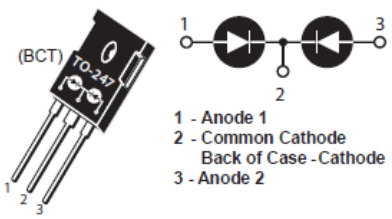
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MSC030SDA070BCT Zero Recovery Silicon Carbide Schottky Dual Diode

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 MSC030SDA070BCT is a 700 V, 30 A SiC dual common cathode SBD in a three-lead TO-247 package shown below.



Features

The following are key features of the MSC030SDA070BCT device:

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

Benefits

The following are benefits of the MSC030SDA070BCT device:

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

Applications

The MSC030SDA070BCT 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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Device Specifications

This section details the device specifications for the MSC030SDA070BCT device. All ratings are per leg.

Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC030SDA070BCT device. All ratings: 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	60	A
		T_C = 135 °C	25	
		T_C = 145 °C	21	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		79	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		146	
P_{tot}	Power dissipation	T_C = 25 °C	188	W
		T_C = 110 °C	81	
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 MSC030SDA070BCT device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.56	0.80	°C/W
Wt	Package weight		0.22		oz

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Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
			6.2		g
	Mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

Electrical Performance

The following table shows the static characteristics of the MSC030SDA070BCT 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		1.75		
I_{RM}	Reverse leakage current	V_R = 700 V, T_J = 25 °C		1	200	µA
		V_R = 700 V, T_J = 175 °C		10		
Q_C	Total capacitive charge	V_R = 400 V, T_J = 25 °C		83		nC
C_J	Junction capacitance	V_R = 1 V, T_J = 25 °C, ƒ = 1 MHz		1200		pF
	Junction capacitance	V_R = 200 V, T_J = 25 °C, ƒ = 1 MHz		150		
	Junction capacitance	V_R = 400 V, T_J = 25 °C, ƒ = 1 MHz		128		

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Performance Curves

This section shows the typical performance curves for the MSC030SDA070BCT device.

