

# C4D02120A–Silicon Carbide Schottky Diode

## Z-REC™ RECTIFIER

$V_{RRM} = 1200\text{ V}$   
 $I_F = 2\text{ A}$   
 $Q_c = 15\text{ nC}$

### Features

- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Switching

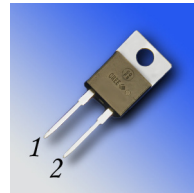
### Benefits

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

### Applications

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

### Package



TO-220-2



Part Number	Package	Marking
C4D02120A	TO-220-2	C4D02120

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

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V		
$V_{RSM}$	Surge Peak Reverse Voltage	1300	V		
$V_R$	DC Peak Reverse Voltage	1200	V		
$I_{F(AVG)}$	Maximum DC Current	5.9	A	$T_c=135^\circ\text{C}$ , no AC component	
$I_{FRM}$	Repetitive Peak Forward Surge Current	13 8.4	A	$T_c=25^\circ\text{C}$ , $t_p=10\text{ ms}$ , Half Sine Pulse $T_c=110^\circ\text{C}$ , $t_p=10\text{ ms}$ , Half Sine Pulse	
$I_{FSM}$	Non-Repetitive Forward Surge Current	19 16.5	A	$T_c=25^\circ\text{C}$ , $t_p=10\text{ ms}$ , Half Sine Pulse $T_c=110^\circ\text{C}$ , $t_p=10\text{ ms}$ , Half Sine Pulse	
$P_{tot}$	Power Dissipation	40.5 17.6	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-220 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	1.4 1.9	1.8 3	V	$I_F = 2\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 2\text{ A}$ $T_J = 175^\circ\text{C}$	
$I_R$	Reverse Current	10 40	50 150	$\mu\text{A}$	$V_R = 1200\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	15		nC	$V_R = 1200\text{ V}$ , $I_F = 2\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	167 11 8		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	3.7		$^\circ\text{C}/\text{W}$		

