RoHS

Available on commercial versions

Low Voltage Avalanche 500 mW Zener Diodes

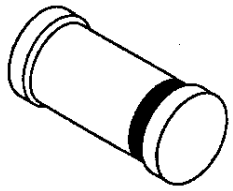
Qualified per MIL-PRF-19500/437

Qualified Levels:
JAN, JANTX and JANTXV

DESCRIPTION

The 1N5518BUR-1 thru 1N5546BUR-1 series of 0.5 watt glass surface mount Zener voltage regulators provides a selection from 3.3 to 33 volts with tolerances ranging from plus/minus 1% to 20%. The standard tolerance is plus/minus 5% with the B suffix unless ordered otherwise. These glass surface mount devices are available with an internal metallurgical bond option. This type of bonded Zener package construction is also in JAN, JANTX, and JANTXV military qualifications. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

Important: For the latest information, visit our website http://www.microsemi.com.



DO-213AA MELF Package

Also available in:

DO-35 (DO-204AH)
(axial-leaded)
1N5518B-1 thru 1N5546B-1

FEATURES

- JEDEC registered 1N5518 thru 1N5546.
- Voltage tolerances of plus/minus 20%, 10%, 5%, 2%, and 1% available. See Note 1 on page 3.
- Internal metallurgical bond.
- JAN, JANTX, and JANTXV qualification per MIL-PRF-19500/437 available.
- RoHS compliant versions available (commercial grade only).

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range.
- Extensive selection from 3.3 to 33 V.
- Hermetically sealed surface mount package.
- Nonsensitive to ESD per MIL-STD-750 Method 1020.
- Minimal capacitance (see Figure 3).
- Inherently radiation hard as described in Microsemi's "MicroNote 050" which is available at Microsemi.com.

MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +175	°C
Steady-State Power (Note 1) (Also see derating in Figure 2)	P_D	0.5	W
Thermal Resistance Junction-to-End Cap (Note 2)	$R_{\Theta JEC}$	100	°C/W
Thermal Resistance Junction-to-Ambient (Note 2)	$R_{\Theta JA}$	300	°C/W
Thermal Impedance	$Z_{\Theta JX}$	35	°C/W
Forward Voltage □ 200mA	V_F	1.1	V
Solder Pad Temperature @ 10 s	T_{SP}	260	°C

Notes: 1. At end cap temperature $T_{EC} \leq 125$ °C or at ambient $T_A \leq 50$ °C when mounted on FR4 PC board as described for thermal resistance above (see Figure 2 for derating). Derate to 0 at +175 °C.
2. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see last page).

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MECHANICAL and PACKAGING

- CASE: Hermetically sealed glass DO-213AA (SOD80 or MLL34) MELF style package.
- TERMINALS: End caps tin-lead plated or RoHS compliant matte-Tin plating available (on commercial only) 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.
- MOUNTING SURFACE SELECTION: The Axial Coefficient of Expansion (COE) of this device is approximately +6 PPM/^{o}C. The COE of the Mounting Surface System should be selected to provide a suitable match with this device.
- MARKING: cathode band only.
- TAPE & REEL option: Standard per EIA-481-1-A with 12 mm tape (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 0.04 grams.
- See Package Dimensions on last page.

PART NOMENCLATURE

JAN 1N5518 B UR -1 (e3)

Reliability Level
JAN = JAN Level
JANTX = JANTX Level
JANTXV = JANTXV Level
Blank = Commercial

JEDEC type number
See Electrical Characteristics table

Zener Voltage Tolerance
A = 10%
B = 5%
C = 2%
D = 1%
Blank = 20%

RoHS Compliance
e3 = RoHS compliant (available on commercial grady only)
Blank = non-RoHS compliant

