AA Portable Power Corp
www.batteryspace.com, Email: Sales@batteryspace.com
Tel: 510-525-2328 Fax: 510-439-2808
Address: 825 S 19th street, Richmond, CA 94804

Li-ion battery

Specification

Model: LC-18500
Capacity: 1500mAh
Voltage: 3.7V

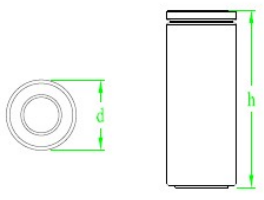
AA Portable Power Corp
www.batteryspace.com, Email: Sales@batteryspace.com
Tel: 510-525-2328 Fax: 510-439-2808
Address: 825 S 19th street, Richmond, CA 94804

1 Scope

This product specification is for lithium battery. Please use the test methods that recommended in this specification. If the battery should be using at the environment that not preferred in this document, please contact us first and get our authorization. It is claimed that we should have no responsibility with the contingency and loss due to the wrong usage (not preferred in the product specification).

2 Product Specification

Table 1

No.	Item	General Parameter		Remark
1	Rated Capacity	Typical	1500mAh	Standard discharge（0.2C_5A） after standard charge
		Minimum	1480mAh	
2	Nominal Voltage	3.7V		Operation Voltage
3	Voltage at end of Discharge	3.0V		Discharge Cut-off Voltage
4	Charging at end of Voltage	4.20V		
5	Standard charge	Constant Current 0.2C_5A, then Constant Voltage 4.20V, 0.02C_5A cut-off		Charge time：Approx 6.0h
6	Standard discharge	Constant Current 0.2C_5A, cut off Voltage 3.0V		
7	Fast charge	Constant Current 1C_5A; then Constant Voltage 4.20V 0.02C_5A cut-off		Charge time：Approx 2.5h
8	Fast discharge	Constant Current 1C_5A end Voltage 3.0V		
9	Max Continuous Charge Current	1C_5A		
10	Max Continuous Discharge Current	2C_5A		
11	Operation Temperature Range	Charge: 0~45℃		60±25%R.H.
		Discharge: -10~60℃		
12	Storage Temperature Range	Less than 1 year：-20~25℃		60±25%R.H. at the shipment state
		Less than 3 months：-20~40℃		
13	Weight	Approx：35.5g		FYI
14	Dimension	Height: 48.7±0.3mm Dia: 18.1±0.2mm		

3 Performance And Test Conditions

3.1 Standard Test Conditions:

Test should be conducted with new batteries within one week after shipment from our company and the cell shall not be cycled more than five times before the test. Unless otherwise specified, test and measurement shall be done under temperature of 20±5℃ and relative humidity of 45~48%.

3.2 Standard Charge/Discharge

Standard charge:

0.2 C_5A Charge: Charging at a 0.2 C_5A constant current rate until the cell reaches 4.20V. The cell shall then be charged at constant voltage 0f 4.20 volts. Charging shall be terminated when the charging current has reduced to 0.02 C_5A. Charge time: Approx 6.0h. The cell shall demonstrate no permanent degradation when charged between 0°C and 45°C.

Standard Discharge:

0.2 C_5A Discharge: Cells shall be discharged at a constant current of 0.2 C_5A to 3.0 volts @ 20°C±5°C.
If no otherwise specified, the rest time between Charge and Discharge amount to 30min.

3.3 Appearance:

There shall be no such defect as flaw, crack, rust, leakage, which may adversely affect commercial value of battery.

3.4 Initial Performance Test

Table 2

Item	Test Method Condition	Requirements
Open-circuit Voltage	The open-circuit voltage shall be measured within 24 hours after standard charge.	
Internal impedance	Internal resistance measured at AC 1KHz after 50% charge.	
Minimal Capacity	Standard Charge, rest for 30 mins, Standard discharge to 3V	Discharge Capacity

3.5 Temperature vs. Discharge

Cells shall be standard charged and discharged @0.2 C_5A to 3.0V. Cells shall be stored for 3 hours at the test temperature prior to charge and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 23°C and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 3.

Table 3

Discharge Temperature	-10℃	0℃	23℃	60℃
Discharge Capacity(0.2 C_5A)	70%	80%	100%	95%

3.6 Cycle Life Test and Leakage Test

Table 4

No.	Item	Criteria	Test Conditions
1	Cycle Life (0.2 C_5A)	Higher than 80% of the Initial Capacities of the Cells after 300 cycles	Carry out 500 cycle at Charge: Standard Discharge:0.2 C_5A to 3.0V Rest Time between charge/discharge: 30min. Temperayure:20±5°C
2	Leakage Test	No leakage (visual inspection)	After full charge with standard charge, store at 60 ±3℃, 60±10%RH for 1 month.

