

**Lithium Polymer Battery
Specification**

Model: PCLP705048-1S1P

ZEUS CONFIDENTIAL

Amendment History

Rev	Description	Date	Name
Pre	Initial Release	2/24/2017	Kevin Oh
Pre 1.1	Added shipping temperature in Item 11 (-30°C for less than 24 hours) Added Special Note on shipping temperature on page 7	11/2/2017	Kevin Oh
A.0	Added Item 4: Protection Parameters Added Item 4.2: Circuit Diagram Added Item 5: Battery Pack labeling	1/22/2018	Kevin Oh
A.1	Removed item 5 Label artwork. Label artwork for mass production TBD.	8/1/2018	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 Polymer battery supplied by Zeus Battery Products.

2. Description and Model

Model: PCLP705048

Description: 3.7V 2000mAh

3. Nominal Specifications

No.	Item	Specification	Remark
1	Nominal Capacity	2000mAh	@ 0.2C discharge, room temperature
2	Nominal Voltage	3.7V	
3	Charge Voltage	4.20 \pm 0.05V	
4	Standard Charge current	400mA	0.2C
5	Max. continuous charge current	2000mA	1.0C
6	Max. continuous discharge current	2000mA	1.0C
7	Discharge cut-off Voltage	3.0V	
8	Internal resistance	$\leq 160\text{m}\Omega$	
9	Weight	Approx. 38.0g	
10	Operating temperature	Charge: 0 ~ 45°C Discharge: -20 ~ 60°C	
11	Storage temperature	1 yr: -10 ~ 25°C 6 months: -10 ~ 45°C 1 month: -10 ~ 55°C	-30°C shipping temperature allowed for ≤ 24 hours. Battery must be allowed to sit in room temperature for min. 5 hours prior to use
12	Cycle Life	≥ 500 cycles	@ 0.2C discharge, room temperature

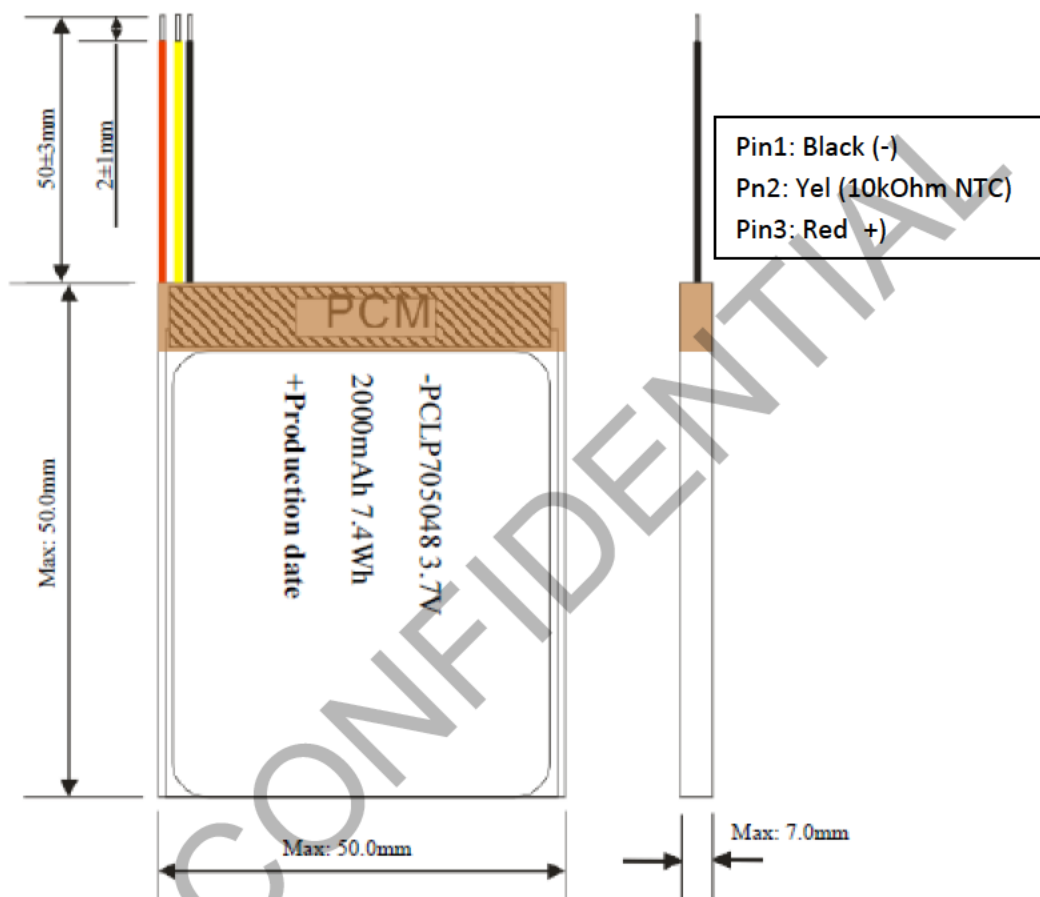
***Note on Air transport: Lithium ion cells and batteries must be offered for transport at a state of charge (SOC) not exceeding 30% of their rated design capacity**