Metallurgical Bond
-1 = Metallurgical bond

Package type
UR = surface mount

SYMBOLS & DEFINITIONS

Symbol	Definition
I_R	Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.
I_Z, I_{ZT}, I_{ZK}	Regulator Current: The dc regulator current (I_Z), at a specified test point (I_{ZT}), near breakdown knee (I_{ZK}).
I_{ZL}	Low Regulator (Zener) Current: The lowest rated dc current for the specified power rating.
I_{ZM}	Maximum Regulator (Zener) Current: The maximum rated dc current for the specified power rating.
V_Z	Zener Voltage: The zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region.
ΔV_Z	Voltage Regulation: The change in zener voltage between two specified currents or percentage of I_{ZM}.
Z_{ZT} or Z_{ZK}	Dynamic Impedance: The small signal impedance of the diode when biased to operate in its breakdown region at a specified rms current modulation (typically 10% of I_{ZT} or I_{ZK}) and superimposed on I_{ZT} or I_{ZK} respectively.

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted. Based on DC measurements at thermal equilibrium; V_F = 1.1 Max @ IF = 200 mA for all types.)

JEDEC TYPE NUMBER (Note 1)	NOMINAL ZENER VOLTAGE V_Z @ I_{ZT} (Note 2)	TEST CURRENT I_{ZT}	MAX. ZENER IMPEDANCE B-C-D SUFFIX Z_{ZT} @ I_{ZT} (Note 3)	MAX. REVERSE CURRENT (Note 4)			B-C-D SUFFIX MAXIMUM DC ZENER CURRENT I_{ZM} (Note 5)	B-C-D SUFFIX MAX. NOISE DENSITY AT I_Z = 250 μA N_D	REGULATION FACTOR ΔV_Z (Note 6)	LOW V_Z CURRENT I_{ZL} (Note 6)
				I_R	V_R – VOLTS					
					NON & A-SUFFIX	B-C-D SUFFIX				
	Volts	mA	Ohms	μA			mA	μV/ √Hz	Volts	mA
1N5518BUR-1	3.3	20	26	5.0	0.90	1.0	115	0.5	0.90	2.0
1N5519BUR-1	3.6	20	24	3.0	0.90	1.0	105	0.5	0.90	2.0
1N5520BUR-1	3.9	20	22	1.0	0.90	1.0	98	0.5	0.85	2.0
1N5521BUR-1	4.3	20	18	3.0	1.0	1.5	88	0.5	0.75	2.0
1N5522BUR-1	4.7	10	22	2.0	1.5	2.0	81	0.5	0.60	1.0
1N5523BUR-1	5.1	5.0	26	2.0	2.0	2.5	75	0.5	0.65	0.25
1N5524BUR-1	5.6	3.0	30	2.0	3.0	3.5	68	1.0	0.30	0.25
1N5525BUR-1	6.2	1.0	30	1.0	4.5	5.0	61	1.0	0.20	0.01
1N5526BUR-1	6.8	1.0	30	1.0	5.5	6.2	56	1.0	0.10	0.01
1N5527BUR-1	7.5	1.0	35	0.5	6.0	6.8	51	2.0	0.05	0.01
1N5528BUR-1	8.2	1.0	40	0.5	6.5	7.5	46	4.0	0.05	0.01
1N5529BUR-1	9.1	1.0	45	0.1	7.0	8.2	42	4.0	0.05	0.01
1N5530BUR-1	10.0	1.0	60	0.05	8.0	9.1	38	4.0	0.10	0.01
1N5531BUR-1	11.0	1.0	80	0.05	9.0	9.9	35	5.0	0.20	0.01
1N5532BUR-1	12.0	1.0	90	0.05	9.5	10.8	32	10	0.20	0.01
1N5533BUR-1	13.0	1.0	90	0.01	10.5	11.7	29	15	0.20	0.01
1N5534BUR-1	14.0	1.0	100	0.01	11.5	12.6	27	20	0.20	0.01
1N5535BUR-1	15.0	1.0	100	0.01	12.5	13.5	25	20	0.20	0.01
1N5536BUR-1	16.0	1.0	100	0.01	13.0	14.4	24	20	0.20	0.01
1N5537BUR-1	17.0	1.0	100	0.01	14.0	15.3	22	20	0.20	0.01
1N5538BUR-1	18.0	1.0	100	0.01	15.0	16.2	21	20	0.20	0.01
1N5539BUR-1	19.0	1.0	100	0.01	16.0	17.1	20	20	0.20	0.01
1N5540BUR-1	20.0	1.0	100	0.01	17.0	18.0	19	20	0.20	0.01
1N5541BUR-1	22.0	1.0	100	0.01	18.0	19.8	17	25	0.25	0.01
1N5542BUR-1	24.0	1.0	100	0.01	20.0	21.6	16	30	0.30	0.01
1N5543BUR-1	25.0	1.0	100	0.01	21.0	22.4	15	35	0.35	0.01
1N5544BUR-1	28.0	1.0	100	0.01	23.0	25.2	14	40	0.40	0.01
1N5545BUR-1	30.0	1.0	100	0.01	24.0	27.0	13	45	0.45	0.01
1N5546BUR-1	33.0	1.0	100	0.01	28.0	29.7	12	50	0.50	0.01

