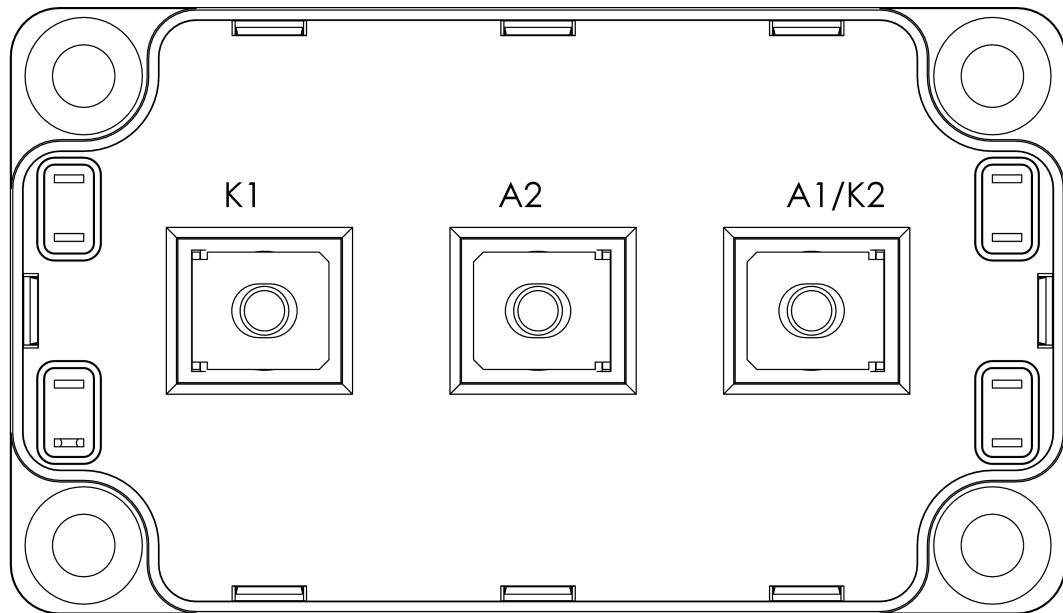
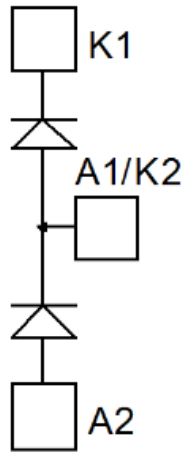


# MSCDC450A120AG SiC Diode Phase Leg Power Module

## 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	$T_C = 90\text{ }^\circ\text{C}$ 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

