

# Product Specification



## LITHIUM POLYMER (LIPO) BATTERY SPECIFICATIONS (FOR SINGLE CELL)

**MODEL NO.: 18650 2000mAh**

(PREPARED BY) : \_\_\_\_\_

DATE: 2024.08.22

(CHECKED BY) : \_\_\_\_\_

DATE: 2024.08.22

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DATE: 2024.08.22

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DATE: \_\_\_\_\_

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## 1. PREFACE

The specification is suitable for the performance of Lithium-Polymer (LIP) rechargeable battery produced by the Akyga Battery

## 2. MODEL

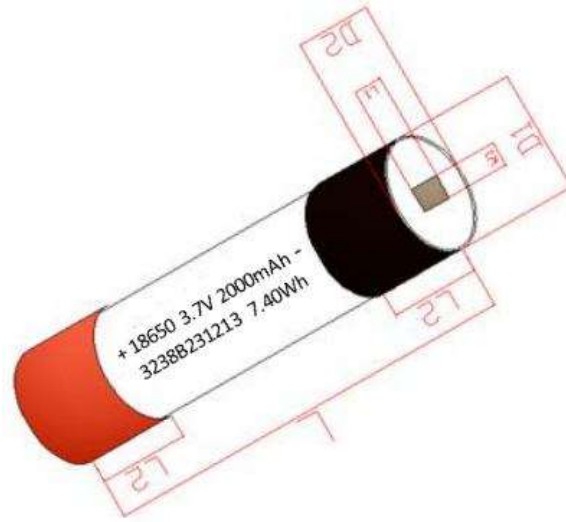
18650-2000mAh

## 3. SPECIFICATION

NO.	Item	Data	
1	Typical Capacity	2000mAh	
2	Min Capacity <sup>①</sup>	2000mAh	
3	High Rate Discharge	≥2000mAh (4A)	
4	Nominal Voltage	3.7V	
5	Max. Current	2000mA	
6	Voltage	4.20V	
7	Nominal Continuous Current	400mA	
8	Max. Continuous Current	4000mA	
9	Cut-off Voltage	3.0V	
10	Impedance	≤60 mΩ	
11	Operating Temp.	Charge	5°C~45°C
		Discharge	-10°C~45°C
12	Dimension	Diameter	≤18.5 mm
		Length	65.0±1.0 mm
13	Weight	39.0g	
14	Delivery Condition	≥3.70V	
Remarks	<sup>①</sup> 0.2CmA, 4.2V~3.0V@23°C±2°C Min Capacity:0.2CmA, 4.2V~3.0V@23°C±2°C		

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## 4. STRUCTURE AND DIMENSION



Unit (mm)					
Diameter		Diameter		Length	
D1	$\leq 18.5$	D2	$\leq 18.5$	L	$65.0 \pm 1.0$
Electrode length		Electrode width		Gummed paper length	
L1	$3.0 \pm 1.0$	W1	$4.0 \pm 0.2$	L2	$8.0 \pm 1.0$

Diameter:  $\leq 18.5\text{mm}$  (When measuring, the pressure of the instrument acting on the battery is 300gf.)

Length:  $65.0 \pm 1.0\text{mm}$  (not cluding tab-film)

## 5. BATTERY CELL PERFORMANCE CRITERIA

### 5.1

Before proceed the following tests, the cells should be discharged at 0.2C to 3.0V cutoff. Unless otherwise stated, tests should be done within one month of delivery under the following conditions:

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

Relative Humidity:  $60 \pm 15\% \text{RH}$

### 5.2 Standard Charge/Discharge Conditions:

The battery will be charged to 4.2V with 0.2C from constant current to constant voltage, when the current is 0.02C, stop to charge.

Discharge: 0.2C to 3.0V

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## 5.3

### ELECTRICAL PERFORMANCE

Test		Unit	Specification	Condition	Remarks
Typical Capacity		mAh	2000	*	*
Min Capacity		mAh	2000	Standard Charge / Discharge	*
High Rate Discharge		mAh	$\geq 2000$	Standard Charge/rest 5 min discharge at 4A to 3.0V	*
Temperature Discharge performance	Normal Temperature		100%	Standard Charge / Discharge	3.0V/cell Cut-off
	High Temperature		$\geq 90\%$	Standard Charge Storage:2 hours at $45\pm 2^{\circ}\text{C}$ 0.5C discharge at $45\pm 2^{\circ}\text{C}$	
Storage performance	23°C 30days		Residual capacity $\geq 85\%$ First capacity	Standard full charge, Storage at 23 degree for 30days, Standard discharge (0.5C) to test residual capacity	3.0V/cell Cut-off
			Recovery capacity $\geq 90\%$ First capacity	Standard Charge/discharge for 3 cycles, to test recovery capacity	

