C3D10170

Silicon Carbide Schottky Diode

Z-Rec® Rectifier

V_{RRM}	=	1700 V
I_F (T_C=135˚C)	=	14 A
Q_c	=	76 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

Halogen-Free

RoHS

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
C3D10170H	TO-247-2	C3D10170

Maximum Ratings (T_C = 25 ˚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	29 14 10	A	T_C=25˚C T_C=135˚C T_C=155˚C	
I_{FRM}	Repetitive Peak Forward Surge Current	45 26	A	T_C=25˚C, t_P=10 ms, Half Sine Wave T_C=110˚C, t_P=10 ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	55 41	A	T_C=25˚C, t_P=10ms, Half Sine Wave T_C=110˚C, t_P=10 ms, Half Sine Wave	
P_{tot}	Power Dissipation	231 100	W	T_C=25˚C T_C=110˚C	
$\int i^2dt$	i^2t value	3.1 1.8	A^2s	T_C=25˚C, t_P=10 ms T_C=110˚C, t_P=10 ms	
T_J	Operating Junction Range	-55 to +175	˚C		
T_{stg}	Storage Temperature Range	-55 to +135	˚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	1.7 3	2 3.5	V	I_F = 10 A T_J=25°C I_F = 10 A T_J=175°C	
I_R	Reverse Current	20 100	60 300	μA	V_R = 1700 V T_J=25°C V_R = 1700 V T_J=175°C	
Q_C	Total Capacitive Charge	76		nC	V_R = 1200 V, I_F = 10 A di/dt = 200 A/μs T_J = 25°C	
C	Total Capacitance	827 78 41		pF	V_R = 0 V, T_J = 25°C, f = 1 MHz V_R = 200 V, T_J = 25°C, f = 1 MHz V_R = 800 V, T_J = 25°C, f = 1 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	0.65	°C/W

