

**1N2804 thru  
1N2846B  
and  
1N4557B thru  
1N4564B**

**FEATURES**

- ZENER VOLTAGE 3.9V to 200V
- AVAILABLE IN TOLERANCES OF  $\pm 5\%$ ,  $\pm 10\%$  and  $\pm 20\%$
- DESIGNED FOR MILITARY ENVIRONMENTS (See Below)

**MAXIMUM RATINGS**

Junction and Storage Temperatures:  $-65^{\circ}\text{C}$  to  $+175^{\circ}\text{C}$

DC Power Dissipation: 50 watts

Power Derating:  $0.5\text{W}/^{\circ}\text{C}$  above  $75^{\circ}\text{C}$

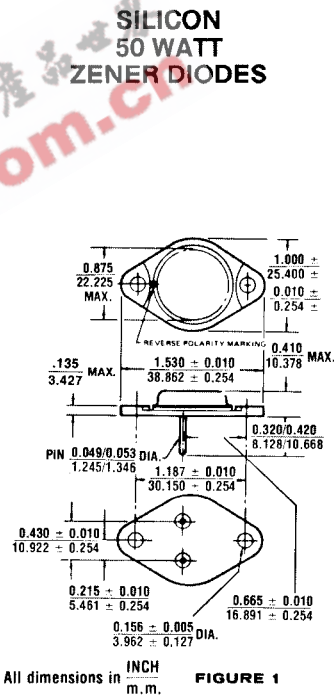
Forward Voltage @ 10 A: 1.5 Volts

**\* ELECTRICAL CHARACTERISTICS @  $25^{\circ}\text{C}$**

| JEDEC TYPE NO. (Note 1) | NOMINAL ZENER VOLTAGE V <sub>Z</sub> @ I <sub>Z</sub> Volts (Note 2) | ZENER TEST CURRENT (I <sub>Z</sub> ) mA | MAX. ZENER IMPEDANCE (Note 3)         |   | MAX. DC ZENER CURRENT (I <sub>ZM</sub> ) @ $75^{\circ}\text{C}$ Case Temp. (Note 4) mA | TYPICAL ZENER VOLTAGE V <sub>ZT</sub> @ I <sub>ZT</sub> %/°C | MAXIMUM LEAKAGE CURRENT **     |                                |
|-------------------------|--|---|---------------------------------------|---|--|--|--------------------------------|--------------------------------|
|                         |  |   | Z <sub>0</sub> @ I <sub>Z0</sub> OHMS | Z <sub>5</sub> @ 5 mA (I <sub>Z5</sub> ) OHMS |  |  | $\mu\text{A}$ @ V <sub>R</sub> | $\mu\text{A}$ @ V <sub>R</sub> |
| †1N4557B                | 3.9  | 3200                                    | 0.16                                  | 490   | 11,600   | -0.046   | 150                            | 0.5                            |
| †1N4558B                | 4.3  | 2900                                    | 0.16                                  | 500   | 10,650   | -0.033   | 150                            | 0.5                            |
| †1N4559B                | 4.7  | 2650                                    | 0.12                                  | 600   | 9,700  | -0.015   | 100                            | 1                              |
| †1N4560B                | 5.1  | 2450                                    | 0.12                                  | 650   | 8,900  | $\pm 0.010$  | 20                             | 1                              |
| †1N4561B                | 5.6  | 2250                                    | 0.12                                  | 900   | 8,100  | +0.03  | 20                             | 1                              |
| †1N4562B                | 6.2  | 2000                                    | 0.14                                  | 1000  | 7,300  | +0.049   | 20                             | 2                              |
| †1N4563B                | 6.8  | 1850                                    | 0.16                                  | 200   | 6,650  | +0.053   | 10                             | 2                              |
| †1N4564B                | 7.5  | 1650                                    | 0.24                                  | 100   | 6,050  | +0.057   | 10                             | 3                              |
| †1N2804B                | 6.8  | 1850                                    | 0.2                                   | 70  | 7,400  | .040   | 150                            | 4.5                            |
| †1N2805B                | 7.5  | 1700                                    | 0.3                                   | 70  | 6,600  | .045   | 100                            | 5                              |
| †1N2806B                | 8.2  | 1500                                    | 0.4                                   | 70  | 5,800  | .048   | 50                             | 5.4                            |
| †1N2807B                | 9.1  | 1370                                    | 0.5                                   | 70  | 5,300  | .050   | 25                             | 6.1                            |
| †1N2808B                | 10   | 1200                                    | 0.6                                   | 80  | 4,800  | .055   | 25                             | 6.7                            |
| †1N2809B                | 11   | 1100                                    | 0.8                                   | 80  | 4,300  | .060   | 10                             | 8.4                            |
| †1N2810B                | 12   | 1000                                    | 1.0                                   | 80  | 4,000  | .065   | 10                             | 9.1                            |
| †1N2811B                | 13   | 960                                     | 1.1                                   | 80  | 3,700  | .065   | 10                             | 9.9                            |
| †1N2812B                | 14   | 890                                     | 1.2                                   | 80  | 3,400  | .070   | 10                             | 10.6                           |
| †1N2813B                | 15   | 830                                     | 1.4                                   | 80  | 3,100  | .070   | 10                             | 11.4                           |
| †1N2814B                | 16   | 780                                     | 1.6                                   | 80  | 2,950  | .070   | 10                             | 12.2                           |
| †1N2815B                | 17   | 740                                     | 1.8                                   | 80  | 2,750  | .075   | 10                             | 13.0                           |
| †1N2816B                | 18   | 700                                     | 2.0                                   | 80  | 2,550  | .075   | 10                             | 13.7                           |
| †1N2817B                | 19   | 660                                     | 2.2                                   | 80  | 2,450  | .070   | 10                             | 14.4                           |
