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EEMB CO., LTD

Lithium Iron Phosphate Battery

Specification

Model:	LIP18650
Capacity:	1500mAh

Prepared	Checked	Approved

Customer:

Customer Approval (Customer confirmation) :

Signature	Checked	Approved

Address: Room ABCD, 25/F, Block A, Fortune Plaza, NO.7060 Shennan Road Shenzhen, China

Postal code: 518040

Phone: 0086-755-83022275

FAX: 0086-755-83021966

<http://www.eemb.com>



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1. Scope

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

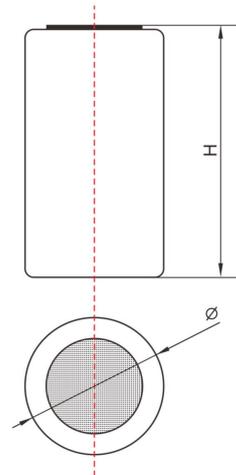
2. Battery Cell Basic Characteristics

No.	Item	Characteristics	Remark
2.1	Model	LIP18650	
2.2	Nominal Capacity	1500 mAh	0.2C ₅ A
2.3	Minimum Capacity	1480 mAh	
2.4	Nominal Voltage	3.2 V	
2.5	Weight	Approx. 42 g	
2.6	Dimension	Diameter	18.1±0.3 mm
		Height	65.0±0.3 mm
2.7	Charge	Standard Current	0.2C ₅ A
			6 hrs
		Fast Current	1 C ₅ A mA
			2.5 hrs
	End-off Voltage	3.65 V	
2.8	Discharge	Standard Current	0.2C ₅ A
		Cut-off Voltage	2.0 V
2.9	Fast Discharge	1C ₅ A	≥3.40V
2.10	Maximum Continuous Charge Current	1C ₅ A	≤60mΩ
2.11	Maximum Continuous Discharge Current	3 C ₅ A	Max. 3 C ₅ A at instance
2.12	Operation Temperature	Charge	0 ~ 45 °C
		Discharge	-10 ~ +60 °C
2.13	Storage Temperature	Less than 1 year	-20 ~ +25 °C
		Less than 3 months	-20 ~ +40 °C
2.14	Storage Relative Humidity	60±15 %	

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

Item	Specification
Diameter (Φ)	18.1 ± 0.3
Height (H)	65.0 ± 0.3



4. Appearance

It shall be free from any defects such as remarkable scratches, breaks, cracks, discoloration, leakage, or middle deformation.

5. Battery Cell Specification

5.1 Electrical Characteristics

No.	Item	Criteria	Test Instructions
5.1.1	Cycle Life (0.5 C ₅ A)	Higher than 80% of the Initial Capacities of the Cells	Carry out 1000 cycle Charging/Discharging in the below condition. Charge: Standard Charge, Discharge: 0.5 C ₅ A to 2.0V Rest Time between charge/discharge: 30min. Temperature: 20±5°C
5.1.2	Leakage-Proof	No leakage (visual inspection)	After full charge with standard charge, store at 60±3°C, 60±10%RH for 1 month.

5.2 Acclimatization Characteristics

No.	Item	Criteria	Test Instructions	
5.2.1	Drop	No leakage, no explosion, no fire	After standard charge, measuring the initial state. Drop the cell onto a hard board with the thickness of 20mm from 1m in six directions for 2 times, test the final state of the cell.	
5.2.2	Discharge performance under different temperatures	60°C	≥ 95%	Measuring cell initial capacity and initial state. After standard charge, 0.2C ₅ A discharge to 2.0V. Then rest at room temperature for 3h. Then discharge respectively 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.
		23°C	≥ 105%	
		0°C	≥ 80%	
		-10°C	≥ 50%	
		No smoke, explosion and fire		

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5.2.3	Vibration	No leakage, no explosion, no fire.	Batteries are vibrated 30 min in three mutually perpendicular directions with amplitude of 10~55Hz and the scanning rate of 1oct per min.
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5.3 Safety Characteristics

No.	Item	Criteria	Test Instructions
5.3.1	Impact	No fire or explosion	After full charge, test the initial state of battery, place it on the flat and connect to the thermocouple, put a bar with 56 mm diameter to the middle of the cell, a 10kg weight drop from 1000mm height to the table, watch battery appearance and temperature changes.
5.3.2	Crush	No explosion or fire	After full charge, test the initial state of cell, place it on the flat and connect to the thermocouple, placed it between two iron flat mould, quickly compress the battery with 13KN and staying for 30 min.
5.3.3	Nail Pricking	No fire or explosion;	Prick through the sample battery with a nail having a diameter of 3mm and remain 2h.
5.3.4	Short Circuit (20°C)	No fire or explosion. The temperature of the cell surface lower than 150°C	Each test sample battery is to be short-circuited by connecting the (+)and (-) terminals of the battery with a copper wire with a maximum resistance load of 0.1Ω. Test are to be conducted at room temperature (20°C±2°C).
5.3.5	Short Circuit (60°C)	No explosion, No fire. The Temperature of the surface of the Cells are lower than 150°C	Each test sample battery is to be short-circuited by connecting the (+)and (-) terminals of the battery with a copper wire with a maximum resistance load of 0.1Ω. Test are to be conducted at temperature (60°C±2°C).
5.3.6	Forced Discharge	No explosion, No fire	Prick through the sample battery with a nail having a diameter of 3mm and remain 2h.

6. Warranty

One year warranty after the date of production

7. Matters Needing Attention

Strictly observes the following needing attention. EEMB will not be responsible for any accident occurred by handling outside of the precautions in this specification.

! Danger

- Strictly prohibits heat or throw cell into fire.
- Strictly prohibits throw and wet cell in liquid such as water、gasoline or drink etc.
- Strictly prohibits use leave cell close to fire or inside of a car where temperature may be above 60°C.

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Also do not charge / discharge in such conditions.

- 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.
- Strictly prohibits short circuit the (+) and (-) terminals with other metals.
- Do not place Cell in a device with the (+) and (-) in the wrong way around.
- Strictly prohibits pierce Cell with a sharp object such as a needle.
- Strictly prohibits disassemble or modify the cell.
- Strictly prohibits welding a cell directly.
- Do not use a Cell with serious scar or deformation.
- 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.

! Warning

- Strictly prohibits put cell into a microwave oven, dryer, or high-pressure container.
- 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.
- Stop charging the Cell if charging is not completed within the specified time.
- Stop using the Cell if abnormal heat, odor, discoloration, deformation or abnormal condition is detected during use, charge, or storage.
- Keep away from fire immediately when leakage or foul odor is detected.
- If liquid leaks onto your skin or clothes, wash well with fresh water immediately.
- 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.

! Caution

- Before using the Cell, be sure to read the user's manual and cautions on handling thoroughly.
- 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.
- Store batteries out of reach of children so that they are not accidentally swallowed.
- If younger children use the Cell, their guardians should explain the proper handling.
- Before using the Cell, be sure to read the user's manual and cautions on handling thoroughly.
- 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.
- When not using Cell for an extended period, remove it from the equipment and store in a place with low humidity and low temperature.
- While the Cell pack is charged, used and stored, keep it away from objects or materials with static electric charges.
- If the terminals of the Cell become dirty, wipe with a dry clothe before using the Cell.
- 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.
- 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.
- Do not exceed these ranges of the following temperature ranges:

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Charge temperature range: 0°C to 45°C

Discharge temperature range: -10°C to 60°C.

Storage temperature range: -20°C to 40°C

! Special Notice

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.