MSC010SDA120K

Datasheet

Zero Recovery Silicon Carbide Schottky Diode

Final

October 2017

Microsemi

Power Matters.

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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 B

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

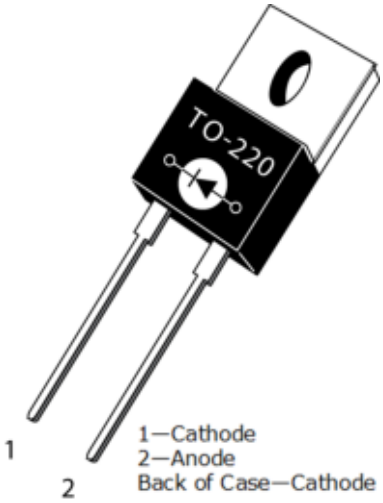
- The Absolute Maximum Ratings (see page 3) table was updated to reflect the single pulse avalanche energy (E_{AS}).
- The diode image in Product Overview (see page 2) was changed.
- The features section was updated.

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 °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 °C	27	A
		T_C = 135 °C	13	
		T_C = 145 °C	11	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		38	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		75	
P_{tot}	Power dissipation	T_C = 25 °C	136	W
		T_C = 110 °C	59	
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 = 2.0 mH, peak I_L = 10 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	°C/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_F	Forward voltage	I_F = 10 A, T_J = 25 °C		1.5	1.8	V
		I_F = 10 A, T_J = 175 °C		2.1		
I_{RM}	Reverse leakage current	V_R = 1200 V, T_J = 25 °C		3	200	µA
		V_R = 1200 V, T_J = 175 °C		50		
Q_C	Total capacitive charge V_R = 600 V, T_J = 25 °C			48		nC
C_J	Junction capacitance V_R = 400 V, T_J = 25 °C, ƒ = 1 MHz			55		pF
	Junction capacitance V_R = 800 V, T_J = 25 °C, ƒ = 1 MHz			43		

3.3 Performance Curves

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

Figure 1 • Maximum Transient Thermal Impedance

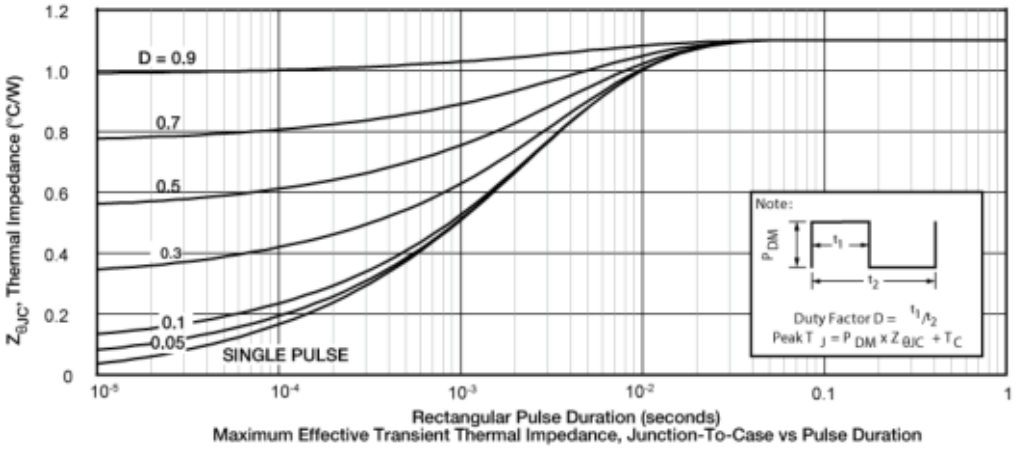


Figure 2 • Forward Current vs. Forward Voltage

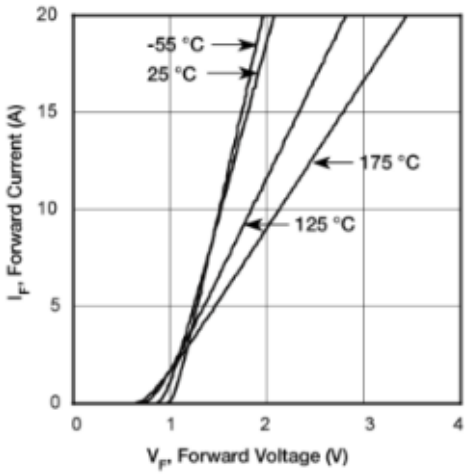


Figure 3 • Max. Forward Current vs. Case Temp.

