

MSC030SDA070K
Datasheet
Zero Recovery Silicon Carbide Schottky Diode

Final
April 2018



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1 Revision History

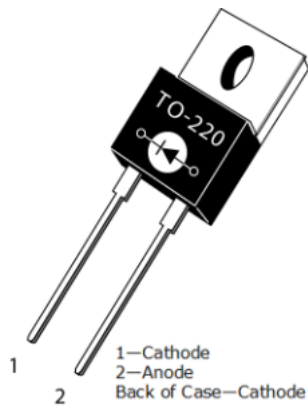
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 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: $T_c = 25\text{ }^{\circ}\text{C}$ 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	700	
V_{RWM}	Maximum working peak reverse voltage	700	
I_F	Maximum DC forward current ($T_c = 25\text{ }^{\circ}\text{C}$)	56	A
	Maximum DC forward current ($T_c = 135\text{ }^{\circ}\text{C}$)	24	
	Maximum DC forward current ($T_c = 145\text{ }^{\circ}\text{C}$)	19	
I_{FRM}	Repetitive peak forward surge current ($T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 8.3\text{ ms}$, half sine wave)	79	
I_{FSM}	Non-repetitive forward surge current ($T_c = 25\text{ }^{\circ}\text{C}$, $t_p = 8.3\text{ ms}$, half sine wave)	146	
P_{tot}	Power dissipation ($T_c = 25\text{ }^{\circ}\text{C}$)	167	W
	Power dissipation ($T_c = 110\text{ }^{\circ}\text{C}$)	72	
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 $T_J = 25\text{ }^{\circ}\text{C}$, $L = 0.22\text{ mH}$, peak $I_L = 30\text{ A}$)	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	$^{\circ}\text{C/W}$
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	$I_F = 30\text{ A}$, $T_J = 25\text{ °C}$	1.5	1.8	V
		$I_F = 30\text{ A}$, $T_J = 175\text{ °C}$	1.75		
I_{RM}	Reverse leakage current	$V_R = 700\text{ V}$, $T_J = 25\text{ °C}$	1	200	μA
		$V_R = 700\text{ V}$, $T_J = 175\text{ °C}$	10		
Q_C	Total capacitive charge	$V_R = 400\text{ V}$, $T_J = 25\text{ °C}$	83		nC
C_J	Junction capacitance	$V_R = 1\text{ V}$, $T_J = 25\text{ °C}$, $f = 1\text{ MHz}$	1200		pF
		$V_R = 200\text{ V}$, $T_J = 25\text{ °C}$, $f = 1\text{ MHz}$	150		
		$V_R = 400\text{ V}$, $T_J = 25\text{ °C}$, $f = 1\text{ MHz}$	128		

