

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
GC3D12065A	TO-220-2	GC3D12065

$$\begin{aligned}
 V_{RRM} &= 650 \text{ V} \\
 I_F (T_c=135^\circ\text{C}) &= 16 \text{ A} \\
 Q_c &= 34 \text{ nC}
 \end{aligned}$$



TO-220-2

Package



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

Symbol	Parameter	Value		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	35 16 12	A	$T_c=25^\circ\text{C}$ $T_c=135^\circ\text{C}$ $T_c=150^\circ\text{C}$
I_{FRM}	Repetitive Peak Forward Surge Current	51.5 33.5	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	104 82	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_{FMax}	Non-Repetitive Peak Forward Current	1075 900	A	$T_c=25^\circ\text{C}$, $t_p=10$ μs , Pulse $T_c=110^\circ\text{C}$, $t_p=10$ μs , Pulse
P_{tot}	Power Dissipation	143 62	W	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-650\text{V}$
$\int i^2 dt$	i^2t value (Per Leg)	54 33.5	A ² 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
V_F	Forward Voltage	1.5 2.0	1.8 2.4	V	$I_F = 12\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 12\text{ A}$ $T_J = 175^\circ\text{C}$
I_R	Reverse Current	15 29	74 295	μA	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$
Q_C	Total Capacitive Charge	34		nC	$V_R = 400\text{ V}$, $I_F = 12\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$
C	Total Capacitance	641.5 57 47.5		pF	$V_R = 0\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 200\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 400\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$

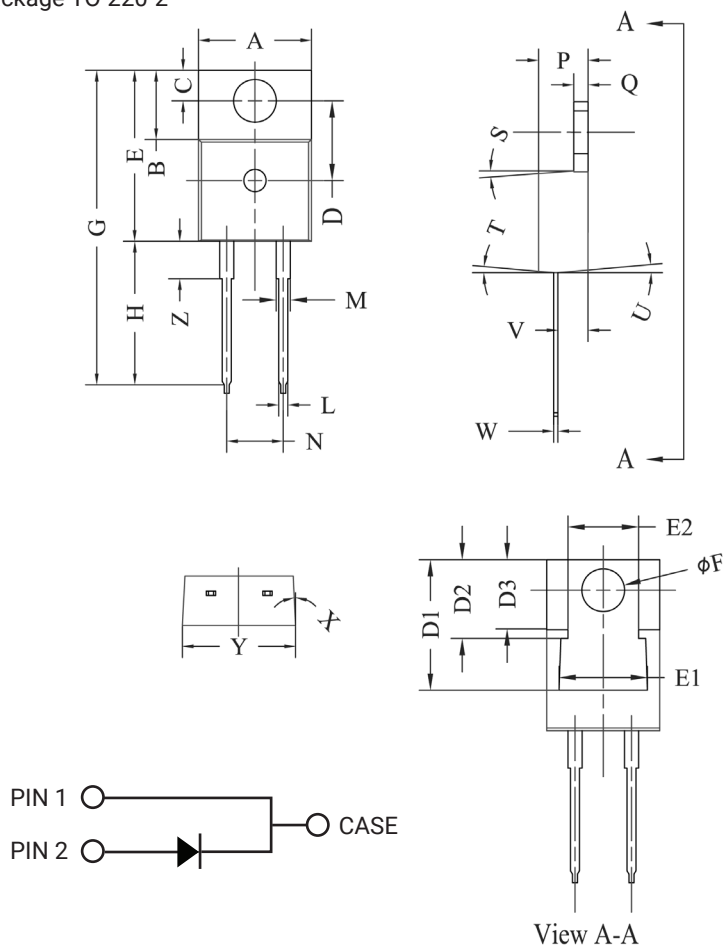
Note: This is a majority carrier diode, so there is no reverse recovery charge.

Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.05	$^\circ\text{C}/\text{W}$

Package Dimensions

Package TO-220-2

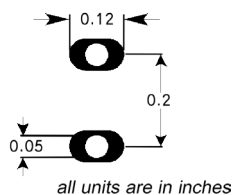


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.235	.255	5.969	6.477
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
D1	.457-.490		11.60-12.45 typ	
D2	.277-.303 typ		7.04-7.70 typ	
D3	.244-.252 typ		6.22-6.4 typ	
E	.590	.615	14.986	15.621
E1	.302	.326	7.68	8.28
E2	.227	.251	5.77	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

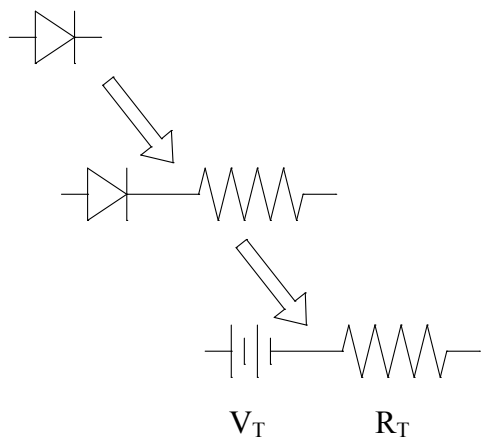
Recommended Solder Pad Layout



TO-220-2

Part Number	Package
GC3D12065A	TO-220-2

Diode Model



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

$$V_T = 0.98 + (T_J * -1.1 * 10^{-3})$$

$$R_T = 0.0365 + (T_J * 3.2 * 10^{-4})$$

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