

### 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
GC3D20065A	T0-220-2	GC3D20065

$V_{RRM}$	=	650 V
$I_F (T_C=135^\circ\text{C})$	=	26 A
$Q_c$	=	48 nC



T0-220-2

### Package



### 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 (Per Leg/Device)	55 26 20	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=149^\circ\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current	46* 31*	A	$T_C=25^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Wave $T_C=110^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Wave	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	90* 71*	A	$T_C=25^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Wave $T_C=110^\circ\text{C}$ , $t_p = 10$ ms, Half Sine Wave	Fig. 8
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	860* 680*	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 (Per Leg/Device)	249 108	W	$T_C=25^\circ\text{C}$ $T_C=110^\circ\text{C}$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-650\text{V}$	
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		
	TO-247 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

### Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.5 2.0	1.8 2.4	V	$I_F = 10\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 10\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
$I_R$	Reverse Current	12 24	60 220	$\mu\text{A}$	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	24		nC	$V_R = 400\text{ V}$ , $I_F = 10\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	460.5 44 40		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	3.6		$\mu\text{J}$	$V_R = 400\text{ V}$	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	1.3** 0.65*	$^\circ\text{C}/\text{W}$	Fig. 9

\*\* Per Leg, \* Both Legs

### Typical Performance (Per Leg)

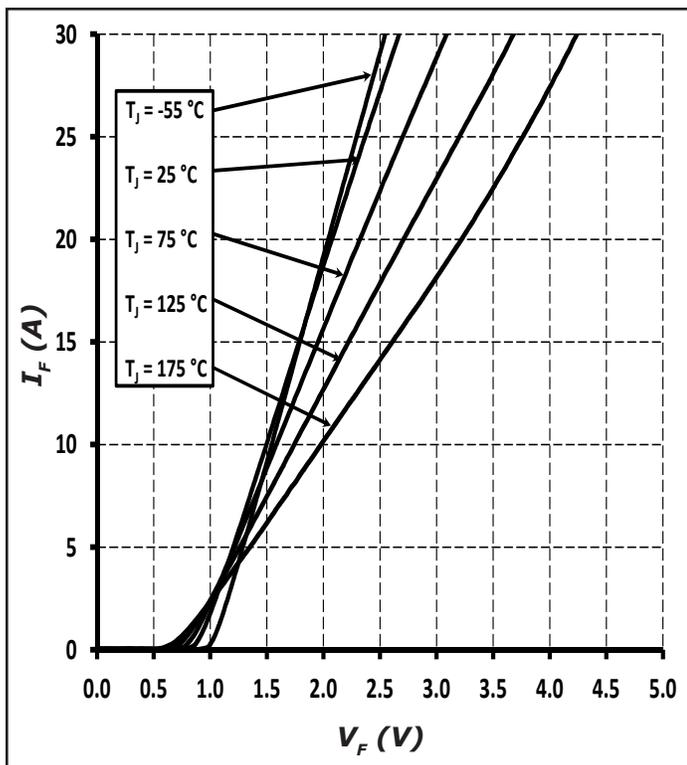


Figure 1. Forward Characteristics

