

# 钠离子电芯规格书

## Na-ion Cell Specification

Model: 18650-1300mAh  
型号: 18650-1300mAh  
Type: High Rate  
类型: 倍率型

Designed 编制	Checked 审核	Approved 批准

Customer Approved 客户确认		
Customer NO. 客户代码	Signature 签名	Date 日期



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## 1. Scope of application 适用范围

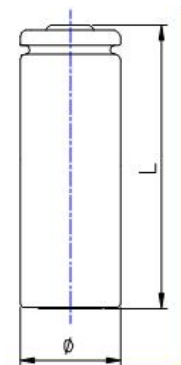
The specification shall be applied to Na-ion cell, which is manufactured by Jiangsu Highstar Battery Manufacturing Co., Ltd .

本规格书适用于江苏海四达电源有限公司生产的钠离子电芯

## 2. Product Type 产品类型

2.1 Cell 电芯 : 18650-1300mAh

2.2 Assembly Drawing 外形尺寸图



项目/Items	尺寸/Sizes(mm)
直径/Diameter (Φ)	18.25±0.20
高度/Height (L)	65.50±0.30

## 3. Technical Specifications 技术规格

No.	Items/项目	Specification/规格	Remarks/备注
1	Typical Capacity 典型容量	1300mAh	Discharge:0.2C Cut-off voltage:1.8V 0.2C 放电至 1.8V 截止
2	Minimum Capacity 最小容量	1220mAh	
3	Nominal Voltage 标称电压	3.0V	
4	Shipment Voltage 出厂电压	≥2.0V	
5	Internal Impedance 内阻	≤20mΩ	AC 1KHz after standard charge 标准充电后 AC 1KHz 测试
6	Weight 重量	39.5±1.0g	
7	Charge cut-off voltage 充电截止电压	4.0V	
8	Standard charge current 标准充电电流	650mA	0.5C
9	Max. charge current 最大充电电流	3900mA	End of charge voltage 3.95V 充电截止电压 3.95V
		2600mA	End of charge voltage 4.0V 充电截止电压 4.0V

10	Standard discharge current 标准放电电流	650mA	0.5C
11	Max. discharge current 最大放电电流	26000mA	20C
12	Instantaneous Max. discharge current 瞬时最大放电电流	39000mA	30C (≤5s)
13	Max.float voltage 浮充最大电压	3.95V	
14	Discharge cut-off voltage 放电截止电压	1.8V	
15	Operating Temperature 工作温度	-10~0°C	≤0.1C (不建议充电)
		0~10°C	≤0.2C
		10~20°C	≤0.5C
		20~25°C	≤1C
		25~35°C	≤3C
		35~45°C	≤1C
		-40°C~0°C	≤1C
		0~20°C	≤3C
		20~45°C	≤20C
		45~60°C	≤1C
16	Storage Temperature 贮存温度	-10°C~+40°C	Less than 1 month 小于一个月
		-10°C~+35°C	Less than 6 months 小于六个月

## 4. Performance test 性能测试

### 4.1 Standard Charge Method 标准充电方法

Under the temperature of 25±2°C, charge the cell with the current of 0.5C until the voltage reaches up to 4.0V, then charge with constant voltage, and stop charging until the current ≤0.05C.

在25±2°C条件下, 电芯用0.5C的电流充电, 当电芯电压达到4.0V 时转为恒压充电, 直到充电电流小于或等于0.05C 时停止充电。

### 4.2 Standard Discharge Method 标准放电方法

Under the temperature of 25±2°C, discharge the cell with the current of 0.5C until the voltage is 1.8V, the capacity marked as C<sub>min</sub>.

