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PRODUCT SPECIFICATIONS

Product name	LiFePo4 Battery
Model	HTCFR18650-1500mAh-3.2V
Manufacturer	Shandong Goldencell Electronics Technology Co.,Ltd
Brand	ENERpower



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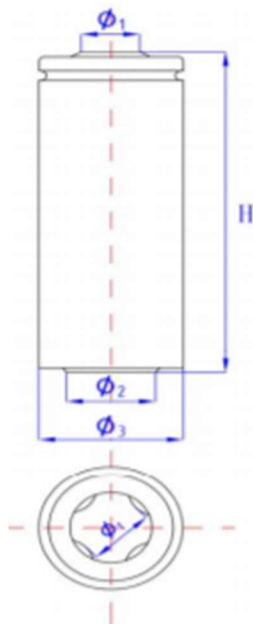
Application Scope

This product specification describes product performance indicators of LiFePo4 battery produced by Shandong Goldencell Electronics Technology Co.,Ltd

Model

HTCFR18650-1500mAh-3.2V

Dimensions



Item	Dimension (mm)
H	65.2±0.3
$\Phi 1$	8.85±0.15
$\Phi 2$	10±0.2
$\Phi 3$	18.15±0.1

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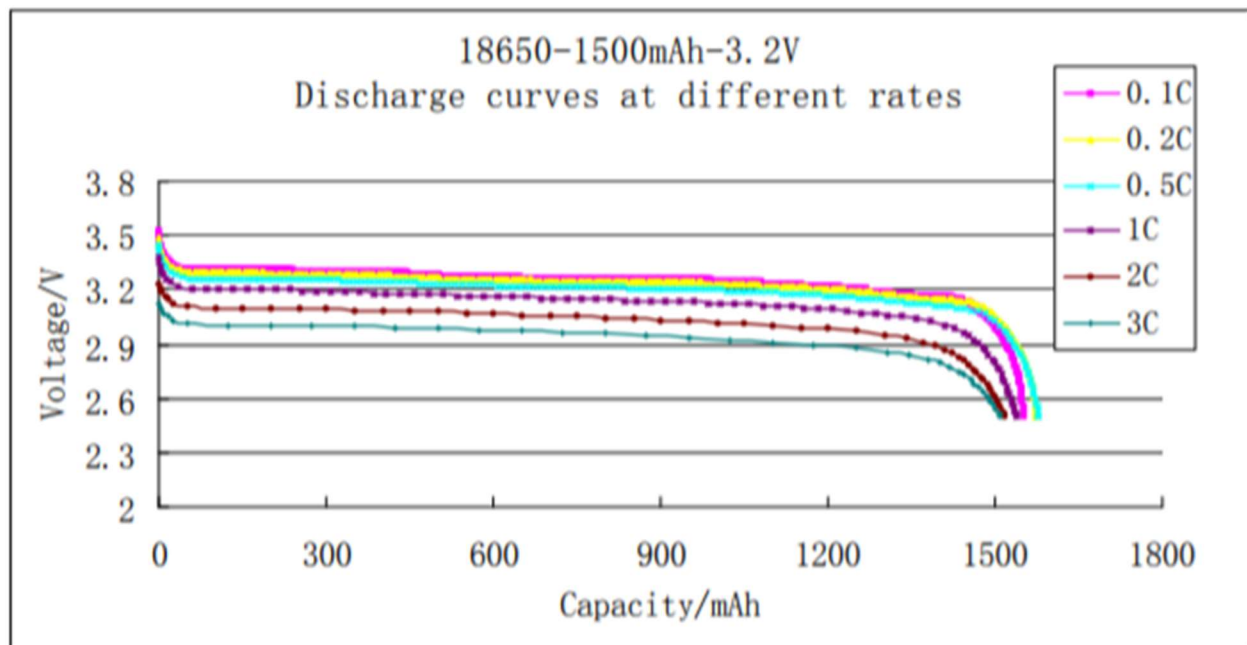
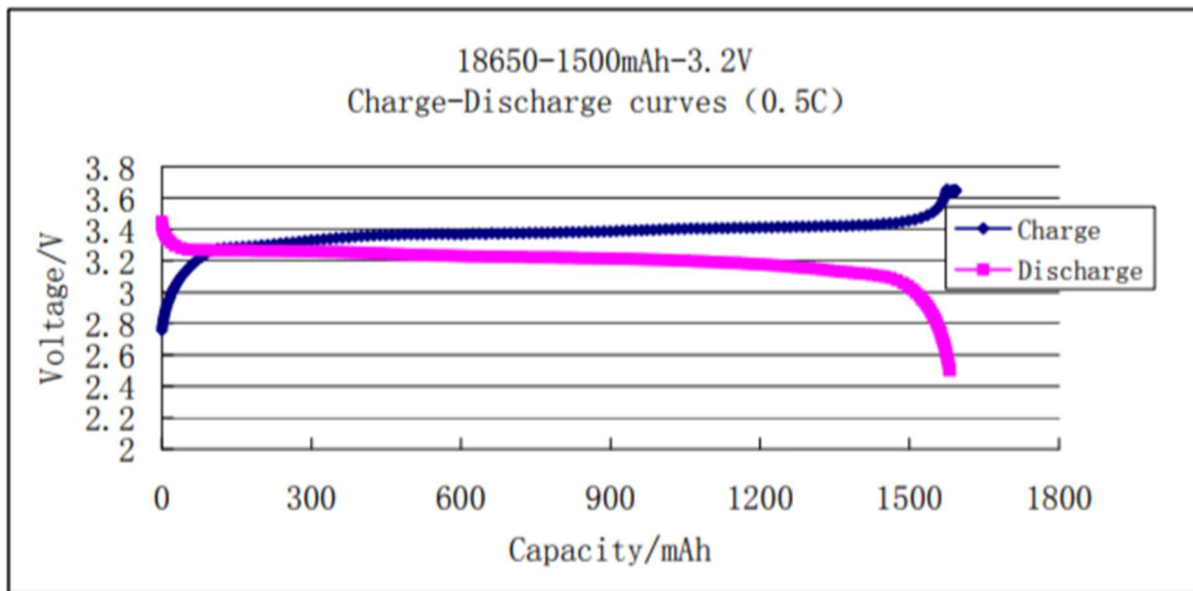
Major Technical Parameters

