

# C3D04065A–silicon Carbide Schottky Diode

## Z-REC™ RECTIFIER

$V_{RRM}$	= 650 V
$I_{F(AVG)}$	= 4 A
$Q_c$	= 8.5 nC

### Features

- 650-Volt Schottky Rectifier
- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on  $V_F$

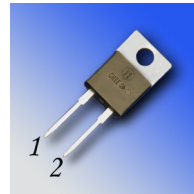
### Benefits

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

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
  - Typical PFC  $P_{out}$  : 400W-600W

### Package



TO-220-2



Part Number	Package	Marking
C3D04065A	TO-220-2	C3D04065

### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	650	V		
$V_{RSM}$	Surge Peak Reverse Voltage	650	V		
$V_{DC}$	DC Blocking Voltage	650	V		
$I_{F(AVG)}$	Average Forward Current	4	A	$T_c < 160^\circ\text{C}$	
$I_{FRM}$	Repetitive Peak Forward Surge Current	22 17	A	$T_c = 25^\circ\text{C}$ , $t_p = 10$ mS, Half Sine Wave $D = 0.3$ $T_c = 110^\circ\text{C}$ , $t_p = 10$ mS, Half Sine Wave $D = 0.3$	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	31.9 28.5	A	$T_c = 25^\circ\text{C}$ , $t_p = 10$ mS, Half Sine Wave $D = 0.3$ $T_c = 110^\circ\text{C}$ , $t_p = 10$ mS, Half Sine Wave $D = 0.3$	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	110	A	$T_c = 25^\circ\text{C}$ , $t_p = 10$ $\mu\text{S}$ , Pulse	
$P_{tot}$	Power Dissipation	75 32.5	W	$T_c = 25^\circ\text{C}$ $T_c = 110^\circ\text{C}$	
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		
	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	1.5 1.8	1.8 2.4	V	$I_F = 4\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 4\text{ A}$ $T_J = 175^\circ\text{C}$	
$I_R$	Reverse Current	12 24	60 120	$\mu\text{A}$	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	8.5		nC	$V_R = 650\text{ V}$ , $I_F = 4\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	251 22 21		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 200\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	

Note:

1. This is a majority carrier diode, so there is no reverse recovery charge.

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JC}$	TO-220 Package Thermal Resistance from Junction to Case	2.02	$^\circ\text{C}/\text{W}$

