# TEST REPORT
## IEC 62133
## Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications

| | |
|---|---|
| **Report Number.** .....: | LCS180612122AS |
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| **Total number of pages**.....: | 24 Pages |
| **Tested by (name + signature)** .....: | Allen Zeng |
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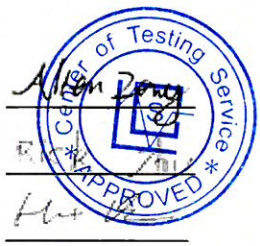
| **Approved by (name + signature)** .: | Hart Qiu |




| | |
|---|---|
| **Applicant's name**.....: | Shenzhen Jin Yu Zhou Energy Co., Ltd. |
| **Address** .....: | 2/F, A Building, JinHeRuiYiQuan Industrial Area, Tangqian Village, Guanlan Street, Longhua New District, Shenzhen City. |
| **Test specification:** | |
| **Standard**.....: | IEC 62133: 2012 (Second Edition) |
| **Test result** .....: | Pass |
| **Non-standard test method**.....: | N/A |
| **Testing laboratory** .....: | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| **Address** .....: | 1/F, Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China |
| **Testing location**.....: | As above |
| **Test item description** .....: | Rechargeable Polymer Li-ion Battery |
| **Trade Mark** .....: | JYZ |
| **Manufacturer**.....: | Same as applicant |
| **Model/Type reference** .....: | 350926 |
| **Ratings** .....: | 3.7V, 55mAh, 0.204Wh |

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

Attachment 1: Photo documentation (4 pages).

**Summary of testing:**

| **Tests performed (name of test and test clause):** | **Testing location:** |
|---|---|
| cl.5.6.2 Design recommendation (Lithium system);<br>cl.8.1 Charging procedure for test purposes (for Cells and Batteries);<br>cl.8.2.1 Continuous charging at constant voltage (Cells);<br>cl.8.2.2 Moulded case stress at high ambient temperature (Batteries);<br>cl.8.3.1 External short circuit (Cell);<br>cl.8.3.2 External short circuit (Batteries);<br>cl.8.3.3 Free fall (Cells and Batteries);<br>cl.8.3.4 Thermal abuse (Cells);<br>cl.8.3.5 Crush (Cells);<br>cl.8.3.6 Over-charging of battery;<br>cl.8.3.7 Forced discharge (Cells);<br>cl.8.3.8 Transport tests (Cells);<br>cl.8.3.9 Design evaluation – Forced internal short circuit (cells).<br><br>The electrolyte type of this cell doesn't belong to polymer, and the additional test cl.8.3.9 was carried out to evaluate the cell.<br><br>Tests are made with the number of cells and batteries specified in IEC 62133: 2012 (Second Edition) Table 2. | Shenzhen LCS Compliance Testing Laboratory Ltd.<br>1/F, Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China |

☒ **The product fulfils the requirements of EN 62133: 2013**

**Copy of marking plate:**

The artwork below may be only a draft.

| |
|---|
| Red wire (+) Black wire (-) JYZ |
| Rechargeable Polymer Li-ion Battery |
| Model: 350926 (1ICP4/10/27) |
| Rated: 3.7V, 55mAh, 0.204Wh |
| YYYY/MM/DD |
| Shenzhen Jin Yu Zhou Energy Co., Ltd. |

Remark:

“YYYY” means year for manufacture;

“MM” means month for manufacture;

“DD” means day for manufacture.

| | |
|---|---|
| **Test item particulars.....:** | |
| **Classification of installation and use.....:** | To be defined in final product |
| **Supply connection.....:** | DC lead wire |
| **Recommend charging method declared by the manufacturer ..... :** | Charging the battery with 11mA constant current until 4.2V, then constant voltage until charge current reduces to 0.55mA at ambient 20°C±5°C. |
| **Discharge current (0.2 $I_t$ A) ..... :** | 11mA |
| **Specified final voltage ..... :** | 2.75V |
| **Chemistry ..... :** | ☐ nickel systems ..... ☒ lithium systems |
| **Recommend of charging limit for lithium system** | |
| **Upper limit charging voltage per cell.....:** | 4.25V |
| **Maximum charging current.....:** | 55mA |
| **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 .....:** | 2018-06-12 |
| **Date (s) of performance of tests.....:** | 2018-06-12 to 2018-06-22 |

**General remarks:**

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
**Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**

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

**General product information:**

This battery pack is constructed with one lithium ion cell, and has overcharge, over-discharge, over current and short-circuits proof circuit.

The main features of the battery pack are shown as below (clause 8.1.1):

| Model | Nominal capacity | Nominal voltage | Nominal Charge Current | Nominal Discharge Current | Maximum Charge Current | Maximum Discharge Current | Maximum Charge Voltage | Cut-off Voltage |
|---|---|---|---|---|---|---|---|---|
| 350926 (Battery) | 55mAh | 3.7V | 11mA | 11mA | 55mA | 55mA | 4.2V | 2.75V |

The main features of the battery pack are shown as below (clause 8.1.2):

| Model | Upper limit charge voltage | Taper-off current | Lower charge temperature | Upper charge temperature |
|---|---|---|---|---|
| 350926 (Battery) | 4.25V | 2.75mA | 0°C | 45°C |

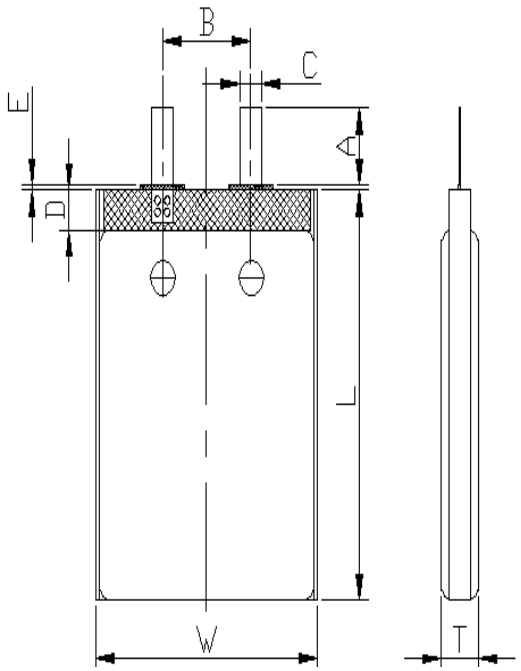
The main features of the cell in the battery pack are shown as below (clause 8.1.1):

| Model | Nominal capacity | Nominal voltage | Nominal Charge Current | Nominal Discharge Current | Maximum Charge Current | Maximum Discharge Current | Maximum Charge Voltage | Cut-off Voltage |
|---|---|---|---|---|---|---|---|---|
| 350926 (Cell) | 55mAh | 3.7V | 11mA | 11mA | 55mA | 55mA | 4.2V | 2.75V |

