Report No. : TSZ23090156-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	:	Lithium-ion battery
Model/P.O. No.	:	401012-30mAh/ 400909-25mAh/ 400911-28mAh/ 401012-35mAh/ 450909-30mAh/ 450911-33mAh/ 701116-80mAh/ 380909-25mAh/ 501012-45mAh/ 501012-40mAh/ 902030-500mAh/ 601530-250mAh/ 701525-240mAh/ 401030-90mAh/ 402030-150mAh/ 502030-200mAh/ 602030-300mAh/ 602040-350mAh/ 701230-230mAh/601230-180mAh
Manufacturer	:	
Received Date	:	Sep 11, 2023
Test Period	:	Sep 11, 2023~Sep 14, 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: Sep 14, 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 (%)
Lithium-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:

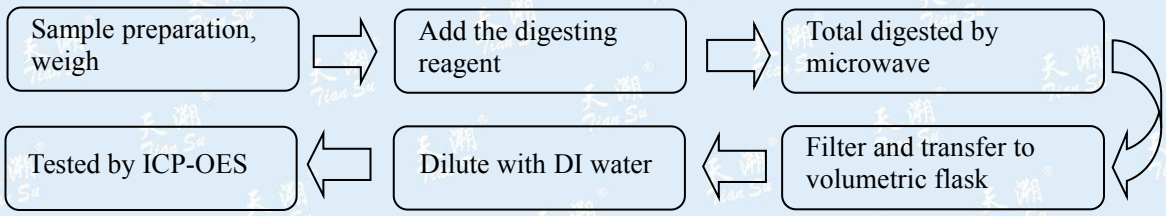
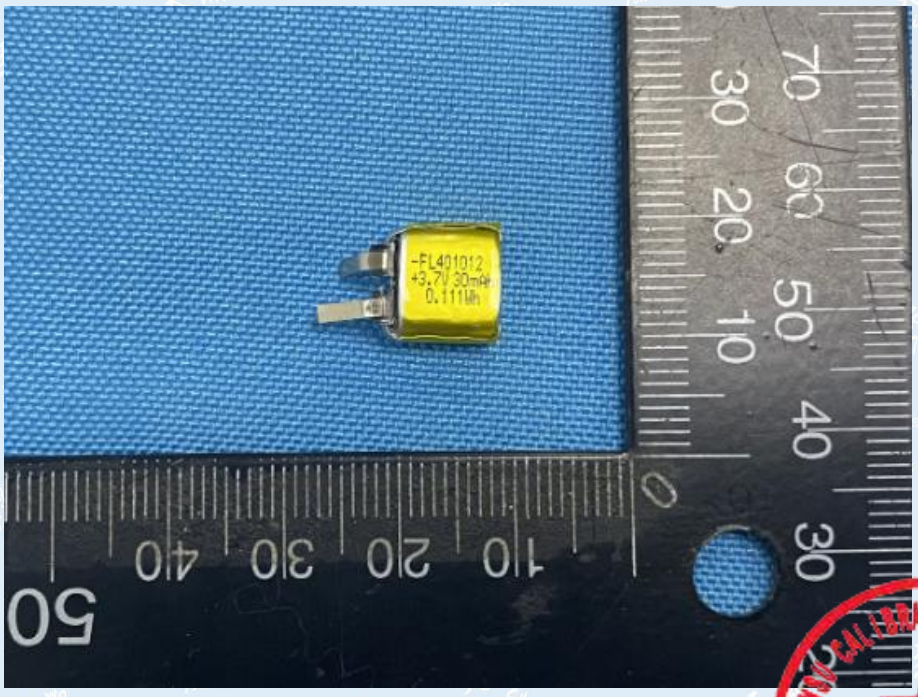


Photo of the sample



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.

Battery Test Report

Report No.: LA2023B0860001

Samples	Polymer lithium-ion rechargeable Cell
Model	FL400909
Applicant	
Issue Date	2023-07-21

深圳市莱恩瑞斯科技有限公司

Shenzhen Lionaces Technology Co., Ltd.

Shenzhen Lionaces Technology Co., Ltd.
Add: 301, Building B6, Junfeng Industrial Zone, Yonghe Road, Heping Community, Fuhai Street, Baoan, Shenzhen, Guangdong, China.
Tel: 0755-28280690 E-mail: service@lionaces.com
Website: www.lionaces.com

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021

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.	:	LA2023B0860001
Tested by (+ signature)	:	Yanyun Xie
Reviewed by (+ signature)	:	Ming Zhu
Approved by (+signature)	:	Rick Liu
Date of issue	:	2023-07-21
Contents	:	Total 25 pages.

Testing laboratory

Name	:	Shenzhen Lionaces Technology Co., Ltd.
Address	:	301, Building B6, Junfeng Industrial Zone, Yonghe Road, Heping Community, Fuhai Street, Baoan, Shenzhen, Guangdong, China
Testing location	:	Same as above.

Applicant

Name	:	
Address	:	

Manufacturer

Name	:	
Address	:	

Test specification

Standard	:	IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021
Test procedure	:	Type test
Procedure deviation	:	N/A
Non-standard test method	:	N/A

Test Report Form/blank test report

Test Report Form No.	:	IEC62133_2B
Test Report Form(s) Originator	:	Lionaces
Master TRF	:	Dated 2022-07

Test item	
Product designation	Polymer lithium-ion rechargeable Cell
Brand name	N/A
Test model	FL400909
Rating(s)	3.7V, 25mAh, 0.0925Wh
Test item particulars	
Classification of installation and use	N/A
Supply connection	DC electrode tab
Recommend charging method declared by the manufacturer	Charge at constant current 5mA until the voltage reaches 4.2V, then charge at 4.2V till charge current is 0.5mA at ambient 20°C±5°C.
Discharge current(0.2I_tA)	5mA
Specified final voltage	3.0V
Chemistry	☐ nickel systems ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell	4.2V
Maximum charging current	12.5mA
Charging temperature upper limit	45°C
Charging temperature lower limit	0°C
Polymer cell electrolyte type	☐ gel polymer ☐ solid polymer ☒ N/A
Test case verdicts	
Test case does not apply to the test object	N (/A)
Test item does meet the requirement	P (ass)
Test item does not meet the requirement	F (ail)
Testing	
Date of receipt of test item	2023-07-05
Date(s) of performance of test	2023-07-05 to 2023-07-19
Attachment	
Attachment A	Photos of product

General remarks

This report shall not be reproduced except in full without the written approval of the testing laboratory.
The test results presented in this report relate only to the item tested.
"(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 point is used as the decimal separator.
☒ The product fulfills the requirements of IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021. and EN 62133-2:2017, EN 62133-2:2017/AMD1:2021.