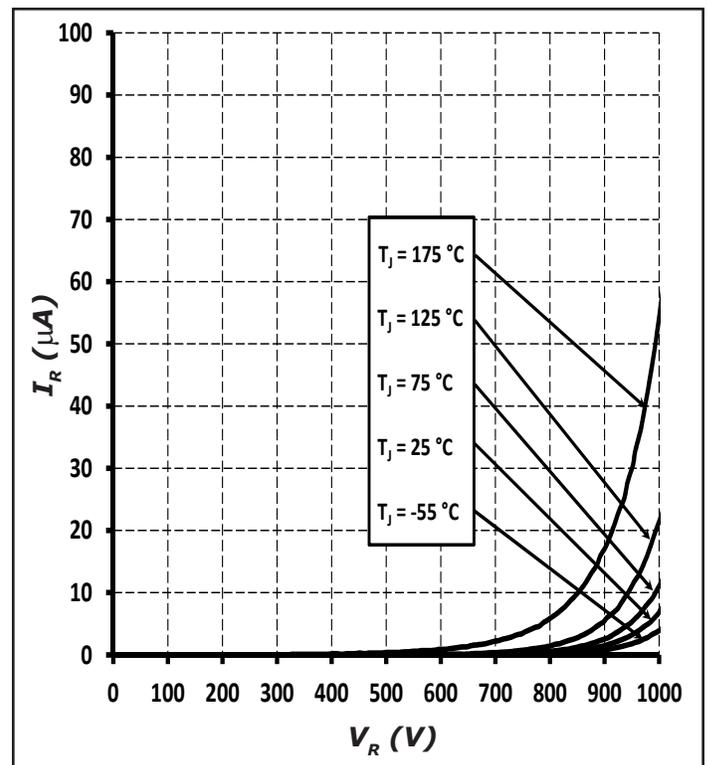


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

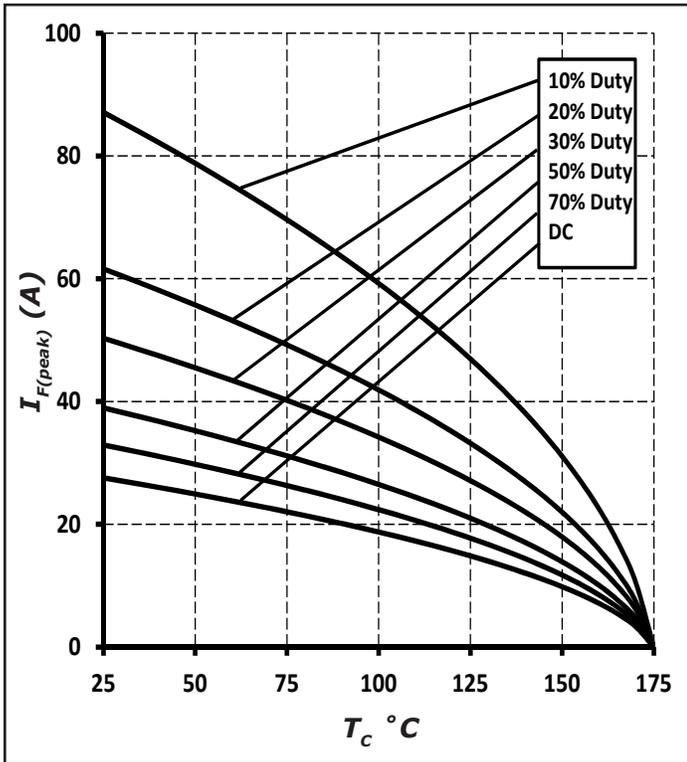


Figure 3. Current Derating

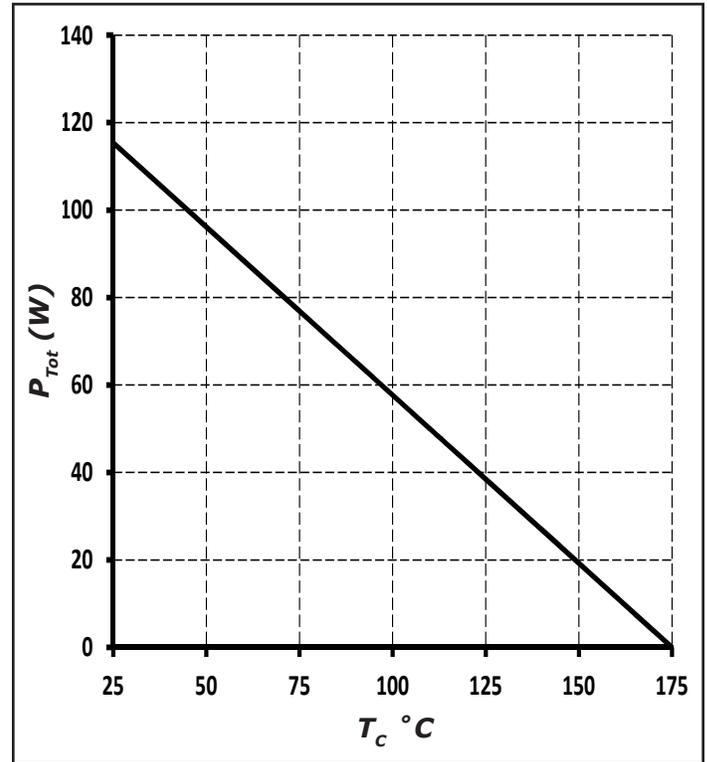


Figure 4. Power Derating

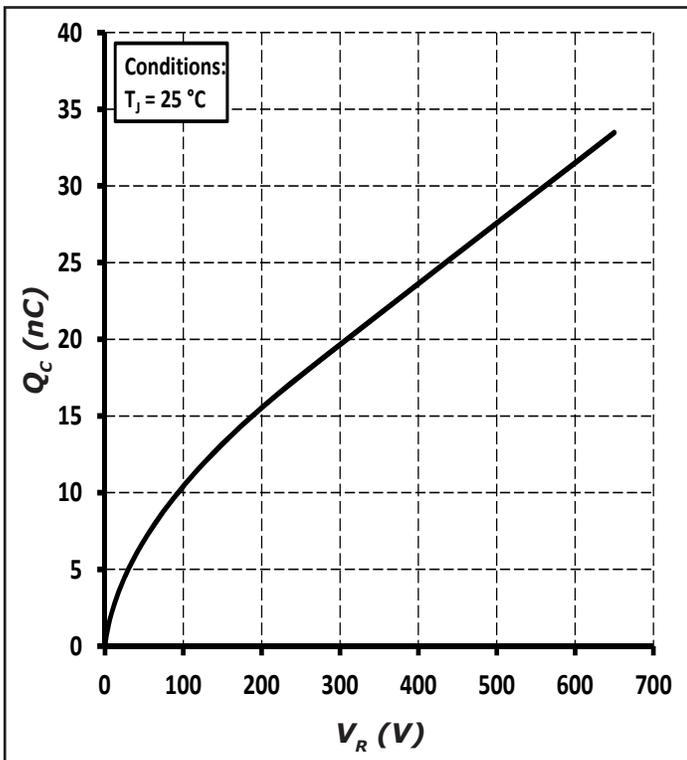


Figure 5. Total Capacitance Charge vs. Reverse Voltage

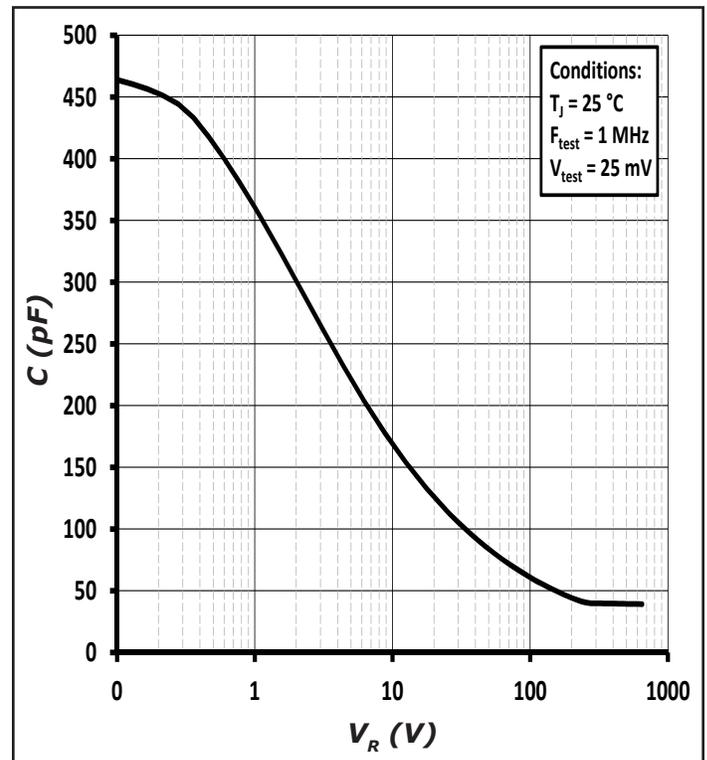


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

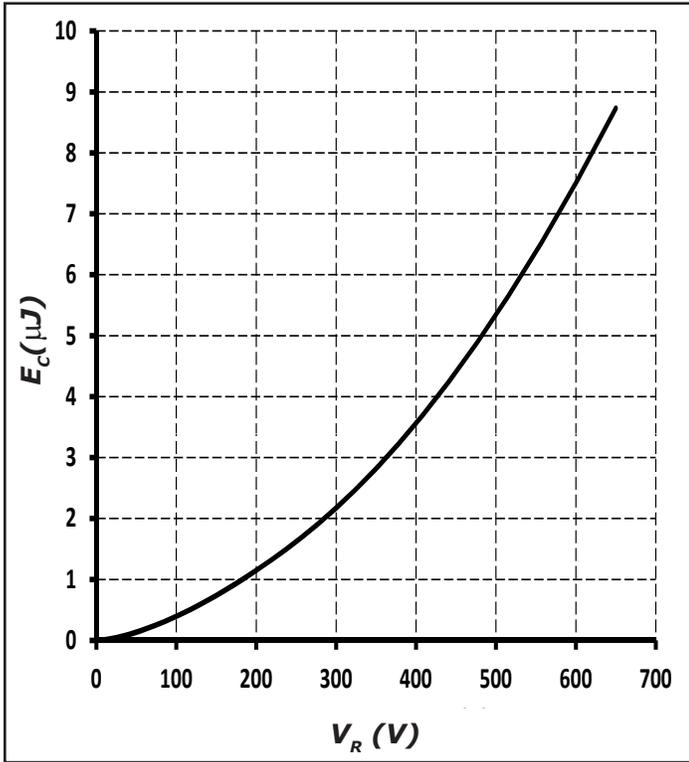


Figure 7. Capacitance Stored Energy

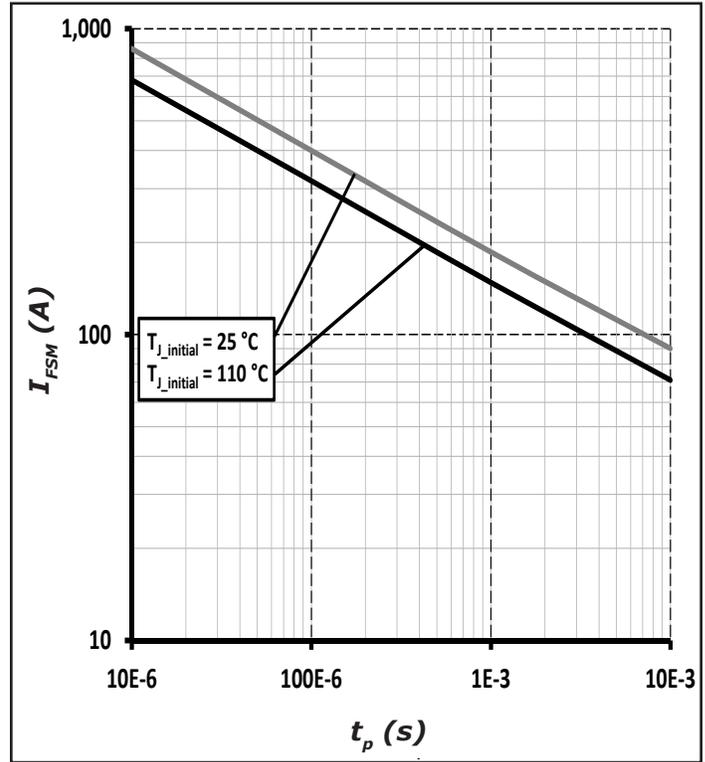


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

