

产 品 规 格 确 认 书

Specification for Lithium-ion Rechargeable Cell

客户名称:

Customer Name _____

产品名称:

Model Name FLY-18650-3000mAh 3.7V

物料编码:

Model Number FLY-18650-3000mAh

送样日期:

Date: _____

◆ 出厂签章:

工程部 PIE	品质部 QA	业务部 B&D	批准 Approved
黄烈清	王仁树	王培	陈远洪
送样数量 sample quantity:		确认书份数 Copy:	

◆ 客户确认签章:

审 核 Checked	批 准 Approved	确认签章 Company Stamp

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规格书修订记录 Revision history

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1. 适用范围 Scope

本标准规定了由远阳公司生产的锂离子电芯技术要求，测试方法及注意事项。

This standard specifies the technical requirements, testing methods and precautions for lithium-ion batteries produced by FLYOUNG Company.

2. 电芯结构 Construction

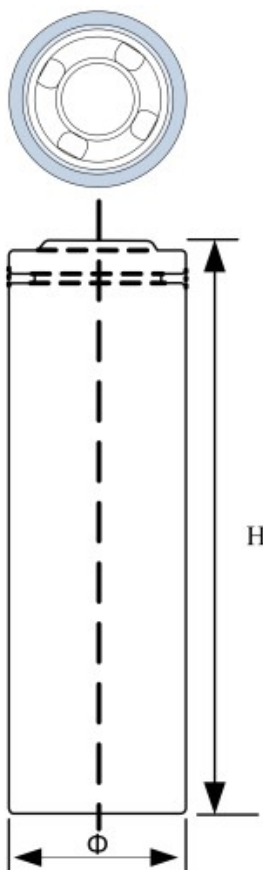
电芯由正极、负极、隔膜、钢壳和盖帽等组成。

A cell is made of cathode, anode, separator, steel can and header etc.

3. 型号 Model

FLY 18650-3000mAh 3.7V

4. 电芯尺寸 Battery size



NO.	项 目	备 注
1	直径Φ	Max: ϕ 18.6mm (含 PET)
2	高度 H	Max: 65.2mm
3	壳体材质	SPCC

5. 电池规格 Specifications of cell

序号 NO.	项目 Items	规格参数 Specifications		
1	充电电压 Charge voltage	4.2V		
2	标称电压 Nominal voltage	3.7V		
3	标称容量 Nominal capacity	3000mAh 0.2C 放电(0.2C Discharge)		
4	最小容量 Min capacity	2900mAh 0.2C 放电(0.2C Discharge)		
5	充电电流 Charge current	标准充电: 0.2C Standard Charging:: 0.2C 快速充电: 1.0C Rapid charge: 1.0C		
6	标准充电方法 Standard Charging method	0.2C CC(恒流)充电至 4.2V, 再 CV(恒压 4.2V)充电直至充电电流≤0.02C 0.2C CC (constant current) charge to 4.2V,then CV(constant voltage 4.2V)charge till charge current decline to ≤0.02C		
7	充电时间 Charging time	标准充电: 6.5 小时 (参考值) Standard Charging: 6.5hours(Ref.) 快速充电: 2.5 小时 (参考值) Rapid charge: 2.5hours(Ref.)		
8	最大充电电流 (不用于循环) Max. Charge current (Not For Cycle)	1.0C (2000mA)		
9	最大放电电流 Max.discharge current	3.0C (9000mA)		
10	放电截止电压 Discharge cut-off voltage	2.5V		
11	工作温度 Operating temperature (不可在极限温度长时间持续 充放电) Don't long time charge and discharge in extreme temperatures	充电/ Charging:	0℃~15℃: 0.2C	16℃~50℃: 1.0C
		放电/ Discharging:	-20℃~60℃	
12	储存温度 Storage temperature	1 个月内:-20℃~ 60℃ Within 1 month: -20℃~ 60℃	3 个月内:-20℃~ +45℃ Within 3 months: -20℃~ +45℃	6 个月内:-20℃~ +25℃ Within 6 months: -20℃~ 25℃
14	电池尺寸 Battery size	直径: 18.6 mm diameter: 18.6 mm		高度: 65.2 mm Height: 65.2 mm
15	电池内阻 Resistance	≤45mΩ		
16	出厂电压 Factory voltage	3.8V-4.05V		
17	电池重量 Cell Weight	≈47.0g		

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6. 外观检查 Visual inspection

无破裂、划痕、变形、污迹、电解液泄露等。

Without break, scratch, distortion, contamination, leakage and so on.

7. 测试条件 Test Conditions

7.1 标准测试条件 Standard Test Conditions

若无特别要求，此规格书上的产品测试条件均为温度：25°C±2°C；湿度：65%±20% RH。

Unless otherwise specified, all tests stated in this Product Specification should be conducted at temperature 25°C±2°C and humidity 65%±20% RH.

