SHANDONG HIPOWER ENERGY GROUP

Lithium-Ion Battery
SPECIFICATION

Name	$LiFePO_4$ Battery
Number	Trial Version
Type	HP-50160282
Specification	3.2V/100Ah
Prepared	
Checked	
Approved	

Address： **HiPower Industrial Park, NO.1 Tianan Rd, Hi-Tech Development District, Zaozhuang, Shandong, CHINA**

Tel: (86-632)8636276 Fax: (86-632)8636289

1. Summarization

This Specification describes the requirements of the LiFePO4 rechargeable battery supplied by SHANDONG HIPOWER Energy Group, The product mentioned in the specification accord with Q/SHB002-2007 (based on GB/T18333.1-2001).

2 Description

2.1 Name: LiFePO4 Battery

2.2 Type:: HP-50160282

3. Parameters

No.	Item	unit	Parameters	Remark
1	Nominal Capacity	Ah	100.0	Capacity according to standard discharge, After standard charge
2	Nominal Voltage	V	3.2	Average Voltage according to standard discharge, After standard charge
3	Charge Type	/	CC/CV	/
4	Charge Cut-off Voltage	V	3.85	/
5	Discharge Cut-off Voltage	V	2.0	/

6	Charge current		A	33.3	**constant current**
7	Discharge current		A	50	**constant current**
8	Max. instantaneous discharge current		A	300	＜15S
9	Weight		g	3500	/
10	Inner Resistance		mΩ	<2	/
11	Dimension（H×W×L）		mm	50×160×282	/
12	Working Temperature	Charging	℃	0～45	/
		Discharging	℃	-20～60	/
13	Storage Temperature	1 month	℃	-20～60	/
		3 months	℃	-20～45	/
		6 months	℃	-20～25	/
	Atmospheric pressure		KPa	86～106	/
	Relative Humidity		RH	25%～85%	/

4. TECHNICAL REQUIREMENTS

4.1 Testing Conditions

(1) Standard charge: Under temperature 20±5 ℃, charge with $1I_3$ constant current till it reaches (to) charge cut off voltage(3.85V), then starts to Charge with constant voltage, Till charge current<0.01C.

(2) Standard discharge: Under temperature 20±5 ℃, discharge with $1I_3$ constant current till(to) discharge cut-off voltage(2.0V).

(3) Standard testing environment:

Temperature: 15-35℃;

Relative Humidity: 25%～85%RH;

Atmospheric pressure: 86kPa～106kPa.

4.2 Electrical Performance:

:

No.	Item	Testing Instructions	Requirement
1	Nominal Capacity	**Temperature 20±5 ℃, Measure discharge capacity to 2.0V cut-off within 1h after standard charge.**。(One time for the first 5times ,meeting the requirements can do)	**100.0A h**
2	high-current discharge performance	**Temperature 20±5 ℃, discharge with 1.5C constant current to discharge cut-off voltage within 1hrs after standard charge.**。	**Discharge time≥ 36 min. The battery shall not be metamorphose, rupture**。
3	Low-temperature discharge performance	**Keep the battery in the case at -20±2℃ for 20hrs after standard charge. Measure the discharge time with constant discharge current $1I_3$ to cut-off voltage. Then, Temperature 20±5℃, lay the battery for 2hrs, observe the appearance of the battery.**。	**Discharge time≥ 126min The battery shall not be metamorphose, rupture**。

4	High-temperature discharge performance	**Keep the battery in the case at 55±2℃ for 5hrs after standard charge. Measure the discharge time with constant discharge current $1I_3$ to cut-off voltage. Then, Temperature 20±5℃, lay the battery for 2hrs, Observe the appearance of the battery.**	**Discharge time≥ 171 min. The battery shall not be metamorphose, rupture。**
5	Charge Retention	**Temperature 20±5 ℃ after standard charge, keep the battery open circuit for 28 days. Then, Measure the discharge time with constant discharge current $1I_3$ to cut-off voltage.**	**Discharge time≥ 144min**
6	Cycle Life	**Temperature 20±2℃, Charge with constant charge current $1I_3$ to charge cut-off voltage, Then charge with constant voltage to the current ≤ 0.01C, Then, stop charge. 10 min later, discharge with discharge current 0.5C to 100% of the capacity DOD. 10 min later, repeat the cycle, till the capacity of lasting 24times ≤ 80% of the Nominal Capacity, Then consider the life of battery end.。**	**Cycle Life ≥1000 times**

4.3 Misuse testing ：

No	Item	Testing instruction	Requirement
1	Falling off testing	After standard charge , drop the battery from the height of 1.5m to the hardwood floor 20mm thin , 2 times one direction , 6 times altogether. During the testing ,make note of the changes of voltage and the temperature .	No explosion, no leakage, no fire.

