LITHIUM Cells Handbook

Introduction:

The Jauch Group is one of the leading specialists for quartz crystals, crystal oscillators and battery technology. Established in 1954, we are now one of the leading companies in the frequency control products industry and a recognized expert on the future market for lithium batteries.
Since 1976 Jauch offered a complete range of Lithium Manganese Dioxide (Li/MnO2) button cells with an excellent performance. In 2018 we expanded and refined the portfolio of high performance and reliable manganese dioxide lithium batteries in CR technology with our own brand JAUCH - both in button cells and cylindrical designs.

Characteristics:

The lithium manganese dioxide (CR) battery is a small, lightweight battery with an operating voltage of 3.0V and the ability to operate over a wide temperature range.

Lithium Manganese Dioxide (Li/MnO2) Li + MnivO2 → MnIIIO2(Li+)
Voltage: Nominal Open Circuit Voltage (OCV) of 3.0 Volt
Wide Temperature Range: -30°C to 70°C
Low Self-discharge, of 1% - 2% at RT permits a very long shelf life - more than 10 years.
Primary / Non-rechargeable

Manufacturing excellence

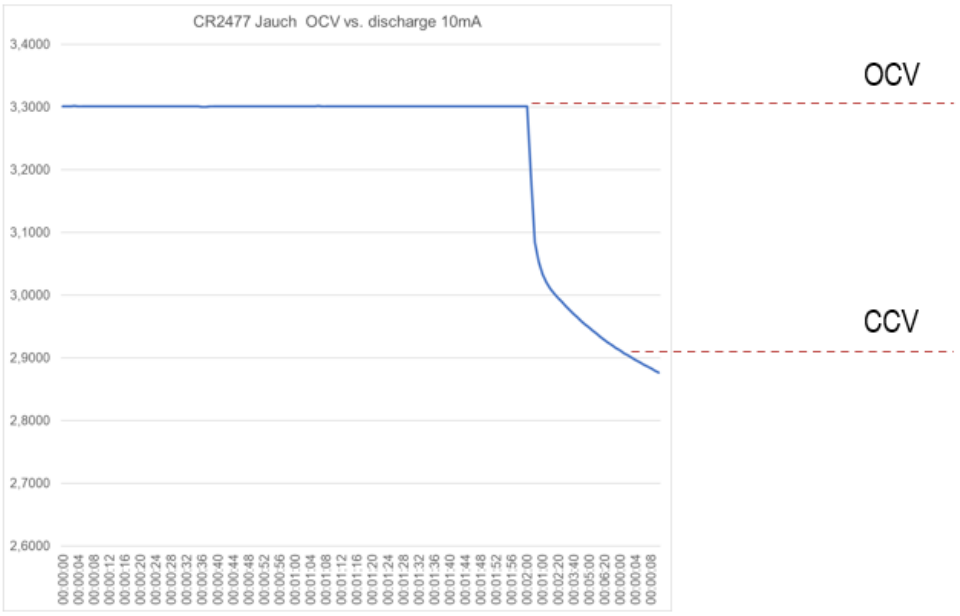
- ISO 9001/ 14001 certification
- Fully automated production lines with high productivity
- UL1642
- UN38.3
- RoHs free
- WEEE

Open-Circuit Voltage, OCV:

The open-circuit voltage is the voltage on the output side when no load is connected. No electric current flows, so no voltage drops across the internal resistance of the voltage source.
Nominal voltage (Fresh battery OCV) is fixed by chemical material. Potential (V) differences between cathode and anode material is theoretical voltage. In case of CR batteries, potential (V) differences between cathode (MnO2) and anode (Li) material is 3,19. There will be some variation depending on each batteries. JAUCH fresh battery OCV guideline is > 3V open-circuit voltage at room temperature.

Cell Voltage OCV vs. Discharge Load CCV

If you discharge a cell with a load, the voltage drop (V) across the circuit will change according to the internal resistance of the battery. Batteries in applications with low pulse power requirements typically have a capacity close to the average power consumption of the device. In high pulse applications, however, the battery voltage drop is during the pulse (CCV) must be taken into account.



