



## Features

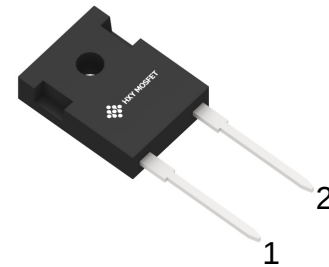
- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Switching
- Positive Temperature Coefficient on  $V_F$
- Increased Creepage/Clearance Distance

## 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-247-2L



| Part Number       | Package  | Qty(PCS) |
|-------------------|----------|----------|
| IDWD20G120C5XKSA1 | TO247-2L | 30       |

## 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                    |                                                                                                                     |        |
| $V_R$          | DC Peak Reverse Voltage                    | 1200           | V                    |                                                                                                                     |        |
| $I_F$          | Continuous Forward Current                 | 54<br>26<br>20 | A                    | $T_C=25^{\circ}\text{C}$<br>$T_C=135^{\circ}\text{C}$<br>$T_C=156^{\circ}\text{C}$                                  | Fig. 3 |
| $I_{FRM}$      | Repetitive Peak Forward Surge Current      | 86<br>56       | A                    | $T_C=25^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse<br>$T_C=110^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse |        |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current       | 130<br>104     | A                    | $T_C=25^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse<br>$T_C=110^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse | Fig. 8 |
| $I_{F,Max}$    | Non-Repetitive Peak Forward Current        | 1150<br>950    | A                    | $T_C=25^{\circ}\text{C}$ , $t_p=10$ ms, Pulse<br>$T_C=110^{\circ}\text{C}$ , $t_p=10$ ms, Pulse                     | Fig. 8 |
| $P_{tot}$      | Power Dissipation                          | 246<br>106.5   | W                    | $T_C=25^{\circ}\text{C}$<br>$T_C=110^{\circ}\text{C}$                                                               | Fig. 4 |
| dV/dt          | Diode dV/dt ruggedness                     | 200            | V/ns                 | $V_R=0-960\text{V}$                                                                                                 |        |
| $\int i^2 dt$  | $i^2t$ value                               | 84.5<br>54     | $\text{A}^2\text{s}$ | $T_C=25^{\circ}\text{C}$ , $t_p=10$ ms<br>$T_C=110^{\circ}\text{C}$ , $t_p=10$ ms                                   |        |
| $T_J, T_{slg}$ | Operating Junction and Storage Temperature | -55 to<br>+175 | $^{\circ}\text{C}$   |                                                                                                                     |        |
|                | TO-247 Mounting Torque                     | 1<br>8.8       | Nm<br>lbf-in         | M3 Screw<br>6-32 Screw                                                                                              |        |



## Electrical Characteristics

| Symbol | Parameter                 | Typ.             | Max.       | Unit          | Test Conditions                                                                                                                                                                                                    | Note   |
|--------|---------------------------|------------------|------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| $V_F$  | Forward Voltage           | 1.5<br>2.2       | 1.8<br>3   | V             | $I_F = 20\text{ A}$ $T_J = 25^\circ\text{C}$<br>$I_F = 20\text{ A}$ $T_J = 175^\circ\text{C}$                                                                                                                      | Fig. 1 |
| $I_R$  | Reverse Current           | 35<br>65         | 200<br>400 | $\mu\text{A}$ | $V_R = 1200\text{ V}$ $T_J = 25^\circ\text{C}$<br>$V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}$                                                                                                                  | Fig. 2 |
| $Q_C$  | Total Capacitive Charge   | 99               |            | nC            | $V_R = 800\text{ V}$ , $I_F = 20\text{ A}$<br>$di/dt = 200\text{ A}/\mu\text{s}$<br>$T_J = 25^\circ\text{C}$                                                                                                       | Fig. 5 |
| C      | Total Capacitance         | 1500<br>93<br>67 |            | pF            | $V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$<br>$V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$<br>$V_R = 800\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ | Fig. 6 |
| $E_C$  | Capacitance Stored Energy | 28               |            | $\mu\text{J}$ | $V_R = 800\text{ V}$                                                                                                                                                                                               | 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 | 0.61 | $^\circ\text{C}/\text{W}$ | Fig. 9 |

