MSCDC300A170AG

Datasheet

SiC Diode Phase Leg Power Module

December 2019

Microsemi

a Microchip company

Contents

1 Revision History

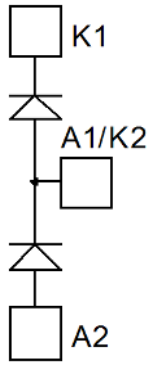
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

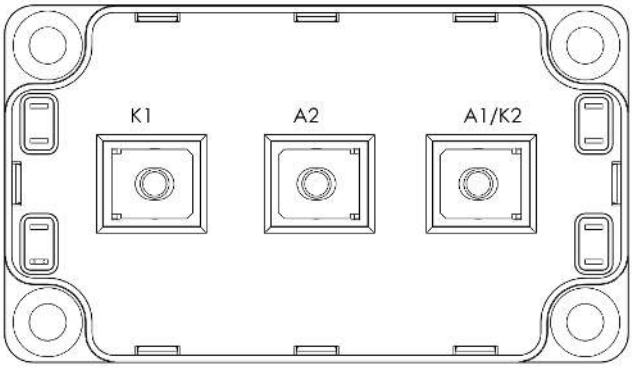
1.1 Revision 1.0

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

2 Product Overview

This section provides the product overview for the MSCDC300A170AG device.





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 MSCDC300A170AG device:

- Silicon Carbide (SiC) Schottky diode
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature independent switching behavior
  - Positive temperature coefficient on
- Low stray inductance
- M5 power connectors
- High level of integration
- Aluminum nitride (AlN) substrate for improved thermal performance

2.2 Benefits

The following are benefits of the MSCDC300A170AG device:

- Outstanding performance at high frequency operation

- Low noise switching
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- RoHS compliant

2.3 Applications

The MSCDC300A170AG device is designed for the following applications:

- Uninterruptible power supply (UPS)
- Induction heating
- Welding equipment
- High-speed rectifiers

3 Electrical Specifications

This section provides the electrical specifications for the MSCDC300A170AG device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode for the MSCDC300A170AG 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	300	A

The following table shows the thermal and package characteristics of the MSCDC300A170AG.

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	°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

3.2 Electrical Performance

The following table shows the electrical characteristics per diode of the MSCDC300A170AG.

Table 3 • Electrical Characteristics

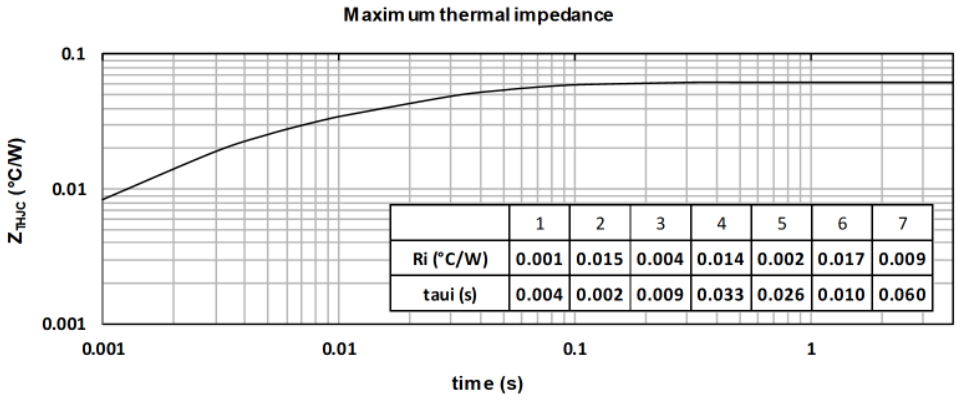
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_F	Diode forward voltage	I_F = 300 A	T_j = 25 °C		1.5	1.8	V
			T_j = 175 °C		2		
I_{RM}	Reverse leakage current	V_R = 1700 V	T_j = 25 °C		0.3	1.2	mA
			T_j = 175 °C		1.5		

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
Q_C	Total capacitive charge	V_R = 900 V		2.5		µC
C	Total capacitance	f = 1 MHz, V_R = 600 V		1.8		nF
		f = 1 MHz, V_R = 900 V		1.5		
R_{thJC}	Junction-to-case thermal resistance				0.062	°C/W

3.3 Typical Performance Curves

This section shows the typical performance curves for the MSCDC300A170AG device.

