

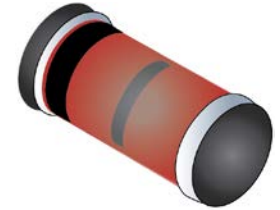


Metallurgically Bonded Glass Surface Mount 1.5 Watt Zener Diodes

Screening in
reference to
MIL-PRF-19500
available

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 through 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.



**DO-213AB MELF
Package**

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


FEATURES

- Surface mount equivalent of JEDEC registered 1N5913B TO 1N5956B number series.
- Zener voltage available 3.3 V to 200 V.
- Voltage tolerances of 10%, 5%, 2% and 1% are available.
- Screening in reference to MIL-PRF-19500 is available.
(See [part nomenclature](#) for all available options.)
- RoHS compliant versions are available.

Also available in:

DO-41 package

(glass axial-leaded)

 [1N5913BG – 1N5956BG](#)

SMB package

(tabbed surface mount)

 [SMBG\(J\)5913B –
SMBG\(J\)5956E](#)

SMAJ package

(tabbed surface mount)

 [SMAJ5913B –
SMAJ5956E](#)

Powermite package

(tabbed surface mount)

 [1PMT5913B –
1PMT5956E](#)

APPLICATIONS / BENEFITS

- Regulates voltage over a broad ranges of operation current and temperature.
- Leadless package ideal for high-density surface mounting.
- Metallurgically enhanced internal contact design for greater reliability and lower thermal resistance.
- Hermetically sealed glass package.
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Specified capacitance (see [figure 2](#)).
- Inherently radiation hard as described in Microsemi [MicroNote 050](#).

MAXIMUM RATINGS @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Parameters/Test Conditions | Symbol | Value | Unit |
|---|-------------------|-------------|--------------------|
| Junction and Storage Temperature | T_J & T_{STG} | -65 to +175 | $^\circ\text{C}$ |
| Thermal Resistance Junction-to-End Cap | $R_{\theta JEC}$ | 40 | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Ambient ⁽¹⁾ | $R_{\theta JA}$ | 120 | $^\circ\text{C/W}$ |
| Steady State Power Dissipation @ $T_{EC} \leq 115^\circ\text{C}$ @ $T_A = 25^\circ\text{C}$ ⁽¹⁾ | P_D | 1.5 1.25 | W |
| Rated Average Power Dissipation (also see figure 1) | $P_{M(AV)}$ | 1.5 | W |
| Forward Voltage @ 200 mA | V_F | 1.2 | V |
| Solder Temperature @ 10 s | T_{SP} | 260 | $^\circ\text{C}$ |

Notes: 1. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page).

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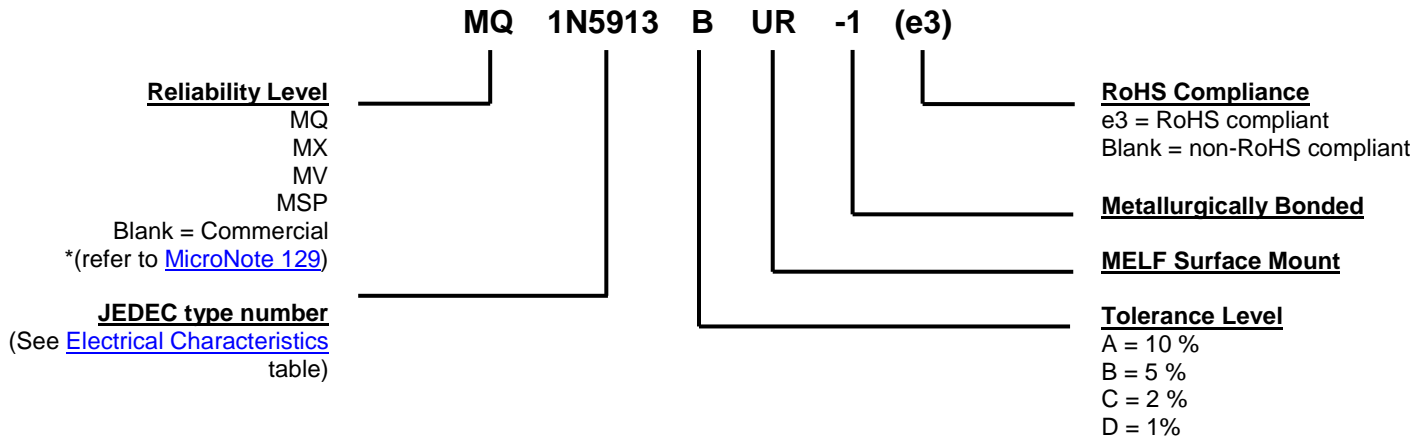
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MECHANICAL and PACKAGING

