



<p>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</p>	
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Name of Testing Laboratory preparing the Report	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
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<p>Test specification:</p> <p>Standard : IEC 62133-2:2017</p> <p>Test procedure : SGS-CSTC</p> <p>Non-standard test method : N/A</p>	
Test Report Form No.	IEC62133_2A
Test Report Form(s) Originator	DEKRA
Master TRF	Dated 2017-08-10
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Test item description :	Rechargeable Li-ion Battery	
Trade Mark :	--	
Manufacturer	Huizhou Huiyi New Energy Co., Ltd. 2 nd Floor, Building C, Boan Industrial, Zhengda Road, Beichencun, Chenjiang Town, Zhongkai Gaoxin District, Huizhou, Guangdong, China	
Model/Type reference	HY 18650	
Ratings	Rated Voltage: 3,7 V Rated Capacity: 2000 mAh (7,4Wh)	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
	Testing location/ address :	No.2, Jianghao Industrial Factory Area, No.430, Jinhua Road, Bantian Street, Longgang District, Shenzhen, Guangdong, China
	Tested by (name, function, signature) :	Rachel Long / Project Engineer <i>Rachel Long</i>
	Approved by (name, function, signature) ... :	Sara Wang / Report Reviewer <i>Sara Wang</i>



<p>List of Attachments (including a total number of pages in each attachment): Attachment 1: 3 pages of Photos; Attachment 2: 2 pages of Information for safety; Attachment 3: 1 page of Packaging; Attachment 4: 1 page of Product specification.</p>	
<p>Summary of testing: The sample(s) tested complies with the requirements of IEC 62133-2: 2017.</p> <p>When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p> <p>Remark: Only battery was considered and tested according to standard in this report as the cell (model: 18650 2000mAh) was separately certified according to IEC 62133-2: 2017 by TUV Rheinland (CB Report No.: 50222624 001, Certif. No.: JPTUV-094812).</p>	
<p>Tests performed (name of test and test clause):</p> <p><input type="checkbox"/> 5.2 Insulation resistance</p> <p><input type="checkbox"/> 7.2.1 Continuous charging at constant voltage (cells)</p> <p><input type="checkbox"/> 7.2.2 Case stress at high ambient temperature (battery)</p> <p><input type="checkbox"/> 7.3.1 External short circuit (cell)</p> <p><input checked="" type="checkbox"/> 7.3.2 External short circuit (battery)</p> <p><input checked="" type="checkbox"/> 7.3.3 Free fall</p> <p><input type="checkbox"/> 7.3.4 Thermal abuse (cells)</p> <p><input type="checkbox"/> 7.3.5 Crush (cells)</p> <p><input checked="" type="checkbox"/> 7.3.6 Over-charging of battery</p> <p><input type="checkbox"/> 7.3.7 Forced discharge (cells)</p> <p><input checked="" type="checkbox"/> 7.3.8 Mechanical tests (batteries)</p> <p><input type="checkbox"/> 7.3.9 Design evaluation – Forced internal short circuit (cells)</p> <p><input type="checkbox"/> Annex D Measurement of the internal AC resistance for coin cells</p>	<p>Testing location: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch No.2, Jianghao Industrial Factory Area, No.430, Jihua Road, Bantian Street, Longgang District, Shenzhen, Guangdong, China</p>
<p>Summary of compliance with National Differences (List of countries addressed): none.</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of EN 62133-2: 2017.</p>	

Copy of marking plate:

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

Rechargeable Li-ion Battery
Model:HY 18650 11NR19/66
Rated:3.7V \equiv 2000mAh,7.4Wh
Huizhou Huiyi New Energy Co., Ltd.
2019-11 Red(+) Black(-)

**WARNING!**

1. Do NOT connect the Red and Black Clamps to same piece of metal to prevent physical injury and damage to the vehicle.
2. Do NOT disassemble product to avoid shock hazard.
3. Keep away from children to avoid any accident.