. 2	Extrusion testing	After standard charge ,lay the battery at 20±5℃ for 1 hour . a) Extrusion direction：press in he vertical direction of the battery polar board. b) Extrusion area：≥20cm2 Extrusion extent：till the rupture of the battery rind and till to be short-circuited inside(voltage be 0V).	No explosion、no fire（distortion and leakage allowed）。
3	Puncture testing	After standard charge ,put the battery at 20±5℃ for 1 hrs .Then puncture the battery in the direction of electrode board with the high temperature-proof steel pin with 3mm diameter .(the pin staying in the battery). The test must be conducted in the protective condition .During the test ,make note of the changes of the voltage and the temperature .	No explosion、no fire（distortion and leakage allowed）。
4	Calefaction testing	Put the battery in the case at constant temperature of 70±2℃ for 120min and observe the appearance of the battery . Meanwhile, make note of the changes of the battery voltage.	No explosion、no fire（distortion and leakage allowed）

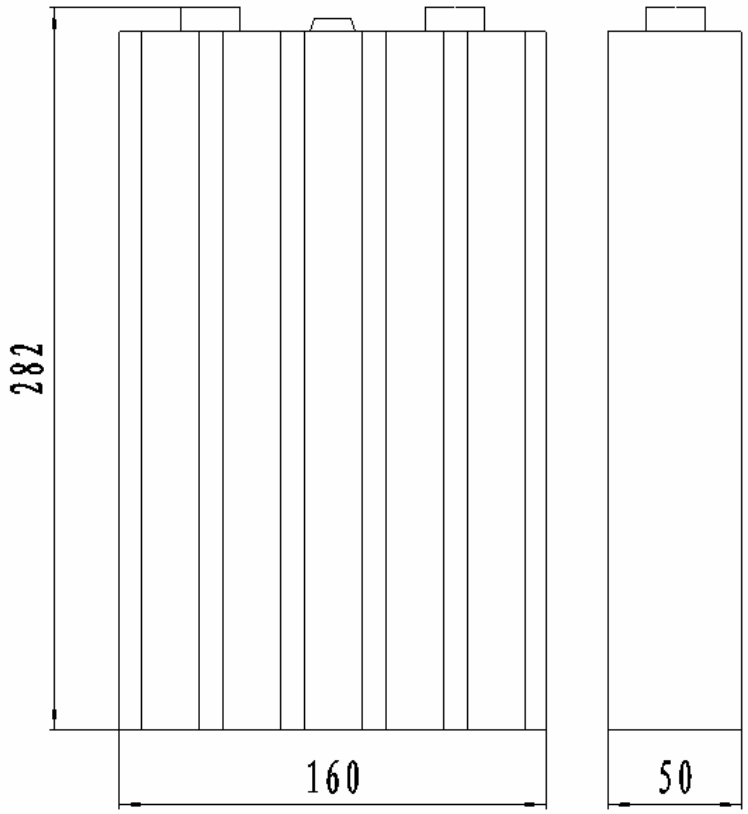
4.4 Safety Performance：

NO	Item	Testing Instructions	Requirement

1	Short Circuit performance	After charging the battery standardly put it under the temperature of 20±5℃ for 1 hrs and then short-circuit the battery for 10 min ,connecting the positive and negative terminals of it (The resistance of the circuitry ≤5 mΩ). Notice the change of the temperature, battery current and the voltage during the experiment.	No fire ,no explosion
2	Over charge Performance	After charging the battery standardly, put it under the temperature of 20±5℃ for 1 hrs The battery with thermocouple is to be put into the fume cupboard .Charge it with constant current 0.3C to 4.1 voltage. Observe the appearance of the battery. Notice the change of the temperature, battery current and the	No fire ,no explosion

