Sales Program and Technical Handbook

# Primary Lithium Cells

## Lithium Manganese Dioxide $LiMnO_2$


www.varta-ag.com

VARTA

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# 1. General Information


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# General Information

The VARTA Microbattery lithium manganese dioxide cell chemistry was one of the first solid cathode cells commercially developed and is still the most widely used system today. These cells offer an excellent shelf life, good high-rate and low-rate capability, a wide operating temperature range and availability in button and cylindrical cell designs. Potential design-in applications for these products are electronic, telecommunication, metering, instrumentation, office and other portable equipment use. Based on the outstanding cell performance and reliability of these products, they have been able to meet and exceed the requirements of our customer base worldwide.

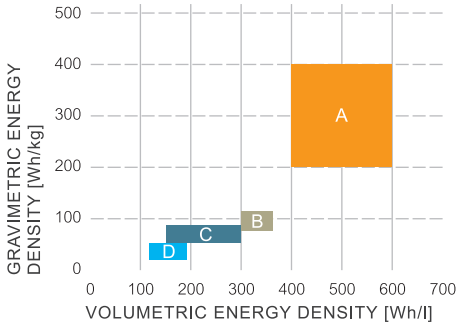
## Advantages for VARTA Microbattery $LiMnO_2$ Cells

- High open circuit and load voltage (above 3.0 volts per cell)
- High energy density (400 Wh/kg and 600 Wh/l)
- High capacity and high rate cell construction
- Operation over a wide temperature range
- Flat discharge profile under low to medium rate applications
- Low self discharge (less than 1% per year at RT)
- Superior shelf life and operational life
- (Up to 10 years and more)
- UL Recognition
- Ability to provide a variety of laser welded termination tabs for all cell types

## Energy Density for Primary Systems

Comparison of different primary battery systems

A = Lithium
B = Silver-oxide
C = Alkaline
D = Zinc-chloride

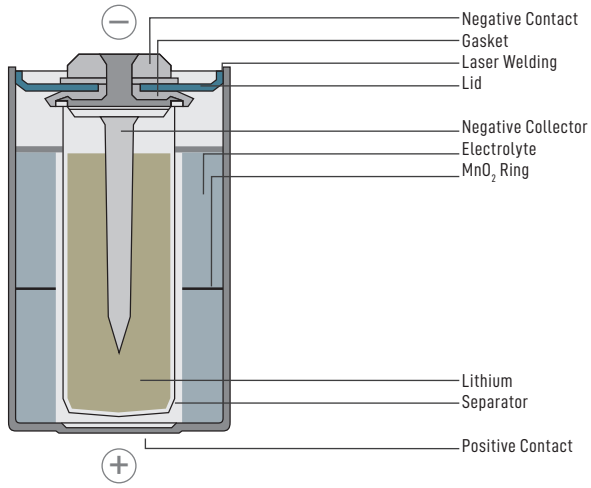


# 1.1 Constructions of Lithium Cells

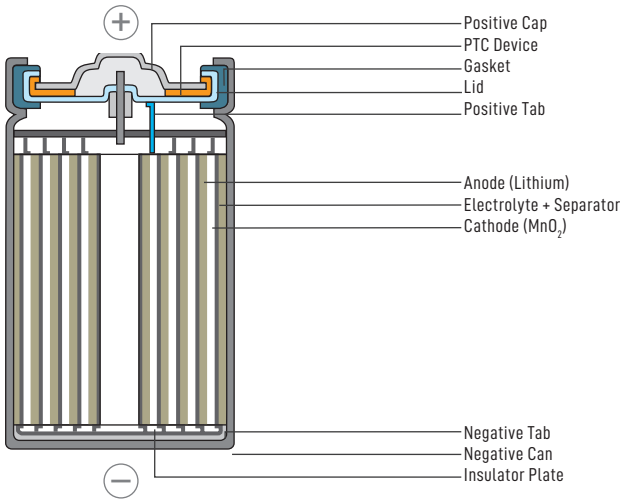
VARTA Microbattery offers a complete range of primary lithium manganese dioxide cylindrical and button cells for memory backup and portable applications worldwide.
The cylindrical cell configurations offer the high-capacity bobbin construction and high-power spirally wound product. The bobbin construction is targeted at low to moderate power requirements, dedicated for applications requiring up to a 10 years operational life at 20°C.
Our spirally wound electrode product offers high-rate discharge capability, with an operational life in excess of 5 years.
For compact and light weight equipment use we have a complete range of high performance primary lithium button cells.

## Lithium Cylindrical Batteries

BOBBIN CONSTRUCTION
Schematic construction of a Li/$MnO_2$ cylindrical cell (CR 1/2 AA).

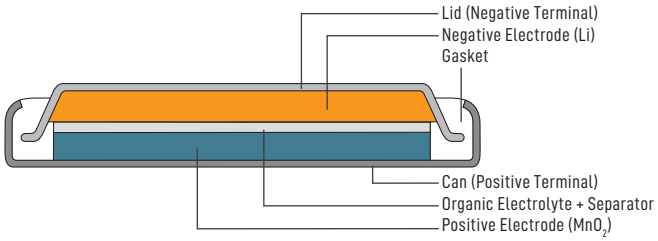



SPIRAL CONSTRUCTION
Schematic construction of a Li/$MnO_2$ cylindrical cell (CR 2/3 AH).



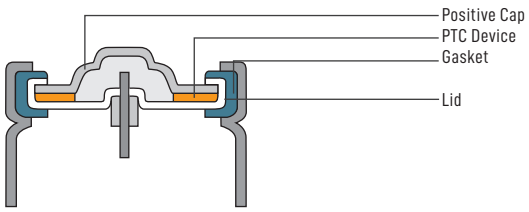
# LITHIUM BUTTON CELLS

Schematic construction of a
Li/MnO2 Button Cell

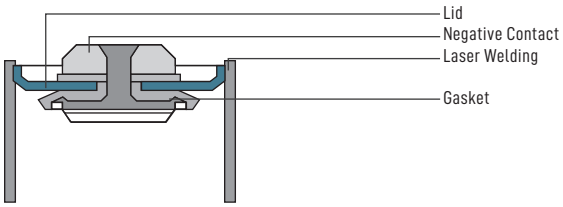



# SEALING TECHNOLOGIES

CRIMP-SEALING
CR High Power Cylindrical Cells




LASER-SEALING
CR High Capacity Cylindrical Cells



# 1.2 Characteristics and Applications

## Main Applications

Both mechanical and electrical properties, together with reliability, ensure that VARTA Microbattery lithium batteries meet the requirements of modern electronics.

They are therefore ideally suited as power sources for the long term supply of microelectronic circuitry.

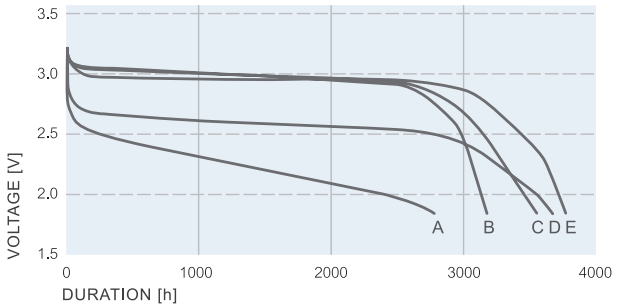
## Main Characteristics

- Long life expectancy and long operational life
- Low self discharge rate
- High energy density
- High cell voltage (3V)
- Wide temperature range
- High operating safety
- High reliability
- Resistance to corrosion with stainless steel case
- No leakage problems with an organic non-corrosive electrolyte

## Temperature characteristics

Temperature characteristics of CR 1/2 AA and CR AA cylindrical cells
(Load: 5.6 kΩ CR AA, 12 kΩ CR 1/2 AA)

A = -40°C
B = +80°C
C = +60°C
D = -20°C
E = +23°C




## System properties of VARTA Microbattery Lithium Cells

| SERIES | CR SERIES CYLINDRICAL CELLS | CR SERIES BUTTON CELLS |
|---|---|---|
| System | $Li/MnO_2$ | $Li/MnO_2$ |
| Gravimetric energy density | 250–300 Wh/kg | 250–300 Wh/kg |
| Nominal voltage | 3.0 V | 3.0 V |
| Open circuit voltage | 3.2 V | 3.2 V |
| Available capacity range | 950–2000 mAh | 25–560 mAh |
| Storage life | >10 years[1)] | >10 years[1)] |
| Self discharge d=20°C | <1% p.a. | <1% p.a. |
| Operating temperature | -30 ... +75°C[2)] | -20 ... +65°C |
| Maximum temperature range (short term)[3)] | -40 ... +80°C[4)] | -40 ... +80°C[4)] |
| Storage temperature[5)] | -55 ... +75°C[2)] | -55 ... +70°C |

[1)] CR 2/3 AH, CR 2, (>5 years)
[2)] CR 2/3 AH (-20 ... +65°C)
[3)] max. two weeks
[4)] µA-range
[5)] Recommended room temperature

# 1.3 Applications

## Utility Meters

Electricity Meters, Gas Meters, Water Meters, Calorimeters, Automatic Meter Reading (AMR), Heat Cost Allocator.

## Safety/Security Systems

Door Lockers, Security and Alarm Systems, Smoke and other Sensors and Detectors, Burglar Alarm Systems.

## Automotive Electronics

Mileage or Kilometer Counters, Onboard Computers, Electronic Monitoring, Navigational Equipment, Airbag Sensor and Gas Generators, Car radios, Container temperature loggers, Community Traffic Control Systems, Traffic Volume Control, Traffic Chart Recorders, Taximeters.

## Asset Tracking

Personal Identification, RF-ID Transponder, Bar Code Reader, Scanner, Goods Tracking, Trailer Identification, Goods Locationing.

## High End Consumer

Audio and Video Memory back-up and RTC, Video Games, Gambling Machines, SCUBA Diving Meters, Altimeters, Marine Electronics, Ski Bindings, Portable Timing Units for sports events, Pigeon Flight Time Recorders.

## Automation

Memory back-up, Intelligent Interfaces, Personal Computers, Intelligent Typewriters, Address Printers, Envelopment Franking Machines, Cash Points, Scales, Copy Machines, Cash Register.

## Industrial/Medical Instrumentation

Industrial Clocks, Pulse-/Event-Counters, High Voltage Power Line Fault Detectors, Remote Data Logging and Data Acquisition Systems, Seismic Measurement Equipment, Biotelemetry, Telemetry Equipment, Weather Balloon Transmitters, Automatic Weather Monitoring Stations, Compass Illumination, Caliper Pig for pipeline maintenance, Oscilloscopes, Medical Instruments, Gauges.

## Vending Machines

Ticket Vending Machines, Newspaper Vending Machines, Cigarette Vending Machines, Sweet Vending Machines, Drink Vending Machines, Parking Meter.

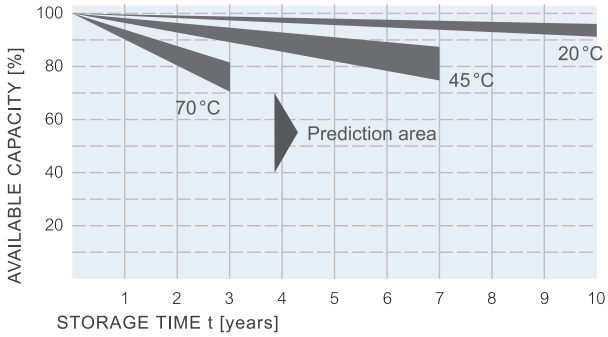
# 1.4 Selection Guide

## To enable battery selection the following is required:

- Discharge current and maximum discharge time
  - capacity
- Operating temperature range
  - self discharge
  - surplus capacity requirement
- Cell size

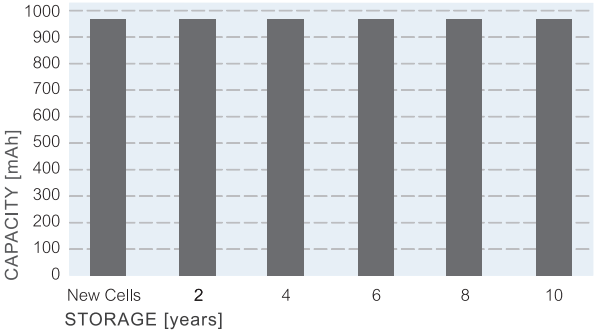
### CAPACITY RETENTION

Capacity retention characteristics of VARTA Microbattery Lithium Cells Cylindrical Cells CR...AA and CR...A



