深圳乐能电子有限公司

锂离子电池规格书

Specification
For
Lithium Ion Rechargeable Battery

电池型号： LN-8161

TYPE ： LN-8161

单支电芯 702335

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1.范围 SCOPE AND APPLICATION

本标准规定了锂离子电池的定义、技术要求、测试方法及注意事项。本标准适用于广州力优电子有限公司生产的锂离子电池。

This specification describes the definition, technical requirement, testing method, warning and caution of the lithium ion rechargeable battery. The specification only applies to battery supplied by Guangzhou LU Electronics Co., Ltd.

2.定义 DEFINITION

2.1 额定容量： 指在 20±5℃，65±5%RH 环境下，以 5 小时率放电至终止电压时的容量，以 C_5 表示，单位毫安时（mAh）。

Rated Capacity: Under 20±5℃, 65±5%RH, it means the capacity value of being discharged by 5hrs ratio to End Voltage. The capacity value can be expressed with code C_5.

2.2 终止电压: 放电终止时的规定电压为 3.0V。

End Voltage: The end voltage of discharge is 3.0V, which is defined specially.

2.3 标准充电： 指在 20±5℃，65±5%RH 环境下，以 0.2 C_5mA 电流恒流充电至单体电池电压 4.2V 后，转为恒压 4.2V 充电，至充电电流小于 0.01C_5mA，停止充电。

Standard Charge: Under 20±5℃, 65±5%RH, it can be charged to 4.2V with constant current of 0.2 C_5mA, and then , charged continuously with constant voltage of 4.2V until the charged current is less than 0.01 C_5mA.

2.4 快速充电： 指在 20±5℃，65±5%RH 环境下，以 1 C_5mA 电流恒流充电至单体电池电压 4.2V 后，转为恒压 4.2V 充电，至充电电流小于 0.01C_5mA，停止充电。

Quick Charge: Under 20±5℃, 65±5%RH, it can be charged to 4.2V with constant current of 1 C_5mA, and then , charged continuously with constant voltage of 4.2V until the charged current is less than 0.01 C_5mA.

2.5 标准放电： 指在 20±5℃，65±5%RH 环境下，以 0.2 C_5mA 电流恒流放电至单体电池电压 3.0V。

Standard Discharge: Under 20±5℃, 65±5%RH, it can be discharged to the voltage of 3.0V with constant current 0.2 C_5mA.

2.6 快速放电： 指在 20±5℃，65±5%RH 环境下，以 1 C_5mA 电流恒流放电至单体电池电压 3.0V。

Quick Discharge: Under 20±5℃, 65±5%RH, it can be discharged to the voltage of 3.0V with constant current 1 C_5mA.

3.产品命名 NAMING INSTRUCTION

3.1 产品的命名(见图 1)

Naming instruction of product is shown as Fig. 1

70 23 35 电池尺寸：厚度、宽度、高度、

Physical Dimension: Thickness, Width, Height, and Special property

图 1 命名说明

Fig. 1 Naming Instruction for Product

3.2 外形尺寸

Shape and Physical Dimension

$7^{0}_{-0.4}$ mm× 23 $^{0}_{-0.5}$ mm×35 $^{0}_{-0.5}$ mm

4.结构 STRUCTURE

电池由正极、负极、隔膜、电解液及外壳组成。

The battery consists of the positive electrode, negative electrode, separator, electrolyte and crust.

5. 技术要求 TECHNICAL REQUIREMENT

5.1 使用环境 Usage Conditions

充电温度　Charging Temperature: 0~45℃

放电温度　Discharging Temperature: -20~60℃

相对湿度　Related Humidity: <93%

大气压力　Atmospheric Pressure: 86~106Kpa

5.2　外观：无破裂、划痕、变形、污迹、电解液泄露。

Appearance: without break, scratch, distortion, contamination and leakage.

5.3 额定容量 Rated Capacity : 580mAh

5.4 内阻 Internal resistance: ＜60 mΩ

5.5　额定电压 Rated Voltage: 3.7V

5.6　重量 Weight: 约　11g

5.7　放电性能　Discharged Characteristic

标准放电时间不少于 5 小时

Time of Standard Discharge should be not less than 5hrs.

