



Silicon MELF 500 mW Zener Diodes

Qualified per MIL-PRF-19500/127

Qualified Levels:
JAN, JANTX, and
JANTXV

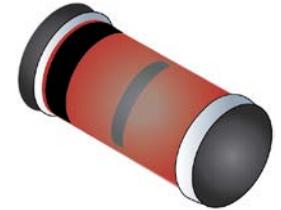
DESCRIPTION

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.

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FEATURES


- JEDEC registered 1N746 through 1N759A and 1N4370 through 1N4372A series.
- Standard voltage tolerance is $\pm 5\%$ with optional tighter tolerances of $\pm 2\%$ 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.



DO-213AA MELF Package

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 | $^{\circ}C$ |
| Thermal Resistance Junction-to-End Cap | $R_{\theta JEC}$ | 100 | $^{\circ}C/W$ |
| Thermal Resistance Junction-to-Ambient when mounted on PCB ⁽¹⁾ | $R_{\theta JA}$ | 300 | $^{\circ}C/W$ |
| Average Rated Power Dissipation @ $T_{EC} = +125^{\circ}C$ ⁽²⁾ @ $T_A = 55^{\circ}C$ mounted on PCB | $P_{M(AV)}$ | 0.5 0.4 | W |
| Forward Voltage @ $I_F = 200$ mA | V_F | 1.1 | V |
| Solder Temperature @ 10 s | | 260 | $^{\circ}C$ |

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

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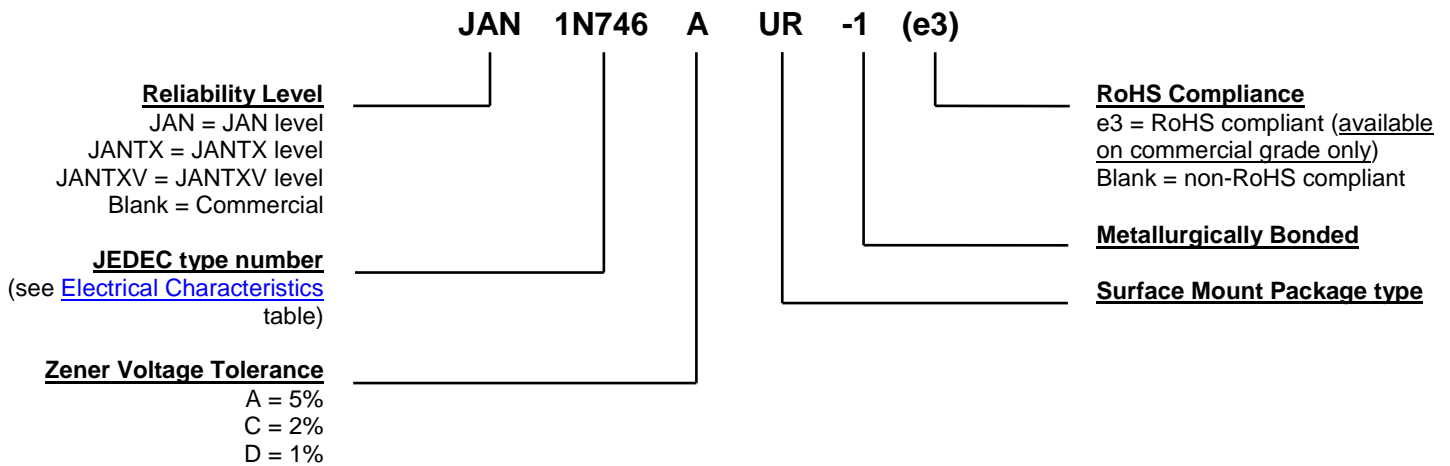
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MECHANICAL and PACKAGING

- 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

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 °C

| 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 α_{VZ} |
|-------------------------------|---|--|-----------------------------|---|-----------|---|--|
| | | | | @ 25 °C | @ +150 °C | | |
| | | | | μA | μA | | |
| | Volts | Ohms | Volts | | | 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 $\pm 5\%$ 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.