在25±2°C条件下, 电芯以0.5C 的电流放电至1.8V时停止, 容量记为C<sub>min</sub>。

### 4.3 Electrical Performance 电性能

No.	Items/项目	Conditions /测试条件	Criteria/标准
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1	0.2C Discharge 0.2C 放电	Charge the cell with standard charge mode, rest for 0.5h, then discharge with 0.2C until the voltage is 1.8V. Test can repeat 3 times until meets the requirements. 将电芯按标准充电模式充好电后, 开路搁置0.5h, 再以0.2C 放电至1.8V, 测试可重复三次, 有一次符合要求时即可停止。	0.2C Discharge Capacity $\geq 1220\text{mAh}$ 0.2C放电容量 $\geq 1220\text{mAh}$
2	Cycle Life 循环寿命	Under the temperature of $25 \pm 2^\circ\text{C}$ , charge the cell with 1.0C, when the voltage reaches up to 4.0V charge with constant voltage until the current $\leq 0.05\text{C}$ , then stop charging, rest for 0.5h, then discharge with 1.0C to 1.8V. Cycle with the above mode. 在 $25 \pm 2^\circ\text{C}$ 条件下电芯按1.0C充电, 当电压达到4.0V时改为恒压充电, 直到充电电流 $\leq 0.05\text{C}$ 时停止充电, 静置0.5h 后, 1.0C 放电至1.8V的方式进行循环。	1000Cycles $\geq 85\%$ 1000周 $\geq 85\%$
3	Rate Discharge 倍率放电	Charge the cell with standard charge mode, rest for 0.5h, then discharge with 3C until the voltage is 1.8V. 将电芯按标准充电模式充好电后, 开路搁置0.5h, 再以3C放电至1.8V。	3C Discharge Capacity $\geq 90\%C_{\min}$ 3C放电容量 $\geq 90\%C_{\min}$
4	High Temperature Discharge 高温放电	Under the temperature of $25 \pm 2^\circ\text{C}$ , after charging the cell with standard charge mode, then put the cell into the constant temperature and humidity oven with $55 \pm 2^\circ\text{C}$ for 2h, then discharge with 0.5C to 1.8V. 在 $25 \pm 2^\circ\text{C}$ 条件下, 电芯按标准充电结束后, 将电芯放入 $55 \pm 2^\circ\text{C}$ 的恒温恒湿箱中恒温2h 后, 然后以0.5C 电流放电至1.8V。	55°C Discharge Capacity $\geq 95\%C_{\min}$ 55°C 放电容量 $\geq 95\%C_{\min}$
5	Low Temperature Discharge 低温放电	Under the temperature of $25 \pm 2^\circ\text{C}$ , after charging the cell with standard charge mode, then put the cell into the constant temperature and humidity oven with $-20 \pm 2^\circ\text{C}$ for 8h, then discharge with 0.5C to 1.8V. 在 $25 \pm 2^\circ\text{C}$ 条件下, 电芯按标准充电结束后, 将电芯放入 $-20 \pm 2^\circ\text{C}$ 的恒温恒湿箱中恒温8h, 然后以0.5C 电流放电至1.8V。	-20°C Discharge Capacity $\geq 85\%C_{\min}$ -20°C 放电容量 $\geq 85\%C_{\min}$
6	Ultra-low Temperature Discharge 超低温放电	Under the temperature of $25 \pm 2^\circ\text{C}$ , after charging the cell with standard charge mode, then put the cell into the constant temperature and humidity oven with $-40 \pm 2^\circ\text{C}$ for 8h, then discharge with 0.5C to 1.5V. 在 $25 \pm 2^\circ\text{C}$ 条件下, 电芯按标准充电结束后, 将电芯放入 $-40 \pm 2^\circ\text{C}$ 的恒温恒湿箱中恒温8h, 然后以0.5C 电流放电至1.5V。	-40°C Discharge to 1.8V Capacity $\geq 48\%C_{\min}$ -40°C放电到1.8V容量 $\geq 48\%C_{\min}$  -40°C Discharge to 1.5V Capacity $\geq 65\%C_{\min}$ -40°C放电到1.5V容量 $\geq 65\%C_{\min}$

