# MSC050SDA120B Datasheet Zero Recovery Silicon Carbide Schottky Diode

Final January 2018





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# 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.

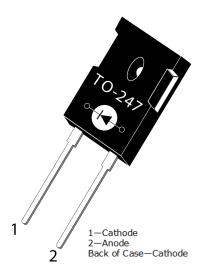
## 1.1 Revision A

Revision A was published in January 2018. It is the first publication of this document.



## 2 Product Overview

The silicon carbide (SiC) power Schottky barrier diodes (SBD) product line from Microsemi increases your performance over silicon diode solutions while lowering your total cost of ownership for high-voltage applications. The MSC50SDA120B is a 1200 V, 50 A SiC SBD in a two-lead TO-247 package (shown below).



#### 2.1 Features

The following are key features of the MSC050SDA120B device:

- Low forward voltage
- Low leakage current
- No reverse recovery current/no forward recovery
- Avalanche energy rated
- RoHS compliant

#### 2.2 Benefits

The following are benefits of the MSC050SDA120B device:

- Higher reliability systems
- Minimizes heat sink requirements
- Higher efficiency

## 2.3 Applications

The MSC050SDA120B device is designed for the following applications:

- H/EV powertrain and EV charger
- Power supply and distribution
- PV inverter, converter, and industrial motor drives
- Smart grid transmission and distribution
- Aviation



# **3** Electrical Specifications

This section details the electrical specifications for the MSC050SDA120B device.

## 3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC050SDA120B device. All ratings at  $T_c = 25$  °C unless otherwise specified.

**Table 1 • Absolute Maximum Ratings** 

Symbol	Parameter		Ratings	Unit
VR	Maximum peak repetitive reverse voltage			V
VRRM				
V <sub>RWM</sub>				
l <sub>F</sub>	Maximum DC forward current	Tc = 25 °C	109	Α
		Tc = 135 °C	49	
		Tc = 145 °C	41	_
İfrm	Repetitive peak forward surge current ( $T_c$ = 25 °C, $t_p$ = 8.3 ms, half sine wave)		154	
Ifsм	Non-repetitive forward surge current ( $T_c$ = 25 °C, $t_p$ = 8.3 ms, half sine wave)		290	_
P <sub>tot</sub>	Power dissipation	Tc = 25 °C	429	W
		Tc = 110 °C	186	_
Tı , Tstg	Operating junction and storage temperature range		–55 to	°C
			175	
Tι	Lead temperature for 10 seconds		300	_
Eas	Single-pulse avalanche energy (starting $T_1$ = 25 °C, L = 0.08 mH, peak $I_L$ = 50 A)		100	mJ

The following table shows the thermal and mechanical characteristics of the MSC050SDA120B device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Тур	Max	Unit
Reлc	Junction-to-case thermal resistance		0.24	0.35	°C/W
WT	Package weight		0.22		OZ
			5.9		g
Torque	Maximum mounting torque			10	lb-in
				1.1	N-m



## 3.2 Electrical Performance

The following table shows the static characteristics of the MSC050SDA120B device.

**Table 3 • Static Characteristics** 

Symbol	Characteristic/Test Conditions		Min	Тур	Max	Unit
VF	Forward voltage	I <sub>F</sub> = 50 A, T <sub>J</sub> = 25 °C		1.5	1.8	V
		I <sub>F</sub> = 50 A, T <sub>J</sub> = 175 °C		2.1		=
Irm	Reverse leakage current	V <sub>R</sub> = 1200 V, T <sub>J</sub> = 25 °C		15	200	μΑ
		V <sub>R</sub> = 1200 V, T <sub>J</sub> = 175 °C		250		=
Qc	Total capacitive charge $V_R = 600 \text{ V}$ , $T_J = 25 ^{\circ}\text{C}$			224		nC
Сл	Junction capacitance $V_R = 400 \text{ V}$ , $T_J = 25 \text{ °C}$ , $f$	f = 1 MHz		246		pF
	Junction capacitance V <sub>R</sub> = 800 V, T <sub>J</sub> = 25 °C, f	f = 1 MHz		182		=



## 3.3 Performance Curves

This section shows the typical performance curves for the MSC050SDA120B device.

Figure 1 • Maximum Transient Thermal Impedance

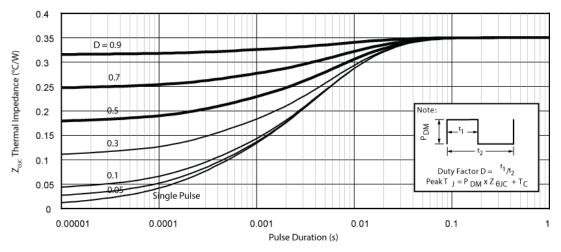


Figure 2 • Forward Current vs Forward Voltage

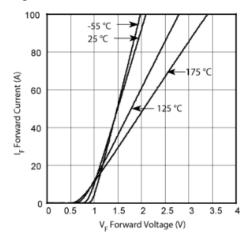


Figure 4 • Max Power Dissipation vs Case Temp

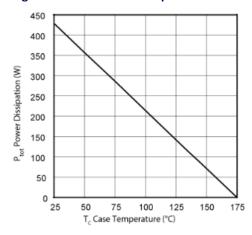


Figure 3 • Max Forward Current vs Case Temp

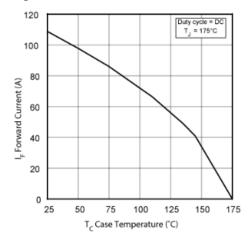


Figure 5 • Reverse Current vs. Reverse Voltage

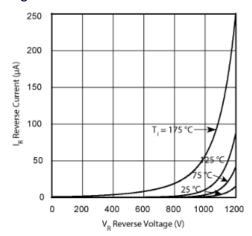




Figure 6 • Total Capacitive Charge vs. Reverse Voltage

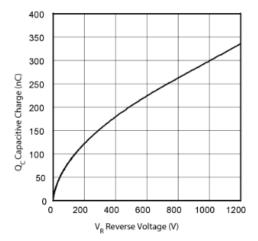
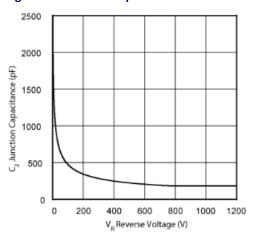


Figure 7 • Junction Capacitance vs Reverse Voltage





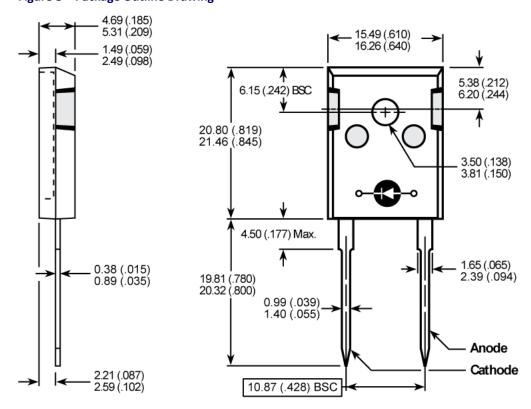
# 4 Package Specification

This section outlines the package specification for the MSC050SDA120B device.

## 4.1 Package Outline Drawing

This section details the TO-247 package drawing of the MSC050SDA120B device. Dimensions are in millimeters and (inches).

Figure 8 • Package Outline Drawing







#### Microsemi Corporate Headquarters

One Enterprise, Aliso Viejo, CA 92656 USA Within the USA: +1 (800) 713-4113 Outside the USA: +1 (949) 380-6100 Fax: +1 (949) 215-4996 Email: sales.support@microsemi.com www.microsemi.com

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