

# C3D1P7060Q

## Silicon Carbide Schottky Diode

### Z-REC™ RECTIFIER

|                                |   |        |
|--------------------------------|---|--------|
| $V_{RRM}$                      | = | 600 V  |
| $I_F, T_c < 150^\circ\text{C}$ | = | 1.7 A  |
| $Q_c$                          | = | 5.6 nC |

#### Features

- 600-Volt Schottky Rectifier
- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on  $V_F$

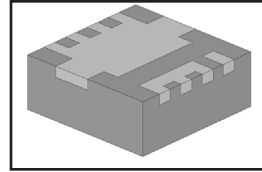
#### Benefits

- Small compact surface mount package
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

#### Applications

- Switch Mode Power Supplies
- LED Lighting

#### Package



PowerQFN 3.3x3.3



| Part Number | Package | Marking   |
|-------------|---------|-----------|
| C3D1P7060Q  | QFN 3.3 | C3D1P7060 |

#### Maximum Ratings

| Symbol         | Parameter                                  | Value          | Unit             | Test Conditions   | Note      |
|----------------|--|----------------|------------------|---|-----------|
| $V_{RRM}$      | Repetitive Peak Reverse Voltage            | 600            | V                |   |           |
| $V_{RSM}$      | Surge Peak Reverse Voltage                 | 600            | V                |   |           |
| $V_{DC}$       | DC Blocking Voltage                        | 600            | V                |   |           |
| $I_F$          | Continuous Forward Current                 | 1.7<br>3       | A<br>A           | $T_c < 150^\circ\text{C}$ , No AC Component<br>$T_c < 135^\circ\text{C}$ , No AC Component                              | See Fig 3 |
| $I_{FRM}$      | Repetitive Peak Forward Surge Current      | 7<br>4.4       | A                | $T_c = 25^\circ\text{C}$ , $t_p = 10$ ms, Half Sine pulse<br>$T_c = 110^\circ\text{C}$ , $t_p = 10$ ms, Half Sine pulse |           |
| $I_{FSM}$      | Non-Repetitive Peak Forward Surge Current  | 15<br>12       | A                | $T_c = 25^\circ\text{C}$ , $t_p = 10$ ms, Half Sine pulse<br>$T_c = 110^\circ\text{C}$ , $t_p = 10$ ms, Half Sine pulse |           |
| $P_{tot}$      | Power Dissipation                          | 39<br>17       | W                | $T_c = 25^\circ\text{C}$<br>$T_c = 110^\circ\text{C}$   |           |
| $T_J, T_{stg}$ | Operating Junction and Storage Temperature | -55 to<br>+175 | $^\circ\text{C}$ |   |           |
| $T_c$          | Maximum Case Temperature                   | 150            | $^\circ\text{C}$ |   |           |

## Electrical Characteristics

| Symbol | Parameter               | Typ.          | Max.       | Unit          | Test Conditions  | Note |
|--------|-------------------------|---------------|------------|---------------|--|------|
| $V_F$  | Forward Voltage         | 1.5<br>1.8    | 1.7<br>2.4 | V             | $I_F = 1.7\text{ A}$ $T_J = 25^\circ\text{C}$<br>$I_F = 1.7\text{ A}$ $T_J = 175^\circ\text{C}$  |      |
| $I_R$  | Reverse Current         | 10<br>20      | 50<br>100  | $\mu\text{A}$ | $V_R = 600\text{ V}$ $T_J = 25^\circ\text{C}$<br>$V_R = 600\text{ V}$ $T_J = 175^\circ\text{C}$  |      |
| $Q_C$  | Total Capacitive Charge | 5.6           |            | nC            | $V_R = 600\text{ V}$ , $I_F = 1.7\text{ A}$<br>$di/dt = 500\text{ A}/\mu\text{s}$<br>$T_J = 25^\circ\text{C}$  |      |
| C      | Total Capacitance       | 100<br>7<br>6 |            | pF            | $V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$<br>$V_R = 200\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$<br>$V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ |      |

Note:

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

## Thermal Characteristics

| Symbol          | Parameter  | Typ. | Unit                      |
|-----------------|--|------|---------------------------|
| $R_{\theta JC}$ | Package Thermal Resistance from Junction to Case | 3.8  | $^\circ\text{C}/\text{W}$ |

