*Available on commercial versions*

# Silicon MELF 500 mW Zener Diodes

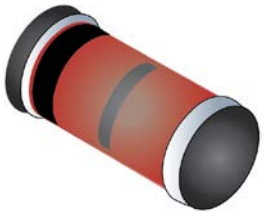
***Qualified per MIL-PRF-19500/127***

*Qualified Levels: JAN, JANTX, and JANTXV*

## DESCRIPTION

This popular series of 500 mW Zener voltage regulators provides a selection from 2.4 to 12 volts in a standard 5% tolerance as well as available tighter 2% and 1% tolerances. These glass, surface mount DO-213AA Zeners feature an internal metallurgical bond and are military qualified to the JAN, JANTX, and JANTXV level. A RoHS compliant commercial grade only version is also available.

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



**DO-213AA MELF Package**

## FEATURES

- JEDEC registered 1N746 through 1N759A and 1N4370 through 1N4372A series.
- Standard voltage tolerance is ± 5% with optional tighter tolerances of ± 2% or 1%.
- Internal metallurgical bond.
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/127.
  (See part nomenclature for all available options.)
- RoHS compliant versions available (commercial grade only).
- These commercial surface mount equivalents were also previously identified with a CDLL or MLL prefix instead of the "1N" prefix.

Also available in:

**DO-35 (DO-204AH) package**
(axial-leaded)
**1N746A-1 – 1N759A-1 and 1N4370A-1 – 1N4372A-1**

## APPLICATIONS / BENEFITS

- Regulates voltage over a broad range of temperature and current.
- Regulated voltage range from 2.4 to 12 V.
- Small size for high density mounting using the surface mount method (see package illustration).
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Minimal capacitance.
- Inherently radiation hard as described in Microsemi MicroNote 050.

## MAXIMUM RATINGS

| Parameters/Test Conditions | Symbol | Value | Unit |
|---|---|---|---|
| Operating and Storage Temperature | $T_J$ and $T_{STG}$ | -65 to +175 | ºC |
| Thermal Resistance Junction-to-End Cap | $R_{\Theta JEC}$ | 100 | ºC/W |
| Thermal Resistance Junction-to-Ambient when mounted on PCB (1) | $R_{\Theta JA}$ | 300 | ºC/W |
| Average Rated Power Dissipation<br>@ $T_{EC}$ = +125°C (2)<br>@ $T_A$ = 55°C mounted on PCB | $P_{M(AV)}$ | 0.5<br>0.4 | W |
| Forward Voltage @ $I_F$ = 200 mA | $V_F$ | 1.1 | V |
| Solder Temperature @ 10 s | | 260 | °C |

**NOTES:**
1. See Figure 1 for derating curves. $T_A$ = +75 °C on an FR4 PC board with 1 oz copper metalization.
2. The 0.5 W linearly derates starting at $T_{EC}$ = 125 °C and goes to zero at 175 °C. For ambient $T_A$ condition on a typical PC board, it linearly derates from 400 mW starting at 55 °C and goes to zero at 175 °C (see Figure2).

**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

## MECHANICAL and PACKAGING

- CASE: Hermetically sealed glass case package.
- TERMINALS: Tin/lead plated or RoHS compliant matte-tin (on commercial grade only) over copper clad steel. Solderable per MIL-STD-750, method 2026.
- POLARITY: Cathode end is banded.
- MOUNTING: The axial coefficient of expansion (COE) of this device is approximately +6PPM/°C. The COE of the mounting surface system should be selected to provide a suitable match with this device.
- MARKING: Part number.
- TAPE & REEL option: Standard per EIA-296. Consult factory for quantities.
- WEIGHT: Approximately 0.04 grams.
- See Package Dimensions on last page.

## PART NOMENCLATURE

**JAN 1N746 A UR -1 (e3)**

**Reliability Level**
JAN = JAN level
JANTX = JANTX level
JANTXV = JANTXV level
Blank = Commercial

**JEDEC type number**
(see Electrical Characteristics table)

**Zener Voltage Tolerance**
A = 5%
C = 2%
D = 1%

**RoHS Compliance**
e3 = RoHS compliant (available on commercial grade only)
Blank = non-RoHS compliant

**Metallurgically Bonded**

**Surface Mount Package type**

## 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. |
| $I_{ZSM}$ | Maximum Zener Surge Current: The non-repetitive peak value of Zener surge current at a specified wave form. |
| $V_F$ | Maximum Forward Voltage: The maximum forward voltage the device will exhibit at a specified current. |
| $V_R$ | 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. |

