

 喆铝电池	东莞市喆铝实业有限公司 Dongguan Zhechang Industry Co.,Ltd.	V 1.0
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产品确认规格书

Specification For Approval

客户 Customer: 深圳昕海科技

型号 Model: ZEC 104050 2500mAh 3.7V

版本 Version: _____

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制定 Draft	审核 Checked	批准 Approved

客户确认 Customer Approval:

签名 Signature	
时间 Date	
盖章 Stamp	

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版本更新记录

Revision History

版本 Version	日期 Date	更新内容 Description



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1. 范围 Scope

本规格书适用于东莞市喆铝实业有限公司生产的可充电聚合物锂离子电池。

This specification is applied to lithium polymer rechargeable battery manufactured by DongGuanZheChang Industry Co.,Ltd

2. 型号 Model

ZEC 104050 2500mAh 3.7V

3.定义 Definition

3.1. 标准测试条件 Standard Test Condition

测试电池必须是本公司出厂时间一个月以内，并且未超过 5 次以上的充放电循环的新电池。除非另有规定，本规格书规定的测试条件为：温度 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ；相对湿度 45%~75%；气压 86kPa~106kPa。

The batteries tested here shall be new batteries within one month after shipment from our factory and not be cycled over 5 times. The tests shall be conducted in an ambient temperature of $23 \pm 2^{\circ}\text{C}$ under humidity of 45% to 75% and pressure of 86kPa to 106kPa, unless otherwise specified..

3.2. 测试仪器或设备 Measuring Instrument or Apparatus

尺寸测量 Dimension Measurement	精度大于或等于 0.01mm。 With equal or more precision of 0.01mm.
电压和电流测量 Voltage and Current	万用表准确度不低于 0.5 级，测电压时内阻不应小于 $10\text{k}\Omega / \text{V}$ 。 Precision over class 0.5, having inner impedance more than $10\text{k}\Omega / \text{V}$.
内阻测量 Impedance Measurement	交流阻抗法，测试条件为 1kHz LCR。 Sinusoidal alternating current method (1kHz LCR meter).
电池测试系统 Battery test system	电流精度应在 $\pm 0.1\%$ 以上,恒压精度 $\pm 0.5\%$,计时精度不低于 $\pm 0.1\%$ 。 Current measurement shall be implemented by instrument with equal to more precision scale of $\pm 0.1\%$ and the constant voltage precision should be implemented with $\pm 0.5\%$, and the timing precision should be not below $\pm 0.1\%$.
温度测量 Temperature Measurement	准确度不低于 $\pm 0.5^{\circ}\text{C}$ 。 With equal or more precision scale of $\pm 0.5^{\circ}\text{C}$.

3.3. 标准充电 Standard Charging

先用 500mA(0.2C)恒流充电至 4.2V，再恒压 4.2V 充电直至充电电流为 25mA(0.01C)@ $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 。

Charging the battery initially with constant current at 500mA(0.2C)and then with constant voltage at 4.2V till charge current declines to 25mA(0.01C@ $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$).

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3.4 标准放电 Standard discharge

Cells shall be discharge at a constant current of 500mA (0.2 C) to 2.75volts @ 23°C ±2°C

电池以 500mA (0.2 C) 恒流放电至 2.75V @ 23°C ±2°C

3.5 放电温度特性 Temperature Dependence of discharge capacity

Cells shall be charged per 3.3 and discharged @0.2 C to 2.75volts. Except to be discharged at temperatures per Table . Cells shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 25 °C and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table .

