

# C3D16065D

Silicon Carbide Schottky Diode

Z-REC<sup>®</sup> RECTIFIER

$V_{RRM}$	=	650 V
$I_F (T_c=135^\circ\text{C})$	=	22 A**
$Q_c$	=	40 nC**

## Features

- 650-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  $V_F$

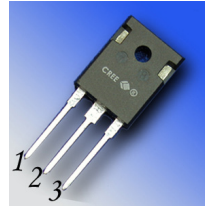
## Benefits

- 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

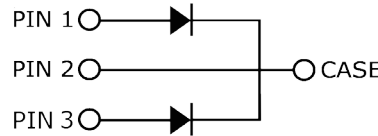
## Package



TO-247-3



AEC-Q101 Qualified



Part Number	Package	Marking
C3D16065D	TO-247-3	C3D16065

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

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		
$I_F$	Continuous Forward Current (Per Leg/Device)	23/46 11/22 8/16	A	$T_c=25^\circ\text{C}$ $T_c=135^\circ\text{C}$ $T_c=150^\circ\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current (Per Leg/Device)	37.5/75 25.5/51	A	$T_c=25^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave $T_c=110^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current (Per Leg/Device)	71/142 60/120	A	$T_c=25^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave $T_c=110^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave	Fig. 8
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current (Per Leg/Device)	650/1300 530/1080	A	$T_c=25^\circ\text{C}, t_p = 10 \mu\text{s}$ , Pulse $T_c=110^\circ\text{C}, t_p = 10 \mu\text{s}$ , Pulse	Fig. 8
$P_{tot}$	Power Dissipation (Per Leg)	100* 43.5*	W	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-600\text{V}$	
$\int i^2 dt$	$i^2t$ value (Per Leg)	25 18	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	$^\circ\text{C}$		
	TO-247 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

\* Per Leg, \*\* Per Device

### Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.5 2.1	1.8 2.4	V	$I_F = 8\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 8\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
$I_R$	Reverse Current	10 12	51 204	$\mu\text{A}$	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	20		nC	$V_R = 400\text{ V}$ , $I_F = 8\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	395 37 32		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	3.0		$\mu\text{J}$	$V_R = 400\text{ V}$	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	1.5 * 0.75 **	$^\circ\text{C}/\text{W}$	Fig. 9

