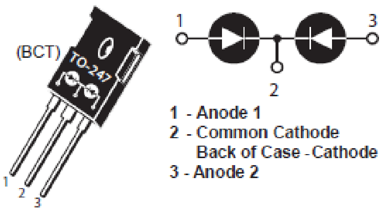
MSC050SDA120BCT Zero Recovery Silicon Carbide Schottky Dual Diode

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 MSC050SDA120BCT is a 1200 V, 50 A SiC dual common cathode SBD in a three-lead TO-247 package shown below.



Features

The following are key features of the MSC050SDA120BCT device:

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

Benefits

The following are benefits of the MSC050SDA120BCT device:

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

Applications

The MSC050SDA120BCT 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

Device Specifications

This section details the specifications for the MSC050SDA120BCT device. All ratings are per leg.

Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC050SDA120BCT 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 MSC050SDA120BCT 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
W_T	Package weight		0.22		oz

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 MSC050SDA120BCT 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, ƒ = 1 MHz			246		pF
	Junction capacitance V_R = 800 V, T_J = 25 °C, ƒ = 1 MHz			182		

Performance Curves

This section shows the typical performance curves for the MSC050SDA120BCT device.

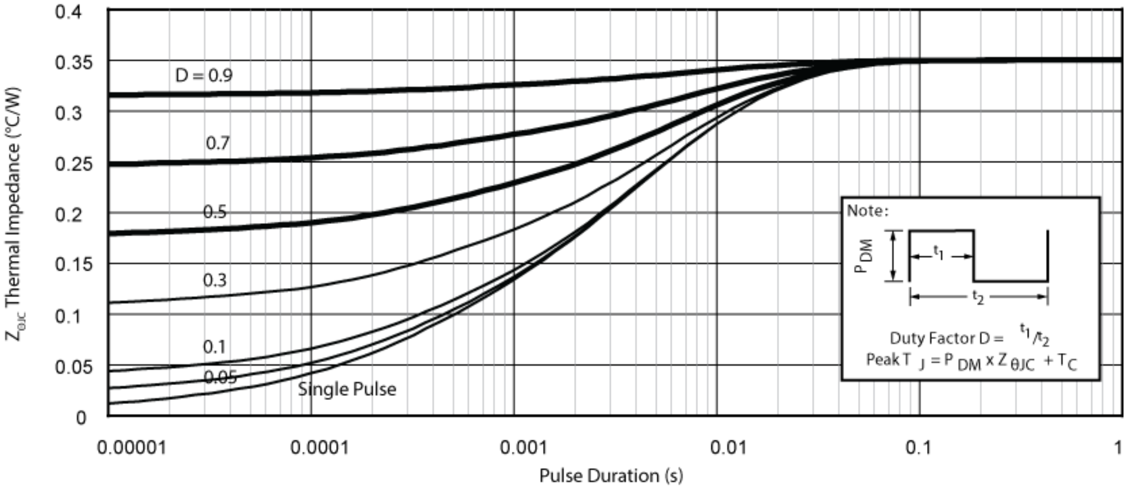


Figure 1 • Maximum Transient Thermal Impedance

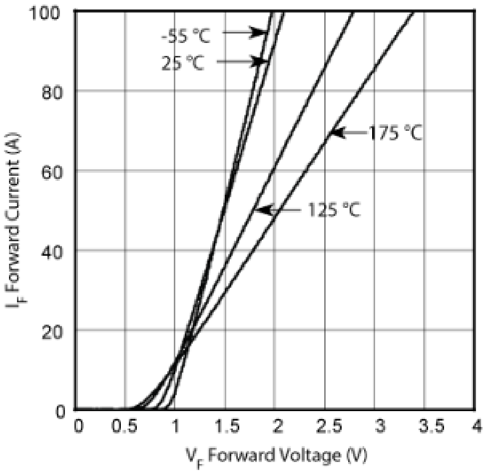


Figure 2 • Forward Current vs. Forward Voltage

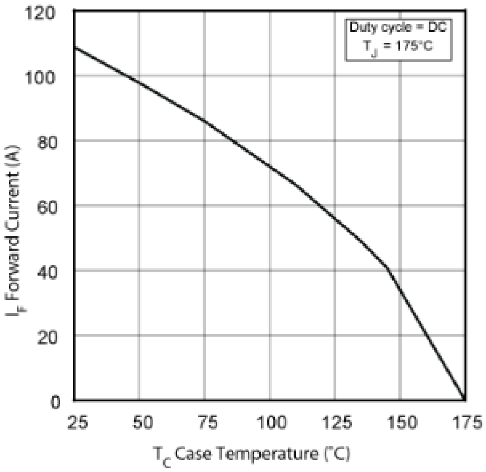


Figure 3 • Max Forward Current vs. Case Temp

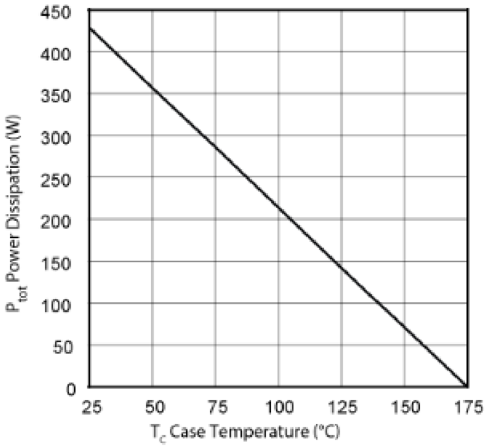


Figure 4 • Max Power Dissipation vs. Case Temp

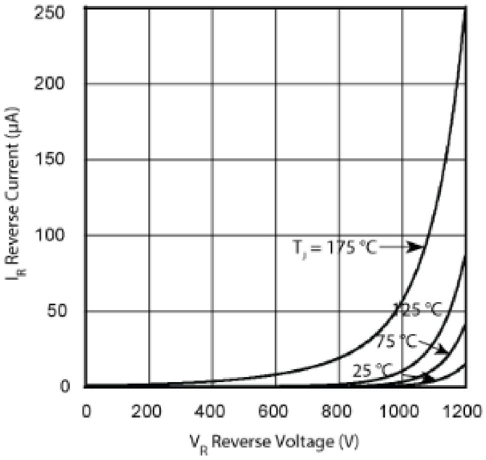


Figure 5 • Reverse Current vs. Reverse Voltage

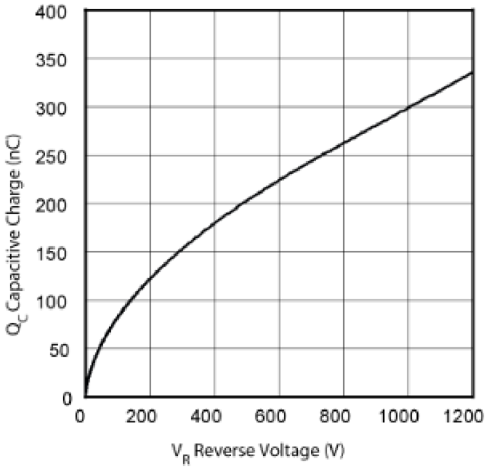


Figure 6 • Total Capacitive Charge vs. V_R

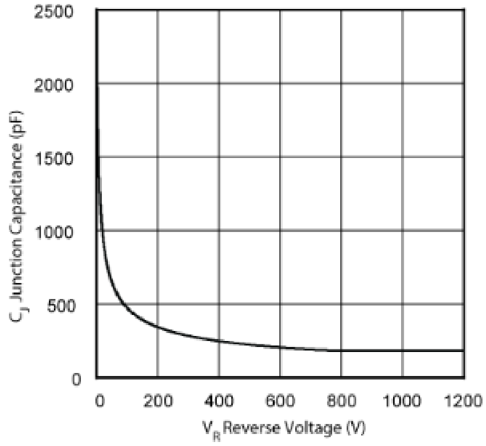


Figure 7 • Junction Capacitance vs. V_R

Package Specification

This section outlines the package specification for the MSC050SDA120BCT device.

Package Outline Drawing

This section details the TO-247 package drawing of the MSC050SDA120BCT device. Dimensions are in millimeters and (inches).

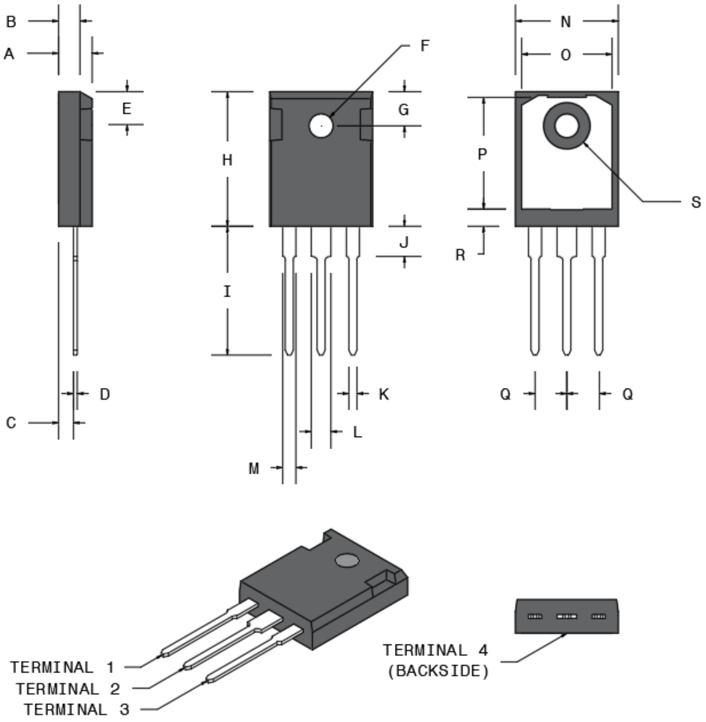


Figure 8 • Package Outline Drawing

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

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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