# FAIRCHILD SILICON PLANAR* ZENER DIODES

## 400 MILLIWATT VOLTAGE REGULATORS

### 1N746-1N759 SERIES & 1N957-1N992 SERIES

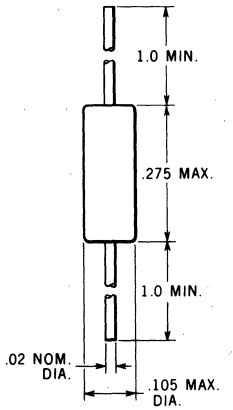
**GENERAL DESCRIPTION** - The Fairchild General Purpose Voltage Regulator is a Silicon Planar Diode designed for a wide range of voltage regulation and voltage limiting applications. Utilizing the Planar process, these devices offer, ultra-stable reverse voltage, low leakage, low dynamic impedance, and high reliability.

- Extremely low leakage at biases approaching the Zener voltage — typically an order of magnitude lower than specified values.
- Extreme leakage stability. This is a strong reliability indicator.
- Very low dynamic resistance.
- Sharp Zener knees.
- Planar Construction above 5.6 volts.

**ABSOLUTE MAXIMUM RATINGS** - The maximum ratings are limiting values above which life or satisfactory performance may be impaired.

| | |
|---|---|
| Operating Temperature | -65°C to +150°C |
| Storage Temperature | -65°C to +175°C |
| Power Dissipation | 400 mW |
| Power Derating Factor | 3.2 mW/°C |

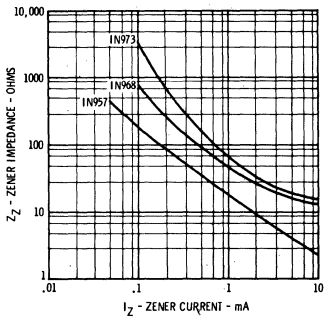
**PHYSICAL DIMENSIONS**



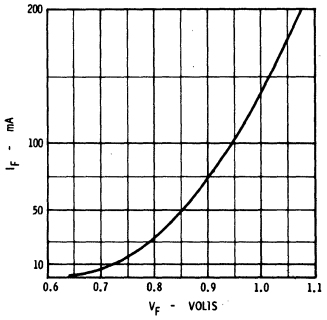

NOTES: All dimensions in inches.
Weight: 0.25 gram.

## TYPICAL ELECTRICAL CHARACTERISTICS

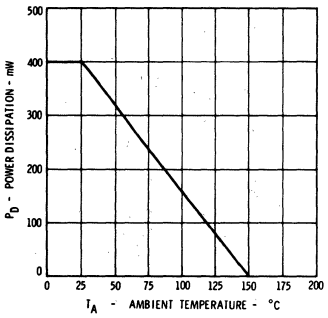
**ZENER IMPEDANCE VERSUS REVERSE CURRENT**




**$V_F$ VERSUS $I_F$ (Typical)**




**POWER DISSIPATION VERSUS AMBIENT TEMPERATURE**




*Planar is a patented Fairchild process.


