



## Silicon 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 axial-leaded, glass DO-35 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>.

### 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).

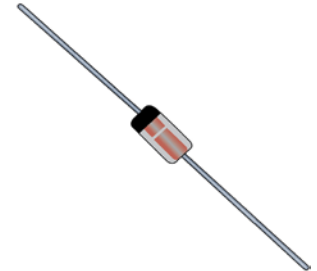
### APPLICATIONS / BENEFITS

- Regulates voltage over a broad range of temperature and current.
- Regulated voltage range from 2.4 to 12 V.
- Flexible axial-lead mounting terminals.
- 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 | $^{\circ}\text{C}$          |
| Thermal Resistance Junction-to-Lead<br>@ .375 inch (9.53 mm) lead length from body   | $R_{\theta JL}$     | 250         | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance Junction-to-Ambient when<br>mounted on PCB <sup>(1)</sup>   | $R_{\theta JA}$     | 300         | $^{\circ}\text{C}/\text{W}$ |
| Average Rated Power Dissipation<br>@ $T_L = +50^{\circ}\text{C}$ .375 inch (9.53 mm) from body <sup>(2)</sup><br>@ $T_A = 55^{\circ}\text{C}$ 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  | $T_{SP}$            | 260         | $^{\circ}\text{C}$          |


- NOTES:**
1. See [Figures 1 and 2](#) for derating curves.  $T_A = +75^{\circ}\text{C}$  on an FR4 PC board with 1 oz copper metalization.
  2. The 0.5 W linearly derates starting at  $T_L = 50^{\circ}\text{C}$  and goes to zero at  $175^{\circ}\text{C}$ . For ambient  $T_A$  condition on a typical PC board, it linearly derates from 400 mW starting at  $55^{\circ}\text{C}$  and goes to zero at  $175^{\circ}\text{C}$  (see [Figure 2](#)).



**DO-35 (DO-204AH)  
Package**

Also available in:

**DO-213AA package**  
(MELF surface mount)

 [1N746AUR-1 –](#)  
[1N759AUR-1 and](#)  
[1N4370AUR-1 –](#)  
[1N4372AUR-1](#)

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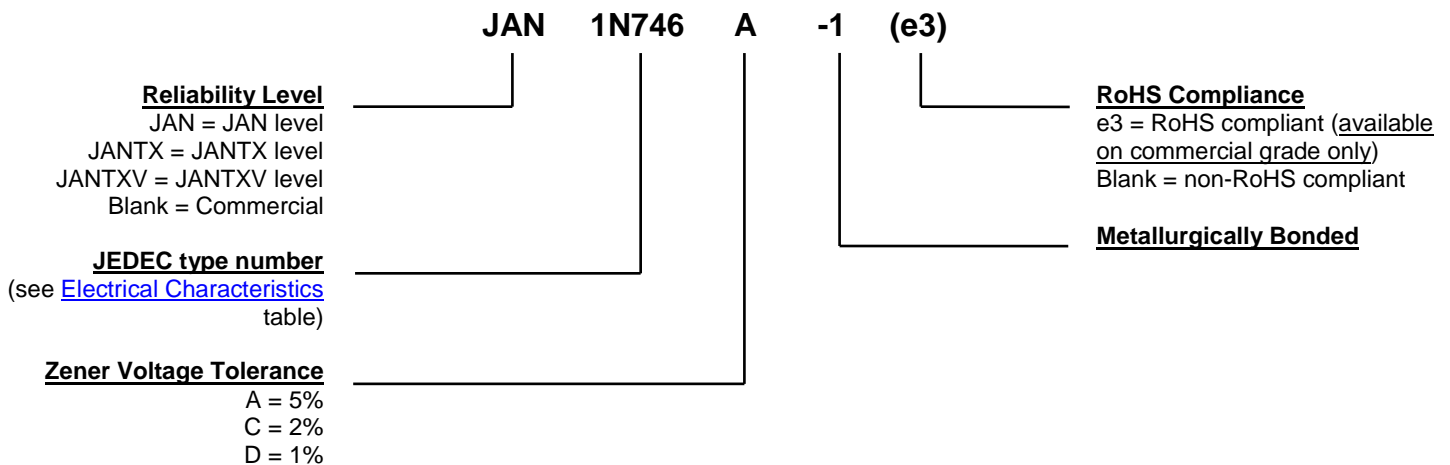
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**MECHANICAL and PACKAGING**

- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204 AH) package.
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating (on commercial grade only). Solderable per MIL-STD-750, method 2026.
- MARKING: Part number.
- 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-296 (add "TR" suffix to part number).
- WEIGHT: Approximately 0.2 grams
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

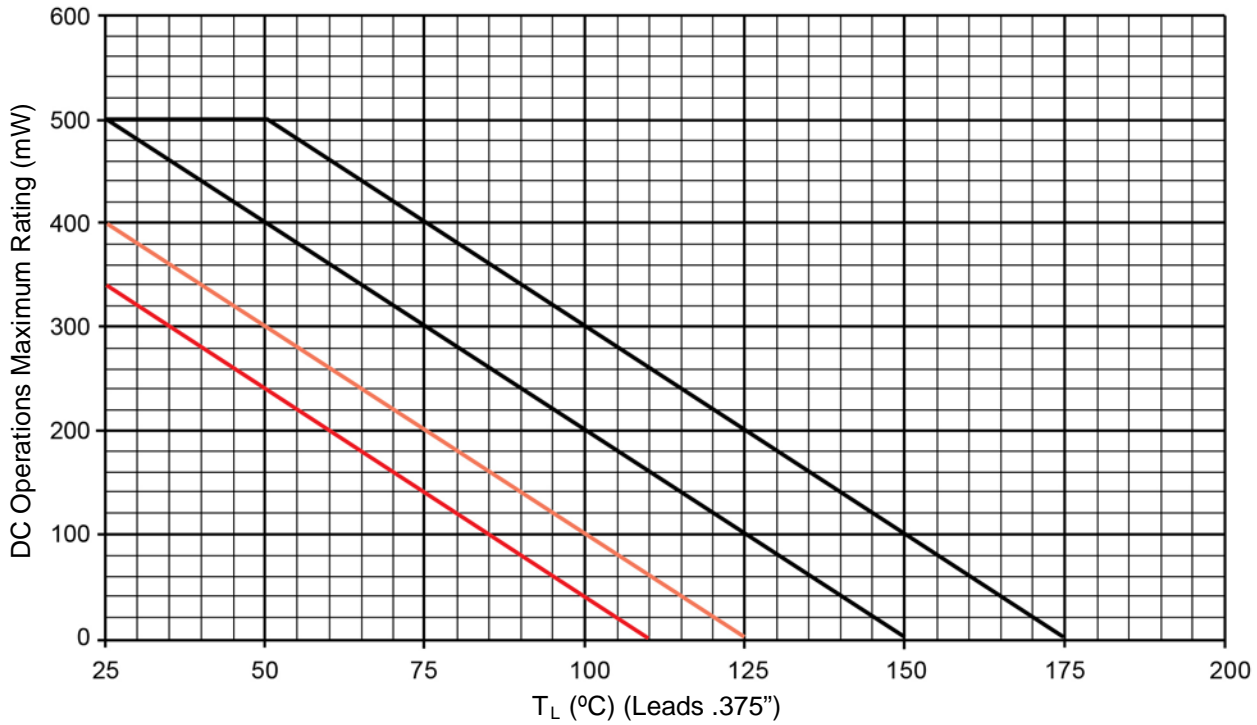
| Symbol                | Definition  |
|-----------------------|---|
| $I_R$                 | Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.   |
| $I_Z, I_{ZT}, I_{ZK}$ | Regulator Current: The dc regulator current ( $I_Z$ ), at a specified 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**

