



Test Report issued under the responsibility of:

**SGS Fimko Ltd.**

**TEST REPORT  
IEC 62133**

**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**

Report Number .....: SZES161000415701

Date of issue .....: 2016-11-15

Total number of pages .....: 22 Pages

Applicant's name .....: Shenzhen Motoma Power Co., Ltd.

Address .....: 321 3/F, Building A, 5<sup>th</sup> Zone, Honghualing Industrial Zone, Taoyuan Road, Nanshan, Shenzhen, Guangdong, China.

**Test specification:**

Standard .....: IEC 62133: 2012 (Second Edition)

Test procedure .....: CB Scheme

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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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

Test item description .....: Li-ion Battery

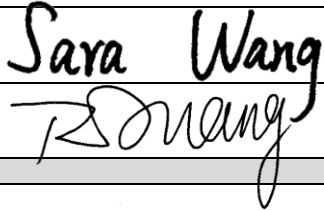
Trade Mark .....: MOTOMA

Manufacturer .....: Same as applicant

Model/Type reference .....: LCR18650

Ratings .....: Rated Voltage: 7,4 V d.c.

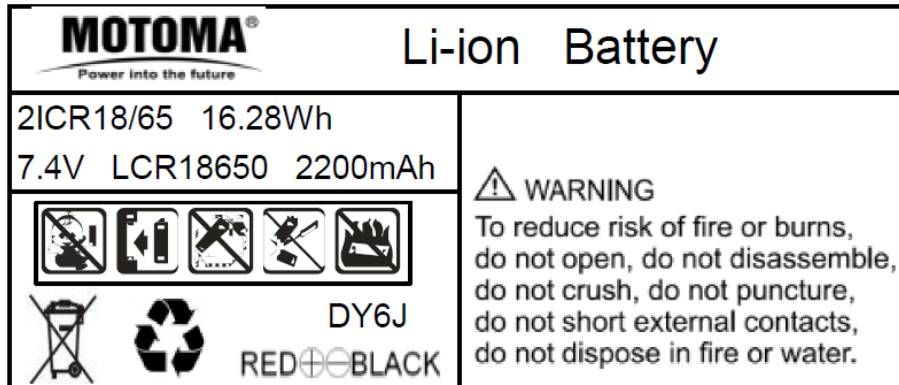
Rated Capacity: 2200 mAh (16,28 Wh)

<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
<b>Testing location/ address .....</b>		No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China 518057
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	N/A
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature) .....</b>		Sara Wang
<b>Approved by (name + signature) .....</b>		Rocky Wang
		
<input type="checkbox"/>	<b>Testing procedure: TMP</b>	N/A
<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>	N/A
<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>	N/A
<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: 5 pages of Photos;          Attachment 2: 1 page of Information for safety;          Attachment 3: 1 page of Packaging;          Attachment 4: 2 pages of Product specification;          Attachment 5: 1 page of ISO9001 certificate.</p>	
<p><b>Summary of testing:</b>          The sample(s) tested complies with the requirements of IEC 62133: 2012.</p> <p>When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p> <p>Remark:</p> <ol style="list-style-type: none"> <li>Battery and cell were considered and tested according to standard in this report;</li> <li>Clause 8.3.8 was considered, the battery was separately tested according to UN38.3 by CVC (Test report: RZUN2016-2880).</li> </ol>	
<p><b>Tests performed (name of test and test clause):</b>  <b>Specific requirements and tests (lithium systems)</b></p> <p><input type="checkbox"/> 5.2 Insulation resistance</p> <p><input checked="" type="checkbox"/> 8.2.1 Continuous charging at constant voltage (cells)</p> <p><input type="checkbox"/> 8.2.2 Moulded case stress at high ambient temperature (battery)</p> <p><input checked="" type="checkbox"/> 8.3.1 External short circuit (cell)</p> <p><input checked="" type="checkbox"/> 8.3.2 External short circuit (battery)</p> <p><input checked="" type="checkbox"/> 8.3.3 Free fall</p> <p><input checked="" type="checkbox"/> 8.3.4 Thermal abuse (cells)</p> <p><input checked="" type="checkbox"/> 8.3.5 Crush (cells)</p> <p><input checked="" type="checkbox"/> 8.3.6 Over-charging of battery</p> <p><input checked="" type="checkbox"/> 8.3.7 Forced discharge (cells)</p> <p><input checked="" type="checkbox"/> 8.3.8 Transport tests</p> <p><input type="checkbox"/> 8.3.9 Design evaluation – Forced internal short circuit (cells)</p>	<p><b>Testing location:</b>          SGS-CSTC Standards Technical Services Co., Ltd.          Shenzhen Branch          No. 1 Workshop, M-10, Middle Section, Science &amp; Technology Park, Shenzhen, Guangdong, China 518057</p>
<p><b>Summary of compliance with National Differences</b>  <b>List of countries addressed: none.</b></p> <p><input checked="" type="checkbox"/> <b>The product fulfils the requirements of EN 62133: 2013.</b></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.



Remark: '6J' means manufacturing date: '16' is the year 2016; 'J' is the month from A to L represented January to December.

<b>Test item particulars</b> .....	: --
<b>Classification of installation and use</b> .....	: --
<b>Supply connection</b> .....	: --
<b>Recommend charging method declared by the manufacturer</b> .....	: CC/CV
<b>Discharge current (0,2 I<sub>t</sub> A)</b> .....	: 0,44 A
<b>Specified final voltage</b> .....	: 6,0 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> .....	: 8,4 V
<b>Maximum charging current</b> .....	: 1100 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 type="checkbox"/> solid polymer
<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> .....	: 2016-10-25
<b>Date (s) of performance of tests</b> .....	: 2016-10-25 to 2016-11-01

**General remarks:**

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

"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

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

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**Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 02:**

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 ..... :  
 **Yes**  
 **Not applicable**

**When differences exist; they shall be identified in the General product information section.**

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

**General product information:**

Product description:	Li-ion Battery
Model of pack:	LCR18650
Designation of pack:	2ICR18/65
Rated voltage:	7,4 V
Rated capacity:	2200 mAh
Maximum charge current:	1100 mA
Number of cells in battery pack:	Two cells in series
Model of cell:	LCR18650
Designation of cell:	ICR18/65
Rated voltage of cell:	3,7 V
Rated capacity of cell:	2200 mAh
Maximum charge current of cell:	1100 mA

Remark: See Attachment 4 for more detail.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>Parameter measurement tolerances</b>		P
	Parameter measurement tolerances		P
<b>5</b>	<b>General safety considerations</b>		P
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		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 creepage and clearance 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: Two cells in series. Insulation tape wrapping the cells.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	Ditto	P
5.4	Temperature/voltage/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	Ditto	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	See Attachment 4 for detail	P
5.5	Terminal contacts		P

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminals have a clear polarity marking on the external surface of the battery	Battery packs with keyed external terminal which prevents reverse polarity connections.	N/A
	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 circuits		P
5.6	Assembly of cells into batteries		P
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	Single battery pack without separate case (for installation within end equipment)	N/A
	Each battery has an independent control and protection		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		N/A
	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		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		N/A
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard		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		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.		N/A