## Typical Performance

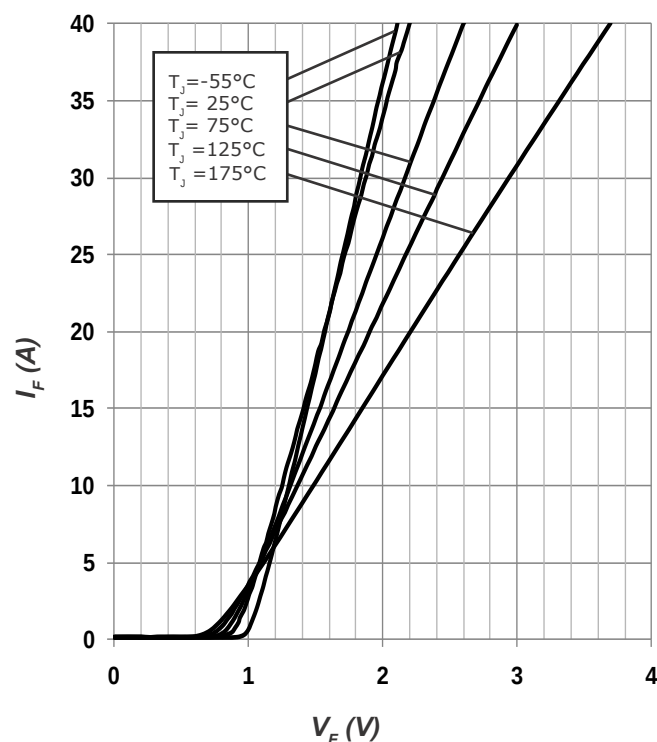


Figure 1. Forward Characteristics

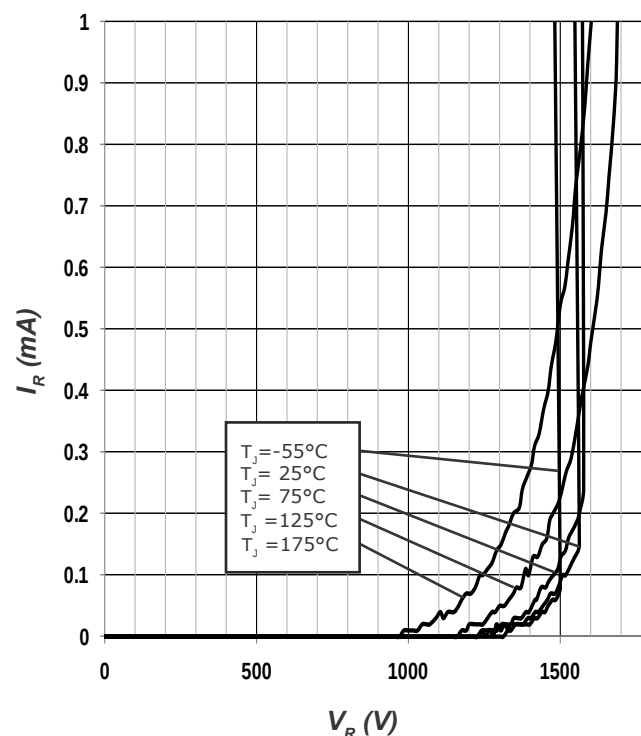


Figure 2. Reverse Characteristics