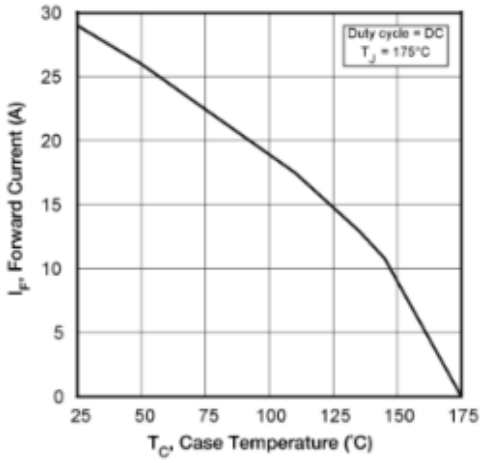


Figure 4 • Max. Power Dissipation vs. Case Temp.

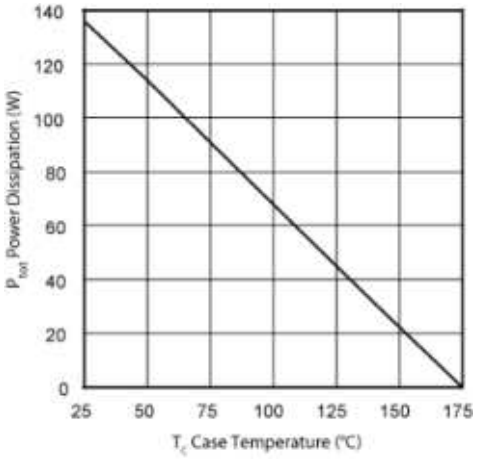


Figure 5 • Reverse Current vs. Reverse Voltage

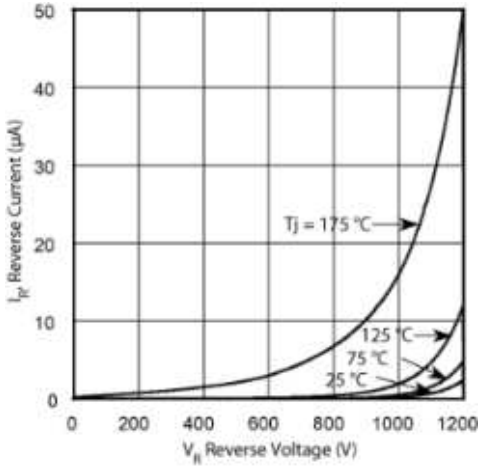


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

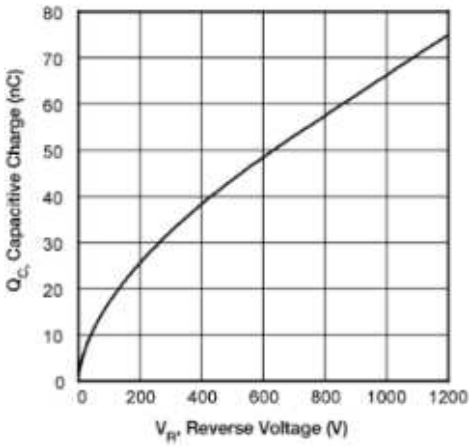
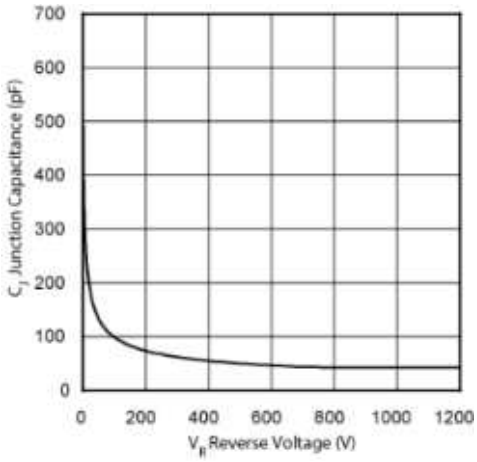


