	<b>产品规格书</b> <b>PRODUCT SPECIFICATION</b>	<b>VER</b> <u>   A   </u>
		<b>DOC NO.</b> <u>          </u>
		<b>PAGE</b> <u>   1   of   11   </u>

## 规格确认书

# Specification Approval Sheet

产品型号/ **MODEL**: ICR14500-750mAh-3.7V

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日期/Date	2015-01-31

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	公司名称/ Company Name	
	公司印章/ Company Stamp	

	<b>产品规格书</b> <b>PRODUCT SPECIFICATION</b>	VER <u>   A   </u>
		DOC NO. <u>          </u>
		PAGE <u>  2  </u> of <u> 11 </u>

修正记录/Amendment Records

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	<h1>产品规格书</h1> <h2>PRODUCT SPECIFICATION</h2>	<b>VER</b> <u>    A    </u>
		<b>DOC NO.</b> <u>          </u>
		<b>PAGE</b> <u>    3    of    11    </u>

### 目 录/ Content

目录/Content	页数/Page
<b>1. 适用范围/ Scope</b>	4
<b>2. 型号/ Model</b>	4
<b>3. 参考文件/ Reference Document</b>	4
<b>4. 规格/ Specification</b>	4
<b>5. 尺寸/ Dimension</b>	5
<b>6. 电池性能/ Test Conditions and Performance</b>	6
6.1 测试条件/ Test Conditions	6
6.2 充放电特征曲线/ Characteristics Curves	6
6.3 常规电性能/ Electric Characteristics	7
6.4 滥用电性能/ Electrical Abuse Characteristics	7
6.5 机械性能/ Mechanical Characteristics	8
6.6 环境测试/ Environmental test	9
6.7 外观检查/ Visual inspection	10
<b>7. 使用须知/ Cautions in use</b>	10
7.1 长期储存/ Long Time Storage	10
7.2 电池使用时警告事项及注意事项/ Warning And Matters Need Attention In Using Battery	10
<b>8. 备注/ Note</b>	11

	<h1>产品规格书</h1> <h2>PRODUCT SPECIFICATION</h2>	<b>VER</b> <u>    A    </u>
		<b>DOC NO.</b> <u>                    </u>
		<b>PAGE</b> <u>    4    of    </u> <u>  11  </u>

### 1. 适用范围/ Scope

本规格书适用于迈洛克的可充电锂离子电池。

This specification is suitable for the performance of rechargeable Lithium-ion Battery by KQT.

### 2. 型号/ Model

ICR14500-750-3.7V

### 3. 参考文件/ Reference Document

IEC 61960-1: 2000 Secondary lithium cells and batteries for portable applications-Part1: Secondary lithium cells

### 4. 规格/ Specification

NO.	项目/ Item	参数/ Specifications
1	标称容量/ Rated Capacity	750mAh (@0.2C 标准放电/ Standard discharge, 25°C)
2	最小容量/ Minimal Capacity	700mAh (@0.2C 标准放电/ Standard discharge, 25°C)
3	标称电压/ Nominal Voltage	3.7 V (即工作电压/ Mean Operation Voltage)
4	交货电压/ Delivery voltage	3.7~3.9V (出厂 10 天内/ Within 10 days from Factory)
5	电池内阻/ Cell Internal Impedance	≤80mΩ AC (1KHz) Impedance New Cell Max.(mΩ)
6	充电截止电压/ Charging Voltage	4.20V
7	放电截止电压/ Discharge Cut-off Voltage	2.75V
8	充电方式/ Standard charge	0.5C 恒流充电至 4.20V, 转恒压充电截止电流 0.01C 0.5C charge to 4.20V, then CV charge (4.20V) till charge current decline to 0.01C.
9	充电时间/ Charging Times	标准充电: 4.0 h (0.5C 参考值) / 0.5C Standard times: 4.0h 快速充电: 2.5 h (1C 参考值) / 1C Fast times: 2.5h
10	最大连续放电电流 / Max. Discharge Current	3C
11	工作温度/ Operating Temperature	充电: 0°C ~ 55°C/ Charge: 0~55°C 放电: -20°C ~ 60°C/ Discharge: -20~60°C
12	储存温湿度/ Storage Temperature and relative humidity Range	-20°C ~ 25°C 60±25%R.H.
13	电池重量/ Battery Weight	17 g (约)/17g (approx)



