

# C3D02060E–Silicon Carbide Schottky Diode

## Z-REC™ RECTIFIER

$$\begin{aligned} V_{RRM} &= 600 \text{ V} \\ I_{F(AVG)} &= 2 \text{ A} \\ Q_c &= 4.8 \text{ nC} \end{aligned}$$

### Features

- 600-Volt Schottky Rectifier
- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on  $V_F$

### Benefits

- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
  - Typical PFC  $P_{out}$  : 300W-450W

### Package



TO-252-2



Part Number	Package	Marking
C3D02060E	TO-252-2	C3D02060

### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	600	V		
$V_{RSM}$	Surge Peak Reverse Voltage	600	V		
$V_{DC}$	DC Blocking Voltage	600	V		
$I_{F(AVG)}$	Average Forward Current	2.0	A	$T_c < 160^\circ\text{C}$	
$I_{FRM}$	Repetitive Peak Forward Surge Current	12.0 9.0	A	$T_c = 25^\circ\text{C}$ , $t_p = 10 \text{ mS}$ , Half Sine Wave $D = 0.3$ $T_c = 110^\circ\text{C}$ , $t_p = 10 \text{ mS}$ , Half Sine Wave $D = 0.3$	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	21 19	A	$T_c = 25^\circ\text{C}$ , $t_p = 10 \text{ mS}$ , Half Sine Wave $D = 0.3$ $T_c = 110^\circ\text{C}$ , $t_p = 10 \text{ mS}$ , Half Sine Wave $D = 0.3$	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	65	A	$T_c = 25^\circ\text{C}$ , $t_p = 10 \mu\text{S}$ , Pulse	
$P_{tot}$	Power Dissipation	39.5 17	W	$T_c = 25^\circ\text{C}$ $T_c = 110^\circ\text{C}$	
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		
	TO-220 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.5 1.8	1.7 2.4	V	$I_F = 2\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 2\text{ A}$ $T_J = 175^\circ\text{C}$	
$I_R$	Reverse Current	10 20	50 100	$\mu\text{A}$	$V_R = 600\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 600\text{ V}$ $T_J = 175^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	4.8		nC	$V_R = 600\text{ V}$ , $I_F = 2\text{ A}$ $di/dt = 500\text{ A}/\mu\text{S}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	120 12 11		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 200\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	

Note:

1. This is a majority carrier diode, so there is no reverse recovery charge.

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JC}$	TO-220 Package Thermal Resistance from Junction to Case	3.8	$^\circ\text{C}/\text{W}$