- CASE: Hermetically sealed voidless hard glass with tungsten slugs.
- TERMINALS: Tin/lead or RoHS compliant matte/tin plating over copper. Solderable per MIL-STD-750, method 2026.
- MARKING: Cathode band only.
- 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-481-B with 12mm tape (add TR suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.05 grams.
- See [package dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|-----------------------|---|
| V_Z | Zener Voltage: The Zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region. |
| 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}). |
| Z_{ZT} or Z_{ZK} | Regulator Impedance: The small signal impedance of the diode when biased to operate in its breakdown region with I_{ZT} applied at I_Z or I_{ZK} respectively. This has also been known as Zener or dynamic impedance (Z_{ZT} or Z_{ZK}). |
| V_F | Forward Voltage: The positive dc anode-cathode voltage the device will exhibit at a specified forward current. |
| I_R | Reverse Current: The dc current flowing from the external circuit into the cathode terminal at the specified voltage V_R . |
| I_{ZM} | Maximum Regulator (Zener) Current: The maximum rated dc current for the specified power rating. |

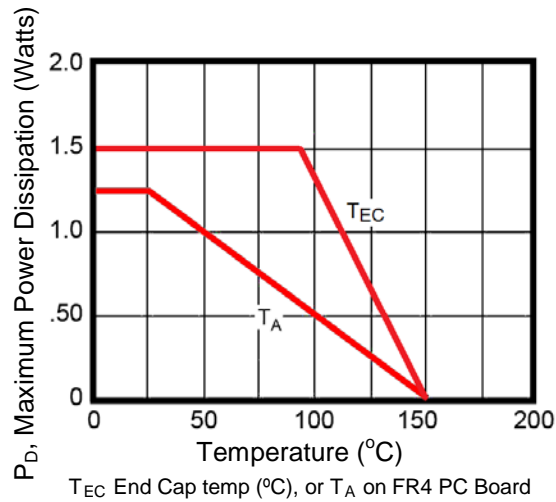
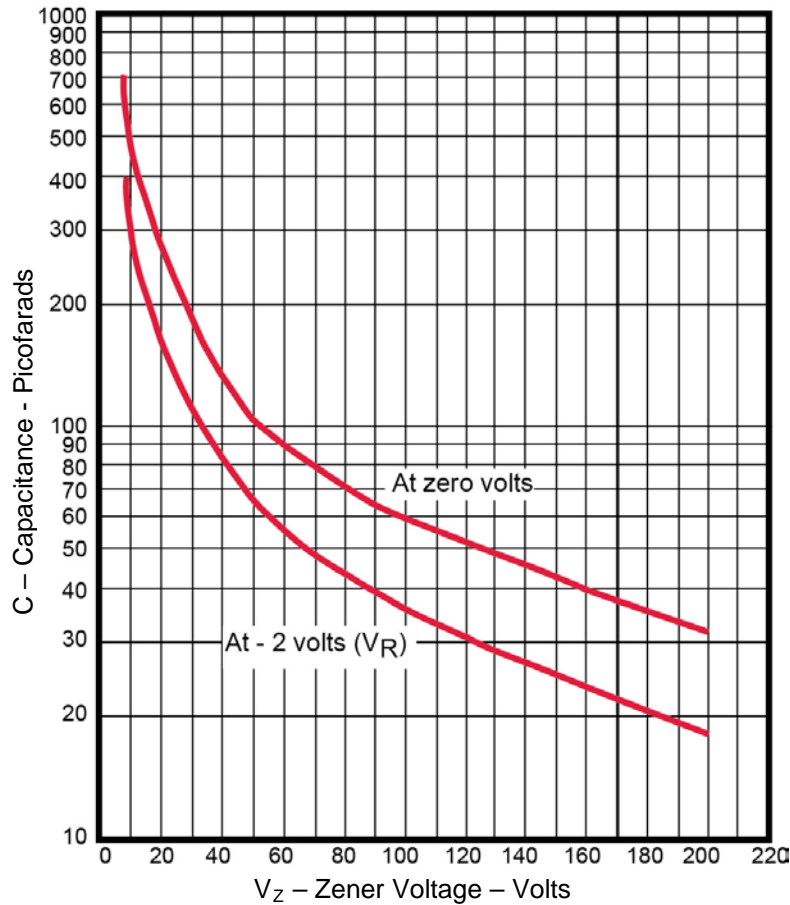
ELECTRICAL CHARACTERISTICS @ $T_{EC} = 25\text{ }^{\circ}\text{C}$ unless otherwise noted