## Typical Performance

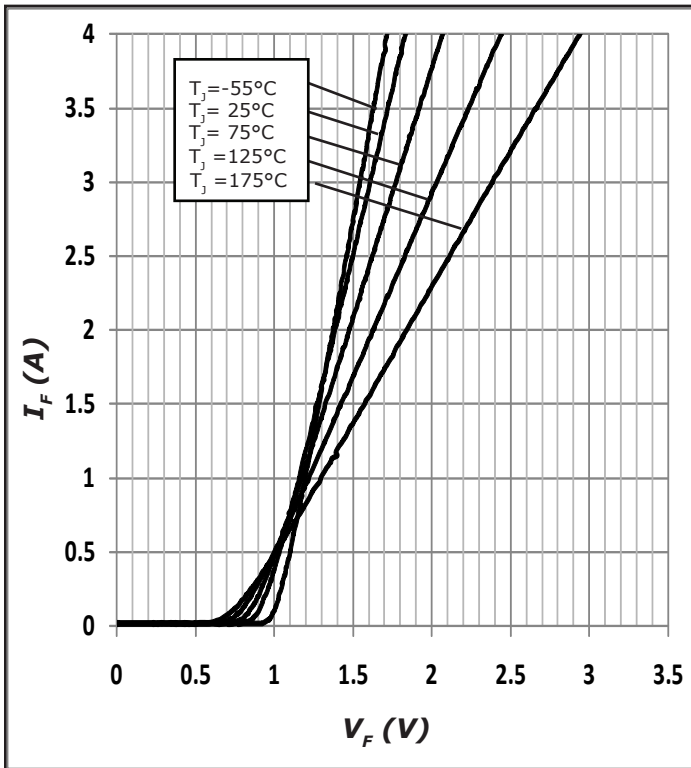


Figure 1. Forward Characteristics

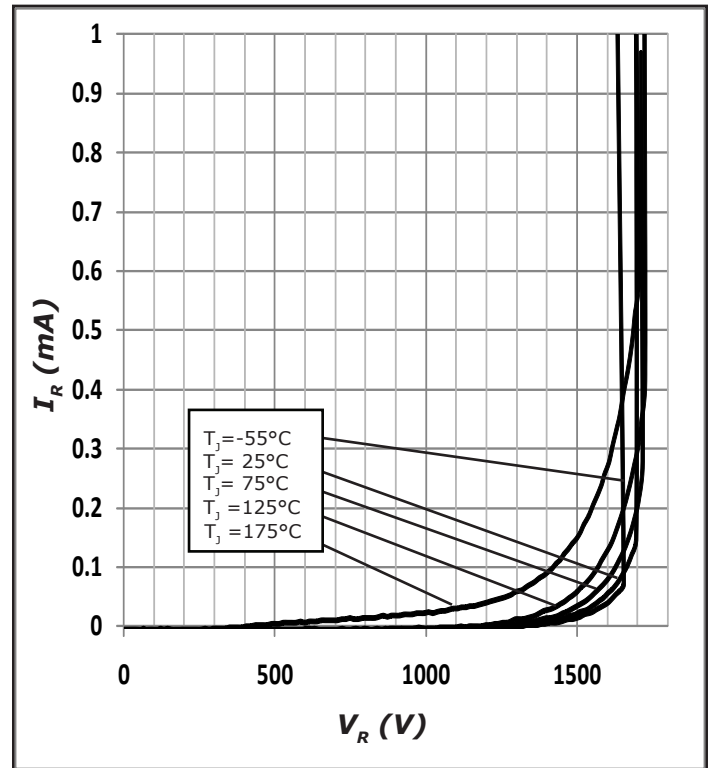


Figure 2. Reverse Characteristics

