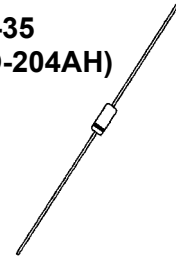


**DESCRIPTION**

The 1N5518 thru 1N5546 series of 0.5 watt Zener Voltage Regulators provides a selection from 3.3 to 33 volts in standard 5% tolerances as well as tighter tolerances identified by different suffix letters on the part number. These glass axial-leaded DO-35 Zeners are also available with an internal-metallurgical-bond option by adding a "-1" suffix. This type of bonded Zener package construction is available in JAN, JANTX, and JANTXV military qualifications to MIL-PRF-19500/437. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

**APPEARANCE**

**DO-35  
(DO-204AH)**



**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

**FEATURES**

- JEDEC registered 1N5518 thru 1N5546
- Internal metallurgical bond option available by adding a "-1" suffix
- Also available in JAN, JANTX, and JANTXV qualifications per MIL-PRF-19500/437 by adding the JAN, JANTX, or JANTXV prefixes to part numbers for desired level of screening as well as "-1" suffix; (e.g. JANTX1N5518B-1, JANTXV1N5546D-1, etc.)
- Military Surface Mount available in DO-213AA package outline by adding a UR-1 suffix in addition to the JAN, JANTX, and JANTXV prefix; e.g. JANTX1N5518BUR-1 (see separate data sheet)
- Commercial Surface Mount also available in separate data sheet as 1N5518UR to 1N5546BUR in DO-213AA package (consult factory for others)
- DO-7 glass body axial-leaded Zener equivalents are also available

**APPLICATIONS / BENEFITS**

- Regulates voltage over a broad operating current and temperature range
- Guaranteed voltage regulation ( $\Delta V_Z$ ) from  $I_{ZL}$  to  $I_{ZT}$
- Voltage selection from 3.3 to 33 V
- Standard voltage tolerances are plus/minus 5% with a "B" suffix
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Flexible axial-lead mounting terminals
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Minimal capacitance (see Figure 3)
- Inherently radiation hard as described in Microsemi MicroNote 050

**MAXIMUM RATINGS**

- Operating and Storage temperature:  $-65^{\circ}\text{C}$  to  $+175^{\circ}\text{C}$
- Thermal Resistance:  $250^{\circ}\text{C/W}$  junction to lead at 3/8 (10 mm) lead length from body, or  $310^{\circ}\text{C/W}$  junction to ambient when mounted on FR4 PC board (1 oz Cu) with  $4\text{ mm}^2$  copper pads and track width 1 mm, length 25 mm
- Steady-State Power: 0.5 watts at  $T_L \leq 50^{\circ}\text{C}$  3/8 inch (10 mm) from body or 0.48 W at  $T_A \leq 25^{\circ}\text{C}$  when mounted on FR4 PC board as described for thermal resistance above (see Figure 2 for derating)
- Forward voltage @200 mA: 1.1 volts
- Solder Temperatures:  $260^{\circ}\text{C}$  for 10 s (max)

**MECHANICAL AND PACKAGING**

- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204AH) package
- TERMINALS: Leads, tin-lead plated solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band where diode is to be operated with the banded end positive with respect to the opposite end for Zener regulation
- MARKING: Part number
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- WEIGHT: 0.2 grams
- See package dimensions on last page