Test item particulars	: --
Classification of installation and use	: --
Supply Connection	: --
Recommend charging method declared by the manufacturer	CC/CV
Discharge current (0,2 It A)	0,4 A
Specified final voltage	2,8 V
Upper limit charging voltage per cell	4,25 V
Maximum charging current	1000 mA
Charging temperature upper limit	45 °C
Charging temperature lower limit	10 °C
Polymer cell electrolyte type	<input type="checkbox"/> gel polymer <input type="checkbox"/> solid polymer <input checked="" type="checkbox"/> 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	: 2019-11-08
Date (s) of performance of tests	: 2019-11-08 to 2019-11-18
General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p> <p>This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. 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. This document cannot be reproduced except in full, without prior written approval of the Company. 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. 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.</p>	

Name and address of factory (ies) : Same as manufacturer

General product information and other remarks:

Product description:	Rechargeable Li-ion Battery
Model of pack:	HY 18650
Designation of pack:	1INR19/66
Rated voltage:	3,7 V
Rated capacity:	2000 mAh
Maximum charge current:	1000 mA
Number of cells in battery pack:	One cell
Model of cell:	18650 2000mAh
Designation of cell:	INR19/66
Rated voltage of cell:	3,7 V
Rated capacity of cell:	2000 mAh
Maximum charge current of cell:	1000 mA

Remark: See Attachment 4 for more detail.

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 exposed metal surface	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	Cell: A pressure relief mechanism was used to relieve excessive internal pressure. Pack: PVC film wrapping 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	PVC film was used as encapsulation to wrap cell, will not cause the battery to overheat during normal operation nor inhibit pressure relief.	P
5.4	Temperature, voltage and current management		P
	Batteries are designed such that abnormal temperature rise conditions are prevented	Protection circuit was used.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	Protection circuit was used.	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	See Attachment 4 for detail	P
5.5	Terminal contacts		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		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		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	The protection is within the battery	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 without separate case	N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation		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	Single cell battery Charging voltage of the cell is 4,25 V in cell report.	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		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		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	The mechanical protection was provided by the end product.	P
	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	Should be considered in end product evaluation	N/A
5.7	Quality plan		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Self-declaration was submitted.	P
5.8	Battery safety components		P
	According annex F		P
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	The production date is 2019-11.	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 $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and 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		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 $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		N/A
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		N/A
	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		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)	Cell was certified according to IEC 62133-2: 2017	N/A
	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		N/A
	Results: No fire. No explosion. No leakage..... :		N/A
7.2.2	Case stress at high ambient temperature (battery)	No moulded case	N/A
	Oven temperature (°C)..... :	--	—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Cell was certified according to IEC 62133-2: 2017	N/A
	The cells were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :		N/A
7.3.2	External short-circuit (battery)		P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or	Applies to samples in normal condition Rapid decline in short circuit current, protective electronic circuit operate	P
	- The case temperature declined by 20 % of the maximum temperature rise	Applies to samples in single fault condition	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
	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		P
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor	Single fault applies to MOSFET (U2)	P
	Results: No fire. No explosion..... :	(See appended table 7.3.2)	P
7.3.3	Free fall		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion		P
7.3.4	Thermal abuse (cells)	Cell was certified according to IEC 62133-2: 2017	N/A
	Oven temperature (°C)		—
	Results: No fire. No explosion		N/A
7.3.5	Crush (cells)	Cell was certified according to IEC 62133-2: 2017	N/A
	The crushing force was released upon:		N/A
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion..... :		N/A
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		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		N/A
	- Returned to ambient		P
	Results: No fire. No explosion..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)	Cell was certified according to IEC 62133-2: 2017	N/A
	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		N/A
	Results: No fire. No explosion..... :		N/A
7.3.8	Mechanical tests (batteries)		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		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)	Cell was certified according to IEC 62133-2: 2017	N/A
	The cells complied with national requirement for :		—
	The pressing was stopped upon:		N/A
	- 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		N/A
	Results: No fire :		N/A

