

SPECIFICATION
FOR LITHIUM BATTERY
锂电池技术规范

Model: ML2032

Approved By (批准)	
Department (部门) Name (姓名)	
Title (标题) Signature/Date (签名/日期)	

(Remarks: The above table shall be filled by customer 上表须由客户填写)

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PRODUCT SPECIFICATION

产品技术规范

1. Applicability:

(适用性)

This specification is applicable to the following product:

Coin type manganese lithium battery **ML2032**

本规范适用于以下产品 : 锂锰扣式电池 **ML2032**

2. Battery type and ratings:

(电池类型和等级)

2.1. Battery type (电池类型) : **ML2032**

2.2. Nominal voltage (标准电压) : **3.0V**

2.3. Nominal capacity: **65mAh** (on continuous discharge at 20°C under 15kΩ load to 2.0V end-voltage, 20°C条件下负载 15kΩ连续放电至2.0V终止)
(标准容量)

2.4 Outer dimensions: Outer dimensions shall be as shown in Fig. 1, Battery Dimensions.

(外观尺寸)

(ML battery is a secondary battery and so change of battery height (thickness) occurs when battery is charged or discharged.

Please establish space more than 1mm around battery.)

(外观尺寸见图1“电池尺寸”。ML电池是可充电电池；电池的高度(厚度)随着电池充电或放电的过程而变化时，请保持电池周围有超过1 mm的空间活动范围。)

2.5 Mass (包装重量) : **Approx. 3.1g**

2.6 Production country (生产国家) : **China**

3. Quality requirements:

(质量要求)

3.1 Dimensions: Dimensions of batteries when tested in accordance with Subparagraph 4.4.1 shall be as shown in Fig. 1. Battery dimensions.

(尺寸：测试的电池尺寸应与4.4.1图1“电池尺寸”相一致)

3.2 Appearance: Battery shall have no deformation, dent, stain, leakage and camber or burr on their sealing members, which may adversely affect their appearance, performance and commercial value. There shall be no coatings or other foreign objects on the surface of terminals which may adversely affect actual use or performance of batteries.

(外观：电池外观应无变形，无凹痕，无污点，无漏液，密封部件无拱形或毛边，以免影响其外观性能和商业价值。电池接线端应无覆盖物或异物，以免影响实际使用或电池性能)

3.3 Characteristics (特性) :

(1) *Open-circuit voltage:* Open-circuit voltage of batteries when tested in accordance with Subparagraph 3.3.1 shall meet the requirement set forth in Table 1.

(开路电压:测试的开路电压应与3.3.1表1相一致)

[TABLE 1]

TEST ITEMS 测试项目	TEMPERATURE 温度	INITIAL 初期	AFTER 12 MONTHS 12个月后	REMARKS 备注
Open-circuit Voltage 开路电压	20±2°C	2.8V TO 3.2V	2.5V TO 3.2V	

(2) Service life: Service life of batteries when tested in accordance with Subparagraph 3.3.2 shall meet the requirements set forth in Table 2.

(使用寿命:测试的使用寿命应与3.3.2表2相一致)

[TABLE 2]

TEST ITEMS 测试项目	TEMPERATURE 温度	INITIAL 初期	AFTER 12 MONTHS 12个月后	REMARKS 备注
Service Life 使用寿命	60±2°C	300 Hrs. Or Longer ≥300小时	-	Continuous Discharge Under 15kΩ Load to 2.0V End-Voltage 负载15kΩ连续放电至2.0V终止
	20±2°C	320 Hrs. Or Longer ≥320小时	270 Hrs. or Longer ≥270小时	
	-20±2°C	180 Hrs. Or Longer ≥180小时	-	

(3) Service life after storage at high temperature: Service life of batteries when tested in accordance with Subparagraph 3.3.3 shall meet the requirements set forth in Table 3

(高温储存后使用寿命:测试的使用寿命应与3.3.3表3相一致)

[TABLE 3]

TEST ITEM 测试项目	STORAGE TEMP 储存温度	STORAGE PERIOD 储存期	REQUIREMENT 要求	REMARKS 备注
Service Life After Storage At High Temperature 高温储存后使用寿命	60 ±2°C	20 Days	270Hrs Minimum ≥270小时	Continuous Discharge At 20±2°C Under 15kΩ Load To 2.0V End-Voltage After Storage. 储存后,20±2°C条件下负载15kΩ连续放电至2.0V终止

(4) Cycle life: Cycle life of batteries, tested in accordance with Subparagraph 3.3.4, should meet the requirements set forth in Table 4.

