

# Lithium Cells and Battery Packs

## Application Overview

### Problem/Solution

Primary lithium cells (such as AA and 2/3A) and rechargeable lithium cells (such as 18650, 17500, and prismatic) are sensitive to faults that cause overcurrent/ overtemperature conditions, such as the accidental shorting of the cell terminals and (for rechargeable lithium) abusive charging or charger failure. For these reasons, these cells usually need to be individually protected. Because of their electrical characteristics as well as their thin, flat form factor, PolySwitch devices internal to each cell help provide effective protection.



### Typical Protection Requirements

Lithium cells typically require a protection device with a rating of 15V and 40A minimum.

### Typical Agency Approval Requirements

Primary and rechargeable lithium cells/packs are covered under the UL1642 Standard for lithium batteries and UL2054 Standard for household and commercial batteries.

### Technology Comparison

The industry standard for the protection of lithium cells for consumer applications (such as cameras, laptop/notebook computers, cellular phones, and camcorders) is the use of PPTC devices in the form of PPTC annular discs inside the lid assembly of each cell. These disc devices work in conjunction with

other cell safety devices, such as separators, pressure vents, and others.

PolySwitch PPTC devices latch into a high-resistance state when a fault occurs. Once the fault and power to the circuit are removed, the device automatically resets and is ready for normal operation.

### Device Selection

Because the design of lid assemblies of lithium cells varies from manufacturer to manufacturer, PolySwitch annular discs are usually custom devices. Different disc sizes can be accommodated for the various cell configurations. For rechargeable lithium battery packs, VLR, VTP, LTP, LR4, SRP, VLP series are typically used with other special application strap devices for coordinated protection with our disc products.

Figure 1. Typical Rechargeable Lithium Battery Pack Circuit

