

Product Specification

产品规格承认书

Customer Code 客户代码: _____

Customer Product Model 客户产品型号: _____

Coincell Battery cell Model.科恩瑟尔电芯型号: **KE-M9440S1**

Coincell Battery Product Model. 科恩瑟尔电池型号: _____

Battery Part Number 产品料号: **209-00026-000**

Document Number 文件号: _____

| Prepared by 制作人 | Checked by 审核人 | Approved by 批准人 |
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| Customer Approval 客户承认 | Customer Signature/Date 客户签名/日期 | Customer Company Stamp 客户公司盖章 |
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Revision History
版本履历表

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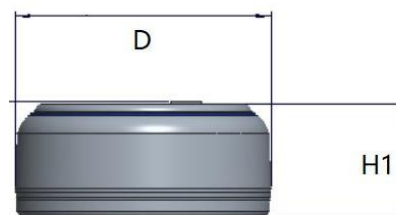
1. Scope 概述

This document describes the specification of rechargeable Li-ion battery pack which is provided by Shenzhen Coincell Battery Co., Ltd.

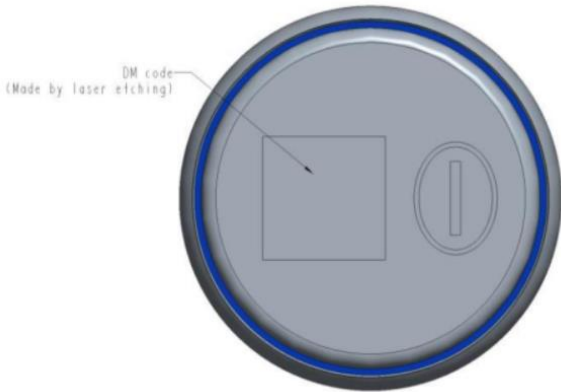
这文件描述由深圳市科恩瑟尔电池有限公司提供的可充电锂离子电池成品的规格。

2. Battery specification 电芯规格:

| No. | Item 项目 | Parameters 参数 | |
|-----|---|---|--|
| 1 | Battery cell model 电芯型号 | M9440S1 | |
| 2 | Minimum capacity最小容量 (0.2C discharge current放电电流) | 23mAh | |
| 3 | Typical capacity典型容量 (0.2C discharge current放电电流) | 25mAh | |
| 4 | Nominal voltage标称电压 | 3.8V | |
| 5 | Shipment Status of charge 出货容量状态 | 65%~85% | |
| 6 | Shipment voltage 出货电压 | 3.8-4.0V | |
| 7 | Charge ending voltage充电限制电压 | 4.35V | |
| 8 | Discharge ending voltage 放电终止电压 | 3.00V | |
| 9 | Maximum cell dimension 电芯最大尺寸 | D: 9.5mm , H:4.0mm | |
| 10 | Cell weight 电芯重量 | Appr 0.8g | |
| 11 | Cell Impedance内阻 (V=3.8-4.0V) | ≤1000mΩ (备注: 出厂时间小于6个月, 循环次数小于30次) | |
| 12 | Max charge current最大充电电流 | 25mA, 1C | 15°C≤T≤45°C |
| | | 5.0mA, 0.2C | 0°C≤T<15°C |
| 13 | Max discharge current最大放电电流 | 25mA, 1C | 15°C≤T≤60°C |
| | | 5.0mA, 0.2C | -20°C≤T<15°C |
| 14 | Operating temperature 工作温度范围 | Charge 充电: 0-45°C Discharge 放电: -20-60°C | |
| 15 | Cycle life 循环寿命 (RT) (2C charge充电, 0.5C discharge放电) | 700次充放电后, 电池恢复80%的初始容量, 电芯膨胀率≤1%。 After 700cycles charge/discharge, battery can recover 80% of its initial capacity, Cell expansivity ≤1%. | |
| 16 | Storage period储存时间 | 1 Month at -20 to 60 °C | Capacity Recovery Rate > 85% |
| | | 3 Month at -20 to 45 °C | Capacity Recovery Rate > 90% |
| | | 1 Year at -20 to 20 °C | Capacity Recovery Rate > 90% |
| 17 | Other 其他 | UL1642, IEC62133, UN38.3, Reach, ROHS | |