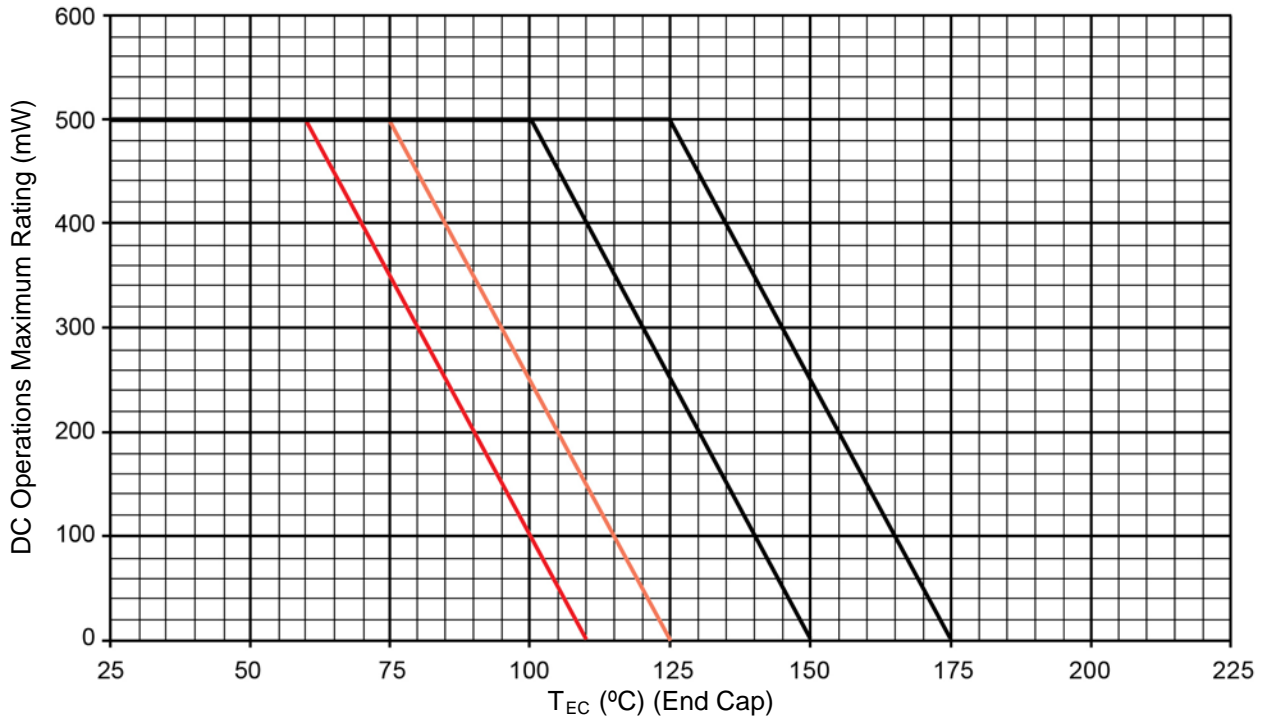
GRAPHS


FIGURE 1
Temperature-Power Derating Curve

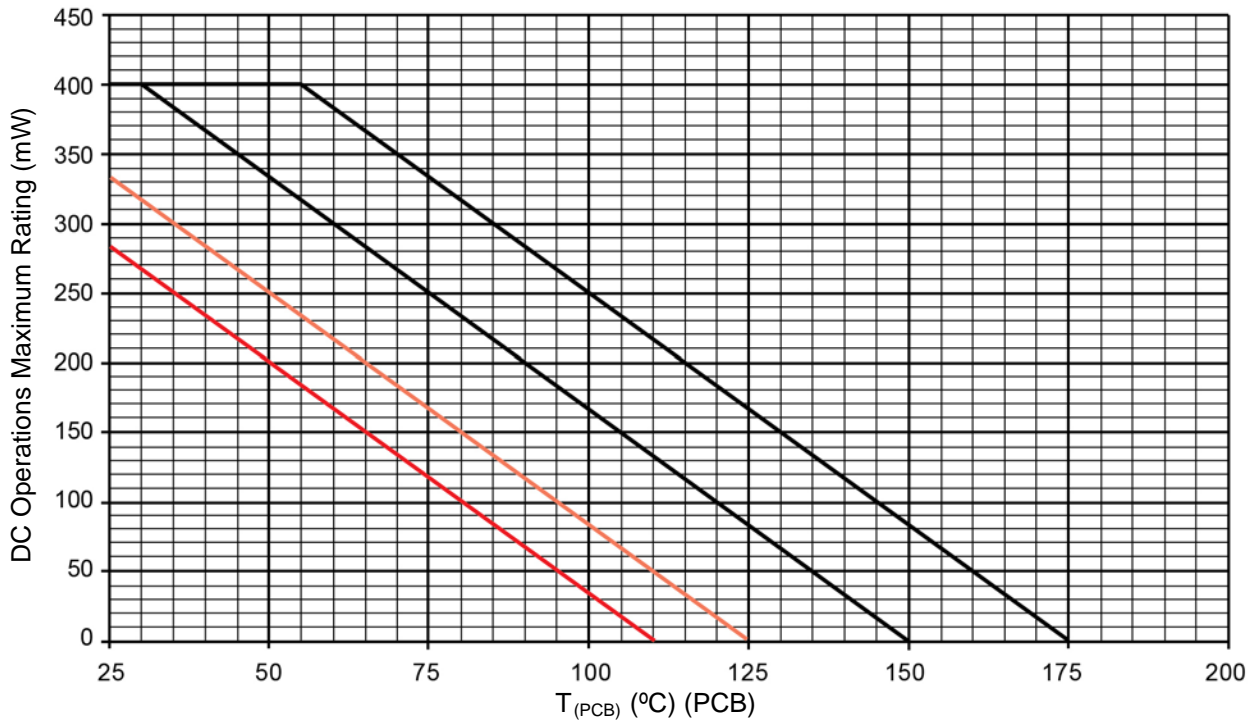


FIGURE 2
Temperature-Power Derating Curve

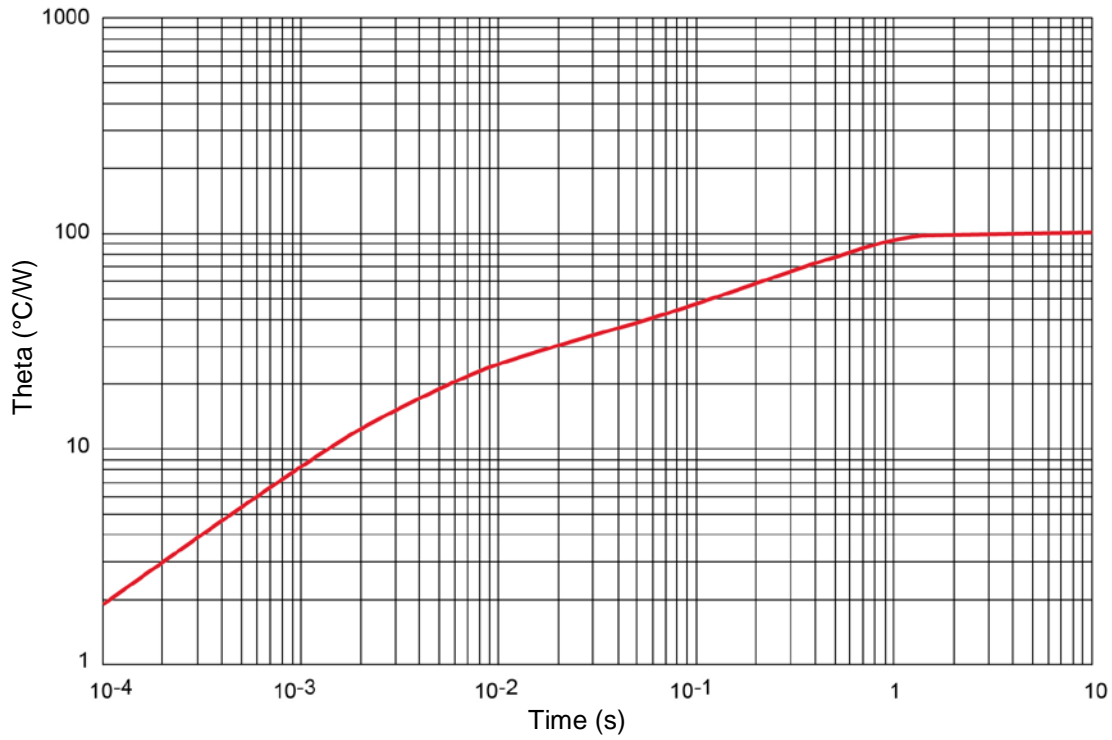
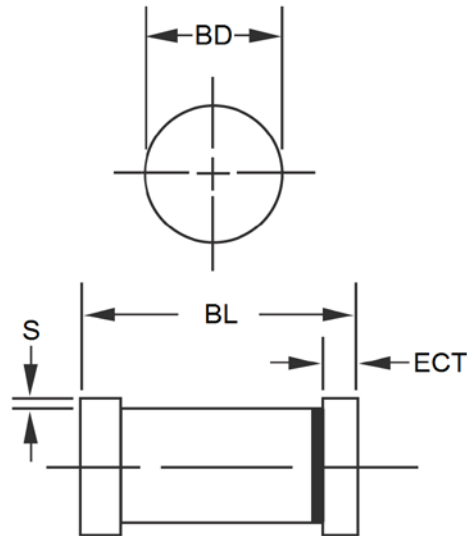
GRAPHS (continued)

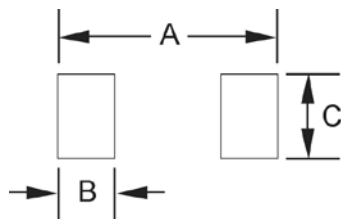
FIGURE 3
Thermal Impedance To End Cap

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 Φ x symbology.

PAD LAYOUT


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