锂离子电芯规格书

Specification
For
Lithium-ion Rechargeable Cell

电芯型号：N18650CP

Cell Type : N18650CP

Document No	P/PR03/PB-D-N18650CP-ZZ-3C	**Revised date**	2018-08-24
Version	A/02	**Pages**	14
Approved	**Checked**	**Designed**	
李艳斌	邱沫	夏剑锋	

Content 目录

1 Preface 前言

This specification describes the type, dimensions, performance, technical characteristics, warnings and cautions of the lithium-ion rechargeable cell. The specification only applies to N18650CP fresh cells supplied by Zhengzhou BAK Battery Co., Ltd.

本说明书描述了圆柱型锂离子电芯的型号、尺寸、特性、技术要求及注意事项。本说明书仅适用于郑州比克电池有限公司生产的新鲜的圆柱型 N18650CP 锂离子电芯。

2 Definition 定义

2.1 Nominal capacity 标称容量

Nominal capacity is defined as the capacity obtained when a cell is discharged at 5-hour rate to the cutoff voltage 2.5V under 22.5°C±2.5°C. It is signed as Cap and uses mAh as unit, and the Cap of N18650CP is 3350mAh.

标称容量指在 22.5°C±2.5°C 环境下，电芯以 5 小时率电流放电至终止电压 2.5V 时的容量，以 Cap 表示，单位为 mAh。N18650CP 的标称容量为 3350mAh。

2.2 Standard charge method 标准充电方式

At 22.5°C±2.5°C, cell is charged at constant current of 0.3C (975mA) to 4.2V, then charged at constant voltage of 4.2V until the current tapers to 50mA.

在 22.5°C±2.5°C 下，电芯以 0.3C（975mA）恒流充电至 4.2 V，然后以 4.2 V 恒压充电直到电流减小至 50mA。

2.3 Standard discharge method 标准放电方式

At 22.5°C±2.5°C, cell is discharged at constant current of 0.2C (650mA) to 2.5 V.

在 22.5°C±2.5°C 下，电芯以 0.2C（650mA）恒流放电至 2.5 V。

3 Cell model and dimensions 电芯型号及尺寸

3.1 Description and model 类型及型号

Description: Cylindrical rechargeable Li-ion cell

Model: N18650CP

类型：圆柱型可再充电锂离子电芯

型号：N18650CP

3.2 Cell dimensions 电芯尺寸

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

电芯尺寸示意图如图 1 所示（单位：mm）。

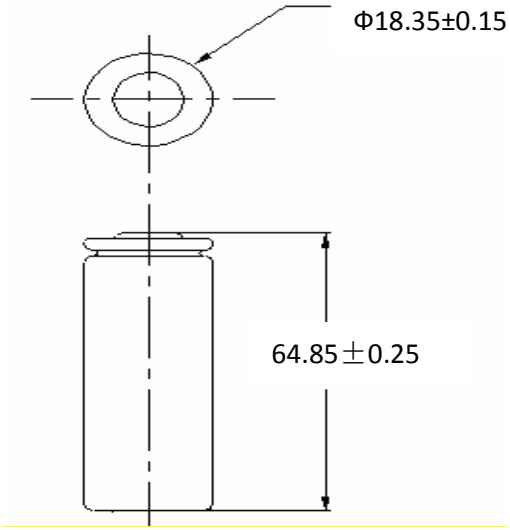

Figure 1/ 图 1

4 Cell characteristics 电芯特性

Unless otherwise specified, all cells stated should be fresh, charging and discharging procedures should be tested as per 2.2 and 2.3 at 22.5°C±2.5°C.

