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.....:	CC25206209015 01001
Date of issue.....:	2025-08-07
Total number of pages .....:	25
Name of Testing Laboratory preparing the Report .....:	**Guangdong CRT Co., Ltd.**
Applicant's name .....:	Guangdong Pyroxene New Energy Technology Co., Ltd
Address.....:	9 / F, Building 4, Zhongnuo Wisdom Valley, Queen Village, Zhenlong Town, Huiyang District, Huizhou City, Guangdong Province, 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_2C
Test Report Form(s) Originator ....:	DEKRA Certification B.V.
Master TRF .....:	Dated 2022-07-01

Copyright © 2022 IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE System). All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

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.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Li-ion Battery
Trade Mark(s) ..... :	PYROXENE
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	PYR-EV037B
Ratings ..... :	36V, 19.6Ah, 705.6Wh

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

☒	**CB Testing Laboratory:**	**Guangdong CRT Co., Ltd.**	
Testing location/ address.....:		Building 3, No.45, Fulai Road, Liaobu Town, Dongguan City, Guangdong Province, China.	
Tested by (name, function, signature).....:		Benny Xu/ Project Handler	Benny Xu
Approved by (name, function, signature)...:		Arvin Chen / Reviewer	Arvin Chen

☐	**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 (13 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
Test items: Cl.5.2 Insulation and wiring; cl.7.1 Charging procedure for test purposes; cl.7.2.2 Case stress at high ambient temperature (battery); cl.7.3.2 External short-circuit (batteries); cl.7.3.3 Free fall (batteries); cl.7.3.6 Over-charging of battery; cl.7.3.8 Mechanical tests (batteries); - 7.3.8.1 Vibration - 7.3.8.2 Mechanical shock cl.8.2 Small cell and battery safety information. Tests are made with the number of batteries specified in IEC 62133-2:2017/AMD1:2021 Table 1.	**Guangdong CRT Co., Ltd.** Building 3, No.45, Fulai Road, Liaobu Town, Dongguan City, Guangdong Province, China.

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

Republic of Korea, EU group *, United Kingdom * (Per customer's request shown separately)

*=No National or Group Differences declared

☒ **The product fulfils the requirements of EN 62133-2: 2017/A1:2021, BS EN 62133-2: 2017+A1:2021 and 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").

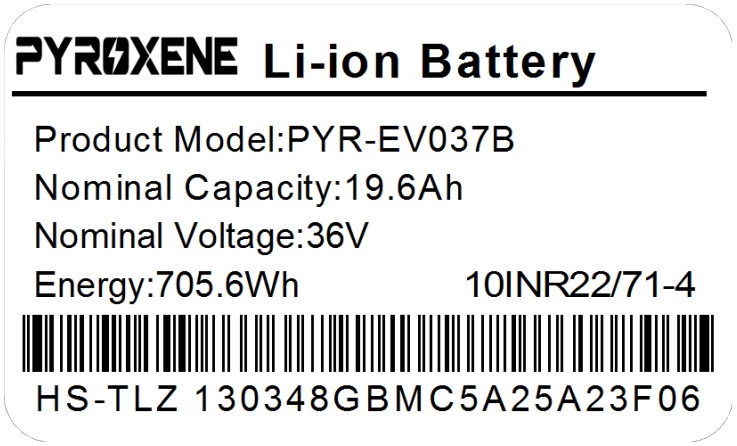
☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

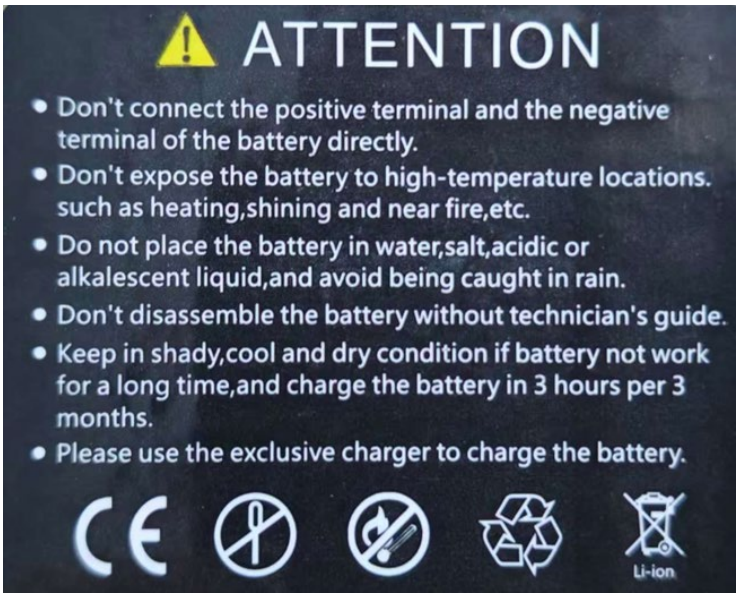
Information on uncertainty of measurement:
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.
IEC Guide 115 provides guidance on the 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.





Date code: YYFDD
YY: Two digitals represent year of manufacture, 23=2023, 24=2024, 25=2025……;
F: One letter represent month of manufacture, A=January, B=February, C=March…….L=December;
DD: Two digitals represent day of manufacture, 01~31.

Test item particulars.....:	
Classification of installation and use.....:	To be defined in final system
Supply Connection.....:	DC connector
Recommend charging method declared by the manufacturer.....:	Charging the battery with 4A constant current and 42V, then constant voltage until charge current reduces to 0.2A at ambient 23°C±2°C
Discharge current (0,2 lt A).....:	3.92A
Specified final voltage.....:	29V
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current.....:	5A
Charging temperature upper limit.....:	45°C
Charging temperature lower limit.....:	0°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 .....:	2025-06-25
Date (s) of performance of tests.....:	2025-06-27 to 2025-07-16

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) ..... :	Guangdong Pyroxene New Energy Technology Co., Ltd 9 / F, Building 4, Zhongnuo Wisdom Valley, Queen Village, Zhenlong Town, Huiyang District, Huizhou City, Guangdong Province, China

General product information and other remarks:

The battery is constructed with 40 lithium-ion cells in series and parallels (10S4P), and has overcharge, over-discharge, over current and short-circuits proof circuit.

Type reference 10INR22/71-4 is standard requirement according to IEC 61960-3 and is identical to Model PYR-EV037B except for model designation.

Battery Pack (Model: PYR-EV037B) has been evaluated to comply with ST/SG/AC.10/11/Rev.8/Section 38.3. Test report No. US10003196 01001, issued on 2025-02-22.

The cell (Model: INR21700-50G) inside the battery is CB approved according to standard IEC 62133-2: 2017, IEC 62133-2:2017/AMD1:2021.

(CB Report No.: 13001-20231106A34217X issued on 2023-11-27, issued by CQC Intime Testing Technology Co., Ltd. CB Certificate No.: CN63658, certified on 2023-11-30, certified by CHINA QUALITY CERTIFICATION CENTRE.)

