



武汉中原长江科技发展有限公司
(国营第七五二厂)

产品规格书 Product Specification

圆柱形锂离子电池

Cylindrical Lithium-ion Rechargeable Cell

型号 : LIR14500

Model : LIR14500

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1 适用范围 Scope

本产品规格书适用于武汉中原长江科技发展有限公司生产的 LIR14500 圆柱形锂离子电池的技术要求、测试方法及注意事项。

This product specification describes the technical requirements, test methods and use Suggestions for cylindrical lithium-ion rechargeable cell (LIR14500) produced by Wuhan Sunmoon Battery Co.,Ltd.

2 说明及型号 Product Type and Model

产品名称：圆柱锂离子电池（以下简称电池）；

Product Type: Cylindrical Lithium-ion Rechargeable Cell（referred to as:Cell）

型号规格：LIR14500。

Product Model: LIR14500.

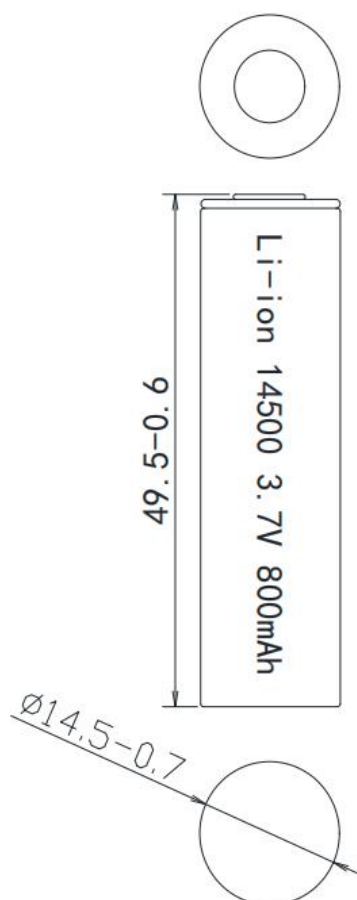
3 产品基本特性 Product Specification

表 1 电池基本特性 Product specification

项目 Items	参数 Specification	备注 Remarks
标称电压 Nominal Voltage	3.7V	
额定容量 Nominal Capacity	800mAh	标准充电，在 25℃±2℃下，0.2C 放电至 3.0V Standard Charge , 25℃±2℃ , 0.2C Discharge to 3.0V
交流阻抗 Internal Impedance	≤70 mΩ	交流频率 AC 1kHz AC 1KHz
使用温度 Operation Temperature	充电：0℃～45℃； Charging Temperature: 0℃～45℃； 放电：-20℃～60℃ Discharging Temperature: -20℃～60℃	
充电截止电压 Charge Limited Voltage	4.20V	
放电截止电压 Discharge Cut-off Voltage	3.0V	
标准充电 Standard Charge	0.2C	在 25℃±2℃下，恒压阶段截止电流 0.05C 25℃±2℃，CV Cut-off 0.05C

项目 Items	参数 Specification	备注 Remarks
快速充电 Rapid Charge	1C	0°C~45°C, 恒压阶段截止电流 0.05C 0°C~45°C, CV Cut-off 0.05C
标准放电 Standard Discharge	0.2C	
快速放电 Rapid Discharge	1C	放电至 3.0V Discharge to 3.0V
最大持续放电 Max. Discharge	3C	放电至 3.0V Discharge to 3.0V
最大脉冲放电 Max. Pulse Discharge	3C	25°C±2°C, 瞬时 10ms 25°C±2°C, Pulse 10ms
外形尺寸 Dimension	D= (14.0±0.5) mm H= (50.5±0.5) mm	
重量 Weight	≤20+/2g	
储存条件 Storage Conditions	1 个月内 one month: -20 °C~ 45°C; 3 个月内 three months: -20 °C~ 35°C; 12 个月内 one year: 0°C~ 35°C; 相对湿度 relative humidity: ≤ 70%	30%~50%SOC
出厂电压 Shipping Voltage	3.10V~3.35V	

4 外形图 Cell Dimension



5 标准测试条件 Standard Testing Conditions

5.1 环境测试条件 Environmental Conditions

若无特别要求，此规格书上的产品测试条件均为温度 $25\pm 10^{\circ}\text{C}$ ，湿度 15~95%RH，大气气压 86~106kPa。

Unless otherwise specified, the test should be carried out in an environment with a temperature of $25\pm 10^{\circ}\text{C}$, a relative humidity of 15~95%RH, and an atmospheric pressure of 86kPa to 106kPa.

