



## Specifications

<b>Chemical system</b>	zinc-manganese dioxide (free of Hg, Cd and Pb)
<b>Voltage</b>	1.5V
<b>Capacity (mAh)</b>	1,150 (75 Ω, 24 h/d, 0.9 V)
<b>Dimensions of battery (mm)</b>	Ø 9.5 - 10.5, Height 43.3 - 44.5
<b>Weight</b>	11.8 g
<b>Design</b>	CARDIOCELL
<b>Standards/certifications</b>	IEC, ANSI, JIS
<b>Dangerous goods</b>	no



## Type designation

IEC = LR03 JIS = AM4 ANSI = AAA

**CARDIOCELL** Alkaline Plus Micro LR03

## Chemical system

Electrolyte-zinc-manganese dioxide (mercury & cadmium free)

## Dimensions

Diameter = 9.5 - 10.5, Height = 43.3 - 44.5

## Weight

The weight of each battery is approx. 11.8 g.

## Heavy metal content (%)

Mercury: ≤ 1 ppm, Cadmium ≤ 10 ppm, Lead ≤ 40 ppm

## Appearance and terminal

Battery shall be clean and have no dirt, no leakage and no deformation which may affect their performance and actual use and shall have clearly visible markings.



## Battery capacity

Test environment = 20 °C +/- 2.6 %; 15 % R. H.

Load resistance = 75 ohms; daily period 24 h/d; cut-off voltage 0.9 V

► The capacity of each battery is approx. 1,150 mAh

## Storage characteristics

After 12 months at 20 °C ► 90 % capacitance of fresh cells

After 24 months at 20 °C ► 85 % capacitance of fresh cells

## Electrical characteristics

Test environment = 20 °C +/- 2.6 %; 15 % R. H.

Load resistance = 3.9 ohms; measure time 0.3 s)

All samples shall be normalized for a minimum of 8 hours at the above environment prior to measurement.

	OCV (V)	CCV (V)	SCC (A)
<b>initial</b>	≥ 1.59	≥ 1.45	≥ 8
<b>after 12 months storage</b>	≥ 1.57	≥ 1.42	≥ 6

OCV = open circuit voltage; CCV = close circuit voltage; SCC = short circuit current

## Discharge test (service life)

Test environment = 20 °C +/- 2.45 %; 75 % R. H.

load resistance	20Ω	24Ω	5,1Ω	10Ω	75Ω	600 mA
<b>daily period</b>	24 h/d	15 s/min 8 h/d	4 min/h 8 h/d	1 h/d	4 h/d	10 s/min 1 h/d
<b>cut-off voltage</b>	0.9 V	1.0 V	0.9 V	0.9 V	0.9 V	0.9 V
<b>initial</b>	≥ 18.0 h	≥ 19.0 h	≥ 225 min	≥ 480 min	≥ 70 h	≥ 280 times
<b>after 12 months storage</b>	≥ 17.2 h	≥ 18.0 h	≥ 210 min	≥ 450 min	≥ 65 h	≥ 250 times
<b>application</b>	-	control	torch	tape recorder	radio	camera, flash light

The initial discharge test shall commence within 30 days of manufacture.

The discharge time is the minimum average duration (MAD).

Test quantity: n = 9 pcs. per discharge test



## Discharge curves

- |  |   |                                       |
|--|---|---------------------------------------|
| 1) 20 Ω - 24 h/d - to 0.9 V            | ▶ | continuous discharge curve (App. 1)   |
| 2) 5.1 Ω - 4 min/h, 8 h/d - to 0.9 V   | ▶ | discharge curve (App. 1)              |
| 3) 600 mA - 10 s/min, 1 h/d - to 0.9 V | ▶ | pulse discharge curve (App. 1)        |
| 4) 24 Ω - 15 s/min, 8 h/d - to 1.0 V   | ▶ | pulse discharge curve (App. 2)        |
| 5) 10 Ω - 1 h/d - to 0.9 V             | ▶ | intermittent discharge curve (App. 2) |
| 6) 75 Ω - 4 h/d - to 0.9 V             | ▶ | intermittent discharge curve (App. 2) |

## Leakage-proof structure

- 1) The top seal is made of imported special nylon from DUPONT, has a much stable vent pressure.
- 2) The sealing location of the battery is provided with double beading scores to make the structure tighter.
- 3) Using imported special sealing glue with more reliable leakage-proof performance.

