

## Features

- Low Forward Voltage Drop ( $V_F$ )
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Low Leakage Current ( $I_r$ )
- Temperature-Independent Switching Behavior
- Positive Temperature Coefficient on  $V_F$

## Benefits

- Higher System Level Efficiency
- Increase System Power Density
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

## Applications

- Switch Mode Power Supplies (SMPS)
- Server/Telecom Power Supplies
- Industrial Power Supplies
- Solar
- UPS

|                              |   |       |
|------------------------------|---|-------|
| $V_{RRM}$                    | = | 650 V |
| $I_F(T_c=155^\circ\text{C})$ | = | 6 A   |
| $Q_c$                        | = | 23 nC |



TO-220-2

### Package



| Part Number | Package  | Marking   |
|-------------|----------|-----------|
| GC6D06065A  | TO-220-2 | GC6D06065 |

## 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                |   |        |
| $V_{DC}$       | DC Blocking Voltage                        | 650            | V                |   |        |
| $I_F$          | Continuous Forward Current                 | 24<br>12<br>6  | A                | $T_c=25^\circ\text{C}$<br>$T_c=125^\circ\text{C}$<br>$T_c=155^\circ\text{C}$  | Fig. 3 |
| $I_{FRM}$      | Repetitive Peak Forward Surge Current      | 28<br>17       | A                | $T_c=25^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave<br>$T_c=110^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave |        |
| $I_{FSM}$      | Non-Repetitive Peak Forward Surge Current  | 51<br>46       | A                | $T_c=25^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave<br>$T_c=110^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave | Fig. 8 |
| $I_{FMax}$     | Non-Repetitive Peak Forward Surge Current  | 520<br>470     | A                | $T_c=25^\circ\text{C}, t_p = 10 \mu\text{s}$ , Pulse<br>$T_c=110^\circ\text{C}, t_p = 10 \mu\text{s}$ , Pulse                 | Fig. 8 |
| $P_{tot}$      | Power Dissipation                          | 73<br>32       | W                | $T_c=25^\circ\text{C}$<br>$T_c=110^\circ\text{C}$   | Fig. 4 |
| $T_J, T_{stg}$ | Operating Junction and Storage Temperature | -55 to<br>+175 | $^\circ\text{C}$ |   |        |
|                | 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           | 1.27<br>1.37    | 1.50<br>1.60 | V             | $I_F = 6\text{ A}$ $T_J = 25^\circ\text{C}$<br>$I_F = 6\text{ A}$ $T_J = 175^\circ\text{C}$  | Fig. 1 |
| $I_R$  | Reverse Current           | 2<br>15         | 30<br>120    | $\mu\text{A}$ | $V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$<br>$V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$  | Fig. 2 |
| $Q_C$  | Total Capacitive Charge   | 23              |              | nC            | $V_R = 400\text{ V}$ , $I_F = 6\text{ A}$<br>$T_J = 25^\circ\text{C}$  | Fig. 5 |
| C      | Total Capacitance         | 394<br>44<br>36 |              | 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>$V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ | Fig. 6 |
| $E_C$  | Capacitance Stored Energy | 3.5             |              | $\mu\text{J}$ | $V_R = 400\text{ V}$   | 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 | 2.05 | $^\circ\text{C/W}$ | Fig. 9 |

