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检测
TESTING
CNAS L5795

TEST REPORT

Applicant	:	GUANGDONG ZHAONENG TECHNOLOGY CO., LTD.
Address	:	No.8 Nanda Road, Jinsha Chengnan Industrial Zone, Danzao Town, Nanhai District, Foshan city, Guangdong, China
Manufacturer	:	GUANGDONG ZHAONENG TECHNOLOGY CO., LTD.
Address	:	No.8 Nanda Road, Jinsha Chengnan Industrial Zone, Danzao Town, Nanhai District, Foshan city, Guangdong, China
Product Name	:	Rechargeable Lithium Polymer Battery
Trade Mark	:	No Trade Mark
Model No.	:	113450
Ratings	:	3.7V, 2000mAh, 7.4Wh
Standard	:	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 IEC 62133-2: 2017
Date of Receiver	:	August 07, 2020
Date of Test	:	August 07, 2020 to August 16, 2020
Date of Issue	:	August 17, 2020
Test Report Form No	:	NTCS-IEC62133-2-A1-IEC
Test Result	:	Pass *

This Test Report is Issued Under the Authority of :

Compiled by

Bettine Liao / Engineer

Approved by & Authorized Signer

Ryan Luo / Authorized Signer

*Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of Dongguan Nore Testing Center Co., Ltd. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Revision History of This Test Report

Report Number	Description	Issued Date
NTC2008046SV00	Initial Issue	2020-08-17
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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 Lithium Polymer Battery
Model: 113450
Rated Capacity: 2000mAh 7.4Wh
Rated Voltage: 3.7V
Polarity: + Red, - Black
1ICP11/35/51 YYMMDD

Caution:
Using the charger designated by the manufacturer.
Don't throw the battery in fire or heat it.
Don't short circuit.
Don't unpack the battery or change its structure.

GUANGDONG ZHAONENG TECHNOLOGY CO., LTD.

Remark:

YYMMDD represents the date of manufacture. YY means year, MM means month , DD means date.

Summary of testing:

From the result of our tests on the submitted samples, we conclude they comply with the requirements of the standards.

☒ **The product fulfils the requirements of EN62133-2: 2017**

Test item particulars	:	
Classification of installation and use	:	Built-in and use in portable applications
Supply Connection	:	DC connector
Recommend charging method declared by the manufacturer	:	Charging the battery with 400mA constant current until 4.2V, then constant voltage until charge current reduces to 20mA at ambient 20°C±5°C
Discharge current (0,2 It A)	:	400mA
Specified final voltage	:	3.0V
Upper limit charging voltage per cell	:	4.2V
Maximum charging current	:	1000mA
Charging temperature upper limit	:	50°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 (N/A)
- test object does meet the requirement	:	P (Pass)
- test object does not meet the requirement	:	F (Fail)

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 is used as the decimal separator.

General product information:

This Rechargeable Lithium Polymer Battery is constructed with only one cell, and has overcharge, over-discharge, over current and short-circuits proof circuit.

Factory: GUANGDONG ZHAONENG TECHNOLOGY CO. LTD.

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

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

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	Cut-off Voltage
113450	2000mAh	3.7V	400mA	400mA	1000mA	2000mA	4.2V	3.0V

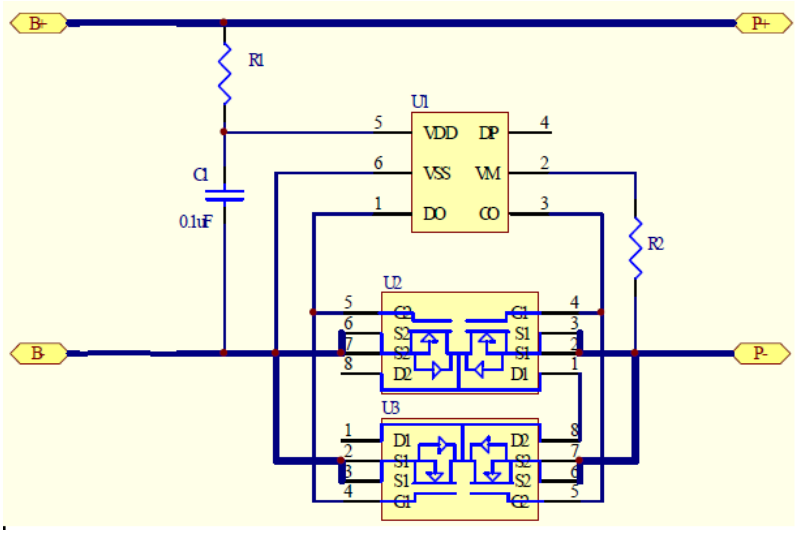
The main features of the cell are shown as below (clause 7.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
113450	2000mAh	3.7V	400mA	400mA	1000mA	2000mA	4.25V	3.0V