## Typical Performance

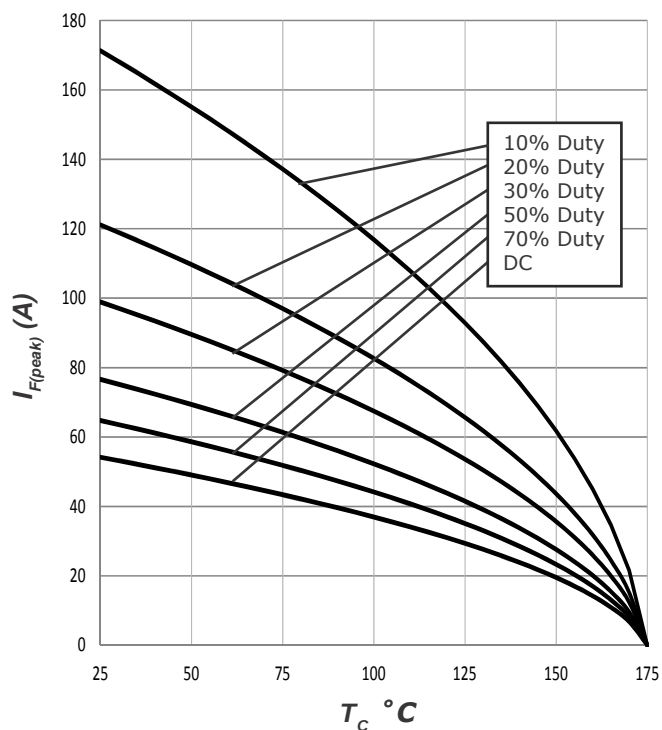


Figure 3. Current Derating

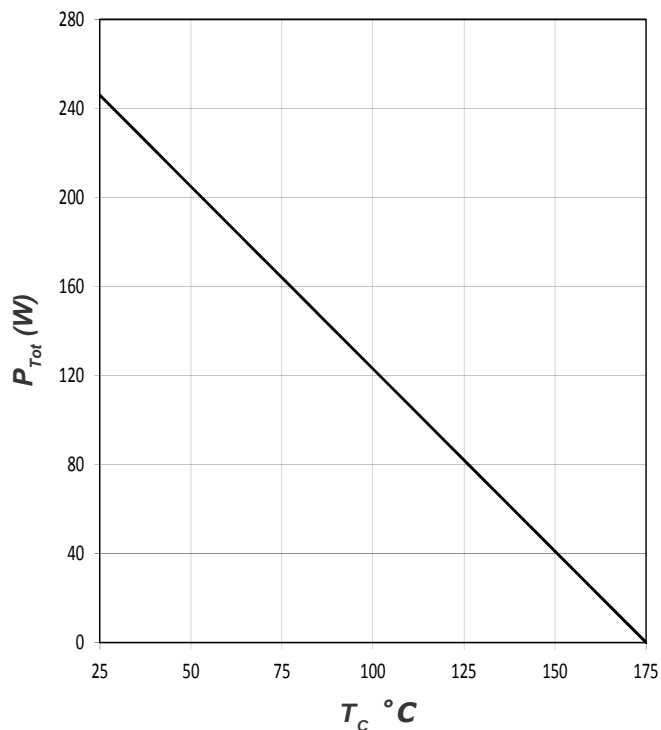


Figure 4. Power Derating

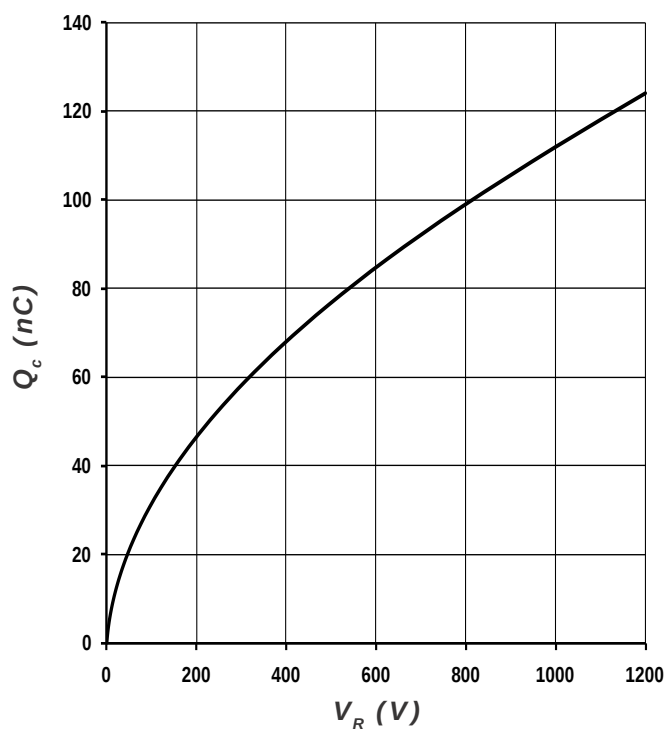


Figure 5. Recovery Charge vs. Reverse Voltage