快速放电时间不少于 1.0 小时

Time of Quick Discharge should be not less than 1.0hrs.

5.8　荷电保持能力　标准放电时间不少于 4.25 小时

Charge Retention: Time of Standard Discharge should be not less than 4.25hrs.

5.9　循环寿命　大于 300 次

Cycle Life: more than 300 cycles

5.10　环境性能 Environmental Characteristic

5.10.1　高温性能：测试后放电时间不低于 51 分钟，并且外观符合 5.2 的要求。

Hi-temperature testing: discharging time is not less than 51 minutes and Visual inspection can meet item 5.2 after testing.

5.10.2　低温性能：测试后放电时间不低于 3.5 小时，并且外观符合 5.2 的要求。

Low-temperature testing: discharging time is not less than 3.5 hours and Visual inspection can meet item 5.2 after testing.

5.10.3　恒定湿热性能：测试后放电时间不低于 36 分钟，并且外观符合 5.2 的要求。

Constant temperature and constant humidity testing: discharging time is not less than 36 minutes and Visual inspection can meet item 5.2 after testing.

5.10.4　振动：测试后电压不低于 3.6V，并且外观符合 5.2 的要求。

Vibration: Voltage is not less than 3.6V and Visual inspection can meet item 5.2 after testing.

5.10.5　碰撞实验：测试后电压不低于 3.6V，并且外观符合 5.2 的要求。

Impacting testing: Voltage is not less than 3.6V and Visual inspection can meet item 5.2 after testing.

5.10.6　自由跌落：测试后放电时间不低于 51 分钟，并且外观符合 5.2 的要求。

Free fall: discharging time is not less than 51 minutes and Visual inspection can meet item 5.2 after testing.

5.11　安全性能 Safe Characteristic

5.11.1　过充测试：无破裂、无泄露现象。

Over charge testing: without break, leakage after testing.

5.11.2　过放测试：无破裂、无泄露现象。

Over discharge testing: without break, leakage after testing.

5.11.3　短路保护测试：不爆炸、不起火、不冒烟及无漏出物；瞬时充电后，电池电压应不小于 3.6V。

Short Protecting Testing: without explosion, fire,fume and leakage. Voltage of the battery should be not less than 3.6V afer being charged instantaneously.

5.11.4　热冲击测试：不爆炸、不起火。

Heat impact testing:without explosion, fire,fume.

6. 试验方法 TESTING METHODS

6.1 试验环境 Testing conditions

温度 Temperature: 15-35℃

相对湿度 Relative Humidity: 45-75%

大气压力 Atmospheric pressure: 86-106Kpa

6.2 测量仪表要求 Requirement of the Testing Equipment

电压仪表要求：测量电压的仪表准确度应不低于 0.5 级，内阻不小于 10KΩ/V。

Voltage instrument: the precision of voltage tester is no less than degree 0.5 , the internal resistance is not less than 10KΩ/V.

电流仪表要求：测量电流的仪表的准确度应不低于 0.5 级。

Current instrument: the precision is no less than degree 0.5.

时间仪表要求：测量时间的仪表的准确度不低于 0.1%。

Stopwatch: the precision is not more than degree 0.1%.

6.3 外观结构检查 Visual inspection

用目测法检查被测电池的微观、结构及标志，应符合 5.2 的规定。

Eyeballing will be used to inspect the appearance, construction and marking of the battery. And also its result can meet Item 5.2.

6.4 额定容量试验 Rated capacity testing

在环境温度 20±5℃条件下，按标准充电的要求进行充电，充电结束后放置 1~12 小时，再按标准放电的要求放电到终止电压。放电时间应不低于 5 小时。

Under 20±5℃, the battery will be charged according to the requirement of standard charge, after keeping the battery for 1~12hrs., The battery will be discharged until the voltage reaches end voltage, according to the requirement of standard discharge. The discharging time is not less then 5 hours.