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4. Battery Dimension



BOM (Bill of materials)				
No	Material Name	Specification	Qty	Remark
1	Cell	PCLP705048/2000mAh	1	RoHS
2	Protection board	PCB4440-36	1	RoHS
3	Wire	Red (UL3302#26)	1	RoHS,
		Yellow (UL3302#26)	1	RoHS
		Black (UL3302#26)	1	RoHS
	Note on wires	Rated temp: 105°C, Passes UL VW-1 vertical flame test		

4.1 Protection Parameters

Item	Sym	Content	Criterion
Over charge protection	VDET1	Over charge detection voltage	4.28+/-0.035V
	tVDET1	Detection delay time	1.4s Max.
	VREL1	Release voltage	4.08+/-0.1V
Over discharge protection	VDET2	Over discharge detection voltage	3.0+/-0.08V
	tVDET2	Detection delay time	173ms Max.
	VREL2	Release voltage	3.0+/-0.10V
Over current protection	VDET3	Over current detection voltage	80mV+/-15mV
	IDP	Detection current	3.0A ~ 5.0A
	tVDET3	Detection delay time	11ms Max
		Release condition	Cut load
Short circuit protection		Detection condition	External short
	TSHORT	Detection delay time	40uS Max.
		Release condition	Cut short circuit
Internal resistance	RDS	Main loop resistance	≤60mΩ
Current consumption	IDD	Consumption during normal operation	Min: 3uA, Max: 8uA
OV Prohibition		Allowed	

5. Standard Test Conditions

5.1 Environmental Conditions

Unless otherwise specified, all tests stated in this specification are conducted at 25±5°C and 60±20% humidity.

5.2 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.

6. Electrical Characteristics

No	Items	Test Method	Criteria
1	Standard charge	Charge with 0.2C constant current and then switch 4.2V constant voltage until charge current declines to 0.02C	NA
2	Capacity	Fully charge and discharge at 0.2C rate. 3.0V cut off voltage.	≥2000mAh
3	Cycle Life	Cycle the battery using 0.2C rate for 500 cycles at 23+/-2°C. Remaining capacity after 500 cycles shall be ≥80% of stated capacity.	≥80%

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,

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
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

- ◆ Don't immerse battery in water or allow it to get wet!
- ◆ Don't charge, use and store battery near a heat source such as fire or a heater! If the battery leaks or release strange odor, please remove from heat source immediately.
- ◆ Don't reverse the positive and negative polarity!
- ◆ Always recharge before first time use!
- ◆ Don't short-circuit battery with wire or other metal objects!

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- ◆ Don't disassemble the battery in any way!
 - ◆ Don't put the battery into microwave oven or pressure vessel!
 - ◆ Don't use battery in a very hot environment, such as under direct sunlight or in car on hot day. Otherwise, the battery will overheat which will affect battery performance and shorten battery life!
 - ◆ If the battery leaks and electrolyte leakage enters into the eyes, don't rub, rinse with water immediately and seek immediate medical assistance.
 - ◆ Ambient temperature will affect the discharge capacity of battery, if the ambient temperature is beyond the standard environment ($23\pm 2^{\circ}\text{C}$), the discharge capacity will be affected

Special Note on -30°C Shipping Temperature

- ◆ Battery must not be exposed to temperature below -30°C
- ◆ -30°C shipping temperature allowed for ≤ 24 hours.
- ◆ Battery must be placed in room temperature for at least 5 hours prior to use.

9. Warranty

Products supplied by Zeus Battery Products contain 12 months warranty against manufacturing defects from date of shipment. Any damage resulting either from user misuse or abuse will void the warranty.

Note: This product specification is subject to change without prior notice.