PRODUCT SPECIFICATION

Lishen Lithium-ion Prismatic Rechargeable Cell

Model: LP514657SA-V-1650mAh

Customer Approval	**Signature**	**Date**
	Company Name：	
	Company Stamp ：	

Prepared By	Checked By	QA	Approved By

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History of revision

LS431.1349GS

Revision	Date	Originator	Reason of Revision
0	08/08/2011	yuhan	Original Release

1. SCOPE

The product specification describes the requirement of the Prismatic 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. DESCRIPTION AND MODEL

2.1. Description : Rechargeable Prismatic Lithium Ion Battery

2.2. Model : LP514657SA-V-1650mAh

3. GENERAL SPECIFICATIONS

3.1.	Minimum Capacity	1650mAh (at 0.2C Discharge)
3.2.	Charging Voltage	4.20V±0.05V
3.3.	Average working Voltage	3.70V,@0.2C
3.4.	Standard Charge Method	Constant Current and Constant Voltage (CC/CV) Current 0.5C Voltage 4.2V End Current 20mA
3.5.	Maximum Charge Current	1C
3.6.	Standard Discharge	Constant Current (CC) Current 0.2C End Voltage 3.0V
3.7.	Maximum Discharge Current	2C
3.8.	Cycle Life	Capacity≥80% Minimum Capacity@300th cycles
3.9.	Weight of Bare Cell	Approx. 32g
3.10.	Operating Temperature	Charge 0°C ~ 45°C Discharge -20°C ~ 60°C
3.11.	Storage Temperature	6 months -20°C ~ 45°C

4. OUTLINE DIMENSION (UNIT: mm)

4.1. Dimension: max5. 1 mm (T) ×max46.1 mm (W) ×max55.65mm (L), refer to the attached drawing 1.

5. APPEARANCE

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

6. TEST CONDITION AND DEFINITIONS

6.1. Measuring Equipment

1. Voltmeter

   Inner impedance>1000Ω per volt.

2. Ampere-meter

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

3. Slide caliper

   The slide caliper should have a scale of 0.02mm.

4. Impedance meter

   The impedance meter should be operated at AC 1KHz.

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

6.3. All tests shall be performed at the same charge voltage, per 7.1.

6.4. Definitions:

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

6.4.2 C Capacity: The capacity (milliampere-hour) obtained during a C discharge. For test purposes, C is defined as the minimum rated capacity of the cell.

7 CHARACTERISTICS

7.1. Charge method:

7.1.1. Charging shall consist of charging at a 0.5C constant current rate until the cell voltage reaches 4.2V. The cell shall then be charged at constant voltage of 4.2 volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 20mA.

7.1.2. Charging shall consist of charging at a 1C constant current rate until the cell voltage reaches 4.2V. The cell shall then be charged at constant voltage of 4.2 volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 20mA.

7.2. Discharge method:

7.2.1. Cells shall be discharged at a constant current of 1C to 3.0 volts

7.2.2. Cells shall be discharged at a constant current of C/2 to 3.0 volts

7.2.3. Cells shall be discharged at a constant current of C/5 to 3.0 volts

7.3. Weight of Bare Cell

Meet 3.9. by balance.

7.4 Internal Impedance

The impedance shall be measured at AC 1000 Hz initially.

Initial Internal Impedance ≤ 60 mohm

7.5. Discharge capacity (1C)

Within 1 hour after charge as per 7.1.1, discharge at 1C until end of discharge voltage.

The capacity≥85% of Minimum Capacity

7.6. Cycle Life

Charge cells per 7.1.2. Rest 10 minutes. Discharge per 7.2.1. Rest 10 minutes before recharge. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured after 300 cycles.

Discharge capacity (300th Cycle) ≥80% of Minimum Capacity

7.7. Storage Characteristics

After charge as per 7.1.1, store the testing cells at 25ºC±2ºC for 28 days. Then discharge at 0.2C to 3.0V.

Discharge capacity≥85% of Minimum Capacity

7.8. Temperature Characteristics

Cells shall be charged per 7.1.1. and discharged per 7.2.3. except to be discharged at temperatures per Table 1. Cells , full charged, shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. Each cell shall meet or exceed the requirements of Table 1.

