# C4D20120A–Silicon Carbide Schottky Diode

## *Z-Rec*™ Rectifier

$V_{RRM}$ = 1200 V
$I_F$ = 20 A
$Q_c$ = 130 nC

## Features

- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Swtitching

## Package


TO-220-2


## 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
- Power Factor Correction
- Motor Drives

| Part Number | Package | Marking |
|---|---|---|
| C4D20120A | TO-220-2 | C4D20120 |

## Maximum Ratings ($T_C$=25°C unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1200 | V | | |
| $V_{RSM}$ | Surge Peak Reverse Voltage | 1300 | V | | |
| $V_R$ | DC Peak Reverse Voltage | 1200 | V | | |
| $I_{F(AVG)}$ | Maximum DC Current | 27 | A | $T_C$=135˚C, no AC component | |
| $I_{FRM}$ | Repetitive Peak Forward Surge Current | 91<br>61 | 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 Forward Surge Current | 130<br>110 | 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 | 242<br>104 | 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 | | |
| | TO-220 Mounting Torque | 1<br>8.8 | Nm<br>lbf-in | M3 Screw<br>6-32 Screw | |

## Electrical Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | 1.5<br>2.2 | 1.8<br>3 | V | $I_F$ = 20 A $T_J$=25°C<br>$I_F$ = 20 A $T_J$=175°C | |
| $I_R$ | Reverse Current | 35<br>65 | 200<br>400 | μA | $V_R$ = 1200 V $T_J$=25°C<br>$V_R$ = 1200 V $T_J$=175°C | |
| $Q_C$ | Total Capacitive Charge | 130 | | nC | $V_R$ = 1200 V, $I_F$ = 20A<br>$di/dt$ = 200 A/μs<br>$T_J$ = 25°C | |
| C | Total Capacitance | 1500<br>93<br>67 | | 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. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 0.62 | | °C/W | | |

