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**Zero Recovery Silicon Carbide Schottky Diode**

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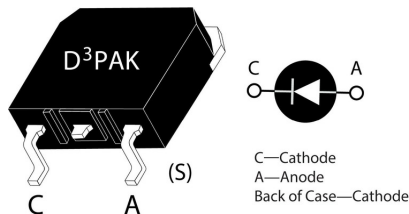
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**Product Overview**

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The silicon carbide (SiC) power Schottky barrier diode (SBD) product line from Microsemi increases the performance over silicon diode solutions while lowering the total cost of ownership for high-voltage applications. The MSC010SDA070S device is a 700 V, 10 A SiC SBD in a TO-268 (D3PAK) package.

**Features**

The following are key features of the MSC010SDA070S device:

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

**Benefits**

The following are benefits of the MSC010SDA070S device:

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

**Applications**

The MSC010SDA070S 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

## 1. Device Specifications

This section shows the specifications of the MSC010SDA070S device.

### 1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC010SDA070S device.  $T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1-1. Absolute Maximum Ratings**

Symbol	Parameter	Ratings	Unit	
$V_R$	Maximum DC reverse voltage	700	V	
$V_{RRM}$	Maximum peak repetitive reverse voltage			
$V_{RWM}$	Maximum working peak reverse voltage			
$I_F$	Maximum DC forward current	$T_C = 25\text{ }^\circ\text{C}$	24	A
		$T_C = 135\text{ }^\circ\text{C}$	10	
		$T_C = 145\text{ }^\circ\text{C}$	8	
$I_{FRM}$	Repetitive peak forward surge current ( $T_C = 25\text{ }^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , half sine wave)	34		
$I_{FSM}$	Non-repetitive forward surge current ( $T_C = 25\text{ }^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , half sine wave)	58		
$P_{TOT}$	Total power dissipation	$T_C = 25\text{ }^\circ\text{C}$	83	W
		$T_C = 110\text{ }^\circ\text{C}$	36	
$E_{AS}$	Single-pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$ , peak $I_L = 10\text{ A}$ )	100	mJ	

The following table shows the thermal and mechanical characteristics of the MSC010SDA070S device.

**Table 1-2. Thermal and Mechanical Characteristics**

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		1.30	1.80	$^\circ\text{C/W}$
$T_J, T_{STG}$	Operating junction and storage temperature range	-55		175	$^\circ\text{C}$
$T_L$	Lead temperature for 10 seconds			300	
Wt	Package weight		0.14		oz
			4.0		g

### 1.2 Electrical Performance

The following table shows the static characteristics of the MSC010SDA070S device.  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise specified.