<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	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	Two cells in series. Charging voltage of the single cell does not exceed 4,25 V	P
	- 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		N/A
	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	Two cells in series. Charging voltage of the single cell does not exceed 4,25 V	P
	- 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		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	ISO 9001 certificate was submitted. See Attachment 5 for detail.	P
<b>6</b>	<b>Type test conditions</b>		P
	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 performed according to specified in table 2 of the standard The cell samples are not more than 6 months old (all of them were produced at 2016-10). See marking plate.	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	The tests are conducted in an ambient of 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	Lithium systems	N/A
7.2	Intended use		N/A
7.2.1	Continuous low-rate charging (cells)		N/A
	Results: No fire. No explosion		N/A

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.2	Vibration		N/A
	Results: No fire. No explosion. No leakage		N/A
7.2.3	Moulded case stress at high ambient temperature		N/A
	Oven temperature (°C)..... :		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
7.2.4	Temperature cycling		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3	Reasonably foreseeable misuse		N/A
7.3.1	Incorrect installation cell		N/A
	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		N/A
	- A stabilized dc power supply.		N/A
	Results: No fire. No explosion..... :		N/A
7.3.2	External short circuit		N/A
	The cells or batteries 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		N/A
	Results: No fire. No explosion..... :		N/A
7.3.3	Free fall		N/A
	Results: No fire. No explosion.		N/A
7.3.4	Mechanical shock (crash hazard)		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3.5	Thermal abuse		N/A
	Oven temperature (°C)..... :		—
	Results: No fire. No explosion.		N/A
7.3.6	Crushing of cells		N/A
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		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		N/A

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :		N/A
7.3.7	Low pressure		N/A
	Chamber pressure (kPa)..... :		—
	Results: No fire. No explosion. No leakage.		N/A
7.3.8	Overcharge		N/A
	Results: No fire. No explosion..... :		N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion..... :		N/A
<b>8</b>	<b>Specific requirements and tests (lithium systems)</b>		P
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		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		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 upper charging temperature is 45°C in specification. The lower charging temperature is 0°C in specification.	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) .....	See the test result.	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		N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) .....		N/A
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)		N/A
	Oven temperature (°C) .....		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
8.3	Reasonably foreseeable misuse		P

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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		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	Protection circuit were used.	P
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	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
	Results: No fire. No explosion..... :	(See Table 8.3.2)	P
8.3.3	Free fall		P
	Results: 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		P
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N/A
	Oven temperature (°C) .....	130°C	—
	Gross mass of cell (g) .....	43,6 g	—
	Results: 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		N/A
	- 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		P
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.6	Over-charging of battery		P

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		P
	- Returned to ambient		N/A
	Results: No fire. No explosion..... :	(See 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	UN38.3 test report was submitted. Report No.: RZUN2016-2880 issued by CVC	P
8.3.9	Design evaluation – Forced internal short circuit (cells)	The applicant declares that this cell isn't to be sold in France, Japan, Republic of Korea and Switzerland.	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 ..... :		N/A
<b>9</b>	<b>Information for safety</b>		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	See Attachment 4 for detail.	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.	Ditto	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, information relating to hazard avoidance resulting from a system analysis is provided to the end user ..... :	Not for end user	N/A
<b>10</b>	<b>Marking</b>		P
10.1	Cell marking	Only battery will be marked	N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
10.2	Battery marking	See marking plate for detail.	P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.		P
	Batteries marked with an appropriate caution statement.		P
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.	See Attachment 2 for detail.	P
	Recommended charging instructions marked on or supplied with the battery.	See Attachment 4 for detail.	P

<b>11</b>	<b>Packaging</b>		P
	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

<b>Annex A</b>	<b>Charging range of secondary lithium ion cells for safe use</b>		P
A.1	General		P
A.2	Safety of lithium-ion secondary battery		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage		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	The upper limit charging voltage is 4,25 V during test.	N/A
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	The recommended temperature range: 0°C to 45°C in specification.	P
A.4.3	High temperature range	The upper charging temperature is 45°C	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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	The lower charging temperature is 0°C	P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	The cells charged at -5°C by the methods specified in 8.2 to 8.3	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 <sup>1)</sup>
Cell	Dongguan Kanyo Battery Technology Co., Ltd.	LCR18650	3,7 V 2200 mAh	IEC 62133: 2012 EN 62133: 2013	Tested with appliance
- Electrolyte	Dongguan Shanshan Battery Material Co., Ltd	LD-88	Composition: LiPF6+DEC+EC Density: 1,222 g/cm <sup>3</sup> , Conductivity: 10,12 ± 0,5 mS/cm	--	--
- Separator	Dalian Ecopower Technology Co., Ltd	20µm	PP, Air permeability: 350-400 s/100mL , Porosity: 41%, Tensile strength: 143 MPa , Shut down temperature: 140°C, Dimensions: 0,020*1400 mm	--	--
- Anode	Dongguan Kaijin New energy Technology Shares Co., Ltd	AML450	C content: 92%, Particle size D50: 17-23 µm, Specific surface area: 0,9-1,5 m <sup>2</sup> /g, Tap density: ≥1,0 g/cm <sup>3</sup> , Dimensions: 57,5 * 659 mm, Specific capacity: ≥340 mAh/g	--	--



IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
-Cathode	Hunan Shanshan Energy Technology Co.,Ltd.	T31D	LiNiCoMnO <sub>2</sub> , Particle size D50: 11,0 ± 2,0 µm, Specific surface area: 0,30 ± 0,10 m <sup>2</sup> /g, Tap density: ≥2,2 g/cm <sup>3</sup> , Dimensions: 55,5 * 611 mm, Specific capacity: 165 mAh/g	--	--
Protect IC (U1)	Shenzhen Yesight Technology Co., Ltd.	2S1P	Overcharge Detection Voltage: 4,25 ± 0,05 V, Over-discharge Detection Voltage: 2,80 ± 0,080 V, Discharge Current threshold: 8,0 - 16,0 A, Operating temperature range: 130°C	--	--
MOSFET (U3)	AOS	A0882	I <sub>d</sub> : 7 A V <sub>ds</sub> : 20 V	--	--
PCB	SHENZHEN MEIYADI ELECTRONICS CO LTD	MYD-1A	V-0, 130°C, Min. thickness: 0,7 mm	--	UL (E348865)
Lead wires (charge & discharge)	ZHONGSHAN WEIFENG ELECTRICAL EQUIPMENT CO LTD	1007	24 AWG, VW-1, 80°C, 300 V	--	UL (E314135)
<b>Supplementary information:</b> <sup>1)</sup> Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.1	TABLE: Continuous low rate charge (cells)		N/A
7.2.2	TABLE: Vibration		N/A
7.3.1	TABLE: Incorrect installation (cells)		N/A
7.3.2	TABLE: External short circuit		N/A
7.3.6	TABLE: Crush		N/A
7.3.8	TABLE: Overcharge		N/A
7.3.9	TABLE: Forced discharge (cells)		N/A

8.2.1	TABLE: Continuous charging at constant voltage (cells)				P
Model	Recommended charging voltage $V_c$ , (Vdc)	Recommended charging current $I_{rec}$ , (A)	OCV at start of test, (Vdc)	Results	
Cell: LCR18650 (#1)	4,2	1,1	4,190	Pass	
Cell: LCR18650 (#2)	4,2	1,1	4,185	Pass	
Cell: LCR18650 (#3)	4,2	1,1	4,192	Pass	
Cell: LCR18650 (#4)	4,2	1,1	4,186	Pass	
Cell: LCR18650 (#5)	4,2	1,1	4,193	Pass	
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> </ul>					

IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
8.3.1	<b>TABLE: External short circuit (cell)</b>				<b>P</b>
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise $\Delta T$ , (°C)	Results
<b>Samples charged at charging temperature upper limit<sup>1)</sup></b>					
Cell: LCR18650 (#6)	22,8	4,225	0,082	125,0	Pass
Cell: LCR18650 (#7)	22,8	4,226	0,082	128,7	Pass
Cell: LCR18650 (#8)	22,8	4,230	0,082	128,0	Pass
Cell: LCR18650 (#9)	22,8	4,224	0,082	129,7	Pass
Cell: LCR18650 (#10)	22,8	4,232	0,082	127,1	Pass
<b>Samples charged at charging temperature lower limit<sup>2)</sup></b>					
Cell: LCR18650 (#11)	23,1	4,184	0,083	132,3	Pass
Cell: LCR18650 (#12)	23,1	4,185	0,083	126,9	Pass
Cell: LCR18650 (#13)	23,1	4,184	0,083	127,8	Pass
Cell: LCR18650 (#14)	23,1	4,180	0,083	125,5	Pass
Cell: LCR18650 (#15)	23,1	4,182	0,083	128,3	Pass
<b>Supplementary information:</b>					
- No fire or explosion					
<sup>1)</sup> Cells charged at 45°C by using 4,25 V and 1100 mA until the charging current reduced to 110 mA;					
<sup>2)</sup> Cells charged at -5°C by using 4,25 V and 1100 mA until the charging current reduced to 110 mA.					

IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
<b>8.3.2</b>	<b>TABLE: External short circuit (battery)</b>				<b>P</b>
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise $\Delta T$ , (°C)	Results
<b>Samples charged at charging temperature upper limit<sup>1)</sup></b>					
Pack: LCR18650 (#44)	55,1	8,463	0,082	Shut down immediately and test for 24 hours, no max temperature was noted.	Pass
Pack: LCR18650 (#45)	55,1	8,469	0,082		Pass
Pack: LCR18650 (#46)	55,1	8,457	0,082		Pass
Pack: LCR18650 (#47)	55,1	8,459	0,082		Pass
Pack: LCR18650 (#48)	55,1	8,460	0,082		Pass
<b>Samples charged at charging temperature lower limit<sup>2)</sup></b>					
Pack: LCR18650 (#49)	55,4	8,386	0,084	Shut down immediately and test for 24 hours, no max temperature was noted.	Pass
Pack: LCR18650 (#50)	55,4	8,392	0,084		Pass
Pack: LCR18650 (#51)	55,4	8,390	0,084		Pass
Pack: LCR18650 (#52)	55,4	8,395	0,084		Pass
Pack: LCR18650 (#53)	55,4	8,385	0,084		Pass
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- The battery pack remains on test for 24 h.</li> </ul>					
<sup>1)</sup> Batteries charged at 45°C by using 8,5 V and 1100 mA until the charging current reduced to 110 mA;					
<sup>2)</sup> Batteries charged at -5°C by using 8,5 V and 1100 mA until the charging current reduced to 110 mA.					

IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
<b>8.3.5</b>	<b>TABLE: Crush</b>				<b>P</b>
Model	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<sup>1)</sup></b>					
Cell: LCR18650 (#29)	4,234	4,234	18,29	1,829	Pass
Cell: LCR18650 (#30)	4,232	4,232	18,31	1,831	Pass
Cell: LCR18650 (#31)	4,230	4,230	18,26	1,826	Pass
Cell: LCR18650 (#32)	4,237	4,237	18,32	1,832	Pass
Cell: LCR18650 (#33)	4,229	4,229	18,30	1,830	Pass
<b>Samples charged at charging temperature lower limit<sup>2)</sup></b>					
Cell: LCR18650 (#34)	4,181	4,181	18,27	1,827	Pass
Cell: LCR18650 (#35)	4,186	4,186	18,32	1,832	Pass
Cell: LCR18650 (#36)	4,190	4,190	18,30	1,830	Pass
Cell: LCR18650 (#37)	4,185	4,185	18,29	1,829	Pass
Cell: LCR18650 (#38)	4,183	4,183	18,31	1,831	Pass
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- 10% of deformation has occurred, the force was released.</li> </ul>					
<sup>1)</sup> Cells charged at 45°C by using 4,25 V and 1100 mA until the charging current reduced to 110 mA;					
<sup>2)</sup> Cells charged at -5°C by using 4,25 V and 1100 mA until the charging current reduced to 110 mA.					

IEC 62133				
Clause	Requirement + Test	Result - Remark		Verdict
<b>8.3.6</b>	<b>TABLE: Over-charging of battery</b>			<b>P</b>
<b>Constant charging current (A) .....</b>		4,4		—
<b>Supply voltage (Vdc) .....</b>		10,0		—
Model	OCV before charging, (Vdc)	Resistance of circuit, ( $\Omega$ )	Maximum outer casing temperature, ( $^{\circ}\text{C}$ )	Results
Pack: LCR18650 (#57)	6,838	--	40,6	Pass
Pack: LCR18650 (#58)	6,832	--	41,1	Pass
Pack: LCR18650 (#59)	6,764	--	41,9	Pass
Pack: LCR18650 (#60)	6,797	--	40,4	Pass
Pack: LCR18650 (#61)	6,830	--	40,3	Pass
<b>Supplementary information:</b> -No fire or explosion -The ambient temperature is 21,2 $^{\circ}\text{C}$				

