

# C4D02120E

## Silicon Carbide Schottky Diode

### Z-REC<sup>®</sup> RECTIFIER

$$V_{RRM} = 1200 \text{ V}$$

$$I_F (T_c = 135^\circ \text{C}) = 4.5 \text{ A}$$

$$Q_c = 11 \text{ nC}$$

#### Features

- 1.2kV Schottky Rectifier
- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Positive Temperature Coefficient on  $V_F$

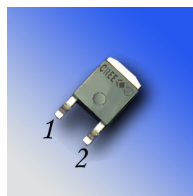
#### Benefits

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

#### Applications

- Solar Inverters
- Power Factor Correction

#### Package



TO-252-2



Part Number	Package	Marking
C4D02120E	TO-252-2	C4D02120

#### Maximum Ratings ( $T_c = 25^\circ \text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V		
$V_{RSM}$	Surge Peak Reverse Voltage	1300	V		
$V_{DC}$	DC Blocking Voltage	1200	V		
$I_F$	Maximum DC Current	9 4.5 2	A	$T_c = 25^\circ \text{C}$ $T_c = 135^\circ \text{C}$ $T_c = 162^\circ \text{C}$	
$I_{FRM}$	Repetitive Peak Forward Surge Current	14.4 10	A	$T_c = 25^\circ \text{C}$ , $t_p = 10 \text{ ms}$ , Half Sine pulse $T_c = 110^\circ \text{C}$ , $t_p = 10 \text{ ms}$ , Half Sine pulse	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	18.8 16.4	A	$T_c = 25^\circ \text{C}$ , $t_p = 10 \text{ ms}$ , Half Sine pulse $T_c = 110^\circ \text{C}$ , $t_p = 10 \text{ ms}$ , Half Sine pulse	
$I_{F,Max}$	Non-Repetitive Peak Forward Current	200 160	A	$T_c = 25^\circ \text{C}$ , $t_p = 10 \mu\text{s}$ , Pulse $T_c = 110^\circ \text{C}$ , $t_p = 10 \mu\text{s}$ , Pulse	
$P_{tot}$	Power Dissipation	51.7 22.4	W	$T_c = 25^\circ \text{C}$ $T_c = 110^\circ \text{C}$	
$T_j$	Operating Junction Range	-55 to +175	$^\circ \text{C}$		
$T_{stg}$	Storage Temperature Range	-55 to +135	$^\circ \text{C}$		

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.4 1.9	1.8 3	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 40	50 150	$\mu\text{A}$	$V_R = 1200\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	11		nC	$V_R = 800\text{ V}$ , $I_F = 2\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	167 11 8		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 800\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	

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-252 Package Thermal Resistance from Junction to Case	2.9	$^\circ\text{C}/\text{W}$