7.2 标准充电方式 Standard Charge Method

“标准充电”即在环境温度为 25°C±2°C 的条件下，先以恒定电流（0.2C）充电至 4.2V，再以 4.2V 的恒压充电至电流小于（0.02C）。

The "Standard Charge" means charging the cell at a constant current of (0.2C) until the voltage is 4.2V, and then charged at a constant voltage of 4.2V until its current is less than (0.02C) mA. For test purpose, charging shall be performed at 25°C±2°C.

7.3 标准放电方式 Standard discharge method

“标准放电”即在环境温度为 25°C±2°C 的条件下，以恒定电流（0.2C）放电到 2.5V。

The "Standard Discharge" means discharging the cell at a constant current of (0.2C) until the voltage is 2.5V. For test purpose, discharging shall be performed at 25°C±2°C.

8. 电芯性能检查及测试 Battery Cell Performance Criteria

8.1 电性能 Electrical characteristics

序号 NO.	测试项目 Test Item	测试方法 Test Method	检验标准 Criteria			
1	倍率放电性能 Discharge Rate Capabilities	电芯按照右表不同电流放电至截止电压（2.5V）。 The cell is measured with the various discharge currents in right table to the cut-off voltage after the standard charge.(2.5V)	放电条件 Discharge Condition			
			放电电流 Discharge Current	3A	9A	
			相对（0.2C）放 电容量比 Relative Capacity Rate of (0.2C)	≥94%	≥88%	
2	不同温度放电性能 Different Temperature Discharge Capacity	电芯按右表不同温度搁置 4h 以（0.2C）电流放电至 2.5V。 The cell is measured with discharge constant current of (0.2C) to 2.5V with follow discharge temperature and rest for 4h after the standard charging.	放电温度 Discharge temperature	-10°C	25°C	55°C
			相对容量 Relative Capacity	≥65%	100%	≥92%

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3	循环寿命 Cycle Life	电芯以 (0.2C) 电流充电至 4.2V, (0.02C) 电流截止, 以 (0.2C) 电流放电至 2.5V, 25°C±2°C 连续进行充放电循环 300 次。 Each cycle is an interval between (0.2C) charges to 4.2V with (0.02C) cut-off and (0.2C) discharge with 2.5V cut-off at 25°C±2°C. Capacity after 300cycles.	容量恢复率≥80%初始容量 Capacity recovery ≥80% Initial capacity		
4	储存 Storage	电芯按规定充电, 45°C±2°C 储存 28d 后以 (0.2C) 电流放电至截止电压测试容量恢复率。 Capacity after storage for 28d at 45°C±2°C after the standard charged measured with discharge current of (0.2C) to cut-off voltage.	容量恢复率≥90%初始容量 Capacity recovery ≥90% Initial capacity		
5	常温荷电保持与恢复能力 Normal Temperature Charge Retention and Regain	电芯按规定充电, 25°C±2°C 储存 28d 后以 (0.2C) 电流放电至截止电压测试容量保持和恢复。 Capacity after storage for 28d at 25°C±2°C after the standard charged measured with discharge current of (0.2C) to cut-off voltage.	相对初始容量 Relative Capacity vs.Initial Capability	保持率 Retention	恢复率 Regain
				≥85%	≥90%
6	高温荷电保持与恢复能力 High Temperature Charge Retention and Regain	电芯按规定充电, 60°C±2°C 储存 7d 后, 以 (0.2C) 电流放电至截止电压测试容量保持率和容量恢复率。 Capacity after storage for 7d at 60°C±2°C after the standard charged measured with discharge current of (0.2C) to cut-off voltage	相对初始容量 Relative Capacity vs.Initial Capability	保持率 Retention	恢复率 Regain
				≥85%	≥90%

8.2 机械特性 Mechanical characteristics

序号 NO.	测试项目 Test Item	测试方法 Test Method	检验标准 Criteria
1	跌落测试 Drop Test	满电电芯从 1m 的高度以随机的方向跌落至木地板 3 次 (从头部、尾部、侧面三个方向), 实验后放置至少 1h 后进行外观检查。 A fully charged cell drop onto the wooden floor from 1.0m height three times in a random direction. After the experiment placed at least 1h, the appearance of the inspection.	不爆炸、不起火 No explosion, no fire

2	振动测试 Vibration Test	电芯经受简单的调谐振动，振幅为 0.76mm。振动频率在 10 ~55Hz 范围内以 1Hz/min 的速率变化，在 90±5min 内恢复回来，电芯沿 3 个相互垂直的方向振动。 A cell is to be subjected to simple harmonic motion with amplitude of 0.76 mm. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90±5 minutes. The cell is to be tested in three mutually perpendicular directions.	不爆炸、不起火、不漏液 No explosion, no fire, no leakage
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8.3 安全测试 Safety Test

All below tests are carried out on the equipment with forced ventilation and explosion-proof device. Before test, all cells should be charged in accordance with 7.2, and stored 24h prior for testing.

