

FILE NAME: SPECIFICATIONS OF
SEALED NICKEL CADMIUM
BATTERIES(FOR HIGH
TEMP)

MODEL: **KRMU 23/43 SC1800mAh**

Specification No.: **S/RONDA0456-1**

EDITION: **A2**

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1. SCOPE

The specifications governs the performance of the following **RONDA** Nickel-Cadmium Cylindrical cell and its battery pack.. (Refer to the attached figure 1)

Rated capacity: 1800mAh

Designation: KRMU 23/43 SC (D: $23.0^{0}_{-1.0}$ mm H: $43.0^{0}_{-1.5}$ mm)

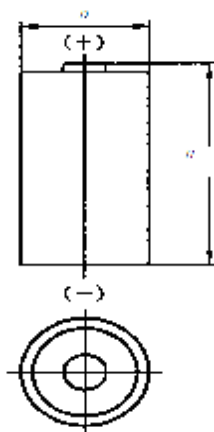


Figure 1- Jacketed cylindrical cells

2. DATA OF BATTERY PACK

The data of battery pack, including voltage and weight, is almost equivalent to the multiple numbers of the relevant single cells.

Example: Battery pack consisting three single cells

Nominal voltage of single cell = 1.2V

Nominal voltage of battery pack = $1.2V \times 3 = 3.6V$

3. RATINGS

Table 1 - Ratings of the cells

| Description | Unit | Specification | Conditions |
|-----------------|--------|---------------|---------------------------|
| Nominal Voltage | V/Cell | 1.2 | Single cell |
| Rated Capacity | mAh | 1800 | Standard Charge/Discharge |

4. PERFORMANCE

Unless otherwise stated, tests should be done within one month of delivery under the following conditions:

Ambient Temperature: $20 \pm 5^{\circ}\text{C}$

Relative Humidity: $65 \pm 20\%$

Standard Charge/Discharge Conditions:

Preparative: Prior to charging, the cell shall be discharged by $360\text{mA}(0.2I_r)$ to 1.0V

Charge: $180\text{mA}(0.1I_r) \times 16\text{hours}$

Stand in charged condition:1~4h

 Discharge: 360mA(0.2I_A) to 1.0V/Cell 1

Table 2 – Performance and test methods

| Test Item | | Unit | Specification | Test Conditions | Remarks |
|-----------------------------|--------------------|---|---------------|---|-----------|
| Discharge performance | 20 °C ^a | h | ≥ 5 | Standard Charge/Discharge | / |
| | | min | ≥ 48 | After Standard Charge, stored for 1~4h, then discharged by 1800mA (1.0I _A) to 0.9V. | HU |
| | -18°C | h | ≥ 2 | After Standard Charge, stored for 16~24h in -18±2°C, then discharged by 360mA (0.2I _A) to 1.0V in -18±2°C. | / |
| Charge (capacity) retention | | h/min | ≥ 3h15min | After Standard Charge, stored on open circuit for a period of 28days, then discharged by 360mA (0.2I _A) to 1.0V. | / |
| Endurance in cycles | | cycle | ≥ 50 | Appendix-table 3 | / |
| Permanent charge endurance | | A: ≥ 3h45min B: ≥ 42min 2 nd | | Appendix-table 4 | / |
| | | A: ≥ 3h45min B: ≥ 42min 3 rd | | | |
| | | A: ≥ 2h30min B: ≥ 24min 8 th | | | |
| | | A: ≥ 2h30min B: ≥ 24min 9 th | | | |
| Over charge | Discharge A | h/min | ≥ 4h15min | Appendix-table 5 | / |
| | Discharge B | min | ≥ 36 | | |
| Safety device operation | | Not disrupt or burst | | Undergo a forced discharge at constant current 360mA(0.2I _A) to 0V. Then discharged by 1800mA (1.0I _A) for 60min. | / |
| Storage ^b | | hour | ≥ 5 | Stored on open circuit for 12 months. Then standard charge/discharge. | / |
| Charge acceptance | | / | / | IEC 61951-1 2006 7.9 | Reference |
| Internal resistance | | mΩ | ≤ 18.0 | Within 1~4h after standard Charge (1000Hz) | |
| Weight | | g | 46.0(approx) | / | Reference |
| Vibration | | No leakage, no fire, no explosion | | IEC 62133 2002 4.2.2 | / |
| Free fall | | No fire, no explosion | | IEC 62133 2002 4.3.3 | / |

