

# 锂离子电芯规格书

## Specification For Lithium-ion Rechargeable Cell

电芯型号 :N18650CL-29

Cell Type : N18650CL-29

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## 1 preface 前言

This specification describes the type and dimension, performance, technical characteristics, warning and caution of the lithium ion rechargeable cell. The specification only applies to N18650CL-29 cell(3C applied) supplied by Zhengzhou BAK Battery Co., Ltd.

本标准描述了圆柱型锂离子电芯的外型尺寸、特性、技术要求及注意事项。本标准适用于郑州比克电池有限公司生产的圆柱型 N18650CL-29 (3C 应用) 应用锂离子电芯。

## 2 Definition 定义

### 2.1 Rated capacity:

标称容量:

Rated capacity  $Cap=2900mAh$ . Under  $22.5\pm2.5^{\circ}C$ , the capacity obtained when a cell is discharged at 5-hours rate to voltage 2.5 V, which is signed Cap, the unit is mAh.

标称容量  $Cap=2900mAh$ , 指在  $22.5\pm2.5^{\circ}C$  环境下, 以 5 小时率放电至终止电压 2.5V 时的容量, 以 Cap 表示, 单位为毫安培时(mAh)。

### 2.2 Standard charge method

标准充电方式:

Under  $22.5\pm2.5^{\circ}C$ , it can be charged to 4.2V with constant current of 0.5C (1375mA), and then, charged continuously with constant voltage of 4.2V until the charged current is 0.01C (28mA).

指在  $22.5\pm2.5^{\circ}C$  环境下, 以 0.5C (1375mA) 的电流恒流充电至单体电芯电压 4.2 V 后, 转为恒压 4.2 V 充电, 至充电电流小于 0.01C (28mA) 时, 停止充电。

### 2.3 Standard discharge method:

标准放电方式:

Under  $22.5\pm2.5^{\circ}C$ , it can be discharged to 2.5 V with constant current of 0.2C (550mA).

指在  $22.5\pm2.5^{\circ}C$  环境下, 以 0.2C (550mA) 的电流恒流放电至单体电芯电压 2.5 V。

## 3 Cell type and dimension 电芯型号及尺寸

### 3.1 Description and model 电芯说明及型号

**Description:** Cylindrical Li-ion rechargeable cell

**Model:** N18650CL-29

N18650CL-29 型号的圆柱锂离子二次电芯

### 3.2 Cell dimension 电芯尺寸

Cell physical dimension listed in Figure 3(unit: mm).

电芯尺寸示意图如图 3 所示 (单位: mm)。

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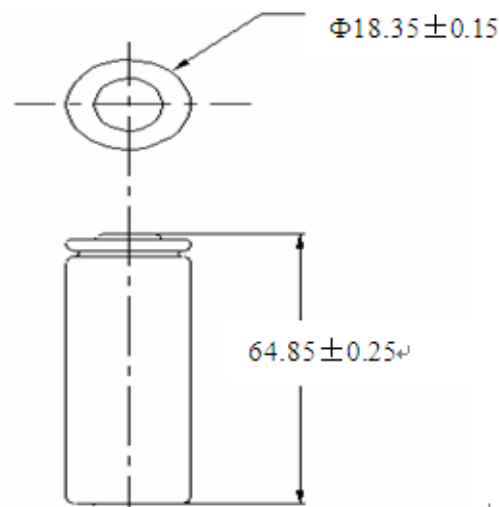


Figure 3/ 图 3

#### 4 Cell characteristics fresh cell tested at $22.5 \pm 2.5^\circ\text{C}$ , standard charge and discharge unless otherwise specified

电芯特性（除非有特殊说明，否则所有测试要求为：温度在  $22.5 \pm 2.5^\circ\text{C}$  条件下，样品为新电池，充放电制度为标准充电和标准放电）

ITEM 项目	SPECIFICATION 规格
Nominal capacity 标称容量	2900 mAh@0.2C (550mA)
Minimum capacity 最小容量	2800 mAh@0.2C (550mA)
Nominal voltage 标称电压	3.6 V
Charge voltage (End current) 充电电压 (截止电流)	4.2 V (28 mA)
Energy density 能量密度	218Wh/Kg
Discharge ending voltage 放电终止电压	2.5 V
Max charge current 最大充电电流	1C (2750 mA) $25^\circ\text{C}$ (not for cycle life)
Max discharge current 最大放电电流	3C (8250mA) $25^\circ\text{C}$ (not for cycle life)
Humidity range 湿度范围	0 ~ 60% RH (non-condensing 不冷凝)
Internal resistance 内阻	$\leq 35 \text{ m}\Omega$ (AC Impedance, 1000 Hz)
Cell dimension	Height: $64.85 \pm 0.25 \text{ mm}$ 高度: $64.85 \pm 0.25 \text{ mm}$