下述试验应在有强制排风条件及防爆措施的装置内进行，在试验前所有的电芯都按 7.2 规定标准充电方式充电，并搁置 24h 后，再进行以下试验。

序号 NO.	测试项目 Test Item	测试方法 Test Method	检验标准 Criteria
1	挤压测试 Crush Test	将电芯置于挤压设备的两个挤压平面之间，用液压油缸或类似的力挤压，挤压面与电芯接触，逐渐增加压力至 13±1 KN 后停止。 A cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells and the crushing is to be continued until an applied force of 13±1 KN is reached. Once the maximum force has been obtained is to be released.	不爆炸、不起火 No explosion, no fire
2	过充电 Over-charge Test	标准充电方式充满电后，以(0.5C) 电流充电至 4.6V 或者充电 1h，观察 1h。 Fully standard charged cell is charged with (0.5C) to 4.6V or until charging time up to 1h.	不爆炸、不起火 No explosion, no fire
3	短路测试 Short-circuit Test	短接电芯的正负极，外部线路总电阻小于 5mΩ，10min 后结束实验。 Short-circuit the standard charged cell by connecting positive and negative terminal less than 5mΩ, until the test time is lasting to 10min.	不爆炸、不起火 No explosion, no fire
4	过放电 Over-discharge Test	标准放电方式后的电芯以 (0.5C) 电流放电 90 min，观察 1h。 Each standard discharged cell is discharged at (0.5C) current for 90 min and observed 1h.	不爆炸、不起火 No explosion, no fire

5	低气压 Altitude Simulation	电芯放入温度为 $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 的低气压箱中，调节试验箱中气压为 11.6KPa，静置 6h 后观察 1h 。 Each fully charged cell is placed in a vacuum chamber with the ambient temperature ($20^{\circ}\text{C}\pm 5^{\circ}\text{C}$). Once the chamber has been sealed, its internal pressure is gradually reduced to a pressure equal to or less than 11.6KPa held at that value for 6 hours. And it need take 1 hour to observe.	不爆炸、不起火、不漏液 No explosion, no fire, no leakage
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9. 储存及运输 Storage and Transportation

9.1 储存 Storage:

9.1.1 锂电池需保存在阴凉，干燥，通风的环境中，避免接触火源与热源。

The Li-ion battery pack should be stored in a cool, dry and well-ventilated area, and should be far from the fire and the high temperature.

9.1.2 电池需按规格书规定温度范围进行储存，最佳储存温度为 $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ ，最佳湿度为 $\leq 65\%\text{RH}$ 。

The battery should store in the product specification book stipulation temperature range, the best storage temp. Is $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$. The best humidity is $\leq 65\%\text{RH}$.

9.1.3 电池应当在室温下存放，应充到 40%至 60%的电量。为防止电池过放，建议每 3 个月按标准充电方式进行一次充电，如储存时间超过一年，建议每年按标准充放电方式进行一次充、放电循环以激活电池。

The battery should be stored within room temperature, and charged to 40%~60% electric quantity. In order to avoid over-discharge, we suggest charge the batteries every three months. If stored over one year, we suggest activate the battery as per standard charge-discharge method.

9.2 运输 Transportation:

9.2.1 请勿与其他货物混合。

Do not mix the battery products with other cargos.

9.2.2 请勿将电池浸入水中或使其受潮。

Do not immerse the battery products in water or allow it to get wet.

9.2.3 最高运输温度不超过 65°C 。

The highest temperature in transportation is lower than 65°C .

9.2.4 运输过程应防止剧烈振动、冲击、日晒雨淋。

During transportation, keep the cell from acutely vibration, impacting, solarization, drenching.

9.2.5 出货电池处于 3.8-4.05V 充电状态，由于电池存在自耗，运送到客户端的电池无法完全保证 3.8-4.05V 充电状态。

The capacity of delivery cell is approximately at 3.8-4.05V of charging. It is not specified more than 3.8-4.05V at customer, because of self-discharge.

10. 安全守则 Precautions and Safety Instructions

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，请仔细阅读以下内容。

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.

安全守则:

注释 1.

如果客户需要将电芯在该文件之外的条件下操作或应用，请先咨询远阳公司相关事宜。

Note 1.

The customer is required to contact FLUOOUNG in advance, if and when the customer needs other applications or operating 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，远阳公司不承担任何责任。

Note 2.

FLUOOUNG will take no responsibility for any accident when the cell is used under other conditions than those described in this document.

