MSC030SDA070K

Datasheet

Zero Recovery Silicon Carbide Schottky Diode

Final

April 2018

Microsemi

Power Matters.™

Contents

1 Revision History

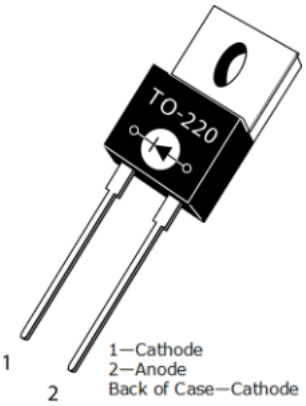
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision A

Revision A was published in April 2018. It is the first publication of this document.

2 Product Overview

This section shows the product overview for the MSC030SDA070K device.



2.1 Features

The following are key features of the MSC030SDA070K device:

- Ultra-fast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche energy rated
- RoHS compliant

2.2 Benefits

The following are benefits of the MSC030SDA070K device:

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

2.3 Applications

The MSC030SDA070K 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

3 Electrical Specifications

This section shows the electrical specifications for the MSC030SDA070K device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC030SDA070K 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	700	V
V_{RRM}	Maximum peak repetitive reverse voltage	700	
V_{RWM}	Maximum working peak reverse voltage	700	
I_F	Maximum DC forward current (T_C = 25 °C)	56	A
	Maximum DC forward current (T_C = 135 °C)	24	
	Maximum DC forward current (T_C = 145 °C)	19	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)	79	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)	146	
P_{tot}	Power dissipation (T_C = 25 °C)	167	W
	Power dissipation (T_C = 110 °C)	72	
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 MSC030SDA070K device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance	0.62	0.9	°C/W
W_T	Package weight	0.07		oz
		1.9		g
Torque	Maximum mounting torque		10	lbf-in
			1.1	N-m

3.2 Electrical Performance

The following table shows the static characteristics of the MSC030SDA070K device.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	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	1.75		
I_{RM}	Reverse leakage current	V_R = 700 V, T_J = 25 °C	1	200	µA
		V_R = 700 V, T_J = 175 °C	10		
Q_C	Total capacitive charge	V_R = 400 V, T_J = 25 °C	83		nC
C_J	Junction capacitance	V_R = 1 V, T_J = 25 °C, ƒ = 1 MHz	1200		pF
		V_R = 200 V, T_J = 25 °C, ƒ = 1 MHz	150		
		V_R = 400 V, T_J = 25 °C, ƒ = 1 MHz	128		

3.3 Performance Curves

This section shows the typical performance curves for the MSC030SDA070K device.

