

**MSC010SDA120K**  
**Datasheet**  
**Zero Recovery Silicon Carbide Schottky Diode**

Final  
October 2017



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# 1 Revision History

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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 B

Revision B was published in October 2017. In Revision B of this document, the following changes were made:

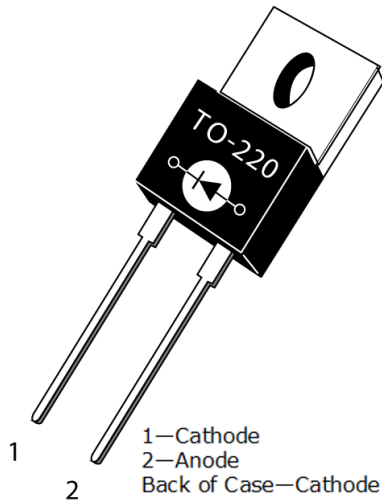
- The [Absolute Maximum Ratings \(see page 3\)](#) table was updated to reflect the single pulse avalanche energy ( $E_{AS}$ ).
- The diode image in [Product Overview \(see page 2\)](#) was changed.
- The features section was updated.

## 1.2 Revision A

Revision A was published in August 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 MSC010SDA120K is a 1200 V, 10 A SiC SBD in a two-lead TO-220 package shown below.



### 2.1 Features

The following are key features of the MSC010SDA120K 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 MSC010SDA120K device:

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

### 2.3 Applications

The MSC010SDA120K 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 MSC010SDA120K device.

#### 3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC010SDA120K 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		1200	V
$V_{RRM}$	Maximum peak repetitive reverse voltage			
$V_{RWM}$	Maximum working peak reverse voltage			
$I_F$	Maximum DC forward current	$T_c = 25\text{ }^\circ\text{C}$	27	A
		$T_c = 135\text{ }^\circ\text{C}$	13	
		$T_c = 145\text{ }^\circ\text{C}$	11	
$I_{FRM}$	Repetitive peak forward surge current ( $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 8.3\text{ ms}$ , half sine wave)		38	
$I_{FSM}$	Non-repetitive forward surge current ( $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 8.3\text{ ms}$ , half sine wave)		75	
$P_{tot}$	Power dissipation	$T_c = 25\text{ }^\circ\text{C}$	136	W
		$T_c = 110\text{ }^\circ\text{C}$	59	
$T_J, T_{STG}$	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 $T_J = 25\text{ }^\circ\text{C}$ , $L = 2.0\text{ mH}$ , peak $I_L = 10\text{ A}$ )		100	mJ

The following table shows the thermal and mechanical characteristics of the MSC010SDA120K device.

**Table 2 • Thermal and Mechanical Characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.67	1.1	$^\circ\text{C}/\text{W}$
$W_T$	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 MSC010SDA120K device.