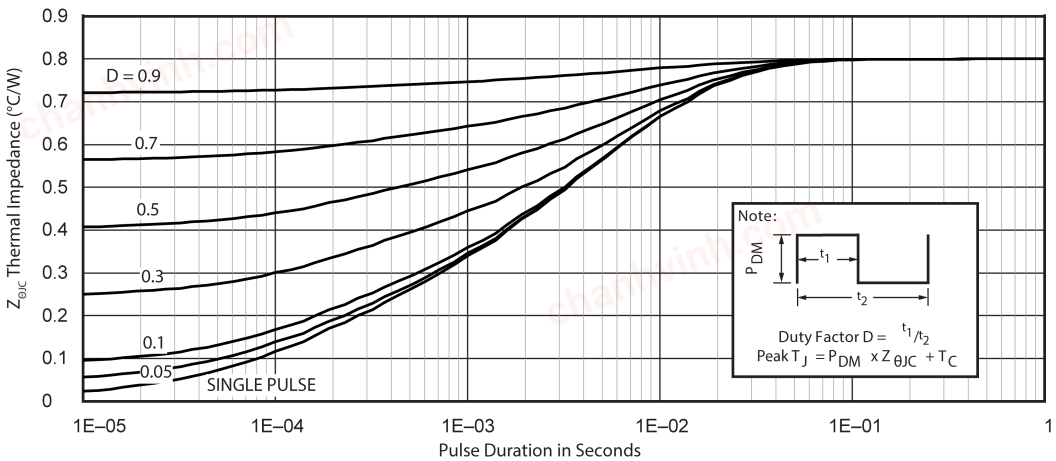


Figure 1 • Maximum Transient Thermal Impedance

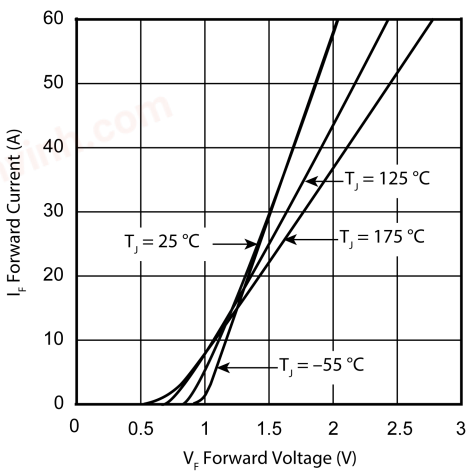


Figure 2 • Forward Current vs. Forward Voltage

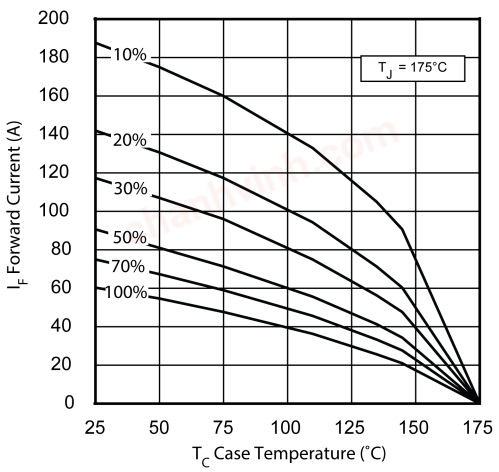


Figure 3 • Max. Forward Current vs. Case Temp.

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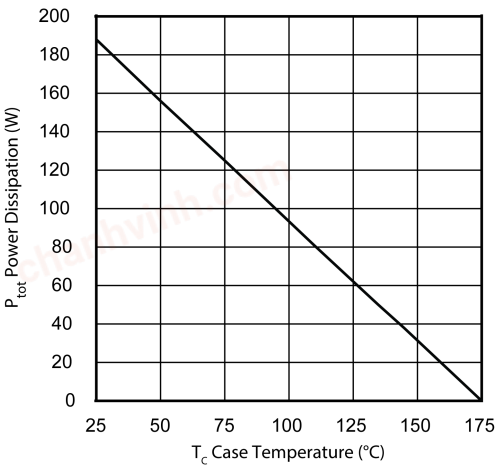


Figure 4 • Max. Power Dissipation vs. Case Temp.

