

## **1 Preface** 前言

This standard describes the external dimensions, characteristics, technical requirements, and precautions of square sodium ion batteries. This standard is applicable to the square 71173204E-240 sodium ion battery produced by Shenzhen Asia Sodium Electronic Technology Co., Ltd.

本标准描述了方形钠离子电池的外型尺寸、特性、技术要求及注意事项。本标准适用于深圳市阿西亚科技有限公司生产的方形 71173204E-240 钠离子电池电芯。

## **2 Definition** 定义

### **2.1 Rated capacity:**

**标称容量:**

**Rated capacity:**  $Cap=240Ah$ . Under  $25.0\pm 3.0^{\circ}C$ , It means the capacity value of being discharged by 5 hours rate to end voltage 1.5V, which is signed Cap, the unit is Ah.

标称容量  $Cap=240Ah$ , 指在  $25.0\pm 3.0^{\circ}C$  环境下, 以 5 小时率放电至终止电压 1.5V 时的容量, 以 Cap 表示, 单位为安培小时(Ah)。

### **2.2 Standard charge method:**

**标准充电方式:**

**Standard charge** Under  $25.0\pm 3.0^{\circ}C$ , it can be charged to 4.0V with constant current of 0.5C, and then, charged continuously with constant voltage of 4.0V until the charged current is 0.05C.

指在  $25.0\pm 3.0^{\circ}C$  环境下, 以 0.5C 的电流恒流充电至单体电芯电压 4.0V 后, 转为恒压 4.0V 充电, 至充电电流小于 0.05C 时, 停止充电。

### **2.3 Standard discharge method:**

**标准放电方式:**

Under  $25.0\pm 3.0^{\circ}C$ , it can be discharged to 1.5V with constant current of 0.5C.

指在  $25.0\pm 3.0^{\circ}C$  环境下, 以 0.5C 的电流恒流放电至单体电芯电压 1.5V。

## **3 Cell model, bar code and dimension** 电芯型号及尺寸

### **3.1 Description and model** 电芯说明及型号

**Description:** Square sodium ion secondary cell

**Model:** 71173204E-240

71173204E-240 型号的方形钠离子二次电芯

### 3.2 Cell dimension 电芯尺寸

Cell physical dimension listed in Figure 1(unit: mm).

