Available on commercial versions

Axial-Leaded 500 mW Zener Diodes

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

The popular 1N5985B-1 thru 1N6031B-1 series of 0.5 watt Zener voltage regulators provides a selection from 2.4 to 200 volts in 10%, 5%, 2% and 1% tolerances. These axial-leaded, glass, DO-35 packaged Zeners are also available in various military equivalent screening levels by adding a prefix identifier as described in the "part nomenclature" section. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

Important: For the latest information, visit our website http://www.microsemi.com.



DO-35 (DO-204AH) Package

Also available in:

DO-213AA
(surface mount)
1N5985BUR-1 – 1N6031BUR-1

FEATURES

- JEDEC registered 1N5985 thru 1N6031 series.
- Similar to operating current conditions of the BZX55 Pro Electron series of Zener products in Europe.
- Multiple voltage tolerances are available (see part nomenclature).
- Internal metallurgical bonds.
- High-Reliability screened equivalents in reference to MIL-PRF-19500 are available.
- RoHS compliant versions available (commercial grade only).

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range.
- Extensive selection from 2.4 to 200 volts.
- Flexible axial-lead mounting terminals.
- Non-sensitive to ESD (MIL-STD-750, method 1020).
- Minimal capacitance (see Figure 2).
- Inherently radiation hard as described in Microsemi "MicroNote 050".

MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Power Dissipation at 25 °C (1) (Also see derating in Figure 1)	P_D	0.5	W
Junction and Storage Temperature	T_J and T_{STG}	-65 to +175	°C
Thermal Resistance Junction-to-Lead (2)	$R_{\Theta JL}$	250	°C/W
Thermal Resistance Junction-to-Ambient (3)	$R_{\Theta JA}$	310	°C/W
Forward Voltage @ 200 mA	V_F	1.1	V
Solder Temperature @ 10 s	T_{SP}	260	°C

Notes: 1. At $T_L \leq 50$ °C 3/8 inch (10 mm) from body or 0.48 W at $T_A \leq 25$ °C when mounted on FR4 PC board as described for thermal resistance above.
2. Junction to lead at 3/8 (10 mm) lead length from body.
3. 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.

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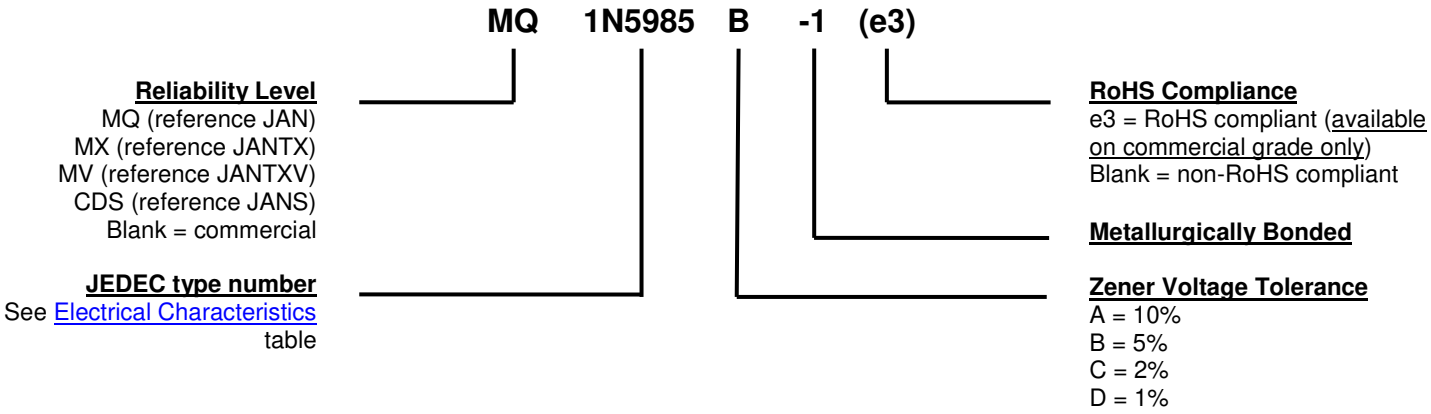
Website:
www.microsemi.com

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MECHANICAL and PACKAGING

- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204AH) package.
- TERMINALS: Tin-lead or RoHS compliant matte-tin (commercial grade only) 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). Consult factory for quantities.
- WEIGHT: 0.2 grams.
- See Package Dimensions on last page.

