RoHS
Available on commercial versions

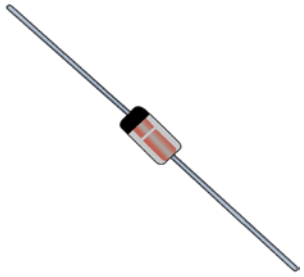
500 mW GLASS AXIAL-LEAD ZENER DIODES

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

The popular 1N5221B-1 thru 1N5281B-1 series of 0.5 watt Zener voltage regulators provides a 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, axial-leaded DO-35 Zeners are also available in various up-screening levels by adding a prefix identifier as described in the "Part Nomenclature" section of this datasheet. 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

FEATURES

- JEDEC registered 1N5221 thru 1N5281 series.
- Voltage tolerances of 10%, 5%, 2%, and 1% available.
- Internal metallurgical bond.
- Up-screening in reference to MIL-PRF-19500 is available. (See part nomenclature for all available options.)
- RoHS compliant versions available (commercial grade only).

Also available in:

DO-213AA MELF
(surface mount)
1N5221BUR-1 thru 1N5281BUR-1

APPLICATIONS / BENEFITS

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

MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +175	°C
Thermal Resistance Junction-to-Lead (1)	$R_{\Theta JL}$	250	°C/W
Thermal Resistance Junction-to-Ambient (2)	$R_{\Theta JA}$	310	°C/W
Steady-State Power Dissipation (3)	P_D	0.5	W
Forward Voltage @ 200 mA	V_F	1.5	V
Solder Temperature @ 10 s	T_{SP}	260	°C

Notes:
1. At 3/8 (10 mm) lead length from body.
2. When mounted on FR4 PC board (1 oz Cu) with 4 mm^2 copper pads and track width 1 mm, length 25 mm.
3. 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 (also see Figure1).

MSC – Lawrence
6 Lake Street,
Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland
Gort Road Business Park,
Ennis, Co. Clare, Ireland
Tel: +353 (0) 65 6840044
Fax: +353 (0) 65 6822298

