement + Test	Result - Remark	Verdict

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 (45°C)				
C29	4.211	4.210	13.13	A, B
C30	4.208	4.207	13.09	A, B
C31	4.203	4.202	13.05	A, B
C32	4.198	4.198	13.08	A, B
C33	4.205	4.204	13.11	A, B
Samples charged at charging temperature lower limit (0°C)				
C34	4.096	4.096	13.09	A, B
C35	4.103	4.102	13.12	A, B
C36	4.112	4.111	13.03	A, B
C37	4.108	4.107	13.06	A, B
C38	4.105	4.105	13.10	A, B

Supplementary information:

A - No fire or explosion

B - Force released after maximum level reached.

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery			P
Constant charging current (A).....:		8.0		—
Supply voltage (Vdc).....:		5.95		—
Sample no.	**OCV before charging (Vdc)**	**Total charging time (minute)**	**Maximum outer case temperature (°C)**	**Results**
B12	3.089	91	30.2	A, B
B13	3.103	91	30.8	A, B
B14	3.091	91	31.3	A, B
B15	3.095	91	30.6	A, B
B16	3.098	91	29.8	A, B

Supplementary information:

A - No fire or explosion

B - The test was continued until the temperature of the outer casing returned to ambient.

C - The test was continued until the temperature of the outer casing reached steady state conditions.

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	2.983	4.0	2.75	A, B
C40	3.102	4.0	2.75	A, B
C41	2.995	4.0	2.75	A, B
C42	2.987	4.0	2.75	A, B
C43	3.093	4.0	2.75	A, B

Supplementary information:

A - No fire or explosion

B - The voltage did not reach negative value of upper limit charging voltage.

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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**
B17	4.170	4.169	72.995	72.994	A, B, C, D
B18	4.168	4.168	72.893	72.892	A, B, C, D
B19	4.171	4.170	73.098	73.097	A, B, C, D

Supplementary information:
A - No fire or explosion
B - No rupture
C - No leakage
D - No venting
E - Others (please explain)

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	4.166	4.165	73.109	73.108	A, B, C, D
B21	4.168	4.167	72.947	72.946	A, B, C, D
B22	4.169	4.168	72.856	72.855	A, B, C, D

Supplementary information:
A - No fire or explosion
B - No rupture
C - No leakage
D - No venting
E - Others (please explain)

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Clause	Requirement + Test	Result - Remark	Verdict

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 (45°C)					
C44	45	4.205	1	400	A, B
C45	45	4.203	1	400	A, B
C46	45	4.198	1	400	A, B
C47	45	4.201	1	400	A, B
C48	45	4.195	1	400	A, B
Samples charged at charging temperature lower limit (0°C)					
C49	0	4.098	1	400	A, B
C50	0	4.109	1	400	A, B
C51	0	4.106	1	400	A, B
C52	0	4.093	1	400	A, B
C53	0	4.089	1	400	A, B

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.

Remark: There is no particle location 2 in this product.

A - No fire

B - The pressure reaches 800 N for cylindrical cell or 400 N for prismatic cell, and 50mV voltage drop was not achieved.

C - Voltage is dropped more than 50 mV, keep the pressing jig in the position for 30 s.

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:

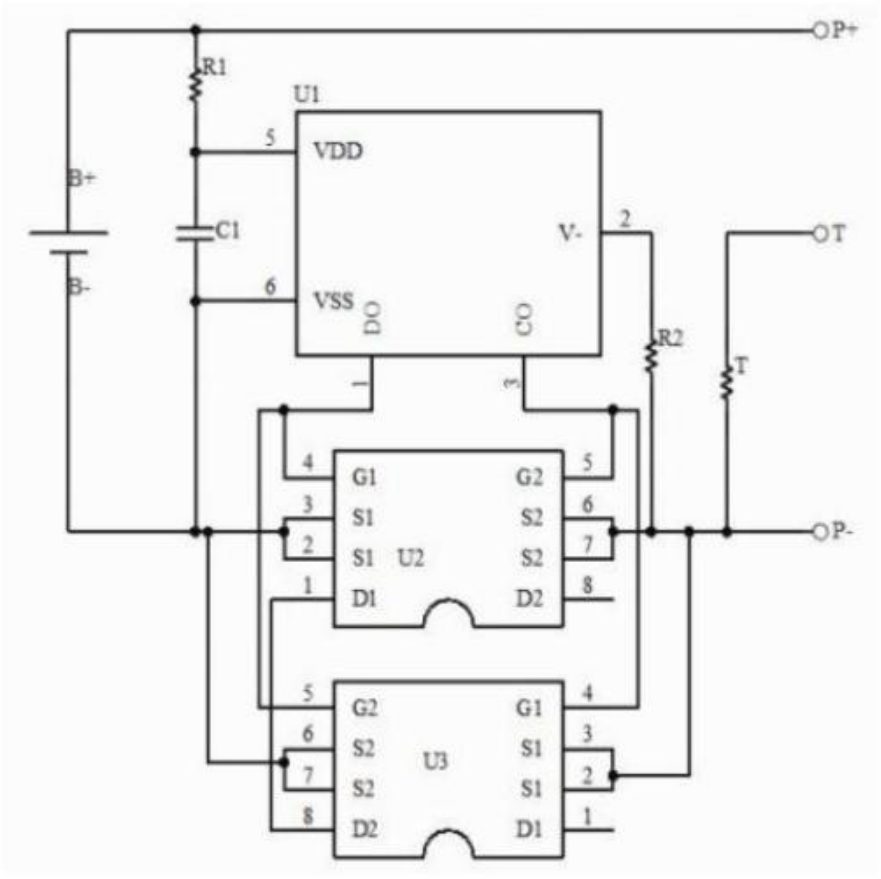
1) Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

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

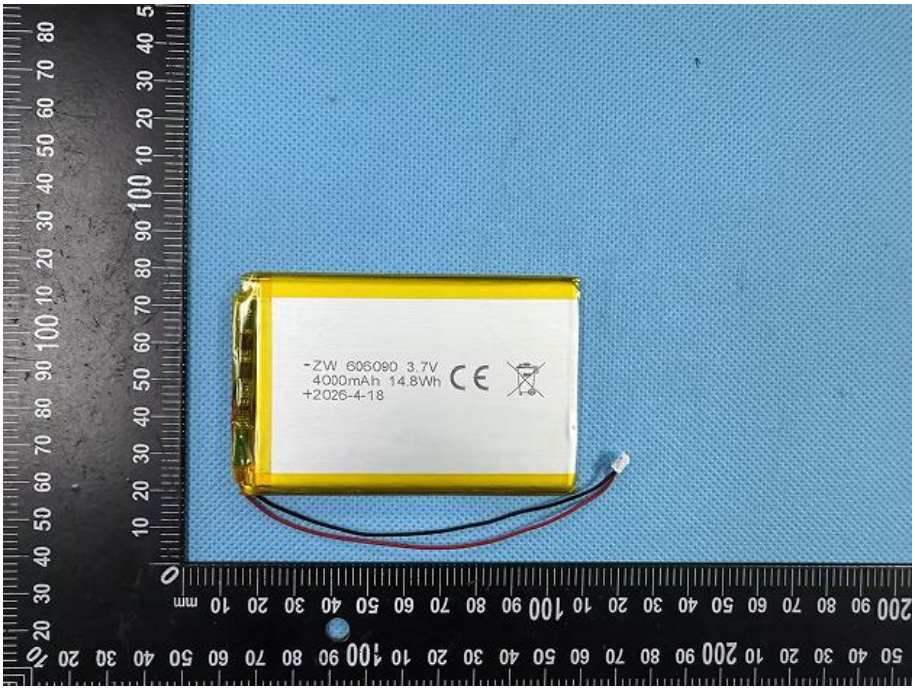
	TABLE: Critical components information				P
Object / part No.	**Manufacturer / trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Cell	Guangdong CVASUN New Energy Technology CO.,LTD.	ZW 606090	3.7V, 4000mAh	IEC 62133-2:2017 +AMD1:2021	Tested with appliance
Supplementary information: 1) At the request of the client, The table: Critical components information does not reflect the material information of the battery.					

