# Test Report



**Applicant** :

**Address** :

**The following sample(s) and sample information was/were submitted and identified by/on behalf of the client**

| | | |
|---|---|---|
| Sample Name | : | Polymer Li-ion Battery |
| Sample Model | : | 803040，3.7V 1000mAh 3.7Wh |
| Sample Lot | : | / |
| Sample Received Date | : | Jun 11, 2025 |
| Test Completed Date | : | Jun 13, 2025 |
| Test Requested | : | As specified by client, with reference to Directive EU 2023/1542 to determine Lead(Pb), Cadmium(Cd), Mercury(Hg) contents in the submitted sample. |
| Test Method | : | Refer to the next page(s). |
| Test Results | : | Refer to the next page(s). |
| Test Conclusion | : | Based upon the performed tests by submitted samples, the test results comply with the limits of the Directive EU 2023/1542. |

scan to check the report

HLF25006168E

Authorized Signature:

Technology Manager



FLION TESTING TECHNOLOGIES
Add :Gangzi Industrial Park,Furong Industrial Area, Xinqiao Village, Shajing Town, Bao'an District, Shenzhen City
Tel : 86-0755-2724 8885 Fax : 86-0755-2746 0090 Http://www.cnftt.com

**Test Results:**

| Test Item | Test method/Instrument | MDL (%) | Result (%) | Limit (%) |
|---|---|---|---|---|
| Lead(Pb) | EPA3050B&EPA3052/ICP-OES | 0.0002 | N.D. | 0.01* |
| Cadmium(Cd) | EPA3050B&EPA3052/ICP-OES | 0.0002 | N.D. | 0.002 |
| Mercury(Hg) | EPA3050B&EPA3052/ICP-OES | 0.0002 | N.D. | 0.0005 |

Note:
(1) 1 mg/kg = 1 ppm = 0.0001%
(2) N.D. = Not Detected (less than MDL)
(3) MDL = Method Detection Limit
(4) "--" = Not Regulated
(5) "*" According to the Directive EU 2023/1542: 1.From 18 August 2024, portable batteries, whether or not incorporated into appliances,shall not contain more than 0.01 % of lead (expressed as lead metal) by weight. 2. The restriction set out in point 1 shall not apply to portable zinc-air button cells until 18 August 2028.
(6) According to the Article 13 (5) of Directive EU 2023/1542, All batteries containing more than 0,002 % cadmium or more than 0,004 % lead, shall be marked with the chemical symbol for the metal concerned: Cd or Pb.
Remark: The test report is only used for customer research, teaching, internal quality control, product development and other purposes, for internal reference only.



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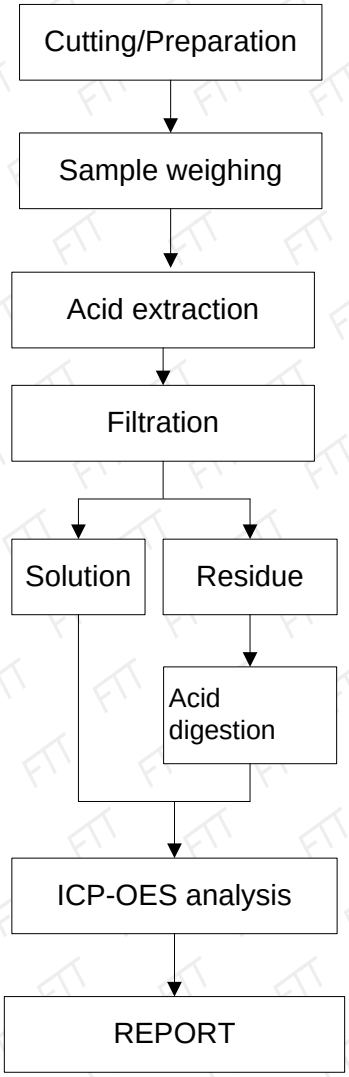
**Testing Flow Chart:**

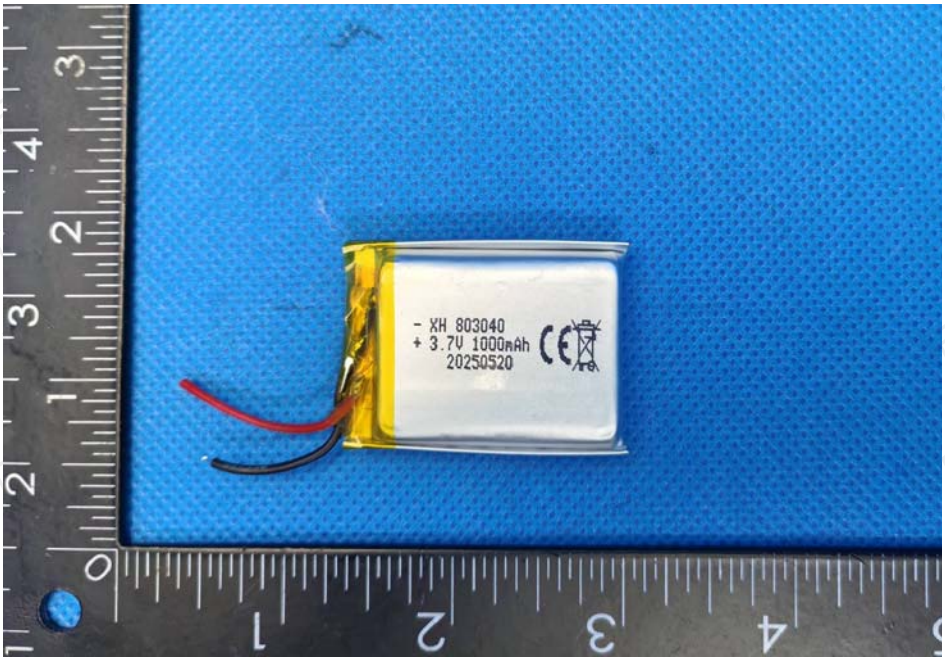


# Test Report



**Test Part Description:** Battery

**Sample Photo**




Note: The results shown in this report refer only to the sample(s) tested.

