

# C4D20120D

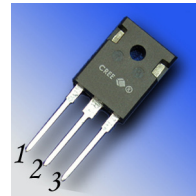
## Silicon Carbide Schottky Diode

### Z-REC™ RECTIFIER

$V_{RRM}$	=	1200 V
$I_F, T_c < 135^\circ\text{C}$	=	32 A
$Q_c$	=	132 nC

### Features

- 1.2-KVolt Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Positive Temperature Coefficient on  $V_F$



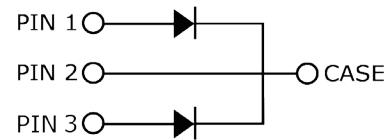
### Benefits

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

Part Number	Package	Marking
C4D20120D	TO-247-3	C4D20120

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Motor Drives



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

Symbol	Parameter	Value		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		
$I_F$	Continuous Forward Current(Per Leg/Device)	16/32	A	$T_c < 135^\circ\text{C}$ , No AC component	
$I_{FRM}$	Repetitive Peak Forward Surge Current	47* 31.5*	A	$T_c = 25^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Pulse $T_c = 110^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Pulse	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	71* 59.5*	A	$T_c = 25^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Pulse $T_c = 110^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Pulse	
$P_{tot}$	Power Dissipation(Per Leg/Device)	176/352 76/152	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	

\* Per Leg, \*\* Per Device

### Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.5 2.2	1.8 3	V	$I_F = 10\text{ A } T_J = 25^\circ\text{C}$ $I_F = 10\text{ A } T_J = 175^\circ\text{C}$	
$I_R$	Reverse Current	35 65	200 400	$\mu\text{A}$	$V_R = 1200\text{ V } T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V } T_J = 175^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	66		nC	$V_R = 1200\text{ V}, I_F = 10\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	754 45 38		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.	Max.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.85* 0.43**		$^\circ\text{C}/\text{W}$		