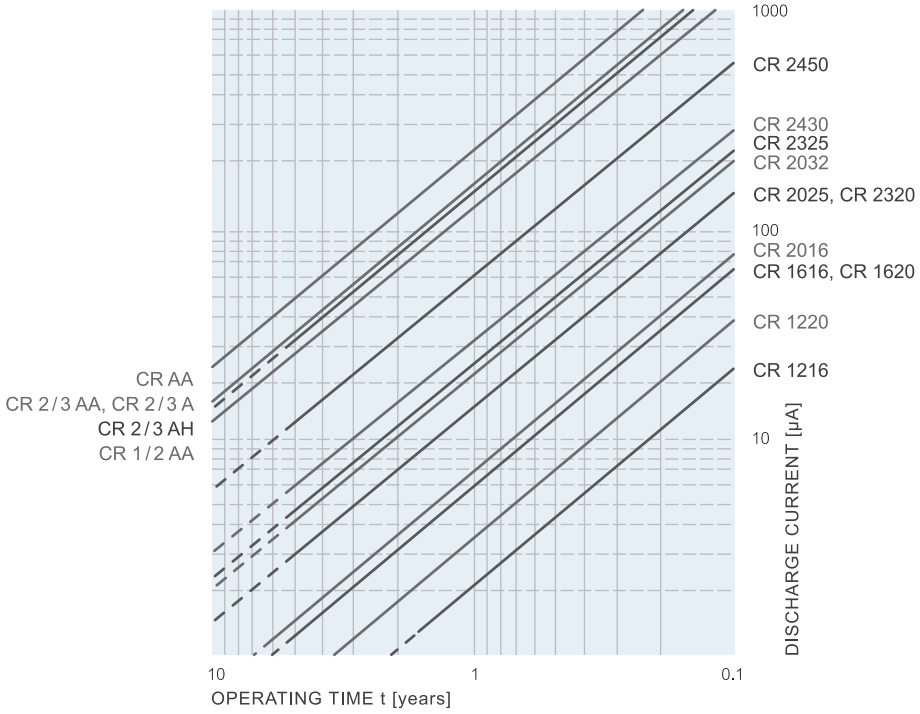

### STORAGE BEHAVIOR

Typical storage behaviour at room temperature 21°C of CR 1/2 AA




### BATTERY SELECTION DIAGRAMM

Discharge current/Operating time



# 2. CR Primary Lithium Button Cells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# 2.1 Types – Technical Data


CR 1216


CR 1616


CR 2016


CR 2025


CR 2032

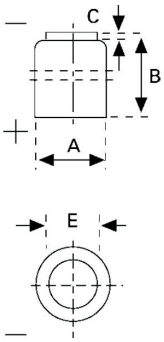

CR 2450

| TYPE | ORDER NO. | NOMINAL VOLTAGE (V) | TYPICAL CAPACITY[1] (mAh) | STANDARD LOAD (kΩ) | MAX. DISCHARGE CURRENT (CONTINUOUS) (mA) | MAX. DISCHARGE CURRENT (PULSE) (mA) | WEIGHT (G) |
|---|---|---|---|---|---|---|---|
| CR 1/3 N | 6131 101 501 | 3 | 170 | 5.6 | 20 | 80 | 3.0 |
| CR 1216 | 6216 101 501 | 3 | 27 | 39 | 2 | 5 | 0.7 |
| CR 1220 | 6220 101 501 | 3 | 35 | 39 | 2 | 5 | 0.8 |
| CR 1616 | 6616 101 501 | 3 | 55 | 39 | 3 | 8 | 1.2 |
| CR 1620 | 6620 101 501 | 3 | 70 | 20 | 3 | 8 | 1.2 |
| CR 2016 | 6016 101 501 | 3 | 90 | 15 | 3 | 10 | 1.8 |
| CR 2025 | 6025 101 501 | 3 | 165 | 10 | 3 | 10. | 2.5 |
| CR 2032 | 6032 101 501 | 3 | 230 | 5.6 | 3 | 10 | 3.0 |
| CR 2430 | 6430 101 501 | 3 | 300 | 5.6 | 3 | 20 | 4.0 |
| CR 2450 | 6450 101 501 | 3 | 620 | 5.6 | 2 | 20 | 6.2 |

Technical data, CR Primary Lithium Button Cells

[1] Nominal capacity is determined to an end voltage of 2.0 V when the battery is allowed to discharge at standard load level at 20°C

# CR 1/3 N


| | |
|---|---|
| Type Number | 6131 |
| Designation IEC | CR 11108 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 |
| Nominal Voltage | 3 V |
| Typical Capacity C | 170 mAh (Load 5,6 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 3 g |
| Volume | 1,1 ccm |
| Coding | TBA |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 65°C[1] |

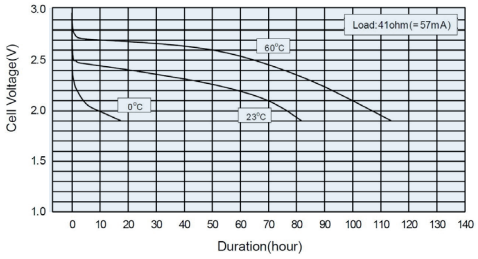
| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 11,40 | 11,60 |
| Height (B) | 10,40 | 10,80 |
| Shoulder Diameter [L] | 7,60 | 8,00 |
| Shoulder Height [M] | 0,40 | |

## Typical Capacities (at 20°C)

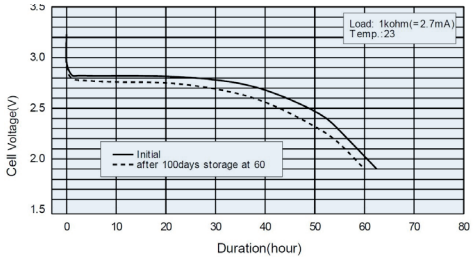
| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 5600 Ω | Time: 335 h<br>Capacity: 170 mAh<br>Energy: 475 mWh |

## Performance Data

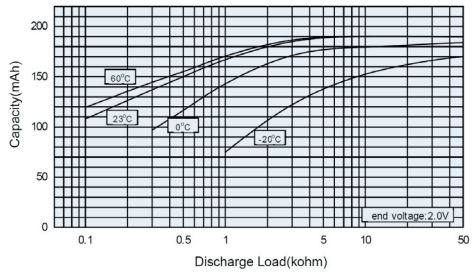
### Temperature Characteristics




### Operating Voltage vs. load resistance



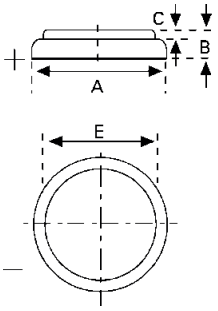

### Capacity vs. load resistance




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

[1] Contact VARTA if the application is intended to be outside the range of -20°C to +65°C.
[2] depending on environmental condition and energy consumption

# CR 1216


| | |
|---|---|
| Type Number | 6216 |
| Designation IEC | CR 1216 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 27 mAh (Load 39 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 0,7 g |
| Volume | 0,17 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 12,20 | 12,50 |
| Height (B) | 1,40 | 1,60 |
| Shoulder Diameter [E] | 10,00 | |
| Shoulder Height [C] | 0,20 | |

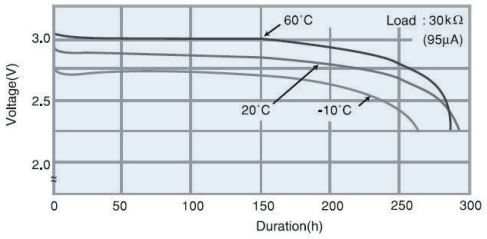
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 39000 Ω | Time: 355 h<br>Capacity: 27 mAh<br>Energy: 77 mWh |

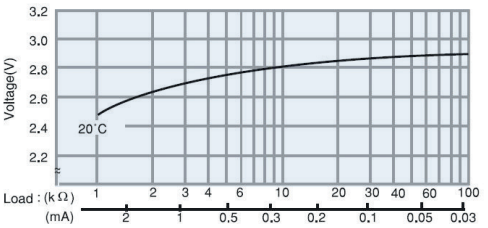
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

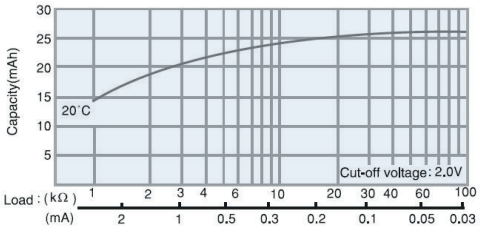



### Operating Voltage vs. load resistance*

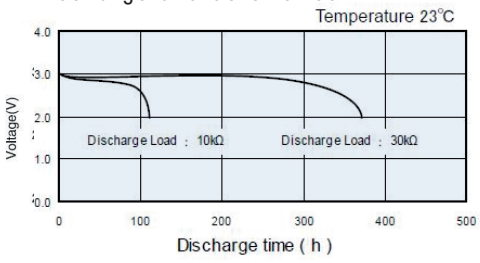



*Discharge depth 50%

### Capacity vs. load resistance

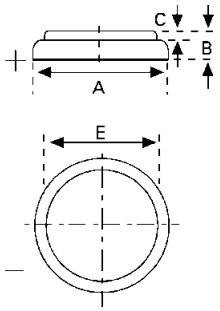



### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2]> 10 years

# CR 1220


| | |
|---|---|
| Type Number | 6220 |
| Designation IEC | CR 1220 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 35 mAh (Load 39 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 0,8 g |
| Volume | 0,2 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 12,20 | 12,50 |
| Height (B) | 1,80 | 2,00 |
| Shoulder Diameter [E] | 10,00 | |
| Shoulder Height [C] | 0,30 | |

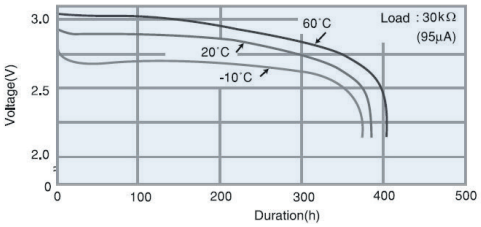
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 39000 Ω | Time: 480 h<br>Capacity: 35 mAh<br>Energy: 100 mWh |

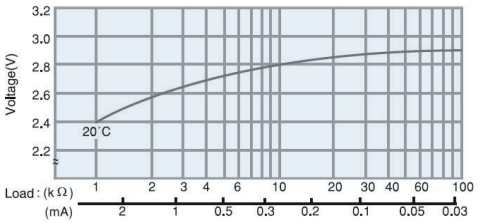
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

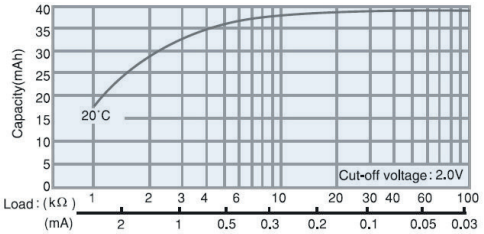



### Operating Voltage vs. load resistance*

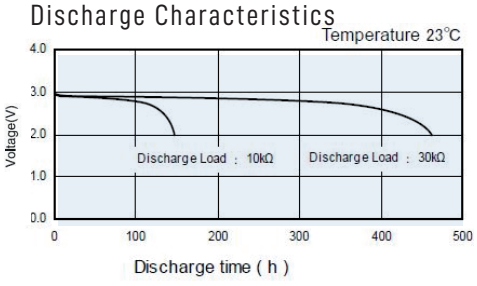



*Discharge depth 50%

### Capacity vs. load resistance

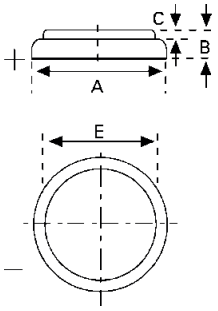



### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 1616


| | |
|---|---|
| Type Number | 6616 |
| Designation IEC | CR 1616 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 55 mAh (Load 39 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 1,2 g |
| Volume | 0,3 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 15,70 | 16,00 |
| Height (B) | 1,40 | 1,60 |
| Shoulder Diameter [E] | 12,00 | |
| Shoulder Height [C] | 0,20 | |

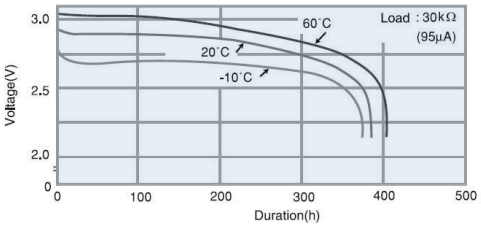
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous | 15000 Ω | Time: 450 h |
| 24 h/d, 7 d/w | | Capacity: 90 mAh |
| Current | 200 µA | Energy: 270 mWh |

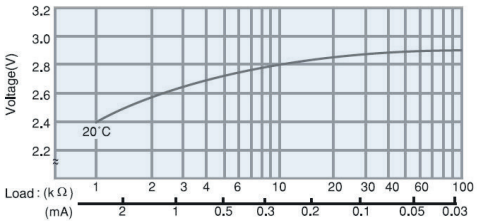
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

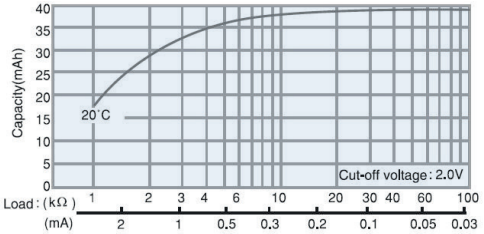



### Operating Voltage vs. load resistance*

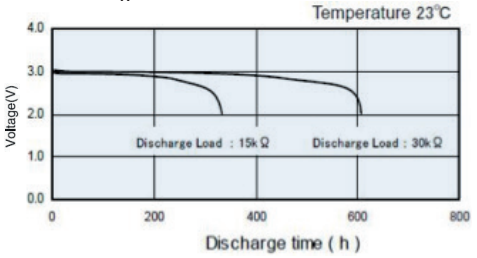



*Discharge depth 40%

### Capacity vs. load resistance

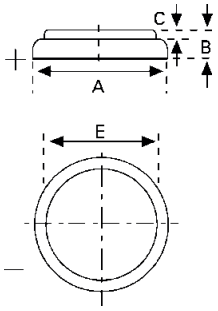



### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 1620


| | |
|---|---|
| Type Number | 6620 |
| Designation IEC | CR 1620 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 70 mAh (Load 20 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 1,2 g |
| Volume | 0,4 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 15,70 | 16,00 |
| Height (B) | 1,80 | 2,00 |
| Shoulder Diameter [E] | 12,90 | |
| Shoulder Height [C] | 0,20 | |

