南屋科技
NANWU TECHNOLOGY

匠芯定智 能启未来
CRAFTING INTELLIGENCE POWERING THE FUTURE

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NNC3659142-5Ah 锂离子单体电池

Lithium-ion NNC3659142-5Ah

产品规格书

Product Specification

产品型号

Product Model：NNC3659142-5Ah

制表 Prepared by	审核 Checked by	批准 Approved by

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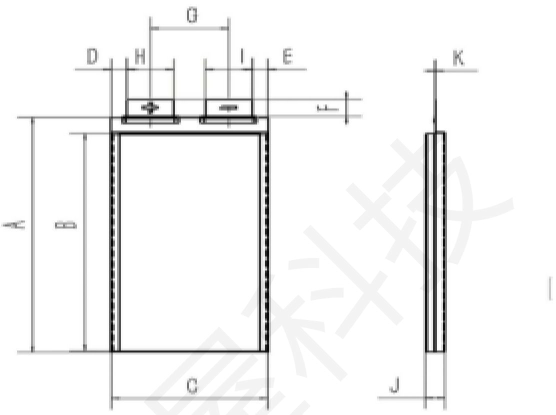
1. 适用范围 Application Scope

本产品规格书描述了 NNC3659142 型号锂离子电池产品性能指标。

This product specification describes the performance of NNC3659142 Lithium-ion Batteries.

2. 产品型号 Product Model

NNC36591425Ah



3. 产品尺寸 Product Size

项目（Item）	描述（Description）	尺寸（Dimension）
A	电芯总高（total cell height）	142±1.0 mm
B	主体高度（body height）	127.5±0.5 mm
C	主体宽度（body width）	58.5±0.5 mm
D	正极耳到侧边距离（distance from cathode tab to side）	7.5±0.2 mm
E	负极耳到侧边距离（Distance from anode tab to side）	7.5±0.2 mm
F	极耳高度（tab height）	15±1 mm
G	中心距（center distance）	32±0.5 mm
H	正极耳宽度（cathode tab width）	12±0.2mm
I	负极耳宽度（anode tab width）	12±0.2mm

J	电芯厚度(50%SOC) (cell thickness)	3.6±0.2mm
K	极耳厚度 (tab thickness)	0.15±0.02mm

4. 产品规格 Product Specification

序号 NO.	项目 Items	技术指标 Specifications
1	典型容量 Typical Capacity	5Ah@1C (5A)
2	标称容量 Nominal Capacity	5Ah@0.2C (1.0A)
3	标称电压 Nominal Voltage	3.65V
4	充电终止电压 Charging Cut-Off Voltage	4.3V
5	放电终止电压 Discharging Cut-Off Voltage	2.7V
6	充电方法 Charging Method	标准充电 Standard charge 0.2C(1.0A)恒流充电至 4.30V, 再 4.30V 恒压充电至截止电 流 0.02C(0.1A),充电时间 330min 0.2C (1.0A) constant current charge to 4.30V, then constant voltage 4.30V charge until charged current reduced to 0.02C (0.1A), the charging time is 330min
		快速充电 Fast charge 0.5C(2.5A)恒流充电至 4.30V, 再 4.30V 恒压充电至截止电流 0. 02C(0.1A),充电时间 150min 0.5C(2.5A) constant current charge to 4.30V, then constant voltage 4.30V charge until charged current reduced to 0.02C (0. 1A), the fast charging time is 150min
7	放电方法 Discharging Method	标准放电电流 Standard Discharge Current 1C (5A)
		最大持续放电电流 Max. Continuous Discharge Current 3C (15A)
		最大脉冲放电电流 Max. Pulse Discharge Current 5C (20A) (≤10S)
8	循环寿命 Cycle Life	≥400 次 (25°C±3 °C, 0.5C(2.5A)/1C(5A)) ≥400 cycles (25°C±3°C, 0.5C(2.5A)/1C(5A))
9	工作温度 Operating Temperature	0°C-45°C, max.90%RH (充电 Charging) -40°C60°C, max.90%RH (放电 Discharging)

