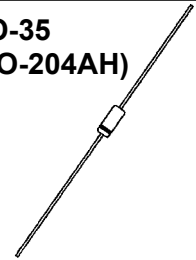


**DESCRIPTION**

The popular 1N957B thru 1N992B series of 0.5 watt Zener Voltage Regulators provides a selection from 6.8 to 200 volts in standard 5% or 10% tolerances as well as tighter tolerances identified by different suffix letters on the part number. These glass axial-leaded DO-35 Zeners are also available with an internal-metallurgical-bond option by adding a "-1" suffix. The 1N962B-1 thru 1N992B-1 are available in JAN, JANTX, and JANTXV military qualifications. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

**APPEARANCE**

**DO-35  
(DO-204AH)**



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

**FEATURES**

- JEDEC registered 1N957B(-1) to 1N992B(-1) series
- Internal metallurgical bond option available by adding a "-1" suffix
- Also available in JAN, JANTX, and JANTXV qualifications per MIL-PRF-19500/117 by adding the JAN, JANTX, or JANTXV prefixes to part numbers for desired level of screening as well as "-1" suffix; (e.g. JANTX1N962B-1, JANTXV1N986C-1, etc.)
- Military Surface Mount equivalents also available in DO-213AA by adding a UR-1 suffix in addition to the JAN, JANTX, and JANTXV prefix; e.g. JANTX1N962BUR-1 (see separate data sheet)
- Commercial Surface Mount equivalents available as MLL957B to MLL992B or with "-1" suffix for bonded in the DO-213AA MELF style package (consult factory for others)
- DO-7 glass body axial-leaded Zener equivalents are also available

**APPLICATIONS / BENEFITS**

- Regulates voltage over a broad operating current and temperature range
- Extensive selection from 6.8 to 200 V
- Standard voltage tolerances are plus/minus 5% with B suffix, 10 % with A suffix identification
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Flexible axial-lead mounting terminals
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Minimal capacitance (see Figure 3)
- Inherently radiation hard as described in Microsemi MicroNote 050

**MAXIMUM RATINGS**

- Operating and Storage temperature: -65°C to +175°C
- Thermal Resistance: 250°C/W junction to lead at 3/8 (10 mm) lead length from body, or 310°C/W junction to ambient when mounted on FR4 PC board (1 oz Cu) with 4 mm<sup>2</sup> copper pads and track width 1 mm, length 25 mm
- Steady-State Power: 0.5 watts at T<sub>L</sub> ≤ 50°C 3/8 inch (10 mm) from body or 0.48 W at T<sub>A</sub> ≤ 25°C when mounted on FR4 PC board as described for thermal resistance above (also see Figure1)
- Forward voltage @200 mA: 1.1 volts (maximum) for 1N957B – 1N985B and 1.3 V for 1N985 – 1N992B
- Solder Temperatures: 260°C for 10 s (max)

**MECHANICAL AND PACKAGING**

- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204AH) package
- TERMINALS: Leads, tin-lead plated solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band. Diode to be operated with the banded end positive with respect to the opposite end for Zener regulation
- MARKING: Part number
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- WEIGHT: 0.2 grams
- See package dimensions on last page