NOTES:

1. TOLERANCE AND VOLTAGE DESIGNATION –
   The JEDEC type numbers without a letter prior to the UR-1 suffix are +/-20% with guaranteed limits for only V_Z, I_R, and V_F. Units with "A" prior to the UR-1 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% prior to the UR-1 suffix.
2. ZENER VOLTAGE (V_Z) MEASUREMENT –
   Nominal zener voltage is measured with the device junction in thermal equilibrium with ambient temperature of 25 °C.
3. 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}.
4. REVERSE CURRENT (I_R) –
   Reverse currents are guaranteed and are measured at V_R as shown on the table.
5. MAXIMUM REGULATOR CURRENT (I_{ZM}) –
   The maximum current shown is as shown in MIL-PRF-19500/437.
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.

GRAPHS

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

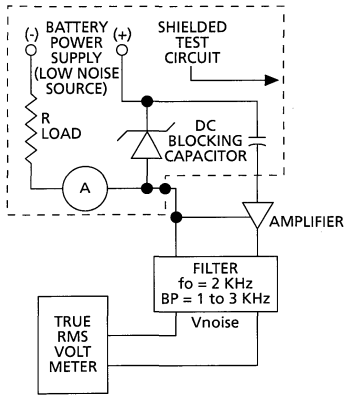


FIGURE 1 – Noise Density Measurement Circuit

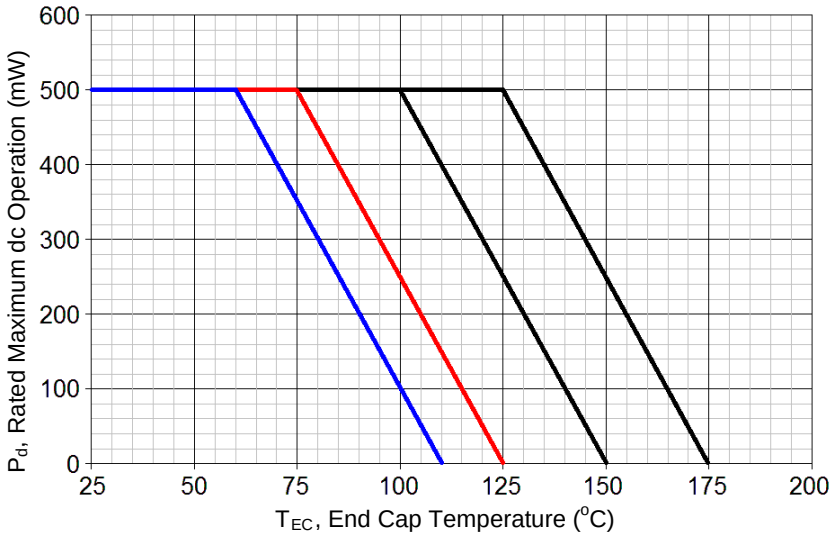


FIGURE 2 – Power Derating Curve

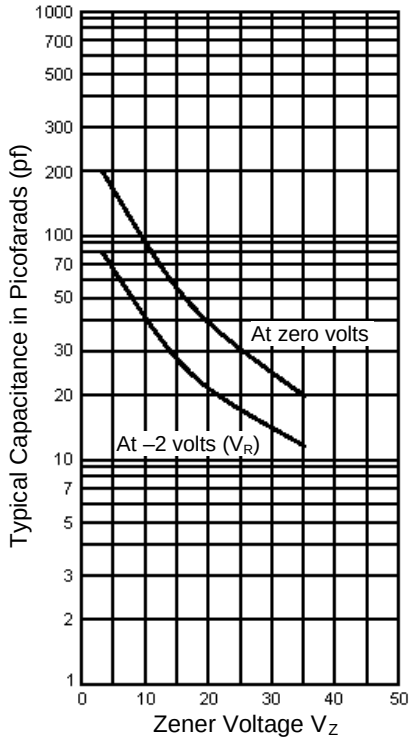


FIGURE 3 – Capacitance vs. Zener Voltage (Typical)

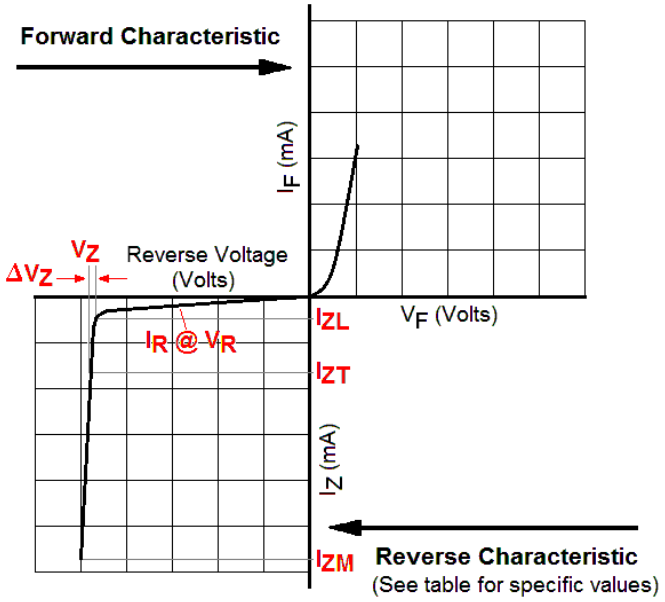


FIGURE 4
Zener Diode Characteristics and Symbol Identification

GRAPHS (continued)