 a) Five cycles is permitted b) Unless otherwise stated, the cell shall be discharged by 360mA(0.2I_A) to 1.0V before test.

Notice: Test conditions is drawn according to IEC 61951-1 2006; Please refer to the related description of the standard.

5. CONFIGURATION, DIMENSIONS AND MARKINGS

Please refer to the attached drawing.

6. EXTERNAL APPEARANCE

The cell/battery shall be free from cracks, scars, breakage, rust, discoloration, leakage nor deformation.

7. CAUTION

- (1) Reverse charging is not acceptable.
- (2) Charge before use. The cells/batteries are delivered in an uncharged state.
- (3) Do not charge/discharge with more than our specified current.

- (4) Prevent short circuit, do not incinerate or disassemble the cell/battery.
- (5) Do not solder directly to the cell/battery for a long time.
- (6) The life expectancy may be reduced if the cell/battery is subjected adverse conditions like: extreme temperature, deep cycling, excessive overcharge/ over-discharge.
- (7) Store the cell/battery in a cool and dry place. Always discharge batteries before assemble or solder.
- (8) Always discharge batteries before bulk storage or shipment.
- (9) Do not mix batteries of different types and capacities.

Appendix

A) Endurance in cycles

Prior to the endurance on cycle test ,the cell shall be discharged at 360mA(0.2I_r) to 1.0V. The following test shall be carried out in accordance with the conditions specified in Table 3.

Table 3 Endurance in cycles

| Cycle number | Charge | Stand in charged condition | Discharge |
|--------------|--------------------------------|----------------------------|---|
| 1 | 0.1I _r for 16h | none | 0.25I _r for 2h20min |
| 2~48 | 0.25I _r for 3h10min | none | 0.25I _r for 2h20min |
| 49 | 0.25I _r for 3h10min | none | 0.25I _r to 1.0V |
| 50 | 0.1I _r for 16h | 1h~4h | 0.20I _r to 1.0V ^a |

a) Cycles 1 to 50 shall be repeated until the discharge duration on any 50th Cycle becomes less than 3h or the cell voltage drops below 1.0V during 1~48th cycle.

B) Permanent charge endurance

The permanent charge endurance test shall be performed in three steps according to the conditions specified in table 4.

It consists of:

- I A charge acceptance test at +50°C;
- I An ageing period of six months at +70°C;
- I A final charge acceptance test to check the cell' s performance after ageing.

NOTE The twelve months ageing period and the temperature of +70 ° C have been selected to simulate four years of permanent charge operation at +50 ° C.

Table 4 Permanent charge endurance

| Cycle number | Ambient temperature | Charge | Discharge A or B ^a | Minimum discharge duration |
|--------------|---------------------|-------------------------------|---|----------------------------|
| 1 | 50°C ± 2°C | 0.05I _r A for 48h | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | No requirement |
| 2 | | 0.05I _r A for 24h | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | 3h45min 42min |
| 3 | | 0.05I _r A for 24h | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | 3h45min 42min |
| 4 | 70°C ± 2°C | 0.05I _r A for 120d | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | No requirement |
| 5 | | 0.05I _r A for 120d | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | |
| 6 | | 0.05I _r A for 120d | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | |
| 7 | 50°C ± 2°C | 0.05I _r A for 48h | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | No requirement |
| 8 | | 0.05I _r A for 24h | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | 2h30min 24min |
| 9 | | 0.05I _r A for 24h | A: 0.2I _r A to 1.0V or B: 1.0I _r A to 1.0V | 2h30min 24min |

a) A: for LU、MU、HU cells; B: for MU、HU cells only.

