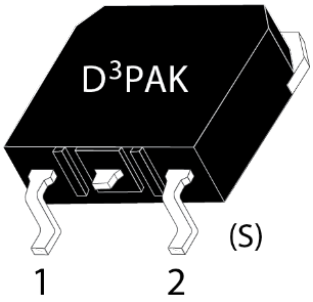
MSC050SDA070S Zero Recovery Silicon Carbide Schottky Diode

1 Product Overview

The silicon carbide (SiC) power Schottky barrier diode (SBD) product line from Microsemi increases your performance over silicon diode solutions while lowering your total cost of ownership for high-voltage applications. The MSC050SDA070S is a 700 V, 50 A SiC SBD.



1 - Cathode
2 - Anode
Back of Case - Cathode

1.1 Features

The following are key features of the MSC050SDA070S device:

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

1.2 Benefits

The following are benefits of the MSC050SDA070S device:

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

1.3 Applications

The MSC050SDA070S 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 MSC050SDA070S device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC050SDA070S device.

All ratings 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	88	A
		T_c = 135 °C	39	
		T_c = 145 °C	32	
I_{FRM}	Repetitive peak forward surge current (t_P = 8.3 ms, half sine wave)		128	
I_{FSM}	Non-repetitive forward surge current (t_P = 8.3 ms, half sine wave)		124	
P_{TOT}	Power dissipation	T_c = 25 °C	283	W
		T_c = 110 °C	123	
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 = 0.08 mH, peak I_L = 50 A)		100	mJ

The following table shows the thermal and mechanical characteristics of the MSC050SDA70S device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.37	0.53	°C/W
Wt	Package weight		0.14		oz
			4.0		g

2.2 Electrical Performance

The following table shows the static characteristics of the MSC050SDA070S device.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 50 A, T_J = 25 °C		1.5	1.8	V
		I_F = 50 A, T_J = 175 °C		1.9		
I_{RM}	Reverse leakage current	V_R = 700 V, T_J = 25 °C		15	200	µA
		V_R = 700 V, T_J = 175 °C		250		
Q_C	Total capacitive charge	V_R = 400 V, T_J = 25 °C		133		nC
C_J	Junction capacitance	V_R = 1 V, T_J = 25 °C, f = 1 MHz		2034		pF
	Junction capacitance	V_R = 200 V, T_J = 25 °C, f = 1 MHz		248		
	Junction capacitance	V_R = 400 V, T_J = 25 °C, f = 1 MHz		216		

2.3 Performance Curves

This section shows the typical performance curves of the MSC050SDA070S device.

