Temperature-Compensated Zener Reference Diodes

1N821,A 1N823,A
1N825,A 1N827,A
1N829,A

TEMPERATURE-COMPENSATED SILICON ZENER REFERENCE DIODES
6.2 V, 400 mW

Temperature-compensated zener reference diodes utilizing a single chip oxide passivated junction for long-term voltage stability. A rugged, glass-enclosed, hermetically sealed structure.

Mechanical Characteristics:

CASE: Hermetically sealed, all-glass
DIMENSIONS: See outline drawing.
FINISH: All external surfaces are corrosion resistant and leads are readily solderable.
POLARITY: Cathode indicated by polarity band.
WEIGHT: 0.2 Gram (approx.)
MOUNTING POSITION: Any

Maximum Ratings
Junction Temperature: – 55 to +175°C
Storage Temperature: – 65 to +175°C
DC Power Dissipation: 400 mW @ T_A = 50°C

WAFER FAB LOCATION: Phoenix, Arizona
ASSEMBLY/TEST LOCATION: Phoenix, Arizona

CASE 299
DO-204AH
GLASS

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted. V_Z = 6.2 V ± 5%* @ I_{ZT} = 7.5 mA) (Note 5)

JEDEC Type No.	Maximum Voltage Change ΔV_Z (Volts) (Note 1)	Ambient Test Temperature °C ±1°C	Temperature Coefficient For Reference Only %/°C (Note 1)	Maximum Dynamic Impedance Z_{ZT} Ohms (Note 2)
1N821	***0.096***	***– 55, 0, +25, +75, +100***	***0.01***	***15***
1N823	***0.048***		***0.005***	
1N825	***0.019***		***0.002***	
1N827	0.009		0.001	
1N829	0.005		0.0005	
1N821A	***0.096***		***0.01***	***10***
1N823A	***0.048***		***0.005***	
1N825A	***0.019***		***0.002***	
1N827A	0.009		0.001	
1N829A	0.005		0.0005	

*Tighter-tolerance units available on special request.

MAXIMUM VOLTAGE CHANGE versus AMBIENT TEMPERATURE

(with I_{ZT} = 7.5 mA ±0.01 mA) (See Note 3)

