li-ion Polymer Battery Specification

MODEL : LP 551230 150mAh

Prepared By/Date	Checked By/Date	Approved By/Date

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1. Scope

Rechargeable Lithium Polymer Battery Date Sheet

2. Product Specification Table 1

No.	Item	Rated Performance		Remark
1	Rated Capacity	Typical	150mAh	Standard discharge（0.2C C_5A) after Standard charge
		Minimum	140mAh	
2	Nominal Voltage	3.7V		Mean Operation Voltage During Standard Discharge After Standard Charge
3	Voltage at end of Discharge	2.75V		Discharge Cut-off Voltage
4	Charging Voltage	4.2±0.03V		
5	AC (1KHz) Impedance New Cell Max.(mΩ)	≤300mΩ		
6	Standard charge	Constant Current 0.5C_5A Constant Voltage 4.2V 0.01 C_5A cut-off		Charge time : Approx 4.0h
7	Standard discharge	Constant current 0.2 C_5A end voltage2.75V		
8	Fast charge	Constant Current 1C_5A Constant Voltage 4.2V 0.01 C_5A cut-off		Charge time : Approx 2.5h
9	Fast discharge	Constant current 1 C_5A end voltage2.75V		
10	Maximum Continuous Charge Current	1 C_5A		
11	Maximum Continuous Discharge Current	1.5C_5A		
12	Operation Temperature Range	Charge: 0~45℃		60±25%R.H. Bare Cell
		Discharge: -20~60℃		
13	Storage Temperature Range	Less than 1 year: -20~25℃		60±25%R.H. at the shipment state
		less than 3 months: -20~40℃		
14	Weight	Approx 2.5g		Bare Cell
15	Cell Dimension	Length: Max.32mm		Bare Cell Initial Dimension
		Width: Max. 12 mm		
		Thickness: Max. 4 mm		

3. Performance And Test Conditions

3.1 Standard Test Conditions

Test should be conducted with new batteries within one week after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of 20±5℃ and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30℃ and humidity 25~85%RH.

3.2 Measuring Instrument or Apparatus

3.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

3.2.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than 10kΩ/V

3.2.3 Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

3.2.4 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method(1kHz LCR meter).

3.3 Standard Charge\Discharge

3.3.1 Standard Charge ：Test procedure and its criteria are referred as follows:

$0.5C_5A$ =75mA

Charging shall consist of charging at a $0.5C_5A$ constant current rate until the cell 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 0.01 C_5A . Charge time : Approx 4.0h, The cell shall demonstrate no permanent degradation when charged between 0 ºC and 45 ºC.

3.3.2 Standard Discharge

$0.2C_5A$ =30mA

Cells shall be discharged at a constant current of 0.2 C_5A to 2.75 volts @ 20º ± 5C

3.4 Appearance

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

3.5 Initial Performance Test

Table 2

Item	Measuring Procedure	Requirements
(1) Open-Circuit Voltage	The open-circuit voltage shall be measured within 24 hours after standard charge.	≥4.08V
(2) AC Impedance Resistance	The Impedance shall be measured in an alternating current method (1kHz LCR meter) after standard charge at 20±5℃.	≤300mΩ
(3) Nominal Capa it	The capacity on $0.2C_5A$ discharge shall be measured after standard charge at 20±5℃.	Discharge Capacity ≥140mAh

3.6 Temperature Dependence of Capacity (Discharge)

Cells shall be charged per 3.3.1. and discharged @0.2C_5A to 2.75 volts. except to be discharged at temperatures per Table 3. Cells shall be stored for 3 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 23 °C and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 3.

Table 3

Discharge Temperature	-10℃	0°C	23℃	60℃
Discharge Capacity （0.2C_5A）	50%	80%	100%	95%

3.7 Cycle Life and Leakage-Proof Table 4

No.	Item	Criteria	Test Conditions
1	Cycle Life (0.5 C_5A)	Higher than 70% of the Initial Capacities of the Cells	Carry out 500cycle charging/ Discharging in the below condition. ◆Charge: Standard Charge, per 3.3.1 ◆Discharge:0.5 C_5A to 2.75V ◆Rest Time between charge/discharge:30min. ◆Temperature:20±5℃
2	Leakage-Proof	No leakage (visual inspection)	After full charge, store at 60±3℃ 60±10%RH for 1month.

