Lithium-ion Polymer Battery Specification

Model: LP4070100

Draft	Examine	Approve

1. Scope

This document describes the Product Specification of the Lithium-ion Polymer.

2. Model: LP4070100

3. Specification

No.	Items	Specifications	
1	Charge voltage (V)(CC/CV)	4.25	
2	Nominal voltage (V)	3.7	
3	Cut-off voltage (V)	3.0	
4	Max. charge current (continuous charging)	1.0C	
5	Min. capacity (discharge @ 0.2C)	3000mAh	
6	Impedance	≦15mΩ(1kHz AC Impedance)	
7	Standard charging time	2.5 hours (Ref.)	
8	Max. discharge current	2.0C	
9	Operating temperature & relative humidity %	Charging: 0℃~45℃, 90% RH Max.	
		Discharging: -20℃~60℃, 90% RH Max.	
10	Storage condition	-20℃~45℃, 65%±20% RH	
11	Recommended storage condition	20℃±5℃, 65%±20% RH	
12	Weight	Approx. 45.0g	
13	Dimension (mm)	Item	cell
		Length	100mm +0.5/-0.5
		Width	69mm +0.5 /-0.5
		Thickness	3.5mm +0.05 /-0.15

4. Cell Performance Criteria

4.1 Visual inspection

There shall be no such defects such as scratch, flaw, crack, and leakage, which may adversely affect Commercial value of the cell.

4.2 Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted in the following conditions:

Temperature : 25 ± 2 °C ,Relative Humidity : 45 ± 20%

4.3 The requirement of measure instrument

(1) The measure instrument is passed tested by qualified institute.

(2) The accuracy of the size instrument is not more than 0.01mm.

(3) The accuracy of multimeter is not less than 0.5%. While measure the voltage, the internal resistance mustn't less than 10KΩ.

(4) The principal of the internal resistance is 1KHz LCR, the accuracy is 0.2%. The internal resistance is changeable, it varies according to the temperature and the charging mode. And it is relevant to the PTC and the length and the capacity of the drawing line.

(5) The current accuracy of the battery test system is more than ±0.1%, is basically accuracy is ±0.5%, timer accuracy is less than ±0.1%.

(6) The accuracy of the temperature meter is less than ±0.5.℃

4．4 Electrical characteristics

Item	Test Method and Condition	Criteria
Full Charging	Charging the cell initially with constant current at 0.5 C to 4.2V, and then with constant voltage at 4.2V till charge current declines to 0.01 C.	
Rated Capacity	① 1~2 hours after the full charging ,with discharge current of 0.2 C (600mA) till 3.0V cut-off voltage	Over 300 minutes
Cycle life	Continue charge and discharge for 300 cycles at 20°C±5°C.condition, then discharge 1.0 C till 3.00V cut off voltage, measure the discharging capacity..	≧ 80% Rated Capacity
Retention Capability	After full charging, storing the battery 28 days with 20°C ± 2°C.condition,and then staying 1 hours with discharge current of 0.2 C till 3.0V cut-off voltage.	Recovery capacity≧ 85%

4. 5 Condition adapting characteristics

Items	Test Method and Condition	Criteria
Temperature	After the battery full charging at 20 °C± 5°C, measure the discharging capacity with discharging current 0.2C5A till 3.0V cut off voltage at different temperature.	At -20°C is 40% At 0 °C is 60% At 25°C is 95%
Invariableness humid and hot	After put the battery in the invariableness humid and hot box of 40 °C± 2°C and relative humidity of 90 ± 5% for 48 hours, and then the cell are placed at room temperature to “dry out” for 2 hours.	No visible distortion, fire explosion.
Vibration	The full charging battery vibrate from 90 to 100 minutes at three mutually perpendicular planes with excursion of 0.8mm,and change the frequency from 10 to 50 HZ with 1hz/min speed.	No visible evidence of leakage, fume, fire or explosion
Free fall	The battery fall from 1m height to 20mm thickness of hardwood for the way of positive and negative of x,y,z each once.	No visible evidence of leakage, fume, fire or explosion

5. Safety performance

No.	Items	Test Method and Condition	Criteria
1	Continuous Charge test	The Battery discharged in accordance with standard charge at 20±5℃,then charged using the method specified by manufacturer, and it should be held at the specified end of charge Voltage for total period of 30 days.	No explosion & no fire
2	Over charge test	Discharge cell to 3.0V at 1C, then charge to 4.8V at 3C and rest for 8 hours.	
3	Over discharge tests	Fully charge cell, then discharge it to 3.0V @ 0.2C at room temperature, connected it with external load of 30Ω for 24 hours.	
4	Hot Oven Test	Put a full charged battery in a forced air oven and raise the temperature at 5±2℃ per minute to 130±2℃, rest for 10 minutes.	