\* Per Leg, \*\* Per Device

### Typical Performance (Per Leg)

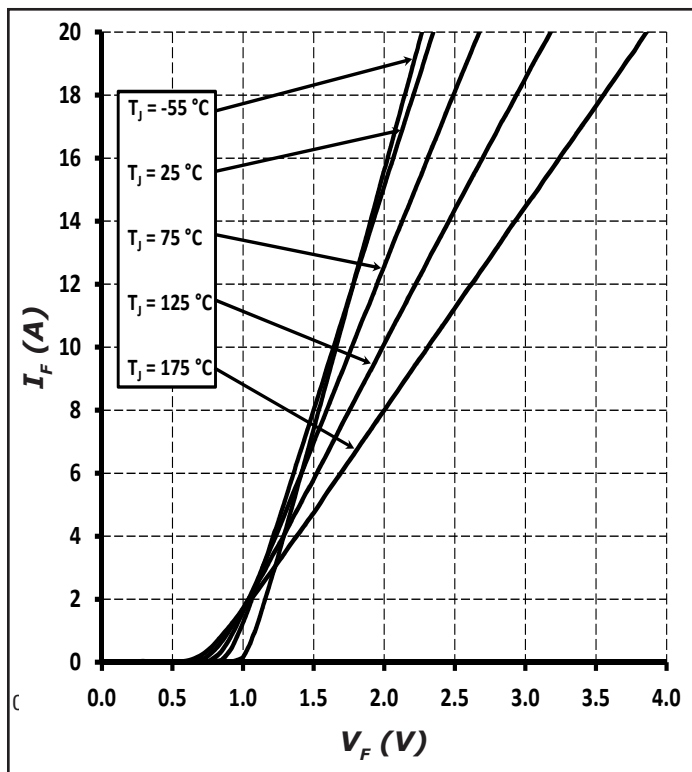


Figure 1. Forward Characteristics

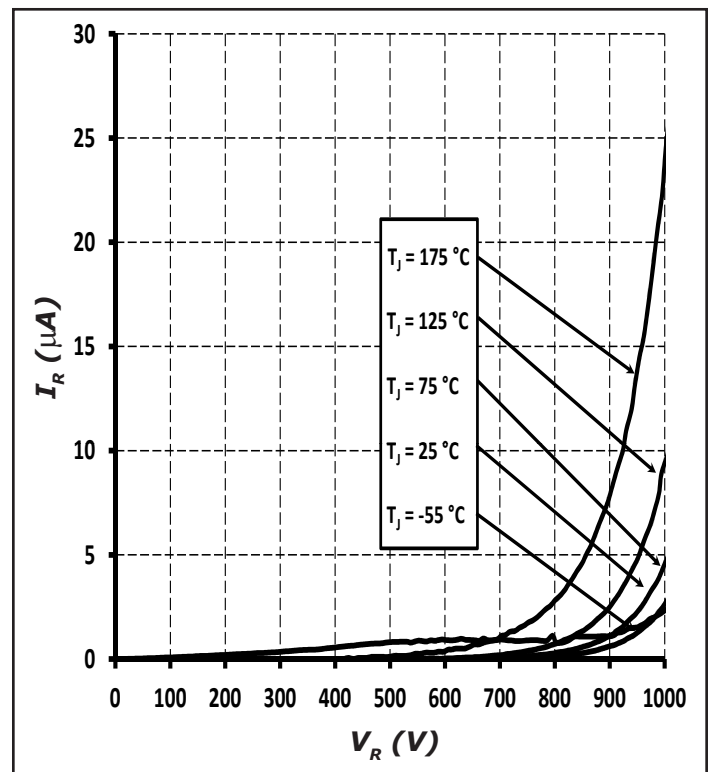


Figure 2. Reverse Characteristics

## Typical Performance (Per Leg)

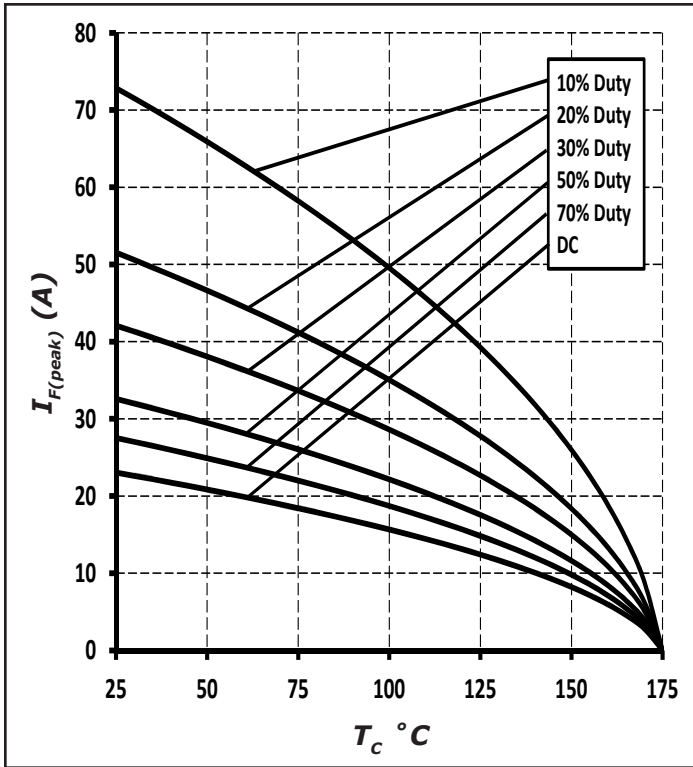