| †1N2818B                | 20   | 630                                     | 2.4                                   | 80  | 2,350  | .075   | 10                             | 15.2                           |
| †1N2819B                | 22   | 570                                     | 2.5                                   | 80  | 2,100  | .080   | 10                             | 16.7                           |
| †1N2820B                | 24   | 520                                     | 2.6                                   | 80  | 1,950  | .080   | 10                             | 18.2                           |
| †1N2821B                | 25   | 500                                     | 2.7                                   | 90  | 1,850  | .080   | 10                             | 19                             |
| †1N2822B                | 27   | 460                                     | 2.8                                   | 90  | 1,650  | .085   | 10                             | 20.6                           |
| †1N2823B                | 30   | 420                                     | 3.0                                   | 90  | 1,550  | .085   | 10                             | 22.8                           |
| †1N2824B                | 33   | 380                                     | 3.2                                   | 90  | 1,450  | .085   | 10                             | 25.1                           |
| †1N2825B                | 36   | 350                                     | 3.5                                   | 90  | 1,300  | .085   | 10                             | 27.4                           |
| †1N2826B                | 39   | 320                                     | 4.0                                   | 90  | 1,175  | .090   | 10                             | 29.7                           |
| †1N2827B                | 43   | 290                                     | 4.5                                   | 90  | 1,075  | .090   | 10                             | 32.7                           |
| †1N2828B                | 45   | 280                                     | 4.5                                   | 100   | 1,030  | .090   | 10                             | 34.2                           |
| †1N2829B                | 47   | 270                                     | 5.0                                   | 100   | 980  | .090   | 10                             | 35.8                           |
| †1N2830B                | 50   | 250                                     | 5.0                                   | 100   | 935  | .090   | 10                             | 38                             |
| †1N2831B                | 51   | 245                                     | 5.2                                   | 100   | 925  | .090   | 10                             | 38.8                           |
| †1N2832B                | 56   | 220                                     | 6                                     | 110   | 825  | .090   | 10                             | 42.6                           |
| †1N2833B                | 62   | 200                                     | 7                                     | 120   | 735  | .090   | 10                             | 47.1                           |
| †1N2834B                | 68   | 180                                     | 8                                     | 140   | 670  | .090   | 10                             | 51.7                           |
| †1N2835B                | 75   | 170                                     | 9                                     | 150   | 600  | .090   | 10                             | 56                             |
| †1N2836B                | 82   | 150                                     | 11                                    | 160   | 550  | .090   | 10                             | 62.2                           |
| †1N2837B                | 91   | 140                                     | 15                                    | 180   | 470  | .090   | 10                             | 69.2                           |
| †1N2838B                | 100  | 120                                     | 20                                    | 200   | 450  | .090   | 10                             | 76                             |
| †1N2839B                | 105  | 120                                     | 25                                    | 210   | 430  | .095   | 10                             | 79.8                           |
| †1N2840B                | 110  | 110                                     | 30                                    | 220   | 410  | .095   | 10                             | 83.6                           |
| †1N2841B                | 120  | 100                                     | 40                                    | 240   | 375  | .095   | 10                             | 91.2                           |
| †1N2842B                | 130  | 95                                      | 50                                    | 275   | 345  | .095   | 10                             | 98.8                           |
| †1N2843B                | 150  | 85                                      | 75                                    | 400   | 300  | .095   | 10                             | 114.0                          |
| †1N2844B                | 160  | 80                                      | 80                                    | 450   | 285  | .095   | 10                             | 121.6                          |
| †1N2845B                | 180  | 68                                      | 90                                    | 525   | 250  | .095   | 10                             | 136.8                          |
| †1N2846B                | 200  | 65                                      | 100                                   | 600   | 220  | .100   | 10                             | 152.0                          |

