

1N821 thru 1N829A-1 DO-7

6.2 & 6.55 Volt Temperature Compensated Zener Reference Diodes

DESCRIPTION

The popular 1N821 thru 1N829 series of 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 axialleaded DO-7 reference diodes are also available in JAN, JANTX, JANTXV, and JANS military qualifications. Microsemi also offers numerous other Zener Reference Diode products for a variety of other voltages up to 200 V.



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

FEATURES

- JEDEC registered 1N821 thru 1N829 series
- Internal metallurgical bonds
- Double anode option with 1N822 and 1N824 selection
- Reference voltage selection of 6.2 V & 6.55 V +/-5% with further tight tolerance options at nominal of 6.35 V
- 1N821, 823, 825, 827 and 829 also have military qualification to MIL-PRF-19500/159 up to the JANS level by adding JAN, JANTX, JANTXV, or JANS prefixes to part numbers as well as the "-1" suffix, e.g. JANTX1N829-1, etc.
- Radiation Hardened devices available by changing "1N" prefix to "RH", e.g. RH827, RH 829, RH829A, etc. Also consult factory for "RH" data sheet brochure
- Military surface mount equivalents also available in DO-213AA with UR-1 suffix and JAN, JANTX, or JANTXV prefix, e.g. JANTX1N829UR-1 (see separate data sheet)
- Also available in smaller axial-leaded DO-35 package (see separate data sheet)

MAXIMUM RATINGS

- Operating & StorageTemperature: -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 (maximum)

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 voltage tolerances with nominal reference voltages of 6.35 V available by adding tolerance 1%, 2%, 3%, etc. after the part number for identification e.g. 1N827-2%, 1N829A -1%, 1N829-1-1%, etc.
- Flexible axial-lead mounting terminals
- Nonsensitive to ESD per MIL-STD-750 Method
 1020

MECHANICAL AND PACKAGING

- CASE: Hermetically sealed glass case with DO-7 (DO-204AA) package
- TERMINALS: Tin-lead plated and solderable per MIL-STD-750, Method 2026
- MARKING: Part number and 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-296 (add "TR" suffix to part number)
- WEIGHT: 0.2 grams.
- See package dimensions on last page

1N821-1N829A-1

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*ELECTRICAL CHARACTERISTICS @ 25°C, unless otherwise specified

JEDEC TYPE NUMBER (Note 1, 5 & 6)	ZENER VOLTAGE (Note 1 and 4) Vz @ 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 (∆V _{2T} MAX) -55°C to +100°C (Note 3 and 4)	EFFECTIVE TEMPERATURE COEFFICIENT αvz
	VOLTS	mA	OHMS	μA	mV	%/°C
1N821	5.9 - 6.5	7.5	15	2.0	96	0.01
1N821A	5.9 - 6.5	7.5	10	2.0	96	0.01
1N822†	5.9 - 6.5	7.5	15	2.0	96	0.01
1N823	5.9 - 6.5	7.5	15	2.0	48	0.005
1N823A	5.9 - 6.5	7.5	10	2.0	48	0.005
1N824†	5.9 - 6.5	7.5	15	2.0	48	0.005
1N825	5.9 - 6.5	7.5	15	2.0	19	0.002
1N825A	5.9 - 6.5	7.5	10	2.0	19	0.002
1N826	6.2 - 6.9	7.5	15	2.0	20	0.002
1N827	5.9 - 6.5	7.5	15	2.0	9	0.001
1N827A	5.9 - 6.5	7.5	10	2.0	9	0.001
1N828	6.2 - 6.9	7.5	15	2.0	10	0.001
1N829	5.9 - 6.5	7.5	15	2.0	5	0.0005
1N829A	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:

Add a "-1" suffix for internal metallurgical bond. When ordering devices with tighter tolerances than specified for the Vz voltage nominal of 1. 6.35 V, add a hyphened suffix to the part number for desired tolerance, e.g. 1N827-1-2%, 1N829-1-1%, 1N829A-1%, 1N829A-1-1%, etc. 2. Zener impedance measured by superimposing 0.75 mA ac rms on 7.5 mA dc @ 25°C.

The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV 3. change at discrete temperature between the established limits.

- Voltage measurements to be performed 15 seconds after application of dc current. 4.
- 5. 1N821, 1N823, 1N825, 1N827, and 1N829 also have gualification to MIL-PRF-19500/159 by adding the JAN, JANTX, JANTXV, or JANS prefix to part numbers as well as the "-1" suffix; e.g. JANTX1N827-1, JANTXV1N829-1, etc. Designate Radiation Hardened devices with "RH" prefix instead of "1N", e.g. RH829A instead of 1N829A.
- 6.



GRAPHS

The curve shown in Figure 1 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 1.

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 estimated limits of +0.0044%/°C and -0.0056%/°C.





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This curve in Figure 2 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 1, this curve can be used to estimate total voltage regulation under conditions of both varying temperature and current.

DIMENSIONS



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1N822 1N821A 1N823A 1N825 1N823 1N826 1N828 1N824 1N829 1N829A 1N825A