武汉中原长江科技发展有限公司

（国营第七五二厂）

# 圆柱形锂-亚硫酰氯电池产品规格书

# SPECIFICATION OF PRODUCT

Cylindrical Li/$SOCl_2$ Primary Cell

## 电池型号：ER14505

实施日期：2020-6-15

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## 1 适用范围 Scope

本产品规格书规定了武汉中原长江科技发展有限公司生产的 ER14505 型锂-亚硫酰氯一次电池的技术要求、测试方法及注意事项。This Product Specification describes the technique requirements,test procedure and precaution notes of Cylindrical Li/SOCl2 Primary Cell ER14505 to be supplied to customer by Wuhan Sunmoon Battery Co., Ltd.

## 2 产品基本特性 Basic Specification

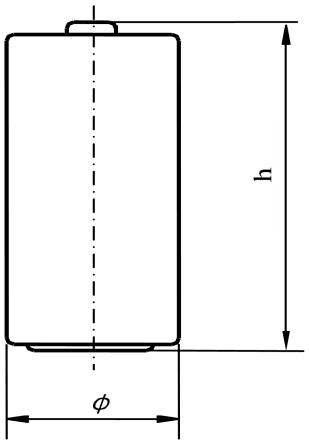
表 1/Chart 1

| 项目<br>Item | 参数<br>Specification | 备注<br>Remarks |
|---|---|---|
| 标称电压<br>Nominal Voltage | 3.60 V | |
| 标称容量<br>Nominal Capacity | 2.6Ah(23℃±2℃时，以 1mA 放电至终止电压 2.0V。<br>2.6Ah(At 23℃±2℃,1mA discharge to cut off voltage 2.0V ) | 电池放电容量还与放电电流、环境温度和终止电压等有关。Capacity is related to discharge current,working temperature and cut off voltage. |
| 使用温度<br>Working temperature | -55℃ ~ +85℃ | 使用温度高于或低于常温，电池的放电容量及脉冲初始电压均会降低。If the working temperature is higher or lower than RT,the capacity and primary pulse voltage will be lower. |
| 最大持续放电电流<br>Maximum constant discharge current | 50mA | 若需要更大电流，请咨询武汉中原长江科技发展有限公司。If need larger current, pls contact Wuhan Sunmoon Battery Co., Ltd. |
| 最大脉冲放电电流<br>Maximum pulse discharge current | 100mA | 在 23℃±2℃的条件下，未放过电的电池以 10μA 的基础电流开始放电，在放电的过程中，每 2 分钟释放一个 100mA/0.1 秒的脉冲，此时的电池电压值不低于 2.7V。该电压值会因脉冲特性、温度，电池使用情况的变化而变化。At 23℃±2℃, new battery begins to discharge with a base current of 10 uA,in the process of discharging,releases a pulse of 100mA/0.1s every 2 minutes, the voltage is not less |

| 项目<br>Item | 参数<br>Specification | 备注<br>Remarks |
|---|---|---|
| | | than 2.7V. The voltage varies with pulse characteristics, temperature and battery usage condition. |
| 最大外形尺寸<br>Maximum measurement | 直径 Diameter：14.5 mm<br>高度 Height：50.5 mm | 无特殊包装、引线、焊片要求的单体电池尺寸。No special package,no wire, no pin, only single battery. |
| 最大重量<br>Maximum Weight | 19g | 无特殊包装、引线、焊片要求的单体电池重量。No special package,no wire, no pin, only single battery. |
| 储存寿命<br>Storage life | 10 年 | 在规定条件下储存。Stored at specified conditions. |
| 年平均容降率<br>Annual capacity lost | ≤2% | |
| 储存条件<br>Storage condition | 电池应放置在包装箱中储存，储存在干燥、通风、清洁的仓库内，储存温度宜在 30℃以下，相对湿度不大于 75%，电池储存时应远离热源，不得与易燃、易爆品和酸、碱或其他腐蚀性物质放在一起。Batteries shall be stored in a dry, ventilated and clean warehouse with temperature below 30℃ and relative humidity no more than 75%. Batteries shall be stored away from heat sources and shall not be put together with inflammable, explosive, acid, alkali or other corrosive substances. | 若需要更高温度 ,请咨询武汉中原长江科技发展有限公司。If need higher temperature, pls contact Wuhan Sunmoon Battery Co., Ltd. |