7	Storage Characteristics 荷电保持能力	Charge the cell with standard charge mode, then rest under the temperature of $25\pm 2^{\circ}\text{C}$ for 28d and then discharge with 0.5C to 1.8V. Charge the cell at $25\pm 2^{\circ}\text{C}$ with standard mode, and then discharge with 0.5C to 1.8V. 电芯按标准充电后，将电芯开路放置在 $25\pm 2^{\circ}\text{C}$ 条件下28天后，以0.5C放电至1.8V。然后电芯按标准充电后，再以0.5C放电到1.8V。	Retention Capacity $\geq 90\%C_{\min}$ 剩余容量 $\geq 90\%C_{\min}$ Recovered Capacity $\geq 95\%C_{\min}$ 恢复容量 $\geq 95\%C_{\min}$
8	High Temperature Storage 高温存储	Charge the cell with standard charge mode, then rest under the temperature of $60\pm 2^{\circ}\text{C}$ for 7d then discharge with 0.5C to 1.8V. 电芯按标准充电后，将电芯开路放置在 $60\pm 2^{\circ}\text{C}$ 条件下7天后，以0.5C放电至1.8V。	Retention Capacity $\geq 85\%C_{\min}$ 剩余容量 $\geq 85\%C_{\min}$ Recovered Capacity $\geq 90\%C_{\min}$ 恢复容量 $\geq 90\%C_{\min}$

#### 4.4 Safety Performance 安全性能

No.	Item/项目	Test Conditions/测试条件	Criteria/标准
1	Over charge 过充	At $25 \pm 2^{\circ}\text{C}$ , After standard charged, charging cell with constant current 1C to voltage 6.0V or charging time reaches 1h (test will be completed if any of the two cases occurs) . Then observe the appearance of the cell. 在 $25 \pm 2^{\circ}\text{C}$ 状态下,标准充电后, 电芯用 1C 电流充电至 6.0V, 或者充电时间达到 1h (出现二者中任一情形, 试验终止), 然后观察电芯的变化。	No fire, no explosion 不起火,不爆炸
2	Over discharge 过放电	At $25 \pm 2^{\circ}\text{C}$ , full charged cell will be discharge to 0V with 1C, rest for 10min, then continuous discharge until 90min with the same current, observe the appearance of the cell. 在 $25 \pm 2^{\circ}\text{C}$ 状态下, 满电电芯以 1C 电流放电至 0V, 搁置 10min, 以相同电流持续放电 90min 后停止放电, 观察 1h。	No fire, no explosion, no leakage 不起火,不爆炸、不泄 漏
3	External Short-circuit 外部短路 ( $25 \pm 5^{\circ}\text{C}$ )	Tests are to be conducted at temperature $25\pm 5^{\circ}\text{C}$ and remain the cell 30min. The fully charged cell is to be short-circuited by connecting the positive and negative terminals of the cell with resistance load $80\pm 20\text{m}\Omega$ . When temperature of the cell drops to 80% of the peak temperature or short-circuit time reach 24h, any of the two cases occurs, the test will be completed. 满电电芯,放置在 $25 \pm 5^{\circ}\text{C}$ 的环境中, 待电芯表面温度达到环境温度后, 再放置 30min, 然后用导线连接正负极端, 并确保全部外部电阻为 $80 \pm 20\text{m}\Omega$ 。试验过程中出现电芯温度下降到峰值 80%或者短接时间达到 24h 中任一情形即终止。	No fire, no explosion 不起火,不爆炸

