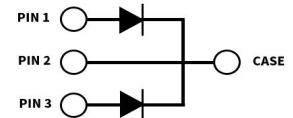


C3D20065D

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*		$T_c = 25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
		31*		$T_c = 110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Forward Surge Current	I_{FSM}	90*		$T_c = 25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	Fig. 8
		71*		$T_c = 110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	860*		$T_c = 25^\circ\text{C}, t_p = 10 \mu\text{s}, \text{Pulse}$	
		680*		$T_c = 110^\circ\text{C}, t_p = 10 \mu\text{s}, \text{Pulse}$	
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	$V_R = 0-650\text{V}$	

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	μA	$V_R = 650\text{ V}, T_j = 25\text{ }^\circ\text{C}$	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		μJ	$V_R = 400\text{ V}$	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

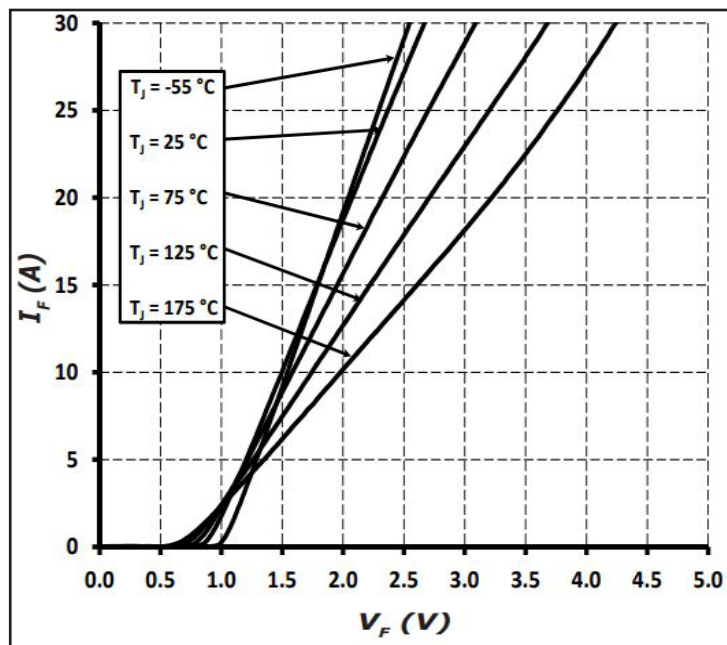


Figure 1

Forward Characteristics

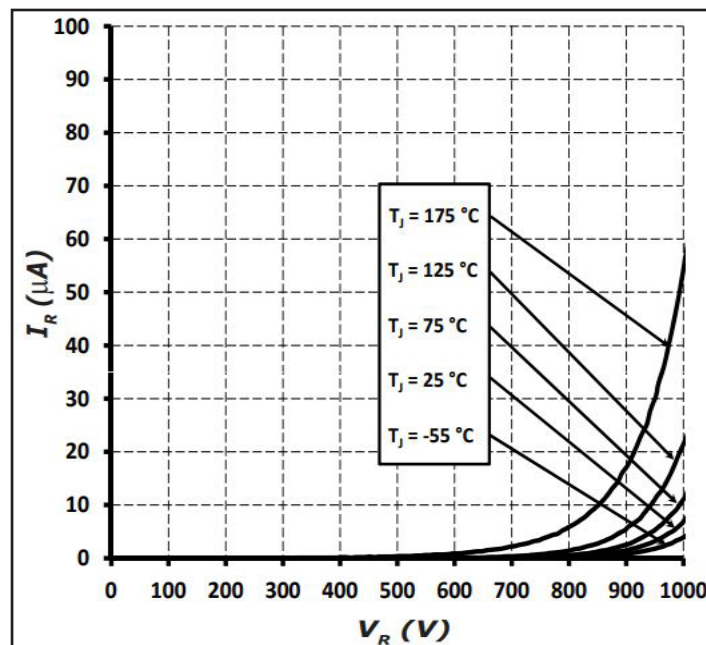


Figure 2

Reverse Characteristics

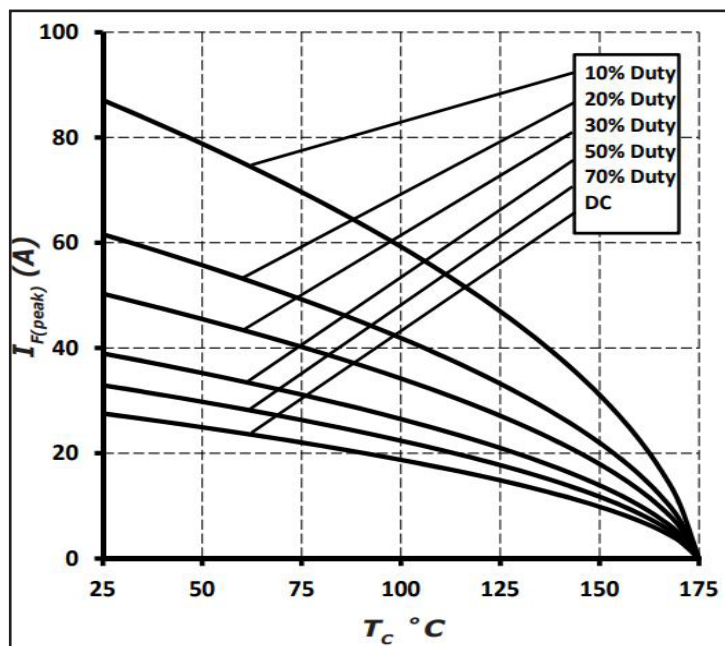


Figure 3

Current Derating

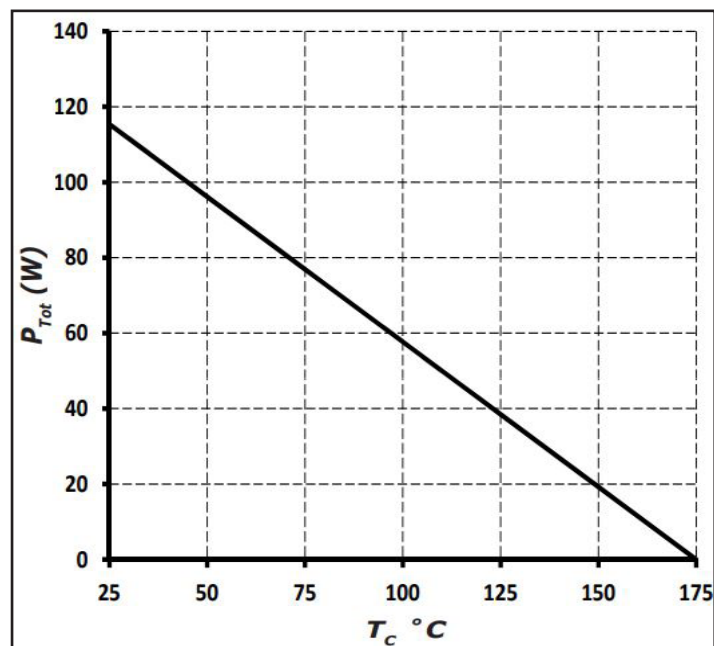


Figure 4

Power Derating

Typical Performance

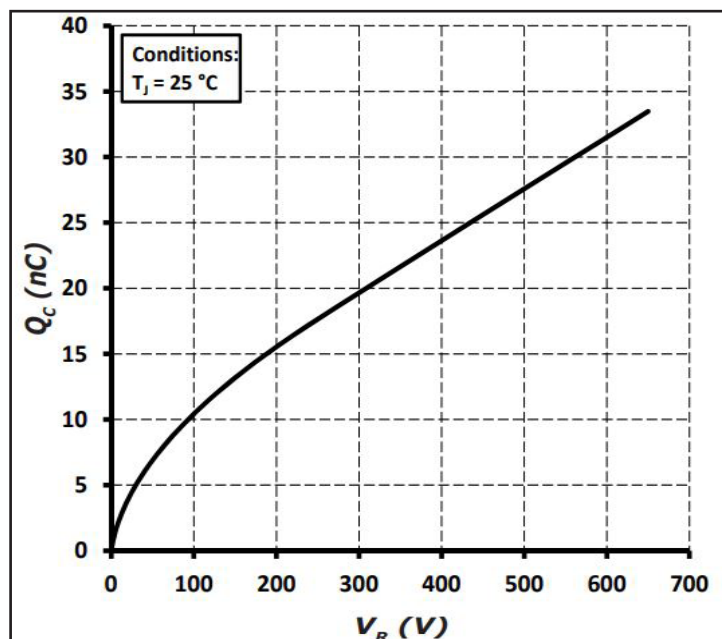


