



Specification For Lithium-ion Rechargeable Battery

Cell Type :HDCNR18650-3200mAh-3.7V





1 Preface

This specification describes the type, dimension, performance, technical characteristics, warnings and cautions of the lithium-ion rechargeable battery. The specification only applies to Haidi Energy Technology Co.,Ltd. (Haidi) HDCNR18650-3200mAh-3.7V fresh battery supplied by Haidi.

2 Definition

2.1 Standard charge method

At $25 \pm 3^{\circ}\text{C}$, the battery is charged to 4.2 V under 0.5 C (1600 mA) constant current, then charged under 4.2 V constant voltage until the current tapers to ≤ 0.03 C (96 mA).

2.2 Standard discharge method

At $25 \pm 3^{\circ}\text{C}$, the battery is discharged to 2.5 V under 0.2 C (640 mA) constant current.

2.3 Nominal capacity

The battery nominal capacity, signed as Cap and using mAh as unit, is obtained as per standard charge followed by standard discharge.

3 Cell type and dimension

3.1 Description and type.

Description: Cylindrical Li-ion rechargeable battery

Type: HDCNR18650-3200mAh-3.7V

3.2 Cell dimension

Cell physical dimension listed in Figure 1(unit: mm).

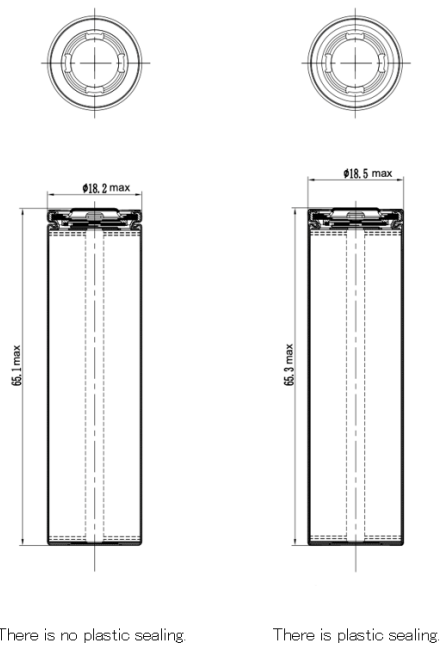


Figure 1/

4 Battery characteristics

Unless otherwise specified, the battery is fresh battery and tested by standard charge and standard discharge.

ITEM	SPECIFICATION
Nominal capacity	3150mAh @ 0.2C
Minimum capacity	3050mAh @ 0.2C
Nominal voltage	3.7V
Charge voltage	4.20V
Discharge cut-off voltage	2.5V
Energy density	240Wh/Kg
Max charge current	1C (3200mA) 10°C≤T≤45°C 0.2C (640mA) 10°C>T≥0°C



Max discharge current	1C (3200mA) 60℃>T≥45℃ 2C (6400mA) 45℃>T≥5℃ 0.5C (1600mA) 5℃>T≥-20℃
Humidity range	0 ~ 60 % RH (non-condensing)
Internal resistance	≤ 35 mΩ (AC Impedance, 1kHz)
Battery dimension	Height: max 65.3mm Diameter: max18.5mm
Weight	≤ 47g

5 Technical requirements

5.1 Battery usage conditions

Charge temperature : 0 ~ 45℃

Discharge temperature : -20 ~ 60 ℃

5.2 Battery testing conditions

Unless otherwise specified, all tests stated should be done at 25 ± 3℃.

Requirement of the testing equipment . The

voltage measurement device: not less than 0.5 grade

The current measurement device: not less than 0.5 grade

AC Impedance: 1kHz

Temperature meter: precision ≤ 0.5 ℃

Time measurement tolerance: ± 0.1 %



The size measurement tolerance: $\pm 0.1 \%$

The quality measurement tolerance: $\pm 0.1 \%$

5.4 Electrochemical characteristics

Unless otherwise specified, the battery should be fresh battery and tested by standard charge and standard discharge.

