

可充电锂离子电芯 产品规格书

SPECIFICATION OF PRODUCT

For Lithium-ion Rechargeable Cell

电芯型号: 14500-500mAh

Cell Model: 14500-500mAh

Document No.		Effective date	2019-5-4
Edition	A01	Pages	12
Approved	Checked	Designed	

目录 Contents

1. 范围 Scope.....	3
2. 产品描述与型号 Description and Model	3
3. 定义 Definition	3
4. 产品规格 Product Specifications	3
5. 外形尺寸 Outline Dimensions	4
6. 外观 Appearance.....	5
7. 性能规格 Performance Specifications	5
7.1 标准测试条件 Standard Test Conditions.....	5
7.2 电性能 Electrical Characteristics	5
7.3 环境适应性能 Environmental Characteristics.....	6
7.4 安全性能 Safety Performance.....	7
7.5 机械性能 Mechanical Performance	7
8. 包装 Packing.....	8
9. 保修期 Warranty Period.....	8
10. 产品责任 Product Liability	8
10. 必要的保护功能 Required Protection Functions	9
12. 警告、注意、提醒 Warning, Notice and Caution	9

1. 范围 Scope

本产品规格书描述的是台思科(香港)有限公司提供的可充电锂离子电池, 包括产品规格信息、各种性能测试条件、产品责任及注意事项。

This product specification defines the requirements of the rechargeable lithium ion battery to be supplied to the customer by **Taisho(HK)Limited**. Including product specification、testing method、product liability and notice.

如果客户需要任何其它的附加信息, 建议事先与台思科(香港)有限公司联系。

Should there be any additional information required by the customer, customers are advised to contact DongGuan **Taisho(HK)Limited**. before selecting a solution.

2. 产品描述与型号 Description and Model

2.1 产品描述: 电芯(可充电锂离子电池)

2.1 Description: Cell (Rechargeable Lithium-ion Battery)

2.2 型号 Model: 14500-500mAh

3. 定义 Definition

3.1 标准模式充电 Standard Charge

标准模式充电的定义:在 $25\pm 2^{\circ}\text{C}$ 下, 将电芯以 250mA 电流恒流充电到 4.2V, 然后转为在 4.2V 下恒压充电至截至电流 3mA。

This "Standard Charge" means charging the cell at constant current of 250mA to 4.2V, then at constant voltage of 4.2V with 4mA cut-off, at temperature $25\pm 2^{\circ}\text{C}$.

3.2 标准模式放电 Standard Discharge

标准模式放电的定义: 在 $25\pm 2^{\circ}\text{C}$ 下, 将满电态电芯以 250mA 电流恒流放电到 2.75V。

This "Standard Discharge" means discharging the fully charged cell at constant current of 250mA to 2.75V, at temperature $25\pm 2^{\circ}\text{C}$.

