# Lithium-ion Rechargeable Battery

## Product Specification

**Product Name :** LiFePO4 Li-ion Battery

**Model No. :** F10-1565150

**Specification No. :** F3.2V/10Ah

**Version No. :** A1

**Issue Date :** 2017-07-25

| Prepared By | Checked by | Approved by |
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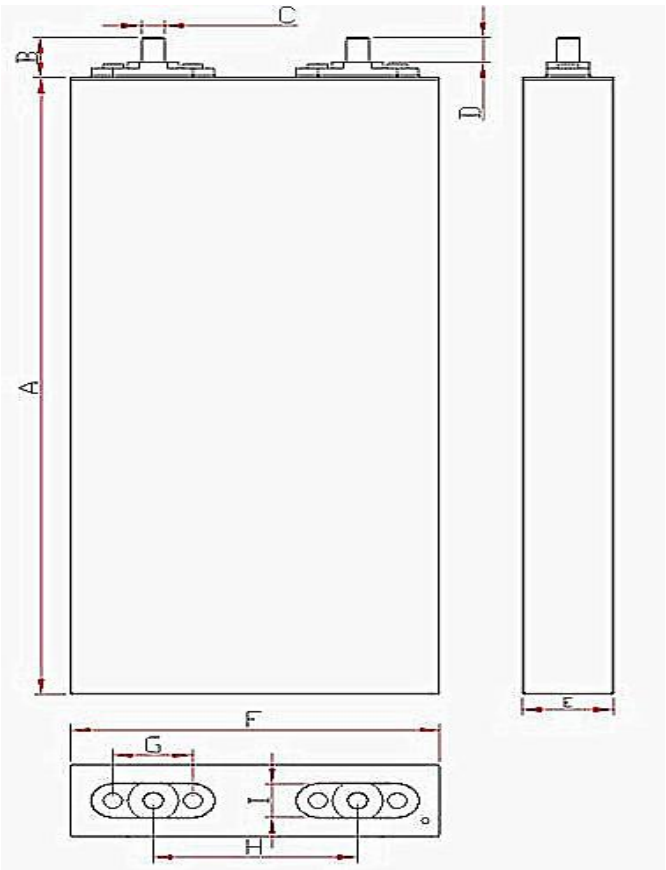
**1、Scope**

This specification describes the performance, testing method, warning and caution of the LiFePO4 Li-ion battery cells supplied by Hangzhou LIAO Technology Co., LTD.

**2、Configuration & Dimension**

| Item | data（mm） |
|---|---|
| A | 139 |
| B | 11 |
| C | M6 |
| D | 7.5 |
| E | 15 |
| F | 65 |
| G | 14 |
| H | 36 |
| I | 7.5 |


**3、Parameters**

| Item | data | Remark |
|---|---|---|
| Configuration | Prismatic Aluminum-Case Cell | |
| Size | 150*65*15mm | L*W*H，including bolts，not including PVC film，Tolerance±0.5mm. |
| Nominal capacity | 10Ah | 25±5℃，0.2C(2A)，CC(constant current)discharged to 2V. |
| Nominal voltage | 3.2V | |
| Charge cut-off voltage | 3.65V | |
| Discharge cut-off voltage | 2V | |
| Standard charge current | 2A | 0.2C(2A) CC (constant current) charged to 3.65V, then CV (constant Voltage) 3.65V charge till current decline to 200mA. |
| Max. charge current | 10A | 1C(10A) CC(constant current)charged to 3.65V, then CV(constant Voltage)3.65V |

