COIN TYPE LITHIUM BATTERIES

Poly-carbonmonofluoride (BR series) /Manganese dioxide (CR series) Lithium batteries

Overview

The Panasonic coin type lithium primary battery is a high-energy, high-density battery resulting from our extensive experience in battery technology. Provided with outstanding features, which conventional dry batteries cannot attain, this battery has a broad range of applications, such as the main power supply of clocks/watches and electronic notebooks, and the memory backup power supply for C-MOS RAM memories and microcomputer IC memories.

Panasonic meets different market needs with two types (30 sizes) of the product offering a wide capacity range (18mAh to 1000mAh):
1. Poly-carbonmonofluoride lithium batteries (BR series) which exhibit stable performance at comparatively high environment temperatures.
2. Manganese dioxide lithium batteries (CR series) which show excellence in comparatively large current applications like the alarm actuation in watches.

Features

- **Voltage about twice that of dry batteries**
  The nominal voltage is as high as 3 V, approximately twice that of manganese and alkaline button batteries. A single lithium battery can replace two or three conventional batteries.

- **Excellent storability with minimal deterioration**
  Minimal deterioration is not necessarily an inherent feature of lithium batteries. It is achieved by using chemically stable materials and superior production methodologies and sealing techniques. Panasonic coin type lithium batteries show an annual deterioration rate as low as about 1.0% at room temperature, meeting the requirement for a room-temperature storage period of more than 10 years.

- **Wide operating temperature range (-40°C to 85°C (-40°F to 185°F))**
  Organic solvents are used for the electrolyte in lithium batteries. Therefore, the solidifying point of this electrolyte is much lower than that of the aqueous solution type electrolyte in manganese batteries, etc., enabling the use of lithium batteries in low-temperature regions. Panasonic coin type lithium batteries are mostly operable over the temperature range from -40°C to 85°C (-40°F to 185°F).

- **Strong leakage resistance**
  The organic electrolyte liquid used in lithium batteries shows minimal creep. This feature, and our unique sealing technique, give our batteries very strong leakage resistance.

- **UL-recognized product**
  Panasonic coin type lithium batteries have all acquired the component recognition of UL (Underwriters Laboratories Inc.) in U.S.. (File No. MH12210)
### Poly-carbonmonofluoride (BR series) Lithium batteries

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JIS</th>
<th>IEC</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Continuous drain</th>
<th>Dimensions (Max.)</th>
<th>Approx. weight (g/oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR1216</td>
<td>---</td>
<td>---</td>
<td>3</td>
<td>25</td>
<td>0.03</td>
<td>12.5 (0.49)</td>
<td>1.60 (0.06)</td>
</tr>
<tr>
<td>BR1220</td>
<td>---</td>
<td>---</td>
<td>3</td>
<td>35</td>
<td>0.03</td>
<td>12.5 (0.49)</td>
<td>2.00 (0.08)</td>
</tr>
<tr>
<td>BR1225</td>
<td>---</td>
<td>BR1225</td>
<td>3</td>
<td>48</td>
<td>0.03</td>
<td>16.0 (0.63)</td>
<td>1.60 (0.06)</td>
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<tr>
<td>BR1616</td>
<td>---</td>
<td>---</td>
<td>3</td>
<td>48</td>
<td>0.03</td>
<td>16.0 (0.63)</td>
<td>1.00 (0.04)</td>
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<tr>
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<td>---</td>
<td>3</td>
<td>120</td>
<td>0.03</td>
<td>3.20 (0.13)</td>
<td>1.50 (0.05)</td>
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<td>BR2016</td>
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<td>75</td>
<td>0.03</td>
<td>20.0 (0.79)</td>
<td>1.60 (0.06)</td>
</tr>
<tr>
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<td>---</td>
<td>BR2020</td>
<td>3</td>
<td>100</td>
<td>0.03</td>
<td>20.0 (0.79)</td>
<td>2.00 (0.08)</td>
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<td>190</td>
<td>0.03</td>
<td>20.0 (0.79)</td>
<td>2.50 (0.10)</td>
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<tr>
<td>BR2320</td>
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<td>BR2320</td>
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<td>110</td>
<td>0.03</td>
<td>23.0 (0.91)</td>
<td>2.00 (0.08)</td>
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<tr>
<td>BR2325</td>
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<td>BR2325</td>
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<td>165</td>
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<td>23.0 (0.91)</td>
<td>3.20 (0.12)</td>
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<td>255</td>
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<td>23.0 (0.91)</td>
<td>3.20 (0.13)</td>
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<td>BR3032</td>
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<td>BR3032</td>
<td>3</td>
<td>500</td>
<td>0.03</td>
<td>30.0 (1.18)</td>
<td>5.5 (0.19)</td>
</tr>
</tbody>
</table>

*1 Nominal capacity shown above is based on standard drain and cut off voltage down to 2.0 V at 20°C (68°F)

