

MANGANESE DIOXIDE (CR SERIES) LITHIUM BATTERIES (SPIRAL TYPE) (USER REPLACEABLE PACKS)

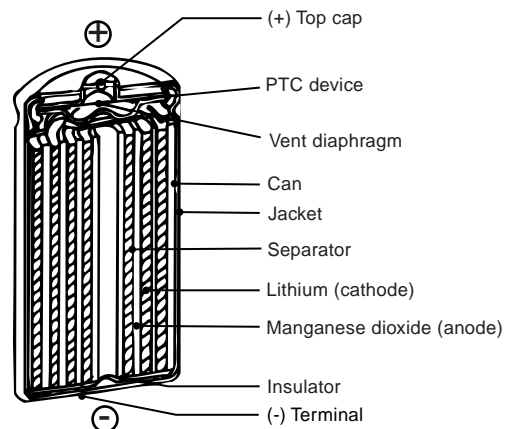


Overview

The lithium pack battery, which Panasonic was first to develop, is packaged in a resin case enabling easy replacement by users. Panasonic lithium batteries are qualified by more than 20 years of experience in production and marketing. More than 300 million of our batteries have been used in camera power supplies. The outstanding properties of Panasonic batteries are known worldwide. Panasonic meets diversified market needs with the resin package types CR-P2 and 2CR5, the single cell type CR123A, and another single cell type CR2, newly developed in 1994.

Structure

Each of the cylindrical type manganese dioxide lithium batteries (CR2, CR123A, 2CR5, and CR-P2) employs spiral-structured electrodes to enlarge the facing area of the positive and negative electrodes, allowing a current as large as several amperes to be drawn.



Cross sectional view of the cylindrical type CR-series lithium battery (spiral type)

MANGANESE DIOXIDE (CR SERIES) LITHIUM BATTERIES (SPIRAL)-CONTINUED

Features

- Voltage per single cell approximately twice that of conventional batteries**
 The rated voltage of the single cell type (CR2 and CR123A) is 3V, approximately twice that of dry batteries. With the pack type, the rated voltage is 6V, enabling high-speed charging for cameras and strobes.
- Wide operational temperature range (-40°C to 70°C)**
 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 cylindrical type manganese dioxide lithium batteries (spiral type) are operable over a temperature range from -40°C to 70°C.
- Designed for safety**
 Both the single cell type (CR2 and CR123A) and pack type batteries have a built-in element (PTC element) for protecting batteries from external shorting. They are also provided with an burst-proof seal structure which allows the safe release of the battery inner pressure.
- Strong leakage resistance**
 The organic electrolyte liquid used in the lithium batteries shows minimal creep. This feature, and our unique sealing technique, give our lithium batteries very strong leakage resistance.
- 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 through superior production methodologies and sealing techniques. Panasonic cylindrical manganese dioxide 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.
- Light weight**
 The use of metal lithium as the anode active material makes lithium batteries lighter than dry batteries of the same volume.

Applications

- Cameras, stroboscopes, shavers, electric tooth-brushes, lights, toys, etc.

When using the batteries for other purposes than cameras or using two or more batteries together, please consult our service staff in advance.

Specification Table

Model No.	JIS	IEC	Electrical characteristics 20°C			Dimensions (Max.)		Approx. weight (g)
			Nominal voltage (V)	Nominal capacity *1 (mAh)	Continuous drain	Diameter (mm)	Height (mm)	
					Standard (mA)			
CR2	---	---	3	750	20	15.6	27.0	11.0
CR123A	---	CR17345	3	1300	20	17.0	34.5	17.0
2CR5	---	2CR5	6	1300	20	34.0 *2	45.0	38.0
CR-P2	---	CR-P2	6	1300	20	35.0 *2	36.0	37.0

