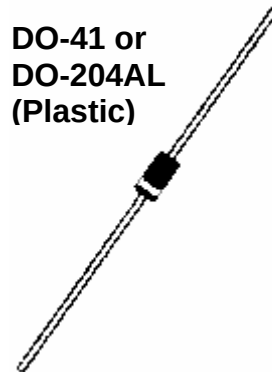


## DESCRIPTION

The popular 1N4728AP thru 1N4764AP series of 1.0 watt Zeners provides voltage regulation in a selection from 3.3 to 100 volts in 5% tolerances with other tighter tolerances also available as identified by different suffix letters in the part number. These plastic encapsulated Zeners are moisture classified as Level 1 with no dry pack required. They are also available in various military screening levels by adding a prefix identifier as described in the Features below. These plastic molded Zeners with a P suffix provide a lower thermal resistance compared to the glass-body (G suffix) option for these same JEDEC part numbers. Both package options are available by Microsemi in RoHS Compliant devices with an "e3" suffix. Microsemi also offers numerous other Zener products to meet higher and lower power and test current applications.

## APPEARANCE

**DO-41 or  
DO-204AL  
(Plastic)**



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

## FEATURES

- JEDEC registered 1N4728A to 1N4764A
- Extensive voltage selection from 3.3 to 100 V
- 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.
- Surface mount equivalents available as SMAJ4728A to SMAJ4764A and MLL4728A to MLL4764A (consult factory for others)
- RoHS Compliant devices available by adding "e3" suffix

## APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range
- Standard voltage tolerances are plus/minus 5% with A suffix and 10 % with no suffix identification
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Flexible axial-lead mounting terminals
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Moisture classification is Level 1 per IPC/JEDEC J-STD-020B with no dry pack required

## MAXIMUM RATINGS

- Power dissipation at 25°C: 1.0 watts (also see derating in Figure 1).
- Operating and Storage temperature: -65°C to +150°C
- Thermal Resistance: 45 °C/W junction to lead at 3/8 (10 mm) lead length from body, or 105 °C/W junction to ambient when mounted on FR4 PC board (1 oz Cu) with 4 mm<sup>2</sup> copper pads and track width 1 mm, length 25 mm
- Steady-State Power: 1.0 watts at T<sub>L</sub> ≤ 105°C 3/8 inch (10 mm) from body or at T<sub>A</sub> ≤ 45°C when mounted on FR4 PC board as described for thermal resistance above (also see Figure 1)
- Forward voltage @200 mA: 1.2 volts (maximum)
- Solder Temperatures: 260 °C for 10 s (max)

## MECHANICAL AND PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- TERMINALS: Tin-Lead (Sn/Pb) or RoHS Compliant annealed matte-Tin plating 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: Part number
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- WEIGHT: 0.7 grams
- See package dimensions on last page

