

圆柱形锂-二氧化锰电芯产品规格书

SPECIFICATION OF PRODUCT

Cylindrical Li/MnO₂ Primary Cell

电芯型号: CR123A

Model: CR123A

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武汉中原长江科技发展有限公司 (国营第七五二厂)

Tel 电话:+86-27-84732172 Fax 传真:+86-27-84732186

Http://www.100752.com

Email: Sunmoon_Battery@hotmail.com

地址:湖北省武汉市汉南区兴三路 231号(武汉中原长江科技园)

Address: No.231, Xingsan Road, Hannan District, Wuhan, Hubei Province, China

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1 Scope 适用范围

This specification of product describes technical characteristics, testing procedure, warnings and cautions of the lithium/manganese dioxide (Li/MnO₂) primary cell. The specification only applies to CR123A manufactured by Wuhan Zhongyuan Changjiang Technology Co., Ltd.

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型号为 CR123A 锂-二氧化锰一次电芯的技术要求、测试方法及注意事项。

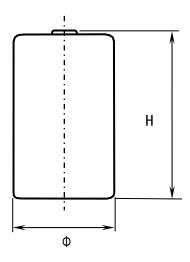
2 Details of Product 产品基本特性

Table 1 表 1

Item 项目	Specification 会数	Remark 备注
nem 坝日	Specification 参数	Remark 會注
Category 产品类型	Cylindrical Lithium/Manganese Dioxide (Li/MnO₂) Cell 圆柱形锂二氧化锰(Li/MnO₂)电芯	
Model 电池型号	CR123A	
Nominal Voltage 标称电压	3.0 V	
Open-circuit Voltage 开路电压	≥3.0V	
Rated Capacity 额定容量	1.5Ah (@ 23°C±2°C, @ 2mA, cut-off voltage: 2.0V; 1.5Ah (23°C±2°C 时,以 2mA 放电至终止电压 2.0V)	Discharge capacity is closely related to discharge current, working temperature and cut-off voltage. 电池放电容量还与放电电流、环境温度和终止电压等有关。
Operating Temperature 使用温度	-40°C~+65°C	Discharge capacity and initial voltage of pulse discharge will drop, if cell/battery is working above or below room temperature. 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。
Weight (Max.) 最大重量	20g	
Continuous Discharge Current (Max.) 最大持续放电电流	1500 mA	If higher discharge current is requested, please contact us. 若需要更大电流,请咨询武汉中原长江科技发展有限公司。
Pulse Discharge Current (Max.) 最大脉冲放电电流	3000 mA	If higher discharge current is requested, please contact us. 若需要更大电流,请咨询武汉中原长江科技发展有限公司。
Maximum Dimensions 最大外形尺寸	Diameter: 17.0 mm, Height: 34.5 mm 直径: 17.0 mm, 高度: 34.5 mm	
Shelf Life 储存寿命	6 years 6 年	
Annual self-discharge Rate 年平均容降率	≤2%	
Storage Condition 储存条件	Temperature:≤30°C、Relative humidity: 45%~75% 温度:≤30°C、相对湿度:45%~75%	If harsher storage condition is requested, please contact us. 若需要更高温度,请咨询武汉中原长江科技发展有限公司

3 Outline Drawing 外形图

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4 Performance and Testing Procedure 性能及测试方法

4.1 Appearance and Dimensions 外观和尺寸

Table 2 表 2

Item 测试项目	Testing Procedure 测试方法	Requirement 检验标准
Appearance 外观	Examine with naked eyes. 用眼睛目视检测电池。	There shall be no such defects like deep scratch, flaw, crack, rust or leakage. 外观整洁,标志清晰,无划伤变形,无生锈、漏液等现象。
Dimensions 尺寸	Use vernier caliper (measurement error ≤0.02mm) to measure while avoiding short-circuit, there should attach a layer of insulation material on the external jaws. 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。	Diameter: ≤17.0mm; Height:≤ 34.5mm 直径: ≤17.0mm; 高度: ≤ 34.5mm

