Test Report issued under the responsibility of:

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

Report Number. ..... :	PNC220422218 02001
Date of issue ..... :	2022-06-09
Total number of pages ..... :	35 pages
Name of Testing Laboratory preparing the Report ..... :	**GUANGDONG UTL CO., LTD.**
Applicant's name ..... :	Dongguan Chenxinsheng Energy Co., LTD
Address ..... :	Room 201, Building 1, No.28, Chenwuzheng Road, Wusha, Chang 'An Town, Dongguan, GUANGDONG, 523860, China.
Test specification:	
Standard ..... :	IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No. ..... :	IEC62133_2B
Test Report Form(s) Originator .... :	DEKRA Certification B.V.
Master TRF ..... :	Dated 2021-08-31

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description ..... :	Rechargeable Li-ion Battery
Trade Mark(s) ..... :	N/A
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	18650-2400mAh, 18650-2200mAh, 18650-2000mAh, 18650-1800mAh, 18650-1500mAh, 18650-1200mAh.
Ratings ..... :	3.7V, 2400mAh, 8.88Wh for model 18650-2400mAh; 3.7V, 2200mAh, 8.14Wh for model 18650-2200mAh; 3.7V, 2000mAh, 7.40Wh for model 18650-2000mAh; 3.7V, 1800mAh, 6.66Wh for model 18650-1800mAh; 3.7V, 1500mAh, 5.55Wh for model 18650-1500mAh; 3.7V, 1200mAh, 4.44Wh for model 18650-1200mAh.

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

☒	**CB Testing Laboratory:**	**GUANGDONG UTL CO., LTD.**	
Testing location/ address.....:		Lianding Testing Building, No.18 Center Road of Yayuan Industrial Zone, Nancheng District, Dongguan, Guangdong, China	
Tested by (name, function, signature).....:		Andy Huang/ Project Handler	Andy Huang
Approved by (name, function, signature)...:		Sophie Wu / Reviewer	Sophie Wu
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

- National Difference (3 pages)
- Enclosure (10 pages)

Summary of testing:

Models 18650-2400mAh, 18650-2000mAh, 18650-1800mAh, 18650-1500mAh, 18650-1200mAh were selected for the tests.

Tests performed (name of test and test clause):	**Testing location:**
Test items: cl.7.1 Charging procedure for test purposes; cl.7.2.1 Continuous charging at constant voltage (cells); cl.7.2.2 Case stress at high ambient temperature (battery); cl.7.3.1 External short-circuit (cells); cl.7.3.2 External short-circuit (batteries); cl.7.3.3 Free fall (cells and batteries); cl.7.3.4 Thermal abuse (cells); cl.7.3.5 Crush (cells); cl.7.3.6 Over-charging of battery; cl.7.3.7 Forced discharge (cells); cl.7.3.8 Mechanical tests (batteries); - 7.3.8.1 Vibration - 7.3.8.2 Mechanical shock cl.7.3.9 Forced internal short-circuit (cells); Tests are made with the number of batteries and cells specified in IEC 62133-2:2017/A1:2021 Table 1.	**GUANGDONG UTL CO., LTD.** Landing Testing Building, No.18 Center Road of Yayuan Industrial Zone, Nancheng District, Dongguan, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

List of countries addressed: KR=Republic of Korea

☒ **The product fulfils the requirements of EN 62133-2: 2017/A1:2021.**

☒ **The product fulfils the requirements of BS EN 62133-2: 2017+A1:2021.**

☒ **The product fulfils the requirements of KC62133-2(2020-07).**

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

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
(-) Black 3.7V 2400mAh 8.88Wh
(+) Red 18650-2400mAh 1ICR19/66
A/S연락처: xxxxxxxx YYMM
Dongguan Chenxinsheng Energy Co., LTD Made in China

Risk of Fire and Burns. Do Not Open, Crush.
Follow Manufacturer's Instructions.

Remark: This is only representative label, others are similar to it except for model name and rating.

Date code: YYMM

YY: Two digitals represent Year of manufacture.
MM: Two digitals represent Month of manufacture.

For example, "2204" means date of manufacture on April of 2022.

Test item particulars.....:	
Classification of installation and use.....:	To be defined in final product
Supply Connection.....:	DC wire
Recommend charging method declared by the manufacturer.....:	CC-CV
Discharge current (0,2 It A).....:	0.2C(see page 7 for detail)
Specified final voltage.....:	2.75V
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current.....:	1C (See page 7 for detail)
Charging temperature upper limit.....:	45°C
Charging temperature lower limit.....:	10°C
Polymer cell electrolyte type.....:	☐ gel polymer ☐ solid polymer ☒ N/A
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/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 .....:	2022-04-24
Date (s) of performance of tests.....:	2022-04-24 to 2022-05-31
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 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) ..... :	Dongguan Chenxinsheng Energy Co., LTD Room 201, Building 1, No.28, Chenwuzheng Road, Wusha, Chang 'An Town, Dongguan, GUANGDONG, 523860, China.

General product information and other remarks:

The battery is constructed with one rechargeable lithium-ion cell (1S1P), and has overcharge, over-discharge, over current and short-circuits proof circuit.

Type reference 1ICR19/66 is standard requirement according to IEC 61960-3 and is identical to Models 18650-2400mAh, 18650-2200mAh, 18650-2000mAh, 18650-1800mAh, 18650-1500mAh, 18650-1200mAh except for model designation.

Models18650-2400mAh, 18650-2200mAh, 18650-2000mAh, 18650-1800mAh, 18650-1500mAh, 18650-1200mAh are identical except for the model designation, capacity and parameter.

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

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
18650-2400mAh (Battery)	2400mAh	3.7V	480mA	480mA	2400mA	2400mA	4.25V	2.75V
18650-2200mAh (Battery)	2200mAh	3.7V	440mA	440mA	2200mA	2200mA	4.25V	2.75V
18650-2000mAh (Battery)	2000mAh	3.7V	400mA	400mA	2000mA	2000mA	4.25V	2.75V
18650-1800mAh (Battery)	1800mAh	3.7V	360mA	360mA	1800mA	1800mA	4.25V	2.75V
18650-1500mAh (Battery)	1500mAh	3.7V	300mA	300mA	1500mA	1500mA	4.25V	2.75V
18650-1200mAh (Battery)	1200mAh	3.7V	240mA	240mA	1200mA	1200mA	4.25V	2.75V

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

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
18650-2400mAh (Cell)	2400mAh	3.7V	480mA	480mA	2400mA	2400mA	4.25V	2.45V
18650-2200mAh (Cell)	2200mAh	3.7V	440mA	440mA	2200mA	2200mA	4.25V	2.45V

18650-2000mAh (Cell)	2000mAh	3.7V	400mA	400mA	2000mA	2000mA	4.25V	2.45V
18650-1800mAh (Cell)	1800mAh	3.7V	360mA	360mA	1800mA	1800mA	4.25V	2.45V
18650-1500mAh (Cell)	1500mAh	3.7V	300mA	300mA	1500mA	1500mA	4.25V	2.45V
18650-1200mAh (Cell)	1200mAh	3.7V	240mA	240mA	1200mA	1200mA	4.25V	2.45V

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
18650-2400mAh (Cell)	4.25V	120mA	10°C	45°C
18650-2200mAh (Cell)	4.25V	110mA	10°C	45°C
18650-2000mAh (Cell)	4.25V	100mA	10°C	45°C
18650-1800mAh (Cell)	4.25V	90mA	10°C	45°C
18650-1500mAh (Cell)	4.25V	75mA	10°C	45°C
18650-1200mAh (Cell)	4.25V	60mA	10°C	45°C

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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	Battery does not contain any exposed metal surfaces.	N/A
	Insulation resistance (MΩ) ..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearances 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	Explosion-proof safety valve for venting exists.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	No Encapsulation.	N/A
5.4	**Temperature, voltage and current management**		P
	Batteries are designed such that abnormal temperature rise conditions are prevented	Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 7.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	See above.	P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified	The charging limits specified in manufacturer's specifications.	P
5.5	**Terminal contacts**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC wire complied with the requirements.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	**Assembly of cells into batteries**		P
5.6.1	General		P
	Each battery has an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region	Protective circuit equipped on battery.	P
	This protection may be provided external to the battery such as within the charger or the end devices		N/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 has protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly	Current, voltage and temperature limits specified by cell manufacturer.	P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer	Battery without selective discharge function.	N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		P
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		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, Max. charging voltage: 4.25V, voltage of cell does not exceed the upper limit of the charging voltage.	P

