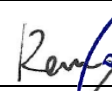




TEST REPORT IEC 62133-2:2017+AMD1:2021 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems	
Report Number..... : RSZBHST2412242899 Date of issue..... : 2024-12-24 Total number of pages : 25	
Name of Testing Laboratory preparing the Report	Shenzhen Beihang Testing Co., Ltd.
Applicant's name	Dongguan LIXING Battery Co., Ltd.
Address.....	Room 201, Building 2, No. 42 Longyuan road, Yanwu Dalingshan town Dongguan, Guangdong P.R.China .
Manufacturer	Dongguan LIXING Battery Co., Ltd.
Address.....	Room 201, Building 2, No. 42 Longyuan road, Yanwu Dalingshan town Dongguan, Guangdong P.R.China .
factory	Dongguan LIXING Battery Co., Ltd.
Address.....	Room 201, Building 2, No. 42 Longyuan road, Yanwu Dalingshan town Dongguan, Guangdong P.R.China .
Model/Type reference	11500
Trade Mark.....	LX
Ratings.....	3.7V, 500mAh,1.85Wh
Test item description.....	RECHARGEABLE LITHIUM-ION BATTERY
Standard	IEC 62133-2:2017+AMD1:2021
Test procedure	Test Report
Non-standard test method	N/A
General disclaimer: The test results presented in this report relate only to the object tested..	

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	Testing Laboratory:	Shenzhen Beihang Testing Co., Ltd.
Testing location/ address.....:		Room 202, 2/F, Building F, HaoWei Industrial Park, QingSong West Road, PingShan District, Shenzhen, Guangdong, China/518000
Tested by (name, function, signature).....:		Romy.Luo 
Approved by (name, function, signature)....:		Arvin.Shang 
Summary of testing: The sample(s) tested complies with the requirements of IEC 62133-2:2017+AMD1:2021. When determining the test conclusion, the Measurement Uncertainty of test has been considered.		
Tests performed (name of test and test clause): ☒ 7.2.1 Continuous charging at constant voltage (cells) ☒ 7.3.1 External short circuit (cell) ☒ 7.3.2 External short circuit (battery) ☒ 7.3.3 Free fall ☒ 7.3.4 Thermal abuse (cells) ☒ 7.3.5 Crush (cells) ☒ 7.3.6 Over-charging of battery ☒ 7.3.7 Forced discharge (cells) ☒ 7.3.8 Mechanical tests (batteries) ☒ 7.3.9 Design evaluation – Forced internal short circuit (cells) ☐ Annex D Measurement of the internal AC resistance for coin cells		Testing location: Shenzhen Beihang Testing Co., Ltd. Room 202, 2/F, Building F, HaoWei Industrial Park, QingSong West Road, PingShan District, Shenzhen, Guangdong, China/518000
Summary of compliance with National Differences (List of countries addressed): Group differences for CENELEC countries are considered. The product fulfils the requirements of IEC 62133-2:2017+AMD1:2021 and 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
+	LX 11500 INR12/51
	3.7V 500mAh 0.185Wh
-	YYYYMMDD
	Dongguan LIXING Battery Co., Ltd.

Remark: "YYYYMMDD" represents the date of manufacture, "YYYY" represents year of manufacture, "MM" represents the month of manufacture, "DD" represents the day of manufacture.



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

Test item particulars.....: --		
Classification of installation and use.....: Battery for special end products		
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 10.0mA at ambient 20°C±5°C	
Discharge current (0.2 It A)	100mA	
Specified final voltage.....	3.0V	
Upper limit charging voltage per cell.....	4.25V	
Maximum charging current	500mA	
Charging temperature upper limit	45°C	
Charging temperature lower limit.....	0°C	
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)		
Date of receipt of test item		2024-12-05
Date (s) of performance of tests		2024-12-06—2024-12-20
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. <i>Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.</i> <i>Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only. This document cannot be reproduced except in full, without prior approval of the Company.</i>		

