C3D10060G–Silicon Carbide Schottky Diode

Z-Rec™ Rectifier

V_{RRM} = 600 V
$I_{F(AVG)}$ = 10 A
Q_c = 25 nC

Features

- 600-Volt Schottky Rectifier
- 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-263-2

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} : 1000W-2000W
- Motor Drives
  - Typical Power : 3HP-5HP

Part Number	Package	Marking
C3D10060G	TO-263-2	C3D10060

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	10	A	T_C=150°C	
I_{FRM}	Repetitive Peak Forward Surge Current	67 44	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	90 71	A	T_C=25°C, t_p=10ms, 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	250	A	T_C=25°C, t_p=10 µs, Pulse	
P_{tot}	Power Dissipation	136.3 59	W	T_C=25°C T_C=110°C	
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	°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 2.0	1.8 2.4	V	I_F = 10 A T_J=25°C I_F = 10 A T_J=175°C	
I_R	Reverse Current	10 20	50 200	μA	V_R = 600 V T_J=25°C V_R = 600 V T_J=175°C	
Q_C	Total Capacitive Charge	25		nC	V_R = 600 V, I_F = 10 A di/dt = 500 A/μs T_J = 25°C	
C	Total Capacitance	480 50 42		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
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.2	°C/W

Typical Performance

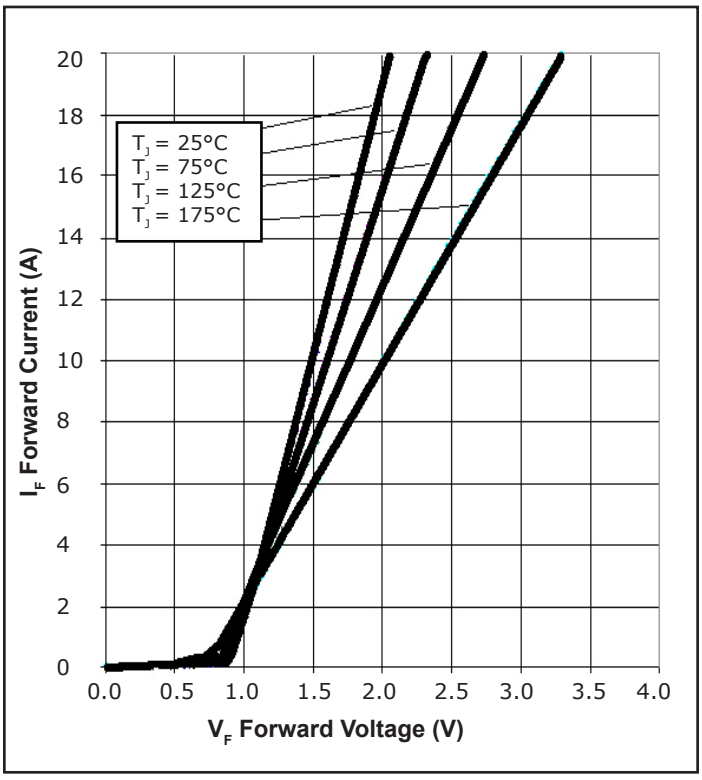


Figure 1. Forward Characteristics

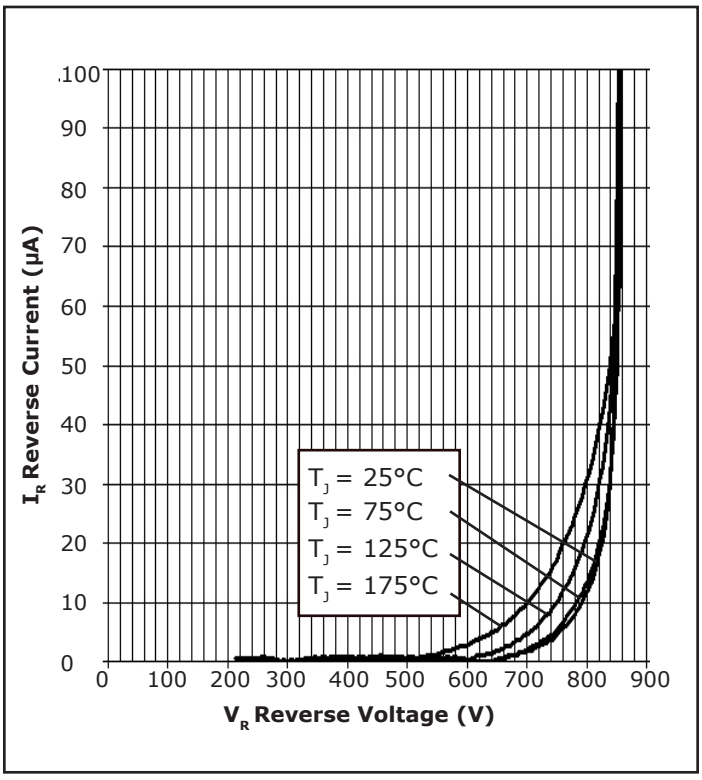


Figure 2. Reverse Characteristics

Typical Performance

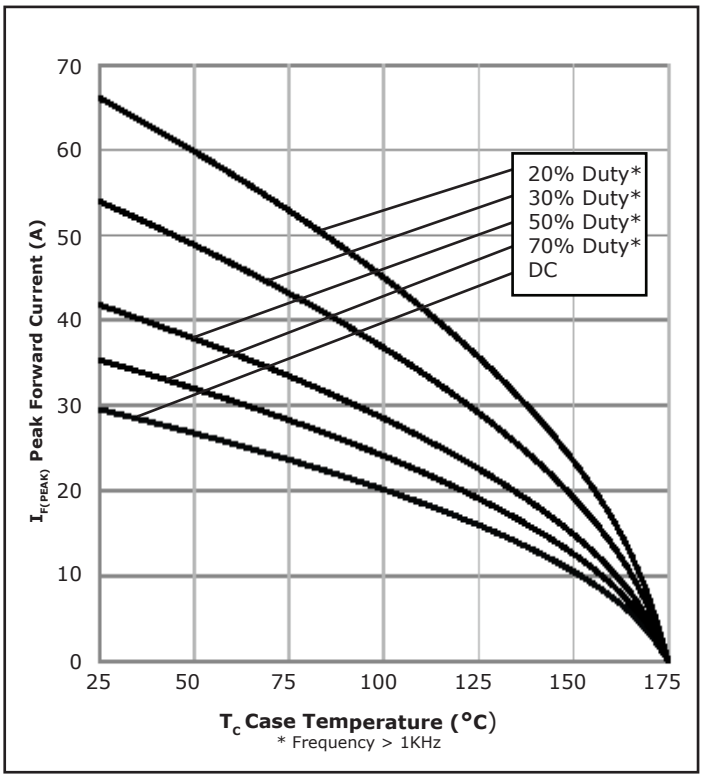