电池按 3.3 规定充电。按表中的温度中放电，电池必须先在该试验温度中放置 3 个小时。在每一个温度中的放电容量应不小于表中的要求。

Discharge Temperature (放电温度)	0°C	10°C	25°C	60°C
Discharge Capacity (0.2 C) (放电容量/0.2 C)	25%	60%	100%	80%

4. 技术参数 Ratings

4.1.	容量 Capacity	2500mAh @0.2C(Typ) (温度 Temp: 23°C ±2°C) 2450mAh @0.2C(Min) (温度 Temp: 23°C ±2°C)
4.2.	内阻 Impedance	≤150mΩ
4.3.	标称电压 Nominal Voltage	3.7V
4.4.	充电限制电压 charge limiting voltage	4.2V
	过充检测电压 Over charge detection voltage	4.3 ±0.05V
4.5.	充电电流 Charge Current	500mA@0.2C (Standard) 1250mA@0.5C(Max)
4.6.	放电终止电压 Discharge termination voltage	2.75V
	过放电检测电压 Over discharge detection voltage	2.5 ±0.075V
4.7.	放电电流 Discharge Current	标准 Standard: 500mA@0.2C 最大持续 Max. Continuous : 2500mA@1.0C
4.8.	重量 Weight	约 40g
4.9.	出货电压 Shipment Voltage	3.80V~4.05V
4.10.	工作温度和湿度 Operation Temperature And Humidity.	充电温度 Charge Temp: 0°C ~45°C 放电温度 Discharge Temp: -20°C ~60°C 湿度 humidity: ≤85% RH



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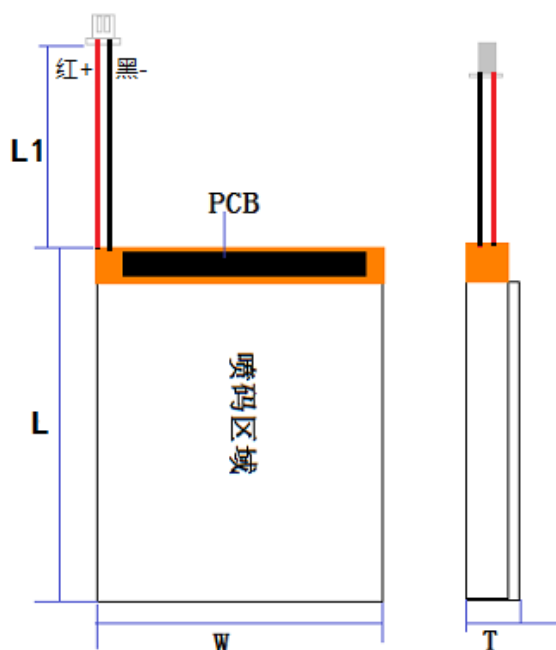
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4.11.	存储温度和湿度 Storage Temperature And Humidity	温度 Temperature : -5℃~45℃ 湿度 Humidity: 65±20% RH
4.12.	保质期 Warranty Period	一年(自出货时间) 1 Year(From Shipment)
4.13.	尺寸 Dimension	长度 Length: ≤53.0mm 宽度 Width: ≤40.0mm 厚度 Thickness: ≤10.0mm
4.14.	外观 Appearance	表面应无明显的划痕、裂纹、污点、泄露、变形等影响产品性能的外观缺陷。 There shall be no such defect as remarkable, scratch, leakage, or deformation, which may obviously affect commercial value of the cell.

5. 外形尺寸图 Dimensional Drawing



Units (单位)	mm	PCB (保护板)	ZEC-24NTC
Connector & wire 连接器	AH-1.25-2pin 正向 导线 UL1571AWG26#	Specification 规格	L1 (不含端子): 25±3mm Pin1: red, P+ Pin2: black, P-
喷码内容: — ZEC 104050 3.7V + 2500mAh 9.25Wh EC (“EC”表示年月代码,随实际生产年月而变动)			

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6.主要组件列表 List of main components

