

**Rechargeable Li-Ion Button Battery**  
**Serial LIR2032**

**AA Portable Power Corp.**

## 1. Scope

This specification applies to the Lithium-Ion Rechargeable Button Battery LIR2032.

## 2. Type and Model

- Type: Lithium-Ion rechargeable button battery.
- Model: Lithium-Ion rechargeable button battery LIR2032

## 3. Produce Introduce Lithium-Ion

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 communication equipments and instruments.

## 4. Features

- Long service time  
Under normal conditions and correct operations, AA PORTABLE POWER LIR2032 battery can maintain 80% capacity after 500 cycles.
- High energy density  
Batteries are easy to meet the mini equipment, with small volume and light weight.
- 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 LIR2032 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 Ions 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 explosion on the internal pressure when the internal pressure of the cell increase abnormally.

## 6. Electrochemical principles

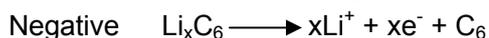
In Lithium Ion batteries, there is no any metal Lithium. Only Li-Ion moves between the positive and negative electrode, without changing the cathode and anode materials. The principle of Li-Ion battery react ion is fundamentally different to metal Lithium battery. Li-Ion batteries have better safe characteristic.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

- **chemical react ion formula:**

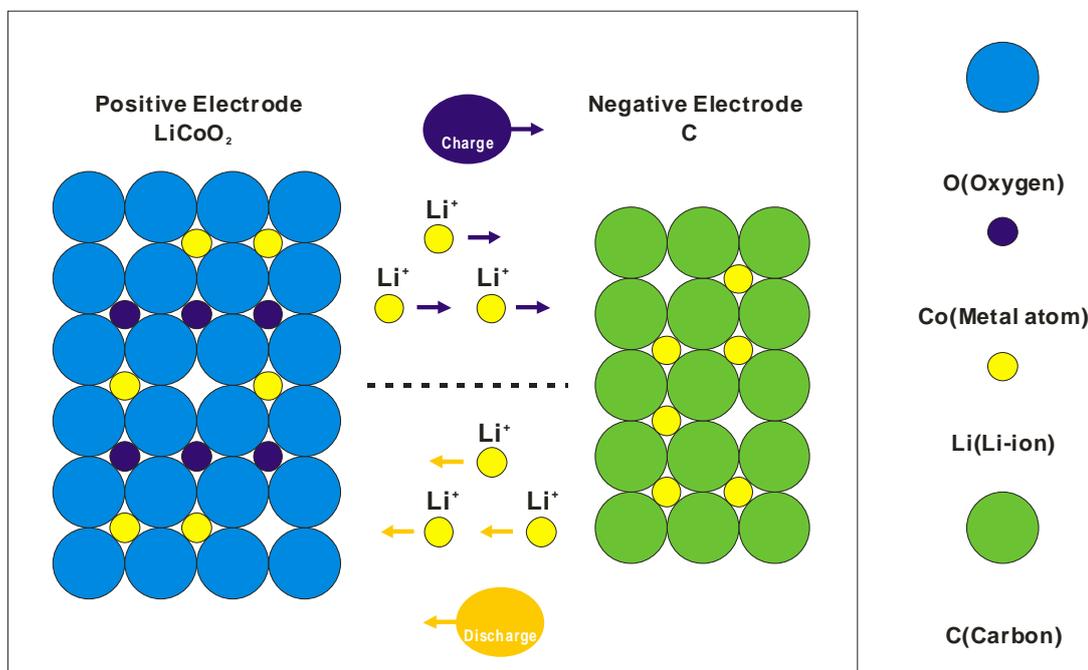
charge:



discharge:



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



## 7. Specifications

### Product Ion specification

- Li-Ion button battery Product 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)			
LIR2032	3.60	40	75	20.0	3.2	3.1	12	500

## 8. Performance

### 8.1 standard test condition

The 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:  $86\text{kPa} \sim 106\text{kPa}$