10.1 电芯防范措施 Standard Cell Precaution

a. 不要将电芯暴露在极热或有火星的环境中。

Do not expose the cell to extreme heat or flame.

b. 不要将电芯短路，过充或过放。

Do not short circuit, over-charge or over-discharge the cell.

c. 不要使电芯承受过重的机械冲击。

Do not subject the cell to strong mechanical shocks.

d. 不要将电芯浸入海水或水中，或者使其吸湿。

Do not immerse the cell in water or sea water, or get it wet.

e. 不要颠倒电芯的正负极。

Do not reverse the polarity of the cell for any reason.

f. 不要拆卸或修整电芯。

Do not disassemble or modify the cell.

g. 不要和项链、硬币或发夹等金属物品放置在一起。

Do not handle or store with metallic like necklaces, coins or hairpins, etc..

h. 不要使电芯受到明显的损害或变形。

Do not use the cell with conspicuous damage or deformation.

i. 不要将电芯与插座连接。

Do not connect cell to the plug socket or car-cigarette-plug.

j. 不要直接焊接电芯。

Do not make the direct soldering onto a cell.

k. 不要直接接触泄漏的电芯。

Do not touch a leaked cell directly.

l. 不要将电芯用于其它设备。

Do not use for other equipment.

m. 不要将锂离子电芯混合使用。

Do not use Lithium-ion cell in mixture.

n. 不要将电芯放置在太阳光直射的地方。

Do not use or leave the cell under the blazing sun (or in heated car by sunshine).

o.将电芯放置在远离儿童的地方。

Keep cell away from children.

p.不要针刺、锤打或践踏电芯。

Do not drive a nail into the cell, strike it by hammer or tread it.

q.不要撞击或投掷电芯。

Do not give cell impact or fling it.

10.2 电芯使用说明 Cell Operation Instruction

10.2.1. 充电 Charging

a.电芯充电温度范围为 0°C~50°C。

Charge the cell in a temperature range of 0°C to 50°C.

b.以 (0.2C) 的电流恒流充电至 4.2V, 超过 (0.2C) 的电流建议不要使用。

Charge the cell at a constant current of (0.2C) until 4.2V is attained. Charge rates greater than (0.2C) are not recommended.

c.保持恒压 4.2V 充电 1 小时(最大容量)。

Maintain charge voltage at 4.2V for 1hour (recommended for maximum capacity).

*必须使用恒流恒压方式对电芯进行充电。

Cell must be charged with constant current-constant voltage method.

*不要超过标准时间持续充电。

Do not continue to charge cell over specified time.

10.2.2. 放电 Discharging

a.建议放电终止电压为 2.5V, 建议最大持续恒流放电电流为 (1.0C) 。

Recommended cut-off voltage to 2.5V. Recommended max continuous discharge current is (1.0 C) .

b.为了达到较好的性能, 电芯的放电温度范围为-20°C~60°C。

For maximum performance, discharge the cell in a temperature range of -20°C to 60°C.

10.2.3. 储存建议 Storage Recommendations

a.短期存放 Short Period Storage

•如果短期存放(不超过 3 个月) 电芯应储存在温度范围为 0°C~45°C, 低湿度和不含腐蚀性气体的环境中。

Storage the cell at temperature of 0°C to 45°C (less than 3 months), low humidity and no corrosive gas atmosphere.

•不要让电芯承担任何压力。

No press on the cell

b.长期存放 Long Period Storage

•如果长期存放(超过 3 个月), 电芯应存储在温度范围为 0°C~25°C, 低湿度和不含腐蚀性气体的环境中。

In case of long period storage (more than 3 months), storage the cell at temperature range of 0°C ~ 25°C, low humidity, no corrosive gas atmosphere.

•不要让电芯承担任何压力。

No press on the cell

11. 质量保证 Warranty

质保是从出厂日期(喷码)开始起十二个月。

Warranty period for this product is 12 months starting from the date when the products left the door of manufacturer.

12. 附录 Appendix

前言: 文件“锂离子充电电池操作指示及注意事项”仅适用于远阳公司生产的电池。

Preface: This document of 'Polymer lithium ion rechargeable battery operating instructions and matters needing attention' shall be applied to the battery cells manufactured by FLYOUNG company.

声明 一:

客户若需要将电池用于超出文件规定以外的设备, 或在文件规定以外的使用条件下使用电芯, 应事先联系远阳公司, 因为需要进行特定的实验测试以核实电芯在该使用条件下的性能及安全性。

Note(1):

The customer is requested to contact FLYOUNG company in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

声明 二:

对于在超出文件规定以外的条件下使用电芯而造成的任何意外事故远阳概不负责。

Note(2):

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

声明 三:

如有必要, 远阳公司会以书面形式告之客户有关正确操作使用电池的改进措施。

Note(3):

FLYOUNG company will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the if it is deemed necessary

声明 四:

规格书所未包含的其它条款由双方协议解决。

Note(4):

Any other items which are not covered in this specification shall be agreed by both parties.