HOW2POWER TODAY
Your Power Design Newsletter

ISSUE: June 2026

3.3-kV SiC Power Modules Target Solid-State Transformers

Microchip Technology’s 3.3-kV HV-D3 mSiC power modules are designed to simplify and accelerate the adoption of solid-state transformers (SSTs) in AI hyperscale data centers and other high-voltage power applications. The modules integrate 3.3-kV silicon carbide (SiC) mSiC MOSFETs and Schottky diodes in an industry-standard 62-mm package, enabling efficient power delivery from the medium-voltage grid directly to the server rack.

As AI data centers continue to scale, token generation is limited by power availability, while efficiency is a defining factor for return on investment. Traditional architectures based on bulky, low-frequency transformers add complexity, increase losses and limit flexibility. Solid-state transformers represent a foundational shift in power delivery, reducing conversion stages and enabling higher system efficiency. The industry's shift toward higher-voltage dc rack distribution in next-generation AI facilities further amplifies the value of SSTs, which are intended to deliver regulated dc directly from the medium-voltage grid with fewer conversion stages.

The HV-D3 mSiC modules are engineered specifically to meet these requirements. The modules use Microchip’s mSiC MOSFET technology, which offers highly competitive $R_{DS(ON)}$ stability over temperature, according to the vendor.

These modules also feature packaging that supports 6-kV isolation, incorporate CTI 600-rated materials and have extended creepage distances, designed to allow safe series connection for high-voltage operation. A silicon nitride (Si_3N_4) substrate delivers enhanced thermal conductivity and power-cycling capability, helping designers achieve higher power density with less aggressive cooling (Figs. 1 and 2). Microchip’s mSiC MOSFET technology, offers balanced switching losses for both hard-switched and soft-switched topologies, making the devices well suited for SST designs and other high-frequency, high-voltage systems.

While optimized for solid-state transformers in AI data centers, the HV-D3 mSiC power modules also address a wide range of applications, including megawatt charging infrastructure for heavy-duty vehicles, auxiliary power supplies for rail/heavy transportation, medium-voltage motor drives, industrial and defense power systems. These markets benefit from the same combination of high isolation, thermal robustness, and efficient power conversion, says the vendor.

The 3.3-kV power modules are supported by an application note, design guide, device and simulation models for rapid prototyping. Additionally, Microchip provides global technical support, design services and field application engineering support. The 3.3-kV mSiC power modules are available to purchase in production quantities. For more information see the HV-D3 mSiC Power Modules page. You can purchase directly from Microchip or contact a Microchip sales representative or authorized worldwide distributor.

Fig. 1. “As AI datacenters continue to push limits in supplying power from the grid to the GPU, the need for solid-state transformers becomes increasingly important,” said Clayton Pillion, vice president of Microchip’s high-power solutions business unit. “Our 3.3-kV HV-D3 mSiC power modules enable designers to reduce the number of series connected devices by roughly half versus lower-voltage SiC alternatives when interfacing to 13.8-kV or 34.5-kV grids. The devices also address a key gap in the industrial market for 100- to 300-A products, bridging discrete SiC devices and much larger power modules.”

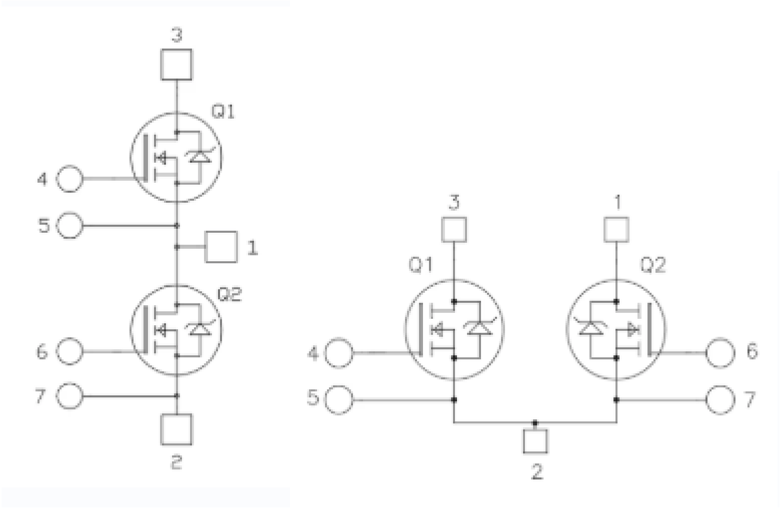

Fig. 2. The HV-D3 mSiC modules are available in half-bridge (a) and dual common-source configurations (b) with and without anti-parallel Schottky diodes.