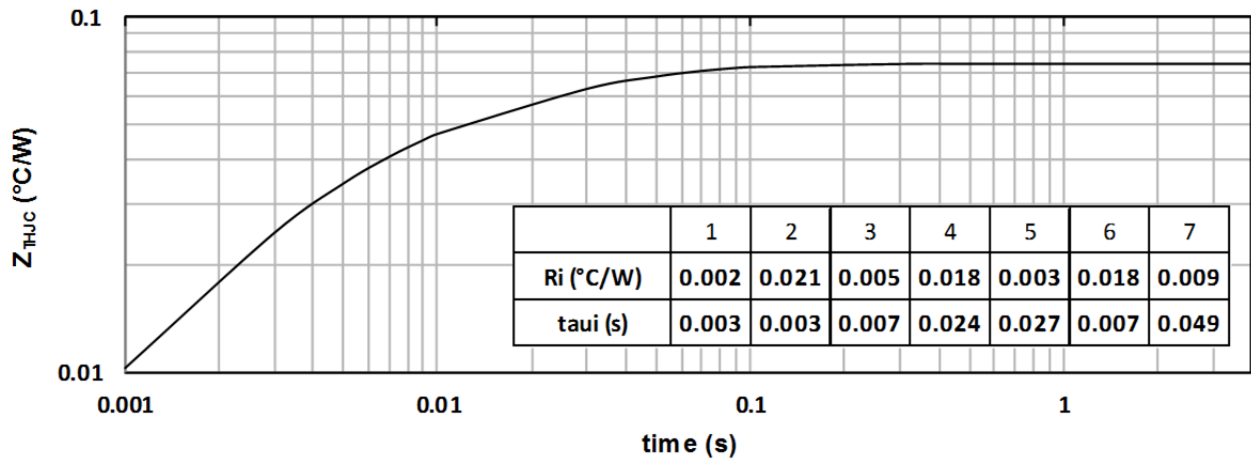


Figure 2 • Forward Current vs. Forward Voltage

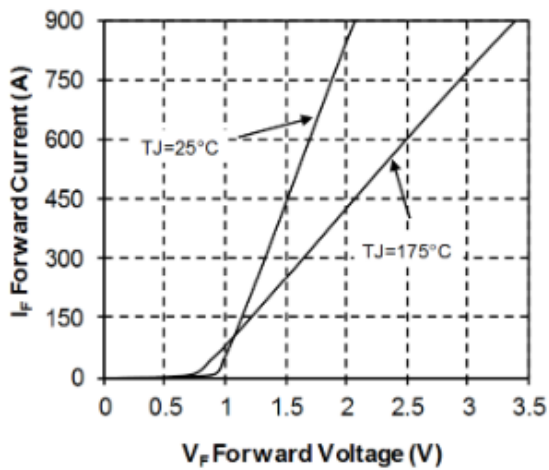
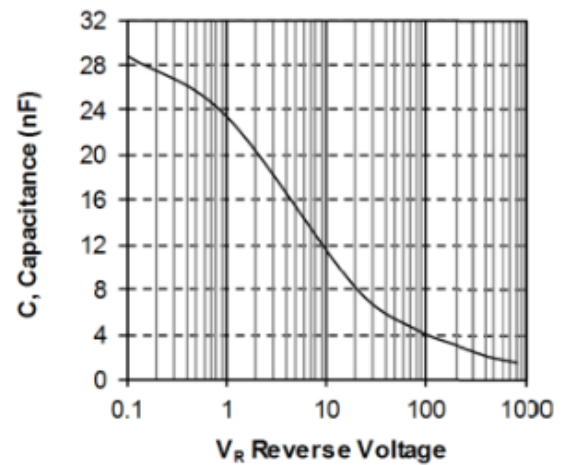


Figure 3 • Capacitance vs. Reverse Voltage



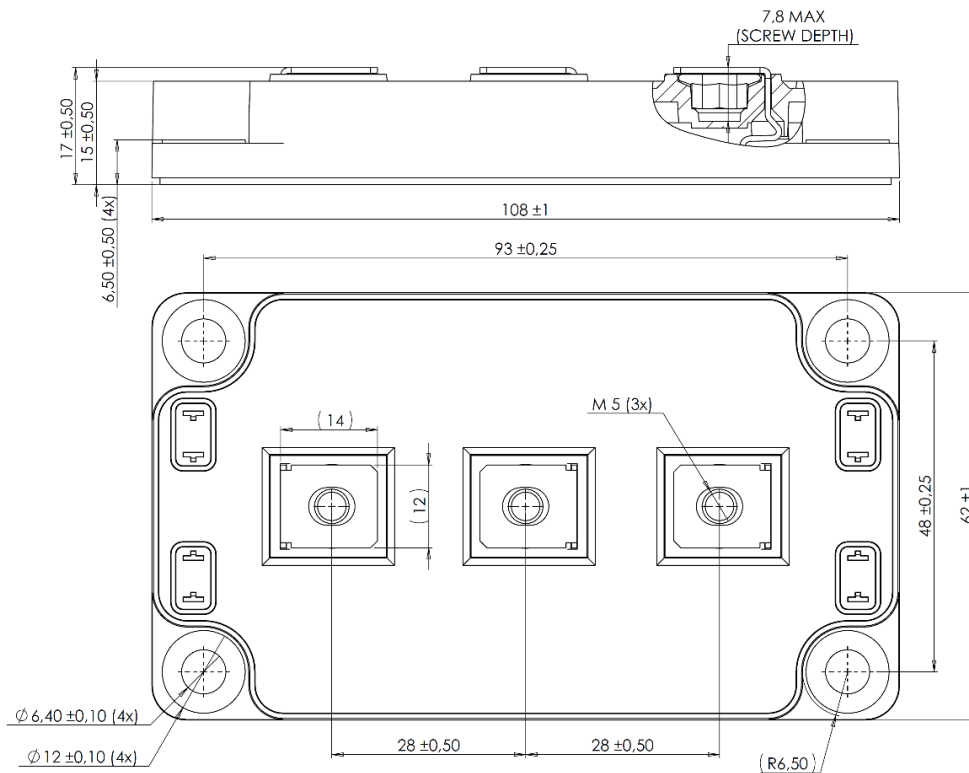
### 3 Package Specifications

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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