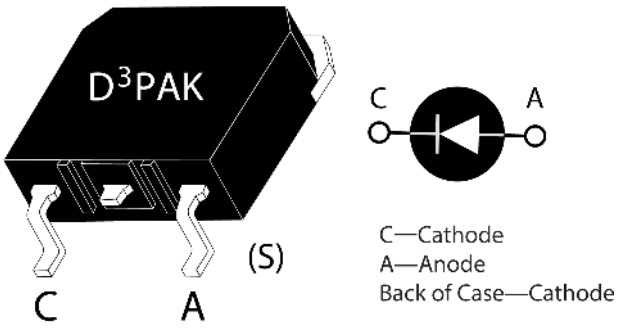
MSC050SDA120S Zero Recovery Silicon Carbide Schottky Diode

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 °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 °C	109	A
		T_C = 135 °C	49	
		T_C = 145 °C	41	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		154	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		290	
P_{tot}	Power dissipation	T_C = 25 °C	429	W
		T_C = 110 °C	186	
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 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	°C/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 A, T_J = 25 °C		1.5	1.8	V
		I_F = 50 A, T_J = 175 °C		2.1		
I_{RM}	Reverse leakage current	V_R = 1200 V, T_J = 25 °C		15	200	µA
		V_R = 1200 V, T_J = 175 °C		250		
Q_C	Total capacitive charge	V_R = 600 V, T_J = 25 °C		224		nC
C_J	Junction capacitance	V_R = 400 V, T_J = 25 °C, f = 1 MHz		246		pF
	Junction capacitance	V_R = 800 V, T_J = 25 °C, f = 1 MHz		182		