SCOTTSDALE DIVISION

1N957B, -1 thru 1N992B, -1 DO-35

Silicon 500 mW Zener Diodes

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

| JEDEC TYPE NUMBER<br>(Note 1) | NOMINAL ZENER VOLTAGE<br>(Note 2) | ZENER TEST CURRENT | MAX. ZENER IMPEDANCE<br>(Note 3) |                   |     | MAX. DC ZENER CURRENT<br>(Note 4) | MAX. SURGE CURRENT<br>(Note 5) | MAX. REVERSE LEAKAGE CURRENT |               | MAX. TEMP. COEFFICIENT |
|-------------------------------|-----------------------------------|--------------------|----------------------------------|-------------------|-----|-----------------------------------|--------------------------------|------------------------------|---------------|------------------------|
|                               | $V_Z$                             | $I_{ZT}$           | $Z_{ZT} @ I_{ZT}$                | $Z_{ZK} @ I_{ZK}$ |     | $I_{ZM}$                          | $I_{ZSM}$                      | $I_R @ V_R$                  | $\alpha_{VZ}$ |                        |
|                               | VOLTS                             | mA                 | OHMS                             | OHMS              | mA  | mA                                | mA                             | $\mu A$                      | VOLTS         | %/°C                   |
| 1N957B                        | 6.8                               | 18.5               | 4.5                              | 700               | 1.0 | 55                                | 300                            | 150                          | 5.2           | +0.05                  |
| 1N958B                        | 7.5                               | 16.5               | 5.5                              | 700               | .5  | 50                                | 275                            | 75                           | 5.7           | +0.058                 |
| 1N959B                        | 8.2                               | 15.0               | 6.5                              | 700               | .5  | 45                                | 250                            | 50                           | 6.2           | +0.065                 |
| 1N960B                        | 9.1                               | 14.0               | 7.5                              | 700               | .5  | 41                                | 225                            | 25                           | 6.9           | +0.068                 |
| 1N961B                        | 10                                | 12.5               | 8.5                              | 700               | .25 | 38                                | 200                            | 10                           | 7.6           | +0.075                 |
| 1N962B                        | 11                                | 11.5               | 9.5                              | 700               | .25 | 32                                | 175                            | 5                            | 8.4           | +0.076                 |
| 1N963B                        | 12                                | 10.5               | 11.5                             | 700               | .25 | 31                                | 160                            | 5                            | 9.1           | +0.077                 |
| 1N964B                        | 13                                | 9.5                | 13.0                             | 700               | .25 | 28                                | 150                            | 5                            | 9.9           | +0.079                 |
| 1N965B                        | 15                                | 8.5                | 16                               | 700               | .25 | 25                                | 130                            | 5                            | 11.4          | +0.082                 |
| 1N966B                        | 16                                | 7.8                | 17                               | 700               | .25 | 24                                | 120                            | 5                            | 12.2          | +0.083                 |
| 1N967B                        | 18                                | 7.0                | 21                               | 750               | .25 | 20                                | 110                            | 5                            | 13.7          | +0.085                 |
| 1N968B                        | 20                                | 6.2                | 25                               | 750               | .25 | 18                                | 100                            | 5                            | 15.2          | +0.086                 |
| 1N969B                        | 22                                | 5.6                | 29                               | 750               | .25 | 16                                | 90                             | 5                            | 16.7          | +0.087                 |
| 1N970B                        | 24                                | 5.2                | 33                               | 750               | .25 | 15                                | 80                             | 5                            | 18.2          | +0.088                 |
| 1N971B                        | 27                                | 4.6                | 41                               | 750               | .25 | 13                                | 70                             | 5                            | 20.6          | +0.090                 |
| 1N972B                        | 30                                | 4.2                | 49                               | 1000              | .25 | 12                                | 65                             | 5                            | 22.8          | +0.091                 |
| 1N973B                        | 33                                | 3.8                | 58                               | 1000              | .25 | 11                                | 60                             | 5                            | 25.1          | +0.092                 |
| 1N974B                        | 36                                | 3.4                | 70                               | 1000              | .25 | 10                                | 55                             | 5                            | 27.4          | +0.093                 |
| 1N975B                        | 39                                | 3.2                | 80                               | 1000              | .25 | 9.5                               | 46                             | 5                            | 29.7          | +0.094                 |
| 1N976B                        | 43                                | 3.0                | 93                               | 1500              | .25 | 8.8                               | 44                             | 5                            | 32.7          | +0.095                 |
| 1N977B                        | 47                                | 2.7                | 105                              | 1500              | .25 | 7.9                               | 40                             | 5                            | 35.8          | +0.095                 |
| 1N978B                        | 51                                | 2.5                | 125                              | 1500              | .25 | 7.4                               | 37                             | 5                            | 38.8          | +0.096                 |
| 1N979B                        | 56                                | 2.2                | 150                              | 2000              | .25 | 6.8                               | 35                             | 5                            | 42.6          | +0.096                 |
| 1N980B                        | 62                                | 2.0                | 185                              | 2000              | .25 | 6.0                               | 30                             | 5                            | 47.1          | +0.097                 |
| 1N981B                        | 68                                | 1.8                | 230                              | 2000              | .25 | 5.5                               | 28                             | 5                            | 51.7          | +0.097                 |
| 1N982B                        | 75                                | 1.7                | 270                              | 2000              | .25 | 5.0                               | 26                             | 5                            | 56.0          | +0.098                 |
| 1N983B                        | 82                                | 1.5                | 330                              | 3000              | .25 | 4.6                               | 23                             | 5                            | 62.2          | +0.098                 |
| 1N984B                        | 91                                | 1.4                | 400                              | 3000              | .25 | 4.1                               | 21                             | 5                            | 69.2          | +0.099                 |
| 1N985B                        | 100                               | 1.3                | 500                              | 3000              | .25 | 3.7                               | 18                             | 5                            | 76.0          | +0.11                  |
| 1N986B                        | 110                               | 1.1                | 750                              | 4000              | .25 | 3.3                               | 16                             | 5                            | 83.6          | +0.11                  |
| 1N987B                        | 120                               | 1.0                | 900                              | 4500              | .25 | 3.1                               | 15                             | 5                            | 91.2          | +0.11                  |
| 1N988B                        | 130                               | 0.95               | 1100                             | 5000              | .25 | 2.7                               | 13                             | 5                            | 98.8          | +0.11                  |
| 1N989B                        | 150                               | 0.85               | 1500                             | 6000              | .25 | 2.4                               | 12                             | 5                            | 114.0         | +0.11                  |
| 1N990B                        | 160                               | 0.80               | 1700                             | 6500              | .25 | 2.2                               | 11                             | 5                            | 121.6         | +0.11                  |
| 1N991B                        | 180                               | 0.68               | 2200                             | 7100              | .25 | 2.0                               | 10                             | 5                            | 136.8         | +0.11                  |
| 1N992B                        | 200                               | 0.65               | 2500                             | 8000              | .25 | 1.8                               | 9                              | 5                            | 152.0         | +0.11                  |

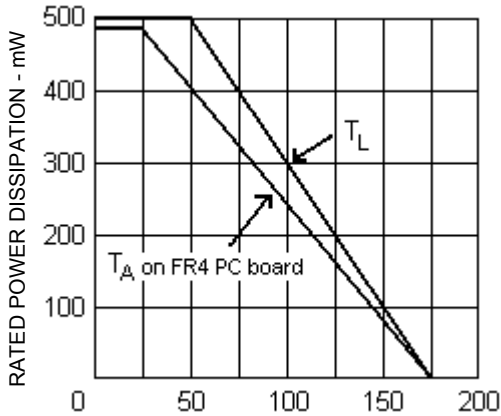
\* JEDEC Registered Data

- NOTE 1:** The JEDEC type numbers shown (B suffix) have a +/-5% tolerance on nominal Zener voltage. The suffix A is used to identify +/-10% tolerance; suffix C is used to identify +/-2%; and suffix D is used to identify +/-1% tolerance; no suffix indicates +/-20% tolerance.
- NOTE 2:** Zener voltage ( $V_Z$ ) is measured after the test current has been applied for 20 +/- 5 seconds. The device shall be suspended by its leads with the inside edge of the mounting clips between .375" and .500" from the body. Mounting clips shall be maintained at a temperature of 25 +/- 5°C.
- NOTE 3:** 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.
- NOTE 4:** The values of  $I_{ZM}$  are calculated for a +/- 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 400 mW. In the case of individual diodes  $I_{ZM}$  is that value of current which results in a dissipation of 400 mW at 75°C lead temperature at 3/8" from body.
- NOTE 5:** The surge for  $I_{ZSM}$  is a square wave or equivalent half-sine wave pulse of 1/120 sec. duration.

