MSC50DC170HJ

Datasheet

SiC Diode Full Bridge Power Module

December 2019

Microsemi

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

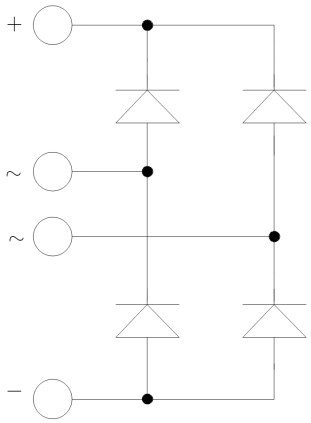
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

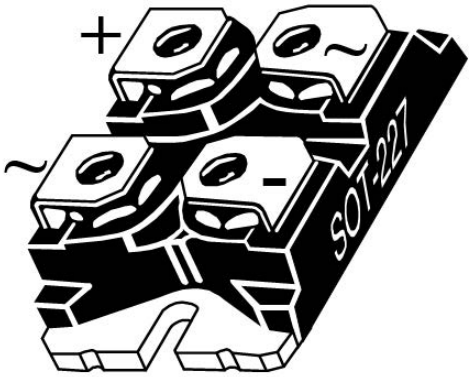
1.1 Revision 1.0

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°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 °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	°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

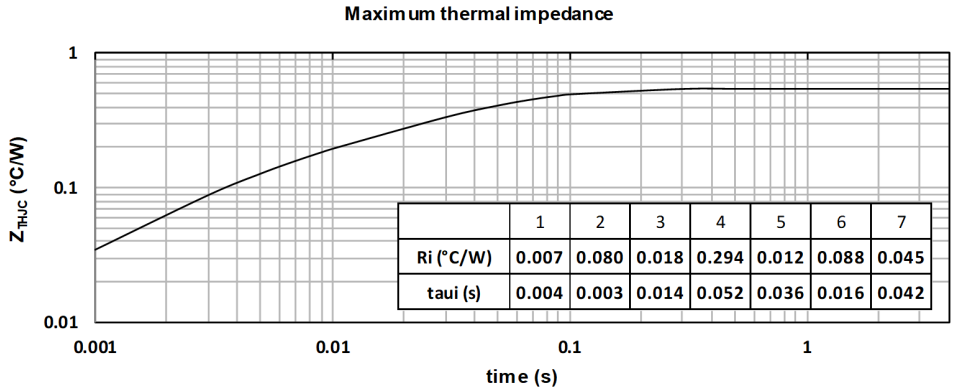
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_F	Diode forward voltage	I_F = 50 A	T_j = 25 °C		1.5	1.8	V
			T_j = 175 °C		2		
I_{RM}	Reverse leakage current	V_R = 1700 V	T_j = 25 °C		50	200	µA
			T_j = 175 °C		250		
Q_C	Total capacitive charge	V_R = 900 V			410		nC

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



	1	2	3	4	5	6	7
Ri (°C/W)	0.007	0.080	0.018	0.294	0.012	0.088	0.045
taui (s)	0.004	0.003	0.014	0.052	0.036	0.016	0.042

Figure 2 • Forward Current vs. Forward Voltage

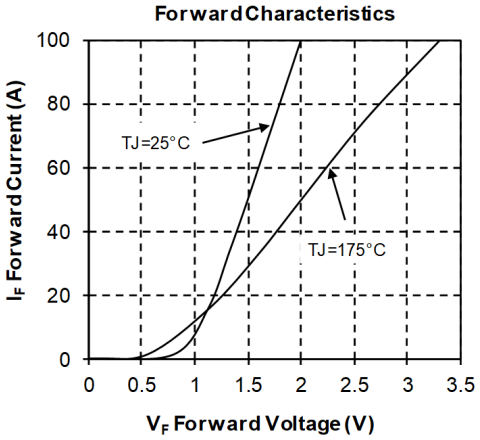
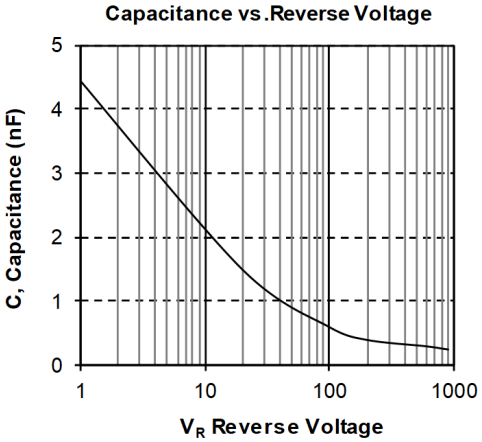


Figure 3 • Capacitance vs. Reverse Voltage



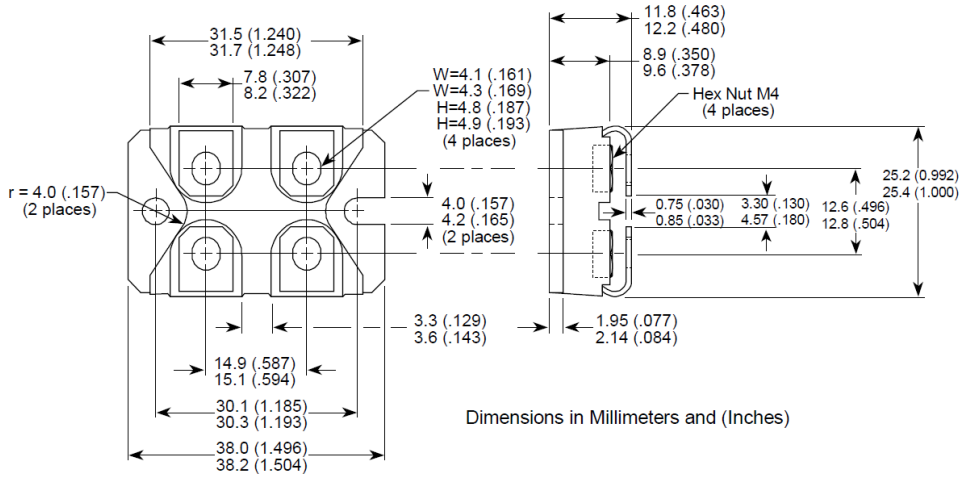
4 Package Specification

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



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

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**.

MSCC-0344-DS-01035-1.0-1219