



<b>TEST REPORT</b> <b>IEC 62133</b> <b>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</b>	
Report Number .....	SZ17080130D01
Date of issue .....	2017-11-09
Total number of pages .....	29 Pages
Applicant's name .....	ShenZhen Chainway Information Technology Co.,Ltd.
Address .....	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, ShenZhen, China
<b>Test specification:</b>	
Standard .....	IEC 62133: 2012(Second Edition)
Test procedure .....	MORLAB
Non-standard test method .....	N/A
Test Report Form No .....	IEC62133B
Test Report Form(s) Originator .....	UL(Demko)
Master TRF .....	Dated 2013-03
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Test item description .....	Rechargeable Li-ion Battery
Trade Mark .....	N/A
Manufacturer .....	Springpower Technology(ShenZhen) Co.,LTD. Chaoshun Industrial Zone, Renmin Road, Fumin,Guanlan, Long'hua, ShenZhen,GuangDong, China
Factory .....	Same as manufacturer
Model/Type reference .....	626071
Ratings .....	3.8 V / 4000 mAh 15.2 Wh

<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	Shenzhen Morlab Communication Technology Co.,Ltd
<b>Testing location/ address .....</b> :		FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		Zhou Xi
<b>Approved by (name + signature) .....</b> :		Li Dong
		<i>Zhou Xi</i>
		<i>Li Dong</i>
<input type="checkbox"/>	<b>Testing procedure: TMP</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		
<b>Approved by (name + signature) .....</b> :		
<input type="checkbox"/>	<b>Testing procedure: WMT</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		
<b>Witnessed by (name + signature) .....</b> :		
<b>Approved by (name + signature) .....</b> :		
<input type="checkbox"/>	<b>Testing procedure: SMT</b>	
<b>Testing location/ address .....</b> :		
<b>Tested by (name + signature) .....</b> :		
<b>Approved by (name + signature) .....</b> :		
<b>Supervised by (name + signature) ..</b> :		

<p><b>List of Attachments (including a total number of pages in each attachment):</b> Attachment 1: Photo documents (3 pages).</p>	
<p><b>Summary of testing:</b></p>	
<p><b>Tests performed (name of test and test clause):</b>            Clause 5 General safety considerations;            Clause 6 Type test conditions;            Clause 8.1 Charging procedure for test purposes;            Clause 8.2.1 Continuous charging at constant voltage (cells);            Clause 8.2.2 Moulded case stress at high ambient temperature (battery);            Clause 8.3.1 External short circuit (cell);            Clause 8.3.2 External short circuit (battery);            Clause 8.3.3 Free fall;            Clause 8.3.4 Thermal abuse(cells);            Clause 8.3.5 Crush (cells);            Clause8.3.6 Over-charge of battery;            Clause 8.3.7 Forced discharge (cells);</p> <p>Tests are made with the number of batteries specified in IEC 62133:2012 Table 2.</p>	<p><b>Testing location:</b>            Shenzhen Morlab Communication Technology Co., Ltd            FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, Guangdong Province, P. R. China 518101</p>
<p><b>Summary of compliance with National Differences</b>  <b>List of countries addressed: N/A</b>            The battery also fulfills the requirements of EN 62133:2013.</p>	

**Copy of marking plate****Battery marking:**

型号(Model) : 626071 1ICP7/61/72 YYYEH  
充电限制电压(Limited charge voltage) : 4.30V  
可充电锂离子电池(Rechargeable Li-ion Battery)  
3.8V 4000mAh 15.2Wh Made In China

警告：1、禁止拆解、撞击、挤压或投入火中。  
2、若出现严重鼓胀，请勿继续使用。  
3、请勿置于高温环境中。  
4、电池出现过热、变形，请更换。  
5、请使用指定的充电器。

WARNING: 1.Prohibited to disassemble, hit, squeeze,  
or into the fire.  
2.If severe ballooning, please do not continue to use.  
3.Please do not in high temperature environment.  
4.Replacing with a new battery if the battery has  
deformation or overheating.  
5.Please use the designated charger.

监制：深圳市成为信息技术有限公司  
Shenzhen Chainway Information Technology Co.,Ltd.  
制造商：睿鹏科技(深圳)有限公司  
Springpower Technology (ShenZhen) Co.,LTD.



