



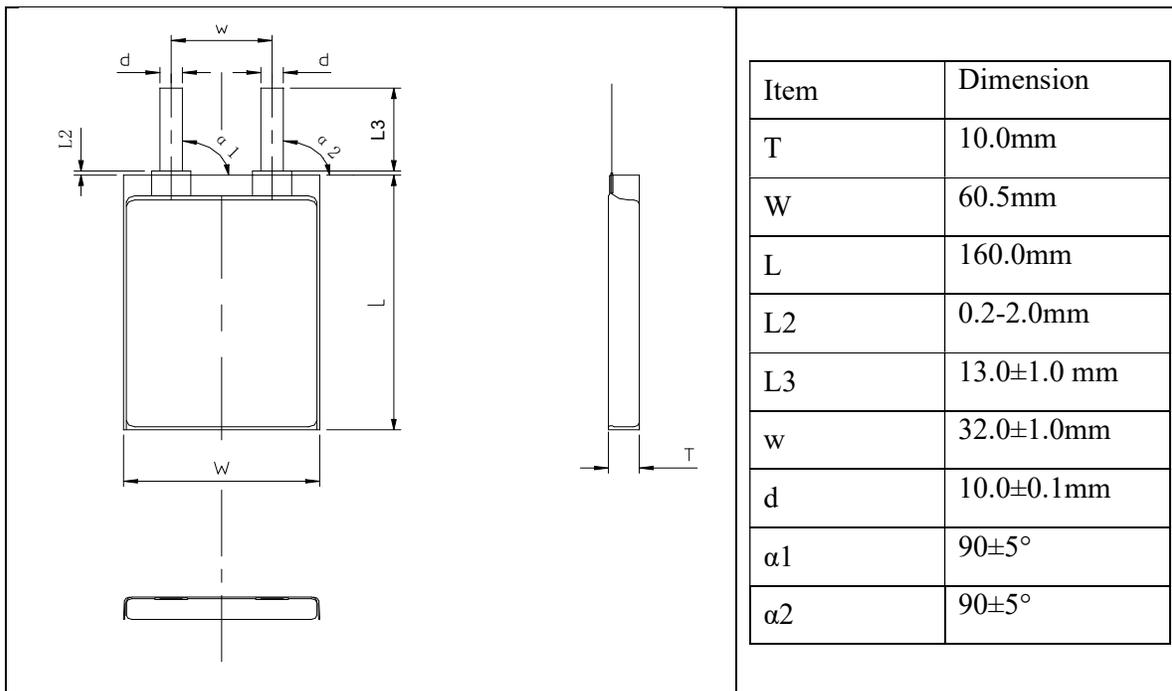
This specification shall be applied to battery cell supplied by AA Portable Power Corp.

## 1. Product Specification

**Model : PL-9059156-1C, 3.7V 10000mAh**

Item		Specifications	Remark
Typical Capacity		<u>10000</u> mAh	25°C, 0.2C <sub>5</sub> A discharge
Min Capacity		<u>9500</u> mAh	25°C, 0.2C <sub>5</sub> A discharge
Nominal Voltage		<u>3.7</u> V	25°C, Average Voltage at 0.2 C <sub>5</sub> A discharge
Charge Current	0.2C <sub>5</sub> A	0.2C <sub>5</sub> A	Working temperature: 0 to 45°C
	1.0C <sub>5</sub> A	1.0C <sub>5</sub> A	Working temperature: 0 to 45°C
Charge cut-off voltage		<u>4.2±0.10</u> V	CC/CV
Standard discharge current		0.2C/ <u>1900</u> mA	-20 to 60°C
Maximum discharge current		1C/10000mA	-20 to 60°C
Peak discharge Current		2C / <u>19000</u> mA	Working temperature: 0 to 45°C For < 30 seconds
Discharge cut-off voltage		<u>2.75</u> V	
Impedance		≤ <u>6</u> mΩ	25°C, AC 1KHz after 50% charge
Weight		≤ <u>200</u> g	
Storage temperature	≤ 1 month	-20 to 45°C	Best 20±5°C for long-time storage
	≤ 6 months	0 to 30°C	
	≤ 12months	20±5°C	
Storage humidity		65±20% RH	

## 2. Cell Dimension



## 3. General Performance

**Definition of Standard charging method:** At 20±5°C, charging the cell initially with constant current 0.2C<sub>5</sub>A till voltage reach 4.2V, then with constant voltage 4.2V till current declines to 0.05C<sub>5</sub>A.

Item	Test Methods	Performance	
3.1	0.2C Capacity	After standard charging, laying the battery 0.5h, then discharging at 0.2C <sub>5</sub> A to voltage 2.75V, recording the discharging time.	≥285min
3.2	1C Discharge	After standard charging, laying the battery 0.5h, then discharging at 5C <sub>5</sub> A to voltage 3.0V, recording the discharging time.	≥54min
3.3	Cycle Life	Constant current 1C <sub>5</sub> A charge to 4.2V, then constant voltage charge to current declines to 0.05C <sub>5</sub> A, stay 5min, constant current 1C <sub>5</sub> A discharge to 2.75V, stay 5min. Repeat above steps till continuously discharging time less than 36min.	≥300times
3.4	Capability of keeping	20±5°C, After standard charging, laying the battery 28days, discharging at 0.2C <sub>5</sub> A to voltage 2.75V, recording the discharging	≥240min



	electricity	time.	
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#### 4. Environment Performance