5.1 Long Time Storage

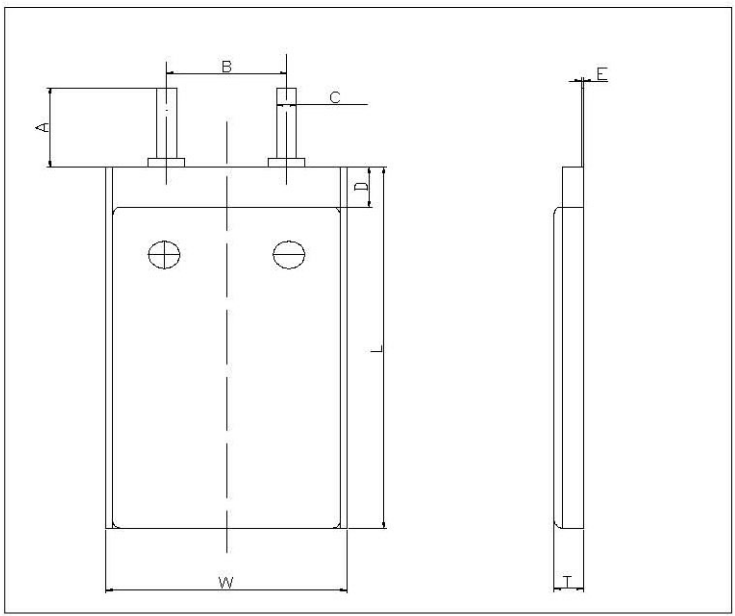
If the Cell is stored for a long time, the cell’s storage voltage should be 3.8~3.9V and the cell is to be stored in a condition as Item. 4.2.

6. Storage

Item	Storage Condition		Storage Period	Capacity (mAh)
	Voltage (V)	Temperature (°C)		Recovery
1. User short storage	Normal	Ref. 4.2 condition	1 month	85%
2. User long storage	Normal	Ref. 4.2 condition	3 month	85%
3. Long term storage	Normal	Ref. 4.2 condition	6 month	80%

7.Product Drawing

7.1 Product Drawing



Handling Precautions and Guideline

For LIPB (Lithium-Ion Polymer Batteries)

Subject to change without notice

1. Charging

1.1 Charging current

Charging current should be less than maximum charge current specified in the Product Specification.Charging with higher current than recommended value may cause damage to cell electrical, mechanical and safety performance and could lead to heat generation or leakage.

1.2 Charging voltage:

Charging shall be done by voltage less than that specified in the Product Specification(4.2V/cell). Charging beyond 4.30V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition. It is very dangerous that charging withhigher voltage than specified value may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

1.3 Charging temperature

The cell shall be charged within the specified temperature range in the Product Specification.

1.4 Prohibition of reverse charging:

Reverse charging is prohibited. The cell shall be connected correctly. The polarity has to be confirmedbefore wiring. In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damaging to the cell which may lead to

degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

2. Discharging

2.1 Discharging current

The cell shall be discharged at less than the maximum discharge current specified in the Product Specification. High discharging current may reduce the discharging capacity significantly or cause over-heat.

2.2 Discharging temperature

The cell shall be discharged within the temperature range specified in the Product Specification

2.3 Over-discharging:

It should be noted that the cell would be at an over-discharged state by its self-discharge characteristicsin case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 3.7V and 3.9V.Over-discharging may causes loss of cell performance, characteristics, or battery functions. The charger shall be equipped with a device to prevent furtherdischarging exceeding a cut-off voyage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The cell battery pack shall start with a low current (0.01C) for 16 - 30 minutes, i.e. pre-charging, before rapid charging starts. The rapid charging shall be started after the individual cell voltage has been reached above 3V within 16 - 30 minutes that can be determined with the use of an appropriate timer for pre-charging.In case the individual cell voltage does not rise to 3V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

3. Protection Circuit Module (PCM)

The cell/battery pack shall be with a PCM that can protect cell/battery pack properly.PCM shall have functions of (1) overcharging prevention, (2) over-discharging prevention, and(3) over current prevention to maintain safety and prevent significant deterioration of cell performance. The over current can occur by external short circuit

3.1 Overcharging prohibition:

Overcharging prevention function shall stop charging if any one of the cells of the battery pack reaches 4.305V.

