

### 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 (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters

Part Number	Package	Marking
GC3D16065A	TO-220-2	GC3D16065

$V_{RRM}$	=	650 V
$I_F (T_C=135^\circ\text{C})$	=	18 A
$Q_c$	=	44.5 nC



TO-220-2

### Package



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

Symbol	Parameter	Value		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	39 18 16	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=142^\circ\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current	66 46	A	$T_C=25^\circ\text{C}$ , $t_p=10$ ms, Half Sine Pulse $T_C=110^\circ\text{C}$ , $t_p=10$ ms, Half Sine Pulse	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	162 150	A	$T_C=25^\circ\text{C}$ , $t_p=10$ ms, Half Sine Pulse $T_C=110^\circ\text{C}$ , $t_p=10$ ms, Half Sine Pulse	Fig. 8
$I_{FMax}$	Non-Repetitive Peak Forward Current	1400 1200	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	150 65	W	$T_C=25^\circ\text{C}$ $T_C=110^\circ\text{C}$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-600\text{V}$	
$\int i^2 dt$	$i^2t$ value	131 112.5	A <sup>2</sup> s	$T_C=25^\circ\text{C}$ , $t_p=10$ ms $T_C=110^\circ\text{C}$ , $t_p=10$ ms	
$T_J, T_{stg}$	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	1.8 2.4	V	$I_F = 16\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 16\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
$I_R$	Reverse Current	18.5 38.5	95 378	$\mu\text{A}$	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	44.5		nC	$V_R = 400\text{ V}$ , $I_F = 16\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	877.5 80 64		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	6.2		$\mu\text{J}$	$V_R = 400\text{ V}$	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	$^\circ\text{C}/\text{W}$	Fig. 9

