

锂离子电芯规格书

Specification For Lithium-ion Rechargeable Cell

电芯型号 : INR26650-50A

Cell Type : INR26650-50A

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1. Preface 前言

The specification only applies to INR26650-50A cell supplied by Dongguan Li Long Li-ion Battery Co.,Ltd.
本标准适用于东莞市力朗电池有限公司生产的圆柱型 INR26650-50A 锂离子电芯。

2. Definition 定义

2.1 Rated capacity 标称容量

Rated capacity: Cap=5000mAh.Under $22.5\pm 2.5^{\circ}\text{C}$, It means the capacity value of being discharged by 5-hours rate to end voltage 2.75 V, which is signed Cap, the unit is mAh.

标称容量 Cap=5000mAh, 指在 $22.5\pm 2.5^{\circ}\text{C}$ 环境下, 以 5 小时率放电至终止电压 2.75 V 时的容量, 以 Cap 表示, 单位为毫安培时(mAh)。

2.2 Standard charge method 标准充电方式

Under $22.5\pm 2.5^{\circ}\text{C}$, it can be charged to 4.20V with constant current of 0.5C, and then, charged continuously with constant voltage of 4.20 V until the charged current is 0.01C.

指在 $22.5\pm 2.5^{\circ}\text{C}$ 环境下, 以 0.5C 的电流恒流充电至单体电芯电压 4.20V 后, 转为恒压 4.20V 充电, 至充电电流小于 0.01C 时, 停止充电。

2.3 Standard discharge method 标准放电方式

At $22.5\pm 2.5^{\circ}\text{C}$, it can be discharged to the voltage of 2.75 V with constant current of 1C.

指在 $22.5\pm 2.5^{\circ}\text{C}$ 环境下, 以 1C 的电流恒流放电至单体电芯电压 2.75 V。

3. Cell type and size 电芯型号及尺寸

3.1 Description and model 电芯说明及型号

Description: Cylindrical Li-ion rechargeable cell

Model: INR26650-50A

INR26650-50A 型号的圆柱锂离子二次电芯

3.2 Cell size 电芯尺寸

Cell physical dimension listed in Figure 1(unit: mm).

电芯尺寸 (包含热缩膜) 如图 1 所示 (单位: mm)。

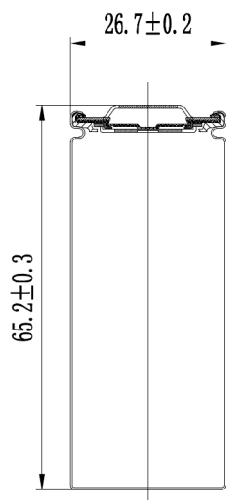


Figure 1 / 图 1

4. Cell specification 电芯特性

Item 项目	Specification 特性
Nominal capacity/标称容量	5000mAh @0.2C
Minimum capacity/最小容量	4900 mAh @0.2C
Nominal voltage/标称电压	3.60V
Max Charging voltage/充电电压	4.20 ±0.05 V
Energy density/能量密度	190 Wh / Kg
Discharge ending voltage/放电终止电压	2.75 ±0.05 V
Standard charge current/标准充电电流	0.5C
Max charge current/最大充电电流	1C
Standard discharge current/标准放电电流	1C
Max discharge current/最大放电电流	3C
Max recommended charge and discharge cell surface temperature 充放电过程中电芯表面的最大推荐温度	Charge: 0~45°C 充电时: 0~45°C Discharge: -20~60°C 放电时: -20~60°C
Storage temperature and time 存储温度和时间	1 year/一年: -20~25°C 3 months/三个月: -20~45°C 1 month/一个月: -20~60°C
Internal resistance/内阻	≤20 mΩ (AC Impedance, 1000 Hz)
Cell dimension/电芯尺寸	Height : 65.5mm 最大高度: 65.5 mm Diameter: 26.9mm 最大直径: 26.9 mm
Weight/重量	About 95g

