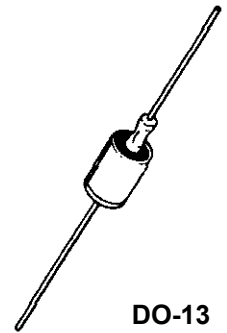


**DESCRIPTION**

This well established zener diode series for the 1N3016 thru 1N3051 JEDEC registration in the metal case DO-13 package provides a glass hermetic seal for 6.8 to 200 volts. It is also well suited for high-reliability applications where it is available in JAN, JANTX, and JANTXV military qualifications. Lower voltages are also available in the 1N3821 thru 1N3830 series (3.3 V to 7.5 V) in the same package (see separate data sheet). Microsemi also offers numerous other Zener diode products for a variety of other packages including surface mount.

**APPEARANCE**



**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

**FEATURES**

- Zener Voltage Range: 6.8V to 200V
- Hermetically sealed DO-13 metal package
- Internally solder-bonded construction.
- Also available in JAN, JANTX, JANTXV qualifications per MIL-PRF19500/115 by adding the JAN, JANTX, or JANTXV prefixes to part numbers for desired level of screening, e.g. JANTX1N3016B, JANTXV1N3051B, etc.
- Surface mount also available with 1N3016BUR-1 thru 1N3051BUR-1 series on separate data sheet

**APPLICATIONS / BENEFITS**

- Regulates voltage over a broad operating current and temperature range
- Wide selection from 6.8 to 200 V
- Tight voltage tolerances available
- Low reverse (leakage) currents
- Nonsensitive to ESD
- Hermetically sealed metal package
- Inherently radiation hard as described in Microsemi MicroNote 050

**MAXIMUM RATINGS**

- Operating Junction and Storage Temperatures: -65°C to +175°C
- THERMAL RESISTANCE: 50°C/W\* junction to lead at 0.375 inches (10 mm) from body or 110°C/W junction to ambient when leads are mounted on FR4 PC board with 4 mm<sup>2</sup> copper pads (1 oz) and track width 1 mm, length 25 mm
- DC Power Dissipation\*: 1.0 Watt at T<sub>L</sub> ≤ +125°C 3/8" (10 mm) from body or 1.0 Watts at T<sub>L</sub> ≤ +65°C when mounted on FR4 PC board as described for thermal resistance above (also see Fig 1)
- Forward Voltage @ 200 mA: 1.5 Volts.
- Solder Temperatures: 260 ° C for 10 s (maximum)

**MECHANICAL AND PACKAGING**

- CASE: DO-13 (DO-202AA), welded, hermetically sealed metal and glass
- FINISH: All external surfaces are Tin-Lead (Pb/Sn) plated and solderable per MIL-STD-750 method 2026
- POLARITY: Cathode connected case.
- WEIGHT: 1.4 grams.
- Tape & Reel option: Standard per EIA-296 (add "TR" suffix to part number)
- See package dimensions on last page

\* For further mounting reference, thermal resistance from junction to metal case may be reduced to ≤ 20 °C/W when mounting DO-13 metal case directly on heat sink.



