

PRODUCT SPECIFICATION

Cylindrical Lithium-ion Cell

Model: LR1865EC 1.3Ah

Customer Approval	Signature	Date
	Company Name :	
	Company Stamp :	

Prepared By	Checked By	QA	Approved By



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Tianjin Lishen Battery Joint-Stock Co., Ltd.

Product Specification

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LS431.743GS

Revision	Date	Originator	Reason of Revision
0	05/23/2006	Jia Hongtao	Original Release
1	09/12/2006	Jia Hongtao	1. Decreasing capacity from 1.35Ah to 1.30Ah; 2. Increasing cycle life from 400 cycles to 600 cycles; 3. Changing charge current from 0.27A (0.2C) to 0.65A (0.5C).
2	04/19/2007	Wang Hongxia	Change cell dimensions

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1. SCOPE

The product specification describes the requirement of the Cylindrical Lithium-ion Cell to be supplied to the customer by Tianjin Lishen Battery J/S Co.,Ltd.. Should there be any additional information required by the customer, customer are advised to contact Tianjin Lishen Battery J/S Co.,Ltd..

2. DEFINTIONS

C Rate ("C"): The rate (amperes) at which a fully charged cell is discharged to its end voltage in one (1) hour.

3. DESCRIPTION AND MODEL

3.1. Description : Cylindrical Lithium Ion Cell

3.2. Model : LR1865EC 1.3Ah

4. GENERAL SPECIFICATIONS

4.1. Nominal Capacity	1.3Ah (at 0.2C Discharge to 2.0V)	
4.2. Charge Voltage	3.65±0.05V	
4.3. Nominal Operating Voltage	3.20V@0.2C	
4.4. Initial Rated Capacity	1.3Ah (0.2C to 2.0V)	
4.5. Standard Charge Method	Constant Current and Constant Voltage (CC/CV)	
	Current	0.65A (0.5C)
	Voltage	3.65V
	End Current	26mA (0.02C)
4.6. Maximum Charge Current	1.3A (1.0C)	
4.7. Discharge Cut-off Voltage	2.0V	
4.8. Max. Continuous Discharge Current	2.6A (2.0C)	
4.9. Operating Temperature (Ambient)	Charge	0°C ~ 45°C
	Discharge	-20°C ~ 60°C
4.10. Storage Temperature	1 month	-20°C ~ 45°C
	6 months	-20°C ~ 35°C
4.11. Weight of Bare Cell	Max.	45.0g
4.12. Cell Dimensions	Height:	65.0±0.5mm
	Diameter:	18.2±0.2mm

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5. OUTLINE DIMENSION (UNIT: mm)

Dimension: Diameter 18.4mm (max), Height 65.5mm (max). Refer to the attached drawing 1.

6. APPEARANCE

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

7. TEST CONDITION AND DEFINITIONS

7.1. Measuring Equipment

7.1.1. Voltmeter

Inner impedance > 1000Ω per volt.

7.1.2. Ampere-meter

Total external resistance (ammeter and wire) < 0.01Ω.

7.1.3. Slide caliper

The slide caliper should have a scale of 0.02mm.

7.1.4. Impedance meter

The impedance meter should be operated at AC 1KHz.

7.2. Unless otherwise specified, all tests shall be performed at (25±2)°C and humidity of (65±20)% RH.

7.3. All tests shall be performed at the same charge voltage, per 8.1.

8. CHARACTERISTICS

8.1. Charge method:

Charging shall consist of charging at a 0.5C constant current rate until the cell voltage reaches 3.65V. The cell shall then be charged at constant voltage of 3.65 volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 26mA.

8.2. Discharge method (Standard discharge):

Cells shall be discharged at a constant current of 0.2C to 2.0 volts @ 25°C±2°C

8.3. Weight of Bare Cell

Meet 4.12 .by balance.

8.4. Internal Impedance

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The impedance shall be measured at AC 1000 Hz initially.

Initial Internal Impedance ≤ 50 mohm

8.5. Cycle Life

Charge cells per 8.1. Rest 1 hour. Discharge per 8.2. Rest 1 hour before recharge. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured after 600 cycles.

Discharge capacity (600th Cycle) $\geq 70\%$ of Initial Capacity

8.6. Storage Characteristics

After charge as per 8.1., store the testing cells at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 30 days. Then discharge at 0.2C to 2.0V.

The discharge capacity $\geq 85\%$ of Initial capacity

8.7. Temperature Characteristics

Cells shall be charged per 8.1. and discharged per 8.2. except to be discharged at temperatures per Table 1. Cells, full charged, shall be stored for 8 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 25°C and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 1.

Table 1

-20°C @ 0.2C	25°C @ 0.2C	60°C @ 0.2C
$\geq 40\%$ Initial Capacity	1.3Ah	$\geq 90\%$ Initial Capacity

9. SAFETY

9.1. External Short-circuiting Test

Cell, charged per 8.1., is to be short circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance ≤ 50 mohm. Stop the test when the battery temperature decays to about 10°C from the maximum.

