

**Rechargeable Li-ion Battery Pack**  
**Specification**

**Model: PCLI18650-2S2P**

ZEUS CONFIDENTIAL

191 Covington Drive, Bloomingdale, IL 60108  
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**Amendment History**

Rev	Description	Date	Name
Pre	Initial Release	6-6-17	Kevin Oh
A.0	Official release for MP	12-14-17	Kevin Oh
A.1	Added item 4: Protection parameters	1-24-18	Kevin Oh
A.2	-Added Shrink tubing PN -Corrected wire gauge (20→24AWG) for core battery pack	5-18/18	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>

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### 1. Scope

This product specification applies to rechargeable Lithium-ion battery pack supplied by Zeus Battery Products.

### 2. Description and Model

Model: PCLI18650-2S2P

Description: 7.4V 5200mAh

### 3. Nominal Specifications

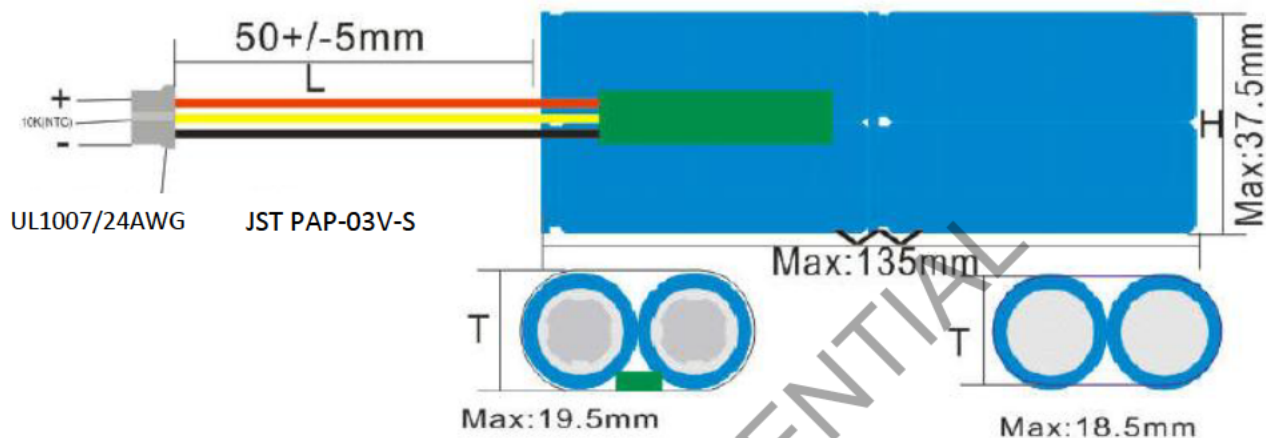
No.	Item	Specification	Remark
1	Nominal Capacity	5200mAh	@ 0.2C discharge, room temperature
2	Nominal Voltage	7.4V	
3	Charge Voltage	8.40V	
4	Standard Charge current	1.0A	
5	Max. continuous charge current	2.0A	
6	Max. continuous discharge current	4.0A	
7	Pulse Discharge current	5.2A	≤3sec
8	Discharge cut-off Voltage	6.2V	
9	Internal resistance	120mΩ	
10	Weight	Approx. 5.7g	
11	Operating temperature	Charge: 0 ~ 45°C Discharge: -20 ~ 60°C	
12	Storage temperature	1 yr: -10 ~ 25°C 6 months: 25 ~ 45°C 1 month: 45 ~ 55°C	Recommended 25+/-5°C at 50% SOC
13	Cycle Life	≥300 cycles	@ 0.2C discharge, room temperature

**\*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**

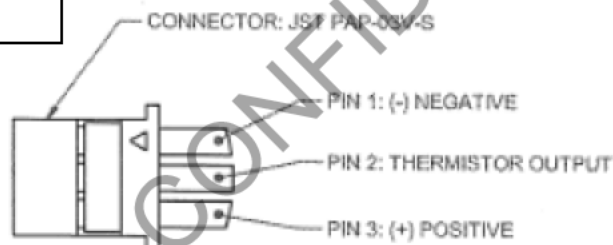
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#### 4. Dimension

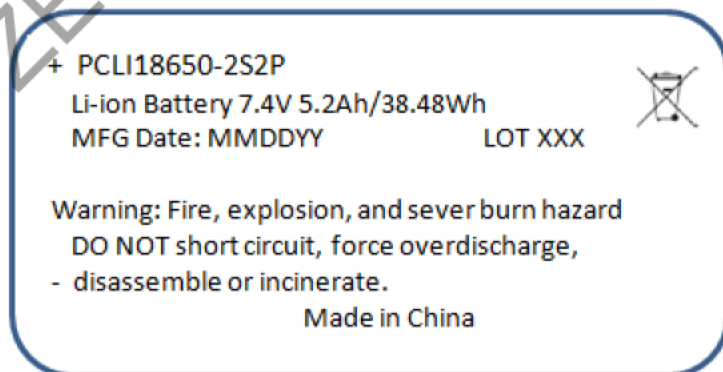
**Note on Shrink Tubing: Must use PN SHK062B6 from S&S Electronics South Korea.**



##### Pin assignment



#### 4.1 Battery Label Artwork (core pack only)



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## 5. Protection Parameters

Item	Description	Criterion
Over charge protection	Protection detection voltage	4.30+/-0.02V
	Recovery voltage	4.15+/-0.03V
	Detection delay time	1.0s Max.
Over discharge protection	Protection detection voltage	2.80+/-0.05V
	Recovery voltage	3.00+/-0.10V
	Detection delay time	128ms
Over discharge current protection	Protection detection voltage	0.150V
	Detection current	5.5A ~ 8.0A
	Detection delay time	8ms
Short circuit protection	Protection condition	External short
	Detection delay time	280us Max
	Recovery condition	Cut load
OV Battery charge function	/	Allowed
Current consumption under normal operation	/	Min: 0.1uA Max: 8.0uA

## 6. Standard Test Conditions

### 6.1 Environmental Conditions

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

### 6.2 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.

## 7. 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, No explosion

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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 <sup>2</sup> , Collision frequency per min: 40~80 Pulse duration time: 16mins collision Frequency: 1000±10	No explosion, No fire
4	Shock test	The fully charged battery is to be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of the cell or battery. The battery is subjected to a total of three shocks of equal magnitude. The shocks are applied in each of three mutually perpendicular directions. At least one of them shall be perpendicular to a flat face. For each shock the cell or battery is accelerated in such a manner that during the initial 3 milliseconds the minimum average acceleration is 75gn. The peak acceleration shall be between 125gn and 175gn. Cells or batteries are tested in an ambient temperature of 20~25°C	No explosion, No leakage, No fire

## 8. Battery Handling 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

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Do not use or place the battery near an open flame, heater or high temperature (above 70°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**

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 a 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.

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**(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 causes the generating 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.

**9. 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 from user abuse or misuse.