Available on commercial versions

Silicon 500 mW Zener Diodes

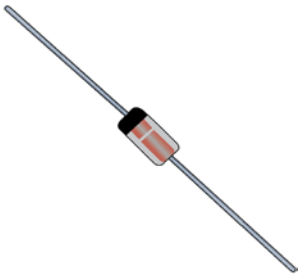
Qualified per MIL-PRF-19500/117

Qualified Levels: JAN, JANTX, and JANTXV*

DESCRIPTION

The popular 1N957B-1 through 1N992B-1 series of 0.5 watt Zener voltage regulators provides a selection from 6.8 to 200 volts in a standard 5%, 2% and 1% tolerance versions. These axial-leaded glass DO-35 Zeners feature an internal metallurgical bond and are available in military qualified and commercial RoHS compliant versions. Military qualified versions are available on the 1N962B-1 through 1N992B-1 range of part numbers.

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



DO-35 (DO-204AH) Package

Also available in:

DO-213AA package
(MELF surface mount)
1N957BUR-1 – 1N992BUR-1

FEATURES

- JEDEC registered 1N957B to 1N992B number series.
- Internal metallurgical bond.
- *JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/117 for part numbers 1N962B-1 thru 1N992B-1.
- Upscreening is available in reference to MIL-PRF-19500 for the range of 1N957B-1 through 1N961B-1.
  (See part nomenclature for all available options.)
- RoHS compliant versions available (commercial grade only).

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range.
- Extensive selection from 6.8 to 200 V.
- Standard voltage tolerance is ± 5% with optional tighter tolerances of ± 2% or 1%.
- Flexible axial-lead mounting terminals.
- 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	ºC
Thermal Resistance Junction-to-Lead @ .375 inch (9.53 mm) lead length from body	$R_{\Theta JL}$	250	ºC/W
Thermal Resistance Junction-to-Ambient when mounted on PCB (1)	$R_{\Theta JA}$	300	ºC/W
Steady-State Power Dissipation @ T_L = +50°C .375 inch (9.53 mm) from body (2) @ T_A = 55°C mounted on PCB	P_D	 0.5 0.4	W
Forward Voltage @ I_F = 200 mA 1N957 – 1N985 1N986 – 1N992	V_F	 1.1 1.3	V
Solder Temperature @ 10 s	T_{SP}	260	°C

NOTES:
1. See figures 1 and 2 for derating curves. T_A = +75°C on an FR4 PC board with 1 oz copper metalization.
2. Both ends of case or diode body to heat sink at L = .375 inch (9.53 mm). Derate I_Z to 0.0 mA at +175°C.

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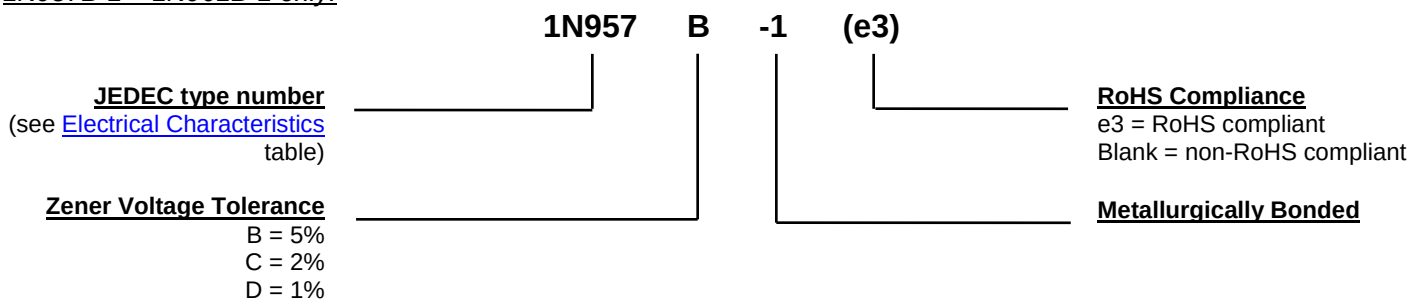
MECHANICAL and PACKAGING