No.	Item	Test method and conditions	Criterion
5.4.1	Rate discharge capability	Charge: 0.5 C (1600mA) constant current charge to 4.2 V followed by 4.2 V constant voltage charge to cut-off current ≤ 0.03 C (96mA) at 25°C Discharge : Specified discharge rates to cut of voltage 2.5V at 25°C	$\frac{\text{discharge capacity at } 0.5C}{\text{discharge capacity at } 0.5C} \geq 95\%$ $\frac{\text{discharge capacity at } 1.0C}{\text{discharge capacity at } 0.2C} \geq 90\%$ $\frac{\text{discharge capacity at } 2.0C}{\text{discharge capacity at } 0.2C} \geq 80\%$
5.4.2	RT cycle life	Charge: 0.5 C (1600mA) constant current charge to 4.2 V followed by 4.2 V constant voltage charge to cut-off current ≤ 0.05 C (160mA) Discharge: 1.0 C (3200mA) constant	$\frac{\text{Discharge capacity of 500th cycle}}{\text{Original discharge capacity}} \geq 70\%$

		current discharge to cut-off voltage $\leq$ 2.5 V. Cycle: repeat of charge and discharge 500times.	
5.4.3	High-low temperature discharge performance	Charge : 0.5 C (1500mA) constant current charge to 4.2 V followed by 4.2 V constant voltage charge to cut-off current $\leq$ 0.03 C (96 mA) Discharge : 0.2C (640mA) constant current discharge to 2.5 V at specified temperature. Discharge cut-off voltage shall be 2.0 V when discharge temperature is less than -10 °C.	$\frac{\text{discharge capacity at } -20^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 70\%$ $\frac{\text{discharge capacity at } 0^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 80\%$ $\frac{\text{discharge capacity at } 60^{\circ}\text{C}}{\text{discharge capacity at } 25^{\circ}\text{C}} \geq 90\%$
5.4.4	Storage performance	Charge : 0.5 C (1600mA) constant current charge to 4.2 V followed by 4.2 V constant voltage charge to cut-off current $\leq$ 0.03 C (96mA) at 25°C	$\frac{\text{Residual capacity after 30days storage}}{\text{Minimum capacity}} \geq 90\%$ $\frac{\text{Recover capacity after 30days storage}}{\text{Minimum capacity}} \geq 95\%$

		Stored at 25℃ for 30 days Discharge: 0.2C (640mA) constant current discharge to 2.5V at 25 ℃ after 30 days	
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5.5 Environmental characteristics and safety characteristics

Meets ROHS and UN38.3 and GB31241-2014

ROHS 、 UN38.3

GB31241-2014

(The following test according to UL1642

UL1642)

NO.	ITEM	CRITERION	TESTING METHOD
5.5.1	Vibration	There shall be no electrolyte leakage	After standard fully charge, cell shall be attached to a vibration table directly and subjected to vibration that consists of 10 Hz to 55 Hz to 10 Hz at the speed of 1Hz/min in 90~100mins.The total excursion of the vibration is 0.8mm (0.060 inches). The cell shall be vibrated in each direction along axis of the cylinder and the vertical directions of axis of the cylinder.
5.5.2	Overcharge test	No leakage 、 No flame、 No fire、 No explode	The cell is discharged following the standard discharge method. Apply a 12V power supply and a 1C charge current for 1.5hrs.

5.5.3	Over discharge test	No leakage 、 No flame、 No fire、 No explode	Cell shall first be charged according to standard charge method, and then cell is to be discharged by 0.2C current for 12 hours; The test is completed when the cell is to be discharged up to 250% of rate capacity or the other protective devices prevent the discharge.
5.5.4	130 °C hot oven test	When the temperature of the cell is 130 °C Cell must not fire or explode in 60 minutes	The cell is charged following the standard charge method. After charging the cell is put in the oven. And then the oven temperature will be ramped at 5°C per minute to 130°C and held at 130°C. When the temperature of the cell reach 130°C , the cell is maintained in the 130°C oven for a maximum of 60 minute or until a fire or explosion is obtained, whichever comes first. Record the time that the cell temperature reaches 130°C and the time when a fire or explosion occurs.
5.5.5	Crush test	No fire、No explode	After charging a cell following the standard charge method, the cell shall be crushed between two flat surfaces. The direction of the crushing force shall be vertical to axis of the cylinder. The crushing force is to be applied by a hydraulic ram with a 32mm diameter piston. Crushing force is approximately 13 KN. Once the maximum pressure has been obtained it is to be released.

