EEMB BATTERY

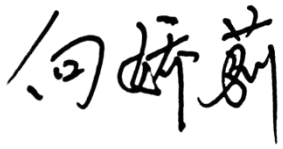
Li-ion Battery

Specification

锂离子电池

产品规格书

Model 型号:	**LIR18650**
Capacity 容量:	**3200mAh**

Prepared 编制	Checked 审核	Approved 批准
		

Customer 客户名称：

Customer Approval（Customer confirmation）客户确认:

Address：6 /F, Block 110, Jindi Industrial Zone, ShaTou Street, Futian District, ShenZhen,China

Postal code：518048

Phone: +86-755-83022275 Fax: +86-755-83021966

https://www.eemb.com

Catalog

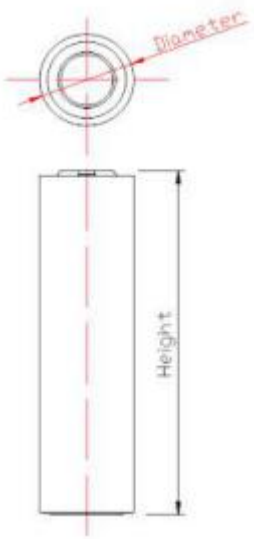
1. Scope 适用范围

This product specification defines the requirements of the rechargeable lithium-ion battery supplied to the customer by EEMB.
本产品规格书适用于 EEMB 提供的锂离子电池。

2. Battery Basic Characteristics 电池产品基本特性

No.	Item 项目		Characteristics 性能指标		Remark 备 注
2.1	Model 型号		LIR18650		
2.2	Capacity 容量	Nominal 标称容量	3200	mAh	
		Minimum 最小容量	3100	mAh	
2.3	Nominal Voltage 额定电压		3.7	V	
2.4	Max. Charging Voltage 最大充电电压		4.2	V	
2.5	Discharge Cut-off Voltage 放电截止电压		2.5	V	
2.6	Max. Charging Current 最大充电电流		1C		3100mA
2.7	Max. Discharging Current 最大放电电流		3C		9300mA
2.8	Dimension 尺寸	Diameter 直径	≤18.7	mm	
		Height 高	≤65.5	mm	
2.9	Weight 重量		46±2	g	
2.10	Internal Resistance 内阻		≤40	mΩ	
2.11	Charging Method 充电方法	Standard 标准	$0.2C_5$		
		Rapid 快速	$0.5C_5$.		
2.12	Operation Temperature 操作温度	Charge 充电	0～45	℃	
		Discharge 放电	-10～60	℃	-
		Storage 贮存	0～45	℃	

3. Battery Shape and Dimension（Unit：mm）
电池产品外形及尺寸（单位：mm）



Item	Specification
Diameter 直径	≤18.7
Height 高	≤65.5

4. Appearance 外观

It shall be free from any defects such as remarkable scratches, breaks, cracks, discoloration, leakage, or middle deformation.
电池表面无划伤、裂纹、脏点、锈蚀、变形、变色、漏液等缺陷，中间无翘起。

5. Battery Characteristics 电池性能

5.1 Charge and Discharge Characteristics 电池充放电性能

No.	Item 项目	Criteria 标准	Test Instructions 测试方法
5.1.1	Room Temperature Rate Discharge Performance 常温倍率放电性能	Discharge capacity/nominal capacity × 90% 放电容量/标称容量×90% A）$0.2C_5A \geq 90\%$ Charge and discharge curves should be smooth. 充放电曲线应平稳光滑。。	Under 1 standard atmospheric pressure, ambient temperature of 25℃±5℃, relative humidity of 45% to 80% of the conditions, the battery 0.3C standard charge (the following if not otherwise specified, are placed under this condition, according to this charging method), Set aside 5min, respectively $0.2C_5A$ discharge to the lower limit voltage 3.0V, cycle three times, once a meet the standard, which meets the standard requirements (the same below). 在 1 标准大气压，环境温度 25℃±2℃，相对湿度为 45%～80%的条件下，电池 0.5C 标准充电后（以下若没有特别说明，均在此条件下放置，皆按此充电方式），搁置 10min，以 $0.5C_5A$ 进行放电至下限电压 3.0V，循环三次，当有一次达到标准，即达到标准要求（下同）。