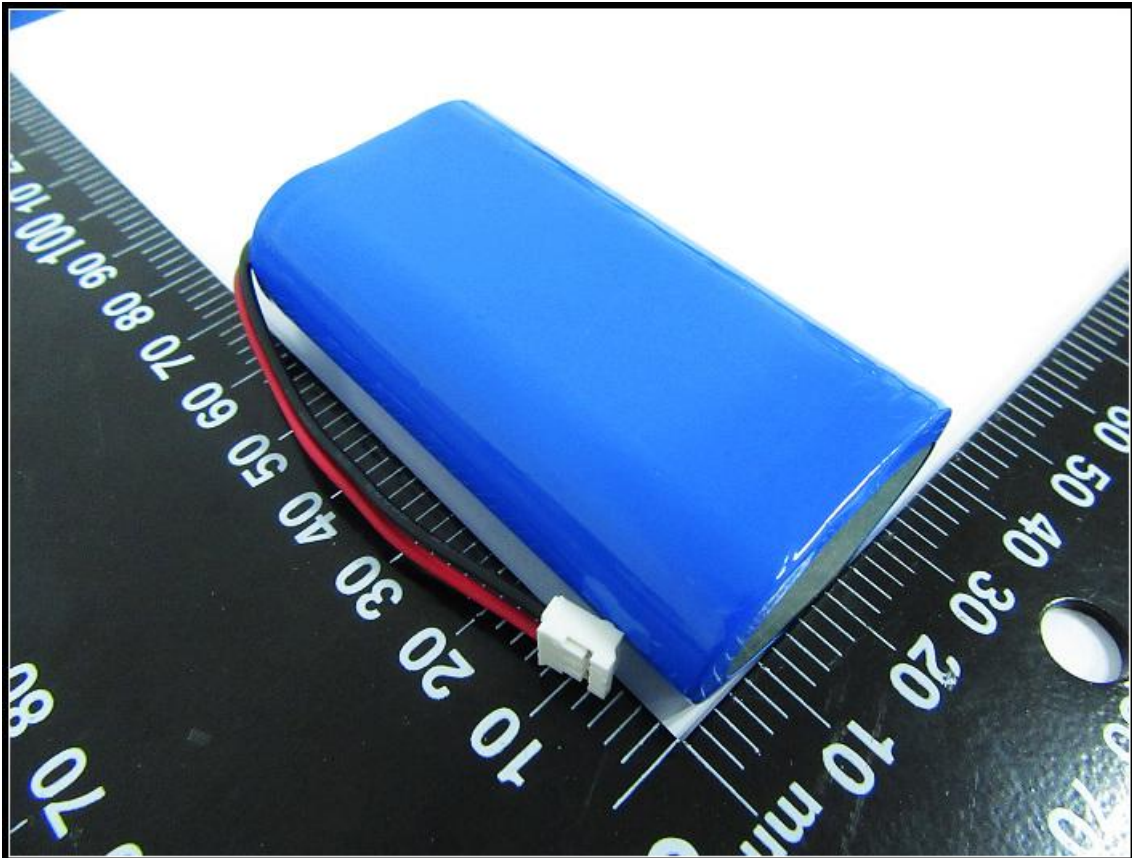
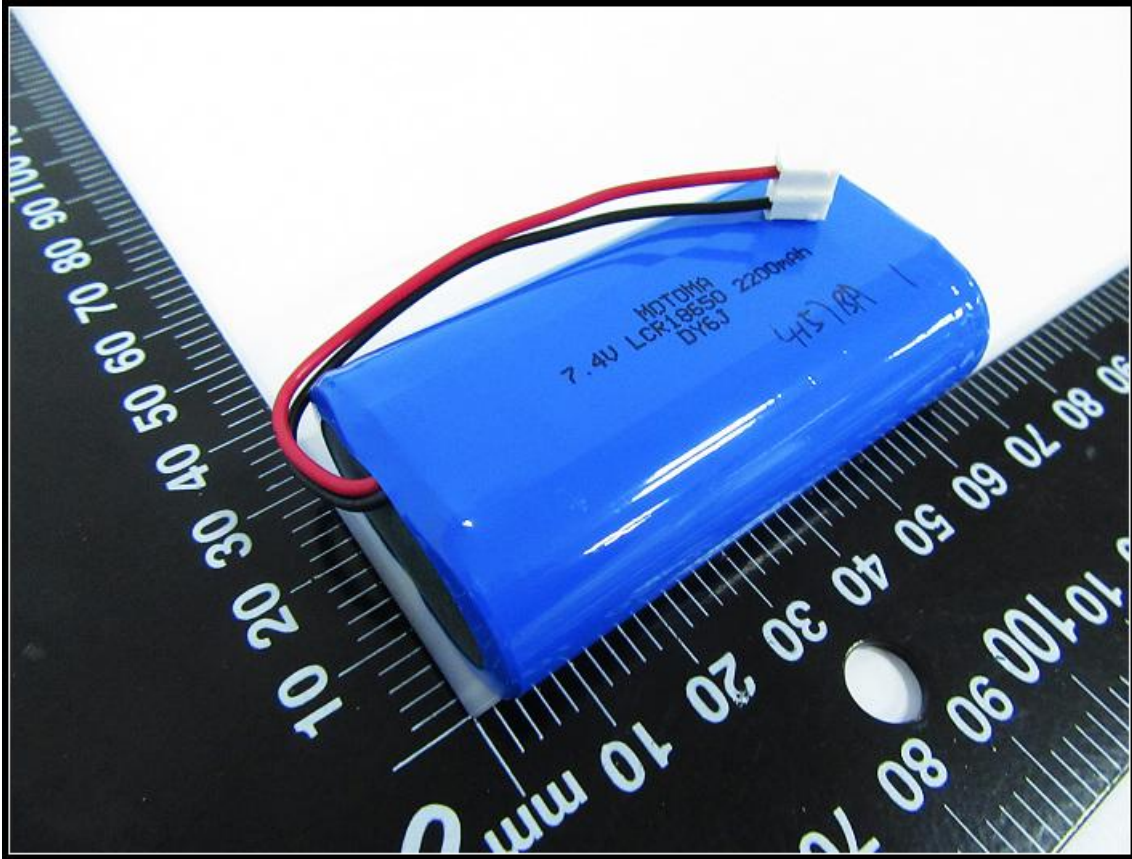
<b>8.3.7</b>	<b>TABLE: Forced discharge (cells)</b>				<b>P</b>
Model	OCV before application of reverse charge, (Vdc)	Measured Reverse charge $I_r$ , (A)	Time for reversed charge, (minutes)	Results	
Cell: LCR18650 (#39)	3,365	2,2	90	Pass	
Cell: LCR18650 (#40)	3,358	2,2	90	Pass	
Cell: LCR18650 (#41)	3,352	2,2	90	Pass	
Cell: LCR18650 (#42)	3,349	2,2	90	Pass	
Cell: LCR18650 (#43)	3,364	2,2	90	Pass	
<b>Supplementary information:</b> - No fire or explosion					

<b>8.3.9</b>	<b>TABLE: Forced internal short circuit (cells)</b>					<b>N/A</b>
Model	Chamber ambient, ( $^{\circ}\text{C}$ )	OCV at start of test, (Vdc)	Particle location <sup>1)</sup>	Maximum applied pressure, (N)	Results	
--	--	--	--	--	--	
<b>Supplementary information:</b> ---						