4. 产品规格 Product Specifications

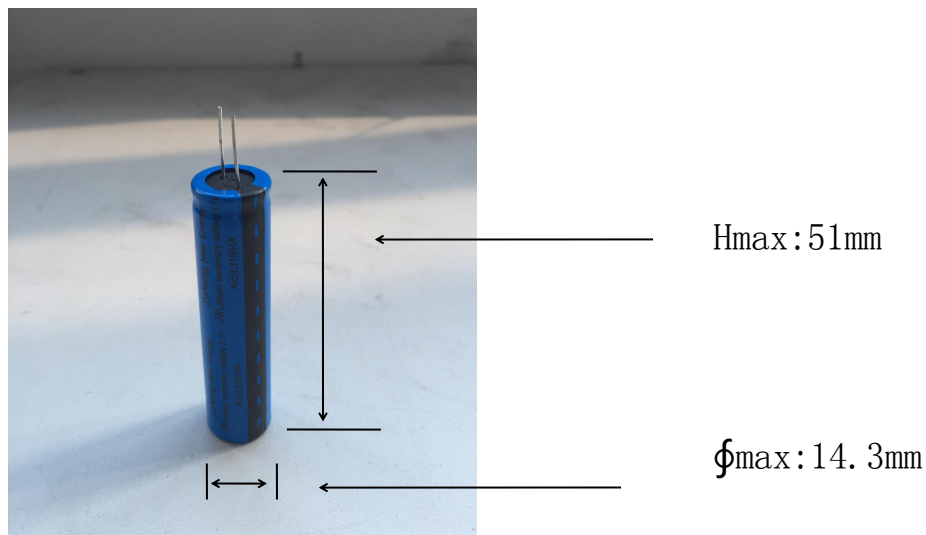
项目 Item	规格 Specification
4.1 标称容量 4.1 Nominal Capacity	500mAh (0.5C 放电容量, 4.20~2.75V) 500mAh (0.5C discharge, 4.20~2.75V)
4.2 最小容量 4.2 Minimum Capacity	450mAh (0.5C 放电容量, 4.20~2.75V) 450mAh (0.5C discharge, 4.20~2.75V)
4.3 标称电压 4.3 Nominal Voltage	3.7 V
4.5 最大充电电流 4.5 Max. Charge Current	500mA (Ambient temperature 25°C)
4.6 最大放电电流 4.6 Max. Discharge Current	1000mA (Ambient temperature 25°C)

4.7 交流内阻 4.7 Internal AC Impedance	$\leq 80\text{m}\Omega$ $\leq 80\text{m}\Omega$
4.8 电芯重量 4.8 Cell Weight	25g max
4.9 电芯尺寸 4.9 Cell Dimension	高度 Height : Max51 mm 直径 Diameter : Max. 14.3 mm
4.10 操作温度 4.10 Operating Temperature	充电 Charge : 0 ~ 45℃; 放电 Discharge : -20 ~ 45℃
4.11 电压范围(出货状态) 4.11 Voltage range (State of shipment)	50%充电态, 开路电压范围 3.60~4.10V 50% state of charge (50%SOC); Open Circuit Voltage (OCV) is from 3.60V to4.10V.
4.12 储存温度 4.12 Storage Temperature (for shipping state)	-20 ~ 45℃

注(1*): 如果电芯维持在出厂状态(半充电)下, 容量恢复率应大于 50%。

Note (1*): If the cell is kept as ex-factory status (50% of charge), the capacity recovery rate is more than 50%.

5. 外形尺寸 Outline Dimensions



6. 外观 Appearance

应没有如深度划痕、裂缝、生锈、斑点或漏液等影响电芯商业价值的外观瑕疵。

There shall be no such defects as deep scratch, crack, rust, discoloration or leakage, which may adversely affect the commercial value of the cell.

7. 性能规格 Performance Specifications

7.1 标准测试条件 Standard Test Conditions

7.1.1 环境条件 Environmental Conditions 除非另有说明,本规格书中的所有测试应在 $25\pm 5^{\circ}\text{C}$,相对湿度 $65\pm 20\%$ 的环境下进行。 Unless otherwise specified, all tests stated in this specification are conducted at temperature $25\pm 5^{\circ}\text{C}$ and humidity $65\pm 20\%$.

7.1.2 测量设备 Measuring Equipment

(1) 电流表和电压表 Ammeter and Voltmeter

电流表和电压表必须达到 0.5 级或以上。

The ammeter and voltmeter should have an accuracy of the grade 0.5 or higher.

(2) 游标卡尺 Slide caliper

游标卡尺的最小刻度必须达到 0.01mm。

The slide caliper should have 0.01 mm scale.

(3)内阻测试仪 Impedance meter

须使用 1kHz 的交流内阻测试仪。

The impedance meter with AC 1kHz should be used.

7.2 电性能 Electrical Characteristics

7.2.1 初始容量 Initial Capacity

电芯经标准模式充电,充满电后,经标准模式放电在 2 小时以内放电,初始容量应满足下面的要求。

标准: 初始容量 $\geq 500\text{mAh}$

Cells shall be charged per Standard Charge and discharged per Standard Discharge within 2h after full charge. Initial capacity shall meet the following requirement.