* * * * * End of Report * * * * *



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# TEST REPORT

**Sample Name:** Lithium Ion Polymer Battery

**Model:** 803040

**Applicant:**

**Report No:** HGXH20240624IEC01

**Standard:** IEC 62133-2:2017+AMD1:2021

**Guangzhou CPUP Certification Technology Service Co., Ltd.**

# 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..... :** | HGXH20240624IEC01 |
| **Date of issue..... ..:** | 2024.09.12 |
| **Total number of pages..... :** | 25 pages |
| **Tested by (name, signature) ..... :** | Tracy Chen |
| **Reviewed by (name, signature) .....:** | Jack Yang |
| **Approved by (name, signature) ..... :** | Leo Zhi |
| **Name of Testing Laboratory preparing the Report.....:** | Guangzhou CPUP Certification Technology Service Co., Ltd. |
| **Applicant's name..... :** | |
| **Address..... :** | |
| **Test specification:** | |
| **Standard..... :** | IEC 62133-2:2017+AMD1:2021 |
| **Test procedure..... :** | Entrust test |
| **Non-standard test method..... :** | N/A |
| **Test Report Form No..... :** | IEC62133_2C |
| **Master TRF..... :** | Dated 2022-10-08 |
| **Test item description..... :** | Lithium Ion Polymer Battery |
| **Trade Mark..... :** | N/A |
| **Manufacturer..... :** | Same as the applicant |
| **Model/Type reference..... :** | 803040 |
| **Ratings..... :** | 3.7Vd.c., 1000mAh |

**Summary of testing:**

| **Tests performed (name of test and test clause):** | **Testing location:** |
|---|---|
| Tests are made with the number of samples specified in Table 1 of IEC 62133-2:2017+AMD1:2021.<br><br>Cl. 7.2.1 Continuous charging at constant voltage (cells)<br>Cl. 7.2.2 Case stress at high ambient temperature (battery)<br>Cl. 7.3.1 External short circuit (cell)<br>Cl. 7.3.2 External short circuit (battery)<br>Cl. 7.3.3 Free fall<br>Cl. 7.3.4 Thermal abuse (cells)<br>Cl. 7.3.5 Crush (cells)<br>Cl. 7.3.6 Over-charging of battery<br>Cl. 7.3.7 Forced discharge (cells)<br>Cl. 7.3.8.1 Vibration<br>Cl. 7.3.8.2 Mechanical shock<br>Cl. 7.3.9 Design evaluation – Forced internal short-circuit (cells)<br><br>The samples comply with the requirements of IEC 62133-2:2017 +AMD1:2021. | Guangzhou CPUP Certification Technology Service Co., Ltd.<br>Address: Room C101/C102/C103/C104, No.9, Hengji Road, Yunxing Zhukeng, Shiqiao Street, Panyu District, Guangzhou, Guangdong, China |

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

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

**Copy of marking plate:**

The artwork below may be only a draft.

Lithium Ion Polymer Battery
Model: 803040 1IMP9/31/40
Rating:3.7V 1000mAh 3.7Wh
Red Wire (+), Black Wire(-)

Caution:
-Do not disassemble or modify
-Do not short-circuit
Date: YYYY/MM/DD

Remark:Date code “YYYY/MM/DD” represents the date of manufacturing.
YYYY–Year, MM-Month; DD-Day;
for example 2024/04/12 means the manufacture date is Apr. 12, 2024

| | |
|---|---|
| **Test item particulars:** | |
| **Classification of installation and use.....:** | Used in portable applications |
| **Supply Connection.....:** | Supplied by lead wires |
| **Recommend charging method declared by the manufacturer.....:** | Charge at constant current 200mA until voltage reaches 4.20V, then charge at constant voltage 4.20V till charge current is 10mA. |
| **Discharge current (0,2 It A).....:** | 200mA |
| **Specified final voltage.....:** | 2.75V |
| **Upper limit charging voltage per cell.....:** | 4.25V |
| **Maximum charging current.....:** | 1000mA |
| **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.....:** | 2024-06-24 |
| **Date (s) of performance of tests.....:** | 2024-06-24 to 2024-07-12 |
| **General remarks:** | |
| "(See appended table)" refers to a table appended to the report.<br>**Throughout this report a ☐ comma / ☒ point is used as the decimal separator.** | |
| **Name and address of factory (ies).....:** | Same as the applicant |

