

# C3D04065A

3rd Generation 650 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 Types: TO-220-2  
Marking: C3D04065A

## Features

- Low Forward Voltage ( $V_F$ ) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior

## 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	$V_{RRM}$	650	V		
DC Blocking Voltage	$V_{DC}$	650			
Continuous Forward Current	$I_F$	13.5	A	$T_J = 25^\circ\text{C}$	Fig. 3
		6		$T_J = 135^\circ\text{C}$	
		4		$T_J = 154^\circ\text{C}$	
Repetitive Peak Forward Surge Current	$I_{FRM}$	17	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	Fig. 8
		12		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Forward Surge Current	$I_{FSM}$	30.5	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	Fig. 8
		20		$T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	220	A	$T_c = 25^\circ\text{C}, t_p = 10\text{ }\mu\text{s}, \text{Pulse}$	Fig. 4
		160		$T_c = 110^\circ\text{C}, t_p = 10\text{ }\mu\text{s}, \text{Pulse}$	
Power Dissipation	$P_{tot}$	52	W	$T_J = 25^\circ\text{C}$	Fig. 4
		22.5		$T_J = 110^\circ\text{C}$	

## Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	$V_F$	1.4	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	$I_R$	6	30	$\mu\text{A}$	$V_R = 650 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$	Fig. 2
		12	120		$V_R = 650 \text{ V}, T_j = 175 \text{ }^\circ\text{C}$	
Total Capacitive Charge	$Q_C$	15		nC	$V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$	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		$\mu\text{J}$	$V_R = 400 \text{ V}$	Fig. 7

### Notes:

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

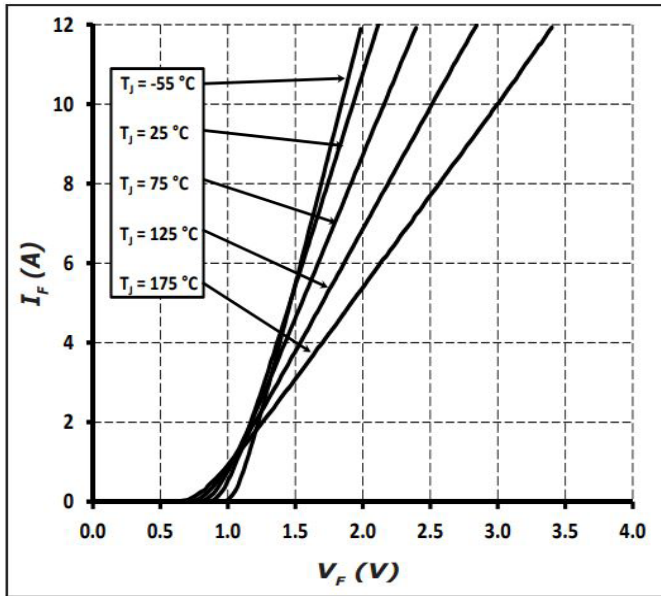
## Thermal & Mechanical Characteristics

Parameter	Symbol	Value	Unit	Notes
Thermal Resistance, Junction to Case (Typical)	$R_{\theta, JC (TYP)}$	2.9	$^\circ\text{C} / \text{W}$	
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

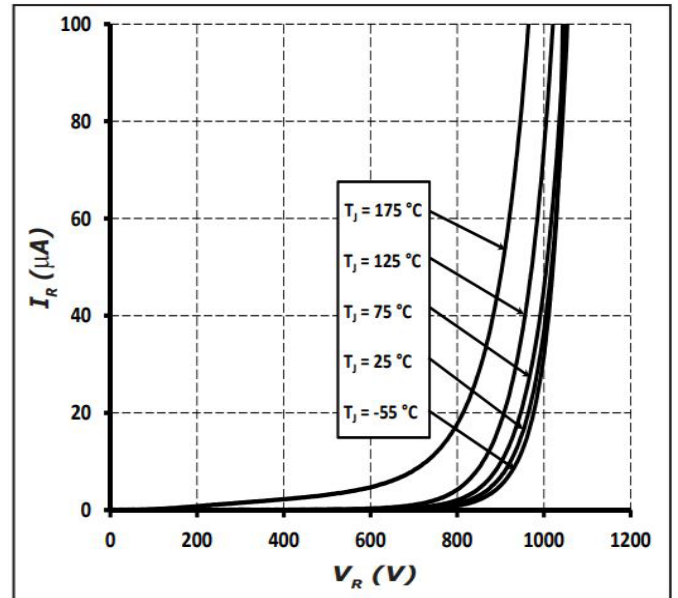
## Electrostatic Discharge (ESD) Classifications