除非有特殊说明，否则所有测试电芯均为新鲜电芯，测试温度为 22.5°C±2.5°C，测试时按照 2.2 和 2.3 进行标准充放电。

ITEM 项目	SPECIFICATION 规格
Nominal capacity 标称容量	3350mAh @0.2C (650mA)
Minimum capacity 最小容量	3250mAh@0.2C (650mA)
Nominal voltage 标称电压	3.6V
Charge voltage (end current) 充电电压（截止电流）	$4.20^{+0.00}_{-0.05}$V (50mA)
Discharge cut-off voltage 放电终止电压	2.5V
Energy density 能量密度	251Wh/Kg
Max charge current 最大充电电流	10°C≤T≤45°C: 0.5C (1625mA) 0°C≤T<10°C: 0.3C (975mA)
Max discharge current 最大放电电流	45°C≤T≤60°C: 1C (3250 mA) 5°C≤T<45°C: 2C (6500mA) -20°C≤T<5°C: 0.5C (1625mA)
Humidity range 湿度范围	0~60% RH (non-condensing 不冷凝)

Internal resistance 内阻	≤45mΩ (AC Impedance, 1000Hz)
Cell dimensions 电芯尺寸	Height: 64.85mm±0.25mm 高度：64.85mm±0.25mm Diameter: 18.35mm±0.15mm 直径：18.35mm±0.15mm
Weight 重量	≤48g

5 Technical requirements 技术要求

5.1 Cell operating conditions 电芯使用环境

Charge temperature 充电温度： 0°C ~ 45°C

Discharge temperature 放电温度：-20°C ~ 60°C

5.2 Cell testing conditions 电芯试验环境

Unless otherwise specified, tests shall be carried out at 22.5°C±2.5°C.

除非有特殊说明，否则测试均在22.5°C±2.5°C环境条件下完成。

5.3 Requirement of the testing equipment 测量仪表要求

Voltage meter: internal resistance ≥10KΩ/V

电压仪表要求：内阻≥10KΩ/V

Temperature meter: test precision ≤0.5°C

温度仪表要求：测量精度≤0.5°C

5.4 Electrochemical performance 电化学性能

Unless otherwise specified, cells should be fresh and charging and discharging procedures should be tested as per 2.2 and 2.3 at 22.5°C±2.5°C.

除非有特殊说明，否则测试电芯均为新鲜电芯，测试温度为 22.5°C±2.5°C，测试时按照 2.2 和 2.3 进行标准充放电。

No. 序号	Item 测试项目	Criterion 性能标准
5.4.1	Rate discharge capability 倍率放电性能	Cell shall be standard charged as per 2.2 and discharged at various current rates (0.2C/0.5C/1C/2C) to 2.5V cutoff 电芯按2.2进行标准充电，以不同电流倍率（0.2C/0.5C/1C/2C）恒流放电至2.5V截止 $\frac{\text{discharge capacity at 0.5C}}{\text{discharge capacity at 0.2C}} \geq 95\%$; $\frac{0.5\text{C放电容量}}{0.2\text{C放电容量}} \geq 95\%$ $\frac{\text{discharge capacity at 1.0C}}{\text{discharge capacity at 0.2C}} \geq 90\%$; $\frac{1.0\text{C放电容量}}{0.2\text{C放电容量}} \geq 90\%$ $\frac{\text{discharge capacity at 2.0C}}{\text{discharge capacity at 0.2C}} \geq 80\%$; $\frac{2.0\text{C放电容量}}{0.2\text{C放电容量}} \geq 80\%$