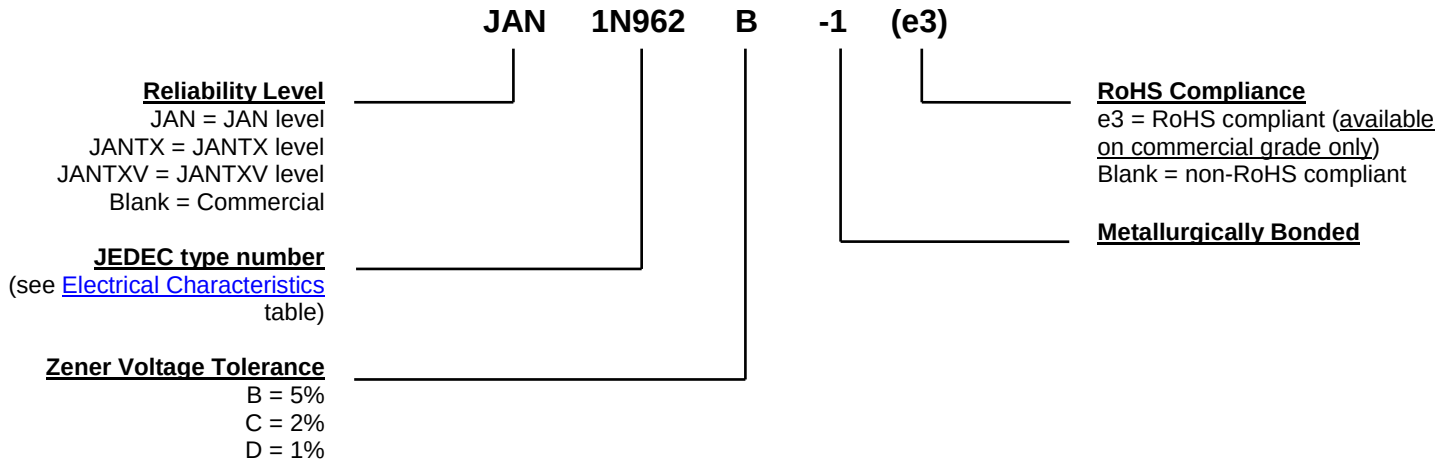
- CASE: Hermetically sealed axial-lead glass DO-35 (DO-204 AH) package.
- TERMINALS: Tin-lead (Sn/Pb) or RoHS compliant annealed matte-tin plating (on commercial grade only). Solderable per MIL-STD-750, method 2026.
- MARKING: Part number.
- POLARITY: Cathode indicated by band. Diode to be operated with the banded end positive with respect to the opposite end for Zener regulation.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: 0.2 grams
- See Package Dimensions on last page.

PART NOMENCLATURE

1N957B-1 – 1N961B-1 only:



1N962B-1 – 1N992B-1 only:



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

JEDEC TYPE NUMBER (NOTE 1)	NOMINAL ZENER VOLTAGE (NOTE 2) V_Z	ZENER TEST CURRENT I_{ZT}	MAXIMUM ZENER IMPEDANCE Z_{ZT} Z_Z	Z_{ZK} @ I_{ZK}		MAXIMUM DC ZENER CURRENT (NOTE 4) I_{ZM}	MAXIMUM SURGE CURRENT (NOTE 5) I_{ZSM}	MAXIMUM REVERSE LEAKAGE CURRENT I_R @ V_R		MAXIMUM TEMPERATURE COEFFICIENT α_{VZ}
	Volts	mA	Ohms	Ohms	µA	mA	mA	µA	Volts	%/°C
1N957B-1	6.8	18.5	4.5	700	250	55	300	150	5.2	+0.050
1N958B-1	7.5	16.5	5.5	700	250	50	275	75	5.7	+0.058
1N959B-1	8.2	15.0	6.5	700	250	45	250	50	6.2	+0.065
1N960B-1	9.1	14.0	7.5	700	250	41	225	25	6.9	+0.068
1N961B-1	10	12.5	8.5	700	250	38	200	10	7.6	+0.075
1N962B-1	11	11.5	9.5	700	250	35	590	1.0	8.4	+0.073
1N963B-1	12	10.5	11.5	700	250	32	540	1.0	9.1	+0.076
1N964B-1	13	9.5	13.0	700	250	30	500	0.5	9.9	+0.079
1N965B-1	15	8.5	16	700	250	26	433	0.5	11	+0.082
1N966B-1	16	7.8	17	700	250	25	406	0.5	12	+0.083
1N967B-1	18	7.0	21	750	250	21	361	0.5	14	+0.085
1N968B-1	20	6.2	25	750	250	19	325	0.5	15	+0.086
1N969B-1	22	5.6	29	750	250	17	295	0.5	17	+0.087
1N970B-1	24	5.2	33	750	250	16	271	0.5	18	+0.088
1N971B-1	27	4.6	41	750	250	14	240	0.5	21	+0.090
1N972B-1	30	4.2	49	1000	250	13	216	0.5	23	+0.091
1N973B-1	33	3.8	58	1000	250	12	197	0.5	25	+0.092
1N974B-1	36	3.4	70	1000	250	11	180	0.5	27	+0.093
1N975B-1	39	3.2	80	1000	250	9.1	166	0.5	30	+0.094
1N976B-1	43	3.0	93	1000	250	8.8	151	0.5	33	+0.095
1N977B-1	47	2.7	105	1500	250	7.9	138	0.5	36	+0.095
1N978B-1	51	2.5	125	1500	250	7.4	127	0.5	39	+0.096
1N979B-1	56	2.2	150	2000	250	6.9	116	0.5	43	+0.096
1N980B-1	62	2.0	185	2000	250	6.0	105	0.5	47	+0.097
1N981B-1	68	1.8	230	2000	250	5.5	95	0.5	52	+0.097
1N982B-1	75	1.7	270	2000	250	5.1	86	0.5	56	+0.098
1N983B-1	82	1.5	330	3000	250	4.6	79	0.5	62	+0.098
1N984B-1	91	1.4	400	3000	250	4.2	71	0.5	69	+0.099
1N985B-1	100	1.3	500	3000	250	3.7	65	0.5	76	+0.110
1N986B-1	110	1.1	750	4000	250	3.3	59	0.5	84	+0.110
1N987B-1	120	1.0	900	4500	250	3.1	54	0.5	91	+0.110
1N988B-1	130	0.95	1100	5000	250	2.7	50	0.5	99	+0.110
1N989B-1	150	0.85	1500	6000	250	2.4	43	0.5	114	+0.110
1N990B-1	160	0.80	1700	6500	250	2.2	40	0.5	122	+0.110
1N991B-1	180	0.68	2200	7100	250	2.0	36	0.5	137	+0.110
1N992B-1	200	0.65	2500	8000	250	1.8	32	0.5	152	+0.110

NOTES:

1. The JEDEC type numbers shown (B suffix) have a ± 5% tolerance on nominal Zener voltage. The suffix C will have ± 2% tolerance; and suffix D will have ± 1% tolerance.
2. Zener voltage (V_Z) is measured after the test current has been applied for 20 ± 5 seconds. The device shall be suspended by its leads with the inside edge of the mounting clips between 0.375" and 0.500" from the body. Mounting clips shall be maintained at temperature of 25 ± 8/ -2 °C.
3. The Zener impedance is derived when a 60 cycle ac current having an rms value equal to 10% of the dc Zener current (I_{ZT} or I_{ZK}) is superimposed on I_{ZT} or I_{ZK}. Zener impedance is measured at 2 points to ensure a sharp knee on the breakdown curve and to eliminate unstable units. See MicroNote 202 for variation in dynamic impedance with different Zener currents.
4. The values of I_{ZM} are calculated for a ± 5% tolerance on nominal Zener voltage. Allowance has been made for the rise in Zener voltage above V_{ZT} which results from Zener impedance and the increase in junction temperature as power dissipation approaches 400 mW. In the case of individual diodes I_{ZM} is that value of current which results in a dissipation of 400 mW at 75°C lead temperature at 3/8" from body.
5. The surge for I_{ZSM} is a square wave or equivalent half-sine wave pulse of 1/120 sec. duration.

