



紘碩科技股份有限公司  
HUNG SHOUTH TECHNOLOGY CO., LTD.  
AUTOCELL TECHNOLOGY CO., LTD.

编号: ZG-LDC-P-60577

版本: A0

日期: 2023-04-14

电池产品规格书

Customer/客户:

## Specification for Li-ion Rechargeable Battery

### 锂离子电池规格书

**MODEL/型号: 18650-4S1P/2600mAh-14.8V**

Prepared By 编制	Checked By 审核	Approved By 批准

Customer Approval	Signature/Date (签名/日期)
	Company Name 公司名称
	Company Stamp 公司印章



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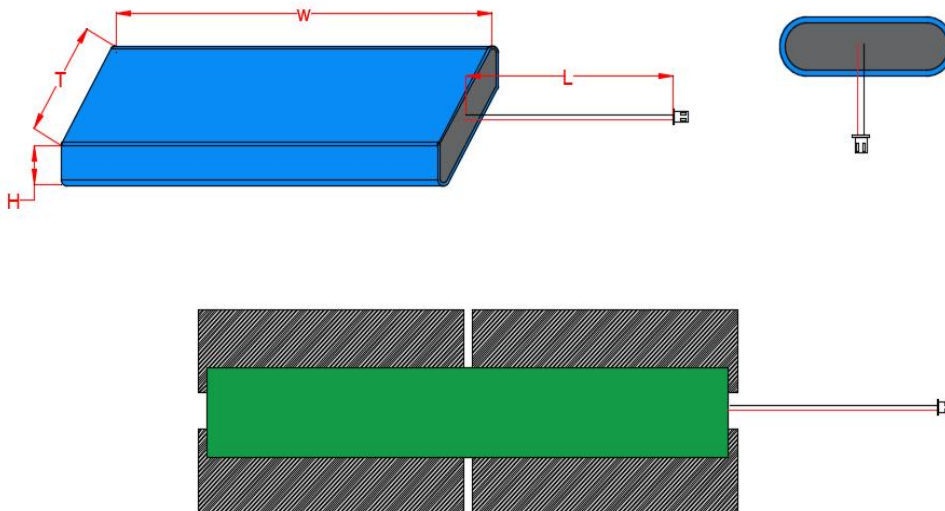
## 电池产品规格书

### 1.Scope 适用范围

This specification describes the performance, testing method, warning and caution of the Li-ion battery. The specification applies to Li-ion battery supplied by **HUNG SHOUTH TECHNOLOGY CO.,LTD**

本标准描述了锂离子电池的性能、测试方法及注意事项。  
本标准适用于紘碩科技股份有限公司生产的锂离子电池。

### 2.Assembly Drawing 装配图纸



T	Max: 43mm	W	Max: 134mm	高度 H	Max: 19mm
引线长 L	100±5mm	放电线	UL3239 20AWG	端子	VH3.96-2P 反向



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### 2.1. PCM 参数

NO	Items	Criteria
1	过充保护电压.	4.25±0.025V
2	过放保护电压.	2.7±0.1V
3	过流保护电流	9-15A
4	短路保护解除	断开短路电路
5	PCB 内阻	$R \leq 60m\Omega$

### 2.2. PCM BOM

序号	元件编号	元件名称	元件规格	封装形式	数量	厂商/备注
1	U1	IC	HTL6034AAAFYT16/R6	TSSOP-16	1	HTL
2	Q1 Q2 Q3 Q4	MOS	P4045GU	DFN5X6	2	P
3	R1 R2 R11 R12 R18 R22 R23	贴片电阻	10K (103)0603 ±5%	0603	7	
4	R3	贴片电阻	510R(511)0805 ±5%	0805	1	
5	R4 R5 R6 R7 R8 R9 R10	贴片电阻	1K (102)0603 ±5%	0603	7	
6	R13	贴片电阻	510K (513)0603 ±5%	0603	1	
7	R14	贴片电阻	5.1K (512)0603 ±5%	0603	1	
8	R21	贴片电阻	20K (203)0603 ±5%	0603	1	
9	R13	电阻	0.005R ±1% 2W 2512 编带 RLM25PEER005	2512	1	大毅
10	C1C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C14	电容	100NF(104)0603Y550V -20%±80%	0603	13	
11	C13	电容	4.7UF(475)0805±20%±80%50V	0805	1	
12	D2	二极管	1N4148 SOD-323	SOD-323	1	
13	PCB	线路板	CYX-116 REV1.0 喷锡板 无铅制程	122*18*1.0	1	SG