### Manganese dioxide (CR series) Lithium batteries

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JIS</th>
<th>IEC</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Continuous drain</th>
<th>Dimensions (Max.)</th>
<th>Approx. weight (g/oz)</th>
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<td>CR1025</td>
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<td>2.50 (0.10)</td>
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<td>18</td>
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<td>12.5 (0.49)</td>
<td>1.20 (0.05)</td>
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<td>CR1216</td>
<td>CR1216</td>
<td>CR1216</td>
<td>3</td>
<td>25</td>
<td>0.10</td>
<td>12.5 (0.49)</td>
<td>1.60 (0.06)</td>
</tr>
<tr>
<td>CR1220</td>
<td>CR1220</td>
<td>CR1220</td>
<td>3</td>
<td>35</td>
<td>0.10</td>
<td>12.5 (0.49)</td>
<td>2.00 (0.08)</td>
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<td>16.0 (0.63)</td>
<td>1.20 (0.05)</td>
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<td>CR1616</td>
<td>CR1616</td>
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<td>55</td>
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<td>16.0 (0.63)</td>
<td>1.60 (0.06)</td>
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<td>CR1620</td>
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<td>16.0 (0.63)</td>
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<td>1.20 (0.05)</td>
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<td>90</td>
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<td>1.60 (0.06)</td>
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<tr>
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<td>CR2025</td>
<td>CR2025</td>
<td>3</td>
<td>165</td>
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<td>20.0 (0.79)</td>
<td>2.50 (0.10)</td>
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<td>CR2032</td>
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<td>1.20 (0.05)</td>
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<td>1000</td>
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<td>500</td>
<td>0.20</td>
<td>30.0 (1.18)</td>
<td>7.1 (0.25)</td>
</tr>
</tbody>
</table>

*1 Nominal capacity shown above is based on standard drain and cut off voltage down to 2.0 V at 20°C (68°F)
*2 Under Development
Applications

- Electronic watches (digital and analog)
- Memory backup for all types of devices (with tab terminal)
- Calculators, cameras, and electronic notebooks
- Electronic clinical thermometers
- Other compact, low power cordless equipment

Cutaway view (BR type)

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Height (mm)</th>
<th>Model</th>
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</thead>
<tbody>
<tr>
<td>30</td>
<td>2.5</td>
<td>CR2477</td>
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<tr>
<td>24.5</td>
<td>2.0</td>
<td>CR2354</td>
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<tr>
<td>23</td>
<td>1.5</td>
<td>BR3032</td>
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<tr>
<td>20</td>
<td>1.0</td>
<td>CR3032</td>
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<td>16</td>
<td>0.8</td>
<td>BR2032</td>
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<td>12.5</td>
<td>0.5</td>
<td>CR2032</td>
</tr>
<tr>
<td>10</td>
<td>0.3</td>
<td>CR1632</td>
</tr>
</tbody>
</table>

Coin type lithium batteries: size and model number

Characteristics

Shelf life (BR series)

Storage characteristics (BR2325)
Discharge life as a function of operating current

Formula:

Duration (years) = \frac{Nominal capacity (mAh)}{Current drain (mA) \times 24 \text{ (hours)} \times 365 \text{ (days)}}

Temp: 20°C (68°F)
Cut off voltage: 2.0V
The dimension data with no tolerance indicated are standard reference values.
INDIVIDUAL DATA SHEETS

BR1216

Discharge temperature characteristics

BR1220

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

Cut off voltage: 2.0V
INDIVIDUAL DATA SHEETS

BR1225

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

BR1616

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance
INDIVIDUAL DATA SHEETS

BR1632

Discharge temperature characteristics

![Graph showing discharge temperature characteristics for BR1632 with voltage (V) on the y-axis and duration (h) on the x-axis at different temperatures and load resistances.]

Operating voltage vs. load resistance

![Graph showing operating voltage vs. load resistance for BR1632 with voltage (V) on the y-axis and load resistance (MΩ/µA) on the x-axis at different temperatures.]

Capacity vs. load resistance

![Graph showing capacity vs. load resistance for BR1632 with capacity (mAh) on the y-axis and load (mA) on the x-axis at different temperatures.]

BR2016

Discharge temperature characteristics

![Graph showing discharge temperature characteristics for BR2016 with voltage (V) on the y-axis and duration (h) on the x-axis at different temperatures and load resistances.]

Operating voltage vs. load resistance

![Graph showing operating voltage vs. load resistance for BR2016 with voltage (V) on the y-axis and load resistance (MΩ/µA) on the x-axis at different temperatures.]

Capacity vs. load resistance

![Graph showing capacity vs. load resistance for BR2016 with capacity (mAh) on the y-axis and load (mA) on the x-axis at different temperatures.]

