

C3D25170H–Silicon Carbide Schottky Diode

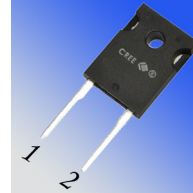
Z-REC™ RECTIFIER

V_{RRM}	=	1700 V
$I_F, T_c < 135^\circ\text{C}$	=	26.3 A
Q_c	=	230 nC

Features

- 1700-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Halogen-Free; RoHS Complaint

Package



Benefits

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



Part Number	Package	Marking
C3D25170H	TO-247-2	C3D25170

Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	1700	V		
V_{RSM}	Surge Peak Reverse Voltage	1700	V		
V_{DC}	DC Blocking Voltage	1700	V		
I_F	Continuous Forward Current	26.3	A	$T_c < 135^\circ\text{C}$	
I_{FRM}	Repetitive Peak Forward Surge Current	99 57	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}, D = 1$ $T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}, D = 1$	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	117 88	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}, D = 1$ $T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}, D = 1$	
P_{tot}	Power Dissipation	377 163	W	$T_c = 25^\circ\text{C}$ $T_c = 110^\circ\text{C}$	
T_c	Maximum Case Temperature	135	$^\circ\text{C}$		
T_j	Operating Junction Range	-55 to +175	$^\circ\text{C}$		
T_{stg}	Storage Temperature Range	-55 to +135	$^\circ\text{C}$		
	TO-247 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	1.8 3.2	2.5 4	V	$I_F = 25\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 25\text{ A}$ $T_J = 175^\circ\text{C}$	
I_R	Reverse Current	20 100	100 400	μA	$V_R = 1700\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1700\text{ V}$ $T_J = 175^\circ\text{C}$	
Q_C	Total Capacitive Charge	230		nC	$V_R = 1700\text{ V}$, $I_F = 25\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	2079 187.5 97		pF	$V_R = 0\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 200\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 800\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$	

Note:

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

Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.4	$^\circ\text{C}/\text{W}$

