TEST REPORT

Reference No. : FS2025070065-1E Date : Jul. 08, 2025 Page No.: 1 of 5

Client :

Address :

The following merchandise was (were) submitted and identified by the client as:

Name of Product :	Polymer Lithium ion Battery
Test Model :	JHL 702040 3.7V 500mAh 1.85Wh
Model May Cover :	/
Main Material:	/
Supplier:	/
Buyer:	/
Sample Received :	Jul. 03, 2025
Test Period :	Jul. 03, 2025 - Jul. 08, 2025

Test Specification and Conclusion:

Total Lead, Cadmium and Mercury content according to the Batteries Regulation- Regulation (EU) 2023/1542	PASS

Prepared By : **Jolin Li**
Testing Engineer

Reviewed By : **Carina Ma**
Report Supervisor

Issued By : **Kevin Chen**
Lab Manager

FS2025070065-1E

TEST RESULTS:

Lead (Pb), Cadmium (Cd) and Mercury (Hg) Content

Test Method:

For Pb and Cd content: Analysis was performed by ICP-OES.

For Hg content: Analysis was performed by cold vapor atomic absorption spectrometry.

Test Item(s)	MDL (%)	Test Result(s) (%)	Limited Value* (%)	Labelling Requirement# (%)
		1#		
Pb	0.0005	N.D.	0.01	>0.004
Cd	0.0005	N.D.	0.002	>0.002
Hg	0.0001	N.D.	0.0005	---

Remark: 1) *The limited value is based on Annex I of Regulation (EU) 2023/1542;

RESTRICTION ON SUBSTANCES

Column 1 Designation of the substance or group of substances	Column 2 Conditions of restriction
1. Mercury CAS No 7439-97-6 EC No 231-106-7 and its compounds	Batteries, whether or not incorporated into appliances, light means of transport or other vehicles, shall not contain more than 0,0005 % of mercury (expressed as mercury metal) by weight.
2. Cadmium CAS No 7440-43-9 EC No 231-152-8 and its compounds	Portable batteries, whether or not incorporated into appliances, light means of transport or other vehicles, shall not contain more than 0,002 % of cadmium (expressed as cadmium metal) by weight.
3. Lead CAS No 7439-92-1 EC No 231-100-4 and its compounds	1. From 18 August 2024, portable batteries, whether or not incorporated into appliances, shall not contain more than 0,01 % of lead (expressed as lead metal) by weight. 2. The restriction set out in point 1 shall not apply to portable zinc-air button cells until 18 August 2028.

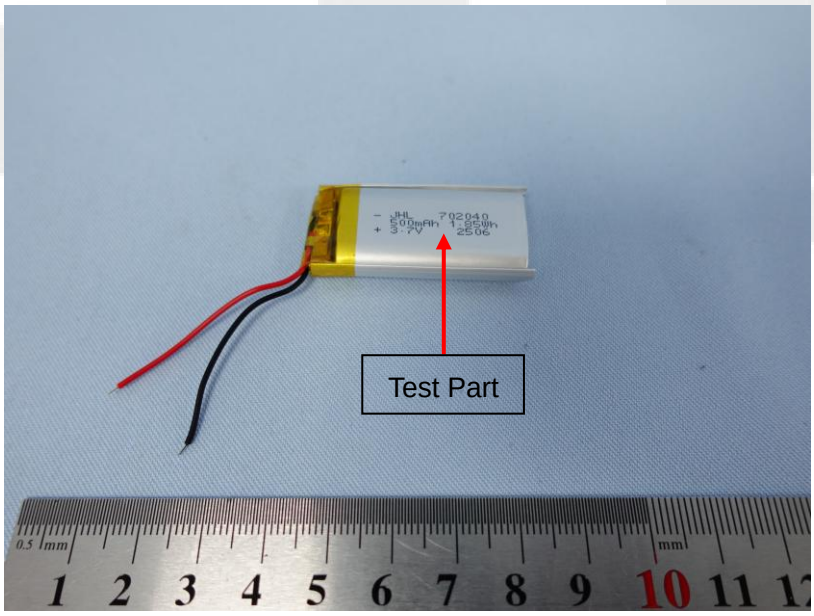
Add.: RM601, Jialiyuan Business Center Building 5, No4, Xingye Road, Beijiao Town, Shunde District, Foshan, China
Tel.: +86/(0)757-23600626 Web: www.stq-cert.com
Technical service: TS@stq-cert.com Customer service: CS@stq-cert.com
Report checking: Report@stq-cert.com Complaint: QA@stq-cert.com

2) #Non portable 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. Portable batteries containing or more than 0.004% but no more than 0.1% lead, shall be marked with the chemical symbol for the metal concerned: Pb.
The relevant chemical symbol indicating the heavy metal content shall be printed beneath the separate collection symbol as shown in Part B of Annex VI in Regulation (EU) 2023/1542 and shall cover an area of at least one-quarter the size of that symbol;
3) --- = Not Regulated.

Note: 1) MDL = Method Detection Limit;
2) N.D. = Not detected, less than MDL.