Li-ion



<b>Test item particulars.....:</b>	
<b>Classification of installation and use.....:</b>	N/A
<b>Supply connection.....:</b>	No direct connection to mains supply
<b>Recommend charging method declared by the manufacturer .....</b>	CC/CV
<b>Discharge current (0,2 I<sub>t</sub> A) .....</b>	800 mA
<b>Specified final voltage .....</b>	3.0 V
<b>Chemistry .....</b>	<input type="checkbox"/> nickel systems ..... <input checked="" type="checkbox"/> lithium systems
<b>Recommend of charging limit for lithium system</b>	
<b>Upper limit charging voltage per cell.....:</b>	4.3 V
<b>Maximum charging current .....</b>	2760 mA
<b>Charging temperature upper limit .....</b>	45 °C
<b>Charging temperature lower limit.....:</b>	0 °C
<b>Polymer cell electrolyte type .....</b>	<input type="checkbox"/> gel polymer ..... <input checked="" type="checkbox"/> solid polymer..... <input type="checkbox"/> N/A
<b>Possible test case verdicts:</b>	
- 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)
<b>Testing.....:</b>	
<b>Date of receipt of test item .....</b>	2017-08-16
<b>Date (s) of performance of tests .....</b>	2017-08-16 to 2017-09-03
<b>General remarks:</b>	
<p>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.</p> <p><b>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</b></p>	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:</b>	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	<input type="checkbox"/> <b>Yes</b> <input checked="" type="checkbox"/> <b>Not applicable</b>
<b>When differences exist; they shall be identified in the General product information section.</b>	

**Name and address of factory (ies)** ..... : Springpower Technology(ShenZhen) Co.,LTD.  
 Chaoshun Industrial Zone, Renmin Road, Fumin,  
 Guanlan, Long'hua, ShenZhen, GuangDong, China

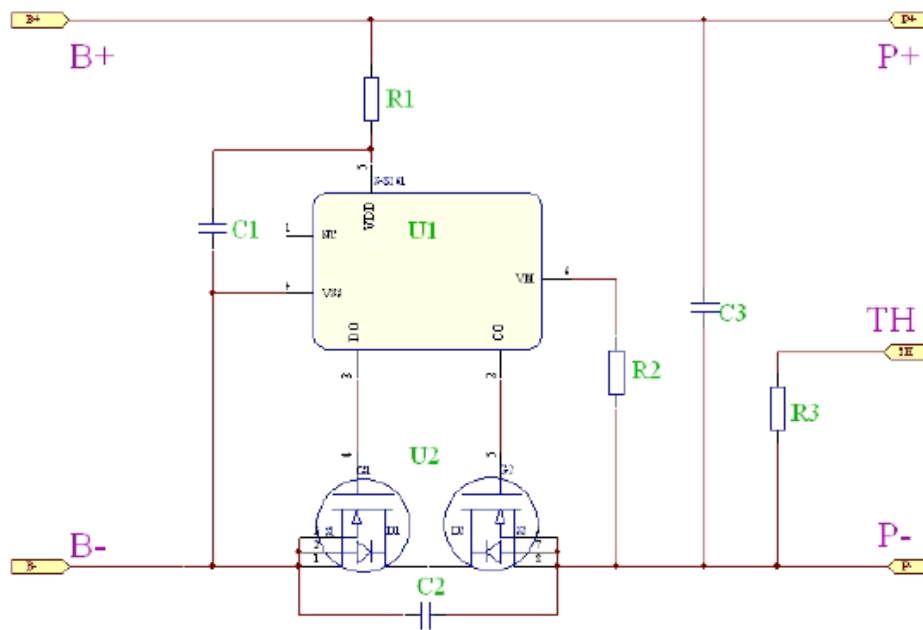
**General product information:**

The product, Rechargeable Li-ion battery, is constructed with one Rechargeable Li-ion Battery cell and fitted with protection circuit.

The basic characteristics of the product are shown as below:

Nominal Voltage	3.8V
Capacity	4000 mAh
Charge Method	CC/CV
Max Charge Voltage	4.3 V
Discharge Cut-off Voltage	3.0 V
Weight	Approx.60.1 g

Circuit diagram:



