

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

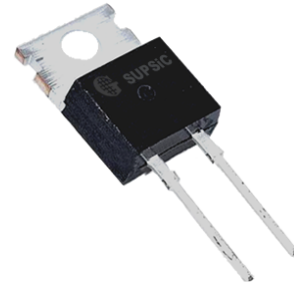
$$\begin{aligned} V_{RRM} &= 650 \text{ V} \\ I_F (T_c=135^\circ\text{C}) &= 36 \text{ A}^{**} \\ Q_c &= 89 \text{ nC}^{**} \end{aligned}$$

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-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 (Per Leg/Device)	39/78 18/36 15/30	A	$T_c=25^\circ\text{C}$ $T_c=135^\circ\text{C}$ $T_c=145^\circ\text{C}$	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	$T_c=25^\circ\text{C}$, $t_p=10$ μs , Pulse $T_c=110^\circ\text{C}$, $t_p=10$ μs , Pulse	Fig. 8
P_{tot}	Power Dissipation(Per Leg/Device)	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^2s	$T_c=25^\circ\text{C}$, $t_p=10$ 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-247 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

* Per Leg, ** Per Device

Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.45 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	μA	$V_R = 650\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$ $T_J = 175^\circ\text{C}$	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		μJ	$V_R = 400\text{ V}$	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* 0.5**	$^\circ\text{C}/\text{W}$	Fig. 9

* Per Leg, ** Per Device

Typical Performance (Per Leg)

