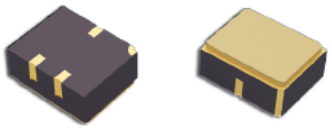
1N6309(US)(UB) - 1N6349(US)(UB)

0.5 W Zener Voltage Regulators

Rev. V3

Features

- Zener Voltage Regulators:
  - Axial = no suffix
  - MELF = US, UB
- JAN, JANTX, JANTXV and JANS available per MIL-PRF-19500/533
- Non-Cavity Glass Package
- Internal Metallurgical Bonds:
  - "Category III" for 1N6309 - 1N6320
  - "Category I" for 1N6321 - 1N6349



MELF(UB)

MELF (US)

Axial

Description

This Zener voltage regulator series is military qualified to MIL-PRF-19500/533 and is ideal for high reliability applications where a failure cannot be tolerated. These industry-recognized 0.5 W zener voltage regulators are hermetically sealed with voidless-glass construction using an internal metallurgical bond. It includes zener selections from 2.4 to 110 volts in standard 5% tolerances as well as tighter tolerances identified by different suffix letters on the part number. They are also available in surface mount packages. VPT Components also offers numerous other zener products to meet higher and lower power ratings in both thru-hole and surface mount packages.

Applications / Benefits

- Hermetically sealed glass case.
- Regulates voltage over a broad operating current and temperature range
- Extensive selection from 2.4 to 110 V
- Standard voltage tolerances are +/-5% with no suffix
- Tight tolerances available in +/-2% or 1% with C or D suffix respectively
- Extremely robust construction
- Nonsensitive to ESD per MIL-STD-750 Method 1020

Electrical Specifications

Part Types[1]	Zener Voltage		Test Current	Dynamic Impedance		Current	Voltage Reg.[2]	Surge Current [3]	Reverse Current	Reverse Current		Noise Density	Temp. Coefficient Zener Voltage
	+/-5% @ IZ1	+/-5% @ IZ1		ZZ @ IZ2	ZZk @ 250 mA			@ 8.3 ms sq. wave IZSM		I_R1 @ V_R, 25°C	I_R2 @ V_R, 150°C	@ 250 mA 1 to 3 kHz	
	Volts		mA	Ohms		mA	Volts	Amps	Volts	µA		mV / √Hz	%/°C
	Nom.		Typ.	Typ.		Max.	Typ.	Typ.	Typ.	Max.		Max.	Max.
1N6309, US, UB	2.4	1.1	20	30	1200	177	1.5	2.5	1.0	100	200	1.0	-0.085
1N6310, US, UB	2.7	1.2	20	30	1300	157	1.5	2.2	1.0	60	150	1.0	-0.080
1N6311, US, UB	3.0	1.3	20	29	1400	141	1.5	2.0	1.0	30	100	1.0	-0.075
1N6312, US, UB	3.3	1.5	20	27	1400	128	1.6	1.8	1.0	5.0	20	1.0	-0.070
1N6313, US, UB	3.6	1.8	20	25	1400	117	1.6	1.65	1.0	3.0	12	1.0	-0.065
1N6314, US, UB	3.9	2.0	20	23	1700	108	1.6	1.5	1.0	2.0	12	1.0	-0.060
1N6315, US, UB	4.3	2.4	20	20	1700	99	0.9	1.4	1.0	2.0	12	1.0	-0.045 +0.020
1N6316, US, UB	4.7	2.8	20	17	1500	90	0.5	1.27	1.5	5.0	12	1.0	-0.028 +0.032