4.2 Electrical Performance 电性能

Table 3 表 3

Item 测试项目	Testing Procedure 测试方法	Requirement 检验标准	
Open-circuit Voltage 开路电压	Measure open-circuit voltage with 3 1/2 digital voltmeter. 用三位半数字电压表测量。	≥3.0V	
Load Voltage 负荷电压	Measure load voltage with 3 1/2 digital voltmeter, the resistance of the load is 15Ω . last for less than 5 seconds. 用三位半数字电压表测量,电阻 15Ω ,时间≤5s。	≥2.75V	
High-drain rate Discharge 快速放电	Discharge at 50mA, until voltage reaches 2.0V (cut-off) voltage. 50mA, 23°C±2°C 连续放电至 2.0V。	≥1.2Ah	
Routine Discharge 常规放电	Discharge at 10mA, until voltage reaches 2.0V (cut-off) voltage. 10mA, 23°C±2°C 连续放电至 2.0V。	≥1.4Ah	
Discharge at High Temperature 高温放电	After storing at 55°C±2°C for 16 hours, discharge at 10mA, with 55°C±2°C, until voltage reaches 2.0V. 在 55°C±2°C 下搁置 16 小时后, 10mA,55°C±2°C 连续放电至 2.0V。	≥1.45Ah	

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Item 测试项目	Testing Procedure 测试方法	Requirement 检验标准
Discharge at Low Temperature 低温放电	After storing at -20°C±2°C for 16 hours, discharge at 10mA, with -20°C±2°C, until voltage reaches 1.8V. 在-20°C±2°C 下搁置 16 小时后,10mA, -20°C±2°C 连 续放电至 1.8V。	≥0.9Ah

4.3 Environmental Adaptability Test 环境适性

Table 4 表 4

Item 測试项目	Testing Procedure 测试方法	Requirement 检验标准	
Low Frequency Vibration 低频振动	Fix the cell/battery firmly to a vibration machine, apply a simple harmonic vibration with an amplitude of 0.8 mm (double-amplitude: 1.6 mm), the frequency change rate is 1 Hz/min, and the frequency range is from 10 to 55Hz. The machine vibrates back and forth. The vibration last for 95min±5min. The cell/battery need to take the vibration test in both axial and radial directions. Remove the battery after each vibration and measure the open-circuit voltage within 3 minutes. 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 为一周期。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。	The open-circuit	
Drop Test 跌落	At ambient temperature, drop the battery from a height of 760mm±5mm to the concrete floor in any attitude for 9 times. observe the test result. 在环境温度下,从 760mm±5mm 高度将电池以任意方向落至水泥地面上,反复跌落 9 次,观察试验结果。	voltage should be in accordance with the value specified at Table 3. The cell/battery	
Low-pressure Test 低气压	Place the cell/battery in a vacuum test chamber, adjust the pressure to 11.6 kPa, set the temperature at 25°C±2°C, store for 6 hours, then observe the test result. 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。	should not explode, ignite . 开路电压符合表 3,电 池不爆炸、不起火。	
Shock Test 冲击	Fix the cell/battery on the test platform, and the cell/battery should be subjected to two equal-amplitude impacts in both axial and radial directions. The minimum average acceleration of the impact in the first 3ms should reach 735m/s^2 , and the peak acceleration ranges from 1225 m/s^2 to 1715 m/s^2 . After the test, measure the open-circuit voltage of the cell/battery and observe the test result. 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 $1225 \text{ m/s}^2 \sim 1715 \text{ m/s}^2$ 。试验后测量电池开路电压,观察试验结果。		

4.4 Safety Performance 安全性能

Table 5 表 5

Item 测试项目	Item 测试项目 Testing Procedure 测试方法	
Short-circuit Test 短路试验	At room temperature, short-circuit the positive and negative terminals of the cell/battery with a copper wire, which has a resistance of less than 0.1Ω for 24 hours. Observe the test result. 在常温下,用阻值小于 0.1Ω 的铜导线将电池正负极短路连接,持续 24h,观察试验结果。	The cell/battery should not explode or ignite. The outside temperature of the battery is less than 150°C. 不爆炸、不起火.电池表面温度≤150°C.
Charging Test 充电试验	Connect 1 trial cell/battery reversely to 3 new batteries of the same model and discharge resistance in series connection. Keep the series resistance $300\Omega\pm1\Omega$. The charging time is 12h. Observe the test result. 取 1 只试验电池,反向与同一型号的 3 只新电池及放电电阻串联,串联电阻要求 $300\Omega\pm1\Omega$,充电时间为 12h,观察试验结果。	The cell/battery should not explode or ignite. 不爆炸、不起火。

