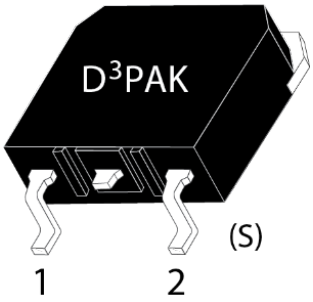
MSC030SDA070S Zero Recovery Silicon Carbide Schottky Diode

1 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. MSC030SDA070S is a 700 V, 30 A SiC SBD in a TO-268 package shown below.



1 - Cathode
2 - Anode
Back of Case - Cathode

1.1 Features

The following are key features of the MSC030SDA070S device:

- No reverse recovery
- Low forward voltage
- Low leakage current
- Avalanche-energy rated
- RoHS compliant

1.2 Benefits

The following are benefits of the MSC030SDA070S device:

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

1.3 Applications

The MSC030SDA070S 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

2 Device Specifications

This section shows the specifications of the MSC030SDA070S device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC030SDA070S device. All ratings are taken at 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	60	A
		T_C = 135 °C	25	
		T_C = 145 °C	21	
I_{FRM}	Repetitive peak forward surge current (t_p = 8.3 ms, half sine wave)		79	
I_{FSM}	Non-repetitive forward surge current (t_p = 8.3 ms, half sine wave)		146	
P_{TOT}	Power dissipation	T_C = 25 °C	188	W
		T_C = 110 °C	81	
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 MSC030SDA070S device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.56	0.80	°C/W
Wt	Package weight		0.14		oz
			4.0		g

2.2 Electrical Performance

The following table shows the static characteristics of the MSC030SDA070S device. T_J = 25 °C unless otherwise specified.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 30 A		1.5	1.8	V
		I_F = 30 A, T_J = 175 °C		1.8		
I_{RM}	Reverse leakage current	V_R = 700 V		1	200	µA
		V_R = 700 V, T_J = 175 °C		10		
Q_C	Total capacitive charge	V_R = 400 V		83		nC
C_J	Junction capacitance	V_R = 1 V, ƒ = 1 MHz		1200		pF
	Junction capacitance	V_R = 200 V, ƒ = 1 MHz		150		
	Junction capacitance	V_R = 400 V, ƒ = 1 MHz		128		

2.3 Typical Performance Curves

This section shows the typical performance curves of the MSC030SDA070S device.