10	工作环境&最大充电电流 Max. Charging Current & Operating Environment	0°C~15°C 0.2C(1.0A)充电到 4.30V 0.2C (1.0A) charge to 4.30V
		15°C~35°C 1C(5A)充电到 4.30V 1C (5A) charge to 4.30V
		35°C~45°C 0.8C(4.0A)充电到 4.30V 0.8C (4.0A) charge to 4.30V
11	存储温度 Storage Temperature	-20℃~45℃ 短期存储(1 个月) Short-term(one month) -20℃~35℃ 长期存储(6 个月) Long-term(six months)
12	存储湿度 Store Humidity	<85%RH
13	能量密度 Energy Density	275Wh/Kg
14	内阻 Internal Resistance	≤3. 0mΩ
15	重量 Weight	62±3.0 g

5. 电池性能 Cell Performance

5.1 电化学性能 Electrochemical Characteristics

序号 NO.	项目 Items	标准 Criteria	测试方法 Test Methods
1	循环寿命 Cycle Life	0.5C(2.5A)/1C (5A) 容量 ≥ 初始循环容量 ×80% (400 周) 0.5C(2.5A)/1C (5A) Capacity ≥ Initial Capacity × 80% (400 cycles)	1. 在 1 标准大气压，环境温度 23±2℃ 相对湿度为 ≤ 85%RH 的条件下，0.5C(2.5A)恒流恒压充电到 4.3V，截止电流 0.02C(0.1A)，搁置 30min; 2. 以 1C(5A)恒流放电至 2.7V，搁置 30min; 3. 重复上述步骤，直至循环容量衰减到初始循环容量的 80%; Under the condition of 1 standard atmospheric pressure, ambient temperature 23±2° C relative humidity ≤ 85%RH, charge to 4.3V at 0.5C(2.5A) standard constant current constant voltage, cut-off current 0.02C (0.1A), 30min-rest; Discharge at IC (5A) constant current to 2.7V, 30min-rest; Repeat the above steps until the cycle capacity decays to 80% of the initial capacity.
2	高温放电 High temperature discharge	容量 ＞ 典型容量 ×90% Capacity ≥ Typical Capacity × 90%	1. 温度 23±2℃的条件下，0.2C (1.0A)恒流恒压充电至 4.3V，电流降为 0.02C(0.1A)时充电结束; 2. 在 55±3℃放置 6h; 3. 以 1C(5A)放电至 2.7V，记录其放电容量。 Under the condition of ambient temperature 23±2° C, charge to 4.3V at 0.2C (1.0A) standard constant current constant voltage, cut-off current 0.02C (0.1A); the cell is placed at 55±3° C for 6h; discharge at IC (5A) to 2.7V and record its discharge capacity.
3	倍率放电 Rate discharge	3C(15A)放电容量 ＞ 标称容量 ×95%，且温度不超过 60℃ 3C (15A) discharge capacity > Nominal Capacity × 95%, the temperature does not exceed 60° C	1. 温度 23±2℃的条件下，0.2C (1.0A)恒流恒压充电至 4.3V，电流降为 0.02C(0.1A)时充电结束; 2. 搁置 30min; 3. 分别以 0.5C(2.5A)、IC(5A)、2C(10A)、3C(15A)放电至 2.7V，并监控表面温度。 Under the condition of ambient temperature 23±2° C, charge to 4.3V at 0.5C(2.5A) standard constant current constant voltage, cut-off current 0.02C (0.1A), 30min-rest, and then discharge at 0.5C(2.5A), 1C (5A), 2C (10A), 3C (15A)) to 2.7V, and monitor the surface temperature.