## 3 外形图 Dimension

### 3.1 电芯外形图 Cell Dimension



## 4 性能及测试方法 Electrical characteristics and testing method

### 4.1 外观和尺寸 Appearance and Dimension

表 2/Chart 2

| 测试项目 Testing item | 测试方法 Testing Method | 检验标准 Testing Standard |
|---|---|---|
| 外观 Appearance | 在昼光条件下，用眼睛目视检测电池。Under daylight conditions,check the battery with eyes. | 外观整洁，标识清晰，无划伤变形，无生锈、漏液等现象。Clean appearance, clear label, no scratches, no deformation, rust, leakage etc. |
| 尺寸 Measurement | 用测量误差不大于 0.02mm 的游标卡尺进行测试，为了防止电池短路，卡尺的卡头上应贴上一层绝缘材料。Use a vernier caliper with a measurement error of not more than 0.02mm for testing. In order to prevent battery from short circuit, a layer of insulating material should be pasted on the caliper head. | 各尺寸符合要求。All dimensions meet the requirements. |

### 4.2 电性能 Electrical characteristics

表 3/Chart 3

| 测试项目 Testing item | 测试方法 Testing Method | 检验标准 Testing Standard | |
|---|---|---|---|
| 开路电压 Open circuit voltage | 用三位半数字电压表测量。Measure with three and a half digital voltmeter. | 3.65～3.70V（23℃±2℃） | 测试数据为电压典型值 the test data are typical voltage |
| 负载电压 Load voltage | 用三位半数字电压表测量,电阻 200Ω，时间≤10s。Measure with three and a half digital voltmeter,resistance 200Ω,time≤10s. | ≥3.30V（23℃±2℃） | |
| 快速放电 Rapid discharge | 200Ω(15mA)，23℃±2℃连续放电至2.0V。200Ω, at 23℃±2℃ constant discharge to 2.0V. | ≥2.0Ah 或≥115h | |
| 常规放电 Normal discharge | 620Ω(5mA)，23℃±2℃连续放电至 2.0V。620Ω,at 23℃±2℃ constant discharge to 2.0V. | ≥2.1Ah 或≥375h | |
| 高温放电 High | 在 55℃±2℃下搁置 16 小时后，620Ω，55℃±2℃连续放电至 2.0V。 | ≥2.0Ah | |

| | | |
|---|---|---|
| temperature discharge | Store for 16 hours at 55℃±2℃, 620Ω, at 55℃±2℃ ,constant discharge to 2.0V. | |
| 低温放电 Low temperature discharge | 在-20℃±2℃下搁置 16 小时后，620Ω，-20℃±2℃连续放电至 1.8V，<br>Store for 16 hours at -20℃±2℃, 620Ω, at -20℃±2℃, constant discharge to 1.8V. | ≥1.05Ah |

备注 Remarks：

—电池（组）如串联二极管，负载电压检测时有 0.4V 电压降。If battery or battery pack in series with diode, the load voltage will be 0.4V lower while testing.

—电池( 组 )使用前必须按上表 3 检测其开路电压和负载电压。The open circuit voltage and load voltage of the battery (pack ) must be tested according to chart 3 above before use.

—快速及常规放电检测 ,电压平台会略有差异 ,放电结果满足容量或时间二者之一即合格。The voltage will be slightly different between rapid discharge and normal discharge, the results meet either capacity or time is qualified.

