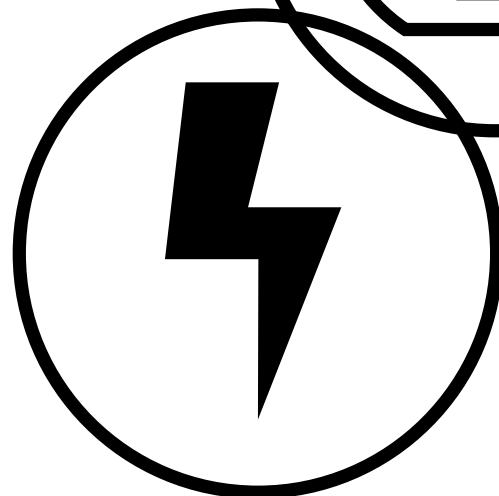
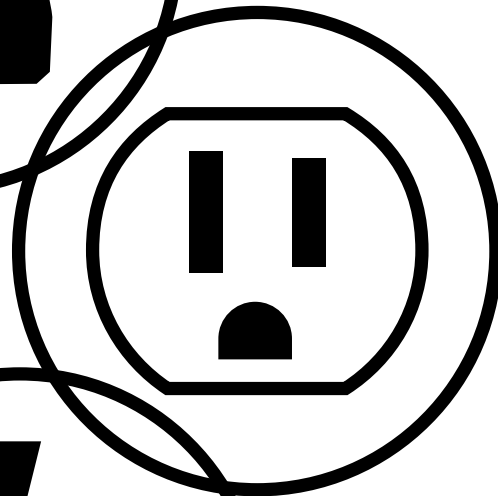
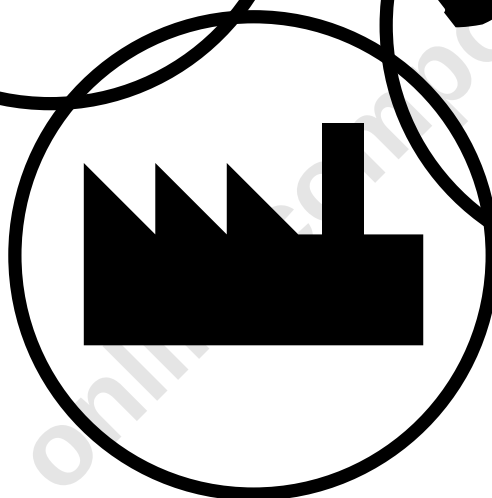
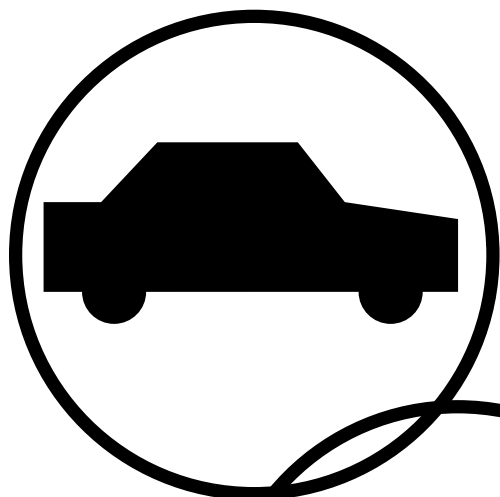




**WORLD PRODUCTS INC.**  
ELECTRONIC COMPONENT SOLUTIONS

# METAL OXIDE VARISTORS



## METAL OXIDE VARISTORS

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# METAL OXIDE VARISTORS

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# METAL OXIDE VARISTORS

## Definitions

### Features

- **Our Metal Oxide Varistors have UL, CSA and VDE approvals.** Plus specific types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11. 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 |
|-------------------|----------|
| 5mm ( < 50 VAC )  | 0.01     |
| 5mm ( ≥ 50 VAC )  | 0.15     |
| 7mm ( < 50 VAC )  | 0.02     |
| 7mm ( ≥ 50 VAC )  | 0.25     |
| 10mm ( < 50 VAC ) | 0.05     |
| 10mm ( ≥ 50 VAC ) | 0.40     |
| 14mm ( < 50 VAC ) | 0.10     |
| 14mm ( ≥ 50 VAC ) | 0.60     |
| 18mm ( ≥ 50 VAC ) | 0.80     |

| Disc Size         | Pm-watts |
|-------------------|----------|
| 20mm ( < 50 VAC ) | 0.20     |
| 20mm ( ≥ 50 VAC ) | 1.00     |
| 25mm              | 1.20     |
| 32mm              | 1.60     |
| 34mm (Single)     | 2.10     |
| 34mm (Dual)       | 2.73     |
| 40mm              | 2.10     |
| 53mm              | 2.50     |
| 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 $\pm$ 10% from initially measured Varistor Voltage. When determining if varistor is within afore mentioned criteria the same temperature must be observed as was used for initial Varistor Voltage measurements. |

### Part Marking

Example: 5D241K

**10**      **D**      **471**      **K**  
 (1)      (2)      (3)      (4)

#### (1) 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

#### (2) Type

D = Standard  
 E = High Energy  
 R = (applicable only for 34mm Types)

#### (3) Varistor Voltage

471 =  $47 \times 10^1 = 470$  (DC Volts)

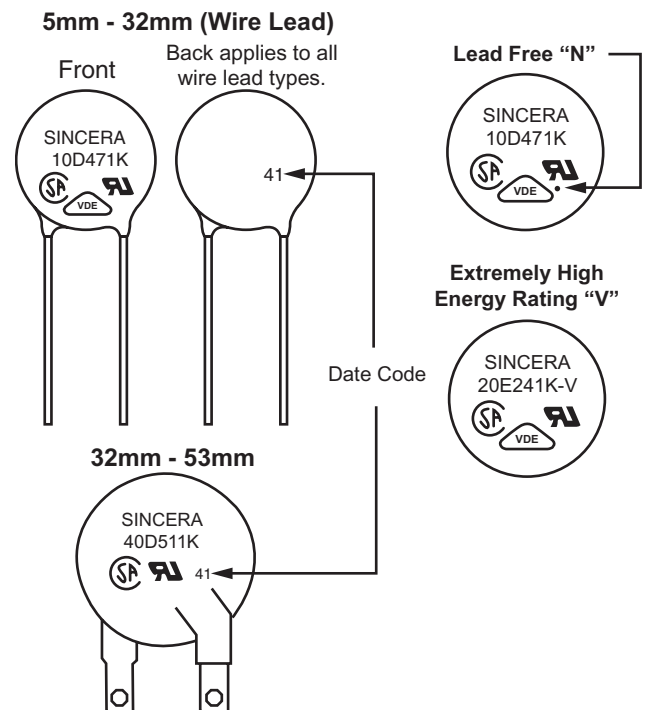
#### (4) Tolerance

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

#### Date Code

41 = First digit represents year - 2004 = 4  
 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 System

Example: VZ20D241KBOCX-VS

| <u>V</u> | <u>Z</u> | <u>20</u> | <u>E</u> | <u>241</u> | <u>K</u> | <u>B</u> | <u>O</u> | <u>C</u> | <u>X</u> | - | <u>V</u> | <u>P</u> | <u>N</u> |
|----------|----------|-----------|----------|------------|----------|----------|----------|----------|----------|---|----------|----------|----------|
| (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

05 = 5mm, 07 = 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 Type

R = (applicable only for 34mm Types)

#### (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.)

Note: For sizes 32 and larger please reference specification pages for fields beyond (6).

#### (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.

Note: Also applicable for 32mm (KW Series) with wire leads.



#### (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).

Applies only to wire lead type product (5mm-25mm) including 32mm (KW Series).

#### (10) Lead Spacing

X = 10mm (0.4") lead spacing (1mm (0.039") lead diameter).

(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 (UL1414, UL1449, UL497B and CSA Recognized parts.) (If you have a special voltage request, please inquire).

#### (12) Coating Option

P = Non-Flammable Phenolic Coating. Applicable for UL1414 (5mm – 25mm), UL1449 (5mm – 25mm), and CSA (5mm – 53mm) recognized parts.

Note: Applicable for disk sizes 5mm-53mm.

#### (13) Lead-Free (Pb-Free) Type

N = Lead-free varistor.

(Available in disk sizes 5mm-60mm)

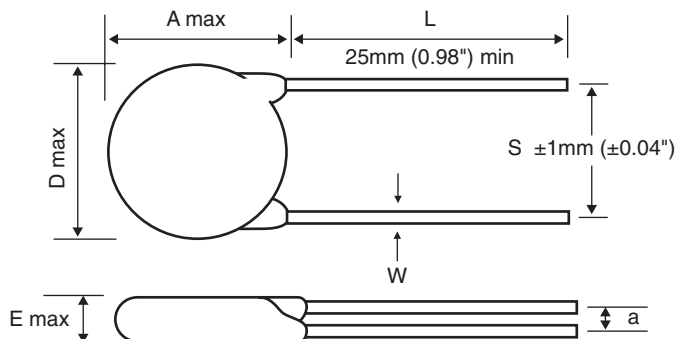
UL1414 (5mm-25mm) and CSA (5mm -53mm).

(UL1449 and UL497B Pending).

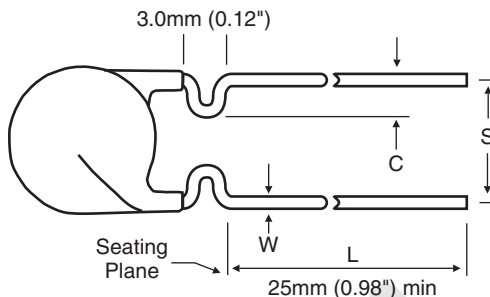
# METAL OXIDE VARISTORS

## Standard Dimensions and Lead Modification Options

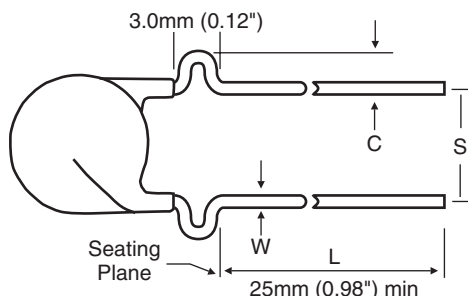
### Straight Leads



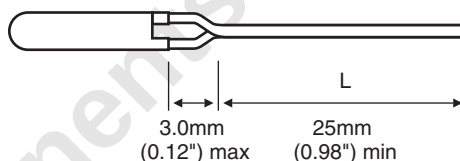
### Inward Crimp



### Outward Crimp



### Inline Crimp



| Disc Size        | A max |      | D max |      | S          |             | W nom     |             | C          |              | L                                                                                                                                | Dimension E max and a                                                               |
|------------------|-------|------|-------|------|------------|-------------|-----------|-------------|------------|--------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 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 | For other than standard lead length, please see Definitions, "Part Number System" "(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 |                                                                                                                                  |                                                                                     |
| 32KW (wire lead) | 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 (as referenced above) for straight disc seating on PC boards. If 320VAC and larger size are required without in-line crimp, please reference "Part Number System" 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 Dimensions and Lead Modification Options (continued)

#### E Max Dimensions

Dimensions are in mm (inches)

##### 5D Series



| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 5D180K | 3.4 (.13)        | 1.2 (.05)                                   |
| 5D220K | 3.6 (.14)        | 1.3 (.05)                                   |
| 5D270K | 3.8 (.15)        | 1.4 (.055)                                  |
| 5D330K | 3.9 (.15)        | 1.2 (.05)                                   |
| 5D390K | 4.0 (.16)        | 1.3 (.05)                                   |
| 5D470K | 3.8 (.15)        | 1.5 (.06)                                   |
| 5D560K | 3.9 (.15)        | 1.6 (.063)                                  |
| 5D680K | 4.2 (.165)       | 1.8 (.07)                                   |
| 5D820K | 3.4 (.13)        | 1.2 (.05)                                   |
| 5D101K | 3.6 (.14)        | 1.2 (.05)                                   |
| 5D121K | 3.8 (.15)        | 1.3 (.05)                                   |
| 5D151K | 3.9 (.15)        | 1.3 (.05)                                   |
| 5D181K | 3.5 (.138)       | 1.5 (.06)                                   |
| 5D201K | 3.6 (.14)        | 1.6 (.063)                                  |

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 5D221K | 3.6 (.14)        | 1.6 (.063)                                  |
| 5D241K | 3.7 (.145)       | 1.8 (.07)                                   |
| 5D271K | 3.8 (.15)        | 2.0 (.08)                                   |
| 5D301K | 3.9 (.15)        | 2.3 (.09)                                   |
| 5D331K | 4.1 (.16)        | 2.4 (.094)                                  |
| 5D361K | 4.4 (.17)        | 2.5 (.1)                                    |
| 5D391K | 4.5 (.18)        | 2.7 (.1)                                    |
| 5D431K | 4.7 (.185)       | 2.9 (.11)                                   |
| 5D471K | 4.9 (.19)        | 3.6 (.14)                                   |
| 5D511K | 5.1 (.2)         | *3.1 (.12)                                  |
| 5D561K | 5.3 (.21)        | *3.3 (.13)                                  |
| 5D621K | 5.5 (.22)        | *3.9 (.15)                                  |
| 5D681K | 5.7 (.22)        | *4.3 (.17)                                  |