Figure 1 • Maximum Transient Thermal Impedance

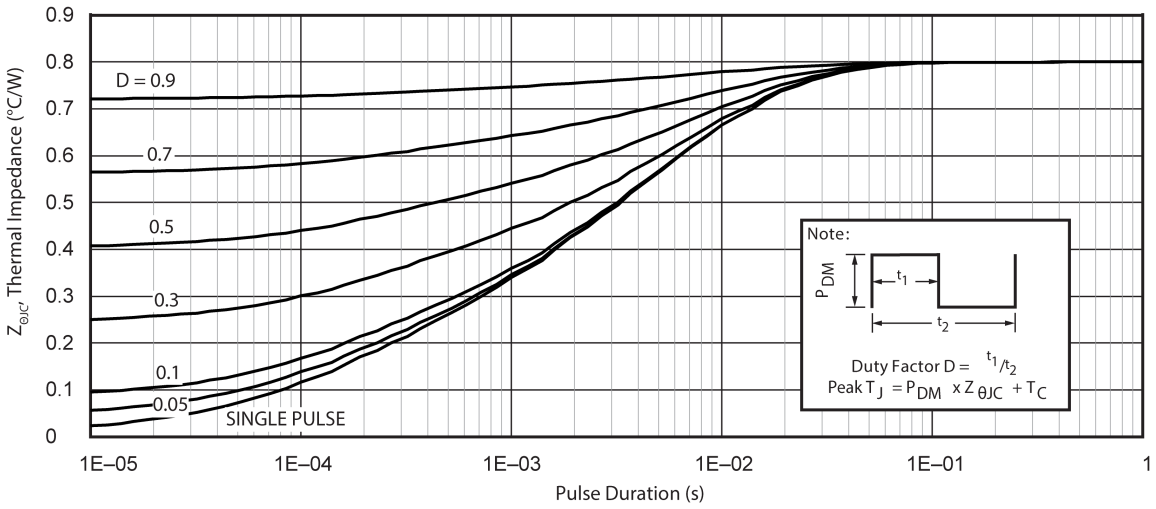


Figure 2 • Forward Current vs. Forward Voltage

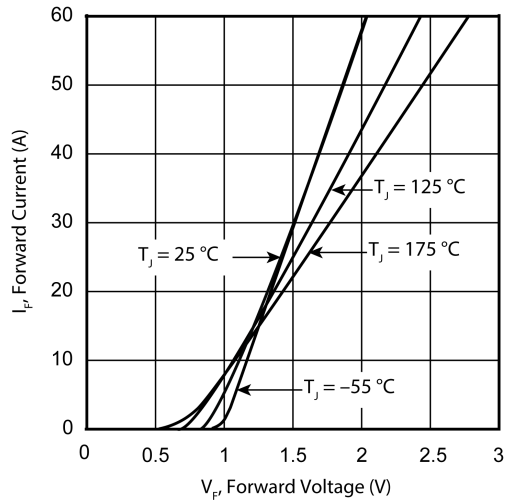


Figure 3 • Max. Forward Current vs. Case Temp.

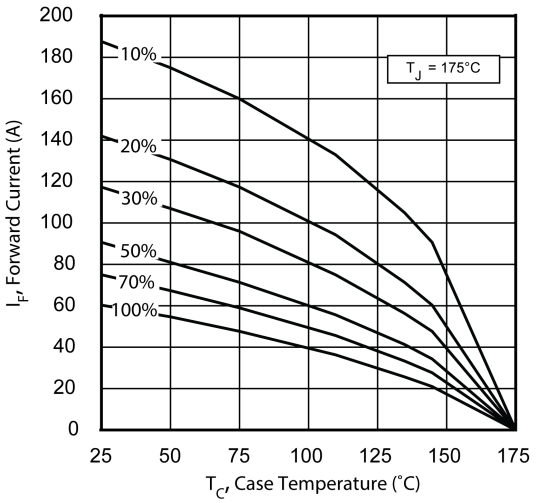


Figure 4 • Max. Power Dissipation vs. Case Temp.

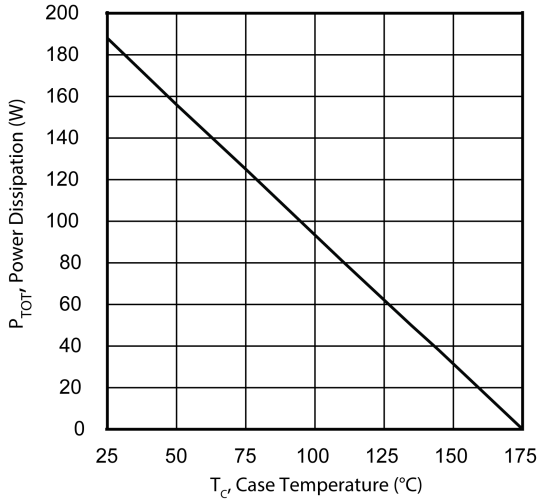


Figure 5 • Reverse Current vs. Reverse Voltage

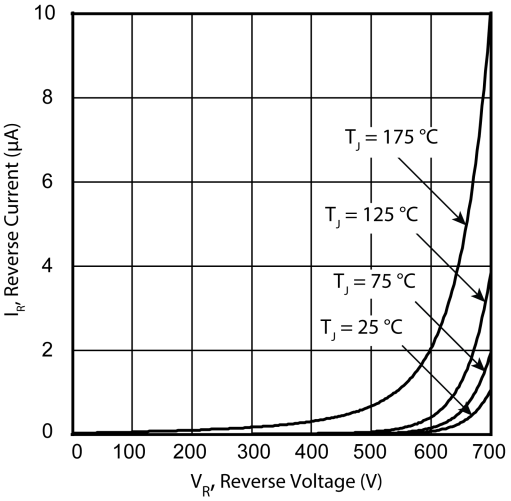


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

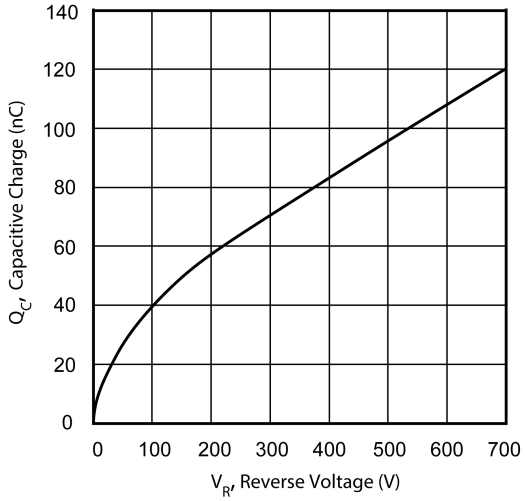
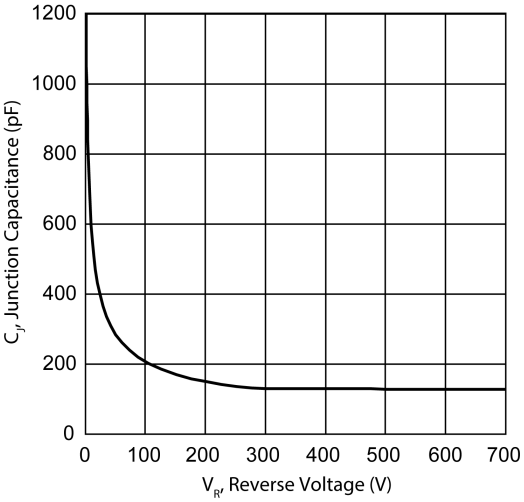


