

Zener Diode Datasheet Information:

For a zener series: 1N4728A–1N4764A.

1N4728A - 1N4764A

Zeners



DO-41 Glass case
COLOR BAND DENOTES CATHODE

Absolute Maximum Ratings * $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
P_D	Power Dissipation @ $T_L \leq 50^\circ\text{C}$, Lead Length = 3/8"	1.0	W
	Derate above 50°C	6.67	mW/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-65 to +200	$^\circ\text{C}$

* These ratings are limiting values above which the serviceability of the diode may be impaired.

Absolute Maximum Ratings in Datasheet

- The maximum power dissipation, P_D , is specified as 1.0 W up to 50°C .
- The power dissipation is **derated** as shown on the datasheet at **6.67 mW** for each degree above.
- **Example:** maximum power dissipation at 60°C :

$$P_D = 1 \text{ W} - 10^\circ\text{C}(6.67 \text{ mW}/^\circ\text{C}) = 1 \text{ W} - 66.7 \text{ mW} = 0.9933 \text{ W}$$

- Maximum reverse current can be determined from the maximum power dissipation:
Example: at 50°C , the max zener current for $V_Z = 3.3$:

$$I_{ZM} = \frac{P_D}{V_Z} = \frac{1 \text{ W}}{3.3 \text{ V}} = 303 \text{ mA}$$

Electrical Characteristics in Datasheet:

- Zener voltage, V_Z , and zener test current, I_Z

V_Z is measured at the specified zener test current I_Z . For example, the zener voltage for a 1N4728A can range from **3.315 V** to **3.465 V** with a typical value of **3.3 V** at a test current of **76 mA**.

- Maximum zener impedance

(Z_Z) at the specified test current I_Z .

The maximum zener impedance (Z_{ZK}), at the knee of the characteristic curve is specified at (I_{ZK}) which is the current at the knee of the curve

- **Leakage current:** Reverse leakage current is specified for a reverse voltage that is **less** than the knee voltage. This means that the zener is not in reverse breakdown for these measurements.

Electrical Characteristics $T_c = 25^\circ\text{C}$ unless otherwise noted

Ex.3.4



Device	V_Z (V) @ I_Z (Note 1)			Test Current I_Z (mA)	Max. Zener Impedance			Leakage Current	
	Min.	Typ.	Max.		Z_Z @ I_Z (Ω)	Z_{ZK} @ I_{ZK} (Ω)	I_{ZK} (mA)	I_R (μA)	V_R (V)
1N4728A	3.315	3.3	3.465	76	10	400	1	100	1
1N4729A	3.42	3.6	3.78	69	10	400	1	100	1
1N4730A	3.705	3.9	4.095	64	9	400	1	50	1
1N4731A	4.085	4.3	4.515	58	9	400	1	10	1
1N4732A	4.465	4.7	4.935	53	8	500	1	10	1
1N4733A	4.845	5.1	5.355	49	7	550	1	10	1
1N4734A	5.32	5.6	5.88	45	5	600	1	10	2
1N4735A	5.89	6.2	6.51	41	2	700	1	10	3
1N4736A	6.46	6.8	7.14	37	3.5	700	1	10	4
1N4737A	7.125	7.5	7.875	34	4	700	0.5	10	5
1N4738A	7.79	8.2	8.61	31	4.5	700	0.5	10	6
1N4739A	8.645	9.1	9.555	28	5	700	0.5	10	7
1N4740A	9.5	10	10.5	25	7	700	0.25	10	7.6
1N4741A	10.45	11	11.55	23	8	700	0.25	5	8.4
1N4742A	11.4	12	12.6	21	9	700	0.25	5	9.1
1N4743A	12.35	13	13.65	19	10	700	0.25	5	9.9
1N4744A	14.25	15	15.75	17	14	700	0.25	5	11.4
1N4745A	15.2	16	16.8	15.5	16	700	0.25	5	12.2
1N4746A	17.1	18	18.9	14	20	750	0.25	5	13.7
1N4747A	19	20	21	12.5	22	750	0.25	5	15.2
1N4748A	20.9	22	23.1	11.5	23	750	0.25	5	16.7
1N4749A	22.8	24	25.2	10.5	25	750	0.25	5	18.2
1N4750A	25.65	27	28.35	9.5	35	750	0.25	5	20.6
1N4751A	28.5	30	31.5	8.5	40	1000	0.25	5	22.8
1N4752A	31.35	33	34.65	7.5	45	1000	0.25	5	25.1
1N4753A	34.2	36	37.8	7	50	1000	0.25	5	27.4
1N4754A	37.05	39	40.95	6.5	60	1000	0.25	5	29.7
1N4755A	40.85	43	45.15	6	70	1500	0.25	5	32.7
1N4756A	44.65	47	49.35	5.5	80	1500	0.25	5	35.8
1N4757A	48.45	51	53.55	5	95	1500	0.25	5	38.8
1N4758A	53.2	56	58.8	4.5	110	2000	0.25	5	42.6
1N4759A	58.9	62	65.1	4	125	2000	0.25	5	47.1
1N4760A	64.6	68	71.4	3.7	150	2000	0.25	5	51.7
1N4761A	71.25	75	78.75	3.3	175	2000	0.25	5	56
1N4762A	77.9	82	86.1	3	200	3000	0.25	5	62.2
1N4763A	86.45	91	95.55	2.8	250	3000	0.25	5	69.2
1N4764A	95	100	105	2.5	350	3000	0.25	5	76