\* Per Leg, \*\* Per Device

### Typical Performance (Per Leg)

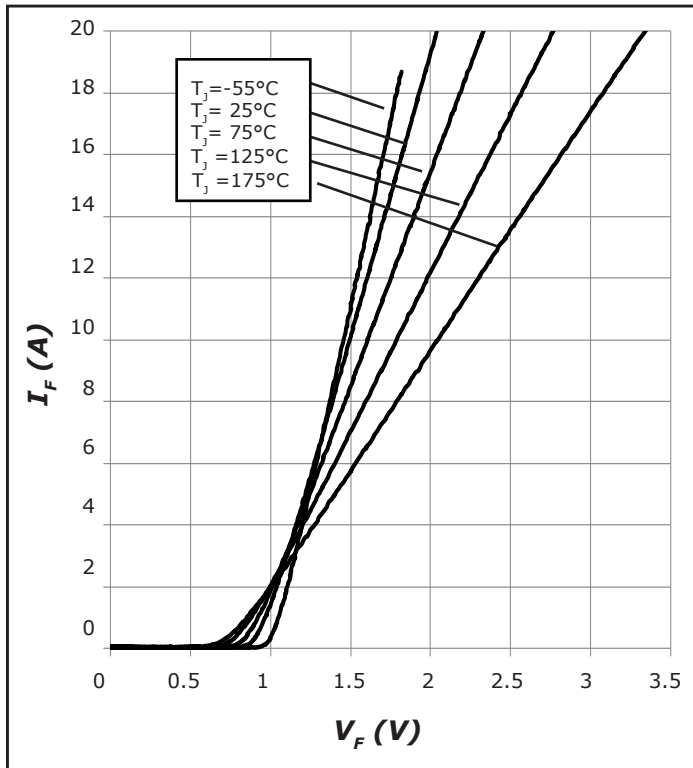


Figure 1. Forward Characteristics

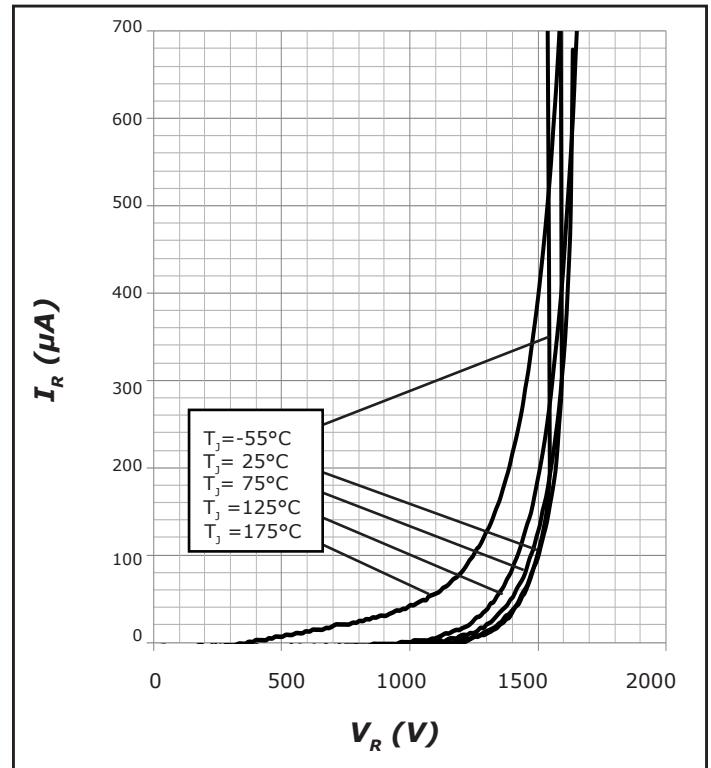


Figure 2. Reverse Characteristics

### Typical Performance (Per Leg)

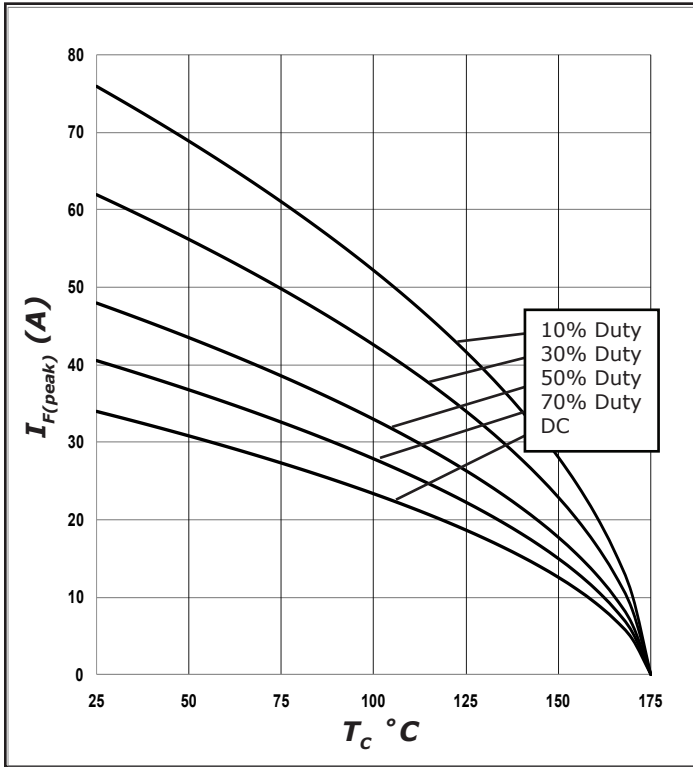