<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>Parameter measurement tolerances</b>		<b>P</b>
	Parameter measurement tolerances	Arrange the test as required.	<b>P</b>
<b>5</b>	<b>General safety considerations</b>		<b>P</b>
5.1	General		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 accessible metal case.	N/A
	Insulation resistance (MΩ) ..... :	No accessible metal case.	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements	See tests of clause 8.	P
	Orientation of wiring maintains adequate creepage and clearance distances between conductors	Minimum creepage distance is 3.25 mm. Minimum clearance is 3.25 mm. Pollution degree 2. FUNCTIONAL INSULATION. Material Group IIIb. PEAK WORKING VOLTAGE ≤71V. RMS WORKING VOLTAGE ≤ 10V. The requirements for minimum creepage and clearance distances are based on Table 2M in IEC60950-1:2005 (0.2mm). Also see tests of clause 8.	P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse	See tests of clause 8.	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 battery cases and cells incorporate a 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	See tests of clause 8.	P
5.4	Temperature/voltage/current management		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Batteries are designed such that abnormal temperature rise conditions are prevented	Overcharge, over discharge, over current and short-circuit protection circuit used. See tests of clause 8.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	Battery temperature, voltage and current parameters meet the limits specified in the battery specification.	P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified	Information mentioned on the battery label and in the battery specification.	P
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery	The battery pack designed with prevention of reverse connector that can prevents reverse polarity connection	P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	The wire terminal contacts complied with the requirements. Maximum output current with any non-capacitive load measured 60 s after application of the load is 4.8 A. Compliance with IEC 60950-1:2005. Also see tests of clause 8.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	The terminal contact surfaces complied with the requirements. Also see tests of clause 8.	P
	Terminal contacts are arranged to minimize the risk of short circuits	The terminal contacts are separated by insulation material, and cannot be short-circuited in normal use. Electric strength test 500V. FUNCTIONAL INSULATION. No insulation breakdown during the test. Compliance with IEC 60950-1:2005. Also see tests of clause 4	P
5.6	Assembly of cells into batteries		P



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Clause	Requirement + Test	Result - Remark	Verdict
5.6.1	If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer	One battery housed in a single battery case.	N/A
	Each battery has an independent control and protection	One battery housed in a single battery case.	N/A
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly	Information mentioned in the cell specification.	P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges	No selective discharge design.	N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		P
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard	One battery housed in a single battery case. See TABLE: Critical components information	N/A
5.6.2	Design recommendation for lithium systems only		P
	For the battery consisting of a single cell or a single cellblock: - Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Clause 8.1.2, Table 4; or	Max charging voltage is 4.3V.	N/A
	- Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1.	Max charging voltage is 4.3V.	P
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - The voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, by monitoring the voltage of every single cell or the single cellblocks; or	One cell used in the battery pack.	N/A
	- The voltages of any one of the single cells or single cellblocks does not exceed the different upper limit of the charging voltage, determined through Clause 8.1.2, NOTE 1, by monitoring the voltage of every single cell or the single cellblocks	One cell used in the battery pack.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - Charging is stopped when the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks; or	One cell used in the battery pack.	N/A
	- Charging is stopped when the upper limit of the different charging voltage, determined through Clause 8.1.2, NOTE 1, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks	One cell used in the battery pack.	N/A
5.7	Quality plan		P
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	The manufacturer's quality system meets requirements of ISO 9001:2008.	P

<b>6</b>	<b>Type test conditions</b>		<b>P</b>
	Tests were made with the number of cells or batteries specified in Table 1 for nickel-cadmium and nickel-metal hydride systems and Table 2 for lithium systems, using cells or batteries that are not more than six months old	Tests are made with the number of batteries specified in Table 2. Batteries are not more than six months old.	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	Tests are carried out at 20°C ± 5°C.	P