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Item 測试项目	Testing Procedure 测试方法	Requirement 检验标准
High Temperature Test 高温试验	Place the cell/battery in a high-temperature chamber of 100℃±2℃ for 5 hours, then put in the environment of 20℃±2℃ for 8hours. 电池在 100℃±2℃放置 5h,接着在 20℃±2℃放置 8h。	The cell/battery should not explode or ignite. 不爆炸、不起火。
Forced Discharge Test 强制放电	Drain the cell/battery that has been discharged to cutoff voltage for capacity test again to 0V. Then connect the cell/battery with a 12V DC power supply in series. The forced discharge time is 24h. Observe the test result. 将容量试验放电至终止电压的电池再放电至 0V,然后将电池与 12V 直流电源串联,再强制放电 24h,观察试验结果。	The cell/battery should not explode or ignite. 不爆炸、不起火。

5 Test Conditions 实验条件

5.1 First Test 初始试验

Unless otherwise specified, routine performance testing must be completed within 45 days after receiving the batteries.

除非另有规定,常规性能检测必须在收到电池45天内完成。

5.2 Temperature and Moisture 温度、湿度

Unless otherwise specified, tests shall be conducted at 20°C±5°C and at relative humidity, which is between 45% and 75%.

无特别规定时,试验均应在 20℃±5℃,相对湿度 $45\% \sim 75\%$ 环境下进行。

5.3 Testing Instruments 试验设备

5.3.1 Size Measurement Instrument 尺寸测量仪器: Vernier caliper with measurement error of no more than 0.02mm or other size measurement instrument with equivalent accuracy.

测量误差不大于 0.02mm 的游标卡尺或具有同等精度的量具。

5.3.2 Voltmeter 电压表: The DC voltmeter with an accuracy of no more than 0.25%, and its internal resistance is no less than 10 $M\Omega$.

精度不低于 0.25%的直流电压表,其内阻应不小于 $10M\Omega$ 。

- **5.3.3 Precision Resistor 精密电阻**: The relative error of precision resistor should be less than 0.5%. 相对误差小于 0.5%。
- **5.3.4 Resistance Box 电阻箱**: The relative error of resistance box should be less than 0.5%. 相对误差小于 0.5%。
- **5.3.5 Electrical Constant-Temperature Drying Machine 电热恒温干燥箱**: The absolute error is less than 2℃.

绝对误差小于2℃。

6 Outgoing Quality Control 出货检验

There are four groups of inspections, inspection group A, B, C, and D. The inspection report will be sent to the customer along with the product, if customer requests one.

出货检验分为 A、B、C、D 四组检验, 当客户要求提供检验报告时,报告随产品一并发给客户。

6.1 Shipment Batch 出货批

A shipment batch shall consist of all products having the same structure, physical dimension and terminal type produced under substantially same conditions. All products shall be produced within the same production cycle using the same materials and processes.

一个出货批应由在基本相同的条件下生产,具有相同结构、物理尺寸和极端形式的所有产品组成,全部产品应是在同一生产周期内、采用相同的材料和工艺生产的。

6.2 Group A Inspection A 组检验

One batch of batteries which delivered according to the contract or order, should be inspected 100% according to the items and order of group A inspection specified in Table 6. Only the batteries which passed the group A inspection can be used for group B and group C inspection. Any battery that does not meet the requirement specified in Table 6 is considered to be defective and is removed from the batch. When the percentage of defective batteries exceeds 4% of the batch, the batteries need to be rejected.

