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**Zero Recovery Silicon Carbide Schottky Diode**

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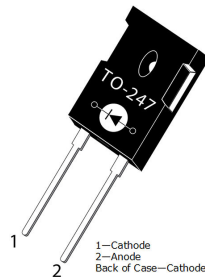
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**Product Overview**

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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 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.

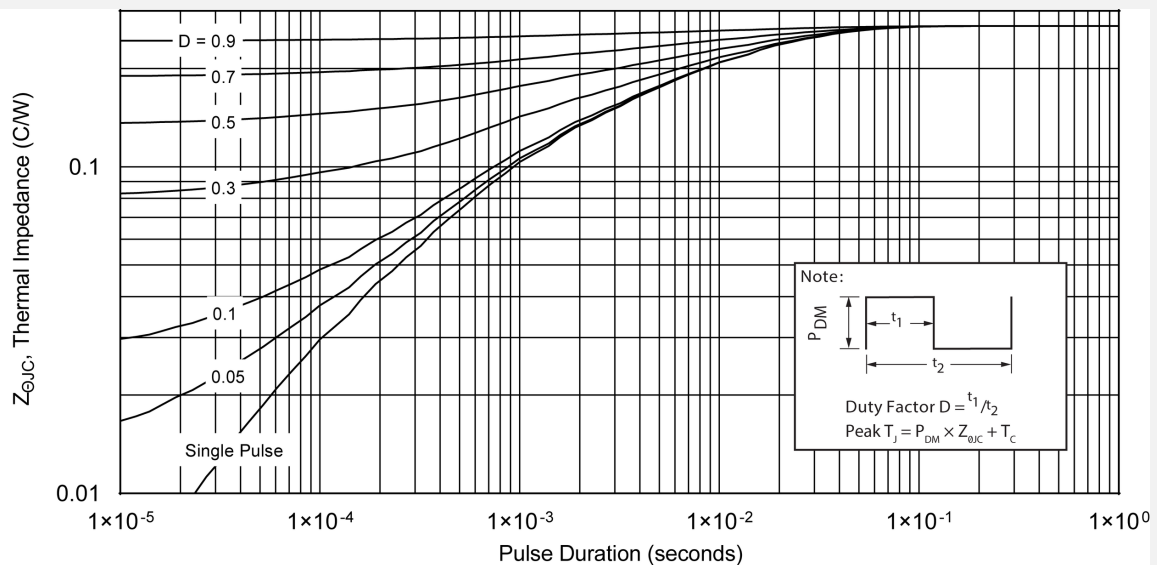
**Table 1-3. Static Characteristics**

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	$\mu\text{A}$
		$V_R = 3300\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$		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		