Figure 1 • Maximum Transient Thermal Impedance

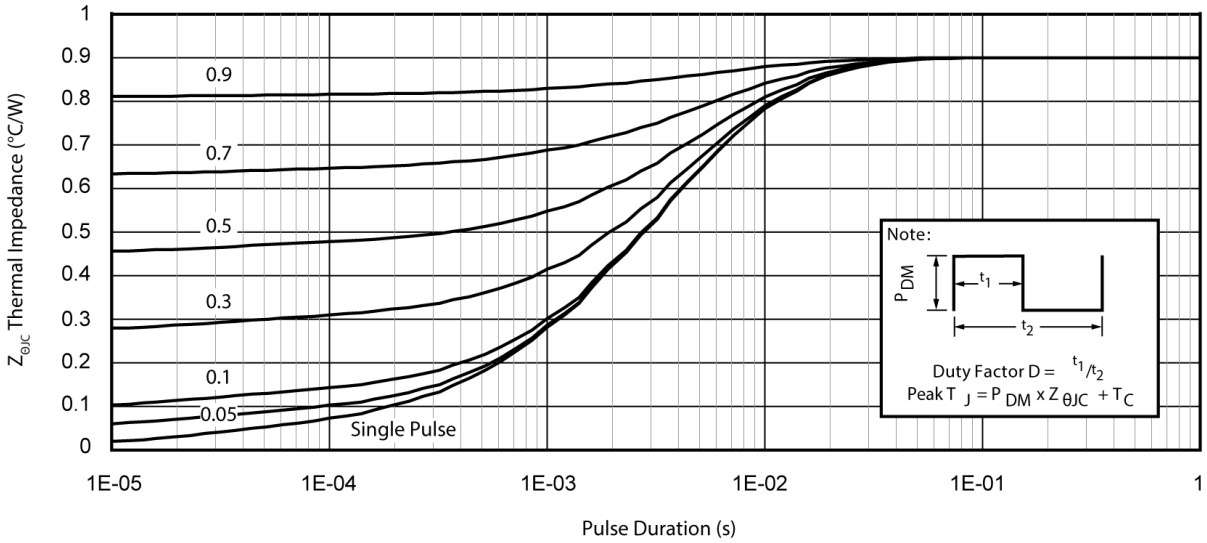


Figure 2 • Forward Current vs. Forward Voltage

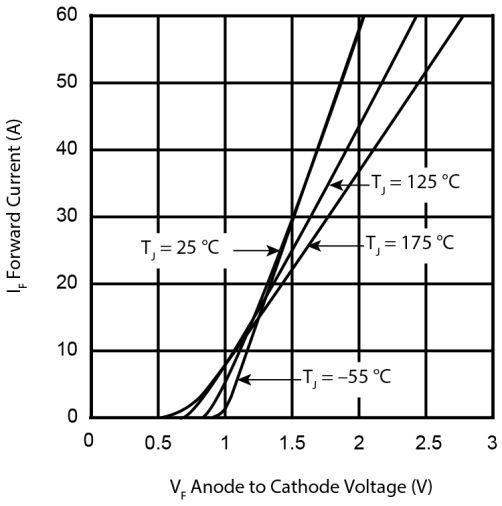


Figure 3 • Max. Forward Current vs. Case Temp.

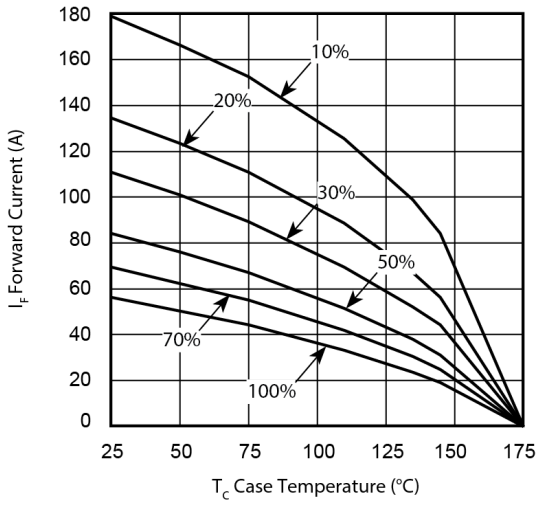


Figure 4 • Max. Power Dissipation vs. Case Temp.

