
Product Specification

Lithium-ion Prismatic Rechargeable Cell

Model : L503040

Contents

1. Scope	4
2. Basic Characteristics	4
2.1 Model	4
2.2 Housing Material	4
2.3 Nominal Voltage	4
2.4 Nominal Capacity	4
2.5 Internal Impedance	4
2.6 Discharge Cut-off Voltage	4
2.7 Charge Cut-off Voltage	4
2.8 Max Charge Current	4
2.9 Max Discharge Current	4
2.10 Charge method	4
2.11 Dimension	4
2.12 Weight	4
2.13 Operating Temperature	4
2.14 Storage Temperature	4
2.15 Relative Humidity	4
2.16 Visual Requirements	4
2.17 Shipping Voltage	4
2.18 Storage Voltage	4
2.19 Environmental request	4
3. Technical Requirements	5
3.1 Testing Conditions	5
3.2 Electrical Characteristics	5
3.3 Reliability Characteristics	5
3.4 Environmental Characteristics	6
3.5 Safty Characteristics	6
3.3 Charge & Discharge Characteristics	8
4. Required Protection Functions	8
5. Manufacturing Date Code	9
6. Product Liability	9
7. Indications On Cell Pack	9
8. Warnings & Cautions In Handling The Lithium-ion Cell	9
8.1 Warnings	9
8.2 Cautions	10
9. Dimensional Drawing	11
10. Packing Drawing	12

1. Scope

This Specification describes the requirements for the lithium ion prismatic rechargeable cell

2. Basic Characteristics

2.1	Model	L503040
2.2	Housing Material	Aluminum
2.3	Nominal Voltage	3.7 V
2.4	Nominal Capacity	500 mAh
2.5	Internal Impedance	60↓mΩ
2.6	Discharge Cut-off Voltage	2.75V/cell
2.7	Charge Cut-off Voltage	4.20V
2.8	Max Charge Current	1C
2.9	Max Discharge Current	1.5C
2.10	Charge method	CC/CV (constant current/constant voltage)
2.11	Dimension (half charged)	Thickness: 5.3 ⁺⁰ _{-0.3} mm Width: 30.2 ⁺⁰ _{-0.5} mm Height:40.0 ⁺⁰ _{-0.5} mm
2.12	Weight	About : 13.0±2.0g
2.13	Operating Temperature	Charging Temperature: 0~45□ Discharging Temperature: -20~55□
2.14	Storage Temperature	-5°C~35°C (suggest25±2°C)
2.15	Relative Humidity	65±20%
2.16	Visual Requirements	Defects, such as scratches, flaws, dirty spots, rust, deformation, discoloration, leakage, etc., which impact commercial values shall not be allowed.
2.17	Shipping Voltage	3.70-3.90V (about 50% capacity)
2.18	Storage Voltage	3.70-3.90V If the cell has been stored over half years, charge the cell with 0.5CmA or 1 CmA of constant current and 3.9V constant voltage until the Charge cut-off current of 0.01 C ₅ mA is achieved.
2.19	Environmental Request	The materials of the product and packaging are RoHS compliant.

3. Technical Requirements

3.1 Testing Conditions (unless otherwise specified):

Temperature:	25±2□
Relative Humidity:	65±20%
Atmospheric pressure:	86~106Kpa

3.2 Electrical Characteristics

3.2.1 Complete Charge

Charge the cell with 0.2 CmA of constant current and 4.2V constant voltage until the Charge Cut-off current of 0.01C₅ is achieved.

3.2.2 Quick Charge

Charge the cell with 1.0 CmA of constant current and 4.2V constant voltage until the Charge Cut-off current of 0.01C₅ is achieved.

3.2.2 Nominal Capacity

Charge per section 3.2.1, measure the nominal capacity by discharging the cell at a constant current of 0.2 CmA until 2.75V is achieved.

Requirement : The discharge capacity ≥ 600mAh

3.3 Reliability Characteristics

3.3.1 Cycle Life

Perform the following life cycle profile (A-D represents 1 cycle):

- A) Charge per section 3.2.1.
- B) wait 5 minutes.
- C) Discharge at a rate of 1.0 CmA until the cell voltage reaches 3.0V.
- D) wait 5 minutes.

Requirement : 300 cycle retention capacity ≥ 80%

3.2.2 Vibration Test

- A) Charge per section 3.2.1.
- B) Fix cell to a vibration table with a clamp.
- C) The cell will undergo 30 min in each X, Y, and Z orientation of the following profile:

* Circulatory vibration where the scanning frequency is 30Hz to 50Hz with a rate of 1 oct/min. frequency: 10Hz to 30Hz, amplitude: 0.38mm, frequency: 30Hz to 55Hz, amplitude 0.19mm.