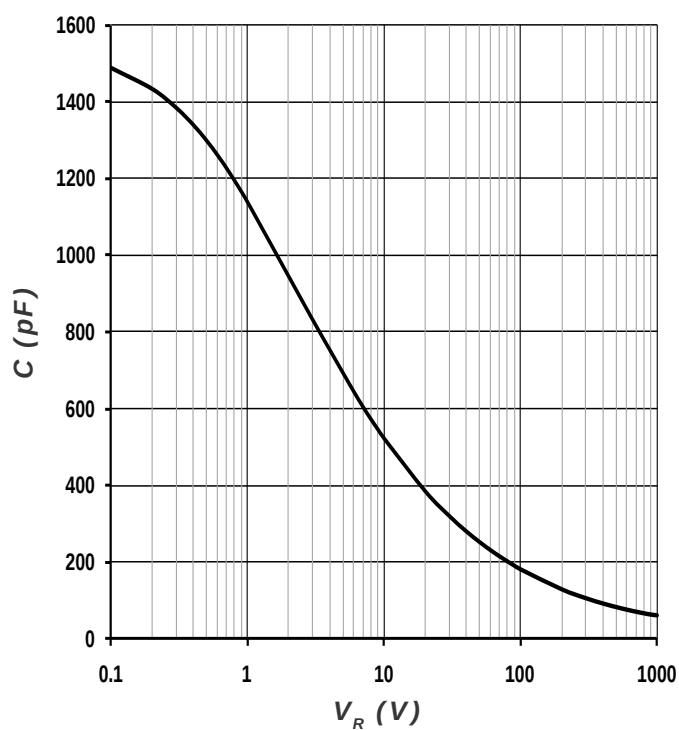


Figure 6. Capacitance vs. Reverse Voltage



## Typical Performance

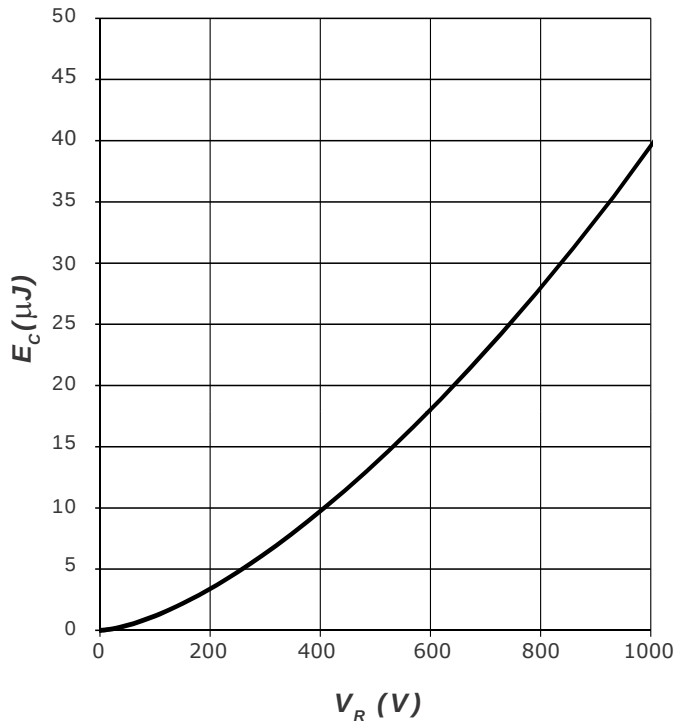


Figure 7. Typical Capacitance Stored Energy