FAIRCHILD SEMICONDUCTOR
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

# FAIRCHILD 400 MILLIWATT VOLTAGE REGULATORS

**ELECTRICAL CHARACTERISTICS** (25°C Free Air Temperature unless otherwise noted)

| JEDEC Type No. | $V_Z$ Zener Voltage Nominal | $I_{ZT}$ Test Current | $Z_Z$ Max. Zener Impedance (Note 3) | | | $V_R$ Reverse Voltage (Note 5) | | $I_R$ Max. Reverse Current @ $V_R$ | | T.C. Temperature Coefficient (Maximum) | $I_{zm}$ Max. Current (Note 4) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $Z_{ZT}$ at $I_{ZT}$ | $Z_{zk}$ at $I_{zk}$ | | | | 25°C | 150°C | | |
| | Volts | mA | Ohms | Ohms | mA | Volts | | μA | μA | %/°C | mA |
| | | | | | | A | B | | | | |
| (Note 1) | | | | | | | | | | | |
| 1N746 | 3.3 | 20.00 | 28.0 | | | 1.0 | | 10.00 | 30.0 | -.070 | 110.0 |
| 1N747 | 3.6 | 20.00 | 24.0 | | | 1.0 | | 10.00 | 30.0 | -.065 | 100.0 |
| 1N748 | 3.9 | 20.00 | 23.0 | | | 1.0 | | 10.00 | 30.0 | -.060 | 95.0 |
| 1N749 | 4.3 | 20.00 | 22.0 | | | 1.0 | | 2.00 | 30.0 | -.055 | 85.0 |
| 1N750 | 4.7 | 20.00 | 19.0 | | | 1.0 | | 2.00 | 30.0 | -.043 | 75.0 |
| 1N751 | 5.1 | 20.00 | 17.0 | | | 1.0 | | 1.00 | 20.0 | ±.030 | 70.0 |
| 1N752 | 5.6 | 20.00 | 11.0 | | | 1.0 | | 1.00 | 20.0 | ±.028 | 65.0 |
| 1N753 | 6.2 | 20.00 | 7.0 | | | 1.0 | | 0.10 | 20.0 | +.045 | 60.0 |
| 1N754 | 6.8 | 20.00 | 5.0 | | | 1.0 | | 0.10 | 20.0 | +.050 | 55.0 |
| 1N755 | 7.5 | 20.00 | 6.0 | | | 1.0 | | 0.10 | 20.0 | +.058 | 50.0 |
| 1N756 | 8.2 | 20.00 | 8.0 | | | 1.0 | | 0.10 | 20.0 | +.062 | 45.0 |
| 1N757 | 9.1 | 20.00 | 16.0 | | | 1.0 | | 0.10 | 20.0 | +.068 | 40.0 |
| 1N758 | 10.0 | 20.00 | 17.0 | | | 1.0 | | 0.10 | 20.0 | +.075 | 35.0 |
| 1N759 | 12.0 | 20.00 | 50.0 | | | 1.0 | | 0.10 | 20.0 | +.077 | 30.0 |
| (Note 2) | | | | | | | | | | | |
| 1N957 | 6.8 | 18.50 | 4.5 | 700 | 1.0 | 4.9 | 5.2 | 10.00 | 50.0 | +.050 | 47.0 |
| 1N958 | 7.5 | 16.50 | 5.5 | 700 | 0.5 | 5.4 | 5.7 | 10.00 | 50.0 | +.058 | 42.0 |
| 1N959 | 8.2 | 15.00 | 6.5 | 700 | 0.5 | 5.9 | 6.2 | 5.00 | 50.0 | +.062 | 38.0 |
| 1N960 | 9.1 | 14.00 | 7.5 | 700 | 0.5 | 6.6 | 6.9 | 1.00 | 10.0 | +.068 | 35.0 |
| 1N961 | 10.0 | 12.50 | 8.5 | 700 | 0.25 | 7.2 | 7.6 | 1.00 | 10.0 | +.072 | 32.0 |
| 1N962 | 11.0 | 11.50 | 9.5 | 700 | 0.25 | 8.0 | 8.4 | 1.00 | 5.0 | +.073 | 28.0 |
| 1N963 | 12.0 | 10.50 | 11.5 | 700 | 0.25 | 8.6 | 9.1 | 1.00 | 5.0 | +.076 | 26.0 |
| 1N964 | 13.0 | 9.50 | 13.0 | 700 | 0.25 | 9.4 | 9.9 | 0.10 | 5.0 | +.079 | 24.0 |
| 1N965 | 15.0 | 8.50 | 16.0 | 700 | 0.25 | 10.8 | 11.4 | 0.10 | 5.0 | +.082 | 21.0 |
| 1N966 | 16.0 | 7.80 | 17.0 | 700 | 0.25 | 11.5 | 12.2 | 0.10 | 5.0 | +.083 | 19.0 |
| 1N967 | 18.0 | 7.00 | 21.0 | 750 | 0.25 | 13.0 | 13.7 | 0.10 | 5.0 | +.085 | 17.0 |
| 1N968 | 20.0 | 6.20 | 25.0 | 750 | 0.25 | 14.4 | 15.2 | 0.10 | 5.0 | +.086 | 15.0 |
| 1N969 | 22.0 | 5.60 | 29.0 | 750 | 0.25 | 15.8 | 16.7 | 0.10 | 1.0 | +.087 | 14.0 |
