



## Silicon MELF 500 mW Zener Diodes

Qualified per MIL-PRF-19500/127

Qualified Levels:  
JAN, JANTX, and  
JANTXV

### DESCRIPTION

This popular series of 500 mW Zener voltage regulators provides a selection from 2.4 to 12 volts in a standard 5% tolerance as well as available tighter 2% and 1% tolerances. These glass, surface mount DO-213AA Zeners feature an internal metallurgical bond and are military qualified to the JAN, JANTX, and JANTXV level. A RoHS compliant commercial grade only version is also available.

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

### FEATURES


- JEDEC registered 1N746 through 1N759A and 1N4370 through 1N4372A series.
- Standard voltage tolerance is  $\pm 5\%$  with optional tighter tolerances of  $\pm 2\%$  or  $1\%$ .
- Internal metallurgical bond.
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/127.  
(See [part nomenclature](#) for all available options.)
- RoHS compliant versions available (commercial grade only).
- These commercial surface mount equivalents were also previously identified with a CDLL or MLL prefix instead of the "1N" prefix.



### DO-213AA MELF Package

Also available in:

**DO-35 (DO-204AH)  
package**  
(axial-leaded)

 [1N746A-1 – 1N759A-1 and 1N4370A-1 – 1N4372A-1](#)

### APPLICATIONS / BENEFITS

- Regulates voltage over a broad range of temperature and current.
- Regulated voltage range from 2.4 to 12 V.
- Small size for high density mounting using the surface mount method (see package illustration).
- Non-sensitive to ESD per MIL-STD-750 method 1020.
- Minimal capacitance.
- Inherently radiation hard as described in Microsemi [MicroNote 050](#).

### MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Operating and Storage Temperature	$T_J$ and $T_{STG}$	-65 to +175	$^{\circ}\text{C}$
Thermal Resistance Junction-to-End Cap	$R_{\theta JEC}$	100	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction-to-Ambient when mounted on PCB <sup>(1)</sup>	$R_{\theta JA}$	300	$^{\circ}\text{C}/\text{W}$
Average Rated Power Dissipation @ $T_{EC} = +125^{\circ}\text{C}$ <sup>(2)</sup> @ $T_A = 55^{\circ}\text{C}$ mounted on PCB	$P_{M(AV)}$	0.5 0.4	W
Forward Voltage @ $I_F = 200\text{ mA}$	$V_F$	1.1	V
Solder Temperature @ 10 s		260	$^{\circ}\text{C}$

- NOTES:**
1. See [Figure 1](#) for derating curves.  $T_A = +75^{\circ}\text{C}$  on an FR4 PC board with 1 oz copper metalization.
  2. The 0.5 W linearly derates starting at  $T_{EC} = 125^{\circ}\text{C}$  and goes to zero at  $175^{\circ}\text{C}$ . For ambient  $T_A$  condition on a typical PC board, it linearly derates from 400 mW starting at  $55^{\circ}\text{C}$  and goes to zero at  $175^{\circ}\text{C}$  (see [Figure 2](#)).