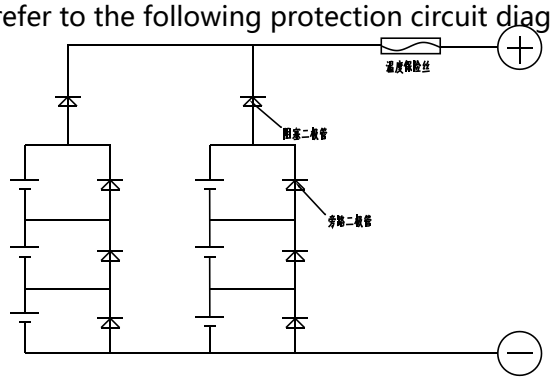
—电池（组）安装前，需用其他替代电源接入电路，检测电路板功耗是否正常；安装时勿破坏电池包装造成短路。Before the battery (pack) is installed, other alternative power sources should be used to access the circuit to detect whether the power consumption of the circuit board is normal; Do not damage the battery pack and cause short circuit during installation.

—电池（组）使用电路中如存在其他电源，需在电路中设计防反充电装置隔断外电源与锂电池，防止电池被充电，具体请与我司沟通。If there are other power sources in the circuit , an anti-charging device should be designed in the circuit to separate the external power source from the lithium battery to prevent the battery from being charged. Please contact us for details.

—使用电路需设置电池（组）放电终止电压，即电池（组）工作时负载低于 2.5V*n（串联电池数量），电池供电电路应切断，防止电池过放电造成安全隐患。The battery (pack) discharge cut off voltage shall be set which means while the load voltage of battery (pack) is lower than 2.5V*n (number of batteries in series), the battery supply circuit should be cut off to prevent the over discharge of the battery from causing danger.

—禁止电池倒放。Do not put the battery upside down.

—电池如组合使用，保护电路参考如下保护电路示意图：If the battery is used in combination, the protection circuit shall refer to the following protection circuit diagram:



### 4.3 环境适应性 Environment Adaptability

表 4/Chart 4

| 测试项目 Testing Item | 测试方法 Testing Method | 检验标准 Testing Standard |
|---|---|---|
| 温度冲击 High and low temperature | a )电池放入试验箱中 ,箱内空气温度调节为-40℃±3℃ ,并至少保持 4h; Put the battery into test box and adjust the temperature to -40℃±3℃ and keep the battery in the box for at least 4h;<br>b ) 电池在 5min 内转移到温度为 70℃±3℃的试验箱中；Transfer the battery into another test box at temperature 70℃±3℃ in 5 mins;<br>c )电池在 70℃±3℃下至少保持 4h ;Keep the battery in the test box for at least 4 h at temperature 70℃±3℃;<br>d ) 电池在 5min 内转移到温度为-40℃±3℃的试验箱中；Transfer the battery into another test box at temperature -40℃±3℃ in 5 mins;<br>e )电池在-40℃±3℃下至少保持 4h ;Keep the battery in the test box for at least 4 h at temperature -40℃±3℃;<br>f ) 重复第 b 至 e 的操作要求，重复 3 次；Repeat operation from b ） to e), 3 times;<br>g ) 电池在 5min 内转移到温度为 70℃±3℃的试验箱中；Transfer the battery into another test box at temperature to 70℃±3℃ in 5 mins;<br>h )电池在 70℃±3℃下至少保持 4h ;Keep the battery in the test box for at least 4 h at temperature 70℃±3℃;<br>试验结束后 ,电池在 5.2 的条件下至少搁置 4h ,检测外观及开路电压。After the test, keep the battery in the condition of 5.2 for at least 4 h and check the appearance and open circuit voltage. | 开路电压符合表 3，电池不爆炸、不起火，不泄漏。<br>The open-circuit voltage conforms to chart 3 and the battery does not explode, fire or leak. |
| 低频振动 Low Frequency Vibration | 电池牢固地固定在振动台上，施加振幅为 0.8mm（双振幅为 1.6mm）、频率变化率为 1Hz/min、频率范围在（10～55） Hz 的简谐振动。往返振动 95min±5min。电池做轴向和径向两个方向的振动。每次振动结束后取下电池，3 分钟内测量电池开路电压。<br>Firmly fix the battery on the vibrating table, apply a simple harmonic vibration with an amplitude of 0.8mm (double amplitude of 1.6mm), frequency change rate of 1Hz/min, frequency range of (10 ~ 55) Hz. After 95min±5min vibration in axial and radial directions,take out the battery and test the open circuit voltage in 3 minutes. | |
| 跌落 Fall | 试验样品分两部分，一半-30℃，另一半 55℃下试验。试验前电池在相应温度达到稳定后保持 4h ,然后从温控箱中取出电池 ,并在 10min 内完成跌落。电池从 76cm±5cm 高度跌落一次至坚硬的混凝土表面 ,每只电池跌落 1 次，其轴面应与混凝土面平行跌落。<br>Divide the test batteries into two parts, keep half of them in the test box at the temperature -30℃ and the other half 55℃ for at least 4h. And then take out the batteries and drop each batteries once from | |