2.3 Performance Curves

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

Figure 1 • Maximum Transient Thermal Impedance

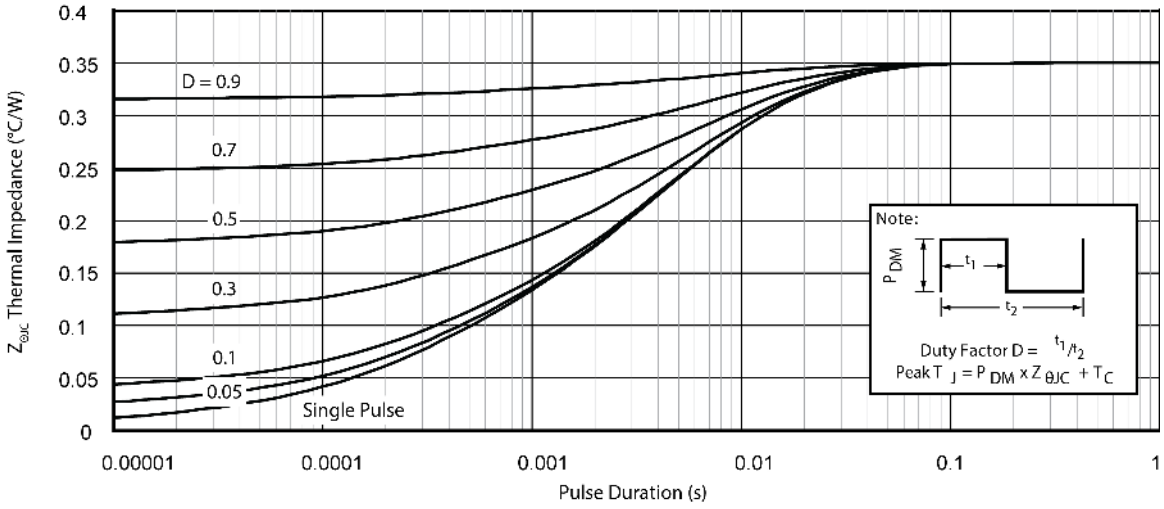


Figure 2 • Forward Current vs. Forward Voltage

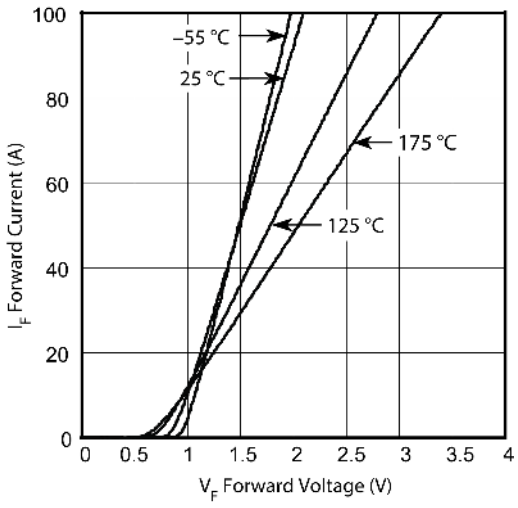


Figure 3 • Max Forward Current vs. Case Temp

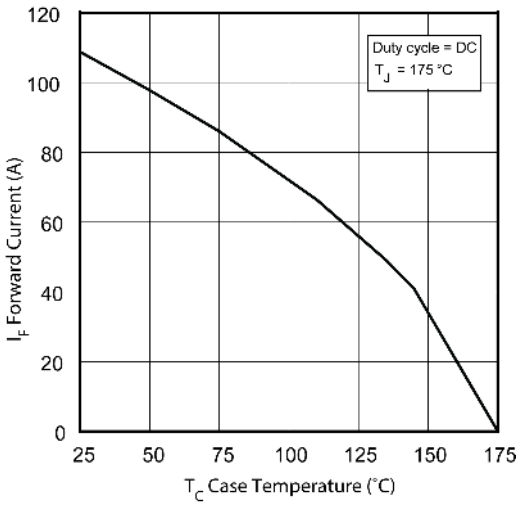


Figure 4 • Max Power Dissipation vs. Case Temp

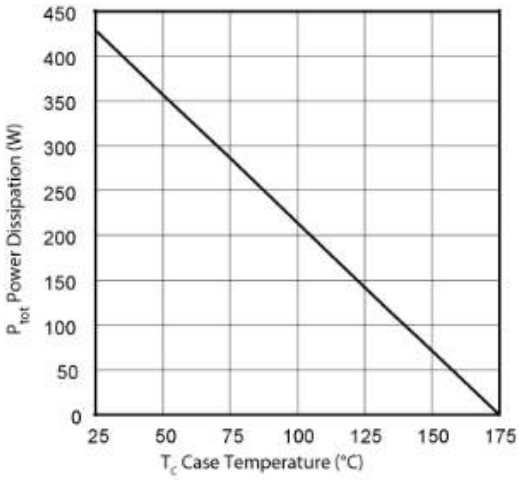