3.3 Performance Curves

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

Figure 1 • Maximum Transient Thermal Impedance

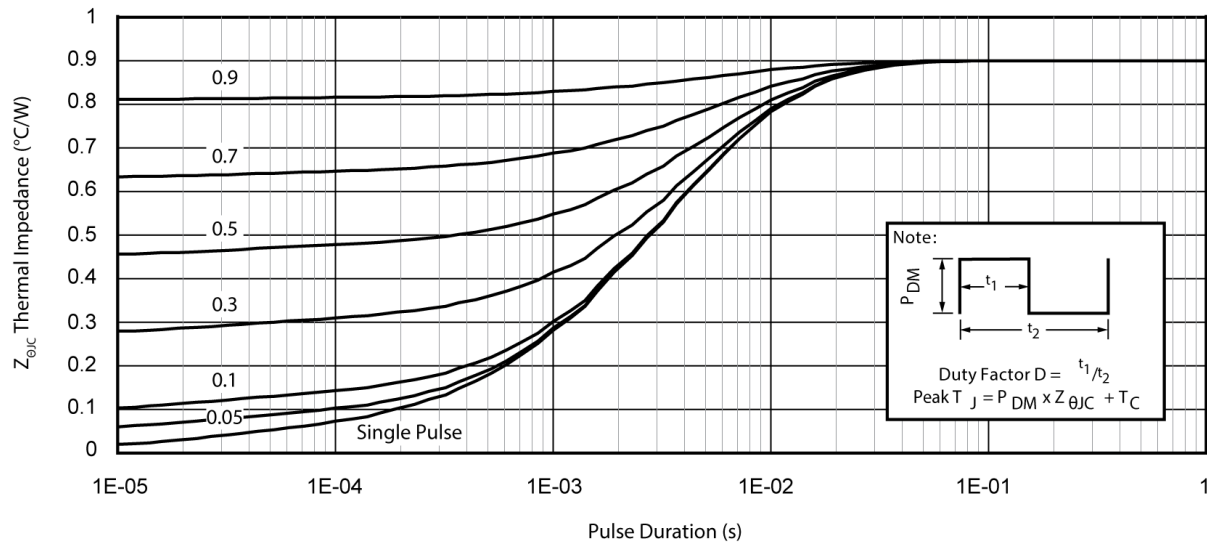


Figure 2 • Forward Current vs. Forward Voltage

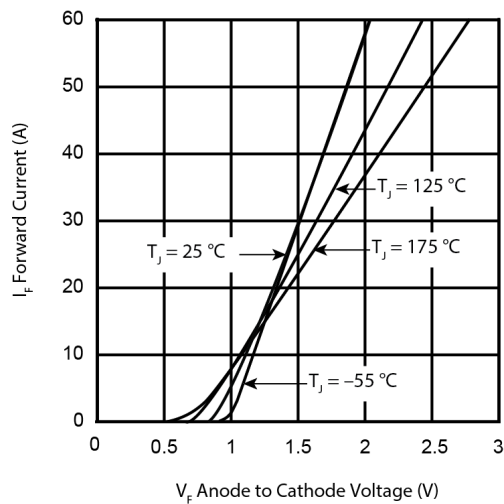


Figure 3 • Max. Forward Current vs. Case Temp.

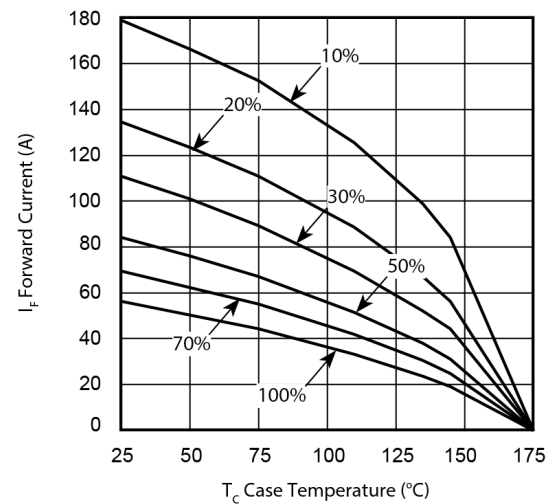
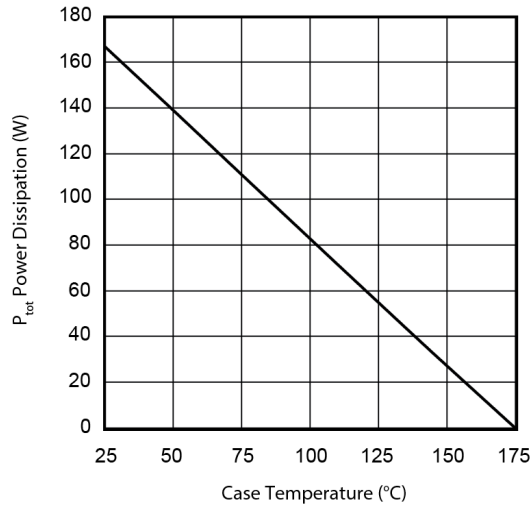
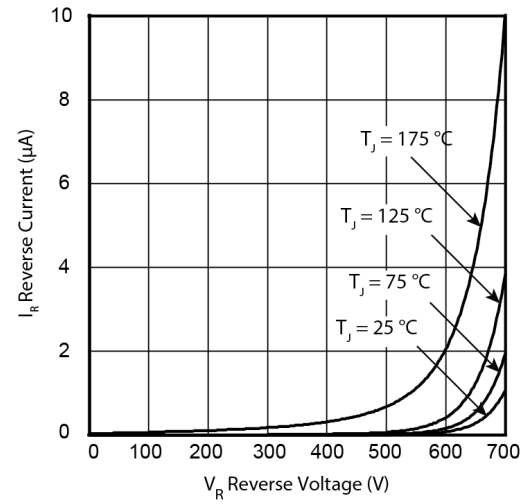
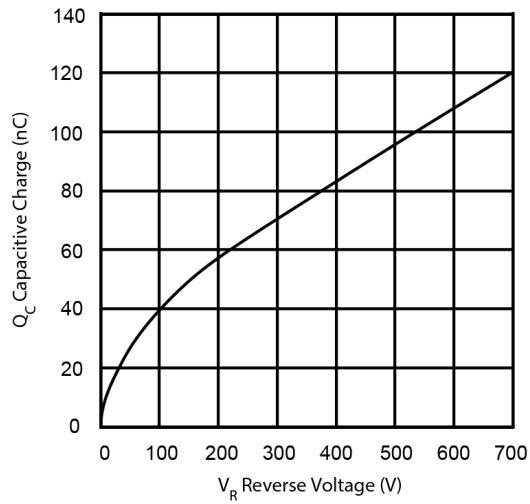
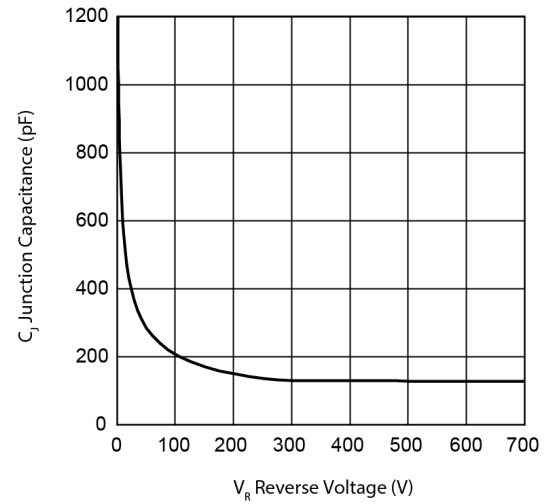