## Typical Performance

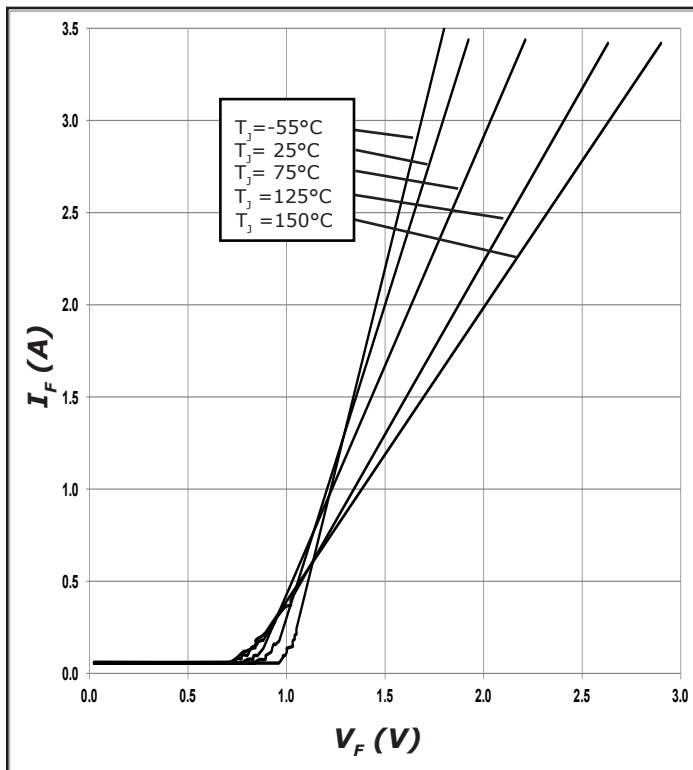


Figure 1. Forward Characteristics

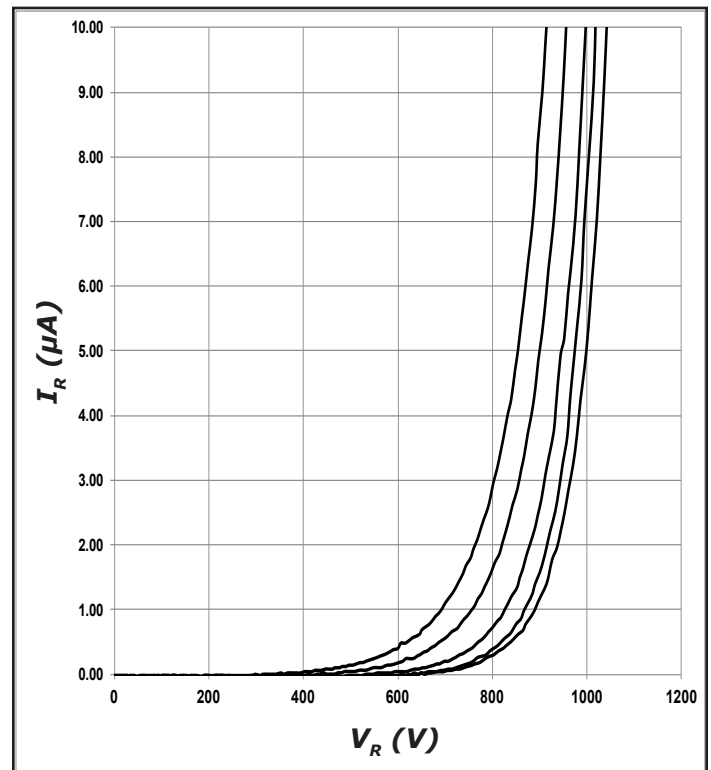


Figure 2. Reverse Characteristics

