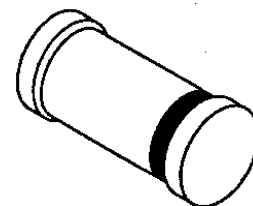


## DESCRIPTION

This surface mountable 1.5 W Zener diode series in the JEDEC DO-213AB package is similar in electrical features to the JEDEC registered 1N5913B thru 1N5956B axial-leaded package for 3.3 to 200 V. It is an ideal selection for applications of high density and low parasitic requirements. Due to its glass hermetic qualities and metallurgically enhanced internal contacts, it may also be used for high reliability applications when required by a source control drawing (SCD) or screening in accordance with MIL-PRF-19500 as described in Features below. Zener voltage tolerance options are identified by part number suffix including tight-tolerance. A variety of other Zener product offerings and packages are available by Microsemi to meet higher or lower power and test current applications.

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

## APPEARANCE



**DO-213AB**

## FEATURES

- Electrically similar to the JEDEC registered 1N5913B thru 1N5956B zener series
- Zener voltages available 3.3V to 200V
- 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, e.g. MX1N5913BUR-1, MV1N5923CUR-1, MSP1N5952DUR-1, etc.
- Surface mount equivalents also available as SMBJ5913B to SMBJ5956B, SMBG5913B to SMBG5956B, or SMAJ5913B to SMAJ5956B (see separate data sheets)
- Plastic body axial-leaded Zener equivalents are also available as 1N5913BP to 1N5956BP (see separate data sheet)

## APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range
- Wide selection from 3.3 to 200 V
- Leadless package for surface mounting
- Ideal for high density mounting
- Metallurgically enhanced internal contact design for greater reliability and lower thermal resistance
- Standard voltage tolerances are +/- 5% with B suffix and 10 % with A suffix identification
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Nonsensitive to ESD
- Hermetically sealed glass package
- Specified capacitance (see Figure 2)
- Inherently radiation hard as described in Microsemi MicroNote 050

## MAXIMUM RATINGS

- Power dissipation at 25°C: 1.5 watts (also see derating in Figure 1).
- Operating and Storage temperature: -65°C to +175°C
- Thermal Resistance: 40 °C/W junction to end cap, or 120 °C/W junction to ambient when mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page)
- Steady-State Power: 1.50 watts at  $T_{EC} \leq 115^{\circ}\text{C}$ , or 1.25 watts at  $T_A = 25^{\circ}\text{C}$  when mounted on FR4 PC board and recommended footprint as described for thermal resistance (also see Figure 1)
- Forward voltage @200 mA: 1.2 volts (maximum)
- Solder Temperatures: 260 °C for 10 s (max)

## MECHANICAL AND PACKAGING

- CASE: Hermetically sealed DO-213AB glass MELF package
- TERMINALS: End caps, tin-lead plated 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: Cathode band only
- TAPE & REEL optional: Standard per EIA-481-B with 12 mm tape, 1500 per 7 inch reel or 5000 per 13 inch reel (add "TR" suffix to part number)
- WEIGHT: 0.05 grams
- See package dimensions on last page