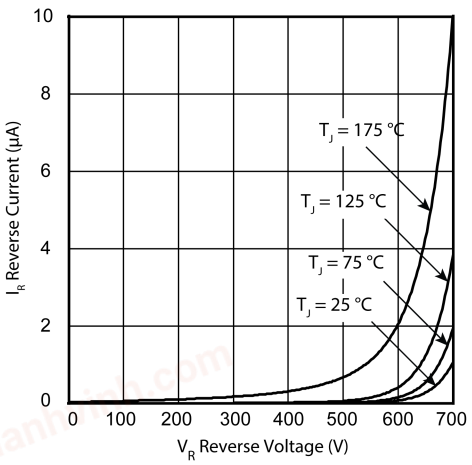


Figure 5 • Reverse Current vs. Reverse Voltage

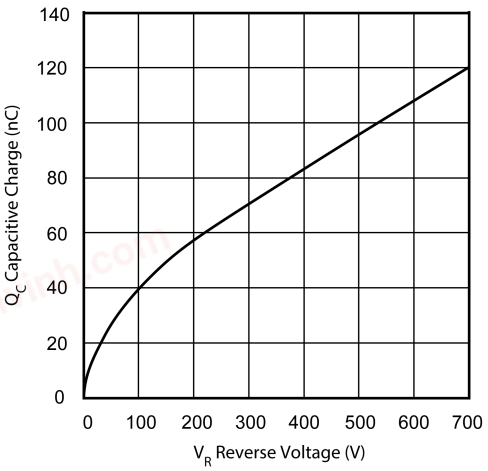


Figure 6 • Total Capacitive Charge vs. V_R

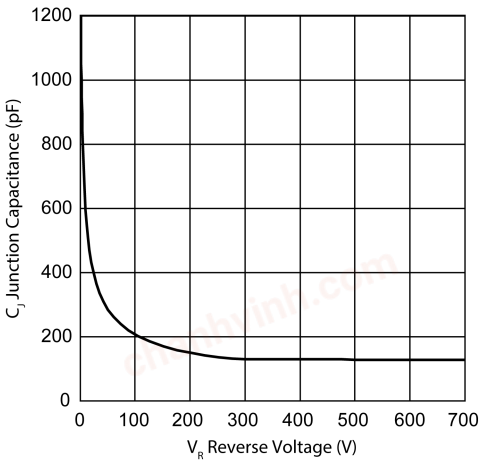


Figure 7 • Junction Capacitance vs. V_R

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Package Specification

This section outlines the package specification for the MSC030SDA070BCT device.

Package Outline Drawing

This section details the TO-247 package drawing of the MSC030SDA070BCT device. Dimensions are in millimeters and (inches).

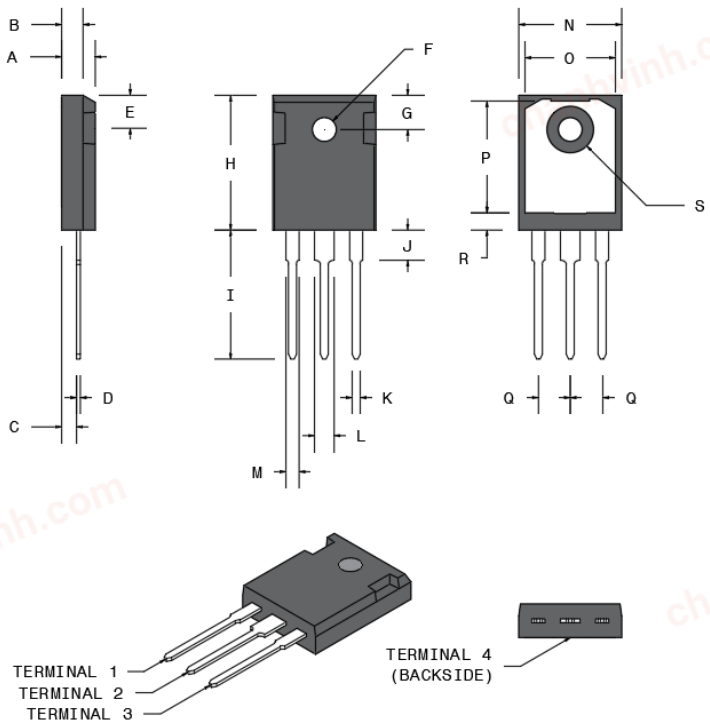


Figure 8 • Package Outline Drawing

The following table shows the TO-247 dimensions and should be used in conjunction with the package outline drawing.

Table 4 • Dimensions

Symbol	Min. (mm)	Max. (mm)	Min. (in.)	Max (in.)
A	4.69	5.31	0.185	0.209
B	1.49	2.49	0.059	0.098
C	2.21	2.59	0.087	0.102
D	0.40	0.79	0.016	0.031
E	5.38	6.20	0.212	0.244
F	3.50	3.81	0.138	0.150

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Symbol	Min. (mm)	Max. (mm)	Min. (in.)	Max (in.)
G	6.15 BSC		0.242 BSC	
H	20.80	21.46	0.819	0.845
I	19.81	20.32	0.780	0.800
J	4.00	4.50	0.157	0.177
K	1.01	1.40	0.040	0.055
L	2.87	3.12	0.113	0.123
M	1.65	2.13	0.065	0.084
N	15.49	16.26	0.610	0.640
O	13.50	14.50	0.531	0.571
P	16.50	17.50	0.650	0.689
Q	5.45 BSC		0.215 BSC	
R	2.00	2.75	0.079	0.108
S	7.10	7.50	0.280	0.295
Terminal 1	Anode 1			
Terminal 2	Common cathode			
Terminal 3	Anode 2			
Terminal 4	Common cathode			

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