

**Lithium Polymer Battery
Specification**

Model: PCLP401221

ZEUS CONFIDENTIAL

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Amendment History

Rev	Description	Date	Name
Pre	Initial release	11-29-16	Kevin Oh
Pre 1.1	Added maximum swelling (thickness)	12-1-16	Kevin Oh
Pre 1.2	Corrected typos on Std charge current and Peak current	9-26-17	Kevin Oh
A.0	MP Release	1/19/18	Kevin Oh

Customer Approval

Company/Customer Name	Department	Date	Signature

- **For Air Shipments:** A 30% state of charge (SOC) limit on secondary lithium-ion cells and batteries, including Section II cells and batteries, will now apply. This does not apply to batteries packed with or contained in equipment (Effective April 1, 2016).
- Lithium cells/battery packs must be charged within 45 days of receipt to avoid over discharge.
- Shipping lithium materials must be done through a licensed shipper with appropriate packaging & labeling to meet current regulations.

These amendments are detailed in a lithium battery update document found on the International Air Transport Association (IATA) website: <http://www.iata.org/whatwedo/cargo/dgr/Documents/lithium-battery-update.pdf>.

1. Scope

This product specification applies to rechargeable Lithium Polymer battery supplied by Zeus Battery Products.

2. Description and Model

Model: PCLP401221

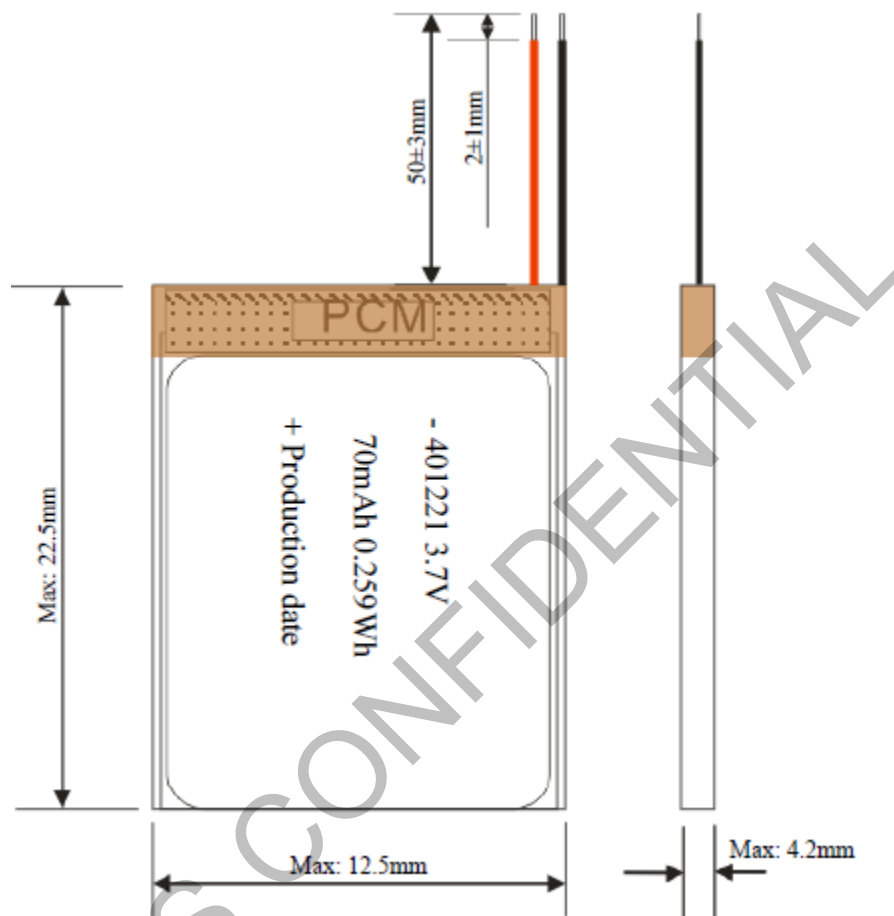
Description: 3.7V 70mAh

3. Nominal Specifications

No.	Item	Specification	Remark
1	Nominal Capacity	70mAh	@ 0.2C discharge, room temperature
2	Nominal Voltage	3.7V	
3	Charge Voltage	4.20+/-0.03V	
4	Standard Charge current	14mA	0.2C
5	Max. continuous charge current	70mA	1.0C
6	Max. continuous discharge current	70mA	1.0C
7	Peak current	140mA	≤3 sec
8	Discharge cut-off Voltage	3.0V	
9	Internal Impedance	≤480mΩ	
10	Operating temperature	Charge: 0 ~ 45°C Discharge: -20 ~ 60°C	
11	Storage temperature	1 yr: 10 ~ 20°C 3 months: 0 ~ 25°C 1 month: -20 ~ 30°C	@ SOC approx. 50%
12	Cycle Life	≥500 cycles	@ 0.2C discharge, room temperature
13	Weight	Approx. 3.2g	

***Note on Air transport: Lithium ion cells and batteries must be offered for transport at a state of charge (SOC) not exceeding 30% of their rated design capacity**

4. Battery Dimension



*Up to 8% swelling could occur in the center of cell after 500 cycles

5. Protection Parameters

Item	Sym	Content	Criterion
Over charge protection	VDET1	Over charge detection voltage	4.28+/-0.05V
	tVDET1	Detection delay time	1.4S Max.
	VREL1	Release voltage	4.08+/-0.05V
Over discharge protection	VDET2	Over discharge detection voltage	3.0+/-0.10V
	tVDET2	Detection delay time	173ms Max.
	VREL2	Release voltage	3.0+/-0.10V
Over current protection	VDET3	Over current detection voltage	100+/-30mV
	IDP	Detection current	3.0A Max.
	tVDET3	Detection delay time	11.0mS Max.
		Release condition	Cut load
Short circuit protection		Detection condition	External short circuit