C) Over charge

The ability of the cell to withstand an overcharge shall be determined by the following test at 0°C ± 2°C in circulating air.

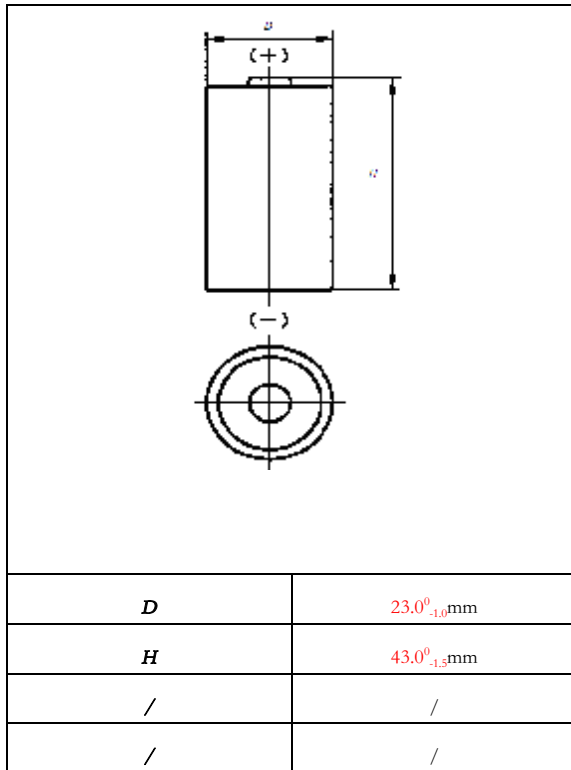
The test shall be carried out according to the specified in table 5.

Table 5 Overcharge at 0°C

| Charge | Discharge A ^a | Discharge B ^a |
|-------------------------------|-----------------------------|-----------------------------|
| | LU、MU、HU cells | MU、HU cells |
| 0.05 I _r A for 28d | 0.2I _r A to 1.0V | 1.0I _r A to 1.0V |

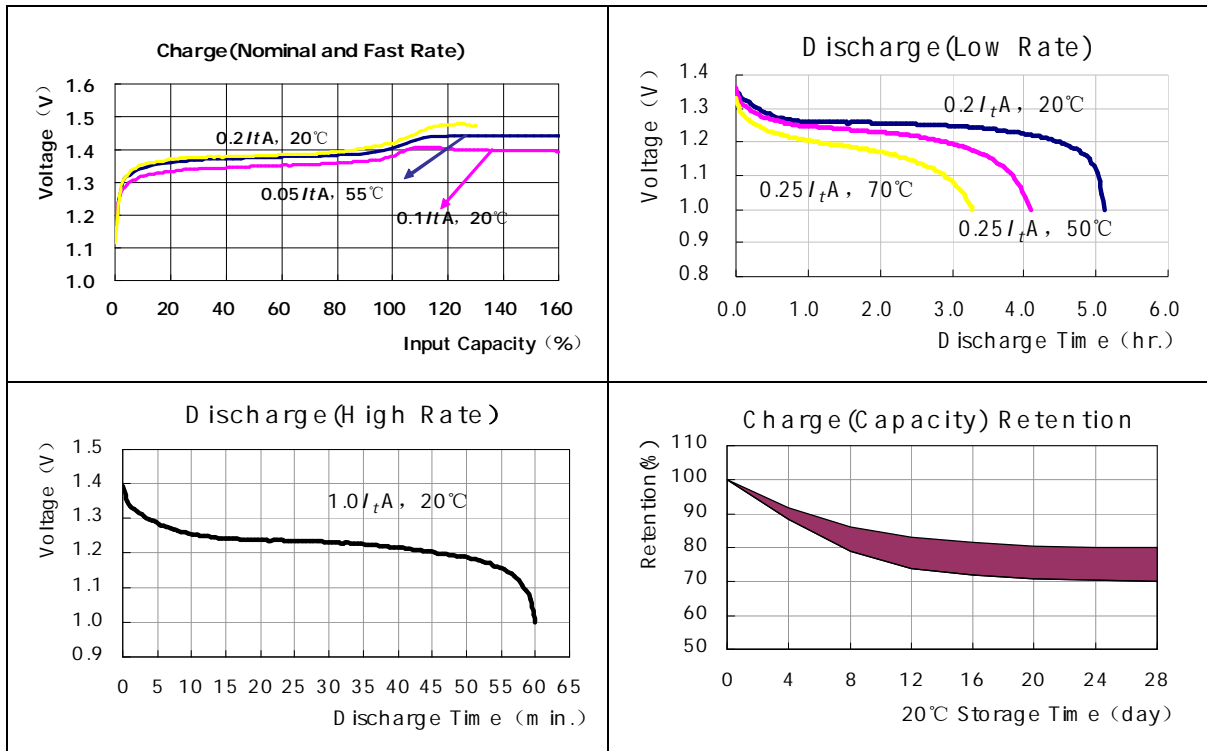
a) The discharge is carried out immediately on the charging