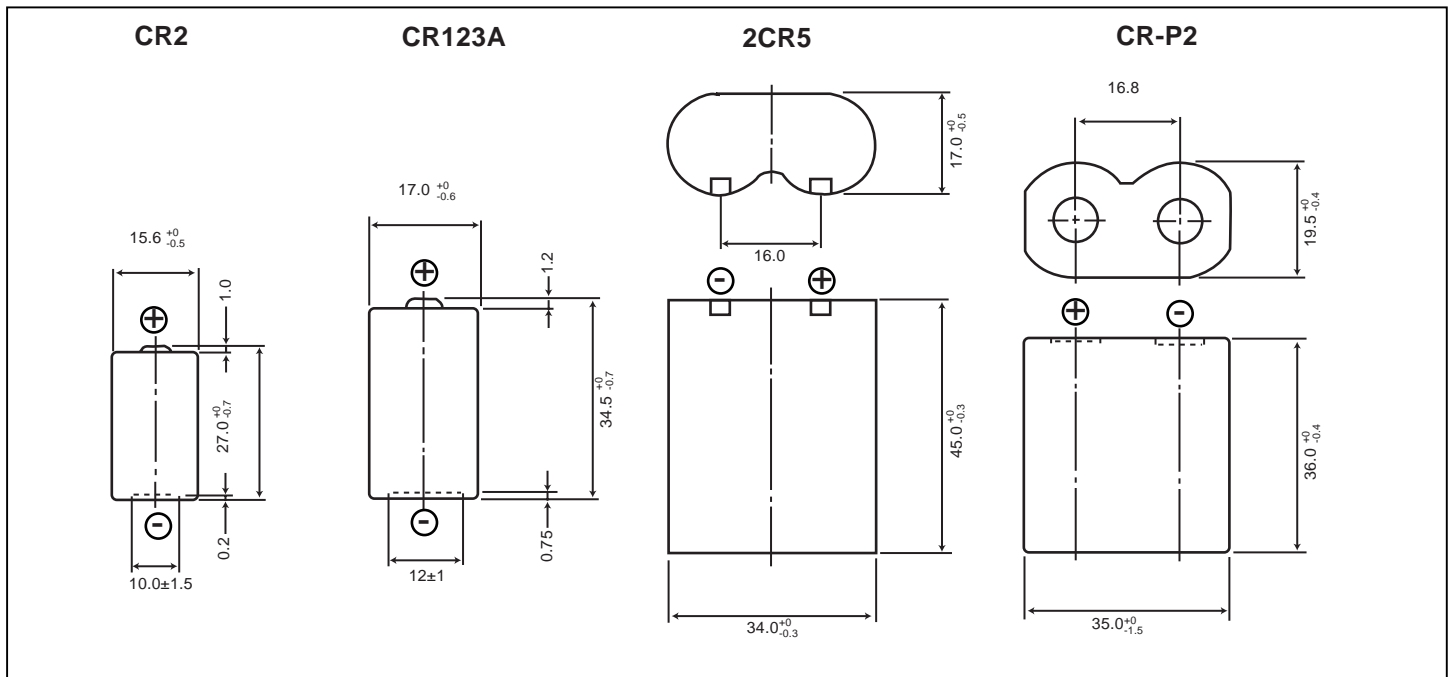
* 1 Nominal capacity shown above is based on standard drain and cut off voltage down to 2.0 V at 20°C ...CR2/CR123A

Nominal capacity shown above is based on standard drain and cut off voltage down to 4.0 V at 20°C ...2CR5/CR-P2

* 2 Width

Panasonic	Kodak	Energizer	Duracell	Rayovac	Varta
CR2	KCR2	EL1CR2	DLCR2	CR2R	CR2
CR123A	K123LA	EL123AP	DL123A	CR123R	CR123A
2CR5	KL2CR5	EL2CR5	DL245	2CR5R	2CR5
CR-P2	K223LA	EL233AP	DL223A	CR-P2R	CR-P2

