

锂离子电池规格书

Specification For Lithium-ion Rechargeable Battery

电芯型号 : N18650CK

Cell Type : N18650CK

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1 Preface 前言

This specification describes the type, dimension, performance, technical characteristics, warnings and cautions of the lithium-ion rechargeable battery. The specification only applies to N18650CK fresh batteries supplied by ZhengZhou BAK Power Battery Co., Ltd.

本标准描述了圆柱型锂离子电池的型号、尺寸、特性、技术要求及注意事项。本标准仅适用于郑州比克电池有限公司生产的新鲜的圆柱型 N18650CK 锂离子电池。

2 Definition 定义

2.1 Standard charge method 标准充电方式

At 25 ± 2 °C, the battery is charged to 4.2 V under 0.5 C (1450 mA) constant current, then charged under 4.2 V constant voltage until the current tapers to ≤ 0.01 C (29 mA).

在 25 ± 2 °C 下，电池以 0.5 C (1450 mA) 恒流充电至 4.2 V 后，以 4.2 V 恒压充电至电流小于等于 0.01 C (29 mA)。

2.2 Standard discharge method 标准放电方式

At 25 ± 2 °C, the battery is discharged to 2.5 V under 1 C (2900 mA) constant current.

在 25 ± 2 °C 下，电池以 1 C (2900 mA) 恒流放电至 2.5 V。

2.3 Nominal capacity 标称容量

The battery nominal capacity, signed as Cap and using mAh as unit, is obtained as per standard charge followed by standard discharge.

电池标称容量以 Cap 表示，单位为毫安时 (mAh)，是指电池按标准充电方式充电后，按标准放电方式放电得到的容量。

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 battery

说明：圆柱型锂离子可再充电电池

Type: N18650CK

型号：N18650CK

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）。

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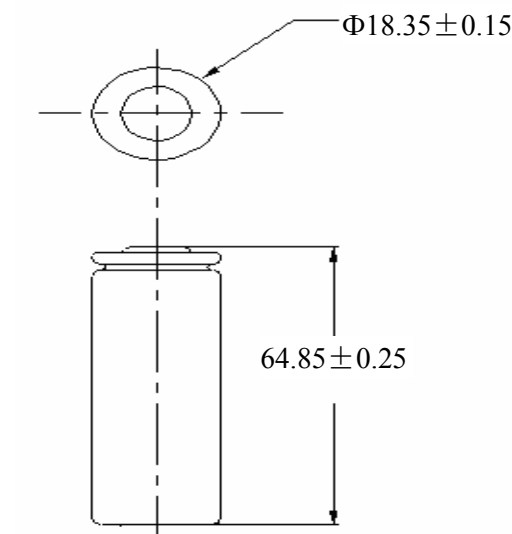


Figure 1/ 图 1

4 Battery characteristics 电池特性

Unless otherwise specified, the battery is fresh battery and tested by standard charge and standard discharge.

除非有特殊说明，否则所有样品均为新鲜电池，且按标准充电和标准放电方式进行测试。

ITEM 项目	SPECIFICATION 规格
Nominal capacity 标称容量	3000 mAh @ 1 C
Minimum capacity 最低容量	2900 mAh @ 1 C
Nominal voltage 标称电压	3.6 V
Charge voltage (End current) 充电电压 (截止电流)	4.2V (Max.) (29mA)
Discharge cut-off voltage 放电终止电压	2.5 V
Energy density 能量密度	222 Wh/Kg (1 C Min.)
Max charge current 最大充电电流	1 C (2900 mA) 25 °C (not for cycle life)
Max discharge current 最大放电电流	3 C (8700 mA) 25 °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)
Battery dimension	Height: $64.85 \pm 0.25 \text{ mm}$ 高度: $64.85 \pm 0.25 \text{ mm}$

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电池尺寸	Diameter: 18.35±0.15 mm 直径: 18.35±0.15 mm
Weight 重量	≤ 47 g

5 Technical requirements 技术要求

5.1 Battery usage conditions 电池使用环境

Charge temperature (cell surface temperature) 充电温度 (电芯表面温度): 0 ~ 45 °C

Discharge temperature (cell surface temperature) 放电温度 (电芯表面温度): -20 ~ 60 °C

5.2 Battery testing conditions 电池试验环境

Unless otherwise specified, all tests stated should be done at 25 ± 2 °C.

