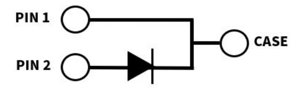
C3D08065I

3rd Generation 650 V, 8 A Silicon Carbide Schottky Diode



Package Type: Isolated TO-220-2
Marking: C3D08065I

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
- Electrically Isolated Package (2.5kV)

Applications

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

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	16.5	A	T_C = 25 °C	Fig. 3
		8		T_C = 130 °C	
		7.5		T_C = 135 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	29		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		19		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Non-Repetitive Forward Surge Current	I_{FSM}	69		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	Fig. 8
		55		T_C = 110 °C,t_p = 10 ms, Half Sine Wave	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	650		T_C = 25 °C, t_p = 10 µs, Pulse	
		530		T_C = 110°C, t_p = 10 µs, Pulse	
Power Dissipation	P_{tot}	53.6	W	T_C = 25 °C	Fig. 4
		23.2		T_C = 110 °C	
Diode dV/dt ruggedness	dV/dt	200	V/ns	V_R = 0-650V	
i^2t value	$\int i^2dt$	23.8	A^2s	T_C = 25 °C, t_p = 10 ms	
		15		T_C = 110°C, t_p = 10ms	

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Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.5	1.8	V	I_F = 8 A, T_j = 25 °C	Fig. 1
		2.1	2.4		I_F = 8 A, T_j = 175 °C	
Reverse Current	I_R	10	51	µA	V_R = 650 V, T_j = 25 °C	Fig. 2
		12	204		V_R = 650 V, T_j = 175 °C	
Total Capacitive Charge	Q_C	20		nC	V_R = 400 V, T_j = 25 °C, I_F = 8 A	Fig. 5
Total Capacitance	C	395		pF	V_R = 0 V, T_j = 25 °C, f = 1 MHz	Fig. 6
		37			V_R = 200 V, T_j = 25 °C, f = 1 MHz	
		32			V_R = 400 V, T_j = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_C	3.0		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)	$R_{\theta, JC (TYP)}$	2.8	°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

Electrostatic Discharge (ESD) Classifications

Parameter	Symbol	Notes
Human Body Model	HBM	**Class 3B (≥ 8000 V)**
Charge Device Model	CDM	**Class C3 (≥ 1000 V)**