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

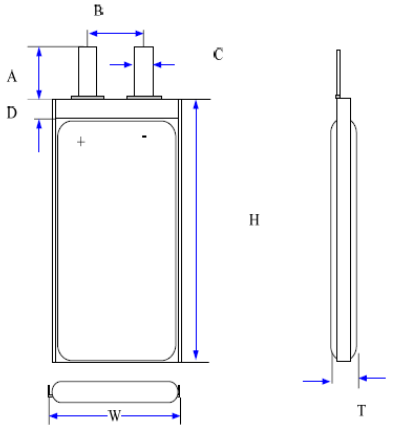
Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
113450	4.25V	100mA	10°C	50°C

Circuit diagram:



Construction:

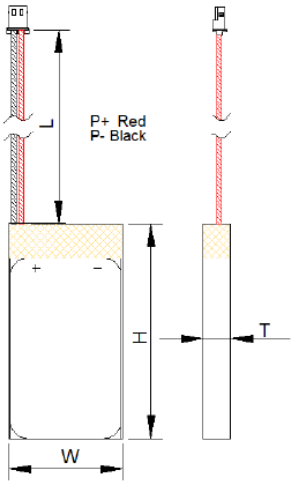
Designation of cell:



项目	尺寸
电池厚T	Max：11.0
电池宽W	Max：34.5
电池高H	Max：50.5
极耳外露长度A	7±1.5
极耳中心距B	16.0±2
极耳宽C	3.0±0.2
顶封宽度	3.5±0.5
折边方式	双折

Cell (Unit: mm)

Designation of battery:



项目	尺寸
电池厚T	Max：11.2
电池宽W	Max：34.8
电池高H	Max：53
线长L	50±5
折边方式	单折边

Battery (Unit: mm)

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
4	**PARAMETER MEASUREMENT TOLERANCES**		P
	Parameter measurement tolerances		P
5	**GENERAL SAFETY CONSIDERATIONS**		P
5.1	**General**		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	**Insulation and wiring**	See below	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 surface of the battery.	N
	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**	See below	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 edge of packing which next to the terminals was considered as the pressure relief mechanism, which can release the pressure during the abnormal operation.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	The EUT is built-in type, no such outer case used. It shall be evaluated in the final assembly.	N
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 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 user manual.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.5	**Terminal contacts**		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC connector complied with the requirements.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short-circuit		P
5.6	**Assembly of cells into batteries**	See below	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	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
	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
	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
	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
	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	See below	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	Charging voltage of each cellblock: 4.25V, not exceed 4.25V specified in Clause 7.1.2, Table 2.	P
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N
	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
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		P
	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		P
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage	Final voltage of cell: 3.0V, not exceed the final voltage specified by cell manufacturer.	P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N
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	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		N
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer	To be evaluated in final system.	N
	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.7	**Quality plan**	See below.	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 certification provided.	P
5.8	**Battery safety components**		N
	According annex F	See TABLE:Critical components information	N
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 cells	N
	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		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 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 have 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
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	Charge temperature specified by manufacturer: 10-50°C; 55°C used for upper limit test temperature; 10°C used for lower limit test temperature.	P
7.2	**Intended use**	See below	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 400mA, 4.2V.	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)	The battery pack is built in type without physical moulded case it should be evaluated in the final system.	N
	Oven temperature (°C)..... :		--
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N
7.3	**Reasonably foreseeable misuse**	See below.	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
	- The case temperature declined by 20 % of the maximum temperature rise	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
	- 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		N
	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 three samples.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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 Pin2-6 and U3 Pin2-6.	P
	Results: No fire. No explosion .....:	(See appended table 7.3.2)	P
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)..... :	130	--
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or	13kN	P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N
	Results: No fire. No explosion .....:	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery		P
	The supply voltage which is:		P
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or	5.95V applied.	P
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached	4A applied.	P
	Test was continued until the temperature of the outer casing:		P
	- Reached steady state conditions (less than 10 °C change in 30-minute period); or	Batteries temperature of the outer casing less than 10°C change in 30-minute period.	P
	- Returned to ambient		N
	Results: No fire. No explosion .....:	(See appended table 7.3.6)	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	Tested complied.	P
	Results: No fire, no explosion, no rupture, no leakage or venting.....:	(See appended table 7.3.8.1)	P
7.3.8.2	Mechanical shock	Tested complied.	P
	Results: No leakage, no venting, no rupture, no explosion and no fire.....:	(See appended table 7.3.8.2)	P
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P
	The cells complied with national requirement for..... :	France, Japan, Republic of Korea and Switzerland	--
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400 N for 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 specification.	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 specification.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N
	Do not allow children to replace batteries without adult supervision		N
8.2	**Small cell and battery safety information**	Not small cell and battery	N

