Test Report

Report No.	:	AGC03362230801-001

SAMPLE NAME	:	Polymer Li-On Cell Battery
MODEL NAME	:	115570
APPLICANT	:	MID OCEAN BRANDS B.V
STANDARD(S)	:	Please refer to the following page(s).
DATE OF ISSUE	:	Aug. 04, 2023

Attestation of Global Compliance (Shenzhen) Std & Tech Co., Ltd.

Applicant	:	MID OCEAN BRANDS B.V
Address	:	7/F, Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.
Test Site	:	6/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China

Report on the submitted sample(s) said to be:

Sample Name	:	Polymer Li-On Cell Battery
Model	:	115570
Vendor code	:	118144
Sample Received Date	:	Aug. 02, 2023
Testing Period	:	Aug. 02, 2023 to Aug. 04, 2023
Test Requested	:	Selected test(s) as requested by client.

Test Requested:	**Conclusion**
European Directive 2006/66/EC and its amendments 2013/56/EU on batteries and accumulators - Lead, Cadmium and Mercury Content	Pass

Approved by : Jessie.Liang

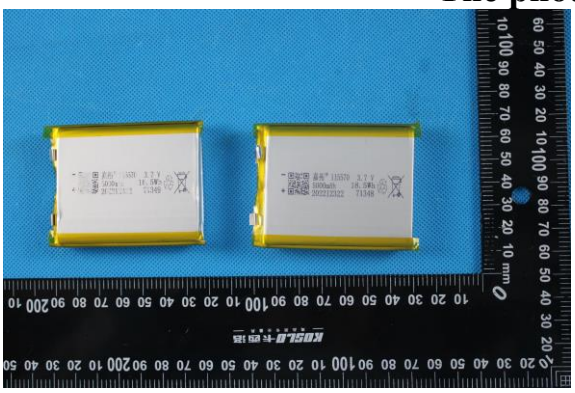
Liangdan, Jessie.Liang

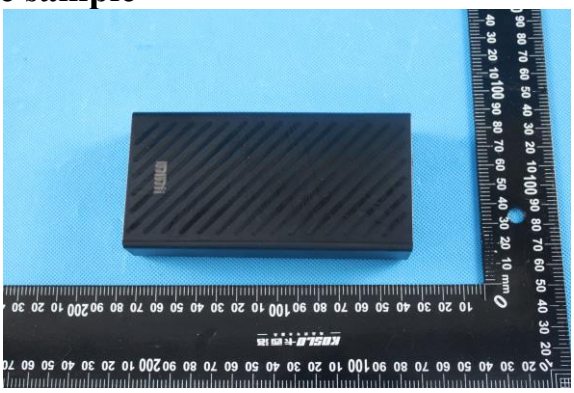
Technical Director

Report Revise Record

Report Version	Issued Date	Valid Version	Notes
/	Aug. 04, 2023	Valid	Initial release

The photo of the sample





The photo of AGC03362230801-001 is for use only with the original report.

Test Point Description

Test point	Test point description
1	Cell

Test Results:

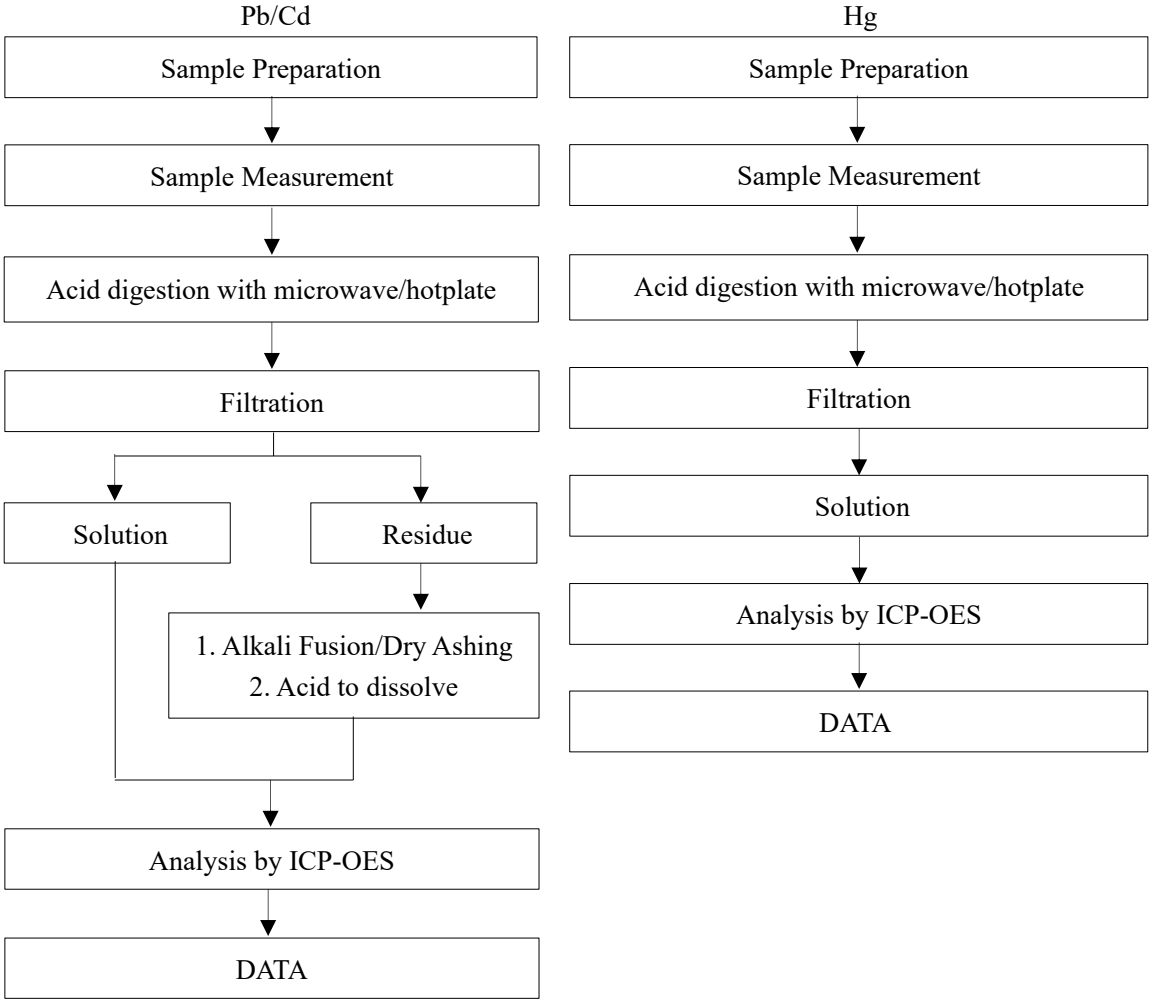
Note: N.D.=Not Detected (less than method detection limit), MDL = Method Detection Limit, 1mg/kg=0.0001%