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

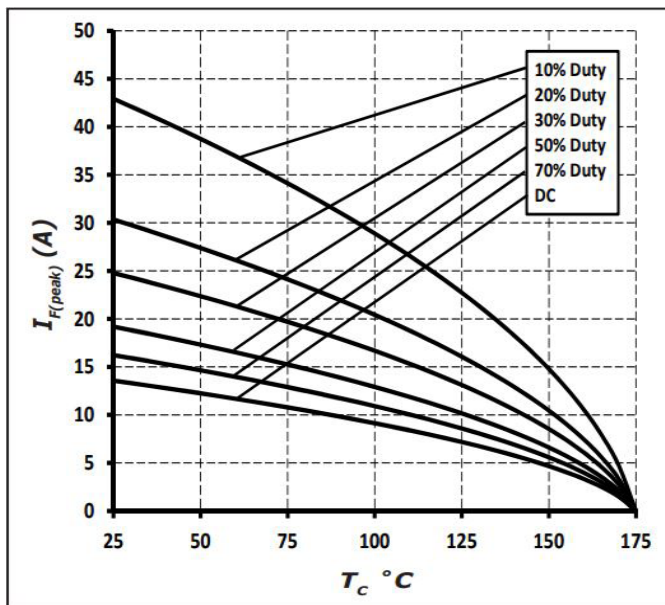
Typical Performance



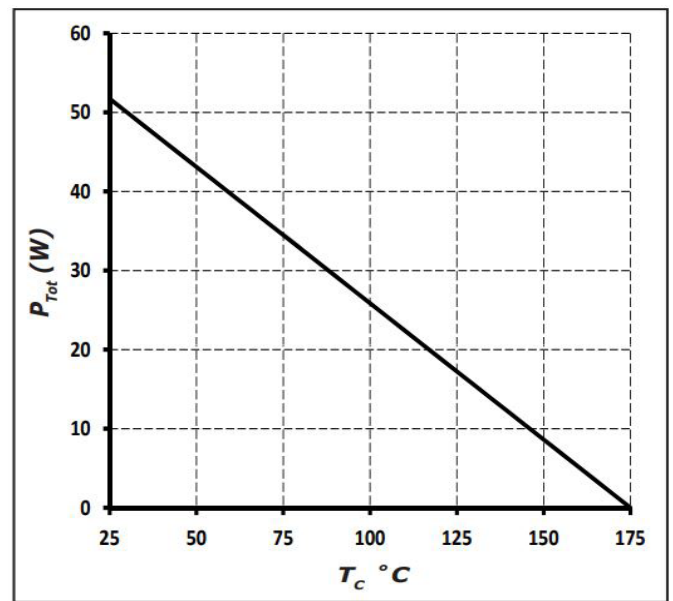
**Figure 1**  
Forward Characteristics



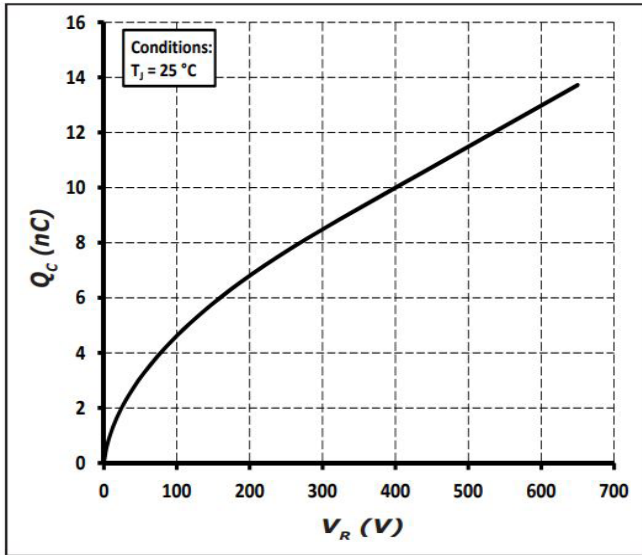
**Figure 2**  
Reverse Characteristics



**Figure 3**  
Current Derating

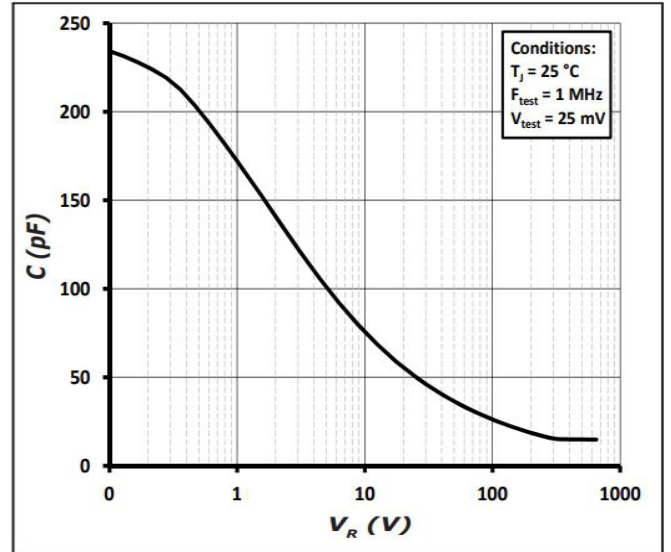


**Figure 4**  
Power Derating



