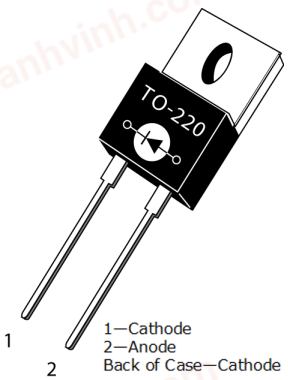
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MSC030SDA120K Zero Recovery Silicon Carbide Schottky Diode

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. The MSC030SDA120K is a 1200 V, 30 A SiC SBD in a two-lead TO-220 package shown below.



1.1 Features

The following are key features of the MSC030SDA120K device:

- Zero recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche-energy rated
- RoHS compliant

1.2 Benefits

The following are benefits of the MSC030SDA120K device:

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

1.3 Applications

The MSC030SDA120K 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

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2 Device Specifications

This section shows the specifications of the MSC030SDA120K device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC030SDA120K 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		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	70	A
		T_C = 135 °C	32	
		T_C = 145 °C	27	
I_{FRM}	Repetitive peak forward surge current (t_p = 8.3 ms, half sine wave)		92	
I_{FSM}	Non-repetitive forward surge current (t_p = 8.3 ms, half sine wave)		165	
P_{TOT}	Power dissipation	T_C = 25 °C	300	W
		T_C = 110 °C	130	
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 MSC030SDA120K device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.35	0.50	°C/W
Wt	Package weight		0.07		oz
			1.9		g
	Mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

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2.2 Electrical Performance

The following table shows the static characteristics of the MSC030SDA120K device.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward Voltage	I_F = 30 A, T_J = 25 °C		1.5	1.8	V
		I_F = 30 A, T_J = 175 °C		2.1		
I_{RM}	Reverse leakage current	V_R = 1200 V, T_J = 25 °C		9	200	µA
		V_R = 1200 V, T_J = 175 °C		150		
Q_C	Total capacitive charge	V_R = 600 V, T_J = 25 °C		130		nC
C_J	Junction capacitance	V_R = 400 V, T_J = 25 °C, f = 1 MHz		141		pF
	Junction capacitance	V_R = 800 V, T_J = 25 °C, f = 1 MHz		105		

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2.3 Typical Performance Curves

This section shows the typical performance curves of the MSC030SDA120K device.