**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.)

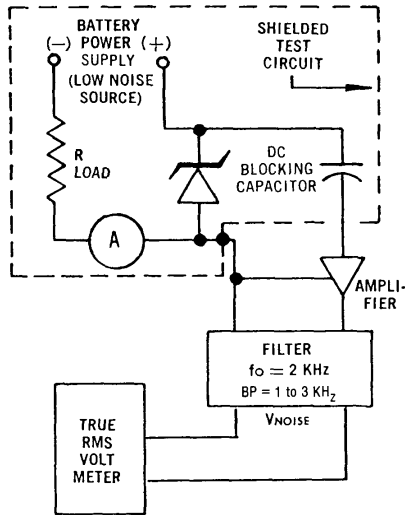
JEDEC TYPE NUMBER (Note 1)	NOMINAL ZENER VOLTAGE $V_Z$ @ $I_{ZT}$ (Note 2) VOLTS	TEST CURRENT $I_{ZT}$ mAdc	MAX. ZENER IMPEDANCE B-C-D SUFFIX $Z_{ZT}$ @ $I_{ZT}$ (Note 3) OHMS	MAX. REVERSE LEAKAGE CURRENT (Note 4)			B-C-D SUFFIX MAXIMUM DC ZENER CURRENT $I_{ZM}$ (Note 5) mAdc	B-C-D SUFFIX MAX. NOISE DENSITY AT $I_Z = 250\mu\text{A}$ $N_D$ $\mu\text{V}/\sqrt{\text{Hz}}$	REGULATION FACTOR $\Delta V_Z$ (Note 6) VOLTS	LOW $V_Z$ CURRENT $I_{ZL}$ (Note 6) mAdc
				$I_R$ $\mu\text{Adc}$	$V_R$ - VOLTS					
					NON & A-SUFFIX	B-C-D SUFFIX				
1N5518	3.3	20	26	5.0	0.90	1.0	115	0.5	0.90	2.0
1N5519	3.6	20	24	3.0	0.90	1.0	105	0.5	0.90	2.0
1N5520	3.9	20	22	1.0	0.90	1.0	98	0.5	0.85	2.0
1N5521	4.3	20	18	3.0	1.0	1.5	88	0.5	0.75	2.0
1N5522	4.7	10	22	2.0	1.5	2.0	81	0.5	0.60	1.0
1N5523	5.1	5.0	26	2.0	2.0	2.5	75	0.5	0.65	0.25
1N5524	5.6	3.0	30	2.0	3.0	3.5	68	1.0	0.30	0.25
1N5525	6.2	1.0	30	1.0	4.5	5.0	61	1.0	0.20	0.01
1N5526	6.8	1.0	30	1.0	5.5	6.2	56	1.0	0.10	0.01
1N5527	7.5	1.0	35	0.5	6.0	6.8	51	2.0	0.05	0.01
1N5528	8.2	1.0	40	0.5	6.5	7.5	46	4.0	0.05	0.01
1N5529	9.1	1.0	45	0.1	7.0	8.2	42	4.0	0.05	0.01
1N5530	10.0	1.0	60	0.05	8.0	9.1	38	4.0	0.10	0.01
1N5531	11.0	1.0	80	0.05	9.0	9.9	35	5.0	0.20	0.01
1N5532	12.0	1.0	90	0.05	9.5	10.8	32	10	0.20	0.01
1N5533	13.0	1.0	90	0.01	10.5	11.7	29	15	0.20	0.01
1N5534	14.0	1.0	100	0.01	11.5	12.6	27	20	0.20	0.01
1N5535	15.0	1.0	100	0.01	12.5	13.5	25	20	0.20	0.01
1N5536	16.0	1.0	100	0.01	13.0	14.4	24	20	0.20	0.01
1N5537	17.0	1.0	100	0.01	14.0	15.3	22	20	0.20	0.01
1N5538	18.0	1.0	100	0.01	15.0	16.2	21	20	0.20	0.01
1N5539	19.0	1.0	100	0.01	16.0	17.1	20	20	0.20	0.01
1N5540	20.0	1.0	100	0.01	17.0	18.0	19	20	0.20	0.01
1N5541	22.0	1.0	100	0.01	18.0	19.8	17	20	0.25	0.01
1N5542	24.0	1.0	100	0.01	20.0	21.6	16	20	0.30	0.01
1N5543	25.0	1.0	100	0.01	21.0	22.4	15	20	0.35	0.01
1N5544	28.0	1.0	100	0.01	23.0	25.2	14	20	0.40	0.01
1N5545	30.0	1.0	100	0.01	24.0	27.0	13	20	0.45	0.01
1N5546	33.0	1.0	100	0.01	28.0	29.7	12	20	0.50	0.01

**NOTES:**

- TOLERANCE AND VOLTAGE DESIGNATION** –  
The JEDEC type numbers shown are +/-20% with guaranteed limits for only  $V_Z$ ,  $I_R$ , and  $V_F$ . Units with A suffix are +/-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 +/-5.0% units, C suffix for +/-2.0% and D suffix for +/-1.0%.
- ZENER VOLTAGE ( $V_Z$ ) MEASUREMENT** –  
Nominal zener voltage is measured with the device junction in thermal equilibrium with ambient temperature of  $25^\circ\text{C}$ .
- ZENER IMPEDANCE ( $Z_Z$ ) MEASUREMENT** –  
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  $I_{ZT}$ .
- REVERSE LEAKAGE CURRENT ( $I_R$ )** –  
Reverse leakage currents are guaranteed and are measured at  $V_R$  as shown on the table.
- MAXIMUM REGULATOR CURRENT ( $I_{ZM}$ )** –  
The maximum current shown is as shown in MIL-PRF-19500/437.
- MAXIMUM REGULATION FACTOR ( $\Delta V_Z$ )** –  
 $\Delta V_Z$  is the maximum difference between  $V_Z$  at  $I_{ZT}$  and  $V_Z$  at  $I_{ZL}$  measured with the device junction in thermal equilibrium.

