

# **Rechargeable Li- ion Button Battery**

**Serial LIR2450**

**AA PORTABLE POWER CORP.**

## 1. Scope

This specification applies to the Lithium-ion Rechargeable Button Battery serial LIR2450.

## 2. Type and Model

- Type: Lithium-ion rechargeable button battery.
- Model: Lithium-ion rechargeable button battery serial LIR2450

## 3. Produce Introduce

AA PORTABLE POWER Lithium-ion battery, depending on “ better technology, better management” concept and leading technique equipment, fabricates powerful, high working voltage, light weight, long service time Li-ion rechargeable battery, applied in mini communicate equipments and instruments.

## 4. Features

- Long service time  
Under normal condition and correct operate ion, AA PORTABLE POWER serial LIR2450 battery can maintain 80% capacity after 500 cycles.
- High energy density  
Batteries are easy to meet the mini equipment, with small volume and lightweight.
- Security  
Without free Lithium metal, batteries are safer than metal Lithium batteries.
- High working voltage  
About 3.6V working voltage, 3 times higher than Cd-Ni or MH-Ni battery, it could reduce the amount of the battery needed.
- No memory effect  
Without memory effect, AA PORTABLE POWER serial LIR2450 battery could provide you enough power whenever and wherever you are.
- Good consistency  
Having an ISO9000 quality control system, manufactory processes are under a strict control. The capacity, internal resistance, discharge plateau and self-discharge of each battery has good consistency.

There are three construct wound together in the steel can, positive electrode (LiCoO<sub>2</sub>), negative electrode(C) and separators (PP&PC). A built-in safety vent could prevent the cell from such an expose the internal pressured when the internal pressure of the cell

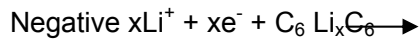
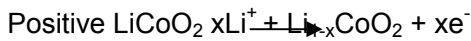
increase abnormally.

## 6. Electrochemical principles

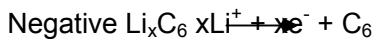
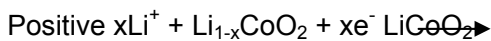
In Lithium-ion batteries, there is no any metal Lithium. Only Li-ion moves between the positive and negative electrode, without changing the cathode and anode materials. The principle of Li-ion battery react is fundamentally different to metal Lithium battery. Li-ion batteries have better safe characteristic. The electrochemical react of Li-ion battery are described below.

- **chemical react ion formula:**

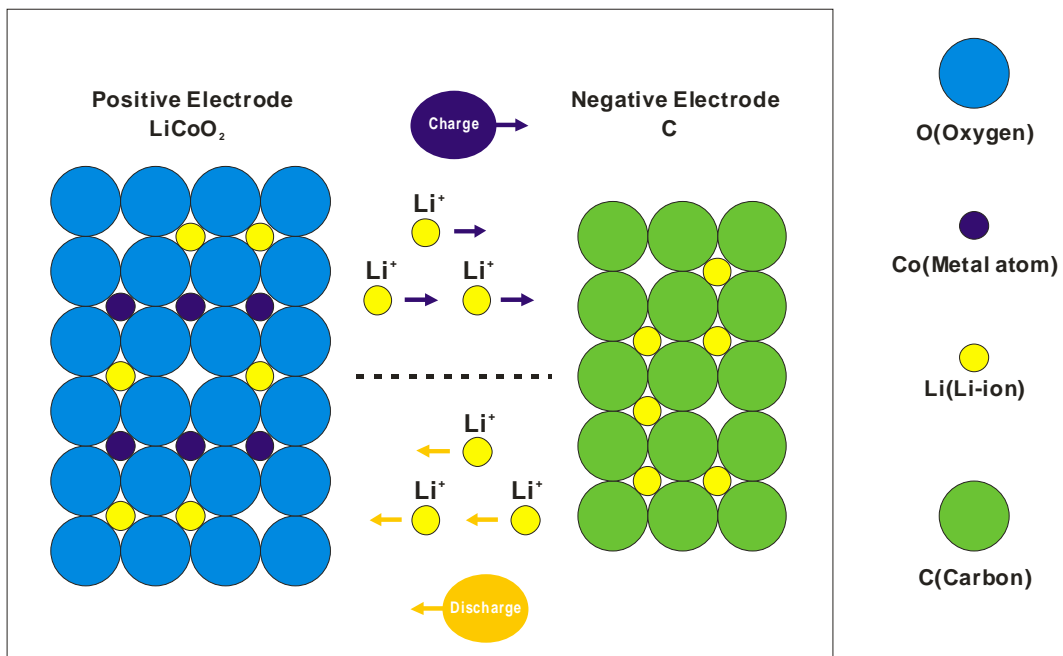
charge:



discharge:



- **chemical react ion principle sketch map:**



## 7. Specification

### Product ion specification

• Li-ion button battery

Model	Nominal voltage (V)	Nominal capacity (mAh)	max pulse discharge current (mA)	diameter (mm)		Weight (g)	Max Discharge Current (mA)	Cycle Life (Times)
				C(diameter)	T(thickness)			
LIR2450	3.60	120	180	24.5	5.0	5.2	35	500

## 8. Performance

### 8.1 standard test condition

test shall be carried out at normal atmosphere pressure, unless otherwise specified:

Temperature:  $20 \pm 5^{\circ}\text{C}$

Relative humidity:  $65 \pm 20\%$

Atmosphere pressure: 86kPa~106kPa

### 8.2 electrical characteristic

If necessary (storage time over 3 months), the battery should be charged and discharged for several times. At  $20 \pm 5^{\circ}\text{C}$  temperature, the battery should be charged with a constant current 0.5CmA reached the voltage limit 4.20V, then rest for about 1 hour, discharged with a constant current 0.5CmA to voltage 3.00V.

## 8.2.1 Charge characteristic

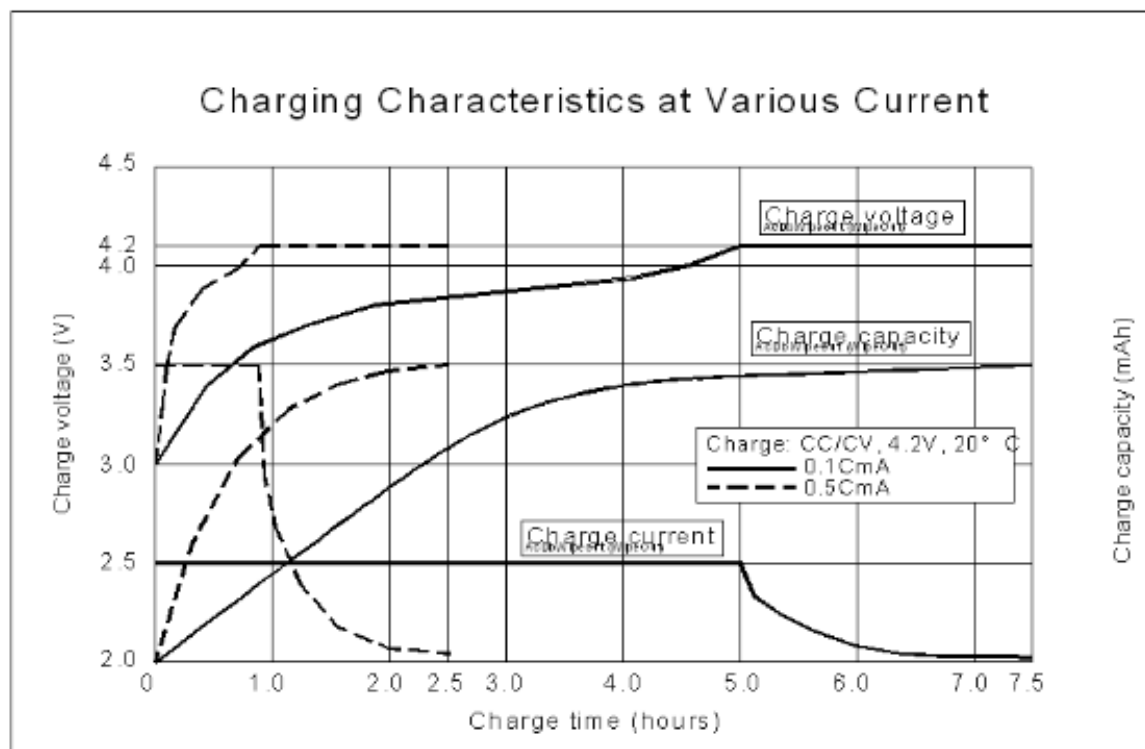
### Charge method

Battery could be charged with one of the following method:

- Standard charge: at  $20\pm 5^{\circ}\text{C}$  temperature, charge with a constant current  $0.5\text{CmA}$ , to the voltage limit  $4.20\text{V}$ , then charge with a constant voltage  $4.2\text{V}$ , until the charge current reaches  $0.8\text{mA}$ , end charge.
- Rapid charge: at  $20\pm 5^{\circ}\text{C}$  temperature, the battery should be charged with a constant current  $1\text{CmA}$  to the voltage limit  $4.20\text{V}$ , then charge with a constant voltage  $4.2\text{V}$ , until the charge current reaches  $0.8\text{mA}$ , end charge.