(循环寿命:测试的循环寿命应与3.3.4表4相一致。)

[TABLE 4]

TEST ITEM 测试项目	TEMPERATURE 温度	DISCHARGE DEPTH 放电深度	REQUIREMENT 要求	REMARKS 备注
Cycle life 循环寿命	20±2°C	100%	30 cycles Minimum ≥30次循环	
		10%	600 cycles Minimum ≥600次循环	

(5) Leakage characteristics: Batteries when tested in accordance with Subparagraph 3.3.5 shall have no leakage.

(漏液特性:测试的电池应与3.3.5表5相一致(无漏液))

[TABLE 5]

TEST ITEM	REQUIREMENT	TEST CONDITIONS
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测试项目	要求	测试条件
Leakage Characteristics 漏液特性	No Leakage 无漏液	Temperature:60°C, Relative Humidity: 75% Storage: 30 Days Shall Be Inspected By Visual Means 温度: 60°C,相对湿度:低于75% 储存: 30天 视觉检查

(6) *Overcharge*: Batteries tested in accordance with Subparagraph 4.5.2 should meet the requirements of Table 2 and should have no visual defect.
(过度充电:按4.5.2方法测试, 电池外观应无不良。)

(7) *Vibration Test*: Batteries, tested in accordance with Subparagraph 4.5.3 should have no visual defect. (振动测试:按4.5.3方法测试, 电池外观应无不良。)

(8) *Drop Test*: Batteries, tested in accordance with Subparagraph 4.5.4, should have no visual defect. (跌落测试:按4.5.4方法测试, 电池外观应无不良。)

(9) *Short Circuit*: Batteries, tested in accordance with Subparagraph 4.5.5, should have no visual defect. (短路:按4.5.5方法测试, 电池外观应无不良。)

4. Testing:

(测试)

4.1 Test conditions (测试条件) :

4.1.1 **Initial test** :Initial test must be done within 1 months from delivery

(初期测试:初期测试应在交付后一个月内进行)

4.1.2 **Temperature and humidity**: Unless otherwise specified elsewhere, tests shall be conducted at ordinary temperature ($20\pm 2^{\circ}\text{C}$) and ordinary humidity ($55\pm 20\%\text{RH}$).

(温度和湿度: 除非另有说明, 测试应安排在常温 ($20\pm 2^{\circ}\text{C}$)和正常湿度 ($55\pm 20\%\text{RH}$)的环境中进行)

4.2 Storage of test specimen batteries (测试样品电池的储存) :

4.2.1 Specimen batteries to be tested shall be kept at the ambient temperature of 30°C or below and at the relative humidity of 75% or below.

(待测的样品电池应在环境温度 30°C 或以下, 相对湿度75%或以下的环境中保存)

4.2.2 Storage at less than -20°C can deform the plastic parts and may cause a leakage.

(在低于 -20°C 储存会使塑料部件变形, 导致漏液)

4.2.3 To prevent self-discharge caused by corrosion or decrease of insulation, humidity during storage shall be less than 75%RH without dewing on battery.

(以防因腐蚀或绝缘材料减少引起的自放电, 储存的湿度应低于 75%RH不至于电池结露)

4.3 Measuring instruments and devices (测量仪器与装置) :

4.3.1 **Dimensions**: Outer micrometers specified in JJG26-95, dial gauges specified in JIS B 7503, and vernier callipers specified in JJG30-92 or those having equal or better accuracy shall be used.