Figure 7 • Junction Capacitance vs. Reverse Voltage



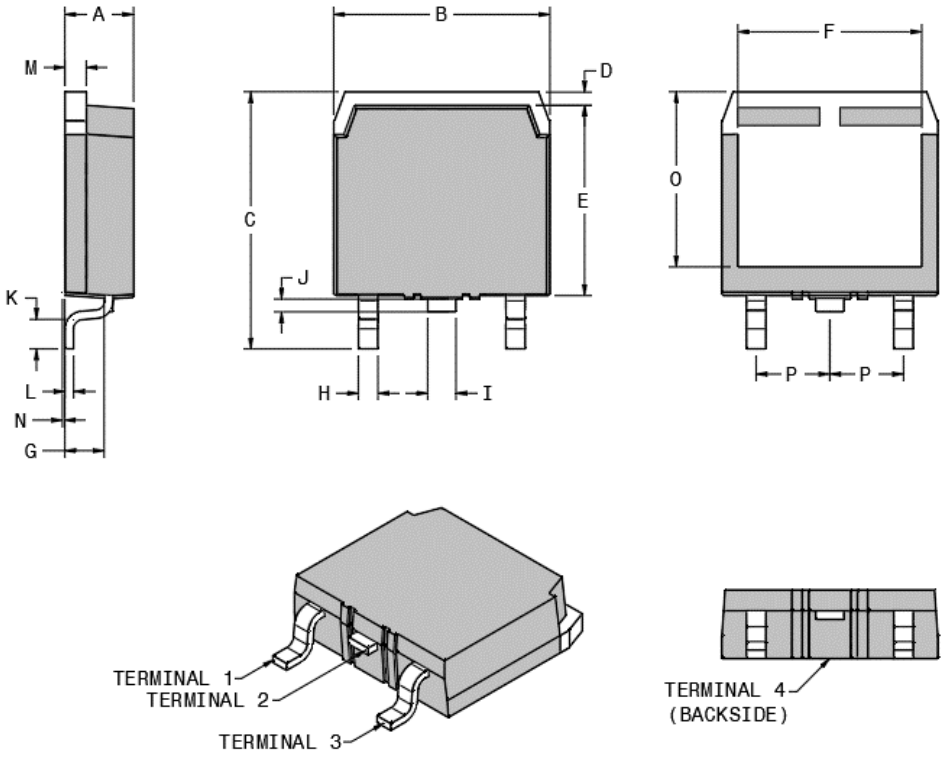
3 Package Specification

This section shows the package specification of the MSC030SDA070S device.

3.1 Package Outline Drawing

The following figure illustrates the TO-268 package drawing of the MSC030SDA070S device.

Figure 8 • Package Outline Drawing



The following table shows the TO-268 dimensions and should be used in conjunction with the package outline drawing.

Table 4 • TO-268 Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
A	4.90	5.10	0.193	0.201
B	15.85	16.20	0.624	0.638
C	18.70	19.10	0.736	0.752
D	1.00	1.25	0.039	0.049
E	13.80	14.00	0.543	0.551
F	13.30	13.60	0.524	0.535
G	2.70	2.90	0.106	0.114
H	1.15	1.45	0.045	0.057
I	1.95	2.21	0.077	0.087

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
J	0.94	1.40	0.037	0.055
K	2.40	2.70	0.094	0.106
L	0.40	0.60	0.016	0.024
M	1.45	1.60	0.057	0.063
N	0.00	0.18	0.000	0.007
O	12.40	12.70	0.488	0.500
P	5.45 BSC (nom.)		0.215 BSC (nom.)	
Terminal 1	Cathode			
Terminal 2	Cathode			
Terminal 3	Anode			
Terminal 4	Cathode			

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053-4102 | June 2019 | Preliminary

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