C3D04060A–Silicon Carbide Schottky Diode

Z-Rec™ Rectifier

V_{RRM} = 600 V

$I_{F(AVG)}$ = 4 A
(T_C < 160°C)

Q_c = 8.5 nC

Features

- 600-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

Package

TO-220-2

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

Part Number	Package	Marking
C3D04060A	TO-220-2	C3D04060

Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	600	V		
V_{RSM}	Surge Peak Reverse Voltage	600	V		
V_{DC}	DC Blocking Voltage	600	V		
$I_{F(AVG)}$	Average Forward Current	4 6	A	T_C<160°C T_C<145°C	See Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	22 17	A	T_C=25°C, t_p=10 mS, Half Sine Wave D=0.3 T_C=110°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°C, t_p=10 mS, Half Sine Wave D=0.3 T_C=110°C, t_p=10 mS, Half Sine Wave D=0.3	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	110	A	T_C=25°C, t_p=10 µS, Pulse	
P_{tot}	Power Dissipation	75 32.5	W	T_C=25°C T_C=110°C	
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	°C		

Subject to change without notice.
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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 A T_J=25°C I_F = 4 A T_J=175°C	
I_R	Reverse Current	10 20	50 100	µA	V_R = 600 V T_J=25°C V_R = 600 V T_J=175°C	
Q_C	Total Capacitive Charge	8.5		nC	V_R = 600 V, I_F = 4A di/dt = 500 A/µs T_J = 25°C	1
C	Total Capacitance	251 22 21		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 = 400 V, T_J = 25°C, f = 1 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	°C/W

