



**1N5518A,B
thru
1N5546A,B**

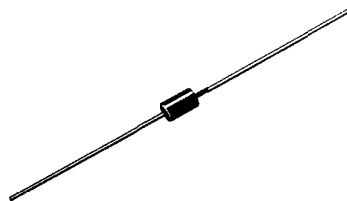
LOW VOLTAGE AVALANCHE SILICON OXIDE PASSIVATED ZENER REGULATOR DIODES

Highly reliable silicon regulators utilizing an oxide-passivated junction for long-term voltage stability. Double slug construction provides a rugged, glass-enclosed, hermetically sealed structure.

- Low Zener Noise Specified
- Low Maximum Regulation Factor
- Low Zener Impedance
- Low Leakage Current
- Controlled Forward Characteristics
- Temperature Range: -65 to $+200^{\circ}\text{C}$

LOW VOLTAGE AVALANCHE ZENER DIODES

**400 MILLIWATTS
3.3 THRU 33 VOLTS**



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DC Power Dissipation @ $T_A = 50^{\circ}\text{C}$ Derate above 50°C	P_D	400 3.2	mW mW/ $^{\circ}\text{C}$
DC Power Dissipation @ $T_L = 50^{\circ}\text{C}$ Lead Length = $1/8''$ Derate above 50°C (Figure 1)	P_D	500 3.3	mW mW/ $^{\circ}\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to $+200$	$^{\circ}\text{C}$

MECHANICAL CHARACTERISTICS

CASE: Hermetically sealed, all-glass

DIMENSIONS: See outline drawing.

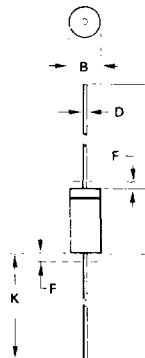
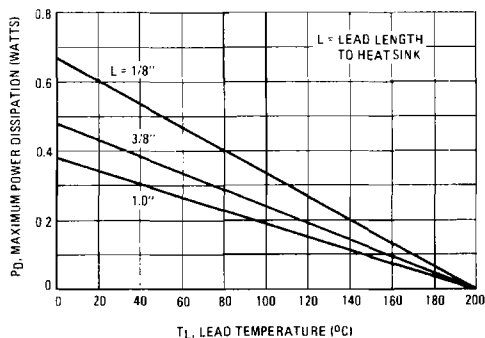
FINISH: All external surfaces are corrosion resistant and leads are readily solderable and weldable.

POLARITY: Cathode indicated by polarity band.

WEIGHT: 0.2 Gram (approx)

MOUNTING POSITION: Any

FIGURE 1 — POWER-TEMPERATURE DERATING CURVE



NOTES

1. PACKAGE CONTOUR OPTIONAL WITHIN A AND B. HEAT SLUGS, IF ANY, SHALL BE INCLUDED WITHIN THIS CYLINDER, BUT NOT SUBJECT TO THE MINIMUM LIMIT OF B.
2. LEAD DIAMETER NOT CONTROLLED IN ZONE F TO ALLOW FOR FLASH, LEAD FINISH BUILDUP AND MINOR IRREGULARITIES OTHER THAN HEAT SLUGS.
3. POLARITY DENOTED BY CATHODE BAND.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	3.05	5.08	0.120	0.200
B	1.52	2.29	0.060	0.090
D	0.46	0.56	0.018	0.022
F		1.27		0.050
K	25.40	39.10	1.000	1.500

All JEDEC dimensions and notes apply

CASE 299-02
DO-204 AH

1N5518A, B thru 1N5546A, B

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted. Based on dc measurements at thermal equilibrium, $V_F = 1.1$ Max @ $I_F = 200$ mA for all types)

