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PRODUCT SPECIFICATION

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Description

Lithium Ion ICP103450A1 2000mAh

PRODUCT SPECIFICATION

Rechargeable Lithium Ion Battery

Model : ICP103450 A1 2000mAh



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1. General Information

1.1 Scope

This product specification defines the requirements of the rechargeable lithium ion battery to be supplied to the Customer by LG Chem.

1.2 Application: Accessory

1.3 Product classification: Prismatic rechargeable lithium ion battery

1.4 Model name: ICP103450A1

2. Nominal Specification

2.1 Recommended specification

| Item | Condition / Note | Specification |
|---|---|--|
| 2.1.1 Capacity | Std. charge / discharge | Nominal 2075mAh (C_{nom}) Minimum 2000mAh (C_{min}) |
| 2.1.2 Nominal Voltage | Average | 3.7V |
| 2.1.3 Standard Charge 1 (Refer to 4.1.1) | Constant current Constant voltage End condition (Cut off) | 0.3C(600mA) 4.2V 100mA |
| 2.1.4 Max. Charge Current | - | 1.0C (2000mA) |
| 2.1.5 Standard Discharge (Refer to 4.1.3) | Constant current End voltage(Cut off) | 0.2C (400mA) 2.75V |
| 2.1.6 Max. Discharge Current | For continuous discharge | 1.5C (3000mA) |
| 2.1.7 Weight | Max | 39.2g |
| 2.1.8 Operating Temperature | Charge Discharge | 0 ~45°C -20 ~ 60°C |
| 2.1.9 Storage Temperature (for shipping state ⁱ) | 1 month 3 month 1 year | -20 ~ 60°C -20 ~ 45°C -20 ~ 20°C |

ⁱ : Shipping state : About 50% capacity of fully charged state

2.1 Safety operating parameters for GB31241

| 安全工作参数 | 符号 | Specification |
|--------------|-----|---------------|
| 2.2.1 充电限制电压 | Ucl | 4.20V |
| 2.2.2 充电上限电压 | Uup | 4.25V |
| 2.2.3 放电截止电压 | Udo | 2.75V |
| 2.2.4 推荐充电电流 | Icr | 0.3C (600mA) |
| 2.2.5 最大充电电流 | Icm | 1.0C (2000mA) |
| 2.2.6 推荐放电电流 | ldr | 0.2C (400mA) |
| 2.2.7 最大放电电流 | ldm | 1.5C (3000mA) |

3. Appearance and Dimension

3.1 Appearance

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

3.2 Dimension

Thickness: Shipping thickness max. 10.45 mm
 Width : 33.70 ± 0.20 mm
 Height : 48.25 ± 0.30 mm

4. Performance Specification

4.1 Standard test condition

4.1.1 Standard Charge

Unless otherwise specified, "Standard Charge" shall consist of charging at constant current of 0.3C. The cell shall then be charged at constant voltage of 4.20V while tapering the charge current. Cut off current is 100mA in all. For test purposes, charging shall be performed at 23°C ± 2°C.

4.1.2 Standard Discharge

"Standard Discharge" shall consist of discharging at a constant current of 0.2C to 2.75V. Discharging is to be performed at 23 °C ± 2 °C unless otherwise noted (such as capacity versus temperature).

4.1.3 Fast Charge / discharge condition

Cells shall be charged at constant current of 0.7C to 4.20V with end current of 100mA. Cells shall be discharged at constant current of 0.5C to 2.75V Cells are to rest 10 minutes after charge and 20 minutes after discharge.

