GC3D16065D

Silicon Carbide Schottky Diode

V_{RRM}	=	650 V
I_F (T_C=135°C)	=	22 A**
Q_c	=	40 nC**

Features

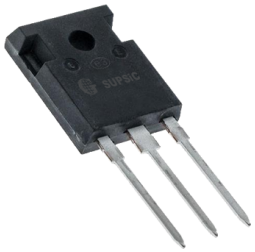
- 650-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on V_F

Benefits

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

Applications

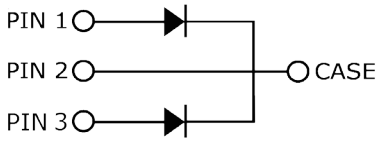
- Switch Mode Power Supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters



TO-247-3

Package

Part Number	Package	Marking
GC3D16065D	TO-247-3	GC3D16065



Maximum Ratings (T_C=25°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)	23/46 11/22 8/16	A	T_C=25°C T_C=135°C T_C=150°C	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current (Per Leg/Device)	37.5/75 25.5/51	A	T_C=25°C, t_P = 10 ms, Half Sine Wave T_C=110°C, t_P = 10 ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current (Per Leg/Device)	71/142 60/120	A	T_C=25°C, t_P = 10 ms, Half Sine Wave T_C=110°C, t_P = 10 ms, Half Sine Wave	Fig. 8
I_{FSM}	Non-Repetitive Peak Forward Surge Current (Per Leg/Device)	650/1300 530/1080	A	T_C=25°C, t_P = 10 µs, Pulse T_C=110°C, t_P = 10 µs, Pulse	Fig. 8
P_{tot}	Power Dissipation (Per Leg)	100* 43.5*	W	T_C=25°C T_C=110°C	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	V_R=0-600V	
$\int i^2dt$	i^2t value (Per Leg)	25 18	A^2s	T_C=25°C, t_P=10 ms T_C=110°C, t_P=10 ms	
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	°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 2.1	1.8 2.4	V	I_F = 8 A T_J=25°C I_F = 8 A T_J=175°C	Fig. 1
I_R	Reverse Current	10 12	51 204	μA	V_R = 650 V T_J=25°C V_R = 650 V T_J=175°C	Fig. 2
Q_C	Total Capacitive Charge	20		nC	V_R = 400 V, I_F = 8A di/dt = 500 A/μs T_J = 25°C	Fig. 5
C	Total Capacitance	395 37 32		pF	V_R = 0 V, T_J = 25°C, f = 1 MHz V_R = 200 V, T_J = 25°C, f = 1 MHz V_R = 400 V, T_J = 25°C, f = 1 MHz	Fig. 6
E_C	Capacitance Stored Energy	3.0		μJ	V_R = 400 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	1.5 * 0.75 **	°C/W	Fig. 9

* Per Leg, ** Per Device

Typical Performance (Per Leg)

