

# E3D20065D

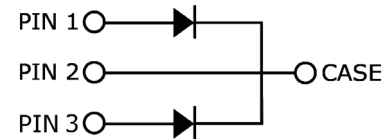
## 650 V, 20 A Silicon Carbide Schottky Diode

### 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

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### 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 ( $T_c = 25\text{ }^\circ\text{C}$ 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	$T_c = 25\text{ }^\circ\text{C}$	Fig. 3
		13*/26**		$T_c = 135\text{ }^\circ\text{C}$	
		10*/20**		$T_c = 150\text{ }^\circ\text{C}$	
Power Dissipation	$P_{tot}$	122*	W	$T_c = 25\text{ }^\circ\text{C}$	Fig. 4
		53*		$T_c = 110\text{ }^\circ\text{C}$	
Repetitive Peak Forward Surge Current	$I_{FRM}$	37*	A	$T_c = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$ , Half Sine Pulse	
		22*		$T_c = 110\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$ , Half Sine Pulse	
Diode dV/dt Ruggedness	dV/dt	200	V/ns	$V_R = 0\text{--}650\text{ V}$	
Operating Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +175	$^\circ\text{C}$		
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	$I_F = 10\text{ A}, T_J = 25\text{ }^\circ\text{C}$	Fig. 1
		2.0*	2.4*		$I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$	
Reverse Current	$I_R$	12*	60*	$\mu\text{A}$	$V_R = 650\text{ V}, T_J = 25\text{ }^\circ\text{C}$	Fig. 2
		24*	220*		$V_R = 650\text{ V}, T_J = 175\text{ }^\circ\text{C}$	
Total Capacitive Charge	$Q_C$	28*		nC	$V_R = 400\text{ V}, I_F = 10\text{ A}, T_J = 25\text{ }^\circ\text{C}$	Fig. 5
Total Capacitance	C	459*		$\text{pF}$	$V_R = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$	Fig. 6
		55*			$V_R = 200\text{ V}, T_J = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$	
		49*			$V_R = 400\text{ V}, T_J = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$	
Capacitance Stored Energy	$E_C$	4.5*		$\mu\text{J}$	$V_R = 400\text{ V}$	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	$R_{\theta JC}$	1.23* 0.62**	$^\circ\text{C/W}$	Fig. 8

