

Wuhan LiXing(Torch) Power Sources Co.,Ltd

Controlled Document's  
No.

Q/LX.S.E.09.008-2020

Edition/Status

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**Cylindrical Li/ SOCl<sub>2</sub> Battery**  
**Specification**  
**Model: ER14505M**

**Customer:**

**Customer's opinion:**

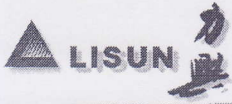
**Signature:**

**Date:**

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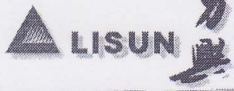
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## 1. Purpose

1.1 In order to avoid errors and deviations by different testing method or condition, we established this specification to define the battery model and test method of lithium battery manufactured by Lixing.

1.2 Give some guidance for using our products.

## 2. Description and model

Table 1

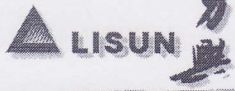
Description	Model
Li/SOCl <sub>2</sub> Cylindrical Battery	ER14505M

## 3. Technical parameters

Table 2

No.	Items	Characteristics	Explanation
1	Nominal Voltage	3.6V	It means when discharge at 36KΩ (≈ 0.1mA)、20±2℃.
2	Nominal Capacity*	2200mAh	It means when discharge at 1.8KΩ (≈ 2.0mA)、20±2℃、end voltage 2.0V.
3	Typical discharge capacity under 2mA	2100±100mAh	It means when continuously discharge under 1mA till 2.0V end voltage.
5	Operating Temperature range	-55~+85℃	
6	Max. Pulse Current	1500mA	
7	Max. Continuous Discharge Current	1000mA	
8	Structures	Thionyl chloride, lithium anode, acetylene black, separator, and stainless steel cell shell etc.	
9	Weight for Reference	About 20g	

\* The nominal capacity may differ due to change of the discharge current, temperature and end voltage.



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## 4. Outline figure and Dimension

To see Appendix 1.

## 5. Appearance

The surfaces of the batteries are clean. The mark is clear. There should not be deformation, rust, stain or leakage.

## 6. Performance

### 6.1 Electronic characteristic

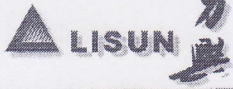
Table 3

No.	Items	Test condition	Performance within one year under normal temperature	Performance after one year's storage under normal temperature
1	Open circuit voltage			
	Room temperature	20±2 °C	3.63~3.70V	3.63~3.72V
	Low temperature	-40±2 °C	3.63~3.70V	3.63~3.72V
	High temperature	60±2 °C	3.63~3.74V	3.63~3.74V
2	Working temperature	Discharge load: 0.82KΩ		
	Room temperature	20±2 °C	≥3.4V	≥3.2V
	Low temperature	-20±2 °C	≥3.1V	≥3.0V
	High temperature	60±2 °C	≥3.5V	≥3.3V
3	Working life	Discharge load: 1.8KΩ End voltage: 2.0V		
	Room temperature	20±2 °C	≥1000hrs	≥950hrs
	Low temperature	-20±2 °C	≥500hrs	≥450hrs
	High temperature	60±2 °C	≥950hrs	≥900hrs
4	Working life	Discharge load: 400mA End voltage: 2.0V	≥1150mAh	≥1000mAh
	Room temperature	20±2 °C		

### 6.2 Performance inspection

6.2.1 Six samples for each testing item.

6.2.2 Samples should be placed over 24 hours under the requested



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temperature, which the test will be done.