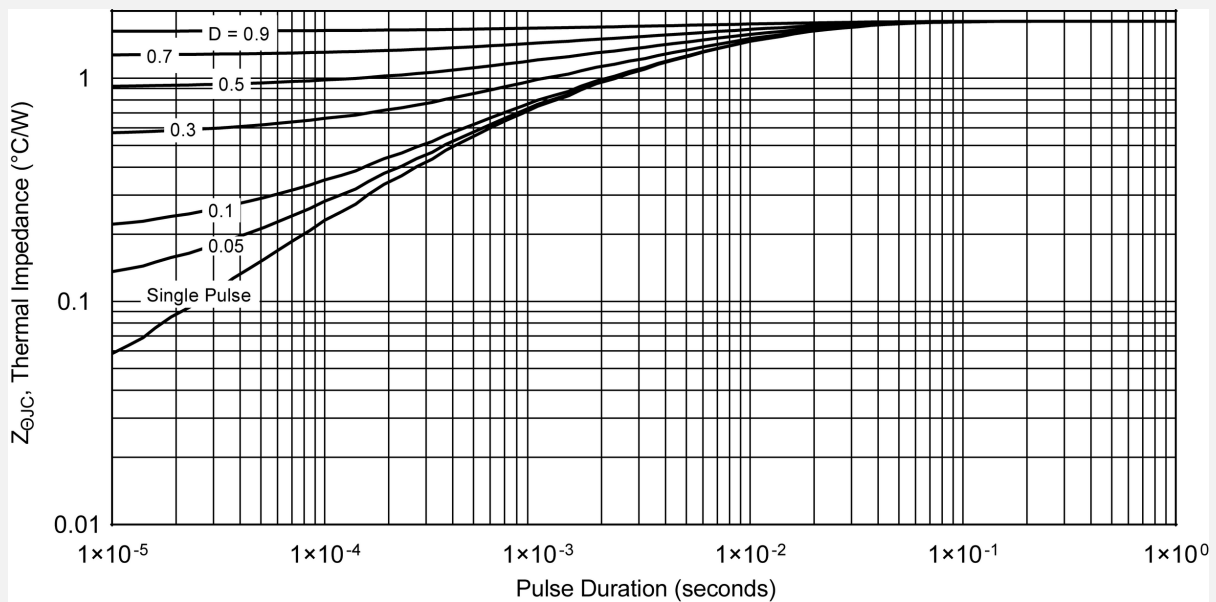
**Table 1-3. Static Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_F$	Forward voltage	$I_F = 10\text{ A}, T_J = 25\text{ }^\circ\text{C}$		1.5	1.8	V
		$I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$		1.8		
$I_{RM}$	Reverse leakage current	$V_R = 700\text{ V}, T_J = 25\text{ }^\circ\text{C}$		3	200	$\mu\text{A}$
		$V_R = 700\text{ V}, T_J = 175\text{ }^\circ\text{C}$		15		
$Q_C$	Total capacitive charge	$V_R = 400\text{ V}$		27		nC
$C_J$	Junction capacitance	$V_R = 1\text{ V}, f = 1\text{ MHz}$		353		pF
		$V_R = 200\text{ V}, f = 1\text{ MHz}$		54		
		$V_R = 400\text{ V}, f = 1\text{ MHz}$		46		

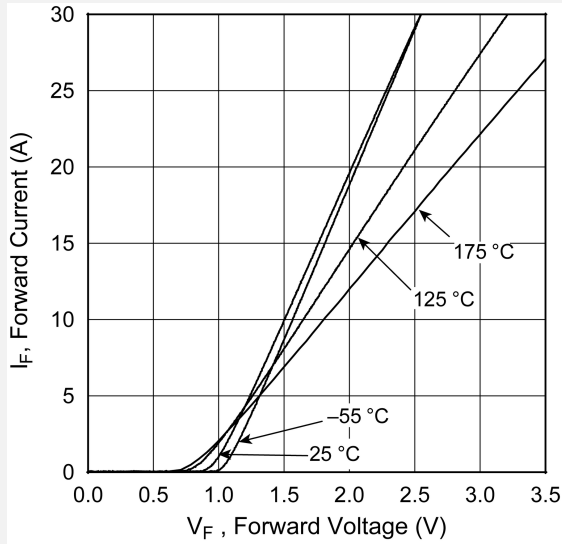
### 1.3 Typical Performance Curves

This section shows the typical performance curves of the MSC010SDA070S device.

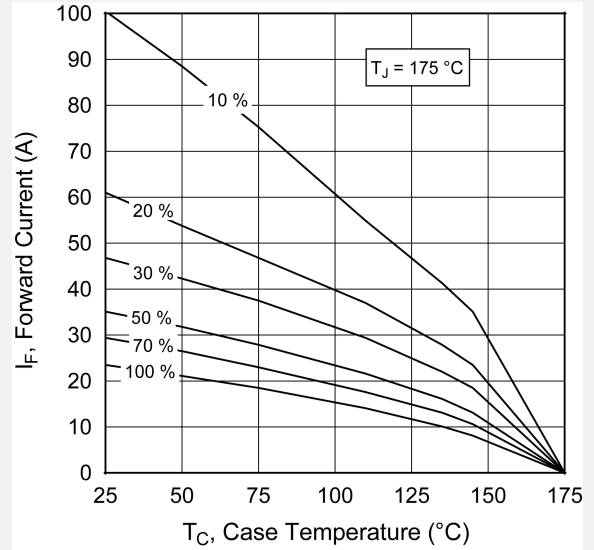
**Figure 1-1. Maximum Transient Thermal Impedance**