5.2 测试设备要求 Measuring Instruments

(1) 伏特计和安培表 Voltmeter and Ammeter

安培表和伏特计的精度不低于 0.5 级。

The DC voltmeter and ammeter with an accuracy of no more than 0.5%.

(2) 尺寸和重量测量设备 Dimension and weight measuring device

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测量尺寸、时间和重量的仪器精度范围 $\pm 0.1\%$ 。

The accuracy of the dimensions and weight measuring device should be no more than $\pm 0.1\%$.

(3) 温度测量设备 Temperature measuring device

测量温度的仪器精度范围 $\pm 0.5^\circ\text{C}$ 。

The accuracy of the temperature measuring device should be no more than $\pm 0.5^\circ\text{C}$.

(4) 内阻测试仪 Impedance meter

内阻测试仪的测试方法为交流阻抗法 (AC 1kHz)。

The impedance shall be measured with the sinusoidal alternating current method (AC 1kHz).

6 性能及测试方法 Performance and Testing Procedure

6.1 外观 Appearance

目视检查电池，外观应清洁、平整，无变形、划痕、生锈和漏液等现象。

Examine with naked eyes. There shall be no such defects like deep scratch, flaw, crack, rust or leakage.

6.2 尺寸 Dimension

用游标卡尺测量电池，为了防止电池短路，卡尺的卡头上应贴上一层绝缘材料。

Use vernier caliper to measure while avoiding short-circuit, there should attach a layer of insulation material on the external jaws.

6.3 电性能 Electrical Performance

表 2 电池电性能 Electrical performance

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
0.2C Capacity 0.2C 容量	After standard charging, rest battery for 10min, then discharging at 0.2C to voltage 3.0V, recording the discharging time. 标准充饱电后, 搁置10分钟, 然后用0.2C电流放电至3.0V, 所记录放电时间	$\geq 300\text{min}$

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
CycleLife 循环寿命	(1) Constant current 1.0C charge to 4.2V, then constant voltage charge to current decline to 0.01C, rest 10min, constant current 1.0C discharge to 3.0V, rest 15min. Repeat above step still continuously discharging capacity higher than 80% of the initial capacities of the cells (2) 先用 1.0C 恒流充电至 4.2V, 再恒压 4.2V 充电直至充电电流 $\leq 0.01C$, 搁置 10 分钟, 再用 1.0C 电流放电至 3.0V; 又搁置 15 分钟, 重复以上步骤, 直到放电容量是初始容量的 80%	≥ 300 times (次)
循环寿命 Cycle Life	在 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 温度条件下, 电池以 0.5C 恒流恒压充满电至 3.65V, 截止电流 0.05C, 搁置 30min, 以 1C 放电至 3.0V, 搁置 30min, 以此为循环; 当电池第 2000 次循环完成后, 记录此时的放电容量。 At $25 \pm 2^{\circ}\text{C}$, 0.5C full-charged to 3.65V, CV Cut-off 0.05C, and discharge to 3.0V with 1 C discharge current, 30min between charge and discharge, after 2000 cycles the discharge capacity is measured.	2000 次循环后放电容量 $\geq 80\%$ 首次放电容量。 2000 cycles, capacity $\geq 80\%$ first capacity
Capability of Keeping electricity 荷电保持能力	$25 \pm 3^{\circ}\text{C}$, After standard charging, rest the battery 28 days discharging at 0.2C to voltage 3.0V, recording the discharging time. 在 $25 \pm 3^{\circ}\text{C}$ 状态下, 标准充饱电后, 电芯搁置 28 天, 然后用 0.2C 放电至 3.0V, 所记录放电时间.	≥ 240 min.

