



深圳市根巨科技有限公司
SHENZHEN GENJU TECHNOLOGY CO.,LTD

锂离子电池规格书

Lithium Ion Battery Specifications

类型：圆柱型通用电池

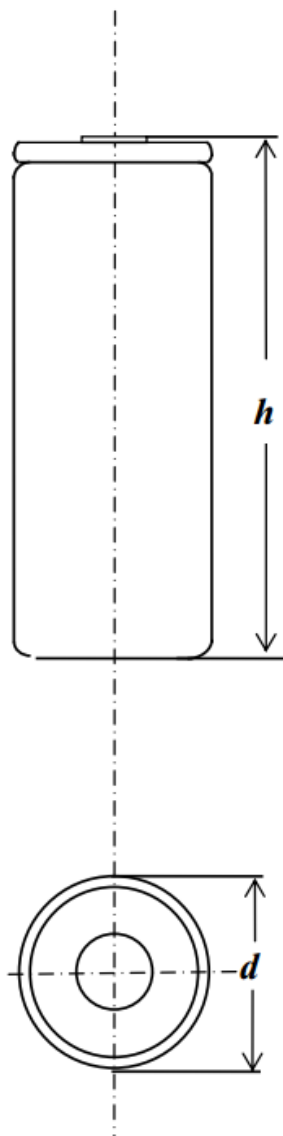
Type: Normal Cylindrical Battery

型号 (Model) : WORWOLF18650 15ML

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产品规格 (Product Specifications)



类型	圆柱通用型电池
Type	Normal Cylindrical Battery
型号(Model)	WORWOLF18650
尺寸(包括热缩外套)	15ML
Dimension (Including shrink sleeve/label)	
直径 (Diameter), d	18.40±0.20mm
高度 (Height), h	65.00±0.30mm
重量 (Mass)	39.0±2.0g
标称电压 (Nominal voltage)	3.2 V
容量 Capacity	
C: 典型值 (Typical)	1500mAh
最小值 (minimum)	1450mAh
恒压充电电压 (CV Charge voltage)	
最大(Maximum)	3.65±0.05V
最大持续充电电流	
Maximum continuous charge current	1500mA
最大放电电流 Maximum discharge current	
连续 Continuous	7500mA
放电终止电压 (Discharge cut-off voltage)	
	2.5 V
内阻(Internal impedance) (25±2°C)	
	≤35 mΩ
使用温度 (Operation temperature)	
放电(Discharge)	
	-30~85 °C
充电(Charge)	
	0~85 °C
0~10°C 充电 (charge)	≤0.2C (300mA)
10~85°C 充电 (charge)	≤1.0C (1500mA)
保存温度(Storage temperature)	
	-20~25°C
极限温度 (Limiting temperature)	
	≤100°C
100°C/96h	容量保持率(Capacity retention ratio)≥87%
100°C/96h	容量恢复率(Capacity recovery rate)≥89%



1. 适用范围 (Scope)

本规格书适用于深圳市根巨科技有限公司生产的锂离子电池。

This specification shall be applied to Lithium ion rechargeable battery cell supplied by SHENZHEN GENJU TECHNOLOGY CO.,LTD.

2. 测试环境 (Testing environment)

除非特别要求, 本文件所有的测试均在 $25\pm 2^{\circ}\text{C}$ 环境下进行:

Unless otherwise specified, all tests stated in this document shall be performed at $25\pm 2^{\circ}\text{C}$.

3. 性能及测试条件 (Performance and test conditions)

标准充电: $0.5\text{C}=750\text{mA}$ 恒流充电至 3.65V; 然后 3.65V 恒压充电至电流小于等于 0.01C 。

Standard charge: $0.5\text{C}=750\text{mA}$ constant current (CC) charge to 3.65V, followed by 3.65V constant voltage (CV) charge until current taper to $\leq 0.01\text{C}$.

快速充电: $25\pm 2^{\circ}\text{C}$ 下, 1C 恒流充电至 3.65V, 再以 3.65V 恒压充电至电流衰减为 0.01C 。

“Rapid Charge” means charging the cell with charge current of 1C (2600mA) and constant voltage 3.65V at $25\pm 2^{\circ}\text{C}$, 0.01C (15mA) cut-off.

