



**THE DATASHEET OF  
C3D16065D**

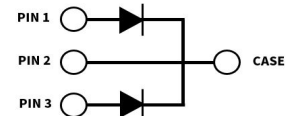


# C3D16065D

## 3rd Generation 650 V, 16 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: C3D16065

### 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<br>(Per Leg/Per Device) | $I_F$         | 23/46    | A                    | $T_c = 25^\circ\text{C}$                                      | Fig. 3 |
|  |               | 11/22    |                      | $T_c = 135^\circ\text{C}$                                     |        |
|  |               | 8/16     |                      | $T_c = 150^\circ\text{C}$                                     |        |
| Repetitive Peak Forward Surge Current              | $I_{FRM}$     | 37.5/75  | A                    | $T_c = 25^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$  |        |
|  |               | 25.5/51  |                      | $T_c = 110^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$ |        |
| Non-Repetitive Forward Surge Current               | $I_{FSM}$     | 71/142   | A                    | $T_c = 25^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$  | Fig. 8 |
|  |               | 60/120   |                      | $T_c = 110^\circ\text{C}, t_p = 10\text{ ms, Half Sine Wave}$ |        |
| Non-Repetitive Peak Forward Surge Current          | $I_{F,Max}$   | 650/1300 | A                    | $T_c = 25^\circ\text{C}, t_p = 10\text{ }\mu\text{s, Pulse}$  |        |
|  |               | 530/1080 |                      | $T_c = 110^\circ\text{C}, t_p = 10\text{ }\mu\text{s, Pulse}$ |        |
| Power Dissipation                                  | $P_{tot}$     | 100*     | W                    | $T_c = 25^\circ\text{C}$                                      | Fig. 4 |
|  |               | 43.5*    |                      | $T_c = 110^\circ\text{C}$                                     |        |
| $i^2t$ value                                       | $\int i^2 dt$ | 25*      | $\text{A}^2\text{s}$ | $T_c = 25\text{C}, t_p=10\text{ms}$                           |        |
|  |               | 18*      |                      | $T_c = 110\text{C}, t_p=10\text{ms}$                          |        |
| Diode $dV/dt$ Ruggedness                           | $dV/dt$       | 200      | V/ns                 | $V_R = 0\text{-}600\text{V}$                                  |        |

## Electrical Characteristics

| Parameter                 | Symbol | Typ. | Max. | Unit          | Test Conditions  | Notes  |
|---------------------------|--------|------|------|---------------|--|--------|
| Forward Voltage           | $V_F$  | 1.5  | 1.8  | V             | $I_F = 8 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$   | Fig. 1 |
|                           |        | 2.1  | 2.4  |               | $I_F = 8 \text{ A}, T_j = 175 \text{ }^\circ\text{C}$  |        |
| Reverse Current           | $I_R$  | 10   | 51   | $\mu\text{A}$ | $V_R = 650 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$   | Fig. 2 |
|                           |        | 12   | 204  |               | $V_R = 650 \text{ V}, T_j = 175 \text{ }^\circ\text{C}$  |        |
| Total Capacitive Charge   | $Q_C$  | 20   |      | nC            | $V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$<br>$I_F = 8 \text{ A}, di/dt = 500 \text{ A}/\mu\text{s}$ | Fig. 5 |
| Total Capacitance         | C      | 395  |      | pF            | $V_R = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$  | Fig. 6 |
|                           |        | 37   |      |               | $V_R = 200 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$  |        |
|                           |        | 32   |      |               | $V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$  |        |
| Capacitance Stored Energy | $E_C$  | 3.0  |      | $\mu\text{J}$ | $V_R = 400 \text{ V}$  | Fig. 7 |

### Notes:

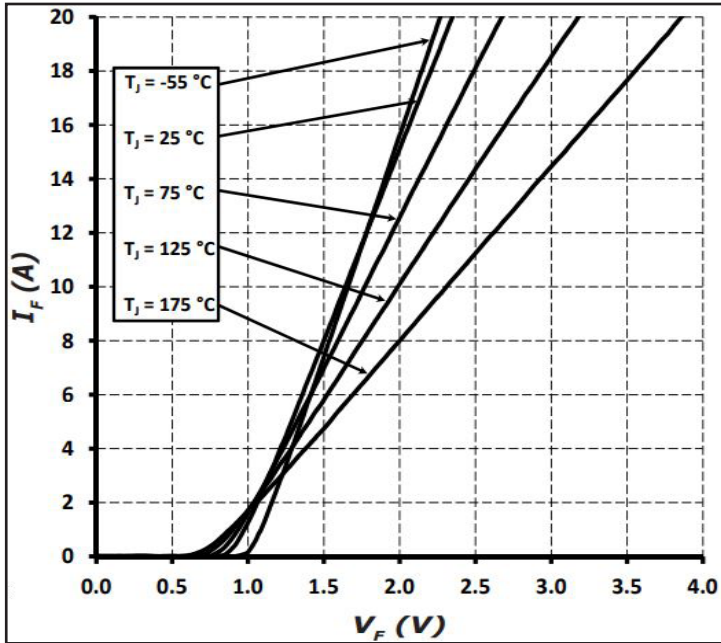
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

## Thermal & Mechanical Characteristics

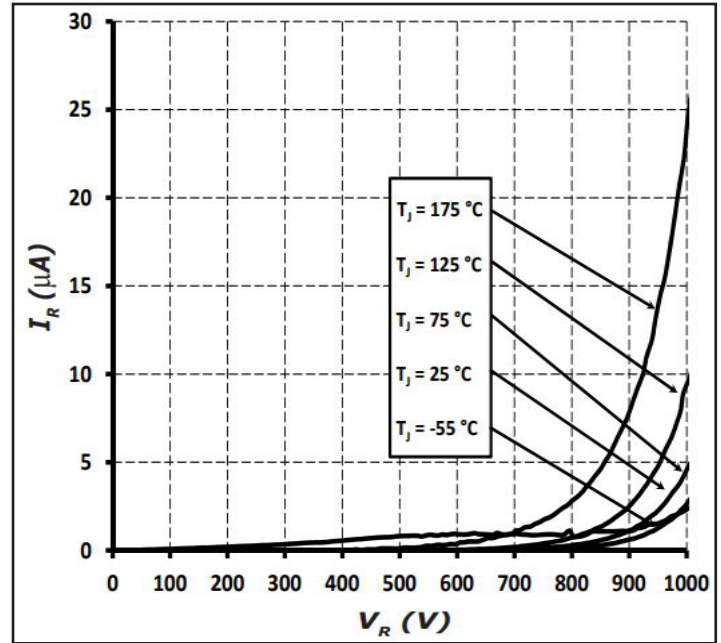
| Parameter                                      | Symbol                | Value          | Unit                        | Notes      |
|--|-----------------------|----------------|-----------------------------|------------|
| Thermal Resistance, Junction to Case (Typical) | $R_{\theta, JC(TYP)}$ | 1.5**<br>0.75* | $^\circ\text{C} / \text{W}$ |            |
| 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

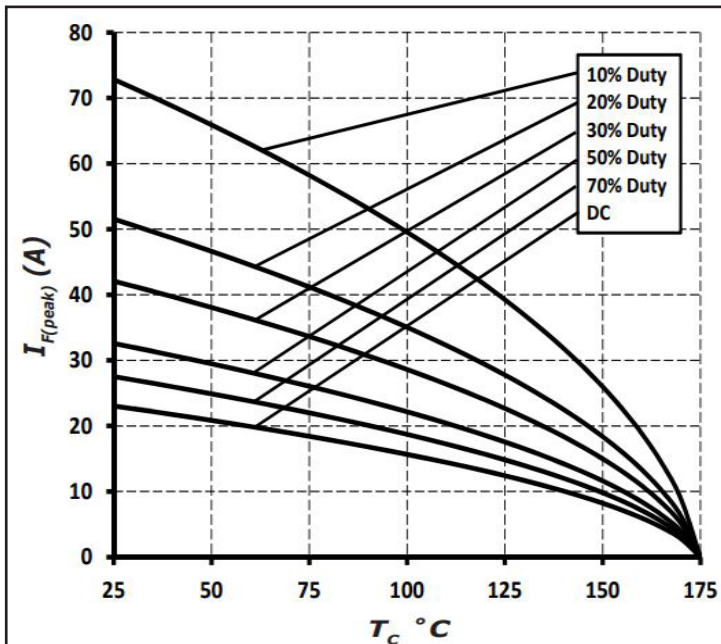
Typical Performance



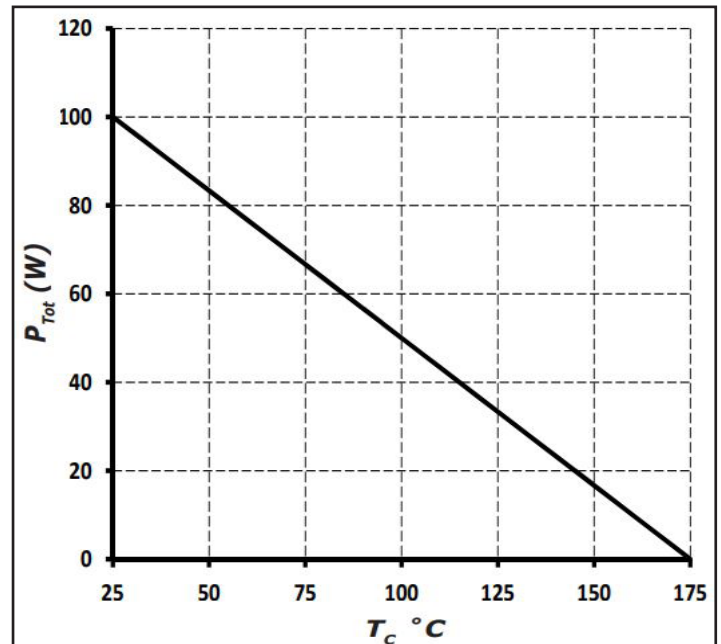
**Figure 1**  
Forward Characteristics



**Figure 2**  
Reverse Characteristics



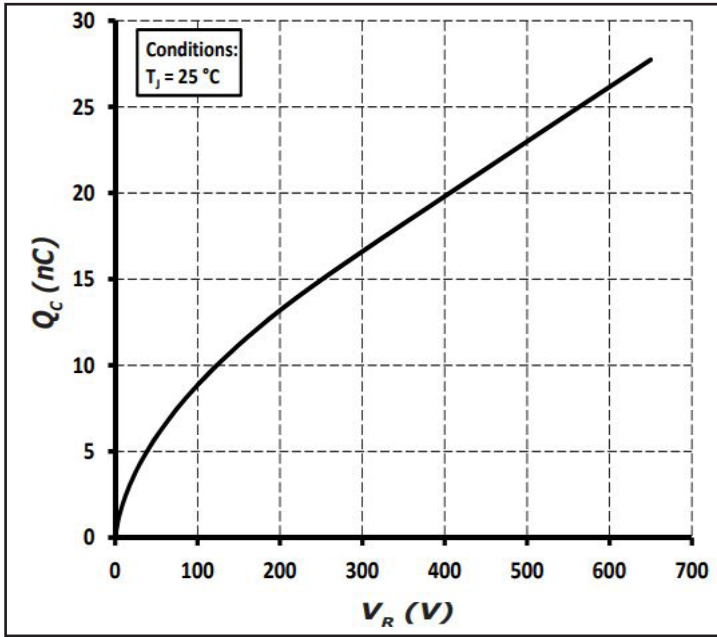
**Figure 3**  
Current Derating



**Figure 4**  
Power Derating

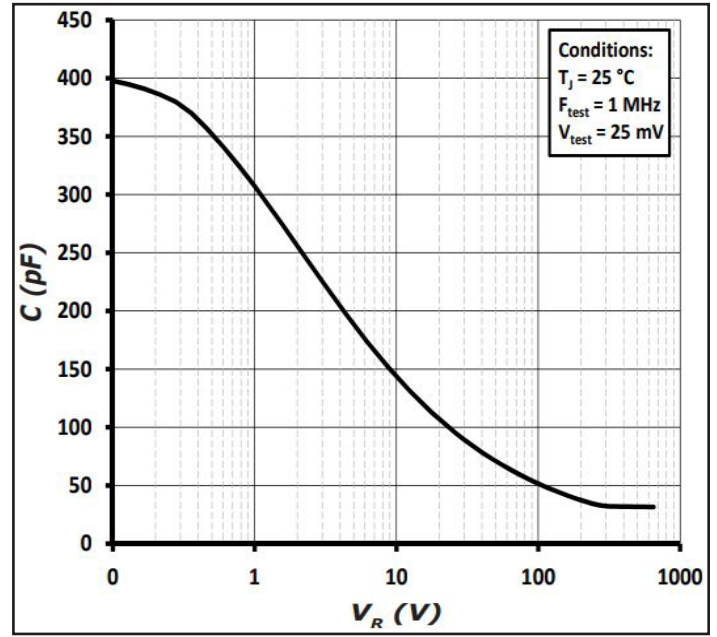


**Typical Performance**



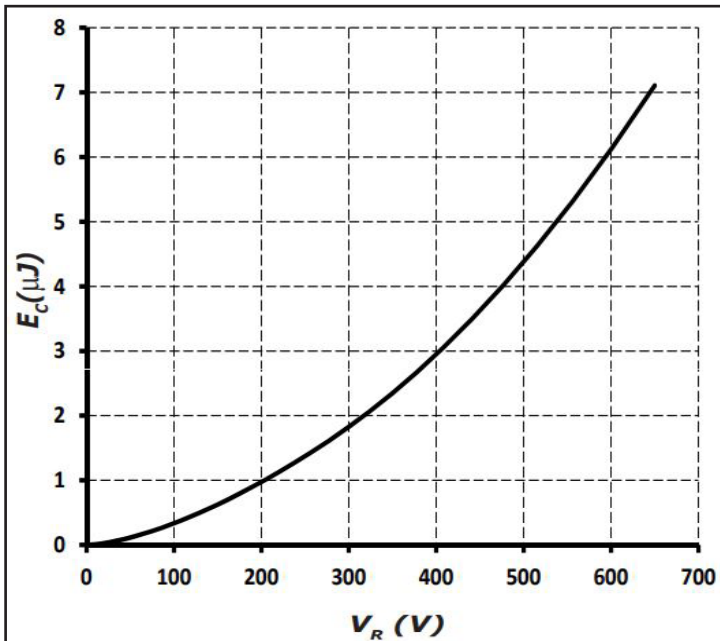
**Figure 5**

Total Capacitance Charge vs. Reverse Voltage



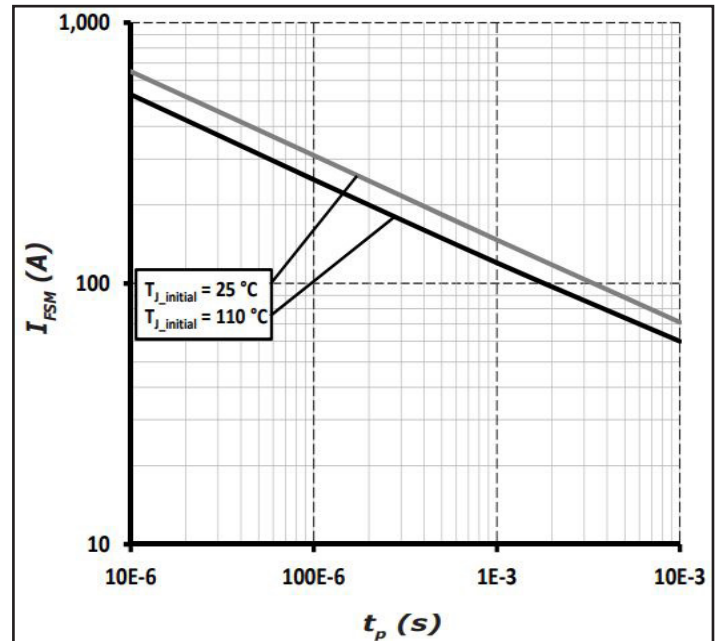
**Figure 6**

Capacitance vs. Reverse Voltage



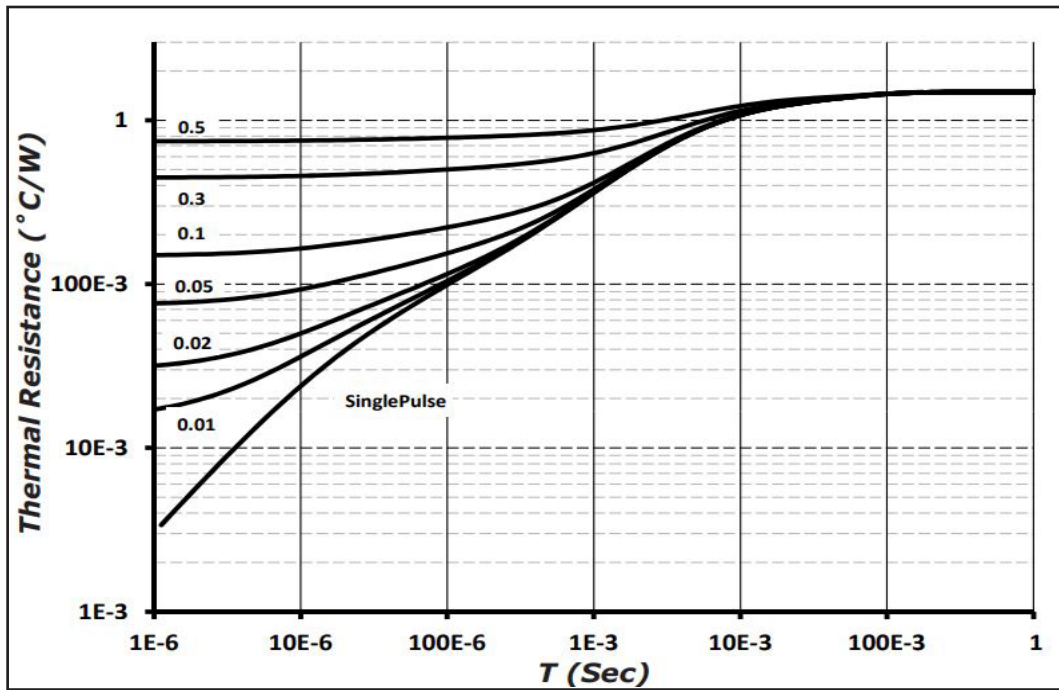
**Figure 7**

Capacitance Stored Energy



**Figure 8**

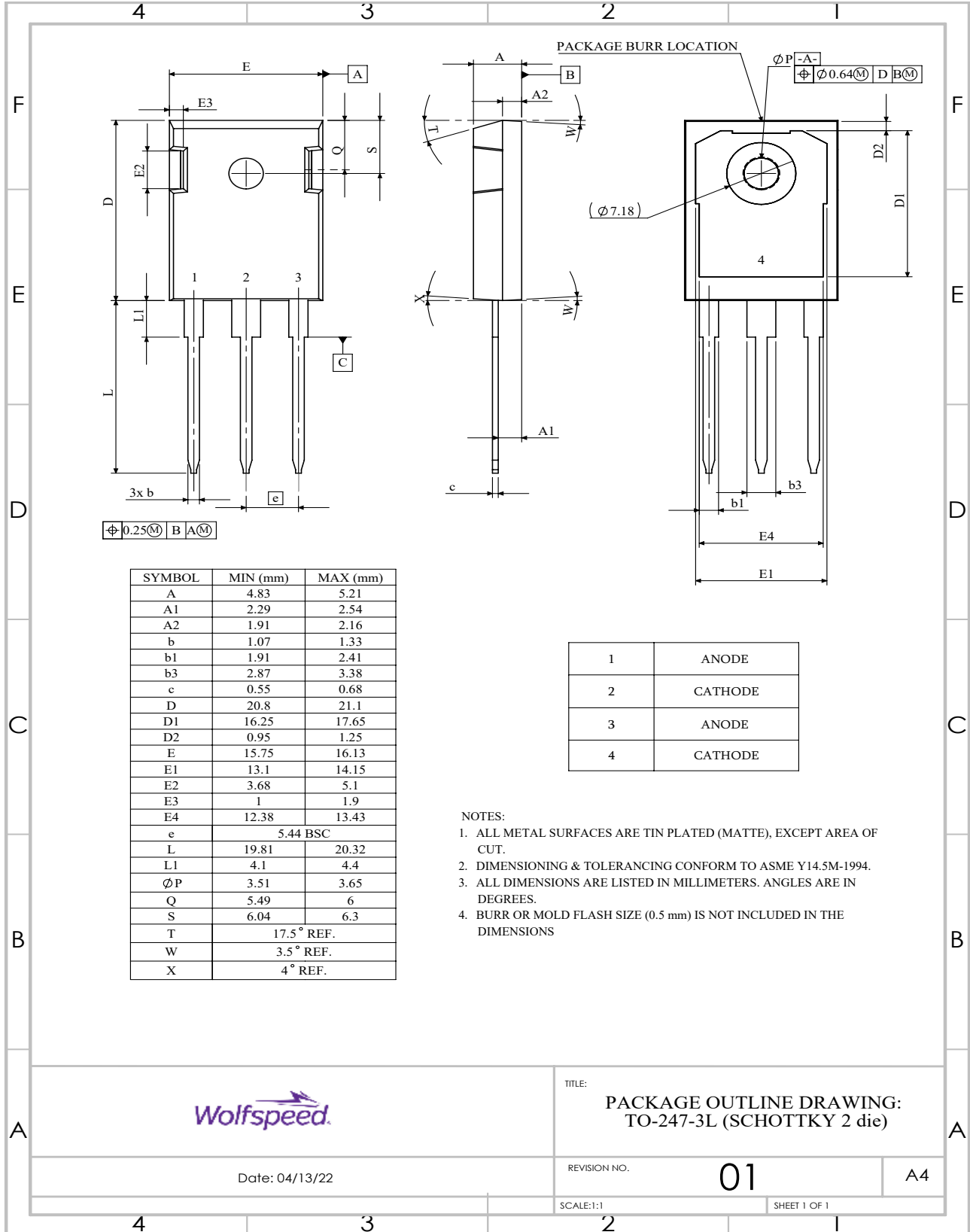
Non-Repetitive Peak Forward Surge Current vs. Pulse Duration