(尺寸: JJG26-95中指定的千分尺, JIS B 7503中指定的百分表, JJG30-92中指定的游标卡尺或等效或更精确的仪器)

4.3.2 **DC voltmeters**: The tolerance shall be $\pm 0.01\text{V}$ and the input resistance rating shall be $10\text{M}\Omega$ or more. (直流电压表: 公差应在 $\pm 0.01\text{V}$, 输入电阻极限为 $10\text{M}\Omega$ 或更大)

4.3.3 **Load resistance**: Load resistance shall include resistance throughout external circuits, and its tolerance shall be $\pm 5\%$.

(负载电阻: 负载电阻应包含贯穿外部电路的电阻, 公差应在 $\pm 5\%$)

4.4 Test methods (测试方法) :

4.4.1 **Dimensions:** Dimension shall be measured with instruments specified in Subparagraph 4.3.1 above, provided that either one or both sides of such instruments shall be insulated in measuring the overall height of the batteries.

(尺寸: 尺寸应用上面4.3.1指定的工具测量。工具的一边或两边在测试电池总高时应被绝缘)

4.4.2 **Appearance:** Appearance of batteries shall be inspected by visual means.

(外观: 电池外观应通过视觉检查)

4.4.3 **Open-circuit voltage:** Test specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in Table 1, and then the voltage between both terminals shall be measured at the same ambient temperature with a voltmeter as specified in Subparagraph 4.3.2.

(开路电压: 测试样本电池应在表1中指定的环境温度中储存8小时或以上, 然后在同一环境温度中用4.3.2指定的电压表测试两端电压)

4.4.4 **Service life:** Test specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in Table 2. and shall then be continuously discharged at the same ambient temperature and through the specified load resistance. The discharge shall be continued until the terminal voltage of the test specimens falls below the discharge end-point voltage of 2.0V, and the time during which the terminal voltage has been maintained equal to and above the discharge end-point voltage shall be taken as the service life.

(使用寿命: 测试样本电池应在表2中指定的环境温度中储存8个小时或以上, 然后在同一环境温度中连接规定负载电阻连续放电。放电应是连续的直到测试样本的路端电压降到放电终止电压2.0V, 路端电压维持在等于或高于放电终止电压的时间即是使用寿命)

4.4.5 **Service life after high-temperature storage:** Test specimen batteries, after having been stored at the temperature and period specified in Table 3, shall be kept for 12hours or longer at ordinary temperature ($20\pm 2^{\circ}\text{C}$) and at ordinary humidity ($55\pm 20\%\text{RH}$) and shall then be continuously discharged through the load resistance $15\text{k}\Omega$ at ambient temperature of $20\pm 2^{\circ}\text{C}$. The discharge shall be continued until the voltage falls below the discharge end-point voltage of 2.0V, and the time during which the voltage has been maintained equal to and above the discharge end-point voltage shall be taken as the service life.

(高温储存后使用寿命: 测试样本电池在表3中指定的温度和时期储存后应在常温($20\pm 2^{\circ}\text{C}$)正常湿度($55\pm 20\%\text{RH}$)环境中储存12个小时或以上, 然后在 $20\pm 2^{\circ}\text{C}$ 的环境温度中连接 $30\text{k}\Omega$ 负载电阻连续放电。放电应连续直到电压降到放电终止电压2.0V, 电压维持在等于或高于放电终止电压的时间即是使用寿命)

4.4.6 **Cycle life:** (循环寿命)

(1) **100% Charge-Discharge Test** (100%充放测试)

- (a) Leave the battery samples at $20\pm 2^{\circ}\text{C}$ for at least 12 hours.
- (b) Charge the battery samples at 2.9mA until $3.25\pm 0.01\text{V}$.
- (c) Use 3.25V constant voltage for charging for next 5 hours.
- (d) Discharge the battery samples continuously at 2.6mA for 7 hours.
- (e) Repeat the above (b), (c) and (d).

Count the number of cycles until the discharge end-point voltage drops below 2.0V.