除非有特殊说明, 所有测试须在 25 ± 2 °C 下完成。

5.3 Requirement of the testing equipment 测量仪表要求

The voltage measurement device: not less than 0.5 grade

电压测量装置: 不低于 0.5 级

The current measurement device: not less than 0.5 grade

电流测量装置: 不低于 0.5 级

AC Impedance: 1000 Hz

交流阻抗测量频率: 1000 Hz

Temperature meter: precision ≤ 0.5 °C

温度仪表要求: 精度为 ≤ 0.5 °C

Time measurement tolerance: ± 0.1 %

时间测量公差: ± 0.1 %

The size measurement tolerance: ± 0.1 %

尺寸测量公差: ± 0.1 %

The quality measurement tolerance: ± 0.1 %

质量测量公差: ± 0.1 %

5.4 Electrochemical Characteristics 电化学性能

Unless otherwise specified, the battery should be fresh battery and tested by standard charge and standard discharge.

除非有特殊说明, 否则所有样品均为新鲜电池, 且按标准充电和标准放电方式进行测试。

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No. 序号	Item 测试项目	Test method and conditions 测试方法与条件	Criterion 性能标准
5.4.1	Rate discharge capability 倍率放电性能	Standard charge followed by constant current discharge to 2.5 V at specified discharge rates at $25 \pm 2^\circ\text{C}$. 按标准充电方式充电后, 在 $25 \pm 2^\circ\text{C}$ 下以给定放电倍率恒流放电至 2.5 V。	$\frac{\text{discharge capacity at } 3\text{C}}{\text{discharge capacity at } 1\text{C}} \geq 90\%$ $\frac{3\text{C 放电容量}}{1\text{C 放电容量}} \geq 90\%$
5.4.2	RT cycle life 常温循环寿命	Charge: 0.5 C constant current charge to 4.2 V followed by 4.2 V constant voltage charge to cut-off current $\leq 0.02\text{ C}$ (58 mA) Discharge: 1 C constant current discharge to cut-off voltage $\leq 2.75\text{ V}$. 充电: 以 0.5 C 恒流充电至 4.2 V 后, 以 4.2 V 恒压充电至电流 $\leq 0.02\text{ C}$ (58 mA) 放电: 以 1 C 恒流放电至截止电压 $\leq 2.75\text{ V}$ 。	$\frac{\text{Discharge capacity of 501th cycle}}{\text{Original discharge capacity}} \geq 90\%$ $\frac{\text{第 501 次循环的放电容量}}{\text{初始放电容量}} \geq 90\% \text{ or }$ $\frac{\text{Discharge capacity of 1001th cycle}}{\text{Original discharge capacity}} \geq 80\%$ $\frac{\text{第 1001 次循环的放电容量}}{\text{初始放电容量}} \geq 80\%$
5.4.3	High-low temperature discharge performance 高低温放电性能	Standard charge followed by 1 C (2900 mA) constant current discharge to 2.5 V at specified temperature. Discharge cut-off voltage shall be 2.0 V when discharge temperature is below -10°C . 按标准充电方式充电后, 在指定温度下以 1 C (2900 mA) 电流恒流放电至截止电压 2.5 V。当放电温度低于 -10°C 时, 放电截止电压为 2.0 V。	$\frac{\text{discharge capacity at } -20^\circ\text{C}}{\text{discharge capacity at } 25^\circ\text{C}} \geq 70\%$ $\frac{-20^\circ\text{C 放电容量}}{25^\circ\text{C 放电容量}} \geq 70\%$ $\frac{\text{discharge capacity at } 60^\circ\text{C}}{\text{discharge capacity at } 25^\circ\text{C}} \geq 90\%$ $\frac{60^\circ\text{C 放电容量}}{25^\circ\text{C 放电容量}} \geq 90\%$
5.4.4	Storage performance at 25°C (100% SOC) 25°C 满电存储性能	(1) Standard charge 标准充电方式充电 (2) Stored at 25°C for 28 days 于 25°C 下存储 28 天 (3) Standard discharge	$\frac{\text{Residual capacity after 28 days storage}}{\text{Original discharge capacity}} \geq 85\%$ $\frac{\text{存储 28 天残余容量}}{\text{初始容量}} \geq 85\%$