The main features of the cell in the battery pack are shown as below (clause 8.1.2):

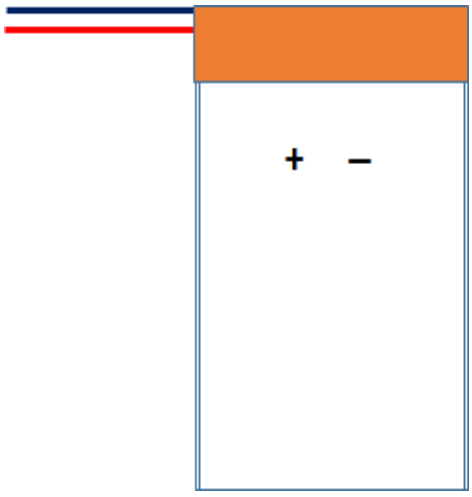
| Model | Upper limit charge voltage | Taper-off current | Lower charge temperature | Upper charge temperature |
|---|---|---|---|---|
| 350926 (Cell) | 4.25V | 2.75mA | 0°C | 45°C |

**Construction:**




| | |
|---|---|
| T | ≪ 3.6 |
| W | ≪ 9.2 |
| L | ≪ 27.0 |

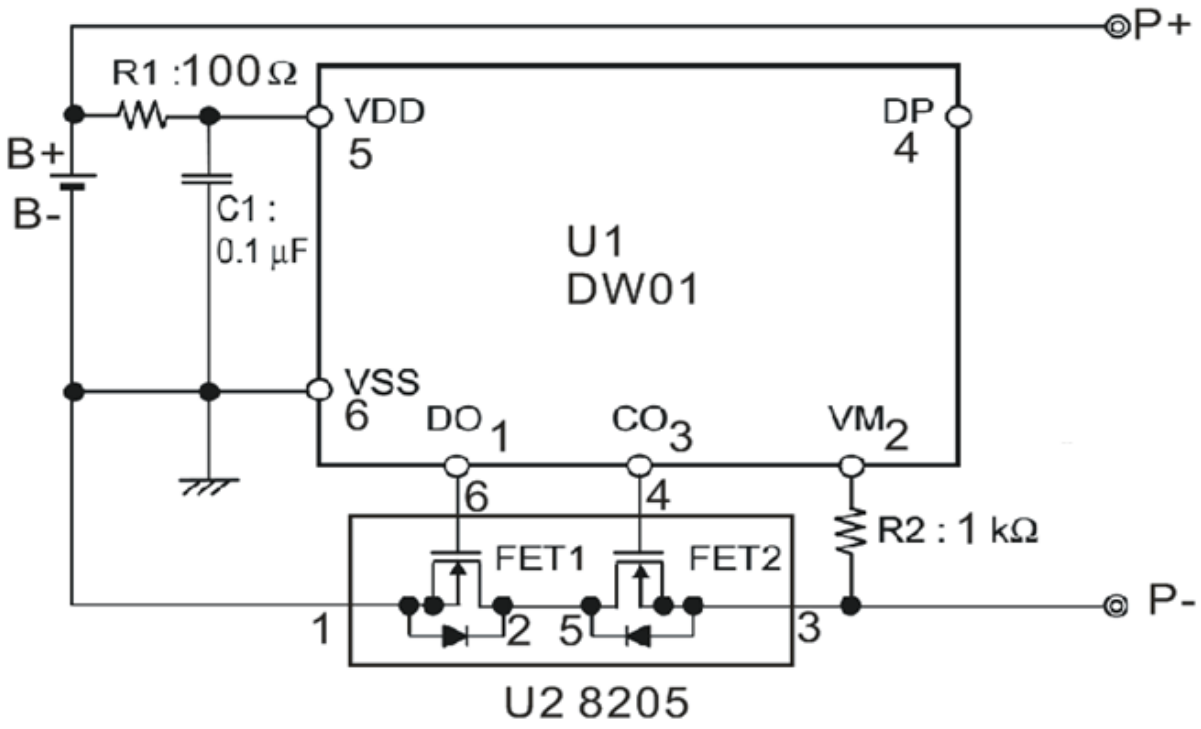
Cell (Unit: mm)




| | |
|---|---|
| T | ≪ 3.6 |
| W | ≪ 9.2 |
| L | ≪ 28.0 |

Battery (Unit: mm)

**Circuit diagram:**



| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4** | **Parameter measurement tolerances** | | **P** |
| | Parameter measurement tolerances | | P |

| | | | |
|---|---|---|---|
| **5** | **General safety considerations** | | **P** |
| 5.1 | General | | P |
| 5.2 | Insulation and wiring | | P |
| | The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ | No metal case exists. | N/A |
| | Insulation resistance (MΩ).....: | | — |
| | Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements | | P |
| | Orientation of wiring maintains adequate creepage and clearance distances between conductors | | P |
| | Mechanical integrity of internal connections accommodates reasonably foreseeable misuse | | P |
| 5.3 | Venting | | P |
| | Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition | Venting mechanism exists on the narrow side of the cell. | 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/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 8. | 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 associated chargers are designed to maintain charging within the temperature, voltage and current limits specified | The charging limits specified in the manufacturer's specifications. | P |
| 5.5 | Terminal contacts | | P |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Terminals have a clear polarity marking on the external surface of the battery | The “Red (+)”, “Black (-)” marked on surface of the battery, also see page 3. | P |
| | The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current | DC lead 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 | If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer | Single cell battery | N/A |
| | Each battery has an independent control and protection | | N/A |
| | Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly | | N/A |
| | Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges | | N/A |
| | Protective circuit components are added as appropriate and consideration given to the end-device application | | N/A |
| | When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard | | N/A |
| 5.6.2 | Design recommendation for lithium systems only | | P |
| | For the battery consisting of a single cell or a single cellblock:<br>- Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Clause 8.1.2, Table 4; or | Charging voltage: 4.2V, not exceed 4.25V specified in Clause 8.1.2, Table 4. | P |
| | - Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1. | | N/A |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For the battery consisting of series-connected plural single cells or series-connected plural cellblocks:<br>- The voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, by monitoring the voltage of every single cell or the single cellblocks; or | | N/A |
| | - The voltages of any one of the single cells or single cellblocks does not exceed the different upper limit of the charging voltage, determined through Clause 8.1.2, NOTE 1, by monitoring the voltage of every single cell or the single cellblocks | | N/A |
| | For the battery consisting of series-connected plural single cells or series-connected plural cellblocks:<br>- Charging is stopped when the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks; or | | N/A |
| | - Charging is stopped when the upper limit of the different charging voltage, determined through Clause 8.1.2, NOTE 1, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks | | 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.<br>Quality plan provided. | P |

