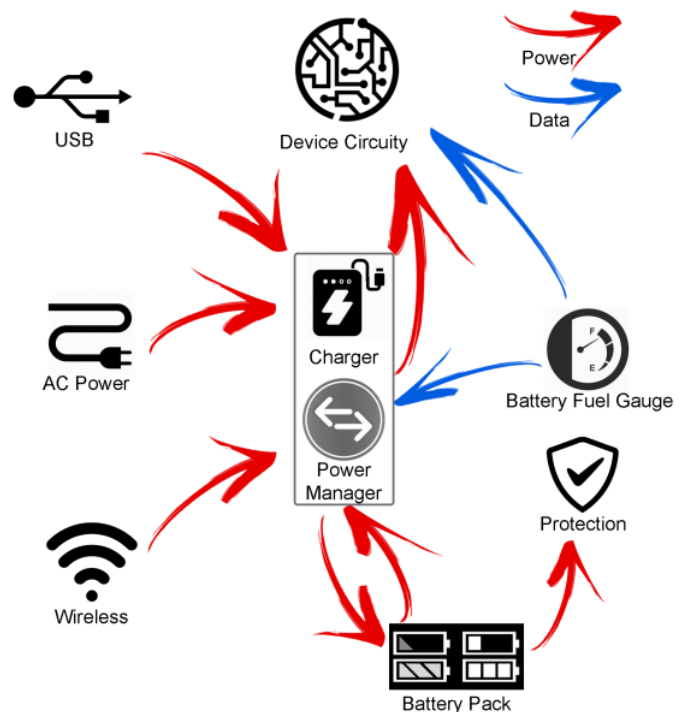


Battery Management

This application highlight will discuss battery management circuits and the various Stackpole current sensing resistors that are suitable for different applications. With end products ranging from laptop computers and other consumer electronics to industrial infrastructure UPS systems, solar power storage, and hybrid vehicles, battery management is a rapidly growing market segment for sensing resistors. This application highlight will discuss the basic structure for battery management circuits and the resistor requirements for various end products.

Battery Management Basic Layout

Typical battery management topologies and reference designs will start with a power manager and charger platform. This block will regulate the incoming power from sources such as USB chargers, AC to DC power transformers, and wireless charging stations. This power is then distributed to either the circuitry itself, if needed or to the battery pack if charging is required. If unplugged, then power transfers to the charger / power management block from the battery pack instead. The battery level is also monitored by the battery fuel gauge and protection block. This block will provide the output levels for the battery that is seen by the user as well as providing interface protection. Note there is not typically a direct path from the battery to the system circuitry itself for isolation purposes.



Battery Management Block Diagram

Tablet PC's, Netbooks, Portable Media Players and Battery Backup Systems

These types of commercial devices will usually employ 1 to 3 cell charging systems at 4.2V per cell and 4.5V to 17V input voltage. These devices require efficiency in the 90% range and typically have charging systems of 1 to 5 amps. The sense resistors for these devices focus more on low cost and small size, since resistance values typically range from 10 milliohm to 100 milliohm. Higher resistance value designs would normally be used for smaller and more portable devices. In many cases, there are sense resistors used to monitor both the power delivered to the system circuitry and the power delivered to or used by the battery. Stackpole's CSR / CSRN offer low cost with the ability to support that kind of efficiency. The CSRF series may be chosen for devices requiring higher precision and efficiency.



Power Tools

Portable electric power tools require a wide range of current levels depending on the particular tool. Drills for example will typically utilize a single 1 to 3W size chip resistor in the 1 to 3 milliohm range. Stackpole's CSS / CSSH, CSNL, or HCS series are good choices for this type of application. These all metal devices feature high current handling, high power, with low resistance values and good TCR. Similar topologies are used for small electronic vehicles, and e-scooters as well as industrial backup power management.



Solar Power Inverter and Power Management

Photo-voltaic systems of any significant size which utilize battery systems require very high efficiency. Therefore, the choice is again high power all metal resistors of at least 3 watts and resistance values of 0.5 milliohm or lower. Because size is normally less of an issue, these designs can use large size parts with extremely low values and have space for the high speed comparator and level shifter necessary for most power IC's to handle the voltage output of such a low resistance value. Stackpole's HCS and HCSK are ideal for these types of applications. They have the added benefit of lower PCB temperatures and have the ability to operate up to higher temperatures than many other current sensing technologies.



The exploding markets for portable electronics, power banks, electrical vehicles, and alternative energy storage systems are creating demand for more current sensing resistors. Stackpole offers a broad range of products to meet the specific requirements of our customers. Please contact Stackpole to learn more about our current sense resistor offering.

More Information and data sheets available at www.seielect.com

For questions on these and any other Stackpole product please contact Stackpole at: marketing@seielect.com