

# C3D10060G

## Silicon Carbide Schottky Diode

### Z-REC<sup>®</sup> RECTIFIER

$V_{RRM}$	=	600 V
$I_F (T_c=135^\circ\text{C})$	=	14 A
$Q_c$	=	24 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  $V_F$

#### 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 (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters

#### Package



TO-263-2



AEC-Q101 Qualified



Part Number	Package	Marking
C3D10060G	TO-263-2	C3D10060

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

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		
$I_F$	Continuous Forward Current	29 14 10	A	$T_c=25^\circ\text{C}$ $T_c=135^\circ\text{C}$ $T_c=151^\circ\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current	44 30.5	A	$T_c=25^\circ\text{C}, t_p=10\text{ ms}, \text{Half Sine Wave}$ $T_c=110^\circ\text{C}, t_p=10\text{ ms}, \text{Half Sine Wave}$	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	90 71	A	$T_c=25^\circ\text{C}, t_p=10\text{ ms}, \text{Half Sine Wave}$ $T_c=110^\circ\text{C}, t_p=10\text{ ms}, \text{Half Sine Wave}$	Fig. 8
$I_{FMax}$	Non-Repetitive Peak Forward Surge Current	860 680	A	$T_c=25^\circ\text{C}, t_p=10\text{ }\mu\text{s}, \text{Pulse}$ $T_c=110^\circ\text{C}, t_p=10\text{ }\mu\text{s}, \text{Pulse}$	Fig. 8
$P_{tot}$	Power Dissipation	125 54	W	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0\text{-}600\text{V}$	
$\int i^2 dt$	$i^2t$ value	40.5 25	A <sup>2</sup> s	$T_c=25^\circ\text{C}, t_p=10\text{ ms}$ $T_c=110^\circ\text{C}, t_p=10\text{ ms}$	
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.5 2.0	1.8 2.4	V	$I_F = 10\text{ A}$ , $T_J = 25^\circ\text{C}$ $I_F = 10\text{ A}$ , $T_J = 175^\circ\text{C}$	Fig. 1
$I_R$	Reverse Current	10 20	50 200	$\mu\text{A}$	$V_R = 600\text{ V}$ , $T_J = 25^\circ\text{C}$ $V_R = 600\text{ V}$ , $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	24		nC	$V_R = 400\text{ V}$ , $I_F = 10\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	460.5 44 40		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 200\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	Fig. 6
$E_C$	Capacitance Stored Energy	3.6		$\mu\text{J}$	$V_R = 400\text{ V}$	Fig. 7

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

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.2	$^\circ\text{C}/\text{W}$	Fig. 9

