1N2163 thru 1N2171 (SILICON) 1N2163A thru 1N2171A 1N3580, A, B thru 1N3583, A, B

TEMPERATURE-COMPENSATED ZENER REFERENCE DIODES

Highly reliable reference sources utilizing an oxide-passivated junction for long-term voltage stability. Construction consists of welded hermetically sealed metal and glass case.

- Low Dynamic Impedance
- Choice of Three Temperature Ranges
- "Box Method" Specifications Guarantee Maximum Voltage Deviation.

Temperature compensated reference diodes are made by taking advantage of the differing thermal characteristics of forward and reverse biased silicon PN junctions. A forward biased junction has a negative temperature coefficient of approximately 2.0 millivolts/°C. Reverse biased junctions above 5.0 volts have a positive temperature coefficient and therefore it is possible by judicious selection of combinations of forward and reverse biased junctions to obtain a device that shows a very low temperature coefficient due to cancellation. Because of the differing impedance versus temperature characteristics of the junctions involved, optimum temperature stability is obtained by operating in the zener current range at which the temperature coefficient is a minimum.

MAXIMUM RATINGS

Junction Temperature: -55 to +200[°]C Storage Temperature: -65 to +200[°]C DC Power Dissipation: 750 mW @ T_A = 25[°]C

MECHANICAL CHARACTERISTICS

CASE: Hermetically sealed, welded metal glass DIMENSIONS: See outline drawing. FINISH: All external surfaces are corrosion resistant and leads are readily solderable and weldable. POLARITY: Cathode to case WEIGHT: 1.5 Grams (approx) MOUNTING POSITION: Any



1N2163 thru 1N2171, 1N2163A thru 1N2171A, 1N3580, A, B thru 1N3583, A, B (continued)

ELECTRICAL CHARACTERISTICS

V _Z = 9.4 Volts ± 0.4 V (± 0.2 V Suffix "A") @ (I _{ZT} = 10 mA)					
Type Number	Max Voltage Change (Note 1) △V _Z (Volts)	Test Temperatures °C	Temperature Coefficient (Note 1) %/ ^O C	Max Dynamic Impedance (Note 2) Z _{ZT} (Ohms)	
1N2163,A	0.033	0, +25, +70	0.005		
1N2164,A	0.086	-55, 0, +25, +75, +125	0.005	15	
1N2165,A	0.115	-55, 0, +25, +75, +125, +185	0.005		
1N2166,A	0.007	0, +25, +70	0.001		
1N2167,A	0.017	-55, 0, +25, +75, +125	0.001	15	
1N2168,A	0.023	-55, 0, +25, +75, +125, +185	0.001		
1N2169,A	0.004	0, +25, +70	0.0005		
1N2170,A	0.009	-55, 0, +25, +75, +125	0.0005	15	
1N2171,A	0.012	-55, 0, +25, +75, +125, +185	0.0005		

ELECTRICAL CHARACTERISTICS

Vz = 11.7 Volts ± 5.0% (I _{ZT} = 7.5 mA)						
Type Number	Max Voltage Change (Note 1) △V _Z (Volts)	Test Temperatures °C	Temperature Coefficient (Note 1) %/ ^O C	Max Dynamic Impedance (Note 2) Z _{ZT} (Ohms)		
1N3580 1N3581 1N3582 1N3583	0,088 0.044 0.018 0.009	0, +25, +75	0.01 0.005 0.002 0.001	25		
1N3580A 1N3581A 1N3582A 1N3583A	0.181 0.090 0.036 0.018	-55, 0, +25, +75, +100	0.01 0.005 0.002 0.001	25		
1N3580B 1N3581B 1N3582B 1N3583B	0.239 0.120 0.048 0.024	-55, 0, +25 +75, +100, +150	0.01 0.005 0.002 0.001	25		

1N2382 thru 1N2385

NOTE 1: Voltage Variation ($\triangle V_Z$) and Temperature Coefficient.

All reference diodes are characterized by the "box method". This guarantees a maximum voltage variation $(\bigtriangleup V_Z)$ 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 $\bigtriangleup V_Z$ between the highest and lowest values must not exceed the maximum $\bigtriangleup V_Z$ 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} . A cathode-ray tube curve-trace test on a sample basis is used to ensure that the zener has a sharp and stable knee region.

For Specifications, See 1N1730 Data.

1N2498 thru 1N2500



Recommended for applications requiring an exact replacement only. For new designs and for industry preferred replacement devices, see 1N2970 series.

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1N2609 thru 1N2617

Obsolete, discontinued types, replace with devices from the 1N4001 series.