PART NOMENCLATURE



SYMBOLS & DEFINITIONS

Symbol	Definition
I_R	Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.
I_Z, I_{ZT}, I_{ZK}	Regulator Current: The dc regulator current (I_Z), at a specified test point (I_{ZT}), near breakdown knee (I_{ZK}).
I_{ZM}	Maximum Regulator (Zener) Current: The maximum rated dc current for the specified power rating.
V_F	Maximum Forward Voltage: The maximum forward voltage the device will exhibit at a specified current.
V_Z	Zener Voltage: The Zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region.
Z_{ZT} or Z_{ZK}	Dynamic Impedance: The small signal impedance of the diode when biased to operate in its breakdown region at a specified rms current modulation (typically 10% of I_{ZT} or I_{ZK}) and superimposed on I_{ZT} or I_{ZK} respectively.

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

JEDEC Type Number	Nominal Zener Voltage V_Z @ I_{ZT} (Note 2)	Test Current I_{ZT}	Max. Zener Impedance (Note 1)				Max. Reverse Leakage Current				Max. dc Zener Current I_{ZM} (Note 3)	Typical Temp. Coeff. of Zener Voltage
			Z_{ZT} @ I_{ZT}		Z_{ZK} @ I_{ZK} = 0.25 mA		I_R @ V_R					
			Ohms		Ohms		µA		Volts			
			B,C,D Suffix	A Suffix	B,C,D Suffix	A Suffix	B,C,D Suffix	A Suffix	B,C,D Suffix	A Suffix		
	Volts	mA									mA	α_{VZ} %/°C
1N5985B	2.4	5.0	100	110	1800	2000	100	100	1.0	0.5	208	-0.090
1N5986B	2.7	5.0	100	110	1900	2200	75	100	1.0	0.5	185	-0.075
1N5987B	3.0	5.0	95	100	2000	2300	50	100	1.0	0.5	167	-0.070
1N5988B	3.3	5.0	95	100	2200	2400	25	75	1.0	0.5	152	-0.060
1N5989B	3.6	5.0	90	95	2300	2500	15	50	1.0	0.5	139	-0.055
1N5990B	3.9	5.0	90	95	2400	2500	10	25	1.0	1.0	128	-0.045
1N5991B	4.3	5.0	88	90	2500	2500	5.0	15	1.0	1.0	116	-0.010
1N5992B	4.7	5.0	70	90	2200	2500	3.0	10	1.5	1.0	106	+0.010
1N5993B	5.1	5.0	50	88	2050	2500	2.0	5.0	2.0	1.0	98	+0.025
1N5994B	5.6	5.0	25	70	1800	2200	2.0	3.0	3.0	1.5	89	+0.035
1N5995B	6.2	5.0	10	50	1300	2050	1.0	2.0	4.0	2.0	81	+0.040
1N5996B	6.8	5.0	8.0	25	750	1800	1.0	2.0	5.2	3.0	74	+0.044
1N5997B	7.5	5.0	7.0	10	600	1300	0.5	1.0	6.0	4.0	67	+0.051
1N5998B	8.2	5.0	7.0	15	600	750	0.5	1.0	6.5	5.2	61	+0.055
1N5999B	9.1	5.0	10	18	600	600	0.1	0.5	7.0	6.0	55	+0.061