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		标准放电方式放电	$\frac{\text{Recovery capacity after 28 days storage}}{\text{Original discharge capacity}} \geq 90 \%$ $\frac{\text{存储 28 天恢复容量}}{\text{初始容量}} \geq 90 \%$
5.4.5	High temperature storage performance (100% SOC) 高温满电存储性能	(1) Standard charge 标准充电方式充电 (2) Stored at 60 °C for 7 days 于 60 °C 下存储 7 天 (3) Kept at 25 °C for 5 hours 于 25 °C 搁置 5 小时 (4) Standard discharge 标准放电方式放电	$\frac{\text{Residual capacity after 7days storage}}{\text{Original discharge capacity}} \geq 85 \%$ $\frac{\text{存储 7 天残余容量}}{\text{初始容量}} \geq 85 \%$ $\frac{\text{Recovery capacity after 7days storage}}{\text{Original discharge capacity}} \geq 90 \%$ $\frac{\text{存储 7 天恢复容量}}{\text{初始容量}} \geq 90 \%$
5.4.6	Storage performance at 45 °C (50% SOC) 45 °C 半电存储性能	(1) Standard charge 标准充电方式充电 (2) 1 C constant current discharge for 30 minutes 以 1 C 恒流放电 30 分钟 (3) Stored at 45 °C for 28 days 于 45 °C 下存储 28 天 (4) Kept at 25 °C for 5 hours 于 25 °C 搁置 5 小时 (5) Standard charge 标准充电方式充电 (6) Standard discharge 标准放电方式放电	$\frac{\text{Recovery capacity after 28days storage}}{\text{Original discharge capacity}} \geq 90 \%$ $\frac{\text{存储 28 天恢复容量}}{\text{初始容量}} \geq 90 \%$

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	Testing method 测试条件与方法	Criterion 性能标准
5.5.1	Overcharge test 过充测试	After fully charged according to the standard charge method, the battery is charged at 1 C till the ending conditions: the battery voltage reaches 1.5 times of the cut-off voltage of standard charge or the 1 C charge time reaches 60 min. The battery is observed for 60 min afterwards. 电池以标准充电方式充满电，然后以 1 C 充电至电压达到充电终止电压的 1.5 倍或充电时间达 60 min 后停止充电，观察 60 min。	No fire, no explosion 电池不起火、不爆炸