5.1.2	Normal Temperature Charge Retention 常温荷电保持能力	Remaining capacity ≥ nominal capacity * 85% Recovery capacity ≥ nominal capacity * 90% 剩余容量≥标称容量*85％ 恢复容量≥标称容量*90％	Measure the initial state and initial capacity of the battery. After the battery is charged, rest with open circuit at room temperature for 28 days to measure the final state of the battery; discharge to 3.0V at 0.2C to measure the remaining capacity of the battery;0.2C/0.2C. Measure the recovery capacity of the battery. It can be cycled three times, and when it reaches the standard once, it meets the standard requirements. 测量电池的初始状态和初始容量，电池标准充电后，开路室温放置 28 天，测量电池最终状态；以 0.2C 放电至 3.0V，测量电池的剩余容量； 0.2C/0.2C 测量电池的恢复容量。可循环三次，当有一次达到标准，即达到标准要求。
5.1.3	Cycle Life 循环寿命	Capacity ≥ nominal capacity * 80% (300 times) 容量≥标称容量*80％ （300 次）	Discharge with 0.5C current to 3.0V; set aside for 30min; charge with 0.3C current to 4.2V to constant voltage charge until the charge current drops to 0.02C to st 0.5C; the discharge capacity was recorded; the cycle was repeated 300 times according to B-E, and the discharge capacity was 80% of the initial capacity. 以 0.5C 电流放电至 3.0V；搁置 30min；以 0.5C 电流充电至 4.2V 转恒压充电至充电电流降至 0.02C 时停止充电；充电后搁置 30min；以 0.5C 电流放电至 3.0V；记录放电容量；按照 B-E 连续循环 300 次，放电容量≧初始容量的 80% 。
5.1.4	High Temperature Charge Retention 高温荷电保持能力	Remaining capacity ≥ nominal capacity * 85% Recovery capacity ≥ nominal capacity * 90% 剩余容量≥标称容量*85％ 恢复容量≥标称容量*90％	After the battery is charged, it is stored at 55 °C ± 2 °C for 7 days; after leaving at room temperature for 5 hours, it is discharged at a current of 1I1 (A) to a final voltage of 2.75 V, and the nuclear power retention capacity (in Ah) is measured; After standard charging, at room temperature, discharge at a current of 1I1 (A) to a termination voltage of 3.0 V; metering recovery capacity (in Ah). 电池标准充电后；放置在 55℃±2℃下储存 7 天；结束后在室温下搁置 5h 后，以 0.2C 电流放电至终止电压 3.0V，计量核电保持容量（以 Ah 计）；电池在标准充电后，室温下，以 0.2C 电流放电至终止电压 3.0V；计量恢复容量（以 Ah 计）。