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

Model	Rated Capacity	Nominal Voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
PYR-EV037B	19.6Ah	36V	4A	4A	5A	25A	42V	29V

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
4	**PARAMETER MEASUREMENT TOLERANCES**		**P**
	Parameter measurement tolerances		P
5	**GENERAL SAFETY CONSIDERATIONS**		**P**
5.1	**General**		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	**Insulation and wiring**		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ		P
	Insulation resistance (MΩ) ..... :	> 5	—
	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		P
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		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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.5	**Terminal contacts**		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC connector used	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	Protection circuit within the 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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A
	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	Upper limit charging voltage.4.25V/Cell, battery pack consists of 10S-4P, 42V/Pack, voltage of cell does not exceed the upper limit of the charging voltage.	P
	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		P
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		P
	It is recommended that the cells and cell blocks are not discharged beyond the cell manufacturer’s specified final voltage		P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry are incorporated into the battery management system		P
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		P
	The battery case and compartments housing cells are designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	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. Quality plan has been provided.	P
5.8	**Battery safety components**		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	Complied.	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	Complied.	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	Complied.	P
7.1.2	Second procedure	CB approved cell used.	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		N/A
	After stabilization for 1 h 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		N/A
7.2	**Intended use**	See below.	P
7.2.1	Continuous charging at constant voltage (cells)	CB approved cell used.	N/A
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		N/A
	Results: no fire, no explosion, no leakage.....:		N/A
7.2.2	Case stress at high ambient temperature (battery)	Tested and complied.	P
	Oven temperature (°C).....:	70	—
	Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells	No physical distortion of the battery case.	P
7.3	**Reasonably foreseeable misuse**	See below.	P
7.3.1	External short-circuit (cell)	CB approved cell used.	N/A
	The cells were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	Results: no fire, no explosion.....:		N/A
7.3.2	External short-circuit (battery)		P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or	Normal condition and single fault for MOSFET (Q6) and Resistance (RN1).	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	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	(See appended table 7.3.2)	P
	Results: no fire, no explosion ..... :	(See appended table 7.3.2)	P
7.3.3	Free fall	Tested and complied.	P
	Results: no fire, no explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	CB approved cell used.	N/A
	Oven temperature (°C) ..... :		—
	Results: no fire, no explosion		N/A
7.3.5	Crush (cells)	CB approved cell used.	N/A
	The crushing force was released upon:		N/A
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: no fire, no explosion ..... :		N/A
7.3.6	Over-charging of battery	Tested and 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		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and	51V applied.	P
	- 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		P
	- Returned to ambient		N/A
	Results: no fire, no explosion ..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)	CB approved cell used.	N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		N/A
	The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage		N/A
	- 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		N/A
	Results: no fire, no explosion ..... :		N/A
7.3.8	Mechanical tests (batteries)	Tested and 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)	CB approved cell used.	N/A
	The cells complied with national requirement for .....:		—
	The pressing was stopped upon:		N/A
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached		N/A
	Results: no fire..... :		N/A
8	**INFORMATION FOR SAFETY**		**P**
8.1	**General**		P
	Manufacturers of secondary cells 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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	Do not allow children to replace batteries without adult supervision		N/A
8.2	**Small cell and battery safety information**	Not small battery	N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A
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: 10INR22/71-4	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		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- Not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		P
9.3	**Caution for ingestion of small cells and batteries**	Not small 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
	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**		**N/A**
A.1	**General**	CB approved cell used.	N/A
A.2	**Safety of lithium ion secondary battery**		N/A
A.3	**Consideration on charging voltage**		N/A
A.3.1	General		N/A
A.3.2	Upper limit charging voltage		N/A
A.3.2.1	General		N/A
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	**Consideration of temperature and charging current**		N/A
A.4.1	General		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.2	Recommended temperature range		N/A
A.4.2.1	General		N/A
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N/A
A.4.3	High temperature range		N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A
A.4.4	Low temperature range		N/A
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint		N/A
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N/A
A.4.5	Scope of the application of charging current		N/A
A.4.6	Consideration of discharge		N/A
A.4.6.1	General		N/A
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		N/A
A.4.6.3	Discharge current and temperature range		N/A
A.4.6.4	Scope of application of the discharging current		N/A
A.5	**Sample preparation**		N/A
A.5.1	General		N/A
A.5.2	Insertion procedure for nickel particle to generate internal short		N/A
A.5.3	Disassembly of charged cell		N/A
A.5.4	Shape of nickel particle		N/A
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	**Experimental procedure of the forced internal short-circuit test**		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.6.1	Material and tools for preparation of nickel particle		N/A
A.6.2	Example of a nickel particle preparation procedure		N/A
A.6.3	Positioning (or placement) of a nickel particle		N/A
A.6.4	Damaged separator precaution		N/A
A.6.5	Caution for rewinding separator and electrode		N/A
A.6.6	Insulation film for preventing short-circuit		N/A
A.6.7	Caution when disassembling a cell		N/A
A.6.8	Protective equipment for safety		N/A
A.6.9	Caution in the case of fire during disassembling		N/A
A.6.10	Caution for the disassembling process and pressing the electrode core		N/A
A.6.11	Recommended specifications for the pressing device		N/A
ANNEX B	**RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS**		**P**
ANNEX C	**RECOMMENDATIONS TO THE END-USERS**		**N/A**
ANNEX D	**MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS**		**N/A**
D.1	**General**		N/A
D.2	**Method**		N/A
	A sample size of three coin cells is required for this measurement	(See appended table D.2)	N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing .....:		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**

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous charging at constant voltage (cells)			N/A
Sample No.	**Recommended charging voltage Vc (Vdc)**	**Recommended charging current I_{rec} (A)**	**OCV before test (Vdc)**	**Results**
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Supplementary information:

A - No fire or explosion

B - No leakage

- Others (please explain)

7.3.1	TABLE: External short circuit (cell)				N/A
Sample No.	**Ambient (°C)**	**OCV at start of test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature rise ΔT (K)**	**Results**
Samples charged at charging temperature upper limit (°C)					
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
Samples charged at charging temperature lower limit (°C)					
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

Supplementary information:

A - No fire or explosion

- Others (please explain)

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: External short circuit (battery)					P
Sample No.	**Ambient T (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature rise ΔT (K)**	**Component single fault condition**	**Results**
S-2-4	22.3	41.73	87.9	0.1	Normal	A, B
S-2-5	22.3	41.76	81.8	0.2	Short RN1	A, B
S-2-6	22.3	41.74	79.4	0.3	Short Q6 (Pin S to Pin D)	A, B
S-2-7	22.3	41.74	73.2	0.2	Short Q6 (Pin S to Pin D)	A, B
S-2-8	22.3	41.75	87.3	0.3	Short Q6 (Pin S to Pin D)	A, B

Supplementary information:

A - No fire or explosion

B - Remain on test for 24 hours

7.3.5	TABLE: Crush (cells)			N/A
Sample No.	**OCV before test (Vdc)**	**OCV at removal of crushing force (Vdc)**	**Maximum force applied to the cell during crush (kN)**	**Results**
Samples charged at charging temperature upper limit (°C)				
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
Samples charged at charging temperature lower limit (°C)				
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Supplementary information:

A - No fire or explosion

- Others (please explain)

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery		P
Constant charging current (A) .....:		39.2	—
Supply voltage (Vdc) .....:		51.0	—

Sample No.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
S-2-12	33.43	425	23.4	A
S-2-13	33.36	425	23.2	A
S-2-14	33.39	425	23.2	A
S-2-15	33.51	425	23.1	A
S-2-16	33.45	425	23.1	A

Supplementary information:
A - No fire or explosion
- Others (please explain)

7.3.7	TABLE: Forced discharge (cells)	N/A

Sample No.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Lower limit discharge voltage (Vdc)	Results
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Supplementary information:
A - No fire or explosion
- Others (please explain)

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
S-2-17	41.74	41.73	3928.4	3928.2	A, B, C, D
S-2-18	41.76	41.75	3911.3	3911.1	A, B, C, D
S-2-19	41.73	41.72	3931.2	3930.9	A, B, C, D

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

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**
S-2-20	41.75	41.74	3925.9	3925.8	A, B, C, D
S-2-21	41.74	41.74	3919.1	3919.0	A, B, C, D
S-2-22	41.76	41.75	3928.7	3928.7	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)				N/A
Sample No.	**Chamber ambient T (°C)**	**OCV before test (Vdc)**	**Particle location 1)**	**Maximum applied pressure (N)**	**Results**
Samples charged at charging temperature upper limit (°C)					
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
Samples charged at charging temperature lower limit (°C)					
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

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

- Others (please explain)

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

Supplementary information:

[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.