Typical Performance

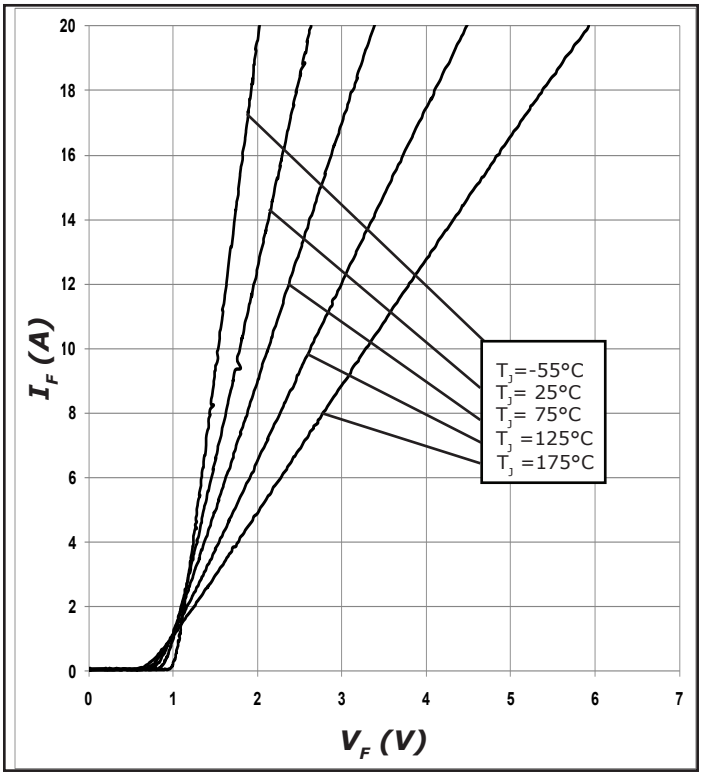


Figure 1. Forward Characteristics

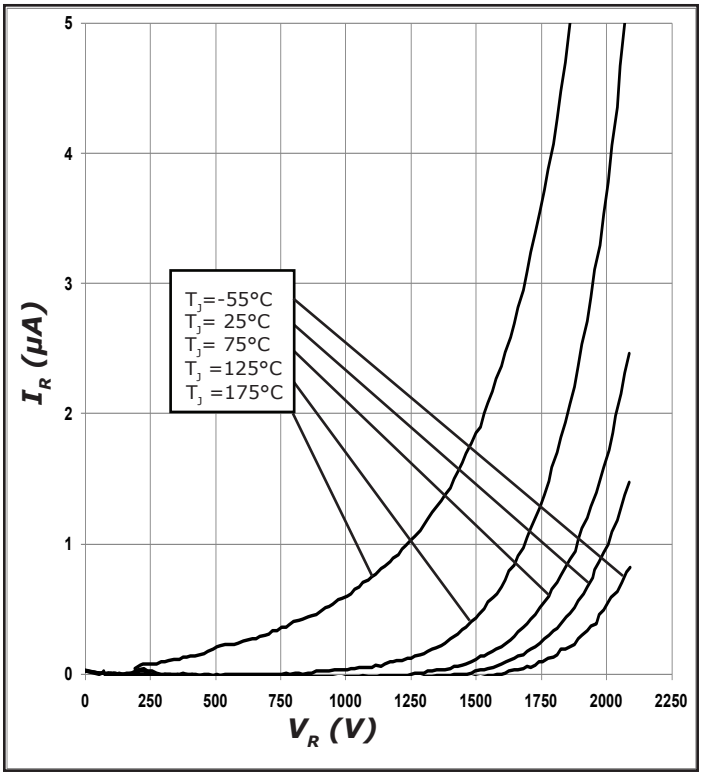


Figure 2. Reverse Characteristics

Typical Performance

