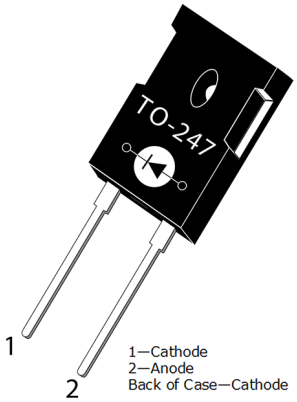
MSC030SDA170B Zero Recovery Silicon Carbide Schottky Diode

1 Product Overview

This section shows the product overview for the MSC030SDA170B device.



1.1 Features

The following are key features of the MSC030SDA170B device:

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

1.2 Benefits

The following are benefits of the MSC030SDA170B device:

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

1.3 Applications

The MSC030SDA170B 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 device specifications for the MSC030SDA170B device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC030SDA170B device.
All ratings: T_C = 25 °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 °C	82	A
		T_C = 135 °C	38	
		T_C = 145 °C	31	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		116	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		353	
P_{tot}	Power dissipation	T_C = 25 °C	429	W
		T_C = 110 °C	186	
T_J, T_{STG}	Operating junction and storage temperature range		–55 to 175	°C
T_L	Lead temperature for 10 seconds		300	
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, L = 0.22 mH, peak I_L = 30 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		0.24	0.35	°C/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 MSC030SDA170B device.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 30 A, T_J = 25 °C		1.5	1.8	V
		I_F = 30 A, T_J = 175 °C		2.25		
I_{RM}	Reverse leakage current	V_R = 1700 V, T_J = 25 °C		4	200	µA
		V_R = 1700 V, T_J = 175 °C		125		
Q_C	Total capacitive charge	V_R = 900 V, T_J = 25 °C		230		nC
C_J	Junction capacitance	V_R = 1 V, T_J = 25 °C, ƒ = 1 MHz		2070		pF
	Junction capacitance	V_R = 600 V, T_J = 25 °C, ƒ = 1 MHz		167		
	Junction capacitance	V_R = 900 V, T_J = 25 °C, ƒ = 1 MHz		138		

2.3 Performance Curves

This section shows the typical performance curves for the MSC030SDA170B device.

