

Product Specification

Polymer Li-ion Rechargeable Battery

**Part# PLH-12211218C
(3.7V 40Ah, 60A rate)**



AA Portable Power Corp

(<http://www.batteryspace.com>)

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1. Scope

These documents describes the Product Specification of the Polymer Lithium-ion rechargeable battery manufactured by AA Portable Power Corp (<http://www.batteryspace.com>)

2. Model: PLH-12211218C

3. Specification

No.	Items	Specifications
1	Charge voltage	DC 4.25V
2	Nominal voltage	3.7V
3	Minimal capacity	40Ah @0.2C Discharge
4	Charge current	Standard charge: 0.3C Rapid charge: 0.5C
5	Standard Charging method	0.3C CC(constant current) charge to 4.25V, then CV(constant voltage 4.25V) charge till charge current decline to $\leq 0.05C$
6	Charging time	Standard charge: 4.0 hours (Ref.) Rapid charge: 1.5 hours (Ref.)
7	Max. charge current)	1.0 C
8	Max. discharge current	1.5 C
9	Discharge cut-off voltage	$2.75V \pm 0.15V$
10	Operating temperature	Charging: $-10^{\circ}C \sim 45^{\circ}C$ Discharging: $-20^{\circ}C \sim 45^{\circ}C$
11	Storage temperature	$-20^{\circ}C \sim +45^{\circ}C$
12	Battery Weight	Approx. 1350g Below
13	Battery Dimension	Length : 218.0 ± 2.0 mm Width : 211.0 ± 2.0 mm Thickness : 12.0 ± 1 mm

4. Battery Performance Criteria

4.1 Electrical characteristics

No.	Items	Test Method and Condition	Criteria
1	Standard Charge	Charging the Battery initially with constant current at 0.3C and then with constant voltage at 4.25 till charge current declines to 0.05C.	N.A.
2	Initial Capacity	The capacity means the discharge capacity of the Battery, which is measured in terms of discharge current of 0.2C and 3.0V cut-off voltage after the standard charge.	
3	Cycle Life	Test condition: Charge: 0.3C to 4.25 Discharge: 0.3C to 3.0V 80% or more of 1 st cycle capacity at 0.3C discharge of Operation	≥ 500
4	Self-discharge	After the standard charging, store the Batterys under the condition as No.4.4 for 30days, then measured the capacity with 0.2C till 3.0V	Remaining capacity > 90%
5	Initial Impedance	Internal resistance measured at AC 1KHz after 50% charge	≤1.5mΩ
6	Battery Voltage	As of shipment.	3.8V ~ 4.0V

4.2 Mechanical characteristics

No.	Items	Test Method and Condition	Criteria
1	Vibration Test	After standard charging, fixed the Battery to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz an 55Hz, the amplitude of the vibration is 1.6mm. The Battery shall be vibrated for 30 minutes towards per axis of XYZ axes.	No leakage No fire
2	Drop Test	The Battery is to be dropped from a height of 1 meter twice onto concrete ground.	No explosion, no fire, no leakage.

4.3 Visual inspection

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the Battery.

4.4 Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted at the condition below:

Temperature : $23 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 20\% \text{ RH}$

5. Storage and Others

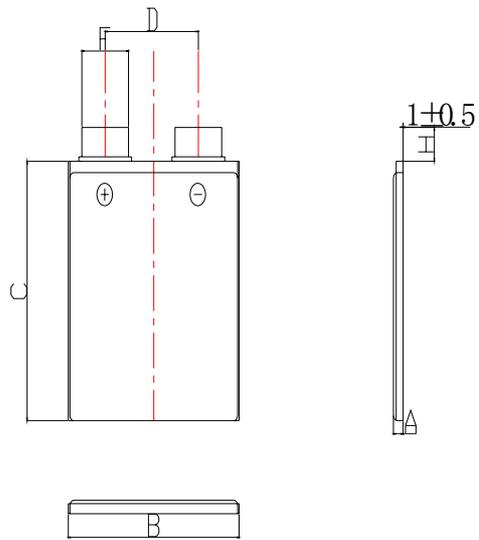
a) Long Time Storage

If the Battery is stored for a long time(over 3 months), the Battery's storage voltage should be 3.8~4.0V and the Battery is to be stored in according to the condition specified about No. 4.4.

b) Others

Any matters that this specification does not cover should be discussed between the customer and ZQPT.

6. Dimension (all unit in mm, not in scale)



Item	Description	Dimension
A	Thickness	12.0±1 mm
B	Width	211.0±2.0mm
C	Length	218.0±2.0 mm
D	Distance of center	108.0±2 mm
F	Width of tab	80.0±0.5 mm
H	Length of tab	45.0 ±1.0 mm

Appendix

**Handling Precautions and Guideline
For PLH Polymer Li-ion Rechargeable Batteries**

Preface

This document of 'Handling Precautions and Guideline PLH Polymer Li-ion batteries' shall be applied to the battery manufactured by AA Portable Power Corp (<http://www.batteryspace.com>) .

