Use case
Eaton's XLHV supercapacitor module

Eaton's XLHV supercapacitor module enhances power efficiency in energy applications

Grid stability issues and inertia are increasingly problematic for utility grids with the ramp-up of renewable energy generation. Non-linear loads, such as switched mode power supply (SMPS) power conversion systems, cause current fluctuations and harmonics, resulting in unwanted voltage fluctuations and power oscillations. Energy storage solutions like supercapacitors can help to mitigate many of these challenges by providing high reliability, high-power output on demand.

Supercapacitors, also known as electrical double-layer capacitors (EDLCs), are rechargeable energy storage devices that do not require chemical reactions to store energy. In addition to their high energy density, supercapacitors have rapid charging and discharging capabilities. They can be charged quickly with low power consumption and discharged efficiently with high power output. Unlike batteries, supercapacitors pose no thermal runaway under various operating temperature conditions and offer a long lifespan (10 to 20+ years depending upon environmental conditions) with minimal maintenance requirements. In terms of environmental impact, they are eco-friendly, containing primary materials of carbon, cellulose, and aluminum.

Supercapacitor modules are an emerging technology in the energy segment for backup power, peak power shaving (e.g., seaports, trolley, rail/light rail electrification, etc.), utility, grid, and microgrid applications requiring high-density power for brief periods. Compared to traditional energy storage solutions, such as batteries, supercapacitors offer high power density, long life cycles, and low weight. Their high energy density, lightweight structure, and flexibility allow them to be customized for various energy storage needs. They have the potential to reduce system costs and enhance energy security by acting as backup power during brownouts or blackouts and enabling increased renewable energy integration.

Eaton's XLHV supercapacitor module is a building block for high-power storage systems applied to microgrids, grid stability systems and peak power shaving. The module is easy to integrate with a standard form factor and connections. Designers can build up standard systems up to 1500 V with combinations of series and parallel configurations; systems up to tens of kV can be built and assembled with special considerations and supporting components. The low internal resistance of the XLHV provides the highest power density for applications requiring power for up to a minute. With no moving parts or chemical reactions, these products can last 10 to 20 years, depending on operating temperature and voltage, with millions of charge and discharge cycles. Eaton's XLHV supercapacitors are eco-friendly, comprise no heavy or rare earth metals, and require no maintenance with low standby power consumption.

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