## Typical Performance

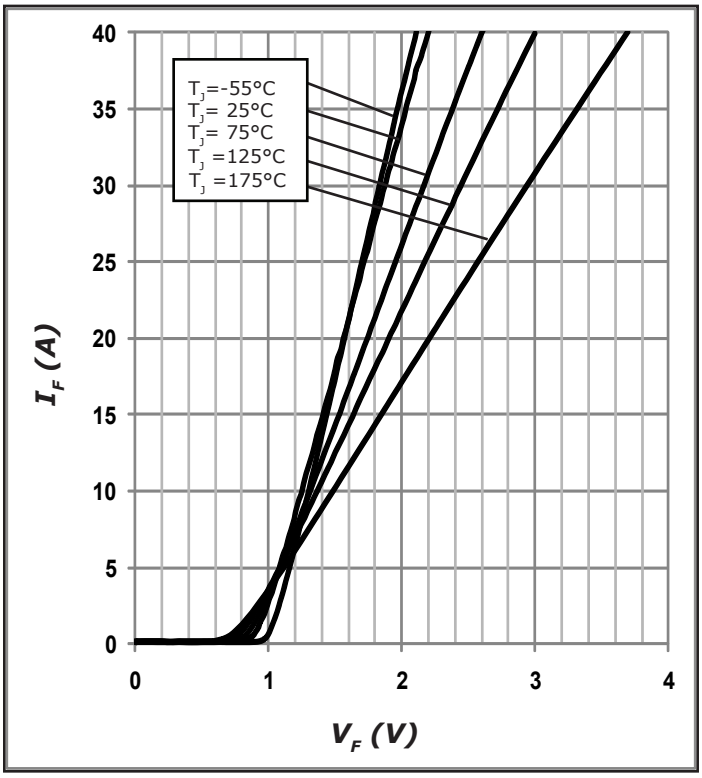



Figure 1. Forward Characteristics

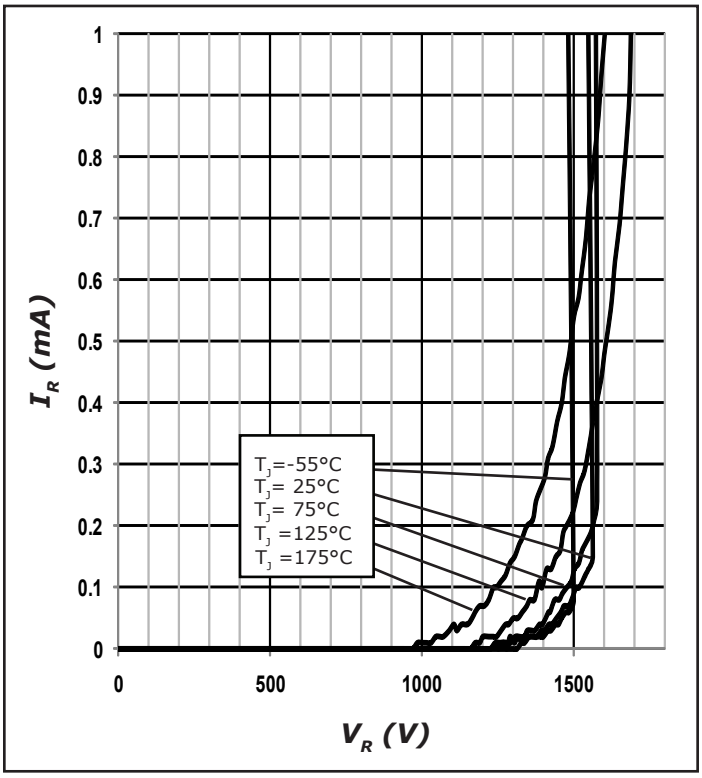



Figure 2. Reverse Characteristics