6.5 荷电保持能力试验 Charge retention Testing

经 6.4 试验合格后，在平均环境温度为 20±5℃条件下，按标准充电的要求进行充电，充电结束后放置 28 天，再按标准放电的要求放电到终止电压。放电时间应符合 5.8 的要求。

At average temperature 20±5℃, the battery will be charged according to the requirement of standard charge after being past item 6.4, and to keep the battery open-circuit 28 days , then the battery will be discharged according to the requirement of standard discharge . The discharging time can meet the requirement of item 5.8.

6.6 循环寿命试验 Cycle life testing

试验前，按标准放电的要求对电池进行放电。在平均环境温度为 20±5℃条件下，按快速充电要求充电 2.5 小时后，搁置 30 分钟，以 $1C_5$mA 的电流进行放电，至电池端电压达到终止电压，完成一次循环。重复以上循环，连续二次循环的放电时间小于 48 分钟，寿命终止。

The battery will be discharged according to the requirement of standard discharge before cycle life testing. At average temperature 20±5℃, the battery will be charged for 2.5hrs, according to the requirement of quick charge, after 30 minutes, then it will be discharged with current $1C_5$mA until the voltage reaches the end voltage. So one cycle will be finished. To do the cycle continuously, consecutive two times the discharge time of any cycles is less than 48 min., the cycle life testing will be stopped.

6.7 环境性能 Environment Characteristic

6.7.1 高温性能试验 Hi-temperature testing

a) 室温（20±5℃），正常大气条件下，对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At room temperature （20±5℃） and normal atmospheric pressure , to inspect the sample battery

visually ,then the battery will be charged according to standard charge.

b) 把电池放在温度 55±2℃烘箱中，持续时间 2 小时，然后按快速放电要求放电，放电时间应不低于 51 分钟。

Keeping the battery in the oven of 55±2℃ for 2hrs. , then the battery will be discharged according to the requirement of quick discharge, the discharging time is not less than 51 minutes.

c) 试验结束后，将电池取出，在正常大气条件，20±5℃下搁置 1~2 小时，对电池进行外观目测检查，应符合 5.2 的要求。

After above testing, to keep the battery at 20±5℃ and the environment of normal atmospheric pressure for 1~2hrs. , the result of visual inspection can meet item 5.2.

6.7.2 低温性能 Low temperature testing

a) 室温（20±5℃），正常大气条件下，对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At room temperature （20±5℃） and normal atmospheric pressure , to inspect the sample battery visually ,then the battery will be charged according to standard charge.

b) 试验温度-20±2℃，持续 16～24 小时,然后按标准放电要求放电，放电时间不少于 3.5 小时。试验结束后，将电池取出，20±5℃下搁置 1~2 小时，目测电池外观，应符合 5.2 的要求。

To keep the battery in the oven of -20±2℃ for 16～24 hrs., Then the battery will be discharged according to standard discharge, and the time of Standard Discharge should be not less than 3.5hrs.. After above testing , to keep the battery at 20±5℃ and the environment of normal atmospheric pressure for 1~2hrs. The result of visual inspection can meet item 5.2

6.7.3 恒定湿热试验 Constant temperature and constant humidity testing

a) 室温（20±5℃），正常大气条件下，对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At room temperature （20±5℃） and normal atmospheric pressure , to inspect the sample battery visually ,then the battery will be charged according to standard charge.

b) 试验温度 40±2℃,相对湿度 90~95%，持续 48 小时。试验结束后，将电池取出，20±5℃下搁置 2 小时，目测电池外观，应符合 5.2 的要求。

To keep the battery in the case of 40±2℃, 90~95%RH for 48hrs.. After above testing , to keep the battery at 20±5℃ and the environment of normal atmospheric pressure for 2hrs.The result of visual inspection can meet item 5.2.

c) 将电池按快速放电要求放电后，放电时间应不低于 36 分钟。

According to the requirement of quick discharge, the time discharge is not less than 36 minutes.

