



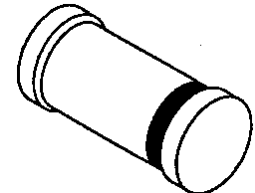
**1N4099UR thru 1N4135UR
(or MLL4099 thru MLL4135)
and
1N4614UR thru 1N4627UR
(or MLL4614 thru MLL4627)**

**GLASS SURFACE MOUNT 0.5 WATT
ZENERS**

DESCRIPTION

The 1N4099UR thru 1N4135UR and 1N4614UR thru 1N4627UR series of 0.5 watt glass surface mount DO-213AA Zener voltage regulators provides a selection from 1.8 to 100 volts in standard 5% tolerances as well as tighter tolerances identified by different suffix letters on the part number. These are also available with an internal-metallurgical-bond option by adding a "-1" suffix (see separate data sheet) including JAN, JANTX, and JANTXV military qualifications. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

APPEARANCE



DO-213AA

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

FEATURES

- Surface mount equivalent to JEDEC registered 1N4099 thru 1N4135 and 1N4614 thru 1N4627 series
- Internal metallurgical bond option available by adding a "-1" suffix that also includes JAN, JANTX, and JANTXV qualifications per MIL-PRF-19500/435 (see separate data sheet for same part numbers with "-1" suffix)
- DO-7 or DO-35 glass body axial-leaded Zener equivalents also available per JEDEC registration (see separate data sheet for part numbers 1N4099 thru 1N4135 and 1N4614 thru 1N4627 series)

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range
- Extensive selection from 1.8 to 100 V
- Standard voltage tolerances are plus/minus 5% with no suffix
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Hermetically sealed surface mount package
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Minimal capacitance (see Figure 3)
- Inherently radiation hard as described in Microsemi MicroNote 050

MAXIMUM RATINGS

- Operating and Storage temperature: -65°C to +175°C
- Thermal Resistance: 150°C/W junction to end cap and 300°C/W junction to ambient when mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page)
- Steady-State Power: 0.5 watts at end cap temperature $T_{EC} \leq 100^\circ\text{C}$ or ambient temperature $T_A \leq 25^\circ\text{C}$ when mounted on FR4 PC board as described for thermal resistance above (see Figure 2 for derating)
- Forward voltage @200 mA: 1.1 volts
- Solder Temperatures: 260°C for 10 s (max)

MECHANICAL AND PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package
- TERMINALS: End caps tin-lead plated solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band where diode is to be operated with the banded end positive with respect to the opposite end for Zener regulation
- MARKING: cathode band only
- TAPE & REEL option: Standard per EIA-481-1-A with 12 mm tape, 2000 per 7 inch reel or 5000 per 13 inch reel (add "TR" suffix to part number)
- WEIGHT: 0.04 grams
- See package dimensions on last page



1N4099UR thru 1N4135UR
(or MLL4099 thru MLL4135)
and
1N4614UR thru 1N4627UR
(or MLL4614 thru MLL4627)

