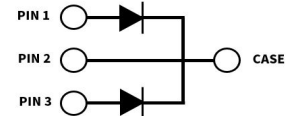


# C3D20065D

## 3rd Generation 650 V, 20 A Silicon Carbide Schottky Diode

### 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.



Package Types: TO-247-3  
Marking: C3D20065

### Features

- High-Frequency Operation
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Parallel Devices Without Thermal Runaway

### Applications

- Boost Diodes in PFC or DC/DC Stages
- Free Wheeling Diodes in Inverter Stages
- Switch Mode Power Supplies
- Solar Inverters
- AC/DC Converters

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

\* Per Leg, \*\* Per Device

Parameter	Symbol	Value	Unit	Test Conditions	Notes
Repetitive Peak Reverse Voltage	$V_{RRM}$	650	V		
Surge Peak Reverse Voltage	$V_{RSM}$	650			
DC Blocking Voltage	$V_{DC}$	650			
Continuous Forward Current (Per Leg/Per Device)	$I_F$	27.5/55	A	$T_c = 25^\circ\text{C}$	Fig. 3
		13/26		$T_c = 135^\circ\text{C}$	
		10/20		$T_c = 149^\circ\text{C}$	
Repetitive Peak Forward Surge Current	$I_{FRM}$	46*	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$	
		31*		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$	
Non-Repetitive Forward Surge Current	$I_{FSM}$	90*	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$	Fig. 8
		71*		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	860*	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ }\mu\text{s, Pulse}$	
		680*		$T_c = 110^\circ\text{C}, t_p = 10\text{ }\mu\text{s, Pulse}$	
Power Dissipation (Per Leg/Per Device)	$P_{tot}$	115.5/231	W	$T_c = 25^\circ\text{C}$	Fig. 4
		50/100		$T_c = 110^\circ\text{C}$	
Diode dV/dt Ruggedness	dV/dt	200	V/ns	$V_R = 0\text{-}650\text{V}$	

## Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
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	$Q_C$	24		nC	$V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$ $I_F = 10 \text{ A}, di/dt = 500 \text{ A}/\mu\text{s}$	Fig. 5
Total Capacitance	C	460.5		pF	$V_R = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$	Fig. 6
		44			$V_R = 200 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$	
		40			$V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$	
Capacitance Stored Energy	$E_C$	3.6		$\mu\text{J}$	$V_R = 400 \text{ V}$	Fig. 7

### Notes:

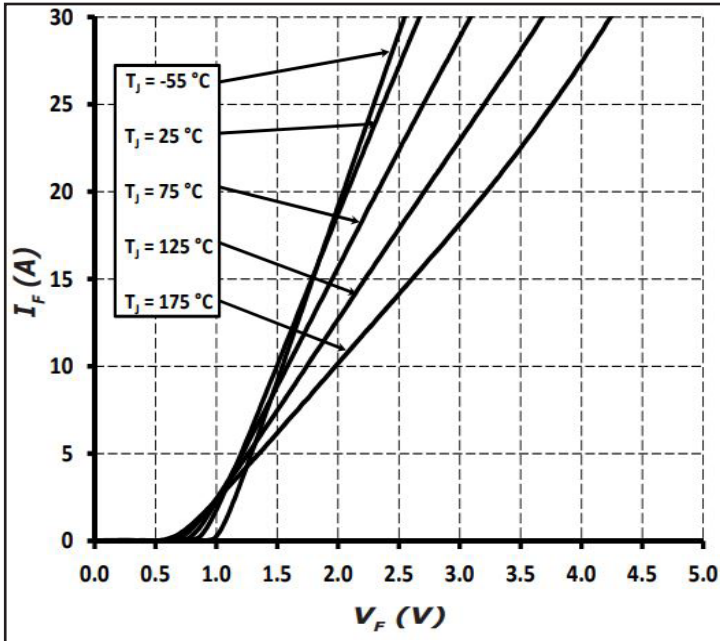
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