2.1 Battery laser etching content 电池激光蚀刻内容:



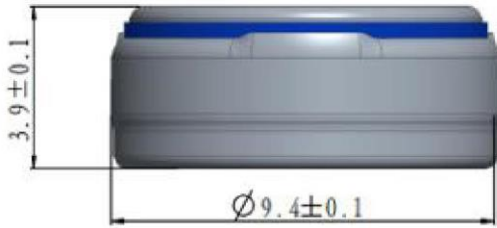
DM code:

Size:3.0±0.5mm

M9440 XX D WW YY T T M 000001



2.2 Cell drawing 电芯示意图:



3.Environmental characteristics 环境特性

| No. | Test item 测试项目 | Test Method 测试方法 | Pass Criteria 合格标准 |
|-----|--|---|--|
| 1 | Charged Storage Characteristics 荷电保持能力 | Battery cell is fully charged by standard charge process. Battery cell idle at 23±3°C for 28days. At 23±3°C, battery cell is discharged battery by 0.2C until 3.0V. 电芯按标准充电流程满充电。在 23±3°C 放置 28 天。 在 23±3°C 电池按 0.2C 放电到 3.0V. | Discharge time ≥4.25hrs 放电时间 ≥4.25hrs |

4. Safety Test安全测试

Coincell battery can meet several international safety standards. Below is part of safety tests which are referred to international standard.

科恩瑟尔的电池能达到多个国际电池安全标准。以下是部分安全测试项目。

| No. | Test item 测试项目 | Test Method 测试方法 | Criteria 标准 |
|-----|--|---|---|
| 1 | Constant Humidity and Temperature test 恒定湿温测试 | Battery cell is fully charged by standard charge process. Then, battery cell is put into chamber with constant humidity(90~95%) and temperature (40±2°C) for 48hrs. After test, battery idle for 2hrs at 23±3°C and discharge by 0.2C to 3.0V. 电芯按标准充电流程满充电。之后电芯放在恒温箱 48 小时, 湿度为 90~95%和温度为 40±2°C。 | After test, battery cell can discharge ≥3hrs No fire, No leakage, No explosion 无起火, 无漏液, 无爆炸 |
| 2 | Overcharge Test 过充电测试 | Battery cell is fully charged by standard charge process. Then, the battery is charged by 3.0C rate constant current and voltage to 4.6V for 7hrs. 电芯按标准充电流程满充电。之后电芯用 3C4.6V 恒流恒压充电 7 小时。 | No fire, No explosion 无起火, 无爆炸 |

| | | | |
|---|------------------------------|---|--|
| 3 | Over discharge Test 过放电测试 | At 23±2°C, battery cell is discharged by 0.2C until 3.0V. And then battery cell is connected the load with 30Ω to discharge for 7hours. 电芯在 23±2°C 用 0.2C 放电到 3.0V。之后电芯连接 30 Ω负载放电 7 小时。 | No fire, No leakage, No explosion 无起火, 无爆炸 |
| 4 | Short test 短路测试 | Battery cell is fully charged by standard charge process. Then, battery cell anode and cathode connected to 80±20mΩ load for 1hour. 电芯按标准充电流程满充电。电芯的正负极连接到小于 80±20mΩ 负载 1 小时。 | No fire, No explosion The Temperature of the Battery surface not exceeded than 150°C 无起火, 无爆炸, 表面温度≤ 150°C |
| 5 | Projectile Test 焚烧测试 | Battery cell is fully charged by standard charge process. Battery cell is placed on the screen which is to be constructed by steel wire mesh. The screen is mounted above the burner. And eight-sided covered wire cage is to be placed over the battery cell. Battery cell is to be heated and remain on the screen until it explodes or has been ignited or burned out. 电芯按标准充电流程满充电。 将电芯放在钢丝网上, 钢丝网下有燃烧器和钢丝网被八面铝网盖住。电芯在钢丝网上被加热直到电芯爆炸或被点燃或完全烧毁。 | No part of an exploding cell shall penetrate the wire screen. 电芯的任何部分不得穿出此八面铝网。 |
| 6 | Drop Test 掉落测试 | Battery cell is fully charged by standard charge process. Battery cell is free fall from a height of 1m on the cement floor, from X-axis、Y-axis positive and negative direction. Each direction is free fall 1 time. 电芯按标准充电流程满充电。 电芯从 1 米高处自由跌落到水泥地板上, 从 X 轴、Y 轴的正负方向, 每个方向自由跌落一次。 | No deformation, No fire, No explosion, No leakage 电池无变形, 无起火, 无爆炸, 无漏液 |