5. Technical characteristics 技术要求

5.1 Cell usage conditions 电芯使用环境

Temperature of charge 充电温度: 0~45°C

Temperature of discharge 放电温度: -20~60°C

5.2 Cell testing conditions 电芯试验环境

Unless otherwise specified, all tests stated according to following:

除非有特殊说明, 所有测试的环境条件要求如下:

Temperature 温度: 22.5±2.5°C

5.3 Requirement of the testing equipment 测量仪表要求

Voltage meter: The voltage tester internal resistance is ≥ 10 KΩ/V

电压仪表要求: 测量电压的仪表内阻不小于 10KΩ/V

Temperature meter: The precision is ≤0.5°C

温度仪表要求: 测量温度的仪表精度不低于 0.5°C

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5.4 Electronic performance 电性能

No 序号	Item 测试项目	Criterion 性能标准
5.4.1	Discharge rate capability 倍率放电性能	Temperation/温度:22.5±2.5℃ Charge/充电: CC/CV 0.5C 4.20V; End current/结束电流:0.01C Discharge/放电 :CC Test current/测试电流; End voltage/截止电压: 2.75V $\frac{\text{discharge capacity at 0.5C}}{\text{discharge capacity at 0.2C}} \geq 97\%$ $\frac{0.5\text{C放电容量}}{0.2\text{C放电容量}} \geq 97\%$ $\frac{\text{discharge capacity at 1.0C}}{\text{discharge capacity at 0.2C}} \geq 95\%$ $\frac{1.0\text{C放电容量}}{0.2\text{C放电容量}} \geq 95\%$ $\frac{\text{discharge capacity at 3.0C}}{\text{discharge capacity at 0.2C}} \geq 90\%$ $\frac{3.0\text{C放电容量}}{0.2\text{C放电容量}} \geq 90\%$
5.4.2	Cycle life 循环寿命	Temperation/温度:22.5±2.5℃ Charge/充电:CC/CV 0.5C 4.20V ; End current/截止电流:0.01C; Rest time/静置:0.5h Discharge/放电: CC 1C; End voltage/截止电压: 2.75V; Rest time/静置: 0.5h $\frac{\text{Discharge capacity of 701th cycle}}{\text{Original capacity}} \geq 70\%$ $\frac{\text{第701次循环的放电容量}}{\text{最小容量}} \geq 70\%$
5.4.3	High-Low temperature discharge performance 高低温放电性能	Charge/充电: CC/CV 0.5C 4.20V ; End current/截止电流: 0.01C Discharge/放电: CC 1C; End voltage/截止电压: 2.75V $\frac{\text{Discharge capacity at } -10^{\circ}\text{C}}{\text{Discharge capacity at } 25^{\circ}\text{C}} \geq 70\%$ $\frac{-10^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 70\%$ $\frac{\text{Discharge capacity at } 0^{\circ}\text{C}}{\text{Discharge capacity at } 25^{\circ}\text{C}} \geq 80\%$ $\frac{0^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 80\%$ $\frac{\text{Discharge capacity at } 60^{\circ}\text{C}}{\text{Discharge capacity at } 25^{\circ}\text{C}} \geq 100\%$ $\frac{60^{\circ}\text{C 放电容量}}{25^{\circ}\text{C 放电容量}} \geq 100\%$
5.4.4	Storage performance 荷电保持	A cell is charged in accordance with 2.2 ,and stored in an ambient temperature of 23℃±2℃ for 28d, then discharged to cut-off voltage at a constant current of 0.2C. 电芯按2.2规定充电结束后, 在环境温度为23℃±2℃条件下, 将电芯搁置28天, 再以0.2C电流放电至终止电压。 $\frac{\text{Residual capacity}}{\text{Original discharge capacity}} \geq 90\%$ $\frac{\text{残余容量}}{\text{初始放电容量}} \geq 90\%$