电芯尺寸示意图如图 1 所示（单位：mm）。

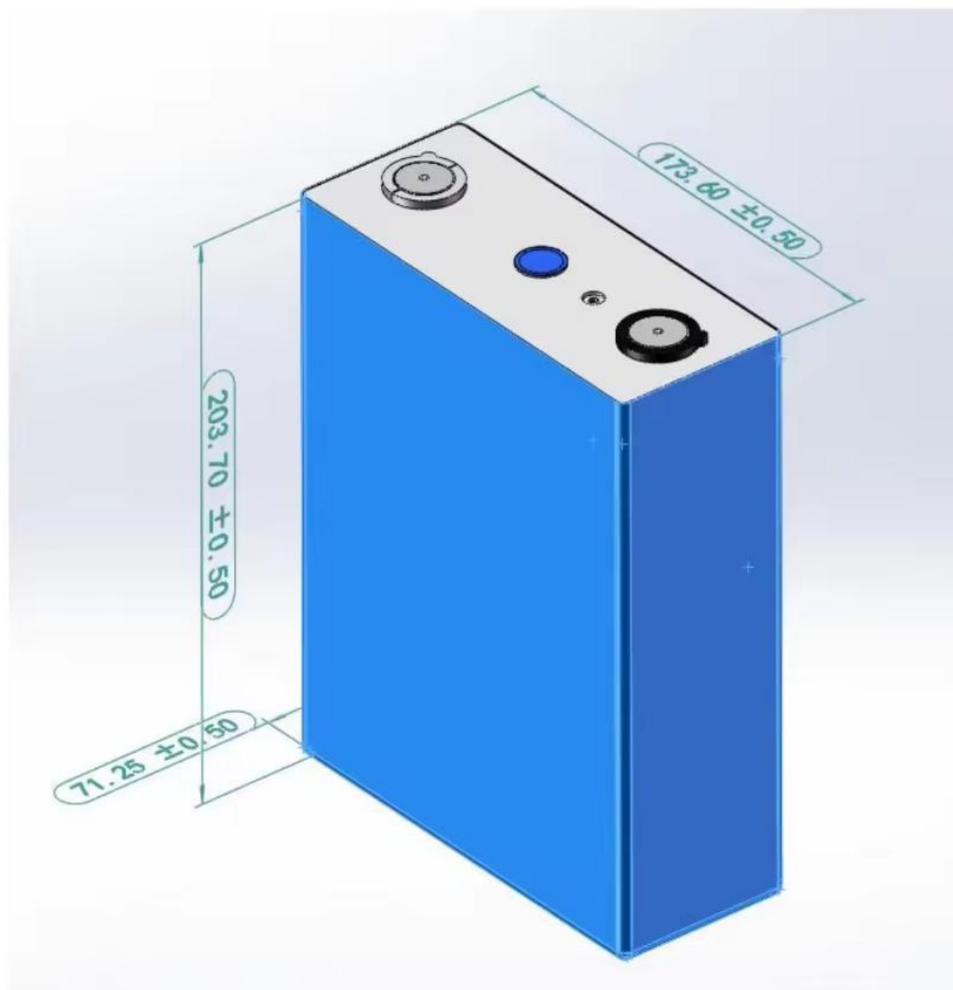


Figure 1/图 1

#### 4 Cell specification 电芯规格

ITEM 项目	SPECIFICATION 规格
Nominal capacity 标称容量	240Ah@0.2C
Typical capacity 典型容量	245Ah@0.2C
Nominal voltage 标称电压	3.10V
Charge voltage 充电电压	4.00 ±0.05 V
Discharge cut-off voltage 放电终止电压	1.50 ±0.05 V
Internal resistance 内阻	≤0.50mΩ
Cell dimension 电芯尺寸	Length: 173.60±0.50mm Width: 71.25±0.50mm Height: 203.70±0.50mm
Energy density 能量密度	166.00Wh/Kg
Weight 重量	4.50±0.50Kg
Storage temperature (State of charge at shipment) 存储温度(出货时的荷电态)	1 year: -20~25℃ 3 months: -20~30℃ 1 month: -20~35℃
Maximum Continuous Charging Current 最大持续充电电流	≤-10℃ : can not charging Temperature 0~5℃ : ≤0.1C 5~15℃ : ≤0.2C 15~25℃ : ≤0.5C 25~35℃: ≤1.0C 35~45℃: ≤0.5C ≥ 45℃: can not charging Temperature
Maximum continuous discharge current 最大持续放电电流	≤-30℃ : can not discharging Temperature -30~0℃ : ≤0.5C 0~10℃ : ≤1.0C 10~35℃ : ≤3.0C 35~45℃: ≤1.0C 45~60℃: ≤0.5C ≥60℃ : can not discharging Temperature
Fast charge 快速充电	Constant Current 1.0C Constant Voltage 4.0V 0.05C cut-off

