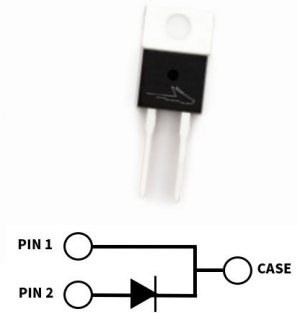


E4D20120A

E-Series Automotive 4th Generation 1200 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-220-2
Marking: E4D20120A

Features

- Low Forward Voltage (V_F) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Automotive Qualified (AEC Q101) and PPAP Capable

Applications

- Industrial Switched Mode Power Supplies
- Uninterruptible & AUX Power Supplies
- Boost for PFC & DC-DC Stages
- Solar Inverters

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

Parameter	Symbol	Value	Unit	Test Conditions	Notes
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V		
DC Blocking Voltage	V_{DC}	1200			
Continuous Forward Current	I_F	54.5	A	$T_J = 25^\circ\text{C}$	Fig. 3
		26		$T_J = 135^\circ\text{C}$	
		20		$T_J = 150^\circ\text{C}$	
Repetitive Peak Forward Surge Current	I_{FRM}	91		$T_C = 25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
		61		$T_C = 110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
Power Dissipation	P_{tot}	250	W	$T_J = 25^\circ\text{C}$	Fig. 4
		112.5		$T_J = 110^\circ\text{C}$	
Diode dV/dt ruggedness	dV/dt	250	V/ns	$V_R = 0-960\text{V}$	
i^2t value	$\int i^2 dt$	84.5	A^2s	$T_C = 25^\circ\text{C}, t_p = 10 \text{ ms}$	
		60.5		$T_C = 110^\circ\text{C}, t_p = 10 \text{ ms}$	

Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.5	1.8	V	$I_F = 20 \text{ A}, T_j = 25^\circ\text{C}$	Fig. 1
		2.2			$I_F = 20 \text{ A}, T_j = 175^\circ\text{C}$	
Reverse Current	I_R	35	200	μA	$V_R = 1200 \text{ V}, T_j = 25^\circ\text{C}$	Fig. 2
		65			$V_R = 1200 \text{ V}, T_j = 175^\circ\text{C}$	
Total Capacitive Charge	Q_C	99		nC	$V_R = 800 \text{ V}, T_j = 25^\circ\text{C}$	Fig. 5
Total Capacitance	C	1500		pF	$V_R = 0 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	Fig. 6
		93			$V_R = 400 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	
		67			$V_R = 800 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	
Capacitance Stored Energy	E_C	28		μJ	$V_R = 800 \text{ V}$	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)	$R_{\theta, JC} \text{ (TYP)}$	0.47	$^\circ\text{C} / \text{W}$	
Thermal Resistance, Junction to Case (Max)	$R_{\theta, JC} \text{ (TYP)}$	0.60	$^\circ\text{C} / \text{W}$	
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