*** ELECTRICAL CHARACTERISTICS @ 25°C**

| INDUSTRY PART NUMBER (NOTE 1) | MICROSEMI PART NUMBER (NOTE 1) | NOMINAL ZENER VOLTAGE $V_Z @ I_{ZT}$ (NOTE 2) | ZENER TEST CURRENT I_{ZT} | MAXIMUM ZENER IMPEDANCE Z_{ZT} (Note 3) | MAXIMUM REVERSE CURRENT $I_R @ V_R$ | | MAXIMUM NOISE DENSITY $N_D @ I_{ZT}$ | MAXIMUM ZENER CURRENT I_{ZM} | TYPICAL TEMP. COEFF. OF ZENER VOLTAGE α_{VZ} |
|----------------------------------|-----------------------------------|---|--------------------------------|---|--|-------|---|-----------------------------------|--|
| | | VOLTS | μA | OHMS | μA | Volts | $\mu V/\sqrt{Hz}$ | mA | %/°C |
| 1N4614UR | MLL4614 | 1.8 | 250 | 1200 | 3.5 | 1.0 | 1 | 120 | -0.075 |
| 1N4615UR | MLL4615 | 2.0 | 250 | 1250 | 2.5 | 1.0 | 1 | 110 | -0.075 |
| 1N4616UR | MLL4616 | 2.2 | 250 | 1300 | 2.0 | 1.0 | 1 | 100 | -0.075 |
| 1N4617UR | MLL4617 | 2.4 | 250 | 1400 | 1.0 | 1.0 | 1 | 95 | -0.075 |
| 1N4618UR | MLL4618 | 2.7 | 250 | 1500 | 0.5 | 1.0 | 1 | 90 | -0.075 |
| 1N4619UR | MLL4619 | 3.0 | 250 | 1600 | 0.4 | 1.0 | 1 | 87 | -0.075 |
| 1N4620UR | MLL4620 | 3.3 | 250 | 1650 | 3.5 | 1.5 | 1 | 85 | -0.075 |
| 1N4621UR | MLL4621 | 3.6 | 250 | 1700 | 3.5 | 2.0 | 1 | 83 | -0.065 |
| 1N4622UR | MLL4622 | 3.9 | 250 | 1650 | 2.5 | 2.0 | 1 | 80 | -0.060 |
| 1N4623UR | MLL4623 | 4.3 | 250 | 1600 | 2.0 | 2.0 | 1 | 77 | -0.050 |
| 1N4624UR | MLL4624 | 4.7 | 250 | 1550 | 5.0 | 3.0 | 1 | 75 | -0.040,+0.020 |
| 1N4625UR | MLL4625 | 5.1 | 250 | 1500 | 5.0 | 3.0 | 2 | 70 | -0.045,+0.030 |
| 1N4626UR | MLL4626 | 5.6 | 250 | 1400 | 5.0 | 4.0 | 4 | 65 | -0.020,+0.040 |
| 1N4627UR | MLL4627 | 6.2 | 250 | 1200 | 5.0 | 5.0 | 5 | 61 | -0.010,+0.050 |
| 1N4099UR | MLL4099 | 6.8 | 250 | 200 | 1.0 | 5.17 | 40 | 56 | 0.040 |
| 1N4100UR | MLL4100 | 7.5 | 250 | 200 | 1.0 | 5.70 | 40 | 51 | 0.045 |
| 1N4101UR | MLL4101 | 8.2 | 250 | 200 | 0.5 | 6.24 | 40 | 46 | 0.048 |
| 1N4102UR | MLL4102 | 8.7 | 250 | 200 | 0.5 | 6.61 | 40 | 44 | 0.049 |
| 1N4103UR | MLL4103 | 9.1 | 250 | 200 | 0.5 | 6.92 | 40 | 42 | 0.050 |
| 1N4104UR | MLL4104 | 10 | 250 | 200 | 0.5 | 7.60 | 40 | 38 | 0.055 |
| 1N4105UR | MLL4105 | 11 | 250 | 200 | .05 | 8.44 | 40 | 35 | 0.060 |
