

C3D08065E

650 V, 8 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-252-2



Package Types: TO-252-2

PN: C3D08065

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.

Applications

- Switch mode power supplies (SMPS)
- Power factor correction
- Motor drives

Benefits

- Replace bipolar with unipolar rectifiers
- Essentially no switching losses
- Higher efficiency
- Reduction of heat sink requirements
- Parallel devices without thermal runaway

Maximum Ratings ($T_c = 25\text{ }^\circ\text{C}$ Unless Otherwise Specified)

Parameter	Symbol	Value	Unit	Test Conditions	Note
Repetitive Peak Reverse Voltage	V_{RRM}	650	V		
Surge Peak Reverse Voltage	V_{RSM}	650			
DC Blocking Voltage	V_{DC}	650			
Continuous Forward Current	I_F	25.5	A	$T_c = 25\text{ }^\circ\text{C}$	Fig. 3
		12		$T_c = 135\text{ }^\circ\text{C}$	
		8		$T_c = 155\text{ }^\circ\text{C}$	
Repetitive Peak Forward Surge Current	I_{FRM}	34	A	$T_c = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave	Fig. 8
		25		$T_c = 110\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave	
Non-Repetitive Peak Forward Surge Current	I_{FSM}	71	A	$T_c = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave	Fig. 8
		60		$T_c = 110\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$, Half Sine Wave	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	650	A	$T_c = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$, Pulse	Fig. 8
		530		$T_c = 110\text{ }^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$, Pulse	
Power Dissipation	P_{tot}	120	W	$T_c = 25\text{ }^\circ\text{C}$	Fig. 4
		52		$T_c = 110\text{ }^\circ\text{C}$	
Operating Junction and Storage Temperature	$T_{J, T_{stg}}$	-55 to +175	$^\circ\text{C}$		



Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Note
Forward Voltage	V_F	1.5	1.8	V	$I_F = 8 \text{ A}, T_J = 25^\circ\text{C}$	Fig. 1
		2.1	2.4		$I_F = 8 \text{ A}, T_J = 175^\circ\text{C}$	
Reverse Current	I_R	10	50	μA	$V_R = 650 \text{ V}, T_J = 25^\circ\text{C}$	Fig. 2
		20	200		$V_R = 650 \text{ V}, T_J = 175^\circ\text{C}$	
Total Capacitive Charge	Q_C	20		nC	$V_R = 650 \text{ V}, I_F = 8 \text{ A}$ $di/dt = 500 \text{ A}/\mu\text{S}$ $T_J = 25^\circ\text{C}$	Fig. 5
Total Capacitance	C	395		pF	$V_R = 0 \text{ V}, T_J = 25^\circ\text{C}, f = 1 \text{ MHz}$	Fig. 6
		37			$V_R = 200 \text{ V}, T_J = 25^\circ\text{C}, f = 1 \text{ MHz}$	
		32			$V_R = 400 \text{ V}, T_J = 25^\circ\text{C}, f = 1 \text{ MHz}$	
Capacitance Stored Energy	E_C	3.0		μJ	$V_R = 400 \text{ V}$	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	$R_{\theta JC}$	1.25	$^\circ\text{C}/\text{W}$	Fig. 9

Typical Performance

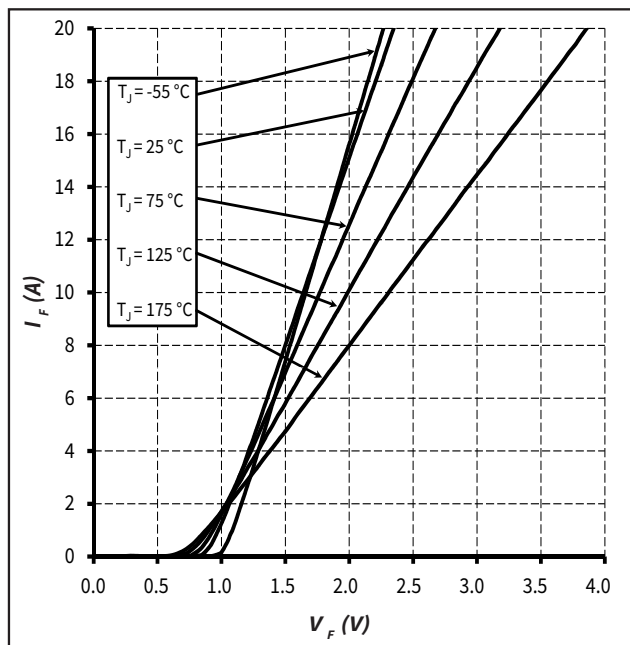


Figure 1. Forward Characteristics

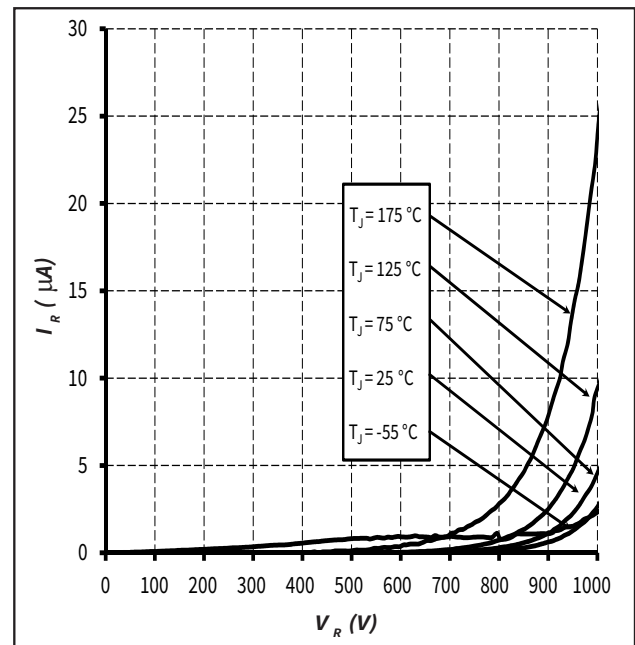


Figure 2. Reverse Characteristics



Typical Performance

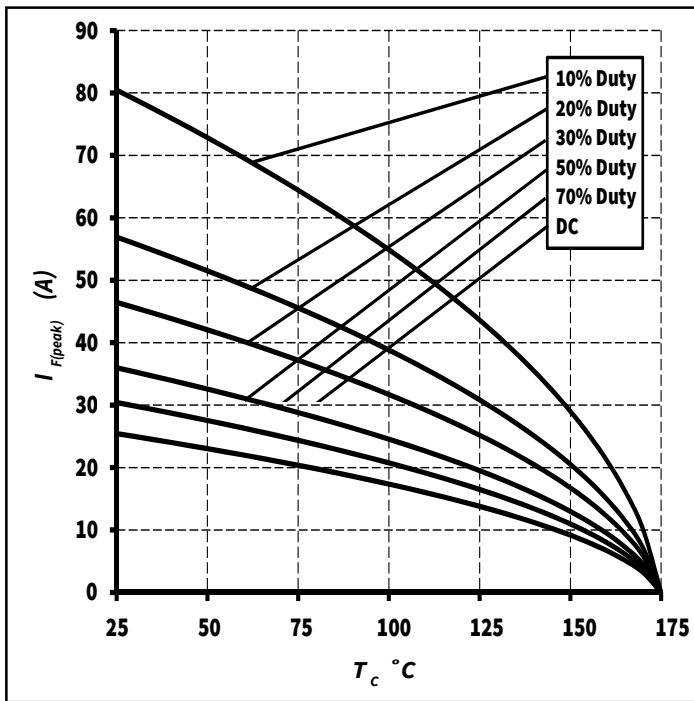


Figure 3. Current Derating

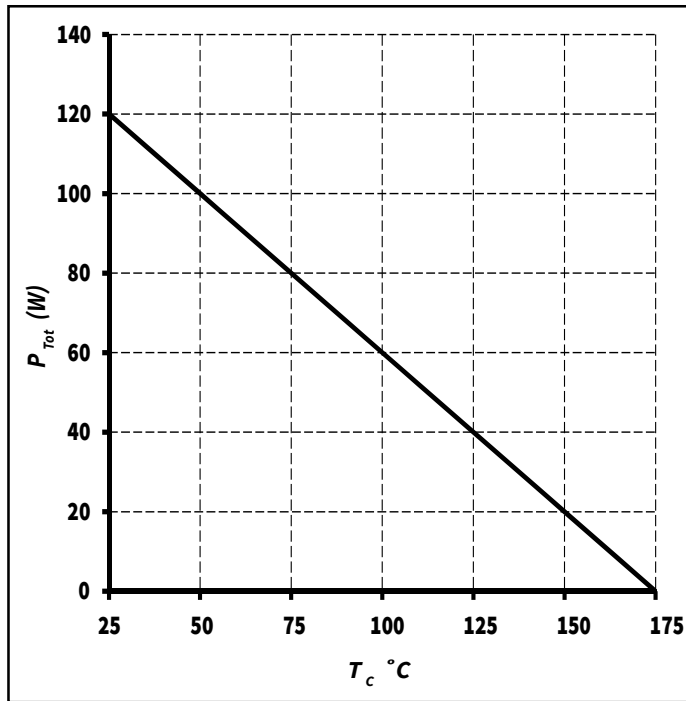


Figure 4. Power Derating

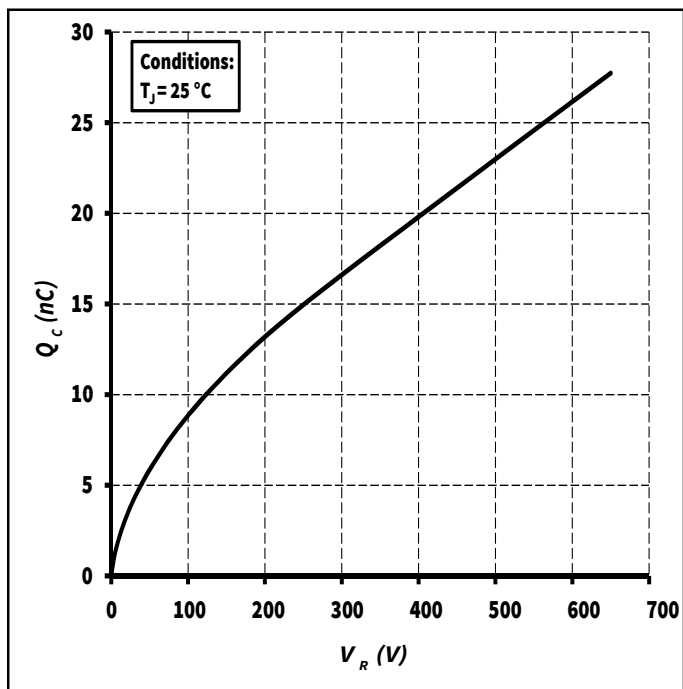


Figure 5. Total Capacitance Charge vs. Reverse Voltage

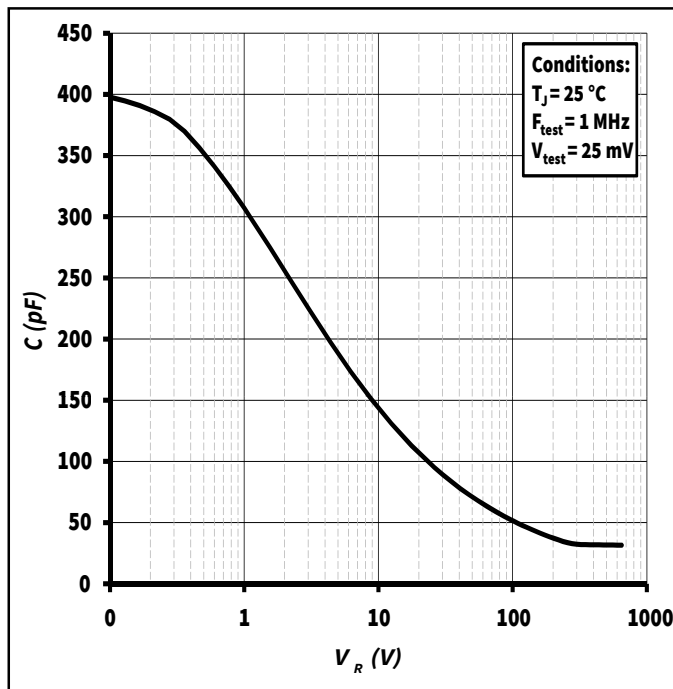


Figure 6. Capacitance vs. Reverse Voltage



Typical Performance

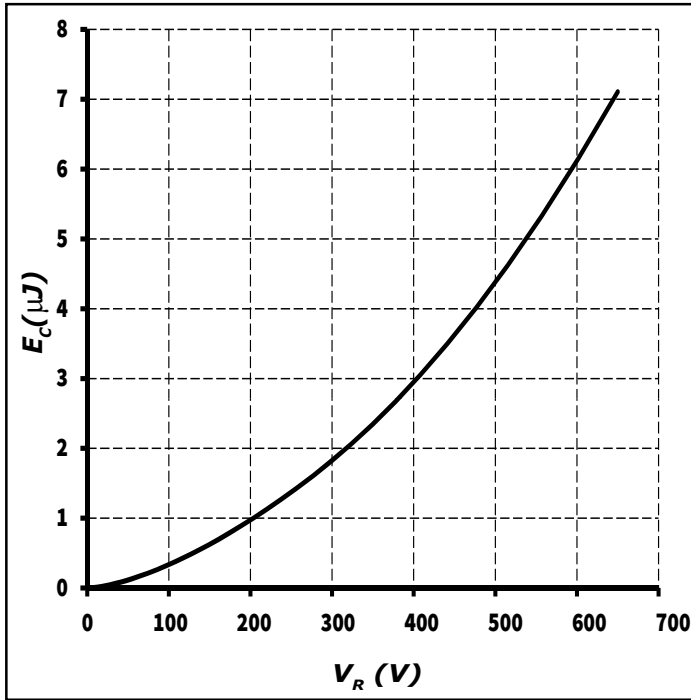


Figure 7. Capacitance Stored Energy

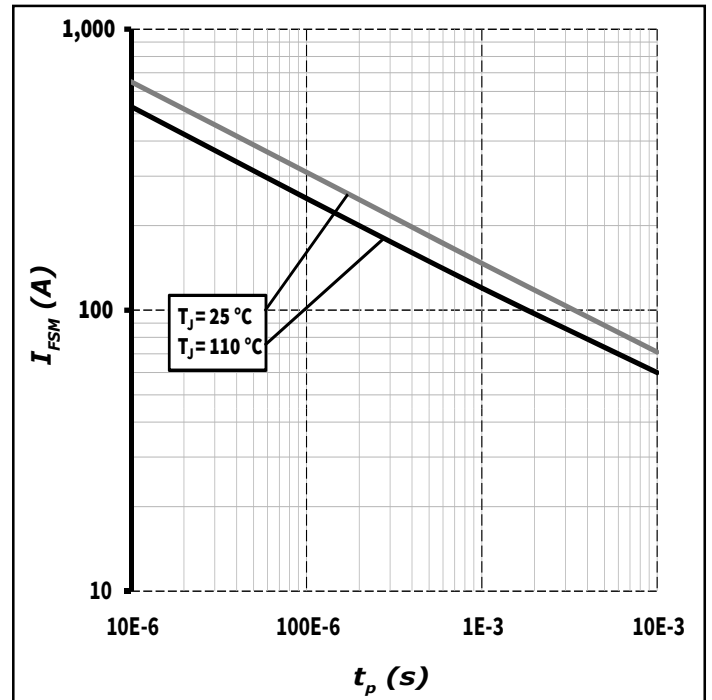


Figure 8. Non-Repetitive Peak Forward Surge Current Versus Pulse Duration (Sinusoidal Waveform)

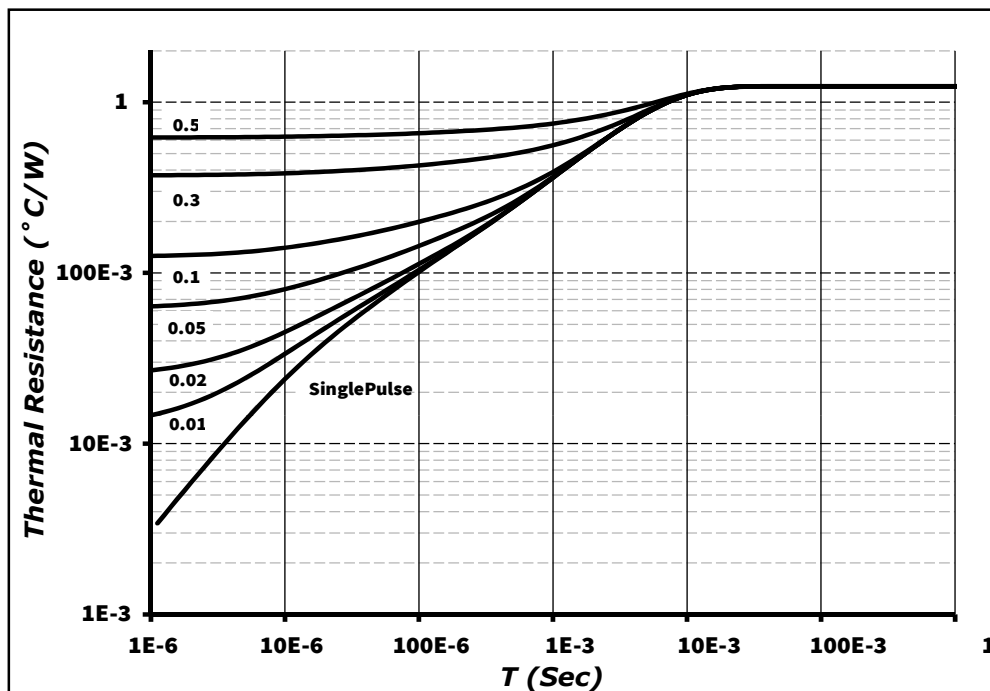
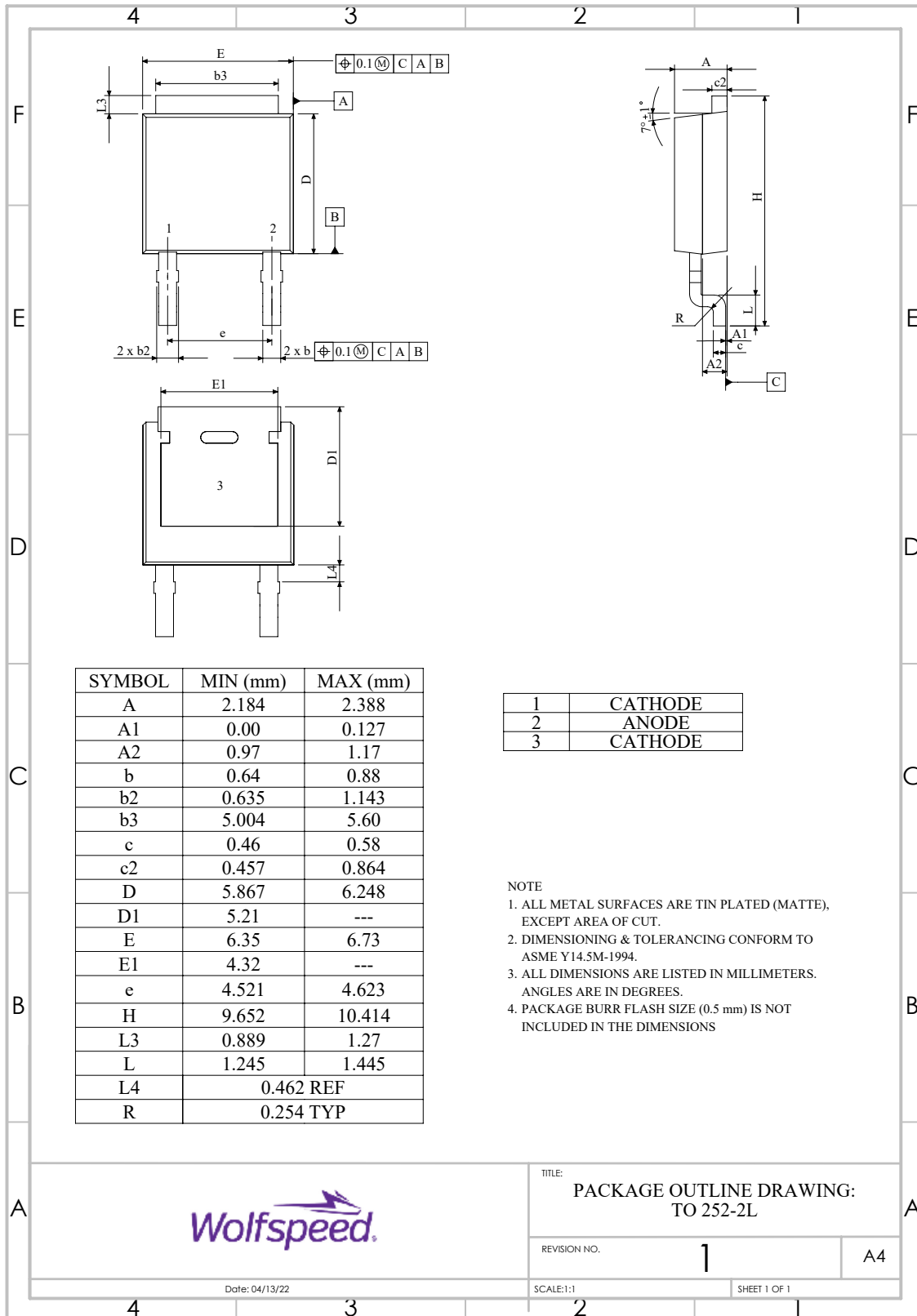


Figure 9. Transient Thermal Impedance



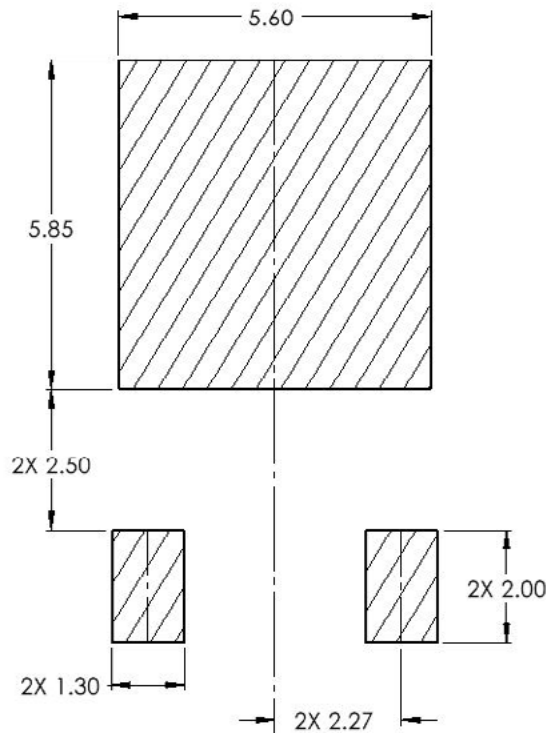
Package Dimensions

Package: TO-252-2



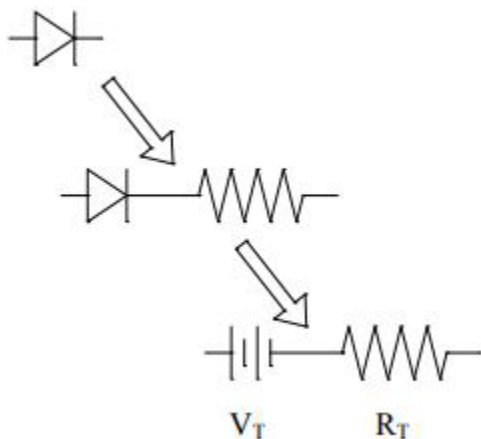


Recommended Solder Pad Layout



Part Number	Package	Marking
C3D08065E	TO-252-2	C3D08065

Diode Model



$$V_{fT} = V_T + I_f * R_T$$

$$V_T = 0.95 + (T_j * -1.2 * 10^{-3})$$

$$R_T = 0.054 + (T_j * 5.5 * 10^{-4})$$

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



Revision History

Current Revision	Date of Release	Description of Changes
5	September-2023	Updated Wolfspeed branding, package drawing, and solder pad layout, Removed AEC-Q101 banner
6	October-2023	Corrected solder pad layout and diode model



Notes & Disclaimer

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