\*JEDEC Registered Data. \*\*Not JEDEC Data.

†Have JAN, JANTX and JANTXV Qualifications to MIL-S-19500/114.



All dimensions in INCH and m.m. **FIGURE 1**

**MECHANICAL CHARACTERISTICS**

CASE: Industry Standard TO-3, (modified), hermetically sealed, 0.052 inch diameter pins.

FINISH: All external surfaces are corrosion resistant and terminal solderable.

THERMAL RESISTANCE:  $1.5^{\circ}\text{C}/\text{W}$  (Typical) junction to base.

POLARITY: Standard Polarity units are connected anode to case. Reverse polarity (cathode to case is indicated by a red dot on the base plate. (Suffix R)

WEIGHT: 15 grams.

MOUNTING HARDWARE: See page 2-9.

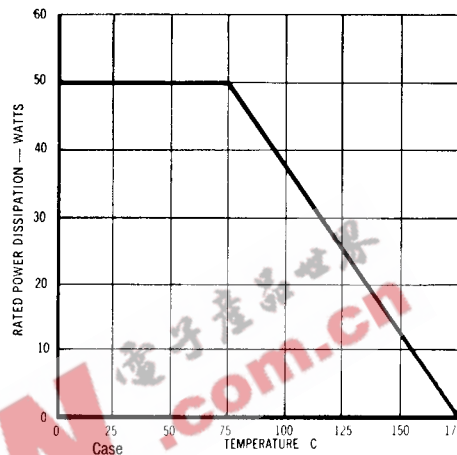
## 1N2804 thru 1N2846B, 1N457B thru 1N4564B

**NOTE 1** The JEDEC type numbers shown (B suffix) have a  $\pm 5\%$  tolerance on nominal zener voltage. The suffix A is used to identify  $\pm 10\%$  tolerance; no suffix indicates  $\pm 20\%$  tolerance. If tighter tolerance is required, consult factory. Standard polarity units have the anode connected to the case. Reverse polarity (cathode-to-case) units are available and are indicated by suffixing an R to the part number.