Typical Performance

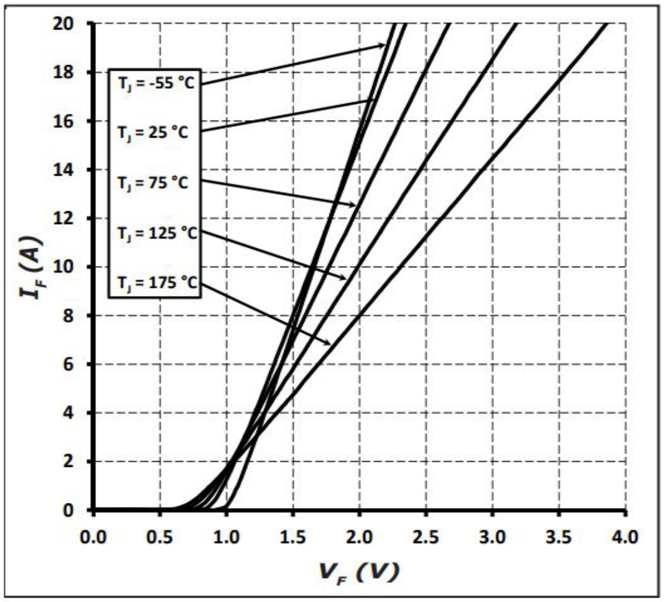


Figure 1
Forward Characteristics

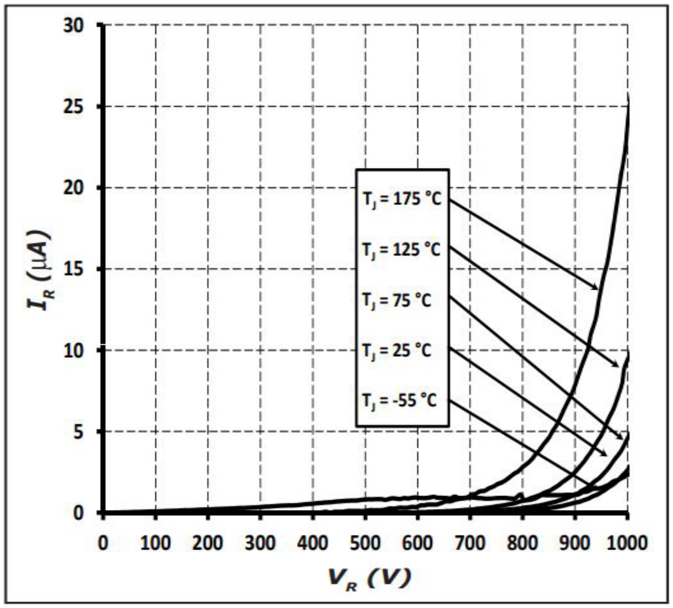


Figure 2
Reverse Characteristics

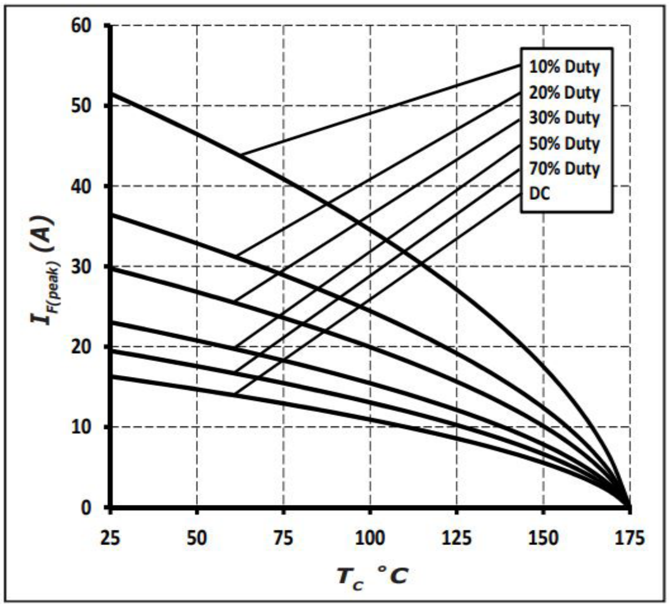


Figure 3
Current Derating

