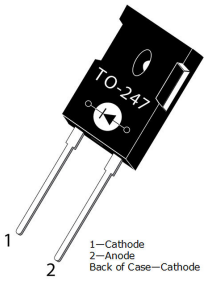
MSC010SDA070B

Zero Recovery Silicon Carbide Schottky 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 MSC010SDA070B device is a 700 V, 10 A SiC SBD in a two-lead TO-247 package.



Features

The following are key features of the MSC010SDA070B device:

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

Benefits

The following are benefits of the MSC010SDA070B device:

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

Applications

The MSC010SDA070B 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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1. Device Specifications

This section shows the specifications of the MSC010SDA070B device.

1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC010SDA070B device. T_C = 25 °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 °C	24	A
		T_C = 135 °C	10	
		T_C = 145 °C	8	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, tp = 8.3 ms, half sine wave)		34	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, tp = 8.3 ms, half sine wave)		58	
P_{TOT}	Total power dissipation	T_C = 25 °C	83	W
		T_C = 110 °C	36	
E_{AS}	Single-pulse avalanche energy (starting T_J = 25 °C, peak I_L = 10 A)	100		mJ

The following table shows the thermal and mechanical characteristics of the MSC010SDA070B 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	°C/W
T_J, T_{STG}	Operating junction and storage temperature range	–55		175	°C
T_L	Lead temperature for 10 seconds			300	
Wt	Package weight		0.22		oz
			6.2		g

1.2 Electrical Performance

The following table shows the static characteristics of the MSC010SDA070B device. T_J = 25 °C unless otherwise specified.

Table 1-3. Static Characteristics

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

1.3 Typical Performance Curves

This section shows the typical performance curves of the MSC010SDA070B device.

Figure 1-1. Maximum Transient Thermal Impedance

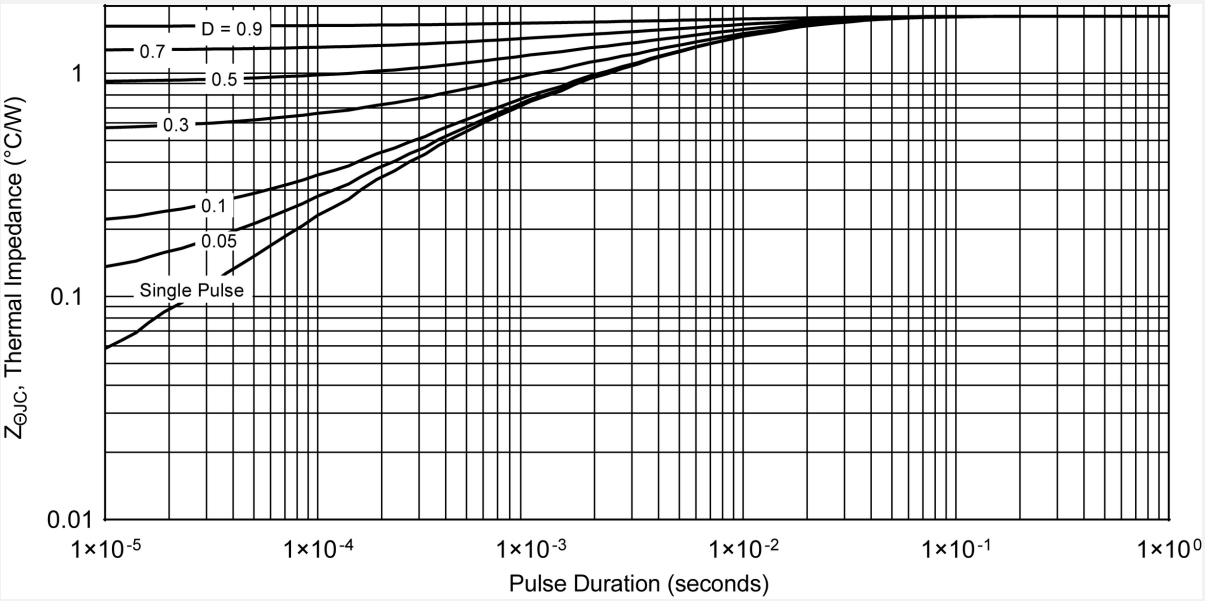


Figure 1-2. Forward Current vs. Forward Voltage

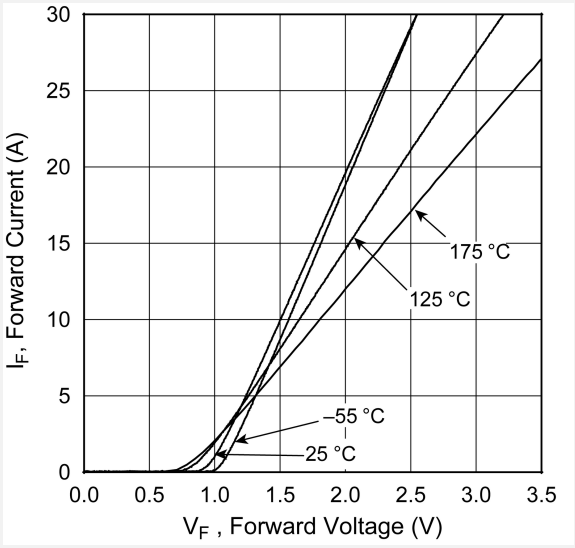


Figure 1-3. Max. Forward Current vs. Case Temp.

