# Specification Approval Sheet

**Name : Cylindrical Li-ion Rechargeable Cell**

**Model : AKYGA INR18650-34M**

**SPEC : 3.7V / 3400mAh**

**Specification Modification Records**

| Modification Time | Descriptions | Issued Date | Approved By |
|---|---|---|---|
| | Release 1 | 2023-02-08 | |
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Content

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Specification Approval sheet

## 1 Scope

lithium ion rechargeable cell. The specification only applies to INR18650-34M cell supplied by Akyga Battery

## 2 Description and model

**2.1 Description** Cylindrical Li-ion rechargeable cell

**2.2 Model** INR18650-34M

## 3 Nominal Specifications

| Item | Specification | Remark |
|---|---|---|
| **Model** | INR18650-34M | |
| **Rated Capacity** | 3400mAh | After standard charging, then at $0.2C_5$ discharge to 2.5V, 25℃ |
| **Min Capacity** | 3350mAh | |
| **Platform Voltage** | 3.7V | |
| **Standard Charging** | CC-CV, Std.$0.2C_5$, 4.2V, cut-off at $1/50C_5$,8.0hrs<br>25℃±2℃ | $C_5$, nominal capacity |
| **Charging Current (Max.)** | 0℃~10℃ $0.2C_5$<br>10℃~20℃ $0.3C_5$<br>20℃~45℃ $0.5C_5$ | |
| **Standard Discharging** | CC,$0.2C_5$, cut-off at 2.5V | |
| **Discharging Current (Max.)** | $3C_5$ | 25℃ |
| **AC Impedance** | ≤40mΩ | AC 1kHz |
| **Cycle Life** | $500^{th}$ cycle>80% of $1^{st}$ Cycle Capacity | 25℃,$0.5C_5$ charge, $1/20C_5$ cut off;Discharge:$1.0C_5$ to 2.5V |
| **Discharge Characteristics (by rate of discharge)** | $0.2\ C_5$ ＝100%<br>$0.5\ C_5$ ≥96%<br>$1.0\ C_5$ ≥95%<br>$2.0\ C_5$ ≥93%<br>$3.0\ C_5$ ≥90% | Cells are to be charged per standard charge profile. The discharge capacity of each cell at respective discharge rate shall be compared with the discharge capacity at $0.2C_5$ |

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|---|---|---|
| **Discharge Characteristics (by temperature)** | 60℃ ⩾100%<br>45℃ ⩾100%<br>25℃ ＝100%<br>0℃ ⩾80%<br>-10℃⩾75%<br>-20℃⩾70% | Discharge: CC 0.2$C_5$, 2.5V cut-off at each temperature |
| **Capacity retention performance at room temperature** | Residual capacity⩾85%<br>Recoverable capacity⩾90% | 25℃,100%SOC, residual and recoverable capacity will be tested after 28 days at 25℃±2℃ |
| **Storage Characteristics** | Recoverable capacity⩾80% | 25℃, Reletive humidity 45%-75%,40%-50% SOC, residual and recoverable capacity will be tested after 12 months ,charge and discharge 5 times. |
| **Temperature** | Charge 0 to +45℃<br>Discharge -20 to +60℃ | |
| **Storage Temperature** | 1 month -5 to 45℃<br>3 months -5 to 45℃<br>12 months -5 to 30℃ | Recommend storage temperature -5~35℃ |
| **Storage Humidity** | ⩽75%RH | |
| **Weight** | ⩽49g | |
| **Dimensions (Max.)（D×H）mm** | 18.45×65.2 | Refer to the attached drawing 1 |

## 4 Appearance

There shall be no such defect as deep scratch, flaw, crack, rust, leakage, which may adversely affect commercial value of the cell.

## 5 Standard Test Conditions

### 5.1 Environmental Conditions

Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±2℃and relatively humidity 15~95% and atmosphere pressure 86~106KPa.

### 5.2 Measurement Apparatus

(1) Ammeter and Voltmeter

The ammeter and voltmeter shall be specified in equal or more precision scale of 0.5class.

(2) Dimension、Time and Weight Measuring Instrument

The dimension, time and weight measurement shall be implemented by instrument with equal or more precision scale of ±0.1%.

(3) Temperature Measuring Instrument

The temperature measurement shall be implemented by instrument with equal or more precision scale of ± 0.5℃.

(4) Impedance Meter

The impedance shall be measured by a sinusoidal alternating current method (AC 1kHzLCR)

## 6 Environmental Safety characteristics

| Item | Testing Procedure | Requirements |
|---|---|---|
| **Free Drop** | After standard charge, the cell is to be dropped onto the concrete slab from 1m height at each of anode, cathode 1 time and a cylinder 2 times, a total of 4 times drop test. | No fire，no explosion and no leakage |
| **Low Pressure** | After standard charge, cell is to be placed in the vacuum oven with a temperature of 25±0.5℃. The inner pressure will be decreased to less than 11.6KPa and keep 6hrs | No fire，no explosion and no leakage |

