



## Features

- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Positive Temperature Coefficient on  $V_F$

## Benefits

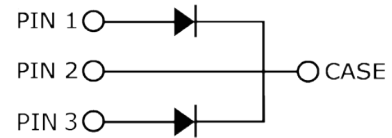
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

## Applications

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



TO247-3L  
Package



Part Number	Package	Marking
HC4D20120D	TO247-3L	HC4D20120D

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

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V		
$V_{RSM}$	Surge Peak Reverse Voltage	1300	V		
$V_{DC}$	DC Blocking Voltage	1200	V		
$I_F$	Continuous Forward Current (Per Leg/Device)	34/68 16.5/33 10/20	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=157^\circ\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current	47* 31.5*	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	71* 59.5*	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	Fig. 8
$I_{F,Max}$	Non-Repetitive Peak Forward Current	750* 620*	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)	176/352 76/152	W	$T_C=25^\circ\text{C}$ $T_C=110^\circ\text{C}$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-960\text{V}$	
$\int i^2 dt$	$i^2t$ value	25* 17.5*	$\text{A}^2\text{s}$	$T_C=25^\circ\text{C}$ , $t_p=10$ ms $T_C=110^\circ\text{C}$ , $t_p=10$ ms	
$T_J$	Operating Junction Range	-55 to +175	$^\circ\text{C}$		
$T_{stg}$	Storage Temperature Range	-55 to +135	$^\circ\text{C}$		
	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	1.5 2.2	1.8 3	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	30 55	250 350	$\mu\text{A}$	$V_R = 1200\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	52		nC	$V_R = 800\text{ V}$ , $I_F = 10\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	754 45 38		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 800\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	Fig. 6
$E_C$	Capacitance Stored Energy	14.5		$\mu\text{J}$	$V_R = 800\text{ V}$	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	0.85* 0.43**	$^\circ\text{C}/\text{W}$	Fig. 9