-- End of Report --

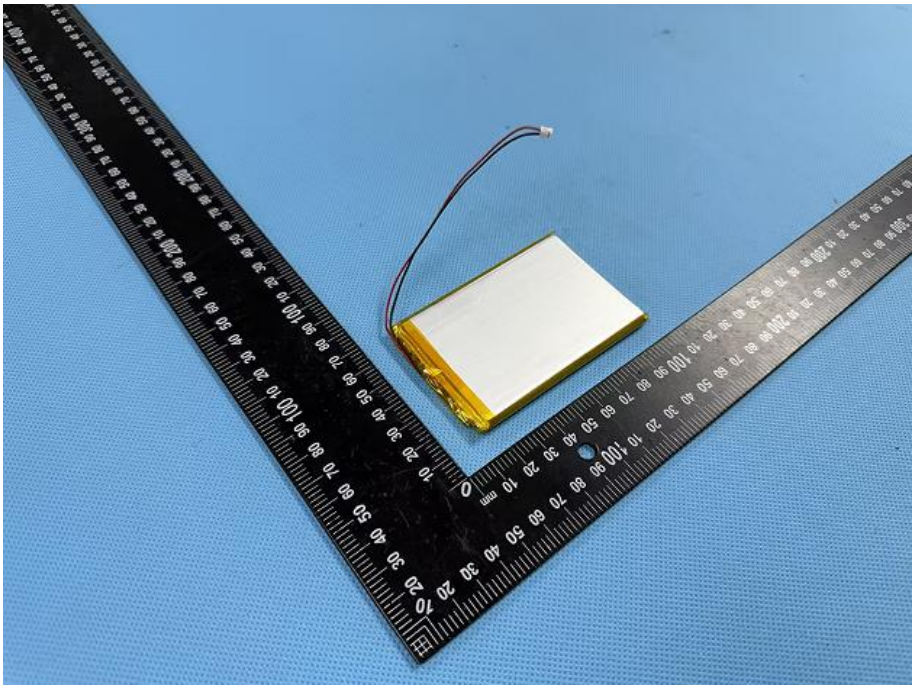
Attachment 1 Circuit diagram:



Attachment 2 Product Photos:

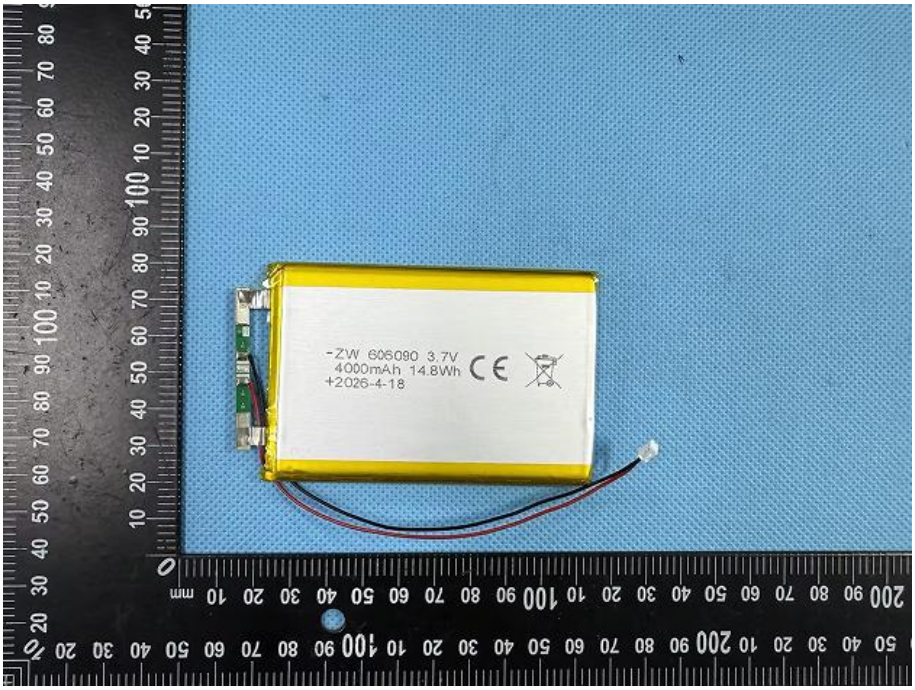


Front view of battery

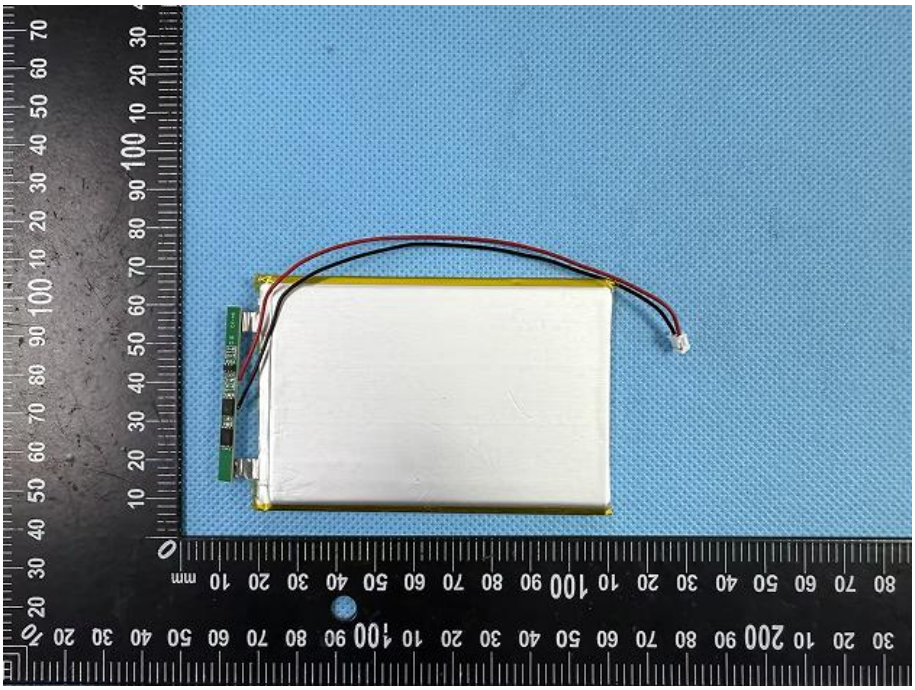


Back view of battery

Attachment 2 Product Photos

