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SiC JFET Cascodes Are High-Performance Upgrades For IGBTs And MOSFETs

[UnitedSiC](#)'s UJ3C1200 series of 1200-V SiC JFET cascodes with on-resistances of 80 m Ω and 40 m Ω offer "drop-in" replacements for many existing IGBT, Si-MOSFET and SiC-MOSFET parts, with no change to gate-drive circuitry. This simplifies design upgrades and provides an alternative-purchasing source for existing parts. Applications include power factor correction stages, active frontend rectifiers, LLC converters and phase-shift full-bridge converters where improvements to efficiency and/or power density are required. End uses include on-board EV chargers, battery charging for forklifts, PV inverters, welding and more (see the figure).

Based on UnitedSiC's Gen 3 SiC transistor technology, the UJ3C1200 series integrates a SiC JFET with a custom-designed Si-MOSFET to produce the combination of normally off operation, high-performance body diode and easy gate drive of the MOSFET with the efficiency, speed and high-temperature rating of the SiC JFET. In this new generation of SiC technology, the company has increased the T_j max rating from the 150°C of previous parts to 175°C. This enhancement in thermal performance was enabled by improvements in chip design, molding compound and die attach.

As a result of these various characteristics, existing systems adopting the UJ3C1200 can expect a performance increase with lower conduction and switching losses, enhanced thermal properties (allowing higher RMS currents delivering more output power) and integrated gate ESD protection (to HBM Class 2, insures overvoltage spikes on gate are clamped). In new designs, according to the company, the UJ3C1200 series delivers increased switching frequencies to gain substantial system benefits in both efficiency and reduction in size and cost of passive components, such as magnetics and capacitors.

Commenting on benefits of the new SiC transistor family, Anup Bhalla, UnitedSiC's VP Engineering said, "These exciting new devices enable designers to deploy SiC technology without worrying about gate-drive complexity. The high-performance body diode and integrated gate ESD protection give added value to designers while purchasers are helped with a second source to many existing sole-supplier parts".

The UJ3C1200 series SiC FETs are available now at licensed distributors with prices starting at \$10.39 each in 500+ quantities. For more information, see the SiC cascodes [selector guide](#). Or see the [UJ3C120080K3S datasheet](#) and the [UJ3C120040K3S datasheet](#).



Figure. The UJ3C1200 series of 1200-V SiC JFET cascodes with on-resistances of 80 m Ω and 40 m Ω can serve as "drop-in" replacements for existing IGBTs, silicon MOSFETs and SiC MOSFETs, with no change to gate-drive circuitry. These capabilities enable both performance upgrades and flexibility in sourcing power switches. These third-generation devices feature improved thermal performance when compared with the company's previously introduced devices.