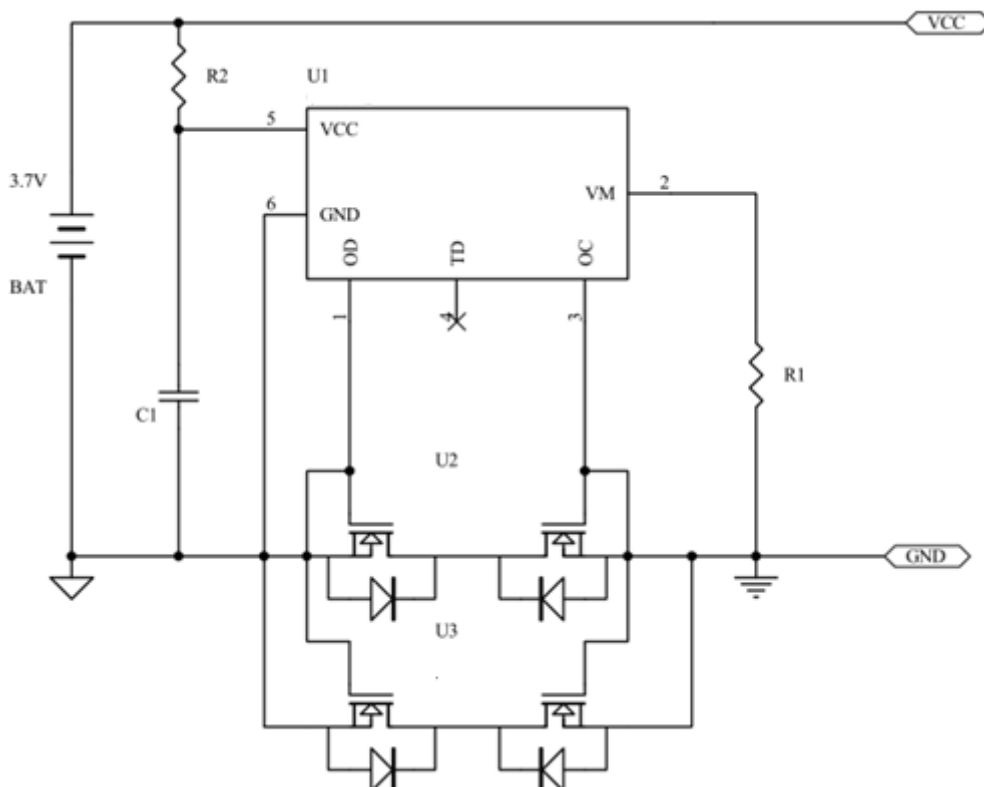
序号	组件编号	组件名称	组件规格	封装形式	数量	备注
1	U1	IC	DW01	SOT-23-6	1	根据生产厂家批次不同丝印会随着变动,性能不变
2	U2. U3	MOSFET	8205	SOT-23-6	2	根据生产厂家批次不同丝印会随着变动,性能不变
3	R2	电阻	SMD100Ω ±5%	0402	1	
4	R1	电阻	SMD 1KΩ ±5%	0402	1	
5	C1	电容	SMD 0.1UF(104)±10%	0402	1	
6	B+, B-	镍片	4*3*0.3mm		2	
7	PCB	电路板	24*4.0*0.6mm FR4		1	