## ELECTRICAL CHARACTERISTICS @ 25 ºC

| JEDEC TYPE NO. (NOTE 1) | NOMINAL ZENER VOLTAGE $V_Z$ @ $I_{ZT}$ (NOTE 2) | MAXIMUM ZENER IMPEDANCE $Z_{ZT}$ @ $I_{ZT}$ (NOTE 3) | REVERSE VOLTAGE $V_R$ | MAXIMUM REVERSE CURRENT $I_R$ @ $V_R$ | | MAXIMUM ZENER CURRENT $I_{ZM}$ (NOTE 4) | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE $\alpha_{VZ}$ |
|---|---|---|---|---|---|---|---|
| | | | | @ 25 °C | @ +150 °C | | |
| | Volts | Ohms | Volts | µA | µA | mA | % / °C |
| 1N4370A-1 | 2.4 | 30 | 1.0 | 100 | 200 | 155 | -0.085 |
| 1N4371A-1 | 2.7 | 30 | 1.0 | 60 | 150 | 140 | -0.080 |
| 1N4372A-1 | 3.0 | 29 | 1.0 | 30 | 100 | 125 | -0.075 |
| 1N746A-1 | 3.3 | 24 | 1.0 | 5 | 30 | 120 | -0.070 |
| 1N747A-1 | 3.6 | 22 | 1.0 | 3 | 30 | 110 | -0.065 |
| 1N748A-1 | 3.9 | 20 | 1.0 | 2 | 30 | 100 | -0.060 |
| 1N749A-1 | 4.3 | 18 | 1.0 | 2 | 50 | 90 | -0.055 / +.020 |
| 1N750A-1 | 4.7 | 15 | 1.5 | 5 | 50 | 85 | -0.043 / +.025 |
| 1N751A-1 | 5.1 | 14 | 2.0 | 5 | 50 | 75 | -0.030 / +.030 |
| 1N752A-1 | 5.6 | 8 | 2.5 | 5 | 50 | 70 | -0.028 / +.036 |
| 1N753A-1 | 6.2 | 3 | 3.5 | 5 | 50 | 65 | +0.045 |
| 1N754A-1 | 6.8 | 3 | 4.0 | 2 | 50 | 60 | +0.050 |
| 1N755A-1 | 7.5 | 4 | 5.0 | 2 | 50 | 55 | +0.058 |
| 1N756A-1 | 8.2 | 5 | 6.0 | 1 | 50 | 50 | +0.062 |
| 1N757A-1 | 9.1 | 6 | 7.0 | 1 | 50 | 45 | +0.068 |
| 1N758A-1 | 10.0 | 7 | 8.0 | 1 | 50 | 40 | +0.076 |
| 1N759A-1 | 12.0 | 10 | 9.0 | 1 | 50 | 35 | +0.080 |

**NOTES:**

1 The JEDEC type numbers shown (A suffix) have a ± 5% tolerance on nominal Zener voltage.

2. Voltage measurements to be performed 20 seconds after application of dc test current.

3. Zener impedance derived by superimposing on $I_{ZT}$, a 60 cps, rms current equal to 10% $I_{ZT}$ (20 mA). See MicroNote 202 for typical Zener Impedance variation with different operating currents.

4. Allowance has been made for the increase in $V_Z$ due to $Z_Z$ and for the increase in junction temperature as the unit approaches thermal equilibrium at the power dissipation of 400mW.