- (a) 将电池样品储存在 $20\pm 2^{\circ}\text{C}$ 12小时以上。
- (b) 电池样品在2.9mA下连续充电至 $3.25\pm 0.01\text{V}$ 。
- (c) 电池样品电压达到3.25 V后, 继续恒压充电5小时。
- (d) 电池样品充电后, 载负载2.6 mA下连续放电7小时。
- (e) 放电后, 重复上述(b)、(c)和(d)项目。

计数循环次数直至放电电压首次低于2.0 V为止。

(2) 10% Charge-Discharge Test (10%充放测试)

- (a) Leave the battery samples at 20±2°C for at least 12 hours.
 - (b) Charge the battery samples continuously at 1.2mA until 3.25 ± 0.01V.
 - (c) Discharge the battery samples at 1.2mA for 2.5 hours.
 - (d) Repeat (b) and (c).
- Count the number of cycles until the discharge end-point voltage drops below 2.0V.

- (a)将电池样品储存在20±2°C 12小时以上。
 - (b)电池样品在1.2 mA连续充电至 3.25±0.01 V。
 - (c)电池样品充电后，在负载1.2 mA下连续放电2.5小时。
 - (d)放电后，重复上述(b)和(c)项目。
- 计数循环次数直至放电电压首次低于2.0 V为止。

Lithium Manganese Dioxide Battery
Model ML2032

The Appearance Of ML2032

外观

Specifications:

- Nominal Discharge current: : 0.2mA
- Nominal Voltage: 3V
- Nominal Capacity: 65MAH
- Continuous stangard load: 15kΩ
- Nominal Charge current : 2.9MA
- Operating temperature: -20°C~70°C
- Weight : 3.1(g)



二氧化锰锂电池

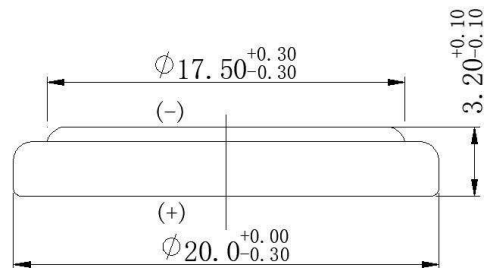
ML2032

(技术规格)

- 标称放电电流: 0.2mA
- 标称电压 : 3V
- 标称容量 : 65MAH
- 连续标准负载: 15kΩ
- 标称充电电流: 2.9MA
- 工作温度 : -20°C~70°C
- 重量 : 3.1(g)

The Dimensions Of ML2032

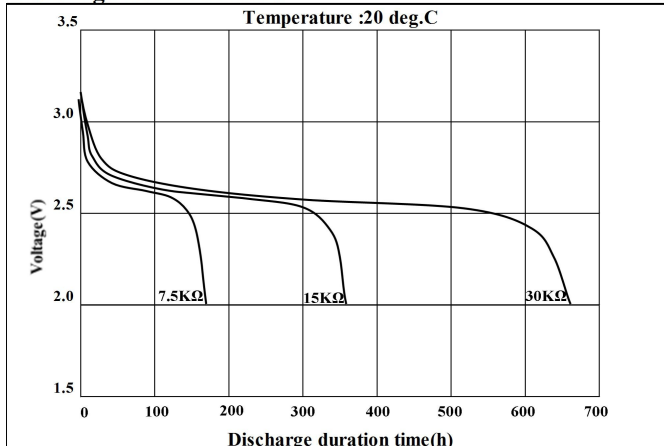
尺寸



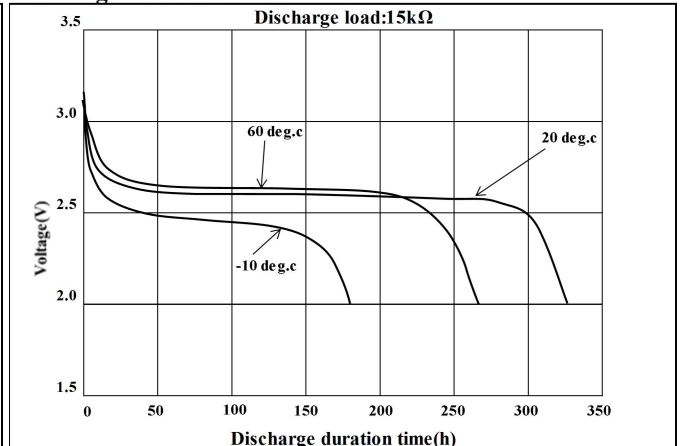
Characteristics:

(特性)

Discharge Characteristics



Discharge Characteristics

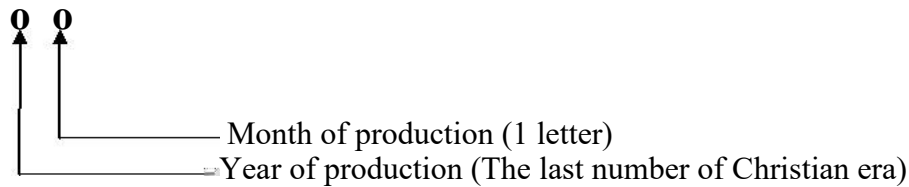


5. Markings:

(标签)

5.1 Markings on batteries (电池上标签) :

- 5.1.1 Battery type (电池类型) : ML2032
- 5.1.2 Brand of battery (电池品牌) : OHMAI
- 5.1.3 Polarity (极性) : + [(-) shall not be indicated] (+ [(-)不标识])
- 5.1.4 Manufacturing marks (制造标识) : The year and month of production shall be marked on the negative (-) terminal side (生产年月应在负极面(-)标识)



[[Example] 21..... Manufactured in January 2012

2X Manufactured in October 2012

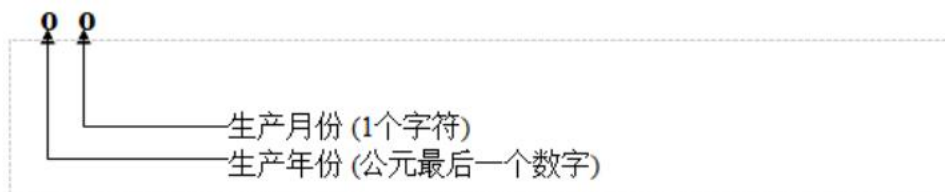
2Y Manufactured in November 2012

2Z Manufactured in December 2012

Month of production.

- January to September -- 1- 9

- Oct, Nov, Dec, -----X, Y, Z



[例子] 21..... 2012年1月制造

2X 2012年10月制造

2Y 2012年11月制造

2Z 2012年12月制造

生产月份:

- 1月-9月 -- 1- 9

- 10月, 11月, 12月, -----X, Y, Z

6. Precautions

(注意事项)

●Precautions in Designing (设计注意事项)

To use the battery efficiently, observe the following precautions.

(为有效地使用电池, 请遵循以下注意事项)

1. Maximum Allowable Charge Current to Battery (电池最大允许充电电流)

Model 型号	Maximum allowable charging current 最大允许充电电流
ML1220	5mA
ML2020	5mA
ML2032	20mA
ML2430	20mA

〔How to Calculate Protection Resistance R〕 (如何估算保护电阻 R 值)

Protection resistance R must exceed the value calculated in the following formula:

(保护电阻 R 值应超过以下公式估算的值)

$$R \geq \frac{V(\text{Main power source voltage})}{I(\text{Maximum allowable charge current per battery})}$$

$$R \geq \frac{V(\text{主电源电压})}{I(\text{每个电池最大允许充电电流})}$$

※在这个方程式中, 假定最坏电池电压为0V

5. Never set charge voltage above 3.3V (禁止将充电电压设置在3.3V以上)

To charge at higher voltage could cause the generation of gas, internal short-circuit, or other malfunctions, and leads to distortion, leakage, overheating, explosion, or fire.

(高电压充电会引起气体的产生, 内部短路, 或其它的故障, 从而导致电池变形、漏液、过热、爆炸或起火。)

●Warning-Handling (警告-操作)

1. Never swallow (禁止吞咽)

Always keep the battery out of the reach of young children to prevent it from being swallowed. If it is swallowed, consult a physician immediately.