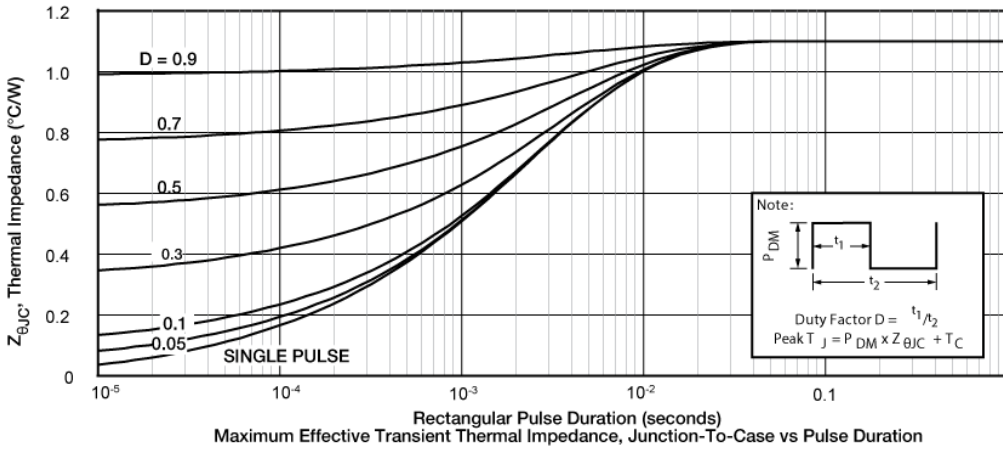
**Table 3 • Static Characteristics**

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	Forward voltage	I <sub>F</sub> = 10 A, T <sub>J</sub> = 25 °C		1.5	V
		I <sub>F</sub> = 10 A, T <sub>J</sub> = 175 °C		2.1	
I <sub>RM</sub>	Reverse leakage current	V <sub>R</sub> = 1200 V, T <sub>J</sub> = 25 °C		3	μA
		V <sub>R</sub> = 1200 V, T <sub>J</sub> = 175 °C		50	
Q <sub>C</sub>	Total capacitive charge V <sub>R</sub> = 600 V, T <sub>J</sub> = 25 °C			48	nC
C <sub>J</sub>	Junction capacitance V <sub>R</sub> = 400 V, T <sub>J</sub> = 25 °C, f = 1 MHz			55	pF
	Junction capacitance V <sub>R</sub> = 800 V, T <sub>J</sub> = 25 °C, f = 1 MHz			43	

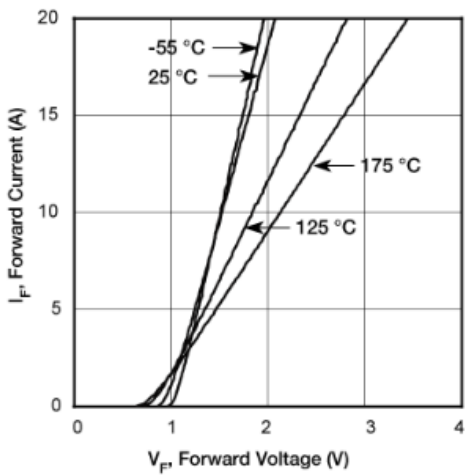
### 3.3 Performance Curves

This section shows the typical performance curves for the MSC010SDA120K device.

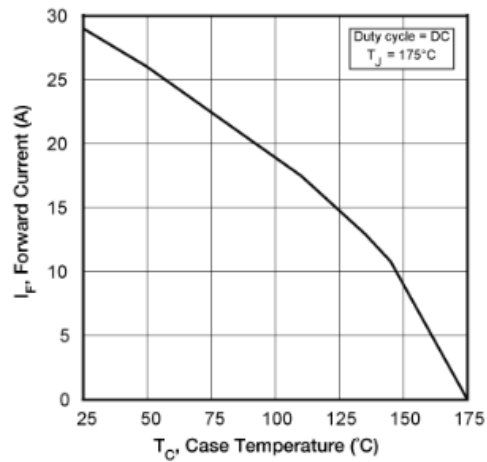
**Figure 1 • Maximum Transient Thermal Impedance**



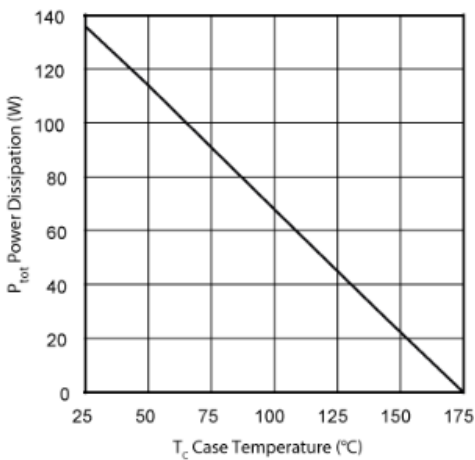
**Figure 2 • Forward Current vs. Forward Voltage**



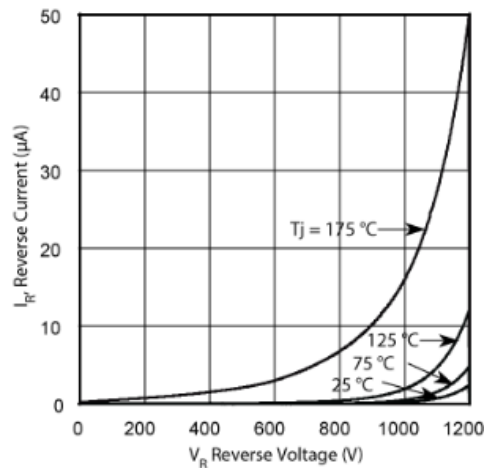
**Figure 3 • Max. Forward Current vs. Case Temp.**



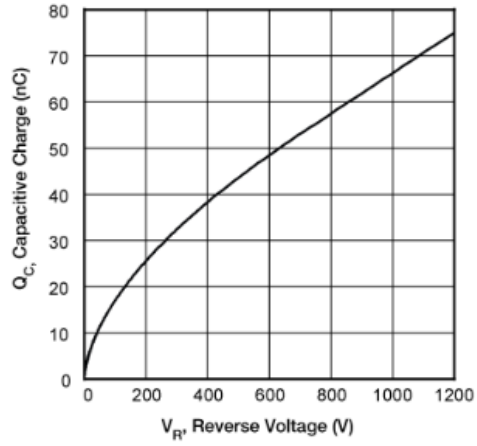
**Figure 4 • Max. Power Dissipation vs. Case Temp.**