##### 7D Series

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 7D180K | 3.4 (.13)        | 1.2 (.05)                                   |
| 7D220K | 3.6 (.14)        | 1.3 (.05)                                   |
| 7D270K | 3.8 (.15)        | 1.4 (.055)                                  |
| 7D330K | 3.9 (.15)        | 1.2 (.05)                                   |
| 7D390K | 4.0 (.16)        | 1.3 (.05)                                   |
| 7D470K | 3.8 (.15)        | 1.5 (.06)                                   |
| 7D560K | 3.9 (.15)        | 1.6 (.063)                                  |
| 7D680K | 4.2 (.165)       | 1.8 (.07)                                   |
| 7D820K | 3.4 (.13)        | 1.2 (.05)                                   |
| 7D101K | 3.6 (.14)        | 1.2 (.05)                                   |
| 7D121K | 3.8 (.15)        | 1.3 (.05)                                   |
| 7D151K | 3.9 (.15)        | 1.3 (.05)                                   |
| 7D181K | 3.5 (.138)       | 1.5 (.06)                                   |
| 7D201K | 3.6 (.14)        | 1.6 (.063)                                  |

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 7D221K | 3.6 (.14)        | 1.6 (.063)                                  |
| 7D241K | 3.7 (.145)       | 1.8 (.07)                                   |
| 7D271K | 3.8 (.15)        | 2.0 (.08)                                   |
| 7D301K | 3.9 (.15)        | 2.3 (.09)                                   |
| 7D331K | 4.1 (.16)        | 2.4 (.094)                                  |
| 7D361K | 4.4 (.17)        | 2.5 (.1)                                    |
| 7D391K | 4.5 (.18)        | 2.7 (.1)                                    |
| 7D431K | 4.7 (.185)       | 2.9 (.11)                                   |
| 7D471K | 4.9 (.19)        | 3.6 (.14)                                   |
| 7D511K | 5.1 (.2)         | *3.1 (.12)                                  |
| 7D561K | 5.3 (.21)        | *3.3 (.13)                                  |
| 7D621K | 5.5 (.22)        | *3.9 (.15)                                  |
| 7D681K | 5.7 (.22)        | *4.3 (.17)                                  |

\* Bulk parts for 320VAC and larger come standard with inline crimp (as referenced at beginning of "Standard Dimensions and Lead Modification Options" section ) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without inline crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" dimensions (for off-set) above.

## METAL OXIDE VARISTORS

### Standard Dimensions and Lead Modification Options (continued)

#### E Max Dimensions

Dimensions are in mm (inches)

#### 10D Series



| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 10D180K | 3.8 (.15)        | 1.4 (.055)                                  |
| 10D220K | 4.0 (.16)        | 1.5 (.06)                                   |
| 10D270K | 4.2 (.165)       | 1.6 (.063)                                  |
| 10D330K | 4.3 (.17)        | 1.8 (.07)                                   |
| 10D390K | 4.4 (.17)        | 1.6 (.063)                                  |
| 10D470K | 4.4 (.17)        | 1.7 (.067)                                  |
| 10D560K | 4.4 (.17)        | 1.8 (.07)                                   |
| 10D680K | 4.6 (.18)        | 2.1 (.083)                                  |
| 10D820K | 3.8 (.15)        | 1.4 (.055)                                  |
| 10D101K | 3.8 (.15)        | 1.4 (.055)                                  |
| 10D121K | 4.0 (.16)        | 1.5 (.06)                                   |
| 10D151K | 4.2 (.165)       | 1.5 (.06)                                   |
| 10D181K | 4.2 (.165)       | 1.6 (.063)                                  |
| 10D201K | 4.2 (.165)       | 1.8 (.07)                                   |
| 10D221K | 4.1 (.16)        | 1.8 (.07)                                   |
| 10D241K | 4.2 (.165)       | 2.0 (.08)                                   |
| 10D271K | 4.3 (.17)        | 2.2 (.087)                                  |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 10D301K | 4.4 (.17)        | 2.5 (.1)                                    |
| 10D331K | 4.6 (.18)        | 2.5 (.1)                                    |
| 10D361K | 4.9 (.19)        | 2.7 (.1)                                    |
| 10D391K | 5.0 (.2)         | 2.9 (.11)                                   |
| 10D431K | 5.2 (.2)         | 3.1 (.12)                                   |
| 10D471K | 5.4 (.21)        | 3.6 (.14)                                   |
| 10D511K | 5.5 (.22)        | *3.4 (.13)                                  |
| 10D561K | 5.8 (.23)        | *3.5 (.138)                                 |
| 10D621K | 6.1 (.24)        | *4.2 (.165)                                 |
| 10D681K | 6.4 (.25)        | *4.6 (.18)                                  |
| 10D751K | 6.7 (.26)        | *5.0 (.197)                                 |
| 10D781K | 6.9 (.27)        | *5.0 (.197)                                 |
| 10D821K | 7.1 (.28)        | *5.4 (.2)                                   |
| 10D911K | 7.5 (.3)         | *5.9 (.23)                                  |
| 10D102K | 7.6 (.3)         | *6.4 (.25)                                  |
| 10D112K | 7.8 (.31)        | *7.0 (.275)                                 |

#### 14D Series

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 14D180K | 3.9 (.15)        | 1.4 (.055)                                  |
| 14D220K | 4.1 (.16)        | 1.5 (.06)                                   |
| 14D270K | 4.3 (.17)        | 1.7 (.067)                                  |
| 14D330K | 4.5 (.18)        | 1.9 (.075)                                  |
| 14D390K | 4.5 (.18)        | 1.7 (.067)                                  |
| 14D470K | 4.3 (.17)        | 1.8 (.07)                                   |
| 14D560K | 4.5 (.18)        | 2.0 (.08)                                   |
| 14D680K | 4.7 (.185)       | 2.2 (.087)                                  |
| 14D820K | 3.8 (.15)        | 1.4 (.055)                                  |
| 14D101K | 3.8 (.15)        | 1.5 (.06)                                   |
| 14D121K | 4.0 (.16)        | 1.5 (.06)                                   |
| 14D151K | 4.2 (.165)       | 1.5 (.06)                                   |
| 14D181K | 4.4 (.17)        | 1.7 (.067)                                  |
| 14D201K | 4.6 (.18)        | 1.9 (.075)                                  |
| 14D221K | 4.1 (.16)        | 1.9 (.075)                                  |
| 14D241K | 4.2 (.165)       | 2.1 (.083)                                  |
| 14D271K | 4.3 (.17)        | 2.2 (.087)                                  |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 14D301K | 4.4 (.17)        | 2.6 (.1)                                    |
| 14D331K | 4.6 (.18)        | 2.6 (.1)                                    |
| 14D361K | 4.9 (.19)        | 2.8 (.11)                                   |
| 14D391K | 5.0 (.2)         | 3.0 (.12)                                   |
| 14D431K | 5.2 (.2)         | 3.2 (.126)                                  |
| 14D471K | 5.4 (.21)        | 3.8 (.15)                                   |
| 14D511K | 5.5 (.22)        | *3.4 (.13)                                  |
| 14D561K | 5.8 (.23)        | *3.5 (.138)                                 |
| 14D621K | 6.1 (.24)        | *4.2 (.165)                                 |
| 14D681K | 6.4 (.25)        | *4.7 (.185)                                 |
| 14D751K | 6.7 (.26)        | *5.1 (.2)                                   |
| 14D781K | 6.9 (.27)        | *5.1 (.2)                                   |
| 14D821K | 7.1 (.28)        | *5.5 (.22)                                  |
| 14D911K | 7.5 (.3)         | *6.0 (.24)                                  |
| 14D102K | 7.6 (.3)         | *6.5 (.255)                                 |
| 14D112K | 8.0 (.31)        | *7.2 (.28)                                  |

\* Bulk parts for 320VAC and larger come standard with inline crimp (as referenced at beginning of "Standard Dimensions and Lead Modification Options" section) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without inline crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" dimensions (for off-set) above.

## METAL OXIDE VARISTORS

### Standard Dimensions and Lead Modification Options (continued)

#### E Max Dimensions

Dimensions are in mm (inches)

#### 20D Series



| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 20D180K | 4.3 (.17)        | 1.5 (.06)                                   |
| 20D220K | 4.5 (.18)        | 1.6 (.063)                                  |
| 20D270K | 4.7 (.185)       | 1.8 (.07)                                   |
| 20D330K | 4.9 (.19)        | 2.1 (.083)                                  |
| 20D390K | 5.1 (.2)         | 2.1 (.083)                                  |
| 20D470K | 5.3 (.21)        | 2.2 (.087)                                  |
| 20D560K | 5.5 (.22)        | 2.2 (.087)                                  |
| 20D680K | 5.7 (.22)        | 2.4 (.094)                                  |
| 20D820K | 4.3 (.17)        | 1.5 (.06)                                   |
| 20D101K | 4.3 (.17)        | 1.6 (.063)                                  |
| 20D121K | 4.4 (.17)        | 1.6 (.063)                                  |
| 20D151K | 4.6 (.18)        | 1.6 (.063)                                  |
| 20D181K | 4.6 (.18)        | 1.8 (.07)                                   |
| 20D201K | 4.7 (.185)       | 2.0 (.08)                                   |
| 20D221K | 4.8 (.19)        | 2.0 (.08)                                   |
| 20D241K | 4.9 (.19)        | 2.2 (.087)                                  |
| 20D271K | 4.9 (.19)        | 2.3 (.09)                                   |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 20D301K | 5.0 (.2)         | 2.6 (.1)                                    |
| 20D331K | 5.0 (.2)         | 2.7 (.1)                                    |
| 20D361K | 5.4 (.21)        | 2.9 (.11)                                   |
| 20D391K | 5.5 (.22)        | 3.1 (.12)                                   |
| 20D431K | 5.7 (.22)        | 3.3 (.13)                                   |
| 20D471K | 5.5 (.22)        | 4.0 (.157)                                  |
| 20D511K | 5.7 (.22)        | *3.4 (.13)                                  |
| 20D561K | 5.9 (.23)        | *3.8 (.15)                                  |
| 20D621K | 6.2 (.24)        | *4.5 (.18)                                  |
| 20D681K | 6.5 (.26)        | *4.8 (.19)                                  |
| 20D751K | 6.8 (.27)        | *5.2 (.2)                                   |
| 20D781K | 7.0 (.275)       | *5.4 (.2)                                   |
| 20D821K | 7.2 (.28)        | *5.6 (.22)                                  |
| 20D911K | 7.5 (.3)         | *6.5 (.255)                                 |
| 20D102K | 7.9 (.31)        | *6.6 (.26)                                  |
| 20D112K | 8.4 (.33)        | *7.3 (.287)                                 |

#### 25D Series

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 25D201K | 5.0 (.2)         | 2.2 (.087)                                  |
| 25D221K | 5.0 (.2)         | 2.2 (.087)                                  |
| 25D241K | 5.3 (.21)        | 2.4 (.094)                                  |
| 25D271K | 5.5 (.22)        | 2.5 (.1)                                    |
| 25D301K | 5.6 (.22)        | 2.7 (.1)                                    |
| 25D331K | 5.9 (.23)        | 2.8 (.11)                                   |
| 25D361K | 5.9 (.23)        | 3.0 (.12)                                   |
| 25D391K | 6.0 (.24)        | 3.3 (.13)                                   |
| 25D431K | 6.5 (.256)       | 3.5 (.138)                                  |
| 25D471K | 6.5 (.26)        | 5.0 (.197)                                  |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 25D511K | 6.8 (.27)        | *3.5 (.138)                                 |
| 25D561K | 7.0 (.275)       | *3.9 (.15)                                  |
| 25D621K | 7.4 (.29)        | *4.8 (.19)                                  |
| 25D681K | 7.5 (.29)        | *5.0 (.197)                                 |
| 25D751K | 7.6 (.30)        | *5.4 (.2)                                   |
| 25D781K | 8.0 (.31)        | *5.5 (.22)                                  |
| 25D821K | 8.2 (.32)        | *5.8 (.23)                                  |
| 25D911K | 8.2 (.32)        | *7.0 (.275)                                 |
| 25D102K | 8.8 (.35)        | *7.2 (.28)                                  |
| 25D112K | 9.4 (.37)        | *7.4 (.29)                                  |

\* Bulk parts for 320VAC and larger come standard with inline crimp (as referenced at beginning of "Standard Dimensions and Lead Modification Options" section ) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without inline crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" dimensions (for off-set) above.