| | | |
|---|---|---|
| | height of 76cm±5cm to a hard concrete surface in 10mins, the axial plane should be parallel to the concrete plane while dropping. | |
| 低气压 Low pressure | 将电池放入真空试验箱内，使其压力为 11.6kPa，温度恒定为 25℃±2℃，贮存 6 小时，观察试验结果。<br>Keep the battery in the vacuum test chamber with pressure11.6kPa and temperature 25℃±2℃ for 6 hours and observe the battery. | |
| 冲击 Strike | 电池应牢固地固定在试验台上，电池应在轴向和径向两个方向各进行一次等幅冲击试验。电池的冲击加速度在最初 3ms 内最低平均加速度达到 735m/s$^2$，峰值加速度为 1225 m/s$^2$～1715 m/s$^2$。试验后测量电池开路电压，观察试验结果。<br>Firmly fix the battery on the test table, conduct an equal amplitude strike test in both axial and radial directions.The lowest average acceleration within the first 3ms reach 735m/s2 and the peak acceleration 1225m /s2 ~ 1715m /s2.After the test, detect the open circuit voltage and observe the battery. | |

### 4.4 安全性能 Safety performance

表 5/Chart 5

| 测试项目 Testing Item | 测试方法 Testing Method | 检验标准 Testing Standard |
|---|---|---|
| 短路试验 Short circuit test | 电池的外壳温度稳定在 55℃后，在此温度下对电池进行外部短路，外电路的总阻值应小于 0.1Ω ,持续短路至电池外壳温度回落到 55℃后至少再记录短路 1h。继续观察被检样品 6h。Keep the temperature of battery shell at 55℃ and short circuit the battery externally at this temperature.The total impedance should be less than 0.1 / Ω. Keep short circuit the battery until the temperature of battery cell is back to 55℃. and then keep short circuit the battery for at least 1h.Observe the battery for 6h. | 允许泄放，不爆炸、不起火。Allow leak,no explosion, no fire. |
| 充电试验 Charge test | 将电池反极向接于一个 12V 直流电源上，再串联一个 280Ω的电阻，充电时间为 217h，观察试验结果。Connect the battery with a 12V DC power supply in the reverse direction and in series with 280 Ω resistance,charge for 217h and observe the battery. | |
| 热滥用试验 Heat abuse test | 将电池放入高温箱中，以 5℃/min 的速度升温，在 130℃保持 10min，观察试验结果。Put the battery in the high temperature test box, increase the temperature at 5℃/min, keep 130℃ for 10 min, observe the battery. | |

## 5 实验条件 Test condition

**5.1 初始试验：**除非另有规定，常规性能检测必须在收到电池 45 天内完成。Unless otherwise specified, routine performance testing must be completed within 45 days after receiving the batteries.