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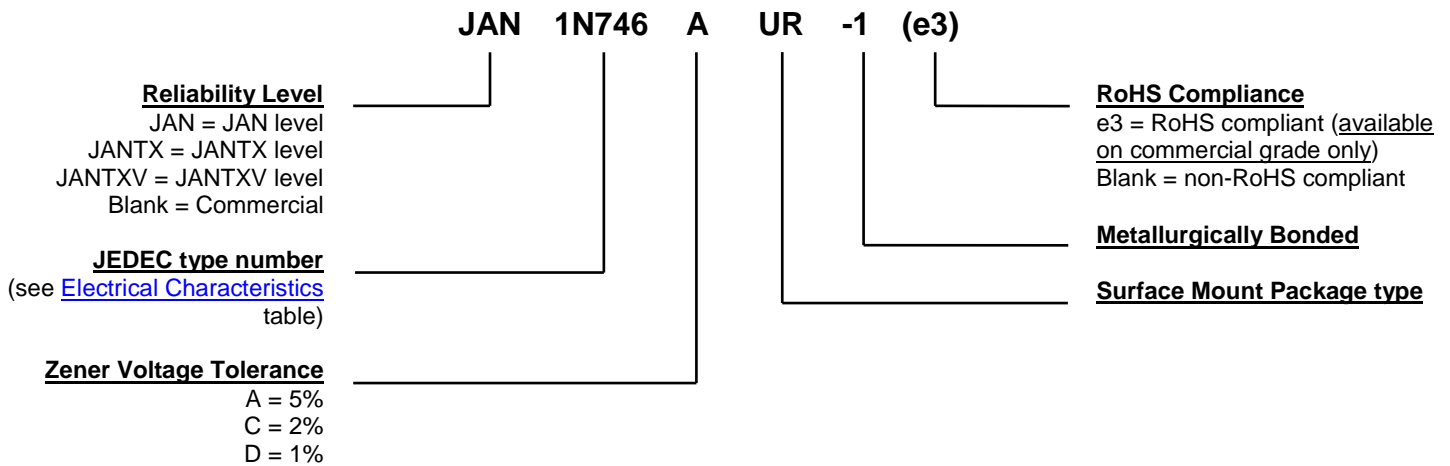
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**MECHANICAL and PACKAGING**

- CASE: Hermetically sealed glass case package.
- TERMINALS: Tin/lead plated or RoHS compliant matte-tin (on commercial grade only) over copper clad steel. Solderable per MIL-STD-750, method 2026.
- POLARITY: Cathode end is banded.
- MOUNTING: The axial coefficient of expansion (COE) of this device is approximately +6PPM/°C. The COE of the mounting surface system should be selected to provide a suitable match with this device.
- MARKING: Part number.
- TAPE & REEL option: Standard per EIA-296. Consult factory for quantities.
- WEIGHT: Approximately 0.04 grams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

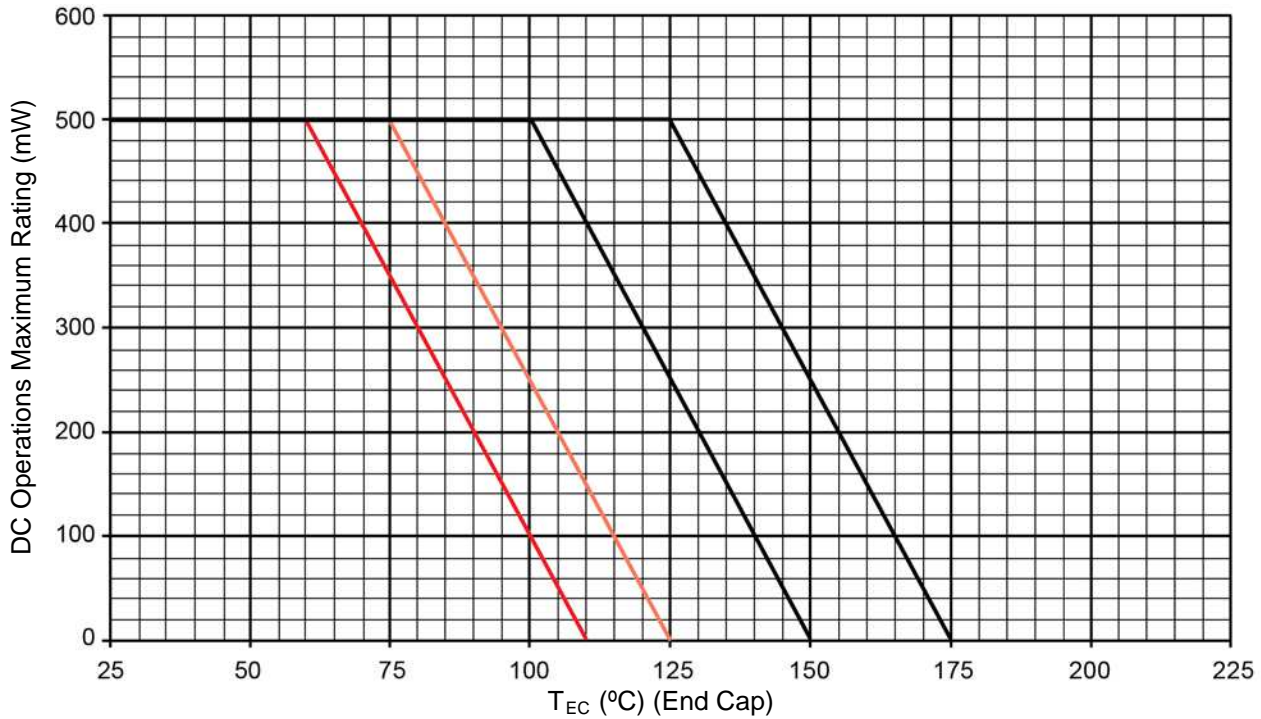
Symbol	Definition
$I_R$	Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.
$I_Z, I_{ZT}, I_{ZK}$	Regulator Current: The dc regulator current ( $I_Z$ ), at a specified test point ( $I_{ZT}$ ), near breakdown knee ( $I_{ZK}$ ).
$I_{ZM}$	Maximum Regulator (Zener) Current: The maximum rated dc current for the specified power rating.
$I_{ZSM}$	Maximum Zener Surge Current: The non-repetitive peak value of Zener surge current at a specified wave form.
$V_F$	Maximum Forward Voltage: The maximum forward voltage the device will exhibit at a specified current.
$V_R$	Reverse Voltage: The reverse voltage dc value, no alternating component.
$V_Z$	Zener Voltage: The Zener voltage the device will exhibit at a specified current ( $I_Z$ ) in its breakdown region.
$Z_{ZT}$ 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 @ 25 °C**