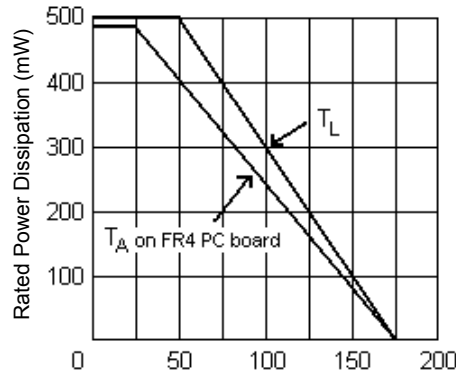
**CIRCUIT AND GRAPHS**

Noise density, ( $N_D$ ) is specified in microvolts rms per square-root-hertz ( $\mu V/\sqrt{Hz}$ ). Actual measurement is performed using a 1 kHz to 3 kHz frequency bandpass filter with a constant Zener test current ( $I_{ZT}$ ) at 25°C ambient temperature.



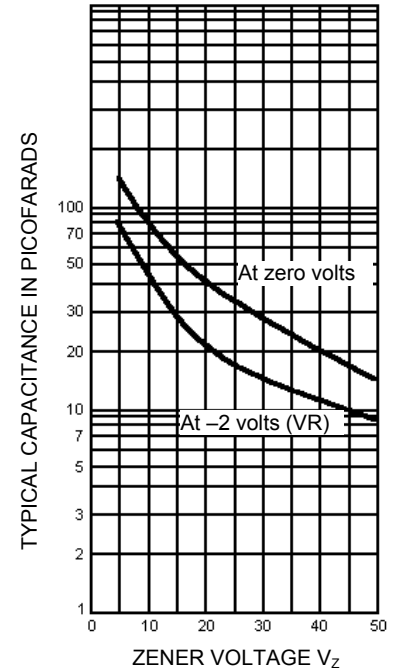
**FIGURE 1**

Noise Density Measurement Circuit

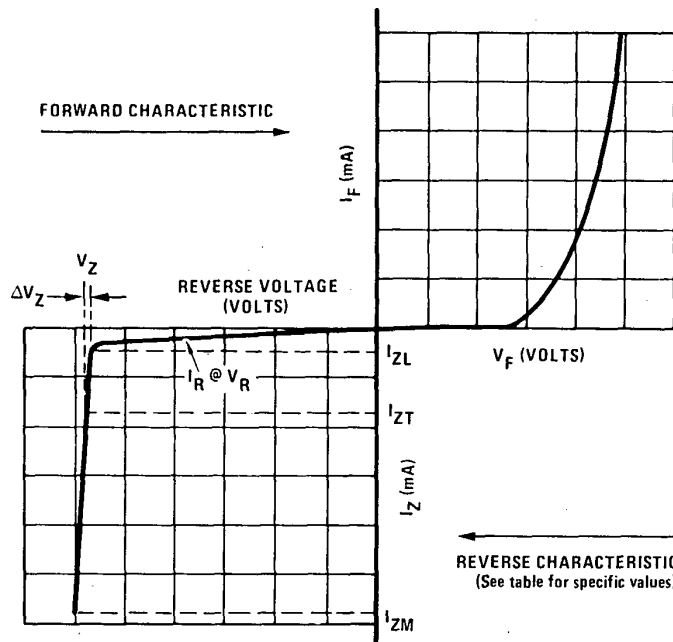


$T_L$  – Lead Temperature ( $^{\circ}C$ ) 3/8" from body or  $T_A$  on FR4 PC Board

**FIGURE 2 – Power Derating Curve**



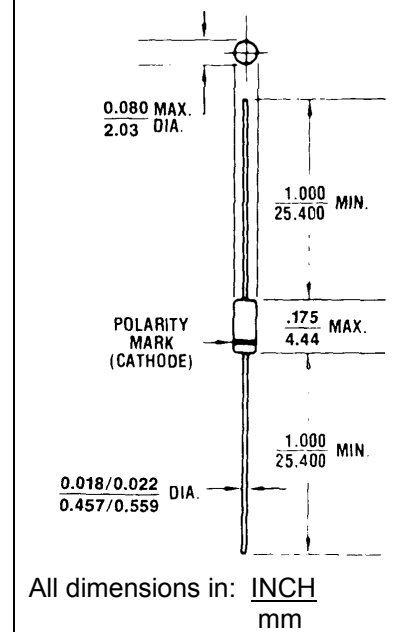
**FIGURE 3**  
Capacitance vs. Zener Voltage (TYPICAL)



**FIGURE 4**

Zener Diode Characteristics and Symbol Identification

**PACKAGE DIMENSIONS**



All dimensions in: INCH  
mm