### Typical Performance

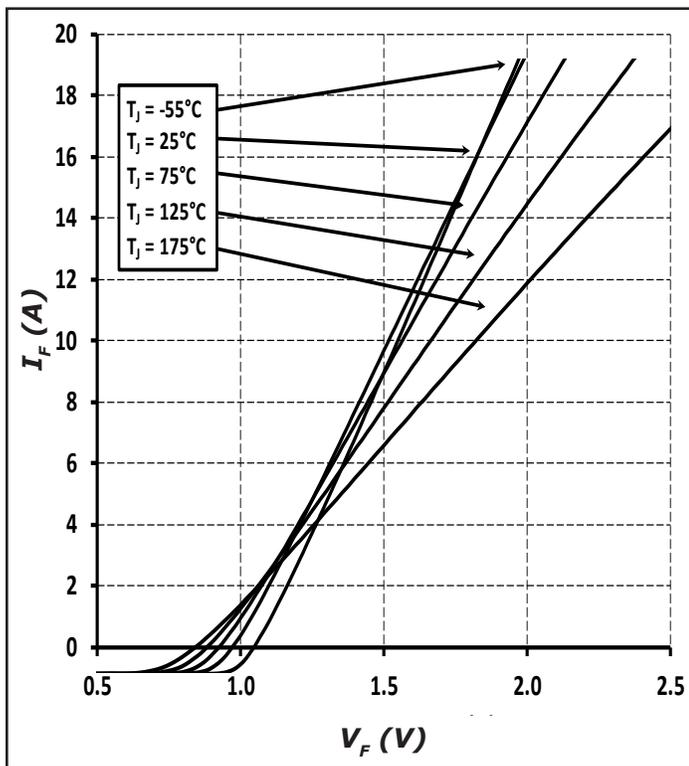


Figure 1. Forward Characteristics

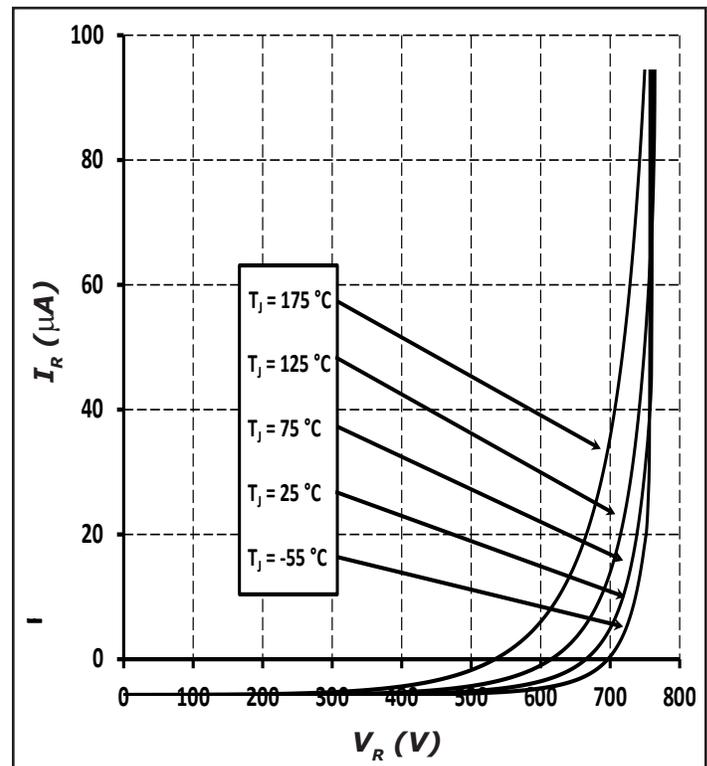


Figure 2. Reverse Characteristics

Typical Performance