<b>7</b>	<b>Specific requirements and tests (nickel systems)</b>		N/A
7.1	Charging procedure for test purposes	Not Nickel system.	N/A
7.2	Intended use	Not Nickel system.	N/A
7.2.1	Continuous low-rate charging (cells)	Not Nickel system.	N/A
	Results: No fire. No explosion	(See Table 7.2.1)	N/A
7.2.2	Vibration	Not Nickel system.	N/A
	Results: No fire. No explosion. No leakage	(See Table 7.2.2)	N/A
7.2.3	Moulded case stress at high ambient temperature	Not Nickel system.	N/A
	Oven temperature (°C).....:		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components	Not Nickel system.	N/A
7.2.4	Temperature cycling	Not Nickel system.	N/A
	Results: No fire. No explosion. No leakage.	Not Nickel system.	N/A
7.3	Reasonably foreseeable misuse	Not Nickel system.	N/A
7.3.1	Incorrect installation cell	Not Nickel system.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The test was carried out using: - Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or	Not Nickel system.	N/A
	- A stabilized dc power supply.	Not Nickel system.	N/A
	Results: No fire. No explosion..... :	(See Table 7.3.1)	N/A
7.3.2	External short circuit	Not Nickel system.	N/A
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or	Not Nickel system.	N/A
	- The case temperature declined by 20% of the maximum temperature rise	Not Nickel system.	N/A
	Results: No fire. No explosion..... :	(See Table 7.3.2)	N/A
7.3.3	Free fall	Not Nickel system.	N/A
	Results: No fire. No explosion.	Not Nickel system.	N/A
7.3.4	Mechanical shock (crash hazard)	Not Nickel system.	N/A
	Results: No fire. No explosion. No leakage.	Not Nickel system.	N/A
7.3.5	Thermal abuse	Not Nickel system.	N/A
	Oven temperature (°C)..... :	Not Nickel system.	—
	Results: No fire. No explosion.	Not Nickel system.	N/A
7.3.6	Crushing of cells	Not Nickel system.	N/A
	The crushing force was released upon: - The maximum force of 13 kN± 1 kN has been applied; or	Not Nickel system.	N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained	Not Nickel system.	N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set	Not Nickel system.	N/A
	Results: No fire. No explosion..... :	(See Table 7.3.6)	N/A
7.3.7	Low pressure	Not Nickel system.	N/A
	Chamber pressure (kPa)..... :	Not Nickel system.	—
	Results: No fire. No explosion. No leakage.	Not Nickel system.	N/A
7.3.8	Overcharge	Not Nickel system.	N/A
	Results: No fire. No explosion..... :	(See Table 7.3.8)	N/A
7.3.9	Forced discharge	Not Nickel system.	N/A
	Results: No fire. No explosion..... :	(See Table 7.3.9)	N/A
<b>8</b>	<b>Specific requirements and tests (lithium systems)</b>		<b>P</b>

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Clause	Requirement + Test	Result - Remark	Verdict
8.1	Charging procedures for test purposes		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2	Arrange the test as required.	P
8.1.2	Second procedure: This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9	Arrange the test as required.	P
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit	The battery cell's specified charge temperature range is 0~45°C. Test was conducted at -5 °C and 45 °C Arrange the test as required.	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1).....:		P
	For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly	Upper limit charging voltage is 4.3V.	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1).....:		P
8.2	Intended use		P
8.2.1	Continuous charging at constant voltage (cells)		P
	Results: No fire. No explosion .....	See Table 8.2.1	P
8.2.2	Moulded case stress at high ambient temperature (battery)		P
	Oven temperature (°C) .....	70 °C	—
	Results: No physical distortion of the battery casing resulting in exposure if internal components	No physical distortion of the battery casing	P
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise	Arrange the test as required.	P
	Results: No fire. No explosion .....	See Table 8.3.1	P
8.3.2	External short circuit (battery)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- The case temperature declined by 20% of the maximum temperature rise	Arrange the test as required.	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	Arrange the test as required.	P
	Results: No fire. No explosion .....	See Table 8.3.2	P
8.3.3	Free fall		P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.4	Thermal abuse (cells)		P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or	Arrange the test as required.	P
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)	Not large cells used in the battery.	N/A
	Oven temperature (°C) .....	130°C	—
	Gross mass of cell (g) .....	57g	—
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.5	Crush (cells)		P
	The crushing force was released upon: - The maximum force of 13 kN± 1 kN has been applied; or	Arrange the test as required.	P
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N/A
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion .....	See Table 8.3.5	P
8.3.6	Over-charging of battery		P
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or	Arrange the test as required.	P
	- Returned to ambient		N/A
	Results: No fire. No explosion .....	See Table 8.3.6	P
8.3.7	Forced discharge (cells)		P
	Results: No fire. No explosion .....	See Table 8.3.7	P
8.3.8	Transport tests		P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	The battery passed the UN38.3 test. Refer test report No.: RZUN2017-2285	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.9	Design evaluation – Forced internal short circuit (cells)	Lithium-ion Polymer Battery.	N/A
	The cells complied with national requirement for..... :		—
	The pressing was stopped upon: - 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.....:	See Table 8.3.9	N/A

9	Information for safety		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Information mentioned in the cell specification.	P
	The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards.	Information mentioned on the battery label and in the battery specification.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	Information mentioned on the battery label and in the battery specification .	P
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user .....	Information mentioned on the battery label and in the battery specification.	P