Figure 3. Current Derating

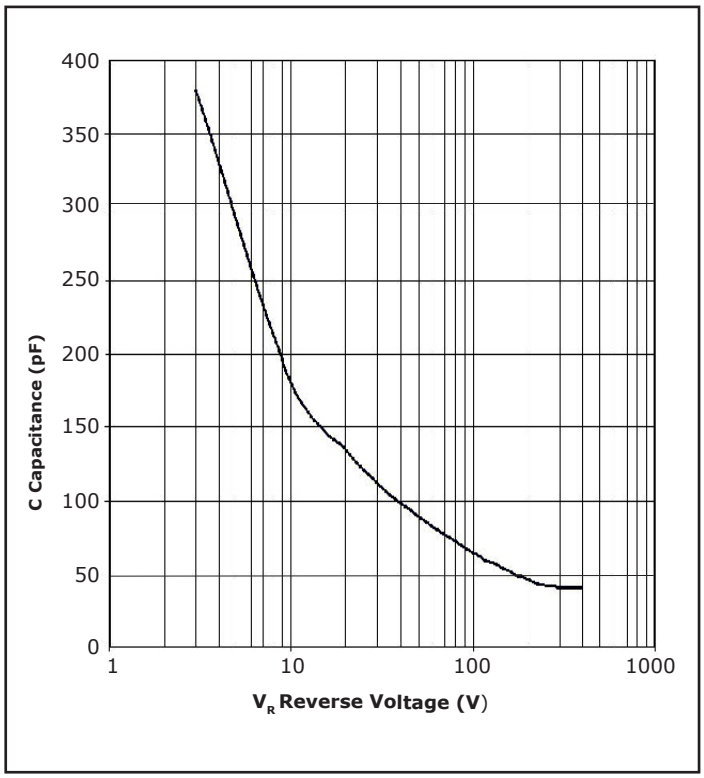


Figure 4. Capacitance vs. Reverse Voltage

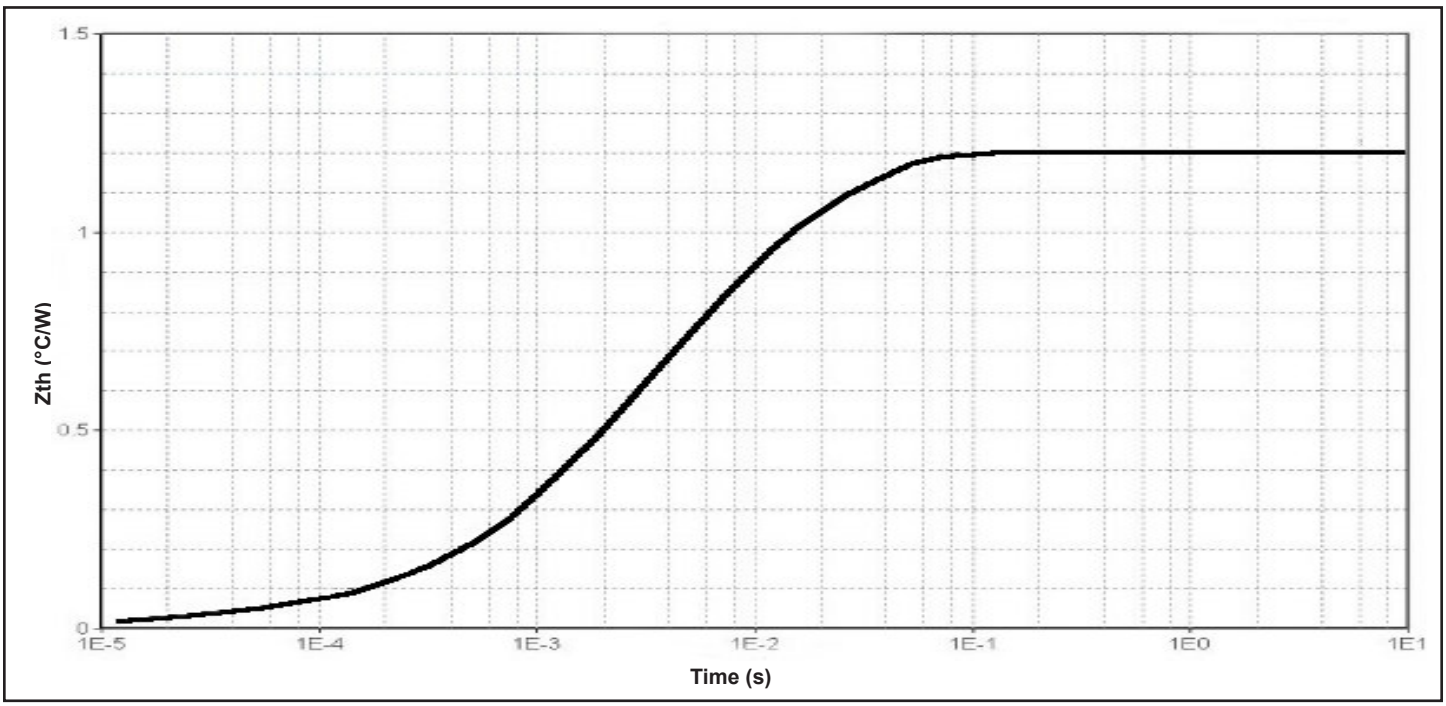


Figure 5. Transient Thermal Impedance

Typical Performance

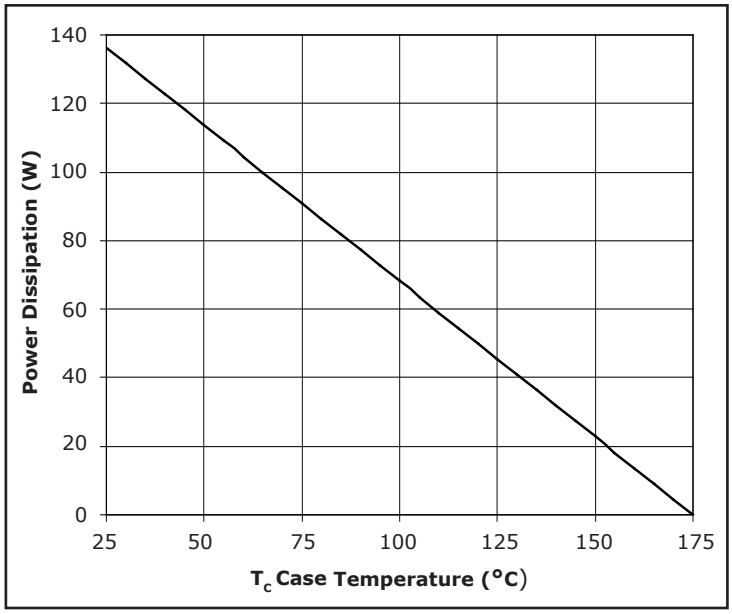
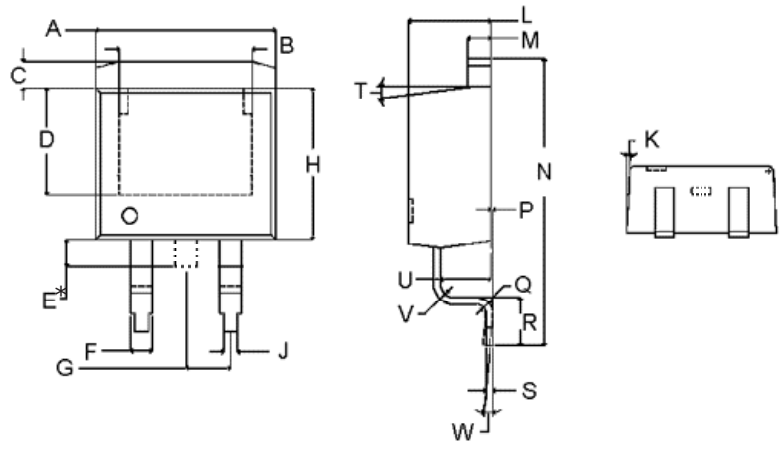


Figure 6. Power Derating

Package Dimensions

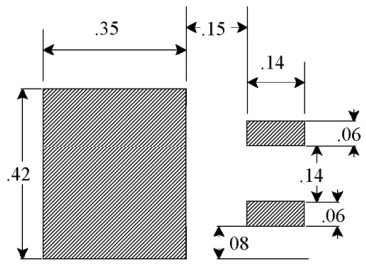
Package TO-263-2



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.396	.406	10.058	10.312
B	.297	.303	7.544	7.696
C	.057	.063	1.448	1.600
D	.237	.243	6.015	6.167
E*	0.00	.070	0.00	1.778
F	.048	.062	1.219	1.575
G	.100 TYP		2.540 TYP	
H	.335	.345	8.509	8.763
J	.028	.034	.711	.864
K	2°	4°	2°	4°