Figure 1 • Maximum Transient Thermal Impedance

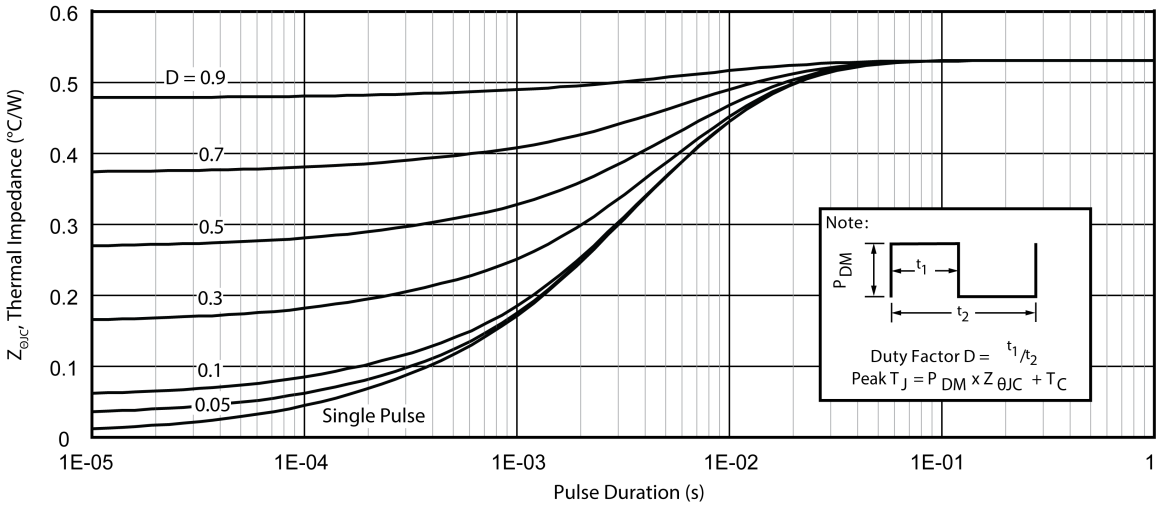


Figure 2 • Forward Current vs. Forward Voltage

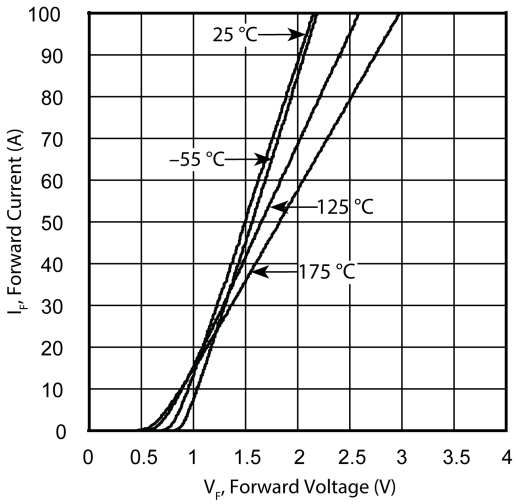


Figure 3 • Max. Forward Current vs. Case Temp.

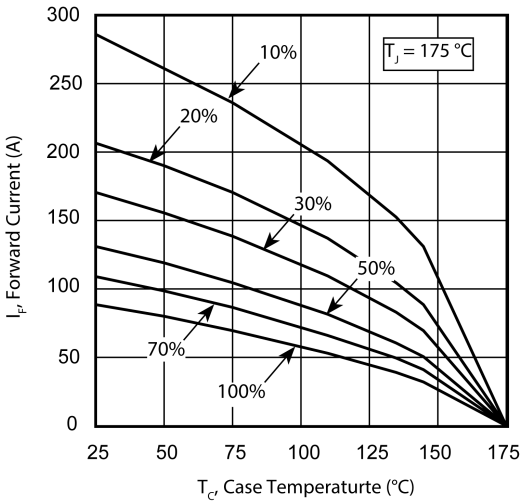


Figure 4 • Max. Power Dissipation vs. Case Temp.