**General product information and other remarks:**

1. The Lithium Ion Polymer Battery, Model 803040 is used for portable appliance and consists of single cell, Model 803040. The cell is tested with battery.
2. Additionally, detailed information of the cell and battery are as following:

| Product name | Lithium Ion Polymer Cell | Lithium Ion Polymer Battery |
|---|---|---|
| Type/model | 803040 | 803040 |
| Nominal voltage | 3.7Vd.c. | 3.7Vd.c. |
| Rated capacity | 1000mAh | 1000mAh |
| Charging voltage declared by manufacturer | 4.20V | 4.20V |
| Upper limit charging voltage | 4.25V | 4.20V |
| Final voltage | 2.75V | 2.75V |
| Charging current declared by manufacturer | 200mA | 200mA |
| Maximum charging current | 1000mA | 1000mA |
| Charging temp. upper limit | 45°C | 45°C |
| Charging temp. lower limit | 10°C | 10°C |
| First charging procedure (20°C ± 5°C) | Charge at constant current 200mA until the voltage reaches 4.20V, then charge at 4.20V till charge current is 10mA. | Charge at constant current 200mA until the voltage reaches 4.20V, then charge at 4.20V till charge current is 10mA. |
| Second charging procedure | After stabilization for 1h to 4h at 10°C and 45°C, respectively, cells are charged at constant current 1000mA until voltage reaches 4.25V, then charge at constant voltage 4.25V till charge current reduced to 0.05 It A (50mA) | - |
| Dimensions | Max.8.2mm(T) ×Max.30.5mm(W) ×Max.40.0mm(H) | Max.8.2mm (T) ×Max.30.5mm(W) ×Max.42.0mm(H) |
| Weight | Approx.18.2g | Approx.18.5g |
| Lower limit discharge voltage | 2.75V | - |
| Discharging current declared by manufacturer | 200mA | 200mA |
| Maximum discharging current | 1000mA | 1000mA |
| Discharging temperature range | 10°C to 45°C | 10°C to 45°C |
| Cell Connection method | - | 1S1P |

Note: The information above is from the documents provided by the applicant.

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4** | **PARAMETER MEASUREMENT TOLERANCES** | | P |
| | Parameter measurement tolerances | | P |
| **5** | **GENERAL SAFETY CONSIDERATIONS** | | P |
| **5.1** | **General** | | P |
| | Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse | | P |
| **5.2** | **Insulation and wiring** | | P |
| | The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ | No externally 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 | | P |
| | Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief | | N/A |
| **5.4** | **Temperature, voltage and current management** | | P |
| | Batteries are designed such that abnormal temperature rise conditions are prevented | Overcharge, overdischarge, over current and short-circuit proof circuit used in this battery. | P |
| | Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer | See page 5. | 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 battery specification. | P |
| **5.5** | **Terminal contacts** | | N/A |
| | The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current | | N/A |
| | External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance | | N/A |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Terminal contacts are arranged to minimize the risk of short circuits | | N/A |
| **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 | | P |
| | If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation | | P |
| | 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 | | P |
| | Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer | | N/A |
| | Protective circuit components are added as appropriate and consideration given to the end-device application | Considered in end-device | N/A |
| | The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance | | N/A |
| 5.6.2 | Design recommendation | | P |
| | For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2 | | P |
| | 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 |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 | Considered in end-device | N/A |
| | 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 | Considered in end-device | N/A |
| | 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 | | N/A |
| | 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 | | 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 | | 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 | | 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 | | P |
| **5.8** | **Battery safety components** | See TABLE: Critical components information | 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 | Tests are performed according to specified in Table 1 of the standard.<br>The samples are not more than 6 months old. | P |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 | See clause 7.3.2. | 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 |
| | 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 | Test samples charged at charging temperature upper limit 45°C;<br>Test samples charged at charging temperature lower limit 10°C; | P |
| **7.2** | **Intended use** | | P |
| 7.2.1 | Continuous charging at constant voltage (cells) | | 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) | The test is specially requested by Applicant. | P |
| | Oven temperature (°C)..... : | 70 ºC ± 2 ºC | — |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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** | | P |
| 7.3.1 | External short-circuit (cell) | | 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) | | P |
| | The batteries were tested until one of the following occurred: | | P |
| | - 24 hours elapsed; or | | P |
| | - The case temperature declined by 20 % of the maximum temperature rise | | P |
| | In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition | | N/A |
| | A single fault in the discharge protection circuit 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 | | P |
| | Results: no fire, no explosion.....: | (See appended table 7.3.2) | P |
| 7.3.3 | Free fall | | P |
| | Results: no fire, no explosion | No fire, no explosion | P |
| 7.3.4 | Thermal abuse (cells) | | P |
| | Oven temperature (°C).....: | 130°C±2°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 | | 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 |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.3.6 | Over-charging of battery | | P |
| | The supply voltage which is: | | P |
| | - 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or | | P |
| | - 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and | | N/A |
| | - Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached | | P |
| | Test was continued until the temperature of the outer casing: | | P |
| | - Reached steady state conditions (less than 10 °C change in 30-minute period); or | | N/A |
| | - Returned to ambient | | P |
| | Results: no fire, no explosion.....: | (See appended table 7.3.6) | P |
| 7.3.7 | Forced discharge (cells) | | 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 |
| | - 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) | | 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) | | P |
| | The cells complied with national requirement for.....: | France, Japan, Korea, Switzerland | — |
| | The pressing was stopped upon: | | P |
| | - A voltage drop of 50 mV has been detected; or | | N/A |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached | 400N for prismatic 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 for safety specified in cell specification. | P |
| | Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users | Information for safety specified in battery 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 |
| | Do not allow children to replace batteries without adult supervision | | P |
| **8.2** | **Small cell and battery safety information** | | P |
| | The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them: | | P |
| | - Keep small cells and batteries which are considered swallowable out of the reach of children | | P |
| | - Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion | | P |
| | - In case of ingestion of a cell or battery, seek medical assistance promptly | | P |
| **9** | **MARKING** | | P |
| **9.1** | **Cell marking** | | 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 |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Batteries are marked as specified in IEC 61960, except for coin batteries | Battery marked as specified in IEC 61960-3:2017 | 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** | | N/A |
| | Coin cells and batteries identified as small batteries include a caution statement regarding the hazards of ingestion in accordance with 8.2 | Not Coin batteries | N/A |
| | Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion is given on the immediate package | Not for direct sale in consumer-replaceable applications | N/A |
| **9.4** | **Other information** | | P |
| | The following information are marked on or supplied with the battery: | Specified in the battery specification | P |
| | - Storage and disposal instructions | | P |
| | - Recommended charging instructions | | 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 |
| A.3.1 | General | | P |
| A.3.2 | Upper limit charging voltage | | P |
| A.3.2.1 | General | | P |
| A.3.2.2 | Explanation of safety viewpoint | | P |
| A.3.2.3 | Safety requirements, when different upper limit charging voltage is applied | 4.25V applied | N/A |
| **A.4** | **Consideration of temperature and charging current** | | P |
| A.4.1 | General | | P |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| A.4.2 | Recommended temperature range | | P |
| A.4.2.1 | General | | P |
| A.4.2.2 | Safety consideration when a different recommended temperature range is applied | | 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 | Considered in end-device | 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 | Considered in end-device | 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 | | P |
| A.4.6 | Consideration of discharge | | P |
| A.4.6.1 | General | | P |
| A.4.6.2 | Final discharge voltage and explanation of safety viewpoint | Considered in end-device | N/A |
| A.4.6.3 | Discharge current and temperature range | Considered in end-device | N/A |
| A.4.6.4 | Scope of application of the discharging current | | P |
| **A.5** | **Sample preparation** | | P |
| A.5.1 | General | | P |
| A.5.2 | Insertion procedure for nickel particle to generate internal short | | P |
| A.5.3 | Disassembly of charged cell | | P |
| A.5.4 | Shape of nickel particle | | P |
| 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 | | P |
| **A.6** | **Experimental procedure of the forced internal short-circuit test** | | P |
| 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 |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| A.6.3 | Positioning (or placement) of a nickel particle | | P |
| A.6.4 | Damaged separator precaution | | P |
| A.6.5 | Caution for rewinding separator and electrode | | P |
| A.6.6 | Insulation film for preventing short-circuit | | P |
| A.6.7 | Caution when disassembling a cell | | P |
| A.6.8 | Protective equipment for safety | | P |
| A.6.9 | Caution in the case of fire during disassembling | | P |
| A.6.10 | Caution for the disassembling process and pressing the electrode core | | P |
| A.6.11 | Recommended specifications for the pressing device | | P |
| **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 | | 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** | | N/A |
| **ANNEX F** | **COMPONENT STANDARDS REFERENCES** | | N/A |

