

C3D03065E

Silicon Carbide Schottky Diode

Z-REC[®] RECTIFIER

| | | |
|-------------------------------|---|--------|
| V_{RRM} | = | 650 V |
| $I_F (T_C=135^\circ\text{C})$ | = | 5 A |
| Q_c | = | 7.6 nC |

Features

- 650-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on V_F

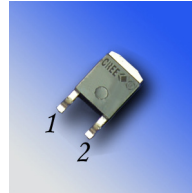
Benefits

- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

Applications

- Switch Mode Power Supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters

Package



TO-252-2



AEC-Q101 Qualified



| Part Number | Package | Marking |
|-------------|----------|----------|
| C3D03065E | TO-252-2 | C3D03065 |

Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|----------------|--|----------------|------------------|---|--------|
| V_{RRM} | Repetitive Peak Reverse Voltage | 650 | V | | |
| V_{RSM} | Surge Peak Reverse Voltage | 650 | V | | |
| V_{DC} | DC Blocking Voltage | 650 | V | | |
| I_F | Continuous Forward Current | 11 5 3 | A | $T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=158^\circ\text{C}$ | Fig. 3 |
| I_{FRM} | Repetitive Peak Forward Surge Current | 18 13.5 | A | $T_C=25^\circ\text{C}$, $t_p=10$ mS, Half Sine Wave D=0.3 $T_C=110^\circ\text{C}$, $t_p=10$ mS, Half Sine Wave D=0.3 | |
| I_{FSM} | Non-Repetitive Peak Forward Surge Current | 26 23 | A | $T_C=25^\circ\text{C}$, $t_p=10$ mS, Half Sine Wave D=0.3 $T_C=110^\circ\text{C}$, $t_p=10$ mS, Half Sine Wave D=0.3 | |
| I_{FSM} | Non-Repetitive Peak Forward Surge Current | 100 | A | $T_C=25^\circ\text{C}$, $t_p=10$ μS , Pulse | |
| P_{tot} | Power Dissipation | 47 20 | W | $T_C=25^\circ\text{C}$ $T_C=110^\circ\text{C}$ | Fig. 4 |
| dV/dt | Diode dV/dt ruggedness | 200 | V/ns | $V_R=0-650\text{V}$ | |
| T_J, T_{stg} | Operating Junction and Storage Temperature | -55 to +175 | $^\circ\text{C}$ | | |

Electrical Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|--------|---------------------------|-----------------|------------|---------------|--|--------|
| V_F | Forward Voltage | 1.5 1.8 | 1.7 2.4 | V | $I_F = 3\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 3\text{ A}$ $T_J = 175^\circ\text{C}$ | Fig. 1 |
| I_R | Reverse Current | 5 9.5 | 24 96 | μA | $V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$ | Fig. 2 |
| Q_C | Total Capacitive Charge | 7.6 | | nC | $V_R = 400\text{ V}$, $I_F = 3\text{ A}$ $di/dt = 500\text{ A}/\mu\text{S}$ $T_J = 25^\circ\text{C}$ | Fig. 5 |
| C | Total Capacitance | 166 14 11 | | pF | $V_R = 0\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 200\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 400\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ | Fig. 6 |
| E_C | Capacitance Stored Energy | 1.1 | | μJ | $V_R = 400\text{ V}$ | Fig. 7 |

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

Thermal Characteristics

| Symbol | Parameter | Typ. | Unit | Note |
|-----------------|--|------|---------------------------|--------|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 3.2 | $^\circ\text{C}/\text{W}$ | Fig. 8 |