### Typical Performance

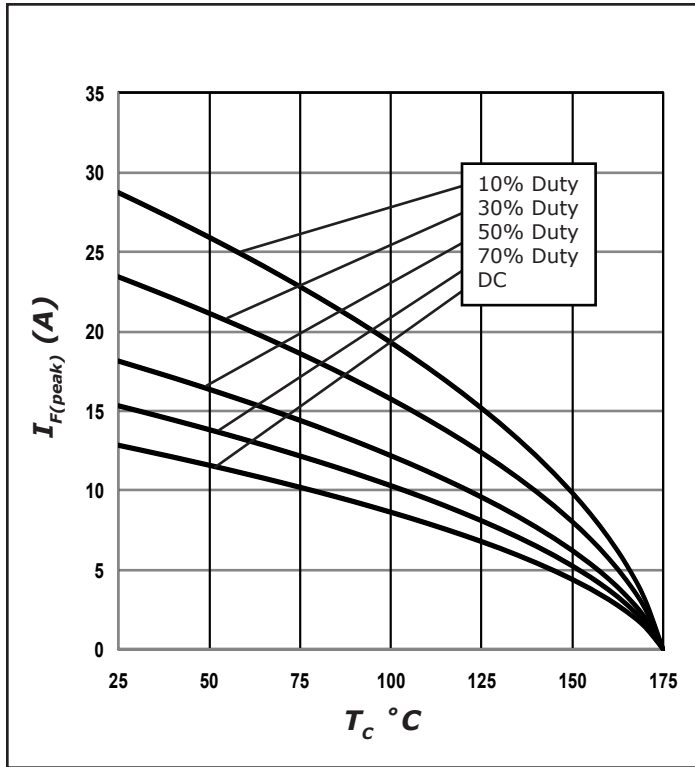


Figure 3. Current Derating

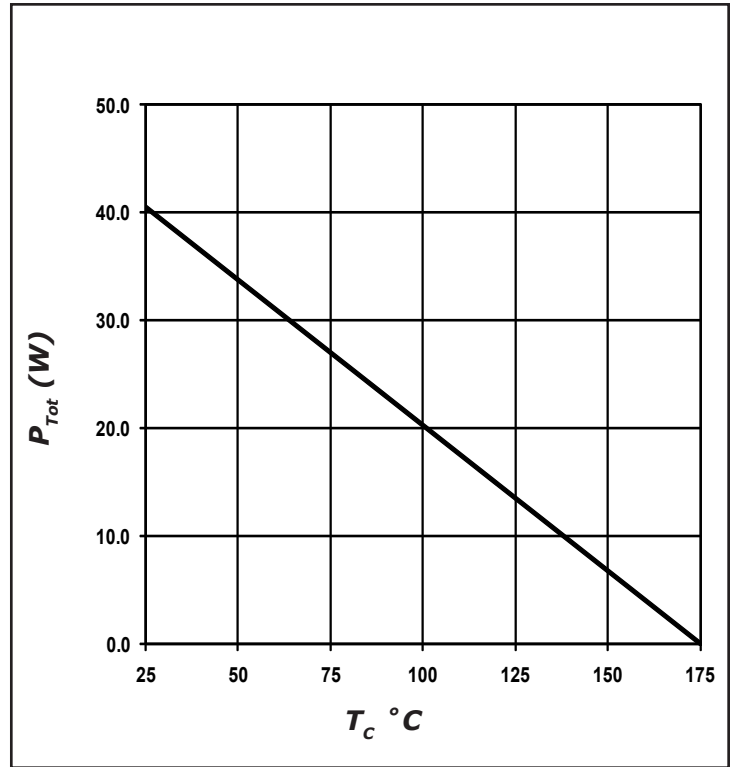


Figure 4. Power Derating

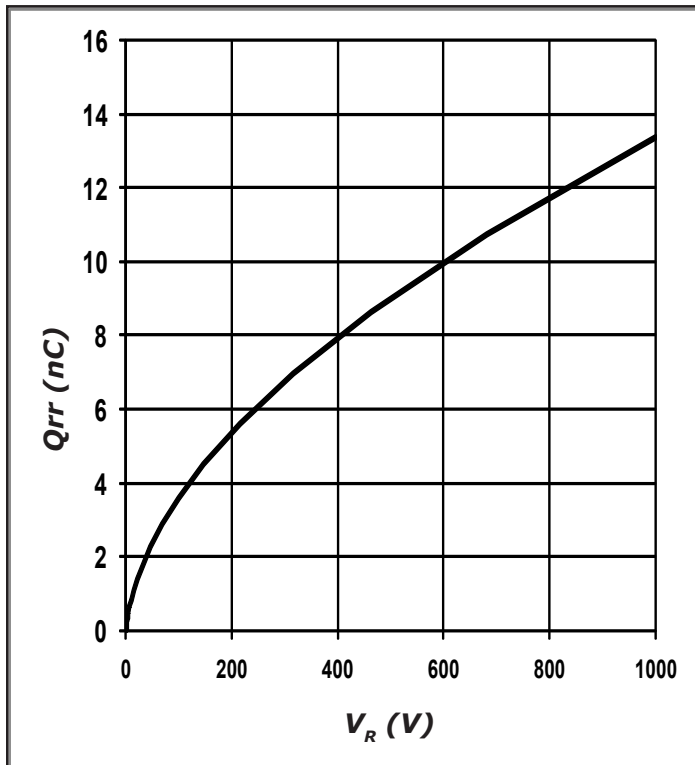