**ELECTRICAL CHARACTERISTICS @  $T_{EC} = 25^{\circ}\text{C}$  unless otherwise noted\***

| MICROSEMI<br>PART<br>NUMBER<br>(Note 1 & 4) | ZENER<br>VOLTAGE<br>$V_Z$<br>(Note 2) | TEST<br>CURRENT<br>$I_{ZT}$ | DYNAMIC<br>IMPEDANCE<br>$Z_{ZT}$<br>(Note 3) | KNEE<br>CURRENT<br>$I_{ZK}$ | KNEE<br>IMPEDANCE<br>$Z_{ZK}$<br>(Note 3) | REVERSE<br>CURRENT<br>$I_R$ | REVERSE<br>VOLTAGE<br>$V_R$ | MAX. DC<br>CURRENT<br>$I_{ZM}$ |
|---------------------------------------------|---------------------------------------|-----------------------------|----------------------------------------------|-----------------------------|-------------------------------------------|-----------------------------|-----------------------------|--------------------------------|
|                                             | Volts                                 | mA                          | Ohms                                         | mA                          | Ohms                                      | $\mu\text{A}$               | Volts                       | mA                             |
| 1N5913BUR-1                                 | 3.3                                   | 113.6                       | 10                                           | 1.0                         | 500                                       | 100                         | 1.0                         | 454                            |
| 1N5914BUR-1                                 | 3.6                                   | 104.2                       | 9.0                                          | 1.0                         | 500                                       | 75                          | 1.0                         | 416                            |
| 1N5915BUR-1                                 | 3.9                                   | 96.1                        | 7.5                                          | 1.0                         | 500                                       | 25                          | 1.0                         | 384                            |
| 1N5916BUR-1                                 | 4.3                                   | 87.2                        | 6.0                                          | 1.0                         | 500                                       | 5.0                         | 1.0                         | 348                            |
| 1N5917BUR-1                                 | 4.7                                   | 79.8                        | 5.0                                          | 1.0                         | 500                                       | 5.0                         | 1.5                         | 319                            |
| 1N5918BUR-1                                 | 5.1                                   | 73.5                        | 4.0                                          | 1.0                         | 350                                       | 5.0                         | 2.0                         | 294                            |
| 1N5919BUR-1                                 | 5.6                                   | 66.9                        | 2.0                                          | 1.0                         | 250                                       | 5.0                         | 3.0                         | 267                            |
| 1N5920BUR-1                                 | 6.2                                   | 60.5                        | 2.0                                          | 1.0                         | 200                                       | 5.0                         | 4.0                         | 241                            |
| 1N5921BUR-1                                 | 6.8                                   | 55.1                        | 2.5                                          | 1.0                         | 200                                       | 5.0                         | 5.2                         | 220                            |
| 1N5922BUR-1                                 | 7.5                                   | 50.0                        | 3.0                                          | 0.5                         | 400                                       | 5.0                         | 6.0                         | 200                            |
| 1N5923BUR-1                                 | 8.2                                   | 45.7                        | 3.5                                          | 0.5                         | 400                                       | 5.0                         | 6.5                         | 182                            |
| 1N5924BUR-1                                 | 9.1                                   | 41.2                        | 4.0                                          | 0.5                         | 500                                       | 5.0                         | 7.0                         | 164                            |
| 1N5925BUR-1                                 | 10                                    | 37.5                        | 4.5                                          | 0.25                        | 500                                       | 5.0                         | 8.0                         | 150                            |
| 1N5926BUR-1                                 | 11                                    | 34.1                        | 5.5                                          | 0.25                        | 550                                       | 1.0                         | 8.4                         | 136                            |
| 1N5927BUR-1                                 | 12                                    | 31.2                        | 6.5                                          | 0.25                        | 550                                       | 1.0                         | 9.1                         | 125                            |
| 1N5928BUR-1                                 | 13                                    | 28.8                        | 7.0                                          | 0.25                        | 550                                       | 1.0                         | 9.9                         | 115                            |
| 1N5929BUR-1                                 | 15                                    | 25.0                        | 9.0                                          | 0.25                        | 600                                       | 1.0                         | 11.4                        | 100                            |
| 1N5930BUR-1                                 | 16                                    | 23.4                        | 10                                           | 0.25                        | 600                                       | 1.0                         | 12.2                        | 93                             |
| 1N5931BUR-1                                 | 18                                    | 20.8                        | 12                                           | 0.25                        | 650                                       | 1.0                         | 13.7                        | 83                             |
| 1N5932BUR-1                                 | 20                                    | 18.7                        | 14                                           | 0.25                        | 650                                       | 1.0                         | 15.2                        | 75                             |
| 1N5933BUR-1                                 | 22                                    | 17.0                        | 17.5                                         | 0.25                        | 650                                       | 1.0                         | 16.7                        | 68                             |
| 1N5934BUR-1                                 | 24                                    | 15.6                        | 19                                           | 0.25                        | 700                                       | 1.0                         | 18.2                        | 62                             |
| 1N5935BUR-1                                 | 27                                    | 13.9                        | 23                                           | 0.25                        | 700                                       | 1.0                         | 20.6                        | 55                             |
| 1N5936BUR-1                                 | 30                                    | 12.5                        | 28                                           | 0.25                        | 750                                       | 1.0                         | 22.8                        | 50                             |
| 1N5937BUR-1                                 | 33                                    | 11.4                        | 33                                           | 0.25                        | 800                                       | 1.0                         | 25.1                        | 45                             |
| 1N5938BUR-1                                 | 36                                    | 10.4                        | 38                                           | 0.25                        | 850                                       | 1.0                         | 27.4                        | 41                             |
| 1N5939BUR-1                                 | 39                                    | 9.6                         | 45                                           | 0.25                        | 900                                       | 1.0                         | 29.7                        | 38                             |
| 1N5940BUR-1                                 | 43                                    | 8.7                         | 53                                           | 0.25                        | 950                                       | 1.0                         | 32.7                        | 34                             |
| 1N5941BUR-1                                 | 47                                    | 8.0                         | 67                                           | 0.25                        | 1000                                      | 1.0                         | 35.8                        | 31                             |
| 1N5942BUR-1                                 | 51                                    | 7.3                         | 70                                           | 0.25                        | 1100                                      | 1.0                         | 38.8                        | 29                             |
| 1N5943BUR-1                                 | 56                                    | 6.7                         | 86                                           | 0.25                        | 1300                                      | 1.0                         | 42.6                        | 26                             |
| 1N5944BUR-1                                 | 62                                    | 6.0                         | 100                                          | 0.25                        | 1500                                      | 1.0                         | 47.1                        | 24                             |
| 1N5945BUR-1                                 | 68                                    | 5.5                         | 120                                          | 0.25                        | 1700                                      | 1.0                         | 51.2                        | 22                             |
| 1N5946BUR-1                                 | 75                                    | 5.0                         | 140                                          | 0.25                        | 2000                                      | 1.0                         | 56.0                        | 20                             |
| 1N5947BUR-1                                 | 82                                    | 4.6                         | 160                                          | 0.25                        | 2500                                      | 1.0                         | 62.2                        | 18                             |
| 1N5948BUR-1                                 | 91                                    | 4.1                         | 200                                          | 0.25                        | 3000                                      | 1.0                         | 69.2                        | 16                             |
| 1N5949BUR-1                                 | 100                                   | 3.7                         | 250                                          | 0.25                        | 3100                                      | 1.0                         | 76.0                        | 15                             |
| 1N5950BUR-1                                 | 110                                   | 3.4                         | 300                                          | 0.25                        | 4000                                      | 1.0                         | 83.6                        | 13                             |
| 1N5951BUR-1                                 | 120                                   | 3.1                         | 380                                          | 0.25                        | 4500                                      | 1.0                         | 91.2                        | 12                             |
| 1N5952BUR-1                                 | 130                                   | 2.9                         | 450                                          | 0.25                        | 5000                                      | 1.0                         | 98.9                        | 11                             |
| 1N5953BUR-1                                 | 150                                   | 2.5                         | 600                                          | 0.25                        | 6000                                      | 1.0                         | 114.0                       | 10                             |
| 1N5954BUR-1                                 | 160                                   | 2.3                         | 700                                          | 0.25                        | 6500                                      | 1.0                         | 121.6                       | 9                              |
| 1N5955BUR-1                                 | 180                                   | 2.1                         | 900                                          | 0.25                        | 7000                                      | 1.0                         | 136.8                       | 8                              |
| 1N5956BUR-1                                 | 200                                   | 1.9                         | 1200                                         | 0.25                        | 8000                                      | 1.0                         | 152.0                       | 7                              |