### 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

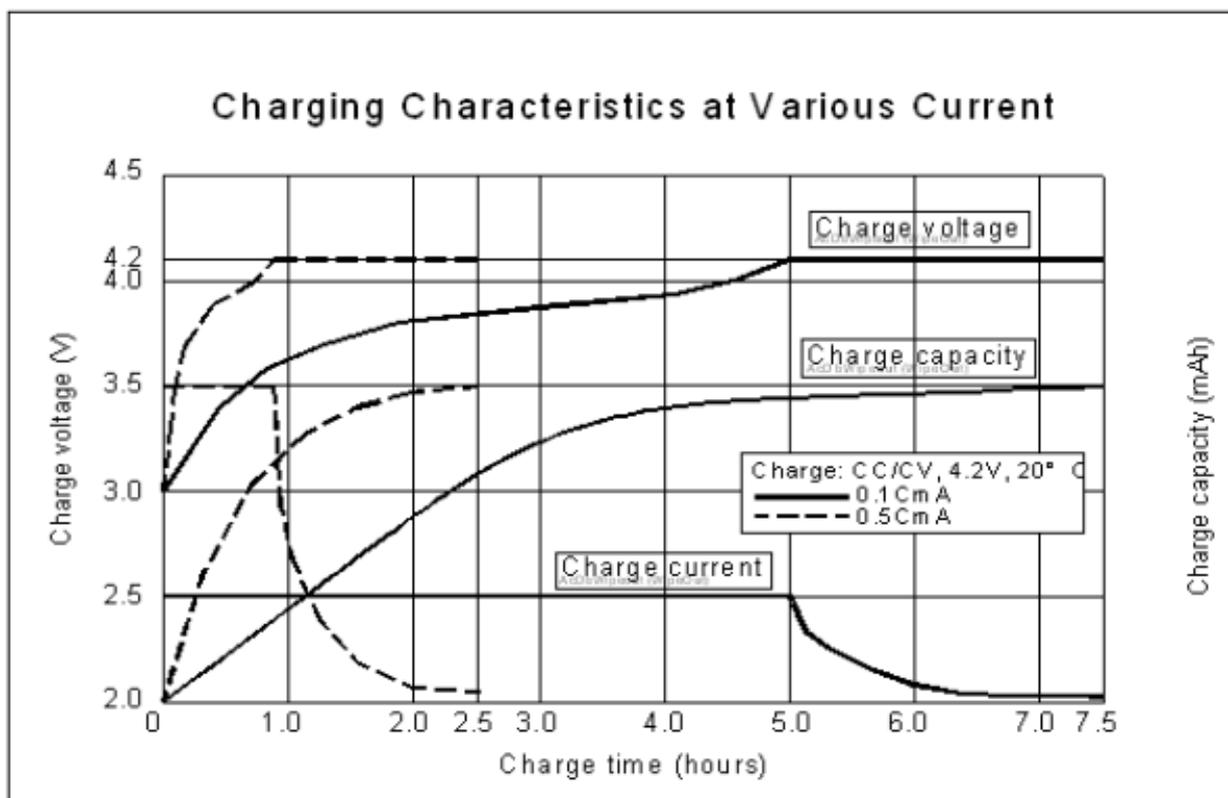
##### Charge method

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  $4.20\text{V}$ , 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  $4.20\text{V}$ , until the charge current reaches  $0.8\text{mA}$ , end charge.