### Charge characteristic curve

Figure 1. Charging at various current



### 8.2.2 Capacity characteristic

#### Nominal capacity

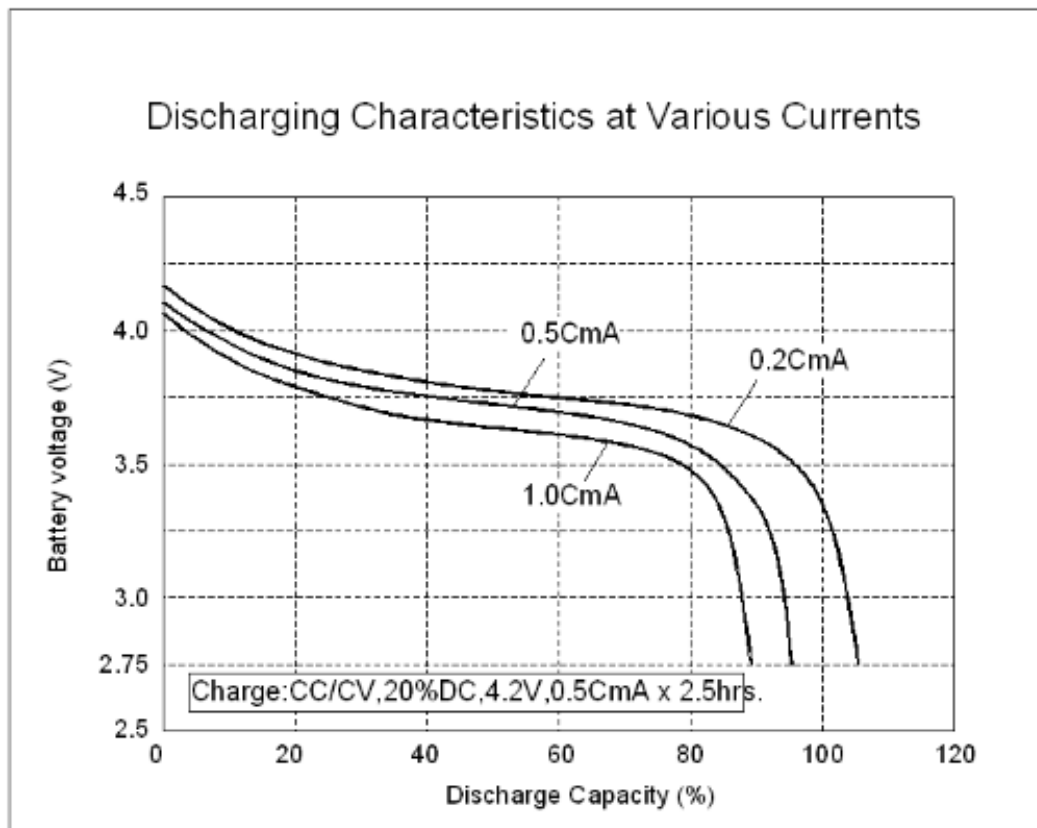
Within 1 hour after charge, discharge with 0.5CmA constant current down to 3.00V, discharge capacity should not lower than nominal capacity.

#### 1CmA discharge capacity

Within 1 hour after charge, discharge with 1CmA constant current down to 3.00V, discharge capacity should not lower than 54 minutes.