No.	Item	Standard	Note
1	Standard Capacity	1500mAh	0.5C, (current value of 1500mA at 1C)
2	Capacity Range	1450~1550mAh	0.5C
3	Standard Voltage	3.2V	
4	Alternating Internal Resistance	$\leq 40\text{m}\Omega$	
5	Charge Conditions	Cut-off Voltage	Constant-current charge to 3.65V at 0.5C, constant voltage charge to stop until 0.01C mA
		Cut-off Current	
6	Max. Charging Current	1.5A	
7	Discharge Cut-off Voltage	2.5V	
8	Standard Discharge Current	0.75A	
9	Fast Discharge Current	1.5A	
10	Max. Continuous Discharge Current	4.5A	
11	Pulse Discharge Current	10A, 5s	
12	Cycle Characteristic	2000 times (100% DOD)	The residual capacity is no less than 80% of rated capacity at 1C rate.
		4000 times (80% DOD)	
		7000 times (50% DOD)	
13	Working Temperature	Charge: 0°C~55°C Discharge: -20°C~60°C	
14	Storage Temperature	-20°C ~ 45°C	Short-term storage (< 3 months)
15	Battery Weight	41 g (Approx.)	

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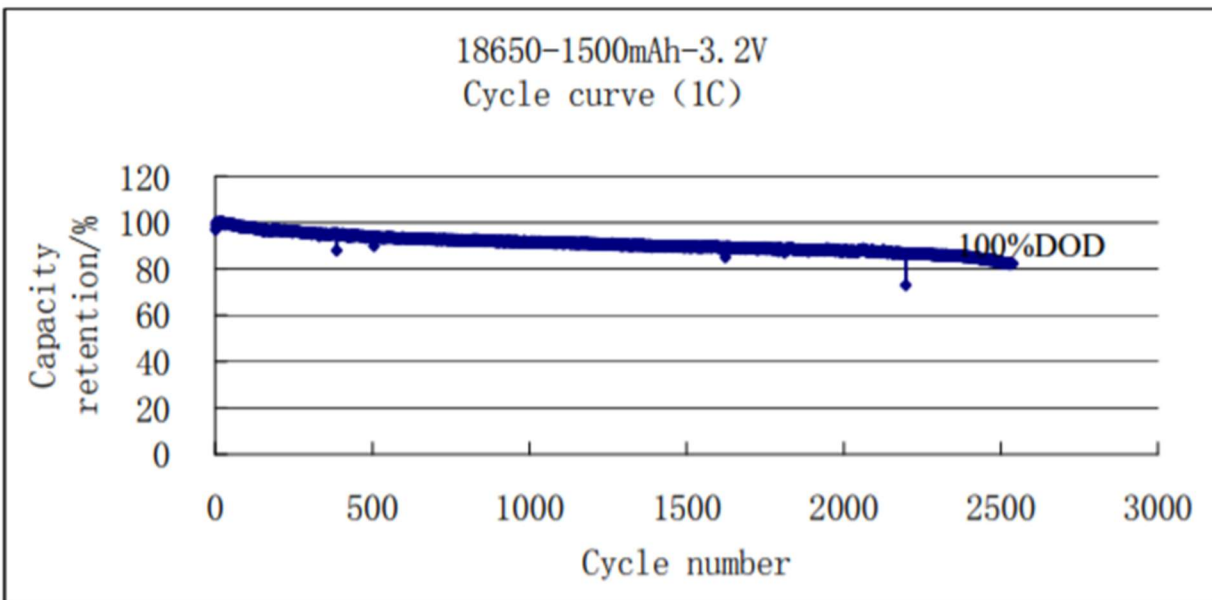
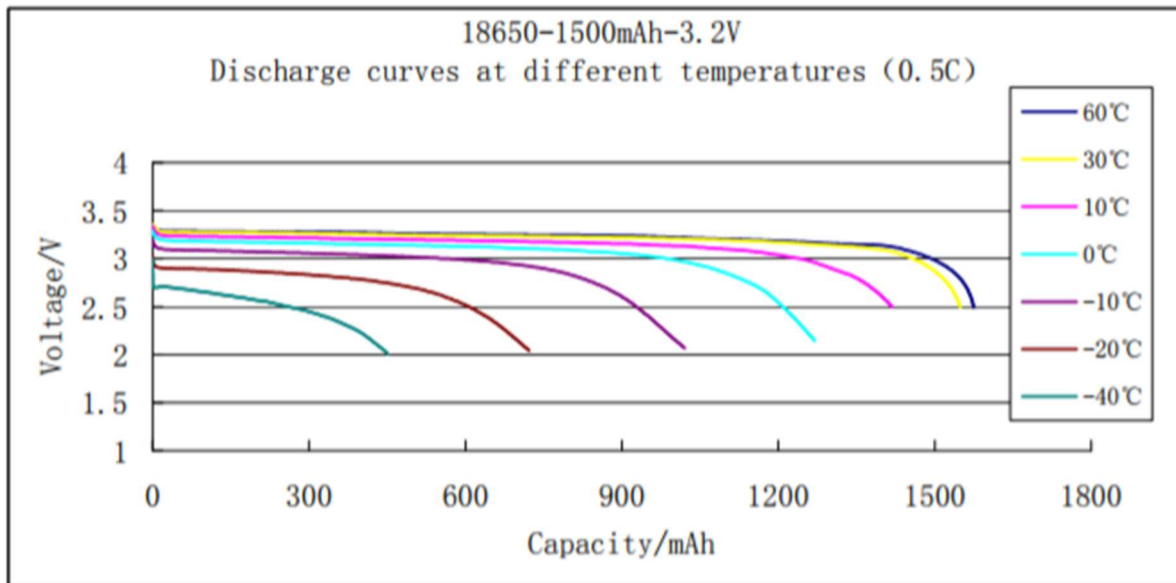
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Characteristics Curves



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Safety Characteristics

No.	Item	Test Method	Standard
1	Overcharge	After normal charge, test the batteries' initial state and capacity. Charge to 10.0V at 3C, then charge at CV mode to 0.01C. Observe battery's variation of appearance	No explosion, No fire.
2	Over Discharge	After normal charge, test the batteries' initial state. When the batteries are normal, Discharge to 0V at 0.5C. Observe battery's variation of appearance	No explosion, No fire.