7. 保护板技术参数 Protective Plate Technical parameters

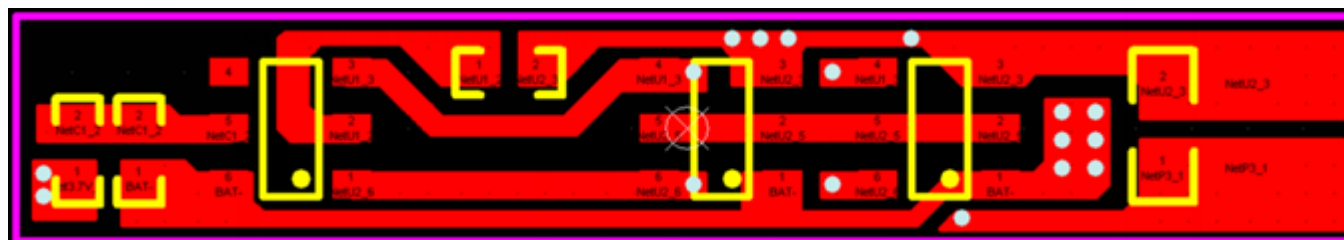
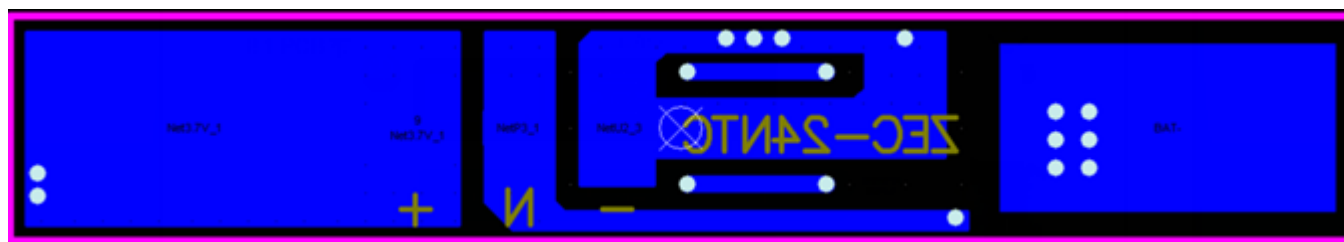
(参照相应元器件技术规格书, 在常温 25℃下测试, 相对湿度≤90%)

检测项目		Min	Typ	Max	Unit
输入电压(B+与B-间)		1.5	—	10	V
过充保护电压		4.25	4.3	4.35	V
过充释放电压		4.05	4.1	4.15	V
过充保护延迟时间		77	110	143	ms
过放保护电压		2.425	2.5	2.575	V
过放释放电压		2.825	2.9	2.975	V
过放保护延迟时间		38.5	55	71.5	ms
过流保护	实际负载值	5.0	6.0	7.0	A
	峰值过流值(综合测试仪测试值)	5.5	7.0	8.5	A
过流保护延迟时间(综合测试仪测试值)		4.9	7.0	15	ms
静态电流		3	5	10	uA
保护板内阻		15	40	50	mΩ
最大工作温度范围		-40	/	85	℃

8.应用原理图 Apply the schematic:



8.1PCB 布局图 PCB Layout Drawing





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9. 产品性能 Product Performance

9.1. 电性能 Electrical Performance

测试项目 Test Items	测试方法 Test Method	指标 Criteria
9.1.1 额定容量 Rated Capacity	该容量是指标准充电后，以(0.2C)的电流放电至终止电压所放出的容量。温度：23℃±2℃ This capacity refers to the capacity that is discharged at a current of (0.2C) to the termination voltage after standard charging. Temperature: 23℃±2℃	≥2500mAh
9.1.2 循环寿命 Cycle Life)	标准充电后，以(0.2C)电流放电至终止电压。持续重复以上测试直到保持容量为 80%。 After standard charging, it is discharged to the termination voltage at (0.2C). Repeat the above tests until the capacity is maintained at 80%.	循环次数≥300 次。 Cycles ≥300 times
9.1.3 高温放电性能 High Temperature Discharge performance	标准充电后，在环境温度为 50±3℃中搁置 2 小时，再以 (0.2C)电流放电到终止电压。 After standard charging, it is left at an ambient temperature of 50±3℃ for 2 hours, and then discharged to the termination voltage at (0.2C).	放电容量大于额定容量的 80% 。 The capacity retention shall be no less than 80% of rated capacity.
9.1.4 低温放电性能 Low Temperature Discharge performance	标准充电后，在环境温度为 0℃中搁置 8 小时，再以 (0.2C)电流放电到终止电压。 After standard charging, it is left at an ambient temperature of 0℃ for 8 hours, and then discharged to the termination voltage at (0.2C)..	放电容量大于额定容量的 25%。 The capacity retention shall be no less than 25% of rated capacity.
9.1.5 过充电测试 Overcharge Test	标准充电后，在环境温度为 23±2℃的条件下，以(3C) 电流 5.0V 恒流恒压充电至保护动作。 After the standard charge, at the ambient temperature of 23±2℃, the (3C) Current 5.0V constant current constant pressure charging to the protection action.	不起火、不爆炸。 No fire, no explosion.
9.1.6 短路测试 Short-Circuit Test	标准充电后，常温下将电池正负极（P+与 P-）短路，电池保护板应具有保护功能，断开短路后自恢复到开路电压。 After the standard charge, the battery positive and negative poles (p+ and p-) are short-circuited at room temperature, the battery protection Board should have protection function, disconnect short circuit after self-recovery to open circuit voltage.	不起火、不冒烟、不爆炸。 No fire, no smoking, no explosion.

