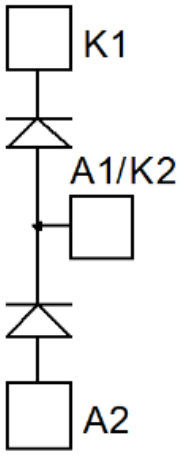
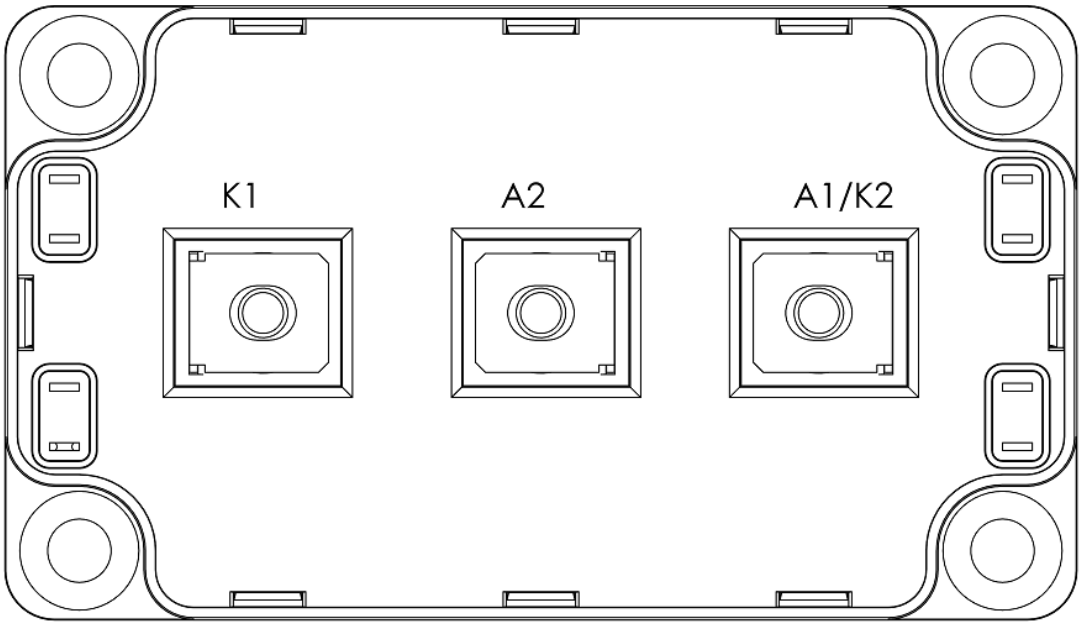
# MSCDC450A70AG SiC Diode Phase Leg Power Module

## 1 Product Overview

This section provides the product overview for the MSCDC450A70AG device.




All ratings at $T_j$ = 25 °C, unless otherwise specified.

**Caution:** These devices are sensitive to electrostatic discharge. Proper handling procedures should be followed.

## 1.1 Features

The following are key features of the MSCDC450A70AG device:

- Silicon carbide (SiC) Schottky diode
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature-independent switching behavior
  - Positive temperature coefficient on VF
- Low stray inductance
- M5 power connectors
- High level of integration
- Aluminum nitride (AlN) substrate for improved thermal performance

## 1.2 Benefits

The following are benefits of the MSCDC450A70AG device:

- Outstanding performance at high-frequency operation
- Low noise switching
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- RoHS compliant

## 1.3 Applications

The MSCDC450A70AG device is designed for the following applications:

- Uninterruptible power supply (UPS)
- Induction heating
- Welding equipment
- High-speed rectifiers

# 2 Electrical Specifications

This section provides the electrical specifications for the MSCDC450A70AG device.

## 2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode for the MSCDC450A70AG device.

**Table 1 • Absolute Maximum Ratings**

| Symbol | Parameter | | Maximum Ratings | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | 700 | V |
| $I_F$ | DC forward current | $T_C$ = 55 °C | 450 | A |

The following table shows the thermal and package characteristics of the MSCDC450A70AG.

**Table 2 • Thermal and Package Characteristics**

| Symbol | Characteristic | | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{ISOL}$ | RMS isolation voltage, any terminal to case t =1 minute, 50 Hz/60 Hz | | | 4000 | | V |
| $T_J$ | Operating junction temperature range | | | –40 | 175 | °C |
| $T_{JOP}$ | Recommended junction temperature under switching conditions | | | –40 | $T_{Jmax}$–25 | |
| $T_{STG}$ | Storage temperature range | | | –40 | 125 | |
| $T_C$ | Operating case temperature | | | –40 | 125 | |
| Torque | Mounting torque | To heatsink | M6 | 3 | 5 | N.m |
| | | For terminals | M5 | 2 | 3.5 | |
| Wt | Package weight | | | | 300 | g |

## 2.2 Electrical Performance

The following table shows the electrical characteristics per diode of the MSCDC450A70AG.