4.2 Electrical Specification

| Item | Condition | Specification |
|-------------------------------|--|---------------------------------|
| 4.2.1 Initial AC Impedance | Cell shall be measured at 1kHz after charge per 4.1.1. | 46 ± 7 mΩ, without PTC |
| 4.2.2 Initial Capacity | Cells shall be charged per 4.1.1 and discharged per 4.1.3 within 1h after full charge. | ≥ 2000 mAh (C _{min.}) |
| 4.2.3 | Cells shall be charged and discharged per 4.1.3 | 351 th 0.2C ≥ 80% |

| | | |
|------------|--|-----------------------|
| Cycle Life | 350 cycles. A cycle is defined as one charge and one discharge. 351st discharge capacity shall be measured per 4.1.1 and 4.1.2 | (of C_{min} in 2.1) |
|------------|--|-----------------------|

4.3 Environmental specification.

| Item | Condition | Specification | |
|---|--|--|--------------------|
| 4.3.1 Storage Characteristics | Cells shall be charged per 4.1.1 and stored in a temperature-controlled environment at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 30 days. After storage, cells shall be discharged per 4.1.2 to obtain the remaining capacity. | Capacity remaining rate 90% (of C_{min} in 2.1) | |
| 4.3.2 High Temperature Storage Test | Cells shall be charged per 4.1.1 and stored in a temperature-controlled environment at 60°C for 30 days. After storage, cells shall be discharged per 4.1.2 and cycled per 4.1.3 for 3 cycles to obtain recovered capacity*. | No leakage, Capacity recovery rate $\geq 70\%$ (of C_{min} in 2.1) | |
| 4.3.3 High Temperature and High Humidity Test | Cells are charged per 4.1.1 and stored at 60°C (95% RH) for 168 hours. After test, cells are discharged per 4.1.2 and cycled per 4.1.3 for 3 cycles to obtain recovered capacity. | No leakage, No rust Capacity recovery rate $\geq 80\%$ (of C_{min} in 2.1) | |
| 4.3.4 Thermal Shock Test | 65°C (8h) \leftarrow 3hrs \rightarrow -20°C (8h) for 8 cycles with cells charged per 4.1.1 After test, cells are discharged per 4.1.2 and cycled per 4.1.3 for 3 cycles to obtain recovered capacity. | No leakage Capacity recovery rate $\geq 80\%$ (of C_{min} in 2.1) | |
| 4.3.5 Temperature Dependency of Capacity | Cells shall be charged per 4.1.1 at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and discharged per 4.1.2 at the following temperatures. | | |
| | Charge | Discharge | |
| | 23 $^{\circ}\text{C}$ | -10°C | 70% of C_{min} . |
| | | 0°C | 90% of C_{min} . |
| 23°C | | 100% of C_{min} . | |
| 60°C | | 95% of C_{min} . | |

* Remaining Capacity : After storage, cells shall be discharged with Std. condition(4.1.2) to measure the remaining capacity.

** Recovery Capacity : After storage, cells shall be discharged with fast discharge condition(4.1.3), and then cells shall be charged with std. charge condition(4.1.1), and then discharged with Std. condition(4.1.2). This charge / discharge cycle shall be repeated three times to measure the recovery capacity.

4.4 Mechanical Specification

| Item | Condition | Specification |
|-------------------------|---|-------------------------------------|
| 4.4.1 Drop Test | Cells charged per 4.1.1 are dropped onto an oak board from 1.5 meter height for 3 cycles, where each cycle consists of 3 drops from each of the three mutually perpendicular axis (x, y, z) for total of 9 drops. | No leakage No temperature rising |
| 4.4.2 Vibration Test | Cells charged per 4.1.2 are vibrated for 90 minutes per each of the three mutually perpendicular axis (x, y, z) with total excursion of 0.8mm, frequency of 10Hz to 55Hz and sweep of 1Hz change per minute. | No leakage |