European Directive 2006/66/EC and its amendments 2013/56/EU on batteries and accumulators - Lead, Cadmium and Mercury Content

Test Methods and Equipment：IEC 62321-4:2013+A1:2017,IEC 62321-5:2013; ICP-OES

Test Item(s)	Unit	Limit	MDL	Test Result(s)
				1
Lead(Pb)	%	/	0.0005	N.D.
Cadmium(Cd)	%	0.002	0.0005	N.D.
Mercury(Hg)	%	0.0005	0.0001	N.D.
Conclusion				Conformity

Test Flow Chart of Lead, Cadmium and Mercury



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*** End of Report ***

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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.....:	TSZ22110018-P04-R01
Date of issue.....:	2022-12-23
Total number of pages.....:	22
Name of Testing Laboratory preparing the Report.....:	Shenzhen Tiansu Calibration and Testing Co., Ltd.
Applicant's name.....:	
Address.....:	
Test specification:	
Standard.....:	IEC 62133-2:2017

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing Laboratory.

Test item description.....:	Polymer Li-ion Battery
Trade Mark.....:	N/A
Manufacturer.....:	Same as applicant
Model/Type reference.....:	115570
Ratings.....:	3.7V, 5000mAh, 18.5Wh

Responsible Testing Laboratory and testing location(s):

☒	**Testing Laboratory:**	Shenzhen Tiansu Calibration and Testing Co., Ltd.	
Testing location/ address.....:		Building 4, No.2, Jinlong Road, Longgang District, Shenzhen, Guangdong, China.	
Tested by (name, function, signature).....:		Sunny Li \Test Engineer	Sunny Li
Reviewed by (name, function, signature)... :		Chovy Qiu \Reviewer	Chovy Qiu
Approved by (name, function, signature)... :		Duan jiang tao \Technology supervisor	Duan jiang tao

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

List of Attachments (including a total number of pages in each attachment): Attachment 1 (1 Page): Circuit diagram Attachment 2 (3 Pages): Product Photos	
Summary of testing:	
Tests performed (name of test and test clause): **Testing for cell: 115570** 7.2.1 Continuous charging at constant voltage (cells) 7.3.1 External short-circuit (cell) 7.3.3 Free fall 7.3.4 Thermal abuse (cells) 7.3.5 Crush (cells) 7.3.7 Forced discharge (cells) 7.3.9"※" Design evaluation – Forced internal short-circuit (cells) **Testing for Battery: 115570** 7.2.2 Case stress at high ambient temperature (battery) 7.3.2 External short-circuit (battery) 7.3.3 Free fall 7.3.6 Over-charging of battery 7.3.8 Mechanical tests (batteries) 7.3.8.1 Vibration 7.3.8.2 Mechanical shock Tests are made with the number of in IEC 62133-2: 2017 Table 1.	**Testing location:** Shenzhen Tiansu Calibration and Testing Co., Ltd. Building 4, No.2, Jinlong Road, Longgang District, Shenzhen, Guangdong, China.

Parameter with asterisk "※" is not within the accreditation by CNAS.

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

Polymer Li-ion Battery
115570 1ICP7/60/90
Red Wire (+) Black Wire (-)
3.7V 5000mAh 18.5Wh
YYYYMMDD

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

Remark:
1. Above plate will be printed on the surface of the battery.
2. The date code "YYYYMMDD" represents the date of production.