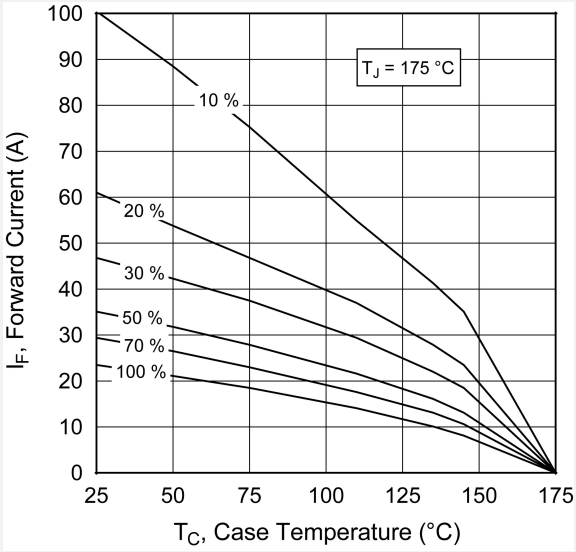


Figure 1-4. Max. Power Dissipation vs. Case Temp.

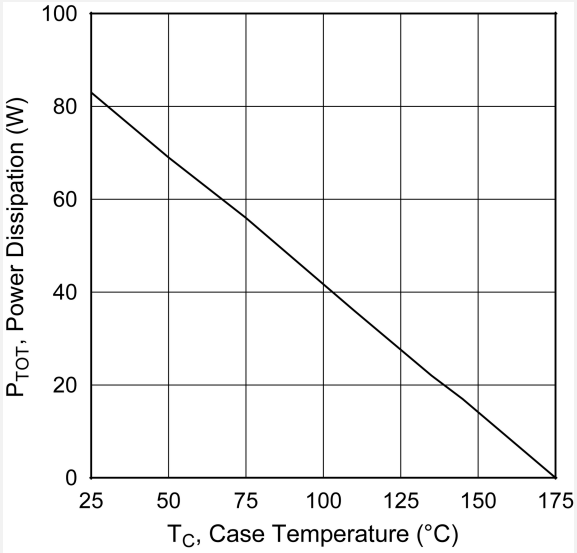


Figure 1-5. Reverse Current vs. Reverse Voltage

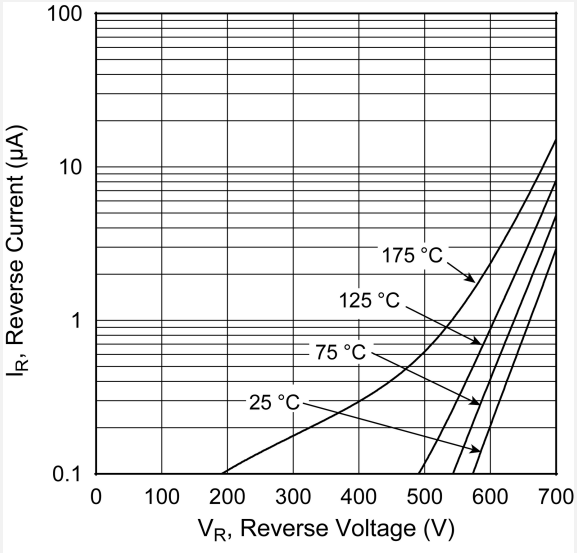


Figure 1-6. Total Charge vs. Reverse Voltage

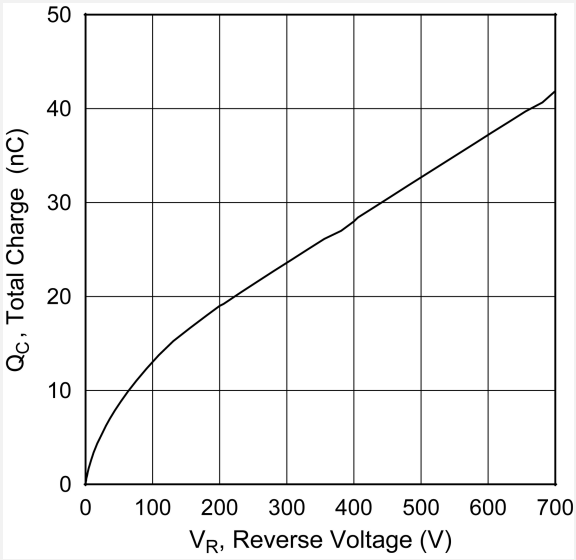
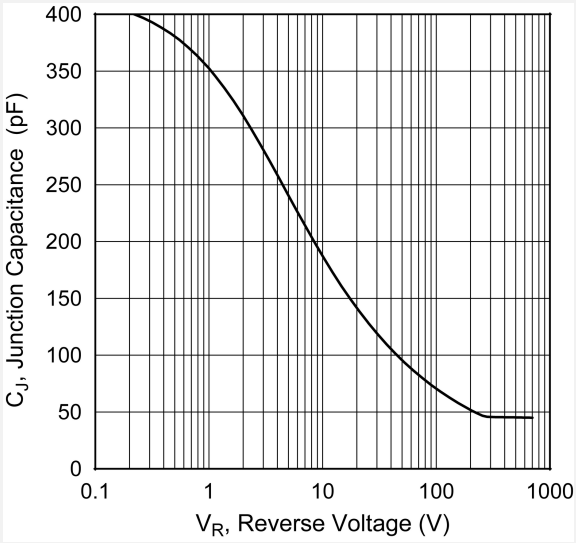