## Thermal & Mechanical Characteristics

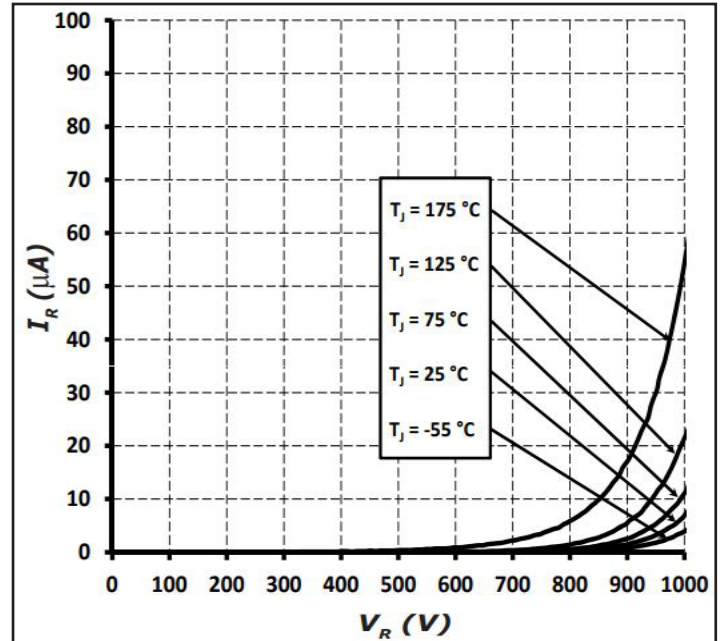
Parameter	Symbol	Value	Unit	Notes
Thermal Resistance, Junction to Case (Typical)	$R_{\theta, JC(TYP)}$	1.3** 0.65*	$^\circ\text{C} / \text{W}$	
Junction Temperature	$T_j$	-55 to +175	$^\circ\text{C}$	
Case & Storage Temperature	$T_c$	-55 to +175		
TO-247 Mounting Torque	-	1	Nm	M3 Screw
		8.8	lbf-in	6-32 Screw