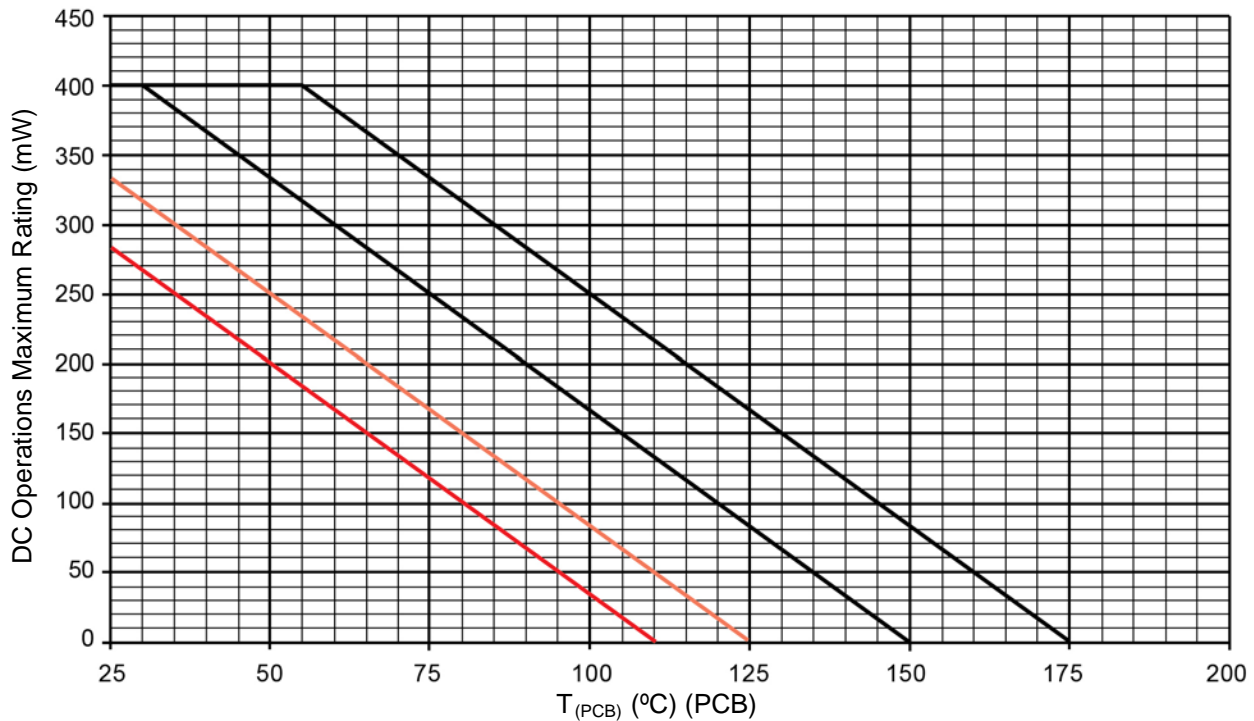
| JEDEC<br>TYPE NO.<br>(NOTE 1) | NOMINAL<br>ZENER<br>VOLTAGE<br>$V_Z @ I_{ZT}$<br>(NOTE 2) | MAXIMUM<br>ZENER<br>IMPEDANCE<br>$Z_{ZT} @ I_{ZT}$<br>(NOTE 3) | MAXIMUM<br>REVERSE<br>VOLTAGE<br>$V_R$ | MAXIMUM REVERSE<br>CURRENT<br>$I_R @ V_R$ |           | MAXIMUM<br>ZENER<br>CURRENT<br>$I_{ZM}$<br>(NOTE 4) | TEMPERATURE<br>COEFFICIENT<br>OF ZENER<br>VOLTAGE<br>$\alpha_{VZ}$ |
|-------------------------------|---|--|--|---|-----------|---|--|
|                               |   |  |  | @ 25 °C                                   | @ +150 °C |   |  |
|                               |   |  |  | $\mu A$                                   | $\mu A$   |   |  |
|                               | Volts   | Ohms   | Volts                                  | $\mu A$                                   | $\mu A$   | 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:**