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	+/-5% @ IZ1	+/-5% @ IZ1		ZZ @ IZ2	ZZk @ 250 mA			@ 8.3 ms sq. wave IZSM		I_R1 @ V_R, 25°C	I_R2 @ V_R, 150°C	@ 250 mA 1 to 3 kHz	
	Volts		mA	Ohms		mA	Volts	Amps	Volts	µA		mV / √Hz	%/°C
	Nom.		Typ.	Typ.		Max.	Typ.	Typ.	Typ.	Max.		Max.	Max.
1N6317, US, UB	5.1	3.3	20	14	1300	83	0.40	1.17	2.0	5.0	12	1.0	-0.020 +0.035
1N6318, US, UB	5.6	4.3	20	8	1200	76	0.40	1.10	2.5	5.0	10	2.0	+0.050
1N6319, US, UB	6.2	5.2	20	3	800	68	0.30	0.97	3.5	5.0	10	5.0	+0.060
1N6320, US, UB	6.8	6.0	20	3	400	63	0.35	1.23	4.0	2.0	50	5.0	+0.062
1N6321, US, UB	7.5	6.6	20	4	400	57	0.40	1.16	5.0	2.0	30	5.0	+0.068
1N6322, US, UB	8.2	7.5	20	5	400	52	0.40	1.07	6.0	1.0	10	20	+0.075
1N6323, US, UB	9.1	8.4	20	6	500	47	0.50	0.97	7.0	1.0	10	40	+0.076
1N6324, US, UB	10	9.1	20	6	500	43	0.50	0.89	8.0	1.0	10	80	+0.079
1N6325, US, UB	11	10.0	20	7	550	39	0.50	0.83	8.5	1.0	10	100	+0.082
1N6326, US, UB	12	11.0	20	7	550	35	0.55	0.77	9.0	1.0	10	100	+0.083
1N6327, US, UB	13	11.9	12	8	550	33	0.55	0.71	9.9	0.05	10	100	+0.083
1N6328, US, UB	15	13.8	8.5	10	600	28	0.70	0.62	11	0.05	10	100	+0.084
1N6329, US, UB	16	14.7	7.8	12	600	27	0.75	0.58	12	0.05	10	100	+0.084
1N6330, US, UB	18	16.6	7.0	14	600	24	0.85	0.52	14	0.05	10	100	+0.085
1N6331, US, UB	20	18.5	6.2	18	500	21	0.95	0.47	15	0.05	10	100	+0.086
1N6332, US, UB	22	20.4	5.6	20	500	19	1.05	0.43	17	0.05	10	100	+0.087
1N6333, US, UB	24	22.3	5.2	24	500	18	1.15	0.39	18	0.05	10	100	+0.088
1N6334, US, UB	27	25.2	4.6	27	500	16	1.30	0.35	21	0.05	10	100	+0.090
1N6335, US, UB	30	28.0	4.2	32	500	14	1.45	0.31	23	0.05	10	100	+0.091
1N6336, US, UB	33	30.9	3.8	40	600	13	1.60	0.28	25	0.05	10	100	+0.092
1N6337, US, UB	36	33.7	3.4	50	600	12	1.75	0.26	27	0.05	10	100	+0.093
1N6338, US, UB	39	36.6	3.2	55	700	11	1.90	0.24	30	0.05	10	100	+0.094
1N6339, US, UB	43	40.4	3.0	65	800	9.9	2.10	0.22	33	0.05	10	80	+0.095
1N6340, US, UB	47	44.2	2.7	75	900	9.0	2.25	0.20	36	0.05	10	80	+0.095
1N6341, US, UB	51	48.0	2.5	85	1000	8.3	2.50	0.18	39	0.05	10	80	+0.096
1N6342, US, UB	56	52.7	2.2	100	1200	7.6	2.70	0.17	43	0.05	10	80	+0.097
1N6343, US, UB	62	58.4	2.0	125	1300	6.8	2.90	0.15	47	0.05	10	80	+0.099
1N6344, US, UB	68	64.1	2.8	155	1500	6.3	3.20	0.13	52	0.05	10	80	+0.101
1N6345, US, UB	75	70.8	1.7	180	1600	5.7	3.40	0.125	56	0.05	10	80	+0.103
1N6346, US, UB	82	77.4	1.5	220	1800	5.2	3.80	0.115	62	0.05	10	80	+0.105
1N6347, US, UB	91	86.0	1.4	270	2100	4.7	4.20	0.100	69	0.05	10	80	+0.108
1N6348, US, UB	100	94.5	1.3	340	2400	4.3	4.40	0.095	76	0.05	10	80	+0.110
1N6349, US, UB	110	104	1.1	500	2800	3.9	4.80	0.085	84	0.05	10	80	+0.110

1. Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively,
   e.g. 1N6309C (1N6309USC), 1N6335D (1N6335USD), etc.
2. Voltage regulation (Vz) (reg) is the measured voltage change at thermal equilibrium between the current of 10% and 50% of maximum zener current (IZM) when the end cap temperature is maintained at 25°C = +8°C, -2°C.
3. Surge Energy is reduced by 50% for all Zener Chips encased in a UB package.

Absolute Maximum Ratings[4,5]

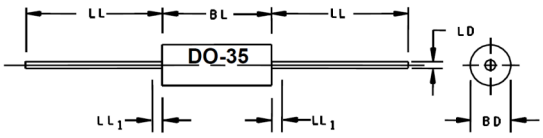
Parameter	Absolute Maximum
Power Dissipation	0.5 W @ T_{EC} = +125°C 0.5 W @ T_L = +75°C
Forward Voltage	1.4 V @ 1 A
Thermal Impedance	20°C/W @ 10 ms (1N6309/US - 1N6320/US) 15°C/W @ 10 ms (1N6321/US - 1N6349/US) 35°C/W @ 10 ms (1N6309UB - 1N6349UB)
Thermal Resistance	$R_{\Theta JL}$ 150°C/W (1N6309 - 1N6320) $R_{\Theta JL}$ 95.5°C/W (1N6321 - 1N6349) $R_{\theta JA\ (PCB)}$ 250°C/W (1N6309UB - 1N6349UB) $R_{\Theta JEC}$ 21°C/W (1N6309US - 1N6320US) $R_{\Theta JEC}$ 35°C/W (1N6321US - 1N6349US) $R_{\theta JSP\ (IS)}$ 90°C/W (1N6309UB - 1N6349UB)
Storage Temperature	-65°C to +175°C
Operating Temperature	-65°C to +175°C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. VPT Components does not recommend sustained operation near these survivability limits.

Outline Drawings

Dimensions	Inches		Millimeters		
	Min.	Max.	Min.	Max.	Notes
BD	.060	.090	1.52	2.29	
BL	.120	.200	3.05	5.08	5
LD	.018	.022	0.46	0.56	
LL	1.00	1.50	25.40	38.10	
LL_1		0.50		1.27	3

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Lead diameter not controlled in this zone to allow for flash. Lead finish build-up and minor irregularities other than slugs.
4. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.
5. The BL dimension shall include the entire body including slugs.

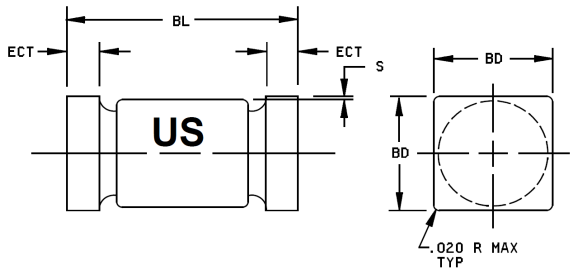


Leaded Design Data

Case: Hermetically sealed glass case D0-35
Lead Finish: Tin/Lead
Lead Material: Copper clad steel
Polarity: Cathode end is banded.
Package Weight: 0.150 g

Dimensions	Inches		Millimeters	
	Min.	Max.	Min.	Max.
D	0.070	0.085	1.78	2.16
B	0.165	0.195	4.19	4.95
ECT	0.019	0.028	0.048	0.71
S	0.003	—	0.08	—