Figure 1 • Maximum Transient Thermal Impedance

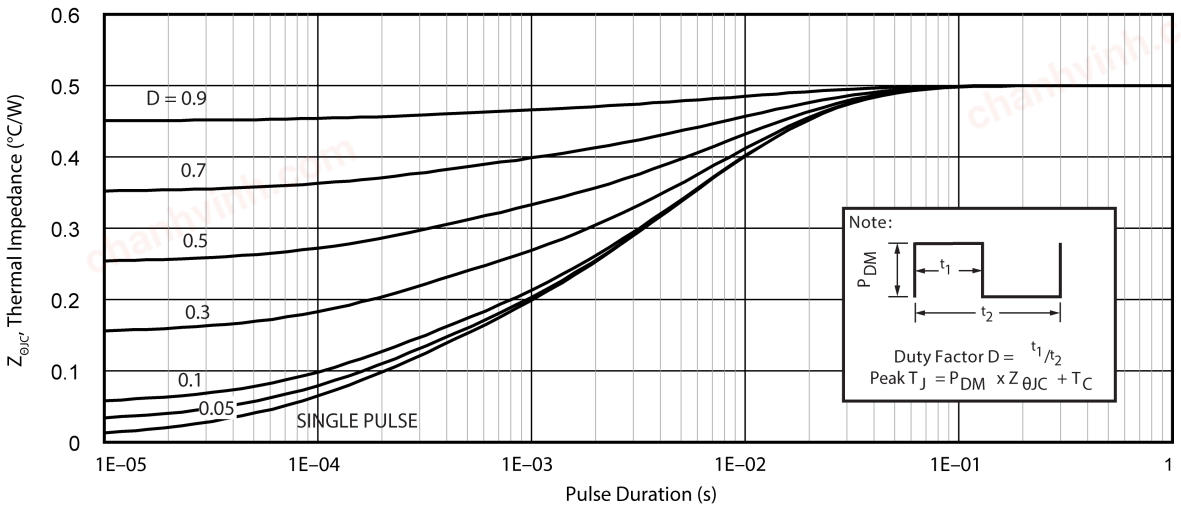


Figure 2 • Forward Current vs. Forward Voltage

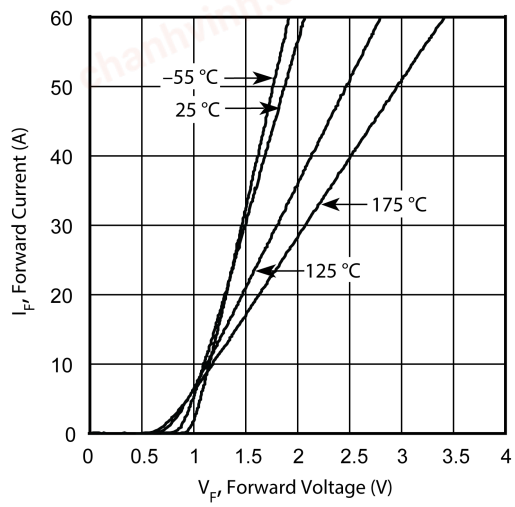
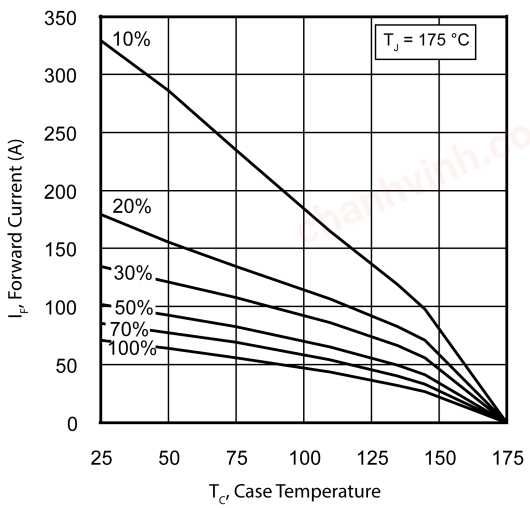


Figure 3 • Max. Forward Current vs. Case Temp.



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

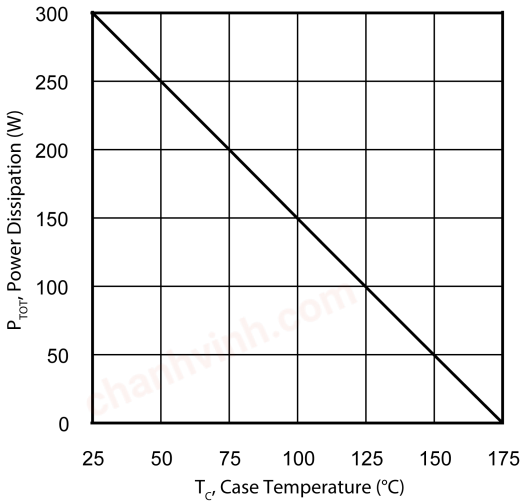


Figure 5 • Reverse Current vs. Reverse Voltage

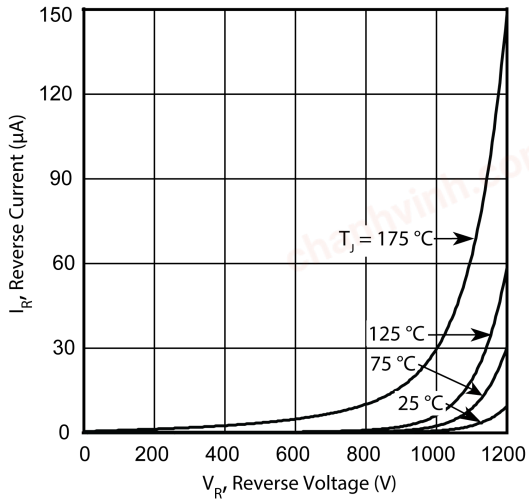


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

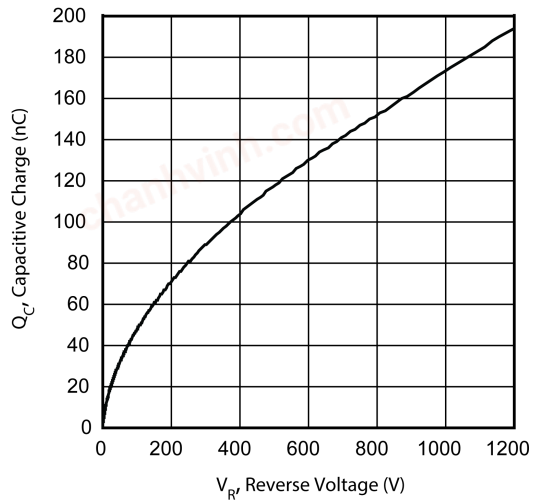
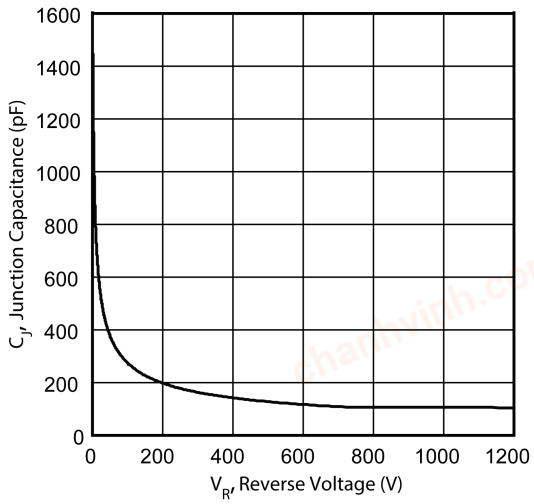