Typical Performance

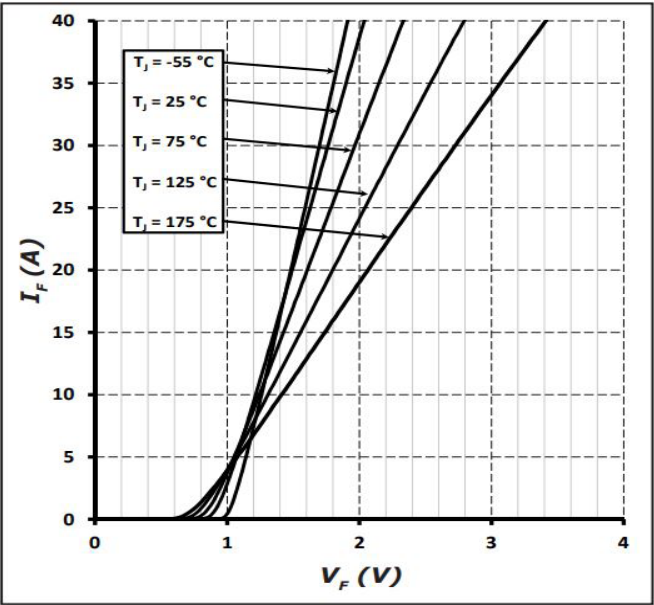


Figure 1
Forward Characteristics

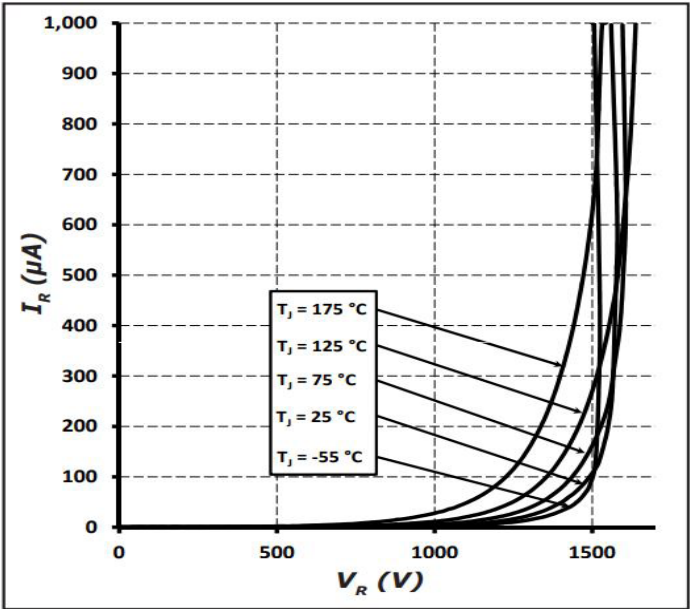


Figure 2
Reverse Characteristics

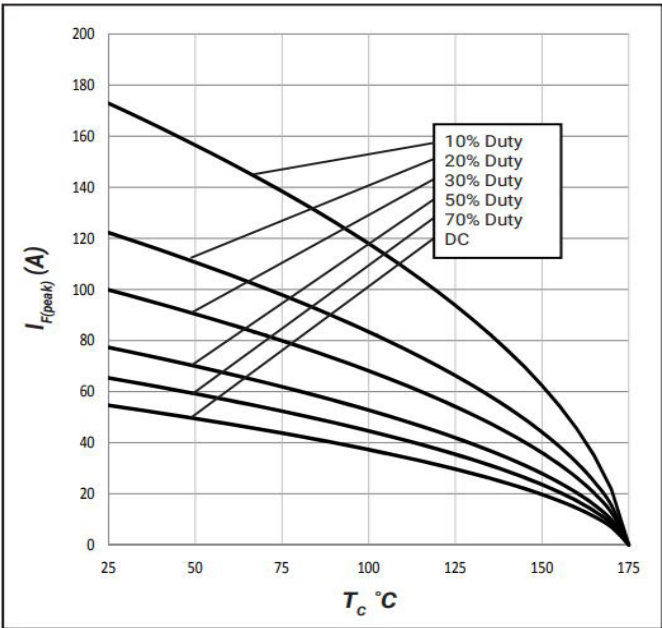


Figure 3
Current Derating

