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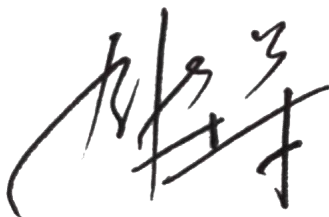

EEMB BATTERY

Lithium Iron Phosphate Battery

Specification

磷酸铁锂电池
产品规格书

Model 型号:	LIP14500
Capacity 容量:	600mAh

Prepared 编制	Checked 审核	Approved 批准
		

Customer 客户名称:

Customer Approval (Customer confirmation) 客户确认:

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1. Scope 适用范围

This product specification defines the requirements of the rechargeable lithium iron phosphate battery supplied to the customer by EEMB Co., Ltd.

本产品规格书适用于 EEMB 提供的磷酸铁锂电池。

2. Battery Cell Basic Characteristics 电芯产品基本特性

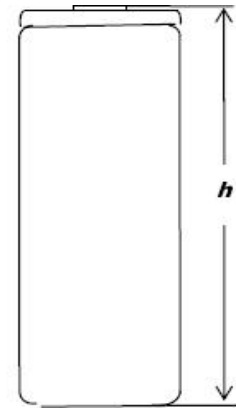
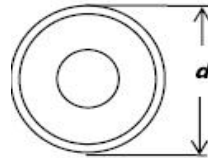
No.	Item 项目	Spec. 规格	Remark 备注
2.1	Battery Type 电池	LIP14500	
2.2	Nominal Capacity 标称容量	600mAh (0.2C ₅ A discharge)	
	Minimum Capacity 最小容量	580mAh (0.2C ₅ A discharge)	
2.3	Nominal Voltage 额定电压	3.2V	Operation voltage
2.4	Voltage at end of discharge 放电终止电压	2.0V	
2.5	Charging at end of voltage 充电终止电压	3.65V	
2.6	Standard charge 标准充电	CC, 0.2C ₅ A CV, 3.65V, 0.02C ₅ A cut-off	Charge time: approx 6h
2.7	Standard discharge 标准放电	CC, 0.2C ₅ A, end voltage 2.0V	
2.8	Quick Charge 快速充电	CC, 1C ₅ A CV, 3.65V, 0.02C ₅ A cut-off	Charge time: approx 2.5h
2.9	Quick Discharge Current 快速放电电流	CC, 1C ₅ A, end voltage 2.0V	
2.10	Max. Continuous Charge Current 最大持续充电电流	1C ₅ A	
2.11	Max. Continuous Discharge Current 最大持续放电电流	3C ₅ A	Instant 5C ₅ A max
2.12	Weight 重量	Approx. 17g	FYI
2.13	Operating Temperature 工作温度	Charge: 0 ~ 45°C	60±25%RH. Bare Cell
		Discharge: -20°C ~ 60°C	
2.14	Storage Temperature 存储温度	Less than 1 year: -20°C ~ 25°C	60±25%RH.at the shipment state
		Less than 3 months: -20°C ~ 40°C	
2.15	Pack Dimension 电池组尺寸	Height: 48.5±0.5mm	Initial Dimension
		Width: 14.0±0.3mm	

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3. Battery Cell Shape and Dimensions (Unit: mm)

产品外形及尺寸 (单位: mm)

Item 项目	Specification 规格
D	14.1±0.3mm
H	48.5±0.5mm



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 Cell Specification 电池性能测试规范

5.1 Initial Performance Test 初始性能测试

No.	Item 项目	Criteria 标准	Test Instructions 测试方法
5.1.1	Open-Circuit Voltage 开路电压		The open-circuit voltage shall be measured within 24 hours after standard charge. 开路电压应在标准充电后 24 小时内测量。
5.1.2	Internal Impedance 内阻		Internal resistance measured at AC 1KHz after 50% charge. 50% 充电后，在 AC 1KHz 下测量内阻。
5.1.3	Minimal Rated Capacity 最小额定容量	Discharge Capacity 放电容量	The capacity on 0.2C _{5A} discharge till the voltage tapered to 2.0V shall be measured after rested for 30min then finish standard charge. 0.2C _{5A} 放电至电压逐渐减小至 2.0V 的容量应在静置 30min 后测量，然后完成标准充电。