4	<p>External Short-circuit 外部短路 (57±4°C)</p>	<p>Tests are to be conducted at temperature about 57±4°C and remain the cell 30min. The fully charged cell is to be short-circuited by connecting the positive and negative terminals of the cell with resistance load 80±20mΩ. When temperature of the cell drops to 80% of the peak temperature or short-circuit time reach 24h, any of the two cases occurs, the test will be completed.</p> <p>满电电芯,放置在 57±4°C的环境中,待电芯表面温度达到环境温度后,再放置30min,然后用导线连接正负极端,并确保全部外部电阻为80±20mΩ。试验过程中出现电芯温度下降到峰值80%或者短接时间达到24h中任一情形即终止。</p>	<p>No fire, no explosion 不起火,不爆炸</p>
5	<p>Drop Test 跌落</p>	<p>Under the temperature of 25 ± 2°C, after full-charging the cell with 0.5C, then drop it freely from 1.5 meter height onto the concrete slab. Each face of the single cell dropped twice, a total of four drop tests were carried out.</p> <p>在25±2°C条件下,电芯按0.5C充满电后,将电芯从1.5米高度自由跌落至混凝土板上。单体电池两个端面各跌落两次,共计进行四次跌落试验。</p>	<p>No fire, no explosion, no leakage 不起火、不爆炸、不 泄漏</p>
6	<p>High and low temperature shock 高低温冲击</p>	<p>Under the temperature of 25 ± 2°C, after full-charging the cell with 0.5C, put it into -40°C for 1 h, and then place it for 1h at 85°C for another 1h. The test is completed after 32 cycles. After the test, take out the sample, and then put it aside for 6 h under the condition of 25 ± 2°C.</p> <p>在25±2°C条件下,电芯按0.5C 充满电后,放入温度-40°C的低温环境中搁置1 h,再在85°C条件下搁置1h,如此循环32次结束试验。试验结束后将样品取出,再在25±2°C的条件下搁置6 h。</p>	<p>No fire or explosion, no leakage. 不起火,不爆炸,不 泄漏</p>
7	<p>Crush test 挤压</p>	<p>After standard charged, the cell is to be placed between two flat plates. The plate is pressed until the extrusion force reaches 13.0±0.78kN.</p> <p>电芯在标准满充后,放置在两块挤压板间。以垂直于电池极板方向施压,直到挤压力达到 13.0±0.78kN 即可停止挤压。</p>	<p>No fire, no explosion 不起火,不爆炸</p>
8	<p>Impact test 重物冲击</p>	<p>A 15.8±0.2mm diameter bar is placed on the middle of the fully charged cell, then a weight of 9.1 ± 0.1kg falls freely from height of 610 ± 25mm to the upper part of the cell, observe the appearance of the cell for 6h.</p> <p>电芯满充后,将一直径为 15.8±0.2mm 的金属棒放置于电芯的中心上表面;采用 9.1±0.1Kg 的重物从 610±25mm 高处自由落体到电芯上部,观察 6h。</p>	<p>No fire, no explosion 不起火,不爆炸</p>



9	Thermal abuse 热滥用	<p>Under the temperature of <math>25 \pm 2^{\circ}\text{C}</math>, after full-charging the cell with 0.5C, place the cell in the oven, and raise the temperature at the speed of <math>5^{\circ}\text{C}/\text{min}</math>, and start timing when the temperature rises to <math>130^{\circ}\text{C}</math>, and keep the temperature within the range of <math>(130 \pm 2)^{\circ}\text{C}</math> for 0.5h.</p> <p>在 <math>25 \pm 2^{\circ}\text{C}</math> 条件下, 电芯按 0.5C 充满电后, 将电芯放置在烤箱中, 并以 <math>5^{\circ}\text{C}/\text{min}</math> 的速度升温, 温度升至 <math>130^{\circ}\text{C}</math> 开始计时, 并保持温度一直处于 <math>(130 \pm 2)^{\circ}\text{C}</math> 范围内 0.5h。</p>	No fire, no explosion 不起火, 不爆炸
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※ Above testing of safe characteristic must be with protective equipment. (安全性能测试应在有保护措施下进行)

## 5. Storage and Shipment Requirement 存储及运输要求

Item 项目		Requirement 需求
Storage temperature 储存温度	Short period less than 1 month 少于 1 个月的短期存放	$-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
	Long period less than 6 month 不超过 6 个月的长期存放	$-10^{\circ}\text{C} \sim +35^{\circ}\text{C}$
Humidity 湿度	$65 \pm 20\% \text{RH}$	
Voltage 电压	$1.8\text{V} \sim 2.3\text{V}$	

## 6. CAUTIONS IN USE 使用警告

To ensure proper use of the cell please read the manual carefully before using it.