\* Per Leg, \*\* Per Device

### Typical Performance (Per Leg)

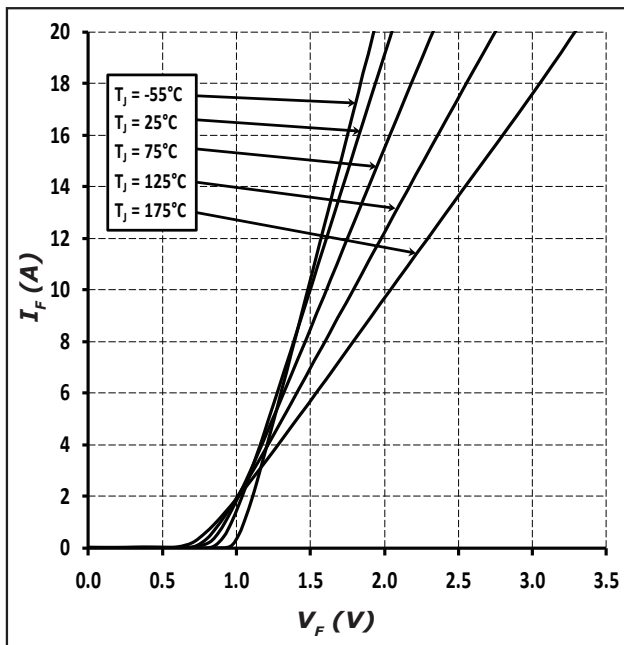


Figure 1. Forward Characteristics

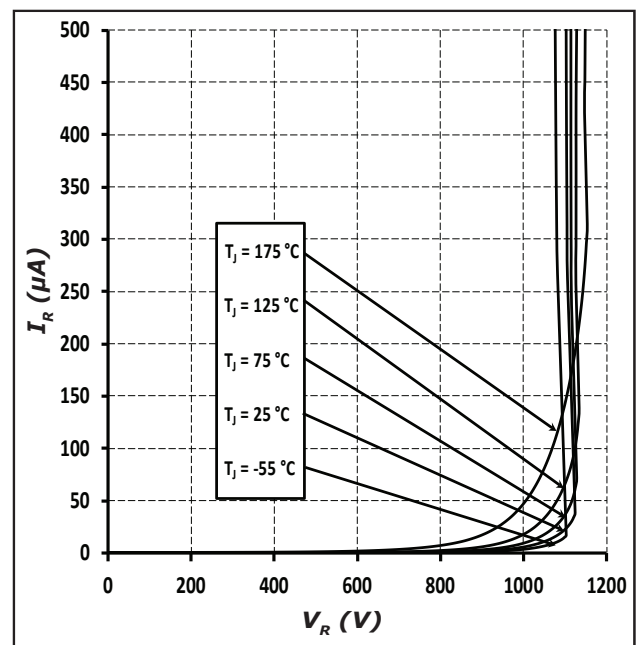


Figure 2. Reverse Characteristics



Typical Performance (Per Leg)