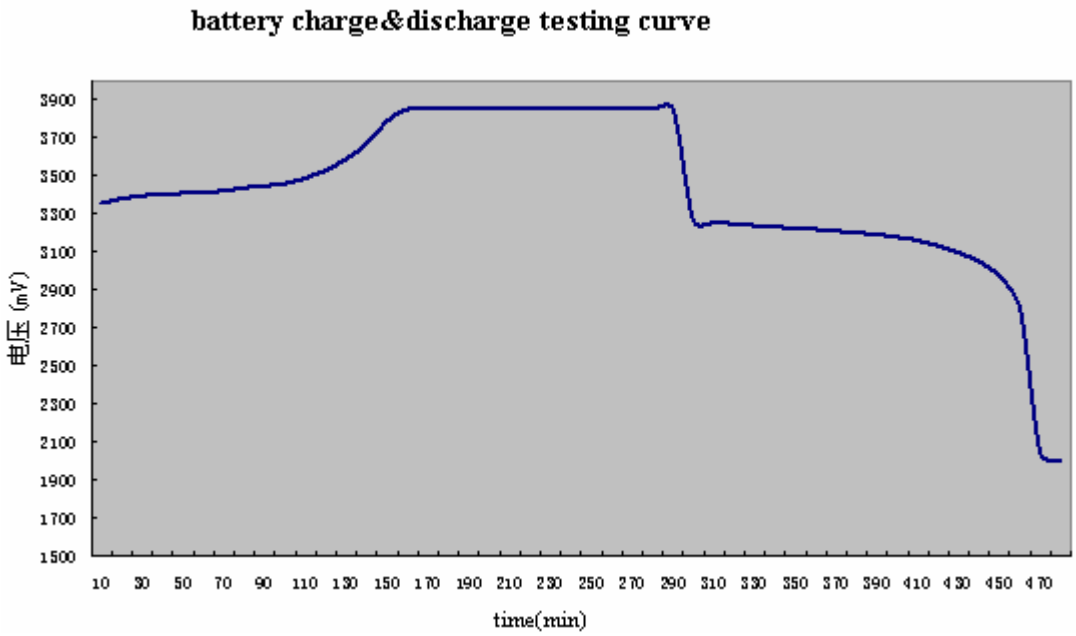
		voltage during the experiment	
3	Over discharge performance	After standard charge and under the temperature of 20±5℃, discharge the battery（if there is BMS, please disconnect the BMS first）with the current of 1I3 till the voltage of the battery is 0v . Notice the change of the temperature, battery current and the voltage during the experiment .	No explosion , no leakage , no fire .

5.Sketch map of product :