---End report---

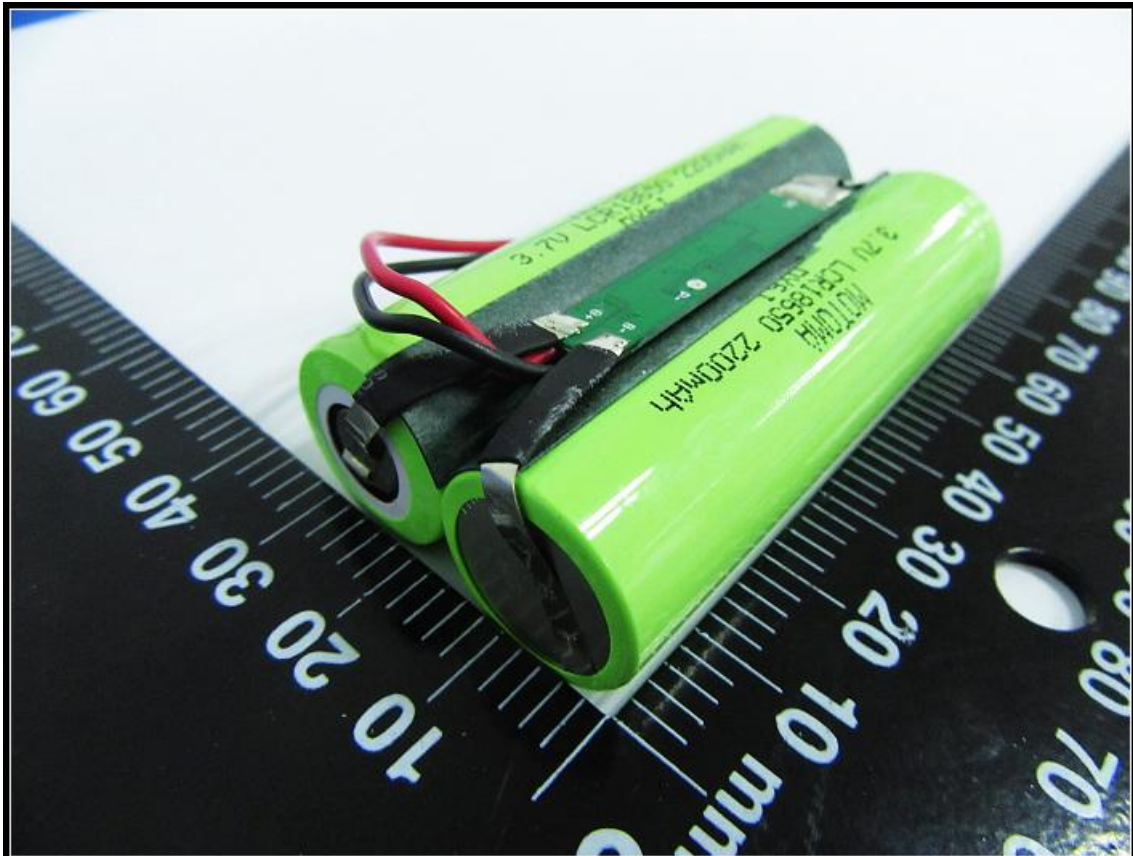
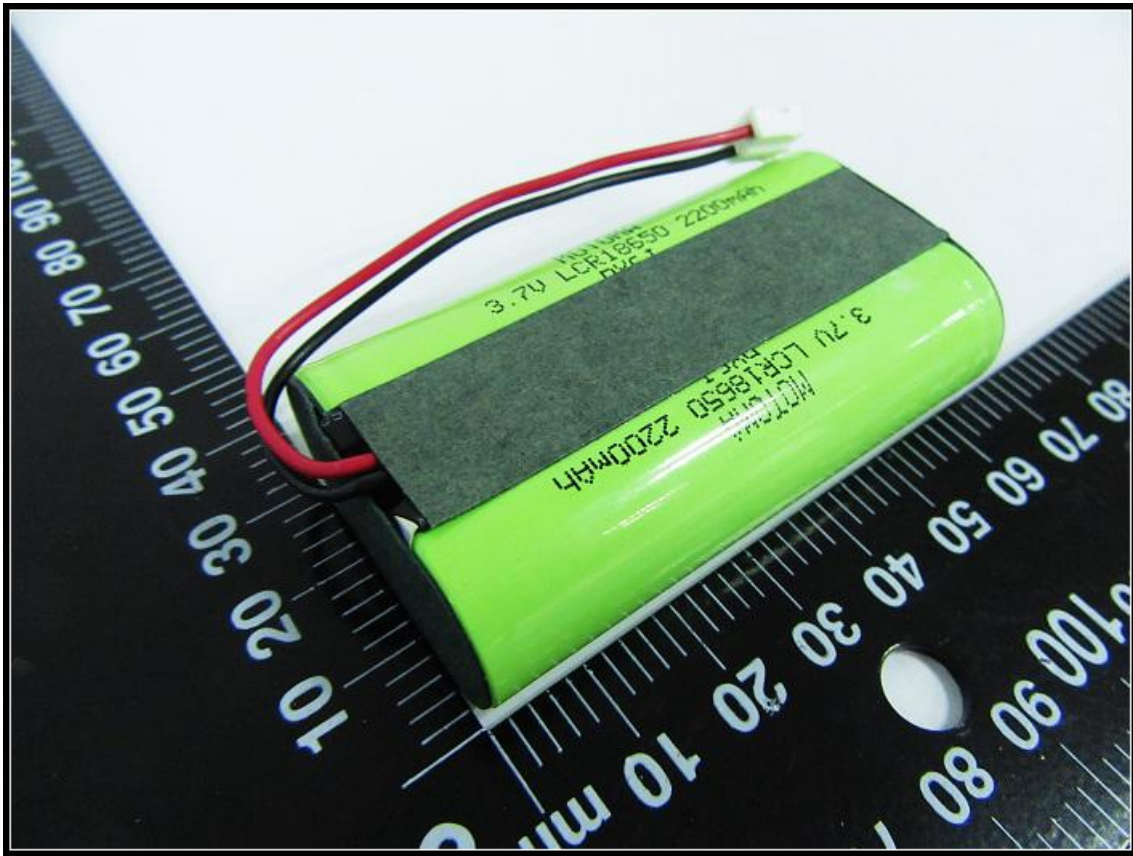
Attachment 1 Photo documentation

