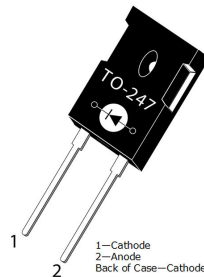

Zero Recovery Silicon Carbide Schottky Diode

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 MSC030SDA330B device is a 3300 V, 30 A SiC SBD in a two-lead TO-247 package.

**Features**

The following are key features of the MSC030SDA330B device:

- No reverse recovery
- Low forward voltage
- Low leakage current
- RoHS compliant

Benefits

The following are benefits of the MSC030SDA330B device:

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

Applications

The MSC030SDA330B 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 MSC030SDA330B device.

1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC030SDA330B 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		3300	V
V_{RRM}	Maximum peak repetitive reverse voltage			
V_{RWM}	Maximum working peak reverse voltage			
I_F	Maximum DC forward current	$T_C = 25\text{ }^{\circ}\text{C}$	62	A
		$T_C = 135\text{ }^{\circ}\text{C}$	30	
		$T_C = 145\text{ }^{\circ}\text{C}$	25	
I_{FRM}	Repetitive peak forward surge current ($T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 8.3\text{ ms}$, half sine wave)		93	
I_{FSM}	Non-repetitive forward surge current ($T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 8.3\text{ ms}$, half sine wave)		205	
P_{TOT}	Total power dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	556	W
		$T_C = 110\text{ }^{\circ}\text{C}$	241	

The following table shows the thermal and mechanical characteristics of the MSC030SDA330B device.

Table 1-2. Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.19	0.27	$^{\circ}\text{C}/\text{W}$
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 MSC030SDA330B 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	$I_F = 30\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$		2.1	2.4	V
		$I_F = 30\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$		4.6		
I_{RM}	Reverse leakage current	$V_R = 3300\text{ V}$, $T_J = 25\text{ }^{\circ}\text{C}$		5	200	μA
		$V_R = 3300\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$		50		
Q_C	Total capacitive charge	$V_R = 1650\text{ V}$		274		nC
C_J	Junction capacitance	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$		1850		pF
		$V_R = 1100\text{ V}$, $f = 1\text{ MHz}$		107		
		$V_R = 2200\text{ V}$, $f = 1\text{ MHz}$		78		

1.3 Typical Performance Curves

This section shows the typical performance curves of the MSC030SDA330B device.