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N
9	**MARKING**		P
9.1	**Cell marking**	The final product is battery	N
	Cells marked as specified in IEC 61960, except coin cells		N
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N
	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
9.2	**Battery marking**	See below	P
	Batteries marked as specified in IEC 61960, except for coin batteries	The battery is marked in accordance with IEC 61960, also see page 3.	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		N
	Terminals have clear polarity marking on the external surface of the battery	DC connector used. And The “+” (red) and “-” (black) polarity explicitly marked on 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		P
9.3	**Caution for ingestion of small cells and batteries**	No small cell and battery	N

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	N
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N
9.4	**Other information**		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
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N
	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
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.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N
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	Charge temperature specified by manufacturer: 10-50°C; 55°C used for upper limit test temperature; 10°C used for lower limit test temperature.	P
A.4.3	High temperature range	Charging high temperature declared by client is: 50°C	P
A.4.3.1	General		P
A.4.3.2	Explanation of safety viewpoint		P
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		P
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range	55°C applied.	P
A.4.4	Low temperature range		N
A.4.4.1	General		N
A.4.4.2	Explanation of safety viewpoint		N
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		N
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N
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 3.0V.	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	See below	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.5.5.1	Insertion of nickel particle in winding core		N
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N
A.5.6	Insertion of nickel particle in prismatic cell		P

IEC 62133-2			
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**		P
ANNEX C	**RECOMMENDATIONS TO THE END-USERS**		P
ANNEX D	**MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS**		N
D.1	**General**	Not coin cells.	N
D.2	**Method**		N
	A sample size of three coin cells is required for this measurement .....:	(See appended table D.2)	N
	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
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N
ANNEX E	**PACKAGING AND TRANSPORT**		N
ANNEX F	**COMPONENT STANDARDS REFERENCES**		N