4	25℃荷电保持与恢复 Charge retention and recovery at 25° C	剩余容量 ≥ 典型容量 * 85% 恢复容量 ≥ 典型容量 * 90% Capacity retention > Typical Capacity × 85% Recovery capacity > Typical Capacity × 90%	1. 温度 23±2℃的条件下，0.2C (1.0A)恒流恒压充电到4.3V，截止电流 0.02C(0.1A)充满电； 2. 电池在 23±2℃的温度箱中存储 28 天； 3. 以 1C(5A)电流放电至 2.7V，测量剩余容量；再0.2C(1.0A)充 1C(5A)放测量电池的恢复容量。可循环三次，当有一次达到标准，即达到要求。 Under the condition of ambient temperature 23±2° C, charge to 4.3V at 0.2C (1.0A) standard constant current constant voltage, cut-off current 0.02C (0.1A). The cell is stored in an oven at 23±2° C for 28 days. Discharge at IC (5A) current to 2.7V to measure the remaining capacity; Then charge at 0.2C (1.0A) and discharge 1C (5A) to measure the recovery capacity of the cell. It meets the requirements if one of the test results meets the standard in the three tests.
5	60℃荷电保持与恢复 Charge retention and recovery at 60° C	剩余容量 ≥ 典型容量 * 80% 恢复容量 ≥ 典型容量 * 85% Capacity retention > Typical Capacity × 80% Recovery capacity > Typical Capacity × 85%	1. 温度 23±2℃的条件下，0.2C (1.0A)恒流恒压充电到4.3V，截止电流 0.02C(0.1A)充满电； 2. 电池在 60±2℃的温度箱中存储 7 天; 3. 23° C±2° C 温度条件下，以 1C(5A)电流放电至 2.7V，测量剩余容量；再0.2C (1.0A)充 1C(5A)放测量电池的恢复容量。可循环三次，当有一次达到标准，即达到要求。 Under the condition of ambient temperature 23±2° C, Charge to 4.3V at 0.2C (1.0A) standard constant current constant voltage, cut-off current 0.02C (0.1A), The cell is stored in an oven at 60±2° C for 7 days, discharge at IC (5A) current to 2.7V to measure the remaining capacity; Then charge at 0.2C (1.0A) and discharge at IC (5A) to measure the recovery capacity of the cell. It meets the requirements if one of the test results meets the standard in the three tests.
6	贮存性能 Storage performance	放电容量 ≥ 典型容量 × 100% 贮存 3 个月 ≥90% 贮存 6 个月 ≥ 85% 贮存 12 个月 ≥ 80% Capacity ≥ Typical Capacity × 100% 3 months ≥ 90% 6 months ≥ 85% 12 months ≥ 80%	测量电池初始容量，电池标准充电后，记录贮存前的初始状态，分别在室温贮存 3 个月、6个月、12 个月后，测量电池的最终状态，然后 0.2C(1.0A)/IC(5A)循环 3 次记录电池放电容量。 Measure initial status and initial capacity. Standard charge and store for 3 months, 6 months and 12months respectively. Measure the final capacity, then charge at 0.2C (1.0A) and discharge at IC (5A) for 3 cycles, and measure the discharge capacity.

5.2 安全性能 Safety performance

序号 NO.	项目 Items	标准 Criteria	测试方法 Test Methods
1	过充电 Overcharge	不起火、不爆炸 No fire No explosion	电芯放电至 2.7V 后，用 0.5C(2.5A)电流和 4.65V 的极限电压充电，电压达到最大值后，继续以该电压值恒压充电，当充电时间大于 7h 或者温度降至比峰值低 20%时终止测试。 After discharge to 2.7V, charged at constant current of 0.5C(2.5A) and constant voltage of 4.65V, While voltage reaches to themax, continue to charge at constant voltage at this value, if charging continued over 7 hours or temperature is 20% less than the top, close the test.
2	强制放电 Forced-Discharge	不起火、不爆炸、不漏液 No fire No explosion No leakage	以 0.5C(2.5A)标准恒流恒压充电至 4.3V，截止电流 0.02C (0.1A)，然后以 1C(5A) 恒流放电 90 min 或者电压为 OV，观察 1h。 Charge to 4.3V at 0.5C(2.5A) constant current constant voltage, cut-off current 0.02C (0.1A), and discharged at 1C (5A) for 90 min or the voltage of OV, then observe for 1h.
3	短路 Short Circuit	不起火、不爆炸 No fire No explosion	0.5C(2.5A)恒流恒压充电至 4.3V，截止电流 0.02C (0.1A)，将其正负极用线缆(线路总电阻<5mΩ)短接 10min，观察 1h. Charge to 4.3V at 0.5C(2.5A) constant current constant voltage, cut-off current 0.02C (0.1A), and then connect the positive and negative terminals directly by a <5 mΩ wire for 10min at 23±2° C, then observe for at least 1h.
4	跌落 Dropping	不起火、不爆炸、不漏液 No fire No explosion No leakage	电池以 0.5C(2.5A)标准恒流恒压充电至 4.3V，截止电流 0.02C(0.1A)，从 1m 高处自由落体跌落于水泥地上，每个面跌落一次。 Charge to 4.3V at 0.5C(2.5A) constant current constant voltage, cut-off current 0.02C (0.1A) Free fall from a height of 1m to the cement ground, one drop on each surface.
5	加热 Thermal stability	不起火、不爆炸 No fire No explosion	电池以 0.5C(2.5A)标准恒流恒压充电至 4.3V，截止电流 0.02C(0.1A)，放入温箱中以 5° C/min 的速率升至 130°C 并保持 30min 后停止加热，观察 1h。 Charge to 4.3V at 0.5C(2.5A) constant current constant voltage, cut-off current 0.02C (0.1A). Put the cell into an oven and heating from room temperature to 130±2° C at the rate of 5±2° C/min. then observe for at least 1h.
6	挤压 Crushing	不起火、不爆炸 No fire No explosion	电池以 0.5C(2.5A)标准恒流恒压充电至 4.3V，截止电流 0.02C(0.1A)。在电池的正反面上各放 1 个平板，两平板间施加 13±0.78KN 的挤压力，用 0.1mm/s 的速度挤压电池，一旦压力到达最大值或者电压下降 30%停止挤压，保持 10 分钟，观察 1h. Charge to 4.3V at 0.5C(2.5A) constant current constant voltage, cut-off current 0.02C (0.1A). Put a plate on the front and back of the cell, apply a