Test Part Description:
1# Battery

SAMPLE PHOTO



********* END OF REPORT *********

GENERAL CONDITIONS OF SERVICES

STQ Testing Services Co.,Ltd. (hereinafter “STQ”), The testing or examining under the request of the customer should obey terms as follow, according to regulation of "Contract Law of the People's Republic of China" on processing and undertaking contract, our company have legal right of termination without any reason and have the right to accept or refuse testing or examining request:

1. STQ only acts for the person or body originating the instructions (the“Clients”). No other party is entitled to give instructions, particularly on the scope of testing or delivery of report or certificate, unless authorized by the Clients.
2. Sample recycling: when the testing or examining is finished, the customer should recycle the sample. Within 30 days after issuing of testing report, if the customer could not recycle the sample or send notification of sample recycling in written (for example, if the sample belongs to consumables, toxic drugs, dangerous goods and other items that are not suitable for long-term storage, such as semi-finished products and fragile samples such as liquids and powders , the retention period will be shortened to 7 days). After the retention period,STQ has the right to dispose of the sample arbitrarily without paying compensation or compensation to the customer and take no responsibility for the consequences that damages the customer’s trade secrets and intellectual property rights due to the loss of the sample.
3. The delivery and return fee of the samples which need to do testing at STQ should be paied by the client. STQ will not bear the responsibility for the testing error that is caused by transporting， packaging and labelling.
4. The Clients shall always comply with the following before or during STQ providing its services:

a) provide sample(s) and relevant data, at the same time, guarantee the consistence of the sample(s)’name they declared with the sample(s) or the goods provided. Otherwise, STQ will not bear any relevant responsibilities;
b) giving timely instructions and adequate information to enable STQ to perform the services effectively;
c) supply, when requested by STQ, any equipment and personnel for the performance of the services;
d) take all necessary steps to eliminate or remedy any obstruction in the performance of the services;
e) inform STQ in advance of any hazards or dangers, actual or potential, associated with any order of samples or testing;
f) provide all necessary access for STQ’s representative to enable the required services to be performed effectively;
g) ensure all essential steps are taken for safety of working conditions, sites and installations during the performance of services;
h) fully discharge all its liabilities under any contract like sales contract with a third party, whether or not a report or certificate has been issued by STQ, failing which STQ shall be under no obligation to the Clients.

5. Subject to STQ’s accepting the Client’s instructions, STQ will issue reports or certificates which reflect statements of opinion made with due care within the scope of instructions but STQ is not obliged to report upon any facts outside the instructions, if there were any dissidence about the report or certificate, the Client should provide the written declaration to STQ within 15 days after the date receiving the report or certificate, otherwise, STQ will not hear the case after the date limit.
6. STQ is irrevocably authorized by the Clients to deliver at its discretion the report or the certificate to any third party when instructed by the Clients or where it implicitly follows from circumstances, trade custom, usage or practice as determined by STQ.
7. A test report will be issued in confidence to the Clients and it will be strictly treated as such by STQ. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of STQ. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by STQ, to his customer, supplier or other persons directly concerned. STQ will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the report unless required by the relevant governmental authorities, laws or court orders.
8. Applicants wishing to use STQ’s reports in court proceedings or arbitration shall inform STQ to that effect prior to submitting the sample for testing.
9. The report will refer only to the sample tested and will not apply to the bulk, unless the sampling has been carried out by STQ and is stated as such in the Report. Also, the report is only for reference.
10. Any documents containing engagements between the Clients and third parties like contracts of sale, letters of credit, bills of lading, etc. are regarded as information for STQ only and do not affect the scope of the services or the obligations accepted by STQ.
11. If the Clients do not specify the methods/standards to be applied, STQ will choose the appropriate ones and further information regarding the methods can be obtained by direct contact with STQ, for the in－house method, STQ will only provide the summary.
12. No liability shall be incurred by and no claim shall be made against STQ or its servants, agents, employees or independent contractors in respect of any loss or damage to any such materials, equipment and property occurring whilst at STQ or any work places in which the testing is carried out, or in the course of transit to or from STQ or the said work places, whether or not resulting from any acts, neglect or default on the part of any such servants, agents, employees or independent contractors of STQ.
13. STQ will not be liable, or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its reports or in any communication whatsoever about its said tests or investigations.
14. Except for term 11 and term 12, if the test sample is damaged due to the negligence of ZOTAC, the total compensation for loss and damage to the sample or loss to the customer shall not exceed twice of the test service fee.
15. In the event of STQ prevented by any cause outside STQ’s control from performing any service for which an order has been given or an agreement made, the Clients shall pay to STQ:

a) the amount of all abortive expenditure actually made or incurred;
b) a proportion of the agreed fee or commission equal to the proportion (if any) of the service actually carried out by STQ, and STQ

Add.: RM601, Jialiyuan Business Center Building 5, No4, Xingye Road, Beijiao Town, Shunde District, Foshan, China
Tel.: +86/(0)757-23600626 Web: www.stq-cert.com
Technical service: TS@stq-cert.com Customer service: CS@stq-cert.com
Report checking: Report@stq-cert.com Complaint: QA@stq-cert.com

shall be relieved of all responsibility whatsoever for the partial or total non－performance of the required service.

