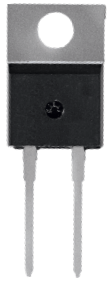
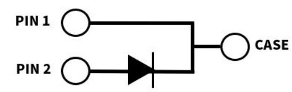
C3D16065A

3rd Generation 650 V, 16A Silicon Carbide Schottky





Package Types: TO-220-2
Marking: C3D16065

Description

With the performance advantages of a Silicon Carbide (SiC) Schottky Barrier diode, power electronics systems can expect to meet higher efficiency standards than Si-based solutions, while also reaching higher frequencies and power densities. SiC diodes can be easily paralleled to meet various application demands, without concern of thermal runaway. In combination with the reduced cooling requirements and improved thermal performance of SiC products, SiC diodes are able to provide lower overall system costs in a variety of diverse applications.

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Features

- Low Forward Voltage (V_F) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior

Typical Applications

- Industrial Switched Mode Power Supplies
- Uninterruptible & AUX Power Supplies
- Boost for PFC & DC-DC Stages
- Solar Inverters

Maximum Ratings (T_C = 25°C Unless Otherwise Specified)

Parameter	Symbol	Value	Unit	Test Conditions	Notes
Repetitive Peak Reverse Voltage	V_{RRM}	650	V		
DC Blocking Voltage	V_{DC}	650			
Continuous Forward Current	I_F	39	A	T_C = 25 °C	Fig. 3
		18		T_C = 135 °C	
		16		T_C = 142 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	66		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		46		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Non-Repetitive Forward Surge Current	I_{FSM}	162		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	Fig. 8
		150		T_C = 110 °C,t_p = 10 ms, Half Sine Wave	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	1400		T_C = 25 °C, t_p = 10 µs, Pulse	
		1200		T_C = 110°C, t_p = 10 µs, Pulse	
Power Dissipation	P_{tot}	150	W	T_C = 25 °C	Fig. 4
		65		T_C = 110 °C	
i^2t value (Per Leg)	$\int i^2dt$	131	A^2s	T_C = 25 °C, t_p = 10ms	
		112.5		T_C = 110 °C, t_p = 10ms	

Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.5	1.8	V	I_F = 16 A, T_j = 25 °C	Fig. 1
		2.0	2.4		I_F = 16 A, T_j = 175 °C	
Reverse Current	I_R	18.5	95	µA	V_R = 650 V, T_j = 25 °C	Fig. 2
		38.5	378		V_R = 650 V, T_j = 175 °C	
Total Capacitive Charge	Q_C	44.5		nC	V_R = 400 V, T_j = 25 °C	Fig. 5
Total Capacitance	C	877.5		pF	V_R = 0 V, T_j = 25 °C, f = 1 MHz	Fig. 6
		80			V_R = 200 V, T_j = 25 °C, f = 1 MHz	
		64			V_R = 400 V, T_j = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_C	6.2		µJ	V_R = 400 V	Fig. 7

Notes:
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

Thermal & Mechanical Characteristics

Parameter	Symbol	Value	Unit	Notes
Thermal Resistance, Junction to Case (Typical)	$R_{\theta, JC (TYP)}$	1	°C / W	
Junction Temperature	T_j	-55 to +175	°C	
Case & Storage Temperature	T_c	-55 to +175		
TO-220 Mounting Torque	-	1	Nm	M3 Screw
		8.8	lbf-in	6-32 Screw