Figure 1 • Maximum Transient Thermal Impedance

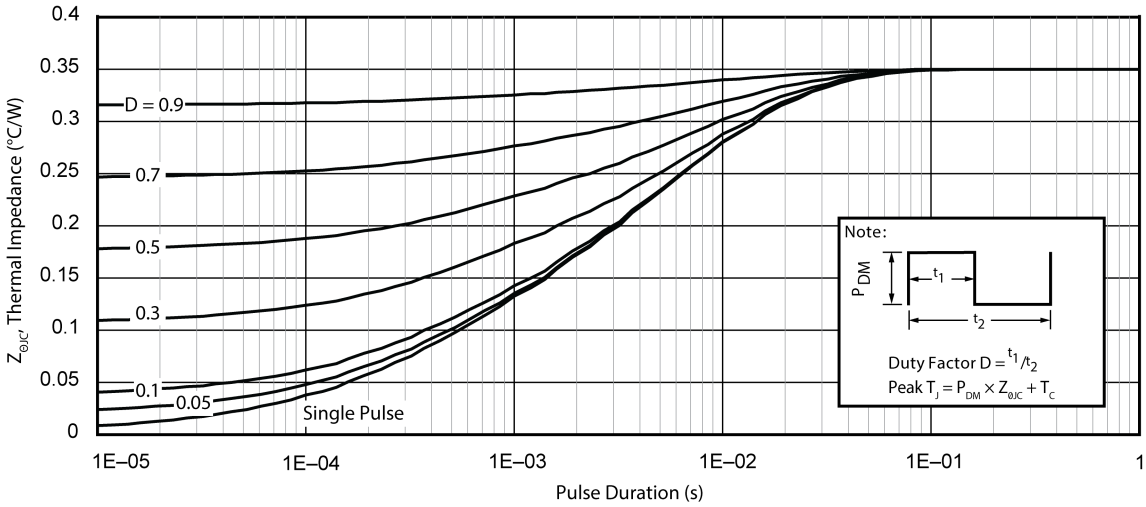


Figure 2 • Forward Current vs. Forward Voltage

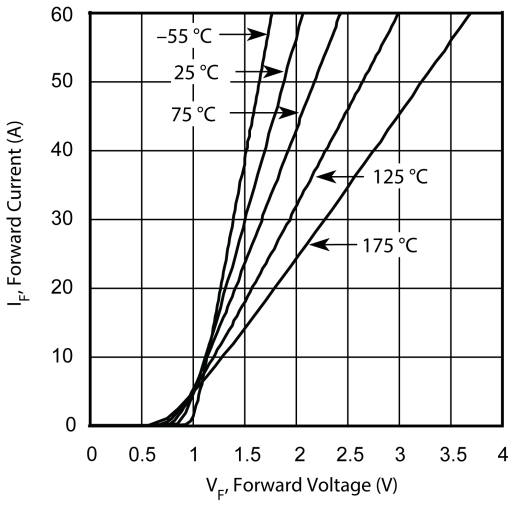


Figure 3 • Max. Forward Current vs. Case Temp.

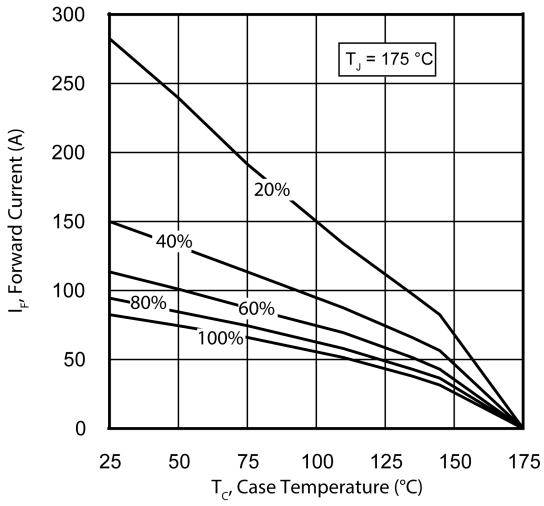


Figure 4 • Max. Power Dissipation vs. Case Temp.