## Typical Performance

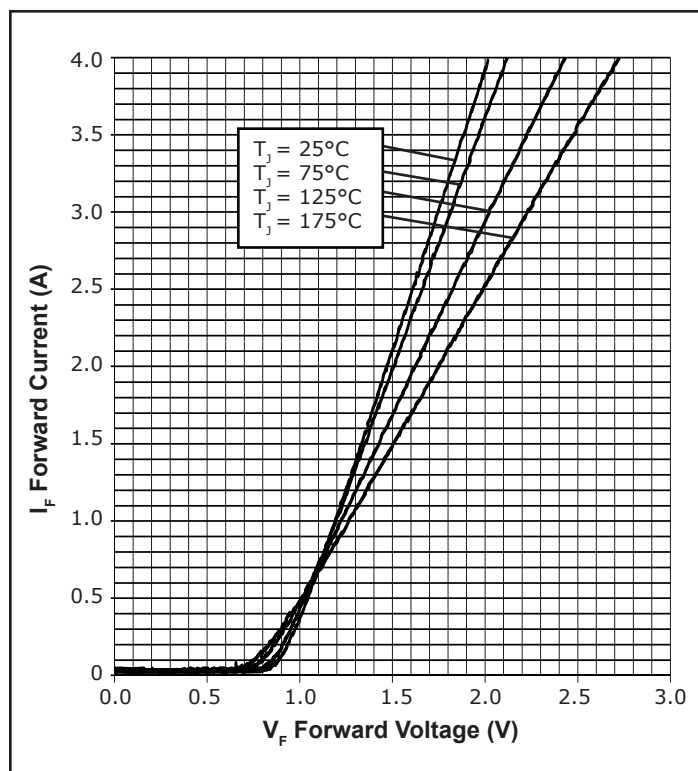


Figure 1. Forward Characteristics

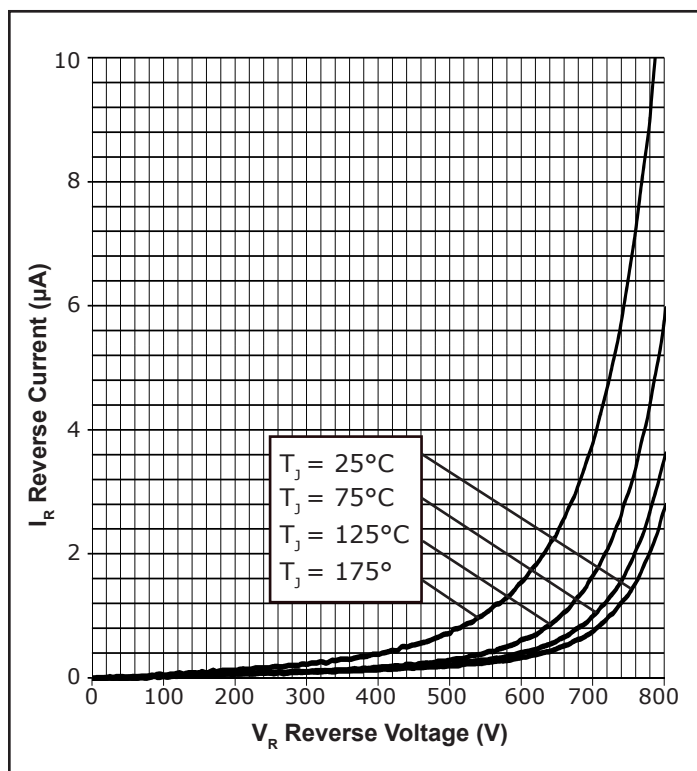


Figure 2. Reverse Characteristics

## Typical Performance

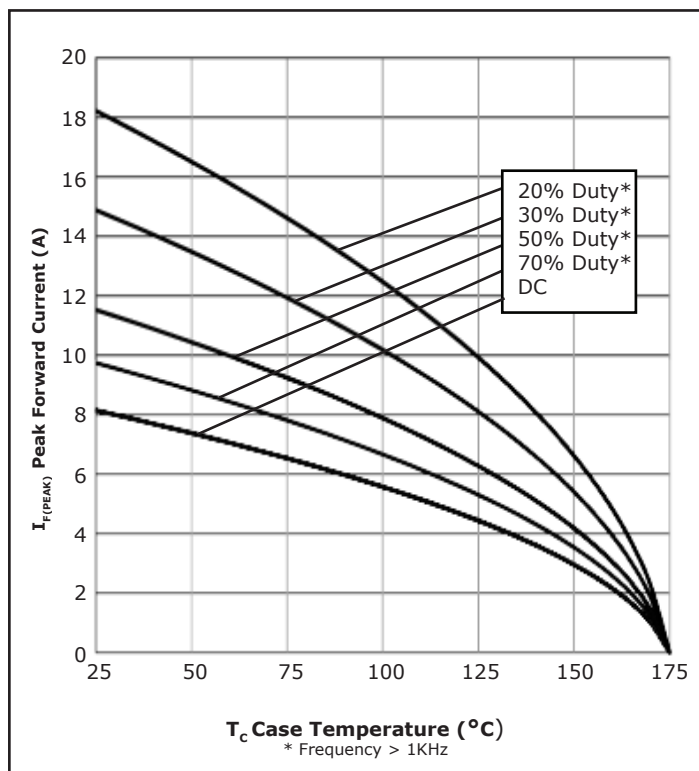


Figure 3. Current Derating

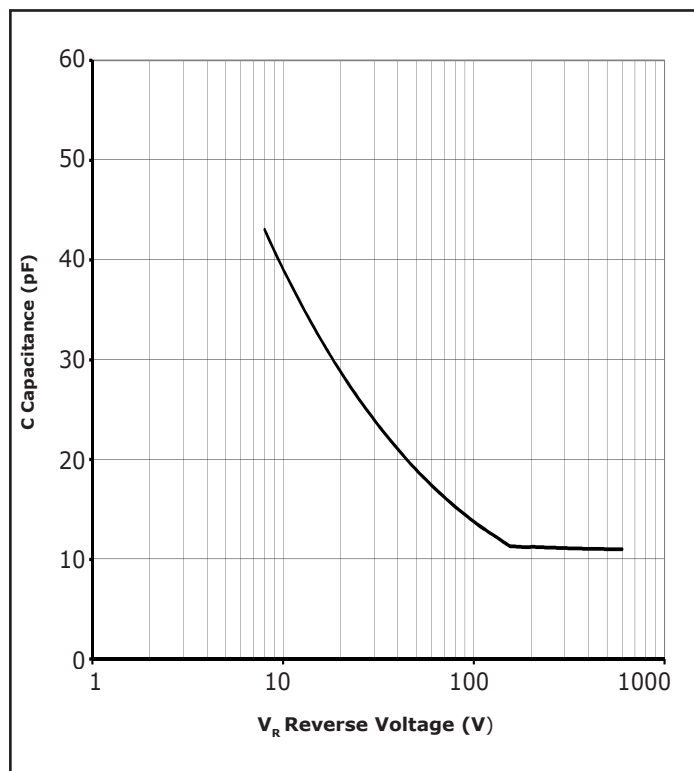


Figure 4. Capacitance vs. Reverse Voltage

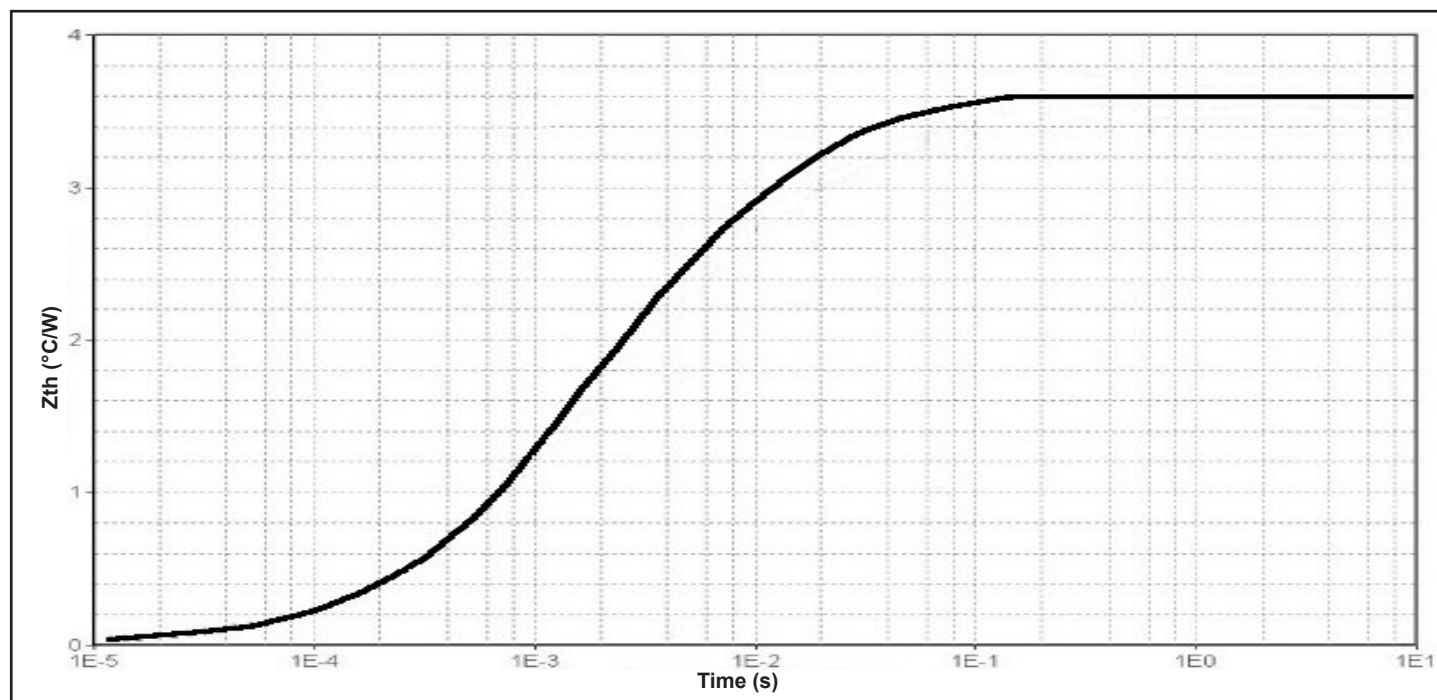


Figure 5. Transient Thermal Impedance

## Typical Performance

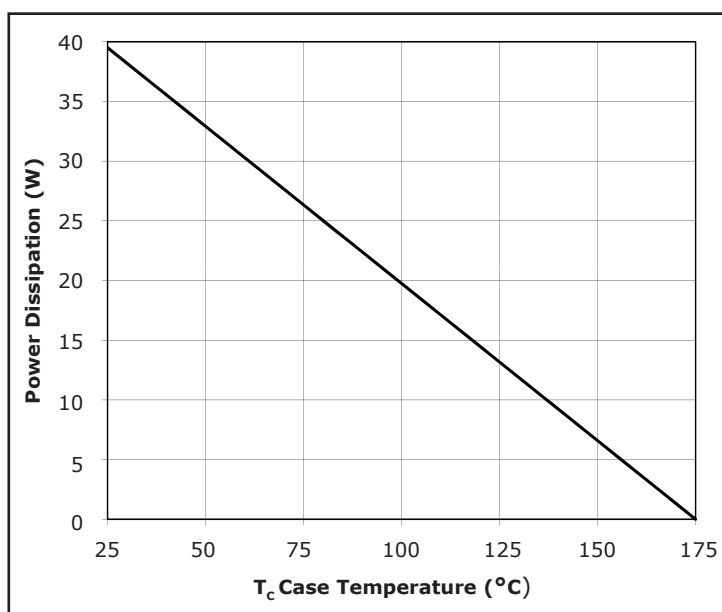
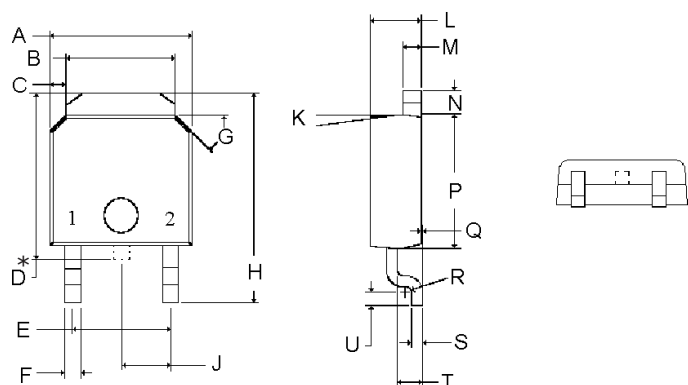


Figure 6. Power Derating

## Package Dimensions

Package TO-252-2

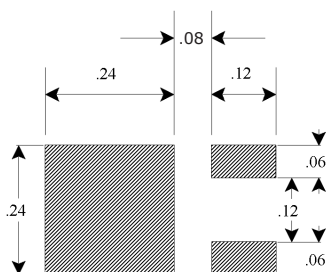