### 6.3 Environment acclimatization

Table 4

No.	Items	Requirements	Method
1	Altitude Simulation Test	NM, NL, NV, NC, NR, NE, NF	At 20°C±2°C, the batteries should be stored at the pressure of 11.6 KPa or less for at least six hours.
2	Temperature Cycling	NM, NL, NV, NC, NR, NE, NF	The batteries should be stored at least 6 hours at 75±2°C, then be stored at least six hours at -40±2°C. The interval between the two temperatures should be maximum 30 minutes. Repeat this process for 10 times. Then store batteries 24hours at 20±5°C.
3	Vibration	NM, NL, NV, NC, NR, NE, NF	The batteries should be subjected to a simple harmonic motion with an amplitude of 0.8mm(1.6mm total maximum excursion). The frequency is to be varied at the rate of 1Hz per minute between 10 and 55Hz. The test should be last 90min~100min and the cell should be tested in two mutually perpendicular direction.
4	Shock	NM, NL, NV, NC, NR, NE, NF	The batteries should be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each battery should be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of the three mutually perpendicular directions. Each shock is to be applied in a direction perpendicular to the face of the battery. For each shock the battery is to be accelerated in such a manner that, during the initial 3ms, the minimum average acceleration is 75×9.8m/s <sup>2</sup> . The peak acceleration should be between 125×9.8 m/s <sup>2</sup> ~175×9.8 m/s <sup>2</sup> .
NM: no weight loss                      NL: no leakage                      NV: no venting                      NF: no fire NC: no short circuit                      NR: no rupture                      NE: no explosion NT: no overheating (the temperature at the surface of battery not exceed 150°C)			

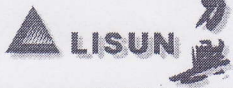
### 6.4 Safety performance

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Table 5

No.	Items	Requirements	Method
1	Forced discharge	NE、NF	Each battery should be forced discharged by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. Each battery should be forced discharged for a time equal to the time in which a new cell is discharged to 2.0V.
2	Abnormal Charge	NE、NF	Sample batteries are to be connected reversely with a D.C. power supply, and subjected to a constant charging current at 3 times the $I_c$ . Charge time $T_c=2.5 \cdot C_n / (3 \cdot I_c)$ **.
3	Free Drop	NV、NE、NF	The not-discharged battery is to be dropped from a height of 1m onto a concrete surface. Each sample is to be dropped six times, two times in each direction. The sample should be examined 1 hours after testing.
4	Heating Test	NE、NF	The battery should be placed in an oven. The oven temperature should be increased at a rate of $5^\circ\text{C} \pm 2^\circ\text{C}$ per minute until the oven reached $130^\circ\text{C} \pm 2^\circ\text{C}$ . The oven should be maintained at $130^\circ\text{C} \pm 2^\circ\text{C}$ for 10min.

**NM: no weight loss**                      **NL: no leakage**                      **NV: no venting**                      **NF: no fire**  
**NC: no short circuit**                      **NR: no rupture**                      **NE: no explosion**  
**NT: no overheating (the temperature at the surface of battery not exceed 150°C)**

\* Max discharge current: in table 5 means maximum continuous discharge current 1000mA.

\*\*  $T_c=2.5 \cdot C_n / (3 \cdot I_c)$   
 $T_c$ —test time calculated by computer is 123h.  
 $C_n$ —nominal capacity, our ER14505M's nominal capacity is 2200mAh.  
 $I_c$ —the abnormal charge current for the tests provided by battery supplier.  
Ours is  $I_c$  15mA.

## 7. Test condition

### 7.1 State of batteries

The batteries should be marked with manufacture date(year, month, date).

### 7.2 Normal testing environment

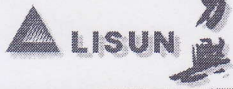
If no special requirement, test should be made under the temperature of  $20^\circ\text{C} \pm 5^\circ\text{C}$  and relative humidity of 45%~75%.

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### 7.3 Test precision

The measuring tolerances relative to the specified or actual values should be within these range:

Voltage	Current	Capacity	Temperature	Time	Weight	Dimension
±1%	±1%	±1%	±2℃	±0.1%	±0.1%	±0.1%

These tolerances include all errors caused by precision of testing instrument, testing method and testing process.

### 8. Packaging

Dimension of box	Net weight	Gross weight
406mm×287mm×165mm	12KG	15KG

Normal package: 600 pcs per box.

### 9. Environment requirement

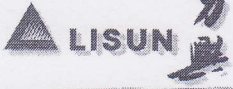
The product meets ROHS standard.

### 10. Producing standard and certification

Our batteries are produced according to the IEC-60086 standard.

### 11. Transportation

- The Batteries should be stored away from solarization, fire, rain, water, and never put together with corrosive during transportation.
- Vibration and shock during transportation and load-and-unload should be restrict to a minimum level.
- The height should not exceed 1.5m for cardboard packages.
- The batteries if transported by sea should be stored away from ship engines during prolonged transit, and not left for long periods in unventilated environment during summer.