Figure 4 • Max. Power Dissipation vs. Case Temp.**Figure 5 • Reverse Current vs. Reverse Voltage****Figure 6 • Total Capacitive Charge vs. Reverse Voltage****Figure 7 • Junction Capacitance vs. Reverse Voltage**

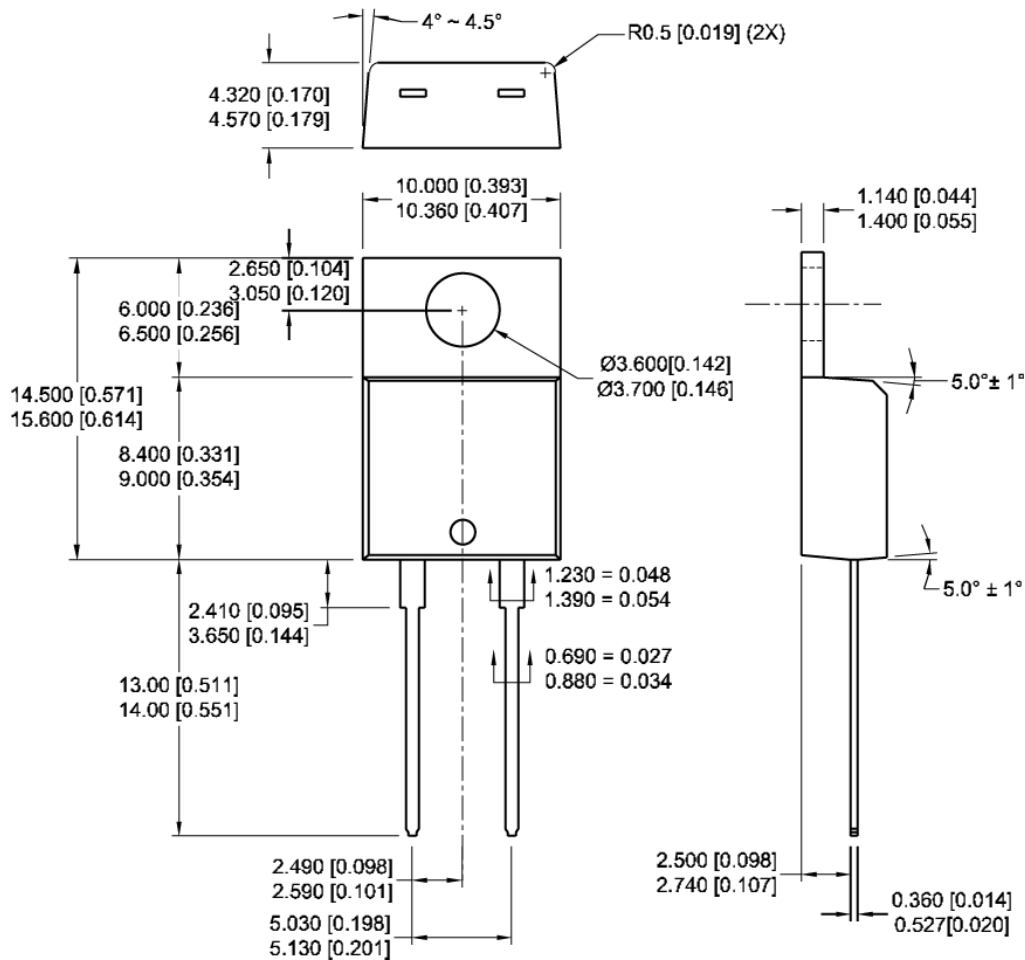
4 Package Specification

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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