Specification Approval Sheet

Name : Polymer Lithium-Ion Battery

Model : AKYGA 18500-15M

SPEC : 3.7V / 1500mAh

Specification Modification Records

Modification Time	Descriptions	Issued Date	Approved By
	Release 1	2023-06-27	

Content

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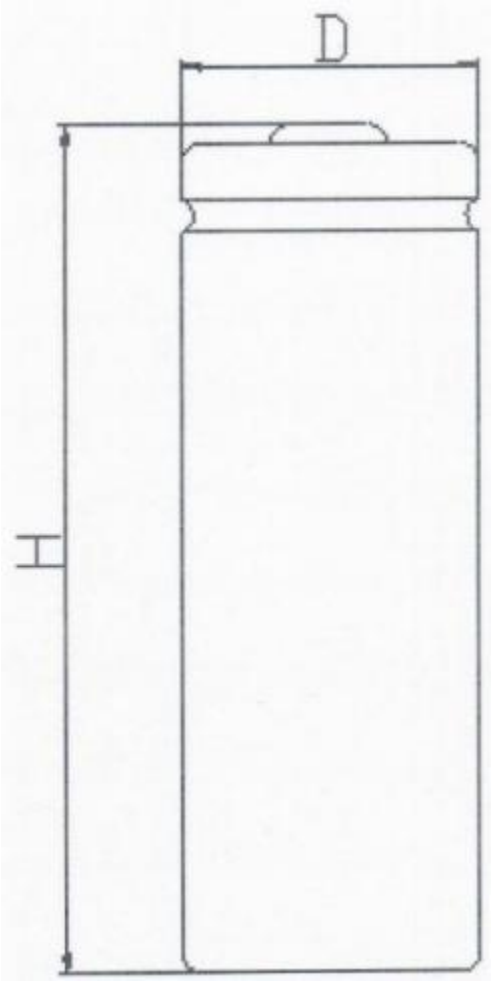
1 .Scope

This specification describes the basic performance, technical requirement, testing method ,warning and caution of the Li-ion rechargeable battery, the specification only applies to Akyga.

2.Initial dimension



H :	49.5±0.5 mm
D :	18.1±0.5 mm

3. **Specification**

NO.	Item		Specifications	
3.1	Normal capacity		1500mAh 0.2C Discharge	
	Min. capacity		1450mAh0.2C Discharge	
3.2	Initial impedance		≤80mΩ	
3.3	Weight		Approx(约) :34g	
3.4	Nominal voltage Fully charge voltage(FC) Fully discharge voltage(FD)		3.7V 4.2 V Defined in this DOC:FC=4.2 V 2.75 V Defined in this DOC:FD=2.75V	
3.5	Rate current		0.02C=30,0.2C=300,0.5C=750, 1C=1500, 2C=3000, : mA	
3.6	Charge current		Standard Charge( ) :0.5C Rapid charge( ) :1.0C	
3.7	Standard charging method		0.5C CC (constant current) charge to FC. then CV(constant voltage FC) charge till charge current decline to ≤0.02C 0.5C CC	
3.8	Charging time		Standard Charging Approx 3 hours Rapid charge Approx 2 hours	
3.9	Max. charge current		Constant current 1.0C constant Voltage FC 0.02 C cut-of	
3.10	Max. discharge current		Constant current 2C end voltage FD	
3.11	Standard dscharge current		Constant current 0.2 C end voltage FD	
3.12	Discharge lower limit voltage		FD	
3.13	Charge upper limit voltage		FC	
3.14	Storage temperature	-20℃~60℃	≤1 month	Percentage of recoverable capacity no less than 80% of the initial capacities
		-20℃~45℃	≤3 month	
		-20℃~20℃	≤1 year	

3.15	Recoverable capacity	Constant current 0.5C charge to FC. then constant voltage FC charge to current declines to 0.02C. rest for 10min, constant current 0.2C discharge to FD, rest for 10min. Repeat above steps 3 times, recording the maximum capacity
3.16	Storage humidity	≤75% RH
3.17	Appearance	Without distortion and leakage
3.18	Before shipment voltage	≥3.7V
3.19	Standard environmental condition	Temperature :23 ± 2 ℃ Hum id ity : 45-75%RH Atmospheric Pressure :86-106 Kpam

Remark: 1. From 3.1 to 3.13, the testing condition is following 3.19 (standard testing condition

2. Operating temperature :charging 0℃~45℃;Discharging -20℃~60℃

If the working condition is out of 3. 19, the performance will be some shift.