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Critical components information				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
1. Metal enclosure (Bottom and middle part)	Tangshan Donggang Sheet Metal Manufacturing Co., Ltd.	DX51D+Z	SPCC, Min. Thickness: 1.50mm,	--	Tested with appliance
2. Plastic enclosure (Upper end)	LG CHEM LTD	LUPOY GN5001RF(T)	Min. 1.5mm, Min. V-0, Min. 80°C	UL 94: 2024 UL 746C: 2025	UL E67171
3. Internal Wires (Charge and Discharge)	Shenzhen Longshengda Wire&Cable Co.,Ltd.	3135	Min. 14AWG, Min. 200°C Min. 600V	UL 758: 2024	UL E472430
4. Cell holder	FORMOSA CHEMICALS &FIBRE CORPPLASTICS DIV	AC310(+)	V-0, 60°C, Min. Thickness: 1.0mm	UL 94: 2024 UL 746C: 2025	UL E162823
5. Internal resin epoxy part materials	Interchangeable	Interchangeable	Min. V-0, Min. 130ºC, Min. thickness 0.38mm	UL 796: 2023 UL 94: 2024	UL approval
6. PCB	HUIZHOU TAISHENG ELECTRONICS CO LTD	TS-D (ASP 1)	Min. V-0, Min. 130ºC	UL 796: 2023	UL E361828
(Alternative)	Interchangeable	Interchangeable	Min. V-0, Min. 130ºC	--	Tested with appliance
7. Protective IC (U2)	O_2Micro	OZ7714SN	VCC to VSS, GNDA, GNDD: 5.5 to 63V T_A: -40°C to 85°C	--	Tested with appliance
8. MOSFET (Q3, Q4, Q5, Q6)	SKY SEMICONDUCTOR	SS040N08LS	V_{DSS}: 85V, I_D: 160A, V_{GS}: ±20V	--	Tested with appliance
9.MOSFET (Q14)	Semipower Technology Co., Ltd.	SW050R85E8S	V_{DSS}: 85V, I_D: 100A V_{GS}: ±20V	--	Tested with appliance
10.MOSFET (Q16)	Semipower Technology Co., Ltd.	SW070R08E7T	V_{DSS}: 80V, I_D: 95A V_{GS}: ±20V	--	Tested with appliance
11. Resistance (RN1, RN2, RN3)	Interchangeable	Interchangeable	3mΩ, 2W	--	Tested with appliance

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

12. Cell	Samsung SDI Co., Ltd.	INR21700-50G	3.63V, 4900mAh	IEC 62133-2:2017, IEC 62133-2:2017/AMD 1:2021	CB Certif. No.: CN63658 CB Report No.: 13001-20231106A34217X
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

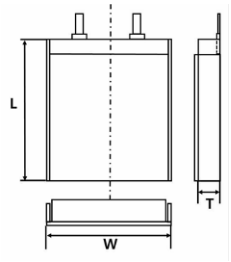
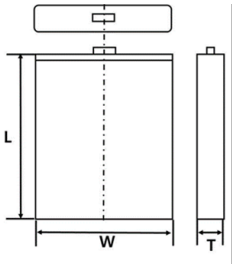
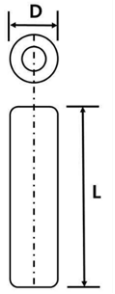
Report No.: CC25206209015 01001

ATTACHMENT to IEC62133_2C			
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-F3:2022, Ed. 1.2		
Attachment Form No. ..... : **Attachment Originator**..... : **Master Attachment**..... :	KR_ND_IEC62133_2C KTR 2023-08-02		
Copyright © 2022 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	National Differences		P
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 I_t A, to a final discharge voltage specified by the manufacturer. Sample batteries shall then be charged at a constant current of 2,0 I_t 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 I_t 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 I_t A, **(e.g., quick charging power bank, etc.)**	The charging voltage specified by the manufacturer is lower than the overcharge test voltage.	N/A

Disclaimer: This document is controlled and has been released electronically.
Only the version on the IECEE Website is the current document version

ATTACHMENT to IEC62133_2C			
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.	691.507 Wh / L	—

Disclaimer: This document is controlled and has been released electronically.
Only the version on the IECEE Website is the current document version

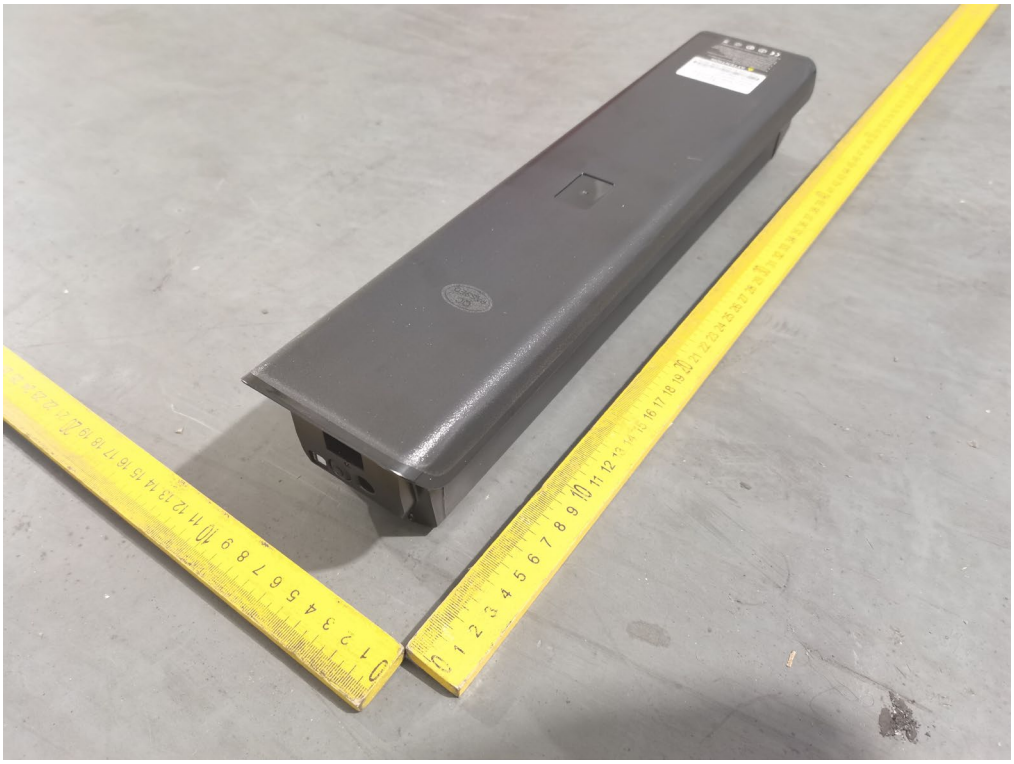
ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
	H.2 Calculation Method  L : Length (max.) of cell (including terrace) W : Width (max.) of cell T : Thickness (max.) when shipping charge (For reference, Please Exclude the dimension of any tape that Is attached to cell) $Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{Length\ (L) \times Width\ (W)\ \times Thickness\ (T)}$ [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]	—	