标准放电: $0.2\text{C}=300\text{mA}$ 恒流放电至 2.5V。

Standard discharge: $0.2\text{C}=300\text{mA}$ constant current (CC) discharge to 2.5V.

序号 No.	测试项目 Test item	测试条件 Test conditions	要求 Requirements
3.1	外观 Outside Appearance	目测 Visual check	无污迹、无变形和划伤 No prominent stain and deformation, nor damage.
3.2	尺寸 Outside Dimensions	游标卡尺 Vernier clippers	直径 Diameter $18.40\pm 0.20\text{mm}$ 高度 Height $65.00\pm 0.30\text{mm}$
3.3	出货时开路电压 Open circuit voltage at delivery	出货后 1 周以内测定。 Voltage within 1 week after delivery	3.20V 或以上 3.20V or more
3.4	出货状态内阻 Internal resistance at delivery	出货后 1 周以内交流四线法 (1kHz) 测定。 The cell impedance shall be measured by AC method (1kHz) within 1 week after delivery.	$35\text{m}\Omega$ 或以下 $35\text{m}\Omega$ or less
3.5	最小容量 Minimum capacity	标准充电后, 标准放电 Standard charge and discharge	1450mAh 或以上 1450mAh or more
3.6	倍率放电性能 (Rate Discharge Performance)	$25\pm 2^{\circ}\text{C}$ 下按照“标准充电”充满电, 分别按照左边放电方式进行放电, 记录电池放电容量, 并计算与电池 0.2C 放电容量百分比。 Charge the battery fully at $25\pm 2^{\circ}\text{C}$ according to the "standard charge", discharge the battery in the left way, record the discharge capacity and calculate the percentage to the 0.2C capacity of the battery.	$1.0\text{C} / 0.2\text{C} \geq 92\%$ $3.0\text{C} / 0.2\text{C} \geq 90\%$



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3.7	温度特性 Temperature-rate performance	<p>1) 常温下标准充电 Standard CH at R.T 将测试电池放入-20°C 恒温箱, 搁置 4 小时 Keep batteries in a icebox with ambient temperature of -20°C for 4 hours. -20°C 下 0.2C 放电至终止电压, 计算放电容量与标称容量的百分比。 DCH at 0.2C to the end of DCH voltage at -20°C, Calculate the capacity ratio with the nominal capacity.</p> <p>2) 常温下标准充电 Standard CH at R.T 将测试电池放入 0°C 恒温箱, 搁置 4 小时 Keep batteries in a icebox with ambient temperature of 0°C for 4 hours. 0°C 下 0.5C 放电至终止电压, 计算与标称容量的百分比。 DCH at 0.5C to the end of DCH voltage at 0°C; Calculate the capacity ratio with the nominal capacity.</p> <p>3) 常温下标准充电 Standard CH at RT 将测试电池放入 60°C 恒温箱, 搁置 4 小时 Keep batteries in a icebox with ambient temperature of 60°C for 4 hours. 60°C 下 0.5C 放电至终止电压, 计算与标称容量的百分比。 DCH at 0.5C to the end of DCH voltage at 60°C; Calculate the capacity ratio with the nominal capacity.</p> <p>3) 常温下标准充电 Standard CH at RT 将测试电池放入-30°C 恒温箱, 搁置 4 小时 Keep batteries in a icebox with ambient temperature of 60°C for 4 hours. -30°C 下 0.2C 放电至 1.8V, 计算与标称容量的百分比。 DCH at 0.2C to the end of 1.8V voltage at -30°C; Calculate the capacity ratio with the nominal capacity.</p>	<p>1) -20°C 容量百分比≥55% -20°C Capacity ratio ≥55%</p> <p>2) 0°C 容量百分比≥85% 0°C Capacity ratio ≥85%</p> <p>3) 60° C 容量百分比 ≥ 95% 60° C Capacity ratio ≥ 95%</p> <p>4) -30°C 容量百分比 ≥ 45% -30°C Capacity ratio ≥45%</p>
3.8	常温循环寿命 Cycle Life with ambient temperature	<p>1、1C 充电后搁置 10 分钟 1C charge, and then rest 10min;</p> <p>2、1C 放电至 2.5V 后搁置 10 分钟 1C discharge to 2.5V, and then rest 10min; 共进行充放电循环 1000 次。 1000 cycles of 1C charge and 1C discharge.</p>	<p>1000 次放电容量/ 首次放电容量≥80% The ratio of the 1000th discharge capacity and the first cycle ≥80%</p>
3.9	高温循环寿命 Cycle Life with high temperature	<p>1、在 85°C 恒温箱下 1C 充电后搁置 10 分钟 1C charge at 85°C±2°C, and then rest 10min;</p> <p>2、85°C 恒温箱下 1C 放电至 2.5V 后搁置 10 分钟 1C discharge to 2.5V at 85°C±2°C, and then rest 10min; 共进行充放电循环 300 次。 300 cycles of 1C charge and 1C discharge at 85°C±2°C</p>	<p>300 次放电容量/ 首次放电容量≥80% The ratio of the 300th discharge capacity and the first cycle ≥80%</p>