Typical Performance

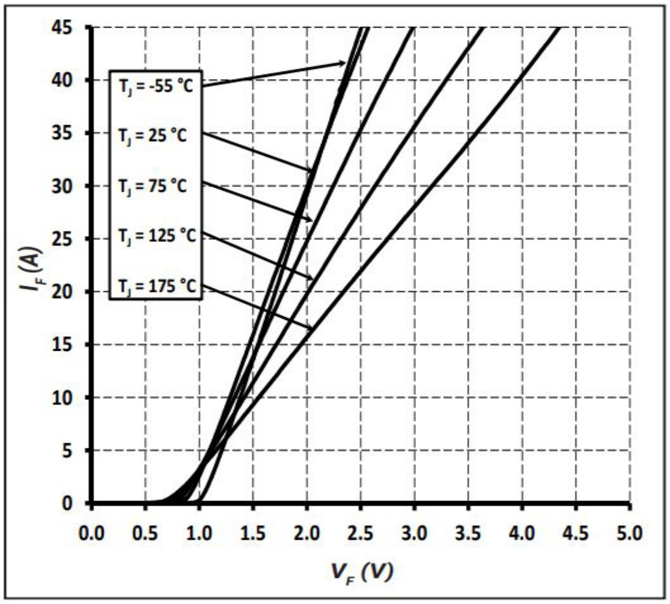


Figure 1

Forward Characteristics

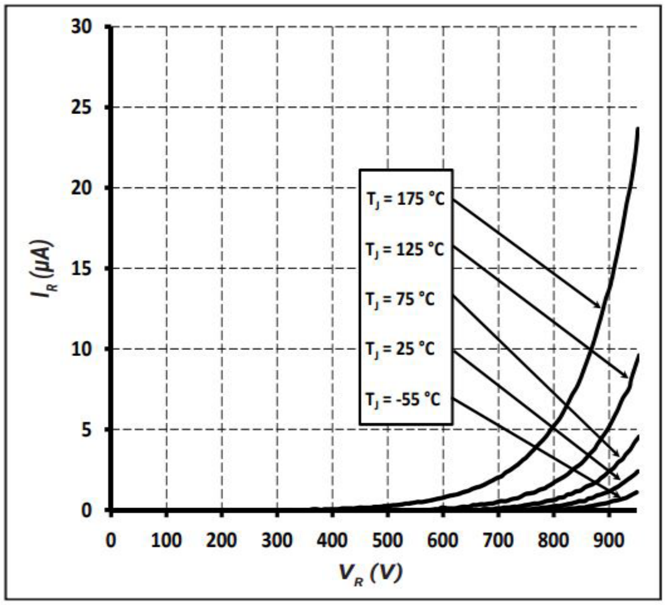


Figure 2

Reverse Characteristics

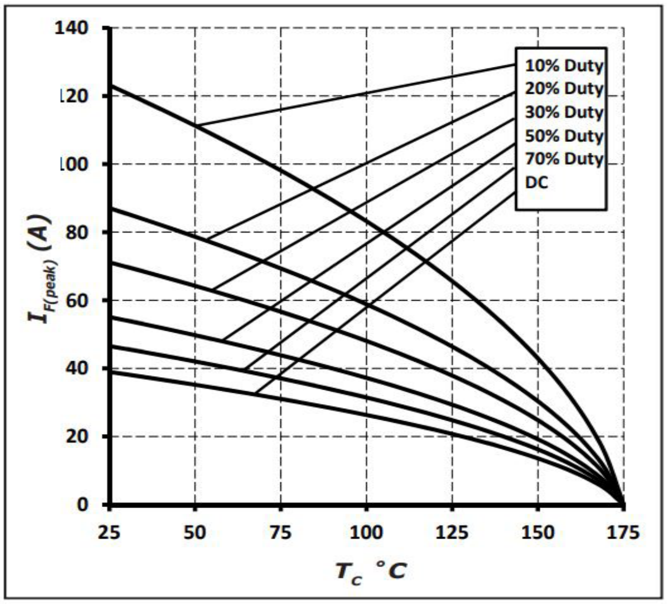


Figure 3

Current Derating

