



## Features

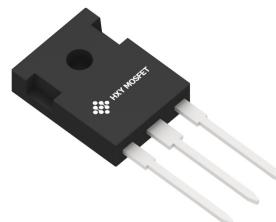
- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Switching

## Benefits

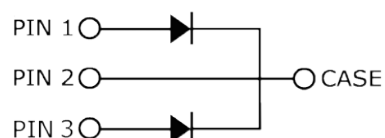
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

## 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



| Part Number    | Package | Qty(PCS) |
|----------------|---------|----------|
| HSTPSC40H12CWL | TO-247  | 30       |

## Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

| Symbol             | Parameter                                      | Value                      | Unit         | Test Conditions                                                                                                               | Note   |
|--------------------|------------------------------------------------|----------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------|--------|
| V <sub>RRM</sub>   | Repetitive Peak Reverse Voltage                | 1200                       | V            |                                                                                                                               |        |
| V <sub>RSM</sub>   | Surge Peak Reverse Voltage                     | 1300                       | V            |                                                                                                                               |        |
| V <sub>R</sub>     | DC Peak Reverse Voltage                        | 1200                       | V            |                                                                                                                               |        |
| I <sub>F</sub>     | Continuous Forward Current<br>(Per Leg/Device) | 56.5/113<br>27/54<br>20/40 | A            | T <sub>C</sub> =25°C<br>T <sub>C</sub> =135°C<br>T <sub>C</sub> =150°C                                                        | Fig. 3 |
| I <sub>FRM</sub>   | Repetitive Peak Forward Surge Current          | 91*<br>61*                 | A            | T <sub>C</sub> =25°C, t <sub>p</sub> =10 ms, Half Sine Pulse<br>T <sub>C</sub> =110°C, t <sub>p</sub> =10 ms, Half Sine Pulse |        |
| I <sub>FSM</sub>   | Non-Repetitive Forward Surge Current           | 130*<br>110*               | A            | T <sub>C</sub> =25°C, t <sub>p</sub> =10 ms, Half Sine Pulse<br>T <sub>C</sub> =110°C, t <sub>p</sub> =10 ms, Half Sine Pulse | Fig. 8 |
| I <sub>F,Max</sub> | Non-Repetitive Peak Forward Current            | 1150*<br>950*              | A            | T <sub>C</sub> =25°C, t <sub>p</sub> =10 ms, Pulse<br>T <sub>C</sub> =110°C, t <sub>p</sub> =10 ms, Pulse                     | Fig. 8 |
| P <sub>tot</sub>   | Power Dissipation (Per Leg/Device)             | 266/532<br>114/228         | W            | T <sub>C</sub> =25°C<br>T <sub>C</sub> =110°C                                                                                 | Fig. 4 |
| dV/dt              | Diode dV/dt ruggedness                         | 200                        | V/ns         | V <sub>R</sub> =0-960V                                                                                                        |        |
| ∫i²dt              | i²t value                                      | 84.5*<br>60.5*             | A²s          | T <sub>C</sub> =25°C, t <sub>p</sub> =10 ms<br>T <sub>C</sub> =110°C, t <sub>p</sub> =10 ms                                   |        |
| T <sub>J</sub>     | Operating Junction Range                       | -55 to<br>+175             | °C           |                                                                                                                               |        |
| T <sub>stg</sub>   | Storage Temperature Range                      | -55 to<br>+135             | °C           |                                                                                                                               |        |
|                    | TO-247 Mounting Torque                         | 1<br>8.8                   | Nm<br>lbf-in | M3 Screw<br>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<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 | 0.29**<br>0.57* | $^\circ\text{C}/\text{W}$ | Fig. 9 |