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	See Attachment 4 for detail.	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	See Attachment 2 for detail.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user	Not for end user	N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information	Not small cell or 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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
9	MARKING		P
9.1	Cell marking	Only battery will be marked.	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		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 batteries	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		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	Storage and disposal instructions were supplied with the battery. See Attachment 2 for detail.	P
	Recommended charging instructions	Recommended charging instructions were supplied with the battery. See Attachment 4 for detail.	P
10	PACKAGING AND TRANSPORT		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3		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	See Attachment 3 for detail.	P

ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		N/A
A.1	General	Cell was certified according to IEC 62133-2: 2017	N/A
A.2	Safety of lithium ion secondary battery		N/A
A.3	Consideration on charging voltage		N/A
A.3.1	General		N/A
A.3.2	Upper limit charging voltage		N/A
A.3.2.1	General		N/A
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	Consideration of temperature and charging current		N/A
A.4.1	General		N/A
A.4.2	Recommended temperature range		N/A
A.4.2.1	General		N/A
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		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.6	Consideration of discharge		N/A
A.4.6.1	General		N/A
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		N/A
A.4.6.3	Discharge current and temperature range		N/A
A.4.6.4	Scope of application of the discharging current		N/A
A.5	Sample preparation		N/A
A.5.1	General		N/A
A.5.2	Insertion procedure for nickel particle to generate internal short		N/A
A.5.3	Disassembly of charged cell		N/A
A.5.4	Shape of nickel particle		N/A
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		N/A
A.6	Experimental procedure of the forced internal short-circuit test		N/A
A.6.1	Material and tools for preparation of nickel particle		N/A
A.6.2	Example of a nickel particle preparation procedure		N/A
A.6.3	Positioning (or placement) of a nickel particle		N/A
A.6.4	Damaged separator precaution		N/A
A.6.5	Caution for rewinding separator and electrode		N/A
A.6.6	Insulation film for preventing short-circuit		N/A
A.6.7	Caution when disassembling a cell		N/A
A.6.8	Protective equipment for safety		N/A
A.6.9	Caution in the case of fire during disassembling		N/A
A.6.10	Caution for the disassembling process and pressing the electrode core		N/A
A.6.11	Recommended specifications for the pressing device		N/A
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	Not coin cell	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement..... :		N/A
	Coin cells with an internal resistance 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		P

IEC 62133-2					
Clause	Requirement + Test		Result - Remark		Verdict
TABLE: Critical components information					P
Object / part No.	Manufacturer / trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Cell	Jiangxi Canhui New Energy Science And Technology Co., Ltd.	18650 2000mAh	3,7 Vd.c. 2000 mAh	IEC 62133-2: 2017 EN 62133-2: 2017	TUV Rheinland (CB Report No.: 50222624 001, Certif. No.: JPTUV- 094812)
Protect IC (U1)	SHENZHEN FUMAN ELECTRONICS CO., LTD	DW01	Overcharge Detection Voltage: 4,20 ± 0,05 V Over-discharge Detection Voltage: 2,8 ± 0,05 V Operated temperature: -40~ 85 °C	--	--
MOSFET (U2)	SHENZHEN FUMAN ELECTRONICS CO., LTD	8205A	Id: 5 A Vds: 20 V Operating temperature range: -55 ~ 150 °C	--	--
PTC (F1)	SHANGHAI BNSTAR NEW MATERIAL TECHNOLOGY CO LTD	SMD1206- 200C	Ihold: 2 A Itrip: 4 A Vmax: 6 V	UL1434	UL (E325958)
PCB	SHENZHEN LUTONGDA TECHNOLOGY CO LTD	LTD-M	V-0 130 °C	UL796	UL (E486889)
Alt.	interchangeable	interchangeable	Min. V-0, 130°C	UL 796	UL
Lead wires (Charge & Discharge)	HUI ZHOU BIN DA ELECTRON CO LTD	1007	24 AWG, 80°C, 300 V	UL758	UL (E332295)
Alt.	interchangeable	interchangeable	Min. 22 AWG, 80°C, 300 V	UL 758	UL
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)				N/A
Sample no.	Recommended charging voltage Vc (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
--	--	--	--	--	
Supplementary information:					
--					

