Specification for Li-ion Battery

Model: ICR26650C1

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Approved By	Checkup	Make

Manufacture		
	AA Portable Power Corp	

Content

1. Scope

The specification is suitable for Li-Ion Cylindrical battery produced by AA Portable Power Corp

2. Model

ICR26650C1　3.6V/4000mAh

3. Basic Performance

Item	Performance	Remark
Nominal Capacity	4000mAh	0.5C_5A discharging
Min Capacity	3950mAh	0.5C_5A discharging
Working Voltage	3.6V Norminal	3.7V Average
Discharge Cut-off Voltage	3.0V	
Charge Mode（Standard）	CC/CV	20±5℃
Charge Cut-off Voltage（Standard）	4.20±0.03V	
Charge Current（Standard）	2000mA（0.5C_5A）	
Charge Current（Quick）	4000mA（1.0C_5A）	
Discharge Current（Standard）	2000mA（0.5C_5A）	20±5℃
Discharge Current（Quick）	4000mA（1C_5A）	
Impedance	≤50mΩ	AC 1kHz
Weight	90±2g	
Operating Temperature: Standard Charge	0℃～+45℃	
Standard Discharge	-10℃～+60℃	
Storage Temperature: Short term within 1 month	-20℃～+45℃	
within 6 months	-10℃～+35℃	Relative Humidity：35%～75%

4. Performance & Test Method

Item	Test Method	Determination Standard
4.1 Quick Charge	CC/CV Mode，under the temperature 20±5℃, constant current charging at 1.0C_5A to 4.2V, and then constant voltage charging until charging current is ≤0.01C_5A	
4.2 Standard Charge	CC/CV Mode， under the temperature 20±5℃, constant current charging at 0.5C_5A to 4.2V, and then constant voltage charging until charging current is ≤0.01C_5A	
4.3 Cycle Life	Under the temperature （22.5±2.5）℃,after standard charging, set aside 1.0h, and then constant current discharging at 0.5C_5A to 3.0V, after discharging, set aside 0.5h, and then the next one charge & discharge cycles. One cycle is defined as once charging and once discharging for the cell, doing so 600 times.	After 600 cycles, the remaining capacity /original capacity ≥80%
4.4 Discharge performance under high & low temperature	After full charge as per the standard charging mode, place the cell under the temperature 25℃ for 3h, and then discharge at 0.5C to 3.0V; After full charge as per the standard charging mode, place the cell under the temperature 60℃ for 3h, and then discharge at 0.5C to 3.0V; After full charge as per the standard charging mode, place the cell under the temperature 0℃ for 3h, and then discharge at 0.5C to 3.0V; After full charge as per the standard charging mode, place the cell under the temperature -10℃ for 3h, and then discharge at 0.5C to 3.0V; Record the discharge capacity under different temperature. Compare discharge capacity under different temperature with the discharge capacity under the temperature 25℃, and calculate the percentage of capacity	discharge capacity under -10℃ /discharge capacity under 25℃≥55% discharge capacity under 0℃ /discharge capacity under 25℃≥85% discharge capacity under 60℃ /discharge capacity under 25℃≥90%
4.5 Impedance	Use AC 1kHz test method and the instrument with the accuracy 0.5 above to measure the impedance between the positive and the negative. (*Note 1)	≤40mΩ
4.6 Storage performance	Under the temperature 20±5℃, charging the cell as per standard charge mode, discharging it as per standard discharge mode, cycle 10 times, measure the cell capacity, record the 10th discharge capacity and mark it as the original discharge capacity. Then, after full charge the cell	Remaining capacity /original capacity ≥95% Resume capacity /original capacity ≥98%

	as per standard charge mode, place it under the temperature 25℃ to store for 28days. After storage, discharging it as per standard discharge mode, mark it as the remaining capacity. Afterward, charging the cell as per the standard charge mode and discharging it as per the standard discharge mode, discharge capacity is marked as resume capacity. Calculate the percentage of remaining capacity.	

