5/F, No. 2, Huike Industrial Park, Shiyan Community, Bao'an District, Shenzhen 518000, China TEL: +86 136 3287 3384/+86 755 8427 6510 FAX:+86 755 8427 6510

Technical Information

ICR18650

ATING BRAND	CONFIDENTIAL	V.	2021.09.01
DEVELOP			RV.

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1. General Information

ICR18650

This product specification defines the requirements of the rechargeable lithium ion battery of ATing BRAND

Cylindrical rechargeable lithium ion battery *ICR18650*

2. Nominal Specification

0.2C Capacity *

Nominal 3500 mAh Minimum 3400 mAh

Nominal Voltage

3.7V

Internal Impedance = $50 \text{ m}\Omega$

* Charge : 1750mA, 4.2V, 50mA End-current (CC-CV) Discharge : 680mAh, 2.5V End-voltage (CC)

Item	Condition / Note	Specification	
2.1 Energy	Std. charge / discharge	Nominal 3500 mAh	
		Minimum 3400 mAh	
2.2 Nominal Voltage	Average	3.7V	

2.3 Standard Charge	Constant current	0.5C (1750mA)
(Refer to 4.1.1)	Constant voltage	4.2V
	End current(Cut off)	50mA
2.4 Max. Charge Voltage		$4.2 \pm 0.05 V$
2.5 Max. Charge Current		1.0 C (3500mA)
2.6 Standard Discharge	Constant current	0.2C (700mA)
(Refer to 4.1.2)	End voltage(Cut off)	2.5V
2.7 Max. Discharge Current		10A
2.8 Weight	Approx.	Max. 50.0 g +/- 3 g
2.9 Operating Temperature	Charge	0 ~ 45°C
	Discharge	-20 ~ 60°C
2.10 Storage Temperature	1 month	-20 ~ 60°C
(for shipping state)	3 month	-20 ~ 45°C
	1 year>	-20 ~ 20°C

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3. Appearance and Dimension

Appearance

There shall be no such defects as deep scratch, crack, rust, discoloration or leakage, which may adversely affect the commercial value of the cell.

Dimension

Diameter: 18.4 +0.1 / -0.3 mm (Max. 18.5mm) Height: 65.0 ±0.2mm (Max. 65.2mm)



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4. Performance Specification



Discharge	Сар	acity	Er	ergy
Rate	mAh	% vs. 0.2C	Wh	% vs. 0.2C
0.2 C	3480	100 %	12.7	100 %
0.5 C	3411	98 %	12.1	95 %
1.0 C	3428	98 %	11.8	93 %
1.5 C	3452	99 %	11.6	91 %
2.0 C	3451	99 %	11.4	90 %



Temperature (℃)	Сар	acity
	mAh	% vs. 0.2C
24	3480	100 %
0	3150	91%
-10	3041	87%
-20	2872	83%



Discharge	Capacity		Energy	
Nate	mAh	% vs. 0.2C	Wh	% vs. 0.2C
0.2 C	3519	100 %	13.4	100%
0.5 C	3501	99 %	13.6	101%
1.0 C	3501	99 %	13.9	104%
1.5 C	3490	99 %	14.0	104%
2.0 C	3471	99 %	14.0	104%



Discharge : 4000mAh, 2.5V End-voltage (CC)

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4.1 Standard test condition

4.1.1 Standard Charge

Unless otherwise specified, "Standard Charge" shall consist of charging at constant current of 0.5C. The cell shall then be charged at constant voltage of 4.20V while tapering the charge current. Charging shall be terminated when the charging current has tapered to 50mA. For test purposes, charging shall be performed at $23^{\circ}C \pm 2^{\circ}C$.

4.1.2 Standard Discharge

"Standard Discharge" shall consist of discharging at a constant current of 0.2C to 2.50V. Discharging is to be performed at 23 °C ± 2

°C unless otherwise noted (such as capacity versus temperature).

4.1.3 High Drain rate Charge/discharge condition

Cells shall be charged at constant current of 1,500mA to 4.20V with end current of 100mA. Cells shall be discharged at constant current of 4,000mA to 2.50V. Cells are to rest 10 minutes after charge and 20 minutes after discharge.

4.2 Electrical Specification

Item	Condition	Specification
4.2.1	Cell shall be measured at 1kHz after charge per	≤ 40 mΩ, without PTC
Initial AC Impedance	4.1.1.	
4.2.2	Cells shall be charged per 4.1.1 and discharged	≥ 3400 mAh
Initial Capacity	per 4.1.2 within 1h after full charge.	