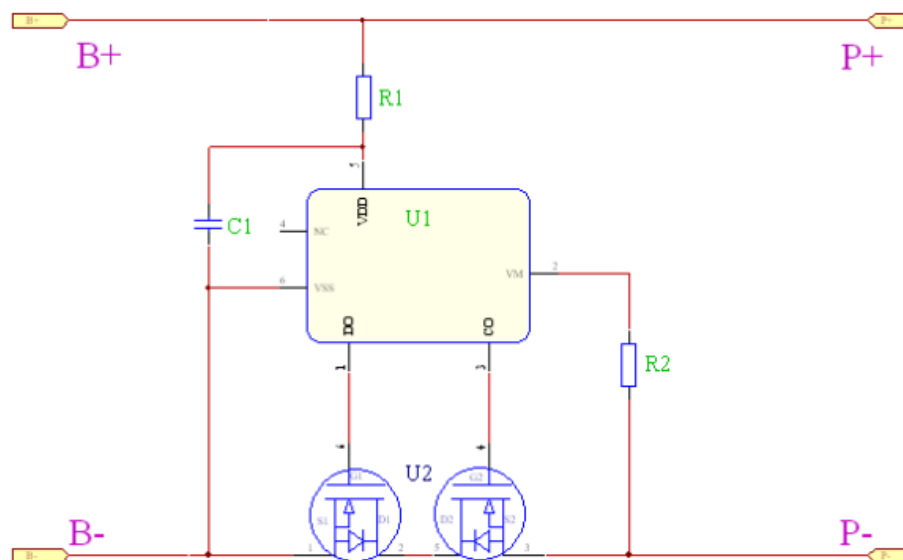
IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

General product information and other remarks:

Product name	Rechargeable Polymer Li-ion Cell	Rechargeable Polymer Li-ion Battery
Type/model	11500	11500
Nominal voltage	3.7Vd.c.	3.7Vd.c.
Rated capacity	500mAh	500mAh
Recommended charging voltage	4.2V	4.2V
Maximum charging voltage	4.25V	4.25V
Nominal charging current	100mAh	100mAh
Nominal discharging current	100mAh	100mAh
Maximum charging current	500mA	500mA
Maximum discharging current	500mA	500mA
Discharge cut-off voltage	3.0V	3.0V
Charging temperature	0-45°C	0-45°C
Charging cut-off current	10.0mA	10.0mA

Dimension of the Cell: mm <table border="1"> <thead> <tr> <th>Item</th><th>Specifications</th></tr> </thead> <tbody> <tr> <td>D1 直径</td><td>≤10.5mm</td></tr> <tr> <td>L 长度</td><td>≤50mm</td></tr> <tr> <td>L3 极耳长</td><td>10.0±1.5mm</td></tr> <tr> <td>d 极耳宽</td><td>2.0±0.1mm</td></tr> </tbody> </table> T*W*L: 5.0mm*10mm*10mm	Item	Specifications	D1 直径	≤10.5mm	L 长度	≤50mm	L3 极耳长	10.0±1.5mm	d 极耳宽	2.0±0.1mm	Dimension of the Battery: mm
Item	Specifications										
D1 直径	≤10.5mm										
L 长度	≤50mm										
L3 极耳长	10.0±1.5mm										
d 极耳宽	2.0±0.1mm										

Protection Circuit:



TRF No. IEC62133_2A

Project No: ST2412242899
Rev.: 4.0
Page: 5 of 25

Phone : +86 755 8650 3482
Fax : +86 755 8650 3182

Website: <http://www.hc-stc.net>
Check: cs@hc-stc.net

ShenzhenBeiHang Testing Co., Ltd.

Room 202, 2/F, Building F, HaoWei
Industrial Park, QingSong West Road, PingShan
District, Shenzhen, Guangdong, China/518000 .