4. 存储性能(Storing Performance)

序号 No.	测试项目 Test Item	测试条件 Test Conditions	规格 Specifications
4.1	常温存储 (Room temperature storage)	1、常温下标准充电, 标准方式放电, 记为初始容量; Standard charge and discharge, recorded as Initial capacity 2、常温下标准充电后, 置于 25°C±2°C 环境下存储 28 天; Standard charge and then storage at 25°C±2°C for 28days 3、标准方式放电, 记为剩余容量; Standard discharge, recorded as Residual capacity 4、标准方式充电, 标准方式放电, 记为恢复容量; Standard charge and discharge, recorded as Recovery capacity	剩余容量/初始容量 ≥90%; Residual capacity/ Initial capacity≥90% 恢复容量/初始容量 ≥95%; Recovery capacity/ Initial capacity≥95%
4.2	60°C 高温存储 (High temperature storage)	1、常温下标准充电, 标准方式放电, 记为初始容量; Standard charge and discharge, recorded as Initial capacity 2、常温下标准充电后, 置于 60°C±2°C 环境下存储 30 天; Standard charge and then storage at 60°C±2°C for 30 days 3、按照标准方式放电, 记为剩余容量; Standard discharge, recorded as Residual capacity 4、按照标准方式充电, 标准方式放电, 记为恢复容量; Standard charge and discharge, recorded as Recovery capacity	剩余容量/初始容量 ≥88%; Residual capacity/ Initial capacity≥88% 恢复容量/初始容量 ≥90%; Recovery capacity/ Initial capacity≥90%
4.3	85°C 高温存储 (High temperature storage)	1、常温下标准充电, 标准方式放电, 记为初始容量; Standard charge and discharge, recorded as Initial capacity 2、常温下标准充电后, 置于 85°C±2°C 环境下存储 7 天; Standard charge and then storage at 85°C±2°C for 7 days 3、按照标准方式放电, 记为剩余容量; Standard discharge, recorded as Residual capacity 4、按照标准方式充电, 标准方式放电, 记为恢复容量; Standard charge and discharge, recorded as Recovery capacity	剩余容量/初始容量 ≥80%; Residual capacity/ Initial capacity≥80% 恢复容量/初始容量 ≥85%; Recovery capacity/ Initial capacity≥85%

5. 安全评估 (Safety Evaluation)

序号 No.	测试项目 Test Item	测试条件 Test Conditions	规格 Specifications
5.1	外部短路 External short circuit	标准充电后, 电池正负极间接80±20mΩ以下内阻电线短路至1小时以上。 The cell shall be standard charged. The plus and minus terminals of the cell shall be short circuited with a wire having 80±20mΩ or less resistance, and left for 1 hour.	不起火, 不爆炸 No fire, No explode
5.2	过充电 Over charge	标准充电后, 以 1C 的电流, 10V 连续充电 2.5 小时。 After standard charged, the cell shall be charged for 2.5 hours using 10V, 1C power supply.	不起火, 不爆炸。 No fire, nor explosion
5.3	过放电 Over discharge	标准充电后, 1C 放电 2.5 小时。 The cell shall be standard charged, and discharged at 1C for 2.5 hours.	不起火, 不爆炸, No fire, No explode,