Test item particulars.....	--
Classification of installation and use.....	--
Supply Connection.....	DC lead wire
Recommend charging method declared by the manufacturer.....	CC/CV
Discharge current (0,2 It A).....	1000mA(Cell), 1000mA(Battery)
Specified final voltage.....	3.0V(Cell), 3.0V(Battery)
Upper limit charging voltage per cell.....	4.2V
Maximum charging current.....	2500mA(Cell), 2500mA(Battery)
Charging temperature upper limit.....	45°C
Charging temperature lower limit.....	10°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.....	2022-11-09
Date (s) of performance of tests.....	2022-11-10 to 2022-11-21

General remarks:

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

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

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

General product information and other remarks:

The product covered by this report is Polymer Li-ion Battery(model: 115570) consists of Polymer Li-ion Cell (model: 115570) in 1S1P which tested with appliance as per IEC 62133-2:2017 in the report.

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

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Final Voltage
115570	5000mAh	3.7V	1000mA	1000mA	2500mA	2500mA	4.2V	3.0V

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

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
115570	5000mAh	3.7V	1000mA	1000mA	2500mA	2500mA	4.2V	3.0V

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
115570	4.2V	250mA	10°C	45°C

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
4	**PARAMETER MEASUREMENT TOLERANCES**		P
	Parameter measurement tolerances		P
5	**GENERAL SAFETY CONSIDERATIONS**		P
5.1	**General**		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	**Insulation and wiring**		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No 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 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		P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	Cell specification and battery specification have been provided. The design of the battery refers to the parameters of the cell	P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified	Battery specifications have been provided.	P
5.5	**Terminal contacts**		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short-circuit		P
5.6	**Assembly of cells into batteries**		P
5.6.1	General		P
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		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 have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly	Current, voltage and temperature limits specified by cell manufacturer.	P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer	Battery without selective discharge function.	N/A
	Protective circuit components added as appropriate and consideration given to the end-device application		P
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation		P
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2	Cell upper limit of the charging voltage: 4.2V	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage		P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries	Shall be evaluate in end product.	N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	**Quality plan**		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery		N/A
5.8	**Battery safety components**		N/A
	According annex F		N/A
6	**TYPE TEST AND SAMPLE SIZE**		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old		P
	Coin cells with resistance ≤ 3 Ω (measured according annex D) are tested according table 1	Not coin cell.	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C ± 5 °C		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection		N/A
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test		P
7	**SPECIFIC REQUIREMENTS AND TESTS**		P
7.1	**Charging procedure for test purposes**		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of 20 °C ± 5 °C, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Highest test temperature: 45°C Lowest test temperature: 10°C	P
7.2	**Intended use**		P
7.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		P
	Results: No fire. No explosion. No leakage..... :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)	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		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 table7.3.1)	P
7.3.2	External short-circuit (battery)	Test complied.	P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		P
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test	Single fault conducted on four samples.	P
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor	Single fault applies on MOSFET U2, MOSFET U3	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See appended table7.3.2)	P
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion		P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)..... :	130	—
	Results: No fire. No explosion		P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery	Tested complied.	P
	The supply voltage which is:		P
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or	5.88V 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 table7.3.6)	P
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P
	Results: No fire. No explosion..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)	Tested complied.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.8.1	Vibration		P
	Results: No fire, no explosion, no rupture, no leakage or venting.....:	(See appended table 7.3.8.1)	P
7.3.8.2	Mechanical shock	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
8	**INFORMATION FOR SAFETY**		P
8.1	**General**		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards	Information for safety mentioned in manufacturer's specifications	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	Considered in end product.	N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user	Considered in end product.	N/A
	Do not allow children to replace batteries without adult supervision	Considered in end product.	N/A
8.2	**Small cell and battery safety information**	Not small cell and battery.	N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A
9	**MARKING**		P
9.1	**Cell marking**		N/A
	Cells marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		N/A
9.2	**Battery marking**		P
	Batteries marked as specified in IEC 61960, except for coin batteries	IEC Designation: 1ICP7/60/90	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement	Not coin battery.	N/A
	Terminals have clear polarity marking on the external surface of the battery		P
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	**Caution for ingestion of small cells and batteries**		N/A
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2	Not coin cells and batteries.	N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N/A
9.4	**Other information**		P
	Storage and disposal instructions		P
	Recommended charging instructions		P
10	**PACKAGING AND TRANSPORT**		N/A
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		N/A
ANNEX A	**CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE**		P
A.1	**General**		P
A.2	**Safety of lithium ion secondary battery**		P
A.3	**Consideration on charging voltage**		P
A.3.1	General		P
A.3.2	Upper limit charging voltage	Upper limit charging voltage of cell is 4.2V.	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	4.2V applied.	N/A
A.4	**Consideration of temperature and charging current**		P
A.4.1	General		P
A.4.2	Recommended temperature range	Charging temperature range declared by client is 10-45°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

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Clause	Requirement + Test	Result - Remark	Verdict
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	**Sample preparation**		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		P
A.6	**Experimental procedure of the forced internal short-circuit test**		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
ANNEX B	**RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS**		P
ANNEX C	**RECOMMENDATIONS TO THE END-USERS**		N/A
ANNEX D	**MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS**		N/A
D.1	**General**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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