### Typical Performance

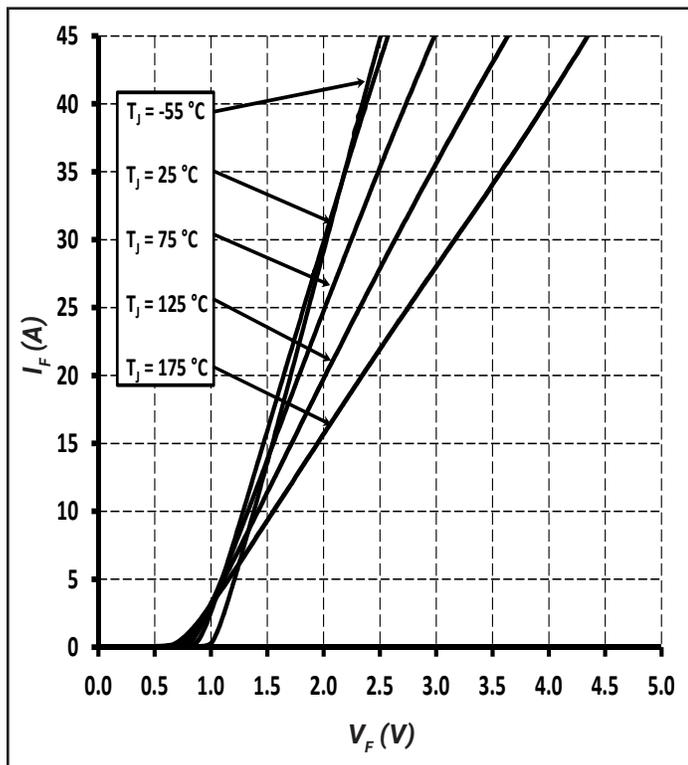


Figure 1. Forward Characteristics

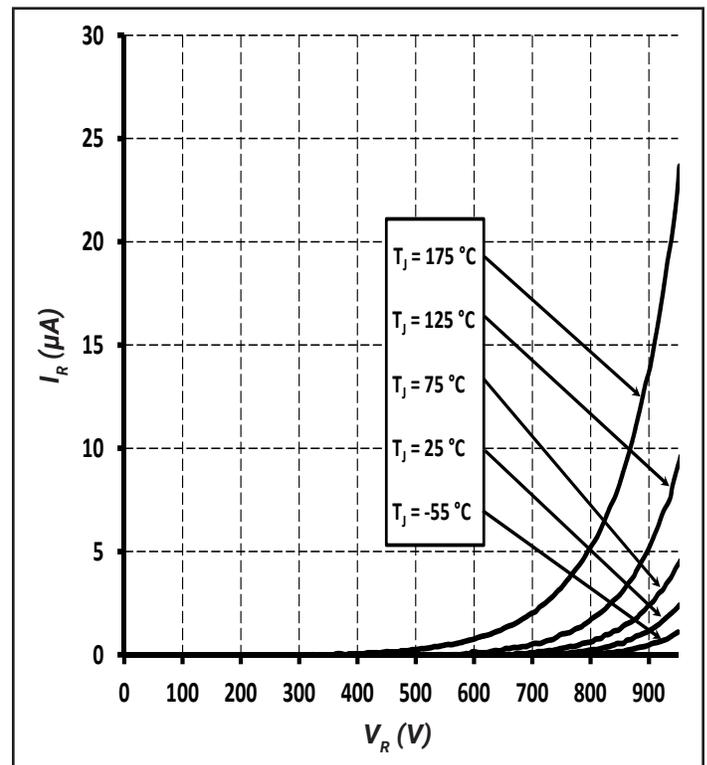


Figure 2. Reverse Characteristics

Typical Performance

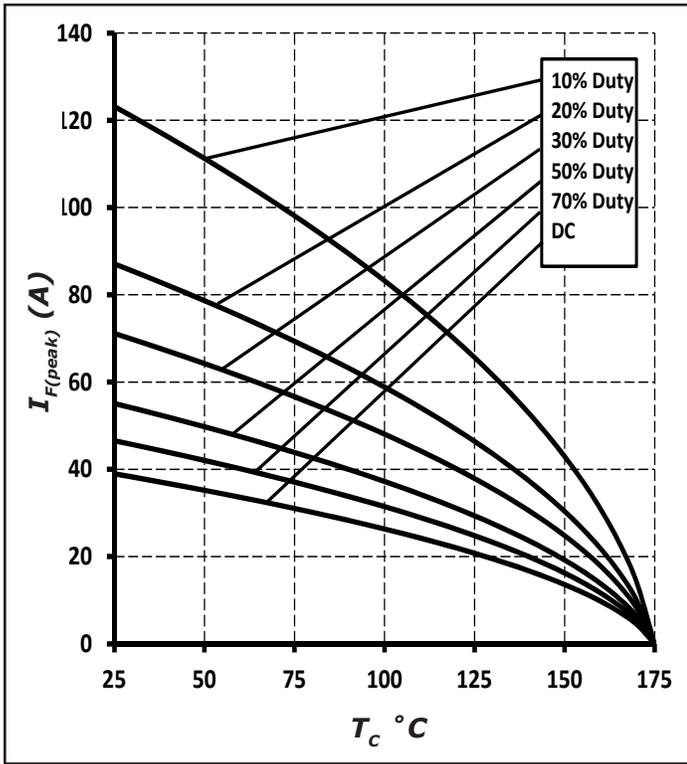


Figure 3. Current Derating

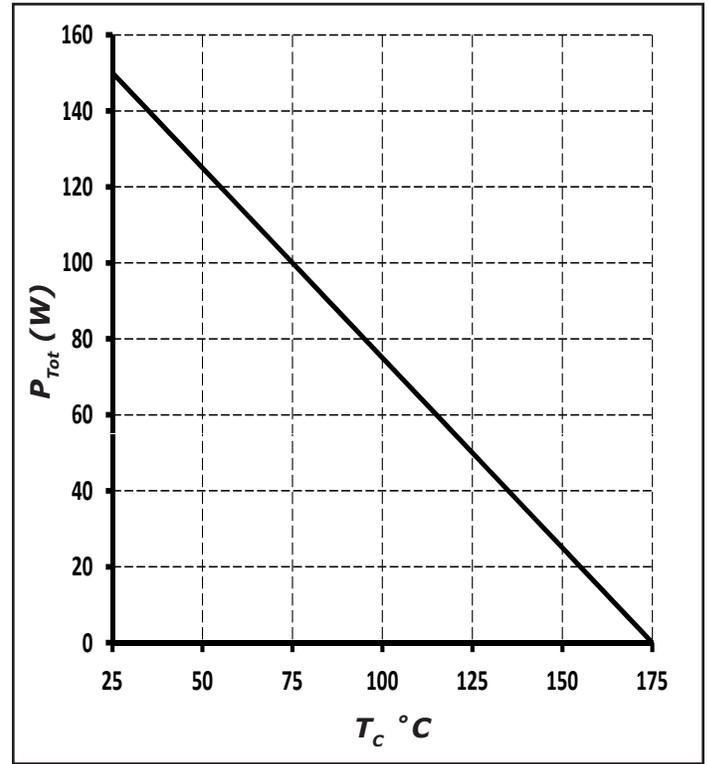


Figure 4. Power Derating

