

**MSC50DC170HJ**  
**Datasheet**  
**SiC Diode Full Bridge Power Module**

December 2019



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a  **MICROCHIP** company

# Contents

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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

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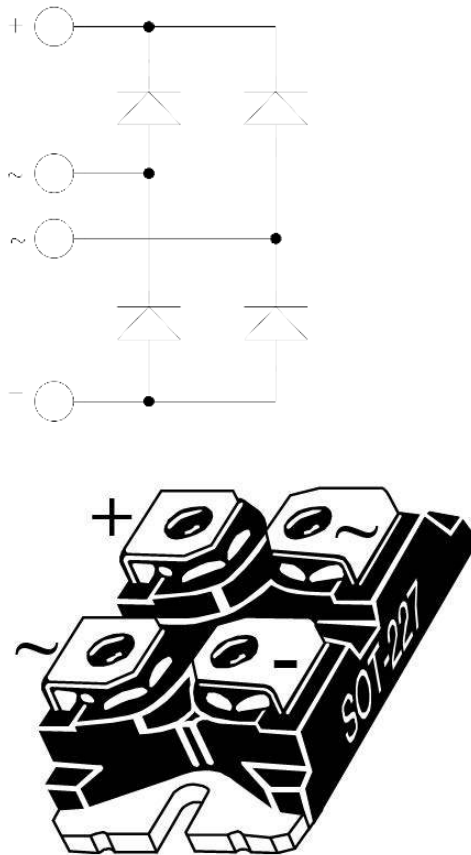
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

## 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 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**

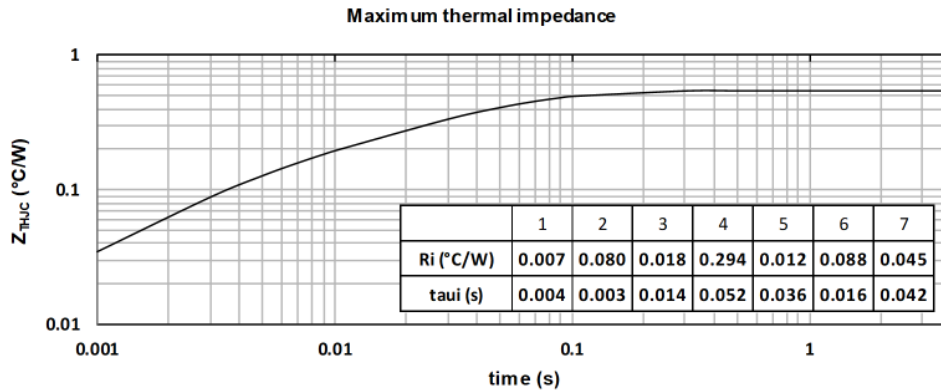
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$V_F$	Diode forward voltage	$I_F = 50\text{ A}$	$T_j = 25\text{ }^\circ\text{C}$		1.5	1.8	V
			$T_j = 175\text{ }^\circ\text{C}$		2		
$I_{RM}$	Reverse leakage current	$V_R = 1700\text{ V}$	$T_j = 25\text{ }^\circ\text{C}$		50	200	$\mu\text{A}$
			$T_j = 175\text{ }^\circ\text{C}$		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 <sub>thJC</sub>	Junction-to-case thermal resistance				0.544	°C/W

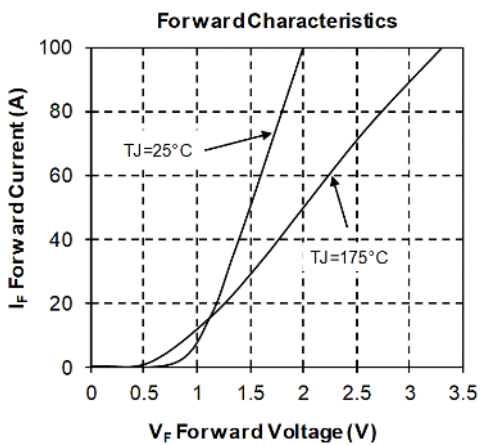
### 3.3 Typical Performance Curves

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

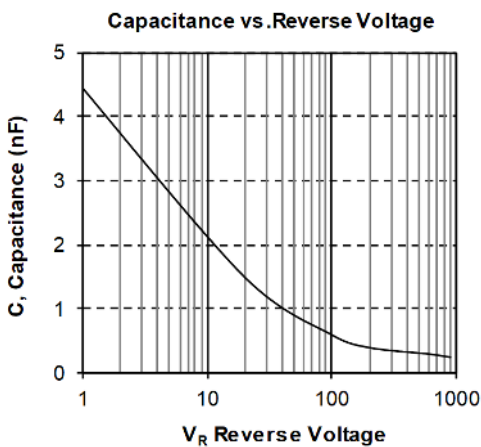
**Figure 1 • Maximum Transient Thermal Impedance**



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



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





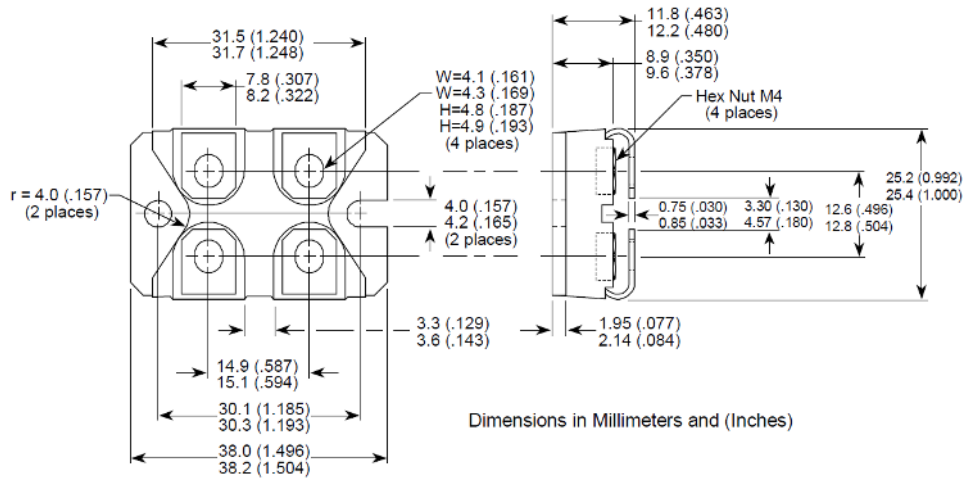
## 4 Package Specification

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**



Dimensions in Millimeters and (Inches)



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