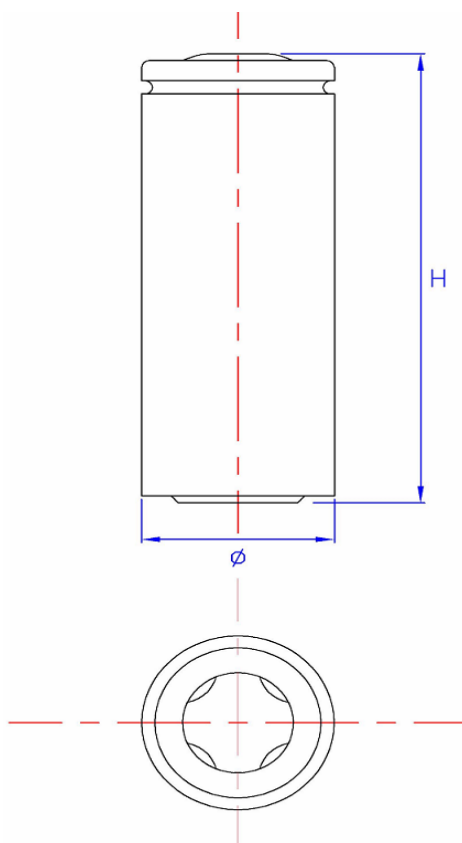
**产品规格书**  
**PRODUCT SPECIFICATION**

VER     A    


DOC NO.           

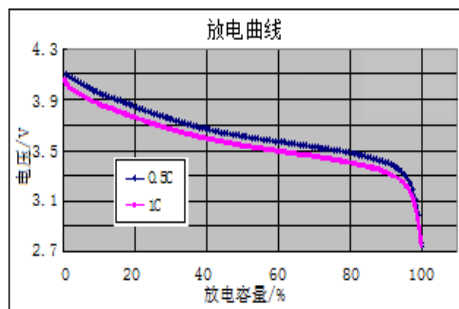
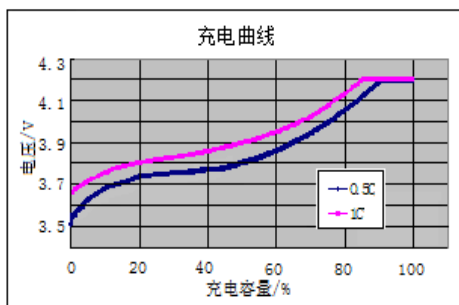
PAGE     5     of   11  

**5. 尺寸/ Dimension**



项目/ Item	描述/ Description	尺寸/ Dimension (mm)
Φ	直径/ Diameter	13.9±0.1
H (平头)	高度/ Height	49.5±0.2
H (尖头)	高度/ Height	50.0±0.2