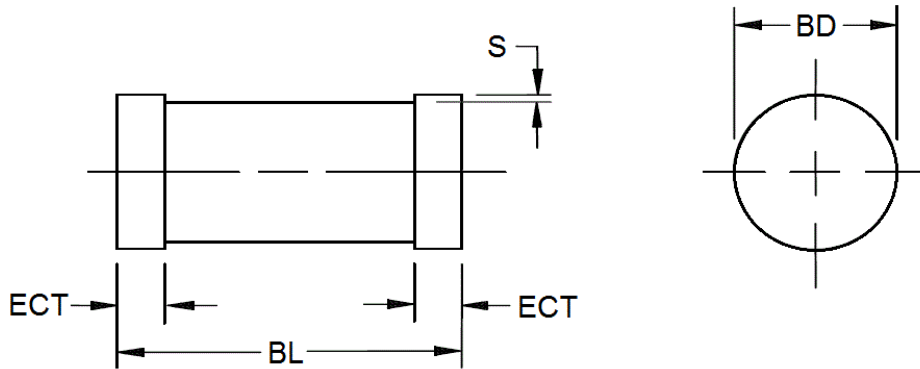
| PART NUMBER (Note 3) | ZENER VOLTAGE V_Z (Note 1) | TEST CURRENT I_{ZT} | DYNAMIC IMPEDANCE Z_{ZT} (Note 2) | KNEE CURRENT I_{ZK} | KNEE IMPEDANCE Z_{ZK} (Note 2) | REVERSE CURRENT I_R | REVERSE VOLTAGE V_R | MAX. DC CURRENT I_{ZM} |
|-------------------------|------------------------------------|--------------------------|---|--------------------------|--|--------------------------|--------------------------|-----------------------------|
| | Volts | mA | Ohms | mA | Ohms | μA | 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 $30\text{ }^{\circ}\text{C}$, $V_F = 1.2\text{ V}$ max @ $I_F = 200\text{ mA}$ (all types).

NOTES:

- Zener voltage (V_Z) is measured at end cap temperatures $T_{EC} = 30\text{ }^{\circ}\text{C}$. Voltage measurement to be performed 90 seconds after application of dc current.
- 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} .
- This product series has also been previously identified as the CDLL5913B through CDLL5956B series that included the enhanced metallurgical bond. This alternate name may still be used.

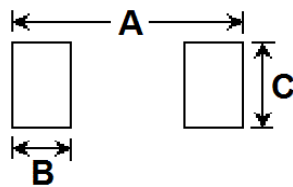
GRAPHS

FIGURE 1 – Power Derating Curve

FIGURE 2 – Capacitance vs Zener Voltage

PACKAGE DIMENSIONS


| Symbol | Dimensions | | | |
|------------|------------|-------|-------------|-------|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| BD | 0.094 | 0.105 | 2.39 | 2.67 |
| BL | 0.189 | 0.205 | 4.80 | 5.21 |
| ECT | 0.014 | 0.022 | 0.360 | 0.560 |
| S | 0.001 min | | 0.03 min | |

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Gap not controlled, shape of body and gap not controlled.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

PAD LAYOUT


| Ltr | Inch | mm |
|----------|-------|------|
| A | 0.276 | 7.00 |
| B | 0.070 | 1.8 |
| C | 0.110 | 2.8 |