**ELECTRICAL CHARACTERISTICS\***

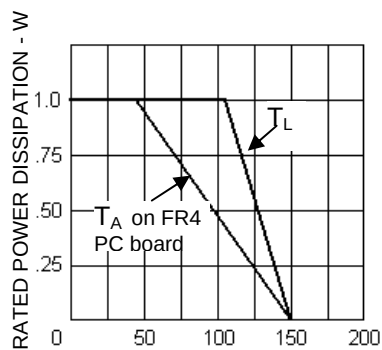
| JEDEC<br>TYPE<br>NUMBER<br>(Note 1) | ZENER<br>VOLTAGE<br>(V <sub>Z</sub> )<br>(Note 4) | TEST<br>CURRENT<br>(I <sub>ZT</sub> ) | MAXIMUM<br>DYNAMIC<br>IMPEDANCE<br>(Z <sub>ZT</sub> @ I <sub>ZT</sub> )<br>(Note 2) | MAXIMUM<br>REVERSE<br>CURRENT<br>(I <sub>R</sub> @ V <sub>R</sub> ) | TEST<br>VOLTAGE<br>(V <sub>R</sub> ) | MAXIMUM<br>REGULATOR<br>CURRENT<br>(I <sub>ZM</sub> )<br>TA = 50°C | MAXIMUM<br>KNEE<br>IMPEDANCE<br>(Z <sub>ZK</sub> @ I <sub>ZK</sub> )<br>(Note 2) | TEST<br>CURRENT<br>(I <sub>ZK</sub> ) | MAXIMUM<br>(SURGE)<br>CURRENT<br>(I <sub>SM</sub> )<br>(Note 3) |
|-------------------------------------|---------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------|
|                                     | VOLTS                                             | mA                                    | OHMS                                                                                | μA                                                                  | VOLTS                                | mA                                                                 | OHMS                                                                             | mA                                    | mA                                                              |
| 1N4728A                             | 3.3                                               | 76                                    | 10                                                                                  | 100                                                                 | 1                                    | 276                                                                | 400                                                                              | 1.0                                   | 1380                                                            |
| 1N4729A                             | 3.6                                               | 69                                    | 10                                                                                  | 100                                                                 | 1                                    | 252                                                                | 400                                                                              | 1.0                                   | 1260                                                            |
| 1N4730A                             | 3.9                                               | 64                                    | 9                                                                                   | 50                                                                  | 1                                    | 234                                                                | 400                                                                              | 1.0                                   | 1190                                                            |
| 1N4731A                             | 4.3                                               | 58                                    | 9                                                                                   | 10                                                                  | 1                                    | 217                                                                | 400                                                                              | 1.0                                   | 1070                                                            |
| 1N4732A                             | 4.7                                               | 53                                    | 8                                                                                   | 10                                                                  | 1                                    | 193                                                                | 500                                                                              | 1.0                                   | 970                                                             |
| 1N4733A                             | 5.1                                               | 49                                    | 7                                                                                   | 10                                                                  | 1                                    | 178                                                                | 550                                                                              | 1.0                                   | 890                                                             |
| 1N4734A                             | 5.6                                               | 45                                    | 5                                                                                   | 10                                                                  | 2                                    | 162                                                                | 600                                                                              | 1.0                                   | 810                                                             |
| 1N4735A                             | 6.2                                               | 41                                    | 2                                                                                   | 10                                                                  | 3                                    | 146                                                                | 700                                                                              | 1.0                                   | 730                                                             |
| 1N4736A                             | 6.8                                               | 37                                    | 3.5                                                                                 | 10                                                                  | 4                                    | 133                                                                | 700                                                                              | 1.0                                   | 660                                                             |
| 1N4737A                             | 7.5                                               | 34                                    | 4.0                                                                                 | 10                                                                  | 5                                    | 121                                                                | 700                                                                              | 0.5                                   | 605                                                             |
| 1N4738A                             | 8.2                                               | 31                                    | 4.5                                                                                 | 10                                                                  | 6                                    | 110                                                                | 700                                                                              | 0.5                                   | 550                                                             |
| 1N4739A                             | 9.1                                               | 28                                    | 5.0                                                                                 | 10                                                                  | 7                                    | 100                                                                | 700                                                                              | 0.5                                   | 500                                                             |
| 1N4740A                             | 10                                                | 25                                    | 7                                                                                   | 10                                                                  | 7.6                                  | 91                                                                 | 700                                                                              | 0.25                                  | 454                                                             |
| 1N4741A                             | 11                                                | 23                                    | 8                                                                                   | 5                                                                   | 8.4                                  | 83                                                                 | 700                                                                              | 0.25                                  | 414                                                             |
| 1N4742A                             | 12                                                | 21                                    | 9                                                                                   | 5                                                                   | 9.1                                  | 76                                                                 | 700                                                                              | 0.25                                  | 380                                                             |
| 1N4743A                             | 13                                                | 19                                    | 10                                                                                  | 5                                                                   | 9.9                                  | 69                                                                 | 700                                                                              | 0.25                                  | 344                                                             |
| 1N4744A                             | 15                                                | 17                                    | 14                                                                                  | 5                                                                   | 11.4                                 | 61                                                                 | 700                                                                              | 0.25                                  | 304                                                             |