Whole unit



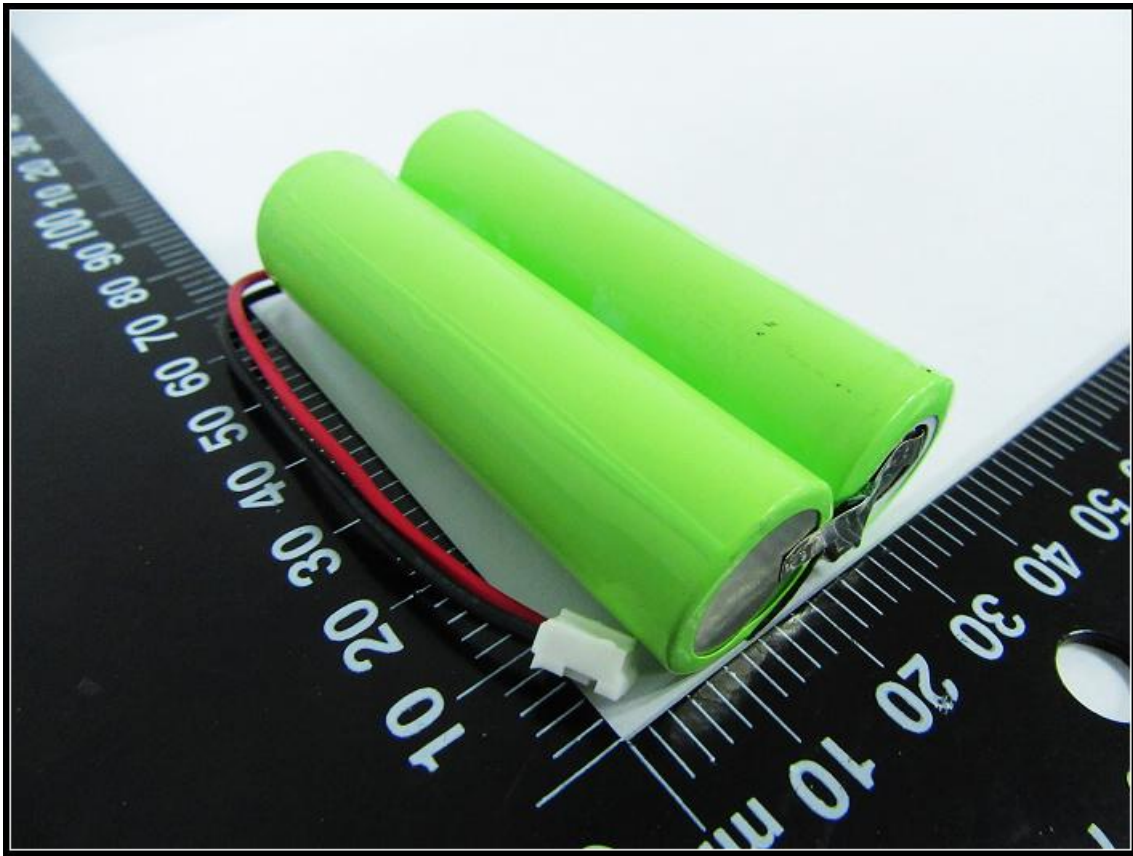


Attachment 1 Photo documentation





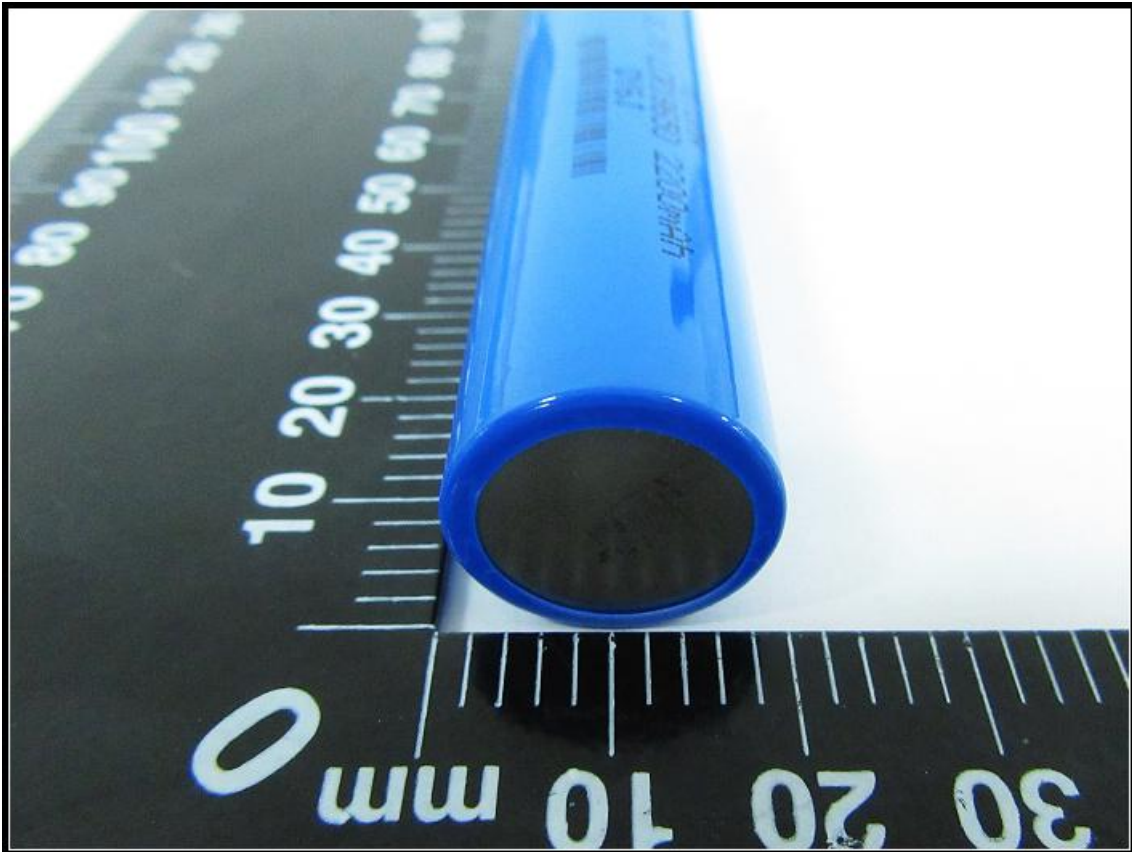
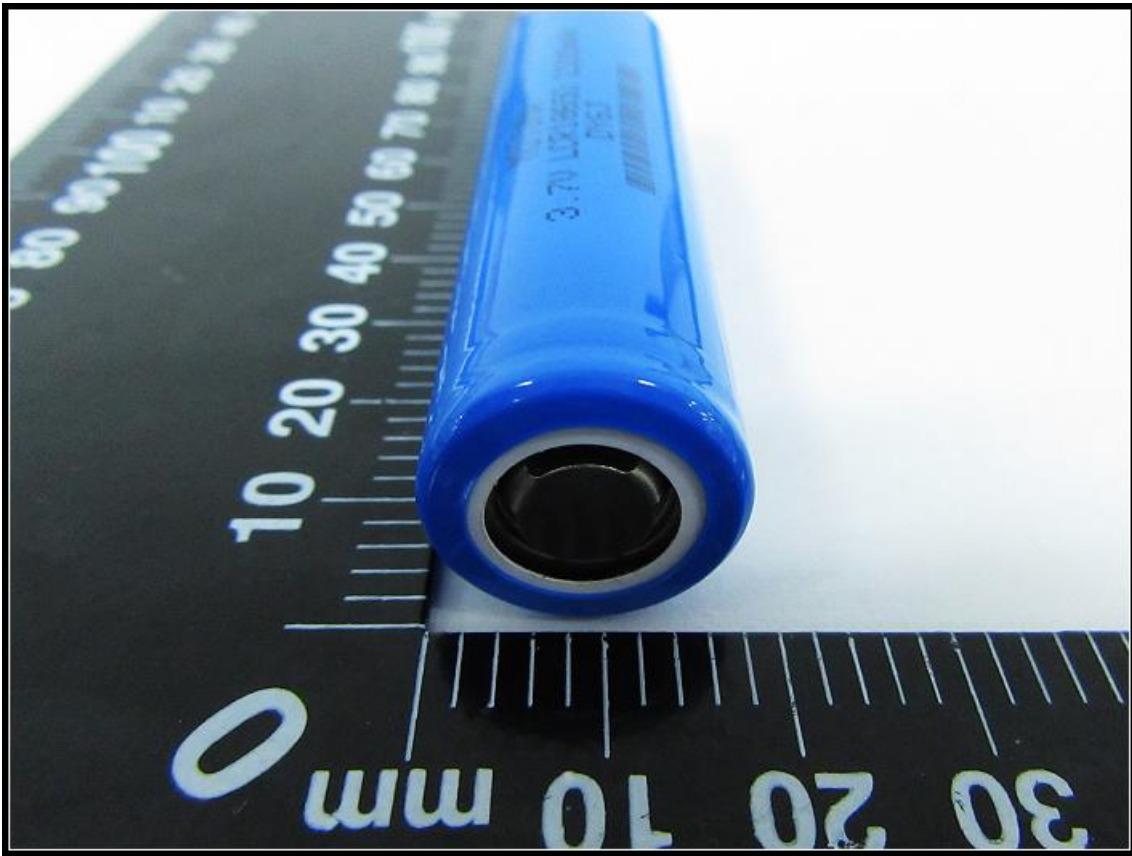
Attachment 1 Photo documentation



