

## 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
- Power Factor Correction
- Motor Drives

| Part Number | Package  | Marking   |
|-------------|----------|-----------|
| GC3D10065A  | TO-220-2 | GC3D10065 |

$$\begin{aligned}
 V_{RRM} &= 650 \text{ V} \\
 I_F (T_c=135^\circ\text{C}) &= 14.5 \text{ A} \\
 Q_c &= 24 \text{ nC}
 \end{aligned}$$



TO-220-2

Package



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

| Symbol         | Parameter                                  | Value            | Unit             | Test Conditions                                                                                                                     |
|----------------|--------------------------------------------|------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| $V_{RRM}$      | 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                 | 30<br>14.5<br>10 | A                | $T_c=25^\circ\text{C}$<br>$T_c=135^\circ\text{C}$<br>$T_c=153^\circ\text{C}$                                                        |
| $I_{FRM}$      | Repetitive Peak Forward Surge Current      | 46<br>31         | 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  | 90<br>71         | 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 |
| $I_{FMax}$     | Non-Repetitive Peak Forward Surge Current  | 860<br>680       | 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                 |
| $P_{tot}$      | Power Dissipation                          | 136.5<br>59      | 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 +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                                                                                                                                                                                                    |
|--------|---------------------------|-------------------|------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $V_F$  | Forward Voltage           | 1.5<br>2.0        | 1.8<br>2.4 | V             | $I_F = 10\text{ A}$ $T_J = 25^\circ\text{C}$<br>$I_F = 10\text{ A}$ $T_J = 175^\circ\text{C}$                                                                                                                      |
| $I_R$  | Reverse Current           | 12<br>24          | 60<br>220  | $\mu\text{A}$ | $V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$<br>$V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$                                                                                                                    |
| $Q_C$  | Total Capacitive Charge   | 24                |            | nC            | $V_R = 400\text{ V}$ , $I_F = 10\text{ A}$<br>$di/dt = 500\text{ A}/\mu\text{s}$<br>$T_J = 25^\circ\text{C}$                                                                                                       |
| C      | Total Capacitance         | 460.5<br>44<br>40 |            | 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>$V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ |
| $E_C$  | Capacitance Stored Energy | 3.6               |            | $\mu\text{J}$ | $V_R = 400\text{ V}$                                                                                                                                                                                               |

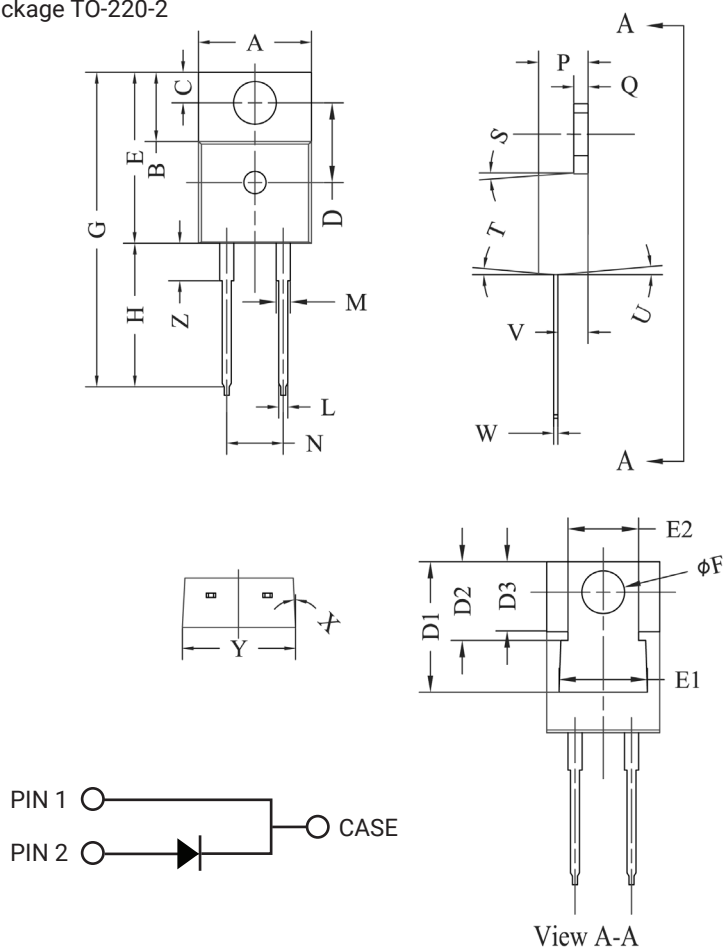
Note: This is a majority carrier diode, so there is no reverse recovery charge.

### Thermal Characteristics

| Symbol          | Parameter                                | Typ. | Unit                      |
|-----------------|------------------------------------------|------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 1.1  | $^\circ\text{C}/\text{W}$ |

## Package Dimensions

Package TO-220-2

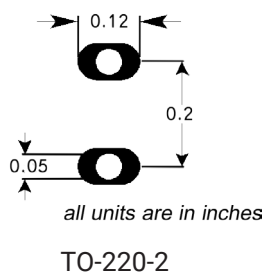


| POS | Inches        |       | Millimeters     |        |
|-----|---------------|-------|-----------------|--------|
|     | Min           | Max   | Min             | Max    |
| A   | .381          | .410  | 9.677           | 10.414 |
| B   | .235          | .255  | 5.969           | 6.477  |
| C   | .100          | .120  | 2.540           | 3.048  |
| D   | .223          | .337  | 5.664           | 8.560  |
| D1  | .457-.490     |       | 11.60-12.45 typ |        |
| D2  | .277-.303 typ |       | 7.04-7.70 typ   |        |
| D3  | .244-.252 typ |       | 6.22-6.4 typ    |        |
| E   | .590          | .615  | 14.986          | 15.621 |
| E1  | .302          | .326  | 7.68            | 8.28   |
| E2  | .227          | .251  | 5.77            | 6.37   |
| F   | .143          | .153  | 3.632           | 3.886  |
| G   | 1.105         | 1.147 | 28.067          | 29.134 |
| H   | .500          | .550  | 12.700          | 13.970 |
| L   | .025          | .036  | .635            | .914   |
| M   | .045          | .055  | 1.143           | 1.550  |
| 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:

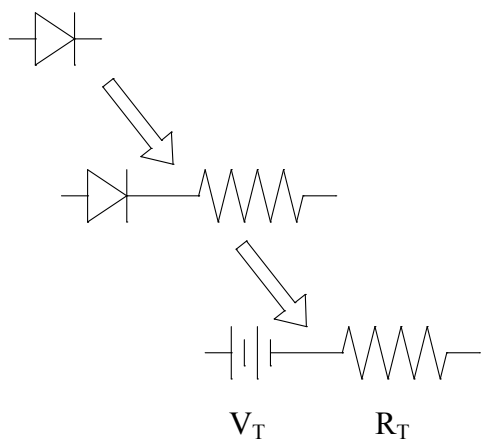
1. Dimension L, M, W apply for Solder Dip Finish

## Recommended Solder Pad Layout



| Part Number | Package  |
|-------------|----------|
| GC3D10065A  | TO-220-2 |

## Diode Model



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

$$V_T = 0.94 + (T_J * -1.3 * 10^{-3})$$

$$R_T = 0.044 + (T_J * 4.4 * 10^{-4})$$

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