

# C3D25170H

## Silicon Carbide Schottky Diode

### Z-REC<sup>®</sup> RECTIFIER

$V_{RRM}$	=	1700 V
$I_F (T_C=135^\circ\text{C})$	=	26 A
$Q_c$	=	182 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 Compliant

#### Package



TO-247-2



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

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	54 26 25	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=138^\circ\text{C}$	
$I_{FRM}$	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	$\mu\text{A}$	$V_R = 1700\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1700\text{ V}$ $T_J = 175^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	182		nC	$V_R = 1200\text{ V}$ , $I_F = 25\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
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: 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

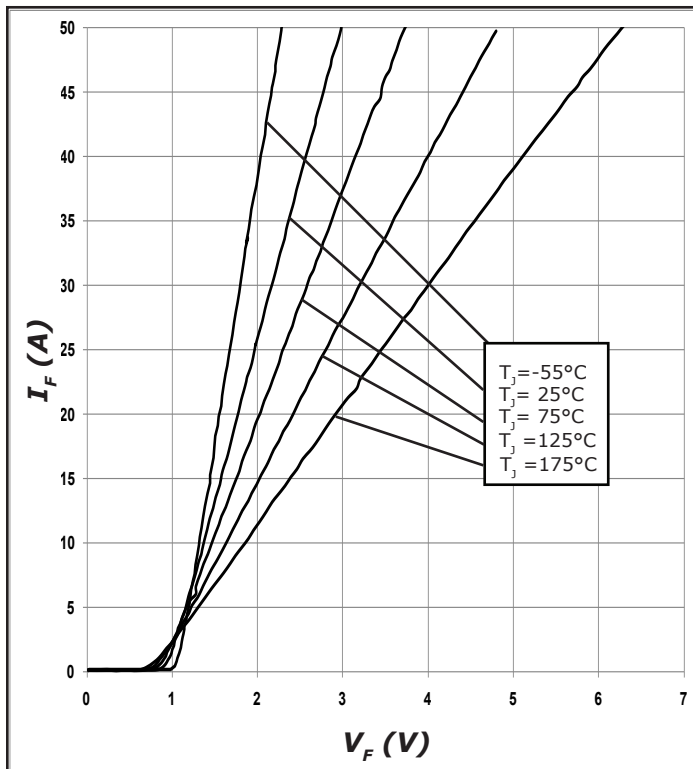


Figure 1. Forward Characteristics

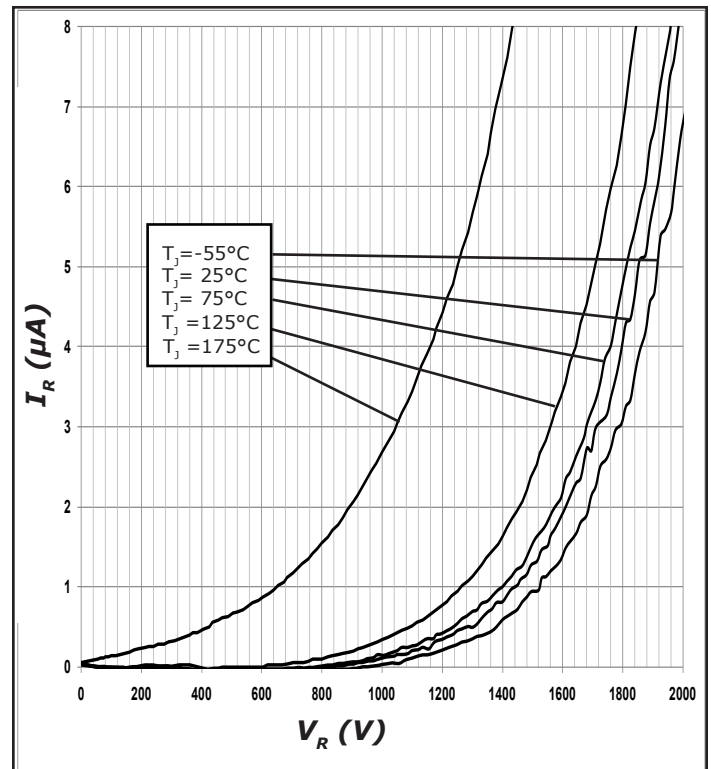


Figure 2. Reverse Characteristics

## Typical Performance

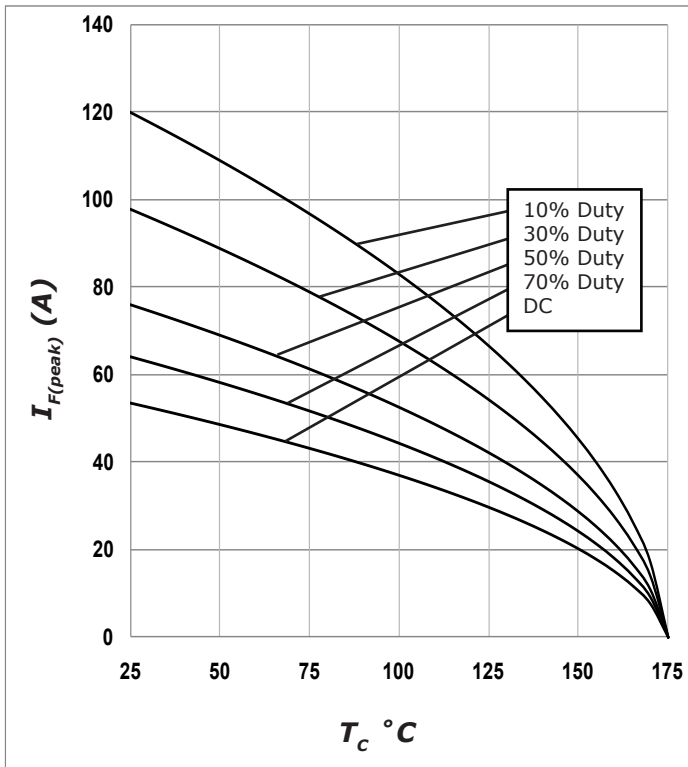