Disclaimer: This document is controlled and has been released electronically.
Only the version on the IECEE Website is the current document version

ENCLOSURE

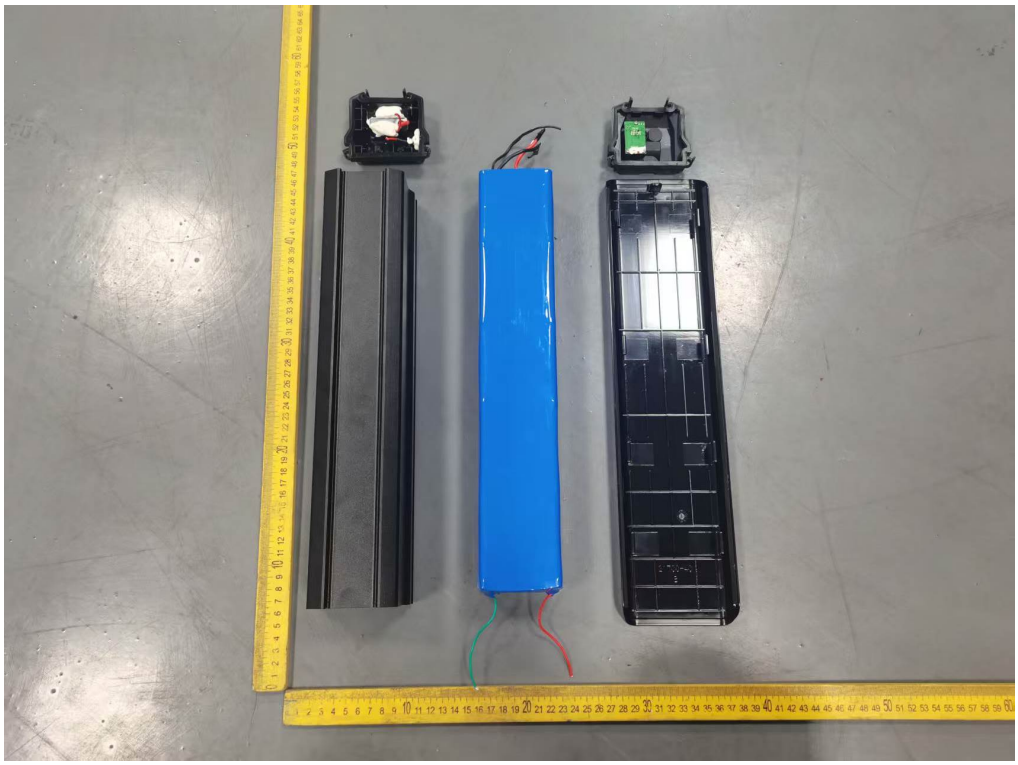
Supplement ID	Description
01-1, 01-2	Overall view of battery
01-3, 01-4	Internal view of battery
01-5, 01-6, 01-7	PCB board view
01-8	Overall view of cell
02-1, 02-2	PCB Layout for BMS
03	Dimension Drawing
04	Packaging Drawing