\*  $T_{EC}$  Maintained at  $30^{\circ}\text{C}$ ,  $V_F = 1.2\text{V}$  max @  $I_F = 200\text{ mA}$  (all types).

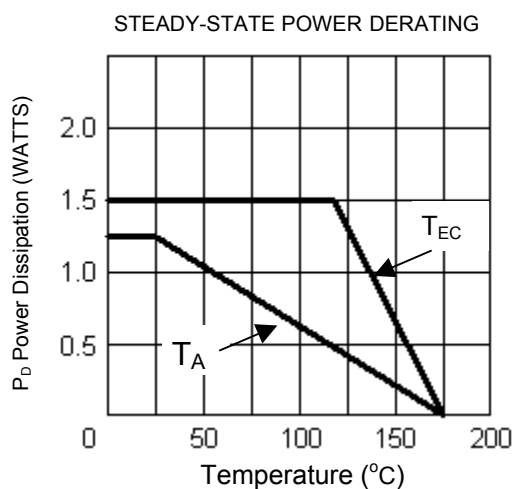
**NOTE 1:** No suffix indicates a  $\pm 20\%$  tolerance on nominal  $V_Z$ . The suffix A denotes  $\pm 10\%$ , the standard suffix B denotes  $\pm 5\%$ , C denotes  $\pm 2\%$ , and D denotes  $\pm 1\%$  tolerance.