为了使电芯安全的使用及处理请在使用前认真的阅读操作说明

- Do not expose to, dispose of the cell in fire.
- 不能把电芯曝晒或丢在火中
- Do not put the cell in a charger or equipment with wrong terminals connected.
- 电芯充电时不能把正负极性装反
- Avoid shorting the cell
- 避免短路电芯
- Avoid excessive physical shock or vibration.
- 避免过分的物理震动和冲击电芯
- Do not disassemble or deform the cell.
- 不能拆解或使电芯变形
- Do not immerse in water.
- 不能将电芯浸入水中
- Do not use the cell mixed with other different make, type, or model cell.
- 不能将其它不同厂家, 类型, 型号的电芯混合使用
- Keep out of the reach of children.
- 禁止小孩接触电芯

### Charge and Discharge 充放电

- cell must be charged in appropriate charger only.

- 电芯必须在合适的条件下充电
- Never use a modified or damaged charger.
- 决不能用故障的充电器给电芯充电
- Do not leave cell in charger over 24 hours.
- 电芯持续充电不能超过 24H

#### Storage 贮存

- Store the cell in a cool, dry and well-ventilated area.
- 电芯贮藏在通风干燥的环境中

#### Disposal 处理

- Regulations vary for different countries. Dispose of in accordance with local regulations.
- 不同国家法规的不同，处理时根据当地的法规。

## 7. Cell operation instruction 电芯操作说明

### 7.1 Charging 充电

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

充电电流：不能超过规格书规定的最大的充电电流

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

充电电压：不能超过规格书规定的最高的限制电压

Charge temperature: the cell must carry on the charge in the ambient temperature scope which this specification book stipulated.

充电温度：电芯充电温度必须按照规格书的温度范围执行

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

先恒流后恒压方式充电，禁止颠倒的方式充电。如果电芯正负极颠倒充电会带来危险。

### 7.2 Discharging current 放电电流

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 cell capacity play to reduce and to cause the cell heat.

电芯放电电流不能超过规格书规定的最大放电电流，过大的电流放电会造成电芯发热和容量衰减。

### 7.3 discharge temperature 放电温度

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

电芯放电温度必须按照规格书的温度范围执行。

### 7.4 Over-discharges 过放电

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the cell the performance, cell function losing. the cell 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 cell should maintain the certain electric quantity.

短时间的过充过放不影响电芯的使用，但是长时间的过放电会影响到电芯的功能失效，电芯永久性不能适用，可能电芯过放还有一个原因是自动能量的消失。预防电芯过放的出现方法电芯应保持一定的电量。

### 7.5 Storing the cell 贮存电芯

The cell should store in the product specification book stipulation temperature range. If has surpasses above

for six months the long time storage, suggested you should carry on additional charge to the cell.

电芯贮存在规格书规定的温度范围内，如果电芯贮存超过六个月，建议你开始给电芯充电。

## **8. Period of Warranty 保质期**

The period of warranty is half a year from the date of shipment. guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

电芯的保质期从出货之日算起为半年。如果证明电芯的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电芯。

## **9. Other The Chemical Reaction 其它化学反应**

Because cell utilize a chemical reaction, cell performance will deteriorate over time even if 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 the specified ranges the life expectancy of the cell may be shortened or the device in which the cell is used may be damaged by electrolyte leakage. If the cell cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the cell.

由于电芯是利用化学反应的原理，所以随时间的增加电芯的性能会降低，即使是存放很长一段时间而不使用。如果使用条件如充电、放电及周围环境温度等情形不在指定的使用范围内，也会缩短电芯的使用寿命，或者产生漏液导致设备损坏。如果电芯长周期不能充电，即使充电方法正确，这样需要更换电芯了。

## **10. Note 备注**

Any other items which are not covered in this specification shall be agreed by both parties.

本说明书未包括事项应由双方协议确定。