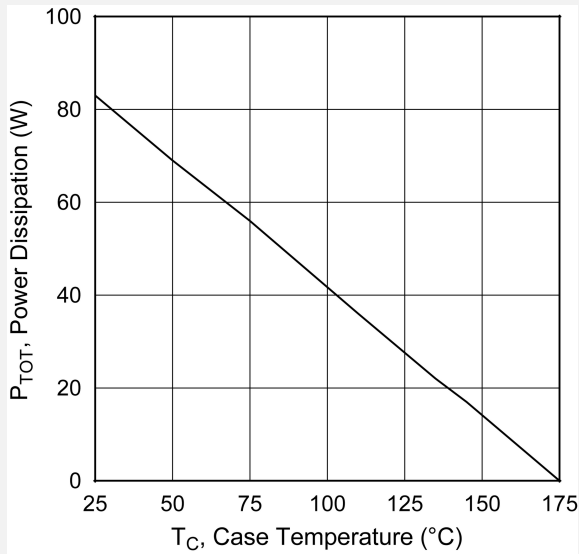
**Figure 1-2. Forward Current vs. Forward Voltage**



**Figure 1-3. Max. Forward Current vs. Case Temp.**



**Figure 1-4. Max. Power Dissipation vs. Case Temp.**



**Figure 1-5. Reverse Current vs. Reverse Voltage**

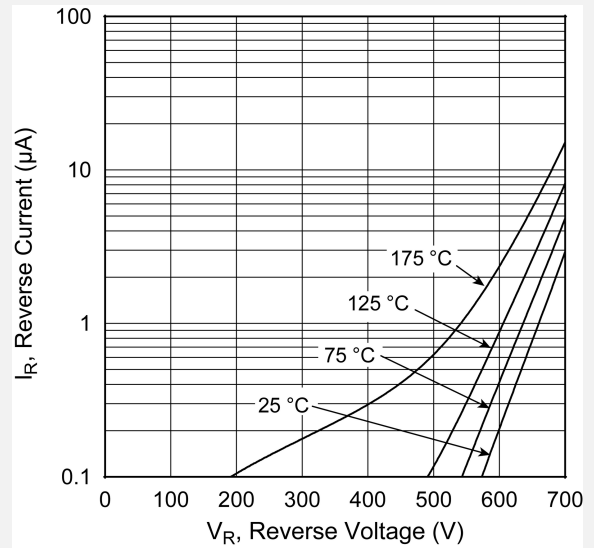


Figure 1-6. Total Charge vs. Reverse Voltage

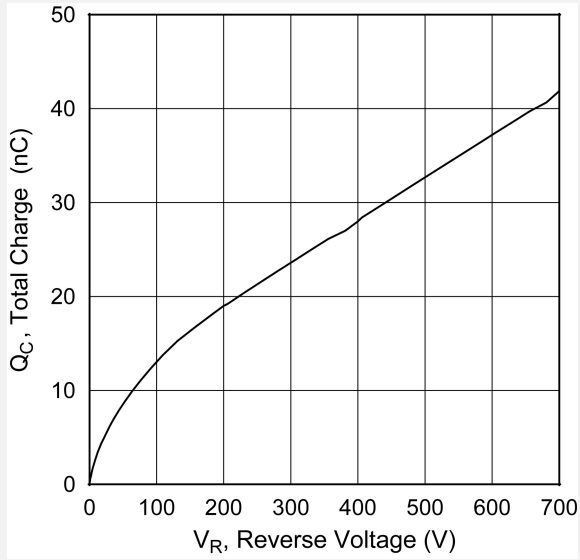
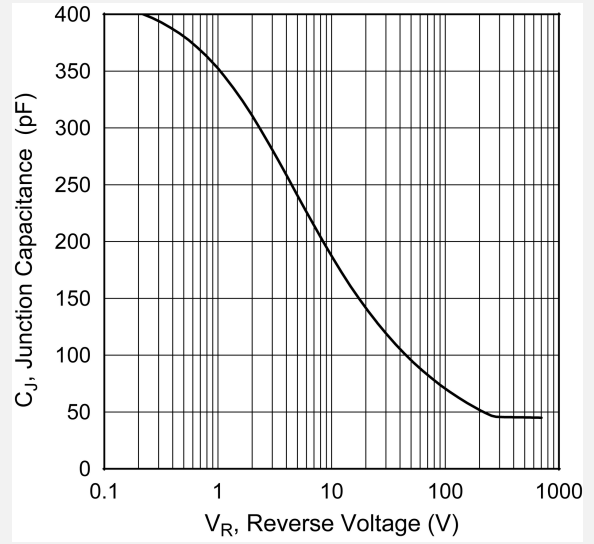


