



SPECIFICATION for
Sealed Rechargeable Lithium Iron Phosphate Battery

Battery Model	LFP18650P-1100
Document No.	JS- LFP18650P-1100
Edition	A0
Pages	6
Creation Date	November 9, 2011
Revisal Date	

JYH Battery Co., Ltd

Address: No. 12, Bangmin Road, Jianghai District, Jiangmen City, Guangdong Province, PR China.

Post Code: 529000

Tel: 0086 - 750 - 3806889 3806886 3808313

Homepage: www.jyh-battery.com

Fax: 0086 - 750 - 3808133 3808113

E-mail: jmdbw@jyh-battery.com

1. Preface

This product specification covers the requirements for the following rechargeable Lithium Iron Phosphate Battery manufactured and delivered by JYH Battery Co. Ltd.

LFP18650P-1100

2. Description and Model

2.1	Description	Rechargeable Lithium Iron Phosphate Cell High rate type
2.2	Model	LFP18650P-1100

3. Ratings

3.1	Nominal Voltage	3.2V
3.2	Typical Capacity	1130mAh after standard charge and 220mA discharge
3.3	Nominal Capacity	1100mAh
3.4	Standard charge	Constant current at 550mA to 3.65V, followed constant voltage at 3.65V till current taper to 11mA.
3.5	Fast charge	Constant current at 1100mA to 3.65V, followed constant voltage at 3.65V till current taper to 11mA.
3.6	Operating temperature	Charging: 0°C to 45°C Discharging: -20°C to 60°C
3.7	Storage temperature	15°C to 35°C
3.8	Dimensions	Diameter 18.7 ⁺⁰ _{-0.7} mm Height 65.5 ⁺⁰ _{-1.5} mm
3.9	Typical weight	37g
3.10	Maximum discharge current	11000mA
3.11	Discharge cut-off Voltage	2.5V/cell

4. Performance

Unless otherwise stated, tests should be conducted under the following conditions:

Time frame	Within one month of delivery
Ambient temperature	20 ± 5°C
Relative Humidity	65 ± 20%

4.1 Standard Capacity

The initial capacity is the discharge capacity of the cell measured with a discharging current of 220mA to a cut-off voltage of 2.5V within 30 minutes after the standard charge. Up to three cycles are permitted for this test.

Discharge capacity ≥ 1050mAh

4.2 Open circuit Voltage

The open circuit Voltage is above 3.2V within one hour after standard charge

4.3 Initial Impedance

The initial internal resistance is measured at 1KHz within 30 minutes after standard charge.

Initial Impedance ≤ 30mOhm

4.4 1C rate capacity

High rate capacity is measured with a discharging current of 1100mA to a cut-off voltage of 2.5V after standard charge.

High rate capacity ≥ 990mAh

4.5 10C rate capacity

High rate capacity is measured with a discharging current of 11000mA to a cut-off voltage of 2.5V after standard charge.

High rate capacity ≥ 935mAh

4.6 Charge retention

After standard charge and storage time of 28 days at ambient temperature, the capacity is measured with a discharging current of 220mA to a cut-off voltage of 2.5V.

Capacity ≥ 935mAh

4.7 Discharge capacity at -20°C

After the standard charge, the cell is stored in an ambient temperature of -20°C±2°C for not less than 16h and not more than 24h. The capacity is measured with a discharging current of 220mA to a cut-off voltage of 2.5V.

Discharge capacity ≥ 550mAh.

4.8 Discharge capacity at 55°C

After the standard charge, the cell is stored in an ambient temperature of 55°C±2°C for not less than 16h and not more than 24h. The capacity is measured with a discharging current of 220mA to a cut-off voltage of 2.5V.

Discharge capacity ≥ 990mAh.

4.9 Cycle life

Cells shall be charged at the constant current of 1100mA to 3.65V and discharged at the constant current of 220mA to 2.5V. After that, the cells should be stored for 0.5-1h prior to next charge-discharge cycle. The test would be ended till the discharge capacity falls to 80% of nominal capacity.

Cycle life is not less than 1000 cycles.

5. Mechanical Test

5.1 Vibration Test

This means the endurance of the cell against vibrations after standard charge.

Conditions:	Frequency	10Hz - 55Hz
	Vibration amplitude	0.38mm (10-30Hz), 0.19mm (30-55Hz),
	Axes of vibration	3 mutually perpendicular axes (x,y,z)
	Time of vibration	90minutes for each axe
	Sweep speed	1 octave per minute

Criteria: No rupture, no leakage, no fume, nor explosion,
Open circuit voltage of cell after vibration should not be less than 3.2V.