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5.5.2	130 °C hot oven test 130 °C 热箱测试	After fully charged according to the standard charge method, the battery is put in a oven at a heating speed of 5 °C per minute until the temperatures of both the battery and the oven reach 130 °C. The battery shall be maintained at 130 °C for 30 min or until a fire or explosion is obtained. 电池按照标准充电方式充满电后，将电池放进热箱里，然后将热箱按 5 °C/min 升温到 130 °C，当电池的温度也达到 130 °C 时，电池在热箱 130 °C 环境下保持 30 min 或者电池起火爆炸为止。	No fire, no explosion 电池不起火、不爆炸
5.5.3	Crush test 挤压测试	After fully charged according to the standard charge method, the battery is crushed with a half cylinder, of which the radius is 75 mm and which is longer than the battery. The direction of the crushing force shall be vertical to axis of the cylinder. Stop testing when the battery voltage reaches 0 V or the deformation extent reaches 30% or the crushing force reaches 200 kN, and the battery is observed for 1 h. 电池以标准充电方式充满电，按垂直于电池极板方向施压，挤压头为半径 75 mm 的半圆柱体，半圆柱体长度 (L) 大于被挤压电池的尺寸，当受挤压电池电压达到 0 V 或变形量达到 30 %或挤压力达到 200 kN 后停止挤压，观察 1 h。	No fire, no explosion 电池不起火、不爆炸
5.5.4	Short circuit test 短路测试	After fully charged according to the standard charge method, the battery is short-circuited by connecting the positive and negative terminals with a copper wire for 10 min. The wire resistance shall be less than 5 mΩ. The battery is observed for 1 h after test. 以标准充电方式充满电后，用内阻小于 5 mΩ 的电线将电池正、负极外部短路 10 min，观察 1 h。	No fire, no explosion 电池不起火、不爆炸
5.5.5	Over discharge test 过放测试	After fully charged according to the standard charge method, the battery is discharged at 1 C for 90 min and then observed for 1 h. 电池按标准充电后以 1 C 电流放电 90 min，观察 1 h。	No fire, no explosion, no leak 电池不起火、不爆炸、不漏液
5.5.6	Drop test 跌落测试	After fully charged according to the standard charge method, the battery is dropped with both ends from a height of 1.5 m onto the cement floor. Afterwards, the battery is observed for 1 h. 电池按标准充电后分别以正负端子两个方向从 1.5 m 高度处自由跌落到水泥地面上。	No fire, no explosion, no leak 电池不起火、不爆炸、不漏液
5.5.7	Seawater immersion 海水浸泡	After fully charged according to the standard charge method, the battery is immersed in sea water (3.5 wt% of NaCl) for 2 h. Afterwards, the battery is observed for 1 h. 电池按标准充电后完全浸入 3.5% NaCl 溶液（质量百分比，模拟常温下的海水成分）中 2 h，并观察 1 h。	No fire, no explosion, no leak 电池不起火、不爆炸

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5.5.8	Thermal cycling 温度循环	After fully charged according to the standard charge method, the battery is put in an oven. Then set the oven temperature as follows: (1) Decrease the chamber temperature from RT to -40 °C within 60 min and keep the battery under -40 °C for 90 min; (2) Raise the chamber temperature from -40 °C to 25 °C within 60 min; (3) Raise the chamber temperature from 25 °C to 85 °C within 90 min and keep the battery under 85 °C for 110 min; (4) Decrease the chamber temperature from 85 °C to 25 °C within 70 min; (5) Repeat the sequence for a further 4 cycles. Afterwards, the battery is observed for 1 h. 电池按标准充电方式充电后放入温度箱中, 然后按以下步骤调节温度箱温度: (1) 在 60 min 内由 25 °C 降温至-40 °C, 保持 90 min; (2) 在 60 min 内温度升至 25 °C; (3) 在 90 min 内温度升至 85 °C, 保持 110 min; (4) 在 70 min 内降温至 25 °C; (5) 循环以上步骤 4 次。 结束后观察 1 h。	No fire, no explosion, no leak 电池不起火、不爆炸、不漏液
5.5.9	Low pressure 低气压	After fully charged according to the standard charge method, the battery is put at the pressure of 11.6 kPa for 6 h. Afterwards, the battery is observed for 1 h. 电池以标准充电方式充满电后将其放入低气压箱中, 调节试验箱中气压为 11.6 kPa, 温度为室温, 静置 6 h, 之后观察 1 h。	No fire, no explosion, no leak 电池不起火、不爆炸、不漏液
Note 备注	Unless otherwise specified, all safety tests above shall be conducted in ventilated environment at 25 ± 2 °C and under protective equipment. 除特殊说明, 以上所有安全测试均应在 25 ± 2 °C 通风橱中, 且附带有保护装置的环境下进行。		

6 Package picture 包装图片



Small box

big box

pallet

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

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7 Shipment 出货

The battery 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.

单体电池按 3.6 ~ 3.9 V 的充电电压或客户要求出货，电池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 battery warranty period is made according to business contract. BAK will replace no batterys for free after shipment if there are problems due to customers' abuse or misuse instead of BAK's manufacturing failure.