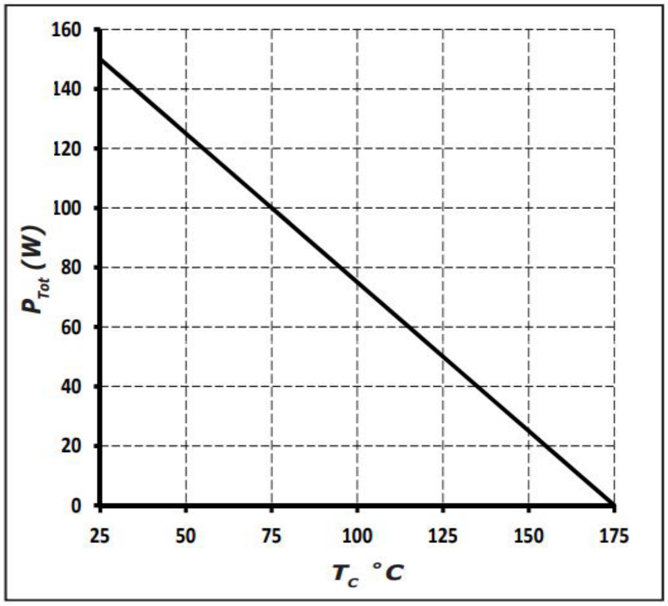


Figure 4

Power Derating

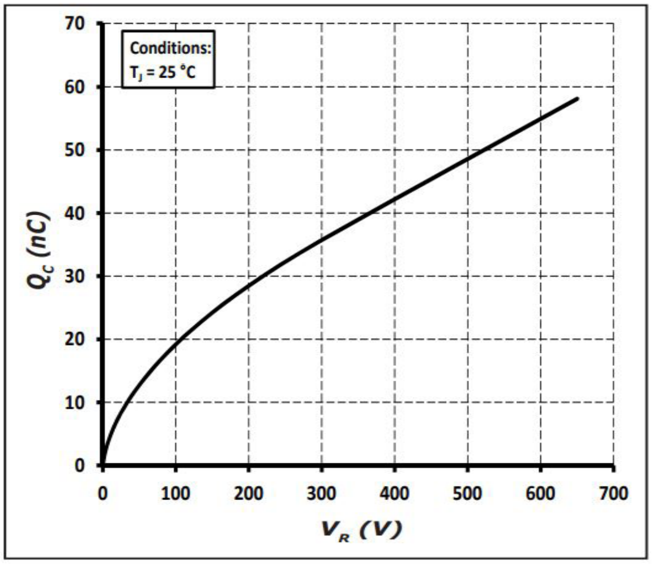


Figure 5

Total Capacitance vs. Reverse Voltage

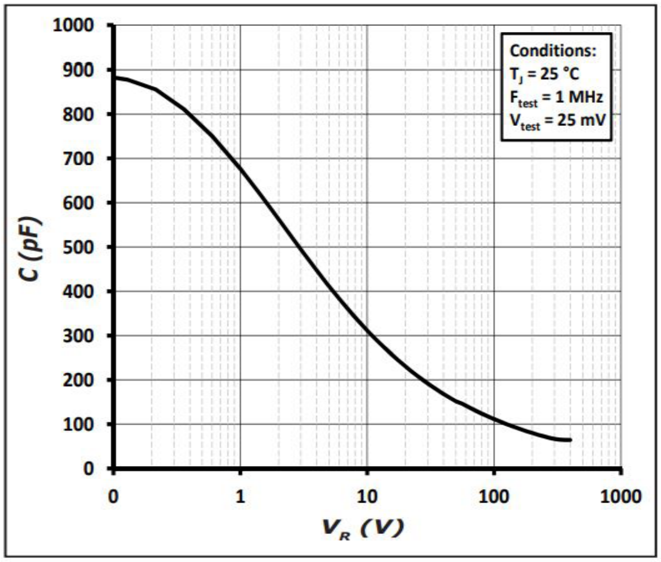


Figure 6

Capacitace vs. Reverse Voltage

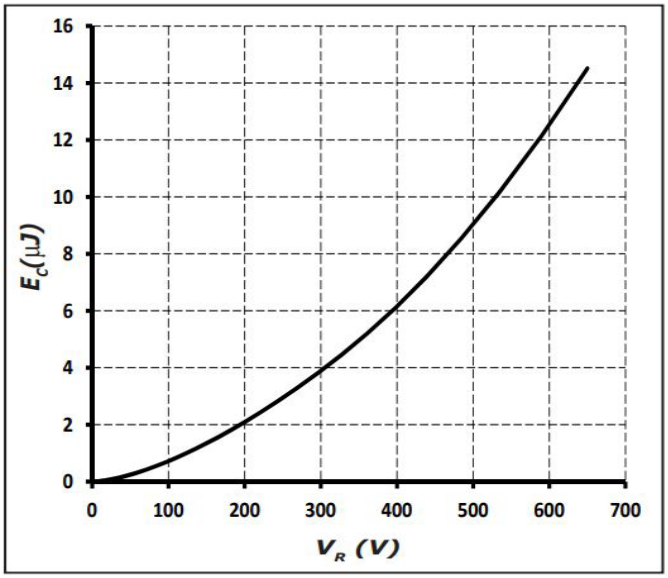