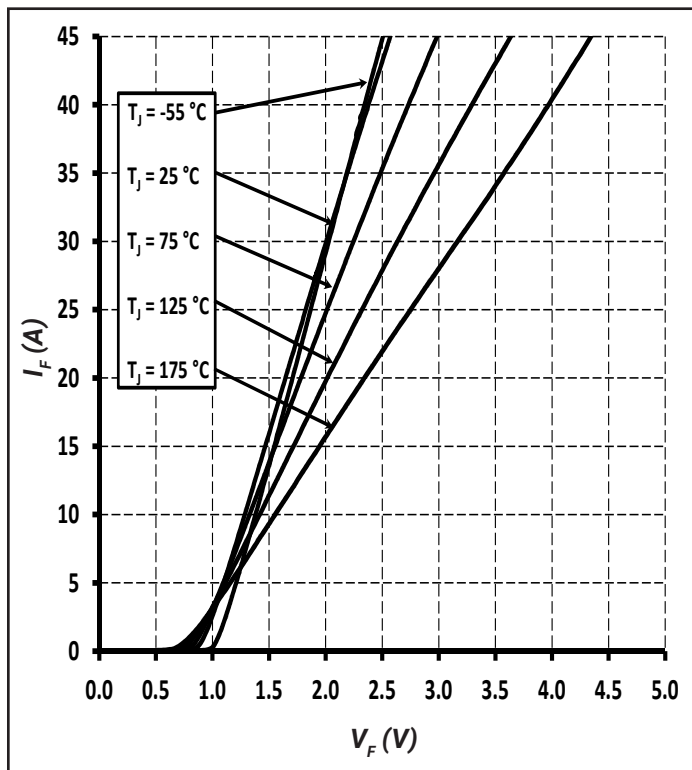


Figure 1. Forward Characteristics

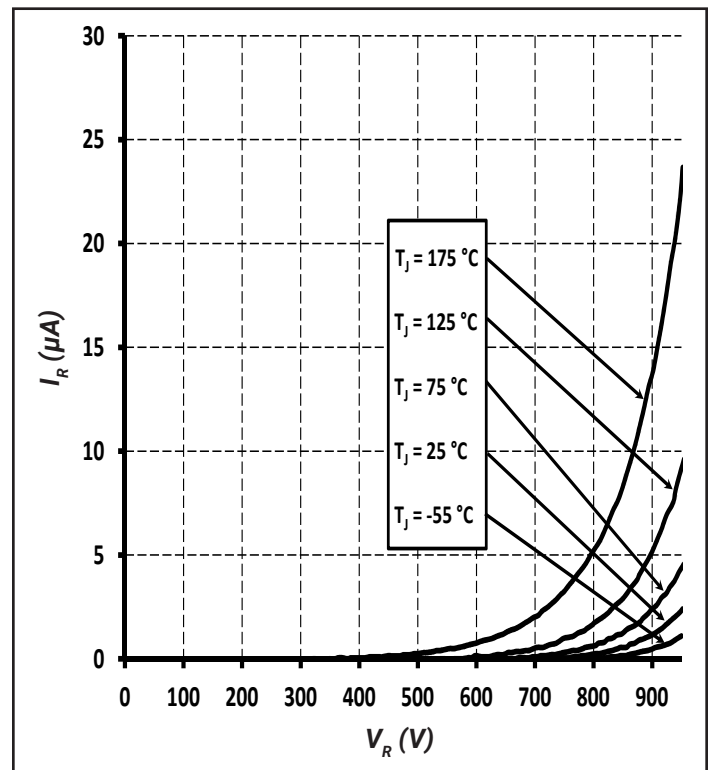


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

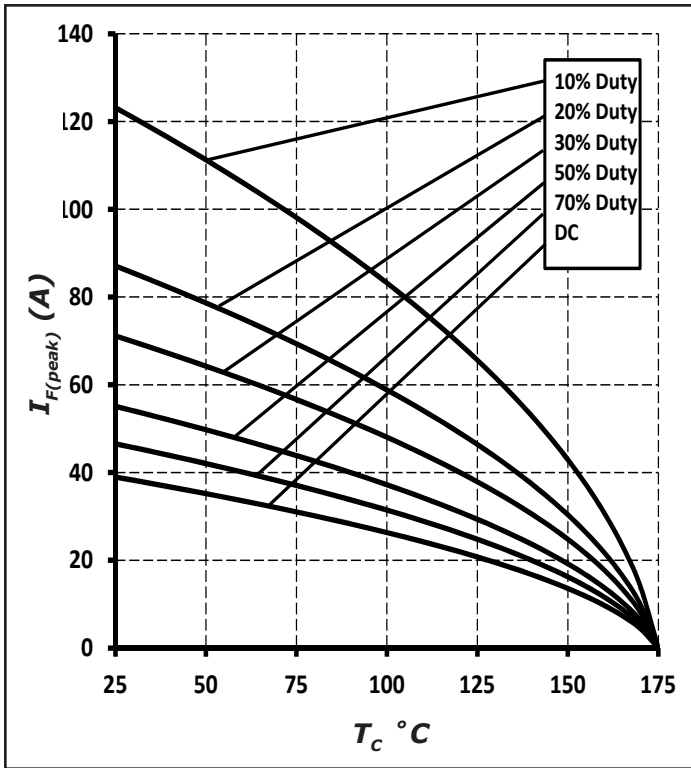


Figure 3. Current Derating

