

PRODUCT SPECIFICATION

1. Applicability:

This specification is applicable to the following product:
Coin type manganese lithium battery CR1220

2. Battery type and ratings:

- 2.1. *Battery type:* CR1220
- 2.2. *Nominal voltage:* 3.0V
- 2.3. *Nominal capacity:* 38mAh (on continuous discharge at 20°C under 62k load to 2.0V end-voltage)
- 2.4. *Outer dimensions:* Outer dimensions shall be as shown in Page 6, Battery Dimensions.
- 2.5. *Standard weight:* 0.8grams
- 2.6. *Terminals:*
 - Materials of Positive electrode: BA stainless steel
 - Negative electrode: BA stainless steel

3. Quality requirements:

- 3.1 **Dimensions:** Dimensions of batteries when tested in accordance with Subparagraph 4.4(1) shall be as shown in Page 6. Battery dimensions.
- 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.

3.3 Characteristics:

- (1) *Open-circuit voltage:* Open-circuit voltage of batteries when tested in accordance with Subparagraph 4.4(3) shall meet the requirement set forth in Table 1.
- (2) *Closed-circuit voltage:* Closed-circuit voltage of batteries when test in accordance with Subparagraph 4.4(4) shall meet the requirements set forth in Table 1.

[TABLE 1]

| TEST ITEMS | TEMPERATURE | INITIAL * | AFTER 12 MONTHS | REMARKS |
|------------------------|-------------|--------------|-----------------|-----------------------------------|
| Open-circuit Voltage | 20±2°C | 3.0V TO 3.7V | 3.0V TO 3.7V | |
| | 0±2°C | 3.0V TO 3.7V | 2.9V TO 3.7V | |
| Closed-circuit Voltage | 20±2°C | 3.0V TO 3.7V | 3.0V TO 3.7V | Load Resistance 62k . 0.8 Sec. |
| | 0±2°C | 3.0V TO 3.7V | 2.9V TO 3.7V | |

(NOTE) * "INITIAL" MEANS PERFORMANCE VALUES MEASURED WITHIN ONE MONTH AFTER DELIVERY.

(3) Service life: Service life of batteries when tested in accordance with Subparagraph 4.4(5) shall meet the requirements set forth in Table 2.

[TABLE 2]

| TEST ITEM | TEMPERATURE | INITIAL | AFTER 12 MONTHS | REMARKS |
|--------------|-------------|--------------------|--------------------|---|
| Service Life | 20±2°C | 830 Hrs. or Longer | 790Hrs. or Longer | Continuous Discharge Under 62k Load to 2.0V End-Voltage |
| | 0±2°C | 780Hrs. or Longer | 740 Hrs. or Longer | |

(4) Service life after storage at high temperature: Service life of batteries when tested in accordance with Subparagraph 4.4(6) shall meet the requirements set forth in Table 3

[TABLE 3]

| TEST ITEM | STORAGE TEMP. | STORAGE PERIOD | REQUIREMENT | REMARKS |
|--|---------------|----------------|----------------|--|
| Service Life After Storage At High Temperature | 60 ± 2°C | 20 Days | 790Hrs Minimum | Continuous Discharge At 20±2°C Under 62k Load To 2.0V End-Voltage After Storage. |

(5) Leakage characteristics: Batteries when tested in accordance with Subparagraph 4.5(1) shall have no leakage.

[TABLE 4]

| TEST ITEM | REQUIREMENT | TEST CONDITIONS |
|-------------------------|-------------|---|
| Leakage Characteristics | No Leakage | Temperature: 45 ± 2°C, Relative Humidity: 75% Storage: 30 Days Shall Be Inspected By Visual Means |

(6) Self-discharge: Self-discharge of batteries when tested in accordance with Subparagraph 4.5(2) shall be as set forth in Table 5.

[TABLE 5]

| TEST ITEM | REQUIREMENT | TEST CONDITIONS |
|----------------|-------------|---|
| Self-discharge | 5% or Below | Continuous Discharge Under 62k Load To 2.0V End-voltage After 12 Months Storage At 20°C. (To Obtain From The Mean Value Of The Same Lot) |

4. Testing:

4.1 Temperature and humidity: Unless otherwise specified elsewhere, tests shall be conducted at ordinary temperature ($20\pm 2^{\circ}\text{C}$) and ordinary humidity ($65\pm 5\%\text{RH}$).

