

# C6D04065E

650 V, 4 A Silicon Carbide Schottky Diode

## Features

- New 6<sup>th</sup> generation technology
- Low forward voltage drop ( $V_F$ )
- Zero reverse recovery current
- Zero forward recovery voltage
- Low leakage current ( $I_L$ )
- Temperature-independent switching behavior
- Positive temperature coefficient on  $V_F$



TO-252-2



Package Types: TO-252-2

Marking: C6D04065

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)
- Server/telecom power supplies
- Industrial power supplies
- Solar
- UPS

## Benefits

- Higher system level efficiency
- Increase system power density
- 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		
DC Blocking Voltage	$V_{DC}$	650			
Continuous Forward Current	$I_F$	16	A	$T_C = 25\text{ }^\circ\text{C}$	Fig. 3
		8		$T_C = 125\text{ }^\circ\text{C}$	
		4		$T_C = 155\text{ }^\circ\text{C}$	
Repetitive Peak Forward Surge Current	$I_{FRM}$	17	A	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$ , Half Sine Wave	
		11		$T_C = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$ , Half Sine Wave	
Non-Repetitive Peak Forward Surge Current	$I_{FSM}$	29	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	
	$I_{F,Max}$	261		$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$ , Pulse	Fig. 8
		180		$T_C = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$ , Pulse	
Power Dissipation	$P_{tot}$	52	W	$T_C = 25\text{ }^\circ\text{C}$	Fig. 4
		22		$T_C = 110\text{ }^\circ\text{C}$	
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	$V_F$	1.27	1.50	V	$I_F = 4 \text{ A}, T_J = 25^\circ\text{C}$	Fig. 1
		1.37	1.60		$I_F = 4 \text{ A}, T_J = 175^\circ\text{C}$	
Reverse Current	$I_R$	2	20	$\mu\text{A}$	$V_R = 650 \text{ V}, T_J = 25^\circ\text{C}$	Fig. 2
		12	80		$V_R = 650 \text{ V}, T_J = 175^\circ\text{C}$	
Total Capacitive Charge	$Q_C$	16		nC	$V_R = 400 \text{ V}, T_J = 25^\circ\text{C}$	Fig. 5
Total Capacitance	C	256		pF	$V_R = 0 \text{ V}, T_J = 25^\circ\text{C}, f = 1 \text{ MHz}$	Fig. 6
		32			$V_R = 200 \text{ V}, T_J = 25^\circ\text{C}, f = 1 \text{ MHz}$	
		27			$V_R = 400 \text{ V}, T_J = 25^\circ\text{C}, f = 1 \text{ MHz}$	
Capacitance Stored Energy	$E_C$	2.6		$\mu\text{J}$	$V_R = 400 \text{ V}$	Fig. 7

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

## Thermal Characteristics

Parameter	Symbol	Typ.	Unit	Note
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.89	$^\circ\text{C}/\text{W}$	Fig. 9