Figure 3. Current Derating

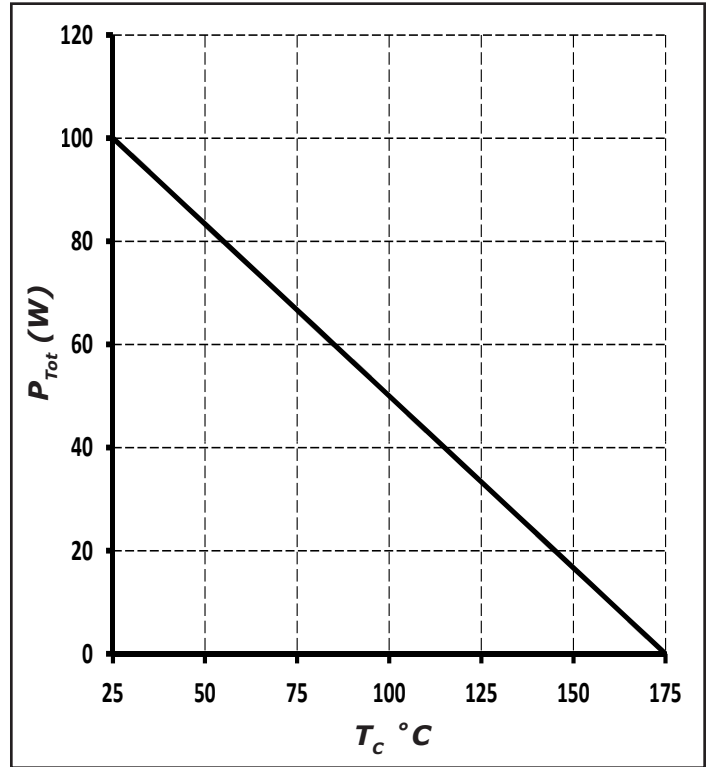


Figure 4. Power Derating



Figure 5. Total Capacitance Charge vs. Reverse Voltage



Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance (Per Leg)