\* Per Leg, \*\* Per Device

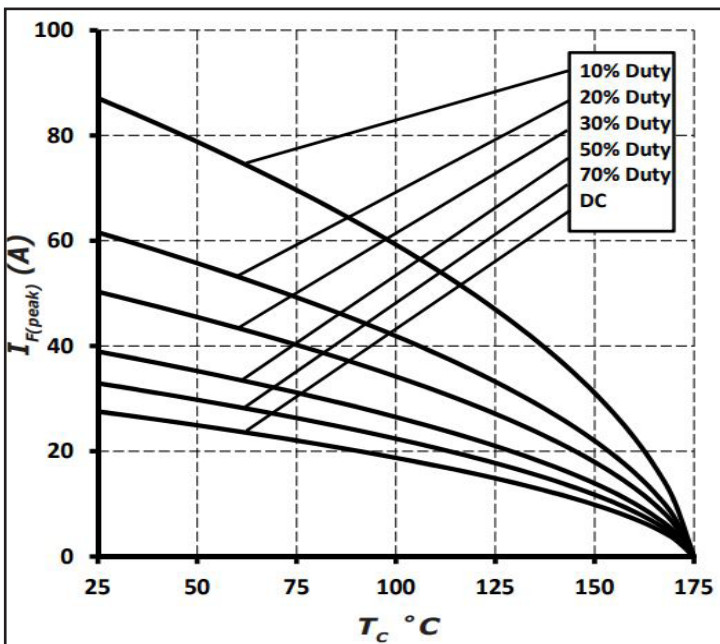
Typical Performance



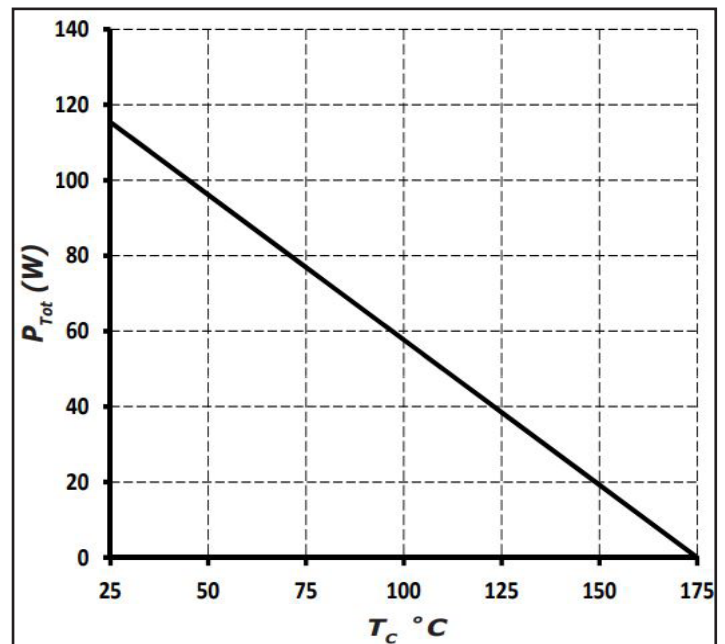
**Figure 1**  
Forward Characteristics



**Figure 2**  
Reverse Characteristics



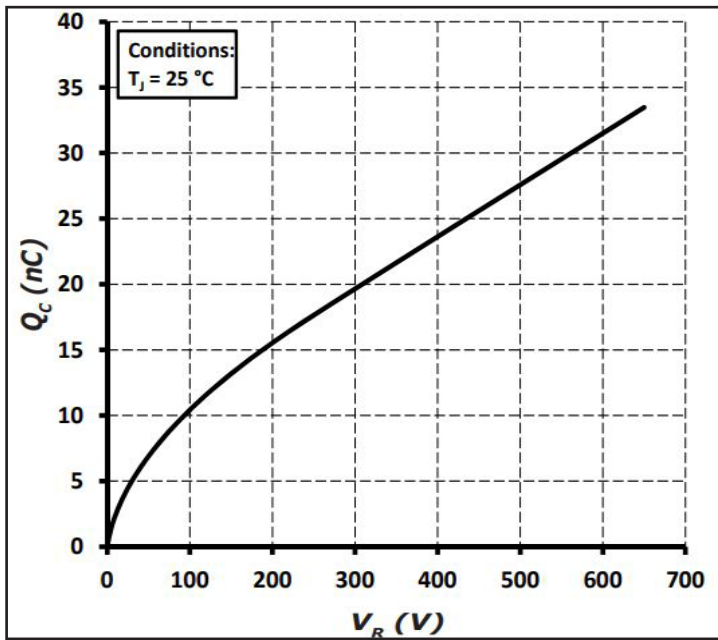