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5.4	跌落测试 Drop Test	标准充电后, 电池从100cm高处落下来到硬木上, X、Y、Z 面各落下一次。 The cell shall be standard charged and then dropped onto hard wood from the height of 100 cm in 3 directions X, Y, and Z once at each direction.	不起火, 不爆炸 No fire, No explode
5.5	热冲击试验 Hot Oven Test	将充满电的电池放在重力对流或循环空气的烘箱中进行加热, 烘箱的温度以每分 $5\pm 2^{\circ}\text{C}$ 的速率上升到 $130\pm 2^{\circ}\text{C}$ 后保温 30 分钟。 The charged batteries are heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5\pm 2^{\circ}\text{C}$ per minute. The oven is to remain for 30 minutes at $130\pm 2^{\circ}\text{C}$ before the test is discontinued.	不起火, 不爆炸。 No fire, nor explosion
5.6	挤压实验 Crush test	将电池放在两个平面之间, 使用直径 32mm 的圆柱体施加压力, 压强持续增加到 17.2MPa, 压力达到 13kN 后释放压力。 The force for the crushing is to be applied by a hydraulic ram with a 1.25 inch (32mm) diameter piston. The crushing is to be continued until a pressure reading of 17.2MPa is reached on the hydraulic ram, applied force of 13kN.	不起火, 不爆炸。 No fire, nor explosion
5.7	重物冲击 Impact Test	将充满电的样品放入实验箱中; 将一直径 $\Phi 15.8\text{mm}$ 的棒放在样品中心, 让重量 9.1kg 的重物从 610mm 的高度落到实验样品上。 Put the fully charged sample into the experimental chamber; A rod with diameter of 15.8mm is placed in the center of the sample and a weight of 9.1kg is dropped onto the sample from 610mm.	不起火, 不爆炸。 No fire, nor explosion

6. 电池焊接部位 (Welding allowable part on a cell)

电池侧壁不可焊接。

Welding is not allowed on cell side wall.

7. 绝缘 (Insulation)

电池罐上端 (正极盖帽侧) 及侧面用绝缘材料包覆。

Can top face (positive terminal) and side is covered with insulation tubing.

8. 出货前电池充电态 (Charge State of Battery before shipment)

约 10% 带电态。

Approximately 10% charged baseline.

9. 储存 (Storage)

请将电池存放在低温 (建议低于 20°C)、低湿、无粉尘、无腐蚀性气体的环境中。

Store the battery at low temperature (below 20°C is recommended), low humidity, no dust and no corrosive gas atmosphere.

10. 保证 (Warranty)

电池出货 1 年内由于本公司制造原因导致不良发生, 本公司将无偿修理或更换新电池。

Our corporation will repair the cells or batteries for free or replace with new product if there is any fault which is due to material or workmanship during one year from the date of delivery.

锂离子二次电池的使用操作禁止及注意事项



Handling Precaution and Prohibitions of Lithium Ion Rechargeable Cells and Batteries

【危险!】[Danger!]

■ 防止电气误用

■ Electrical misusage

必须使用专用充电器。

Use dedicated charger.

电池只能用于指定的用途。

Use or charge the battery only in the dedicated application.

不要对电池反向充电。

Don't charge the battery reversely.

■ 防止环境误用

■ Environmental misusage

请勿将电池靠近火源或热源。

Don't leave the battery near the fire or a heated source.

不要将电池投入火中。

Don't throw the battery into the fire.

不要在温度超过 60°C 的地方使用电池或对其充电。

Don't charge or use the battery in a car or similar place where inside of temperature may be over 60°C.

不要将电池沾湿, 或将其浸泡或投进水或海水中。

Don't immerse, throw, wet the battery in water / seawater.

■ 其他

■ Others

不要把电池储存在装有钥匙、项链、发夹、硬币、金属物体的口袋中, 或与螺丝包在一起。

Don't store the battery in a pocket or a bag together with metallic objects such as keys, necklaces, hairpins, coins, or screws.

不要用金属导体短路电池正负极。

Don't short circuit (+) and (-) terminals with metallic object intentionally.

不要用烙铁等对电池进行局部加热。

Don't heat partial area of the battery with heated objects such as soldering iron.

不要用重物捶打电池。

Don't hit with heavy objects such as a hammer, weight.

