

Library Sort	Product Specifications	VER	II
Library Name	Cylindrical Li-ion Rechargeable Battery	Date	2004/4/30

Cylindrical Li-ion battery

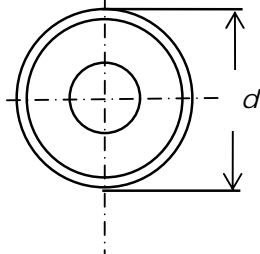
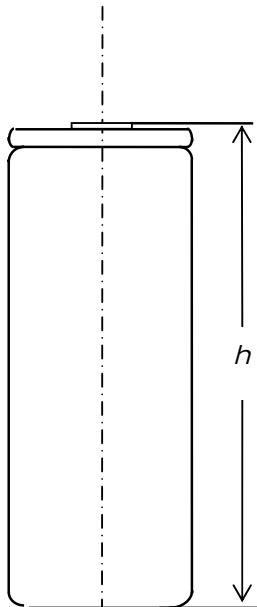
Specification

Type: [ICR18650](#)

Prepared/Date	Auditing/Date	Approved/Date
Genxiao Li	Peng kun Gao	Dragon Lv

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DATA SHEET



TYPE	-----	CYLINDRICAL
MODEL	-----	ICR18650
SPECIFICATION	-----	18650
Nominal voltage	-----	3.7V
Weight	-----	约 45g
C _s Ah	-----	2000mAh
Charge voltage	-----	4.200±0.049V
Minimum discharge end voltage	-----	2.75V
Maximum charge voltage	-----	4.20V
Maximum continuous charge current	-----	1500mA
Maximum continuous discharge current	-----	3000mA
Dimension (including shrink sleeve/label)		
Diameter, d	-----	18.2±0.2mm
height, h	-----	64.5±0.5mm
Capacity (20°C, 0.2 C _s to 2.75V)		
Minimum capacity	-----	2000mAh
Internal impedance (20°C±5°C)		<80mΩ
Charge conditions (20°C±5°C)		
Standard charge	-----	900mA CC/CV
Fast charge	-----	1500mA CC/CV
Operation conditions (recommended)		
Storage---temperature		(15-35°C)
		Relative humidity(45-75%)
		Pressure(86-106Kpa)
Discharge	-----	-20-60°C
Standard charge	-----	0-45°C
Standard Test Conditions (Except additional quest)		
Temperature	-----	20°C±5°C
Relative humidity	-----	65±20%

Subject to change without prior notice

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1. Performance

Test item	Test conditions	Requirements
(1) Outside Appearance	Visual check	No abnormal stain, Deformation nor damage
(2) Standard test conditions	Measurements are carried out at $20 \pm 5^\circ\text{C}$ and relative humidity of $65 \pm 20\%$ without other specified condition. Accuracy of voltmeters and ammeters used in test is equal to or better than the grade 0.5.	
(3) Standard charge	Battery is charged continuously at the constant current of $0.5 I_t$ end at voltage of 4.2V, then charge at the constant voltage of 4.2V until the end current of 20mA after Pre-discharge at the constant current of $0.2 I_t$ until the end voltage of 2.75V/cell	
(4) Fast charge	Charge shall be conducted continuously at the constant current of 1500mA until the end voltage of 4.2V, then charge at the constant voltage of 4.2V until the end current of 20mA after Pre-discharge mentioned in Item (2).	
(5) Open-circuit voltage (OCV)		$\geq 3.75\text{V}$
(6) Rated Capacity	Discharge duration of the charged battery specified in Item (3) shall be measured at $0.2 I_t$ mA until the end voltage of 2.75V/cell, after rest for 0.25 hour. If the discharge duration does not reach the specified value, the test may be repeated up to three times in total.	Rated capacity: $\geq 100\%C_{5mAh}$
(7) Capacity high-rate discharge	Discharge duration of the charged battery specified in Item (3) shall be measured at 1500mA until the end voltage of 2.75V/cell, after rest for 0.25 hour. If the discharge duration does not reach the specified value, the test may be repeated up to three times in total.	Discharge capacity: $\geq 90\%C_{5mAh}$
(8) Cycle Life (20°C)	Carry out cycles (1500mA CC/CV(4.2V), discharge at the constant current of 1500mA after rest for 0.25 hour) at $20 \pm 2^\circ\text{C}$. The test end until the discharge capacity $< 60\%C_{5mAh}$	≥ 300 cycles

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(9)Low temperature discharge	1)charge shall be conducted at Item (3); 2)The battery shall be stored under $-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$ for 16h~24h; 3)Discharge shall be conducted at the constant current of 0.2I,mA until the end voltage of 2.75V/cell;	Discharge capacity: $\geq 60\%C_{5\text{mAh}}$
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2 Mechanical test