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电芯尺寸	Diameter: 18.35±0.15 mm 直径: 18.35±0.15 mm
Weight 重量	≤ 48g

## 5 Technical requirements技术要求

### 5.1 Cell usage conditions 电芯使用环境

Temperature of charge 充电温度: 0~45℃

Temperature of discharge 放电温度: -20~60℃

### 5.2 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: 22.5±2.5℃

### 5.3 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 10KΩ/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℃

### 5.4 Electrochemical Characteristics 电化学特性

(Fresh cells, tested at 22.5±2.5℃, standard charge and discharge unless otherwise specified.

(除非有特殊说明, 否则所有测试要求为: 温度在 22.5±2.5℃条件下, 样品为新电池, 充放电制度为标准充电和标准放电)

NO. 序号	ITEM 测试项目	CRITERION 性能标准
5.4.1	Discharge rate capability 倍率放电性能	Test condition: Temperature : 22.5±2.5℃ Charge: CC/CV 0.5C (1375mA) 4.2V cut off current: 0.01C (28mA) Discharge: CC variable values; End-of-discharge Voltage: 2.5V  $\frac{\text{discharge capacity at 0.5C}}{\text{discharge capacity at 0.2C}} \geq 95\% ;$ $\frac{0.5\text{C 放电容量}}{0.2\text{C 放电容量}} \geq 95\% ;$  $\frac{\text{discharge capacity at 1.0C}}{\text{discharge capacity at 0.2C}} \geq 90\% ;$ $\frac{1.0\text{C 放电容量}}{0.2\text{C 放电容量}} \geq 90\% ;$  $\frac{\text{discharge capacity at 2.0C}}{\text{discharge capacity at 0.2C}} \geq 80\% ;$ $\frac{2.0\text{C 放电容量}}{0.2\text{C 放电容量}} \geq 80\%$
5.4.2	Cycle life 循环寿命	Test condition: Temperature : 22.5±2.5℃ Charge: CC/CV 0.5C (1375mA) 4.2V cut off current: 0.02C (55mA) Discharge: CC 0.5C (1375mA) ; End-of-discharge Voltage: 2.5V 501th: Charge: CC/CV 0.5C (1375mA) 4.2V cut off current: 0.02C (55mA)

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		Discharge: CC 0.2C (550mA) ; End-of-discharge Voltage: 2.5V  $\frac{\text{Discharge capacity of 501th cycle}}{\text{Minimum capacity}} \geq 70\% ; \quad \frac{\text{第501次循环的放电容量}}{\text{标称最低容量}} \geq 70\%$
5.4.3	High-Low temperature discharge performance 高低温放电性能	Test condition: Charge: CC/CV 0.5C (1375mA) 4.2V cut off current: 0.01C (28mA) Discharge: CC 0.5C(1375mA); End-of-discharge Voltage: 2.5V  $\frac{\text{discharge capacity at } -10^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 70\% ; \quad \frac{-10^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 70\%$  $\frac{\text{discharge capacity at } 0^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 80\% ; \quad \frac{0^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 80\%$  $\frac{\text{discharge capacity at } 60^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 95\% ; \quad \frac{60^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 95\%$
5.4.4	Storage performance 存储性能	Test condition: Charge: CC/CV 0.5C(1375mA) 4.2V cut off current: 0.01C(28mA); stored at 25°C for 30 days Discharge: CC 0.5C(1375mA); End-of-discharge Voltage: 2.5V  $\frac{\text{Residual capacity after 30days storage}}{\text{Minimum capacity}} \geq 90\% ; \quad \frac{\text{存储30天后残余容量}}{\text{标称最低容量}} \geq 90\%$  $\frac{\text{Recover capacity after 30days storage}}{\text{Minimum capacity}} \geq 95\% ; \quad \frac{\text{存储30天后恢复容量}}{\text{标称最低容量}} \geq 95\%$

## 5.5 Environmental characteristics and safety characteristics 环境适应性能和安全性能

Meets ROHS and UN38.3 and GB31241-2014 产品符合 ROHS 、 UN38.3 及 GB31241-2014 标准

(The following test according to UL1642 以下测试方法来自 UL1642)

