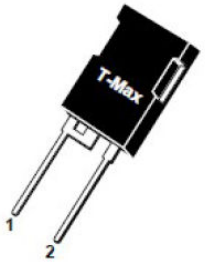
MSC090SDA330B2

3300 V, 90 A Silicon Carbide Schottky Barrier 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 MSC090SDA330B2 device is a 3300 V, 90 A SiC SBD in a two-lead T-MAX package.



1 – Cathode
2 – Anode
Back of Case - Cathode

Features

The following are key features of the MSC090SDA330B2 device:

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

Benefits

The following are benefits of the MSC090SDA330B2 device:

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

Applications

The MSC090SDA330B2 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 MSC090SDA330B2 device.

1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MSC090SDA330B2 device. T_C = 25 °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 °C	184	A
		T_C = 135 °C	89	
		T_C = 145 °C	75	
I_{FRM}	Repetitive peak forward surge current (tp = 8.3 ms, half sine wave)		258	
I_{FSM}	Non-repetitive forward surge current (tp = 8.3 ms, half sine wave)		615	
P_{TOT}	Total power dissipation	T_C = 25 °C	1500	W
		T_C = 110 °C	650	

The following table shows the thermal and mechanical characteristics of the MSC090SDA330B2 device.

Table 1-2. Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.07	0.10	°C/W
T_J, T_{STG}	Operating junction and storage temperature range	–55		175	°C
T_L	Lead temperature for 10 seconds			300	
	Reflow temperature			260	
Wt	Package weight		0.22		oz
			6.2		g

1.2 Electrical Performance

The following table shows the static characteristics of the MSC090SDA330B2 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 = 90 A, T_J = 25 °C		2.1	2.4	V
		I_F = 90 A, T_J = 175 °C		4.3		
I_{RM}	Reverse leakage current	V_R = 3300 V, T_J = 25 °C		15	200	µA
		V_R = 3300 V, T_J = 175 °C		150		
Q_C	Total capacitive charge	V_R = 1650 V		927		nC
C_J	Junction capacitance	V_R = 1 V, f = 1 MHz		6326		pF
		V_R = 1100 V, f = 1 MHz		361		
		V_R = 2200 V, f = 1 MHz		256		

1.3 Typical Performance Curves

This section shows the typical performance curves of the MSC090SDA330B2 device.

