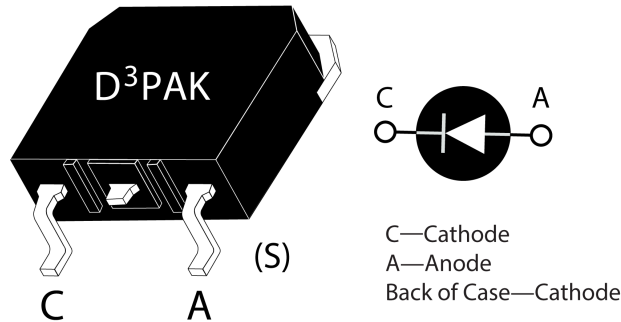


# MSC050SDA120S Zero Recovery Silicon Carbide Schottky Diode

## 1 Product Overview



### 1.1 Features

The following are key features of the MSC050SDA120S device:

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

### 1.2 Benefits

The following are benefits of the MSC050SDA120S device:

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

### 1.3 Applications

The MSC050SDA120S 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 details the specifications for the MSC050SDA120S device.

### 2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC050SDA120S device. All ratings at  $T_c = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1 • Absolute Maximum Ratings**

Symbol	Parameter		Ratings	Unit
$V_R$	Maximum DC reverse voltage		1200	V
$V_{RRM}$	Maximum peak repetitive reverse voltage			
$V_{RWM}$	Maximum working peak reverse voltage			
$I_F$	Maximum DC forward current	$T_c = 25\text{ }^\circ\text{C}$	109	A
		$T_c = 135\text{ }^\circ\text{C}$	49	
		$T_c = 145\text{ }^\circ\text{C}$	41	
$I_{FRM}$	Repetitive peak forward surge current ( $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 8.3$ ms, half sine wave)		154	
$I_{FSM}$	Non-repetitive forward surge current ( $T_c = 25\text{ }^\circ\text{C}$ , $t_p = 8.3$ ms, half sine wave)		290	
$P_{tot}$	Power dissipation	$T_c = 25\text{ }^\circ\text{C}$	429	W
		$T_c = 110\text{ }^\circ\text{C}$	186	
$T_J, T_{STG}$	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 $T_J = 25\text{ }^\circ\text{C}$ , $L = 0.08$ mH, peak $I_L = 50$ A)		100	mJ

The following table shows the thermal and mechanical characteristics of the MSC050SDA120S Device.

**Table 2 • Thermal and Mechanical Characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.24	0.35	$^\circ\text{C}/\text{W}$
$Wt$	Package weight		0.14		oz
			3.9		g

## 2.2 Electrical Performance

The following table shows the static characteristics of the MSC050SDA120S device.

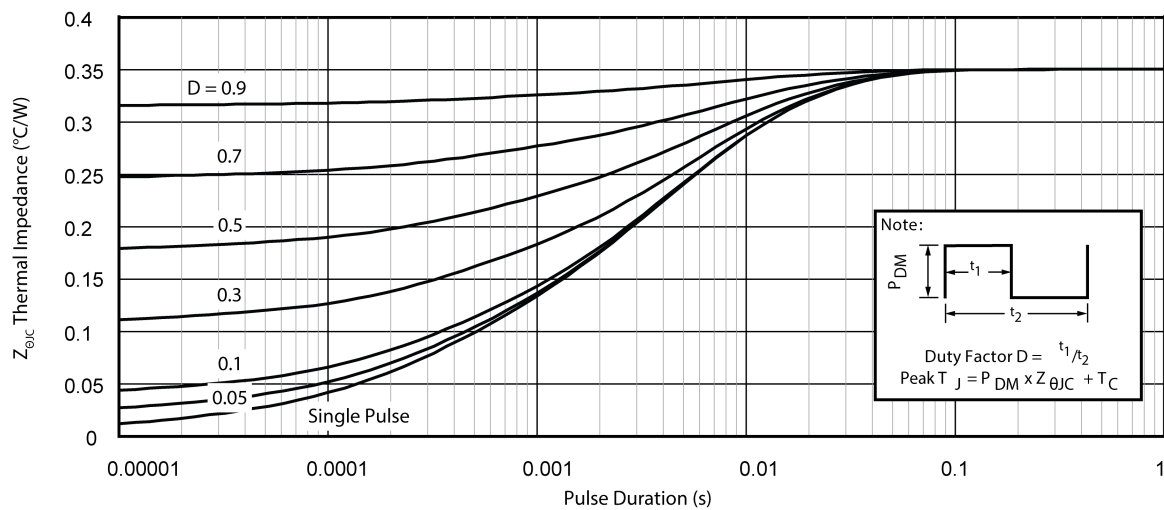
**Table 3 • Static Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_F$	Forward voltage	$I_F = 50 \text{ A}, T_J = 25 \text{ }^\circ\text{C}$		1.5	1.8	V
		$I_F = 50 \text{ A}, T_J = 175 \text{ }^\circ\text{C}$		2.1		
$I_{RM}$	Reverse leakage current	$V_R = 1200 \text{ V}, T_J = 25 \text{ }^\circ\text{C}$		15	200	$\mu\text{A}$
		$V_R = 1200 \text{ V}, T_J = 175 \text{ }^\circ\text{C}$		250		
$Q_C$	Total capacitive charge	$V_R = 600 \text{ V}, T_J = 25 \text{ }^\circ\text{C}$		224		nC
$C_J$	Junction capacitance	$V_R = 400 \text{ V}, T_J = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$		246		pF
	Junction capacitance	$V_R = 800 \text{ V}, T_J = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$		182		