**5.2 温度、湿度和气压:Temperature, Moisture and Atmosphere Pressure:** 无特别要求，此规格书上的产品试验均应在 25℃±2℃，相对湿度 45%～75%，大气气压 86~106kPa 环境下进行。Unless otherwise specified, tests shall be conducted at 25℃±2℃, atmosphere pressure 88~106kPa and relative humidity 45%~75%。

**5.3 试验设备 Testing Instruments**

**5.3.1 尺寸测量仪器 Size Measurement Instrument：**测量误差不大于±0.02mm 的游标卡尺或具有同等精度的量具。Vernier caliper with measurement error of no more than ± 0.02mm or other size measurement instrument with equivalent accuracy.

**5.3.2 电压表 Voltmeter**：精度不低于 0.25%的直流电压表，其内阻应不小于 10MΩ。The DC voltmeter with an accuracy of no more than 0.5%, and its internal resistance is no less than 10 MΩ.

**5.3.3 精密电阻** precision resistance：相对误差小于 0.5%。Relative error is less than 0.5%。

**5.3.4 电阻箱** resistance box：相对误差小于 0.5%。Relative error is less than 0.5%。

**5.3.5 电热恒温干燥箱** electric thermostatic drying oven：绝对误差小于±2℃。The absolute error is less than ±2℃.

## 6 铭牌和标志 Nameplate and Logo

电池的铭牌和标志应保持清晰，不脱落、无明显色差。The nameplate and logo of the battery should be kept clear, without falling off, and without obvious color difference.

**6.1 铭牌 Nameplate：**电池的铭牌(商标)包括电池型号、额定电压、生产日期代码、警示标识等内容。The nameplate (trademark) of the battery includes the battery model, rated voltage, production date code, warning signs, etc.

**6.2 代码编写 Code writing：**电池生产日期代码用八位数字表示。头四位数字表示年份，中间两位表示月份。后两位数表示日期。例如：代码“20200520”表示该电池生产于 2020 年 05 月 20 日。The battery production date code is represented by eight digits. The first four digits indicate the year, and the middle two digits indicate the month. The last two digits indicate the date. For example: the code "20200520" means that the battery was produced on May 20, 2020.

**6.3 极端标记 Mark of the extremes: 标记在电池侧面，用“+”、“-”分别表示其所指的正负极端。**Mark on the side of the battery, and use "+" and "-" to indicate the positive and negative ends of batteries.

## 7 运输 Transportation

—电池在运输过程中，应避免日晒、火烤、雨淋、水浸及与腐蚀性物质放在一起。During transportation,

the battery should be protected from sunlight, fire, rain, water and corrosive substances.

—运输和装卸中的冲击、震动应限制在最小程度。Shock and vibration during transportation and loading and unloading should be limited to a minimum.

—对于纸质的包装箱堆放高度不得超过 1.5 米。The stacking height of paper packaging boxes shall not exceed 1.5 meters.

—电池长途运输时，如是船运，应放在远离发动机的地方；夏季不应该长期滞留在不通风的环境内。When the battery is transported over long distances, if it is transported by ship, it should be placed away from the engine; in summer, it should not be left in an unventilated environment for a long time.

## 8 安全注意事项 Safety Precautions

因为本产品在运输、贮存、使用过程中存在一些危险性，操作不正确时都可能发生泄漏，甚至爆炸，在您使用本产品前，请仔细阅读本产品规格书，并请妥善保存以备查阅。

Because this product has some hazards during transportation, storage and use, leakage or evenexplosion may occur when the operation is not correct. Before you use this product, please read this product specification carefully and keep it properly for reference.

—电池严禁过放电、挤压、焚烧。Batteries are strictly prohibited from over-discharging, squeezing and burning.