GRAPHS

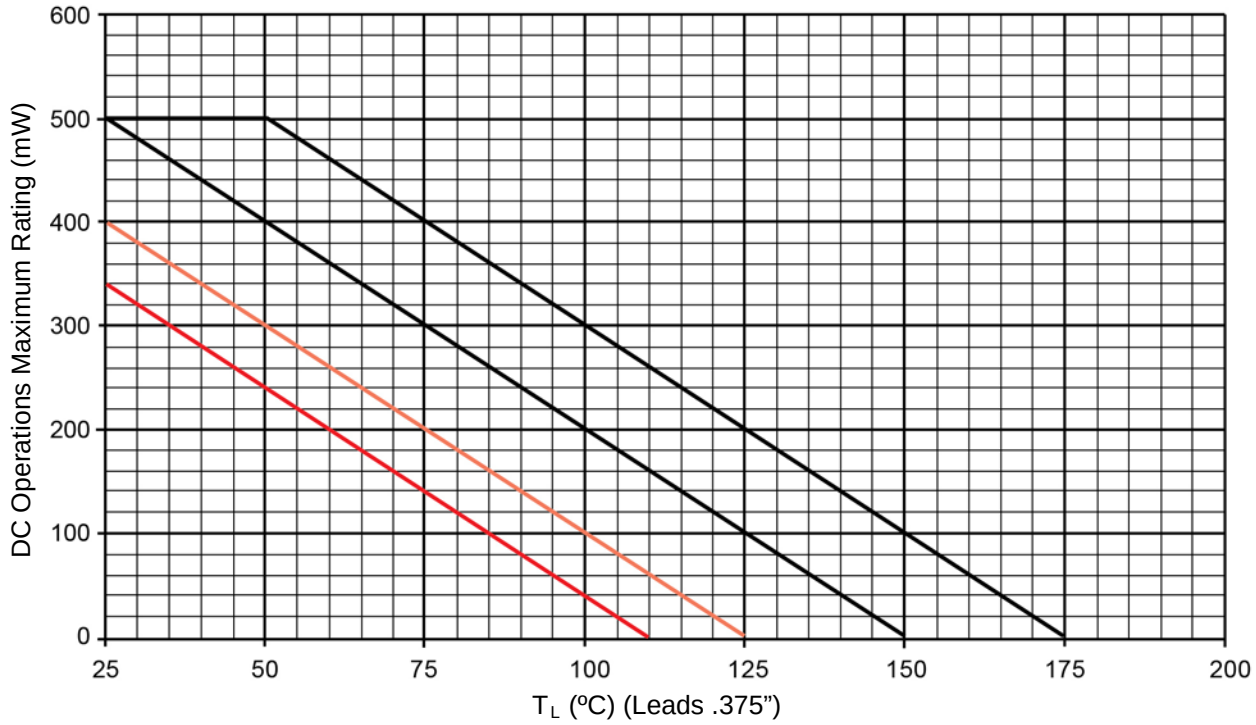


FIGURE 1
Temperature-Power Derating Curve

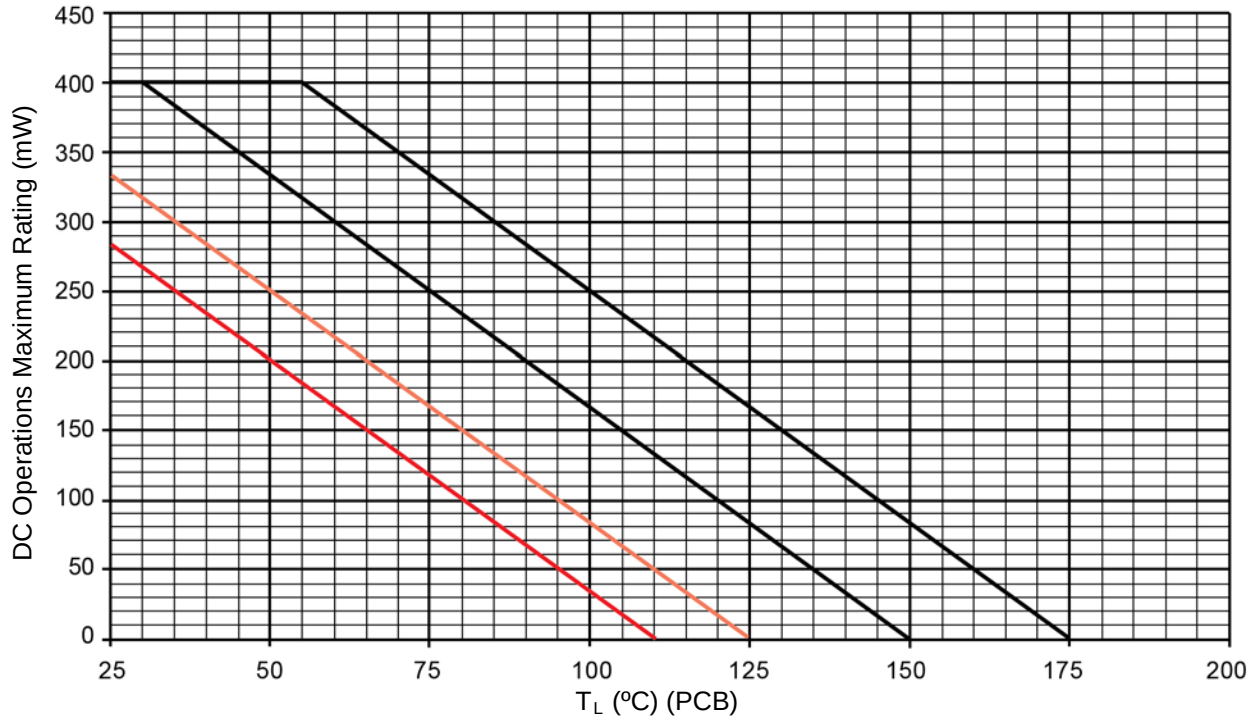


FIGURE 2
Temperature-Power Derating Curve (PCB mount)