10	Marking		P
10.1	Cell marking		N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	By agreement between the manufacturer and user, cells used in the manufacture of a battery need not be marked.	N/A
10.2	Battery marking		P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	See Copy of Marking Plate item in the page 4 of this report.	P
	Batteries marked with an appropriate caution statement.	Information mentioned in the battery specification.	P
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.	Information mentioned on the battery label and in the battery specification.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Recommended charging instructions marked on or supplied with the battery.	Information mentioned in the battery specification.	P

<b>11</b>	<b>Packaging</b>		<b>P</b>
	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.	The proper packaging description is provided in the product specification, which can avoid unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants.	P

<b>Annex A</b>	<b>Charging range of secondary lithium ion cells for safe use</b>		<b>P</b>
A.1	General		P
A.2	Safety of lithium-ion secondary battery		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		P
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range		P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		P
A.4.3	High temperature range		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 high temperature range		N/A
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N/A
A.4.4	Low temperature range		P
A.4.4.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		P
A.4.5	Scope of the application of charging current		P
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
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		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 to cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle to winding core		N/A
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		N/A
A.5.6	Insertion of nickel particle to prismatic cell		N/A



IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
<b>TABLE: Critical components information</b>					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
Cell	Springpower Technology (ShenZhen) Co.,LTD.	626071	3.8 V, 4000 mAh	IEC 62133:2012	Tested with appliance
Control IC	SEIKO	S-8261DBQ-I6T1U	VCU: 4.405 V to 4.445 V VDL: 2.750 V to 2.850 V	IEC 62133:2012	Tested with appliance
MOSFET	UBIQ	QM2538N3	VDS : 20V ID : 56A VGS : ±8V	IEC 62133:2012	Tested with appliance
PCB	Various	Various	V-0, 130°C	UL 94	UL recognized
<b>Supplementary information:</b>					

IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
<b>7.2.1</b>	<b>TABLE: Continuous low rate charge (cells)</b>				N/A
Model	Recommended charging method, (CC, CV, or CC/CV)	Recommended charging voltage $V_c$ , (Vdc)	Recommended charging current $I_{rec}$ , (A)	OCV at start of test, (Vdc)	Results
N/A	N/A	N/A	N/A	N/A	N/A
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>					

<b>7.2.2</b>	<b>TABLE: Vibration</b>		N/A
Model	OCV at start of test, (Vdc)	Results	
N/A	N/A	N/A	
<b>Supplementary information:</b>			
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>			

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.1	<b>TABLE: Incorrect installation (cells)</b>		N/A
Model	OCV of reversed cell, (Vdc)	Results	
N/A	N/A	N/A	
<b>Supplementary information:</b>			
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>			

7.3.2	<b>TABLE: External short circuit</b>					N/A
Model	Ambient (at 20°C ± 5°C or 55°C ± 5°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (°C)	Results	
N/A	N/A	N/A	N/A	N/A	N/A	
<b>Supplementary information:</b>						
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>						

7.3.6	<b>TABLE: Crush</b>			N/A
Model	OCV at start of test, (Vdc)	OCV at removal of crushing force, (Vdc)	Results	
N/A	N/A	N/A	N/A	
<b>Supplementary information:</b>				
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>				

IEC 62133				
Clause	Requirement + Test	Result - Remark	Verdict	
7.3.8	<b>TABLE: Overcharge</b>			N/A
Model	OCV prior to charging, (Vdc)	Maximum charge current, (A)	Time for charging, (hours)	Results
N/A	N/A	N/A	N/A	N/A
<b>Supplementary information:</b>				
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>				

7.3.9	<b>TABLE: Forced discharge (cells)</b>			N/A
Model	OCV before application of reverse charge, (Vdc)	Measured reverse charge $I_r$ , (A)	Time for reversed charge, (minutes)	Results
N/A	N/A	N/A	N/A	N/A
<b>Supplementary information:</b>				
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>				

IEC 62133				
Clause	Requirement + Test	Result - Remark		Verdict
<b>8.2.1</b>	<b>TABLE: Continuous charging at constant voltage (cells)</b>			<b>P</b>
Cell No.	Recommended charging voltage $V_{c_3}$ (Vdc)	Recommended charging current $I_{rec_3}$ (mA)	OCV at start of test, (Vdc)	Results
1#	4.3	800	4.253	P1, P2
2#	4.3	800	4.264	P1, P2
3#	4.3	800	4.271	P1, P2
4#	4.3	800	4.264	P1, P2
5#	4.3	800	4.268	P1, P2
<b>Supplementary information:</b>				
P1- No Fire or Explosion				
P2- No Leakage				
P3- Leakage				
P4- Fire				
P5- Explosion				
P6- Bulge				
P7- Other (Please Explain)				