Figure 3. Current Derating

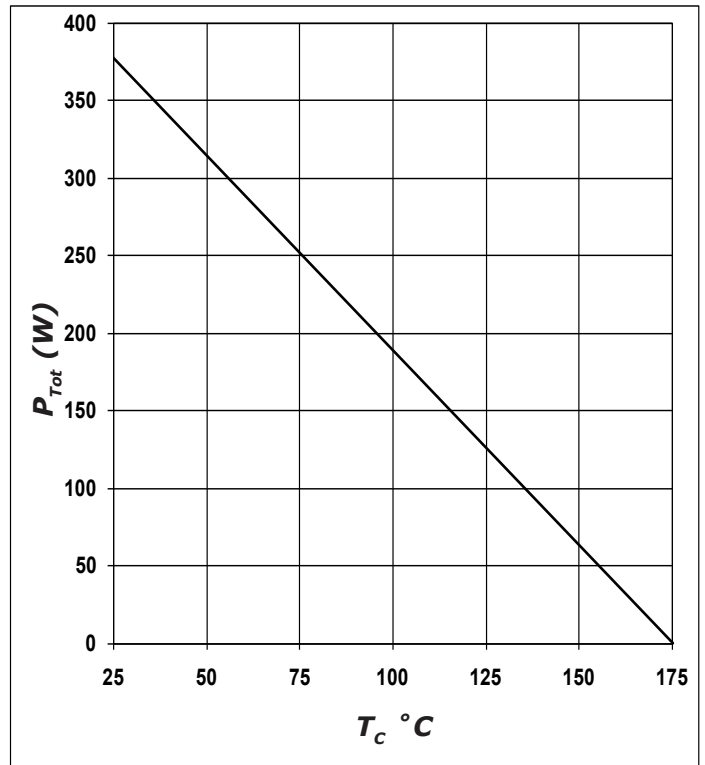


Figure 4. Power Derating

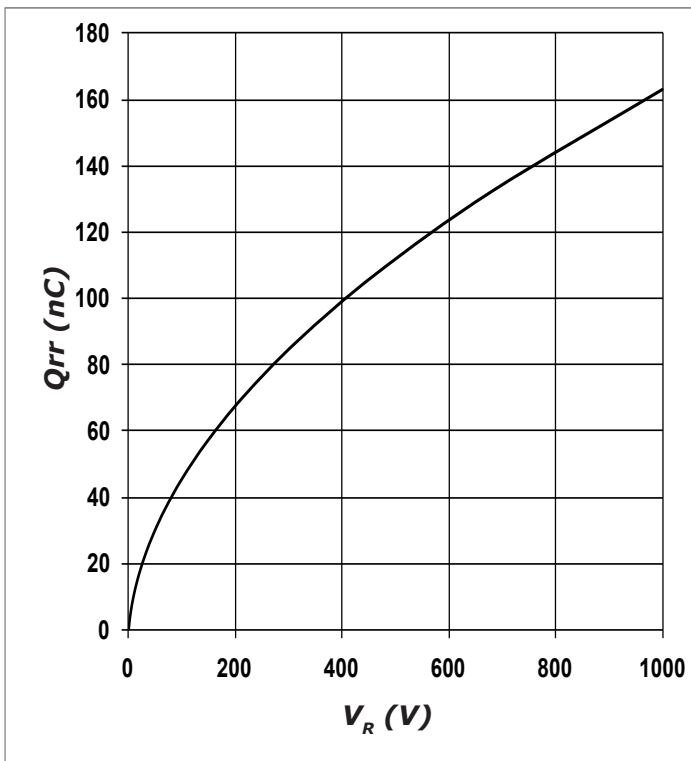


Figure 5. Recovery Charge vs. Reverse Voltage

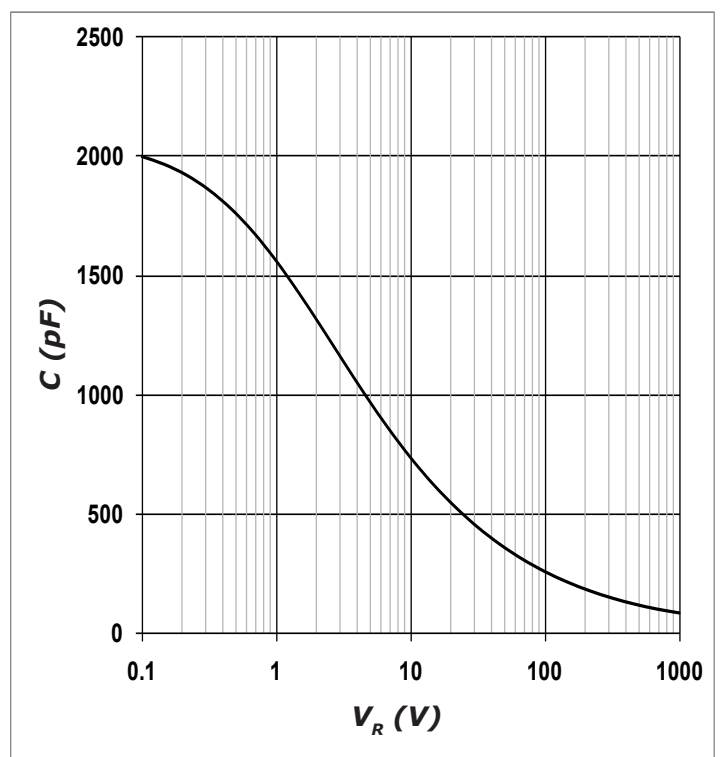


Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance

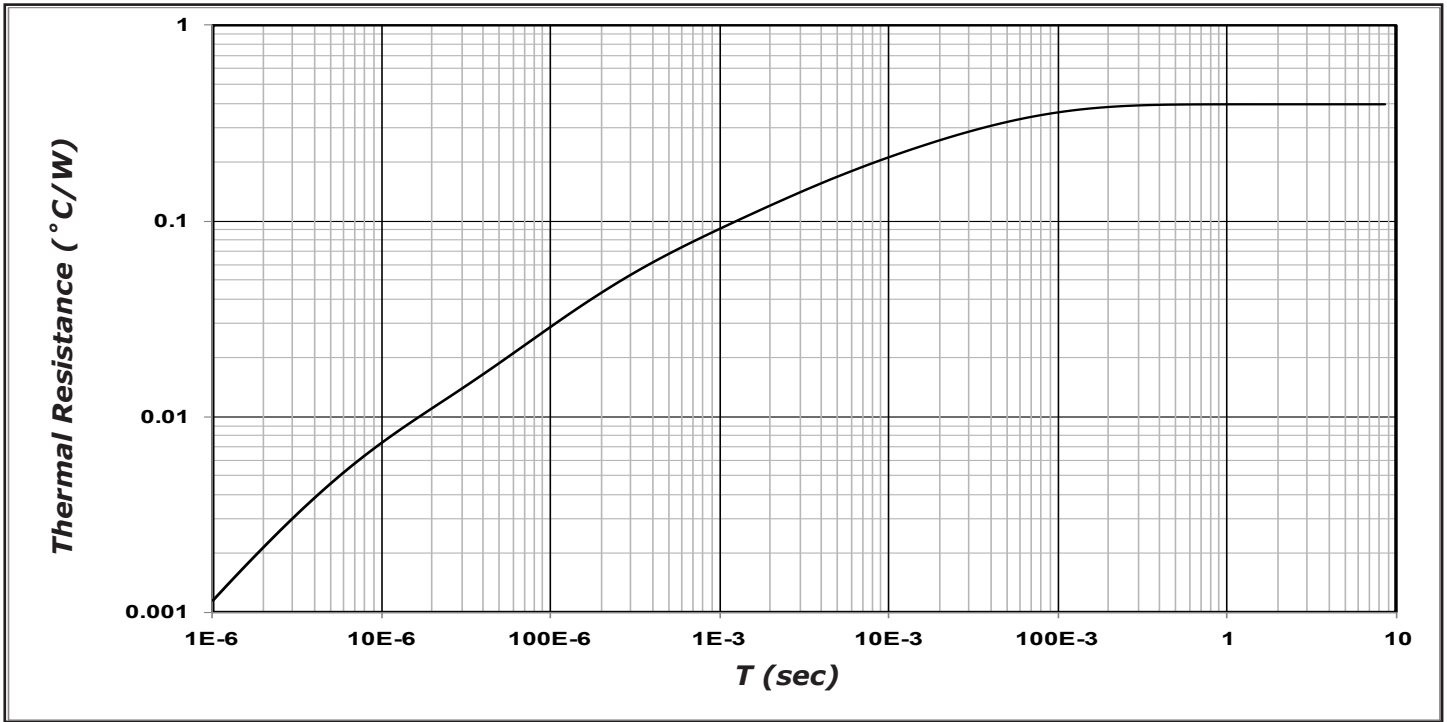
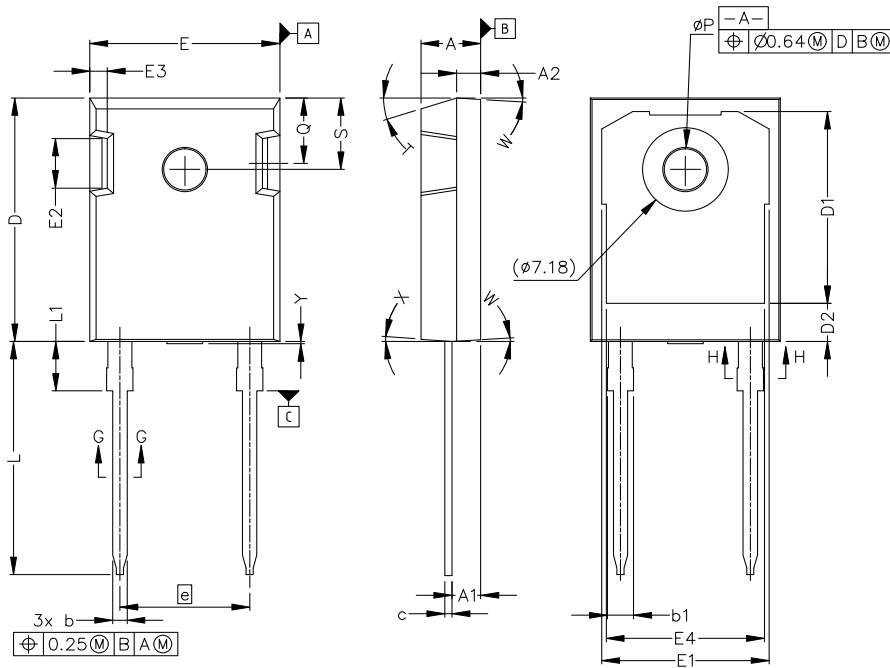


