



APSEMI

AC3D08060A

Silicon Carbide Schottky Diode



Features

- 600-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

Parameter	Rating	Units
V_{RRM}	600	V
$I_F (T_C=135^\circ\text{C})$	11	A**
Q_c	20	nC**

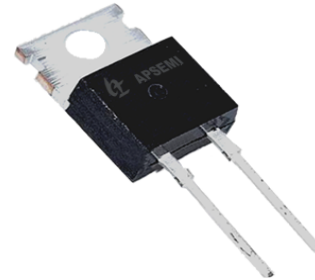
Benefits

- 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
AC3D08060A	TO-220-2



TO-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	600	V		
V_{RSM}	Surge Peak Reverse Voltage	600	V		
V_{DC}	DC Blocking Voltage	600	V		
I_F	Continuous Forward Current	24 11 8	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=152^\circ\text{C}$	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	37.5 25.5	A	$T_C=25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$ $T_C=110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	71 60	A	$T_C=25^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$ $T_C=110^\circ\text{C}, t_p = 10 \text{ ms}, \text{Half Sine Wave}$	Fig. 8
I_{FMax}	Non-Repetitive Peak Forward Surge Current	650 530	A	$T_C=25^\circ\text{C}, t_p = 10 \mu\text{s}, \text{Pulse}$ $T_C=110^\circ\text{C}, t_p = 10 \mu\text{s}, \text{Pulse}$	Fig. 8
P_{tot}	Power Dissipation	107 46.5	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		
V_F	Forward Voltage	1.5 2.1	1.8 2.4	V	$I_F = 8A$ $I_F = 8A$	1
I_R	Reverse Current	8.5 17	42.5 170	μA	$V_R = 60V$ $V_R = 60V$	2
Q_C	Total Capacitive Charge	20		nC	$V_R = 400V, I_F = 8A$ $di/dt = 500A/\mu s$ $T_J = 25^\circ C$	Fig. 5
C	Total Capacitance	395 37 32		pF	$V_R = 0V, T_J = 25^\circ C, f = 1MHz$ $V_R = 200V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$	Fig. 6
E_C	Capacitance Stored Energy	3.0		μJ	$V_R = 400V$	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	1.4	$^\circ C/W$	Fig. 9