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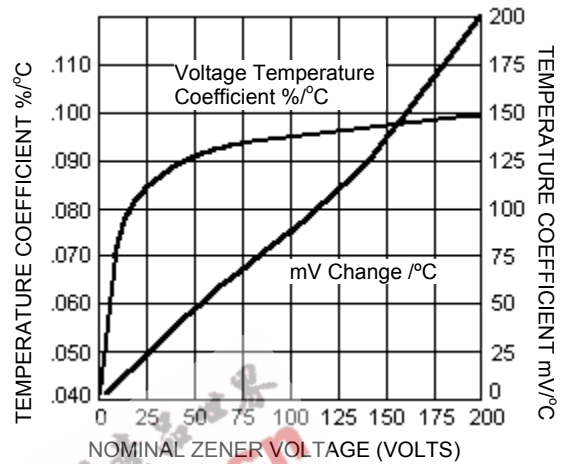
1N957B - 992B (DO-35)

**GRAPHS**

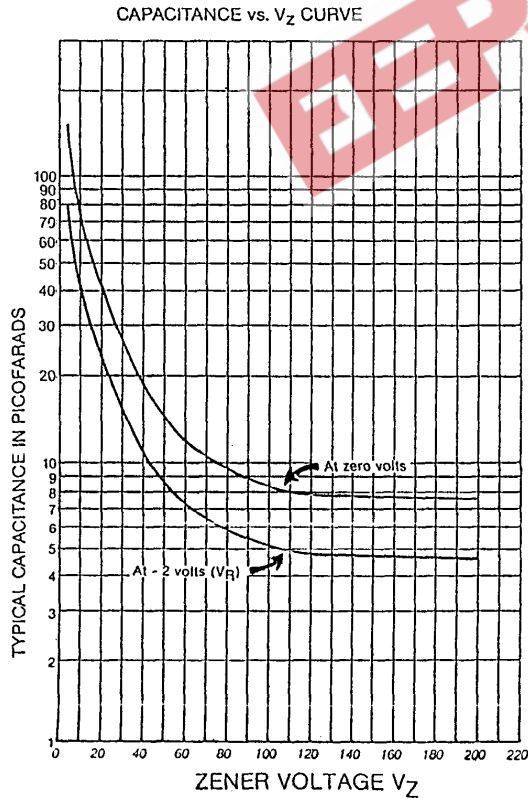


$T_L$  - LEAD TEMPERATURE ( $^{\circ}C$ ) 3/8" FROM BODY or  
 $T_A$  on FR4 PC BOARD

**FIGURE 1**  
POWER DERATING CURVE

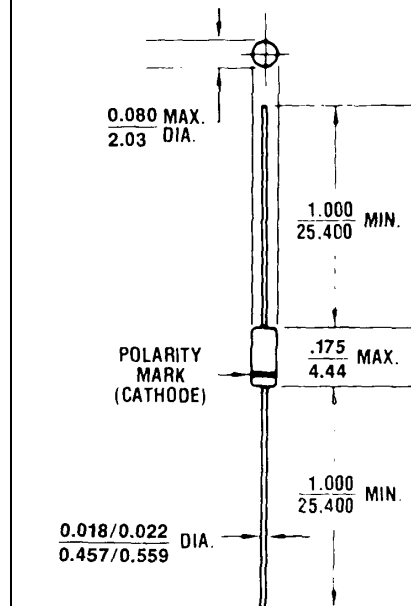


**FIGURE 2**  
ZENER VOLTAGE TEMPERATURE  
COEFFICIENT vs. ZENER VOLTAGE



**FIGURE 3**  
CAPACITANCE vs. ZENER VOLTAGE  
(TYPICAL)

**PACKAGE DIMENSIONS**



All dimensions in: INCH  
mm