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

4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P

5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	Insulation and wiring		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No externally exposed metal surfaces.	N/A
	Insulation resistance (MΩ)..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition	The vents on the narrow side of the 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	No encapsulation	N/A
5.4	Temperature, voltage and current management	See Below	P
	Batteries are designed such that abnormal temperature rise conditions are prevented	Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 8.	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 specifications.	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	Complied. Lead wire used.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	Complied.	P
	Terminal contacts are arranged to minimize the risk of short-circuit	Complied.	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	Single cell battery	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	Single cell battery	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		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, charging voltage 4.2V, not exceed 4.25V specified in 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	Single cell battery	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	Single cell battery	N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection	Single cell battery	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	Single cell battery	N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage	Battery specified final voltage 3.0V, not exceed 3.0V specified by cell manufacturer	P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system	Single cell battery	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 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	Build-in batteries , The mechanical protection are provided by the end product enclosure	P
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer	No battery case	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 considered when conducting mechanical tests		P
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. ISO 9001: 2015 certificate provided.	P
5.8	Battery safety components		N/A
	According annex F	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	Tests are performed according to specified in Table 1 of this standard. The samples are not more than six months old	P
	Coin cells with resistance $\leq 3 \Omega$ (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 $20^\circ\text{C} \pm 5^\circ\text{C}$	Tests are carried out at $20^\circ\text{C} \pm 5^\circ\text{C}$.	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 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 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 $20^\circ\text{C} \pm 5^\circ\text{C}$, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at $20^\circ\text{C} \pm 5^\circ\text{C}$ at a constant current of 0,2 It A down to a specified final voltage		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 I t A, using a constant current to constant voltage charging method.	Charging temperature specified by client is 0-45 °C , 45 °C and -5°C were used as highest test temperature and lowest test temperature during 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		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 complied.	P
	Oven temperature (°C)..... :	70	—
	Results :No physical distortion of the battery case resulting in exposure of internal protective components and cells	No physical distortion of the battery case resulting in exposure of internal protective components and cells.	P
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Tested complied.	P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- 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 conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test	Single fault conducted on 3 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 (1-3) .	P
	Results: No fire. No explosion..... :	(See appended table 7.3.2)	P
7.3.3	Free fall	1m	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, 30min	—
	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±0,78kN has been applied; or	13 kN	P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery		P
	The supply voltage which is:		P
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or	5.88V	P
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and	Single cell battery	N/A
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached	1.0A	P
	Test was continued until the temperature of the outer casing:		P
	- Reached steady state conditions (less than 10°C change in 30-minute period); or		N/A
	- Returned to ambient		P
	Results: No fire. No explosion..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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)		P
7.3.8.1	Vibration		P
	Results: No fire, no explosion, no rupture, no leakage or venting. :	Tested complied.	P
7.3.8.2	Mechanical shock		P
	Results: No leakage, no venting, no rupture, no explosion and no fire :		P
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P
	The cells complied with national requirement for :	France, Japan, 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	800 N (cylindrical cells)	P
	Results: No fire :	(See appended table 7.3.9)	P

8	INFORMATION FOR SAFETY		P
8.1	General		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications.	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards	Information for safety mentioned in manufacturer's specifications.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		P
	Do not allow children to replace batteries without adult supervision	Non-removable battery	N/A
8.2	Small cell and battery safety information	Non-removable battery	N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A

9	MARKING		P
9.1	Cell marking	The final product is battery.	N/A
	Cells marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		N/A
9.2	Battery marking		P
	Batteries marked as specified in IEC 61960, except for coin batteries	The battery is marked in accordance with IEC 61960,	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement	Not coin battery.	N/A
	Terminals have clear polarity marking on the external surface of the battery	see page 4.	P
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections	The red line is positive, the black line is negative	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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 cell or battery.	N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package	Not intended for direct sale in consumer-replaceable applications.	N/A
9.4	Other information		P
	Storage and disposal instructions	Information for disposal instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions	Information for disposal instructions mentioned in manufacturer's specifications.	P

10	PACKAGING AND TRANSPORT		P
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P

ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		P
A.1	General		P
A.2	Safety of lithium ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.25V applied.	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	4.25V applied.	N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	See A.4.2.2.	P
A.4.2.1	General		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature range declared by client is: 0-45°C	P
A.4.3	High temperature range	Charging high temperature declared by client is: 45°C	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range	45°C applied.	N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range	No documents provided by manufacturer explaining the higher limit exceed 45°C, 45°C applied for testing in this report for safety consideration.	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	-5°C applied.	P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	No documents provided by manufacturer explaining the lower limit exceed 10°C, -5°C applied for testing in this report for safety consideration.	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		P
A.5.5.1	Insertion of nickel particle in winding core		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		P
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
ANNEX B	RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS		P
ANNEX C	RECOMMENDATIONS TO THE END-USERS		P
ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A
D.1	General	Not coin cells	N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement..... :	(See appended tableD.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		P
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⁾
Protection IC	Shenzhen century Hongfeng technology Co., LTD	DW01	Over-charge Threshold Voltage: 4.3V±0.05V Over-discharge Threshold Voltage: 2.5V±0.075V;	--	Tested with appliance
MOSFET	Shenzhen century Hongfeng technology Co., LTD	8205A	Drain-Source Voltage: 20V ID: 5A	--	Tested with appliance
PCB	XBL	LTD-M	V-0,130°C 13*3.5*0.6mm	UL 796	E492187
Wire	Shenzhen smooth da wire Co., LTD	UL1571	28AWG, 80°C, 300V	UL758	E332522
Cell	LX	11500	3.7V,500mAh	IEC62133	Tested with appliance
Positive electrode	Jiangmen Keheng Industrial Co., LTD	LCO-103	LiCoO2	--	--
Negative electrode	Jiangxi Zhengtuo new energy Technology Co., LTD	H9-5	C	--	--
Separator	Dongguan Hanman new material technology Co., LTD	SU9+3	PE (9+3) μ m 135° C	--	--
Electrolyte	Hubei Huachi new energy Materials Co., LTD	HC310	LIPF6+EC+DEC+ EMC+VC 7.5~9.5 mS/cm	--	--
Supplementary information: ¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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	
C1	4.2	0.1	4.18	P	
C2	4.2	0.1	4.18	P	
C3	4.2	0.1	4.17	P	
C4	4.2	0.1	4.17	P	
C5	4.2	0.1	4.18	P	
Supplementary information: - No fire or explosion - No leakage - Others (please explain)					