| 1N4106UR | MLL4106 | 12 | 250 | 200 | .05 | 9.12 | 40 | 32 | 0.065 |
| 1N4107UR | MLL4107 | 13 | 250 | 200 | .05 | 9.87 | 40 | 29 | 0.065 |
| 1N4108UR | MLL4108 | 14 | 250 | 200 | .05 | 10.65 | 40 | 27 | 0.070 |
| 1N4109UR | MLL4109 | 15 | 250 | 100 | .05 | 11.40 | 40 | 25 | 0.070 |
| 1N4110UR | MLL4110 | 16 | 250 | 100 | .05 | 12.15 | 40 | 24 | 0.070 |
| 1N4111UR | MLL4111 | 17 | 250 | 100 | .05 | 12.92 | 40 | 22 | 0.075 |
| 1N4112UR | MLL4112 | 18 | 250 | 100 | .05 | 13.67 | 40 | 21 | 0.075 |
| 1N4113UR | MLL4113 | 19 | 250 | 150 | .05 | 14.44 | 40 | 20 | 0.075 |
| 1N4114UR | MLL4114 | 20 | 250 | 150 | .01 | 15.20 | 40 | 19 | 0.075 |
| 1N4115UR | MLL4115 | 22 | 250 | 150 | .01 | 16.72 | 40 | 17 | 0.080 |
| 1N4116UR | MLL4116 | 24 | 250 | 150 | .01 | 18.25 | 40 | 16 | 0.080 |
| 1N4117UR | MLL4117 | 25 | 250 | 150 | .01 | 1900 | 40 | 15 | 0.080 |
| 1N4118UR | MLL4118 | 27 | 250 | 150 | .01 | 20.45 | 40 | 14 | 0.085 |
| 1N4119UR | MLL4119 | 28 | 250 | 200 | .01 | 21.28 | 40 | 14 | 0.085 |
| 1N4120UR | MLL4120 | 30 | 250 | 200 | .01 | 22.80 | 40 | 13 | 0.085 |
| 1N4121UR | MLL4121 | 33 | 250 | 200 | .01 | 25.08 | 40 | 12 | 0.085 |
| 1N4122UR | MLL4122 | 36 | 250 | 200 | .01 | 27.38 | 40 | 11 | 0.090 |
| 1N4123UR | MLL4123 | 39 | 250 | 200 | .01 | 29.65 | 40 | 9.8 | 0.090 |
| 1N4124UR | MLL4124 | 43 | 250 | 250 | .01 | 32.65 | 40 | 8.9 | 0.090 |
| 1N4125UR | MLL4125 | 47 | 250 | 250 | .01 | 35.75 | 40 | 8.1 | 0.090 |
| 1N4126UR | MLL4126 | 51 | 250 | 300 | .01 | 38.76 | 40 | 7.5 | 0.090 |
| 1N4127UR | MLL4127 | 56 | 250 | 300 | .01 | 42.60 | 40 | 6.7 | 0.090 |
| 1N4128UR | MLL4128 | 60 | 250 | 400 | .01 | 45.60 | 40 | 6.4 | 0.090 |
| 1N4129UR | MLL4129 | 62 | 250 | 500 | .01 | 47.10 | 40 | 6.1 | 0.090 |
| 1N4130UR | MLL4130 | 68 | 250 | 700 | .01 | 51.68 | 40 | 5.6 | 0.095 |
| 1N4131UR | MLL4131 | 75 | 250 | 700 | .01 | 57.00 | 40 | 5.1 | 0.095 |
| 1N4132UR | MLL4132 | 82 | 250 | 800 | .01 | 62.32 | 40 | 4.6 | 0.095 |
| 1N4133UR | MLL4133 | 87 | 250 | 1000 | .01 | 66.12 | 40 | 4.4 | 0.095 |
| 1N4134UR | MLL4134 | 91 | 250 | 1200 | .01 | 69.16 | 40 | 4.2 | 0.095 |
| 1N4135UR | MLL4135 | 100 | 250 | 1500 | .01 | 76.00 | 40 | 3.8 | 0.095 |