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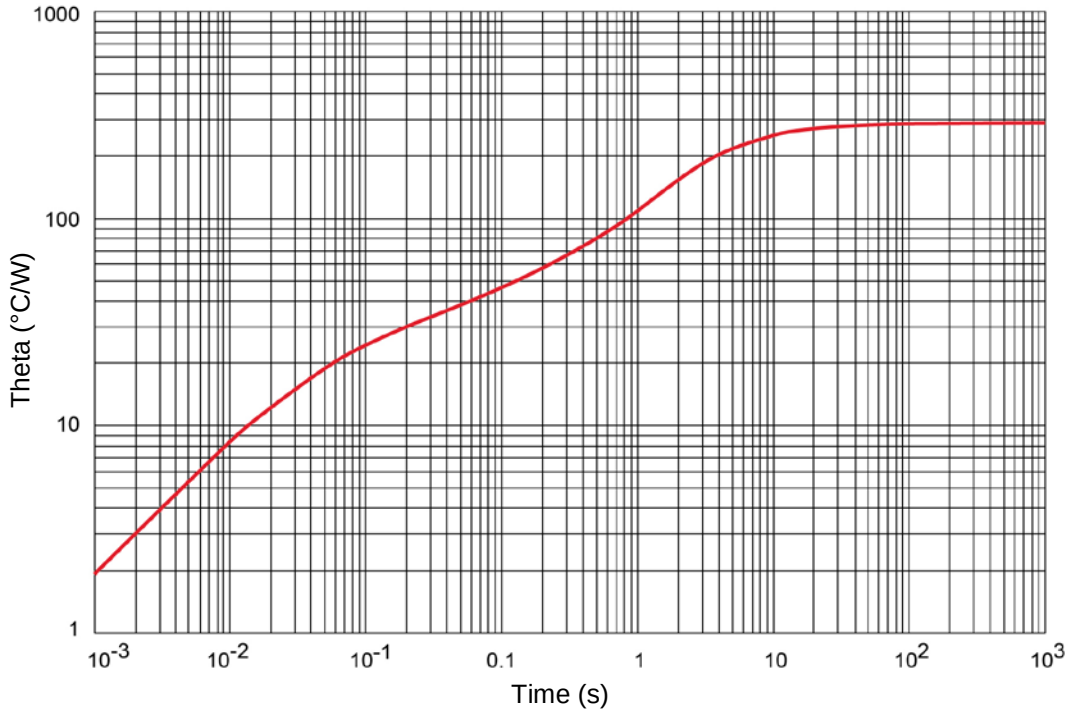