## Typical Performance

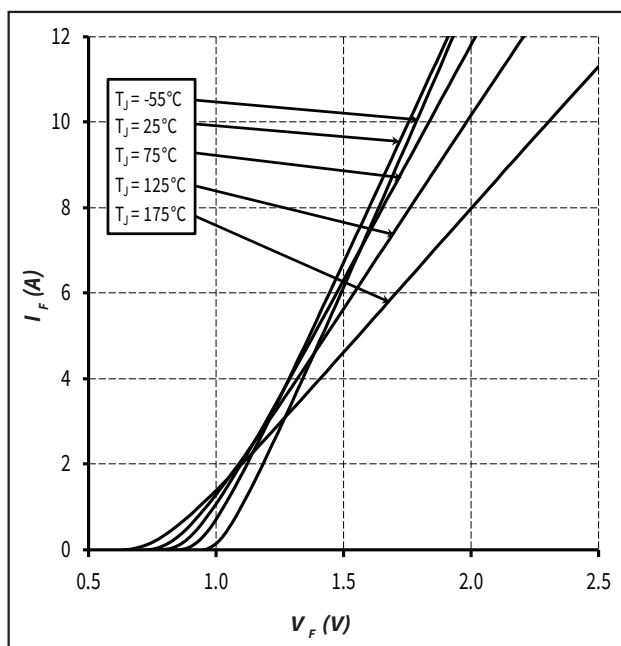


Figure 1. Forward Characteristics

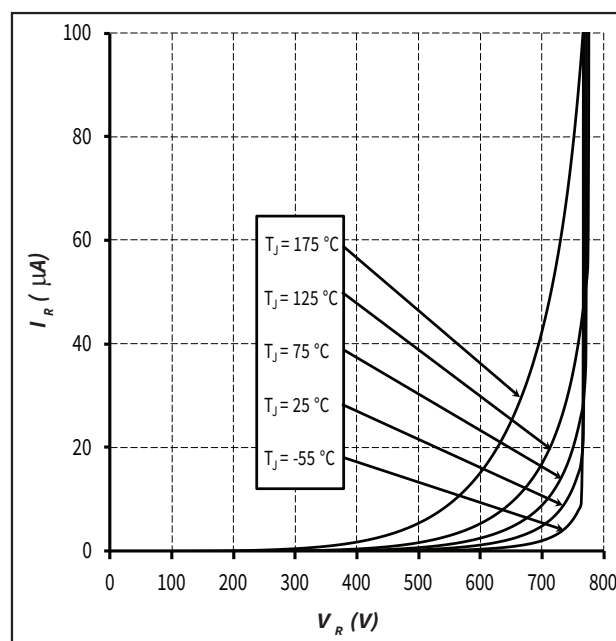


Figure 2. Reverse Characteristics



Typical Performance

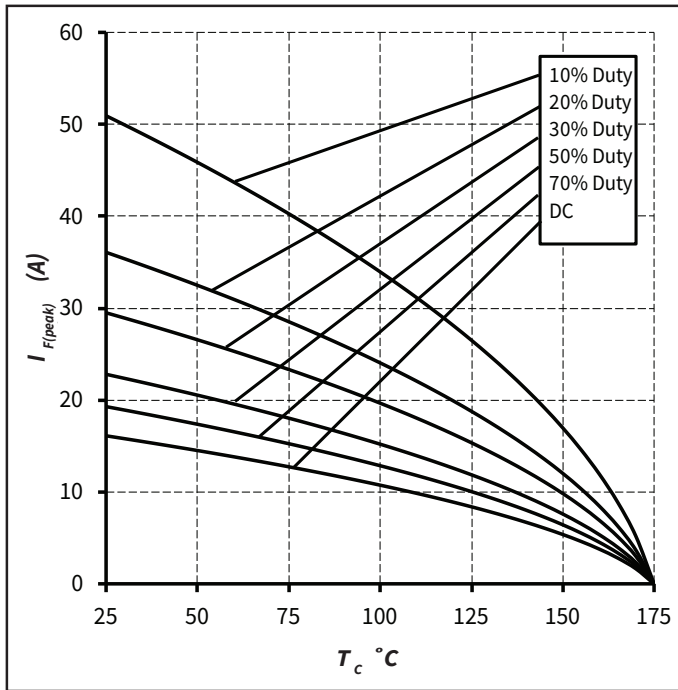


