Microsemi
SCOTTSDALE DIVISION

1N821UR thru 1N829AUR-1, e3
(or MLL821 thru MLL829-1, e3)

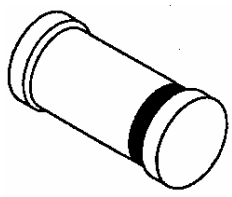
6.2 & 6.55 Volt Temperature Compensated Surface Mount Zener Reference Diodes

DESCRIPTION

The 1N821UR thru 1N829AUR-1 series of surface mount Zero-TC Reference Diodes provides a selection of both 6.2 V and 6.55 V nominal voltages and temperature coefficients to as low as 0.0005%/°C for minimal voltage change with temperature when operated at 7.5 mA. These glass surface mount DO-213AA (MELF) reference diodes are optionally available with an internal-metallurgical-bond by adding a "-1" suffix as well as RoHS Compliant with an e3 suffix. This type of bonded Zener package construction is also available in JAN, JANTX, and JANTXV military qualifications (RoHS Compliant option not applicable). Microsemi also offers numerous other Zener Reference Diode products for a variety of other voltages up to 200 V.

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

APPEARANCE



DO-213AA

FEATURES

- Surface mount equivalent of JEDEC registered 1N821 thru 1N829 series
- Internal metallurgical bond option available by adding a "-1" suffix
- Reference voltage selection of 6.2 V & 6.55 V +/-5% with further tight tolerance options at lower voltage
- 1N821, 823, 825, 827 and 829 also have surface mount qualification to MIL-PRF-19500/159 by adding the JAN, JANTX, or JANTXV prefixes to part numbers a well as the "-1" suffix; e.g. JANTX1N829-1, etc.
- RoHS Compliant devices available by adding an e3 suffix (not applicable to military)
- Axial-leaded equivalents also available in DO-35 or DO-7 without the UR suffix (see separate data sheet) including military qualifications up to JANS for DO-7 (see separate data sheet)
- JANS equivalent available in DO-213AA via SCD

APPLICATIONS / BENEFITS

- Provides minimal voltage changes over a broad temperature range
- For instrumentation and other circuit designs requiring a stable voltage reference
- Maximum temperature coefficient selections available from 0.01%/°C to 0.0005%/°C
- Tight reference voltage tolerances available with center nominal value of 6.15 V by adding designated tolerance such as 1%, 2%, 3%, etc. after the part number for identification
  e.g. 1N827UR-2%, 1N829AUR-1-1%, etc.
- Small surface-mount footprint
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Typical low capacitance of 100 pF or less

MAXIMUM RATINGS

- Operating Temperatures: -65°C to +175°C
- Storage Temperatures: -65°C to +175°C
- DC Power Dissipation: 500 mW @ T_L = 25°C and maximum current I_{ZM} of 70 mA. NOTE: For optimum voltage-temperature stability, I_Z = 7.5 mA (less than 50 mW in dissipated power)
- Solder Temperatures: 260°C for 10 s (max)

MECHANICAL AND PACKAGING

- CASE: Hermetically sealed glass case. DO-213AA package
- TERMINALS: Leads, Tin-Lead (military) or RoHS Compliant annealed matte Tin plating solderable per MIL-STD-750, Method 2026
- MARKING: Cathode band (except double anode 1N822 and 1N824)
- POLARITY: Reference diode to be operated with the banded end positive with respect to the opposite end
- TAPE & REEL option: Standard per EIA-481-B with 12 mm tape, 2000 per 7 inch reel or 5000 oer 13 inch reel (add "TR" suffix to part number)
- WEIGHT: 0.04 grams.
- See package dimensions on last page

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*ELECTRICAL CHARACTERISTICS @ 25°C, unless otherwise specified

JEDEC TYPE NUMBER (Notes 1, 5 & 6)	ZENER VOLTAGE (Note 1 and 4) V_Z @ I_{ZT}	ZENER TEST CURRENT I_{ZT}	MAXIMUM ZENER IMPEDANCE (Note 2) Z_{ZT} @ I_{ZT}	MAXIMUM REVERSE CURRENT I_R @ 3 V	VOLTAGE TEMPERATURE STABILITY (ΔV_{ZT} MAX) -55°C to +100°C (Note 3 and 4)	EFFECTIVE TEMPERATURE COEFFICIENT α_{VZ}
	VOLTS	mA	OHMS	µA	mV	%/°C
1N821UR	5.9 – 6.5	7.5	15	2.0	96	0.01
1N821AUR	5.9 – 6.5	7.5	10	2.0	96	0.01
1N822UR †	5.9 – 6.5	7.5	15	2.0	96	0.01
1N823UR	5.9 – 6.5	7.5	15	2.0	48	0.005
1N823AUR	5.9 – 6.5	7.5	10	2.0	48	0.005
1N824UR †	5.9 – 6.5	7.5	15	2.0	48	0.005
1N825UR	5.9 – 6.5	7.5	15	2.0	19	0.002
1N825AUR	5.9 – 6.5	7.5	10	2.0	19	0.002
1N826UR	6.2 – 6.9	7.5	15	2.0	20	0.002
1N827UR	5.9 – 6.5	7.5	15	2.0	9	0.001
1N827AUR	5.9 – 6.5	7.5	10	2.0	9	0.001
1N828UR	6.2 – 6.9	7.5	15	2.0	10	0.001
1N829UR	5.9 – 6.5	7.5	15	2.0	5	0.0005
1N829AUR	5.9 – 6.5	7.5	10	2.0	5	0.0005

*JEDEC Registered Data.

