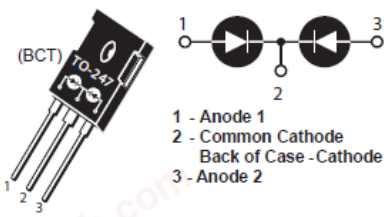
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Microsemi
a Microchip company

MSC030SDA120BCT 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 MSC030SDA120BCT is a 1200 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 MSC030SDA120BCT device:

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

Benefits

The following are benefits of the MSC030SDA120BCT device:

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

Applications

The MSC030SDA120BCT 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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Electrical Specifications

This section details the specifications for the MSC030SDA120BCT device. All ratings are per leg.

Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC030SDA120BCT device.

All Ratings: T_C = 25 °C unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Sym-bol	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	65	A
		T_C = 135 °C	29	
		T_C = 145 °C	24	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)		92	
I_{FSM}	Non-repetitive forward surge current (T_C = 25°C, t_p = 8.3 ms, half sine wave)		165	
P_{TOT}	Power dissipation	T_C = 25 °C	259	W
		T_C = 110 °C	112	
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 MSC030SDA120BCT device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.4	0.58	°C/W
W_T	Package weight		0.22		oz

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Symbol	Characteristic	Min	Typ	Max	Unit
			5.9		g
	Maximum mounting torque			10	lbf-in
				1.1	N-m

Electrical Performance

The following table shows the static characteristics of the MSC030SDA120BCT device.

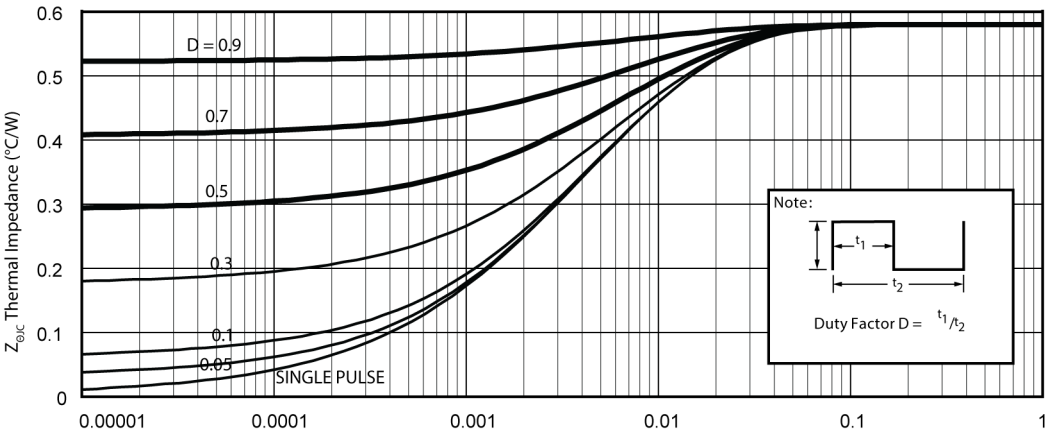
Table 3 • Static Characteristics

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, ƒ = 1 MHz		141		pF
	Junction capacitance	V_R = 800 V, T_J = 25 °C, ƒ = 1 MHz		105		

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Performance Curves

This section shows the typical performance curves for the MSC030SDA120BCT device.



Maximum Effective Transient Thermal Impedance, Junction-to-Case vs. Pulse Duration