Table 1

-20°C @ 0.2C	25°C @ 0.2C	60°C @ 1C
≥60% Minimum Capacity	1650mAh	≥90% Minimum Capacity

8 SAFETY

8.1. External Short-circuiting Test

Cell, charged per 7.1.1, 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 10ºC from the maximum.

Criteria: No Explosion, No Fire

8.2. Overcharge Test

Cells shall be discharged in terms of 7.2.1 to 3.0V,and then rest 30 minutes . Connect cell positive and negative to a power supply of constant current and constant voltage. Adjust current to3A and voltage to4.6V, Stop the test when battery temperature decays to about 10ºC from the maximum or the current decays to less than 50mA.

Criteria: No Explosion, No Fire

8.3. Heating Test

Cell, Charged per 7.1.1, is to be heated in a gravity convection or circulating air oven.The temperature of the oven is to be raised at a rate of (5±2)°C/min to a temperature of (130±2)°C and remain for 60 minutes at that temperature before the test is discontinued.

Criteria: No Explosion, No Fire

8.4. Pressing test

Fix the testing cells in the middle of bottom armor plate, pressing the cells with 13kN.

Criteria: No Explosion, No Fire

9 GUARANTEE

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.

10 PACKAGING

Loading36 cells per box, 4 boxes per case for a total of 144cells. Sketch map refer to attached drawing 2