Report Revise Record:

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2023-07-21	Valid	Original report

General product information

	Cell
Model	FL400909
Nominal capacity	25mAh
Nominal voltage	3.7V
Nominal charge current	5mA
Nominal discharge current	5mA
Maximum charge current	12.5mA
Maximum discharge current	25mA
Upper Limited Charging Voltage	4.2V
Cut-off voltage	3.0V

Copy of marking plate

This is reference label, final label should be including the content of it.

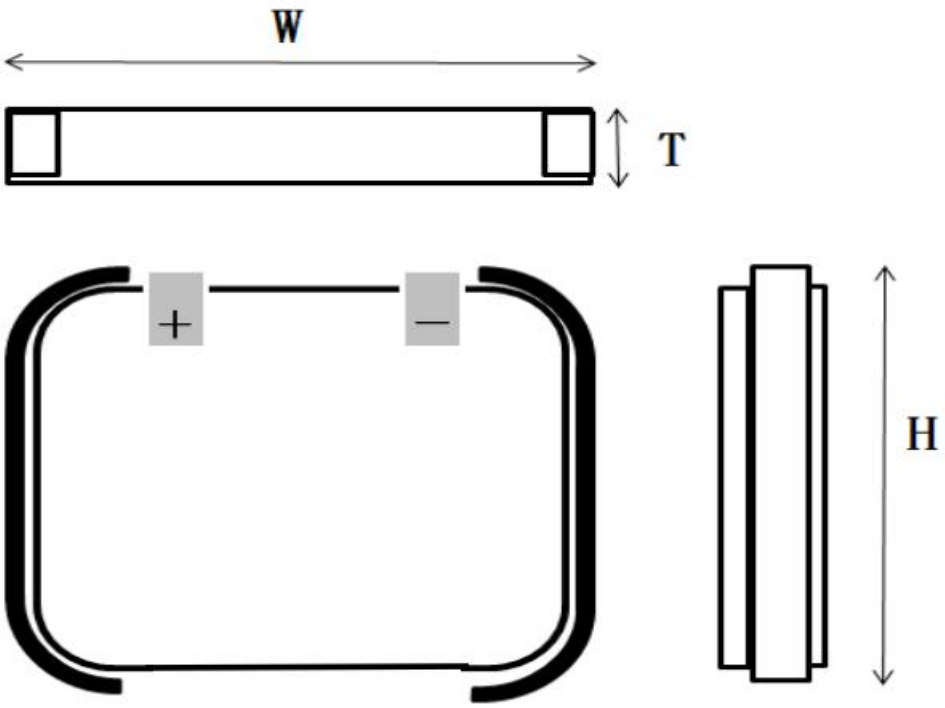
Red(+)	Black (-)
Lithium Ion Cell	FL400909
3.7V, 25mAh, 0.0925Wh	ICP5/10/10
Made in China	Date：YYMMDD

Warning: Risk of Fire and Burns.
Follow Manufacturer's Instructions.

Caution for ingestion of small batteries

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

Construction



项目	描述	尺寸
T	厚度	4.2mm max
W	宽度	9.2mm max
L	长度	9.2mm max

Cell(mm)

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
4	**Parameter measurement tolerances**		**P**
	Parameter measurement tolerances	Comply with relevant requirements.	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 case exists.	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	Venting mechanism exists on the narrow side of 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**	Cell only.	N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N/A
	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		N/A

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
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	Complied. DC electrode tab.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short-circuit		P
5.6	**Assembly of cells into batteries**	Cell only.	N/A
5.6.1	**General**		N/A
	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		N/A
	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 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**		N/A
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage		N/A

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
	of the cell does not exceed the upper limit of the charging voltage specified in Table 2		
	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		N/A
	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		N/A

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
	end product considered when conducting mechanical tests		
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.	P
5.8	**Battery safety components**	Cell only.	**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		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	Prismatic cell	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C ± 5 °C	Tests are carried out at 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		N/A

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	See page 3.	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	See page 3.	P

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
	a specified final voltage		
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 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		P
7.2	**Intended use**		**P**
7.2.1	**Continuous charging at constant voltage (cells)**		**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	Tested complied.	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)**	Cell only.	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 (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)**	Cell only	N/A
	The batteries were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one		N/A

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
	hour after the current reached a low end steady state condition		
	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		N/A
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.2)	N/A
7.3.3	**Free fall**		**P**
	Results: No fire. No explosion	No fire. No explosion	P
7.3.4	**Thermal abuse (cells)**		**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		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		P
	Results: No fire. No explosion..... :	(See appended table 7.3.5)	P
7.3.6	**Over-charging of battery**	Cell only.	N/A
	The supply voltage which is:		--
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		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		N/A
	Test was continued until the temperature of the outer casing:		N/A
	- Reached steady state conditions (less than 10 °C change in 30-minute period); or		N/A
	- Returned to ambient		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.6)	N/A

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
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..... :	(See appended table 7.3.7)	P
7.3.8	**Mechanical tests (batteries)**	Cell only	N/A
7.3.8.1	**Vibration**		N/A
	Results: No fire, no explosion, no rupture, no leakage or venting.....:	(See appended table 7.3.8.1)	N/A
7.3.8.2	**Mechanical shock**		N/A
	Results: No leakage, no venting, no rupture, no explosion and no fire.....:	(See appended table 7.3.8.2)	N/A
7.3.9	**Design evaluation – Forced internal short-circuit (cells)**		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		P
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400N	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	Information for safety mentioned in manufacturer's specifications.	P

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
	equipment manufacturers or end-users		
	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
8.2	**Small cell and battery safety information**	Small cell.	**P**
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		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**		**P**
	Cells marked as specified in IEC 61960, except coin cells	The final product is cell.	P
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		P
	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**	Cell only	N/A
	Batteries marked as specified in IEC 61960, except for coin batteries		N/A
	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		N/A
	Batteries are marked with an appropriate caution statement		N/A
	- Terminals have clear polarity marking on the		N/A

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
	external surface of the battery, or		
	- 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**	Not consumer replaceable	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		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**
	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 not small enough to fit within the limits of the ingestion gauge of Figure 3		N/A

Annex A	**Charging and discharging range of secondary lithium ion cells for safe use**		**P**
A.1	**General**		**P**
A.2	**Safety of lithium ion secondary battery**		**P**
A.3	**Consideration on charging voltage**		**P**
A.3.1	General	Charging voltage is 4.2V	P
A.3.2	Upper limit charging voltage	4.2V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint	4.2V applied.	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 declared by client is: 0-45°C.	P

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		P
A.4.3	High temperature range	Not higher than the temperature range 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	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		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	-5°C applied.	P
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	**Sample preparation**		**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

IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021			
Clause	Requirement – Test	Result – Remark	Verdict
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**	**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**		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**