## METAL OXIDE VARISTORS

### Standard Dimensions and Lead Modification Options (continued)

#### E Max Dimensions

Dimensions are in mm (inches)

#### 32D Series



| Style    | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|----------|------------------|---------------------------------------------|
| 32D201KW | 5.6 (.22)        | 2.6 (.1)                                    |
| 32D221KW | 5.7 (.22)        | 2.7 (.11)                                   |
| 32D241KW | 5.8 (.23)        | 2.8 (.11)                                   |
| 32D271KW | 5.9 (.23)        | 2.9 (.11)                                   |
| 32D331KW | 6.3 (.25)        | 3.3 (.13)                                   |
| 32D361KW | 6.5 (.255)       | 3.5 (.137)                                  |
| 32D391KW | 6.6 (.26)        | 3.6 (.14)                                   |
| 32D431KW | 6.8 (.27)        | 3.8 (.15)                                   |
| 32D471KW | 6.9 (.27)        | 3.9 (.15)                                   |
| 32D511KW | 7.3 (.29)        | *4.3 (.17)                                  |
| 32D561KW | 7.3 (.29)        | *4.3 (.17)                                  |

| Style    | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|----------|------------------|---------------------------------------------|
| 32D621KW | 7.9 (.31)        | *4.9 (.19)                                  |
| 32D681KW | 8.1 (.32)        | *5.1 (.2)                                   |
| 32D751KW | 8.5 (.33)        | *5.5 (.216)                                 |
| 32D781KW | 8.7 (.34)        | *5.7 (.22)                                  |
| 32D821KW | 9.0 (.35)        | *6.0 (.236)                                 |
| 32D911KW | 9.4 (.37)        | *6.4 (.25)                                  |
| 32D951KW | 9.8 (.39)        | *6.7 (.26)                                  |
| 32D102KW | 10.0 (.39)       | *7.0 (.275)                                 |
| 32D112KW | 10.5 (.41)       | *7.5 (.295)                                 |
| 32D122KW | 11.0 (.43)       | *8.0 (.31)                                  |
| 32D152KW | 12.5 (.49)       | *9.5 (.37)                                  |

#### 5E High Energy Series

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 5E820K | 3.4 (.13)        | 1.2 (.05)                                   |
| 5E181K | 3.5 (.138)       | 1.5 (.06)                                   |
| 5E201K | 3.5 (.138)       | 1.6 (.063)                                  |
| 5E221K | 3.6 (.14)        | 1.6 (.063)                                  |
| 5E241K | 3.7 (.145)       | 1.8 (.07)                                   |
| 5E271K | 3.8 (.15)        | 2.0 (.08)                                   |

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 5E331K | 4.1 (.16)        | 2.4 (.094)                                  |
| 5E361K | 4.4 (.17)        | 2.5 (.1)                                    |
| 5E391K | 4.5 (.18)        | 2.7 (.1)                                    |
| 5E431K | 4.7 (.185)       | 2.9 (.11)                                   |
| 5E471K | 4.7 (.185)       | 3.6 (.14)                                   |
|        |                  |                                             |

#### 7E High Energy Series

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 7E820K | 3.4 (.13)        | 1.2 (.05)                                   |
| 7E181K | 3.5 (.138)       | 1.5 (.06)                                   |
| 7E201K | 3.5 (.138)       | 1.6 (.063)                                  |
| 7E221K | 3.6 (.14)        | 1.6 (.063)                                  |
| 7E241K | 3.7 (.145)       | 1.8 (.07)                                   |
| 7E271K | 3.8 (.15)        | 2.0 (.08)                                   |

| Style  | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|--------|------------------|---------------------------------------------|
| 7E331K | 4.1 (.16)        | 2.4 (.094)                                  |
| 7E361K | 4.4 (.17)        | 2.5 (.1)                                    |
| 7E391K | 4.5 (.18)        | 2.7 (.1)                                    |
| 7E431K | 4.7 (.185)       | 2.9 (.11)                                   |
| 7E471K | 4.7 (.185)       | 3.6 (.14)                                   |
|        |                  |                                             |

\* Bulk parts for 320VAC and larger come standard with inline crimp (as referenced at beginning of "Standard Dimensions and Lead Modification Options" section ) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without inline crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" dimensions (for off-set) above.

## METAL OXIDE VARISTORS

### Standard Dimensions and Lead Modification Options (continued)

#### E Max Dimensions

Dimensions are in mm (inches)

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



#### 10E High Energy Series

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 10E820K | 3.8 (.15)        | 1.4 (.055)                                  |
| 10E181K | 3.9 (.15)        | 1.6 (.063)                                  |
| 10E201K | 3.9 (.15)        | 1.8 (.07)                                   |
| 10E221K | 4.1 (.16)        | 1.8 (.07)                                   |
| 10E241K | 4.2 (.165)       | 2.0 (.08)                                   |
| 10E271K | 4.3 (.17)        | 2.2 (.087)                                  |
| 10E331K | 4.6 (.18)        | 2.5 (.1)                                    |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 10E361K | 4.9 (.19)        | 2.7 (.1)                                    |
| 10E391K | 5.0 (.2)         | 2.9 (.11)                                   |
| 10E431K | 5.2 (.2)         | 3.1 (.12)                                   |
| 10E471K | 5.2 (.2)         | 3.6 (.14)                                   |
| 10E511K | 5.3 (.21)        | *3.4 (.13)                                  |
| 10E561K | 5.8 (.23)        | *3.5 (.138)                                 |
| 10E821K | 6.7 (.26)        | *5.4 (.2)                                   |

#### 14E High Energy Series

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 14E820K | 3.8 (.15)        | 1.4 (.055)                                  |
| 14E181K | 4.4 (.17)        | 1.7 (.067)                                  |
| 14E201K | 4.4 (.17)        | 1.9 (.075)                                  |
| 14E221K | 4.5 (.18)        | 1.9 (.075)                                  |
| 14E241K | 4.5 (.18)        | 2.1 (.083)                                  |
| 14E271K | 4.5 (.18)        | 2.2 (.087)                                  |
| 14E331K | 4.6 (.18)        | 2.6 (.1)                                    |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 14E361K | 4.9 (.19)        | 2.8 (.11)                                   |
| 14E391K | 5.0 (.2)         | 3.0 (.12)                                   |
| 14E431K | 5.2 (.2)         | 3.2 (.126)                                  |
| 14E471K | 5.2 (.2)         | 3.8 (.15)                                   |
| 14E511K | 5.3 (.21)        | *3.4 (.13)                                  |
| 14E561K | 5.8 (.23)        | *3.5 (.138)                                 |
| 14E821K | 6.7 (.26)        | *5.5 (.22)                                  |

#### 18E High Energy Series

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 18E820K | 4.1 (.16)        | 1.5 (.06)                                   |
| 18E181K | 4.4 (.17)        | 1.9 (.075)                                  |
| 18E201K | 4.7 (.185)       | 1.9 (.075)                                  |
| 18E221K | 4.9 (.19)        | 1.9 (.075)                                  |
| 18E241K | 5.0 (.2)         | 2.0 (.08)                                   |
| 18E271K | 5.1 (.2)         | 2.2 (.08)                                   |
| 18E331K | 5.2 (.2)         | 2.7 (.11)                                   |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 18E361K | 5.4 (.21)        | 2.8 (.11)                                   |
| 18E391K | 5.5 (.22)        | 3.0 (.12)                                   |
| 18E431K | 5.7 (.22)        | 3.2 (.126)                                  |
| 18E471K | 5.8 (.23)        | 3.9 (.15)                                   |
| 18E511K | 6.1 (.24)        | *3.4 (.13)                                  |
| 18E561K | 6.2 (.24)        | *3.8 (.15)                                  |
| 18E821K | 7.4 (.29)        | *5.5 (.22)                                  |

\* Bulk parts for 320VAC and larger come standard with inline crimp (as referenced at beginning of "Standard Dimensions and Lead Modification Options" section ) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without inline crimp, please reference "Part Number Code" position # (8) and add "N" and reference "a" dimensions (for off-set) above.

## METAL OXIDE VARISTORS

### Standard Dimensions and Lead Modification Options (continued)

#### E Max Dimensions

Dimensions are in mm (inches)

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



#### 20E High Energy Series

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 20E820K | 4.3 (.17)        | 1.5 (.06)                                   |
| 20E181K | 4.3 (.17)        | 1.8 (.07)                                   |
| 20E201K | 4.9 (.19)        | 2.0 (.08)                                   |
| 20E221K | 5.0 (.2)         | 2.0 (.08)                                   |
| 20E241K | 5.1 (.2)         | 2.2 (.087)                                  |
| 20E271K | 5.4 (.21)        | 2.3 (.09)                                   |
| 20E301K | 5.5 (.22)        | 2.6 (.1)                                    |
| 20E331K | 5.8 (.23)        | 2.7 (.1)                                    |
| 20E361K | 5.4 (.21)        | 2.9 (.11)                                   |
| 20E391K | 5.5 (.22)        | 3.1 (.12)                                   |
| 20E431K | 5.7 (.22)        | 3.3 (.13)                                   |

| Style   | E Max<br>mm (in) | Off-set Dimension (a)<br>±1 (±0.04) mm (in) |
|---------|------------------|---------------------------------------------|
| 20E471K | 5.8 (.23)        | 4.0 (.157)                                  |
| 20E511K | 5.9 (.23)        | *3.4 (.13)                                  |
| 20E561K | 5.9 (.23)        | *3.8 (.15)                                  |
| 20E621K | 6.6 (.26)        | *4.5 (.18)                                  |
| 20E681K | 6.9 (.27)        | *4.8 (.19)                                  |
| 20E751K | 7.2 (.28)        | *5.2 (.2)                                   |
| 20E781K | 7.4 (.29)        | *5.4 (.2)                                   |
| 20E821K | 7.2 (.28)        | *5.6 (.22)                                  |
| 20E911K | 8.0 (.32)        | *6.5 (.255)                                 |
| 20E102K | 8.5 (.33)        | *6.6 (.26)                                  |
| 20E112K | 8.0 (.32)        | *7.3 (.287)                                 |

\* Bulk parts for 320VAC and larger come standard with inline crimp (as referenced at beginning of "Standard Dimensions and Lead Modification Options" section ) for straight disc seating on PC boards. Therefore, "a" dimension is not applicable. If 320VAC and larger size are required without inline 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 (5, 7, 10, 14, 20, 25 mm)

| Part Number | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |                  |             | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|-------------|----------------------------------|----------|------------------------------|------------------|-------------|--------------------------|-----------|-----------------------------------------------|------|--------------------------------|
|             |                                  |          | Energy                       |                  | Peak        |                          |           |                                               |      |                                |
|             | AC RMS Volts                     | DC Volts | 2ms Joules                   | 10/1000µs Joules | 8/20µs Amps | Min Volts                | Max Volts | Volts                                         | Amps | pF                             |
| 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 #227006). No values certified below 130VAC.

VDE (File # 40012633 for VZ05), (File # 40012632 for VZ07, VZ10, VZ14, and VZ20).

## METAL OXIDE VARISTORS

### D Series Electrical Characteristics (5, 7, 10, 14, 20, 25 mm) (cont.)

| Part Number | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |                  |             | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|-------------|----------------------------------|----------|------------------------------|------------------|-------------|--------------------------|-----------|------------------------------------------------|------|--------------------------------|
|             |                                  |          | Energy                       |                  | Peak        |                          |           |                                                |      |                                |
|             | AC RMS Volts                     | DC Volts | 2ms Joules                   | 10/1000µs Joules | 8/20µs Amps | Min Volts                | Max Volts | Volts                                          | Amps | pF                             |
| 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 #227006). No values certified below 130VAC.

VDE (File # 40012633 for VZ05), (File # 40012632 for VZ07, VZ10, VZ14, and VZ20).

## METAL OXIDE VARISTORS

### D Series Electrical Characteristics (5, 7, 10, 14, 20, 25 mm) (cont.)

| Part Number  | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |                  |             | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|--------------|----------------------------------|----------|------------------------------|------------------|-------------|--------------------------|-----------|-----------------------------------------------|------|--------------------------------|
|              |                                  |          | Energy                       |                  | Peak        |                          |           |                                               |      |                                |
|              | AC RMS Volts                     | DC Volts | 2ms Joules                   | 10/1000µs Joules | 8/20µs Amps | Min Volts                | Max Volts | Volts                                         | Amps | pF                             |
| 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                           |
| *VZ25D201KBS |                                  |          | —                            | 200              | 18000       |                          |           | 340                                           | 100  | 3600                           |
| 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                           |
| *VZ25D221KBS |                                  |          | —                            | 225              | 18000       |                          |           | 360                                           | 100  | 3300                           |
| 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                           |
| *VZ25D241KBS |                                  |          | —                            | 235              | 18000       |                          |           | 395                                           | 100  | 3000                           |

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 #227006). No values certified below 130VAC.

VDE (File # 40012633 for VZ05), (File # 40012632 for VZ07, VZ10, VZ14, and VZ20).