Item		Test Methods	Performance
4.1	High temperature	After standard charging, laying the battery 4h at 60°C, then discharging at 0.2C <sub>5</sub> A to voltage 2.75V, recording the discharging time.	≥270min
4.2	Low temperature	After standard charging, laying the battery 4h at -20°C, then discharging at 0.2C <sub>5</sub> A to voltage 2.75V, recording the discharging time.	≥210min
4.3	Constant humidity and temperature	After standard charging, laying the battery 48h at 40±2°C, RH 93±2%. Recording 0.2C <sub>5</sub> A discharging time	No distortion No electrolytes leakage ≥270 min
4.4	Temperature shock	After standard charging, battery stored at -20°C for 2 hours, then stored at 50°C for 2 hours. Repeat 10 times.	No electrolytes leakage

#### 5. Mechanical Performance

Item		Test Methods	Performance
5.1	Vibration	After standard charging, put battery on the vibration table. 30 min experiment from X,Y,Z axis. Scan rate: 1 oct/min; Frequency 10-30Hz, Swing 0.38mm; Frequency 30-55Hz, Swing 0.19mm.	No influence to batteries' electrical performance and appearance.
5.2	Collision	After vibration test, batteries were laying on the vibration table about X, Y, Z axis. Max frequency acceleration: 100m/s <sup>2</sup> ; collision times per minutes: 40~80; frequency keeping time 16ms; all collision times 1000±10.	No influence to batteries' electrical performance and appearance.
5.3	Drop	Random drop the battery from 10m height onto concrete one times.	No explosion or fire

#### 6. Safety Test

**Test conditions:** The following tests must be measured at flowing air and safety protection conditions. All batteries must standard charge and lay 24h.

Item	Test Methods	Performance
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6.1	Over charge	At 20±5°C, charging batteries with constant current 3C <sub>5</sub> A to voltage 4.8V, then with constant voltage 4.8V till current decline to 0. Stop test till batteries' temperature 10°C lower than max temperature.	No explosion or fire
6.2	Over discharge	At 20±5°C, discharge battery with 0.2C <sub>5</sub> A continuously 12.5h.	No explosion or fire
6.3	Short-circuit	At 20±5°C, connect batteries' anode and cathode by wire which impedance less than 50mΩ, keep 6h.	No explosion or fire
6.4	Extrusion	At 20±5°C, put the battery in two parallel steal broad, add pressure 13kN.	No explosion or fire
6.5	Thermal shock	Put the battery in the oven. The temperature of the oven is to be raised at 5±1°C per minute to a temperature of 130±2°C and remains 60 minutes.	No explosion or fire

## 7. Cautions of charge & discharge

### 7.1 Charge

Charge current should be lower than the values recommend below. Higher current and voltage may cause damage to the cell's electrical performance, mechanical performance, safety performance and could lead heat generation or leakage.

- Use CC/CV (constant current/constant voltage) charge mode;
- Charge current should be lower than (or equal to )1C<sub>5</sub>A;
- Temperature 0 to 45°C is preferred;
- Maximum Charge voltage must be lower than 4.25V.

### 7.2 Discharge

- Temperature 0 to 60°C is preferred;
- Discharge voltage must not be lower than 2.75V.

### 7.3 Over-discharge

The cell has the nature of self-discharge. In order to prevent over-discharge, the cell shall be charged periodically to keeping voltage between 3.6-3.9V. Over-discharge may cause loss of cell performance. It should be noted that the cell should not be discharged below 2.5V.

## 8. Storage of polymer lithium-ion batteries



- The environment of long-time storage:
- Temperature:  $20 \pm 5^{\circ}\text{C}$ ;
- Humidity: 45-85%;
- Batteries were 40~60% charged.
- We recommend to charge the batteries once every three months to avoid self-over-discharge.
- Charge and discharge once to maintain and renew battery energy after storage above 1 year.

## 9. Transportation of polymer lithium-ion batteries

- **Cells must be properly packed to avoid short circuit.**
- Do not immerse the cell products in water or allow it to get wet.
- The highest temperature in transportation is lower than  $65^{\circ}\text{C}$ .
- The batteries should transportation with 10 to 50% charged states.

## 10. Precautions

### Charge the battery

- When using a new battery for the first time or after long term storage, please fully charge the battery before use.
- For charging methods, please refer to our specification.
- Use the correct charger for Lithium Ion batteries.
- When connecting a battery pack to a charger, ensure correct polarity.
- During long term storage, battery should be charged and discharged once every 3 months.

### Assembly and disassembly the batteries

- Do not solder directly to cells or batteries.
- Do not mix new batteries with semi-used batteries, over-discharge may occur.
- Do not disassembly the batteries.
- Do not remove the outer sleeve from a battery.
- Do not short the batteries, it will permanent damage the batteries or batteries might catch fire.

### Storage



- Store batteries in a cool dry place.
- During transport and storage, please separate the battery apart, to prevent external short circuit.

#### **Use the batteries**

- If find leakage from a battery, please stop its use.
- When the battery is hot, please do not touch it and handle it, until it has cooled down.
- Unplug a battery by holding the connector itself and not by pulling at its cord.
- When not using a battery, disconnect it from the device.
- After use, if the battery is hot, before recharging it, allow it to cool in a well-ventilated place out of direct sunlight.
- Do not put batteries into the fire.
- Never put a battery into water or seawater.
- Do not mix AA Portable Power batteries with other battery brands or batteries of a different chemistry.
- Avoid batteries being used in an airtight compartment. Ventilation should be provided inside the battery compartment; otherwise batteries may generate hydrogen gas, which could cause an explosion if exposed to an ignition source.
- Keep away from children. If swallowed, contact a physician immediately.

#### **Recycle the batteries**

- Please recycle the batteries.

**Please contact us when you need any help for custom battery packs and safety concerns**

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