Note (1):

The customer is requested to contact AA Portable Power Corp (<http://www.batteryspace.com>) in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

Note (2):

AA Portable Power Corp (<http://www.batteryspace.com>) will take no responsibility for any accident for the Battery used under other conditions unspecified in this Document.

Note (3):

AA Portable Power Corp (<http://www.batteryspace.com>) will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the Battery, if it is deemed necessary.

1. Charging

1.1 Charging current:

Charging current should be less than the maximum charge current specified in the Product Specification. Charging with higher current instead of the recommended value may cause damage to Battery electrical, mechanical, and safety performance and could lead to heat generation or leakage.

1.2 Charging voltage:

Charging shall be done by voltage less than the value specified in the Product Specification (4.2V/Battery). Charging over 4.25, which is the absolute maximum voltage, is strictly prohibited. The charger shall be designed to comply with this condition.

It is very dangerous that charging with higher voltage than maximum voltage, which may cause damage to the battery electrical, mechanical safety performance and could lead to heat generation or leakage.

1.3 Charging temperature:

The battery shall be charged within 0°C~45 °C range in the Product Specification.

1.4 Prohibition of reverse charging:

Reverse charging is prohibited. The Battery shall be connected correctly. The polarity has to be confirmed before charging. In case of the Battery is connected improperly, the Battery cannot be charged. Simultaneously, the reverse charging may cause damage to the Battery which may lead to degradation of battery performance and damage the Battery safety, and could cause heat generation or leakage.

2. Discharging

2.1 Discharging current

The Battery shall be discharged at less than the maximum discharge current specified in the Product Specification. High discharging current may reduce the discharging capacity significantly or cause over-heat.

2.2 Discharging temperature

The Battery shall be discharged within -20°C~45 °C range specified in the Product Specification.

2.3 Over-discharging:

It should be noted that the Battery might be at an over-discharged state because of its self-discharge property when the Battery is not long use. In order to prevent over-discharging, the Battery shall be charged periodically to maintain its voltage between 3.6V and 3.9V.

Over-discharging may causes loss of Battery performance, characteristics, or battery functions.

The charger shall be equipped with a device to prevent th battery from further discharging below the cut-off voltage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The Battery pack shall start with a small current (0.01C) for 15 - 30 minutes, i.e. pre-charging, before rapid charging starts. The rapid charging shall be started after the (individual) Battery voltage has been reached above 3.0V within 15 - 30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) Battery voltage does not rise to 3.0V within the pre-charging time, then the charger shall have functions to stop further charging and display the Battery/pack is at an abnormal state.

3. Protection Circuit Module (PCM)

The Battery/battery pack shall be equipped with a PCM that can protect Battery pack properly.

PCM shall have functions of (1) overcharging prevention, (2) over-discharging prevention, and (3) over current prevention to maintain safety and prevent great damages to battery performance. The over current can occur by external short circuit

3.1 Overcharging prohibition:

Overcharging prevention function shall stop charging if any one of the Battery of the battery pack reaches 4.28V.

3.2 Over-discharge prohibition:

Over-discharging prevention function shall work to avoid further drop of battery voltage below 2.3V. It is recommended that the dissipation current of PCM shall be 0.5uA or less with the over-discharge prevention function.

The protection function shall monitor each bank of the battery pack and control the current all the time.

4. Storage

The Battery shall be stored within $-20^{\circ}\text{C} \sim 45^{\circ}\text{C}$ range environmental condition.

If the Battery has to be stored for a long time (Over 3 months), the environmental condition should be:

Temperature: $23 \pm 5^{\circ}\text{C}$

Humidity: $65 \pm 20\% \text{RH}$

The voltage for a long time storage shall be 3.8V~4.0V range.

5. Handling of Battery

Because the battery is packed in Gum hull package, in order to ensure its better performance, it's very important to carefully handle the battery

6. Notice for Designing Battery Casing

6.1 Casing design

- Battery pack should have sufficient strength and battery should be protected from mechanical shock
- No Sharp edge components should be inside the casing containing the battery.

7. Others

7.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the Battery shall be used to maintain absolute safety protection.

The battery pack shall be structured with no short circuit within the battery pack, which may cause generation of smoke or firing.

7.2 Prohibition of disassembly

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1) Never disassemble the Battery

The disassembling may generate internal short circuit in the Battery, which may cause burst, fire, or other problems.

2) Electrolyte is harmful

LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

7.3 Prohibition of dispose of Battery into fire

Never burn nor dispose of the Battery in fire. These may cause battery fire, which is very dangerous and is strongly prohibited.

7.4 Prohibition of Battery immersion into liquid such as water

The Battery shall never be soaked with liquids such as water, seawater, drinks such as soft drinks, juices, coffee or others.

7.5 Battery replacement

The battery replacement shall be done only by either Battery supplier or device supplier and never be done by the user.

7.6 Prohibition of use of damaged Battery

The Battery might be damaged during shipping because of shock. If any abnormal features of the Battery are found such as damages to a plastic seal of the Battery, deformation of the Battery package, smelling of an electrolyte, an electrolyte leakage and others, the Battery shall never be used any more. The Battery with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.