L	.170	.180	4.318	4.572
M	.048	.052	1.219	1.321
N	.595	.615	15.113	15.621
P	0.00	0.10	0.00	.254
Q	R0.018 TYP	R0.022 TYP	R0.457 TYP	R0.559 TYP
R	.090	.110	2.286	2.794
S	.013	.017	.330	.432
T	6.5°	8.5°	6.5°	8.5°
U	.103	.107	2.616	2.718
V	R0.028 TYP	R0.032 TYP	R0.711 TYP	R0.813 TYP
W	—	5.0°	—	5.0°

Note:
* Tab "E" may not be present

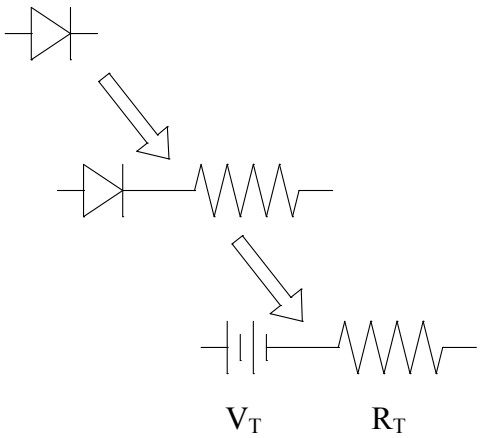
Recommended Solder Pad Layout



TO-263-2

Part Number	Package	Marking
C3D10060G	TO-263-2	C3D10060

Diode Model



$$Vf_T = V_T + If * R_T$$

$$V_T = 0.98 + (T_J * -1.6 * 10^{-3})$$
$$R_T = 0.04 + (T_J * 0.522 * 10^{-3})$$

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.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5451
www.cree.com/power