

MSCDC50X1701AG
Datasheet
SiC Diode 3 Phase Bridge Power Module

December 2019



Contents

Revision History.....	1
1.1 Revision 1.0.....	1
Product Overview.....	2
2.1 Features.....	2
2.2 Benefits.....	3
2.3 Applications.....	3
Electrical Specification.....	4
3.1 Absolute Maximum Ratings.....	4
3.2 Electrical Performance.....	4
3.3 Typical Performance Curves.....	5
Package Specifications.....	6
4.1 Package Outline Drawing.....	6

1 Revision History

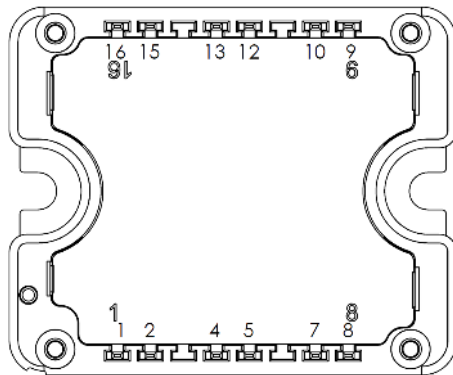
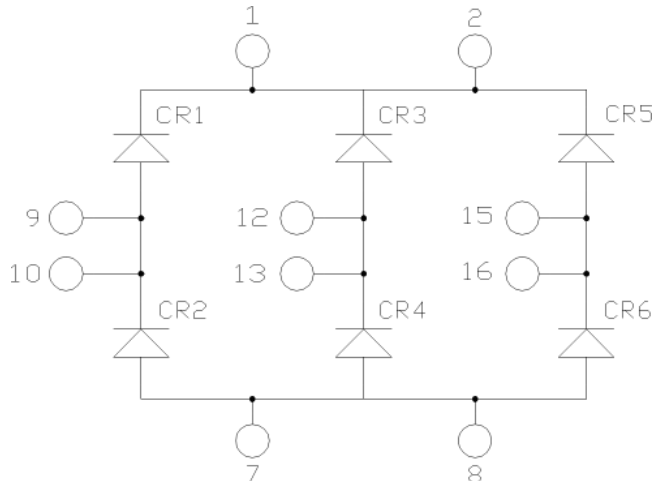
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

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	μA
			$T_J = 175\text{ }^\circ\text{C}$	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

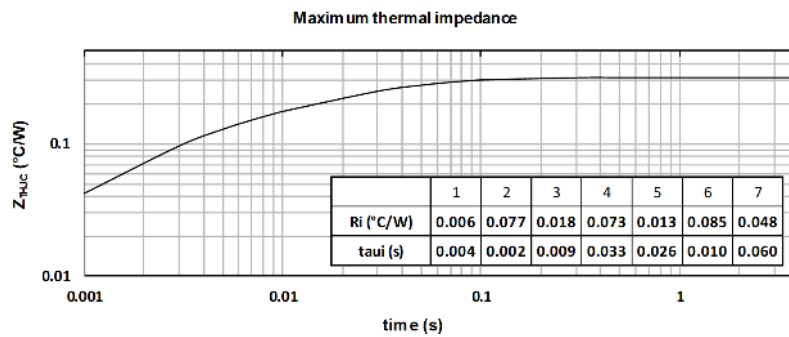


Figure 2 • Forward Current vs. Forward Voltage

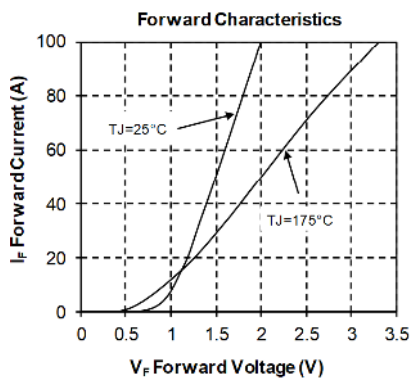
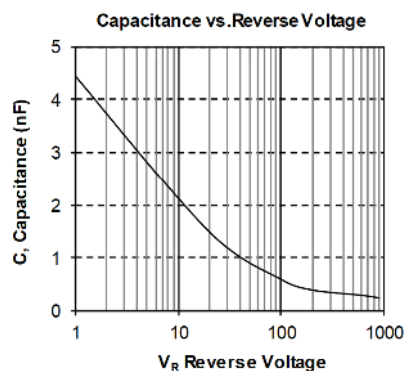


Figure 3 • Capacitance vs. Reverse Voltage



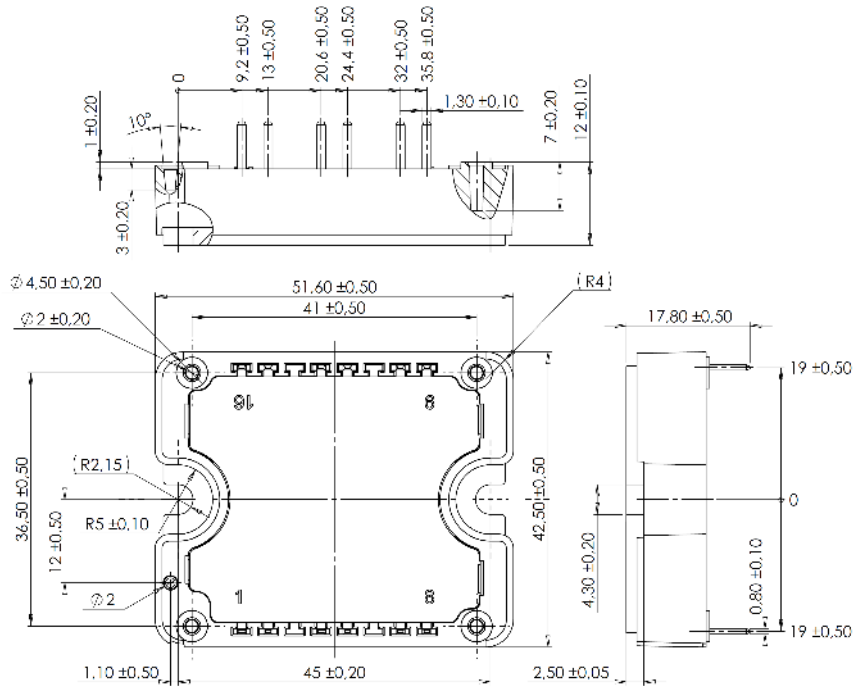
4 Package Specifications

This section shows the package specifications for the MSCDC50X1701AG device.

4.1 Package Outline Drawing

The following image illustrates the package outline of MSCDC50X1701AG device. The dimensions in the following figure are in millimeters.

Figure 4 • Package Outline Drawing





Microchip Technology Inc.
 2355 West Chandler Blvd.
 Chandler, Arizona, USA 85224-6199

Within the USA: +1 (800) 713-4113
 Outside the USA: +1 (949) 380-6100
 Sales: +1 (949) 380-6136
 Fax: +1 (949) 215-4996
 Email: sales.support@microsemi.com
www.microsemi.com

© 2019 Microsemi. All rights reserved. Microsemi and the Microsemi logo are trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

Microsemi, a wholly owned subsidiary of Microchip Technology Inc. (Nasdaq: MCHP), offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Learn more at www.microsemi.com.

MSSC-0344-DS-01037-1.0-1219