Table: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
Cell		FL400909	3.7V, 25mAh, 0.0925Wh	IEC 62133-2:2017/AMD1:2021	Tested with appliance
Positive electrode	Jiangmen Keheng Industrial Co., LTD	LCO-103	$LiCoO_2$, Dimensions: 240mm*29mm*0.138mm Specific capacity: 142mAh/g	--	--
Negative electrode	Shenzhen Liyuan New Energy Technology Co., LTD	LY-960	Material: Graphite Dimensions: 261 mm *29 mm* 0.105mm Specific capacity: 355mAh/g	--	--
Electrolyte	Zhuhai light rui new material	GR-B670	Composition: LiPF6+EC+DMC+EMC Conductivity: 8.5S/cm	--	--
Separator	Shenzhen Shunjia Energy Co., Ltd	16μm	PP&PE&PP Dimensions: 604mm*31mm*0.016mm Shut down temperature: 130°C	--	--
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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**
C001	4.2	0.005	4.176	P
C002	4.2	0.005	4.179	P
C003	4.2	0.005	4.181	P
C004	4.2	0.005	4.182	P
C005	4.2	0.005	4.178	P
Supplementary information: - No fire or explosion - No leakage				

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					
C006	55.4	4.173	83.2	103.3	P
C007	55.4	4.176	78.6	110.1	P
C008	55.4	4.178	81.4	108.3	P
C009	55.4	4.170	81.9	110.7	P
C010	55.4	4.174	79.7	106.8	P
Samples charged at charging temperature lower limit: -5°C					
C011	55.1	4.134	83.2	111.1	P
C012	55.1	4.138	78.6	109.2	P
C013	55.1	4.146	81.4	110.8	P
C014	55.1	4.133	81.9	107.7	P
C015	55.1	4.141	79.7	104.9	P
Supplementary information: - No fire or explosion					

7.3.2	Table: External short-circuit (battery)					N/A
Sample no.	**Ambient T (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature ~~rise ΔT~~ (°C)**	**Component single fault condition**	**Results**
Supplementary information:						

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				
C016	4.172	2.920	6.05	P
C017	4.177	2.923	5.11	P
C018	4.174	2.921	6.92	P
C019	4.179	2.925	5.76	P
C020	4.173	2.921	5.46	P
Samples charged at charging temperature lower limit: -5°C				
C021	4.138	2.896	4.83	P
C022	4.144	2.900	5.26	P
C023	4.145	2.901	5.00	P
C024	4.139	2.897	6.08	P
C025	4.140	2.898	5.87	P
Supplementary information: - No fire or explosion				

7.3.6	Table: Over-charging of battery	N/A
Constant charging current (A).....:		—
Supply voltage (Vdc).....:		—

Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature ~~rise ΔT~~ (°C)	Results

Supplementary information:

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**
C026	3.336	0.025	-4.2	P
C027	3.331	0.025	-4.2	P
C028	3.335	0.025	-4.2	P
C029	3.333	0.025	-4.2	P
C030	3.337	0.025	-4.2	P

Supplementary information:
- No fire or explosion

7.3.8.1	Table: Vibration				N/A
Sample no.	**OCV before test (Vdc)**	**OCV after test (Vdc)**	**Mass before test (g)**	**Mass after test (g)**	**Results**

Supplementary information:

7.3.8.2	Table: Mechanical shock				N/A
Sample no.	**OCV before test (Vdc)**	**OCV after test (Vdc)**	**Mass before test (g)**	**Mass after test (g)**	**Results**
Supplementary information:					

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					
C031	45	4.171	1	400	P
C032	45	4.177	1	101.2	P
C033	45	4.174	1	93.7	P
C034	45	4.176	2	97.5	P
C035	45	4.179	2	115.0	P
Samples charged at charging temperature lower limit -5°C					
C036	-5	4.139	1	99.4	P
C037	-5	4.138	1	106.1	P
C038	-5	4.140	1	400	P
C039	-5	4.137	2	87.2	P
C040	-5	4.141	2	400	P

Supplementary information:

[1)] Identify one of the following:

1: Nickel particle inserted between positive and negative (active material) coated area.

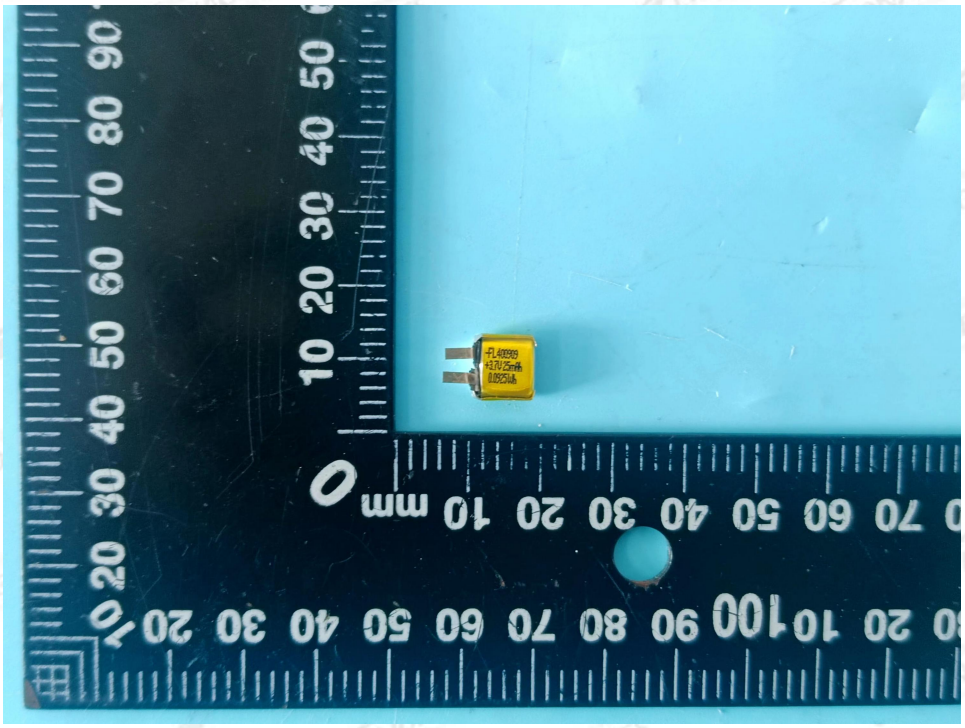
2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