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

| **7** | **Specific requirements and tests (nickel systems)** | | **N/A** |
|---|---|---|---|
| 7.1 | Charging procedure for test purposes | Lithium system. | N/A |
| 7.2 | Intended use | | N/A |
| 7.2.1 | Continuous low-rate charging (cells) | | N/A |
| | Results: No fire. No explosion | | N/A |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.2.2 | Vibration | | N/A |
| | Results: No fire. No explosion. No leakage | | N/A |
| 7.2.3 | Moulded case stress at high ambient temperature | | N/A |
| | Oven temperature (°C) .....: | | — |
| | Results: No physical distortion of the battery casing resulting in exposure if internal components | | N/A |
| 7.2.4 | Temperature cycling | | N/A |
| | Results: No fire. No explosion. No leakage. | | N/A |
| 7.3 | Reasonably foreseeable misuse | | N/A |
| 7.3.1 | Incorrect installation cell | | N/A |
| | The test was carried out using:<br>- Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or | | N/A |
| | - A stabilized dc power supply. | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.2 | External short circuit | | N/A |
| | The cells or batteries were tested until one of the following occurred:<br>- 24 hours elapsed; or | | N/A |
| | - The case temperature declined by 20% of the maximum temperature rise | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.3 | Free fall | | N/A |
| | Results: No fire. No explosion. | | N/A |
| 7.3.4 | Mechanical shock (crash hazard) | | N/A |
| | Results: No fire. No explosion. No leakage. | | N/A |
| 7.3.5 | Thermal abuse | | N/A |
| | Oven temperature (°C) .....: | | — |
| | Results: No fire. No explosion. | | N/A |
| 7.3.6 | Crushing of cells | | N/A |
| | The crushing force was released upon:<br>- The maximum force of 13 kN ± 1 kN has been applied; or | | N/A |
| | - An abrupt voltage drop of one-third of the original voltage has been obtained | | N/A |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.7 | Low pressure | | N/A |
| | Chamber pressure (kPa)..... : | | — |
| | Results: No fire. No explosion. No leakage. | | N/A |
| 7.3.8 | Overcharge | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| 7.3.9 | Forced discharge | | N/A |
| | Results: No fire. No explosion..... : | | N/A |
| **8** | **Specific requirements and tests (lithium systems)** | | **P** |
| 8.1 | Charging procedures for test purposes | | P |
| 8.1.1 | First procedure:<br>This charging procedure applied to tests other than those specified in 8.1.2 | Complied. | P |
| 8.1.2 | Second procedure:<br>This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9 | | P |
| | If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit | Charging temperature 0-45°C declared.<br>45°C used for upper limit tests;<br>-5°C used for lower limit tests. | P |
| | A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... : | | P |
| | For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly | 4.25V applied. | N/A |
| | A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... : | | N/A |
| 8.2 | Intended use | | P |
| 8.2.1 | Continuous charging at constant voltage (cells) | Test complied. | P |
| | Results: No fire. No explosion..... : | (See Table 8.2.1) | P |
| 8.2.2 | Moulded case stress at high ambient temperature (battery) | Tested as client requested. | P |
| | Oven temperature (°C)..... : | 70°C | — |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Results: No physical distortion of the battery casing resulting in exposure of internal components | No physical distortion of the battery casing resulting in exposure of internal components | P |
| 8.3 | Reasonably foreseeable misuse | | P |
| 8.3.1 | External short circuit (cell) | Test complied. | P |
| | The cells were tested until one of the following occurred:<br>- 24 hours elapsed; or | | N/A |
| | - The case temperature declined by 20% of the maximum temperature rise | | P |
| | Results: No fire. No explosion..... : | (See Table 8.3.1) | P |
| 8.3.2 | External short circuit (battery) | Test complied. | P |
| | The cells were tested until one of the following occurred:<br>- 24 hours elapsed; or | | N/A |
| | - 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 | | P |
| | Results: No fire. No explosion..... : | (See Table 8.3.2) | P |
| 8.3.3 | Free fall | Test complied. | P |
| | Results: No fire. No explosion. | No fire. No explosion. | P |
| 8.3.4 | Thermal abuse (cells) | Test complied. | P |
| | The cells were held at 130°C ± 2°C for:<br>- 10 minutes; or | | P |
| | - 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281) | <500g, small cell. | N/A |
| | Oven temperature (°C)..... : | 130°C | — |
| | Gross mass of cell (g) ..... : | <500g, small cell. | — |
| | Results: No fire. No explosion. | No fire. No explosion. | P |
| 8.3.5 | Crush (cells) | Test complied. | P |
| | The crushing force was released upon:<br>- The maximum force of 13 kN ± 1 kN has been applied; or | | P |
| | - An abrupt voltage drop of one-third of the original voltage has been obtained; or | | N/A |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 10% of deformation has occurred compared to the initial dimension | | N/A |
| | Results: No fire. No explosion..... : | (See Table 8.3.5) | P |
| 8.3.6 | Over-charging of battery | Test complied. | P |
| | Test was continued until the temperature of the outer casing:<br>- 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 Table 8.3.6) | P |
| 8.3.7 | Forced discharge (cells) | Test complied. | P |
| | Results: No fire. No explosion..... : | (See Table 8.3.7) | P |
| 8.3.8 | Transport tests | Test complied. | P |
| | Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods | | P |
| 8.3.9 | Design evaluation – Forced internal short circuit (cells) | Test complied. | P |
| | The cells complied with national requirement for .....: | France, Japan, Republic of Korea and Switzerland. | — |
| | The pressing was stopped upon:<br>- 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 | 400N for prismatic cells | P |
| | Results: No fire ..... : | (See Table 8.3.9) | P |