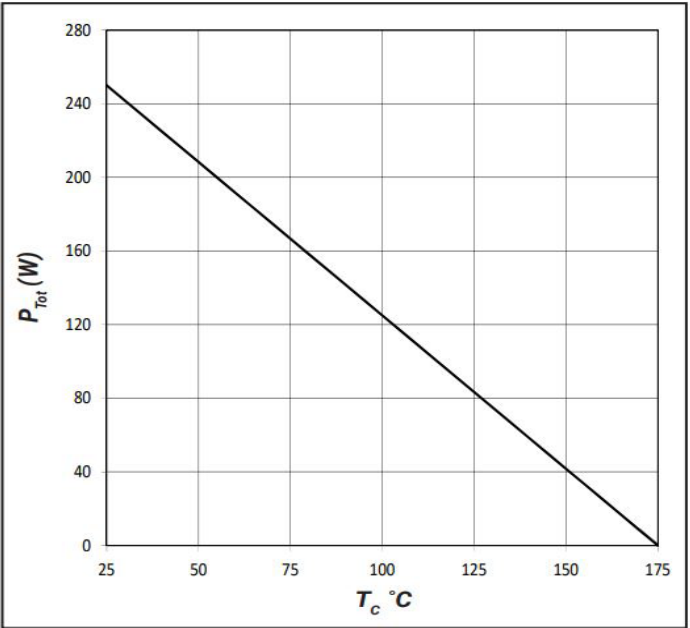


Figure 4
Power Derating

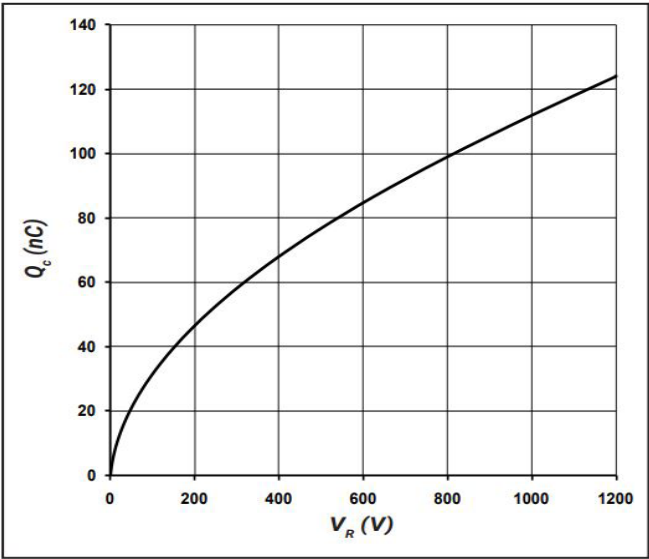


Figure 5

Total Capacitance vs. Reverse Voltage

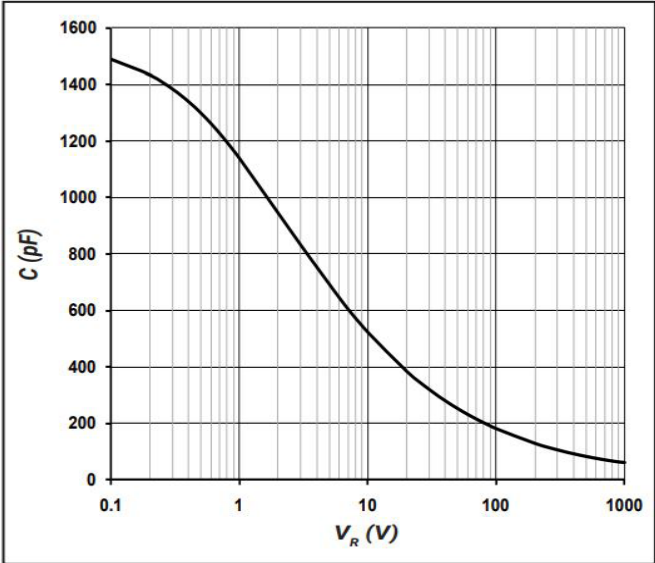


Figure 6

Capacitance vs. Reverse Voltage