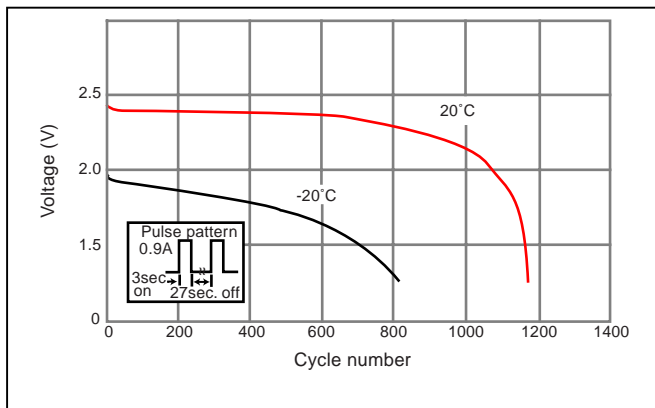
Dimensions (mm)



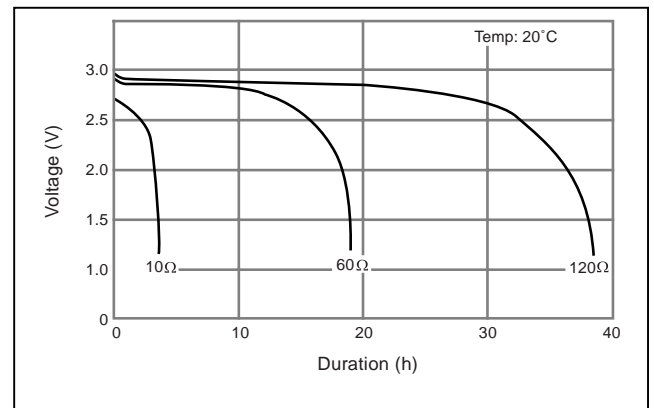
Individual Data Sheets

- CR2

Pulse discharge characteristics

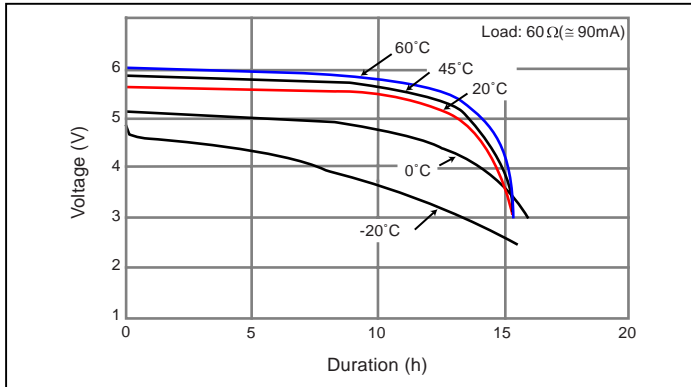


Load characteristics

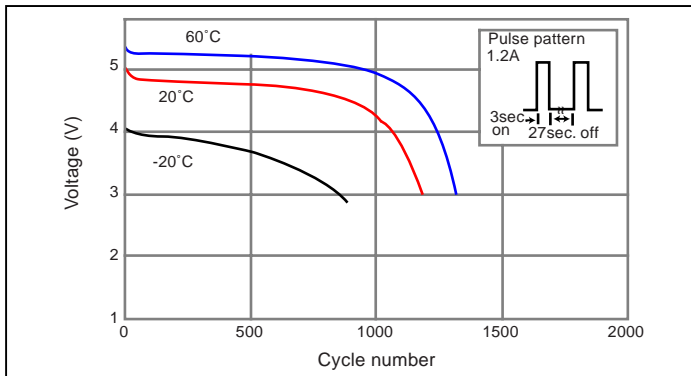


2CR5, CR-P2 (Resin package)

