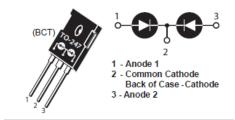


# MSC050SDA070BCT Zero Recovery Silicon Carbide Schottky Dual Diode

#### **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 MSC050SDA070BCT is a 700 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 MSC050SDA070BCT device:

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

#### **Benefits**

The following are benefits of the MSC050SDA070BCT device:

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

#### **Applications**

The MSC050SDA070BCT 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



# **Electrical Specifications**

This section shows the specifications for the MSC050SDA070BCT device. All ratings are per leg.

## **Absolute Maximum Ratings**

The following table shows the absolute maximum ratings for the MSC050SDA070BCT device.

All ratings:  $T_C = 25$  °C unless otherwise specified.

**Table 1 • Absolute Maximum Ratings** 

Symbol	Parameter	Ratings	Unit
V <sub>R</sub>	Maximum DC reverse voltage	700	V
V <sub>RRM</sub>	Maximum peak repetitive reverse voltage	700	
V <sub>RWM</sub>	Maximum working peak reverse voltage	700	
I <sub>F</sub>	Maximum DC forward current (T <sub>c</sub> = 25 °C)	88	А
	Maximum DC forward current (T <sub>c</sub> = 135 °C)	39	
	Maximum DC forward current (T <sub>c</sub> = 145 °C)	32	
I <sub>FRM</sub>	Repetitive peak forward surge current ( $T_c = 25$ °C, $t_p = 8.3$ ms, half sine wave)	128	
I <sub>FSM</sub>	Non-repetitive forward surge current ( $T_c$ = 25 °C, $t_p$ = 8.3 ms, half sine wave)	124	
P <sub>tot</sub>	Power dissipation (T <sub>c</sub> = 25 °C)	283	w
	Power dissipation (T <sub>c</sub> = 110 °C)	123	
T <sub>J</sub> , T <sub>STG</sub>	Operating and storage temperature range	-55 to 175	°C
T <sub>L</sub>	Lead temperature for 10 seconds	300	
E <sub>AS</sub>	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 MSC050SDA70BCT device.

**Table 2 • Thermal and Mechanical Characteristics** 

Symbol	Characteristic	Min	Тур	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.37	0.53	°C/W
W <sub>T</sub>	Package weight		0.22		OZ



Symbol	Characteristic	Min	Тур	Max	Unit
			5.9		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 MSC050SDA070BCT device.

**Table 3 • Static Characteristics** 

Symbol	Characteristic	Test Conditions	Тур	Max	Unit
V <sub>F</sub>	Forward voltage	I <sub>F</sub> = 50 A, T <sub>J</sub> = 25 °C	1.5	1.8	V
		I <sub>F</sub> = 50 A, T <sub>J</sub> = 175 °C	1.9		
I <sub>RM</sub>	Reverse leakage current	V <sub>R</sub> = 700 V, T <sub>J</sub> = 25 °C	15	200	μА
		V <sub>R</sub> = 700 V, T <sub>J</sub> = 175 °C	250		
Q <sub>C</sub>	Total capacitive charge	V <sub>R</sub> = 400 V, T <sub>J</sub> = 25 °C	133		nC
C <sub>J</sub>	Junction capacitance	V <sub>R</sub> = 1 V, T <sub>J</sub> = 25 °C, f = 1 MHz	2034		pF
	Junction capacitance	V <sub>R</sub> = 200 V, T <sub>J</sub> = 25 °C, f = 1 MHz	248		
	Junction capacitance	$V_R = 400 \text{ V}, T_J = 25 \text{ °C}, f = 1 \text{ MHz}$	216		



### **Performance Curves**

This section shows the typical performance curves for the MSC050SDA070BCT device.

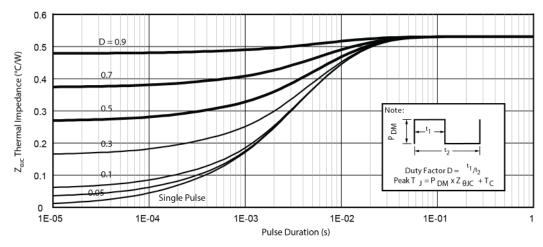


Figure 1 • Maximum Transient Thermal Impedance

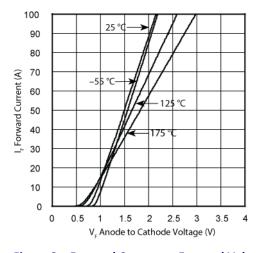


Figure 2 • Forward Current vs Forward Voltage

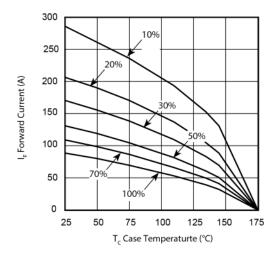


Figure 3 • Max Forward Current vs Case Temp



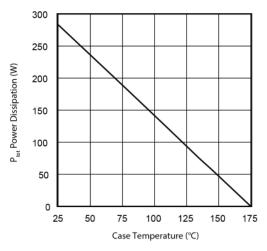


Figure 4 • Max Power Dissipation vs Case Temp

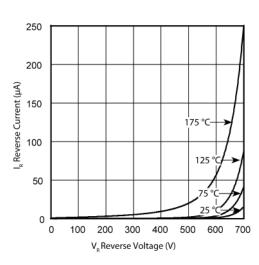


Figure 5 • Reverse Current vs. Reverse Voltage

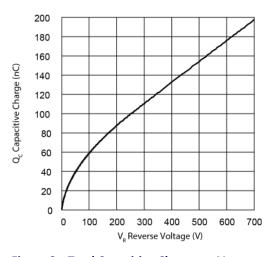


Figure 6 ● Total Capacitive Charge vs. V<sub>R</sub>

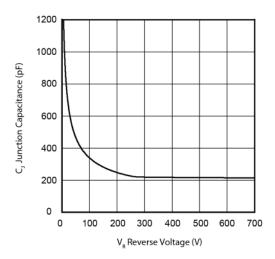


Figure 7 • Junction Capacitance vs  $V_R$ 



# **Package Specification**

This section outlines the package specification for the MSC050SDA070BCT device.

## **Package Outline Drawing**

This section shows the TO-247 package drawing of the MSC050SDA070BCT device. Dimensions are in millimeters and (inches).

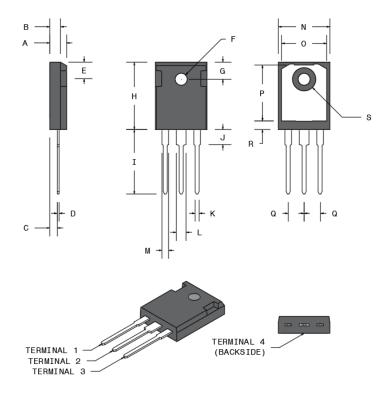


Figure 8 • Package Outline Drawing

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.)
А	4.69	5.31	0.185	0.209
В	1.49	2.49	0.059	0.098
С	2.21	2.59	0.087	0.102
D	0.40	0.79	0.016	0.031
Е	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		
Н	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	
К	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	
0	13.50	14.50	0.531	0.571	
Р	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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