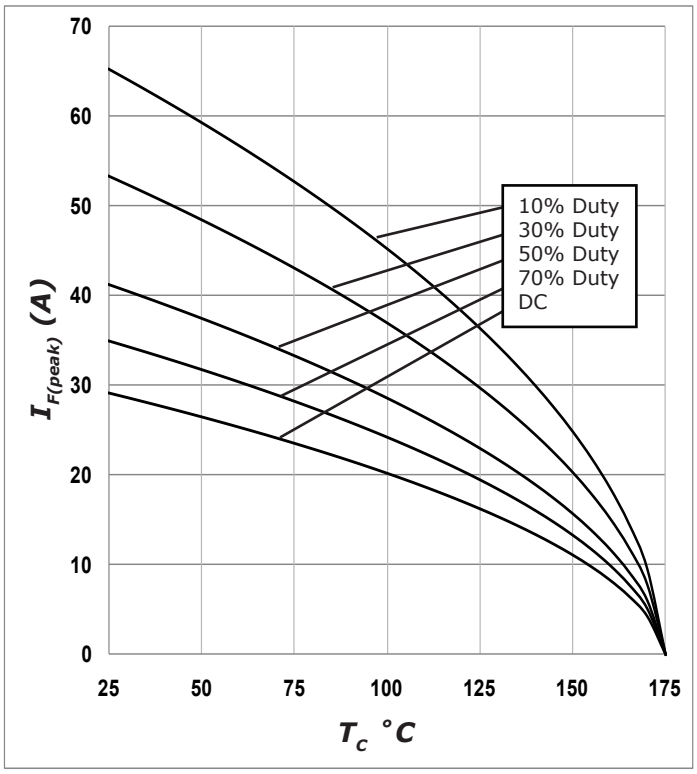


Figure 3. Current Derating

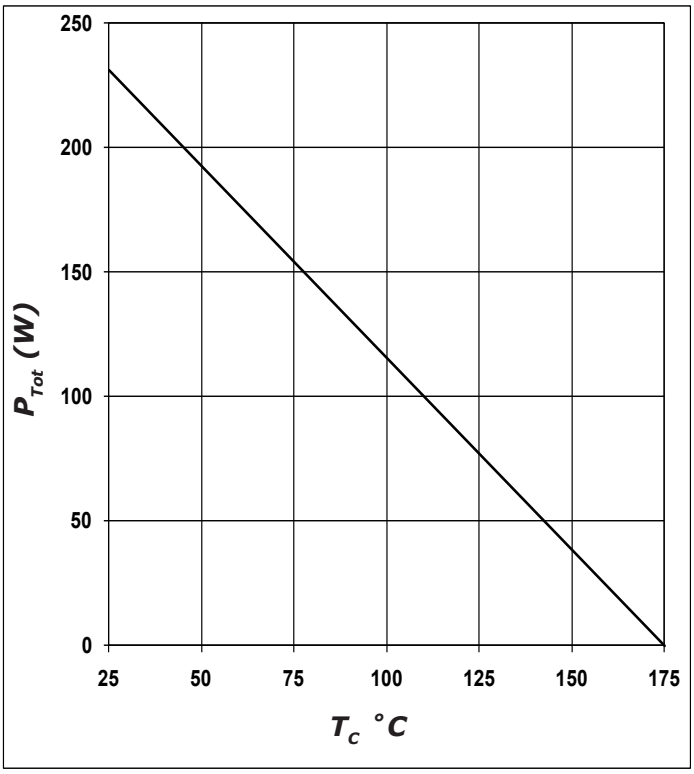


Figure 4. Power Derating

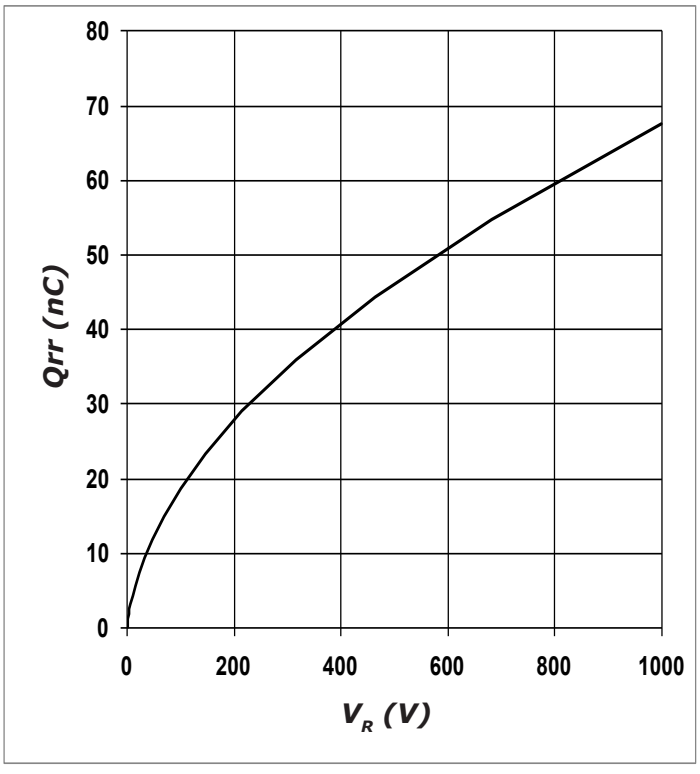


Figure 5. Recovery Charge vs. Reverse Voltage