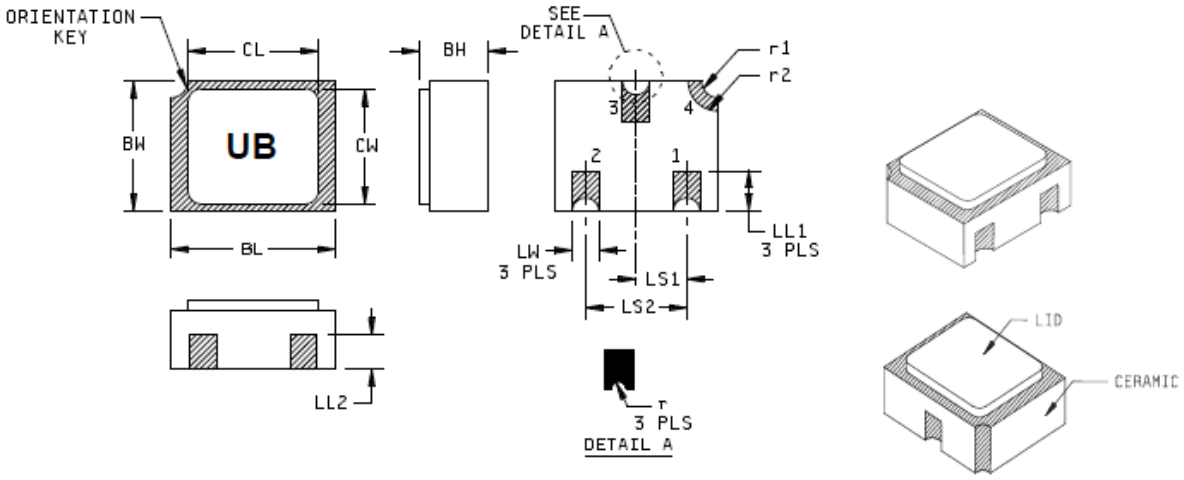
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Dimensions are pre-solder dip.
4. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

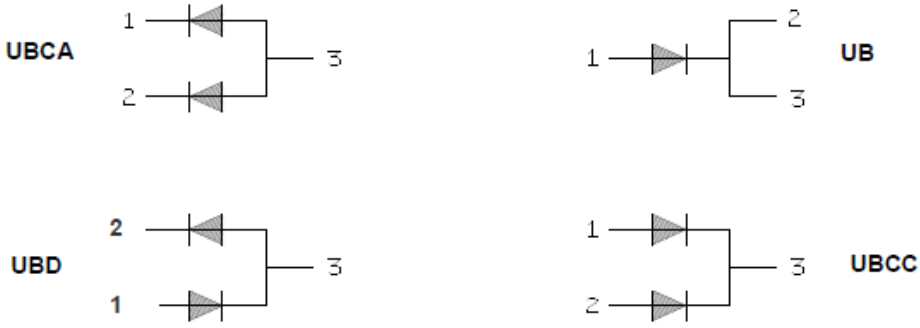


U & US Design Data

Case: Hermetically sealed glass case D-5D
Lead Finish: Tin/Lead
End Cap Material (U, US): Copper
Polarity: Cathode end is banded.
Package Weight: 0.095g
Mounting Surface Selection: The Axial Coefficient of Expansion (COE) of this device is approximately +4PPM/°C. The COE of the Mounting Surface System should be selected to provide a suitable match with this device.

Outline Drawings for UB





Symbol	Dimensions				Symbol	Dimensions			
	Inches		Millimeters			Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
BH	.046	.056	1.17	1.42	LS1	.035	.039	0.89	0.99
BL	.115	.128	2.92	3.25	LS2	.071	.079	1.80	2.01
BW	.085	.108	2.16	2.74	LW	.016	.024	0.41	0.61
CL		.128		3.25	r		.008		0.20
CW		.108		2.74	r1		.012		0.31
LL1	.022	.038	0.56	0.97	r2		.022		0.56
LL2	.017	.035	0.43	0.89					

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Ceramic package only.
3. Hatched areas on package denote metallized areas. Pad 4 = shielding, connected to the lid.
4. Dimensions are pre-solder dip.
5. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.