| 1N4745A                             | 16                                                | 15.5                                  | 16                                                                                  | 5                                                                   | 12.2                                 | 57                                                                 | 700                                                                              | 0.25                                  | 285                                                             |
| 1N4746A                             | 18                                                | 14                                    | 20                                                                                  | 5                                                                   | 13.7                                 | 50                                                                 | 750                                                                              | 0.25                                  | 250                                                             |
| 1N4747A                             | 20                                                | 12.5                                  | 22                                                                                  | 5                                                                   | 15.2                                 | 45                                                                 | 750                                                                              | 0.25                                  | 225                                                             |
| 1N4748A                             | 22                                                | 11.5                                  | 23                                                                                  | 5                                                                   | 16.7                                 | 41                                                                 | 750                                                                              | 0.25                                  | 205                                                             |
| 1N4749A                             | 24                                                | 10.5                                  | 25                                                                                  | 5                                                                   | 18.2                                 | 38                                                                 | 750                                                                              | 0.25                                  | 190                                                             |
| 1N4750A                             | 27                                                | 9.5                                   | 35                                                                                  | 5                                                                   | 20.6                                 | 34                                                                 | 750                                                                              | 0.25                                  | 170                                                             |
| 1N4751A                             | 30                                                | 8.5                                   | 40                                                                                  | 5                                                                   | 22.8                                 | 30                                                                 | 1000                                                                             | 0.25                                  | 150                                                             |
| 1N4752A                             | 33                                                | 7.5                                   | 45                                                                                  | 5                                                                   | 25.1                                 | 27                                                                 | 1000                                                                             | 0.25                                  | 135                                                             |
| 1N4753A                             | 36                                                | 7.0                                   | 50                                                                                  | 5                                                                   | 27.4                                 | 25                                                                 | 1000                                                                             | 0.25                                  | 125                                                             |
| 1N4754A                             | 39                                                | 6.5                                   | 60                                                                                  | 5                                                                   | 29.7                                 | 23                                                                 | 1000                                                                             | 0.25                                  | 115                                                             |
| 1N4755A                             | 43                                                | 6.0                                   | 70                                                                                  | 5                                                                   | 32.7                                 | 22                                                                 | 1500                                                                             | 0.25                                  | 110                                                             |
| 1N4756A                             | 47                                                | 5.5                                   | 80                                                                                  | 5                                                                   | 35.8                                 | 19                                                                 | 1500                                                                             | 0.25                                  | 95                                                              |
| 1N4757A                             | 51                                                | 5.0                                   | 95                                                                                  | 5                                                                   | 38.8                                 | 18                                                                 | 1500                                                                             | 0.25                                  | 90                                                              |
| 1N4758A                             | 56                                                | 4.5                                   | 110                                                                                 | 5                                                                   | 42.6                                 | 16                                                                 | 2000                                                                             | 0.25                                  | 80                                                              |
| 1N4759A                             | 62                                                | 4.0                                   | 125                                                                                 | 5                                                                   | 47.1                                 | 14                                                                 | 2000                                                                             | 0.25                                  | 70                                                              |
| 1N4760A                             | 68                                                | 3.7                                   | 150                                                                                 | 5                                                                   | 51.7                                 | 13                                                                 | 2000                                                                             | 0.25                                  | 65                                                              |
| 1N4761A                             | 75                                                | 3.3                                   | 175                                                                                 | 5                                                                   | 56.0                                 | 12                                                                 | 2000                                                                             | 0.25                                  | 60                                                              |
| 1N4762A                             | 82                                                | 3.0                                   | 200                                                                                 | 5                                                                   | 62.2                                 | 11                                                                 | 3000                                                                             | 0.25                                  | 55                                                              |
| 1N4763A                             | 91                                                | 2.8                                   | 250                                                                                 | 5                                                                   | 69.2                                 | 10                                                                 | 3000                                                                             | 0.25                                  | 50                                                              |
| 1N4764A                             | 100                                               | 2.5                                   | 350                                                                                 | 5                                                                   | 76.0                                 | 9                                                                  | 3000                                                                             | 0.25                                  | 45                                                              |