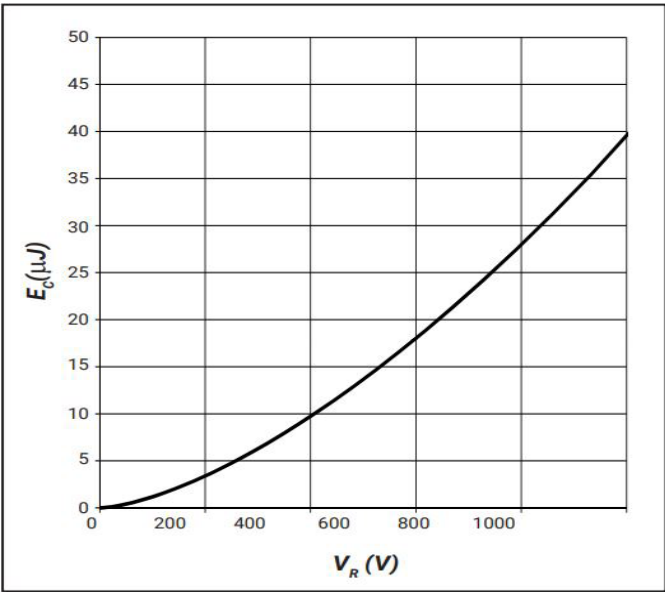


Figure 7

Capacitance Stored Energy

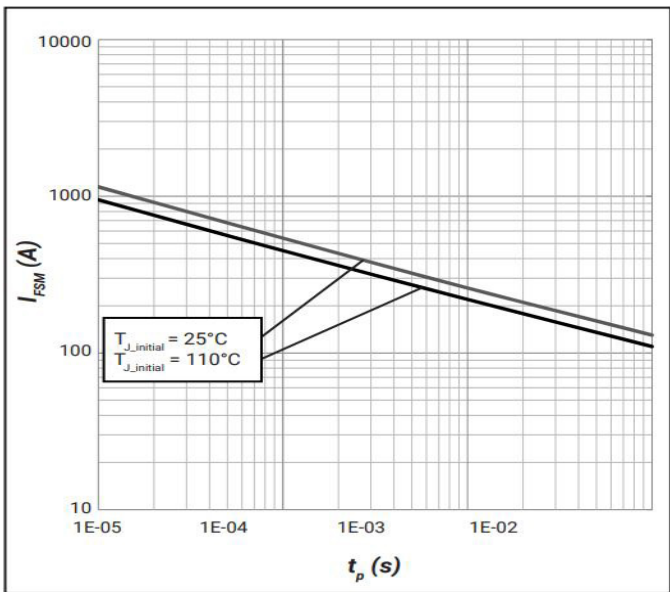


Figure 8

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

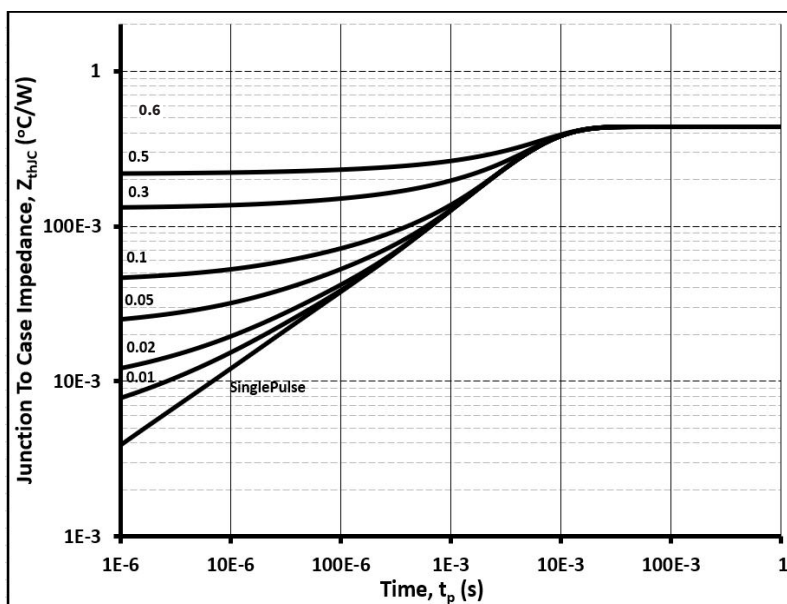
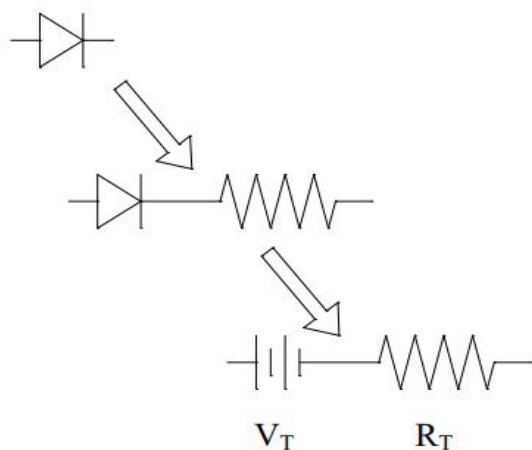