			extrusion pressure of 13±0.78KN between the two plates, and squeeze the cell at a speed of 0.1mm/s. Once the pressure reaches the top value or the voltage drops by 30%, stop the extrusion, keep it for 10 minutes, observe for 1 h.
7	低气压 Low pressure	不起火、不爆炸、不漏液 No fire No explosion No leakage	电池以 0.5C(2.5A)标准恒流恒压充电至 4.3V，截止电流 0.02C(0.1A)，然后将电池放入低气压箱中，调节试验箱中气压为 11.6kPa，温度为室温，静置 6h. Charge to 4.3V at 0.5C(2.5A) constant current constant voltage, cut-off current 0.02C (0.1A) Then test cells shall be stored at a pressure of 11.6kPa or less for at least six hours at ambient temperature.

6. 外观检查 Visual Inspection

不允许有任何影响电池性能的外观缺陷，如裂纹、裂缝、泄漏等。

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

7. 标准测试环境 Standard Test Conditions

除非特别说明，本规格书中所有测试均在以下环境条件下进行：

Unless otherwise specified, all tests in this Product Specification are conducted at below conditions:

温度 Temperature: 25±3℃

湿度 Humidity: ≤75

大气压 Atmosphere: 86KPa~106KPa

8. 包装 Packaging

8.1 电池的包装应符合防潮防震的要求，详细包装如下：

The cell shall be packed in accordance with the requirements of moisture-proof and shock-proof.

单个电池使用无色塑料托盘存放，每盘 3 只；

Cell is stored in a colorless plastic tray, and there are 4 cells in every tray;

外包装为纸箱，每箱 10 盘，共 30 只。

The outer packing is carton, where 30 pieces cells in 10 trays per carton is.

8.2 包装箱内应装入随同产品提供的文件:

The packing case shall contain the documents provided with the products:

装箱单(指一批多箱包装时)

Packing list (refers to a batch of multiple boxes);

产品合格证及产品检验报告 Product certificate and Product inspection report.

