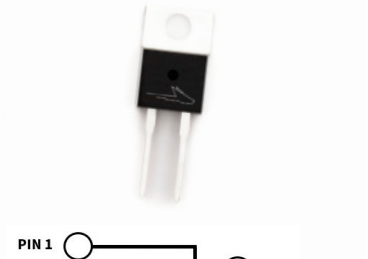


E4D10120A

E-Series Automotive 4th Generation 1200 V, 10 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: E4D10120A

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	33	A	$T_J = 25^\circ\text{C}$	Fig. 3
		16		$T_J = 135^\circ\text{C}$	
		10		$T_J = 156^\circ\text{C}$	
Repetitive Peak Forward Surge Current	I_{FRM}	44		$T_C = 25^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave	
		26		$T_C = 110^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave	
Power Dissipation	P_{tot}	166	W	$T_J = 25^\circ\text{C}$	Fig. 4
		72		$T_J = 110^\circ\text{C}$	
Diode dV/dt ruggedness	dV/dt	250	V/ns	$V_R = 0-960\text{V}$	

Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.5	1.8	V	$I_F = 10 \text{ A}, T_j = 25^\circ\text{C}$	Fig. 1
		2.2			$I_F = 10 \text{ A}, T_j = 175^\circ\text{C}$	
Reverse Current	I_R	30	200	μA	$V_R = 1200 \text{ V}, T_j = 25^\circ\text{C}$	Fig. 2
		55			$V_R = 1200 \text{ V}, T_j = 175^\circ\text{C}$	
Total Capacitive Charge	Q_C	56		nC	$V_R = 800 \text{ V}, T_j = 25^\circ\text{C}$	Fig. 5
Total Capacitance	C	77		pF	$V_R = 0 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	Fig. 6
		51			$V_R = 400 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	
		44			$V_R = 800 \text{ V}, T_j = 25^\circ\text{C}, f = 1 \text{ MHz}$	
Capacitance Stored Energy	E_C	17		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)	$R_{\theta, JC} \text{ (TYP)}$	0.9	$^\circ\text{C} / \text{W}$	
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