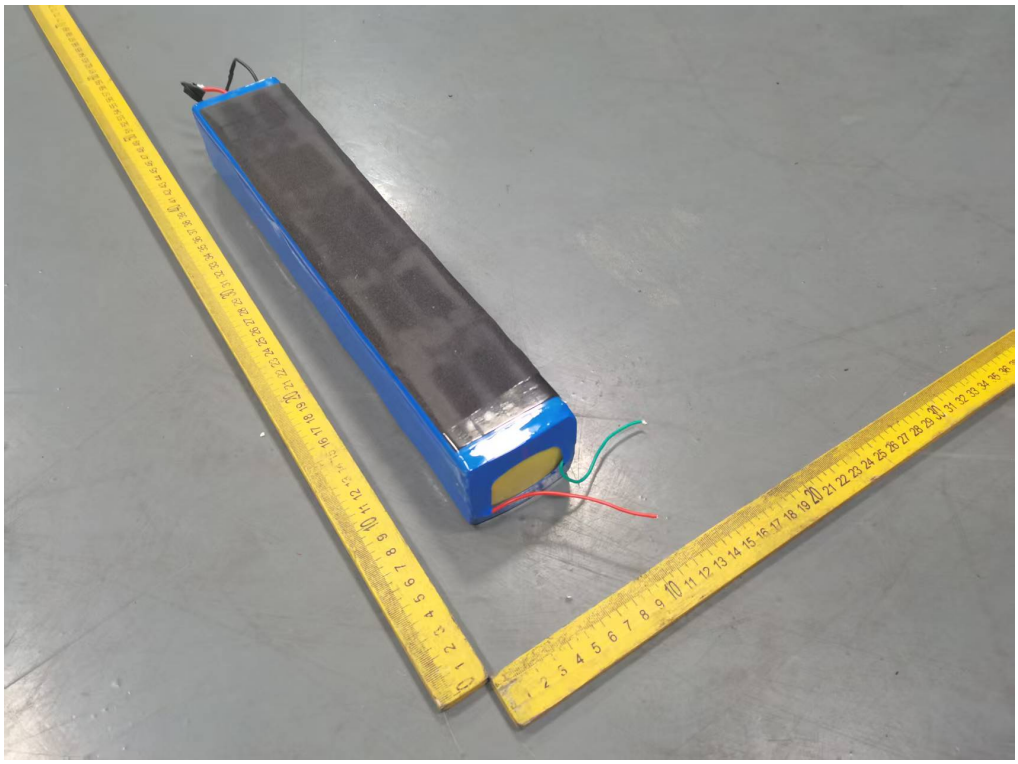
ID 01-1



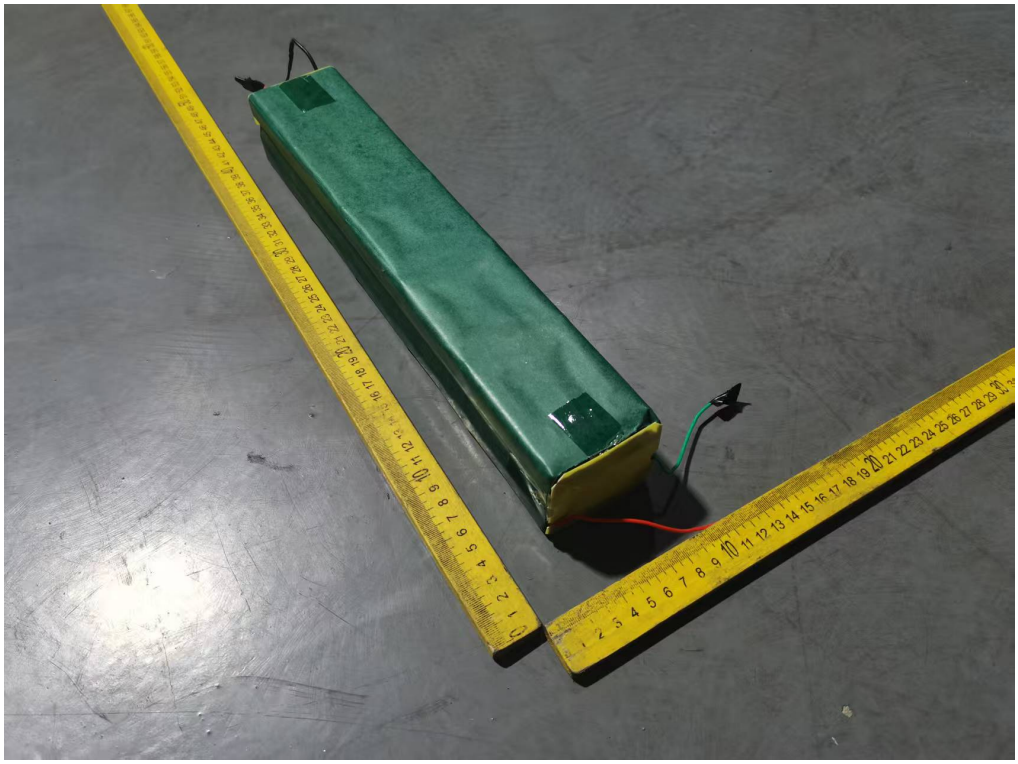
ID 01-2

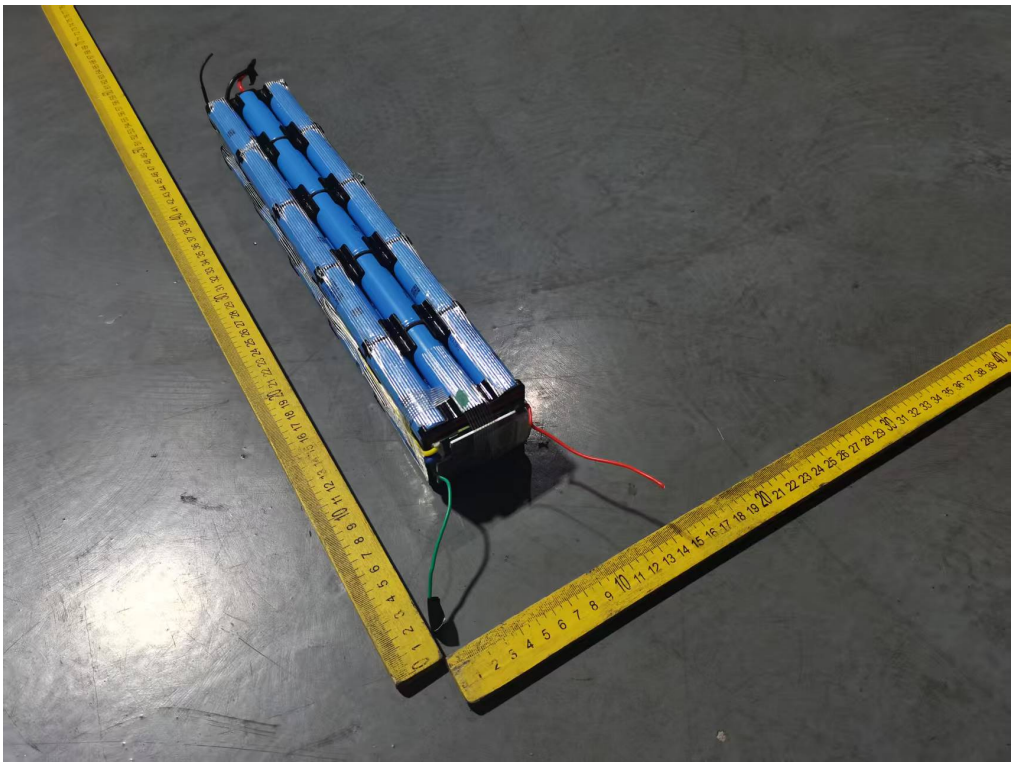
ID 01-3



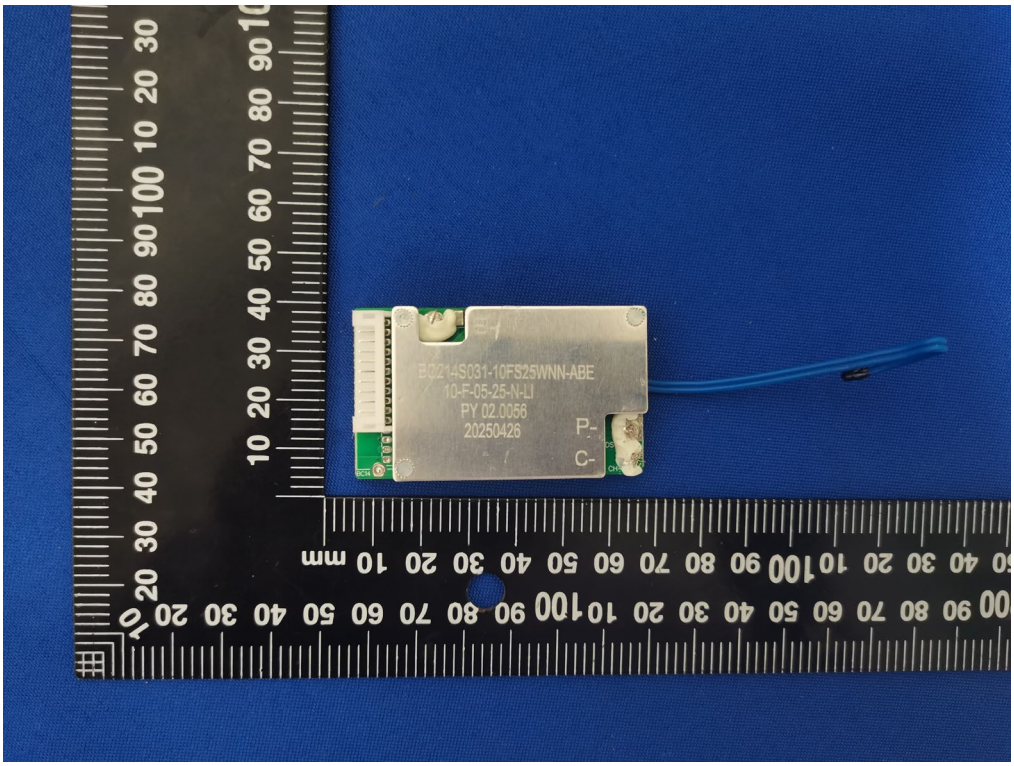


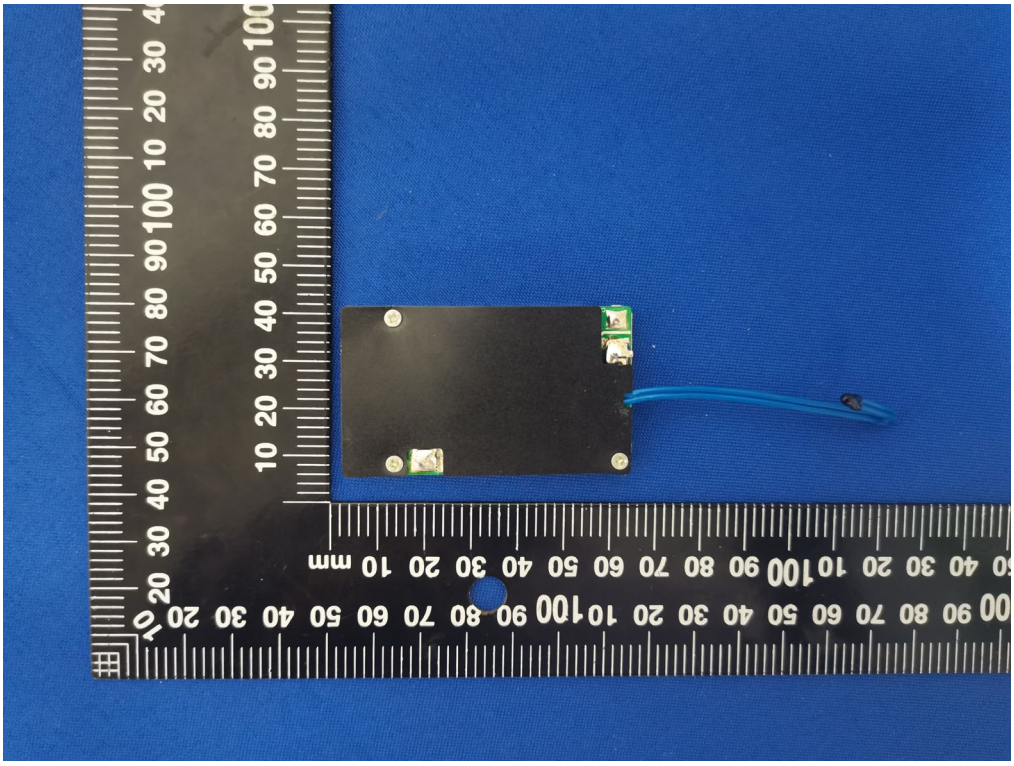
ID 01-4



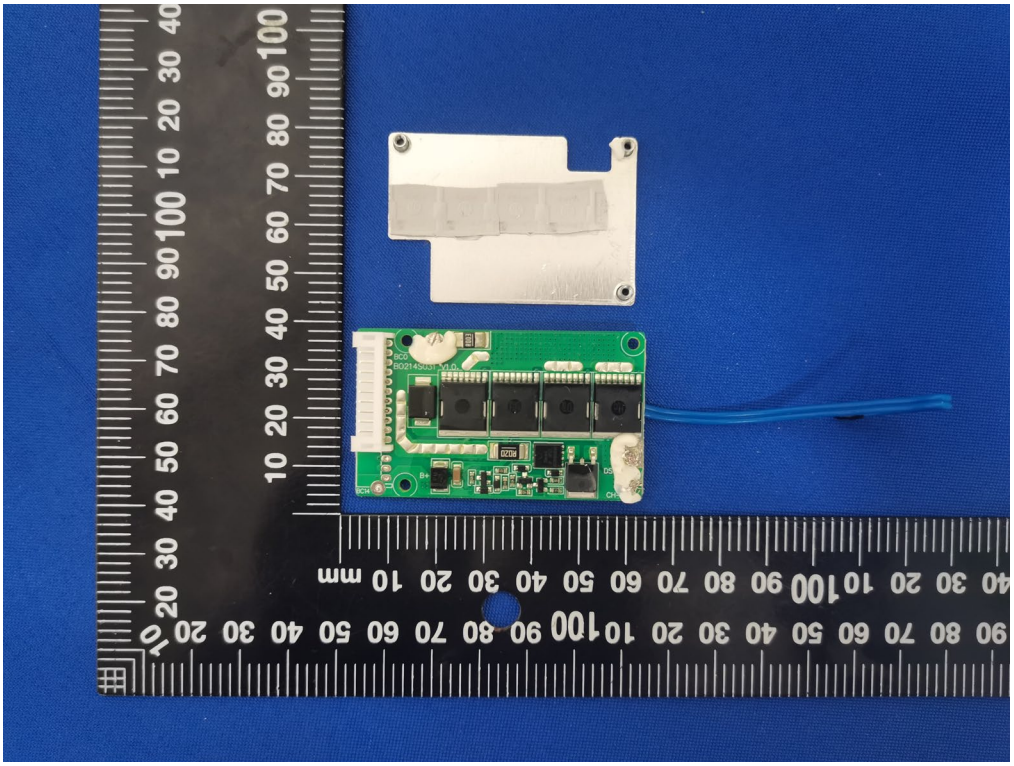


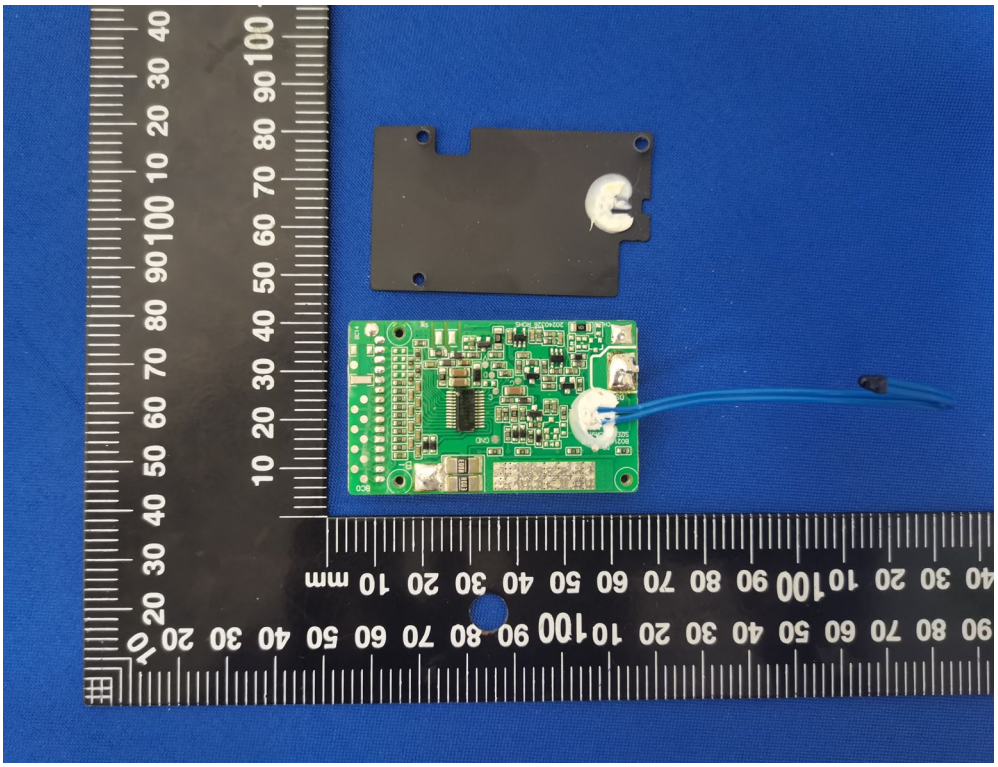
ID 01-5



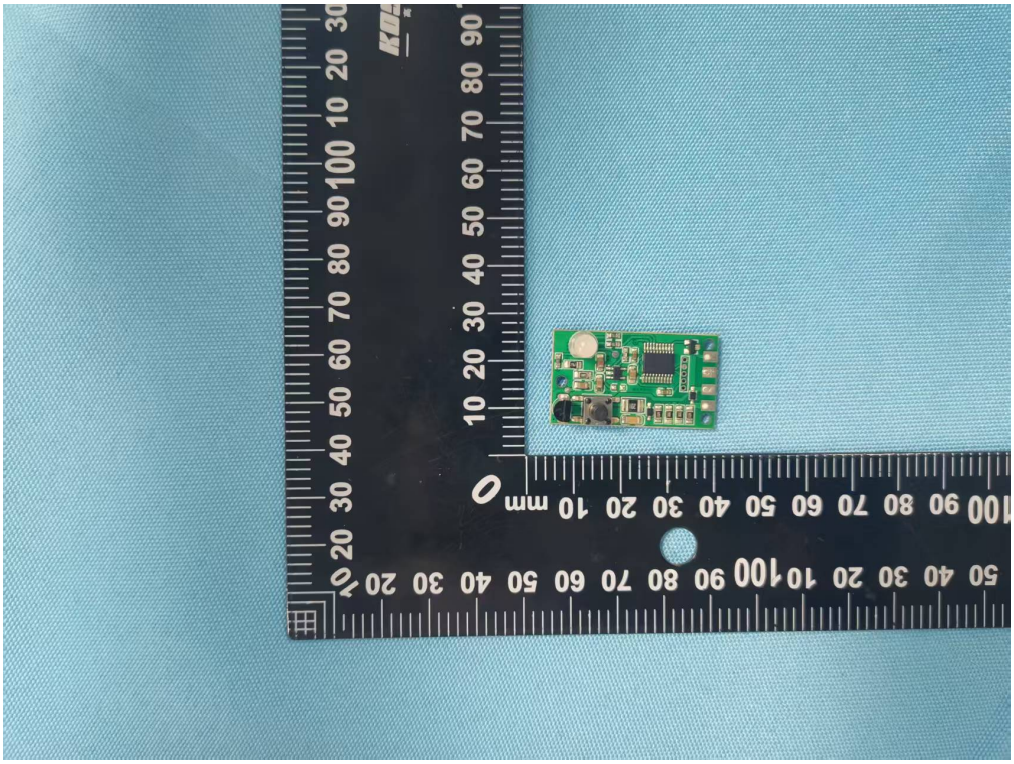


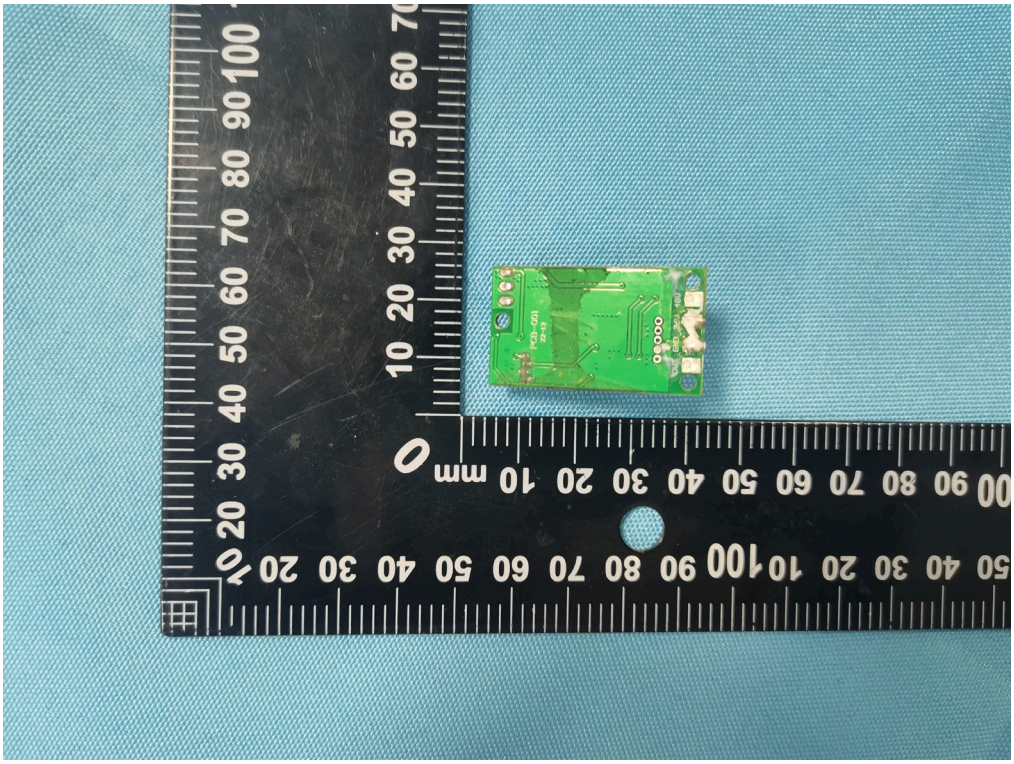
