

## SIB32140-10Ah 产品规格书

### Product Specification of SIB32140-10Ah

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## 1. 适用范围 Scope of Application

本技术协议详细描述了无锡盘古新能源有限责任公司生产的 32140 / 3.0V / 10Ah 钠离子电池的产品性能指标以及产品使用条件及风险警示。

The purpose of this document is to specify the specifications of 32140 / 3.0V / 10Ah sodium ion Batteries supplied by PARAGONAGE.

## 2. 产品类型 Product Type

名称: 圆柱形钠离子电池

Name: Cylindrical Na-ion Battery

型号: 32140

Model:32140

## 3. 产品规格 Product Specification

### 3.1 基本参数 Essential Parameter

No.	参数 Parameter	产品规格 Specification	备注 Remarks
3.1.1	标称容量 Nominal Capacity	10Ah	新电池状态, 0.2C 充放电@25°C Fresh battery, 0.2C charge and discharge@25°C
3.1.2	标称能量 Nominal Energy	30Wh	
3.1.3	标称电压 Nominal Voltage	3.0V	
3.1.4	充电截止电压 Charge Cut-off Voltage	4.0V	充电截止电流 0.05C Charge cut-off current is 0.05C
3.1.5	放电截止电压 Discharge Cut-off Voltage	1.5V	
3.1.6	电池内阻 Impedance (1KHz)	$\leq 3\text{m}\Omega$	AC Impedance 1kHz
3.1.7	出货电量 Shipping SOC	~50%	/
3.1.8	重量 Weight	$270 \pm 5\text{g}$	N.A.
3.1.9	存储温度 Storage Temperature	-20~30°C	约 50%SOC 存储 (About 50%SOC storage) 湿度 < 60% Humidity < 60%
3.1.10	尺寸 Dimension (D*H)	直径(Diameterh): 33.2±0.2mm 高度(Height): 140.0±0.3mm	

3.1.11	充电温度 Charge Temperature	-20°C ~ -10°C	0.05C
		-10°C ~ 0°C	0.2C
		0°C ~ 45°C	0.5C
3.1.12	标准充电电流 Standard Charge Current	0.2C	2A
3.1.13	最大充电电流 Maximum Charge Current	0.5C	5A
3.1.14	放电温度 Discharge Temperature	-40°C ~ 60°C	
3.1.15	标准放电电流 Standard Discharge Current	0.2C	2A
3.1.16	最大持续放电电流 Maximum Continuous Discharge Current	10.0C	0-45°C
3.1.17	最大瞬间放电电流 Maximum Instantaneous Discharge Current	15.0C	0-45°C, 3S

### 3.2 电性能 Electric Performance

标准测试条件 Standard Test Conditions

测试必须使用出厂时间不超过一个星期的新电芯，且未进行过五次以上的充放电循环。除非特别说明，否则测试会在温度  $23 \pm 2^\circ\text{C}$ ，相对湿度 45~85% 的条件下进行。

Cells for tested must be newly delivered cells(in 7 days), and must not be tested for more than five standard charge-discharge cycles. Unless otherwise specified, all tests are conducted at  $23 \pm 2^\circ\text{C}$ , relative humidity from 45% to 85%.

项目 Item	测试方法 Test method	标准 Standard
容量 Capacity	在 $23 \pm 2^\circ\text{C}$ 环境下，电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C，搁置 5min，0.2C 放电至 1.5V。 At $23 \pm 2^\circ\text{C}$ , charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, put aside for 5min, "Standard discharge" refers to the discharge to 1.5V at constant current of 0.2C.	放电容量 $\geq 10\text{Ah}$ Discharge capacity $\geq 10\text{Ah}$