1N6000B	10	5.0	15	22	600	600	0.1	0.5	8.0	6.5	50	+0.065
1N6001B	11	5.0	18	25	600	600	0.1	0.1	8.4	7.0	45	+0.068
1N6002B	12	5.0	22	32	600	600	0.1	0.1	9.1	8.0	42	+0.073
1N6003B	13	5.0	25	36	600	600	0.1	0.1	9.9	8.4	38	+0.075
1N6004B	15	5.0	32	42	600	600	0.1	0.1	11	9.1	33	+0.079
1N6005B	16	5.0	36	48	600	600	0.1	0.1	12	9.9	31	+0.080
1N6006B	18	5.0	42	55	600	600	0.1	0.1	14	11	28	+0.083
1N6007B	20	5.0	48	62	600	600	0.1	0.1	15	12	25	+0.085
1N6008B	22	5.0	55	70	600	600	0.1	0.1	17	14	23	+0.087
1N6009B	24	5.0	62	78	600	600	0.1	0.1	18	15	21	+0.090
1N6010B	27	5.0	70	88	600	700	0.1	0.1	21	17	19	+0.091
1N6011B	30	5.0	78	95	600	700	0.1	0.1	23	18	17	+0.093
1N6012B	33	5.0	88	110	700	800	0.1	0.1	25	21	15	+0.094
1N6013B	36	5.0	95	130	700	900	0.1	0.1	27	23	14	+0.094
1N6014B	39	2.0	130	170	800	1000	0.1	0.1	30	25	13	+0.095
1N6015B	43	2.0	150	180	900	1100	0.1	0.1	33	27	12	+0.095
1N6016B	47	2.0	170	200	1000	1300	0.1	0.1	36	30	11	+0.096
1N6017B	51	2.0	180	225	1300	1400	0.1	0.1	39	33	9.8	+0.096
1N6018B	56	2.0	200	240	1400	1600	0.1	0.1	43	36	8.9	+0.096
1N6019B	62	2.0	225	265	1400	1700	0.1	0.1	47	39	8.0	+0.097
1N6020B	68	2.0	240	280	1600	2000	0.1	0.1	52	43	7.4	+0.097
1N6021B	75	2.0	265	300	1700	2300	0.1	0.1	56	47	6.7	+0.098
1N6022B	82	2.0	280	350	2000	2600	0.1	0.1	62	52	6.1	+0.098
1N6023B	91	2.0	300	400	2300	3000	0.1	0.1	69	56	5.5	+0.099
1N6024B	100	1.0	500	800	2600	4000	0.1	0.1	76	62	5.0	+0.110
1N6025B	110	1.0	650	950	3000	4500	0.1	0.1	84	69	4.5	+0.110
1N6026B	120	1.0	800	1250	4000	5000	0.1	0.1	91	76	4.2	+0.110
1N6027B	130	1.0	950	1400	4500	5500	0.1	0.1	99	84	3.8	+0.110
1N6028B	150	1.0	1250	1700	5000	6000	0.1	0.1	114	91	3.3	+0.110
1N6029B	160	1.0	1400	2000	5500	7000	0.1	0.1	122	99	3.1	+0.110
1N6030B	180	1.0	1700	2350	6000	8000	0.1	0.1	137	114	2.8	+0.110
1N6031B	200	1.0	2000	2700	7000	9000	0.1	0.1	152	122	2.5	+0.110

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NOTES:

1. Zener impedance is derived from the 1 kHz ac voltage which 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.
2. Voltage measurements to be performed 20 seconds after application of the dc test current.
3. 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