\*JEDEC Registered Data

**NOTES:**

- The JEDEC type numbers shown with an A suffix have a 5% tolerance on nominal zener voltage. No suffix signifies a 10% tolerance, C signifies 2%, and D signifies 1% tolerance. Also add a P suffix for designating plastic construction, e.g. 1N4764AP (G suffix designates glass body options described by separate data sheet).
- The Zener impedance is derived from the 60 Hz ac voltage that results when an ac current having an rms value equal to 10% of the dc Zener current (I<sub>ZT</sub> or I<sub>ZK</sub>) is superimposed on I<sub>ZT</sub> or I<sub>ZK</sub>. Zener impedance is measured at two points to ensure a sharp knee on the breakdown curve and eliminate unstable units. See MicroNote 202 for zener impedance variation with different operating currents.
- The reverse surge current is measured at 25°C ambient using a ½ square wave or equivalent sine wave pulse 1/120 second duration superimposed on I<sub>ZT</sub>.
- Zener voltage (V<sub>Z</sub>) is measured at T<sub>L</sub> = 25°C (+8, -2°C) and 90 seconds after application of dc current.

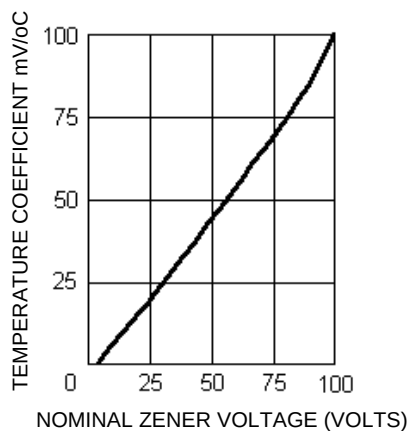
GRAPHS



$T_L$ , LEAD TEMP. ( $^{\circ}\text{C}$ ) 3/8" from body  
or  $T_A$  on FR4 PC Board

**FIGURE 1**

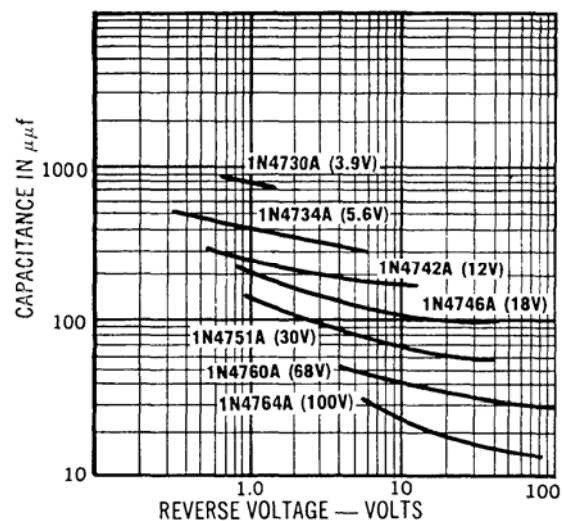
Power Derating Curve



NOMINAL ZENER VOLTAGE (VOLTS)

**FIGURE 2**

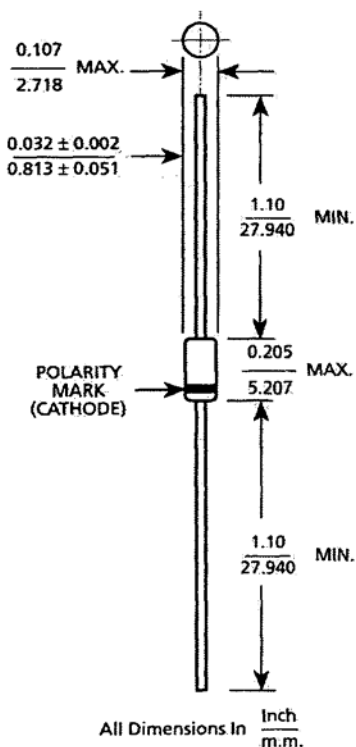
Temp. Coeff. vs. Zener Voltage



**FIGURE 3**

Capacitance vs. Voltage for Representative Types

PACKAGE DIMENSIONS (DO-41 or DO-204AL)



All Dimensions In  $\frac{\text{Inch}}{\text{m.m.}}$