

## Discrete mSiC™ MOSFETs

### Summary

SiC MOSFETs are used in medium- to high-voltage power systems and enable higher switching frequencies with improved efficiency, while reducing the system size and the need for redundancy. Our mSiC™ MOSFETs offer unrivaled ruggedness and performance with a wide breadth of solutions with a lower system cost, faster time to market and lower risk. Our solutions come with an oxide lifetime of more than 100 years and a stable body diode, coupled with best-in-class avalanche ruggedness, short circuit capability and neutron susceptibility for improved system reliability and uptime.

As industries move toward higher efficiency, smaller form factors and increased power density in power electronics systems, traditional silicon (Si) MOSFETs and IGBTs are increasingly unable to meet the stringent performance requirements. These legacy technologies suffer from higher conduction and switching losses, limited high-voltage capability and thermal inefficiencies, which constrain system performance and lead to bulky, expensive cooling solutions. There is a critical need for a next-generation switching technology that can operate at higher voltages, higher frequencies and elevated temperatures while reducing system size, weight and cost.

To meet these growing demands, mSiC MOSFETs offer a significant leap beyond the capabilities of traditional switching devices. The advanced material properties of SiC and our robust design enable superior electrical performance across a wide range of operating conditions. This allows you to create smaller, more efficient systems with simplified cooling and greater long-term reliability while reducing total system cost.

### Key Features of mSiC MOSFETs

- **Low  $R_{DS(on)}$  Across Temperature Range:** Ensure high efficiency and minimal conduction losses even at elevated temperatures
- **High Avalanche Ruggedness:** Withstand harsh operating conditions and inductive load switching without device failure
- **Fast Switching with Low Gate Charge (Qg):** Enable high-frequency operation to reduce system size and improve system performance
- **Voltage Range of 700–3300V:** Supports a broad range of high-voltage industrial, transportation and other applications
- **High-Temperature Operation ( $T_J$  up to 175°C):** Optimal for thermally demanding environments due to their reduced cooling requirements
- **Short-Circuit and Surge Robustness:** Enhance system reliability and longevity in fault-prone applications

## Key Benefits of mSiC MOSFETS

- **High Power Density:** The high efficiency and switching frequency of SiC MOSFETs enable the use of smaller passive components, such as magnetics and filters, which contribute to overall system miniaturization.
- **Increased System Efficiency:** Lower switching and conduction losses reduce power waste and improve efficiency and system performance.
- **Smaller, Lighter Systems:** High-frequency operation enables the use of smaller passive components and cooling systems, reducing size and weight.
- **Improved Reliability and Robustness:** High avalanche and surge capabilities enhance durability in demanding applications.
- **Simplified Thermal Management:** High-temperature operation allows for reduced or simplified cooling infrastructure.
- **Faster Time to Market:** Comprehensive design support, including gate drivers and reference designs, accelerates development.
- **Scalable Solutions:** Broad portfolio of discrete devices and modules allows for easy system scalability across power levels.

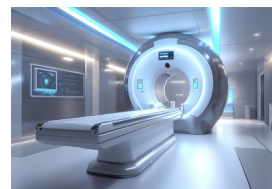
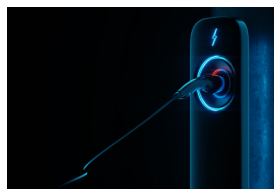
## mSiC MOSFET Families

The MA, MB and MC SiC MOSFET families address different levels of cost, compatibility and integration. The MA family delivers strong all-around performance with excellent  $R_{DS(on)}$  stability and thermal resistance, making it an excellent choice for applications prioritizing ruggedness and increased performance and reliability.

The MB family builds on these capabilities by offering enhanced robustness, including HV-H3TRB qualification. It is optimized for cost-sensitive applications and compatibility with 15V gate drive systems. The MC family further advances the MB family by integrating gate resistance for improved switching control to maintain low switching energy, high reliability and robust performance in harsh environments. The MB and MC families target high-volume, cost-optimized designs, while the MA family remains the go-to option for applications where thermal resistance and high power density are critical.

Table Key	
-	Average
↓	Lower
+	Good
++	Better

		MA Family	MB Family	MC Family
<b>Price</b>	<b>Cost Per Amp</b>	-	↓	↓
<b>Compatibility</b>	<b><math>V_{GS(min)}</math></b>	18V	15V	15V
<b>Performance</b>	<b>Switching Energy</b>	Medium	Low	Low
<b>Performance</b>	<b>Integrated RG</b>	No	No	Yes
<b>Robustness</b>	<b>HV-H3TRB Capable</b>	No	Yes	Yes
<b>Performance</b>	<b>Short-Circuit Withstand Time (SCWT)</b>	+	+	+
<b>Performance</b>	<b><math>R_{DS(on)}</math> vs. Temperature</b>	++	++	++
<b>Performance</b>	<b>Junction-to-Case Thermal Resistance</b>	++	+	+
<b>Robustness</b>	<b>Unclamped Inductive Switching (UIS)</b>	+	+	+



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