6.4 环境适应性 Environmental Characteristics

表 3 电池环境适应性 Environmental characteristics

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
Discharge at high temperature 高温放电	After standard charging, rest the cells 4h at $60 \pm 2^{\circ}\text{C}$, then discharging at 1C to voltage 3.0V, recording the discharging time. 标准充电后, 在 $60 \pm 2^{\circ}\text{C}$ 条件下贮存 4h, 然后用 1C 放电至 3.0V, 所记录放电时间	≥ 54 min.

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
<p>跌落 Free Fall</p>	<p>电池以标准充电方式充电后, 在高度 1m 位置处自由跌落于混凝土板上, 两个端面各跌落一次, 圆柱面跌落两次, 共计进行 4 次自由跌落; 测量电池开路电压, 观察 1h。 After standard full-charged of the cell,dropped four times from a height of 1m(the lowest point of the cell) onto a concrete floor. The cells or batteries are dropped so as to obtain impacts in random orientations. After the test, the cell shall be put on rest for a minimum of one hour and then a visual inspection shall be performed.</p>	<p>不爆炸、不起火、不冒烟, 开路电压不低于 90%的初始电压。 No explosion, no fire, no smoke. The OCV after the test no less than 90% before free-fall test.</p>
<p>挤压 Crush Test</p>	<p>电池以标准充电方式充电后, 放在可移动的平面间, 通过一个液压缸施加 13±1kN 的压力, 一旦达到压力后或电池电压下降至原始电压的 1/3 或与原尺寸相比发生了 10% 的变形, 即可释放压力; 观察 1h。 A standard full-charged cell is to be crushed between two flat surfaces. The force for the crushing is applied by a hydraulic ram exerting a force of 13±1KN. Once the maximum force has been applied, or an abrupt voltage drop 1/3 initial voltage, or 10% of deformation has occurred compared to the initial dimension, the force is released; and observed for 1 hour.</p>	<p>不爆炸、不起火 No explosion, no fire</p>
<p>振动 Vibration Test</p>	<p>电池以标准充电方式充电后, 将电池固定在振动台上, 沿 X、Y、Z 三个方向各振动 90~100 分钟, 振幅 0.8mm, 振动频率为 10Hz~55Hz, 每分钟变化 1Hz, 在测试完成后电池恢复到原位, 观察 6 小时。 A full-charged cell is to be subjected to simple harmonic motion with amplitude of 0.8mm total maximum excursion. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz. After the test is completed, And the cell returned to the starting position. The cell shall be vibrated for 90~100 minutes per axis of XYZ axes. The samples should be observed for 6 hours after the test, and also check the weight loss of cells before and after the test; and observed for 1 hour.</p>	<p>不爆炸, 不起火, 不漏液 No explosion, no fire, no leakage</p>

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
低气压 Altitude Simulation Test	<p>电池以标准充电方式充电后,将电池放入真空试验箱内,使其压力为 11.6kPa,温度恒定为 20℃±3℃,贮存 6 小时,观察试验结果。 The full-charged cells are to be stored for 6 hours at an absolute pressure of 11.6 KPa and the temperature of 20±3℃.</p>	<p>不爆炸,不起火,不漏液 No explosion, no fire, no leakage</p>
机械冲击 Shock Test	<p>电池以标准充电方式充电后,在两个轴向方向进行测试,每个轴向有正反两个方向。在最初的 3 ms 内最小的平均加速度为 75g_n,峰值加速度介于 125g_n 和 175g_n 之间,脉冲持续时间为 6ms±1ms;测试结束后观察 6 小时。 The full charged cell has only two axes of symmetry in which case only two directions shall be tested. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3 milliseconds the minimum average acceleration is 75g_n. The peak acceleration shall be between 125g_n and 175g_n,shock pulse 6ms ± 1ms. The samples should be observed for 6 hours after the test and also check the weight loss of cells before and after the test.</p>	<p>不爆炸,不起火,不漏液 No explosion, no fire, no leakage</p>