电池的保质期限依合同而定，交货之后，如非郑州比克电池有限公司的制程原因，而是客户的滥用和误用造成的电池质量问题，郑州比克电池有限公司不承诺免费更换。

BAK will not be responsible for the trouble caused by handling in violation of cautions in instructions.

郑州比克电池有限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 the trouble caused by matching electric circuit, battery pack and charger.

郑州比克电池有限公司对与电路、电池组和充电器搭配使用所产生的问题不承担任何责任。

BAK will not be responsible for any defect of batterys caused during assembling after acceptance.

出货后客户在电池组装过程中产生的不良电池不在郑州比克电池有限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 battery needs to be stored for a long time, the battery's storage voltage should be 3.6 ~ 3.9 V. Also, it is recommended to charge the battery every six months. 关于长期存储： 若电池需长期存储，电池的存储电压应该为 3.6 ~ 3.9 V。同时，建议每 6 个月对电池进行充电。		

10 Warning and cautions in handling the lithium-ion battery 电池使用时警告事项及注意事项

Battery abuse can cause damage to the battery and/or personal injury. Please read and observe the standard battery precautions below before utilization.

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电池滥用可能会造成对电池的损害或对人身伤害，在使用前，请仔细阅读以下安全守则。

Note 1, the customer is required to contact ZhengZhou BAK Power Battery Co., Ltd. in advance, if and when the customer needs other applications or operating conditions not described in this specification.

注释 1，客户如需在本规格书所述之外的条件下使用电池，请提前联系郑州比克电池有限公司。

Note 2, ZhengZhou BAK Power Battery Co., Ltd. will take no responsibility for any accident when the battery is used under other conditions not described in this specification.

注释 2，如在本规格书所述条件之外使用电池而发生事故，郑州比克电池有限公司不承担任何责任。

Warnings 警告

To prevent damage or injury from battery leaking, heating and/or explosion, please observe the following precautions before use. (It should be indicated especially in manual or instruction for users.)

为避免因电池泄漏、发热和/或爆炸造成伤害，请在使用前注意以下预防措施。（应在使用说明手册或说明书中特别注明）

1	Do not use and leave the battery near a heat source such as fire or heater.
	禁止在火、加热器待高温热源附近使用和留置电池。
2	Do not use or leave the battery at very high temperature conditions (e.g., strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or catch 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）使用或留置电池，否则可能会引起电池过热、起火、功能失效和寿命减短。
3	Do not short circuit, over-charge or over-discharge the battery.
	不要将电池短路、过充或过放。
4	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。
5	Don't reverse the positive and negative terminals
	严禁颠倒正负极使用电池。
6	Do not disassemble or modify the battery.
	不要拆卸或修整电池。
7	Do not transport or store the battery together with metal objects such as necklaces, hairpins, coins, etc.
	禁止将电池与金属，如发夹、项链等一起运输或贮存。
8	Make sure the battery is not with conspicuous damage or deformation.
	不要使电池受到明显的损害或变形。
9	Don't connect the battery to an electrical outlet directly.
	严禁将电池直接插入电源插座。
10	If the battery leaks and the electrolyte splashes into the eyes, rinse the eyes with clean running water immediately for at least 15 minutes, and go to hospital for treatment if necessary.
	如果电池发生泄露，电解液进入眼睛，请立即用流动的清水冲洗眼睛至少 15 min，必要时请立即前往医院接受治疗。
11	Mixed use of batteries of different types is not allowed.
	禁止与液态锂离子或不同型号的锂电池混合使用。