Criteria: No Explosion, No Fire

9.2. Overcharge Test

Store the testing cell connecting with thermocouple in ventilated cabinet, connect the testing cell to a power supply with constant current-constant voltage function. Adjust current to 3.0C and voltage to 5.0V. Then charging at 3.0C until voltage reaches 5.0V, Monitoring change of cell temperature during testing, Stop the test when battery temperature decays to room temperature or the current decays to less than 26mA.

Criteria: No Explosion, No Fire

10. GUARANTEE

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Cells are guaranteed to be free from defects in workmanship and materials for a period of half a year provided that the manufacturer can confirm such defects are coming from manufacturing abnormality and not from abusive usage, or else manufacturer will solve the quality problem.

11. OTHERS

Any matter not included in this specification shall be conferred between the both parties.

12. SHIPPING

The capacity of delivery battery is approximately at 30% of charging. During transportation, keep the battery from acutely vibration, impacting, solarization, drenching.



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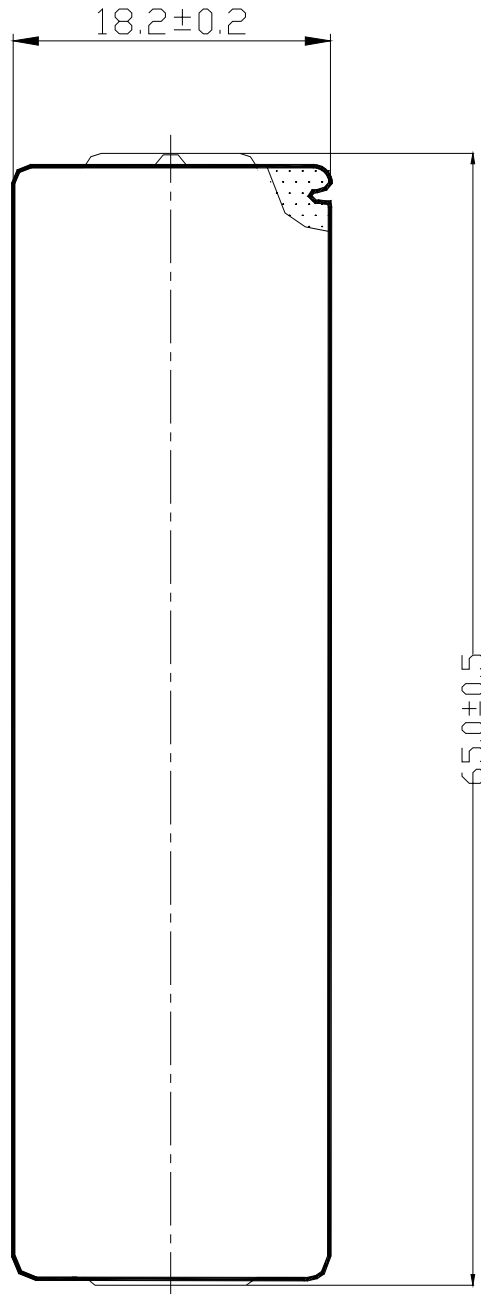
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Attached drawing 1



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The following caution and warning should appear in manuals and/or instructions for users, especially at the point of use.

HANDLING INSTRUCTIONS FOR LITHIUM ION RECHARGEABLE BATTERY

1. CAUTION

1.1 Charging

- a) Avoid over-charging voltage of charging not over 3.65V.
- b) Charger should start charging at temperature range 0 ~ 45°C.
- c) No reverse charging

1.2 Discharging

- a) Discharge end voltage must be over 2.0V.
- b) Discharge temperature range should be -20°C ~ 60°C.

1.3 Environmental using conditions:

When the battery is charged	:	0°C ~+45°C
When the battery is discharged	:	-20°C ~+60°C
When stored within 1 month	:	-20°C ~+45°C
When stored within 6 months	:	-20°C ~+35°C

1.4 Storage

For any long time storage, cell should be in a dry area and at 25°C±2°C at 30% charged stage.

1.5 Battery position in equipment and charger.

To avoid degradation of battery performance by heat, a battery should set the place apart from heat generating



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electronic parts inside equipment and charger.

2. **WARNING**

2.1 Don't heat or disposed in fire or water .Don't modify or disassemble the battery. It will be dangerous, and may cause ignition, heating, leakage or explosion.

2.2 Don't short-circuit positive(+) and negative(-) terminals. Keep away from metal or other conductive materials. Jumbling the batteries of direct contact with positive(+) and negative(-) terminals or other conductive materials may cause short-circuit.

2.3 Don't reverse the positive (+) and negative (-) terminals.

2.4 If the battery gives off an odor, generates heat, becomes discolored, or in any way appears abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.

2.5 Don't solder the battery directly. Excessive heating may cause deformation of the battery components such as the gasket, which may lead to the battery swelling,leakage, explosion,or ignition.

2.6 Don't use abnormal cell which has damages by shipping stress, drop, short or something else, and which gives off electrolyte odor.