ID 01-6





ID 01-7

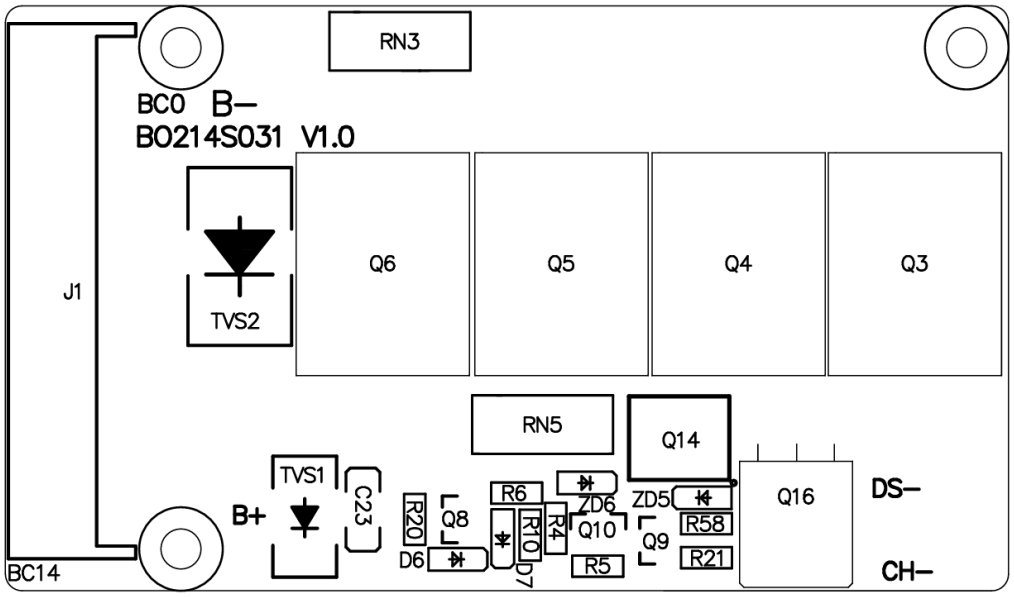


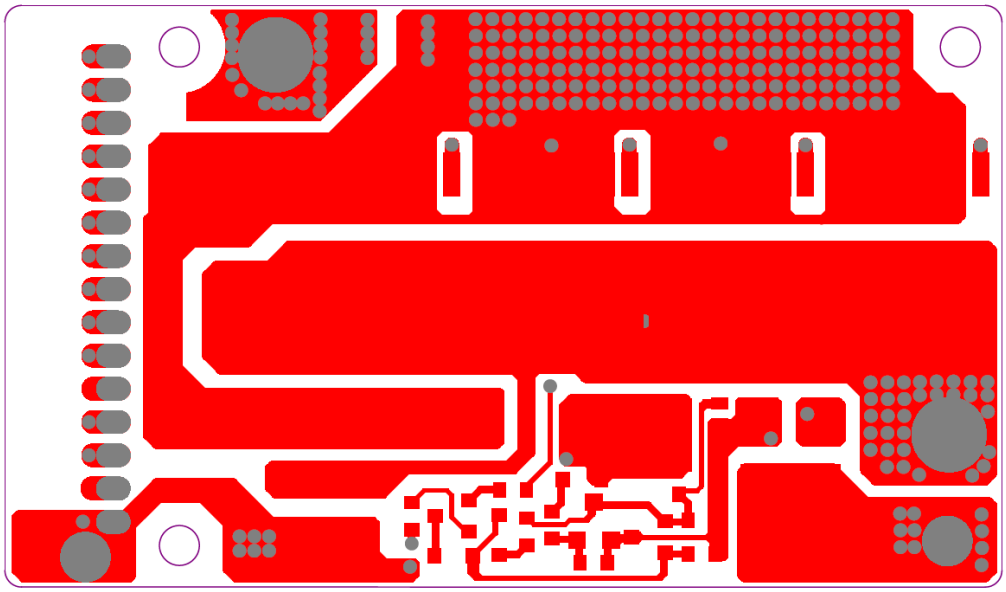


ID 01-8

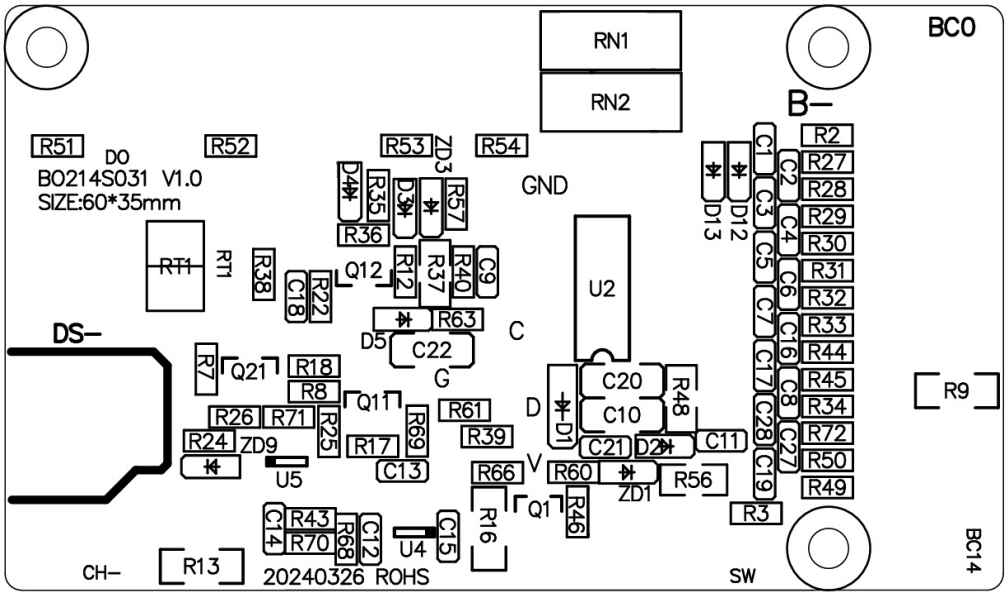

INR21700-50S
+4900mAh CCC
B SDIP71T
FIRE HAZARD! NOT FOR
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

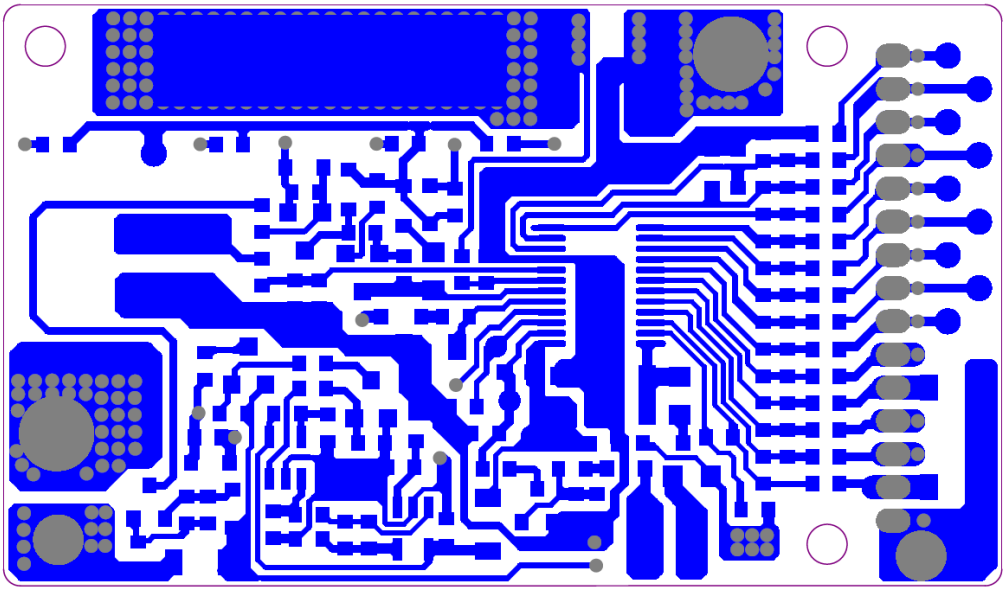
ID 02-1


RN3
BC0 B−
B0214S031 V1.0
J1
TVS2
Q6
Q5
Q4
Q3
RN5
Q14
TVS1
C23
B+
R20
Q8
D6
R6