Figure 1 • Maximum Transient Thermal Impedance

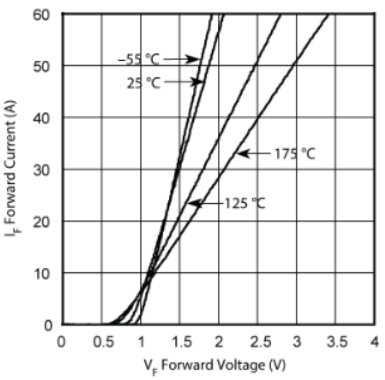


Figure 2 • Forward Current vs. Forward Voltage

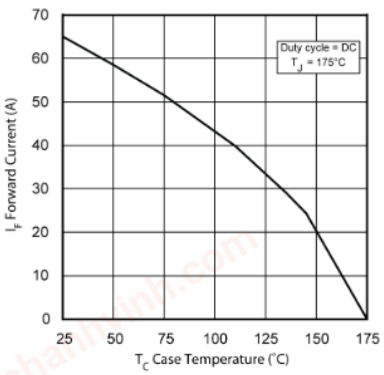


Figure 3 • Max Forward Current vs. Case Temp

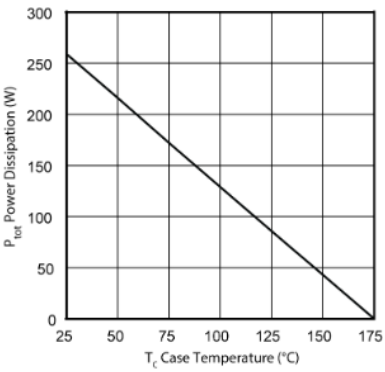


Figure 4 • Max Power Dissipation vs. Case Temp

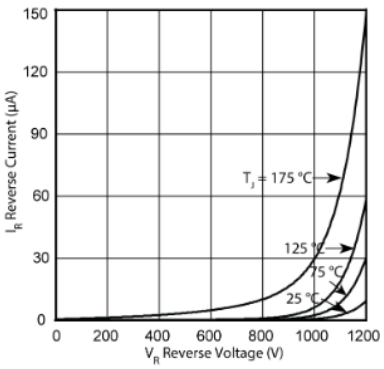


Figure 5 • Reverse Current vs. Reverse Voltage

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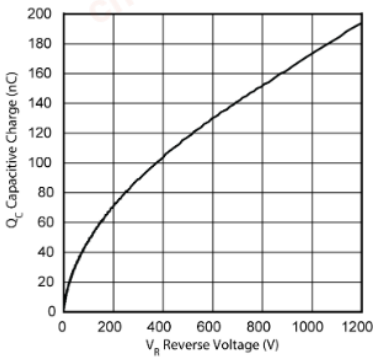


Figure 6 • Total Capacitive Charge vs. V_R

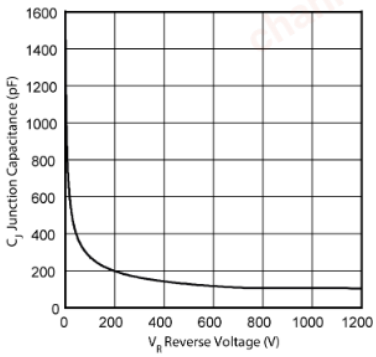


Figure 7 • Junction Capacitance vs. V_R

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Package Specification

This section outlines the package specification for the MSC030SDA120BCT device.

Package Outline Drawing

This section details the TO-247 package drawing of the MSC030SDA120BCT device. Dimensions are in millimeters and (inches).

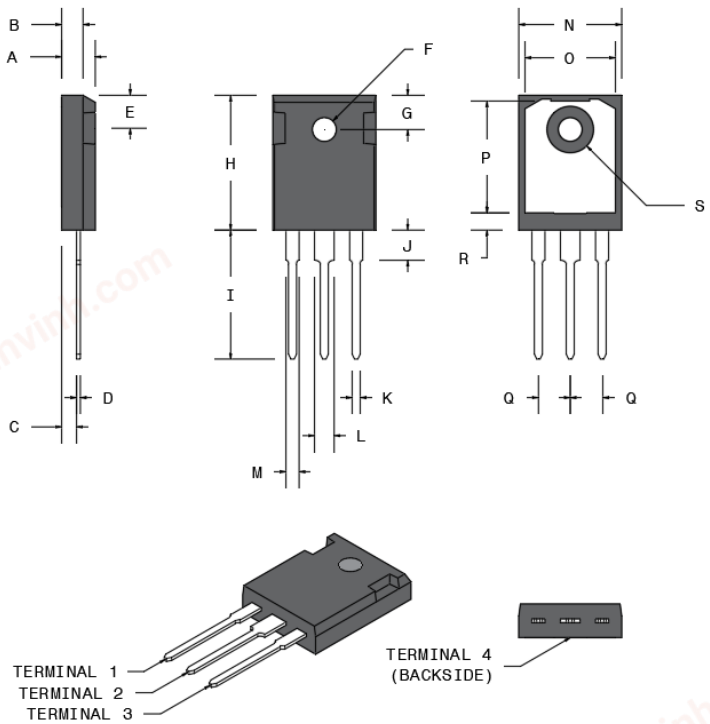


Figure 8 • Package Outline Drawing

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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