IEC 62133-2						
Clause	Requirement + Test					Verdict
7.3.1	TABLE: External short-circuit (cell)					N/A
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						
--	--	--	--	--	--	
Samples charged at charging temperature lower limit						
--	--	--	--	--	--	
Supplementary information:						
--						

IEC 62133-2							
Clause	Requirement + Test						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	
Pack: HY 18650 (#1)	20,4	4,175	87,2	--*	Normal	Pass	
Pack: HY 18650 (#2)	20,4	4,172,	86,6	17,7	SC U2 PIN 1-3	Pass	
Pack: HY 18650 (#3)	20,4	4,173	87,5	19,0	SC U2 PIN 1-3	Pass	
Pack: HY 18650 (#4)	20,4	4,173	85,7	12,0	SC U2 PIN 1-3	Pass	
Pack: HY 18650 (#5)	20,4	4,172	88,1	16,7	SC U2 PIN 1-3	Pass	
Supplementary information:							
- No fire or explosion							
--* Shut down immediately, and tested for 24 hours, no max. temperature was noted.							
- SC = Short circuit							

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
7.3.5	TABLE: Crush (cells)				N/A
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					
--	--	--	--	--	
Samples charged at charging temperature lower limit					
--	--	--	--	--	
Supplementary information:					
--					

7.3.6	TABLE: Over-charging of battery				P
Constant charging current (A)			4,0	—	
Supply voltage (Vdc)			5,95	—	
Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results	
Pack: HY 18650 (#9)	3,328	109	24,8	Pass	
Pack: HY 18650 (#10)	3,352	109	29,4	Pass	
Pack: HY 18650 (#11)	3,347	109	31,7	Pass	
Pack: HY 18650 (#12)	3,361	109	27,8	Pass	
Pack: HY 18650 (#13)	3,354	109	25,5	Pass	
Supplementary information:					
- No fire or explosion					
- Ambient temperature was 22,1 °C.					
- The maximum charging current was 2,5 A during the testing due to electronic circuit cut of higher current.					

7.3.7	TABLE: Forced discharge (cells)				N/A
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I _t (A)	Lower limit discharge voltage (Vdc)	Results	
--	--	--	--	--	
Supplementary information:					
--					

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
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
Pack: HY 18650 (#14)	4,172	4,160	46,9753	46,9753	Pass
Pack: HY 18650 (#15)	4,172	4,161	46,7628	46,7628	Pass
Pack: HY 18650 (#16)	4,173	4,162	46,8614	46,8614	Pass
Supplementary information:					
<ul style="list-style-type: none"> - No fire or explosion - No rupture - No leakage - No venting 					

7.3.8.2	TABLE: Mechanical shock				P
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results
Pack: HY 18650 (#17)	4,172	4,160	46,9753	46,9753	Pass
Pack: HY 18650 (#18)	4,172	4,161	46,7628	46,7628	Pass
Pack: HY 18650 (#19)	4,173	4,162	46,8614	46,8614	Pass
Supplementary information:					
<ul style="list-style-type: none"> - No fire or explosion - No rupture - No leakage - No venting 					