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9.2. 环境适应性能 Environmental Performance

测试项目 Test Items	测试方法 Test Method	指标 Criteria
9.2.1 恒定湿热 Humidity	标准充电后, 在温度 $45\pm 2^{\circ}\text{C}$, 相对湿度为 90%-95% 的环境中搁置 48 小时, 取出在 $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 的环境中搁置 2 小时后, 观察外观并以(0.2C) 电流放电到终止电压, 测量容量。 After standard charging, it was left for 48 hours in an environment with a temperature of $45\pm 2^{\circ}\text{C}$ and a relative humidity of 90%-95%, and after being taken out and left in an environment of $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$ for 2 hours, the appearance was observed and discharged to the termination voltage with a current of (0.2C) to measure the capacity.	不变形、不漏液、不冒烟、不起火、不爆炸。 容量保持量 $\geq$ 额定容量的 70%。 No distortion, no leakage, no smoking, no fire, no explosion. Capacity retention shall be no less than 70% of rated capacity.
9.2.2 热冲击 Heating	标准充电后, 放置于热箱中, 温度以 $5^{\circ}\text{C}/\text{min}$ 的速率升至 130°C 并保温 10min。 After standard charged, the battery is placed in an oven and is heated up at a rate of $5^{\circ}\text{C}/\text{min}$ until the temperature reaches 130°C . The oven shall be maintained at 130°C for 10 minutes.	不起火、不爆炸。 No fire, no explosion.
9.2.3 低压 Low Pressure	标准充电后, 放置于绝对压力为 11.6Kpa 或以下, $23\pm 2^{\circ}\text{C}$ 条件下贮存 6 小时。 After standard charged, the battery is placed in a vacuum chamber, in a ambient temperature of $23\pm 2^{\circ}\text{C}$. once the chamber has been sealed, its internal pressure is gradually reduced to a pressure equal to or less than 11,6 k Pa held at that value for 6 hrs.	不泄露、不起火、不爆炸。 No leakage, no fire, no explosion.
9.2.4 温度循环 Temperature cycling	标准充电后, 在 $70\pm 2^{\circ}\text{C}$ 环境下搁置 4h, 放在 $20\pm 3^{\circ}\text{C}$ 环境下 2h, 放在 $-20\pm 2^{\circ}\text{C}$ 环境中 4h, $20\pm 3^{\circ}\text{C}$ 环境下 2h。温度转换时间 $\leq 30\text{min}$, 持续上述温度储存循环共 10 次。 After fully charged, store the battery at $70\pm 2^{\circ}\text{C}$ for 4h, at $20\pm 3^{\circ}\text{C}$ for 2h, at $-20\pm 2^{\circ}\text{C}$ for 4h and then $20\pm 3^{\circ}\text{C}$ for 2h. Temperature translating within 30 min and cycle for 10 times.	不泄露、不起火、不爆炸。 No leakage, no fire, no explosion
9.2.5 常温贮存性能 (25°C) Storage Characteristics (25°C)	标准充电后, 在环境温度为 $23\pm 2^{\circ}\text{C}$ 的条件下开路搁置 28 天, 再以(0.2C) 电流进行放电到终止电压。 After standard charging, it is left open for 28 days at an ambient temperature of $23\pm 2^{\circ}\text{C}$, and then discharged to the termination voltage at (0.2C).	容量保持量 $\geq$ 额定容量的 95%。 容量恢复量 $\geq$ 额定容量的 98%。 The capacity retention shall be no less than 95% of rated capacity. The recovery capacity shall be no less than 98% of rated capacity.