## Typical Performance

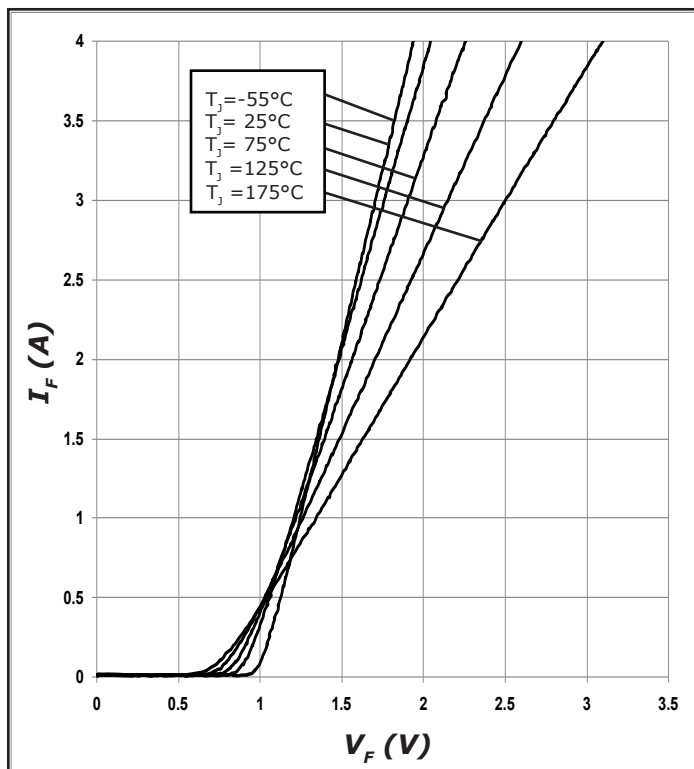


Figure 1. Forward Characteristics

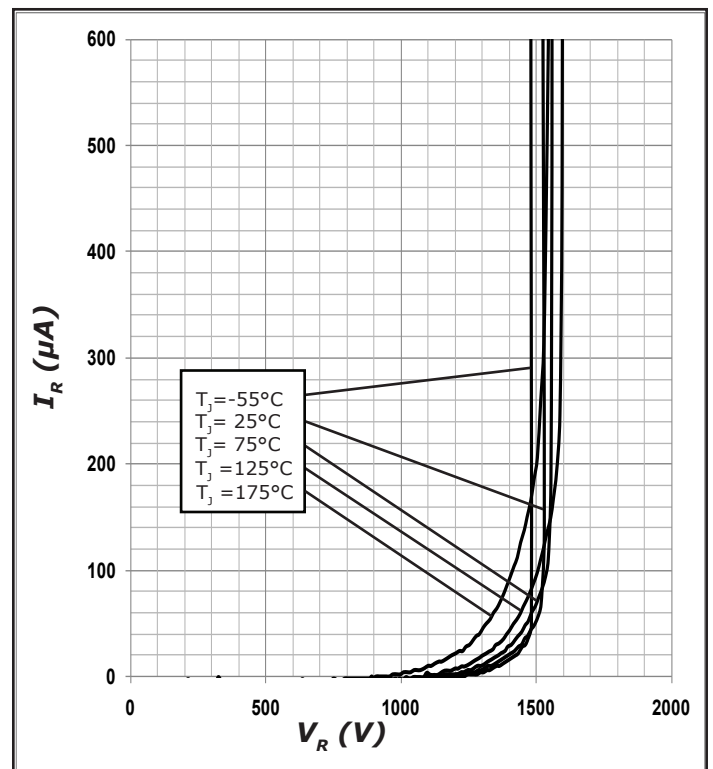


Figure 2. Reverse Characteristics

