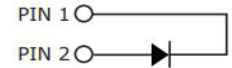


C3D04060F

3rd Generation 600 V, 4 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 Type: TO-220-F2
Marking: C3D04060

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Features

- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Fully Isolated Case
- Extremely Fast Switching

Typical Applications

- Switch Mode Power Supplies (SMPS)
- Free Wheeling Diodes in Inverter Stages
- Boost for PFC & DC-DC Stages
- Solar Inverters
- AC/DC Converters

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

Parameter	Symbol	Value	Unit	Test Conditions	Notes
Repetitive Peak Reverse Voltage	V_{RRM}	600	V		
DC Blocking Voltage	V_{DC}	600			
Continuous Forward Current	I_F	9	A	$T_c = 25^\circ\text{C}$	Fig. 3
		5		$T_c = 125^\circ\text{C}$	
		3		$T_c = 150^\circ\text{C}$	
Repetitive Peak Forward Surge Current	I_{FRM}	15		$T_c = 25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
		10.5		$T_c = 110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Forward Surge Current	I_{FSM}	19		$T_c = 25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	Fig. 8
		16.5		$T_c = 110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	220		$T_c = 25^\circ\text{C}, t_p = 10 \mu\text{s}, \text{Pulse}$	Fig 8.
		160		$T_c = 110^\circ\text{C}, t_p = 10 \mu\text{s}, \text{Pulse}$	
Power Dissipation	P_{tot}	30.9	W	$T_c = 25^\circ\text{C}$	Fig. 4
		13.4		$T_c = 110^\circ\text{C}$	
Diode dV/dt Ruggedness	dV/dt	200	V/ns	$V_R = 0-600\text{V}$	
i^2t value (Per Leg)	$\int i^2 dt$	1.8	A^2s	$T_c = 25^\circ\text{C}, t_p = 10\text{ms}$	
		1.3		$T_c = 110^\circ\text{C}, t_p = 10\text{ms}$	



Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.5	1.7	V	$I_F = 4\text{ A}, T_J = 25\text{ }^{\circ}\text{C}$	Fig. 1
		1.7	2.4		$I_F = 4\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$	
Reverse Current	I_R	5	25	μA	$V_R = 600\text{ V}, T_J = 25\text{ }^{\circ}\text{C}$	Fig. 2
		10	100		$V_R = 600\text{ V}, T_J = 175\text{ }^{\circ}\text{C}$	
Total Capacitive Charge	Q_C	10		nC	$V_R = 400\text{ V}, T_J = 25\text{ }^{\circ}\text{C}, I_F = 4\text{ A}$	Fig. 5
Total Capacitance	C	231		pF	$V_R = 0\text{ V}, T_J = 25\text{ }^{\circ}\text{C}, f = 1\text{ MHz}$	Fig. 6
		18.5			$V_R = 200\text{ V}, T_J = 25\text{ }^{\circ}\text{C}, f = 1\text{ MHz}$	
		15			$V_R = 400\text{ V}, T_J = 25\text{ }^{\circ}\text{C}, f = 1\text{ MHz}$	
Capacitance Stored Energy	E_C	1.4		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)	$R_{\theta, JC (TYP)}$	4.85	$^{\circ}\text{C} / \text{W}$	
Junction Temperature	T_J	-55 to +175	$^{\circ}\text{C}$	
Case & Storage Temperature	T_C	-55 to +175		
TO-220 Mounting Torque	-	1	Nm	M3 Screw
		8.8	lbf-in	6-32 Screw

Electrostatic Discharge (ESD) Classifications

Parameter	Symbol	Notes
Human Body Model	HBM	Class 3B ($\geq 8000\text{ V}$)
Charge Device Model	CDM	Class C3 ($\geq 1000\text{ V}$)