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9.2.6	高温贮存性能 (50℃) Storage Characteristics (50℃)	标准充电后, 在环境温度为 50±3℃ 的条件下开路搁置 7 天, 再以 (0.2C) 电流进行放电到终止电压时放电容量测量值。 After standard charging, it is left open for 7 days at an ambient temperature of 50±3℃, and then discharged at (0.2C) to the end voltage	容量保持量≥额定容量的 80%。 The capacity retention shall be no less than 80% of rated capacity.
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9.3. 机械性能 Mechanical Performance

测试项目 Test Items	测试方法 Test Method	指标 Criteria
9.3.1 振动测试 Vibration Test	标准充电后, 将电池固定在振动台上, 沿 X、Y、Z 三个方向各振动 100 分钟, 振幅 1.6mm, 振动频率为 10Hz~55Hz, 每分钟变化 1Hz。 After standard charged, fixed the battery to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz an 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 100 minutes per axis of XYZ axes.	不泄露、不起火。 No leakage, no fire.
9.3.2 自由跌落 Free Drop	标准充电后, 电池从 100cm 高度(最低点高度)位置自由跌落到置于水泥地面上的 18~20 mm 厚的硬木板上, 从 X、Y、Z 正负方向(六个方向)每个方向自由跌落 1 次。 After standard charged, the battery is to be dropped onto the wood board with a thickness of 18mm to 20mm on the cement ground, the height shall be 100cm measured from the lowest point of the battery to the wood board surface. Drop the battery from X, Y, Z direction (including face side and reverse side direction each) each time.	不漏液、不冒烟、不起火、不爆炸。 No leakage, no smoking, no fire, no explosion.
9.3.3 重物冲击 Impact	电池标准充电后, 将一直径 15.8mm 的金属棒平放在电池最大平面中心, 金属棒的中心轴与电池高度方向垂直。将 9.1kg 的重物从 610mm 高度自由垂落冲击金属棒。 Standard-charge a cell, place a 15.8mm-diameter metal bar onto the center of the cell's flat surface, ensuring the longitudinal axis of the bar is perpendicular to the height direction of the cell.	不起火、不爆炸。 No fire, No explosion
9.3.4 挤压 Crush	标准充电后, 将电池放置于台面上进行挤压, 压力是由一个可以产生 13±1KN 压力的活塞提供, 一旦达到最高值, 立即释放压力。 After standard charged, the battery is to be crushed between two flat surfaces. The force for the crushing is applied by a hydraulic ram exerting a force of 13KN. Once the maximum force has been obtained it is to be released.	不起火、不爆炸。 No fire, no explosion.

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10. 电池外观允许标准 Battery appearance allows standard:

10.1 轻微磨花: (电池为软包封装在制程中会有轻微磨花, 在不影响其性能情况下是允许的)

允收标准: 电池正反面磨花面积 $\leq$ 电池面积 $1/10\text{mm}^2$

10.2 划痕: (电池为软包封装在制程中会有轻微划痕, 在不影响其性能情况下是允许的)

允收标准: 划痕面积 $\leq$ 电池面积 $1/10\text{mm}^2$

10.3 表面污染: (电池在制程中会有轻微污染点, 在不影响其性能情况下是允许的)

允收标准: 电池正反面各不可超过 3 个污染点

11. 安全使用指南 Handing Guideline

11.1. 免责声明 Free-responsibility Declaration

产品使用前, 请用户说细阅读产品规格书、使用说明书及使用注意事项等, 了解产品的使用方法及应用范围; 若出现产品使用方法错误、电路连接不对或采用的输入电源、负载功能参数与产品规格书所标性能参数不符等现象均属使用不当, 由使用不当造成产品、负载及周边连接件的损坏, 本公司均不承担任何责任。

Before using the battery, the customers should read the specifications, usage instruction and some attentions carefully to learn its application method and areas. If the phenomenon such as error using method or wrong circuit connection, or input power data, working index are inconsistent with the specifications happen and cause damage to production, circuit and its accessories, we are not responsible for it.