16. STQ shall be discharged from all liabilities for all claims for loss, damage or expense unless suit is brought within one calendar year after the date of the performance by STQ of the service relating to the claim or in the event of any alleged non－performance within one year of the date when such service should have been completed.
17. The Clients acknowledge that STQ does not, either by entering into a contract or by performing service, assume or undertake to discharge any duty of the Clients to any other persons. STQ is neither an insurer nor a guarantor and disclaims all liability in such capacity.
18. The Clients shall hold harmless and indemnify STQ and its officers, employees, agents or independent contractors against all claims made by any third party for loss，damage or expense of whatsoever nature including reasonable legal expenses relating to the performance or non- performance of any services to the extent that the aggregate of any such claims relating to any one service exceed the limits mentioned in Clause 13.
19. Any unauthorized alteration, forgery or falsification of the content or appearance of the report/certificate is unlawful and offenders may be prosecuted to the fullest extent of the law; in the event of improper use of the report, STQ reserves the right to withdraw it, and to adopt any other measures which may be appropriate.
20. Samples are deposited with and accepted by STQ on the basis that either they are insured by the Clients or the Clients assumes entire responsibility for loss through fire, theft, burglary or for damages arising in the course of analysis or handling, without recourse whatsoever to STQ or its servants, agent, employees or independent contractors.
21. If the requirements of the Clients require the analysis of samples by the Clients' or any third party's laboratory, STQ will only convey the result of the analysis without responsibility for its accuracy. If STQ is only able to witness an analysis by the Clients' or any third Party's laboratory STQ will only confirm that the correct sample has been analyzed without responsibility for the accuracy of any analysis or results.
22. In the event of any unforeseen additional time or costs being incurred in the course of carrying out any of its services, STQ shall be entitled to charge the Clients additional fees to reflect the additional time and costs incurred.
23. All rights（including but not limited to copyright）in any reports, certificates or other materials produced by STQ in the course of providing its services shall remain vested in STQ.
24. Unless otherwise agreed in written, payment should be arranged within 10 days after the invoice date or the debit note date. If the payment is overdue, the overdue penalty shall be calculated at 1‰ per day of the unpaid part till the actual payment date. All expenses, costs and losses incurred by STQ as a result of collecting or claiming the fees owed shall be borne by the customer, including but not limited to attorney fees, litigation fees, preservation fees, preservation guarantee fees, travel expenses, etc.
25. Test results may be transmitted by electronic means at the Client's request. However, it should be noted that electronic transmission cannot guarantee the information contained will not be lost, delayed or intercepted by third party. STQ is not liable for any disclosure, error or omission in the content of such messages as a result of electronic transmission.
26. If necessary, STQ may subcontract part of or all tests to competent subcontractors. If no objection is raised at the time of the Clients submitting the application, STQ shall assume the Client's approval.
27. This report/certificate does not relieve sellers/suppliers from their contractual responsibility with regards to the quality/quantity of this delivery nor does it prejudice the Client's right to claim towards sellers/suppliers for compensation for any apparent and/or hidden defects not detected during STQ's random inspection or testing or audit.
28. The testing data and result(s) in this reportis(are) just for scientific research, education, internal quality control and product development etc.
29. STQ reserves the right to include Special Conditions in addition to the foregoing General Conditions if warranted by the particular circumstances of the required test or investigation [this clause is only effective when the other party has been informed].
30. The foregoing General Conditions shall in all respects be governed, construed, interpreted and operated in accordance with the relevant Chinese laws and regulations. Unless otherwise agreed, the arbitration shall take place in P．R．C
31. These General Condition have been drafted in Chinese and may be translated into other languages. In the event of any discrepancy, the Chinese version shall prevail.
32. In general sample will be stored for 30 days. But for liquid, powder, etc semi-product & fragile product, it will be stored only for 7 days.

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 reference No. ..... :	DSP25060748-1
Tested by (name+ signature) ..... :	King Li
Compiled by (name+ signature) ..... :	Fiona Lu
Approved by (name+ signature) ..... :	Ailis Ma
Date of issue ..... :	2025-06-25
Total number of pages ..... :	26 Pages.
Name of Testing Laboratory preparing the Report ..... :	Dongguan ZRLK Testing Technology Co., Ltd. Building 2, No.1, Technology 10th Road, Songshan Lake Park, Dongguan, Guangdong, China
Applicant's name ..... :	
Address ..... :	
Manufacturer's name ..... :	
Address ..... :	
Test specification ..... :	
Standard..... :	IEC 62133-2:2017/AMD1:2021
Test procedure ..... :	Type approved
Procedure deviation ..... :	N/A
Non-standard test method ..... :	N/A

This test report is specially limited to the above client company and product model only, It may not be duplicated without prior written consent of Dongguan ZRLK Testing Technology Co., Ltd.

Test item description ..... :	Polymer Lithium ion Battery
Trade Mark ..... :	N/A
Model/type reference ..... :	702040
Ratings ..... :	3.7V, 500mAh, 1.85Wh

Particulars: test item vs. test requirements

Classification of installation and use	:	To be defined in final product
Supply connection	:	DC lead wires
Discharge current (0,2 It A)	:	100mA
Upper limit charging voltage per cell	:	4.25V
Charging temperature upper limit	:	45°C
Charging temperature lower limit	:	0°C
Shape of Cell	:	☐ Prismatic ☒ Pouch ☐ Coin/button ☐ Cylindrical
Polymer cell electrolyte type	:	☐ gel polymer ☐ solid polymer ☒ Other

Possible test case verdicts:

- test case does not apply to the test object	:	N/A
- test object does meet the requirement	:	P(ass)
- test object does not meet the requirement	:	F(ail)

Testing:

Date of receipt of test item	:	2025-06-15
Date(s) of performance of test	:	2025-06-15 to 2025-06-24

General remarks:

"(see remark #)" refers to a remark appended to the report,
"(see appended table)" refers to a table appended to the report,
Throughout this report a comma is used as the decimal separator,
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 testing laboratory,
Clause numbers between brackets refer to clauses in IEC 62133-2:2017/AMD1:2021 (Optional remark).

Name and address of factory (ies) :

General product information:

The Polymer Lithium ion Battery is constructed with one Polymer Lithium ion Cell, and has overcharge, over-discharge, over current and short-circuits protection circuit.

The cells have been tested and evaluated according to their specified working conditions (as given below), which are provided by client;

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

Product	Polymer Lithium ion Cell	Polymer Lithium ion Battery
Model No.	702040	702040

Nominal voltage	3.7V	3.7V
Rated capacity	500mAh	500mAh
Recommend charging method declared by the manufacturer	Charging the cell with 0.5C (250mA) constant current, 4.2V constant voltage until current reaches 0.05C (2.5mA)	Charging the battery with 0.5C (250mA) constant current, 4.2V constant voltage until current reaches 0.05C (2.5mA)
Maximum charging current	500mA	500mA
Maximum discharge current	500mA	500mA
Maximum charging voltage	4.25V	4.25V
Specified final voltage	2.5V	2.5V

Summary of testing:

Tests Performed (name of test and test clause):

Tests are made with the number of samples specified in Table 1 of IEC 62133-2:2017/AMD1:2021.