**Figure 3**  
Current Derating



**Figure 4**  
Power Derating

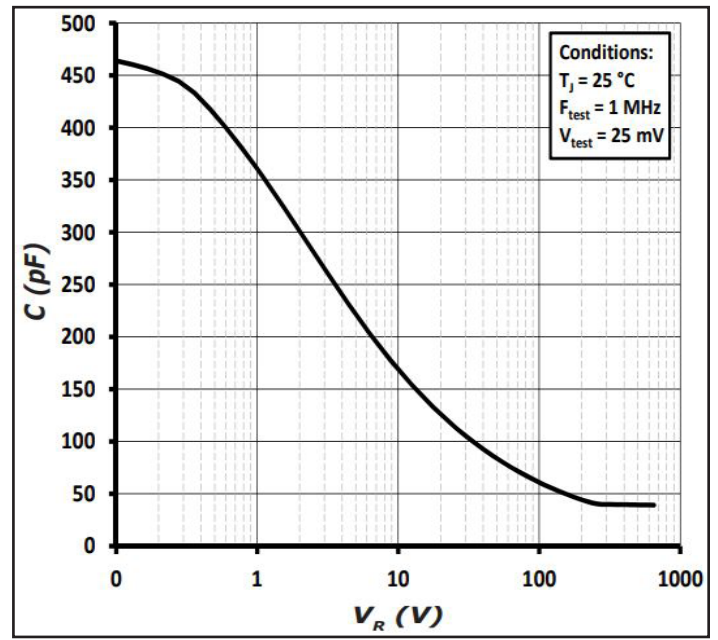


**Typical Performance**



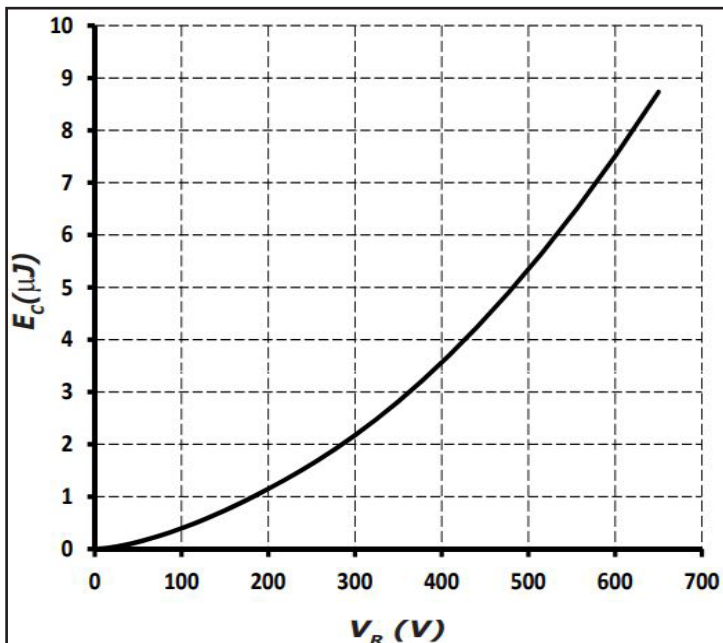
**Figure 5**

Total Capacitance Charge vs. Reverse Voltage



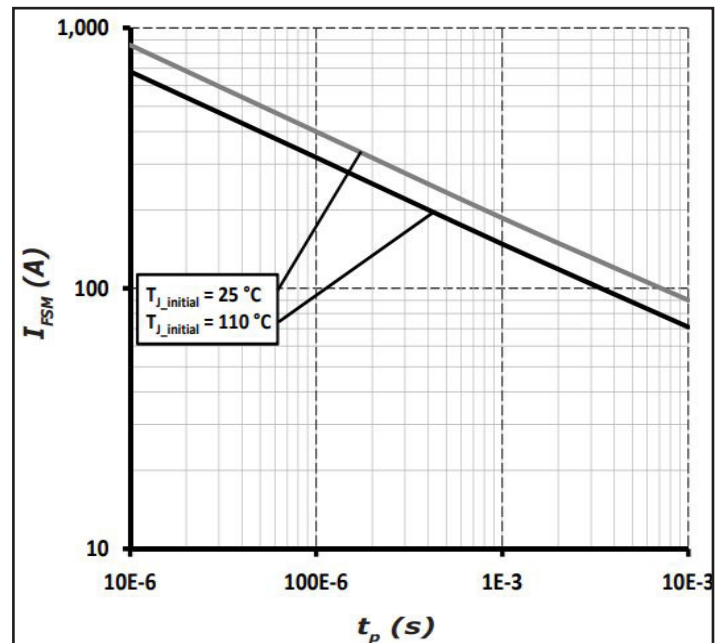