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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, 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 are not 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 are not discharged beyond the cell manufacturer's specified final voltage	Final voltage of cell: 2.45V, Not exceed the final voltage specified by cell manufacturer.	P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry are 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 are provided to prevent damage as a result of intended use and reasonably foreseeable misuse	Mechanical protection for cell connections and control circuits provided.	P
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product	This shall be considered in end product.	N/A
	The battery case and compartments housing cells are designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer	This shall be considered in end product.	N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product is considered when conducting mechanical tests	This shall be considered in end product.	N/A
5.7	**Quality plan**		P

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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	Complied. ISO 9001 certificate provided.	P
5.8	**Battery safety components**	See TABLE: Critical components information for detail.	N/A

6	**TYPE TEST AND SAMPLE SIZE**		**P**
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old	Test sample not more than six months old.	P
	The internal resistance of coin cells are measured in accordance with Annex D. Coin cells with internal resistance less than or equal to 3 Ω are tested in accordance with Table 1	Not coin cells.	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C ± 5 °C		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and over discharge protection		P
	When conducting the short-circuit test, consideration is 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 °C ± 5 °C, using the method declared by the manufacturer		P
	Prior to charging, the battery has been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P

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Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h to 4 h, at an ambient temperature of the highest test temperature and the lowest test temperature, respectively, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant current to constant voltage charging method	Charge temperature 10-45°C declared.	P
7.2	**Intended use**	See below.	P
7.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		P
	Results: no fire, no explosion, no leakage.....:	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)	Battery with not moulded case, test for reference.	P
	Oven temperature (°C).....:	70°C	—
	Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells	No physical distortion of the battery case resulting in exposure of internal protective components and cells.	P
7.3	**Reasonably foreseeable misuse**	See below.	P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: no fire, no explosion.....:	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Tested complied.	P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise	Single fault for MOSFET (U2).	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	Normal condition.	P
	A single fault in the discharge protection circuit is conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A single fault applies to protective component parts such as MOSFET (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor	Single fault for MOSFET (U2).	P
	Results: no fire, no explosion ..... :	(See appended table 7.3.2)	P
7.3.3	Free fall	Tested complied.	P
	Results: no fire, no explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C) ..... :	130°C	—
	Results: no fire, no explosion	No fire. No explosion.	P
7.3.5	Crush (cells)		P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or	Tested complied.	P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: no fire, no explosion ..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery	Tested complied.	P
	The supply voltage which is:		P
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or	5.95V applied.	P
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/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)	Tested complied.	P
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		P
	The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- 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
	- The discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration. The test is terminated at the end of the testing duration		P
	Results: no fire, no explosion ..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)	Tested complied.	P
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)	Tested complied.	P
	The cells complied with national requirement for ..... :	France, Japan, Republic of Korea and Switzerland.	—
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	800N, cylindrical cells	P
	Results: no fire ..... :	(See appended table 7.3.9)	P
8	**INFORMATION FOR SAFETY**		**P**
8.1	**General**		P
	Manufacturers of secondary cells provides information about current, voltage and temperature limits of their products	Information is provided in manufacturer’s specification.	P
	Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users	Information is provided in manufacturer’s specification.	P
	Systems analyses are 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 is provided to the end user		N/A
8.2	**Small cell and battery safety information**	Not small cell and battery.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A
9	**MARKING**		**P**
9.1	**Cell marking**	The final product is battery.	N/A
	Cells are 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 are marked as specified in IEC 61960, except for coin batteries	IEC Designation: 1ICR19/66	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity		N/A
	Batteries are marked with an appropriate caution statement		P
	- Terminals have clear polarity marking on the external surface of the battery, or		P
	- 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**	Not small cell and battery.	N/A
	Coin cells and batteries identified as small batteries include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A
	Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion is given on the immediate package		N/A
9.4	**Other information**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The following information are marked on or supplied with the battery:		P
	- Storage and disposal instructions	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	- Recommended charging instructions	Information for recommended charging instructions mentioned in manufacturer's specifications.	P
10	**PACKAGING AND TRANSPORT**		**N/A**
	Packaging for coin cells are not be small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells.	N/A
ANNEX A	**CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE**		**P**
A.1	**General**		P
A.2	**Safety of lithium ion secondary battery**		P
A.3	**Consideration on charging voltage**		P
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A.3.2	Upper limit charging voltage	4.25V.	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	4.25V applied.	P
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A.4.2	Recommended temperature range	See A.4.2.2.	P
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A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature declared by client is: 10-45°C	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

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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
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ANNEX D	**MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS**		**N/A**
D.1	**General**		N/A
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 greater than 3 Ω require no further testing .....:	(See appended table D.2)	N/A
	Coin cells with an internal resistance less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
ANNEX E	**PACKAGING AND TRANSPORT**		**P**
ANNEX F	**COMPONENT STANDARDS REFERENCES**		**N/A**

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7.2.1	TABLE: Continuous charging at constant voltage (cells)			P
Sample No.	**Recommended charging voltage Vc (Vdc)**	**Recommended charging current I_{rec} (A)**	**OCV before test (Vdc)**	**Results**
Model: 18650-2400mAh				
SLine-1-1	4.25	0.48	4.241	A, B
SLine-1-2	4.25	0.48	4.238	A, B
SLine-1-3	4.25	0.48	4.240	A, B
SLine-1-4	4.25	0.48	4.238	A, B
SLine-1-5	4.25	0.48	4.240	A, B
Model: 18650-2000mAh				
SLine-3-1	4.25	0.40	4.240	A, B
SLine-3-2	4.25	0.40	4.237	A, B
SLine-3-3	4.25	0.40	4.239	A, B
SLine-3-4	4.25	0.40	4.239	A, B
SLine-3-5	4.25	0.40	4.236	A, B
Model: 18650-1800mAh				
SLine-5-1	4.25	0.36	4.239	A, B
SLine-5-2	4.25	0.36	4.238	A, B
SLine-5-3	4.25	0.36	4.237	A, B
SLine-5-4	4.25	0.36	4.238	A, B
SLine-5-5	4.25	0.36	4.233	A, B
Model: 18650-1500mAh				
SLine-7-1	4.25	0.30	4.198	A, B
SLine-7-2	4.25	0.30	4.208	A, B
SLine-7-3	4.25	0.30	4.201	A, B
SLine-7-4	4.25	0.30	4.200	A, B
SLine-7-5	4.25	0.30	4.210	A, B
Model: 18650-1200mAh				
SLine-9-1	4.25	0.24	4.215	A, B
SLine-9-2	4.25	0.24	4.211	A, B
SLine-9-3	4.25	0.24	4.212	A, B
SLine-9-4	4.25	0.24	4.216	A, B
SLine-9-5	4.25	0.24	4.211	A, B

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

A -– No fire or explosion

B -– No leakage

- Others (please explain)

7.3.1	TABLE: External short circuit (cell)				P
Sample No.	**Ambient (°C)**	**OCV at start of test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature rise ΔT (K)**	**Results**
Model: 18650-2400mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-1-6	56.7	4.235	74.7	66.4	A, B
SLine-1-7	56.7	4.234	63.3	64.3	A, B
SLine-1-8	56.7	4.236	65.8	68.5	A, B
SLine-1-9	56.7	4.244	67.7	70.9	A, B
SLine-1-10	56.7	4.236	75.0	60.9	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-1-11	56.7	4.149	83.0	59.5	A, B
SLine-1-12	56.7	4.145	63.4	60.4	A, B
SLine-1-13	56.7	4.142	78.7	63.4	A, B
SLine-1-14	56.7	4.146	73.0	59.2	A, B
SLine-1-15	56.7	4.152	81.3	56.9	A, B
Model: 18650-2000mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-3-6	56.2	4.229	94.8	84.2	A, B
SLine-3-7	56.2	4.228	69.7	77.5	A, B
SLine-3-8	56.2	4.237	70.1	75.8	A, B
SLine-3-9	56.2	4.230	94.7	79.4	A, B
SLine-3-10	56.2	4.235	73.7	75.5	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-3-11	56.2	4.139	81.1	72.0	A, B
SLine-3-12	56.2	4.145	87.8	68.2	A, B
SLine-3-13	56.2	4.146	73.0	69.1	A, B
SLine-3-14	56.2	4.140	66.0	68.9	A, B
SLine-3-15	56.2	4.144	71.6	68.1	A, B
Model: 18650-1800mAh					