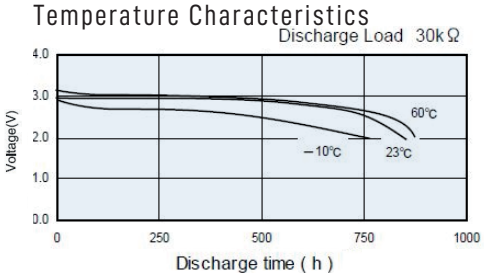
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 20000 Ω | Time: 500 h<br>Capacity: 70 mAh<br>Energy: 200 mWh |

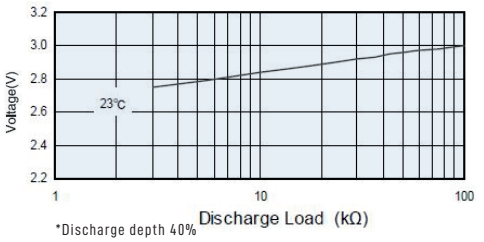
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

Temperature Characteristics

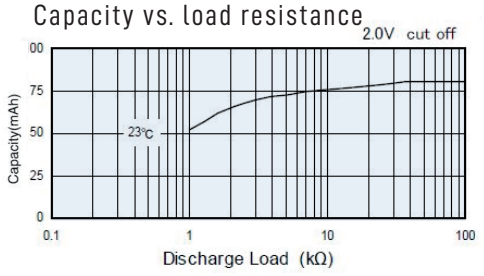



Operating Voltage vs. load resistance*

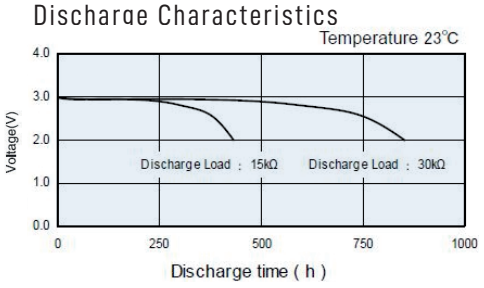



*Discharge depth 40%

Capacity vs. load resistance

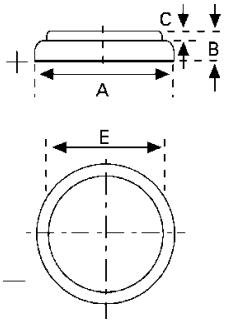



Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2016


| | |
|---|---|
| Type Number | 6016 |
| Designation IEC | CR 2016 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 90 mAh (Load 15 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 1,8 g |
| Volume | 0,5 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 19,70 | 20,00 |
| Height (B) | 1,40 | 1,60 |
| Shoulder Diameter [E] | 18,40 | |
| Shoulder Height [C] | 0,10 | |

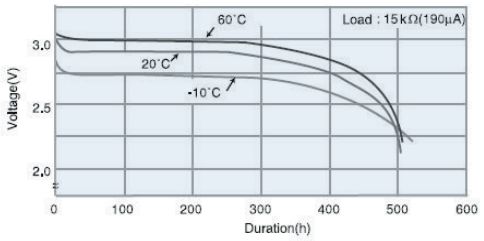
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous | 15000 Ω | Time: 450 h |
| 24 h/d, 7 d/w | | Capacity: 90 mAh |
| Current | 200 µA | Energy: 270 mWh |

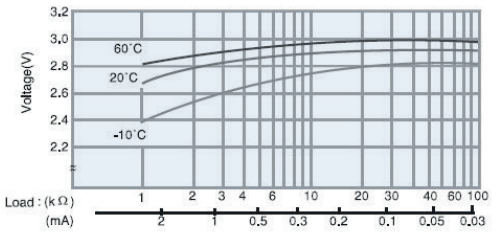
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

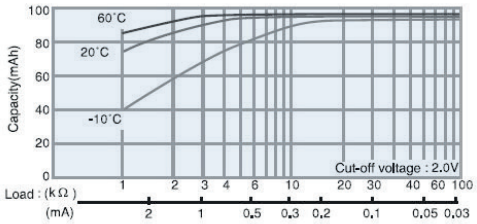



### Operating Voltage vs. load resistance*



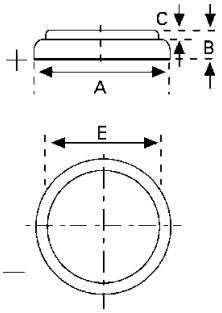

*Voltage at 50% discharge depth

### Capacity vs. load resistance




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2025


| | |
|---|---|
| Type Number | 6025 |
| Designation IEC | CR 2025 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 165 mAh (Load 10 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 2,5 g |
| Volume | 0,75 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 19,70 | 20,00 |
| Height (B) | 2,20 | 2,50 |
| Shoulder Diameter [E] | 18,30 | |
| Shoulder Height [C] | 0,20 | |

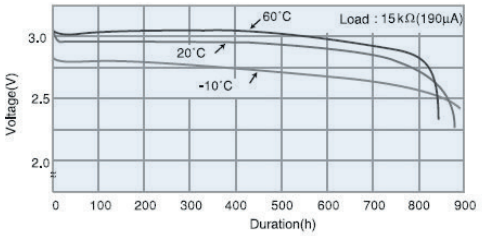
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 10000 Ω | Time: 580 h<br>Capacity: 165 mAh<br>Energy: 475 mWh |

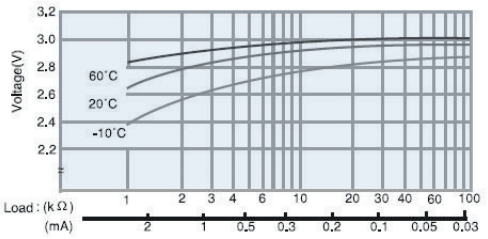
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

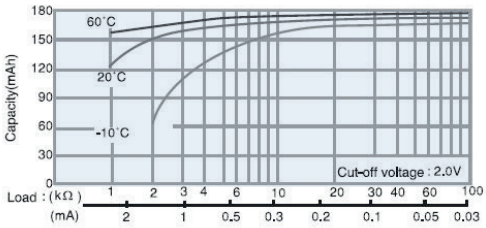



### Operating Voltage vs. load resistance*



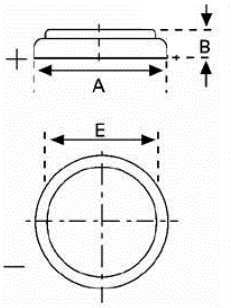

*Voltage at 50% discharge depth

### Capacity vs. load resistance




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2032


| | |
|---|---|
| Type Number | 6032 |
| Designation IEC | CR 2032 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 230 mAh (Load 5,6 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 3 g |
| Volume | 0,95 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 19,70 | 20,00 |
| Height (B) | 2,90 | 3,20 |
| Shoulder Diameter [E] | 16,00 | |

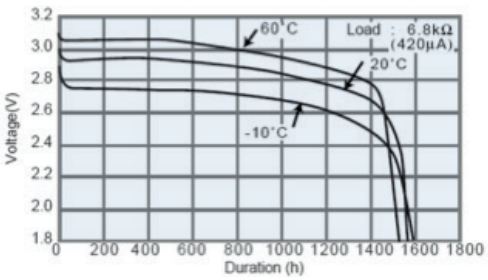
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 5600 Ω | Time: 460 h<br>Capacity: 230 mAh<br>Energy: 645 mWh |

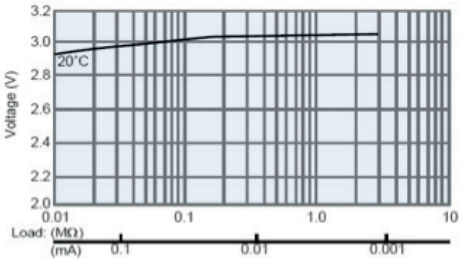
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

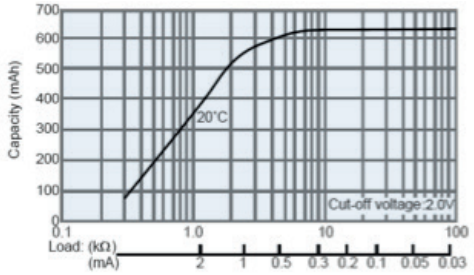



### Operating Voltage vs. load resistance*



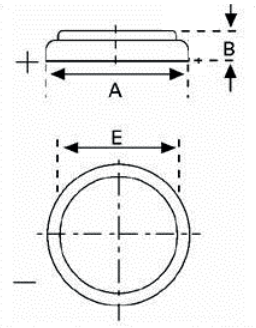

*Discharge depth 40%

### Capacity vs. load resistance




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2430


| | |
|---|---|
| Type Number | 6430 |
| Designation IEC | CR 2430 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 300 mAh (Load 5,6 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 4 g |
| Volume | 1,3 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 24,20 | 24,50 |
| Height (B) | 2,70 | 3,00 |
| Shoulder Diameter [E] | 16,30 | 16,70 |

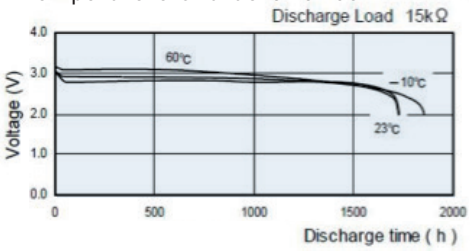
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w<br>Current [µA] | 5600 Ω | Time: 600 h<br>Capacity: 300 mAh<br>Energy: 840 mWh |

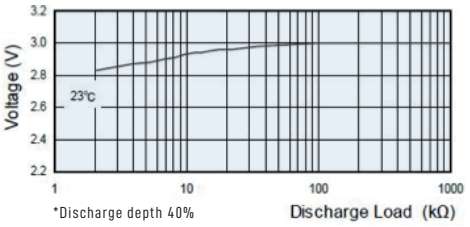
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

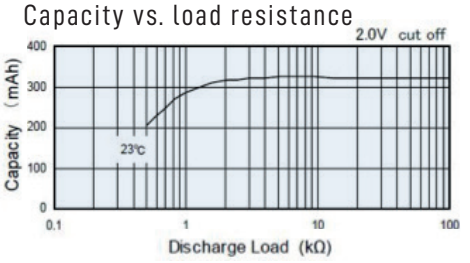
### Temperature Characteristics




### Operating Voltage vs. load resistance*

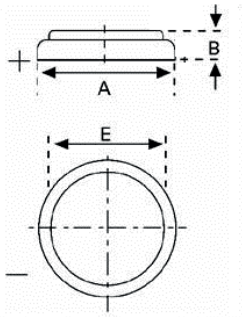



### Capacity vs. load resistance




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2450


| | |
|---|---|
| Type Number | 6450 |
| Designation IEC | CR 2450 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 620 mAh (Load 5,6 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 6,2 g |
| Volume | 2,3 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -20°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 24,20 | 24,70 |
| Height (B) | 4,60 | 5,00 |
| Shoulder Diameter [E] | 21,00 | |

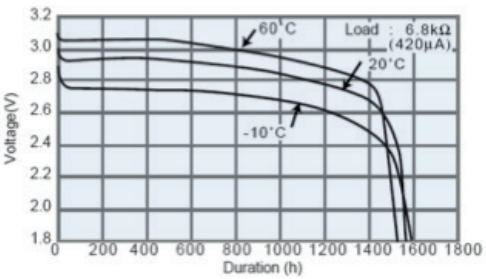
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous<br>24 h/d, 7 d/w | 5600 Ω | Time: 1250 h<br>Capacity: 620 mAh<br>Energy: 1730 mWh |

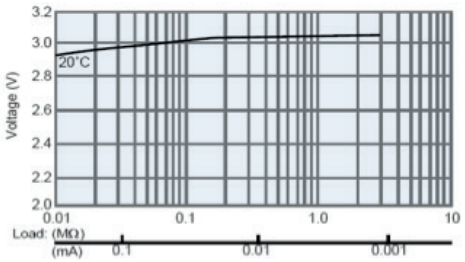
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

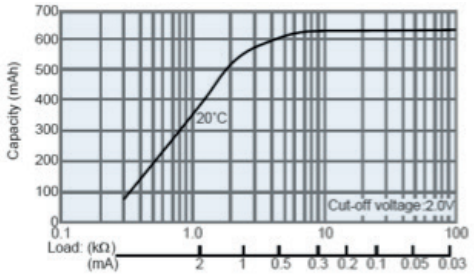



### Operating Voltage vs. load resistance*




*Discharge depth 40%

### Capacity vs. load resistance




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# 2.2 Assemblies

## CR 1/3 N

| TYPE | ORDER NO. | A | B | C | D | E | F | G | H | I | K | L | FIG. NO. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR 1/3 N | 6131 101 501 | 11.6 | 10.8 | 0.4 | 7.8 | – | – | – | – | – | – | – | 1 | – |
| CR 1/3 N PC PCBD | 6131 201 501 | 13.0 | 1.0 | 10.0 | 1.0 ±0.5 | 11.5 ±0.5 | 12.0 ±0.5 | – | 1.0 ±0.5 | 3.0 | – | – | 3 | tag 0.25 mm |
| CR 1/3 N BE STO | 6131 301 501 | – | – | – | – | 11.5 | 12.0 | – | – | – | 19.0 | 4.0 | 2 | tag 0.25 mm 180° |

Tag material: nickel plated sheet-steel. SLF: tip tinned.
Custom made assemblies are available on request for large volume.