JEDEC Type No. (Note 1)	Nominal Zener Voltage V _Z @ I _{ZT} Volts (Note 2)	Test Current I _{ZT} mAdc	Max Zener Impedance B-C-D Suffix Z _{ZT} @ I _{ZT} Ohms (Note 3)	Max Reverse Leakage Current			B-C-D Suffix Maximum DC Zener Current I _{ZM} mAdc (Note 5)	B-C-D Suffix Max Noise Density at I _Z = 250 μA N _D (Figure 1) (micro-volts per square root cycle)	Regulation Factor ΔV _Z Volts (Note 6)	Low V _Z Current I _{ZL} mAdc
				I _R μAdc (Note 4)	V _R – Volts					
					Non & A- Suffix	B-C-D Suffix				
1N5518A	3.3	20	26	5.0	0.90	1.0	115	0.5	0.90	2.0
1N5519A	3.6	20	24	3.0	0.90	1.0	105	0.5	0.90	2.0
1N5520A	3.9	20	22	1.0	0.90	1.0	98	0.5	0.85	2.0
1N5521A	4.3	20	18	3.0	1.0	1.5	88	0.5	0.75	2.0
1N5522A	4.7	10	22	2.0	1.5	2.0	81	0.5	0.60	1.0
1N5523A	5.1	5.0	26	2.0	2.0	2.5	75	0.5	0.65	0.25
1N5524A	5.6	3.0	30	2.0	3.0	3.5	68	1.0	0.30	0.25
1N5525A	6.2	1.0	30	1.0	4.5	5.0	61	1.0	0.20	0.01
1N5526A	6.8	1.0	30	1.0	5.5	6.2	56	1.0	0.10	0.01
1N5527A	7.5	1.0	35	0.5	6.0	6.8	51	2.0	0.05	0.01
1N5528A	8.2	1.0	40	0.5	6.5	7.5	46	4.0	0.05	0.01
1N5529A	9.1	1.0	45	0.1	7.0	8.2	42	4.0	0.05	0.01
1N5530A	10.0	1.0	60	0.05	8.0	9.1	38	4.0	0.10	0.01
1N5531A	11.0	1.0	80	0.05	9.0	9.9	35	5.0	0.20	0.01
1N5532A	12.0	1.0	90	0.05	9.5	10.8	32	10	0.20	0.01
1N5533A	13.0	1.0	90	0.01	10.5	11.7	29	15	0.20	0.01
1N5534A	14.0	1.0	100	0.01	11.5	12.6	27	20	0.20	0.01
1N5535A	15.0	1.0	100	0.01	12.5	13.5	25	20	0.20	0.01
1N5536A	16.0	1.0	100	0.01	13.0	14.4	24	20	0.20	0.01
1N5537A	17.0	1.0	100	0.01	14.0	15.3	22	20	0.20	0.01
1N5538A	18.0	1.0	100	0.01	15.0	16.2	21	20	0.20	0.01
1N5539A	19.0	1.0	100	0.01	16.0	17.1	20	20	0.20	0.01
1N5540A	20.0	1.0	100	0.01	17.0	18.0	19	20	0.20	0.01
1N5541A	22.0	1.0	100	0.01	18.0	19.8	17	20	0.25	0.01
1N5542A	24.0	1.0	100	0.01	20.0	21.6	16	20	0.30	0.01
1N5543A	25.0	1.0	100	0.01	21.0	22.4	15	20	0.35	0.01
1N5544A	28.0	1.0	100	0.01	23.0	25.2	14	20	0.40	0.01
1N5545A	30.0	1.0	100	0.01	24.0	27.0	13	20	0.45	0.01
1N5546A	33.0	1.0	100	0.01	28.0	29.7	12	20	0.50	0.01

NOTE 1 – TOLERANCE AND VOLTAGE DESIGNATION

The JEDEC type numbers shown are $\pm 10\%$ with guaranteed limits for V_Z , I_R , and V_F . Units with guaranteed limits for all six parameters are indicated by a "B" suffix for $\pm 5.0\%$ units, "C" suffix for $\pm 2.0\%$ and "D" suffix for $\pm 1.0\%$.

