

## 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  $V_F$

$V_{RRM}$	=	650 V
$I_F (T_c=135^\circ\text{C})$	=	9 A
$Q_c$	=	15 nC



## Benefits

- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway



TO-220-2

## Package

## Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Motor Drives

Part Number	Package	Marking
GC3D06065A	TO-220-2	GC3D06065



## 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		
$V_{RSM}$	Surge Peak Reverse Voltage	650	V		
$V_{DC}$	DC Blocking Voltage	650	V		
$I_F$	Continuous Forward Current	19 9 6	A	$T_c=25^\circ\text{C}$ $T_c=135^\circ\text{C}$ $T_c=154^\circ\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current	30 20	A	$T_c=25^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave $T_c=110^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	63 49	A	$T_c=25^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave $T_c=110^\circ\text{C}, t_p = 10 \text{ ms}$ , Half Sine Wave	Fig. 8
$I_{FMax}$	Non-Repetitive Peak Forward Surge Current	540 460	A	$T_c=25^\circ\text{C}, t_p = 10 \mu\text{s}$ , Pulse $T_c=110^\circ\text{C}, t_p = 10 \mu\text{s}$ , Pulse	Fig. 8
$P_{tot}$	Power Dissipation	88 38	W	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	Fig. 4
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		
	TO-220 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

### Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.5 2.0	1.7 2.4	V	$I_F = 6\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 6\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
$I_R$	Reverse Current	8 15.5	40 160	$\mu\text{A}$	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	15		nC	$V_R = 400\text{ V}$ , $I_F = 6\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	295 28.5 25.5		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 200\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	Fig. 6
$E_C$	Capacitance Stored Energy	2.3		$\mu\text{J}$	$V_R = 400\text{ V}$	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	1.7	$^\circ\text{C}/\text{W}$	Fig. 9