	TSHORT	Detection delay time	380us Max.
		Release condition	Cut short circuit
Internal Resistance	RDS	Main loop resistance	Vc=4.20V; RDS≤70mΩ
Current consumption	IDD	Consumption under normal operation	3.0uA, 7.0uA Max
OV Prohibition		Allowed	

8. Standard Test Conditions

Environmental Conditions

Unless otherwise specified, all tests stated in this specification are conducted at $25\pm5^{\circ}\text{C}$ and $60\pm20\%$ humidity.

Measuring Equipment

1) Ammeter and Voltmeter

Standard class specified in the national standard or more sensitive class

2) Slide caliper

The slide caliper should have 0.01mm accuracy.

3) Impedance meter

An impedance meter with 1kHz AC should be used.

9. Environmental Tests

No	Items	Test Method and Condition	Criteria
1	Free fall test	The battery is to be fully charged in accordance with standard charge condition, then drop the battery three times from a height of 1.0 m onto a concrete floor. The batteries are dropped so as to obtain impacts in random orientations.	No Fire,
2	Vibration test	After standard, install battery on the vibration table; adjust the equipment according to the following vibration and amplitude frequency. From X,Y,Z three directions in 10Hz~55Hz sweep vibration to sweep for 30mins with the sweep frequency speed rate at 1oct/min: Vibration frequency: 10Hz~30 Hz(single amplitude) Displacement amplitude(single): 0.38mm; Amplitude frequency: 30Hz~55 Hz(single amplitude) Displacement amplitude (single): 0.19mm	No explosion, No leakage, No fire

3	Shock Test	Affix the battery through the fixture from the three perpendicular X,Y,Z axes respectively to the vibration table, then following the requests below to adjust the acceleration, pulse duration time for crash test: Pulse peak acceleration: 100m/s ² , Collision frequency per min: 40~80 Pulse duration time: 16mins collision Frequency: 1000±10	No explosion, No fire
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10. Battery Handling Warning and Precautions

The battery contains flammable materials such as organic solvents. Mishandling the battery may cause fire, smoke, or an explosion and the battery's functionality will be seriously damaged. Protection circuitry must be designed into the application device to protect the battery. Please read and check the following prohibited actions

(1) Immersion

Do not immerse the battery in liquid such as water, beverages or other fluids.

Exposure to liquid may damage the battery or the battery pack (including protection circuit). As a result, the battery may generate heat, smoke, catch fire, or explode.

(2) High Temperature

Do not use or place the battery near an open flame, heater or high temperature (above 80°C).

Subjecting the battery to high temperature may damage the separator and can cause an internal short circuit. This may cause the battery to generate heat, smoke, catch fire, or explode.