	TABLE: Critical components information				P
Object / part No.	**Manufacturer / trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Cell	Foshan Zhaoneng Battery Industrial Co., Ltd.	113450	3.7V, 2000mAh	IEC 62133-2: 2017	Tested with appliance
-Electrolyte	Anhui XingLi New Energy	ZN-29	Composition: LiPF6+EC+DEC+EMC	--	--
-Positive Electrode	Hunan Kingfuli new energy co.,Ltd.	KP-05C	Material: $LiNi_{(5)}Co_{(2)}Mn_{(3)}O_2$	--	--
-Negative Electrode	Shanghai Shanshan Tech Co.,Ltd.	C800	Material: C	--	--
-Separator	ShenZhen Xuran Electronic Co.,Ltd.	44.5mm*16um	Material: PE Thickness 16um Shutdown temperature: 135~140°C	--	--
PCB	SHENZHEN XING BAO SHUN ELECTRONICS SCIENTIFIC CO. ,LTD.	XBS-9	V-0, 130°C	UL 94 UL 796	UL E361977
PCB (alternative)	Interchangeable	Interchangeable	V-0 or better, Min. 130°C	UL 94, UL 796	UL approved
Protective IC (U1)	Seiko	S-8261DAW-M6T1U	Over-charge Detection Voltage: 4.28V±0.02V, Over-discharge Detection Voltage: 3.00V±0.05V; Overcurrent Detection Voltage: 0.08V±0.01V; Topr: -40°C~+85°C	--	Tested with appliance
MOSFET (U2, U3)	ShenZhen Puolop Electronics Co.,Ltd.	PT8205	V_{DS}: 20V I_D: 6A V_{GS}: ±12V T_j: -55°C~+150°C	-	Tested with appliance
Lead wire (Red & Black)	DONGGUAN DANYANG ELECTRONIC WIRE CO LTD	1007	24AWG, VW-1, 80°C, 300Vac	UL758 UL94	UL E336285
Lead wire (Red & Black) (alternative)	Interchangeable	Interchangeable	24AWG, VW-1, 80°C, 300Vac	UL 758	UL approved
Tape	JINGJIANG JINGYI ADHESIVE PRODUCT CO LTD	J16	180°C	UL 510A	UL E246950
DC Connector	JAPAN SOLDERLESS TERMINAL MFG CO LTD	PH	2 Pin, PA6, V-0	UL94 UL1694	UL E60389

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} (mA)**	**OCV before test (Vdc)**	**Results**
Cell #1	4.2	400	4.19	P
Cell #2	4.2	400	4.18	P
Cell #3	4.2	400	4.18	P
Cell #4	4.2	400	4.18	P
Cell #5	4.2	400	4.18	P

Supplementary information:

- No fire , no 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 (55°C)					
Cell #6	55.3	4.21	80.3	105.2	P
Cell #7	55.1	4.21	80.2	112.0	P
Cell #8	55.3	4.22	81.3	112.3	P
Cell #9	55.2	4.21	81.4	117.2	P
Cell #10	55.1	4.21	80.5	107.4	P
Samples charged at charging temperature lower limit (10°C)					
Cell #11	55.3	4.20	82.3	98.6	P
Cell #12	55.1	4.20	81.7	105.2	P
Cell #13	55.1	4.21	82.1	107.4	P
Cell #14	55.1	4.21	83.3	110.2	P
Cell #15	55.3	4.21	82.2	113.1	P

Supplementary information:

- No fire , no 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 #4	23.8	4.18	91.3	24.0	Normal	P
Battery #5	24.0	4.18	90.2	24.1	Normal	P
Battery #6	24.1	4.19	90.1	110.2	Short U2 pin 2-6	P

Battery #7	23.9	4.18	91.4	105.3	Short U2 pin 2-6	P
Battery #8	24.0	4.18	89.5	102.5	Short Q3 pin 2-6	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 (55°C)					
Cell #29	4.21	4.21	13.0	P	
Cell #30	4.21	4.21	13.0	P	
Cell #31	4.21	4.21	13.0	P	
Cell #32	4.21	4.21	13.0	P	
Cell #33	4.21	4.21	13.0	P	
Samples charged at charging temperature lower limit (10°C)					
Cell #34	4.21	4.21	13.0	P	
Cell #35	4.21	4.21	13.0	P	
Cell #36	4.20	4.20	13.0	P	
Cell #37	4.21	4.20	13.0	P	
Cell #38	4.20	4.20	13.0	P	

Supplementary information:
- No fire, no explosion.

7.3.6	**TABLE: Over-charging of battery**				P
Constant charging current (A) .....:		4			—
Supply voltage (Vdc) .....:		5.95			—
Sample no.	**OCV before charging (Vdc)**	**Total charging time (minute)**	**Maximum outer case temperature (°C)**	**Results**	
Battery #12	3.43	90	35.5	P	
Battery #13	3.44	90	32.6	P	
Battery #14	3.43	90	36.3	P	
Battery #15	3.44	90	36.5	P	
Battery #16	3.44	90	34.2	P	

Supplementary information:
- No fire , no explosion.