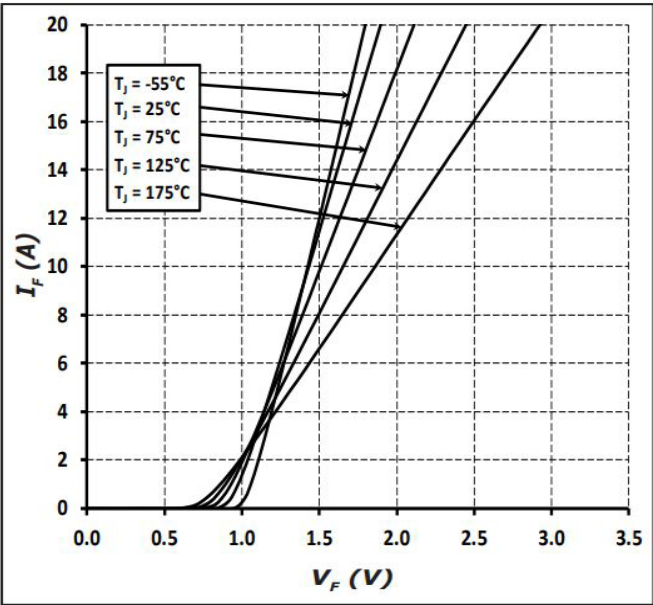


Figure 1
Forward Characteristics

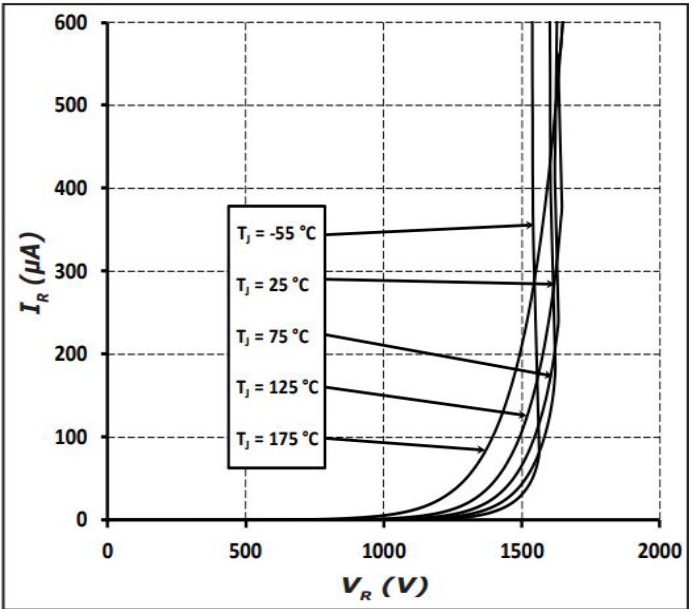


Figure 2
Reverse Characteristics

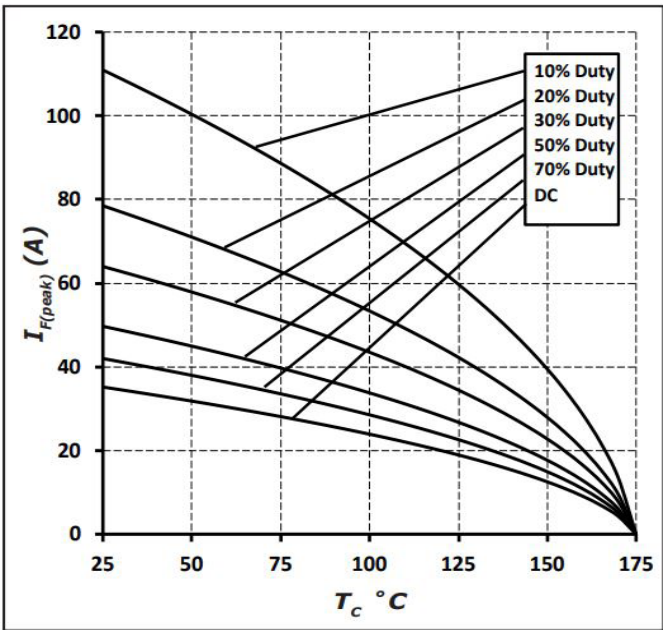


Figure 3
