# MSC50DC170HJ

# Datasheet

# SiC Diode Full Bridge Power Module

December 2019

Microsemi

a Microchip company

# Contents

# 1 Revision History

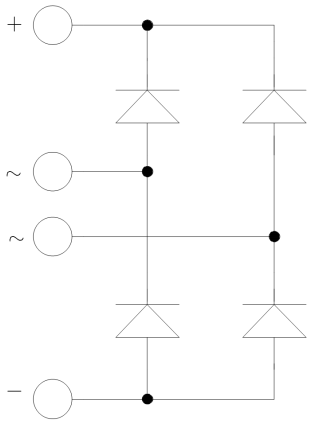
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

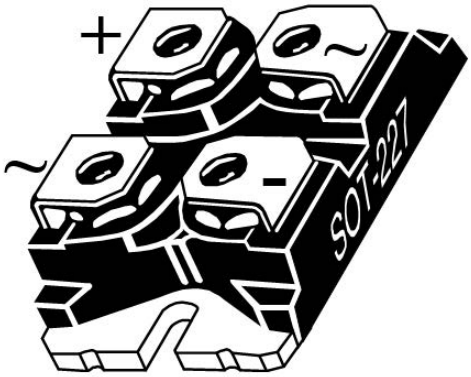
## 1.1 Revision 1.0

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

# 2 Product Overview

This section 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**

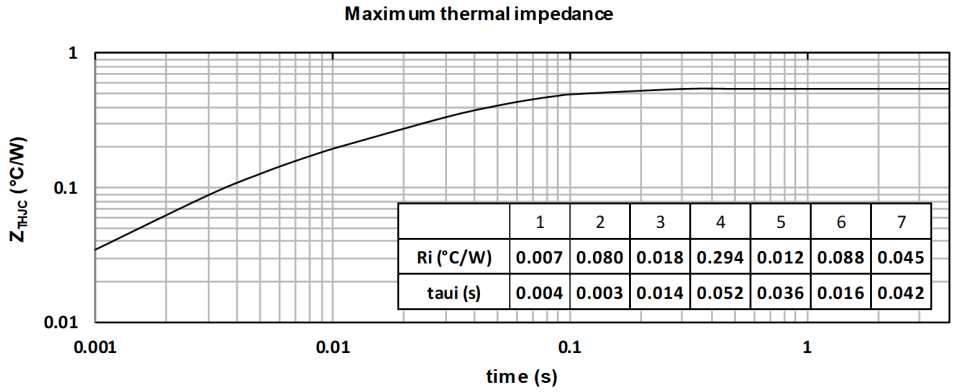
| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_F$ | Diode forward voltage | $I_F$ = 50 A | $T_j$ = 25 °C | | 1.5 | 1.8 | V |
| | | | $T_j$ = 175 °C | | 2 | | |
| $I_{RM}$ | Reverse leakage current | $V_R$ = 1700 V | $T_j$ = 25 °C | | 50 | 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**

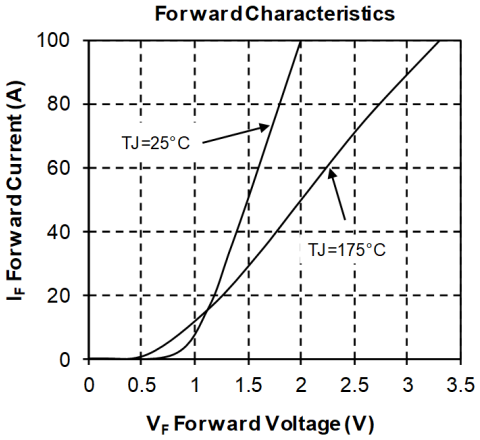
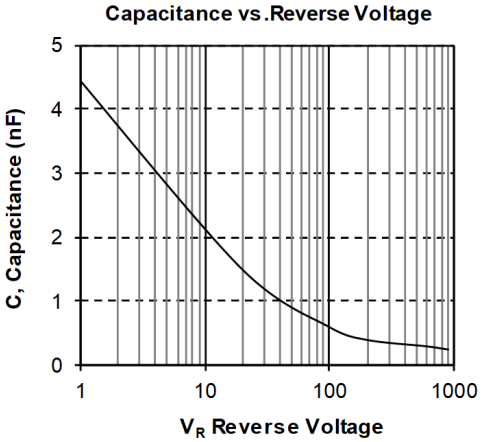



**Figure 3 • Capacitance vs. Reverse Voltage**



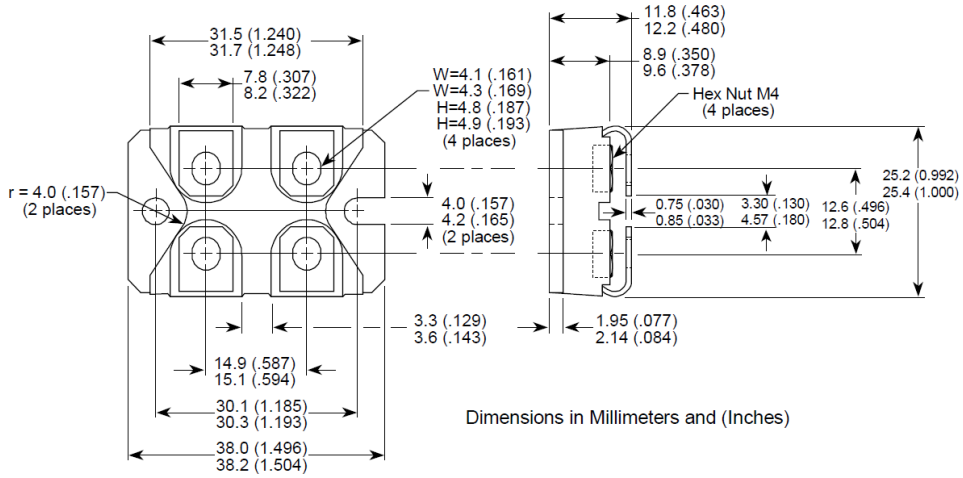
# 4 Package Specification

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**



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