7.3.7	TABLE: Forced discharge (cells)			P
Sample no.	**OCV before application of reverse charge (Vdc)**	**Measured reverse charge I_t (A)**	**Lower limit discharge voltage (Vdc)**	**Results**
Cell #39	3.45	2.0	3.0	P
Cell #40	3.45	2.0	3.0	P
Cell #41	3.45	2.0	3.0	P
Cell #42	3.45	2.0	3.0	P
Cell #43	3.43	2.0	3.0	P

Supplementary information:
- No fire , no explosion.

7.3.8.1	TABLE: Vibration				P
Sample no.	**OCV before test (Vdc)**	**OCV after test (Vdc)**	**Mass before test (g)**	**Mass after test (g)**	**Results**
Battery #17	4.18	4.18	35.123	35.105	P
Battery #18	4.19	4.18	34.854	34.833	P
Battery #19	4.19	4.17	35.026	34.983	P

Supplementary information:
- No fire , no 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 #20	4.19	4.18	35.125	35.098	P
Battery #21	4.19	4.18	34.871	34.857	P
Battery #22	4.18	4.17	34.980	34.972	P

Supplementary information:
- No fire , no 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					
Cell #44	55	4.21	1	400	P
Cell #45	55	4.21	1	400	P

Cell #46	55	4.21	2	400	P
Cell #47	55	4.21	1	400	P
Cell #48	55	4.21	2	400	P
Samples charged at charging temperature lower limit					
Cell #49	10	4.20	1	400	P
Cell #50	10	4.20	2	400	P
Cell #51	10	4.20	2	400	P
Cell #52	10	4.20	1	400	P
Cell #53	10	4.21	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

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

Supplementary information:

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

Photo documentation

Photo 1

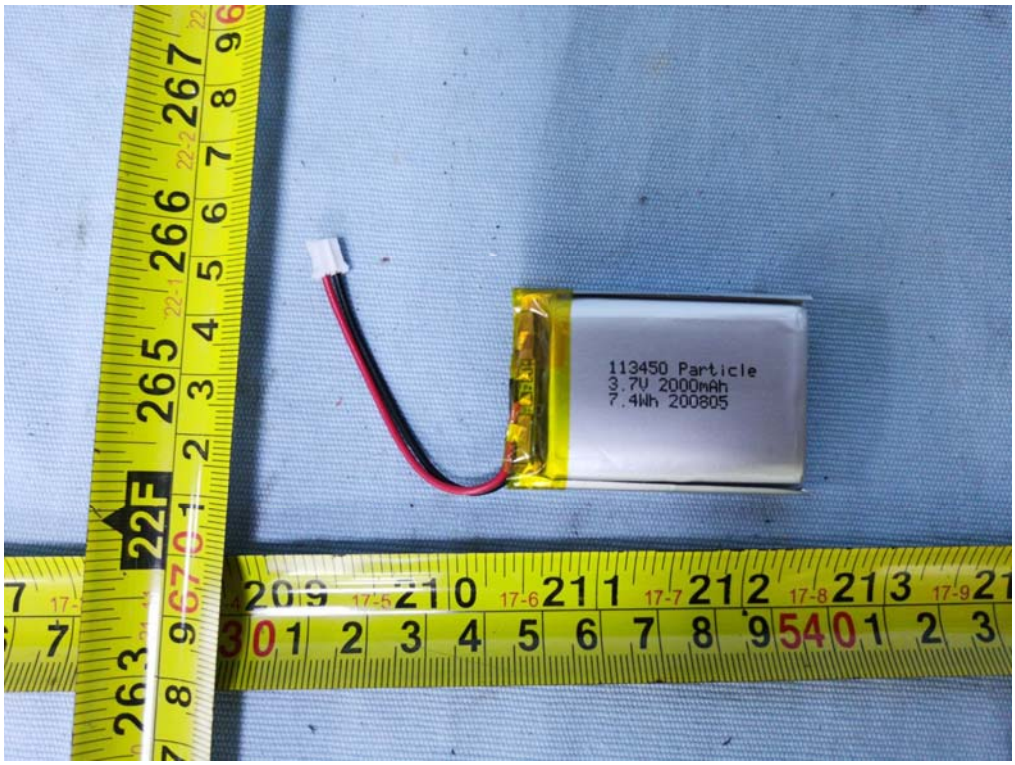

Photo 2

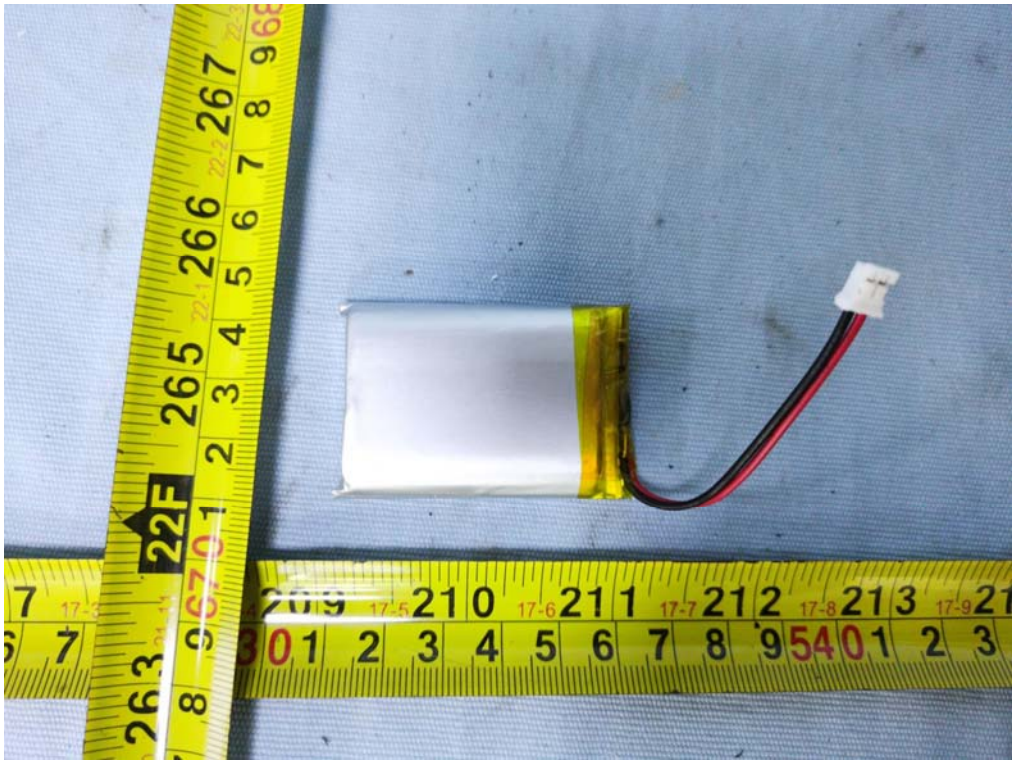

Photo 3