Typical Performance

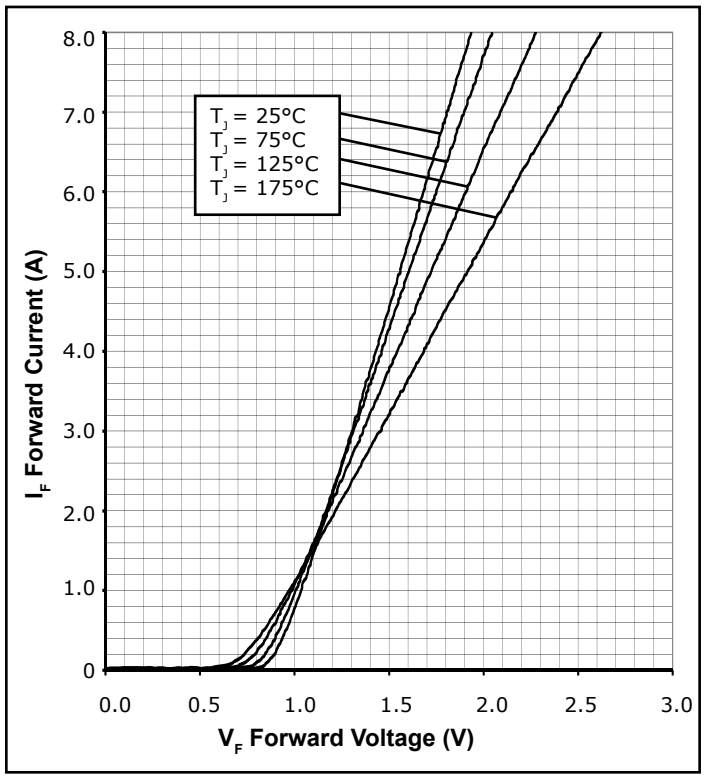


Figure 1. Forward Characteristics

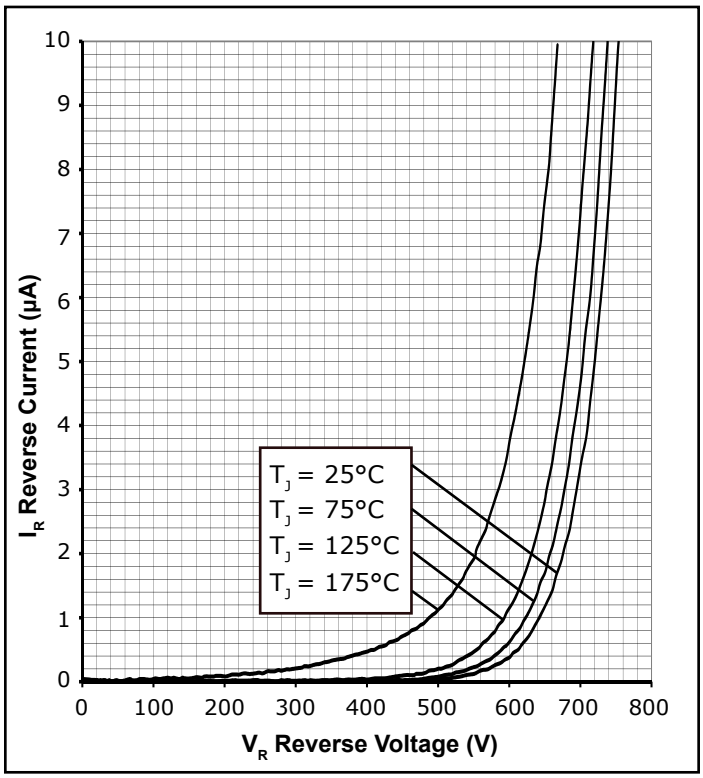


Figure 2. Reverse Characteristics

Typical Performance

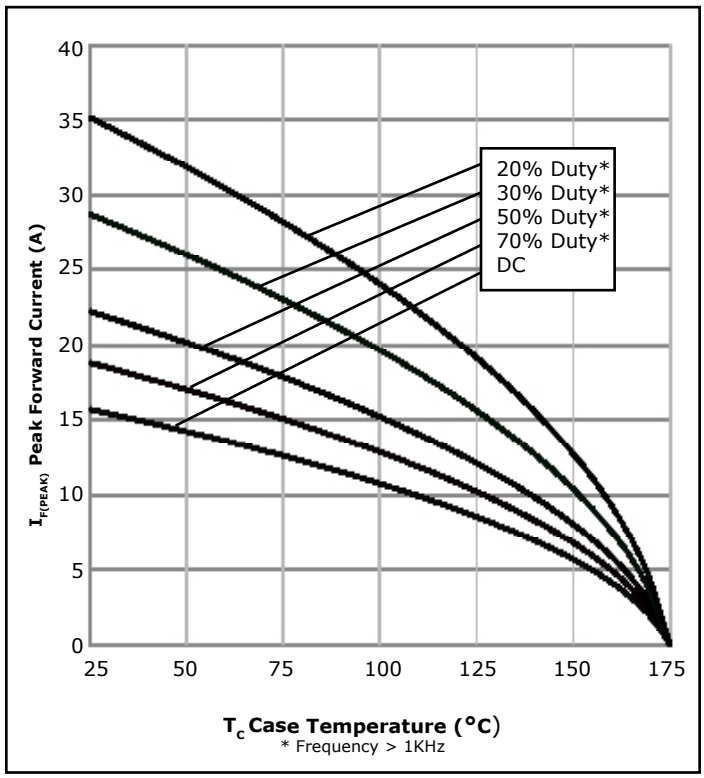


Figure 3. Current Derating

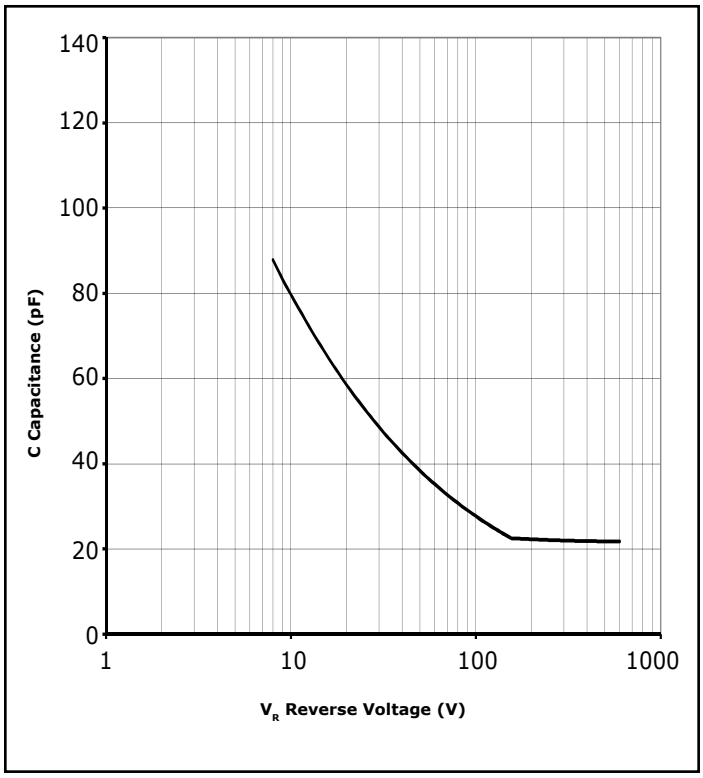


Figure 4. Capacitance vs. Reverse Voltage