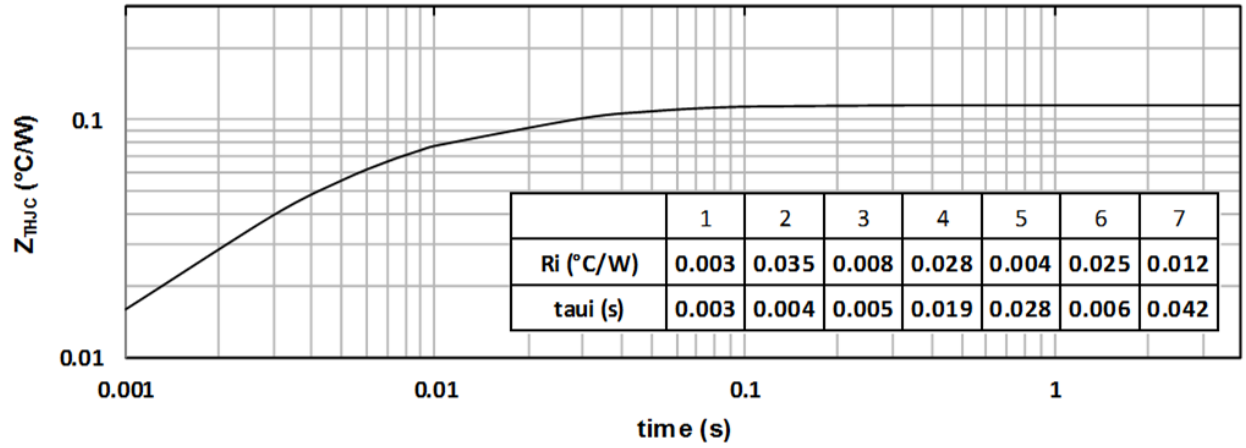
**Table 3 • Electrical Characteristics Per Diode**

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_F$ | Diode forward voltage | $I_F$ = 450 A | $T_j$ = 25 °C | | 1.5 | 1.8 | V |
| | | | $T_j$ = 175 °C | | 1.9 | | |
| $I_{RM}$ | Reverse leakage current | $V_R$ = 700 V | $T_j$ = 25 °C | | 0.13 | 1.8 | mA |
| | | | $T_j$ = 175 °C | | 1.9 | | |
| $Q_C$ | Total capacitive charge | $V_R$ = 400 V | | | 1197 | | nC |
| C | Total capacitance | f = 1 MHz, $V_R$ = 200 V | | | 2232 | | pF |
| | | f = 1 MHz, $V_R$ = 400 V | | | 1944 | | |
| $R_{thJC}$ | Junction-to-case thermal resistance | | | | | 0.114 | °C/W |

## 2.3 Performance Curves

This section shows the typical performance curves for the MSCDC450A70AG device.

**Figure 1 • Maximum Transient Thermal Impedance**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Ri (°C/W) | 0.003 | 0.035 | 0.008 | 0.028 | 0.004 | 0.025 | 0.012 |
| taui (s) | 0.003 | 0.004 | 0.005 | 0.019 | 0.028 | 0.006 | 0.042 |