#### Capacity characteristic curve

Figure 2. Discharging at various current



### 8.2.3 Temperature characteristic

#### High temperature feature

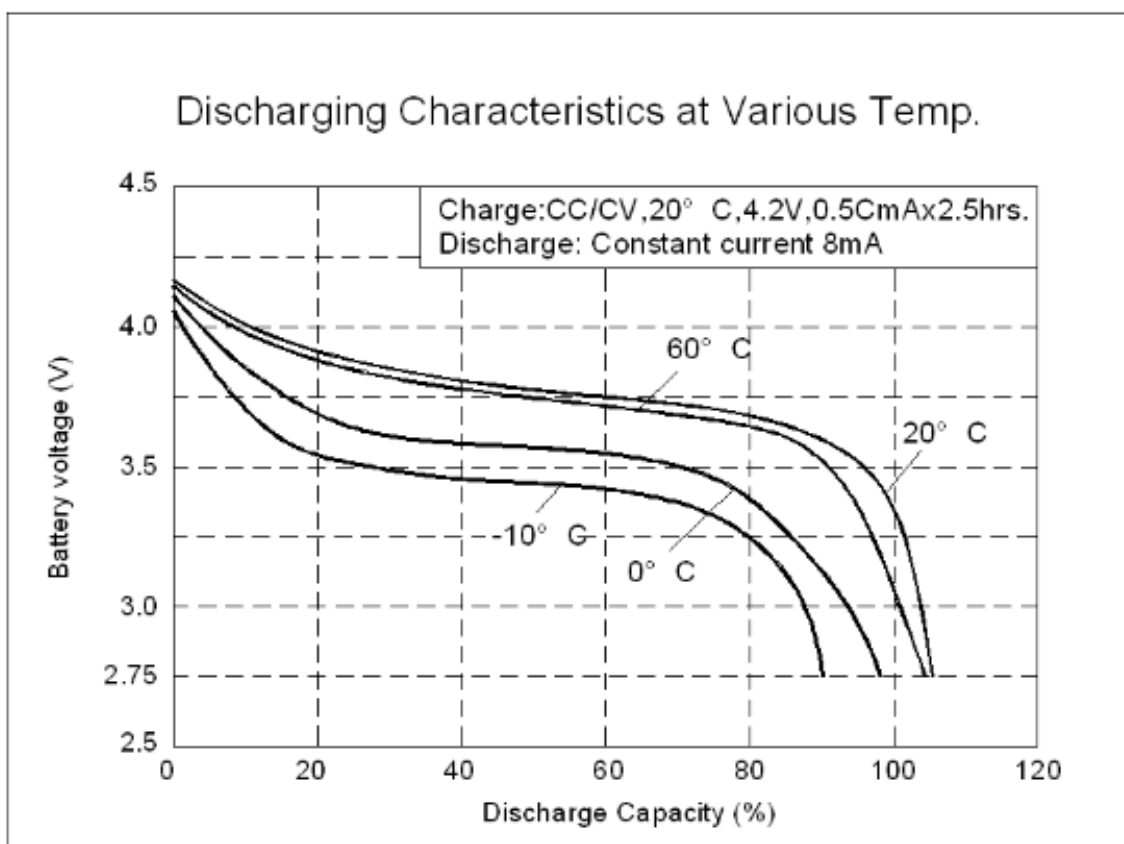
After charge, leaving the battery in  $60\pm 2^{\circ}\text{C}$  stove for 2 hours, discharging with 1CmA constant current down to 3.00V, then back to  $20\pm 5^{\circ}\text{C}$  for 2 hours, discharge time should not less then 54 minutes. The battery has no reformat and damage.

#### Low temperature feature

After charge, leaving the battery in  $-10\pm 2^{\circ}\text{C}$  stove for 2 hours, discharging with 0.5CmA constant current down to 3.00V, then back to  $20\pm 5^{\circ}\text{C}$  for 2 hours, discharge time should not less then 1.8 hours. The battery has no reformat and damage.