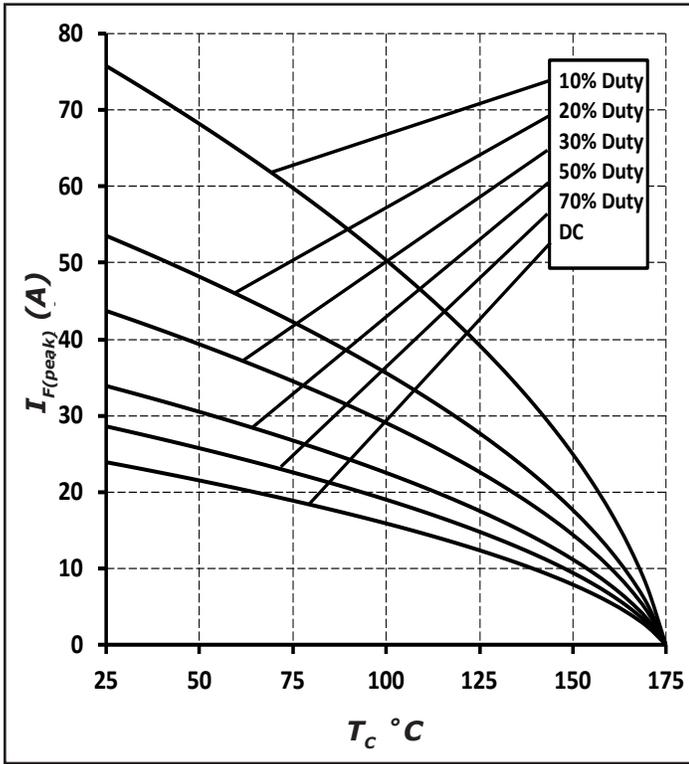


Figure 3. Current Derating

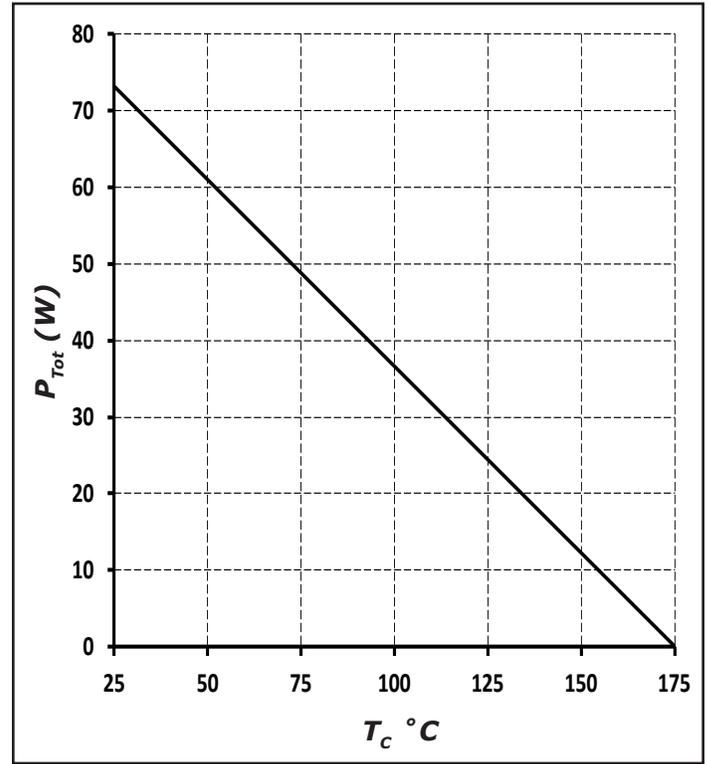


Figure 4. Power Derating

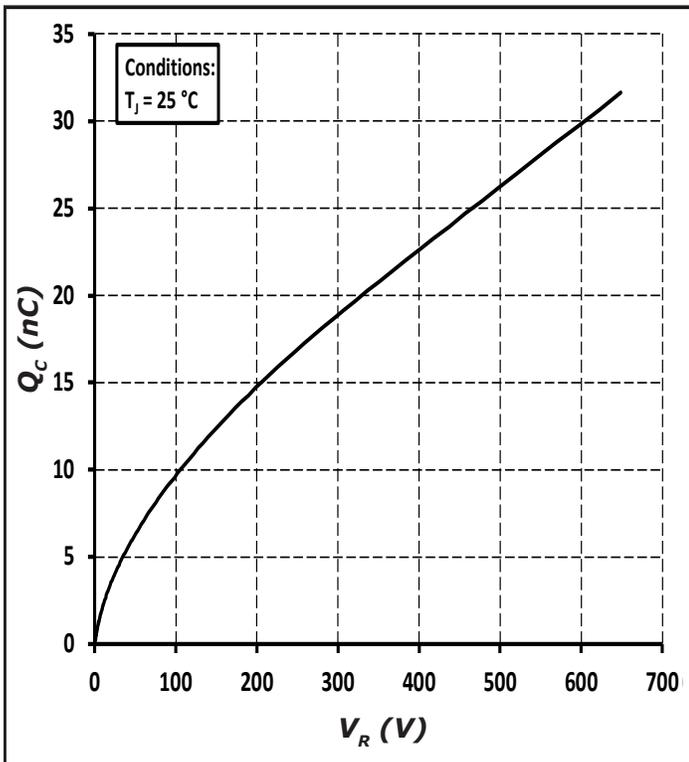