—严禁对电池进行短路、充电。It is strictly forbidden to short-circuit or charge the battery.

—严禁用户自行拆解电池。It is strictly forbidden for users to disassemble the battery by themselves.

—严禁在允许的温度范围之外使用或加热。It is strictly forbidden to use or heat outside the allowable temperature range.

—严禁直接在电池表面焊接。It is strictly forbidden to weld directly on the surface of the battery.

—严禁使用带有严重伤痕或变形的电池。It is strictly forbidden to use batteries with severe scars or deformation.。

—严禁把电池同干电池或其他原电池一起使用，也不要把不同包装、不同型号或不同品牌的电池一起使用。It is strictly forbidden to use batteries with dry batteries or other primary batteries, and do not use batteries with different packages, different models or different brands.

—严禁把新旧电池混用。It is strictly forbidden to mix new and old batteries.

—在装入设备时注意电池的正负极不要反装。When installing the device, make sure that the battery's positive and negative poles are not reversed.

—电池使用至终止电压时，应及时从仪器中取出。When the battery is used to the end voltage, it should be removed from the instrument in time.

—当长期不用时，要将电池从设备中取出并放在低温低湿的环境中保存。When not in use for a long time, remove the battery from the device and store it in a low temperature and low humidity environment.

—对电池进行串并联应与我公司联系。To connect batteries in series and parallel, please contact our company.

—使用过的电池应按照当地环保规定处理。Used batteries should be disposed of in accordance with local environmental protection regulations.

—在使用或储存期间如发现电池有发热、散发气味、变色、变形或其他异常之处请停止使用。During use or storage, if the battery is found to have heat, odor, discoloration, deformation or other abnormalities, please stop using it.

## 9 储存 Storage

—电池应在远离静电的场所使用和储存。The battery should be used and stored in a place away from static electricity.

—电池应储存在温度不超过 30℃、相对湿度 45%～75%的环境中。The battery should be stored in an environment where the temperature does not exceed 30°C and the relative humidity is 45% to 75%.

—电池储存时要远离热源，也不能置于阳光直射的地方，保证清洁、凉爽、干燥、通风，并不受气候影响。When storing the battery, keep it away from heat sources, do not place it in direct sunlight. Ensure that it is clean, cool, dry, ventilated, and not affected by climate.

—电池的堆放高度取决于包装强度，一般规定，纸质包装箱堆放高度不得超过 1.5 米，木箱不超过 3 米。The stacking height of batteries depends on the packaging strength. Generally, the stacking height of paper packaging boxes should not exceed 1.5 meters, and the stacking height of wooden boxes should not exceed 3 meters.

—电池以原包装存放和陈列电池，去掉包装后电池不能乱堆放，易引起电池短路和损坏。Batteries are stored and displayed in their original packaging. After the packaging is removed, the batteries cannot be stacked, which may cause short circuit and damage to the battery.