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4. Safety Test

Item	Battery Condition	Test Method	Requirements
Crush	Fresh, Fully charged	Crush between two flat plates. Applied force is about 13kN(1.72Mpa) for 30min.	No explosion, No fire
Short Circuit	Fresh, Fully charged	Each test sample battery, in turn, is to be short-circuited by connecting the (+) and (-) terminals of the battery with a Cu wire having a maximum resistance load of 0.1Ω.Tests are to be conducted at room temperature(20±2℃).	No explosion, No fire The Temperature of the surface of the Cells are lower than 150℃
Short Circuit	Fresh, Fully charged	Each test sample battery, in turn, is to be short-circuited by connecting the (+) and (-) terminals of the battery with a Cu wire having a maximum resistance load of 0.1Ω.Tests are to be conducted at temperature(60±2℃).	No explosion, No fire The Temperature of the surface of the Cells are lower than 150℃
Impact	Fresh, Fully charged	A 56mm diameter bar is inlayed into the bottom of a 10kg weight. And the weight is to be dropped from a height of 1m onto a sample battery and then the bar will be across the center of the sample.	No explosion, No fire
Forced Discharge	Fresh, Fully charged	Discharge at a current of 1CmA for 2.5h.	No explosion, No fire
Nail Pricking (3mm)	Fresh, Fully charged	Prick through the sample battery with a nail having a diameter of 3mm and remain 2h.	No explosion, No fire

5.Handling of Cells

5.1Consideration of strength of film package

1)Aluminium laminated film

Easily damaged by sharp edge parts such as pins and needles, comparing with metal-can-cased LIB.

2).Sealed edge May be damaged by heat above 100°C.

5.2 Prohibition short circuit

Never make short circuit cell. It generates very high current which causes heating of the cells and may cause electrolyte leakage, gassing or explosion that are very dangerous.

The LIP tabs may be easily short-circuited by putting them on conductive surface.

(Such outer short circuit may lead to heat generation and damage of the cell.)

An appropriate circuitry with PCM shall be employed to protect accidental short circuit of the battery pack.

5.3.Mechanical shock

LIP cells have less mechanical endurance than metal-can-cased LIB.

Falling, hitting, bending, etc. may cause degradation of LIP characteristics.

6.4 Handling of tabs

The LIP tabs are not exceedingly sturdy, especially the aluminium tabs for the terminal. Do not put much force on LIP tabs. (Aluminium tab may easily be torn off by shear force.)

Do not bend tabs unnecessarily.

6.Notice for Designing Battery Pack

6.1Pack toughness

Battery pack should have sufficient strength and the LIP cell inside should be protected from mechanical shocks.

6.2Cell fixing

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

No cell movement in the battery pack should be allowed.

6.3 Inside design

No sharp edge components should be inside the pack containing the LIP cell.

6.4 Tab connection

Ultrasonic welding is recommended for LIP tab connection method.

Battery pack should be designed that shear force are not applied to the LIP tabs.

6.5 For mishaps

Battery pack should be designed not to generate heat even when leakage occurs due to mishaps.

1) Isolate PCM (Protection Circuit Module) from leaked electrolyte as perfectly as possible.
2) Avoid narrow spacing between bare circuit patterns with different voltage. (Including around connector)
3) LIP battery should not have liquid from electrolyte, but in case If leaked electrolyte touches bare circuit patterns, higher potential terminal material may dissolve and precipitate at the lower potential terminal, and may cause short circuit. The design of the PCM must have this covered.

7.Notice for Assembling Battery Pack

Shocks, high temperature, or contacts of sharp edge components should not be allowed in battery pack assembling process.

7.1 Do not solder directly to LIP tabs. Do not bring heated tools such as soldering Iron close to LIP cells. Temperature above 80°C may cause damage to the LIP cell and degrade its performances.

7.2 .In case that the battery pack is fixed by ultrasonic welding, it is necessary not to apply too much ultrasonic welding power to LIP cell and electronic circuits such as PCM. Otherwise it may cause serious damage to the cells and electronic circuit.