4. General performance

No.	Item	Test methods and condition	Criteria
4.1	0.2C Capacity	At standard testing condition, after standard charging. rest battery for 10min, then discharging at 0.2C to voltage FD recording the discharging Capacity	≥1450mAh
4.2	Cycle life	At standard testing condition, constant current 0.5C charge to FC, then constant voltage charge to current declines to 0.02C. rest 10min ;constant current 0.5C discharge to FD, rest 10min Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells	≥300 times

4.3	Capability of keeping electricity	At standard testing condition after standard charging, no outer loading circuit, rest the cell 28days, discharging at 0.2C to voltage FD, recording the discharging time.	≥285min

5 Environment performance

No.	Item	Test methods and condition			Criteria
5.1	**Operation** Temperature and relative humiditv Range Operating temperature **range**	Max. charge current	00~15℃(0.2C)	Low temperature charging and discharging efficiency will decrease, the temperature is too high or too low use will affect the battery life, it is prohibited to charge below 0 ℃ . The temperature cannot above 60 ℃ during charging	
			15~30℃(1C)		
			30~45℃(0.5C)		
		Max. discharge current/	-20~15℃(0.2C)		
			15~45℃(2C)		
			45~60℃(1C)		
5.2	Discharge at high temperature	After standard charging, rest for 2h at 55±2℃,then discharging at 0 . 2 C to voltage FD at the same time, recording the discharging time			≥285min
5.3	Discharge at low temperature	After standard charging, rest the Cells 4h at -10±2℃,then discharging at 0.2C to voltage FC, recording the discharging time.			≥180min

6. Safe characteristic

No.	**Item**	Test methods and condition	Criteria
6.1	Overcharge testing	At 23±2℃, charging cells with constant current 3C to voltage 5V, then with constant voltage 5V till current decline to 0A, charging time no less than 7h.	No fire, no explosion
6.2	Over discharge testing	At standard testing condition, the cells be discharge to FD according to the requirements of standard discharge, then connect with external load of 30 ohm for 24 hours.	No fire, no explosion
6.3	Short-circuit testing	At 23±2℃, After standard charging, connect cells anode and cathode by wire which impedance less than 80±20m52, keep 6h.	No fire. no explosion
6.4	Thermal shock	Put the battery in the oven. the temperature of the oven is to be raised at 5±2℃ per minute to a temperature of 130 ±2℃ and remains 30 minutes	No fire, no explosion
6.5	Drop Test	Fully charge as standard. Free fall from a height of 1.0m to the cemen floor, a total of four times, the top and bottom sides of the ground once the side of the ground twice.	No fire, no explosion

Above testing of safe characteristic must be with protective equipment.

7. **Battery Protection**

The battery shall be with the over-charging prevention, over-discharging prevention, and over-current prevention during use. Protective circuit shall have protective functions as follows: 电池必须在有过充、

☆Over-charging protection

Overcharging prevention stops charging if any cell of the battery pack reaches FC

☆Over- discharging protection

The Over-discharging protection monitors the voltage of any cell in the pack and works to avoid a drop in the cell voltage to FD or less.

☆Over-current protection

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. A high discharging current may reduce the discharge capacity significantly or cause overheating.

8.Warnings

o prevent the possibility of the battery from leaking, heating, fire, please observe the following precautions:

Do not immerse the battery in water and seawater

Do not use and leave the battery near a heat source such as fire and heater

When recharging, use the battery charger specifically for that purpose

Do not reverse the position and negative terminals

Do not connect the battery to an electrical outlet

Do not discard the battle in fire or heat it

Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such wire

Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.

strike or Do not throw the battery.

Do not directly solder the battery and pierce the battery with a nail or other sharp object.

9.Cautions

Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be

decreased.

Do not use it in a location where static electricity is great, otherwise, the safety devices may be damaged and cause hidden trouble of safety.

If the battery leaks and the electrolyte get into the eyes, do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.

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If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.

In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.

Be aware discharged battery may cause fire, tape the terminals to insulate them.

The batteries should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, batteries should be charged with standard charging method for one time every 3 months while storing and batteries should be charging-discharge with standard method for one time after being stored more than a year in order to activate it and restore energy.

10.Handling of Cells

10.1 Charging

Charging current: Cannot surpass the biggest charging current which in this specification book stipulated。

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage。

Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated。

Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery。

10.2 Discharging current

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat。

10.3 discharge temperature

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated

10.4 Over-discharges

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity。

11.Period of Warranty

The shelf life of the battery is one year from the date of shipment. If it is proved that the defect of the battery is caused by the manufacturing process of Akyga. and not caused by the customer's abuse or misuse, the company is responsible for returning and replacing the battery.

12.Others

12.1 If the customer needs to use the battery for equipment beyond the provisions of the document, or use the battery under the conditions of use other than the provisions of the document, he should contact Akyga in advance, because specific experimental tests are required to verify the performance and safety ofthe battery

under the conditions ofuse.

12.2 For any accident caused by the use of the battery under conditions other than those specified in the document,