R10
R4
ZD6
Q10
R5
ZD5
Q9
R58
R21
Q16
DS−
CH−
BC14



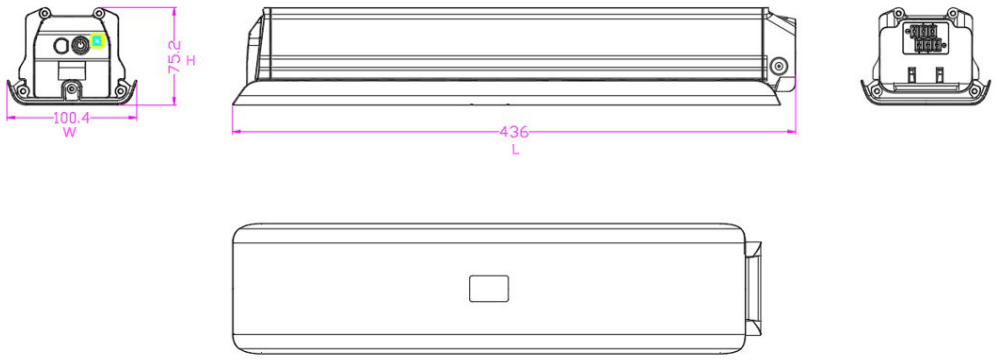
ID 02-2


RN1
RN2
BC0
B-
R51
D0
R52
R53
ZD3
R54
GND
B0214S031 V1.0
SIZE:60*35mm
D4
R35
D3
R57
R36
RT1
R38
R12
R37
R40
C9
C18
R22
Q12
U2
DS-
R63
D5
C22
C
G
R7
Q21
R18
R8
Q1
R61
D
D1
C20
C10
R48
R26
R71
R25
R69
R39
R24
ZD9
R17
C13
U5
C21
D2
C11
R66
V
R60
ZD1
R56
R43
R70
R68
C12
U4
C15
R16
Q1
R46
R3
CH-
R13
20240326 ROHS
SW
BC14
R9
C1
C2
C3
C4
C5
C6
C7
C16
C17
C8
C28
C27
C19
D13
D12
R2
R27
R28
R29
R30
R31
R32
R33
R44
R45
R34
R72
R50
R49

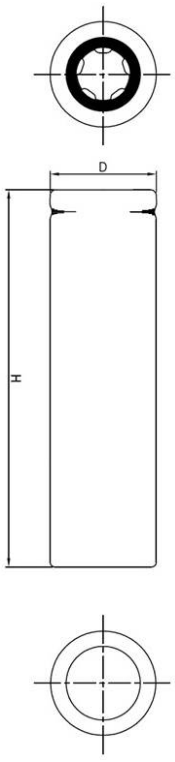


ID 03

Battery Drawing:



H(max.): W(max.): L(max.) =75.2mm: 100.4mm:436.0mm



D(max.): H(max.) = 21.50mm: 70.85mm

ID 04


UN
4G/Y21/S/25
CNIC421405
PI: 002
9


UN
4G/Y21/S/25
CNIC421405
PI: 002
9
CARGO AIRCRAFT ONLY
FORBIDDEN IN PASSENGER AIRCRAFT