<b>8.3.1</b>	<b>TABLE: External short circuit (cell)</b>				<b>P</b>
Cell No.	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, ( $\Omega$ )	Maximum case temperature rise $\Delta T$ , (°C)	Results
<b>Samples charged at charging temperature upper limit</b>					
6#	23.4	4.249	0.08	78.3	P1
7#	23.5	4.256	0.08	87.8	P1
8#	23.4	4.261	0.08	85.0	P1
9#	23.5	4.258	0.08	81.2	P1
10#	23.5	4.269	0.08	80.3	P1
<b>Samples charged at charging temperature lower limit</b>					
11#	23.4	4.147	0.08	77.7	P1
12#	23.4	4.161	0.08	80.0	P1
13#	23.3	4.171	0.08	82.7	P1
14#	23.4	4.180	0.08	80.0	P1
15#	23.3	4.174	0.08	79.0	P1

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Supplementary information:</b> P1- No Fire or Explosion P2- No Leakage P3- Leakage P4- Fire P5- Explosion P6- Bulge P7- Other (Please Explain) Comments: Samples 11#~15# under tested were equipped with a PTC.			

8.3.2	TABLE: External short circuit (battery)					P
Pack No.	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, ( $\Omega$ )	Maximum case temperature rise $\Delta T$ , (°C)	Results	
<b>Samples charged at charging temperature upper limit</b>						
1#	55.1	4.267	0.08	0.2	P1	
2#	55.1	4.271	0.08	0.3	P1	
3#	55.3	4.258	0.08	0.2	P1	
4#	55.3	4.261	0.08	0.2	P1	
5#	55.1	4.264	0.08	0.4	P1	
<b>Samples charged at charging temperature lower limit</b>						
6#	55.3	4.141	0.08	0.2	P1	
7#	55.3	4.151	0.08	0.3	P1	
8#	55.5	4.164	0.08	0.2	P1	
9#	55.5	4.174	0.08	0.3	P1	
10#	55.5	4.168	0.08	0.2	P1	
<b>Supplementary information:</b> P1- No Fire or Explosion P2- No Leakage P3- Leakage P4- Fire P5- Explosion P6- Bulge P7- Other (Please Explain)						

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.5	TABLE: Crush					P
Cell No.	OCV at start of test, (Vdc)	OCV at removal of crushing force, (Vdc)	Width/ diameter of cell before crush, (mm)	Required deformation for crush, (mm)	Results	
<b>Samples charged at charging temperature upper limit</b>						
16#	4.263	4.263	5.8	0.58	P1	
17#	4.257	4.257	5.8	0.58	P1	
18#	4.258	4.258	5.8	0.58	P1	
19#	4.264	4.264	5.8	0.58	P1	
20#	4.268	4.268	5.8	0.58	P1	
<b>Samples charged at charging temperature lower limit</b>						
21#	4.178	4.178	5.8	0.58	P1	
22#	4.184	4.184	5.8	0.58	P1	
23#	4.185	4.185	5.8	0.58	P1	
24#	4.177	4.177	5.8	0.58	P1	
25#	4.186	4.186	5.8	0.58	P1	
<b>Supplementary information:</b>						
P1- No Fire or Explosion						
P2- No Leakage						
P3- Leakage						
P4- Fire						
P5- Explosion						
P6- Bulge						
P7- Other (Please Explain)						

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.6	<b>TABLE: Over-charging of battery</b>		<b>P</b>
Constant charging current (A) .....		8	—
Supply voltage (Vdc) .....		5	—
Pack No.	OCV before charging, (Vdc)	Maximum outer casing temperature, (°C)	Results
11#	3.322	24.7	P1
12#	3.341	24.5	P1
13#	3.323	24.6	P1
14#	3.334	24.5	P1
15#	3.327	24.6	P1
<b>Supplementary information:</b> P1- No Fire or Explosion P2- No Leakage P3- Leakage P4- Fire P5- Explosion P6- Bulge P7- Other (Please Explain)			