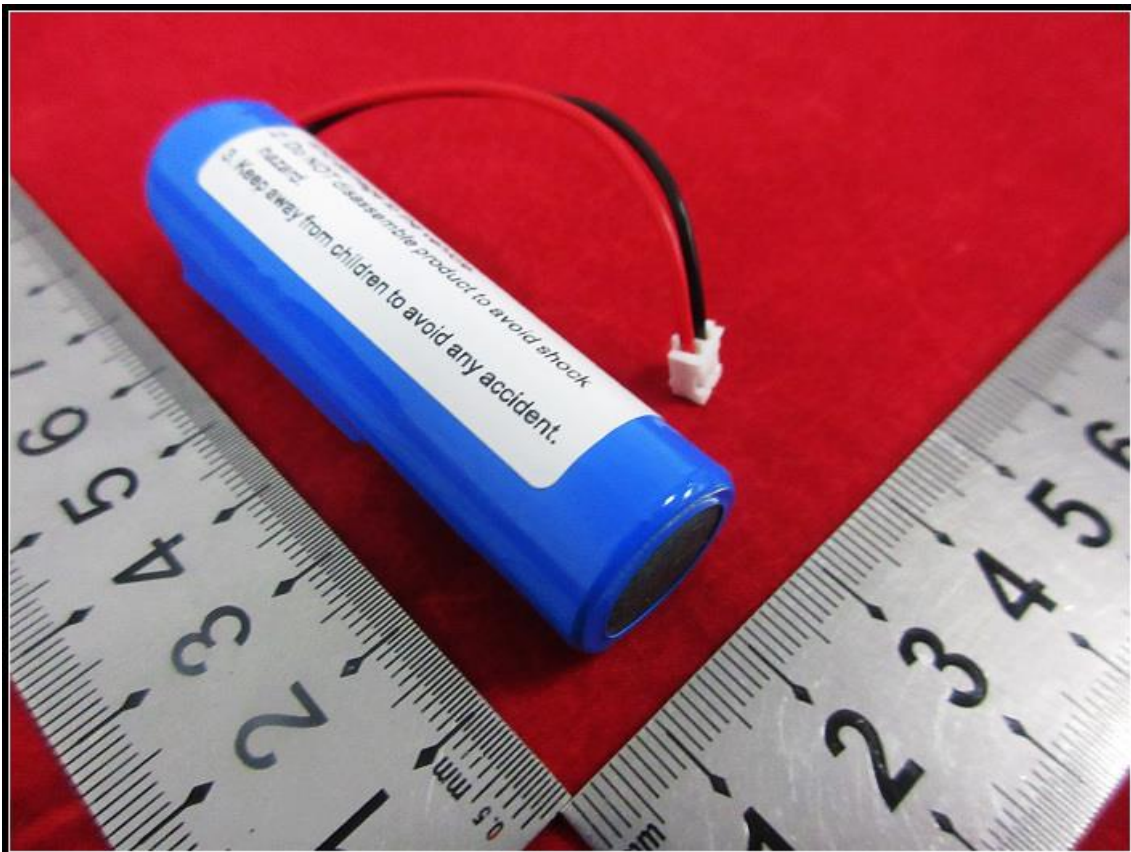
7.3.9	TABLE: Forced internal short circuit (cells)				N/A
Sample no.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results
Samples charged at charging temperature upper limit					
--	--	--	--	--	--
Samples charged at charging temperature lower limit					
--	--	--	--	--	--
Supplementary information:					
--					