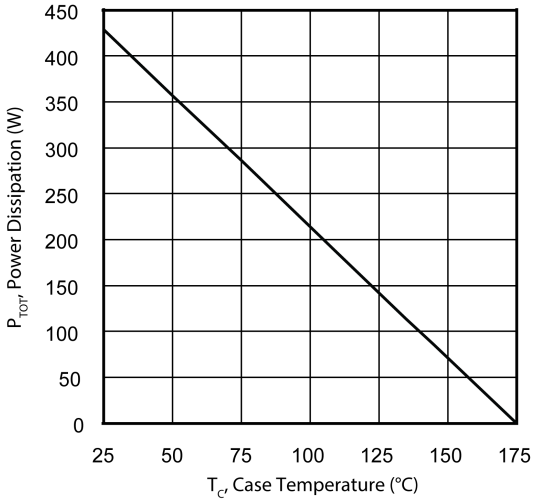


Figure 5 • Reverse Current vs. Reverse Voltage

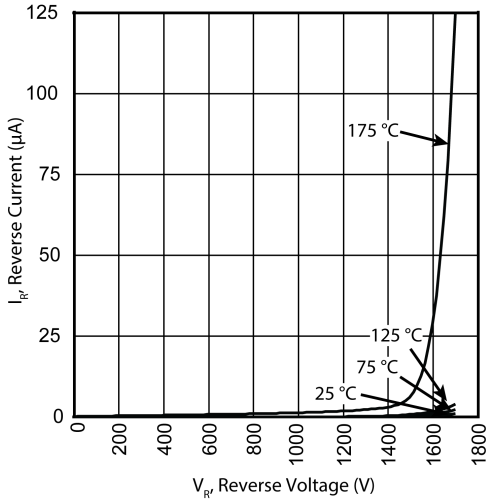


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

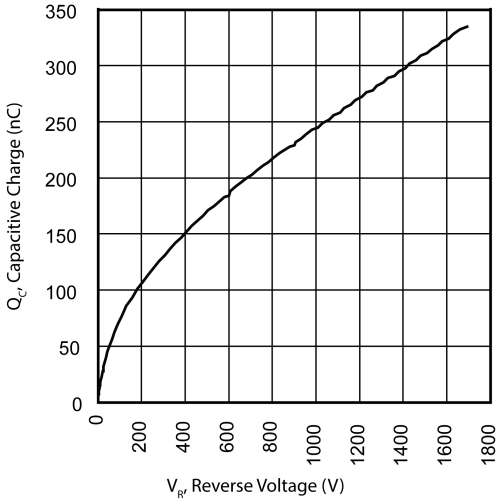
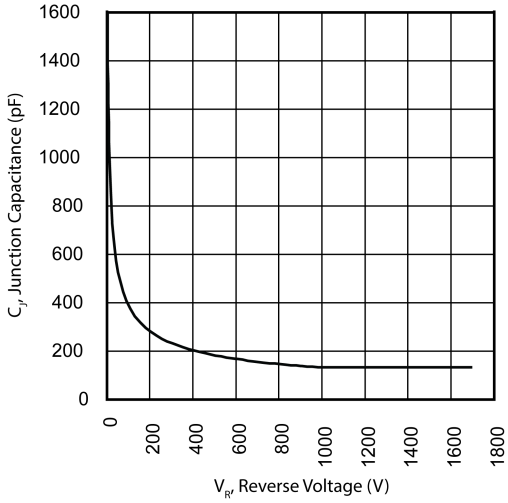


Figure 7 • Junction Capacitance vs. Reverse Voltage



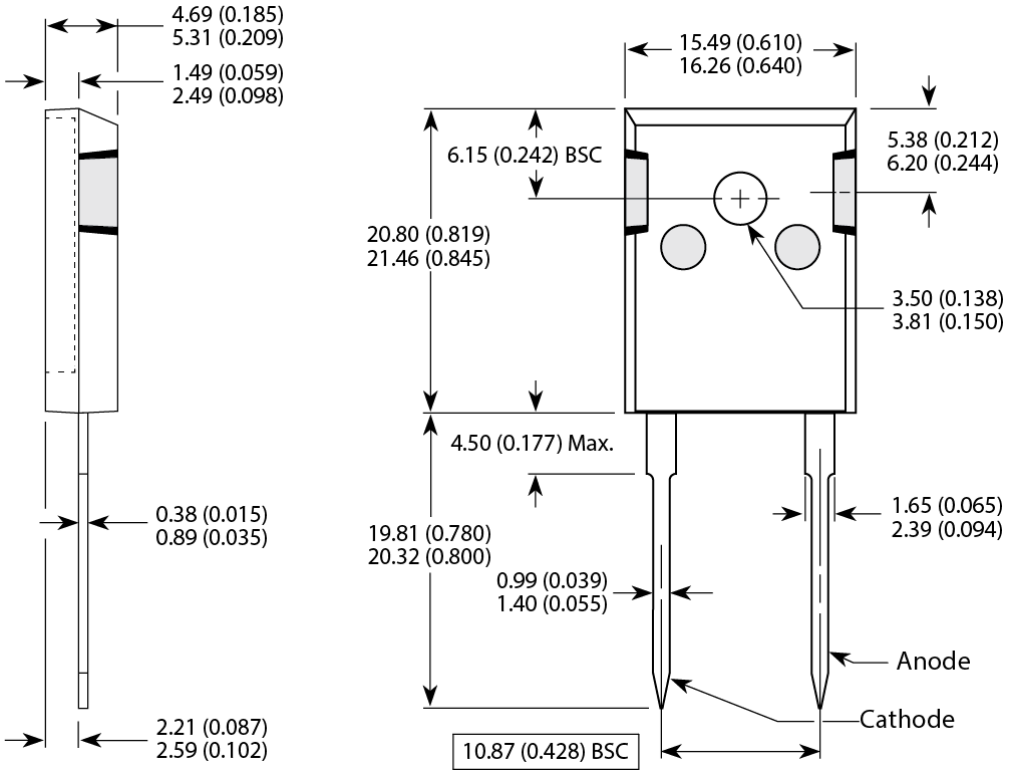
3 Package Specification

This section outlines the package specification for the MSC030SDA170B device.

3.1 Package Outline Drawing

This section details the TO-247 package drawing of the MSC030SDA170B device. Dimensions are in millimeters and (inches).

Figure 8 • Package Outline Drawing



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