Cell



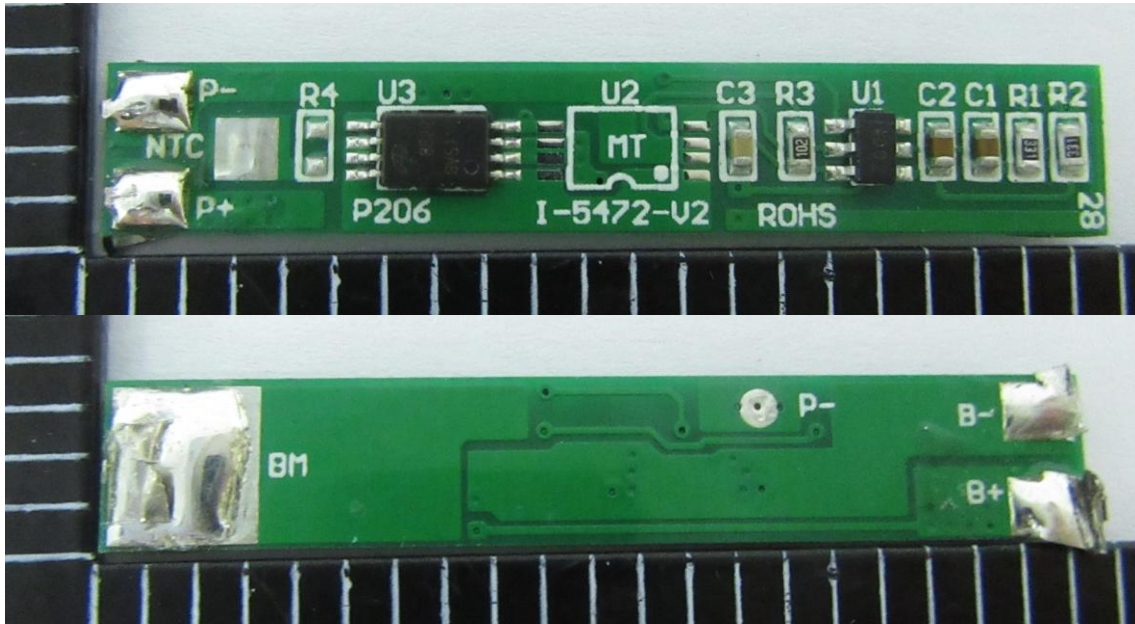
Attachment 1 Photo documentation



Attachment 1 Photo documentation

PWB

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--- End of Attachment 1 ---



**Attachment 2 Information for safety****Handling Instructions****1. WARNING !**

- ◆ Do not immerse the battery in water or allow it to get wet.
- ◆ Do not use or store the battery near sources of heat such as a fire or heater.
- ◆ Do not use any chargers other than those recommended by MOTOMA POWER.
- ◆ Do not reverse the positive(+) and negative(-) terminals.
- ◆ Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
- ◆ Do not put the battery into a fire or apply direct heat to it.
- ◆ Do not short-circuit the battery by connecting wires or other metal objects to the positive(+) and negative(-) terminals.
- ◆ Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.
- ◆ Do not strike, throw or subject the battery to physical shock.
- ◆ Do not directly solder the battery terminals.
- ◆ Do not attempt to disassemble or modify the battery in any way.
- ◆ Do not place the battery in a microwave oven or pressurized container.
- ◆ Do not use the battery in combination with primary batteries(such as dry cell batteries) or batteries of different capacity, type or brand.
- ◆ Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontinue use.

**2. CAUTION !**

- ◆ Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.
- ◆ If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.
- ◆ Use the battery only under the following environmental conditions. Failure to do so can result in reduced performance or a shorten service life. Recharging the battery outside of these temperatures can cause the battery to overheat, explode or catch fire.

Operating environment:

When charging the battery: ☉ ~45°C

When discharging the battery: -20°C~60°C

When stored up to 30 days: -20°C~45°C

When stored up to 90 days: -20°C~35°C

— 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

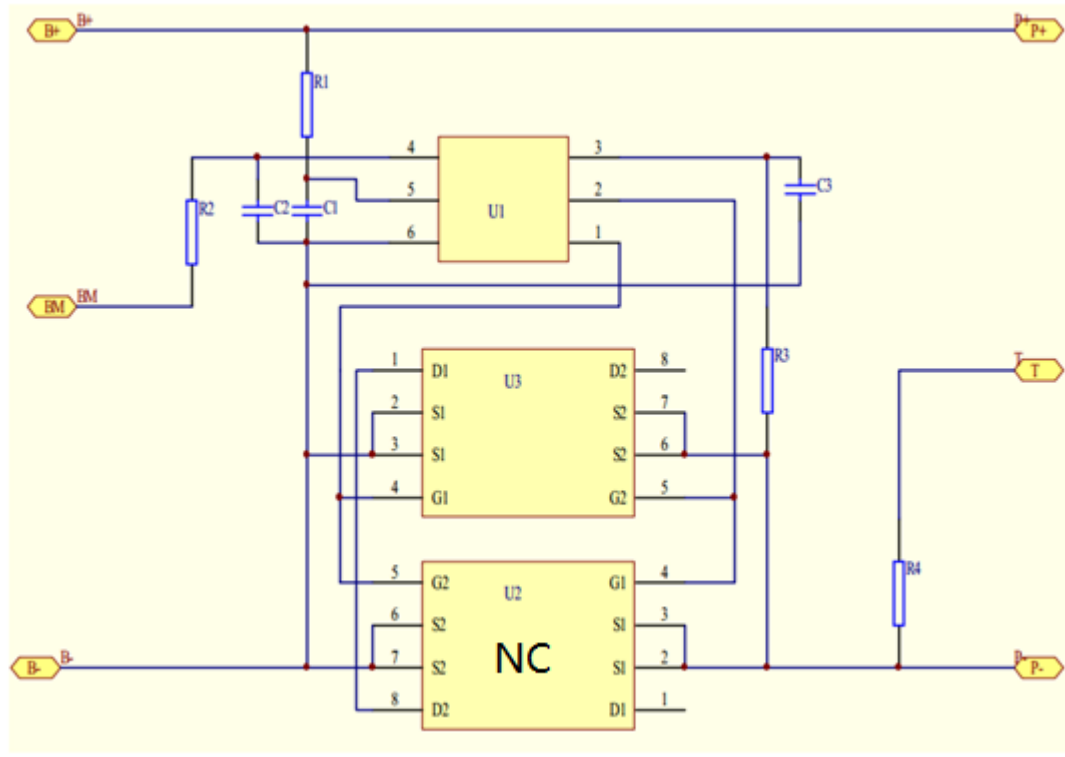
Item	Rating for battery
Capacity	2200 mAh
Nominal Voltage	7,4 V
Discharge Cut-off Voltage	6,0 V
Max. Charge Voltage	8,4 V
Max. Charge Current	1100 mA
Max. Discharge Current	2200 mA
Charge Operating Temperature	0 - 45°C