Figure 3. Current Derating

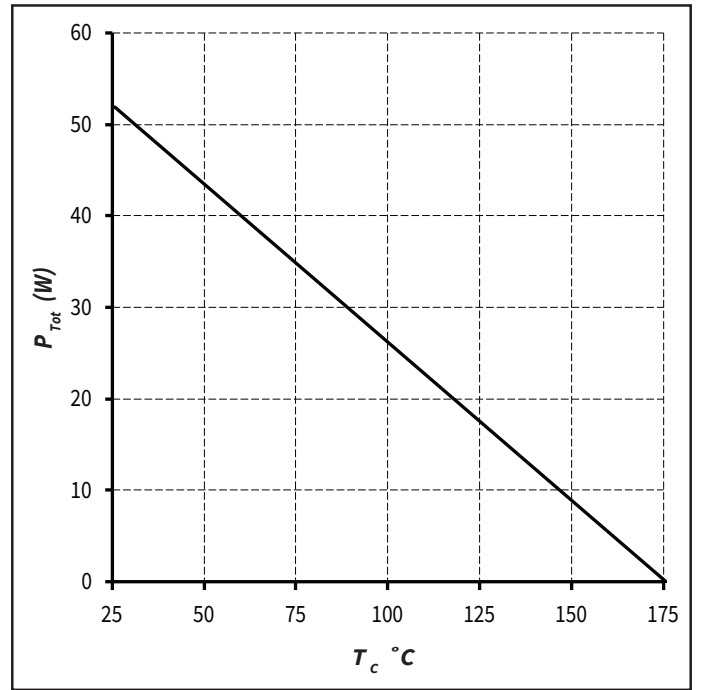


Figure 4. Power Derating

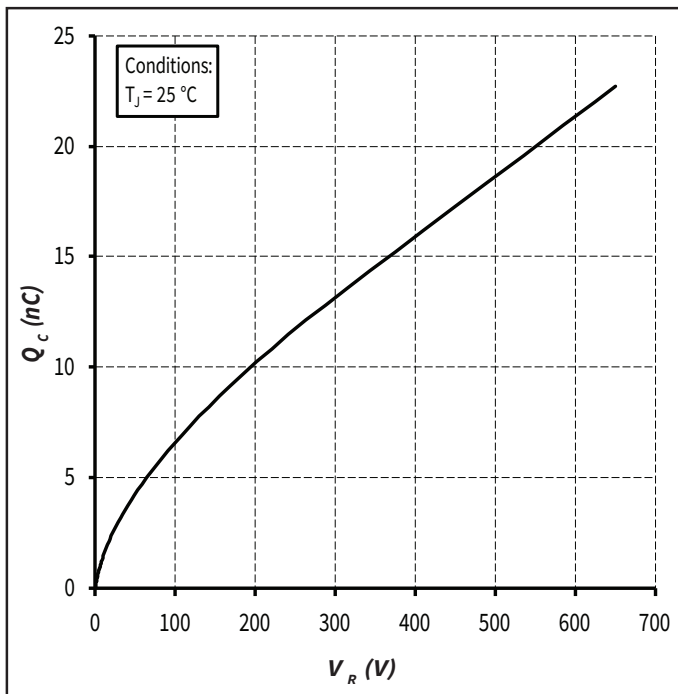


Figure 5. Total Capacitance Charge vs. Reverse Voltage

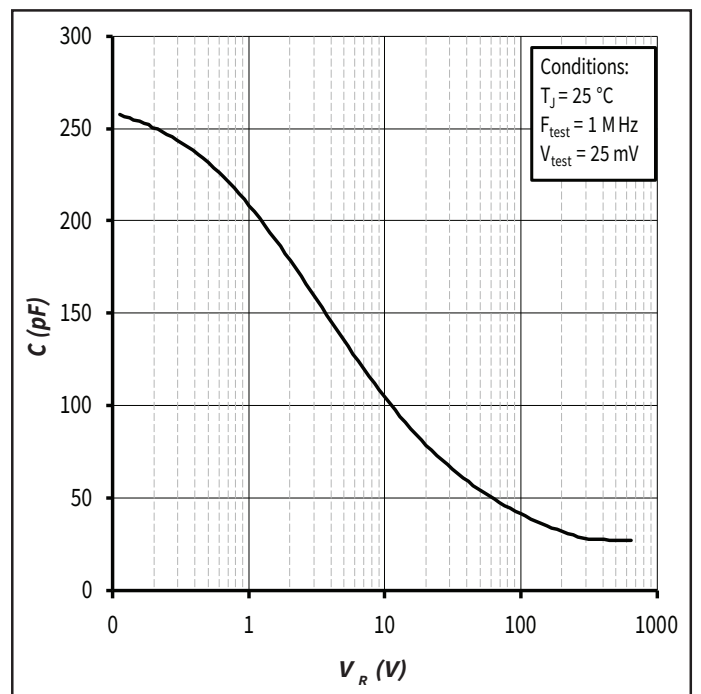


Figure 6. Capacitance vs. Reverse Voltage