## Typical Performance

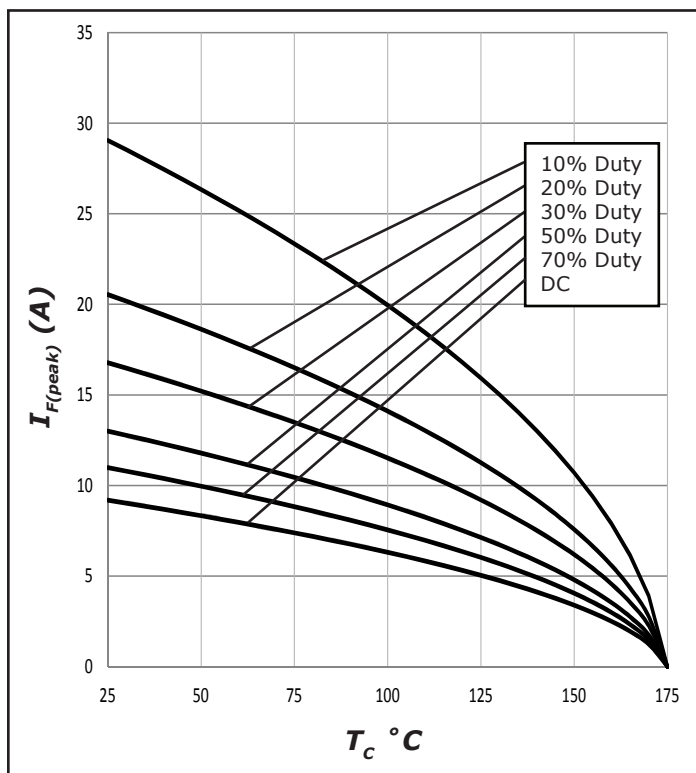


Figure 3. Current Derating

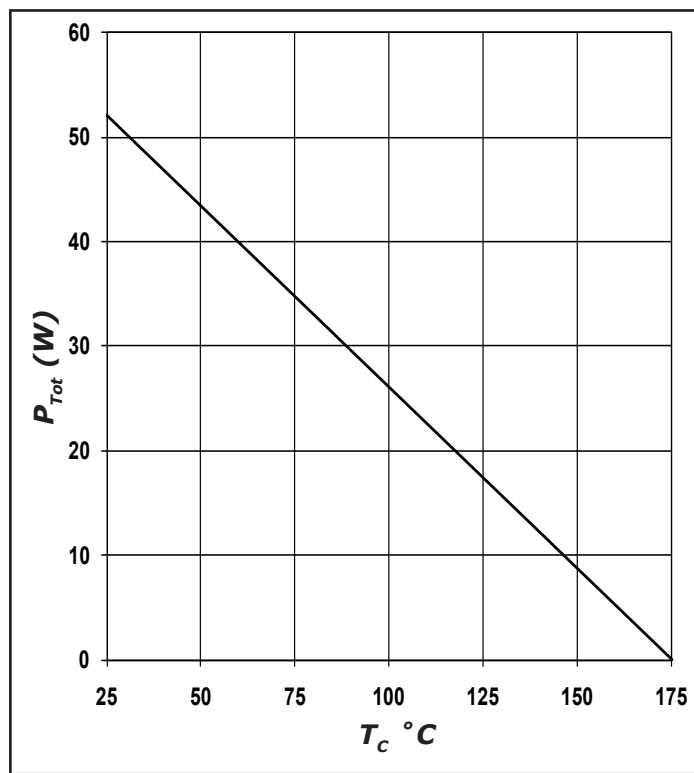


Figure 4. Power Derating

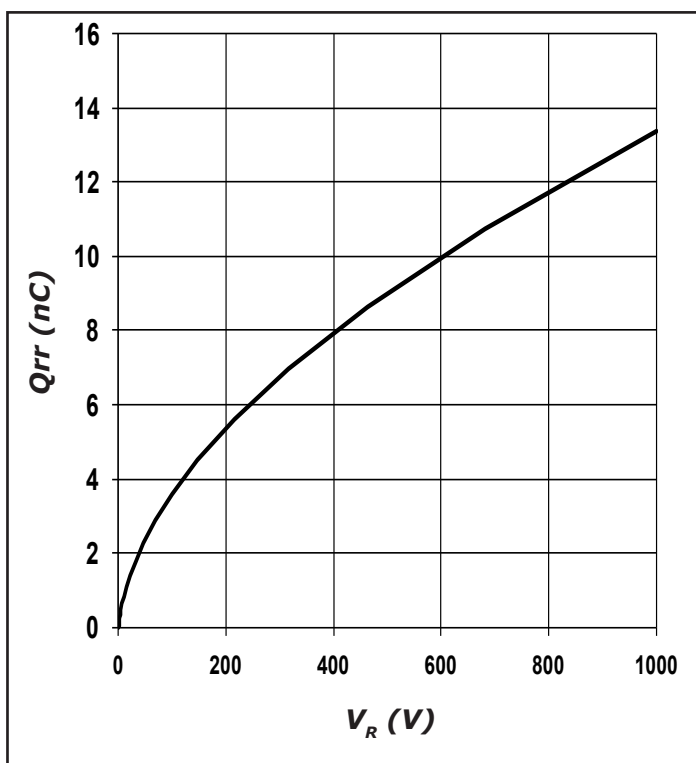


Figure 5. Recovery Charge vs. Reverse Voltage