Test items:

cl.5.6.2 Design recommendation;

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 (battery);

cl.7.3.1 External short-circuit (cell);

cl.7.3.2 External short-circuit (battery);

cl.7.3.3 Free fall (cell and battery);

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.

The electrolyte type of this cell doesn't belong to polymer, and the additional test cl.7.3.9 was carried out to evaluate the cell.

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

Testing location:

Dongguan ZRLK Testing Technology Co., Ltd.

Building 2, No.1, Technology 10th Road, Songshan Lake Park, Dongguan, Guangdong, China

Test conclusion:

The Polymer Lithium ion Battery submitted by
are tested according to 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.

Test result: Pass.

Copy of marking plate:
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Polymer Lithium ion Battery
702040 Red (+) Black (-)
3.7V, 500mAh, 1.85Wh
YYMMDD 1INP7/20/41

Battery Label

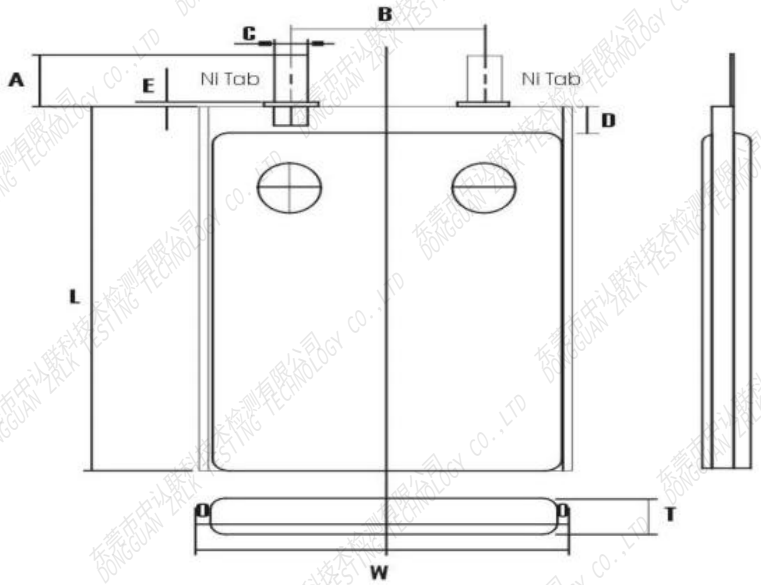
Caution:

1. Keep small cells and batteries which are considered swallowable out of the reach of children
2. Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion
3. In case of ingestion of a cell or battery, seek medical assistance promptly

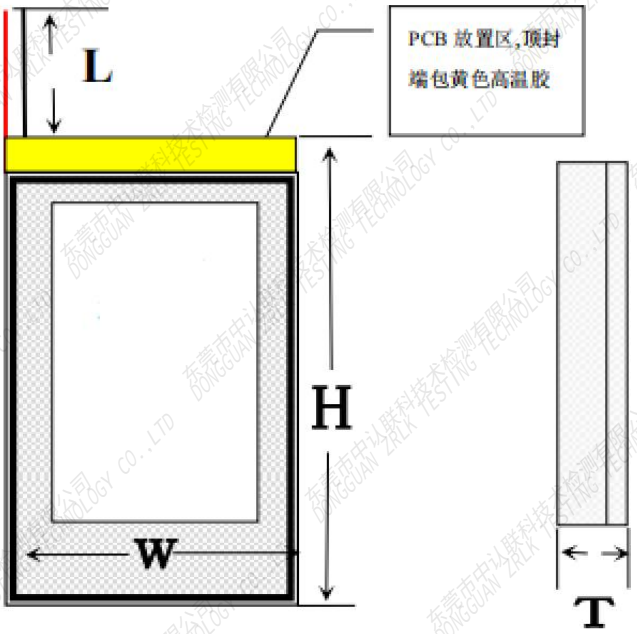
Caution Label

Remark: 1). “YYMMDD” represents the date of manufacture, “YY” represents the year, “MM” represents the month, “DD” represents the day. 2). Caution label will be placed on the immediate package.

Construction:

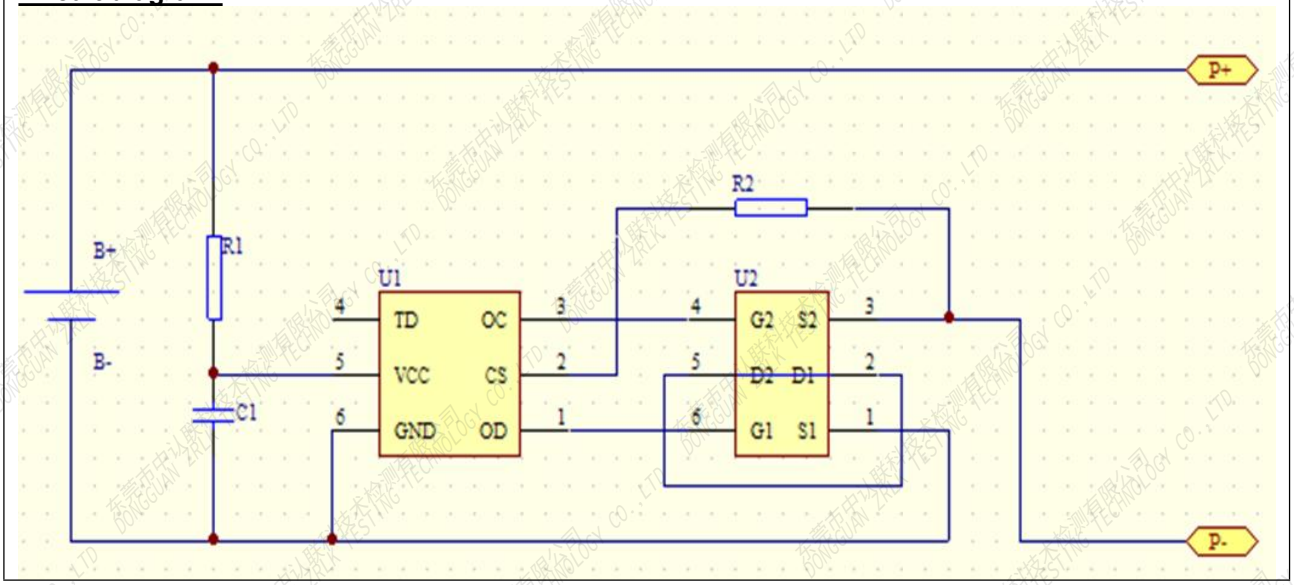


T*W*L= 7.0 (max)*20.0(max)*40.5 (max)
Cell (Unit: mm)



T*W*H=7.2 (max)*20.5 (max)*41.5 (max)
Battery (Unit: mm)

Circuit diagram:



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 surface exists.	N/A
	Insulation resistance (MΩ)..... :	N/A	—
	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	The charging limits specified in the manufacturer's specification.	P
5.5	**Terminal contacts**		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC lead wires complied with the requirements.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	DC lead wires complied with the requirements.	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	Safety analysis report provided by manufacturer.	P
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	Charging voltage of cell: 4.25V, not exceed 4.25V specified in Clause 7.1.2, Table 2.	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 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 battery: 2.5V, 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	Mechanical protection for cell connections and control circuits provided.	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	Build-in batteries, mechanical protection should be provided by 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	To be evaluated in final system.	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**	Complied.	P

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	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		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	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
	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

IEC 62133-2			
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	Charge temperature 0-45°C declared; 45°C used for upper limit test temperature; 0°C used for lower limit test temperature.	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	Charging for 7 days with 250mA and 4.20V.	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)	Tested as client requested.	P
	Oven temperature (°C).....:	70	—
	Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells	No physical distortion of the battery.	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
	- 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	Shorting single fault conducted on two samples.	P

IEC 62133-2			
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	Single fault applies on MOSFET U2 (Pin1-Pin3).	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	—
	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		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	1.0A applied.	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)	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

IEC 62133-2			
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		P
	Results: no fire, no explosion.....:	(See appended table 7.3.7)	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, Republic of Korea and 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	400 N 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
	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	**Small cell and battery safety information**	Small cell and battery.	P
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:	See marking plate on page 4.	P
	- Keep small cells and batteries which are considered swallowable out of the reach of children		P
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		P
	- In case of ingestion of a cell or battery, seek medical assistance promptly		P
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 4.	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity	Not coin battery	N/A
	Batteries are marked with an appropriate caution statement	Batteries also marked with an appropriate caution statement	P
	- Terminals have clear polarity marking on the external surface of the battery, or	Polarity marked on the surface of battery, also see marking plate on page 4.	P
	- 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 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	Not direct sale batteries.	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
9.4	**Other information**		P
	The following information are marked on or supplied with the battery:		P
	- Storage and disposal instructions	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	- Recommended charging instructions	Information for recommended charging instructions mentioned 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	Not coin cells.	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	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	4.25V 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
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 range specific 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	45°C applied	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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	Charging low temperature declared by client is: 0°C	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	0°C applied	P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	No documents provided by manufacturer explaining the lower limit exceed 10°C, 0°C applied for testing in this report for safety considerations.	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	Cell specified final voltage 2.5V.	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
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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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		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**		N/A

IEC 62133-2			
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**
Cell #1	4.2	0.25	4.18	P
Cell #2	4.2	0.25	4.19	P
Cell #3	4.2	0.25	4.19	P
Cell #4	4.2	0.25	4.18	P
Cell #5	4.2	0.25	4.19	P
Supplementary information: - No fire or explosion - No leakage				

7.3.1	TABLE: External short circuit (cell)				P
Sample No.	**Ambient (°C)**	**OCV at start of test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature ~~rise~~ ΔT (°C)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
Cell 6#	57.4	4.21	87	122.6	P
Cell 7#	57.4	4.20	78	124.0	P
Cell 8#	57.4	4.21	81	125.5	P
Cell 9#	57.4	4.20	75	124.9	P
Cell 10#	57.4	4.20	79	117.1	P
Samples charged at charging temperature lower limit (0°C)					
Cell 11#	57.1	4.13	88	127.1	P
Cell 12#	57.1	4.12	76	127.3	P
Cell 13#	57.1	4.12	84	126.8	P
Cell 14#	57.1	4.13	75	128.6	P
Cell 15#	57.1	4.13	85	126.8	P
Supplementary information: - No fire or explosion					

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~~ (°C)**	**Component single fault condition**	**Results**
Battery 4#	23.0	4.19	75	117.2	MOSFET U2 (Pin1-Pin3) S-C	P
Battery 5#	23.0	4.18	87	120.7	MOSFET U2 (Pin1-Pin3) S-C	P
Battery 6#	23.0	4.18	77	23.5	--	P
Battery 7#	23.0	4.19	82	23.2	--	P
Battery 8#	23.0	4.18	73	23.7	--	P

Supplementary information:
- No fire or explosion
Remark: S-C: 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 (45°C)				
Cell 29#	4.21	4.20	13	P
Cell 30#	4.20	4.19	13	P
Cell 31#	4.20	4.19	13	P
Cell 32#	4.21	4.20	13	P
Cell 33#	4.20	4.19	13	P
Samples charged at charging temperature lower limit (0°C)				
Cell 34#	4.13	4.12	13	P
Cell 35#	4.12	4.11	13	P
Cell 36#	4.12	4.11	13	P
Cell 37#	4.12	4.11	13	P
Cell 38#	4.13	4.12	13	P

Supplementary information:
- No fire or explosion
Note: A 13kN force applied at the wide side of prismatic cells.

