### SPECIFICATIONS

**BATTERY TYPE**
- **Makeup:** Solid State Rechargeable Microbattery
- **Electrolyte:** All Solid State (LiPON, Lithium Phosphorus Oxynitride)
- **Anode:** Lithium
- **Cathode:** Lithium Cobalt Oxide
- **Form:** Thin Film, ~15 microns total thickness (not including substrate)
- **Substrate:** Metal Foil or Rigid Ceramic or OEM Component
- **Encapsulant:** Fully encapsulated in thin membrane

<table>
<thead>
<tr>
<th>Voltage (V) Nominal</th>
<th>4.0 V O pen Circuit</th>
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<tbody>
<tr>
<td>Capacity Up to</td>
<td>~0.2mAhr/cm²</td>
</tr>
<tr>
<td>Operating Range</td>
<td>Survivability -50°C to 180°C, Sustained 0°C to 120°C</td>
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<tr>
<td>Charging</td>
<td>&gt;85% Charging efficiency</td>
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</table>

### ENERGY DENSITY
- Wh/kg (gravimetric): 200
- Wh/l (volumetric): 450

### LIFE
- **Cycle Life:** >60,000 charge/discharge cycles
- **Shelf Life:** Infinite prior to activation
- **Quiescent Storage Life:** <1% total energy loss per year after initial activation

### MECHANICAL
- Designed to Application Specific Form Factor Requirements

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**Product Design Optimization**

The LiTE*STAR™ Battery offers product designers the opportunity to customize form and function to the specific application requirements. The thin film technology in the LiTE*STAR™ battery provides high energy density in extremely small packages that can be custom integrated into the product packaging and electronics. The diagram below compares the energy performance range for LiTE*STAR™ with traditional batteries. LiTE*STAR™ is most suited to applications requiring capacities in the micro-milli amp-hr range and with maximum current loads of 20-40 milli-amps. Since LiTE*STAR™ is a rechargeable battery, even a 1 milli-amp-hr cell can provide energy capacities in excess of 10 amp-hrs over the entire product life cycle. The LiTE*STAR™ recharging features enable a micro-battery to deliver the overall energy performance of larger primary batteries. How to best take advantage of the rechargeable cell in a micro-battery package is the principal objective of the product designer.

The LiTE*STAR™ Battery can be manufactured in small chip-like formats or flexible formats depending on the application. Whereas traditional button cells come in fixed sizes and formats that are often oversized for the application and can occupy greater than 50% of a product’s electronics package, a LiTE*STAR™ micro-battery can be integrated with the electronics in thin profiles occupying less than 1cm² in total area. The result is a custom micro-battery that now requires less than 10% of the total electronics package volume in many applications.

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**Pricing/Battery - $0.10 to $100.00**

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8130 Shaffer Parkway
Littleton, Colorado USA 80127

Infinite Power Solutions
Ph: 303-285-5108 Fax: 303-420-1351
www.InfinitePowerSolutions.com
Permanent Power - Revolutionizes Microelectronic Applications

The **LiTE**™ battery is revolutionizing microelectronic product applications in many industries by providing a means to achieve a permanent source of power. **LiTE**™ goes where no other battery is able...... *Inside the Product for Life!*

**Revolutionary Products... Ready for Reality Today**

**Detectors & Sensors**

The **LiTE**™ battery is particularly well suited for providing primary or back-up power to a variety of detectors and sensors ranging from smoke, pressure, humidity, or temperature control. There is no longer a need to periodically replace the battery in these applications. For example, current batteries in smoke detectors require replacement because the energy becomes dangerously low when the battery self-discharges over time whether it is used or not. A smoke detector indicates a low battery by continuously chirping the alarm to get your attention (this usually occurs at 3:00 a.m. when you are sound asleep!). **LiTE**™ does not self-discharge and therefore requires no replacement. The detector or sensor can be installed permanently without the need for servicing batteries.

**Implantable Hearing Aid**

**LiTE**™ is being developed in custom packages for powering neural prosthetics. The first application is a fully implantable cochlear device to restore hearing to profoundly deaf individuals. Radio Frequency energy is used to recharge the battery remotely enabling fully implantable product designs. The long life cycle provides permanent power and eliminates the need to replace the battery in most applications.

**RFID Tags and Smart Cards**

**LiTE**™ enables a new generation of RFID tags in the form of "Active and Smart" flexible labels and other compact packages. An RFID tag is now able to achieve "active tag" performance while maintaining the packaging, flexibility and cost benefits of passive tags. Smart Cards can now integrate power directly into the card for multi-functional performance including non-volatile memory, security, biometrics, and real time displays.

**“Smart” Consumer Products**

There is no end to the creative applications that can be realized in consumer products using permanent power solutions. A **LiTE**™ application for "Smart" glasses allows the lenses to be tinted to the desired shade. Those aggravating digital clocks found in VCR’s, Ovens, Microwaves, Thermostats, etc. will blink no more when the power goes off—a permanent **LiTE**™ microchip battery will prevent this once and for all. Even "Smart" shoes are possible with **LiTE**™ powered electronics that measure and display heart rate, distance, calories etc.

**Micro-Electronics**

**LiTE**™ can be integrated directly into the electronics on printed circuit boards or into the components themselves. The small form factor reduces the typical packaging density by as much as 50%. Back-up power for non-volatile memory and distributed power-on-the-chip are just a few examples. The **LiTE**™ attributes include a very quick response time, a flat discharge voltage profile, and sustained energy storage capacity enabling performance akin to an infinite capacitor – the ultimate in a stored energy component for circuit designers.

**Continuous Power Strips**

Combining the energy storage attributes of the **LiTE**™ battery with the power generating features of a photovoltaic cell results in a virtually endless supply of self-contained, regenerating power. The photovoltaic cell generates power to charge the battery either indoors or outdoors during the day, and the battery provides continuous power around-the-clock. The product applications using continuous power strips are limited only by the imagination, vision, and creativity of the product engineers.

Whether it is Medical Implants, RFID tags, Smart Cards, Micro-Electromechanical Sensors, or Consumer Electronics **LiTE**™ provides a power solution that changes the way product designers think of incorporating batteries.