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

	TABLE: Critical components information				
Object / part No.	**Manufacturer / trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity** [1)]
1. Cell		115570	3.7V, 5000mAh, 18.5Wh	IEC 62133-2:2017	Tested with appliance
-Electrolyte	Heyuan Lianmao New Materials Co., Ltd	LM-XDS002A	Composition: LiPF6: 0.8moil, EC:EMC:DEC:30:20:50, VC:1, PS: 2	--	--
-Separator	Shenzhen Palong Electronic Technology Co., Ltd	0.02*61.5mm	Material: PE, Air permeability (s/100mL): 320±50, Porosity (%): 39±2, Tensile strength (MPa): ≥1200, Shutdown temperature (ºC): 105	--	--
-Positive electrode	Yunnan Shengbihe New Materials Co., Ltd	SS-M110	Material: $LiCoO_2$, Particle size D_{50}(μm): 12±3.0, Specific surface area (m^2/g): 0.4-0.7, Tap density (g/cm^3): ≥1.5	--	--
-Negative electrode	Wuzhou Tongchuang Energy Materials Co., Ltd	A13	Material: Graphite, C content: ≥99.85%, Particle size D_{50}(μm): 17±2, Specific surface≤3.5	--	--
-Cell Pouch	Xinlun New Energy Materials (Changzhou) Co., Ltd	0.152mm	Nylon: 25μm, Aluminum: 40μm, CPP: 80μm	--	--
2. PCB	Shenzhen Lutongda Technology Co Ltd	LTD-M	130ºC, V-0	UL 94 UL 796	UL E486889
3. IC (U1)	Shenzhen Developer Microelectronics Co., Ltd.	DW01	Overcharge Detection Voltage: 4.28 ± 0.05V, Over-discharge Detection Voltage: 2.40 ± 0.1V, Operating temperature range: -40ºC~85ºC	--	Tested with appliance
4. MOSFET (U2, U3)	Shenzhen Developer Microelectronics Co., Ltd.	DP8205A	V_{DS}: 20V, V_{GS}: ±12V, I_D: 5A, T_J: -55ºC to 150ºC	--	Tested with appliance

Supplementary information:

[1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.

Client did not provided relevant information.

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**
C01#	4.20	1.0	4.186	P
C02#	4.20	1.0	4.187	P
C03#	4.20	1.0	4.185	P
C04#	4.20	1.0	4.184	P
C05#	4.20	1.0	4.185	P

Supplementary information:
- No fire or explosion
- No leakage
- The ambient temperature is 22.9°C

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 (K)**	**Results**
Samples charged at charging temperature upper limit[1)]					
C06#	55.6	4.169	90	67.8	P
C07#	55.6	4.171	88	66.4	P
C08#	55.6	4.170	91	65.7	P
C09#	55.6	4.168	89	66.9	P
C10#	55.6	4.170	87	67.2	P
Samples charged at charging temperature lower limit[2)]					
C11#	55.2	4.080	87	65.8	P
C12#	55.2	4.078	88	66.3	P
C13#	55.2	4.077	90	66.7	P
C14#	55.2	4.081	89	67.1	P
C15#	55.2	4.079	90	66.7	P

Supplementary information:
- No fire or explosion

[1)] Cells charged at 45°C
[2)] Cells charged at 0°C

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

7.3.2	TABLE: External short-circuit (battery)					P
Sample no.	**Ambient T (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature rise ΔT (K)**	**Component single fault condition**	**Results**
B04#	22.7	4.184	87	1.1	Normal	P
B05#	22.7	4.185	90	99.3	SC MOSFET U2	P
B06#	22.7	4.184	88	95.4	SC MOSFET U2	P
B07#	22.7	4.186	86	94.9	SC MOSFET U3	P
B08#	22.7	4.183	85	96.8	SC MOSFET U3	P

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

7.3.5	TABLE: Crush (cells)			P
Sample no.	**OCV before test (Vdc)**	**OCV at removal of crushing force (Vdc)**	**Maximum force applied to the cell during crush (kN)**	**Results**
Samples charged at charging temperature upper limit[1)]				
C29#	4.170	4.168	13.09	P
C30#	4.168	4.166	13.08	P
C31#	4.169	4.168	13.05	P
C32#	4.171	4.170	13.04	P
C33#	4.167	4.165	13.03	P
Samples charged at charging temperature lower limit[2)]				
C34#	4.079	4.078	13.05	P
C35#	4.077	4.075	13.07	P
C36#	4.080	4.078	13.04	P
C37#	4.081	4.080	13.09	P
C38#	4.080	4.078	13.08	P

Supplementary information:
- No fire or explosion

1) Cells charged at 45°C

2) Cells charged at 0°C

- The ambient temperature is 22.6°C

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

7.3.6	TABLE: Over-charging of battery		P
Constant charging current (A).....:		10.0	—
Supply voltage (Vdc).....:		5.88	—

Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
B12#	3.384	84	24.5	P
B13#	3.381	84	25.2	P
B14#	3.385	84	26.1	P
B15#	3.384	84	24.6	P
B16#	3.387	84	25.9	P

Supplementary information:

- No fire or explosion
- The ambient temperature is 21.6°C

7.3.7	TABLE: Forced discharge (cells)			P

Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Lower limit discharge voltage (Vdc)	Results
C39#	3.387	5.0	3.0	P
C40#	3.386	5.0	3.0	P
C41#	3.384	5.0	3.0	P
C42#	3.383	5.0	3.0	P
C43#	3.385	5.0	3.0	P

Supplementary information:

- No fire or explosion
- The ambient temperature is 22.9°C

7.3.8.1	TABLE: Vibration			P

Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results
B17#	4.185	4.184	75.809	75.807	P
B18#	4.184	4.183	75.865	75.863	P
B19#	4.183	4.182	75.872	75.870	P

Supplementary information:

- No fire or explosion
- No rupture
- No leakage
- No venting
- The ambient temperature is 22.4°C

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**
B20#	4.184	4.182	75.818	75.816	P
B21#	4.185	4.184	75.847	75.844	P
B22#	4.182	4.180	75.867	75.865	P

Supplementary information:

- No fire or explosion
- No rupture
- No leakage
- No venting
- The ambient temperature is 22.6°C

7.3.9※	TABLE: Forced internal short circuit (cells)				P
Sample no.	**Chamber ambient T (°C)**	**OCV before test (Vdc)**	**Particle location [1)]**	**Maximum applied pressure (N)**	**Results**
Samples charged at charging temperature upper limit[2)]					
C44#	45	4.168	1	400	P
C45#	45	4.166	1	400	P
C46#	45	4.169	1	400	P
C47#	45	4.170	1	400	P
C48#	45	4.171	1	400	P
Samples charged at charging temperature lower limit[3)]					
C49#	10	4.078	1	400	P
C50#	10	4.080	1	400	P
C51#	10	4.081	1	400	P
C52#	10	4.077	1	400	P
C53#	10	4.079	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 exists.