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

7.3.6	TABLE: Over-charging of battery		P
Constant charging current (A).....:		1.0	—
Supply voltage (Vdc).....:		5.95	—

Sample No.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
Battery 12#	3.14	120	33.6	P
Battery 13#	3.14	120	33.1	P
Battery 14#	3.25	120	33.8	P
Battery 15#	3.15	120	33.5	P
Battery 16#	3.17	120	32.7	P

Supplementary information:
- No fire or explosion

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
Cell 39#	3.12	0.5	2.5	P
Cell 40#	3.01	0.5	2.5	P
Cell 41#	3.10	0.5	2.5	P
Cell 42#	3.11	0.5	2.5	P
Cell 43#	3.12	0.5	2.5	P

Supplementary information:
- No fire or explosion

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
Battery 17#	4.19	4.18	9.8906	9.8886	P
Battery 18#	4.18	4.17	9.8843	9.8823	P
Battery 19#	4.18	4.17	9.8974	9.8954	P

Supplementary information:
- No fire or explosion
- No rupture
- No leakage
- No venting

IEC 62133-2			
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**
Battery 20#	4.18	4.18	9.8954	9.8944	P
Battery 21#	4.18	4.18	9.8874	9.8865	P
Battery 22#	4.19	4.19	9.8931	9.8922	P

Supplementary information:
- No fire or explosion
- No rupture
- No leakage
- No venting

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)					
Cell 44#	45	4.20	1	400	P
Cell 45#	45	4.19	1	400	P
Cell 46#	45	4.19	1	400	P
Cell 47#	45	4.20	1*	400	P
Cell 48#	45	4.20	1*	400	P
Samples charged at charging temperature lower limit (0°C)					
Cell 49#	0	4.12	1	400	P
Cell 50#	0	4.11	1	400	P
Cell 51#	0	4.11	1	400	P
Cell 52#	0	4.11	1*	400	P
Cell 53#	0	4.12	1*	400	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.
*: No location 2 exist.
- No fire

IEC 62133-2			
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:

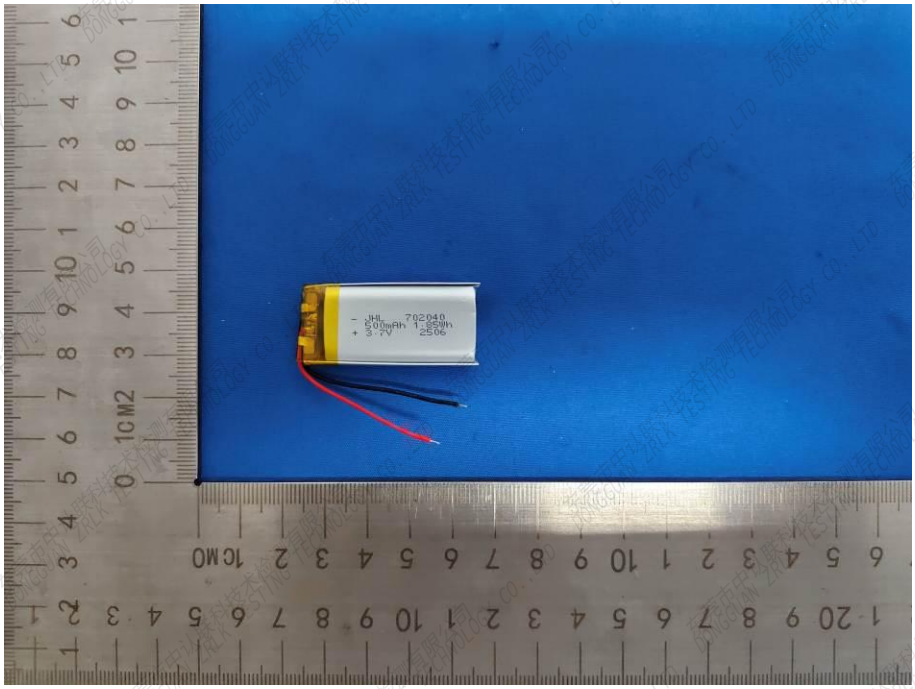
[1)] Coin cells with an internal resistance less than or equal to 3 Ω, see test result on corresponding tables according to Clause 6 and Table 1.

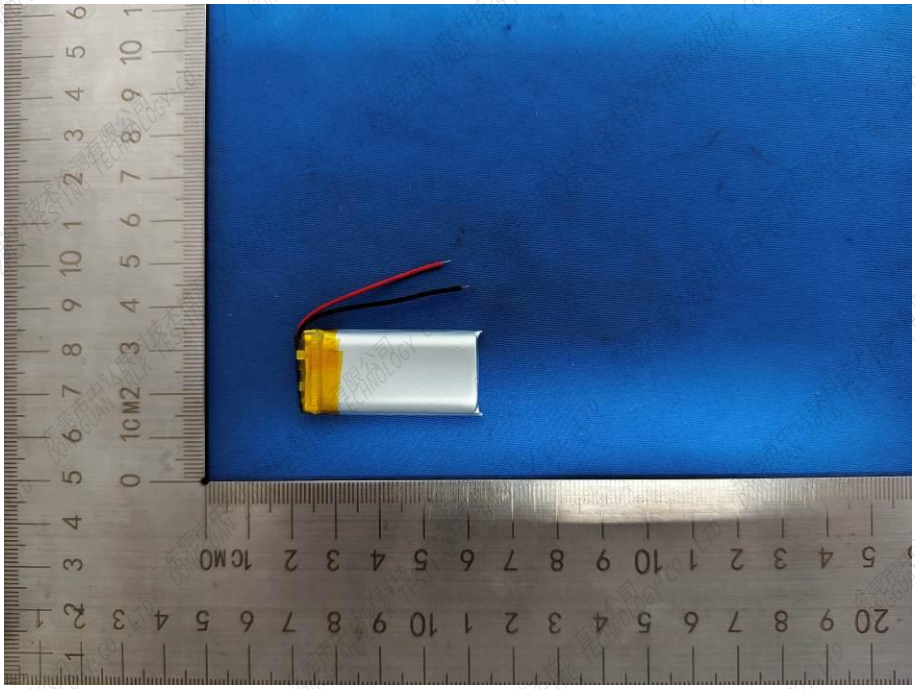
IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