Figure 1-1. Maximum Transient Thermal Impedance

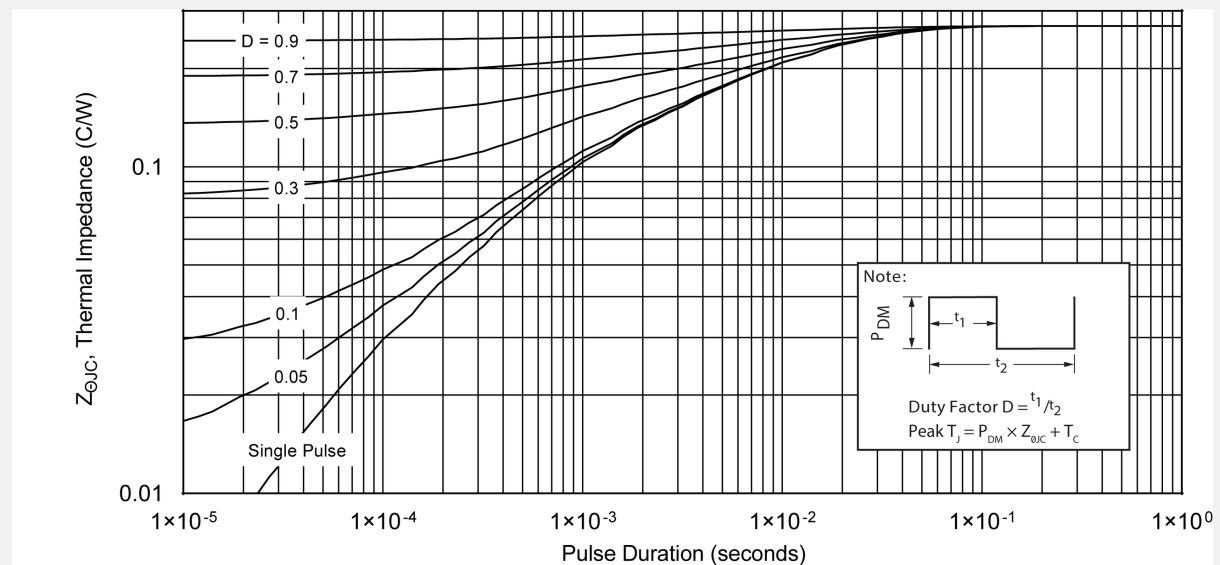


Figure 1-2. Forward Current vs. Forward Voltage

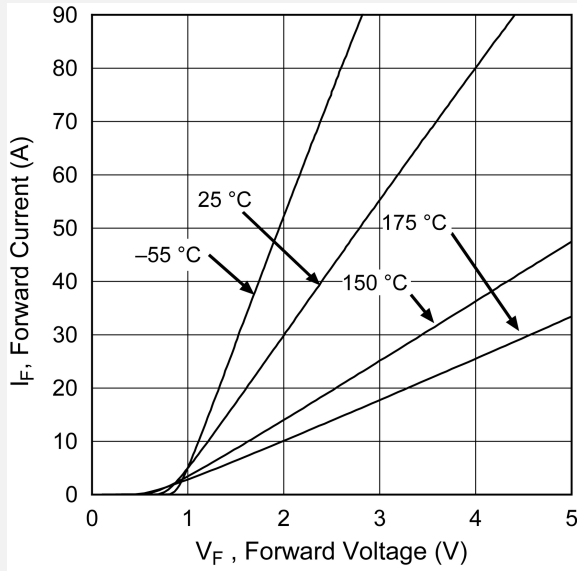


Figure 1-3. Max. Forward Current vs. Case Temp.

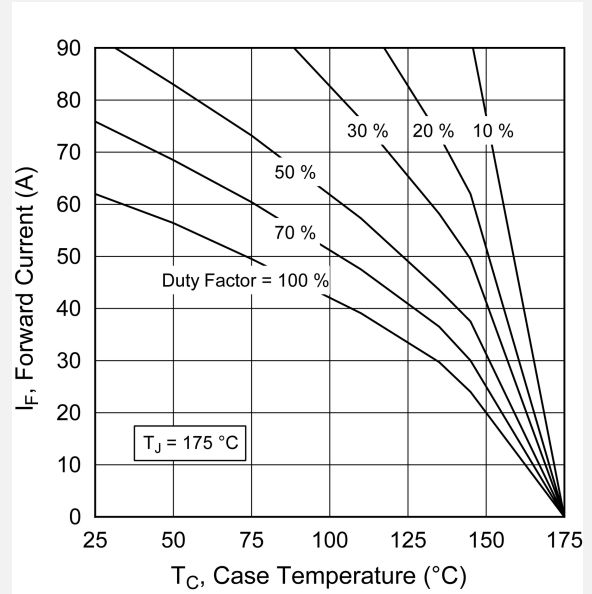


Figure 1-4. Max. Power Dissipation vs. Case Temp.