依据合同或订单交货的一个批量电池,A 组检验按表 6 规定的检验项目和顺序进行 100%的出货检验,只有通过 A 组检验的电池才可以进行 B,C 组检验。A 组检验任一只电池不符合表 6 中任一项要求时应判为缺陷并从批中剔除,当有缺陷电池数量超过该批量的 4%,则该批电池拒收。

 Order 序号
 Items of Inspection 检验项目
 Testing Procedure and requirement 试验方法及判定标准

 1
 Appearance 外观

 2
 Open-Circuit Voltage 开路电压
 4.1、4.2

 3
 Load Voltage 负载电压

Table 6 表 6

6.3 Group B Inspection B 组检验

Group B inspection is carried out according to the inspection items and order specified in Table 7. The sampling plan and requirement are specified in Table 7.

B 组检验按表 7 规定的检验项目和顺序进行,抽样方案及判定规则按表 7 规定执行。

Table 7 表 7

Order		Testing Procedure and	Sampling Plan 抽样方案	
序号	Items of Inspection 检验项目	Requirement 试验方法及判定标准	Inspection Level 检验水平	AQL
1	Outline Dimension 外形尺寸	2 44		4.5
2	Weigh 重量	2、4.1	1	1.5

6.4 Group C Inspection C 组检验

The samples used for group C inspection are taken from the shipment batch. The quantity of samples is determined by Table 8. The test results should be in accordance with Table 3.

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C 组检验按出货批抽取样品检测,抽样数量按表8规定执行,检测结果满足表3要求。

Table 8 表 8

Quantity of Products in One Batch 批量产品	Amount of Samples 样品数	Distribution of Samples 样本分配	
1~100 piece(s)	6		
100~2000 pieces	10	Test Half of the samples for high-drain rate discharge. And test another half of the	
2000~10000 pieces	14	samples for routine discharge. 快速放电和常规放电检测各一半电池。	
Above 10000 pieces	18	MENY GUELLAMIN GENIGE TOO	

6.4.1 Requirements of Group C Inspection C 组检验判定规则

6.4.1.1 When the average discharge capacity is no less than the standard value specified in Table 3, and the quantity of batteries which discharge capacity is below 90% of the standard value is 0, the battery capacity is judged to be qualified.

当平均放电容量不低于表 3 所规定的标准值,且低于标准值90%的电池数为0时,判定电池容量合格。

6.4.1.2 When the average discharge capacity is less than the standard value specified in Table 3, or when the quantity of batteries which discharge capacity is below 90% of the standard value is larger than 0, resample for another inspection. If the average discharge capacity in another inspection is no less than the standard value specified in Table 3, and the quantity of batteries which discharge capacity is below 90% of the standard value is 0, the battery capacity is judged to be qualified.

当平均放电容量低于表 3 所规定的标准值,或低于标准值90%的电池数大于0时,重新抽取样品进行试验,若平均放电容量不低于表 3 所规定的标准值,且低于标准值90%的电池数不大于0时,判定电池容量合格。

6.4.1.3 If the average discharge capacity in the second inspection is lower than the standard value specified in Table 3, or if the quantity of batteries which discharge capacity is below 90% of the standard value is larger than 0, the battery capacity is judged to be unqualified.

若第二次试验中平均放电容量低于表 3 所规定的标准值,或低于标准值90%的电池数大于 0 时,判定电池容量不合格。

6.5 Group D Inspection D 组检验

The samples of group D inspection are taken from the shipment batch which have passed the group C inspection and stored under the conditions which is specified in section 11. Test the appearance and open-circuit voltage of the batteries every 12 months, and sample 9 batteries for 2mA discharge capacity test. The result should meet the requirements specified in Table 1, Table 2 and Table 3.

D 组检验样品是从通过 C 组检验的出货批中抽取,在 12 项规定的环境条件下贮存,每隔 12 个月检测一次电池外观和开路电压,并抽取 9 只进行 2mA 容量放电,检测结果符合表 1、表 2 和表 3 中的规定。

7 Packaging 包装

The specification and weight of the package are specified in Table 9. 电池包装箱的规格、重量见表 9。

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Table 9 表 9

External Dimensions of the Package 纸箱外形尺寸	Net Weight of The Package 包装箱净重	Gross Weight of The Package 包装箱毛重	Quantity of the Batteries 电池数量
555mm×310mm×230mm	16kg	17kg	800 pieces/carton 800 只/箱

8 Nameplate and Symbol 铭牌和标志

The nameplates and symbols of the batteries should stay clear, attached and have no obvious color difference.