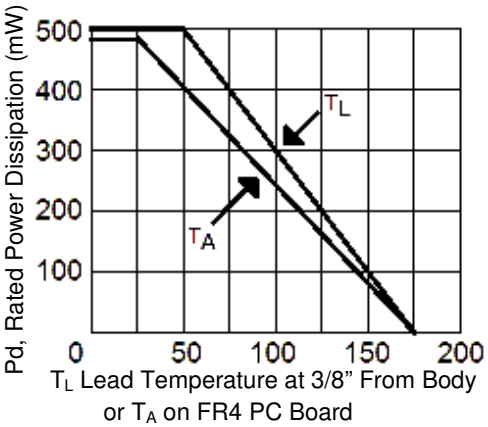


FIGURE 1
POWER DERATING CURVE

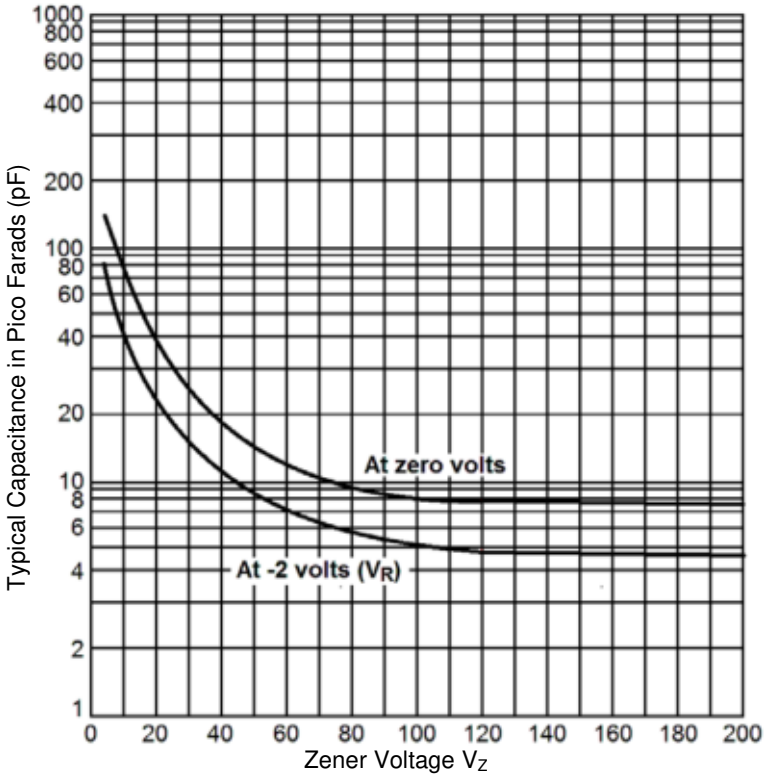
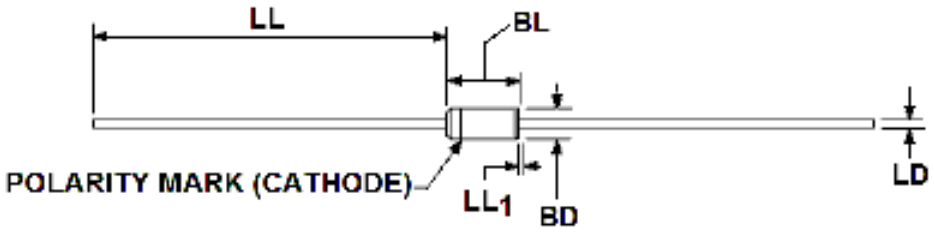


FIGURE 2
CAPACITANCE vs. ZENER VOLTAGE (TYPICAL)

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PACKAGE DIMENSIONS



Ltr	DIMENSION				Notes
	INCH		MILLIMETERS		
	Min	Max	Min	Max	
BD	.055	.090	1.40	2.29	3
BL	.120	.200	3.05	5.08	3
LD	.018	.022	0.46	0.56	
LL	1.000	1.500	25.40	38.10	
LL_1		.050		1.27	4

NOTES:

1. Dimensions are in inch.
2. Millimeters are given for general information only.
3. Package contour optional within BD and length BL. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of BD. The BL dimension shall include the entire body including slugs.
4. Within this zone lead, diameter may vary to allow for lead finishes and irregularities other than heat slugs.
5. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

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