Figure 5

Total Capacitance Charge vs. Reverse Voltage

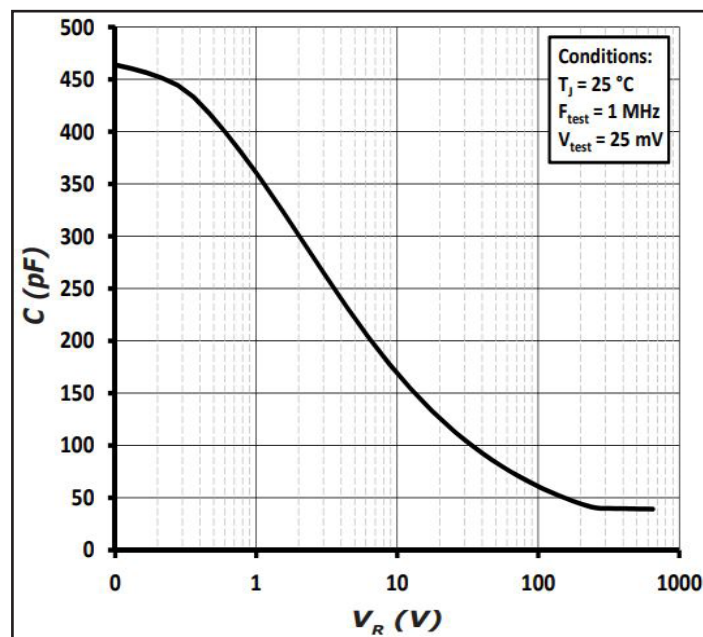


Figure 6

Capacitance vs. Reverse Voltage

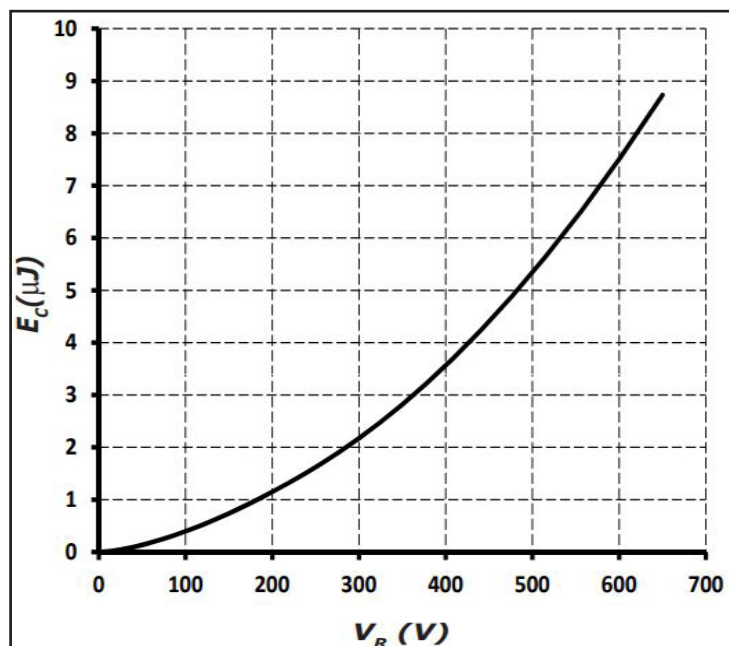


Figure 7

Capacitance Stored Energy

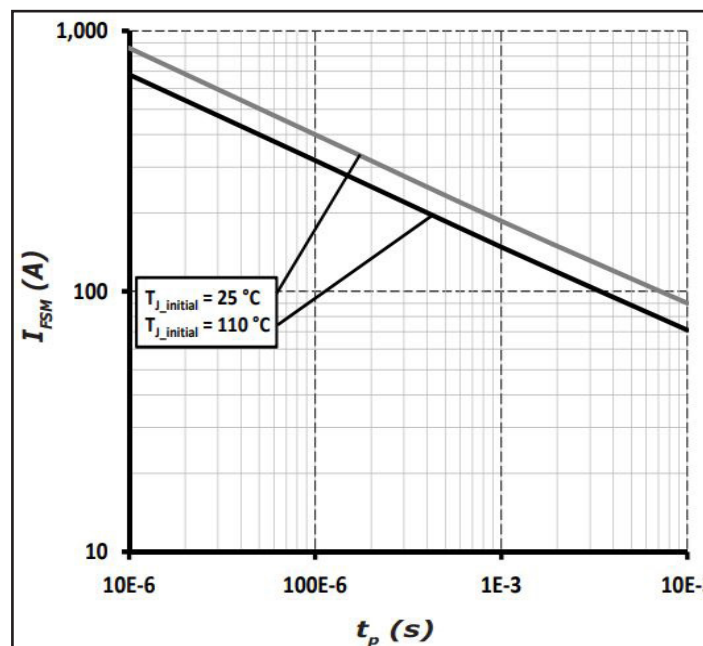


Figure 8

Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

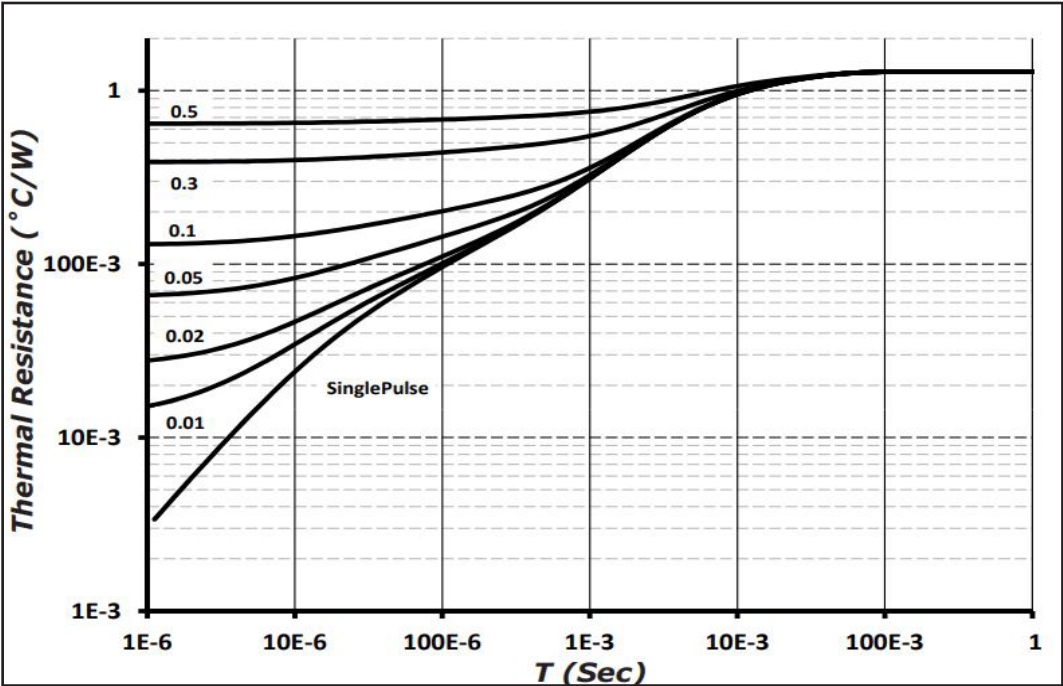
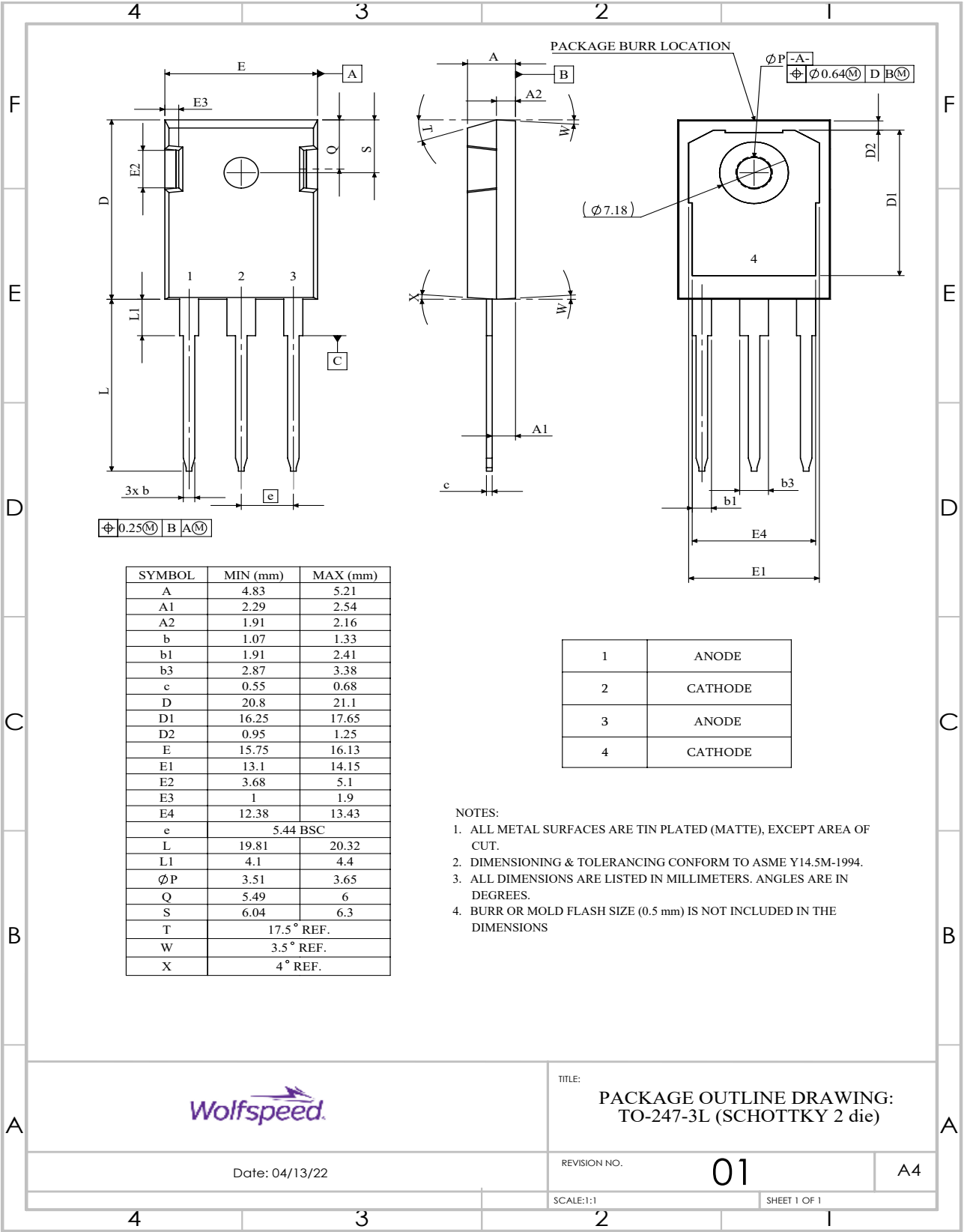