4.2 Storage of test specimen batteries: Specimen batteries to be tested shall be kept at the ambient temperature of 25°C or below and at the relative humidity of 75% or below.

4.3 Measuring instruments and devices:

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.

DC voltmeters: The tolerance shall be $\pm 0.01\text{V}$ and the input resistance rating shall be 10M or more.

Load resistance: Load resistance shall include resistance throughout external circuits, and its tolerance shall be $\pm 0.5\%$.

4.4 Test methods:

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.

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

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).

Closed-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 with a voltmeter as specified in Subparagraph 4.3(2) while the specified load is connected between both terminals at the same ambient temperature as specified above; provided that the measured value shall be based on meter reading taken 8 seconds after the circuit is closed.

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.

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 12 hours or longer at ordinary temperature ($20\pm 2^{\circ}\text{C}$) and at ordinary humidity ($65\pm 5\%\text{RH}$) and shall then be continuously discharged through the load resistance 62K 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.

4.5 Other tests: Tests specified below shall be conducted as required. Except as specified in this paragraph. Test methods be in accordance with the provisions of Paragraph 4.4.

Electrolyte leakage test: Test specimen batteries shall be examined for electrolyte leakage while they are kept at ordinary temperature and at ordinary humidity after having been stored at the temperature, humidity and period specified in Table 4.

Self-discharge: Test specimen batteries which have been stored for 12 month at the ambient temperature of $20 \pm 2^{\circ}\text{C}$ and at the relative humidity of $65 \pm 5\%$ shall be tested for service life in accordance with the method specified in Subparagraph 4.4(5).

Self-discharge shall be determined in the following manner:

$$\text{Self-discharge rate (\%)} = \frac{X1 - X2}{X1} \times 100\%$$

X1: Average initial discharge life of batteries of the same lot

X2: Average discharge life after storage

5. Markings:

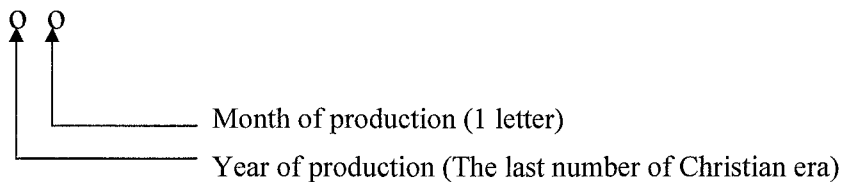
5.1 Markings on batteries:

Battery type: **CR1220**

Brand of battery: **No Marking**

Polarity: + (- shall not be indicated)

Manufacturing marking: The year and month of production shall be marked on the negative (-) terminal side



[Example] 58 August 2005

Month of production. :-

- January to September -- 1- 9

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

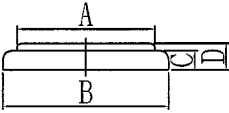
RATINGS OF MANGANESE DIOXIDE LITHIUM BATTERY

(TYPE: CR1220)