#### Temperature feature curve

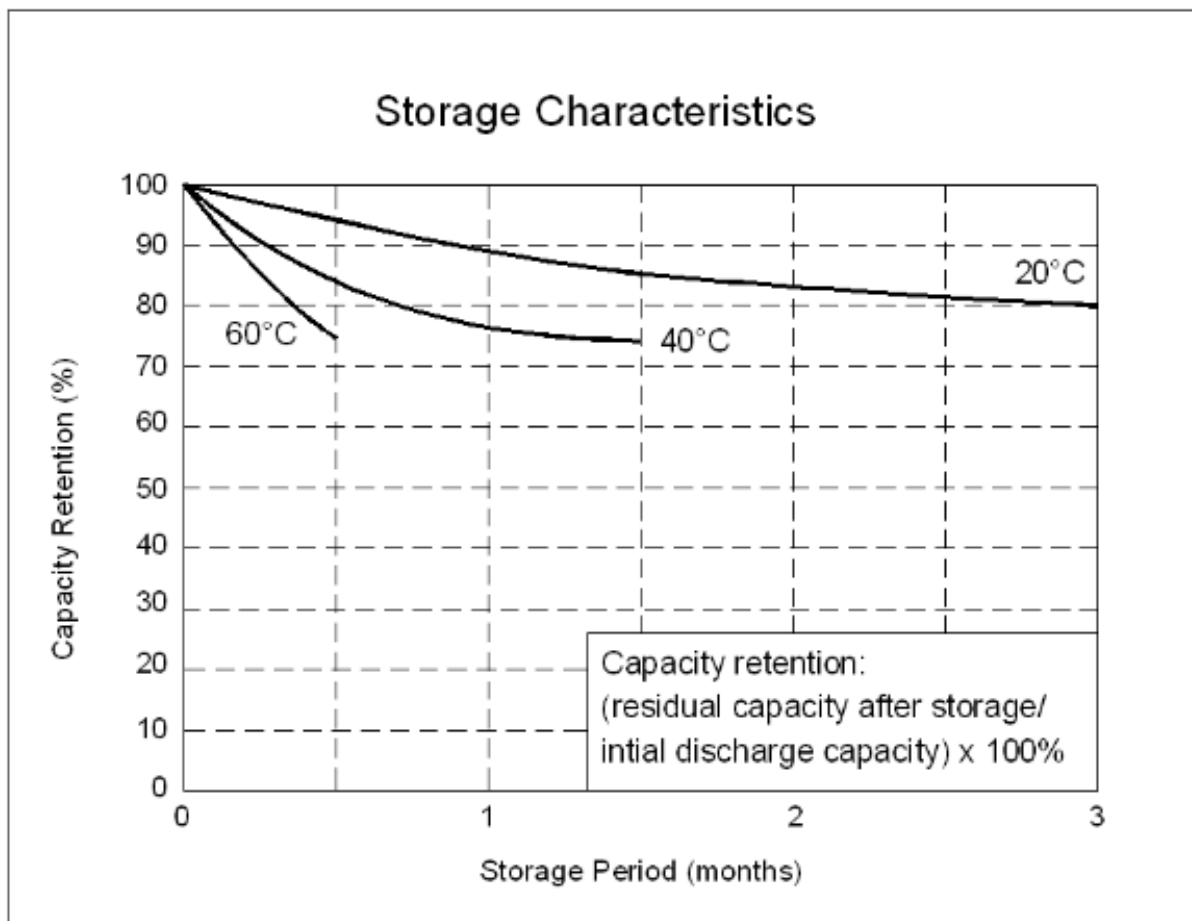
Figure 3. Discharging at various temperature



### 8.2.4 Storage feature

After charge, leaving the battery at  $20\pm 5^{\circ}\text{C}$  for 30 days, discharging with 0.5CmA constant current down to 3.00V, discharge time should not less than 1.8 hours.