Typical Performance

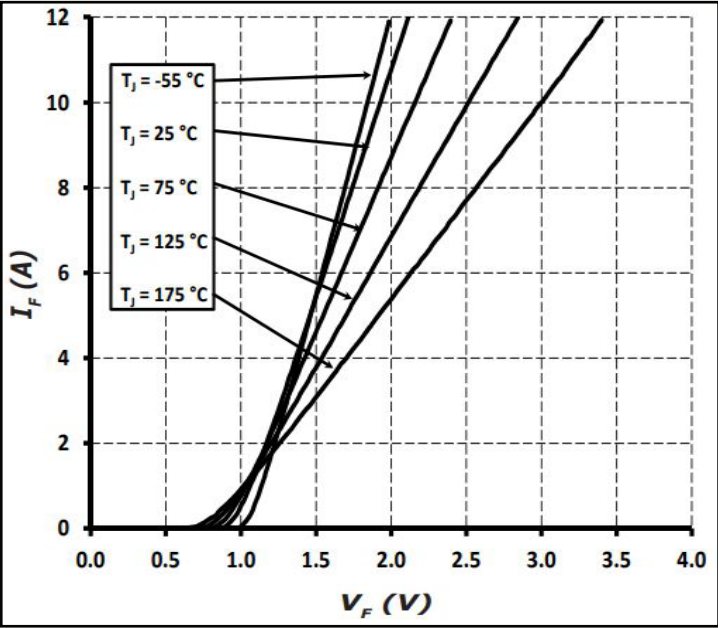


Figure 1
Forward Characteristics

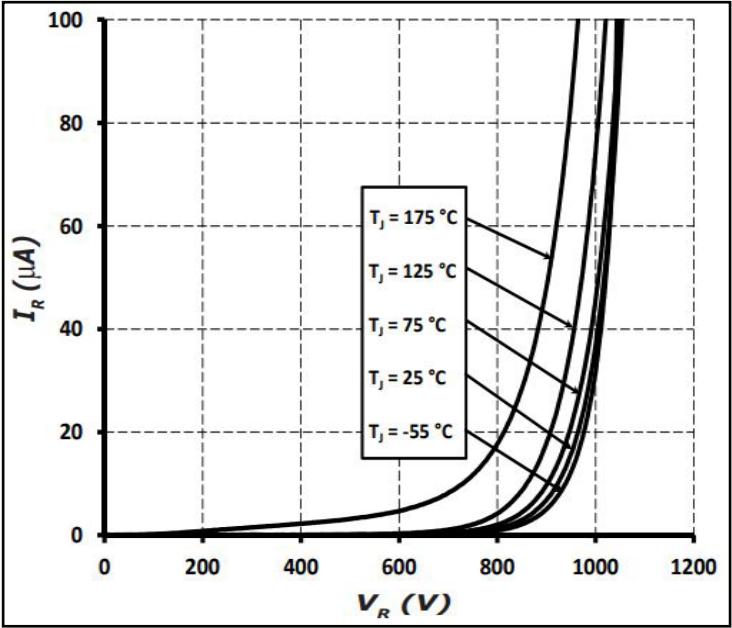


Figure 2
Reverse Characteristics

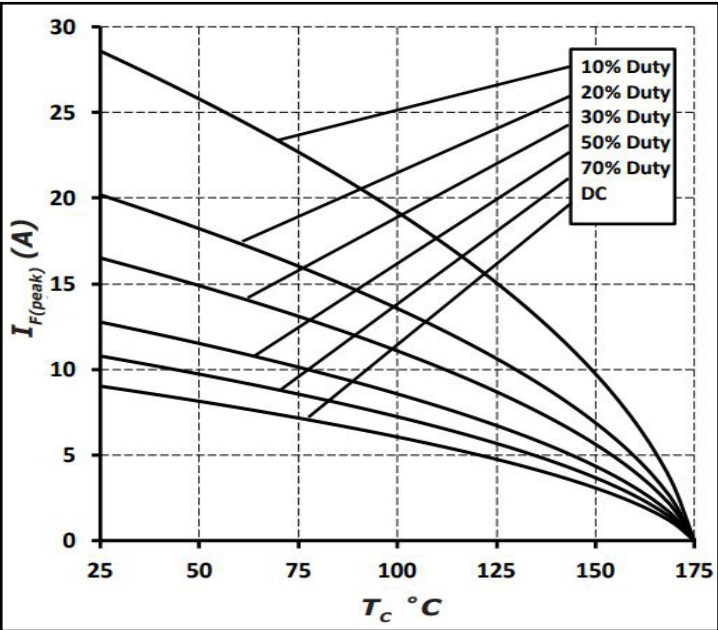


Figure 3
Current Derating

