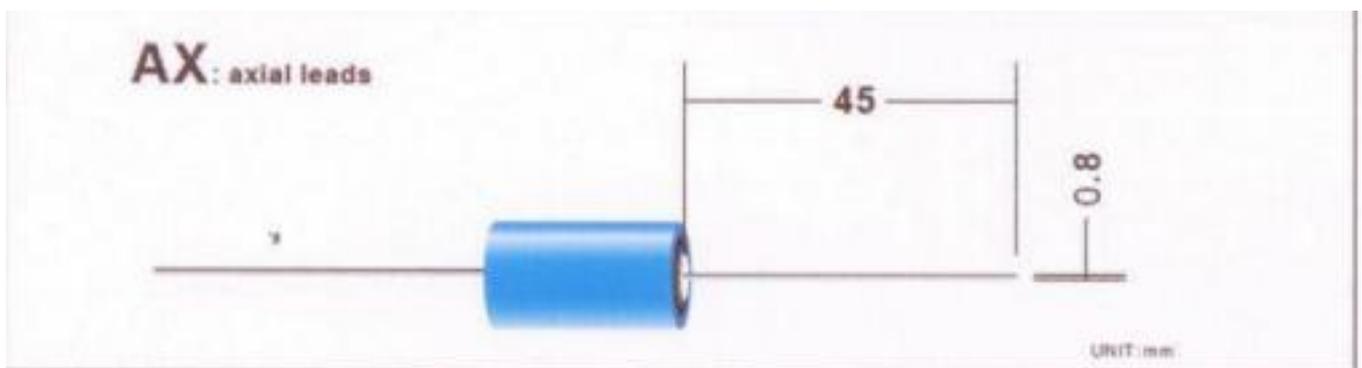


SPECIFICATION FOR APPROVAL

ER14505AX(Li-SOCl₂)

APPROVE LETTER

Model: ER14505AX



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1. Overview:

Performance described below is provided for the full-sealed lithium thionyl chloride battery (hereinafter referred to as battery). The battery can be used for variety of application, mainly for the smart card meters(water, electricity, gas meters), computer back-up power , medical devices, wireless communication ,s oil drilling, mobile communication equipment, scientific instruments, remote data systems, military applications and other electric equipment.

2. Cell structure and appearance:

2.1 Structure: **ER14505AX Bobbin type/ glass to metal sealed.** ($1\text{atm He} \leq 10^{-7} \text{atm.cc/ second}$) 。

2.2 Appearance: Visual check the **ER14505P**, no dents, no bumps, no rust and leakage, the label can be cleared.

3. General Performance:

Item	Item	Performance
3.1	Model	ER14505P
3.2	Nominal voltage	3.6V
3.3	Nominal capacity	2.7Ah 【 ($3.6\text{K}\Omega / 1\text{mA}, +23^\circ\text{C}$, ending voltage 2.0V) <u>Note:</u> <u>different drain, different temperature and different ending voltage which will result in different test result</u>
3.4	Max. constant current	100mA (If you need higher pulse current, pls consult malak)
3.5	Max. pulse current	200mA
3.6	Max size	$\Phi 14.2\text{mm} \times 50.5\text{mm}$ (cell)
3.7	Temperature range	- $55^\circ\text{C} \sim +85^\circ\text{C}$
3.8	Max weight	21g

4、 Technical request and safety performance

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4. 1 Technical request :

Item	Item	Test standard	Storage after 1 year
4.1.1	Opening voltage	$\geq 3.64V$	$\geq 3.64V$
	Room temperature	$20 \pm 2^{\circ}C$	3.64—3.68V
	Lower temperature	$-40 \pm 2^{\circ}C$	3.65—3.68V
4.1.2	Loading voltage	$20 \pm 2^{\circ}C$, 100 Ω	10S $\geq 3.3V$
4.1.3	Working voltage	Ohm: 100 Ω	
	Room temperature	$20 \pm 2^{\circ}C$	At least: 3.2V
	Lower temperature	$-30 \pm 2^{\circ}C$	At least: 3.0V
4.1.4	Lifetime	Ending voltage: 2.0V Load: 1.8K Ω	
	Room temperature	$20 \pm 2^{\circ}C$	Min: 800 h
	Lower temperature	$-30 \pm 2^{\circ}C$	Min: 400 h
	Room	Load: 100 Ω $20 \pm 2^{\circ}C$	Min: 190h
4.1.5	Leakage	Above item 1-4	No liquid leakage
4.1.6	Deforme	Above item 1-4	The size can't exceed the max request size.

4.2 Enviroment test:

NO.	Item	Test method	Standard
4.3.1	Temperature	Put the battery under $-54^{\circ}C$ and $71^{\circ}C$ for 16 hours and	UL test***Involved

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	recycle	then turn on for 10 times, When ready to move the battery from one temperature environment temperature into another, storage the battery at room temperature for 8 hours, when the battery stability , then make the recoard of the result, the battery voltage , capacity no change and the there is not leakage.	File MH46528
4.3.2	Higher degree test	Storage at +20°C , 11.6KPa (≈ 15, 240m) storage for 6 hours, no leakage, no fire and no explore.	UN Test involved Report ID:100125-176
4.3.3	Free drop test	2 times each time, total 6 times, from 1 meter drop to the floor, no explosion or fire during the test.	IEC Test involved CGZ3100712-02536-E
4.3.4	Shaking test	Frequency range :10-5 5Hz Amplitude: 1.6mm Test duration: 95 ± 5 minutes each axis Vertical axis for the three trials to start After the test, the battery should keep the original performance and appearance with the original status.	UL*IEC*** test involved
4.3.5	Mechanical shock	Average acceleration: 75g Maximum acceleration :125-175g Impact imposed on the three vertical axis After the test, the battery should keep the original performance and appearance with the original status.	UN*IEC*** test involved