Figure 9
Transient Thermal Impedance

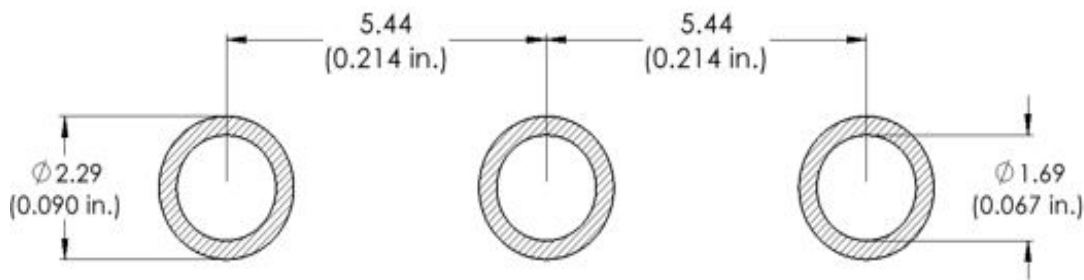
Package Dimensions & Pin-Out

Package: TO-247-3

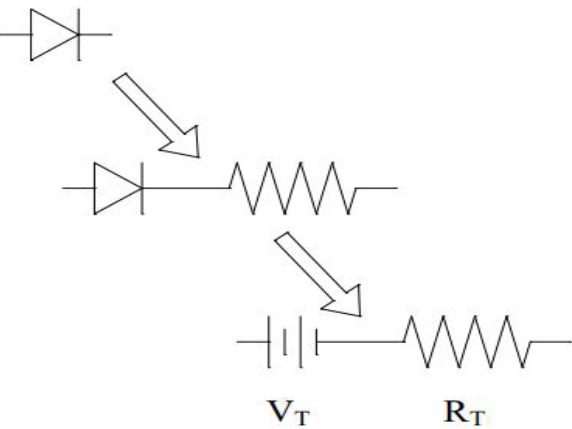


Recommended Solder Pad Layout

Primary dimensions shown in mm.



Diode Model



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

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

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

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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