



Silicon MELF 500 mW Zener Diodes

Qualified per MIL-PRF-19500/127

Qualified Levels:
JAN, JANTX, and
JANTXV

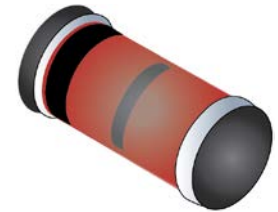
DESCRIPTION

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.

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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 ⁽¹⁾	$R_{\theta JA}$	300	$^{\circ}\text{C}/\text{W}$
Average Rated Power Dissipation @ $T_{EC} = +125^{\circ}\text{C}$ ⁽²⁾ @ $T_A = 55^{\circ}\text{C}$ 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°C . For ambient T_A condition on a typical PC board, it linearly derates from 400 mW starting at 55°C and goes to zero at 175°C (see [Figure2](#)).

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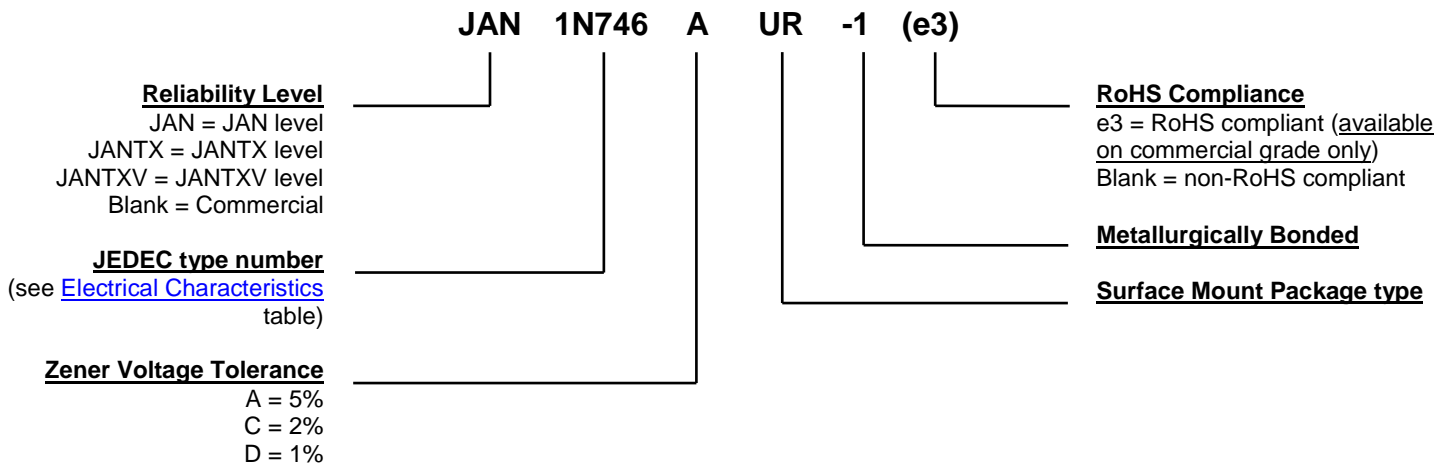
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MECHANICAL and PACKAGING

- 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 α_{VZ}
				@ 25 °C	@ +150 °C		
				μA	μA		
	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.