Typical Performance

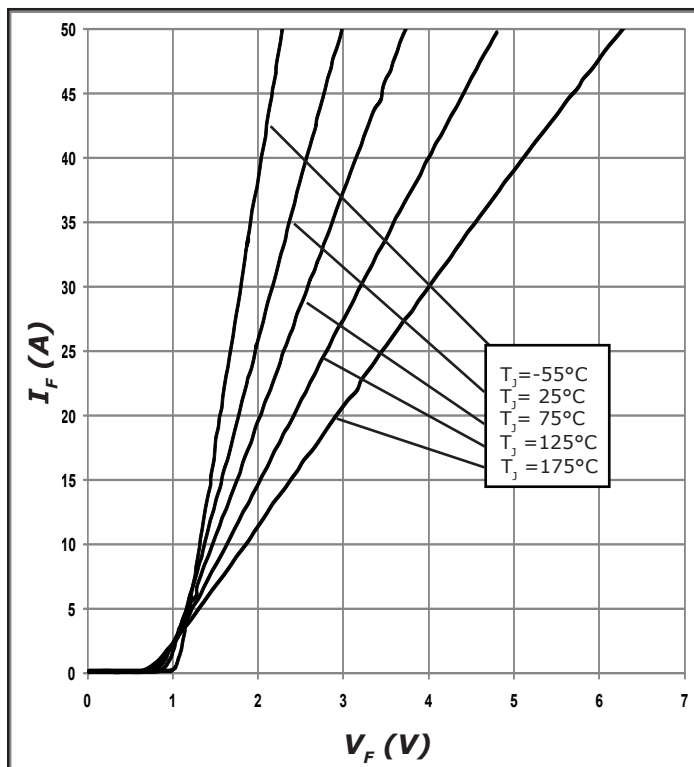


Figure 1. Forward Characteristics

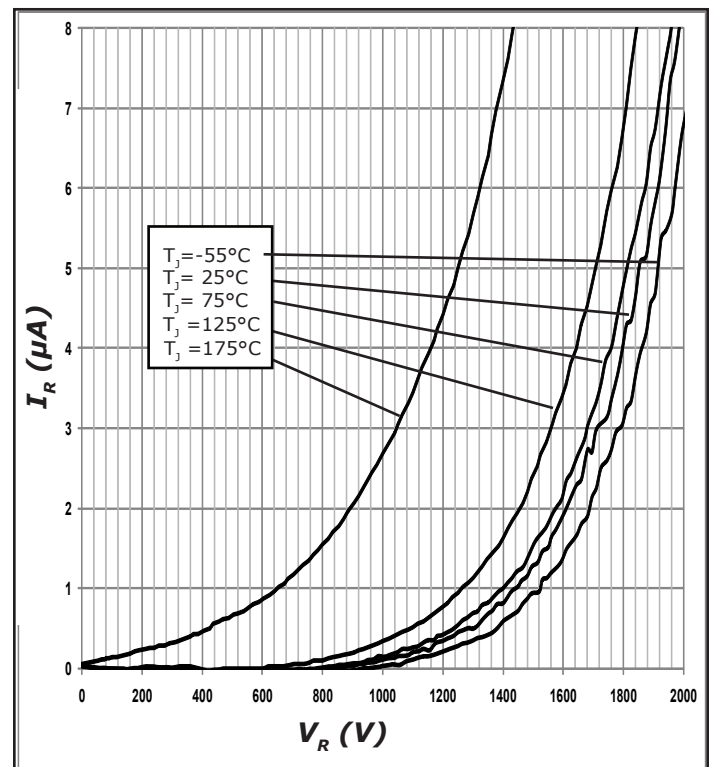


Figure 2. Reverse Characteristics