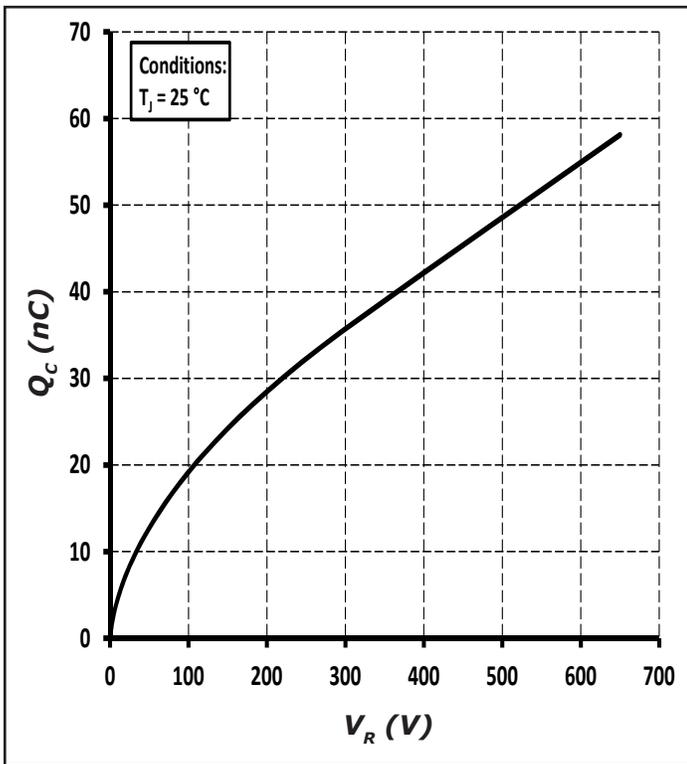


Figure 5. Total Capacitance Charge vs. Reverse Voltage

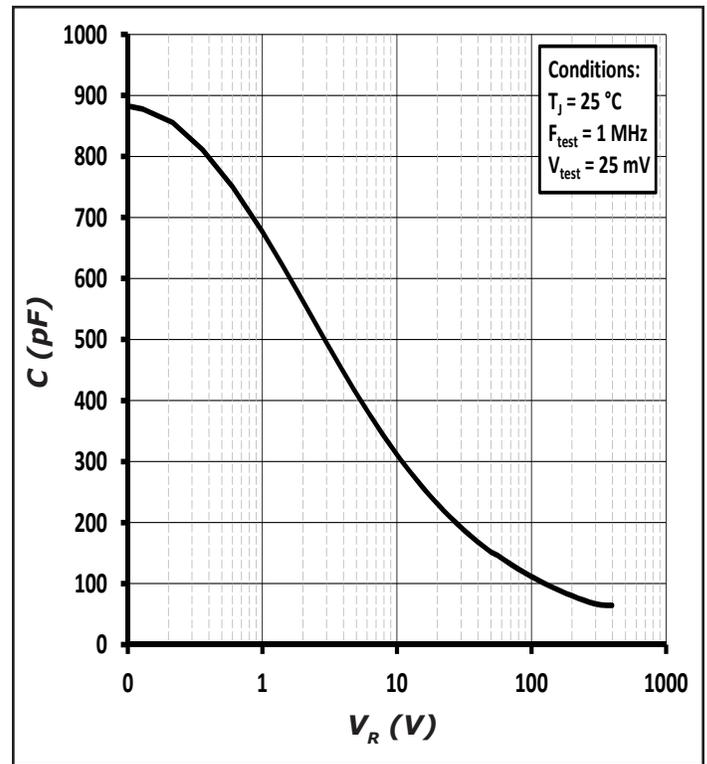


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

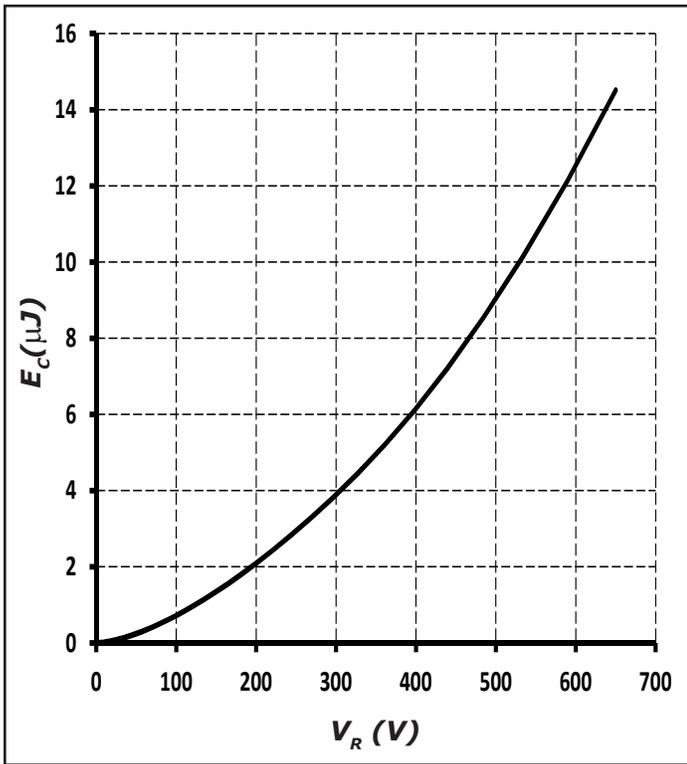


Figure 7. Capacitance Stored Energy

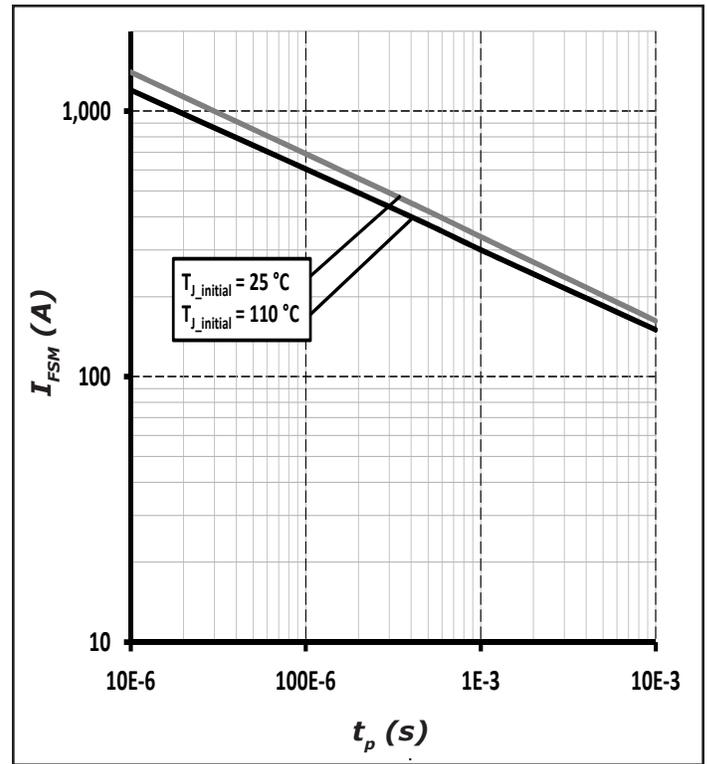