\* 25mm are UL 1449 (File# E172311) and CSA 22.2 #1 Certified (File# 227006). No values certified below 130VAC. 25mm types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### D Series Electrical Characteristics (5, 7, 10, 14, 20, 25 mm) (cont.)

| Part Number  | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |                  |             | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|--------------|----------------------------------|----------|------------------------------|------------------|-------------|--------------------------|-----------|-----------------------------------------------|------|--------------------------------|
|              |                                  |          | Energy                       |                  | Peak        |                          |           |                                               |      |                                |
|              | AC RMS Volts                     | DC Volts | 2ms Joules                   | 10/1000µs Joules | 8/20µs Amps | Min Volts                | Max Volts | Volts                                         | Amps | pF                             |
| 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                           |
| *VZ25D271KBS |                                  |          | —                            | 245              | 18000       |                          |           | 465                                           | 100  | 2600                           |
| 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                           |
| *VZ25D301KBS |                                  |          | —                            | 255              | 18000       |                          |           | 505                                           | 100  | 2400                           |
| 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                           |
| *VZ25D331KBS |                                  |          | —                            | 270              | 18000       |                          |           | 540                                           | 100  | 2200                           |
| 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                           |
| *VZ25D361KBS |                                  |          | —                            | 315              | 18000       |                          |           | 595                                           | 100  | 2100                           |
| 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                           |
| *VZ25D391KBS |                                  |          | —                            | 342              | 18000       |                          |           | 650                                           | 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 #227006). No values certified below 130VAC.

VDE (File # 40012633 for VZ05), (File # 40012632 for VZ07, VZ10, VZ14, and VZ20).

\* 25mm are UL 1449 (File# E172311) and CSA 22.2 #1 Certified (File# 227006). No values certified below 130VAC. 25mm types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### D Series Electrical Characteristics (5, 7, 10, 14, 20, 25 mm) (cont.)

| Part Number  | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |                  |             | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|--------------|----------------------------------|----------|------------------------------|------------------|-------------|--------------------------|-----------|-----------------------------------------------|------|--------------------------------|
|              |                                  |          | Energy                       |                  | Peak        |                          |           |                                               |      |                                |
|              | AC RMS Volts                     | DC Volts | 2ms Joules                   | 10/1000µs Joules | 8/20µs Amps | Min Volts                | Max Volts | Volts                                         | Amps | pF                             |
| 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                           |
| *VZ25D431KBS |                                  |          | —                            | 370              | 18000       |                          |           | 710                                           | 100  | 1700                           |
| 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                           |
| *VZ25D471KBS |                                  |          | —                            | 390              | 18000       |                          |           | 775                                           | 100  | 1600                           |
| 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                            |
| *VZ25D511KBS |                                  |          | —                            | 422              | 18000       |                          |           | 840                                           | 100  | 1500                           |
| 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                            |
| *VZ25D561KBS |                                  |          | —                            | 460              | 18000       |                          |           | 910                                           | 100  | 1300                           |
| 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                            |
| *VZ25D621KBS |                                  |          | —                            | 495              | 18000       |                          |           | 1025                                          | 100  | 1200                           |

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 #227006). No values certified below 130VAC.

VDE (File # 40012633 for VZ05 except values 511, 561, and 621), (File # 40012632 for VZ07, VZ10, VZ14, and VZ20).

\* 25mm are UL 1449 (File# E172311) and CSA 22.2 #1 Certified (File# 227006). No values certified below 130VAC. 25mm types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### D Series Electrical Characteristics (5, 7, 10, 14, 20, 25 mm) (cont.)

| Part Number  | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |                  |             | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|--------------|----------------------------------|----------|------------------------------|------------------|-------------|--------------------------|-----------|-----------------------------------------------|------|--------------------------------|
|              |                                  |          | Energy                       |                  | Peak        |                          |           |                                               |      |                                |
|              | AC RMS Volts                     | DC Volts | 2ms Joules                   | 10/1000µs Joules | 8/20µs Amps | Min Volts                | Max Volts | Volts                                         | Amps | pF                             |
| 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                            |
| *VZ25D681KBS |                                  |          | —                            | 515              | 18000       |                          |           | 1120                                          | 100  | 1100                           |
| 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                            |
| *VZ25D751KBS |                                  |          | —                            | 530              | 18000       |                          |           | 1240                                          | 100  | 1000                           |
| 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                            |
| *VZ25D781KBS |                                  |          | —                            | 540              | 18000       |                          |           | 1240                                          | 100  | 990                            |
| 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                            |
| *VZ25D821KBS |                                  |          | —                            | 550              | 18000       |                          |           | 1350                                          | 100  | 920                            |
| 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                            |
| *VZ25D911KBS |                                  |          | —                            | 600              | 18000       |                          |           | 1400                                          | 100  | 860                            |
| 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                            |
| *VZ25D102KBS |                                  |          | —                            | 630              | 18000       |                          |           | 1620                                          | 100  | 760                            |
| 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                            |
| *VZ25D112KBS |                                  |          | —                            | 700              | 18000       |                          |           | 1800                                          | 100  | 690                            |

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 #227006). No values certified below 130VAC.

VDE (File # 40012632 for VZ07, VZ10, VZ14, and VZ20).

\* 25mm are UL 1449 (File# E172311) and CSA 22.2 #1 Certified (File# 227006). No values certified below 130VAC. 25mm types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### High Energy E Series Electrical Characteristics (5, 7, 10, 14, 18, 20 mm)

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

All parts approved as follows:  
 UL 1449 recognized (File # E172311).  
 UL 1414 recognized (File # E182369).  
 No value recognized below 130VAC  
 VDE (File # 40012630 for VZ07, VZ10, VZ14, and VZ18).

UL 497B recognized (File # E199593).  
 No voltage recognized beyond 680VAC.  
 CSA 22.2 #1 certified (File #227006).  
 No value certified below 130VAC  
 Note: VZ18 and VZ20 Series Types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### High Energy E Series Electrical Characteristics (5, 7, 10, 14, 18, 20 mm) (cont.)

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

All parts approved as follows:

UL 1449 recognized (File # E172311).

UL 1414 recognized (File # E182369).

No value recognized below 130VAC

VDE (File # 40012630 for VZ07, VZ10, VZ14, and VZ18).

UL 497B recognized (File # E199593).

No voltage recognized beyond 680VAC.

CSA 22.2 #1 certified (File #227006).

No value certified below 130VAC

Note: VZ18 and VZ20 Series Types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### High Energy E Series Electrical Characteristics (5, 7, 10, 14, 18, 20 mm) (cont.)

| Part Number   | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |             | Varistor Voltage @ 1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C |
|---------------|----------------------------------|----------|------------------------------|-------------|---------------------------|-----------|------------------------------------------------|------|---------------------------------|
|               |                                  |          | Energy                       | Peak        |                           |           |                                                |      |                                 |
|               | AC RMS Volts                     | DC Volts | 10/1000µs Joules             | 8/20µs Amps | Min Volts                 | Max Volts | Volts                                          | Amps | pF                              |
| VZ05E391KBS   | 250                              | 330      | 17                           | 800         | 351                       | 429       | 675                                            | 5    | 63                              |
| VZ07E391KBS   |                                  |          | 35                           | 1750        |                           |           | 650                                            | 10   | 116                             |
| VZ10E391KBS   |                                  |          | 70                           | 3500        |                           |           | 650                                            | 25   | 270                             |
| VZ14E391KBS   |                                  |          | 150                          | 6500        |                           |           | 650                                            | 50   | 500                             |
| VZ18E391KBS   |                                  |          | 245                          | 9000        |                           |           | 650                                            | 80   | 800                             |
| VZ20E391KBS   |                                  |          | 305                          | 12000       |                           |           | 650                                            | 100  | 1000                            |
| VZ05E431KBS   | 275                              | 370      | 20                           | 800         | 387                       | 473       | 740                                            | 5    | 57                              |
| VZ07E431KBS   |                                  |          | 40                           | 1750        |                           |           | 710                                            | 10   | 108                             |
| VZ10E431KBS   |                                  |          | 80                           | 3500        |                           |           | 710                                            | 25   | 255                             |
| VZ14E431KBS   |                                  |          | 165                          | 6500        |                           |           | 710                                            | 50   | 460                             |
| VZ18E431KBS   |                                  |          | 270                          | 9000        |                           |           | 710                                            | 80   | 730                             |
| VZ20E431KBS   |                                  |          | 330                          | 12000       |                           |           | 710                                            | 100  | 950                             |
| VZ05E471KBS   | 300                              | 385      | 21                           | 800         | 423                       | 517       | 775                                            | 5    | 50                              |
| VZ07E471KBS   |                                  |          | 42                           | 1750        |                           |           |                                                | 10   | 100                             |
| VZ10E471KBS   |                                  |          | 85                           | 3500        |                           |           |                                                | 25   | 230                             |
| VZ14E471KBS   |                                  |          | 175                          | 6500        |                           |           |                                                | 50   | 400                             |
| VZ18E471KBS   |                                  |          | 290                          | 9000        |                           |           |                                                | 80   | 660                             |
| VZ20E471KBS   |                                  |          | 350                          | 12000       |                           |           |                                                | 100  | 900                             |
| VZ10E511KBS   | 320                              | 420      | 92                           | 3500        | 459                       | 561       | 840                                            | 25   | 210                             |
| VZ14E511KBS   |                                  |          | 190                          | 6500        |                           |           |                                                | 50   | 350                             |
| VZ18E511KBS   |                                  |          | 314                          | 9000        |                           |           |                                                | 80   | 570                             |
| VZ18E511KBS-V |                                  |          | 350                          | 12000       |                           |           |                                                | 80   | 570                             |
| VZ20E511KBS   |                                  |          | 382                          | 12000       |                           |           |                                                | 100  | 800                             |
| VZ20E511KBS-V |                                  |          | 400                          | 15000       |                           |           |                                                | 100  | 800                             |

All parts approved as follows:

UL 1449 recognized (File # E172311).

UL 1414 recognized (File # E182369).

No value recognized below 130VAC

VDE (File # 40012630 for VZ07, VZ10, VZ14, and VZ18).

UL 497B recognized (File # E199593).

No voltage recognized beyond 680VAC.

CSA 22.2 #1 certified (File #227006).

No value certified below 130VAC

Note: VZ18 and VZ20 Series Types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### High Energy E Series Electrical Characteristics (5, 7, 10, 14, 18, 20 mm) (cont.)

| Part Number | Maximum Continuous Rated Voltage |          | Rated Single Pulse Transient |             | Varistor Voltage @ 1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C |
|-------------|----------------------------------|----------|------------------------------|-------------|---------------------------|-----------|------------------------------------------------|------|---------------------------------|
|             |                                  |          | Energy                       | Peak        |                           |           |                                                |      |                                 |
|             | AC RMS Volts                     | DC Volts | 10/1000µs Joules             | 8/20µs Amps | Min Volts                 | Max Volts | Volts                                          | Amps | pF                              |
| VZ10E561KBS | 360                              | 470      | 97                           | 3500        | 522                       | 638       | 910                                            | 25   | 170                             |
| VZ14E561KBS |                                  |          | 210                          | 6500        |                           |           |                                                | 50   | 320                             |
| VZ18E561KBS |                                  |          | 330                          | 9000        |                           |           |                                                | 80   | 560                             |
| VZ20E561KBS |                                  |          | 420                          | 12000       |                           |           |                                                | 100  | 720                             |
| VZ20E621KBS | 390                              | 505      | 430                          | 12000       | 558                       | 682       | 1025                                           | 100  | 710                             |
| VZ20E681KBS | 420                              | 560      | 435                          | 12000       | 612                       | 748       | 1120                                           | 100  | 680                             |
| VZ20E751KBS | 460                              | 615      | 440                          | 12000       | 675                       | 825       | 1240                                           | 100  | 620                             |
| VZ20E781KBS | 485                              | 640      | 450                          | 12000       | 702                       | 858       | 1240                                           | 100  | 560                             |
| VZ10E821KBS | 510                              | 675      | 110                          | 3500        | 738                       | 902       | 1350                                           | 25   | 110                             |
| VZ14E821KBS |                                  |          | 235                          | 6500        |                           |           |                                                | 50   | 190                             |
| VZ18E821KBS |                                  |          | 388                          | 9000        |                           |           |                                                | 80   | 310                             |
| VZ20E821KBS |                                  |          | 460                          | 12000       |                           |           |                                                | 100  | 530                             |
| VZ20E911KBS | 550                              | 745      | 510                          | 12000       | 819                       | 1001      | 1400                                           | 100  | 440                             |
| VZ20E102KBS | 625                              | 825      | 560                          | 12000       | 900                       | 1100      | 1620                                           | 100  | 425                             |
| VZ20E112KBS | 680                              | 895      | 620                          | 12000       | 962                       | 1175      | 1800                                           | 100  | 380                             |

All parts approved as follows:  
UL 1449 recognized (File # E172311).  
UL 1414 recognized (File # E182369).  
No value recognized below 130VAC  
VDE (File # 40012630 for VZ07, VZ10, VZ14, and VZ18).