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

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **10** | **Marking** | | **P** |
| 10.1 | Cell marking | | N/A |
| | Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960. | The final product is battery. | N/A |
| 10.2 | Battery marking | | P |
| | Batteries marked in accordance with the requirements for the cells from which they are assembled. | The battery is marked in accordance with IEC 61960, also see page 3. | P |
| | Batteries marked with an appropriate caution statement. | | N/A |
| 10.3 | Other information | | P |
| | Storage and disposal instructions marked on or supplied with the battery. | Information for disposal instructions mentioned in manufacturer's specifications. | P |
| | Recommended charging instructions marked on or supplied with the battery. | Information for recommended charging instructions mentioned in manufacturer's specifications. | P |
| **11** | **Packaging** | | **P** |
| | The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants. | | P |
| **Annex A** | **Charging range of secondary lithium ion cells for safe use** | | **P** |
| A.1 | General | | P |
| A.2 | Safety of lithium-ion secondary battery | Complied. | P |
| A.3 | Consideration on charging voltage | Complied. | P |
| A.3.1 | General | | P |
| A.3.2 | Upper limit charging voltage | 4.2V | P |
| A.3.2.1 | General | | P |
| A.3.2.2 | Explanation of safety viewpoint | | N/A |
| 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 |
| A.4.2 | Recommended temperature range | See A.4.2.2. | P |
| A.4.2.1 | General | | P |

| IEC 62133: 2012 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| A.4.2.2 | Safety consideration when a different recommended temperature range is applied | Charging temperature for cell declared by client is: 0-45°C | P |
| A.4.3 | High temperature range | Not higher than the temperature range specific in this standard. | N/A |
| A.4.3.1 | General | | N/A |
| A.4.3.2 | Explanation of safety viewpoint | | N/A |
| A.4.3.3 | Safety considerations when specifying charging conditions in high temperature range | | N/A |
| A.4.3.4 | Safety consideration when specifying new upper limit in high temperature range | | N/A |
| A.4.4 | Low temperature range | Charging low temperature declared by client is: 0°C. | P |
| A.4.4.1 | General | | P |
| A.4.4.2 | Explanation of safety viewpoint | | P |
| A.4.4.3 | Safety considerations, when specifying charging conditions in low temperature range | | P |
| A.4.4.4 | Safety considerations when specifying a new lower limit in the low temperature range | -5°C applied. | P |
| A.4.5 | Scope of the application of charging 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 |
| | The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point | | P |
| A.5.3 | Disassembly of charged cell | | P |
| A.5.4 | Shape of nickel particle | | P |
| A.5.5 | Insertion of nickel particle to cylindrical cell | | N/A |
| A.5.5.1 | Insertion of nickel particle to winding core | | N/A |
| A.5.5.2 | Mark the position of nickel particle on the both end of winding core of the separator | | N/A |
| A.5.6 | Insertion of nickel particle to prismatic cell | | P |

| | TABLE: Critical components information | | | | P |
|---|---|---|---|---|---|
| Object/part no. | Manufacturer/ trademark | Type/model | Technical data | Standard | Mark(s) of conformity [1]) |
| Cell | Shenzhen Jin Yu Zhou Energy Co., Ltd. | 350926 | 3.7V, 55mAh | IEC 62133: 2012 | Tested with appliance |
| -Positive Electrode | DongGuan Liyu Energy Co., Ltd. | SN5 | $LiCoO_2$, PVDF, NMP, Conductive Additive | -- | -- |
| -Negative Electrode | DongGuan Liyu Energy Co., Ltd. | G6 | Graphite, CMC, SBR, Distilled Water, Conductive | -- | -- |
| -Separator | XinMingZhi City Science And Technology Co., Ltd | 12μm | Shutdown Temperature: 130°C | -- | -- |
| -Electrolyte | Dongguan Tianfeng Power Material Co. Ltd. | TF-008 | $LiPF_6$ + EC+ PC + DMC + EMC | -- | -- |
| PCB | SHENZHEN JIUHEYONG ELECTRONICS CO LTD | JHY-D | V-0, 130°C | UL 796 | UL E311990 |
| Protection IC (U1) | Fortune Semiconductor Corporation | DW01 | Over charge Protection Voltage: 4.24V~4.35V, Over Discharge Protection Voltage: 2.5±0.08V, $T_{opr}$: -40°C to 85°C | -- | Tested with appliance |
| MOSFET (U2) | Fortune Semiconductor Corporation | 8205 | $V_{DS}$: 20V, $I_D$: 4A, $V_{GS}$: ±12V, $T_{stg}$: -55°C ~+150°C | -- | Tested with appliance |
| Wire | KIN DING TAI GROUP CO LTD | 3302 | 30AWG, 105°C, 30V, VW-1 | UL 758 | UL E341631 |

**Supplementary information:**

**[1]) Provided evidence ensures the agreed level of compliance.**

| 7.2.1 | TABLE: Continuous low rate charge (cells) | N/A |
|---|---|---|

| Model | Recommended charging method, (CC, CV, or CC/CV) | Recommended charging voltage $V_c$, (Vdc) | Recommended charging current $I_{rec}$, (A) | OCV at start of test, (Vdc) | Results |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.2.2 | TABLE: Vibration | N/A |
|---|---|---|

| Model | OCV at start of test, (Vdc) | Results |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.1 | TABLE: Incorrect installation (cells) | N/A |
|---|---|---|

| Model | OCV of reversed cell, (Vdc) | Results |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.2 | TABLE: External short circuit | N/A |
|---|---|---|

| Model | Ambient (at 20℃ ± 5ºC or 55°C ± 5 ºC) | OCV at start of test, (Vdc) | Resistance of circuit, (Ω) | Maximum case temperature rise ΔT, (ºC) | Results |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.6 | TABLE: Crush | | | N/A |
|---|---|---|---|---|
| **Model** | **OCV at start of test, (Vdc)** | **OCV at removal of crushing force, (Vdc)** | **Results** | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.8 | TABLE: Overcharge | | | N/A |
|---|---|---|---|---|
| **Model** | **OCV prior to charging, (Vdc)** | **Maximum charge current, (A)** | **Time for charging, (hours)** | **Results** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 7.3.9 | TABLE: Forced discharge (cells) | | | N/A |
|---|---|---|---|---|
| **Model** | **OCV before application of reverse charge, (Vdc)** | **Measured reverse charge $I_t$, (A)** | **Time for reversed charge, (minutes)** | **Results** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Supplementary information:**