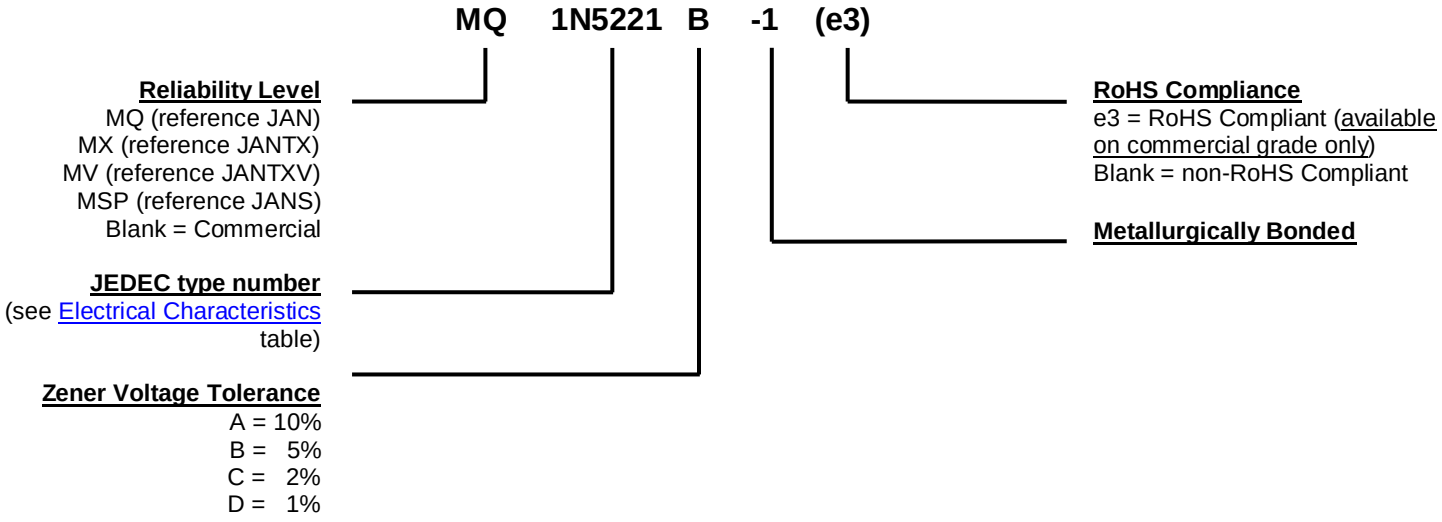
Website:
www.microsemi.com

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MECHANICAL and PACKAGING

- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204AH) package.
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating (commercial grade only) solderable per MIL-STD-750, method 2026.
- MARKING: Part number.
- POLARITY: Cathode indicated by band. Diode to be operated with the banded end positive with respect to the opposite end for Zener regulation.
- 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.
T_{SP}	Temperature Solder Pad: The maximum solder temperature that can be safely applied to the terminal.
V_R	Reverse Voltage: The reverse voltage dc value, no alternating component.
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 @ 25 °C unless otherwise noted.*

JEDEC Type No. (Note 1)	Nominal Zener Voltage V_Z @ I_{ZT}	Test Current I_{ZT}	Max Zener Impedance (Note 2)		Max Reverse Leakage Current			Max Zener Voltage Temp. Coeff. (Note 3)
			Z_{ZT} @ I_{ZT}	Z_{ZK} @ I_{ZK} = 0.25 mA	I_R	@	V_R	
						Volts		
	Volts	mA	Ohms	Ohms	µA	A	B,C & D	α_{VZ} (% / °C)
1N5221B-1	2.4	20	30	1200	100	0.95	1.0	-0.085
1N5222B-1	2.5	20	30	1250	100	0.95	1.0	-0.085
1N5223B-1	2.7	20	30	1300	75	0.95	1.0	-0.080
1N5224B-1	2.8	20	30	1400	75	0.95	1.0	-0.080
1N5225B-1	3.0	20	29	1600	50	0.95	1.0	-0.075
1N5226B-1	3.3	20	28	1600	25	0.95	1.0	-0.070
1N5227B-1	3.6	20	24	1700	15	0.95	1.0	-0.065
1N5228B-1	3.9	20	23	1900	10	0.95	1.0	-0.060
1N5229B-1	4.3	20	22	2000	5.0	0.95	1.0	+/-0.055
1N5230B-1	4.7	20	19	1900	50	1.9	2.0	+/-0.030
1N5231B-1	5.1	20	17	1600	5.0	1.9	2.0	+/-0.030
1N5232B-1	5.6	20	11	1600	5.0	2.9	3.0	+0.038
1N5233B-1	6.0	20	7.0	1600	5.0	3.3	3.5	+0.038
1N5234B-1	6.2	20	7.0	1000	5.0	3.8	4.0	+0.045
1N5235B-1	6.8	20	5.0	750	3.0	4.8	5.0	+0.050
1N5236B-1	7.5	20	6.0	500	3.0	5.7	6.0	+0.058
1N5237B-1	8.2	20	8.0	500	3.0	6.2	6.5	+0.062