Figure 7. Capacitance Stored Energy

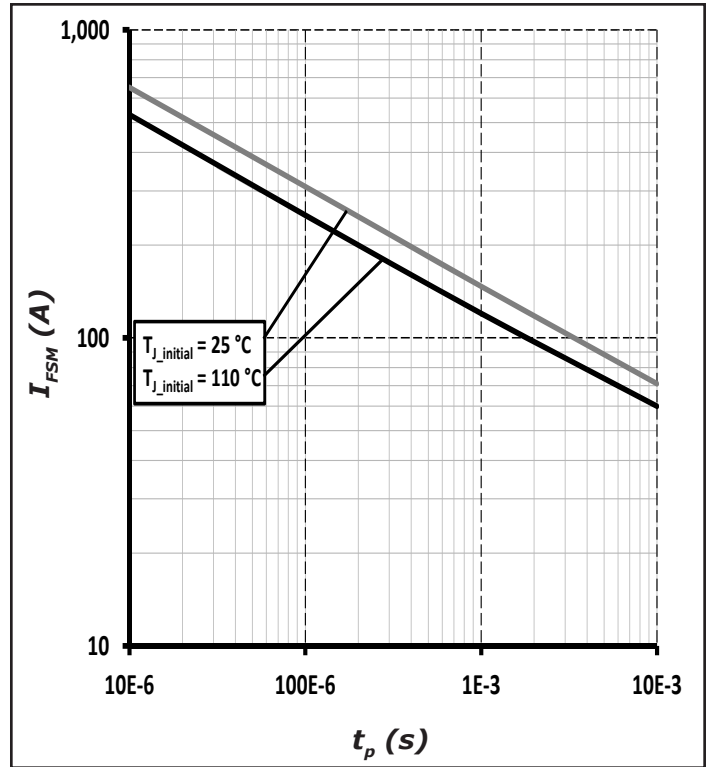


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

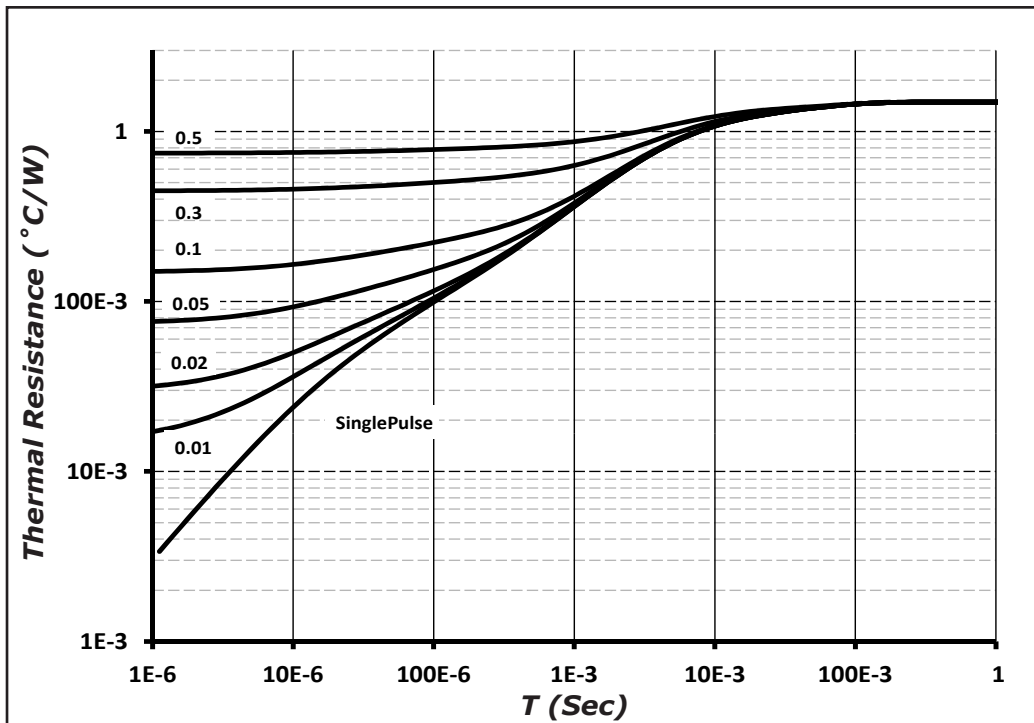
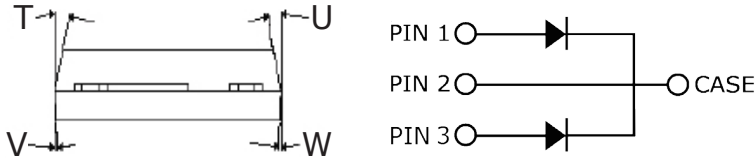
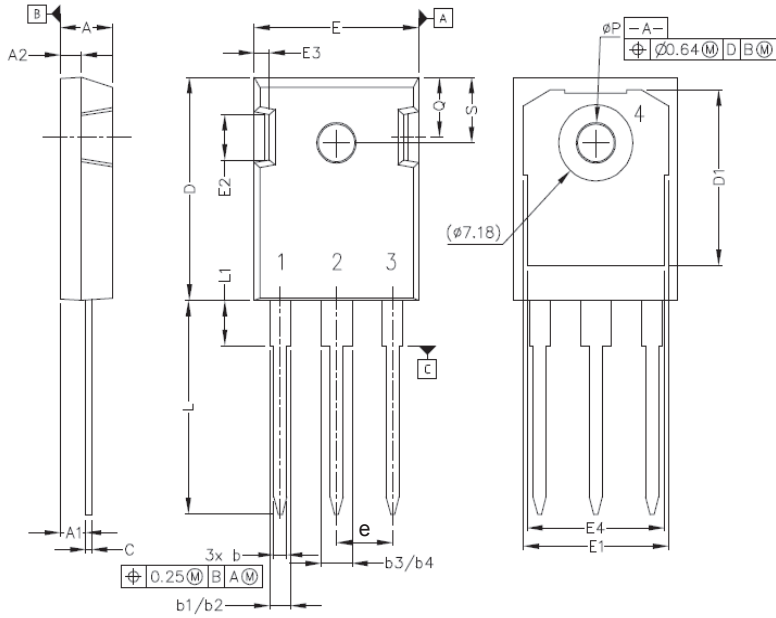


Figure 9. Transient Thermal Impedance

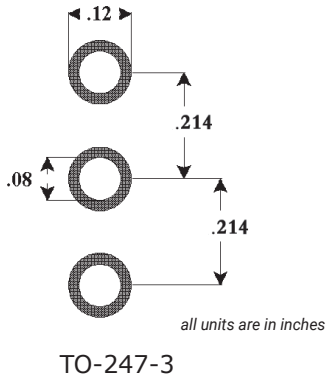
## Package Dimensions

Package TO-247-3



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b2	.075	.085	1.91	2.16
b3	.113	.133	2.87	3.38
b4	.113	.123	2.87	3.13
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
N	3		3	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	9°	11°	9°	11°
U	9°	11°	9°	11°
V	2°	8°	2°	8°
W	2°	8°	2°	8°

## Recommended Solder Pad Layout



Part Number	Package	Marking
C3D16065D	TO-247-3	C3D16065

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)