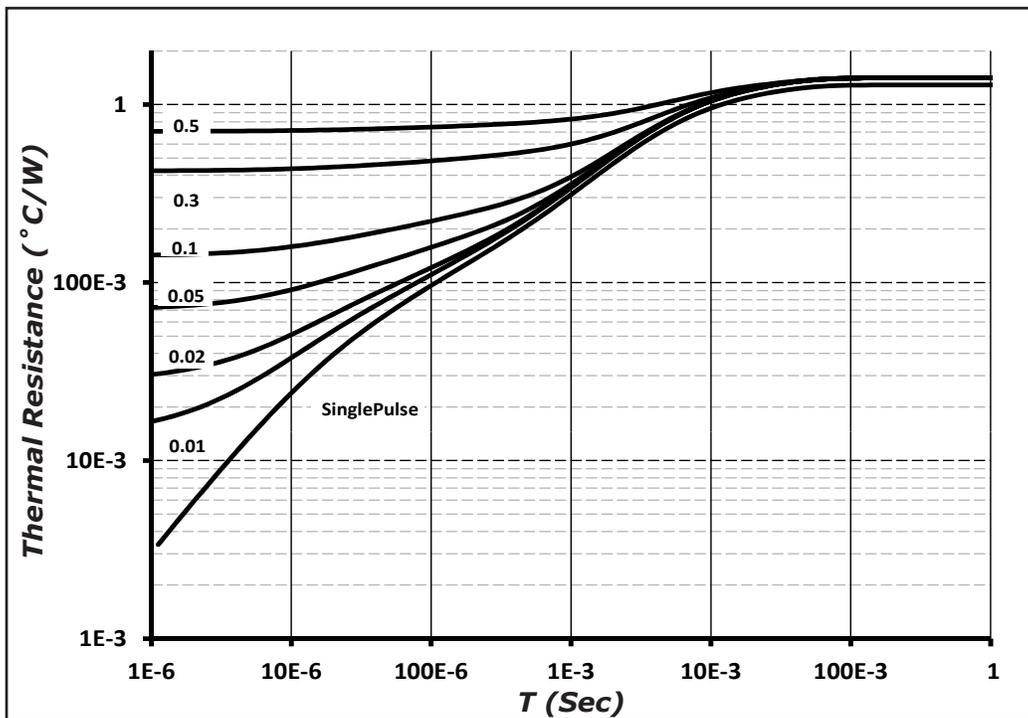
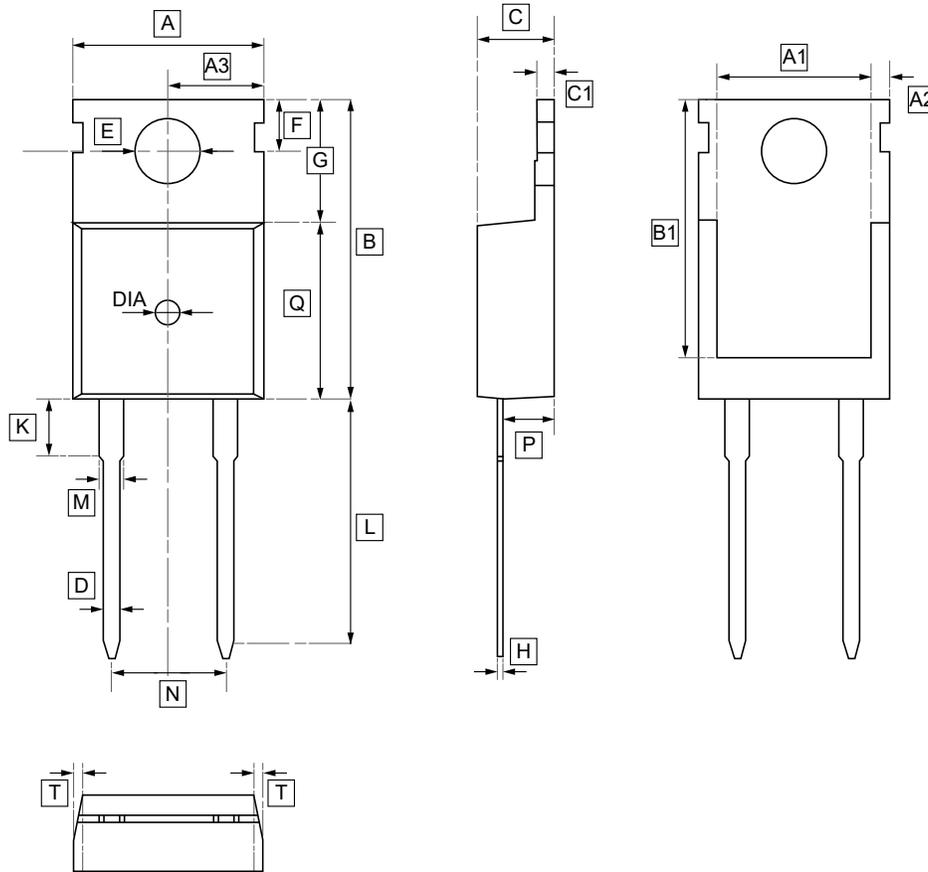


Figure 9. Transient Thermal Impedance

**Package Dimensions**

Package TO-220-2

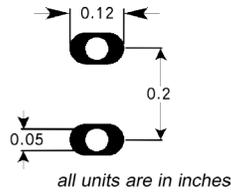


**DIMENSIONS (mm are the original dimensions)**

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

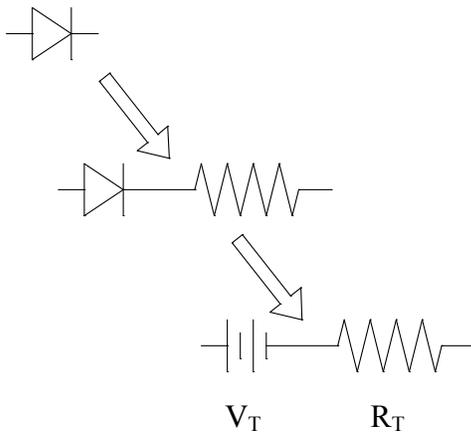


TO-220-2

Part Number	Package
GC3D20065A	TO-220-2



Diode Model



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

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

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

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