## Safety test

Test environment = 20 °C +/- 2.6 %; 15 % R. H

Test item	Test method	Test pcs.	Requirements
<b>Over-discharge leakage test</b>	20 Ω - 24 h/d - 48 hours	9	no leakage
	5.1 Ω - 4 min, 8 h/d - to 0.6 V	9	no leakage
	600 mA - 10 s/min, 1 h/d - to 0.6 V	9	no leakage
	10 Ω - 1 h/d - to 0.6 V	9	no leakage
	75 Ω - 4 h/d - to 0.6 V	9	no leakage
	24 Ω - 15 s/min, 8 h/d - to 0.6 V	9	no leakage
<b>High temperature test</b>	60 +/- 2 °C, 90 +/- 5 % R. H. After 20 days of storage the cells shall be stored in an ambient temperature of 20 +/- 2 °C, 60 +/- 5 % R. H. for 4-24 hours.	40	no leakage
<b>1 pc. of battery, short-circuit test</b>	The terminal of an un-discharged battery is connected by wire. The circuit is completely for 24 hours or until the case temperature has return to environment.	10	no leakage, no explosion
<b>Reversible charge</b>	4 pcs. of battery are in series connected and one of them is under incorrect polarity for 24 hours or until the case temperature has return to environment.	40	no explosion
<b>Over-discharge</b>	One battery is discharged at 75 Ω to 0.6 V, then in series connected with 3 pcs. of new battery with 20 Ω for 24 hours.	36	no explosion
<b>4 pcs. of battery in series short circuit test</b>	The terminal of 4 pcs. of battery is connected by wire. The circuit is completely for 24 hours or until the case temperature has return to environment.	40	no explosion
<b>Free fall test</b>	The battery free drops from 1 meter height for 6 times, then stored for 1 hour.	10	no explosion
<b>Impact under high and low temperature</b>	Un-discharged battery stored in test box under 70 +/- 2 °C for 24 hours, then changed to -20 °C for 24 hours, repeat the above condition for 10 cycles.	20	no explosion
<b>Storage after partial discharge</b>	50 % discharged battery stored under 45 +/- 5 °C for 30 days	9	no leakage no explosion



## Expiry period

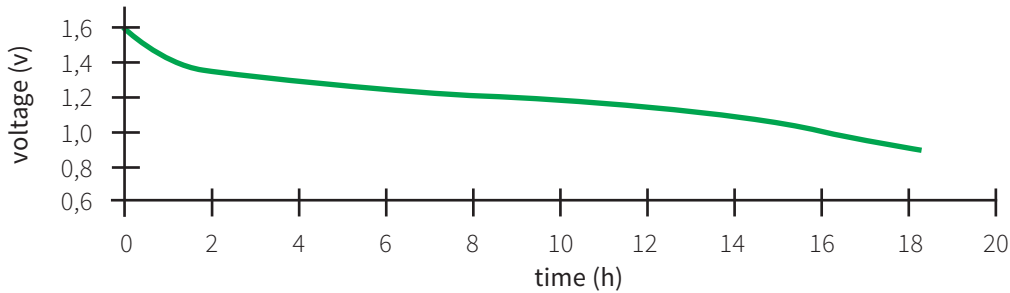
7 years

## Expiry period marking

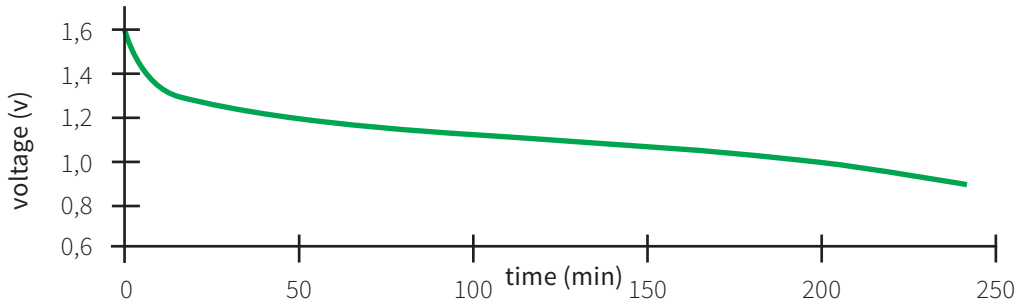
For example: 08-2015 means the expiry date is August 2015.