3	External Short-circuit	After normal charge, test the batteries initial state, Keep the battery into explosion protection cover, short-circuit the positive and negative terminals directly (general resistance shall be less than or equal to 50mΩ). Stop the test when the temperature falls to 10°C lower than the peak value. Observe the variation of the batteries' appearance and temperature	No explosion, No fire.
4	Thermal Abuse	Test the batteries' initial state and capacity. Standard charge. Put battery into oven, increase the temperature to 130±2°C at rate of (5±2°C)/min, and keep it for 30min. Observe the variation of batteries' appearance.	No explosion, No fire.
5	Drop	After normal charge, test the batteries' initial state and capacity. Then let it fall from a height of 1m (the lowest height) to a smooth cement floor, twice	No explosion, No fire.
6	Heavy Impact	A diameter of 15.8 mm steel rod is placed in the middle of the fully charged battery, then the weight of 10Kg hammer from 1.0m height free falls to the battery upper.	No explosion, No fire.
7	Extrusion Test	Place the battery in between the pressing surface of extrusion apparatus, parallel the axes of cylindrical battery to the pressing surface, and gradually increase pressure up to 13KN, keeping the pressure for 1min.	No explosion, No fire.
8	Prick test	Use Φ3 mm to 5 mm high temperature resistant steel needle, to 10 mm/s ~ 40 mm/s of speed, from the perpendicular to the direction of the battery plate (Steel needle stops in the battery).	No explosion, No fire.