Figure 3. Current Derating

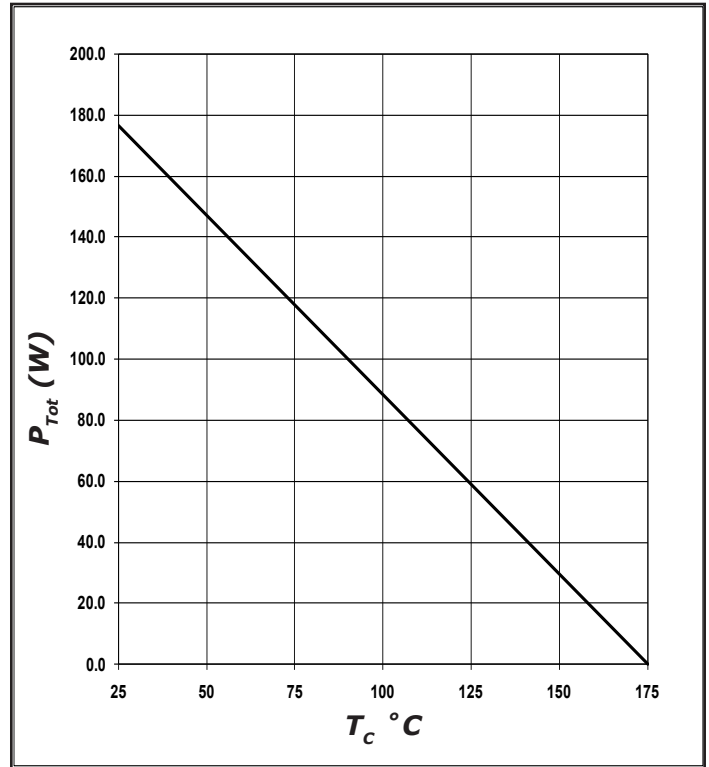


Figure 4. Power Derating

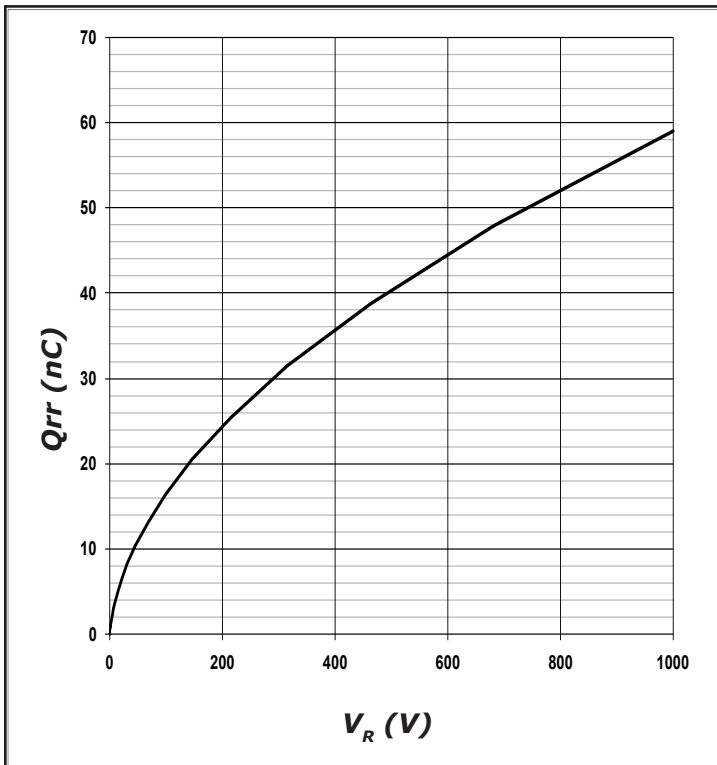


Figure 5. Recovery Charge vs. Reverse Voltage

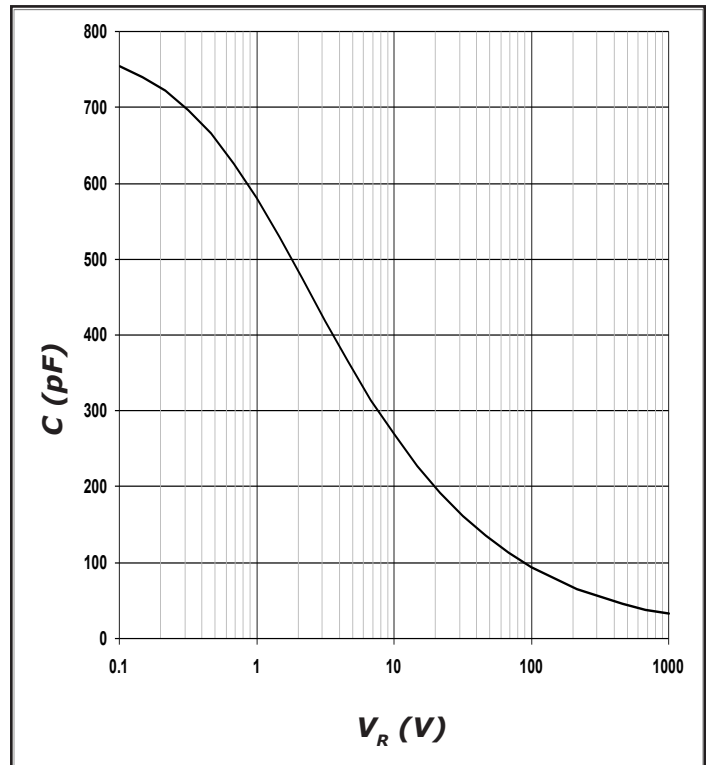


Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance (Per Leg)