**Figure 2 • Forward Current vs. Forward Voltage**

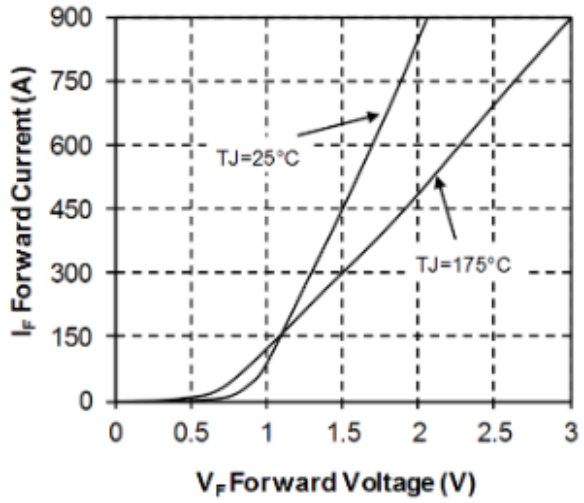
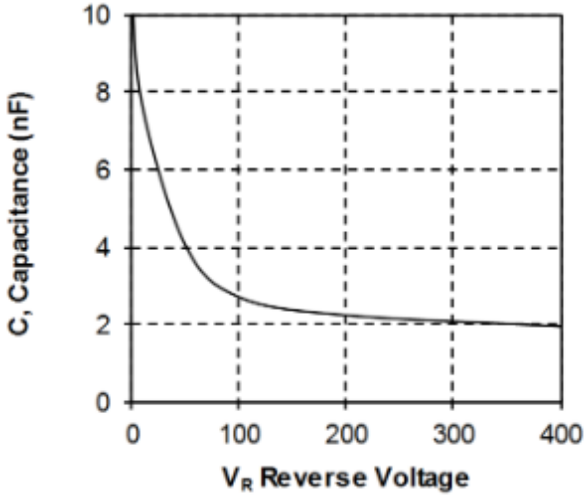



**Figure 3 • Capacitance vs. Reverse Voltage**



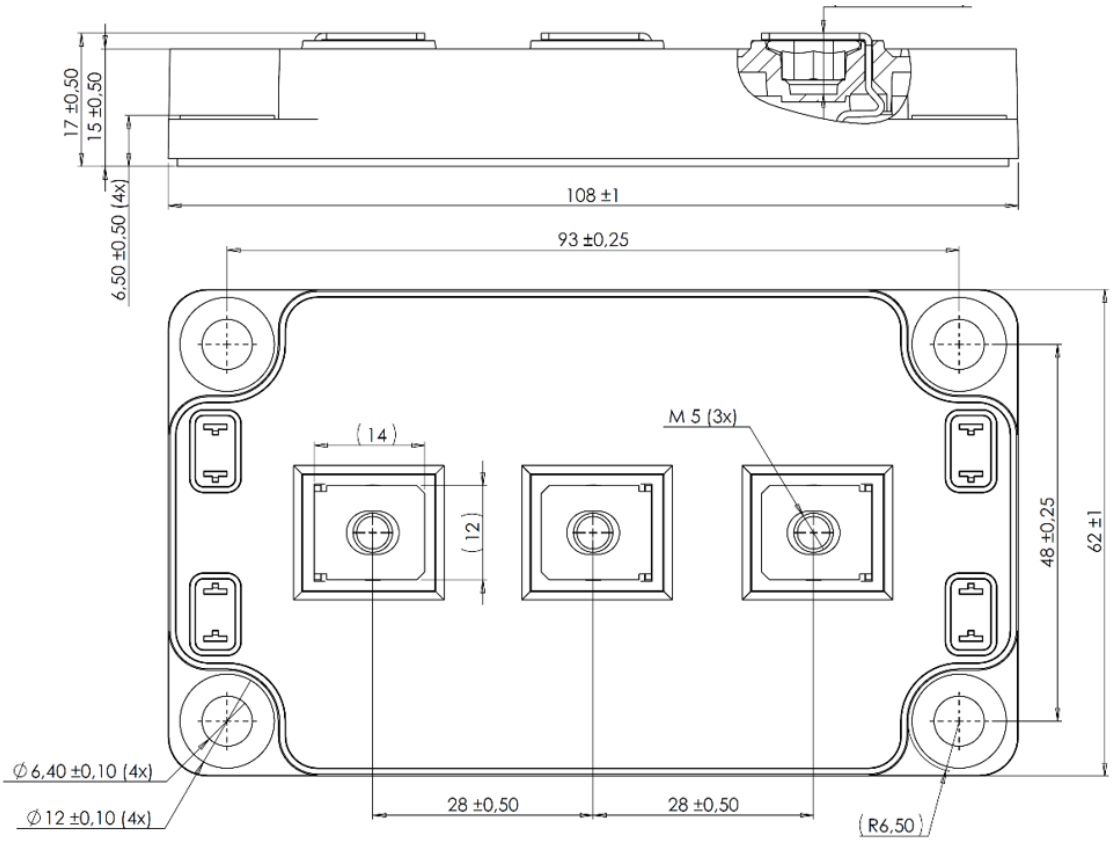
# 3 Package Specifications

This section shows the package specifications for the MSCDC450A70AG device.

## 3.1 Package Outline Drawing

The following drawing shows the package outline of the MSCDC450A70AG device. The dimensions in the following figure are in millimeters.

**Figure 4 • Package Outline Drawing**



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MSCC-0344-DS-01021 | June 2019 | Final