## Appendix 1

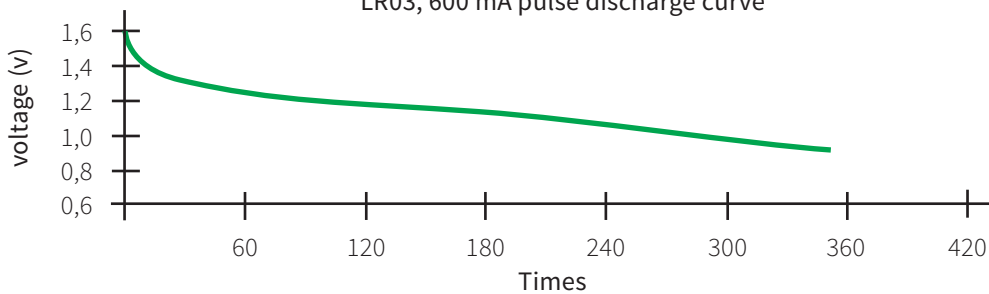
LR03, 20 ohms 24 h/d to 0.9 V continuous discharge curve



LR03, 5.1 ohms 4 min/h, 8 h/d to 0.9 V discharge curve



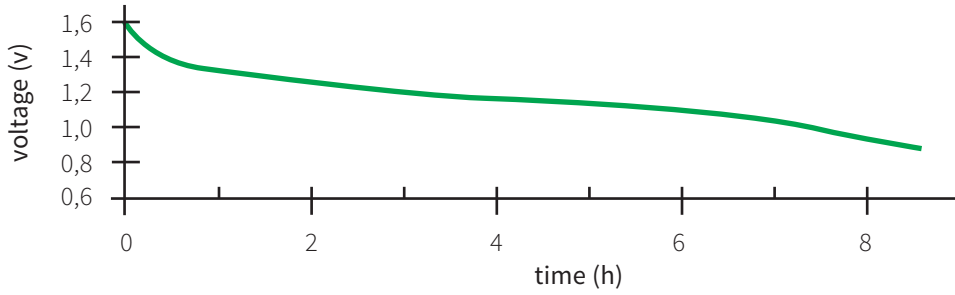
LR03, 600 mA pulse discharge curve



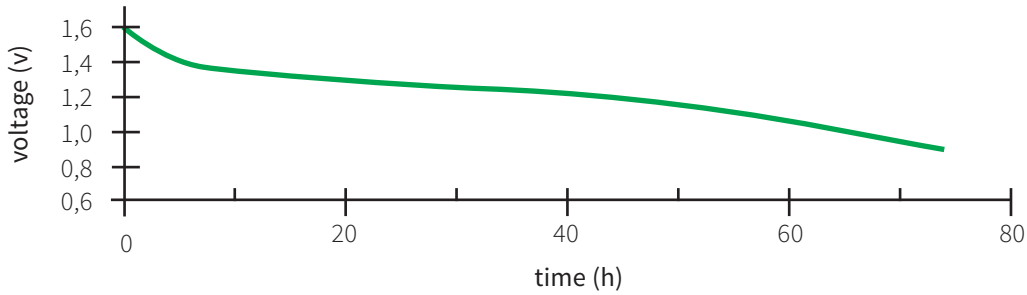


## Appendix 2

LR03, 10 ohms 1 h/d to 0.9 V intermittent discharge curve



LR03, 75 ohms intermittent discharge curve



LR03, 24 ohms pulse discharge curve