Figure 7 • Junction Capacitance vs. Reverse Voltage



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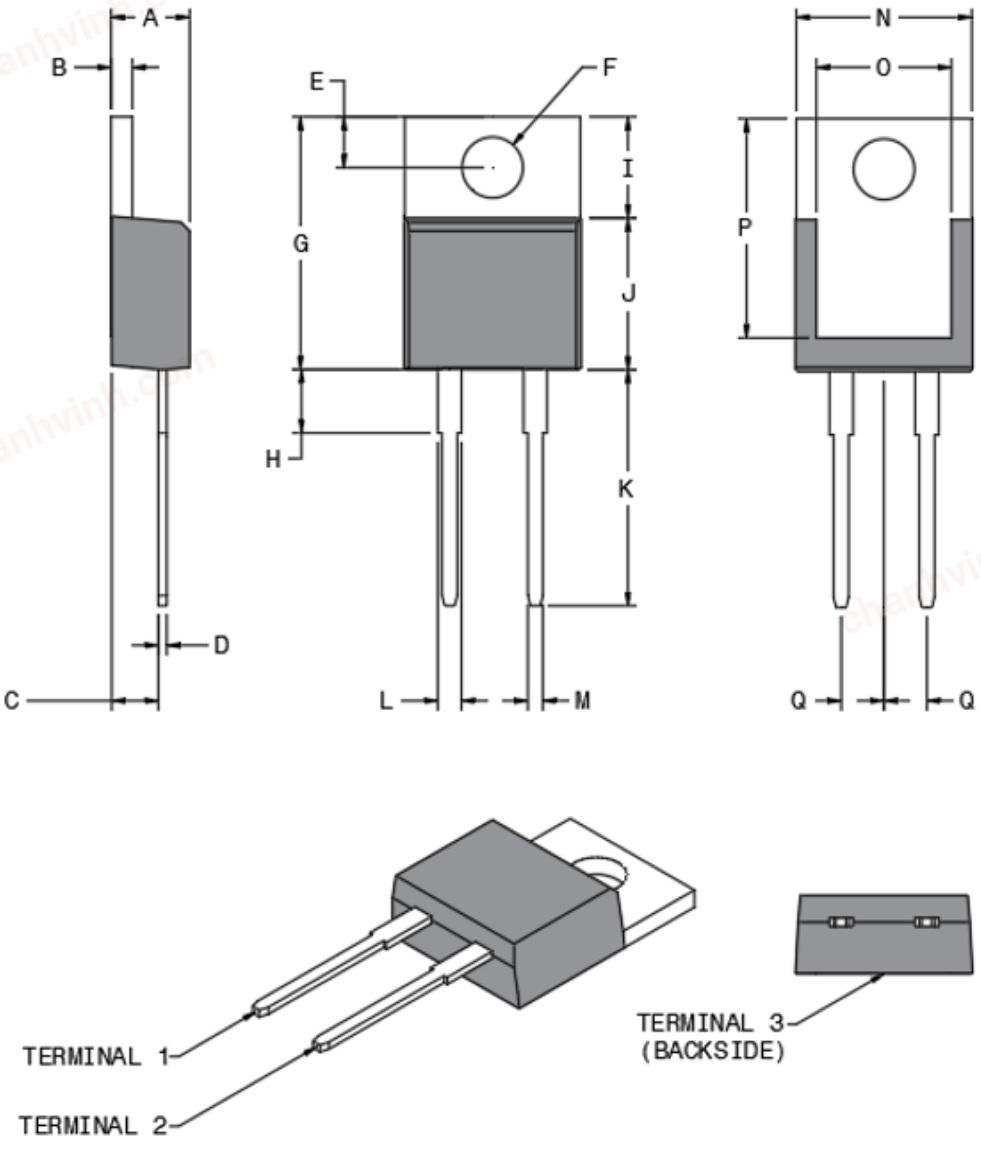
3 Package Specification

This section shows the package specification of the MSC030SDA120K device.

3.1 Package Outline Drawing

The following figure illustrates the TO-220 package drawing of the MSC030SDA120K device.

Figure 8 • Package Outline Drawing



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The following table lists the TO-220 dimensions and should be used in conjunction with the package outline drawing.

Table 4 • TO-220 Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
A	4.32	4.57	0.170	0.180
B	1.14	1.40	0.045	0.055
C	2.50	2.74	0.098	0.108
D	0.36	0.53	0.014	0.021
E	2.65	3.05	0.104	0.120
F	3.60	3.96	0.142	0.156
G	14.50	15.60	0.571	0.614
H	2.39	3.65	0.094	0.144
I	6.00	6.80	0.236	0.268
J	8.40	9.00	0.331	0.354
K	13.00	14.00	0.512	0.551
L	1.23	1.39	0.048	0.055
M	0.69	0.88	0.027	0.035
N	10.00	10.36	0.394	0.408
O	7.57	7.90	0.298	0.311
P	12.20	13.10	0.480	0.516
Q	2.54 BSC (nom.)		0.100 BSC (nom.)	
Terminal 1	Cathode			
Terminal 2	Anode			
Terminal 3	Cathode			

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