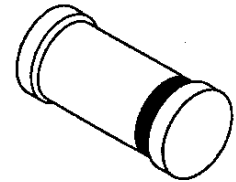


DESCRIPTION

The popular 1N5985UR thru 1N6031BUR (or MLL5985 thru MLL6031B) series of 0.5 watt Zener Voltage Regulators provides selection from 2.4 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 surface mount DO-213AA Zeners are also available with an internal metallurgical bond option by adding a "-1" suffix (see separate data sheet) including various equivalent military screening levels as described in the Features section. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

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

APPEARANCE



DO-213AA

FEATURES

- Surface mount equivalent to JEDEC registered 1N5985 to 1N6031
- Similar to operating current conditions of the BZV55 Pro Electron series of Zener products in Europe
- Internal metallurgical bonds are optionally available with "-1" suffix (see separate data sheet) with screening options in accordance with MIL-PRF-19500 for JAN, JANTX, JANTXV, and JANS by adding MQ, MX, MV, or MSP prefixes respectively to part numbers
- Axial-leaded equivalents available as 1N5985 to 1N6031 in the DO-35 package including "-1" suffix options (see separate data sheet)

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range
- Extensive selection from 2.4 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
- Nonsensitive to ESD (MIL-STD-750 Method 1020)
- Minimal capacitance (see Figure 2)
- Inherently radiation hard as described in Microsemi MicroNote 050

MAXIMUM RATINGS

- Operating and Storage temperature: -65°C to $+175^{\circ}\text{C}$
- Thermal Resistance: 150°C/W junction to end cap or 300°C/W for junction to ambient when mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page)
- Steady-State Power: 0.5 watts at end cap temperatures $T_{\text{EC}} \leq 100^{\circ}\text{C}$ or 0.5 watts at ambient $T_{\text{A}} \leq 25^{\circ}\text{C}$ when mounted on FR4 PC board as described for thermal resistance (also see Figure 1)
- Forward voltage @200 mA: 1.1 volts
- Solder Temperatures: 260°C for 10 s (max)

MECHANICAL AND PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package
- TERMINALS: End caps tin-lead plated solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band where diode is to be operated with the banded end positive with respect to the opposite end for Zener regulation
- MARKING: cathode band only
- TAPE & REEL option: Standard per EIA-481-B with 12 mm tape, 2000 per 7 inch reel or 5000 per 13 inch reel (add "TR" suffix to part number)
- WEIGHT: 0.04 grams
- See package dimensions on last page

*** ELECTRICAL CHARACTERISTICS @ 30°C Lead Temperature. Lead Length 3/8".**

JEDEC Type Number**	Nominal Zener Voltage V_Z @ I_{ZT} Volts (Note 2)	Test Current I_{ZT} mA	Maximum Zener Impedance (Note 1)				Maximum Reverse Current				Max. DC Zener Current I_{ZM} (Note 3)	Typical Temp. Coeff. of Zener Voltage α_{VZ} %/°C
			Z_{ZT} @ I_{ZT} OHMS		Z_{ZK} @ $I_{ZK} = 0.25$ mA OHMS		I_R @ V_R μ A		V_R Volts			
			B, C, D Suffix	A, Non-Suffix	B, C, D Suffix	A, Non-Suffix	B, C, D Suffix	A, Non-Suffix	B, C, D Suffix	A, Non-Suffix		
1N5985BUR	2.4	5.0	100	110	1800	2000	100	100	1.0	0.5	208	-0.09
1N5986BUR	2.7	5.0	100	110	1900	2200	75	100	1.0	0.5	185	-0.075
1N5987BUR	3.0	5.0	95	100	2000	2300	50	100	1.0	0.5	167	-0.07
1N5988BUR	3.3	5.0	95	100	2200	2400	25	75	1.0	0.5	152	-0.06
1N5989BUR	3.6	5.0	90	95	2300	2500	15	50	1.0	0.5	139	-0.055
1N5990BUR	3.9	5.0	90	95	2400	2500	10	25	1.0	1.0	128	-0.045
1N5991BUR	4.3	5.0	88	90	2500	2500	5.0	15	1.0	1.0	116	-0.01
1N5992BUR	4.7	5.0	70	90	2200	2500	3.0	10	1.5	1.0	106	+0.01
1N5993BUR	5.1	5.0	50	88	2050	2500	2.0	5.0	2.0	1.0	98	+0.025
1N5994BUR	5.6	5.0	25	70	1800	2200	2.0	3.0	3.0	1.5	89	+0.035
1N5995BUR	6.2	5.0	10	50	1300	2050	1.0	2.0	4.0	2.0	81	+0.04
1N5996BUR	6.8	5.0	8.0	25	750	1800	1.0	2.0	5.2	3.0	74	+0.044
1N5997BUR	7.5	5.0	7.0	10	600	1300	0.5	1.0	6.0	4.0	67	+0.051
1N5998BUR	8.2	5.0	7.0	15	600	750	0.5	1.0	6.5	5.2	61	+0.055
1N5999BUR	9.1	5.0	10	18	600	600	0.1	0.5	7.0	6.0	55	+0.061
1N6000BUR	10	5.0	15	22	600	600	0.1	0.5	8.0	6.5	50	+0.065
1N6001BUR	11	5.0	18	25	600	600	0.1	0.1	8.4	7.0	45	+0.068
1N6002BUR	12	5.0	22	32	600	600	0.1	0.1	9.1	8.0	42	+0.073
1N6003BUR	13	5.0	25	36	600	600	0.1	0.1	9.9	8.4	38	+0.075
1N6004BUR	15	5.0	32	42	600	600	0.1	0.1	11	9.1	33	+0.079
1N6005BUR	16	5.0	36	48	600	600	0.1	0.1	12	9.9	31	+0.080
1N6006BUR	18	5.0	42	55	600	600	0.1	0.1	14	11	28	+0.083
1N6007BUR	20	5.0	48	62	600	600	0.1	0.1	15	12	25	+0.085
1N6008BUR	22	5.0	55	70	600	600	0.1	0.1	17	14	23	+0.087
1N6009BUR	24	5.0	62	78	600	600	0.1	0.1	18	15	21	+0.090
1N6010BUR	27	5.0	70	88	600	700	0.1	0.1	21	17	19	+0.091
1N6011BUR	30	5.0	78	95	600	700	0.1	0.1	23	18	17	+0.093
1N6012BUR	33	5.0	88	110	700	800	0.1	0.1	25	21	15	+0.094
1N6013BUR	36	5.0	95	130	700	900	0.1	0.1	27	23	14	+0.094
1N6014BUR	39	2.0	130	170	800	1000	0.1	0.1	30	25	13	+0.095
1N6015BUR	43	2.0	150	180	900	1100	0.1	0.1	33	27	12	+0.095
1N6016BUR	47	2.0	170	200	1000	1300	0.1	0.1	36	30	11	+0.096
1N6017BUR	51	2.0	180	225	1300	1400	0.1	0.1	39	33	9.8	+0.096
1N6018BUR	56	2.0	200	240	1400	1600	0.1	0.1	43	36	8.9	+0.096
1N6019BUR	62	2.0	225	265	1400	1700	0.1	0.1	47	39	8.0	+0.097
1N6020BUR	68	2.0	240	280	1600	2000	0.1	0.1	52	43	7.4	+0.097
1N6021BUR	75	2.0	265	300	1700	2300	0.1	0.1	56	47	6.7	+0.098
1N6022BUR	82	2.0	280	350	2000	2600	0.1	0.1	62	52	6.1	+0.098
1N6023BUR	91	2.0	300	400	2300	3000	0.1	0.1	69	56	5.5	+0.099
1N6024BUR	100	1.0	500	800	2600	4000	0.1	0.1	76	62	5.0	+0.110
1N6025BUR	110	1.0	650	950	3000	4500	0.1	0.1	84	69	4.5	+0.110
1N6026BUR	120	1.0	800	1250	4000	5000	0.1	0.1	91	76	4.2	+0.110
1N6027BUR	130	1.0	950	1400	4500	5500	0.1	0.1	99	84	3.8	+0.110
1N6028BUR	150	1.0	1250	1700	5000	6000	0.1	0.1	114	91	3.3	+0.110
1N6029BUR	160	1.0	1400	2000	5500	7000	0.1	0.1	122	99	3.1	+0.110
1N6030BUR	180	1.0	1700	2350	6000	8000	0.1	0.1	137	114	2.8	+0.110
1N6031BUR	200	1.0	2000	2700	7000	9000	0.1	0.1	152	122	2.5	+0.110

* Indicates JEDEC Registered Data. The type number without a suffix letter before "UR" indicates a 20% tolerance. For 10% tolerance, add suffix A; for 5% tolerance, add suffix B (as shown); for 2% tolerance add suffix C; for 1% tolerance, add suffix D.

** These may also be ordered as MLL5985B thru MLL6031B for the applicable part number and tolerance in this series.

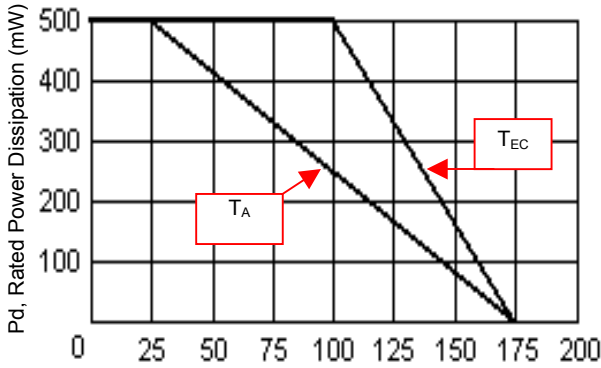
NOTES:

- Zener Impedance is derived from the 1 kHz ac voltage that results when an ac current having an rms value equal to 10% of dc zener current (I_{ZT} or I_{ZK}) is superimposed on I_{ZT} or I_{ZK} . See MicroNote 202 for dynamic impedance variation with other operating currents.
- Voltage Measurements to be performed 20 seconds after application of the dc test current.
- The maximum zener current I_{ZM} shown is for the nominal voltages. The following formula can be used to determine the worst case current for any tolerance device:

$$I_{ZM} = \frac{P}{V_{ZM}}$$

Where V_{ZM} is the high end of the voltage tolerance specified and P is the rated power of the device.

GRAPHS



T_{EC} , End Cap Temperature ($^{\circ}C$) or T_A
Ambient temperature on FR4 PC board

FIGURE 1
POWER DERATING CURVE

CAPACITANCE vs. V_Z CURVE

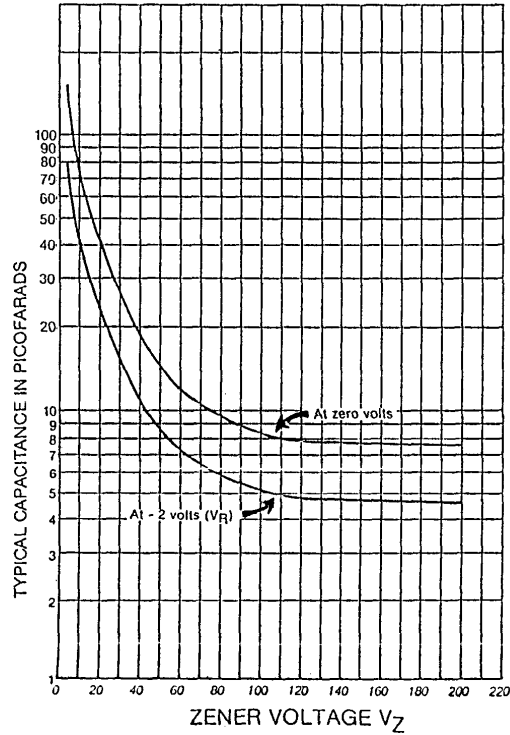
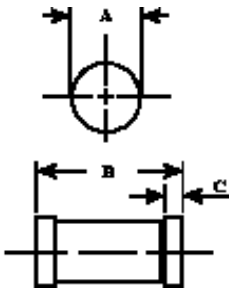
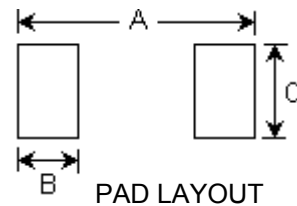


FIGURE 2
CAPACITANCE vs. ZENER VOLTAGE
(TYPICAL)

PACKAGE DIMENSIONS and PAD LAYOUT



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.063	0.067	1.60	1.70
B	0.130	0.146	3.30	3.70
C	0.016	0.022	0.41	0.55



	INCHES	mm
A	.200	5.08
B	.055	1.40
C	.080	2.03