| 7.2.1 | TABLE: Continuous charging at constant voltage (cells) | | | P |
|---|---|---|---|---|
| **Sample no.** | **Recommended charging voltage (Vdc)** | **Recommended charging current $I_{rec}$ (A)** | **OCV before test (Vdc)** | **Results** |
| C1# | 4.20 | 0.2 | 4.188 | A, B |
| C2# | 4.20 | 0.2 | 4.187 | A, B |
| C3# | 4.20 | 0.2 | 4.188 | A, B |
| C4# | 4.20 | 0.2 | 4.189 | A, B |
| C5# | 4.20 | 0.2 | 4.187 | A, B |

**Supplementary information:**

A- No fire or explosion
B- No leakage
C- Others (please explain)

| 7.3.1 | TABLE: External short-circuit (cell) | | | | P |
|---|---|---|---|---|---|
| **Sample no.** | **Ambient T (°C)** | **OCV before test (Vdc)** | **Resistance of circuit (mΩ)** | **Maximum case temperature(°C)** | **Results** |
| **Samples charged at charging temperature upper limit** | | | | | |
| C6# | 55.0 | 4.227 | 82 | 118.7 | A |
| C7# | 55.0 | 4.228 | 81 | 121.9 | A |
| C8# | 55.0 | 4.228 | 87 | 109.2 | A |
| C9# | 55.0 | 4.226 | 83 | 115.7 | A |
| C10# | 55.0 | 4.229 | 83 | 113.2 | A |
| **Samples charged at charging temperature lower limit** | | | | | |
| C11# | 55.0 | 4.195 | 84 | 116.9 | A |
| C12# | 55.0 | 4.191 | 80 | 117.3 | A |
| C13# | 55.0 | 4.193 | 84 | 117.3 | A |
| C14# | 55.0 | 4.193 | 82 | 115.5 | A |
| C15# | 55.0 | 4.194 | 83 | 122.3 | A |

**Supplementary information:**

A- No fire or explosion
B- Others (please explain)

| 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(°C)** | **Component single fault condition** | **Results** |
| B1# | 23.9 | 4.184 | 82 | 24.0 | No | A |
| B2# | 23.9 | 4.183 | 83 | 24.1 | No | A |
| B3#* | 23.2 | 4.183 | 85 | 121.8 | Yes | A |
| B4#* | 23.2 | 4.185 | 83 | 121.4 | Yes | A |
| B5#* | 23.2 | 4.183 | 80 | 121.7 | Yes | A |