1N821 through 1N829

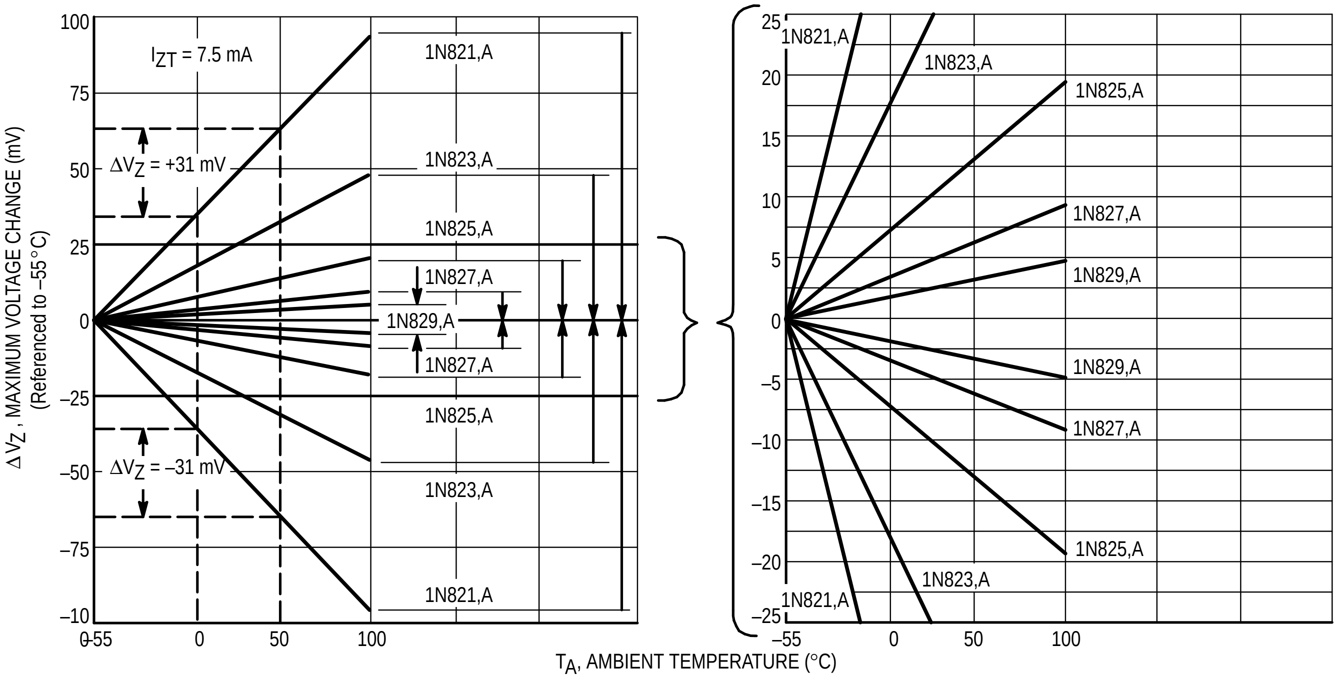

Figure 1a **Figure 1b**

ZENER CURRENT versus MAXIMUM VOLTAGE CHANGE

(At Specified Temperatures)

(See Note 4)

MORE THAN 95% OF THE UNITS ARE IN THE RANGES INDICATED BY THE CURVES.

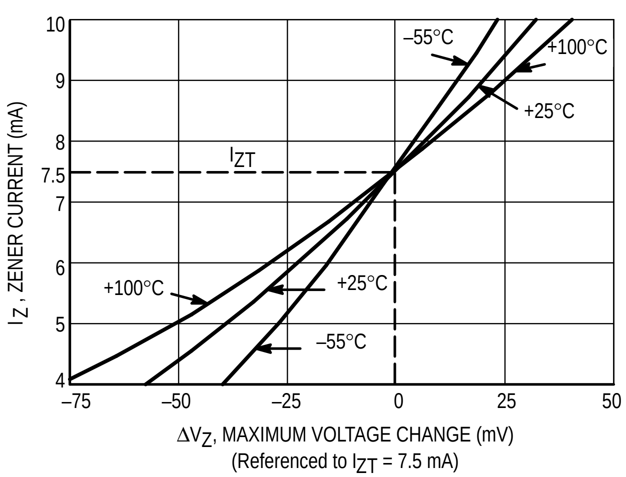

Figure 2. 1N821 Series

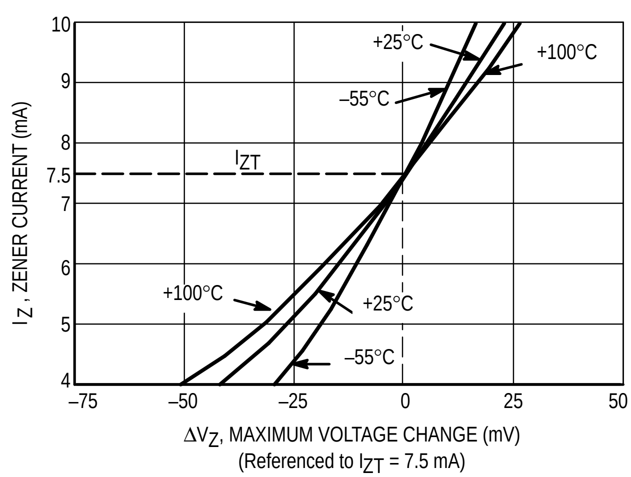

Figure 3. 1N821A Series

Devices listed in bold, italic are Motorola preferred devices.

MAXIMUM ZENER IMPEDANCE versus ZENER CURRENT

(See Note 2)

MORE THAN 95% OF THE UNITS ARE IN THE RANGES INDICATED BY THE CURVES.