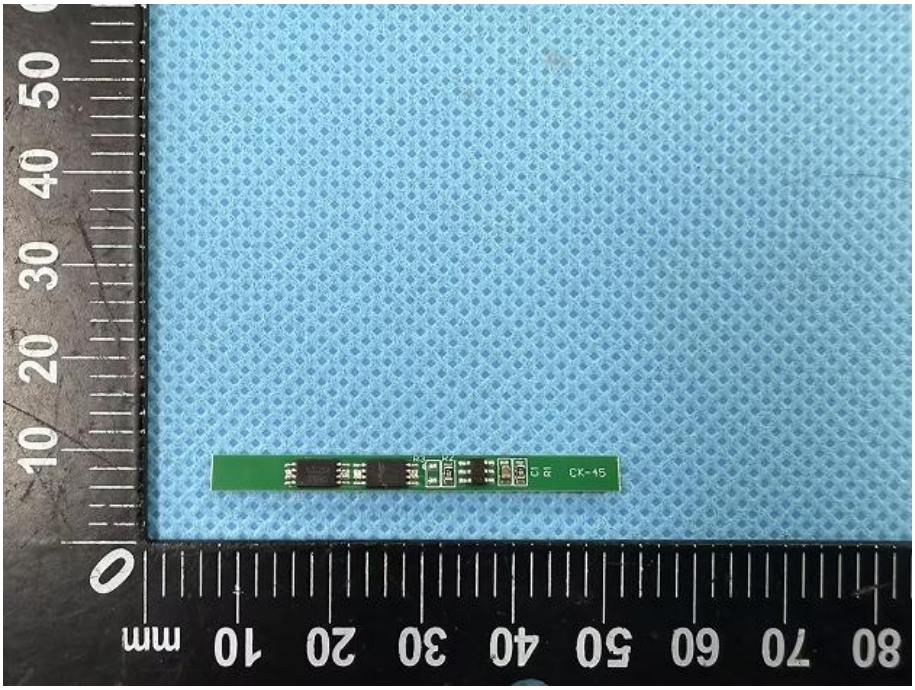


Internal view-1 of battery

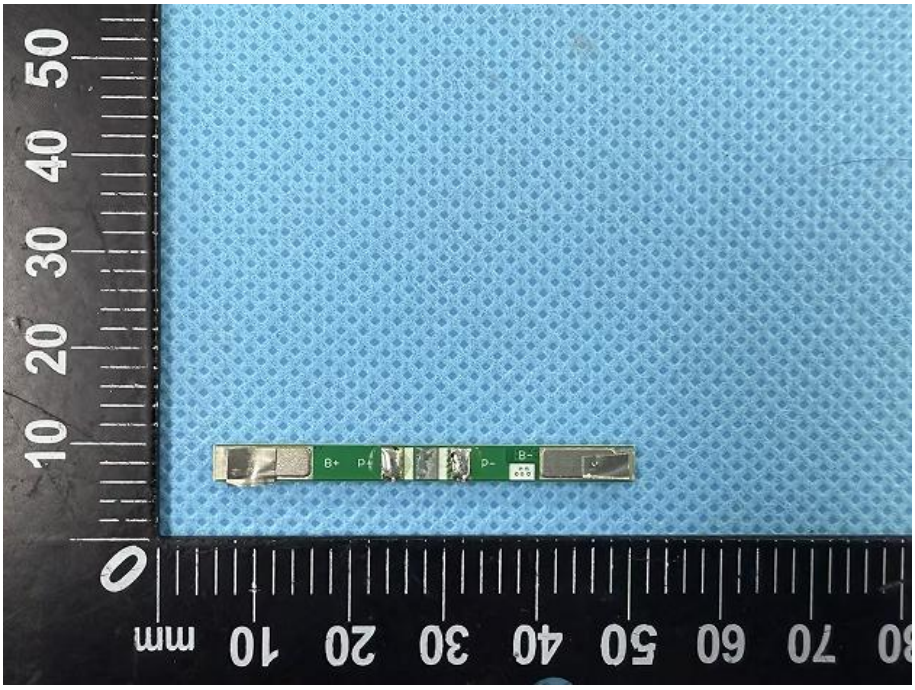


Internal view-2 of battery

Attachment 2 Product Photos