9. 标识 Identification

9.1 单体电池产品上应有下列标识:

Cell product shall have the following marks:

额定容量、极性符号+、-

Rated capacity and Polar symbol : +/-

产品条码(信息包含产品型号、批号、生产日期信息)

Product barcode (information including product model, batch number and date of production)

9.2 包装箱外壁应有下列标志:

Each packing case shall be marked with:

产品名称(锂离子电池)、产品型号、产品批号、产品等级、数量、物料编码

Product name (solid lithium ion cell), product model, product batch number, product grade, quantity, material code

标明防潮、不准倒置、轻放等标志、制造商或商标

Moisture-proof, no upside-down and other signs, Manufacturer or trademark

10.存储及其他事项 Storage and Others

10.1 长期储存 Long Time Storage: 长期储存的电池(超过 3 个月)须置于干燥、凉爽处，每 6 个月对电池进行一次充放电，储存电压为 3.55~3.65V，且充放电环境要求如 7 所述。

If the cell is to be stored for a long time (over 3 months), the cell should be stored in dry and cool place. The cell should be charged and discharged every six month. The cell's storage voltage should be 3.55~3.65V and the cell is to be stored at the condition as NO.7.

10.2 其他事项 Others: 任何本规格书中未提及的事项，须经双方协商确定。

Any matters which have not been covered in this specification should be conferred between the customer and Nanwu Technology (Guangzhou) Co., Ltd..

11.保质期及产品责任 Warranty Period and Product Liability

11.1 保质期 Warranty

保质期是从客户验收开始起 12 个月。

Warranty period of this product is 12 months from the production date.

11.2 产品责任 Product Liability

对因没有按本规格书规定操作而导致的意外不负责任，当本规格书有些变动时，本公司会通知购买方。

Nanwu Technology (Guangzhou) Co., Ltd. is not responsible for the troubles caused by mishandling of the cell which is clearly against the instructions in this specification. Nanwu Technology (Guangzhou) Co., Ltd. will notify our customers if there are any changes of the product specification.

12.文件有效期 Validity Period of Documents

本文件自发布之日至下次修正日止。

The validaiton for this document is from the issue date to the date of the next revision.

13.保密 Confidentiality

本产品规格书在没有得到南屋科技(广州)有限公司的许可时，不能向第三方泄露，禁止复印或转载。

This product specification shall not be disclosed to any third party without the permission of Nanwu Technology (Guangzhou) Co., Ltd.; nor shall it be copied or reproduced.

14.警告及注意事项 Warnings and Cautions

14.1 不要将电池投入火中或加热;

Do not put the cell into the fire or a heater;

14.2 不要将电池分解拆散:

Do not dismantle the cell;

14.3 严禁将电池浸入海水或水中，保存不用时，应放置于阴凉干燥的环境中；

Do not immerse the cell in water or seawater, keep the cell in a cool dry environment if it stands by;

14.4 禁止将电池放在热源旁，如火、加热器等；

Do not use or leave the cell near sources of heat such as a fire or heater;

14.5 充电时请选用锂离子电池专用充电器；

Use the charger specifically for lithium-ion cell when recharging;

14.6 严禁颠倒正负极使用电池；

Do not reverse the position and negative terminals;

14.7 严禁将电池直接插入电源插座

Do not connect the cell directly to an electrical outlet;

14.8 禁止用金属直接连接电池正负极短路；

Do not short-circuit the cell by directly connecting the positive and negative terminals with metal objects;

14.9 禁止将电池与金属(如发夹、项链等)一起运输或贮存；

Do not transport or store the cell together with metal objects such as hairpins, necklaces, etc;

14.10 禁止敲击或抛掷、踩踏电池等；

Do not strike, trample or throw the cell, etc;

14.11 禁止直接焊接电池和用钉子或其它利器刺穿电池；

Do not directly solder the cell and pierce the cell with a nail or other sharp objects;

14.12 禁止在高温下(炙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 or leave the cell at high temperature (for example, under the hot sunlight or in a hot vehicle). Otherwise, it can overheat, catch fire, or suffer from performance and life degradation;

14.13 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；

Do not use the cell in a location with strong electrostatic field or magnetic field. Otherwise, the safety protective device may be damaged, causing safety hazard;

14.14 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 cell 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 so as not to cause more injury to your eyes;

14.15 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 cell 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 cell charger and stop using it;

14.16 废弃之电池应用绝缘纸包住电极以防起火、爆炸；

Be aware that abandoned batteries may cause fire or explosion, tape the cell terminals to insulate them;

14.17 如果电池极柱弄脏，使用前应用干布抹净，否则可能会导致接触不良功能失效。

If the cell terminals are stained, clean the terminals with a dry cloth before use. Otherwise performance degredation may be caused due to the poor connection.