UL 497B recognized (File # E199593).  
No voltage recognized beyond 680VAC.  
CSA 22.2 #1 certified (File #227006).  
No value certified below 130VAC  
Note: VZ18 and VZ20 Series Types comply with Accelerated Aging Test Requirements per ANSI/IEEE C62.11, UL File# E172311.

## METAL OXIDE VARISTORS

### VZ32 KW (Wire Lead) Series Electrical Characteristics

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

All parts recognized as follows:

UL1449 - (File #E196885)

Complies with accelerated aging test requirements per ANSI/IEEE C62.11, UL File #E172311.

# METAL OXIDE VARISTORS

## VZ32 Series Electrical Characteristics

| Part Number  | Continuous Rated Voltage |          | Rated Single Pulse Transient |              | Varistor Voltage @1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @1KHZ 25°C |
|--------------|--------------------------|----------|------------------------------|--------------|--------------------------|-----------|------------------------------------------------|------|--------------------------------|
|              |                          |          | Energy                       | Peak         |                          |           |                                                |      |                                |
|              | AC RMS Volts             | DC Volts | 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: VZ32D201**KR**)

- **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# E196885)

UL 1414 recognized (File# E182369) except VZ32D122

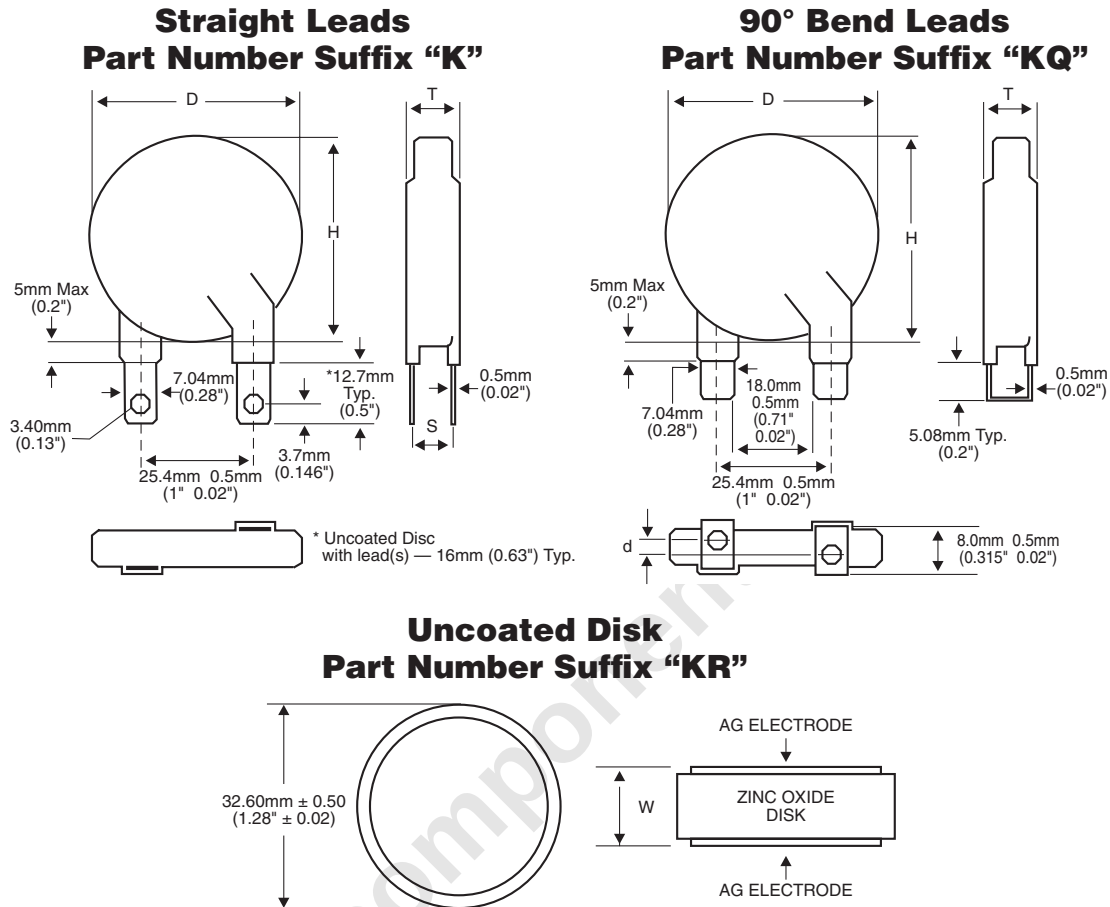
CSA 22.2 #1 certified (File #227006).

All Uncoated Disk types are recognized to UL1449 (File # E196885)

Complies with accelerated aging test requirements per ANSI/IEEE C62.11, UL File #E172311.

# METAL OXIDE VARISTORS

## VZ32 Series Dimensions



| Part Number  | D max.       | H max.       | T max.     | S         | d                  | W                    |
|--------------|--------------|--------------|------------|-----------|--------------------|----------------------|
| VZ32D201 □□□ | 40<br>(1.57) | 40<br>(1.57) | 7.5 (.30)  | 2.3 (.09) | 5.7±1.0 (.22±.04)  | 1.09±0.50 (.04±.02)  |
| 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  | Continuous Rated Voltage |          | Rated Single Pulse Transient |                     | Varistor Voltage @ 1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C |
|--------------|--------------------------|----------|------------------------------|---------------------|---------------------------|-----------|------------------------------------------------|------|---------------------------------|
|              |                          |          | Energy                       | Peak                |                           |           |                                                |      |                                 |
|              | AC RMS Volts             | DC Volts | 10/1000µs Joules             | 8/20µs KAmps 1 time | Min Volts                 | Max Volts | Volts                                          | Amps | pF                              |
| VZ34R201 □□□ | 130                      | 175      | 310                          | 40                  | 185                       | 225       | 340                                            | 300  | 10000                           |
| VZ34R221 □□□ | 140                      | 180      | 330                          | 40                  | 198                       | 242       | 360                                            | 300  | 9000                            |
| VZ34R241 □□□ | 150                      | 200      | 360                          | 40                  | 216                       | 264       | 395                                            | 300  | 8000                            |
| VZ34R271 □□□ | 180                      | 230      | 390                          | 40                  | 255                       | 311       | 455                                            | 300  | 7100                            |
| VZ34R301 □□□ | 195                      | 250      | 405                          | 40                  | 270                       | 330       | 505                                            | 300  | 6000                            |
| VZ34R331 □□□ | 210                      | 275      | 430                          | 40                  | 297                       | 363       | 540                                            | 300  | 4800                            |
| VZ34R361 □□□ | 230                      | 300      | 460                          | 40                  | 324                       | 396       | 595                                            | 300  | 5600                            |
| VZ34R391 □□□ | 250                      | 330      | 490                          | 40                  | 351                       | 429       | 650                                            | 300  | 5000                            |
| VZ34R431 □□□ | 275                      | 370      | 550                          | 40                  | 387                       | 473       | 710                                            | 300  | 4500                            |
| VZ34R471 □□□ | 300                      | 385      | 600                          | 40                  | 423                       | 517       | 775                                            | 300  | 4000                            |
| VZ34R511 □□□ | 320                      | 420      | 640                          | 40                  | 459                       | 561       | 840                                            | 300  | 3800                            |
| VZ34R561 □□□ | 360                      | 470      | 710                          | 40                  | 522                       | 638       | 910                                            | 300  | 2700                            |
| VZ34R621 □□□ | 390                      | 505      | 800                          | 40                  | 558                       | 682       | 1025                                           | 300  | 3300                            |
| VZ34R681 □□□ | 420                      | 560      | 910                          | 40                  | 612                       | 748       | 1120                                           | 300  | 3000                            |
| VZ34R751 □□□ | 460                      | 615      | 980                          | 40                  | 675                       | 825       | 1240                                           | 300  | 2600                            |
| VZ34R781 □□□ | 485                      | 640      | 1020                         | 40                  | 702                       | 858       | 1290                                           | 300  | 2700                            |
| VZ34R821 □□□ | 510                      | 675      | 1100                         | 40                  | 738                       | 902       | 1355                                           | 300  | 2500                            |
| VZ34R911 □□□ | 550                      | 745      | 1150                         | 40                  | 819                       | 1001      | 1500                                           | 300  | 1800                            |
| VZ34R951 □□□ | 575                      | 765      | 1200                         | 40                  | 855                       | 1045      | 1570                                           | 300  | 1700                            |
| VZ34R102 □□□ | 625                      | 825      | 1250                         | 40                  | 900                       | 1100      | 1650                                           | 300  | 1600                            |
| VZ34R112 □□□ | 680                      | 895      | 1350                         | 40                  | 962                       | 1175      | 1815                                           | 300  | 1500                            |
| VZ34R122 □□□ | 750                      | 970      | 1450                         | 40                  | 1062                      | 1300      | 1980                                           | 300  | 1300                            |

□□□ - Part Number Suffix Code  
(ie: VZ34R201**KR**)

- **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 # E196885)

UL 1414 recognized (File #E182369) except VZ34R122

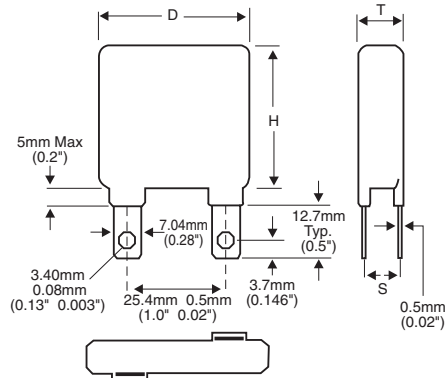
CSA 22.2 #1 certified (File #227006).

All Uncoated Disk types are recognized to UL1449 (File # E196885)

## METAL OXIDE VARISTORS

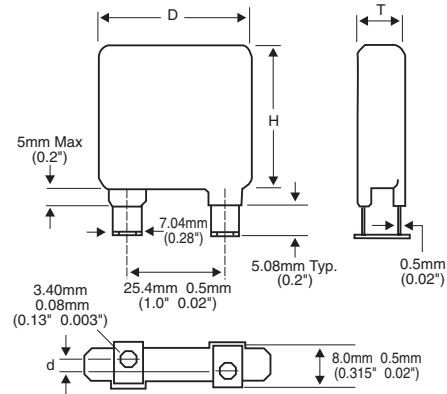
## VZ34 Single - Series Dimensions

## Straight Leads Part Number Suffix “K”

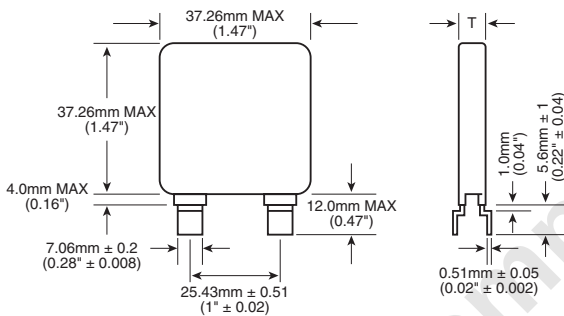


## 90° Bend Leads

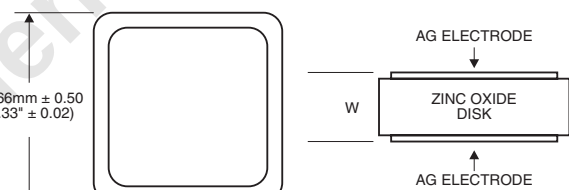
### Part Number Suffix “KQ”



