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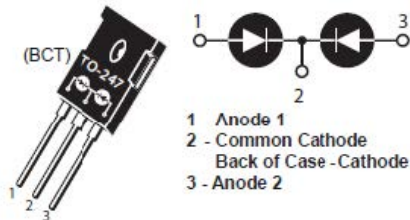
## 700V, 10A Silicon Carbide Schottky Dual Diode

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### Product Overview

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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.

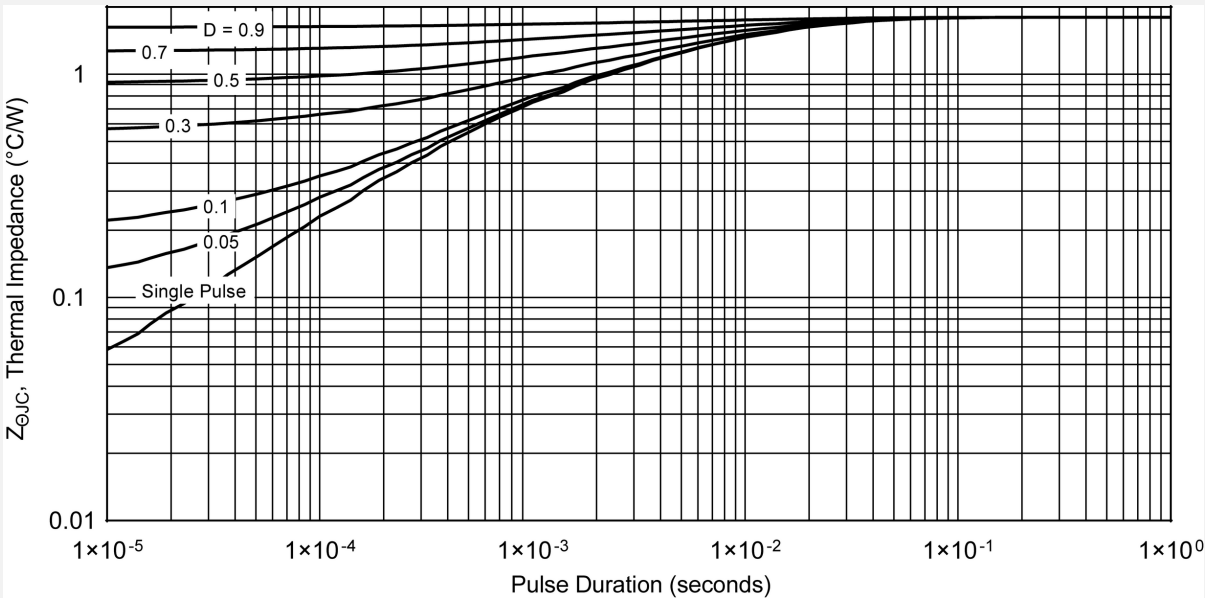
**Table 1-3. Static Characteristics**

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	$\mu\text{A}$
		$V_R = 700\text{ V}, T_J = 175\text{ }^\circ\text{C}$		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		