| | | | |
|---|--------------------|---|------------------------------------|
| 7 | Crush test 挤压测试 | <p>Battery cell is fully charged by standard charge process.</p> <p>The battery cell is to be crushed with its longitudinal axis parallel to the surfaces of crushing apparatus.</p> <p>The surfaces are to be brought in contact with cell and the crushing is to be continued until an applied force of $13\pm 1\text{kN}$ is reached. Once the maximum force has been obtained, it is to be released.</p> <p>电芯按标准充电流程满充电。</p> <p>电芯的纵向跟平面金属板间平行, 持续施加 $13\pm 1\text{kN}$ 的压力挤压, 直到压力达到 $13\pm 1\text{kN}$ 时停止并释放压力。</p> | No fire, No explosion 无起火, 无爆炸 |
| 8 | Shock test 撞击测试 | <p>Battery cell is fully charged by standard charge process.</p> <p>Battery cell is secured to the testing machine by means of a rigid mount which will support all mounting surfaces of the battery cell. The battery cell is subjected to a total of two shocks of equal magnitude. The shocks are to be applied in each of two mutually perpendicular directions. For each shock the battery cell is accelerated in such a manner that during the initial 3ms the minimum average acceleration is 75g. The peak acceleration shall be between 125 g and 175 g. Battery cell is tested at $20\pm 5^\circ\text{C}$</p> <p>电芯按标准充电流程满充电。</p> <p>在环境温度下, 将电芯分别按二个轴向固定在测试台面上, 前 3ms 内平均加速度最少达到 75g (g 为重力加速度), 峰值加速度达 125g 至 175g。</p> <p>电芯测试温度为 $20\pm 5^\circ\text{C}$</p> | No fire, No explosion, 不起火, 不爆炸 |

5. Performance and Test Criteria 电池性能和测试标准**5.1 Standard Test Criteria 标准测试标准**

If test criteria is not defined, test should be done under the below standard test criteria.

如果测试标准没有定义，测试标准会按以下测试完成。

| Test Criteria 测试标准 | Parameters 参数 |
|---|-----------------------------------|
| Ambient Temperature 环境温度 | 23±3°C |
| Relative Humidity 相对湿度 | 65±20% |
| Atmospheric pressure 大气压力 | 86 ~ 106 kPa |
| Charge 充电 | Standard charge process 标准充电流程 |
| Discharge 放电 | Standard discharge process 标准放电流程 |
| Delivery Time from coin cell 从工厂发出时间 | Within 1month 一个月内 |

5.2 Visual Inspection 外观检查

No crack, no leakage

没有破裂，没有漏液

5.3 Measuring Instrument Standard 测量仪器标准

| Instrument 仪器 | Standard 标准 |
|---|--|
| Instrument to measure dimension 测试尺寸仪器 | Precision scale : 0.01mm 精度: 0.01mm |
| Voltmeter 伏特计 | Internal impedance < 10kΩ/V 内阻 < 10kΩ/V |
| Ammeter 安培计 | Impedance of ammeter and wires < 0.01Ω 安培计和电线内阻 < 0.01Ω |
| Impedance meter 阻抗计 | Impedance is measured by sinusoidal 1kHz AC current 内阻测试用1kHz正弦交流电流 |

5.4 Standard charge process 标准充电流程

Battery pack is charged by 0.2C constant current at 23±2°C until 4.35V. Then, battery cell is charged by constant voltage until current drop to 0.02C.