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

| 8.2.1 | TABLE: Continuous charging at constant voltage (cells) | | | P |
|---|---|---|---|---|
| **Model** | **Recommended charging voltage $V_c$, (Vdc)** | **Recommended charging current $I_{rec}$, (mA)** | **OCV at start of test, (Vdc)** | **Results** |
| Cell #1 | 4.20 | 11 | 4.18 | P |
| Cell #2 | 4.20 | 11 | 4.19 | P |
| Cell #3 | 4.20 | 11 | 4.18 | P |
| Cell #4 | 4.20 | 11 | 4.19 | P |
| Cell #5 | 4.20 | 11 | 4.18 | P |

**Supplementary information:**

- No fire or explosion
- No leakage

| 8.3.1 | TABLE: External short circuit (cells) | | | | P |
|---|---|---|---|---|---|
| **Model** | **Ambient, (°C)** | **OCV at start of test, (Vdc)** | **Resistance of circuit, (mΩ)** | **Maximum case temperature, (°C)** | **Results** |
| **Samples charged at charging temperature upper limit (45°C)** | | | | | |
| Cell #1 | 24.0 | 4.21 | 78 | 113.4 | P |
| Cell #2 | 24.0 | 4.20 | 82 | 108.7 | P |
| Cell #3 | 24.0 | 4.21 | 76 | 109.2 | P |
| Cell #4 | 24.0 | 4.20 | 80 | 111.4 | P |
| Cell #5 | 24.0 | 4.20 | 81 | 110.6 | P |
| **Samples charged at charging temperature lower limit (-5°C)** | | | | | |
| Cell #6 | 24.2 | 4.16 | 82 | 111.3 | P |
| Cell #7 | 24.2 | 4.15 | 81 | 109.0 | P |
| Cell #8 | 24.2 | 4.15 | 79 | 108.7 | P |
| Cell #9 | 24.2 | 4.16 | 83 | 110.1 | P |
| Cell #10 | 24.2 | 4.15 | 80 | 110.8 | P |
| Supplementary information:<br>- No fire, no explosion | | | | | |

| 8.3.2 | TABLE: External short circuit (battery) | | | | P |
|---|---|---|---|---|---|
| **Model** | **Ambient, (℃)** | **OCV at start of test, (Vdc)** | **Resistance of circuit, (mΩ)** | **Maximum case temperature, (°C)** | **Results** |
| **Samples charged at charging temperature upper limit (45°C)** | | | | | |
| Battery #1 | 55.3 | 4.21 | 82 | 55.4 | P |
| Battery #2 | 55.3 | 4.20 | 80 | 55.5 | P |
| Battery #3 | 55.3 | 4.20 | 81 | 55.3 | P |
| Battery #4 | 55.3 | 4.20 | 79 | 55.4 | P |
| Battery #5 | 55.3 | 4.21 | 83 | 55.5 | P |
| **Samples charged at charging temperature lower limit (-5°C)** | | | | | |
| Battery #6 | 55.1 | 4.18 | 76 | 55.3 | P |
| Battery #7 | 55.1 | 4.17 | 82 | 55.4 | P |
| Battery #8 | 55.1 | 4.17 | 81 | 55.4 | P |
| Battery #9 | 55.1 | 4.18 | 77 | 55.3 | P |
| Battery #10 | 55.1 | 4.17 | 79 | 55.6 | P |
| **Supplementary information**<br>- No fire, no explosion | | | | | |

| 8.3.5 | TABLE: Crush (cells) | | | | P |
|---|---|---|---|---|---|
| **Model** | **OCV at start of test, (Vdc)** | **OCV at removal of crushing force, (Vdc)** | **Width/ diameter of cell before crush, (mm)** | **Required deformation for crush, (mm)** | **Results** |
| **Samples charged at charging temperature upper limit (45°C)** | | | | | |
| Cell #1 | 4.21 | 4.20 | -- | -- | P |
| Cell #2 | 4.20 | 4.20 | -- | -- | P |
| Cell #3 | 4.21 | 4.19 | -- | -- | P |
| Cell #4 | 4.21 | 4.20 | -- | -- | P |
| Cell #5 | 4.20 | 4.20 | -- | -- | P |
| **Samples charged at charging temperature lower limit (-5°C)** | | | | | |
| Cell #6 | 4.16 | 4.14 | -- | -- | P |
| Cell #7 | 4.15 | 4.14 | -- | -- | P |
| Cell #8 | 4.16 | 4.15 | -- | -- | P |
| Cell #9 | 4.16 | 4.14 | -- | -- | P |
| Cell #10 | 4.15 | 4.13 | -- | -- | P |

**Note:**

**A 13kN force applied at the wide side of prismatic cells.**

**No voltage abrupt drop occurred.**

**Supplementary information:**

- No fire or explosion

| 8.3.6 | TABLE: Over-charging of battery | | | P |
|---|---|---|---|---|
| **Constant charging current (A).....:** | | **0.11** | | – |
| **Supply voltage (Vdc).....:** | | **5.0** | | – |
| **Model** | **OCV before charging, (Vdc)** | **Resistance of circuit, (Ω)** | **Maximum outer casing temperature, (°C)** | **Results** |
| Battery #1 | 3.31 | -- | 36.7 | P |
| Battery #2 | 3.30 | -- | 34.8 | P |
| Battery #3 | 3.29 | -- | 35.2 | P |
| Battery #4 | 3.30 | -- | 36.0 | P |
| Battery #5 | 3.29 | -- | 35.7 | P |