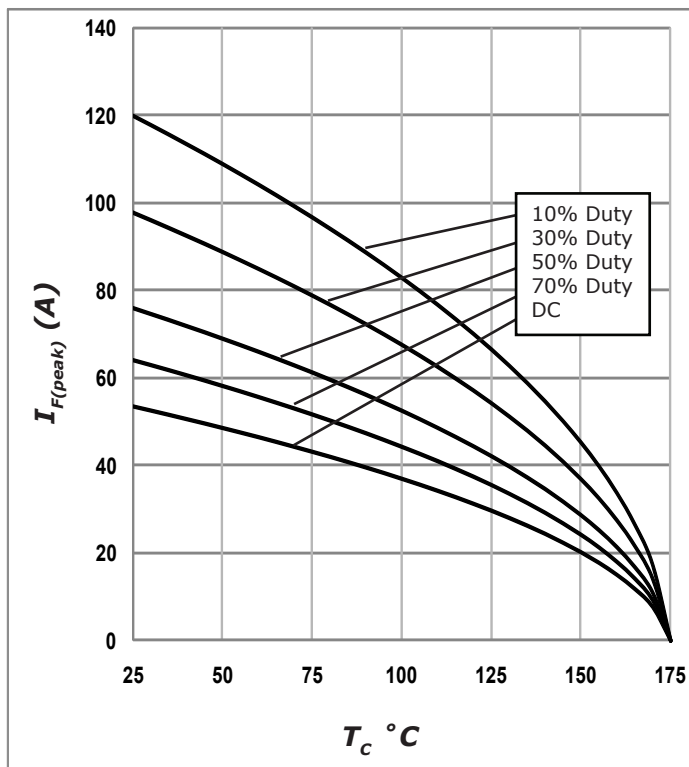


Figure 3. Current Derating

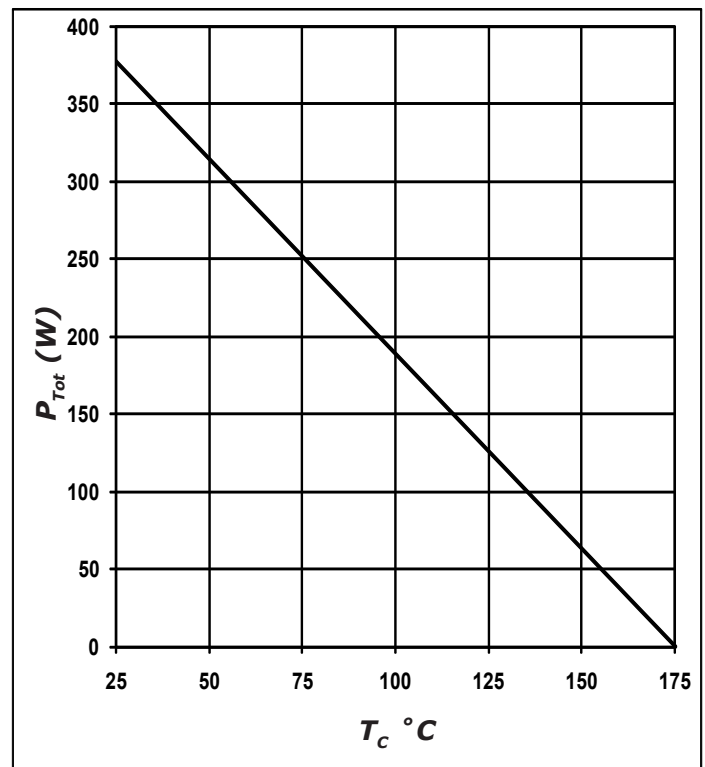


Figure 4. Power Derating

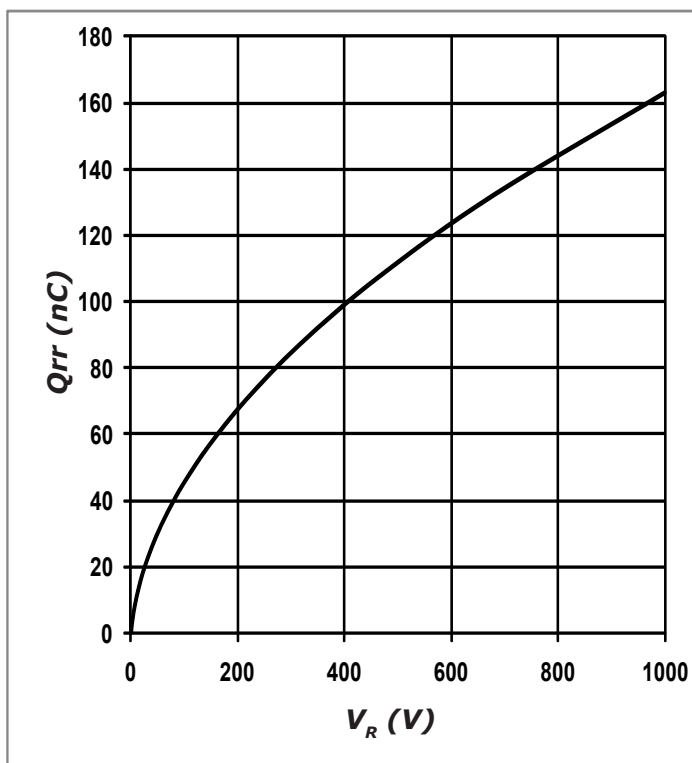


Figure 5. Recovery Charge vs. Reverse Voltage