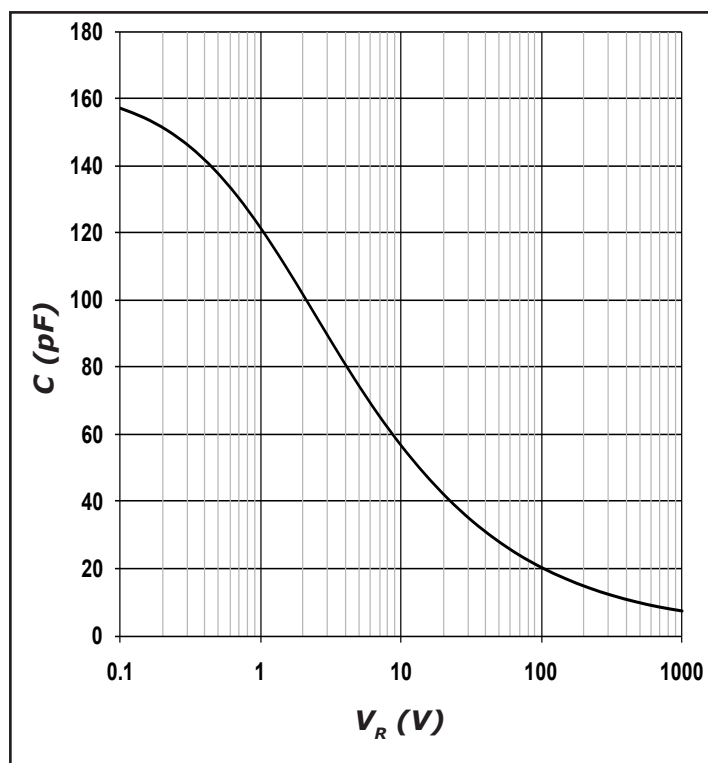


Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance

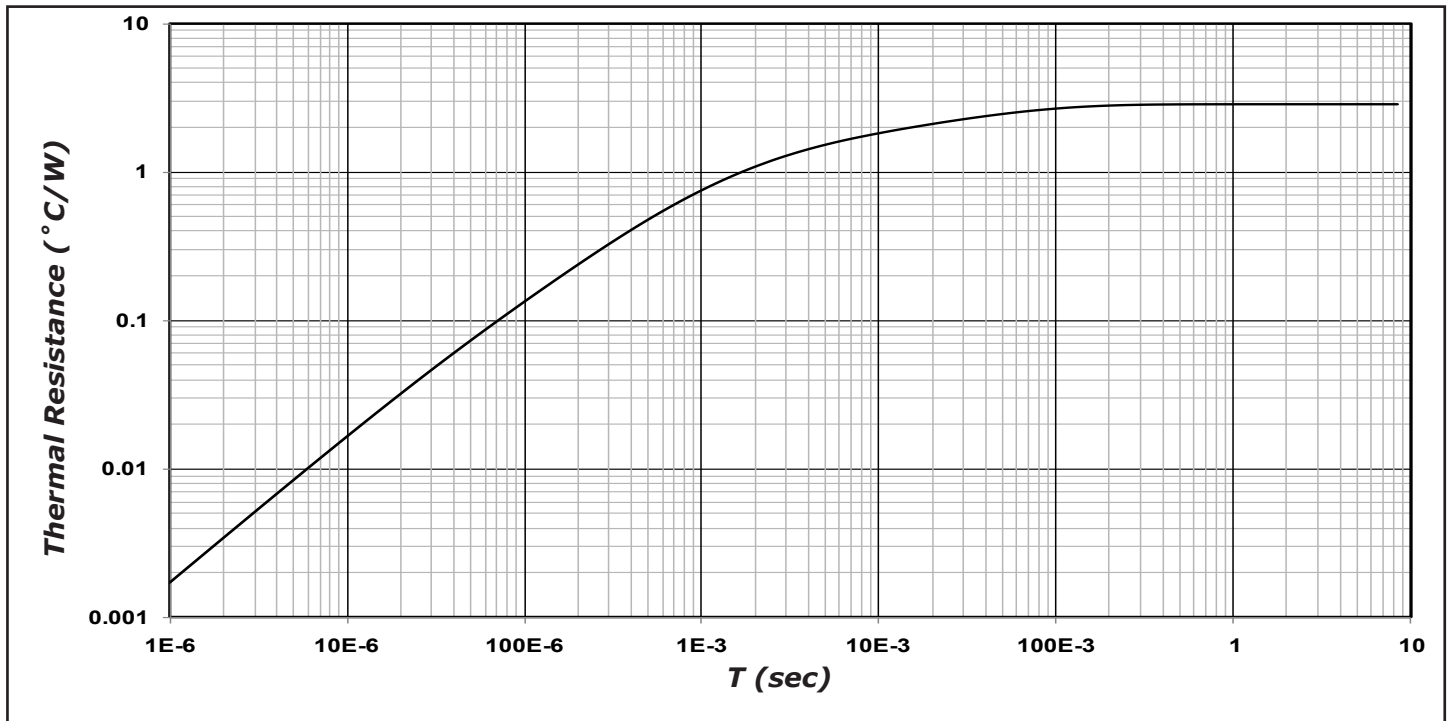
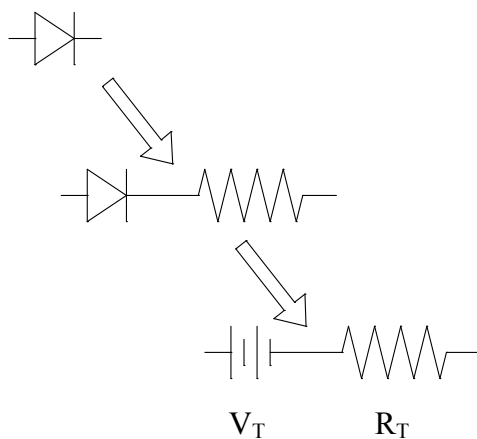