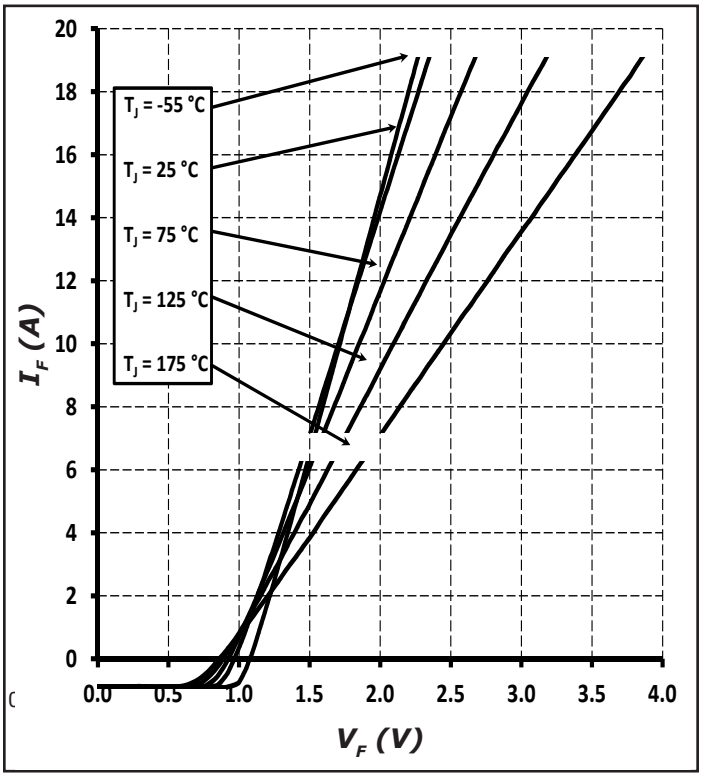


Figure 1. Forward Characteristics

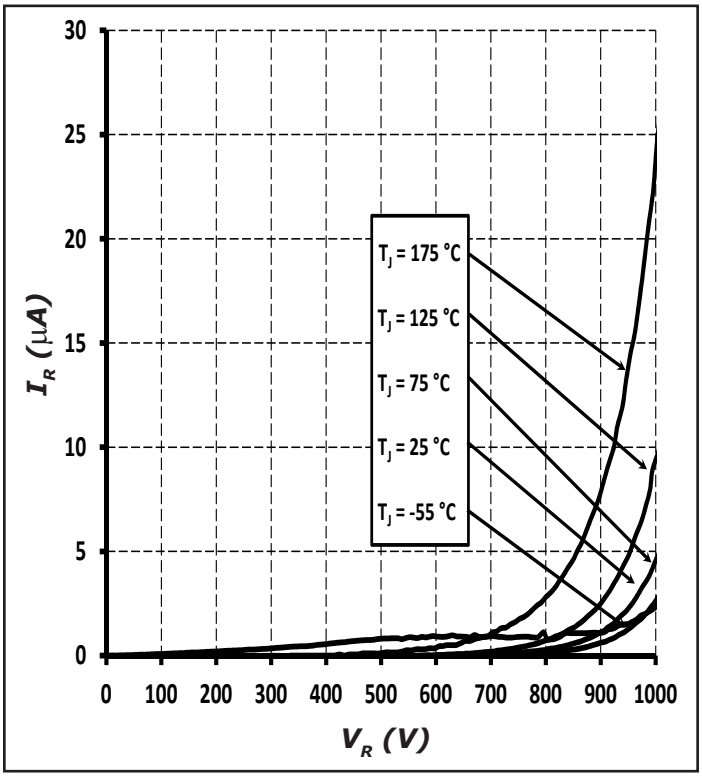


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