Criteria: Initial Capacity $\geq 500\text{mAh}$

7.2.2 循环寿命 Cycle Life

电芯以 250mA 恒流恒压充电至 4.20V,截止 3mA, 然后以 250mA 恒流放电至 3.0V, 充电与放电之间需要搁置 10min, 以一次充电和一次放电定义为 1 个循环。100 次循环后, 按照标准充放电模式测试电芯的放电容量。

标准: 放电容量(101th cycle) $\geq 80\%$ (以 7.2.1 测试的初始容量为基准)

Cells shall be charged at constant current of 250mA to 4.2V with end current of 3mA, and discharged at constant current of 250mA to 3.0V. Cells are to rest 10 minutes after charge and discharge. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured per Standard Charge and Standard Discharge after 101 cycles.

Criteria: Discharge capacity (101th cycle) $\geq 80\%$ (of initial capacity measured in 7.2.1)

7.2.3 倍率放电性能 Discharge Rate Capabilities

电芯以标准模式充满电后，按以下不同电流放电至 2.75V 来测试放电容量，不同倍率下的相对放电容量需满足下表。

Discharge capacity is measured with various currents as below to 2.75V after the standard charge. Relative capacity at each current shall meet the following table.

电流 Current	0.2C	0.5C	1C
相对容量 Relative Capacity	100%	≥95%	≥90%

7.2.4 不同温度下的放电能力 Temperature Dependence of Discharge Capacity

电芯以标准模式充满电后，在下列不同温度下以 100mA 恒流放电至 2.75V（100mA 恒流放电至 2.75V）来测试放电容量，不同温度下的相对放电容量需满足下表。

Cells shall be charged per and discharged with constant current 100mA to 2.75V (discharged with constant current 100mA to 2.75V) at the following temperatures. Relative capacity at each temperature shall meet the following table.

温度 Temperature	-20℃	-10℃	0℃	25℃	60℃
相对容量 Relative Capacity	≥70%	≥85%	≥90%	100%	≥90%

注：当充电和放电的温度不同时，温度变换之间的搁置时间为 3 小时。

Note: If charge temperature and discharge temperature is not the same, the interval for temperature change is 3 hours.

7.2.5 储存性能 Storage Characteristics

电芯以标准模式充满电后，在控制温度为 25±2℃ 的环境下储存 30 天，储存后，电芯按标准模式放电获得剩余容量。

标准：剩余容量 ≥85 % (以 7.2.1 测试的初始容量为基准)

Cells shall be charged per Standard Charge and stored in a temperature-controlled environment at 25±2℃ for 30 days. After storage, cells shall be discharged per Standard Discharge to obtain the remaining capacity.

Criteria : Remaining capacity ≥85 % (initial capacity measured in 7.2.1)

7.3 环境适应性能 Environmental Characteristics.

7.3.1 高温高湿测试 High Temperature and High Humidity Test 电芯以标准模式充满电，在温度为 60±2℃，相对湿度为 95% 的环境下储存 24 小时。储存后按标准模式放电并按标准模式充电和标准模式放电循环 3 次获得恢复容量（第三次循环的放电容量）。

标准：不漏液，不破裂，不生锈，容量恢复率 ≥80%

Cells are charged per Standard Charge and stored at 60±2℃ (95%RH) for 168 hours. After test,

cells are discharged per **Standard Charge** and **Standard Discharge** cycled per & **Standard Discharge** for 3 cycles to obtain recovered capacity (3rd discharge capacity).

Criteria : No leakage, No rupture, No rust, Capacity recovery rate $\geq 80\%$

7.4 安全性能 **Safety Performance.**

7.4.1 外部短路测试 **External Short-Circuiting Test (25 \pm 2 $^{\circ}$ C)**

电芯以标准模式充电, 将电芯的正极和负极以一根电阻为 100m Ω 的导线相连接, 并维持 1 小时。

标准: 不起火,不爆炸, 电芯表面温度不超过 150 $^{\circ}$ C。

Cells are charged per **Standard Charge**, and the positive and negative terminal is connected by a 100m Ω -wire for 1hour .