8.3.7	<b>TABLE: Forced discharge (cells)</b>			<b>P</b>
Cell No.	OCV before application of reverse charge, (Vdc)	Measured Reverse charge I <sub>r</sub> , (mA)	Time for reversed charge, (minutes)	Results
26#	3.227	4000	90	P1
27#	3.231	4000	90	P1
28#	3.241	4000	90	P1
29#	3.226	4000	90	P1
30#	3.233	4000	90	P1
<b>Supplementary information:</b> P1- No Fire or Explosion P2- No Leakage P3- Leakage P4- Fire P5- Explosion P6- Bulge P7- Other (Please Explain)				



IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
<b>8.3.9</b>	<b>TABLE: Forced internal short circuit (cells)</b>				<b>N/A</b>
Cell No.	Chamber ambient, (°C)	OCV at start of test, (Vdc)	Particle location <sup>1)</sup>	Maximum applied pressure, (N)	Results
N/A	N/A	N/A	N/A	N/A	N/A
<p><b>Supplementary information:</b></p> <p><sup>1)</sup>Identify one of the following:</p> <p>1: Nickel particle inserted between positive and negative (active material) coated area.</p> <p>2: Nickel particle inserted between positive aluminium foil and negative active material coated area.</p> <p>P1- No Fire or Explosion  P2- No Leakage  P3- Leakage  P4- Fire  P5- Explosion  P6- Bulge  P7- Other (Please Explain)</p>					

**List of test equipment used**

Clause	Measurement/ testing	Testing/measuring equipment/material used, (equipment ID)	Range used	Last calibration date	Calibration due date
8.2.1	Continuous charging at constant voltage (cells)	RF-T Battery Testing System	0~5A, 0~10V	2017-05-24	2018-05-23
8.2.2	Moulded case stress at high ambient temperature (battery)	Programmable chamber	-40~+160℃	2017-05-10	2018-05-09
8.3.1 & 8.3.2	External short circuit	Data recorder apparatus (Temperature and Voltage recorder)	-200~1370℃	2017-05-24	2018-05-23
8.3.1 & 8.3.2	External short circuit	Milliohm-meter	1uΩ~2MΩ	2017-05-24	2018-05-23
8.3.3	Free fall	Free fall testing table	0~2m	2016-12-07	2017-12-06
8.3.4	Thermal abuse (cells)	Explosion-proof oven	+25℃ ~+160℃	2017-06-05	2018-06-04
8.3.5	Crush (cells)	Crush Apparatus	0~15KN	2017-05-24	2018-05-23
8.3.6	Over-charging of battery	RF-T Battery Testing System	0~5A, 0~10V	2017-05-24	2018-05-23
8.3.7	Forced discharge (cells)	RF-T Battery Testing System	0~5A, 0~10V	2017-05-24	2018-05-23
8.3.9	Design evaluation – Forced internal short circuit (cells)	Battery Internal Short Circuit Apparatus	0~2000N,0~10V	2017-05-24	2018-05-23

**Photo document**

Photo 1– Top view of battery pack



The Battery marking (See Page 4) will be marked here.

Photo 2 - Bottom view of battery pack

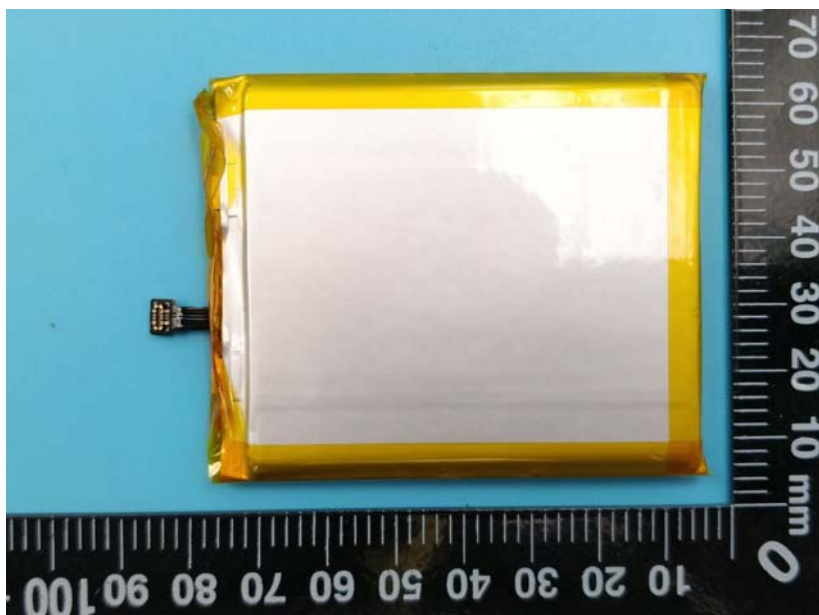


Photo 3 - Top view of Cell



Photo 4 - Bottom view of Cell

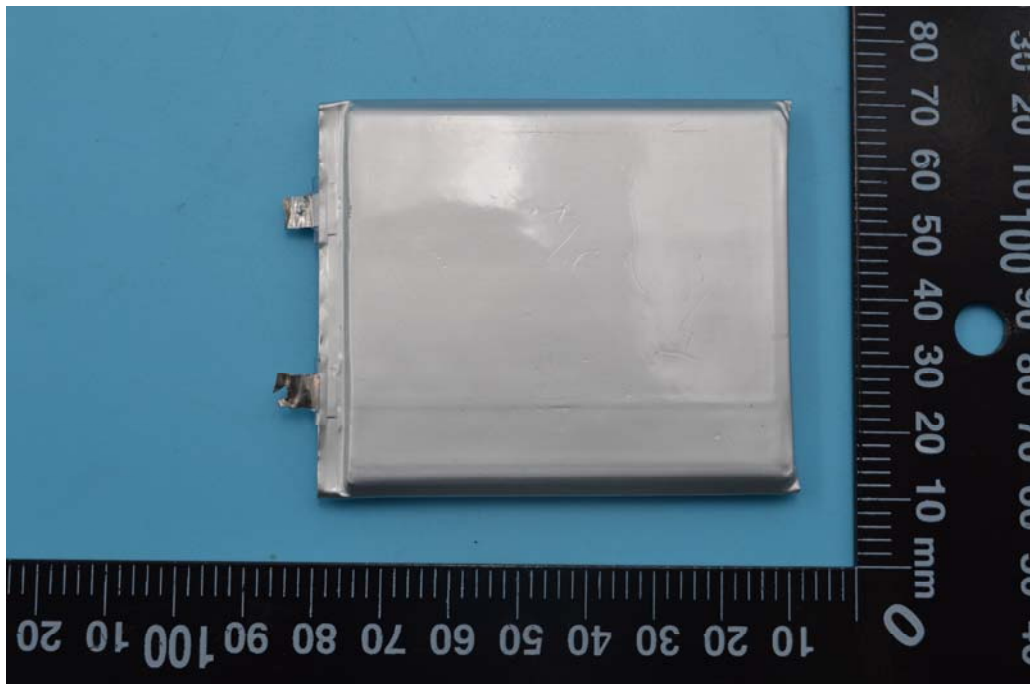


Photo 5 - Top view of PCB

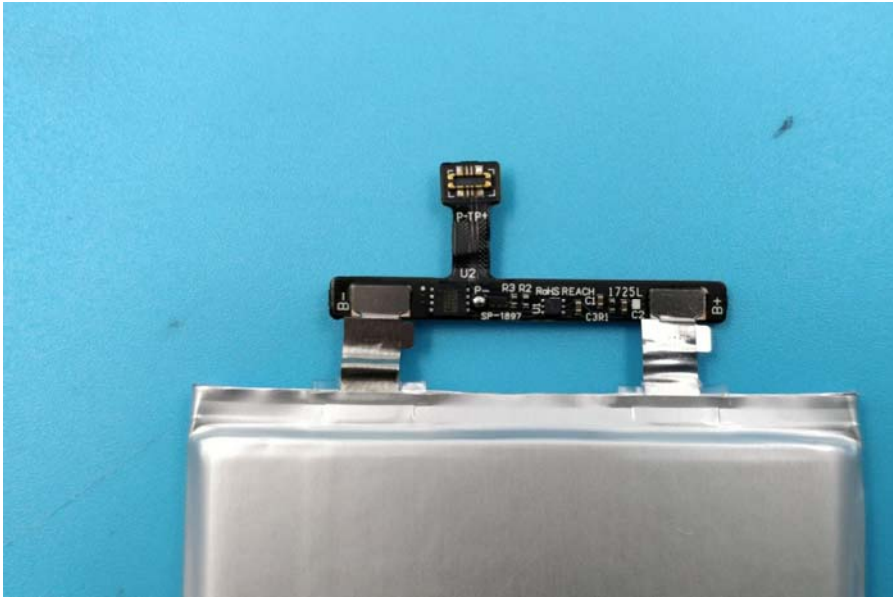


Photo 6 - Bottom view of PCB

