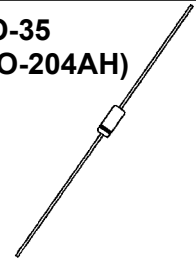


**DESCRIPTION**

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)<br>$V_Z$<br>VOLTS | ZENER TEST CURRENT<br>$I_{ZT}$<br>mA | MAX. ZENER IMPEDANCE<br>(Note 3) |                           |       | MAX. DC ZENER CURRENT<br>(Note 4)<br>$I_{ZM}$<br>mA | MAX. SURGE CURRENT<br>(Note 5)<br>$I_{ZSM}$<br>mA | MAX. REVERSE LEAKAGE CURRENT |       | MAX. TEMP. COEFFICIENT<br>$\alpha_{VZ}$<br>%/°C |
|-------------------------------|---|--------------------------------------|----------------------------------|---------------------------|-------|---|---|------------------------------|-------|---|
|                               |   |                                      | $Z_{ZT} @ I_{ZT}$<br>OHMS        | $Z_{ZK} @ I_{ZK}$<br>OHMS | $I_R$ |   |   | @ $V_R$<br>VOLTS             |       |   |
|                               |   |                                      |                                  |                           |       |   |   |                              | mA    |   |
| 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   |

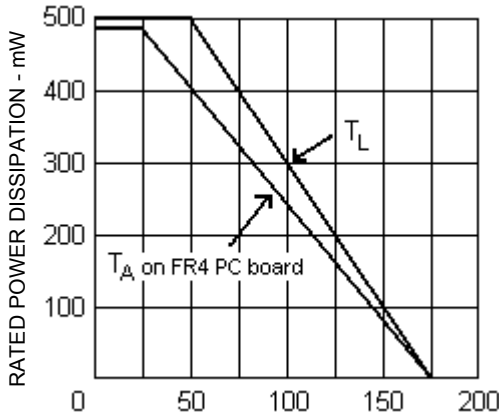
\* JEDEC Registered Data

- 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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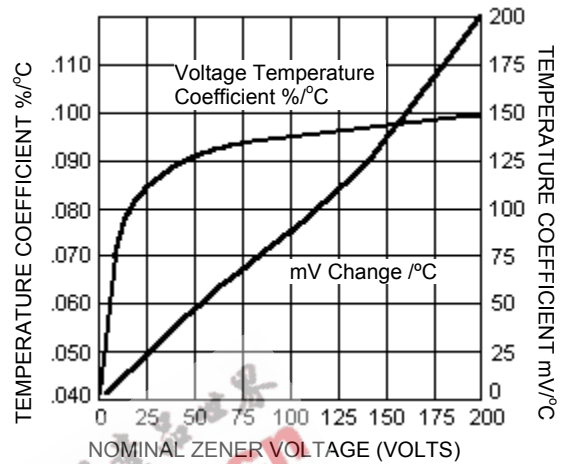
1N957B - 992B (DO-35)

**GRAPHS**

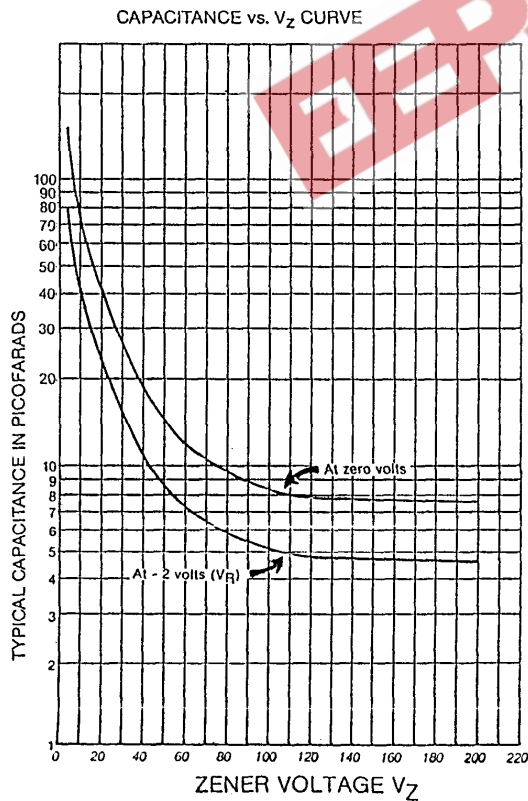


$T_L$  - LEAD TEMPERATURE ( $^{\circ}C$ ) 3/8" FROM BODY or  
 $T_A$  on FR4 PC BOARD

**FIGURE 1**  
POWER DERATING CURVE

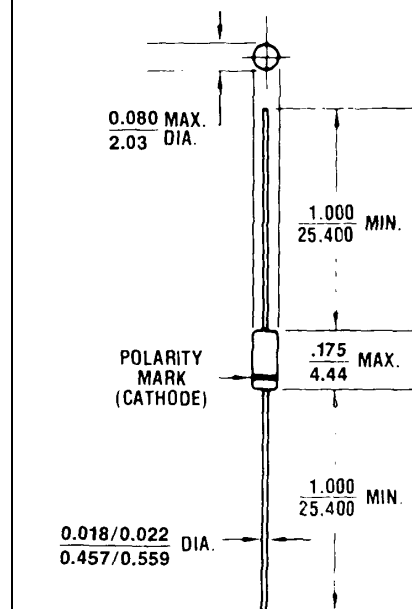


**FIGURE 2**  
ZENER VOLTAGE TEMPERATURE  
COEFFICIENT vs. ZENER VOLTAGE



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

**PACKAGE DIMENSIONS**



All dimensions in: INCH  
mm