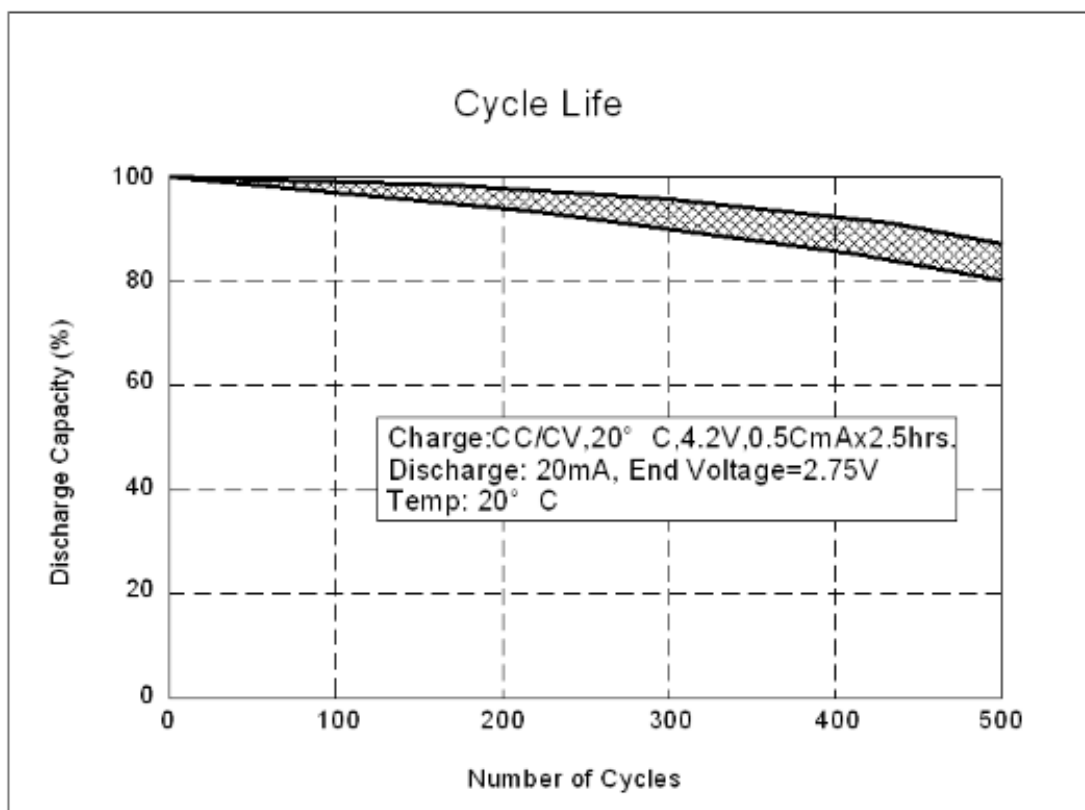
Figure 4 Storage characteristics



### 8.2.5 Cycle life

At  $20\pm 5^{\circ}\text{C}$  temperature, charge with a constant current 1CmA to the voltage limit 4.20V, then charge with a constant voltage 4.2V, until the charge current reaches 0.8mA, end charge. Discharge with 0.5CmA constant current down to 3.00V. If discharge capacity is lower than 80% 1CmA discharge capacity twice continuously, end cycle. Cycle life is more than 500 times.

Figure 5. Cycle life



### 8.3 Reliability

#### 8.3.1 Constant humidity and temperature feature

After charge, subject to 10~55Hz 0.35mm amplitude vibrate with direct of X, Y, Z for 10 times, by visual check, the battery should not have abnormal stain, reformat or damage. Discharge with 1CmA constant current down to 3.00V, then cycle 3 times, discharge time larger than 54 minutes.

#### 8.3.3 Drop impact

After charge, drop the battery 1000mm above tiled concrete ground 2 times each for X, Y, Z direct, by visual check, the battery should not have abnormal stain, rupture or damage. Discharge with 1CmA constant current down to 3.00V, then cycle 3 times, discharge time larger than 54 minutes.

## 8.4 Protective feature (including protective circuit)

### 8.4.1 Over-charging protective feature

After charge, charge 8 hours with a 2V nominal voltage 2C output current power supplier. At  $20\pm 5^{\circ}\text{C}$ , discharge with 0.5CmA constant current down to 3.00V, then cycle 3 times, discharge time larger than 54 minutes. No rupture, fire, smoke or leakage.

### 8.4.2 Over-discharging protective feature

At  $20\pm 5^{\circ}\text{C}$ , discharge with 0.2CmA constant current down to 3.00V, then discharge 24h for  $30\Omega$  load, cycle 3 times, discharge time larger than 54 minutes. The battery has no rupture, fire, smoke, and leakage.

### 8.4.3 Short circuit protect feature

After charge, short circuit for 1 hour with a  $0.2\Omega$  resistant. The voltage of the battery after instantaneous charge should higher than 3.6V. The battery has no rupture, fire, smoke, and leakage.

Remark: the above security performance tests should be processed under a protect ion.

## 9. Notice

- Keep away from heat or fire;
- Do not try to disassemble the battery or battery pack;
- Do not short-circuit the battery, do not handle or store with metallic materials, which can cause short-circuit;
- Do not disposed the battery into water or contact with water;
- Do not throw the battery or drop into ground;
- Do not punch or hammer the battery;
- Use specified charger to charge battery;
- Do not directly solder onto the battery;
- Do not connect battery with reversed poles;
- Do not use the battery in the unspecified applicant;
- Do not use the battery mixed with primary cells or other kinds rechargeable battery;
- Before use, the battery should be charged by specified charger;
- Please read instruct carefully before use.