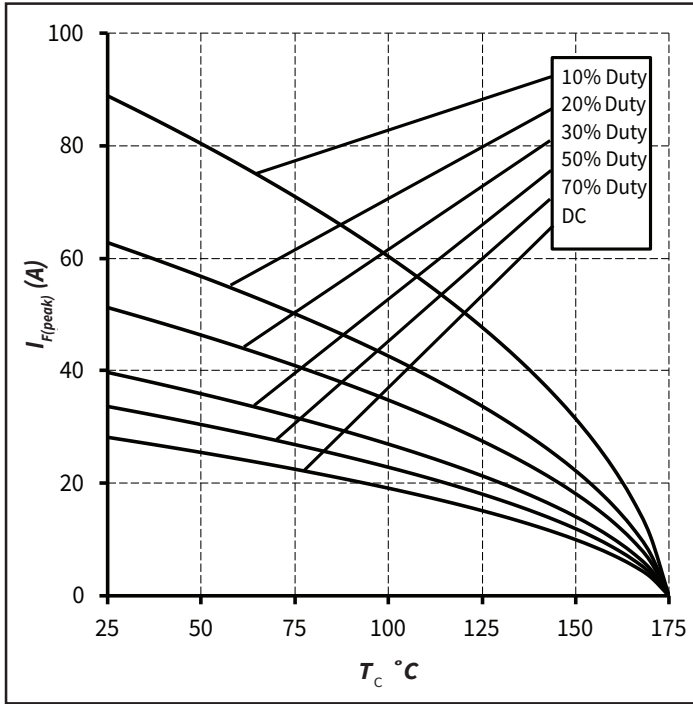


Figure 3. Current Derating

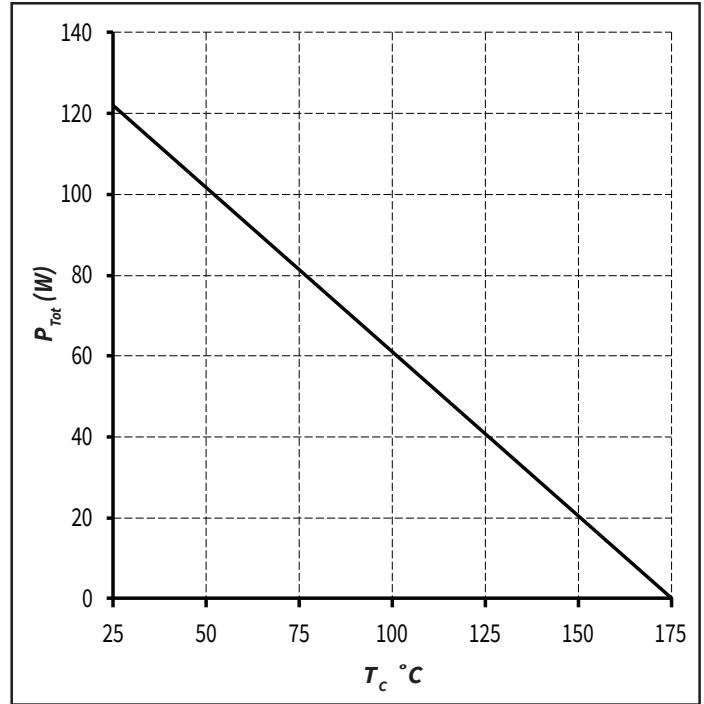


Figure 4. Power Derating

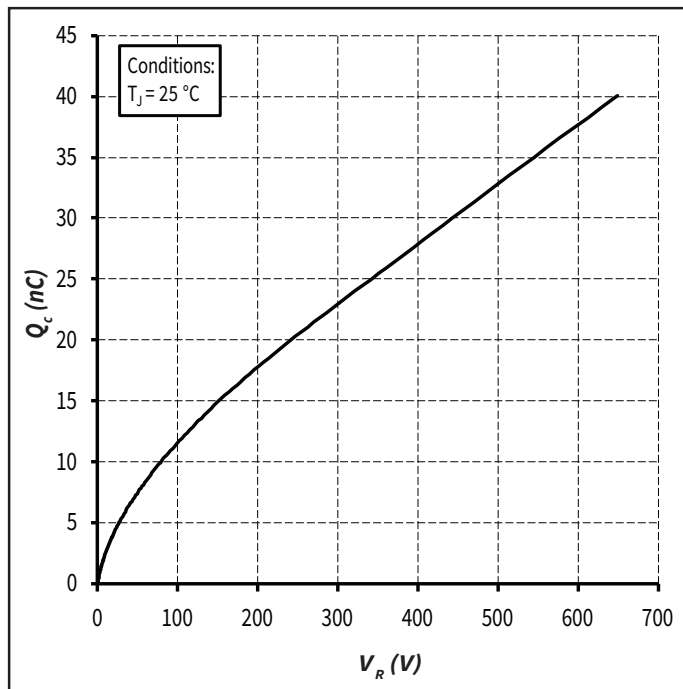


Figure 5. Recovery Charge vs. Reverse Voltage

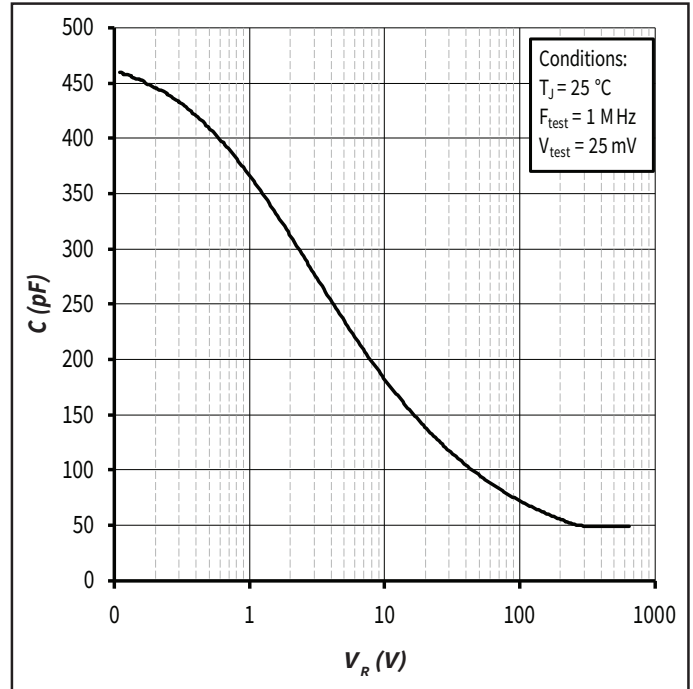


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance (Per Leg)

