



1N957A thru 1N986A
See Page 6-4

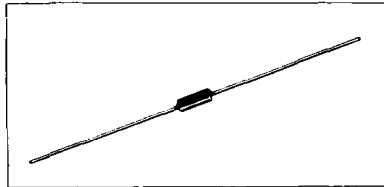
Advance Information

**CONSTANT -VOLTAGE REFERENCES FOR
 120 thru 200-VOLT APPLICATIONS**

- 400-Milliwatt
- Guaranteed Low Zener Impedance
- Guaranteed Low Leakage Current
- Controlled Forward Characteristics
- Temperature Range: -65 to +175°C
- No Heat Sink Required

**1N987A
 thru
 1N992A**

**400-MILLIWATT
 SILICON ZENER
 DIODES**



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DC Power Dissipation @ $T_L = 50^\circ\text{C}$	P_D	400	mW
Derate above $T_L = 50^\circ\text{C}$		3.2	$\text{mW}/^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +175	$^\circ\text{C}$

MECHANICAL CHARACTERISTICS

CASE: Hermetically sealed all glass case.

DIMENSIONS: See outline drawing

FINISH: All external surfaces are corrosion resistant with readily solderable leads.

POLARITY: Cathode end indicated by color band. When operated in zener region, the cathode end will be positive with respect to anode end.

WEIGHT: 0.2 grams (approx.)

MOUNTING POSITION: Any

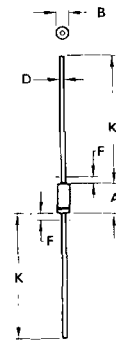
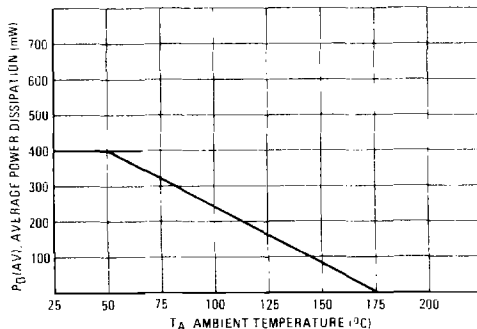


FIGURE 1 - POWER DISSIPATION



NOTES

1. PACKAGE CONTOUR OPTIONAL WITHIN DIA B AND LENGTH A. HEAT SLUGS IF ANY, SHALL BE INCLUDED WITHIN THIS CYLINDER BUT SHALL NOT BE SUBJECT TO THE MIN LIMIT OF DIA B.
2. LEAD DIA NOT CONTROLLED IN ZONES F, TO ALLOW FOR FLASH, LEAD FINISH BUILDUP AND MINOR IRREGULARITIES OTHER THAN HEAT SLUGS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.84	7.62	0.230	0.300
B	2.16	2.72	0.085	0.107
D	0.46	0.56	0.018	0.022
F	-	1.27	-	0.050
K	25.40	38.10	1.000	1.500

All JEDEC dimensions and notes apply

**CASE 51-02
 DO-204AA
 (DO-7)**

This document contains information on a new product. Specifications and information herein are subject to change without notice.

1N987A thru 1N992A

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_F = 1.5\text{ V}$ max at 200 mA for all types)

Type Number (Note 1)	Nominal Zener Voltage V_Z (Note 2) Volts	Test Current I_{ZT} mA	Maximum Zener Impedance (Note 3)			Maximum DC Zener Current I_{ZM} (Note 4) mA	Maximum Reverse Current (Note 5)		
			$Z_{ZT} @ I_{ZT}$ Ohms	$Z_{ZK} @ I_{ZK}$ Ohms	I_{ZK} mA		I_R Maximum μA	Test Voltage Vdc 5% V_R 10%	
1N987A	120	1.0	900	4500	0.25	2.5	5.0	91.2	86.4
1N988A	130	0.95	1100	5000	0.25	2.3	5.0	98.8	93.6
1N989A	150	0.85	1500	6000	0.25	2.0	5.0	114	108
1N990A	160	0.80	1700	6500	0.25	1.9	5.0	121.6	115.2
1N991A	180	0.68	2200	7100	0.25	1.7	5.0	136.8	129.6
1N992A	200	0.65	2500	8000	0.25	1.5	5.0	152	144

NOTE 1 – TOLERANCE AND VOLTAGE DESIGNATION

Tolerance Designation

The tolerance designations are as follows:

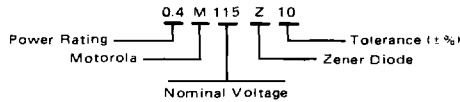
Suffix A: $\pm 10\%$

Suffix B: $\pm 5\%$

Voltage Designation

To designate units with zener voltages other than those listed, a Motorola type number should be used, as shown below. Unless otherwise specified, the electrical characteristics other than the nominal voltage (V_Z) and test voltage for leakage current will conform to the characteristics of the next higher voltage type shown in the table.

EXAMPLE



Matched Sets for Closer Tolerances or Higher Voltages

Series matched sets make zener voltages in excess of 200 volts or tolerances of less than 5% possible as well as providing lower temperature coefficients, lower dynamic impedance and greater power handling ability.

For Clippers, Parallel Matched Sets or other special circuit requirements, contact your Motorola Representative.

NOTE 2 – ZENER VOLTAGE (V_Z) MEASUREMENT

Nominal zener voltage is measured with the device junction in thermal equilibrium with ambient temperature of 25°C .

NOTE 3 – ZENER IMPEDANCE (Z_Z) DERIVATION

The zener impedance is derived from the 60 cycle ac voltage, which results when an ac current having an rms value equal to 10% of the dc zener current (I_{ZT}) is superimposed on I_{ZT} .

A cathode ray oscilloscope curve test is used to insure that each zener diode breakdown region begins at a low current level and that zener voltage remains nearly constant to a current level in excess of I_{ZM} .

NOTE 4 – MAXIMUM ZENER CURRENT RATINGS (I_{ZM})

Maximum zener current ratings are based on the maximum voltage of a 20% unit. For closer tolerance units (10% or 5%) or units where the actual zener voltage (V_Z) is known at the operating point, the maximum zener current may be increased and is limited by the derating curve.

NOTE 5 – REVERSE LEAKAGE CURRENT I_R

Reverse leakage currents are guaranteed only for 5% and 10% 400 mW silicon zener diodes and are measured at V_R as shown on the table.