5.2 Safety Performance 安全性能

No.	Item 项目	Criteria 标准	Test Instructions 测试方法
5.2.1	Over Charge Performance 过充性能	No explosion, no fire. 不爆炸、不起火。	After the battery is charged, the battery is charged with constant current of 0.2C, stop charging when reaching 1.5 times of the end-of charging voltage or the charging time is 1h, and observe for 1h. Then the constant voltage is applied to the cut-off current of 0.02C. Stop charging and the temperature and appearance of the battery are observed. 电池标准充电后，以 0.2C 电流恒流充电达到充电终止电压的 1.5 倍或充电时间达 1h 后停止充电，观察 1h。然后转恒压充电至截至电流 0.02C 时终止，观察电池的温度及外观变化。
5.2.2	Over Discharge Performance 过放性能	No explosion, no fire. No leakage 不起火，不爆炸， 不漏液。	After the battery is charged, it is discharged with a current of 0.2C for 90 minutes and observed for 1 hour. 电池标准充电后，以 0.2C 电流放电 90min，观察 1h。
5.2.3	Short Circuit Performance 短路性能	No explosion, no fire. 不爆炸、不起火。	After the battery is charged, put it in the explosion-proof box and directly short-circuit its positive and negative poles (the total resistance of the line is not more than 5mΩ) and observe for 1h. 电池标准充电后，置于防爆箱中直接短路其正负极（线路总电阻不大于 5mΩ），观察 1h。
5.2.4	Seawater Immersion 海水浸泡	No explosion, no fire. 不爆炸、不起火。	After the battery is charged, it is immersed in a 3.5% NaCl solution (mass fraction, simulating seawater composition at room temperature) for 2 hours, and the water depth should immerse the battery completely. . 电池标准充电后，将其浸入 3.5%Nacl 溶液（质量分数，模拟常温下的海水成分）中 2h，水深应完全没过电池。

5.2.5	Extrusion 挤压	No explosion, no fire. 不爆炸、不起火。	After the battery is charged, the test is carried out according to the following conditions: extrusion direction: pressing perpendicular to the direction of the battery plate; extrusion plate form: semi-cylindrical with a radius of 75 mm, the length of the semi-cylindrical body is greater than the length of the extruded battery; Pressing speed: 5 ± 1) mm/s; degree of extrusion: when the voltage reaches 0V or the deformation reaches 30% or the pressing force reaches 200KN, the extrusion is stopped and observed for 1 hour. 电池标准充电后，按下列条件进行试验：挤压方向：垂直于电池极板方向施压；挤压板形式：半径 75mm 的半圆柱体，半圆柱体的长度大于被挤压的电池长度；挤压速度：5±1）mm/s；挤压程度：电压达到 0V 或变形量达到 30%或挤压力达到 200KN 后停止挤压，观察 1h。
5.2.6	Heat 加热	No explosion, no fire. 不爆炸、不起火。	After the battery is charged, it is placed in a hot box and connected to a thermocouple. The temperature is raised to 130℃ ±2℃ at a rate of (5℃ ±2℃) / min and the temperature is stopped for 30 min, and the heating is stopped. Observe for 1 h. 电池标准充电后，放置于热箱中，并与热电偶相连，温度以（5℃±2℃）/min 的速率升至 130℃±2℃并保温 30Min 后停止加热，观察 1h。