7.3.1	TABLE: External short-circuit (cell)				P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature (°C)	Results
Samples charged at charging temperature upper limit (45°C)					
C6	55.3	4.225	83.8	105.7	P
C7	55.3	4.223	87.2	112.6	P
C8	55.3	4.224	82.8	106.3	P
C9	55.3	4.226	85.6	110.5	P
C10	55.3	4.228	88.5	104.6	P
Samples charged at charging temperature lower limit (-5°C)					
C11	55.3	4.144	86.8	104.5	P
C12	55.3	4.142	90.5	105.2	P
C13	55.3	4.144	83.3	112.3	P
C14	55.3	4.145	87.2	113.4	P
C15	55.3	4.143	85.9	106.6	P
Supplementary information: - No fire or explosion - Others (please explain)					

7.3.2	TABLE: External short-circuit (battery)				P
-------	---	--	--	--	---

IEC 62133-2						
Clause	Requirement + Test			Result - Remark		Verdict
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature (°C)	Component single fault condition	Results
B1	23.5	4.184	86.3	112.8	MOSFET U2	P
B2	23.5	4.183	83.9	106.2	MOSFET U2	P
B3	23.5	4.182	87.2	111.7	MOSFET U2	P
B4	23.5	4.182	85.8	24.1	Normal	P
B5	23.5	4.183	84.2	24.2	Normal	P
Supplementary information: - No fire or explosion - Others (please explain) Mosfet (pinS-C) short circuit.						

7.3.5	TABLE: Crush (cells)				P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
Samples charged at charging temperature upper limit (45℃)					
C16	4.225	4.225	13.0	P	
C17	4.227	4.227	13.0	P	
C18	4.224	4.224	13.0	P	
C19	4.225	4.225	13.0	P	
C20	4.223	4.223	13.0	P	
Samples charged at charging temperature lower limit (-5℃)					
C21	4.146	4.146	13.0	P	
C22	4.144	4.144	13.0	P	
C23	4.147	4.147	13.0	P	
C24	4.145	4.145	13.0	P	
C25	4.144	4.144	13.0	P	
Supplementary information:					
- No fire or explosion					
- Others (please explain)					

7.3.6	TABLE: Over-charging of battery		P
Constant charging current (A)	1.0A		—
Supply voltage (Vdc)	5.88V		—

IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
Sample no.	OCV before charging (Vdc)	cut-off condition	Maximum outer case temperature (°C)	Results
B6	3.333	90min	38.6	P
B7	3.336	90min	33.7	P
B8	3.335	90min	36.5	P
B9	3.338	90min	37.2	P
B10	3.334	90min	34.8	P
Supplementary information: - No fire or explosion - Others (please explain)				

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	
C26	3.336	0.5	3.0	P	
C27	3.334	0.5	3.0	P	
C28	3.333	0.5	3.0	P	
C29	3.336	0.5	3.0	P	
C30	3.333	0.5	3.0	P	
Supplementary information:					
- No fire or explosion					
- Others (please explain)					

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	
B11	4.183	4.182	10.118	10.115	P	
B12	4.184	4.183	10.238	10.234	P	
B13	4.183	4.182	10.179	10.175	P	
Supplementary information: - No fire or explosion - No rupture - No leakage - No venting - Others (please explain)						

7.3.8.2	TABLE: Mechanical shock				N/A
---------	-------------------------	--	--	--	-----

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test(g)	Results
B14	4.184	4.183	10.254	10.254	P
B15	4.182	4.181	10.167	10.167	P
B16	4.183	4.182	10.188	10.188	P
Supplementary information: - No fire or explosion - No rupture - No leakage - No venting - Others (please explain)					