Base Data:



| | | |
|---|---------------------|-----------|
| Nominal voltage | | 1.2V |
| Capacity comparison(mAh) | 0.2I _t A | 1800 |
| | 1.0I _t A | 1440 |
| Weight(g) | | 46.0 |
| Internal Impedance at 1000Hz (After Charge;mΩ) | | ≤ 18.0 |
| Charge current | Trickle | 90mA |
| | Standard | 180mA |
| | Rapid | 360mA |
| Charge time | Trickle | 48h |
| | Standard | 16h |
| | Rapid | 6.5h |
| Temperature Ambient | charge | 0~+70°C |
| | Discharge | -20~+70°C |
| | Storage | -30~+70°C |
| Max. Test Temperature | | 70°C |

Electrical Performance:



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 编 号： **S/RONDA0456-1**
 版 次： A2
 日 期： **2014年5月23日**

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1. 范围

本规格书适用于下述的朗达牌 Ni-Cd 圆柱型电池单体及电池组的全部性能指标。

额定容量: 1800mAh

电池型号: KRMU 23/43 SC (D: $23.0^{0}_{-1.0}$ mm H: $43.0^{0}_{-1.5}$ mm)

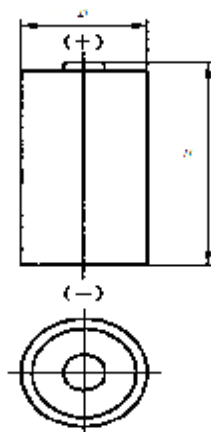


图 1 带防护外套的圆柱型密封镍镉可充单体电池

2. 组合电池的指标

组合电池的电压、重量等数据，近似等于单体电池数与对应值之乘积。

例如：组合电池包括三个单体电池

单体电池的额定电压=1.2V

则电池组的额定电压=1.2V×3=3.6V

3. 额定性能

表 1 电池的额定性能

| 项目 | 单位 | 指标 | 备注 |
|------|-----|------|------|
| 标称电压 | V | 1.2 | 单体 |
| 额定容量 | mAh | 1800 | 标准充放 |

