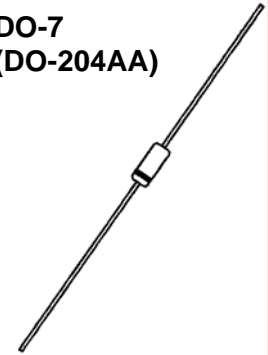


DESCRIPTION

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. The somewhat larger DO-7 packaging option offers a "straight-through" soldered internal connection with a larger active die element than otherwise provided in the smaller DO-35 package when needed. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

APPEARANCE

DO-7
(DO-204AA)



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

FEATURES

- JEDEC registered 1N957B to 1N992B series
- Internal metallurgical bonding equivalent to "-1" suffix identification on other military DO-7 Zeners
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, JANTXV, and JANS are available by adding MQ, MX, MV, or MSP prefixes respectively to part numbers.
- Surface mount equivalents in DO-213AA also available as MLL957B to MLL992B or with "-1" suffix (consult factory for other surface mount options)
- RoHS Compliant devices available by adding e3 suffix
- Smaller DO-35 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
- Capacitance also specified (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: 300 °C/W junction to lead at 3/8 (10 mm) lead length from body, or 360 °C/W junction to ambient when mounted on FR4 PC board (1 oz Cu) with 4 mm² copper pads and track width 1 mm, length 25 mm
- Steady-State Power: 0.5 watts at $T_L \leq 25^\circ\text{C}$ 3/8 inch (10 mm) from body or 0.417 W at $T_A \leq 25^\circ\text{C}$ when mounted on FR4 PC board as described for thermal resistance above (also see Figure 1)
- 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-7 (DO-204AA) package
- TERMINALS: Tin-Lead or RoHS Compliant annealed matte-Tin plating 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

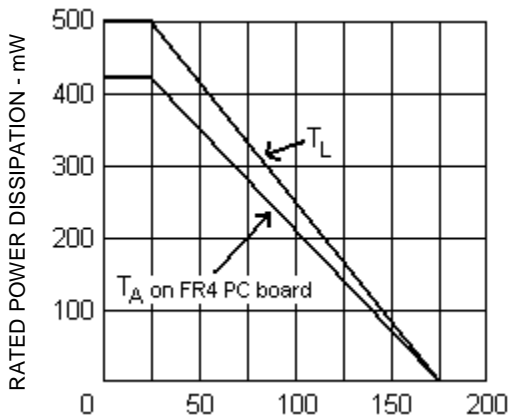
ELECTRICAL CHARACTERISTICS* @ 25°C

| JEDEC TYPE NUMBER (Note 1) | NOMINAL ZENER VOLTAGE (Note 2) | ZENER TEST CURRENT | MAX. ZENER IMPEDANCE (Note 3) | | | MAX. DC ZENER CURRENT (Note 4) | MAX. SURGE CURRENT (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} | $I_R @ V_R$ | α_{VZ} | | |
| | VOLTS | mA | OHMS | OHMS | mA | mA | mA | μA | 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 +/- 2°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.

GRAPHS



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

FIGURE 1
POWER DERATING CURVE

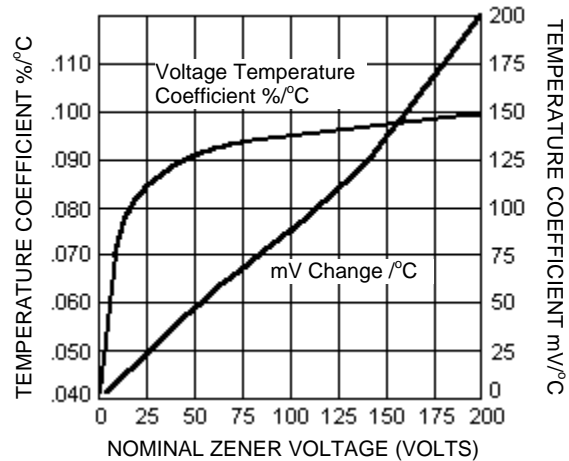


FIGURE 2
ZENER VOLTAGE TEMPERATURE
COEFFICIENT vs. ZENER VOLTAGE

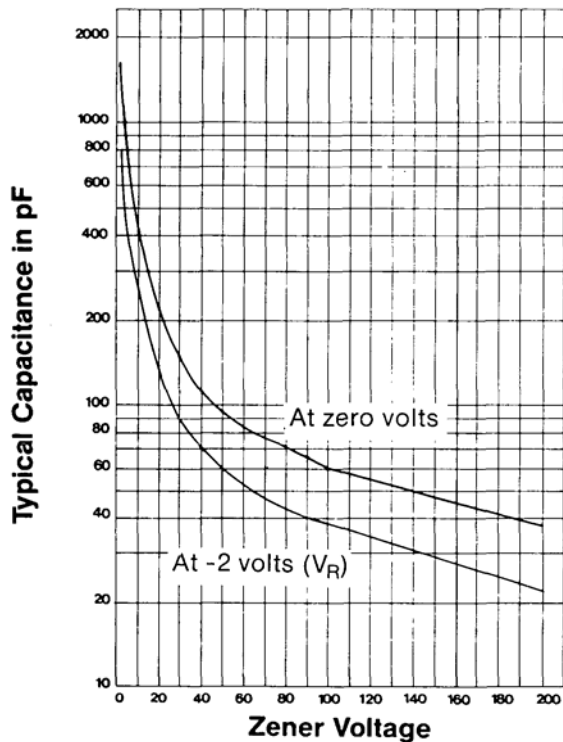


FIGURE 3
CAPACITANCE vs. ZENER VOLTAGE
(TYPICAL)

PACKAGE DIMENSIONS