Figure 1 • Maximum Transient Thermal Impedance



	1	2	3	4	5	6	7
Ri (°C/W)	0.001	0.015	0.004	0.014	0.002	0.017	0.009
taui (s)	0.004	0.002	0.009	0.033	0.026	0.010	0.060

Figure 2 • Forward Current vs. Forward Voltage

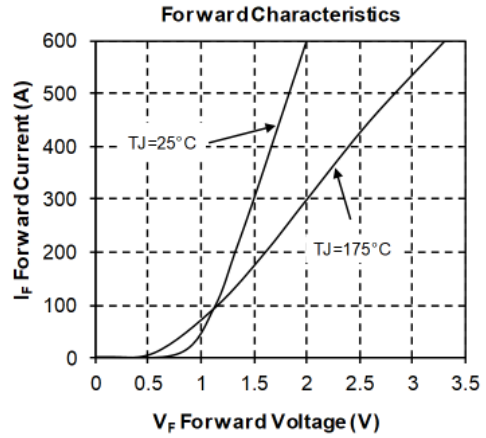
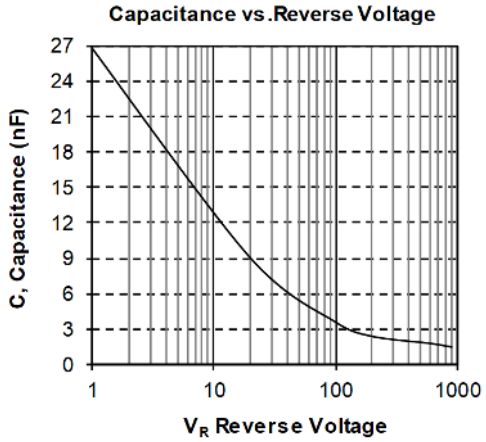


Figure 3 • Capacitance vs. Reverse Voltage



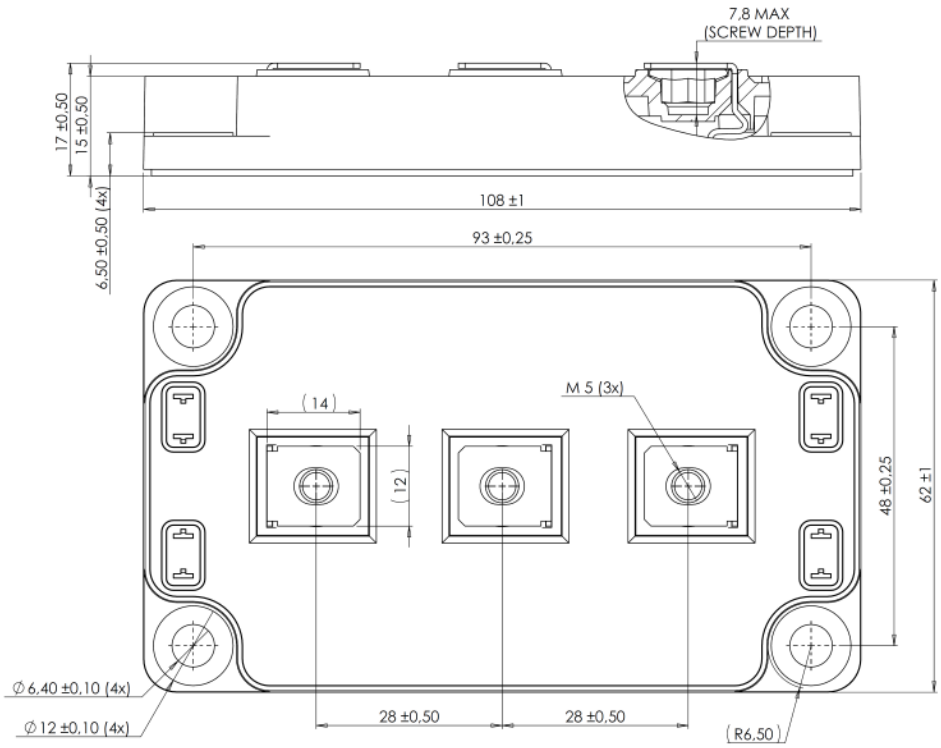
4 Package Specifications

This section shows the package specifications for the MSCDC300A170AG device.

4.1 Package Outline Drawing

The following image illustrates the package outline of the MSCDC300A170AG device. The dimensions in the following figure are in millimeters.

Figure 4 • Package Outline Drawing



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