\* Per Leg, \*\* Per Device

### Typical Performance (Per Leg)

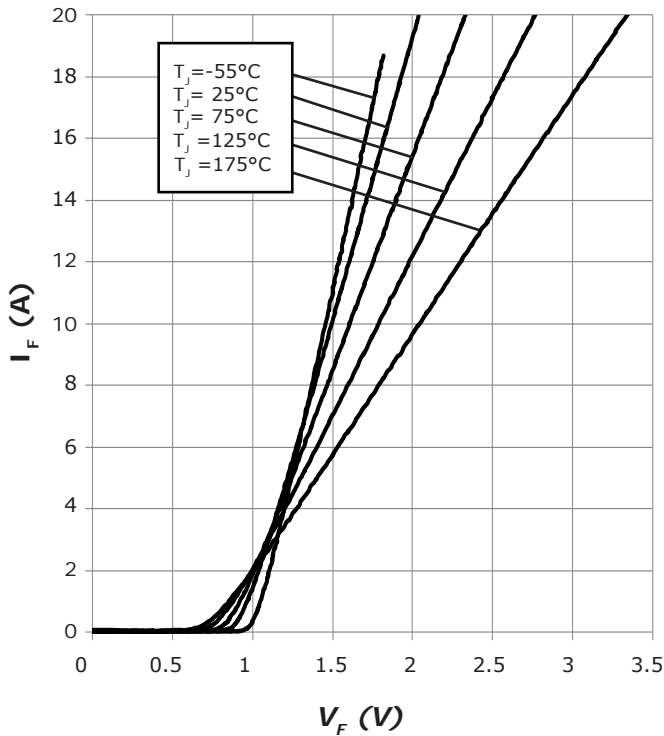


Figure 1. Forward Characteristics

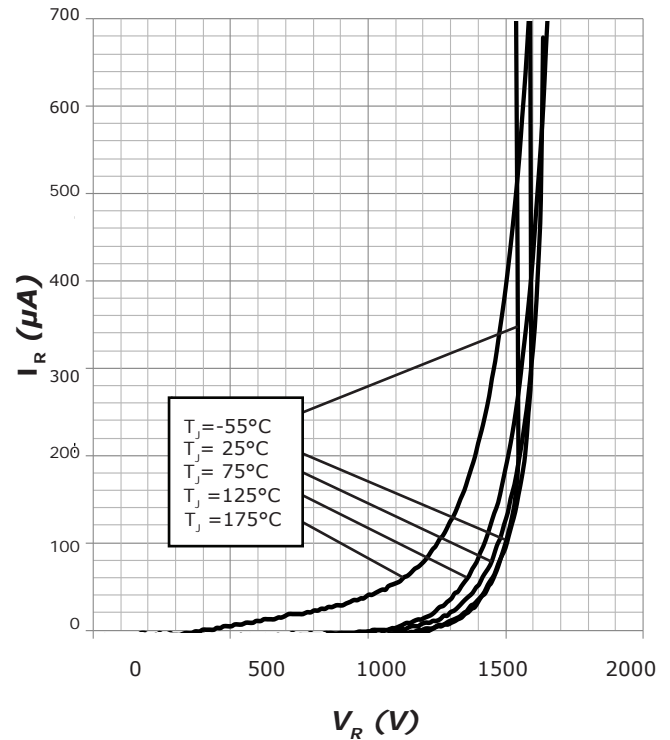


Figure 2. Reverse Characteristics



### Typical Performance (Per Leg)

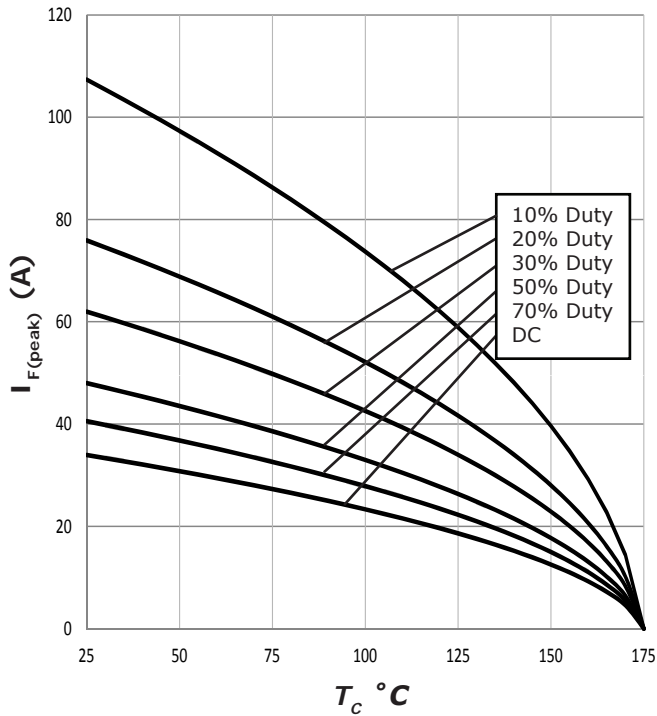


Figure 3. Current Derating

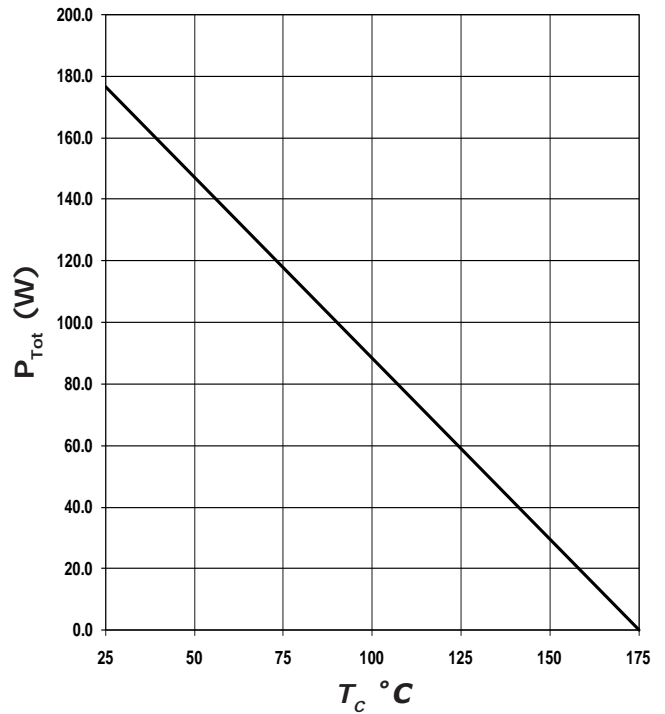


Figure 4. Power Derating

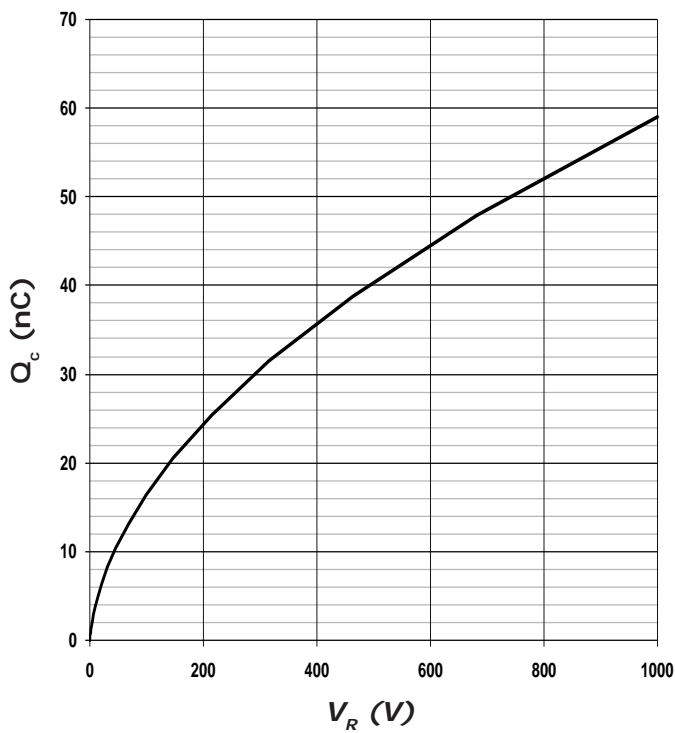