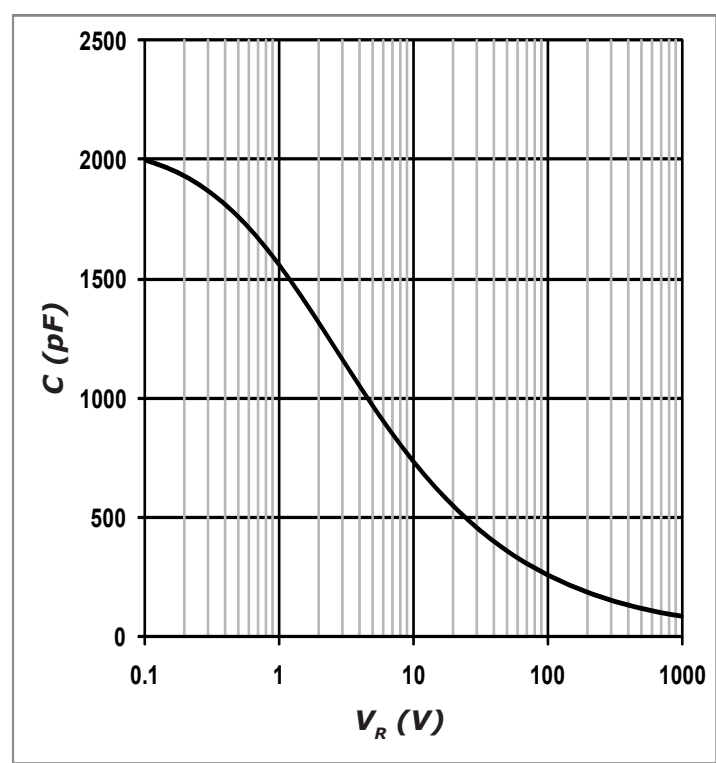


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

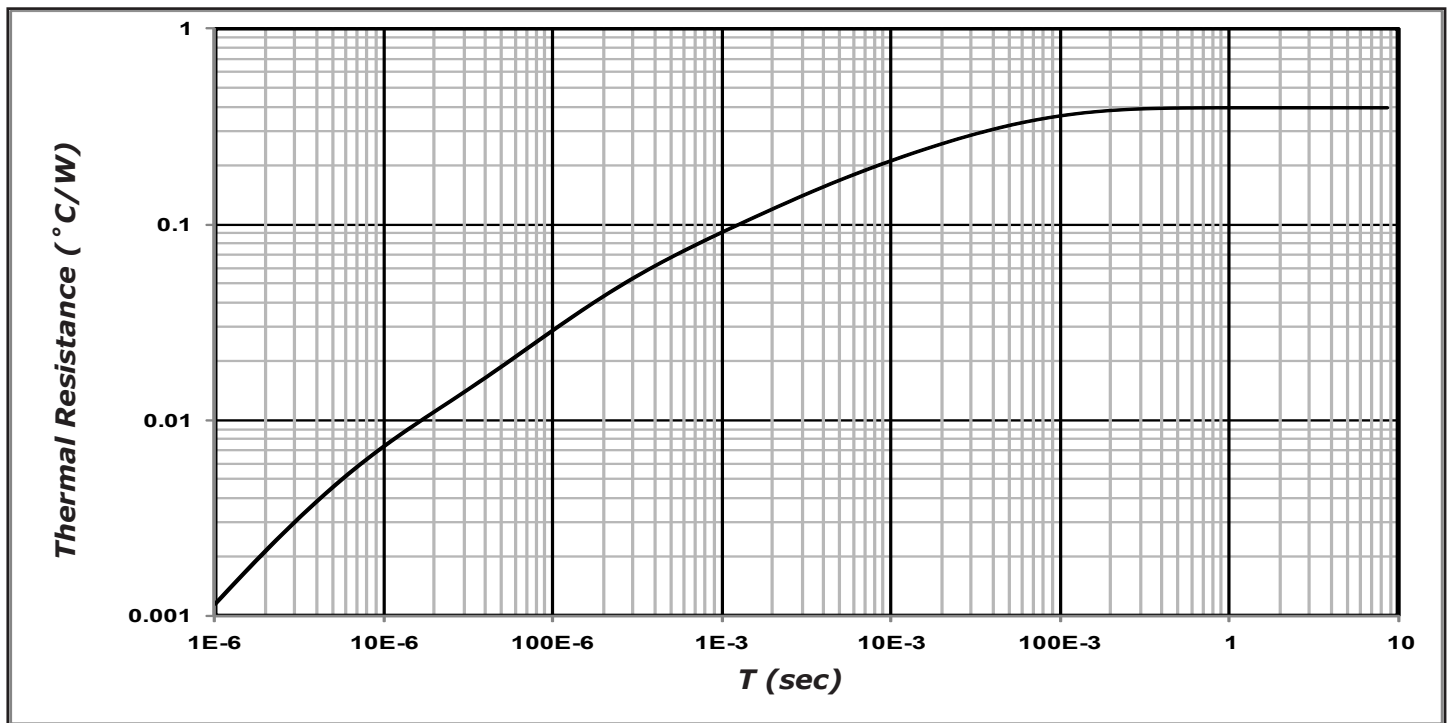
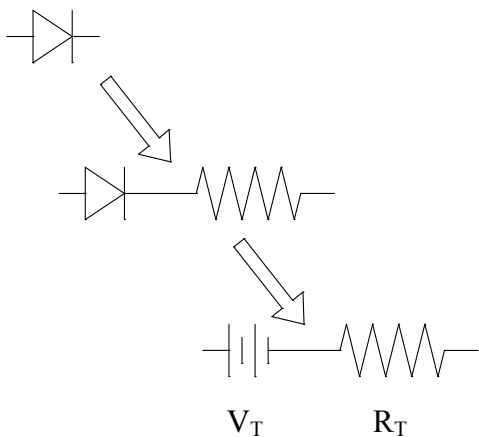