Figure 5. Recovery Charge vs. Reverse Voltage

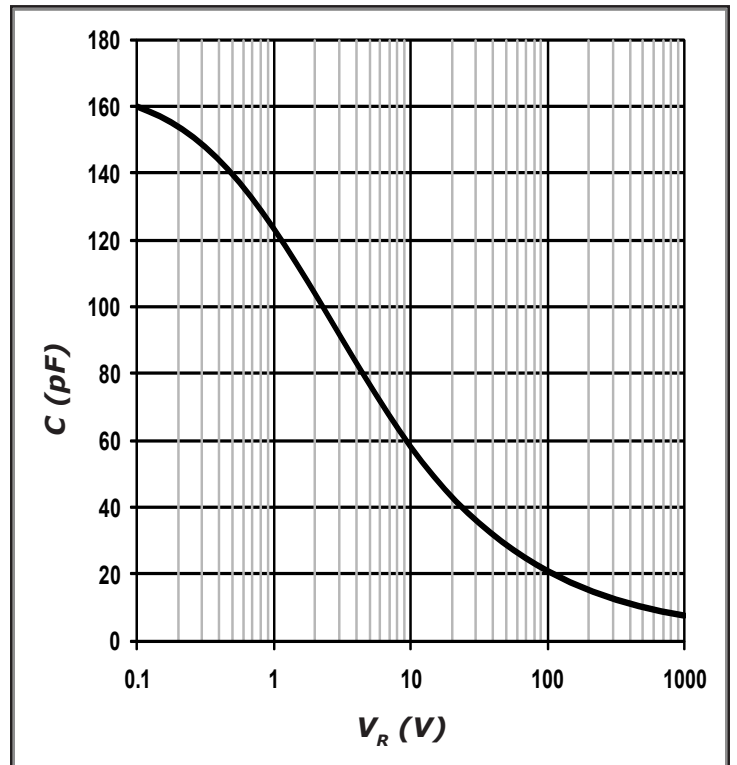


Figure 6. Capacitance vs. Reverse Voltage

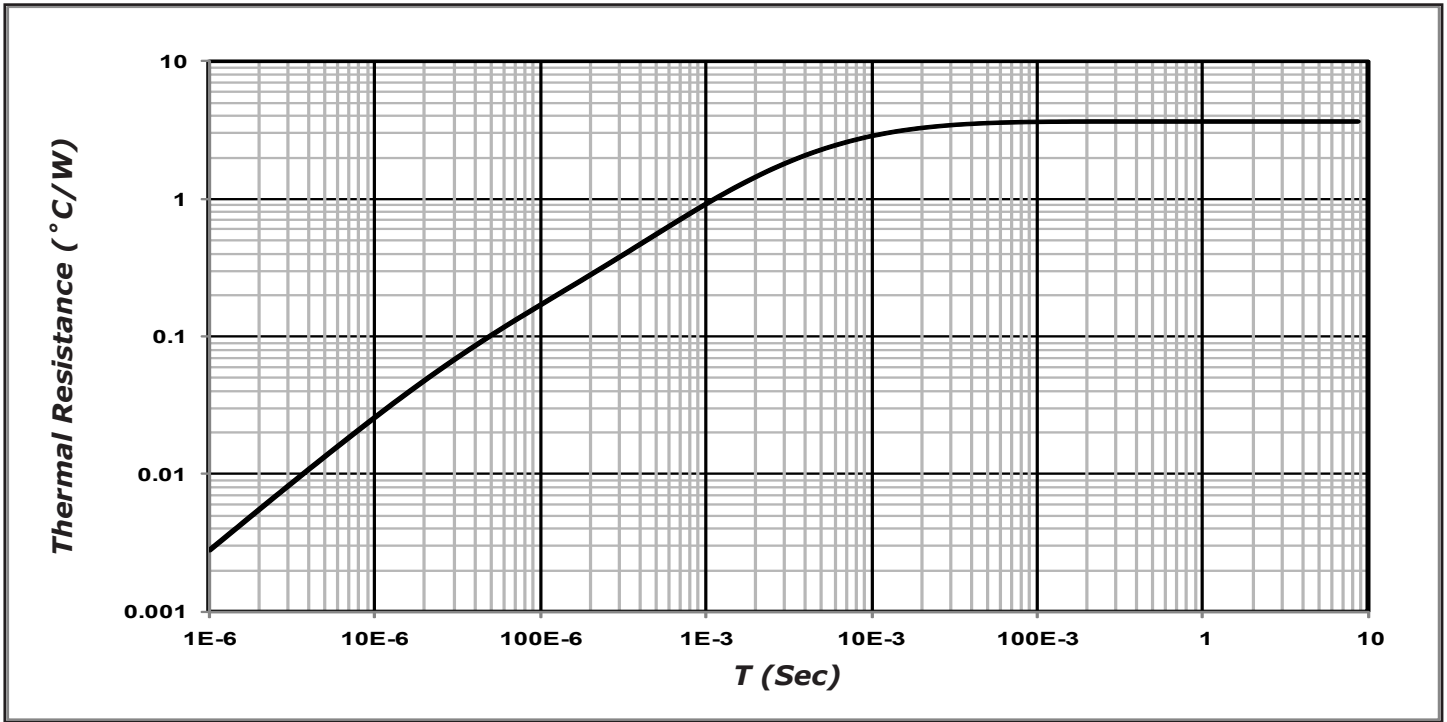
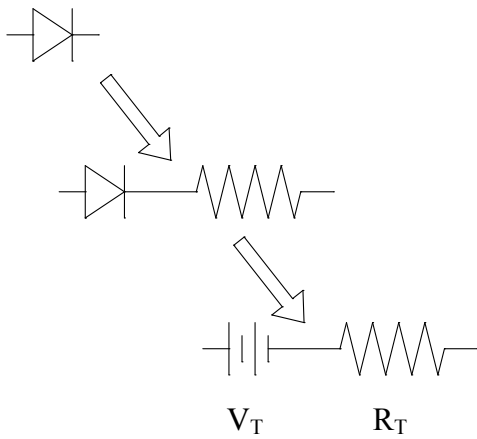