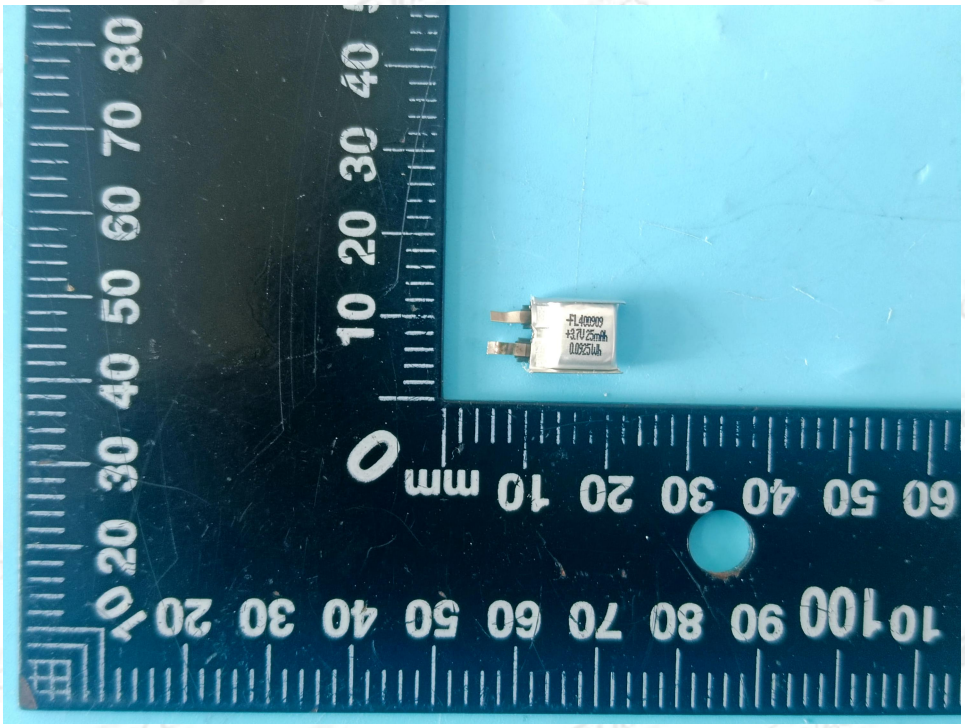
D.2	Table: Internal AC resistance for coin cells			N/A
Sample no.	**Ambient T (°C)**	**Store time (h)**	**Resistance Rac (Ω)**	**Results [1)]**

Supplementary information:

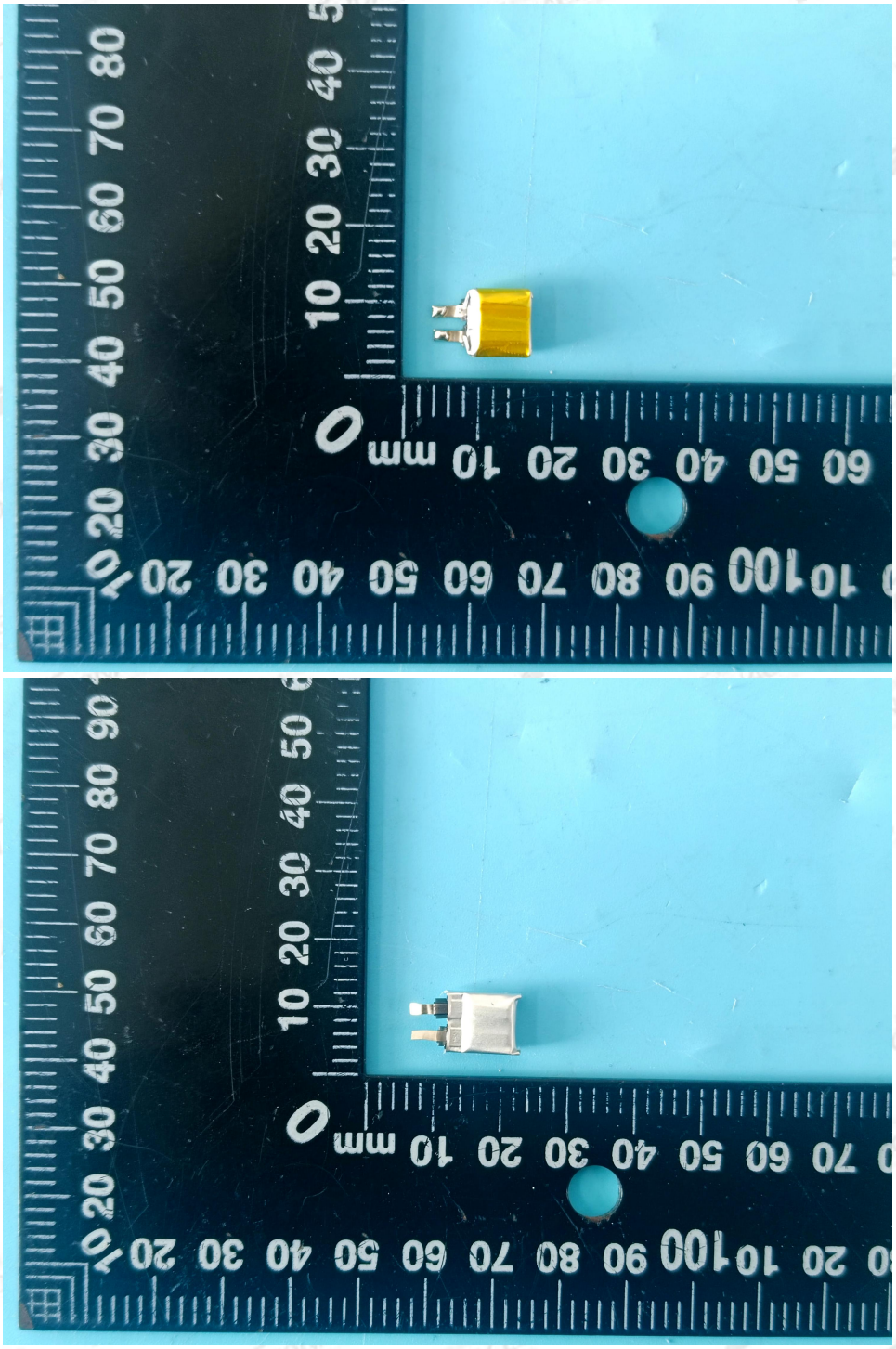
[1)] Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

Attachment A
Photos of product





Front view of cell



Back view of cell

Shenzhen Lionaces Technology Co., Ltd.
Add: 301, Building B6, Junfeng Industrial Zone, Yonghe Road, Heping Community, Fuhai Street, Baoan, Shenzhen, Guangdong, China.
Tel: 0755-28280690 E-mail: service@lionaces.com
Website: www.lionaces.com

Test Equipment

No	Name	Model specifications	Device Number	Calibration validity	Using (√)
1	High-performance battery detection system	CT-4008-5V6A-S1	LA-BT-E070	2023-12-06	√
2	Digital temperature recorder	GL240	LA-BT-E096	2024-03-16	√
3	Battery short circuit tester	GX-055-B50	LA-BT-E097	2024-03-16	√
4	Drop test system	FH-03	LA-BT-E010	2023-12-06	√
5	Battery thermal shock test box	GX-3020-B	LA-BT-E085	2023-12-06	√
6	Battery crush test instrument	GX-5067-CSM	LA-BT-E084	2023-12-06	√
7	Battery forced internal testing machine	FH-07	LA-BT-E006	2023-12-06	√
8	DC power supply	UTP1306S	LA-BT-E079 LA-BT-E080 LA-BT-E081 LA-BT-E082 LA-BT-E083	2023-12-06	√
9	Gauge	H:57.1*h:25.4*R:31.7mm	LA-BT-E077	2023-12-08	√