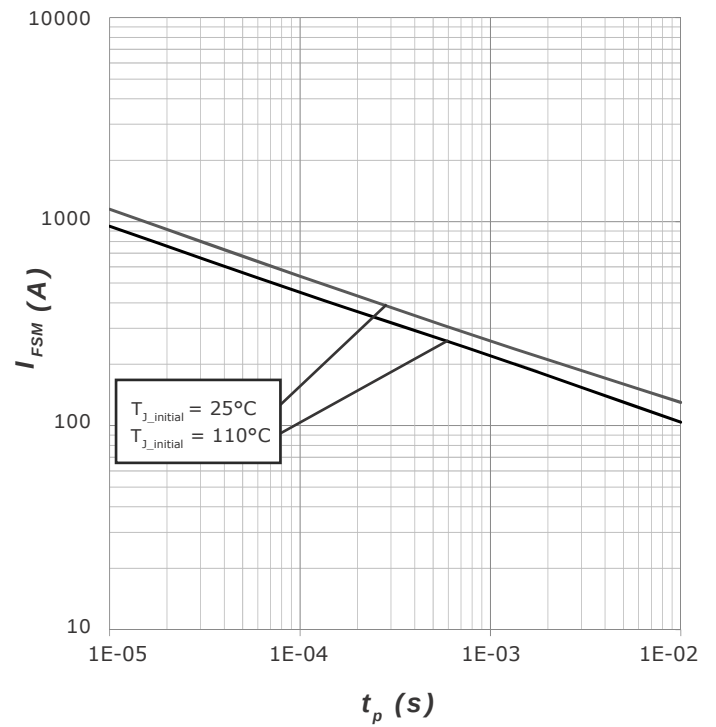


Figure 8. Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform)

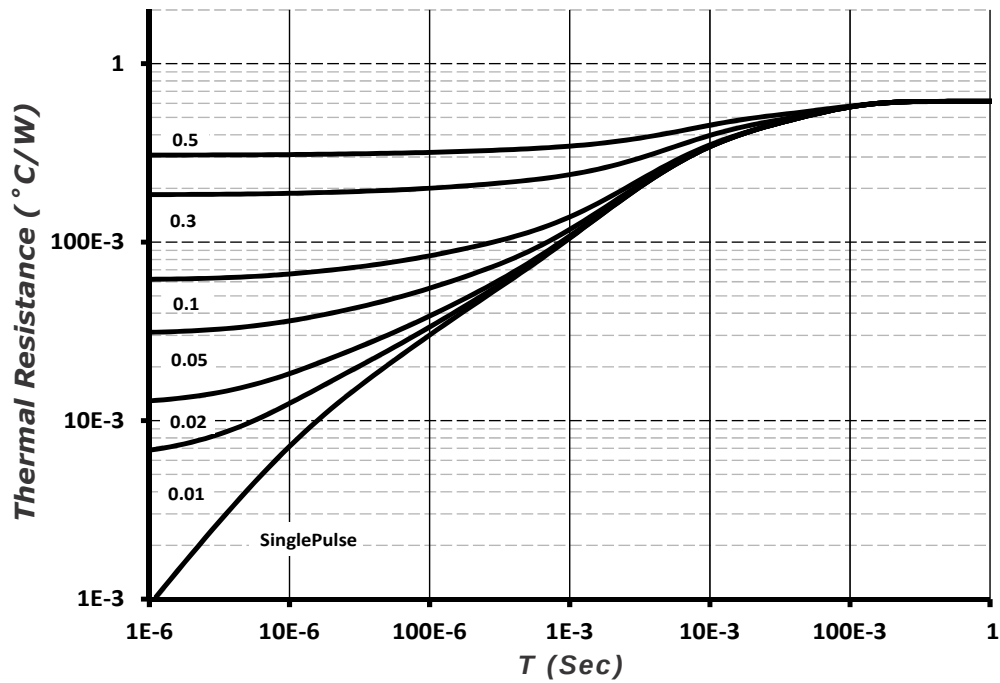
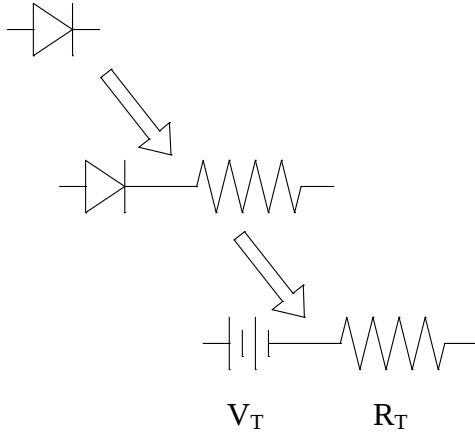