<p style="text-align: center;">常温循环 Cycle life test at RT</p>	<p>在 23±2℃ 环境下</p> <p>① 充电：0.5C 恒流恒压充电至到 3.9V,截止电流 0.05C,搁置 5min;</p> <p>② 放电：0.5C 恒流放电到 2.0V，搁置 5min;</p> <p>③ 循环以上两步 1500 次。</p> <p>①Charging:At 23 °C ± 2 °C environment, the cell is charged to 3.9V at a constant current of 0.5C, and charged to 0.05C at a constant, then put it aside for 5 min; ;</p> <p>②Discharging:the cell is discharged with 0.5C to 2.0V and laid for 5 min</p> <p>③Repeat the above two steps 1500 times</p>	<p style="text-align: center;">循环容量保持率≥70% Capacity retention rate ≥70%</p>
<p style="text-align: center;">倍率放电 Rate discharge</p>	<p>在 23±2℃ 环境下，电芯 0.2C 恒流恒压充至 4.0V,截止电流 0.05C，搁置 5min，以不同电流放电至 1.5V。</p> <p>At 23 °C ± 2 °C environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, put it aside for 5 min, then discharge with different currents to 1.5V.</p>	<p style="text-align: center;">1C 放电容量保持率≥98% 3C 放电容量保持率≥95% 5C 放电容量保持率≥93% 10C 放电容量保持率≥90%</p>
<p style="text-align: center;">高低温放电 High and low temperature discharge</p>	<p>在 23±2℃ 环境下，电芯 0.2C 恒流恒压充至 4.0V,截止电流 0.05C，在不同温度下搁置 8H,按照 0.2C 电流放电至 1.5V。</p> <p>At 23 °C ± 2 °C environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, then put the cell into a low-temperature box of different temperatures for 8 hours, then discharge the cell in the box with a current of 0.2C to 1.5V</p>	<p style="text-align: center;">-40℃容量保持率≥60% -20℃容量保持率≥80% 0℃容量保持率≥90% 25℃容量保持率≥100% 45℃容量保持率≥98% 55℃容量保持率≥95%</p>

常温存储 Normal temperature storage	<p>在 23±2℃ 环境下，电芯 0.2C 恒流恒压充至 4.0V,截止电流 0.05C，在 25℃ 环境下搁置 28d 后进行 0.2C 放电，记录放电容量（保持容量），然后再 0.2C 充放循环 3 次，记录容量最大值（恢复容量）。</p> <p>At 23 °C ± 2 °C environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant. At 25 °C environment, put the cell aside for 28 days, then discharge to the end voltage with 0.2C, record the cell capacity; and then the cell is chargeg and discharged with 0.2C to the end voltage for 3 times , and record the recovery capacity</p>	容量保持率 ≥ 90% 容量恢复率 ≥ 95% Capacity retention rate ≥ 90% Capacity recovery rate ≥ 95%
高温存储 High temperature storage	<p>在 23±2℃ 环境下，电芯 0.2C 恒流恒压充至 4.0V,截止电流 0.05C，在 55℃ 环境下搁置 7d 后进行 0.2C 放电，记录放电容量（保持容量），然后再 0.2C 充放循环 3 次，记录容量最大值（恢复容量）。</p> <p>At 23 °C ± 2 °C environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant. At 55 °C environment, put the cell aside for 7 days, then discharge to the end voltage with 0.2C, record the cell capacity; and then the cell is chargeg and discharged with 0.2C to the end voltage for 3 times , and record the recovery capacity</p>	容量保持率 ≥ 85% 容量恢复率 ≥ 90% Capacity retention rate ≥ 85% Capacity recovery rate ≥ 90%

### 3.3 安全性能 Safety Performance

项目 Item	测试方法 Test method	标准 Standard
过充电 Over charge	<p>在 23±2℃ 环境下，电芯 0.2C 恒流恒压充至 4.0V,截止电流 0.05C，再以 0.5C 电流充电到 4.4V 或 115%SOC 停止充电。</p> <p>At 23 °C ± 2 °C environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant ; then charge it to 4.4V or 115%SOC with 0.5C or 115%SOC.</p>	不起火、不爆炸 No fire, no explosion

<p style="text-align: center;">过放电 Over discharge</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 1C 电流放电至 0V, 搁置 30min 后, 1C 电流恒流恒压充电至上限电压, 再以 1C 电流放电至下限电压, 记录放电容量。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, discharge to 0V, put it aside for 30 min, charged with 1C to the end voltage, discharged with 1C to the end voltage, record the recovery capacity.</p>	<p>不爆炸、不起火、不泄漏, 放电容量<math>\geq 95\%</math> No explosion, no fire, no leakage, discharge capacity<math>\geq 95\%</math></p>
<p style="text-align: center;">短路 Short circuit</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 直接短路其正、负极 (线路总电阻不大于 <math>5\text{m}\Omega</math>) 10 min 结束, 观察电芯的温度及外观变化。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant; directly short-circuit its positive and negative electrodes (the total resistance is less than <math>5\text{m}\Omega</math>) for 10 min, observe the temperature and appearance changes of the cell.</p>	<p>不起火、不爆炸 No fire, no explosion</p>
<p style="text-align: center;">温度循环 High and low temperature shock</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 放入温度 <math>-40^{\circ}\text{C}</math> 的低温环境中搁置 1h, 再在 <math>85^{\circ}\text{C}</math> 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。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, put it into <math>-40^{\circ}\text{C}</math> for 1h, and then place it for 1h at <math>85^{\circ}\text{C}</math> for another 1h. The test is completed after 32 cycles. After the test, take out the sample.</p>	<p>不起火、不爆炸 No fire, no explosion</p>