## 5 Charging and discharging curves of sodium ion batteries 钠离子电池充放电曲线

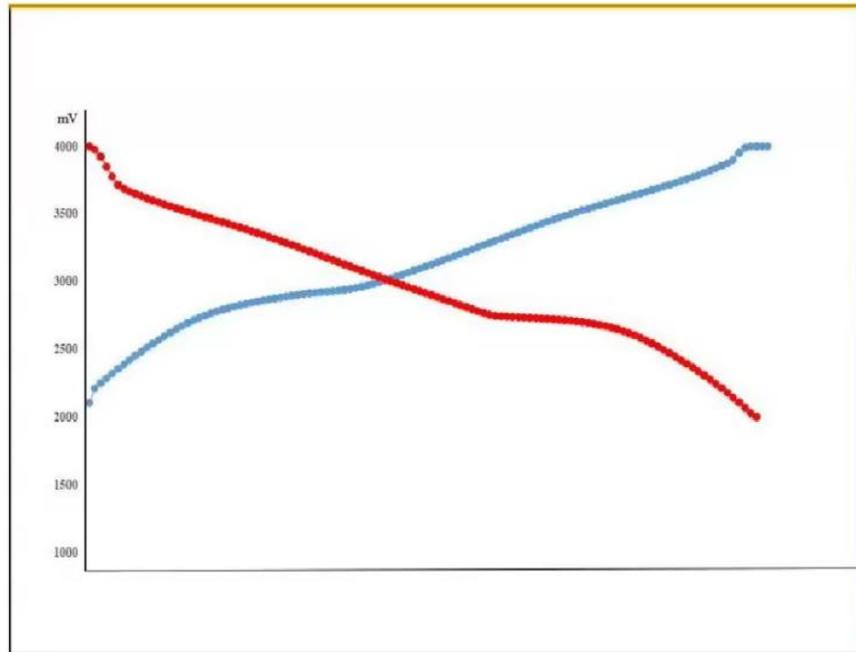


Figure 2/图 2

## 6 Technical characteristics 技术特性

### 6.1 Cell usage conditions 电芯使用环境

Temperature of charge

充电温度:  $-10\sim 45^{\circ}\text{C}$

Temperature of discharge 放电温度:  $-30\sim 60^{\circ}\text{C}$

### 6.2 Cell testing conditions 电芯试验环境

Unless otherwise specified, all tests stated according to following:

除非有特殊说明, 所有测试的环境条件要求如下

Temperature 温度:  $25.0\pm 3.0^{\circ}\text{C}$

Humidity 湿度:  $65\pm 20\%\text{RH}$

### 6.3 Requirement of the testing equipment 测量仪表要求

Voltage meter: The voltage tester internal resistance is  $\geq 10\text{ K}\Omega/\text{V}$

电压仪表要求: 测量电压的仪表内阻不小于  $10\text{K}\Omega/\text{V}$

Temperature meter: The precision is  $\leq 0.5^{\circ}\text{C}$

温度仪表要求: 测量温度的仪表精度不低于  $0.5^{\circ}\text{C}$

#### 6.4 Electronic performance 电性能

NO. 序号	ITEM 测试项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
1	Discharge rate capability 倍率放电性能	Test condition: Temperature : 25.0±3.0℃ Charge: CC/CV 0.5C 4.0V cut off current: 0.05C Discharge: CC variable values; End-of-discharge Voltage: 1.5V discharge capacity at 1.0C discharge capacity at 0.5C $\geq 97.00\%$ discharge capacity at 2.0C discharge capacity at 0.5C $\geq 96.00\%$ discharge capacity at 3.0C discharge capacity at 0.5C $\geq 95.00\%$	
2	Cycle life 循环寿命	Test condition: Temperature : 25.0±3.0℃ Charge: CC/CV 0.5C 4.0V cut off current: 0.05C Discharge: CC 0.5C ; End-of-discharge Voltage: 1.5V discharge capacity of 4000th cycle nominal capacity $\geq 70.00\%$	
3	High-Low temperature discharge performance 高低温放电性能	Test condition: Temperature : 25.0±3.0℃ Charge: CC/CV 0.5C 4.0V cut off current: 0.05C Discharge: CC 0.5C ; End-of-discharge Voltage: 1.5V discharge capacity at -30℃ discharge capacity at 25℃ $\geq 85.00\%$ discharge capacity at 60℃ discharge capacity at 25℃ $\geq 98.00\%$	
4	Storage performance 存储性能	Test condition: Charge: CC/CV 0.5C 4.0V cut off current: 0.05C; stored at 25℃ for 1 month Discharge: CC 0.5C; End-of-discharge Voltage: 1.5V recover capacity original discharge capacity $\geq 95.00\%$	

