MSCDC50X1701AG

Datasheet

SiC Diode 3 Phase Bridge Power Module

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a MICROCHIP company

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1 Revision History

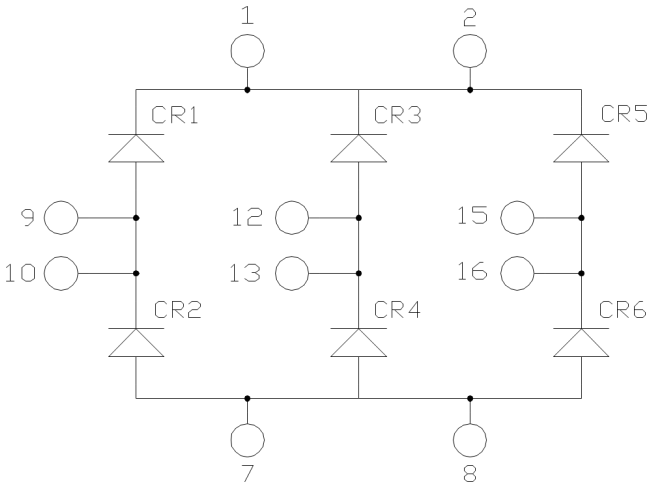
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

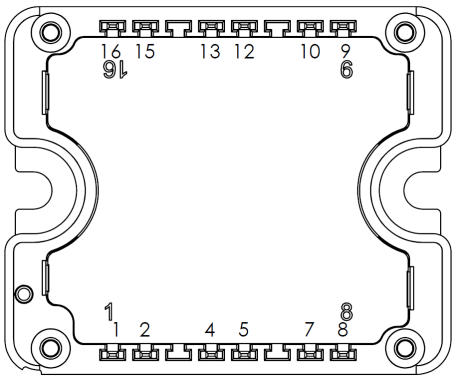
1.1 Revision 1.0

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 Tj = 25 °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 °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	°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 A	T_j = 25 °C		1.5	1.8	V
			T_j = 175 °C		2		
I_{RM}	Reverse leakage current	V_R = 1700 V	T_j = 25 °C		50	200	µA
			T_j = 175 °C		250		

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

3.3 Typical Performance Curves

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

Figure 1 • Maximum Transient Thermal Impedance

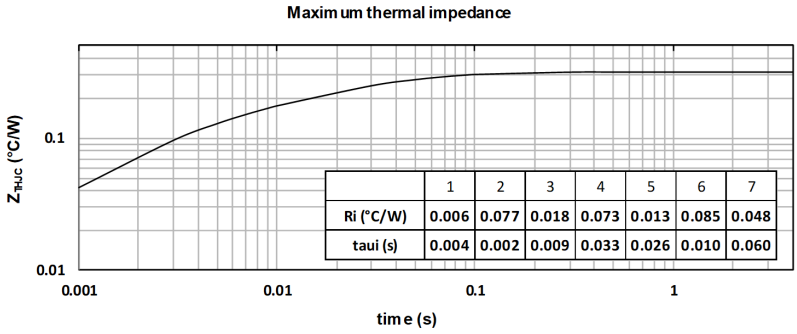


Figure 2 • Forward Current vs. Forward Voltage

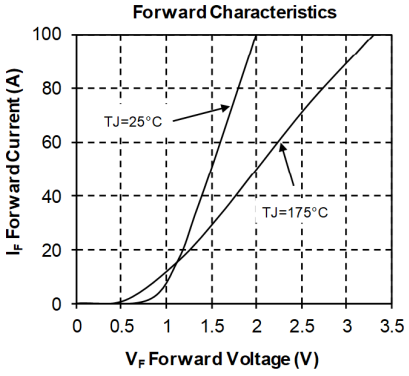
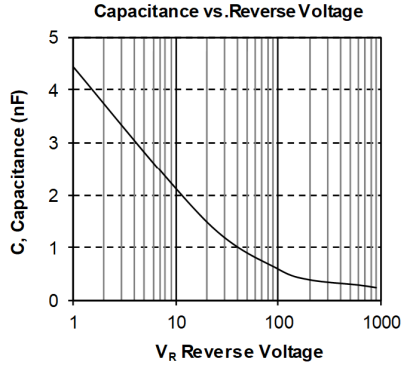


Figure 3 • Capacitance vs. Reverse Voltage



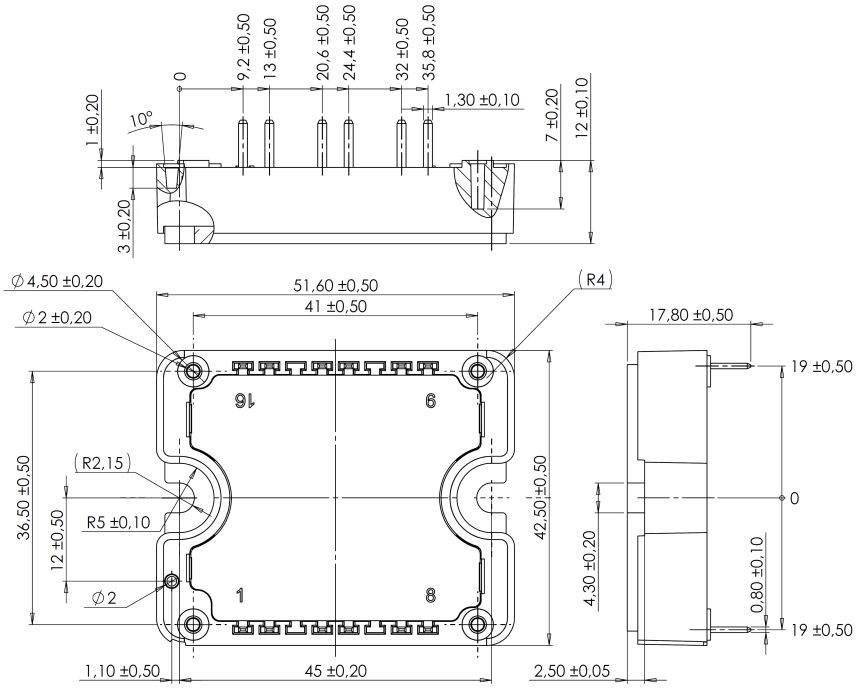
4 Package Specifications

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



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