**Supplementary information:**

A- No fire or explosion
B- Others (please explain)
* Tested with MOSFET(U2) pin1 & pin3 was short circuited

| 7.3.5 | TABLE: Crush (cells) | | P |
|---|---|---|---|
| **Sample no.** | **OCV before test (Vdc)** | **Maximum force applied to the cell during crush (kN)** | **Results** |
| **Samples charged at charging temperature upper limit** | | | |
| C26# | 4.229 | 13.02 | A |
| C27# | 4.226 | 13.08 | A |
| C28# | 4.226 | 13.17 | A |
| C29# | 4.227 | 13.05 | A |
| C30# | 4.227 | 13.06 | A |
| **Samples charged at charging temperature lower limit** | | | |
| C31# | 4.194 | 13.09 | A |
| C32# | 4.192 | 13.11 | A |
| C33# | 4.195 | 13.05 | A |
| C34# | 4.193 | 13.09 | A |
| C35# | 4.193 | 13.14 | A |

**Supplementary information:**

A- No fire or explosion
B- Others (please explain)

| 7.3.6 | TABLE: Over-charging of battery | P |
|---|---|---|
| Constant charging current (A).....: | 2.0 | — |
| Supply voltage (Vdc).....: | 5.95 | — |

| Sample no. | OCV before charging (Vdc) | Maximum outer case temperature (°C) | Results |
|---|---|---|---|
| B6# | 3.398 | 40.9 | A |
| B7# | 3.381 | 40.8 | A |
| B8# | 3.384 | 41.8 | A |
| B9# | 3.392 | 40.6 | A |
| B10# | 3.394 | 40.1 | A |

**Supplementary information:**

A- No fire or explosion
B- Others (please explain)

| 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** |
| C36# | 3.385 | 1.0 | 2.75 | A |
| C37# | 3.387 | 1.0 | 2.75 | A |
| C38# | 3.379 | 1.0 | 2.75 | A |
| C39# | 3.380 | 1.0 | 2.75 | A |
| C40# | 3.384 | 1.0 | 2.75 | A |

**Supplementary information:**

A- No fire or explosion
B- 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** |
| B11# | 4.183 | 4.171 | 18.447 | 18.446 | A, B, C, D |
| B12# | 4.185 | 4.173 | 18.416 | 18.415 | A, B, C, D |
| B13# | 4.185 | 4.174 | 18.506 | 18.504 | A, B, C, D |

**Supplementary information:**

A- No fire or explosion
B- No rupture
C- No leakage
D- No venting
E- 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** |
| B14# | 4.182 | 4.178 | 18.432 | 18.431 | A, B, C, D |
| B15# | 4.185 | 4.180 | 18.497 | 18.497 | A, B, C, D |
| B16# | 4.184 | 4.179 | 18.452 | 18.451 | A, B, C, D |

**Supplementary information:**

A- No fire or explosion
B- No rupture
C- No leakage
D- No venting
E- 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** |
| **Samples charged at charging temperature upper limit** | | | | | |
| C44# | 45 | 4.228 | 1 | 400 | A |
| C45# | 45 | 4.225 | 1 | 400 | A |
| C46# | 45 | 4.226 | 1 | 400 | A |
| C47# | 45 | 4.228 | 1 | 400 | A |
| C48# | 45 | 4.228 | 1 | 400 | A |
| **Samples charged at charging temperature lower limit** | | | | | |
| C49# | 10 | 4.194 | 1 | 400 | A |
| C50# | 10 | 4.194 | 1 | 400 | A |
| C51# | 10 | 4.195 | 1 | 400 | A |
| C52# | 10 | 4.194 | 1 | 400 | A |
| C53# | 10 | 4.193 | 1 | 400 | A |

**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 or explosion

B- Others (please explain)

Remark: There is no Test Particle location 2 in this cell.

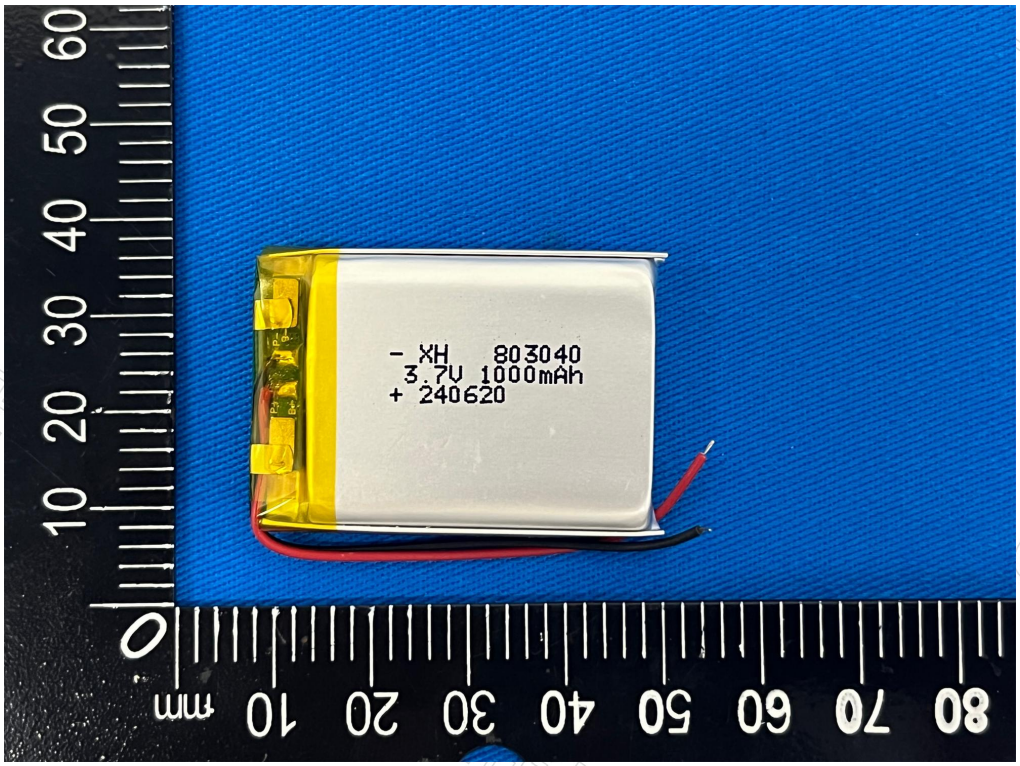
| D.2 | TABLE: Internal AC resistance for coin cells | | | N/A |
|---|---|---|---|---|
| **Sample no.** | **Ambient T (°C)** | **Store time (h)** | **Resistance Rac (Ω)** | **Results 1)** |
| - | - | - | - | - |
| - | - | - | - | - |
| - | - | - | - | - |