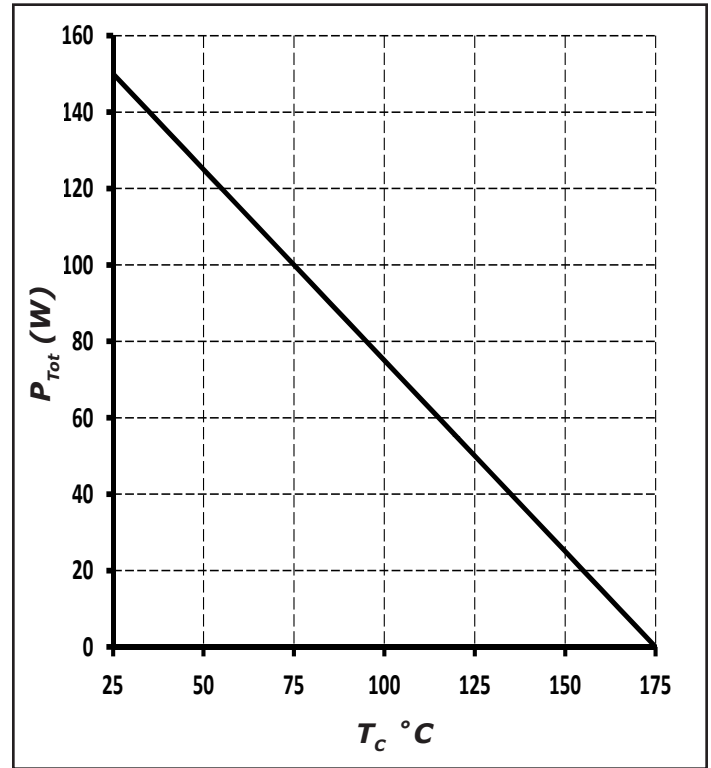


Figure 4. Power Derating

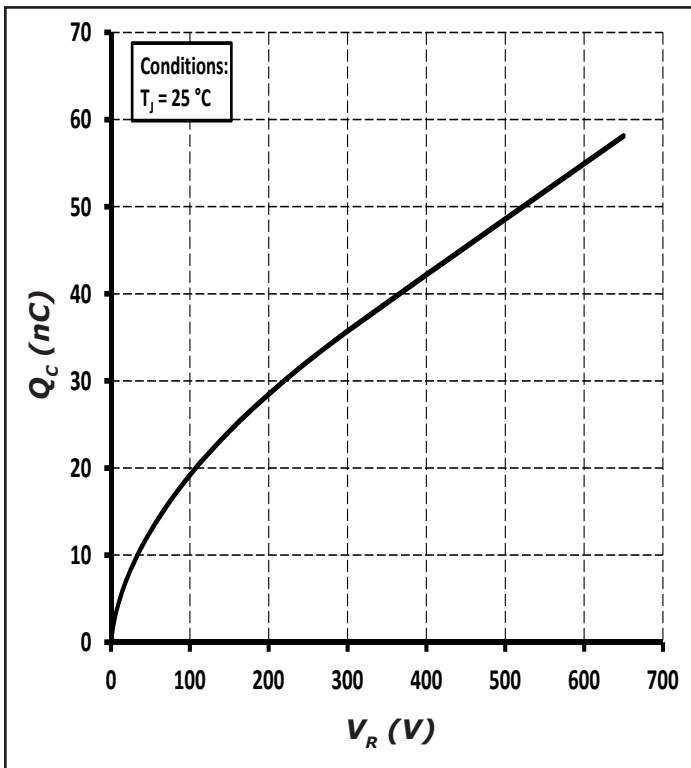


Figure 5. Total Capacitance Charge vs. Reverse Voltage

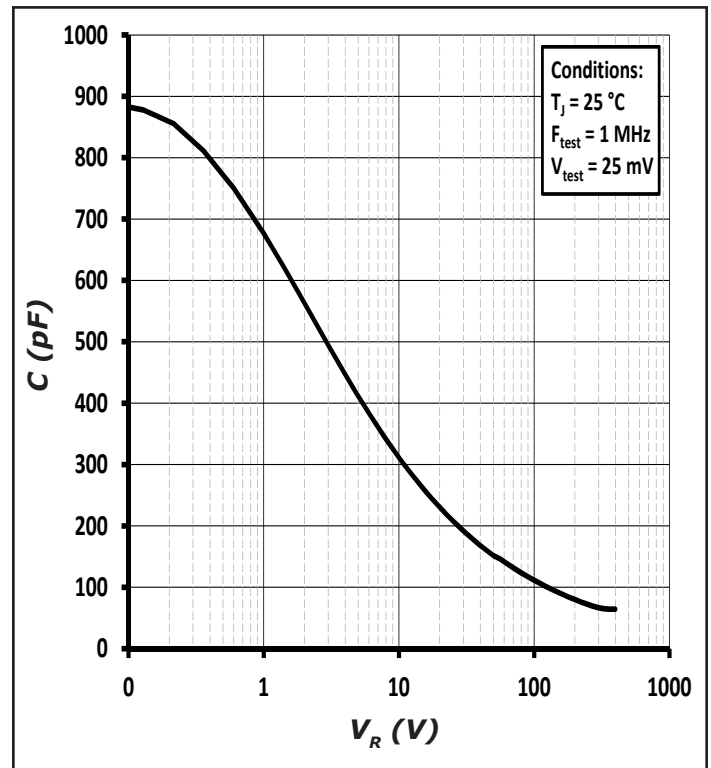


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance (Per Leg)