4.3 Safety Test

No.	Item	Test method	Standard
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<p>4.2.1</p>	<p>Short-circuit performance at room temperature</p>	<p>Solder the nickel plate to the battery, the battery short 24 hours, the effective resistance is about 0.005Ω, the short circuit test within 24 hours of observation on the battery, the battery no explosion, fire, and so on. Instantaneous surface temperature not exceeding 150 ± 2 °C.</p>	<p>UL test involved</p>
<p>4.2.2</p>	<p>High-temperature short-circuit performance 72 °C</p>	<p>Solder the nickel plate to the battery, stored the battery under 72 °C for 16 hours. Short-circuit the battery, and its effective resistance is about 0.005 Ω , the temperature at 72 °C +2 °C environment, and then stored for 24 hours. In the short-circuit test of the battery within 24 hours of observation. Battery no explosion, fire, etc., the instantaneous surface temperature not exceeding 150 ± 2 °C.</p>	<p>UL test involved</p>
<p>4.2.3</p>	<p>Over-discharge performance</p>	<p>The full discharge single cell connect with 4PCS new battery , forced discharge for 12 hours, the battery no explosion, fire, etc.</p>	<p>UL & IEC test involved</p>

Reference to safety standards:

* **UL (USA) Underwriters Laboratories**

"Li-ion battery Standard"-UL 1642 - 3rd Edition -1995

** **UN United Nations Secretariat**

"Recommendations on the Transport of dangerous goods case "

Ref.ST/SG/AC.10/1- 12th Edition -2001

"Testing and Standards Manual "

Ref.ST/SG/AC.10/1- 3rd Edition -1999

Ref.ST/SG/AC.10/1- Appendix 2 - Annex 4-2001

*** **IEC International Electrotechnical Commission**

International safety standards for lithium batteries

"IEC-CEI 86-4" - 1st Edition -19965.

5. Transportation

ER14505AX in accordance with the United Nations "Transport of Dangerous Goods Rules"(Ref.ST/SG/AC.10/1 Rev.12-2001) provides that the lithium metal content of less than 1g, the rating for non-transport of dangerous goods.

6. Shipment inspection

Supplier before shipment of ER26500 battery open circuit voltage (OCV) and the appearance and size of the load voltage and 100% testing. Battery capacity, should be sampling.

7. Safety Precautions:

7.1 Short-circuit, discharge are strictly prohibited ;

7.2 Don't do the battery pack by yourself ;

7.3 The battery is prohibited discharge, squeezing, burning , buming or demolition.

7.4 The battery is prohibited heating over request temperature ;

7.5 Please strictly check the packaging before use, if packaging is damaged, please find out the reason before use it.

7.6 Please check the battery's open circuit voltage, load voltage and validity before installing the battery,

7.7 It is prohibited to use different series of batteries, different specification used together ;

7.8 Please don't solder the pins on the positive or negative directly, please solder a leads , the chip should be completed within 5 seconds.

7.9 The battery can't be used when to be the ending voltage ;

7.10 Treatment of scrap batteries: the battery should be soaked in 5% salt water, place the remaining voltage to 0V, and should be handled in accordance with local environmental requirements, deep underground or into deep water.

Above considerations should be strictly adhered to, in order to avoid battery-operated, used improperly, causing the battery bulging, leaking or fire or explosion.

8, ER26500 battery shipment inspection standards

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9.1 Appearance

- 1, No bulging steel bottom of the battery case, battery (with particular attention to the positive column core and the seal) without leakage phenomenon.
- 2, The battery lead pins to be connected to a solid, smooth and free from rust pin lead.
- 3, The steel bottom of the phenomenon may not have depression.
- 4, The bottom steel not rust, scratch or spot welding scars.
- 5, Product identification clear, no ghosting or illegible, marking should be located in the center pad, left and right deviation of $\leq 1\text{mm}$

9.2 Size

Battery sizes with an accuracy of 0.02mm vernier caliper test. Light body cell of its maximum diameter 14.2mm, maximum height of 50.5mm (with packaging), cited in needle size according to customer requirements.

9.3 Battery Performance Test

Test the battery performance indicators measured by meter. Refer to the following standards.

- 1, the open circuit voltage $\geq 3.64\text{V}$.
- 2, the load voltage: The power of 0.5W load resistance $100\ \Omega$ resistance testing, the load voltage $\geq 3.0\text{V}$.

Discharge capacity of 9.4

1, the discharge capacity of the battery discharge method with a constant resistance in the battery positive and negative resistance welding a discharge, with four semi-digital multimeter to measure and record.

2, the capacity calculation: the discharge capacity with sub-sum method, assumptions discharge resistance R, the first time t1 (converted to hours), the voltage V1, the next recording time t2, voltage V2, then the paragraph time of discharge capacity

$$(V2 + V1) \times (t2-t1)$$

$$2 \times R;$$

The discharge records of all time is the cumulative capacity of the battery discharge capacity.

3, the discharge capacity of the standard is:

20 ± 5 °C at room temperature environment for the 68Ω load with resistance resistance testing, termination voltage is 2.0V, the discharge time ≥ 30 hours.