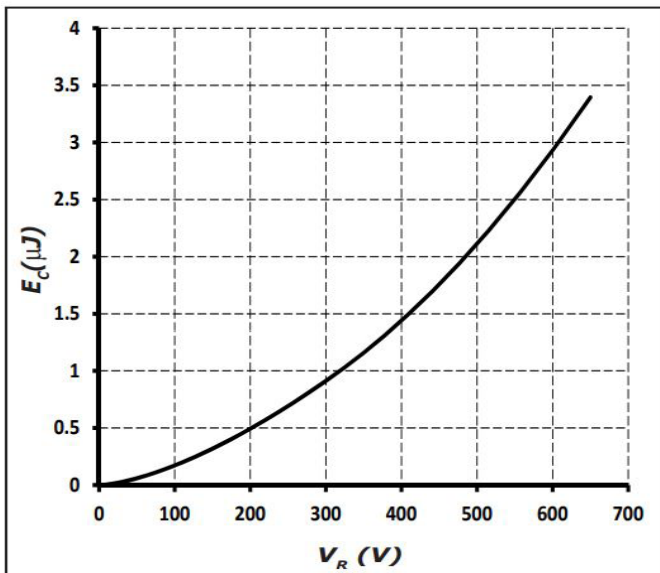
**Figure 5**

Total Capacitance vs. Reverse Voltage



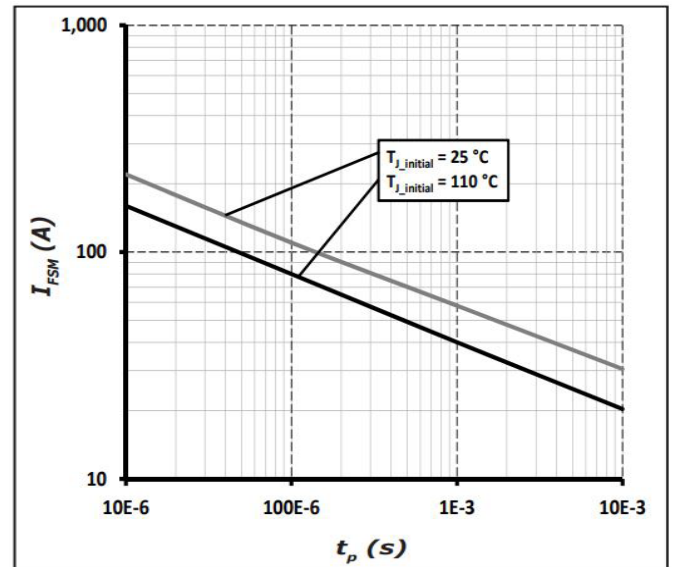
**Figure 6**

Capacitance vs. Reverse Voltage



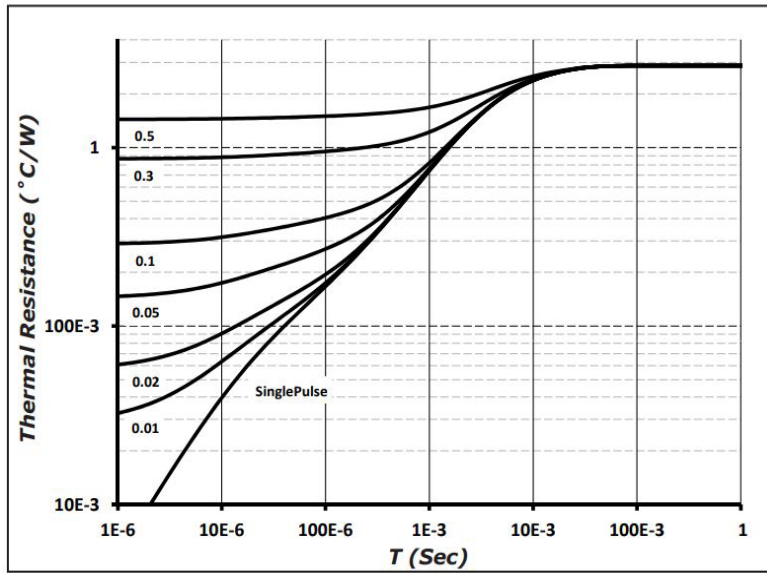
**Figure 7**

Capacitance Stored Energy



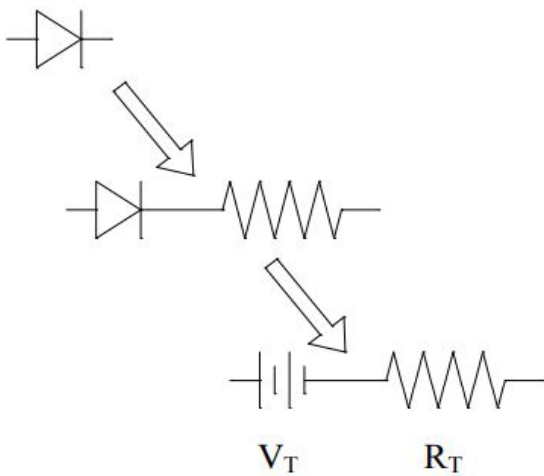
**Figure 8**

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