Charge characteristic curve

Figure 1. charging at vcurrent



8.2.2 Capacity characteristic

Nominal capacity

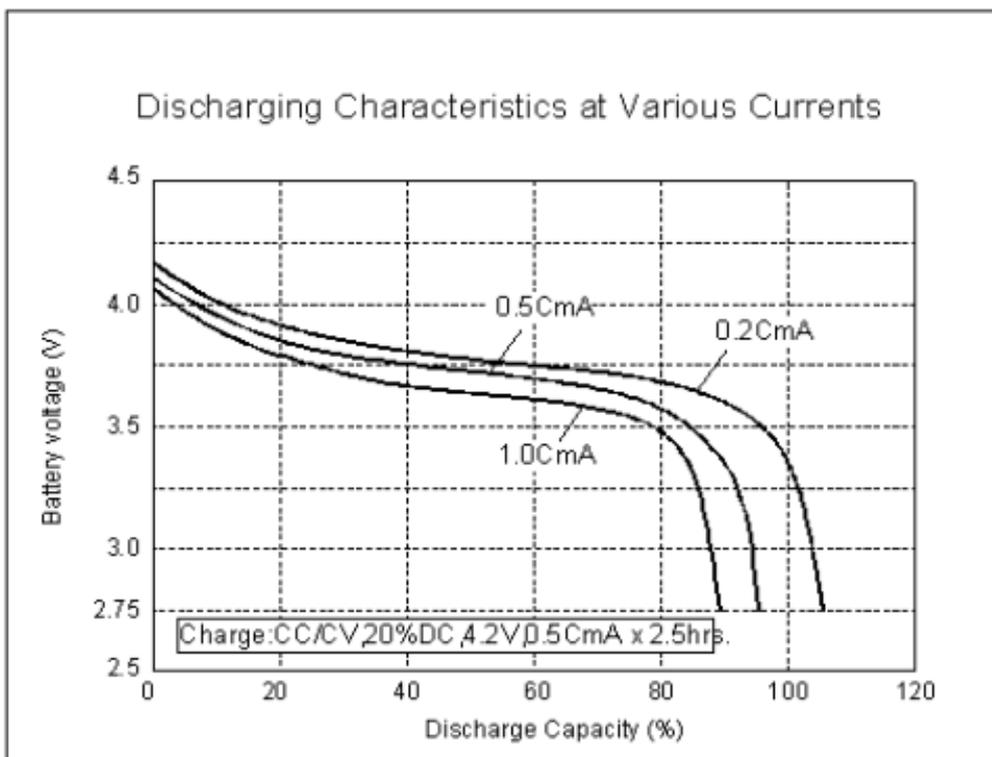
Within 1 hour after charge, discharge with  $0.5\text{CmA}$  constant current down to  $3.00\text{V}$ , discharge capacity should not lower than nominal capacity.

