FAQ

How Do I Choose the Right Battery Fuse?

Q: What should my priorities be when choosing a battery fuse for rechargeable lithium-ion batteries?

A: Safety should always be your first priority when selecting a battery fuse. A reliable battery fuse will help protect Li-ion batteries from potentially dangerous overcurrent, over-charging and over-discharging conditions. In addition, you will want to choose surfacemount battery fuses that are compatible with your manufacturing processes and are available in a wide range of package sizes to suit your specific application needs.

Q: What aspects of my application will affect my choice of battery fuse?

A: Different applications require different levels of protection depending on their current rating, the battery chemistry, and the number of cells in the battery pack. Li-ion battery packs typically include a state-of-the-art battery-management system (BMS) that monitors battery conditions such as voltage, current, and temperature. If any of these metrics fall outside the prescribed range, the BMS will shut off the battery pack. The BMS generally includes protection ICs and a battery fuse. SCHOTT's SEFUSE® D6S battery fuses offer a wide selection of current ratings from 12 A to 60 A to serve emerging high-current consumer and other applications.

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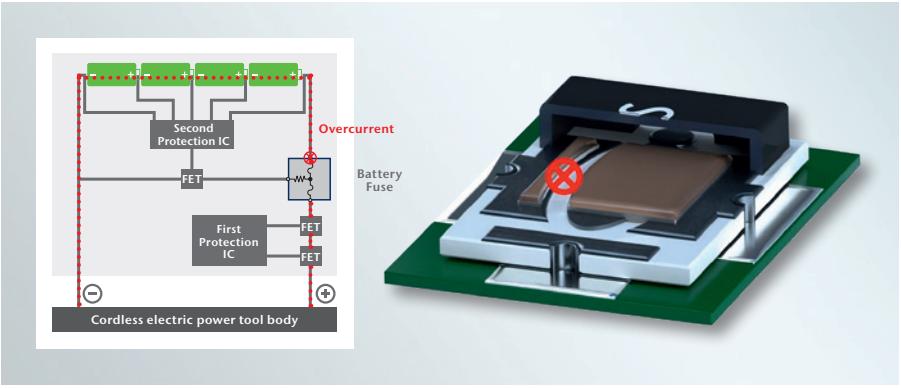
Q: How does overcurrent protection works?

A: During both charge and discharge operation, a primary protection IC monitors battery current. Upon detection of an overcurrent condition, whether caused by an overload or short circuit, the IC will attempt to turn off field-effect transistors (FETs) in the current path to shut down the battery pack. SCHOTT's SEFUSE® D6S battery fuses offer current-breaking capacity from 50 A to 120 A.

A battery fuse incorporates a fuse element that opens if a primary protection IC fails to shut down the Li-ion battery pack in the event of an overcurrent condition.

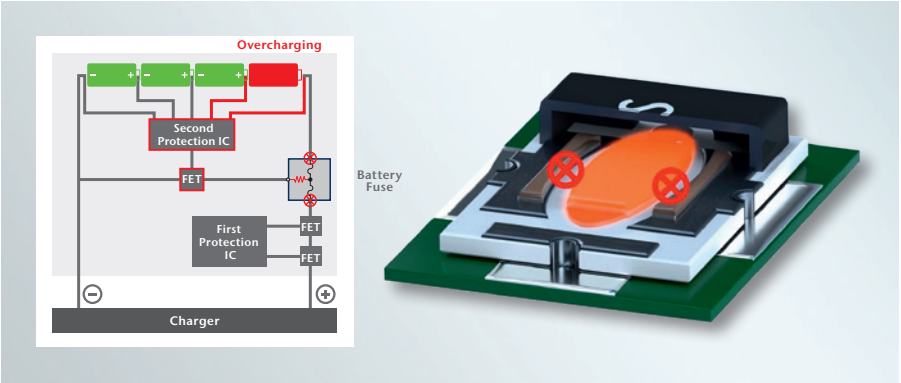


Q: Why is overcharging a problem, and how does overcharge protection work?

A: Overcharging severely reduces battery life and is potentially dangerous. Overcharging can cause overheating, potentially leading to an explosion due to outgassing from the Li-ion battery's electrolyte. As a result, battery makers need suitable safety systems to prevent overcharging.

To implement overcharge protection, a secondary protection IC monitors the voltage across each cell in a battery pack. When an overvoltage condition is detected, which indicates that overcharging is occurring, the IC activates an external FET that in turn powers a heater element within the battery fuse. The heater element will then trigger the fuse and cut off the current. SCHOTT's SEFUSE® D6S battery fuses offer a wide variety of heater resistance values from 0.9 Ω to 154 Ω to help designers implement reliable overcharge protection across a range of applications for battery packs having as many as 14 cells.

In the event of overcharging, a protection circuit activates a FET that in turn powers a fuse heater element, opening the fuse and cutting off the current.



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Q: What do I need to know about safety standards?

A: Be aware that your product could be required to meet various safety standards for Li-ion batteries, including standards requiring redundancy – that is, a single point of failure must not prevent the overcurrent or overcharging protection function from operating properly. For example, the IEC standard for Li-ion batteries requires that an external short-circuit test be conducted with one protective device within the battery pack disabled. In addition, the IEC standard for rechargeable power tools requires that the Li-ion charging system be permanently disabled in response to certain abnormal conditions. In both cases, the addition of a secondary protection device can satisfy these requirements, with a device such as the SCHOTT SEFUSE® D6S battery fuse meeting the need. SEFUSE® D6S battery fuses are fully compliant with relevant UL and TÜV standards.

Q: What advancements can I expect to see in battery-cell technology?

A: Researchers continue to investigate the fundamentals of Li-ion battery technology with the goal of achieving both safer and more energy-dense cells. Recent developments have significantly improved the latest Li-ion cells, allowing higher charging currents without raising the internal temperature. These developments are expanding the applicability of Li-ion batteries from relatively low-power smartphones and tablets to an array of higher-power consumer products, including rechargeable power tools and garden tools, cordless and robotic vacuum cleaners, drones, eBikes, electric motorcycles, and energy storage systems (ESS). Despite advancements in performance and safety, Li-ion batteries still present overcurrent, over-charging and over-discharging risks, and secondary protection devices such as battery fuses will continue to be required.

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Q: What should I look for in a battery-fuse supplier?

A: Choose a longstanding company with experience across a wide range of applications and the ability to reliably deliver devices. SCHOTT's large-scale production base enables it to deliver eco-friendly (RoHS-compliant) battery fuses on time despite the current supply-chain issues that are causing shortages of many component types.

SCHOTT is the longstanding leader in supplying battery fuses for notebook PCs and smartphones and stands ready to apply its battery-fuse expertise to assist you with development and regulatory support as you address applications requiring ever higher levels of current.

schott.com/batteryfuse

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