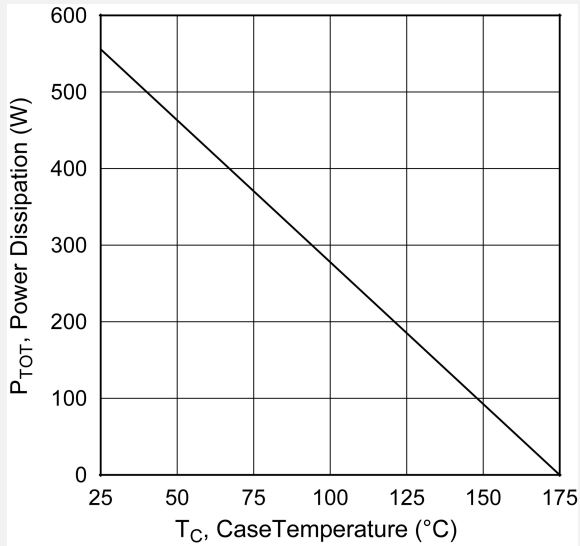


Figure 1-5. Reverse Current vs. Reverse Voltage

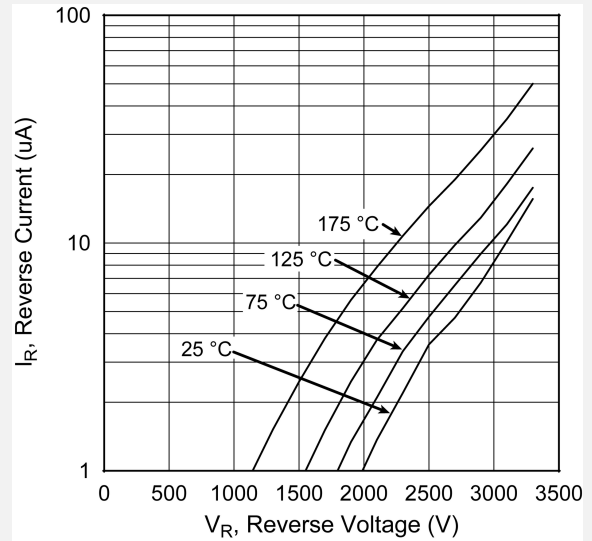


Figure 1-6. Total Charge vs. Reverse Voltage

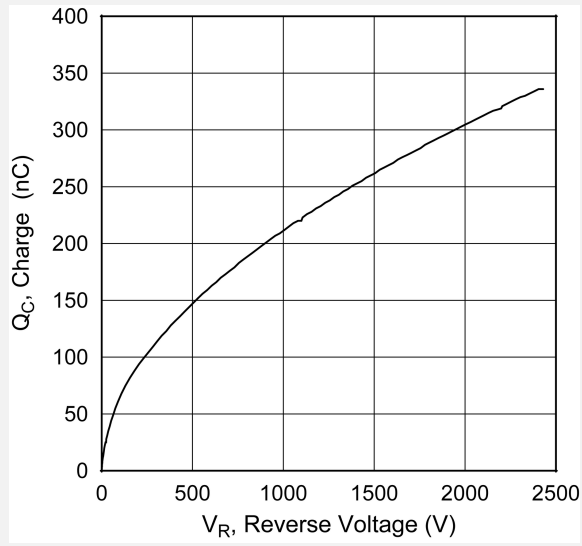
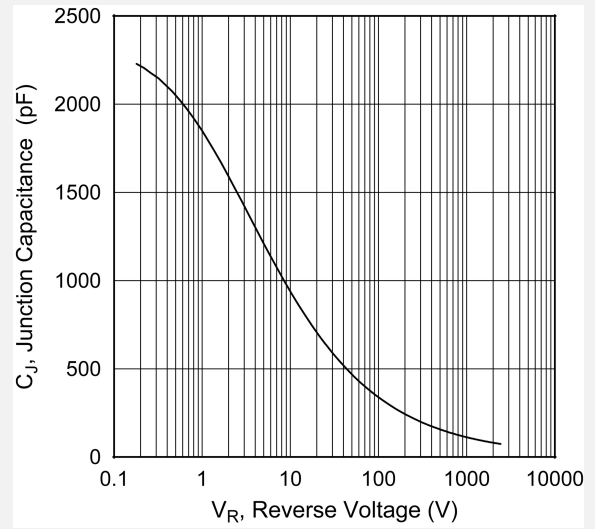


Figure 1-7. Capacitance vs. Reverse Voltage



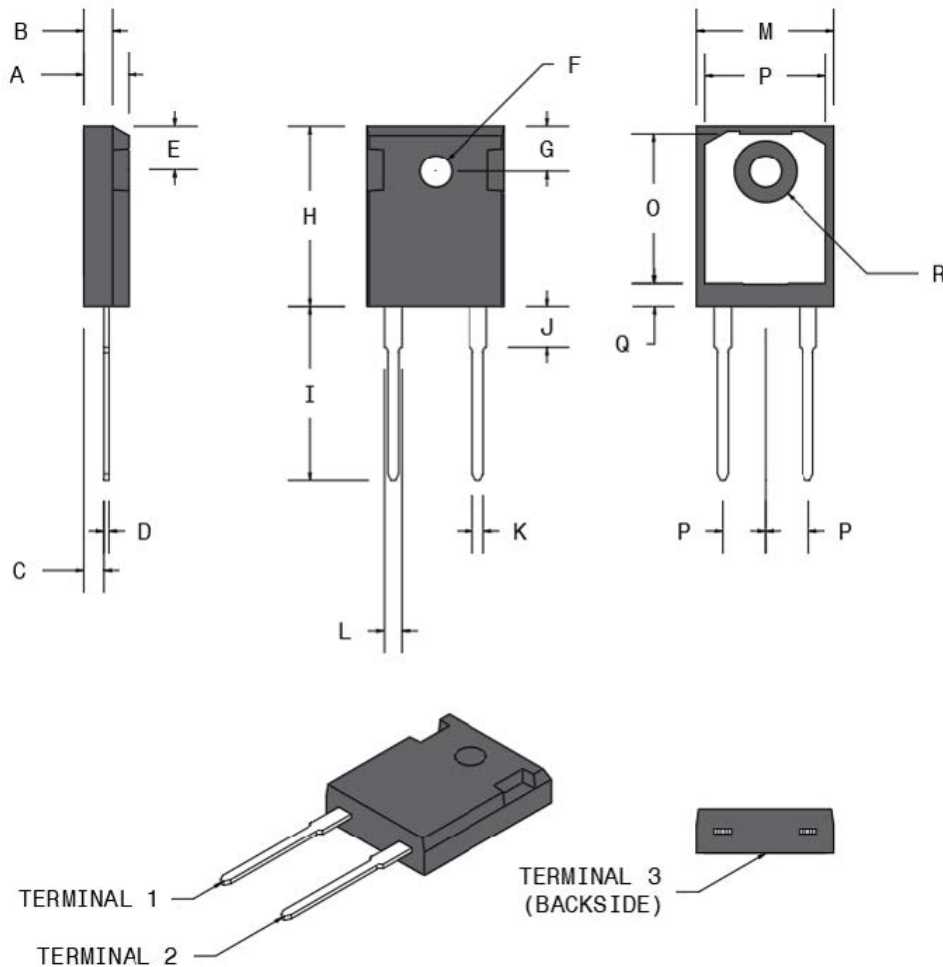
2. Package Specification

This section shows the package specification of the MSC030SDA330B device.

2.1 Package Outline Drawing

The following figure illustrates the TO-247 package outline of the MSC030SDA330B 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	11/2021	Document created.

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