Figure 5. Total Capacitance Charge vs. Reverse Voltage

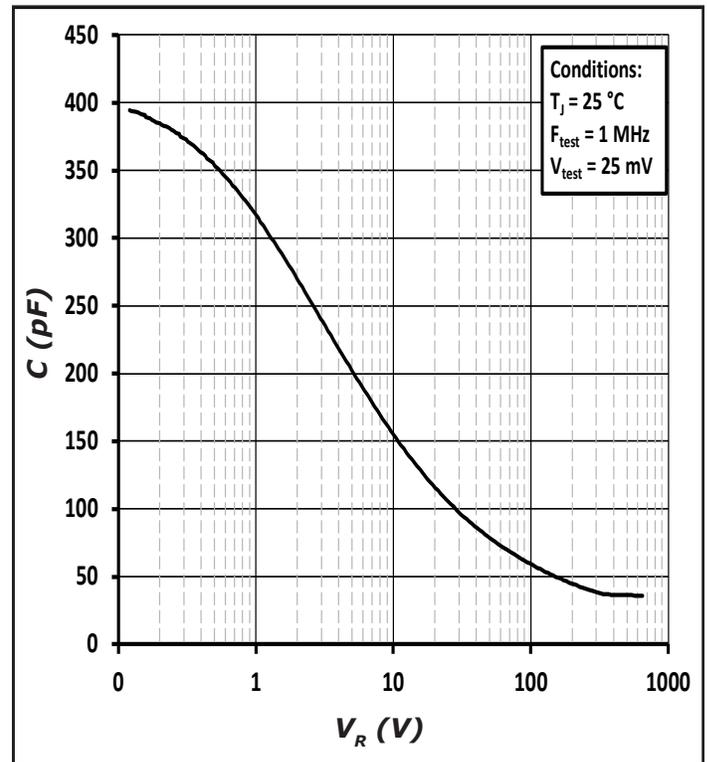


Figure 6. Capacitance vs. Reverse Voltage

**Typical Performance**

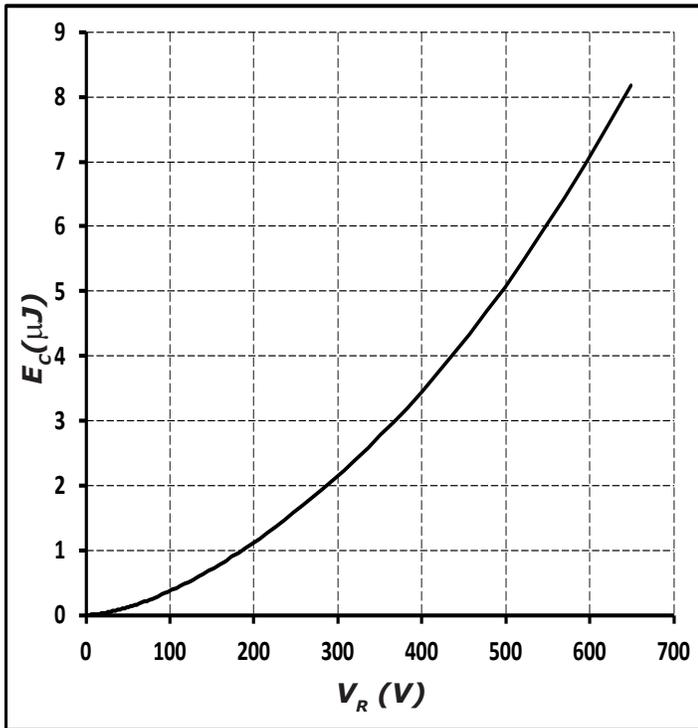