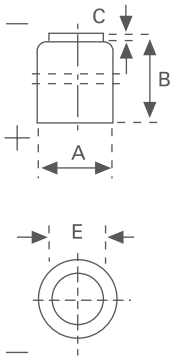



Fig. 1

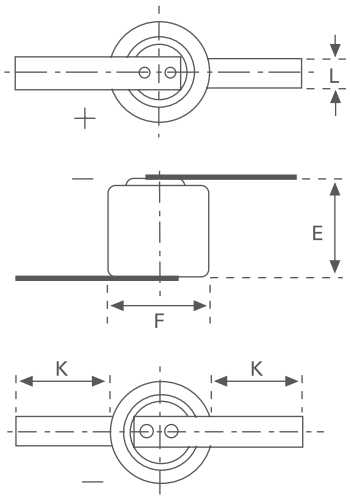



Fig. 2 LF

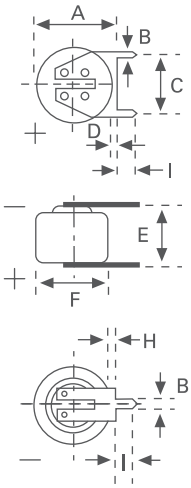



Fig. 3 SLF

## CR Button

| TYPE | ORDER NO. | A | B | C | D | E | F | G | H | I | K | L | FIG. NO. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR 1216 | 6216 101 501 | 12.5 | 1.6 | 0.2 | – | 10.0 | – | – | – | – | – | – | 4 | – |
| CR 1220 | 6220 101 501 | 12.5 | 2.0 | 0.3 | – | 10.0 | – | – | – | – | – | – | 4 | – |
| CR 1616 | 6616 101 501 | 16.0 | 1.6 | 0.2 | – | 12.0 | – | – | – | – | – | – | 4 | – |
| CR 1620 | 6620 101 501 | 16.0 | 2.0 | 0.02 | – | 12.9 | – | – | – | – | – | – | 4 | – |
| CR 2016 | 6016 101 501 | 20.0 | 1.6 | 0.1 | – | – | – | – | – | – | – | – | 4 | – |
| CR 2016 SC PCBD | 6016 201 501 | 21.3 | 1.0 | 10.0 ±0.15 | 1.0 ±0.3 | 2.1 ±0.5 | 20.3 ±0.15 | – | 1.0 ±0.3 | 4.5 | – | – | 5 | tag 0.25 mm |
| CR 2016 SC STO | 6016 301 501 | 20.0 | – | – | – | 1.9 | 20.0 | – | – | – | 10.0 | 4.0 | 6 | tag 0.15 mm |
| CR 2016 BE PCBD | 6016 401 501 | 20.0 | 1.0 | 10.0 | 9.1 | 1.6 | 17.8 | 7.3 | 10.0 | 4.5 | 11.4 | – | 7 | tag 0.15 mm |
| CR 2016 FM S STO | 6016 301 012 | 20.5 | 3.5 | 1.8 | 3.0 | 2.2 | – | – | – | – | – | – | – | – |

Tag material: nickel plated sheet-steel. SLF: tip tinned.
Custom made assemblies are available on request for large volume.

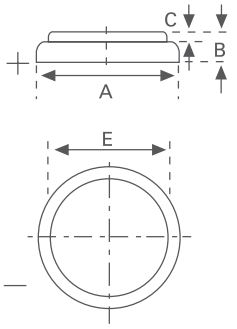



Fig. 4

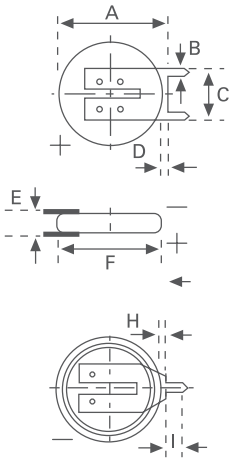



Fig. 5 SLF

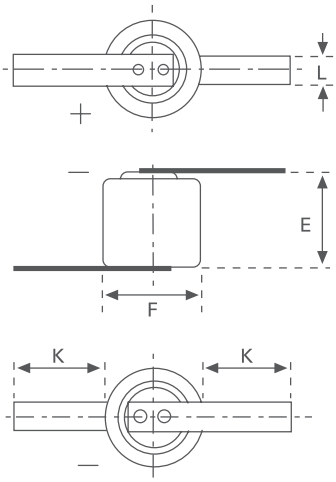



Fig. 6 LF

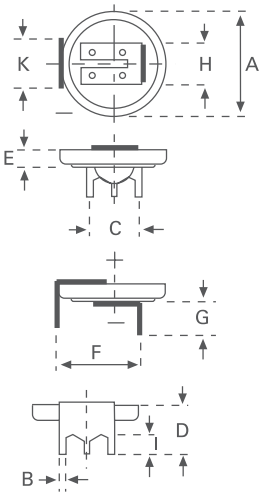



Fig. 7 PCB 3

## CR Button

| TYPE | ORDER NO. | A | B | C | D | E | F | G | H | I | K | L | FIG. NO. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR 2025 | 6025 101 501 | 20.0 | 2.5 | 0.2 | – | – | – | – | – | – | – | – | 8 | – |
| CR 2025 ST | 6025 201 501 | 21.3 | 1.0 | 10.0 ±0.2 | 1.0 ±0.3 | 3.0 ±0.5 | 20.3 ±0.15 | – | 1.0 ±0.3 | 4.5 | – | – | 9 | tag 0.25 mm |
| CR 2025 SC STO | 6025 301 501 | 20.0 | – | – | – | 2.8 | 20.3 | – | – | – | 10.0 | 4.0 | 10 | tag 0.15 mm |
| CR 2025 BE PCBD | 6025 401 501 | 20.0 | 1.0 | 10.0 | 10.0 | 2.8 | 17.8 | 7.3 | 10.0 | 4.5 | 11.4 | – | 11 | tag 0.15 mm |
| CR 2032 | 6032 101 501 | 20.0 | 3.2 | 0.02 | – | 16.5 | – | – | – | – | – | – | 8 | – |
| CR 2032 SC PCBD | 6032 201 501 | 21.5 | 1.0 | 10.0 | 1.0 ±0.3 | 4.2 | 20.3 | – | 1.0 | 4.5 | – | – | 9 | tag 0.25 mm |
| CR 2032 SC STO | 6032 301 501 | – | – | – | – | 3.2 | 20.3 | – | – | – | 10.0 | 4.0 | 10 | tag 0.15 mm |
| CR 2032 PCBD | 6032 401 501 | 20.0 | 1.0 | 10.0 | 11.0 | 3.2 | 17.8 | 7.5 | 10.0 | 4.5 | 11.4 | – | 11 | tag 0.25 mm |
| CR 2032 BE PCBS | 6032 701 501 | 20.0 | 1.0 | – | 11.0 | 3.2 | 17.8 | 7.3 | 10.0 | 4.5 | 10.0 | – | 12 | tag 0.20 mm |
| CR 2032 S WC[1] | 6032 101 013 | 20.7 | – | – | – | 5.5 | 30.0 | – | – | – | 96.0 | 2.0 | 13 | tag 0.20 mm[2] |
| CR 2032 S STO | 6032 101 012 | 20.0 | 7.0 | 2.8 | 5.0 | 3.8 | – | – | – | – | – | – | 14 | – |

Tag material: nickel plated sheet-steel. SLF: tip tinned.
[1] using Molex 51021-03 connector (Other wire connectors and wire length are available on request.) [2] in shrink sleeve with wire and connector
Custom made assemblies are available on request for large volume.

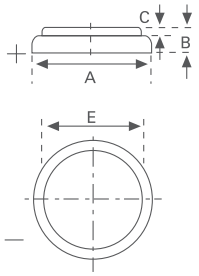



Fig. 8

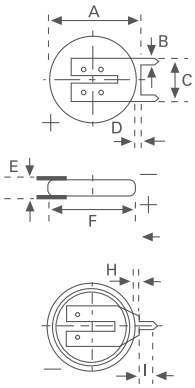



Fig. 9 SLF

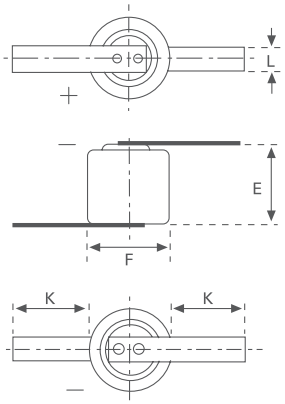



Fig. 10 LF

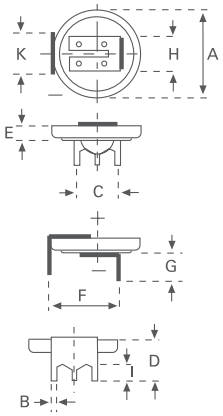



Fig. 11 PCB 3

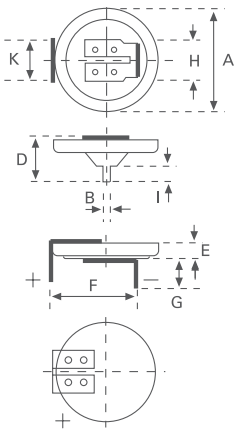



Fig. 12 PCB 2

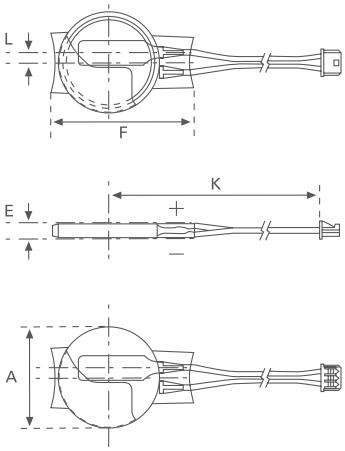



Fig. 13 WC

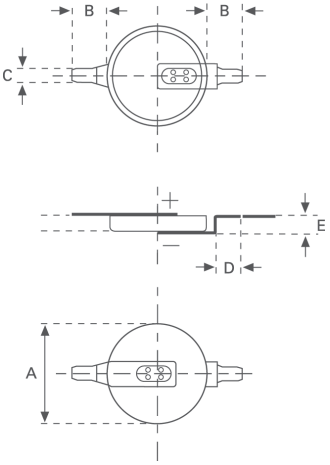



Fig. 14 SMT

## CR Button

| TYPE | ORDER NO. | A | B | C | D | E | F | G | H | I | K | L | FIG. NO. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR 2430 | 6430 101 501 | 24.5 | 3.0 | 0.3 | – | 20.0 | – | – | – | – | – | – | 15 | – |
| CR 2430 SLF | 6430 201 501 | 25.6 | 1.0 | 10.0 | 1.0 | 4.0 | 25.0 | – | 1.0 | 4.5 | – | – | 16 | tag 0.25 mm |
| CR 2430 LF | 6430 301 501 | 20.0 | – | – | – | – | 25.0 | – | – | – | 10.0 | 4.0 | 17 | tag 0.15 mm |
| CR 2430 PCB 3 | 6430 401 501 | 24.5 | 1.0 | 10.0 | 11.0 | 3.0 | 17.8 | 7.5 | 10.0 | 4.5 | 11.4 | – | 18 | tag 0.25 mm |
| CR 2430 PCB 2 | 6430 701 501 | 24.5 | 1.0 | – | 11.0 | 3.0 | 20.0 | 7.5 | 10.0 | 4.5 | 11.4 | – | 19 | tag 0.20 mm |
| CR 2430 SMT | 6430 301 012 | 24.5 | 5.2 | 4.0 | 5.0 | 3.3 | – | – | – | – | – | – | 20 | – |
| CR 2450 | 6450 101 501 | 24.7 | 5.0 | 0.5 | – | 21.8 | – | – | – | – | – | – | 15 | – |
| CR 2450 SLF | 6450 201 501 | 25.6 | 1.0 | 10.0 | 1.0 | 6.0 | 25.0 | – | 1.0 | 4.5 | – | – | 16 | tag 0.25 mm |
| CR 2450 PCB 3 | 6450 401 501 | 24.5 | 1.0 | 10.0 | 13.2 | 5.0 | 17.8 | 7.5 | 10.0 | 4.5 | 11.4 | – | 18 | tag 0.25 mm |
| CR 2450 PCB 2 | 6450 701 501 | 24.7 | 1.0 | – | 12.7 | 5.0 | 17.8 | 7.5 | 10.0 | 4.5 | 11.4 | – | 19 | tag 0.20 mm |
| CR 2450 SMT | 6450 301 013 | 24.5 | 4.5 | 2.8 | 3.5 | 5.3 | – | – | – | – | – | – | 20 | – |

Tag material: nickel plated sheet-steel. SLF: tip tinned.
1) using Molex 51021-03 connector (Other wire connectors and wire length are available on request.) 2) in shrink sleeve with wire and connector
Custom made assemblies are available on request for large volume.