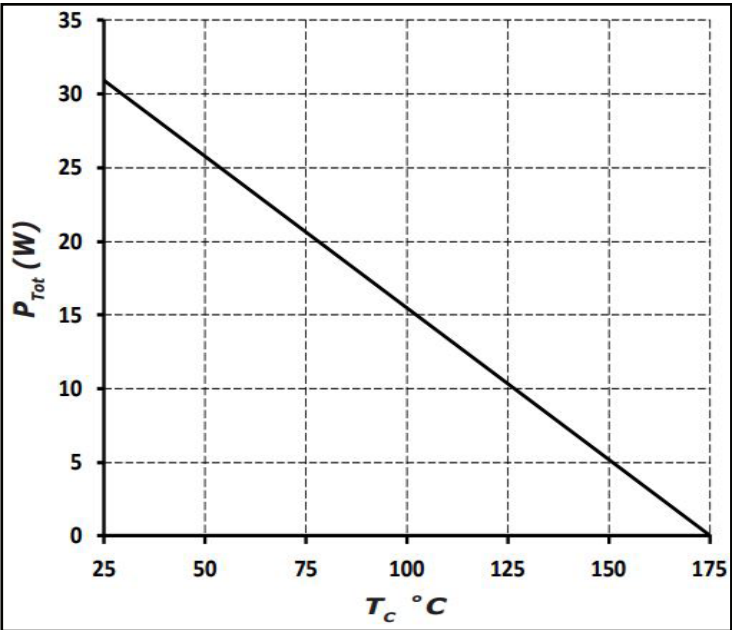


Figure 4
Power Derating

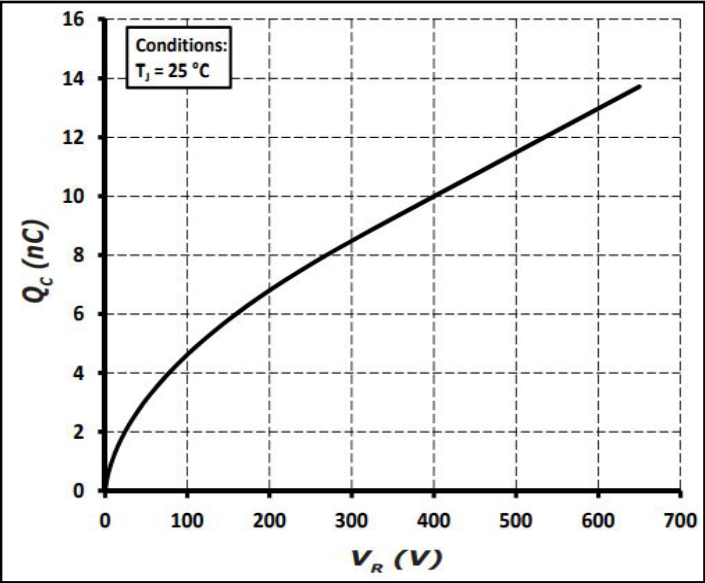


Figure 5

Total Capacitance vs. Reverse Voltage

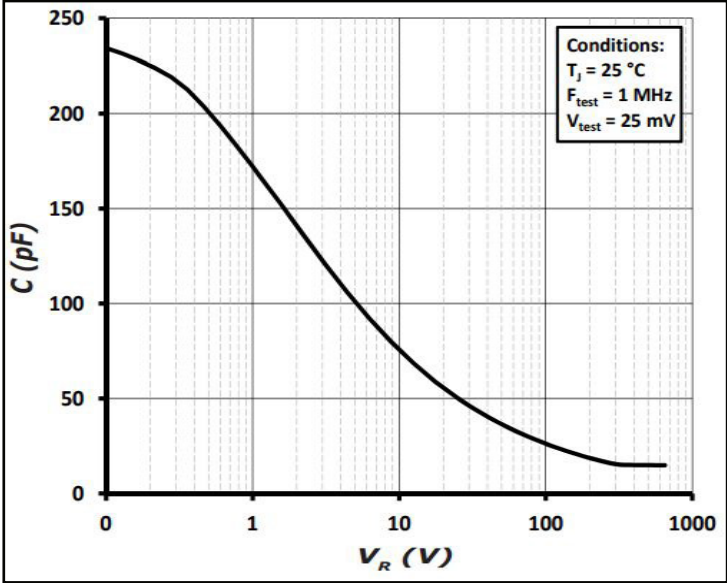


Figure 6