FIGURE 3
Thermal Impedance PCB mount

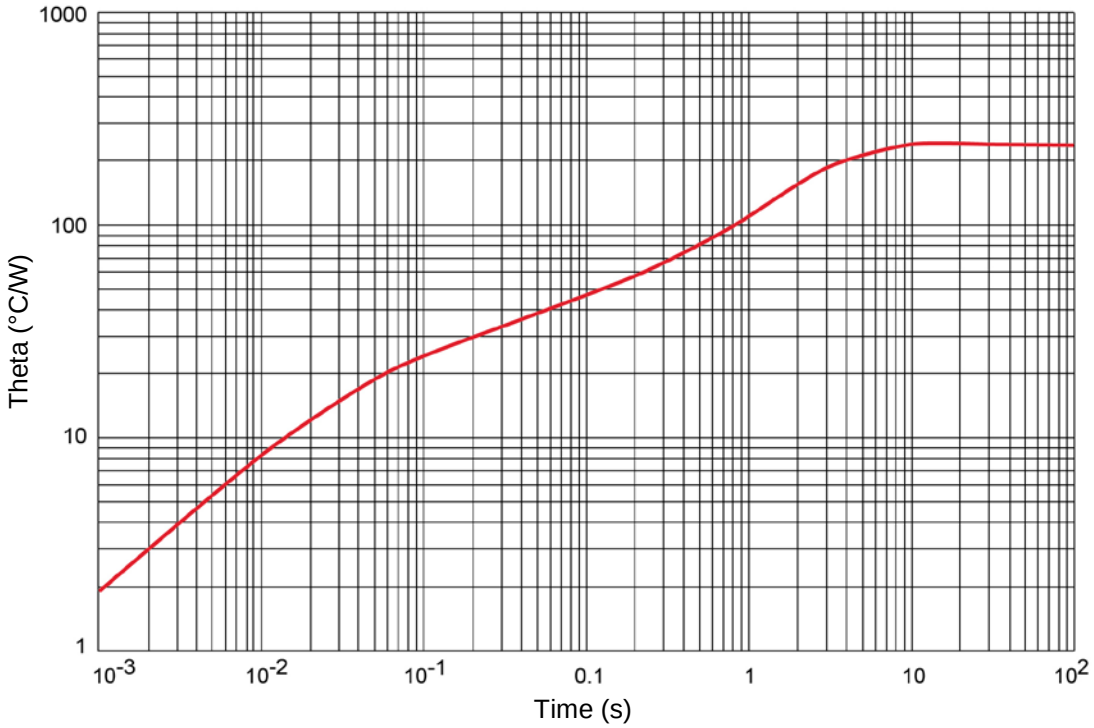

FIGURE 4
Thermal Impedance

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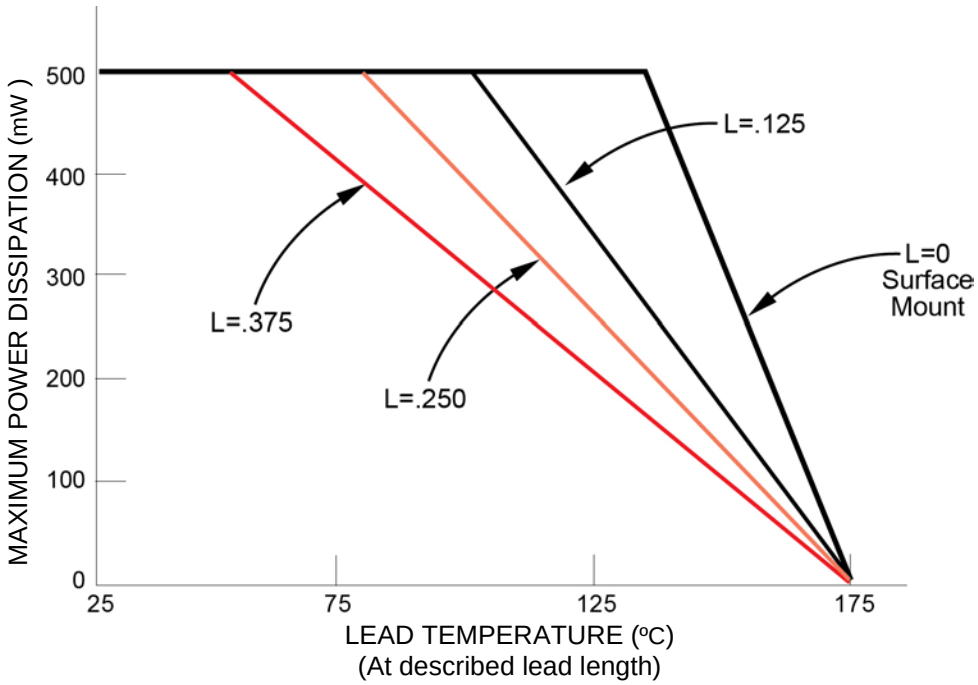
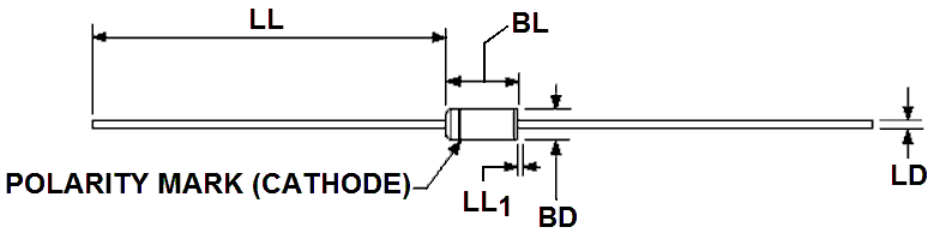


Inches	Millimeters
.000	0.00
.125	3.18
.250	6.35
.375	9.53

FIGURE 5
Maximum Power vs Lead Temperature And Lead Length.

PACKAGE DIMENSIONS



Ltr	Dimensions				Notes
	Inch		Millimeters		
	Min	Max	Min	Max	
BD	.055	.090	1.40	2.29	3
BL	.120	.200	3.05	5.08	3
LD	.018	.022	0.46	0.56	
LL	1.000	1.500	25.40	38.10	
LL_1		.050		1.27	4

NOTES:

1. Dimensions are in inch.
2. Millimeters are given for general information only.
3. Package contour optional within BD and length BL. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of LD. The BL dimension shall include the entire body including slugs.
4. Within LL_1 lead, diameter may vary to allow for for flash, lead finish build-up, and minor irregularities other than heat slugs.
5. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.