| | | |
|---|---|---|
| | | charge till current decline to200mA. |
| Standard discharge current | 2A | 0.2(2A)C，CC (constant current)discharged to 2V. |
| Max continuous discharge current | 30A | 3C(30A)，CC (constant current)discharged to 2V. |
| Max peak discharge current | 50A | Lasting time ≤1 min. |
| Retention ability of Charge capacity | ≥95% Nominal capacity | Standard charge at 0.2C CC/CV to 3.65V, cut off current≤0.02C at 25±5℃.<br>Discharge at 0.5C CC to 2V after store it at 25±5℃ for 28days record the battery discharge capacity. |
| Cycle Life | ≥2000 times | Standard charge at 0.2C CC/CV to 3.65V,cut off when current≤0.02C at 25±5℃.<br>Standard discharge at 0.5C CC to 2V at 25±5℃.<br>Repeat the cycle of standard charge and discharge, When the battery capacity is less than 80% of the nominal capacity, stop the test. |
| -20℃ Discharge performance | ≥55% Nominal capacity | Fully charge the battery at room temperature. Standing at -20℃ for 20hrs, discharge at 0.5C to 2.0V. |
| 60℃ Discharge performance | ≥98% Nominal capacity | Fully charge the battery at room temperature. Standing at 60℃ for 6hrs, discharge at 0.5C to 2.0V. |
| Impedance | ≤1.5mΩ | Between discharge port of Cathode and Anode. |
| Weight | 275±10g | |
| Charging Temp. | 0 ~ 45℃ | Suggested Temp. |
| Discharging Temp. | -20 ~ 60℃ | Suggested Temp. |
| Storage Temp. | -20 ~ 45℃ | Suggested storage Temp. if long-term no use the battery. |

**4、**Safety Performance & Testing method

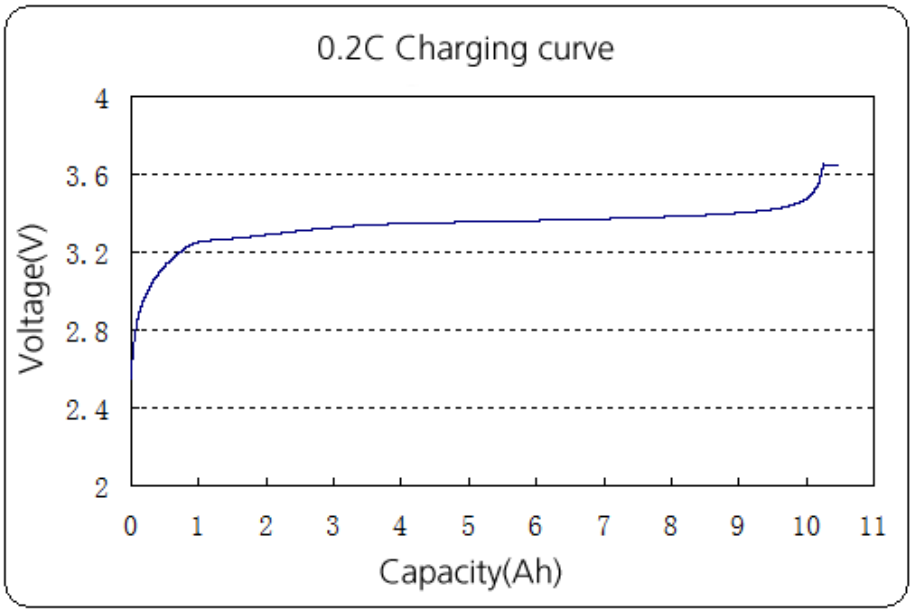
| No. | Item | Standard | Testing method |
|---|---|---|---|
| 1 | Vibration test | No fire,<br>no explosion,<br>no leakage. | After standard charged, fix the cell to vibration table, then subjected to vibration test for 30 minutes per axis of XYZ axes.<br>Frequency rate: 1oct/min<br>Vibration frequency: 10Hz-30Hz<br>Excursion (single amplitude): 0.38mm<br>Vibration frequency: 30Hz-55Hz<br>Excursion (single amplitude): 0.19mm |
| 2 | Drop test | No fire,<br>no explosion,<br>no leakage. | Drop the battery in the shipment condition from 1m height onto 5cm or thicker concrete with p-tile on it 3 times each of X, Y and Z directions. |
| 3 | Over-charge test | No fire,<br>no explosion | Charge in accordance with the following two ways(Choosing one between the two).<br>(1)Charge at 1C current for 90min or until the voltage of the battery reaches 5.0V(stop test when fulfills either condition).<br>(2)Charge at 3C current until the voltage of the battery reaches 10.0V, then stop the test. |
| 4 | Over- discharge test | No fire,<br>no explosion | Charge the battery. Place at 20±5℃ for 1h, then discharge in 1/3C current at the same temperature until the cell's voltage is 0V . |
| 5 | Heating | No fire, | After standard charged, the battery is to be heated in a gravity convection or |