Figure 7

Capacitance Stored Energy

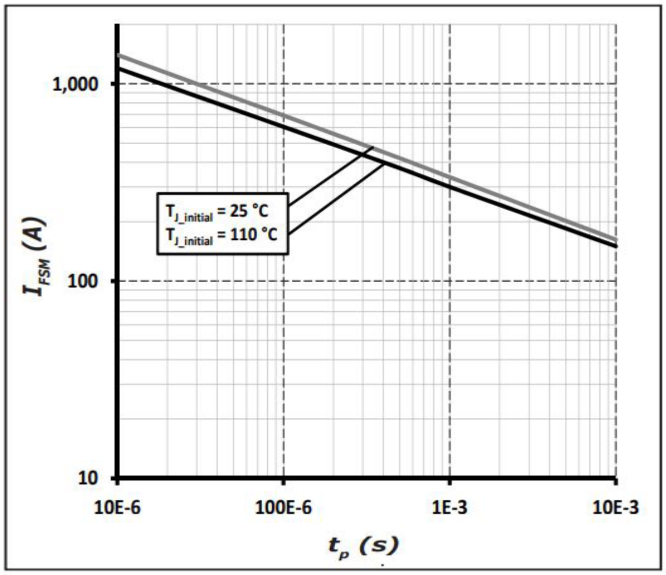


Figure 8

Non-Repetitive Peak Forward Surge Current
versus Pulse Duration (sinusoidal waveform)

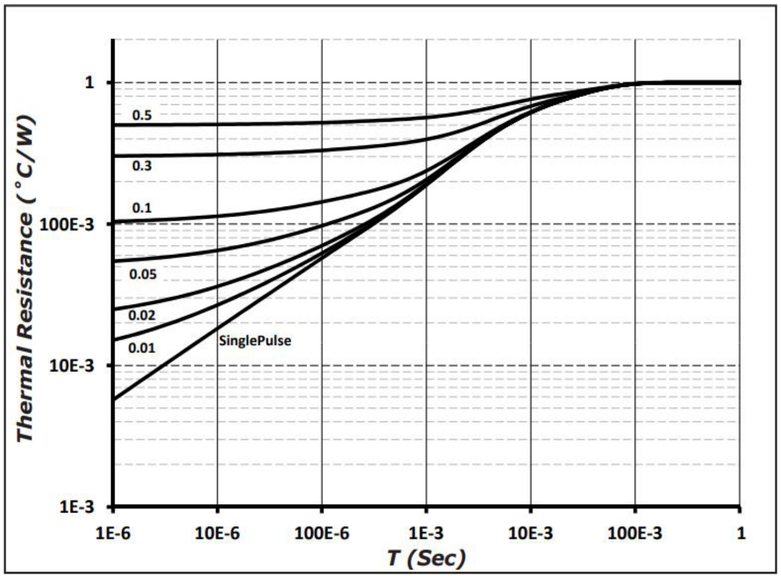
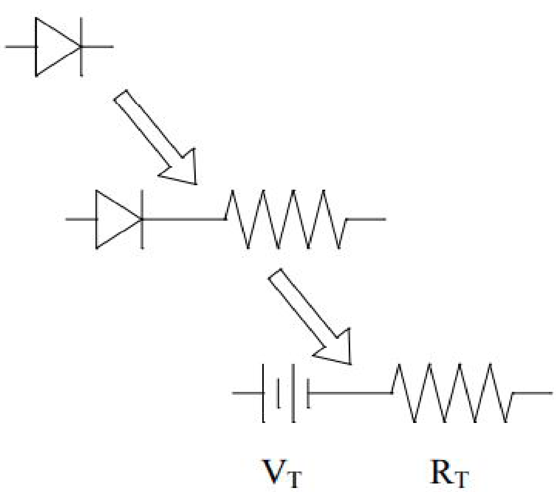