**Supplementary information:**

- No fire or explosion

| 8.3.7 | TABLE: Forced discharge (cells) | | | P |
|---|---|---|---|---|
| **Model** | **OCV before application of reverse charge, (Vdc)** | **Measured Reverse charge $I_t$, (mA)** | **Time for reversed charge, (minutes)** | **Results** |
| Cell #1 | 3.29 | 55 | 90 | P |
| Cell #2 | 3.28 | 55 | 90 | P |
| Cell #3 | 3.29 | 55 | 90 | P |
| Cell #4 | 3.29 | 55 | 90 | P |
| Cell #5 | 3.30 | 55 | 90 | P |

**Supplementary information:**

- No fire or explosion

| 8.3.9 | TABLE: Forced internal short circuit (cells) | | | | P |
|---|---|---|---|---|---|
| **Model** | **Chamber ambient, (°C)** | **OCV at start of test, (Vdc)** | **Particle location [1)]** | **Maximum applied pressure, (N)** | **Results** |
| Cell #1 | 45 | 4.21 | 1 | 400 | P |
| Cell #2 | 45 | 4.20 | 1 | 400 | P |
| Cell #3 | 45 | 4.20 | 1 | 400 | P |
| Cell #4 | 45 | 4.21 | 1 | 400 | P |
| Cell #5 | 45 | 4.20 | 1 | 400 | P |
| Cell #6 | 10 | 4.16 | 1 | 400 | P |
| Cell #7 | 10 | 4.17 | 1 | 400 | P |
| Cell #8 | 10 | 4.15 | 1 | 400 | P |
| Cell #9 | 10 | 4.16 | 1 | 400 | P |
| Cell #10 | 10 | 4.15 | 1 | 400 | P |