<p>加热 Heat additive</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 将电芯放置在加热试验箱中, 以 <math>5^{\circ}\text{C}/\text{min}</math> 的速度由室温升至 <math>130^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> 并保持 30 分钟。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, place the cell in the heating test chamber, 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 30min.</p>	<p>不起火、不爆炸 No fire, no explosion</p>
<p>低气压 Low-pressure test</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 电芯在绝对压力为 11.6kPa, 温度为室温条件下搁置 6 小时。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, then stored it for 6 hours at an absolute pressure of 11.6kPa</p>	<p>不起火、不爆炸 No fire, no explosion</p>
<p>挤压 Crush</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 用半径为 75mm 的半圆柱体挤压板以 <math>(2 \pm 1) \text{mm}/\text{s}</math> 的速度沿垂直于电芯极板方向对电芯施压, 当电压达到 0V 或变形量达到 15% 或挤压力达到 2.67kN 后停止测试。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, measure the initial state of the cell. When the cell state is normal, use a semi cylindrical extrusion plate with radius of 75mm to apply pressure to the cell along the direction vertical to the electrode plate of the cell at the speed of <math>(2 \pm 1) \text{mm}/\text{s}</math>. Stop the test when the voltage reaches 0V or the deformation reaches 15% or the extrusion force reaches 2.67kN, observe the appearance change.</p>	<p>不起火、不爆炸 No fire, no explosion</p>

<p>重物冲击 Heavy impact</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 将一直径为 15.8mm 的钢棒放置于电芯中部; 然后将重量为 <math>9.1 \pm 0.1\text{kg}</math> 的铁锤从 <math>610 \pm 25\text{mm}</math> 高处自由落体到电芯上。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, place a steel bar with adiameter of 15.8 mm on the middle of the cell,and then drop a 10 kg hammer from 1.0 m to the upper part of the cell.</p>	<p>不起火、不爆炸 No fire, no explosion</p>
<p>跌落测试 Drop test</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 按 1.2m 的跌落高度自由落体跌落于混凝土板上, 单体电芯两个端面各跌落两次, 共计进行四次跌落试验。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, measure the initial state of the cell. According to the drop height of 1.2m, fall the cell on the concrete slab. Each face of the single cell dropped twice, a total of four drop tests were carried out.</p>	<p>不起火、不爆炸 No fire, no explosion</p>
<p>振动测试 Vibration test</p>	<p>在 <math>23 \pm 2^{\circ}\text{C}</math> 环境下, 电芯 0.2C 恒流恒压充至 4.0V, 截止电流 0.05C, 将电池用夹具安装在振动台的台面上, 按下面的振动频率和对应的振幅调整好试验设备。X、Y、Z 三个方向每个方向上从 10~55Hz 循环扫频振动 90—100min, 扫频速率为 1Hz/min, 位移幅值 (单振幅): 0.16mm。</p> <p>At <math>23^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> environment, the cell is charged to 4.0V at a constant current of 0.2C, and charged to 0.05C at a constant, then installed onto the vibration desk with clamps. Equipment parameters of frequency and amplitude are as follows( the frequency is varied at the rate of 1Hz/min between 10 and 55hertz, and repeat vibration for 90min, amplitude 0.16mm. The cell is tested in three mutually perpendicular directions)</p>	<p>不漏液、不起火、不爆炸 No leakage, no fire, no explosion</p>

#### 4. 运输与贮存 Transport and Storage

4.1 电芯运输荷电状态为 20%~50%SOC, 电芯包装成箱进行运输, 在运输过程中应防止剧烈振动、冲击或挤压, 防止日晒雨淋, 不得倒置。

The state of charge of cell transportation should be within the range of 20% to 50% SOC. Cells are packaged in boxes for transportation. During transportation, it is essential to prevent severe vibration, shock or compression, avoiding exposure to direct sunlight and rain, not be inverted.