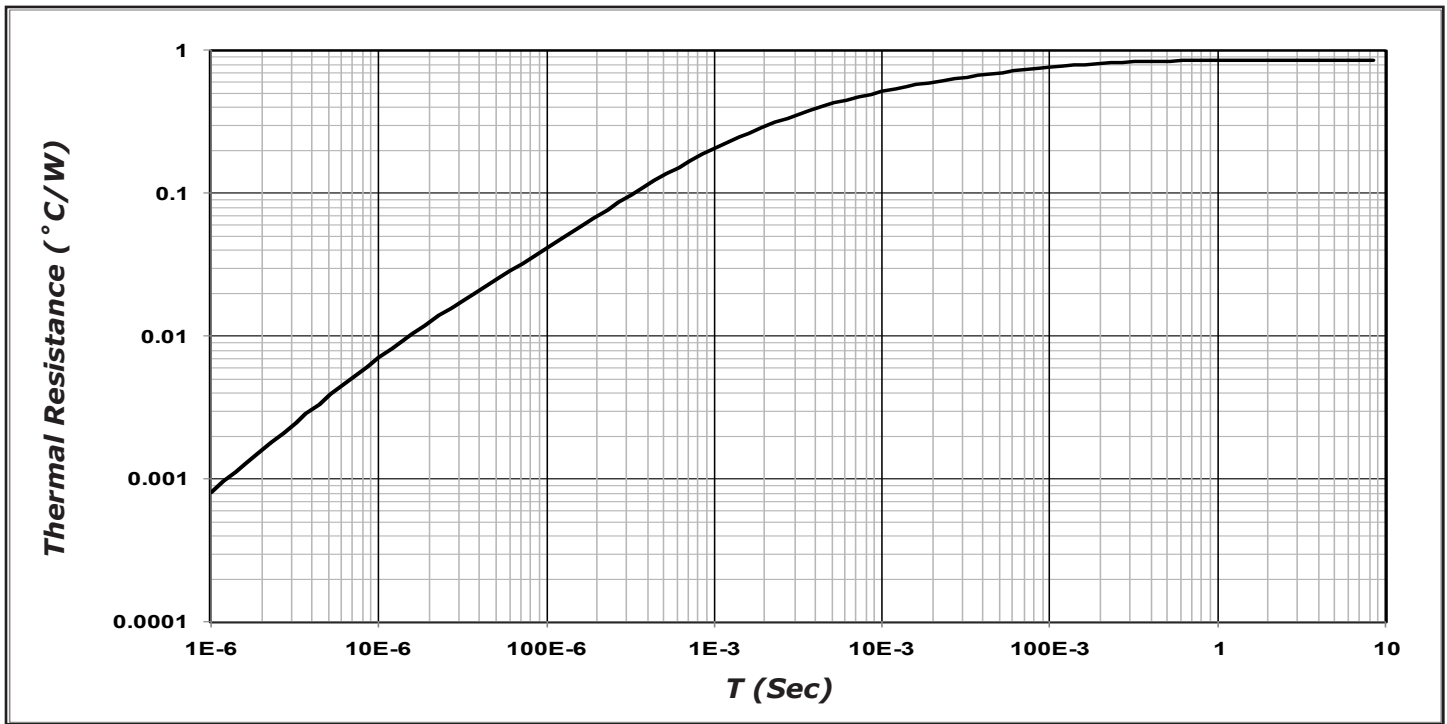
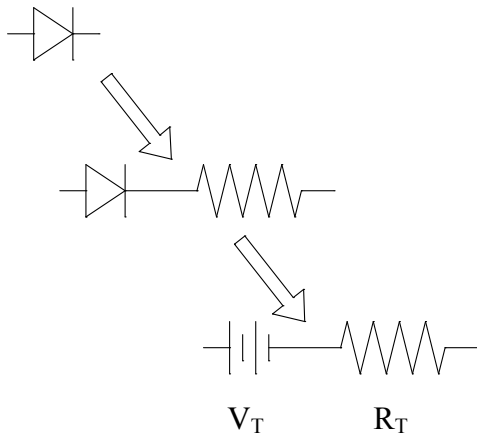


Figure 7. Transient Thermal Impedance

## Diode Model



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

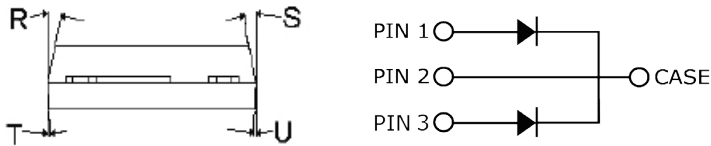
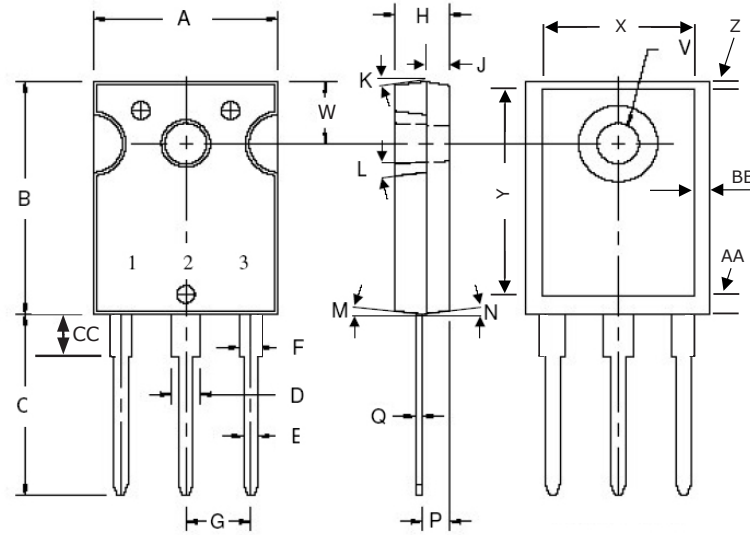
$$V_T = 0.98 + (T_j * -1.71 * 10^{-3})$$

$$R_T = 0.040 + (T_j * 5.32 * 10^{-4})$$

Note:  $T_j$  = Diode Junction Temperature In Degrees Celsius

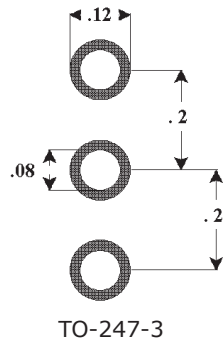
## Package Dimensions

Package TO-247-3



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.605	.635	15.367	16.130
B	.800	.831	20.320	21.10
C	.780	.800	19.810	20.320
D	.095	.133	2.413	3.380
E	.046	.052	1.168	1.321
F	.060	.095	1.524	2.410
G	.215 TYP		5.460 TYP	
H	.175	.205	4.450	5.210
J	.075	.085	1.910	2.160
K	6°	21°	6°	21°
L	4°	6°	4°	6°
M	2°	4°	2°	4°
N	2°	4°	2°	4°
P	.090	.100	2.286	2.540
Q	.020	.030	.508	.762
R	9°	11°	9°	11°
S	9°	11°	9°	11°
T	2°	8°	2°	8°
U	2°	8°	2°	8°
V	.137	.144	3.487	3.658
W	.210	.248	5.334	6.300
X	.502	.557	12.751	14.150
Y	.637	.695	16.180	17.653
Z	.038	.052	0.964	1.321
AA	.110	.140	2.794	3.556
BB	.030	.046	0.766	1.168
CC	.161	.176	4.100	4.472

## Recommended Solder Pad Layout



Part Number	Package	Marking
C4D20120D	TO-247-3	C4D20120

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.

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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