## Typical Performance

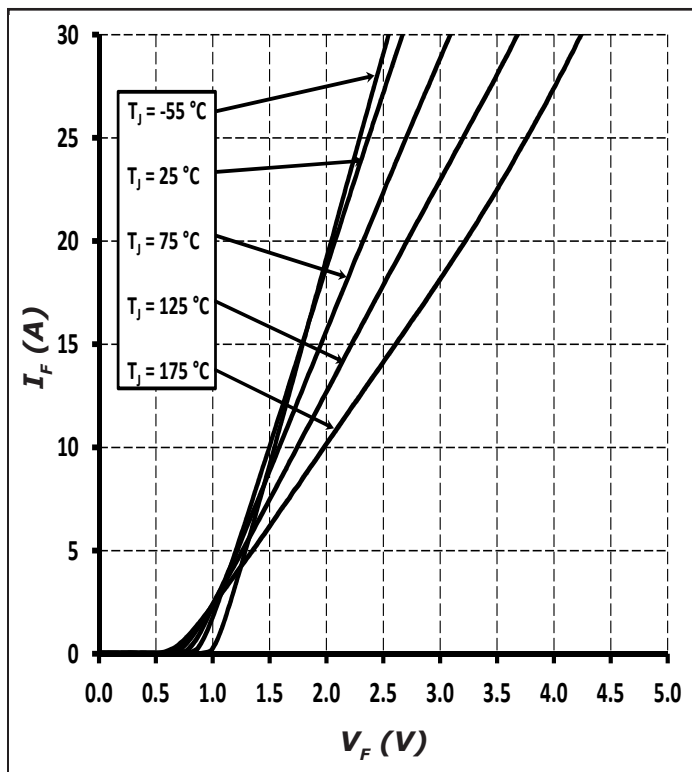


Figure 1. Forward Characteristics

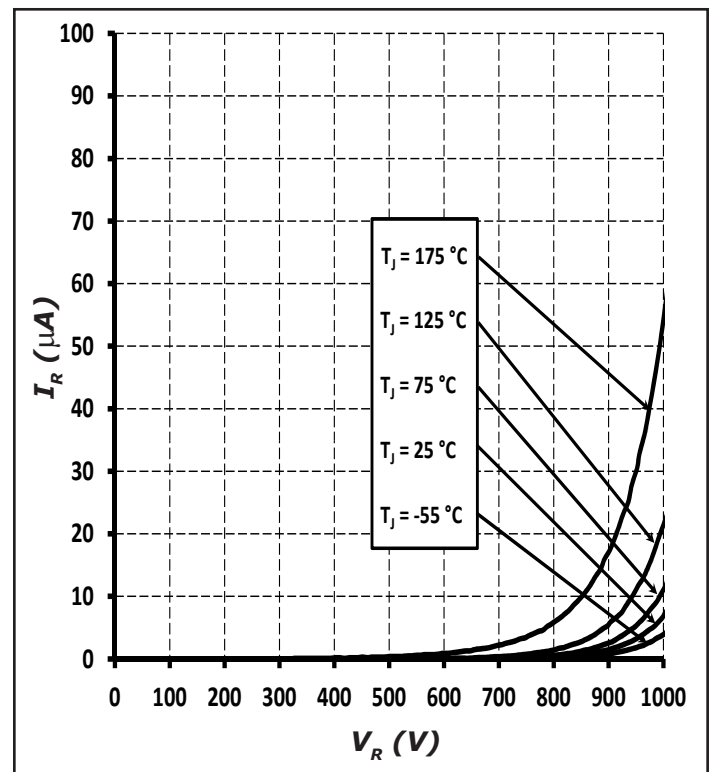


Figure 2. Reverse Characteristics

## Typical Performance

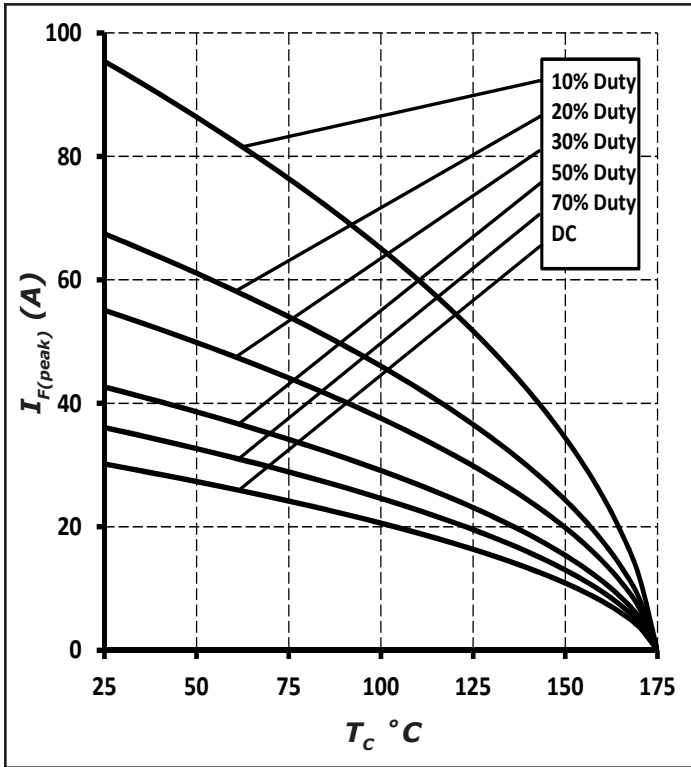


Figure 3. Current Derating

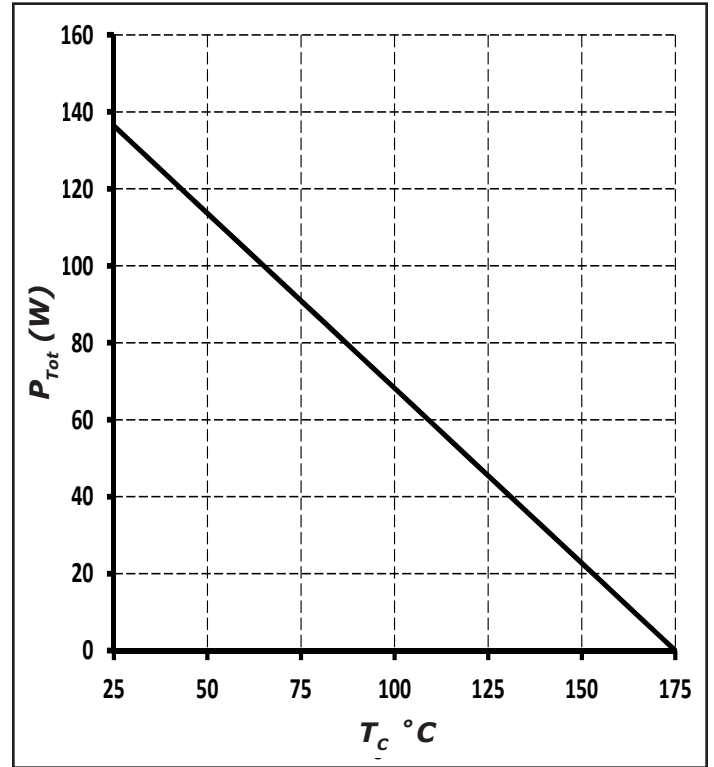


Figure 4. Power Derating

