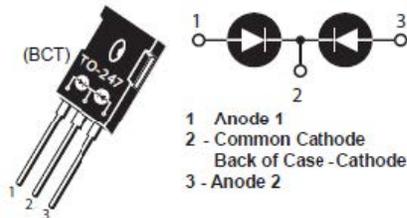


700V, 10A Silicon Carbide Schottky Dual Diode

Product Overview

The silicon carbide (SiC) power Schottky barrier diode (SBD) product line from Microchip increases the performance over silicon diode solutions while lowering the total cost of ownership for high-voltage applications. The MSC010SDA070BCT device is a 700 V, 10 A SiC dual common cathode SBD in a three-lead TO-247 package.



Features

The following are key features of the MSC010SDA070BCT device:

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

Benefits

The following are benefits of the MSC010SDA070BCT device:

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

Applications

The MSC010SDA070BCT 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

1. Device Specifications

This section shows the specifications of the MSC010SDA070BCT device. All ratings are per leg.

1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC010SDA070BCT device. $T_C = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Table 1-1. Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit	
V_R	Maximum DC reverse voltage	700	V	
V_{RRM}	Maximum peak repetitive reverse voltage			
V_{RWM}	Maximum working peak reverse voltage			
I_F	Maximum DC forward current	$T_C = 25\text{ }^\circ\text{C}$	24	A
		$T_C = 135\text{ }^\circ\text{C}$	10	
		$T_C = 145\text{ }^\circ\text{C}$	8	
I_{FRM}	Repetitive peak forward surge current ($t_p = 8.3\text{ ms}$, half sine wave)	34		
I_{FSM}	Non-repetitive forward surge current ($t_p = 8.3\text{ ms}$, half sine wave)	58		
P_{TOT}	Total power dissipation	$T_C = 25\text{ }^\circ\text{C}$	83	
		$T_C = 110\text{ }^\circ\text{C}$	36	
E_{AS}	Single-pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$, peak $I_L = 10\text{ A}$)	100	mJ	

The following table shows the thermal and mechanical characteristics of the MSC010SDA070BCT device.

Table 1-2. Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		1.30	1.80	$^\circ\text{C}/\text{W}$
T_J, T_{STG}	Operating junction and storage temperature range	-55		175	$^\circ\text{C}$
T_L	Lead temperature for 10 seconds			300	
W_t	Package weight		0.22		oz
			6.2		g
	Mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

1.2 Electrical Performance

The following table shows the static characteristics of the MSC010SDA070BCT device. $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Table 1-3. Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	$I_F = 10\text{ A}, T_J = 25\text{ }^\circ\text{C}$		1.5	1.8	V
		$I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$		1.8		
I_{RM}	Reverse leakage current	$V_R = 700\text{ V}, T_J = 25\text{ }^\circ\text{C}$		3	200	μA
		$V_R = 700\text{ V}, T_J = 175\text{ }^\circ\text{C}$		15		
Q_C	Total capacitive charge	$V_R = 400\text{ V}$		27		nC
C_J	Junction capacitance	$V_R = 1\text{ V}, f = 1\text{ MHz}$		353		pF
		$V_R = 200\text{ V}, f = 1\text{ MHz}$		54		
		$V_R = 400\text{ V}, f = 1\text{ MHz}$		46		

1.3 Typical Performance Curves

This section shows the typical performance curves of the MSC010SDA070BCT device.