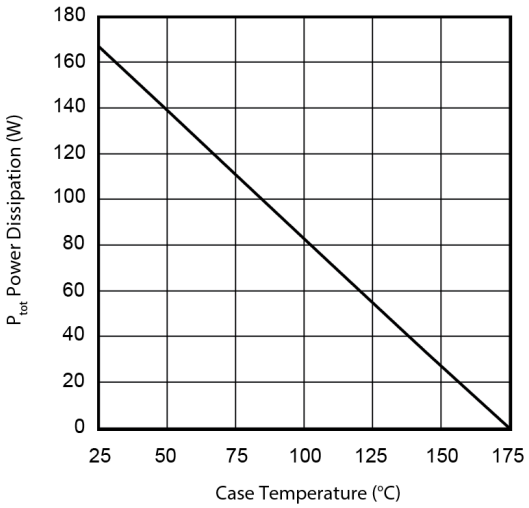


Figure 5 • Reverse Current vs. Reverse Voltage

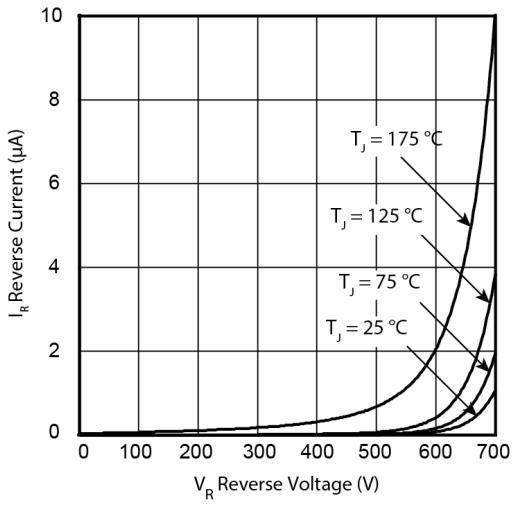


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

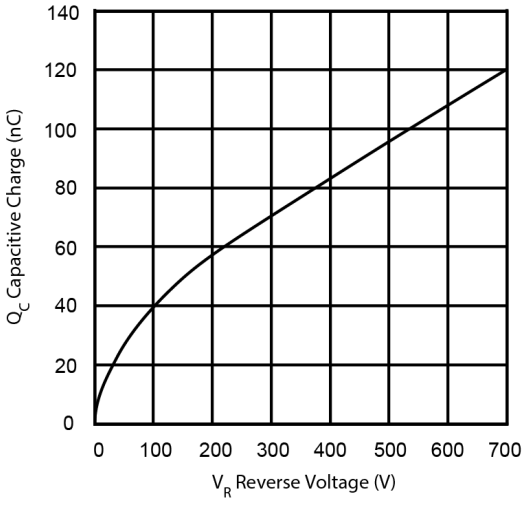
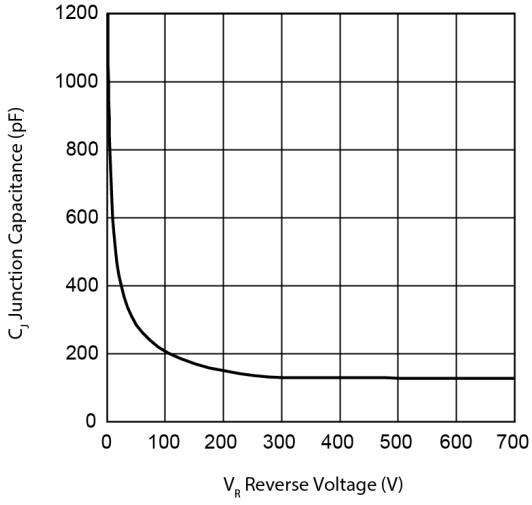


Figure 7 • Junction Capacitance vs. Reverse Voltage



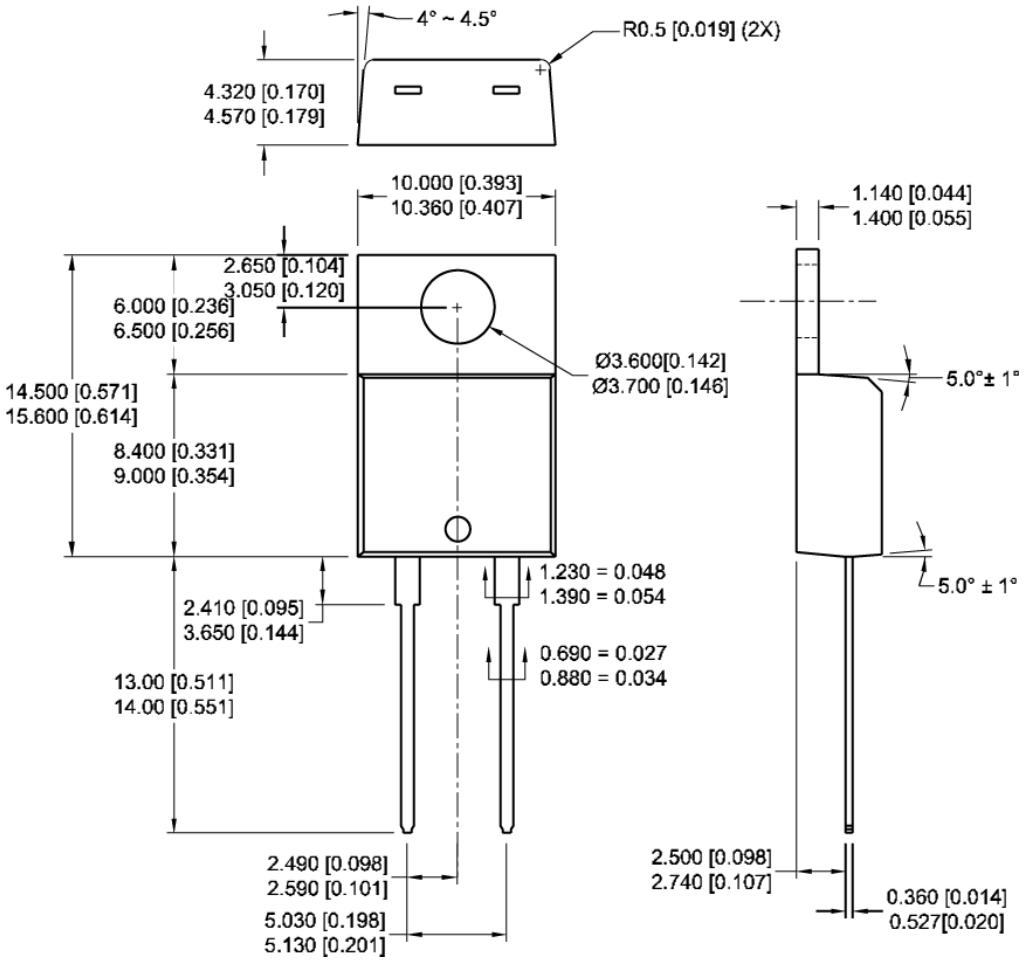
4 Package Specification

This section outlines the package specification for the MSC030SDA070K device.

4.1 Package Outline Drawing

This section details the TO-220 package drawing of the MSC030SDA070K device. Dimensions are in millimeters and (inches).

Figure 8 • Package Outline Drawing



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