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### 3.Basic Performance 基本性能

No. 序号	Item 项目	Specification 性能
1	Rated Capacity 标称容量	2600mAh @0.2C, 11V
	Minimum Capacity 最小容量	2520mAh @0.2C, 11V
2	Nominal Voltage 标称电压	14.8V
3	O.C.V 出厂电压	14.4~15.8V
4	Charge Ending Voltage 充电截止电压	16.8V
5	Discharge Ending Voltage 放电截止电压	11V
6	Standard Charging Method 标准充电方式	20°C~25°C 0.2C constant current charge to 16.8V, then constant voltage 16.8V charge till charged current declines to $\leq 0.01C$ 20°C~25°C 0.2C 恒流恒压充电至 16.8V, 截止电流 0.01C
7	Maximum Charging Current 最大充电电流	2A
8	Standard Discharging Current 标准放电电流	20°C~25°C 0.2C constant current discharge to 11V 20°C~25°C 0.2C 恒流放电至 11V
9	Maximum Discharging Current 最大放电电流	6A
10	Operating Environment 工作环境	Charging: 0°C~45°C, max.90%RH. 充电: 0°C~45°C, 最大相对湿度 90% Discharging: -10°C~60°C, max.90%RH. 放电: -10°C~60°C, 最大相对湿度 90%
11	Initial Impedance 初始内阻	$\leq 250m\Omega$



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### 4. Performance And Test Conditions 电池性能及测试条件

#### 4.1 Standard Test Conditions 标准测试条件

Test should be conducted with new batteries within one week after shipment from our factory and the cells shall not be cycled more than five times before the test.

测试必须使用出厂时间不超过一个星期的新电池，且未进行过五次以上的充放电循环。

Unless otherwise specified, all tests stated according to following

Temperature: 20~25°C

Relative Humidity (RH.): 45~75%

Atmospheric pressure: 86~106 kPa

除非另有规定，本规格书中的各项测试应在以下标准条件下进行：

温度: 20~25°C

相对湿度 (RH.) :45~75%

大气压力:86 ~106 kPa

#### 4.2 Requirement of the testing equipment 测量仪表要求

Voltage meter: The voltage tester internal impedance is  $\geq 10 \text{ K}\Omega/\text{V}$ .

电压仪表要求：测量电压的仪表内阻不小于  $10\text{K}\Omega/\text{V}$ 。

Impedance meter: shall be measured by a sinusoidal alternating current method (1 kHz LCR meter).

内阻测试仪要求：测量原理应为交流阻抗法（1kHz LCR）。

Temperature meter: The precision is  $\leq 0.5^\circ\text{C}$ .

温度仪表要求：测量温度的仪表精度不低于  $0.5^\circ\text{C}$ 。

If no otherwise specified, the rest time between Charge and Discharge amount to 10min.

如果没有特别说明，电池充放电间隔时间为 10 分钟。

#### 4.3 Appearance 外观

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

电池外观应没有划痕、气胀、漏液等影响市场价值的缺陷存在。

#### 4.4 Electrochemical Characteristics 电化学特性

No. 序号	Items 项目	Criterion 标准
1	Discharge rate capability 倍率放电	$\frac{\text{discharge capacity at } 0.5\text{C}}{\text{discharge capacity at } 0.2\text{C}} \geq 95\%$ ; $\frac{0.5\text{C放电容量}}{0.2\text{C放电容量}} \geq 95\%$