Figure 7. Capacitance Stored Energy

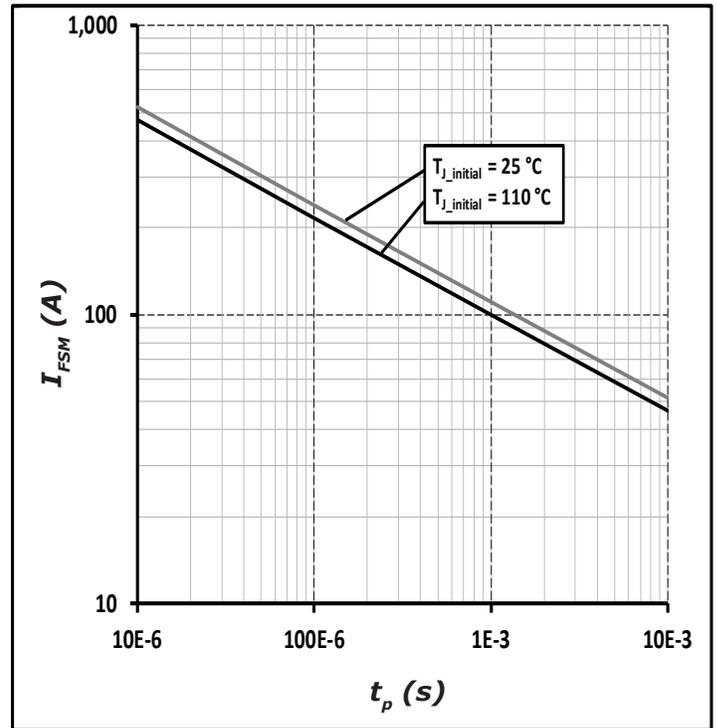


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

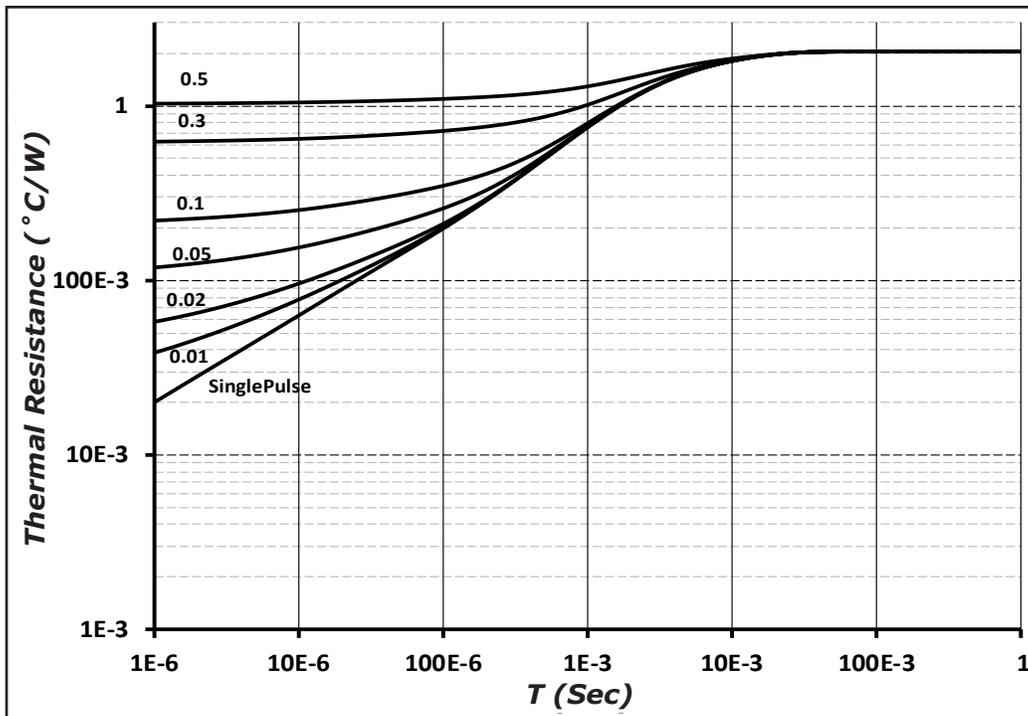
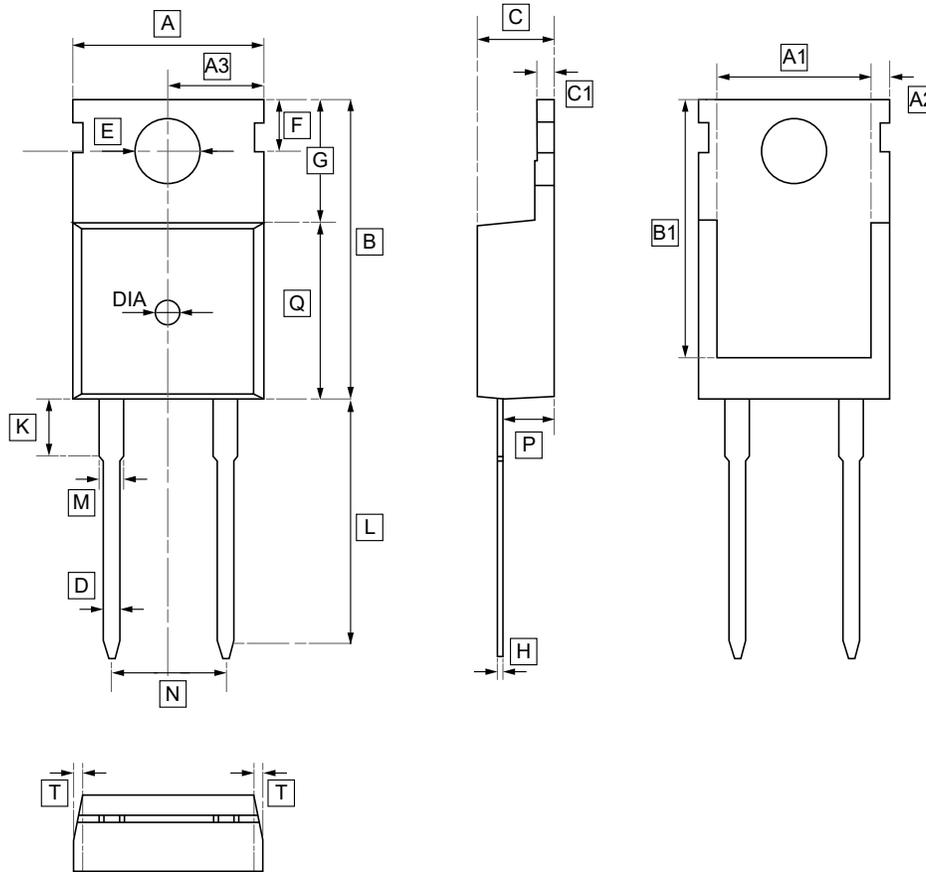