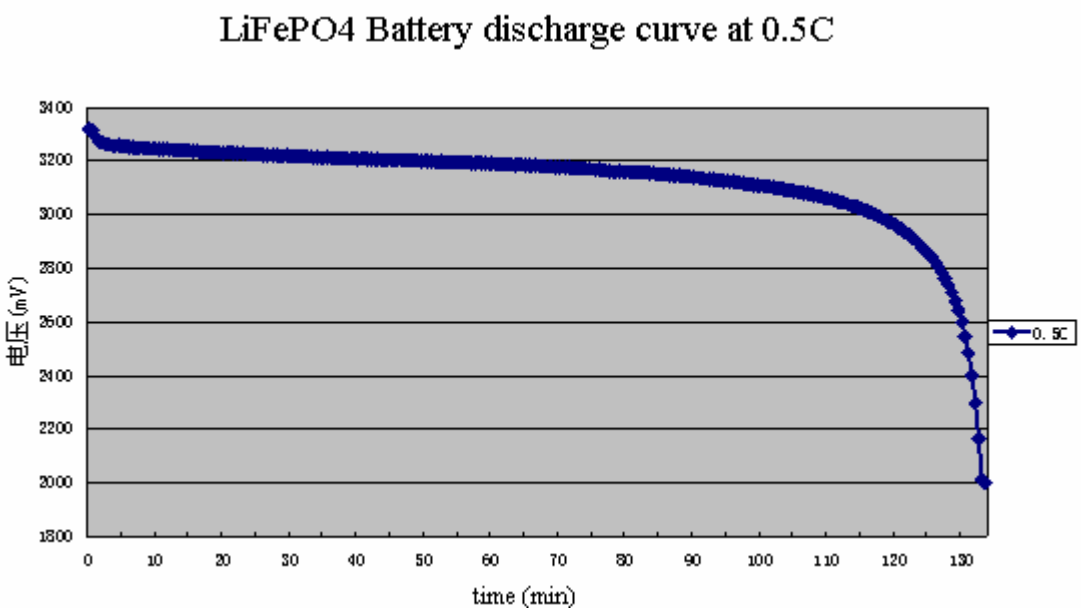


6. Typical curves :

6.1 Typical charge/discharge curve graph:

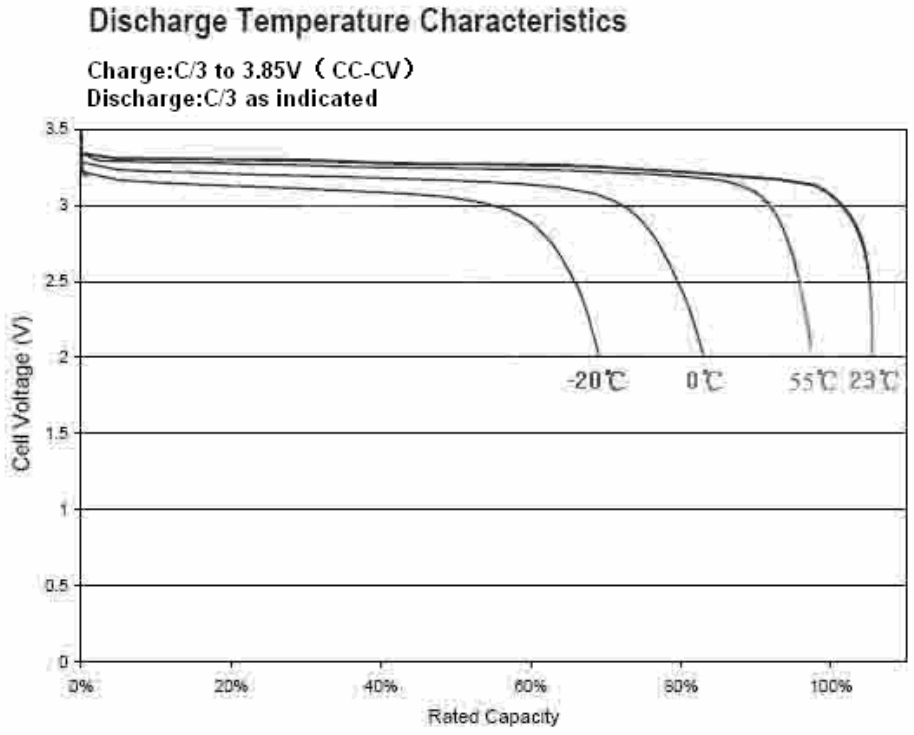


6.2 Discharge curve at different rate:

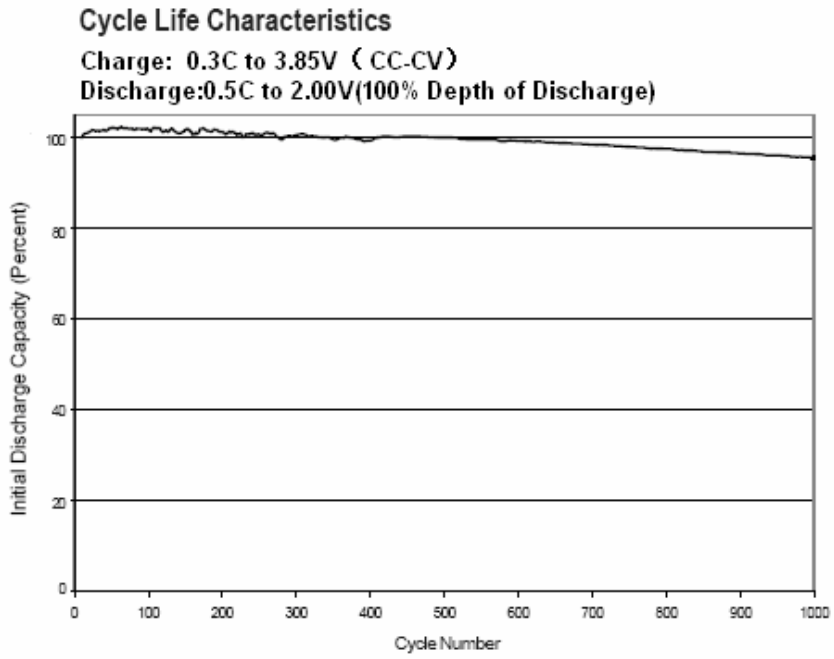


This curve shows the discharge capacity at high drain rate . The Max discharge current allowed is 3C ,which is the instantaneous current within 15s .

6.3 High/Low-temperature testing typical curve：



6.Cycle life curve:



7. Storage

The place of preserving the battery must accord with the following requirements:

Indoor, The temperature of environment is between -5℃～35℃, The relative humidity is ≤75%, The place must be clean dry and ventilative;

Avoid contacting to the corrosives;

Keep far away from fire and heat;

Keep the battery 50%～60% charge state;

Avoid being over-charged, the battery should be charged once per 3~6 months when preserved.

8. Battery **maintenance**

(1)Be sure to charge the new battery fully before using for the first time .The battery will reach its max capacity after 3-5 times of full charging and discharging .

(2) The battery should be used in the ventilative and dry environment. Avoid being near to fire .

(3) The best working temperature range for the battery is 15℃-40℃ .Beyond that , there will be effect on the battery's normal working .

(4) Don't short circuit the battery by connecting the cathode and anode, in case of any danger.

(5) Don't wash the outer shell of the battery with impregnant .In case of fire, please use Carbon Chlorin to put out fire instead of CO2.

(6) If the battery goes wrong, please deliver that to the factory service centre or relevant organization for proper disposal .

(9)Don't dismantle the battery at will and never open the electrolyte-injecting hole .

9. Notice when using the battery ：

In case of leakage, heat, fire, performance decrease etc , please use the battery according to the following regulations .Our company won't take any responsibility for any mis-operation not according to this specification .

(1) Handle with care, do not shake.

(2)Don't immerge the battery in the water or other liquid , in case of damp .Especially on rainy days , take care to prevent the water from going into the controller and motor ,in case of short- circuit .