Typical Performance

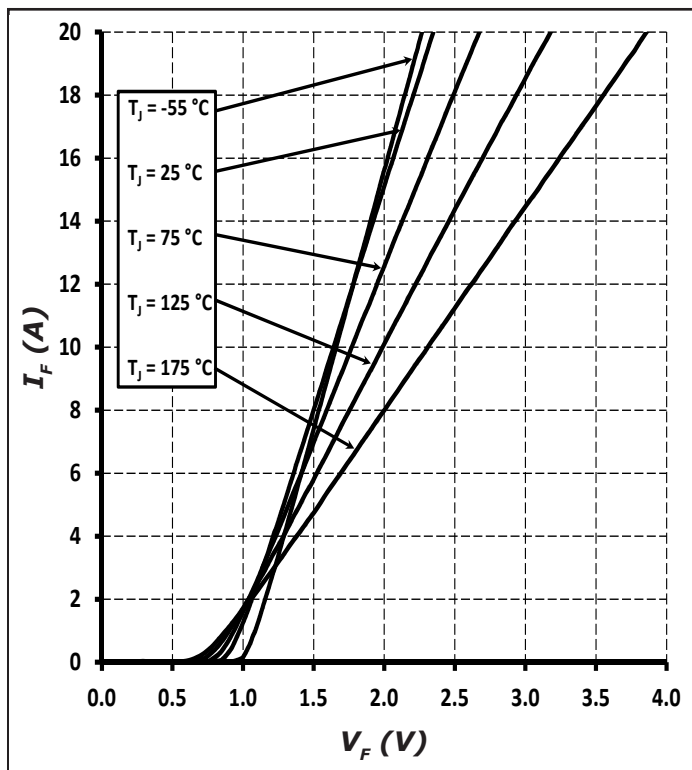


Figure 1. Forward Characteristics

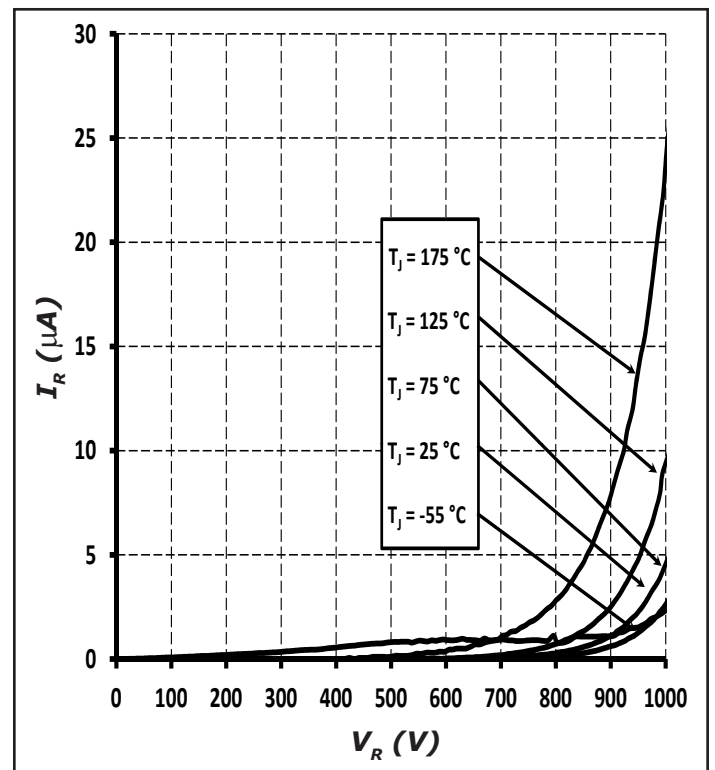


Figure 2. Reverse Characteristics



Typical Performance

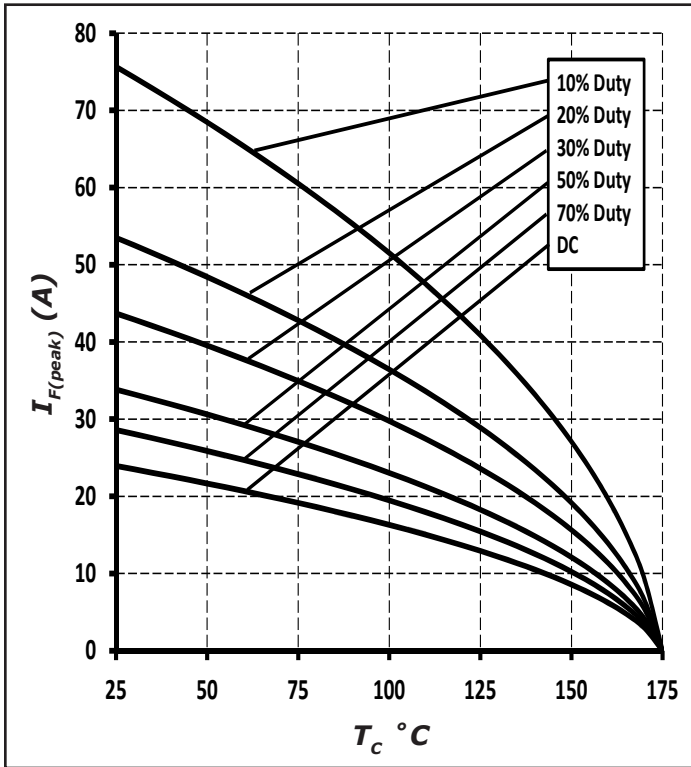


Figure 3. Current Derating

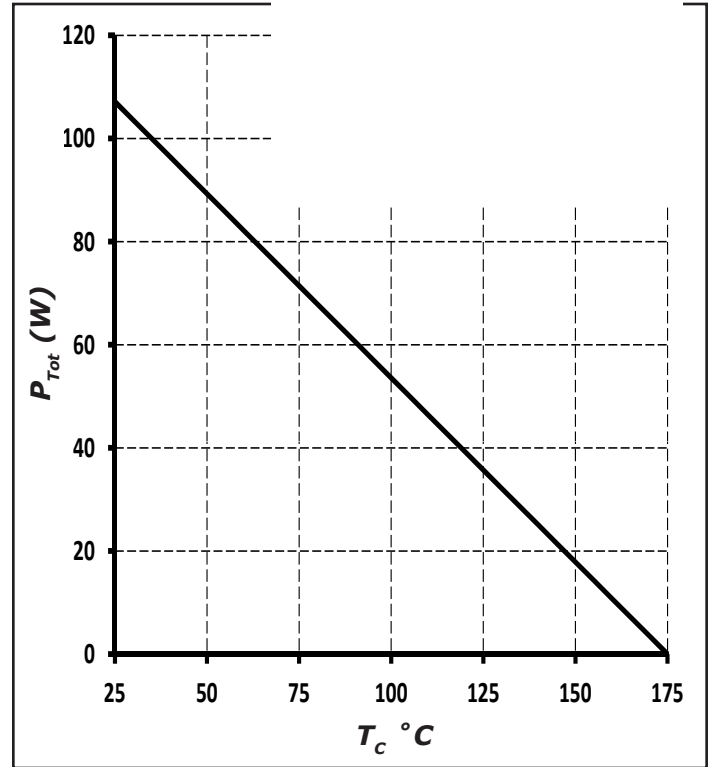


Figure 4. Power Derating

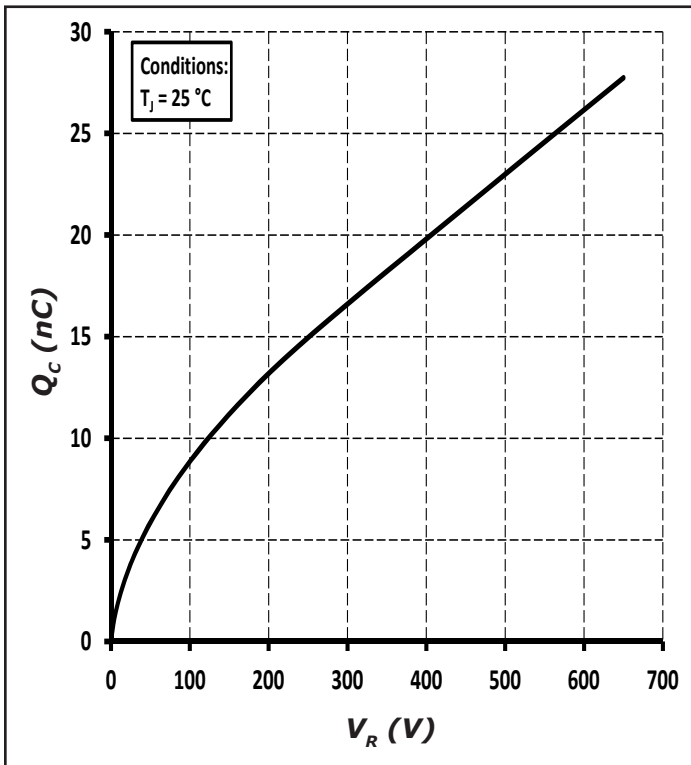


Figure 5. Total Capacitance Charge vs. Reverse Voltage