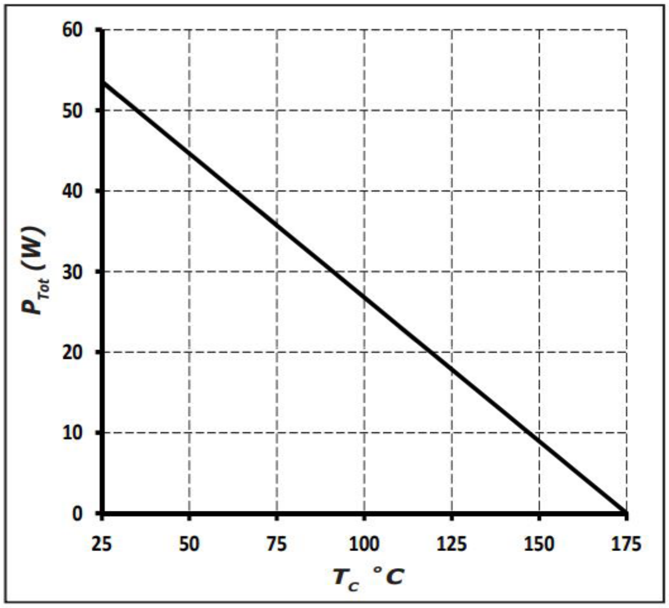


Figure 4
Power Derating

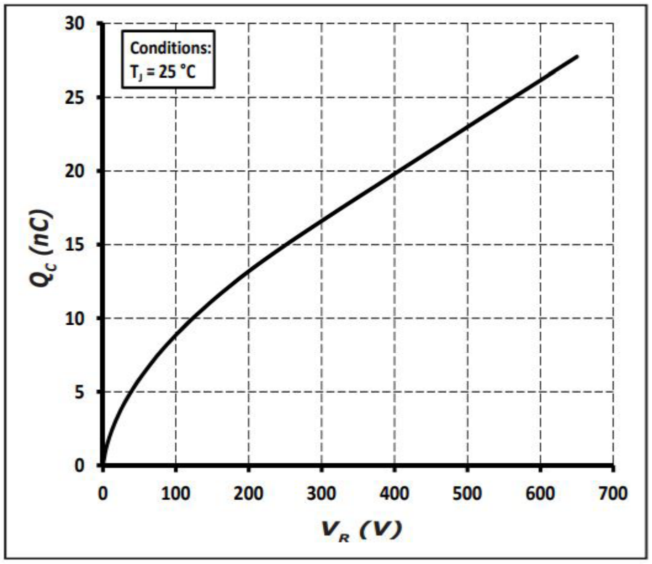


Figure 5
Total Capacitance vs. Reverse Voltage

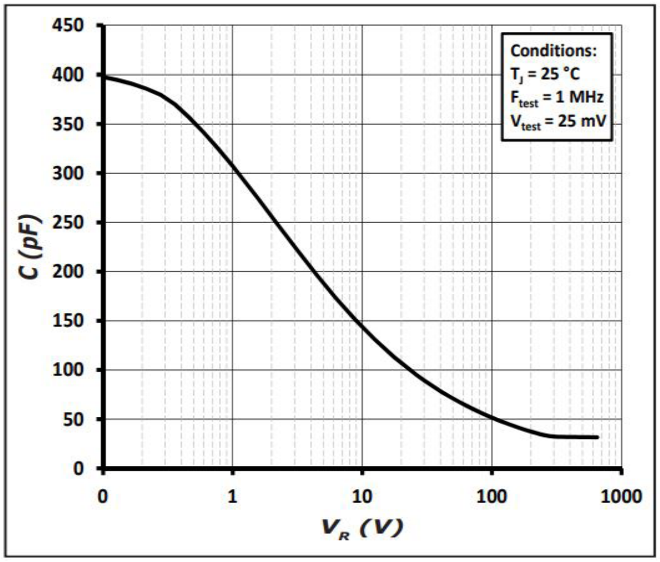


Figure 6
Capacitace vs. Reverse Voltage

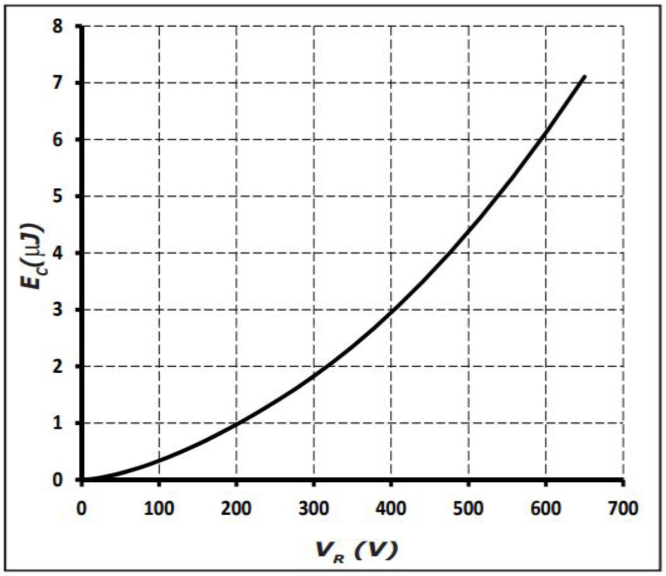


Figure 7
Capacitance Stored Energy

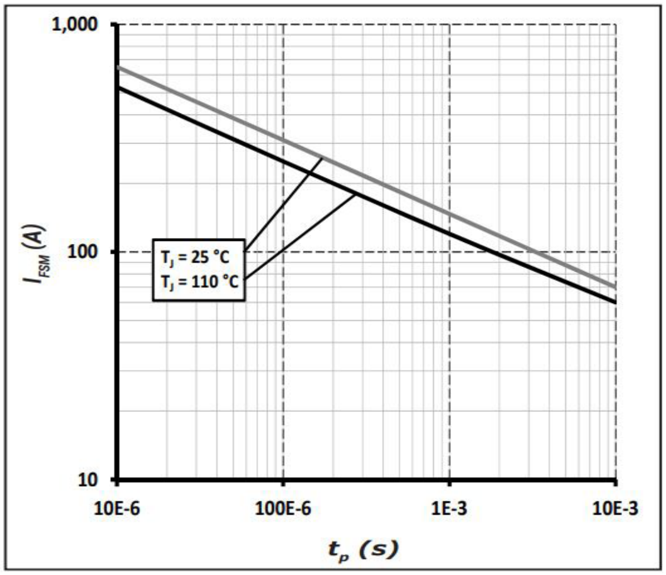


Figure 8
Non-Repetitive Peak Forward Surge Current
versus Pulse Duration (sinusoidal waveform)

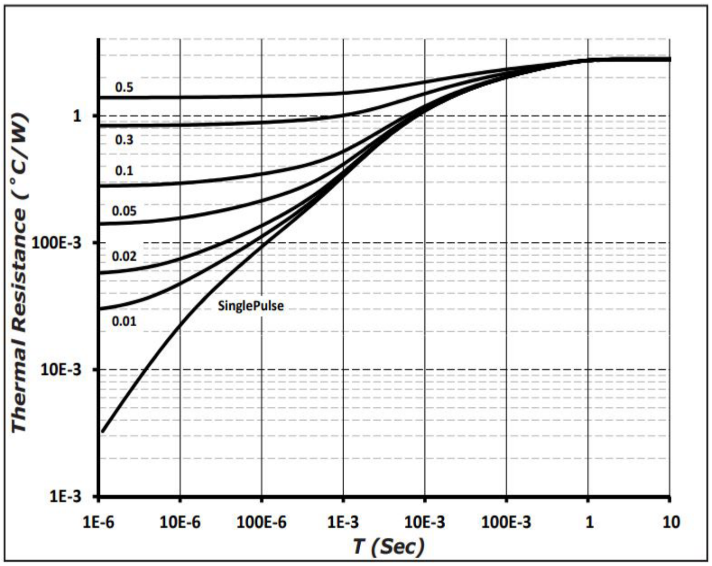
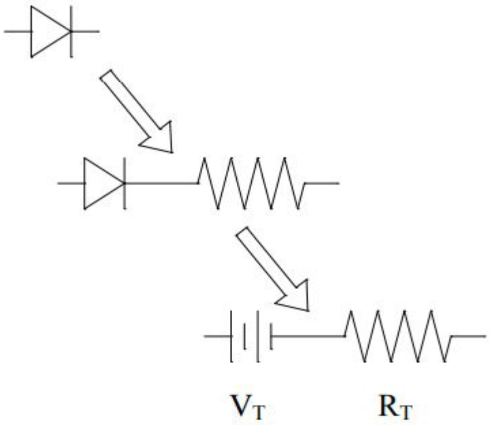


Figure 9
Transient Thermal Impedance

Diode Model



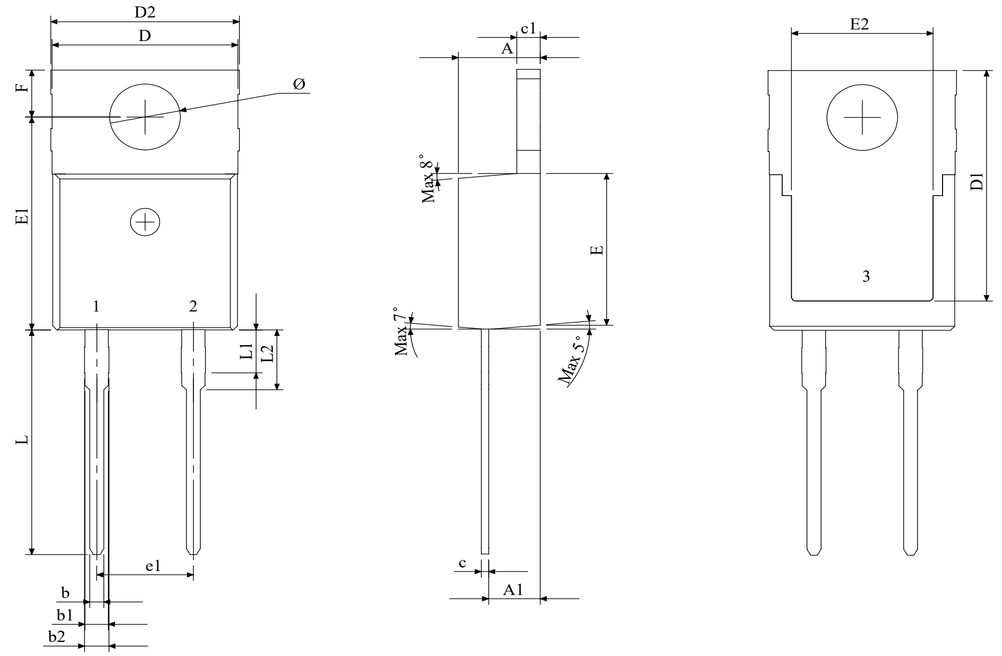
$$Vf_T = V_T + If * R_T$$

$$V_T = 0.96 + (T_J * -1.1*10^{-3})$$
$$R_T = 0.07 + (T_J * 7.4*10^{-4})$$

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	4.42	4.72
A1	2.52	2.82
b	0.71	0.91
b1	1.17	1.37
b2	1.17	1.67
c	0.36	0.46
c1	1.17	1.37
D	9.96	10.25
D1	13.25	13.65
D2	10.05	10.45
E	8.99	9.29
E1	12.55	12.85
E2	7.50	7.90
e1	4.98	5.18
F	2.59	2.89
L	13.08	13.48
L1	2.47	2.87
L2	3.20	3.60
Ø	3.79	3.89

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

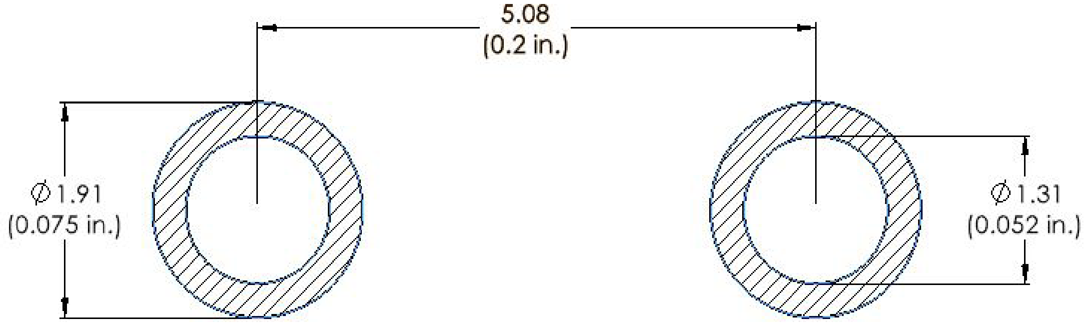
TITLE: PACKAGE OUTLINE DRAWING: TO 220-ISOLATED

REVISION NO. 01 A4

Date: 04/13/22 SCALE:1:1 SHEET 1 OF 1

Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

Order Number	Packing Type
C3D08065I	Tube

Revision History

Document Version	Date of Release	Description of Changes
C	January-2018	Initial Release
5	May-2023	Update Package Drawing Update Landing Pad

Notes & Disclaimer

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