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5.2 Temperature Dependence of discharge capacity 温度对放电容量的依赖性

Cells shall be charged per $0.2C_5A = 120mA$ and discharged @ $0.2C_5A$ to 2.0 volts. Except to be discharged at temperatures per table below. Cells shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 23 °C and the percentage shall be calculated. Each cell shall meet or exceed the requirements of table below.

电池应按 $0.2C_5A = 120mA$ 充电，并在 $0.2C_5A$ 放电至 2.0V。除了在下表的温度放电，电芯在放电前应在试验温度下储存 3 小时，然后在试验温度下放电。应将每个温度下电芯的容量与 23°C 时达到的容量进行比较，并计算百分比。每个电芯应满足或超过下表的要求。

No. 序号	Item 项目	Temp. 温度			
		-10°C	0°C	23°C	60°C
5.2.1	Discharge Temperature 放电温度	-10°C	0°C	23°C	60°C
5.2.2	Discharge Capacity ($0.2C_5A$) 放电容量 ($0.2C_5A$)	50%	80%	100%	95%

5.3 Cycle Life and Leakage-Proof 循环寿命和防泄漏

No. 序号	Item 项目	Criteria 标准	Test Conditions 测试条件
5.3.1	Cycle Life ($0.5C_5A$) 循环寿命 ($0.5C_5A$)	Higher than 80% of the Initial Capacities of the Cells 高于电芯初始容量的 80%。	Carry out 2000 cycle Charging/discharging in the below condition. Charge: standard charge. Discharge: $0.5C_5A$ to 2.0V. Rest time between charge/discharge: 30min. Temperature: $20 \pm 5^\circ C$. 进行 2000 次循环 在以下条件下充电/放电。 充电：标准充电。 放电： $0.5C_5A$ 至 2.0V。 充放电间隔时间：30 分钟。 温度： $20 \pm 5^\circ C$ 。
5.3.2	Leakage-proof 防泄漏	No leakage (visual inspection). 无泄漏（目视检查）。	After full charge with standard charge, store at $60 \pm 3^\circ C$, $60 \pm 10\%RH$ for 1 month. 标准充电完全充电后，在 $60 \pm 3^\circ C$ ， $60 \pm 10\%RH$ 下保存 1 个月。

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5.4 Mechanical Characteristics 机械特性

No. 序号	Item 项目	Criteria 标准	Test Conditions 测试条件
5.4.1	Vibration Test 振动测试	After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz and 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes. 标准充电后, 将电芯固定在振动台上, 进行振动循环, 频率在 10Hz 和 55Hz 之间以每分钟 1Hz 的速率变化, 振动的偏移为 1.6mm。每个 XYZ 轴的轴振动 30 分钟。	No leakage, no fire. 不泄漏, 不着火。
5.4.2	Drop Test 跌落测试	The cell is to be dropped from a height of 1 meter twice onto concrete ground. 将电芯从 1 米的高度落到混凝土地面上两次。	No explosion, no fire, no leakage. 不爆炸, 不着火, 不泄 漏。

5.5 Safety Test 安全测试

Battery Condition: Fresh, fully charged.

