

MSC010SDA070K
Datasheet
Zero Recovery Silicon Carbide Schottky Diode

Final
December 2017



Contents

- 1 Revision History 1
 - 1.1 Revision A 1

- 2 Product Overview 2
 - 2.1 Features 2
 - 2.2 Benefits 2
 - 2.3 Applications 2

- 3 Electrical Specifications 3
 - 3.1 Absolute Maximum Ratings 3
 - 3.2 Electrical Performance 4
 - 3.3 Performance Curves 5

- 4 Package Specification 7
 - 4.1 Package Outline Drawing 7

1 Revision History

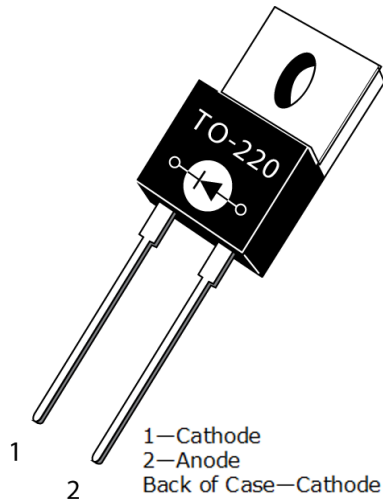
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision A

Revision A was published in December 2017. 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 MSC010SDA070K is a 700 V, 10 A SiC SBD in a two-lead TO-220 package shown below.



2.1 Features

The following are key features of the MSC010SDA070K device:

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

2.2 Benefits

The following are benefits of the MSC010SDA070K device:

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

2.3 Applications

The MSC010SDA070K 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 MSC010SDA070K device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC010SDA070K device. All ratings taken at $T_c = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter		Ratings	Unit
V_R	Maximum DC reverse voltage		700	V
V_{RRM}	Maximum peak repetitive reverse voltage			
V_{RWM}	Maximum working peak reverse voltage			
I_F	Maximum DC forward current	$T_c = 25\text{ }^{\circ}\text{C}$	24	A
		$T_c = 135\text{ }^{\circ}\text{C}$	11	
		$T_c = 145\text{ }^{\circ}\text{C}$	9	
I_{FRM}	Repetitive peak forward surge current ($T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$, half sine wave)		34	
I_{FSM}	Non-repetitive forward surge current ($T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$, half sine wave)		58	
P_{tot}	Power dissipation	$T_c = 25\text{ }^{\circ}\text{C}$	88	W
		$T_c = 110\text{ }^{\circ}\text{C}$	38	
T_J, T_{STG}	Operating junction and storage temperature range		-55 to 175	$^{\circ}\text{C}$
T_L	Lead temperature for 10 Seconds		300	

The following table shows the thermal and mechanical characteristics of the MSC010SDA070K device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		1.2	1.7	$^{\circ}\text{C}/\text{W}$
W_T	Package weight		0.07		oz
			1.9		g
Torque	Maximum mounting torque			6.4	lbf-in
				0.7	N-m

3.2 Electrical Performance

The following table shows the static characteristics of the MSC010SDA070K device.

Table 3 • Static Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	$I_F = 10\text{ A}, T_J = 25\text{ °C}$	1.5	1.8	V
		$I_F = 10\text{ A}, T_J = 175\text{ °C}$	2.1		
I_{RM}	Reverse leakage current	$V_R = 700\text{ V}, T_J = 25\text{ °C}$	3	200	μA
		$V_R = 700\text{ V}, T_J = 175\text{ °C}$	50		
Q_C	Total capacitive charge $V_R = 400\text{ V}, T_J = 25\text{ °C}$		27		nC
C_J	Junction capacitance $V_R = 1\text{ V}, T_J = 25\text{ °C}, f = 1\text{ MHz}$		397		pF
	Junction capacitance $V_R = 200\text{ V}, T_J = 25\text{ °C}, f = 1\text{ MHz}$		49		
	Junction capacitance $V_R = 400\text{ V}, T_J = 25\text{ °C}, f = 1\text{ MHz}$		46		

3.3 Performance Curves

This section shows the typical performance curves for the MSC010SDA070K device.