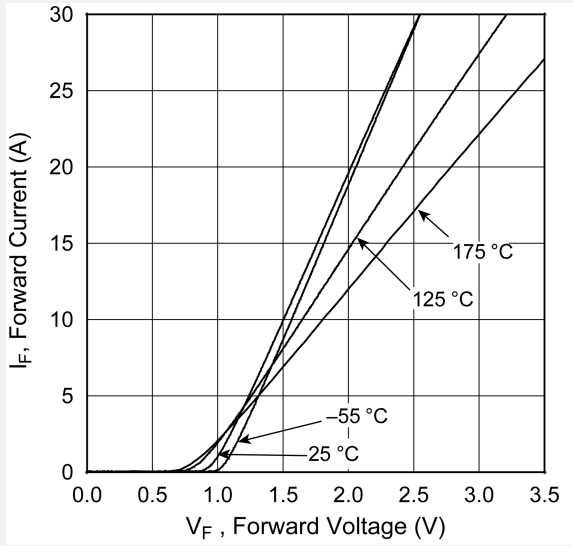
**1.3 Typical Performance Curves**

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

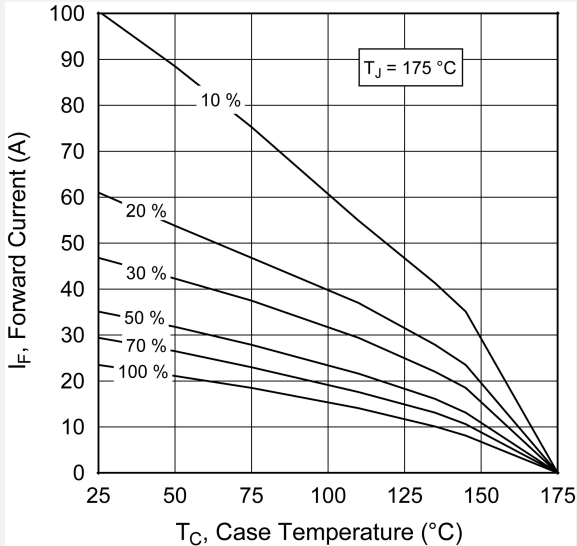
**Figure 1-1. Maximum Transient Thermal Impedance**



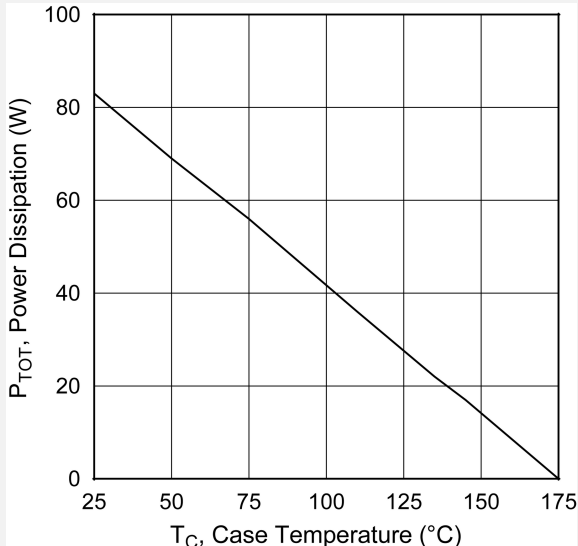
**Figure 1-2. Forward Current vs. Forward Voltage**