Figure 7. Transient Thermal Impedance

## Diode Model



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

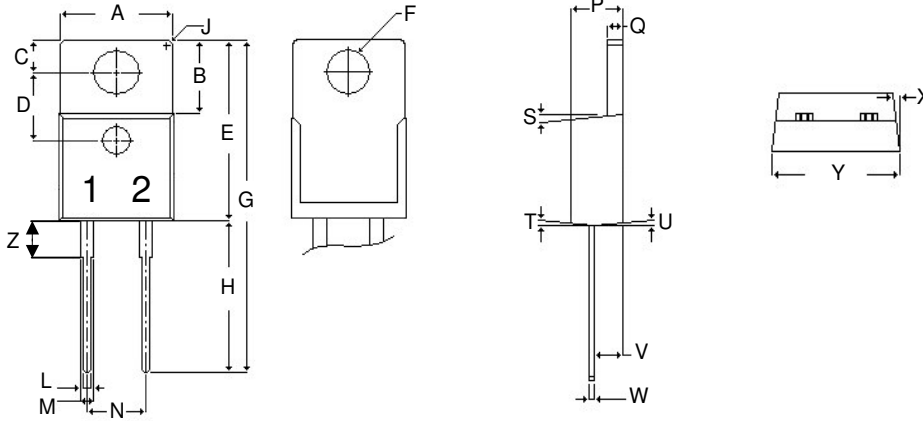
$$V_T = 0.99 + (T_j * -1.70 * 10^{-3})$$

$$R_T = 0.15 + (T_j * 2.40 * 10^{-4})$$

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

## Package Dimensions

Package TO-220-2

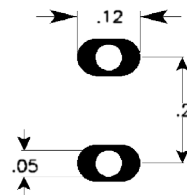


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.235	.255	5.969	6.477
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
E	.590	.615	14.986	15.621
F	.143	.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	.500	.550	12.700	13.970
J	R 0.197		R 0.197	
L	.025	.036	.635	.914
M	.045	.055	1.143	1.397
N	.195	.205	4.953	5.207
P	.165	.185	4.191	4.699
Q	.048	.054	1.219	1.372
S	3°	6°	3°	6°
T	3°	6°	3°	6°
U	3°	6°	3°	6°
V	.094	.110	2.388	2.794
W	.014	.025	.356	.635
X	3°	5.5°	3°	5.5°
Y	.385	.410	9.779	10.414
Z	.130	.150	3.302	3.810

NOTE:

1. Dimension L, M, W apply for Solder Dip Finish

## Recommended Solder Pad Layout



TO-220-2

Part Number	Package	Marking
C4D02120A	TO-220-2	C4D02120

"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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