

MSC50DC170HJ
Datasheet
SiC Diode Full Bridge Power Module

December 2019



a  **MICROCHIP** company

Contents

Revision History.....	1
1.1 Revision 1.0.....	1
Product Overview.....	2
2.1 Features.....	2
2.2 Benefits.....	2
2.3 Applications.....	3
Electrical Specifications.....	4
3.1 Absolute Maximum Ratings.....	4
3.2 Electrical Performance.....	4
3.3 Typical Performance Curves.....	6
Package Specification.....	7
4.1 Package Outline Drawing.....	7

1 Revision History

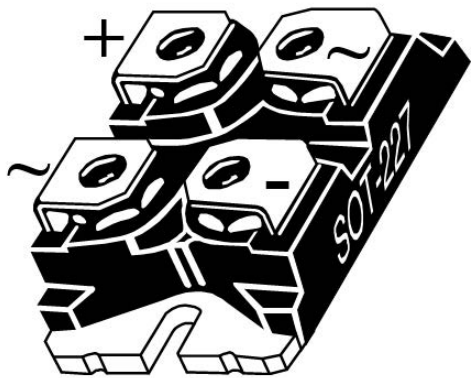
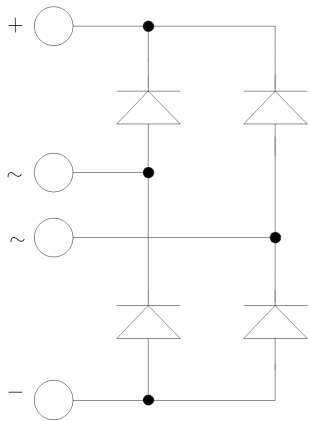
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

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 MSC50DC170HJ device.



All ratings at $T_j = 25^\circ\text{C}$, 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 MSC50DC170HJ device:

- Silicon Carbide (SiC) Schottky diode
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature-independent switching behavior
 - Positive temperature coefficient on VF
- Very low stray inductance
- High level of integration

2.2 Benefits

The following are benefits of the MSC50DC170HJ device:

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- RoHS compliant

2.3 Applications

The MSC50DC170HJ device is designed for the following applications:

- Switch-mode power supplies rectifier
- Induction heating
- Welding equipment
- High-speed rectifiers

3 Electrical Specifications

This section shows the electrical specifications of the MSC50DC170HJ device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per SiC diode of the MSC50DC170HJ device.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Max Ratings	Unit
V_{RRM}	Repetitive peak reverse voltage	1700	V
I_F	DC forward current	$T_C = 100\text{ }^\circ\text{C}$ 50	A

Table 2 • Thermal and Package Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
V_{ISOL}	RMS isolation voltage, any terminal to case $t = 1$ minute, 50 Hz/60 Hz	2500			V
T_J, T_{STG}	Storage temperature range	-55		175	$^\circ\text{C}$
T_{JOP}	Recommended junction temperature under switching conditions	-55		$T_{Jmax} - 25$	
Torque	Terminals and mounting screws			1.1	N.m
Wt	Package weight		29.2		g

3.2 Electrical Performance

The following table shows the electrical characteristics per SiC diode of the MSC50DC170HJ.

Table 3 • Electrical Characteristics

Symbol	Characteristic	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	
Q_C	Total capacitive charge	$V_R = 900\text{ V}$		410		nC

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C	Total capacitance	f = 1 MHz, VR = 600 V		300		pF
		f = 1 MHz, VR = 900 V		250		
R _{thJC}	Junction-to-case thermal resistance				0.544	°C/W

3.3 Typical Performance Curves

This section shows the typical performance curves of the MSC50DC170HJ device.