Figure 1 • Maximum Transient Thermal Impedance

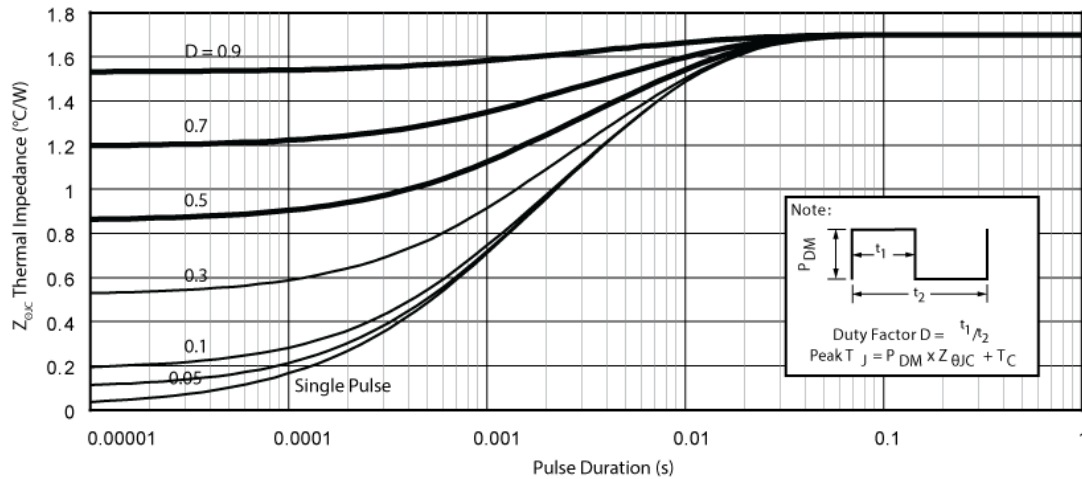


Figure 2 • Forward Current vs. Forward Voltage

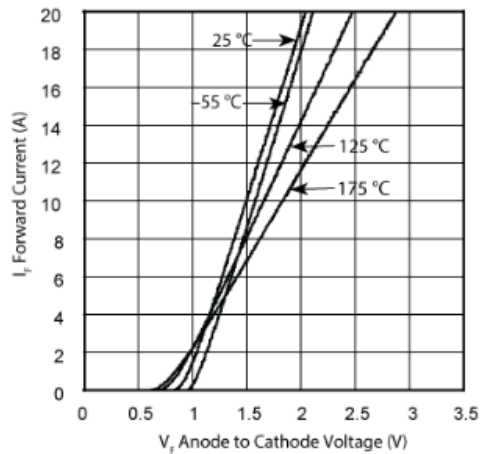


Figure 3 • Max. Forward Current vs. Case Temp.

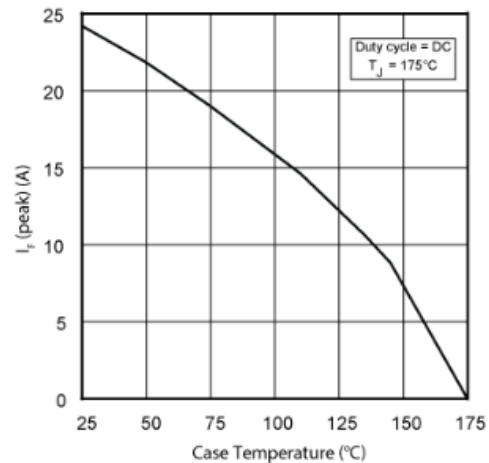


Figure 4 • Max. Power Dissipation vs. Case Temp.