## 10 使用建议 Usage Advice

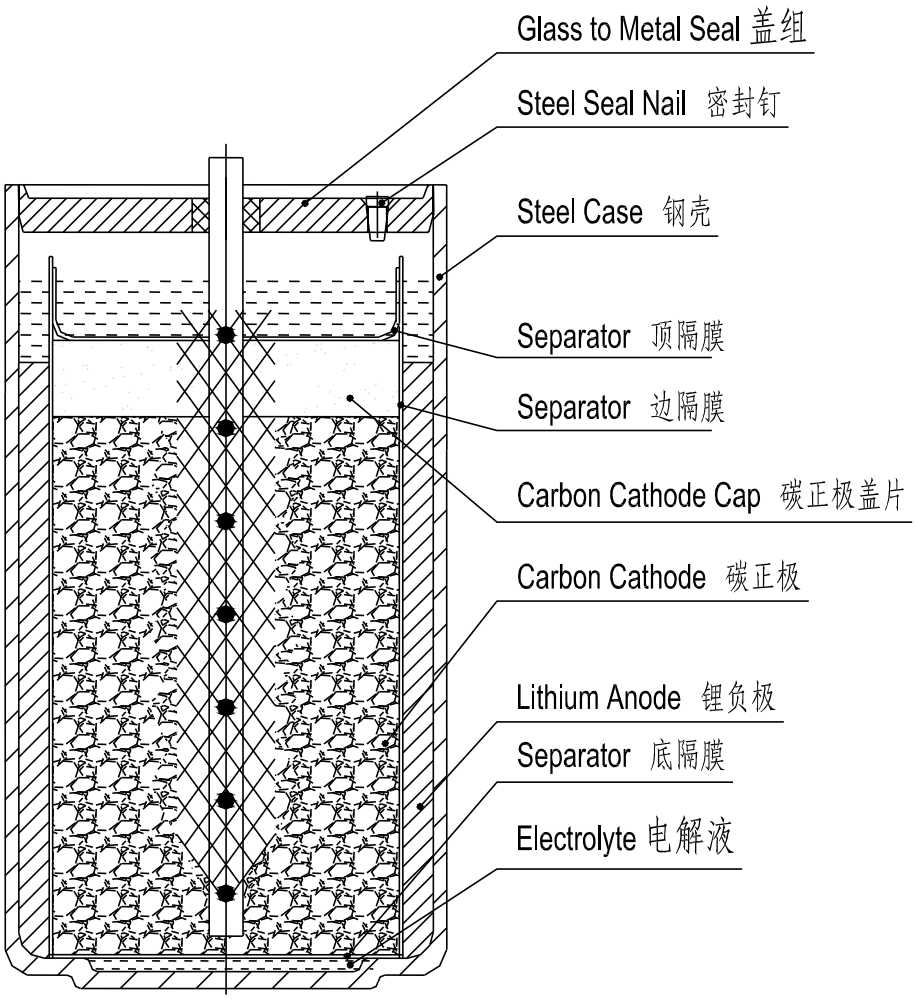
—电池在正极极端朝上方式使用时，能量利用率最高，建议设计电池仓时电池直立放置。When the battery is used with the positive pole facing upwards, the energy utilization is the highest. It is recommended that the battery be placed upright when designing the battery compartment.

—电池适合在环境温度相对阴凉的位置使用，当在高温高湿环境下长期使用，使用寿命会下降。The battery is suitable for use in a relatively cool environment. When used for a long time in a high temperature and high humidity environment, the service life will be reduced.