<table>
<tr><td>Crush</td><td>After standard charge, cell is to be crushed with its longitudinal axis parallel to two flat surfaces. The force between the two flat surfaces is 13.0KN±0.78KN. The test will be continued until the maximum force is achieved. And during the test, the cell cannot be short-circuited.</td><td>No fire and no explosion</td></tr>
<tr><td>Vibration</td><td>After standard charge, the cell is to be attached to a vibration table and tested under the following conditions：<br>The Sine Wane is applied to the vibration test. The testing frequency is from 7Hz to 200Hz, then returns to 7Hz with a total sweeping timeof15 min by the logarithm scanning method. The logarithm scanning method: 7 Hz~8Hz with the acceleration of 9.8m/s$^2$, keep amplitude of 0.8mm to the acceleration of 78.4m/s$^2$(50Hz), and then keep the acceleration of 78.4 m/s$^2$ to 200Hz frequency.<br>Direction: the cell is to be tested in three mutually perpendicular to X/Y/Z axis for total 3h, every direction repeat 12 times.</td><td>No fire，no explosion and no leakage</td></tr>
<tr><td>Temperature cycling</td><td>After standard charge, cell is to be placed in the constant temperature oven. The inner temperature of oven should be set up as the following table and testing will be repeated 10 times. Keep 1h.
<table>
<tr><td>Temperature ℃）</td><td>Time speed min）</td><td>Total time （h）</td></tr>
<tr><td>20±5℃</td><td>0</td><td>0</td></tr>
<tr><td>75±2℃</td><td>30</td><td>6</td></tr>
<tr><td>-40±2℃</td><td>30</td><td>6</td></tr>
<tr><td>75±2℃</td><td>30</td><td>6</td></tr>
</table></td><td>No fire，no explosion and no leakage</td></tr>
</table>

| | | |
|---|---|---|
| **Impact** | After standard charge, the cell is to be placed on a flat surface. A 15.8±0.2 mm diameter bar is to be placed across the center of the cell. A 9.1±0.1kg hammer is to be dropped on the cell from a height of 610mm. Keep 6hrs. | No fire and no explosion |
| **Heating**<br><br>**（130℃30 min）** | After standard charge, cell is to be heated in a circulating air oven. The temperature of the oven is raised to 130±2℃ at the rate of 5±2℃/min and remains for 30 minutes. Keep 1h. | No fire and no explosion |
| **Burning** | After standard charge, cell is to be fixed on a steel mesh and heated with a flame until the flowing situations occur: ①explosion;②complete combustion; ③ Continuous burning for 30 min. | The components of the cell or the cell as a whole cannot penetrate the steel mesh |
| **Acceleration shock** | After standard charge, cell is to be fixed on the impact table and the test is conducted under the half-sine acceleration pulse. At the first 3ms, the minimum average acceleration is $75g_n$, the peak acceleration is $150g_n$±$25g_n$and the lasting time is about 6ms±1ms. Every side of the cell should be tested 3 times. | No fire, no explosion and no leakage |

## 7 Safety characteristics

| Item | Testing Method | Criterion |
|---|---|---|
| **Overcharge 3C/4.6V）** | After standard discharge, the cell is to be charged to 4.6V at $3C_5$currentand continues to charge at the voltage until one of the following situations occur: ①the cell temperature is 20% less than the peak temperature;②the test time reaches 7 hours. | No fire, No explosion and the highest temperature less than 150℃ |
| **Forced discharge** | After standard discharge，the cell is to be reverse charged at $1C_5$for 90min. | No fire, no explosion and no leakage |

| | | |
|---|---|---|
| **External short circuit** | After standard charge, cell is to be short-circuited by connecting the positive and negative terminals under the temperature of 25℃±2℃ and 55℃±5℃respectively with a resistance load of 80±20mΩfor 10min. The cell is continuously short-circuited until the following situations occur: ① the cell temperature is 20%less than the peak temperature; ②the test time reaches 24 hours. | No fire, No explosion and the highest temperature less than 150℃ |

## 8 Warranty

Akyga Battery will provide this product a warranty for 1 year after shipment, even within the warranty period Akyga Battery will only be responsible for defect of cells related to manufacturing. Any other problems caused by malfunction of the equipment or incorrect use will not be covered by this warranty.

## 9 Warning

**9.1** Stop charging the battery if charging isn't completed within the specified time.

**9.2** Don’t use the unspecified charger or breach charging requirements. Charging cells under unspecified conditions may lead overcharge or abnormal chemical reaction, which cause heat, smoking, rupture or fire.

**9.3** Don’t expose the cell to direct sunlight (or in car exposed to sunlight) and keep it away from children, seek immediate medical attention if the cell is swallowed or inhaled.

**9.4** Don’t expose the cell to extreme hot environment and don’t dispose it in fire or water. It will be dangerous to modify or disassemble the cell which may cause fire, heating, leakage or explosion.

**9.5** Don’t short-circuit cell positive(+) and negative(-) terminals and keep the cell away from metal or other conductive materials. Don’t reverse the positive (+) and negative (-) terminals.

**9.6** Remove the cell from the device or cell charger and stop using it immediately once abnormal situation such as heating, gas generating, discoloration or deformation occurred.

**9.7** Don’t weld the cell directly. Excessive heating may cause deformation of the cell components such as the gasket

which may lead swelling, leakage, fire or explosion.

**9.8** Don't use the cell which has been damaged by shipping stress, drop, short-circuit or has an electrolyte smell.

**Attached drawing 1 Outline Dimensions**