4.2 在装卸过程中, 产品应轻搬轻放, 严防摔掷、翻滚、重压。

In the process of loading and unloading, the products should be handled lightly. Throwing, rolling and heavy pressure should be strictly prevented.

4.3 若预计将电池存放 30 天以上的, 建议将 SOC 调整为 50%左右。单体电池, -10~30°C建议补电周期为 6 个月, 30~45°C建议补电周期为 3 个月, 45°C~60°C建议补电周期为 1 个月; 以上补电周期为建议, 实际存储 SOC 不得低于 20%。存储周期不考虑 BMS 或其他除单体电池以外的自耗电影响。

When the Products are intended to be stored for a prolonged period of time (more than one month), the SOC of cells should be periodically adjusted to around 50% (every three months is recommended). For cells, the recommended recharge period is 6 months at -10~30°C; 3 months at 30~45°C, 1 months at 45~60°C. The recharge periods are for reference, and the SOC should not fall below 8% during storage. The storage considerations account for the self-discharge of cells only.

## 5. 安全事项 Security Matters

为避免电芯发生泄漏、发热、燃烧、爆炸等危险, 请注意:

In order to avoid the dangers of leakage, heating, combustion and explosion of cells, please pay attention to:

a. 严禁将电芯浸入液体中, 贮存不用时, 应放置于阴凉干燥的环境中

It is strictly forbidden to immerse cells in liquids. When not in use, cells should be stored in a cool and dry environment

b. 禁止将电芯置于高温热源旁, 如火、加热器等

It is forbidden to place cells near high-temperature heat sources, such as fire, heaters, etc.

c. 充电时请选用钠离子电池专用充电器

When charging, please use a dedicated charger for sodium-ion cells

d. 严禁颠倒正负极使用电芯

It is strictly forbidden to reverse the positive and negative electrodes when using cells

e. 禁止用金属直接连接电芯正负极使电芯短路

It is forbidden to directly connect the positive and negative electrodes of cells with metals, causing a short circuit.

f. 禁止敲击或抛掷、踩踏和弯折电芯

Striking or throwing, trampling and bending cells are prohibited

g. 禁止用钉子或其他利器刺穿电芯

It is forbidden to pierce the cell with nails or other sharp tools

h. 禁止在高温下使用电芯

Cells are prohibited at high temperatures

i. 禁止在强静电和强磁场的地方使用电芯

It is forbidden to use cells in places with strong static and magnetic fields

j. 如果电芯发生泄漏，电解液进入眼睛，请不要揉擦，应用清水冲洗眼睛，并立即送医治疗

If the cell leaks and the electrolyte enter the eyes, please don't rub. Rinse your eyes with clean water and seek medical treatment immediately.

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

If there is any abnormality such as odor, heat, discoloration, deformation, or any anomalies during use, storage and charging, immediately remove the cell from the device or charger and cease usage.

l. 防止电芯包装内产生短路，引线与电芯之间要有足够的绝缘层以保证绝对安全。外壳内不得有任何短路发生，以防止冒烟或着火

To prevent short circuit inside cell packaging, there should be enough insulation between the lead and cell to ensure absolute safety. No short circuit shall occur within the casing to prevent smoke or fire.

m. 严禁拆卸电芯，更换电芯时应由电芯供应商或设备供应商完成，用户不得自行更换

Disassembly of cells is strictly prohibited. When replacing cells, it should be done by the cell supplier or equipment supplier. Users are not allowed to replace cells by themselves

n. 禁止使用已损坏的电芯

Using damaged cells is prohibited

o. 禁止和不同型号，不同品牌的电芯混用

It is forbidden to mix cells of different models and brands

p. 禁止新旧电芯，不同材料的电芯混用

It is forbidden to mix old and new cells with cells of different materials

## 6. 免责声明 Disclaimer

6.1. 如果由于产品需求单位不按本说明书中的规定进行使用，造成社会性影响，并对无锡盘古新能源有限责任公司的声誉造成影响的，无锡盘古新能源有限责任公司将会追究产品需求单位的责任。

If the product demand unit does not use the product according to the provisions of this specification, causing social impact and affecting the reputation of PARAGONAGE, PARAGONAGE will look into the responsibility of the product demand unit.