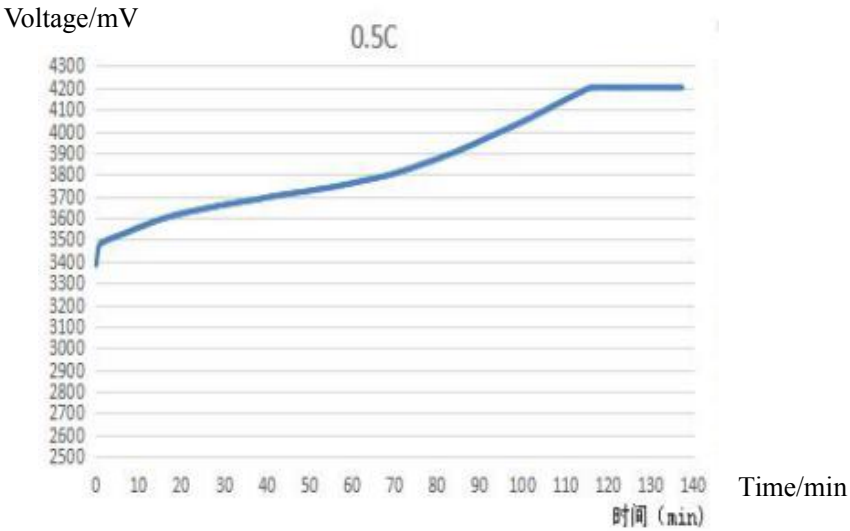
5.3 Environmental adaptability 环境适应性能

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria 标准</th><th>Test Instructions 测试方法</th></tr>
<tr><td>5.3.1</td><td>Temperature Cycle
温度循环</td><td>No explosion, no fire, no leakage.
不爆炸、不起火，不漏液。</td><td>After the battery is charged, put it in the temperature box and cycle it 5 times according to the following table.
电池标准充电后，放入温度箱中，按下表循环 5 次。
<table>
<tr><th>Temp.
温度℃</th><th>Time increment
时间增量
min</th><th>Cumulative time
累计时间
min</th><th>Temperature change rate
温度变化率℃/min</th></tr>
<tr><td>25</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>-40</td><td>60</td><td>60</td><td>13/12</td></tr>
<tr><td>-40</td><td>90</td><td>150</td><td>0</td></tr>
<tr><td>25</td><td>60</td><td>210</td><td>13/12</td></tr>
<tr><td>85</td><td>90</td><td>300</td><td>2/3</td></tr>
<tr><td>85</td><td>110</td><td>410</td><td>0</td></tr>
<tr><td>25</td><td>70</td><td>480</td><td>6/7</td></tr>
</table></td></tr>
</table>

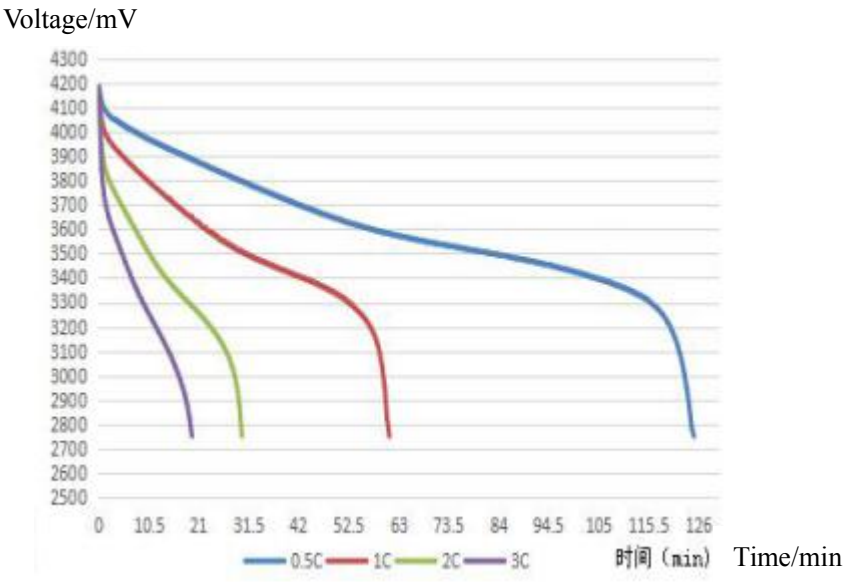
5.3.2	Low Pressure 低气压	No explosion, no fire, no leakage. 不爆炸、不起火，不漏液。	After the battery is charged, put it into the low pressure box, adjust the air pressure in the test chamber to 11.6KPa, the temperature is room temperature, let stand for 6h, observe for 1h. 电池标准充电后，将其放入低气压箱中，调节试验箱中气压为 11.6KPa，温度为室温，静置 6h，观察 1h。
5.3.3	Drop Performance 跌落性能	No explosion, no fire, no leakage. 不爆炸、不起火，不漏液。	After the battery is fully charged, the battery sample is freely dropped from the height (lowest point height) of 1.5 m onto the concrete floor for 1 h. 电池标准充电后，将电池样品由高度（最低点高度）为 1.5m 的位置自由跌落到水泥地面上，观察 1h。
5.3.4	Discharge Performance at Different Temperatures 不同温度下的放电性能	放电容量/初始容量×100％ A)55 ℃时≥90%; B)-20 ℃时≥70%	Measure the initial capacity and initial state of the battery. A) After the battery is charged, leave it at 55±2°C for 5h, then discharge at 2°C (±) at 55°C±2°C to the termination voltage of 3.0V to calculate the discharge capacity. B) After the battery is charged, it is left at -20 °C ± 2 °C for 24 hours, and then discharged at 1-2 °C ± 2 °C with a current of 1I1 (A) to a final voltage of 2.5 V to calculate the discharge capacity. 测量电池的初始容量和初始状态，A）电池标准充电后，在 55±2℃下搁置 5h，再在 55℃±2℃下以 0.2C 电流放电至终止电压 3.0V，计算放电容量；B）电池标准充电后，在-20 ℃±2℃下搁置 24h，再在-20 ℃±2℃下，以 1C 电流放电至终止电压 2.5V，计算放电容量。

