

E4D20120D

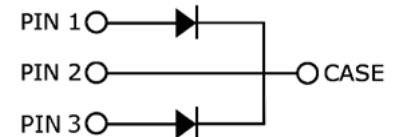
1200 V, 20 A Silicon Carbide Schottky Diode

Features

- 4th generation SiC merged PIN schottky technology
- Zero reverse recovery current
- High-frequency operation
- Temperature-independent switching behavior
- AEC-Q101 qualified and PPAP capable
- Humidity resistant



TO-247-3



Package Types: TO-247-3

PN's: E4D20120D

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Applications

- Boost diodes in PFC or DC/DC stages
- Free wheeling diodes in inverter stages
- AC/DC converters
- Automotive and traction power conversion
- PV inverters

Benefits

- Replace bipolar with unipolar rectifiers
- Essentially no switching losses
- Higher efficiency
- Reduction of heat sink requirements
- Parallel devices without thermal runaway
- Ideal for outdoor environments

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

| Parameter | Symbol | Value | Unit | Test Conditions | Note |
|--|----------------|-------------|------------------|--|--------|
| Repetitive Peak Reverse Voltage | V_{RRM} | 1200 | V | | |
| DC Peak Reverse Voltage | V_R | 1200 | | | |
| Continuous Forward Current | I_F | 33/66 | A | $T_c = 25\text{ }^\circ\text{C}$ | Fig. 3 |
| | | 16/32 | | $T_c = 100\text{ }^\circ\text{C}$ | |
| | | 10/20 | | $T_c = 155\text{ }^\circ\text{C}$ | |
| Power Dissipation | P_{tot} | 176 | W | $T_c = 25\text{ }^\circ\text{C}$ | Fig. 4 |
| | | 76 | | $T_c = 110\text{ }^\circ\text{C}$ | |
| Repetitive Peak Forward Surge Current | I_{FRM} | 45* | A | $T_c = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$, Half Sine Pulse | |
| | | 26* | | $T_c = 110\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$, Half Sine Pulse | |
| Diode dV/dt Ruggedness | dV/dt | 250 | V/ns | $V_R = 0\text{--}960\text{ V}$ | |
| Operating Junction and Storage Temperature | T_J, T_{stg} | -55 to +175 | $^\circ\text{C}$ | | |

* Per Leg, ** Per Device



Electrical Characteristics

| Parameter | Symbol | Typ. | Max. | Unit | Test Conditions | Note |
|---------------------------|--------|------|--|---------------|---|--------|
| Forward Voltage | V_F | 1.5 | 1.8 | V | $I_F = 10\text{ A}, T_J = 25\text{ }^\circ\text{C}$ | Fig. 1 |
| | | 2.2 | | | $I_F = 10\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | |
| Reverse Current | I_R | 30 | 200 | μA | $V_R = 1200\text{ V}, T_J = 25\text{ }^\circ\text{C}$ | Fig. 2 |
| | | 55 | | | $V_R = 1200\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | |
| Total Capacitive Charge | Q_C | 50 | | nC | $V_R = 800\text{ V}, I_F = 10\text{ A}, T_J = 25\text{ }^\circ\text{C}$ | Fig. 5 |
| Total Capacitance | C | 712 | | pF | $V_R = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$ | Fig. 6 |
| | | 44 | $V_R = 400\text{ V}, T_J = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$ | | | |
| | | 32 | $V_R = 800\text{ V}, T_J = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$ | | | |
| Capacitance Stored Energy | E_C | 14 | | μJ | $V_R = 800\text{ V}$ | Fig. 7 |

Note: This is a majority carrier diode, so there is no reverse recovery charge.

Thermal Characteristics

| Parameter | Symbol | Typ. | Unit | Note |
|--|-----------------|--------|--------------------|--------|
| Thermal Resistance from Junction to Case | $R_{\theta JC}$ | 0.85* | $^\circ\text{C/W}$ | Fig. 8 |
| | | 0.43** | | |

* Per Leg, ** Per Device

Typical Performance

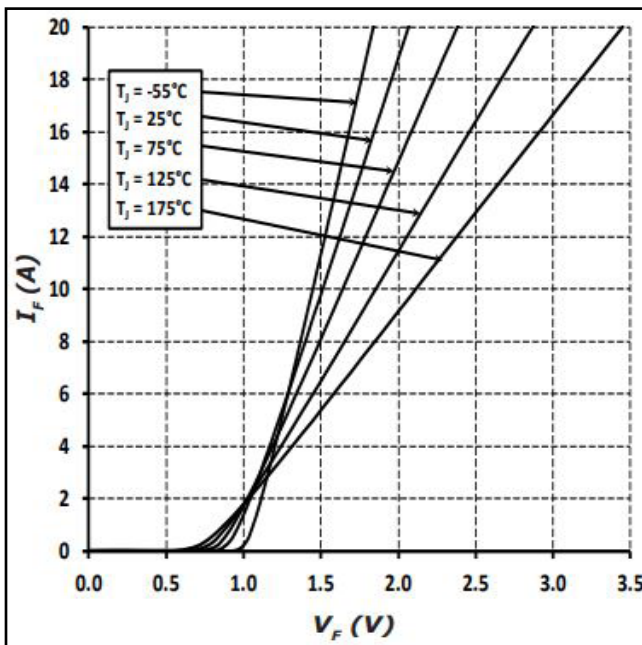


Figure 1. Forward Characteristics

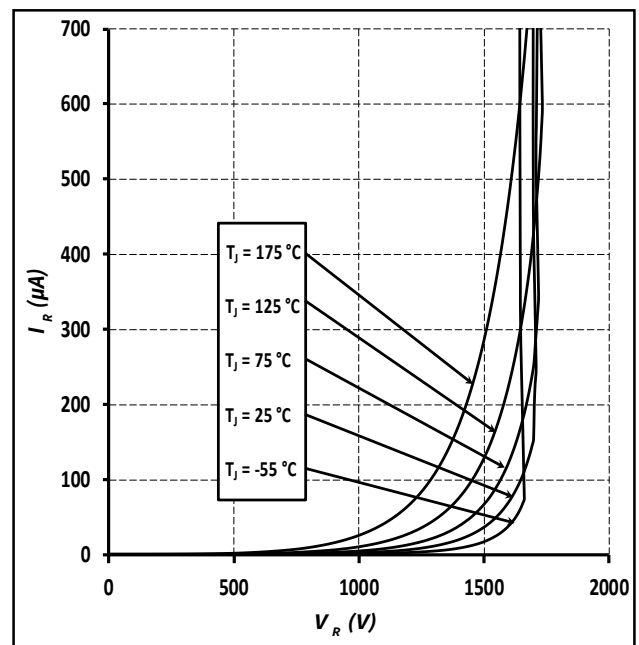


Figure 2. Reverse Characteristics



Typical Performance

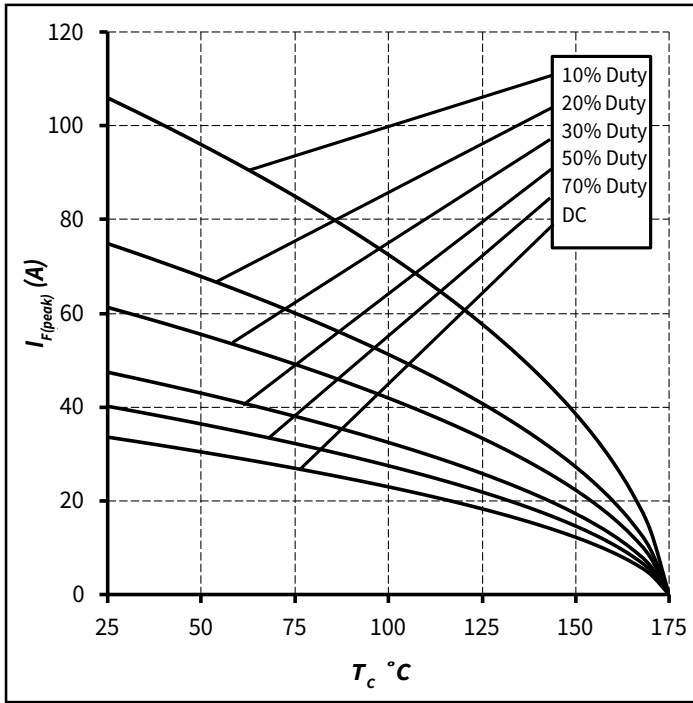


Figure 3. Current Derating

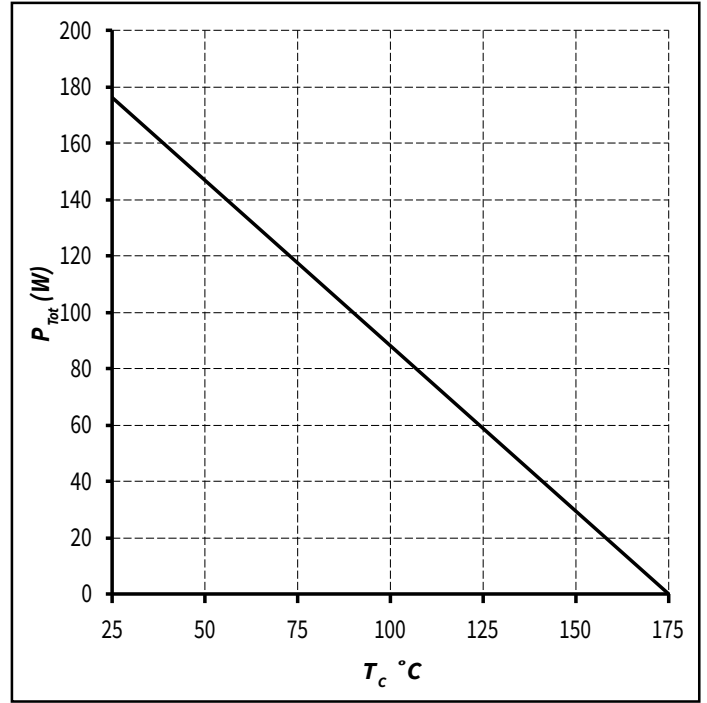


Figure 4. Power Derating

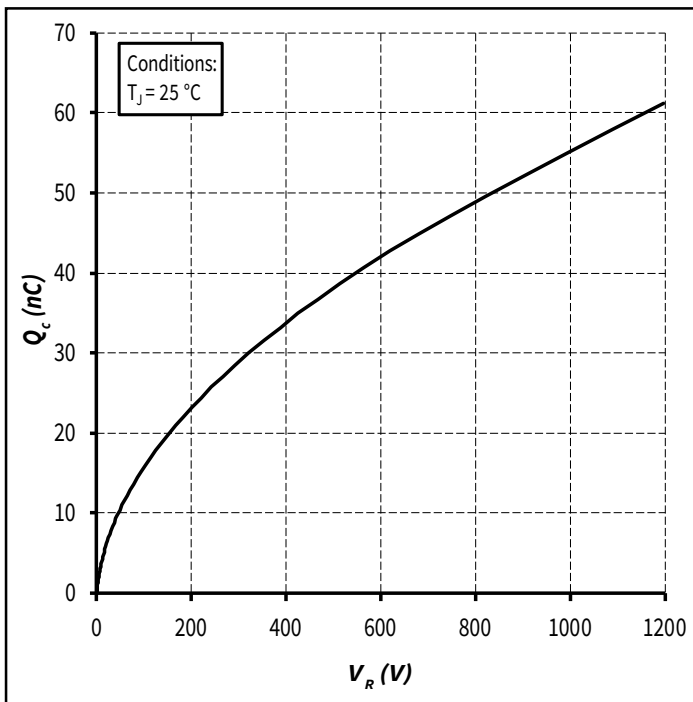


Figure 5. Recovery Charge vs. Reverse Voltage

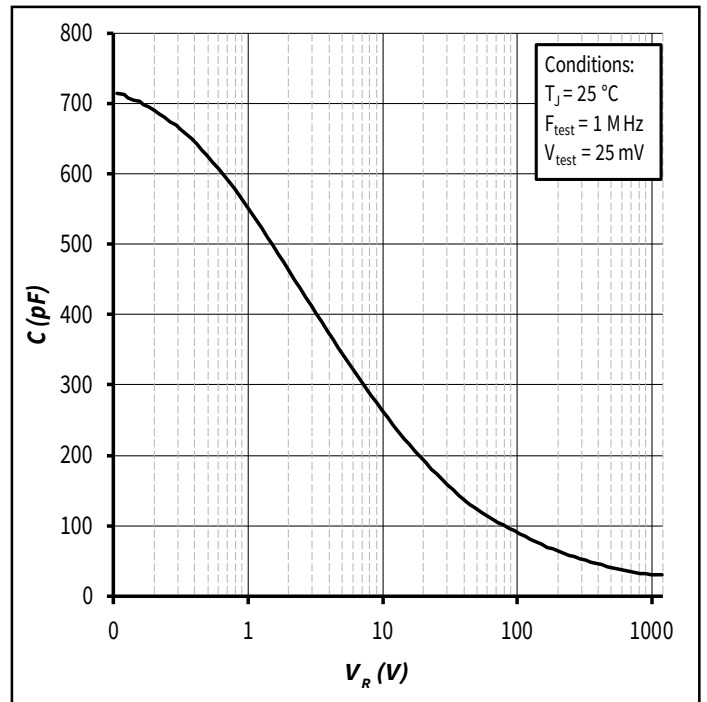


Figure 6. Capacitance vs. Reverse Voltage



Typical Performance

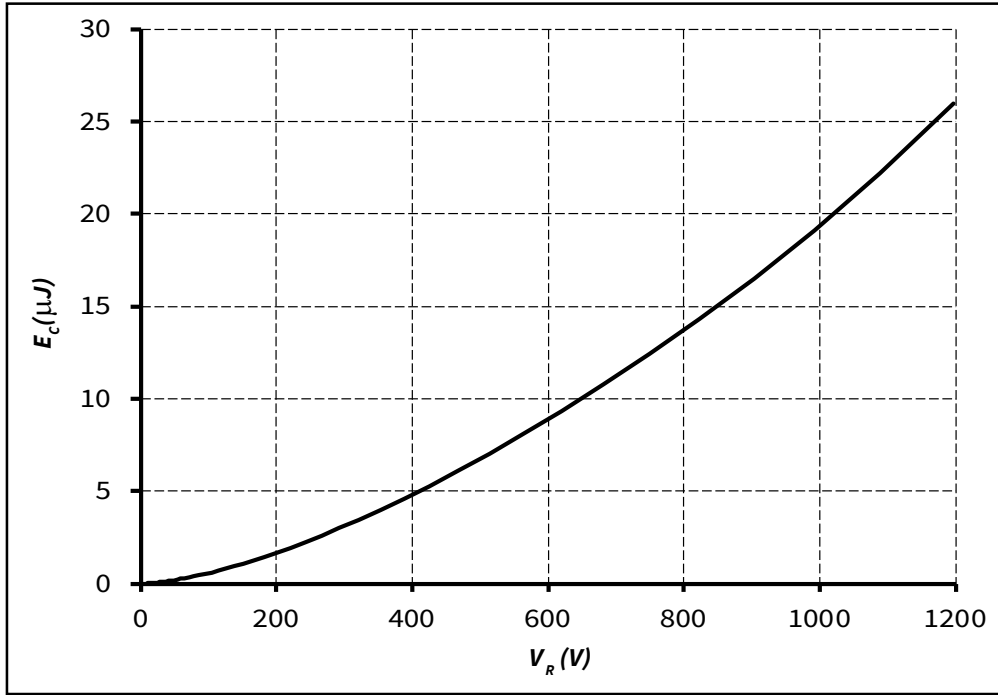


Figure 7. Typical Capacitance Stored Energy

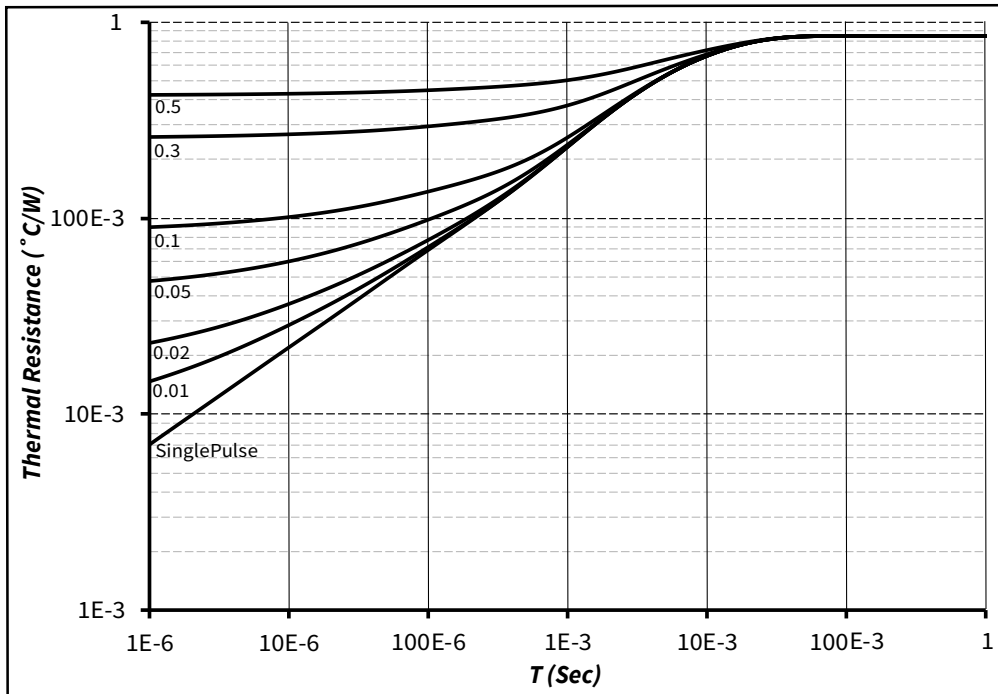
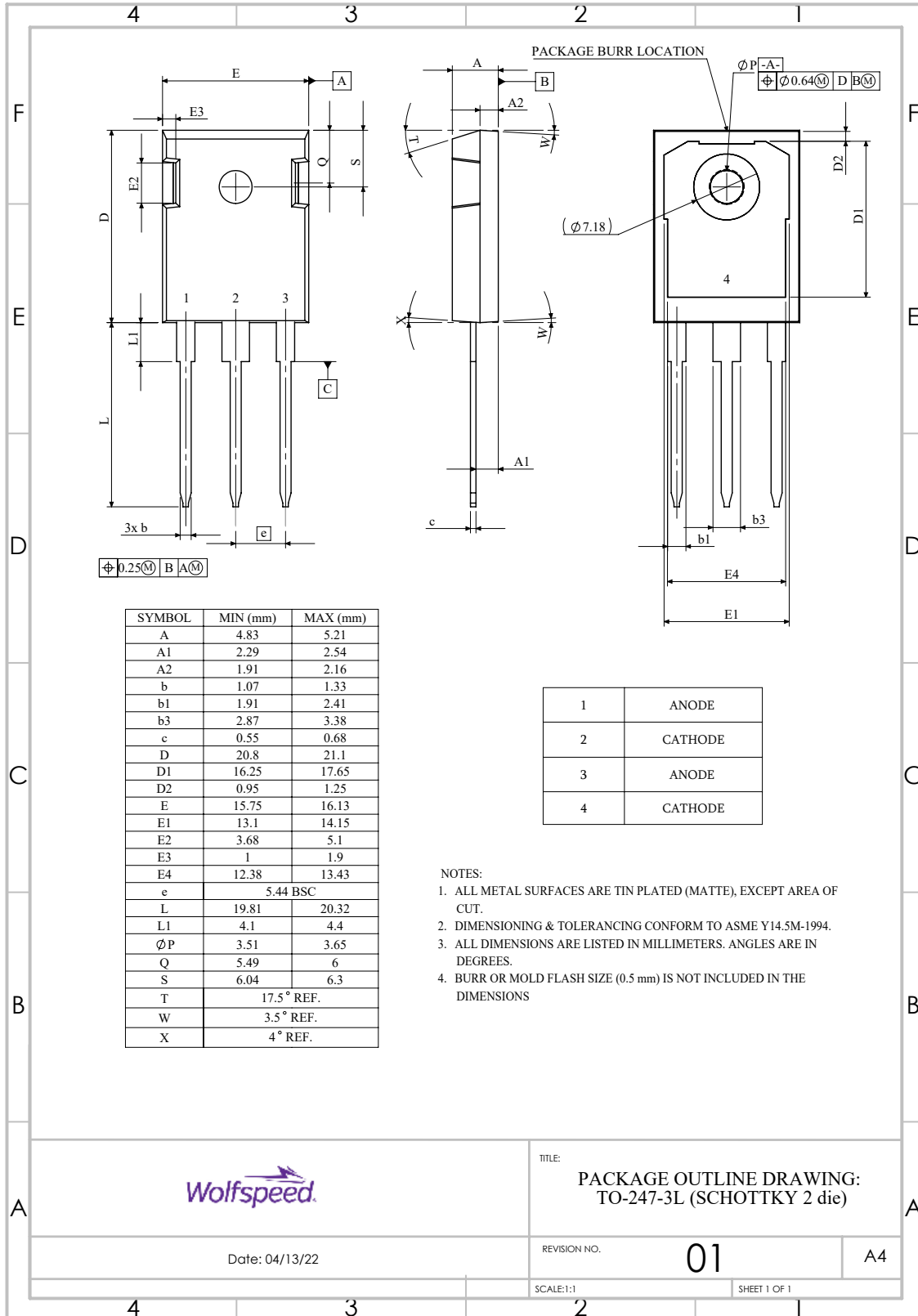


Figure 8. Transient Thermal Impedance



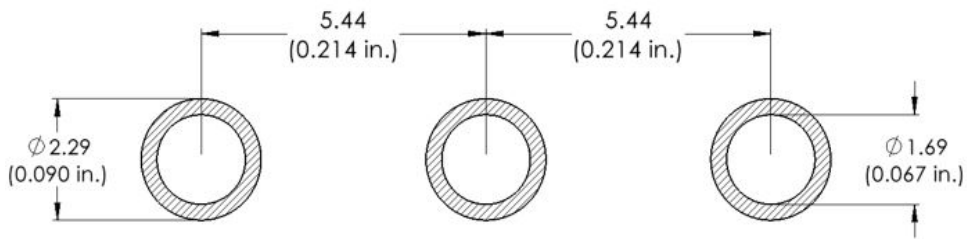
Package Dimensions

Package: TO-247-3





Recommended Solder Pad Layout



| Part Number | Package | Marking |
|-------------|----------|----------|
| E4D20120D | TO-247-3 | E4D20120 |



Revision History

| Current Revision | Date of Release | Description of Changes |
|------------------|-----------------|--|
| A | June-2020 | Initial Release |
| 2 | September-2023 | Updated Wolfspeed branding, package drawing, and solder pad layout |



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