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	性能	$\frac{\text{discharge capacity at 1.0C}}{\text{discharge capacity at 0.2C}} \geq 90\%$ ; $\frac{1.0\text{C放电容量}}{0.2\text{C放电容量}} \geq 90\%$ $\frac{\text{discharge capacity at 2.0C}}{\text{discharge capacity at 0.2C}} \geq 85\%$ ; $\frac{2.0\text{C放电容量}}{0.2\text{C放电容量}} \geq 85\%$
2	Cycle Life 循环寿命	$\frac{\text{Discharge capacity of 300th cycle}}{\text{Original discharge capacity}} \geq 80\%$ ; $\frac{\text{第300次循环的放电容量}}{\text{初始放电容量}} \geq 80\%$
3	Storage performance 存储性能	$\frac{\text{Residual capacity after 28D}}{\text{Original discharge capacity}} \geq 85\%$ ; $\frac{28\text{天后残余容量}}{\text{初始放电容量}} \geq 85\%$
4	High-Low temperature discharge performance 高低温放电性能	$\frac{\text{discharge capacity at } -10^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 60\%$ ; $\frac{-10^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 60\%$ $\frac{\text{discharge capacity at } 55^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 95\%$ ; $\frac{55^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 95\%$





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### 4.5 Environment Characteristics 环境性能

No. 序号	Items 项目	Criterion 性能标准	Test Method 测试方法
1	Vibration Test 振动测试	No explosion, no fire, no leakage 不起火、不爆炸、无泄漏。	After Standard Charging, fixed the cell to vibration table, then subjected to vibration test for 30 minutes per axis of X,Y,Z axes Frequency rate:1oct/min Vibration frequency:10Hz~30Hz Excursion (single amplitude):0.38mm Vibration frequency:30Hz~55Hz Excursion (single amplitude):0.19mm 电芯按标准充电后, 固定在振动台上, 然后沿 X、Y、Z 每个坐标方向振动 30 分钟 扫频速率: 1oct/min 振动频率: 10Hz~30Hz 位移幅值(单振幅): 0.38mm 振动频率: 30Hz~55Hz 位移幅值(单振幅): 0.19mm
2	Free Fall 自由跌落	No explosion, no fire, no leakage 不起火、不爆炸、无泄漏。	After Standard Charging, drop the cell three times per axis of X, Y, Z axes from a height of 1m onto a concrete floor in random orientations. 电芯按标准充电后, 将电芯从 1 米高度向 X、Y、Z 三个不同的方向跌落。



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### 4.6 Safety Characteristics 安全性能

No. 序号	Items 项目	Criterion 性能标准	Test Method 测试方法
1	Short-Circuit test 短路	No explosion, no fire 不起火、不爆炸	After Standard Charging, Short circuit the positive and negative, and the resistance of copper wire is $80 \pm 20 \text{m}\Omega$ , When the temperature falls $10^\circ\text{C}$ lower than the peak, Stop testing. 标准充电后, 使用总内阻 $80 \pm 20 \text{m}\Omega$ 的导线短路正负极, 当电池温度下降到比峰值低约 $10^\circ\text{C}$ 时, 结束试验。
2	Heating test 热冲击	No explosion, no fire 不起火、不爆炸	Put cell into a hot box, test condition: Temperature Rate: $5 \pm 2^\circ\text{C} / \text{min}$ Ending temperature: $130^\circ\text{C} \pm 2^\circ\text{C}$ Keep temperature for 30 minutes, Then stop testing 将电芯放置于热箱中, 测试条件如下: 升温速率: $5 \pm 2^\circ\text{C} / \text{min}$ 终止温度: $130 \pm 2^\circ\text{C}$ 保持此温度 30min, 然后停止测试。
3	Overcharge test 过充电性能	No explosion, no fire 不起火、不爆炸	Discharge : 0.5C to 3.0V Charge : 3C to 4.6V When the temperature falls $10^\circ\text{C}$ lower than the peak ,Stop testing. 放电: 0.5C 放电至 3.0V 充电: 3C 充电至 4.6V 当温度下降到比峰值低约 $10^\circ\text{C}$ 时, 结束试验。

### 4.7 Storage and Shipment Requirement 存储及运输要求

	Item 项目	Requirement 要求
Storage environment	Short period less than 1 month 短期少于 1 个月	$-20^\circ\text{C} \sim +45^\circ\text{C}$ , 90%RH. Max
	Long period more than 3 month 长期超过 3 个月	$-10^\circ\text{C} \sim +45^\circ\text{C}$ , 90%RH. Max



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储存环境	Recommend storage 推荐存储	15°C ~35°C, 85%RH. Max
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Long time storage:

If the cell is stored for a long time, the cell's storage voltage should be 14.4~15.4V and the cell is to be stored in a condition as No.4.1. Also, it is recommended to charge the cell every six months.