电池状态: 新电池, 充满电。

No. 序号	Item 项目	Test Method 测试方法	Requirement 要求
5.5.1	Crush 挤压	Crush between two flat plates. Applied force is about 13kN (1.72Mpa) for 30min. 在两块平板之间挤压。施加力约为 13kN (1.72Mpa), 持续 30min。	No explosion, no fire. 不爆炸, 不起火。
5.5.2	Short Circuit (20°C) 短路 (20°C)	Each test sample battery, in turn, is to be short-circuited by connecting the (+) and (-) terminals of the battery with a Cu wire having a maximum resistance load of 0.1Ω. Tests are to be conducted at room temperature (20±2°C). 每个测试样品电池依次通过将电池的 (+) 和 (-) 端子与最大电阻负载为 0.1Ω 的 Cu 线连接而短路。试验应在室温 (20±2°C) 下进行。	No explosion, no fire. The temperature of the surface of the cells are lower than 150°C. 没有爆炸, 没有火灾。电 芯表面温度低于 150°C。

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5.5.3	Short Circuit (60°C) 短路 (60°C)	Each test sample battery, in turn, is to be short-circuited by connecting the (+) and (-) terminals of the battery with a Cu wire having a maximum resistance load of 0.1 Ω. Tests are to be conducted at temperature (60±2°C). 每个测试样品电池依次通过将电池的 (+) 和 (-) 端子与最大电阻负载为 0.1 Ω 的 Cu 线连接而短路。试验应在室温 (60±2°C) 下进行。	No explosion, no fire. The temperature of the surface of the cells are lower than 150°C. 没有爆炸, 没有火灾。电芯表面温度低于 150°C。
5.5.4	Impact 重击	A 56mm diameter bar is inlaid into the bottom of a 10kg weight. And the weight is to be dropped from a height of 1m onto a sample battery and then the bar will be across the center of the sample. 直径 56 毫米的棒嵌入 10 千克重量的底部。并且将重量从 1 米的高度落到样品电池上, 然后棒将穿过样品的中心。	No explosion, no fire. 没有爆炸, 没有火灾。
5.5.5	Forced Discharge 强迫放电	Discharge at a current of 1C ₅ A for 2.5h. 以 1C ₅ A 的电流放电 2.5 小时。	No explosion, no fire. 没有爆炸, 没有火灾。
5.5.6	Nail Pricking 钉子穿刺	Prick through the sample battery with a nail having a diameter of 3mm and remain 2h. 用直径为 3mm 的钉子刺穿样品电池并保持 2h。	No explosion, no fire. 没有爆炸, 没有火灾。

6. 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。

7. 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°C.
Also do not charge / discharge in such conditions.
禁止在火源附近或温度超过 60°C 的轿车中使用或遗留电池, 也不要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

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品一起储存或运输。

- Strictly prohibits short circuit the (+) and (-) terminals with other metals.
禁止使用金属导体短路电池的正负极。
- 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 iron phosphate rechargeable cell may cause leakage, heat, smoke, an explosion, or fire, capacity decreasing.
在使用之前请仔细阅读操作说明书，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 microware 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 edible oil 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，立刻用食用油清洗眼睛并就医。

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! 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，应仔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 reversed 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仔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 3.2~3.4V. with no using 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3.2~3.4V 贮存。
- Battery should be charged and discharged every 3 months at 0.2 C during long term storage, and then charge to 50-70% 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50~70%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：

Charge temperature range 充电 : 0°C to 45°C;

Discharge temperature range 放电 : -20°C to 60°C.

Store less than 1 month 贮存 1 个月 : -20°C - +60°C

Store less than 3 months 贮存 3 个月 : -20°C - +45°C

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Store less than 1 year 贮存 12 个月 : -20°C - +25°C

! Special Notice 特别注意

Keep the cells in **50% charged state** during long period storage. We recommend to charge the battery up to 50% of the total capacity every 3 months after receipt of the battery and maintain the voltage 3.2~3.4V. 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为 50%。我们建议每 3 个月充电至 **50%**以上容量，保持电压在 3.2~3.4V。将电池存储在阴凉干燥的地方。

EEMB reserves the final explanation. Please use battery strictly according to specification. EEMB will not be responsible for any inappropriate operation. EEMB keeps the right to change product specifications without previous notice. If any question, please consult with the manufacturer

EEMB 保留最终解释权。请严格按照规范使用电池。EEMB 对任何不当操作将不负责。EEMB 保留修改产品规格书不另行通知的权利。如有任何问题,请咨询制造商。