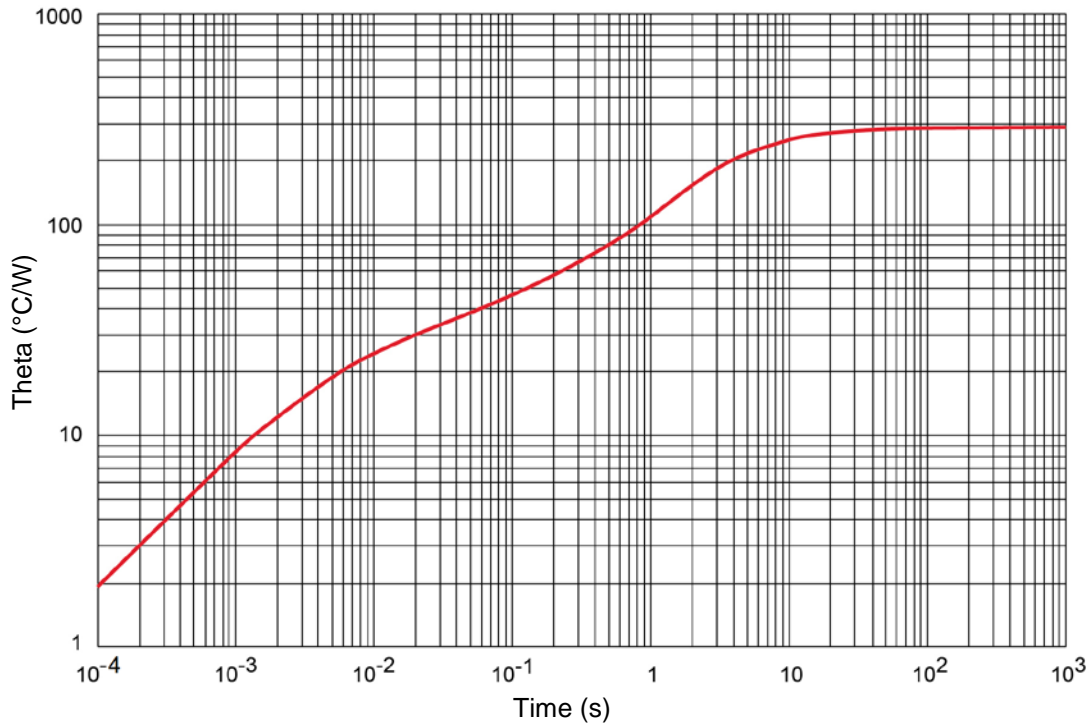
- 1 The JEDEC type numbers shown (A suffix) have a  $\pm 5\%$  tolerance on nominal Zener voltage.
2. Voltage measurements to be performed 20 seconds after application of dc test current.
3. Zener impedance derived by superimposing on  $I_{ZT}$ , a 60 cps, rms current equal to 10%  $I_{ZT}$  (20 mA). 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 400 mW.