Current Derating

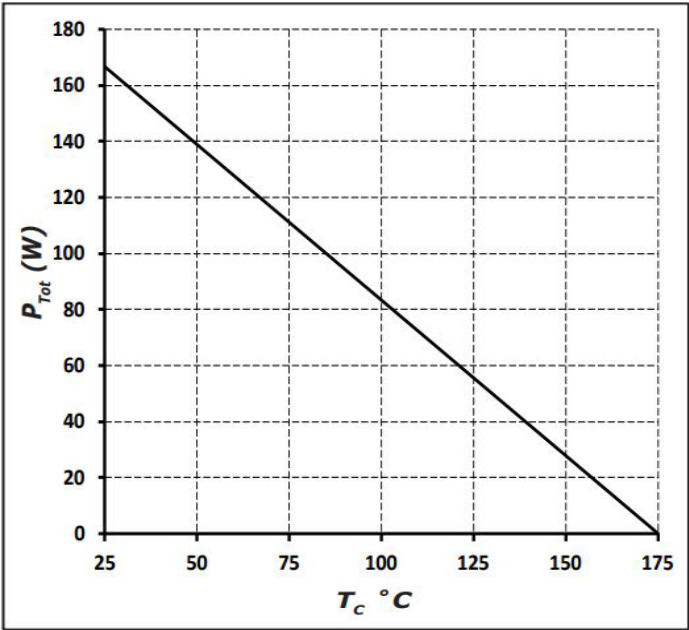


Figure 4
Power Derating

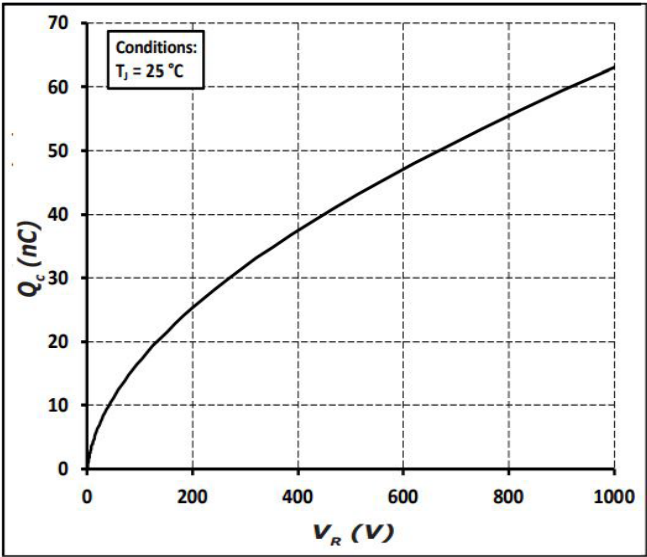


Figure 5
Total Capacitance vs. Reverse Voltage

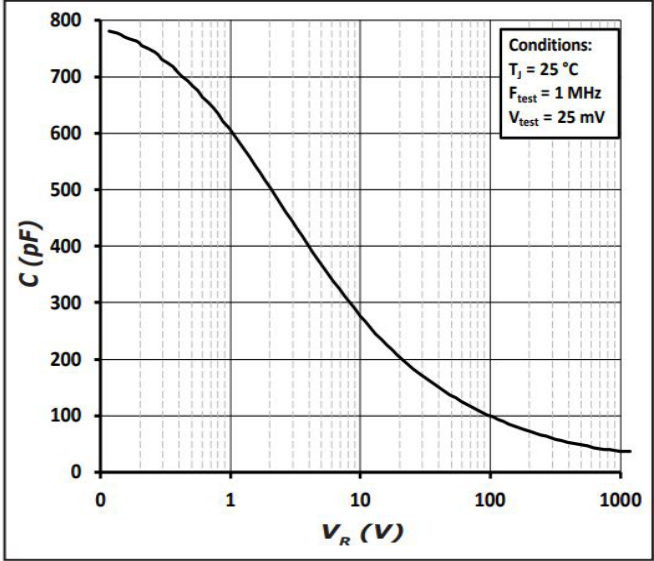