### Typical Performance

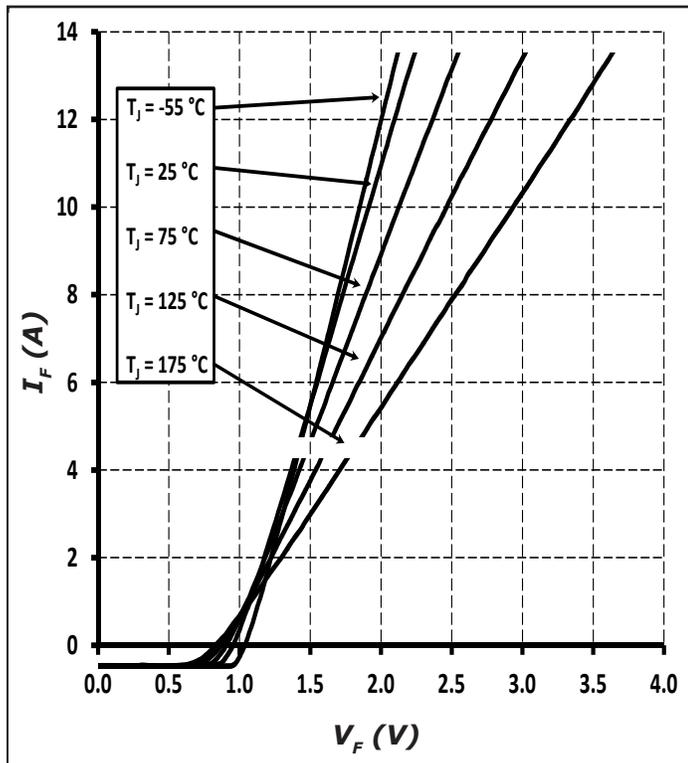


Figure 1. Forward Characteristics

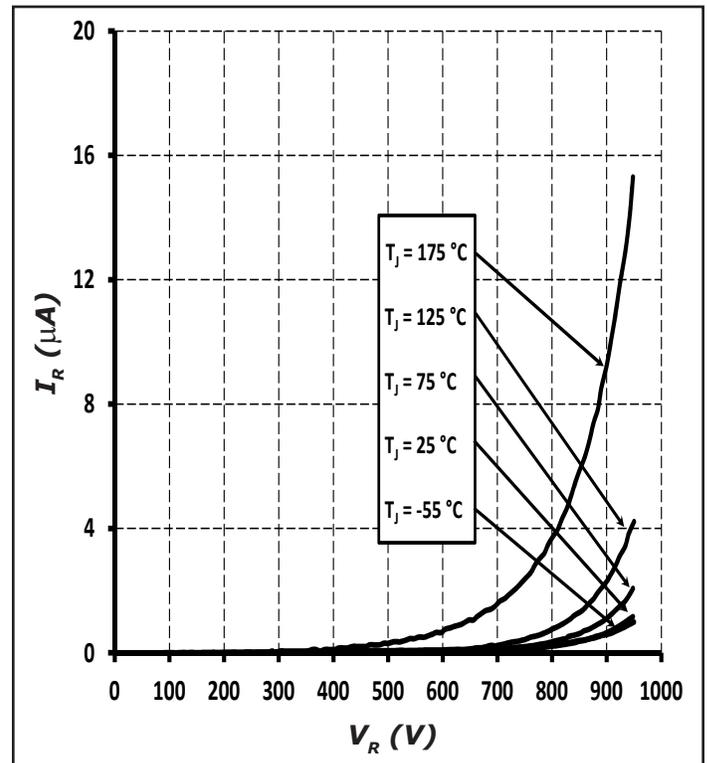


Figure 2. Reverse Characteristics

Typical Performance

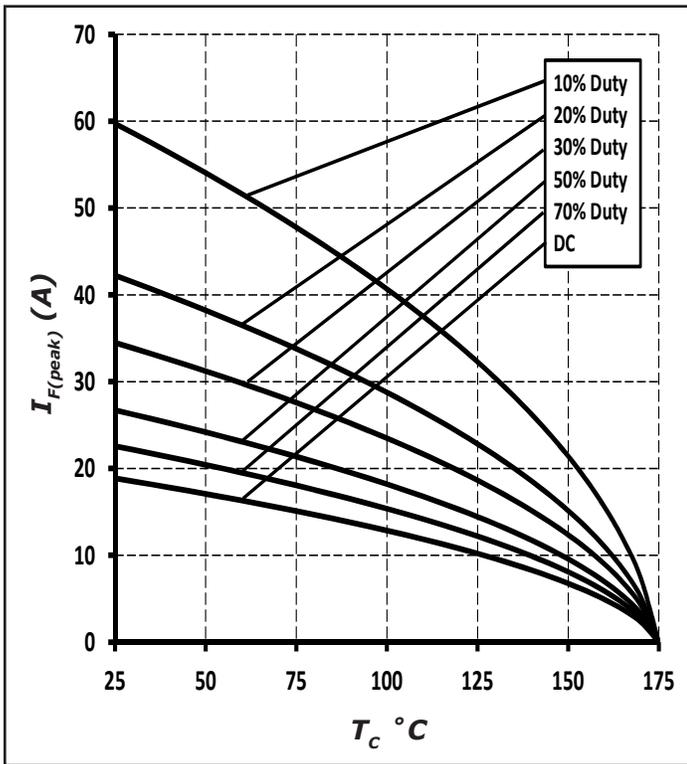


Figure 3. Current Derating

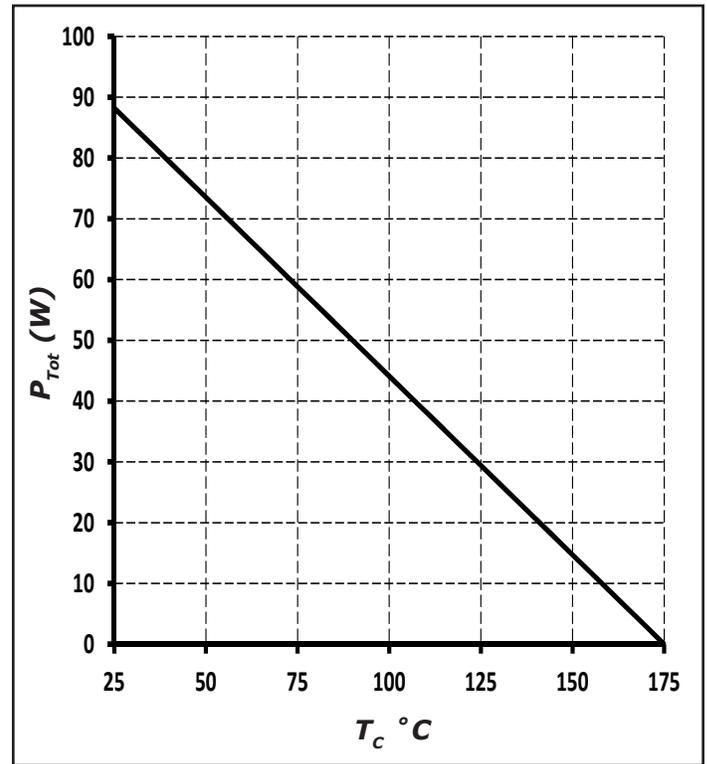


Figure 4. Power Derating