**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**

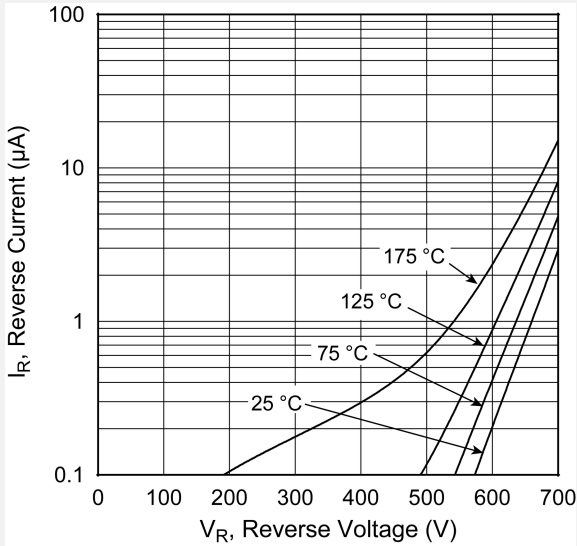


Figure 1-6. Total Charge vs. Reverse Voltage

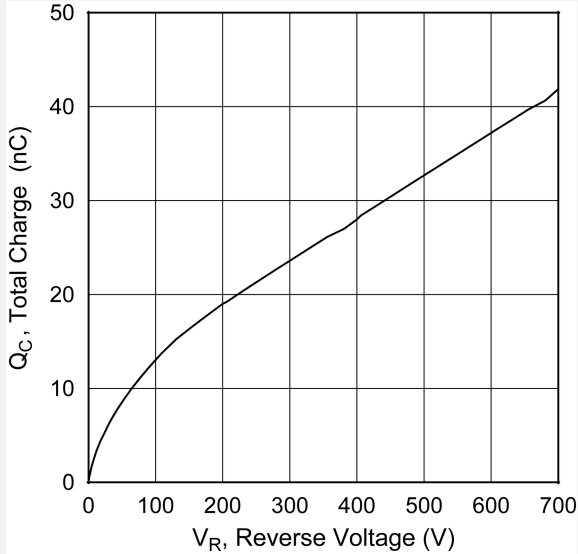
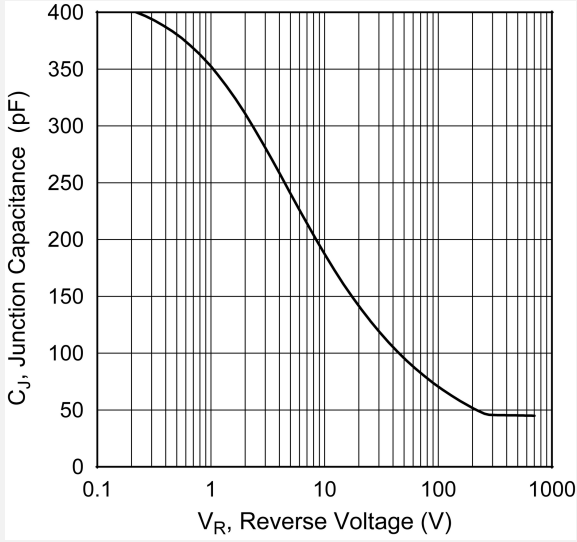


Figure 1-7. Capacitance vs. Reverse Voltage



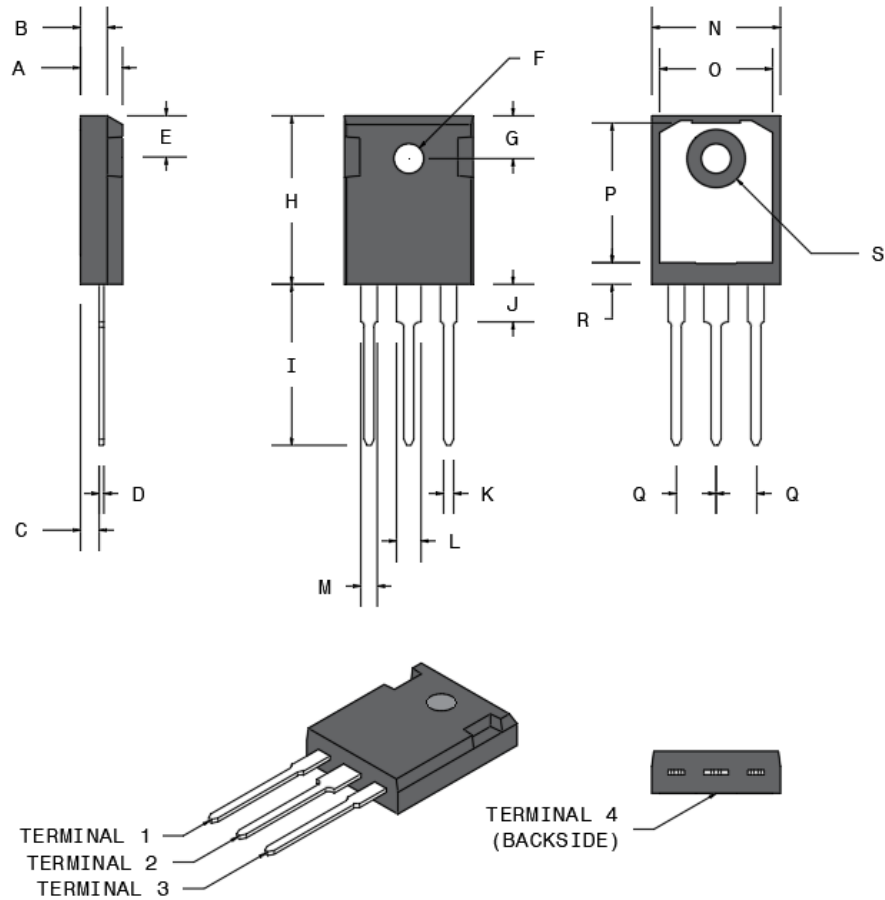
## 2. Package Specification

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**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
A	08/2022	Document created.



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