**GRAPHS**


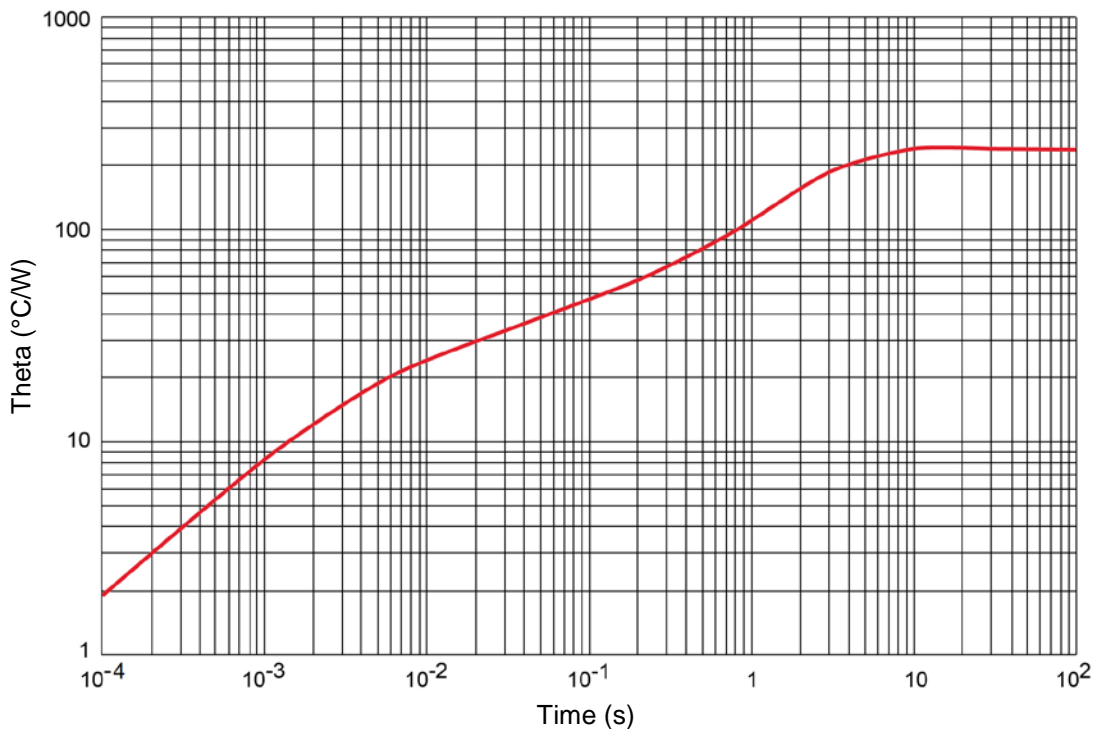
**FIGURE 1**  
Temperature-Power Derating Curve



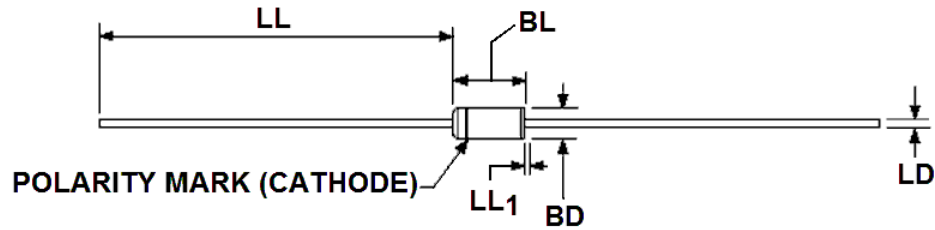
**FIGURE 2**  
Temperature-Power Derating Curve

**GRAPHS (continued)**


**FIGURE 3**  
Thermal Impedance PCB mount



**FIGURE 4**  
Thermal Impedance  
( $T_L = 25\text{ }^\circ\text{C}$  at 0.375 inch (9.53 mm) from body.)

**PACKAGE DIMENSIONS**


| Ltr             | Dimensions |       |             |       | Notes |
|-----------------|------------|-------|-------------|-------|-------|
|                 | Inch       |       | Millimeters |       |       |
|                 | Min        | Max   | Min         | Max   |       |
| BD              | 0.055      | 0.090 | 1.40        | 2.29  | 3     |
| BL              | 0.120      | 0.200 | 3.05        | 5.08  | 4     |
| LD              | 0.018      | 0.023 | 0.46        | 0.58  |       |
| LL              | 1.000      | 1.500 | 25.40       | 38.10 |       |
| LL <sub>1</sub> | -          | 0.050 | -           | 1.27  | 5     |

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for information only.
3. Dimension BD shall be measured at the largest diameter.
4. The BL dimension shall include the entire body including slugs.
5. Dimension LU shall include the sections of the lead over which the diameter is uncontrolled. This uncontrolled area is defined as the zone between the edge of the diode body and extending 0.050 inch (1.27 mm) onto the leads.
6. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.