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4.2.3	Cells shall be charged and discharged per 4.1.3	≥ 80 % (of C _{min} in 2.1)
Cycle Life	Over 700 cycles. A cycle is defined as one	
	charge and one discharge. 401st discharge	
	capacity shall be measured per 4.1.1 and 4.1.2	

4.3 Environmental specification.

Item	Condition	Specification
4.3.1	Cells shall be charged per 4.1.1 and stored in a	Power remaining rate ≥
Storage Characteristics	temperature-controlled environment at 23°C ±	90% (P _{min} in 2.1)
	2°C for 30 days. After storage, cells shall be	
	discharged per 4.1.2 to obtain the remaining	
	power*.	
4.3.2	Cells shall be charged per 4.1.1 and stored in a	No leakage,
High Temperature	temperature-controlled environment at 60°C for	Power recovery rate ≥
Storage Test	1 week. After storage, cells shall be discharged	80%
	per 4.1.2 and cycled per 4.1.3 for 3 cycles to	
	obtain recovered power [□] *.	
4.3.3	Cells are charged per 4.1.1 and stored at 60°C	No leakage, No rust
High Temperature and	(95% RH) for 168 hours. After test, cells are	Power recovery rate ≥
High Humidity Test	discharged per 4.1.2 and cycled per 4.1.3 for 3	80%
	cycles to obtain recovered power.	

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4.3.4 Thermal Shock Test	65°C (8h) ← 3hrs → with cells charged per discharged per 4.1.2 a cycles to obtain recove	-20°C (8h) for 8 cycles 4.1.1 After test, cells are and cycled per 4.1.3 for 3 red power.	No leakage Power recovery rate ≥ 80%
4.3.5 Temperature Dependency of	Cells shall be charged and discharged per temperatures.	per 4.1.1 at $23^{\circ}C \pm 2^{\circ}C$ 4.1.2 at the following	
Capacity	Charge	Discharge	Capacity
	23°C	-10°C 0°C 23°C 60°C	70% of P _{ini} 80% of P _{ini} 100% of P _{ini} 95% of P _{ini}

4.4 Mechanical Specification

Item	Condition	Specification
4.4.1	Cells charged per 4.1.1 are dropped onto an wooden	No leakage
Drop Test	floor from 1.0 meter height for 1 cycle, 2 drops from	No temperature rising
	each cell terminal and 1drop from the side of cell can	
	(Total number of drops = 3).	
4.4.2	Cells charged per 4.1.1 are vibrated for 90 minutes per	No leakage
Vibration Test	each of the three mutually perpendicular axis (x, y, z)	
	with total excursion of 0.8mm, frequency of 10Hz to	
	55Hz and sweep of 1Hz change per minute	

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4.5 Safety Specification

Item	Condition	Specification
	Cells are discharged per 4.1.2, and then charged at	
4.5.1	constant current of 3 times the max. charge condition	· No explode. No fire
Overcharge Test	and constant voltage of 4.2V while tapering the charge	
	current. Charging is continued for 7 hours (Per UL1642).	
4.5.2	Cells are charged per 4.1.1, and the positive and	
External Short -	negative terminal is connected by a 100m Ω -wire for 1	: No explode, No fire
Circuiting Test	hour (Per UL1642).	
4,5.3	Cells are discharged at constant current of 0.2C to	
Overdischarge	250% of the minimum conscitu	: No explode, No fire
Test		
	Cells are charged per 4.1.1 and heated in a circulating	
4.5.4	air oven at a rate of 5°C per minute to 130°C. At 130°C,	· No ovolodo. No firo
Heating Test	oven is to remain for 10 minutes before test is	. No explode, No life
	discontinued (Per UL1642).	
	Cells charged per 4.1.1 are impacted with their	
4.5.5	longitudinal axis parallel to the flat surface and	. No ovelodo. No firo
Impact Test	perpendicular to the longitudinal axis of the 15.8mm	. NO explode, NO life
	diameter bar (Per UL1642).	
156	Cells charged per 4.1.1 are crushed with their	
4.J.O	longitudinal axis parallel to the flat surface of the	: No explode, No fire
Crush rest	crushing apparatus (Per UL1642).	

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5. Caution

Warning: Using the lithium ion rechargeable battery, mishandling of the battery may cause heat, fire and deterioration in performance. Be sure to observe the following.