### 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 deformed Ion and damage.

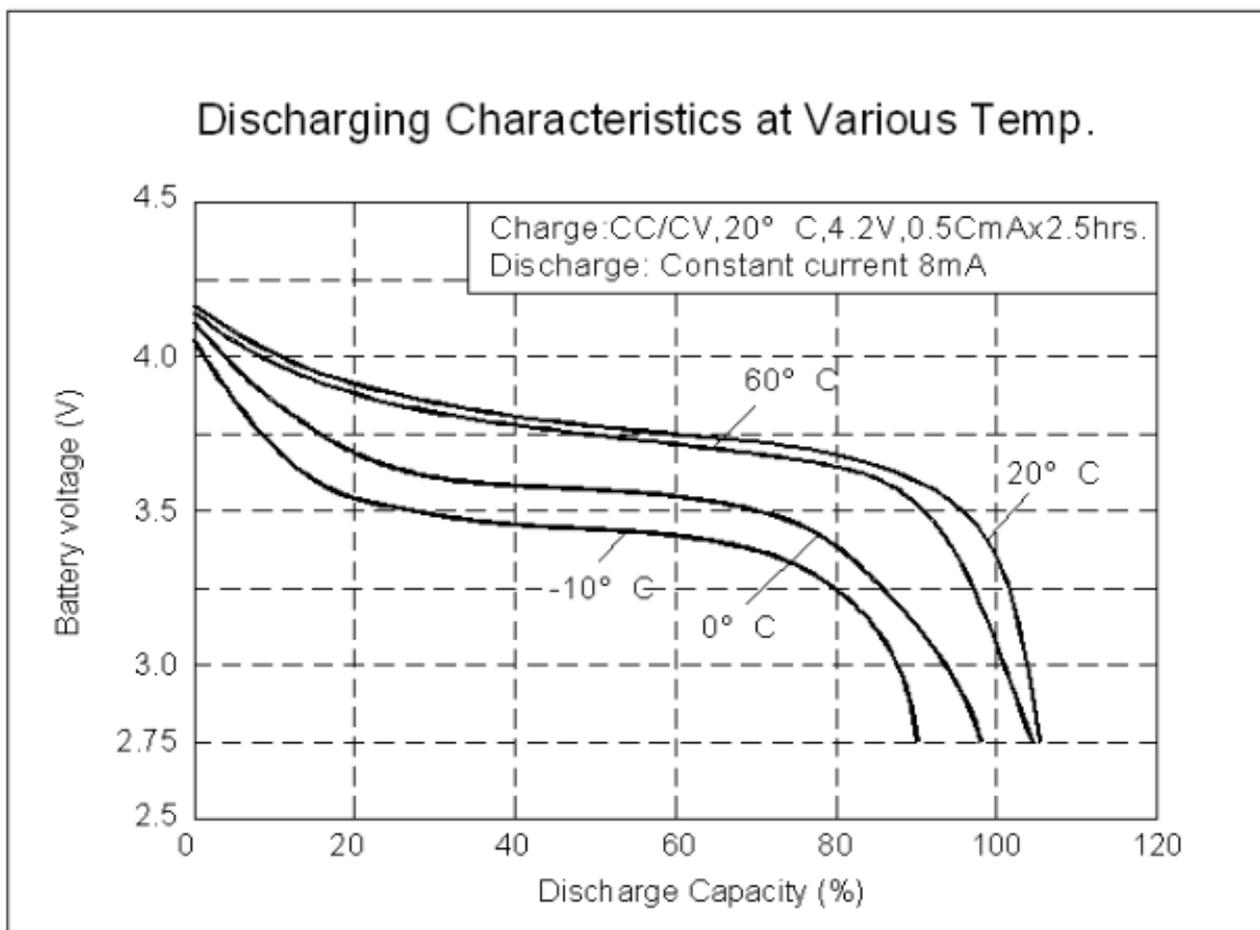
#### Low temperature feature

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±5°C for 2 hours, discharge time should not less then 1.8 hours. The battery has no deformed Ion and damage.

### Temperature feature curve

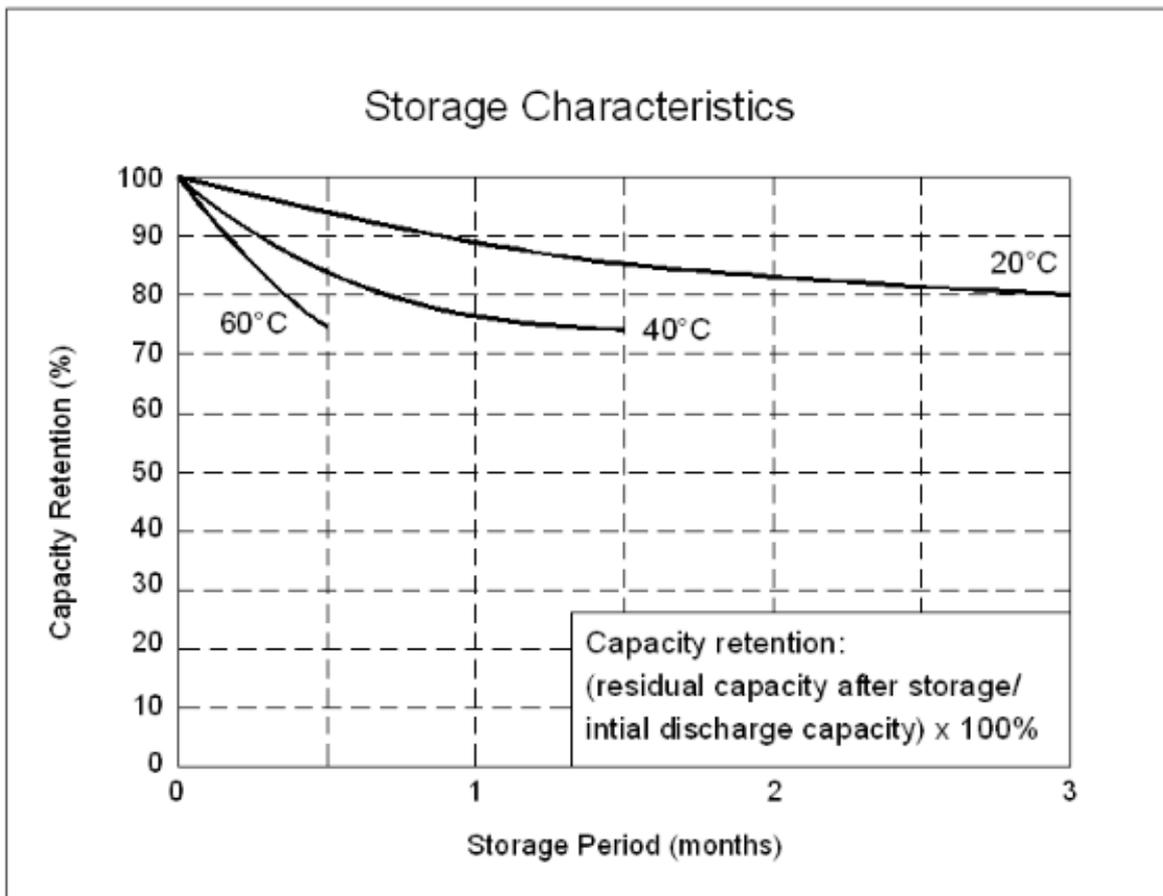
Figure 3. Discharging at various temperature



### 8.2.4 Storage feature

After charge, leaving the battery at 20±5°C for 30 days, discharging with 0.5CmA constant current down to 3.00V, discharge time should not less then 1.8 hours.