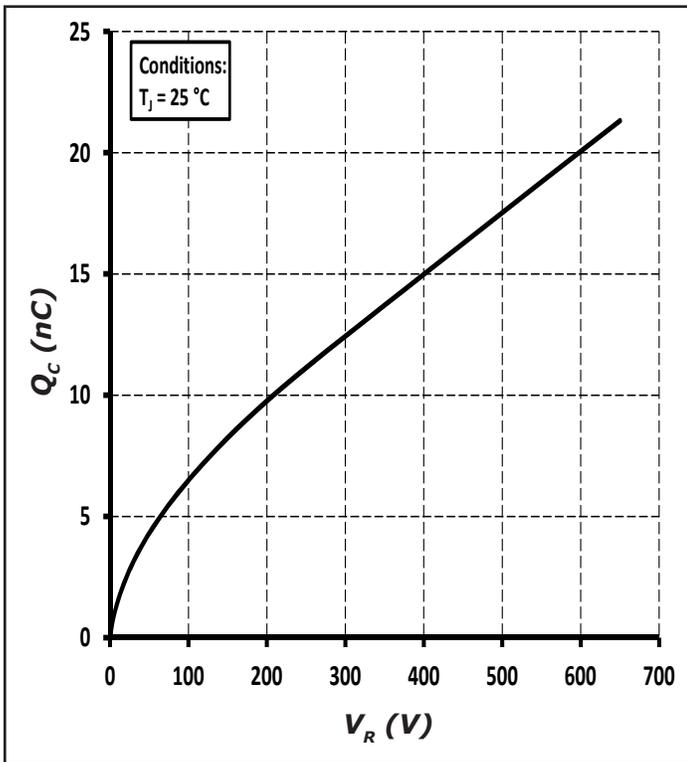


Figure 5. Total Capacitance Charge vs. Reverse Voltage

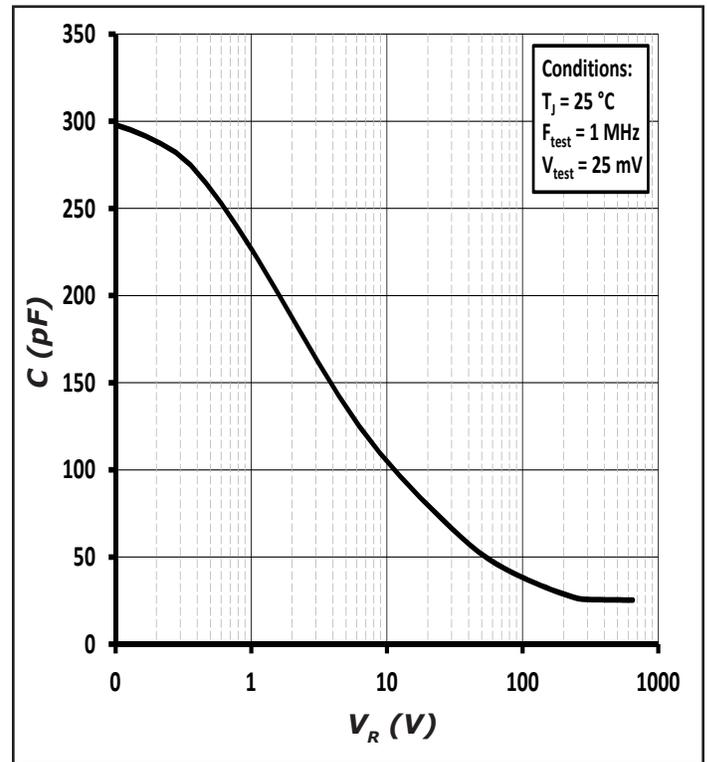


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

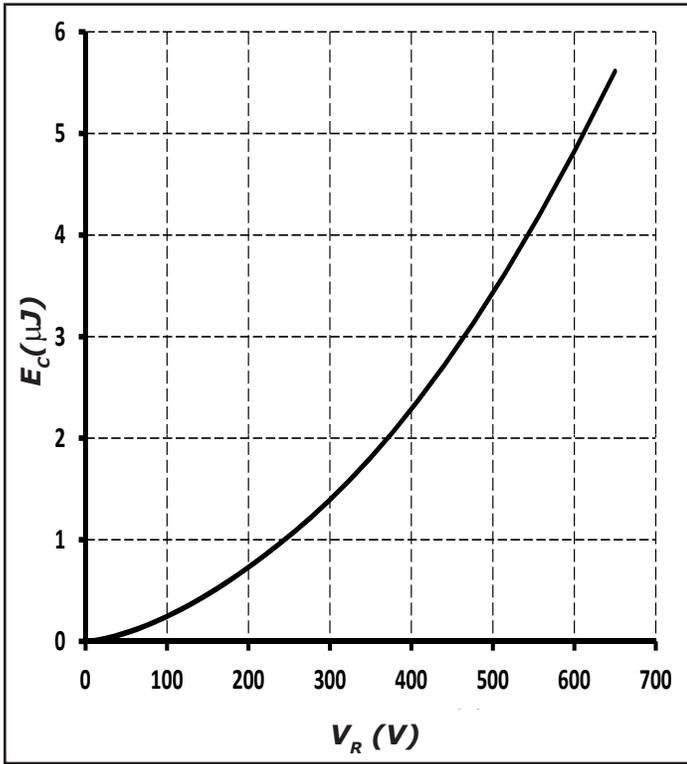


Figure 7. Capacitance Stored Energy

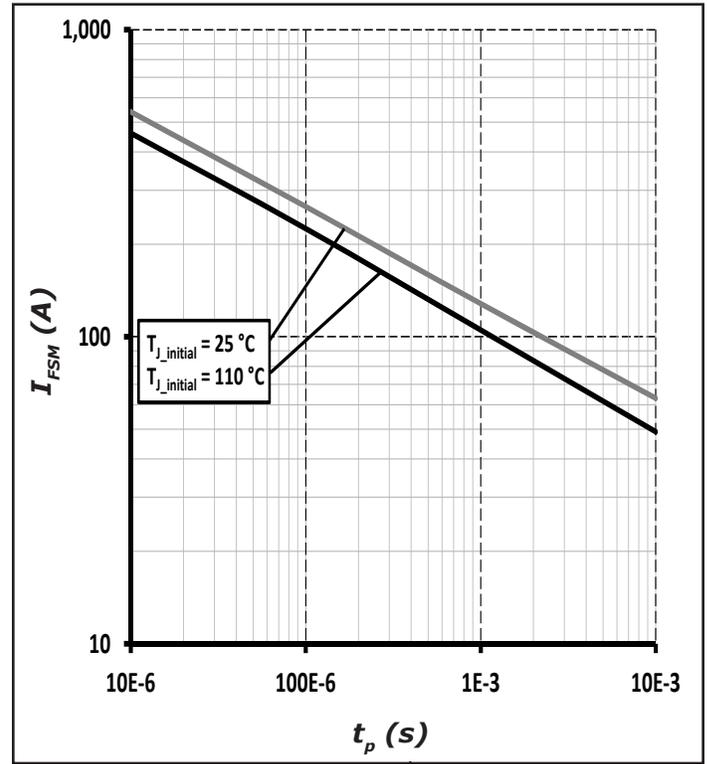