NO. 序号	ITEM 测试项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
5.5.1	Vibration 振动性能	There shall be no electrolyte leakage 电解液无泄漏	After standard fully charge, cell shall be attached to a vibration table directly and subjected to vibration that consists of 10 Hz to 55 Hz to 10 Hz at the speed of 1Hz/min in 90~100mins. The total excursion of the vibration is 0.8mm(0.060 inches). The cell shall be vibrated in each direction along axis of the cylinder and the vertical directions of axis of the cylinder. 将满电电芯放在振动实验台上，在 90~100mins 由 10 Hz 到 55 Hz 再到 10Hz 以 1Hz/min 的速率变化，振幅为

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			0.8mm(0.060 英寸)进行振动实验。电芯在电芯的轴向和与电芯轴向垂直的两个方向上振动。
5.5.2	overcharge test 过充测试	No leakage、No flame、No fire、No explode 电芯不漏液、不冒烟、不起火、不爆炸	The cell is discharged following the standard discharge method. Apply a 12V power supply and a 1C charge current for 1.5hrs. 电芯按照标准放电方式放完电后，采用 1C 电流 12V 电压恒流恒压充电 1.5 小时。
5.5.3	Over discharge test 过放测试	No leakage、No flame、No fire、No explode 电芯不漏液、不冒烟、不起火、不爆炸	Cell shall first be charged according to standard charge method, and then cell is to be discharged by 0.2C current for 12 hours; The test is completed when the cell is to be discharged up to 250% of rate capacity or the other protective devices prevent the discharge. 电芯按照标准充电方式充满电后，以 0.2C 放电 12 小时直到放电容量达到额定容量的 250%或者保护装置动作为止。
5.5.4	130℃ hot oven test 130℃ 热箱测试	When the temperature of the cell is 130℃. Cell must not fire or explode in 60 minutes 电芯表面温度达到 130℃后的 60 分钟内，电芯不起火、不爆炸	The cell is charged following the standard charge method. After charging the cell is put in the oven. And then the oven temperature will be ramped at 5℃ per minute to 130℃ and held at 130℃. When the temperature of the cell reach 130℃, the cell is maintained in the 130℃ oven for a maximum of 60 minute or until a fire or explosion is obtained, whichever comes first. Record the time that the cell temperature reaches 130℃ and the time when a fire or explosion occurs.  电芯按照标准充电方式充满电后，将电芯放进热箱里，然后将热箱按 5℃/min 升温到 130℃，当电芯的温度也达到 130℃时，电芯在热箱 130℃环境下保持 60 分钟或者电芯起火爆炸为止。记录电芯温度升至 130℃起直到电芯起火或爆炸的时间。
5.5.5	Crush test 挤压测试	No fire、No explode 电芯不起火、不爆炸	After charging a cell following the standard charge method, the cell shall be crushed between two flat surfaces. The direction of the crushing force shall be vertical to axis of the cylinder. The crushing force is to be applied by a hydraulic ram with a 32mm diameter piston. Crushing force is approximately 13 KN. Once the maximum pressure has been obtained it is to be released.  电芯按照标准充电方式充满电后，放在两个平整的表面进行挤压测试，压力器必须施加一个与圆柱电芯轴向垂直的力，平压于电芯。采用 32 mm 直径的液压活塞，所用压力为 13 KN，一旦达到最大压力值，即释放压力。