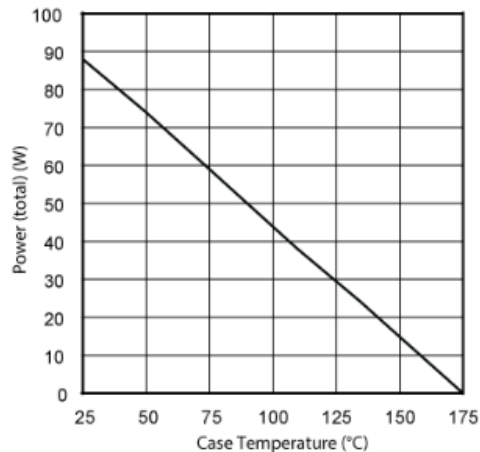


Figure 5 • Reverse Current vs. Reverse Voltage

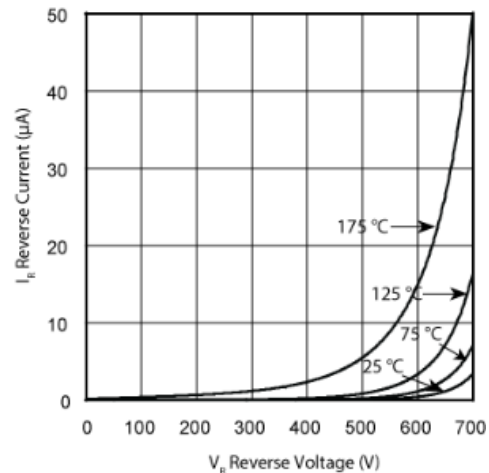
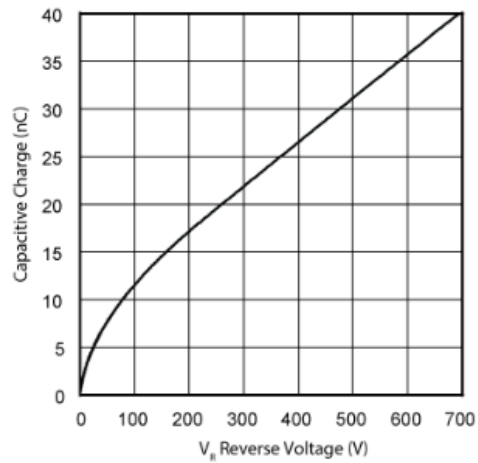
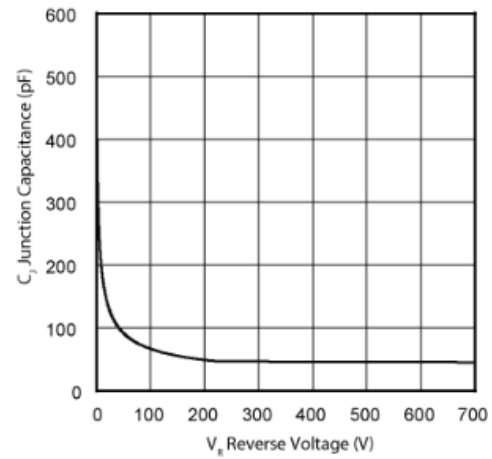


Figure 6 • Total Capacitive Charge vs. Reverse Voltage**Figure 7 • Junction Capacitance vs. Reverse Voltage**

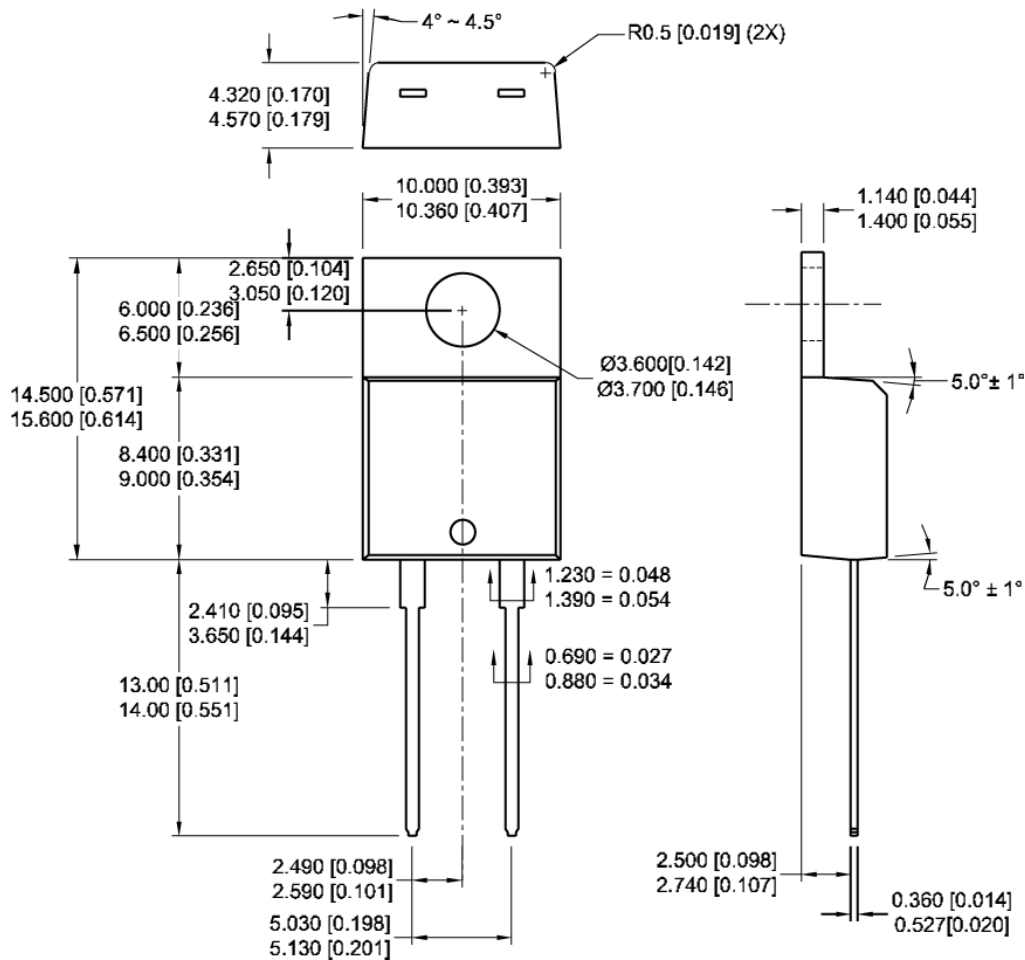
4 Package Specification

This section outlines the package specification for the MSC010SDA070K device.

4.1 Package Outline Drawing

This section details the TO-220 package drawing of the MSC010SDA070K device. Dimensions are in millimeters and (inches).

Figure 8 • Package Outline Drawing



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