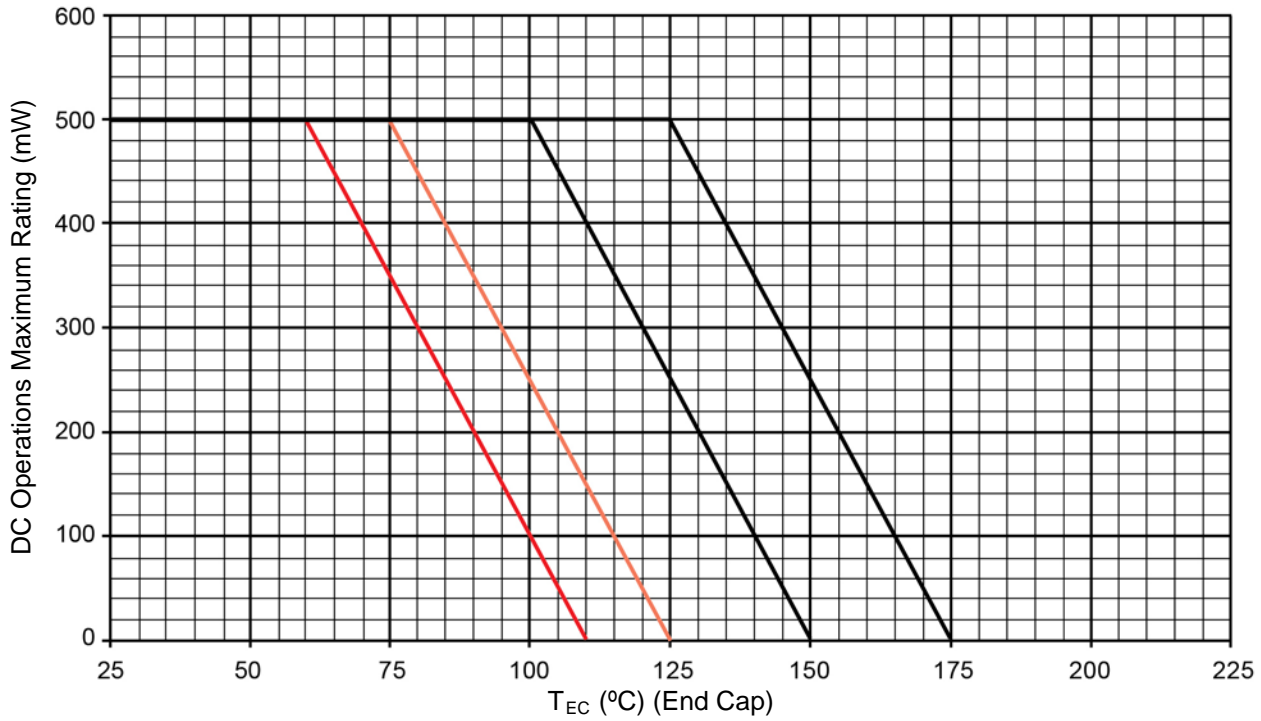
GRAPHS


FIGURE 1
Temperature-Power Derating Curve

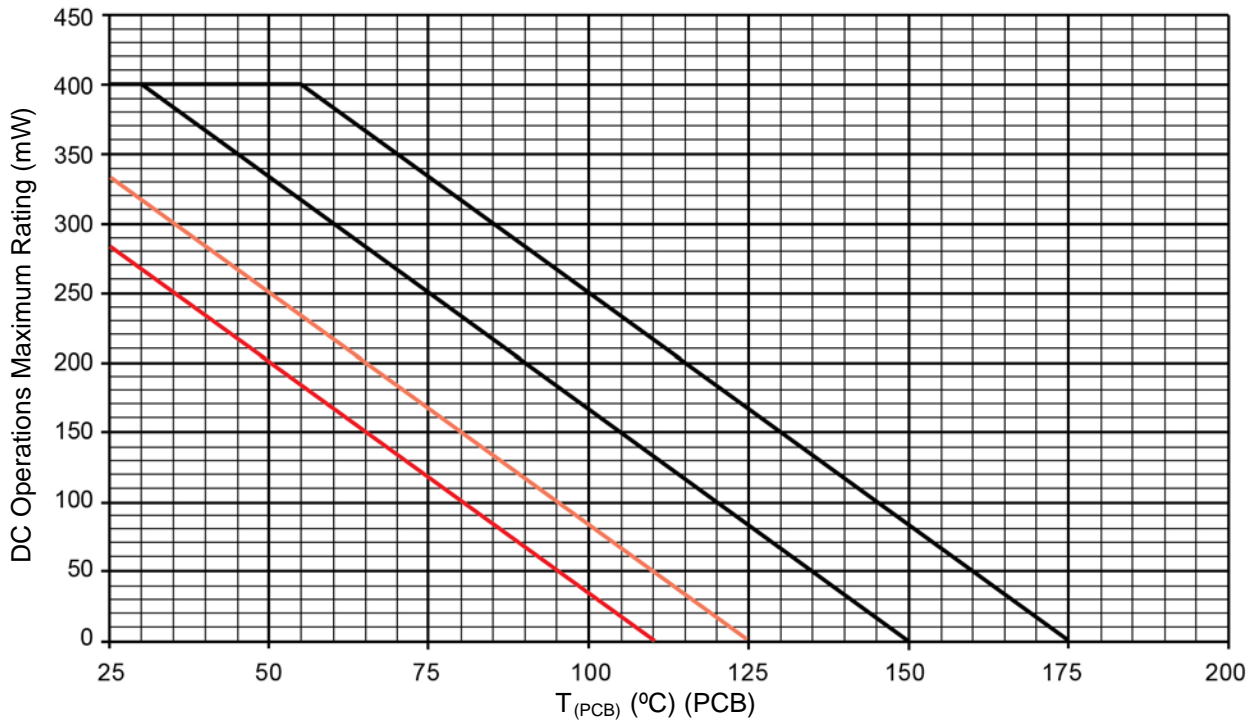


FIGURE 2
Temperature-Power Derating Curve

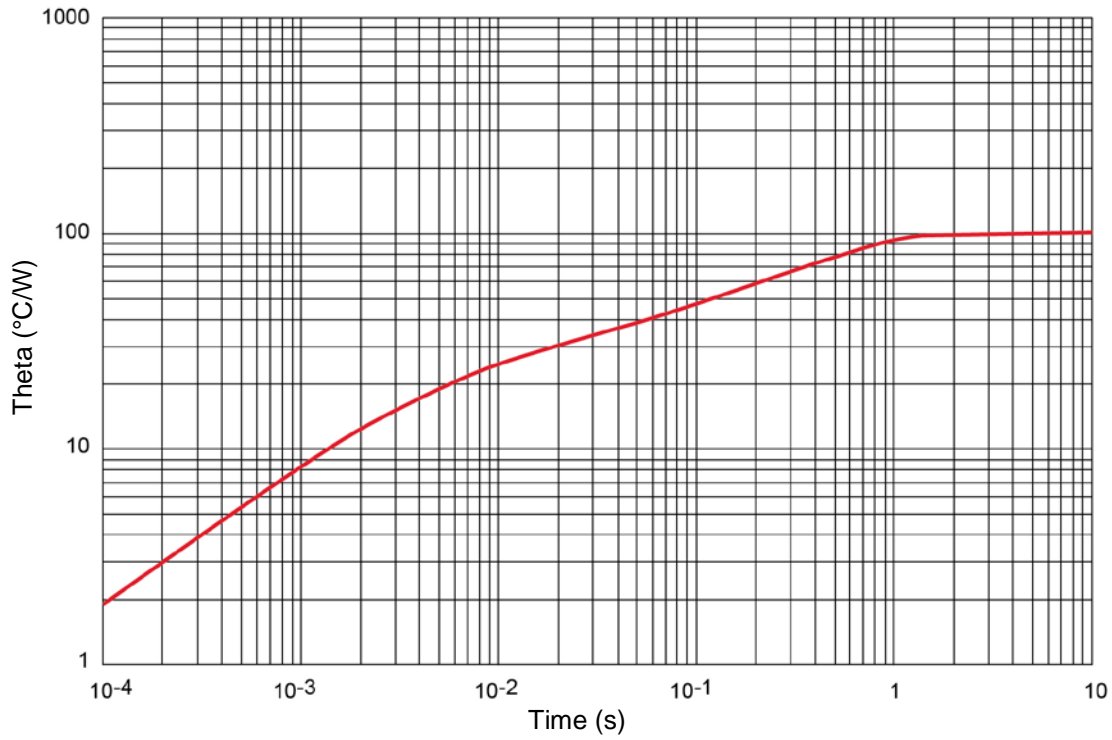
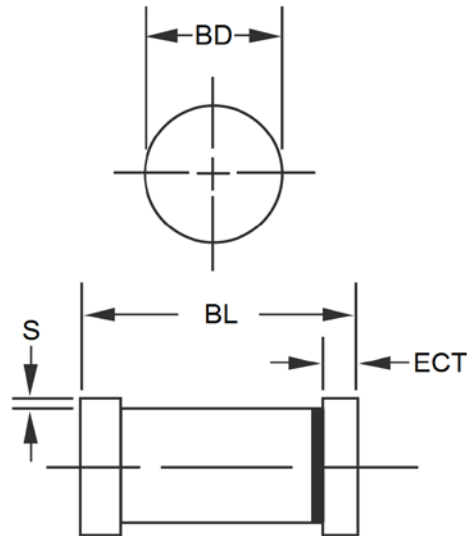
GRAPHS (continued)

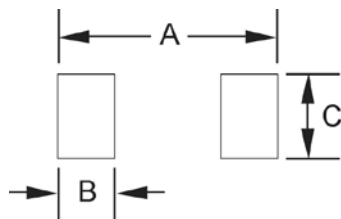
FIGURE 3
Thermal Impedance To End Cap

PACKAGE DIMENSIONS


DIM	INCH		MILLIMETERS	
	MIN	MAX	MIN	MAX
BD	0.063	0.067	1.60	1.70
BL	0.130	0.146	3.30	3.71
ECT	0.016	0.022	0.41	0.56
S	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 Φ x symbology.

PAD LAYOUT


	INCH	mm
A	0.200	5.08
B	0.055	1.40
C	0.080	2.03

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[1N748A-1](#) [1N746A-1](#) [1N749A-1](#) [1N750A-1](#) [1N4370AUR-1](#) [1N753A-1](#) [1N752A-1](#) [1N759A-1](#) [1N756AUR-1](#)
[1N746AUR-1](#) [1N753AUR-1](#) [1N757A-1](#) [1N755A-1](#) [1N758A-1](#) [1N751AUR-1](#) [1N747A-1](#) [1N750AUR-1](#) [1N747AUR-1](#)
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[1](#) [1N759AUR-1](#) [1N749AUR-1](#)