Figure 6
Capacitance vs. Reverse Voltage

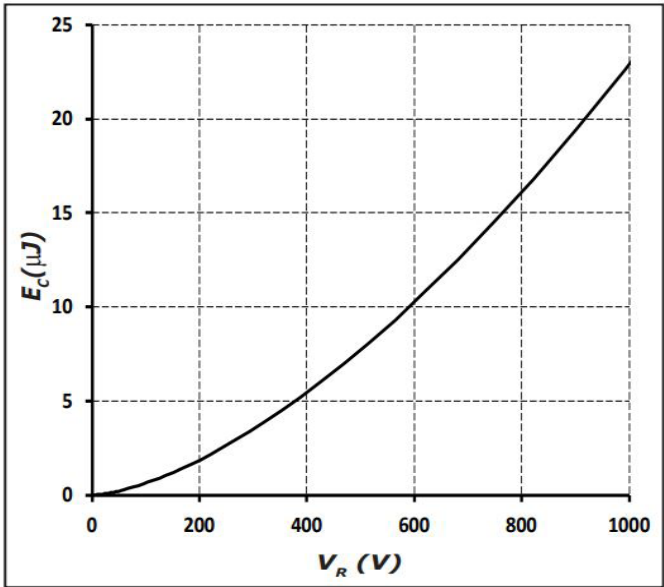


Figure 7
Capacitance Stored Energy

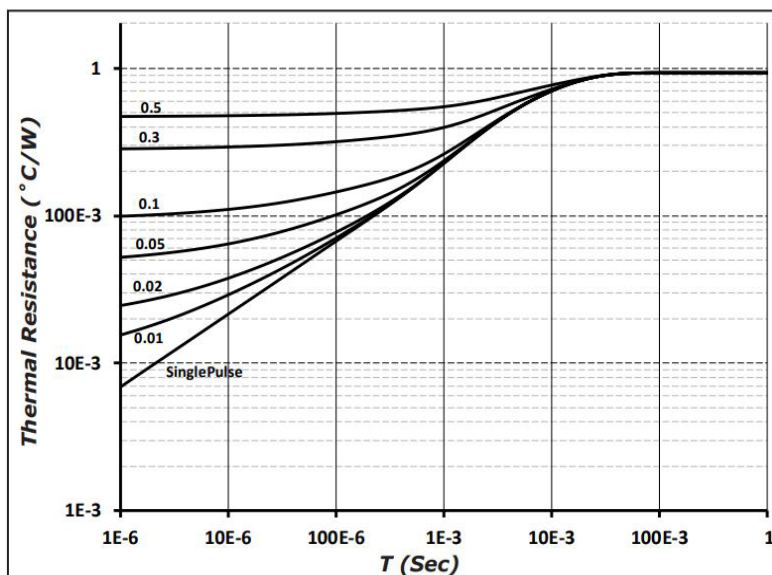
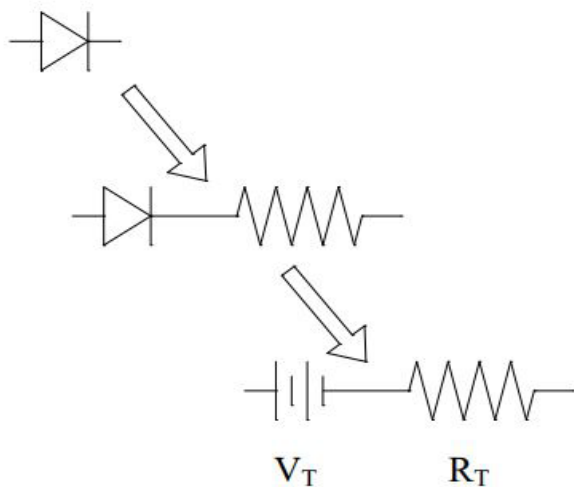