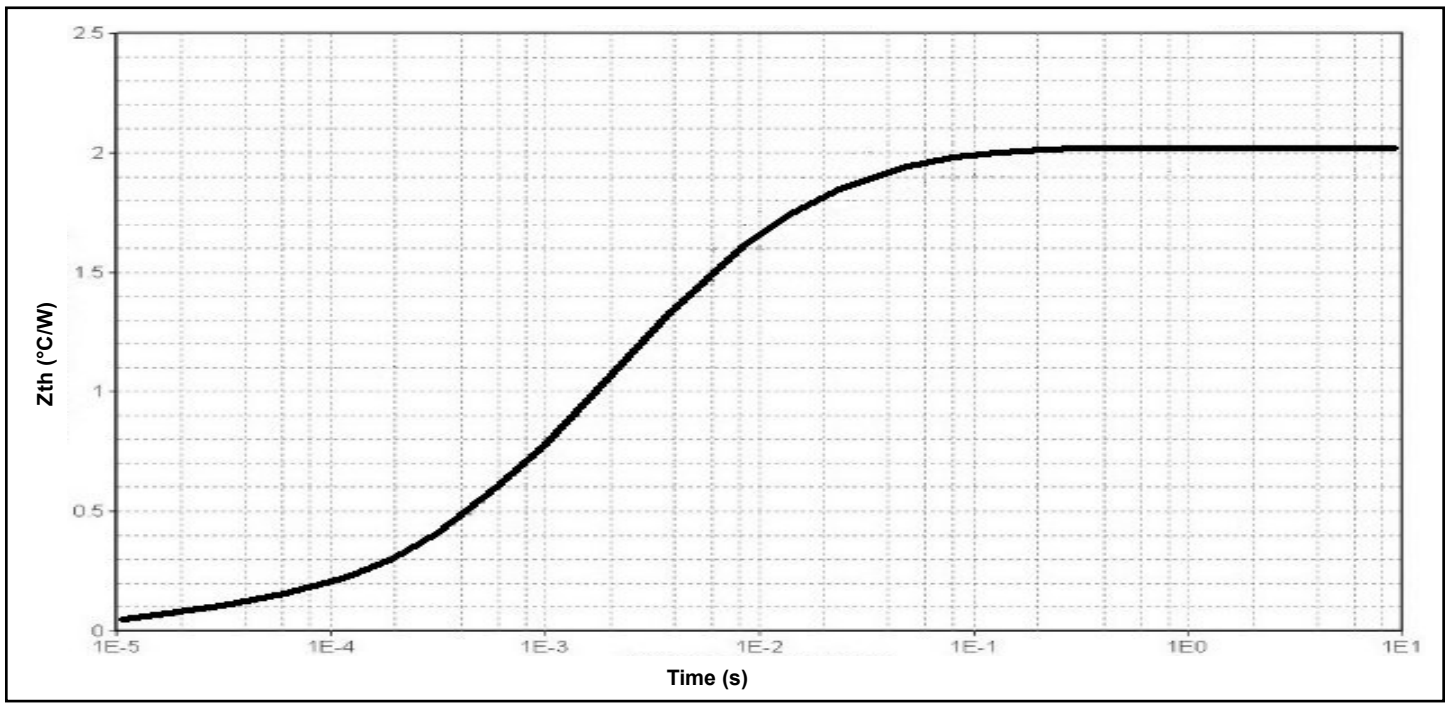


Figure 5. Transient Thermal Impedance

Typical Performance

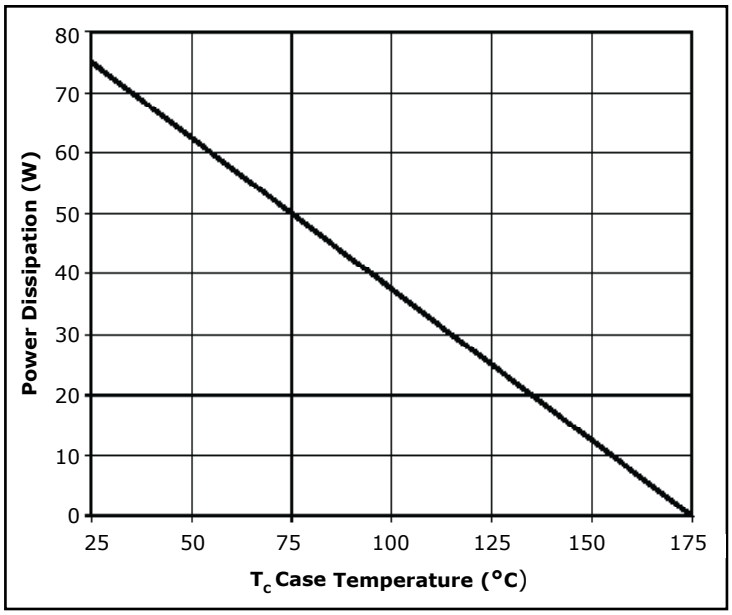
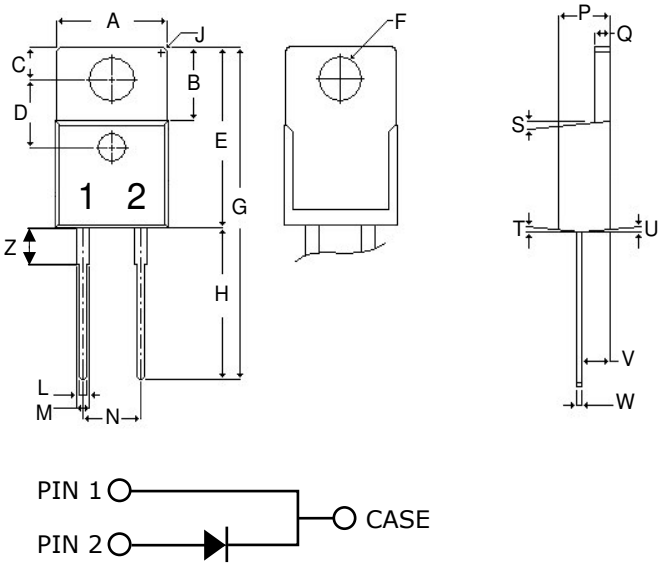


Figure 6. Power Derating

Package Dimensions

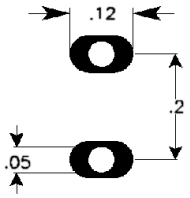
Package TO-220-2



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

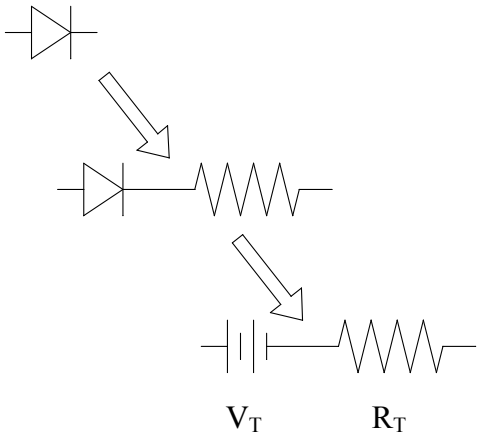
Recommended Solder Pad Layout



TO-220-2

Part Number	Package	Marking
C3D04060A	TO-220-2	C3D04060

Diode Model



$$Vf_T = V_T + If * R_T$$

$$V_T = 0.98 + (T_J * -1.8 * 10^{-3})$$
$$R_T = 0.10 + (T_J * 9.16 * 10^{-4})$$

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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