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Clause	Requirement + Test	Result - Remark	Verdict

Samples charged at charging temperature upper limit (45°C)					
SLine-5-6	56.3	4.234	82.6	75.2	A, B
SLine-5-7	56.3	4.233	63.5	80.7	A, B
SLine-5-8	56.3	4.238	85.2	79.0	A, B
SLine-5-9	56.3	4.234	67.7	82.7	A, B
SLine-5-10	56.3	4.241	70.7	78.7	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-5-11	56.3	4.145	69.3	69.3	A, B
SLine-5-12	56.3	4.140	84.6	71.0	A, B
SLine-5-13	56.3	4.142	67.7	71.9	A, B
SLine-5-14	56.3	4.141	66.5	71.7	A, B
SLine-5-15	56.3	4.140	65.2	68.4	A, B
Model: 18650-1500mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-7-6	56.8	4.199	89.4	78.9	A, B
SLine-7-7	56.8	4.207	86.9	83.9	A, B
SLine-7-8	56.8	4.207	74.8	79.7	A, B
SLine-7-9	56.8	4.205	93.5	81.4	A, B
SLine-7-10	56.8	4.200	78.4	81.7	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-7-11	56.8	4.113	72.6	65.4	A, B
SLine-7-12	56.8	4.112	67.9	72.3	A, B
SLine-7-13	56.8	4.111	84.3	69.1	A, B
SLine-7-14	56.8	4.112	85.5	66.3	A, B
SLine-7-15	56.8	4.108	79.0	64.5	A, B
Model: 18650-1200mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-9-6	55.3	4.214	79.5	78.1	A, B
SLine-9-7	55.3	4.210	71.8	77.9	A, B
SLine-9-8	55.3	4.208	97.0	75.6	A, B
SLine-9-9	55.3	4.209	79.6	82.2	A, B
SLine-9-10	55.3	4.213	79.0	81.1	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-9-11	55.3	4.124	81.7	65.0	A, B
SLine-9-12	55.3	4.117	65.8	63.9	A, B

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Clause	Requirement + Test	Result - Remark	Verdict

SLine-9-13	55.3	4.115	93.6	67.0	A, B
SLine-9-14	55.3	4.114	64.2	66.3	A, B
SLine-9-15	55.3	4.114	78.5	61.6	A, B

Supplementary information:

A -– No fire or explosion

B -– The test was completed after the cell casing cooled to 20% of the maximum temperature rise.

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**
Model: 18650-2400mAh						
SLine-2-4	24.0	4.232	75.7	0.4	Normal	A, C
SLine-2-5	24.0	4.230	73.3	110.3	Short U2 pin 1-3	A, B
SLine-2-6	24.0	4.228	93.7	101.5	Short U2 pin 1-3	A, B
SLine-2-7	24.0	4.222	83.4	106.6	Short U2 pin 1-3	A, B
SLine-2-8	24.0	4.222	86.3	108.9	Short U2 pin 1-3	A, B
Model: 18650-2000mAh						
SLine-4-4	23.7	4.224	81.2	0.9	Normal	A, C
SLine-4-5	23.7	4.217	74.2	119.4	Short U2 pin 1-3	A, B
SLine-4-6	23.7	4.220	78.2	109.1	Short U2 pin 1-3	A, B
SLine-4-7	23.7	4.218	75.3	118.4	Short U2 pin 1-3	A, B
SLine-4-8	23.7	4.221	76.0	116.8	Short U2 pin 1-3	A, B
Model: 18650-1800mAh						
SLine-6-4	23.4	4.219	84.7	0.6	Normal	A, C
SLine-6-5	23.4	4.222	68.0	118.1	Short U2 pin 1-3	A, B
SLine-6-6	23.4	4.217	79.5	116.5	Short U2 pin 1-3	A, B

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Clause	Requirement + Test			Result - Remark		Verdict
SLine-6-7	23.4	4.217	84.8	117.1	Short U2 pin 1-3	A, B
SLine-6-8	23.4	4.216	74.1	115.5	Short U2 pin 1-3	A, B
Model: 18650-1500mAh						
SLine-8-4	23.6	4.178	72.0	0.7	Normal	A, C
SLine-8-5	23.6	4.177	65.7	112.9	Short U2 pin 1-3	A, B
SLine-8-6	23.6	4.184	90.3	102.5	Short U2 pin 1-3	A, B
SLine-8-7	23.6	4.183	69.4	112.5	Short U2 pin 1-3	A, B
SLine-8-8	23.6	4.184	69.8	108.4	Short U2 pin 1-3	A, B
Model: 18650-1200mAh						
SLine-10-4	23.9	4.161	68.6	0.5	Normal	A, C
SLine-10-5	23.9	4.170	82.5	83.0	Short U2 pin 1-3	A, B
SLine-10-6	23.9	4.166	86.9	92.6	Short U2 pin 1-3	A, B
SLine-10-7	23.9	4.166	64.1	97.1	Short U2 pin 1-3	A, B
SLine-10-8	23.9	4.171	83.6	88.3	Short U2 pin 1-3	A, B

Supplementary information:

A – No fire or explosion

B – The test was completed after the cell casing cooled to 20% of the maximum temperature rise.

C – No obvious temperature rise due to the protection of short circuit. The battery pack remained on test for an additional one hour after rapid decline in short circuit current.

7.3.5	TABLE: Crush (cells)			P
Sample No.	**OCV before test (Vdc)**	**OCV at removal of crushing force (Vdc)**	**Maximum force applied to the cell during crush (Kn)**	**Results**
Model: 18650-2400mAh				
Samples charged at charging temperature upper limit (45°C)				
SLine-1-29	4.231	4.230	13.282	A, B
SLine-1-30	4.233	4.231	12.653	A, B
SLine-1-31	4.233	4.232	12.771	A, B

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Clause	Requirement + Test	Result - Remark	Verdict

SLine-1-32	4.231	4.231	13.198	A, B
SLine-1-33	4.231	4.230	12.941	A, B
Samples charged at charging temperature lower limit (10°C)				
SLine-1-34	4.143	4.140	12.831	A, B
SLine-1-35	4.140	4.139	13.090	A, B
SLine-1-36	4.143	4.141	12.763	A, B
SLine-1-37	4.147	4.146	13.340	A, B
SLine-1-38	4.141	4.141	12.621	A, B
Model: 18650-2000mAh				
Samples charged at charging temperature upper limit (45°C)				
SLine-3-29	4.223	4.222	13.229	A, B
SLine-3-30	4.226	4.223	13.141	A, B
SLine-3-31	4.221	4.220	13.283	A, B
SLine-3-32	4.230	4.230	12.920	A, B
SLine-3-33	4.231	4.230	13.160	A, B
Samples charged at charging temperature lower limit (10°C)				
SLine-3-34	4.133	4.131	13.073	A, B
SLine-3-35	4.130	4.129	13.301	A, B
SLine-3-36	4.135	4.132	12.746	A, B
SLine-3-37	4.130	4.130	12.620	A, B
SLine-3-38	4.132	4.130	12.654	A, B
Model: 18650-1800mAh				
Samples charged at charging temperature upper limit (45°C)				
SLine-5-29	4.228	4.227	13.089	A, B
SLine-5-30	4.227	4.227	12.811	A, B
SLine-5-31	4.224	4.222	13.216	A, B
SLine-5-32	4.222	4.221	12.688	A, B
SLine-5-33	4.224	4.223	12.650	A, B
Samples charged at charging temperature lower limit (10°C)				
SLine-5-34	4.137	4.136	13.228	A, B
SLine-5-35	4.130	4.129	12.862	A, B
SLine-5-36	4.141	4.140	13.195	A, B
SLine-5-37	4.139	4.137	12.895	A, B
SLine-5-38	4.136	4.135	13.397	A, B
Model: 18650-1500mAh				