5.1 Cautions for Using and Handling

- □ When using the application equipped with the battery, refer to the user's manual before usage.
- □ Please read the specific charger manual before charging.
- Charge time should not be longer than specified in the manual.
- □ When the cell is not charged after long exposure to the charger, discontinue charging.
- \square Battery must be charged at operating temperature range 0 ~ 45°C.
- \square Battery must be discharged at operating temperature range -20 ~ 60°C.
- □ Please check the positive(+) and negative(-) direction before packing.
- When a lead plate or wire is connected to the cell for packing, check out insulation not to short-circuit.
- □ Battery must be stored separately.
- Battery must be stored in a dry area with low temperature for long-term storage.
- Do not place the battery in direct sunlight or heat.
- Do not use the battery in high static energy environment where the protection device can be damaged.
- □ When rust or smell is detected on first use, please return the product to the seller immediately.
- □ The battery must be away from children or pets
- □ When cell life span shortens after long usage, please exchange to new cells.

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5.2 Prohibitions

- Do not use different charger. Do not use cigarette jacks (in cars) for charging.
- Do not charge with constant current more than maximum charge current.
- Do not disassemble or reconstruct the battery.
- Do not throw or cause impact.
- Do not pierce a hole in the battery with sharp things. (such as nail, knife, pencil, drill)
- Do not use with other batteries or cells.
- Do not solder on battery directly.
- Do not press the battery with overload in manufacturing process, especially ultrasonic welding.
- Do not use old and new cells together for packing.
- Do not expose the battery to high heat. (such as fire)
- Do not put the battery into a microwave or high pressure container.
- Do not use the battery reversed.
- Do not connect positive(+) and negative(-) with conductive materials (such as metal, wire)

5.3 Caution for the battery and the pack

Pack shall meet under condition to maintain battery safety and last long performance of the lithium rechargeable cells.

- 5.3.1 Installing the battery into the pack
 - -. The cell should be inspected visually before battery assembly into the pack.
 - -. Damaged cell should not be used. (Damaged surface, can-distortion, electrolyte-smell)
 - -. Different Lot Number cells should not be packaged into the same pack.
 - -. Different types of cells, or same types but different cell maker's should not be used together.

5.3.2 Design of battery pack

-. The battery pack should not be connected easily to any charger other than the dedicated charger.

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-. The battery pack has function not to cause external short cut easily.

5.3.3 Charge

- -. Charging method is Constant Current-Constant Voltage (CC/CV).
- -. Charging should be operating under maximum charge voltage and current which is specified in the product specification. (Article. 2.4, 2.5)
- -. The battery should be charged under operating temperature specified in the product specification. (Article. 2.9)

5.3.4 Discharge

-. Discharging method is Constant Current (CC).

(In case of using the battery for mobile equipment, discharging mode could be Constant Power.)

-. Discharging should be operating under maximum discharge current which is specified in the product specification. (Article. 2.7) -. Discharging should be done by cut off voltage which is specified in the product specification. (Article. 2.6)

-. The battery should be discharged under operating temperature specified in the product specification. (Article. 2.9)

5.3.5 Protection Circuit

-. The protection circuit should be installed in the battery pack, charger.

-. Charger or pack should have voltage sensing system to control over charge or discharge in order to maintain the battery's normal operating mode and protect cell imbalance.

-. Charger or pack should have warning system for over temperature, over voltage and over current.

6. EXCLUSION OF LIABILITY

THE WARRANTY SHALL NOT COVER DEFECTS CAUSED BY NORMAL WEAR AND TEAR, INADEQUATE MAINTENANCE, HANDLING, STORAGER FAULTY REPAIR, MODIFICATION TO THE BATTERY OR PACK BY A THIRD PARTY OTHER THAN ATING BRAND SPECIFICATION PROVIDED HEREIN OR IMPROPER USE OR INSTALLATION, INCLUDING BUT NOT LIMITED TO, THE FOLLOWING:

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- -. DAMAGE DURING TRANSPORT OR STORAGE
- -. INCORRECT INSTALLATION OF BATTERY INTO PACK OR MAINTENANCE
- -. USE OF BATTERY OR PACK IN INAPPROPRIATE ENVIRONMENT

-. IMPROPER, INADEQUATE, OR INCORRECT CHARGE, DISCHARGE OR PRODUCTION CIRCUIT OTHER THAN STIPULATED HEREIN

- -. INCORRECT USE OR INAPPROPRIATE USE
- -. INSUFFICIENT VENTILATION
- -. IGNORING APPLICABLE SAFETY WARNINGS AND INSTRUCTIONS
- -. ALTERING OR ATTEMPTED REPAIRS BY UNAUTHORIZED PERSONNEL
- -. IN CASE OF FORCE MAJEURE (LIGHTENING, STORM, FLOOD, FIRE, EARTHQUAKE, ETC.)

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