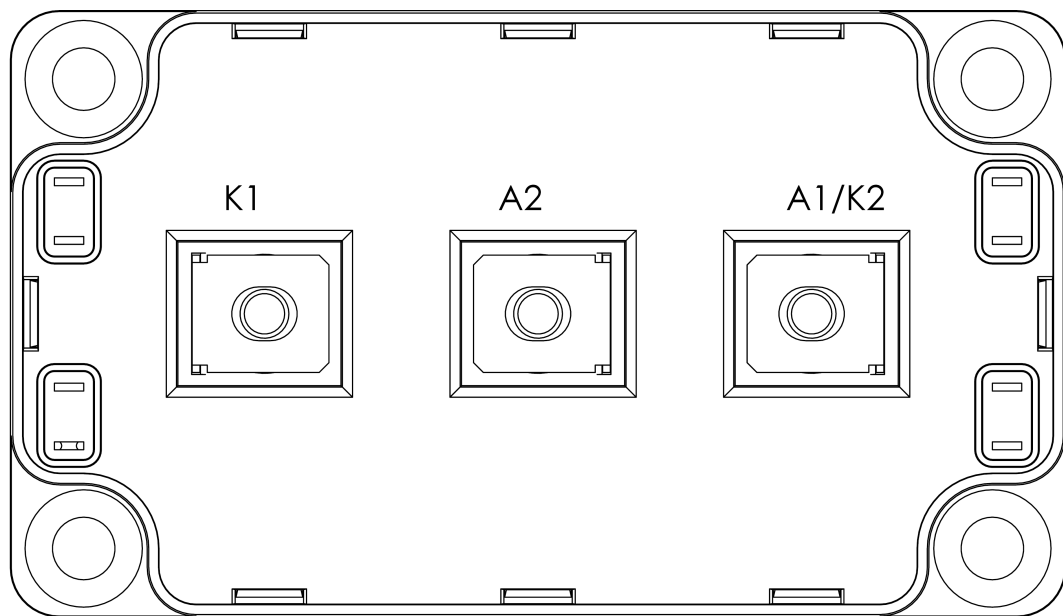
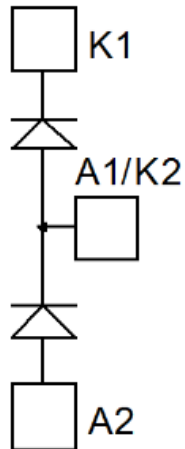


# MSCDC450A120AG SiC Diode Phase Leg Power Module

## 1 Product Overview

This section provides the product overview for the MSCDC450A120AG device.



All ratings at  $T_j = 25\text{ }^\circ\text{C}$ , 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 MSCDC450A120AG 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 MSCDC450A120AG 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 MSCDC450A120AG 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 MSCDC450A120AG device.

### 2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode for the MSCDC450A120AG device.

**Table 1 • Absolute Maximum Ratings**

| Symbol    | Parameter                       | Maximum Ratings                         | Unit |
|-----------|---------------------------------|---|------|
| $V_{RRM}$ | Repetitive peak reverse voltage | 1200                                    | V    |
| $I_F$     | DC forward current              | $T_C = 90\text{ }^\circ\text{C}$<br>450 | A    |

The following table shows the thermal and package characteristics of the MSCDC450A120AG.

**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             | $^\circ\text{C}$ |     |     |
| $T_{JOP}$  | 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 MSCDC450A120AG.