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Clause	Requirement + Test	Result - Remark	Verdict

Samples charged at charging temperature upper limit (45°C)				
SLine-7-29	4.195	4.193	13.073	A, B
SLine-7-30	4.194	4.193	13.062	A, B
SLine-7-31	4.196	4.194	12.577	A, B
SLine-7-32	4.199	4.198	13.202	A, B
SLine-7-33	4.197	4.195	13.407	A, B
Samples charged at charging temperature lower limit (10°C)				
SLine-7-34	4.110	4.109	13.129	A, B
SLine-7-35	4.109	4.109	12.958	A, B
SLine-7-36	4.109	4.108	12.867	A, B
SLine-7-37	4.106	4.105	13.023	A, B
SLine-7-38	4.105	4.105	13.337	A, B
Model: 18650-1200mAh				
Samples charged at charging temperature upper limit (45°C)				
SLine-9-29	4.214	4.212	13.055	A, B
SLine-9-30	4.212	4.211	12.849	A, B
SLine-9-31	4.217	4.216	13.011	A, B
SLine-9-32	4.210	4.210	13.251	A, B
SLine-9-33	4.209	4.207	12.949	A, B
Samples charged at charging temperature lower limit (10°C)				
SLine-9-34	4.116	4.115	12.949	A, B
SLine-9-35	4.117	4.116	12.819	A, B
SLine-9-36	4.120	4.118	13.385	A, B
SLine-9-37	4.116	4.115	12.815	A, B
SLine-9-38	4.116	4.116	13.541	A, B
Supplementary information: A – No fire or explosion B – Force released after maximum level reached				

7.3.6	**TABLE: Over-charging of battery**		**P**
Constant charging current (A) ..... :		**4.8A for model 18650-2400mAh** **4.0A for model 18650-2000mAh** **3.6A for model 18650-1800mAh** **3.0A for model 18650-1500mAh** **2.4A for model 18650-1200mAh**	**—**
Supply voltage (Vdc) ..... :		**5.95**	**—**

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Clause	Requirement + Test	Result - Remark	Verdict

Sample No.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
Model: 18650-2400mAh				
SLine-2-12	3.082	83	64.2	A
SLine-2-13	3.074	83	56.2	A
SLine-2-14	3.078	83	66.7	A
SLine-2-15	3.078	83	63.8	A
SLine-2-16	3.079	83	61.1	A
Model: 18650-2000mAh				
SLine-4-12	2.989	132	49.9	A
SLine-4-13	2.978	132	44.0	A
SLine-4-14	2.988	132	47.0	A
SLine-4-15	2.986	132	51.7	A
SLine-4-16	2.982	132	51.4	A
Model: 18650-1800mAh				
SLine-6-12	3.054	144	45.5	A
SLine-6-13	3.049	144	45.2	A
SLine-6-14	3.049	144	45.5	A
SLine-6-15	3.047	144	44.4	A
SLine-6-16	3.048	144	45.5	A
Model: 18650-1500mAh				
SLine-8-12	3.037	115	39.5	A
SLine-8-13	3.038	115	39.7	A
SLine-8-14	3.039	115	38.9	A
SLine-8-15	3.038	115	38.1	A
SLine-8-16	3.038	115	38.9	A
Model: 18650-1200mAh				
SLine-10-12	3.110	105	36.7	A
SLine-10-13	3.111	105	35.3	A
SLine-10-14	3.108	105	36.7	A
SLine-10-15	3.110	105	36.6	A
SLine-10-16	3.113	105	36.3	A

Supplementary information:

A -– No fire or explosion

- Others (please explain)

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.7	TABLE: Forced discharge (cells)			P
Sample No.	**OCV before application of reverse charge (Vdc)**	**Measured reverse charge I_t (A)**	**Lower limit discharge voltage (Vdc)**	**Results**
Model: 18650-2400mAh				
SLine-1-39	3.089	2.4	-4.25	A, B
SLine-1-40	3.073	2.4	-4.25	A, B
SLine-1-41	3.085	2.4	-4.25	A, B
SLine-1-42	3.083	2.4	-4.25	A, B
SLine-1-43	3.083	2.4	-4.25	A, B
Model: 18650-2000mAh				
SLine-3-39	2.934	2.0	-4.25	A, B
SLine-3-40	2.928	2.0	-4.25	A, B
SLine-3-41	2.925	2.0	-4.25	A, B
SLine-3-42	2.929	2.0	-4.25	A, B
SLine-3-43	2.925	2.0	-4.25	A, B
Model: 18650-1800mAh				
SLine-5-39	3.097	1.8	-4.25	A, B
SLine-5-40	3.102	1.8	-4.25	A, B
SLine-5-41	3.097	1.8	-4.25	A, B
SLine-5-42	3.098	1.8	-4.25	A, B
SLine-5-43	3.099	1.8	-4.25	A, B
Model: 18650-1500mAh				
SLine-7-39	3.133	1.5	-4.25	A, B
SLine-7-40	3.142	1.5	-4.25	A, B
SLine-7-41	3.132	1.5	-4.25	A, B
SLine-7-42	3.141	1.5	-4.25	A, B
SLine-7-43	3.135	1.5	-4.25	A, B
Model: 18650-1200mAh				
SLine-9-39	3.138	1.2	-4.25	A, B
SLine-9-40	3.131	1.2	-4.25	A, B
SLine-9-41	3.138	1.2	-4.25	A, B
SLine-9-42	3.138	1.2	-4.25	A, B
SLine-9-43	3.139	1.2	-4.25	A, B

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

A -– No fire or explosion

B -– The voltage did not reach negative value of upper limit charging voltage during 90 mins.

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**
Model: 18650-2400mAh					
SLine-2-17	4.235	4.233	48.509	48.505	A, B, C, D
SLine-2-18	4.229	4.228	48.507	48.500	A, B, C, D
SLine-2-19	4.235	4.234	48.497	48.494	A, B, C, D
Model: 18650-2000mAh					
SLine-4-17	4.221	4.219	46.653	46.650	A, B, C, D
SLine-4-18	4.226	4.225	46.656	46.648	A, B, C, D
SLine-4-19	4.221	4.219	46.670	46.662	A, B, C, D
Model: 18650-1800mAh					
SLine-6-17	4.214	4.212	44.409	44.406	A, B, C, D
SLine-6-18	4.213	4.212	44.412	44.408	A, B, C, D
SLine-6-19	4.216	4.215	44.454	44.453	A, B, C, D
Model: 18650-1500mAh					
SLine-8-17	4.176	4.174	41.386	41.383	A, B, C, D
SLine-8-18	4.176	4.175	41.385	41.385	A, B, C, D
SLine-8-19	4.172	4.172	41.353	41.350	A, B, C, D
Model: 18650-1200mAh					
SLine-10-17	4.166	4.165	37.670	37.668	A, B, C, D
SLine-10-18	4.162	4.160	37.665	37.665	A, B, C, D
SLine-10-19	4.160	4.158	37.679	37.674	A, B, C, D

Supplementary information:

A -– No fire or explosion

B -– No rupture

C -– No leakage

D -– No venting

- Others (please explain)

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**
Model: 18650-2400mAh					

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Clause	Requirement + Test	Result - Remark	Verdict

SLine-2-20	4.232	4.230	48.511	48.509	A, B, C, D
SLine-2-21	4.233	4.232	48.507	48.505	A, B, C, D
SLine-2-22	4.237	4.235	48.499	48.491	A, B, C, D
Model: 18650-2000mAh					
SLine-4-20	4.227	4.223	46.648	46.641	A, B, C, D
SLine-4-21	4.226	4.225	46.652	46.648	A, B, C, D
SLine-4-22	4.221	4.219	46.661	46.656	A, B, C, D
Model: 18650-1800mAh					
SLine-6-20	4.217	4.216	44.413	44.409	A, B, C, D
SLine-6-21	4.213	4.212	44.411	44.410	A, B, C, D
SLine-6-22	4.216	4.215	44.438	44.433	A, B, C, D
Model: 18650-1500mAh					
SLine-8-20	4.171	4.170	41.366	41.363	A, B, C, D
SLine-8-21	4.174	4.172	41.370	41.365	A, B, C, D
SLine-8-22	4.172	4.170	41.351	41.350	A, B, C, D
Model: 18650-1200mAh					
SLine-10-20	4.169	4.168	37.668	37.664	A, B, C, D
SLine-10-21	4.167	4.165	37.674	37.671	A, B, C, D
SLine-10-22	4.171	4.170	37.658	37.654	A, B, C, D