	<h1>产品规格书</h1> <h2>PRODUCT SPECIFICATION</h2>	VER <u>    A    </u>
		DOC NO. <u>                    </u>
		PAGE <u>    6    of    <u>11</u>    </u>
<p><b>6. 电池性能/ Test Conditions and Performance</b></p> <p><b>7.</b></p> <p>7.1 测试条件/ Test Conditions</p> <p>7.1.1 测试仪器和设备/ Measuring Instrument or Apparatus</p> <p>7.1.1.1 尺寸测试/ Dimension Measuring Instrument:</p> <p>    电池尺寸使用精确度为 0.01mm 或更高的游标卡尺测量；          The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.</p> <p>7.1.1.2 电压表/ Voltmeter</p> <p>    达到国家标准或内阻灵敏度达到 10k Ω/V；          Standard class specified in the national standard or more sensitive class having inner impedance more than 10k Ω/V</p> <p>7.1.1.3 电流表/ Ammeter</p> <p>    达到国家标准或更高级别，包括电流表及外部引线的总电阻应小于 0.01 Ω；          Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01 Ω.</p> <p>7.1.1.4 内阻测试仪/ Impedance Meter</p> <p>    用频率为 1000 赫兹的交流阻抗仪测试。          Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter)</p> <p>7.1.2 测试环境/ Standard Test Conditions</p> <p>    除非特别说明，本规格书中所有测试均在以下环境条件下进行：          温度：25±2℃      湿度：(65±20) %RH。          Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition.          Temperature: 25±2℃      Humidity: (65±20) %RH</p> <p>7.1.3 测试方法说明/ Test method</p> <p>7.1.3.1 标准充电：以 0.2C<sub>5</sub>mA 恒流充电至电压 4.20V 时，转恒压充电，截止电流小于或等于 0.01C<sub>5</sub>mA 后停止充电。          Standard Charge:Charging shall consist of charging at a 0.2C<sub>5</sub>mA constant current rate until the cell reaches 4.20V. The cell shall then be charged at constant voltage of 4.20volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 0.01C<sub>5</sub>mA.</p> <p>7.1.3.2 标准放电：以 0.2C<sub>5</sub>mA 恒流放电至电压 2.75V 停止。          Standard Discharge:Cells shall be discharged at a constant current of 0.2 C<sub>5</sub>mA to 2.75 volts.</p> <p>7.1.3.3 标准循环：电池以 0.2C<sub>5</sub>mA/0.2C<sub>5</sub>mA 充放电，放电容量等于标称容量的 70%停止。          Standard Cycle Life:100%DOD, recycle it continuously at 0.2C rate. The residual capacity is 70% of rated capacity.</p> <p>7.2 充放电特征曲线/ Characteristics Curves</p>		



# 产品规格书

VER   A  

DOC NO.

<b>PRODUCT SPECIFICATION</b>		PAGE <u>7</u> of <u>11</u>
------------------------------	--	----------------------------

7.3 常规电性能/ Electric Characteristics

NO.	项目/ Item	测试方法/ Measuring Procedure	评判标准/ Criteria
1	开路电压 Open-Circuit Voltage	开路电压在电池标准充电后的 24 小时内测量。 The open-circuit voltage shall be measured within 24 hours after standard charge.	≥3.70V
2	放电容量 Standard Discharge Performance	电池标准充电后，搁置 0.5~1h，分别以 0.2C <sub>5</sub> mA、0.5C <sub>5</sub> mA、1C <sub>5</sub> mA 进行放电至截止电压 2.75V，可循环三次，当有一次达到标准，即达到标准要求（下同）。 Store the battery for 0.5-1h after standard charged, then discharged to cut-off voltage at a constant current of 0.2C <sub>5</sub> mA、0.5C <sub>5</sub> mA and 1C <sub>5</sub> mA, Three cycles are permitted for this test , If the capacity of one of the three cycles can reach the standard, it represents the battery has reached the standard.	A) 0.2C <sub>5</sub> mA 放电容量≥100%标称容量 B) 0.5C <sub>5</sub> mA 放电容量≥95%标称容量 C) 1C <sub>5</sub> mA 放电容量≥90%标称容量 A) Discharge Performance (0.2C <sub>5</sub> mA) ≥100% Rated Capacity B) Discharge Performance (0.5C <sub>5</sub> mA) ≥95% Rated Capacity C) Discharge Performance (1C <sub>5</sub> mA) ≥90% Rated Capacity
3	循环寿命 Cycle Life	100%DOD, 0.2C/0.2C 连续循环使用，以标称容量的 70%为截止容量。 100%DOD, recycle it continuously at 0.2C rate. The residual capacity is 70% of rated capacity.	≥500 次 500Times
4	荷电保持率 Self-discharge	测量电池的初始状态和初始容量，电池标准充电后，在开路状态下，室温搁置 28 天后，以 0.2 C <sub>5</sub> mA 放电至 2.75V，测量电池的剩余容量。 After the standard charging, storied the cells under the test condition for 28 days, then measured the capacity with 0.2C <sub>5</sub> mA to 2.75V.	放电容量不少于初始容量的 85% Residual capacity ≥85%