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

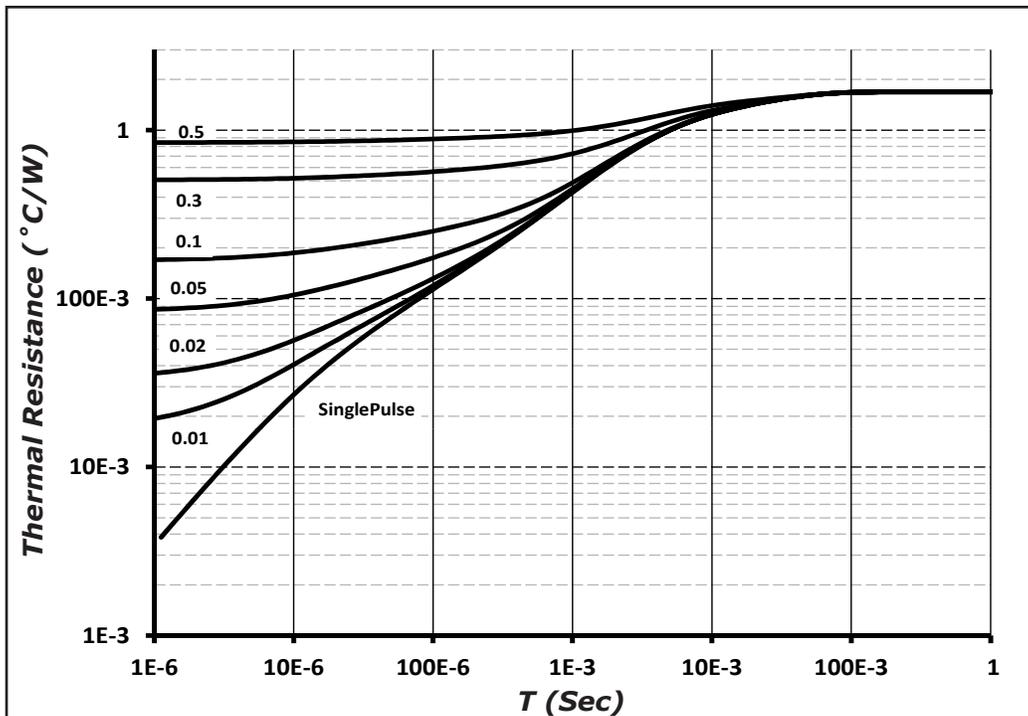
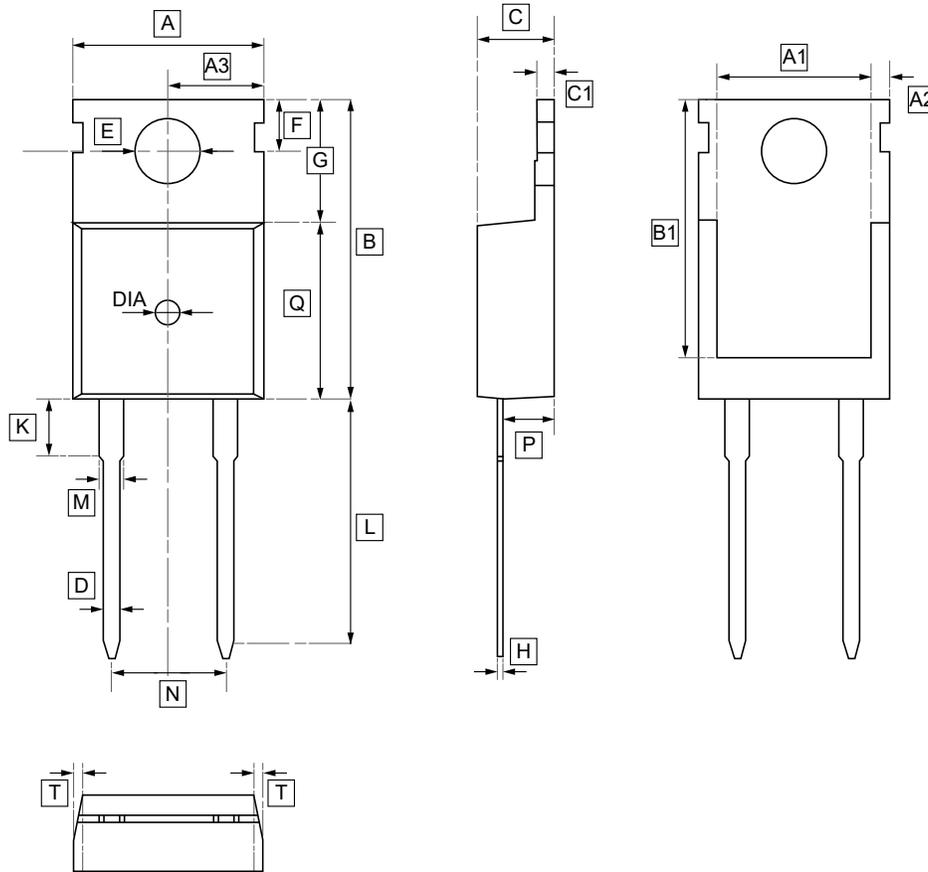


Figure 9. Transient Thermal Impedance

**Package Dimensions**

Package TO-220-2

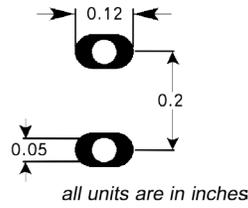


**DIMENSIONS (mm are the original dimensions)**

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)

Diode Model

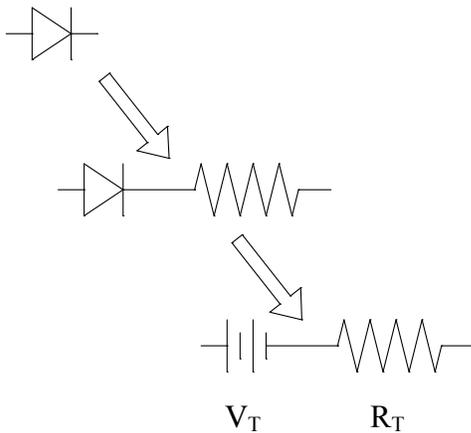


TO-220-2

Part Number	Package
GC3D06065A	TO-220-2



Diode Model



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

$$V_T = 0.96 + (T_J * -1.1 * 10^{-3})$$

$$R_T = 0.07 + (T_J * 7.4 * 10^{-4})$$

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