| | | | |
|---|---|---|---|
| | test | no explosion | circulating air oven. The temperature of the oven is to be raised at a rate of (5±2)℃/min to a temperature of 150℃±2℃, keep that temperature for 30 minutes before the test is discontinued. |
| 6 | Short circuit test | No fire, no explosion | After standard charged, the battery shall be subjected to a short-circuit condition with a wire of resistance less than 3mΩ for 1 hour. Short circuit positive and negative pole ,monitor battery temperature during the test ,when the temperature of the battery is below its peak value of 10 degrees centigrade ,end test.Temperature less than 115℃. |
| 7 | Prick test | No fire, no explosion | After standard charged, hitting from the direction perpendicular to the series batteries with a nail of 3～8mm diameter and more than 90 mm in length, nail pierces through at least three parallel batteries with speed of 20mm-40mm/S. Keep the nail in the batteries for at least 1h. |
| 8 | Impact test | No fire, no explosion | After standard charged, the battery is to be placed on a flat surface, place a Φ 15.8mm steel column in the center of the battery,the longitudinal axis of a steel column is parallel to the plane.10Kg weight is to be dropped from a height of 610mm onto the battery. |
| 9 | Squeeze test | No fire, no explosion | After standard charged, Put the battery between two squeeze plates of the extrusion equipment, then increase pressure to 13kN, hold on for 1 min. The squeeze direction is on the direction perpendicular to arranged battery. |

**5、Curves**

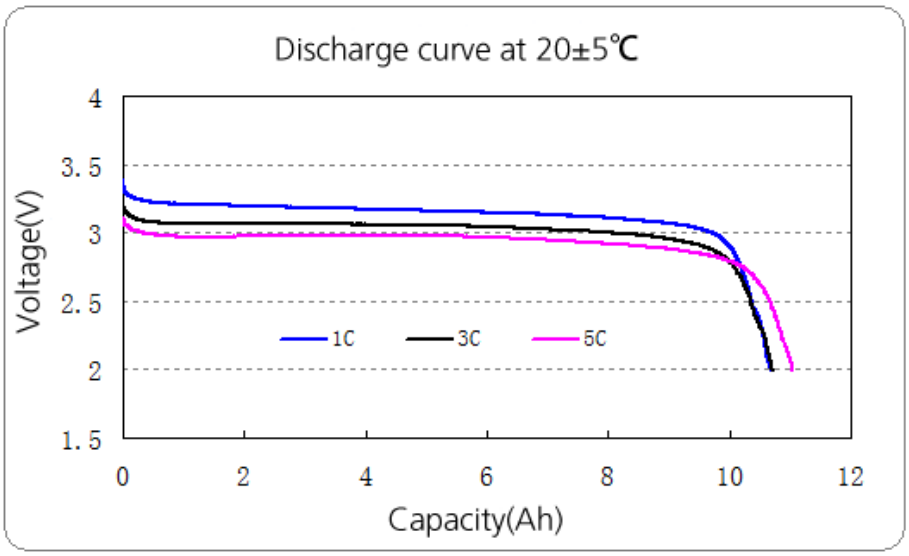
5.1 Charge curves at room temperature

Charge at 0.2C at room temperature,Cut-off current of charge is 0.2A, Cut-off voltage of charge is 3.65V.