### Typical Performance

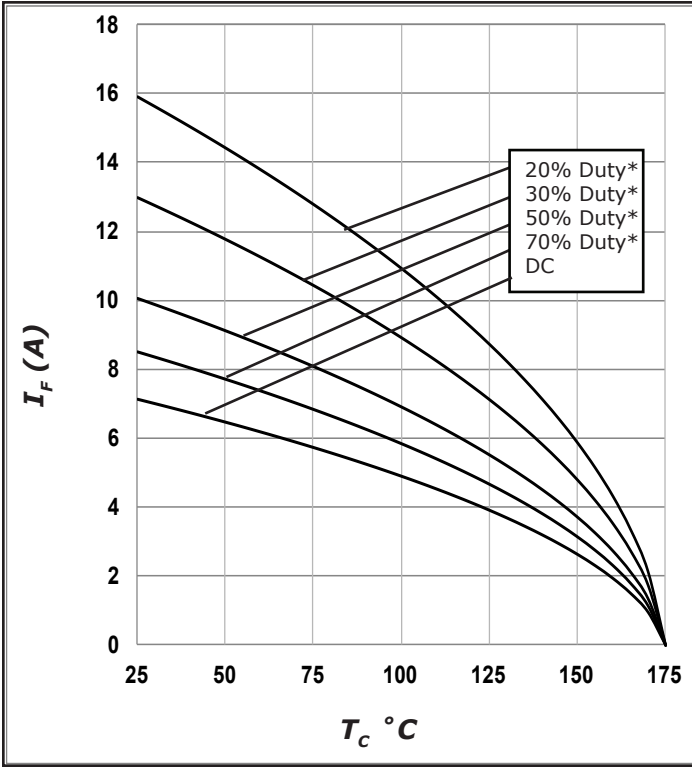


Figure 3. Current Derating

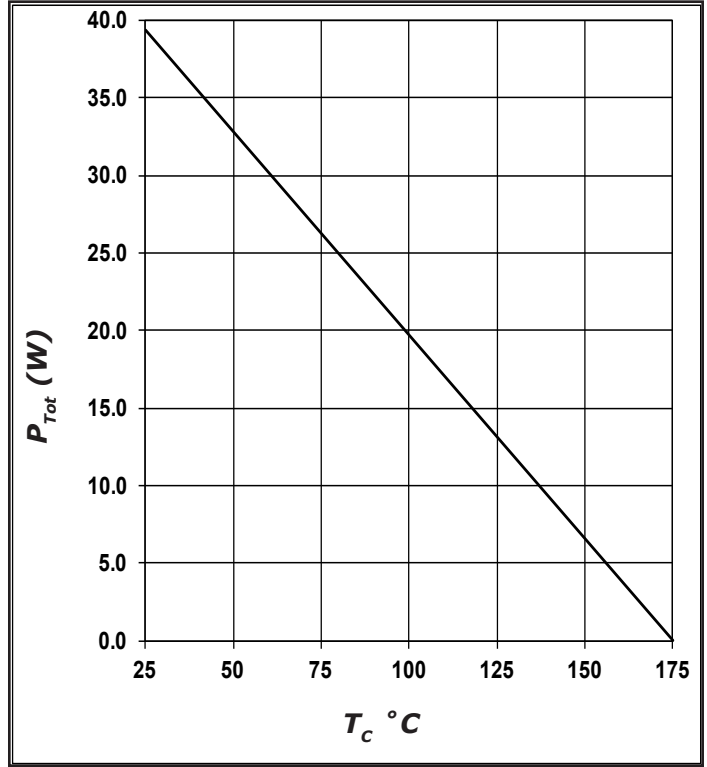


Figure 4. Power Derating

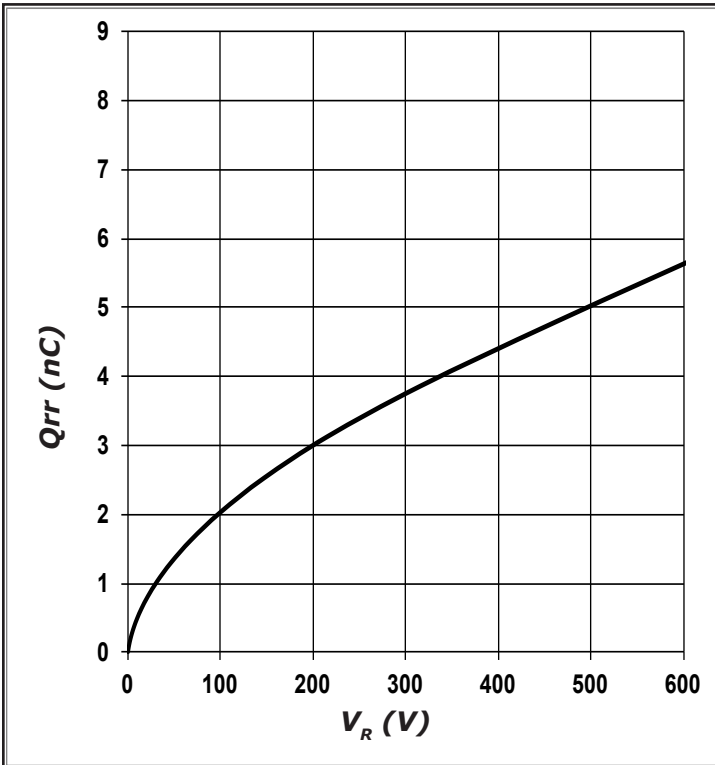


Figure 5. Recovery Charge vs. Reverse Voltage