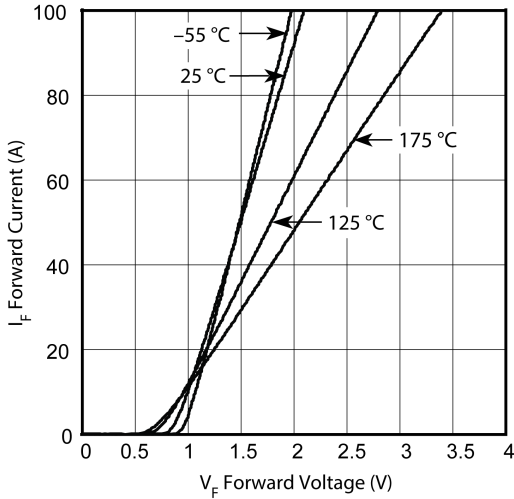
## 2.3 Performance Curves

This section shows the typical performance curves for the MSC050SDA120S device.

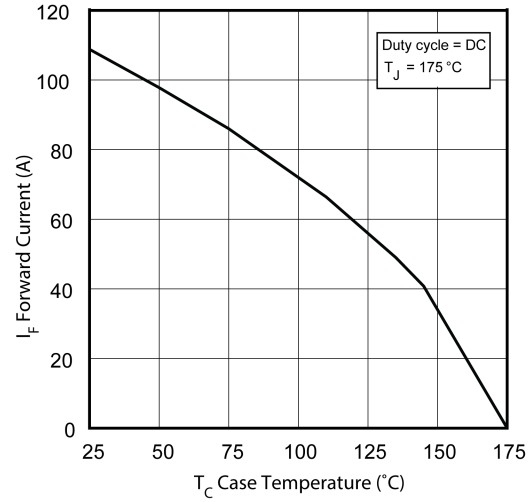
**Figure 1 • Maximum Transient Thermal Impedance**



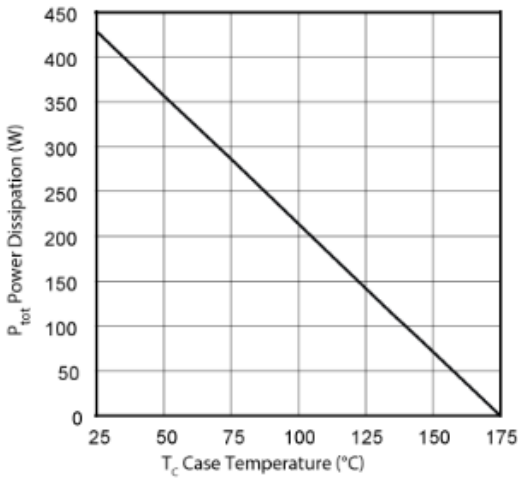
**Figure 2 • Forward Current vs. Forward Voltage**



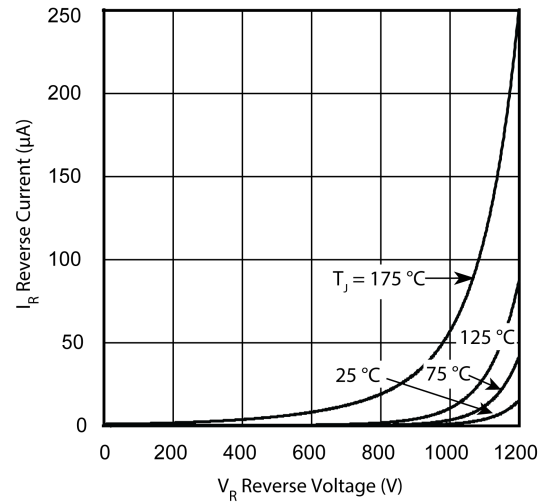
**Figure 3 • Max Forward Current vs. Case Temp**