Supplementary information:
A -– No fire or explosion
B -– No rupture
C -– No leakage
D -– No venting
- Others (please explain)

7.3.9	TABLE: Forced internal short circuit (cells)				P
Sample No.	**Chamber ambient T (°C)**	**OCV before test (Vdc)**	**Particle location [1)]**	**Maximum applied pressure (N)**	**Results**
Model: 18650-2400mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-1-44	45.12	4.233	1	800	A, B
SLine-1-45	45.12	4.235	1	800	A, B
SLine-1-46	45.12	4.232	1	800	A, B
SLine-1-47	45.12	4.229	1	800	A, B
SLine-1-48	45.12	4.228	1	800	A, B

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Clause	Requirement + Test	Result - Remark	Verdict

Samples charged at charging temperature lower limit (10°C)					
SLine-1-49	0.15	4.141	1	800	A, B
SLine-1-50	0.15	4.143	1	800	A, B
SLine-1-51	0.15	4.144	1	800	A, B
SLine-1-52	0.15	4.138	1	800	A, B
SLine-1-53	0.15	4.145	1	800	A, B
Model: 18650-2000mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-3-44	45.12	4.224	1	800	A, B
SLine-3-45	45.12	4.221	1	800	A, B
SLine-3-46	45.12	4.221	1	800	A, B
SLine-3-47	45.12	4.223	1	800	A, B
SLine-3-48	45.12	4.228	1	800	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-5-49	0.15	4.128	1	800	A, B
SLine-5-50	0.15	4.127	1	800	A, B
SLine-5-51	0.15	4.127	1	800	A, B
SLine-5-52	0.15	4.130	1	800	A, B
SLine-5-53	0.15	4.136	1	800	A, B
Model: 18650-1800mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-5-44	45.12	4.228	1	800	A, B
SLine-5-45	45.12	4.228	1	800	A, B
SLine-5-46	45.12	4.227	1	800	A, B
SLine-5-47	45.12	4.221	1	800	A, B
SLine-5-48	45.12	4.227	1	800	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-5-49	0.15	4.137	1	800	A, B
SLine-5-50	0.15	4.132	1	800	A, B
SLine-5-51	0.15	4.139	1	800	A, B
SLine-5-52	0.15	4.129	1	800	A, B
SLine-5-53	0.15	4.130	1	800	A, B
Model: 18650-1500mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-7-44	45.12	4.197	1	800	A, B

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Clause	Requirement + Test	Result - Remark	Verdict

SLine-7-45	45.12	4.191	1	800	A, B
SLine-7-46	45.12	4.191	1	800	A, B
SLine-7-47	45.12	4.192	1	800	A, B
SLine-7-48	45.12	4.196	1	800	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-7-49	0.15	4.108	1	800	A, B
SLine-7-50	0.15	4.106	1	800	A, B
SLine-7-51	0.15	4.103	1	800	A, B
SLine-7-52	0.15	4.104	1	800	A, B
SLine-7-53	0.15	4.103	1	800	A, B
Model: 18650-1200mAh					
Samples charged at charging temperature upper limit (45°C)					
SLine-9-44	45.12	4.219	1	800	A, B
SLine-9-45	45.12	4.217	1	800	A, B
SLine-9-46	45.12	4.213	1	800	A, B
SLine-9-47	45.12	4.211	1	800	A, B
SLine-9-48	45.12	4.210	1	800	A, B
Samples charged at charging temperature lower limit (10°C)					
SLine-9-49	0.15	4.126	1	800	A, B
SLine-9-50	0.15	4.127	1	800	A, B
SLine-9-51	0.15	4.125	1	800	A, B
SLine-9-52	0.15	4.125	1	800	A, B
SLine-9-53	0.15	4.128	1	800	A, B

Supplementary information:

[1)] Identify one of the following:

1: Nickel particle inserted between positive and negative (active material) coated area.

2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

A -– No fire

B -– Test concluded when 800 N pressure was reached and 50 Mv voltage drop was not achieved.

D.2	TABLE: Internal AC resistance for coin cells			N/A
Sample no.	**Ambient T (°C)**	**Store time (h)**	**Resistance Rac (Ω)**	**Results [1)]**
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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

[1)] Coin cells with an internal resistance less than or equal to 3 Ω, see test result on corresponding tables according to Clause 6 and Table 1.

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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)]**
1. PCB	Interchangeable	Interchangeable	V-0, 130°C	UL 796 UL 94	UL approved
2. Lead wire	Interchangeable	Interchangeable	Min. 24AWG, min 80ºC, min. 300V	UL 758	UL approved
3. Protective IC (U1)	Taiwan Zhuolang Micro Technology Co., Ltd	DW01A	V_{CU}: 4.3V±0.05V, V_{DL}: 2.5V±0.1V	--	Tested with appliance
4. MOSFET (U2, U3)	Taiwan Zhuolang Micro Technology Co., Ltd	8205A	V_{DS} =20V, V_{GS} =±12V, I_D =6A	--	Tested with appliance
5-1. Cell	Dongguan Chenxinsheng Energy Co., LTD	18650-2400mAh	3.7Vdc, 2400mAh	IEC 62133-2: 2017/A1:2021	Tested with appliance
5-2. Cell	Dongguan Chenxinsheng Energy Co., LTD	18650-2200mAh	3.7Vdc, 2200mAh	IEC 62133-2: 2017/A1:2021	Tested with appliance
5-3. Cell	Dongguan Chenxinsheng Energy Co., LTD	18650-2000mAh	3.7Vdc, 2000mAh	IEC 62133-2: 2017/A1:2021	Tested with appliance
5-4. Cell	Dongguan Chenxinsheng Energy Co., LTD	18650-1800mAh	3.7Vdc, 1800mAh	IEC 62133-2: 2017/A1:2021	Tested with appliance
5-5. Cell	Dongguan Chenxinsheng Energy Co., LTD	18650-1500mAh	3.7Vdc, 1500mAh	IEC 62133-2: 2017/A1:2021	Tested with appliance
5-6. Cell	Dongguan Chenxinsheng Energy Co., LTD	18650-1200mAh	3.7Vdc, 1200mAh	IEC 62133-2: 2017/A1:2021	Tested with appliance
-Positive electrode	Hunan Kingfuli New Energy Co., Ltd	KP-05C	Li(CoMnNi)O_2, Carbon, NMP, PVDF, Conductive Additive	--	--
-Negative electrode	Fujian XFH New Energy Materials Co., Ltd	X6	Graphite	--	--
-Separator	Shanghai Enjie New Material Technology Co., Ltd.	TS	PE+AL2O3, Shutdown temp: 130-150°C	--	--

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-Electrolyte	Shenzhen Capchem Technology Co., Ltd	LBC305-01	LiPF6+EC+DEC+ EMC	--	--
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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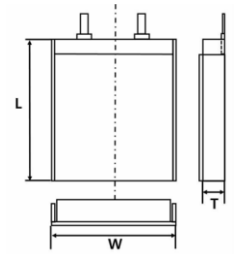
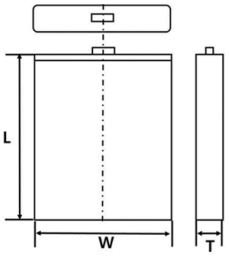
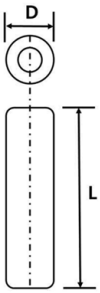
IEC62133_2B ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 62133-2** **(Republic of Korea) NATIONAL DIFFERENCES** (Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems)			
Differences according to.....:	National standard KC62133-2(2020-07)		
TRF template used: .....:	IECEE OD-2020-F3, Ed. 1.1		
Attachment Form No.....:	KR_ND_IEC62133_2B		
Attachment Originator .....:	KTR		
Master Attachment.....:	Dated 2022-05-27		
	National Differences		
7.3.6	**Over-charging of battery**		N/A
(Revision)	***[Add the bolded text]*** b) Test The test shall be carried out in an ambient temperature of 20 °C ± 5 °C. Each test battery shall be discharged at a constant current of 0,2 It A, to a final discharge voltage specified by the manufacturer. Sample batteries shall then be charged at a constant current of 2,0 It A, using a supply voltage which is: • 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 • 1,2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and • sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached. **• In case the charging voltage specified by the manufacturer is higher than the overcharge test voltage, the maximum charging voltage specified by manufacturer should be applied with 2.0 ItA,** **(e.g., quick charging power bank, etc.)**	The charging voltage specified by the manufacturer is lower than the overcharge test voltage.	N/A