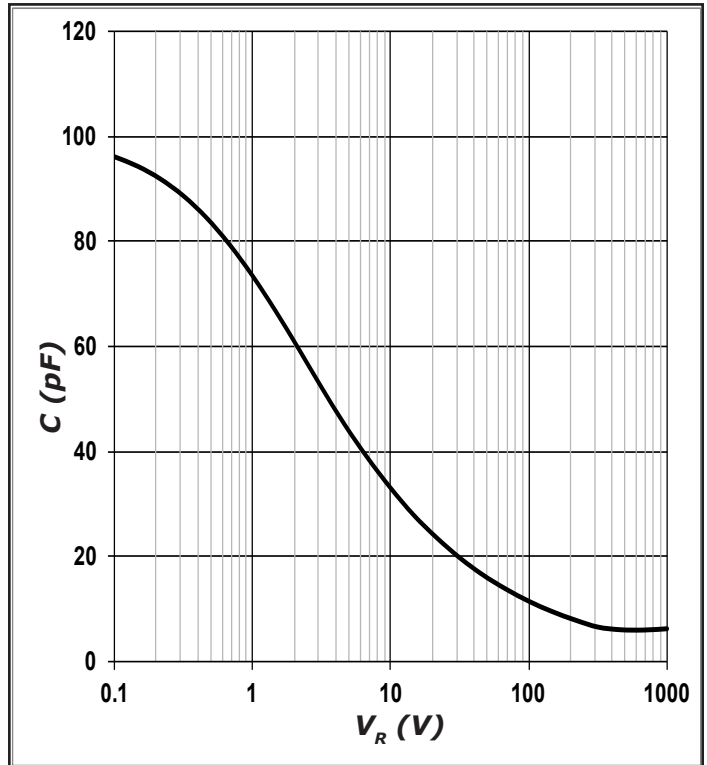


Figure 6. Capacitance vs. Reverse Voltage

## Typical Performance

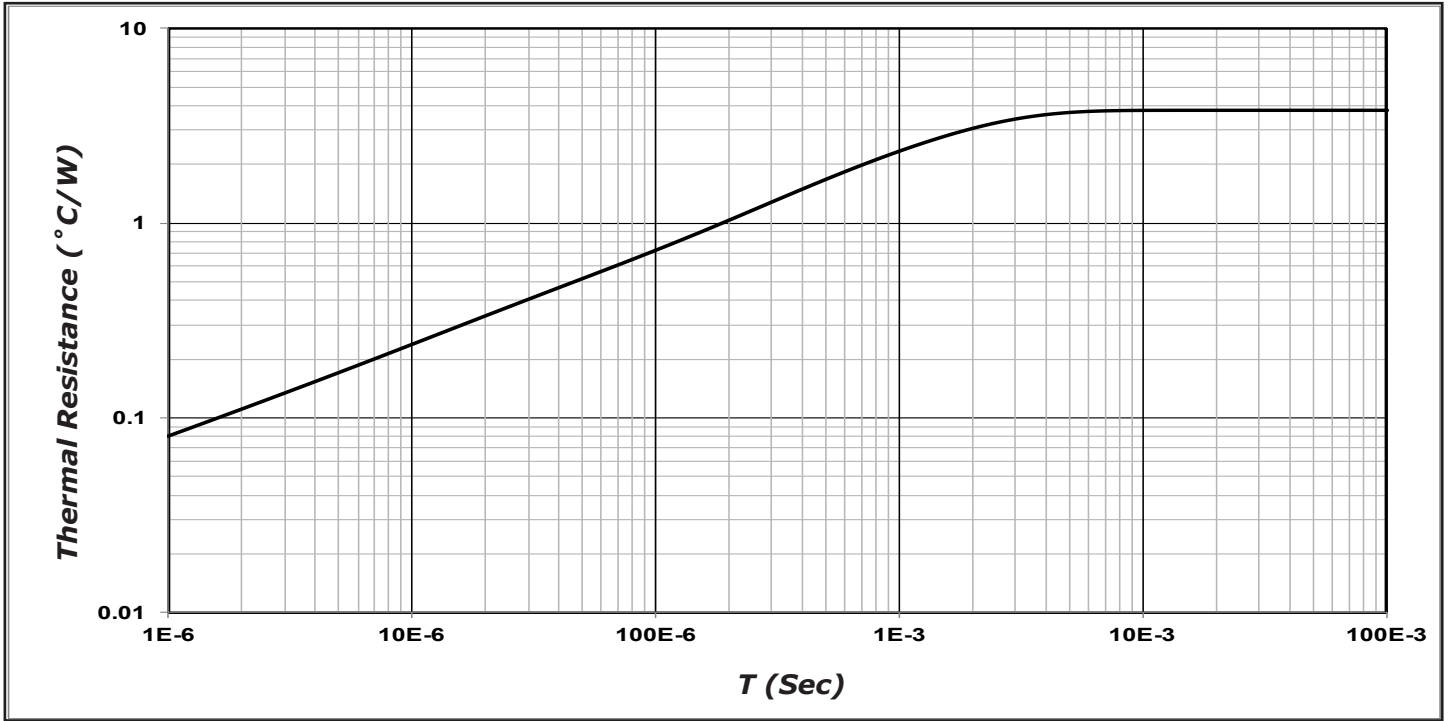
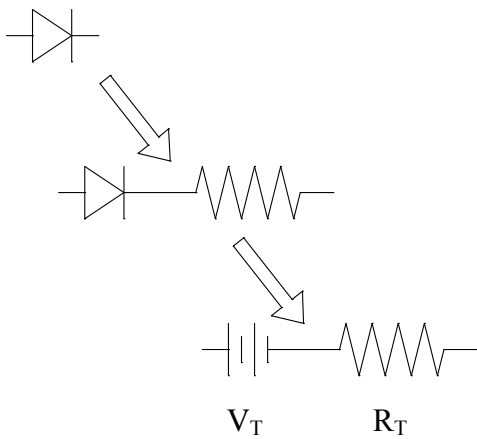