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)						
C31	45	4.224	1	400	P	
C32	45	4.226	1	400	P	
C33	45	4.225	1	400	P	
C34	45	4.223	2	400	P	
C35	45	4.226	2	400	P	
Samples charged at charging temperature lower limit (−5°C)						
C36	-5	4.143	1	400	P	
C37	-5	4.145	1	400	P	
C38	-5	4.144	1	400	P	
C39	-5	4.147	2	400	P	
C40	-5	4.146	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. - No fire or explosion - Others (please explain)						

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



IEC 62133-2				
Clause	Requirement + Test		Result - Remark	Verdict
Supplementary information:				
¹⁾ Coin cells with internal resistance less than or equal to 3 Ω , see test result on corresponding tables				

Fig.1 –Front view of battery



Fig. 2 –Back view of battery

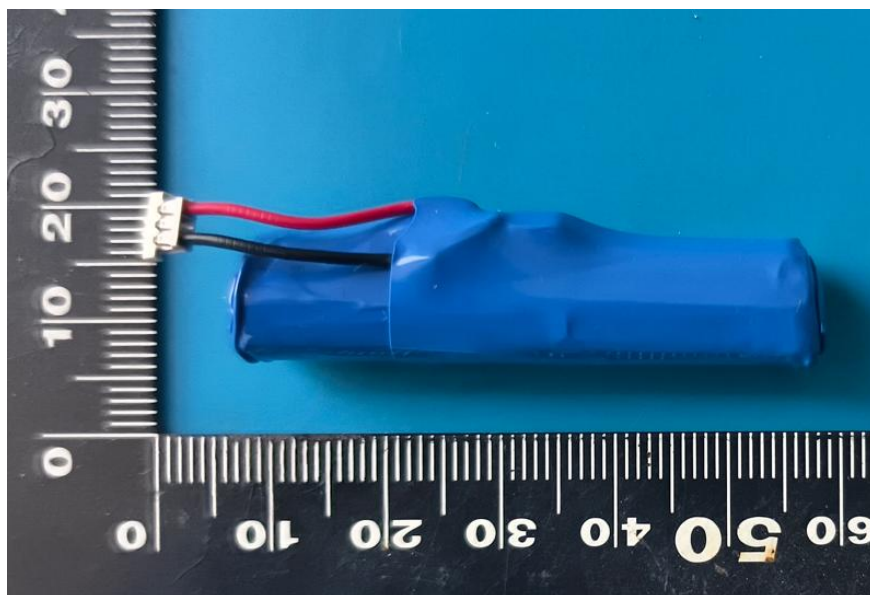


Fig.3 –Front view of Cell



Fig.4 –Back view of Cell

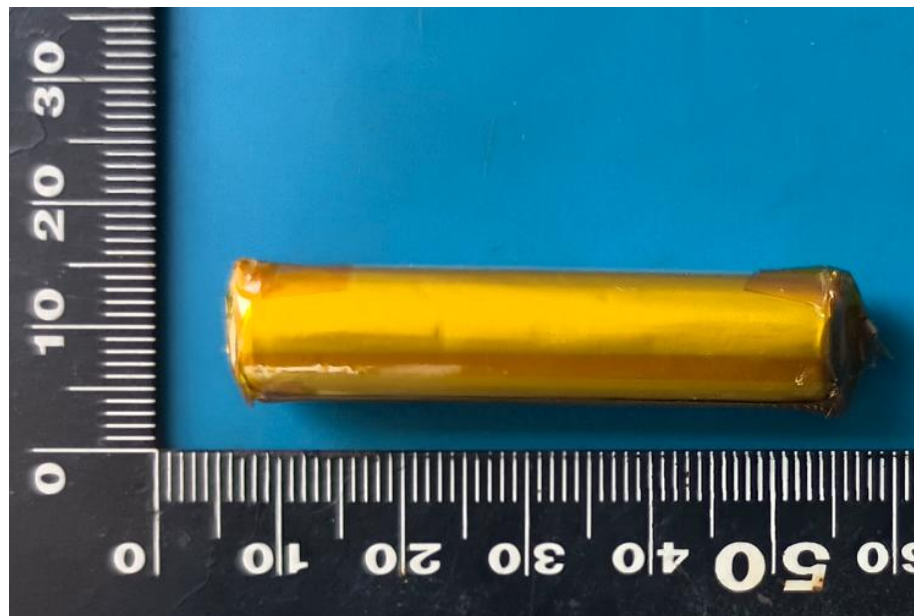


Fig.5 –Front view of PCM

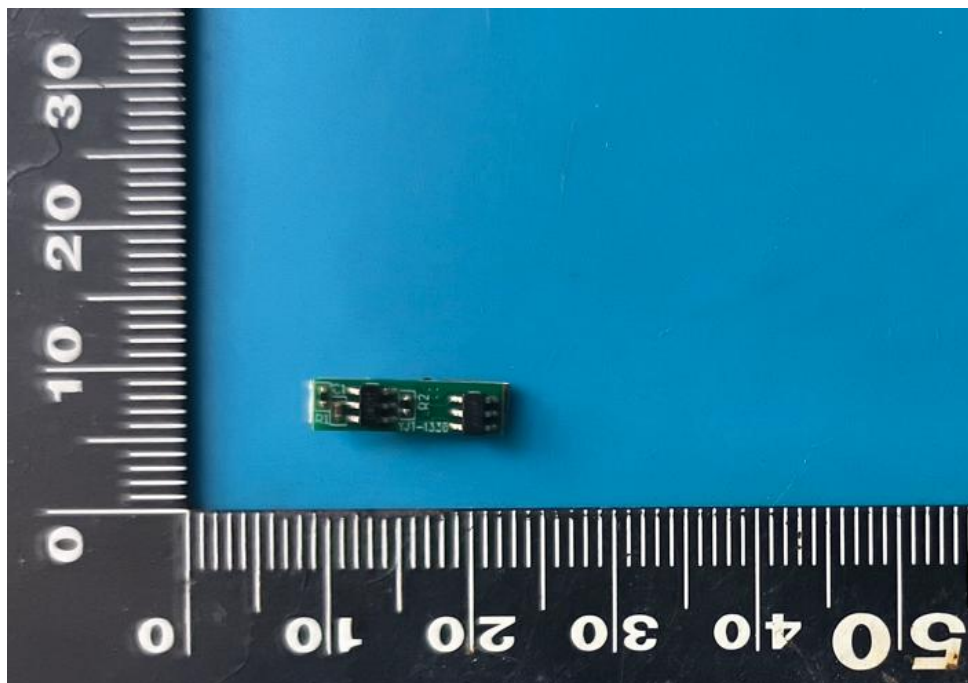
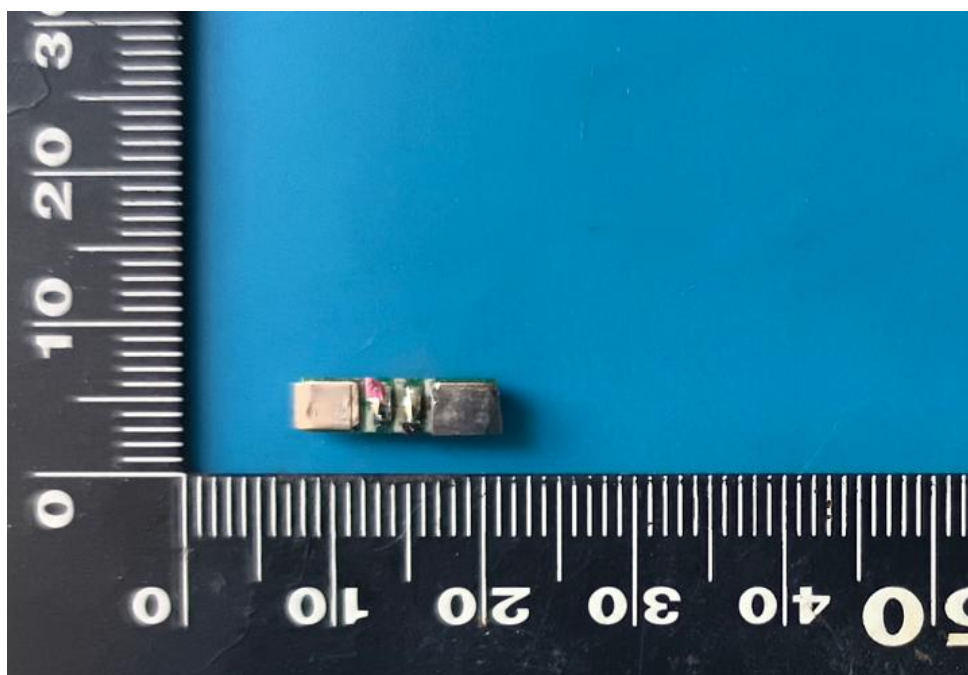


Fig.6 –Back view of PCM



---End report---