Figure 9
Transient Thermal Impedance

Diode Model



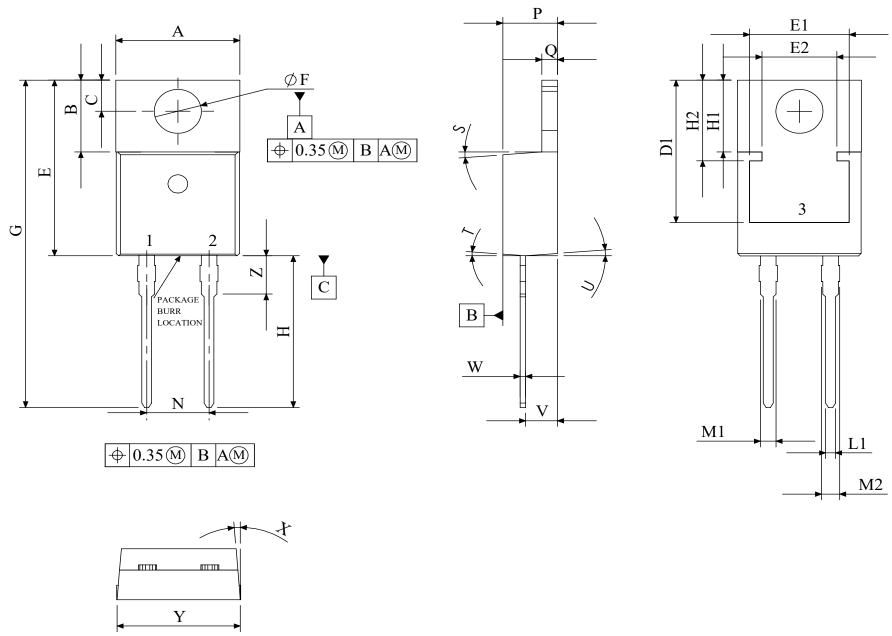
$$Vf_T = V_T + If * R_T$$

$$V_T = 0.94 + (T_J * -1.0*10^{-3})$$
$$R_T = 0.027 + (T_J * 2.8*10^{-4})$$

Note: T_j = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 175°C

Package Dimensions & Pin-Out

Package: TO-220-2



SYMBOL	MIN (mm)	MAX (mm)
A	9.67	10.41
B	5.96	6.48
C	2.54	3.05
D1	12.45 REF	
E	14.98	15.62
E1	8.12 REF	
E2	6.10 REF	
F	3.63	3.89
G	28.06	29.13
H	12.70	13.97
H1	6.22 REF	
H2	7.04 REF	
L1	0.63	0.91
M1	1.14	1.40
M2	1.14	1.77
N	4.95	5.21
P	4.19	4.70
Q	1.21	1.37
S	3°	6°
T	3°	6°
U	3°	6°
V	2.38	2.79
W	0.35	0.64
X	3°	5.5°
Y	9.77	10.41
Z	3.30	3.81

1	CATHODE
2	ANODE
3	CATHODE

NOTE
1. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT.
2. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE LISTED IN MILLIMETERS. ANGLES ARE IN DEGREES.
4. PACKAGE BURR FLASH SIZE (0.5 mm) IS NOT INCLUDED IN THE DIMENSIONS

Wolfspeed

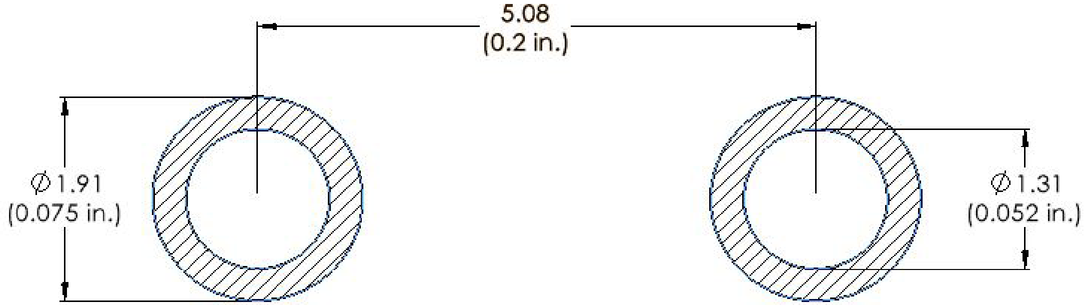
TITLE: PACKAGE OUTLINE DRAWING: TO 220-2L

REVISION NO. 02 A4

Date: 06/18/24 | PRD-05955 | SCALE:1:1 | SHEET 1 OF 1

Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

Order Number	Packing Type
C3D16065A	Tube

Revision History

Document Version	Date of Release	Description of Changes
0	September-2016	Initial Release
1	March-2023	Update Package Drawing Update Landing Pad
2	July-2023	Updated Test Conditions of I_F and P_{tot} Added Package Marking Statement
3	October - 2024	Legal Disclaimer, POD, corrected package marking

Notes & Disclaimer

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