(3)Avoid being short-circuited , connecting the anode and cathode .

(4) Please charge the battery with the Special charger provided by Shan Dong Hipower.

(5) Don't dismantle the battery, as that may cause inner short-circuit and then decomposition of the inner material, fire and even explosion accordingly. In addition , dismantling the battery may cause the leakage of the electrolyte ,which will do bad to the human body . .If the electrolyte is spattered onto skin , eye and other part of the body , please wash with clean water immediately and go to the doctor at once .

(6) Don't dispose the battery with fire ,in case of any danger.

(7) If the battery is damaged, distorted or there is leakage of the electrolyte or the taste of electrolyte and some similar abnormal phenomena ,don't use the battery any more . .Please deliver that to the factory service centre or relevant organization for proper disposal . In addition , battery with electrolyte leakage should be far away from fire ,in case of explosion .

(8) battery replacement

The battery provider should be responsible for replacing and installing the battery .The consumer shouldn't replace that at will.

(9) dismantle without permission

The consumer shouldn't dismantle the battery at will .Or our company won't take any responsibility.

10. Notice during the transportation ：

(1) The battery is suitable for being transported by truck , train , plane . During transportation, please avoid solarization ,drench and serious shake .

(2)The battery pack must be packed with insulated material and marked with logo

of frangibility in case of any damage caused by bumping in transit.

(3) Don't upside down the battery. A sticker indicating'Don't upside down' is needed. Also can't be put at will .

(4) Handle with care in transit. Can't throw or impact the battery.

(5) Don't place any heavy objects on battery pack.

(6) Don't mix-transport with flammable or explosive consignment, or metal objects with sharp end.

(7) Outer packing should be marked 'Away from moisture, water, and fire'.

11. Other

Any issues not included , suppliers and customers can negotiate .