Figure 1-1. Maximum Transient Thermal Impedance

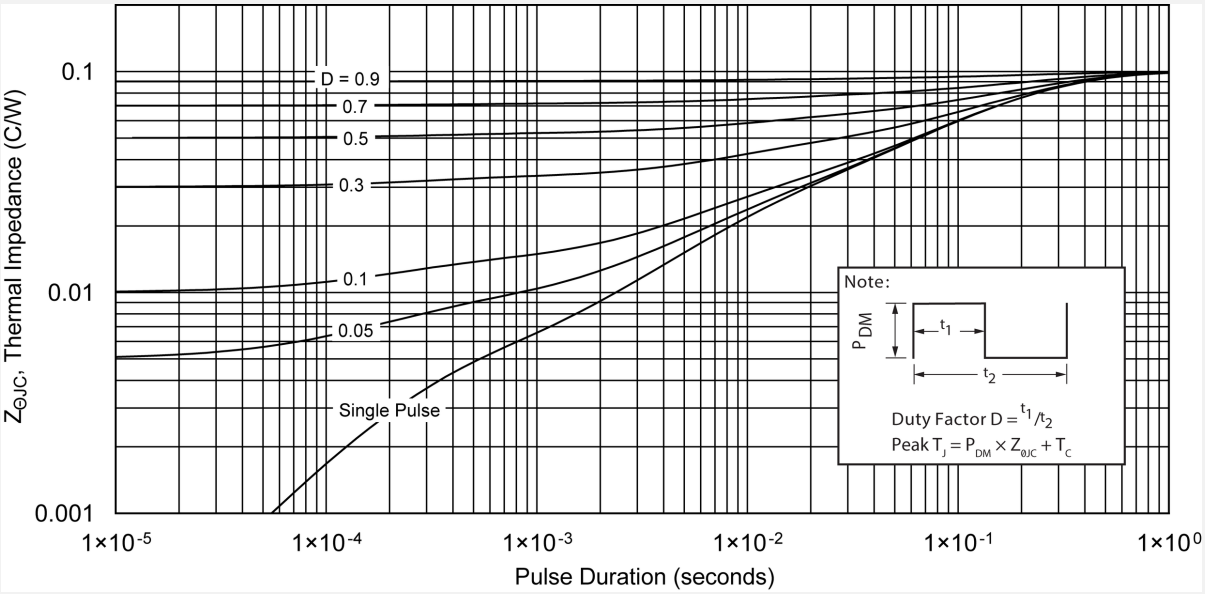


Figure 1-2. Forward Current vs. Forward Voltage

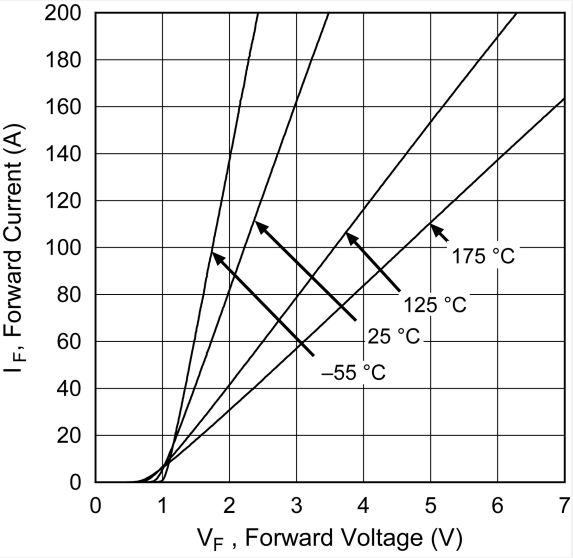


Figure 1-3. Max. Forward Current vs. Case Temp.

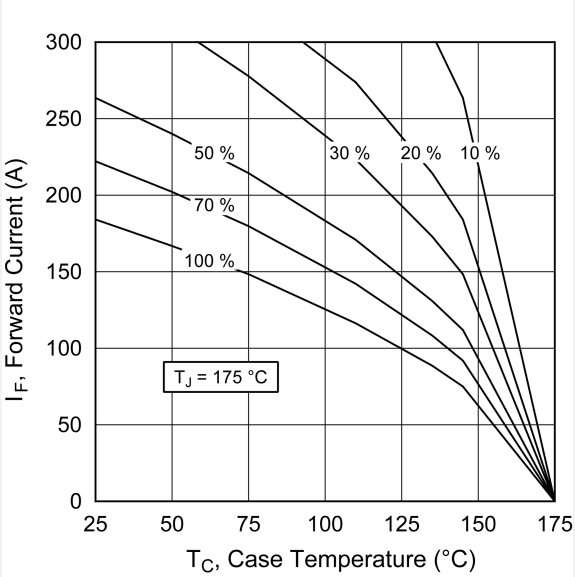


Figure 1-4. Max. Power Dissipation vs. Case Temp.