电池的铭牌和标志应保持清晰,不脱落、无明显色差。

8.1 Nameplate 铭牌

The nameplate should include battery model, rated voltage, code of production date, warning symbol and so on.

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。

8.2 Composition of Code 代码编写

The code of production date is a 8-digit figure. The first four digits stand for year, the fifth and sixth digits stand for month, the last two digits stand for day.

电池生产日期代码用 8 位数字表示。头 4 位数字表示年份,中间两位表示月份。后两位数表示日期。

For example, the code "20160808" stands for the production date of the battery, which is August 8th, 2016.

8.3 Polarity marking 极端标记

The polarity markings are on the side of the battery, "+" and "-" stand for positive tab and negative tab respectively.

标记在电池侧面,用"+"、"-"分别表示其所指的正负极端。

9 Transportation 运输

During transportation, the batteries should not be exposed to direct sunlight, fire, rain, water, or corrosive substances.

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。

Impacts and vibrations during the transportation, loading and unloading should be limited to the minimum scale.

运输和装卸中的冲击、震动应限制在最小程度。

The stacking height of cartons should not exceed 1.5 meters.

对于纸质的包装箱堆放高度不得超过 1.5 米。

When batteries transported over a long distance, if they are shipped, they should be kept away from the

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engine; in the summer, they should not be kept in an unventilated environment for a long period of time.

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。

10 Safety Precautions 安全注意事项

The product can be somewhat dangerous during transportation, storage and use. It may leak or even explode when it is operated incorrectly. Before using this product, please read this specification of product carefully and keep it for reference.

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。

The battery must not be over-discharged, squeezed or incinerated.

电池严禁过放电、挤压、焚烧。

Do not short circuit or charge the battery.

严禁对电池进行短路、充电。

Do not disassemble the battery.

严禁用户自行拆卸电池。

Do not use the battery outside of the working temperature range. Do not heat up the battery above allowable temperature.

严禁在允许的温度范围之外使用或加热。

It is forbidden to solder directly on the surface of the battery.

严禁直接在电池表面焊接。

Do not use batteries with deep scratches or deformation.

严禁使用带有严重伤痕或变形的电池。

Do not use the battery with dry batteries or other kinds of primary batteries together. Do not use batteries with different packaging, different models or different brands together.

严禁把电池同干电池或其他原电池—起使用,也不要把不同包装、不同型号或不同品牌的电池—起使用。

It is forbidden to mix up old and new batteries and use them together.

严禁把新旧电池混用。

When installing the batteries into the device, pay attention to the positive polarity and negative polarity of the battery.

在装入设备时注意电池的正负极不要反装。

When the battery is used up to the cut-off voltage, it should be taken out from the instrument in time.

电池使用至终止电压时,应及时从仪器中取出。

When the battery is not in use for a long time, it should be taken out from the device and stored in a low-temperature and low-humidity environment.

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。

For series and parallel connection of the batteries, please contact us.

对电池进行串并联应与我公司联系。

Used batteries should be disposed in accordance with local environment regulations.

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使用过的电池应按照当地环保规定处理。

If there is any heating, odor, discoloration, deformation, or other abnormality of the battery during usage or storage, stop using it.

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。

11 Storage 储存

The battery should be used and stored in a place away from static electricity.

电池应在远离静电的场所使用和储存。

The battery should be stored in an environment where the temperature does not exceed 30°C and the relative humidity is between 45% and 75%.

电池应储存在温度不超过30℃、相对湿度45%~75%的环境中。

Keep the battery away from heat sources and direct sunlight. Keep it clean, cool, dry, and away from the influence of the weather.

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。

The stacking height of the batteries depends on the strength of the package. Generally, the stacking height of the cartons shall not exceed 1.5 meters. And for wooden boxes, the stacking height shall not exceed 3 meters.