**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.

- No fire

**--End of Report--**

**Attachment 1**

# Photo Documentation



Product: Rechargeable Polymer Li-ion Battery

Type Designation: 350926

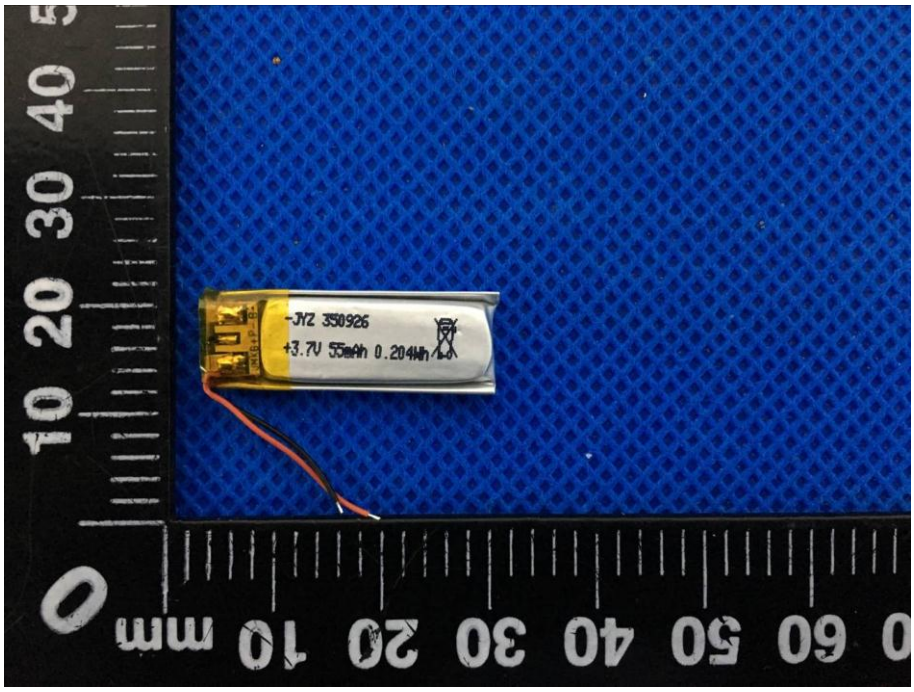



Figure 1 Front view of battery

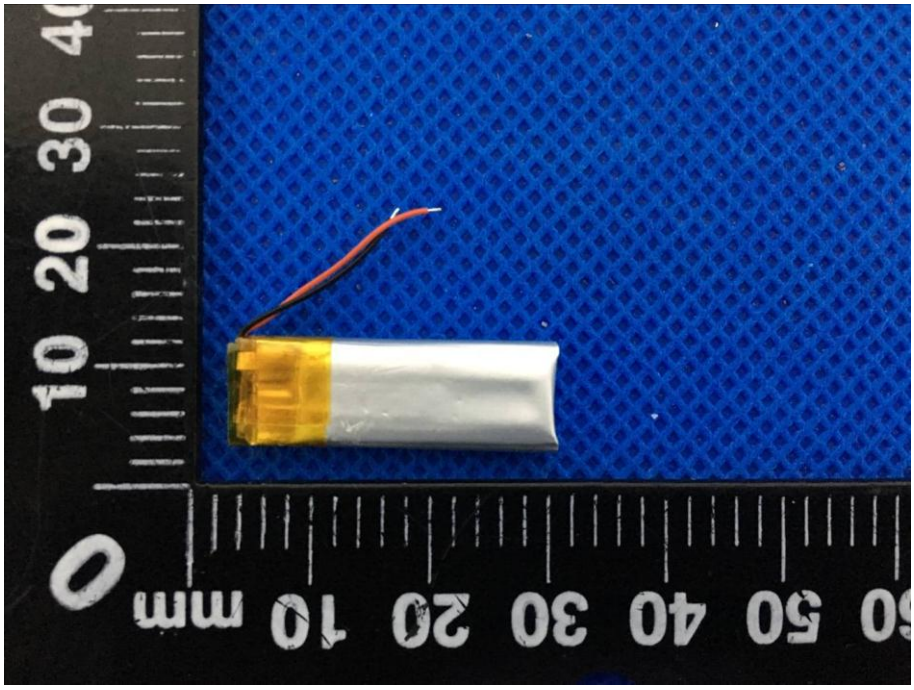



Figure 2 Back view of battery

Product: Rechargeable Polymer Li-ion Battery

Type Designation: 350926

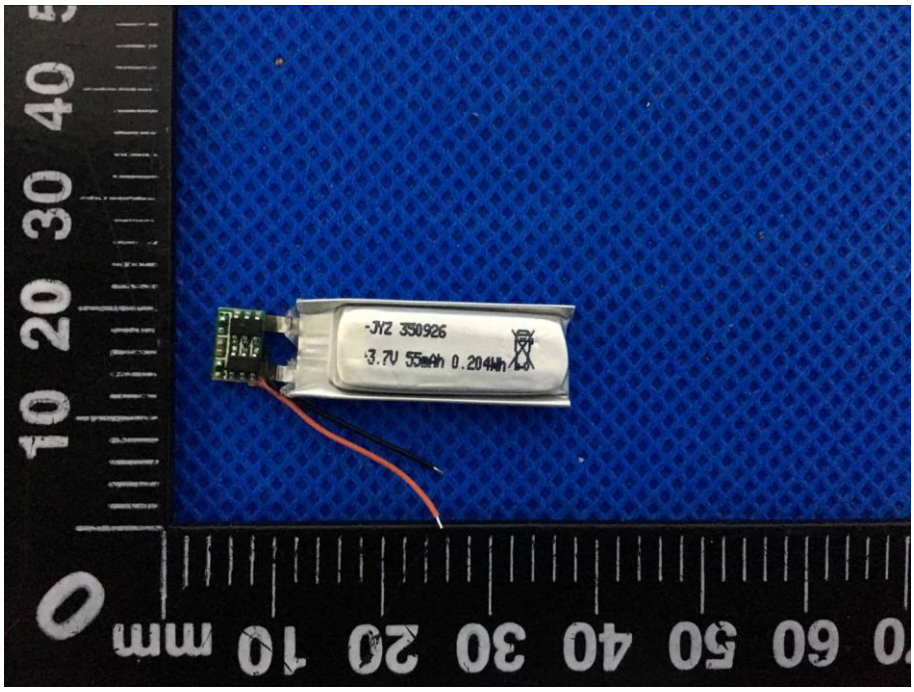



Figure 3 Internal view of battery