Figure 9. Transient Thermal Impedance



## Diode Model



$$V_{FT} = V_T + I_F \cdot R_T$$

$$V_T = 0.97 + (T_J \cdot -1.40 \cdot 10^{-3})$$

$$R_T = 0.023 + (T_J \cdot 2.71 \cdot 10^{-4})$$

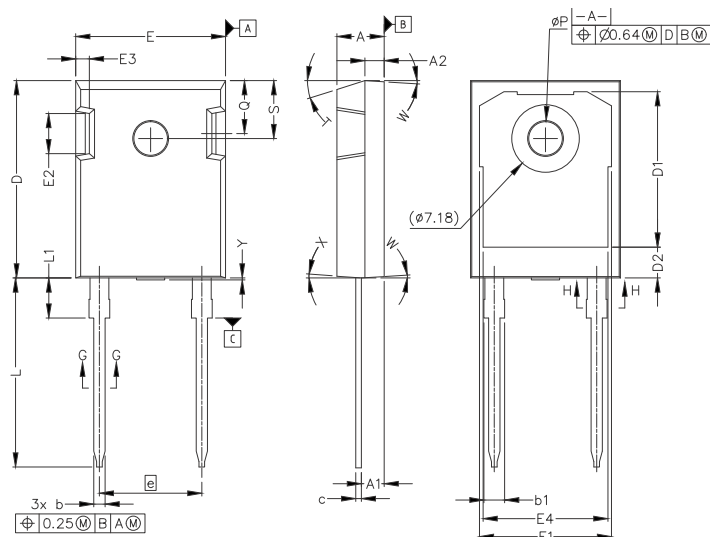
Note:  $T_J$  = Diode Junction Temperature In Degrees Celsius,  
valid from 25°C to 175°C



## Package Dimensions

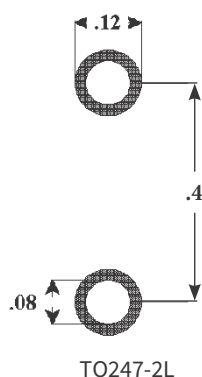
Package: TO247-2L

All dimensions in mm.



| SYM | MILLIMETERS |       | INCHES   |       |
|-----|-------------|-------|----------|-------|
|     | MIN         | MAX   | MIN      | MAX   |
| A   | 4.83        | 5.21  | .190     | .205  |
| A1  | 2.29        | 2.54  | .090     | .100  |
| A2  | 1.91        | 2.16  | .075     | .085  |
| b'  | 1.07        | 1.28  | .042     | .050  |
| b   | 1.07        | 1.33  | .042     | .052  |
| b1  | 1.91        | 2.41  | .075     | .095  |
| b2  | 1.91        | 2.16  | .075     | .085  |
| c'  | 0.55        | 0.65  | .022     | .026  |
| c   | 0.55        | 0.68  | .022     | .027  |
| D   | 20.80       | 21.10 | .819     | .831  |
| D1  | 16.25       | 17.35 | .640     | .683  |
| D2  | 2.86        | 3.16  | .112     | .124  |
| E   | 15.75       | 16.13 | .620     | .635  |
| E1  | 13.10       | 14.15 | .516     | .557  |
| E2  | 3.68        | 5.10  | .145     | .201  |
| E3  | 1.00        | 1.90  | .039     | .075  |
| E4  | 12.38       | 13.43 | .487     | .529  |
| e   | 10.88 BSC   |       | .428 BSC |       |
| L   | 19.81       | 20.32 | .780     | .800  |
| L1  | 4.10        | 4.40  | .161     | .173  |
| φP  | 3.51        | 3.65  | .138     | .144  |
| Q   | 5.49        | 6.00  | .216     | .236  |
| S   | 6.04        | 6.30  | .238     | .248  |
| T   | 17.5° REF.  |       |          |       |
| W   | 3.5° REF.   |       |          |       |
| X   | 4° REF.     |       |          |       |
| Y   | 0           | 0.50  | 0        | 0.020 |

## Recommended Solder Pad Layout



*all units are in inches*



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