

# Product Specification

Product Name: Lithium-ion battery

Model: HTCF18650-1600mAh-3.2V

Make By: Zhou Hui

Checked By: Li Tao

Approved By: \_\_\_\_\_

HETER ELECTRONICS GROUP

Headquarter

Add: Thailand Industrial Park, Hi-tech District, Zaozhuang  
City, Shandong Province, China.

Toll-free telephone: 400-812-5699

Tel: +86-632-5296888

Fax: +86-632-5292918

Postcode: 277800

E-MAIL: Market@heter.biz

Branch office (Shenzhen)

Add: Room 1801, West Tower, Nanshan Software Park  
Building, Shennan Road, Nanshan District, Shenzhen.

Tel: +86-755-28891995

Fax: +86-755-28892486

Postcode: 518129

Web site: www.heter.biz

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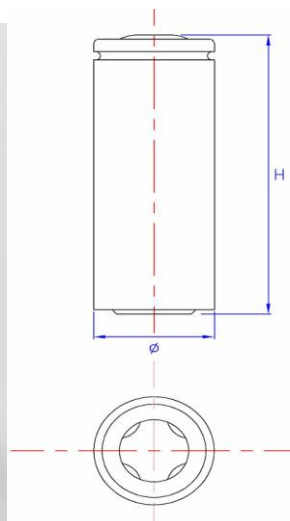
### 1. Application Scope

This product specification describes product performance indicators of Lithium-ion battery produced by Heter Electronics Group.

### 2. Model

HTCF18650-1600mAh-3.2V

### 3. Appearance and Dimension

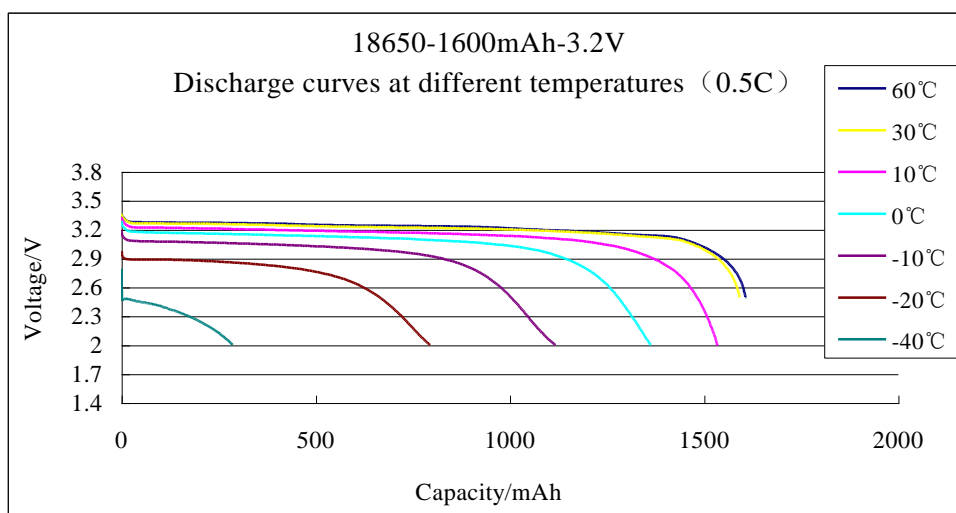
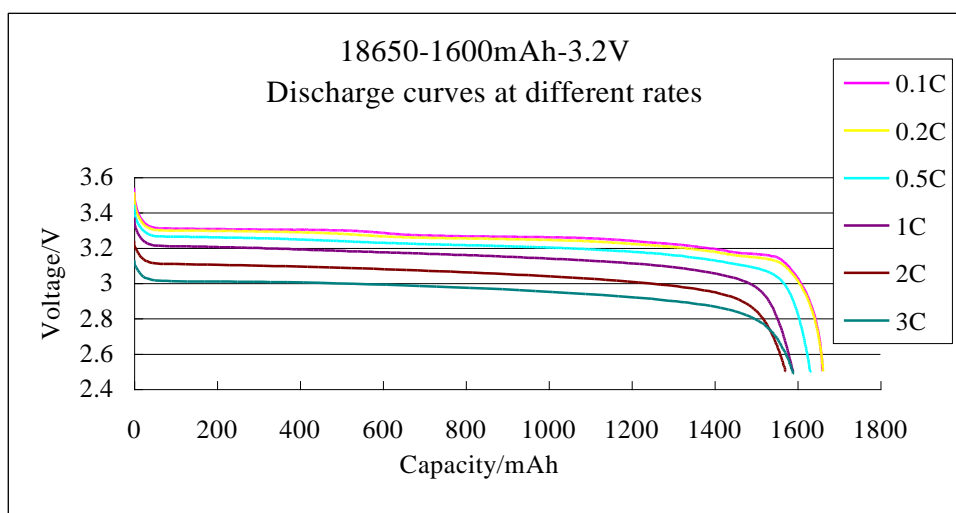
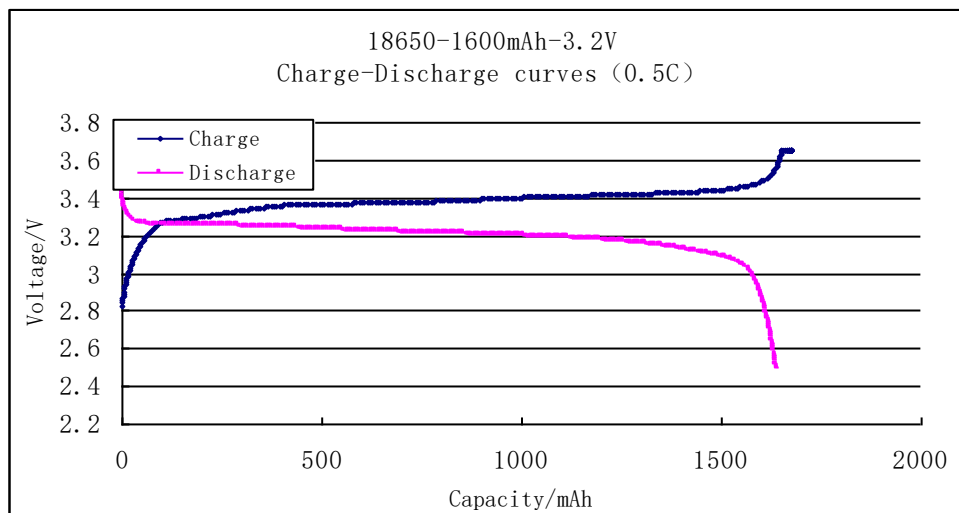