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## 12. Information for safety

### ! Dangerous

- Do not overheat batteries or dispose of batteries in fire.
- Do not put batteries together with metalwork such as necklace, coins, etc in one bag, or store them together.
- Do not short-circuit batteries.
- Do not inset batteries in reverse. Observe the + and - markings on battery and equipment.
- Do not disassemble batteries.
- Do not weld or solder directly to batteries.
- Do not use deformed batteries or batteries with serious scar.
- Read the guide carefully before using batteries. Unsuitable operation will make batteries overheat, fire, explode, destroy or reduce battery's capacity.

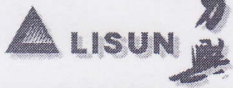
### ! Warning

- Do not place the battery in heater, washer or high-pressure container.
- Do not use the battery together with different kind of or different type of battery.
- Stop using when the battery become heat, emit smell or appear other abnormality during use, or storing.
- Do not recharge the battery.
- Do not force-discharge the battery.
- Keep away from the battery when the battery is leakage or emit abnormal smell.
- Wash yourself quickly when the electrolyte infiltrate to your skin or clothes.
- Wash your eyes with clean water quickly and go to hospital for further check if the electrolyte infiltrate to your eyes.
- Please contact with us in advance If two or more batteries are to be connected in a series and / or placed in a parallel arrangement.

### ! Caution

- Keep the battery away from the children, avoid being swallowed.
- Read the guide carefully and pay attention to the guide when using the battery.





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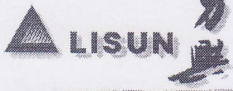
- Read the instrument guide carefully before installing the battery or uninstalling the battery from the instrument.
- Take out of the battery when the life of the battery is over.
- Take out of the battery and keep it under the condition of low temperature and low humidity when the battery is not used for a long time.
- Clean the battery with dry cloth before use if the connection of the battery is dirty.
- Battery should be used and stored far from the electrostatic place.

### 13. Storage

- The batteries should be stored at 10°C ~ 25°C (never exceed 30°C) , 45% ~ 75%RH.
- The batteries should not be stored next to heat sources nor in direct sunlight. The storage area should be clean, cool, dry, ventilated and weatherproof.
- The height to which batteries may be stacked is clearly dependent on the strength of the packaging. As a general rule, this height should not exceed 1.5m for cardboard packages nor 3m for wooden cases.
- Store and display batteries in their original package. The batteries may be short-circuited or damaged if been unpacked and stacked mussily.

### 14. Declaration

- 14.1 Please contact with Wuhan Lixing (Torch) Power Source Co., Ltd. If you have any question with this specification.
- 14.2 Wuhan LiXing (Torch) Power Source Co., Ltd keep the right to change the specification.



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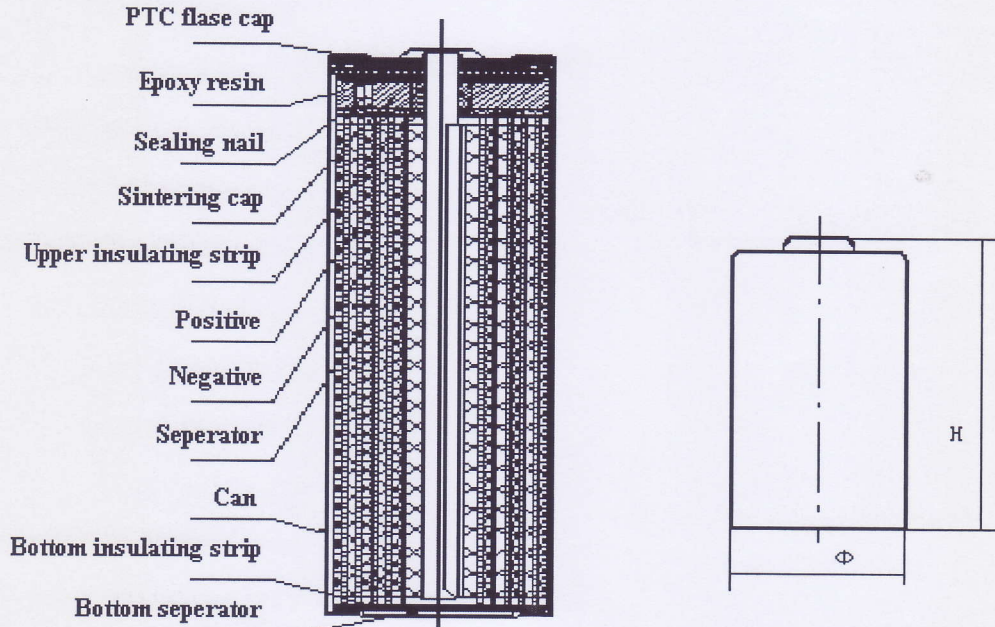
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Appendix 1:

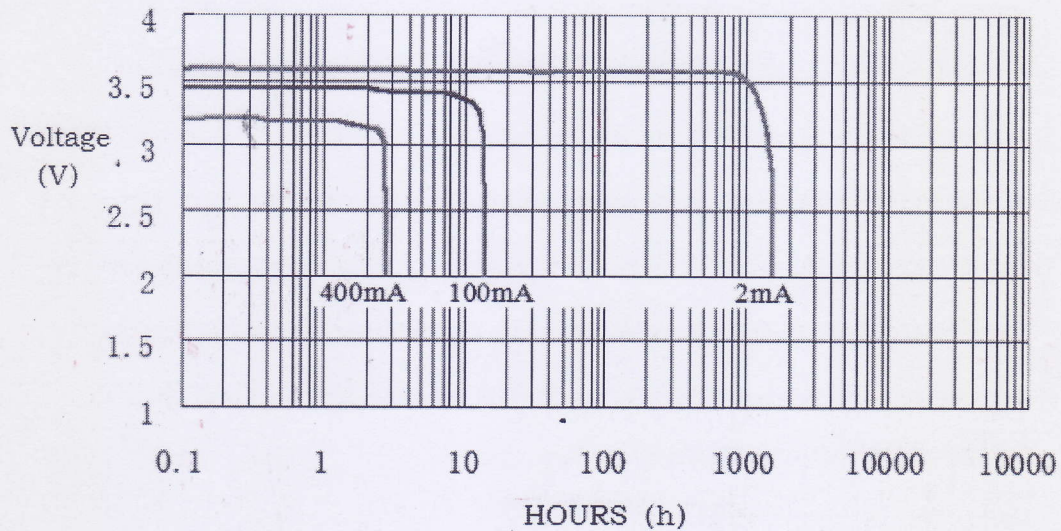
Battery Structural Drawing  
Li-SOCl<sub>2</sub> Battery with High Power



Model	Diameter $\Phi$ ( mm )	Height H ( mm )
ER14505M	$\leq 14.5$	$\leq 50.5$

Appendix 2:

ER14505M's discharge Curve on Different Current at 20°C

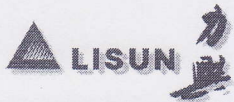


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Appendix 3:

Structure Figure of Package  
ER14505M 600 Pcs Per Box

1. Battery

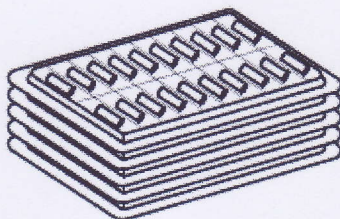


2. 20 Pcs Pre Plate

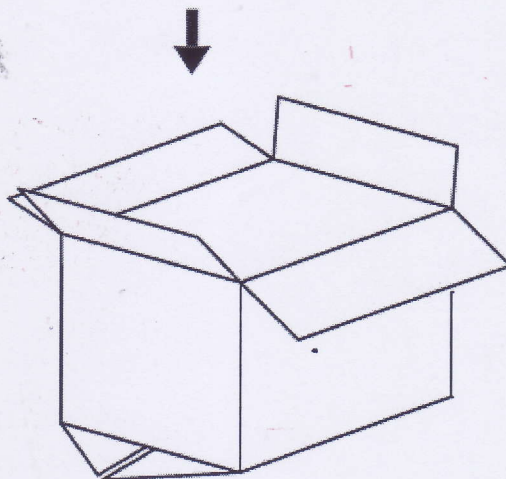


Outline Dimensions Of  
Plate: 243 × 128 × 17

3. 5 Plates Per Min Package



4. 6 Min Package Per Box



Outline Dimensions Of  
Box: 406 × 287 × 165  
Net: 12.0 kg Gross: 15.0 kg