3.2 Over-discharge prohibition:

Over-discharging prevention function shall work to minimize a dissipation current to avoid further drop in

cell voltage of 2.30V or less per cell in any cell of the battery pack. It is recommended that the dissipation

current of PCM shall be minimized to 0.5uA or less with the over-discharge prevention. The protection

function shall monitor each bank of the battery pack and control the current all the time.

4.Storage

The cell should be stored within the proper voltage and temperature range specified in the Product Specification.

5. Handling of Cells

Since the battery is packed in soft package, to ensure its better performance, it's very important to Carefully handle the battery

5.1 Soft Aluminum foil

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles.

Surface scratch

- Don't strike battery with any sharp edge parts
- Trim your nail or wear glove before taking battery
- Clean worktable to make sure no any sharp particle

5.2 Sealed edge

Sealing edge is very flimsy.

Tab bending

- Don't bend or fold sealing edge

5.3 Folding edge

The folding edge is form in battery process and passed all hermetic test

- Don't open or deform folding edge

5.4 Tabs

The battery tabs are not so stubborn especially for aluminum tab.

Tab bending

- Don't bend tab.

5.5 Mechanical shock

- Doesn't Fall, hit, bend battery

5.6 short

- Short terminals of battery is strictly prohibited, it may damage battery.

Cell tumble distortion

Cell extrusion distortion

Edge bending

6. Notice for Designing Battery Pack

6.1 Pack design

- Battery pack should have sufficient strength and battery should be protected from mechanical shock
- No Sharp edge components should be inside the pack containing the battery.

6.2 PCM design

- The overcharge threshold voltage should not be exceed 4.30V
- The over-discharge threshold voltage should not be lower than 2.30V

- The PCM should have short protection function built inside

6.3 Structure design

- Battery pack should be designed that shear would not be applied to the battery tabs.
- PCM is better to be designed suitable for installing on the sealing edge of battery to use space

efficiently, as below photos

6.4 Structure design

7. Notice for Assembling Battery Pack

7.1 Tab connectional

Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts.

If apply manual solder method to connect tab with PCM, below notice is very important to ensure

battery performance.

a) The solder iron should be temperature controlled and ESD safe

b) Soldering temperature should not exceed 1300°C

c) Soldering time should not be longer than 3s

d)Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approximate 100°C

7.2 Cell fixing

The battery should be fixed to the battery pack by its large surface area.

No cell movement in the battery pack should be allowed.

8. Others

8.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection. The battery pack shall be structured with no short circuit within the battery pack, which may cause generation of smoke or firing.

8.2 Prohibition of disassembly

1) Never disassemble the cells The disassembling may generate internal short circuit in the cell, which may cause gassing, fining, explosion, or other problems.

2) Electrolyte is harmful LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

8.3 Prohibition of dumping of cells into fire

Never incinerate nor dispose the cells in fire. These may cause explosion of the cells, which is very dangerous and is prohibited.

8.4 Prohibition of cells immersion into liquid such as water

The cells shall never be soaked with liquids such as water, seawater, and drinks such as soft drinks, juices, coffee or others.

8.5 Cells replacement

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

8.6 Prohibition of using the damaged cells

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used any more. The Cells with smell of the electrolyte or leakage shall be placed away from fire to avoid firing or exploding

8.7 Power consumption at standby status

Products using LIB battery can charge from 0V but not preferred: Power consumption of products with LIB battery at standby status maybe cause battery discharged deeply.

8.8 Placed battery for a long time.

Please use 0.5c current to charge up 80% capacity after the battery placed 3 months.

8.9 Guarantee to keep the battery in good repair

Guarantee to keep the battery in good repair in12 mouth from the shipment.