6. Characteristics Curves 性能曲线图

6.1 Rate Charge Curve 倍率充电曲线 (Temp.：25℃ Charge：CC—CV：0.5C—4.2V)



6.2 Rate Discharge Performance 倍率放电性能 (Temp.: 25℃ Charge: CC---CV: 0.5C—4.2V, Discharge: CC---CV: 0.5C、1C、2C、3C——2.75V)



7. Warranty 保质期

6 months warranty for sample battery after date of production. One year warranty for finished battery after the date of production.
样品电池保质期为（出厂之日起）半年；产品电池保质期为（出厂之日起）1 年。

8. Matters Needing Attention 注意事项

Strictly observes the following needing attention. EEMB will not be responsible for any accident occurred by handling outside of the precautions in this specification.
您必须严格遵守下述电池使用注意事项。对于没有按照以下注意事项所造成的任何意外事故，EEMB 不负担任何责任。

! Danger 危险

- Strictly prohibits heat or throw cell into fire. 严禁把将电池投进火中或进行加热
- Strictly prohibits throw and wet cell in liquid such as water、gasoline or drink etc.
  严禁把电池投入液体中，如水、汽油、饮料等，也不要把电池弄湿。
- Strictly prohibits use leave cell close to fire or inside of a car where temperature may be above 60℃. Also do not charge / discharge in such conditions.
  禁止在火源附近或温度超过 60℃的轿车中使用或遗留电池，也不要在这些环境中进行充放电。
- Strictly prohibits put batteries in your pockets or a bag together with metal objects such as necklaces. Hairpins, coins, or screws. Do not store or transportation batteries with such objects.
  禁止把电池同项链、发夹、硬币或螺钉等金属品一起放在兜中或包中，也不要把电池同上述物品一起储存或运输。

- Strictly prohibits short circuit by any way.
  禁止任何形式对电池短路。
- Do not place Cell in a device with the (+) and (-) in the wrong way around.
  在装入设备时注意电池的正负极不要反装。
- Strictly prohibits pierce Cell with a sharp object such as a needle.
  禁止使用锐利的物品刺穿电池。
- Strictly prohibits disassemble or modify the cell.
  禁止对电池进行分解。
- Strictly prohibits welding a cell directly.
  禁止直接对电池进行焊接。
- Do not use a Cell with serious scar or deformation.
  禁止使用已经损坏的电池。
- Thoroughly read the user's manual before use, inaccurate handling of lithium-ion rechargeable cell may cause leakage, heat, smoke, an explosion, or fire, capacity decreasing.
  在使用之前请详细阅读操作说明书，不适当的操作可能引起电池变热、着火、爆炸、毁坏或电池容量的衰减。