**Supplementary information:**

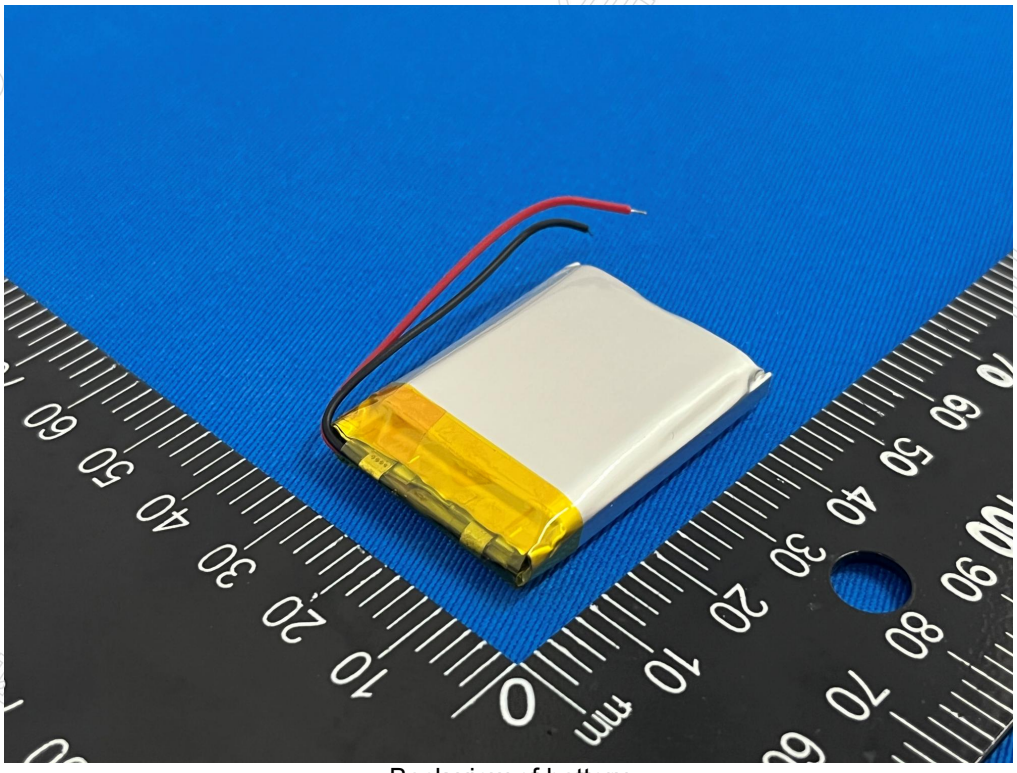
1) Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

| TABLE: Critical components information | | | | | |
|---|---|---|---|---|---|
| **Object / part No.** | **Manufacturer / trademark** | **Type / model** | **Technical data** | **Standard** | **Mark(s) of conformity[1)]** |
| 1. Lithium Ion Polymer Cell | | 803040 | 3.7Vd.c., 1000mAh | IEC 62133-2:2017+AMD1:2021 | Tested with battery |
| -Electrolyte | Macheng Tin Li Technology Limited | TLDJY-5112 | LiPF6,EC,DEC,EMC | - | - |
| -Separator | Shenzhen Yuehongyuan Technology Co. , Ltd. | 0.016*36 | PP, 16μm thick | - | - |
| -Positive electrode | Shandong Qianyun Gaoke New Materials Co. , Ltd. | SDQY-A01 | NiCoMnO2, Carbon black, PVDF, Conductive Additive,Aluminum Foil | - | - |
| -Negative electrode | Xinxiang Ling Wan Technology Limited | LY-588 | Graphite, CMC, SBR, Conductive Additive, Copper Foil | - | - |
| 2. IC (U1) | Dongguan Power Technology Co. , Ltd. | BQDW01A | Over-charge Threshold Voltage: 4.280V±0.050V@Topt=25°C; Over-discharge Threshold Voltage: 2.400V±0.050V; | IEC 62133-2:2017+AMD1:2021 | Tested with battery |
| 3. MOSFET (U2) | Dongguan Power Technology Co. , Ltd. | BQ8205A | $V_{DS}$: 20V, $V_{GS}$: ±12V, $I_D$: 5A, $T_J$, $T_{STG}$: -55°C to 150°C | IEC 62133-2:2017+AMD1:2021 | Tested with battery |
| 4. PCB material | Shenzhen Lutongda Technology Co Ltd | LTD-D | FR4, 130°C, V-0 | UL 796 | UL E486889 |
| Interchangeable | Shenzhen Lutongda Technology Co Ltd | LTD-M | FR4, 130°C, V-0 | UL 796 | UL E486889 |
| Interchangeable | Interchangeable | LTD-M | FR4, 130°C, V-0 | UL 796 | UL approved |
| 5. Wiring | DONGGUAN ZHONGZHEN NEW ENERGY TECHNOLOGY CO.,LTD | 1007 | 28AWG, 80°C, 300V | UL 758 | UL E355578 |
| -Alternative | Interchangeable | Interchangeable | 22AWG,150°C, 3kV | UL758 | UL approved |
| Note: The information above is from the documents provided by the applicant. | | | | | |