## Typical Performance

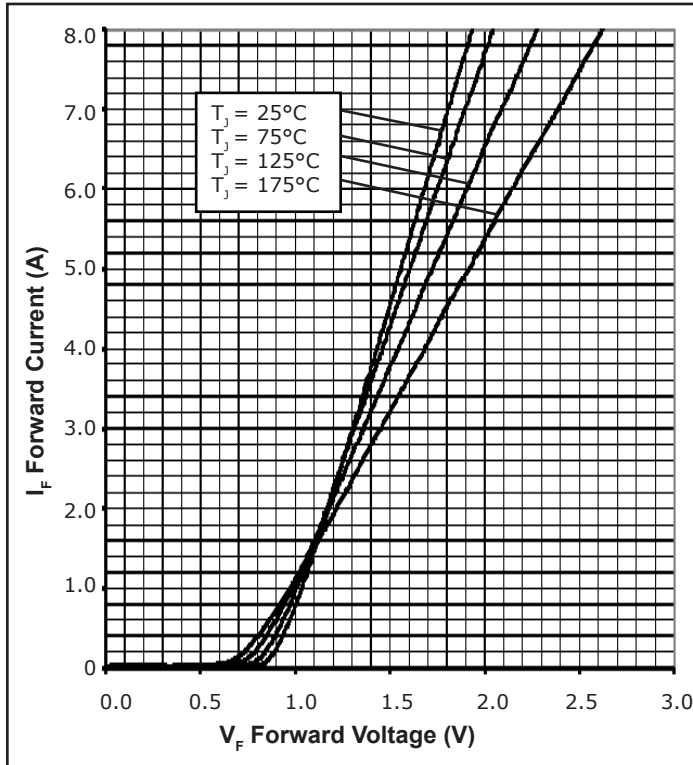


Figure 1. Forward Characteristics

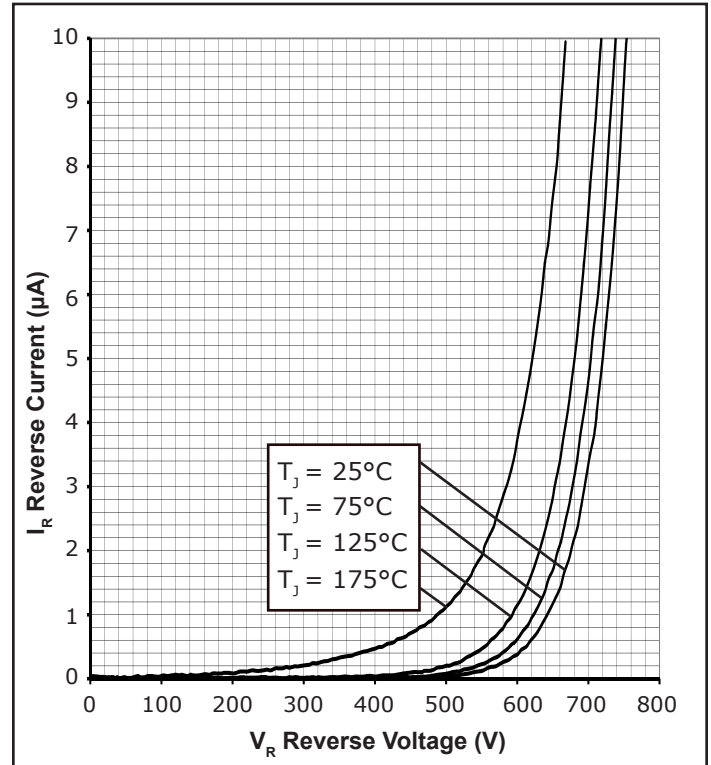


Figure 2. Reverse Characteristics

## Typical Performance

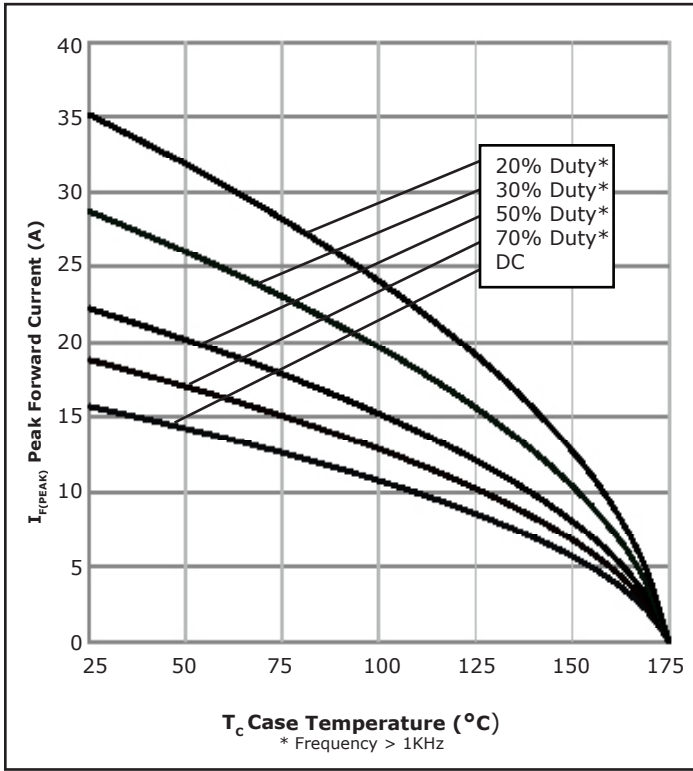


Figure 3. Current Derating

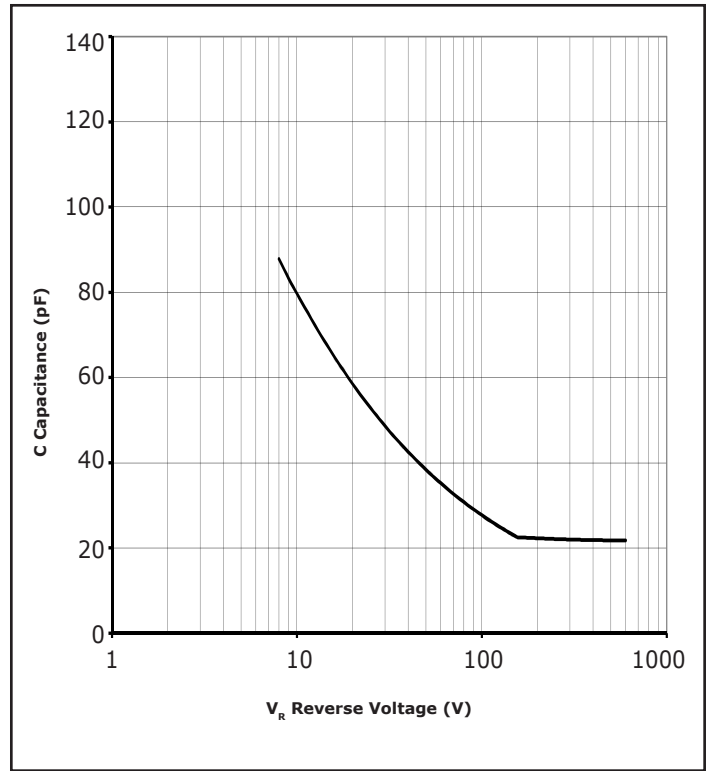


Figure 4. Capacitance vs. Reverse Voltage

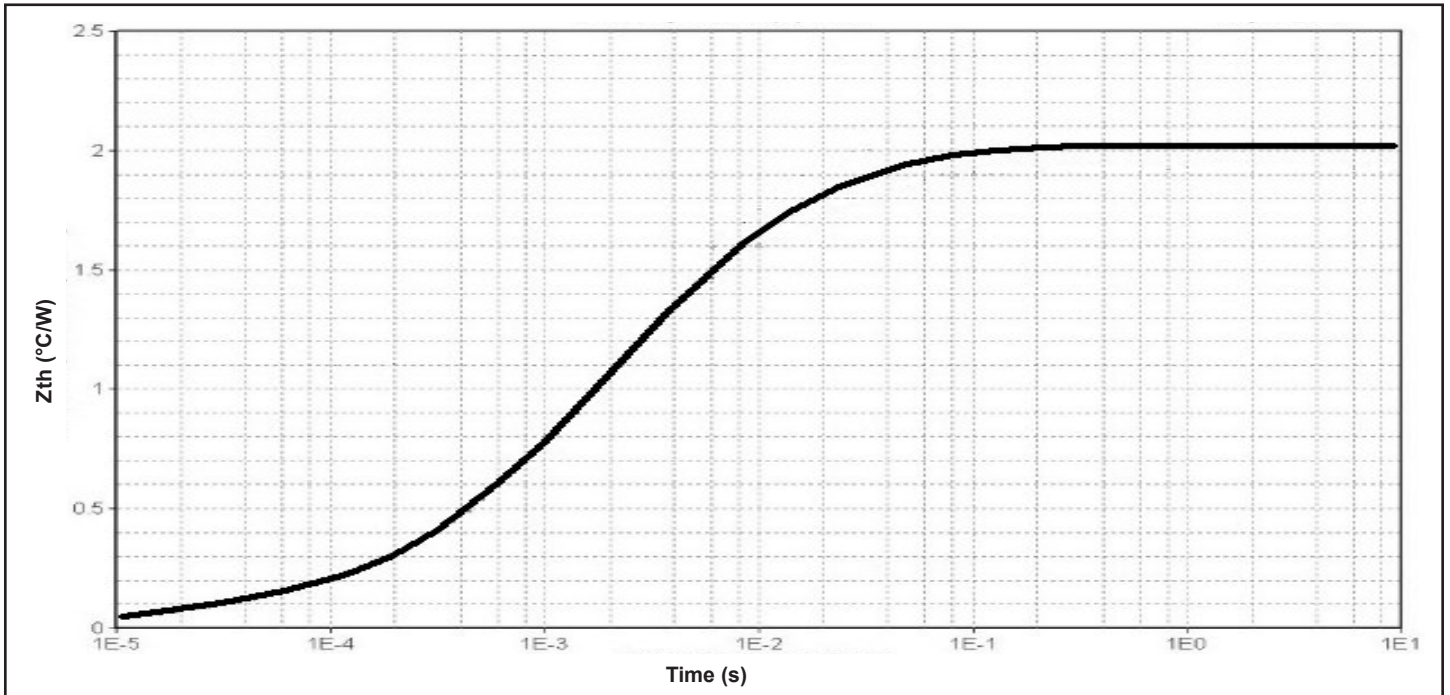


Figure 5. Transient Thermal Impedance

# Typical Performance

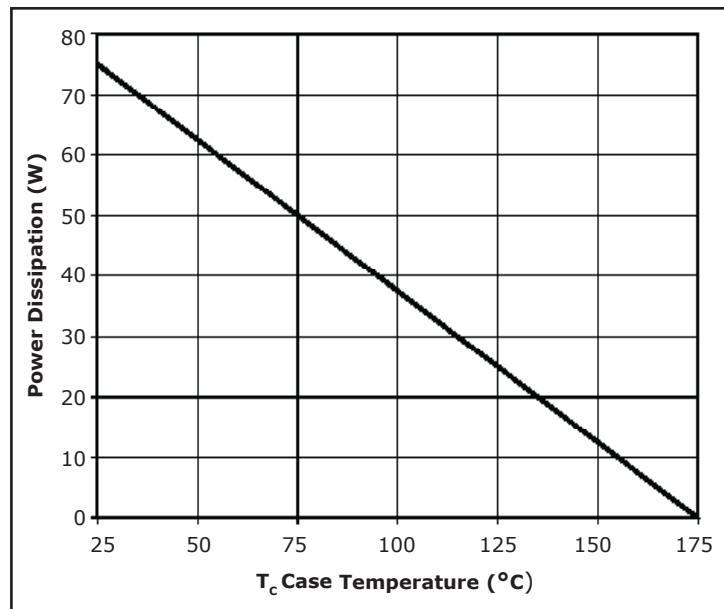