7.4 滥用电性能/ Electrical Abuse Characteristics

NO.	项目/ Item	测试方法/ Measuring Procedure	评判标准/ Criteria
1	过充电性能 Over Charge	电池标准充电后，测量电池的初始状态，确认电池状态正常时，以 3C <sub>5</sub> mA 电流充电至 10.0V，然后转恒压充电 1h 后测试停止。观察电池的温度及外观变化。 After standard charge, 3C <sub>5</sub> mA current charge to 10V and constant voltage at 10V for 1h.	不爆炸、不起火 No fire; No explosion.

<b>产品规格书</b>		VER <u>A</u>
		DOC NO. _____



<b>PRODUCT SPECIFICATION</b>		PAGE <u>8</u> of <u>11</u>
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滥用电性能（接上表）/ Electrical Abuse Characteristics (continuous)

NO.	项目/ Item	测试方法/ Measuring Procedure	评判标准/ Criteria
2	过放电性能 Over Discharge	<p>电池标准充电后，测量电池初始状态，以 1C<sub>5</sub>mA 进行放电至 2.75 V，然后用小于 10Ω 的电阻将电池正负极相连，搁置 14 天。观察电池外观变化。</p> <p>After normal charge, test batteries' initial state and capacity. Discharge at 1C<sub>5</sub>mA to 2.75V, then connect positive and negative pole with resistor less than 10Ω. Store it for 14 days. Observe batteries' variation of appearance.</p>	<p>不爆炸、不起火</p> <p>No fire; No explosion.</p>
3	外部短路 External Short Circuit	<p>电池标准充电后，测量电池的初始状态，确认电池状态正常时，置于防爆罩中，用电阻不大于 50mΩ 铜线直接连接电池正负极，当电池温度下降到低于峰值温度约 10℃ 时试验结束。观察电池的温度及外观变化。</p> <p>Standard charge. Keep the battery into a ventilation cabinet and short-circuit the positive and negative terminals directly (general resistance shall be less than or equal to 50mΩ). Stop the test when the temperature falls to 10 °C lower than the peak value. Observe the variation of the battery's appearance and temperature.</p>	<p>不爆炸、不起火</p> <p>No fire; No explosion.</p>

7.5 机械性能/ Mechanical Characteristics

NO.	项目/ Item	测试方法/ Measuring Procedure	评判标准/ Criteria
1	振动 Vibration	<p>电池标准充电后，测量电池初始状态，安装在振动台面上，按下面的振动频率和对应的振幅调整好试验设备，X、Y、Z 三个方向每个方向上从 10Hz~55Hz 循环扫频振动 30min，扫频速率为 1oct/min:</p> <p>A) 振动频率：10Hz~30Hz      位移幅值（单振幅）：0.38mm                      B) 振动频率：30Hz~55Hz      位移幅值（单振幅）：0.19mm。</p> <p>扫频结束后测电池最终状态，观察电池外观变化。</p> <p>Test the batteries' initial state and capacity, Equip it to the vibration platform, adjust and prepare the test equipment according to following vibration frequency and relevant swing, doing frequency sweeping from X, Y, Z three directions, each from 10Hz to 55Hz for 30 minutes of recycling, rating of which is 1oct/min:</p> <p>A) vibration frequency: 10Hz~30Hz      Displacement breadth (single swing): 0.38mm                      B) vibration frequency: 30Hz~55Hz      Displacement breadth (single swing): 0.19mm.</p> <p>Observe the final state after scanning.</p>	<p>无漏液，无爆炸，无起火。</p> <p>No leakage, No explode, no fire.</p>


