

650-V SiC MOSFETs Offer High Reliability And Performance

[Infineon Technologies](#) continues to expand its silicon carbide (SiC) product portfolio with 650-V devices. With the newly launched CoolSiC MOSFETs Infineon is addressing the growing demand for energy efficiency, power density, and robustness in a wide range of applications. Among them are server, telecom and industrial SMPS, solar energy systems, energy storage and battery formation, UPSs, motor drives as well as EV-charging. These CoolSiC MOSFETs were among the new devices the company had planned to show last month at APEC 2020 in New Orleans.

“With this launch, Infineon complements its broad silicon, silicon carbide, and gallium nitride-based power semiconductor portfolio in the 600-V/650-V power domain,” said Steffen Metzger, senior director, high-voltage conversion at Infineon’s Power Management & Multimarket Division. “It underlines our unique position in the market being the only manufacturer with such a broad offering for all three power technologies.”

The CoolSiC MOSFET 650-V devices are rated from 27 mΩ to 107 mΩ. They are available in classic TO-247 3-pin as well as TO-247 4-pin packages, which allows for even lower switching losses (see the figure). As with all previously launched CoolSiC MOSFET products, the new family of 650 V devices are based on Infineon’s state-of-the-art trench semiconductor technology. Maximizing the strong physical characteristics of SiC, this ensures that the devices offer superior reliability, and best-in-class switching and conduction losses, according to the vendor.

Additionally, the company adds that these devices feature the highest transconductance level (gain), threshold voltage (V_{th}) of 4 V and short-circuit robustness. Thus, trench technology allows for lowest losses in the application and highest reliability in operation—without any compromise, says Infineon.

The 650-V CoolSiC MOSFETs offer attractive benefits in comparison with other silicon and silicon carbide solutions in the market such as switching efficiency at higher frequencies and outstanding reliability. Thanks to the very low on-state resistance dependency on temperature they feature an excellent thermal behavior. The devices also boast robust and stable body diodes retaining a very low level of reverse recovery charge (Qrr), roughly 80% less than the best superjunction CoolMOS MOSFET.

The commutation-robustness helps in easily achieving an overall system efficiency of 98%, e.g. through the usage of continuous-conduction-mode totem-pole power factor correction (PFC).

To ease the application design using 650-V CoolSiC MOSFETs and to ensure high-performance operation of the devices, Infineon offers dedicated 1-channel and 2-channel galvanically isolated EiceDRIVER gate-driver ICs. This solution—combining CoolSiC switches and dedicated gate-driver ICs—helps lower system costs as well as total cost of ownership and enables energy efficiency gains. The CoolSiC MOSFETs also work seamlessly with other ICs from Infineon’s EiceDRIVER gate-driver family.

The CoolSiC MOSFET 650-V family comprises eight variants housed in two throughhole TO-247 packages. They can be ordered now. Three dedicated gate-driver ICs are also available. For more information, see at www.infineon.com/cool-sic-mosfet-discretes.



Figure. As with the 1200-V family members, the new 650-V CoolSiC MOSFETs are well suited for hard- and resonant-switching topologies such as LLC and ZVS, and can be driven like an IGBT or CoolMOS MOSFET, using standard drivers. According to Infineon, these robust devices offer superior gate-oxide reliability enabled by state-of-the-art trench design, best-in-class switching and conduction losses, highest transconductance level (gain), a 4-V threshold voltage and short-circuit robustness. These CoolSiC MOSFET 650-V devices are rated from 27 mΩ to 107 mΩ.