Figure 1-1. Maximum Transient Thermal Impedance

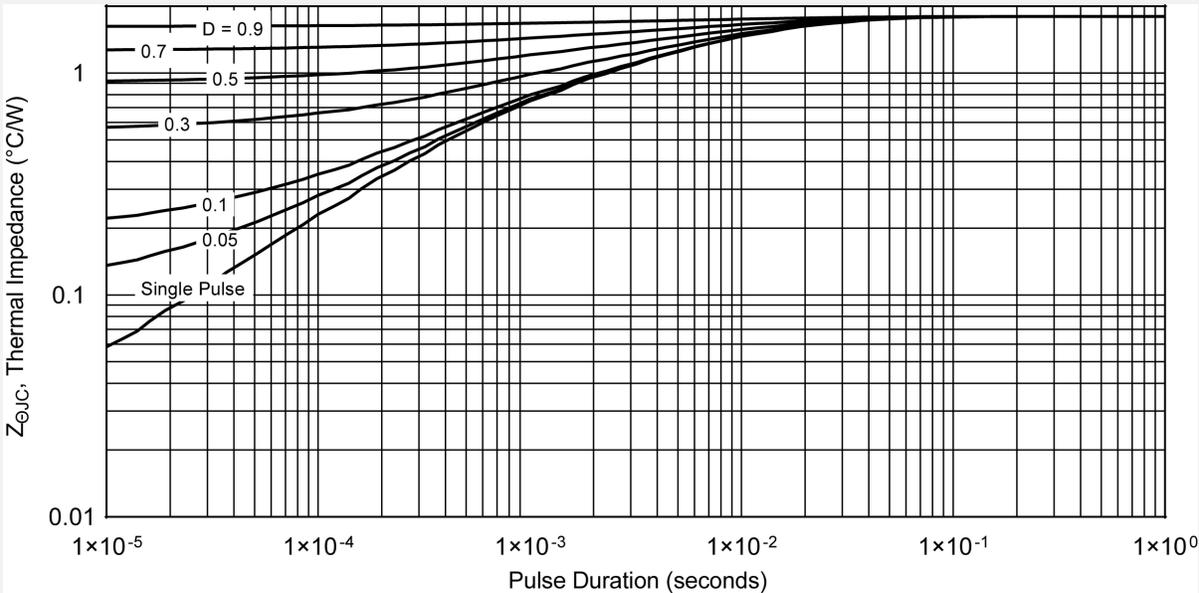


Figure 1-2. Forward Current vs. Forward Voltage

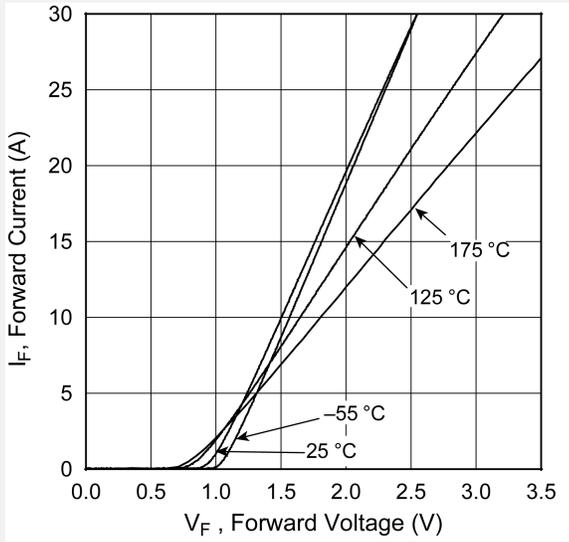


Figure 1-3. Max. Forward Current vs. Case Temp.

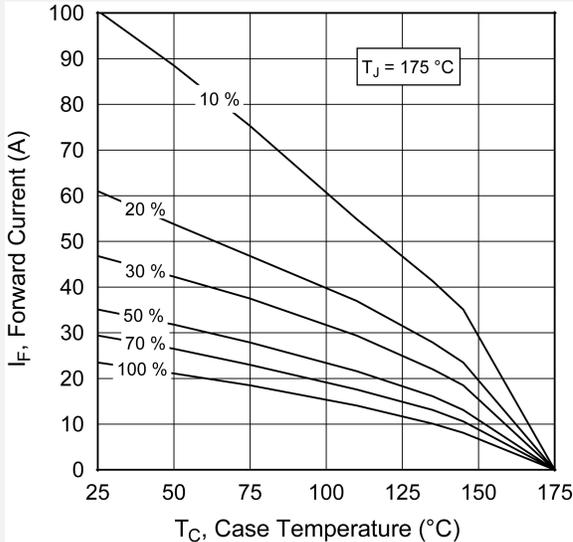


Figure 1-4. Max. Power Dissipation vs. Case Temp.