**Figure 6**

Capacitance vs. Reverse Voltage



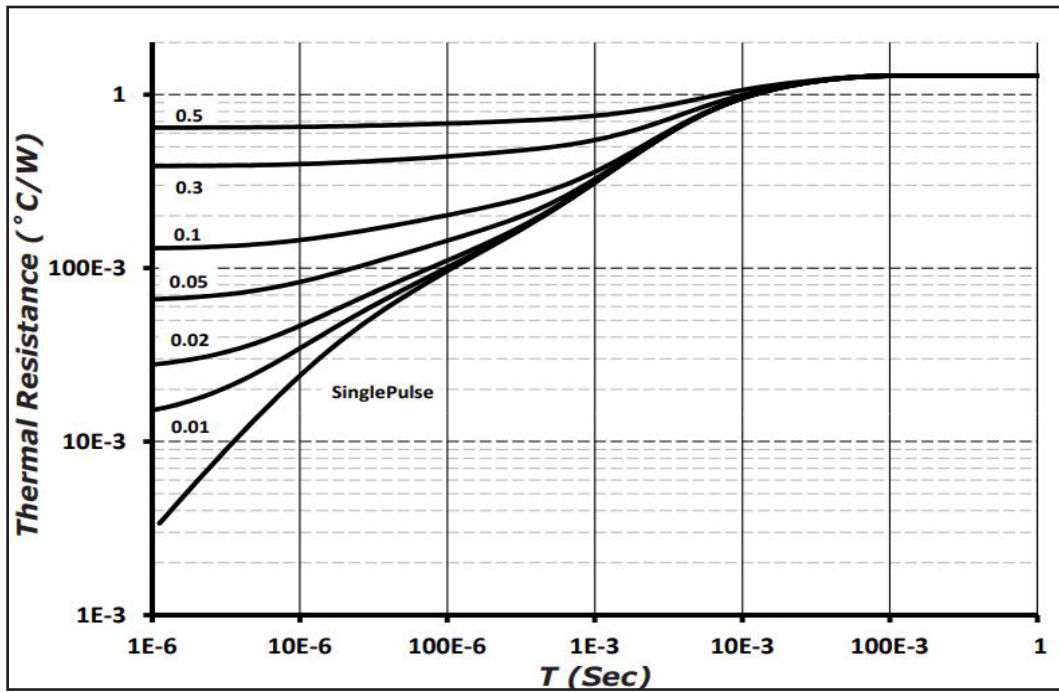
**Figure 7**

Capacitance Stored Energy



**Figure 8**

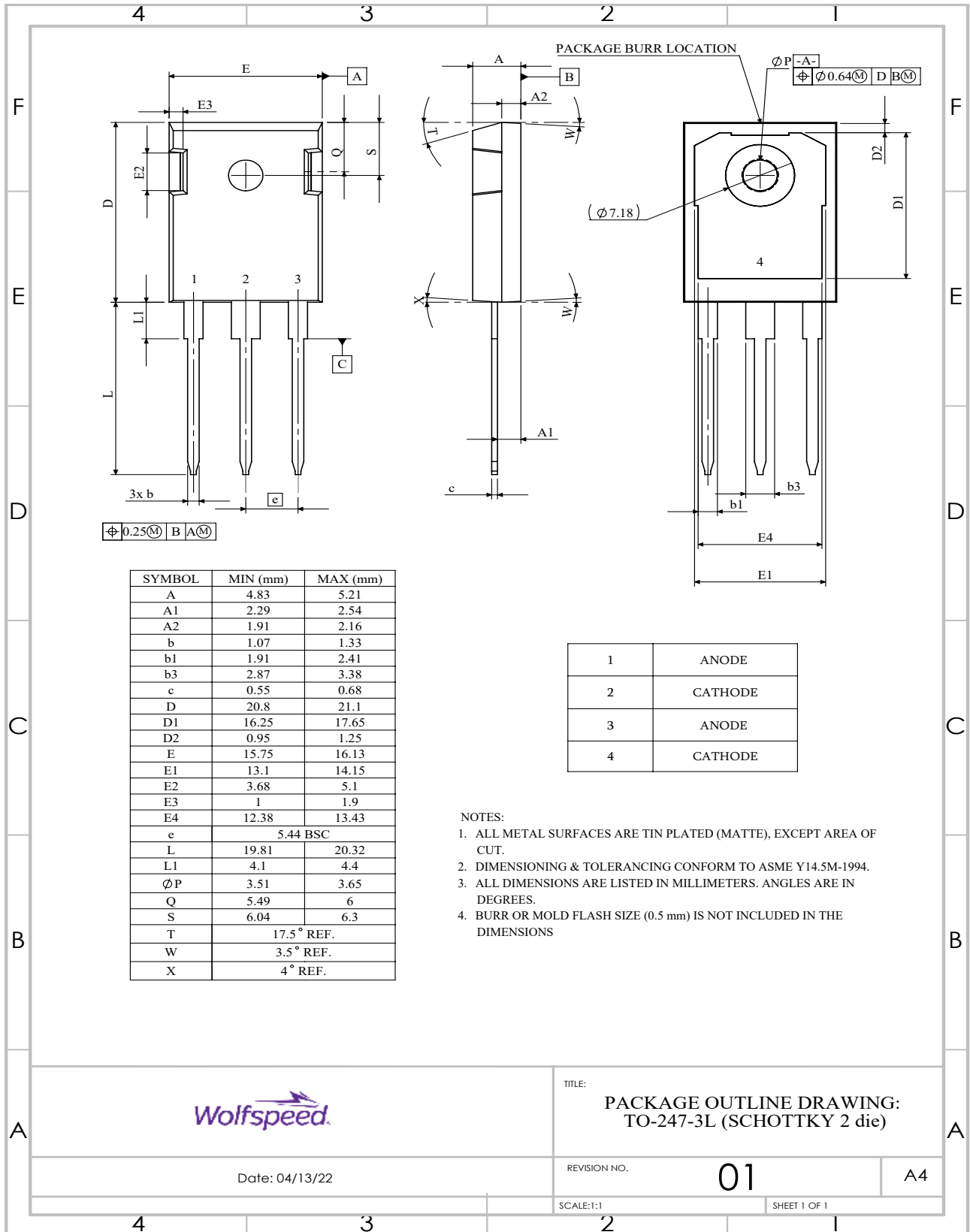
Non-Repetitive Peak Forward Surge Current vs. Pulse Duration