5.2 Drop Test

This means the endurance of the cell against drop after standard charge.

Condition:	Height:	1m
	Direction:	2 drops along each direction of the 3 mutually perpendicular axes
	Surface:	Wooden board, 5cm thick

After the drop, the cell is discharged at the constant current of 280mA to 2.5V. And then the standard capacity would be measured. Up to three cycles are permitted for this capacity test.

Criteria: No rupture, no leakage, no fume, nor explosion.
Discharge capacity ≥ 990mAh.

6 Safety Test

6.1 Short Circuit test

After standard charge, connect cell positive and negative terminals with copper wire (electric resistance: 50mΩ or less). Monitor the temperature change during testing, end the test when the cell case temperature drops to 10°C lower than peak temperature.

Criteria: No fire, nor explosion.
Max. Temperature < 150°C

6.2 Overcharge Test

The cell is discharged at 220mA to 2.5V. Then it is charged at the current of 3300mA and the voltage of 10V, till last 7h at the voltage of 10V or the voltage is no more increased.

Criteria: No fire, nor explosion.

6.3 Hot Oven Test

After standard charge, the cell is heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5\pm 2^{\circ}\text{C}$ per minute. The oven is to remain for 30 minutes at $150\pm 2^{\circ}\text{C}$ before the test is ended.

Criteria: No fire, nor explosion.

6.4 Nail Test

A nail with 2.5~5mm diameter is penetrated vertically through the center of the fully charged battery.

Criteria: No fire, nor explosion.

6.5 Crush test

The cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram with a 32mm diameter piston. The crushing is to be continued until a pressure reading of 17.2MPa is reached on the hydraulic ram, applied force of 13KN. Once the maximum pressure has been obtained it is to be released.

Criteria: No fire, nor explosion.

6.6 Impact Test

The cell is to be placed on a flat surface. A bar with 15.8mm diameter is to be placed across the center of the cell. A weight of 9.1Kg is to be dropped from a height of 610mm onto the cell.

Criteria: No fire, nor explosion.

7 Appearance

The cell shall be free from break, scratch, distortion, contamination, leakage and so on.

8 Warranty

As long as the cell is treated in accordance with this product specification, one year limited warranty against workmanship and material defects is given.

Caution

- If cells/batteries terminals become dirty, clean up them with a soft dry cloth prior to use.
- Charge and discharge under specified ambient temperature according to JYH specification.
- While the cells/batteries are charged, used and stored, keep it away from object materials with static electric chargers.
- Turn off the equipment after use.
- If the cells/batteries are needed to be stored for a long period, battery should be removed from the equipment.
- In case of long period storage (more than 3 months), store the cells/batteries at a temperature range of - 10-20°C, low humidity, no corrosive gas atmosphere.
- For long period storage, it is recommended that cells/batteries are charged once per half a year to prevent over discharge.
- Stop charging the cells/batteries if charging isn't completed within the specified time.
- Always discharge cells/batteries before bulk storage or shipment.
- When the operating time of the cells/batteries becomes much shorter than its initial operating time even after recharged, it should be replaced to a new battery as its cycle life has ended.
- If the skin or clothing comes in contact with fluid from the cells/batteries, thoroughly wash the area immediately with clean water. If any fluid from the cells/batteries gets into your eyes, don't rub your eyes and flush and wash them with a plenty of clean water and then consult a doctor immediately.
- Use cells/batteries in extreme condition may affect the service life. such as: deep cycle, extreme overcharge and overdischarge.

Warning

- Never solder onto cell directly.
- Don't short circuit (+) and (-) terminals with metallic object intentionally.
- Don't store the battery in a pocket or a bag together with metallic objects such as keys, necklaces, hairpins, coins, or screws.
- Keep away from fire immediately when leakage or foul odors are detected.
- Do not dispose of cell into fire or dismantled under any condition.
- Cell reversal is not permitted.
- Don't charge or use the battery in a car or similar place where inside of temperature may be over 60°C.
- Store cells/batteries out of the reach of babies and children.
- Stop using the battery immediately if the battery becomes abnormally hot, discoloration, deformation, or abnormal conditions is detected during use, charge, or storage.
- Don't use or assemble the battery with other manufacturer's batteries, different types and/or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries.
- Don't disassemble the battery or modify the battery design including electric circuit.
- Do not remove the outer tube from a battery or damage it. Doing so will expose the battery to the risk of a short circuit, and may cause leakage of battery fluid, heat, generation, explosion and fire.
- Don't immerse, throw, wet the battery in water / seawater