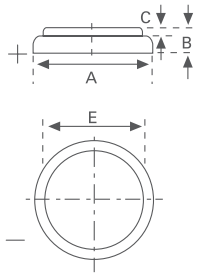



Fig. 15

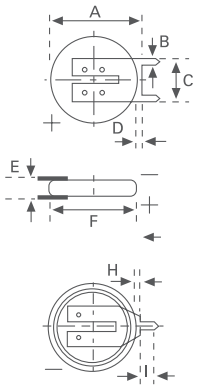



Fig. 16 SLF

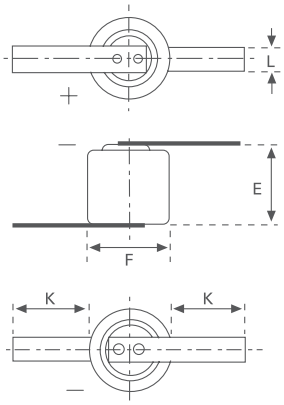



Fig.17 LF

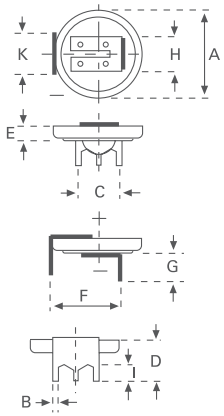



Fig. 18 PCB 3

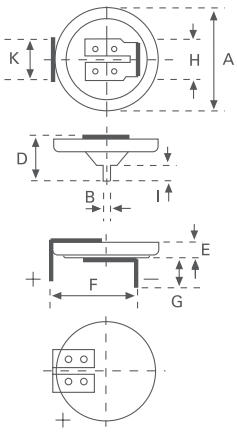



Fig. 19 PCB 2

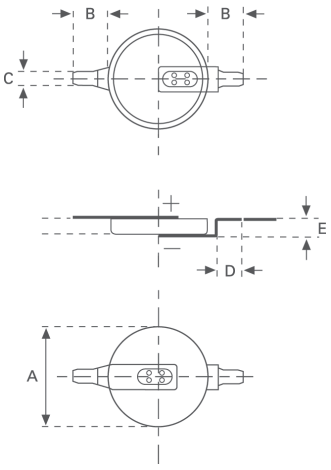



Fig. 20 SMT

# 3. CR High Capacity Primary Lithium Cylindrical Cells


3.1 Types – Technical Data 28
3.2 Assemblies 32

# 3.1 Types – Technical Data

| TYPE | ORDER NO. | NOMINAL VOLTAGE (V) | NOMINAL CAPACITY AT 20°C, DOWN TO 2.0 V, LOAD (mAh) | MAX. CONTINUOUS DISCHARGE CURRENT (mA) | WEIGHT (G) |
|---|---|---|---|---|---|
| CR 1/2 AA | 6127 101 301 | 3 | 950 mAh–5.6 kΩ | 5 | 11.5 |
| CR 2/3 AA | 6237 101 301 | 3 | 1350 mAh–1.0 kΩ | 10 | 15.0 |
| CR AA | 6117 101 301 | 3 | 2000 mAh–1.0 kΩ | 15 | 21.5 |

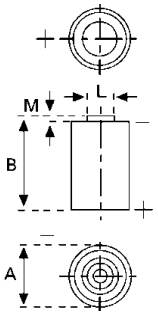
Technical data, CR High Capacity Primary Lithium Cylindrical Cells


CR 1/2 AA


CR 2/3 AA


CR AA

# CR 1/2 AA


| | |
|---|---|
| Type Number | 6127 |
| Designation IEC | – |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 950 mAh (Load 5,6 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 11,5 g |
| Volume | 5 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -30°C | 75°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 14,15 | 14,45 |
| Height (B) | 25,09 | 25,30 |
| Shoulder Diameter [L] | 7,00 | |
| Shoulder Height [M] | 0,90 | |

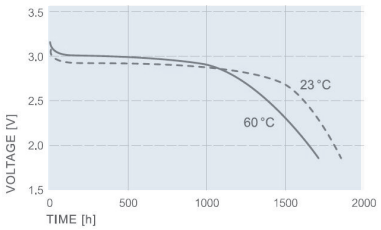
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 5600 Ω | Time: 1860 h, Capacity: 950 mAh, Energy: 2700 mWh |
| Continuous 24 h/d, 7 d/w | 2000 Ω | Time: 670 h, Capacity: 930 mAh, Energy: 2600 mWh |
| Continuous 24 h/d, 7 d/w | 1000 Ω | Time: 335 h, Capacity: 900 mAh, Energy: 2400 mWh |
| Constant current | 50 µA | Capacitiy: 1000 mAh |

[1] Contact VARTA if the application is intended to be outside the range of -30°C to +75°C.
[2] depending on environmental condition and energy consumption

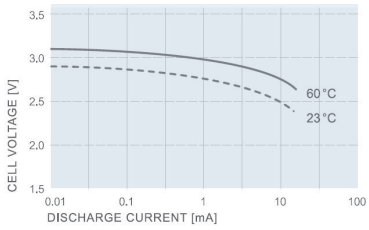
## Performance Data

### Temperature Characteristics*



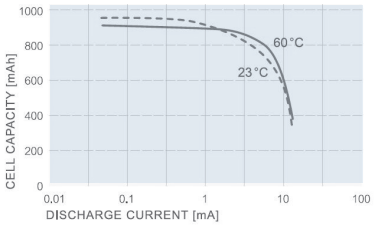

*Discharge Load 5,6 kΩ

### Operating Voltage vs. load resistance*

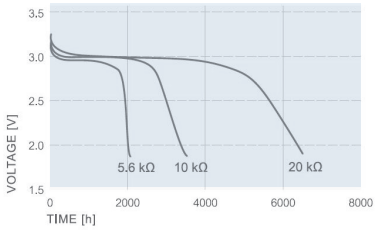



*Discharge depth 50%

### Capacity vs. load resistance



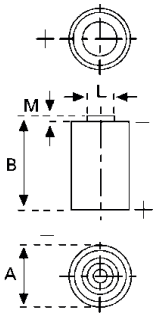

### Discharge Characteristics*




*at room temperature 21°C

- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2]> 10 years

# CR 2/3 AA


| | |
|---|---|
| Type Number | 6237 |
| Designation IEC | – |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 1350 mAh (Load 1,0 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 15 g |
| Volume | 5,6 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -30°C | 75°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 14,45 | 14,75 |
| Height (B) | 33,10 | 33,00 |
| Shoulder Diameter [L] | 7,00 | |
| Shoulder Height [M] | 0,60 | |

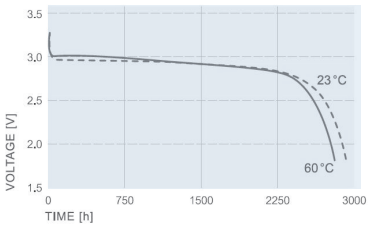
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 1000 Ω | Time: 500 h<br>Capacity: 1350 mAh<br>Energy: 3600 mWh |

[1] Contact VARTA if the application is intended to be outside the range of -30°C to +75°C.
[2] depending on environmental condition and energy consumption

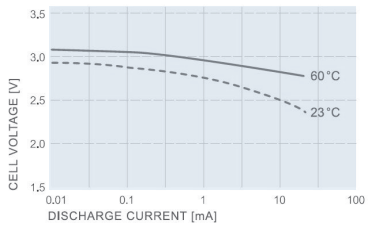
## Performance Data

### Temperature Characteristics*



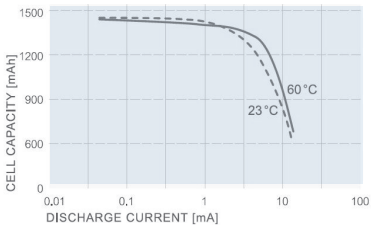

*Discharge Load 5,6 kΩ

### Operating Voltage vs. load resistance*

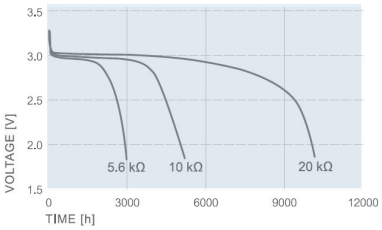



*Discharge depth 50%

### Capacity vs. load resistance



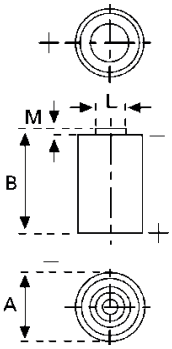

### Discharge Characteristics*




*at room temperature 21°C

- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR AA




| | |
|---|---|
| Type Number | 6117 |
| Designation IEC | – |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 2000 mAh (Load 1,0 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 21,5 g |
| Volume | 8,5 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -55°C | 70°C |
| Discharge | -30°C | 75°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 14,45 | 14,75 |
| Height (B) | 49,50 | 50,50 |
| Shoulder Diameter [L] | 7,00 | |
| Shoulder Height [M] | 0,60 | |

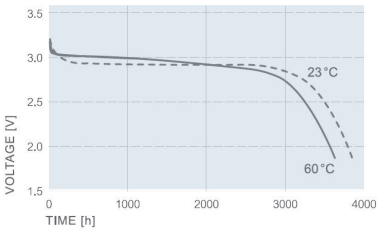
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 1000 Ω | Time: 745 h<br>Capacity: 2000 mAh<br>Energy: 5600 mWh |
| Continuous 24 h/d, 7 d/w | 620 Ω | Time: 430 h<br>Capacity: 1850 mAh<br>Energy: 5000 mWh |

[1] Contact VARTA if the application is intended to be outside the range of -30°C to +75°C.
[2] depending on environmental condition and energy consumption

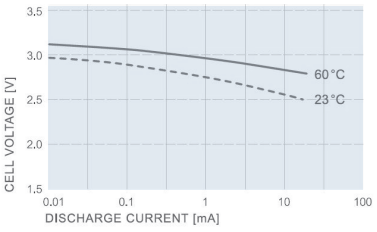
## Performance Data

### Temperature Characteristics*



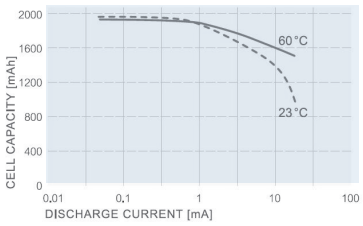

*Discharge Load 5,6 kΩ

### Operating Voltage vs. load resistance*

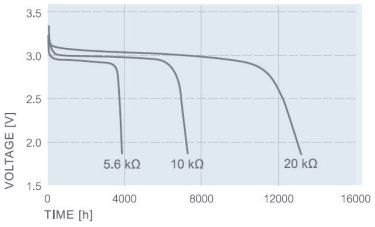



*Discharge depth 50%

### Capacity vs. load resistance




### Discharge Characteristics*




*at room temperature 21°C

- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# 3.2 Assemblies

| TYPE | ORDER NO. | A (MAX.) | B | C | D | E | F | G | H | I | K | L | M | FIG. NO. | TAGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR 1/2 AA S | 6127 101 301 | 14.75 | 25.2 | – | – | – | – | – | – | – | – | 7.0 | 0.6 | 1 | – |
| CR 1/2 AA S PCBD | 6127 201 301 | 14.75 | 25.2 | 10.0 | 1.0 | 1.0 | – | 25.4 | – | 3.0 | 5.0 | – | – | 2 | – |
| CR 1/2 AA S ST | 6127 301 301 | 14.75 | 25.2 | 10.0 | – | 3.5 | 2.1 | 25.4 | 2.5 | – | – | – | | 3 | – |
| CR 1/2 AA BE CD | 6127 501 301 | 14.75 | 25.4 | 45.0 | – | – | – | – | – | – | – | – | – | 7 | – |
| CR 1/2 AA S CD | 6127 601 301 | 14.75 | 25.4 | – | 7.5 | – | – | 33.5 | – | – | – | – | – | 6 | (90°) |
| CR 1/2 AA S PCBS | 6127 901 301 | 14.75 | 25.2 | – | – | 1.0 | – | 25.4 | – | 3.0 | – | – | – | 5 | short pin |
| CR 1/2 AA S TP | 6127 601 381 | 14.75 | 25.2 | 16.5 | – | 0.64 | – | 25.8 | – | – | – | – | – | 8 | pin |
| CR 1/2 AA WC[1)] | 6127 201 390 | 17.5 | 27.0 | 50.0 | – | – | – | – | – | – | – | – | – | 9 | wire & connector |
| CR 2/3 AA S | 6237 101 301 | 14.75 | 33.5 | – | – | – | – | – | – | – | – | 7.0 | 0.6 | 1 | – |
| CR 2/3 AA S PCBD | 6237 201 301 | 14.75 | 33.5 | 10.0 | 1.0 | 1.0 | – | 33.7 | – | 3.0 | 5.0 | – | – | 2 | – |
| CR 2/3 AA S ST | 6237 301 301 | 14.75 | 33.5 | 10.0 | – | 3.5 | 2.1 | 33.7 | 2.5 | – | – | – | – | 3 | – |
| CR 2/3 AA S CD | 6237 501 301 | 14.75 | 33.5 | 45.0 | – | – | – | – | – | – | – | – | – | 7 | – |
| CR 2/3 AA S PCBS | 6237 701 301 | 14.75 | 33.5 | – | 1.0 | 1.0 | – | 33.7 | – | 3.0 | – | – | – | 4 | single pin |
| CR AA S | 6117 101 301 | 14.75 | 50.0 | – | – | – | – | – | – | – | – | 7.0 | 0.6 | 1 | – |
| CR AA S PCBD | 6117 201 301 | 14.75 | 50.0 | 10.0 | 1.0 | 1.0 | – | 50.2 | – | 3.0 | 5.0 | – | – | 2 | – |
| CR AA S ST | 6117 301 301 | 14.75 | 50.0 | 10.0 | – | 3.5 | 2.1 | 50.2 | 2.5 | – | – | – | – | 3 | – |
| CR AA S CD | 6117 501 301 | 14.75 | 50.2 | 45.0 | – | 3.5 | – | – | – | – | – | – | – | 7 | – |
| CR AA S PCBS | 6117 701 301 | 14.75 | 50.0 | – | 1.0 | 1.0 | – | 50.2 | – | 3.0 | – | – | – | 4 | single pin |
| CR AA S WC[1)] | 6117 201 390 | 18 | 51.0 | 50.0 | – | – | – | – | – | – | – | – | – | 9 | wire & connector |

Material: nickel plated sheet-steel, tag thickness: 0.15 mm till 0.25 mm. SLF: tip tinned, all types in green shrink sleeve.
[1)] using connector: JST type: PHR2 (Other connector types available on request.)
Custom made assemblies are available on request for large volume.