**Table 3 • Electrical Characteristics Per Diode**

| Symbol     | Characteristic                      | Test Conditions                        | Min                                    | Typ  | Max   | Unit               |
|------------|-------------------------------------|--|--|------|-------|--------------------|
| $V_F$      | Diode forward voltage               | $I_F = 450\text{ A}$                   | $T_J = 25\text{ }^\circ\text{C}$       | 1.5  | 1.8   | V                  |
|            |                                     |  | $T_J = 175\text{ }^\circ\text{C}$      | 2.1  |       |                    |
| $I_{RM}$   | Reverse leakage current             | $V_R = 1200\text{ V}$                  | $T_J = 25\text{ }^\circ\text{C}$       | 0.14 | 1.8   | mA                 |
|            |                                     |  | $T_J = 175\text{ }^\circ\text{C}$      | 2.1  |       |                    |
| $Q_C$      | Total capacitive charge             | $V_R = 600\text{ V}$                   |  | 2016 |       | nC                 |
| C          | Total capacitance                   | $f = 1\text{ MHz}, V_R = 400\text{ V}$ |  | 2214 |       | pF                 |
|            |                                     |  | $f = 1\text{ MHz}, V_R = 800\text{ V}$ | 1638 |       |                    |
| $R_{thJC}$ | Junction-to-case thermal resistance |  |  |      | 0.074 | $^\circ\text{C/W}$ |

## 2.3 Performance Curves

This section shows the typical performance curves for the MSCDC450A120AG device.

Figure 1 • Maximum Transient Thermal Impedance

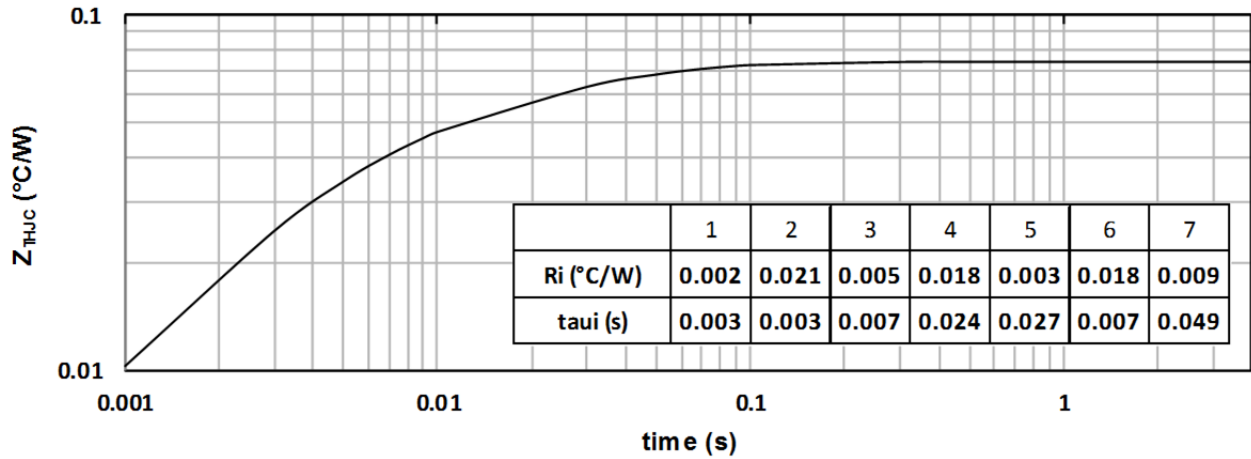


Figure 2 • Forward Current vs. Forward Voltage

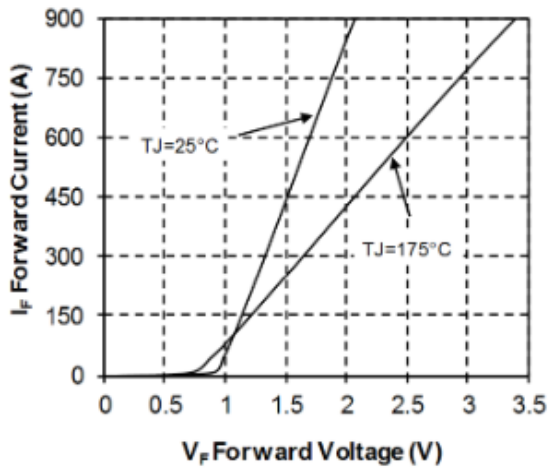
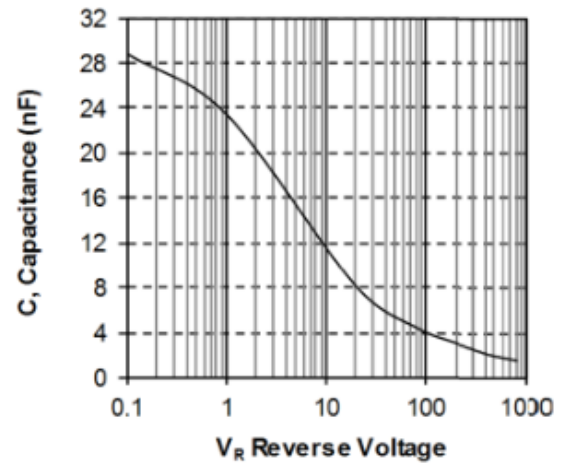