5.4.2	Cycle life 循环寿命	Cell shall be charged at constant current of 0.3C (975mA) to 4.2V, then charged at constant voltage of 4.2V until current tapers to 50mA. Cell shall be discharged at constant current of 0.5C (1625mA) to 2.5V. Cell is to rest for 10min after charge and 20min after discharge. 电芯充电时以0.3C（975mA）恒流充电至4.2V后以4.2V恒压充电至50mA截止，放电时以0.5C（1625mA）恒流放电至2.5V。电芯充电后静置时间为10min，放电后静置时间为20min。 $\frac{\text{Discharge capacity of 400th cycle}}{\text{Minimum capacity}} \geq 80\%$; $\frac{\text{第400次循环的放电容量}}{\text{标称最低容量}} \geq 80\%$
5.4.3	High-low temperature discharge performance 高低温放电性能	Cell shall be standard charged and standard discharged. Charge shall be carried out at 22.5°C±2.5°C and discharge shall be carried out at various temperatures (25°C/60°C/0°C/-10°C). 电芯按标准方式进行充放电，充电在 22.5°C±2.5°C 环境下进行，放电在不同温度环境下（25°C/60°C/0°C/-10°C）进行。 $\frac{\text{discharge capacity at -10°C}}{\text{discharge capacity at 25°C}} \geq 70\%$; $\frac{\text{-10°C放电容量}}{\text{25°C放电容量}} \geq 70\%$ $\frac{\text{discharge capacity at 0°C}}{\text{discharge capacity at 25°C}} \geq 80\%$; $\frac{\text{0°C放电容量}}{\text{25°C放电容量}} \geq 80\%$ $\frac{\text{discharge capacity at 60°C}}{\text{discharge capacity at 25°C}} \geq 95\%$; $\frac{\text{60°C放电容量}}{\text{25°C放电容量}} \geq 95\%$
5.4.4	Storage performance 存储性能	Cell shall be standard charged, then stored at 25°C for 30 days. After storage, cell shall be standard discharged to measure residual capacity and perform another standard charge-discharge cycle to measure recovery capacity. 电芯按标准充电方式充满电后于 25°C 环境下存储 30 天，存储完成后按标准放电方式放电测试保持容量，之后再进行一次标准充放电循环测试恢复容量。 $\frac{\text{Residual capacity after 30 - day storage}}{\text{Minimum capacity}} \geq 90\%$; $\frac{\text{存储储30天后残余容}}{\text{标称最低容量}} \geq 90\%$ $\frac{\text{Recovery capacity after 30 - day storage}}{\text{Minimum capacity}} \geq 95\%$; $\frac{\text{存储储30天后恢复容}}{\text{标称最低容量}} \geq 95\%$

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

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	overcharge test 过充测试	No fire, no explode 电芯不起火、不爆炸	Cell shall be standard discharged, then charged at constant current of 3C (9750mA) and constant voltage of 4.6V. Charging shall be terminated when either of the following conditions is reached: (1) Charging time reaches 7h; (2) Temperature of cell surface is 20% lower than maximum temperature. 电芯按照标准放电方式放完电后，采用 3C 电流 4.6V 电压恒流恒压充电。当持续充电时间达到 7h 或电芯表面温度降到比峰值温度低 20%时，停止测试。
5.5.2	Over discharge test 过放测试	No fire, no explode 电芯不起火、不爆炸	Cell shall be standard charged and discharged, then reverse charged at 1C for 90min. 电芯标准充电和放电后，以 1C 电流反向充电 90min。
5.5.3	130°C hot oven test 130°C 热箱测试	No fire, no explode 电芯不起火、不爆炸	After standard charge, cell is heated in the oven at a rate of 5°C/min to 130°C and maintained at 130°C for 30min. 标准充电后，将电芯放进热箱里，以 5°C/min 速率升温至 130°C，并在 130°C 环境下保持 30min。
5.5.4	Short circuit test at room temperature 室温短路测试	No fire, no explode, Cell case Tmax≤150°C 电芯不起火、不爆炸，电芯表面最高温度≤150°C	After standard charge, cell is short-circuited by a wire with resistance of 80mΩ±20mΩ at room temperature. Test is stopped when the cell case cools to room temperature or short-circuit time reaches 24h. 标准充电后，在室温下用内阻为 80mΩ±20mΩ 的导线将电芯短接，当电芯表面温度降至室温时或当短接时间达到 24h 时，结束实验。
5.5.5	Short circuit test at 55°C 室温短路测试	No fire, no explode, Cell case Tmax≤150°C 电芯不起火、不爆炸，电芯表面最高温度≤150°C	After standard charge, cell is short-circuited by a wire with resistance of 80mΩ±20mΩ at 55°C±5°C. Test is stopped when the cell case cools to 55°C±5°C or short-circuit time reaches 24h. 标准充电后，在 55°C±5°C 下用内阻为 80mΩ±20mΩ 的导线将电芯短接，当电芯表面温度降至 55°C±5°C 时或当短接时间达到 24h 时，结束实验。