## Tab Leads Outward Crimp Part Number Suffix “KA”



## Uncoated Disk Part Number Suffix “KR”



| Part Number  | D max.       | H max.       | T max.     | S<br>±1.0<br>(±.04) | d                  | W                    |
|--------------|--------------|--------------|------------|---------------------|--------------------|----------------------|
| VZ34R201 □□□ | 42<br>(1.65) | 42<br>(1.65) | 7.5 (.30)  | 2.5 (.10)           | 5.7±1.0 (.22±.04)  | 1.34±0.50 (.05±.02)  |
| 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  | Continuous Rated Voltage* |          | Rated Single Pulse Transient |                     | Varistor Voltage @ 1mA DC* |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C** |
|--------------|---------------------------|----------|------------------------------|---------------------|----------------------------|-----------|------------------------------------------------|------|-----------------------------------|
|              |                           |          | Energy*                      | Peak***             |                            |           |                                                |      |                                   |
|              | AC RMS Volts              | DC Volts | 10/1000µs Joules             | 8/20µs Kamps 1 time | Min Volts                  | Max Volts | Volts*                                         | Amps | pF                                |
| VZ34R201 □□□ | 130                       | 175      | 310                          | 40                  | 185                        | 225       | 340                                            | 300  | 7900                              |
| VZ34R221 □□□ | 140                       | 180      | 330                          | 40                  | 198                        | 242       | 360                                            | 300  | 7200                              |
| VZ34R241 □□□ | 150                       | 200      | 360                          | 40                  | 216                        | 264       | 395                                            | 300  | 6600                              |
| VZ34R271 □□□ | 180                       | 230      | 390                          | 40                  | 255                        | 311       | 455                                            | 300  | 5600                              |
| VZ34R301 □□□ | 195                       | 250      | 405                          | 40                  | 270                        | 330       | 505                                            | 300  | 5200                              |
| VZ34R331 □□□ | 210                       | 275      | 430                          | 40                  | 297                        | 363       | 540                                            | 300  | 4800                              |
| VZ34R361 □□□ | 230                       | 300      | 460                          | 40                  | 324                        | 396       | 595                                            | 300  | 4400                              |
| VZ34R391 □□□ | 250                       | 330      | 490                          | 40                  | 351                        | 429       | 650                                            | 300  | 4100                              |
| VZ34R431 □□□ | 275                       | 370      | 550                          | 40                  | 387                        | 473       | 710                                            | 300  | 3800                              |
| VZ34R471 □□□ | 300                       | 385      | 600                          | 40                  | 423                        | 517       | 775                                            | 300  | 3400                              |
| VZ34R511 □□□ | 320                       | 420      | 640                          | 40                  | 459                        | 561       | 840                                            | 300  | 3200                              |
| VZ34R561 □□□ | 360                       | 470      | 710                          | 40                  | 522                        | 638       | 910                                            | 300  | 2700                              |
| VZ34R621 □□□ | 390                       | 505      | 800                          | 40                  | 558                        | 682       | 1025                                           | 300  | 2600                              |
| VZ34R681 □□□ | 420                       | 560      | 910                          | 40                  | 612                        | 748       | 1120                                           | 300  | 2400                              |
| VZ34R751 □□□ | 460                       | 615      | 980                          | 40                  | 675                        | 825       | 1240                                           | 300  | 2200                              |
| VZ34R781 □□□ | 485                       | 640      | 1020                         | 40                  | 702                        | 858       | 1290                                           | 300  | 2100                              |
| VZ34R821 □□□ | 510                       | 675      | 1100                         | 40                  | 738                        | 902       | 1355                                           | 300  | 2000                              |
| VZ34R911 □□□ | 550                       | 745      | 1150                         | 40                  | 819                        | 1001      | 1500                                           | 300  | 1800                              |
| VZ34R951 □□□ | 575                       | 765      | 1200                         | 40                  | 855                        | 1045      | 1570                                           | 300  | 1700                              |
| VZ34R102 □□□ | 625                       | 825      | 1250                         | 40                  | 900                        | 1100      | 1650                                           | 300  | 1600                              |
| VZ34R112 □□□ | 680                       | 895      | 1350                         | 40                  | 962                        | 1175      | 1815                                           | 300  | 1500                              |
| VZ34R122 □□□ | 750                       | 970      | 1450                         | 40                  | 1062                       | 1300      | 1980                                           | 300  | 1300                              |

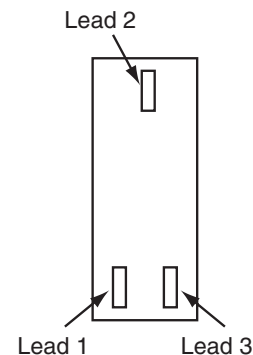
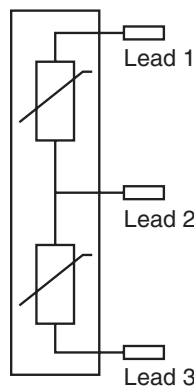
□□□ - Part Number Suffix Code  
(ie: VZ34R201**KD**)

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

UL 1449 Recognized (File # E196885)  
UL 1414 recognized (File #E182369) except VZ34R122  
CSA 22.2 #1 certified (File #227006).

\* 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.

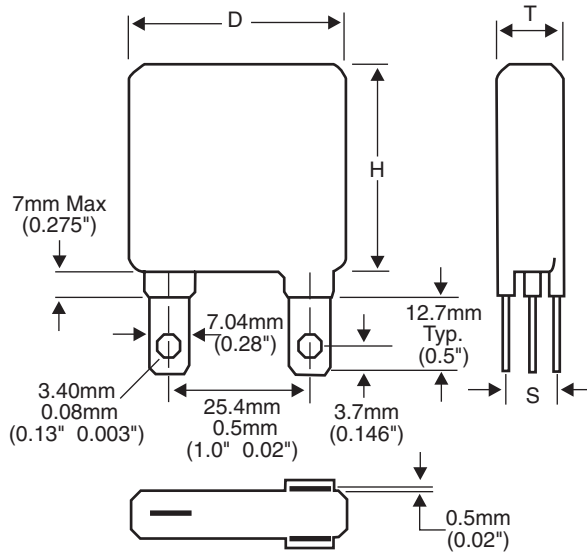
Termination



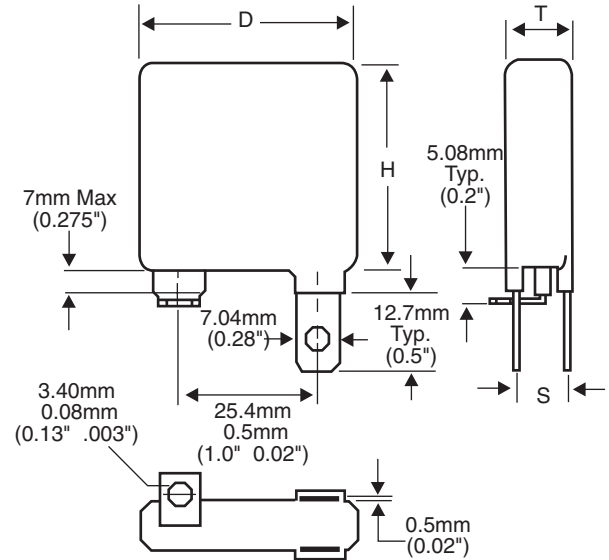
# METAL OXIDE VARISTORS

## VZ34 Dual - Series Dimensions

**Straight Leads**  
**Part Number Suffix "KD"**



**90° Bend Leads**  
**Part Number Suffix "KDQ"**



| Part Number  | D max.       | H max.       | T max.     | S                   |
|--------------|--------------|--------------|------------|---------------------|
| VZ34R201 □□□ | 42<br>(1.65) | 42<br>(1.65) | 9.1 (.36)  | 4.1±1.0 (.16±0.04)  |
| 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) |

# METAL OXIDE VARISTORS

## VZ40 Series Electrical Characteristics

| Part Number  | Continuous Rated Voltage |          | Rated Single Pulse Transient |              | Varistor Voltage @ 1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C |
|--------------|--------------------------|----------|------------------------------|--------------|---------------------------|-----------|------------------------------------------------|------|---------------------------------|
|              |                          |          | Energy                       | Peak         |                           |           |                                                |      |                                 |
|              | AC RMS Volts             | DC Volts | 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                            |
| VZ40D301 □□□ | 195                      | 250      | 425                          | 40           | 270                       | 330       | 505                                            | 300  | 6550                            |
| 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: VZ40D201**KR**)

- **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# E196885)

UL 1414 recognized (File# E182369) except VZ40D122

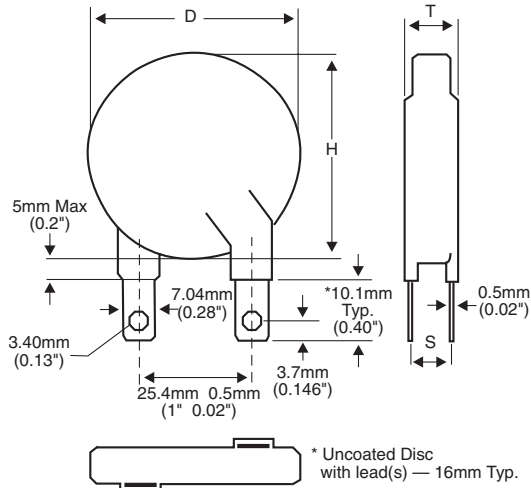
CSA 22.2 #1 certified (File #227006).

All Uncoated Disk types are recognized to UL1449 (File # E196885)

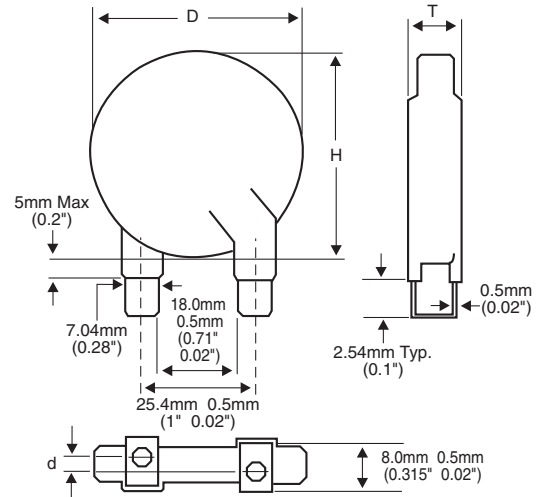
# METAL OXIDE VARISTORS

## VZ40 Series Dimensions Straight Leads

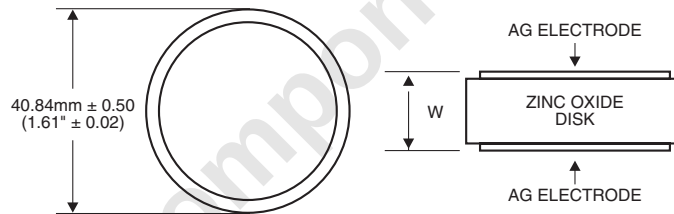
### Part Number Suffix "K"



## 90° Bend Leads Part Number Suffix "KQ"



## Uncoated Disk Part Number Suffix "KR"



| Part Number  | D max.       | H max.       | T max.     | S         | d                  | W                    |
|--------------|--------------|--------------|------------|-----------|--------------------|----------------------|
| VZ40D201 □□□ | 48<br>(1.89) | 48<br>(1.89) | 7.5 (.30)  | 2.3 (.09) | 5.7±1.0 (.22±.04)  | 1.13±0.50 (.044±.02) |
| 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)  |
| VZ40D301 □□□ |              |              | 8.7 (.34)  | 3.0 (.12) | 5.0±1.0 (.20±.04)  | 1.68±0.50 (.07±.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  | Continuous Rated Voltage |          | Rated Single Pulse Transient |              | Varistor Voltage @ 1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C |
|--------------|--------------------------|----------|------------------------------|--------------|---------------------------|-----------|------------------------------------------------|------|---------------------------------|
|              |                          |          | Energy                       | Peak         |                           |           |                                                |      |                                 |
|              | AC RMS Volts             | DC Volts | 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                           |
| VZ53D301 □□□ | 195                      | 250      | 655                          | 70           | 270                       | 330       | 505                                            | 500  | 12000                           |
| 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      | 1900                         | 70           | 819                       | 1001      | 1500                                           | 500  | 4100                            |
| VZ53D951 □□□ | 575                      | 765      | 2000                         | 70           | 855                       | 1045      | 1570                                           | 500  | 4000                            |
| VZ53D102 □□□ | 625                      | 825      | 2070                         | 70           | 900                       | 1100      | 1650                                           | 500  | 3700                            |
| VZ53D112 □□□ | 680                      | 895      | 2270                         | 70           | 962                       | 1175      | 1815                                           | 500  | 3300                            |
| VZ53D122 □□□ | 750                      | 970      | 2400                         | 70           | 1062                      | 1300      | 1980                                           | 500  | 3400                            |

□□□ - Part Number Suffix Code  
(ie: VZ53D201**KR**)

- **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 # E196885)

