Li/CF<sub>x</sub>-MnO<sub>2</sub> Primary Electrochemistry
Rate-Optimized, High Energy Pouch Cell

Features and Benefits

- Higher energy and lower weight than Li/MnO<sub>2</sub>
- Optimized electrolyte for low-temperature performance
  - Minimal voltage delay at -40°C (-40°F)
- No maintenance required
- No recharge infrastructure, immediately deployable
- Low self-discharge: 0.7%/year at 20°C (68°F)
- Long shelf-life:
  - >7 years at 20°C (68°F)
  - 5 years at ≤ 45°C (113°F)
- Shut-down separator
- Safety demonstrated to UN/DOT 38.3 and MIL-PRF-32271A
  - Altitude, thermal, vibration, shock and impact
  - External short circuit and forced discharge
  - Nail penetration, crush and impact
- Improved battery packaging efficiency over cylindrical cells

Specifications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>LCF-145</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions with folded sides</td>
<td>49.8 x 58.0 x 5.2 mm (1.96 x 2.28 x 0.21 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>23.9 g (0.05 lb)</td>
</tr>
<tr>
<td>Continuous Current/Power&lt;sup&gt;1&lt;/sup&gt;</td>
<td>8 A/20 W</td>
</tr>
<tr>
<td>Maximum Pulse Current&lt;sup&gt;2&lt;/sup&gt;</td>
<td>35 A/75 W for 5 sec</td>
</tr>
<tr>
<td>Voltage Range, Nominal</td>
<td>3.3-1.5 V, 2.65 V</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 to 60°C (-40 to 140°F)</td>
</tr>
<tr>
<td>Capacity/Energy</td>
<td>3.5 Ah/9 Wh</td>
</tr>
</tbody>
</table>

<sup>1</sup> Thermal management can improve discharge capabilities - contact EaglePicher for specific application details
<sup>2</sup> Maximum pulse current/power is dependent upon depth of discharge, as well as cell and ambient thermal conditions; higher pulse current/power can be achieved depending on test conditions. Contact EaglePicher for specific application details.

Applications

- High-power applications at low temperature
- Portable one-time use power
- Survival and emergency equipment
- Surveillance
- Vehicles: unmanned aerial (UAV), autonomous (AUV), unmanned aircraft systems (UAS) and unmanned underwater (UUV)
- Loitering missiles and munitions

Concept Design - Product Under Development
Primary $CF_x$ Hybrid Cell

![Graph](image.png)

Shown with folded sides. Dimensions: mm (in.)

<table>
<thead>
<tr>
<th>Operating Temperature °C (°F)</th>
<th>Discharge Rate (W)</th>
<th>Capacity (Ah)</th>
<th>Energy (Wh)</th>
<th>Specific Energy (Wh/kg)</th>
<th>Energy Density (Wh/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 (-40)</td>
<td>20</td>
<td>2.8</td>
<td>5.8</td>
<td>243</td>
<td>400</td>
</tr>
<tr>
<td>20 (68)</td>
<td>20</td>
<td>2.7</td>
<td>6.9</td>
<td>289</td>
<td>476</td>
</tr>
<tr>
<td>60 (140)</td>
<td>20</td>
<td>2.6</td>
<td>6.8</td>
<td>285</td>
<td>469</td>
</tr>
</tbody>
</table>

1 Single-cell capability; adequate heat dissipation in the form of conductive mounting and convective airflow is required once integrated into a battery within the application (≥17W/m²K).

Energy as a Function of Temperature

Energy versus 20 W Continuous Discharge Power

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