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## 5.4

### MECHANICAL CHARACTER

Test	Specification	Condition	Remarks
Vibration	No fire and no explosion	After standard charge, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz~ 55Hz, the excursion of the vibration is 1.6mm.The cell shall be vibrated for 30 minutes per axis of XYZ axes.	*
Constant Temperature and Humidity	No fire and no explosion	Put the battery in 40 °C and relative humidity of 90% for constant temperature and humidity box 48 hours later, the 1 C discharge to 2.75V termination voltage.	*
Free falling(drop)	No fire and no explosion	After standard charge, the battery is dropping to the wood board with a thickness of 18mm to 20mm on the cement ground, the height shall be 1m measured from the lowest point of the battery to the wood board surface. Drop the cell from X, Y, Z direction (including face side and reverse side direction each) each time, then measured the capacity at a discharge current 0.5C and a cut-off voltage of 3.0V., and then cycled times to measure the maximal discharge capacity.	*

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## 6. STORAGE AND OTHERS

- 6.1 Ambient temperature:  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$   
Relative Humidity:  $65 \pm 20\%$

### 6.2

Please activate the battery once every 3 months according to the following method:  
Charge at 0.2C to 4.2V, rest 5 min, then discharge with 0.2C to 3.0V/cell, rest 5 min, then charge at 0.2C to 3.9V.

## 7.

### Note(1):

The customer is requested to contact Akyga Battery 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):

Akyga Battery will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

### Note(3):

Akyga Battery will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

### 7.1. Charging

#### 7.1.1

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

#### 7.1.2. Charging voltage:

Charging shall be done by voltage less than that specified in the Product Specification

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(4.2V/cell). Charging beyond 4.25V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition. It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

### 7.1.3. Charging temperature:

The cell shall be charged within 5°C~45°C range in the Product Specification.

### 7.1.4. Prohibition of reverse charging:

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

## 7.2. Discharging

### 7.2.1. Discharging current

The cell 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.

### 7.2.2. Discharging temperature

The cell shall be discharged within -10°C~45°C range specified in the Product Specification.

### 7.2.3. Over-discharging:

It should be noted that the cell would be at over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 3.6V and 3.9V. Over-discharging may causes loss of cell performance, characteristics, or battery functions. The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voltage specified in the Product Specification. Also the charger shall be equipped with a device



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to control the recharging procedures as follows:

The cell battery pack shall start with a low current (0.01C) for 15-30 minutes, i. e. -charging, before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 3V within 15-30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

### 7.3 Storage:

If the cell has to be storied 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 3.6V~3.9V range.

### 7.4. Handling of Cells:

Since the battery is packed in soft package, to ensure its better performance, it' s very important to carefully handle the battery;

#### 7.4.1.

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles.

Don' t strike battery with any sharp edge parts;

Trim your nail or wear glove before taking battery;

Clean worktable to make sure no any sharp particle;

#### 7.4.2

Don' t bend or fold sealing edge.

#### 7.4.3

Don' t open or deform folding edge;

#### 7.4.5

Don' t bend tab

#### 7.4.6

Don' t Fall, hit, bend battery body;

#### 7.4.7

Short terminals of battery is strictly prohibited, it may damage battery;

### 7.5 Notice Designing Battery Pack;

Battery pack should have sufficient strength and battery should be protected from mechanical shock;

No Sharp edge components should be inside the pack containing the battery;

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## 7.6. Notice for Assembling Battery Pack

### 7.6.1. Tab connection

Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts. If apply manual solder method to connect tab with PCM, below notice is very important to ensure battery performance.

a)

The solder iron should be temperature controlled and ESD safe

b)

Soldering temperature should not exceed 350°C

c)

Soldering time should not be longer than 3s

d)

Soldering time should not exceed 5 times Keep battery tab cold down before next time soldering

e)

Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx. 100°C

### 7.6.2. Cell fixing

The battery should be fixed to the battery pack by its large surface area

No cell movement in the battery pack should be allowed

## 8. OTHERS

### 8.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

### 8.2. Prohibition of disassembly

#### 8.2.1.

The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, or other problems.

#### 8.2.2.

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.

### 8.3

Never incinerate nor dispose the cells in fire. These may cause firing of the cells, which is very

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dangerous and is prohibited.

### 8.4

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

### 8.5

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

### 8.6

Prohibition of use of damaged cells

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of electrolyte, electrolyte leakage and others, the cells shall never be used any more.

The cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.