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Environmental Adaptability

No.	Item	Test Method	Standard
1	Temperature Cycle	Store the battery for 48 hours at 75 ± 2 after standard $^{\circ}\text{C}$ charge, then store the battery at -20 for 6 hours, and $^{\circ}\text{C}$ at room temperature for 24 hours. Observe the batteries' appearance.	No leakage, No smoke, No fire, No explosion.
2	Static Humidity	Put the battery at $40^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and 95%RH chamber for 48h, then get it out and store it for 2h at room temperature. Observe the appearance and discharge at 0.5C to 2.5V, then test the final capacity	Discharge capacity after storage is more than 90% of rated capacity. No obvious outside damage, No corrosion, No smoke, No explosion
3	Vibration	Standard charge. Equip it to the vibration platform, prepare the test equipment according to following vibration frequency and relevant swing, doing frequency sweeping from X, Y, Z three directions, each from 10Hz to 55Hz for 30 minutes of recycling, rating of which is 1oct/min: A) vibration frequency: 10Hz~30Hz Displacement breadth (single swing): 0.38mm B) vibration frequency: 30Hz~55Hz Displacement breadth (single swing): 0.19mm. Observe the final state after scanning.	Residual Capacity $\geq 90\%$ Rated Capacity Voltage Decrease Rate $\leq 0.5\%$ No obvious outside damage, No leakage, No smoke, No explosion.
4	Normal Storage	Test the batteries' initial state and capacity; store the battery for 30 days after standard charge, test the final state. Discharge at 0.5C to 2.5V, then test batteries' residual capacity. Then after normal charge, discharge at 0.5C to 2.5V, then test the batteries' recovery capacity, Three cycles are permitted for this test, If one of the three cycles can reach the standard, it represents the battery has reached the standard.	Residual Capacity $\geq 90\%$ Initial Capacity Recuperative Capacity $\geq 95\%$ Initial Internal.

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Standard Test Environment

Unless especially specified, all tests stated in this Product Specification are conducted at below condition: Temperature: $25\pm 2^{\circ}\text{C}$ Humidity: $(65\pm 20)\%$ RH

Storage and Others

1. **Long Time Storage:** If the battery is stored for a long time (more than three months), the battery should be stored in a dry and cool place. The battery should be charged and discharged every three months. The batteries' storage voltage should be $3.3\sim 3.4\text{V}$ and the battery should be stored in a condition as NO.8.
2. **Others:** Any matters that this specification does not cover should be consulted between the customer and Goldencell.

Notice in Using Battery

Please pay attention to followings in case of battery will have leakage, heat etc.

- Do not immerse the battery in water or seawater, and keep the battery in a cool dry surrounding if it stands by.
- Do not use or leave the battery at high temperature as fire or heater. Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
- Do not reverse the position and negative terminals.
- Do not connect the battery electrodes to an electrical outlet.
- Do not short circuit. Otherwise it will cause serious damage to the battery.
- Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.
- Do not strike, trample, throw, drop and shock the battery.

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- Do not directly solder the battery and pierce the battery with a nail or other sharp objects.
- Do not use the battery in a location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.
- Use the battery charger specifically when recharging.
- If the battery leaks and the electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.
- If the battery gives off strange odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately stop charging, using, and remove it from the device.
- In case the battery terminals are dirty, clean the terminals with a dry cloth before use. Otherwise poor performance may occur due to the poor connection with the instrument.
- Tape the discarded battery terminals to insulate them.

Note

The following is the interpretation of some terms in the above test project: **(1) Standard charge:** Under the environment of $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$, for constant current battery charging 0.5 C to cut-off voltage, to a constant voltage charging to the cut-off current, stop charging. **(2) Initial state:** Initial state of voltage and internal resistance of the battery. **(3) Final state:** State of battery internal resistance and voltage. **(4) Residual Capacity:** The first discharge capacity batteries after a specific test. **(5) Recovery Capacity:** The discharge capacity by specifically charge-discharge cycle repeatedly after being tested by the specific procedure.



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Accountability for the content

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