----END OF REPORT----

IEC 62133-2 TEST REPORT

For

Rechargeable Li-ion Battery

Model: 502030

Prepared for:

Prepared by: Shenzhen NCT Testing Technology Co., Ltd.
B2A101/B2A201/B2A202, Fuqiao 6th Area, Xintian, Fuhai Subdistrict,
Bao'an District, Shenzhen, Guangdong, China
TEL: +86-755-23218380

Report Number: NCT2404106OI1-1
Date of Test: 2024-10-02 to 2024-10-16
Date of Issue: 2024-10-17

Tested By: Miller Gao Reviewed By: Miya Li Approved By: Boris Lin

Miller Gao Miya Li Boris Lin

Seal of NCT

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. .....:	NCT24041060I1-1
Date of issue .....:	2024-10-17
Total number of pages.....	27 pages
Applicant's name .....:	Same as the applicant
Address .....:	Same as the applicant
Test specification:	
Standard.....:	IEC 62133-2:2017+AMD1:2021
Test procedure .....:	Test Report
Non-standard test method .....:	N/A
Test item description.....:	Rechargeable Li-ion Battery
Trade Mark .....:	N/A
Manufacturer.....:	Same as applicant
Address .....:	Same as applicant
Model/Type reference .....:	502030
Ratings .....:	3.7V, 200mAh, 0.74Wh

Testing procedure and testing location:

Testing Laboratory:

Testing location/ address.....: Shenzhen NCT Testing Technology Co., Ltd.

B2A101/B2A201/B2A202, Fuqiao 6th Area, Xintian, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

List of Attachments:

Appendix 1: 3 pages of Photo Documentation

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
cl.5.6.2 Design recommendation; cl.7.1 Charging procedure for test purposes (for Cells and Batteries); cl.7.2.1 Continuous charging at constant voltage (cells); 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 NCT Testing Technology Co., Ltd. B2A101/B2A201/B2A202, Fuqiao 6th Area, Xintian, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences

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. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Rechargeable Li-ion Battery

Model: 502030 (1INP5/20/30)

Rated: 3.7V, 200mAh, 0.74Wh

Red wire: + Black wire: -

YYYYMM

Manufacturer date: YYMMDD

"YY" means year, "MM" means month, "DD" means day.

Information for safety mentioned on equipment's package

Potential for fire or burning. Do not disassemble, puncture, crush, heat or burn.
Use only with specified charger.
Keep small cells and batteries which are considered swallowable out of the reach of children.
Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2h of ingestion.
In case of ingestion of a cell or battery, seek medical assistance promptly.

Test item particulars .....:	
Classification of installation and use .....:	To be defined in final product
Supply connection .....:	Lead wire
Recommend charging method declared by the manufacturer..... :	Charging the battery with 100mA constant current until 4.2V, then constant voltage until charge current reduces to 4mA at ambient 20°C±5°C.
Discharge current (0,2 I_t A) ..... :	40mA
Specified final voltage..... :	2.75V
Upper limit charging voltage per cell.....:	4.2V
Maximum charging current.....:	300mA
Charging temperature upper limit.....:	45°C
Charging temperature lower limit.....:	0°C
Polymer cell electrolyte type ..... :	☐gel polymer ☐solid polymer ☒N/A
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing .....:	
Date of receipt of test item .....:	2024-09-30
Date (s) of performance of tests.....:	2024-10-02 to 2024-10-16
General remarks:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(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.**	
Name and address of factory (ies) ……:	Same as applicant

General product information:

This battery is constructed with one lithium-ion cell and has overcharge, over-discharge, over current and short-circuits proof circuit.

The main features of the battery pack are shown as below (clause 7.1.1):

Model (Battery)	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
502030	200mAh	3.7V	100mA	100mA	300mA	300mA	4.20V	2.75V

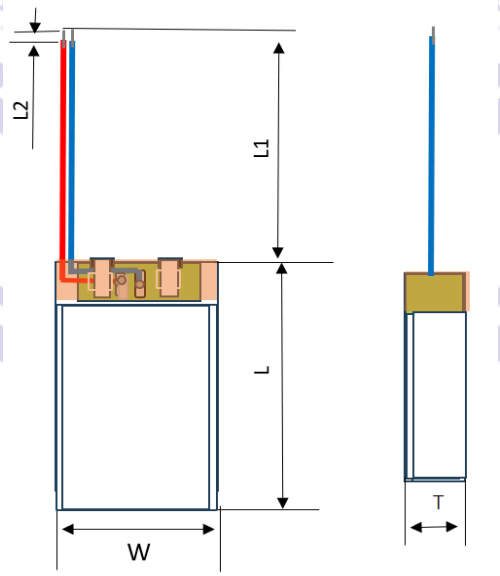
The main features of the cell in the battery pack are shown as below (clause 7.1.1):

Model (Cell)	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
502030	200mAh	3.7V	100mA	100mA	300mA	300mA	4.20V	2.75V

The main features of the cell in the battery pack are shown as below (clause 7.1.2):

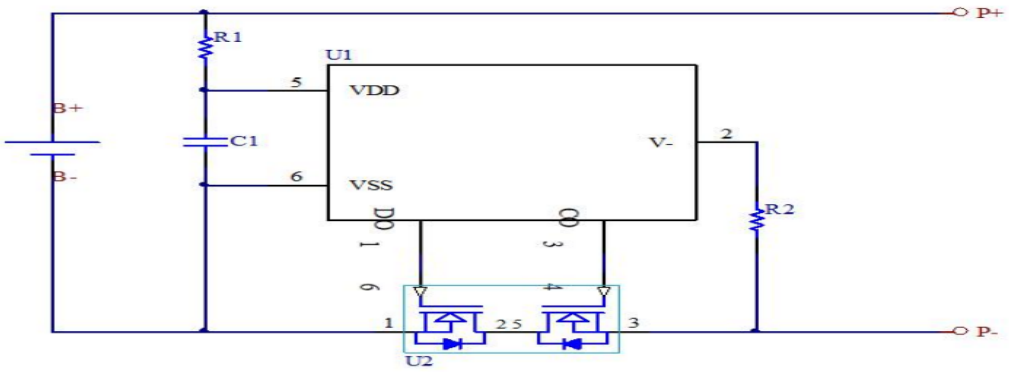
Model (Cell)	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
502030	4.25V	10mA	0°C	45°C

Construction:



T：max 5.2mm，W：max 20.2mm，L：max 32.5mm
Battery

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) ..... :		—
	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 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, overdischarge, 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

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		P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	**Assembly of cells into batteries**		P
5.6.1	General		P
	Each battery has an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region	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