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

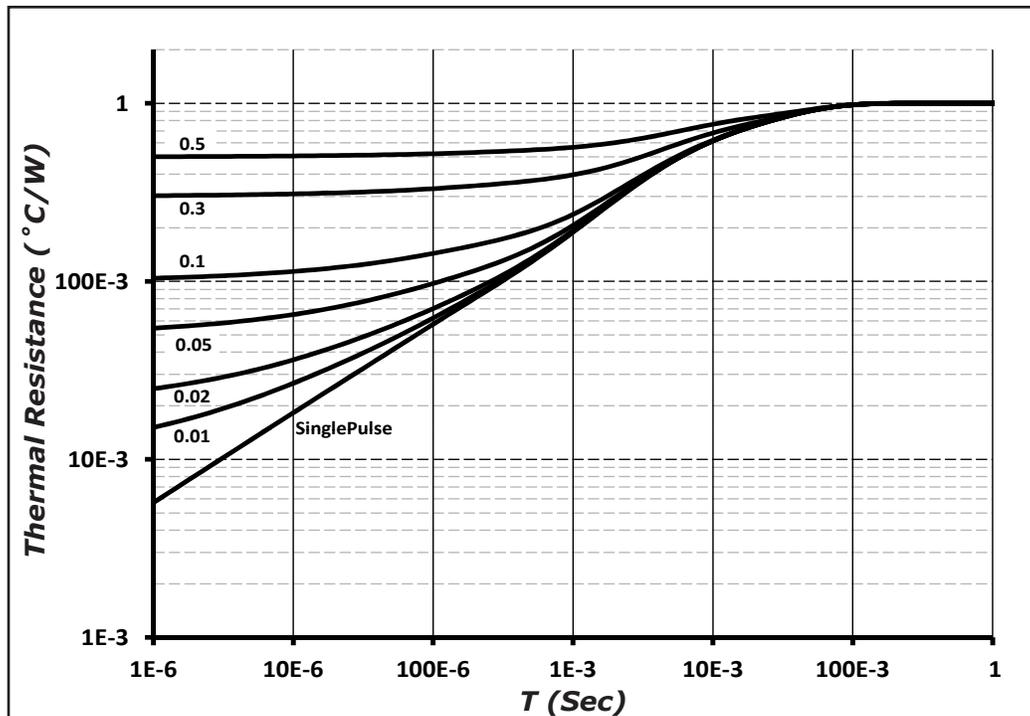
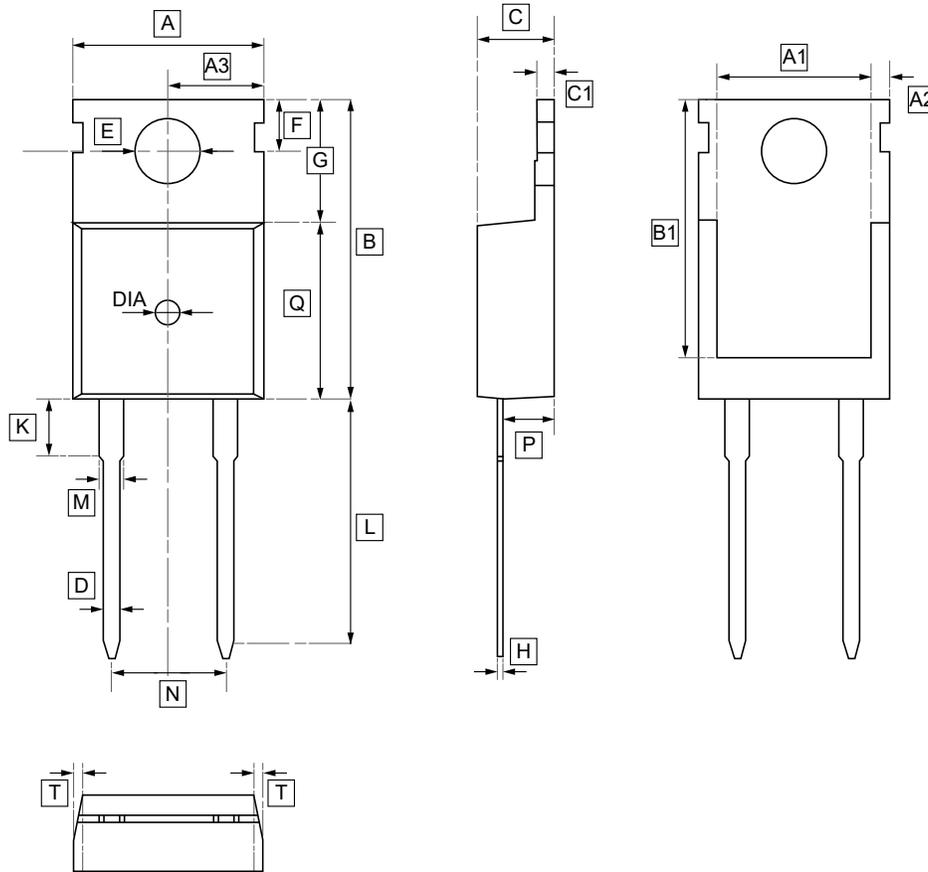


Figure 9. Transient Thermal Impedance

**Package Dimensions**

Package TO-220-2

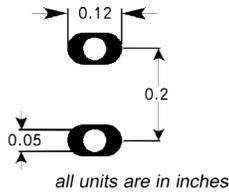


**DIMENSIONS (mm are the original dimensions)**

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**

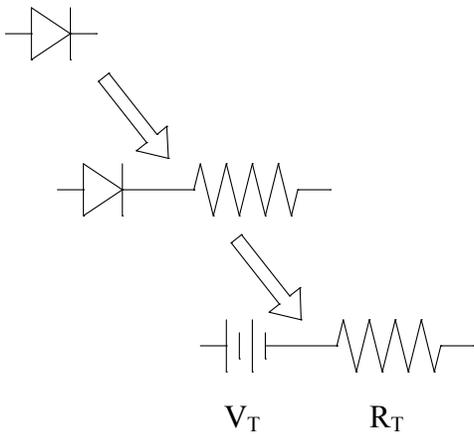


TO-220-2

Part Number	Package
GC3D16065A	TO-220-2



**Diode Model**



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

$$V_T = 0.94 + (T_J * -1.0 * 10^{-3})$$

$$R_T = 0.027 + (T_J * 2.8 * 10^{-4})$$

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