Figure 7. Transient Thermal Impedance

## Diode Model



$$V_{fT} = V_T + I_f * R_T$$

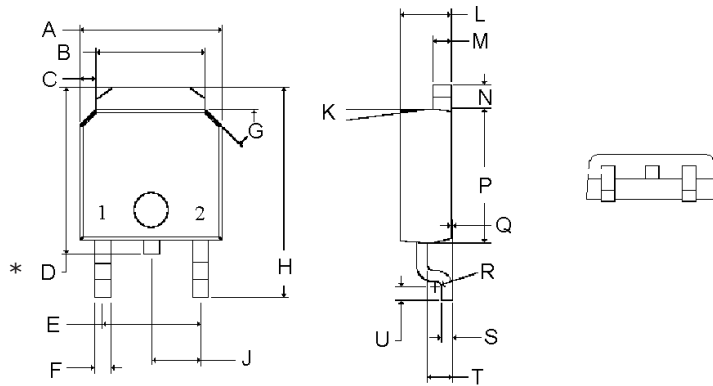
$$V_T = 0.9592 + (T_j * -1.20 * 10^{-3})$$

$$R_T = 0.1673 + (T_j * 2.10 * 10^{-3})$$

**Note:**  $T_j$  = Diode Junction Temperature in Degrees Celsius

## Package Dimensions

Package TO-252-2

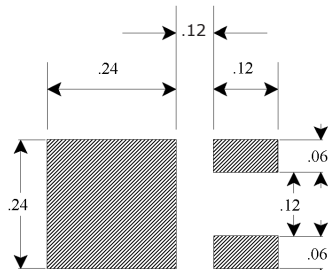


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.250	.289	6.350	7.341
B	.197	.215	5.004	5.461
C	.027	.050	.686	1.270
D*	.270	.322	6.858	8.179
E	.178	.182	4.521	4.623
F	.025	.045	.635	1.143
G	44°	46°	44°	46°
H	.380	.410	9.652	10.414
J	.090 TYP		2.286 TYP	
K	6°	8°	6°	8°
L	.086	.094	2.184	2.388
M	.018	.034	.457	.864
N	.035	.050	.889	1.270
P	.231	.246	5.867	6.248
Q	0.00	.005	0.00	.127
R	R0.010 TYP		R0.254 TYP	
S	.017	.023	.432	.584
T	.038	.045	.965	1.143
U	.021	.029	.533	.737

Note:

\* Tab "D" may not be present

## Recommended Solder Pad Layout



TO-252-2

Part Number	Package	Marking
C4D02120E	TO-252-2	C4D02120

**Note:** Recommended soldering profiles can be found in the applications note here:  
[http://www.cree.com/power\\_app\\_notes/soldering](http://www.cree.com/power_app_notes/soldering)





## Notes

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- **RoHS Compliance**

The levels of RoHS 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 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of [www.cree.com](http://www.cree.com).

- **REACH Compliance**

REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

- 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, or air traffic control systems.