Figure 9. Transient Thermal Impedance

**Package Dimensions**

Package TO-220-2

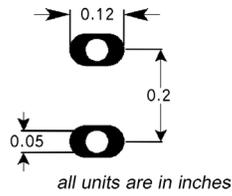


**DIMENSIONS (mm are the original dimensions)**

| Symbol | A    | A1   | A2   | A3  | B    | B1   | C    | C1  | D   | E   | F    | G   |
|--------|------|------|------|-----|------|------|------|-----|-----|-----|------|-----|
| Min    | 9.7  | 8.44 | 1.05 | 4.8 | 15.4 | 12.9 | 4.28 | 1.1 | 0.6 | 3.4 | 2.65 | 5.2 |
| Max    | 10.3 | 8.84 | 1.25 | 5.2 | 16.2 | 13.5 | 4.68 | 1.5 | 1.0 | 3.8 | 3.25 | 5.8 |

| Symbol | H   | K   | L    | L1  | M    | N    | P   | Q   | T      | DIA        |
|--------|-----|-----|------|-----|------|------|-----|-----|--------|------------|
| Min    | 0.4 | 2.9 | 12.8 | 2.7 | 1.15 | 4.98 | 2.1 | 8.7 | W:0.35 | ⊙1.5       |
| Max    | 0.6 | 3.3 | 13.6 | 3.3 | 1.35 | 5.18 | 2.7 | 9.3 |        | (deep 0.2) |

### Recommended Solder Pad Layout

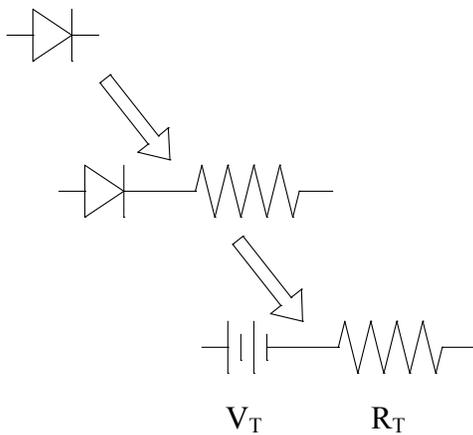


TO-220-2

| Part Number | Package  |
|-------------|----------|
| GC6D06065A  | TO-220-2 |



### Diode Model



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

$$V_T = 0.95 + (T_J * -1.2 * 10^{-3})$$

$$R_T = 0.054 + (T_J * 5.5 * 10^{-4})$$

Note:  $T_J$  = Diode Junction Temperature In Degrees Celsius,  
valid from 25°C to 175°C