**Figure 9**  
Transient Thermal Impedance

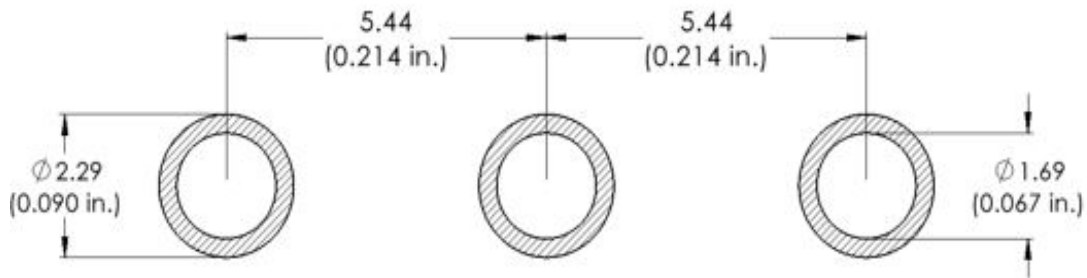
### Package Dimensions & Pin-Out

Package: TO-247-3

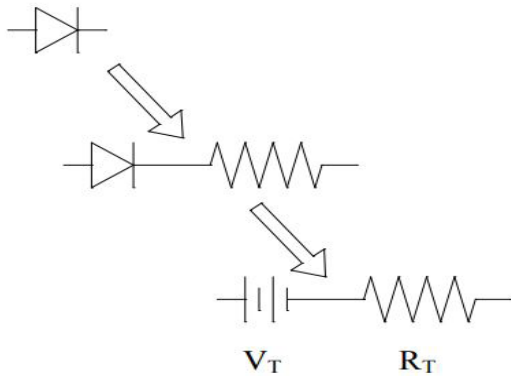


## Recommended Solder Pad Layout

Primary dimensions shown in mm.



## Diode Model



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

$$V_T = 0.95 + (T_J * -1.2 * 10^{-3})$$

$$R_T = 0.054 + (T_J * 5.5 * 10^{-4})$$

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

## Product Ordering Information

| Order Number | Packing Type |
|--------------|--------------|
| C3D16065D    | Tube         |

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



## Revision History

| Document Version | Date of Release | Description of Changes                                 |
|------------------|-----------------|--|
| B                | July- 2016      | Initial Release  |
| 5                | November-2023   | Update Branding, POD, Package Image, Solder pad layout |

## Notes & Disclaimer

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The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Wolfspeed representative or from the Product Documentation sections of [www.wolfspeed.com](http://www.wolfspeed.com).

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