Capacitance vs. Reverse Voltage

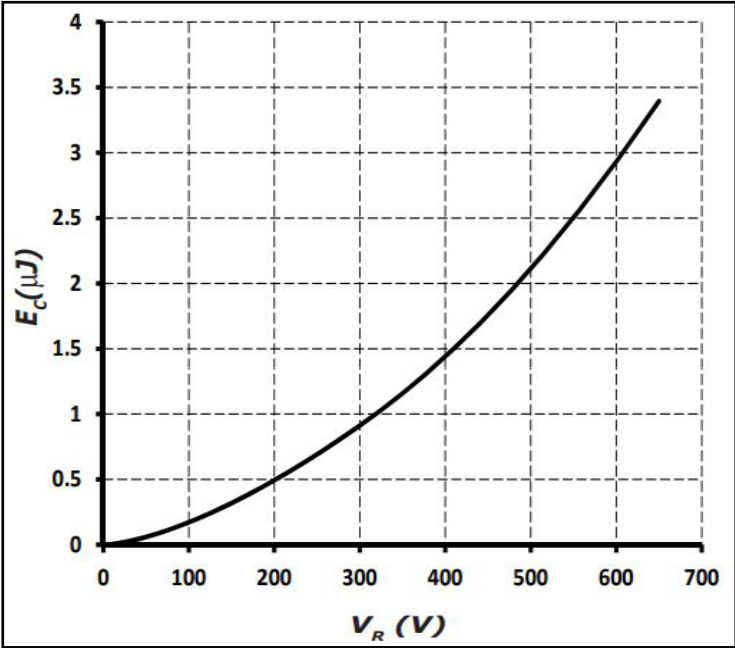


Figure 7

Capacitance Stored Energy

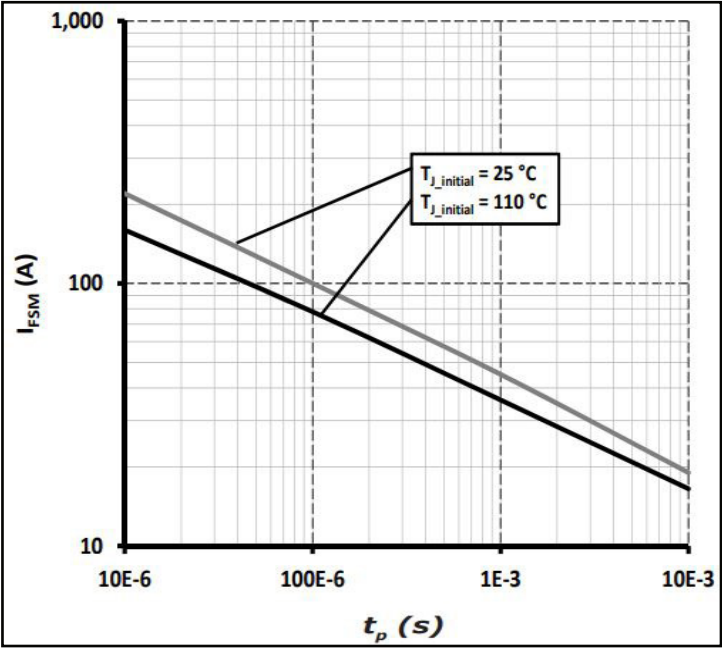


Figure 8

Non-Repetitive Peak Forward Surge Current
versus Pulse Duration (sinusoidal waveform)