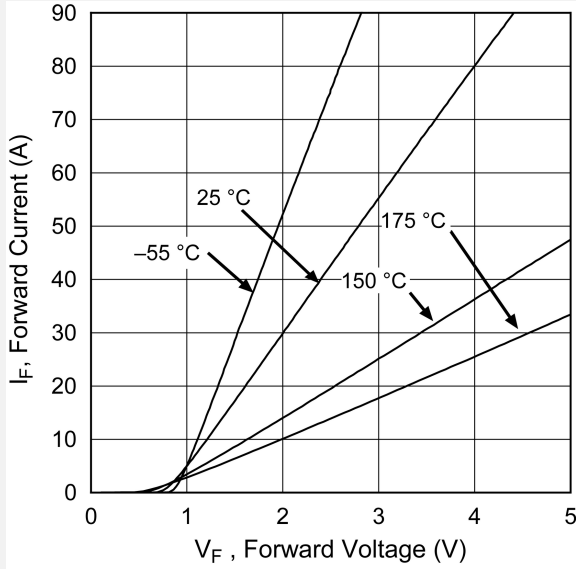
### 1.3 Typical Performance Curves

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

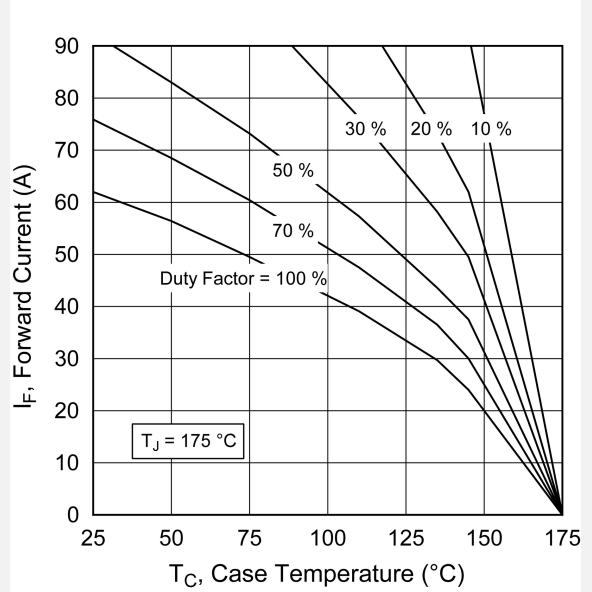
**Figure 1-1. Maximum Transient Thermal Impedance**



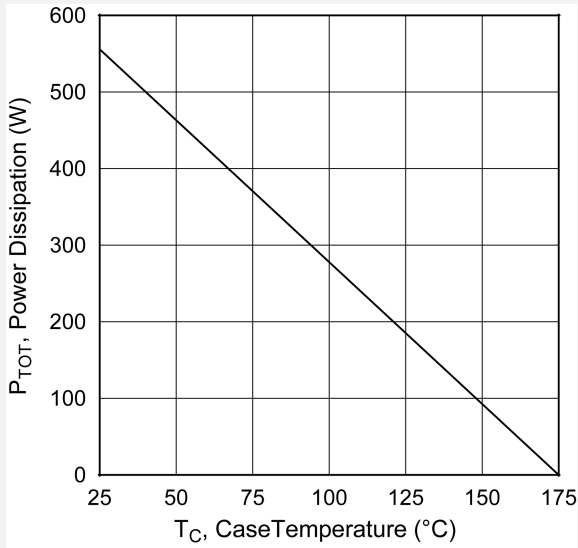
**Figure 1-2. Forward Current vs. Forward Voltage**



**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**

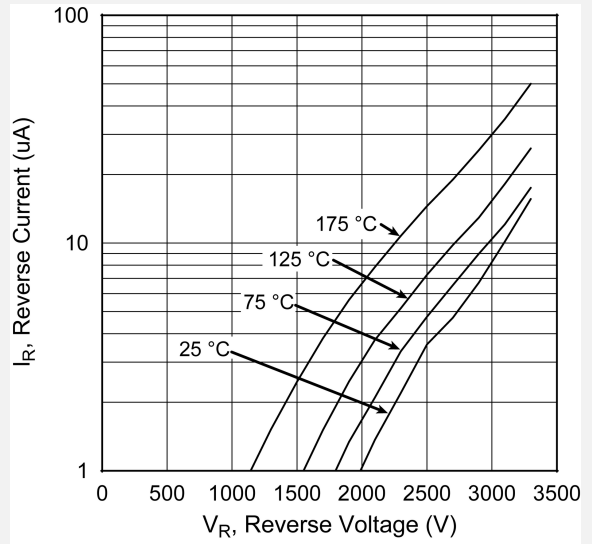


Figure 1-6. Total Charge vs. Reverse Voltage

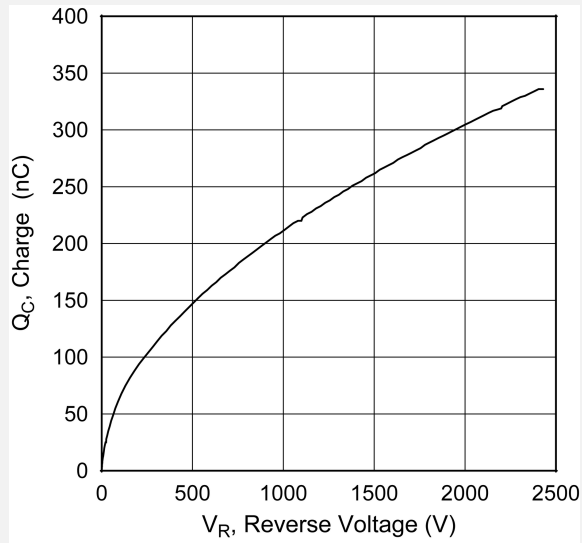
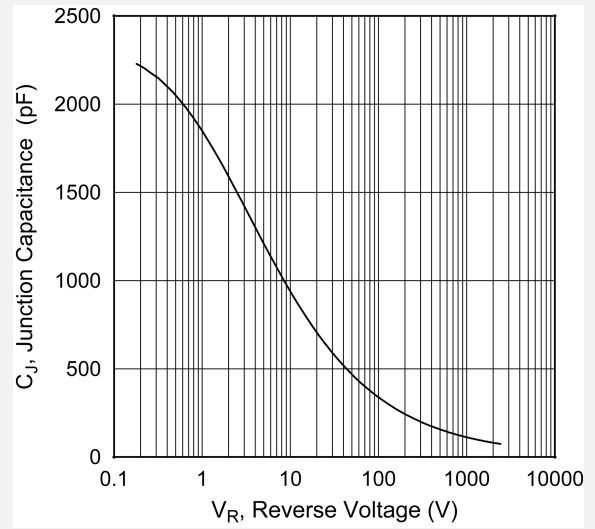