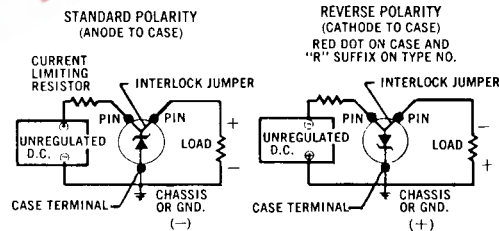
**NOTE 2** Zener Voltage ( $V_Z$ ) is measured with junction in thermal equilibrium with  $30^\circ\text{C}$  base temperature. The test currents ( $I_{ZT}$ ) have been selected so that at nominal voltages the dissipation is a constant 12.5 watts. This results in a nominal junction temperature rise of  $18.75^\circ\text{C}$ .

**NOTE 3** The zener impedance is derived from the 60 cycle A.C. voltage, which results when an A.C. current having an R.M.S. value equal to 10% of the D.C. zener current ( $I_{ZT}$  or  $I_{ZK}$ ) is superimposed on  $I_{ZT}$  or  $I_{ZK}$ . Zener impedance is measured at 2 points to insure a sharp knee on the breakdown curve and to eliminate unstable units. A curve showing the variation of zener impedance vs. zener current for six representative types is shown in Figure 3. A 100% cathode ray tube curve trace test is used to insure that each zener diode breakdown region begins at a current lower than  $I_{ZK}$  and continues at nearly constant voltage to a current level in excess of  $I_{ZM}$ .

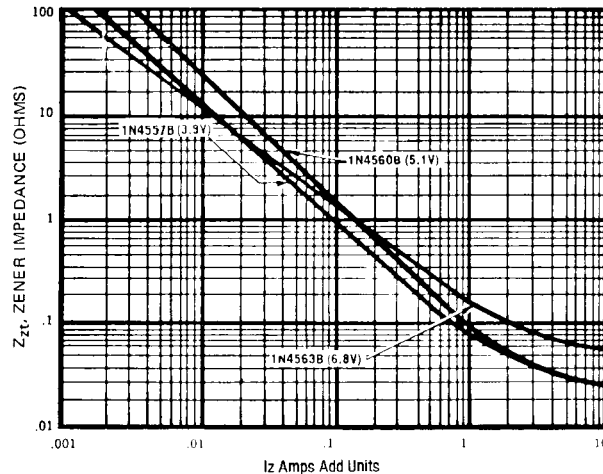
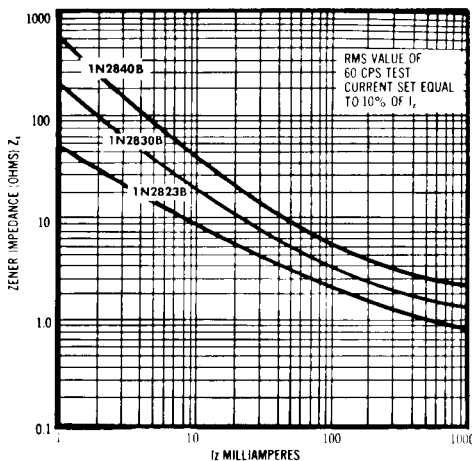
**NOTE 4** The values of  $I_{ZM}$  are calculated for a  $\pm 5\%$  tolerance on nominal zener voltage. Allowance has been made for the rise in zener voltage above  $V_{ZT}$  which results from zener impedance and the increase in junction temperature as power dissipation approaches 50 watts. In the case of individual diodes  $I_{ZM}$  is that value of current which results in a dissipation of 50 watts.



**FIGURE 2**  
POWER DERATING CURVE



Typical circuit connections for anode-to-case and cathode-to-case polarities (standard and reverse polarities, respectively).



**FIGURE 3**

TYPICAL ZENER IMPEDANCE vs. ZENER CURRENT  
FOR TYPES SHOWN