## GRAPHS

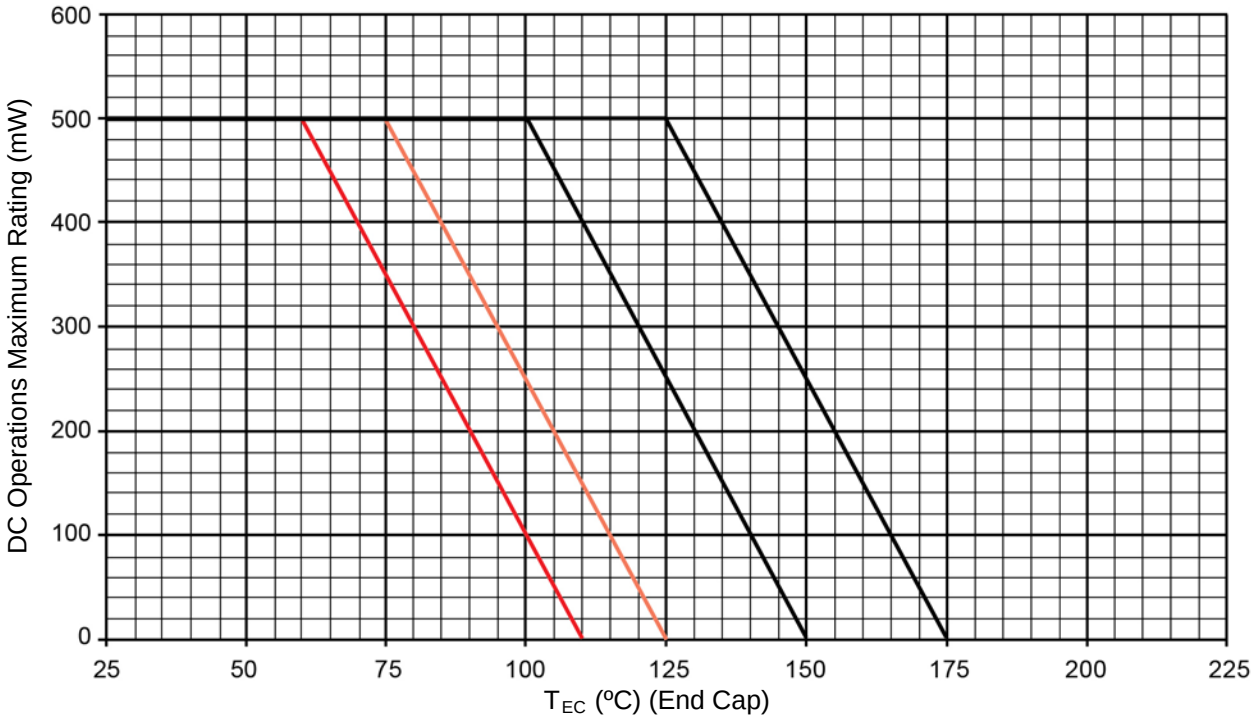



**FIGURE 1**
Temperature-Power Derating Curve

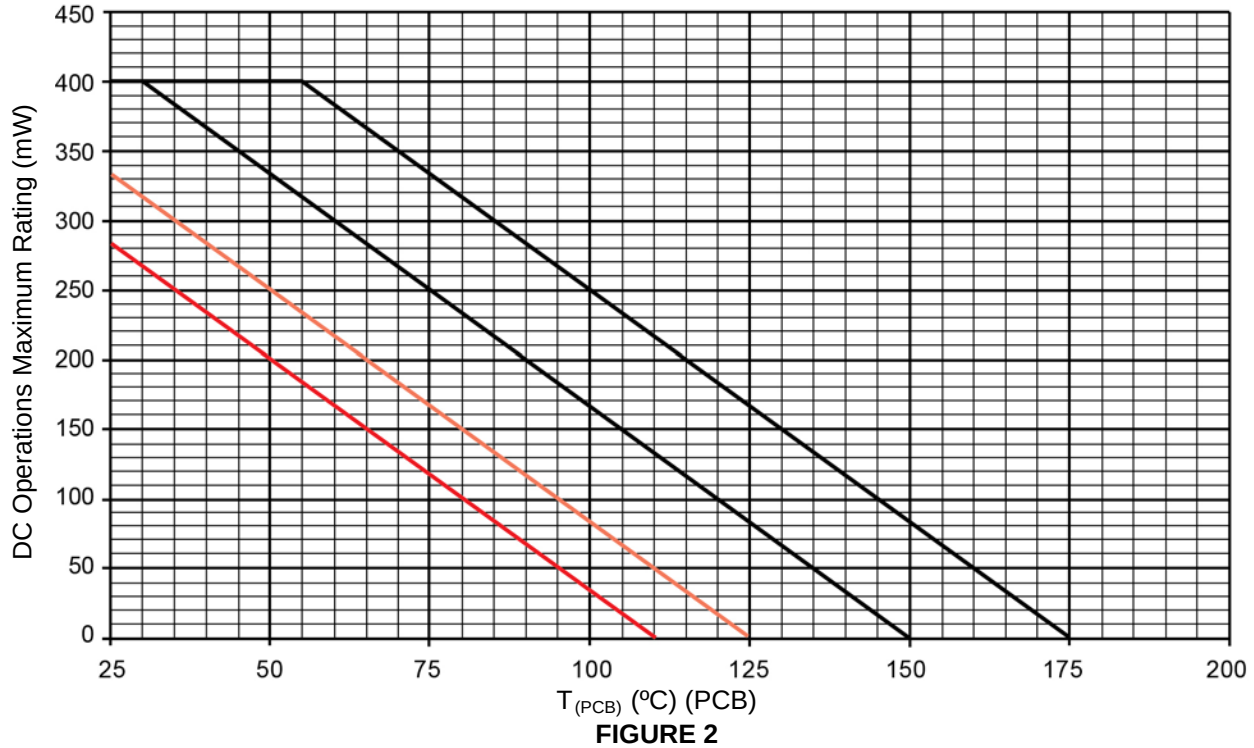



**FIGURE 2**
Temperature-Power Derating Curve

## GRAPHS (continued)

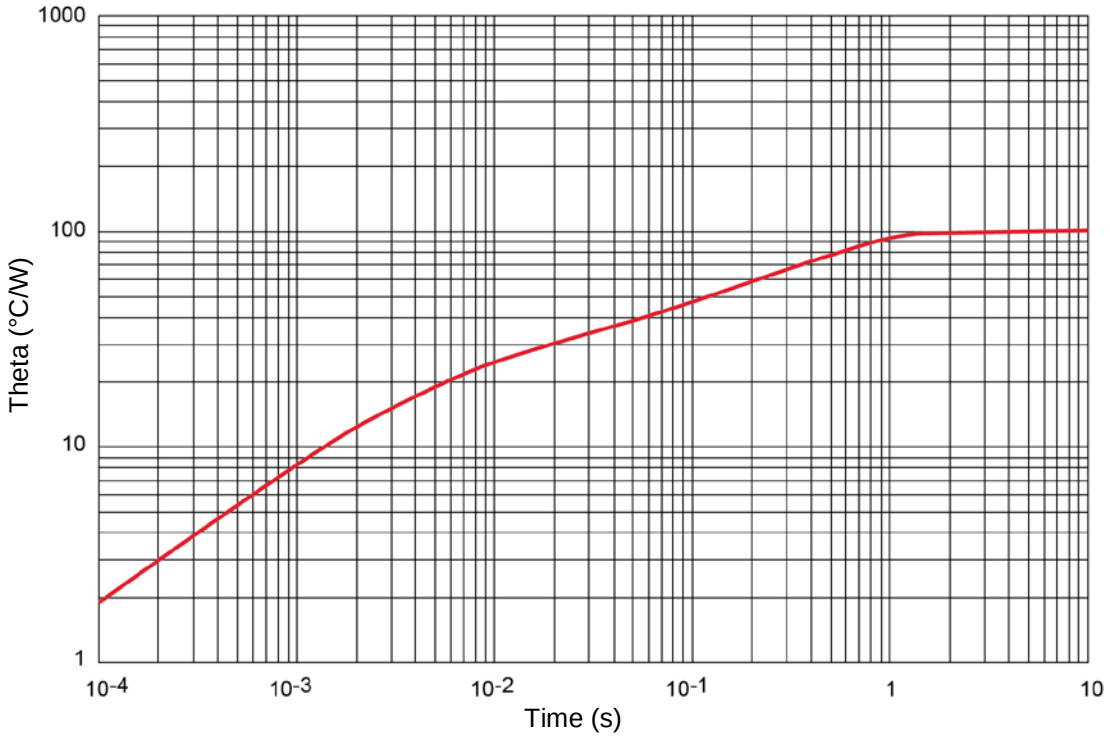
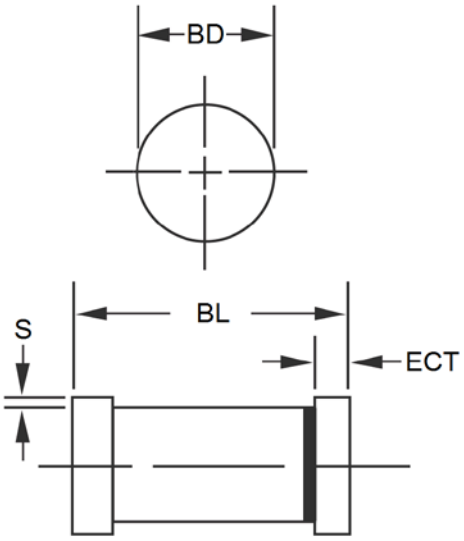



**FIGURE 3**
Thermal Impedance To End Cap

## PACKAGE DIMENSIONS

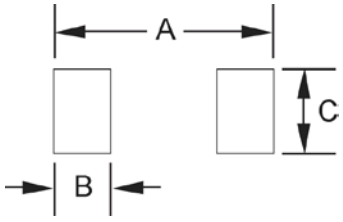



| DIM | INCH | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| BD | 0.063 | 0.067 | 1.60 | 1.70 |
| BL | 0.130 | 0.146 | 3.30 | 3.71 |
| ECT | 0.016 | 0.022 | 0.41 | 0.56 |
| S | 0.001 min | | 0.03 min | |

**NOTES:**

1. Dimensions are in inches. Millimeters are given for information only.
2. Dimensions are pre-solder dip.
3. Referencing to dimension S, minimum clearance of glass body to mounting surface on all orientations.
4. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

## PAD LAYOUT




| | INCH | mm |
|---|---|---|
| A | 0.200 | 5.08 |
| B | 0.055 | 1.40 |
| C | 0.080 | 2.03 |

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