6.7.4 振动试验 Vibration testing

a) 室温（20±5℃），正常大气条件下，对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At room temperature （20±5℃） and normal atmospheric pressure , to inspect the sample battery visually ,then the battery will be charged according to standard charge.

b) 试验条件：频率 10~55HZ，位移振幅为 0.35mm，X、Y、Z 每个方向扫频循环次数为 10 次，扫频速率为每分钟一个倍频。

The battery will be vibrated 10 times in each direction of X, Y, Z with changing frequency of 10~55HZ and amplitude of 0.35mm. The rate of scan frequency is from 10~55HZ per min.

c) 试验结束后，将电池取出，在正常大气条件，20±5℃下搁置 1~2 小时，对电池进行外观目测检查，应符合 5.2 的要求。

After above testing , to keep the battery at 20±5℃ and the environment of normal atmospheric pressure for 1~2hrs. , The result of visual inspection can meet item 5.2.

d) 电压应不低于 3.6V。

Voltage is not less than 3.6V.

6.7.5 碰撞实验 Impact Testing

a) 室温（20±5）℃，正常大气条件下对电池进行外观目测检查，并按标准充电的要对电池进行充电。

At the temperature of （20±5）℃ and the normal atmospheric pressure ,to inspect the sample battery visually . And the battery will be charged according to the requirement of standard charge.

b) 碰撞脉冲峰值加速度为 100m/s^2，脉冲持续时间为 16ms，碰撞次数为 1000±10 次。

The battery will be impacted 1000±10 times with the acceleration of 100m/s^2 and pulse lasting time 16ms.

c) 实验结束后，将电池取出，在正常大气条件下，（20±5）℃下搁置 1-2h，对电池进行外观目测检查，应符合 5.2 的规定。

After above testing, to keep the battery at（20±5）℃ and the environment of normal atmospheric pressure for 1-2hrs.The result of Visual inspection can meet item 5.2.

d) 电压应不低于 3.6V.

Voltage is not less than 3.6V.

6.7.6 自由跌落试验 Free fall testing

a) 室温（20±5）℃，正常大气条件下对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At the temperature of （20±5）℃ and the normal atmospheric pressure, to inspect the sample battery visually . And the battery will be charged according to the requirement of standard charge.

b) 高度为 1000mm ，试验台面厚度为 20mm 硬木板，X,Y,Z 每个方向试验次数 6 次。

The battery will be dropped free six times in each direction of X, Y, Z from the height of 1000mm onto the hard board with the thickness of 20mm.

c) 试验结束后，将电池取出，在正常大气条件下，下搁置，对电池进行外观目测检查，应符合 5.2 条的规定。

After above testing, to keep the battery at (20±5)℃ and the environment of normal atmospheric pressure for 1-2hrs. The result of Visual inspection can meet item 5.2.

d) 按标准放电的要求进行放电，放电时间应不低于 51 分钟。

According to the requirement of standard discharge, the battery will discharged and the discharge time is not less than 51 minutes.

6.8 安全性能 Safe Characteristic

6.8.1 过充电性能 Over charge Testing

a) 室温（20±5）℃，正常条件下对电池进行外观目测检查，并按标准充电的要求对电池进行充电。

At the temperature of （20±5）℃ and the normal atmospheric pressure, to inspect the sample battery visually . And the battery will be charged according to the requirement of standard charge.

b) 电池充满电后，1C 电流恒流充电至电压 4.8V 后现再 4.8V 恒压充电 2h，应符合 5.11.1 的要求。

The battery charged completely will be charged continuously at 1C current to 4.8V, and then , charged continuously with constant voltage of 4.8V for 2h. The result of Visual inspection can meet item 5.11.1.

6.8.2 过放电试验 Over Discharge Testing

a) 室温（20±5）℃，正常大气条件下对电池进行外观目测检查，并按标准充电的要求对电池进行充电.

At the temperature of （20±5）℃ and the normal atmospheric pressure, to inspect the sample battery visually . And the battery will be charged according to the requirement of standard charge.

b) 按标准放电的要求放电到终止电压后，外接 30Ω 负载放电 24h。应符合 5.11.2 的要求。

According to the requirement of standard discharge, the battery will be discharged to end voltage, then connected with external load of 30Ω for 24hrs. The result of Visual inspection can meet item 5.11.2.