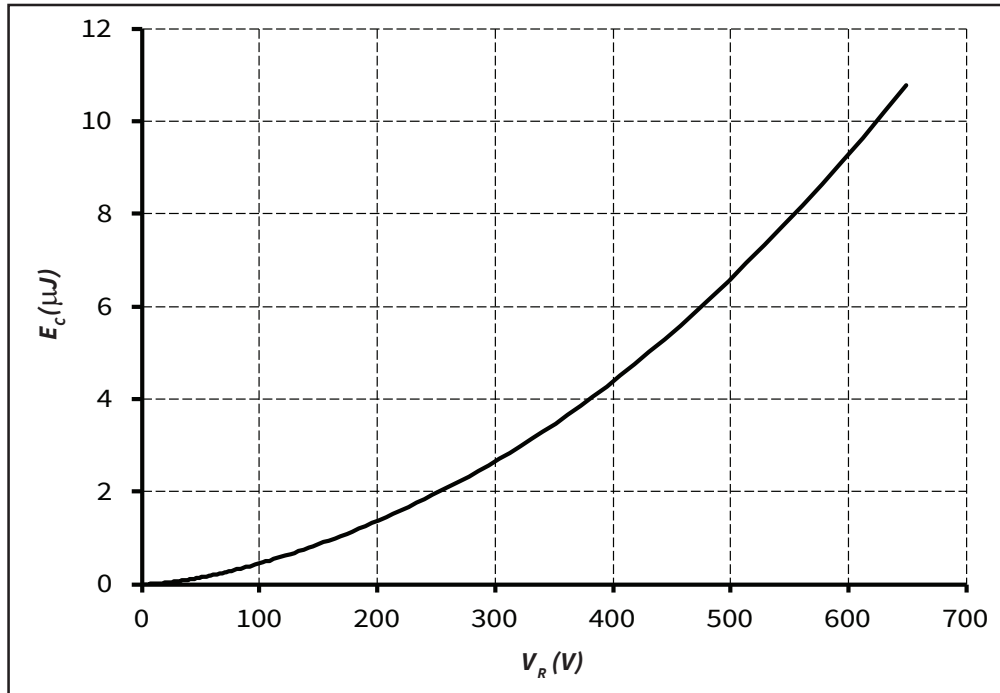


Figure 7. Typical Capacitance Stored Energy

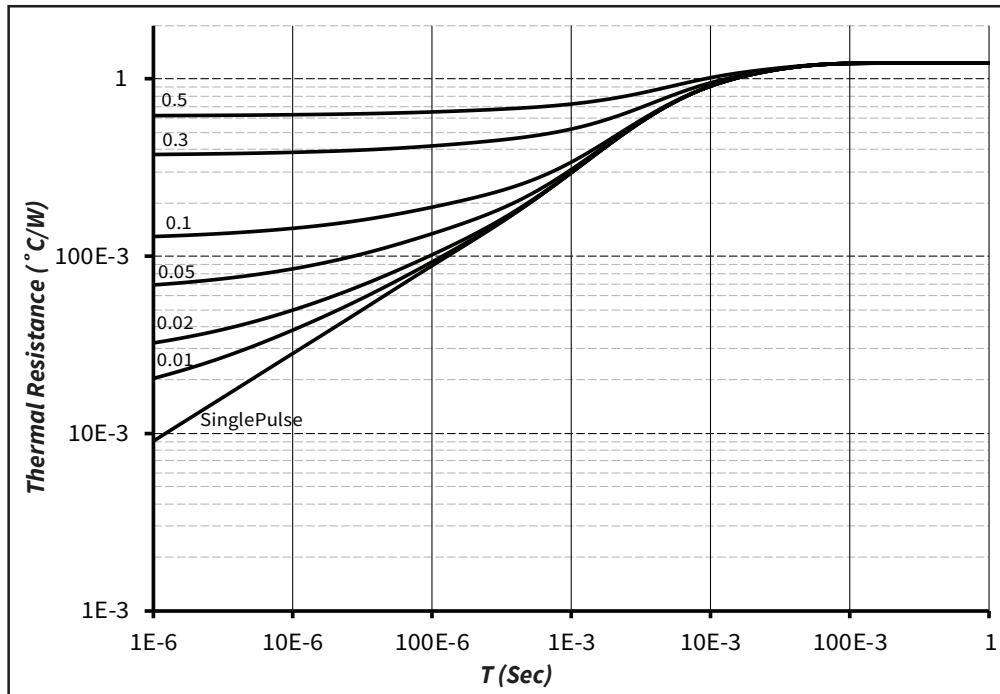
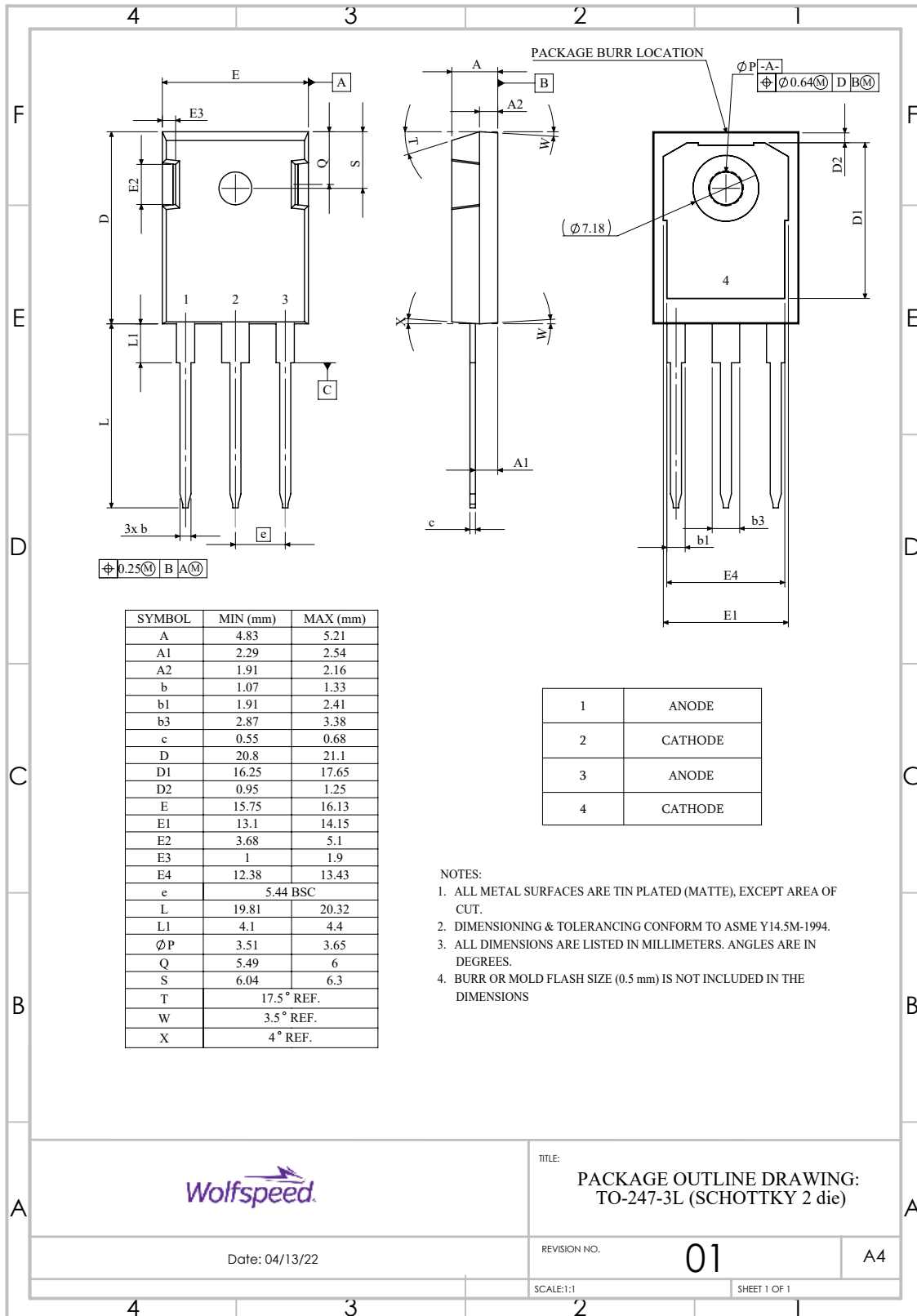


Figure 8. Transient Thermal Impedance



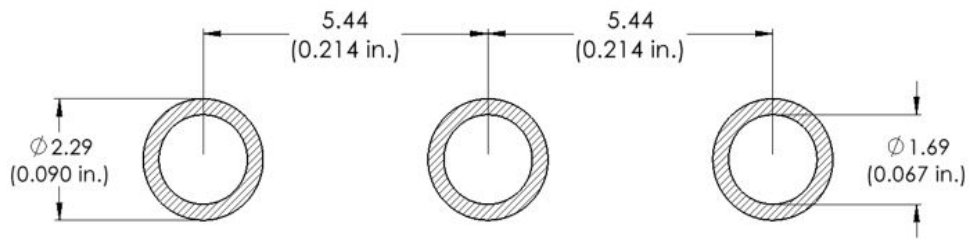
### Package Dimensions

Package: TO-247-3





## 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



## Notes & Disclaimer

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