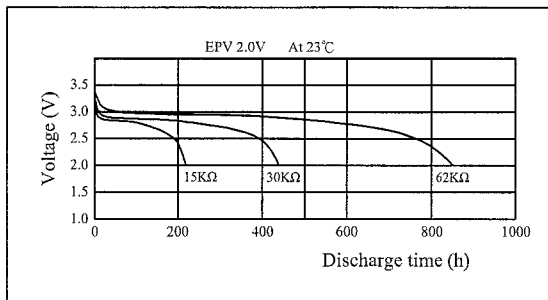
| | | |
|-----------------------------------|---|---|
| <i>CLASSIFICATION</i> | | <i>PRIMARY COIN TYPE BATTERY</i> |
| <i>CHEMISTRY SYSTEM</i> | | <i>LITHIUM MANGANESE DIOXIDE</i> |
| <i>BATTERY TYPE</i> | | <i>CR1220</i> |
| <i>NOMINAL VOLTAGE</i> | | <i>3V</i> |
| <i>NOMINAL CAPACITY</i> | | <i>38mAh</i> <i>(ON CONTINUOUS DISCHARGE UNDER 62K Ω load to 2.0V end-point)</i> |
| <i>STANDARD DISCHARGE CURRENT</i> | | <i>0.1mA</i> |
| <i>STANDARD WEIGHT</i> | | <i>0.8g</i> |
| <i>TERMINALS</i> | <i>CAP TERMINAL</i> <i>CASE TERMINAL</i> | <i>SUS BA Stainless Steel</i> <i>SUS BA Stainless Steel</i> |
| <i>OUTER DIMENSIONS</i> | <i>DIAMETER</i> <i>OVERALL HEIGHT</i> | <i>$\phi 12.5(+0/-0.2)mm$</i> <i>2.0(+0/-0.3)mm</i> |
| <i>USABLE TEMPERATURE RANGE</i> | | <i>-20 °C ~ +60 °C</i> |
| <i>STORAGE TEMPERATURE RANGE</i> | | <i>0 °C ~ +35 °C</i> |
| <i>STORAGE HUMIDITY RANGE</i> | | <i>45%~85%</i> |

Lithium Manganese Dioxide Coin Battery : Individual Specification

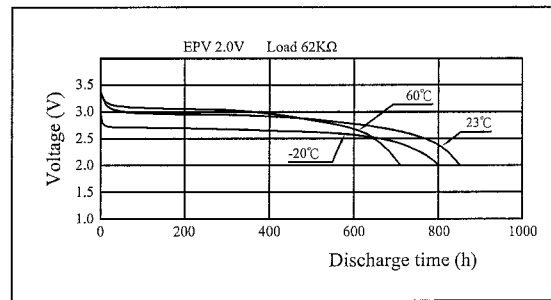
CR1220

| | | | | |
|--------------------------|---------------------|--|---|---------------------------|
| Nominal Voltage | 3V | Dimensions (mm)  | A | $\phi 10.4$ |
| Nominal Capacity | 38(mAh) | | B | $\phi 12.5^{+0.0}_{-0.2}$ |
| Continuous standard load | 62(K Ω) | | C | 1.4 |
| Operating temperature | -20~60 $^{\circ}$ C | | D | $2.0^{+0.0}_{-0.3}$ |
| Weight | 0.8(g) | | | |

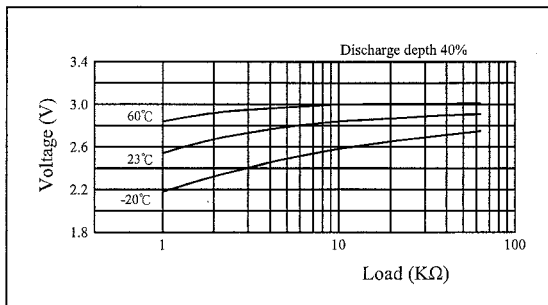
Discharge characteristics



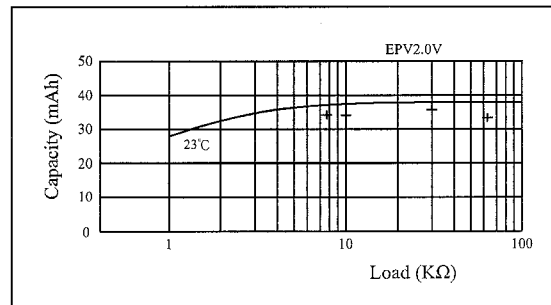
Temperature characteristics



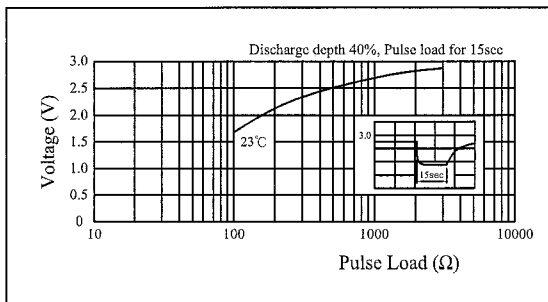
Load vs. Operating voltage



Load vs. Capacity



Pulse discharge characteristics



Storage characteristics

