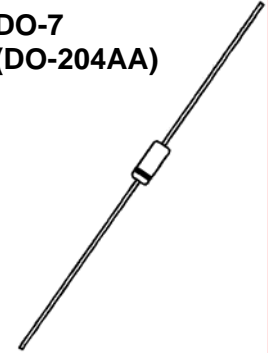


### DESCRIPTION

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 mm<sup>2</sup> 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 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-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
	$V_Z$	$I_{ZT}$	$Z_{ZT} @ I_{ZT}$	$Z_{ZK} @ I_{ZK}$	$I_{ZM}$	$I_{ZSM}$	$I_R @ V_R$	$\alpha_{VZ}$		
	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.

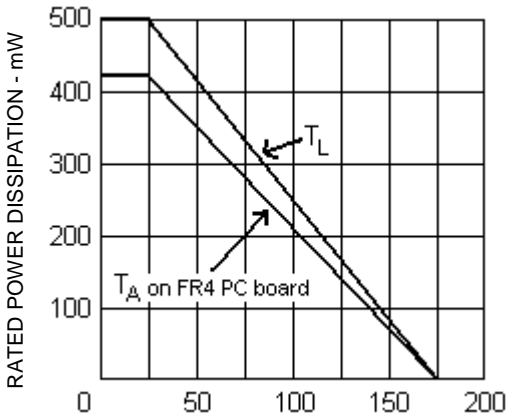
**NOTE 2:** Zener voltage ( $V_Z$ ) is measured after the test current has been applied for 20 +/- 5 seconds. The device shall be suspended by its leads with the inside edge of the mounting clips between .375" and .500" from the body. Mounting clips shall be maintained at a temperature of 25 +/- 2°C.

**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.

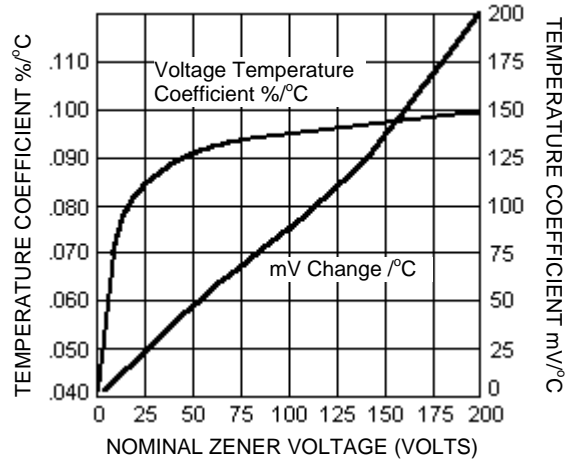
**NOTE 5:** The surge for  $I_{ZSM}$  is a square wave or equivalent half-sine wave pulse of 1/120 sec. duration.

GRAPHS

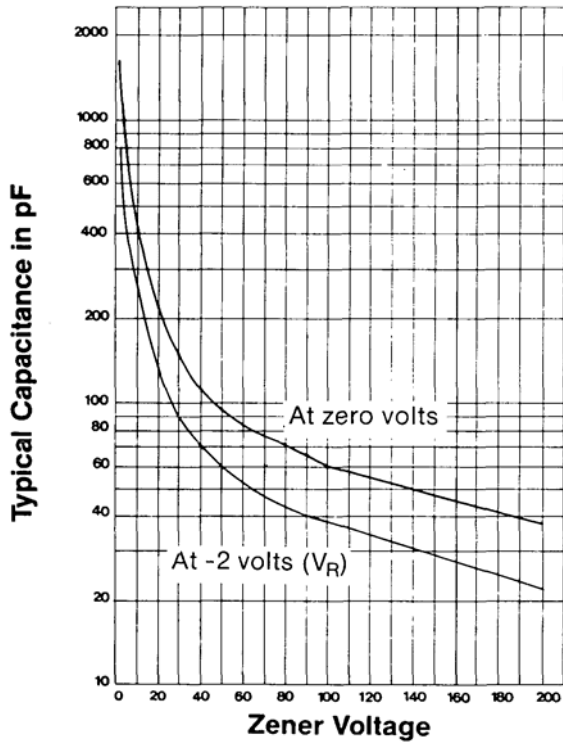


$T_L$  - LEAD TEMPERATURE ( $^{\circ}\text{C}$ ) 3/8" FROM BODY  
or  $T_A$  on FR4 PC BOARD

**FIGURE 1**  
POWER DERATING CURVE



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



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