Figure 1-7. Capacitance vs. Reverse Voltage



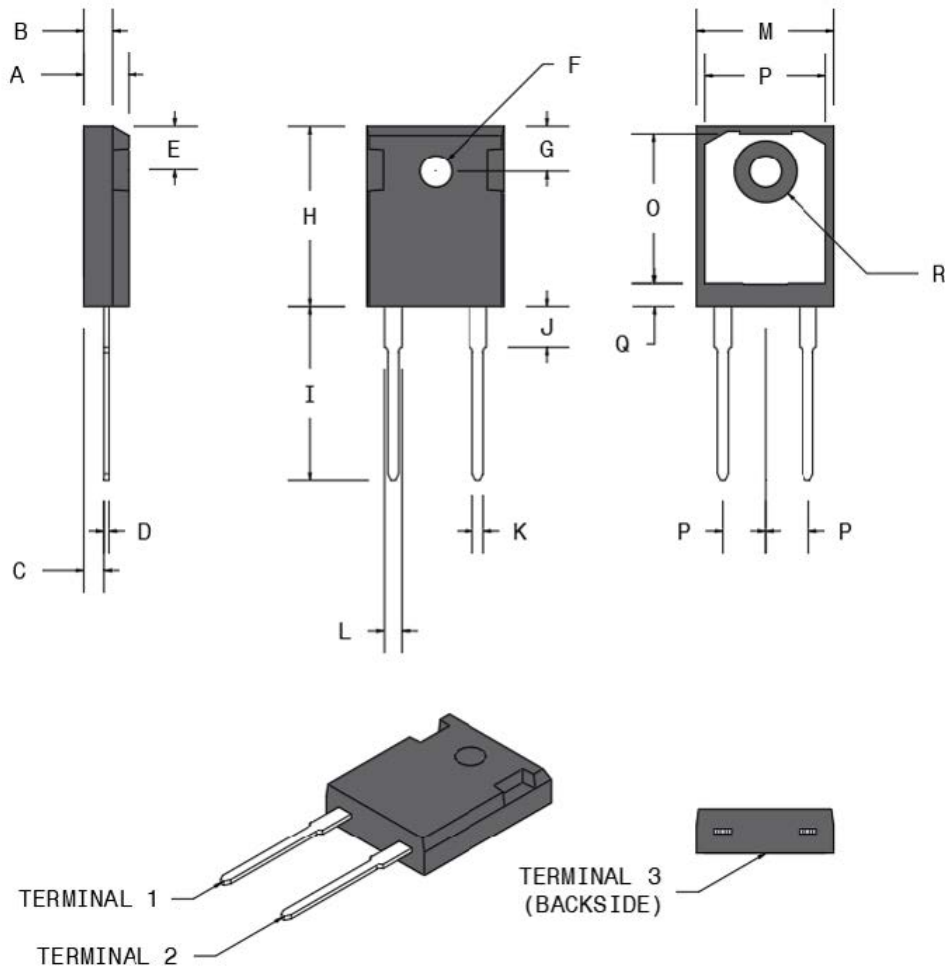
## 2. Package Specification

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

# MSC030SDA330B

## Package Specification

.....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**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
A	11/2021	Document created.



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ISBN: 978-1-5224-9152-1

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