

C4D20120D

Silicon Carbide Schottky Diode

Z-REC™ RECTIFIER

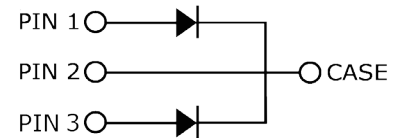
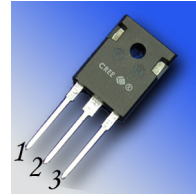
$$V_{RRM} = 1200 \text{ V}$$

$$I_F = 20 \text{ A}$$

$$Q_c = 132 \text{ nC}$$

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		
$I_{F(AVG)}$	Average 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 Wave $T_c=110^\circ\text{C}$, $t_p=10$ ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	71* 59.5*	A	$T_c=25^\circ\text{C}$, $t_p=10$ μs , Pulse $T_c=110^\circ\text{C}$, $t_p=10$ μs , 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	μA	$V_R = 1200\text{ V } T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V } T_J = 175^\circ\text{C}$	
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)

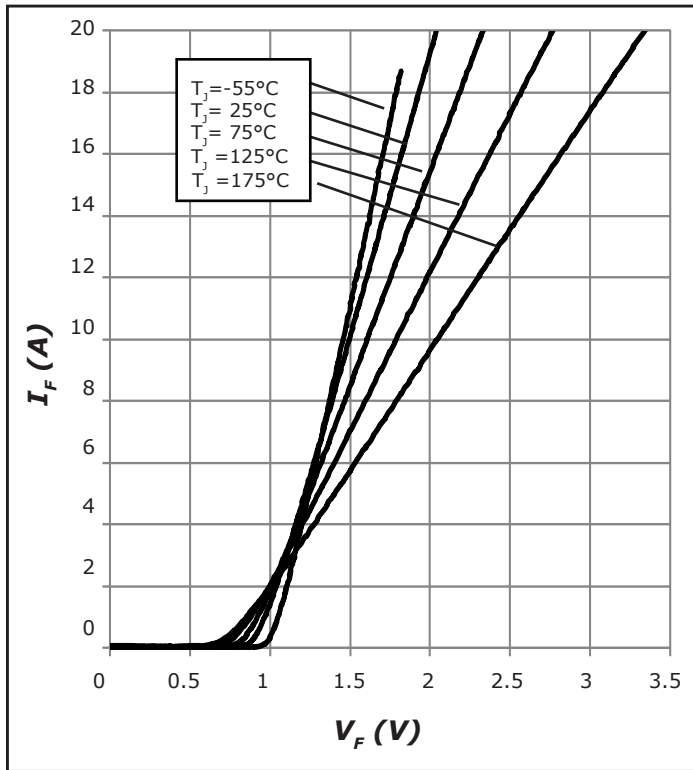


Figure 1. Forward Characteristics

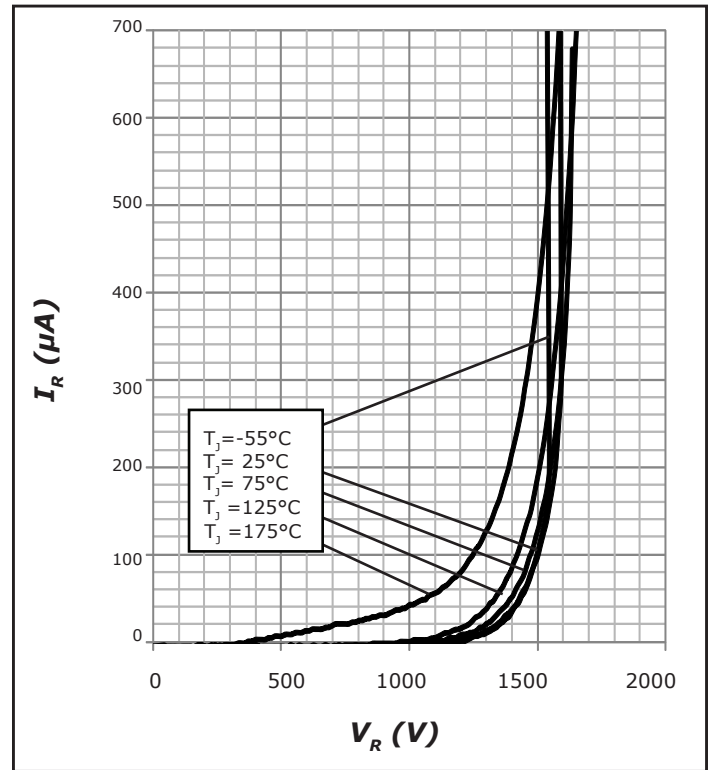


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

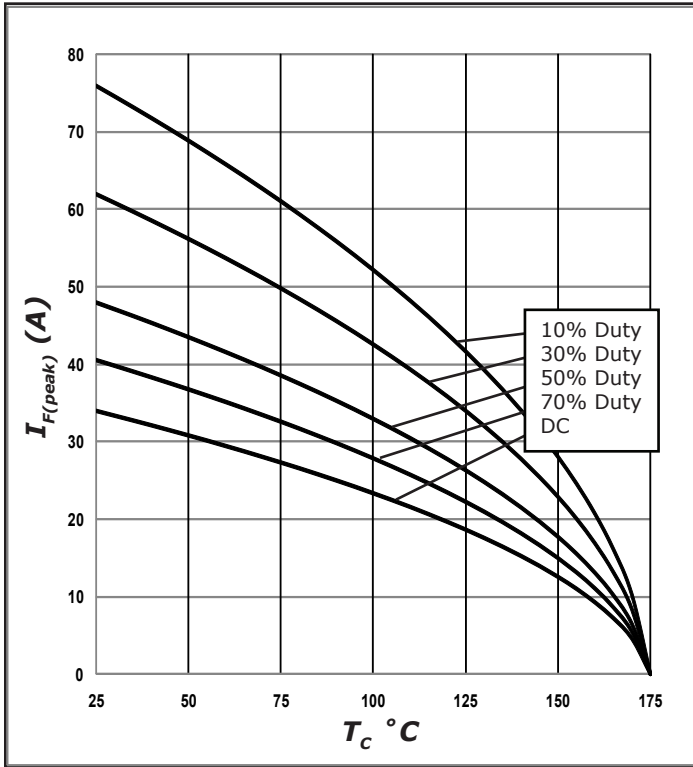


Figure 3. Current Derating

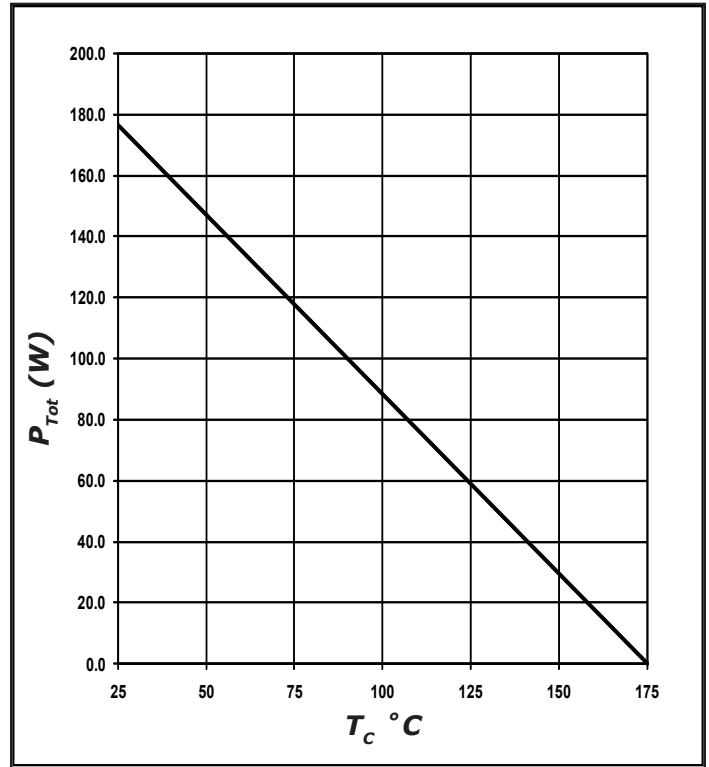


Figure 4. Power Derating

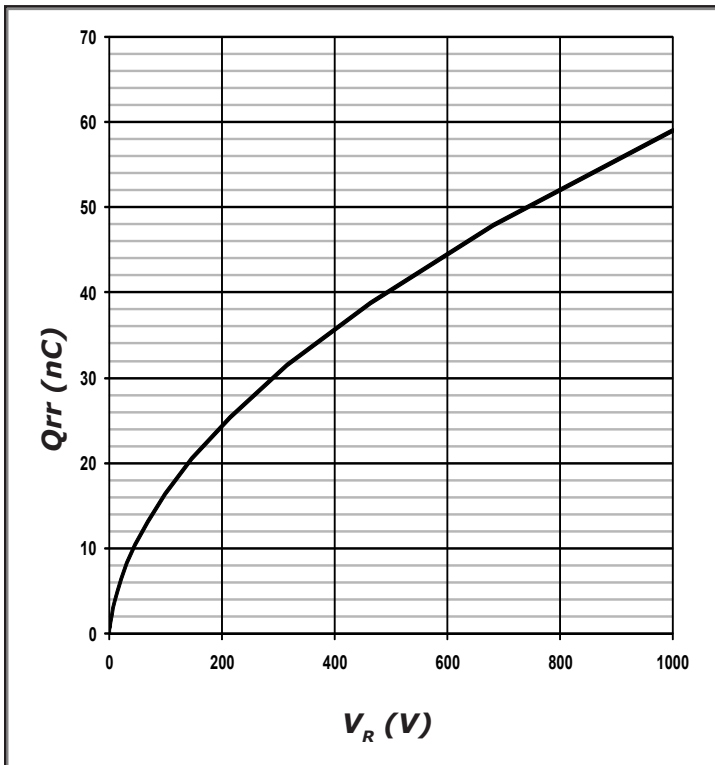


Figure 5. Recovery Charge vs. Reverse Voltage

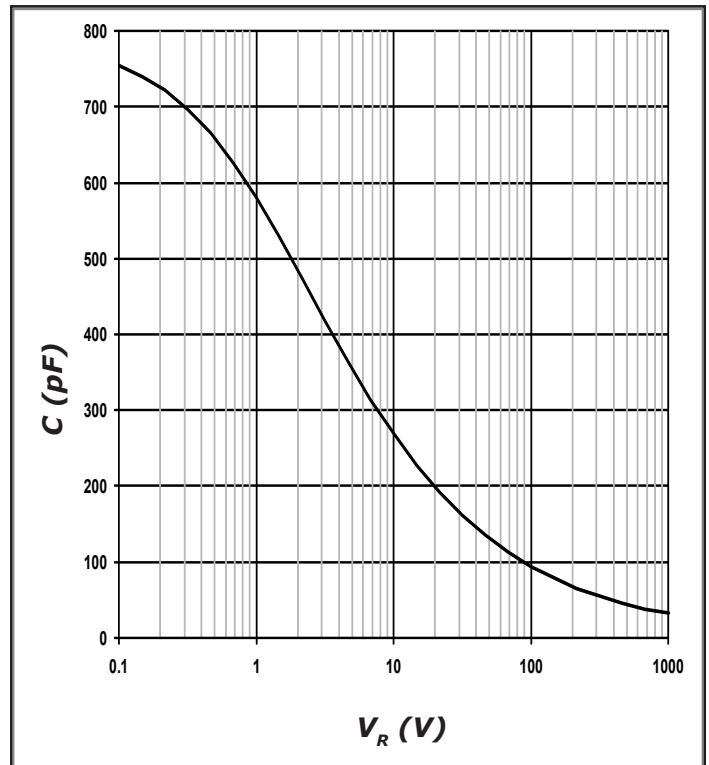


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance (Per Leg)

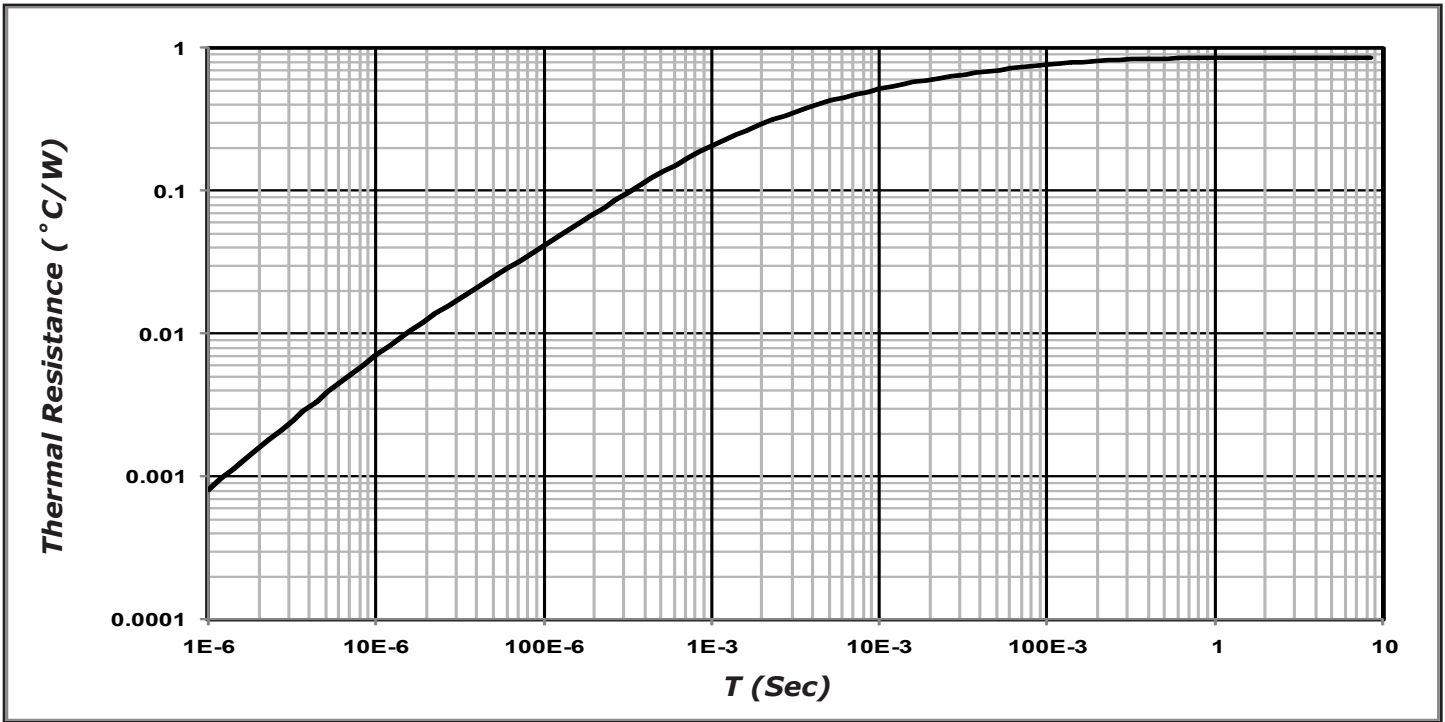
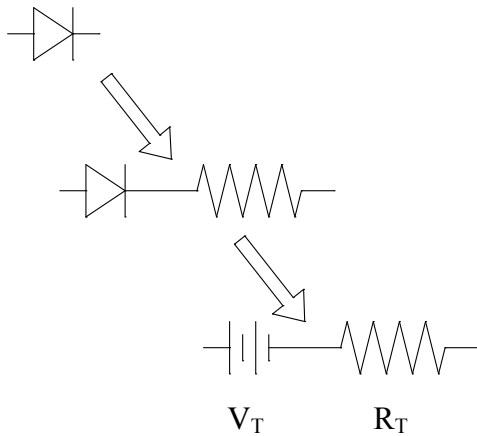