1N5238B-1	8.7	20	8.0	600	3.0	6.2	6.5	+0.065
1N5239B-1	9.1	20	10	600	3.0	6.7	7.0	+0.068
1N5240B-1	10	20	17	600	3.0	7.6	8.0	+0.075
1N5241B-1	11	20	22	600	2.0	8.0	8.4	+0.076
1N5242B-1	12	20	30	600	1.0	8.7	9.1	+0.077
1N5243B-1	13	9.5	13	600	0.5	9.4	9.9	+0.079
1N5244B-1	14	9.0	15	600	0.1	9.5	10	+0.082
1N5245B-1	15	8.5	16	600	0.1	10.5	11	+0.082
1N5246B-1	16	7.8	17	600	0.1	11.4	12	+0.083
1N5247B-1	17	7.4	19	600	0.1	12.4	13	+0.084
1N5248B-1	18	7.0	21	600	0.1	13.3	14	+0.085
1N5249B-1	19	6.6	23	600	0.1	13.3	14	+0.086
1N5250B-1	20	6.2	25	600	0.1	14.3	15	+0.086
1N5251B-1	22	5.6	29	600	0.1	16.2	17	+0.087
1N5252B-1	24	5.2	33	600	0.1	17.1	18	+0.088
1N5253B-1	25	5.0	35	600	0.1	18.1	19	+0.089
1N5254B-1	27	4.6	41	600	0.1	20	21	+0.090
1N5255B-1	28	4.5	44	600	0.1	20	21	+0.091
1N5256B-1	30	4.2	49	600	0.1	22	23	+0.091
1N5257B-1	33	3.8	58	700	0.1	24	25	+0.092
1N5258B-1	36	3.4	70	700	0.1	26	27	+0.093
1N5259B-1	39	3.2	80	800	0.1	29	30	+0.094
1N5260B-1	43	3.0	93	900	0.1	31	33	+0.095
1N5261B-1	47	2.7	105	1000	0.1	34	36	+0.095
1N5262B-1	51	2.5	125	1100	0.1	37	39	+0.096
1N5263B-1	56	2.2	150	1300	0.1	41	43	+0.096
1N5264B-1	60	2.1	170	1400	0.1	44	46	+0.097
1N5265B-1	62	2.0	185	1400	0.1	45	47	+0.097
1N5266B-1	68	1.8	230	1600	0.1	49	52	+0.097
1N5267B-1	75	1.7	270	1700	0.1	53	56	+0.098
1N5268B-1	82	1.5	330	2000	0.1	59	62	+0.098
1N5269B-1	87	1.4	370	2200	0.1	65	68	+0.099
1N5270B-1	91	1.4	400	2300	0.1	66	69	+0.099
1N5271B-1	100	1.3	500	2600	0.1	72	76	+0.110
1N5272B-1	110	1.1	750	3000	0.1	80	84	+0.110
1N5273B-1	120	1.0	900	4000	0.1	86	91	+0.110
1N5274B-1	130	0.95	1100	4500	0.1	94	99	+0.110
1N5275B-1	140	0.90	1300	4500	0.1	101	106	+0.110
1N5276B-1	150	0.85	1500	5000	0.1	108	114	+0.110
1N5277B-1	160	0.80	1700	5500	0.1	116	122	+0.110
1N5278B-1	170	0.74	1900	5500	0.1	123	129	+0.110
1N5279B-1	180	0.68	2200	6000	0.1	130	137	+0.110
1N5280B-1	190	0.66	2400	6500	0.1	137	144	+0.110
1N5281B-1	200	0.65	2500	7000	0.1	144	152	+0.110