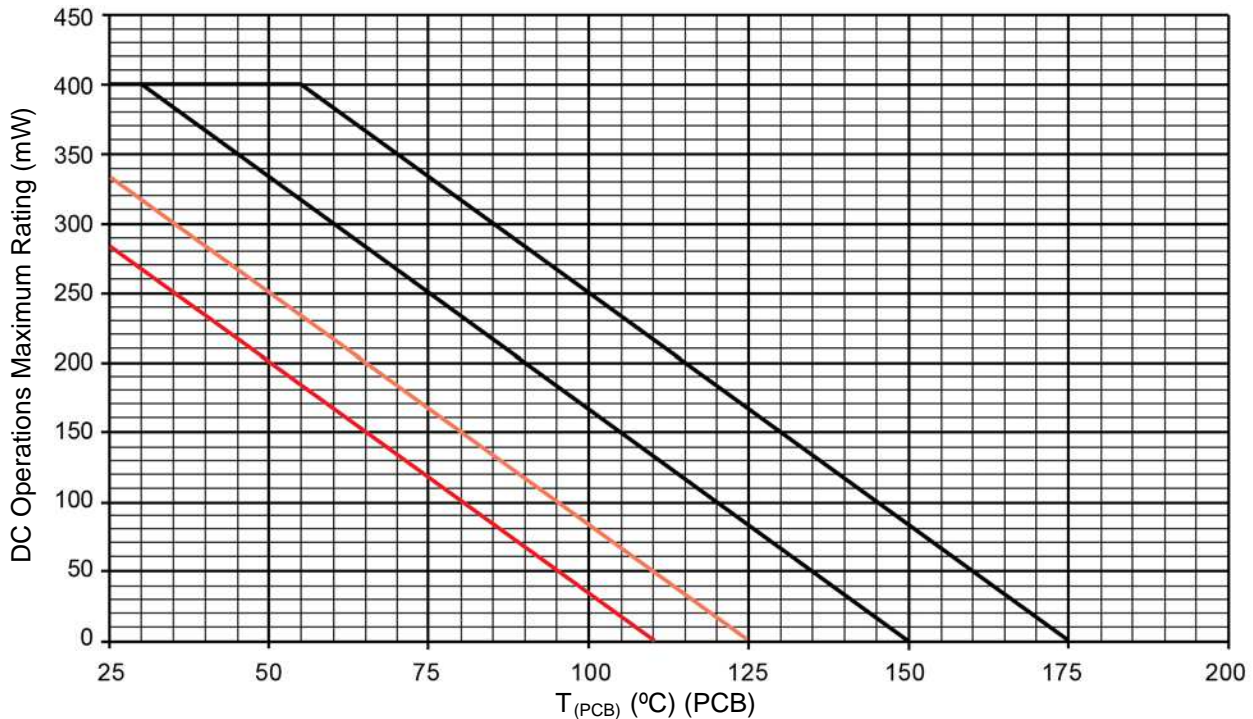
JEDEC TYPE NO. (NOTE 1)	NOMINAL ZENER VOLTAGE $V_Z @ I_{ZT}$ (NOTE 2)	MAXIMUM ZENER IMPEDANCE $Z_{ZT} @ I_{ZT}$ (NOTE 3)	REVERSE VOLTAGE $V_R$	MAXIMUM REVERSE CURRENT $I_R @ V_R$		MAXIMUM ZENER CURRENT $I_{ZM}$ (NOTE 4)	TEMPERATURE COEFFICIENT OF ZENER VOLTAGE $\alpha_{VZ}$
				@ 25 °C	@ +150 °C		
				$\mu A$	$\mu A$		
	Volts	Ohms	Volts			mA	% / °C
1N4370A-1	2.4	30	1.0	100	200	155	-0.085
1N4371A-1	2.7	30	1.0	60	150	140	-0.080
1N4372A-1	3.0	29	1.0	30	100	125	-0.075
1N746A-1	3.3	24	1.0	5	30	120	-0.070
1N747A-1	3.6	22	1.0	3	30	110	-0.065
1N748A-1	3.9	20	1.0	2	30	100	-0.060
1N749A-1	4.3	18	1.0	2	50	90	-0.055 / +.020
1N750A-1	4.7	15	1.5	5	50	85	-0.043 / +.025
1N751A-1	5.1	14	2.0	5	50	75	-0.030 / +.030
1N752A-1	5.6	8	2.5	5	50	70	-0.028 / +.036
1N753A-1	6.2	3	3.5	5	50	65	+0.045
1N754A-1	6.8	3	4.0	2	50	60	+0.050
1N755A-1	7.5	4	5.0	2	50	55	+0.058
1N756A-1	8.2	5	6.0	1	50	50	+0.062
1N757A-1	9.1	6	7.0	1	50	45	+0.068
1N758A-1	10.0	7	8.0	1	50	40	+0.076
1N759A-1	12.0	10	9.0	1	50	35	+0.080