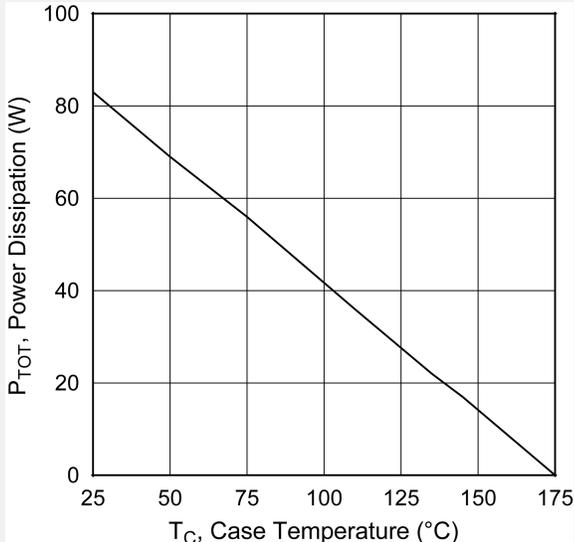


Figure 1-5. Reverse Current vs. Reverse Voltage

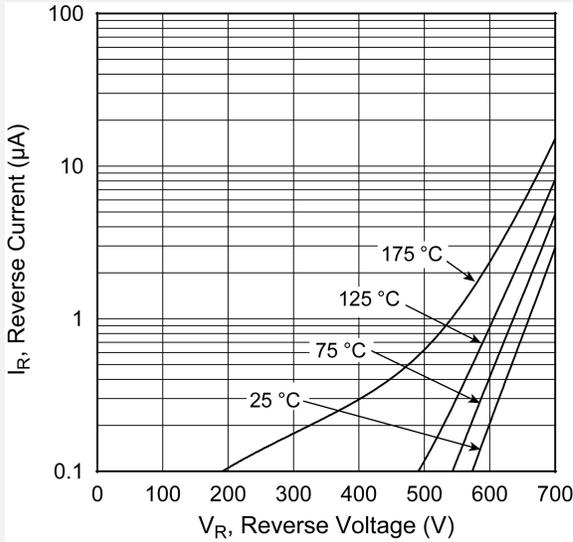


Figure 1-6. Total Charge vs. Reverse Voltage

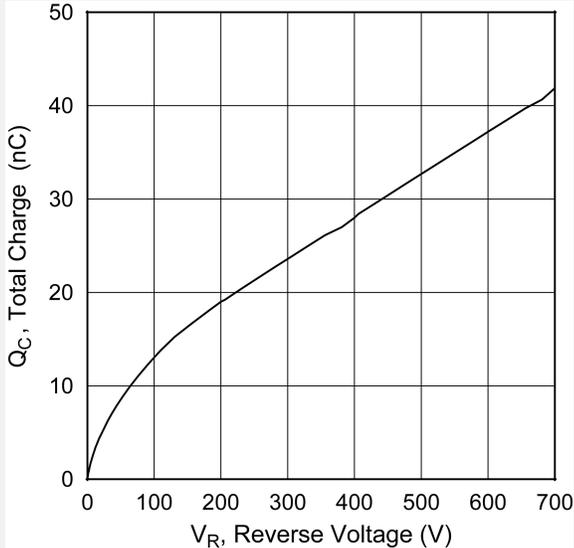
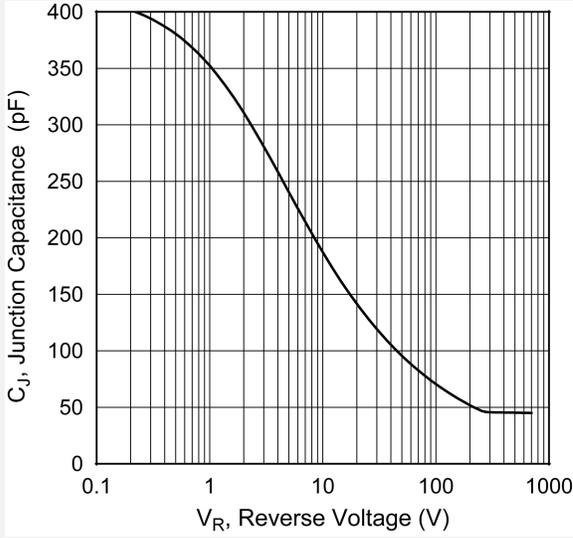