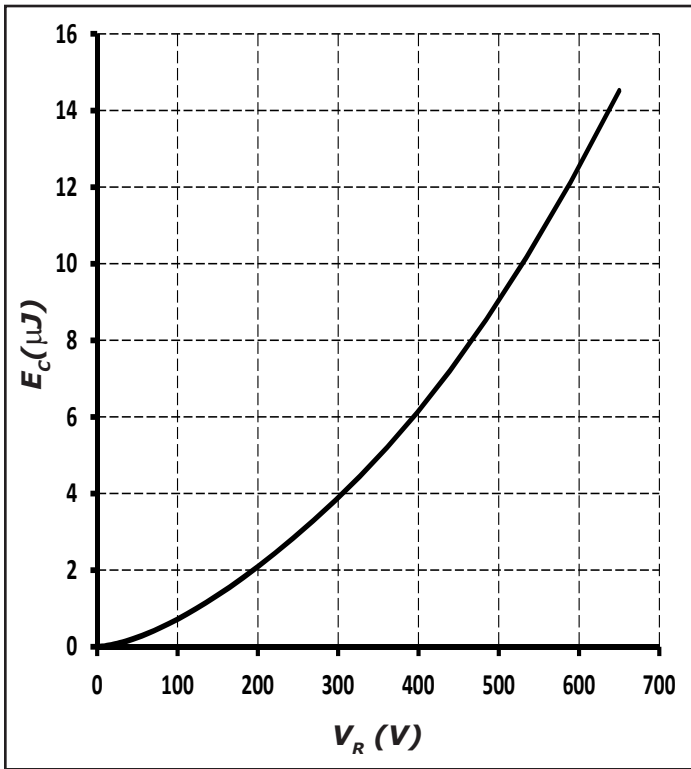


Figure 7. Capacitance Stored Energy

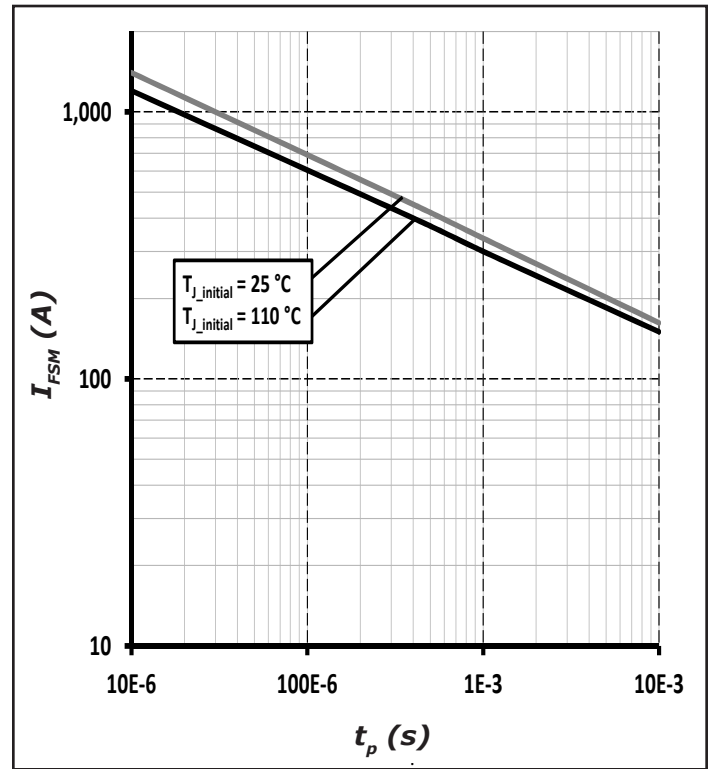


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

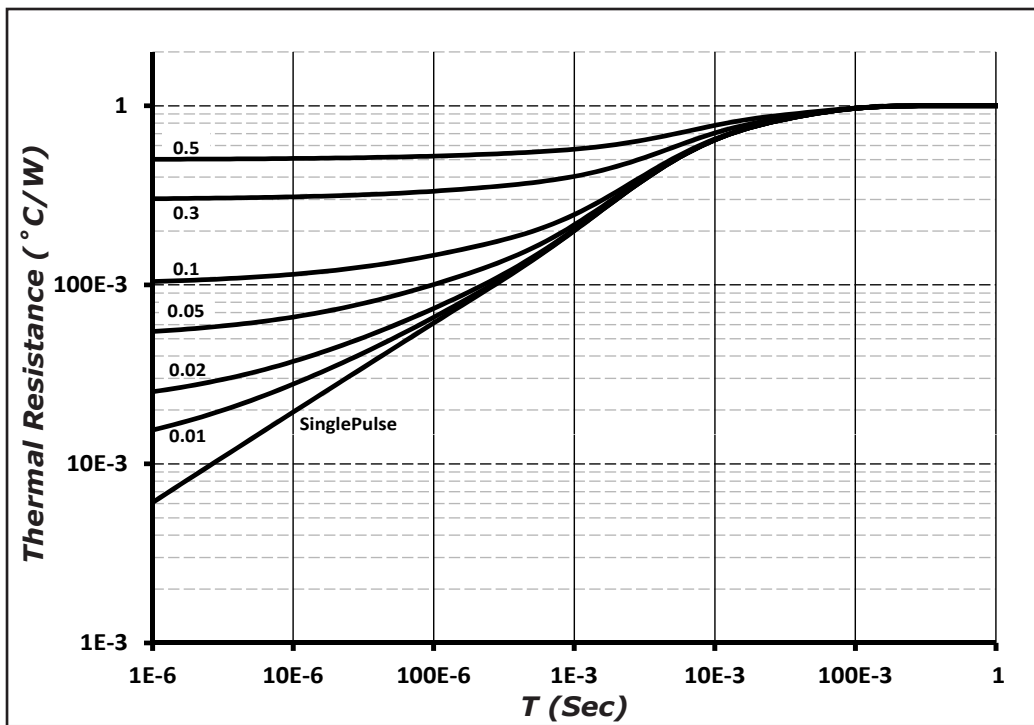
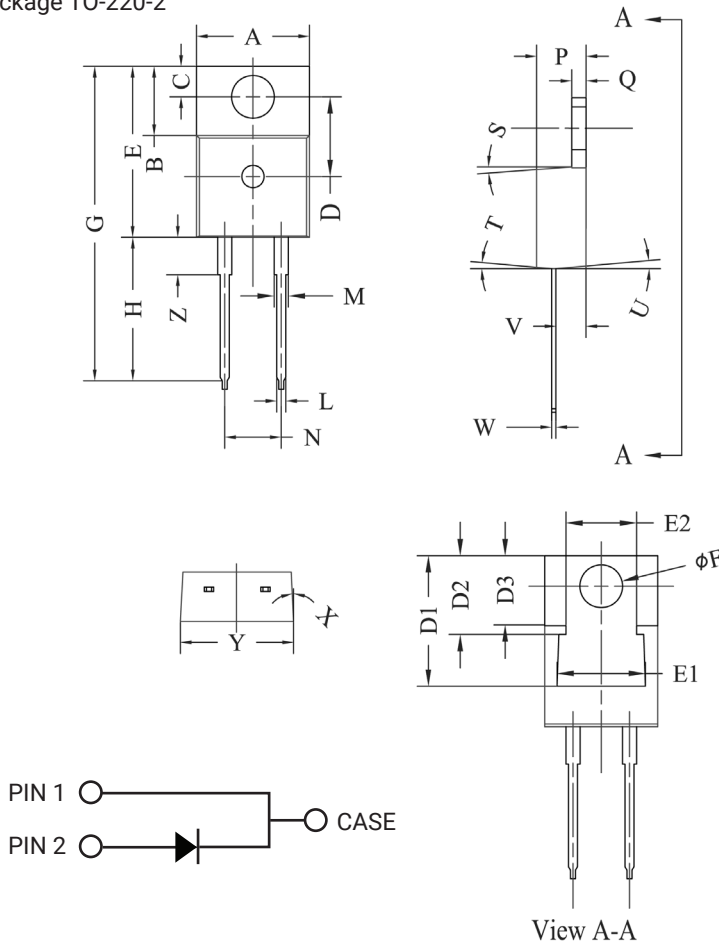


Figure 9. Transient Thermal Impedance

Package Dimensions

Package TO-220-2

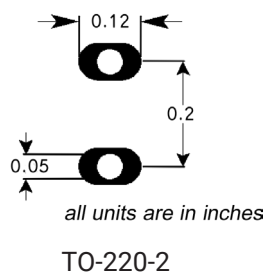


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.235	.255	5.969	6.477
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
D1	.457-.490		11.60-12.45 typ	
D2	.277-.303 typ		7.04-7.70 typ	
D3	.244-.252 typ		6.22-6.4 typ	
E	.590	.615	14.986	15.621
E1	.302	.326	7.68	8.28
E2	.227	.251	5.77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

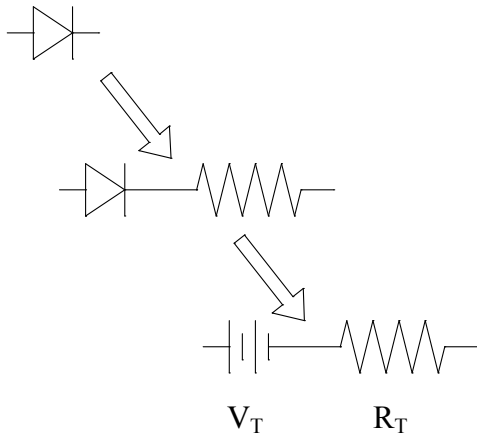
NOTE:

1. Dimension L, M, W apply for Solder Dip Finish

Recommended Solder Pad Layout



Diode Model (Per Leg)



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

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

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

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

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