不要踩踏电池, 或将其扔或掉在硬地板上, 以避免机械冲击。

Don't step on the battery and throw or drop the battery on the hard floor to avoid mechanical shock.

不要对电池包括保护电路进行拆卸或改装。

Don't disassemble the battery or modify the battery design including electric circuit.

不要使用严重扭曲或变形的电池。

Don't use seriously scared or deformed battery.

不要把电池放进微波炉、烘干机或高压容器中。

Don't put the battery into a microwave oven, dryer or high-pressure container.

不要与其他制造商生产的电池、不同类型或不同规格的电池(如干电池、镍氢电池或镍镉电池)一同使用或组合。

Don't use or assemble the battery with other makers' batteries, different types and/or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries.

【警告!】[Warning!]

不要将新旧电池混用或组装。

Don't use or assemble old and new batteries together.

若在规定时间内充电仍未完成, 要停止电池充电。



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Stop charging the battery if charging isn't completed within the specified time.

在使用、充电或储存过程中, 若发现电池发热异常、变色、变形或其他反常情况, 请停止使用电池。

Stop using the battery if the battery becomes abnormally hot, discoloration, deformation, or abnormal conditions is detected during use, charge, or storage.

若电池漏液或产生臭味, 请将其立刻远离火源。

Keep away from fire immediately when leakage or foul odors are detected.

如果液体粘到皮肤或衣服上, 立即用清水冲洗。若液体进入到眼睛, 不要揉擦, 用清水冲洗并马上就医。

If liquid leaks onto your skin or cloths, wash well with fresh water immediately. If liquid leaking from the battery gets into your eyes, don't rub your eyes and wash them with clean water and go to see a doctor immediately.

若电池端子脏污, 请用干布擦拭后再使用电池。

If the terminals of the battery become dirty, wipe with a dry cloth before using the battery.

电池在以下温度范围内使用。不要超出这个范围。

The battery can be used within the following temperature ranges. Don't exceed these ranges.

充电温度范围: 0~85°C

Charge temperature ranges: 0~85°C

放电温度范围: -30~85°C

Discharge Temperature ranges: -30~85°C

储存电池温度不得高于 85°C

Store the battery at temperature below 85°C

【注意！】[Caution!]

■ 防止电气误用

■ Electrical misuse

电池必须以恒流恒压 (CC/CV) 模式充电。

Battery must be charged with constant current-constant voltage (CC/CV).

充电电流必须控制在电池规格书规定值内。

Charge current must be controlled by specified value in Cell specification.

放电电流必须控制在电池规格书指定范围内。放电截止电压不得低于 2.5V/只。

Discharge current must be controlled by specified value in Cell's specification. Cut-off voltage of discharging must be over 2.5V/cell.

请将电池放在远离孩童的地方, 避免发生吞食意外。若是年幼者使用电池, 其监护人应为其解释适当的处理方法和预防措施。

Keep the battery away from babies and children to avoid any accidents such as swallow. If younger children use the battery, their guardians should explain the proper handling method and precaution before using.

在使用电池前, 请务必阅读用户手册和处理防范措施。

Before using the battery, be sure to read the user's manual and precaution of it's handling.

在使用充电器前, 请务必阅读充电器用户手册。

Before using charger, be sure to read the user's manual of the charger.

在安装和移除工作态的电池前, 请务必阅读用户手册。

Before installing and removing the battery from application, be sure to read user's manual of the application.

若电池使用时间比平常短, 请更换。废弃电池前, 用绝缘胶带缠住电池终端。

Replace the battery when using time of battery becomes much shorter than usual. Cover terminals with insulating tape before proper disposal.

若电池需要长期保存, 电池应退出使用, 存储在温度、湿度都较低的地方。

If the battery is needed to be stored for a long period, battery should be removed from the application and stored in a place where humidity and temperature are low.

电池在充电、使用和储存时, 请将其远离带有静电的物体材料。

While the battery is charged, used and stored, keep it away from object materials with static electric chargers.

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有关电池组在用电器具或充电器中的位置设计

Design of positioning the battery pack in application and charger

为了防止由高温引起的电池性能恶化，电池应放置在远离使用和充电过程中的发热区域。

To prevent the deterioration of the battery performance caused by heat, battery shall be positioned away from the area where heat is generated in the application and the charger.