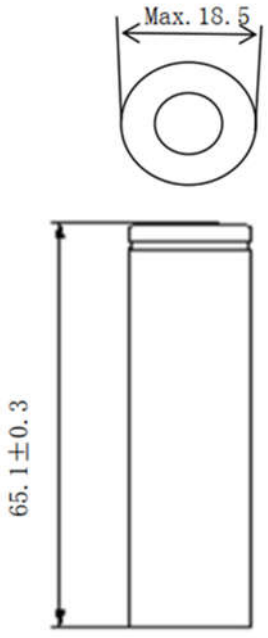
	Lithium-ion Battery	
ORANGE	**Model**	**Specifications**
	ISR18650-2200	**ISR 2200mAh 5c Grade A**

Product Specifications:

No.	Items	Specifications
1	Limited Charge Voltage	4.2 ± 0.05V
2	Nominal Voltage	3.7V
3	Rated Capacity	2200mAh
4	Initial Capacity (0.2C)	≥2200mAh
5	Standard Charging Current	1100mA (0.5C)
	Rapid Charging Current	2200mA (1C)
6	Max. Continuous Charge Current	4.4A (2C)
7	Max. Continuous Discharge Current	11A (5C)
	Pulse Discharge	20A 5s
8	Discharge Cut-off Voltage	2.75V
9	Standard Cycle Life	500C≥70% Initial Capacity
10	Operating Temperature (Cell Surface Temperature)	Charging : 0°C~50°C (Recommended recharge release < 45°C)
		Discharging: -20°C~80°C (Recommended recharge release < 70°C)
9	Storage Temperature	-20°C~40°C
10	Cell Weight	Approx. 44.5 gms
11	AC Impedance	≤25 mΩ
12	Cell Dimension	Height: 65.1 mm ± 0.3 mm Diameter: ≤18.5mm

Cell Dimension:



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Standard Test Conditions:

Unless otherwise specified, all tests stated in this datasheet are conducted at below conditions:
Temperature: 23°C±2°C, Relative Humidity: 65%±20%

Electrical characteristics:

No.	Items	Test Methods and conditions	Criteria
1	Standard Charge	Charging the cell with constant current at 0.5C followed by constant voltage at 4.2V till charge current declining to ≤ 0.05C	Limited Charge Voltage = 4.2V Charge Current = 0.5C
2	Rapid Charging Method	Charging the cell initially at constant current of 1C, then at constant voltage of 4.20V till charge current declining to ≤ 0.1C	Limited Charge Voltage = 4.2V Charge Current = 1C
3	Initial Impedance	Initial impedance measure at AC 1 KHz within 1 hour after standard charge.	≤25mΩ
4	Initial Capacity	(1) Prior to charging the cell shall be discharged at a constant current of 0.2C down to cutoff voltage 2.75V, rest for 10 minutes. (2) The initial capacity of cell is measured at the discharge current of 0.2C to 2.75V cut-off voltage after standard charge.	≥2000mAh
5	Low Temperature Performance	The cell shall be charged in accordance with the standard charge. The cell shall be stored in temperature of -20°C±2°C for 20h. Discharge at the constant current of 0.2C down to the end of discharge voltage 2.50V	Discharge Capacity≥70% Initial Capacity
6	High Temperature Performance	The cell shall be charged in accordance with the standard charge. The cell shall be stored in temperature of 55°C±2°C for 5h. Discharge at the constant current of 0.2C down to the end of discharge voltage 2.75V	Discharge Capacity≥97% Initial Capacity No Distortion and No Rupture
7	Capacity Retention and Capacity Recovery	(1) Fully charged cell stored for 7 days at 55°C±2°C (28 days at 23°C±2°C), discharged at a constant current of 0.2C to 2.75V after 4h later at the room temperature, rest for 10 minutes.	Capacity Retention ≥92% Initial Capacity Capacity Recovery≥97% Initial Capacity
8	Room Temperature Rate Discharge	The cell shall be charged in accordance with the standard charge with 10 mins rest.	The Time of Discharge≥18min

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		Discharge at a constant current of 3C to 2.75V	
9	Standard Cycle Life	Charge: After standard charge and rest for 10 mins. Discharge: 3C discharge to 2.75V with 10 mins rest. Repeat above steps until capacity is less than 70% of initial capacity	500C≥70% Initial Capacity
10	Self-discharge	Voltage difference after corresponding days rest at 23±2°C	10 days ≤ 0.05V 30 days ≤ 0.08V 90 days ≤ 0.15V

Cell Safety Tests:

No.	Items	Test Methods & Conditions	Criteria
1	Overcharge Test	Firstly, discharge to 2.75V with the current of 0.2C. The charge at constant current of 4C to 10V until the cell explode or fire of the surface temperature of the cell stabled (the changes of temperature less than 10°C during 30 minutes). Once the cell meets one of the three conditions, the test can be stopped	No Fire, No Explosion.
2	Low Pressure Test	The full charged cells are to be stored for at least 6h at a vaccum environment with pressure of less than 11.6kPa, and temperature of 20°C±5°C	No Fire, No Explosion. The open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.
3	Heating Test	The cells are fully charged with standard charging method and put into oven with nature air or cycled air convected, heat cell by velocity of 5°C/min ± 2°C/min to 130°C± 2°C and maintain for 30 minutes	No Fire, No Explosion.

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4	Temperature Cycling Test	The fully charged cells are placed in a test chamber and subjected to the following cycles: a) Raising the temperature to 75°C± 2°C and maintaining this temperature for at least 6 hours. b) Reducing the temperature to -40°C± 2°C within 30 minutes and maintaining this temperature for at least 6 hours. c) Repeating the sequence for a further 9 cycles. d) After the 10^{th} cycle, storing the cells for 24 hours prior examination, in the temperature of 23°C± 2°C.	No Fire, No Explosion. The open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.
5	Short Test	The full charged cells are placed in a test chamber and subjected to the following cycles: short the positive and negative terminals with the wire resistance of 80mΩ±20mΩ. Tests are to be conducted at 23°C± 2°C, keep 24h or surface temperature decline to 20% of max temperature, test is end.	No Fire, No Explosion. The surface temperature of samples shall not exceed 150°C.
6	Forced Discharge Test	The cell is discharged with standard discharging method. Inverse charge current 1C time≥90 minutes	No Fire, No Explosion.

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Mechanical Tests:

No.	Items	Test Methods & Condition	Criteria
1	Vibration Test	After standard charging, fixed the cell on the vibration table and subjected to vibration cycling that frequency is 250 Hz, the amplitude of the vibration is ±0.1mm. The cell shall be vibrated for 8h, and rest 30 minutes after every hour.	No Fire, No Explosion. The open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.
2	Shock Test	The full charged cell is fixed on shock table. Each cell shall be subjected to a half sine shock of peak acceleration of 150 gn and pulse duration of 6 milliseconds. Each cell shall be subjected to three shocks in positive direction followed by three shocks in negative direction of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.	No Fire, No Explosion. The open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.
3	Impact Test	After standard charge, the cell is placed on a flat surface. A 15.8mm diameter bar is placed across the center of the cell. The weight of 9.1 kg is dropped from a height of 610mm onto the cell	No Fire, No Explosion.
4	Crush Test	A cell is crushed between two flat surfaces. The applied force is 13 kN±1kN by hydrocylinder. Once the maximum pressure has been obtained or voltage decrease to 1/3 of nominal voltage sharply or 10% of deformation has occurred compared to the initial dimension, the force is released.	No Fire, No Explosion.
5	Free Drop Test	The fully charged cell drops on the concrete ground from 1m height, total 3 times, to obtain the shock of random directions. After the test, the cell shall rest for a minimum one hour and then a visual inspection shall be performed.	No Fire, No Explosion.

Visual Inspection:

There shall be no such defect as scratch, flaw, crack and leakage which may adversely affect commercial value of the cell.

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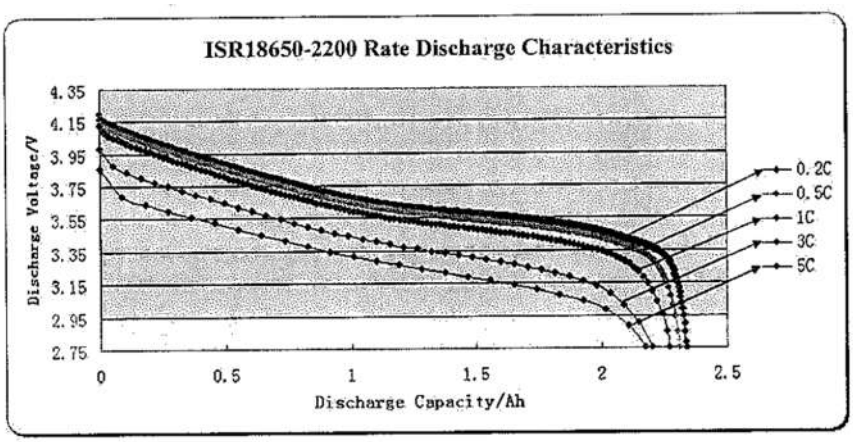
Rate Discharge Characteristics:



Cycle Performance: