# C4D02120E–Silicon Carbide Schottky Diode

## *Z-Rec*™ Rectifier

| | |
|---|---|
| $V_{RRM}$ | = 1200 V |
| $I_{F,\ T_C<135^\circ C}$ | = 6.9 A |
| $Q_c$ | = 15 nC |

### Features

- 1200-Volt Schottky Rectifier
- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- 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

- Solar Inverters
- Power Factor Correction

### Package


TO-252-2

Halogen-Free (F, Cl, Br, I)

RoHS COMPLIANT


| Part Number | Package | Marking |
|---|---|---|
| C4D02120E | TO-252-2 | C4D02120 |

### Maximum Ratings

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1200 | V | | |
| $V_{RSM}$ | Surge Peak Reverse Voltage | 1300 | V | | |
| $V_{DC}$ | DC Blocking Voltage | 1200 | V | | |
| $I_F$ | Continuous Forward Current | 6.9 | A | $T_C$=135°C; No AC component | |
| $I_{FRM}$ | Repetitive Peak Forward Surge Current | 14.4<br>10 | A | $T_C$=25°C, $t_p$=10 ms, Half Sine pulse<br>$T_C$=110°C, $t_p$=10 ms, Half Sine pulse | |
| $I_{FSM}$ | Non-Repetitive Peak Forward Surge Current | 18.8<br>16.4 | A | $T_C$=25°C, $t_p$=10 ms, Half Sine pulse<br>$T_C$=110°C, $t_p$=10 ms, Half Sine pulse | |
| $P_{tot}$ | Power Dissipation | 51.7<br>22.4 | W | $T_C$=25°C<br>$T_C$=110°C | |
| $T_c$ | Maximum Case Temperature | 135 | °C | | |
| $T_J$ | Operating Junction Range | -55 to +175 | °C | | |
| $T_{stg}$ | Storage Temperature Range | -55 to +135 | °C | | |

## Electrical Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | 1.5<br>1.9 | 1.8<br>3 | V | $I_F$ = 2 A $T_J$=25°C<br>$I_F$ = 2 A $T_J$=175°C | |
| $I_R$ | Reverse Current | 10<br>40 | 50<br>150 | μA | $V_R$ = 1200 V $T_J$=25°C<br>$V_R$ = 1200 V $T_J$=175°C | |
| $Q_C$ | Total Capacitive Charge | 15 | | nC | $V_R$ = 1200 V, $I_F$ = 2A<br>$di/dt$ = 200 A/μs<br>$T_J$ = 25°C | |
| C | Total Capacitance | 167<br>11<br>8 | | pF | $V_R$ = 0 V, $T_J$ = 25°C, f = 1 MHz<br>$V_R$ = 400 V, $T_J$ = 25°C, f = 1 MHz<br>$V_R$ = 800 V, $T_J$ = 25°C, f = 1 MHz | |

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

## Thermal Characteristics

| Symbol | Parameter | Typ. | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | TO-252 Package Thermal Resistance from Junction to Case | 2.9 | °C/W |

## Typical Performance

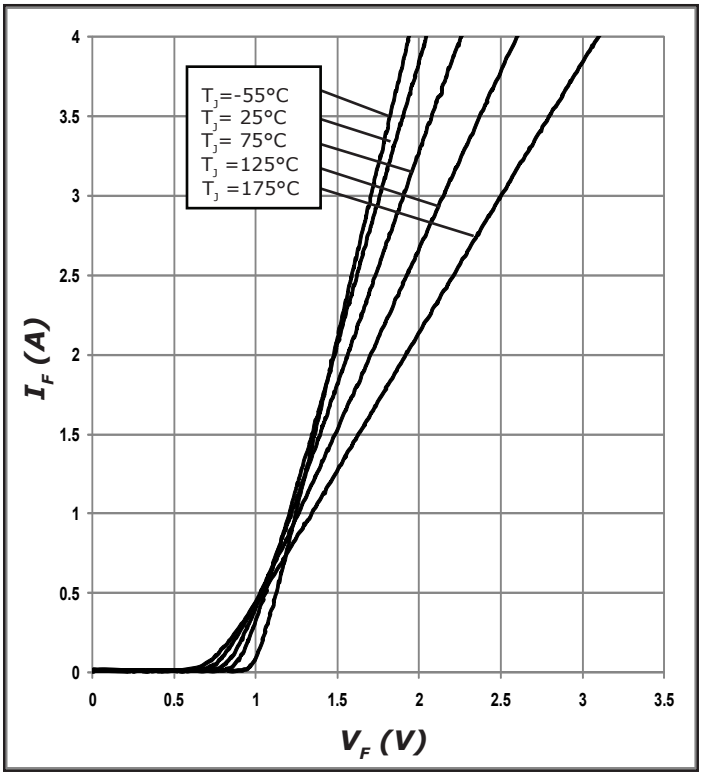



Figure 1. Forward Characteristics

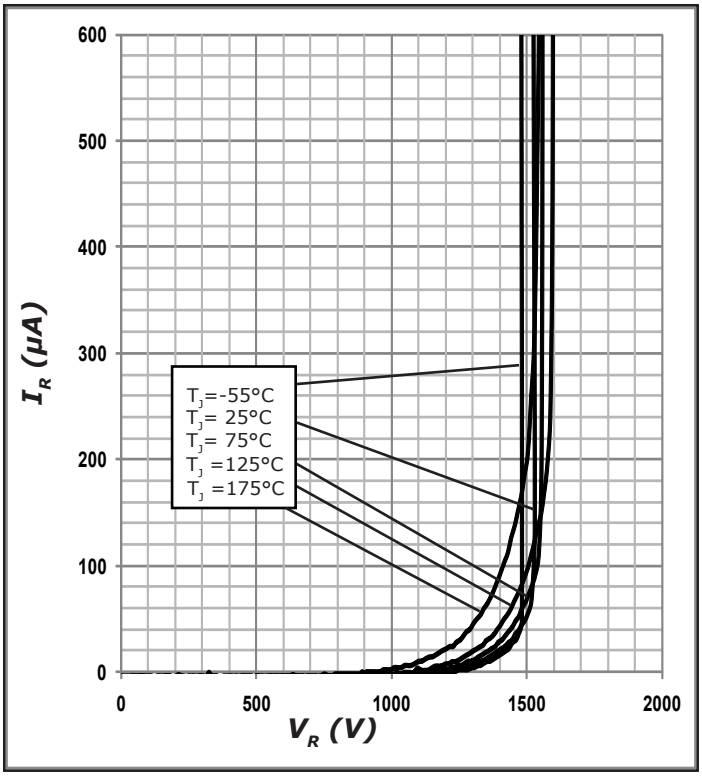



Figure 2. Reverse Characteristics

## Typical Performance

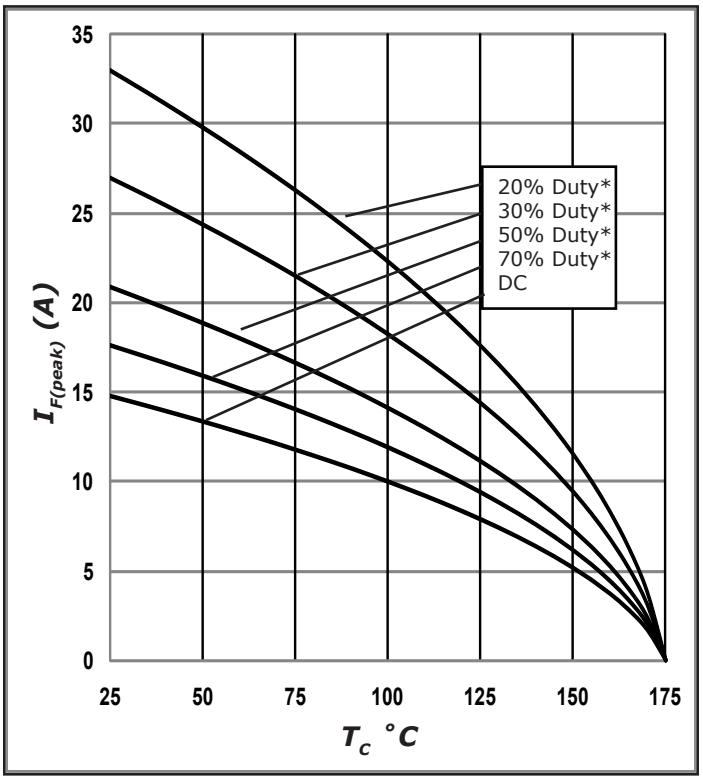



Figure 3. Current Derating

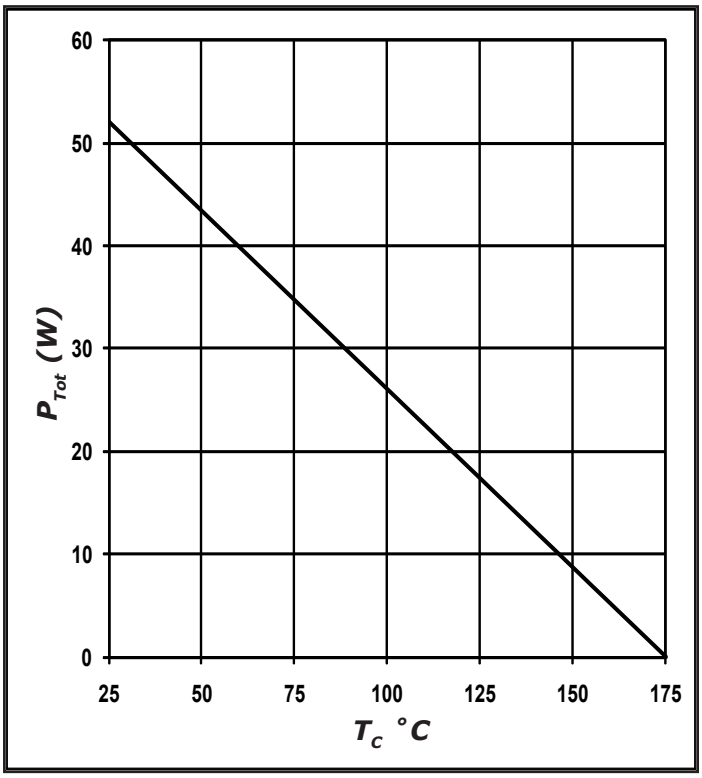



Figure 4. Power Derating

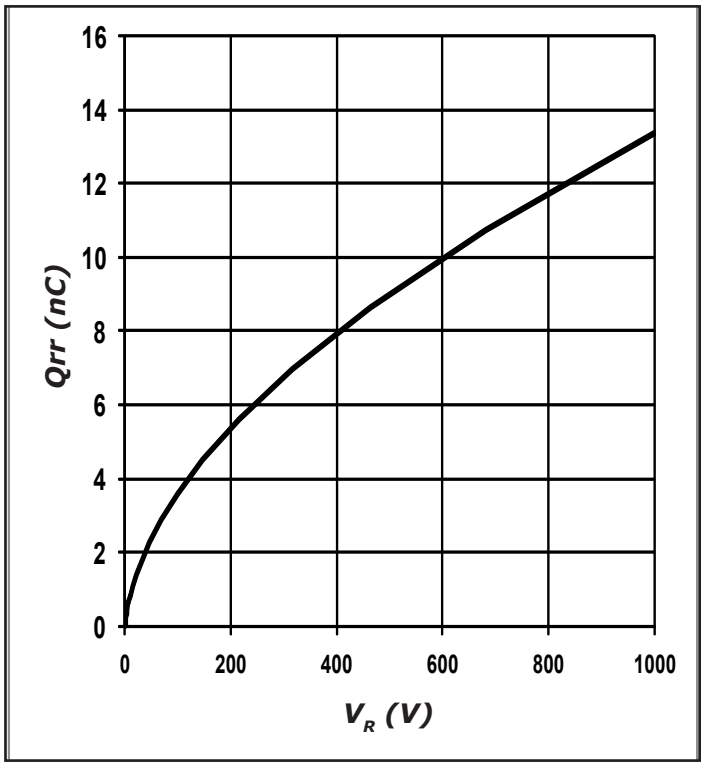



Figure 5. Recovery Charge vs. Reverse Voltage

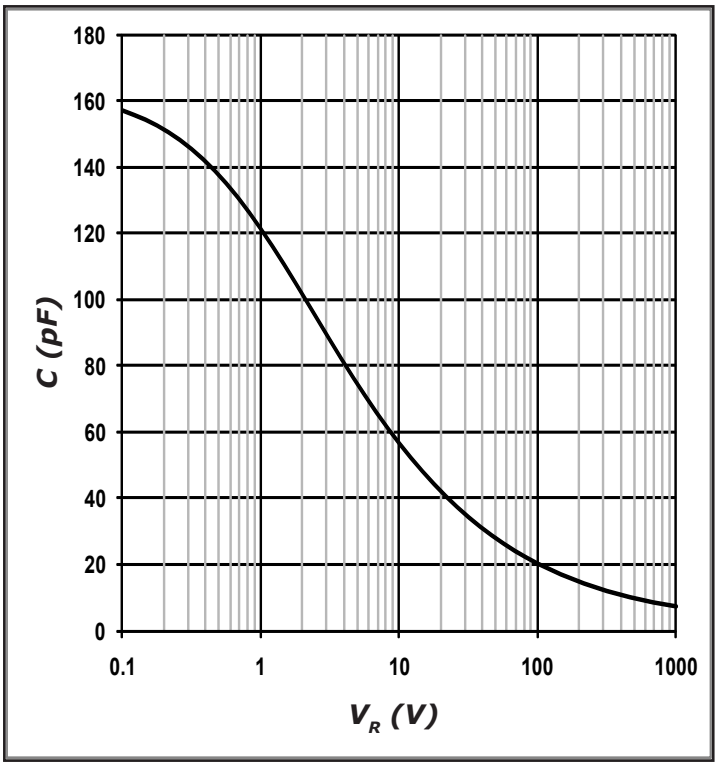



Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance

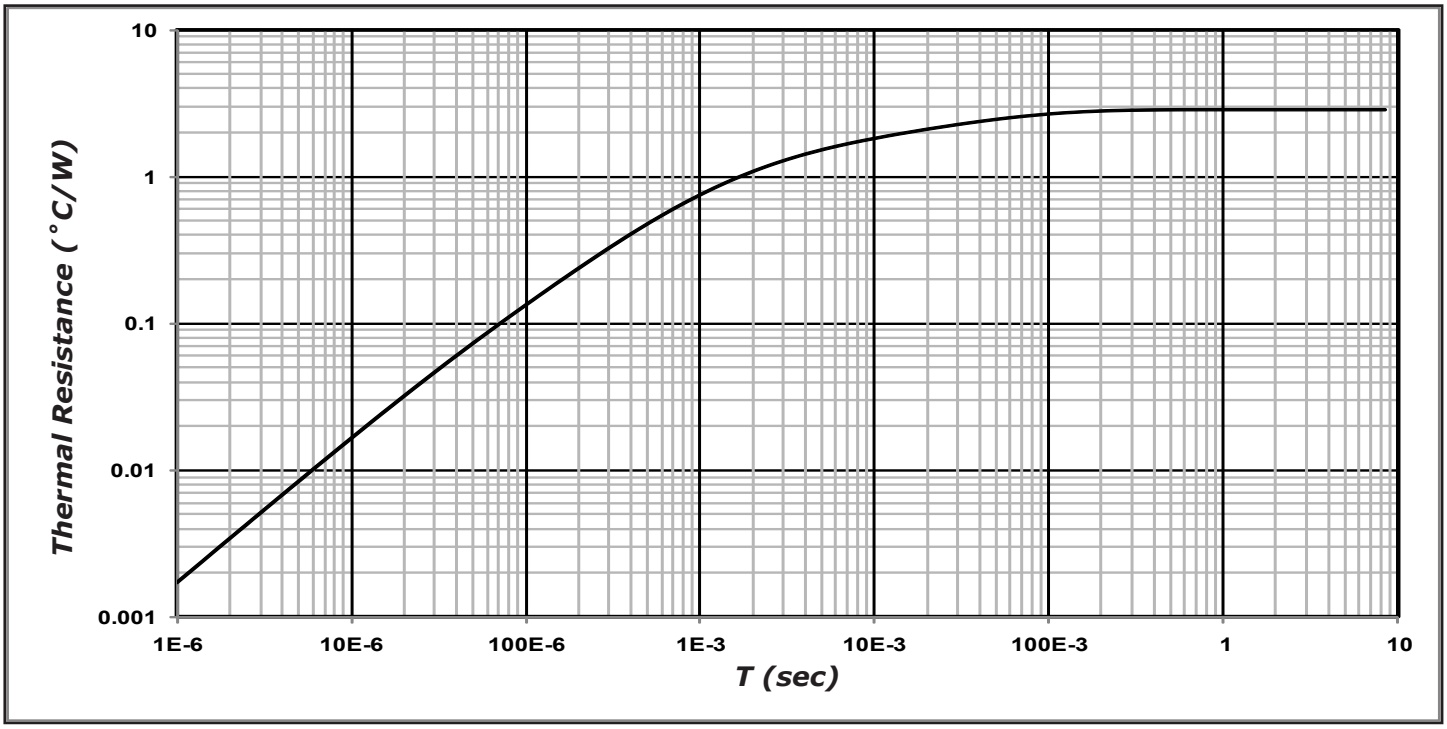
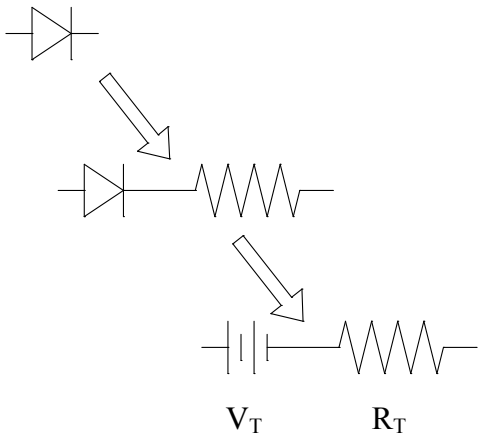



Figure 7. Transient Thermal Impedance

## Diode Model

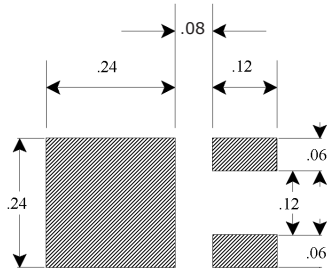



$$V_{fT} = V_T + If * R_T$$

$$V_T = 0.99 + (T_J * -1.70 * 10^{-3})$$
$$R_T = 0.15 + (T_J * 2.40 * 10^{-4})$$

**Note: Tj = Diode Junction Temperature in Degrees Celsius**

## Recommended Solder Pad Layout

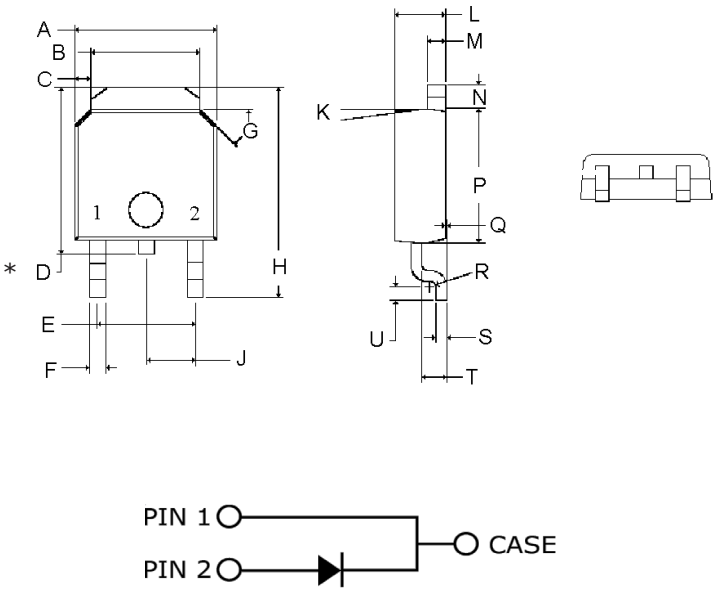



TO-252-2

| Part Number | Package | Marking |
|---|---|---|
| C4D02120E | TO-252-2 | C4D02120 |

## Package Dimensions

Package TO-252-2




| POS | Inches | | Millimeters | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | .250 | .289 | 6.350 | 7.341 |
| B | .197 | .215 | 5.004 | 5.461 |
| C | .027 | .050 | .686 | 1.270 |
| D* | .270 | .322 | 6.858 | 8.179 |
| E | .178 | .182 | 4.521 | 4.623 |
| F | .025 | .045 | .635 | 1.143 |
| G | 44° | 46° | 44° | 46° |
| H | .380 | .410 | 9.652 | 10.414 |
| J | .090 TYP | | 2.286 TYP | |
| K | 6° | 8° | 6° | 8° |
| L | .086 | .094 | 2.184 | 2.388 |
| M | .018 | .034 | .457 | .864 |
| N | .035 | .050 | .889 | 1.270 |
| P | .231 | .246 | 5.867 | 6.248 |
| Q | 0.00 | .005 | 0.00 | .127 |
| R | R0.010 TYP | | R0.254 TYP | |
| S | .017 | .023 | .432 | .584 |
| T | .038 | .045 | .965 | 1.143 |
| U | .021 | .029 | .533 | .737 |

Note:
* Tab "D" may not be present

"The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise 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 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.



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