*Note 1: During the testing process, if the test instrument use additional fixed fixture, as the case may be less the impedance of fixed fixture and lead wires. However, for the batteries in the same batch, the impedance value can only subtract the same value of fixture and wires, and the difference between the maximum and the minimum should be less than 30mΩ.

5. Environmental Adaptation Performance

Item	Test Method	Determination Standard
5.1 Constant humidity & temperature test	After quick charge the cell, put it into 40±2℃, relative humidity 90%-95% constant temperature and humidity box for 48h, and then take the cell out to set aside for 2h under the temperature 20±5℃, visually inspect the battery appearance, and discharge to 3.0V at constant current 1.0C_5A	Discharging time ≥36min; No appearance deformation, no explosion, no fire, no smoke or leakage
5.3 Vibration	Fix full charged cell on a platform ,adjust the testing equipment as per the following frequency and relative amplitude, and vibrate for 30minutes from 10Hz to 55Hz in each directions X , Y and Z at the speed 1 oct/ min Frequency：10Hz～30Hz Amplitude：0.38mm Frequency：30Hz～55Hz Amplitude：0.19mm After vibration, observe the battery appearance and measure the battery voltage.	Voltage≥3.7V No evident appearance damage, no leakage, no smoke, or explosion
5.4 Drop Test	After quick charge, drop the cell from the height 1000mm to the hard board with the thickness 18mm ～20mm. Drop once in the positive and negative direction of X, Y, and Z (total 6 directions). Visually inspect the battery appearance, discharge at constant current 1C_5A to 2.75V, and then do 3 or more charge & discharge cycle at 1C_5A.	No evident appearance damage, no leakage, no smoke and no explosion.

6. Safety Performance

Item	Test Method	Determination Standard
6.1 Over Charge	After charge the cell as per standard charge mode, CC/CV charge (CC 3C and CV 10V), watch the temperature change during testing process, when the cell temperature drops to 10℃ lower than the peak, end the experiment.	No fire and no explosion.
6.2 Over discharge	Testing environmental temperature: 20±5℃ After full charge as per standard charging mode, discharge for 12h at 0.2C until discharge capacity reaches 250% of rated capacity or protection device acts.	No fire and no explosion.
6.3 Short Circuit	After full charge the cell as per standard charge mode, do short circuit testing under the room temperature. Place thermocouple cells in the fume hood, use copper wires to short circuit the positive and the negative(total resistance of the circuit less than 50mΩ), and watch the temperature changes, when the cell temperature drop to 10℃ lower than the peak, end the experiment.	No explosion and no fire.
6.4 Heavy Impact	Cell shall first be charged according to standard charge method，then the battery cell was placed on a flat surface so that the longitudinal axis of the battery cell shall be parallel with it. A 15.8mm diameter bar is to be placed across the center of the sample. A.9.1kg weight is to be dropped from a height of 61cm on the sample.	The battery can be deformed, but no fire, no explosion.
6.5 Thermal Shock	After full charge the cell as per standard charge mode, put the cell into the oven, and rise the oven temperature to 130℃ at the speed of 5℃/min. When the cell gets 130℃, keep it for 10 minutes in the oven of 130℃, or until the cell fires and explodes. Record the time from when the cell gets 130℃ to that the cell fires or explodes.	Within 30minutes after the cell gets 130℃, the cell doesn't fire and explode.
6.6 Crush Test	Testing environmental temperature: 20±5℃ After full charge as per standard charge mode, place the cell between two flat surfaces to press. The pressure vessel is forced vertically to the cylindrical cell and presses the cell. Use hydraulic piston of diameter 32mm, pressure 13KN, once get max pressure value, you release pressure.	No fire and no explosion

7. Testing Conditions

7.1 Testing Environmental Conditions

Unless otherwise specified, each experiment in the specification should be done under the standard atmospheric conditions.