长期存储:

如果需要长期存储, 电池存储电压应该保证在 14.4~15.4V, 存储条件参考 No.4.1。同时, 建议对电池每 6 个月充一次电。

## 5. Warning and Cautions 警告及注意事项

Danger warning :( it should be described in manual or instruction for users, indicated especially) to prevent the possibility of the battery from leaking, heating, explosion. Please observe the following precautions:

**危险警告:** (应在使用说明手册或说明书中, 特别注明) 为防止电池可能发生泄漏, 发热, 爆炸, 请注意以下预防措施:

- Don't immerse the cell in water. Save when not in use, should be placed in a cool dry environment.  
严禁将电芯浸入水中, 保存不用时, 应放置在阴凉干燥的环境中。
- Don't use and leave the cell near a heat source such as fire or heater.  
禁止将电芯在热高温源旁, 如火, 加热器等旁边使用和留置。
- When charging, use a cell charger specifically for that purpose.  
充电时请选用锂离子电池专用充电器。
- Don't reverse the positive and negative terminals.  
严禁颠倒正负极后使用电池。
- Don't connect the cell to an electrical outlet directly.  
严禁将电池直接插入电源插座。
- Don't discard the cell in fire or heater.  
禁止将电芯丢入火或加热器中。
- Don't connect the positive and negative terminal directly with metal objects such as wire.  
Short terminals of battery is strictly prohibited, it may damage battery.  
禁止用金属直接连接电池正负极短路, 任何时候禁止短路电芯, 它会导致电池严重损坏。
- Don't transport and store the cell together with metal objects such as necklaces, hairpins.  
禁止将电池与金属, 如项链、发卡等一起运输或存储。
- Don't strike, throw or trample the cell.  
禁止敲击, 抛掷或踩踏电池等。
- Don't directly solder the cell.  
禁止直接焊接电池。

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- Don't pierce the cell with a nail or other sharp object.  
禁止用钉子或其它利器刺穿电池。
- When disposing of secondary cells, keep cells of different electrochemical systems separate from each other.  
二次电池处理时, 请将电池和其他电化学体系的产品分开。
- Prohibition of use of damaged cells.  
禁止使用已损坏的电池。
- Never disassemble the cells .  
在任何情况下不得拆卸电芯。
- The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.  
更换电芯应由电芯供应商或设备供应商完成, 用户不得自行更换。
- Keep the battery away from babies.  
电池应远离小孩。
- Any components contacting these two edges, they must be insulated.  
导电元件与电池两侧封边接触必须绝缘。

### Caution 注意

- Do not use or leave the battery at very high temperature conditions (for example, 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)使用或放置电池, 否则可能会引起电池过热, 起火或功能失效, 寿命减短。
- Do not use it in a location where is electrostatic and magnetic greatly, otherwise, the safety devices may be damaged, causing hidden trouble of safety.  
禁止在强静电和强磁场的地方使用, 否则易破坏电池安全保护装置, 带来不安全的隐患。
- If the battery leaks, and the electrolyte get into the eyes. Do not wipe eyes, instead, rinse the eyes with clean running water, and immediately seek medical attention. Otherwise, eyes injury can result.  
如果电池发生泄漏, 电解液进入眼睛, 请不要揉擦, 应用清水冲洗眼睛, 并立即送医治疗, 否则会伤害眼睛。
- If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.  
如果电池发出异味、发热、变色、变形或使用、贮存、充电过程中出现任何异常现象, 立即将电池从装置或充电器中移离并停用。
- In case the battery terminals are dirt, clean the terminals with a dry cloth before use.



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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。

- Be aware discharged batteries may cause fire; tape the terminals to insulate them.  
废弃之电池应用绝缘纸包住电极，以防起火，爆炸。

## 6.Note:注释

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

本说明书未包括事项应由双方协议确定。