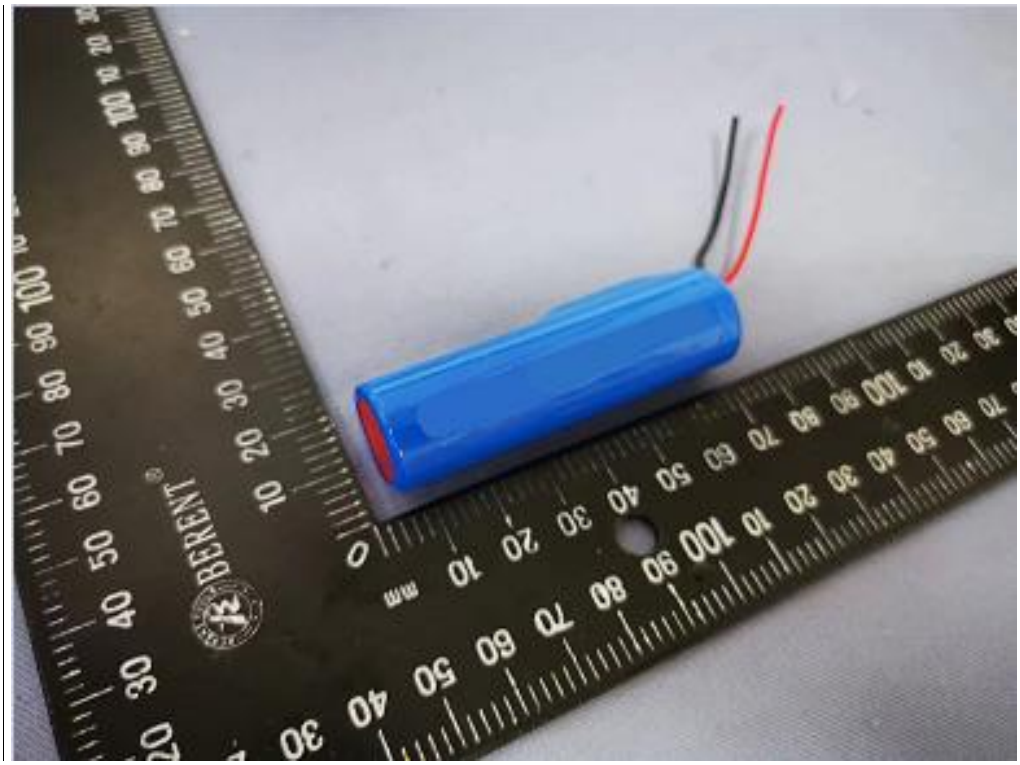
IEC62133_2B ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	[Replace to the following statement] c) Acceptance criteria Filling beyond the manufacturer's specified limits should not result in ignition or explosion		N/A
Annex G	**Definition for shape and materials of outer case for cell**		—
(Addition)	G.1 General Annex G provides definitions for shape and materials of outer case for cell G.2 Shape of outer case for cell G 2.1 Cylindrical cell Cell with a cylindrical shape in which the overall height is equal to or greater than diameter. G 2.2 Prismatic cell Cell having the shape of a parallelepiped whose faces are rectangular G.3 Materials of outer case for cell G.3.1 Soft case Non-metallic outer case or container for cell G.3.2 Hard case Metallic outer case or container for cell.	(Shape of outer cases) ☒ Cylindrical ☐ Prismatic (Materials of outer cases) ☒ Hard ☐ Soft	—
Annex H	**Calculation method of the volumetric energy density for cell**		—
(Addition)	Annex H provide a calculation method of the volumetric energy density for cell in use of smart phone, tablet, notebook. H.1 General Unless otherwise stated in the Annex E, the dimensions for calculation are based on these for cell before shipment and the volumetric energy density shall be calculated with a maximum values specified by manufacturer. If the specification for cell can't be provided a dimension for calculation, the manufacturer's other documentation shall be provided to demonstrate compliance for its calculation.		—

IEC62133_2B ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	H.2 Calculation Method  L : Length (max.) of cell (including terrace) W : Width (max.) of cell T : Thickness (max.) when shipping charge (For reference, Please Exclude the dimension of any tape that Is attached to cell) $Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{Length\ (L) \times Width\ (W)\ \times Thickness\ (T)}$ [H.1 – Prismatic cell using soft case]  L : Length (max.) of cell W : Width (max.) of cell T : Thickness when shipping charge (For reference, Please Exclude the dimension of any tape that Is attached to cell) $Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{Length\ (L) \times Width\ (W)\ \times Thickness\ (T)}$ [H.2 – Prismatic cell using hard case]  D : Diameter (max.) of cell L : Length (max.) of cell (According to shape of cell at shipping, The dimension of tube for cell may be included In overall dimension of cell) $Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{3.14159 \times \frac{Diameter\ (D)^2}{4} \times Length(L)}$ [H.3 – Cylindrical cell using hard case]	506.68Wh/L for 18650-2400mAh; 464.46Wh/L for 18650-2200mA; 422.23Wh/L for 18650-2000mA; 380.01Wh/L for 18650-1800mA; 316.67Wh/L for 18650-1500mA; 253.34Wh/L for 18650-1200mA.	—

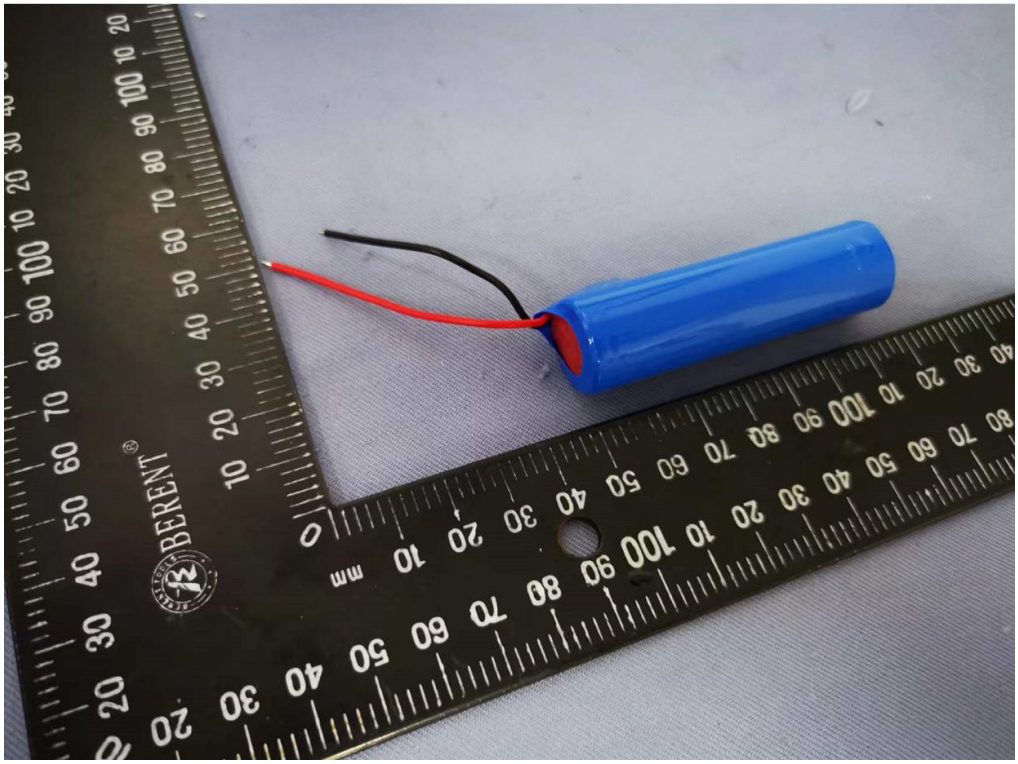
ENCLOSURE

Supplement ID	Description
01-1	Overall view 1 of battery
01-2	Overall view 2 of battery
01-3	Internal view of battery
01-4	Component view of protection board
01-5	Trace view of protection board
01-6	Overall view of cell
02	PCB Layout
03	Drawing
04	Packaging Drawing