Figure 3 • Capacitance vs. Reverse Voltage



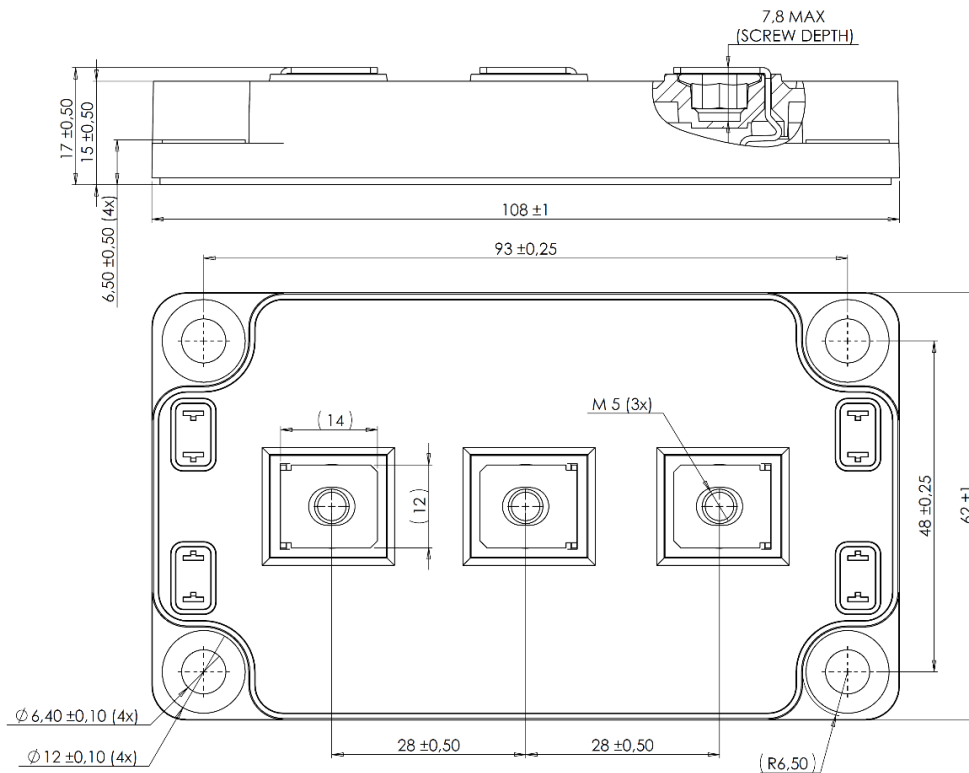
### 3 Package Specifications

This section shows the package specifications for the MSCDC450A120AG device.

#### 3.1 Package Outline Drawing

The following drawing shows the package outline of the MSCDC450A120AG device. The dimensions in the following figure are in millimeters.

**Figure 4 • Package Outline Drawing**





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[25.330.4753.1](#) [25.330.5253.1](#) [25.334.3253.1](#) [25.334.3353.1](#) [25.350.2053.0](#) [25.352.4753.1](#) [25.522.3253.0](#) [T483C](#) [T484C](#) [T485F](#) [T485H](#)  
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[25.332.4353.1](#) [25.350.1653.0](#) [25.350.2453.0](#) [25.352.1453.0](#) [25.352.1653.0](#) [25.352.2453.0](#) [25.352.5453.1](#) [25.522.3353.0](#) [25.602.4053.0](#)  
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