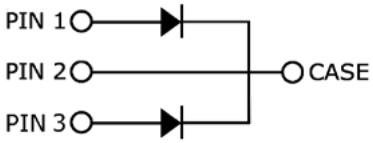
E3D20065D

650 V, 20 A Silicon Carbide Schottky Diode

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

TO-247-3



Package Types: TO-247-3
Marking: E3D20065D

Wolfspeed, Inc. is in the process of rebranding its products and related materials pursuant to the entity name change from Cree, Inc. to Wolfspeed, Inc. During this transition period, products received may be marked with either the Cree name and/or logo or the Wolfspeed name and/or logo.

Typical Applications

- Automotive and traction power conversion
- Battery charging systems
- Boost diode in PFC or DC/DC stages
- Free wheeling diodes in inverter stages
- AC/DC converters
- PV inverters

Benefits

- Higher system level efficiency
- Increase system power density
- Reduction of heat sink requirements
- Parallel devices without thermal runaway

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

Parameter	Symbol	Value	Unit	Test Conditions	Note
Repetitive Peak Reverse Voltage	V_{RRM}	650	V		
DC Peak Reverse Voltage	V_R	650			
Continuous Forward Current	I_F	28*/56**	A	T_C = 25 °C	Fig. 3
		13*/26**		T_C = 135 °C	
		10*/20**		T_C = 150 °C	
Power Dissipation	P_{tot}	122*	W	T_C = 25 °C	Fig. 4
		53*		T_C = 110 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	37*	A	T_C = 25 °C, t_P = 10 ms, Half Sine Pulse	
		22*		T_C = 110 °C, t_P = 10 ms, Half Sine Pulse	
Diode dV/dt Ruggedness	dV/dt	200	V/ns	V_R = 0-650 V	
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to +175	°C		
TO-247 Mounting Torque		1	Nm	M3 Screw	
		8.8	lbf-in	6-32 Screw	

* Per Leg, ** Per Device

Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Note
Forward Voltage	V_F	1.5*	1.8*	V	I_F = 10 A, T_J = 25 °C	Fig. 1
		2.0*	2.4*		I_F = 10 A, T_J = 175 °C	
Reverse Current	I_R	12*	60*	µA	V_R = 650 V, T_J = 25 °C	Fig. 2
		24*	220*		V_R = 650 V, T_J = 175 °C	
Total Capacitive Charge	Q_C	28*		nC	V_R = 400 V, I_F = 10 A, T_J = 25 °C	Fig. 5
Total Capacitance	C	459*		pF	V_R = 0 V, T_J = 25 °C, f = 1 MHz	Fig. 6
		55*			V_R = 200 V, T_J = 25 °C, f = 1 MHz	
		49*			V_R = 400 V, T_J = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_C	4.5*		µJ	V_R = 400 V	Fig. 7

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

Thermal Characteristics

Parameter	Symbol	Typ.	Unit	Note
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.23* 0.62**	°C/W	Fig. 8

* Per Leg, ** Per Device

Typical Performance (Per Leg)

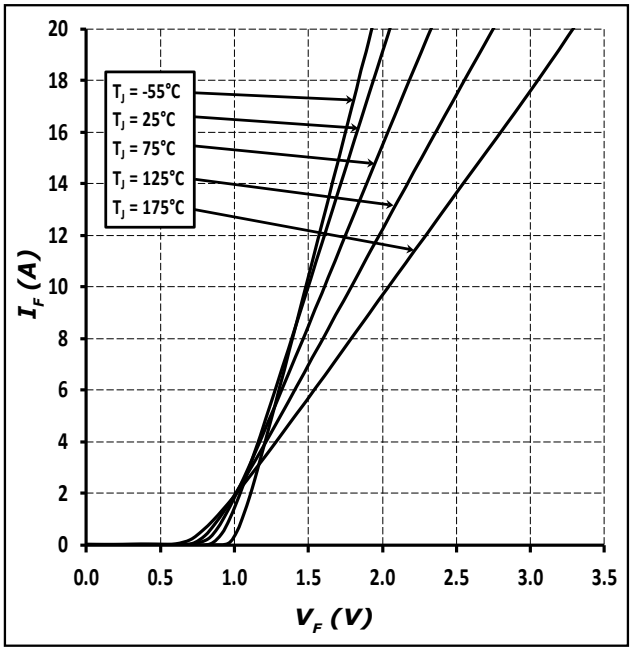


Figure 1. Forward Characteristics

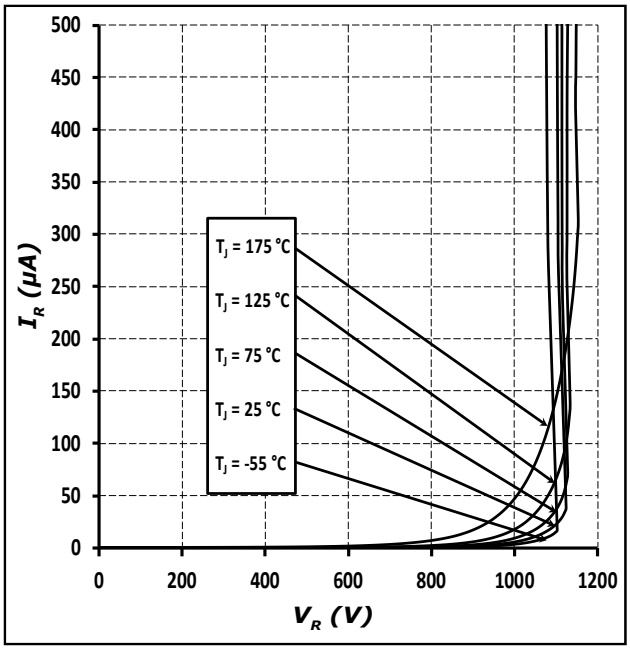


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

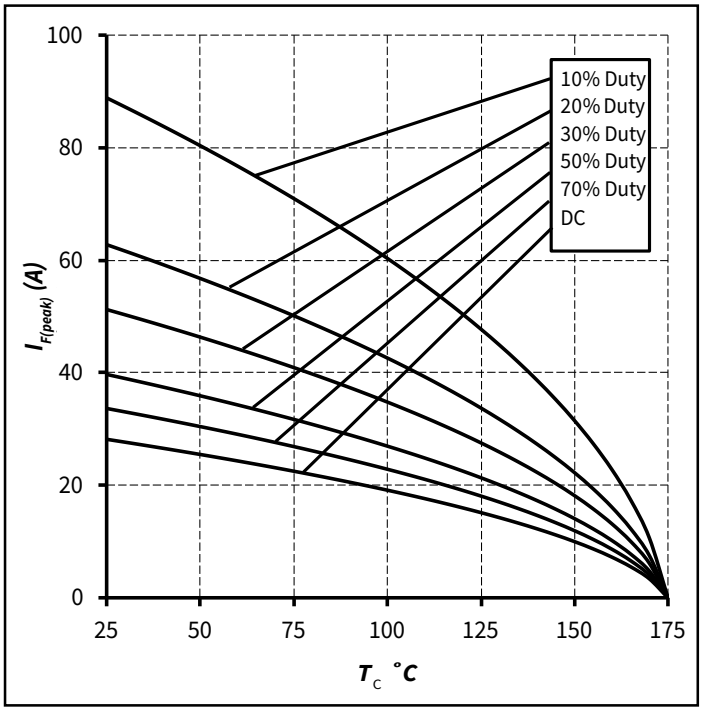


Figure 3. Current Derating

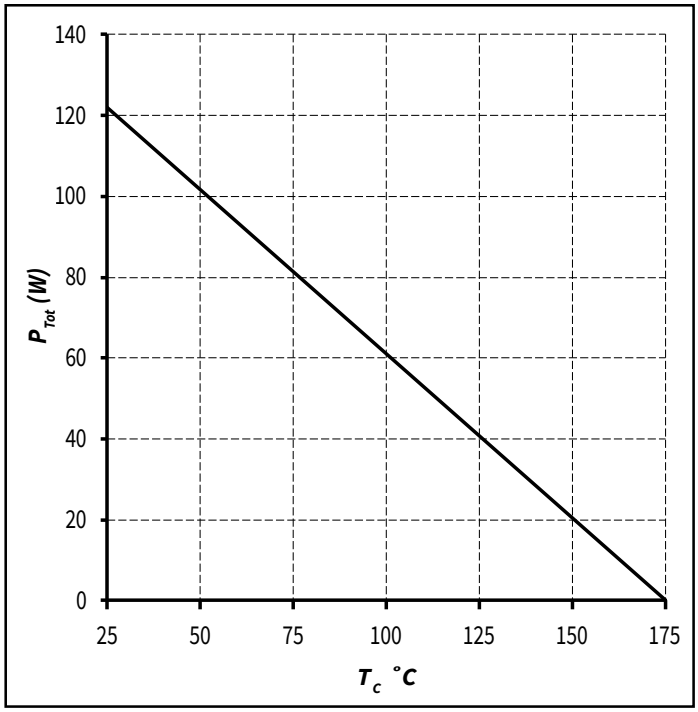


Figure 4. Power Derating

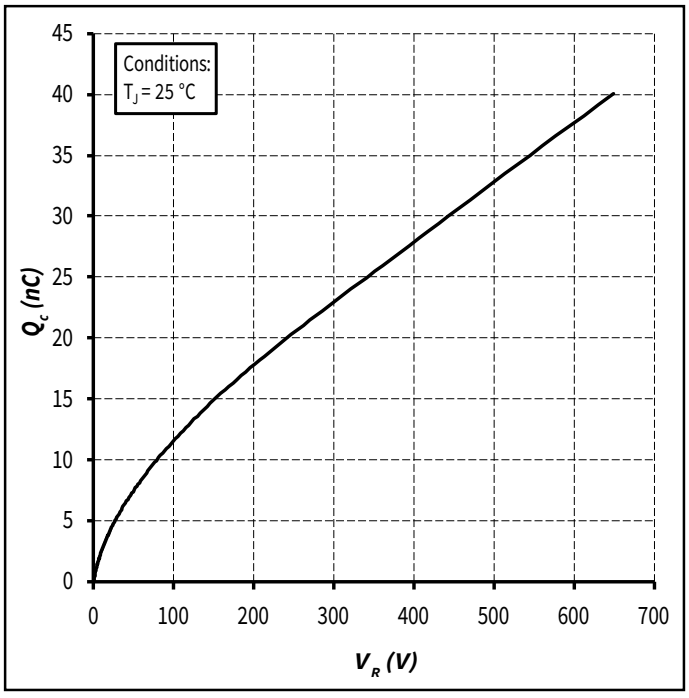


Figure 5. Recovery Charge vs. Reverse Voltage

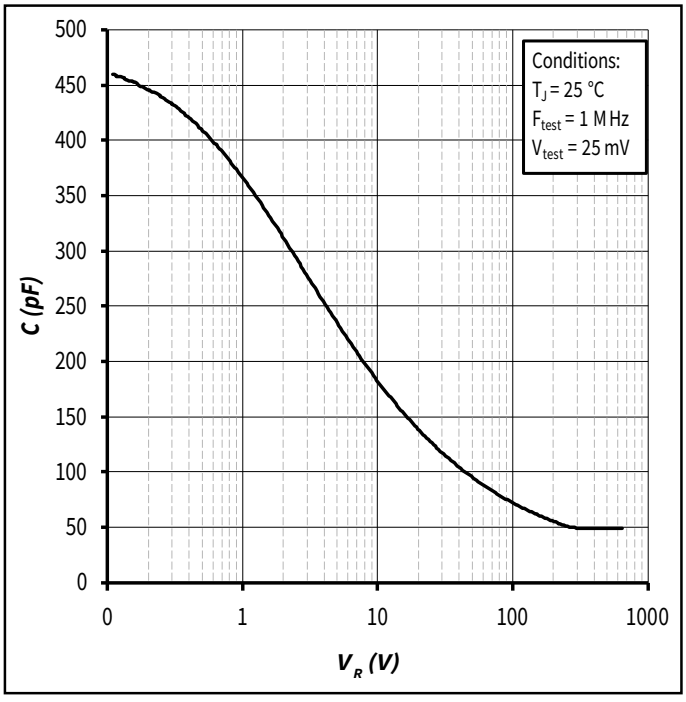


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance (Per Leg)

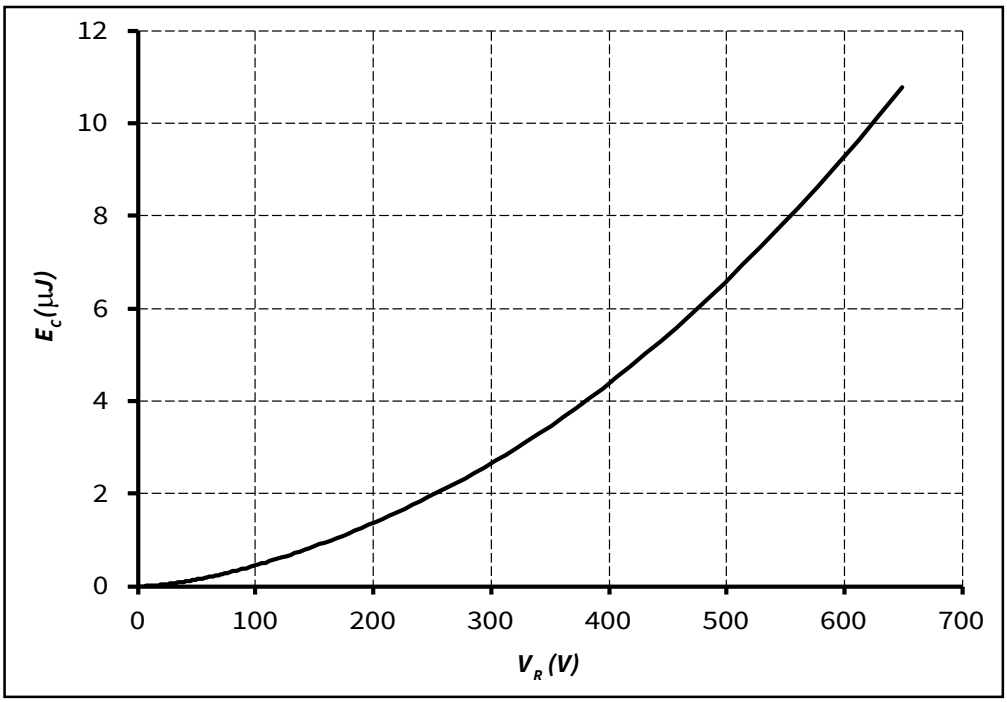


Figure 7. Typical Capacitance Stored Energy

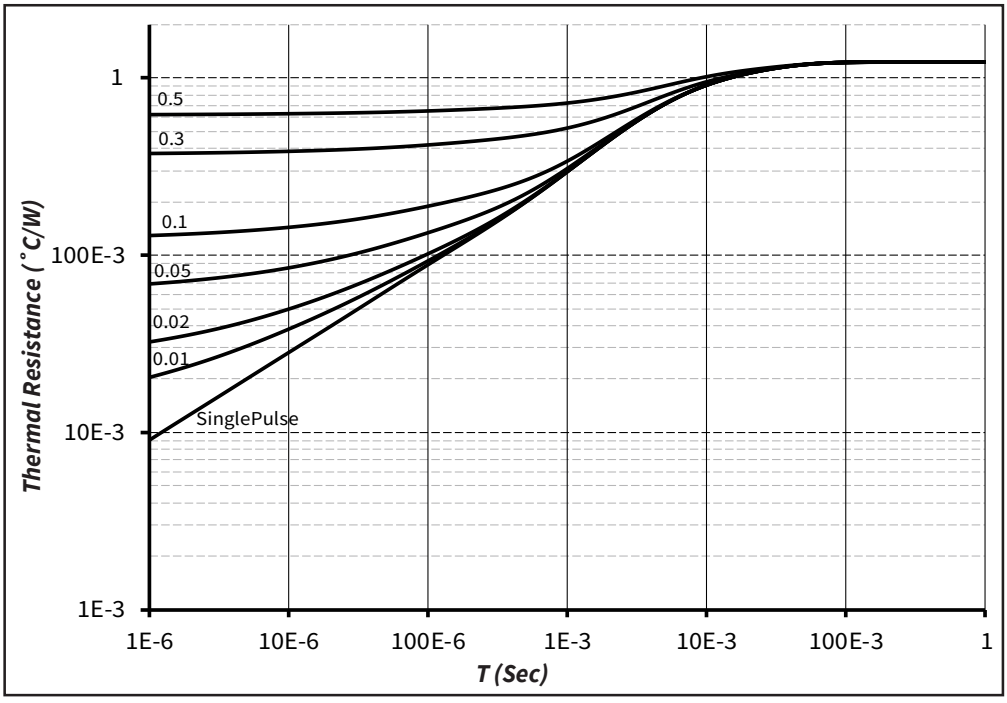
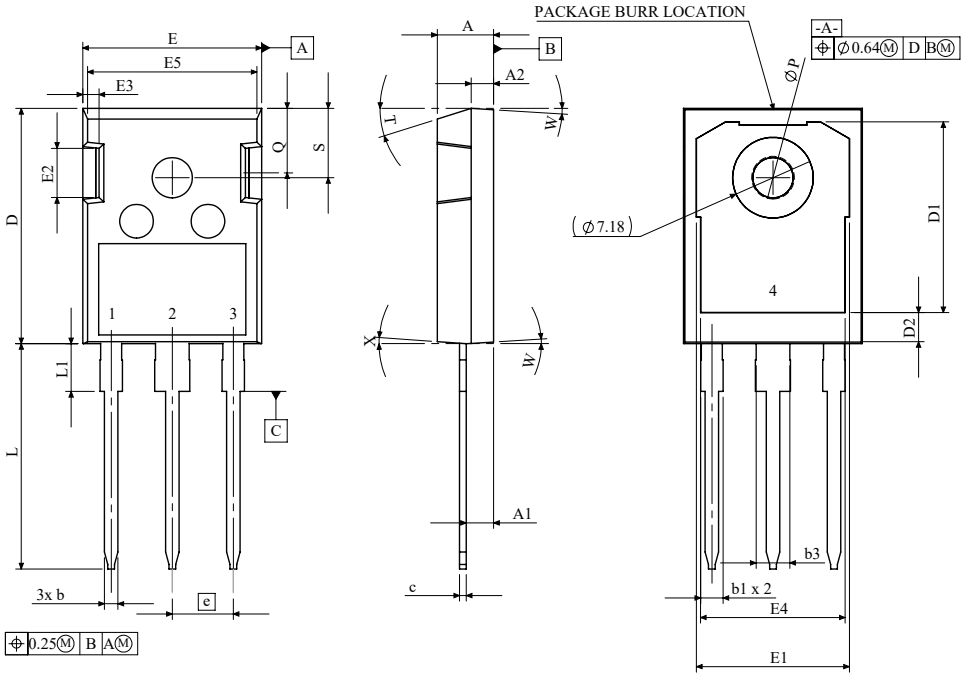


Figure 8. Transient Thermal Impedance

Package Dimensions

Package: TO-247-3

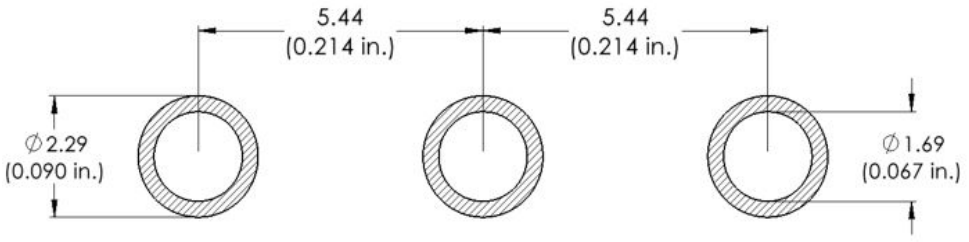


SYMBOL	MIN (mm)	MAX (mm)
A	4.83	5.21
A1	2.27	2.52
A2	1.91	2.16
b	1.07	1.33
b1	1.91	2.41
b3	2.87	3.38
c	0.55	0.74
D	20.75	21.05
D1	16	17.4
D2	2.86	3.26
E	15.75	16.13
E1	13.5	14.55
E2	3.68	5.1
E3	1	1.9
E4	12.38	13.43
E5	14.65	15.05
e	5.44 BSC	
L	19.73	20.48
L1	3.97	4.69
ØP	3.18	4.06
Q	5.42	5.96
S	5.85	6.49
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	

1	ANODE
2	CATHODE
3	ANODE
4	CATHODE

NOTES:
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. BURR OR MOLD FLASH SIZE (0.5 mm) IS NOT INCLUDED IN THE DIMENSIONS

Recommended Solder Pad Layout



Part Number	Package	Marking
E3D20065D	TO-247-3	E3D20065

Revision History

Current Revision	Date of Release	Description of Changes
1	September-2023	Updated Wolfspeed branding, package drawing, and solder pad layout
2	February 2025	Legal Disclaimer, POD

Notes & Disclaimer

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