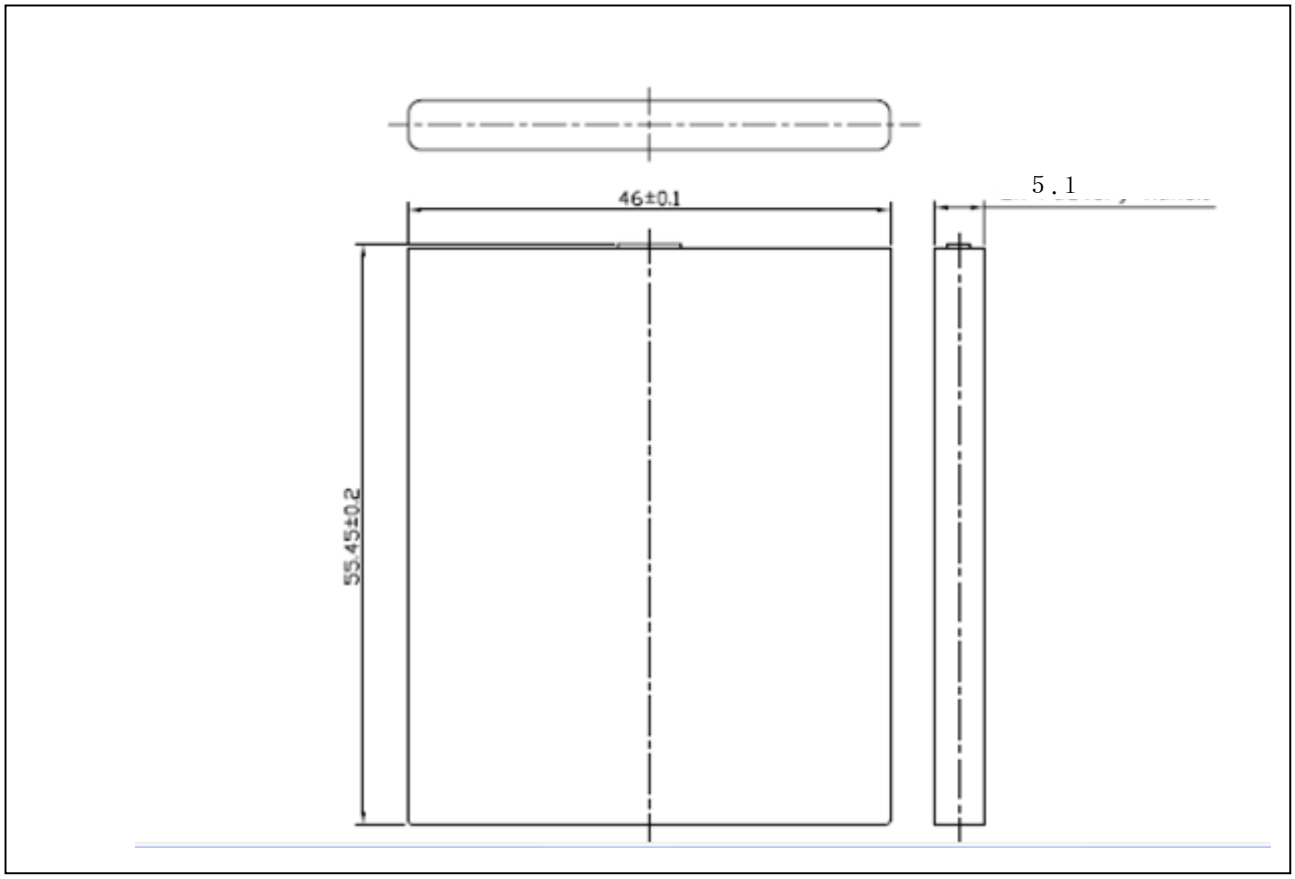
11 OTHERS

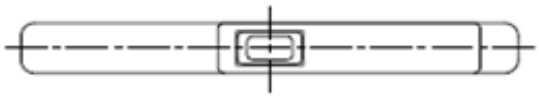
Any matter not included in this specification shall be conferred between the both parties.

12 SHIPPING

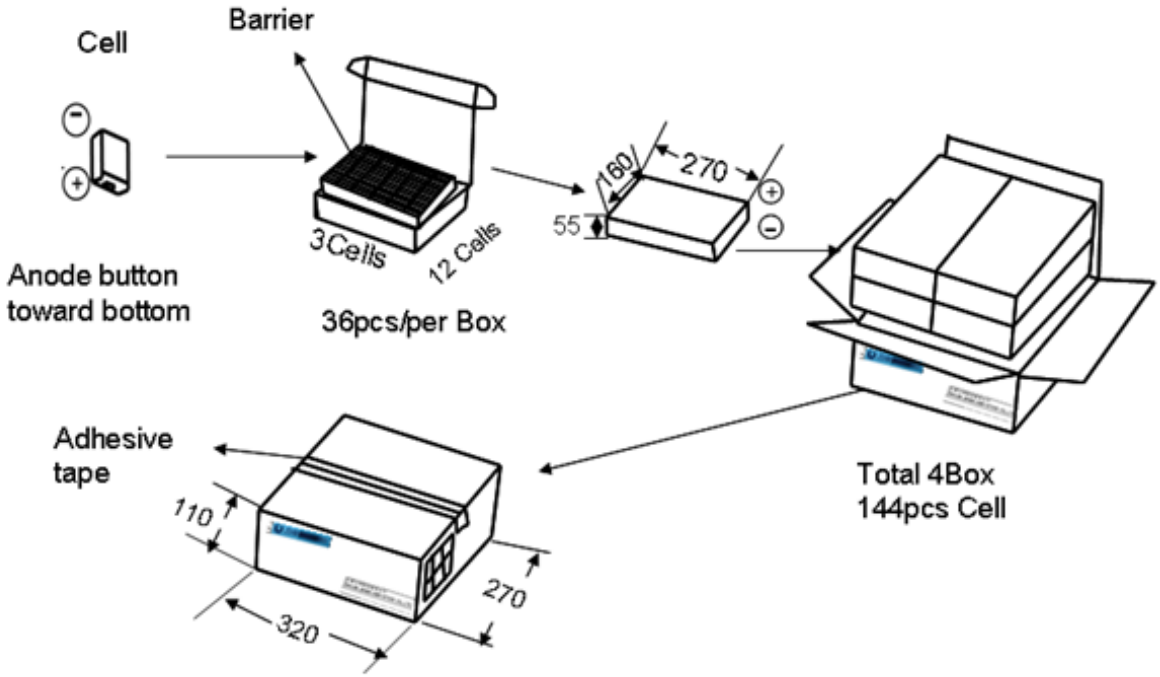
The capacity of delivery battery is approximately at 50% of charging. During transportation, keep the battery from acutely vibration, impacting, solarization, drenching.

Attached drawing 1





Attached drawing 2



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 4.25V.

b) Charger should start charging at temperature range 0 ~ 45°C.

c) No reverse charging

1.2 Discharging

a) Discharge current must be below 2C (3300mA) /cell.

b) Discharge end voltage must be over 2.75V.

c) 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 6 months : -20°C ~+35°C

1.4 Storage

For any long time storage, cell should be in a dry area and at 20°C±5°C at half 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 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.