Figure 7. Transient Thermal Impedance

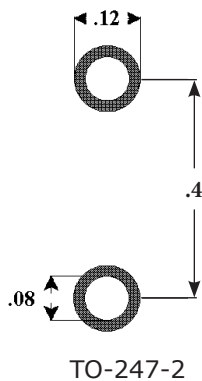


SYMBOL	MIN (mm)	MAX (mm)
A	4.70	5.31
A1	2.21	2.59
A2	1.91	2.16
b	1.02	1.40
b1	1.65	2.41
c	0.41	0.79
D	20.80	21.46
D1	16.25	17.35
D2	2.86	3.16
E	15.49	16.26
E1	13.10	14.15
E2	3.43	5.10
E3	1.00	1.90
E4	12.38	13.43
e	10.88 BSC *	
L	19.81	20.32
L1	4.10	4.47
$\phi P$	3.51	3.66
Q	5.38	6.20
S	6.04	6.30
T	17.5° REF *	
W	3.5° REF *	
X	4° REF *	
Y	0.00	0.50

(\* Basic Spacing between Centers)

(\* Reference)

## Recommended Solder Pad Layout



TO-247-2

*all units are in inches*

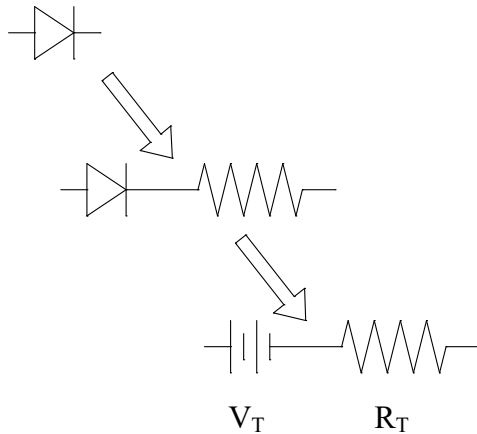
Part Number	Package	Marking
C3D25170H	TO-247-2	C3D25170

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



## Diode Model

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

$$V_T = 0.99 + (T_J * -1.50 * 10^{-3})$$

$$R_T = 0.03 + (T_J * 0.5 * 10^{-3})$$

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

## 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 Wolfspeed representative or from the Product Ecology section of our website at <http://www.wolfspeed.com/power/tools-and-support/product-ecology>.

- **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.

## Related Links

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- Cree SiC Schottky diode portfolio: <http://www.wolfspeed.com/Power/Products#SiCSchottkyDiodes>
- Schottky diode Spice models: <http://www.wolfspeed.com/power/tools-and-support/DIODE-model-request2>
- SiC MOSFET and diode reference designs: <http://go.pardot.com/l/101562/2015-07-31/349i>