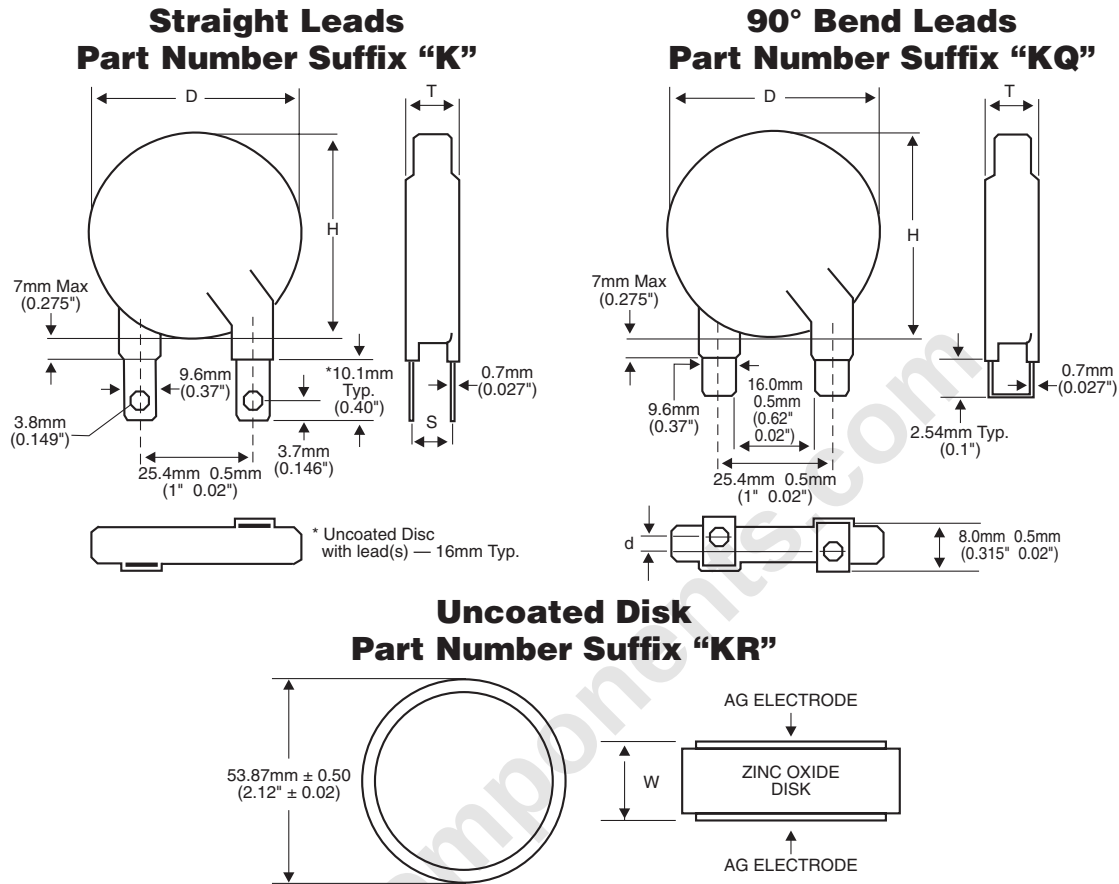
UL 1414 recognized (File #E182369) except VZ53D122

CSA 22.2 #1 certified (File #227006)

All Uncoated Disk types are recognized to UL1449 (File # E196885)

# METAL OXIDE VARISTORS

## VZ53 Series Dimensions



| PartNumber   | D max.      | H max.      | T max.      | S         | d                  | W                    |
|--------------|-------------|-------------|-------------|-----------|--------------------|----------------------|
| VZ53D201 □□□ | 61<br>(2.4) | 61<br>(2.4) | 7.5 (.30)   | 2.3 (.09) | 5.7±1.0 (.22±.04)  | 1.41±0.50 (.056±.02) |
| 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) |
| VZ53D301 □□□ |             |             | 8.7 (.34)   | 3.0 (.12) | 5.0±1.0 (.20±.04)  | 2.10±0.50 (.08±.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

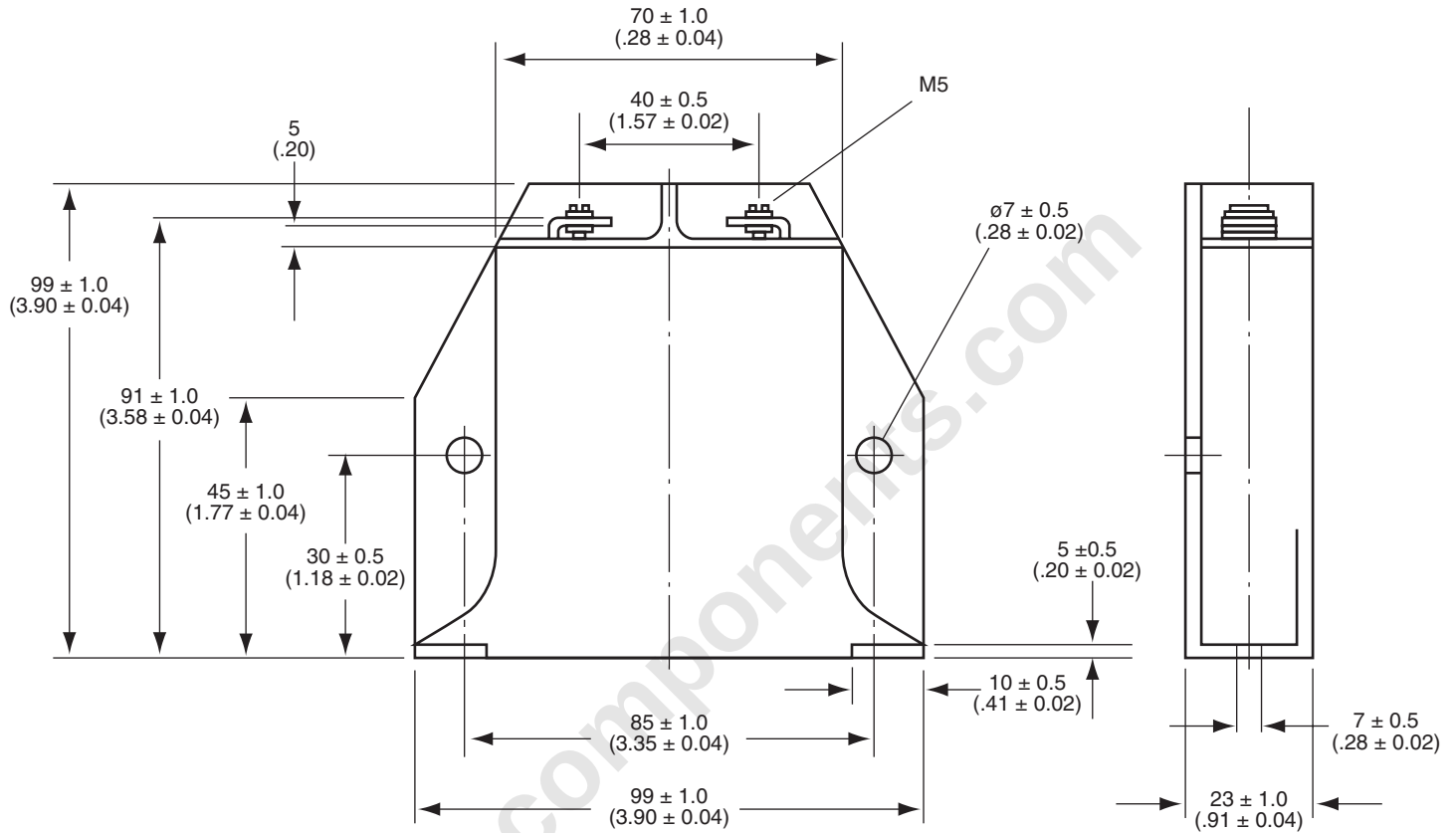
### VZ60 Series Electrical Characteristics

| Part Number | Continuous Rated Voltage |          | Rated Single Pulse Transient |              | Varistor Voltage @ 1mA DC |           | Maximum Clamping Voltage @ Test Current 8/20µs |      | Typical Capacitance @ 1KHZ 25°C |
|-------------|--------------------------|----------|------------------------------|--------------|---------------------------|-----------|------------------------------------------------|------|---------------------------------|
|             |                          |          | Energy                       | Peak         |                           |           |                                                |      | pF                              |
|             | AC RMS Volts             | DC Volts | 10/1000µs Joules             | 8/20µs KAmps | Min Volts                 | Max Volts | Volts                                          | Amps |                                 |
| VZ60B201K   | 130                      | 175      | 630                          | 80           | 185                       | 225       | 340                                            | 500  | 15000                           |
| VZ60B221K   | 140                      | 180      | 650                          | 80           | 198                       | 242       | 365                                            | 500  | 13250                           |
| VZ60B241K   | 150                      | 200      | 750                          | 80           | 216                       | 264       | 395                                            | 500  | 12500                           |
| VZ60B271K   | 180                      | 230      | 800                          | 80           | 255                       | 311       | 455                                            | 500  | 11000                           |
| VZ60B301K   | 195                      | 250      | 870                          | 80           | 270                       | 330       | 500                                            | 500  | 10000                           |
| VZ60B331K   | 210                      | 275      | 950                          | 80           | 297                       | 363       | 550                                            | 500  | 9000                            |
| VZ60B361K   | 230                      | 300      | 980                          | 80           | 324                       | 396       | 595                                            | 500  | 8500                            |
| VZ60B391K   | 250                      | 330      | 1020                         | 80           | 351                       | 429       | 650                                            | 500  | 7500                            |
| VZ60B431K   | 275                      | 370      | 1140                         | 80           | 387                       | 473       | 710                                            | 500  | 7000                            |
| VZ60B471K   | 300                      | 385      | 1240                         | 80           | 423                       | 517       | 775                                            | 500  | 6500                            |
| VZ60B511K   | 320                      | 420      | 1320                         | 80           | 459                       | 561       | 845                                            | 500  | 6000                            |
| VZ60B561K   | 360                      | 470      | 1400                         | 80           | 522                       | 638       | 920                                            | 500  | 5500                            |
| VZ60B621K   | 390                      | 505      | 1490                         | 80           | 558                       | 682       | 1025                                           | 500  | 5000                            |
| VZ60B681K   | 420                      | 560      | 1550                         | 80           | 612                       | 748       | 1120                                           | 500  | 4500                            |
| VZ60B751K   | 460                      | 615      | 1610                         | 80           | 675                       | 825       | 1240                                           | 500  | 4300                            |
| VZ60B781K   | 485                      | 640      | 1670                         | 80           | 702                       | 858       | 1290                                           | 500  | 4000                            |
| VZ60B821K   | 510                      | 675      | 1840                         | 80           | 738                       | 902       | 1355                                           | 500  | 3900                            |
| VZ60B911K   | 550                      | 745      | 1960                         | 80           | 819                       | 1001      | 1500                                           | 500  | 3300                            |
| VZ60B102K   | 625                      | 825      | 2170                         | 80           | 900                       | 1100      | 1650                                           | 500  | 3000                            |
| VZ60B112K   | 680                      | 895      | 2360                         | 80           | 962                       | 1175      | 1815                                           | 500  | 2700                            |
| VZ60B951K   | 575                      | 765      | 2070                         | 80           | 855                       | 1045      | 1570                                           | 500  | 3100                            |
| VZ60B122K   | 750                      | 990      | 2570                         | 80           | 1080                      | 1320      | 1980                                           | 500  | 2500                            |
| VZ60B142K   | 880                      | 1140     | 2650                         | 80           | 1260                      | 1540      | 2310                                           | 500  | 2300                            |
| VZ60B162K   | 1000                     | 1280     | 2870                         | 80           | 1440                      | 1760      | 2640                                           | 500  | 2000                            |

# METAL OXIDE VARISTORS

## VZ60 Series Dimensions

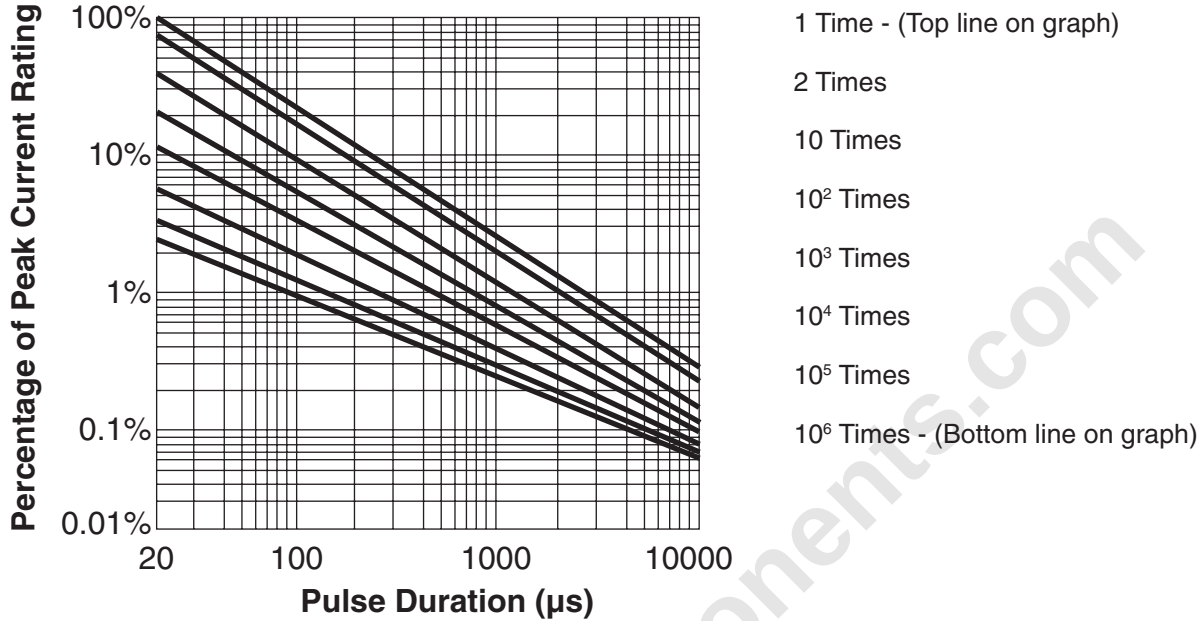
mm (inches)