**Photos**

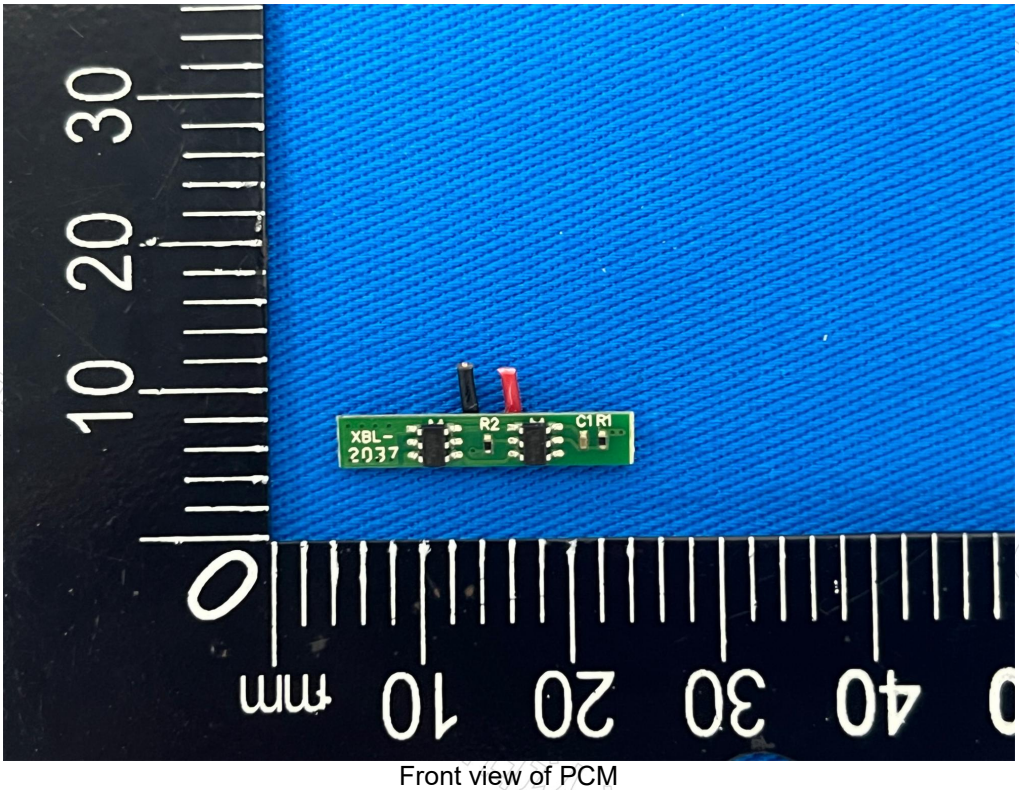



Front view of battery

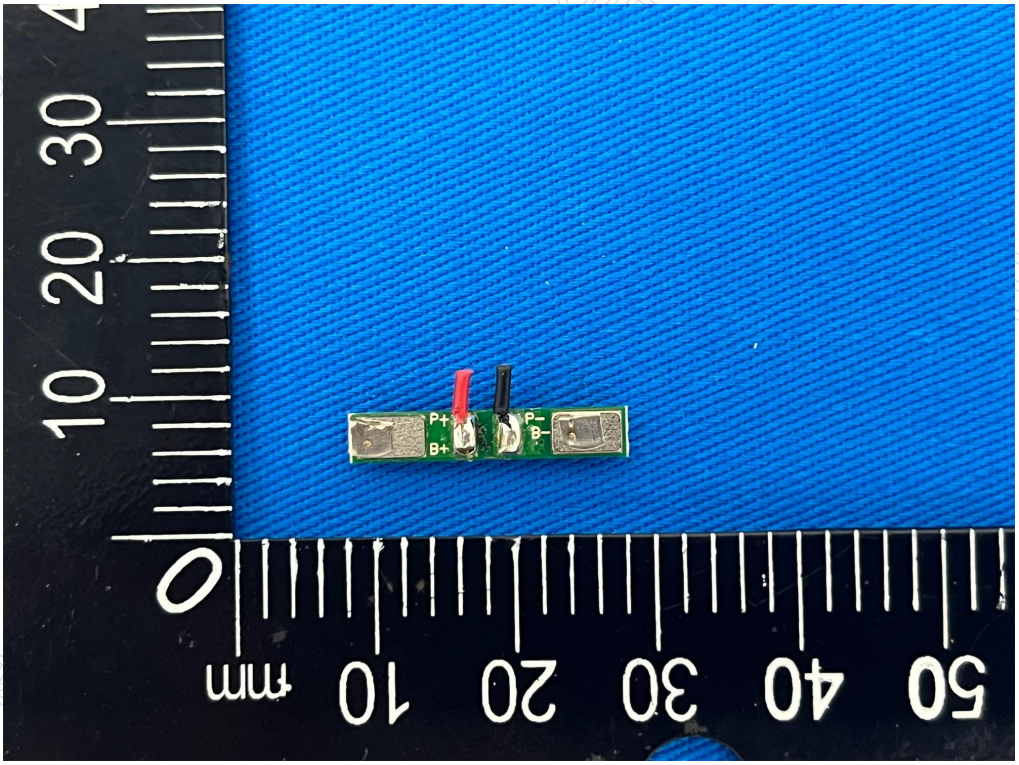


Back view of battery

**Photos**

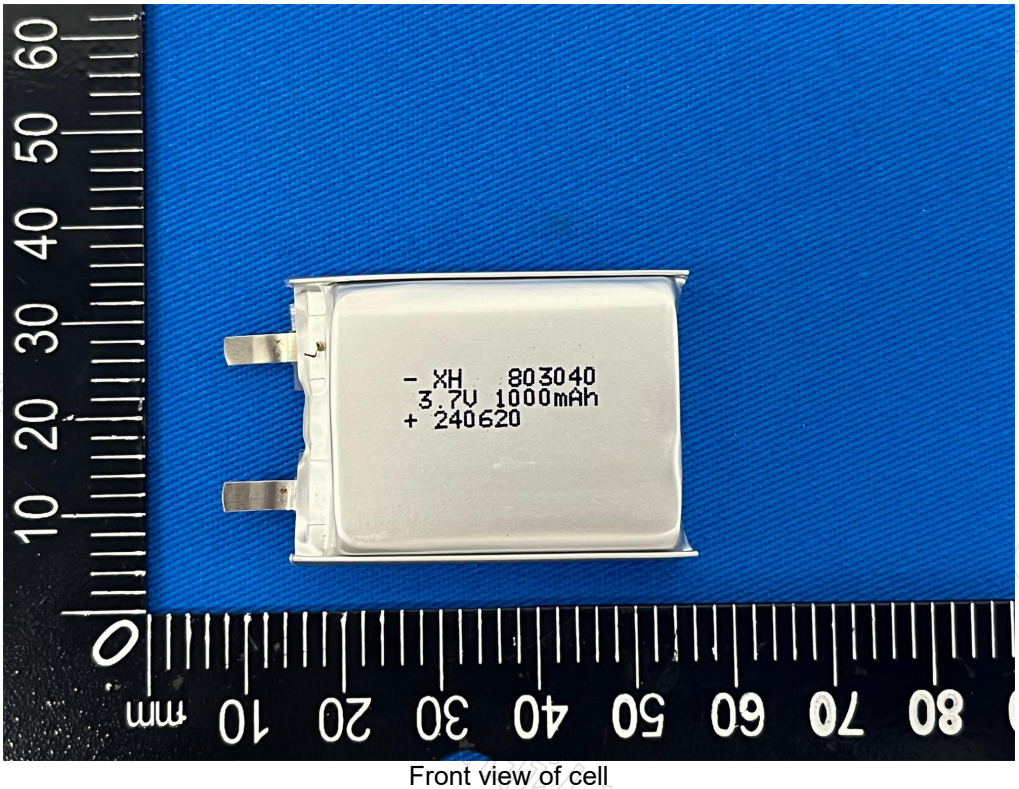