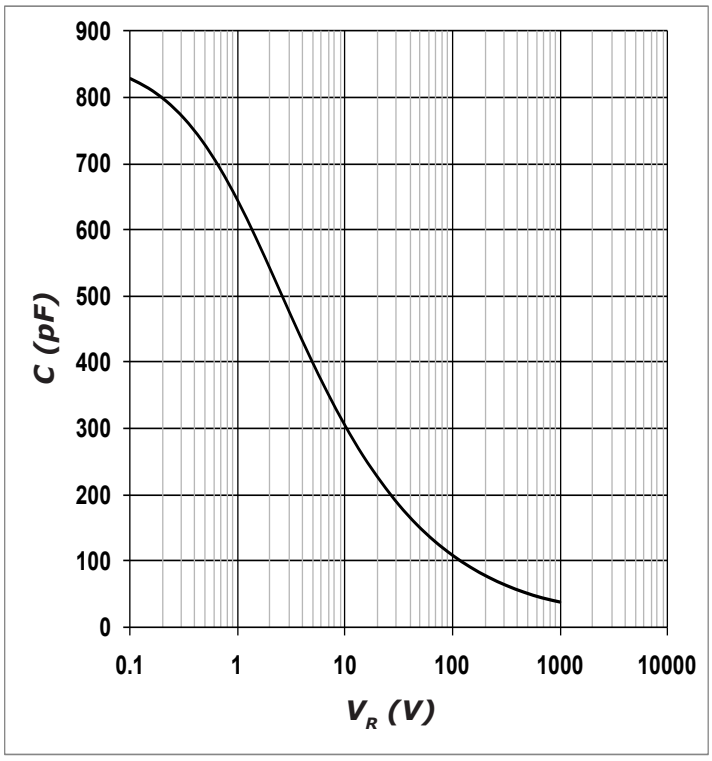


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

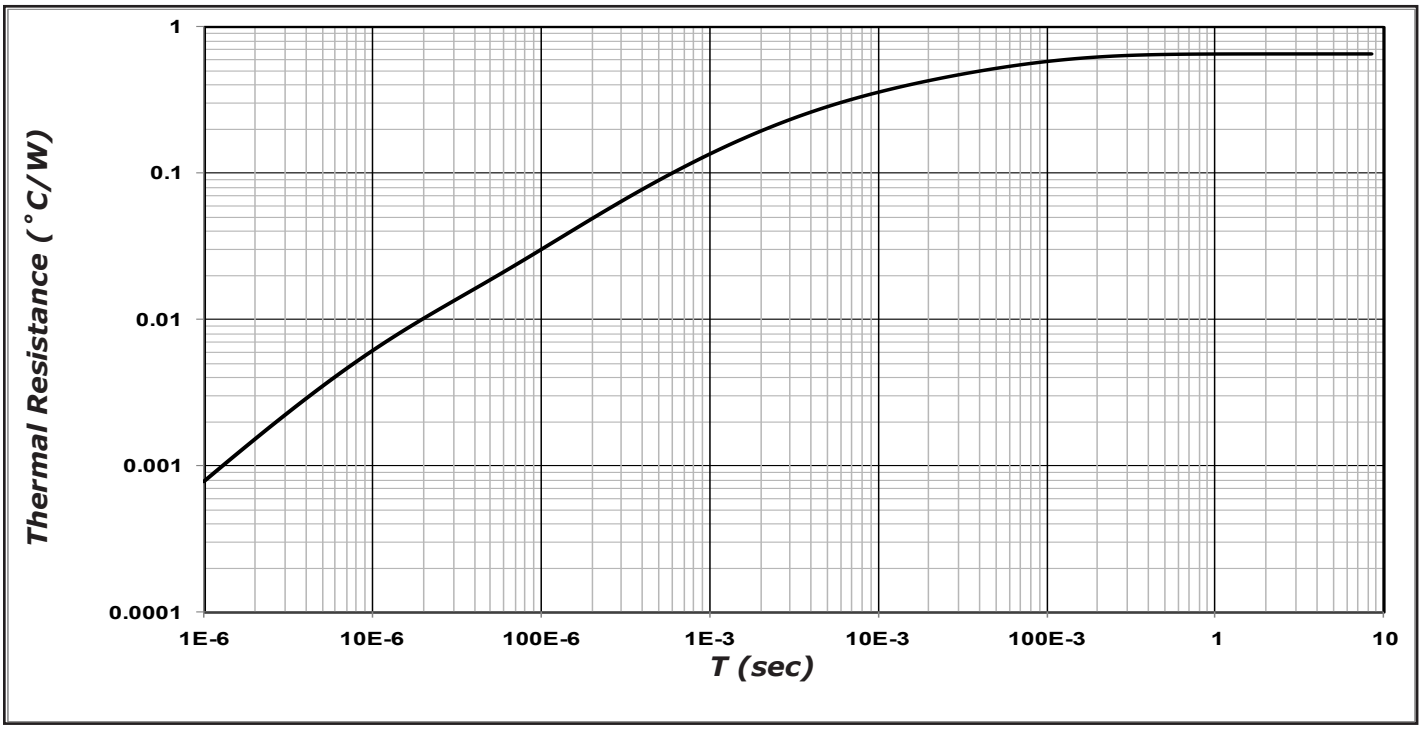
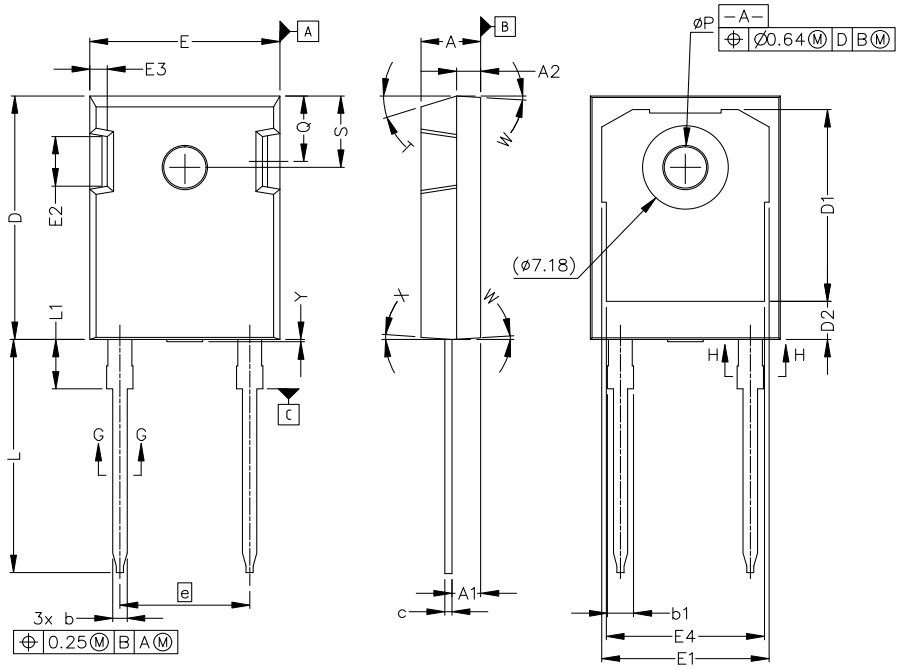