Typical Performance

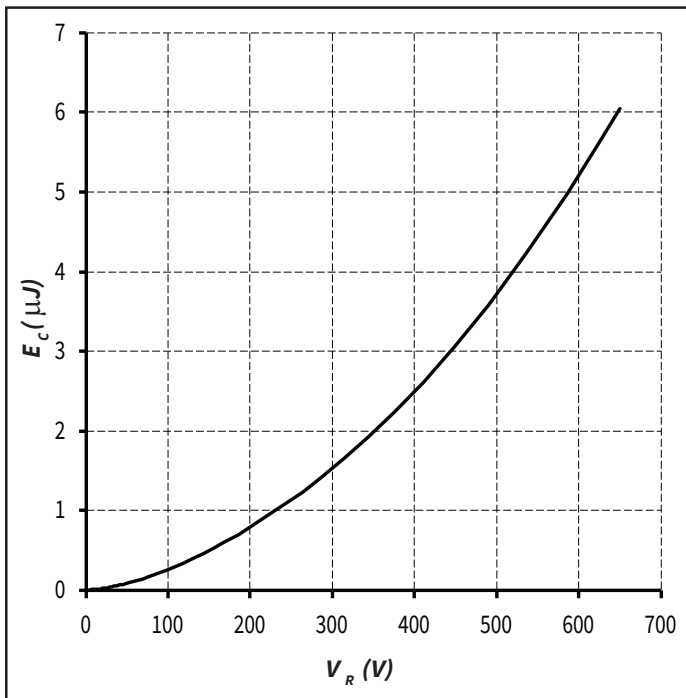


Figure 7. Capacitance Stored Energy

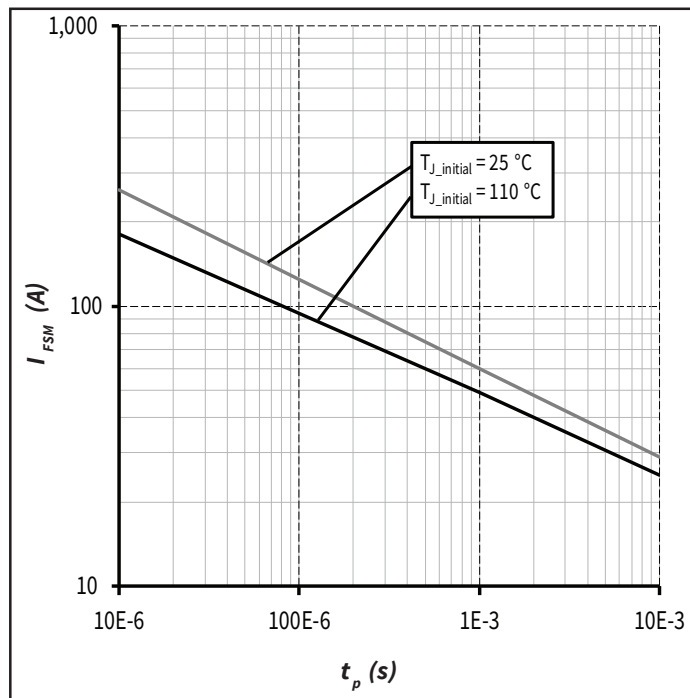


Figure 8. Non-Repetitive Peak Forward Surge Current Versus Pulse Duration (Sinusoidal Waveform)