6.5 安全性 Safety Performance

表 4 电池安全性 Safety performance

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
外部短路 External Short-Circuit	<p>电池以标准充电方式充电后,分别在 20±5℃ 和 55±5℃ 的环境温度下依次用内阻为 80±20mΩ 的铜线连接电池芯的正负极持续放电直至发生爆炸、起火或至电压小于 0.2V,电池芯表面温度恢复到环境温度 ±10℃ 以内,观察 1h。 After standard full-charged of the cells,each test sample cell is to be short-circuited by connecting the positive and negative terminals of the cell with a Cu wire having a maximum resistance load</p>	<p>不起火、不爆炸,温度 < 150℃ No fire,no explosion, Max. Temp. of cell surface should not exceed 150℃.</p>

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
	of 80±20mΩ. The sample is to discharge until a fire or explosion is obtained, or until it has reached a completely discharge state of less than 0.2V and the sample case temperature has returned to ±10°C of the ambient temperature. Tests are to be conducted at 20±5°C and 55±5°C; and observed for 1 hour.	
过充电 Over-charge	电池以标准充电方式充电后，用 3C 电流和 4.8V 的恒定电压充电 8h，观察 1h。 The cell is charged at a 3C constant current with a voltage limit of 4.8V for 8 hours after standard full-charged; and observed for 1 hour.	不起火、不爆炸，温度 < 150°C No fire, no explosion, Max. Temp. of cell surface should not exceed 150°C.
过放电 Over Discharge	电池以标准充电方式充电后，以 0.2C 恒流放电至 3.0V。用一根内阻小于 30Ω 的导线连接电池正负极 24 小时，观察 1h。 After standard full-charged of the cells, discharged at constant Current of 0.2C to 3.0V, and the positive and negative terminal is connected by a 30 Ω wire for 24 hours; and observed for 1 hour.	不起火、不爆炸 No fire, no explosion
热冲击 Hot oven Characteristics	电池以标准充电方式充电后，放置于热箱中，温度以 (5±2) °C/min 的速率升至 130°C±2°C，并保持 30min，观察 1h。 The standard full-charged cells is placed in the hot box, then rise to 130 °C ± 2 °C in the temperature to 5 °C ± 2 °C /min rate, insulation 30min; and observed for 1 hour.	不起火、不爆炸 No fire, no explosion
重物冲击 Impact Test	电池以标准充电方式充电后，将电池置于冲击台面上，将一根φ15.8mm±0.2 mm 的钢柱置于电池中心，钢柱的纵轴垂直于电池的纵轴，让重量 9.1kg±0.1kg 的重锤自 610mm±25mm 高度垂直落下在电池表面位置，观察 6 小时。 The standard full-charged cell is to be placed on a flat surface. A φ 15.8 ± 0.2mm diameter bar is to be placed across the center of the sample. A 9.1Kg ± 0.1Kg mass is to be dropped from the height of 610 ± 25mm to the center of the cell vertically; and observed for 1 hour.	不起火、不爆炸 No fire, no explosion

测试项目 Items	测试方法 Test Conditions	检验标准 Specification
冷热循环性能测试 Thermal-cold Cycling Performance Test	<p>电池以标准充电方式充电后，在环境温度 $75^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 条件下放置 6 小时，然后在 $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 条件下放置 6 小时，温度转换时间小于 30 分钟，温度循环 10 次，最后室温条件下放置 24h，观察电池外观变化。</p> <p>The standard full-charged cells placed in $75\pm 2^{\circ}\text{C}$ for 6h, and then put the Cell in -40°C for 6h; change temperature time $< 30\text{min}$, then repeat it for 10 cycles. Finally the cell is placed in room temperature for 24h. Watch the appearance of cell.</p>	<p>不起火、不爆炸、不漏液 No fire, no explosion, no leakage</p>

7 铭牌和标志 Nameplate and Symbol

电池标志应保持清晰，不脱落、无明显色差。

The nameplates and symbols of the cells should stay clear, attached and have no obvious color difference.

