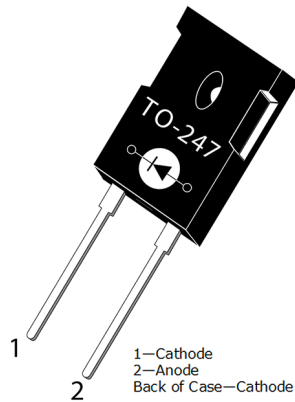


# MSC050SDA0170B Zero Recovery Silicon Carbide Schottky Diode

## 1 Product Overview

This section shows the product overview for the MSC050SDA170B device.



### 1.1 Features

The following are key features of the MSC050SDA170B device:

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

### 1.2 Benefits

The following are benefits of the MSC050SDA170B device:

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density

### 1.3 Applications

The MSC050SDA170B device is designed for the following applications:

- Power factor correction (PFC)
- Anti-parallel diode
  - Switch-mode power supply
  - Inverters/converters
  - Motor controllers
- Freewheeling diode
  - Switch-mode power supply
  - Inverters/converters
- Snubber/clamp diode

## 2 Device Specifications

This section details the specifications for the MSC050SDA170B device.

### 2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC050SDA170B device.

All ratings:  $T_c = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1 • Absolute Maximum Ratings**

Symbol	Parameter	Ratings	Unit	
$V_R$	Maximum DC reverse voltage	1700	V	
$V_{RRM}$	Maximum peak repetitive reverse voltage	1700		
$V_{RWM}$	Maximum working peak reverse voltage	1700		
$I_F$	Maximum DC forward current	$T_c = 25\text{ }^\circ\text{C}$	136	A
		$T_c = 135\text{ }^\circ\text{C}$	62	
		$T_c = 145\text{ }^\circ\text{C}$	51	
$I_{FRM}$	Repetitive peak forward surge current ( $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 8.3\text{ ms}$ , half sine wave)	192		
$I_{FSM}$	Non-repetitive forward surge current ( $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 8.3\text{ ms}$ , half sine wave)	432		
$P_{tot}$	Power dissipation	$T_c = 25\text{ }^\circ\text{C}$	652	W
		$T_c = 110\text{ }^\circ\text{C}$	282	
$T_J, T_{STG}$	Operating junction and storage temperature range	-55 to 175	$^\circ\text{C}$	
$T_L$	Lead temperature for 10 seconds	300		
$E_{AS}$	Single pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$ , $L = 0.08\text{ mH}$ , peak $I_L = 50\text{ A}$ )	100	mJ	

The following table shows the thermal and mechanical characteristics of the MSC050SDA170B device.

**Table 2 • Thermal and Mechanical Characteristics**

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.15	0.23	$^\circ\text{C}/\text{W}$
$Wt$	Package weight		0.22		oz
			6.2		g
	Mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

## 2.2 Electrical Performance

The following table shows the static characteristics of the MSC050SDA170B device.

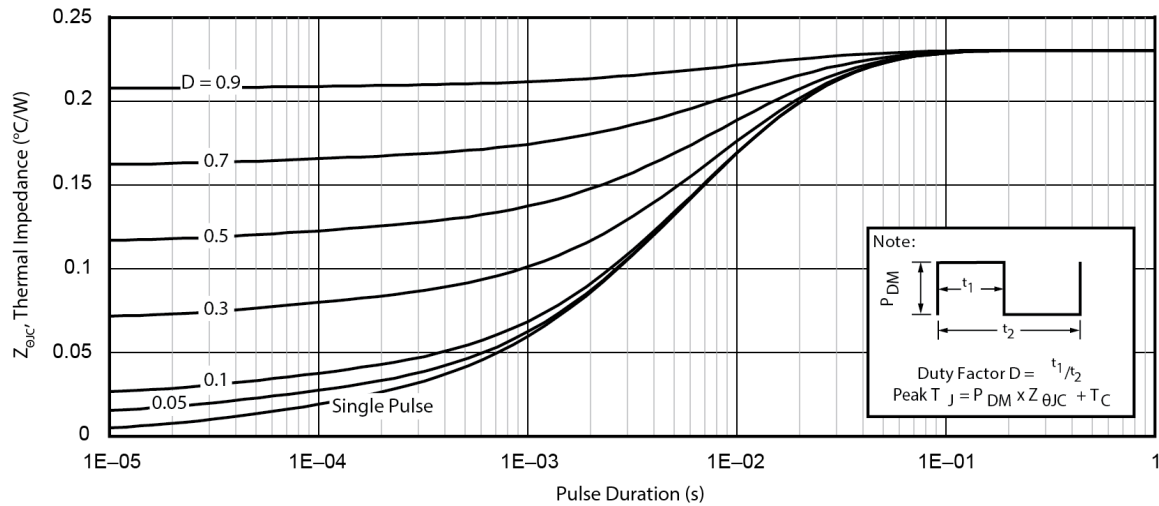
**Table 3 • Static Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	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		2.0		
I <sub>RM</sub>	Reverse leakage current	V <sub>R</sub> = 1700 V, T <sub>J</sub> = 25 °C		50	200	μA
		V <sub>R</sub> = 1700 V, T <sub>J</sub> = 175 °C		250		
Q <sub>C</sub>	Total capacitive charge	V <sub>R</sub> = 900 V, T <sub>J</sub> = 25 °C		410		nC
C <sub>J</sub>	Junction capacitance	V <sub>R</sub> = 1 V, T <sub>J</sub> = 25 °C, f = 1 MHz		4450		pF
	Junction capacitance	V <sub>R</sub> = 600 V, T <sub>J</sub> = 25 °C, f = 1 MHz		300		
	Junction capacitance	V <sub>R</sub> = 900 V, T <sub>J</sub> = 25 °C, f = 1 MHz		250		