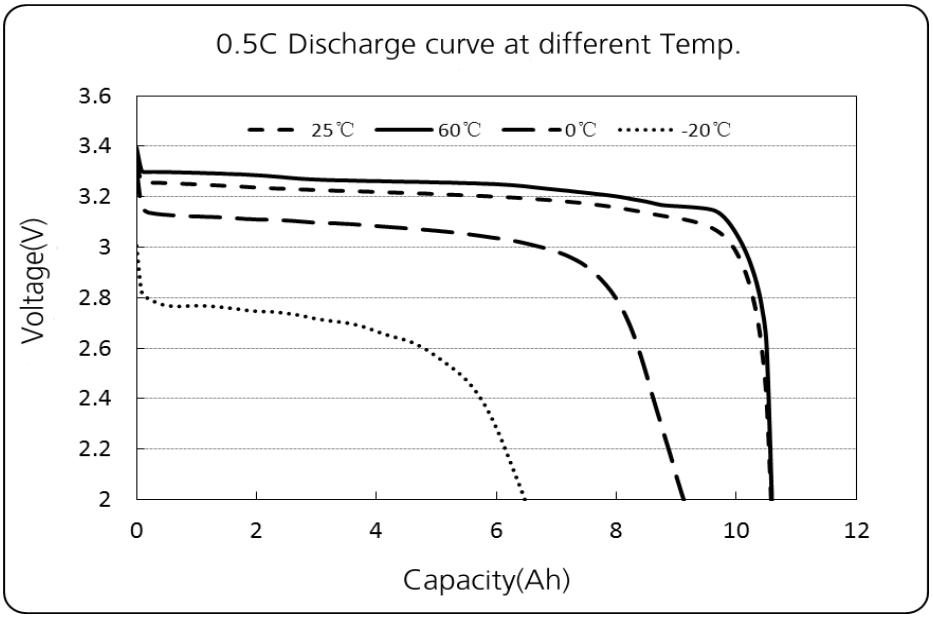

5.2 Discharging curves at different current

Discharge at different current of 1C,3C and 5C to cut-off voltage of 2V.




5.3 Discharging curves at different temperature

Fully charged the battery at room temperature, discharge it at different temperature with 0.5C current to 2V




## 6、Storage & Transportation

6.1 Storage

When the battery need to be long-term stored, charge the battery to about 10%-20% capacity, store it in dry and ventilated place, Charge and discharge battery one time every 6 months.

6.2 Transportation

The battery should keep 10% capacity during transportation, prevent excessive vibration, shock or extrusion in transport process and prevent the sun and rain. The battery can be transported by cars, trains, ships, aircraft and other vehicles etc.

## 7、Battery Handling Precautions

* Forbid to immerse battery in water or get wet!
* Don't charge, use and store battery near a heat source such as fire and heater! If the battery leaks or releases strange odor, please remove it from place near fire place immediately. Fully charge the battery before first-time using.
* Forbid to reverse the positive and negative pole!
* Forbid to throw the battery pack into fire or heat it!
* Forbid to short-circuit battery with wire or other metal objects!
* Forbid to nail, knock or trample battery!
* Forbid to disassemble the battery and battery pack in any way!
* Forbid to put the battery into microwave oven or pressure vessel!
* If the battery pack gives off odor, gets heat, deformation, discoloration or appears and abnormal phenomenon, stop using it; please remove the battery from electrical appliances and stop using it, when the battery is being used or charged!
* If the battery leaks and electrolyte get on your skin or clothes, please immediately rinse with plenty of clean water.
* If the battery leaks and electrolyte leakage enters into the eyes, do not rub, rinse with water immediately and seek immediate medical assistance. If not in time, eyes will be hurt!

**8、Product Liability**

8.1 The warranty term of the single cell base on the relevant contract agreement. Dissembled assembled by any third party shall not be returned or replaced by our company.

8.2 We assume no responsibility for the accident of not operating in accordance with the specification.

8.3 If the contents of this specification changed because of improving product quality or upgrading technical parameters, we will not give notice. For the latest product information, please feel free to contact us as following:

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