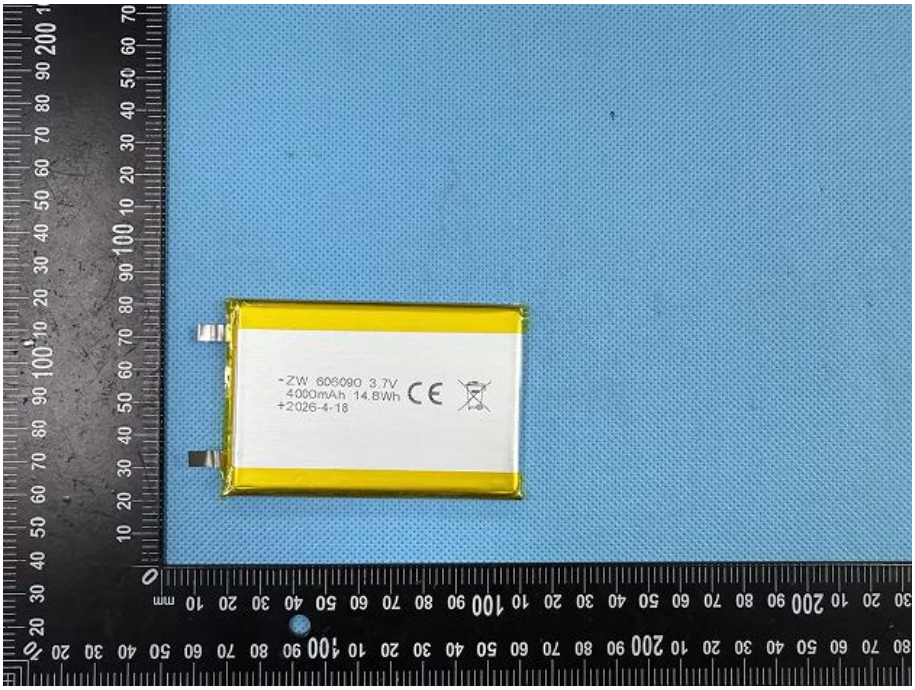


Front view of PCM

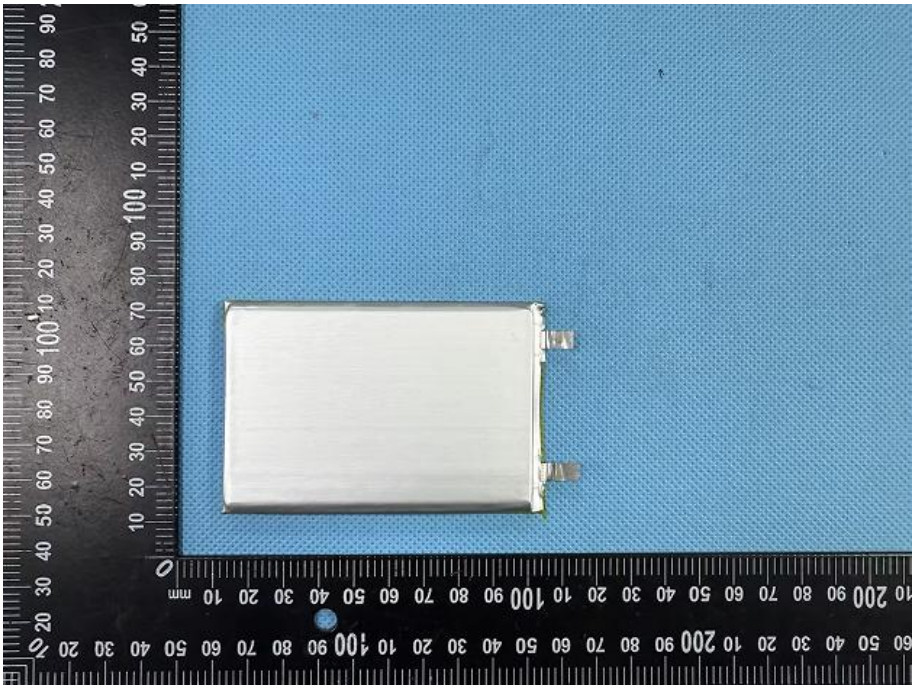


Back view of PCM

Attachment 2 Product Photos



Front view of cell



Back view of cell