Figure 7. Transient Thermal Impedance

Diode Model



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

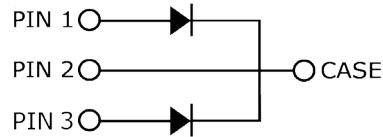
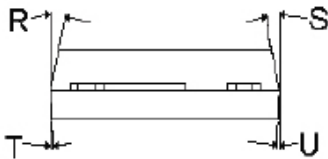
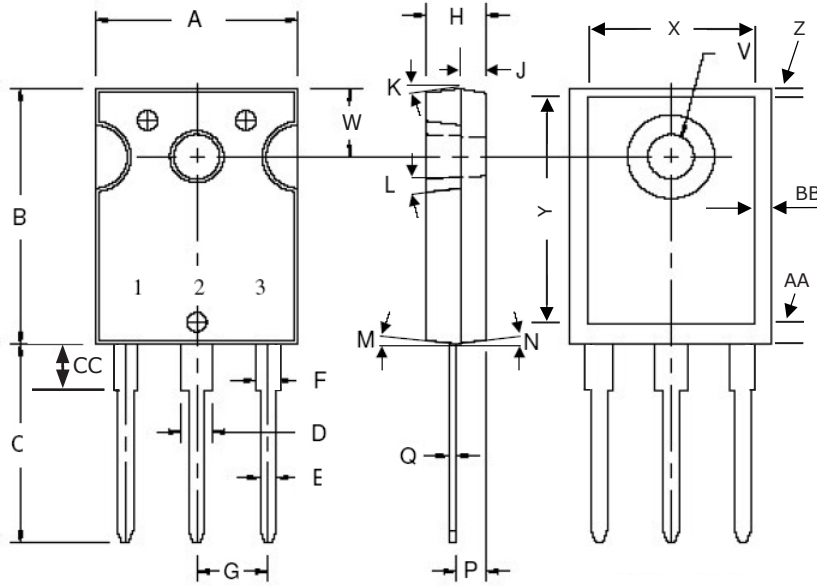
$$V_T = 0.98 + (T_j * -1.71 * 10^{-3})$$

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

Note: T_j = Diode Junction Temperature In Degrees Celcius

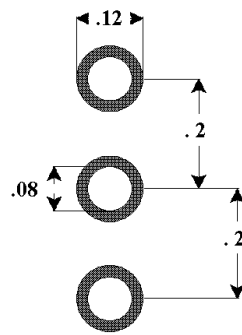
Package Dimensions

Package TO-247-3



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.605	.640	15.367	16.250
B	.800	.839	20.320	21.300
C	.778	.800	19.750	20.310
D	.095	.126	2.413	3.200
E	.045	.052	1.150	1.321
F	.060	.087	1.524	2.200
G	.217 TYP		5.500 TYP	
H	.175	.203	4.450	5.156
J	.078	.081	1.982	2.057
K	6°	21°	6°	21°
L	4°	6°	4°	6°
M	2°	4°	2°	4°
N	2°	4°	2°	4°
P	.090	.097	2.286	2.464
Q	.018	.030	.450	.762
R	9°	11°	9°	11°
S	9°	11°	9°	11°
T	2°	8°	2°	8°
U	2°	8°	2°	8°
V	.126	.144	3.200	3.658
W	.210	.238	5.334	6.050
X	.502	.557	12.751	14.148
Y	.637	.695	16.180	17.653
Z	.040	.052	1.016	1.321
AA	.032	.046	.813	1.168
BB	.110	.140	2.794	3.556
CC	.146	.176	3.700	4.472

Recommended Solder Pad Layout



TO-247-3

Part Number	Package	Marking
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"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.

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