11.2. 注意事项 Attention

- 将电池置于孩童够不着的地方, 以避免孩童吞咽电池。
- Store batteries out of reach of children so that they are not accidentally swallowed.
- 孩童需在监护人指导下使用电池。
- If younger children use the cell, their guardians should explain the proper handling.
- 长期不使用电池, 应将电池取出, 在低温湿度环境下存储。
- Remove it from the equipment and store in a place with low humidity and temperature if the cell is not used for an extended period.
- 电池充电, 使用和存储过程中需远离静电。
- Keep it far away from articles or materials with static electric charges while the cell is charged, used or stored.
- 使用专用充电器和正确的方法充电。
- Use dedicated chargers and follow the specified conditions when charging the cell.
- 在电池长期存储过程中, 需每六个月补充电一次, 以保持约 50% 的荷电状态(50%SOC)。
- Charge the battery to about 50% SOC each six months during storage.



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- 禁止在高温下使用或放置电池。
- Do not use or leave the battery at high temperature
- 禁止在强静电和强磁场的地方使用。
- Do not use the battery in a location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.
- 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,立即将电池从装置或充电器中移离并停用。
- If the battery gives off strange 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 charger and stop using it.

11.3. 危险操作 Dangerous Operation

- 不要加热或把电池扔到火盆里, 禁止弄湿电池。
- Do not heat or put the cell into the fire. Also do not wet the cell.
- 不要在火源, 烤炉附近或超过 60 度的环境中放置和使用电池。
- Do not use, leave cell close to fire or inside of a car where temperature may be above 60 °C. Also do not charge / discharge in such conditions.
- 不要将电池与金属放在一起存贮移动, 诸如项链、发夹、硬币以及螺丝等。
- Do not put or store cell together with metal articles such as necklaces, hairpins, coins, or screws.
- 严禁反充电池。
- Prohibit reverse charging of the battery. The battery must be connected correctly.
- 不要将电池的正负极用金属连接。
- Do not short circuit the (+) and (-) terminals with metal conductors.
- 不要将电池反接在设备上使用。
- Do not place cell in a device with the (+) and (-) in a reverse way.
- 不要用针状尖锐物品刺穿电池。
- Do not penetrate cell with a sharp articles such as a needle.
- 不要拆解电池。
- Do not disassemble the cell.
- 不要使用有严重划痕和变形的电池。
- Do not use a cell with serious scar or deformation.
- 不要将电池置于加热、洗涤和高压容器中。
- Do not put cell into a heating vessel, washing machine or high-pressure container.
- 电池不可与其它类型的一次或不同的包装、类型和品牌二次电池混用。
- Do not use cell with primary batteries, or batteries of a different package, type, or brand.

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11.4. 警告 Warning

- 超出规定的充电时间时，应停止充电。
- Stop charging the cell if charging is not completed within the specified time.
- 在使用，充电或存贮过程中发现有异常发热，有气味，变色，变形的情况，应停止使用。
- Stop using the cell if abnormal heat, odor, discoloration, deformation or abnormal condition is detected during use, charge, or storage.
- 假如发现电池漏液或有异味，应立即远离。
- Keep away from cell immediately when leakage or foul odor is detected.
- 假如电池漏液粘在皮肤或衣物上，请立即用清水冲洗。
- Wash well with clean water immediately if liquid leaks onto your skin or clothes.
- 如果电池发生泄露,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。
- If the battery leaks and the electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention.

12. 产品规格书的修订和声明 Revision and Statement

本司有权对本产品规格书进行修订，修订后本司将会通知相关客户。

We have the right to revise this specification. We'll inform our customers after revision.

如对本规格有异议，双方可协商解决。

If any matters with this specification arise, it shall be revised by mutual agreements.