极端标记：标记在电池体上，用“+”、“-”分别表示其所指的正负极端。

The polarity markings are on the side of the cell, “+” and “-” stand for positive tab and negative tab respectively.

8 运输 Transportation

● 出厂运输的电池荷电量为满容量的 25%~45%。

● The cells should be in a 25%~45% state of charge packaging boxes for transport.

● 电池在运输过程中，应避免日晒、火烤、雨淋、水浸及与腐蚀性物质放在一起。

● During transportation, the cells should not be exposed to direct sunlight, fire, rain, water, or corrosive substances.

● 运输和装卸中的冲击、震动应限制在最小程度。

● Impacts and vibrations during the transportation, loading and unloading should be limited to the minimum scale.

● 对于纸质的包装箱堆放高度不得超过 10 层。

● The stacking height of cartons should not exceed 10 layers.

● 电池长途运输时，如是船运，应放在远离发动机的地方；夏季不应该长期滞留在不通

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风的环境内。

●When cells transported over a long distance, if they are shipped, they should be kept away from the engine; in the summer, they should not be kept in an unventilated environment for a long period of time.

9 安全注意事项 Safety Precautions

本产品运输、贮存、使用过程中存在一定危险性，操作不正确时可能发生泄漏，甚至爆炸、起火等安全性风险，在您使用本产品前，请仔细阅读本产品规格书，并妥善保存以备查阅。

The product can be somewhat dangerous during transportation, storage and use. It may leak or even explode when it is operated incorrectly. Before using this product, please read this specification of product carefully and keep it for reference.

- 电池严禁过充电、过放电、挤压、焚烧。
- The cells must not be over-discharged, squeezed or incinerated.
- 严禁对电池进行短路。
- Do not short circuit the cells.
- 严禁用户自行拆解电池。
- Do not use the cells outside of the working temperature range. Do not heat up the cells above allowable temperature.
- 严禁在允许的温度范围之外使用或加热。
- Do not use the cells outside of the working temperature range. Do not heat up the cells above allowable temperature.
- 严禁直接在电池表面高温焊接（焊接温度不高于 130℃）。
- It is forbidden to high-temperature solder directly on the surface of the cells (solder temperature not higher than 130℃) .
- 严禁使用带有严重伤痕或变形的电池。
- Do not use cells with deep scratches or deformation.
- 严禁与其他类型电池一起使用，也不要将不同包装、不同型号或不同品牌的电池一起使用。
- Do not use the cells with dry batteries or other kinds of primary batteries together. Do not use batteries with different packaging, different models or different brands together.

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- 严禁把新旧电池混用。
- It is forbidden to mix up old and new batteries and use them together.
- 在装入设备时注意电池的正负极不要反装。
- When installing the cells into the device, pay attention to the positive polarity and negative polarity of the cell.
- 电池使用至终止电压时，应及时从设备仪器中取出。
- When the cells is used up to the cut-off voltage, it should be taken out from the instrument in time.
- 当长期不用时，要将电池从设备中取出并放在规定的环境中保存。
- When the cells is not in use for a long time, it should be taken out from the device and stored in a low-temperature and low-humidity environment.
- 对电池进行串并联组合时应与我公司联系。
- For series and parallel connection of the cells, please contact us.
- 使用过的电池应按照当地环保规定处理。
- Used batteries should be disposed in accordance with local environment regulations.
- 在使用或储存期间如发现电池有发热、散发气味、变色、变形或其他异常之处应及时停止使用。
- If there is any heating, odor, discoloration, deformation, or other abnormality of the cell during usage or storage, stop using it.

10 储存 Storage

- 电池应在远离静电的场所使用和储存。
- The batteries should be used and stored away from static electricity.
- 电池应当存放在温度为 0℃~30℃、相对湿度不大于 60%的环境中，同时应确保电池的荷电态为满电态的 30%~50%。如长时间储存，每 3~4 个月充一次电以防止电池过放电。
- The batteries should be stored at a temperature between 0 °C and 30 °C with a relative humidity of not more than 60%， and batteries should be in a 30%~50% state of charge .If the batteries is stored for a long time, the batteries should be conducted a cycle of charge and discharge for 3~4 months.