Figure 5. Recovery Charge vs. Reverse Voltage

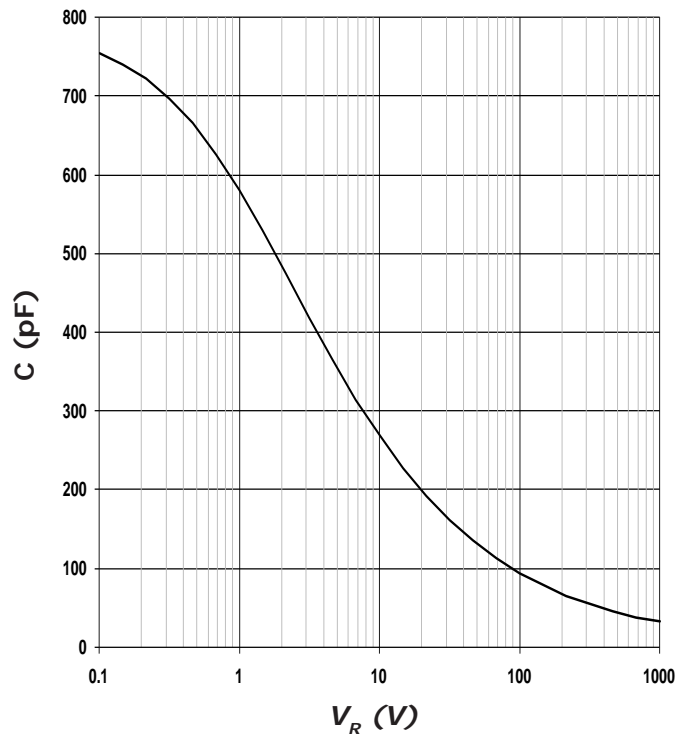


Figure 6. Capacitance vs. Reverse Voltage



### Typical Performance

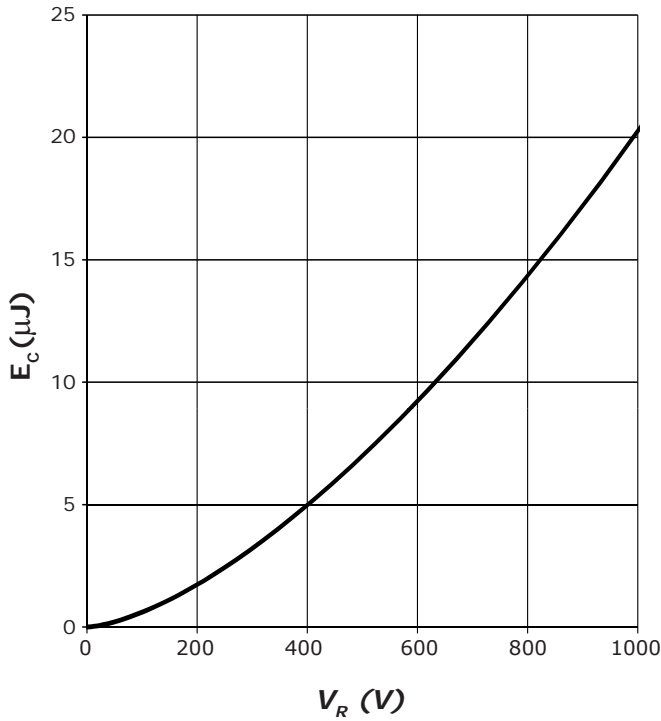


Figure 7. Typical Capacitance Stored Energy, per leg

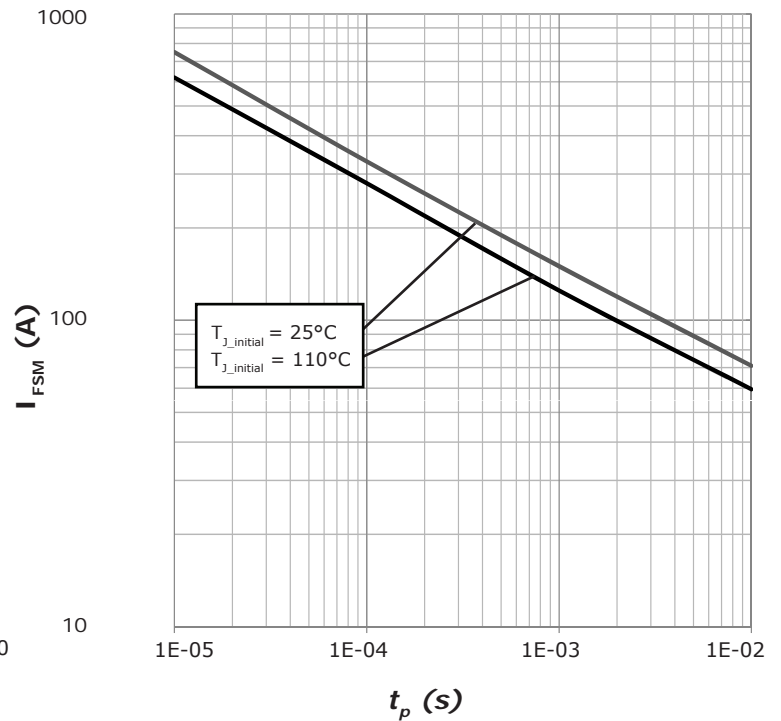


Figure 8. Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform), per leg

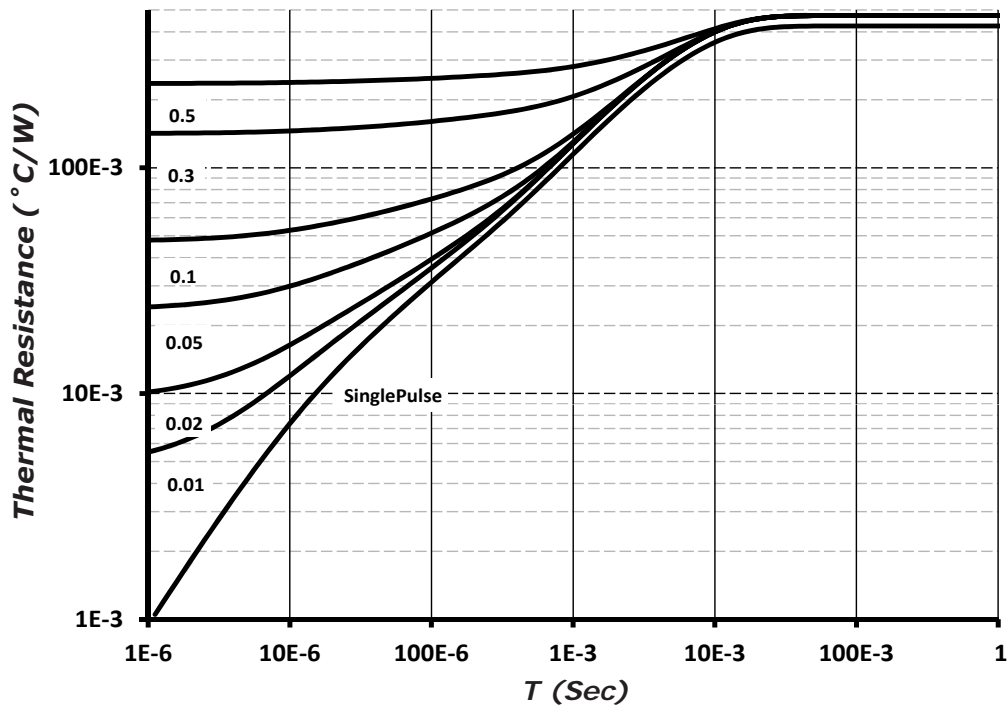