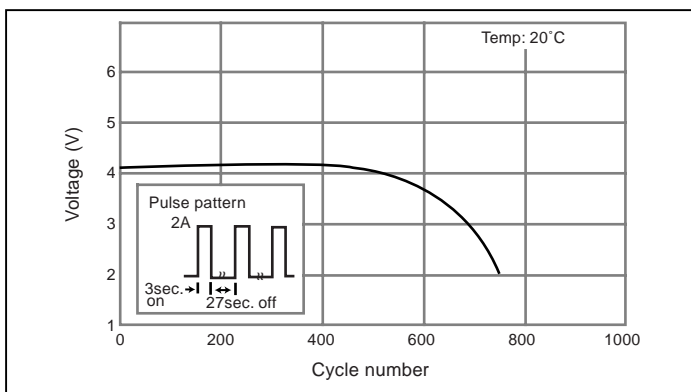
Temperature Characteristics



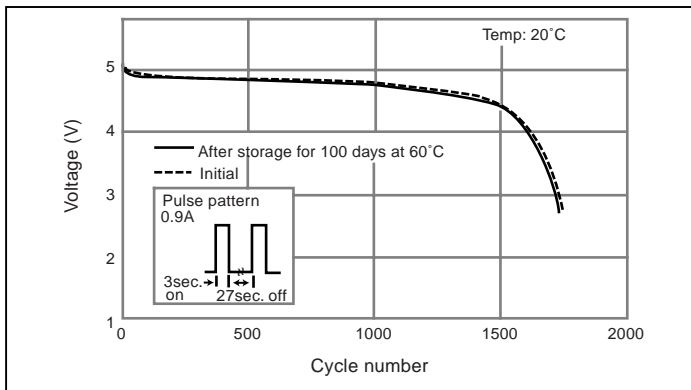
Pulse discharge characteristics



Pulse discharge characteristics

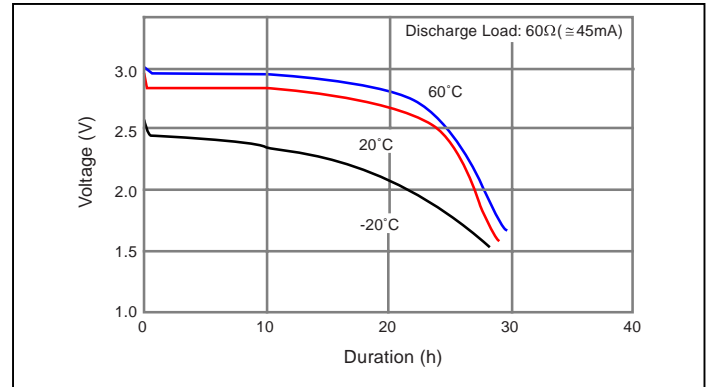


High temperature storage characteristics

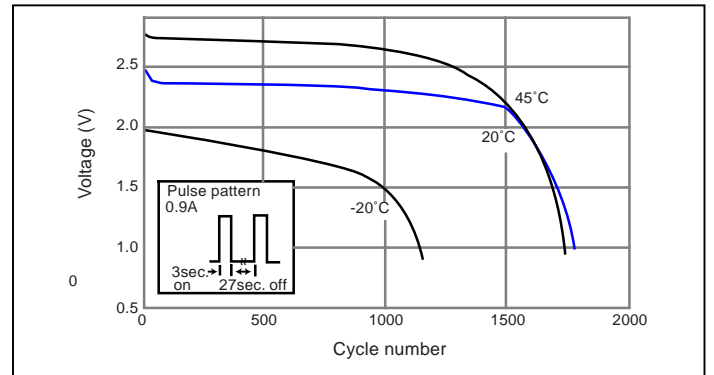


CR123A

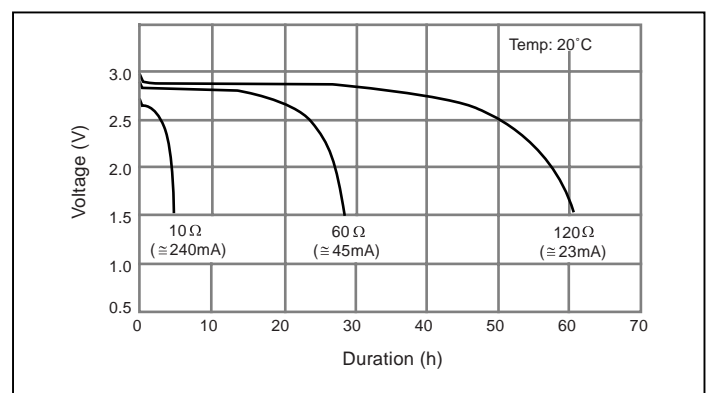
Temperature Characteristics



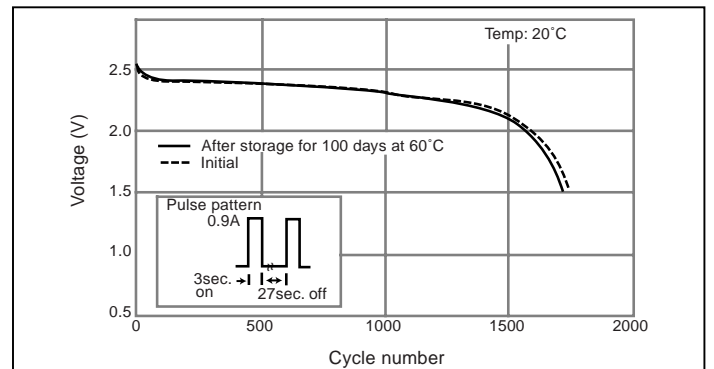
Pulse discharge characteristics



Load characteristics



High temperature storage characteristics



PRECAUTIONS

Precautions for handling cylindrical type lithium batteries

Please observe the following precautions to keep the batteries in good condition.

Precautions for storage

- Avoid storing batteries at unusually high or low temperatures.
- Keep batteries in a low-humidity location with little temperature variation. If batteries are kept in a humid place, moisture may condense on them exerting an adverse influence on their electrical characteristics.
- Keep batteries away from direct sunlight.

Precautions in using

- For measuring the battery voltage, use an instrument with an internal resistance of 10 M Ω or higher.
- For measuring internal resistance use an instrument of 1000-Hz a.c. method.
- When mounting batteries with terminals onto a printed circuit board, etc. by dipping in a soldering bath, limit the dipping time to 5 seconds or less; dipping for a longer time may exert an adverse influence on the electrical characteristics such as voltage and capacity. Use extreme caution not to drop batteries into the soldering bath during the dipping; if dropped, batteries may rupture due to abrupt heating. Avoid direct soldering to batteries. Also, do not use reflow soldering.
* For details, refer to "Guide to correct soldering of lithium batteries with terminals" on page 94.
- Avoid inserting batteries into antistatic materials or wrapping the board mounted with batteries in conductive sheets, which may cause a voltage drop or consumption of the capacity.
