



METALLURGICALLY BONDED GLASS SURFACE MOUNT 0.5 WATT ZENERS

Qualified per MIL-PRF-19500/435

*Qualified Levels:
JAN, JANTX,
JANTXV and JANS*

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% tolerance. 1% and 2% tolerance versions are also available (see [part nomenclature](#)). These also have an internal metallurgical bond. This type of internally bonded Zener package construction is also military qualified up to a JANS level for higher reliability applications. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- Surface mount equivalent to JEDEC registered 1N4099 thru 1N4135 and 1N4614 thru 1N4627 series.
- Internal metallurgical bond.
- JAN, JANTX, JANTXV and JANS qualifications are available per MIL-PRF-19500/435.
- RoHS compliant versions available (commercial grade only).

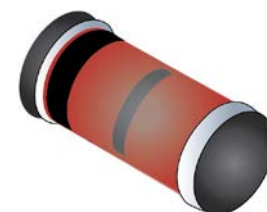
APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range.
- Extensive selection from 1.8 to 100 volts.
- Standard voltage tolerance is plus or minus 5% with tighter tolerances available at plus or minus 2% or 1%.
- Hermetically sealed surface mount package.
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Minimal capacitance (see [Figure 3](#)).
- Inherently radiation hard as described in Microsemi [MicroNote 050](#).

MAXIMUM RATINGS @ $T_C = +25^\circ\text{C}$ unless otherwise specified

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +175	$^\circ\text{C}$
Thermal Resistance Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	300	$^\circ\text{C/W}$
Thermal Resistance Junction-to-End Cap	$R_{\theta JEC}$	100	$^\circ\text{C/W}$
Steady-State Power Dissipation ⁽²⁾	P_D	0.5	W
Forward Voltage @ 200 mA	V_F	1.1	V
Solder Temperature @ 10 s	T_{SP}	260	$^\circ\text{C}$

- Notes:**
1. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see [last page](#)).
 2. 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).



DO-213AA Package

Also available in:

 **DO-35 package**
(axial-leaded)
[1N4099 – 1N4135 and](#)
[1N4614 – 1N4627](#)

 **DO-216 package**
(tabbed surface mount)
[1PMT4100 – 1PMT4135 and](#)
[1PMT4621 – 1PMT4627](#)

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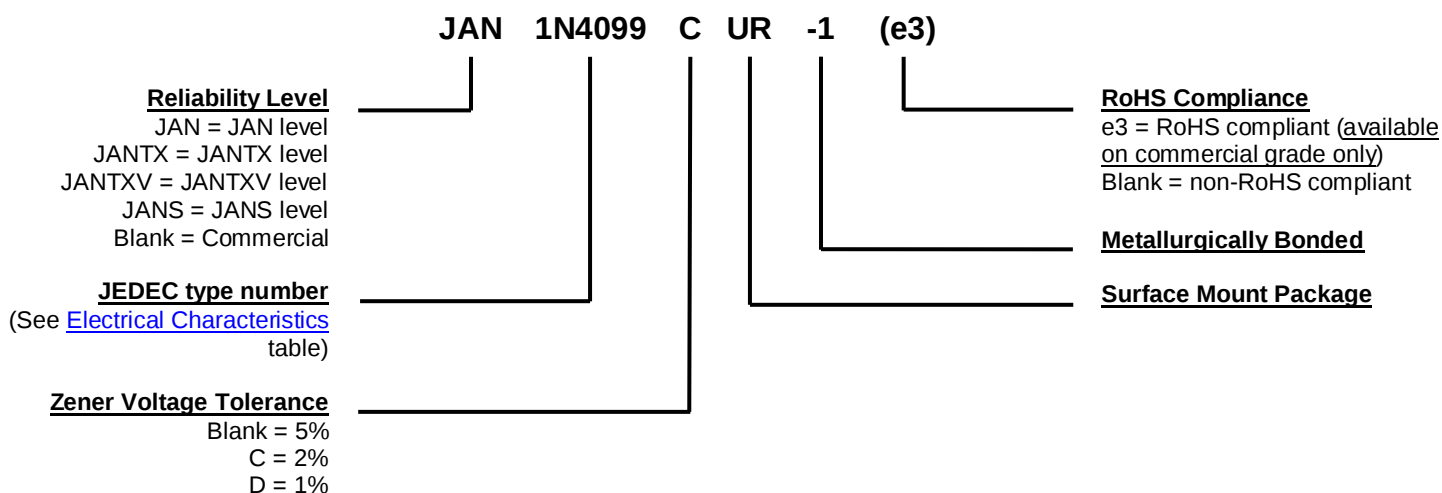
Website:

www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or CDLL34) MELF style package.
- TERMINALS: End caps tin-lead (Sn/Pb) or RoHS compliant annealed matte-tin (on commercial grade only) plating solderable per MIL-STD-750, method 2026.
- POLARITY: Cathode indicated by banded end. 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 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 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.
N_D	Noise Density: The noise generated over a specified frequency bandwidth usually specified in terms of mV/ $\sqrt{\text{Hz}}$.
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 unless otherwise stated

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-1	CDLL4614-1	1.8	250	1200	3.5	1	1	120	-0.075
1N4615UR-1	CDLL4615-1	2.0	250	1250	2.5	1	1	110	-0.075
1N4616UR-1	CDLL4616-1	2.2	250	1300	2.0	1	1	100	-0.075
1N4617UR-1	CDLL4617-1	2.4	250	1400	1.0	1	1	95	-0.075
1N4618UR-1	CDLL4618-1	2.7	250	1500	0.5	1	1	90	-0.075
1N4619UR-1	CDLL4619-1	3.0	250	1600	0.4	1	1	87	-0.075
1N4620UR-1	CDLL4620-1	3.3	250	1650	3.5	1	1	85	-0.075
1N4621UR-1	CDLL4621-1	3.6	250	1700	3.5	2	1	83	-0.065
1N4622UR-1	CDLL4622-1	3.9	250	1650	2.5	2	1	80	-0.060
1N4623UR-1	CDLL4623-1	4.3	250	1600	2.0	2	1	77	-0.050
1N4624UR-1	CDLL4624-1	4.7	250	1550	5.0	3	1	75	-0.040,+0.020
1N4625UR-1	CDLL4625-1	5.1	250	1500	5.0	3	2	70	-0.045,+0.030
1N4626UR-1	CDLL4626-1	5.6	250	1400	5.0	4	4	65	-0.020,+0.040
1N4627UR-1	CDLL4627-1	6.2	250	1200	5.0	5	5	61	-0.010,+0.050
1N4099UR-1	CDLL4099-1	6.8	250	200	1.0	5.17	40	56	0.040
1N4100UR-1	CDLL4100-1	7.5	250	200	1.0	5.70	40	51	0.045
1N4101UR-1	CDLL4101-1	8.2	250	200	0.5	6.24	40	46	0.048
1N4102UR-1	CDLL4102-1	8.7	250	200	0.5	6.61	40	44	0.049
1N4103UR-1	CDLL4103-1	9.1	250	200	0.5	6.92	40	42	0.050
1N4104UR-1	CDLL4104-1	10	250	200	0.5	7.60	40	38	0.055
1N4105UR-1	CDLL4105-1	11	250	200	0.05	8.44	40	35	0.060
1N4106UR-1	CDLL4106-1	12	250	200	0.05	9.12	40	32	0.065
1N4107UR-1	CDLL4107-1	13	250	200	0.05	9.87	40	29	0.065
1N4108UR-1	CDLL4108-1	14	250	200	0.05	10.65	40	27	0.070
1N4109UR-1	CDLL4109-1	15	250	100	0.05	11.40	40	25	0.070
1N4110UR-1	CDLL4110-1	16	250	100	0.05	12.15	40	24	0.070
1N4111UR-1	CDLL4111-1	17	250	100	0.05	12.92	40	22	0.075
1N4112UR-1	CDLL4112-1	18	250	100	0.05	13.67	40	21	0.075
1N4113UR-1	CDLL4113-1	19	250	150	0.05	14.44	40	20	0.075
1N4114UR-1	CDLL4114-1	20	250	150	0.01	15.20	40	19	0.075
1N4115UR-1	CDLL4115-1	22	250	150	0.01	16.72	40	17	0.080
1N4116UR-1	CDLL4116-1	24	250	150	0.01	18.25	40	16	0.080
1N4117UR-1	CDLL4117-1	25	250	150	0.01	19.00	40	15	0.080
1N4118UR-1	CDLL4118-1	27	250	150	0.01	20.45	40	14	0.085
1N4119UR-1	CDLL4119-1	28	250	200	0.01	21.28	40	14	0.085
1N4120UR-1	CDLL4120-1	30	250	200	0.01	22.80	40	13	0.085
1N4121UR-1	CDLL4121-1	33	250	200	0.01	25.08	40	12	0.085
1N4122UR-1	CDLL4122-1	36	250	200	0.01	27.38	40	11	0.090
1N4123UR-1	CDLL4123-1	39	250	200	0.01	29.65	40	9.8	0.090
1N4124UR-1	CDLL4124-1	43	250	250	0.01	32.65	40	8.9	0.090
1N4125UR-1	CDLL4125-1	47	250	250	0.01	35.75	40	8.1	0.090
1N4126UR-1	CDLL4126-1	51	250	300	0.01	38.76	40	7.5	0.090
1N4127UR-1	CDLL4127-1	56	250	300	0.01	42.60	40	6.7	0.090
1N4128UR-1	CDLL4128-1	60	250	400	0.01	45.60	40	6.4	0.090
1N4129UR-1	CDLL4129-1	62	250	500	0.01	47.10	40	6.1	0.090
1N4130UR-1	CDLL4130-1	68	250	700	0.01	51.68	40	5.6	0.095
1N4131UR-1	CDLL4131-1	75	250	700	0.01	57.00	40	5.1	0.095
1N4132UR-1	CDLL4132-1	82	250	800	0.01	62.32	40	4.6	0.095
1N4133UR-1	CDLL4133-1	87	250	1000	0.01	66.12	40	4.4	0.095
1N4134UR-1	CDLL4134-1	91	250	1200	0.01	69.16	40	4.2	0.095
1N4135UR-1	CDLL4135-1	100	250	1500	0.01	76.00	40	3.8	0.095