4. 电池性能与测试方法

除非另有说明，测试须在发货后一个月内在下述条件下进行：

环境温度: $20 \pm 5^{\circ}\text{C}$

相对湿度: $65 \pm 20\%$

标准充放条件：

准备：充电前电池要以 $0.2I_d$ 恒流放电至终点电压 1.0V；

充电：180mA($0.1I_d$)充 16 小时；

搁置：1~4 小时；

放电：360mA($0.2I_d$)至 1.0V。

电池性能和测试方法见表 2

表 2 电池性能及测试方法

| 测试项目 | | 单位 | 标准 | 测试方法 | 备注 |
|------------------|--------------------|---|----------|---|----|
| 放电性能 | 20°C ¹⁾ | h | ≥5 | 标准充放 | / |
| | | min | ≥48 | 标准充电后搁置 1~4 小时, 以 1800mA(1.0I _A)放电至 0.9V。 | HU |
| | -18°C | h | ≥2 | 标准充电后在 -18°C ± 2°C 搁置 16~24 小时, 以 360mA(0.2I _A)放电至 1.0V。 | / |
| 荷电保持率 | | h/min | ≥3h15min | 标准充电后, 开路搁置 28 天(20°C ± 2°C), 随后标准放电(0.2I _A)至 1.0V。 | / |
| 循环寿命 | | Cycle | ≥50 | 见附录 表 3 | / |
| 耐充电寿命 | | A: ≥ 3h45min B: ≥ 42min 2 nd | | 见附录 表 4 | / |
| | | A: ≥ 3h45min B: ≥ 42min 3 rd | | | |
| | | A: ≥ 2h30min B: ≥ 24min 8 th | | | |
| | | A: ≥ 2h30min B: ≥ 24min 9 th | | | |
| 过充测试 | 放电 A | h/min | ≥4h15min | 见附录 表 5 | / |
| | 放电 B | min | ≥36 | | |
| 安全装置操作 | | / | 无爆炸、无破裂 | 以 360mA(0.2I _A) 放电至 0V 后再以 1800mA(1.0 I _A)强制放电 60 分钟。 | / |
| 贮存 ¹⁾ | | h | ≥5 | 以 360mA(0.2I _A)放电至 1.0V 后搁置 12 个月, 再进行标准充放。 | / |
| 内阻 | | mΩ | ≤18.0 | 电池应以 0.2I _A 放电至 1.0V, 然后标准充电, 搁置 1~4 小时; 在频率为 1.0kHz ± 0.1kHz 的交流电流下测电池内阻。 | / |
| 重量 | | g | 46.0(大约) | / | 参考 |
| 碰撞试验 | | 不漏液、不着火、不爆炸 | | IEC 62133 2002 4.2.2 | / |
| 自由落体 | | 不着火、不爆炸 | | IEC 62133 2002 4.3.3 | / |

 1) 允许最多测试五次 2) 如未特别说明电池在测试前必须以 0.2I_A 恒流放电至终点电压 1.0V

注: 本规格书中的测试方法根据 IEC 61951-1 2006 制订, 详细测试方法请参考该标准的相关条款。

5. 电池外观尺寸

参见附图

6. 外观

无裂缝、疤痕、破裂、锈蚀、脏污、漏液、变形

7. 使用注意事项

- 1) 勿将电池反极充电;
- 2) 如电池已带电, 初次用前先放电后再充电;

- 3) 避免以高于指定的电流充放电；
- 4) 防止电池短路，不要拆解或焚烧电池；
- 5) 勿在电池上直接锡焊焊接；
- 6) 如极端高温、大于规定的过充、过放电，电池的使用寿命可能会下降；
- 7) 电池应存放于凉爽阴凉处，电池在组装或焊接前应将电池放电；
- 8) 建议在运输或散装贮存时将电池放电；
- 9) 不要将不同类型或不同容量的电池组合使用。

附录
1) 循环寿命测试

循环寿命试验前，电池应以 $0.2I_A$ 放电至终止电压 1.0V，然后，在环境温度 $20^\circ\text{C} \pm 5^\circ\text{C}$ 下作循环寿命测试；测试循环见表 3。