\* Per Leg, \*\* Per Device

## Typical Performance (Per Leg)

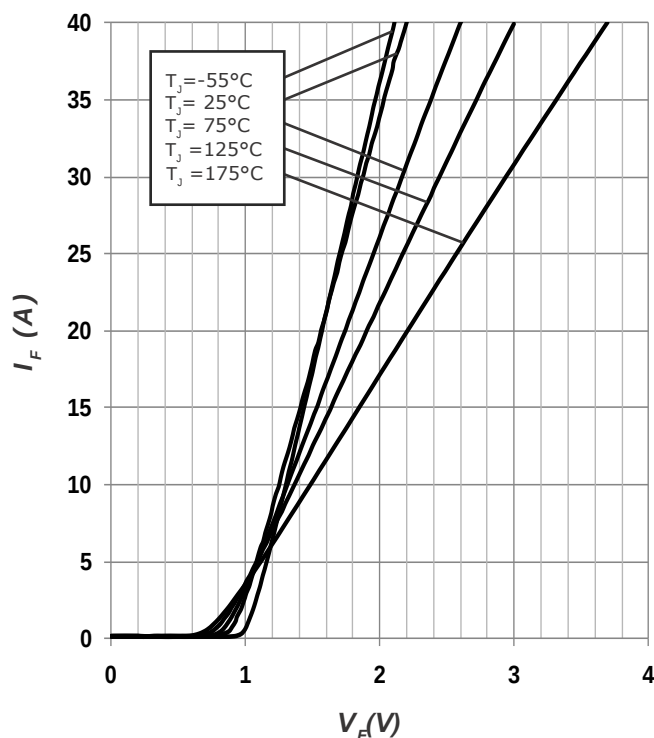


Figure 1. Forward Characteristics

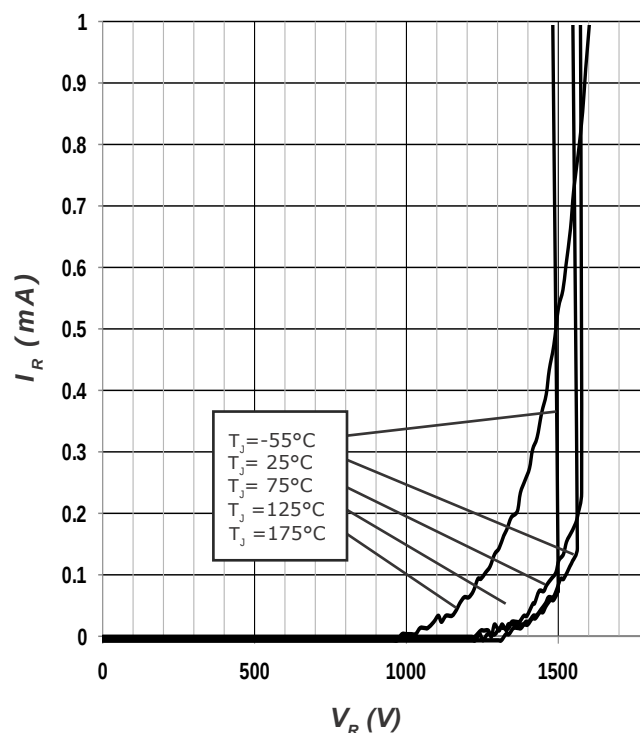


Figure 2. Reverse Characteristics



## Typical Performance (Per Leg)

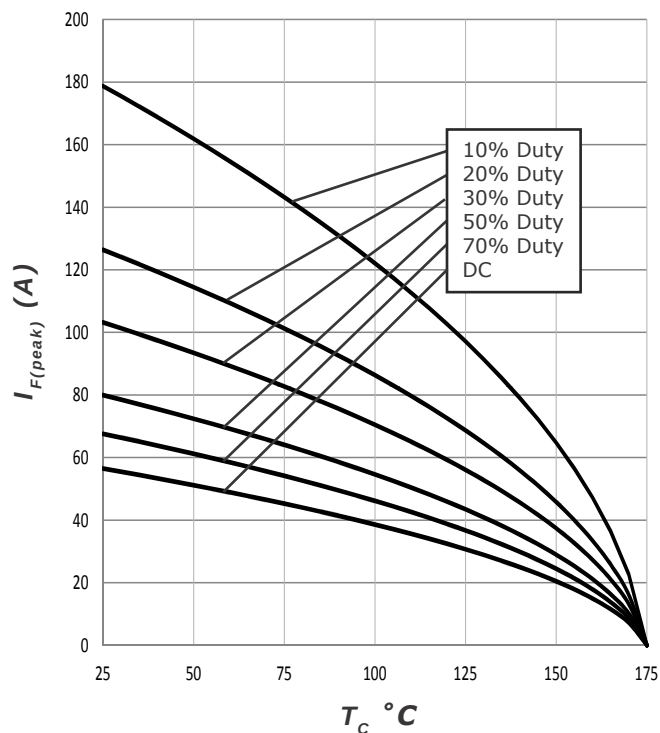


Figure 3. Current Derating

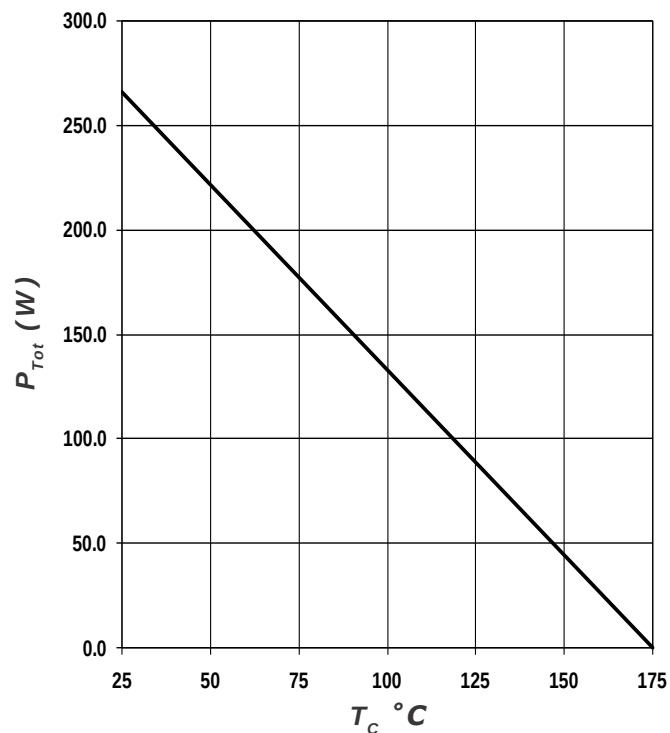