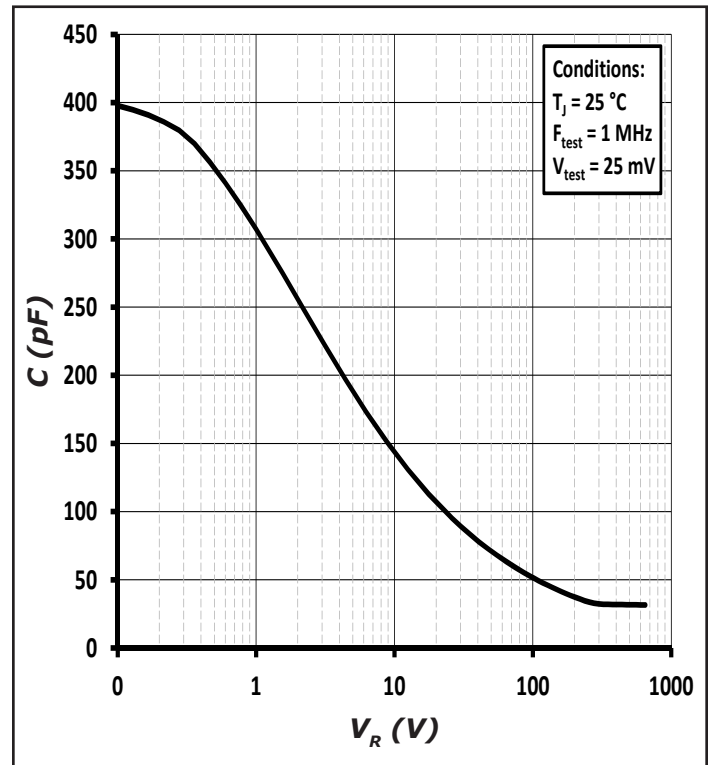


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

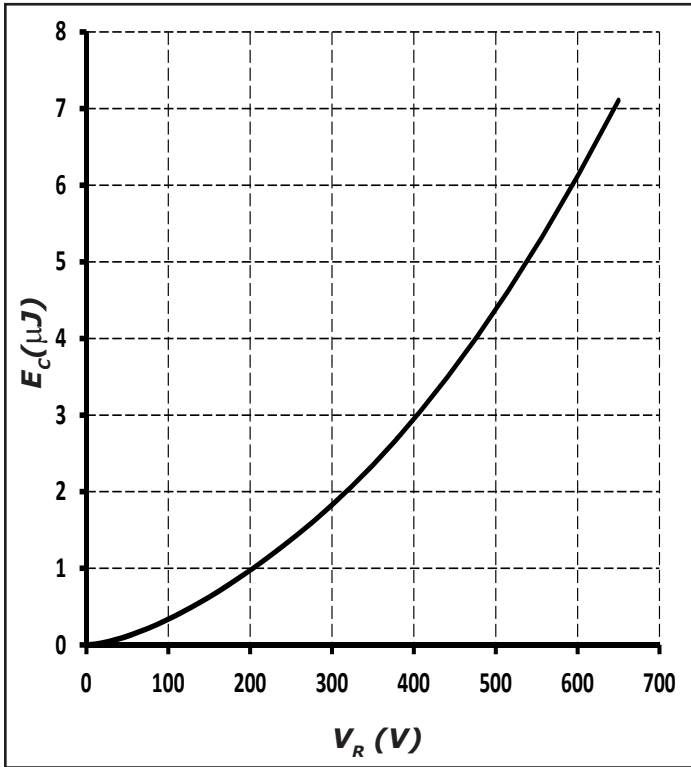


Figure 7. Capacitance Stored Energy

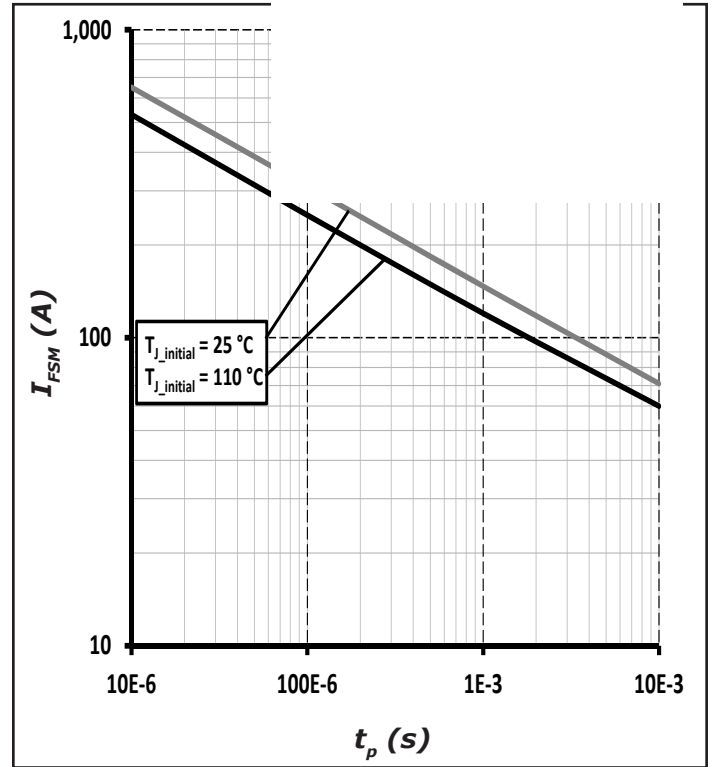


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

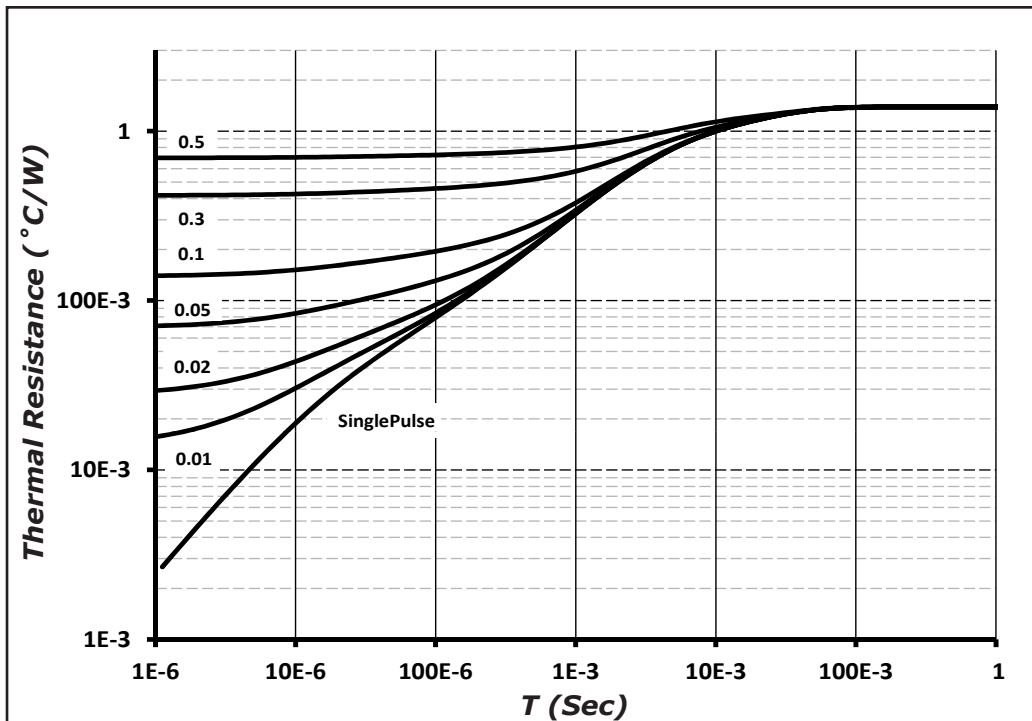


Figure 9. Transient Thermal Impedance



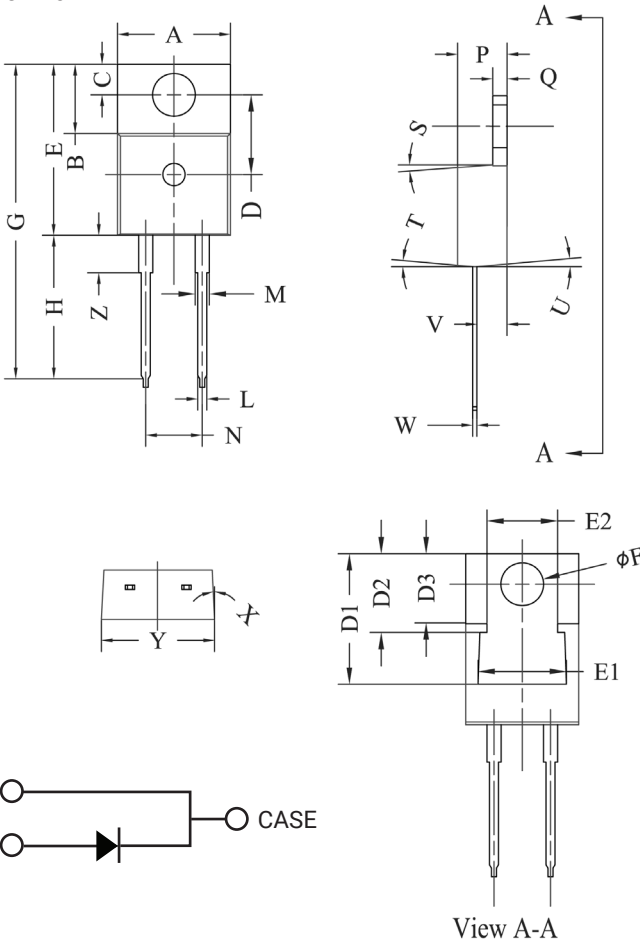