Test Item	Test Conditions	Requirements
(1)Vibration Test	Vibrate test sample for 90minutes each at room temperature after rated charge. Amplitude: 0.38mm(10-30Hz); 0.19mm (30-55Hz) Frequency: 10-55Hz(1oct/min) Direction: X, Y Then measure resistance, voltage of battery and check outside appearance.	No rupture, fire, smoke, Nor critical damage $\geq 90\% C_{5\text{mAh}}$
(2) Drop Test	Drop 100% charged test sample from 1m above onto concrete board with more than 5cm thickness two times each for every direction at room temperature. Then measure rated capacity and checks outside appearance.	No rupture, fire, smoke, Nor critical damage $\geq 90\% C_{5\text{mAh}}$

3 Safety evaluation

Test Item	Test Conditions	Requirements
(1) Hot Oven Test	The charged battery is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5\pm 2^{\circ}\text{C}$ per minute. The oven is to remain for 30 minutes at $150\pm 2^{\circ}\text{C}$ before the test is discontinued.	No fire, Nor explosion
(2)Short Circuit Test	After fast charge at $20\pm 2^{\circ}\text{C}$, Connect battery terminals with electric wire (electric resistance: $50\text{m}\Omega$ or less). And stop the test when the temperature of battery is 10°C lower than peak temperature.	No fire, Nor explosion
(3) Overcharge Test	After discharged at 1 I,mA and end at 2.75V, the battery shall be charged at 3 I,mA current with a voltage limit of 4.6V.	No fire, Nor explosion
(4)Dip test	The charged battery shall be dipped in water for 24h in an ambient temperature of $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$.	No fire, Nor explosion

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4 Charge State of Battery before shipment

To be determined. (Recommendation Approx. 3.75 - 3.85V 30% charge)

5 Duration of guarantee the product

We can keep on the quality in six month.

6 Handling precautions on Lithium Ion Rechargeable Battery

To assure product safety, describe the following precautions in the instruction manual of the equipment.

! Danger

- When charging the battery, use dedicated chargers and follow the specified conditions.
- Use the battery only in the specified equipment.
- Do not connect battery directly to an electric outlet or cigarette lighter charger.
- Do not heat or throw battery into a fire.
- Do not use, leave battery close to fire or inside of a car where temperature may be above 60°C. Also do not charge / discharge in such conditions.
- Do not immerse, throw, and wet battery in water/ seawater.
- Do not put batteries in your pockets or a bag together with metal objects such as necklaces. Hairpins, coins, or screws. Do not store batteries with such objects.
- Do not short circuit the (+) and (-) terminals with other metals.
- Do not place battery in a device with the (+) and (-) in the wrong way around.
- Do not pierce battery with a sharp object such as a needle.
- Do not hit with a hammer, step on or throw or drop to cause strong shock.
- Do not disassemble or modify the battery.
- Do not solder a battery directly.
- Do not use a battery with serious scar or deformation.

! Warning

- Do not put battery into a microwave oven, dryer, or high-pressure container.
- Do not use battery with dry cells and other primary batteries, or batteries of a different package, type, or brand.
- Stop charging the battery if charging is not completed within the specified time.
- Stop using the battery if abnormal heat, odor, discoloration, deformation or abnormal condition is detected

During use, charge, or storage.

- Keep away from fire immediately when leakage or foul odor is detected.
- If liquid leaks onto your skin or clothes, wash well with fresh water immediately.

If liquid leaking from the battery gets into your eyes, do not rub your eyes. Wash them well with clean water and go to see a doctor immediately.

! Caution

- Store batteries out of reach of children so that they are not accidentally swallowed.

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- If younger children use the battery, their guardians should explain the proper handling.
- Before using the battery, be sure to read the user's manual and cautions on handling thoroughly.
- Thoroughly read the user's manual for the charger before charging the battery.
- For information on installing and removing from equipment, thoroughly read the user's manual for the specific equipment.
- Batteries have life cycles. If the time that the battery powers equipment becomes much shorter than usual, the battery life is at an end. Replace the battery with a new same one.
- Remove a battery whose life cycle has expired from equipment immediately.
- When the battery is thrown away, be sure it is non-conducting by applying vinyl tape to the (+) and (-) terminals.
- When not using battery for an extended period, remove it from the equipment and store in a place with low humidity and low temperature.
- While the battery pack is charged, used and stored, keep it away from objects or materials with static electric charges.
- If the terminals of the battery become dirty, wipe with a dry clothe before using the battery.
- The battery can be used within the following temperature ranges. Do not exceed these ranges.
Charge temperature range : 0°C to 45°C
Discharge temperature range : -20°C to 60°C
(When using equipment)