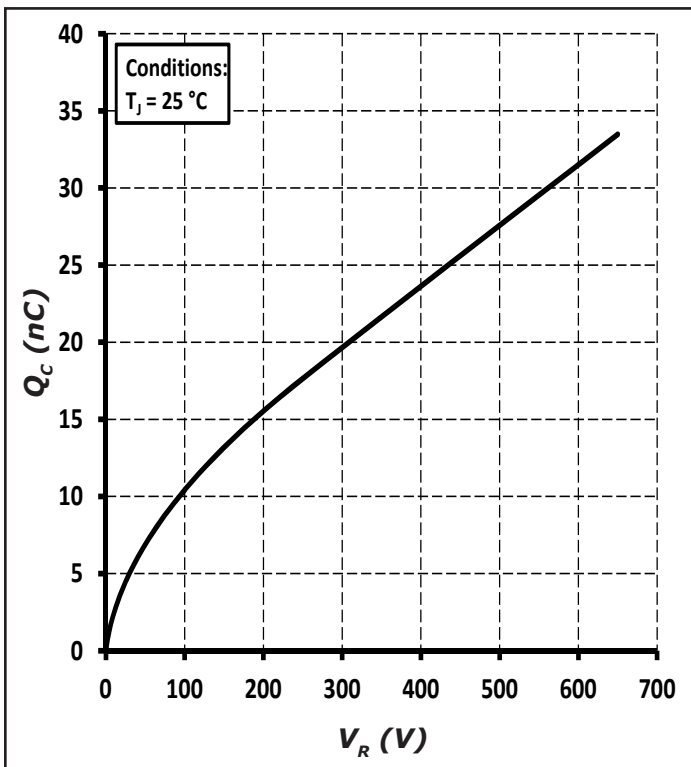


Figure 5. Total Capacitance Charge vs. Reverse Voltage

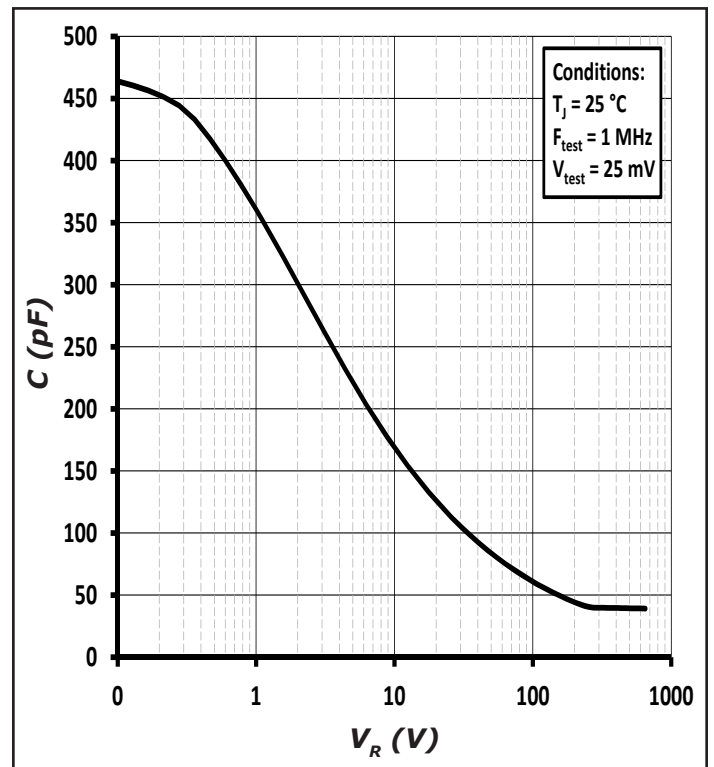


Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance

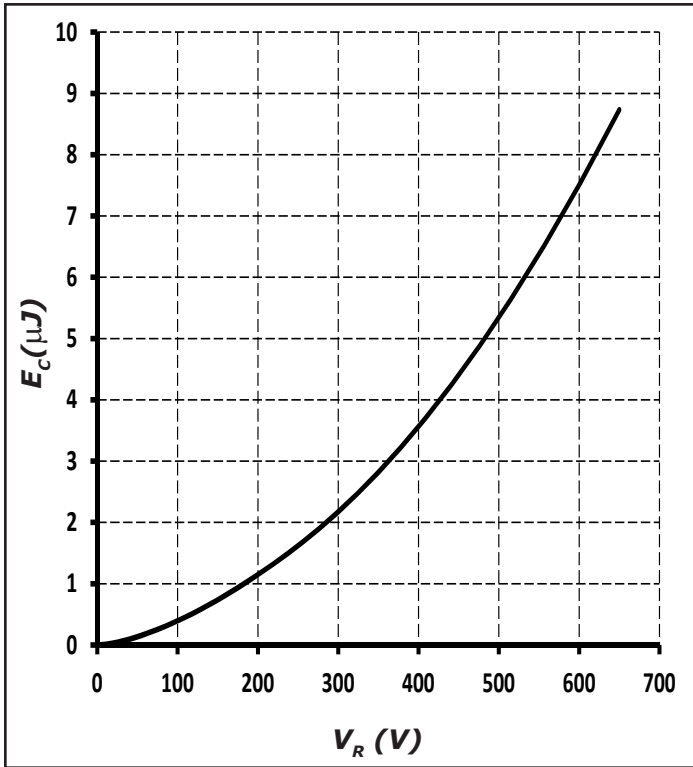


Figure 7. Capacitance Stored Energy

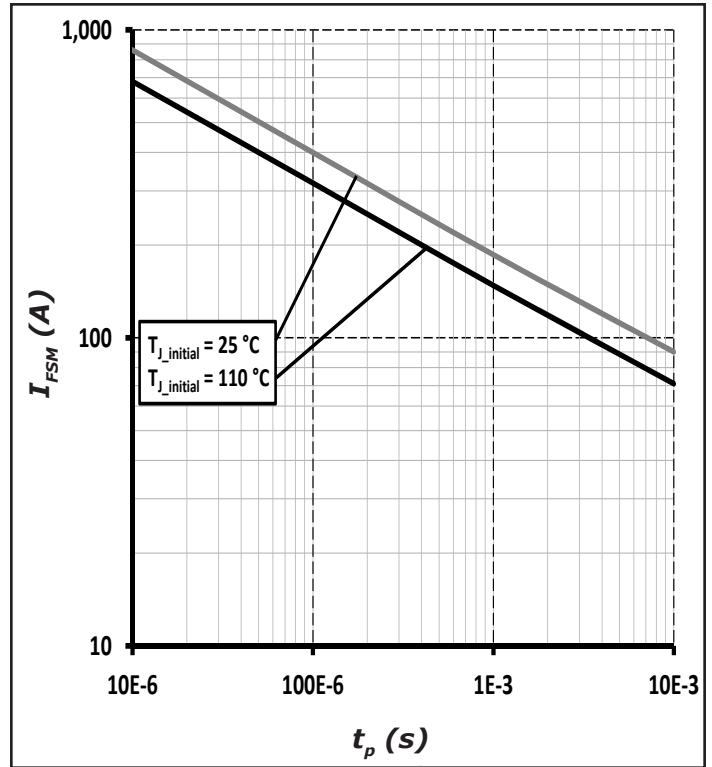