| 1N970 | 24.0 | 5.20 | 33.0 | 750 | 0.25 | 17.3 | 18.2 | 0.10 | 1.0 | +.088 | 13.0 |
| 1N971 | 27.0 | 4.60 | 41.0 | 750 | 0.25 | 19.4 | 20.6 | 0.10 | 1.0 | +.090 | 11.0 |
| 1N972 | 30.0 | 4.20 | 49.0 | 1000 | 0.25 | 21.6 | 22.8 | 0.10 | 1.0 | +.091 | 10.0 |
| 1N973 | 33.0 | 3.80 | 58.0 | 1000 | 0.25 | 23.8 | 25.1 | 0.05 | 1.0 | +.092 | 9.2 |
| 1N974 | 36.0 | 3.40 | 70.0 | 1000 | 0.25 | 25.9 | 27.4 | 0.05 | 1.0 | +.093 | 8.5 |
| 1N975 | 39.0 | 3.20 | 80.0 | 1000 | 0.25 | 28.1 | 29.7 | 0.05 | 1.0 | +.094 | 7.8 |
| 1N976 | 43.0 | 3.00 | 93.0 | 1500 | 0.25 | 31.0 | 32.7 | 0.05 | 1.0 | +.095 | 7.0 |
| 1N977 | 47.0 | 2.70 | 105.0 | 1500 | 0.25 | 33.8 | 35.8 | 0.05 | 1.0 | +.095 | 6.4 |
| 1N978 | 51.0 | 2.50 | 125.0 | 1500 | 0.25 | 36.7 | 38.6 | 0.05 | 1.0 | +.096 | 5.9 |
| 1N979 | 56.0 | 2.20 | 150.0 | 2000 | 0.25 | 40.3 | 42.6 | 0.05 | 1.0 | +.096 | 5.4 |
| 1N980 | 62.0 | 2.00 | 185.0 | 2000 | 0.25 | 44.6 | 47.1 | 0.05 | 1.0 | +.097 | 4.9 |
| 1N981 | 68.0 | 1.80 | 230.0 | 2000 | 0.25 | 49.0 | 51.7 | 0.05 | 1.0 | +.097 | 4.5 |
| 1N982 | 75.0 | 1.70 | 270.0 | 2000 | 0.25 | 54.0 | 56.0 | 0.05 | 1.0 | +.098 | 4.0 |
| 1N983 | 82.0 | 1.50 | 330.0 | 3000 | 0.25 | 59.0 | 62.2 | 0.05 | 1.0 | +.098 | 3.7 |
| 1N984 | 91.0 | 1.40 | 400.0 | 3000 | 0.25 | 65.5 | 69.2 | 0.05 | 1.0 | +.099 | 3.3 |
| 1N985 | 100.0 | 1.30 | 500.0 | 3000 | 0.25 | 72.0 | 76.0 | 0.05 | 1.0 | +.110 | 3.0 |
| 1N986 | 110.0 | 1.10 | 750.0 | 4000 | 0.25 | 79.2 | 83.6 | 0.05 | 1.0 | +.110 | 2.7 |
| 1N987 | 120.0 | 1.00 | 900.0 | 4500 | 0.25 | 86.4 | 91.2 | 0.05 | 1.0 | +.110 | 2.5 |
| 1N988 | 130.0 | 0.95 | 1100.0 | 5000 | 0.25 | 93.6 | 98.8 | 0.05 | 1.0 | +.110 | 2.3 |
| 1N989 | 150.0 | 0.85 | 1500.0 | 6000 | 0.25 | 108.0 | 114.0 | 0.05 | 1.0 | +.110 | 2.0 |
| 1N990 | 160.0 | 0.80 | 1700.0 | 6500 | 0.25 | 115.2 | 121.6 | 0.05 | 1.0 | +.110 | 1.9 |
| 1N991 | 180.0 | 0.68 | 2200.0 | 7100 | 0.25 | 129.6 | 136.8 | 0.05 | 1.0 | +.110 | 1.7 |
| 1N992 | 200.0 | 0.65 | 2500.0 | 8000 | 0.25 | 144.0 | 152.0 | 0.05 | 1.0 | +.110 | 1.5 |

**NOTES:**

(1) The 1N746-1N759 series have a standard Zener voltage tolerance of ±10%. A tolerance of ±5.0% is also available by suffixing A to the JEDEC type number.

(2) The 1N957-1N992 series have a 20% tolerance. Add suffix A for 10% tolerance, and suffix B for 5.0% tolerance.

(3) The Zener impedances $Z_{zT}$ and $Z_{zk}$ are derived by superimposing a 60 cycle AC signal, having an RMS value equal to 10% of the DC Zener current, on $I_{zT}$ or $I_{zk}$.

(4) Maximum Zener current ratings ($I_{zm}$) are based on the maximum voltage of a 20% tolerance unit. For closer tolerance units or units where the actual Zener voltage (VZ) is known at the operating point, the maximum Zener current may be increased according to the derating curve.

(5) $V_R$ Value for 20% tolerance = 80% lowest $V_z$ value for each type.

1N753A through 1N759A, and 1N962B through 1N973B are available in Military Qualified (JAN) types.