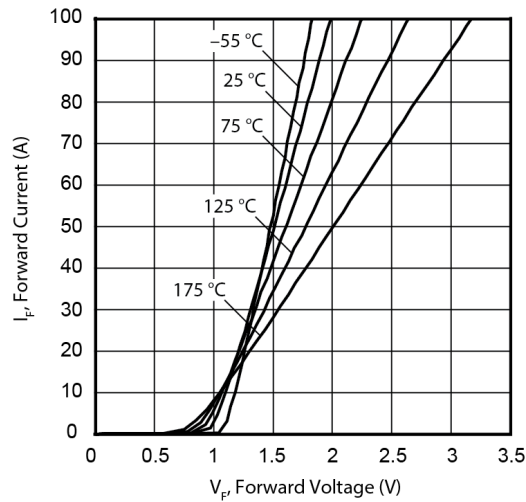
## 2.3 Performance Curves

This section shows the typical performance curves for the MSC050SDA170B device.

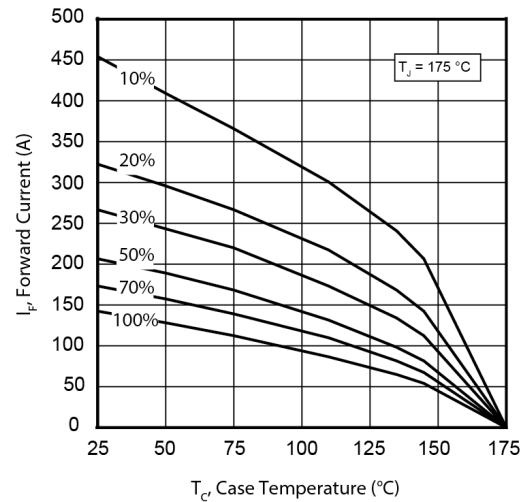
**Figure 1 • Maximum Transient Thermal Impedance**



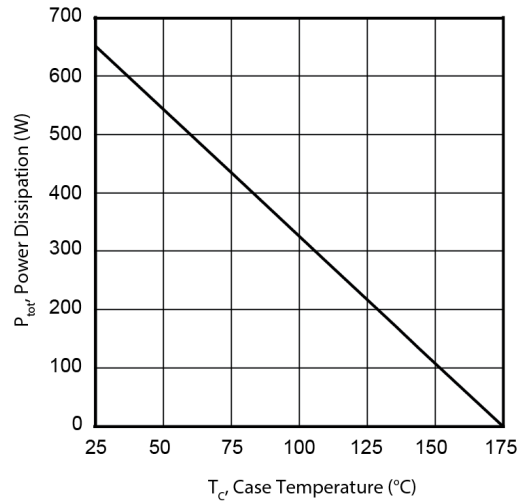
**Figure 2 • Forward Current vs. Forward Voltage**



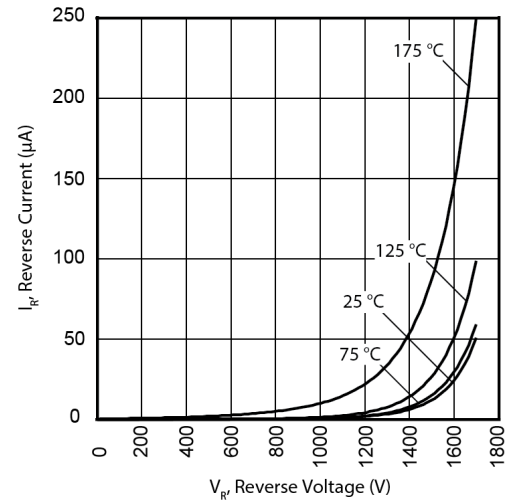
**Figure 3 • Max. Forward Current vs. Case Temp.**