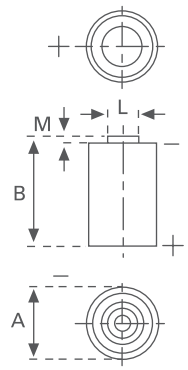



Fig. 1

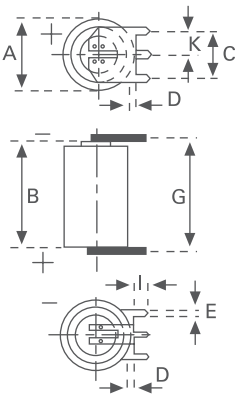



Fig. 2

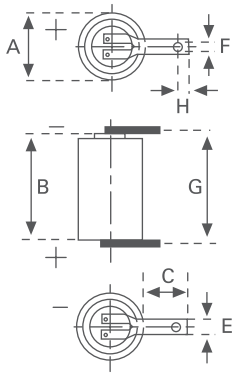



Fig. 3

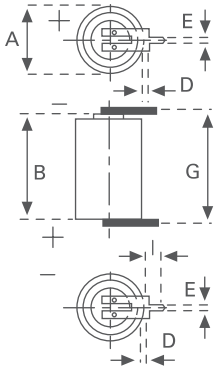



Fig. 4

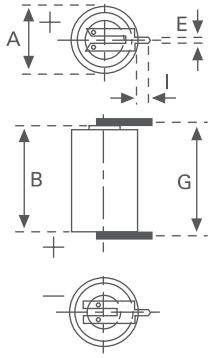



Fig. 5

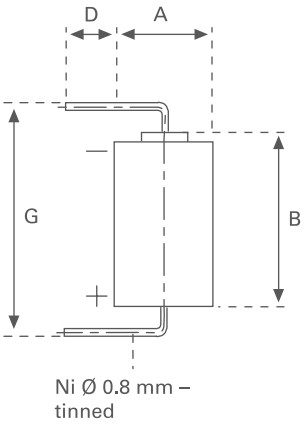



Fig. 6

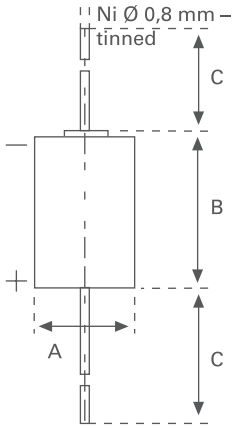



Fig. 7

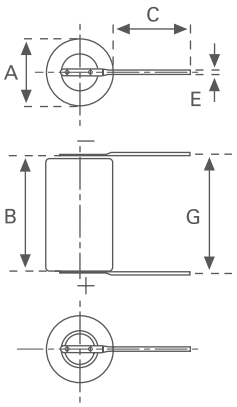



Fig. 8

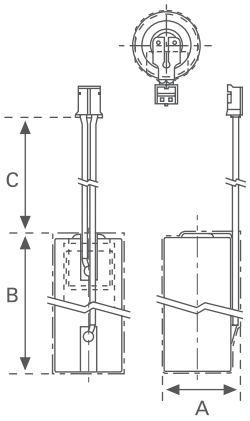



Fig. 9

# 4. CR High Power Primary Lithium Cylindrical Cells


4.1 Types – Technical Data 35
4.2 Assemblies 44

# 4.1 Types – Technical Data


CR 2-R


CR 123 A-R


CR 1/2 AAH-R


CR 2/3 AH-R


CR AH-R

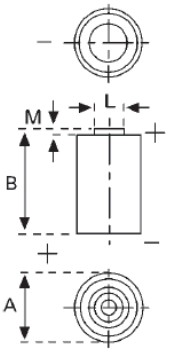

CR 2/3 AH

| TYPE | ORDER NO. | NOMINAL VOLTAGE (V) | NOMINAL CAPACITY AT 20°C, LOAD (mAh) | MAX. CONTINUOUS DISCHARGE CURRENT[1] (mA) | WEIGHT (G) |
|---|---|---|---|---|---|
| CR 2-R | 6206 101 511 | 3 | 850 mAh–20mA/2.0 V | 885 | 11 |
| CR 123 A-R | 6205 101 511 | 3 | 1450 mAh–20mA/2.0 V | 1400 | 17 |
| CR 1/2 AAH-R | 6213 101 511 | 3 | 850 mAh–1mA/2.0 V | 800 | 9 |
| CR 2/3 AH-R | 6214 101 511 | 3 | 1600 mAh–1mA/2.0 V | 1500 | 17 |
| CR AH-R | 6217 101 511 | 3 | 2400 mAh–1mA/2.0 V | 1500 | 23 |
| CR 2/3 AH | 6215 101 501 | 3 | 1500 mAh–200 Ω/2.0 V | 1000 | 16 |
| CR 2 P1 | 6206 210 501 | 3 | 850 mAh–200 Ω/2.0 V | 885 | 11 |
| CR 123 A P1 | 6205 210 501 | 3 | 1550 mAh–200 Ω/2.0 V | 1400 | 17 |

Technical data, CR High Power Primary Lithium Cylindrical Cells

[1] Current value for obtaining 50% capacity

# CR 2-R


| | |
|---|---|
| Type Number | 6206 |
| Designation IEC | CR 15H270 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 |
| Nominal Voltage | 3 V |
| Typical Capacity C | 850 mAh (Current 20 mA, at 20°C down to 2,0 V) |
| Weight (approx.) | 11 g |
| Volume | 5,2 ccm |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

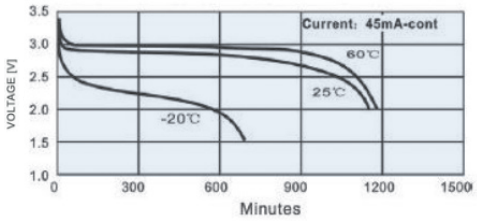
| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 15,00 | 15,50 |
| Height (B) | 26,70 | 27,30 |
| Shoulder Diameter [L] | 6,00 | 6,60 |
| Shoulder Height [M] | 0,80 | 1,80 |

## Typical Capacities (at 20°C)

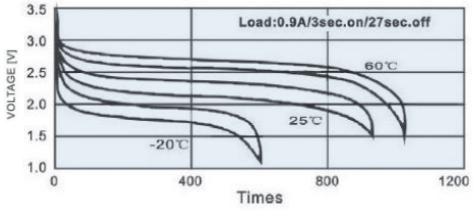
| DISCHARGE TYPE | DISCHARGE CURRENT | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 20 mA | Capacity: 850 mAh |

## Performance Data

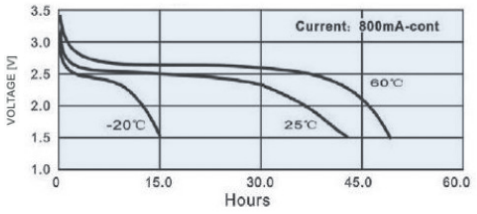
### Temperature Characteristics




### Pulse Discharge Characteristics



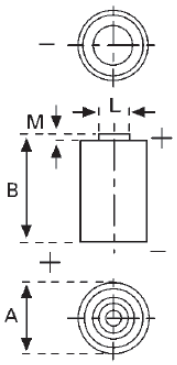

### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

[1] Contact VARTA if the application is intended to be outside the range of -20°C to +60°C.
[2] depending on environmental condition and energy consumption

# CR 123 A-R


| | |
|---|---|
| Type Number | 6205 |
| Designation IEC | CR 17345 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 |
| Nominal Voltage | 3 V |
| Typical Capacity C | 1450 mAh (Current 20 mA, at 20°C down to 2,0 V) |
| Weight (approx.) | 17 g |
| Volume | 7 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

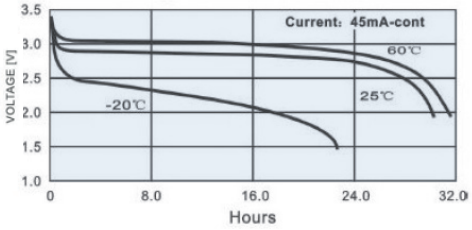
| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 16,20 | 16,80 |
| Height (B) | 33,50 | 34,50 |
| Shoulder Diameter [L] | 6,00 | 6,60 |
| Shoulder Height [M] | 1,00 | 1,50 |

## Typical Capacities (at 20°C)

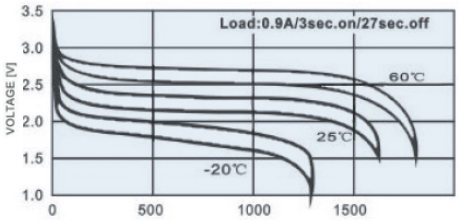
| DISCHARGE TYPE | DISCHARGE CURRENT | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 20 mA | Capacity: 1450 mAh |

## Performance Data

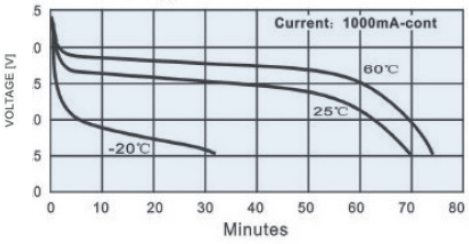
### Temperature Characteristics




### Pulse Discharge Characteristics



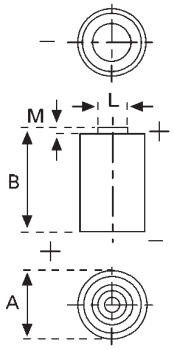

### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

[1] Contact VARTA if the application is intended to be outside the range of -20°C to +60°C.
[2] depending on environmental condition and energy consumption

# CR 1/2AAH-R




| | |
|---|---|
| Type Number | 6213 |
| Designation IEC | CR 14250 |
| System | Li-Manganese dioxide / Organic Electrolyte |
| UL Recognition | MH 13654 |
| Nominal Voltage | 3 V |
| Typical Capacity C | 850 mAh (Current 1 mA, at 20°C down to 2 V) |
| Maximum cont. Discharge | 800 mA |
| Maximum Pulse Discharge | 1500 mA |
| Weight (approx.) | 9 g |
| Volume | 5 ccm |
| Coding | Date of Manufacturing Quarter/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 13,82 | 14,22 |
| Height (B) | 24,65 | 24,95 |
| Shoulder Diameter [L] | 6,30 | |
| Shoulder Height [M] | 0,50 | |

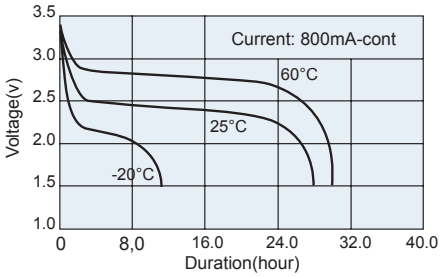
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | DISCHARGE | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 1 mA | Capacity: 850 mAh |

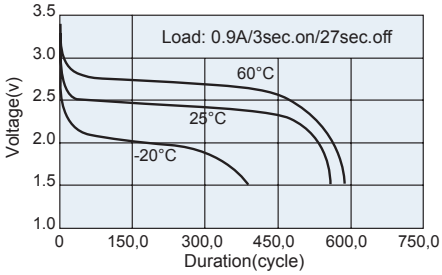
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +60°C. / # pending
[2] depending on environmental condition and energy consumption

## Performance Data

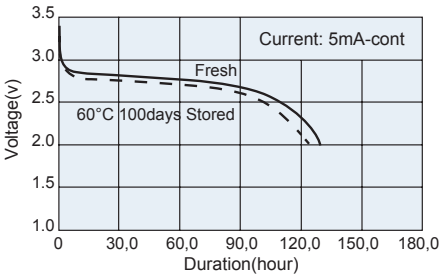
### Temperature Characteristics




### Pulse Discharge Characteristics

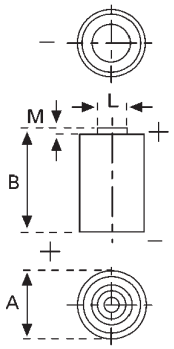



### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2/3AH-R


| | |
|---|---|
| Type Number | 6214 |
| Designation IEC | CR 17335 |
| System | Li-Manganese dioxide / Organic Electrolyte |
| UL Recognition | MH 13654 |
| Nominal Voltage | 3 V |
| Typical Capacity C | 1600 mAh (Current 1 mA, at 20°C down to 2 V) |
| Maximum cont. Discharge | 1500 mA |
| Maximum Pulse Discharge | 3500 mA |
| Weight (approx.) | 17 g |
| Volume | 7 ccm |
| Coding | Date of Manufacturing Quarter/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 16,20 | 16,80 |
| Height (B) | 32,50 | 33,50 |
| Shoulder Diameter [L] | 6,30 | |
| Shoulder Height [M] | 0,50 | |