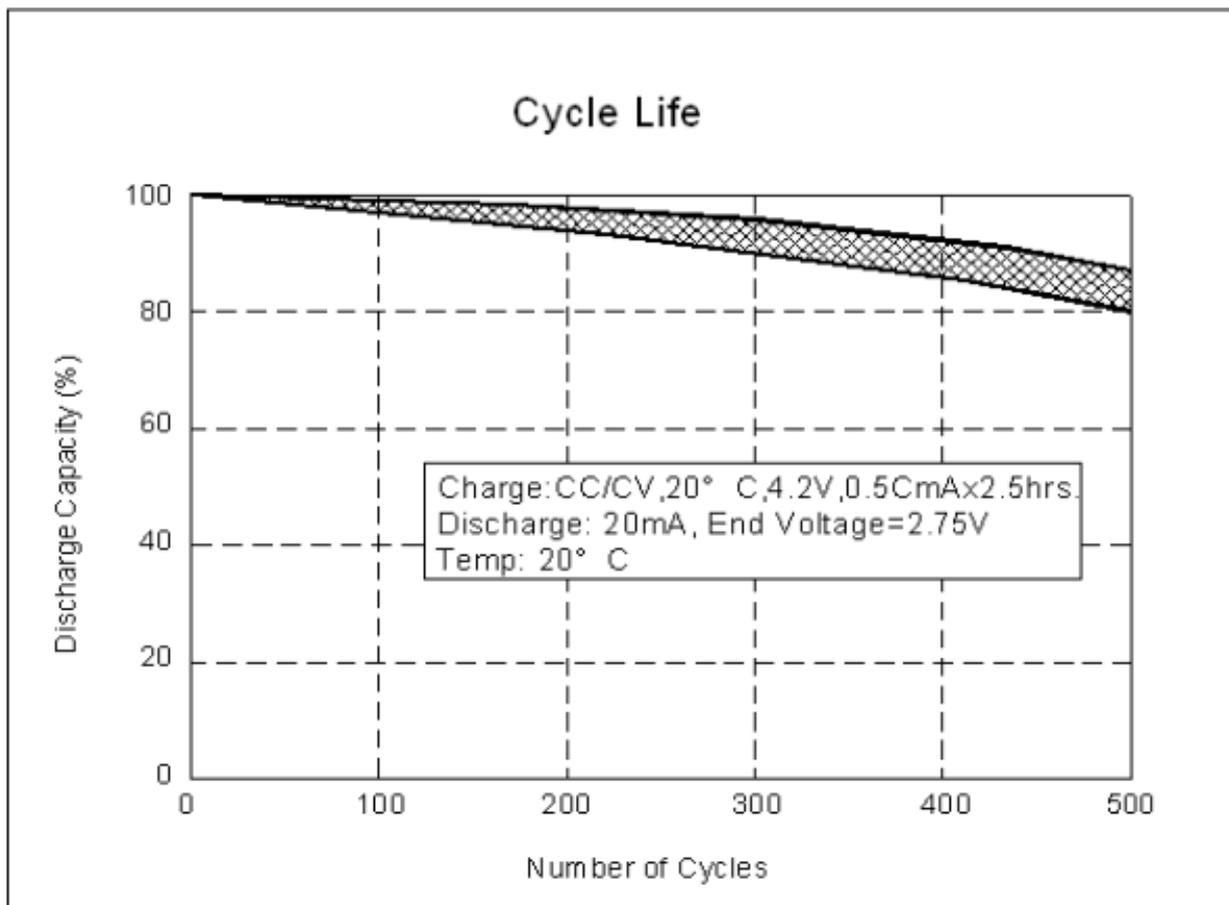
Figure 4. Storage characteristics



### 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 4.20V, until the charge current reaches 0.8mA, end charge. Discharge with a 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 Ion with direct Ion of X, Y, Z for 10 times, by visual check, the battery should not have abnormal stain, deformed Ion or damage. Discharge with 1CmA constant current down to 3.00V, then cycle 3 times, discharge time not lower 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 Ion, 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 Ion 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 that 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 filed;
- 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 the instruction carefully before use.