**Figure 9**  
Transient Thermal Impedance

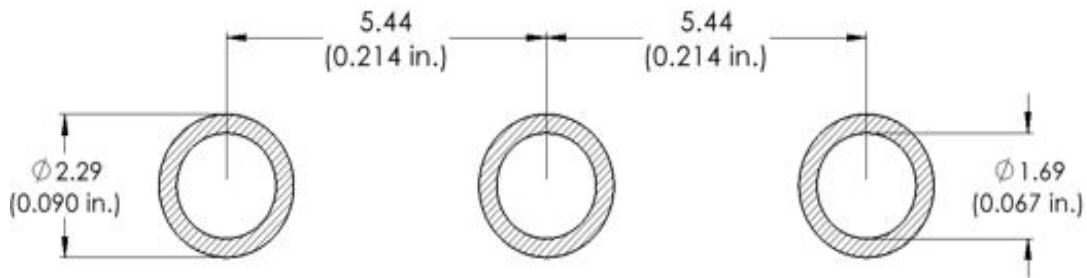
### Package Dimensions & Pin-Out

Package: TO-247-3

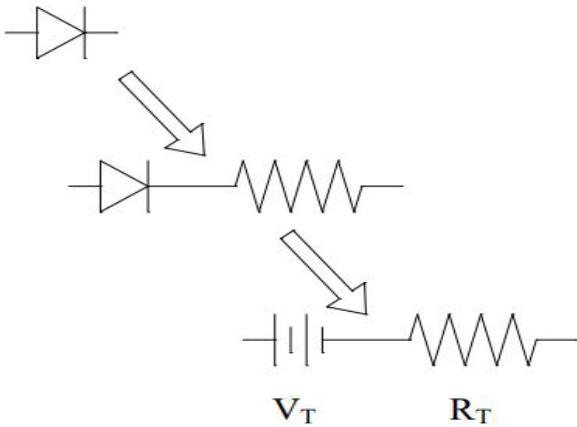


## Recommended Solder Pad Layout

Primary dimensions shown in mm.



## Diode Model



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

$$V_T = 0.94 + (T_J * -1.3 * 10^{-3})$$

$$R_T = 0.044 + (T_J * 4.4 * 10^{-4})$$

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

## Product Ordering Information

Order Number	Packing Type
C3D20065D	Tube

REACH, RoHS, and Halogen-Free compliance documentation available for this product.



## Revision History

Document Version	Date of Release	Description of Changes
3	May- 2021	Initial Release
4	November-2023	Update Branding, POD, Package Image, Solder pad layout



## Notes & Disclaimer

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