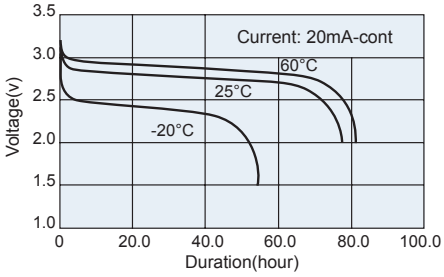
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | DISCHARGE | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 1 mA | Capacity: 1600 mAh |

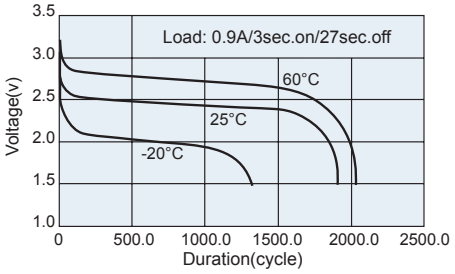
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +60°C. / # pending
[2] depending on environmental condition and energy consumption

## Performance Data

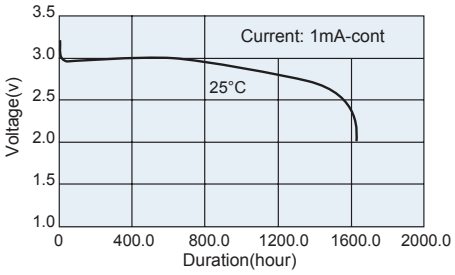
### Temperature Characteristics




### Pulse Discharge Characteristics

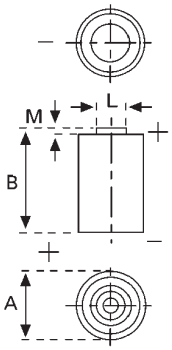



### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR AH-R


| | |
|---|---|
| Type Number | 6217 |
| Designation IEC | CR 17450 |
| System | Li-Manganese dioxide / Organic Electrolyte |
| UL Recognition | MH 13654 |
| Nominal Voltage | 3 V |
| Typical Capacity C | 2400 mAh (Current 1 mA, at 20°C down to 2 V) |
| Maximum cont. Discharge | 1500 mA |
| Maximum Pulse Discharge | 3500 mA |
| Weight (approx.) | 23 g |
| Volume | 9,5 ccm |
| Coding | Date of Manufacturing Quarter/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 16,40 | 17,00 |
| Height (B) | 44,00 | 45,00 |
| Shoulder Diameter [L] | 6,30 | |
| Shoulder Height [M] | 1,45 | |

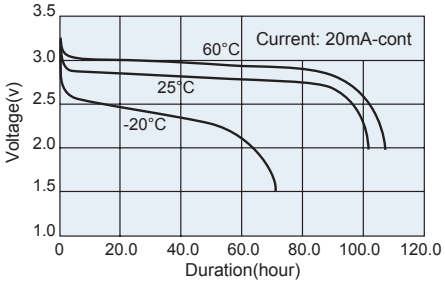
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | DISCHARGE | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 1 mA | Capacity: 2400 mAh |

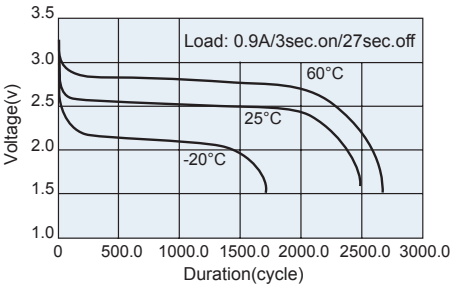
[1] Contact VARTA if the application is intended to be outside the range of -20°C to +60°C
[2] depending on environmental condition and energy consumption

## Performance Data

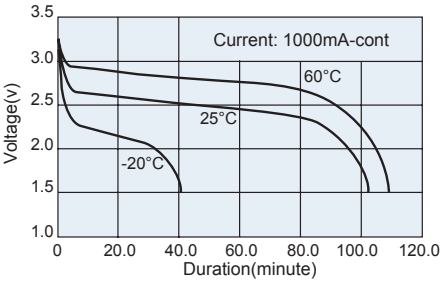
### Temperature Characteristics




### Pulse Discharge Characteristics

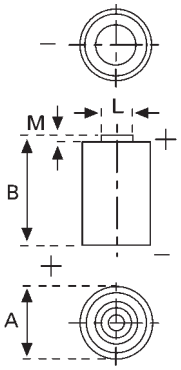



### Discharge Characteristics




- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2/3 AH


| | |
|---|---|
| Type Number | 6215 |
| Designation IEC | CR 17345 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 1500 mAh (Load 200 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 17 g |
| Volume | 7 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 16,00 | 17,00 |
| Height (B) | 32,40 | 33,90 |
| Shoulder Diameter [L] | 6,10 | |
| Shoulder Height [M] | 1,00 | |

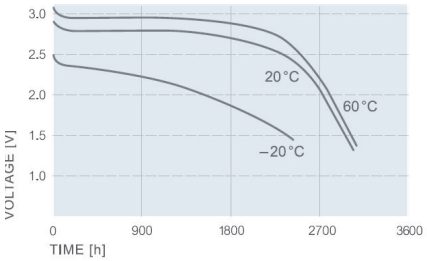
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 200 Ω | Time: 108 h<br>Capacity: 1500 mAh<br>Energy: 4190 mWh |

[1] Contact VARTA if the application is intended to be outside the range of -40°C to +70°C.
[2] depending on environmental condition and energy consumption

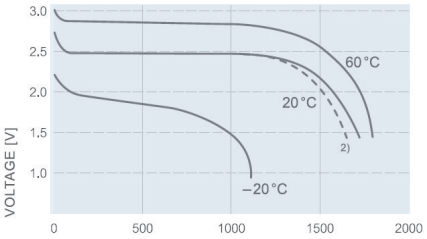
## Performance Data

### Temperature Characteristics*



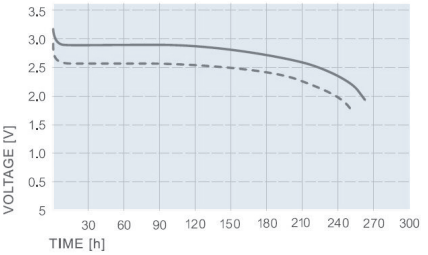

*Discharge Load 5,6 kΩ

### Pulse Discharge Characteristics*



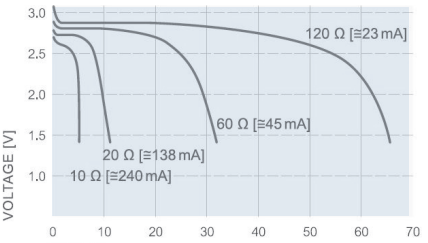

*1) Load: 0.9A. 3 sec on. 27 sec. off 2) after storage at 60°C/100 days

### Typical Discharge Curve*




*Load: cont. 560 Ω, Pulse load: 2 sec/min 3Ω (parallel)

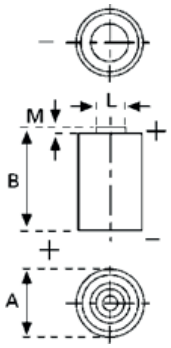
### Discharge Characteristics*




*at room temperature 21°C

- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 2 P1


| | |
|---|---|
| Type Number | 6206 |
| Designation IEC | CR 15H270 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 850 mAh (Load 200 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 11 g |
| Volume | 5,2 ccm |
| Coding | TBA |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 15,10 | 15,60 |
| Height (B) | 26,30 | 27,00 |
| Shoulder Diameter [L] | 6,20 | 6,30 |
| Shoulder Height [M] | 0,70 | 1,30 |

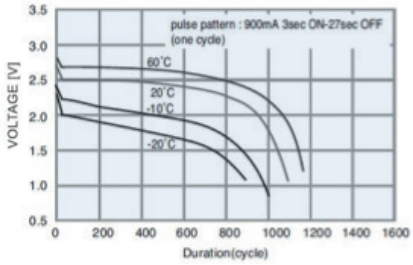
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 200 Ω | Capacity: 850 mAh |

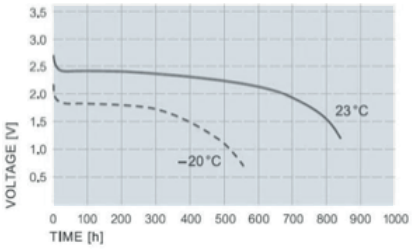
[1] Contact VARTA if the application is intended to be outside the range of -40°C to +70°C.
[2] depending on environmental condition and energy consumption

## Performance Data

### Temperature Characteristics

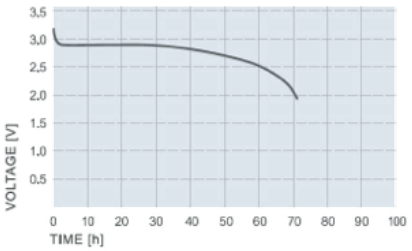



### Pulse Discharge Characteristics*




*1) Load: 0.9A. 3 sec on. 27 sec. off 2) after storage at 60°C/100 days

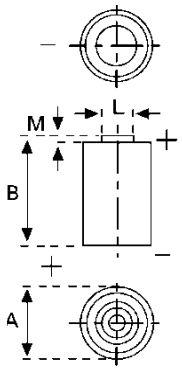
### Discharge Characteristics*




*at room temperature 21°C

- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# CR 123 A P1


| | |
|---|---|
| Type Number | 6205 |
| Designation IEC | CR 17345 |
| System | Li-Manganese dioxide/ Organic Electrolyte |
| UL Recognition | MH 13654 (N) |
| Nominal Voltage | 3 V |
| Typical Capacity C | 1550 mAh (Load 100 kOhm, at 20°C down to 2 V) |
| Weight (approx.) | 17 g |
| Volume | 7 ccm |
| Coding | Date of Manufacturing Month/Year |

| **Temperature Ranges** | **min.** | **max.** |
|---|---|---|
| Storage | -20°C | 45°C |
| Discharge | -40°C | 70°C[1] |

| **Dimensions** | **min.** | **max.** |
|---|---|---|
| Diameter (A) | 16,40 | 17,00 |
| Height (B) | 34,30 | 34,50 |
| Shoulder Diameter [L] | 6,20 | 6,40 |
| Shoulder Height [M] | 1,18 | 1,23 |

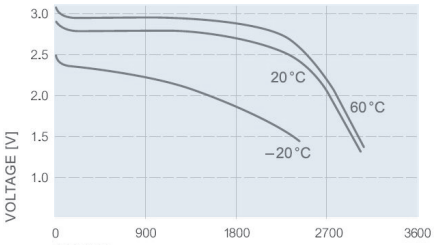
## Typical Capacities (at 20°C)

| DISCHARGE TYPE | LOAD | END VOLTAGE: 2,0 V |
|---|---|---|
| Continuous 24 h/d, 7 d/w | 100 Ω | Capacity: 1550 mAh |

[1] Contact VARTA if the application is intended to be outside the range of -40°C to +70°C.
[2] depending on environmental condition and energy consumption

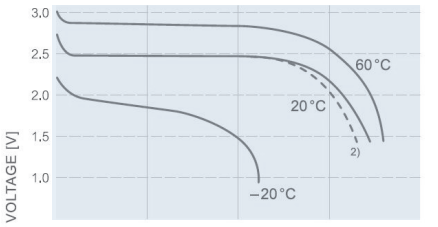
## Performance Data

### Temperature Characteristics*



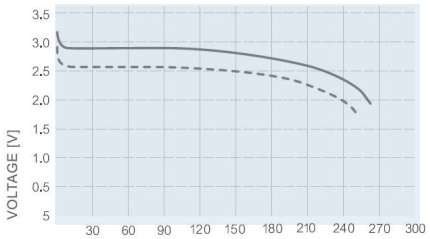

*Discharge Load 5,6 kΩ

### Pulse Discharge Characteristics*



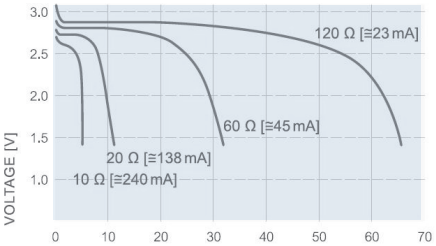

*1) Load: 0.9A. 3 sec on. 27 sec. off 2) after storage at 60°C/100 days

### Typical Discharge Curve*




*Load: cont. 560 Ω, Pulse load: 2 sec/min 3Ω (parallel)

### Discharge Characteristics*




*at room temperature 21°C

- Self-dischange rate < 1%/Y at room temperature
- Storage life > 10 years
- Operating life[2] > 10 years