Figure 7. Transient Thermal Impedance

Diode Model

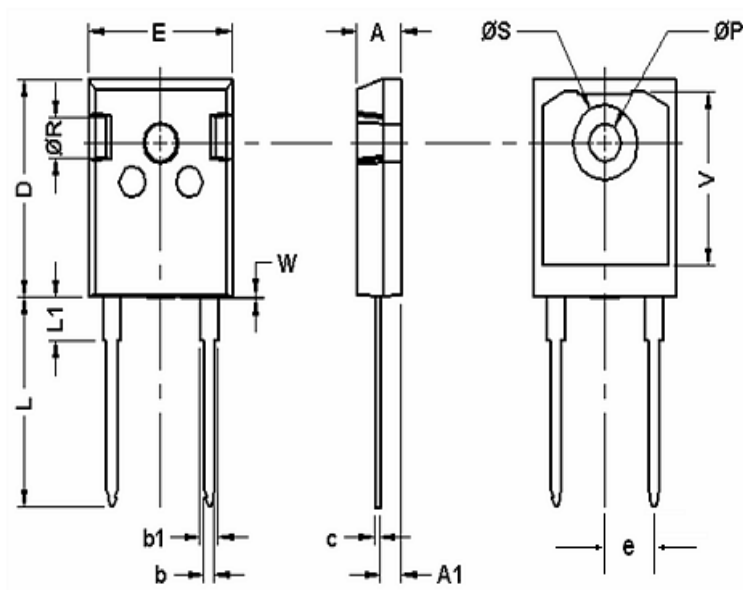


$$V_{f_T} = V_T + I_f \cdot R_T$$

$$V_T = 0.99 + (T_j \cdot -1.50 \cdot 10^{-3})$$

$$R_T = 0.03 + (T_j \cdot 0.5 \cdot 10^{-3})$$

Note: T_j = Diode Junction Temperature in Degrees Celsius



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	0.185	0.209	4.70	5.31
A1	0.087	0.102	2.21	2.59
b	0.040	0.055	1.02	1.40
b1	0.065	0.088	1.65	2.23
C	0.016	0.031	0.41	0.79
D	0.819	0.845	20.80	21.46
E	0.61	0.640	15.49	16.26
e	0.215	0.215	5.46	5.46
L	0.78	0.80	19.81	20.32
L1	0.164	0.176	4.17	4.47
øP	0.140	0.144	3.56	3.66
Q	0.212	0.244	5.38	6.20
øR	0.135	0.157	3.43	3.99
øS	0.278	0.288	7.06	7.32
V	0.652	0.662	16.56	16.81
W	0.000	0.006	0.00	0.15



"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 © 2011 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