**Figure 9**  
Transient Thermal Impedance

**Diode Model**



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

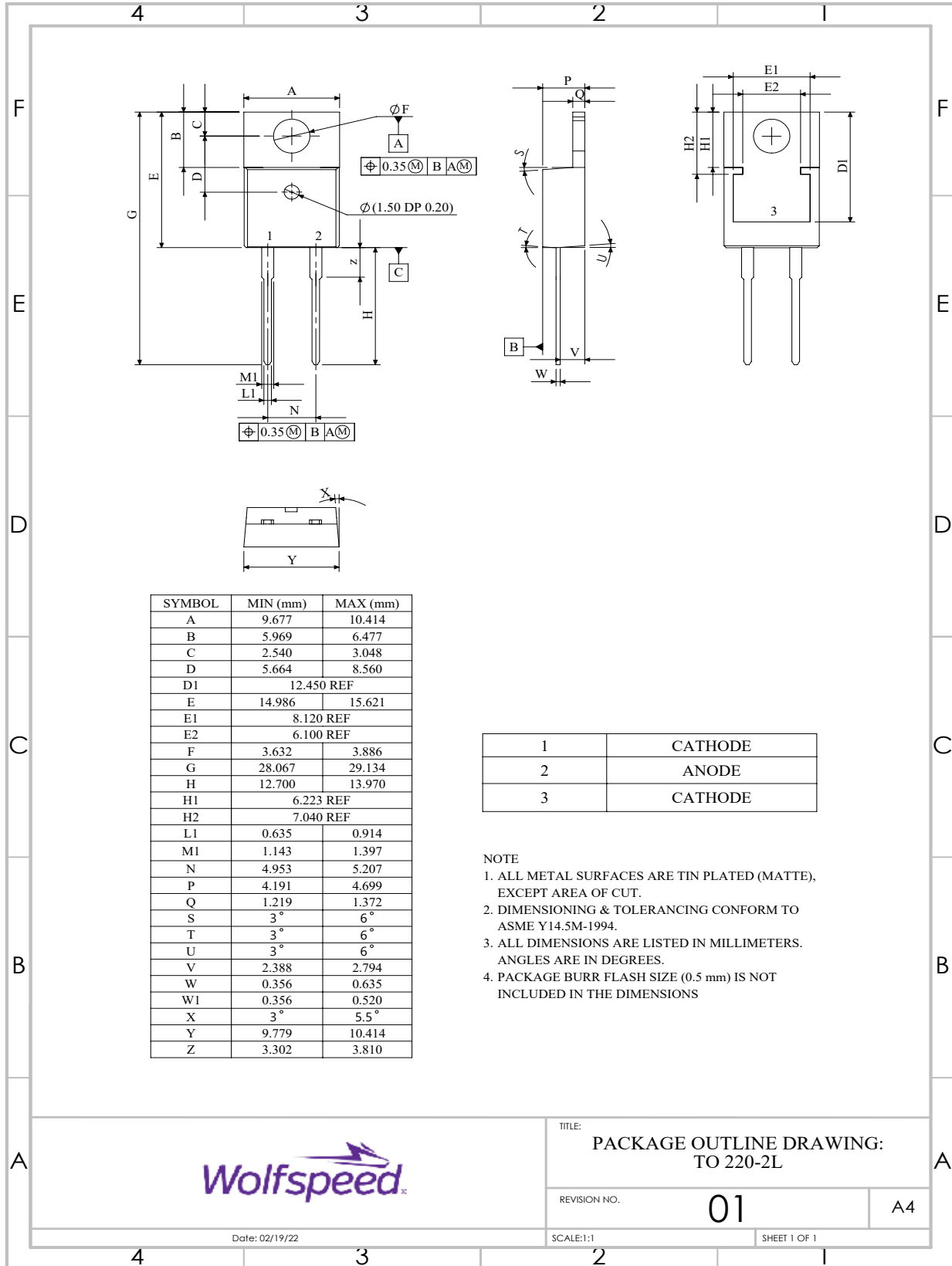
$$V_T = 1.00 + (T_J * -1.1 * 10^{-3})$$

$$R_T = 0.069 + (T_J * 8.3 * 10^{-4})$$

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

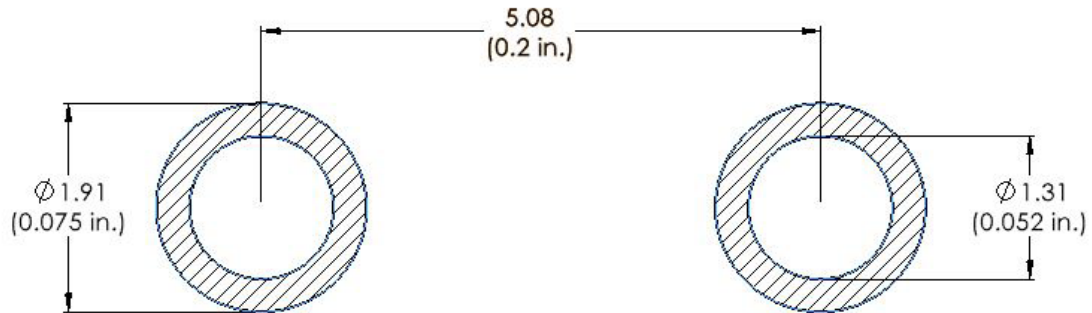
### Package Dimensions & Pin-Out

Package: TO-220-2



## Recommended Solder Pad Layout

Primary dimensions shown in mm.



## Product Ordering Information

Order Number	Packing Type
C3D04065A	Tube

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



## Revision History

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



## Notes & Disclaimer

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