Figure 7. Transient Thermal Impedance

## Diode Model



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

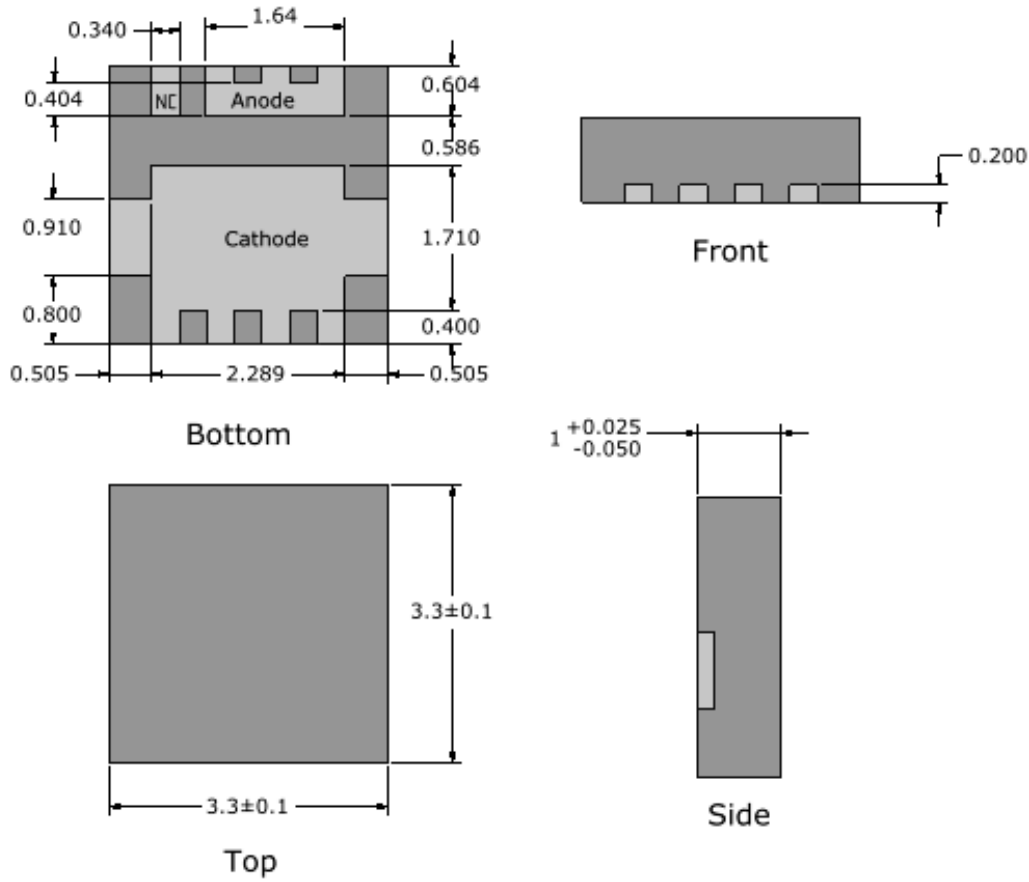
$$V_T = 0.99 + (T_j * -1.5 * 10^{-3})$$

$$R_T = 0.22 + (T_j * 2.6 * 10^{-3})$$

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

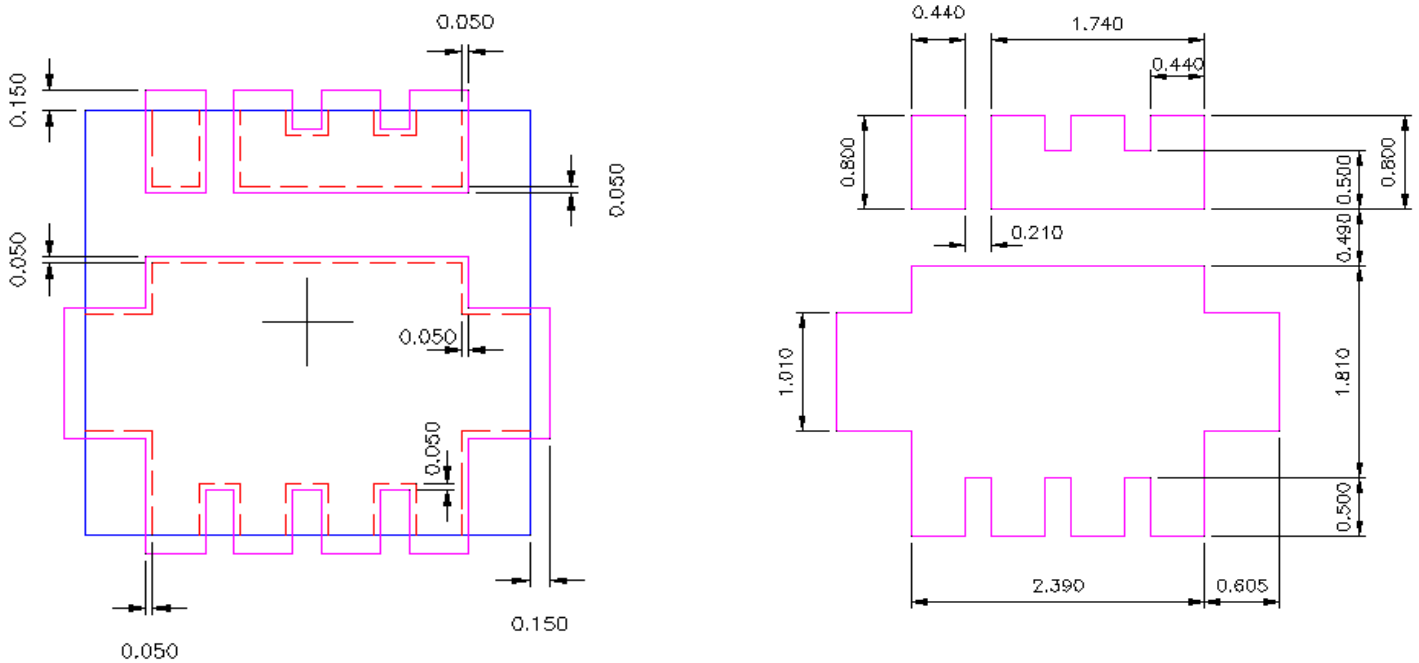
## Package Dimensions

Package QFN 3.3



All Dimensions are in mm  
 Tolerances are 0.05 mm if not specified  
 NC = No Connect

## Recommended Landing Pattern (All Dimensions are in mm)



Note: The design of the land pattern and the size of the thermal pad depend mainly on the thermal characteristic and power dissipation. In general, the size of the thermal pad should be as close to the exposed pad of the package as possible, provided that there is no bridging between the thermal pad and the lead pads.

The 0.050mm extra length and width provides space to accommodate the placement tolerance of the component during pick and place process. The 0.150mm along the perimeter present areas for solder to form fillet along the side metal edges of the package.

"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."

This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, air traffic control systems, or weapons systems.

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