

Third-Gen SiC MOSFETs Boast Better Figures-of-Merit

[GeneSiC Semiconductor's](#) next-generation 1200-V G3R SiC MOSFETs feature $R_{DS(ON)}$ levels ranging from 20 m Ω to 350 m Ω , delivering unprecedented levels of performance, robustness and quality, according to the company. System benefits include higher efficiency, faster switching frequency, increased power density, reduced ringing (EMI) and compact system size. These G3R SiC MOSFETs are offered in optimized low-inductance discrete packages (SMD and through hole).

"After years of development work towards achieving the lowest on-state resistance and enhanced short circuit performance, we are excited to release the industry's best performing 1200-V SiC MOSFETs with over 15+ discrete and bare chip products. If the next-generation power electronics systems are to meet the challenging efficiency, power density and quality goals in applications like automotive, industrial, renewable energy, transportation, IT and telecom, then they require significantly improved device performance and reliability as compared to presently available SiC MOSFETs," says Ranbir Singh, president at GeneSiC Semiconductor.

The new devices are said to offer a superior $Q_G \times R_{DS(ON)}$ figure-of-merit. According to GeneSiC they feature the industry's lowest on-state resistance with a very low gate charge, resulting in to 20% better figure-of-merit than any other similar competitor device. They also offer low conduction losses at all temperatures. GeneSiC's MOSFETs are said to have the softest temperature dependence of on-state resistance to achieve very low conduction losses at all temperatures; significantly better than any other trench and planar SiC MOSFETs on the market, says the vendor.

In addition, GeneSiC's 1200-V SiC MOSFET discretes are 100% avalanche (UIL) tested during production. They also have low gate charge and low internal gate resistance, which are critical to realizing ultra-fast switching and achieving highest efficiencies (low E_{on} and E_{off}) across a wide range of application switching frequencies. Furthermore, these devices incorporate a fast and reliable body diode with low intrinsic charge.

The MOSFETs are also said to provide benchmark low reverse-recovery charge (Q_{RR}) at all temperatures; 30% better than any similarly rated competitor device. This offers further reduction in power losses and boosts operating frequencies.

Other features includes normally-off stable operation up to 175°C. All of GeneSiC's SiC MOSFETs are designed and fabricated with state-of-the-art processes to deliver products that are stable and reliable at all operating conditions without any malfunction risk. The superior gate-oxide quality of these devices prevents any threshold (V_{TH}) drift, says the vendor.

The SiC MOSFETs are designed to drive faster and more efficient with their low device capacitances— C_{iss} , C_{oss} and C_{rss} . Additionally, these devices are designed to be driven at +15-V/-5-V gate drive. This offers broad compatibility with existing commercial IGBT and SiC MOSFET gate drivers

Applications for the 1200V G3R SiC MOSFETs include electric vehicles (power train and charging), solar inverters and energy storage, industrial motor drives, uninterruptible power supplies, switched-mode power supplies, bidirectional dc-dc converters, smart grid and HVDC, induction heating and welding, and pulsed power applications.

All of the company's SiC MOSFETs are targeted for automotive applications (AEC-Q101) and are PPAP-capable. All devices are offered in industry standard D2PAK, TO-247 and SOT-227 packages, some of which have the Kelvin source connection (see the figure). A list of the devices in the G3R series are shown in the table.

All devices are available for purchase from authorized distributors including Digi-key, [Newark](#), [Mouser](#), and [Arrow](#). See the GeneSiC website to find a local [source](#). For datasheet and other resources, visit the SiC MOSFET [page](#).

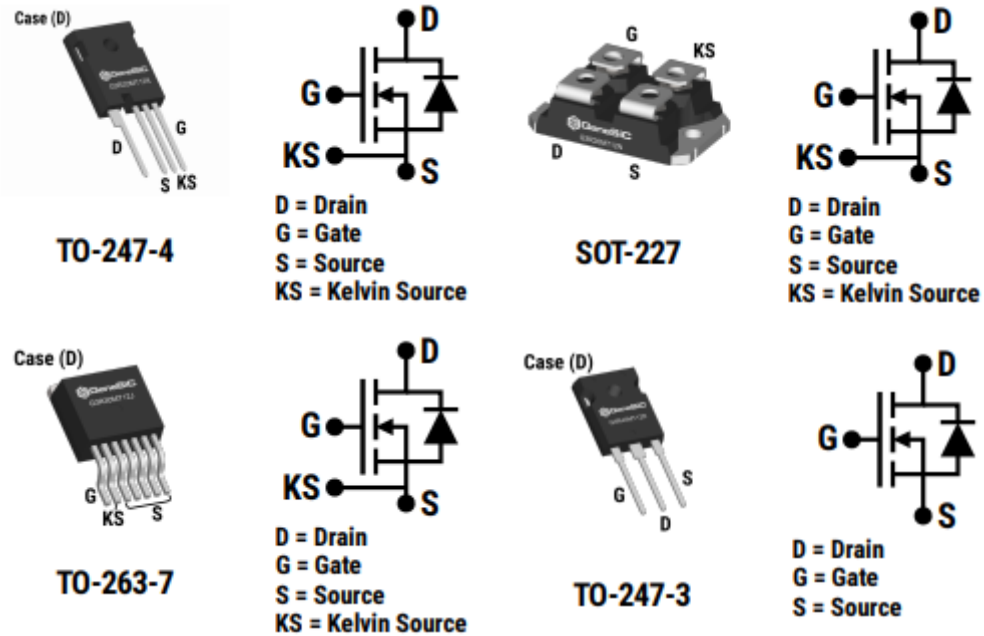


Figure. Packaging options for the 1200-V G3R SiC MOSFETs.

Table. Part numbers, $R_{DS(ON)}$ and package types for the 1200-V G3R SiC MOSFETs. (Part numbers contain links to the datasheets.)

Model number	$R_{DS(ON)}$ (m Ω)	Package
G3R20MT12K	20	TO-247-4
G3R20MT12N	20	SOT-227
G3R30MT12J	30	TO-263-7
G3R30MT12K	30	TO-247-4
G3R40MT12J	40	TO-263-7
G3R40MT12D	40	TO-247-3
G3R40MT12K	40	TO-247-4
G3R75MT12J	75	TO-263-7
G3R75MT12D	75	TO-247-3
G3R75MT12K	75	TO-247-4
G3R160MT12J	160	TO-263-7
G3R160MT12D	160	TO-247-3
G3R350MT12J	350	TO-263-7
G3R350MT12D	350	TO-247-3