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	Single cell battery, Max. Charging voltage of cell: 4.2V, not exceed 4.2V 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 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	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 for battery should be provided by end product.	N/A
	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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 certificate	P
5.8	**Battery safety components**	See TABLE: Critical components information	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	See page 4.	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	See page 4.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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 range: 0-45°C declared. 0°C used for lower limit tests. 45°C used for upper limit tests.	P
7.2	**Intended use**		P
7.2.1	Continuous charging at constant voltage (cells)		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 100mA.	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).....:	70.4	—
	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 (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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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 three 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	Single fault applies on MOSFET (U2).	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
	- Reached steady state conditions (less than 10 °C change in 30-minute period); or		P
	- Returned to ambient		N/A
	Results: no fire, no explosion..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)	Tested complied.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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..... :	(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, 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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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		P
8.2	**Small cell and battery safety information**	Small cells and batteries.	P
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:	Information for safety mentioned on equipment's package.	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**		N/A
	Cells are marked as specified in IEC 61960, except coin cells	The final product is battery.	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Batteries are marked as specified in IEC 61960, except for coin batteries	The battery is marked in accordance with IEC 61960, also see copy of marking plate.	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		P
	- Terminals have clear polarity marking on the external surface of the battery, or	The “Red wire: +” and “Black wire: -” polarity explicitly marked on surface of the battery.	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	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 intended for direct sale.	N/A
9.4	**Other information**		P
	The following information are marked on or supplied with the battery:		P
	- Storage and disposal instructions	Information for 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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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	4.25V applied.	P
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: 0-45°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		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		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	Cell specified final voltage 2.75V, not exceed 2.75V specified by cell manufacturer.	P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P

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

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

5.1 – 5.6	TABLE: Critical components information				
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity**
-Lead wire	DONGGUAN WENCHANG ELECTRONIC PRODUCTS CO.,LTD	3302	30AWG, 105°C, 30Vac	UL 758	UL E214500
-Lead wire (Alternative)	Interchangeable	Interchangeable	30AWG, 105°C, 30Vac	UL 758	UL approved
PCB	Shenzhen Assunny Precision Circuit Scien-Tech Co., LTD	RD	V-0, 130 ºC	UL 796	UL E248037
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130ºC	UL 796	UL approved
Protective IC (U1)	Shenzhen Developer Microelectronics CO., LTD	DW01	Over-charge detection Voltage: 4.28±0.05V, Over-discharge detection Voltage: 2.40±0.1V	--	Tested with appliance
MOSFET (U2)	Shenzhen Developer Microelectronics CO., LTD	8205A	V_{DS}=20V, V_{GS}=±12V, I_D= 5A	--	Tested with appliance
Cell		502030	3.7V, 200mAh	IEC 62133-2: 2017, IEC 62133-2: 2017/AMD1: 2021	Tested with appliance
-Positive electrode	Ningxia Sinochem Lithium battery Material Co., LTD	Z10C	$LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$	--	--
-Negative electrode	Ganzhou Ruifute Technology Co., LTD	AGF-7	Graphite	--	--
-Separator	Huizhou Yusheng Technology Co., LTD	PE14	PE, Shutdown temperature: 130ºC, Thickness: 14μm	--	--
-Electrolyte	Xiamen First energy technology Co., LTD	SN3225M1	$LiPF_6$+EC+EMC+DMC, H_2O<20ppm, HF<50ppm	--	--
Supplementary information: N/A					

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	4.20	0.10	4.19	P
Cell #2	4.20	0.10	4.18	P
Cell #3	4.20	0.10	4.18	P
Cell #4	4.20	0.10	4.18	P
Cell #5	4.20	0.10	4.19	P

Supplementary information:
- No fire or explosion
- No leakage

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)					
Cell #1	55.6	4.21	91.2	112.6	P
Cell #2	55.6	4.21	90.9	113.8	P
Cell #3	55.6	4.20	89.6	115.1	P
Cell #4	55.6	4.21	92.0	110.7	P
Cell #5	55.6	4.20	88.8	114.5	P
Samples charged at charging temperature lower limit (0°C)					
Cell #6	55.5	4.16	87.9	116.9	P
Cell #7	55.5	4.16	91.2	118.0	P
Cell #8	55.5	4.17	90.7	119.1	P
Cell #9	55.5	4.16	88.8	117.8	P
Cell #10	55.5	4.17	89.6	121.4	P

Supplementary information:
- No fire or explosion

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 #1	23.6	4.19	91.2	119.2	Short Circuit MOSFET (U2)	P
Battery #2	23.6	4.18	90.8	115.3	Short Circuit MOSFET (U2)	P
Battery #3	23.6	4.19	87.9	117.6	Short Circuit MOSFET (U2)	P
Battery #4	23.6	4.19	88.6	23.7	/	P
Battery #5	23.6	4.18	92.3	23.9	/	P
Supplementary information: - No fire or explosion						

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 #1	4.21	4.20	13.02	P
Cell #2	4.20	4.20	12.98	P
Cell #3	4.20	4.20	13.00	P
Cell #4	4.21	4.20	13.01	P
Cell #5	4.20	4.20	12.99	P
Samples charged at charging temperature lower limit (10°C)				
Cell #6	4.16	4.16	13.02	P
Cell #7	4.16	4.16	12.99	P
Cell #8	4.17	4.16	13.01	P
Cell #9	4.17	4.17	13.00	P
Cell #10	4.17	4.16	12.97	P
Supplementary information: - No fire or explosion				

7.3.6	TABLE: Over-charging of battery				P
Constant charging current (A) .....:			0.40		—
Supply voltage (Vdc) .....:			5.95		—
Sample no.	**OCV before charging (Vdc)**	**Total charging time (minute)**	**Maximum outer case temperature (°C)**		**Results**
Battery #1	3.04	73.0	23.6		P
Battery #2	3.03	73.0	25.9		P
Battery #3	3.04	73.0	26.1		P
Battery #4	3.03	73.0	28.3		P
Battery #5	3.04	73.0	29.4		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 #1	3.03	0.20	2.75	P
Cell #2	3.04	0.20	2.75	P
Cell #3	3.03	0.20	2.75	P
Cell #4	3.03	0.20	2.75	P
Cell #5	3.04	0.20	2.75	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 #1	4.18	4.18	5.415	5.415	P
Battery #2	4.19	4.18	5.404	5.404	P
Battery #3	4.19	4.19	5.349	5.349	P
Supplementary information: - No fire or explosion - No rupture - No leakage - No venting					