# 4.2 Assemblies

| TYPE | ORDER NO. | A | B | C | D | E | F | G | H | I | K | L | M | FIG. NO. | TAGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR 2/3 AH S | 6215 101 501 | 17.0 | 33.9 | – | – | – | – | – | – | – | – | 6.1 | 1.0 | 1 | – |
| CR 123A R | 6205 101 511 | 17.0 | 34.5 | – | – | – | – | – | – | – | – | 6.4 | 1.2 | 1 | – |
| CR 2 R | 6206 101 511 | 15.6 | 27.0 | – | – | – | – | – | – | – | – | 6.4 | 1.0 | 1 | – |
| CR 1/2 AAH-R | 6213 101 511 | 14,0 | 24,8 | – | – | – | – | – | – | – | – | 6,3 | 0,5 | 1 | – |
| CR 1/2 AAH-R PCBD | 6213 201 098 | 14,5 | 24,8 | 10,0 | – | 1,00 | – | 25,5 | – | 4,5 | 5,0 | – | – | 2 | – |
| CR 1/2 AAH-R S SLF | 6213 201 097 | 14,5 | 24,8 | – | – | 0,75 | – | 25,5 | – | 4,5 | – | – | – | 3 | single pin |
| CR 1/2 AAH-R TP | 6213 201 096 | 14,5 | 24,8 | 23,0 | – | 0.64 | – | 25.7 | – | – | – | – | – | 4 | terminal pin |
| CR 1/2 AAH-R WC | 6213 201 099 | 16,5 | 27,0 | 30,0 | – | – | – | – | – | – | – | – | – | 5 | wire & connector |
| CR 2/3 AH-R | 6214 101 511 | 16,5 | 33,0 | – | – | – | – | – | – | – | – | 6,3 | 0,5 | 1 | – |
| CR 2/3 AH-R PCBD | 6214 201 097 | 17,0 | 33,0 | – | – | 1,00 | – | 33,5 | – | 4,5 | 5,0 | – | – | 2 | – |
| CR 2/3 AH-R S SLF | 6214 201 099 | 17,0 | 33,0 | – | – | 0,75 | – | 33,5 | – | 4,5 | – | – | – | 3 | single pin |
| CR 2/3 AH-R TP | 6214 201 096 | 17,0 | 33,0 | 22,0 | – | 0,64 | – | 33,5 | – | – | – | – | – | 4 | terminal pin |
| CR 2/3 AH-R WC | 6214 201 098 | 18,0 | 36,0 | 30,0 | – | – | – | – | – | – | – | – | – | 5 | wire & connector |
| CR AH-R | 6217 101 511 | 16,5 | 44,5 | – | – | – | – | – | – | – | – | 6,3 | 1,45 | 1 | – |
| CR AH-R PCBD | 6217 201 098 | 17,0 | 45,0 | – | – | 1,0 | – | 45,0 | – | 4,5 | 5,0 | – | – | 2 | – |
| CR AH-R S SLF | 6217 201 097 | 17,0 | 45,0 | – | – | 0,75 | – | 45,0 | – | 4,5 | – | – | – | 3 | single pin |
| CR AH-R TP | 6217 201 096 | 17,0 | 45,0 | 22,0 | – | – | – | – | – | – | – | – | – | 4 | terminal pin |
| CR AH-R WC | 6217 201 095 | 19,5 | 47,0 | 60,0 | – | – | – | – | – | – | – | – | – | 5 | wire & connector |
| CR AH-R WC | 6217 201 099 | 19,5 | 47,0 | 80,0 | – | – | – | – | – | – | – | – | – | 5 | wire & connector |

Material: nickel plated sheet-steel, tag thickness: 0.15 mm till 0.25 m. SLF: tip tinned.
Custom made assemblies are available on request for large volume.

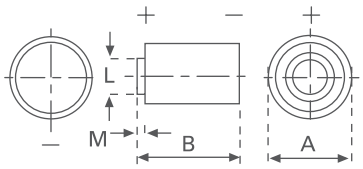



Fig. 1

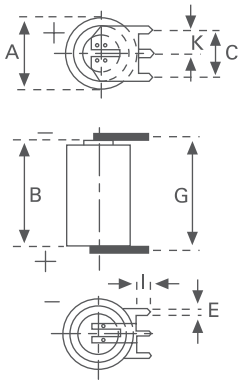



Fig. 2

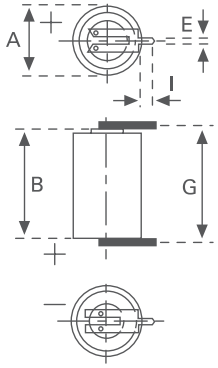



Fig. 3

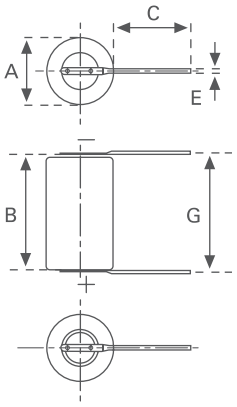



Fig. 4

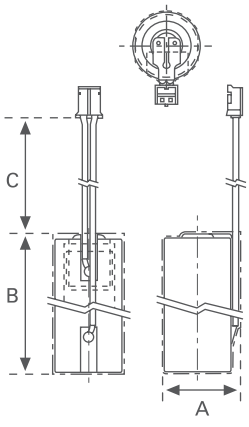



Fig. 5

# 5. General Design Characteristics


5.1 Safety Tests 48
5.2 Safety Guidelines 49
5.3 OEM – Application Check List 50


Basically, VARTA Lithium batteries are safely designed to endure various environmental conditions. The design of the hermetically seal rim and the laser welding can give the battery high endurance in various environmental conditions such as variant temperatures, humidity and vibration. Also, the position of lithium against the inner wall of the cell case makes heat dissipated to the outside easier when inside heat is generated. Therefore, there is no concern over safety when the suggested cautions are followed during usage, handling or storage.

However, there might be some possibilities of mishandling or misuse by the customer. Thus, following simulation tests have been performed. The test conditions are based on the procedures of the UL standard tests and Military Standards for environmental and safety testing. The abnormal test is only carried out to check the behavior of the batteries under misuse conditions and make certain the batteries react in a safe manor.

## Battery Selection

In order to ensure optimum battery performance for the primary CR Button, the cylindrical CR High Power and cylindrical High Capacity cells, we suggest consideration of the following design-in requirements. They are the nominal and operating voltage, load current and profile, the duty cycle, temperature requirements and shelf life for the application. These characteristics for each battery type must be evaluated against the design requirements to select the most appropriate product that fulfills these requirements.

## Design-in Considerations

VARTA Microbattery Primary Lithium Batteries offer lightweight packaged power for a variety of portable electric and electronic equipment. They are suitable as a main or standby power source for memory (RAM) and Real-Time clock (RTC) applications.

The Lithium Batteries are blocked from the power supply by means of a diode to prevent discharge of the battery into the DC supply during shut down.

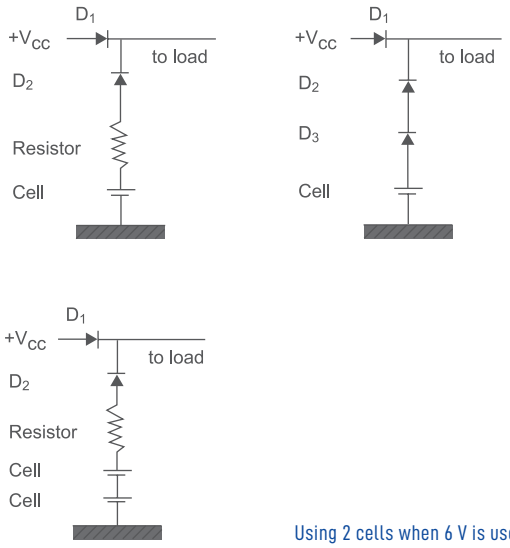
The voltage drop across D1 should be taken into account as the minimum voltage of the load that has to be maintained under all circumstances.

Blocking diode D2 and D3 prevents the battery from being charged through the power supply. The amount of accumulated reverse current (IR) should be kept around 1% of the cell's typical capacity during its standby life time. The leakage current of the diodes has to be considered.

Example:
- CR 1/2 AA for 5 years life time
- 1% of 950 mAh = 9,5 mAh = 9500 µAh
- 5 years = 43800 h
- max. reserve current = 9500 µAh / 43800 h = 0,217 µA

However a maximum of 5µA continuously must not be exceeded. In the absence of a DC supply voltage, the lithium battery supplies the load with the necessary power.

As diodes fail at low current levels by an alloy-effect causing a severe reduction in impedance, an additional safety device must be incorporated.




Using 2 cells when 6 V is used in series

## Printed Circuit Board Mounting

Never solder on the body of the battery directly, use a battery equipped with PC-mount terminals. When using automatic soldering apply 350-380° within 3 seconds. Make sure that the battery is not suspended or dropped into the soldering bath.

Do not heat above 80°C to avoid leakage caused by deterioration in the battery's performance.

## UL-Recognition

All VARTA Microbattery Lithium Cells and Batteries are recognized by Underwriters Laboratories Inc. under UL-file number MH 13654 (N).

The cells are marked with the Recognized Component Mark.

Please also pay attention to the Safety Guidelines in Section 5.2.

Trademark of Underwriters Laboratories

# 5.1 Safety Tests

## Example Short Circuit

In table 11 the temperature is listed at short circuit at an ambient temperature of 20°C, 40°C and 70°C.

| AMBIENT TEMPERATURE | CR 1/2 AA | CR 2/3 AA | CR AA |
|---|---|---|---|
| 20°C | 24°C | 28°C | 24°C |
| 40°C | 50°C | 50°C | 47°C |
| 70°C | 80°C | 84°C | 77°C |

## Vibration Test

VIBRATION TEST

- Frequency range
  5 Hz ➨ 55 Hz ➨ 500 Hz ➨ 55 Hz ➨ 5 Hz
- Amplitude at frequency range:
  5 to 55 Hz: ± 0.75 mm
- Acceleration at frequencey range:
  55 Hz to 500 Hz: 100 $m/s^2$
- Cycle duration: 15 min
  Oscillation time of each main axis: 3 h

RESULT

Without changing of the electrical values the following Li-cell can be exposed to this vibration test:

- CR 1/2 AA
- CR 2/3 AA
- CR AA

# 5.2 Safety Guidelines

For current edition of the Material Safety Data Sheet (MSDS) please see our website https://www.varta-ag.com/en/industry/product-solutions

# 5.3 OEM – Application Check List

## 1. PROJECT INFORMATION

From (Writer) | Sales Agreement

Customer | Application

Name of the project | Country

## 2. MARKETING DATA

Yearly expectation of sales | Per batch of

Estimated selling price | Expected data of first order

Lifetime of the project | Start of volume production

Competitors

Substitution of existing product Yes ☐ No ☐ | Which

Comments

## 3. WHAT IS REQUIRED?

| | | | Reply wishes for | Reply provided for |
|---|---|---|---|---|
| Feasibility study, preliminary proposal | Yes ☐ | No ☐ | | |
| Technical proposal | Yes ☐ | No ☐ | | |
| Preliminary drawing | Yes ☐ | No ☐ | | |
| Samples to run electric tests | Yes ☐ | No ☐ | | |
| Samples (with dummy cells) | Yes ☐ | No ☐ | | |
| Prototypes (for qualification by the customer) | Yes ☐ | No ☐ | | |
| Preliminary cost estimation (+/- 20%) | Yes ☐ | No ☐ | | |
| Development and industrial cost estimation | Yes ☐ | No ☐ | | |
| Product cost estimation (+/- 5%) | Yes ☐ | No ☐ | | |

# 4. TECHNICAL REQUIREMENTS

## 4.1. STORAGE BEFORE USE

Duration | Temperature min. | Average | max.

Humidity

## 4.2. STORAGE INTO THE DEVICE BEFORE OPERATING

Duration | Temperature min. | Average | max.

Humidity

## 4.3. SPECIFIC TESTS PRIOR INCORPORATION

## 4.4. ELECTRIC DATA

Required minimum life time in use

Maximum voltage | Nominal capacity

Cut off voltage | Required minimum capacity

Current profile (average current, current pulse strength, pulse duration, pulse rate...)

Others

## 4.5. CLIMATIC DATA

Operating temperature min. | Average | max.

Humidity

Others

## 4.6. MECHANICAL DATA (VIBRATION, DROP, BUMP, SHOCK, ...)

Mention the applicable specification and enclose the document if necessary

## 4.7. AVAILABLE DIMENSIONS (WEIGHT, VOLUME, IF POSSIBLE ENCLOSE THE USER DRAWING OF THE PROSPECT)

## 4.8. ASSEMBLY (DESCRIBE OR ENCLOSE A DRAWING)

## 4.9. APPLICABLE SPECIFICATIONS / STANDARDS

UL ☐ BS UN ☐ IEC86-4 ☐ Other ☐

Reference and issue

## 4.10. RELIABILITY LEVEL – GUARANTEES

## 4.11. LABELING AND PACKAGING

VARTA standard labeling and packaging ☐

Customised labeling ☐ (enclose the customer specification)

Customised packaging ☐ (enclose the customer specification)

## 4.12. ATTACHED DOCUMENTS

Samples ☐ Competitor samples ☐ Drawing ☐ Specification of the customer ☐

Copy of specific standards ☐ Samples of connector ☐ Samples of specific components ☐ Other ☐

## 4.13. ADDITIONAL INFORMATION

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Representations and distributors in all major countries and regions worldwide.
Please see webpage.

www.varta-ag.com/youtube/li-ion&microbatteries

http://weixin.qq.com/r/OxNLUx7EkUPurVow90Yp

www.linkedin.com/showcase/varta-microbatteries

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www.varta-ag.com

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