**NOTES:**

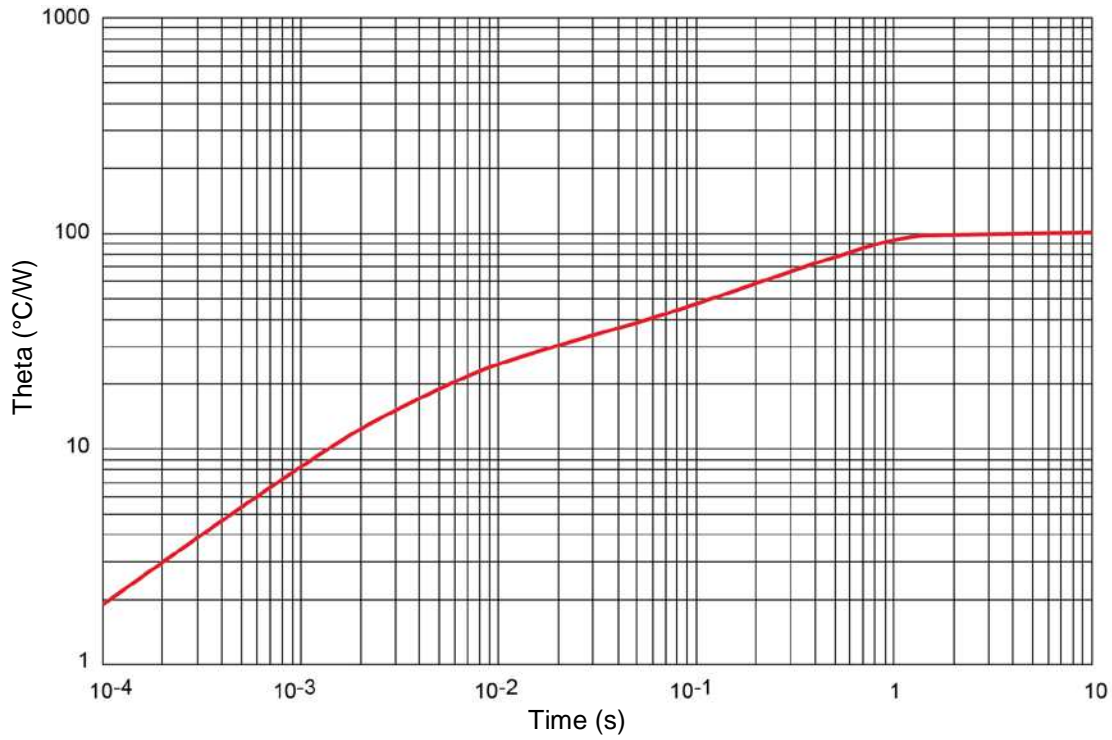
- 1 The JEDEC type numbers shown (A suffix) have a  $\pm 5\%$  tolerance on nominal Zener voltage.
- 2 Voltage measurements to be performed 20 seconds after application of dc test current.
- 3 Zener impedance derived by superimposing on  $I_{ZT}$ , a 60 cps, rms current equal to 10%  $I_{ZT}$  (20 mA). See [MicroNote 202](#) for typical Zener Impedance variation with different operating currents.
- 4 Allowance has been made for the increase in  $V_Z$  due to  $Z_Z$  and for the increase in junction temperature as the unit approaches thermal equilibrium at the power dissipation of 400mW.

**GRAPHS**


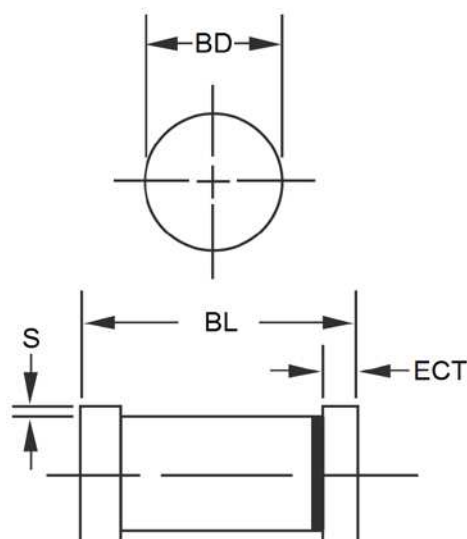
**FIGURE 1**  
Temperature-Power Derating Curve



**FIGURE 2**  
Temperature-Power Derating Curve

**GRAPHS (continued)**

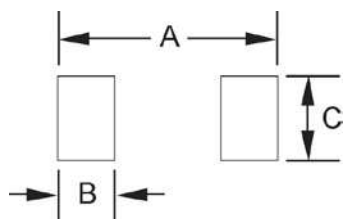
**FIGURE 3**  
Thermal Impedance To End Cap

**PACKAGE DIMENSIONS**


DIM	INCH		MILLIMETERS	
	MIN	MAX	MIN	MAX
<b>BD</b>	0.063	0.067	1.60	1.70
<b>BL</b>	0.130	0.146	3.30	3.71
<b>ECT</b>	0.016	0.022	0.41	0.56
<b>S</b>	0.001 min		0.03 min	

**NOTES:**

1. Dimensions are in inches. Millimeters are given for information only.
2. Dimensions are pre-solder dip.
3. Referencing to dimension S, minimum clearance of glass body to mounting surface on all orientations.
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

**PAD LAYOUT**


	INCH	mm
<b>A</b>	0.200	5.08
<b>B</b>	0.055	1.40
<b>C</b>	0.080	2.03