Figure 9
Transient Thermal Impedance

Diode Model



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

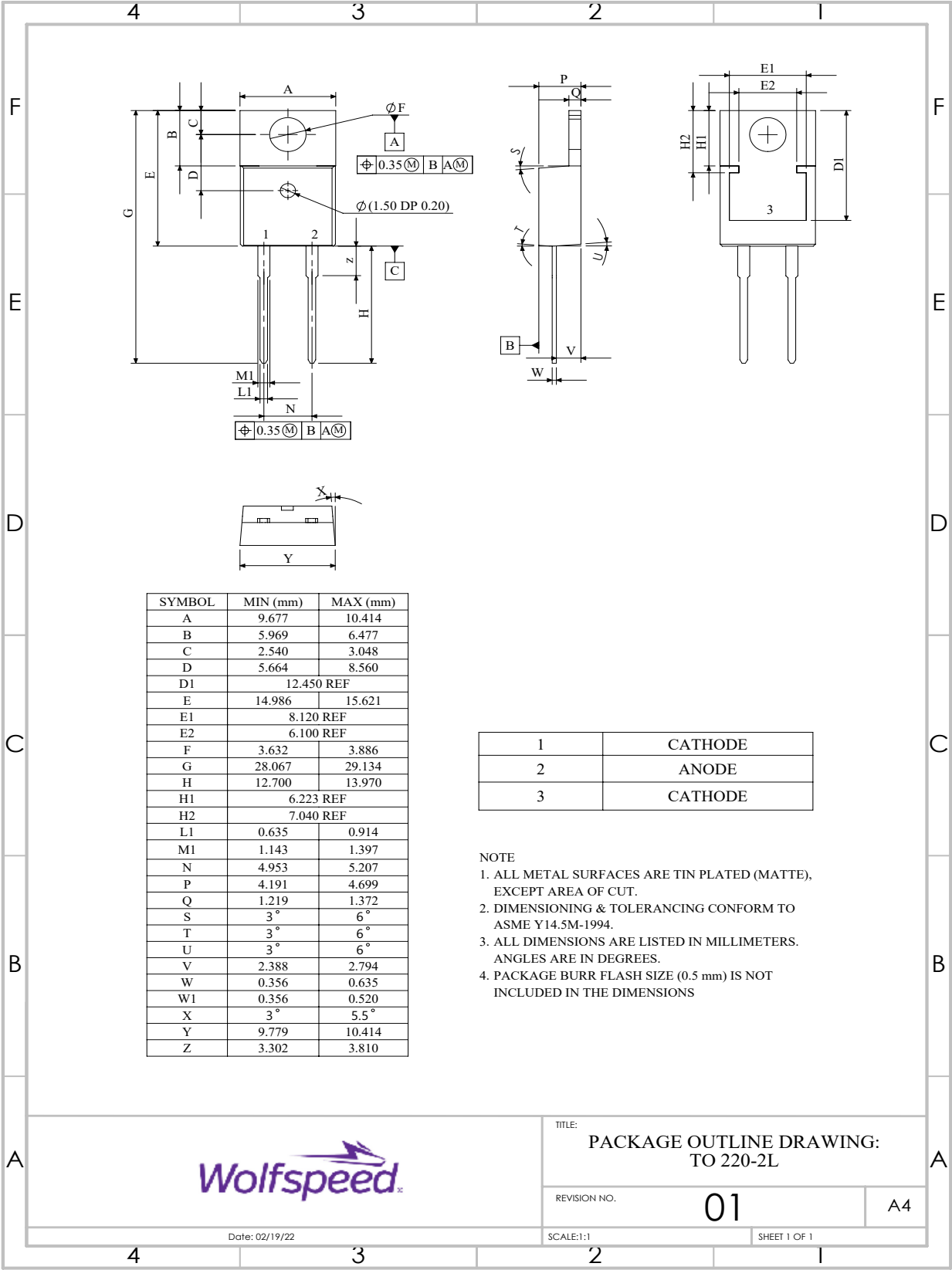
$$V_T = 1.00 + (T_J \cdot -1.10 \cdot 10^{-3})$$

$$R_T = 0.03 + (T_J \cdot 4.00 \cdot 10^{-4})$$

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

Package Dimensions & Pin-Out

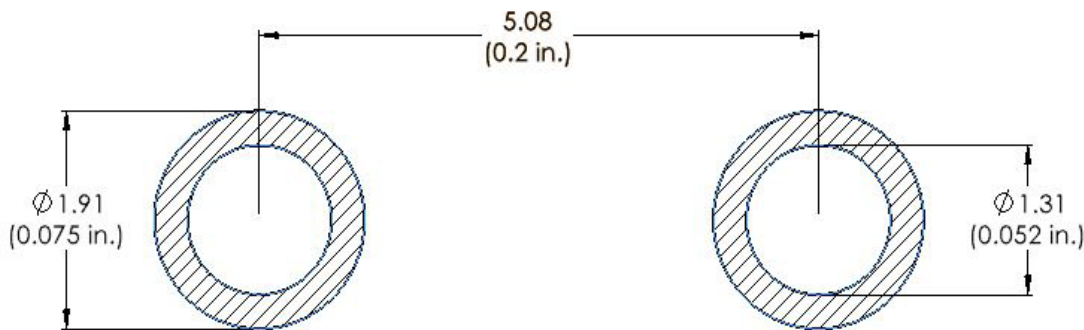
Package: TO-220-2





Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

Order Number	Packing Type
E4D10120A	Tube



Revision History

Document Version	Date of Release	Description of Changes
0	July-2016	Initial Release
1	March-2023	Update Package Drawing Update Landing Pad

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