

**MSCDC50X1701AG**  
**Datasheet**  
**SiC Diode 3 Phase Bridge Power Module**

December 2019



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a  **MICROCHIP** company

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# 1 Revision History

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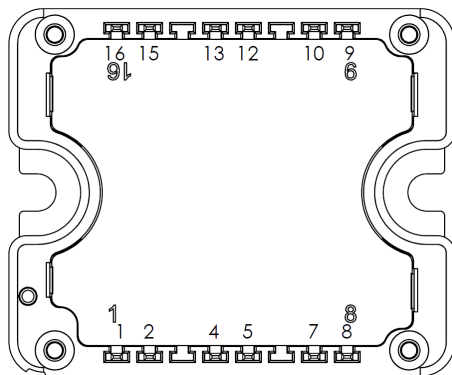
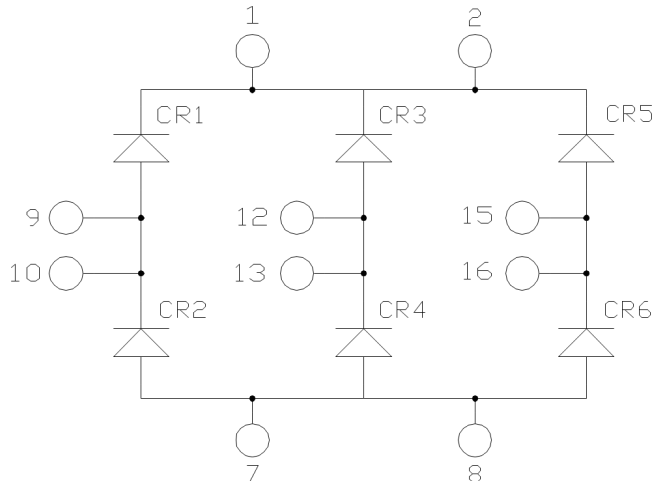
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

## 1.1 Revision 1.0

Revision 1.0 was published in December 2019. It is the first publication of this document.

## 2 Product Overview

This section shows the product overview of the MSCDC50X1701AG device.



All multiple inputs and outputs must be shorted together

1/2 ; 7/8 ; 9/10 ; 12/13 ; 15/16

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.

### 2.1 Features

The following are key features of the MSCDC50X1701AG device:

- Silicon Carbide (SiC) Schottky Diode
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature independent switching behavior
  - Positive temperature coefficient on VF
- High blocking voltage
- Very low stray inductance
- Aluminum nitride (AlN) substrate for improved thermal performance

## 2.2 Benefits

The following are benefits of the MSCDC50X1701AG device:

- Outstanding performance at high frequency operation
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low profile
- RoHS compliant

## 2.3 Applications

The MSCDC50X701AG device is designed for the following applications:

- Welding converters
- Switched-mode power supplies
- Uninterruptible power supplies
- Battery DC power supply

## 3 Electrical Specifications

This section shows the electrical specifications of the MSCDC50X1701AG device.

### 3.1 Absolute Maximum Ratings

The following tables show the absolute maximum ratings per SiC diode and thermal and package characteristics of the MSCDC50X1701AG device.

**Table 1 • Absolute Maximum Ratings**

Symbol	Parameter	Max Ratings	Unit
$V_{RRM}$	Repetitive peak reverse voltage	1700	V
$I_F$	DC forward current	$T_C = 125\text{ }^\circ\text{C}$ 50	A

**Table 2 • Thermal and Package Characteristics**

Symbol	Characteristics	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	M4	2	3	N.m
Wt	Package weight				80	g

### 3.2 Electrical Performance

The following table shows the electrical characteristics per SiC diode of the MSCDC50X1701AG device.

**Table 3 • Electrical Characteristics**

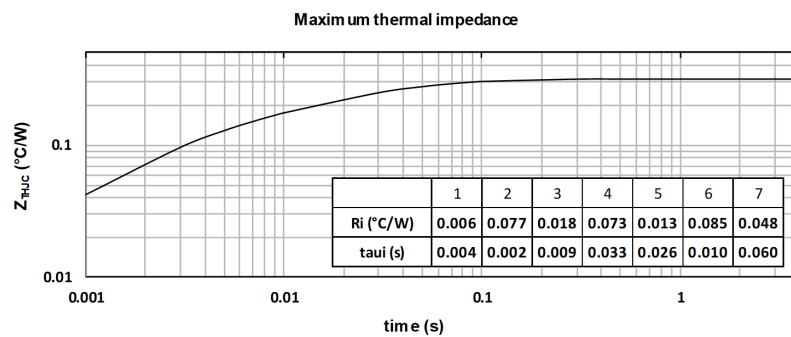
Symbol	Characteristics	Test Conditions	Min	Typ	Max	Unit
$V_F$	Diode forward voltage	$I_F = 50\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	1.5	1.8	V
			$T_J = 175\text{ }^\circ\text{C}$	2		
$I_{RM}$	Reverse leakage current	$V_R = 1700\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	50	200	$\mu\text{A}$
			$T_J = 175\text{ }^\circ\text{C}$	250		

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Unit
$Q_C$	Total capacitive charge	$V_R = 900\text{ V}$		410		nC
C	Total capacitance	$f = 1\text{ MHz}, V_R = 600\text{ V}$		300		pF
		$f = 1\text{ MHz}, V_R = 900\text{ V}$		250		
$R_{thJC}$	Junction-to-case thermal resistance				0.32	$^{\circ}\text{C}/\text{W}$

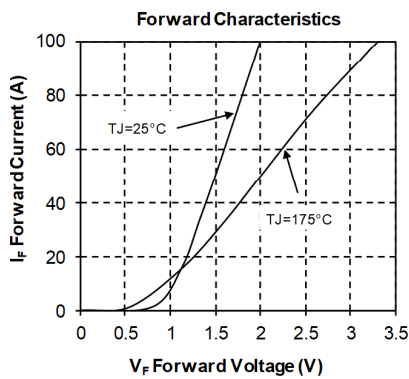
### 3.3 Typical Performance Curves

This section shows the typical performance curves of the MSCDC50X1701AG device.

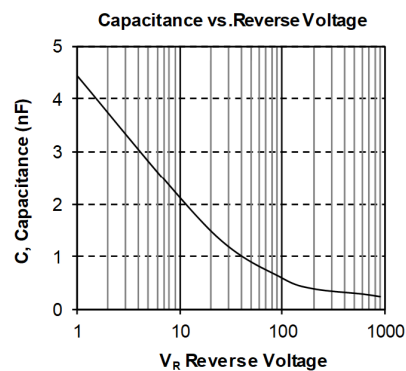
**Figure 1 • Maximum Transient Thermal Impedance**



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



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









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