在23°C±2°C，电池成品以0.2C恒流电流充电直到4.35V，电池用恒压充电直到电池电流降到0.02C。

5.5 Standard discharge process 标准放电流程

Battery pack is discharged by 0.2C continuous current at 23±2°C until the voltage drop to 3.0V.

在23°C±2°C，电池成品以0.2C连续放电电流放电直到3.0V。

5.6 Maximum charge current 最大充电电流

Battery pack is charged by 1.0C constant current at 23±2°C until 4.35V. Then, battery pack is charged by

constant voltage at 4.35V until current drop to 0.02C.

The charging time is limited to 2hours.

在 $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$, 电池成品以1.0C恒流电流充电直到4.35V, 电池用恒压充电直到电池电流降到0.02C。充电限时3小时。

5.7 Maximum discharge current 最大放电电流

Battery pack is discharged by 1.0C continuous current at $23\pm 2^{\circ}\text{C}$ until the voltage drop to 3.0V.

在 $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$, 电池成品以1.0C连续放电电流放电直到3.0V。

5.8 Initial impedance 初始内阻值

Battery pack is fully charged by standard charge process.

The impedance of fully charged battery cell is tested by AC impedance tester at 1kHz. The initial impedance should be $\leq 1000\text{m}\Omega$.

电池成品用标准充电流程充满电。再使用交流阻抗测试仪 (at 1KHz) 测量初始内阻。电芯初始内阻应 $\leq 1000\text{m}\Omega$ 。

5.9 Initial capacity 初始容量值

Battery pack is fully charged by standard charge process and then battery cell is fully discharged by standard discharge process.

The initial capacity is $\geq 23\text{mAh}$.

电池成品用标准充电流程充满电。电芯再用标准放电流程放完电。电芯初始容量 $\geq 23\text{mAh}$ 。

5.10 Cycle life 循环寿命

Test procedure 测试步骤:

Step 1: 0.2C constant current charge battery until 4.35V, and then, charge battery by 4.35V constant voltage

until current drop to 0.02C.

Step 2: Wait for 10mins

Step 3: 0.2C constant current discharged battery until the voltage drop to 3.0V.

Step 4: Wait for 10mins

Step 5: step1 to step 4 is defined as 1st cycle, repeat step 1 to step 4 at 2nd~49th cycle, at 51th ~99th cycles,

and so forth

Step 6: 0.2C constant current charge battery until 4.35V, and then, charge by 4.35V constant voltage until current drop to 0.02C.

Step 7: Wait for 10mins

Step 8: 0.05C constant current discharged battery until the voltage drop to 3.0V.

Step 9: Wait for 10mins

Step 10: step6 to step 9 is defined as 50th cycle, repeat step 6 to step 9 at 100th cycle, at 150th cycle, and so

forth

Step11: Repeat above steps 700 times, the recovery capacity should be should no less than 80% of initial capacity

Note: Check and record capacity, the impedance, the size and the appearance for each 50 cycles.

1) 电池成品按照 0.2C 恒流充电直到 4.35V。再用 4.35V 恒压充电直到充电电流小于 0.02C。

2) 等待 10 分钟

3) 电池成品按 0.2C 恒流放电直到 3.0V

4) 等待 10 分钟

5) 步骤 1 到 4 定义为一个循环，接着从 2~49， 51~99，以此类推，重复 1 到 4 的步骤。

6) 电池成品按照 0.2C 恒流充电直到 4.35V。再用 4.35V 恒压充电直到充电电流小于 0.02C。

7) 等待 10 分钟

8) 电池成品按 0.05C 恒流放电直到 3.0V

9) 等待 10 分钟

10) 步骤 6 到 9 定义为一次循环，接着从第 50 次， 100 次， 150 次，以此类推，重复 6 到 9 的步骤。

11) 重复以上循环 700 次，电池可恢复容量应大于或者等有初始容量的 80%。

备注： 每 50 次循环，记录的容量，内阻，尺寸数据。

6. Usage of battery 使用电池

Shenzhen Coincell Battery Co., Ltd. **DO NOT** take responsibility if customer **DO NOT** follow the specification and below instruction using the battery.

