RoHS

Available on commercial versions

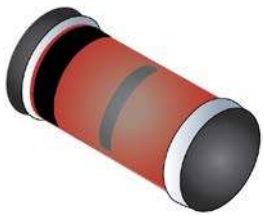
Surface Mount 500 mW Zener Diodes

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

The popular 1N5985BUR-1 thru 1N6031BUR-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 glass surface mount DO-213AA 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-213AA Package

Also available in:

DO-35 (DO204AH) (axial-leaded)
1N5985B-1 – 1N6031B-1

FEATURES

- Surface mount equivalents to JEDEC registered 1N5985 to 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.
- 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	Watts
Junction and Storage Temperature	T_J and T_{STG}	-65 to +175	°C
Thermal Resistance Junction-to-End Cap (2)	$R_{\Theta JL}$	150	°C/W
Thermal Resistance Junction-to-Ambient (2)	$R_{\Theta JA}$	300	°C/W
Forward Voltage @ 200mA	V_F	1.1	Volts
Solder Temperature @ 10 s	T_{SP}	260	°C

Notes: 1. At end cap temperatures $T_{EC} \leq 100$ °C or 0.5 watts at ambient $T_A \leq 25$ °C when mounted on FR4 PC board as described for thermal resistance.
2. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page).

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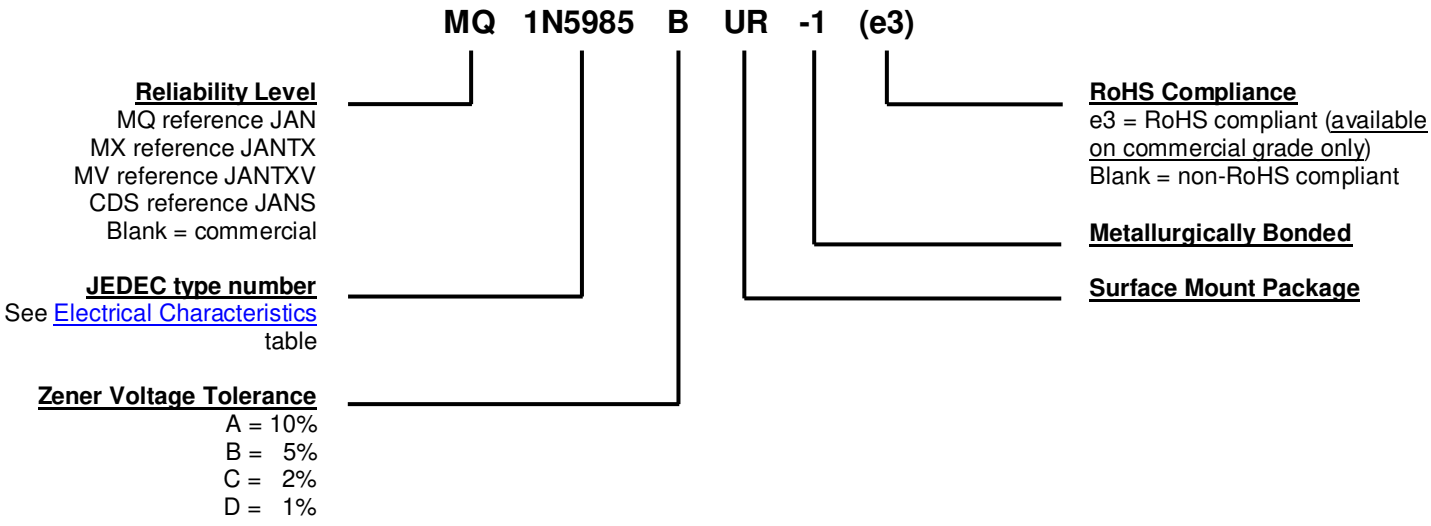
MECHANICAL and PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package.
- TERMINALS: End caps tin-lead or RoHS compliant matte-tin (commercial grade only) plating 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 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 0.04 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.

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		α_{VZ}
	Volts	mA									mA	%/°C
1N5985BUR	2.4	5.0	100	110	1800	2000	100	100	1.0	0.5	208	-0.090
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	-0.070
1N5988BUR	3.3	5.0	95	100	2200	2400	25	75	1.0	0.5	152	-0.060
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	-0.010
1N5992BUR	4.7	5.0	70	90	2200	2500	3.0	10	1.5	1.0	106	+0.010
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	+0.040
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.