**NOTE 2:** Zener voltage ( $V_Z$ ) is measured at end cap temperatures  $T_{EC} = 30^{\circ}\text{C}$ . Voltage measurement to be performed 90 seconds after application of dc current.

**NOTE 3:** The zener impedance is derived from the 60 Hz ac voltage, which 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  $I_{ZK}$ .

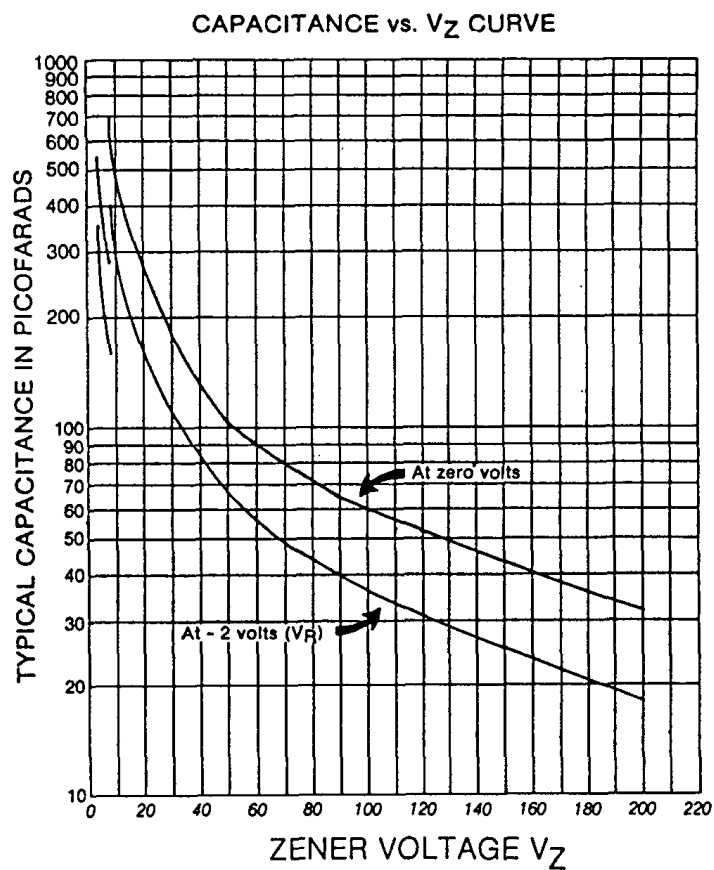
**NOTE 4:** This product series has also been previously identified as the MLL5913B thru MLL5956B series that included the enhanced metallurgical bond. This alternate name may still be used.

## GRAPHS



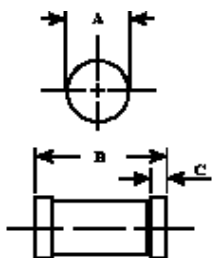
**FIGURE 1**

Power Derating Curve Where  $T_{EC}$  is End Cap Temp and  $T_A$  is Ambient Temperature on FR4 PC board.

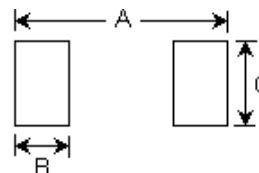


**FIGURE 2**

## PACKAGE DIMENSIONS



| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.094  | 0.105 | 2.39        | 2.66 |
| B   | 0.189  | 0.205 | 4.80        | 5.20 |
| C   | 0.016  | 0.022 | 0.41        | 0.55 |



**PAD LAYOUT**

|   | INCHES | mm   |
|---|--------|------|
| A | .276   | 7.00 |
| B | 0.070  | 1.8  |
| C | 0.110  | 2.8  |