6.8.3 短路保护试验 Short Protecting Testing

a）室温（20±5）℃，正常大气条件下对电池进行外观目测检查，并按标准充电的要求对电池进行充电.
At the temperature of （20±5）℃ and the normal atmospheric pressure, to inspect the sample battery visually . And the battery will be charged according to the requirement of standard charge.

b）电池按标准要求充电之后，将正负极用 0.2Ω 电阻短路 1h，将正负极断开，瞬时充电后用电压表测量电池电压，应符合 5.11.3 规定的要求。

6.8.4 热冲击试验 Heat impact testing

将电池放置于热箱中，温度以(5±2℃)/min 的速率升至 130℃±2℃，保温 30min 电池应符合 5.11.4 要求。

Put a battery into a ain oven .The temperature in the oven should rise at the rate of speed of(5±2℃)/min to be 130℃±2℃ (Holding the Temperature for 30 min).The battery should be up to standard of 5.11.4.

After standard charge, connect with the positive electrode and the cathode electrode, after being shorted by resistance of 0.2Ω for 1hrs., then disconnect. Being changed instantaneously , then measure the battery voltage. The result of visual inspection can meet item 5.11.3.

注：以上安全性能实验应在有保护措施的条件下进行。

Note: Above testing of safe characteristic must be with protective equipment.

7. 电池使用时警告事项及注意事项

WARNINGS AND CAUTIONS IN HANDING THE LITHIUM-ION BATTERY

警告 Warning

危险警告：（应在使用说明手册或说明书中，特别注明）

Danger warning (it should be described in manual or instruction for users, indicated especially)

为防止电池可能发生泄漏，发热，爆炸，请注意以下预防措施：

To prevent the possibility of the battery from leaking, heating, explosion. Please observe the following precautions:

- 严禁将电池浸入海水或水中，保存不用时，应放置在阴凉干燥的环境中。

Don’t immerse the battery in water and seawater. Please put it in cool and dry entironment if no using.

- 禁止将电池在热高温源旁，如火，加热器等使用和留置。

Do not use and leave the battery near a heat source as fire or heater

- 充电时请选用锂离子电池专用充电器。

Being charged, using the battery charger specifically for that purpose

- 严禁颠倒正负极使用电池。

Don’t reverse the positive and negative terminals

- 严禁将电池直接接入电源插座。

Don’t connect the battery to an electrical outlet directly.

- 禁止将电池丢入火或加热器中。

Don’t discard the battery in fire or heater.

- 禁止用金属直接连接电池正负极短路。

Don’t connect the positive and negative terminal directly with metal objects such as wire.

- 禁止将电池与金属，如发夹，项链等一起运输或贮存。

Do not transport and store the battery together with metal objects such as necklaces, hairpins.

- 禁止敲击或抛掷，踩踏电池等。

Do not strike , throw or trample the battery.

- 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 battery and pierce the battery with a nail or other sharp object.

小心 Caution

◆ 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 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 fire or its performance will be degenerate and its service life will be decreased.

◆ 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 it in a location where is electrostatic and magnetic greatly, otherwise, the safety devices may be damaged, causing hidden trouble of safety.

◆ 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 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。

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。

In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.

◆ 废弃之电池应用绝缘纸包住电极，以防起火，爆炸。

Be aware discharged batteries may cause fire; tape the terminals to insulate them.

9V 电池成品特性说明：

恒流恒压充电：用 0.5C 充电，终止电压 8.4V，最大不超过 8.6V，截止电流 6MA

恒流放电：用 0.5C 放电，终止电压 6V，最低不低于 5.4V，容量在 117 分钟以上。

电池最大工作电流不超过 2A

如果长时间搁置 3 个月不用，需要补电 50%来放置。

成品电池重量 26 克，成品尺寸：26.3*16.3*48.5MM

成品出货电压 7.3V 以上。