	<h1>产品规格书</h1> <h2>PRODUCT SPECIFICATION</h2>	<b>VER</b> <u>    A    </u>
		<b>DOC NO.</b> <u>                    </u>
		<b>PAGE</b> <u>    9    of    11    </u>


机械性能（接上表）/ Mechanical Characteristics (continuous)

NO.	项目/ Item	测试方法/ Measuring Procedure	评判标准/ Criteria
2	跌落 Drop	测试电池的初始容量，标准充电后，测量电池的初始状态，将试验电池由高度(最低点高度)为 1m 的位置垂直、水平方向自由跌落到水泥地面上，要求跌落 2 次。 Test the batteries' initial state and capacity. Standard charge. Then let it self fall off from a height of 1m (the lowest height) to a smooth cement, twice.	无爆炸，无起火 No fire; No explosion.
3	挤压 Crush	用两平板挤压电池. 用 13kN(1.72Mpa) 的压力持续 30min. Crush between two flat plates. Applied force is about 13kN(1.72Mpa) for 30min.	无爆炸，无起火 No fire; No explosion.
4	针刺 Nail Pricking (3mm)	用直径为 3mm 的针刺入电池内部，并维持 2 小时。 Prick through the sample battery with a nail having a diameter of 3mm and remain 2h.	无爆炸，无起火 No fire; No explosion.

7.6 环境测试/ Environmental test

NO.	项目/ Item	测试方法/ Measuring Procedure	评判标准/ Criteria
1	热冲击 Thermal Shock	测量电池的初始状态，电池标准充电后，放置于烘箱中，温度以 $(5\pm 2^{\circ}\text{C})/\text{min}$ 的速率升至 $130\pm 2^{\circ}\text{C}$ 并保温 30min。观察电池外观变化。 Test the batteries' initial state and capacity. Standard charge. Put battery into oven, increase the temperature to $130\pm 2^{\circ}\text{C}$ at rate of $(5\pm 2^{\circ}\text{C})/\text{min}$ , and keep it for 30min. Observe variation of batteries' appearance.	不爆炸、不起火 No fire; No explosion.
2	热循环 Temperature shock	电池标准充电后,在环境温度为 $75\pm 2^{\circ}\text{C}$ 的条件下开路放置 48h, 后在 $-20^{\circ}\text{C}$ 条件下开路放置 6h, 后在室温条件下开路放置 24h。观察电池外观变化。 Store the battery for 48 hours at $75\pm 2^{\circ}\text{C}$ after standard charge, then store the battery at $-20^{\circ}\text{C}$ for 6 hours, and at room temperature for 24 hours. Observe the appearance of the battery.	不漏液、不起火、不爆炸。 No leakage, No fire, No explosion
3	恒定湿热性能 Static Humidity	电池标准充电后，置于温度为 $40^{\circ}\text{C}\pm 5^{\circ}\text{C}$ ，相对湿度为 95% 的恒温恒湿箱中，搁置 48h 后，取出电池搁置 2h。观察电池外观变化。然后以 $0.2\text{C}_5\text{mA}$ 放电至 2.75V，测量电池最终容量。 Put the battery at $40^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and 95% RH chamber for 48h, then get it out and store it for 2h at room temperature. Observe the appearance and discharge at $0.2\text{C}_5\text{mA}$ till the 2.75V, then test the final capacity.	搁置后容量/标称容量，要求大于标称容量的 60% 电池外观无明显变形、无腐蚀、不冒烟、不爆炸 Discharge capacity after storage/rated capacity >60% rated capacity No obvious damage, No leakage, No explosion