Requirement : The cell should not be scathe,leakage,smoking,explosion.

3.4 Environmental Characteristics

3.4.1 High Temperature Test

- A) Charge per section 3.2.1.
- B) Place cell in a temperature controlled environment of 55 degrees C (+/- 2 deg) for 2 hours.
- C) Discharge at a rate of 1.0 CmA until the cell voltage reaches 2.75V.
- D) Place the cell in an ambient environment for 2 hours before proceeding to the next step.

Requirement: The high temp capacity retention \geq 85% of nominal capacity.

3.4.2 Low Temperature Test

- A) Charge per section 3.2.1.
- B) Place cell in a temperature controlled environment of -20 degrees C (+/- 2 deg) for 2 hours.
- C) Discharge at a rate of 0.2 CmA until the cell voltage reaches 2.75V.
- D) Place the cell in an ambient environment for 2 hours before proceeding to the next step.

Requirement: The low temp capacity retention \geq 60% of nominal capacity

3.4.3 Constant Temperature/Humidity

- A) Charge per section 3.2.1.
- B) Place the cell in a temperature(@38-42 deg C) and humidity(90%-95%) controlled environment for 48 hours.
- C) Place cell at ambient conditions for 2 hours.
- D) Discharge the cell with a constant current of 1.0 CmA until 2.75V is achieved.

Requirement: For a period of at least 36 minutes during discharge, there should be no distortion, rust, discoloration, smoke or explosion.

3.5 Safty Characteristics

3.5.1 Impact

- A) Charge per section 3.2.1.
- B) Place the cell on a hard surface.
- C) From a height of 0.6m, drop a steel cylindrical bar weighing 9.1kg on the longitudinal axis of the cell.

Requirement : There should be no smoking, leakage, or explosions during the test.

3.5.2 Drop Test

- A) Charge per section 3.2.1.
 - B) Drop the cell from a height of 1.5m onto a cement floor.
 - C) Repeat drop six times on each (X, Y, Z) axis (total of 18 drops for the cell)
-

Requirement : There should be no smoking, leakage, or explosions during the test..

3.5.3 Short Circuit

- A) Charge per section 3.2.1.
- B) While monitoring cell temperature, place a 100 milli ohm wire between the (+) and (-) terminals.
- C) Remove the wire when the temperature drops 10 degrees C from the maximum temperature witnessed during the test (or 6 hours maximum).

Requirements : There should be no fire or explosion during the test.

3.5.4 Over Charge

- A) Discharge cell at a constant current of 1.0 CmA until cell voltage of 3.0V is acquired.
- B) Charge cell at a constant current of 3.0CmA.
- C) Maintain constant current charge for a period of 30 min after cell voltage of 4.8V is achieved. After 30 minutes, discontinue the test.

Requirement : There should be no fire or explosion during the test.

3.5.5 Over Discharge

- A) Discharge cell at a constant current of 0.2 CmA until cell voltage of 3.0V is acquired.
- B) Connect an external load of 30 ohms for 24 hours.
- C) Disconnect the external load.

Requirement : There should be no fire or explosion during the test.

3.5.6 Heating Test

- A) Charge per section 3.2.1.
- B) Place the cell in an oven and increase the oven temperature at a rate of 5 deg C per min (+/- 2 deg) up to a maximum of 130 deg C (+/- 2 deg).
- C) Maintain 130 deg C (+/- 2 deg) for ten minutes.

Requirement : There should be no fire or explosion during the test.

Remark: dehiscing from the blast line is a normal press leakage in all of the testing items upwards, out of on fire or explode.