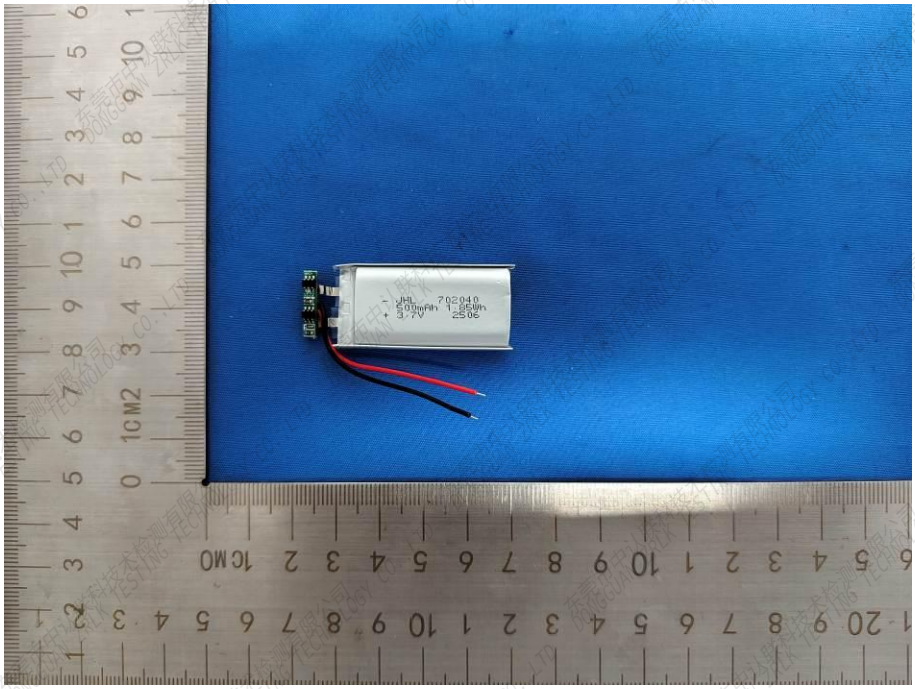
	TABLE: Critical components information				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Wiring	DONGGUAN WENGAHNG ELECTRONIC PRODUCTS CO., LTD	1571	26AWG, 80°C, 30V	--	--
Wiring (Alternative)	Interchangeable	Interchangeable	26AWG, 80°C, 30V	--	--
PCB	Dongguan Xinrui Electronics Technology Co., LTD	XR-08	130ºC, Min. Thk.: 0.6mm	--	--
PCB (Alternative)	Interchangeable	Interchangeable	130ºC, Min. Thk.: 0.6mm	--	--
Protect IC (U1)	SHEN ZHEN FINE MADE ELECTRONICS GROUP CO., LTD.	DW01-A	Overcharge Detection Voltage: 4.30±0.05V, Overdischarge Detection Voltage: 2.5±0.075V, T_A: -40°C ~ +85°C	--	Tested with appliance
MOSFET (U2)	ShenZhen CanSheng Industry Development Co.,Ltd.	8205A	V_{DS}: 16V, V_{GS}: ±12V, I_D: 4A, T_J: -55 to 150°C	--	Tested with appliance
Cell		702040	3.7V, 500mAh	IEC 62133-2:2017/AMD1:2021	Tested with appliance
-Electrolyte	Dongguan hangsheng new energy material Co.,LTD	A1938	$LiPF_6$, DMC, EMC, EC	--	--
-Separator	Huizhou Jinglitai Technology Co.Ltd	ND20	Material: PE + Ceramic, 20μm(T), Shut down temperature: 130°C	--	--
-Negative electrode	Ganzhou Ruiford Technology Co.Ltd	LA1	Graphite	--	--
-Positive electrode	Jiangmen Kanhoo Industry Co., Ltd	T31D	$LiNi_xCo_yMn_{1-x-y}O_2$, Ni: Co: Mn = 5: 2: 3	--	--
-Aluminum	Shenzhen Furuji Technology Co., Ltd	D-EL40H	Thickness: 113μm, Material: PP, Aluminium, Nylon	--	--
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