Figure 1-7. Capacitance vs. Reverse Voltage



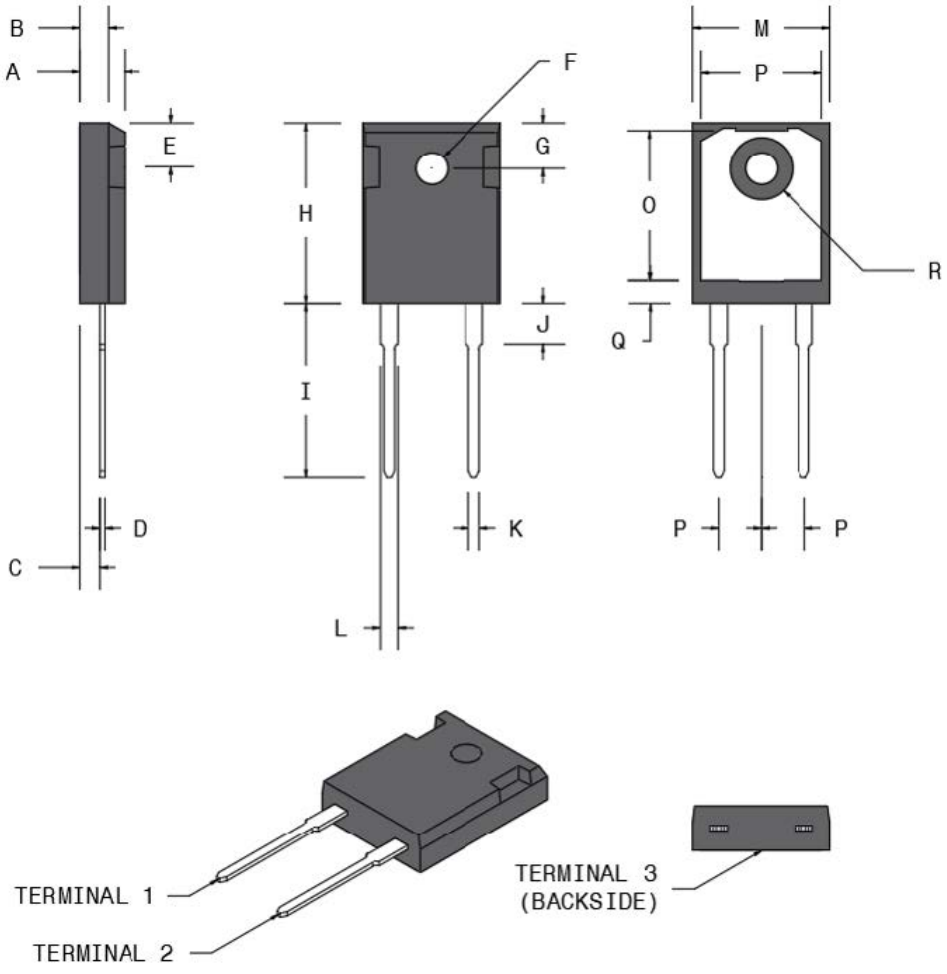
2. Package Specifications

This section shows the package specification of the MSC010SDA070B device.

2.1 Package Outline Drawing

The following figure illustrates the TO-247 package outline of the MSC010SDA070B 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

.....continued

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
E	5.38	6.20	0.212	0.244
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	1.65	2.13	0.065	0.084
M	15.49	16.26	0.610	0.640
N	13.50	14.50	0.531	0.571
O	16.50	17.50	0.650	0.689
P	5.45 BSC		0.215 BSC	
Q	2.00	2.75	0.079	0.108
R	7.10	7.50	0.280	0.295
Terminal 1	Cathode			
Terminal 2	Anode			
Terminal 3	Cathode			

3. Revision History

Table 3-1. Revision History

Revision	Date	Description
A	03/2021	Document migrated from Microsemi template to Microchip template; Assigned Microchip literature number DS-00003878A,which replaces the previous Microsemi literature number 053-4089.
Initial release (Microsemi Revision A)	10/2018	Document created.

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