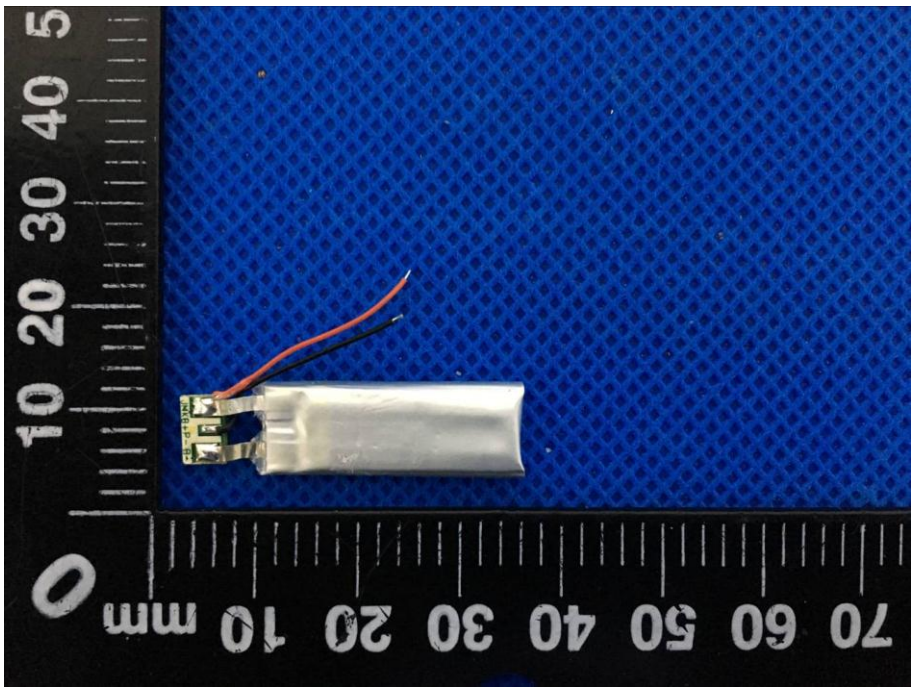


Figure 4 Internal view of battery

Product: Rechargeable Polymer Li-ion Battery

Type Designation: 350926

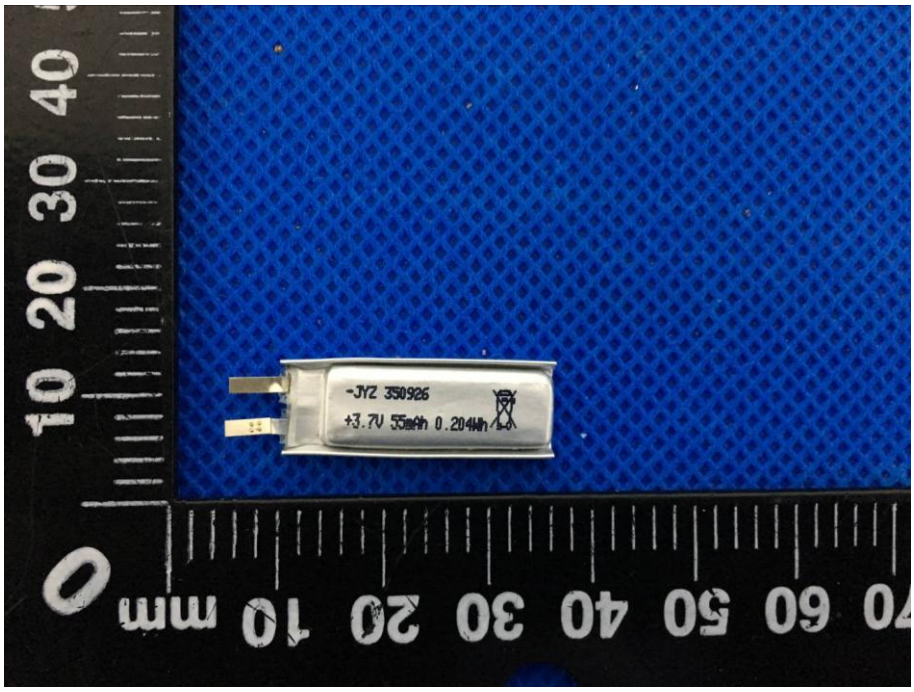



Figure 5 Front view of cell

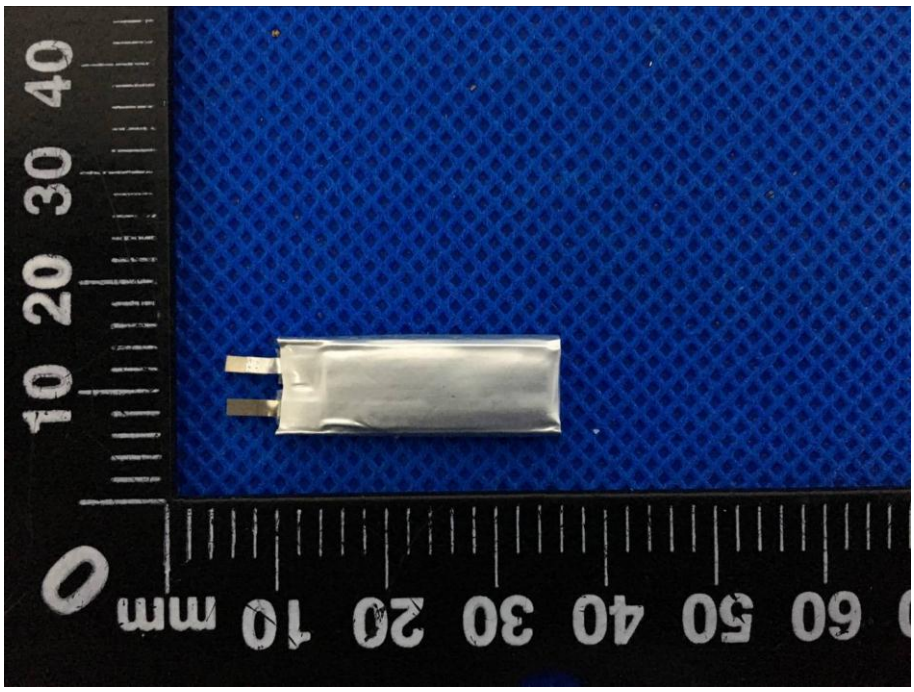



Figure 6 Side view of cell

Product: Rechargeable Polymer Li-ion Battery

Type Designation: 350926

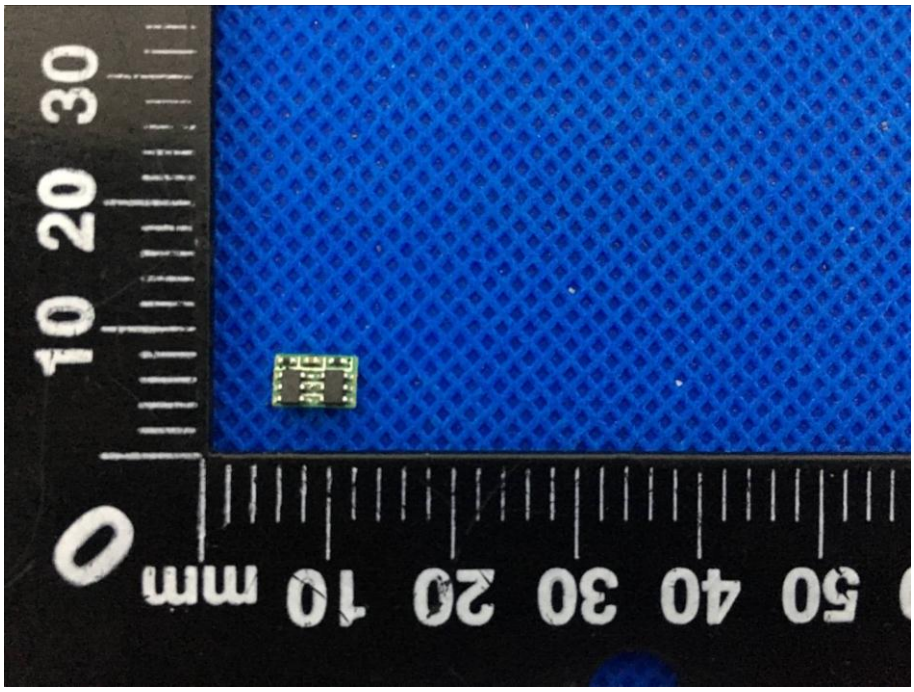



Figure 7 Front view of PCB

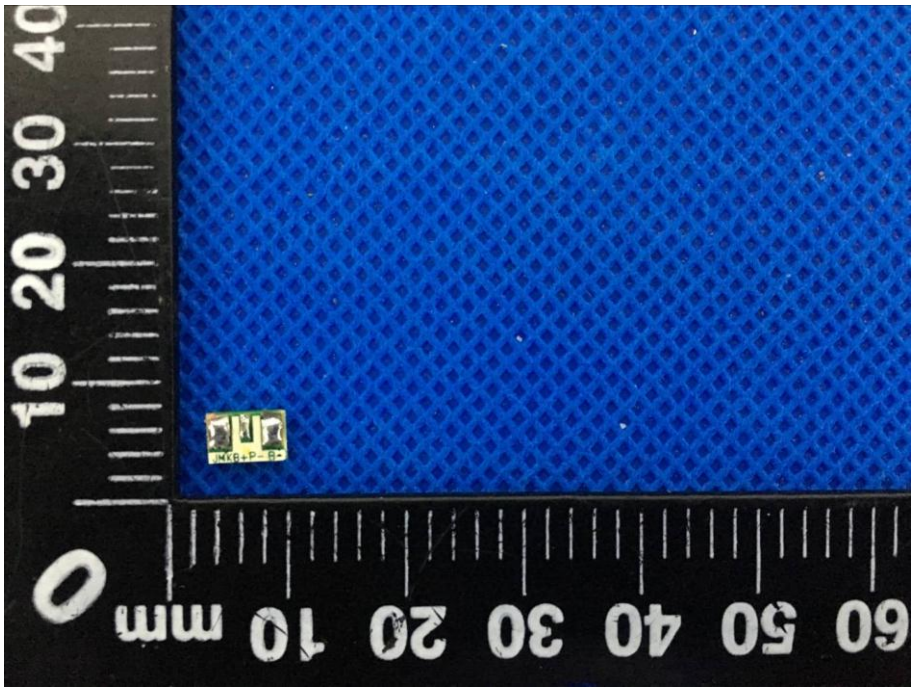



Figure 8 Back view of PCB