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5.5.6	Impact test 重物冲击测试	No flame、No fire、No explode 电芯不冒烟、不起火、不爆炸	<p>Cell shall first be charged according to standard charge method, then the battery cell was placed on a flat surface so that the longitudinal axis of the battery cell shall be parallel with it.</p> <p>A 15.8mm diameter bar is to be placed across the center of the sample. A 9.1kg weight is to be dropped from a height of 61cm on the sample.</p> <p>电芯按照标准充电方式充满电后，水平放置于一个与电芯纵轴平行的平板。将一直径 <math>\Phi 15.8\text{mm}</math> 的棒放在样品中心，让重量 9.1kg 的重物从 610mm 的高度落到实验电芯上</p>
5.5.7	Short circuit test 短路测试	No fire、No explode 电芯不起火、不爆炸	<p>Cell shall first be charged according to standard charge method, and then cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 100m<math>\Omega</math>. This test is done at room temperature and at 60°C (different cells). Monitor the cell temperature while testing. The cell is continuously discharged until the cell case temperature has returned to be 10°C less than peak temperature.</p> <p>电芯按照标准充电方式充满电后，在室温和 60°C 进行短路实验，将接有热电偶的电芯置于通风橱中，用铜线短路其正负极(线路总电阻不大于 100 毫欧)，实验过程中监视电芯温度变化，当电芯温度下降到比峰值低 10°C 时，结束实验。</p>
5.5.8	Incineration test 焚烧测试	<p>When subjected to the test no part of exploding cell shall penetrate from the screen such that some or all the cell or battery protrudes through the screen</p> <p>爆炸的电芯没有任何一个部分通过或者透过金属网筛</p>	<p>After full charging by the standard method, each test sample cell or battery is to be placed on a platform table having a 4-inch diameter hole in the center covered by a screen. The screen over the hole is to be steel wire mesh having 20 openings per inch and a wire diameter of 0.017 inch. An eight-sided covered wire cage, 2 feet across and 1 foot high is covered with a metal screen is to be constructed from 0.010inch diameter wire with 16-18 wires per inch in each direction. This wire cage is placed over to the test sample. The sample is to be placed on the screen covering the hole in the center of the hole. It is to be heated until it explodes, or until it is destroyed.</p> <p>电芯以 0.5C 充满电后，每次试验的样品电芯放置于一个平台桌子上，桌子中间有一个直径为 102mm (4 英寸) 被网筛覆盖的洞，网筛由每英寸 (25.4mm) 20 孔、钢丝直径为 0.42mm (0.017 英寸) 的钢丝网组成。在试验样品电芯上要罩上由铝做成的丝网，丝网共八面，每面 610mm (2 英尺) 宽、305mm (1 英尺) 高，</p>



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			金属网由直径 0.25mm (0.010 英寸) 的铝丝编织成, 在每个方向上, 每英寸 (25.4mm) 有 16~18 根铝丝组成。样品放在覆盖桌子中间洞的网筛上加热直至起火爆炸或者完全破坏。
<b>Note</b> 备注	All above safety tests will be conducted at 22.5°C ±2.5°C except where specified differently. Use proper ventilation with protective equipment. 除特殊说明, 以上所有安全测试均应在 22.5°C ±2.5°C通风橱中, 且附带有保护装置的条件下进行。		

## 6 Package picture 包装图片



Small box

big box

pallet

(100pcs cells in a small box, 2 small boxes in a big box)

## 7 Shipment 出货

The Cell shall be shipped in voltage range of 3.6 ~ 3.9 V or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.

单体电芯按 3.6~3.9V 的充电电压或客户要求出货,电芯出货后充电前的剩余容量取决于储存时间和条件。

## 8 Warranty 质量保证

The Warranty period of cell is made according to business contract. However, even though the problem occurs within this period, BAK won't replace a new cell for free as long as the problem is not due to the failure of BAK manufacturing process or is due to customer's abuse or misuse.

自出货之日起,电芯的保质期限依合同而定,但是,在此期限内,如果非比克公司的制程原因。而是客户的误用造成的电芯质量问题,比克公司不承诺免费更换。

BAK will not be responsible for trouble occurred by handling outside of the precautions in instructions.

比克公司对违反安全守则操作所产生的问题不承担任何责任。

BAK will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

比克公司对与电路,电池组,充电器搭配使用所产生的问题不承担任何责任。

BAK will be exempt from warrantee any defect cells during assembling after acceptance.

出货后客户在电芯组装过程中产生的不良电芯不在比克公司质量保证的范围之列。

## 9 Storage and Shipment Requirement 存储及运输要求

## 10 Warning and cautions in handling the lithium-ion cell

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### 电芯使用时警告事项及注意事项

Item 项目		Permissible time 可存储时间
Storage environment 储存环境	45 °C ~ 60 °C, 60% RH Max	Less than 1 month 少于 1 个月
	25 °C ~ 45 °C, 60% RH Max	Less than 3 months 少于 3 个月
	-20 °C ~ 25 °C, 60% RH Max	Less than 1 year 少于 1 年

About long time storage:

If the cell needs to be stored for a long time, the cell's storage voltage should be 3.6 ~ 3.9 V. Also, it is recommended to charge the cell every six months.

关于长期存储:

若电芯需长期存储, 电芯的存储电压应该为 3.6 ~ 3.9 V。同时, 建议每 6 个月对电芯进行充电。

Lithium-Ion rechargeable batteries subject to abusive conditions can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

滥用锂离子充电电芯可能会造成电芯的损害或人身的伤害.在使用锂离子充电电芯以前,请仔细阅读以下的安全守则:

Note 1. The customer is required to contact BAK in advance, if and when the customer needs other applications or operating conditions than those described in this document.