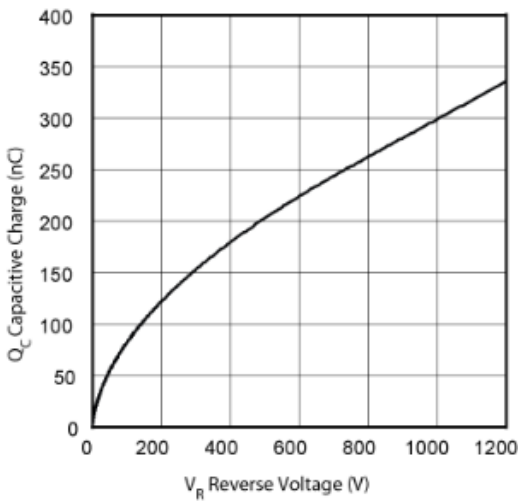
**Figure 4 • Max Power Dissipation vs. Case Temp**



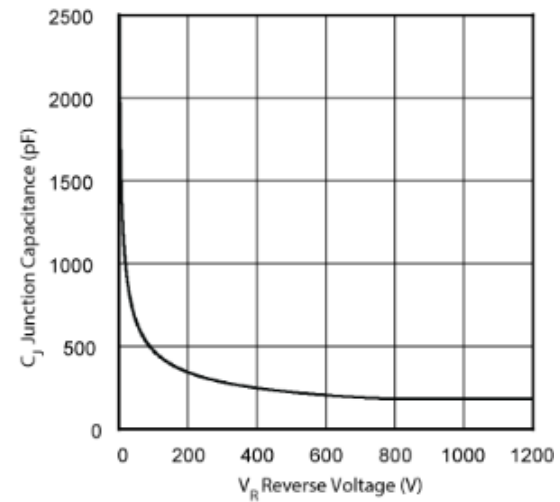
**Figure 5 • Reverse Current vs. Reverse Voltage**



**Figure 6 • Total Capacitive Charge vs. Reverse Voltage**



**Figure 7 • Junction Capacitance vs. Reverse Voltage**



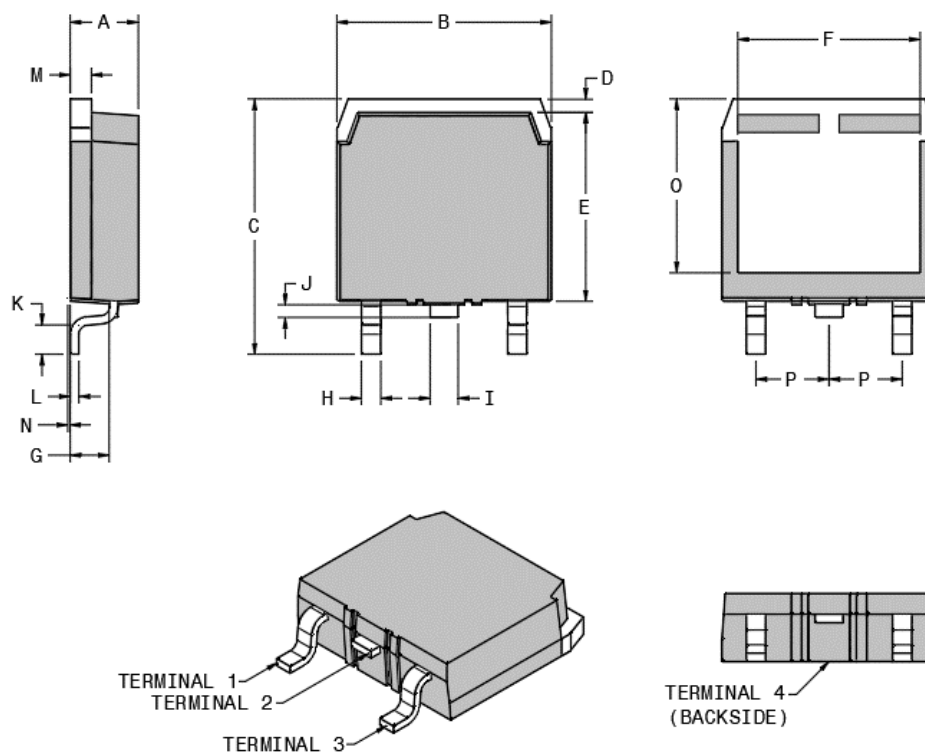
## 3 Package Specification

This section outlines the package specification for the MSC050SDA120S device.

### 3.1 Package Outline Drawing

This section shows the TO-268 package drawing of the MSC050SDA120S 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			



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