Criteria : No fire, No explosion, The temp of the exterior cell shall not exceed 150 $^{\circ}$ C.

7.4.2 热冲击测试 **Heating Test**

电芯以标准模式充电, 置入鼓风烘箱中并以 5 $^{\circ}$ C/min 的速率升温至 130 $^{\circ}$ C,在 130 $^{\circ}$ C 下维持 30min。

标准: 不起火,不爆炸

Cells are charged per **Standard Charge** and heated in a circulating air oven at a rate of 5 $^{\circ}$ C per minute to 130 $^{\circ}$ C. and remain then oven at 130 $^{\circ}$ C for 30 minutes.

Criteria: No fire, No explosion.

7.4.3 过充电测试 **Overcharge Test**

电芯以标准模式放电, 然后以 1C 恒定电流充电直到电压达到 4.5V 并维持 2.5 小时, 测试中应没有任何保护措施。

标准: 不起火,不爆炸

Cells are discharged per **Standard Charge**, then charged at constant current of 1C till the voltage reaches 4.5V for 2.5hrs. Not should have any protect during testing.

Criteria: No fire, No explosion.

7.5 机械性能 **Mechanical Performance.**

7.5.1 跌落测试 **Drop Test**

按标准模式充电的电芯, 从 1.0m 高处跌落至平滑的水泥地板上, 电芯上下两个面各跌落一次、侧面跌落一次计为一个循环, 一共测试 6 个循环。(总跌落次数为 18 次)

标准: 不起火,不爆炸

Fully charged cells as **Standard Charge** are dropped from a height of 1.0m onto concrete-floor for six cycles, 2 drops from each cell terminal and 1 drop from the side of cell can

(Total number of drops =18).

Criteria: No fire, no explosion.

7.5.2 振动测试 Vibration Test

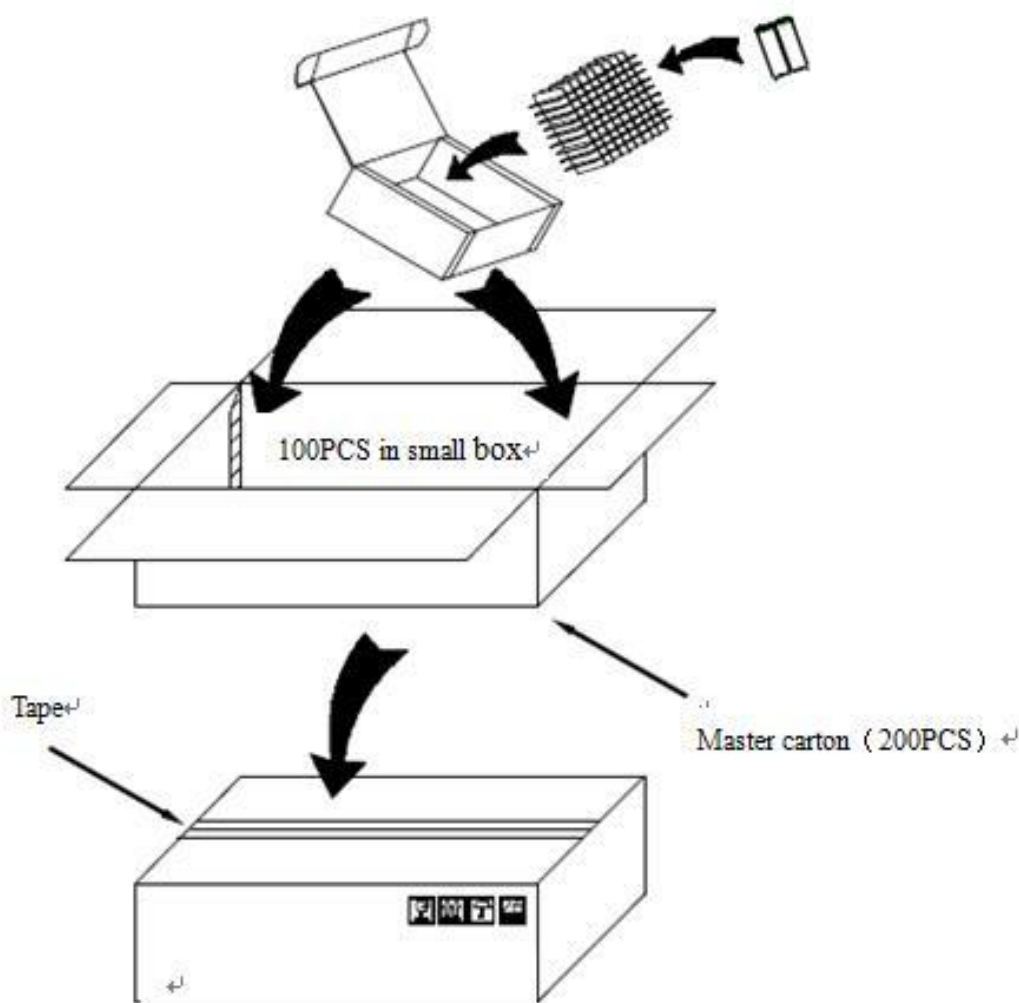
按标准充电模式充满电的电芯，两个相互垂直的方向从 10Hz~55Hz 往返振动 90 分钟，双 振幅为 1.6 米，频率变化为 1Hz/min。(参考 UL 1642)