Figure 7. Transient Thermal Impedance

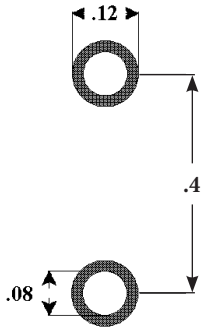
Package Dimensions



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
ØP	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

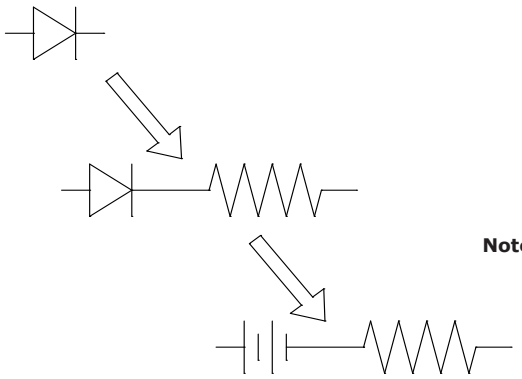
all units are in inches

Part Number	Package	Marking
C3D10170H	TO-247-2	C3D10170

Note: Recommended soldering profiles can be found in the applications note here:
http://www.wolfspeed.com/power_app_notes/soldering

Diode Model

Diode Model CSD10060



$$Vf_T = V_T + If * R_T$$

$$V_T = 0.975 + (T_J * -1.4 * 10^{-3})$$
$$R_T = 0.053 + (T_J * 1.1 * 10^{-3})$$

Note: T_j = Diode Junction Temperature In Degrees Celsius

Notes

- **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

- 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

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