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

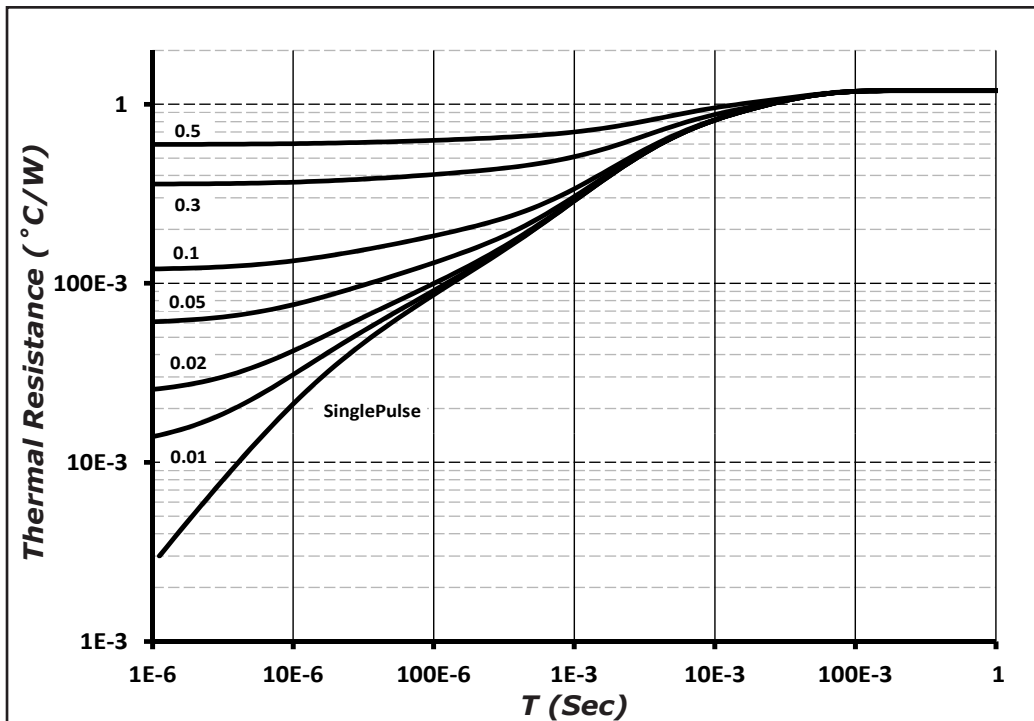
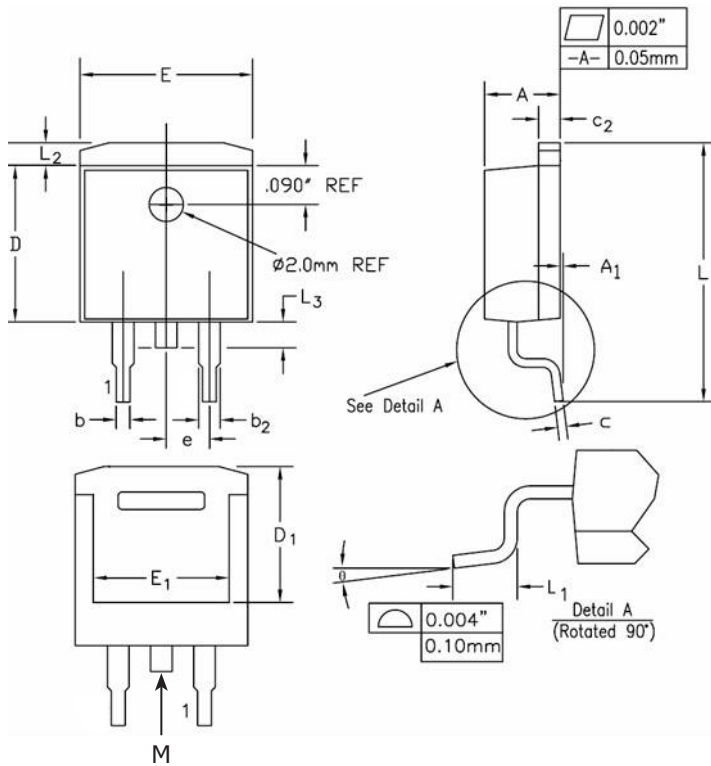


Figure 9. Transient Thermal Impedance

## Package Dimensions

Package TO-263-2

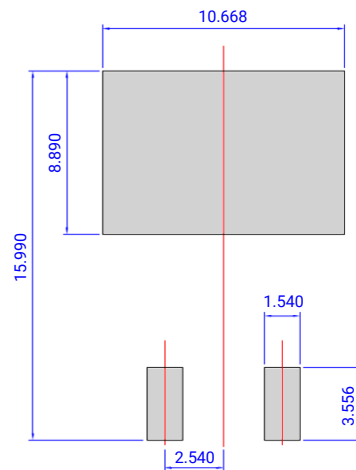


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	0.17	0.18	4.32	4.57
A1	-	0.01	-	0.25
b	0.028	0.037	0.71	0.94
b2	0.045	0.055	1.15	1.4
c	0.014	0.025	0.356	0.635
c2	0.048	0.055	1.22	1.4
D	0.35	0.37	8.89	9.4
D1	0.255	0.324	6.48	8.23
E	0.395	0.405	10.04	10.28
E1	0.31	0.318	7.88	8.08
e	0.1	BSC.	2.54	BSC.
L	0.58	0.62	14.73	15.75
L1	0.09	0.11	2.29	2.79
L2	0.045	0.055	1.15	1.39
L3	0.05	0.07	1.27	1.77
θ	0°	8°	0°	8°

Note: Tab "M" may not be present



## Recommended Solder Pad Layout



Part Number	Package	Marking
C3D10060G	TO-263-2	C3D10060

Note: Recommended soldering profiles can be found in the applications note here:  
[http://www.wolfspeed.com/power\\_app\\_notes/soldering](http://www.wolfspeed.com/power_app_notes/soldering)