标准: 不起火, 不爆炸, 不漏液

Fully charged cells as Standard Charge are vibrated for 90 minutes per each of the two mutually perpendicular axis (x, y) with total excursion of 0.8mm, frequency of 10Hz to 55Hz by 1Hz/min. (Refer UL1642)

Criteria: No fire, no explosion, No leakage

8. 包装 Packing



9. 保修期 Warranty Period

只要按照本说明书、正确使用和处理电芯, 台思科(香港)有限公司保证提供的电芯自生产日期起 1 年以内不出现任何缺陷。

As long as the cell is treated in accordance with this Product Specification and/or Proper Use and Handling, **Taisho(HK)Limited.** warrants that the cell should be free from any defect for a period of 1 year from date of manufacturing.

10. 产品责任 Product Liability

台思科(香港)有限公司的责任范围只涵盖电芯本身, 而客户应承担包括电芯和保护线路板在内的电池产品责任。

The coverage of **Taisho(HK)Limited.** is for the cell itself, while the customer assumes the liability of the battery including the cell and its protection circuit. 请您务必按照所提供的规格说明书和本文最后所附的注意事项来使用台思科(香港)有限公司提供的电池。

You are kindly requested to use the cell which is delivered from **Taisho(HK)Limited.** in strict accordance with the specification and remarks include at the end of the document.

不正确使用电池, 可能会发生意外或起火。对于客户在超出规格说明书以外的情况下使用电池, 台思科(香港)有限公司不保证其安全性能。

Due to improper usage of the cell, an accident or a fire may occur. **Taisho(HK)Limited.** will not guarantee against any accidents occurring due to use beyond the content of this specification.

11. 必要的保护功能 Required Protection Functions

为确保安全, 充电器和保护线路必须具有符合以下条件。请使用带有温度保险丝或过流保险丝的安全装置。标准充电方式为 CC/CV (恒流/恒压)。

To insure the safety, charger and the protection circuit shall be satisfied following items. As safety device, please use in combination with the temperature fuse or poly-switch. The standard charge method is CC / CV (Constant current / constant voltage)

NO.	项目 Items	条件 Condition
1	充电终止电压 Charge Termination Voltage	4.200±0.025V
2	过充检测电压 Excess Charge Detection Voltage	4.250±0.025V
3	过充释放电压 Excess Charge Release Voltage	3.85 ~ 4.23V
4	放电终止电压 Discharge Termination Voltage	2.50±0.10V
5	过放保护电压 Excess Discharge Detection Voltage	2.00 ~ 2.40V
6	过放释放电压 Excess Discharge Release Voltage	2.40 ~ 3.00V

12. 警告、注意、提醒 Warning, Notice and Caution

使用前请仔细阅读并遵守以下电池相关注意事项, 不适当的使用电池会引起电池起火、破裂、损坏、及电池容量衰竭。

Please read and follow the announcements for the cell before use. Improper use of the cell may cause heat, fire, rupture, damage or capacity deterioration of the cell.



注意 NOTICE

- (1). 请勿将电池放入火中，或对电池加热，请勿在高温下储存电池；
(1). Do not put the cell into a fire, or heat the cell, do not store the cell in high temperature environment.
- (2). 安装电池时请勿将正负极反接；
(2). Do not connect the cell reversed in positive (+) and negative (-) terminals in the charger or equipment.
- (3). 请勿将电池用导线或任何金属（如金属项链或金属发卡）直接连接或放在一起，可能导致电池短路；
(3). Do not let the cell terminals (+ / -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.
- (4). 请勿用针刺、用锤敲打、用力踩踏或其它方式对电池惊醒撞击；
(4). Do not drive a nail in, hit with a hammer, or stamp on the cell, do not strike the cell other ways.
- (5). 请勿拆开电池或随意改变电池结构；
(5). Do not disassemble or alter the cells' outside structure.
- (6). 请勿将电池导针位顶死或朝下跌落或摔打，可能导致电池短路
(6). Do not push or drop the battery guide pin downwards or hit it, as it may cause a short circuit in the battery
- (7). 请勿将电池放入水中，储存时注意电池使电池受潮。
(7). Do not submerge the cell in water, do not wet the cell when store the cell.



提醒 CAUTION

- (1). 请勿使用不合格的充电器对电池充电，并遵守正确的使用说明；
(1). Cells should be charged with proper charger, in compliance with correct operation contents.
- (2). 请勿将电池与其它不同标示、不同型号、不同种类如干电池、镍氢电池、镍镉电池混用或新旧电池混用
(2). Do not use the cell with other maker's cells, different types and /or models of cells such as dry cells, nickel-metal hydride cells, or nickel-cadmium cells, or new and old lithium cells together.
- (3). 请勿将老化、发热、变形、漏液或其它异常的电池放在充电器上充电；
(3). Do not leave the cell in a charger or equipment if it generates an older and/or heat, changes color and/or shape, leaks electrolyte, or cause any other abnormality.
- (4). 在电池没有充电的情况下，请勿对电池进行持续过放。
(4). Do not discharge the cell continuously when it is not charged



警告 WARNING

- (1).如果儿童使用电池，请预先按照说明书进行指导，确保他们在任何时间能正确使用电池；
- (1). In case young children use cells, instruct them on the contents of the instructions and ensure the cell is correctly used by them at all times.
- (2).电池出货前已由 QA 严格按规格书进行检查，如您发现所购电池有发热或异味现象，请与我们联系；
- (2). The cell was inspected carefully by QA before shipment to confirm with the specifications. However, in the case any abnormality of bad smell or heat, etc .arise after purchase, please communicate with us.
- (3).长时间储存电池时，请您对电池用 0.1C 的电流充电 5 小时左右；
- (3). For long-term storage, please charge at 0.1C for about five hours in advance. (4). 请勿超出说明书以外的情况使用电池，否则可能导致电池发热、损坏或降低电池性能。
- (4) . Do not use the cell in other than the the instructions, Otherwise the cell might cause heat generation, damage, or deterioration of its performance.

电池开阀说明

Instructions for opening the battery valve

电池开阀分类：底部防爆阀开阀、胶粒裂开开阀、胶粒开阀。此类开阀均为为安全设计开阀，不是爆炸，均视作为合格开阀。以图片说明，与爆炸起火区分开来。

Battery valve classification: Explosion-Proof Bottom Open valve, Rubber split open Valve, Rubber-Grain open valve. This kind of valve is safety design valve, no explosion, are regarded as qualified valve. Image caption the explosion was separated from the fire.



Bottom Open valve

Rubber split open Valve

Rubber-Grain open valve