(保持电池远离小孩以防吞咽。万一吞咽, 请立即咨询医师。)

2. Do not replace (禁止替换)

There could be some large differences even between battery manufacturers, not to mention between types or models. If you are equipment manufacturer and you should replace the battery, please use new same type and same model battery. Because this is a rechargeable battery, its characteristics are completely different from a primary battery even though their shapes are alike. If a primary battery is installed in the circuit instead of a rechargeable battery, gas could be generated, or the primary battery could be short-circuited by charging, leading to distortion, leakage, overheating, explosion, or fire. Please pay attention in designing your equipment so that end user cannot replace the battery by mistake.

(不同电池制造商制造的电池存在一些大差异, 更不用说不同型号不同模型。如果你是设备制造商并且必须更换电池, 那么请使用琦捷公司的新的同一型号和同一模型的电池。因为这是可充电电池, 它的特性和一次电池完全不同, 即便它们形状相似。如果一次电池被当作可充电电池安装到电路中, 气体将会产生或者一次电池会在充电时发生短路, 从而导致变形、漏液、过热、爆炸或起火。请设计你的设备以防最终用户替换错电池。)

3. Never use two or more batteries connected in series or in parallel

(禁止使用两个或多个电池串联或并联)

It is very difficult to design the circuit so that each battery can be observed the instructed charging voltage or charging current in warning of circuit design mentioned later.

(很难设计一个电路使每个电池的指示充电电压或充电电流在后面提到的报警电路设计中都被考虑到。)

4. Never reverse the positive and negative terminals when mounting

(安装时禁止将正负极接反)

The improper mounting of the battery could lead to equipment malfunction or short-circuit. This could cause distortion, leakage, overheating, explosion, or fire.

(不正确地安装电池可能导致设备故障或短路, 从而引起电池变形、漏液、过热、爆炸或起火。)

5. Never short-circuit the battery (禁止短路电池)

Do not allow the positive and negative terminals to be short-circuited. Never carry or keep battery with metal goods such as a necklace or a hairpin. Please be careful on installing not to be short-circuited via metal parts of the equipment. Otherwise battery could cause distortion, leakage, overheating, explosion, or fire.

(不允许正负极短路。禁止将电池与项链、发夹一起携带或保存。安装时小心因设备金属部件而造成电池短路。否则电池将导致变形、漏液、过热、爆炸或起火。)

6. Never heat (禁止加热)

Heating the battery to become more than 100 degree C could increase the internal pressure and lead to distortion, leakage, overheating, explosion, or fire.

(加热电池超过100°C会增大内压力而导致电池变形、漏液、过热、爆炸或起火。)

7. Never expose to open flames (禁止暴露于明火)

Exposing to flames could cause the lithium metal to melt, causing the battery to catch fire and explode violently.

(暴露于火会引起锂金属溶解从而导致电池剧烈起火和爆炸。)

8. Never disassemble (禁止拆解)

Separator or gasket could be damaged. This could cause distortion, leakage, overheating, explosion, or fire.

(分离装置或垫圈可能被损坏从而导致电池变形、漏液、过热、爆炸或起火。)

9. Never weld terminal or wire to the body of battery directly

(禁止直接在电池上焊接端线)

The heat on welding such as soldering could cause melting of lithium, or damage to insulating material in battery. It could cause distortion, leakage, overheating, explosion, or fire. When soldering the battery directly to equipment is required, soldering must be done only on tabs or leads. And the temperature of soldering iron must be below 350 degree C and the soldering time must be less than 5 seconds; as low and short as possible. Do not use soldering bath, because the board with battery could stop on the bath or the battery could drop into the bath. Moreover, prevent to solder excessively, because excessive solder may lead to short or charge of the battery in unintended portion on the board.

(焊接高温如锡焊可能引起锂熔化或电池隔热材料的损坏，从而导致电池变形、漏液、过热、爆炸或起火。电池直接焊接到设备时必须使用焊片。即便如此，烙铁温度必须低于350°C，焊接时间必须低于5秒，且温度越低时间越短越好。不要使用焊接浴，因为电路板可能留在焊接浴内或电池掉进焊接浴。同时注意不要过度焊接，因为过度焊接可能滴到线路板意想不到的地方从而导致电池短路或充电。)

10. Never touch the liquid leaked out of battery. (禁止接触电池泄露的液体)

If the liquid comes into eyes, immediately flush the eyes with plenty of water and consult a physician, because the liquid could damage eyes. If the liquid comes into mouth, immediately rinse by plenty of water and consult a physician.