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:				
--				

---End report---

Attachment 1 Photo documentation

Whole Unit

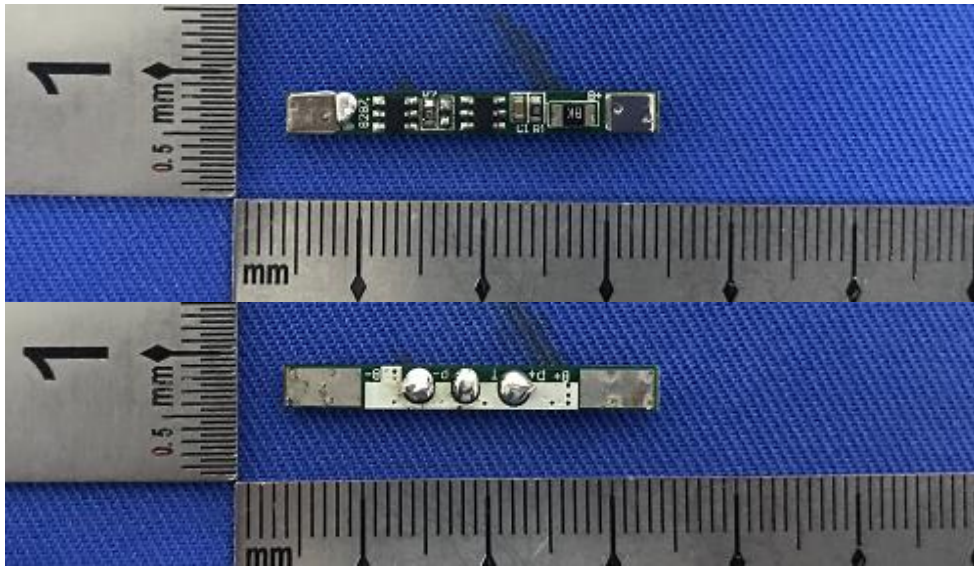


Attachment 1 Photo documentation



Attachment 1 Photo documentation

PWB



--- End of Attachment 1 ---

Attachment 2 Information for safety

- Please use 0.5C current to charge up 60% capacity after the battery placed 3 months.

电池每放置三个月,请预先以 0.5C 充电 1 次,即让电池具备 60%以上的电量.

- Before Use the battery, carefully read the instruction manual and battery labels on the surface.

使用电池前, 请仔细阅读使用说明书和电池表面标识.

- Need to use the original battery charger, and should be placed in a dry ventilated place.

电池需使用原装充电器充电, 并应放置在干燥通风场所.

- Such as long-term when not in use, the battery charger to charge state half full, remove the battery from the device and separated, to avoid metal contact with the battery, causing short-circuit or damage to the phenomenon.

如长期不使用时, 请将电池充电至半满电荷状态, 把电池从设备中拆除并分开放置, 避免金属接触电池, 造成短路或损坏现象.

- In use or during storage, battery found there has been high fever, leakage, odor, distortion and other anomalies, please stop using it immediately and stay away from the battery.

在使用或储存期间, 如发现电池有出现高温发热、漏液、散发异味、变形及其它异常现象时, 请立即停止使用并远离电池.

- Do not short-circuit the battery positive and negative, and careful not to allow the battery to moisture, to avoid danger.

切勿将电池正负极短路, 并注意不可让电池受潮, 以免发生危险.

- Using, keep away from heat, High pressure place, and do not beat, hit the battery.

使用过程中, 应远离热源、高压场所, 并勿摔打、撞击电池.

- Battery end of life should be immediately removed from the equipment, Please properly handle security of spent batteries, do not put into fire or water.

电池寿命终止应立刻从设备中取出,废弃电池请安全妥善处理, 切勿投入火中或水中.

1. Do not connect the Red (+) and Black (-) Clamps to same piece of metal to prevent physical injury and damage to the vehicle.

请勿将电池正极和负极短路, 以防身体受伤以及损坏设备。

2. Do not disassemble product to avoid shock hazard.

请勿拆卸产品避免造成危险。

3. Keep away from children to avoid any accident.

远离小孩, 以免发生意外。

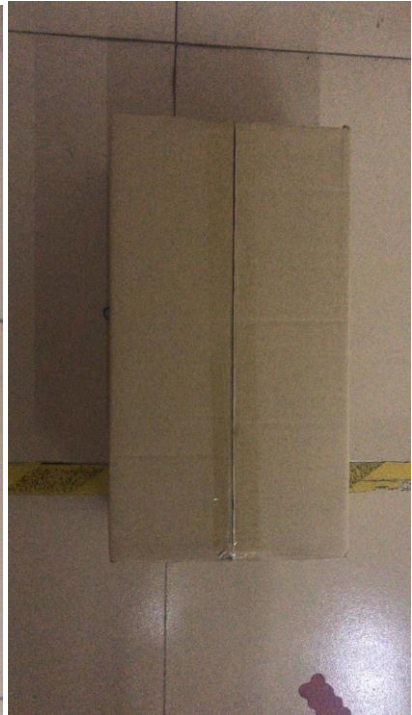
Attachment 2 Information for safety

Storage (At 50% SOC and specified temp, recoverable capacity in % vs time.) 存储 (50%容量下的存储时间和温度关系)	10°C~25°C	(3months, ≥85%)
	10°C ~45°C	(2months, ≥90%)
	20±5°C is the recommended storage temperature	