4. Mechanical characteristics and Safety Test

Table 5: Mechanical characteristics

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

Table 6: Safety Test

Item	Battery Condition	Test Method	Requirements
Crush	Fresh, Fully charged	Crush between two flat plates. Applied force is about 13kN(1.72Mpa) for 30min.	No explosion, No fire
Short Circuit (20°C)	Fresh, Fully charged	Each test sample cell, in turn, is short-circuited by connecting the (+) and (-) terminals of the cell with a wire having a maximum resistance load of 0.1Ω. Test is conducted at room temperature (20°C±2°C).	No explosion, No fire. The Temperature of the surface of the Cells are lower than 150°C
Short Circuit (60°C)	Fresh, Fully charged	Each test sample cell, in turn, is short-circuited by connecting the (+) and (-) terminals of the battery with a wire having a maximum resistance load of 0.1Ω. Test is conducted at temperature (60°C±2°C).	No explosion, No fire. The Temperature of the surface of the Cells are lower than 150°C
Impact	Fresh, Fully charged	A 56mm diameter bar is inlayed into the bottom of a 10Kg weight. And the weight is to be dropped from a height of 1m onto a sample battery and then the bar will be across the center of the sample.	No explosion, No fire
Forced Discharge	Fresh, Fully charged	Discharge at a current of 1 C_5A for 2.5h.	No explosion, No fire

5. Protection circuit

5.1 PCM Specification

Item	Test Condition
Over charge Protection	The battery should be charged under 4.20V/1C. The charging should be shut off when the internal cell's voltage becomes more than the specified protection voltage.
Over discharge Protection	The battery should be discharged with 1C. The discharging should be shut off when the internal cell's voltage becomes less than the specified protection voltage.
Short protection	After rated charge, (+) and (-) terminals are connected with 10mΩ mental resistor or equivalence.

6. Handling of Cells

Prohibition short circuit

Never short circuit cell. It generates very high current which causes heating of the cells and may cause electrolyte leakage are very dangerous. Such outer short circuit may lead to heat generation and damage of the cell. An appropriate circuitry with PCM shall be employed to protect accidental short circuit of the battery pack.

7. Notice for Designing Battery Pack

7.1 Battery Pack Enclosure

Suggest having an enclosure for the battery pack which will protect battery pack from mechanical shocks.

7.2 Cell fixing

The cells should be fixed to an enclosure by its large surface area.

No cells movement in the enclosure should be allowed.

7.3 Inside design

No sharp edge components should be insides the pack and enclosure.

7.4 Tab connection

Spot welding is recommended for connection method.

If manual soldering method is used to connect tabs with PCM, please read the following carefully to ensure battery's performance:

- Soldering temperature should not exceed 350℃;
- Soldering duration should not be longer than 3 seconds;
- Soldering times should not exceed 5 times, Keep battery tab cold down before next soldering;
- Directly heat cell body is strictly prohibited. Battery may be damaged by heat above approx.100℃.

8. Notice for Assembling Battery Pack

Shocks, high temperature, or contacts of sharp edge components should not be allowed in battery pack assembling process.

9. Others

9.1 Cells connection

- Direct soldering of wire leads or devices to the cell is strictly prohibited.
- Always spot welding tabs first and then soldering wires on tabs as a second step. Solder wire leads directly to cell will generate heat and damage the cell.

9.2 Prevention of short circuit within a battery pack

Enough insulation layers, like fish pager, between wiring and the cells shall be used to maintain extra safety protection. The battery pack shall be structured with no short circuit within the battery pack, which may cause generation of smoke or firing.

9.3 Prohibition of disassembly

- Never disassemble the cell. The disassembling may cause internal short circuit within the cell, and leads to gas release, fire, explosion, etc..
- In case of electrolyte leakage, wash skin or eyes with fresh water immediately for 15 minutes and get call physician.

9.4 Prohibition of dumping of cells into fire

Never put cells in fire. It may cause explosion.

9.5 Battery cells replacement

The battery replacement shall be performed only by either cells supplier or device supplier and should never be done by end user.

9.6 Prohibition of use of damaged cells

The cells might be damaged during shipping by shock. If any abnormal features are found, such as deformation of the cell, smell of electrolyte, leakage and etc, the cells should not be used any more.

The cells with smell of electrolyte or leakage shall be placed away from fire.

10. Storing the Batteries

The batteries should be stored according to specification, with 30% to 50% charged. We recommend charge the battery once per half a year to prevent self discharge.

11. Replacement of the Battery

Due to chemical reaction inside the battery, the performance of the battery will reduced over time, even if it is stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within specified ranges (please refer the specification), the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.