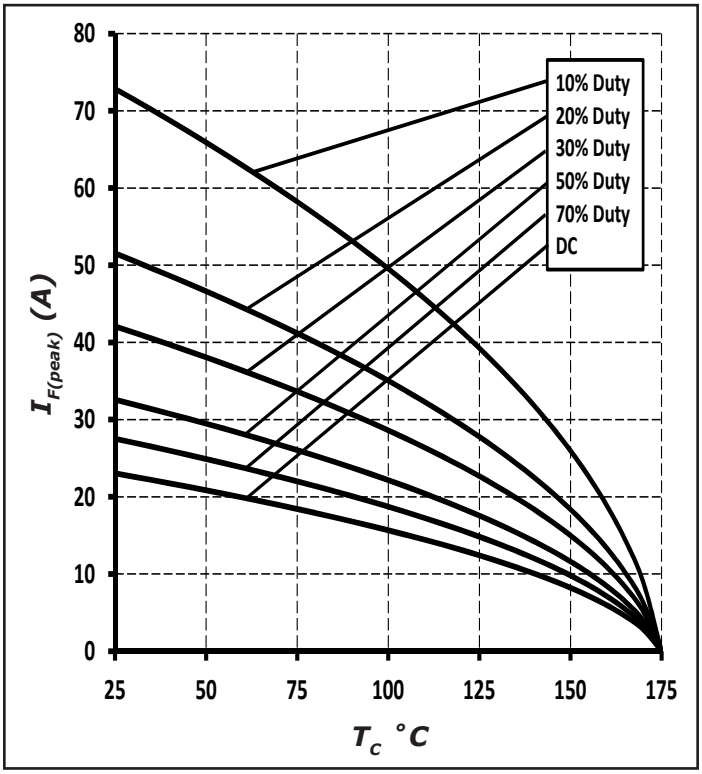


Figure 3. Current Derating

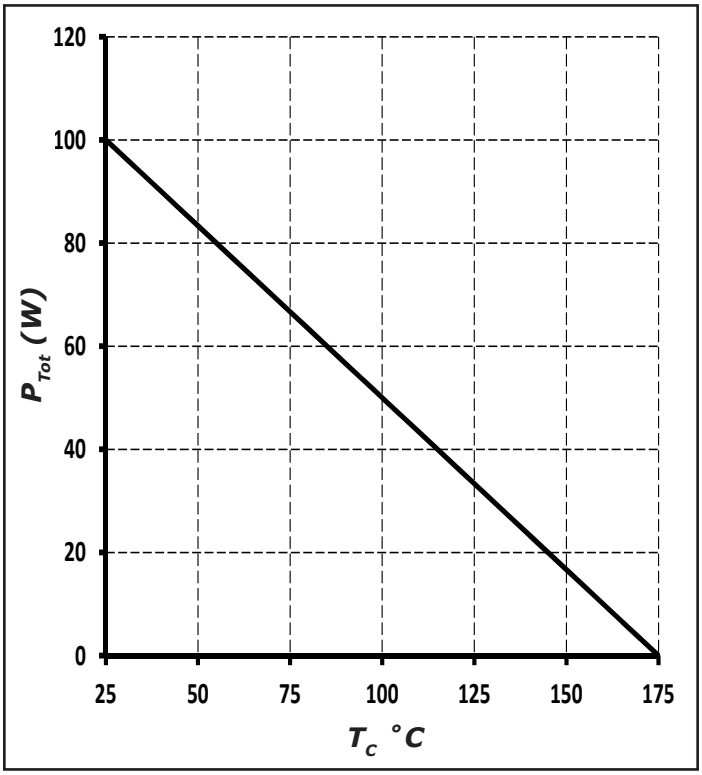


Figure 4. Power Derating

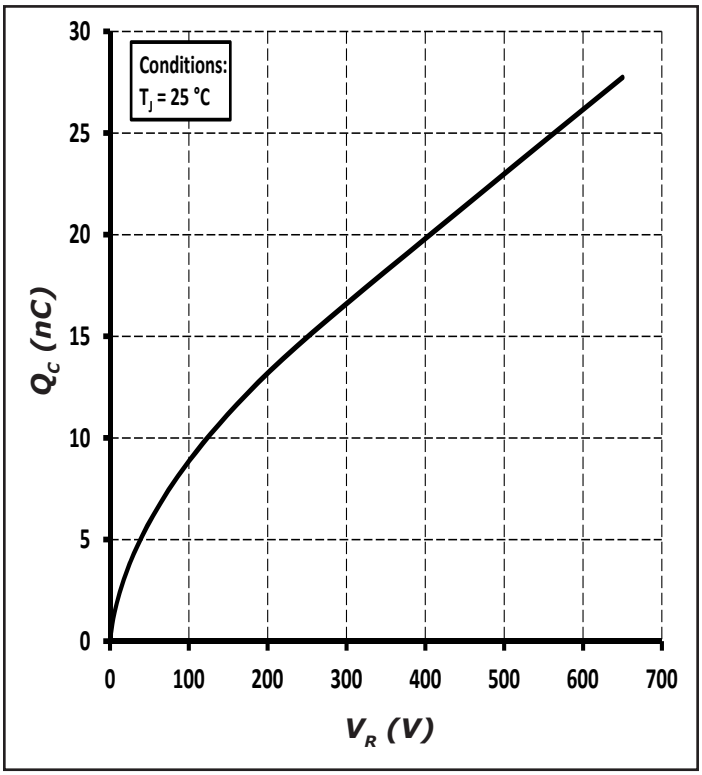


Figure 5. Total Capacitance Charge vs. Reverse Voltage

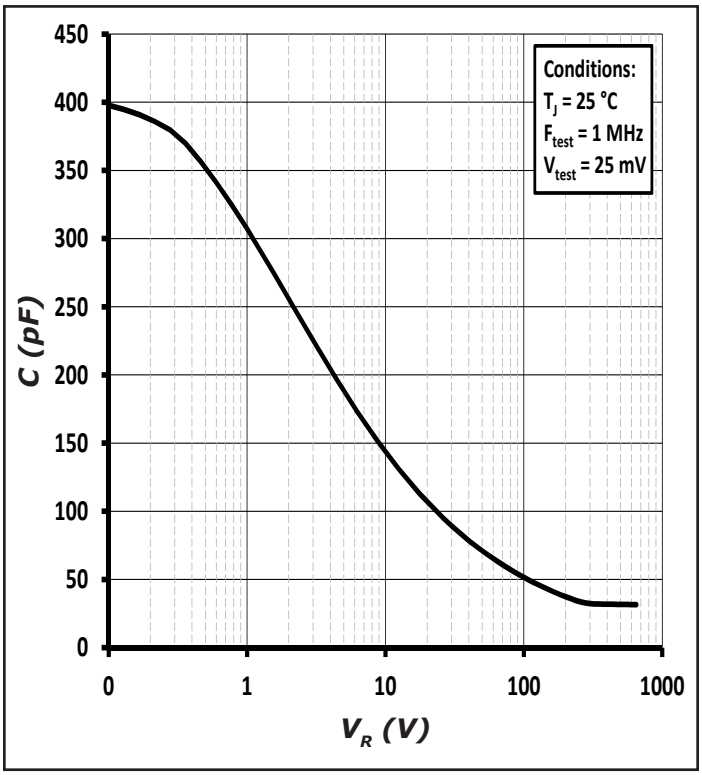


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance (Per Leg)