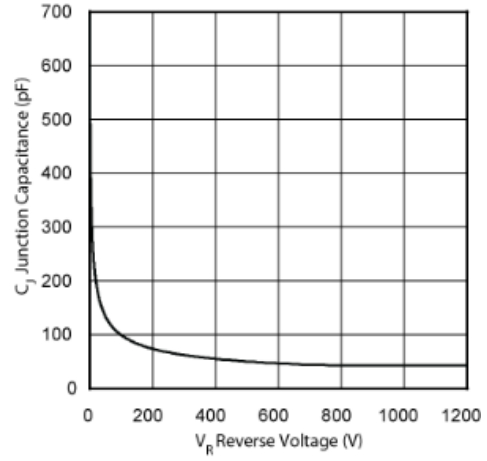
**Figure 5 • Reverse Current vs. Reverse Voltage**



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



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





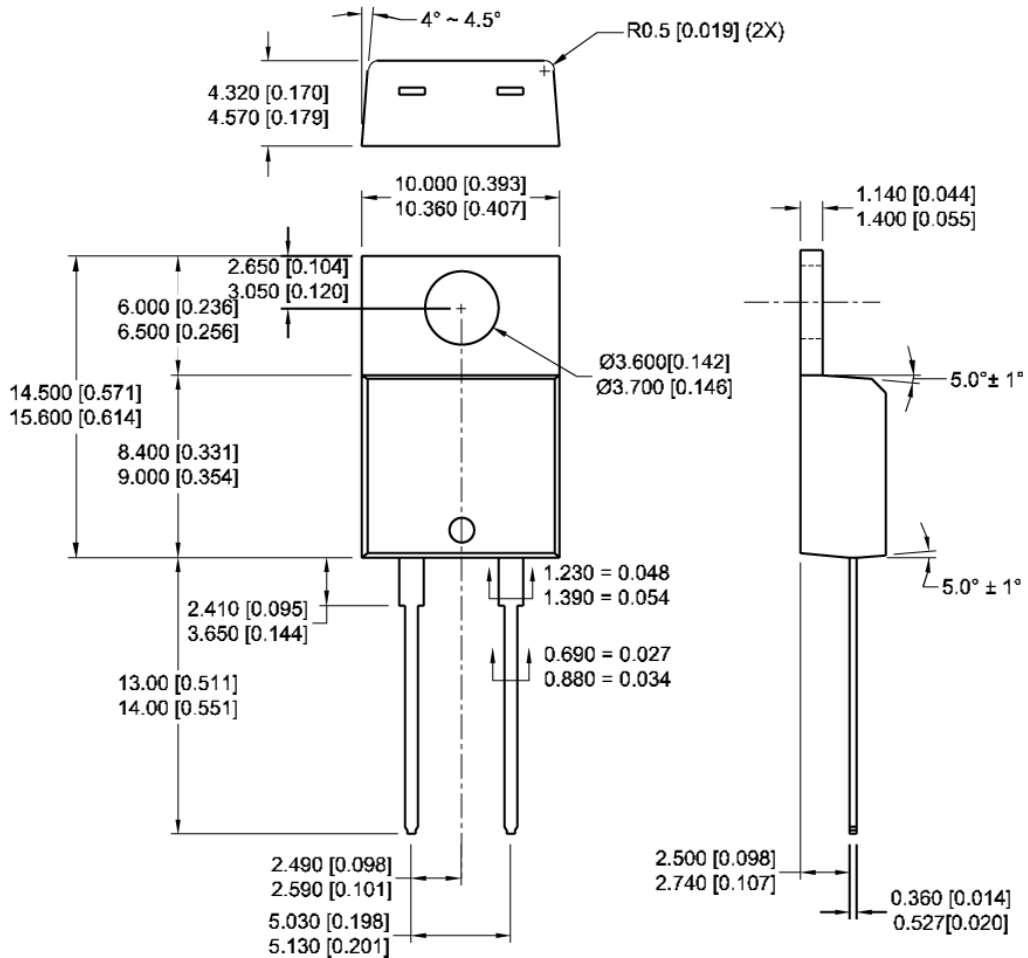
## 4 Package Specification

This section outlines the package specification for the MSC010SDA120K device.

### 4.1 Package Outline Drawing

This section details the TO-220 package drawing of the MSC010SDA120K device. Dimensions are in millimeters and (inches).

Figure 8 • Package Outline Drawing



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