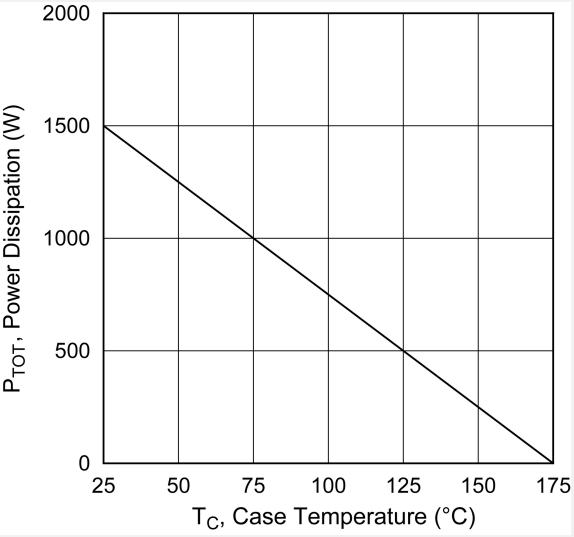


Figure 1-5. Reverse Current vs. Reverse Voltage

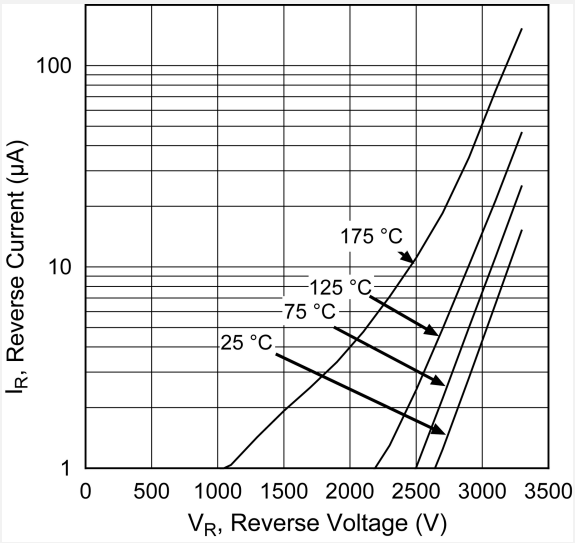


Figure 1-6. Total Charge vs. Reverse Voltage

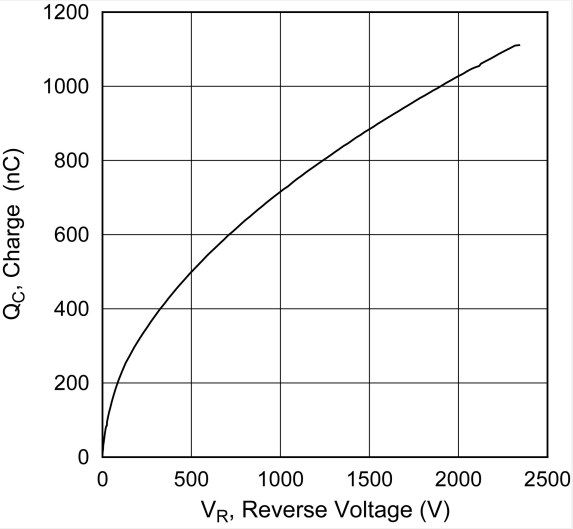
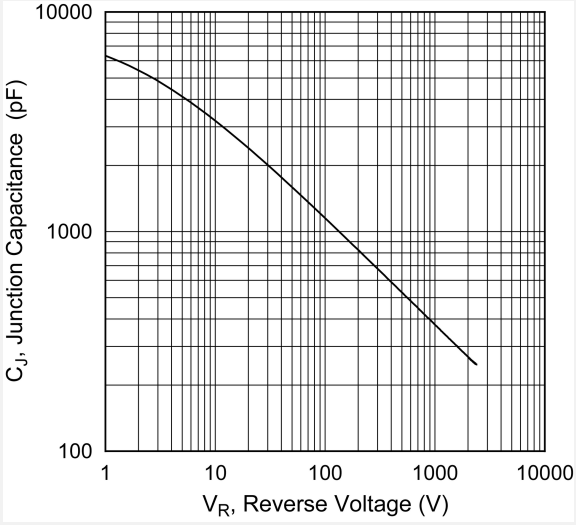


Figure 1-7. Capacitance vs. Reverse Voltage



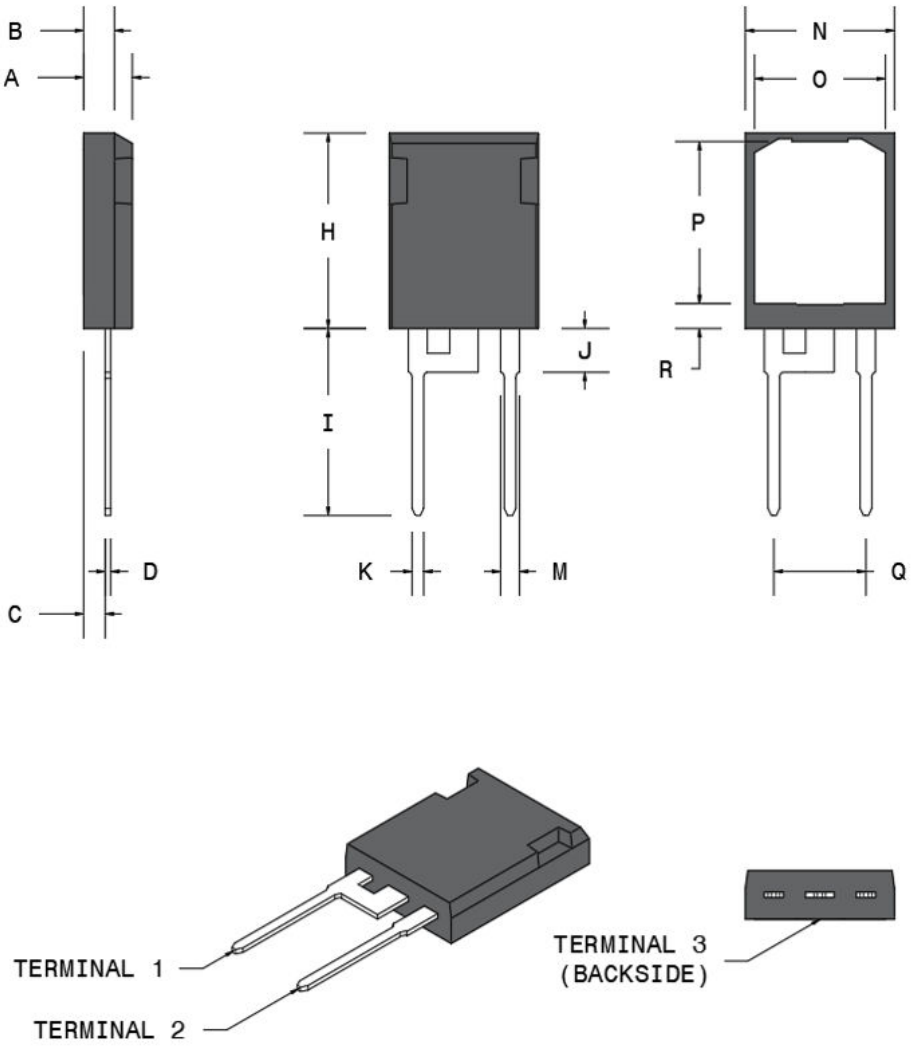
2. Package Specification

This section shows the package specification of the MSC090SDA330B2 device.

2.1 Package Outline Drawing

The following figure illustrates the T-MAX package outline of the MSC090SDA330B2 device.

Figure 2-1. Package Outline Drawing



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

Table 2-1. T-MAX 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

.....continued

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
C	2.21	2.59	0.087	0.102
D	0.40	0.79	0.016	0.031
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
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	10.90 BSC		0.430 BSC	
R	2.00	2.75	0.079	0.108
Terminal 1	Cathode			
Terminal 2	Anode			
Terminal 3	Cathode			

3. Revision History

Table 3-1. Revision History

Revision	Date	Description
A	03/2022	Document created.

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ISBN: 978-1-5224-9841-4

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