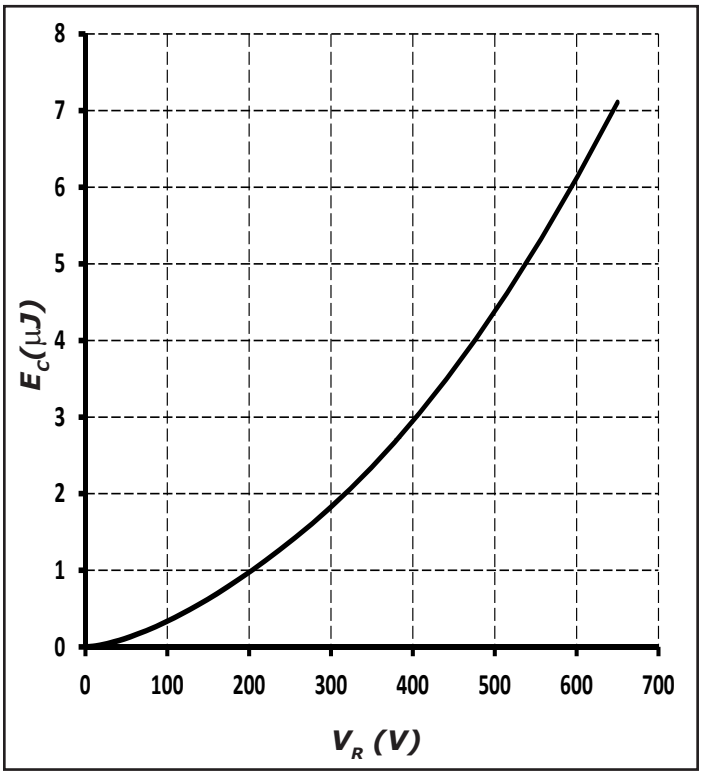


Figure 7. Capacitance Stored Energy

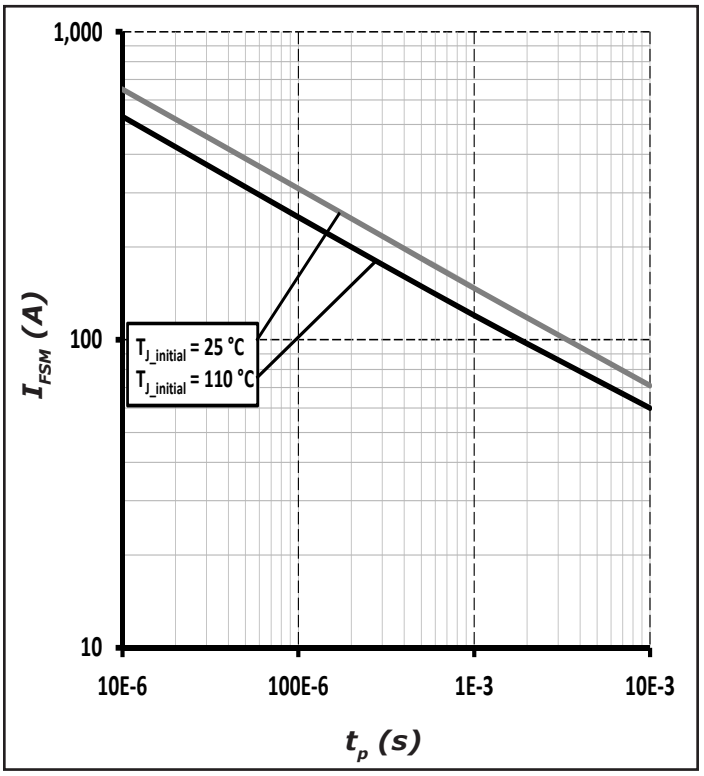


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

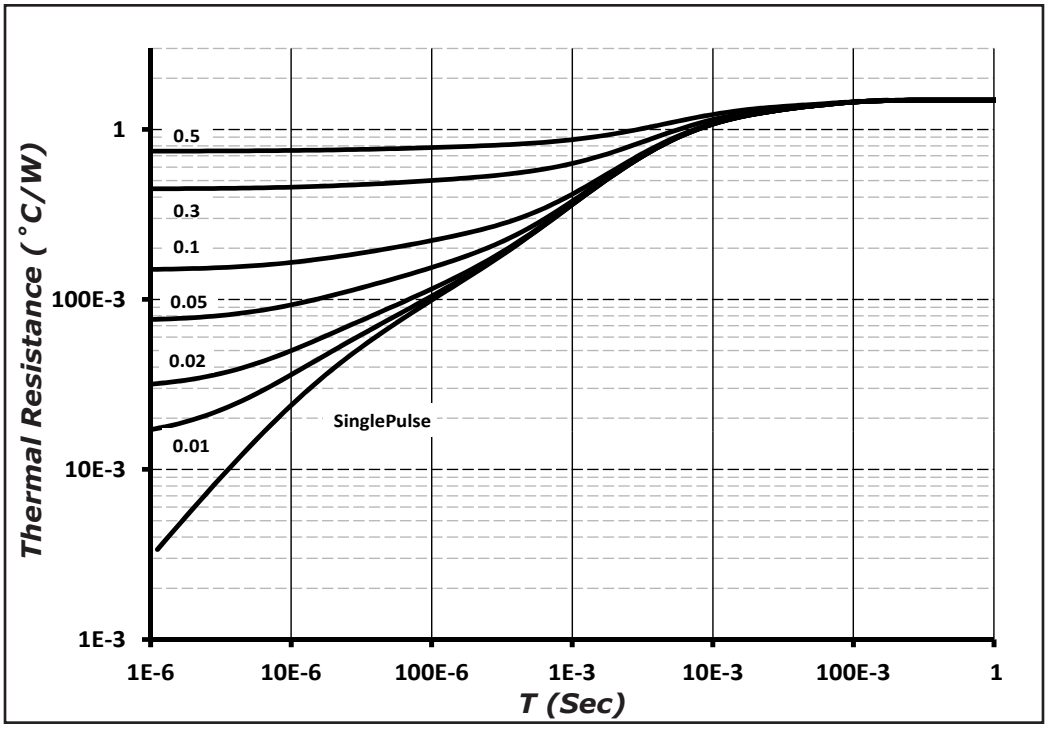


Figure 9. Transient Thermal Impedance

Package Dimensions

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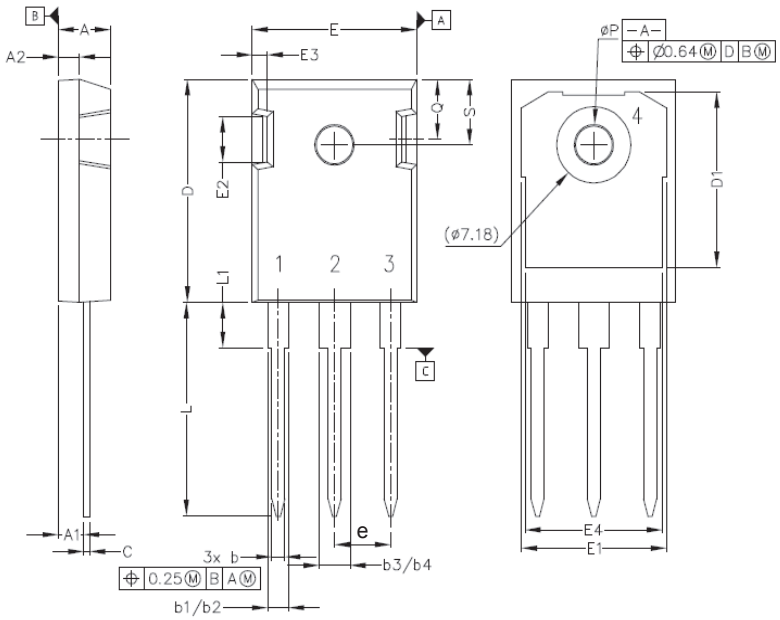
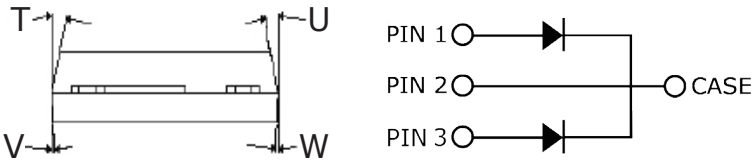
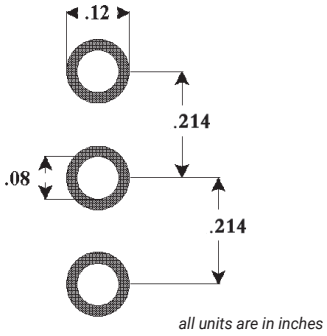




POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b2	.075	.085	1.91	2.16
b3	.113	.133	2.87	3.38
b4	.113	.123	2.87	3.13
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
N	3		3	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	9°	11°	9°	11°
U	9°	11°	9°	11°
V	2°	8°	2°	8°
W	2°	8°	2°	8°

Recommended Solder Pad Layout



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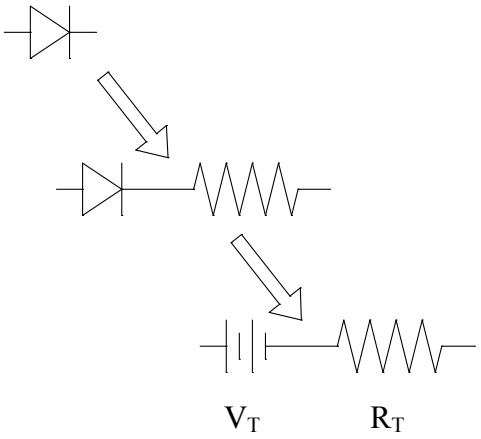
Part Number	Package
GC3D16065D	TO-247-3

Diode Model (Per Leg)



$$Vf_T = V_T + If * R_T$$

$$V_T = 0.95 + (T_J * -1.2*10^{-3})$$
$$R_T = 0.054 + (T_J * 5.5*10^{-4})$$

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