Temperature：20℃～30℃

Relative Humidity：45%～75%

Atmospheric Pressure：86kPa～106kPa

7.2 The requirements for test instruments and equipment.

7.2.1 The accuracy of voltage should be more than 0.5%, and the impedance should be more than 10KΩ/V.

7.2.2 The accuracy of ampere meter should be more than 0.5%.

7.2.3 The relative error of the instrument measuring the time is ±0.1%

7.2.4 When constant current load, the constant current can be adjusted within the voltage measured and relative error of the current is ±0.1%

7.2.5 After the battery voltage reaches constant voltage value, the charge power supply (or charger) can be changed into constant voltage charging.

8.Expiration date and product liability

Product expiration date for three months, starting from the date of production. No according to this specification operation caused accident, AA Portable Power Corp is irresponsible.

9. Transportation

The battery should be in the state of charge 20—50% to be packed into the boxes for transportation. During the transportation, prevent severe vibration, shock or extrusion; prevent the sun and rain, suitable for cars, trains, ships, aircraft and other common means of transport.

10. Storage

The battery should be stored at a clean, dry and well ventilated room of ambient temperature -5℃～35℃,should avoid contact with corrosive substances, and should be far away from fire and heat.

The battery should be charged once every six months during the storage.

During the processing, using the cells and batteries in the inventory for delivery should follow the principle “first in first out”.

11. Marks and Package

The packaging boxes containing batteries should be stored in a dry, dustproof, moisture proof carton. Outside the box should be labeled with name, type, quantity, gross weight, the manufacturer and their contact address, date of manufacture, but also the "handle with care", "afraid of wet," "upward" and other necessary marks.

Each battery shall have the Chinese symbol: product name, model, nominal voltage, rated capacity, positive and negative polarity, trademarks and manufacturing

date.

12. Safety Regulations and Instructions

12.1 Recommended items

12.1.1 Before use the battery, please carefully read the instruction and the mark on the battery surface.

12.1.2 Please be in normal indoor environment to use the battery. Temperature -20～+35℃, and relative humidity 65±20%

12.1.3 In the course of use, please stay away from heat, high pressure, and avoid the children to play with battery. Don't beat the battery. The battery only uses the matching charger. Don't charge the battery on the charger more than 24h.

12.1.4 Don't short circuit the positive and the negative. Don't disassemble the battery. Don't damp the battery to avoid the danger.

12.1.5 If the battery isn't used for a long time, please store it well. Keep the battery in half-charged status, neither full charge nor completely discharge. Package the battery in the non-conductive material to avoid direct contact with the metal, causing the cell damage. Please store the cells in a cool dry place.

12.1.7 Please safely handle the wasted cells. Don't put it into fire or water.

12.2 Danger Caution

12.2.1 Don't assemble the battery

The protection circuit board inside the battery pack can avoid the danger. Inappropriate disassembly will damage the protection function and cause the battery heat, smoke, deformation or burning.

12.2.2 Don't short circuit the battery

Don't connect the positive with the negative by the metal. Don't store and move the battery together with the metal. If the battery is short circuit, the large current will flow through and damage the battery, causing the battery heat, smoke, deformation or burning.

12.2.3 Don't heat and burn the battery

Heating and burning the battery will cause the separator melt, safety function failure or electrolyte burning. Overheating will cause the battery the battery heat, smoke, deformation or burning.

12.2.4 Don't use the battery near heat

Don't use the battery near fire, the oven or the environment more than 80℃Overheating will lead to short circuit and cause the battery heat, smoke, deformation or burning.

12.2.5 Don't wet the battery

Don't wet the battery, let alone the battery into water. Or else, it will cause the function of protect circuit inside failure and abnormal chemical reaction, and the battery may heat, smoke, deform or burn.

12.2.6 Avoid charging the battery near fire or under direct sunlight, or else, which will cause the function of protect circuit inside failure and

abnormal chemical reaction, and the battery may heat, smoke, deform or burn.

12.2.7 Use specified charger and collect charge

Using non-exclusive charger to charge the battery will cause danger. Charging under the abnormal conditions will cause the function of protect circuit inside failure and abnormal chemical reaction, and the battery may heat, smoke, deform or burn.