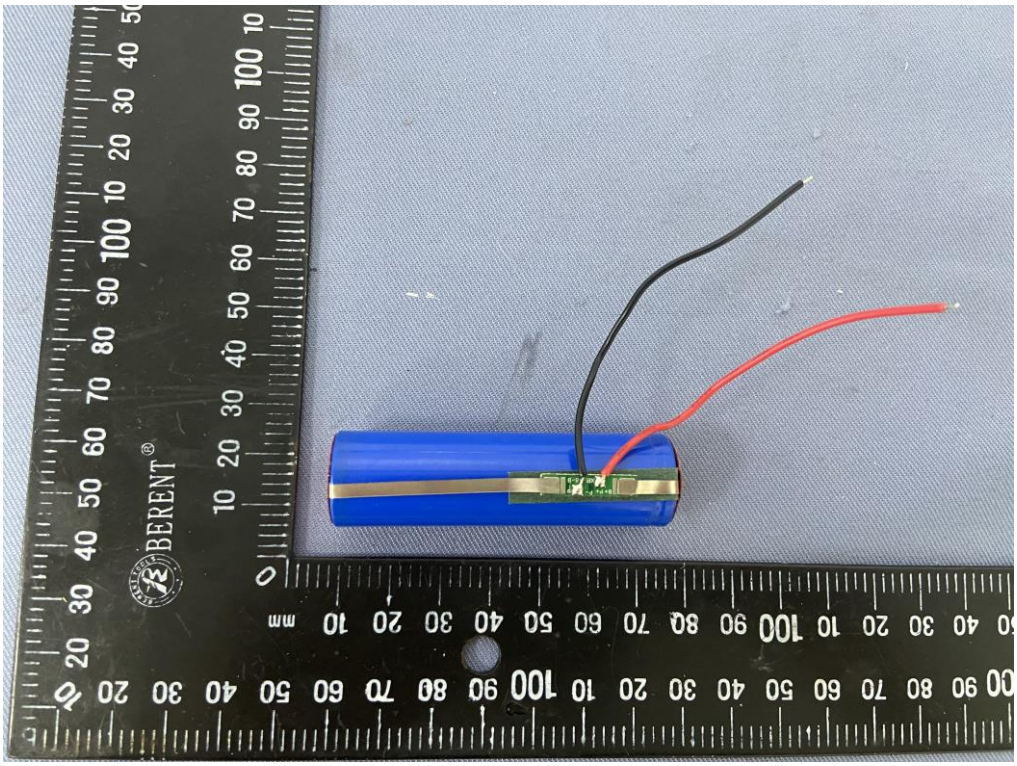
ID 01-1



ID 01-2



ID 01-3



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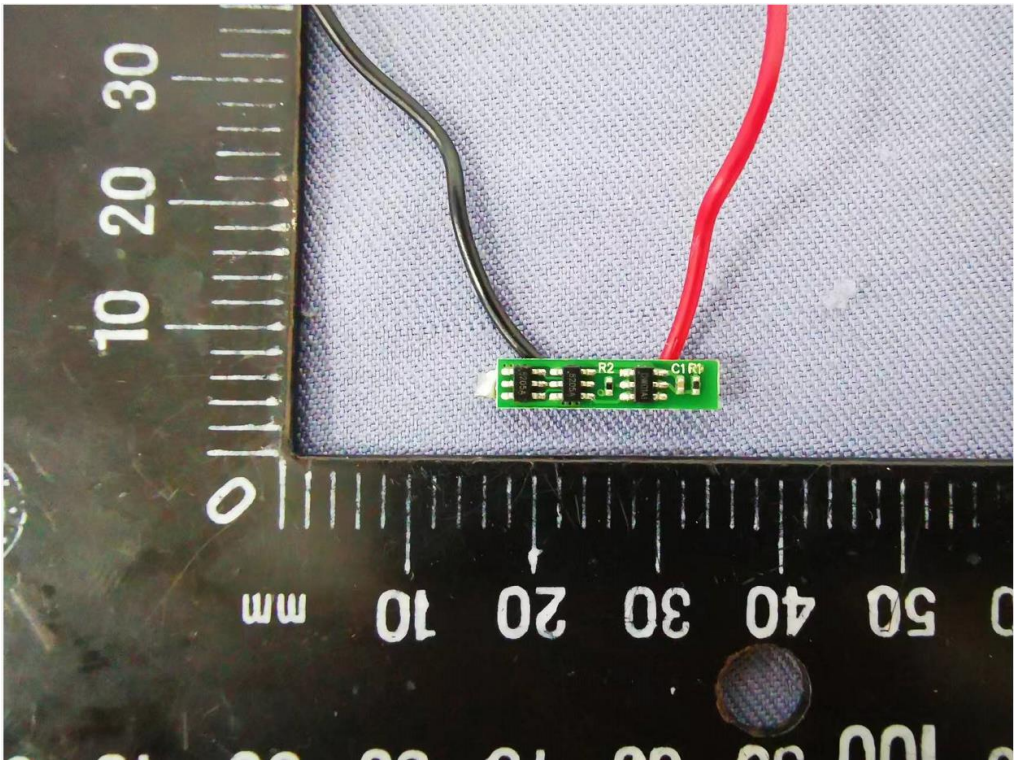
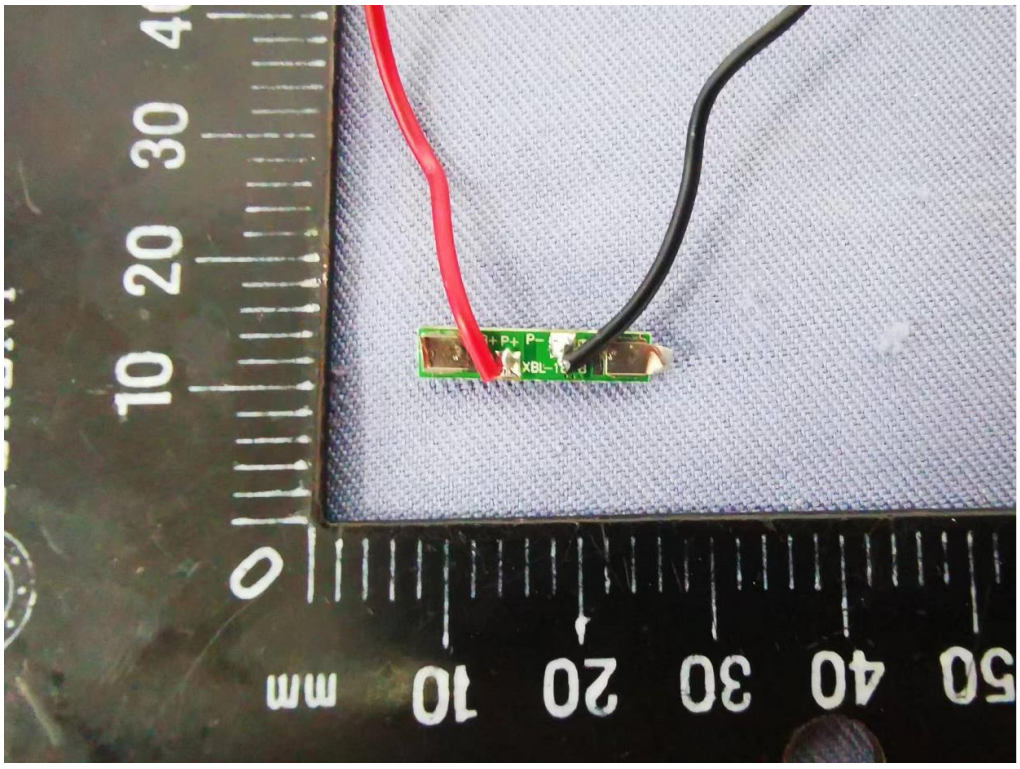
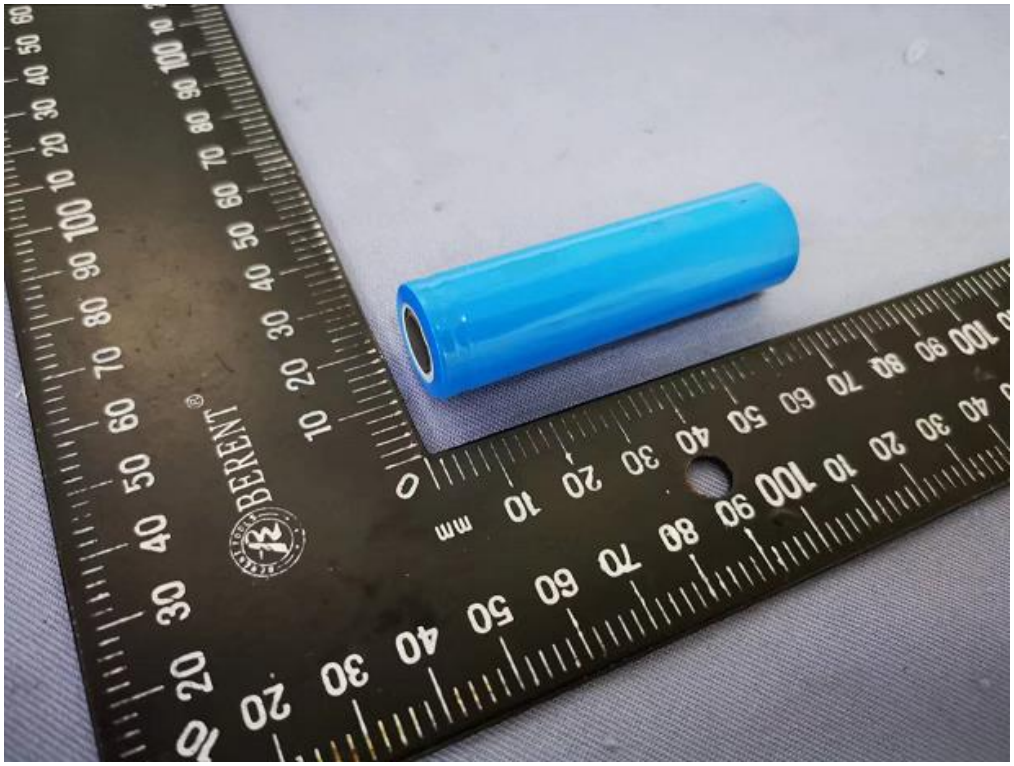


