

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 mm² copper pads (1 oz) and track width 1 mm, length 25 mm
- DC Power Dissipation*: 1.0 Watt at T_L ≤ +125°C 3/8" (10 mm) from body or 1.0 Watts at T_L ≤ +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.

***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 α_{VZ} |
|----------------------------|---|-----------------------------|----------------------------------|-------------------|------|---|----------------------------------|-------|---|
| | | | $Z_{ZT} @ I_{ZT}$ | $Z_{ZK} @ I_{ZK}$ | | | $I_R @ V_R$ | Volts | |
| | | | | OHMS | 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