Figure 9
Transient Thermal Impedance

Diode Model



$$V_{fT} = V_T + I_f \cdot R_T$$

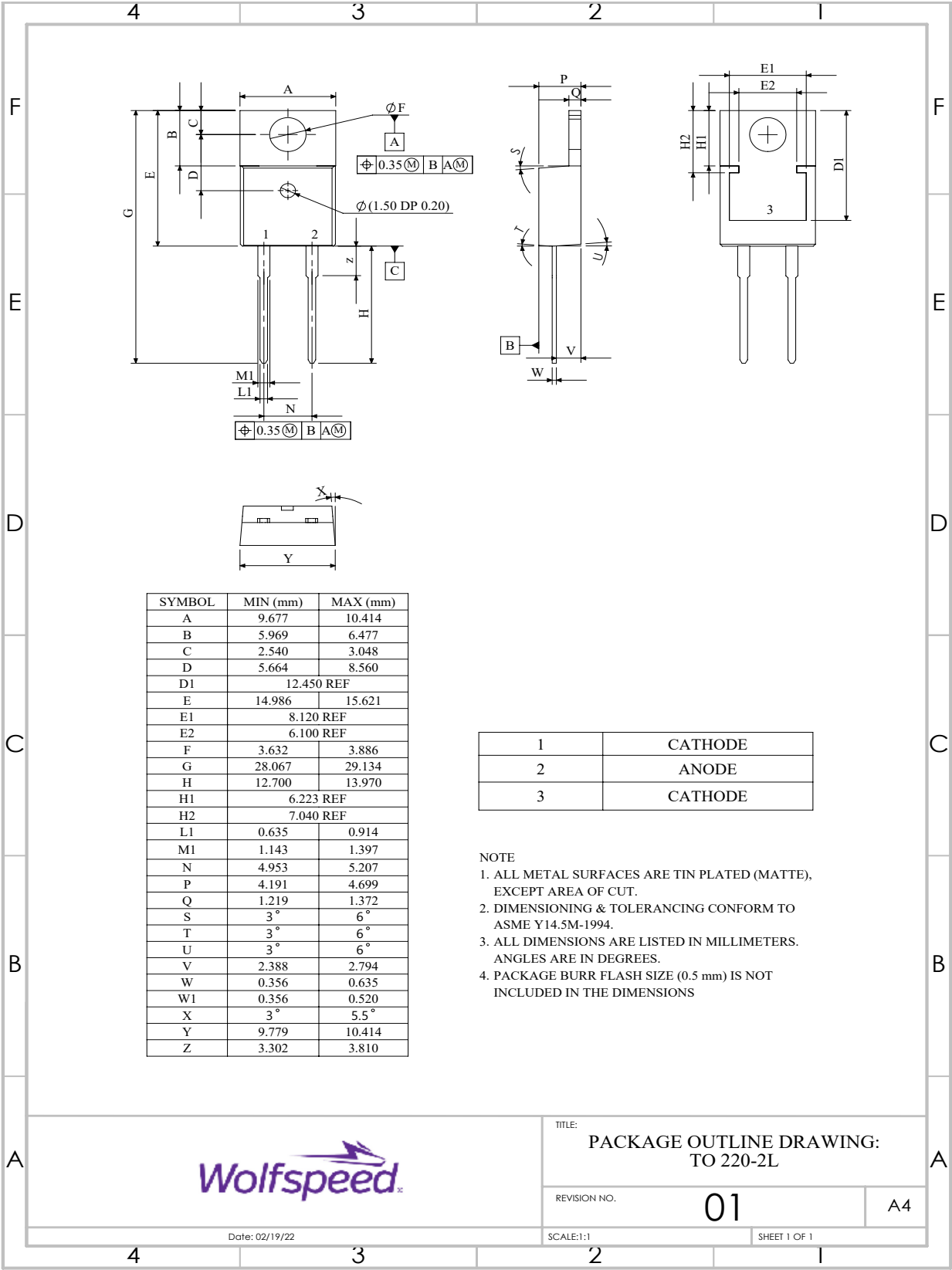
$$V_T = 0.97 + (T_J \cdot -1.40 \cdot 10^{-3})$$

$$R_T = 0.023 + (T_J \cdot 2.71 \cdot 10^{-4})$$

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

Package Dimensions & Pin-Out

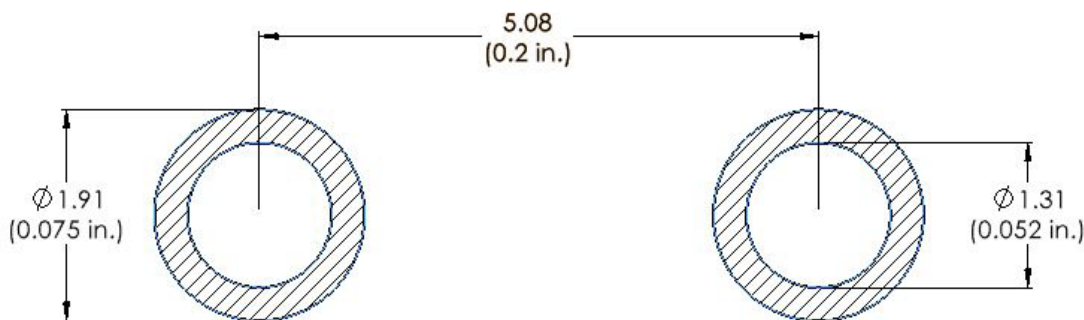
Package: TO-220-2





Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

Order Number	Packing Type
E4D20120A	Tube



Revision History

Document Version	Date of Release	Description of Changes
0	July-2018	Initial Release
1	April-2023	Update Package Drawing Update Landing Pad

Notes & Disclaimer

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