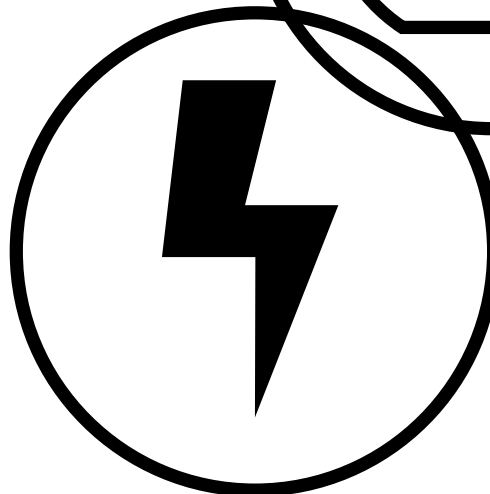
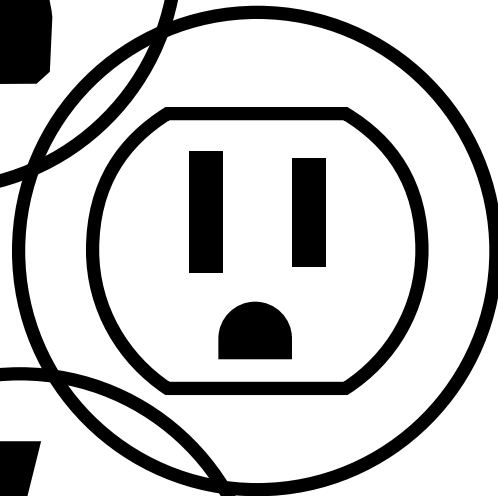
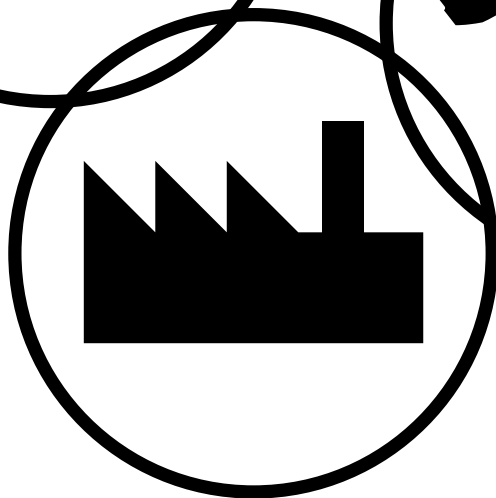
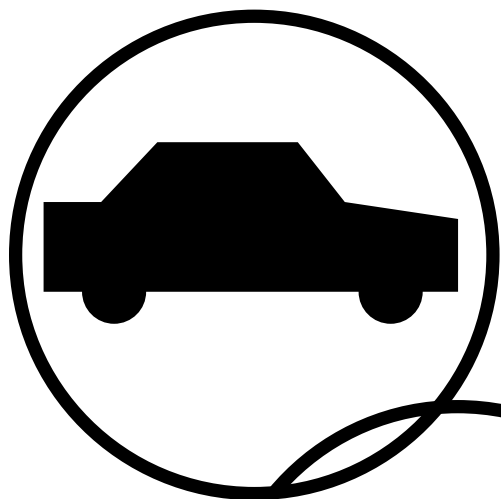




WORLD PRODUCTS INC.
ELECTRONIC COMPONENT SOLUTIONS

METAL OXIDE VARISTORS



Metal Oxide Varistors

ISO 9002:1994

EN ISO 9002:1994; BS EN ISO 9002:1994; ANSI/ASQ Q9002:1994



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Metal Oxide Varistors - Definitions Features

- Our Metal Oxide Varistors have **UL, CSA, SEV and VDE approvals**. The factory is **ISO** certified. Taped Parts conform to **EIA** standards. All electrical specifications are to industry standards with definitions conforming to **IEEE** specifications. Solderability to **MIL STD**. Epoxy flammability rating of **94V0**
- **Product consistency** is maintained through extremely stringent quality and statistical control. On-line automatic test equipment provides **100% inspection**.
- **Extensive selection of equivalents** to essentially all metal oxide varistor types. All specifications available **for proper accurate design-in purposes**.
- **Extremely low leakage current** levels achieved and **exceptional surge handling capability** through proprietary formulations.
- Epoxy conformity and control providing for **consistent physical dimensions and improved solderability**.
- **Varistor product design flexibility and quick design cycles** in order to assist our customers with their most stringent varistor applications.



Definition of Terms - (according to IEEE specifications C62.33)

Rated RMS Voltage, Rated DC Voltage

The maximum designated values of power system voltage that may be applied continuously between the terminals of a device.

Varistor Voltage

Test characteristic that is used to classify varistors by type. A test current of 1mA DC is typically used to determine varistor voltage classification type. Varistor voltage clamping characteristics can be defined at various test levels.

Rated Peak Single Pulse Transient Current

Maximum surge current, 8/20μs waveform which a varistor is rated to withstand for a single surge.

Rated Single Pulse Transient Energy

Maximum allowable energy for a single impulse (see specified waveforms).

Maximum Clamping Voltage

Measured peak voltage across the device terminals when a current impulse of specified amplitude and waveform is conducted through the varistor.

Typical Capacitance

Typical capacitance values are measured at a test frequency of 1KHZ.

Power Dissipation Ratings

Disc Size	Pm-watts	Disc Size	Pm-watts	Disc Size	Pm-watts
5mm (< 50 VAC)	0.01	14mm (< 50 VAC)	0.10	32mm	1.60
5mm (≥ 50 VAC)	0.15	14mm (≥ 50 VAC)	0.60	34mm (Single)	2.10
7mm (< 50 VAC)	0.02	18mm (≥ 50 VAC)	0.80	34mm (Dual)	2.73
7mm (≥ 50 VAC)	0.25	20mm (< 50 VAC)	0.20	40mm	2.10
10mm (< 50 VAC)	0.05	20mm (≥ 50 VAC)	1.00	53mm	2.50
10mm (≥ 50 VAC)	0.40	25mm	1.2	60mm	2.8

Metal Oxide Varistors - Definitions - (continued)

General Characteristics

Storage Temperature	- 55° C to + 125° C
Operating Surface Temperature	125° C
Operating Ambient Temperature	- 55° C to + 85° C (without derating)
Maximum Voltage-Temperature Coefficient	< -0.01 % / °C
Insulation Resistance	1000 Megohm min.
Hi POT (Leads to Case, 1 min.)	2500 VDC (Phenolic coating 2000 VDC)
Typical Response Time	< 15 nsec.
Epoxy Rating	94 V-0
Current/Energy Derating (>85°C)	- 2.5 % / °C
DC Leakage Current	200µA Max (at rated DC working voltage)
Solderability	MIL STD 202F
Failure Criteria	Voltage change ± 10% from initially measured DC Breakdown Voltage (varistor voltage). When determining if varistor is within afore mentioned criteria the same temperature must be observed as was used for initial DC Breakdown Voltage (varistor voltage) measurements.

Part Marking

Example: 5D241K

5 **D** **241** **K**
 (1) (2) (3) (4)

(1) Disc Diameter

05 = 5mm, **07** = 7mm, **10** = 10mm, **14** = 14mm,
18 = 18mm, **20** = 20mm, **25** = 25mm, **32** = 32mm,
34 = 34mm, **40** = 40mm, **53** = 53mm, **60** = 60mm

(2) Type

D = Standard
E = High Energy

(3) Varistor Voltage

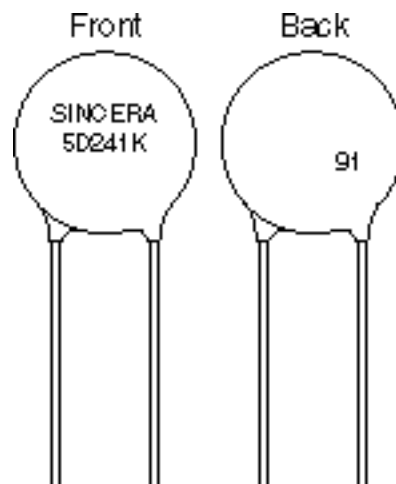
241 = $24 \times 10^1 = 240$ (DC Volts)

(4) Tolerance

J = 5%, **K** = 10%, **M** = 20%

Date Code

91 = First digit represents year - 1999 = 9
 Second digit represents month - 1-9 January through September and O for October, N for November, D for December.
 * - Parts will be marked **Sincera**.
 (This is the brand name.)



Metal Oxide Varistors - Definitions - (continued)

Part Number Code

Example: VZ20D241KBOCX-VPN

V Z 20 E 241 K B O C X - V P N

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)

(1) Series

V = Varistor

(2) Type

Z = Zinc Oxide

(3) Disc Diameter

5 = 5mm, **7** = 7mm, **10** = 10mm, **14** =

14mm, **18** = 18mm, **20** = 20mm

25 = 25mm, **32** = 32mm, **34** = 34mm, **40**

= 40mm, **53** = 53mm, **60** = 60mm

(4) Type

D = Standard

E = High Energy

(5) Varistor Voltage

241 = $24 \times 10^1 = 240$ (DC Volts)

(6) Tolerance

J = 5%, **K** = 10%, **M** = 20%

(7) Packing Code

B = Bulk Pack

(For taped parts packing code, see Taping Specifications.)

(8) Lead Configuration (For Bulk Parts)

S = Straight

O = Outward Crimp

I = Inward Crimp

L = Inline Crimp

N = Bulk parts for 320VAC and larger

come standard with inline crimp (see

illustration below) for straight disc

seating on PC boards. If straight leads are

required instead of inline crimp please use

code "N" in the appropriate position as

stated above.

(9) Lead Cutting

A = $4.0 \pm 1.0\text{mm}$ (.16" $\pm$.04")

(Crimped lead)

B = $3.0 \pm 1.0\text{mm}$ (.12" $\pm$.04")

(Crimped lead)

C = $4.5 \pm 1.5\text{mm}$ (.18" $\pm$.06")

(Crimped lead)

D = $6.5 \pm 1.0\text{mm}$ (.26" $\pm$.04")

(Crimped lead)

E = $4.0 \pm 1.0\text{mm}$ (.18" $\pm$.04")

(Straight lead)

F = $5.0 \pm 1.0\text{mm}$ (.2" $\pm$.04")

(Crimped lead)

G = $3.3 \pm 0.5\text{mm}$ (.13" $\pm$.02")

(Crimped lead)

(For lead length reference points see

Standard Lead Modifications).

(10) Lead Spacing

X = 10mm (0.4") leadspacing.

(For 18mm and 20mm disc diameter only.)

Z = 5mm (0.2") leadspacing.

(For 10mm and 14mm disc diameters.)

(11) Extremely High Energy Rating

V = 15KA for 20mm and 12KA for 18mm, "E Series" parts only.

Available in varistor voltages 201, 221, 241 and 511.

(12) Coating Option

P = Non-Flammable Phenolic Coating.

Applicable for UL1414 and UL1449 recognized parts.

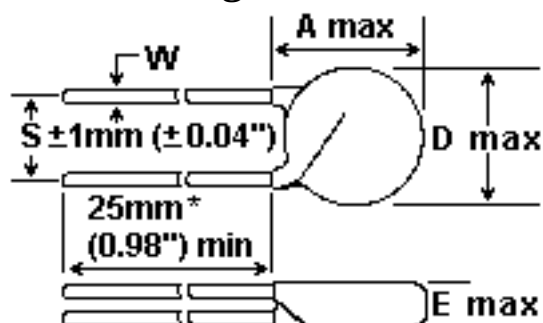
(13) Lead-Free Type

N = Lead-free varistor.

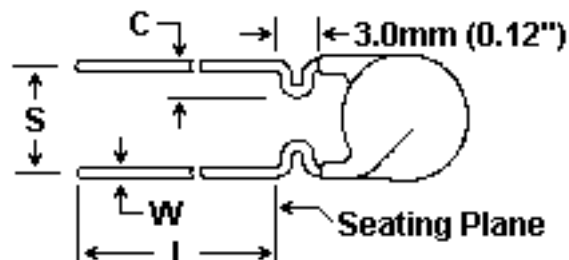


Metal Oxide Varistors - Standard Dimensions and Lead Modification Options

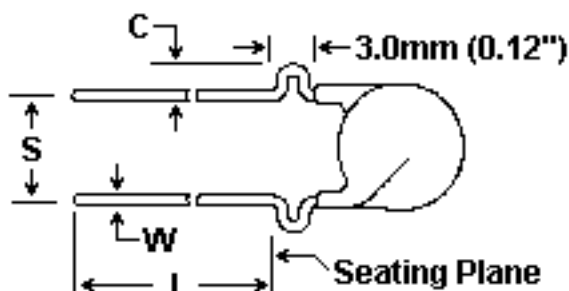
Straight Leads



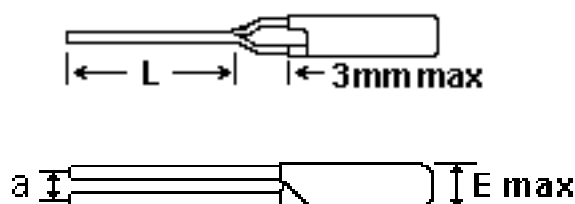
Inward Crimp



Outward Crimp



Inline Crimp



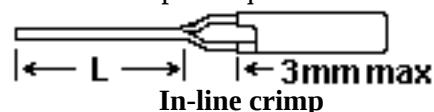
* Total lead length for the 32mm part is 20mm max/0.8"

Disc Size	A max		D max		S		W nom		C		L	E max and a Dimension
mm	mm	in	mm	in	mm ± 1	in ± .04	mm ± .02	in ± .001	mm	in		
5	10.0	0.4	7.0	0.28	5.0	0.2	0.6	0.024	1.6 ± 0.4	0.06 ± 0.016	Please See Definitions, "Part Number Code" "(9) Lead Cutting" for specs and suffix codes.	Please See E Maximum Thickness and Off-set (a) Dimension by Part Number (Next Page)
7	12.0	0.47	9.5	0.37	5.0	0.2	0.6	0.024	1.6 ± 0.4	0.06 ± 0.016		
10	17.0	0.67	12.5	0.49	7.5	0.3	0.8	0.031	1.6 ± 0.4	0.06 ± 0.016		
14	20.5	0.8	16.5	0.65	7.5	0.3	0.8	0.031	1.6 ± 0.4	0.06 ± 0.016		
18	24.0	0.94	20.0	0.79	7.5	0.3	0.8	0.031	2.05 ± 0.4	0.08 ± 0.016		
18*	24.0	0.94	20.0	0.79	10.0	0.4	1.0	0.039	2.05 ± 0.4	0.08 ± 0.016		
20	28.0	1.10	24.0	0.94	7.5	0.3	0.8	0.031	2.05 ± 0.4	0.08 ± 0.016		
20*	28.0	1.10	24.0	0.94	10.0	0.4	1.0	0.039	2.05 ± 0.4	0.08 ± 0.016		
25	31.75	1.25	27.9	1.1	12.7	0.5	1.0	0.039	2.05 ± 0.4	0.08 ± 0.016		
32	45.0	1.77	40.0	1.57	22.5 ± 1.5	0.9 ± 0.059	1.5 ± 0.5	0.06 ± 0.02				

* For 10mm lead spacing use suffix "X" for bulk parts (18mm and 20mm disc diameter).

Notes:

- Maximum epoxy extending on leads (measured from bottom most portion of disc) is 3mm for all disc sizes with exception of 20mm, 25mm and 32mm disc sizes which are 4mm.
- Reduced dimensions, special lead diameters and special lead spacing may be available upon request.
- Bulk parts for 320VAC and larger come standard with inline crimp for straight disc seating on PC boards. If 320VAC and larger size are required without in-line crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" off-set dimensions.
- The maximum straight lead length available for 5mm leadspacing is 40mm max, 7.5mm leadspacing is 32mm max., 10mm leadspacing is 35mm max.



Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

Note: For Suffix "V" add 0.1 (0.004)



5D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
5D180K	3.4 (.13)	1.2 (.05)		5D221K	3.6 (.14)	1.6 (.063)
5D220K	3.6 (.14)	1.3 (.05)		5D241K	3.7 (.145)	1.8 (.07)
5D270K	3.8 (.15)	1.4 (.055)		5D271K	3.8 (.15)	2.0 (.08)
5D330K	3.9 (.15)	1.2 (.05)		5D301K	3.9 (.15)	2.3 (.09)
5D390K	4.0 (.16)	1.3 (.05)		5D331K	4.1 (.16)	2.4 (.094)
5D470K	3.8 (.15)	1.5 (.06)		5D361K	4.4 (.17)	2.5 (.1)
5D560K	3.9 (.15)	1.6 (.063)		5D391K	4.5 (.18)	2.7 (.1)
5D680K	4.2 (.165)	1.8 (.07)		5D431K	4.7 (.185)	2.9 (.11)
5D820K	3.4 (.13)	1.2 (.05)		5D471K	4.9 (.19)	3.6 (.14)
5D101K	3.6 (.14)	1.2 (.05)		5D511K	5.1 (.2)	*3.1 (.12)
5D121K	3.8 (.15)	1.3 (.05)		5D561K	5.3 (.21)	*3.3 (.13)
5D151K	3.9 (.15)	1.3 (.05)		5D621K	5.5 (.22)	*3.9 (.15)
5D181K	3.5 (.138)	1.5 (.06)		5D681K	5.7 (.22)	*4.3 (.17)
5D201K	3.6 (.14)	1.6 (.063)				

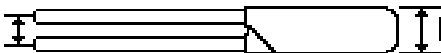
7D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
7D180K	3.4 (.13)	1.2 (.05)		7D221K	3.6 (.14)	1.6 (.063)
7D220K	3.6 (.14)	1.3 (.05)		7D241K	3.7 (.145)	1.8 (.07)
7D270K	3.8 (.15)	1.4 (.055)		7D271K	3.8 (.15)	2.0 (.08)
7D330K	3.9 (.15)	1.2 (.05)		7D301K	3.9 (.15)	2.3 (.09)
7D390K	4.0 (.16)	1.3 (.05)		7D331K	4.1 (.16)	2.4 (.094)
7D470K	3.8 (.15)	1.5 (.06)		7D361K	4.4 (.17)	2.5 (.1)
7D560K	3.9 (.15)	1.6 (.063)		7D391K	4.5 (.18)	2.7 (.1)
7D680K	4.2 (.165)	1.8 (.07)		7D431K	4.7 (.185)	2.9 (.11)
7D820K	3.4 (.13)	1.2 (.05)		7D471K	4.9 (.19)	3.6 (.14)
7D101K	3.6 (.14)	1.2 (.05)		7D511K	5.1 (.2)	*3.1 (.12)
7D121K	3.8 (.15)	1.3 (.05)		7D561K	5.3 (.21)	*3.3 (.13)
7D151K	3.9 (.15)	1.3 (.05)		7D621K	5.5 (.22)	*3.9 (.15)
7D181K	3.5 (.138)	1.5 (.06)		7D681K	5.7 (.22)	*4.3 (.17)
7D201K	3.6 (.14)	1.6 (.063)				

Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

Note: For Suffix "V" add 0.1 (0.004)  **E max**

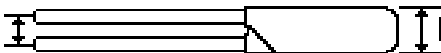
10D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
10D180K	3.8 (.15)	1.4 (.055)		10D301K	4.4 (.17)	2.5 (.1)
10D220K	4.0 (.16)	1.5 (.06)		10D331K	4.6 (.18)	2.5 (.1)
10D270K	4.2 (.165)	1.6 (.063)		10D361K	4.9 (.19)	2.7 (.1)
10D330K	4.3 (.17)	1.8 (.07)		10D391K	5.0 (.2)	2.9 (.11)
10D390K	4.4 (.17)	1.6 (.063)		10D431K	5.2 (.2)	3.1 (.12)
10D470K	4.4 (.17)	1.7 (.067)		10D471K	5.4 (.21)	3.6 (.14)
10D560K	4.4 (.17)	1.8 (.07)		10D511K	5.5 (.22)	*3.4 (.13)
10D680K	4.6 (.18)	2.1 (.083)		10D561K	5.8 (.23)	*3.5 (.138)
10D820K	3.8 (.15)	1.4 (.055)		10D621K	6.1 (.24)	*4.2 (.165)
10D101K	3.8 (.15)	1.4 (.055)		10D681K	6.4 (.25)	*4.6 (.18)
10D121K	4.0 (.16)	1.5 (.06)		10D751K	6.7 (.26)	*5.0 (.197)
10D151K	4.2 (.165)	1.5 (.06)		10D781K	6.9 (.27)	*5.0 (.197)
10D181K	4.2 (.165)	1.6 (.063)		10D821K	7.1 (.28)	*5.4 (.2)
10D201K	4.2 (.165)	1.8 (.07)		10D911K	7.5 (.3)	*5.9 (.23)
10D221K	4.1 (.16)	1.8 (.07)		10D102K	7.6 (.3)	*6.4 (.25)
10D241K	4.2 (.165)	2.0 (.08)		10D112K	7.8 (.31)	*7.0 (.275)
10D271K	4.3 (.17)	2.2 (.087)				

Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

Note: For Suffix “V” add 0.1 (0.004)  **E max**

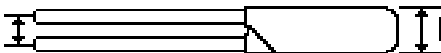
14D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
14D180K	3.9 (.15)	1.4 (.055)		14D301K	4.4 (.17)	2.6 (.1)
14D220K	4.1 (.16)	1.5 (.06)		14D331K	4.6 (.18)	2.6 (.1)
14D270K	4.3 (.17)	1.7 (.067)		14D361K	4.9 (.19)	2.8 (.11)
14D330K	4.5 (.18)	1.9 (.075)		14D391K	5.0 (.2)	3.0 (.12)
14D390K	4.5 (.18)	1.7 (.067)		14D431K	5.2 (.2)	3.2 (.126)
14D470K	4.3 (.17)	1.8 (.07)		14D471K	5.4 (.21)	3.8 (.15)
14D560K	4.5 (.18)	2.0 (.08)		14D511K	5.5 (.22)	*3.4 (.13)
14D680K	4.7 (.185)	2.2 (.087)		14D561K	5.8 (.23)	*3.5 (.138)
14D820K	3.8 (.15)	1.4 (.055)		14D621K	6.1 (.24)	*4.2 (.165)
14D101K	3.8 (.15)	1.5 (.06)		14D681K	6.4 (.25)	*4.7 (.185)
14D121K	4.0 (.16)	1.5 (.06)		14D751K	6.7 (.26)	*5.1 (.2)
14D151K	4.2 (.165)	1.5 (.06)		14D781K	6.9 (.27)	*5.1 (.2)
14D181K	4.4 (.17)	1.7 (.067)		14D821K	7.1 (.28)	*5.5 (.22)
14D201K	4.6 (.18)	1.9 (.075)		14D911K	7.5 (.3)	*6.0 (.24)
14D221K	4.1 (.16)	1.9 (.075)		14D102K	7.6 (.3)	*6.5 (.255)
14D241K	4.2 (.165)	2.1 (.083)		14D112K	8.0 (.31)	*7.2 (.28)
14D271K	4.3 (.17)	2.2 (.087)				

Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

Note: For Suffix "V" add 0.1 (0.004)  E max

20D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
20D180K	4.3 (.17)	1.5 (.06)		20D301K	5.0 (.2)	2.6 (.1)
20D220K	4.5 (.18)	1.6 (.063)		20D331K	5.0 (.2)	2.7 (.1)
20D270K	4.7 (.185)	1.8 (.07)		20D361K	5.4 (.21)	2.9 (.11)
20D330K	4.9 (.19)	2.1 (.083)		20D391K	5.5 (.22)	3.1 (.12)
20D390K	5.1 (.2)	2.1 (.083)		20D431K	5.7 (.22)	3.3 (.13)
20D470K	5.3 (.21)	2.2 (.087)		20D471K	5.5 (.22)	4.0 (.157)
20D560K	5.5 (.22)	2.2 (.087)		20D511K	5.7 (.22)	*3.4 (.13)
20D680K	5.7 (.22)	2.4 (.094)		20D561K	5.9 (.23)	*3.8 (.15)
20D820K	4.3 (.17)	1.5 (.06)		20D621K	6.2 (.24)	*4.5 (.18)
20D101K	4.3 (.17)	1.6 (.063)		20D681K	6.5 (.26)	*4.8 (.19)
20D121K	4.4 (.17)	1.6 (.063)		20D751K	6.8 (.27)	*5.2 (.2)
20D151K	4.6 (.18)	1.6 (.063)		20D781K	7.0 (.275)	*5.4 (.2)
20D181K	4.6 (.18)	1.8 (.07)		20D821K	7.2 (.28)	*5.6 (.22)
20D201K	4.7 (.185)	2.0 (.08)		20D911K	7.5 (.3)	*6.5 (.255)
20D221K	4.8 (.19)	2.0 (.08)		20D102K	7.9 (.31)	*6.6 (.26)
20D241K	4.9 (.19)	2.2 (.087)		20D112K	8.4 (.33)	*7.3 (.287)
20D271K	4.9 (.19)	2.3 (.09)				

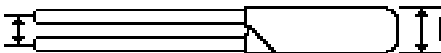
25D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
25D201K	5.0 (.2)	2.2 (.087)		25D511K	6.8 (.27)	*(3.5 (.138))
25D221K	5.0 (.2)	2.2 (.087)		25D561K	7.0 (.275)	*3.9 (.15)
25D241K	5.3 (.21)	2.4 (.094)		25D621K	7.4 (.29)	*4.8 (.19)
25D271K	5.5 (.22)	2.5 (.1)		25D681K	7.5 (.29)	*5.0 (.197)
25D301K	5.6 (.22)	2.7 (.1)		25D751K	7.6 (.30)	*5.4 (.2)
25D331K	5.9 (.23)	2.8 (.11)		25D781K	8.0 (.31)	*5.5 (.22)
25D361K	5.9 (.23)	3.0 (.12)		25D821K	8.2 (.32)	*5.8 (.23)
25D391K	6.0 (.24)	3.3 (.13)		25D911K	8.2 (.32)	*7.0 (.275)
25D431K	6.5 (.256)	3.5 (.138)		25D102K	8.8 (.35)	*7.2 (.28)
25D471K	6.5 (.26)	5.0 (.197)		25D112K	9.4 (.37)	*7.4 (.29)

Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

Note: For Suffix "V" add 0.1 (0.004)  E max

32D Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
32D201KW	5.6 (.22)	2.6 (.1)		32D621KW	7.9 (.31)	*4.9 (.19)
32D221KW	5.7 (.22)	2.7 (.11)		32D681KW	8.1 (.32)	*5.1 (.2)
32D241KW	5.8 (.23)	2.8 (.11)		32D751KW	8.5 (.33)	*5.5 (.216)
32D271KW	5.9 (.23)	2.9 (.11)		32D781KW	8.7 (.34)	*5.7 (.22)
32D331KW	6.3 (.25)	3.3 (.13)		32D821KW	9.0 (.35)	*6.0 (.236)
32D361KW	6.5 (.255)	3.5 (.137)		32D911KW	9.4 (.37)	*6.4 (.25)
32D391KW	6.6 (.26)	3.6 (.14)		32D951KW	9.8 (.39)	*6.7 (.26)
32D431KW	6.8 (.27)	3.8 (.15)		32D102KW	10.0 (.39)	*7.0 (.275)
32D471KW	6.9 (.27)	3.9 (.15)		32D112KW	10.5 (.41)	*7.5 (.295)
32D511KW	7.3 (.29)	*4.3 (.17)		32D122KW	11.0 (.43)	*8.0 (.31)
32D561KW	7.3 (.29)	*4.3 (.17)		32D152KW	12.5 (.49)	*9.5 (.37)

5E High Energy Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
5E820K	3.4 (.13)	1.2 (.05)		5E331K	4.1 (.16)	2.4 (.094)
5E181K	3.5 (.138)	1.5 (.06)		5E361K	4.4 (.17)	2.5 (.1)
5E201K	3.5 (.138)	1.6 (.063)		5E391K	4.5 (.18)	2.7 (.1)
5E221K	3.6 (.14)	1.6 (.063)		5E431K	4.7 (.185)	2.9 (.11)
5E241K	3.7 (.145)	1.8 (.07)		5E471K	4.7 (.185)	3.6 (.14)
5E271K	3.8 (.15)	2.0 (.08)				

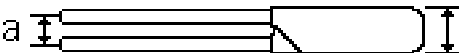
7E High Energy Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
7E820K	3.4 (.13)	1.2 (.05)		7E331K	4.1 (.16)	2.4 (.094)
7E181K	3.5 (.138)	1.5 (.06)		7E361K	4.4 (.17)	2.5 (.1)
7E201K	3.5 (.138)	1.6 (.063)		7E391K	4.5 (.18)	2.7 (.1)
7E221K	3.6 (.14)	1.6 (.063)		7E431K	4.7 (.185)	2.9 (.11)
7E241K	3.7 (.145)	1.8 (.07)		7E471K	4.7 (.185)	3.6 (.14)
7E271K	3.8 (.15)	2.0 (.08)				

Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

Note: For Suffix "V" add 0.1 (0.004)  E max

10E High Energy Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
10E820K	3.8 (.15)	1.4 (.055)		10E361K	4.9 (.19)	2.7 (.1)
10E181K	3.9 (.15)	1.6 (.063)		10E391K	5.0 (.2)	2.9 (.11)
10E201K	3.9 (.15)	1.8 (.07)		10E431K	5.2 (.2)	3.1 (.12)
10E221K	4.1 (.16)	1.8 (.07)		10E471K	5.2 (.2)	3.6 (.14)
10E241K	4.2 (.165)	2.0 (.08)		10E511K	5.3 (.21)	*3.4 (.13)
10E271K	4.3 (.17)	2.2 (.087)		10E561K	5.8 (.23)	*3.5 (.138)
10E331K	4.6 (.18)	2.5 (.1)		10E821K	6.7 (.26)	*5.4 (.2)

14E High Energy Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
14E820K	3.8 (.15)	1.4 (.055)		14E361K	4.9 (.19)	2.8 (.11)
14E181K	4.4 (.17)	1.7 (.067)		14E391K	5.0 (.2)	3.0 (.12)
14E201K	4.4 (.17)	1.9 (.075)		14E431K	5.2 (.2)	3.2 (.126)
14E221K	4.5 (.18)	1.9 (.075)		14E471K	5.2 (.2)	3.8 (.15)
14E241K	4.5 (.18)	2.1 (.083)		14E511K	5.3 (.21)	*3.4 (.13)
14E271K	4.5 (.18)	2.2 (.087)		14E561K	5.8 (.23)	*3.5 (.138)
14E331K	4.6 (.18)	2.6 (.1)		14E821K	6.7 (.26)	*5.5 (.22)

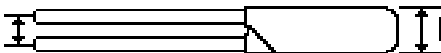
18E High Energy Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
18E820K	4.1 (.16)	1.5 (.06)		18E361K	5.4 (.21)	2.8 (.11)
18E181K	4.4 (.17)	1.9 (.075)		18E391K	5.5 (.22)	3.0 (.12)
18E201K	4.7 (.185)	1.9 (.075)		18E431K	5.7 (.22)	3.2 (.126)
18E221K	4.9 (.19)	1.9 (.075)		18E471K	5.8 (.23)	3.9 (.15)
18E241K	5.0 (.2)	2.0 (.08)		18E511K	6.1 (.24)	*3.4 (.13)
18E271K	5.1 (.2)	2.2 (.08)		18E561K	6.2 (.24)	*3.8 (.15)
18E331K	5.2 (.2)	2.7 (.11)		18E821K	7.4 (.29)	*5.5 (.22)

Metal Oxide Varistors - Standard Lead Modifications

E Max Dimensions

Dimensions are in mm (inches)

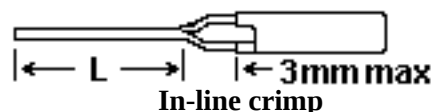
Note: For Suffix "V" add 0.1 (0.004)  **E max**

20E High Energy Series

Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)		Style	E Max mm (in)	Off-set Dimension (a) ±1 (±0.04) mm (in)
20E820K	4.3 (.17)	1.5 (.06)		20E471K	5.8 (.23)	4.0 (.157)
20E181K	4.3 (.17)	1.8 (.07)		20E511K	5.9 (.23)	*3.4 (.13)
20E201K	4.9 (.19)	2.0 (.08)		20E561K	5.9 (.23)	*3.8 (.15)
20E221K	5.0 (.2)	2.0 (.08)		20E621K	6.6 (.26)	*4.5 (.18)
20E241K	5.1 (.2)	2.2 (.087)		20E681K	6.9 (.27)	*4.8 (.19)
20E271K	5.4 (.21)	2.3 (.09)		20E751K	7.2 (.28)	*5.2 (.2)
20E301K	5.5 (.22)	2.6 (.1)		20E781K	7.4 (.29)	*5.4 (.2)
20E331K	5.8 (.23)	2.7 (.1)		20E821K	7.2 (.28)	*5.6 (.22)
20E361K	5.4 (.21)	2.9 (.11)		20E911K	8.0 (.32)	*6.5 (.255)
20E391K	5.5 (.22)	3.1 (.12)		20E102K	8.5 (.33)	*6.6 (.26)
20E431K	5.7 (.22)	3.3 (.13)		20E112K	8.0 (.32)	*7.3 (.287)

Note:

* Bulk parts for 320VAC and larger come standard with inline crimp (see illustration to the right) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without in-line crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" dimensions (for off-set) above.



Metal Oxide Varistors - D Series Electrical Characteristics

Part Number	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
	Maximum Continuous Rated Voltage		Rated Single Pulse Transient			Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy		Peak	Min Volts	Max Volts	Volts	Amps	pF
			2ms Joules	10/1000µs Joules	8/20µs Amps					
VZ05D180KBS	11	14	0.4	0.6	100	16	20	36	1	1500
VZ07D180KBS			0.8	1.0	250			36	2.5	2900
VZ10D180KBS			1.7	2.1	500			36	5	6000
VZ14D180KBS			3.5	4.0	1000			36	10	15000
VZ20D180KBS			10	12	2000			36	20	27000
VZ05D220KBS	14	18	0.6	0.8	100	20	24	43	1	1260
VZ07D220KBS			0.9	1.3	250			43	2.5	2400
VZ10D220KBS			2.0	2.5	500			43	5	5000
VZ14D220KBS			4.0	5.0	1000			43	10	12000
VZ20D220KBS			13	15	2000			43	20	20000
VZ05D270KBS	17	22	0.7	0.9	100	24	30	53	1	1050
VZ07D270KBS			1.1	1.4	250			53	2.5	1800
VZ10D270KBS			2.5	3.0	500			53	5	4000
VZ14D270KBS			5.0	6.0	1000			53	10	8500
VZ20D270KBS			15	17	2000			53	20	15000
VZ05D330KBS	20	26	0.9	1.2	100	30	36	65	1	850
VZ07D330KBS			1.3	1.7	250			65	2.5	1500
VZ10D330KBS			3.1	4.0	500			65	5	3500
VZ14D330KBS			6.0	7.5	1000			65	10	7200
VZ20D330KBS			20	22	2000			65	20	12200
VZ05D390KBS	25	31	1.1	1.3	100	35	43	77	1	600
VZ07D390KBS			1.6	2.1	250			77	2.5	1230
VZ10D390KBS			3.7	4.6	500			77	5	3100
VZ14D390KBS			7.0	8.6	1000			77	10	6300
VZ20D390KBS			24	26	2000			77	20	10000
VZ05D470KBS	30	38	1.4	1.6	100	42	52	93	1	500
VZ07D470KBS			2.0	2.5	250			93	2.5	950
VZ10D470KBS			4.5	5.5	500			93	5	2800
VZ14D470KBS			9.0	10	1000			93	10	5500
VZ20D470KBS			30	33	2000			93	20	9350

UL 1449 recognized (File# E172311). UL 497B recognized (File# E199593). No values recognized beyond 680VAC.

UL 1414 recognized (File# E182369). No values recognized below 130VAC.

CSA 22.2 #1 certified (File# LR109496-1 and LR109496-4). No values certified below 130VAC.

VDE/CECC 42000/42200 (File# 21022-4790-0001/22ZFJ), (21022-4790-0001/303WM), (21022-4790-0001/22BBM),

(21022-4790-0001/30SH2). VDE/CECC for 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

SEV/CECC 42000/42200. (File# 9977006701). 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

Metal Oxide Varistors - D Series Electrical Characteristics (continued)

Part Number	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
	Maximum Continuous Rated Voltage		Rated Single Pulse Transient			Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy		Peak	Min Volts	Max Volts	Volts	Amps	pF
			2ms Joules	10/1000µs Joules	8/20µs Amps					
VZ05D560KBS	35	45	1.5	1.9	100	50	62	110	1	400
VZ07D560KBS			2.5	3.1	250			110	2.5	890
VZ10D560KBS			5.5	7.0	500			110	5	2400
VZ14D560KBS			10	11	1000			110	10	4800
VZ20D560KBS			35	38	2000			110	20	8000
VZ05D680KBS	40	56	1.8	2.3	100	61	75	135	1	360
VZ07D680KBS			3.0	3.8	250			135	2.5	850
VZ10D680KBS			6.5	8.2	500			135	5	2100
VZ14D680KBS			13	14	1000			135	10	4000
VZ20D680KBS			40	43	2000			135	20	6800
VZ05D820KBS	50	66	2.4	3.0	400	74	90	135	5	350
VZ07D820KBS			4.2	5.5	1200			135	10	830
VZ10D820KBS			8.4	12	2500			135	25	1600
VZ14D820KBS			15	22	4500			135	50	3300
VZ20D820KBS			37	48	6500			135	100	5600
VZ05D101KBS	60	85	2.4	3.5	400	90	110	165	5	320
VZ07D101KBS			4.8	6.5	1200			165	10	730
VZ10D101KBS			10	15	2500			165	25	1400
VZ14D101KBS			20	30	4500			165	50	2900
VZ20D101KBS			38	50	6500			165	100	4700
VZ05D121KBS	75	102	3.0	5.0	400	108	132	200	5	250
VZ07D121KBS			5.9	7.8	1200			200	10	570
VZ10D121KBS			12	18	2500			200	25	1200
VZ14D121KBS			22	34	4500			200	50	2600
VZ20D121KBS			40	55	6500			200	100	4100

UL 1449 recognized (File# E172311). UL 497B recognized (File# E199593). No values recognized beyond 680VAC.

UL 1414 recognized (File# E182369). No values recognized below 130VAC.

CSA 22.2 #1 certified (File# LR109496-1 and LR109496-4). No values certified below 130VAC.

VDE/CECC 42000/42200 (File# 21022-4790-0001/22ZFJ), (21022-4790-0001/303WM), (21022-4790-0001/22BBM),

(21022-4790-0001/30SH2). VDE/CECC for 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

SEV/CECC 42000/42200. (File# 9977006701). 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

Metal Oxide Varistors - D Series Electrical Characteristics (continued)

Part Number	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
	Maximum Continuous Rated Voltage		Rated Single Pulse Transient			Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy		Peak	Min Volts	Max Volts	Volts	Amps	pF
			2ms Joules	10/1000µs Joules	8/20µs Amps					
VZ05D151KBS	95	127	3.5	5.5	400	135	165	250	5	180
VZ07D151KBS			7.6	9.7	1200			250	10	400
VZ10D151KBS			16	22	2500			250	25	1100
VZ14D151KBS			30	45	4500			250	50	2000
VZ20D151KBS			50	70	6500			250	100	3200
VZ05D181KBS	120	160	4.2	8.0	400	170	207	320	5	155
VZ07D181KBS			8.8	12	1200			300	10	305
VZ10D181KBS			18.5	27.5	2500			300	25	700
VZ14D181KBS			33	53	4500			300	50	1400
VZ20D181KBS			60	85	10000			300	100	2500
VZ05D201KBS	130	175	5.0	8.5	400	184	224	340	5	140
VZ07D201KBS			10	13	1200			340	10	275
VZ10D201KBS			20	30	2500			300	25	640
VZ14D201KBS			38	60	4500			300	50	1370
VZ20D201KBS			70	95	10000			300	100	2200
VZ05D221KBS	140	180	6.0	9.0	400	198	242	360	5	125
VZ07D221KBS			11	14	1200			360	10	250
VZ10D221KBS			23	32	2500			360	25	600
VZ14D221KBS			40	60	4500			360	50	1150
VZ20D221KBS			75	100	10000			360	100	2000
VZ05D241KBS	150	200	6.5	10	400	216	264	395	5	115
VZ07D241KBS			11	16	1200			395	10	230
VZ10D241KBS			25	35	2500			395	25	560
VZ14D241KBS			45	66	4500			395	50	1060
VZ20D241KBS			82	120	10000			395	100	1900

UL 1449 recognized (File# E172311). UL 497B recognized (File# E199593). No values recognized beyond 680VAC.

UL 1414 recognized (File# E182369). No values recognized below 130VAC.

CSA 22.2 #1 certified (File# LR109496-1 and LR109496-4). No values certified below 130VAC.

VDE/CECC 42000/42200 (File# 21022-4790-0001/22ZFJ), (21022-4790-0001/303WM), (21022-4790-0001/22BBM),

(21022-4790-0001/30SH2). VDE/CECC for 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

SEV/CECC 42000/42200. (File# 9977006701). 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

Metal Oxide Varistors - D Series Electrical Characteristics (continued)

Part Number	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
	Maximum Continuous Rated Voltage		Rated Single Pulse Transient			Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy		Peak	Min Volts	Max Volts	Volts	Amps	pF
			2ms Joules	10/1000µs Joules	8/20µs Amps					
VZ05D271KBS	180	230	7.5	11	400	255	311	475	5	105
VZ07D271KBS			13	18	1200			455	10	205
VZ10D271KBS			30	40	2500			455	25	500
VZ14D271KBS			52	72	4500			455	50	950
VZ20D271KBS			90	127	10000			455	100	1700
VZ05D301KBS	195	250	8.0	11.5	400	270	330	525	5	95
VZ07D301KBS			13	19	1200			505	10	185
VZ10D301KBS			32	42.5	2500			505	25	450
VZ14D301KBS			56	78	4500			505	50	890
VZ20D301KBS			100	135	10000			505	100	1540
VZ05D331KBS	210	275	8.5	11.7	400	297	363	540	5	85
VZ07D331KBS			14	20	1200			540	10	170
VZ10D331KBS			33.5	44.5	2500			540	25	415
VZ14D331KBS			63	87	4500			540	50	800
VZ20D331KBS			110	148	10000			540	100	1400
VZ05D361KBS	230	300	9.0	13	400	324	396	595	5	80
VZ07D361KBS			17	25	1200			595	10	155
VZ10D361KBS			36	47	2500			595	25	380
VZ14D361KBS			70	98	4500			595	50	725
VZ20D361KBS			120	163	10000			595	100	1320
VZ05D391KBS	250	330	10	15	400	351	429	650	5	75
VZ07D391KBS			19	26	1200			650	10	145
VZ10D391KBS			40	60	2500			650	25	350
VZ14D391KBS			72	102	4500			650	50	665
VZ20D391KBS			130	180	10000			650	100	1210

UL 1449 recognized (File# E172311). UL 497B recognized (File# E199593). No values recognized beyond 680VAC.

UL 1414 recognized (File# E182369). No values recognized below 130VAC.

CSA 22.2 #1 certified (File# LR109496-1 and LR109496-4). No values certified below 130VAC.

VDE/CECC 42000/42200 (File# 21022-4790-0001/22ZFJ), (21022-4790-0001/303WM), (21022-4790-0001/22BBM),

(21022-4790-0001/30SH2). VDE/CECC for 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

SEV/CECC 42000/42200. (File# 9977006701). 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

Metal Oxide Varistors - D Series Electrical Characteristics (continued)

Part Number	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
	Maximum Continuous Rated Voltage		Rated Single Pulse Transient			Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy		Peak	Min Volts	Max Volts	Volts	Amps	pF
			2ms Joules	10/1000µs Joules	8/20µs Amps					
VZ05D431KBS	275	370	11	16	400	387	473	710	5	65
VZ07D431KBS			21	28	1200			710	10	130
VZ10D431KBS			45	65	2500			710	25	310
VZ14D431KBS			75	115	4500			710	50	600
VZ20D431KBS			140	190	10000			710	100	1120
VZ05D471KBS	300	385	13	19	400	423	517	775	5	55
VZ07D471KBS			23	30	1200			775	10	115
VZ10D471KBS			47	70	2500			775	25	280
VZ14D471KBS			80	125	4500			775	50	570
VZ20D471KBS			150	220	10000			775	100	1000
VZ05D511KBS	320	420	15	21	400	459	561	865	5	39
VZ07D511KBS			23	32	1200			850	10	82
VZ10D511KBS			50	71	2500			840	25	260
VZ14D511KBS			84	128	4500			840	50	530
VZ20D511KBS			152	222	10000			840	100	950
VZ05D561KBS	360	470	17	25	400	522	638	960	5	36
VZ07D561KBS			27	39	1200			960	10	75
VZ10D561KBS			48	72	2500			910	25	240
VZ14D561KBS			85	139	4500			950	50	480
VZ20D561KBS			154	226	10000			910	100	900
VZ05D621KBS	390	505	19	27	400	558	682	1040	5	33
VZ07D621KBS			29	43	1200			1040	10	68
VZ10D621KBS			49	73	2500			1025	25	150
VZ14D621KBS			88	142	4500			1025	50	270
VZ20D621KBS			158	228	10000			1025	100	770

UL 1449 recognized (File# E172311). UL 497B recognized (File# E199593). No values recognized beyond 680VAC.

UL 1414 recognized (File# E182369). No values recognized below 130VAC.

CSA 22.2 #1 certified (File# LR109496-1 and LR109496-4). No values certified below 130VAC.

VDE/CECC 42000/42200 (File# 21022-4790-0001/22ZFJ), (21022-4790-0001/303WM), (21022-4790-0001/22BBM),

(21022-4790-0001/30SH2). VDE/CECC for 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

SEV/CECC 42000/42200. (File# 9977006701). 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

Metal Oxide Varistors - D Series Electrical Characteristics (continued)

Part Number	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
	Maximum Continuous Rated Voltage		Rated Single Pulse Transient			Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy		Peak	Min Volts	Max Volts	Volts	Amps	pF
			2ms Joules	10/1000µs Joules	8/20µs Amps					
VZ05D681KBS	420	560	21	30	400	612	748	1120	5	30
VZ07D681KBS			32	45	1200			1120	10	62
VZ10D681KBS			50	74	2500			1120	25	130
VZ14D681KBS			90	142	4500			1120	50	240
VZ20D681KBS			160	230	10000			1120	100	700
VZ10D751KBS	460	615	51	75	2500	675	825	1240	25	120
VZ14D751KBS			100	143	4500			1240	50	210
VZ20D751KBS			175	255	10000			1240	100	640
VZ10D781KBS	485	640	52	80	2500	702	858	1290	25	120
VZ14D781KBS			105	148	4500			1240	50	205
VZ20D781KBS			180	265	10000			1240	100	590
VZ10D821KBS	510	675	55	85	2500	738	902	1350	25	110
VZ14D821KBS			110	157	4500			1350	50	200
VZ20D821KBS			195	282	10000			1350	100	510
VZ10D911KBS	550	745	60	93	2500	819	1001	1400	25	90
VZ14D911KBS			120	175	4500			1400	50	175
VZ20D911KBS			215	310	10000			1400	100	430
VZ10D102KBS	625	825	68	102	2500	900	1100	1650	25	80
VZ14D102KBS			130	190	4500			1620	50	145
VZ20D102KBS			230	342	10000			1620	100	380
VZ10D112KBS	680	895	72	115	2500	962	1175	1815	25	70
VZ14D112KBS			140	215	4500			1800	50	140
VZ20D112KBS			250	383	10000			1800	100	340

UL 1449 recognized (File# E172311). UL 497B recognized (File# E199593). No values recognized beyond 680VAC.

UL 1414 recognized (File# E182369). No values recognized below 130VAC.

CSA 22.2 #1 certified (File# LR109496-1 and LR109496-4). No values certified below 130VAC.

VDE/CECC 42000/42200 (File# 21022-4790-0001/22ZFJ), (21022-4790-0001/303WM), (21022-4790-0001/22BBM),

(21022-4790-0001/30SH2). VDE/CECC for 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

SEV/CECC 42000/42200. (File# 9977006701). 5mm and 7mm values approved through 300VAC. No voltages approved beyond 680VAC for any type. 20mm values approved (50VAC-680VAC).

Metal Oxide Varistors - High Energy E Series Electrical Characteristics

Part Number	Maximum Continuous Voltage		Reference Current (mA)	Voltage at Reference Current		Maximum Clamping Voltage 8/20µs		Max Peak Current (8/20µs 1 time) (A)	Energy Surge Rating (10/1000µs) (joules)	Typical Capacitance (@1KHZ) (pF)
	R.M.S (V)	DC (V)		Min (V)	Max (V)	Class Current (A)	Max Voltage (V)			
VZ05E820KBS	50	66	1	74	90	5	135	800	3.5	355
VZ07E820KBS						10		1750	7	790
VZ10E820KBS						25		3500	14	1780
VZ14E820KBS						50		6500	28	3310
VZ18E820KBS						80		8000	46	4300
VZ20E820KBS						100		10000	56	5300
VZ05E181KBS	120	160	1	170	207	5	310	800	8	130
VZ07E181KBS						10	320	1750	16	210
VZ10E181KBS						25	320	3500	33	460
VZ14E181KBS						50	320	6500	56	800
VZ18E181KBS						80	320	9000	70	1300
VZ20E181KBS						100	320	12000	135	1800
VZ05E201KBS	130	175	1	185	225	5	340	800	8.5	120
VZ07E201KBS						10	330	1750	17.5	200
VZ10E201KBS						25	330	3500	42	430
VZ14E201KBS						50	330	6500	78	770
VZ18E201KBS						80	340	9000	140	1270
VZ18E201KBS-V						80	340	12000	160	2000
VZ20E201KBS						100	340	12000	170	1700
VZ20E201KBS-V						100	340	15000	195	2200
VZ05E221KBS	140	180	1	198	242	5	360	800	9	110
VZ07E221KBS						10		1750	19	190
VZ10E221KBS						25		3500	43	410
VZ14E221KBS						50		6500	85	740
VZ18E221KBS						80		9000	150	1220
VZ18E221KBS-V						80		12000	180	1700
VZ20E221KBS						100		12000	180	1600
VZ20E221KBS-V						100		15000	220	2100

All parts approved as follows:

UL 1449 recognized (File # E172311).

UL 1414 recognized (File # E182369).

No value recognized below 120VAC

VDE - Pending. SEV - Pending.

UL 497B recognized (File # E199593).

No voltage recognized beyond 675VDC.

CSA 22.2 #1 certified (File # LR109496-1 and LR109496-5).

No value certified below 130VAC

Metal Oxide Varistors - High Energy E Series Electrical Characteristics (continued)

Part Number	Maximum Continuous Voltage		Reference Current (mA)	Voltage at Reference Current		Maximum Clamping Voltage 8/20μs		Max Peak Current (8/20μs 1 time) (A)	Energy Surge Rating (10/1000μs) (joules)	Typical Capacitance (@1KHZ) (pF)
	R.M.S (V)	DC (V)		Min (V)	Max (V)	Class	Max			
						Current	Voltage			
						(A)	(V)			
VZ05E241KBS	150	200	1	216	264	5	395	800	10.5	100
VZ07E241KBS						10		1750	21	170
VZ10E241KBS						25		3500	45	380
VZ14E241KBS						50		6500	90	700
VZ18E241KBS						80		9000	155	1200
VZ18E241KBS-V						80		12000	195	1500
VZ20E241KBS						100		12000	190	1500
VZ20E241KBS-V						100		15000	240	2000
VZ05E271KBS	180	230	1	255	311	5	475	800	11	90
VZ07E271KBS						10	450	1750	24	150
VZ10E271KBS						25	450	3500	49	350
VZ14E271KBS						50	450	6500	99	640
VZ18E271KBS						80	455	9000	163	1050
VZ20E271KBS						100	455	12000	200	1300
VZ20E301KBS	195	250	1	270	330	100	505	12000	210	1200
VZ05E331KBS	210	275	1	297	363	5	540	800	13	75
VZ07E331KBS						10	540	1750	28	130
VZ10E331KBS						25	540	3500	58	300
VZ14E331KBS						50	545	6500	115	580
VZ18E331KBS						80	545	9000	190	950
VZ20E331KBS						100	545	12000	228	1100
VZ05E361KBS	230	300	1	324	396	5	595	800	16	69
VZ07E361KBS						10		1750	32	123
VZ10E361KBS						25		3500	65	285
VZ14E361KBS						50		6500	140	540
VZ18E361KBS						80		9000	220	870
VZ20E361KBS						100		12000	275	1050

All parts approved as follows:

UL 1449 recognized (File # E172311).

UL 1414 recognized (File # E182369).

No value recognized below 120VAC

VDE - Pending. SEV - Pending.

UL 497B recognized (File # E199593).

No voltage recognized beyond 675VDC.

CSA 22.2 #1 certified (File # LR109496-1 and LR109496-5).

No value certified below 130VAC

Metal Oxide Varistors - High Energy E Series Electrical Characteristics (continued)

Part Number	Maximum Continuous Voltage		Reference Current (mA)	Voltage at Reference Current		Maximum Clamping Voltage 8/20 μ s		Max Peak Current (8/20 μ s 1 time) (A)	Energy Surge Rating (10/1000 μ s) (joules)	Typical Capacitance (@1KHZ) (pF)
	R.M.S (V)	DC (V)		Min (V)	Max (V)	Class Current (A)	Max Voltage (V)			
VZ05E391KBS	250	330	1	351	429	5	675	800	17	63
VZ07E391KBS						10	650	1750	35	116
VZ10E391KBS						25	650	3500	70	270
VZ14E391KBS						50	650	6500	150	500
VZ18E391KBS						80	650	9000	245	800
VZ20E391KBS						100	650	12000	305	1000
VZ05E431KBS	275	370	1	387	473	5	740	800	20	57
VZ07E431KBS						10	710	1750	40	108
VZ10E431KBS						25	710	3500	80	255
VZ14E431KBS						50	710	6500	165	460
VZ18E431KBS						80	710	9000	270	730
VZ20E431KBS						100	710	12000	330	950
VZ05E471KBS	300	385	1	423	517	5	775	800	21	50
VZ07E471KBS						10		1750	42	100
VZ10E471KBS						25		3500	85	230
VZ14E471KBS						50		6500	175	400
VZ18E471KBS						80		9000	290	660
VZ20E471KBS						100		12000	350	900
VZ10E511KBS	320	420	1	459	561	25	840	3500	92	210
VZ14E511KBS						50		6500	190	350
VZ18E511KBS						80		9000	314	570
VZ18E511KBS-V						80		12000	350	570
VZ20E511KBS						100		12000	382	800
VZ20E511KBS-V						100		15000	400	800

All parts approved as follows:

UL 1449 recognized (File # E172311).

UL 1414 recognized (File # E182369).

No value recognized below 120VAC

VDE - Pending. SEV - Pending.

UL 497B recognized (File # E199593).

No voltage recognized beyond 675VDC.

CSA 22.2 #1 certified (File # LR109496-1 and LR109496-5).

No value certified below 130VAC

Metal Oxide Varistors - High Energy E Series Electrical Characteristics (continued)

Part Number	Maximum Continuous Voltage		Reference Current (mA)	Voltage at Reference Current		Maximum Clamping Voltage 8/20 μ s		Max Peak Current (8/20 μ s 1 time) (A)	Energy Surge Rating (10/1000 μ s) (joules)	Typical Capacitance (@1KHZ) (pF)
	R.M.S (V)	DC (V)		Min (V)	Max (V)	Class Current (A)	Max Voltage (V)			
VZ10E561KBS	360	470	1	522	638	25	910	3500	97	170
VZ14E561KBS						50		6500	210	320
VZ18E561KBS						80		9000	330	560
VZ20E561KBS						100		12000	420	720
VZ20E621KBS	390	505	1	558	682	100	1025	12000	430	710
VZ20E681KBS	420	560	1	612	748	100	1120	12000	435	680
VZ20E751KBS	460	615	1	675	825	100	1240	12000	440	620
VZ20E781KBS	485	640	1	702	858	100	1240	12000	450	560
VZ10E821KBS	510	675	1	738	902	25	1350	3500	110	110
VZ14E821KBS						50		6500	235	190
VZ18E821KBS						80		9000	388	310
VZ20E821KBS						100		12000	460	530
VZ20E911KBS	550	745	1	819	1001	100	1400	12000	510	440
VZ20E102KBS	625	825	1	900	1100	100	1620	12000	560	425
VZ20E112KBS	680	895	1	962	1175	100	1800	12000	620	380

All parts approved as follows:

UL 1449 recognized (File # E172311).

UL 1414 recognized (File # E182369).

No value recognized below 120VAC

VDE - Pending. SEV - Pending.

UL 497B recognized (File # E199593).

No voltage recognized beyond 675VDC.

CSA 22.2 #1 certified (File # LR109496-1 and LR109496-5).

No value certified below 130VAC

Metal Oxide Varistors - VZ25 Series Electrical Characteristics

Part Number	Maximum Continuous Voltage		Reference Current (mA)	Voltage at Reference Current		Maximum Clamping Voltage 8/20 μ s		Max Peak Current (8/20 μ s 1 time)	Energy Surge Rating (10/1000 μ s)	Typical Capacitance (@1KHZ)
	R.M.S (V)	DC (V)		Min (V)	Max (V)	Class Current (A)	Max Voltage (V)	(A)	(joules)	(pF)
VZ25D201KBS	130	175	1	185	225	100	340	18000	200	3600
VZ25D221KBS	140	180	1	198	242	100	360	18000	225	3300
VZ25D241KBS	150	200	1	216	264	100	395	18000	235	3000
VZ25D271KBS	180	230	1	255	311	100	465	18000	245	2600
VZ25D301KBS	195	250	1	270	330	100	505	18000	255	2400
VZ25D331KBS	210	275	1	297	363	100	540	18000	270	2200
VZ25D361KBS	230	300	1	324	396	100	595	18000	315	2100
VZ25D391KBS	250	330	1	351	429	100	650	18000	342	1900
VZ25D431KBS	275	370	1	387	473	100	710	18000	370	1700
VZ25D471KBS	300	385	1	423	517	100	775	18000	390	1600
VZ25D511KBS	320	420	1	459	561	100	840	18000	422	1500
VZ25D561KBS	360	470	1	522	638	100	910	18000	460	1300
VZ25D621KBS	390	505	1	558	682	100	1025	18000	495	1200
VZ25D681KBS	420	560	1	612	748	100	1120	18000	515	1100
VZ25D751KBS	460	615	1	675	825	100	1240	18000	530	1000
VZ25D781KBS	485	640	1	702	858	100	1240	18000	540	990
VZ25D821KBS	510	675	1	738	902	100	1350	18000	550	920
VZ25D911KBS	550	745	1	819	1001	100	1400	18000	600	860
VZ25D102KBS	625	825	1	900	1100	100	1620	18000	630	760
VZ25D112KBS	680	895	1	962	1175	100	1800	18000	700	690

All parts approved as follows:

UL 1449 - (File # E172311)

CSA 22.2.1 - Certified (File # LR109496-1 and LR109496-4)

Metal Oxide Varistors - VZ32 KW (Wire Lead) Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS					Tmax
	Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C	
	AC RMS Volts	DC Volts	Energy 10/1000µs Joules	Peak 8/20µs KAmps	Min Volts	Max Volts	Volts	Amps	pF	
VZ32D201KW	130	175	210	25	184	224	340	200	4700	7.5
VZ32D221KW	140	180	235	25	198	242	360	200	4300	7.5
VZ32D241KW	150	200	240	25	216	264	395	200	4000	7.5
VZ32D271KW	180	230	255	25	255	311	455	200	3500	8.5
VZ32D331KW	210	275	300	25	297	363	550	200	3000	9.0
VZ32D361KW	230	300	325	25	324	396	595	200	2800	9.0
VZ32D391KW	250	330	350	25	351	429	650	200	2500	9.0
VZ32D431KW	275	370	380	25	387	473	710	200	2200	9.0
VZ32D471KW	300	385	400	25	423	517	775	200	2000	9.7
VZ32D511KW	320	420	430	25	459	561	840	200	1900	9.7
VZ32D561KW	360	470	480	25	522	638	910	200	1700	9.7
VZ32D621KW	390	505	500	25	558	682	1025	200	1600	9.7
VZ32D681KW	420	560	525	25	612	748	1120	200	1500	9.7
VZ32D751KW	460	615	540	25	675	825	1240	200	1400	10.5
VZ32D781KW	485	640	550	25	702	858	1290	200	1300	10.5
VZ32D821KW	510	675	580	25	738	902	1355	200	1200	10.5
VZ32D911KW	550	745	620	25	819	1001	1500	200	1150	11.5
VZ32D951KW	575	765	650	25	855	1045	1570	200	1100	11.5
VZ32D102KW	625	825	680	25	900	1100	1650	200	1000	12.0
VZ32D112KW	680	895	760	25	962	1175	1815	200	900	12.0
VZ32D122KW	750	970	790	25	1062	1300	1980	200	800	13.0
VZ32D152KW	880	1150	850	25	1350	1650	2640	200	680	15.0

All parts recognized as follows:
UL1449 - (File #E172311)

Metal Oxide Varistors - VZ32 Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
	Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy	Peak					
			10/1000µs Joules	8/20µs KAmps	Min Volts	Max Volts	Volts	Amps	pF
VZ32D201□□□	130	175	210	30	185	225	340	200	4700
VZ32D221□□□	140	180	240	30	198	242	360	200	4300
VZ32D241□□□	150	200	250	30	216	264	395	200	4000
VZ32D271□□□	180	230	260	30	255	311	455	200	3500
VZ32D331□□□	210	275	310	30	297	363	550	200	3000
VZ32D361□□□	230	300	330	30	324	396	595	200	2800
VZ32D391□□□	250	330	360	30	351	429	650	200	2500
VZ32D431□□□	275	370	400	30	387	473	710	200	2200
VZ32D471□□□	300	385	405	30	423	517	775	200	2000
VZ32D511□□□	320	420	440	30	459	561	840	200	1900
VZ32D561□□□	360	470	500	30	522	638	910	200	1700
VZ32D621□□□	390	505	550	30	558	682	1025	200	1600
VZ32D681□□□	420	560	600	30	612	748	1120	200	1500
VZ32D751□□□	460	615	600	30	675	825	1240	200	1400
VZ32D781□□□	485	640	600	30	702	858	1290	200	1300
VZ32D821□□□	510	675	600	30	738	902	1355	200	1200
VZ32D911□□□	550	745	630	30	819	1001	1500	200	1150
VZ32D951□□□	575	765	660	30	855	1045	1570	200	1100
VZ32D102□□□	625	825	690	30	900	1100	1650	200	1000
VZ32D112□□□	680	895	770	30	962	1175	1815	200	900
VZ32D122□□□	750	970	810	30	1062	1300	1980	200	800

□□□ Part Number Suffix Code

(ie: VZ32D201KR)

- **K - Straight Lead**
- **KL - Straight Lead** - Left Side Lead Orientation
- **KQ - 90° Bend Lead**
- **KR - Uncoated Disk** - Without Leads
- **KF - Uncoated Disk** - With Leads
- **KN - Uncoated Disk** - With one Lead only, Right side orientation
- **KNL - Uncoated Disk** - With one Lead only, Left side orientation

UL 1449 recognized (File# E172311)

UL 1414 recognized (File# E182369) except VZ32D122

CSA 22.2 #1 certified (File# 206608MOOO)

Suffix codes KR, KF, KN and KNL are only recognized to UL1449 (File #E172311)

Metal Oxide Varistors - VZ32 Series Dimensions

Part Number	D max.	H max.	T max.	S	d	W	Dimensions: mm (inches)
VZ32D201□□□	40 (1.57)	40 (1.57)	7.5 (.30)	2.3 (.09)	5.7±1.0 (.22±.04)	1.09±0.50 (.04±.02)	Straight Leads Part Number Suffix "K" 90° Bend Leads Part Number Suffix "KQ" Uncoated Disk Part Number Suffix "KR"
VZ32D221□□□			7.5 (.30)	2.3 (.09)	5.±1.0 (.22±.04)	1.19±0.50 (.047±.02)	
VZ32D241□□□			7.5 (.30)	2.3 (.09)	5.4±1.0 (.21±.04)	1.32±0.50 (.05±.02)	
VZ32D271□□□			8.5 (.33)	2.3 (.09)	5.2±1.0 (.20±.04)	1.44±0.50 (.056±.02)	
VZ32D331□□□			9.0 (.35)	2.5 (.10)	4.8±1.0 (.19±.04)	1.78±0.50 (.07±.02)	
VZ32D361□□□			9.0 (.35)	2.9 (.11)	4.6±1.0 (.18±.04)	1.97±0.50 (.077±.02)	
VZ32D391□□□			9.0 (.35)	3.1 (.12)	4.4±1.0 (.17±.04)	2.11±0.50 (.083±.02)	
VZ32D431□□□			9.0 (.35)	3.3 (.13)	4.2±1.0 (.165±.04)	2.34±0.50 (.09±.02)	
VZ32D471□□□			9.7 (.38)	3.6 (.14)	4.2±1.0 (.165±.04)	2.53±0.50 (.1±.02)	
VZ32D511□□□			9.7 (.38)	3.9 (.15)	4.0±1.0 (.16±.04)	2.77±0.50 (.11±.02)	
VZ32D621□□□			9.7 (.38)	3.9 (.15)	3.9±1.0 (.15±.04)	3.40±0.50 (.134±.02)	
VZ32D681□□□			9.7 (.38)	4.1 (.16)	3.6±1.0 (.14±.04)	3.64±0.50 (.143±.02)	
VZ32D751□□□			10.5 (.41)	4.4 (.17)	3.3±1.0 (.13±.04)	4.11±0.50 (.16±.02)	
VZ32D781□□□			10.5 (.41)	4.5 (.18)	3.1±1.0 (.12±.04)	4.15±0.50 (.16 ±.02)	
VZ32D821□□□			10.5 (.41)	4.6 (.18)	2.9±1.0 (.11±.04)	4.47±0.50 (.176±.02)	
VZ32D911□□□			11.5 (.45)	4.6 (.18)	2.5±1.0 (.10±.04)	4.95±0.50 (.195±.02)	
VZ32D951□□□			11.5 (.45)	5.2 (.20)	2.3±1.0 (.09±.04)	5.05±0.50 (.2±.02)	
VZ32D102□□□			11.5 (.45)	5.4 (.21)	2.1±1.0 (.08±.04)	5.48±0.50 (.215±.02)	
VZ32D112□□□			11.5 (.45)	5.7 (.22)	2.1±1.0 (.08±.04)	5.96±0.50 (.23±.02)	

Metal Oxide Varistors - VZ34 Single - Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
	Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy	Peak			Volts	Amps	pF
			10/1000µs Joules	8/20µs Amps 1 time	Min Volts	Max Volts			
VZ34R201□□□	130	175	310	40000	185	225	340	300	10000
VZ34R221□□□	140	180	330	40000	198	242	360	300	9000
VZ34R241□□□	150	200	360	40000	216	264	395	300	8000
VZ34R271□□□	180	230	390	40000	255	311	455	300	7100
VZ34R301□□□	195	250	405	40000	270	330	505	300	6000
VZ34R331□□□	210	275	430	40000	297	363	540	300	4800
VZ34R361□□□	230	300	460	40000	324	396	595	300	5600
VZ34R391□□□	250	330	490	40000	351	429	650	300	5000
VZ34R431□□□	275	370	550	40000	387	473	710	300	4500
VZ34R471□□□	300	385	600	40000	423	517	775	300	4000
VZ34R511□□□	320	420	640	40000	459	561	840	300	3800
VZ34R561□□□	360	470	710	40000	522	638	910	300	2700
VZ34R621□□□	390	505	800	40000	558	682	1025	300	3300
VZ34R681□□□	420	560	910	40000	612	748	1120	300	3000
VZ34R751□□□	460	615	980	40000	675	825	1240	300	2600
VZ34R781□□□	485	640	1020	40000	702	858	1290	300	2700
VZ34R821□□□	510	675	1100	40000	738	902	1355	300	2500
VZ34R911□□□	550	745	1150	40000	819	1001	1500	300	1800
VZ34R951□□□	575	765	1200	40000	855	1045	1570	300	1700
VZ34R102□□□	625	825	1250	40000	900	1100	1650	300	1600
VZ34R112□□□	680	895	1350	40000	962	1175	1815	300	1500
VZ34R122□□□	750	970	1450	40000	1062	1300	1980	300	1300

□□□ - Part Number Suffix Code

(ie: VZ34R201KR)

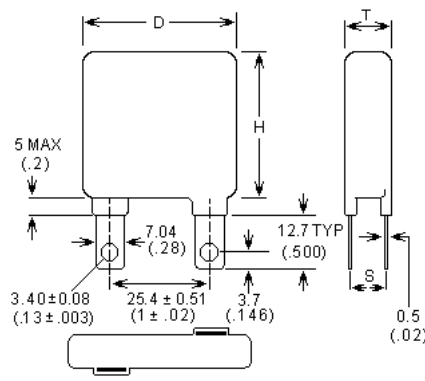
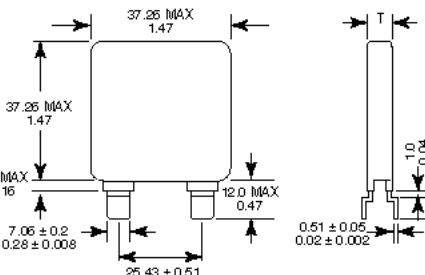
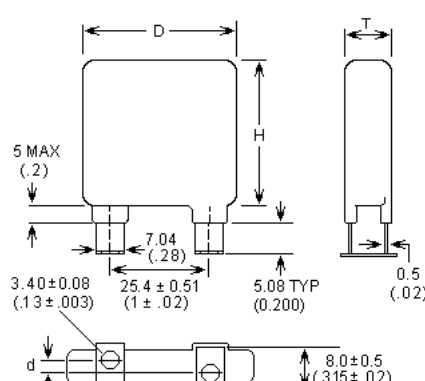
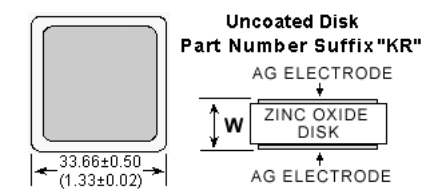
- **K - Straight Lead**
- **KA - Tab Leads Outward Crimp**
- **KL - Straight Lead - Left Side Lead Orientation**
- **KQ - 90° Bend Lead**
- **KR - Uncoated Disk - Without Leads**
- **KF - Uncoated Disk - With Leads**
- **KN - Uncoated Disk - With one Lead only, Right side orientation**
- **KNL - Uncoated Disk - With one Lead only, Left side orientation**

UL 1449 Recognized (File # E172311)

UL 1414 Pending.

CSA 22.2 #1 Certified (File # 206608M000)

Metal Oxide Varistors - VZ34 Single - Series Dimensions

Part Number	D max.	H max.	T max.	S ±1.0 (±.04)	d	W	Dimensions: mm (inches)
VZ34R201□□□	42 (1.65)	42 (1.65)	7.5 (.30)	2.5 (.10)	5.7±1.0 (.22±.04)	1.34±0.50 (.05±.02)	Straight Leads Part Number Suffix "K"  Tab Leads Outward Crimp Part Number Suffix "KA"  90° Bend Leads Part Number Suffix "KQ"  Uncoated Disk Part Number Suffix "KR" 
VZ34R221□□□			7.5 (.30)	2.5 (.10)	5.5±1.0 (.22±.04)	1.47±0.50 (.057±.02)	
VZ34R241□□□			7.5 (.30)	2.8 (.11)	5.4±1.0 (.21±.04)	1.62±0.50 (.06±.02)	
VZ34R271□□□			8.5 (.33)	2.8 (.11)	5.2±1.0 (.20±.04)	1.77±0.50 (.07±.02)	
VZ34R301□□□			9.0 (.35)	3.0 (.12)	5.0±1.0 (.20±.04)	2.00±0.50 (.078±.02)	
VZ34R331□□□			9.0 (.35)	3.1 (.12)	4.8±1.0 (.19±.04)	2.19±0.50 (.086±.02)	
VZ34R361□□□			9.0 (.35)	3.3 (.13)	4.6±1.0 (.18±.04)	2.42±0.50 (.095±.02)	
VZ34R391□□□			9.0 (.35)	3.6 (.14)	4.4±1.0 (.17±.04)	2.59±0.50 (.1±.02)	
VZ34R431□□□			9.0 (.35)	3.6 (.14)	4.2±1.0 (.17±.04)	2.88±0.50 (.11±.02)	
VZ34R471□□□			9.7 (.38)	3.8 (.15)	4.2±1.0 (.17±.04)	3.1±0.50 (.12±.02)	
VZ34R511□□□			9.7 (.38)	3.8 (.15)	4.0±1.0 (.16±.04)	3.41±0.50 (.134±.02)	
VZ34R621□□□			9.7 (.38)	4.3 (.17)	3.9±1.0 (.15±.04)	4.19±0.50 (.165±.02)	
VZ34R681□□□			9.7 (.38)	4.6 (.18)	3.6±1.0 (.14±.04)	4.49±0.50 (.177±.02)	
VZ34R751□□□			10.5 (.41)	4.8 (.19)	3.3±1.0 (.13±.04)	4.95±0.50 (.195±.02)	
VZ34R781□□□			10.5 (.41)	4.8 (.19)	3.1±1.0 (.12±.04)	5.12±0.50 (.2±.02)	
VZ34R821□□□			10.5 (.41)	5.1 (.20)	2.9±1.0 (.11±.04)	5.50±0.50 (.22±.02)	
VZ34R911□□□			11.5 (.45)	5.6 (.22)	2.5±1.0 (.10±.04)	6.09±0.50 (.24±.02)	
VZ34R951□□□			11.5 (.45)	5.6 (.22)	2.3±1.0 (.09±.04)	6.38±0.50 (.25±.02)	
VZ34R102□□□			12.0 (.47)	5.8 (.23)	2.1±1.0 (.08±.04)	6.75±0.50 (.265±.02)	
VZ34R112□□□			12.0 (.47)	6.4 (.25)	2.1±1.0 (.08±.04)	7.34±0.50 (.29±.02)	

Metal Oxide Varistors - VZ34 Dual - Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
	Continuous Rated Voltage*		Rated Single Pulse Transient		Varistor Voltage @1mA DC*		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C**
	AC RMS Volts	DC Volts	Energy*	Peak***					
			10/1000µs Joules	8/20µs Amps 1 time	Min Volts	Max Volts	Volts*	Amps	pF
VZ34R201□□□	130	175	310	40000	185	225	340	300	7900
VZ34R221□□□	140	180	330	40000	198	242	360	300	7200
VZ34R241□□□	150	200	360	40000	216	264	395	300	6600
VZ34R271□□□	180	230	390	40000	255	311	455	300	5600
VZ34R301□□□	195	250	405	40000	270	330	505	300	5200
VZ34R331□□□	210	275	430	40000	297	363	540	300	4800
VZ34R361□□□	230	300	460	40000	324	396	595	300	4400
VZ34R391□□□	250	330	490	40000	351	429	650	300	4100
VZ34R431□□□	275	370	550	40000	387	473	710	300	3800
VZ34R471□□□	300	385	600	40000	423	517	775	300	3400
VZ34R511□□□	320	420	640	40000	459	561	840	300	3200
VZ34R561□□□	360	470	710	40000	522	638	910	300	2700
VZ34R621□□□	390	505	800	40000	558	682	1025	300	2600
VZ34R681□□□	420	560	910	40000	612	748	1120	300	2400
VZ34R751□□□	460	615	980	40000	675	825	1240	300	2200
VZ34R781□□□	485	640	1020	40000	702	858	1290	300	2100
VZ34R821□□□	510	675	1100	40000	738	902	1355	300	2000
VZ34R911□□□	550	745	1150	40000	819	1001	1500	300	1800
VZ34R951□□□	575	765	1200	40000	855	1045	1570	300	1700
VZ34R102□□□	625	825	1250	40000	900	1100	1650	300	1600
VZ34R112□□□	680	895	1350	40000	962	1175	1815	300	1500
VZ34R122□□□	750	970	1450	40000	1062	1300	1980	300	1300

□□□- Part Number Suffix Code
(ie: VZ34R201KD)

Termination

- KD - Straight Lead
- KDQ - 90° Bend Lead

UL 1449 Recognized (File # E172311)

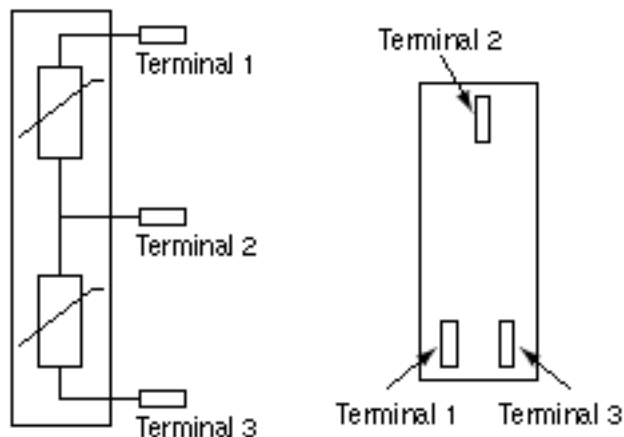
UL 1414 Pending.

CSA 22.2 #1 Certified (File # 206608M000)

* For leads 1-3, double published rating

** For leads 1-3, 50% of published rating

*** If leads 1-3 are shorted together, then the energy between 2 and (1+3) will be double the rating.



Metal Oxide Varistors - VZ34 Dual - Series Dimensions

Part Number	D max.	H max.	T max.	S	Dimensions: mm (inches)
VZ34R201□□□	42 (1.65)	42 (1.65)	9.1 (.36)	4.1±1.0 (.16±0.04)	Straight Leads Part Number Suffix "KD"
VZ34R221□□□			9.2 (.36)	4.2±1.0 (.17±0.04)	
VZ34R241□□□			9.3 (.37)	4.6±1.0 (.18±0.04)	
VZ34R271□□□			9.5 (.37)	4.8±1.0 (.19±0.04)	
VZ34R301□□□			10.5 (.41)	5.2±1.0 (.20±0.04)	
VZ34R331□□□			11.3 (.44)	5.4±1.0 (.21±0.04)	
VZ34R361□□□			11.5 (.45)	5.8±1.0 (.23±0.04)	
VZ34R391□□□			11.6 (.46)	6.2±1.0 (.24±0.04)	
VZ34R431□□□			11.9 (.47)	6.5±1.0 (.26±0.04)	
VZ34R471□□□			12.8 (.50)	6.9±1.0 (.27±0.04)	
VZ34R511□□□			13.1 (.52)	7.2±1.0 (.28±0.04)	
VZ34R621□□□			13.6 (.54)	8.2±1.0 (.32±0.04)	
VZ34R681□□□			13.9 (.55)	8.8±1.0 (.35±0.04)	
VZ34R751□□□			15.1 (.59)	9.3±1.0 (.37±0.04)	
VZ34R781□□□			15.3 (.60)	9.6±1.0 (.38±0.04)	
VZ34R821□□□			15.5 (.61)	10.1±1.0 (.40±0.04)	
VZ34R911□□□			17.0 (.67)	11.1±1.0 (.44±0.04)	
VZ34R951□□□			17.2 (.68)	11.3±1.0 (.44±0.04)	
VZ34R102□□□			18.0 (.71)	11.8±1.0 (.46±0.04)	
VZ34R112□□□			18.6 (.73)	13.0±1.0 (.51±0.04)	
					90° Bend Leads Part Number Suffix "KDQ"

Metal Oxide Varistors - VZ40 Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
	Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy	Peak					
			10/1000µs Joules	8/20µs KAmps	Min Volts	Max Volts	Volts	Amps	pF
VZ40D201□□□	130	175	310	40	185	225	340	300	10000
VZ40D221□□□	140	180	330	40	198	242	360	300	9000
VZ40D241□□□	150	200	360	40	216	264	395	300	8000
VZ40D271□□□	180	230	390	40	255	311	455	300	7100
VZ40D331□□□	210	275	460	40	297	363	550	300	6000
VZ40D361□□□	230	300	475	40	324	396	595	300	5600
VZ40D391□□□	250	330	490	40	351	429	650	300	5000
VZ40D431□□□	275	370	550	40	387	473	710	300	4500
VZ40D471□□□	300	385	600	40	423	517	775	300	4000
VZ40D511□□□	320	420	640	40	459	561	840	300	3800
VZ40D561□□□	360	470	710	40	522	638	910	300	3700
VZ40D621□□□	390	505	800	40	558	682	1025	300	3300
VZ40D681□□□	420	560	910	40	612	748	1120	300	3000
VZ40D751□□□	460	615	910	40	675	825	1240	300	2600
VZ40D781□□□	485	640	910	40	702	858	1290	300	2500
VZ40D821□□□	510	675	910	40	738	902	1355	300	2300
VZ40D911□□□	550	745	960	40	819	1001	1500	300	2200
VZ40D951□□□	575	765	1000	40	855	1045	1570	300	2000
VZ40D102□□□	625	825	1055	40	900	1100	1650	300	1900
VZ40D112□□□	680	895	1155	40	962	1175	1815	300	1800
VZ40D122□□□	750	970	1450	40	1062	1300	1980	300	1300

□□□ Part Number Suffix Code

(ie: VZ40D201KR)

- **K - Straight Lead**
- **KL - Straight Lead** - Left Side Lead Orientation
- **KQ - 90° Bend Lead**
- **KR - Uncoated Disk** - Without Leads
- **KF - Uncoated Disk** - With Leads
- **KN - Uncoated Disk** - With one Lead only, Right side orientation
- **KNL - Uncoated Disk** - With one Lead only, Left side orientation

UL 1449 recognized (File# E172311)

UL 1414 recognized (File# E182369) except VZ40D122

CSA 22.2 #1 certified (File# 206608MOOO)

Approvals not applicable for uncoated disk product.

Metal Oxide Varistors - VZ40 Series Dimensions

Part Number	D max.	H max.	T max.	S	d	W	Dimensions: mm (inches)
VZ40D201□□□	48 (1.89)	48 (1.89)	7.5 (.30)	2.3 (.09)	5.7±1.0 (.22±.04)	1.13±0.50 (.044±.02)	Straight Leads Part Number Suffix "K" 90° Bend Leads Part Number Suffix "KQ" Uncoated Disk Part Number Suffix "KR"
VZ40D221□□□			7.5 (.30)	2.3 (.09)	5.5±1.0 (.22±.04)	1.24±0.50 (.049±.02)	
VZ40D241□□□			7.5 (.30)	2.5 (.10)	5.4±1.0 (.21±.04)	1.38±0.50 (.054±.02)	
VZ40D271□□□			8.5 (.33)	2.9 (.11)	5.2±1.0 (.20±.04)	1.50±0.50 (.06±.02)	
VZ40D331□□□			9.0 (.35)	3.1 (.12)	4.8±1.0 (.19±.04)	1.86±0.50 (.073±.02)	
VZ40D361□□□			9.0 (.35)	3.3 (.13)	4.6±1.0 (.18±.04)	2.06±0.50 (.08±.02)	
VZ40D391□□□			9.0 (.35)	3.6 (.14)	4.4±1.0 (.17±.04)	2.2 ±0.50 (.087±.02)	
VZ40D431□□□			9.0 (.35)	3.9 (.15)	4.2±1.0 (.165±.04)	2.44±0.50 (.096±.02)	
VZ40D471□□□			9.7 (.38)	3.9 (.15)	4.2±1.0 (.165±.04)	2.64±0.50 (.104±.02)	
VZ40D511□□□			9.7 (.38)	4.1 (.16)	4.0±1.0 (.16±.04)	2.89±0.50 (.113±.02)	
VZ40D621□□□			9.7 (.38)	4.4 (.17)	3.9±1.0 (.15±.04)	3.55±0.50 (.14±.02)	
VZ40D681□□□			9.7 (.38)	4.5 (.18)	3.6±1.0 (.14±.04)	3.81±0.50 (.15±.02)	
VZ40D751□□□			10.5 (.41)	4.6 (.18)	3.3±1.0 (.13±.04)	4.19±0.50 (.165±.02)	
VZ40D781□□□			10.5 (.41)	4.6 (.18)	3.1±1.0 (.12±.04)	4.34±0.50 (.17±.02)	
VZ40D821□□□			10.5 (.41)	5.2 (.20)	2.9±1.0 (.11±.04)	4.67±0.50 (.184±.02)	
VZ40D911□□□			11.5 (.45)	5.4 (.21)	2.5±1.0 (.10±.04)	5.1± 0.50 (.2±.02)	
VZ40D951□□□			11.5 (.45)	5.4 (.21)	2.3±1.0 (.09±.04)	5.28±0.50 (.21±.02)	
VZ40D102□□□			11.5 (.45)	5.7 (.22)	2.1±1.0 (.08±.04)	5.72±0.50 (.225±.02)	
VZ40D112□□□			11.5 (.45)	5.7 (.22)	2.1±1.0 (.08±.04)	6.22±0.50 (.24±.02)	

Metal Oxide Varistors - VZ53 Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
	Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy	Peak					
			10/1000µs Joules	8/20µs KAmps	Min Volts	Max Volts	Volts	Amps	pF
VZ53D201□□□	130	175	490	70	185	225	340	500	18000
VZ53D221□□□	140	180	530	70	198	242	360	500	16000
VZ53D241□□□	150	200	570	70	216	264	395	500	14000
VZ53D271□□□	180	230	630	70	255	311	455	500	12500
VZ53D331□□□	210	275	680	70	297	363	550	500	11500
VZ53D361□□□	230	300	730	70	324	396	595	500	10000
VZ53D391□□□	250	330	880	70	351	429	650	500	8800
VZ53D431□□□	275	370	950	70	387	473	710	500	8000
VZ53D471□□□	300	385	1000	70	423	517	775	500	7200
VZ53D511□□□	320	420	1100	70	459	561	840	500	6600
VZ53D561□□□	360	430	1200	70	522	638	910	500	6400
VZ53D621□□□	390	505	1300	70	558	682	1025	500	6200
VZ53D681□□□	420	560	1500	70	612	748	1120	500	5300
VZ53D751□□□	460	615	1600	70	675	825	1240	500	5000
VZ53D781□□□	485	640	1650	70	702	858	1290	500	4800
VZ53D821□□□	510	675	1800	70	738	902	1355	500	4400
VZ53D911□□□	550	745	2000	70	819	1001	1500	500	4100
VZ53D951□□□	575	765	2100	70	855	1045	1570	500	4000
VZ53D102□□□	625	825	2200	70	900	1100	1650	500	3700
VZ53D112□□□	680	895	2500	70	962	1175	1815	500	3300
VZ53D122□□□	750	970	2700	70	1062	1300	1980	500	3400

□□□- Part Number Suffix Code
(ie: VZ53D201KR)

- **K - Straight Lead**
- **KL - Straight Lead - Left Side Lead Orientation**
- **KQ - 90° Bend Lead**
- **KR - Uncoated Disk - Without Leads**
- **KF - Uncoated Disk - With Leads**
- **KN - Uncoated Disk - With one Lead only, Right side orientation**
- **KNL - Uncoated Disk - With one Lead only, Left side orientation**

UL 1449 Recognized (File # E172311)

UL 1414 Pending.

CSA 22.2 #1 Certified (File # 206608M000)

Approvals not applicable for uncoated disk product.

Metal Oxide Varistors - VZ53 Series Dimensions

PartNumber	D max.	H max.	T max.	S	d	W	Dimensions: mm (inches)
VZ53D201□□□	61 (2.4)	61 (2.4)	7.5 (.30)	2.3 (.09)	5.7±1.0 (.22±.04)	1.41±0.50 (.056±.02)	Straight Leads Part Number Suffix "K" 90° Bend Leads Part Number Suffix "KQ" Uncoated Disk Part Number Suffix "KR" AG ELECTRODE ZINC OXIDE DISK AG ELECTRODE
VZ53D221□□□			7.5 (.30)	2.3 (.09)	5.5±1.0 (.22±.04)	1.55±0.50 (.061±.02)	
VZ53D241□□□			7.5 (.30)	2.5 (.10)	5.4±1.0 (.21±.04)	1.72±0.50 (.068±.02)	
VZ53D271□□□			8.5 (.33)	2.9 (.11)	5.2±1.0 (.20±.04)	1.87±0.50 (.074±.02)	
VZ53D331□□□			9.0 (.35)	3.1 (.12)	4.8±1.0 (.19±.04)	2.32±0.50 (.091±.02)	
VZ53D361□□□			9.0 (.35)	3.3 (.13)	4.6±1.0 (.18±.04)	2.56±0.50 (.1±.02)	
VZ53D391□□□			9.0 (.35)	3.6 (.14)	4.4±1.0 (.17±.04)	2.74±0.50 (.108±.02)	
VZ53D431□□□			9.0 (.35)	3.9 (.15)	4.2±1.0 (.165±.04)	3.05±0.50 (.12±.02)	
VZ53D471□□□			9.7 (.38)	3.9 (.15)	4.2±1.0 (.165±.04)	3.29±0.50 (.13±.02)	
VZ53D511□□□			9.7 (.38)	4.1 (.16)	4.0±1.0 (.16±.04)	3.60±0.50 (.14±.02)	
VZ53D621□□□			9.7 (.38)	4.4 (.17)	3.9±1.0 (.15±.04)	4.43±0.50 (.174±.02)	
VZ53D681□□□			9.7 (.38)	4.5 (.18)	3.6±1.0 (.14±.04)	4.74±0.50 (.187±.02)	
VZ53D751□□□			10.5 (.41)	4.6 (.18)	3.3±1.0 (.13±.04)	5.23±0.50 (.206±.02)	
VZ53D781□□□			10.5 (.41)	4.6 (.18)	3.1±1.0 (.12±.04)	5.41±0.50 (.21±.02)	
VZ53D821□□□			10.5 (.41)	5.2 (.20)	2.9±1.0 (.11±.04)	5.82±0.50 (.23±.02)	
VZ53D911□□□			11.5 (.45)	5.4 (.21)	2.5±1.0 (.10±.04)	6.44±0.50 (.25±.02)	
VZ53D951□□□			11.5 (.45)	5.4 (.21)	2.3±1.0 (.09±.04)	6.74±0.50 (.265±.02)	
VZ53D102□□□			11.5 (.45)	5.7 (.22)	2.1±1.0 (.08±.04)	7.13±0.50 (.28±.02)	
VZ53D112□□□			11.5 (.45)	5.7 (.22)	2.1±1.0 (.08±.04)	7.76±0.50 (.306±.02)	
VZ53D122□□□			11.68 (.46)	5.7 (.22)	2.1±1.0 (.08±.04)	8.49±0.50 (.334±.02)	

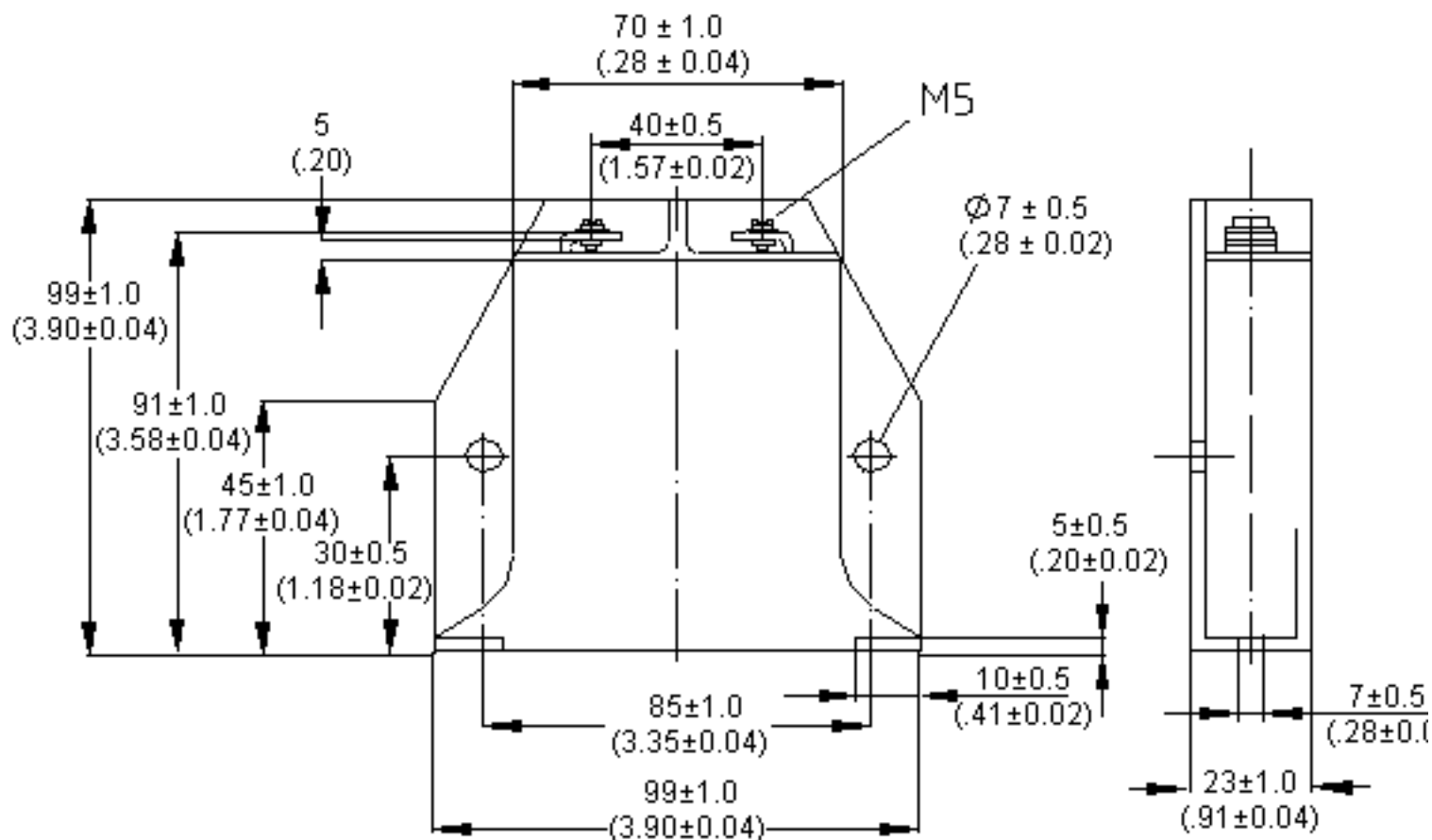
Metal Oxide Varistors - VZ60 Series Electrical Characteristics

Part Number	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
	Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @1mA DC		Maximum Clamping Voltage @Test Current 8/20µs		Typical Capacitance @1KHZ 25°C
	AC RMS Volts	DC Volts	Energy	Peak			Volts	Amps	pF
			10/1000µs Joules	8/20µs KAmps	Min Volts	Max Volts			
VZ60B201K	130	175	490	70	185	225	340	500	15000
VZ60B221K	140	180	530	70	198	242	365	500	13250
VZ60B241K	150	200	570	70	216	264	395	500	12500
VZ60B271K	180	230	630	70	255	311	455	500	11000
VZ60B301K	195	250	650	70	270	330	500	500	10000
VZ60B331K	210	275	680	70	297	363	550	500	9000
VZ60B361K	230	300	730	70	324	396	595	500	8500
VZ60B391K	250	330	880	70	351	429	650	500	7500
VZ60B431K	275	370	950	70	387	473	710	500	7000
VZ60B471K	300	385	1000	70	423	517	775	500	6500
VZ60B511K	320	420	1100	70	459	561	845	500	6000
VZ60B561K	360	470	1200	70	522	638	920	500	5500
VZ60B621K	390	505	1300	70	558	682	1025	500	5000
VZ60B681K	420	560	1500	70	612	748	1120	500	4500
VZ60B751K	460	615	1600	70	675	825	1240	500	4300
VZ60B781K	485	640	1650	70	702	858	1290	500	4000
VZ60B821K	510	675	1800	70	738	902	1355	500	3900
VZ60B911K	550	745	2000	70	819	1001	1500	500	3300
VZ60B102K	625	825	2200	70	900	1100	1650	500	3000
VZ60B112K	680	895	2500	70	962	1175	1815	500	2700

UL and CSA Pending.

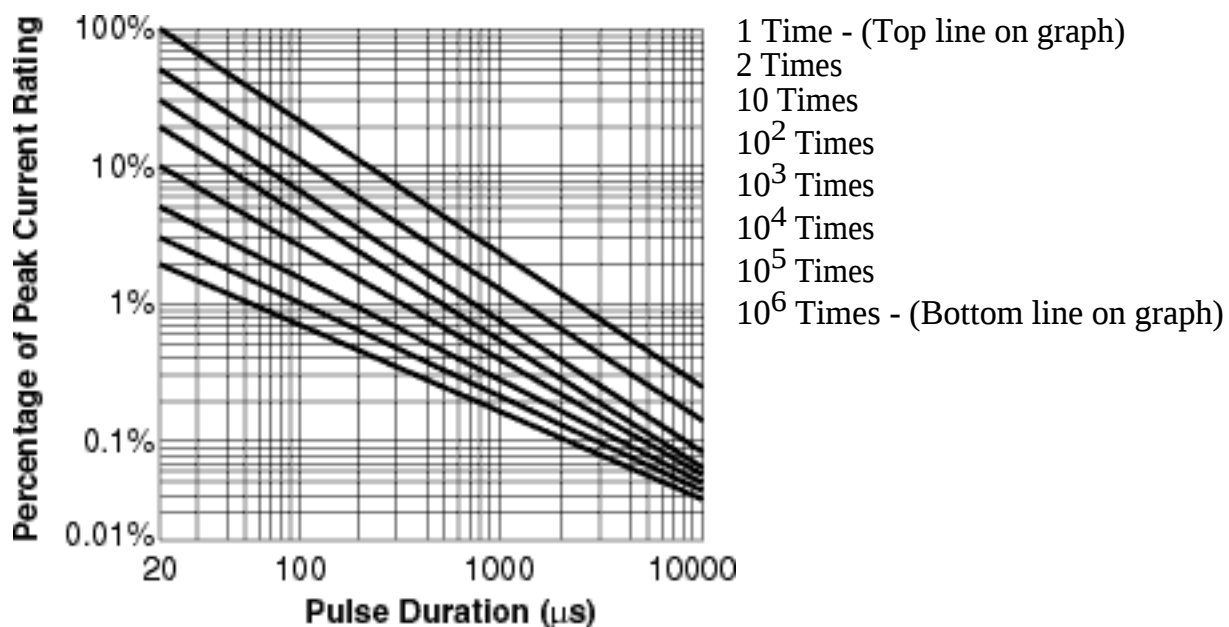
Metal Oxide Varistors - VZ60 Series Dimensions

mm (inches)

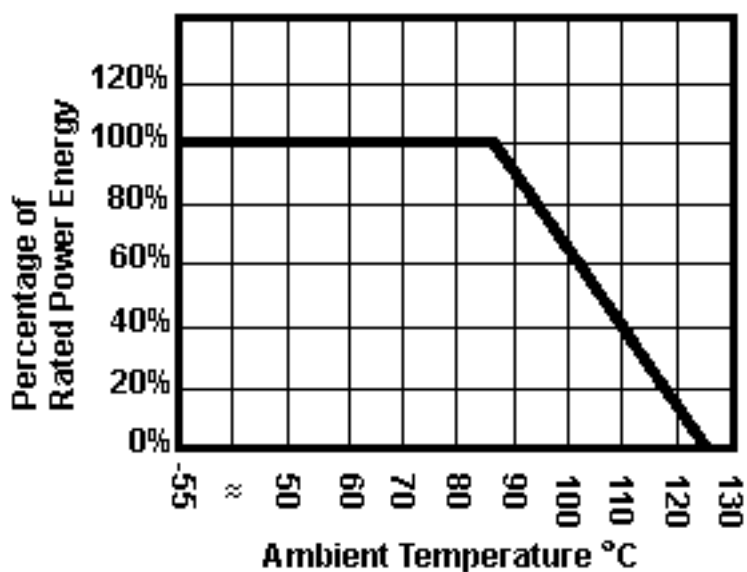


Metal Oxide Varistors - Peak Pulse and Derating Curves

Peak Current Per Pulse Versus Pulse Duration



Temperature Derating Curve Power and Energy Rating vs. Temperature

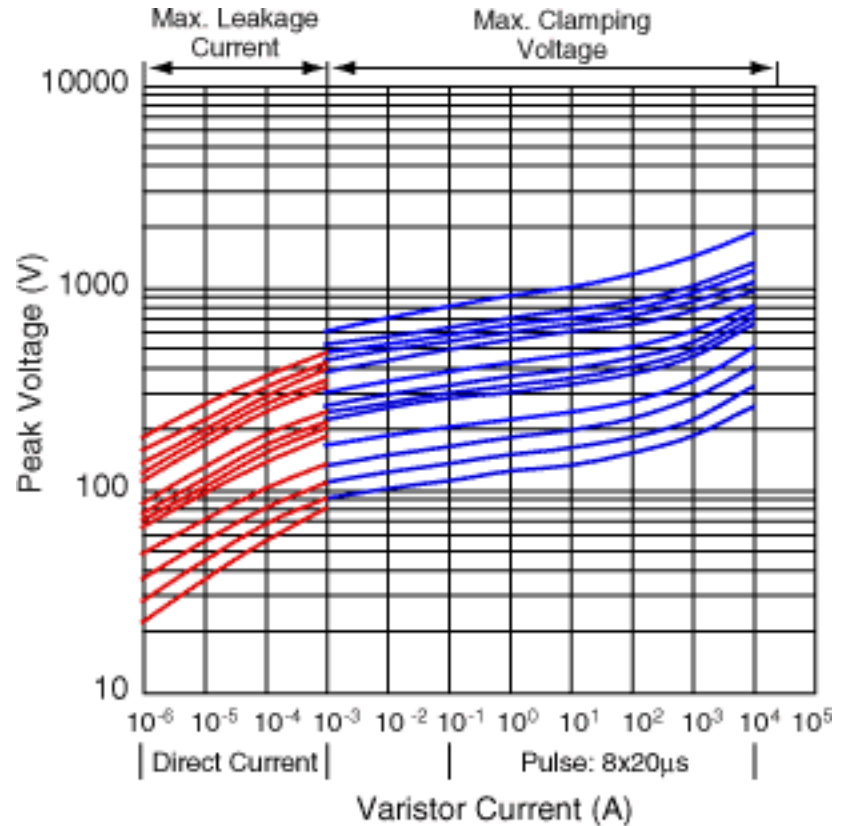


Metal Oxide Varistors - V-I Characteristics

5mm Disc Size

VZ05D561K - (Top line on graph)
VZ05D471K
VZ05D431K
VZ05D391K
VZ05D361K
VZ05D271K
VZ05D241K
VZ05D221K
VZ05D201K
VZ05D151K
VZ05D121K
VZ05D101K
VZ05D820K - (Bottom line on graph)

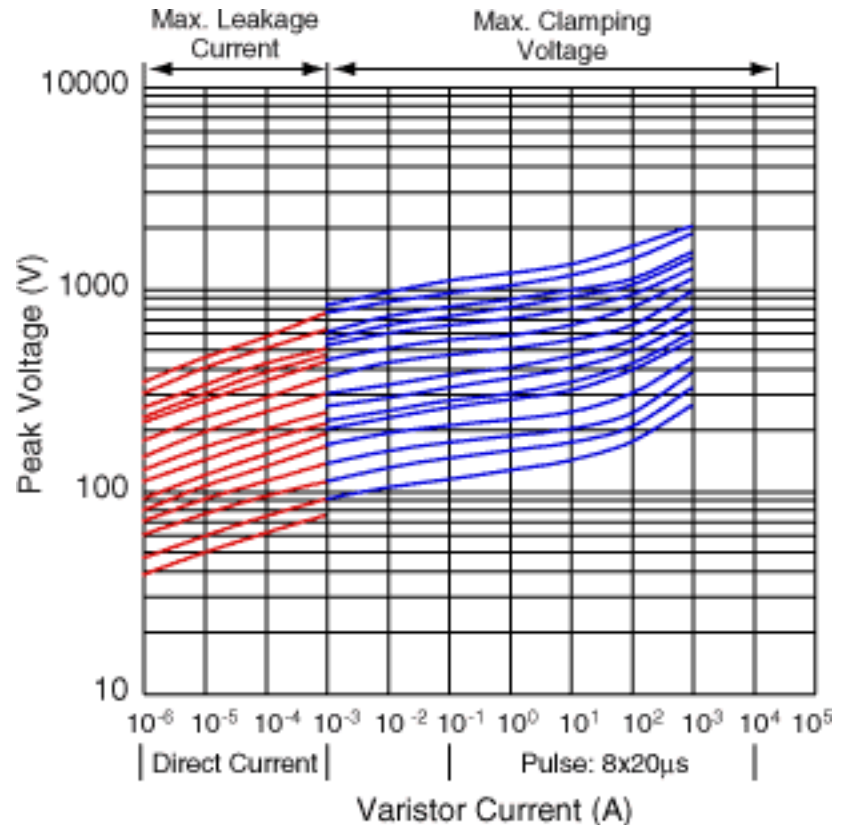
(Also applies to “E” series parts)



7mm Disc Size

VZ07D681K - (Top line on graph)
VZ07D621K
VZ07D561K
VZ07D511K
VZ07D471K
VZ07D391K
VZ07D331K
VZ07D271K
VZ07D241K
VZ07D201K
VZ07D181K
VZ07D151K
VZ07D121K
VZ07D101K
VZ07D820K - (Bottom line on graph)

(Also applies to “E” series parts)



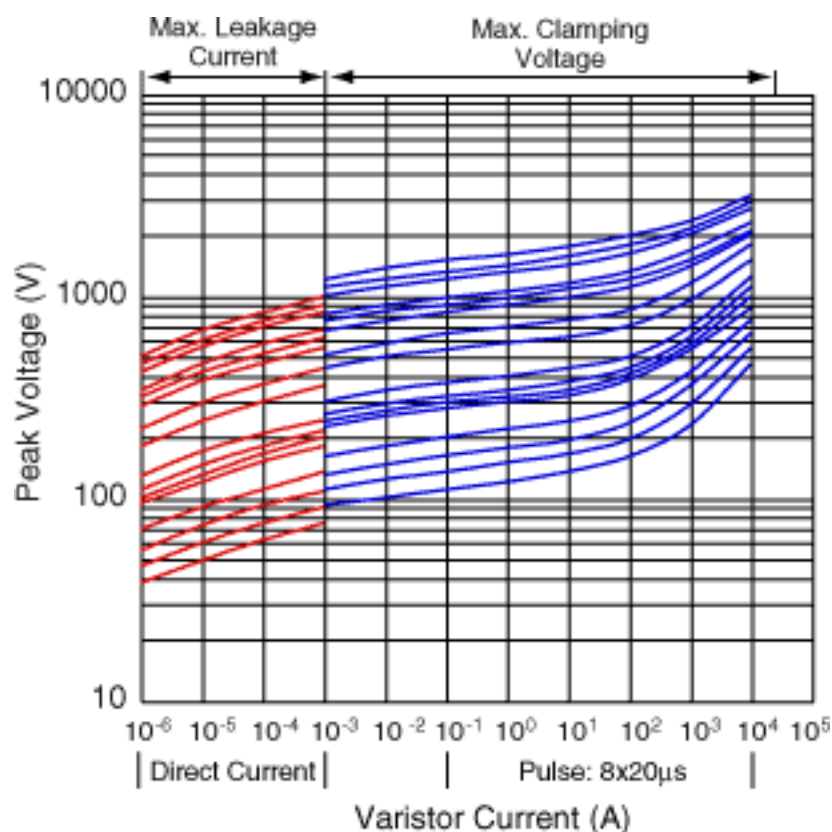
At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Metal Oxide Varistors - V-I Characteristics - (continued)

10mm Disc Size

VZ10D112K - (Top line on graph)
VZ10D102K
VZ10D911K
VZ10D751K
VZ10D681K
VZ10D621K
VZ10D471K
VZ10D391K
VZ10D271K
VZ10D241K
VZ10D221K
VZ10D201K
VZ10D151K
VZ10D121K
VZ10D101K
VZ10D820K - (Bottom line on graph)

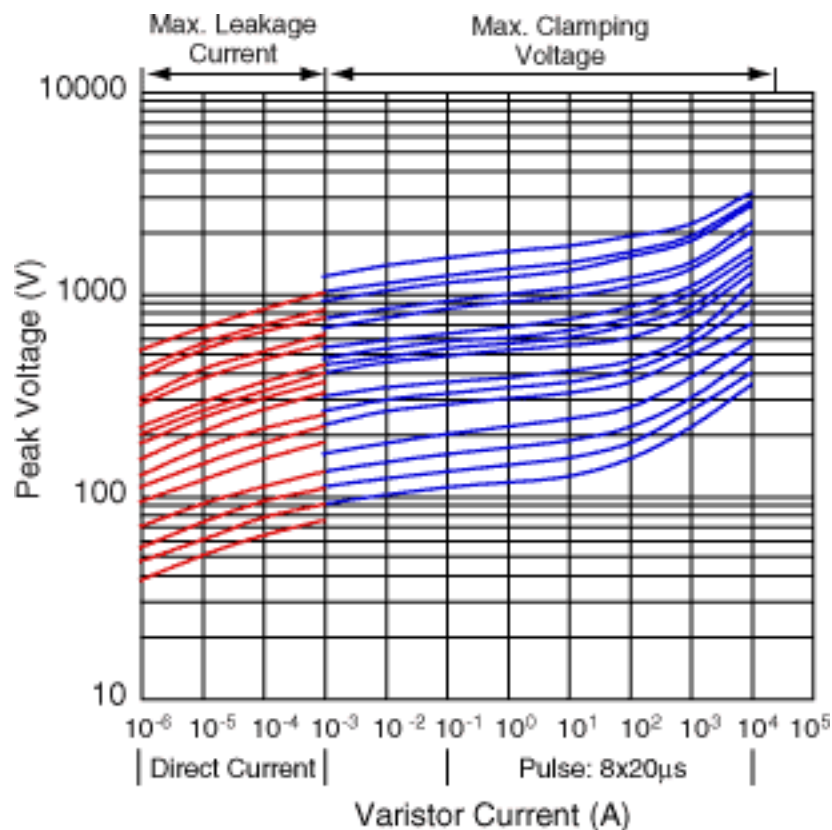
(Also applies to “E” series parts)



14mm Disc Size

VZ14D112K - (Top line on graph)
VZ14D911K
VZ14D821K
VZ14D681K
VZ14D621K
VZ14D471K
VZ14D431K
VZ14D391K
VZ14D361K
VZ14D271K
VZ14D241K
VZ14D201K
VZ14D151K
VZ14D121K
VZ14D101K
VZ14D820K - (Bottom line on graph)

(Also applies to “E” series parts)



At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Metal Oxide Varistors - V-I Characteristics - (continued)

18mm Disc Size

VZ18E951K - (Top line on graph)

VZ18E911K

VZ18E821K

VZ18E751K

VZ18E681K

VZ18E621K

VZ18E511K

VZ18E471K

VZ18E431K

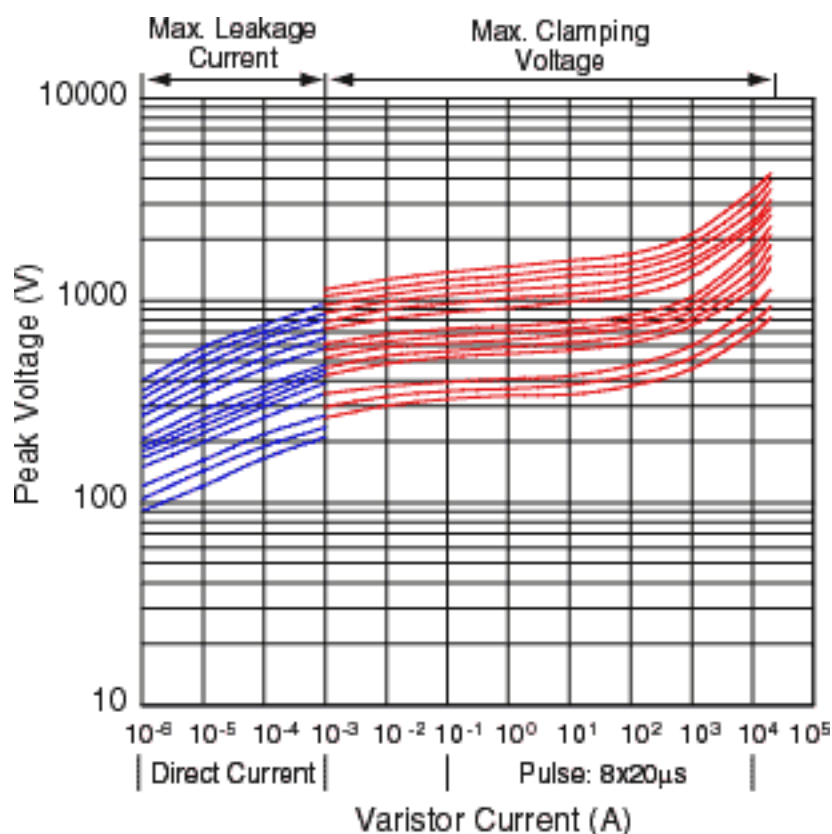
VZ18E391K

VZ18E361K

VZ18E271K

VZ18E241K

VZ18E201K - (Bottom line on graph)



20mm Disc Size

VZ20D112K - (Top line on graph)

VZ20D911K

VZ20D821K

VZ20D681K

VZ20D471K

VZ20D431K

VZ20D391K

VZ20D271K

VZ20D241K

VZ20D221K

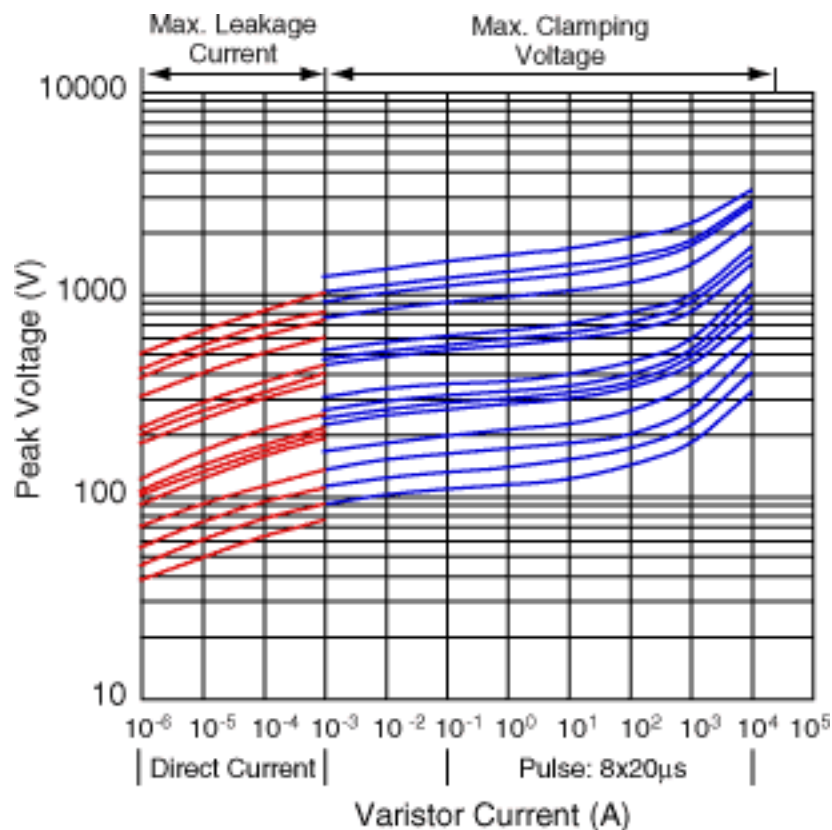
VZ20D201K

VZ20D151K

VZ20D121K

VZ20D101K

VZ20D820K - (Bottom line on graph)



(Also applies to "E" series parts)

At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Metal Oxide Varistors - V-I Characteristics - (continued)

25mm Disc Size

VZ25D951K - (Top line on graph)

VZ25D911K

VZ25D821K

VZ25D751K

VZ25D681K

VZ25D621K

VZ25D511K

VZ25D471K

VZ25D431K

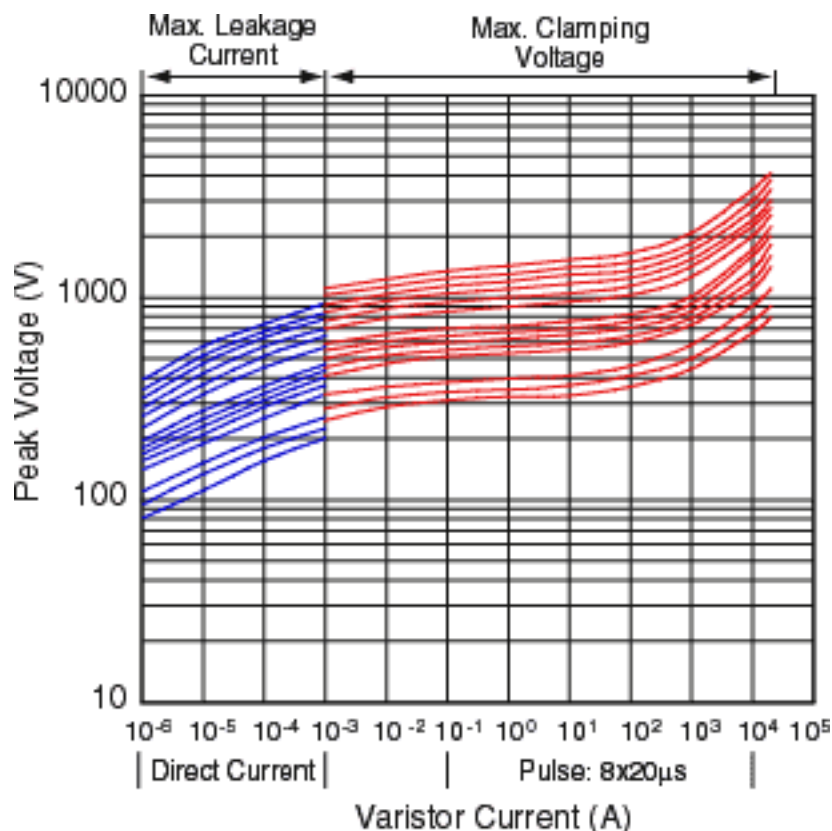
VZ25D391K

VZ25D361K

VZ25D271K

VZ25D241K

VZ25D201K - (Bottom line on graph)



32mm Disc Size

VZ32D951K - (Top line on graph)

VZ32D911K

VZ32D821K

VZ32D751K

VZ32D681K

VZ32D621K

VZ32D511K

VZ32D471K

VZ32D431K

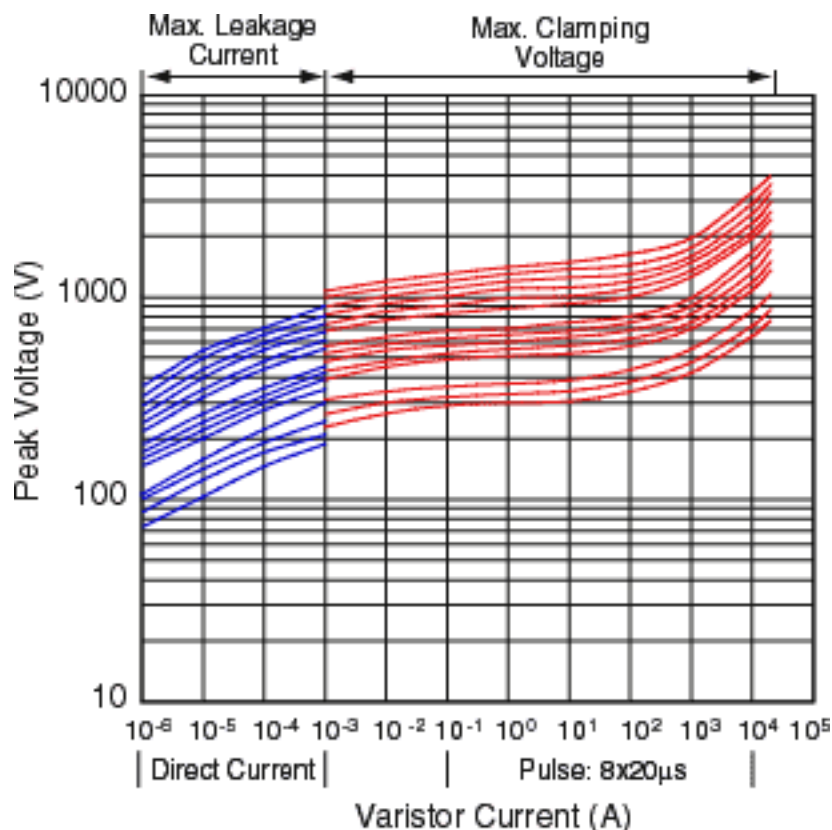
VZ32D391K

VZ32D361K

VZ32D271K

VZ32D241K

VZ32D201K - (Bottom line on graph)



At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Metal Oxide Varistors - V-I Characteristics - (continued)

34mm Disc Size

VZ34D951K - (Top line on graph)

VZ34D911K

VZ34D821K

VZ34D751K

VZ34D681K

VZ34D621K

VZ34D511K

VZ34D471K

VZ34D431K

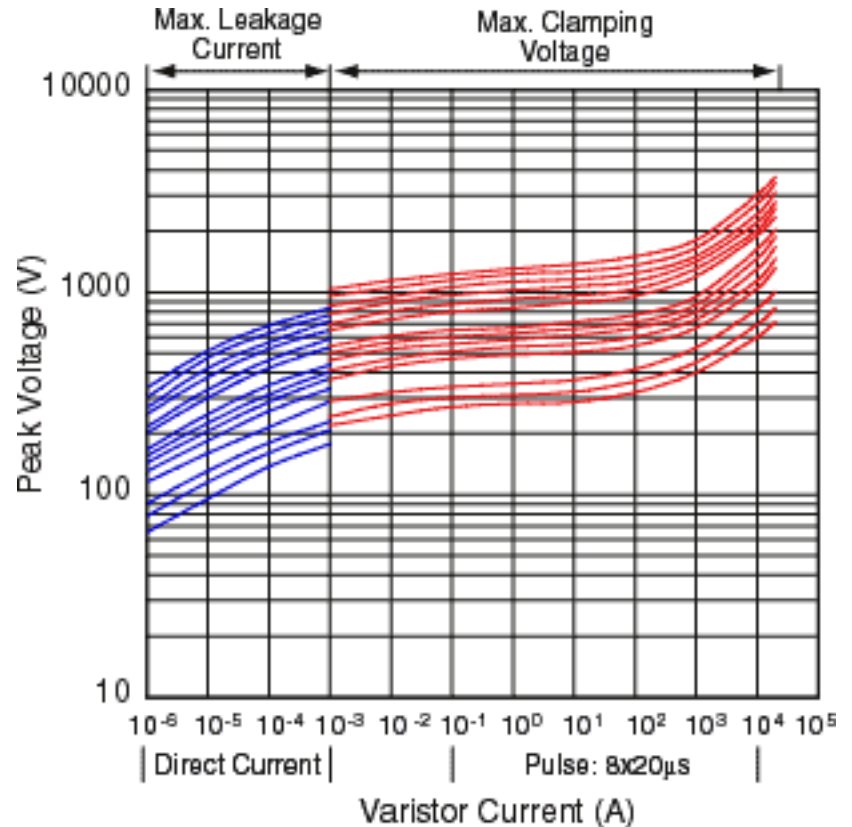
VZ34D391K

VZ34D361K

VZ34D271K

VZ34D241K

VZ32D201K - (Bottom line on graph)



40mm Disc Size

VZ40D951K - (Top line on graph)

VZ40D911K

VZ40D821K

VZ40D751K

VZ40D681K

VZ40D621K

VZ40D511K

VZ40D471K

VZ40D431K

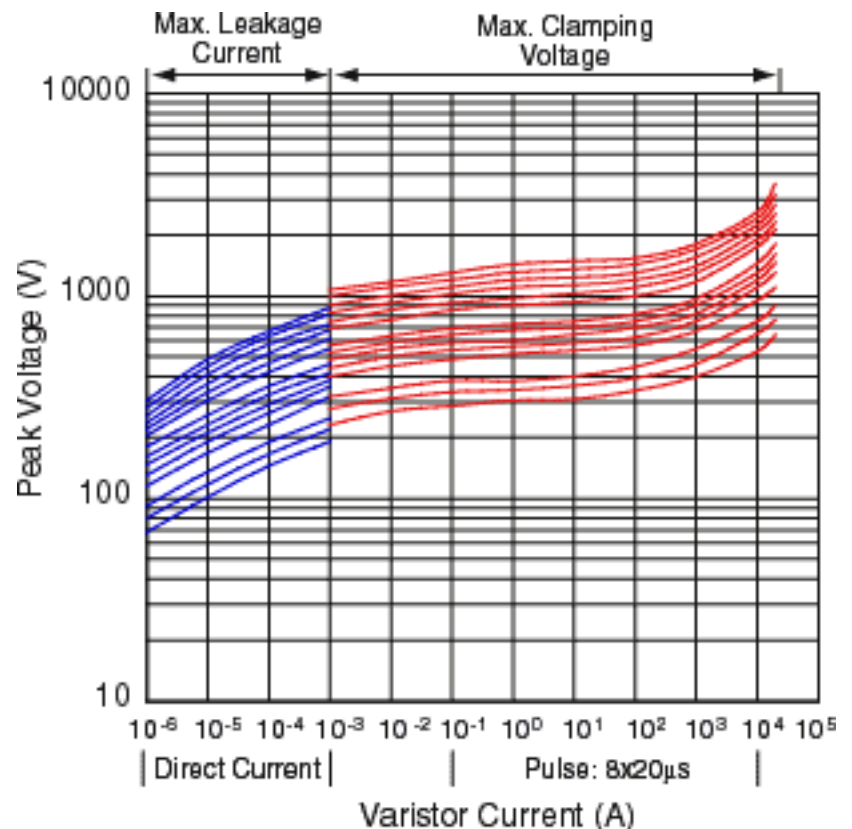
VZ40D391K

VZ40D361K

VZ40D271K

VZ40D241K

VZ40D201K - (Bottom line on graph)



At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Metal Oxide Varistors - V-I Characteristics - (continued)

53mm Disc Size

VZ53D951K - (Top line on graph)

VZ53D911K

VZ53D821K

VZ53D751K

VZ53D681K

VZ53D621K

VZ53D511K

VZ53D471K

VZ53D431K

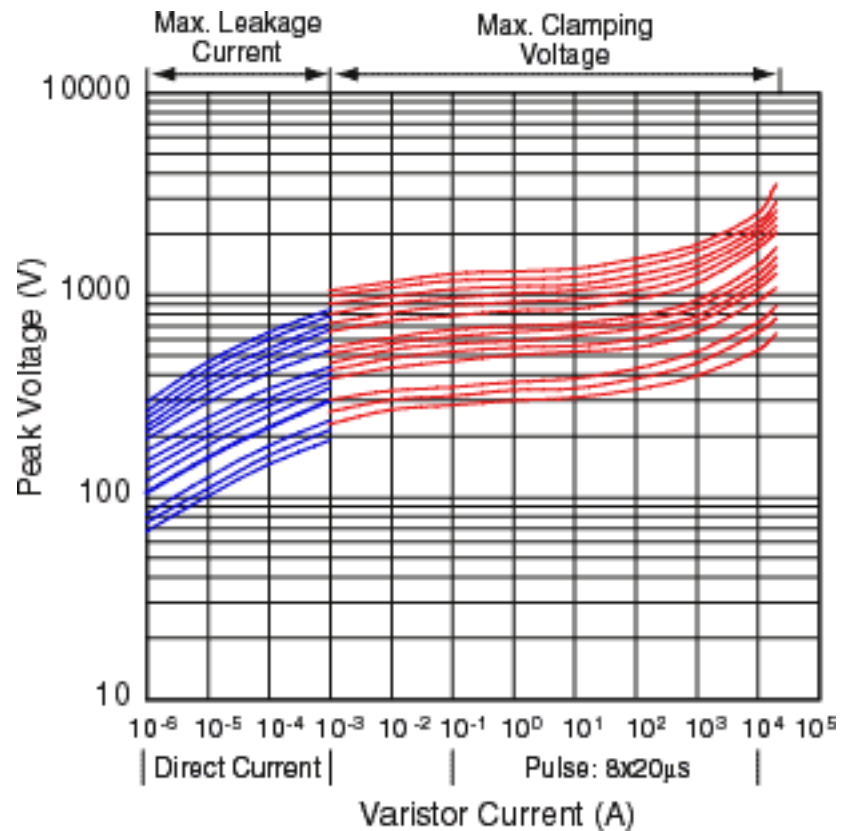
VZ53D391K

VZ53D361K

VZ53D271K

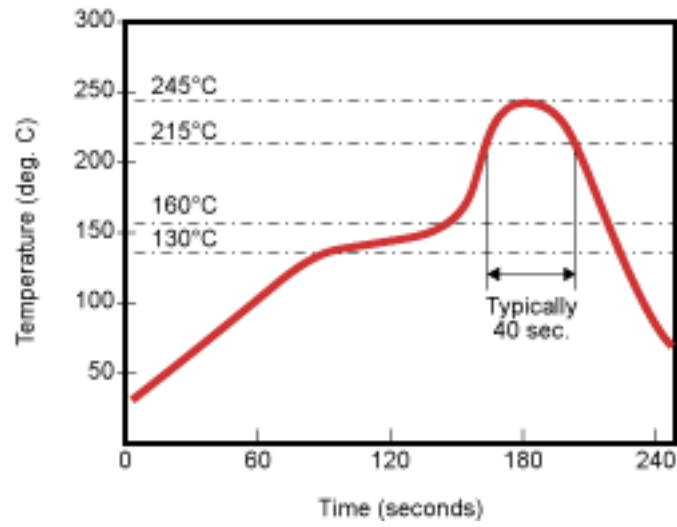
VZ53D241K

VZ53D201K - (Bottom line on graph)



At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Metal Oxide Varistors - Soldering Profile



Metal Oxide Varistors - 5mm / 7mm Taping Specifications

Item	Symbol	5mm Disc Size		7mm Disc Size	
		T11, T1	T17, T3, T1D, T14, T1W, T32	T11, T1	T17, T3, T1D, T14, T1W, T32
Body Diameter	D	7 max	7 max	9.5 max	9.5 max
Lead Wire Diameter	d	0.6 ± 0.02	0.6 ± 0.02	0.6 ± 0.02	0.6 ± 0.02
Pitch of Component	P	12.7 ± 1	12.7 ± 1	12.7 ± 1	12.7 ± 1
Feed Hole Pitch	P0	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3
Feed Hole Center to Lead	P1	3.85 ± 0.7	3.85 ± 0.7	3.85 ± 0.7	3.85 ± 0.7
Lead to Lead Distance (Center to Center)	F	5 ± 0.8	5 ± 0.8	5 ± 0.8	5 ± 0.8
Component Alignment	Δ h	2.0 max	2.0 max	2.0 max	2.0 max
Basepaper Tape Width	W	18 +1/-0.5	18 +1/-0.5	18 +1/-0.5	18 +1/-0.5
Adhesive Tape Width	W0	10 min	10 min	10 min	10 min
Hole Position	W1	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5
Adhesive Tape Border	W2	3 max	3 max	3 max	3 max
Component Height	H1	30 max	30 max	32 max	32 max
Lead-Wire Clinch Height	H0	--	16 ± 0.5	--	16 ± 0.5
Lead-Wire Protrusion	Lx	1.0 max	1.0 max	1.0 max	1.0 max
Feed Hole Diameter	D0	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2
Total Tape Thickness	t	»0.7 max	»0.7 max	»0.7 max	»0.7 max
Length of Clipped Lead	L	11 max	11 max	11 max	11 max
Component Height from Seating Plane	A	--	13 max	--	15 max
Hole Center to Component Center	P2	6.35 ± .7	6.35 ± .7	6.35 ± .7	6.35 ± .7

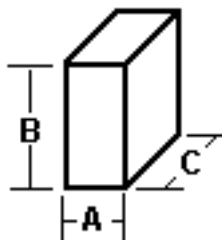
All dimensions are in Millimeters.

Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel)

Adhesive Tape Thickness = 0.16mm ± 0.03mm

Largest voltage which can be taped is 420VAC. For 320VAC and larger, only T1W or T32 is available

Ammo Box



5mm and 7mm Disc Size, (T11, T17, T1D, T1W)

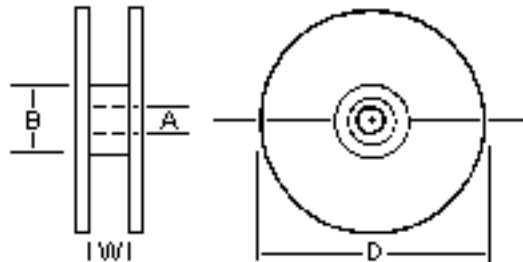
A = 50 max, B = 300 max, C = 340 max

2,000 pieces (5^ø)

≤ 250VAC = 1,500 pieces (7^ø)

> 250VAC = 1,000 pieces (7^ø)

Reel



5mm and 7mm Disc Size, (T1, T3, T14, T32)

W = Approximately 50, D = 350^ømax, A = Approximately 30^ø

B = Approximately 95^ø

2,000 pieces (5^ø)

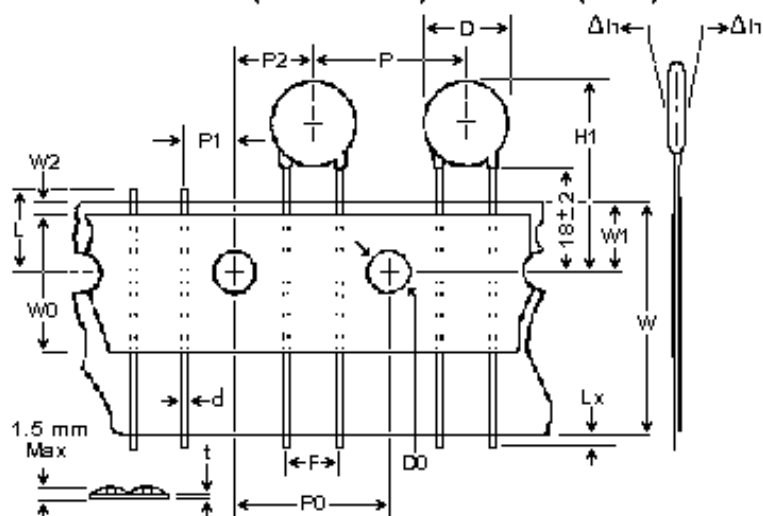
≤ 250VAC = 1,500 pieces (7^ø)

> 250VAC = 1,000 pieces (7^ø)

Metal Oxide Varistors - 5mm / 7mm Taping Specifications - (continued)

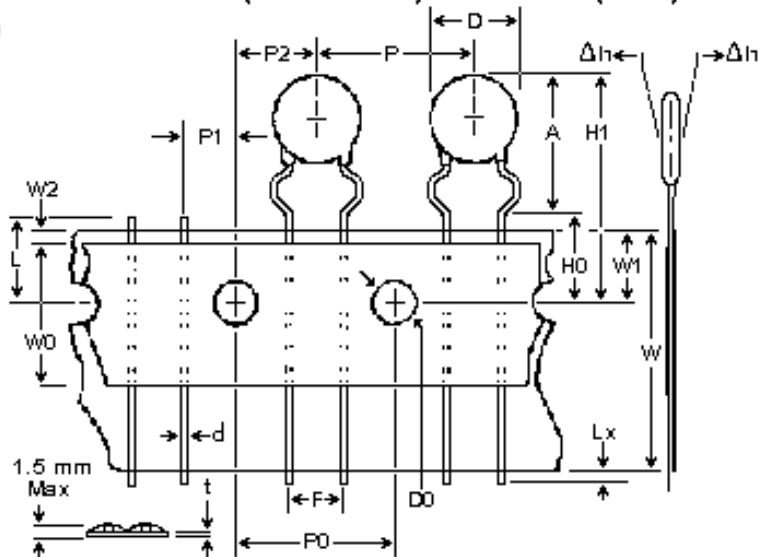
Straight Leads

T11 (Ammo Box) T1 (Reel)



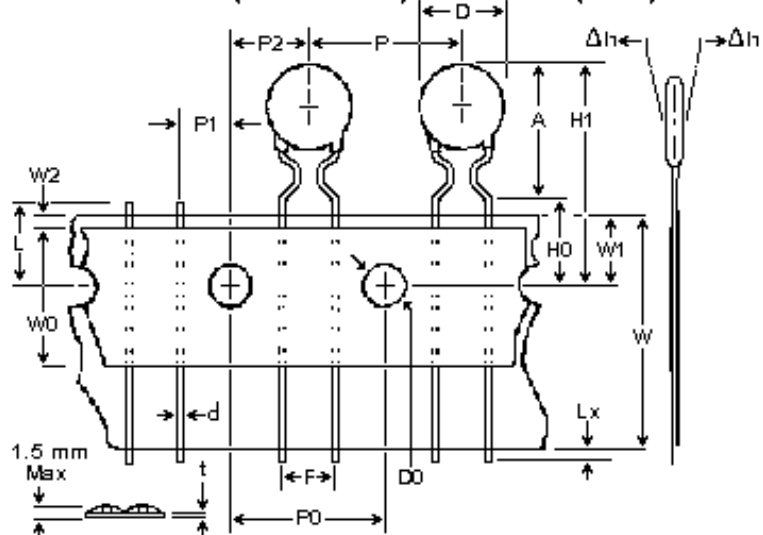
Outward Crimp

T17 (Ammo Box) T3 (Reel)



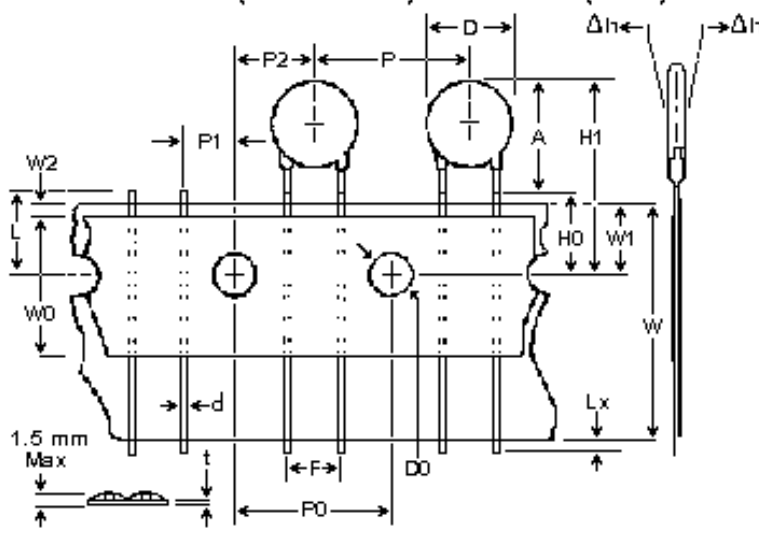
Inward Crimp

T1D (Ammo Box) T14 (Reel)



Inline Crimp

T1W (Ammo Box) T32 (Reel)



Based on EIA-468-B Specifications.

Metal Oxide Varistors - 10mm Taping Specifications

Item	Symbol	Straight Leads		Outward Crimp		Inline Crimp		Inward Crimp	
		T36, T19	T7, T18	T1U, T1N	T10, T26	T43, T4	T15, T38	T8, T16	T6, T12
Body Diameter	D	12.5 max	12.5 max	12.5 max	12.5 max	12.5 max	12.5 max	12.5 max	12.5 max
Lead Wire Diameter	d	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06
Pitch of Component	P	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1
Feed Hole Pitch	P0	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3
Feed Hole Center to Lead	P1		3.85 ± 0.7		3.85 ± 0.7		3.85 ± 0.7		3.85 ± 0.7
Lead to Lead Distance (Center to Center)	F	7.5 ± 0.8	5.0 ± 0.8	7.5 ± 0.8	5.0 ± 0.8	7.5 ± 0.8	5.0 ± 0.8	7.5 ± 0.8	5.0 ± 0.8
Component Alignment	Δ h	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max
Basepaper Tape Width	W	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5
Adhesive Tape Width	W0	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min
Hole Position	W1	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5
Adhesive Tape Border	W2	3 max	3 max	3 max	3 max	3 max	3 max	3 max	3 max
Component Height	H1	33 max	33 max	38.5 max	38.5 max	35.5 max	38.5 max	38.5 max	38.5 max
Lead-Wire Protrusion	Lx	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max
Feed Hole Diameter	D0	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2
Total Tape Thickness	t	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max
Length of Clipped Lead	L	11 max	11 max	11 max	11 max	11 max	11 max	11 max	11 max
Component Height from Seating Plane	A	--	--	19.5 max	19.5 max	19.5 max	19.5 max	19.5 max	19.5 max
Hole Center to Component Center	P2		6.35 ± 0.7		6.35 ± 0.7		6.35 ± 0.7		6.35 ± 0.7

All dimensions are in Millimeters.

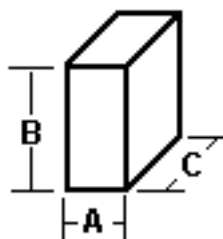
Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel)

Adhesive Tape Thickness = 0.16mm ± 0.03mm

Largest voltage which can be taped is 460VAC. For 320VAC and larger, only T15, T43, T38 or T4 is available

Metal Oxide Varistors - 10mm Taping Specifications - (continued)

Ammo Box



Ammo Box Taping Codes
(T7, T36, T15, T43, T1U, T10, T8, T6)

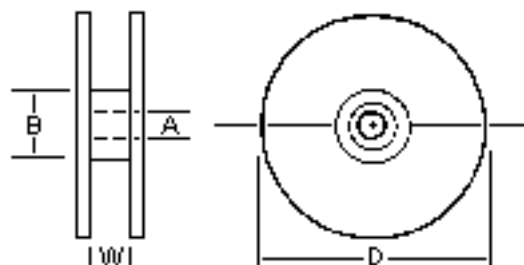
A = 65 max
B = 250 max
C = 340 max

< 300VAC = 500 to 1,000 pieces

> 300VAC = 300 pieces

All dimensions are in Millimeters.

Reel



Reel Taping Codes
(T19, T18, T4, T38, T26, T1N, T16, T12)

W = Approximately 50

D = 350^Ømax

A = Approximately 30^Ø

B = Approximately 95^Ø

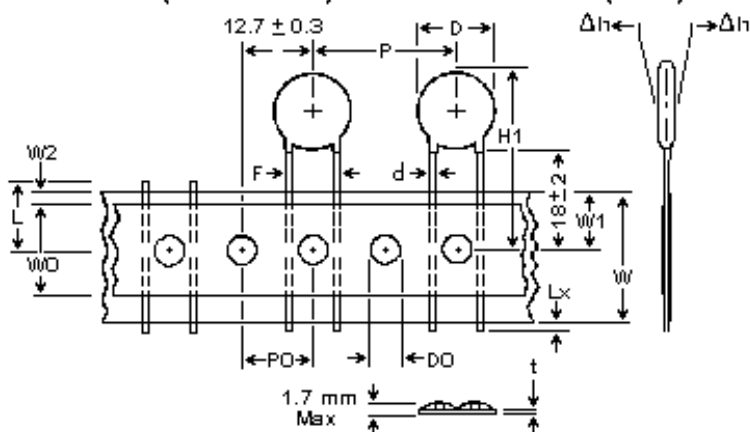
< 300VAC = 500 to 1,000 pieces

> 300VAC = 300 pieces

Straight Leads

T36 (Ammo Box)

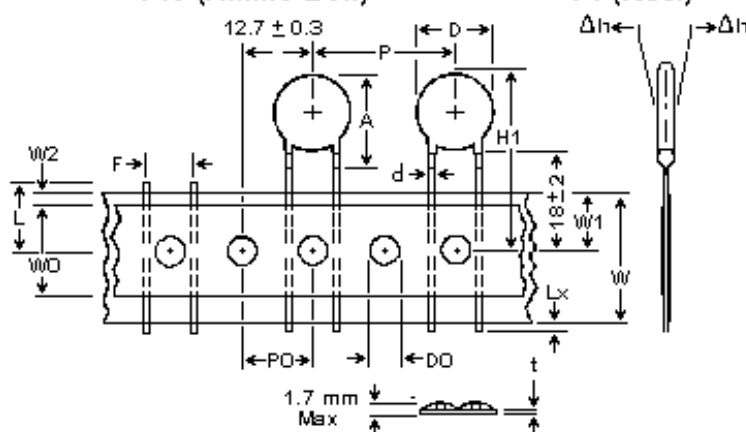
T19 (Reel)



Inline Crimp

T43 (Ammo Box)

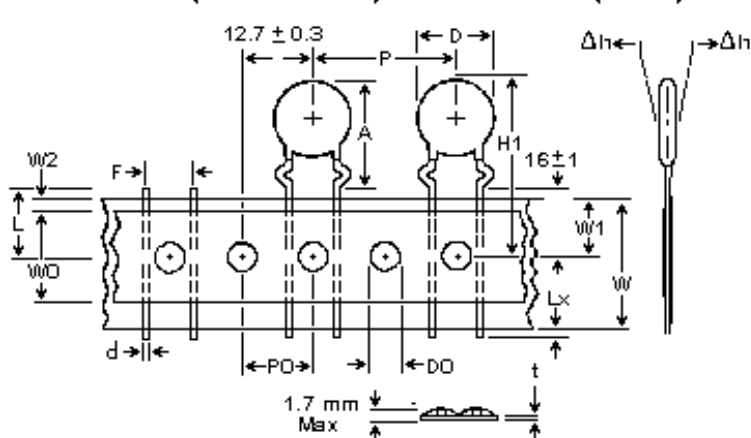
T4 (Reel)



Outward Crimp

T1U (Ammo Box)

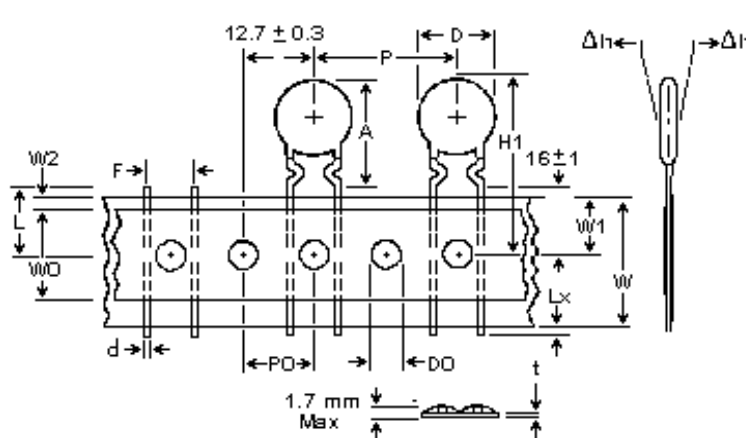
T1N (Reel)



Inward Crimp

T8 (Ammo Box)

T16 (Reel)

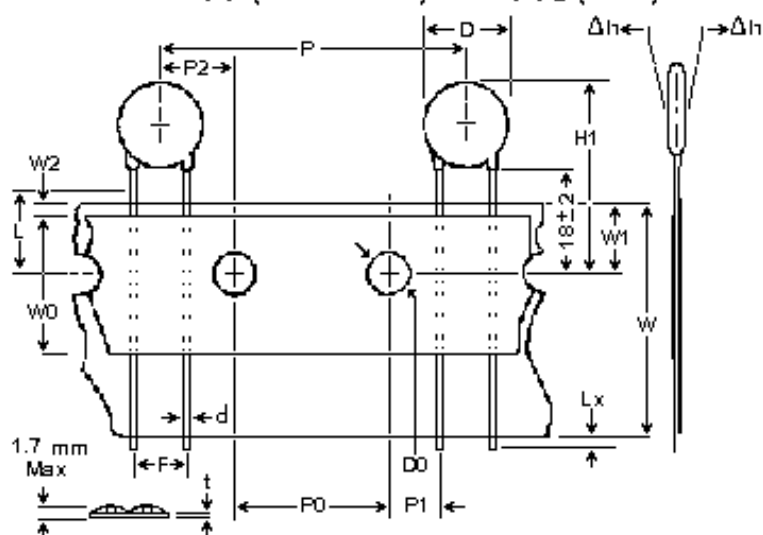


Based on EIA-468-B Specifications.

Metal Oxide Varistors - 10mm Taping Specifications - (continued)

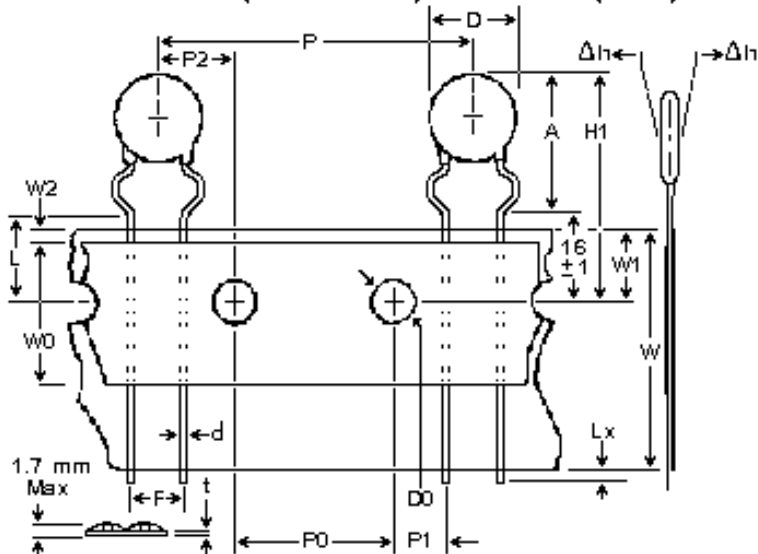
Straight Leads

T7 (Ammo Box) T18 (Reel)



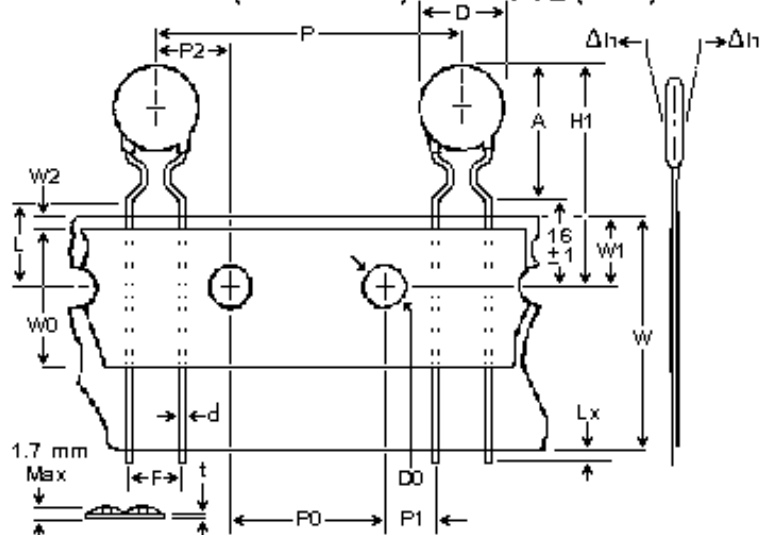
Outward Crimp

T10 (Ammo Box) T26 (Reel)



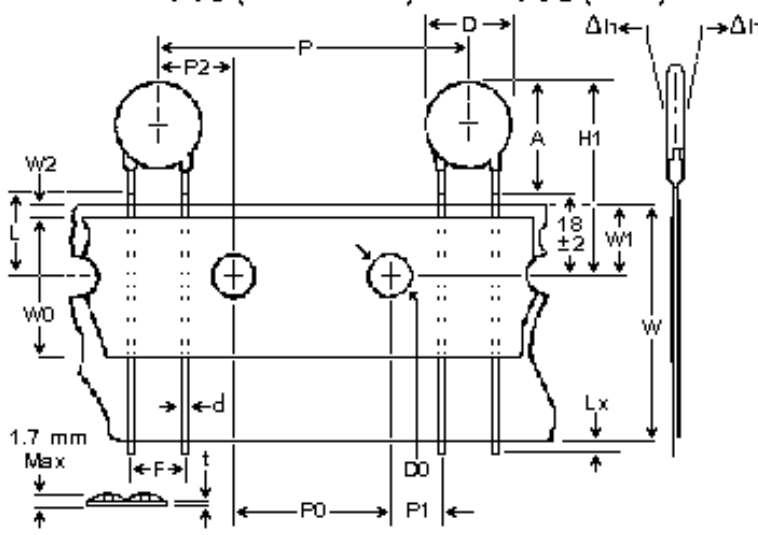
Inward Crimp

T6 (Ammo Box) T12 (Reel)



Inline Crimp

T15 (Ammo Box) T38 (Reel)



Based on EIA-468-B Specifications.

Metal Oxide Varistors - 14mm Taping Specifications

Item	Symbol	Straight Leads		Outward Crimp		Inline Crimp		Inward Crimp	
		T36, T19	T7, T18	T1U, T1N	T10, T26	T43, T4	T15, T38	T8, T16	T6, T12
Body Diameter	D	16.5 max	16.5 max	16.5 max	16.5 max	16.5 max	16.5 max	16.5 max	16.5 max
Lead Wire Diameter	d	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06	0.8 ± 0.06
Pitch of Component	P	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1
Feed Hole Pitch	P0	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3
Feed Hole Center to Lead	P1		3.85 ± 0.7		3.85 ± 0.7		3.85 ± 0.7		3.85 ± 0.7
Lead to Lead Distance (Center to Center)	F	7.5 ± 0.8	5.0 ± 0.8	7.5 ± 0.8	5.0 ± 0.8	7.5 ± 0.8	5.0 ± 0.8	7.5 ± 0.8	5.0 ± 0.8
Component Alignment	 h	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max
Basepaper Tape Width	W	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5	18 +1/- 0.5
Adhesive Tape Width	W0	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min
Hole Position	W1	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5
Adhesive Tape Border	W2	3 max	3 max	3 max	3 max	3 max	3 max	3 max	3 max
Component Height	H1	37 max	37 max	40 max	40 max	40 max	40 max	40 max	40 max
Lead-Wire Protrusion	Lx	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max
Feed Hole Diameter	D0	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2
Total Tape Thickness	t	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max
Length of Clipped Lead	L	11 max	11 max	11 max	11 max	11 max	11 max	11 max	11 max
Component Height from Seating Plane	A	--	--	22.5 max	22.5 max	22.5 max	22.5 max	22.5 max	22.5 max
Hole Center to Component Center	P2		6.35 ± 0.7		6.35 ± 0.7		6.35 ± 0.7		6.35 ± 0.7

All dimensions are in Millimeters.

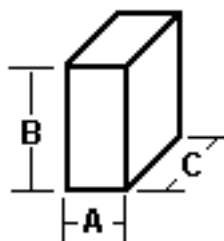
Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel)

Adhesive Tape Thickness = 0.16mm ± 0.03mm

Largest voltage which can be taped is 460VAC. For 320VAC and larger, only T15, T43, T38 or T4 is available

Metal Oxide Varistors - 14mm Taping Specifications - (continued)

Ammo Box

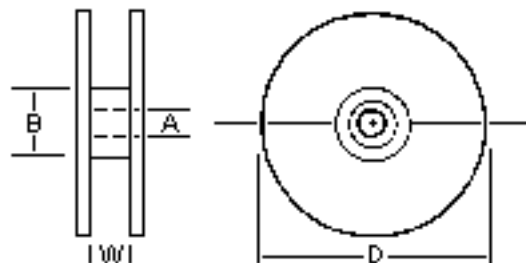


Ammo Box Taping Codes
(T7, T36, T15, T43, T1U, T10, T8, T6)

A = 65 max
B = 250 max
C = 340 max

< 300VAC = 500 to 1,000 pieces
≥ 300VAC = 300 pieces

Reel



Reel Taping Codes
(T19, T18, T4, T38, T26, T1N, T16, T12)

W = Approximately 50

D = 350^Ømax

A = Approximately 30^Ø

B = Approximately 95^Ø

< 300VAC = 500 to 1,000 pieces

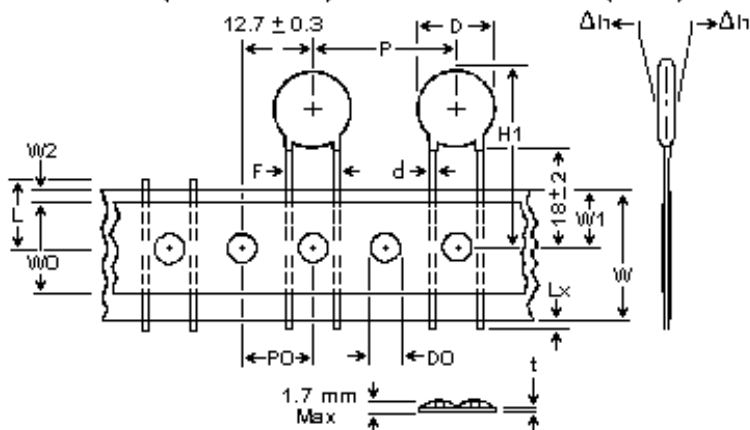
≥ 300VAC = 300 pieces

All dimensions are in Millimeters.

Straight Leads

T36 (Ammo Box)

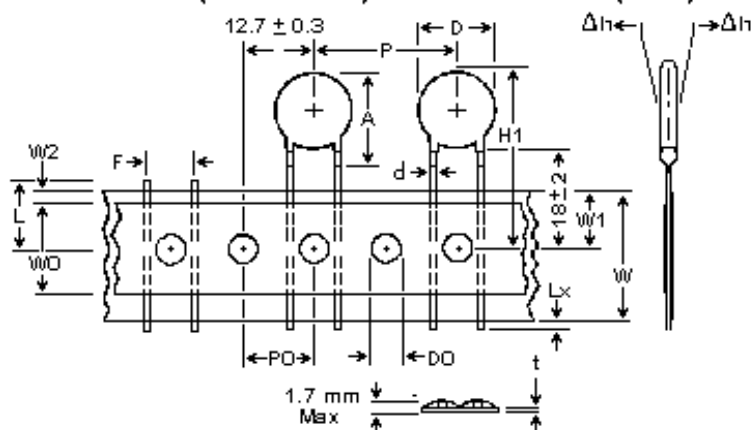
T19 (Reel)



Inline Crimp

T43 (Ammo Box)

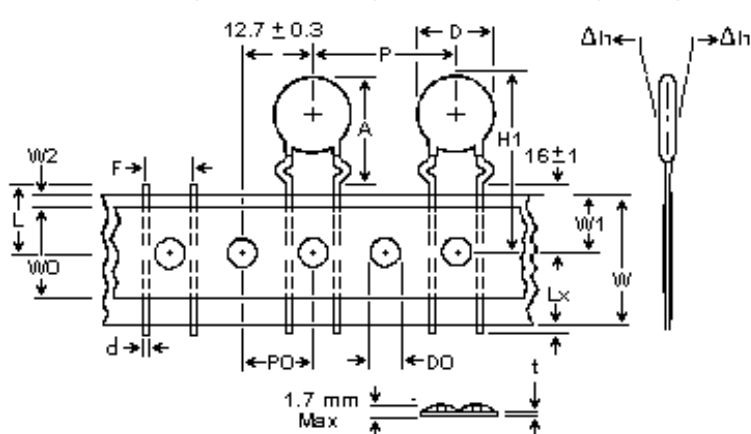
T4 (Reel)



Outward Crimp

T1U (Ammo Box)

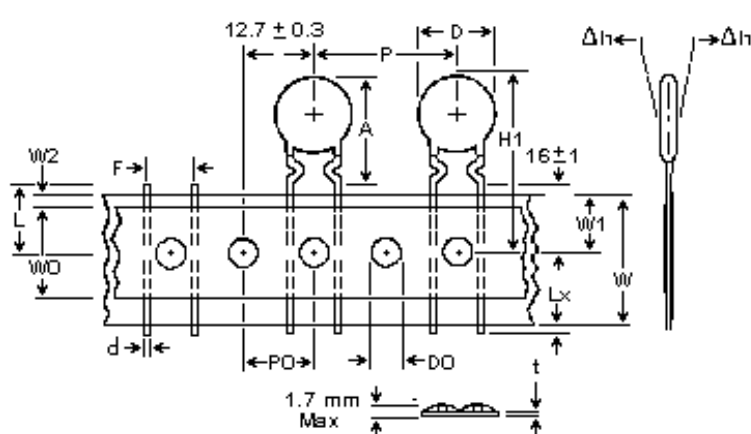
T1N (Reel)



Inward Crimp

T8 (Ammo Box)

T16 (Reel)

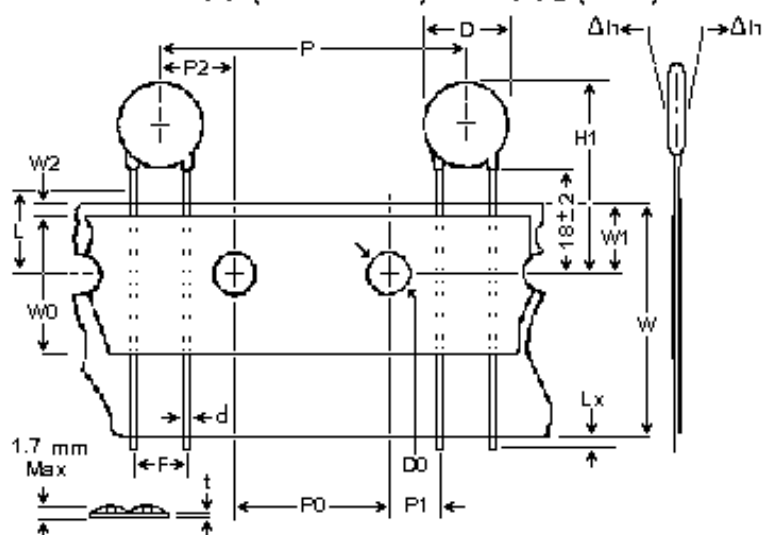


Based on EIA-468-B Specifications.

Metal Oxide Varistors - 14mm Taping Specifications - (continued)

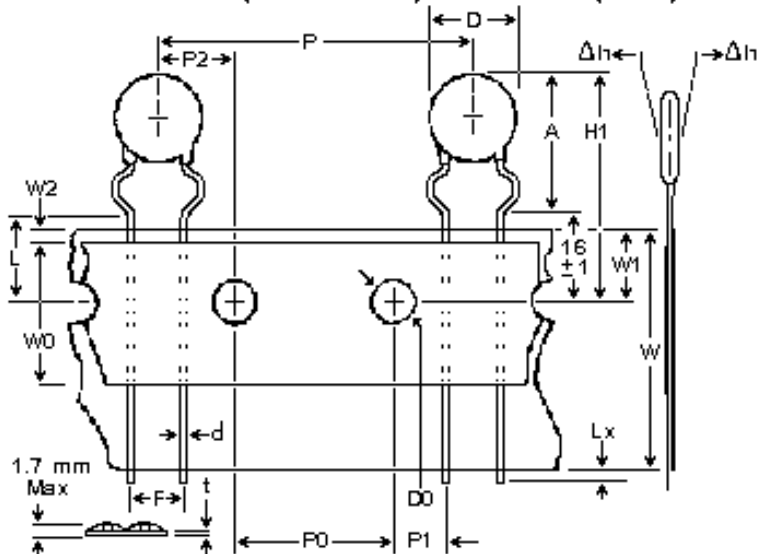
Straight Leads

T7 (Ammo Box) T18 (Reel)



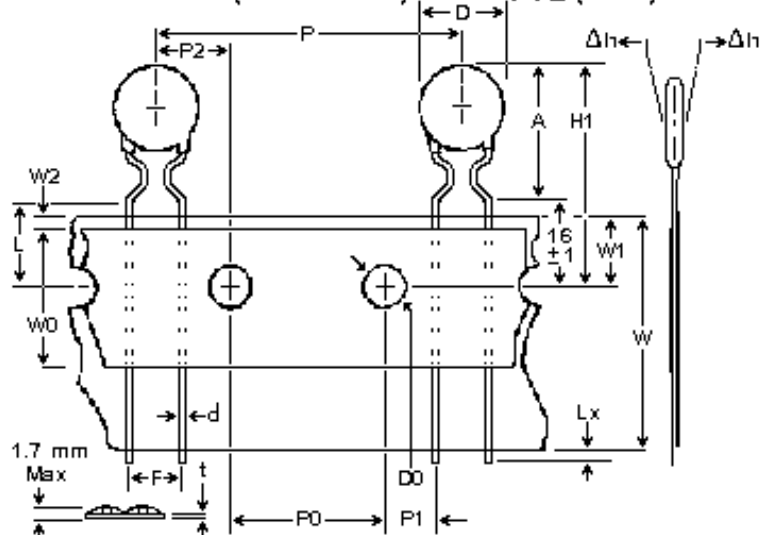
Outward Crimp

T10 (Ammo Box) T26 (Reel)



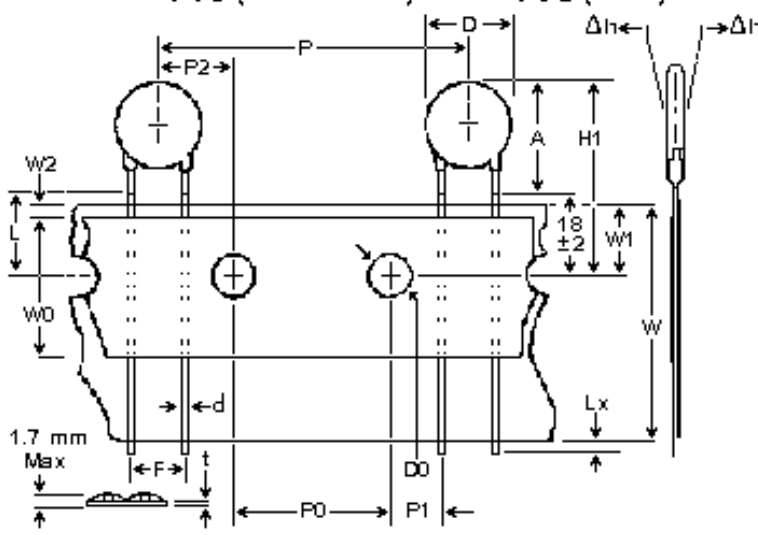
Inward Crimp

T6 (Ammo Box) T12 (Reel)



Inline Crimp

T15 (Ammo Box) T38 (Reel)



Based on EIA-468-B Specifications.

Metal Oxide Varistors - 18mm / 20mm Taping Specifications

Item	Symbol	Straight Leads		Outward Crimp		Inline Crimp		Inward Crimp	
		T44, T1H	T5, T30	T1X, T45	T50, T2X	T2, T25	T60, T3X	T40, T4X	T35, T2D
Body Diameter	D	*24 max	*24 max	*24 max	*24 max	*24 max	*24 max	*24 max	*24 max
Lead Wire Diameter	d	0.8 ± 0.06	1.0 ± 0.1	0.8 ± 0.06	1.0 ± 0.1	0.8 ± 0.06	1.0 ± 0.1	0.8 ± 0.06	1.0 ± 0.1
Pitch of Component	P	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1	25.4 ± 1
Feed Hole Pitch	P0	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3	12.7 ± 0.3
Lead to Lead Distance (Center to Center)	F	7.5 ± 0.8	10 ± 1	7.5 ± 0.8	10 ± 1	7.5 ± 0.8	10 ± 1	7.5 ± 0.8	10 ± 1
Component Alignment	 h	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max	2.0 max
Basepaper Tape Width	W	18+1/-0.5	18+1/-0.5	18+1/-0.5	18+1/-0.5	18+1/-0.5	18+1/-0.5	18+1/-0.5	18+1/-0.5
Adhesive Tape Width	W0	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min
Hole Position	W1	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5	9 ± 0.5
Adhesive Tape Border	W2	3 max	3 max	3 max	3 max	3 max	3 max	3 max	3 max
Component Height	H1	*48 max	*48 max	*48 max	*48 max	*48 max	*48 max	*48 max	*48 max
Lead-Wire Clinch Height	H0	18 ± 2	18 ± 2	16 ± 1	16 ± 1	16 ± 1	16 ± 1	16 ± 1	16 ± 1
Lead-Wire Protrusion	Lx	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max	1.0 max
Feed Hole Diameter	D0	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2	4 ± 0.2
Total Tape Thickness	t	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max	»0.7 max
Length of Clipped Lead	L	11 max	11 max	11 max	11 max	11 max	11 max	11 max	11 max
Component Height from Seating Plane	A	--	--	*29 max	*29 max	*31 max	*31 max	*29 max	*29 max

All dimensions are in Millimeters.

Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel).

Adhesive Tape Thickness = 0.16mm ± 0.03mm.

* - 18mm disc size dimensions: D = 22 max, H1 = 46 max, A = 26 max.

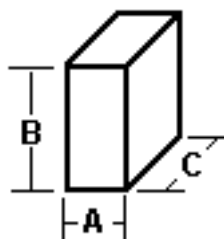
Largest voltage which can be taped is 460VAC.

For 320VAC and larger, only T2, T25, T60 or T3X is available

Metal Oxide Varistors - 18mm / 20mm Taping Specifications -

(continued)

Ammo Box



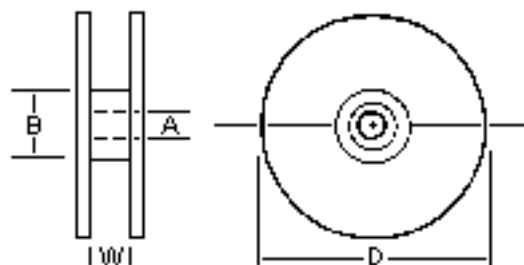
Ammo Box Taping Codes (T44, T5, T2, T60, T45, T50, T40, T35)

A = 65 max, B = 250 max

C = 340 max

< 300VAC = 500 pieces, > 300VAC = 300 pieces

Reel



Reel Taping Codes (T1H, T30, T25, T3X, T1X, T2X, T4X, T2D)

A = Approx. 30ø, B = Approx. 95ø

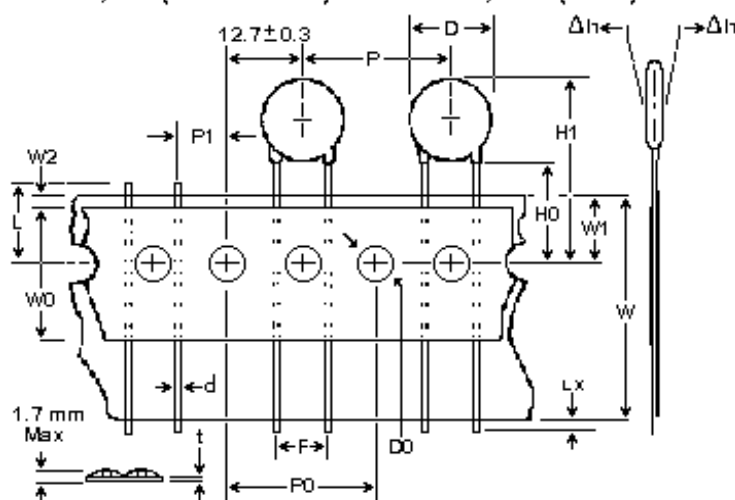
W = Approx. 50, D = 350ømax

< 300VAC = 500 pieces, > 300VAC = 300 pieces

Straight Leads

T44, T5 (Ammo Box)

T1H, T30 (Reel)

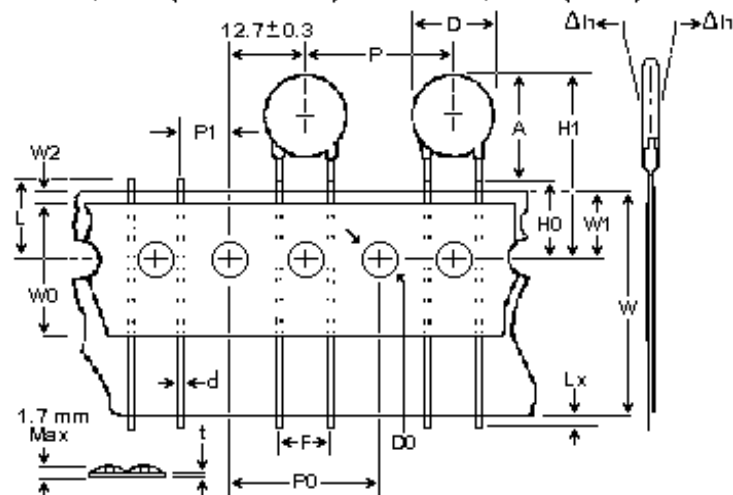


T44 (Ammo Box) and T1H (Reel) = 7.5mm Lead Spacing
T5 (Ammo Box) and T30 (Reel) = 10mm Lead Spacing

Inline Crimp

T2, T60 (Ammo Box)

T25, T3X (Reel)

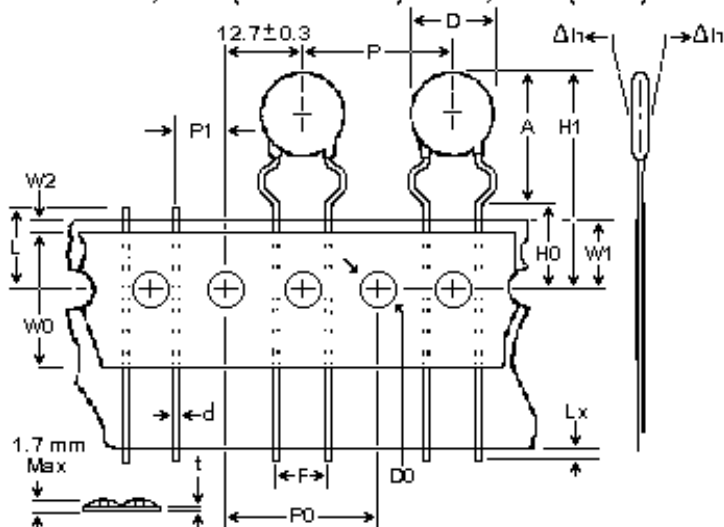


T40 (Ammo Box) and T4X (Reel) = 7.5mm Lead Spacing
T35 (Ammo Box) and T2D (Reel) = 10mm Lead Spacing

Outward Crimp

T45, T50 (Ammo Box)

T1X, T2X (Reel)

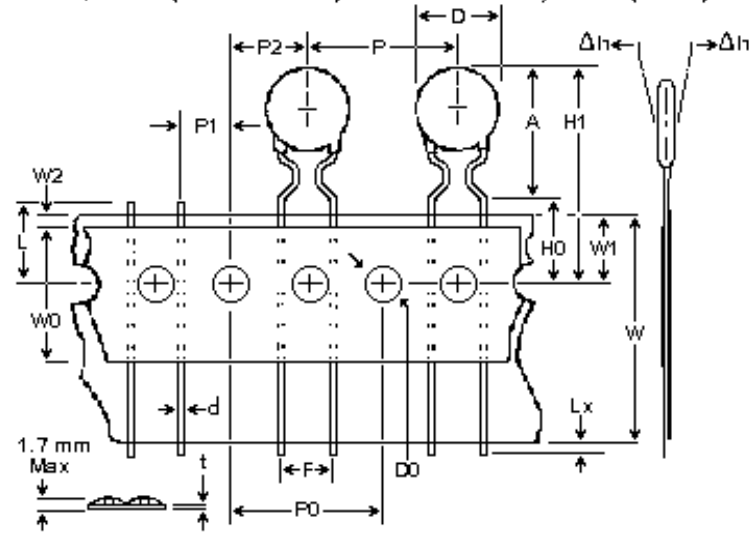


T45 (Ammo Box) and T1X (Reel) = 7.5mm Lead Spacing
T50 (Ammo Box) and T2X (Reel) = 10mm Lead Spacing

Inward Crimp

T35, T40 (Ammo Box)

T4X, T2D (Reel)

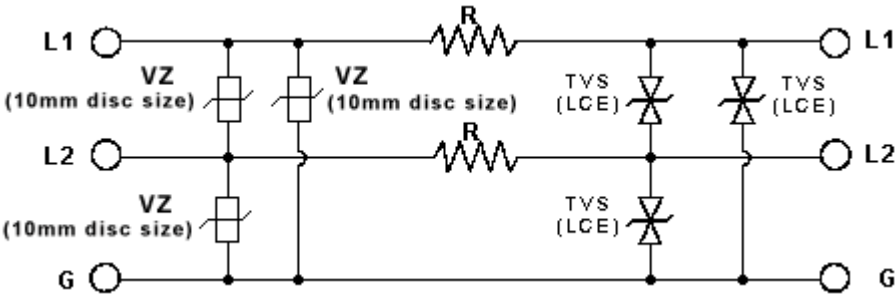


T40 (Ammo Box) and T4X (Reel) = 7.5mm Lead Spacing
T35 (Ammo Box) and T2D (Reel) = 10mm Lead Spacing

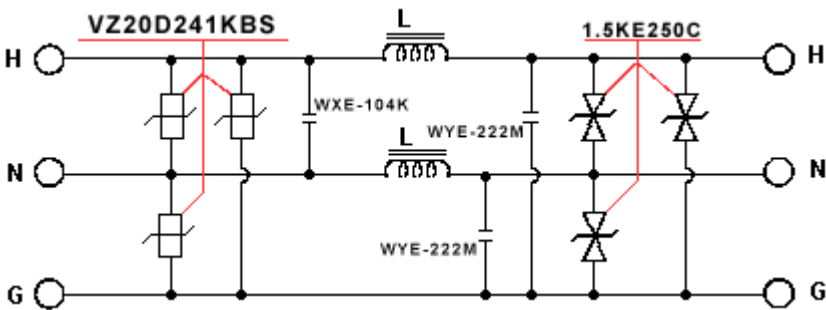
Based on EIA-468-B Specifications. All dimensions are in Millimeters.

Metal Oxide Varistors - Circuit Examples

Data Line Protection



AC Line Protection



Telecom Circuit Protection