4.5 Safety Specification

| Item | Condition | Specification |
|--|--|---------------------|
| 4.5.1 Overcurrent Charge Test | Cells are discharged per 4.1.2, then charged at constant current of 3 times the max. charge condition and constant voltage of 4.20V while tapering the charge current. Charging is continued for 7 hours (Per UL1642). | No explode, No fire |
| 4.5.2 External Short - Circuiting Test | Cells are charged per 4.1.1, and the positive and negative terminal is connected by a 100m Ω -wire for 1 hour (Per UL1642). | No explode, No fire |
| 4.5.3 Overdischarge Test | Cells are discharged at constant current of 0.2C to 250% of the minimum capacity. | No explode, No fire |
| 4.5.4 Heating Test | Cells are charged per 4.1.1 and heated in a circulating air oven at a rate of 5°C per minute to 130°C. At 130°C, oven is to remain for 10 minutes before test is discontinued (Per UL1642). | No explode, No fire |

| | | |
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| 4.5.5 Impact Test | Cells charged per 4.1.1 are impacted with their longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter bar (Per UL1642). | No explode, No fire |
| 4.5.6 Crush Test | Cells charged per 4.1.1 are crushed with their longitudinal axis parallel to the flat surface of the crushing apparatus. And cells are also to be rotated 90 degrees around its longitudinal axis so that both the wide side will be subjected to the crushing force. (Per UL1642). | No explode, No fire |

5. Caution and Prohibition in Handling

Warning for using the lithium ion rechargeable battery. Mishandling of the battery may cause heat, fire and deterioration in performance. Be sure to observe the following.

Caution

- When using the application equipped with the battery, refer to the user's manual before usage.
- Please read the specific charger manual before charging.
- Charge time should not be longer than specified in the manual.
- When the cell is not charged after long exposure to the charger, discontinue charging.
- Battery must be charged at operating temperature range 0 ~ 45°C.
- Battery must be discharged at operating temperature range -20 ~ 60°C.
- Please check the positive(+) and negative(-) direction before packing.
- When a lead plate or wire is connected to the cell for packing, check out insulation not to short-circuit.
- Battery must be stored separately.
- Battery must be stored in a dry area with low temperature for long-term storage.
- Do not place the battery in direct sunlight or heat.
- Do not use the battery in high static energy environment where the protection device can be damaged.
- When rust or smell is detected on first use, please return the product to the seller immediately.
- The battery must be away from children or pets
- When cell life span shortens after long usage, please exchange to new cells.
- The design of battery pack and its structure should be reviewed physically, mechanically and electrically not to cause cell imbalance.
- The battery pack for multiple cells should be designed to monitor the voltage of each bank.
- Do insulate between the metal plate and cell or other components not to make a electrical short.
- Protection circuit should have function which is described below inside battery pack, to insure safety of battery in case of misuse.
 - A. Overcharge protection
 - i. At the voltage maximum 4.25V (Maximum recommended voltage)/cell by charge, overcharge protection should work. Then charge current shall be shut down.
 - B. Over discharge protection
 - i. At the voltage range 2.5V/cell over discharge protection should work. Then discharge current shall be shut down.
 - C. Over discharge current protection
 - i. When discharge current exceed 5about 1.5C, over discharge current protection should work. Then over discharge current shall be shut down.

Prohibitions

- Do not use different charger. Do not use cigarette jacks (in cars) for charging.
- Do not charge with constant current more than maximum charge current.
- Do not disassemble or reconstruct the battery.
- Do not throw or cause impact.
- Do not pierce a hole in the battery with sharp things. (such as nail, knife, pencil, drill)
- Do not use with other batteries or cells.
- Do not solder on battery directly.
- Do not press the battery with overload in manufacturing process, especially ultrasonic welding.
- Do not use old and new cells together for packing.
- Do not expose the battery to high heat. (such as fire)
- Do not put the battery into a microwave or high pressure container.
- Do not use the battery reversed.
- Do not connect positive(+) and negative(-) with conductive materials (such as metal, wire)
- Do not allow the battery to be immersed in or wetted with water or sea-water.
- Do not give immoderate heat and force to battery cell during a welding process of metal plates on it

6. Dimensional Drawing