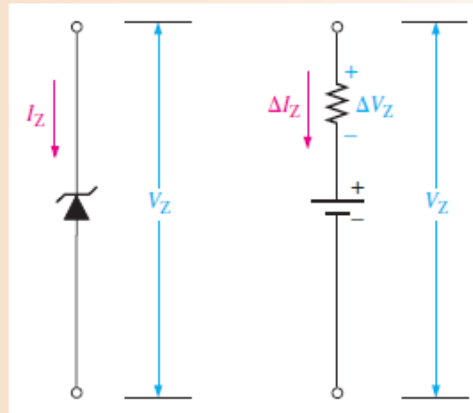
Notes:

1. Zener Voltage (V_Z)

The zener voltage is measured with the device junction in the thermal equilibrium at the load temperature (T_c) at $30^\circ\text{C} \pm 1^\circ\text{C}$ and 3/8" lead length.

EXAMPLE 3-4

From the datasheet in Figure 3-7, a 1N4736A zener diode has a Z_Z of 3.5Ω . The datasheet gives $V_Z = 6.8 \text{ V}$ at a test current, I_Z , of 37 mA . What is the voltage across the zener terminals when the current is 50 mA ? When the current is 25 mA ? Figure 3-8 represents the zener diode.



For $I_Z = 50 \text{ mA}$ which is above the test current ($I_Z = 37 \text{ mA}$)

$$\begin{aligned}\Delta I_Z &= I_Z - 37 \text{ mA} = 50 \text{ mA} - 37 \text{ mA} = +13 \text{ mA} \\ V_Z &= 6.8 + \Delta I_Z \cdot Z_Z \\ &= 6.8 + 13 \text{ mA} \times 3.5 \\ &= \mathbf{6.85 \text{ V}}\end{aligned}$$

For $I_Z = 25 \text{ mA}$ which is below the test current ($I_Z = 37 \text{ mA}$)

$$\begin{aligned}\Delta I_Z &= I_Z - 37 \text{ mA} = 25 \text{ mA} - 37 \text{ mA} = -42 \text{ mA} \\ V_Z &= 6.8 + \Delta I_Z \cdot Z_Z \\ &= 6.8 - 13 \text{ mA} \times 3.5 \\ &= \mathbf{6.85 \text{ V}}\end{aligned}$$