## 6.5 Safety characteristics 安全性能

NO. 序号	ITEM 测试项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
1	Vibration Test 振动测试	No explosion, No fire There shall be no electrolyte leakage 不起火、不爆炸, 电解液无泄漏	After standard charging, 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 and 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes.  将标准充电后的电芯固定在振动台上, 沿 X、Y、Z 三个方向各振动 30 分钟, 振幅 1.6mm, 振动频率为 10Hz~55Hz, 每分钟变化 1Hz。
2	Thermal abuse 加热	No explosion, No fire 无起火、无爆炸	Each fully charged cell, stabilized at room temperature is placed in a gravity or circulating air-convection oven. The oven temperature is raised at a rate of 5 °C/min ± 2 °C/min to a temperature of 130°C ± 2°C. The cell remains at this temperature for 10 min before the test is discontinued.  将充满电的电池放置在空气循环烘箱中, 烘箱温度以 5 °C/min ± 2 °C/min 升高到 130°C ± 2°C, 在此温度下保留 10min。
3	Short Circuit 短路试验	No explosion, No fire The Temperature of the surface of the Cells are lower than 150°C 无起火、无爆炸 电池表面温度低于 150°C	Each test sample battery, in turn, is to be short-circuited by connecting the (+) and (-) terminals of the battery with a Cu wire having a maximum resistance load of 0.1Ω. Tests are to be conducted at room temperature (20±2°C).  在常温下约 20±2°C 依次把每个样品电池的正负极用铜线连接起来使电池外部短路--线路总电阻不超过 0.1Ω
4	Abnormal Charging Test 过充电测试	No explosion, No fire 无起火、无爆炸	After standard charge, charge at a current of 1.0 C for 1h.  标准充电后, 以 1.0C 的电流继续充电 1 小时
5	Forced Discharge 过放试验	No explosion, No fire 无起火、无爆炸	Discharge at a current of 1.0 C for 1.5h.  以 1.0C 的电流放电 1.5 小时

6	Impact 重物冲击	No explosion, No fire 无起火、无爆炸	A 15.8mm diameter bar is inlaid into the bottom of a 9.1kg weight. And the weight is to be dropped from a height of 610mm onto a sample battery and then the bar will be across the center of the sample. 用一条直径为 15.8mm 的圆棒放置在电池中央，将一 9.1Kg 的重锤从 610mm 的高度垂直落下在电池的中心位置)
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### 7 Warning and cautions in handling the sodium-ion cell

#### 电芯使用时警告事项及注意事项

To prevent the possibility of the cell from leaking, heating, explosion, please observe the following precautions:

为防止电芯可能发生泄露，发热，爆炸，请注意以下预防措施：

1. Don't immerse the cell in water.

严禁将电芯浸入水中，保存不用时，应放置在阴凉干燥的环境中。

2. Don't use and leave the cell near a heat source such as fire or heater.

禁止将电芯在热高温源旁，如火，加热器等旁边使用和留置。

3. When charging, use a cell charger specifically for that purpose.

充电时请选用锂离子电芯专用充电器。

4. Don't reverse the positive and negative terminals.

严禁颠倒正负极后使用电芯。

5. Don't connect the cell to an electrical outlet directly.

严禁将电芯直接插入电源插座。

6. Don't discard the cell in fire or heater.

禁止将电芯丢入火或加热器中。

7. Don't connect the positive and negative terminal directly with metal objects.

禁止用金属直接连接电芯正负极，造成短路。

8. Don't transport and store the cell together with metal objects such as necklaces, hairpins.

禁止将电芯与金属，如发卡、项链等一起运输或存储。

9. Don't strike, throw or trample the cell.

禁止敲击，抛掷或踩踏电芯等。

10. Don't directly solder the cell.

禁止直接焊接电芯。

11. Don't pierce the cell with a nail or other sharp object.

禁止用钉子或其它利器刺穿电芯。

12. When disposing of secondary cells, keep cells of different electrochemical systems separate from each other.

二次电池处理时，请将电池和其他电化学体系的产品分开。

### **Caution 小心**

1. Don't use or leave the cell at very high temperature conditions (for example, strong direct sunlight or a environment in extremely hot conditions).

禁止在高温下（直射的阳光下或很热的环境中）使用或放置电芯，否则可能会引起电芯过热，起火或 功能失效，寿命减短。

2. If the cell leaks and the electrolyte get into your eyes, don't wipe eyes, instead, thoroughly rinse the eyes with clean running water for at least 15 minutes, and immediately seek medical attention. Otherwise, eyes injury can result.

如果电芯发生泄露，电解液进入眼睛，请不要搓揉，应用清水冲洗眼睛，必要时请立即前往医院接受治疗，否则会伤害眼睛。

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

如果电芯发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电芯从 装置或充电器中移开并停用。

4. In case the cell terminals get dirty, clean the terminals with a dry cloth before use.

如果电芯弄脏，使用前应用干布抹净。

### **8 The restriction of the use of hazardous substances 有害物质控制要求**

This model of sodium ion secondary cell is in accordance with our company's request of "environmental substances control standard".

本型号钠离子二次电芯符合本公司“环境物质控制标准”要求！

### **9 Contact information 联系方式**

If you have any questions regarding the cell, please contact the following address: