

Custom Lithium Primary Battery Packs

Cornerstone designs, develops, and manufactures custom lithium primary battery packs and assemblies for a wide range of applications. Utilizing advanced mechanical and electronic design techniques, our skilled battery design team will optimize your custom battery packs' reliability, manufacturability, and safety. This process gives our customers the most dependable, most economical lithium primary battery pack solutions for their unique needs.

Request a quote on the custom lithium battery packs you need. Contact Cornerstone to learn more

Custom Lithium Battery Packs & Assemblies

Lithium is the lightest non-gaseous metal, and its negative potential for battery packs is higher than any other metal. Lithium-chemistry batteries and battery packs have the highest specific energy (energy per unit weight) and energy density (energy per unit volume) of all battery types.

While most lithium cells have open circuit voltages (OCVs) between 2.7 and 3.6 V, most lithium primary cells have a relatively high impedance which generally limits them to low-drain applications. Special high-rate discharge cells are available for certain applications.

Lithium primary batteries often have broad operating temperature ranges, and can continue to function properly at temperatures from -55° to 150°C (-67° to 302°F).

Though incineration or other exposure to extremely high temperatures can cause lithium batteries to experience catastrophic failure, other battery types typically react similarly in the same conditions.

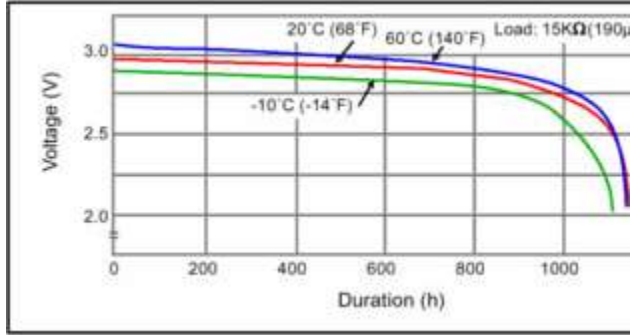
Primary lithium battery packs are available in several different chemistries, each with its own set of performance and safety characteristics. Poly (carbon monofluoride) lithium, or (CF)_x-Li; manganese dioxide lithium, or MnO₂Li; thionyl chloride lithium, or SOCl₂Li; and sulfur dioxide lithium, or SO₂Li, have all proven to be especially popular and effective.

Custom Lithium-Manganese Dioxide Battery Packs & Assemblies

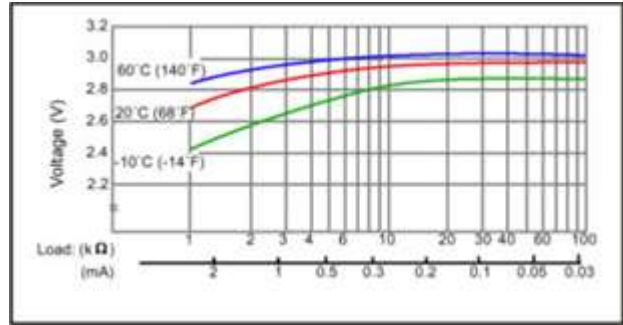
Manganese dioxide lithium cells are similar to poly (carbon mono-fluoride) cells in energy density, construction, safety, and OCV, but generally provide only about half the service life. However, MnO₂Li cells are well-suited to applications requiring relatively high continuous- or pulse-current requirements, as their internal impedance is lower than that of other chemistries.

Manganese dioxide lithium batteries are available in many standard cylindrical and coin sizes.

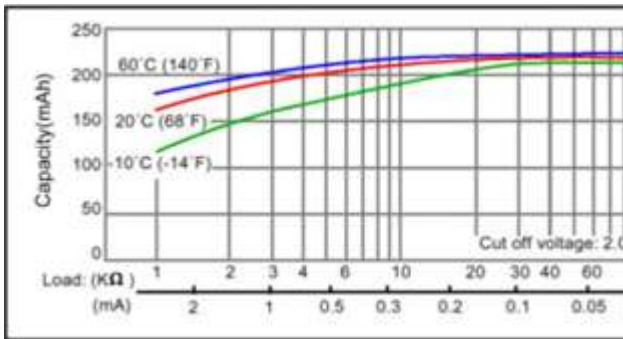
- Cell voltage: 3.0V (nominal)
- Capacity: 30mAh to 5Ah
- Energy by volume: (230 Wh/kg); 9.0 Wh/in³ (550 Wh/L)
- Energy by weight: dependent on cell configuration; up to 105 Wh/lb.
- Discharge characteristics: Flat (stable voltage) discharge curves
- Shelf life: 10+ years at 20°C (68°F)
- Operating temperature range: -20° to 60°C (-4° to 140°F)
- Sizes: variable
- Applications: general purpose for applications requiring small, high powered batteries, e.g. security transmitters, smoke alarms, cameras and photographic equipment, computer peripherals, communications equipment, personal organizers, memory backup, lights, etc.



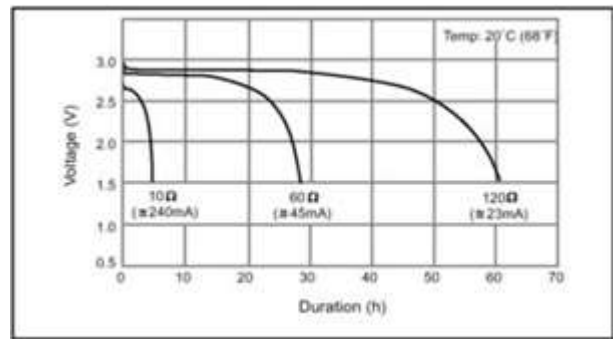
Typical Discharge at Various Temperatures for a Typical 20mm X 3.2mm LiMnO₂ Coin Cell



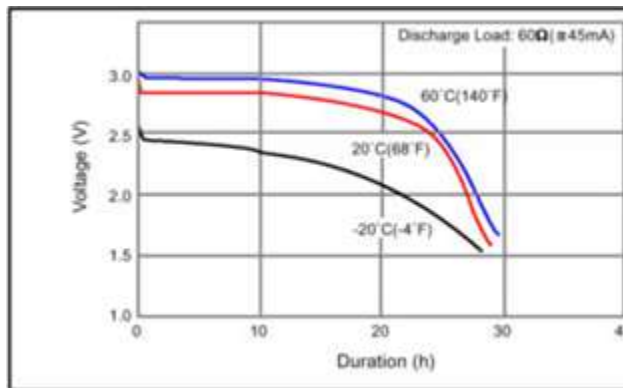
Voltage Vs. Discharge Load for a Typical 20mm X 3.2mm LiMnO₂ Coin Cell



Capacity Vs. Discharge Load for a Typical 20mm X 3.2mm LiMnO₂ Coin Cell



Discharge Characteristics for a Typical 17mm X 28mm LiMnO₂ Spiral Cylindrical Cell



Discharge Vs. Temperature for a Typical 17mm X 28mm LiMnO₂ Spiral Cylindrical Cell

Custom Lithium-Poly Carbon Monofluoride Battery Packs & Assemblies

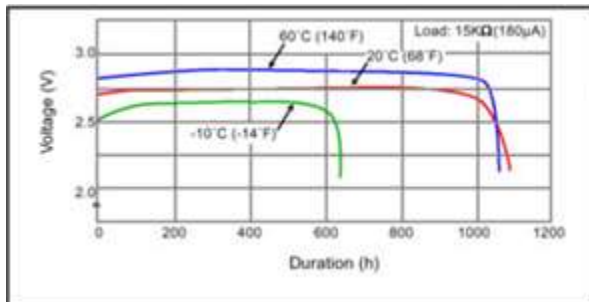
Poly (carbon monofluoride) cells are an excellent solution for long-term, low-drain applications. They have an OCV of 3V and fairly high energy density. Though generally

safe, in extreme conditions their elastomer seals can fail before the casing does, thus allowing the relatively reactive cell components to escape.

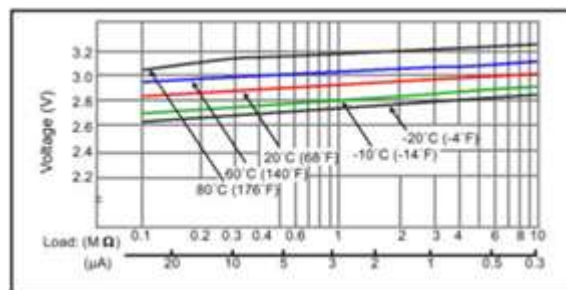
Lithium-poly carbon monofluoride cells are available in all standard cylindrical sizes, as well as coin configurations. Cylindrical cells are manufactured with spiral-shaped cathodes and crimped elastomer seals.

- Cell voltage: 3.0V (nominal)
- Capacity: 25mAh to 5000mAh
- Energy by weight: Wh/kg
- Shelf life: 10+ years at 20°C (68°)
- Operating temperature range: -20° to 60°C (-4° to 140°F), specialties -40° to 85°C (-40° to 185°F)
- Sizes: variable
- Applications: calculators, cameras, compact and low power consuming cordless applications, electronic watches (digital and analog), memory backup in electronic devices (with tab terminals)

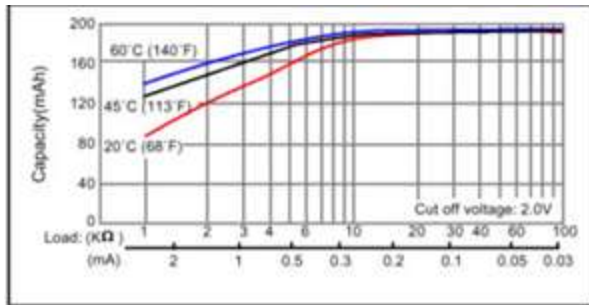
Request a quote or contact Cornerstone for more information.



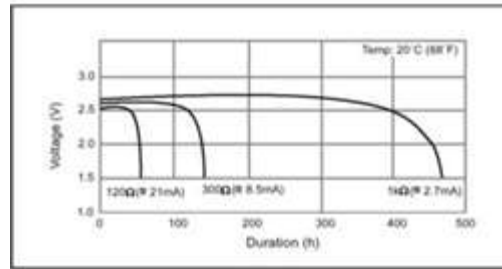
Typical Discharge at Various Temperatures for a Typical 20mm X 3.2mm (BR) Coin Cell



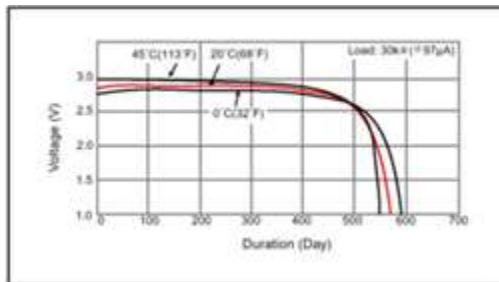
Voltage Vs. Discharge Load for a Typical 20mm X 3.2mm (BR) Coin Cell



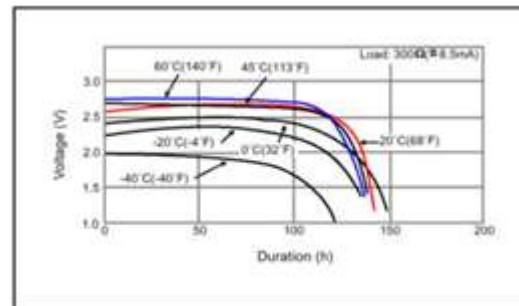
Capacity Vs. Discharge Load for a Typical 20mm X 3.2mm LiMnO₂ Coin Cell



Discharge Characteristics for a Typical 17mm X 28mm Li Spiral Cylindrical Cell



Long Term Discharge Characteristics for a Typical 17mm X 28mm Li Spiral Cylindrical Cell



Discharge Vs. Temperature for a Typical 17mm X 28mm Li Spiral Cylindrical Cell

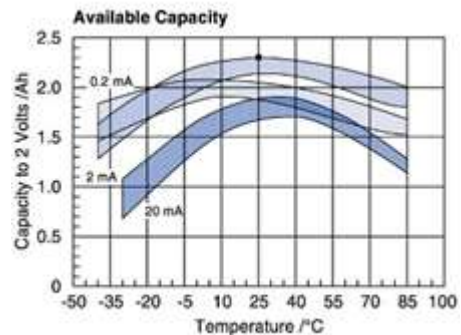
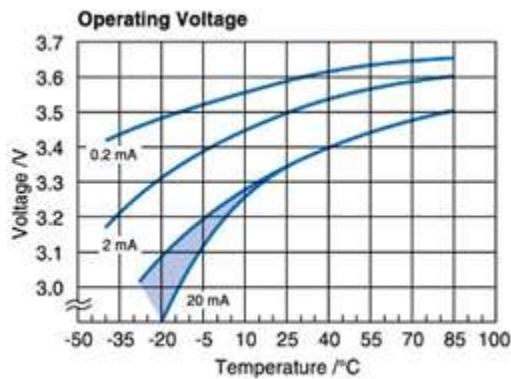
Custom Lithium-Thionyl Chloride Battery Packs & Assemblies

Thionyl chloride-lithium cells are best suited for applications having very low continuous-current and moderate pulse-current requirements. These cells have the highest energy density of all lithium types, and are manufactured in welded, hermetically sealed cases. Service life is an unmatched 20-plus years, which holds for all case types—cylindrical and coin/wafer.

The extremely long service life and low self-discharge rate of thionyl chloride-lithium cells make them ideal for applications where physical access is limited, such as for remote sensing systems. For example, wireless passive infrared (PIR) sensors used in security systems typically draw very small currents (tens of μA) in quiescent mode and 7.5 mA to 10 mA while transmitting. Under these operating conditions, lithium-thionyl chloride battery cells offer service life up to 2.5 times longer than either poly (carbon monofluoride) or manganese-dioxide lithium cells of equal size.

- Cell voltage: 3.6V (nominal)
- Capacity: 25mAh to 40,000mAh
- Energy by volume: 1300 Wh/L
- Energy by weight: 710 Watt hour/kilogram
- Discharge characteristics: see graphs below
- Shelf life: 9 years for spiral; 15-20 years for bobbin (to 80% capacity)
- Operating temperature range: -40° to 85°C (-40° to 185°F), specialties -55° to 100°C (-67° to 212°F)
- Sizes: variable
- Applications: GPS emergency locators/roadside assistance, wireless security systems (PIR), electronic toll tags, tire tags, animal tracking, asset tracking, law enforcement/security, emergency, utilities and metering, deep hole drilling, medical devices, telecommunications

Request a quote today or contact Cornerstone to learn more.



Operating Voltage vs. Temperature and Discharge Current for a Typical Lithium Thionyl Chloride Bobbin AA Cell

Available Capacity vs. Temperature and Discharge Current for a Typical Lithium Thionyl Chloride Bobbin AA Cell

Custom Lithium-Sulfur Dioxide Battery Packs & Assemblies

Sulfur dioxide-lithium cells are used almost exclusively in military/aerospace applications. This chemistry provides somewhat lower energy density than manganese dioxide-lithium or poly (carbon monofluoride) lithium cells, and their energy density and

service life are generally less than half than that of thionyl chloride-lithium cells. “Emergency” vent structures are required in these batteries’ hermetically welded cases for safety purposes.

- Cell voltage: 3.0V (nominal), 0.8V (cut-off)
- Capacity: N/A
- Energy by volume: 500 Wh/L
- Energy by weight: 290 Wh/kg
- Discharge characteristics: N/A
- Shelf life: 10+ years (to 80% capacity)
- Operating temperature range: -60° to 85°C (-76° to 185°F)
- Sizes: round cells (typically 1/2AA, AA, “C” and “D”)
- Applications: devices requiring high constant current output, long-term storage, high current pulses, and operation at low temperatures (military equipment, for example)

Request a quote or contact Cornerstone for more info.

Other Custom Primary Lithium Battery Systems

In addition to LiSOCl_2 and Li-SO_2 cells, a variety of other primary lithium cell types are available. Each lithium chemistry offers different technical attributes for specific applications.

Lithium-Iodine Cells

Li-I_2 cells offer outstanding performance, very low self-discharge rates, high reliability, and very high hermeticity. They are used for limited applications, such as cardiac pacemakers.

Lithium-Iron Sulfide Cells

Li-FeS₂ cells have very low self-discharge rates and very high pulse capabilities—as high as 1.5 amps for AA size cells. These batteries are designed for niche markets, such as camera flash systems.

Lithium-Copper Oxide Cells

Lithium-copper oxide and lithium-copper oxyphosphate cells were taken out of production in the mid-1990s. This chemistry is now used only sparingly for highly specialized applications.

Request a quote on custom lithium primary battery packs for your application, or contact Cornerstone to discuss your custom requirements.