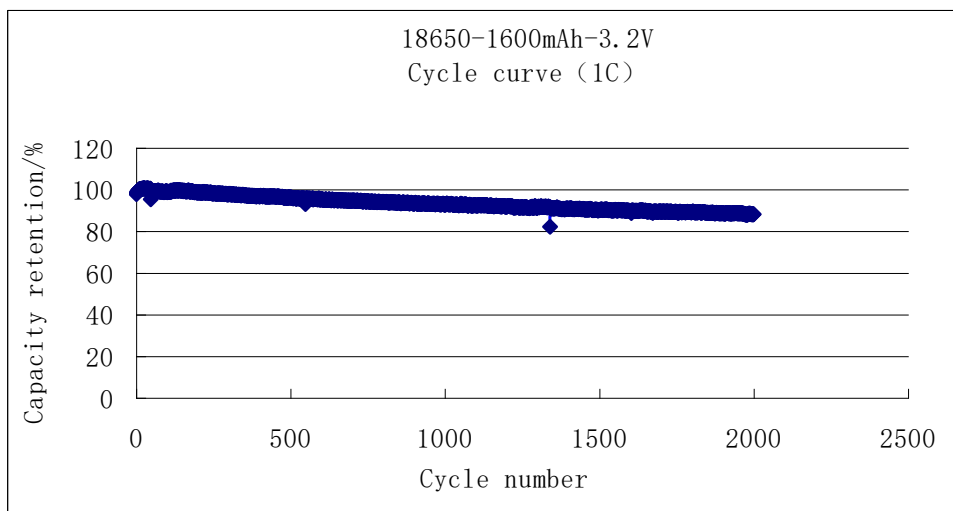
Item	Dimension (mm)
Diameter ( Φ )	18.2±0.1
Height ( H )	64.8±0.4

### 4. Major Technical Parameters

No.	Item	Standard	Note
1	Standard Capacity	1600mAh	0.5C,(current value of 1600mA at 1C)
2	Capacity Range	1550~1650mAh	0.5C
3	Standard Voltage	3.2 V	
4	Alternating Internal Resistance	≤60mΩ	with PTC
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	Discharge Cut-off Voltage	2.5V	
7	Cycle Characteristic	2000 times	100% DOD, the residual capacity is no less than 80% of rated capacity at 1C rate.
8	Max. Continuous Discharge Current	4.8A	
9	Pulse Discharge Current	10A, 5s	
10	Working Temperature	Charge:0°C~55°C Discharge:-20°C~60°C	
11	Storage Temperature	-20°C ~ 45°C	
12	Battery Weight	42 g (Approx.)	

### 5. Characteristics Curves





## 6. 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.

## 7. Environmental Adaptability

NO	Item	Test Method	Standard
1	Temperature Cycle	Store the battery for 48 hours at $75\pm 2^{\circ}\text{C}$ after standard charge, then store the battery at $-20^{\circ}\text{C}$ for 6 hours, and 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 $\leq 0.5\%$ Internal Resistance Increase Rate $\leq 20\%$  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 Resistance Increase Rate $\leq 30\%$

## 8. 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

## 9. Storage and Others

### 9.1 Long Time Storage

If the battery is stored for a long time (more than three months), the battery should be stored in dry and cool place. The battery should be charged and discharged every three months. The batteries' storage voltage should be 3.3~3.4V and the battery should be stored in a condition as NO.8.

## 9.2 Others

Any matters that this specification does not cover should be consulted between the customer and HETER.

## 10. 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 of the battery.
- Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.
- Do not strike, trample, throw, fall and shock the battery.
- 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 definitions of some nomenclatures of this specification:

- (1) Standard charge: 0.5C charge at  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$  to 3.65V, then change to charge with constant voltage till the current less than or equal to 0.01C.
- (2) Initial state: battery initial voltage, internal resistance and appearance.
- (3) Final state: battery final voltage, internal resistance and appearance.
- (4) Residual Capacity: The first discharge capacity after being tested by the specific procedure.
- (5) Standard cycle: charge at 1C, then store for 30min, discharge at 1C to the 2.5V.
- (6) Recovery Capacity: The discharge capacity by specifically charge-discharge cycle repeatedly after being tested by the specific procedure.
- (7) All batteries tested above are within 60 days unless there are other regulations. Otherwise, part of the electrical properties may be inconsistent with the above parameters (For instance, discharge capacity of the batteries may be less than the minimum calibration capacity after 6 months).