5.5.6	Incineration test 焚烧测试	No part of explosive residue shall penetrate the screen 爆炸的电芯没有任何一个部分通过或者透过金属网筛	After standard charge, cell is placed on the steel wire screen and is heated until it explodes, or until cell is burnt out, or until the heating time reaches 30min without fire and explosion. ①按制造商规定的方法充满电后，将电芯放在试验工装的钢丝网上 ②用火焰加热电芯，当出现电芯爆炸或电芯完全燃烧，或持续加热 30min 后电芯未起火未爆炸，停止加热
5.5.7	Drop test 跌落测试	No fire, no explosion 电芯不起火、不爆炸	After standard charge, cell is dropped with both ends from a height of 1m onto the cement floor. 标准充电后，电芯分别以正负端子两个方向从 1m 高度处自由跌落到水泥地面上。
5.5.8	Thermal cycling 温度循环	No fire, no explosion, no leak (weight loss ≤0.1%) 电芯不起火、不爆炸、不漏液（失重比≤0.1%）	After standard charge, cell is put in an oven. Then set the oven temperature as follows: (1) Raising the chamber temperature to 70°C±5°C within 30min and maintaining this temperature for 4h; (2) Reducing the chamber temperature to 20°C±5°C within 30min and maintaining this temperature for 2h; (3) Reducing the chamber temperature to -40°C±5°C within 30min and maintaining this temperature for 4h; (4) D Raising the chamber temperature to 20°C±5°C within 30min; (5) Repeating the sequence for a further 9 cycles; (6) Storing the cell for at least 24h at 20°C±5°C before examination. 标准充电后，将电芯放入温度箱中，并按以下步骤调节温度箱温度： （1）在 30 min 内升温至 70°C±5°C，保持 4h； （2）在 30 min 内降温至 20°C±5°C，保持 2h； （3）在 30 min 内降温至-40°C±5°C，保持 4h； （4）在 30 min 内降温至 20°C±5°C； （5）再循环以上步骤 9 次； （6）在 20°C±5°C 存储至少 24h 后再检查。
5.5.9	Low pressure 低气压	No fire, no explosion, no leak (weight loss ≤0.1%) 电芯不起火、不爆炸、不漏液（失重比≤0.1%）	After standard charge, cell is stored for 6h in the environment with preasure of 11.6 kPa and temperature of 20°C±5°C. 标准充电后，将电芯放入 11.6 kPa 和 20°C±5°C 的环境中，保持 6 h。

5.5.10	Crush test 挤压测试	No fire, no explosion 电芯不起火、不爆炸	After standard charge, cell is crushed between two flat surfaces until an applied force of 13kN±1kN is reached. 标准充电后，将电芯放在两个平板内进行挤压，当压力达到 13kN±1kN 时结束测试。
5.5.11	Vibration test 振动测试	No fire, no explosion, no leak (weight loss ≤0.1%) 电芯不起火、不爆炸、不漏液（失重比≤0.1%）	After standard charge, cells are vibrated for 90~100 minutes per each of the three mutually perpendicular axis (x, y, z) with total excursion of 0.8mm, frequency of 10Hz to 55Hz and sweep of 1Hz change per minute 标准充电后，将电芯紧固在振动实验台上进行振幅为 0.8mm（最大偏移 1.6mm）的振动，振动频率以 1Hz/min 的速度从 10Hz 增加至 55Hz，每 90min~100min 往复一次回到原位。按轴向和径向两个方向进行振动。
Note 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

Item 项目	Conditions 环境	Permissible time 允许时间
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 3.6V ~ 3.9V. 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 3.6V ~ 3.9 V。同时，建议每 6 个月对电芯进行充电。		

10 Warning and cautions 警告及注意事项

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档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.
- 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.
- 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 withclean 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）

13 Version change record 修订履历

Version 版次	Change Content 修改内容	Page 页码	PIC 修改人	Date 修改日期
A/00	初版发行	无	夏剑锋	2018-04-27
A/01	1. 充电电压 4.2V 修改为 $4.20^{+0.00}_{-0.05}$V 2. 内阻≤35mΩ 修改为≤70mΩ	2 3	夏剑锋	2018-07-18
A/02	1. 内阻≤70mΩ 修改为≤45mΩ 2. 循环保持率 301 次≥75%修改为 400 次≥80% 3. 增加了挤压测试、振动测试	3 4 7	夏剑锋	2018-08-24