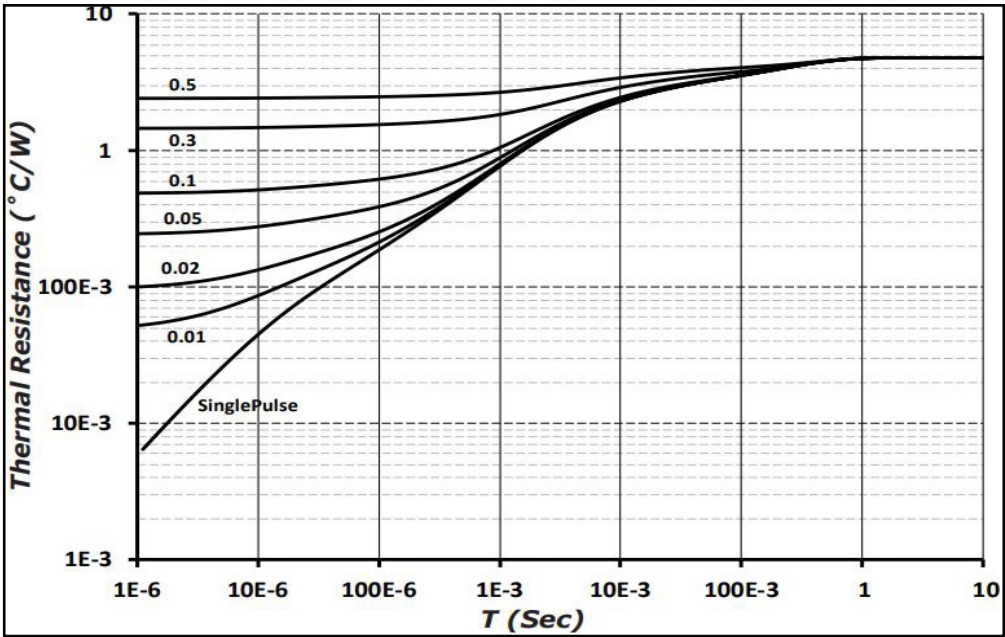
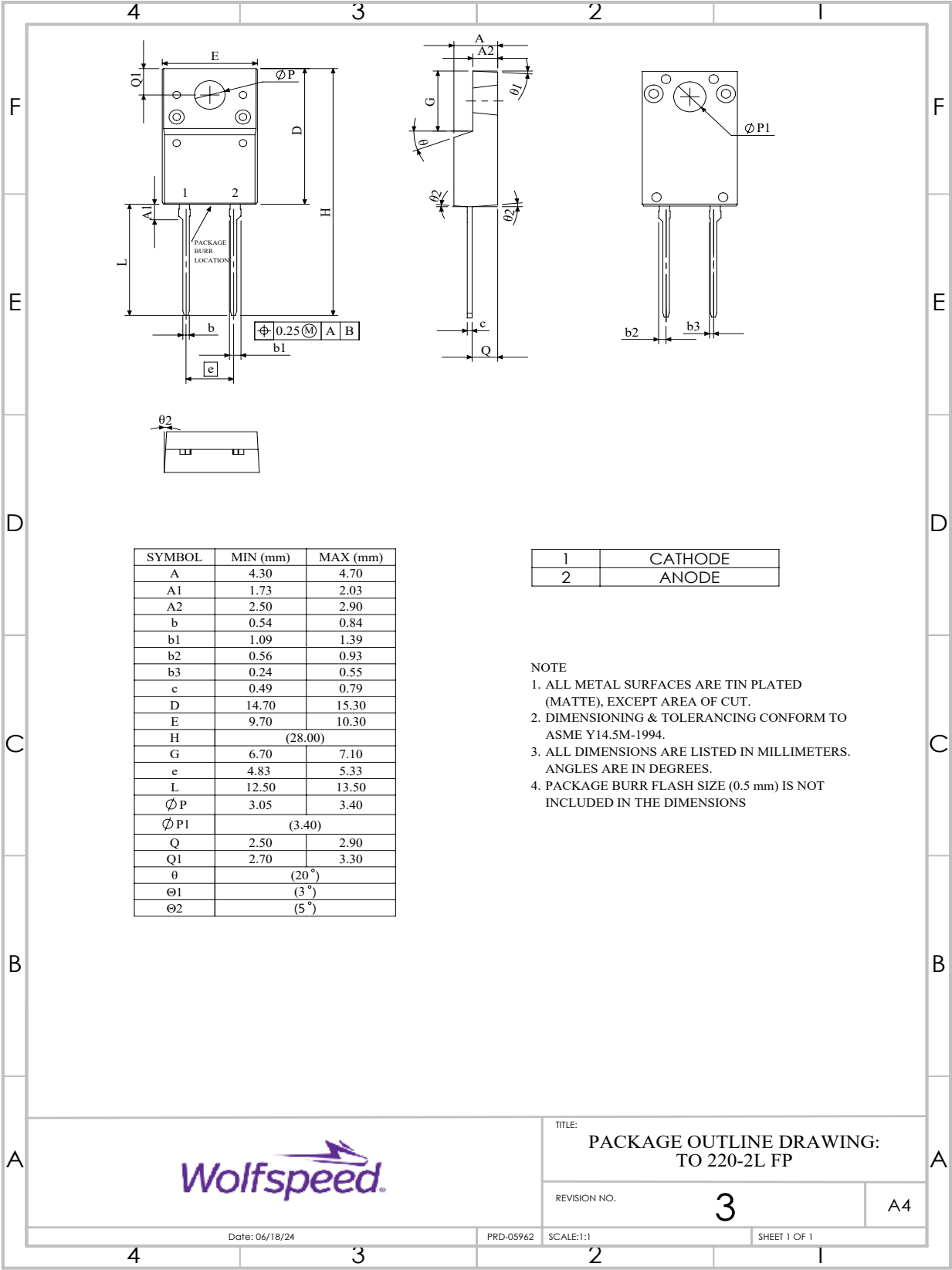