Figure 1-7. Capacitance vs. Reverse Voltage



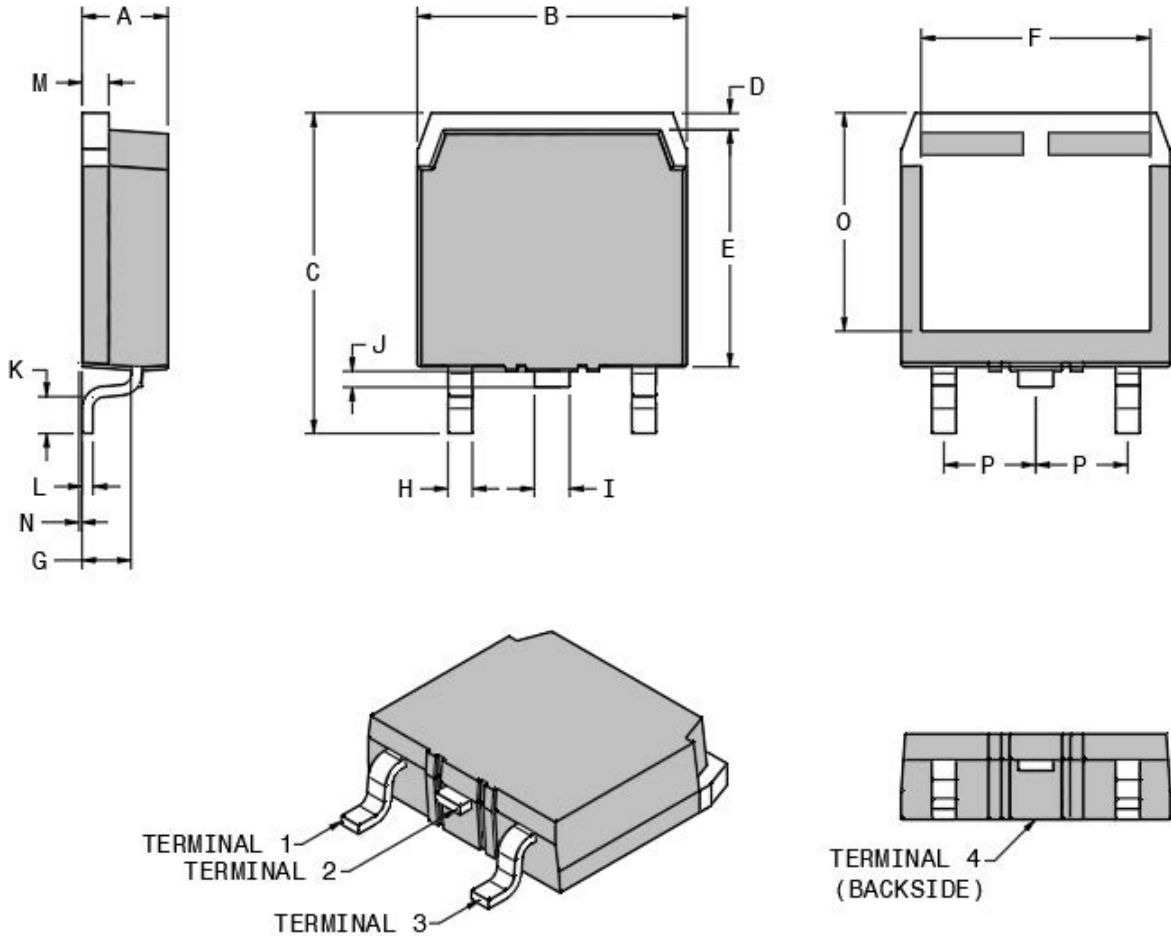
## 2. Package Specification

This section shows the package specification of the MSC010SDA070S device.

### 2.1 Package Outline Drawing

The following figure illustrates the TO-268 package outline of the MSC010SDA070S device.

**Figure 2-1. Package Outline Drawing**



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

**Table 2-1. 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
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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