†Double Anode; electrical specifications apply under both bias polarities.

NOTES:

1. Add a "-1" suffix for internal metallurgical bond. When ordering devices with tighter tolerances than specified for the V_Z voltage nominal of 6.15 V, add a further hyphened suffix number % to the part number for desired tolerance, e.g. 1N827UR-1-2%, 1N829UR-1-1%, 1N829AUR-1%, 1N829AUR-1-1%, etc.
2. Zener impedance is measured by superimposing 0.75 mA ac rms on 7.5 mA dc @ 25°C.
3. The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV change at any discrete temperature between the established limits.
4. Voltage measurements to be performed 15 seconds after application of dc current.
5. 1N821UR-1, 1N823UR-1, 1N825UR-1, 1N827UR-1, and 1N829UR-1 also have qualification to MIL-PRF-19500/159 by adding the JAN, JANTX, or JANTXV prefix to part numbers as well as the "-1" suffix; e.g. JANTX1N827UR-1, JANTXV1N829UR-1, etc.
6. This product series has also been previously identified as the MLL821 thru MLL829A-1. This alternate name may still be used.

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GRAPHS

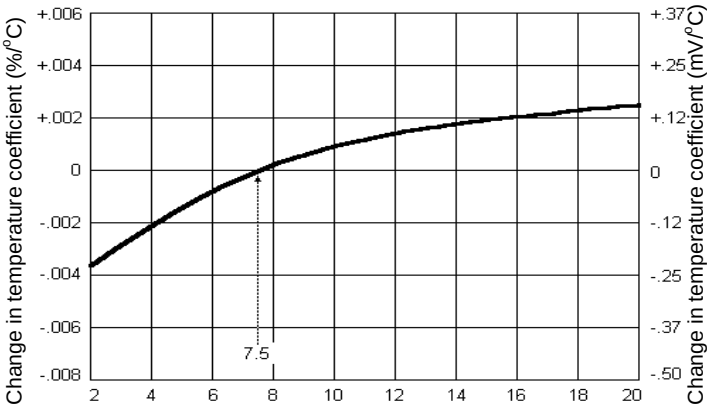


FIGURE 2
TYPICAL CHANGE OF TEMPERATURE COEFFICIENT WITH CHANGE IN OPERATING CURRENT.

The curve shown in Figure 2 is typical of the diode series and greatly simplifies the estimation of the Temperature Coefficient (TC) when the diode is operated at currents other than 7.5mA.

EXAMPLE: A diode in this series is operated at a current of 7.5mA and has specified Temperature Coefficient (TC) limits of +/-0.005%/°C. To obtain the typical Temperature Coefficient limits for this same diode operated at a current of 6.0mA, the new TC limits (%/°C) can be estimated using the graph in FIGURE 2. At a test current of 6.0mA the change in Temperature Coefficient (TC) is approximately –0.0006%.°C. The algebraic sum of +/-0.005%°C and –0.0006%/°C gives the new estimated limits of +0.0044%/oC and -0.0056%/oC.

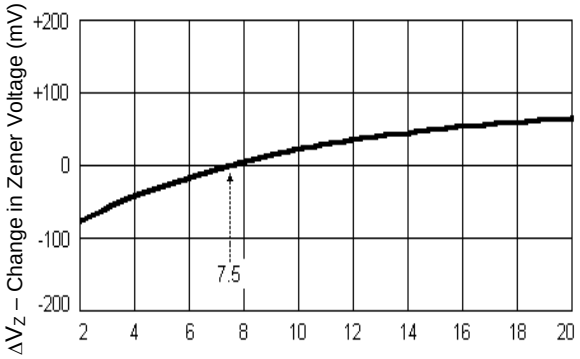
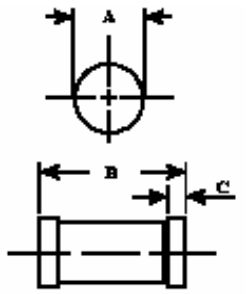


FIGURE 3
TYPICAL CHANGE OF ZENER VOLTAGE WITH CHANGE IN OPERATING CURRENT

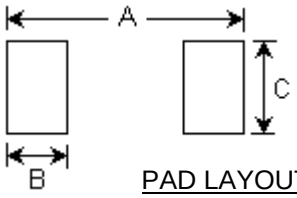
This curve in Figure 3 illustrates the change of diode voltage arising from the effect of impedance. It is in effect an exploded view of the zener operating region of the I-V characteristic.

In conjunction with Figure 2, this curve can be used to estimate total voltage regulation under conditions of both varying temperature and current.

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



PAD LAYOUT

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