6.2. 买方在订购无锡盘古新能源有限责任公司产品前，需要与无锡盘古新能源有限责任公司提前确认产品的最新状态。

Before ordering PARAGONAGE products, the purchaser needs to confirm the latest status of the products in advance with PARAGONAGE.

6.3. 英文规格释义仅供参考，请以中文版技术规格要求为准。

English specifications are for reference only. Please refer to the technical specifications of the Chinese version.

## 7. 风险警告 Risk Warning

### 7.1. 警示声明 Waring Statement

#### 警告

电池存在潜在的危险，在操作和维护时必须采取适当的防护措施！  
不正确地滥用测试实验，可能导致严重的人身伤害和财产损失！  
必须使用正确的工具和防护装备操作电池。

电池的维护必须由具有电池专业知识并经过安全培训的人士执行。  
不遵守上述警告可能造成多种灾难。

**CELLS ARE POTENTIALLY DANGEROUS AND PROPER  
PRECAUTIONS MUST BE OBSERVED IN HANDLING AND  
MAINTENANCE.**

**RUNNING TESTS ON THE CELLS IMPROPERLY MAY RESULT IN  
SEVERE PERSONAL BODY INJURY OR PROPERTY DAMAGES.  
WORK ON CELLS MUST BE PERFORMED ONLY WITH PROPER  
TOOLS AND PROTECTIVE EQUIPMENT MUST BE USED.**

**CELL MAINTENANCE MUST BE CARRIED OUT BY PERSONNEL  
KNOWLEDGEABLE OF CELLS AND TRAINED IN THE SAFETY  
PRECAUTIONS INVOLVED.**

**FAILURE TO OBSERVE THE ABOVE MAY CAUSE VARIOUS HAZARDS.**

### 7.2. 危险类型: Types of Hazards

客户知悉在电池使用和操作过程中存在以下潜在的危险:

Customer acknowledges the following potential hazards in connection with the usage and handling of the Products:

7.2.1 操作者在操作时可能会受到化学品、电击或者电弧的伤害。尽管人体对遭受直流电与交流电的反应不同，但是高于 50V 的直流电压与交流电对人体的伤害是同样严重的，因此客户必须在操作中采取保守的姿势以避免电流的伤害。

Working with battery can expose the handler to chemical, shock or arcing damage. Although a person's body might react to contact with direct current voltage differently than from contact with alternate current voltage, it is the same for both alternate current and direct current exposures greater than 50 V, so Customer shall take a conservative position to escape from the damage of current.

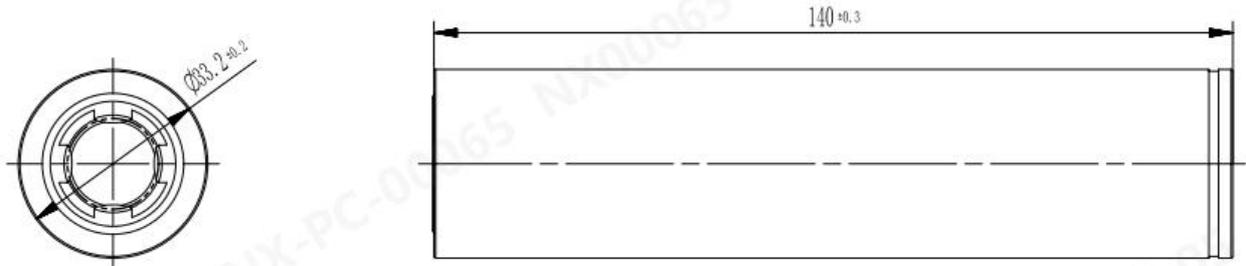
7.2.2 存在来自电池中的电解液的化学风险。

Cells expose its handler to chemical hazards associated with the electrolyte used in the cell.

7.2.3 在操作电池和选择个人防护装备时，客户及其雇员必须考虑到以上潜在的风险，防止发生意外短路，造成电弧、爆炸或热失控。

When operating batteries and selecting personal protective equipment, customer and its employees should consider potential exposure to these hazards and therefore prevent accidental short-circuit that can result in electrical arcing, explosion, and/or “thermal runaway” of the batteries.

## 8. 电芯图纸 Battery Drawings



项目 Item	尺寸
直径 Diameter	$33.2 \pm 0.2 \text{mm}$
高度 Height	$140 \pm 0.3 \text{mm}$