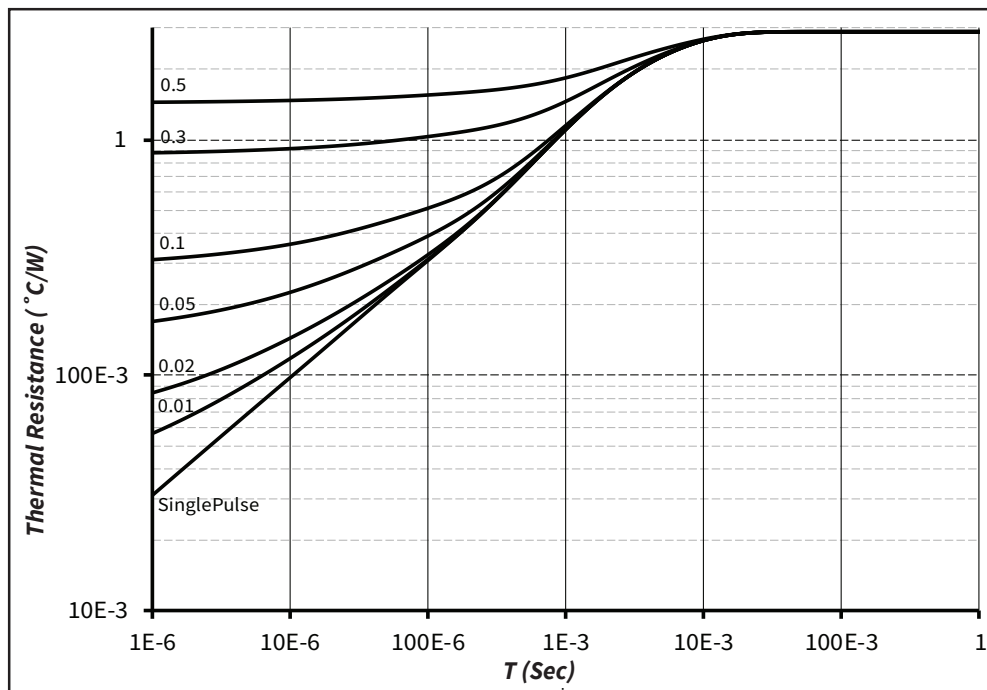
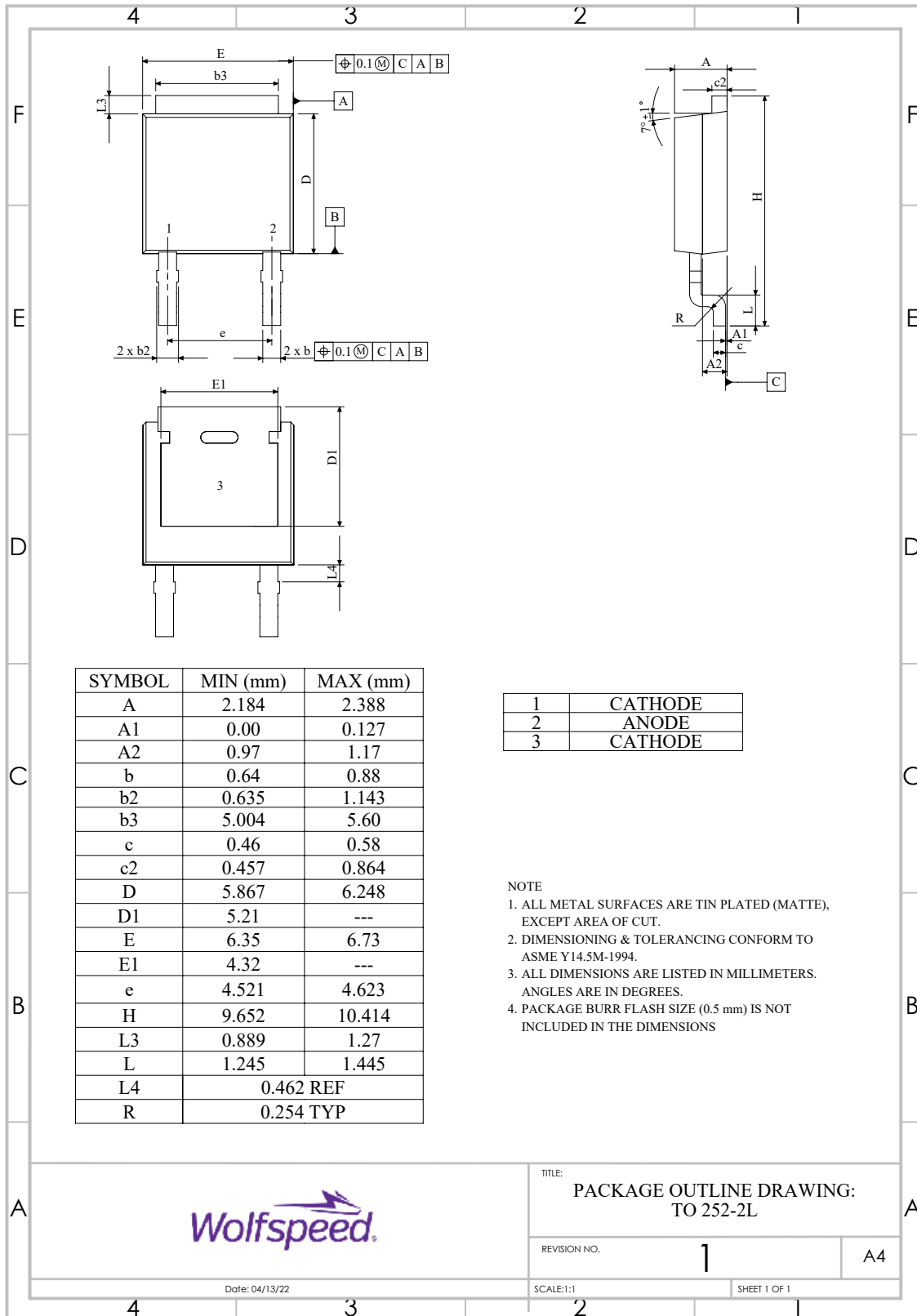