Figure 1 • Maximum Transient Thermal Impedance

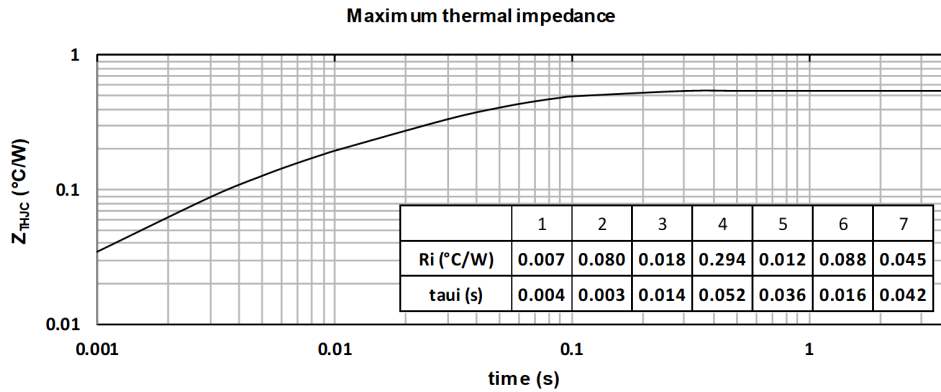


Figure 2 • Forward Current vs. Forward Voltage

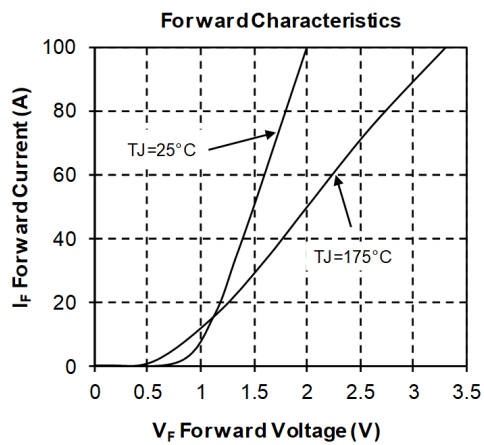
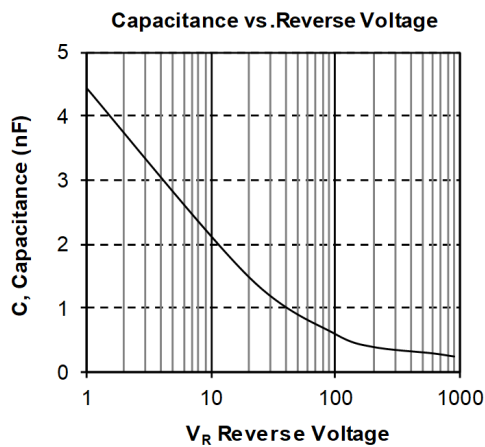


Figure 3 • Capacitance vs. Reverse Voltage



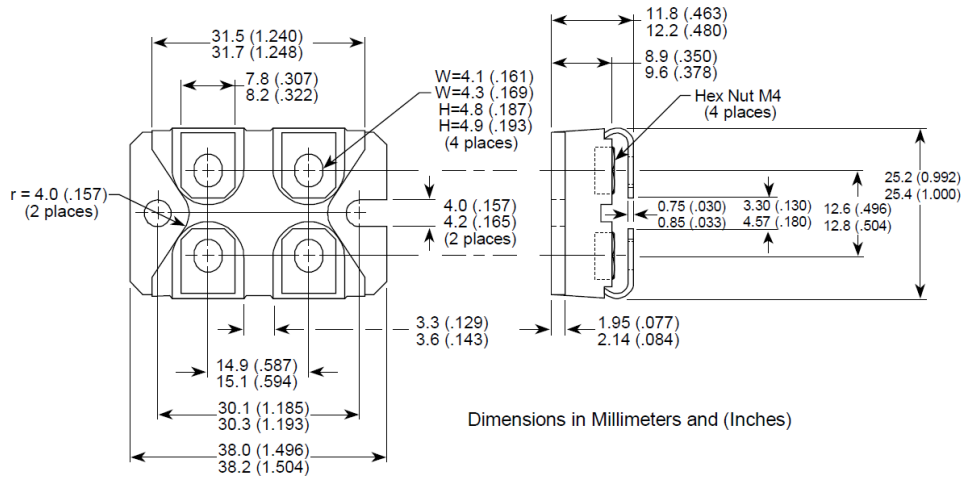
4 Package Specification

This section shows the package specification of the MSC50DC170HJ device.

4.1 Package Outline Drawing

The following image illustrates the package outline of MSC50DC170HJ device.

Figure 4 • Package Outline Drawing





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