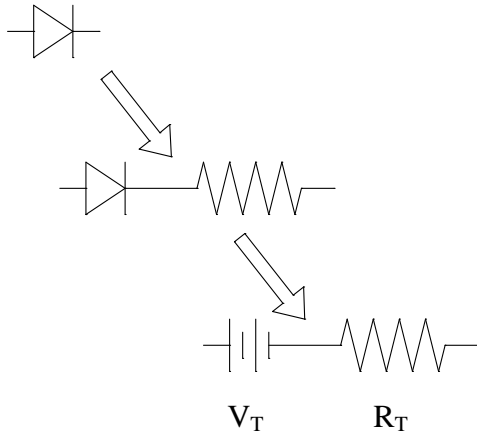


Figure 9. Device Transient Thermal Impedance



## Diode Model



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

$$V_T = 0.98 + (T_J * -1.71 * 10^{-3})$$

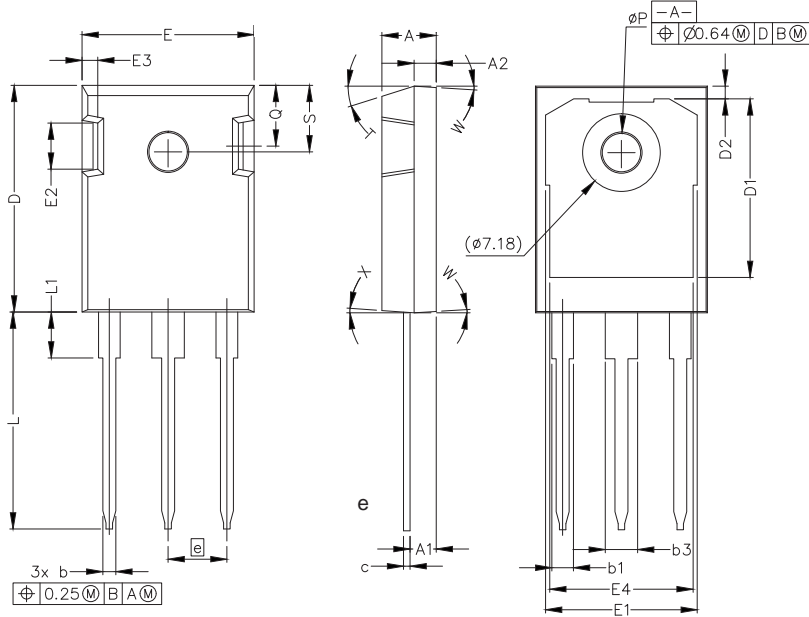
$$R_T = 0.040 + (T_J * 5.32 * 10^{-4})$$

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

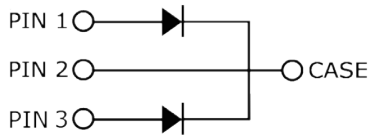


### Package Dimensions

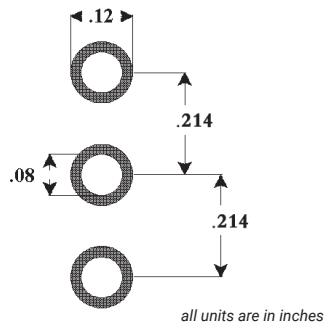
Package TO247-3L



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
b3	.113	.133	2.87	3.38
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	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
N	3			
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	17.5° REF			
W	3.5° REF			
X	4° REF			



### Recommended Solder Pad Layout





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