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12	Keep the battery away from babies. 避免让小孩接触电池。
13	Do not directly solder the battery and pierce the battery with a nail or other sharp objects. 禁止直接焊接电池和用钉子或其它利器刺穿电池。
14	Do not strike, throw or trample the battery. 禁止敲击、抛掷或踩踏电池等。
15	Use the battery charger specifically for that purpose when charging. 请选用锂离子电池专用充电器进行充电。
16	Please separate batterys of different electrochemical systems from one another when disposing of secondary batterys. 二次电池处理时，请将电池和其他电化学体系的产品分开。
17	Clean the terminals with a dry cloth before use if the battery terminals are dirty. 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。
18	Batteries should be removed from the device or charger immediately and not used again if they are over heat, give off odor, discolor or deform, or appear abnormally in any way during use, charging and storage. 如果电池发出异味、发热、变色、变形，或在使用、贮存和充电过程中出现任何异常现象，应立即将电池从装置或充电器中移离并停用。
19	The battery replacement shall be done only by either battery supplier or device supplier instead of the user. 更换电池应由电池供应商或设备供应商完成，用户不得自行更换。
20	Please tape the terminals to insulate batteries before discarding them in case of fire and explosion. 废弃电池之前应用绝缘纸包住电极，以防起火、爆炸。
21	Do not use batterys in strong electrostatic and magnetic occasions, otherwise, it can cause safety problems easily. 禁止在强静电和强磁场的地方使用，否则易带来不安全的隐患。
22	Use of damaged batterys is not permitted. 禁止使用已损坏的电池。
23	Make sure package designing will not cause battery damages. 电池外壳设计和包装禁止损伤电池。
24	Battery packing should be conducted strictly according to level range, any misuse of different levels should not be permitted. 电池配组时需严格按等级执行，不能跨等级成组。
25	Disassembling batterys from pack or module is not permitted unless under the guidance of professional technicians. 严禁将电池从电池包或电池模组中拆卸，除非在专业技术人员的指导下进行。

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

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

本型号锂离子电池符合本公司《有害物质与材料管理规范》要求或参照客户要求执行。

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12 Contact information 联系方式

If you have any questions regarding the battery, 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)

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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	无	初	张静	2016-9-14
A/01	1、图1中电池直径由“Φ18.65 Max”更改为“Φ18.5 Max”。 2、能量密度由“216 Wh/Kg (1 C)”更改为“220 Wh/Kg (1 C)”。 3、电池尺寸由“Diameter: 18.65 mm Max 最大直径: 18.65 mm”更改为“Diameter: 18.5 mm Max 最大直径: 18.5 mm”。 4、电池重量由“≤ 50 g”更改为“≤ 49 g”。	P2、P3	张静	2016-10-27
A/02	1、存储温度:“3 months: -20 ~ 45 °C 1 month: -20 ~ 60 °C”, 变更为“3 months: 25 ~ 45 °C 1 month: 45 ~ 60 °C。”; 2、“cut-off current ≤ 0.01 C (30 mA)”变更为“cut-off current ≤ 0.02 C (58 mA)”。 3、循环测试“End-of-discharge Voltage: 2.5 V”变更为“cut-off voltage ≤ 2.75 V”。 4、存储温度:“3 months: -20 ~ 45 °C 1 month: -20 ~ 60 °C”, 变更为“3 months: 25 ~ 45 °C 1 month: 45 ~ 60 °C”。 5、电流“1 C = 3000 mA”变更为“1 C = 2900 mA”; 6、增加“典型容量 3000 mAh @ 1 C”。	P2、P4、P8、P1-P5	张静	2017-3-25
A/03	1、充电电压和放电终止电压删除公差。 2、调整部分文字格式。 3、存储湿度由“0 ~ 90% RH”调整为“0 ~ 60% RH”。	P2、P3	张静	2017-4-10
A/04	修改标点符号、字体等格式。	P1-P11	张静	2017-4-13
A/05	1、“Typical capacity”更改为“Minimum capacity”。 2、“典型容量”更改为“最低容量”。	P2	张静	2017-5-25
A/06	1、“220 Wh/Kg”更改为“222 Wh/Kg(1 C Min.)”。 2、电池重量由“≤ 49 g”更改为“≤ 47 g”。	P2	张静	2017-7-12
A/07	电池高度由“最大高度 65.2mm”改为“高度: 64.85 ± 0.25 mm”、电池直径由“最大直径: 18.5mm”改为“直径: 18.35 ± 0.15 mm”。	P2、P3	秦春阳	2017-8-16