[2)] Cells charged at 45°C

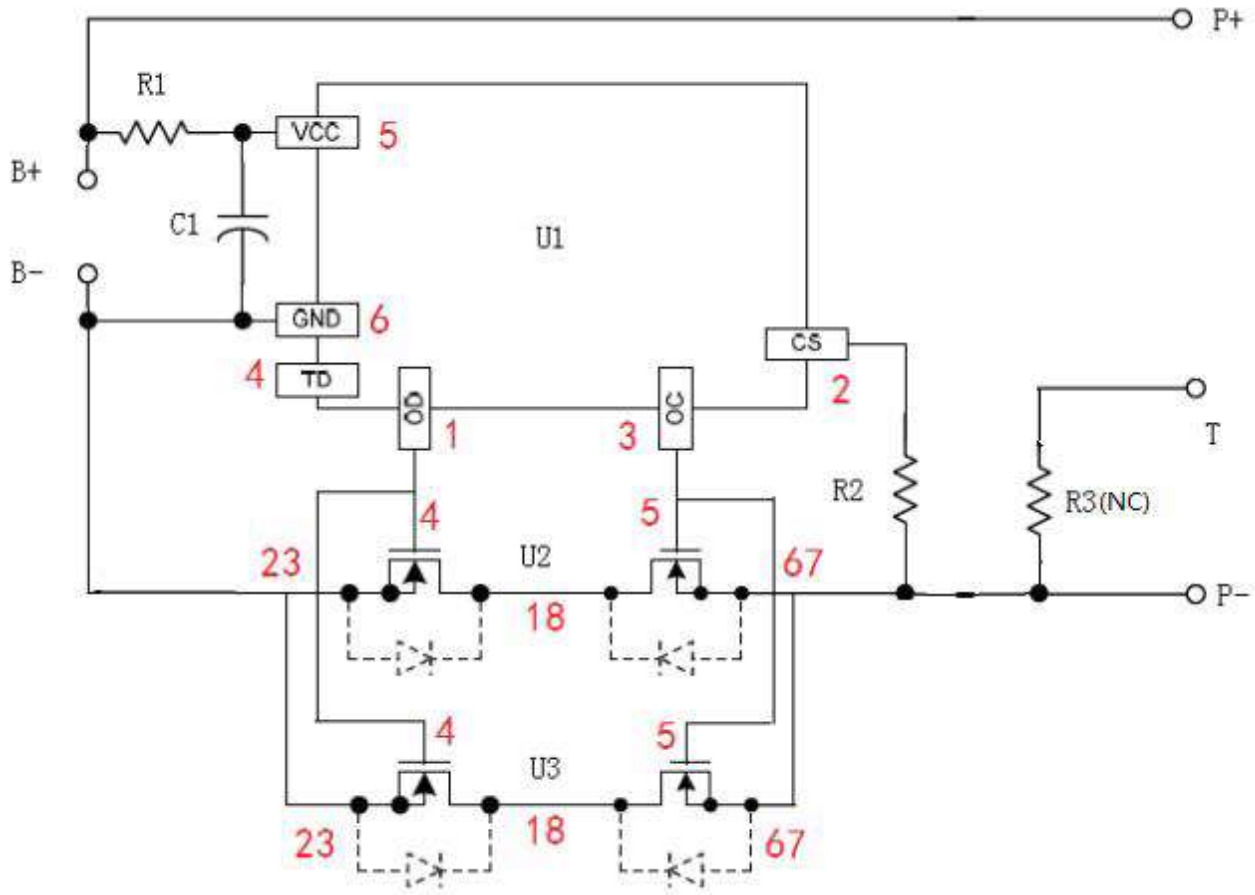
[3)] Cells charged at 10°C

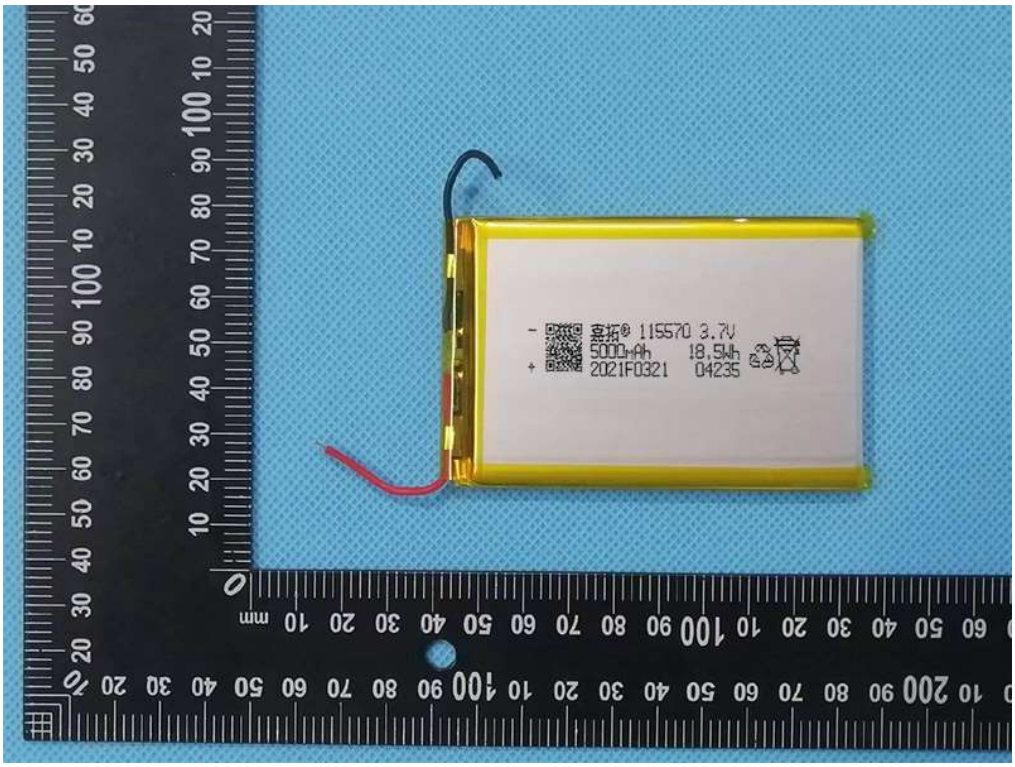
IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

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

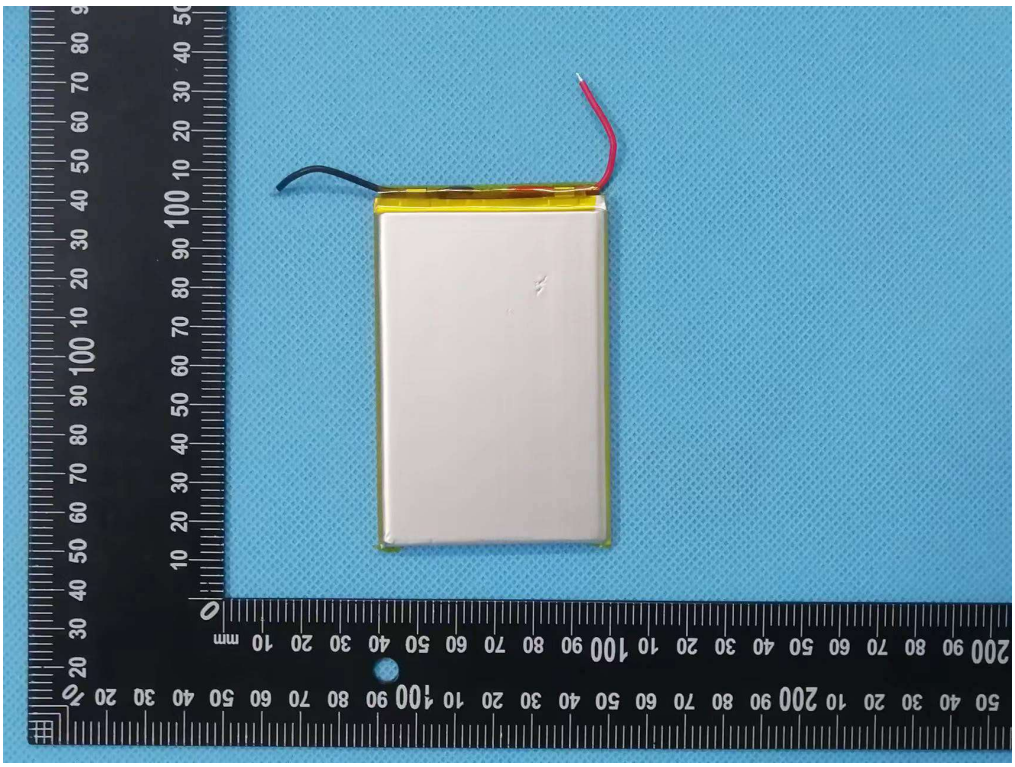
Supplementary information:

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

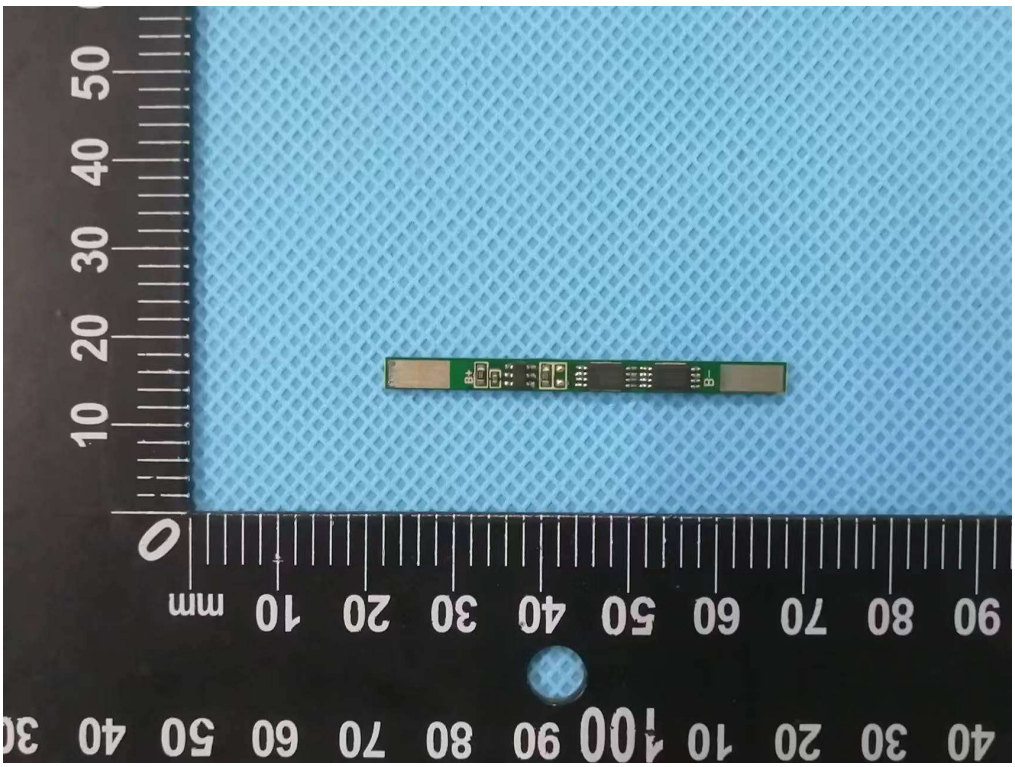

P+
R1
VCC
5
B+
C1
U1
B-
GND
6
CS
4
TD
OC
1
OC
3
2
T
R2
R3(NC)
4
5
23
U2
67
18
P-
4
5
U3
23
18
67



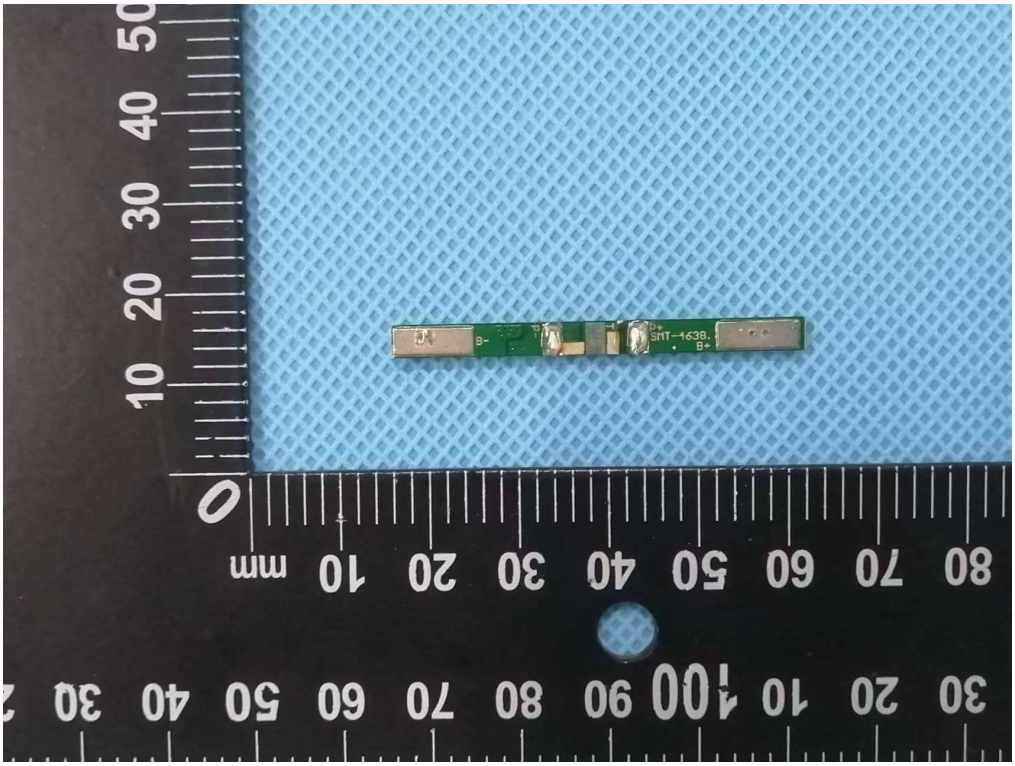