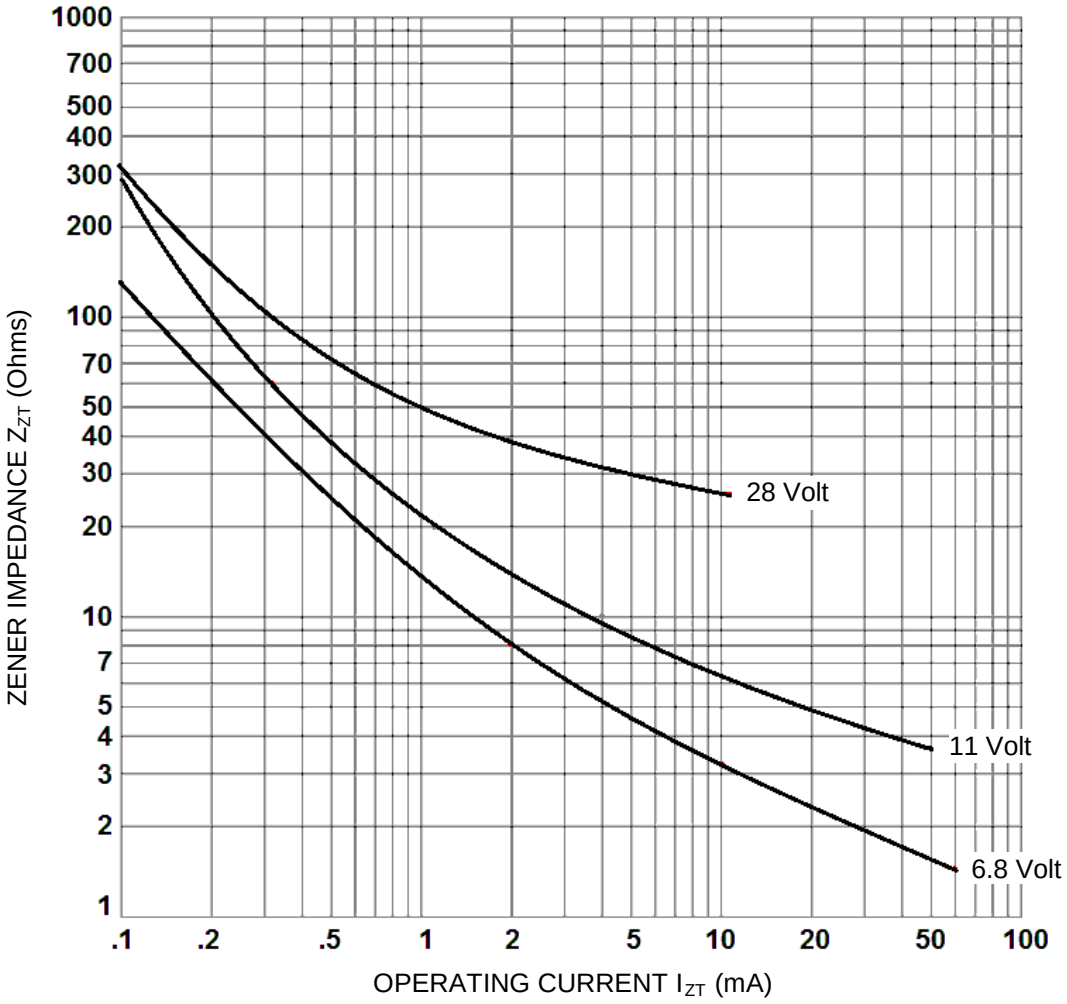
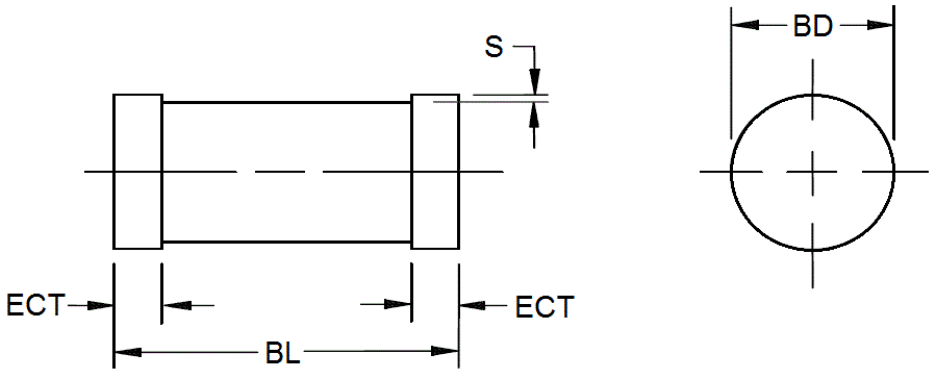


FIGURE 5
ZENER IMPEDANCE vs. OPERATION CURRENT (typical)

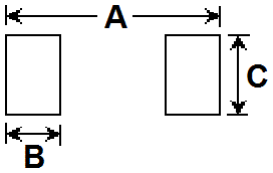
PACKAGE DIMENSIONS



Ltr	Dimensions			
	Inch		Millimeter	
	Min	Max	Min	Max
BD	.063	.067	1.60	1.70
BL	.130	.146	3.30	3.71
ECT	.016	.022	0.41	0.56
S	.001 min		0.03 min	

NOTES:
1. Dimensions are in inch.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

PAD LAYOUT



	INCHES	mm
A	.200	5.08
B	.055	1.40
C	.080	2.03

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