Figure 4. Power Derating

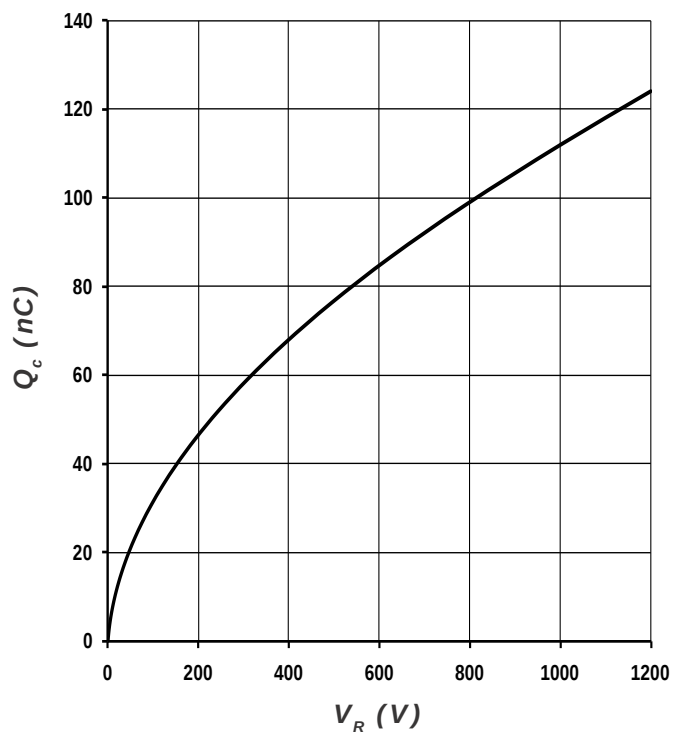


Figure 5. Recovery Charge vs. Reverse Voltage

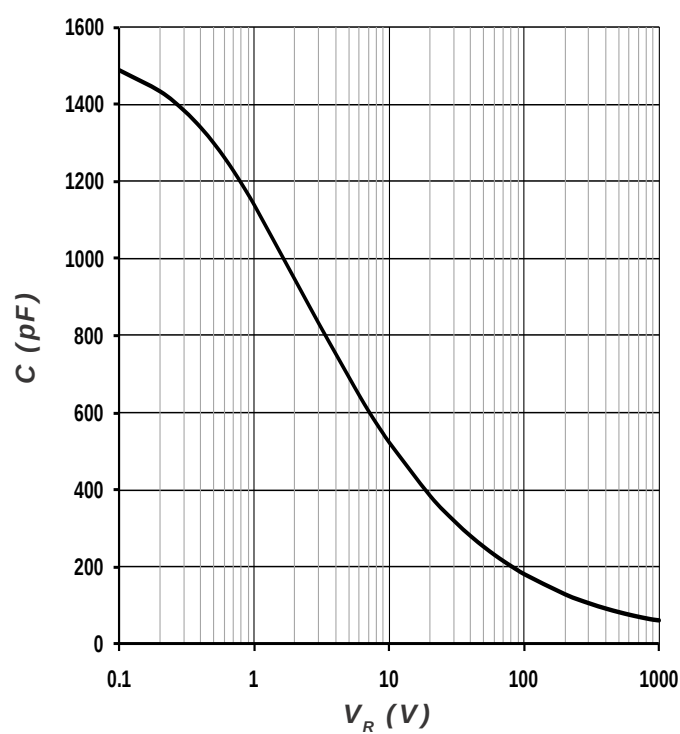


Figure 6. Capacitance vs. Reverse Voltage



## Typical Performance

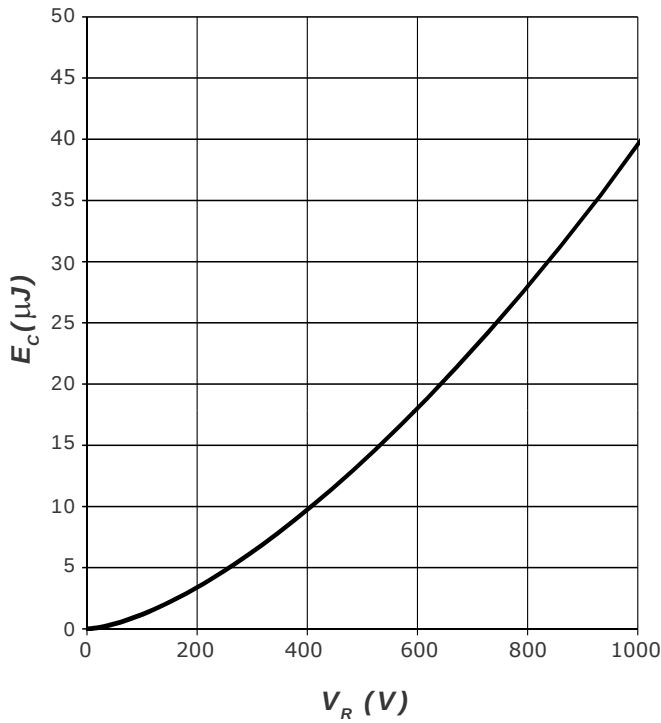


Figure 7. Typical Capacitance Stored Energy, per leg