12.2.8 Don't damage the battery

Don't use the metal to cut into the battery, hammer, or beat batteries, or other means to damage the battery, otherwise it will cause the battery heat, smoke, deformation or burning, or even dangerous.

12.2.9 Don't directly solder the battery

Overheating will cause the separator melt, protection function failure and battery heat, smoke, deformation or burning.

12.2.10 Don't directly connect the battery with the power outlet or car cigarette lighter to charge.

High pressure, large current will flow through the battery and cause it heat, smoke, deformation or burning.

12.2.11 Don't use the battery for other devices

Inappropriate conditions of use will damage the battery performance, reduce the life, even will cause the battery heat, smoke, deformation or burning.

12.2.12 Don't directly touch the battery leakage

Electrolyte leakage can cause the skin discomfort. In case the electrolyte into the eyes, rinse with water as soon as possible, not rubbing the eyes, and quickly sent to hospital.

12.3 Caution

12.3.1 Can't be mixed with other battery

Can't be mixed with other types of primary or secondary battery to use, otherwise abnormal charging & discharging will cause the battery heat, smoke, deformation or burning.

12.3.2 Keep away from Children

Keep the battery out of reach of the children, to avoid the children bite or swallow it. If the children swallow the battery, should be promptly sent to hospital.

12.3.3 Don't be placed on the charger for a long time

If exceed much more than the normal charging time, the charger is still charging, please stop charging. Abnormal charging may cause the battery heat, smoke, deformation or burning.

12.3.4 Don't be placed in the microwave oven or other pressure vessel

Instant heating or structural damage will cause the battery heat, smoke, deformation or burning.

12.3.5 The leaking battery don't be near to fire

If find battery leakage (or stale), should keep away from fire. Otherwise, the electrolyte leakage will be on fire, even cause other hazards.

12.3.6 Don’t use abnormal battery

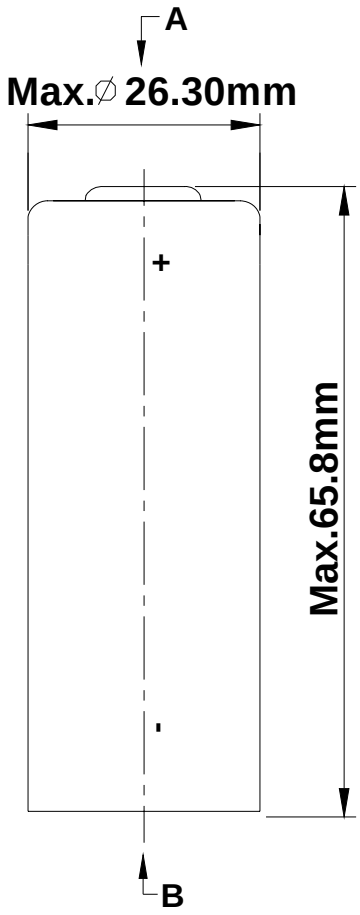
If it is found the battery stale, deformation, discoloration, or distortion, should remove the battery from the mobile or charger and abandon.

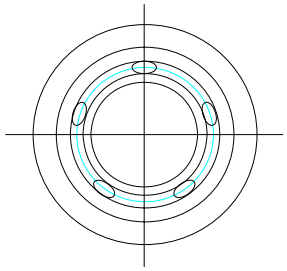
13. Others

The above can be used as the framework of the rule both the supplier and the buyer request for the battery performance and testing. If no new written, agreement or change notification, please comply with the above to implement.

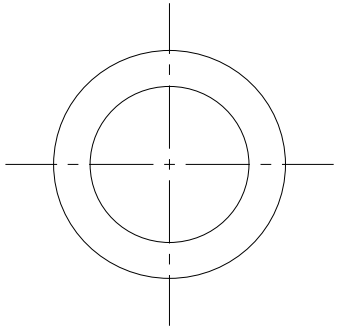
The specification is formulated based on the relative rule of GB/T18287-2000

14. Battery dimension





A side



B side