#### Specification of Cell

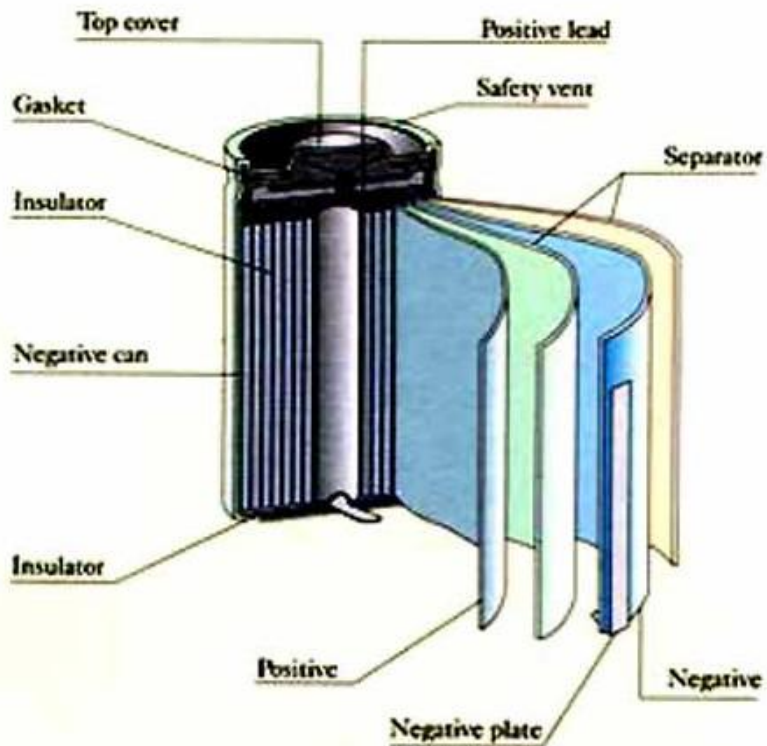
<b>3.1 Nominal voltage</b>	3.7V
<b>3.2 Nominal capacity</b>	2200mAh
<b>3.3 Minimum capacity</b>	2200mAh
<b>3.4 Charging</b>	
Constant Current and Constant Voltage (CC/CV)	
Charge voltage	4.2V
Standard charge current	440mA (0.2C)
End current	22mA (0.01C)
Max. charge current	1100mA (0.5C)
<b>3.5 Discharging</b>	
Standard discharge current	440mA (0.2C)
Max. discharge current	2200mA (1C)
End voltage of discharge	3.0V
<b>3.6 Cycle Life</b>	
Discharge capacity (300th Cycle) $\geq$ 80% of Initial Capacity(0.2C)	
<b>3.7 Operate temperature range (relative humidity: 45%~75%)</b>	
Standard charge	0~45°C
Discharge:	-20~60°C
<b>3.8 Storage (relative humidity: 45%~75%)</b>	
Less than 30 days	-20~45°C
Less than 180 days	-20~35°C
<b>3.9 Internal Impedance</b>	$\leq$ 50m $\Omega$
<b>3.10 Weight</b>	Approx. 45g

**Attachment 4 Product specification**

Circuit diagram



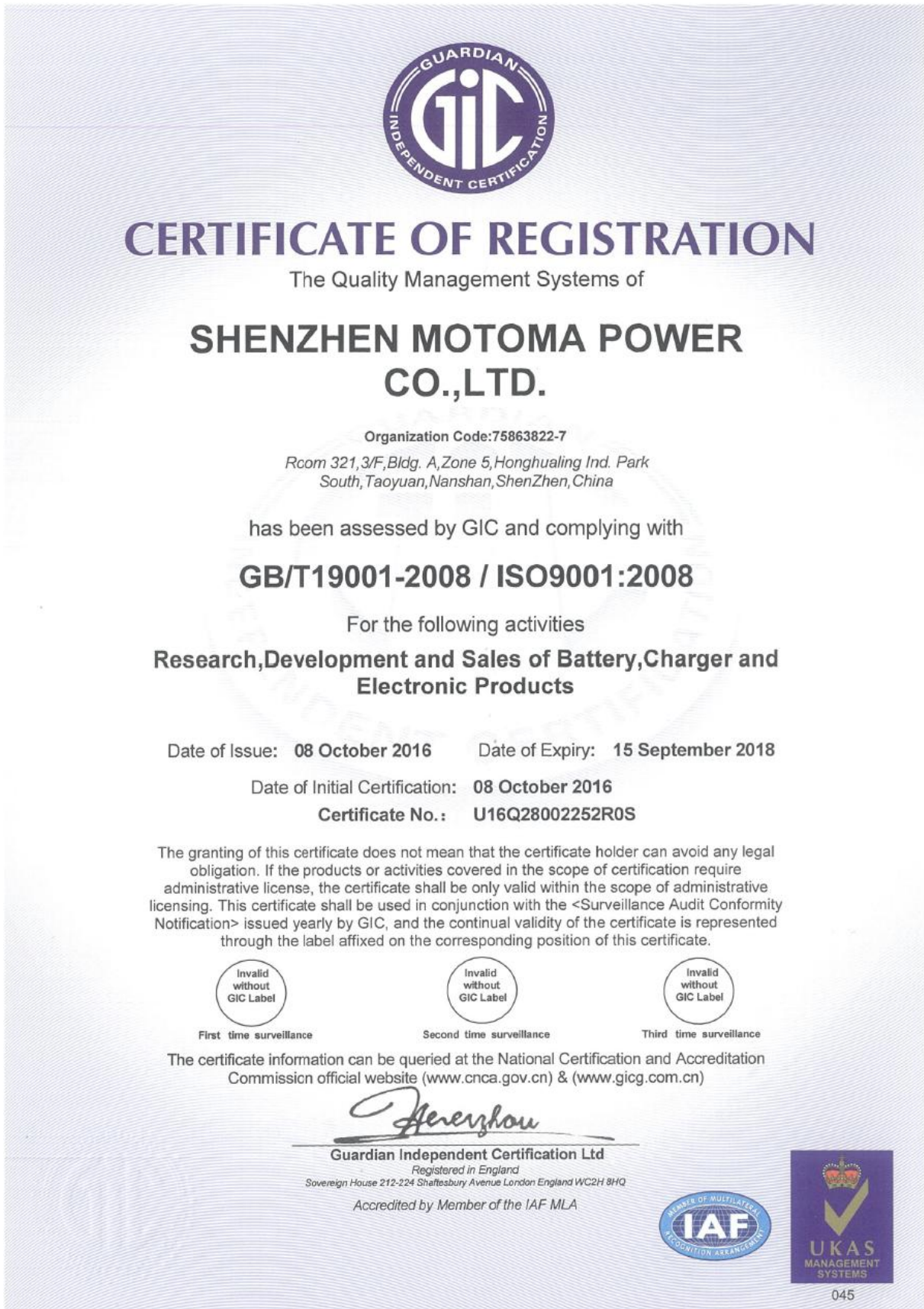
Construction for cell



\*\*\*\*\*End of Attachment 4\*\*\*\*\*



**Attachment 5 ISO 9001 certificate**



# CERTIFICATE OF REGISTRATION

The Quality Management Systems of

## SHENZHEN MOTOMA POWER CO.,LTD.

Organization Code:75863822-7

Room 321,3/F,Bldg. A,Zone 5,Honghualing Ind. Park  
South,Taoyuan,Nanshan,ShenZhen,China

has been assessed by GIC and complying with

**GB/T19001-2008 / ISO9001:2008**

For the following activities

**Research,Development and Sales of Battery,Charger and  
Electronic Products**

Date of Issue: **08 October 2016**      Date of Expiry: **15 September 2018**

Date of Initial Certification: **08 October 2016**

Certificate No.: **U16Q28002252R0S**

The granting of this certificate does not mean that the certificate holder can avoid any legal obligation. If the products or activities covered in the scope of certification require administrative license, the certificate shall be only valid within the scope of administrative licensing. This certificate shall be used in conjunction with the <Surveillance Audit Conformity Notification> issued yearly by GIC, and the continual validity of the certificate is represented through the label affixed on the corresponding position of this certificate.



The certificate information can be queried at the National Certification and Accreditation Commission official website ([www.cnca.gov.cn](http://www.cnca.gov.cn)) & ([www.gicg.com.cn](http://www.gicg.com.cn))

*Herenzhou*

**Guardian Independent Certification Ltd**  
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Accredited by Member of the IAF MLA



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