Front view of battery



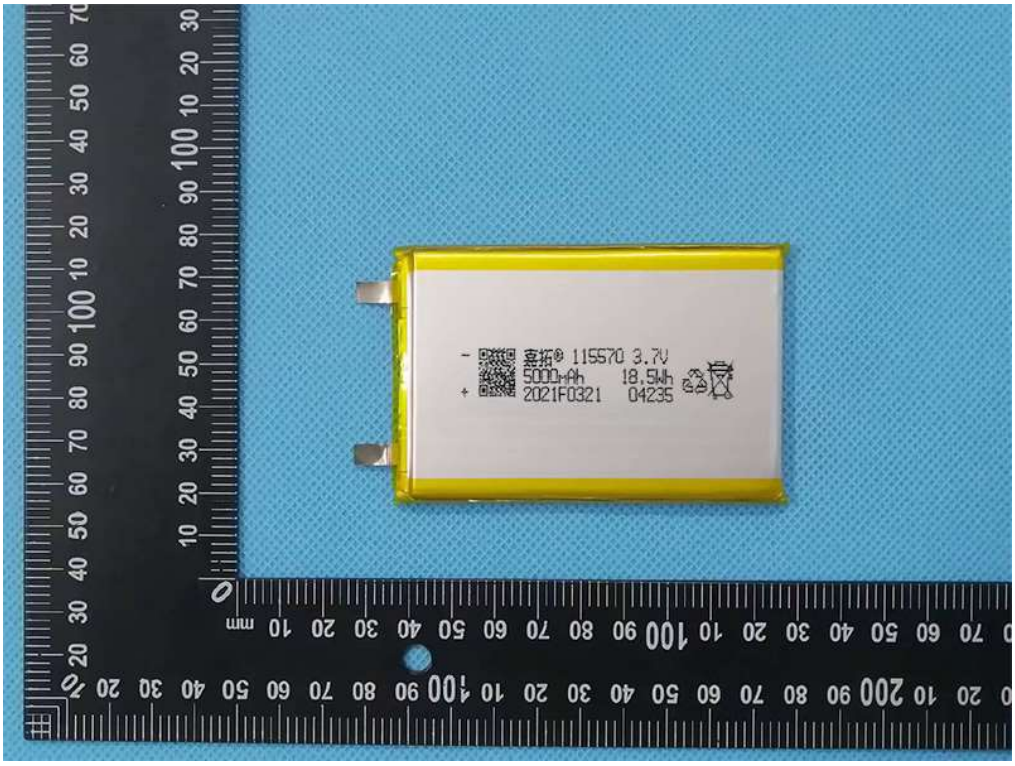
Back view of battery



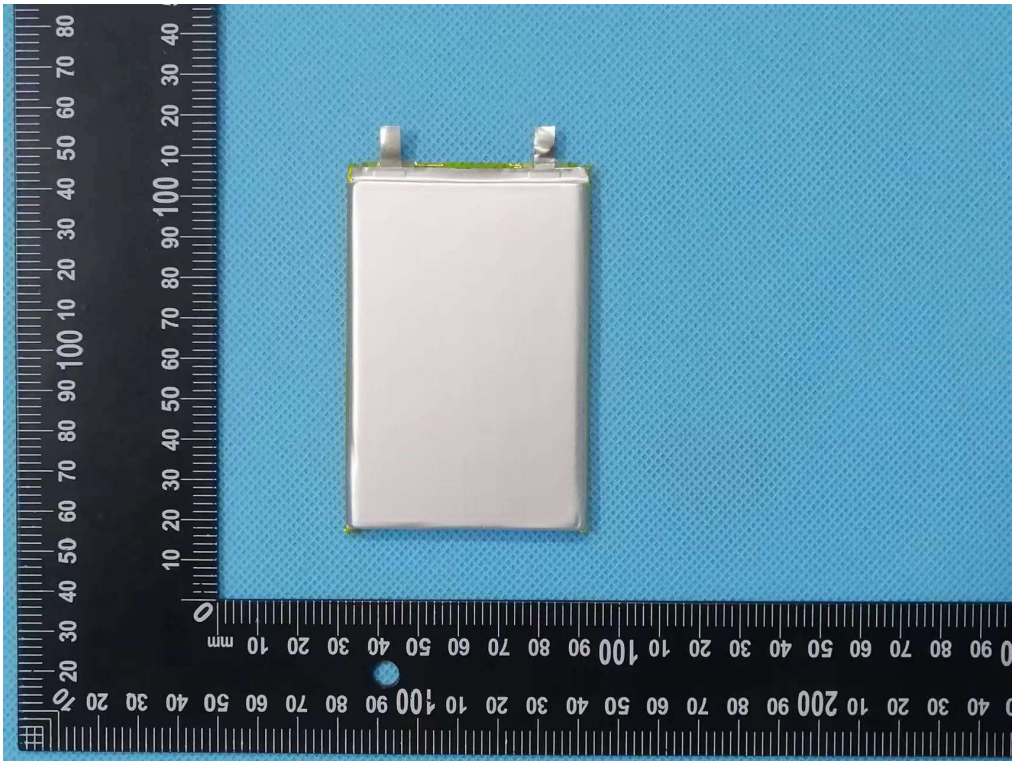
Front view of PCM



Back view of PCM



Front view of cell



Back view of cell