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。

Store and display the batteries in its original package. If the package is removed, the batteries cannot be stacked, otherwise it may cause short-circuit and damage of the batteries.

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。

12 Suggestions 使用建议

When the battery is used in a positive-polarity-upward position, the energy utilization rate is the highest. It is recommended to design the battery compartment properly to make sure the battery is placed in a upright position.

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。

The battery is suitable for use in the location with relatively cool ambient temperature. When it is used for a long time in high-temperature and high-humidity environment, the service life will be reduced.

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。

13 Declaration 声明

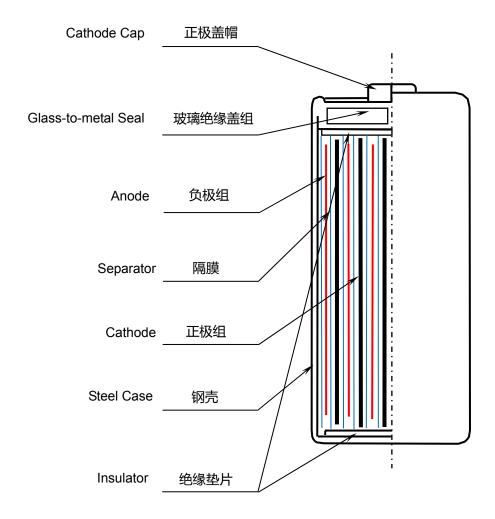
If you have any question about this specification of product, please contact us. Wuhan Zhongyuan Changjiang Technology Co., Ltd reserves the right to modify this specification of product.

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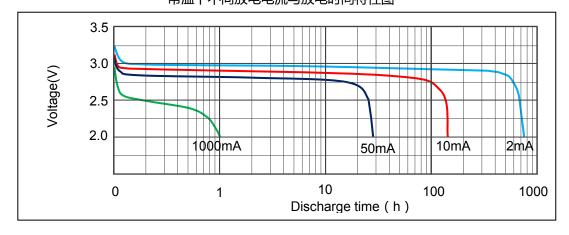
Attachment 1 The Structural Drawing of Spirally Wound Electrode Li/MnO₂ Cell 附图 1 锂-二氧化锰电池(卷绕型)结构图



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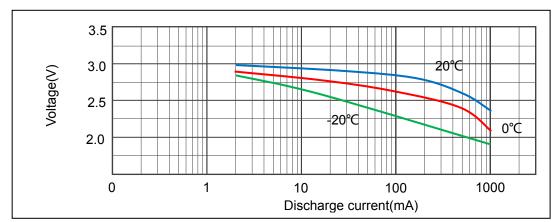
Attachment 2 The Typical Curves of Electrical Performance of the cell 附图 2 电池电性能典型曲线图

At room temperature, different discharge current as a function of discharge time 常温下不同放电电流与放电时间特性图

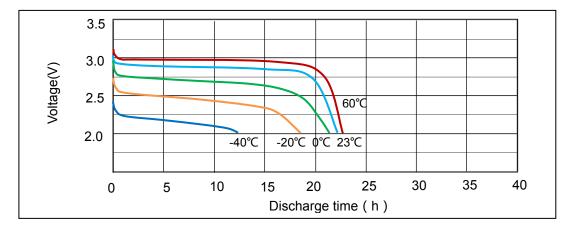


Discharge voltage, current as a function of temperature

电压、电流与温度特性图



Discharge characteristics at different temperature (discharge current is 50mA) 温度与放电特性图(放电电流 50mA)



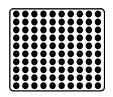
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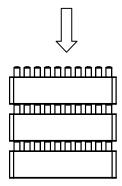
Attachment 3 Packing Method And Package of The Product

附图 3 产品装箱方式及包装

1) 100 cells per pallet. 每盘 100 只电池。



2) 8 pallets per carton. 每箱 8 盘电池。



3) There are 800 cells per carton. Net weight: 16 kg. Gross weight: 17kg. 每箱 800 只电池,净重 16kg,毛重 17kg