SCOTTSDALE DIVISION

1N3016B thru 1N3051B

1 WATT METAL CASE ZENER DIODES

**\*ELECTRICAL CHARACTERISTICS @ 25°C**

| JEDEC TYPE NUMBER (Note 1) | NOMINAL ZENER VOLTAGE $V_Z @ I_{ZT}$ (Note 2) | ZENER TEST CURRENT $I_{ZT}$ | MAXIMUM ZENER IMPEDANCE (Note 3) |                   |             | MAXIMUM ZENER CURRENT $I_{ZM}$ (Note 4) | MAXIMUM REVERSE LEAKAGE CURRENT† |       | TYPICAL TEMP. COEFF. OF ZENER VOLTAGE $\alpha_{VZ}$ |
|----------------------------|---|-----------------------------|----------------------------------|-------------------|-------------|---|----------------------------------|-------|---|
|                            |   |                             | $Z_{ZT} @ I_{ZT}$                | $Z_{ZK} @ I_{ZK}$ | $I_R @ V_R$ |   | Volts                            |       |   |
|                            |   |                             |                                  |                   |             |   |                                  | OHMS  |   |
| 1N3016B                    | 6.8   | 37                          | 3.5                              | 700               | 1.0         | 140                                     | 150                              | 5.2   | .040  |
| 1N3017B                    | 7.5   | 34                          | 4.0                              | 700               | .5          | 125                                     | 100                              | 5.7   | .045  |
| 1N3018B                    | 8.2   | 31                          | 4.5                              | 700               | .5          | 115                                     | 50                               | 6.2   | .048  |
| 1N3019B                    | 9.1   | 28                          | 5                                | 700               | .5          | 105                                     | 25                               | 6.9   | .050  |
| 1N3020B                    | 10  | 25                          | 7                                | 700               | .25         | 95                                      | 25                               | 7.6   | .055  |
| 1N3021B                    | 11  | 23                          | 8                                | 700               | .25         | 85                                      | 10                               | 8.4   | .060  |
| 1N3022B                    | 12  | 21                          | 9                                | 700               | .25         | 80                                      | 10                               | 9.1   | .065  |
| 1N3023B                    | 13  | 19                          | 10                               | 700               | .25         | 74                                      | 10                               | 9.9   | .065  |
| 1N3024B                    | 15  | 17                          | 14                               | 700               | .25         | 63                                      | 10                               | 11.4  | .070  |
| 1N3025B                    | 16  | 15.5                        | 16                               | 700               | .25         | 60                                      | 10                               | 12.2  | .070  |
| 1N3026B                    | 18  | 14                          | 20                               | 750               | .25         | 52                                      | 10                               | 13.7  | .075  |
| 1N3027B                    | 20  | 12.5                        | 22                               | 750               | .25         | 47                                      | 10                               | 15.2  | .075  |
| 1N3028B                    | 22  | 11.5                        | 23                               | 750               | .25         | 43                                      | 10                               | 16.7  | .080  |
| 1N3029B                    | 24  | 10.5                        | 25                               | 750               | .25         | 40                                      | 10                               | 18.2  | .080  |
| 1N3030B                    | 27  | 9.5                         | 35                               | 750               | .25         | 34                                      | 10                               | 20.6  | .085  |
| 1N3031B                    | 30  | 8.5                         | 40                               | 1000              | .25         | 31                                      | 10                               | 22.8  | .085  |
| 1N3032B                    | 33  | 7.5                         | 45                               | 1000              | .25         | 28                                      | 10                               | 25.1  | .085  |
| 1N3033B                    | 36  | 7.0                         | 50                               | 1000              | .25         | 26                                      | 10                               | 27.4  | .085  |
| 1N3034B                    | 39  | 6.5                         | 60                               | 1000              | .25         | 23                                      | 10                               | 29.7  | .090  |
| 1N3035B                    | 43  | 6.0                         | 70                               | 1500              | .25         | 21                                      | 10                               | 32.7  | .090  |
| 1N3036B                    | 47  | 5.5                         | 80                               | 1500              | .25         | 19                                      | 10                               | 35.8  | .090  |
| 1N3037B                    | 51  | 5.0                         | 95                               | 1500              | .25         | 18                                      | 10                               | 38.8  | .090  |
| 1N3038B                    | 56  | 4.5                         | 110                              | 2000              | .25         | 17                                      | 10                               | 42.6  | .090  |
| 1N3039B                    | 62  | 4.0                         | 125                              | 2000              | .25         | 15                                      | 10                               | 47.1  | .090  |
| 1N3040B                    | 68  | 3.7                         | 150                              | 2000              | .25         | 14                                      | 10                               | 51.7  | .090  |
| 1N3041B                    | 75  | 3.3                         | 175                              | 2000              | .25         | 12                                      | 10                               | 56.0  | .090  |
| 1N3042B                    | 82  | 3.0                         | 200                              | 3000              | .25         | 11                                      | 10                               | 62.2  | .090  |
| 1N3043B                    | 91  | 2.8                         | 250                              | 3000              | .25         | 10                                      | 10                               | 69.2  | .090  |
| 1N3044B                    | 100   | 2.5                         | 350                              | 3000              | .25         | 9.0                                     | 10                               | 76.0  | .090  |
| 1N3045B                    | 110   | 2.3                         | 450                              | 4000              | .25         | 8.3                                     | 10                               | 83.6  | .095  |
| 1N3046B                    | 120   | 2.0                         | 550                              | 4500              | .25         | 8.0                                     | 10                               | 91.2  | .095  |
| 1N3047B                    | 130   | 1.9                         | 700                              | 5000              | .25         | 6.9                                     | 10                               | 98.8  | .095  |
| 1N3048B                    | 150   | 1.7                         | 1000                             | 6000              | .25         | 5.7                                     | 10                               | 114.0 | .095  |
| 1N3049B                    | 160   | 1.6                         | 1100                             | 6500              | .25         | 5.4                                     | 10                               | 121.6 | .095  |
| 1N3050B                    | 180   | 1.4                         | 1200                             | 7000              | .25         | 4.9                                     | 10                               | 136.8 | .095  |
| 1N3051B                    | 200   | 1.2                         | 1500                             | 8000              | .25         | 4.6                                     | 10                               | 152.0 | .100  |

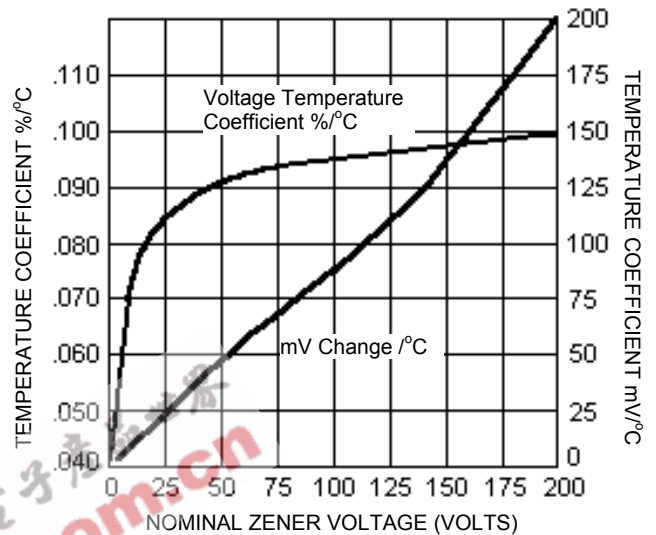
\*JEDEC Registered Data. †Not JEDEC Data.

- NOTES:**
- When using JEDEC numbers, B suffix signifies +/-5% tolerance on nominal zener voltage. The suffix A is used to identify +/-10% tolerance; no suffix indicates +/-20% tolerance; suffix C is used to identify +/- 2%; and suffix D is used to identify +/- 1% tolerance.
  - Zener Voltage ( $V_Z$ ) is measured with junction in thermal equilibrium with still air at a temperature of 25°C. The test currents ( $I_{ZT}$ ) at nominal voltages provide a constant 0.25 watts.
  - The zener impedance is derived when a 60 cycle ac current having an rms value equal to 10% of the dc zener current ( $I_{ZT}$  or  $I_{ZK}$ ) is superimposed on  $I_{ZT}$  or  $I_{ZK}$ . Zener impedance is measured at 2 points to ensure a sharp knee on the breakdown curve and to eliminate unstable units. See MicroNote 202 for variation in dynamic impedance with different zener currents.
  - These values of  $I_{ZM}$  may often be exceeded in the case of individual diodes. The values shown are calculated for a unit at the high voltage end of its tolerance range. Allowance has also been made for the rise in zener voltage above  $V_{ZT}$  that results from zener impedance and the increase in junction temperature as a unit approaches thermal equilibrium at a dissipation of 1 watt. The  $I_{ZM}$  values shown for +/-5% tolerance units may be used with little error for +/-10% tolerance units, but should be reduced by 7% to include a +/-20% tolerance unit near the high voltage end of its tolerance range.

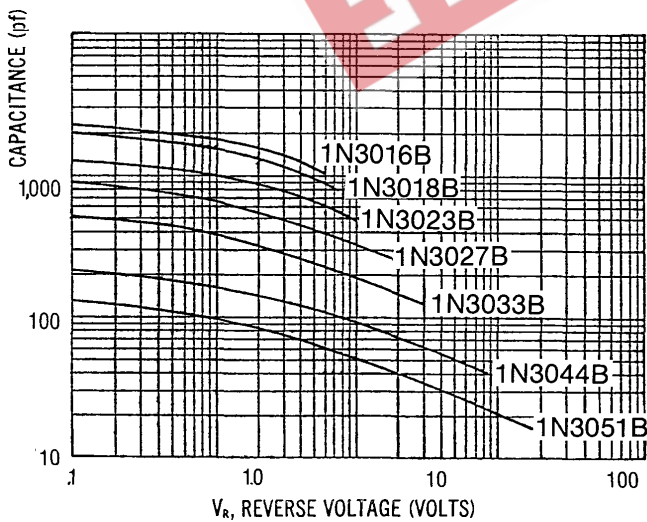
**OUTLINE AND CIRCUIT**



$T_L$  - Lead Temperature ( $^{\circ}C$ ) 3/8" from body or  $T_A$  on FR4 PC Board  
**FIGURE 1**  
Power Derating Curve



**FIGURE 2**  
Typical Zener Voltage Temperature Coeff. vs. Zener Voltage



**FIGURE 3**  
Typical Capacitance vs. Reverse Voltage for 1-Watt Zeners

