

SUPERCAPACITORS IN ACTION: ENHANCING BACKUP POWER AND LOAD MANAGEMENT



Supercapacitors, also known as electric double-layer capacitors (EDLCs), store energy electrostatically rather than via chemical reactions like traditional batteries. Their unique characteristics make them ideal for applications requiring short bursts of power and/or durability over time.

With built-in high-power characteristics, supercapacitors are critical in power electronics, where engineers are looking for short-term power peaks. Supercapacitors are also popular in low-power applications, like security installations. In these cases, batteries provide insufficient performance over time; in contrast, supercapacitors can efficiently handle those quick bursts of energy when needed and endure many more charge/discharge cycles than batteries over time.

Supercapacitors in Electronic Circuits

Supercapacitors play two main functions in electronic circuits. In battery-powered devices, they provide backup power in the event of disconnection (Figure 1a). They also provide alternating current (AC) voltage for devices with heavy switching currents (Figure 1b). In that case, supercapacitors protect the device’s memory, for example, from large voltage drops.

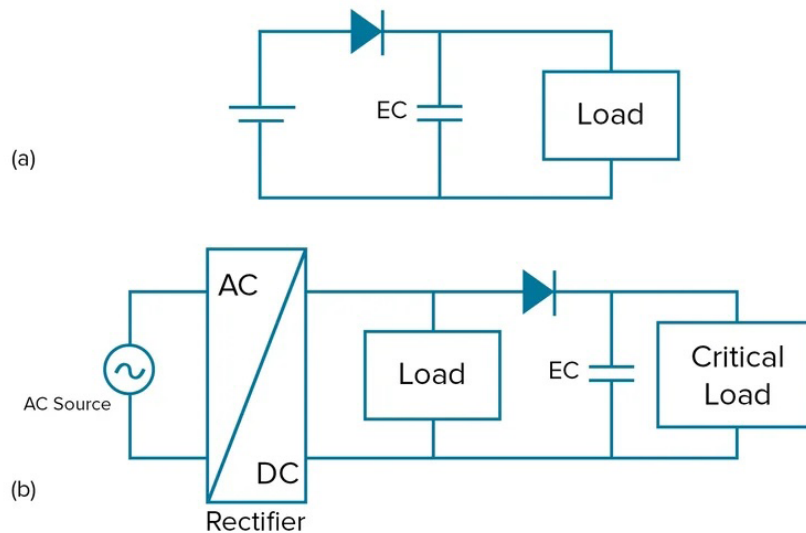


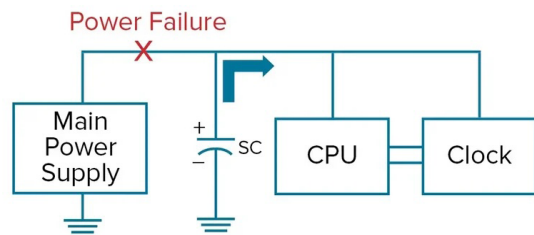
Figure 1. Common supercapacitor roles in electronic circuits, including backup power (a) and protection against voltage drops (b).

The following examples demonstrate how supercapacitors assume these functions in real-time clock backups, power failure backups, high load assist systems and hybrid energy storage systems to enhance efficiency and reliability.

Real-Time Clock Backup

In real-time clock backup, also known as memory backup, solid-state drives have many advantages over hard-disk drives, including low power consumption and high reliability. By design, write speed is their main weakness, and that's remedied using protected cache memory (SDRAM). SDRAMs need backup power, and supercapacitors are an excellent choice because of their fast response time, high power density and low maintenance requirements.

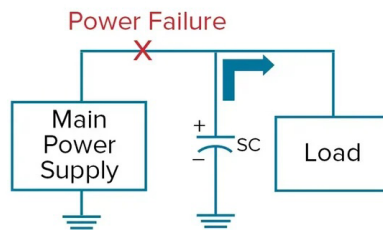
Real-Time Clock Backup



Power Failure Backup

Power supply backups, otherwise known as uninterruptible power supplies (UPS), offer emergency power when a system's primary power source fails. In these cases, telecommunications, industrial and other electrical equipment can be subject to malfunction or data loss. To successfully provide uninterrupted power, the backup supply must be able to start up reliably and instantaneously.

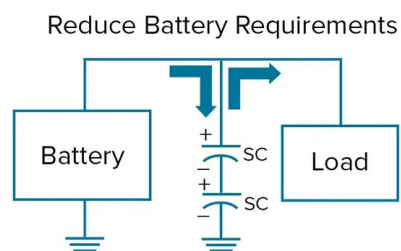
Power Failure Backup



High Load Assist

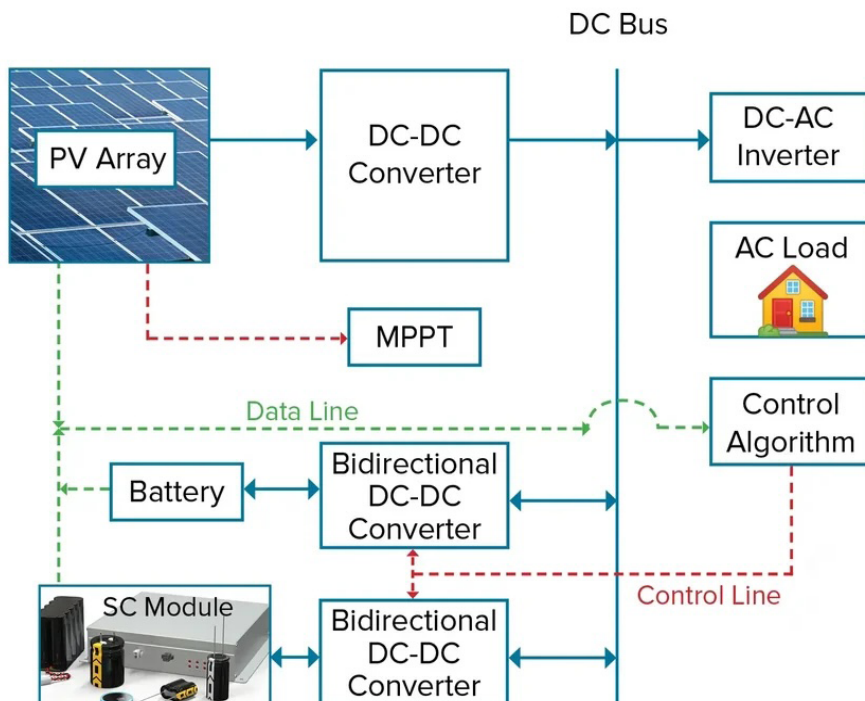
Supplementary systems help maintain a system's primary energy storage system (ESS). In some cases, like the camera flash on a smartphone, peak lower load is significantly higher for a short period of time. Supercapacitors are ideal secondary sources to handle those power bursts while leveraging a low-power, more cost-effective battery as the primary energy source.

High Load Assist



Hybrid Energy Storage Systems

Some energy storage systems combine supercapacitors with batteries to form hybrid energy storage systems (HESS). These are common in applications like the photovoltaic (PV) microgrids found in homes and neighborhoods. Microgrids are weak electrical grids, so they're sensitive to load generation changes. A HESS decreases the impact of variations in load.



As technology continues to evolve, supercapacitors will remain a critical component in meeting the demand for more efficient, reliable and sustainable energy solutions. [Review detailed specifications](#) for our supercapacitor offerings or [contact us](#) for an application-specific design consultation.

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If you need help selecting from our portfolio please contact us and we can guide you through the selection process.



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