Figure 7 • Junction Capacitance vs. Reverse Voltage



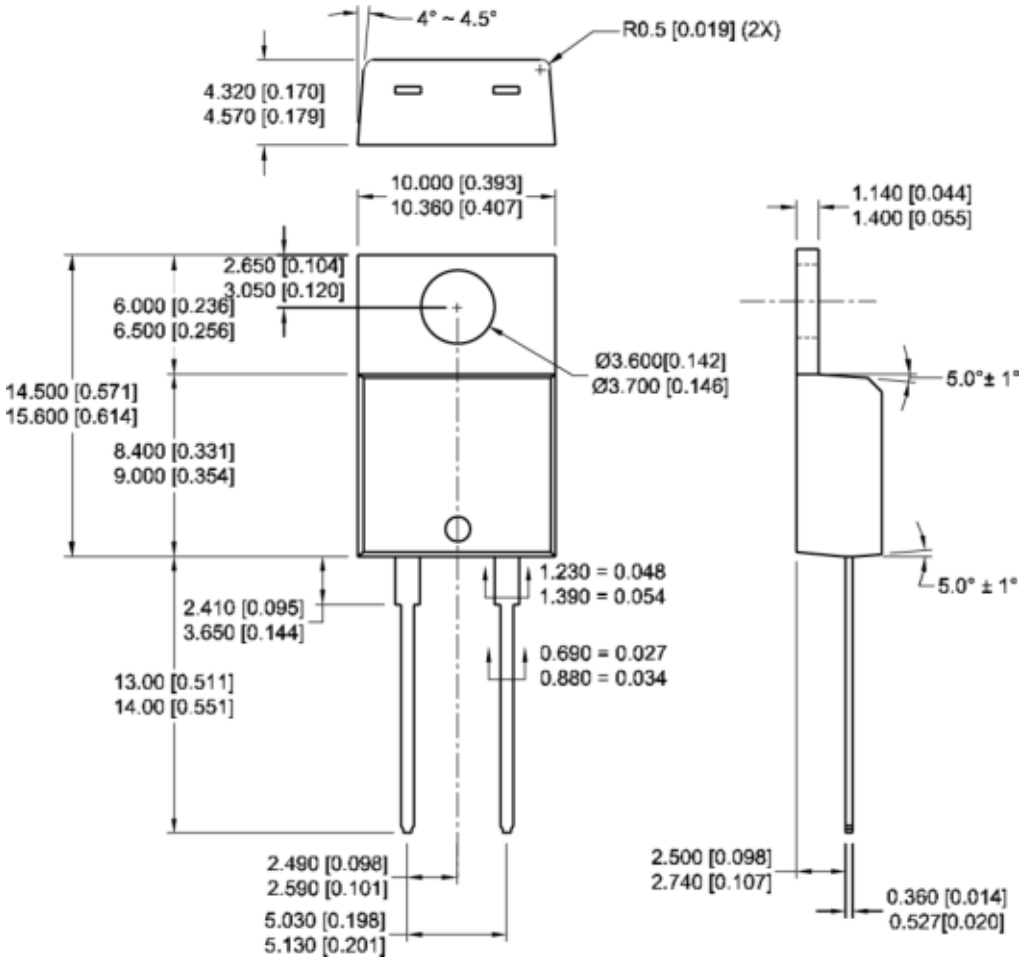
4 Package Specification

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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