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INDIVIDUAL DATA SHEETS

BR2020

Discharge temperature characteristics

[Graph showing voltage vs. duration for BR2020 at different temperatures: 60°C (140°F), 20°C (68°F), -10°C (-14°F).]

Operating voltage vs. load resistance

[Graph showing voltage vs. load resistance at different temperatures: 60°C (140°F), 20°C (68°F), -10°C (-14°F).]

Capacity vs. load resistance

[Graph showing capacity vs. load resistance at different temperatures: 60°C (140°F), 20°C (68°F), -10°C (-14°F).]

BR2032

Discharge temperature characteristics

[Graph showing voltage vs. duration for BR2032 at different temperatures: 60°C (140°F), 20°C (68°F), -10°C (-14°F).]

Operating voltage vs. load resistance

[Graph showing voltage vs. load resistance at different temperatures: 60°C (140°F), 20°C (68°F), -10°C (-14°F).]

Capacity vs. load resistance

[Graph showing capacity vs. load resistance at different temperatures: 60°C (140°F), 20°C (68°F), -10°C (-14°F).]
INDIVIDUAL DATA SHEETS

BR2330

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

BR3032

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

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INDIVIDUAL DATA SHEETS

CR1025

Discharge temperature characteristics

![Graph showing discharge temperature characteristics for CR1025](image)

Operating voltage vs. load resistance

![Graph showing operating voltage vs. load resistance for CR1025](image)

Capacity vs. load resistance

![Graph showing capacity vs. load resistance for CR1025](image)

CR1212

Discharge temperature characteristics

![Graph showing discharge temperature characteristics for CR1212](image)

Operating voltage vs. load resistance

![Graph showing operating voltage vs. load resistance for CR1212](image)

Capacity vs. load

![Graph showing capacity vs. load for CR1212](image)
INDIVIDUAL DATA SHEETS

CR1216

Discharge temperature characteristics

![Graph showing discharge temperature characteristics for CR1216 batteries at 20°C (68°F), -10°C (-14°F), and 60°C (140°F).]

Operating voltage vs. load resistance

![Graph showing operating voltage vs. load resistance for CR1216 batteries at 20°C (68°F).]

Capacity vs. load resistance

![Graph showing capacity vs. load resistance for CR1216 batteries at 20°C (68°F).]

CR1220

Discharge temperature characteristics

![Graph showing discharge temperature characteristics for CR1220 batteries at 20°C (68°F), -10°C (-14°F), and 60°C (140°F).]

Operating voltage vs. load resistance

![Graph showing operating voltage vs. load resistance for CR1220 batteries at 20°C (68°F).]

Capacity vs. load resistance

![Graph showing capacity vs. load resistance for CR1220 batteries at 20°C (68°F).]
**INDIVIDUAL DATA SHEETS**

**CR1612**

**Discharge temperature characteristics**

![Graph showing discharge temperature characteristics for CR1612 at 60˚C (140˚F), 20˚C (68˚F), and -10˚C (-14˚F).]

**Operating voltage vs. load resistance**

![Graph showing operating voltage vs. load resistance for CR1612 at 20˚C (68˚F).]

**Capacity vs. load resistance**

![Graph showing capacity vs. load resistance for CR1612 at 20˚C (68˚F).]

**CR1616**

**Discharge temperature characteristics**

![Graph showing discharge temperature characteristics for CR1616 at 60˚C (140˚F), 20˚C (68˚F), and -10˚C (-14˚F).]

**Operating voltage vs. load resistance**

![Graph showing operating voltage vs. load resistance for CR1616 at 60˚C (140˚F) and 20˚C (68˚F).]

**Capacity vs. load resistance**

![Graph showing capacity vs. load resistance for CR1616 at 20˚C (68˚F).]
INDIVIDUAL DATA SHEETS

CR1620

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

CR1632

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance
CR2012

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

CR2016

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance
INDIVIDUAL DATA SHEETS

CR2025

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

CR2032

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

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INDIVIDUAL DATA SHEETS

CR2320

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

CR2330

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

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### CR2354

**Discharge temperature characteristics**

![Graph showing discharge voltage vs. duration at different temperatures for CR2354.](image)

**Operating voltage vs. load resistance**

![Graph showing operating voltage vs. load resistance for CR2354.](image)

**Capacity vs. load resistance**

![Graph showing capacity vs. load resistance for CR2354.](image)

### CR2412

**Discharge temperature characteristics**

![Graph showing discharge voltage vs. duration at different temperatures for CR2412.](image)

**Operating voltage vs. load resistance**

![Graph showing operating voltage vs. load resistance for CR2412.](image)

**Capacity vs. load resistance**

![Graph showing capacity vs. load resistance for CR2412.](image)
INDIVIDUAL DATA SHEETS

CR2477

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance

CR3032

Discharge temperature characteristics

Operating voltage vs. load resistance

Capacity vs. load resistance