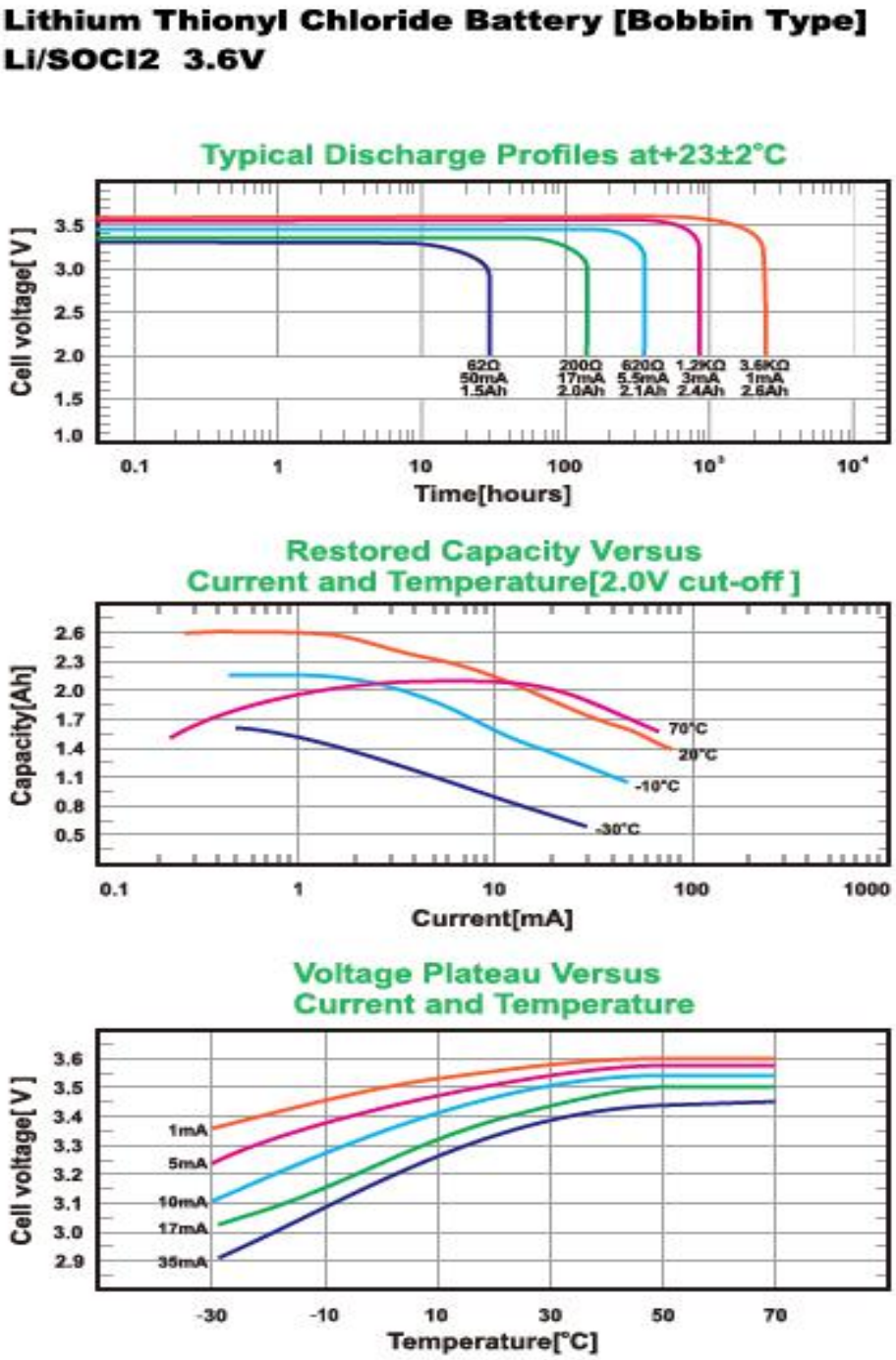
## 11 声明 Claim

若对本产品规格书有疑问，请与武汉中原长江科技发展有限公司联系。武汉中原长江科技发展有限公司保留对本产品规格书更改的权利。If you have any questions about this product specification, please contact Wuhan Sunmoon Battery Co.,Ltd.. Wuhan Sunmoon Battery Co., Ltd. reserves the right to modify this product specification.

附图 1 锂-亚硫酰氯电池（能量型）结构图 Figure 1 Structure diagram of lithium thionyl chloride battery (energy type)

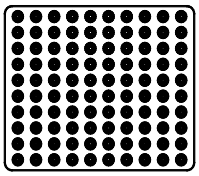


附图 2 电池电性能典型曲线图 Discharge Curve of Single Cell

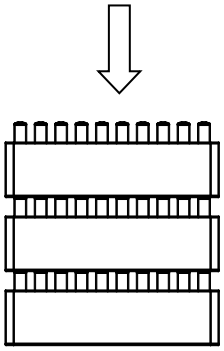


附图 3 产品装箱方式及包装 Figure 3 Package

1）每盘 100 只电池。
100PCS each plate.



2）每箱 4 盘电池。
4 plate each carton.



3）每箱 400 只电池，净重 8kg，毛重 9kg
400PCS each carton,net weight 8kg,gross weight 9kg.