— When disposing of secondary cells or batteries, keep cells or batteries of different electrochemical systems separate from each other.(电池处置信息)

- - - End of Attachment 2 - - -

Attachment 3 Packaging



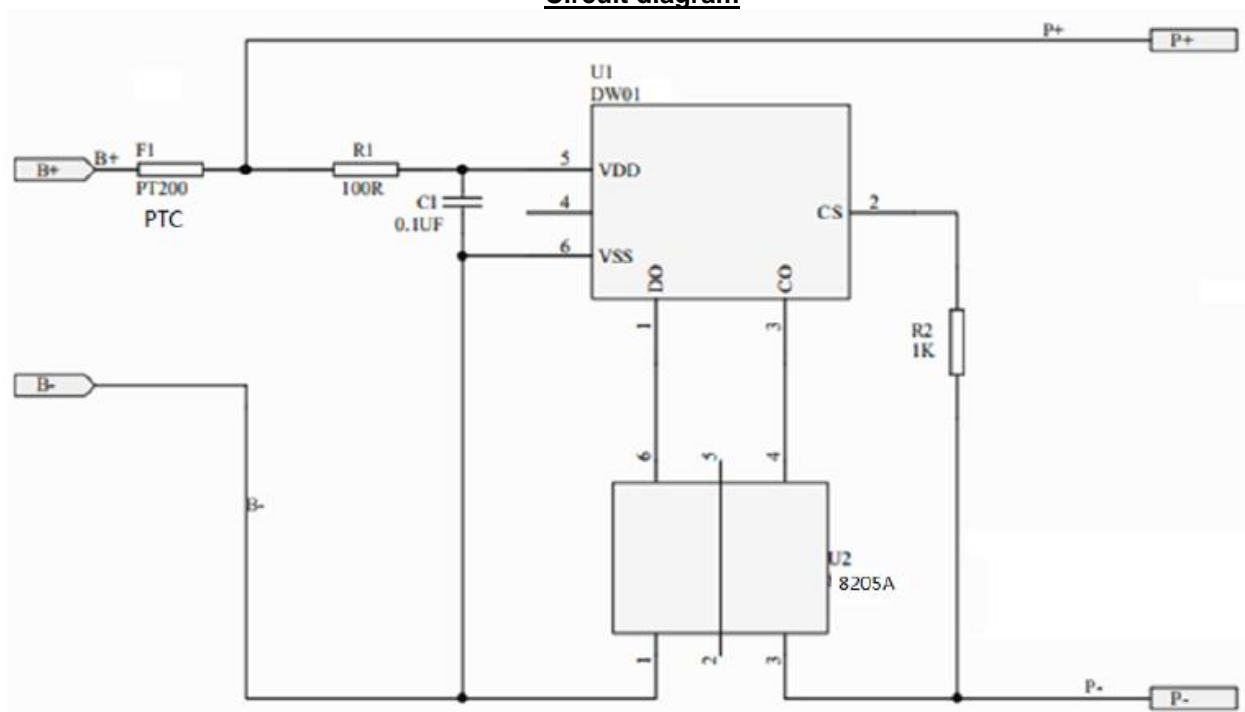
--- End of Attachment 3 ---

Attachment 4 Product specification

Specification of Pack

Items 项目	Parameter 参数
Nominal voltage 标称电压	3.7V
Typical capacity 典型容量	2000mAh(0.2C discharge 放电)
Charging voltage 充电电压	4.2V
Discharging cut-off voltage 放电截止电压	2.8V
Max charging 最大充电	0.5C /4.2V
Operating temperature 使用温度	Charging: 10°C ~ 45°C

Circuit diagram



--- End of Attachment 4 ---