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.255	.265	6.477	6.731
B	.197	.205	5.004	5.207
C	.027	.033	.686	.838
D*	.270	.322	6.858	8.179
E	.178	.182	4.521	4.623
F	.025	.035	.635	.889
G	44°	46°	44°	46°
H	.382	.397	9.703	10.084
J	.090 TYP		2.286 TYP	
K	6°	8°	6°	8°
L	.086	.094	2.184	2.388
M	.030	.034	.762	.864
N	.040	.044	1.016	1.118
P	.235	.245	5.969	6.223
Q	0.00	.004	0.00	.102
R	R0.01 TYP		R0.31 TYP	
S	.017	.023	.428	.588
T	.040	.044	1.016	1.118
U	.021	.027	.534	1.118

Note:

\* Tab "D" may not be present

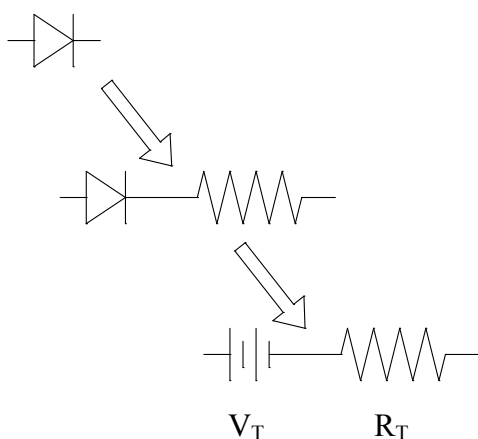
## Recommended Solder Pad Layout



TO-252-2

Part Number	Package	Marking
C3D02060E	TO-252-2	C3D02060

## Diode Model



$$V_{f_T} = V_T + I_f \cdot R_T$$

$$V_T = 0.98 + (T_j \cdot -1.7 \cdot 10^{-3})$$

$$R_T = 0.21 + (T_j \cdot 1.71 \cdot 10^{-3})$$

**Note:**  $T_j$  = Diode Junction Temperature In Degrees Celcius

"The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.

This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, air traffic control systems, or weapons systems.

Copyright © 2009 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks and Z-Rec is a trademark of Cree, Inc.

Cree, Inc.  
4600 Silicon Drive  
Durham, NC 27703  
USA Tel: +1.919.313.5300  
Fax: +1.919.313.5451  
[www.cree.com/power](http://www.cree.com/power)