7.3.8.2	TABLE: Mechanical shock				P
Sample no.	**OCV before test (Vdc)**	**OCV after test (Vdc)**	**Mass before test (g)**	**Mass after test(g)**	**Results**
Battery #1	4.19	4.18	5.211	5.211	P
Battery #2	4.19	4.19	5.358	5.358	P
Battery #3	4.18	4.18	5.504	5.504	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 #1	45	4.21	1	400	P
Cell #2	45	4.20	1	400	P
Cell #3	45	4.20	1	400	P
Cell #4	45	4.21	1	400	P
Cell #5	45	4.21	1	400	P
Samples charged at charging temperature lower limit (0°C)					
Cell #6	0	4.16	1	400	P
Cell #7	0	4.17	1	400	P
Cell #8	0	4.16	1	400	P
Cell #9	0	4.17	1	400	P
Cell #10	0	4.16	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 fire or explosion

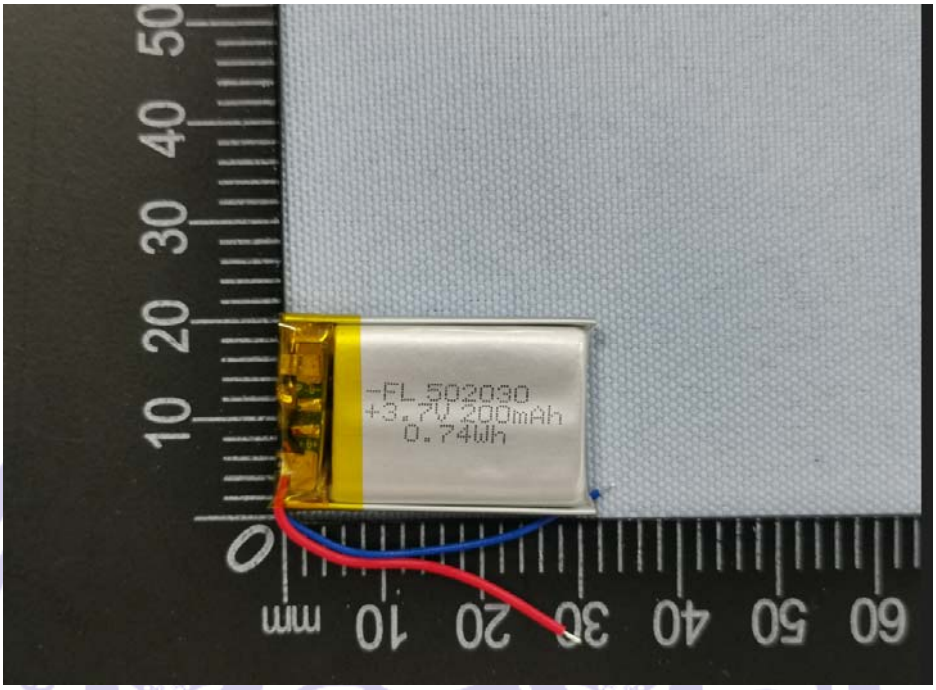
D.2	TABLE: Internal AC resistance for coin cells			N/A
Sample no.	**Ambient T (°C)**	**Store time (h)**	**Resistance Rac (Ω)**	**Results [1)]**

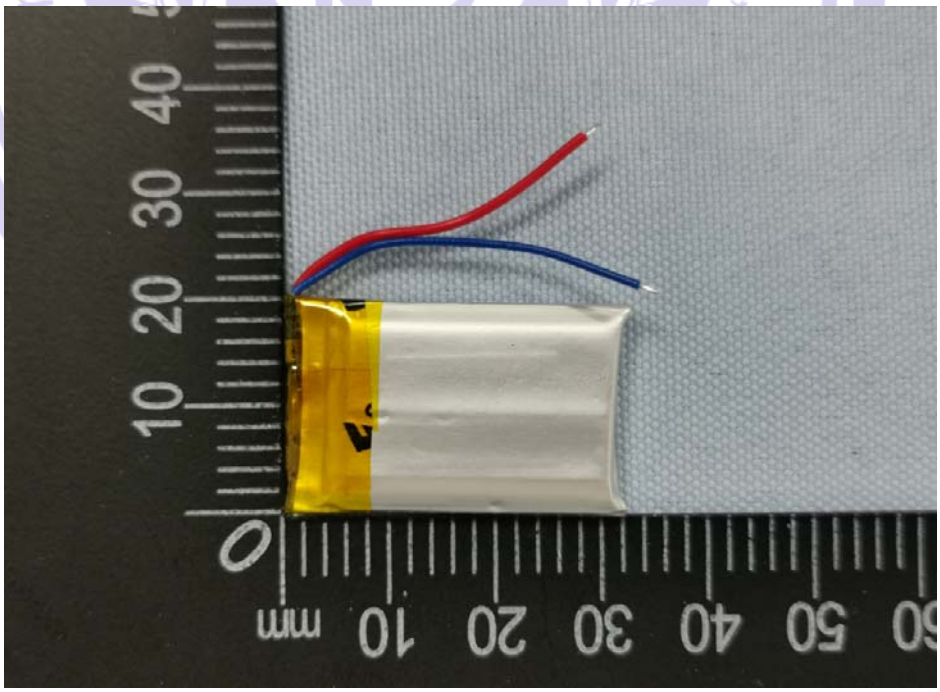
Supplementary information:

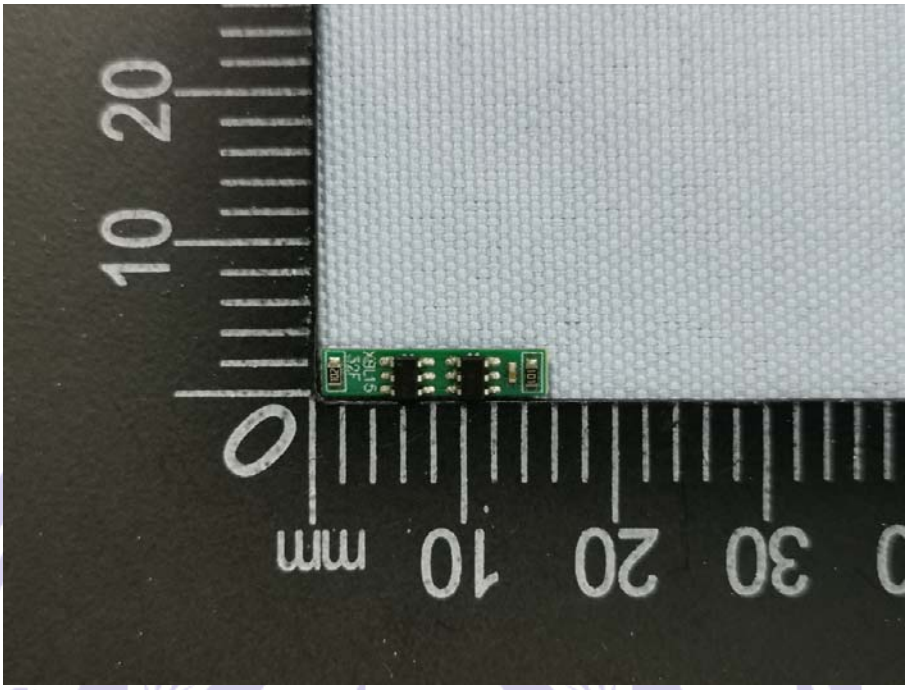
[1)] Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