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 Hz 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} .

NOTE 4 – REVERSE LEAKAGE CURRENT (I_R)

Reverse leakage currents are guaranteed and are measured at V_R as shown on the table.

NOTE 5 – MAXIMUM REGULATOR CURRENT (I_{ZM})

The maximum current shown is based on the maximum voltage of a 5.0% type unit, therefore, it applies only to the "B" suffix device. The actual I_{ZM} for any device may not exceed the value of 400 milliwatts divided by the actual V_Z of the device.

NOTE 6 – MAXIMUM REGULATION FACTOR (ΔV_Z)

ΔV_Z is the maximum difference between V_Z at I_{ZT} and V_Z at I_{ZL} measured with the device junction in thermal equilibrium.

1N5518A, B thru 1N5546A, B

ZENER NOISE DENSITY

A zener diode generates noise when it is biased in the zener direction. A small part of this noise is due to the internal resistance associated with the device. A larger part of zener noise is a result of the zener breakdown phenomenon and is called microplasma noise. To eliminate the higher frequency components of noise a small shunting capacitor can be used. The lower frequency noise generally must be tolerated since a capacitor required to eliminate the lower frequencies would degrade the regulation properties of the zener in many applications.

Motorola is rating this series with a maximum noise density at 250 microamperes, a bandwidth of 2.0 kHz and a center frequency of 2.0 kHz.

Noise density decreases as zener current increases. The junction temperature will also change the zener noise levels, thus the noise rating must indicate frequency, bandwidth, current level and temperature.

The block diagram shown in Figure 2 represents the method used to measure noise density. The input voltage and load resistance is high so that the zener is driven from a constant current source. The amplifier must be low noise so that the amplifier noise is negligible compared to the test zener. The filter frequency and bandpass is known so that the noise density in volts RMS per square root cycle can be calculated.

FIGURE 2 – NOISE DENSITY MEASUREMENT METHOD

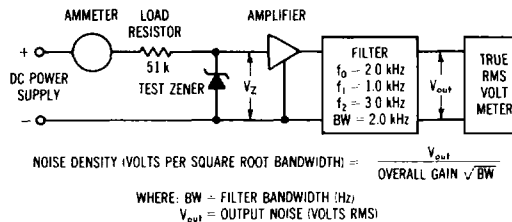


FIGURE 3 – TYPICAL CAPACITANCE

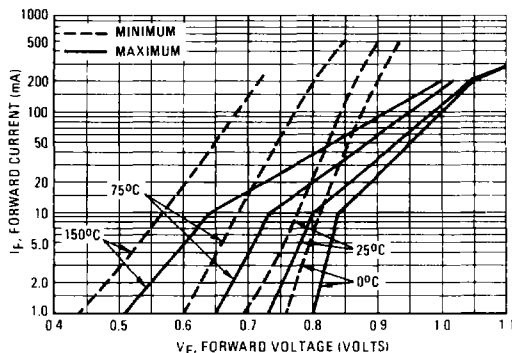


FIGURE 4 – TYPICAL FORWARD CHARACTERISTICS

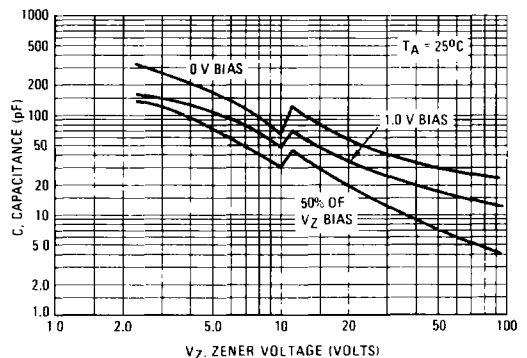


FIGURE 5 — ZENER DIODE CHARACTERISTICS AND SYMBOL IDENTIFICATION