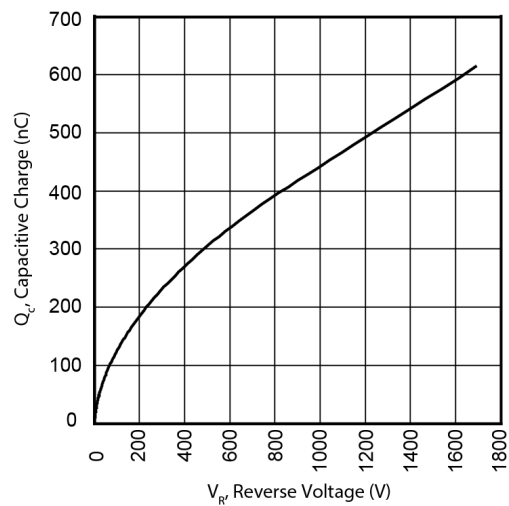
**Figure 4 • Max. Power Dissipation vs. Case Temp.**



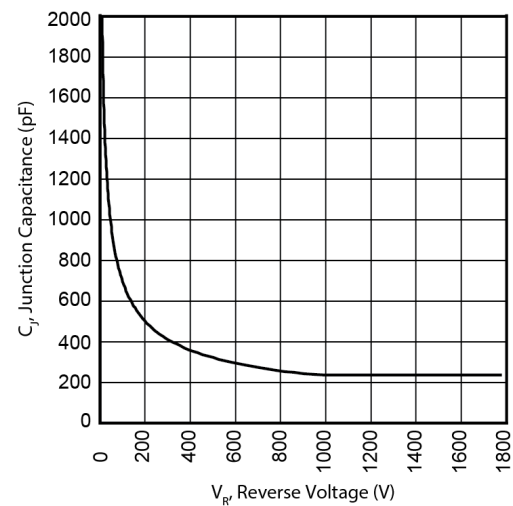
**Figure 5 • Reverse Current vs. Reverse Voltage**



**Figure 6 • Total Capacitive Charge vs. Reverse Voltage**



**Figure 7 • Junction Capacitance vs. Reverse Voltage**



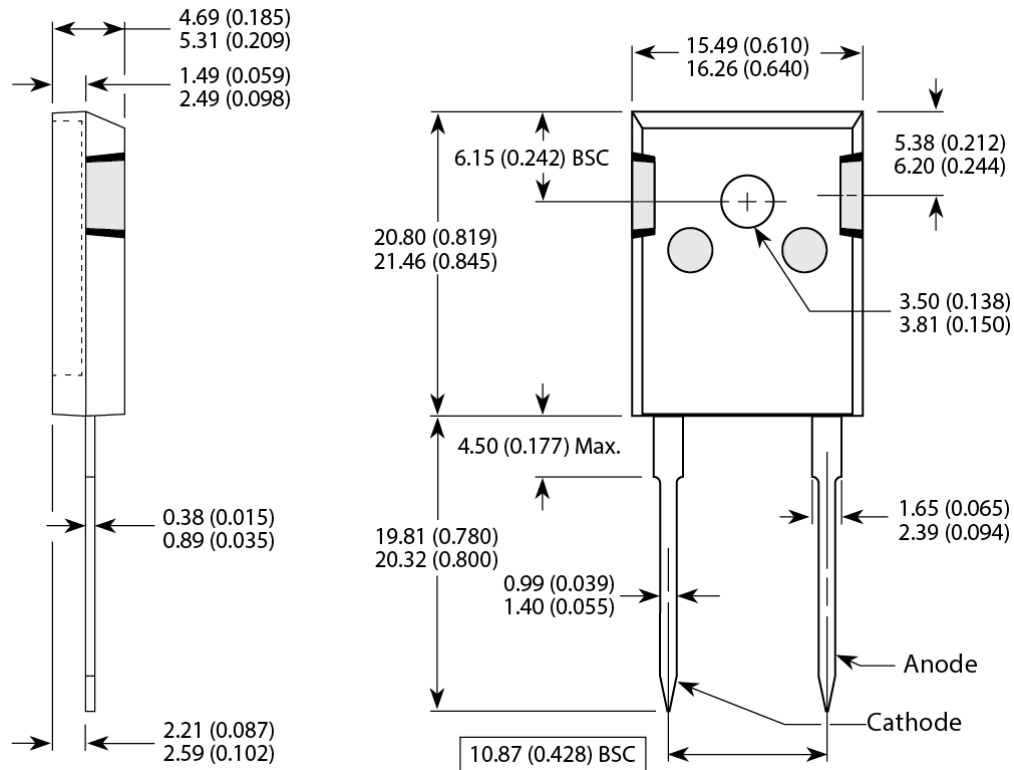
### 3 Package Specification

This section outlines the package specification for the MSC050SDA170B device.

#### 3.1 Package Outline Drawing

This section details the TO-247 package drawing of the MSC050SDA170B device. Dimensions are in millimeters and (inches).

**Figure 8 • Package Outline Drawing**



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053-4095 | March 2019 | Preliminary

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