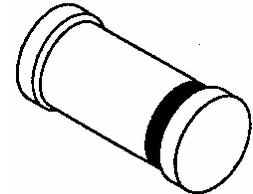


### DESCRIPTION

The 1N4099UR-1 thru 1N4135UR-1 and 1N4614UR-1 thru 1N4627UR-1 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 have an internal-metallurgical-bond option as identified with the "-1" suffix. This type of internally bonded Zener package construction is also available in JAN, JANTX, and JANTXV military qualifications. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

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

### APPEARANCE



DO-213AA

### FEATURES

- Surface mount equivalent to JEDEC registered 1N4099 thru 1N4135 and 1N4614 thru 1N4627 series
- Internal metallurgical bond with the "-1" suffix
- Nonbonded types also available without the "-1" suffix for both the axial and surface mount packages (see separate data sheets)
- DO-7 or DO-35 glass body axial-leaded Zener equivalents also available per JEDEC registration with part numbers 1N4099 thru 1N4135 and 1N4614 thru 1N4627 on separate data sheets
- RoHS Compliant devices available by adding "e3" suffix

### MAXIMUM RATINGS

- Operating and Storage temperature: -65°C to +175°C
- Thermal Resistance: 100 °C/W junction to end cap, or 250 °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  $T_{EC} \leq 125^{\circ}\text{C}$  or at ambient  $T_A \leq 50^{\circ}\text{C}$  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)

### 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

### MECHANICAL AND PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package
- FINISH: End caps Tin-lead (Sn/Pb) or RoHS Compliant annealed matte-Tin plating 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



**IN4099UR-1 thru 1N4135UR-1  
(or MLL4099-1 thru MLL4135-1)  
and  
1N4614UR-1 thru 1N4627UR-1  
(or MLL4614-1 thru MLL4627-1)**

**\*ELECTRICAL CHARACTERISTICS @ 25°C**

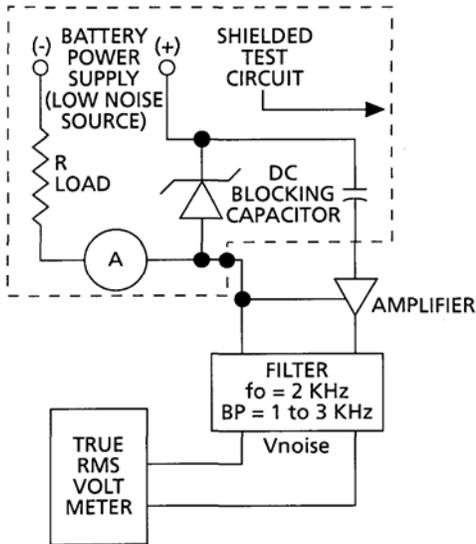
INDUSTRY PART NUMBER (NOTE 1)	MICROSEMI PART NUMBER (NOTE 1)	NOMINAL ZENER VOLTAGE $V_Z @ I_{ZT}$ (NOTE 2)	ZENER TEST CURRENT $I_{ZT}$	MAXIMUM ZENER IMPEDANCE $Z_{ZT}$ (Note 3)	MAXIMUM REVERSE CURRENT $I_R @ V_R$		MAXIMUM NOISE DENSITY $N_D @ I_{ZT}$	MAXIMUM ZENER CURRENT $I_{ZM}$	TYPICAL TEMP. COEFF.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

**NOTE 1:** These may be ordered as either 1N4614UR-1 thru 1N4627UR-1 and 1N4099UR-1 thru 1N4135UR-1 or MLL4614-1 thru MLL4627-1 and MLL4099-1 thru MLL4135-1. For military types, add the JAN, JANTX, JANTXV prefix for required screening to the industry part number.

**NOTE 2:** The JEDEC type numbers shown above have a standard tolerance of +/-5% on the nominal Zener voltage. Tighter tolerances are also available with C or D suffix for 2% or 1% tolerance respectively, e.g. 1N4105CUR-1 for 2%.  $V_Z$  is measured with the diode in thermal equilibrium (still air) at 25°C for end-cap terminations.

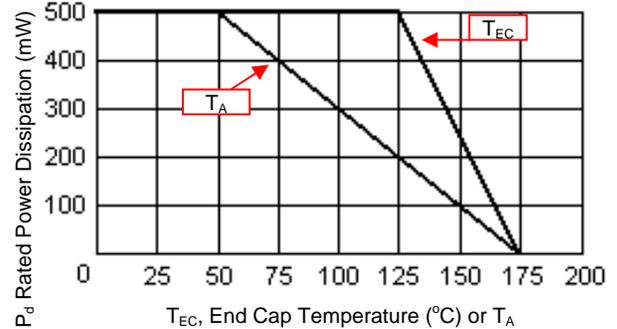
**NOTE 3:** Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms ac current at 10% of  $I_{ZT}$ . See MicroNote 202 for  $Z_{ZT}$  variation with  $I_Z$ .

**GRAPHS AND CIRCUIT**

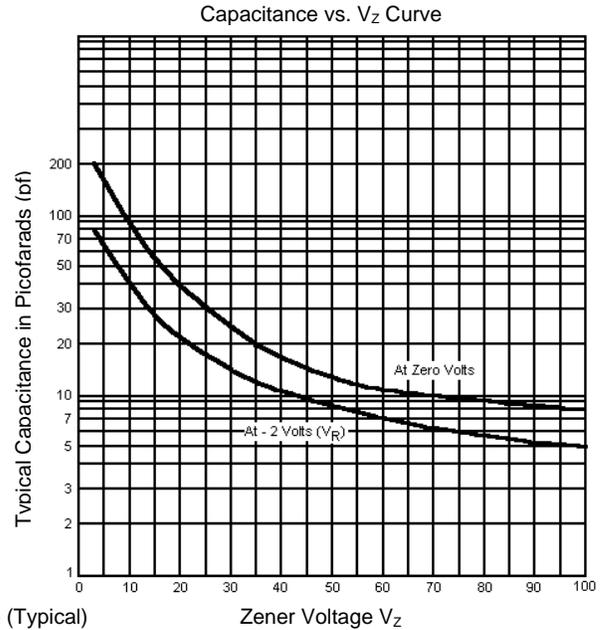


**FIGURE 1** Noise Density Measurement Circuit

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.

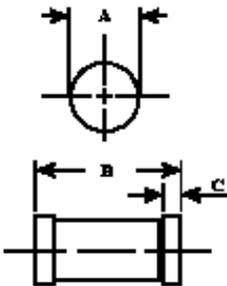


**FIGURE 2** Power Derating Curve

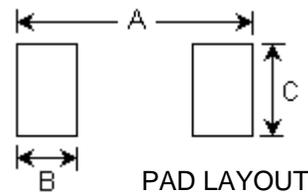


**FIGURE 3** Capacitance vs. Zener Voltage (Typical)

**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