● 电池储存时要远离热源，也不能置于阳光直射的地方，保证清洁、凉爽、干燥、通风，并不受气候影响。

● Batteries should be stored away from the heat source, can not be placed in direct sunlight, to ensure that clean、cool、dry、ventilation, and not affected by the climate.

● 电池的堆放高度取决于包装强度，一般规定，纸质包装箱堆放高度不得超过 1.5 米。

● Battery Stacking Height depends on the strength of the packaging, general provisions, paper packaging box stacking height should not exceed 1.5 meters.

● 电池以原包装存放和陈列电池，去掉包装后电池不能乱堆放，易引起电池短路和损坏。

● Battery to the original packaging storage and display batteries, remove the packaging after the battery can not be disorderly stacked, it is easy to cause battery short circuit and damage.

11 使用建议 Use suggestions

● 电池适合在环境温度相对阴凉的位置使用，当在高温高湿环境下长期使用，使用寿命会下降。

● The battery is suitable for use in a relatively cool environment. When used in a high temperature and high humidity environment for a long time, the service life of the battery will decrease.

● 电池用完电，请及时充电。

● Please charge the battery when it discharges out.

● 请使用配套或者推荐的专业锂电池充电器。

● Please use the matching or recommended professional lithium battery charger.

● 如果电池漏液，接触眼睛或皮肤，请立刻用大量清水冲洗并寻求医生帮助。

● If the battery leaks, contact eyes or skin, immediately flush with plenty of water and seek medical help.

● 电池有异味、变色、噪音、漏液、严重变形等异常情形时，应停止使用。

● Battery odor, discoloration, noise, leakage, serious deformation and other abnormal circumstances, should stop using.

● 请将电池放置在宠物和儿童接触不到的位置，禁止小孩接触电池。

● Keep batteries out of reach of pets and children. Keep them out of reach of children.

12 声明 Disclaimer

使用电池前请仔细阅读规格书表面的警示标志，不当的使用电池可能会引起电池过热损坏，对于未按规格书操作造成的任何意外事故，武汉中原长江科技发展有限公司不负担任何责任，为了使电池安全的使用及处理请在使用前认真阅读本产品规格书。

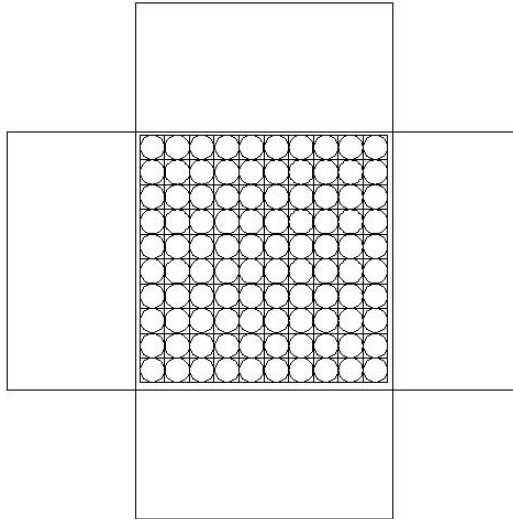
若对本产品规格书有疑问，请与武汉中原长江科技发展有限公司联系，我司保留对本产品规格书更改的权利。

Please read the warning sign on the surface of the specification carefully before using the cell. Improper use of the cell may cause the cell to overheat and damage, Wuhan Sunmoon Battery Co., Ltd. does not assume any responsibility, in order to make the safe use and disposal of cells, please read this product specification carefully before use.

If you have any questions about this specification of product, please contact us. Wuhan Sunmoon cell Co., Ltd. reserves the right to modify this product specification .

附图 1： 产品装箱方式及包装 Figure 1:Packing method

(1) 每箱 600 只电池。 Each box contains 600 cells



(2) 每箱电池净重约 11.0kg，毛重约 12.0kg。

The net weight and gross weight of the cells are about 11.0 kg and 12.0 kg respectively.