SEE NOTES ON NEXT PAGE.

NOTE 1: These may be ordered as either 1N4614UR-1 thru 1N4627UR-1 and 1N4099UR-1 thru 1N4135UR-1 or CDLL4614-1 thru CDLL4627-1 and CDLL4099-1 thru CDLL4135-1. 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 $\pm 5\%$ 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

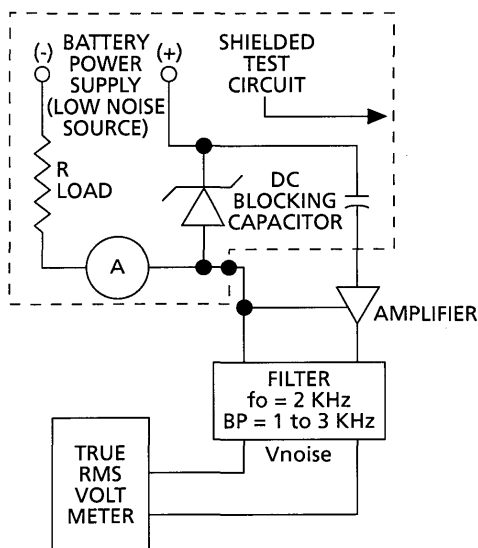


FIGURE 1 – Noise Density Measurement Circuit

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.