注释 1. 如果客户需要其它应用程序或本文中描述之外的操作条件, 客户需要提前联系比克。

Note 2. BAK will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

注释 2.在该文件说明的条件之外使用该电芯而产生的事故, 比克公司不承担任何责任。

### Warning 警告

Danger warning (it should be described in manual or instruction for users, indicated especially) to prevent the possibility of the battery from leaking, heating, explosion. Please observe the following precautions:

**危险警告:** (应在使用说明手册或说明书中, 特别注明) 为防止电池可能发生泄漏, 发热, 爆炸, 请注意以下预防措施:

- » Don't immerse the battery in water and seawater. Please put it in cool and dry environment if no using.
- » 严禁将电池浸入海水或水中, 保存不用时, 应放置在阴凉干燥的环境中。
- » 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。
- » Do not use or leave the cell under the blazing sun (or in heated car by sunshine).
- » 不要将电芯放置在太阳光直射的地方。
- » Being charged, using the battery charger specifically for that purpose.
- » 充电时请选用锂离子电芯专用充电器。
- » Don't reverse the positive and negative terminals
- » 严禁颠倒正负极后使用电芯。
- » Do not disassemble or modify the cell.

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- » 不要拆卸或修整电芯.
- » Do not use the cell with conspicuous damage or deformation..
- » 不要使电芯受到明显的损害或变形.
- » Don't connect the cell to an electrical outlet directly.
- » 严禁将电芯直接插入电源插座。
- » Don't discard the cell in fire or heater.
- » 禁止将电芯丢入火或加热器中。
- » Do not short circuit, over-charge or over-discharge the cell.
- » 不要将电芯短路,过充或过放.
- » 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。
- » Do not use lithium ion battery and others different lithium battery model in mixture.
- » 禁止与液态锂离子或不同型号的锂电池混合使用。
- » Keep the battery away from babies.
- » 电池应远离小孩.
- » Don't strike, throw or trample the cell.
- » 禁止敲击, 抛掷或踩踏电芯等。
- » Prohibition of use of damaged cells.
- » 禁止使用已损坏的电芯。
- » Battery pack designing and packing Prohibition injury batteries.
- » 电池外壳设计和包装禁止损伤电池。
- » The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.
- » 更换电芯应由电芯供应商或设备供应商完成, 用户不得自行更换。
- » Be aware discharged batteries may cause fire; tape the terminals to insulate them..
- » 废弃之电池应用绝缘纸包住电极, 以防起火, 爆炸。
- » Do not use it in a location where is electrostatic and magnetic greatly, otherwise, the safety devices may be damaged, causing hidden trouble of safety.
- » 禁止在强静电和强磁场的地方使用, 否则易破坏电池安全保护装置, 带来不安全的隐患。
- » Do not directly solder the battery and pierce the battery with a nail or other sharp object.
- » 禁止直接焊接电池和用钉子或其它利器刺穿电池。
- » Do not recommend series and parallel connection (not cylinder battery), Otherwise, do that after grouping.
- » 不建议串并联使用 (非圆柱产品), 串并联需经过配组后。
- » 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。
- » Do not disassemble or reconstruct the cell

禁止拆解或重新组装电芯

### Caution 小心

- » Do not use or leave the battery at very high temperature conditions (for example, 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.

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- » 禁止在高温下（直热的阳光下或很热的汽车中）使用或放置电池，否则可能会引起电池过热，起火或功能失效，寿命减短。
- » If the cell leaks and the electrolyte get into the 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，应用清水冲洗眼睛不少于 15min，必要时请立即前往医院接受治疗，否则会伤害眼睛。
- » 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。
- » 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.
- » 如果电池弄脏，使用前应用干布抹净，否则可能会导致接触不良功能失效。

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

This model of lithium-ion cell is in accordance with our company's request of "The hazardous substances and material management standard".

本型号锂离子电芯符合本公司“有害物质和材料管理规范”要求！

#### 12 Contact information 联系方式

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

如有疑问，请按以下地址联系：

Headquarter: Liuqiao Village Zhengan town Zhongmou country Zhengzhou Henan China ( 451470 )

厂址：河南省郑州市中牟县郑庵镇刘巧村委 ( 451470 )

Tel: +86-0371-62033103 (王工) 电话：+86-0371-62033103 (王工)

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**Version change record 修订履历**

Version 版次	Change Content 修改内容	Page 页码	修改人 PIC	修改日期 Date
A/00	无	全部	孙新科	2017-7-13
A/01	1.电芯尺寸增加公差 2.重量由 $\leq 49g$ 更改为 $\leq 48g$	P2., P3	孙新科	2017-8-25

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