! Warning 警　告

- Strictly prohibits put cell into a microwave oven, dryer, or high-pressure container.
  禁止把电池放加热器皿、洗衣机或高压容器中。
- Strictly prohibits use cell with dry cells and other primary batteries, or new and old battery or batteries of a different package, type, or brand.
  禁止把电池同干电池或其它原电池或者新旧电池一起使用，也不要同不同包装、不同型号或不同品牌的电池一起使用。
- Stop charging the Cell if charging is not completed within the specified time.
  如果在规定的充电时间内充电没有结束，停止充电。
- Stop using the Cell if abnormal heat, odor, discoloration, deformation or abnormal condition is detected during use, charge, or storage.
  在使用、充电或储存期间如发现电池有变热、散发气味、变色、变形或其它反常之处停止使用。
- Keep away from fire immediately when leakage or foul odor is detected.
  当发现电池漏液或散发出难闻的气味时立即远离。
- If liquid leaks onto your skin or clothes, wash well with fresh water immediately.
  如果电解液渗漏到您的皮肤或衣服上，立刻用大量清水冲洗。
- If liquid leaking from the Cell gets into your eyes, do not rub your eyes. Wash them well with clean flowing water and go to see a doctor immediately.
  如果电解液渗出并进入您的眼睛里，不要揉擦您的眼睛，立刻用大量清水清洗眼睛并就医。

! Caution 注　意

- Before using the Cell, be sure to read the user's manual and cautions on handling thoroughly.
  在使用电池之前，应详细阅读操作指南并对使用中的注意事项有足够深刻的理解。
- Charging with specific charger according to product specification. Charge with CC/CV method. Strictly prohibits revered charging. Connect cell reverse will not charge the cell. At the same time, it

will reduce the charge-discharge characteristics and safety characteristics; this will lead to product heat and leakage.

充电时请使用指定的充电器并按照本规格书的要求进行充电。采用恒流恒压方式充电，禁止反向充电。若电池正负极接反，将无法对电芯进行充电；同时，反向充电会降低电芯的充放电性能和安全性，并会导致发热和泄漏。

- Store batteries out of reach of children so that they are not accidentally swallowed.
  把电池放到小孩够不到的地方以免吞服。
- If younger children use the Cell, 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。
- Before using the Cell, be sure to read the user's manual and cautions on handling thoroughly.
  在将电池装入设备或从设备中取出之前详细阅读设备操作手册。
- Batteries have life cycles. If the time that the Cell powers equipment becomes much shorter than usual, the Cell life is at an end. Replace the Cell with a new same one.
  电池具有使用寿命，如果使用电池的设备的工作时间比平常少的多，请更换新电池。
- When not using Cell for an extended period, remove it from the equipment and store in a place with low humidity and low temperature.
  当长期不用时，要将电池从设备中取出并放在低温低湿的环境中保存。
- While the Cell pack is charged, used and stored, keep it away from objects or materials with static electric charges.
  电池应在远离静电的场所进行充电、使用和储存。
- If the terminals of the Cell become dirty, wipe with a dry clothe before using the Cell.
  如果电池的接线端变脏，在使用之前用干布擦净。
- Storage the cells in storage temperature range as the specifications. After full discharged, we suggest that charging to 3.6~4.0V if not used for a long time.
  电芯应贮存在产品规格书规定的温度范围内，电芯放电放完后，如果长期不使用，建议充电至 3.6~4.0V 贮存。
- Battery should be charged and discharged every 3 months at 0.2 C during long term storage, and then charge to 40-60% of the capacity for storage.
- 电池在长期贮存过程中，必须每 3 个月 0.2C 进行充放电一次，然后充电至 40~60%的容量进行贮存。
- Do not exceed these ranges of the following temperature ranges：
  电池在使用和贮存时的温度不能超出下面的要求：

Working temperature range 工作温度范围: -20℃～60℃
Storage temperature range 贮存温度范围: 20℃±1℃

! Special Notice 特别注意

Keep the cells in 40%-60% charged state during long period storage. We recommend to charge/discharge the battery every 3 months after receipt of the battery and maintain the voltage 3.7~4.0V. And store the battery in cool and dry place.

电池在长时间储存的过程中保持带电量应在 40%-60%。我们建议每 3 个月进行一次充放电维护，保持电压在 3.7~4.0V。将电池存储在阴凉干燥的地方。