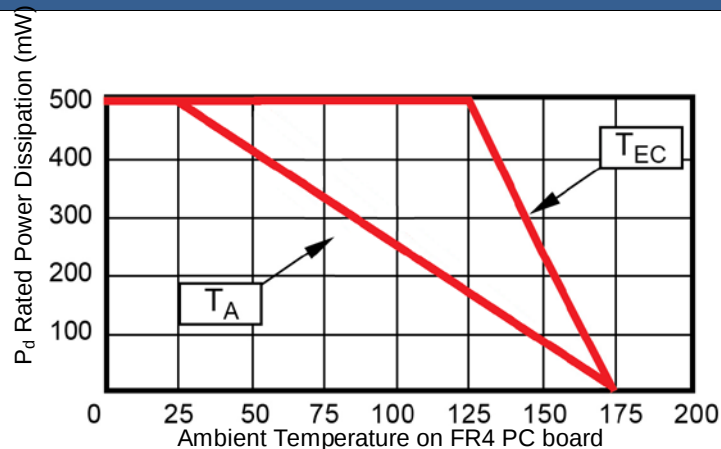


FIGURE 2 – Power Derating Curve

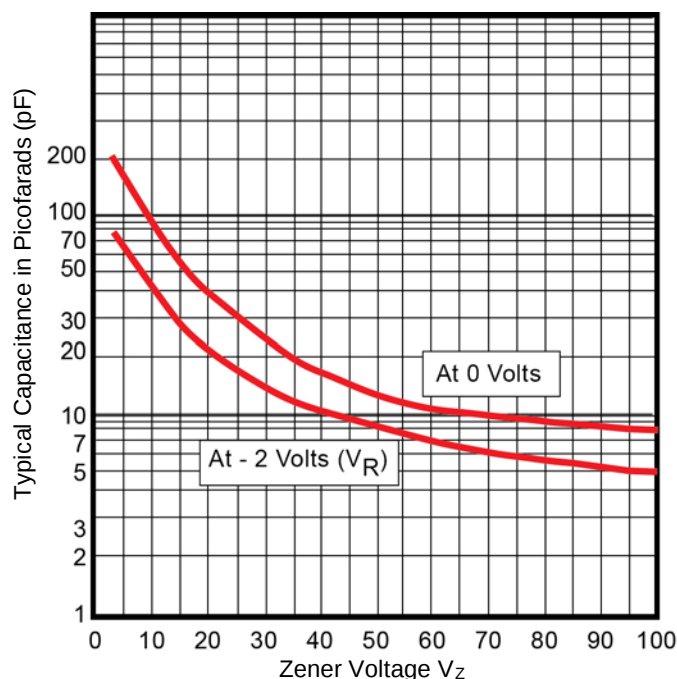
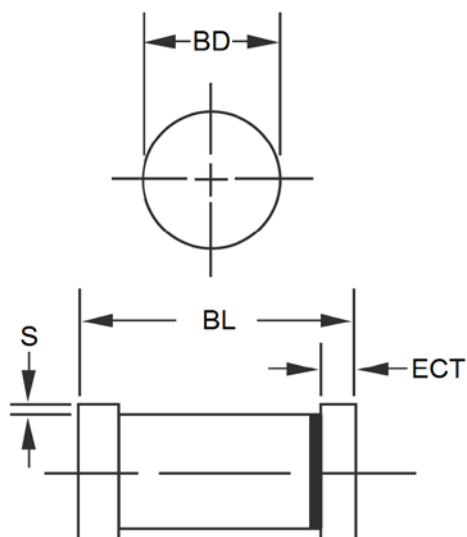
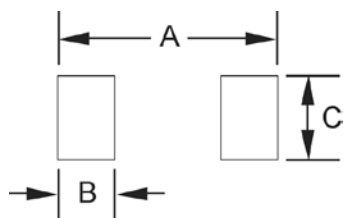


FIGURE 3 – Capacitance vs. Zener Voltage (Typical)

PACKAGE DIMENSIONS


DIM	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	.001 min		0.03 min	

PAD LAYOUT


	INCH	mm
A	.200	5.08
B	.055	1.40
C	.080	2.03