3.3 Charge & Discharge Characteristics (Note: Average capacity, Weight and Internal Impedance are for reference only)

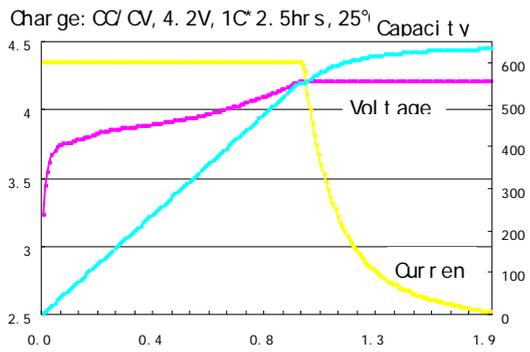


Fig1. Charge Characteristics

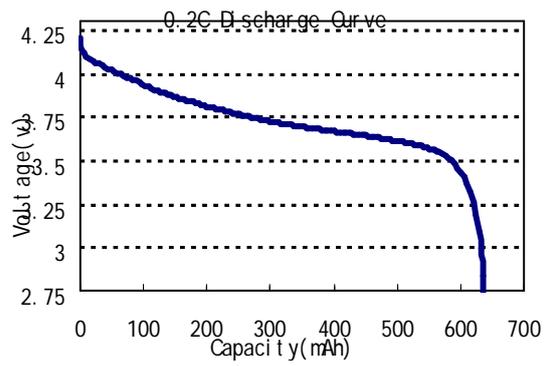


Fig 2. Discharge Characteristics

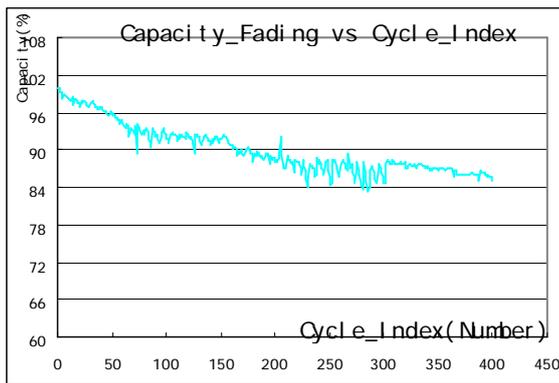


Fig3. Cycle life Characteristics

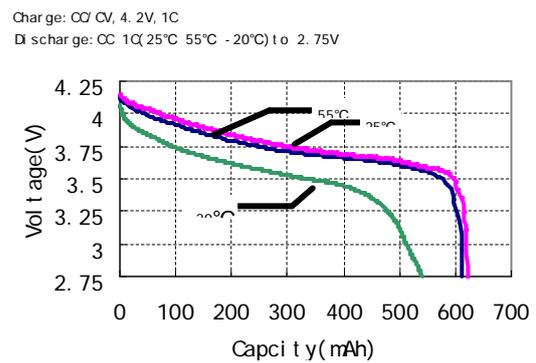


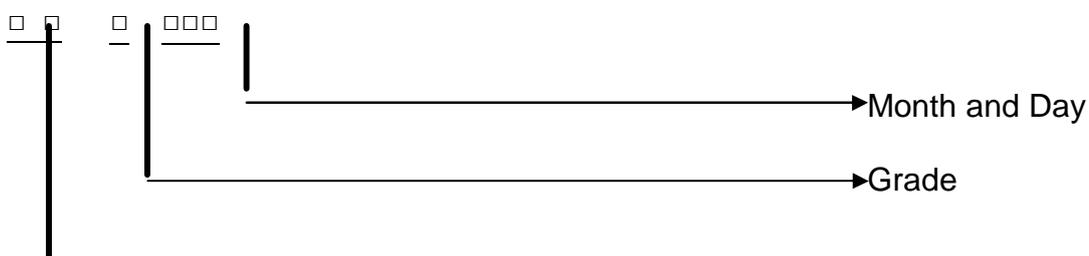
Fig4. High & Low Temp Characteristics

4. Required Protection Functions

For safety purpose, cell chargers and protection circuits should meet the requirements listed below. Also, temperature fuses are recommended. Standard charge method is CC/CV.

NO	Device	Items	Requirements
4.1	Charger	Charge termination voltage	4.200±0.050V
4.2	Protection Functions (For reference)	Excess Charge detection voltage.	4.275±0.025V
4.3		Discharge termination voltage.	3.00±0.10V
4.4		Excess discharge detection voltage.	2.3±0.08V
4.5		Excess current detection value	2.7±0.2A

5. Manufacturing Data Codes



For example : R42E21 mean the cell which leaves factory at 2004/21/5.

6. Product Liability

Manufacturer is not responsible for issues caused by mishandling of the cell which is clearly against the instructions in this specification.

Customers will be informed of modifications to this specification.

7. Indications On Battery Pack

The following warnings should be indicated on the battery packs.

- Use a specified charger.
- Do not place the battery in excessive heat (including an open flame).
- Do not short-circuit the battery terminals.
- Do not disassemble the battery.