*JEDEC registered data. JEDEC type numbers listed indicate a tolerance of +/- 5%. Devices with guaranteed limits on all six parameters are indicated by suffix A for +/- 10% tolerance and suffix B for +/- 5% tolerance. Also available with suffix C or D which indicates 2% and 1% tolerance respectively.

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NOTES:

1. The electrical characteristics are measured after allowing the device to stabilize for 20 seconds when mounted with a 3/8" (10 mm) minimum lead length from the case.

2. The Zener impedance is derived from the 60 Hz ac voltage that results when an 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 two points to ensure a sharp knee on the breakdown curve, thereby eliminating unstable units. Also see "MicroNote 202" for variation in dynamic impedance with different operating currents.

3. Temperature coefficient (α_{VZ}). Test conditions for temperature coefficient are as follows:

   a. I_{ZT} = 20 mA, T_1 = 25 °C, T_2 = 125 °C (1N5221A, B thru 1N5242A, B).

   b. I_{ZT} = Rated I_{ZT}, T_1 = 25 °C, T_2 = 125 °C (1N5243A, B thru 1N5281A, B).

   (Device to be temperature stabilized with current applied prior to reading breakdown voltage at the specified ambient temp.)

GRAPHS

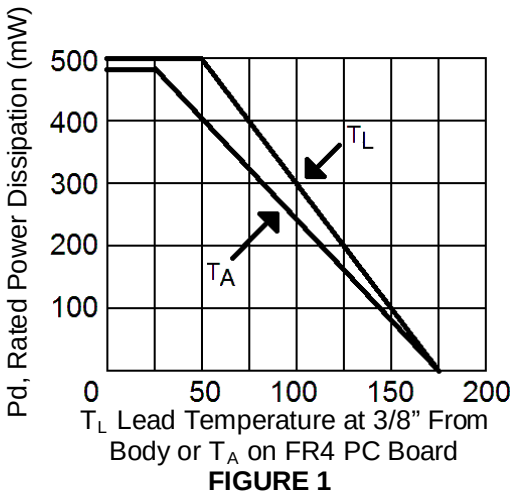


FIGURE 1
POWER DERATING CURVE

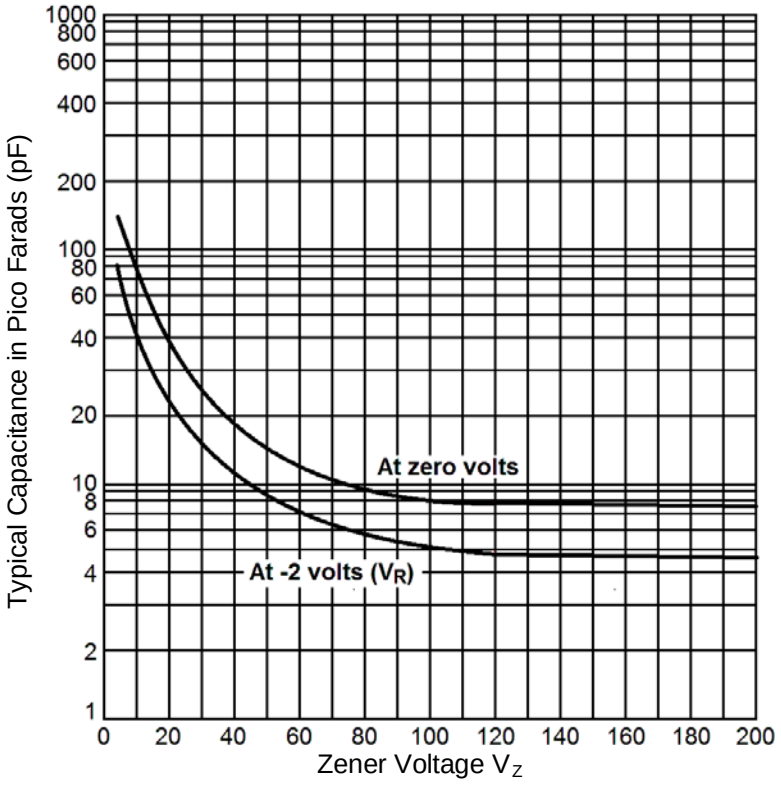
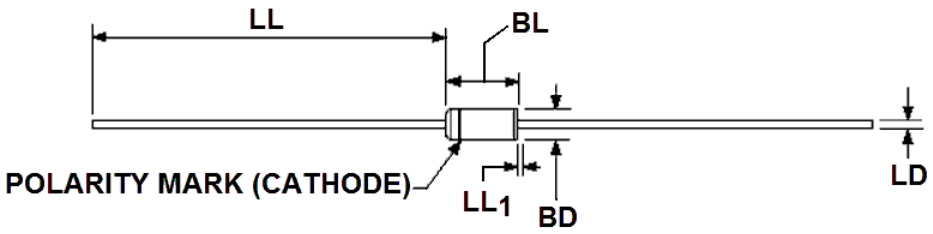


FIGURE 2
CAPACITANCE vs. ZENER VOLTAGE (TYPICAL)

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PACKAGE DIMENSIONS



Ltr	Dimensions				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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