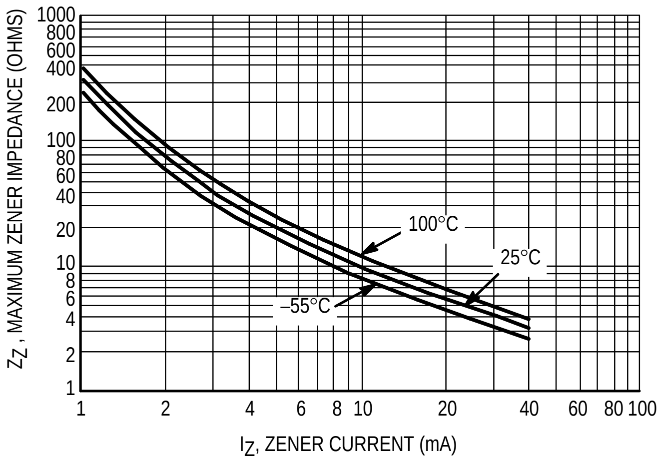

Figure 4. 1N821 Series

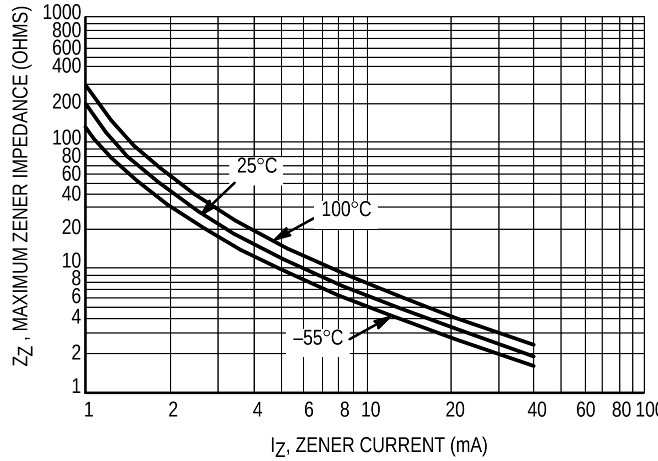

Figure 5. 1N821A Series

NOTE 1. VOLTAGE VARIATION (ΔV_Z) AND TEMPERATURE COEFFICIENT

All reference diodes are characterized by the "box method." This guarantees a maximum voltage variation (ΔV_Z) over the specified temperature range, at the specified test current (I_{ZT}), verified by tests at indicated temperature points within the range. V_Z is measured and recorded at each temperature specified. The ΔV_Z between the highest and lowest values must not exceed the maximum ΔV_Z given. This method of indicating voltage stability is now used for JEDEC registration as well as for military qualification. The former method of indicating voltage stability — by means of temperature coefficient accurately reflects the voltage deviation at the temperature extremes, but is not necessarily accurate within the temperature range because reference diodes have a nonlinear temperature relationship. The temperature coefficient, therefore, is given only as a reference.

NOTE 2.

The dynamic zener impedance, Z_{ZT}, is derived from the 60 Hz ac voltage drop which results when an ac current with an rms value equal to 10% of the dc zener current, I_{ZT}, is superimposed on I_{ZT}. Curves showing the variation of zener impedance with zener current for each series are given in Figures 4 and 5.

NOTE 3.

These graphs can be used to determine the maximum voltage change of any device in the series over any specific temperature range. For example, a temperature change from 0 to +50°C will cause a voltage change no greater than +31 mV or – 31 mV for 1N821 or 1N821A, as illustrated by the dashed lines in Figure 1. The boundaries given are maximum values. For greater resolution, an expanded view of the center area in Figure 1a is shown in Figure 1b.

NOTE 4.

The maximum voltage change, ΔV_Z, Figures 2 and 3 is due entirely to the impedance of the device. If both temperature and I_{ZT} are varied, then the total voltage change may be obtained by graphically adding ΔV_Z in Figure 2 or 3 to the ΔV_Z in Figure 1 for the device under consideration. If the device is to be operated at some stable current other than the specified test current, a new set of characteristics may be plotted by superimposing the data in Figure 2 or 3 on Figure 1. For a more detailed explanation see application note in later section.

NOTE 5.

Zener voltage limits at 25°C measured with the test current (I_{ZT}) applied with the device junction in thermal equilibrium at an ambient temperature of 25°C.