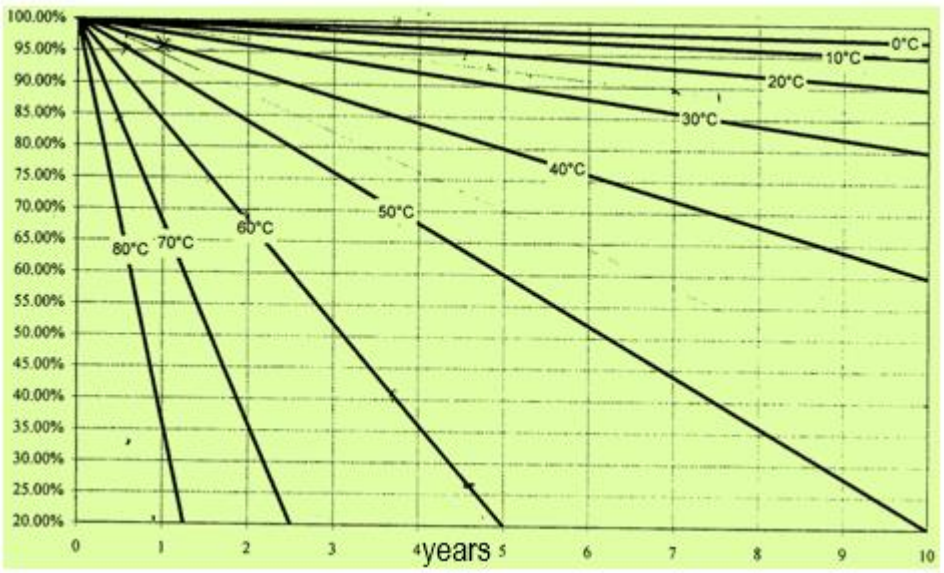
Passivation

Passivation is a phenomenon of all lithium primary cells related to the interaction of the metallic lithium anode and the electrolyte. A thin passivation layer forms on the surface of the anode at the instant the electrolyte is introduced into the cell. This layer is important because it protects the anode from reaction while the cell is dormant – resulting in a long shelf-life. The drop in operating voltage depends on the thickness of the passivation layer and the required discharge current. At low discharge currents, the voltage drops are usually minimal.
Impedance is increasing due to the passivation phenomena.

Temperature:

Cold temperature slows down the electrochemical processes and this in turn increases the internal resistance. The electrolyte becomes thick-flowing and slows down the ion exchange. Cold temperatures affect the performance of the button cell and reduce the voltage and lifetime.

Self-discharge vs. Temperature In principle, the relationship between temperature and the course of chemical processes is governed by the RGT (reaction rate-temperature) rule. For +10°C the factor is a doubling of the reaction speed.



Lifetime Calculation

To be able to calculate the lifetime for your battery, we need the following information:

- ✓ Constant Current
- ✓ Pulse current
- ✓ Pulse length
- ✓ Pulses per unit (s, min, h, day, month, year)
- ✓ Cut-off Voltage

Temperature days per year

Temp.	<20°C	30°C	40°C	50°C	60°C	65°C	70°C	75°C	80°C
Days									

Product Range:

Jauch SAP code	Part number	Voltage (V)	Nominal Capacity (mAh)
245718	CR2	3.0	850
245719	CR123A	3.0	1500
247980	CR1025	3.0	30
247161	CR1216	3.0	30
246534	CR1220	3.0	40
245989	CR1620	3.0	75
246535	CR1632	3.0	135
245886	CR2016	3.0	85
246538	CR2025	3.0	165
245785	CR2032	3.0	240
246060	CR2330	3.0	260
246539	CR2354	3.0	530
245786	CR2430	3.0	320
245787	CR2450	3.0	610
245788	CR2477	3.0	1000
247284	CR 1632 H2	3.0	135
247289	CR 1632 H2B	3.0	135
247291	CR 2032 H3	3.0	240
247282	CR 2032 H3B	3.0	240
245990	CR 2032 V3	3.0	240
247285	CR 2450 H3	3.0	610