Figure 5 • Reverse Current vs. Reverse Voltage

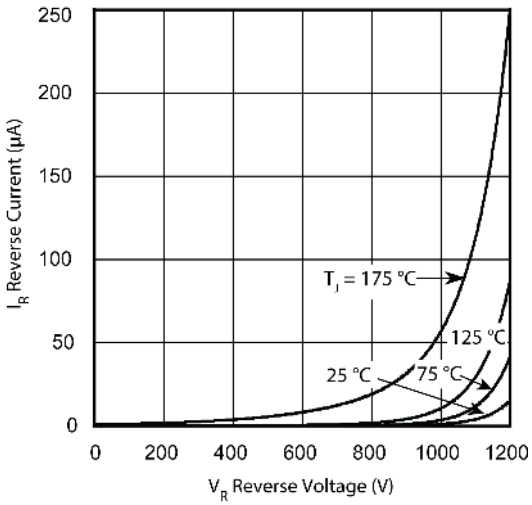


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

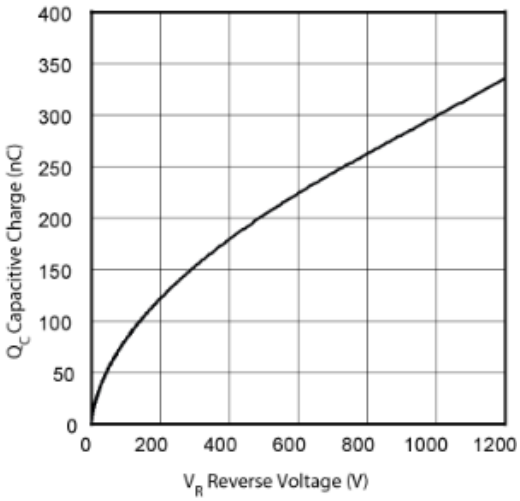
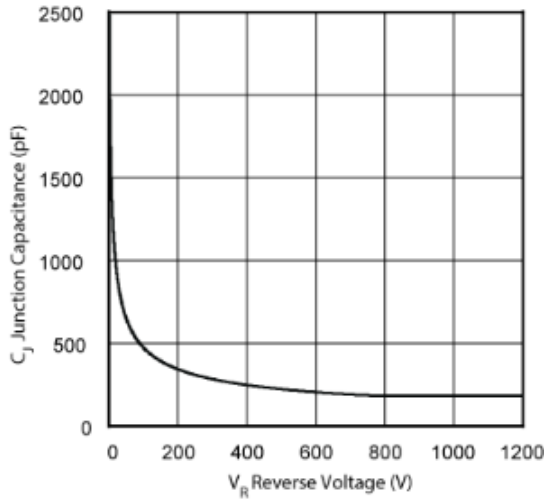


Figure 7 • Junction Capacitance vs. Reverse Voltage



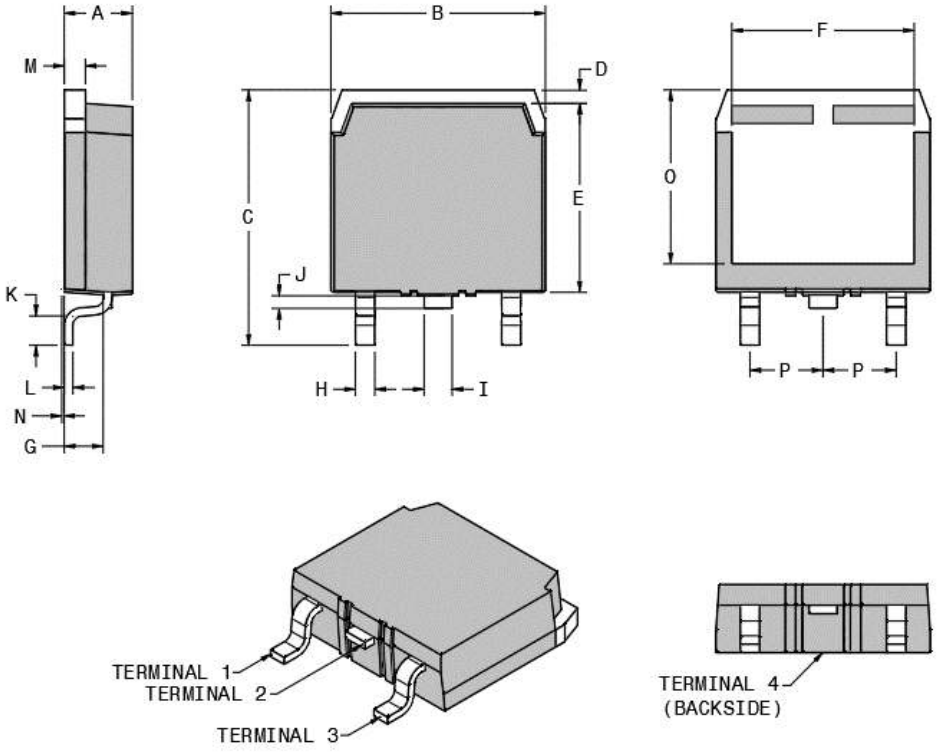
3 Package Specification

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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