NOTE 1: These may be ordered as either 1N4614UR-1N4627UR, 1N4099UR-1N4135UR or as the MLL4614-MLL4627, MLL4099-MLL4135.

NOTE 2: The JEDEC type numbers shown above have a standard tolerance of +/-5% for nominal Zener voltage and are also available in 2% and 1% tolerance with suffix C and D respectively. V_Z is measured with the diode in thermal equilibrium (still air) at 25°C for end-cap terminations.

NOTE 3: The zener impedance is derived by superimposing on I_{ZT} , a 60 Hz rms ac current equal to 10% of I_{ZT} (25 μA). See MicroNote 202 for zener impedance variation with different operating currents.

GRAPHS and CIRCUIT

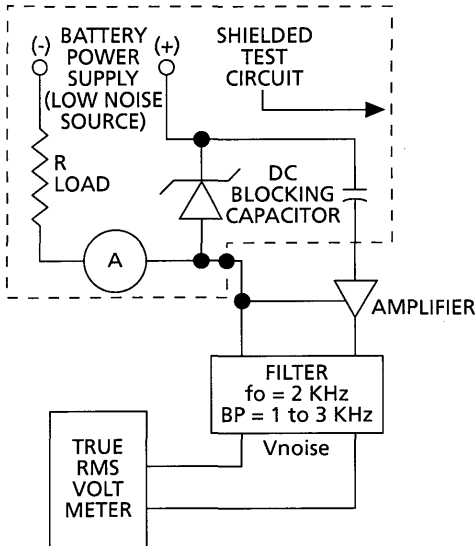
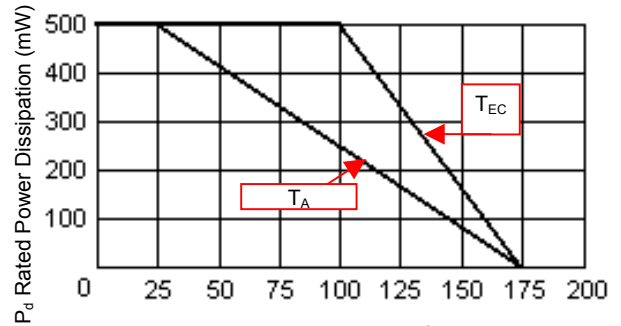


FIGURE 1 Noise Density Measurement Circuit

Noise density, (N_D) is specified in microvolt-rms per square-root-hertz. Actual measurement is performed using a 1 KHz to 3 KHz frequency bandpass filter at a constant Zener test current (I_{ZT}) AT 25°C ambient temperature. N_D is calculated from the formula.



T_{EC} , End Cap Temperature (°C) or T_A Ambient temperature on FR4 PC board
FIGURE 2 Power Derating Curve

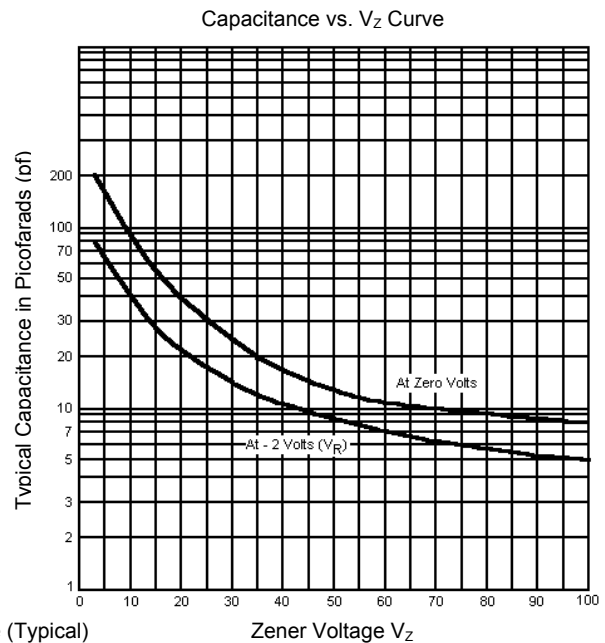
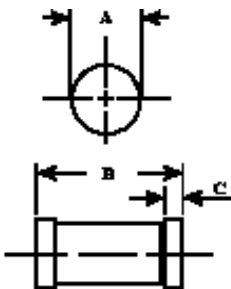
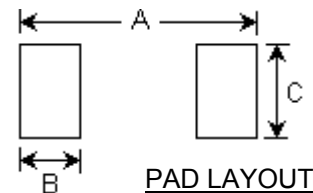


FIGURE 3 Capacitance vs. Zener Voltage (Typical)

PACKAGE DIMENSIONS



| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.063 | 0.067 | 1.60 | 1.70 |
| B | 0.130 | 0.146 | 3.30 | 3.70 |
| C | 0.016 | 0.022 | 0.41 | 0.55 |



| | INCHES | mm |
|---|--------|------|
| A | .200 | 5.08 |
| B | .055 | 1.40 |
| C | .080 | 2.03 |



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