如果客户**没有**按规格书和以下说明使用电池，深圳市科恩瑟尔电池有限公司将**不负**任何责任。

To have good performance of battery, battery should follow this battery specification to use and storage.

Recommend charging battery every 6months using standard charge process.

To use the battery safe, battery is prohibited to disassemble, drop, heat, burn, soak, crush, shock, short circuit.

Enough insulation inside the customer' s end product is required to avoid the short circuit of the battery.

Battery should have enough space to install inside the customer' s end product. Please use the maximum dimension of battery pack after cycle life to reserve the space.

To protect the battery, battery should be installed in the customer' s end product with strong mechanical strength.

Any movement of the battery in the end product should be avoided.

If battery has any abnormal feature such as battery cannot be charged and discharge, abnormal heat generate, deformation, smelling of electrolyte or leakage, battery should be stopped to use immediately. Battery with smelling of electrolyte or leakage should be placed away from fire. Electrolyte is harmful. If electrolyte is contacted the skin or eyes, please flush electrolyte by purified water and consult doctor.

为了电池保持良好的性能，电池需要按本规格书使用和储存。

建议电池每6个月按标准充电流程充电一次。

为了安全使用电池，电池禁止拆解，掉落，加热，焚烧，浸泡，挤压，撞击，短路。

客户终端产品需要有足够的绝缘，避免电池被短路。

客户终端产品需要有足够的空间组装电池。空间需求请按规格书中循环后的电池成品最大尺寸进行设计。

客户终端产品需要有强力的结构保护电池。

请避免电池在客户终端产品中能移动。

如果电池有异常特征，比方说电池不能充放电，发热异常，变形，有电解液气味或漏液，电池应马上停止使用。

电池有电解液气味或漏液须要远离火种。电解液是有害的。如果电解液接触到皮肤或眼睛，请马上用纯净水冲洗和就医。

7. Warranty 保证期

Shenzhen Coincell Battery Co., Ltd. guarantees the battery at good condition within **12months** when battery is delivered from factory.

深圳市科恩瑟尔电池有限公司保证电池从出厂日起**12个月内**功能良好

8. Others 其他

8.1 Prohibition of disassembly 禁止拆卸

1) Never disassemble the cells. The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, explosion, or other problems.

2) Electrolyte is harmful LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

1) 不要拆卸电池。拆卸电池会发生电池内部短路，会引起起火、爆炸、有害气体或者其它问题。

2) 电解液是有害的万一电解液沾到皮肤、进入眼睛，应立即用清水冲洗以及求助医生。

8.2 Prohibition of dumping of battery into fire 不要把电池倾倒在火中

Never incinerate nor dispose the cells in fire. These may cause explosion of the cells, which is very Dangerous and is prohibited.

不要焚烧电池，否则会致电池爆炸，这很危险，必须禁止。

8.3 Prohibition of use of damaged battery 禁止使用损坏的电池

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used any more. The Cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing or explosion.

电池可能在出货途中碰撞而受损。如果发现电池有异常，例如包装损坏、电池包裹变形，有电解液的味道、发现漏液等等，不要再使用这些电池。电池如果有电解液的味道或者出现漏液，电池放置应该远离火源避免起火及爆炸。

8.4 The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them 以下警告语言将提供与小型电池、电池或设备一起使用的信息：

- Keep batteries out of reach of children to avoid being swallowed, Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion. In case of ingestion of a cell or battery, seek medical assistance promptly.
把电池放到小孩够不到的地方以免吞服，吞下可能导致烧伤，软组织穿孔和死亡。如摄入电池，应立即寻求医疗救助，2小时内未进行处理可能会导致严重灼伤。
- If children use the battery, their guardians should explain the proper handling.
小孩使用电池时，监护人应详细解释操作方法。

8.5 Any other items are not covered in the specification shall be agreed by both parties.

任何本规格书没有包括的事项，需要双方协议确定。