表 3 循环寿命

| 循环次数 | 充电 | 充电态搁置 | 放电 |
|------|-------------------|-------|----------------------------------|
| 1 | $0.1I_A$ 16h | 无 | $0.25I_A$ 2h20min |
| 2~48 | $0.25I_A$ 3h10min | 无 | $0.25I_A$ 2h20min |
| 49 | $0.25I_A$ 3h10min | 无 | $0.25I_A$ 放电至 1.0V |
| 50 | $0.1I_A$ 16h | 1h~4h | $0.20I_A$ 放电至 1.0V ^{b)} |

循环至第 50 次放电时间不足 3 小时或在 1~48 个循环中电压降至 1.0V 以下为止。

2) 耐充电寿命

按表 4 规定的条件，耐充电寿命试验应分三步进行，它包括：

——充电效率试验

——在 70°C 下十二个月的老化周期；

注： 70°C 的试验是模拟 50°C 时 4 年的耐充电寿命。

——最后充电效率试验检查电池老化后的性能。

表 4 LU、MU、HU 电池的耐充电寿命

| 循环次数 | 环境温度 | 充电 | 放电 A 或 B ^a | 最少放电时间 |
|------|------------|-------------------------------|--|------------------|
| 1 | 50°C ± 2°C | 0.05I _A 48h | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 无要求 |
| 2 | | 0.05I _A 24h | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 3h45min 42min |
| 3 | | 0.05I _A 24h | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 3h45min 42min |
| 4 | 70°C ± 2°C | 0.05I_A 120d | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 无要求 |
| 5 | | 0.05I_A 120d | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | |
| 6 | | 0.05I_A 120d | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | |
| 7 | 50°C ± 2°C | 0.05I _A 48h | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 无要求 |
| 8 | | 0.05I _A 24h | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 2h30min 24min |
| 9 | | 0.05I _A 24h | A: 0.2I _A 放电至 1.0V 或 B: 1.0I _A 放电至 1.0V | 2h30min 24min |

a) A: 适用于 LU、MU、HU 电池; B: 仅适用于 MU、HU 电池。

3) 过充电测试

试验前, 电池应在 20°C ± 5°C 下以 0.2I_A 放电至终止电压 1.0V, 并在 0°C ± 2°C 下搁置 16h-24h。在 0°C ± 2°C 循环空气中, 电池的耐过充电能力应由下面试验来决定, 测试条件见表

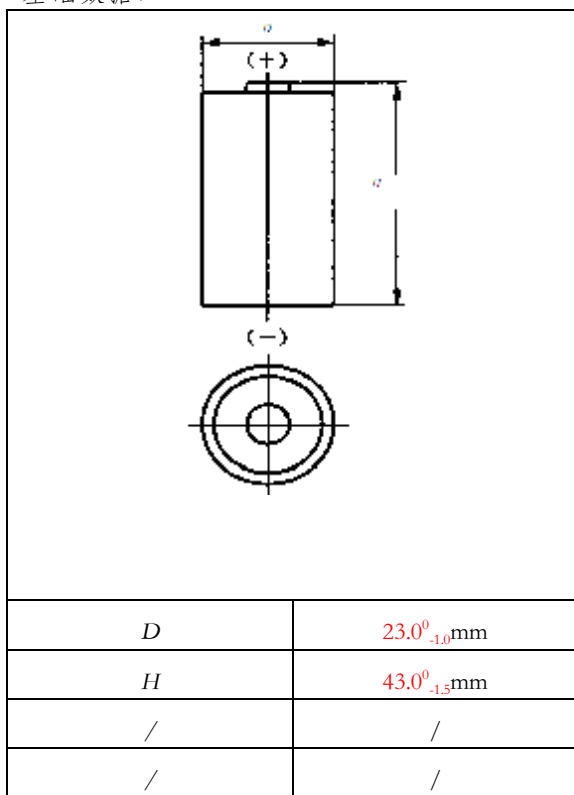
表 5 0°C 过充电

| 充电 | 放电 ^a | |
|--------------------------|----------------------------|----------------------------|
| | LU、MU、HU 电池 | MU、HU 电池 |
| 0.05I _A 充 28d | 0.2I _A 放电至 1.0V | 1.0I _A 放电至 1.0V |