8. Warnings & Cautions In Handling The Lithium-ion Cell

To prevent a possibility of the cell from leaking, heating or explosion please observe the following precautions:

8.1 Warnings

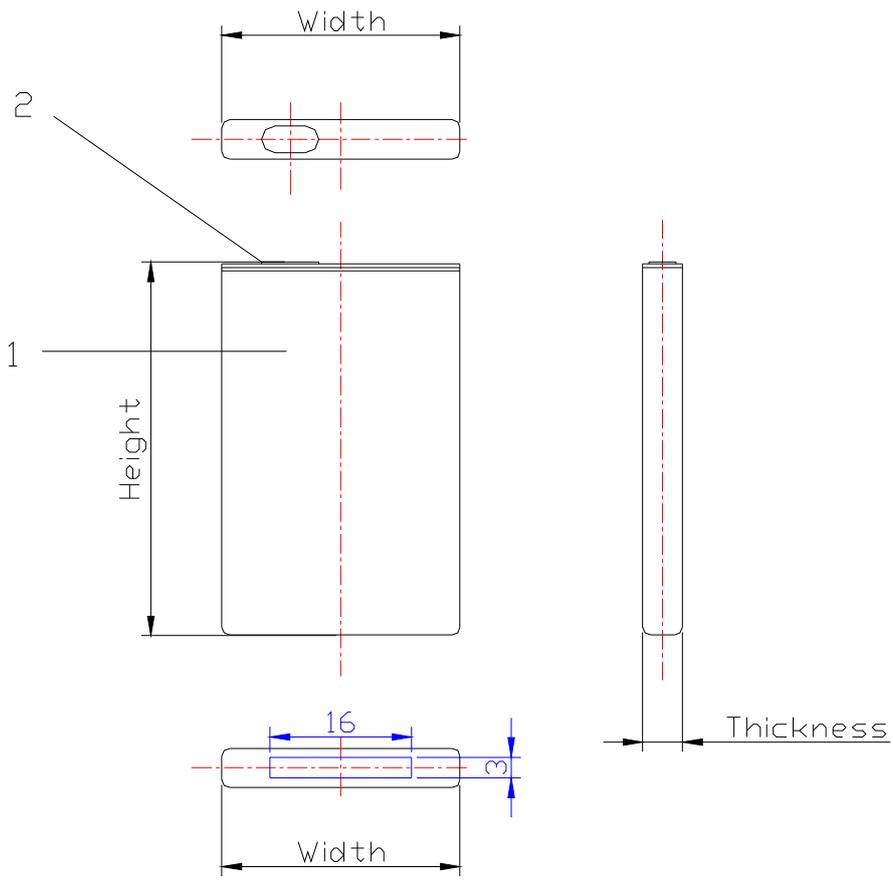
- Do not immerse the cell in water (including seawater) and store the cell in a cool dry place.
- Do not store or use the cell near a heat source or open flame.
- When recharging, use the specified cell charger.
- Do not reverse the position of the (+) and (-) terminals.
- Do not connect the cell to an electrical outlet.
- When discarding cells, do not place cells in a combustion chamber.
- Do not short-circuit the cell by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire.
- Do not transport or store the cell together with metal objects such as necklaces, hairpins etc.
- Do not strike or throw the cell.
- Do not directly solder the cell.
- Do not pierce the cell with any sharp object.

8.2 Cautions

- Do not use or leave the cell in very high temperatures (such as direct sunlight or inside a vehicle in extremely hot weather). These conditions will cause the cell to overheat; which may lead to fire, performance degradation, and service life reduction.
 - Do not use the cell in areas of high static electricity. High static electricity may compromise the safety devices of the cell.
 - If the cell leaks and electrolyte gets into a persons eyes, rinse the eyes with clean running water and seek medical attention immediately. DO NOT rub the eyes. Eye injury and loss of sight is possible if actions identified are not followed.
 - If the cell gives off an odor, generates heat, becomes discolored or deformed, or in
-

any way appear abnormal during use, recharging or storage, immediately remove it from the device or cell charger and stop using it.

- In case the cell terminals are dirty, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- Be aware discarded cells may cause fire, tape the cell terminals to insulate them.



Width: $30.2^{+0}_{-0.5}$ mm

Thickness: $5.3^{+0}_{-0.3}$ mm

Height: $40.0^{+0}_{-0.5}$ mm

底部铝镍复合带：长度*宽度*厚度=16.00mm*3.00mm*0.15mm

2	Insulate Plate	L503040	1	Approved		Date	
1	Bare Cell	L503040	1	Checked		Date	
NO	Name	Description		Prepared		Date	