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

NOTES:

1. 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.
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

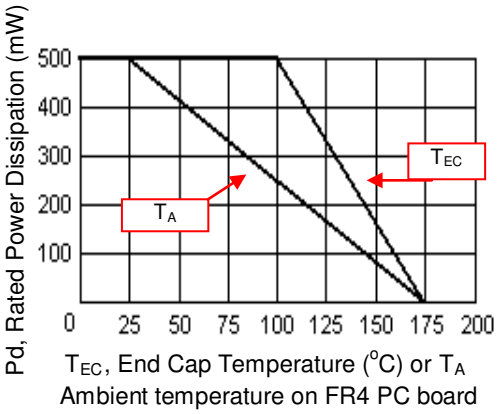


FIGURE 1

POWER DERATING CURVE

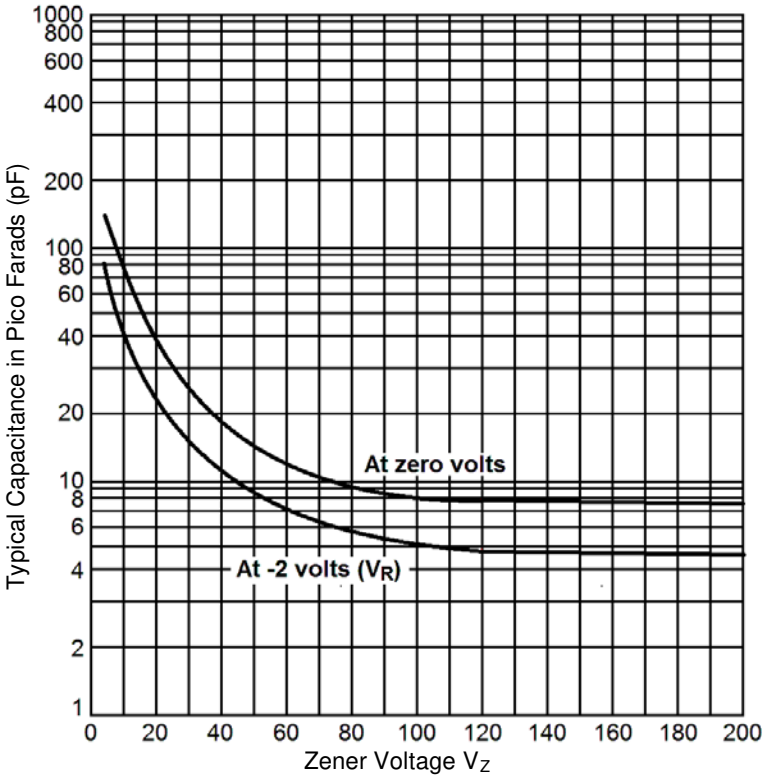
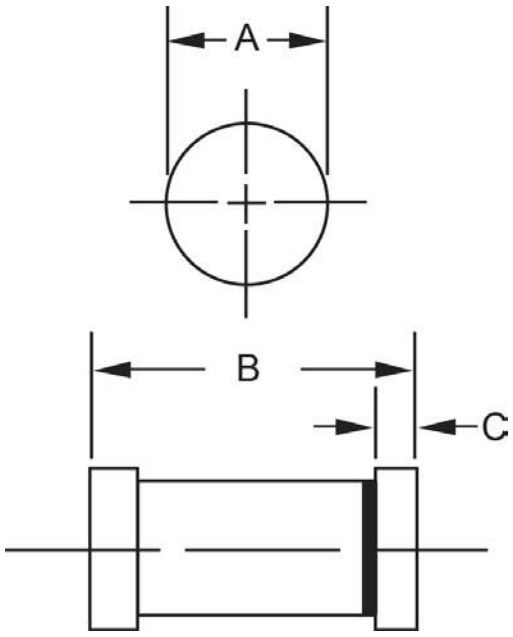


FIGURE 2

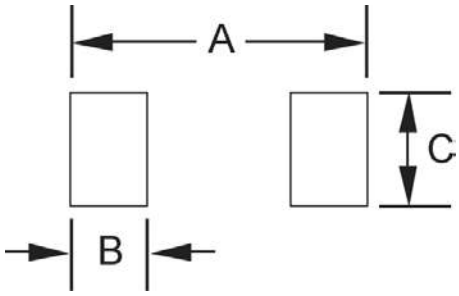
CAPACITANCE vs. ZENER VOLTAGE (TYPICAL)

PACKAGE DIMENSIONS



DIM	INCH		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

PAD LAYOUT



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