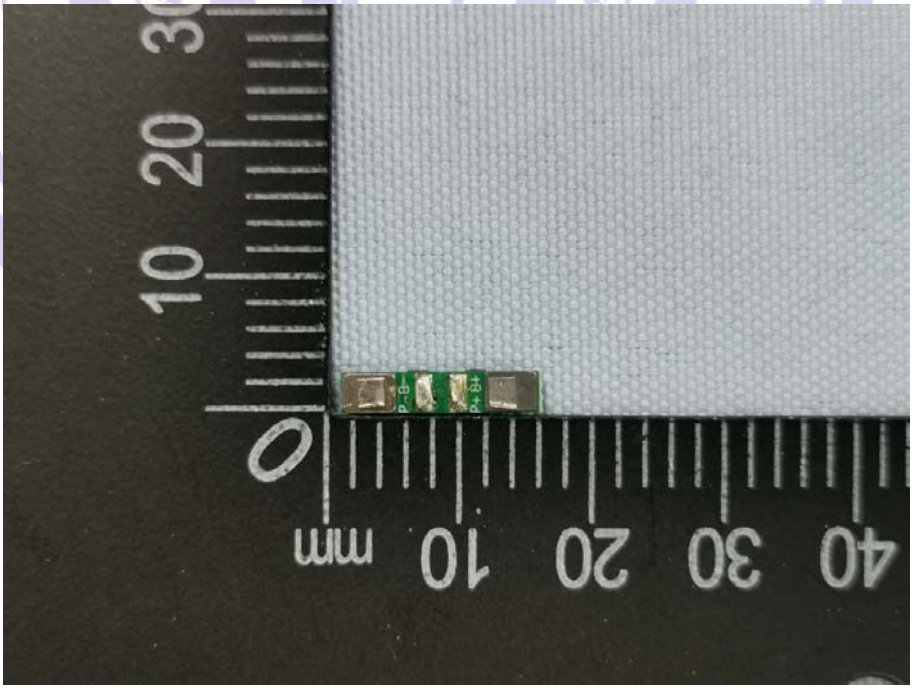
Appendix 1

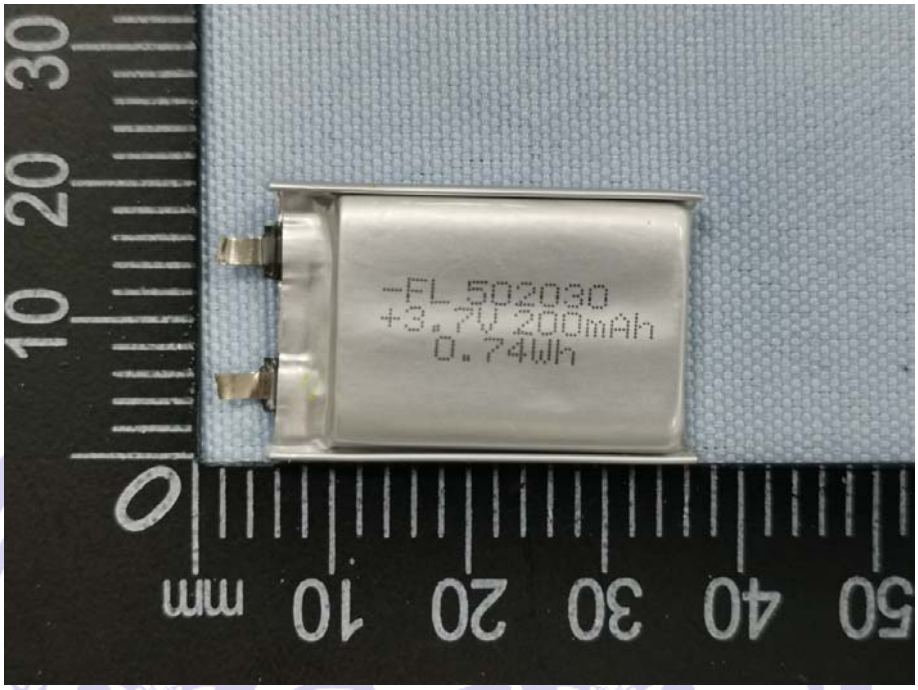
Photo Documentation

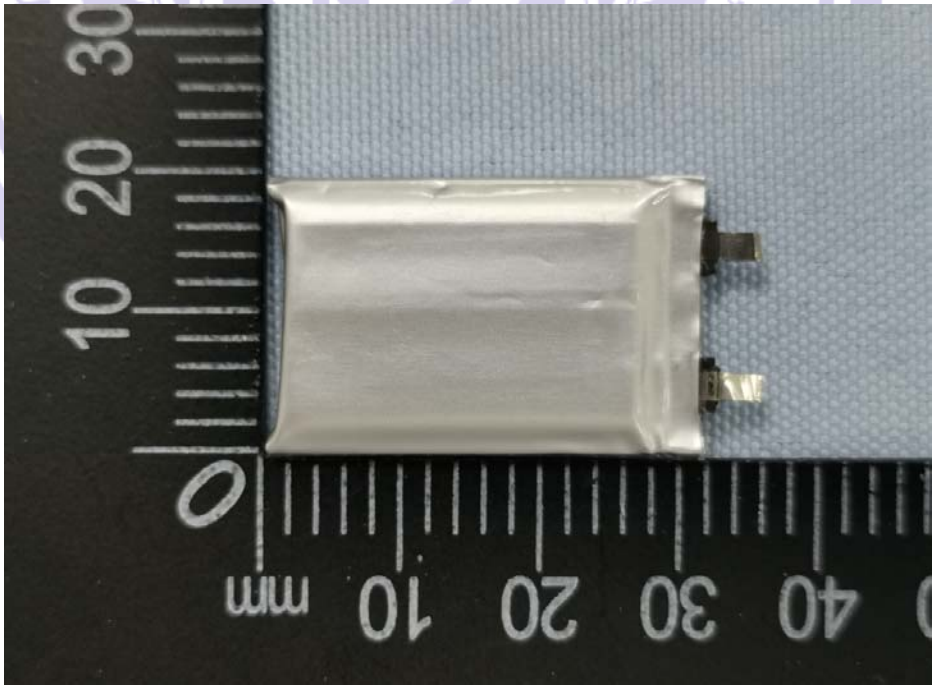
Details of:	Fig.1–Front view of battery 502030
	

Details of:	Fig. 2–Back view of battery 502030
	

Details of:	Fig.3–Front view of PCM
	

Details of:	Fig.4–Back view of PCM
	

Details of:	Fig.5–Front view of cell 502030
	

Details of:	Fig. 6–Back view of cell 502030
	

---End of Test Report---