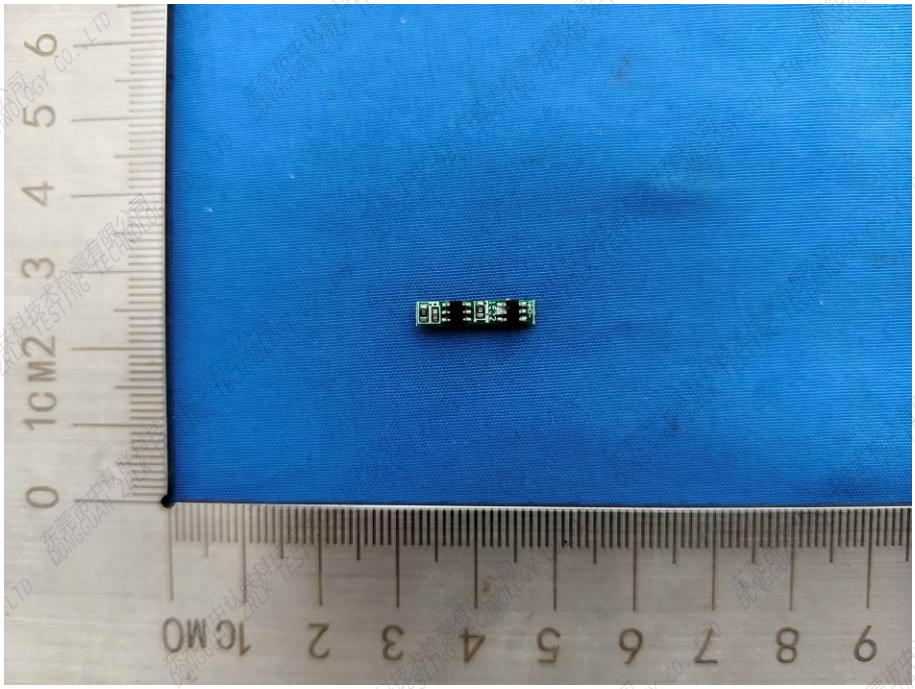
Photos

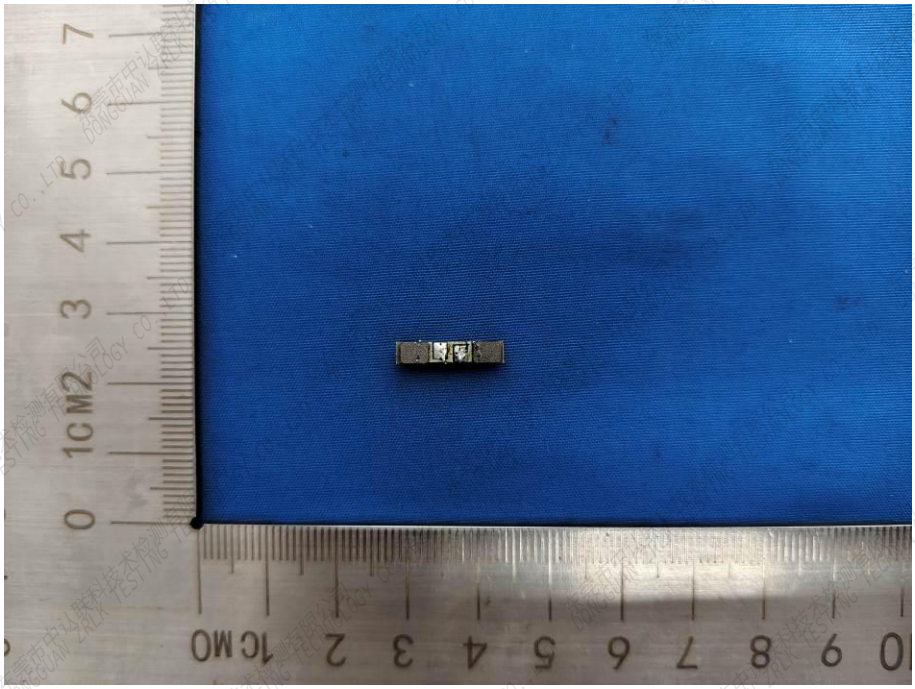
Model: 702040



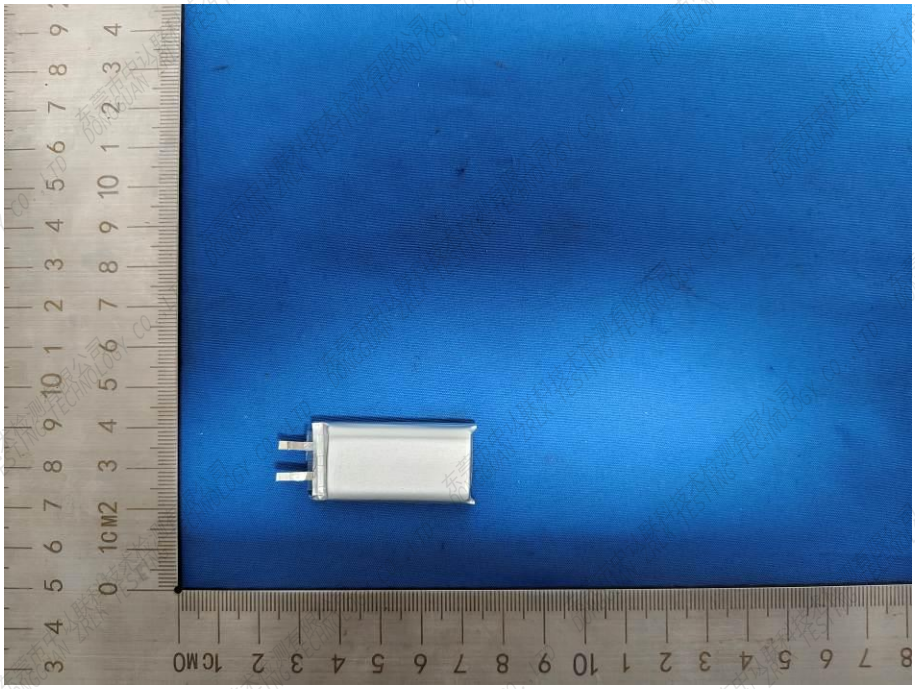









JHL
702040
500mAh 1.85Wh
3.7V
2506



***** End of Test Report *****