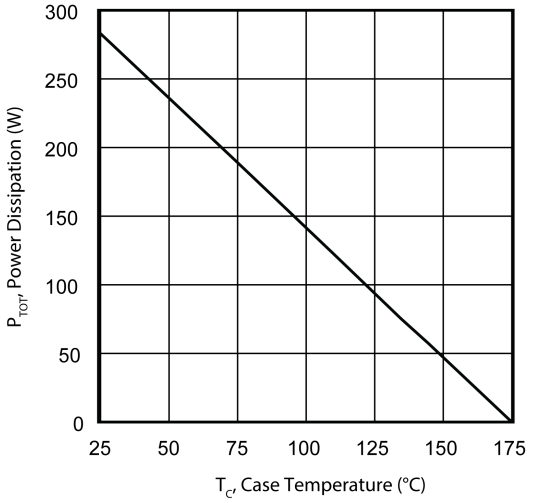


Figure 5 • Reverse Current vs. Reverse Voltage

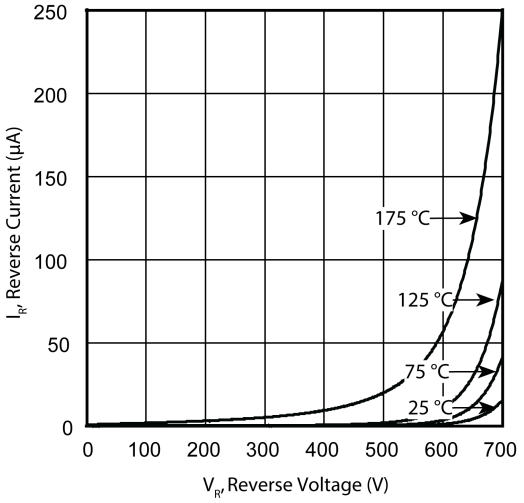


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

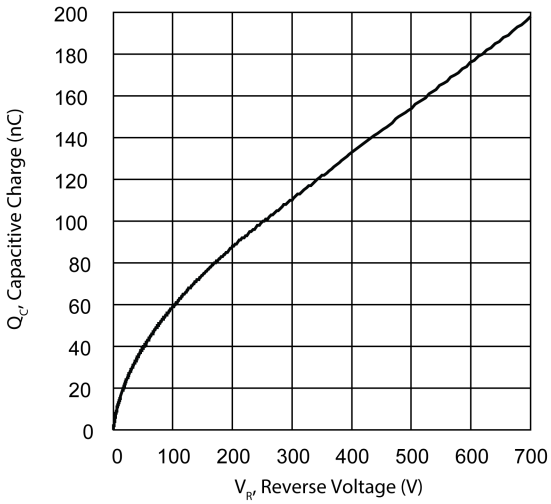
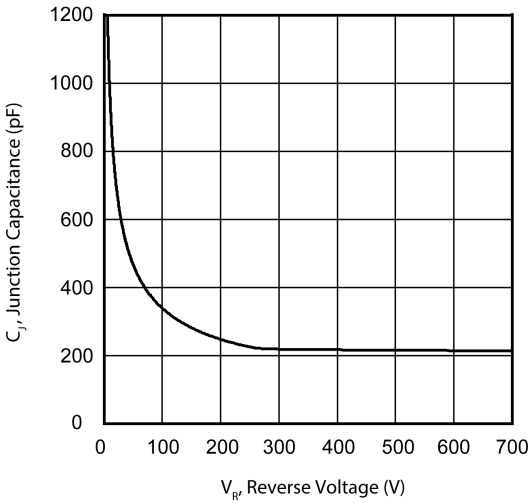


Figure 7 • Junction Capacitance vs. Reverse Voltage



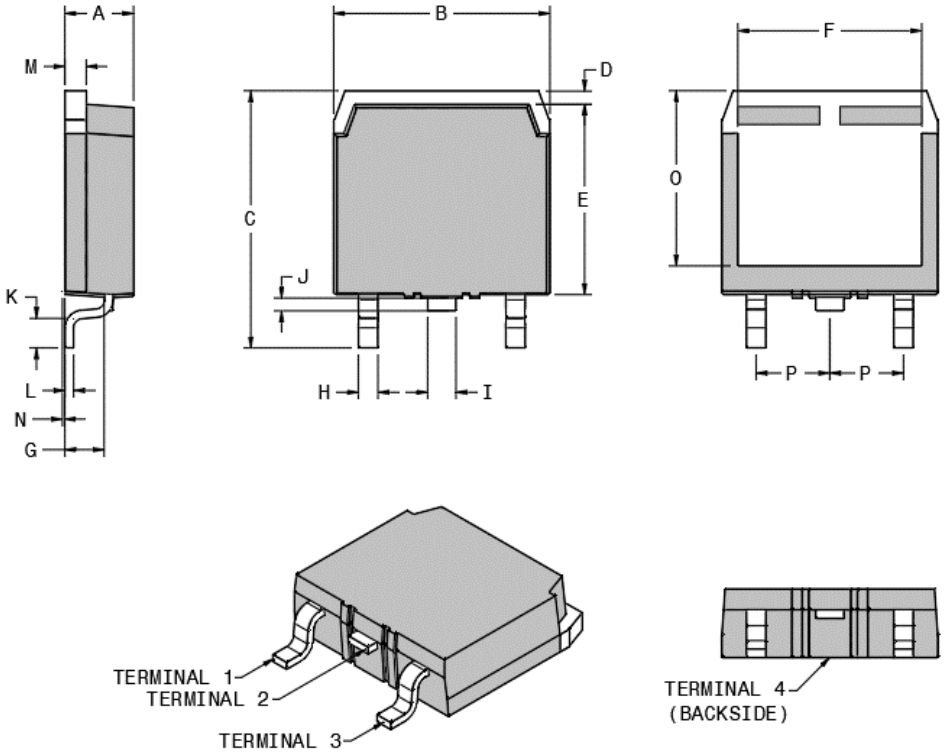
3 Package Specification

This section shows the package specification of the MSC050SDA070S device.

3.1 Package Outline Drawing

This following figure illustrates the TO-268 package outline of the MSC050SDA070S device.

Figure 8 • Package Outline Drawing



The following table lists 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
J	0.94	1.40	0.037	0.055

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
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			

Microsemi Headquarters
One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Sales: +1 (949) 380-6136
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

Microsemi, a wholly owned subsidiary of Microchip Technology Inc. (Nasdaq: MCHP), offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

053-4101 | May 2019 | Final