a) 充电结束后立即放电

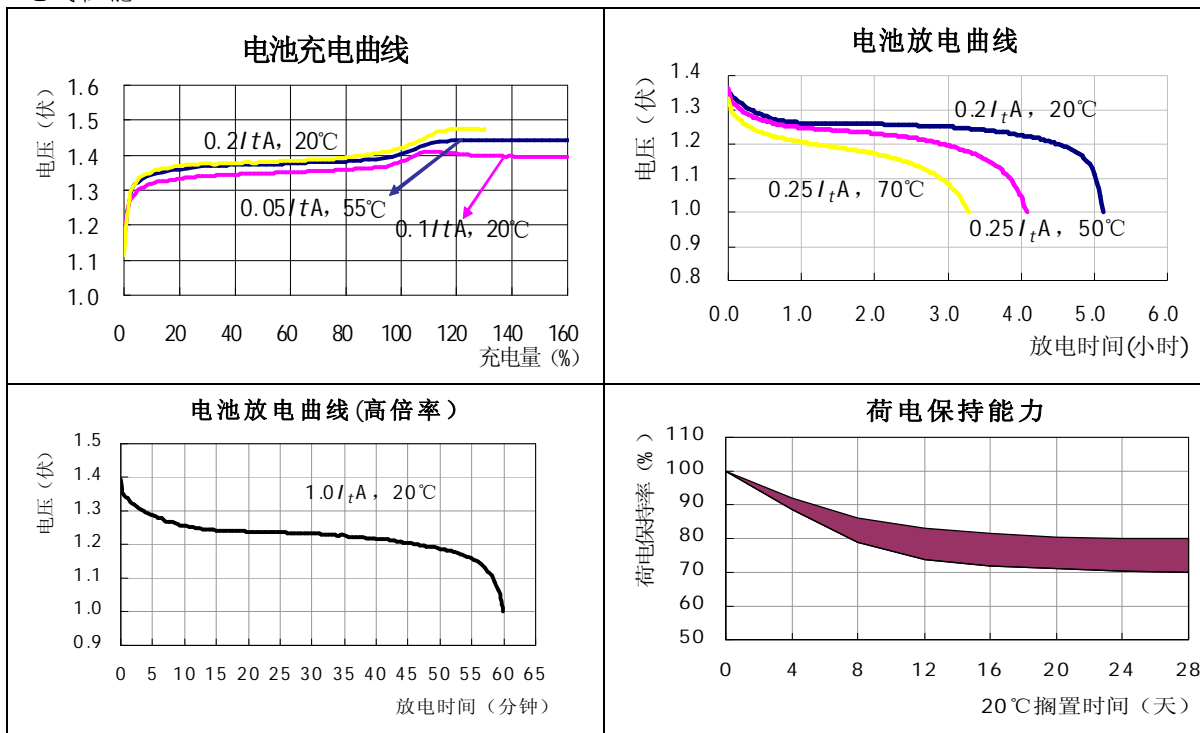
KRMU 23/43 SC1800 毫安时

基础数据:



| | | |
|------------------------------|---------------------|-----------|
| 标称电压 | | 1.2V |
| 容量对比(mAh) | 0.2I _t A | 1800 |
| | 1.0I _t A | 1440 |
| 重量 (g) | | 46.0 |
| 内阻 (在 1000Hz 下) (充电后; mΩ) | | ≤18.0 |
| 充电电流 | 涓流 | 90mA |
| | 标准 | 180mA |
| | 快速 | 360mA |
| 充电时间 | 涓流 | 48 小时 |
| | 标准 | 16 小时 |
| | 快速 | 6.5 小时 |
| 使用温度 | 充电 | 0~+70°C |
| | 放电 | -20~+70°C |
| | 贮存 | -30~+70°C |
| 最高测试温度 | | 70°C |

电气性能:



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