## Typical Performance

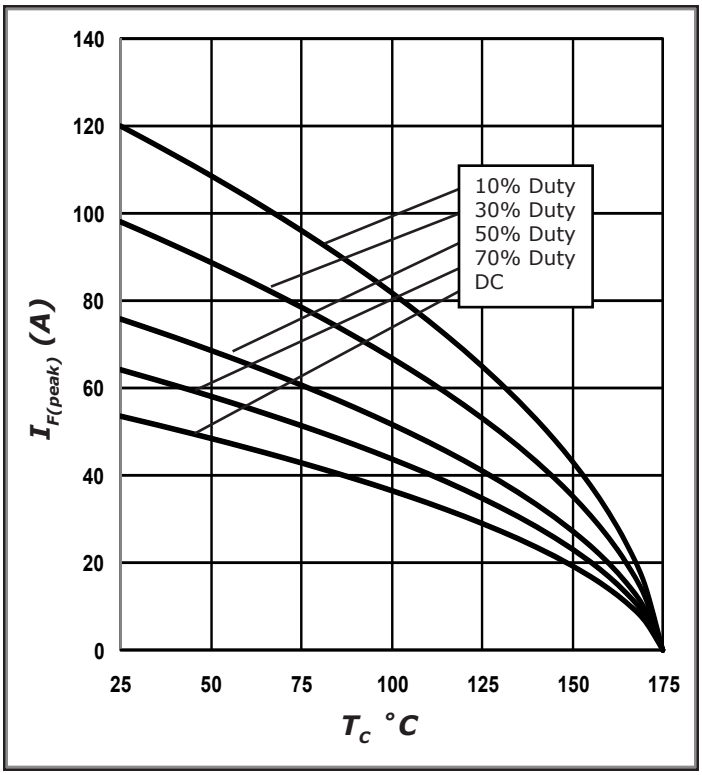



Figure 3. Current Derating

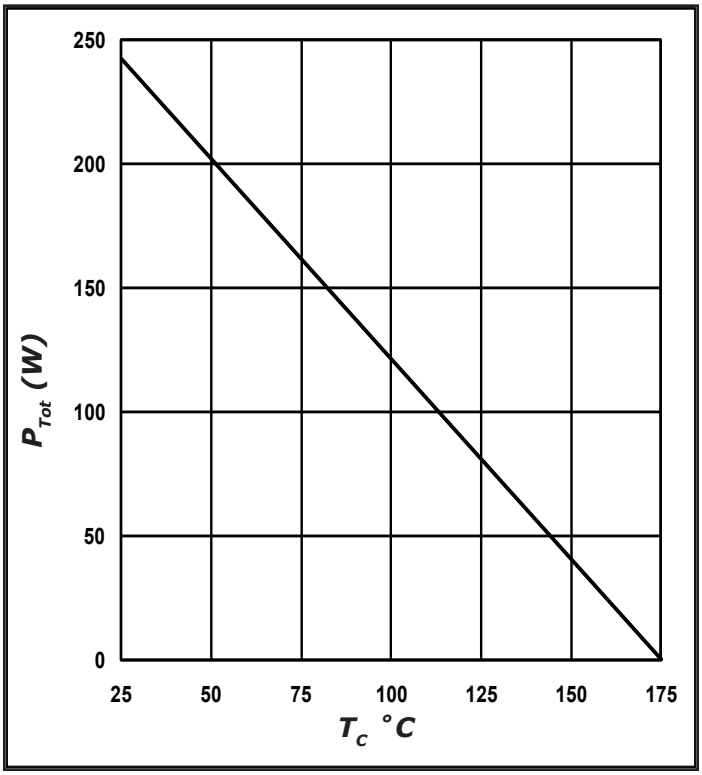



Figure 4. Power Derating

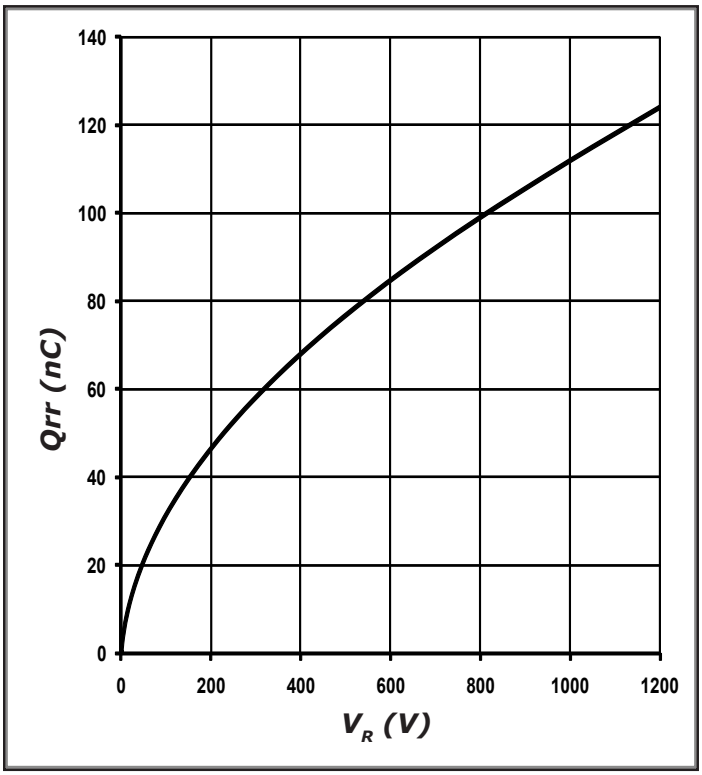