* For details, refer to "Use caution with antistatic conductive materials" on page 96.

- Do not place two or more batteries loosely in a bag or a container; external shorts between batteries may cause a voltage drop or reduced capacity.
- Lithium batteries show a high voltage even when only a slight capacity is left, which can be misunderstood as having sufficient capacity available. When any one of two or more batteries in use together has become exhausted, replace all batteries at the same time, even if they still show a high voltage.
- When two or more batteries are used in series, inversion of polarity may occur in a battery near the end of its life. This indicates that the battery has become exhausted first among the other batteries in use. This is not an abnormal condition.
- If a voltage drop due to shorting, even momentarily, occurs in lithium batteries, it takes time for the voltage to recover. In such a situation, use caution - do not check voltage characteristics of the battery before sufficient recovery of the voltage - or it may lead to a misjudgment that the battery is defective.

Precautions in equipment design

- For mounting batteries, avoid high-temperature locations and protect them from foreign materials.
- Give sufficient consideration to safety when specifying the use of two or more batteries at the same time. Panasonic can help you prepare composite batteries (two or more batteries combined) on request. Do not use single-body batteries by means of a battery holder.
- When different type batteries are to be used together in the equipment circuit, design the circuit so as not to allow the current from the other power source to flow into the lithium battery.
- When lead wires and connection terminals, such as tab terminals, connectors, etc., are needed, Panasonic can supply them on user's request.