	<h1 style="margin: 0;">产品规格书</h1> <h2 style="margin: 0;">PRODUCT SPECIFICATION</h2>	<b>VER</b> <u>   A   </u>
		<b>DOC NO.</b> <u>          </u>
		<b>PAGE</b> <u>  10 of 11  </u>
<p>7.7 外观检查/ Visual inspection                  不允许有任何影响电池性能的外观缺陷，如裂纹、裂缝、泄漏等。                  There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of cell.</p> <p>8. 使用须知/ Cautions in use</p> <p>8.1 长期储存/ Long Time Storage                  长期储存的电池（超过 3 个月）须置于干燥、凉爽处，储存电压为 3.7 ~3.9 V；建议每三个月对电池进行一次充放电循环。                  If the battery is stored for a long time (exceed three months), the battery should be stored in drying and cooling place. The battery's storage voltage should be 3.7~3.9V ;The battery should be charged and discharged each three months.</p> <p>8.2 电池使用时警告事项及注意事项/ Warning And Matters Need Attention In Using Battery                  为防止电池可能发生泄漏、发热、爆炸，请注意以下预防措施：                  Please pay attention to followings in case of battery will have leakage, heat or explosion.</p> <p><b>警 告 ！</b>  <b>Warning!</b></p> <ul style="list-style-type: none"> <li>● 严禁将电池浸入海水或水中，保存不用时，应放置于阴凉干燥的环境中。                      Do not immerse the battery in water or seawater, and keep the battery in a cool dry surrounding if it stands by.</li> <li>● 禁止将电池在热高温源旁，如火、加热器等使用和留置。                      Does not use or leave the battery near a heat source as fire or heater</li> <li>● 充电时请选用锂离子电池专用充电器。                      Use the battery charger specifically for that purpose when recharging.</li> <li>● 严禁颠倒正负极使用电池。                      Do not reverse the position and negative terminals.</li> <li>● 严禁将电池正负端直接插入电源插座。                      Do not connect the battery electrodes to an electrical outlet.</li> <li>● 禁止将电池丢于火或加热器中。                      Do not discard the battery in fire or a heater.</li> <li>● 禁止用金属直接连接电池正负极短路。                      Do not short-circuit the battery by directly connecting the positive and negative terminals with metal objects.</li> <li>● 禁止将电池与金属,如发夹、项链等一起运输或贮存。                      Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.</li> <li>● 禁止敲击或抛掷、踩踏电池等。                      Do not strike, trample or throw the battery.</li> </ul>		

	<h1>产品规格书</h1> <h2>PRODUCT SPECIFICATION</h2>	VER <u>    A    </u>
		DOC NO. <u>                    </u>
		PAGE <u>    11 of 11    </u>
<ul style="list-style-type: none"> <li>● 禁止直接焊接电池和用钉子或其它利器刺穿电池。 Do not directly solder the battery and pierce the battery with a nail or other sharp objects.</li> </ul> <p><b>小 心 !</b> <b>Becareful!</b></p> <ul style="list-style-type: none"> <li>● 禁止在高温下（如炙热的阳光下）使用或放置电池，否则可能会引起电池过热、起火或功能失效、寿命减短。 Do not use or leave the battery at high temperature (for example, at strong direct sunlight). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased</li> <li>● 禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置,带来不安全的隐患。 Do not use the battery in a location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.</li> <li>● 如果电池发生泄露,电解液进入眼睛,请不要揉擦,应用清水冲洗眼睛,并立即送医治疗,否则会伤害眼睛。 If the battery leaks and the electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.</li> <li>● 如果电池发出异味,发热、变色、变形或使用、贮存、充电过程中出现任何异常,立即将电池从装置或充电器中移除并停用。 If the battery gives off strange odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.</li> <li>● 如果电极弄脏,使用前应用干布抹净,否则可能会导致接触不良功能失效 In case the battery terminals are dirty, clean the terminals with a dry cloth before use. Otherwise poor performance may occur due to the poor connection with the instrument.</li> <li>● 废弃之电池应用绝缘纸包住电极,以防起火、爆炸。 Be aware of discarded batteries may cause fire or explosion; tape the battery terminals to insulate them.</li> </ul> <p><b>9. 备注/ Note</b> 此规格书上未涉及的项目，双方可共同协商达到一致。 Any other items which are not covered in this specification shall be agreed by both parties.</p>		