Typical Performance

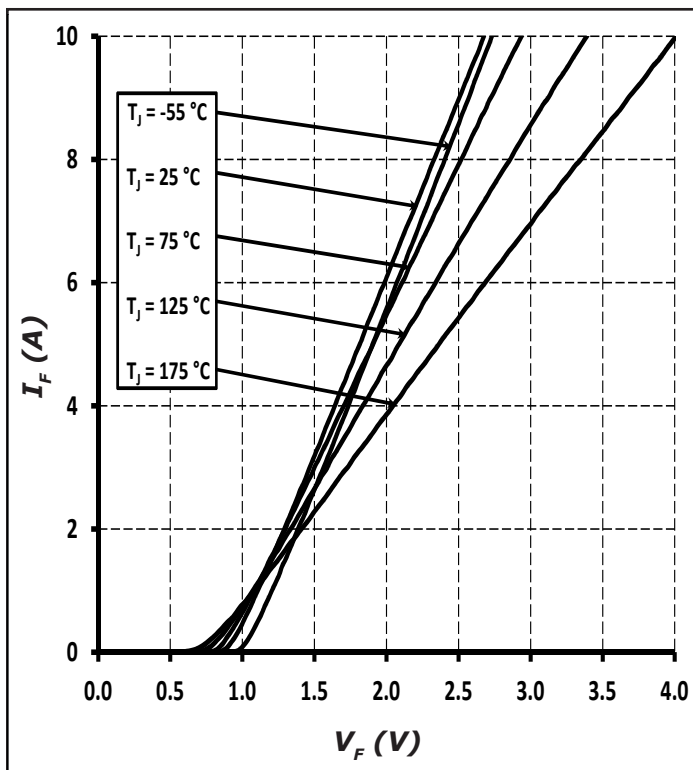


Figure 1. Forward Characteristics

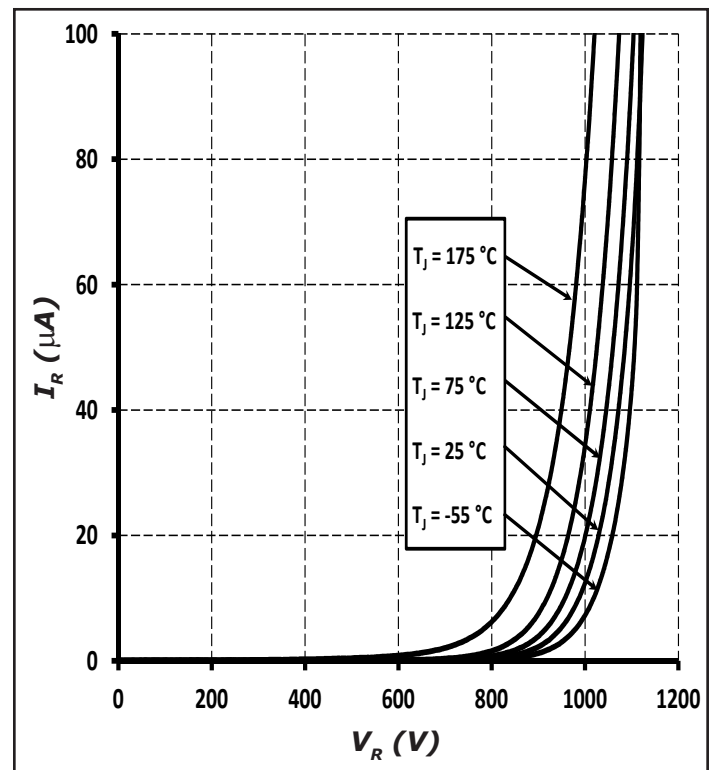


Figure 2. Reverse Characteristics

Typical Performance

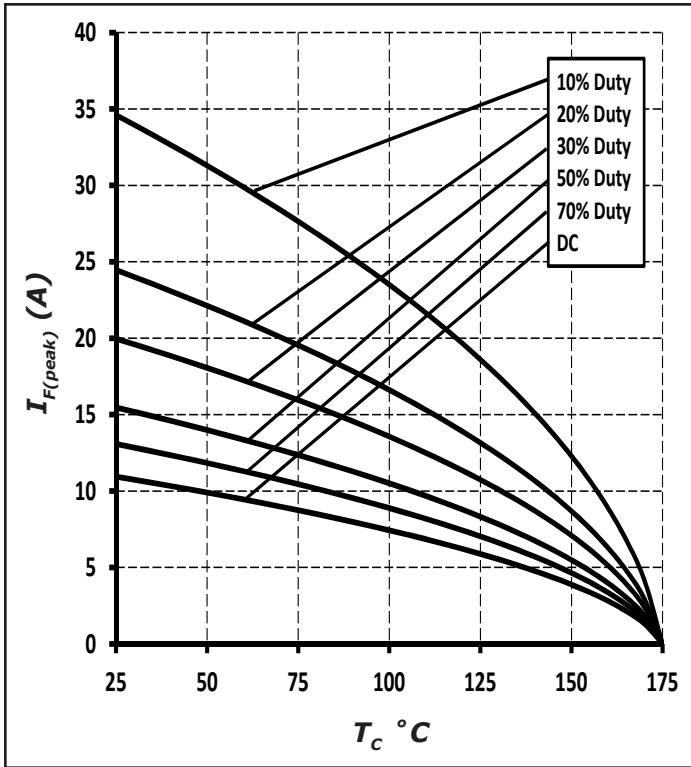


Figure 3. Current Derating

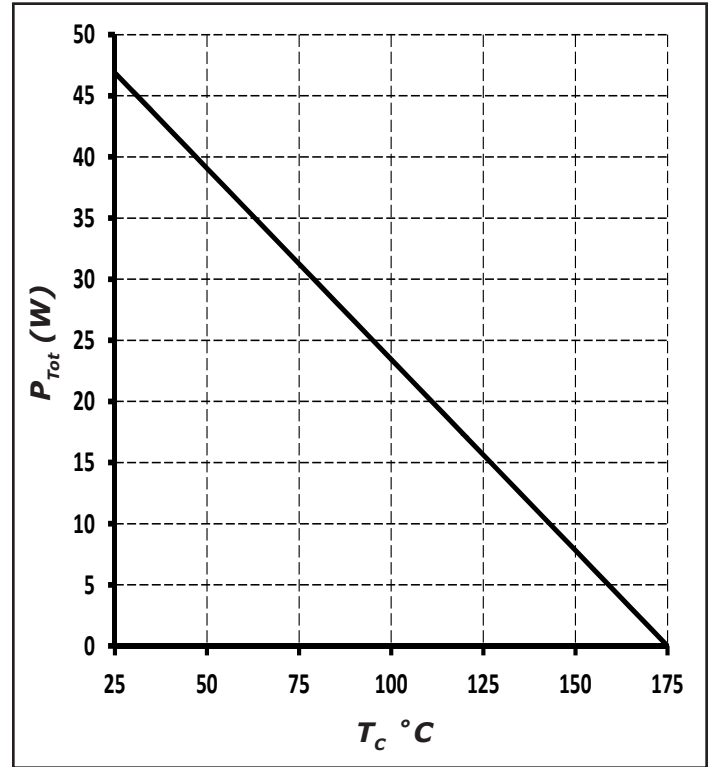


Figure 4. Power Derating

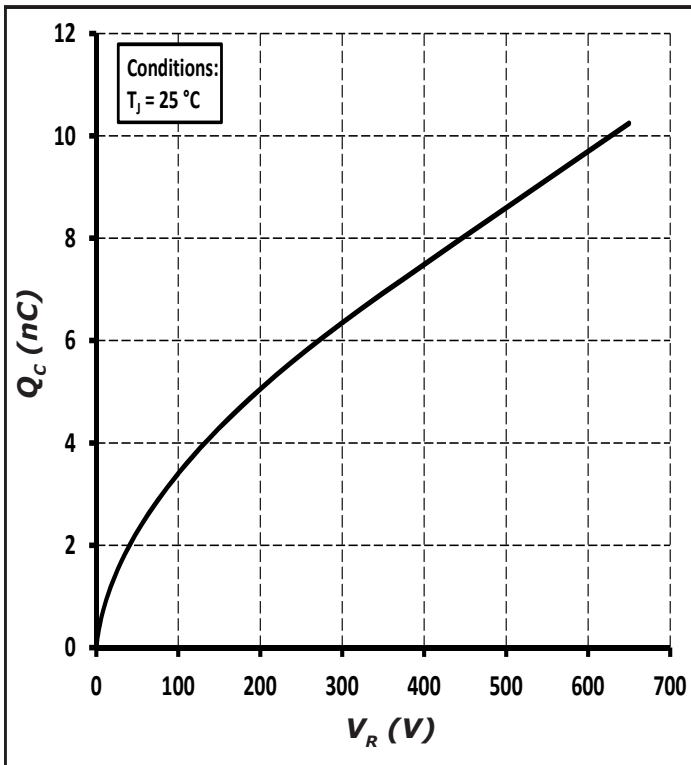


Figure 5. Total Capacitance Charge vs. Reverse Voltage

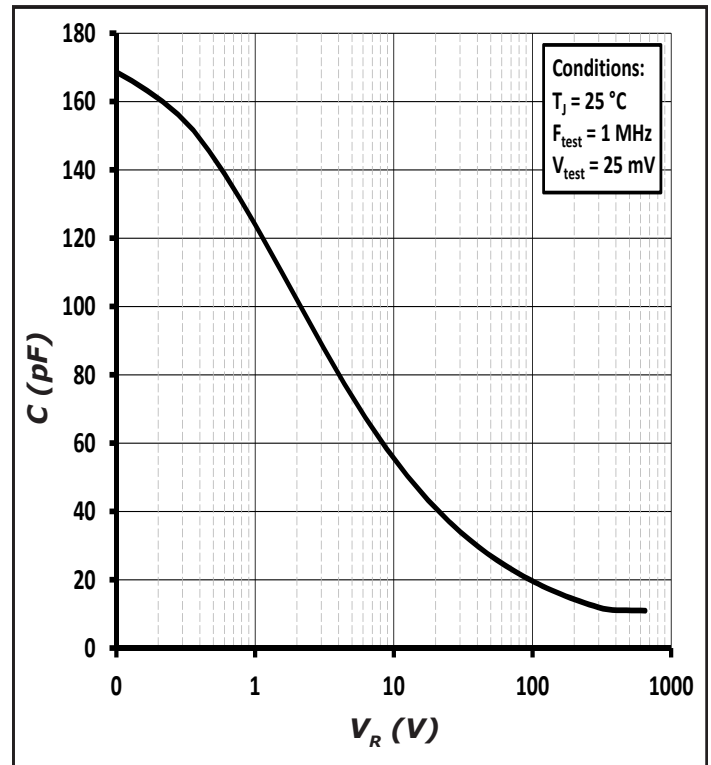


Figure 6. Capacitance vs. Reverse Voltage

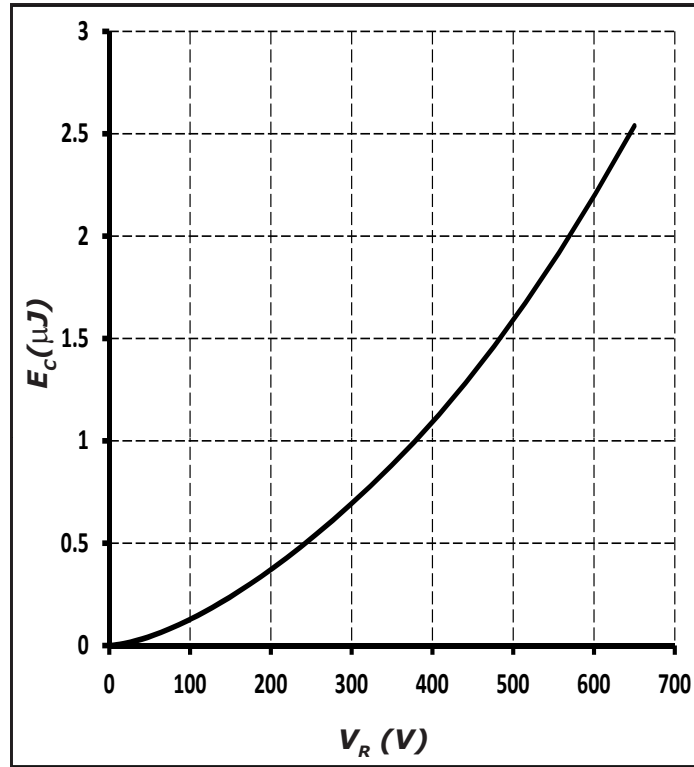


Figure 7. Capacitance Stored Energy

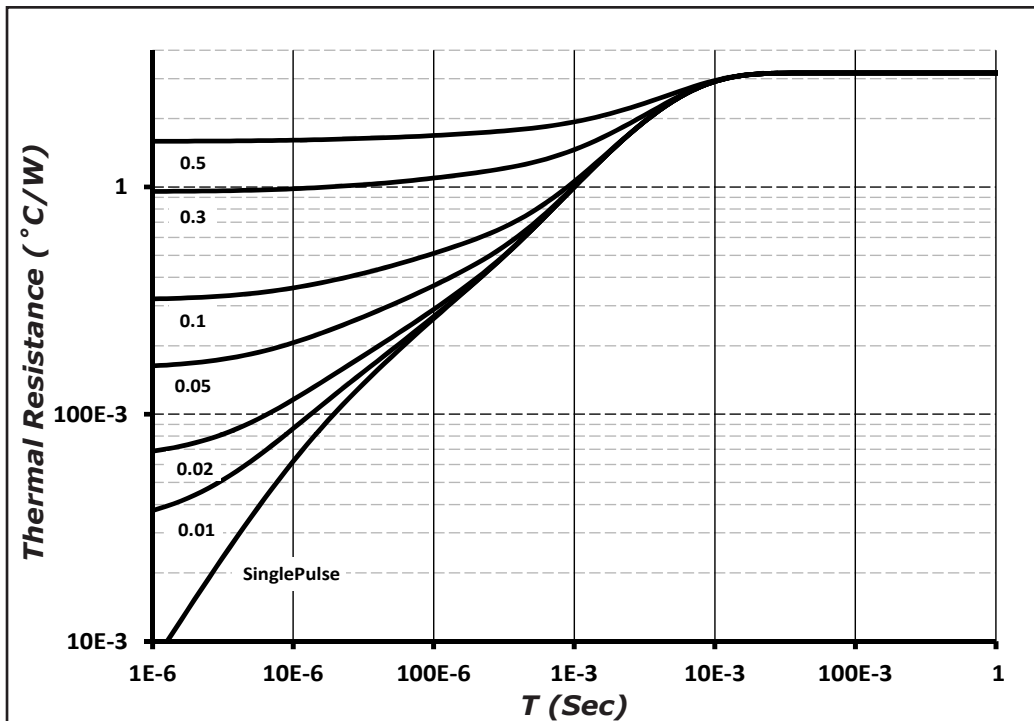
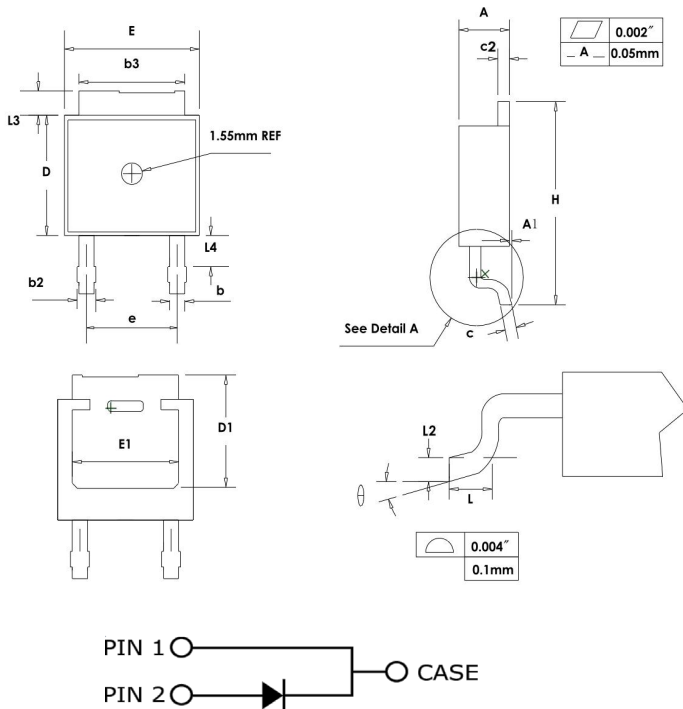


Figure 8. Transient Thermal Impedance

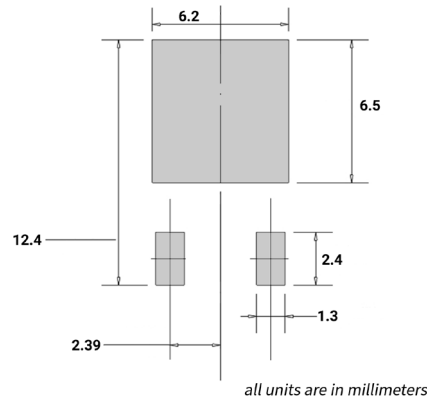
Package Dimensions

Package TO-252-2



| SYMBOL | MILLIMETERS | |
|----------|-------------|--------|
| | MIN | MAX |
| A | 2.159 | 2.413 |
| A1 | 0 | 0.13 |
| b | 0.64 | 0.89 |
| b2 | 0.653 | 1.143 |
| b3 | 5.004 | 5.6 |
| c | 0.457 | 0.61 |
| c2 | 0.457 | 0.864 |
| D | 5.867 | 6.248 |
| D1 | 5.21 | - |
| E | 6.35 | 7.341 |
| E1 | 4.32 | - |
| e | 4.58 BSC | |
| H | 9.65 | 10.414 |
| L | 1.106 | 1.78 |
| L2 | 0.51 BSC | |
| L3 | 0.889 | 1.27 |
| L4 | 0.64 | 1.01 |
| θ | 0° | 8° |

Recommended Solder Pad Layout



TO-252-2

| Part Number | Package | Marking |
|-------------|----------|----------|
| C3D03065E | TO-252-2 | C3D03065 |

Note: Recommended soldering profiles can be found in the applications note here: http://www.wolfspeed.com/power_app_notes/soldering