5.5.6	Impact test	No flame、No fire、 No explode	Cell shall first be charged according to standard charge method, and then the battery cell was placed on the flat surface so that the longitudinal axis of the battery cell shall be parallel with it. 15.8mm diameter bar is to be placed across the center of the sample. 9.1kg weight is to be dropped from a height of 610mm on the sample.
5.5.7	Short circuit test	No fire、No explode	Cell shall first be charged according to standard charge method, and then cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 100mΩ. This test is done at room temperature and at 60 °C (different cells). Monitor the cell temperature while testing. The cell is continuously discharged until the cell case temperature has returned to be 10 °C less than peak temperature.
5.5.8	Incineration test	When subjected to the test no part of exploding cell shall penetrate from the screen such that	After full charging by the standard method, each test sample cell or battery is to be placed on a platform table having a 4-inch diameter hole in the center covered by a screen. The screen over the hole is to be steel wire mesh having 20 openings per inch and a wire diameter of 0.017 inch eight-sided covered wire cage, 2 feet across and 1 foot high

		some or all the cell or battery protrudes through the screen	is covered with a metal screen is to be constructed from 0.010inch diameter wire with 16-18 wires per inch in each direction. This wire cage is placed over to the test sample. The sample is to be placed on the screen covering the hole in the center of the hole. It is to be heated until it explodes, or until it is destroyed.
Note	All above safety tests will be conducted at $23^{\circ}\text{C}\pm 3^{\circ}\text{C}$ except where specified differently. Use proper ventilation with protective equipment.		

6 Package picture



Small box



Big box



Pallet

(100pcs battery in a small box, 4 small boxes in a big box)



7 Shipment

The battery shall be shipped in voltage range of 3.7~ 3.9 V or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.

8 Warranty

The battery warranty period is made according to business contract. Haidi Energy Technology Co.,Ltd. (HAIDI) will replace no battery for free after shipment if there are problems due to customers' abuse or misuse instead of HAIDI's manufacturing failure.

HAIDI will not be responsible for the trouble caused by handling in violation of cautions in instructions.

HAIDI will not be responsible for the trouble caused by matching electric circuit, battery pack and charger.

HAIDI will not be responsible for any defect of battery caused during assembling after acceptance.



9 Storage and shipment requirement

Item	Conditions	Permissible time
Storage environment	45°C~ 60°C, 60% RH Max	Less than 1 month 1
	25°C~ 45°C, 60% RH Max	Less than 3 months 3
	-20°C~ 25°C, 60% RH Max	Less than 1 year 1
About long time storage: If the battery needs to be stored for a long time, the battery's storage voltage should be 3.6 ~ 3.9 V. Also, it is recommended to charge the battery every six months.		

10 Warning and cautions in handling the lithium-ion battery

Battery abuse can cause damage to the battery and/or personal injury. Please read and observe the standard battery precautions below before utilization.

Note 1, the customer is required to contact HAIDI in advance, if and when the customer needs other applications or operating conditions not described in this specification.

Note 2, HAIDI will take no responsibility for any accident when the battery is used under other conditions not described in this specification.

Warnings

To prevent damage or injury from battery leaking, heating and/or explosion, please observe the following precautions before use. (It should be indicated especially in manual or instruction for users.)



1	Do not use and leave the battery near a heat source such as fire or heater.
2	Do not use or leave the battery at very high temperature conditions (e.g., strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or catch fire or its performance will be degenerate and 2 its service life will be decreased.
3	Do not short circuit, over-charge or over-discharge the battery.
4	Don't immerse the battery in water and seawater. Please put it in cool and dry environment if no using.
5	Don't reverse the positive and negative terminals
6	Do not disassemble or modify the battery.
7	Do not transport or store the battery together with metal objects such as necklaces, hairpins, coins, etc.
8	Make sure the battery is not with conspicuous damage or deformation.
9	Don't connect the battery to an electrical outlet directly.
10	If the battery leaks and the electrolyte splashes into the eyes, rinse the eyes with clean running water immediately for at least 15 minutes, and go to hospital for treatment if necessary.
11	Mixed use of batteries of different types is not allowed.



12	Keep the battery away from babies.
13	Do not directly solder the battery and pierce the battery with a nail or other sharp objects.
14	
	Do not strike, throw or trample the battery.
15	Use the battery charger specifically for that purpose when charging.
16	Please separate battery of different electrochemical systems from one another when disposing of secondary battery.
17	Clean the terminals with a dry cloth before use if the battery terminals are dirty. Otherwise, power failure or charge failure may occur due to the poor connection with the instrument.
18	Batteries should be removed from the device or charger immediately and not used again if they are over heat, give off odor, discolor or deform, or appear abnormally in any way during use, charging and storage.
19	The battery replacement shall be done only by either battery supplier or device supplier instead of the user.
20	Please tape the terminals to insulate batteries before discarding them in case of fire and explosion.
21	Do not use battery in strong electrostatic and magnetic occasions, otherwise, it can cause safety problems easily.
22	Use of damaged battery is not permitted.