(万一液体入眼，请立即用大量清水冲洗并咨询医师。因为此液体可能损坏眼睛。万一液体入口，请立即用大量清水漱口并咨询医师。)

11. Never bring fire close to battery liquid. (禁止电池液体靠近火源)

When leakage or strange smell are suspected, keep the battery away from a fire immediately because the leaked liquid could catch fire.

(疑似电池漏液、有异味，请迅速将电池远离火源。因为电池泄露的液体会着火。)

12. Never keep in touch with battery. (禁止与电池保持接触)

Keeping in touch with battery on the skin by such as a tape could damage the touched area of the skin. (用带子使电池与皮肤保持接触会损伤皮肤被接触的区域。)

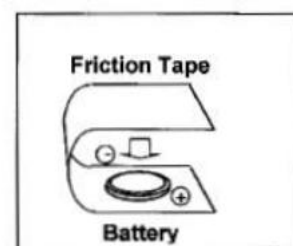
●Warning-Disposal (注意-处置)

The battery may be regulated by national or local regulation.

Please follow the instructions of proper regulation.

As electric capacity is left in a discarded battery and it comes into contact with other metals, it could lead to distortion, leakage, overheating, or explosion, so make sure to cover the (+) terminals with friction tape or some other insulator before disposal.

(电池可能受管于国家或地方控制。请遵循以下恰当规则的技术指导。正因为丢弃电池有残留的电容量, 当其与其它金属接触时可能导致变形、漏液、过热、爆炸, 所以请确保在处理前使用绝缘胶布或其它绝缘材料包好正、负极。)



(Example of battery insulating)

●Caution – Handling/Storage (注意-操作/存储)

1. Use within rated temperature range (-20 to 70 degree centigrade). Otherwise the charge and discharge characteristics may be reduced.

(在额定温度范围 (-20~70°C) 使用。否则充放性能会降低。)

2. Never expose the battery in ultrasonic. (禁止将电池暴露于超声波内)

Exposing the battery in ultrasonic may cause short-circuiting by powdering of the inside material leading to distortion, leakage, overheating, explosion, or fire.

(电池暴露于超声波内将会引起内部材料粉化接触而短路, 进而导致电池变形、漏液、过热、爆炸或起火。)

3. Never treat the battery violently. (禁止暴力拆解电池)

Deforming or strong shock by dropping or throwing may cause distortion, leakage, overheating, explosion, or fire.

(坠落或抛掷使电池变形或强震会导致电池变形、漏液、过热、爆炸或起火。)

4. Keep contact pressure no more than 2N. (保持触点压力不超过2N)

The battery voltage may be lower than intended value because of poor contact condition. Please keep contact pressure no more than 2N for suitable contact resistance.

(电池电压因接触不良可能会低于预期值。当使用合适的接触电阻时, 请保持触点压力不超过2N。)

5. Never use or leave the battery in hot place such as under the direct rays of the sun or in the car under the burning sun. Otherwise this may cause distortion, leakage, overheating, explosion, or fire of the battery.

(禁止在高温的地方使用或存放电池, 如太阳直射或烈日下的汽车内。否则可能导致电池变形、漏液、过热、爆炸或起火。)

6. Never let the battery contact with water. (禁止将电池浸入水中)

Contact of the battery with water may cause distortion, leakage, overheating, explosion, or fire of the battery. And rust may be generated.

(电池与水接触可能导致其变形、漏液、过热或起火, 也会生锈。)

7. Never store the battery in hot and high humidity place.

(禁止将电池储存在高温高湿的地方)

Otherwise the property of the battery may deteriorate. Under certain circumstances, this may cause distortion, leakage, overheating, explosion, or fire.

(否则电池特性将会恶化。此种环境下, 将会导致电池变形、漏液、过热、爆炸或起火。)