Figure 1-7. Capacitance vs. Reverse Voltage



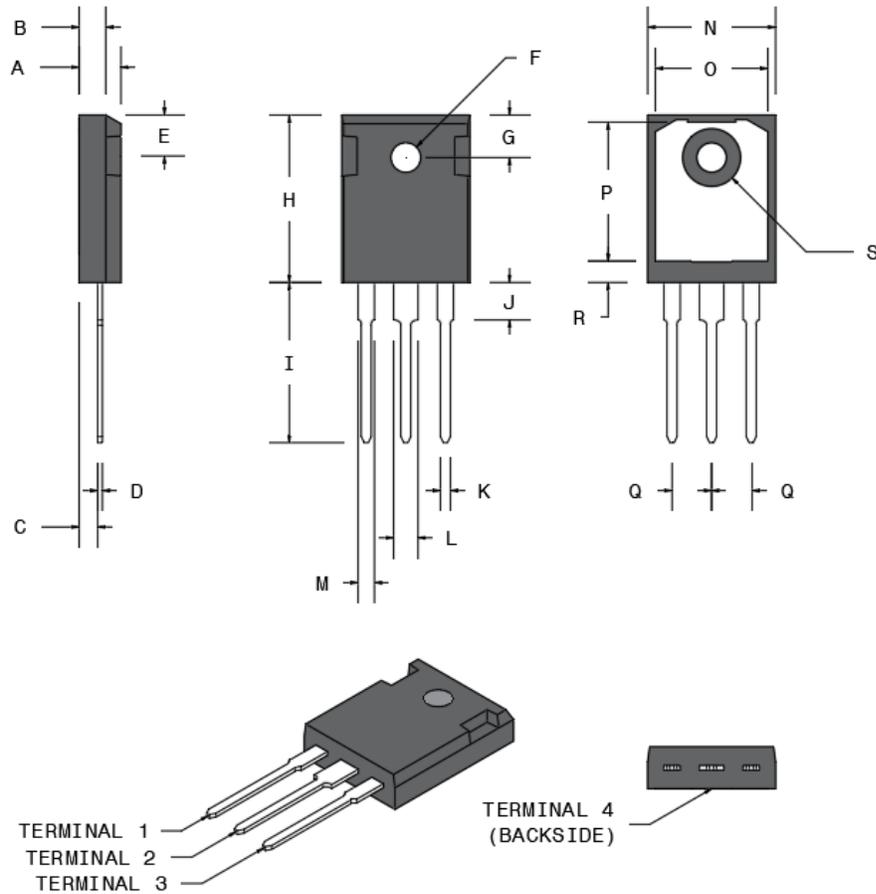
2. Package Specification

This section shows the package specification of the MSC010SDA070BCT device.

2.1 Package Outline Drawing

The following figure illustrates the TO-247 package outline of the MSC010SDA070BCT device.

Figure 2-1. Package Outline Drawing



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

Table 2-1. TO-247 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

MSC010SDA070BCT

Package Specification

.....continued				
Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
F	3.50	3.81	0.138	0.150
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			

3. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Table 3-1. Revision History

Revision	Date	Description
A	08/2022	Document created.

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