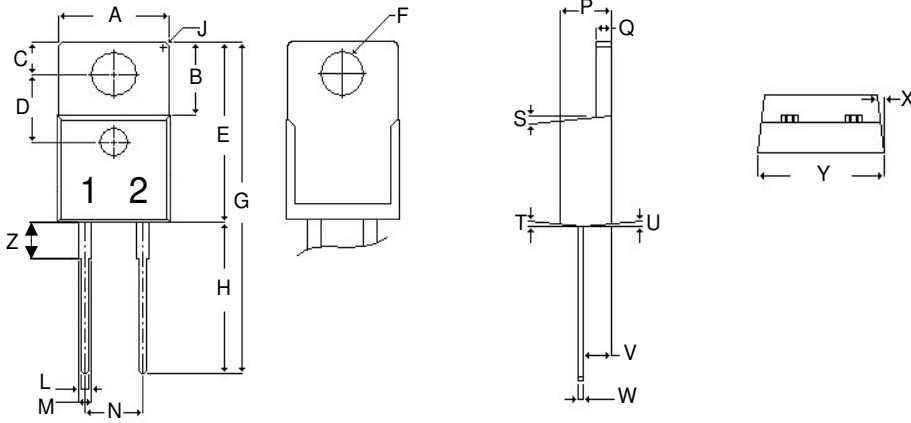


Figure 6. Power Derating

## Package Dimensions

Package TO-220-2

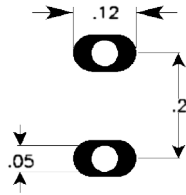


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.235	.255	5.969	6.477
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
E	.590	.615	14.986	15.621
F	.143	.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	.500	.550	12.700	13.970
J	R 0.197		R 0.197	
L	.025	.036	.635	.914
M	.045	.055	1.143	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

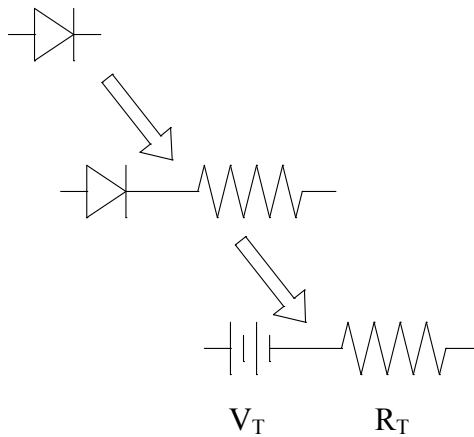
## Recommended Solder Pad Layout



TO-220-2

Part Number	Package	Marking
C3D04065A	TO-220-2	C3D04065

## Diode Model



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

$$V_T = 0.98 + (T_J * -1.8 * 10^{-3})$$

$$R_T = 0.10 + (T_J * 9.16 * 10^{-4})$$

**Note:**  $T_J$  = Diode Junction Temperature In Degrees Celcius

"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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