Front view of PCM

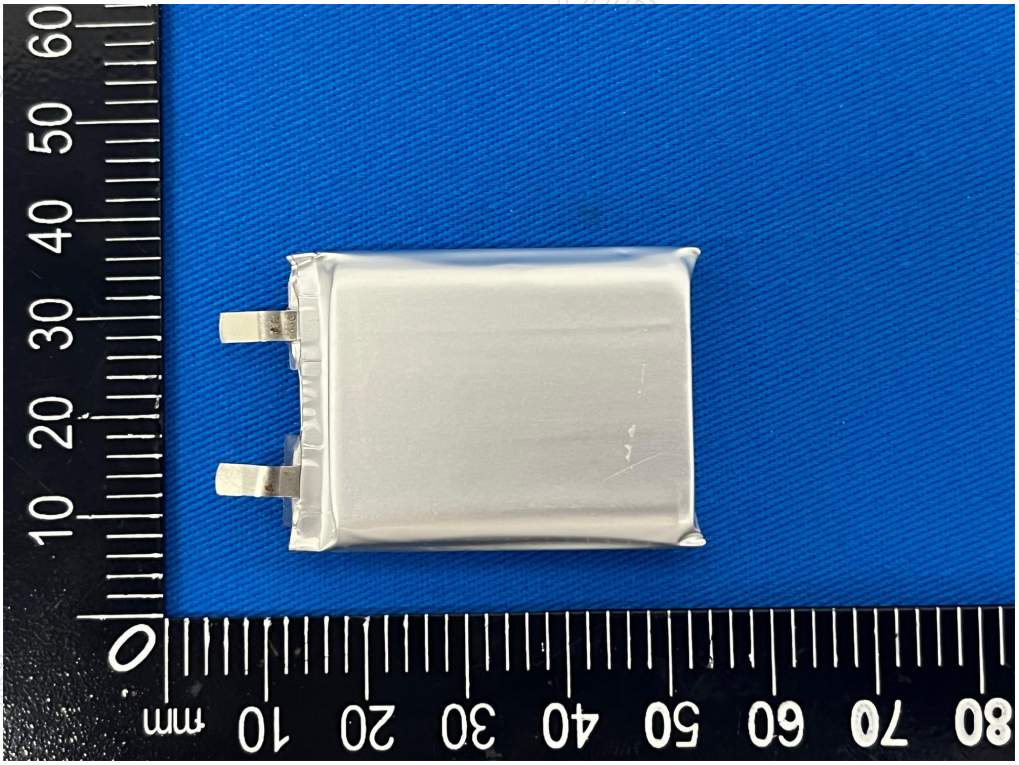



Back view of PCM

**Photos**




Front view of cell



Back view of cell

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--End of report--