5.5 Environmental characteristics 环境适应性能和安全性能

No 序号	Item 测试项目	Criterion 性能标准	Testing method 测试条件与方法
5.5.1	Vibration 振动性能	1.No scratch, No leakage, no fire, no explosion, no vent; 2.The voltage is not less than 3.6V. 1.电芯外观应无明显损伤、不漏液、不着火、不爆炸、不裂开; 2.单体电芯电压不低于 3.6V.	A cell is charged in accordance with 2.2, then installed onto the vibration desk with clamps. Equipment parameters of frequency and amplitude are as follows (the frequency is to be varied at the rate of 1oct/min between 10 and 55 hertz, and repeat vibration for 30min. The cell is to be tested in three mutually perpendicular directions): frequency: 10Hz~30Hz amplitude: 0.38mm frequency: 30Hz~55Hz amplitude: 0.19mm 电芯按2.2的规定充电结束后, 将电芯用夹具安装在振动台的台面上, 按下面的振动频率和对应的振幅调整好实验设备。X、Y、Z三个方向每个方向上从10~55Hz循环扫频振动30min, 扫频速率为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
5.5.2	Temperature Test 温度冲击性能	No leakage, no fire, no explosion, no vent. 电芯应不漏液、不着火、不爆炸、不裂开	A cell is charged in accordance with 2.2, then heated the cell to be in a oven. then the temperature of the oven is to be raised to the temperature of 65°C±3°C and remain for 4h at that temperature, then the temperature of the oven is to be dropped to the temperature of 20°C±3°C and remain for 4h at that temperature, then the temperature of the oven is to be dropped to the temperature of -20°C±3°C and remain for 4hrs at that temperature, repeat this for another 9 cycles, after that put the cell in room temperature for at least 24hrs, then check cell's appearance. 电芯按2.2的规定充电结束后, 将电芯放入温控箱内, 在30分钟内, 环境温度升至65±3°C, 并在此温度下保持4h, 在30分钟内, 环境温度降至20±3°C, 并在此温度下保持4h, 在30分钟内, 环境温度降至-20±3°C, 并在此温度下保持4h, 重复以上步骤9次, 将电池保持在室温环境下24h, 目测电芯外观。

5.6 Environmental characteristics 环境适应性能和安全性能

No 序号	Item 测试项目	Criterion 性能标准	Testing method 测试条件与方法
5.6.1	Overcharge Test 过充测试	No fire, no explosion 电芯不起火, 不爆炸	A cell is discharged to cut-off voltage at CC of 0.2C. then it is to be subjected to CC/CV power by connecting its positive & negative terminal, then set the current as 10A, the voltage as 10V, after that, Charge the cell up to 10V at CC of 10A, until that last 7h at the voltage of 10V. 先将电池以0.2C放电至终止电压, 然后将电芯正负极连接于恒压电源, 调节电流至10A, 电压为10V, 然后对电芯以10A充电, 直到输出电压达到10V, 持续充电7h.

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5.6.2	Forced-Discharge Test 过放测试	No fire, no explosion 电芯不起火, 不爆炸	A cell is discharged to cut-off voltage 0V at a constant current of 1C. 以 1C 电流放电, 直至电池电压为 0V。
5.6.3	Heating Test 130℃热箱测试	No fire, no explosion 电池不起火、不爆炸	A cell is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of 5℃±2℃ per minute to a temperature of 130℃±2℃ and remain for 30min at that temperature before the test is discontinued. 将电芯放在电热鼓风干燥箱中, 温度以5℃±2℃/min的速率由室温升至130℃±2℃并保持30min。
5.6.4	Short-circuit Test 短路测试	No fire, no explosion, Max Temp< 150℃ 电池不起火、不爆炸、 最高温度<150℃	A oven is to be raised to the temperature of 55℃ and remain for 10min at that temperature. A cell is to be placed into the oven and remain for 30min~40min. Then the Cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 50mΩ. Monitor its temperature while testing, the cell is to be discharged until the cell case temperature has returned to be 10℃ less than peak temperature. 将高温试验箱加热到55℃, 保持10min。将接有热电偶的电芯置于高温箱中, 电芯在高温试中保持30min~45min。用铜线短路其正负极(线路总电阻不大于50毫欧)。实验过程中监视电芯温度变化, 当电芯温度下降到比峰值低约10℃时, 结束实验。
5.6.5	Drop Test 跌落测试	No leakage, no smoking, no fire, no explosion. 电池不漏液、不冒烟、 不起火、不爆炸	A cell is charged in accordance to standard charge method and stored for 1~4h, then dropped from a height of 1000mm to a wooden board(18-20mm thick) which is placed on the concrete ground. Cells shall be dropped from top, bottom and diameter side. Each side drop 3 and repeat two times. 电池按照标准充电方式充满电后, 搁置1~4 h, 将电池由高度为1 m的位置自由跌落到18~20mm厚的水平硬木板上, 每只电芯做2个循环跌落, 每个循环包括底部向下、顶部向下、侧边向下三次跌落。
Note 备注	All above safety tests will be conducted at 22.5℃±2.5℃ except where specified differently. Use proper ventilation with protective equipment. 除特殊说明, 以上所有安全测试均应在 23℃±2℃通风橱中, 且附带有保护装置的条件下进行		

6. Warning and cautions in handling the lithium-ion cell

电芯使用时警告事项及注意事项

To prevent the possibility of the cell from leaking, heating, explosion, please observe the following precautions:
为防止电芯可能发生泄露, 发热, 爆炸, 请注意以下预防措施:

- » Don't immerse the cell in water.
- » 严禁将电芯浸入水中。
- » 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芯专用充电器。
- » Don't reverse the positive and negative terminals.
- » 严禁颠倒正负极后使用电芯。
- » Don't connect the cell to an electrical outlet directly.
- » 严禁将电芯直接插入电源插座。
- » 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.
- » 禁止用金属直接连接电芯正负极，造成短路。
- » Don't transport and store the cell together with metal objects such as necklaces, hairpins.
- » 禁止将电芯与金属，如发卡、项链等一起运输或存储。
- » Don't strike, throw or trample the cell.
- » 禁止敲击，抛掷或踩踏电芯等。
- » 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芯。

Caution 小心

- » Don't use or leave the cell at very high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions).
- » 禁止在高温下（直热的阳光下或很热的汽车中）使用或放置电芯，否则可能会引起电芯过热，起火或功能失效，寿命减短。
- » If the cell leaks and the electrolyte get into your eyes, don't wipe eyes, instead, thoroughly rinse the eyes with clean running water for at least 15 minutes, and immediately seek medical attention. Otherwise, eyes injury can result.
- » 如果电芯发生泄露，电解液进入眼睛，请不要搓揉，应用清水冲洗眼睛，必要时请立即前往医院接受治疗，否则会伤害眼睛。
- » If the cell gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during usage, recharging or storage, immediately remove it from the device or cell charger and stop using it.
- » 如果电芯发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电芯从装置或充电器中移开并停用。
- » In case the cell terminals get dirty, clean the terminals with a dry cloth before use.
- » 如果电芯弄脏，使用前应用干布抹净。
- » If the cell beyond the useful-life, please fully discharged, sticks the cell with insulating tape, then put the cell to the specialized recycle bin.
- » 如果电池使用寿命达到极限，请将电池放电至 3.0V 以下，将电池头部用绝缘胶纸粘住，送至专业的废品回收站回收。

7 Contact information 联系方式

If you have any questions regarding the cell, please contact the following address:

如有疑问，请按以下地址联系：

Headquarter: No 401 on Keji Road, Qingxi District, Dongguan. (523660)

厂址：东莞市清溪镇科技路 401 号(523660)

Tel/电话：86-769-82018666 Fax/传真：86-769-89389122