(3) Chargers and Charge Conditions

Do not use unauthorized chargers.

Only charge the battery within specified conditions (e.g., temperature range, voltage, and current). Use of an unauthorized charger could cause the battery to generate heat, smoke, catch fire, or explode.

(4) Reverse Polarity

Do not attach or insert battery with polarity reversed.

A battery has polarity. If the battery does not easily fit into the charger or device, check the battery's orientation. Do not force the battery into the battery compartment. If attached to the device with reversed polarity the battery may generate heat, smoke, catch fire, or explode.

(5) Direct Connection

Do not connect the battery to an AC outlet or DC automotive plug.

The battery requires a specific charger. If the battery is connected directly to a power outlet, the battery may generate heat, smoke, catch fire, or explode.

(6) Use in Other Equipment

Do not use the battery in equipment for which it was not intended.

If the battery is used in unapproved applications or systems, the battery may become damaged and generate heat, smoke, catch fire, or explode.

(7) Incineration and Heat

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Keep the battery away from heat and fire.

Heat will damage the battery and may cause it to generate heat, smoke, catch fire, or explode.

(8) Short-Circuit

Do not induce short-circuit.

Do not connect the positive (+) and negative (-) terminals with a conductive material. Do not carry or store the battery with any metal objects. If the battery is shorted, the shorting item may overheat and the battery may generate heat, smoke, catch fire, or explode.

(9) Impact

Avoid excessive impact to the battery.

Impact beyond specification may damage the battery. This may cause the battery to leak, generate heat, smoke, catch fire, or explode.

(10) Penetration

Do not penetrate the battery with a nail or strike with a hammer.

If subjected to a hard strike or penetrated by an object, the battery may be damaged or destroyed, thereby causing an internal short-circuit. This may cause the battery to generate heat, smoke, catch fire, or explode.

(11) Soldering

Do not directly solder to the battery.

Soldering directly to the battery could melt the separator or damage the gas release vent or other safety mechanisms. This may cause the battery to generate heat, smoke, catch fire, or explode.

(12) Disassembly

Do not disassemble the battery.

Disassembly or modification of the battery may damage the protection circuit. This may cause the battery to generate heat, smoke, catch fire, or explode.

(13) Charge near High Temperatures

Do not charge the battery near high temperature.

If the battery is charged while exposed to high temperature, the battery's protection circuit may activate and prevent charging, or fail and cause the battery to generate heat, smoke, catch fire, or explode.

(14) Deformation

Do not use the battery with conspicuous damage or deformation.

It can lead to generating of heat, smoke, rupture or flame.

(15) Reverse Charge and Over discharge

Do not reverse polarity (and terminals).

On charging, the battery is reverse-charged and abnormal chemical reaction occurs. And also, there may be case that unexpected large current flows on discharging, and can generate heat, smoke, rupture or flame.

Additional Precaution

- ◆ The battery should be stored at half charged state in a dry, clean area with good ventilation. If the battery has to be stored for extended period of time (over 3 months), the environmental condition should be 20+/-5°C with 65+/-20% Relative Humidity.
- ◆ Charging current and voltage should be less than maximum charge current specified in the Product Specification. Charging with higher current or voltage than recommended value may damage the battery and lead to poor performance increased safety risk.
- ◆ Do not reverse the polarity of battery pack leads. Reverse charging may cause damage to the battery and lead to degradation of performance and increased safety risk.
- ◆ Parents must explain how to use the system and the battery. Periodic checks must be made to ensure children are using the system and the battery correctly.
- ◆ Always adhere to operating temperature as listed in the Product Specification. Using batteries outside of its operating temperature will lead to reduced performance and increased safety risk.
- ◆ Never short-circuit the battery pack.
- ◆ If electrolytes leak and come into contact with the skin or eyes, flush with fresh water and seek medical attention immediately.
- ◆ Batteries might be damaged during shipping. If abnormal features are present such as damage in a plastic enclosure, visible deformation of packaging or electrolyte odor, the battery shall not be used and placed in a safe and well ventilated area away from heat source.

11. Warranty

Products supplied by Zeus Battery Products contain 12 months warranty against manufacturing defects from date of shipment. Zeus Battery Products shall not be responsible for any accident or damage resulting either from user abuse or misuse.