Figure 9
Transient Thermal Impedance

Package Dimensions & Pin-Out

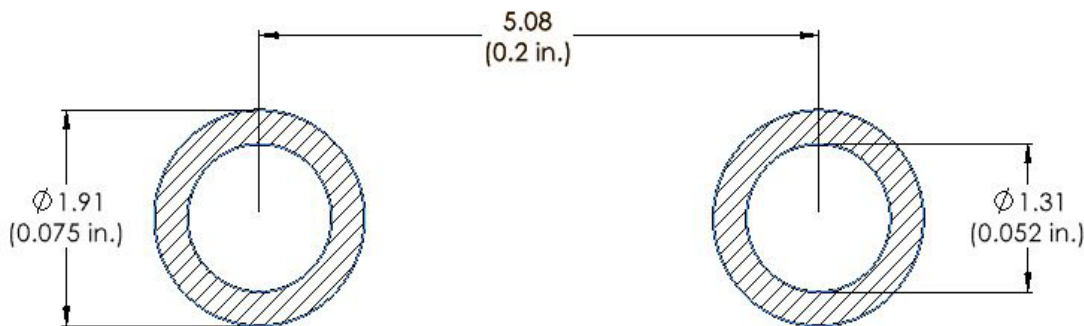
Package: TO-220-F2





Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

Order Number	Packing Type
C3D04060F	Tube



Revision History

Document Version	Date of Release	Description of Changes
H	February- 2019	Initial Release
9	October-2023	Update Package Drawing Update Landing Pad Updated Branding Updated Package Image
10	November-2023	Corrected POD A1, b1, and Q
11	October - 2024	Legal Disclaimer, POD

Notes & Disclaimer

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