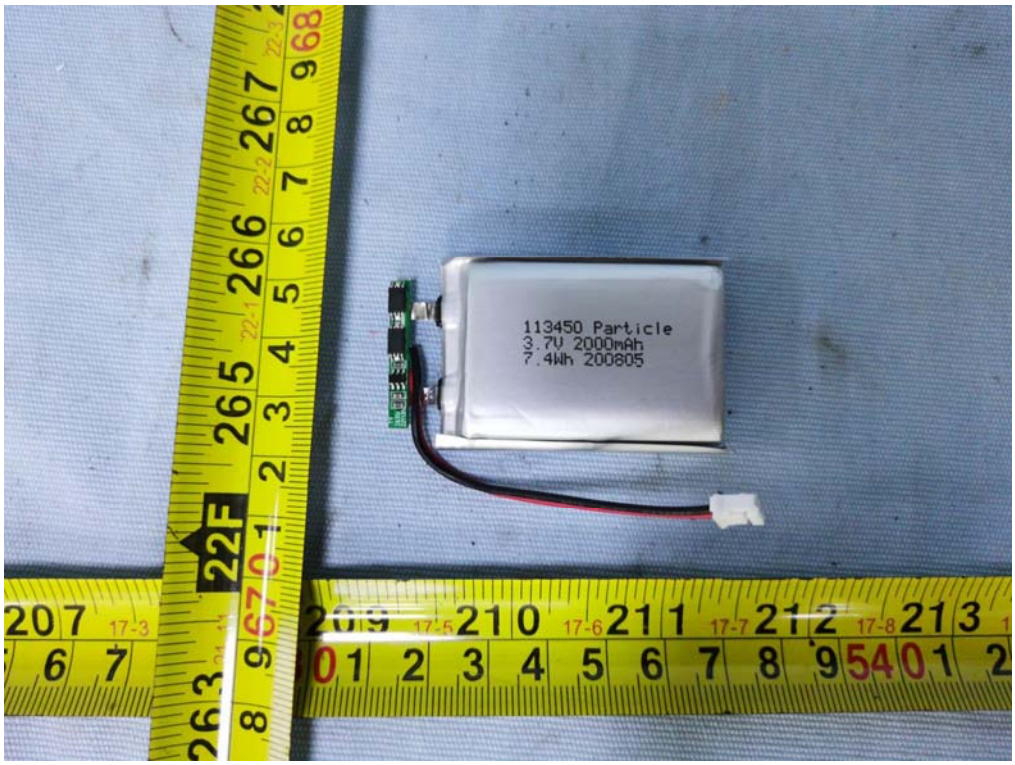

Photo 4

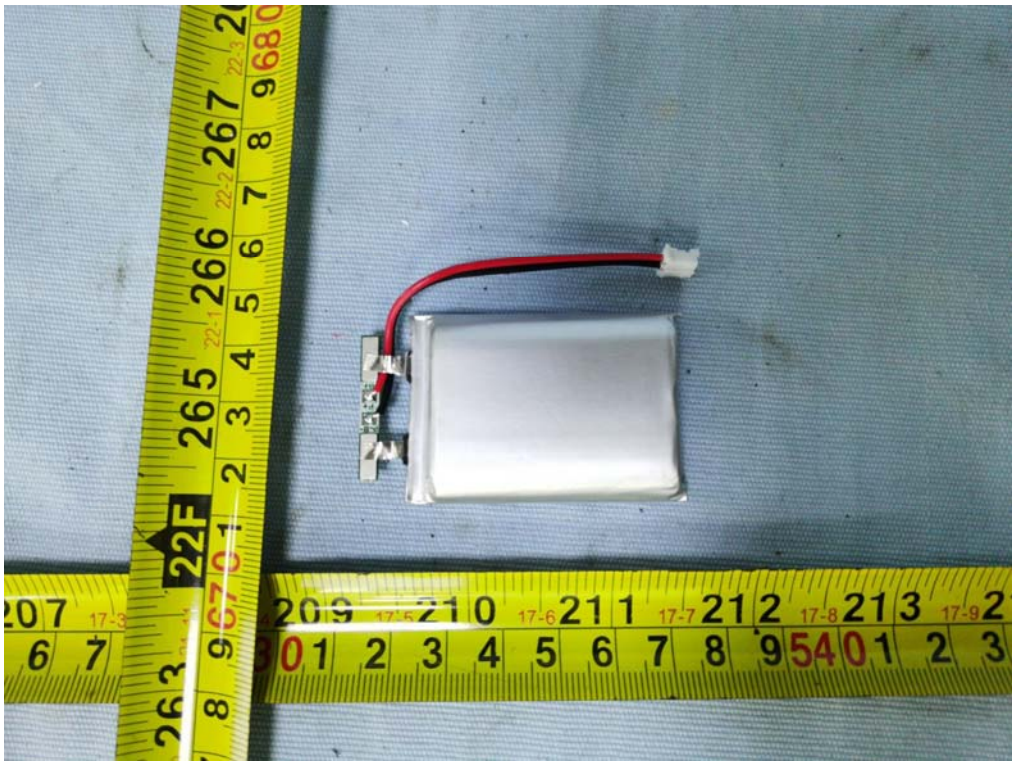

Photo 5

Photo 6

Photo 7

Photo 8

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