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Package Dimensions

Package TO-220-2

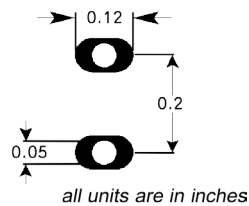


POS	Min			
A	.381			
B	.235			
C	.100			
D	.223	.337	5.664	8.560
D1	.457-.490		11.60-12.45 typ	
D2	.277-.303 typ		7.04-7.70 typ	
D3	.244-.252 typ		6.22-6.4 typ	
E	.590	.615	14.986	15.621
E1	.302	.326	7.68	8.28
E2	.227	.251	5.77	6.37
F	.143	.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	.500	.550	12.700	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

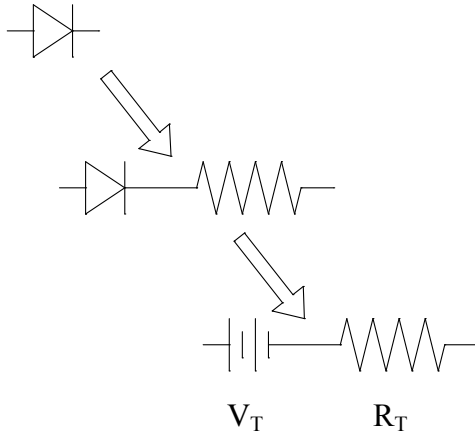
Recommended Solder Pad Layout



TO-220-2

Part Number	Package
AC3D08060A	TO-220-2

Diode Model



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

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

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

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