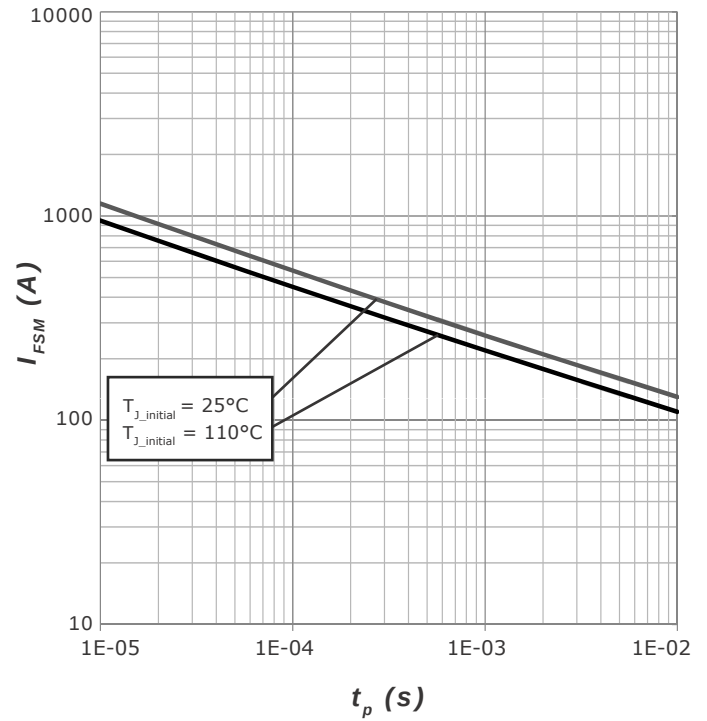


Figure 8. Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform), per leg

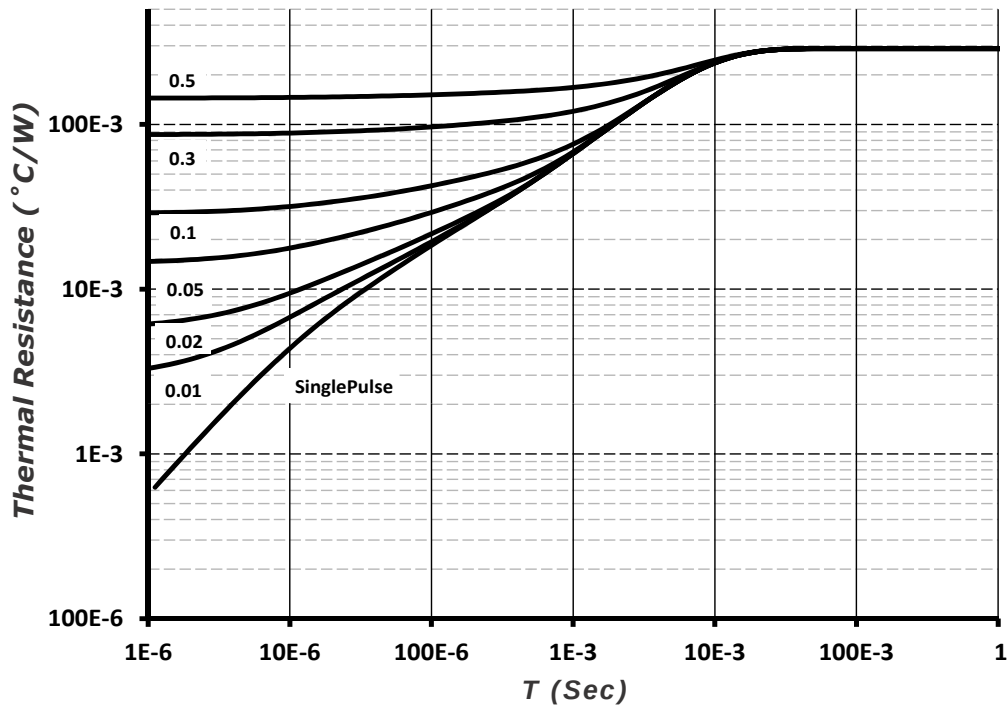
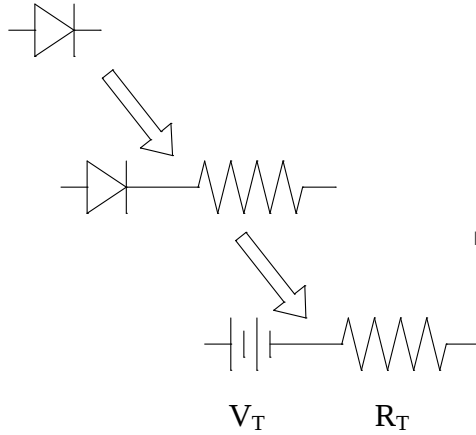


Figure 9. Device Transient Thermal Impedance



## Diode Model

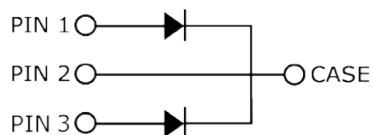
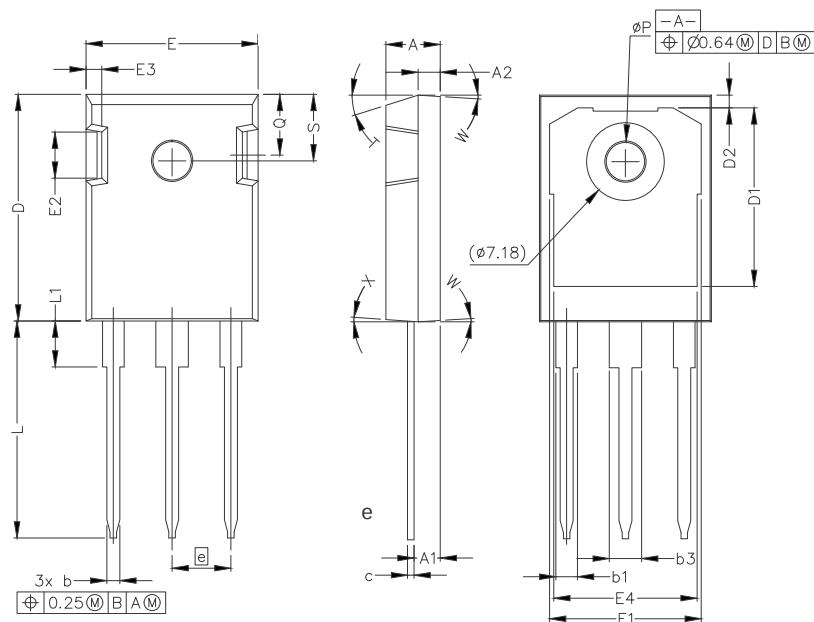


$$V_{fT} = V_T + I_f R_T$$
$$V_T = 0.97 + (T_J - 1.40 \times 10^{-3})$$
$$R_T = 0.023 + (T_J \times 2.71 \times 10^{-4})$$

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

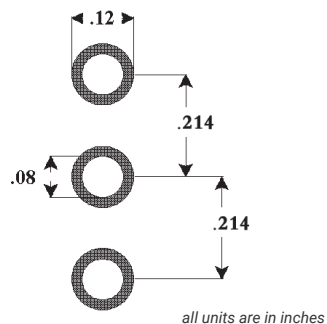
## Package Dimensions

## Package TO-247



| 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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