Figure 5. Recovery Charge vs. Reverse Voltage

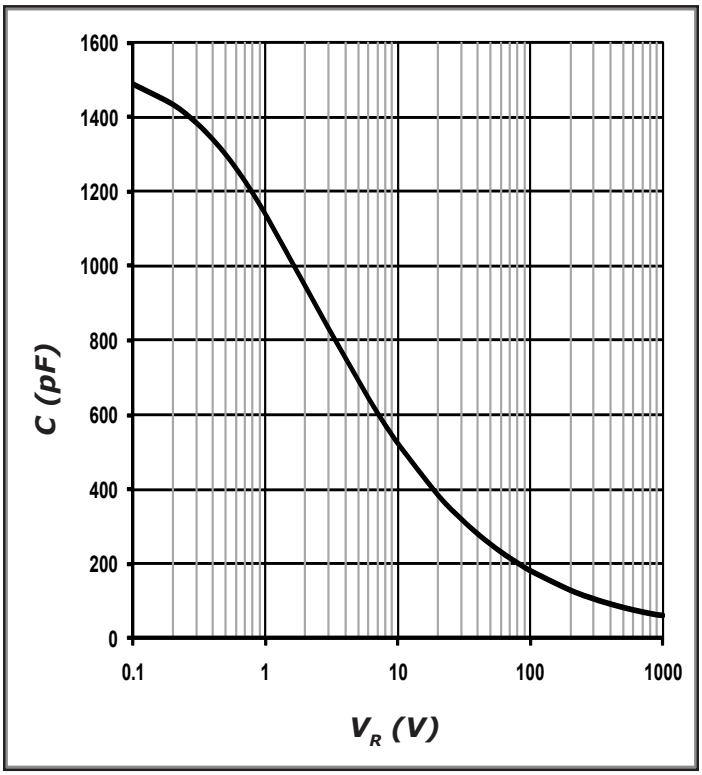



Figure 6. Capacitance vs. Reverse Voltage

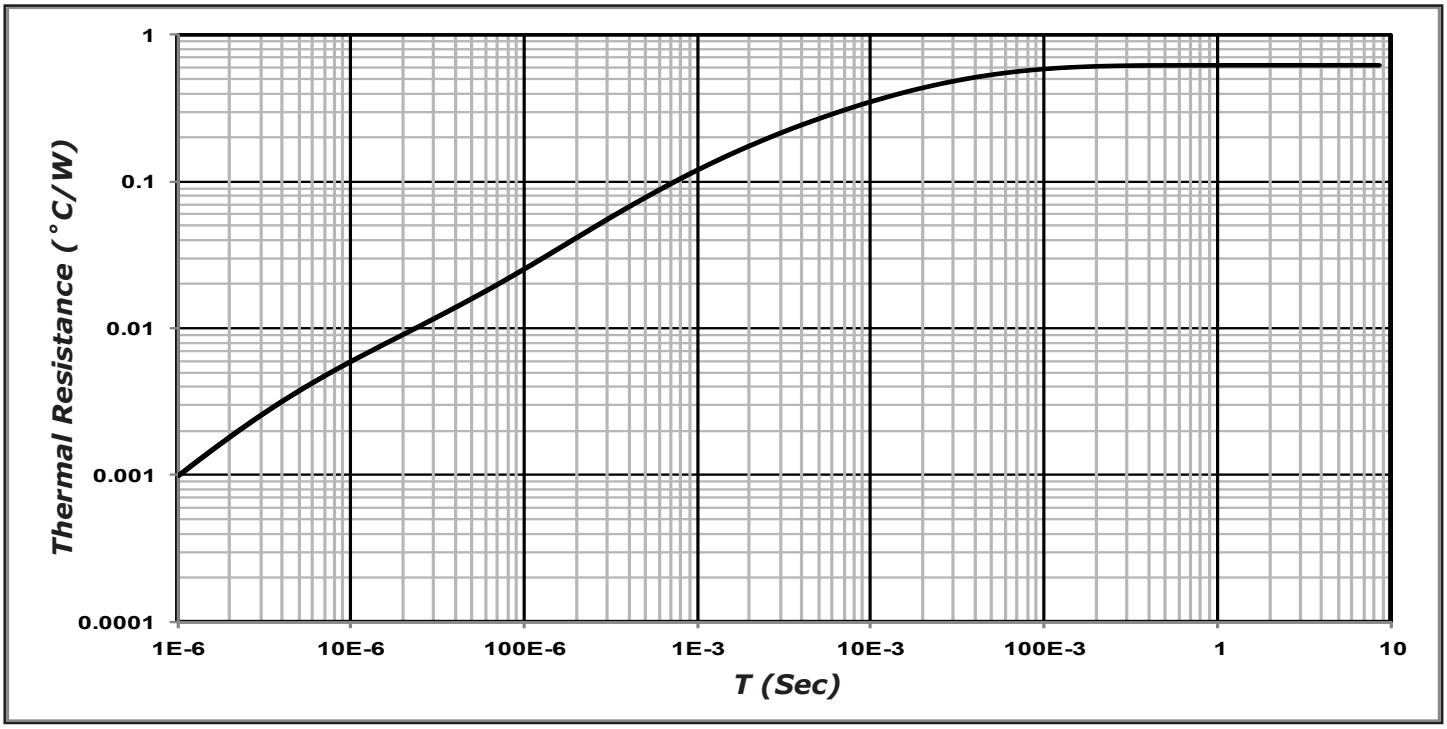
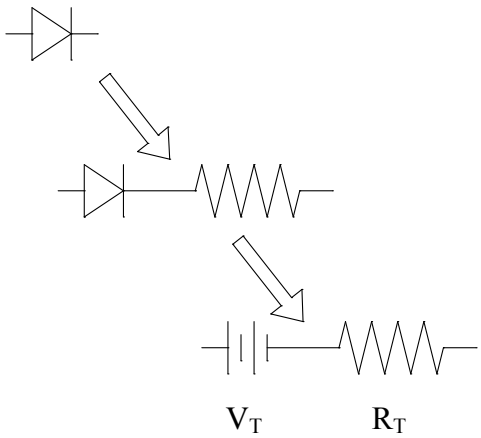