Figure 9. Transient Thermal Impedance

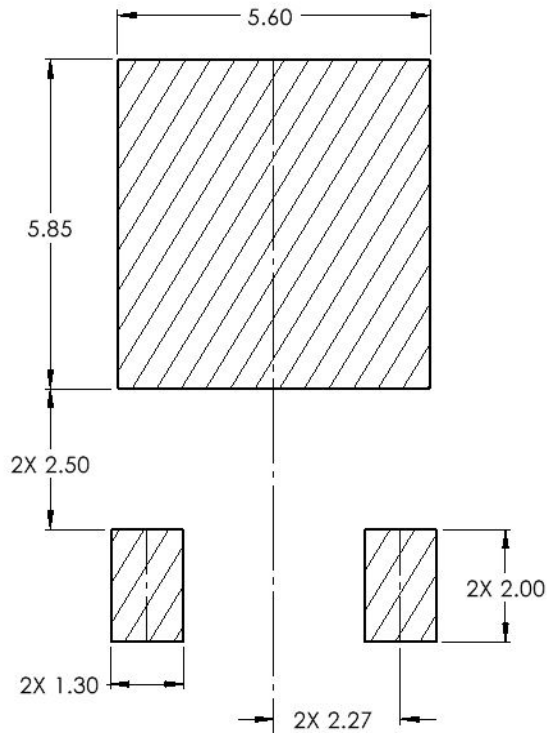


### Package Dimensions

Package: TO-252-2



### Recommended Solder Pad Layout



Part Number	Package	Marking
C6D04065E	TO-252-2	C6D04065



## Revision History

Current Revision	Date of Release	Description of Changes
2	September-2023	Updated Wolfspeed branding, package drawing, and solder pad layout
3	October-2023	Corrected solder pad layout, removed incorrect diode model



## Notes & Disclaimer

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