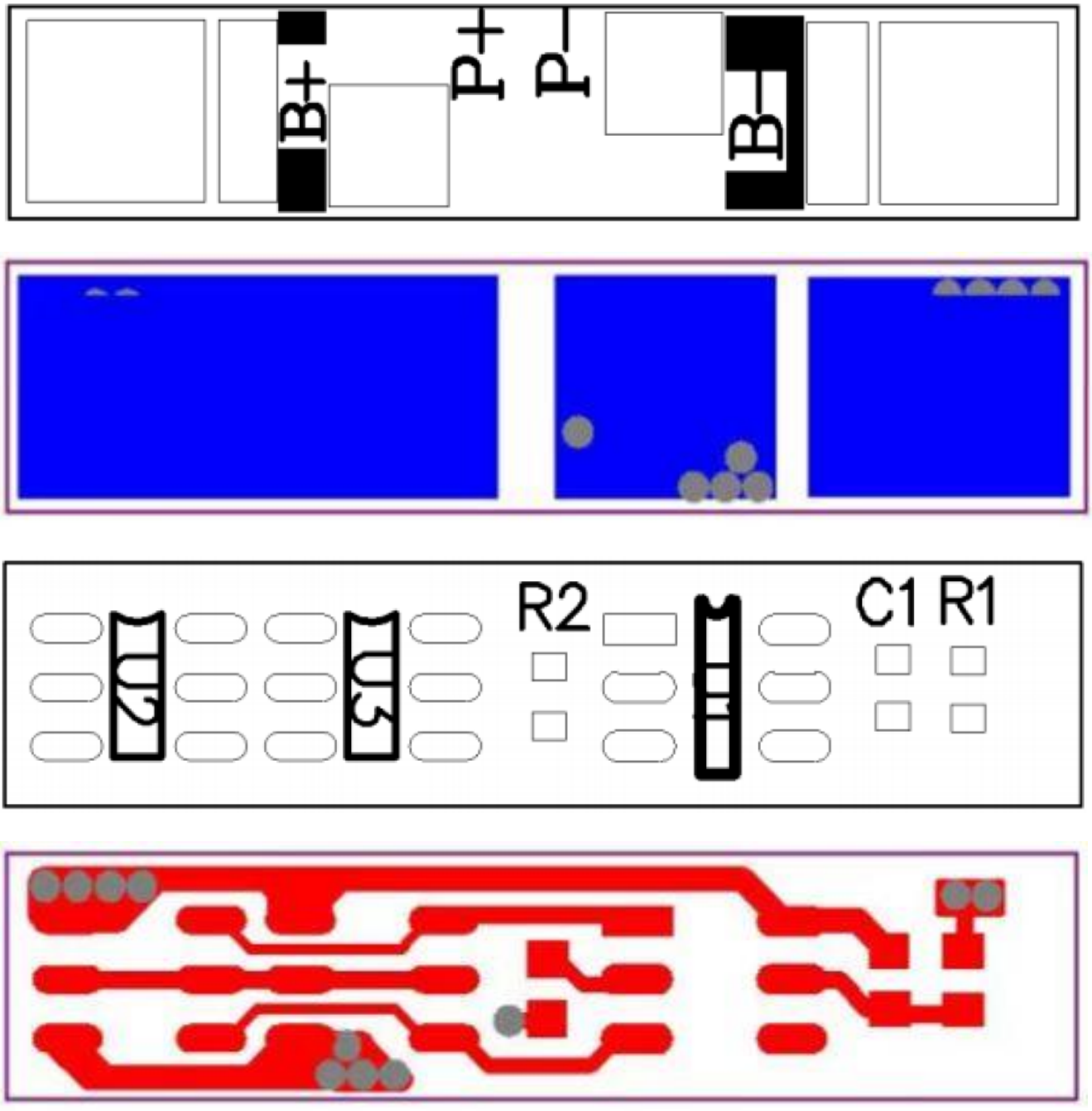
ID 01-5



ID 01-6

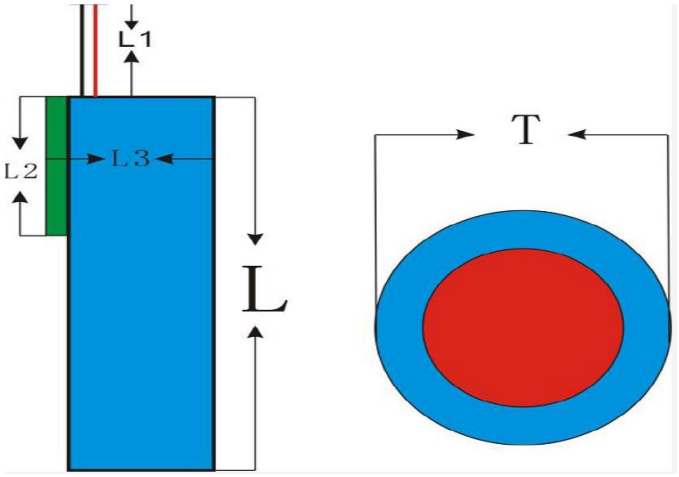


ID 02



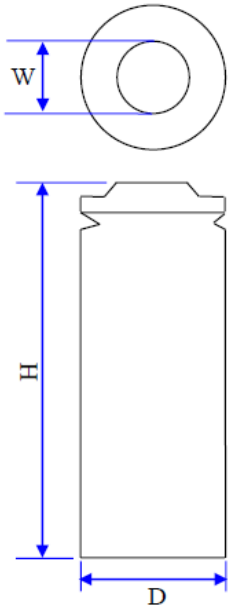
ID 03

Battery Drawing:



T(max.): L(max) =19.5mm: 69.0mm

Cell Drawing:



D(max.): H(max) = 18.5mm: 65.2mm

ID 04

产品包装示意图