Figure 7. Transient Thermal Impedance

## Diode Model



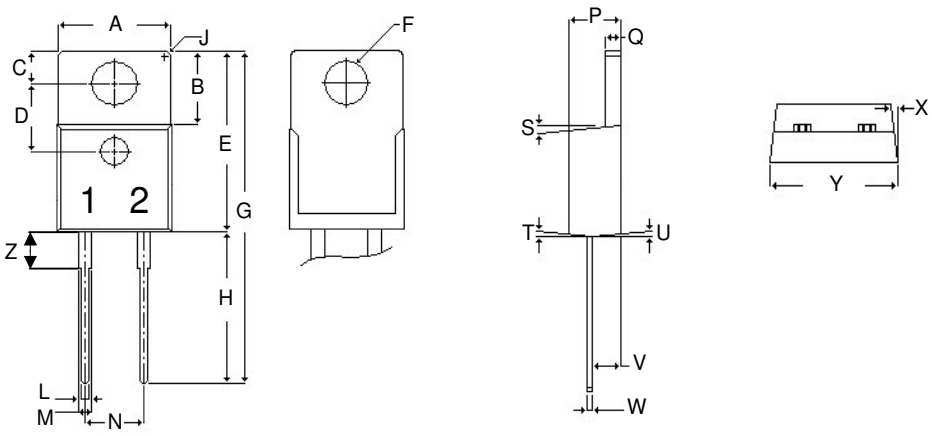

$$V_{fT} = V_T + If * R_T$$

$$V_T = 0.97 + (T_J * -1.40 * 10^{-3})$$
$$R_T = 0.023 + (T_J * 2.71 * 10^{-4})$$

**Note: $T_j$ = Diode Junction Temperature In Degrees Celcius**

## Package Dimensions

Package TO-220-2

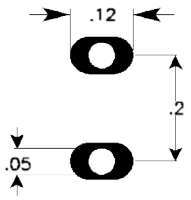




| POS | Inches | | Millimeters | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | .381 | .410 | 9.677 | 10.414 |
| B | .235 | .255 | 5.969 | 6.477 |
| C | .100 | .120 | 2.540 | 3.048 |
| D | .223 | .337 | 5.664 | 8.560 |
| E | .590 | .615 | 14.986 | 15.621 |
| F | .143 | .153 | 3.632 | 3.886 |
| G | 1.105 | 1.147 | 28.067 | 29.134 |
| H | .500 | .550 | 12.700 | 13.970 |
| J | R 0.197 | | R 0.197 | |
| L | .025 | .036 | .635 | .914 |
| M | .045 | .055 | 1.143 | 1.397 |
| N | .195 | .205 | 4.953 | 5.207 |
| P | .165 | .185 | 4.191 | 4.699 |
| Q | .048 | .054 | 1.219 | 1.372 |
| S | 3° | 6° | 3° | 6° |
| T | 3° | 6° | 3° | 6° |
| U | 3° | 6° | 3° | 6° |
| V | .094 | .110 | 2.388 | 2.794 |
| W | .014 | .025 | .356 | .635 |
| X | 3° | 5.5° | 3° | 5.5° |
| Y | .385 | .410 | 9.779 | 10.414 |
| z | .130 | .150 | 3.302 | 3.810 |

NOTE:
1. Dimension L, M, W apply for Solder Dip Finish

## Recommended Solder Pad Layout




TO-220-2

| Part Number | Package | Marking |
|---|---|---|
| C4D20120A | TO-220-2 | C4D20120 |

"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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