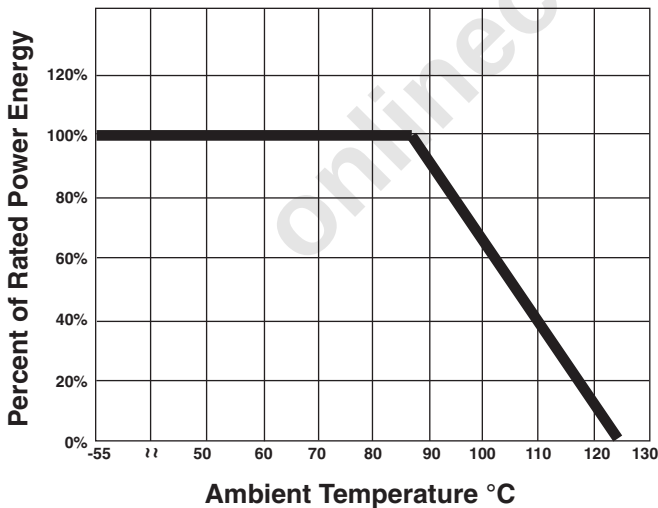
## METAL OXIDE VARISTORS

### Peak Pulse and Derating Curves

#### Peak Current Per Pulse Versus Pulse Duration



#### Temperature Derating Curve Power and Energy Rating vs. Temperature



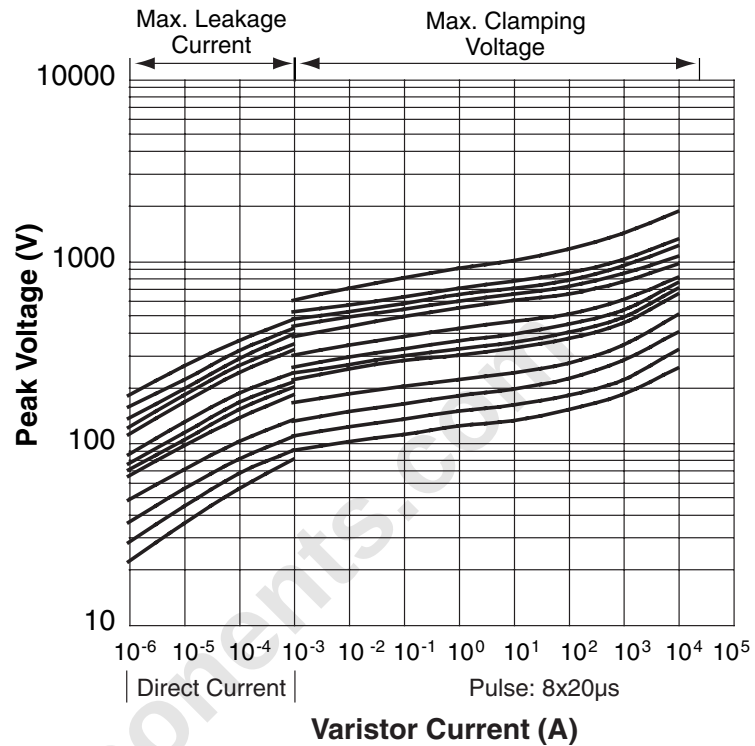
# METAL OXIDE VARISTORS

## 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)

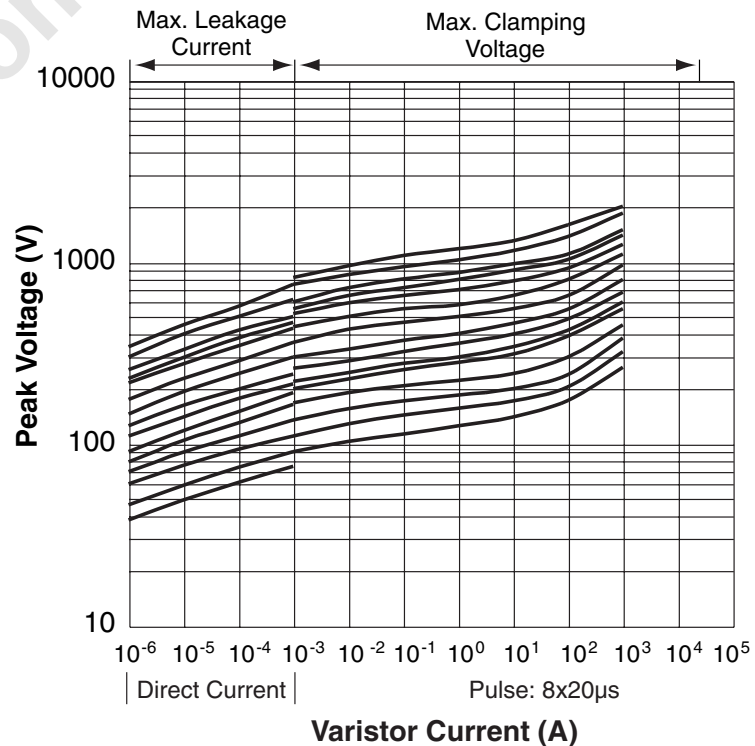
(Also applies to "E" series parts)



### 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.

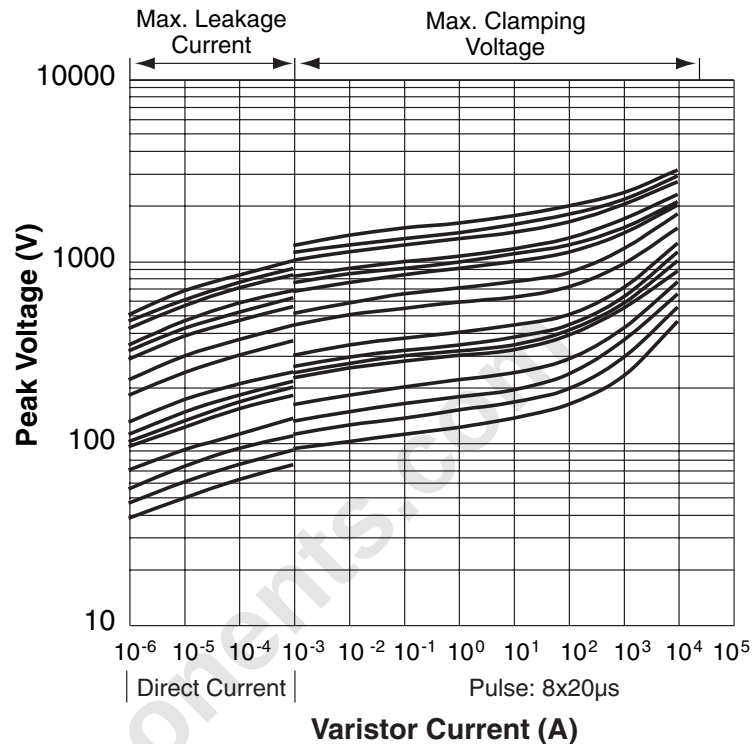
## METAL OXIDE VARISTORS

### 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)

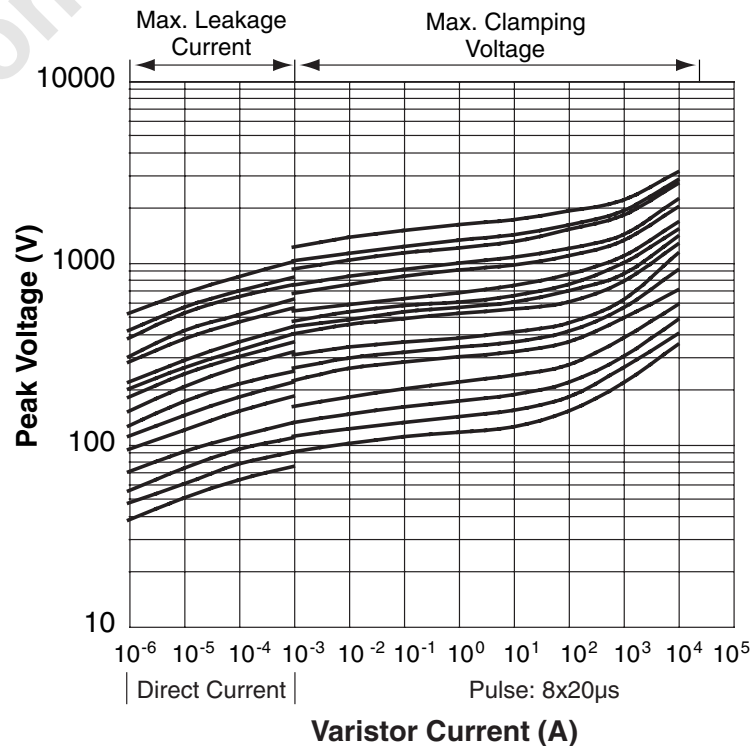
(Also applies to "E" series parts)



#### 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)



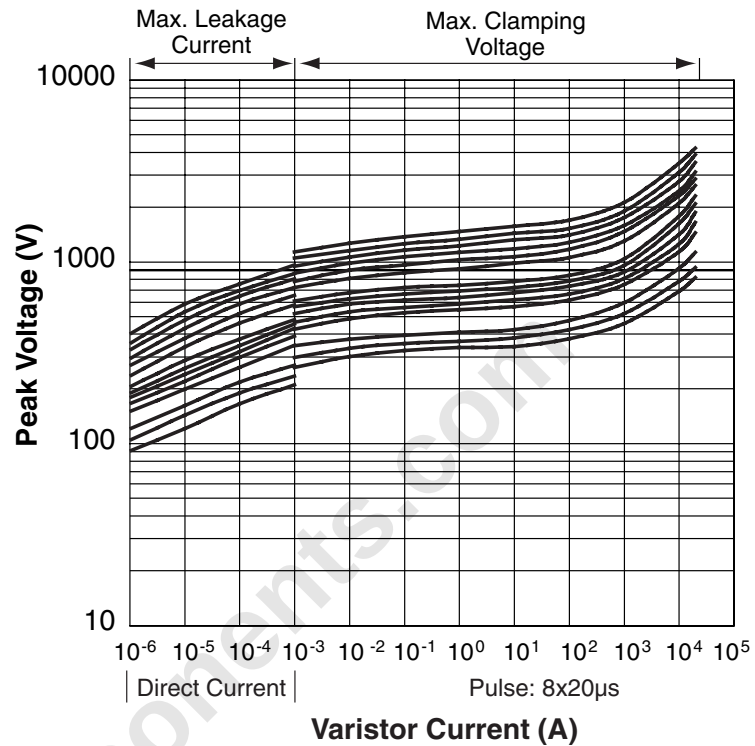
At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

## METAL OXIDE VARISTORS

### V-I Characteristics (continued)

#### 18mm Disc Size

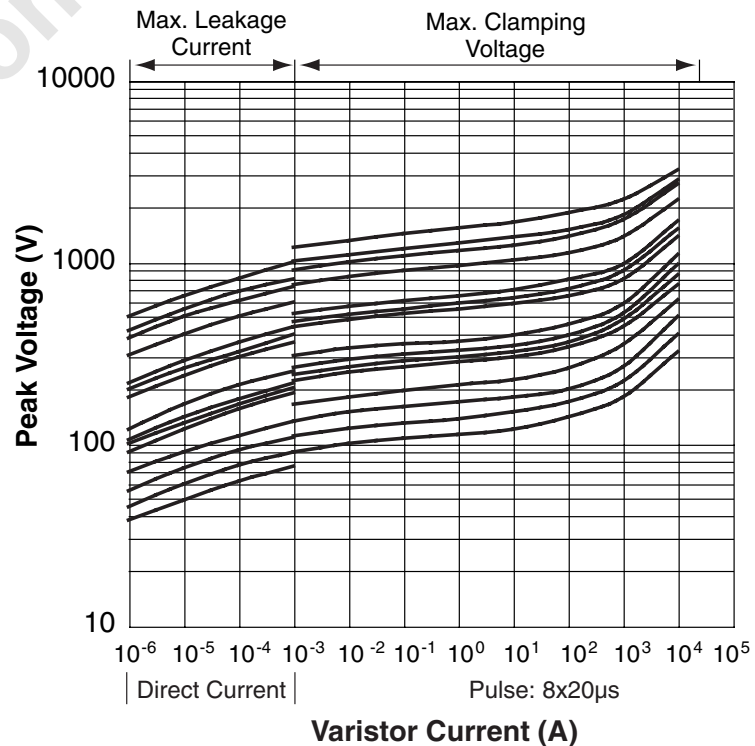
VZ18E951K - (Top line on graph)  
VZ18E911K  
VZ18E821K  
VZ18E751K  
VZ18E681K  
VZ18E621K  
VZ18E511K  
VZ18E471K  
VZ18E431K  
VZ18E391K  
VZ18E361K  
VZ18E271K  
VZ18E241K  
VZ18E201K - (Bottom line on graph)



#### 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)



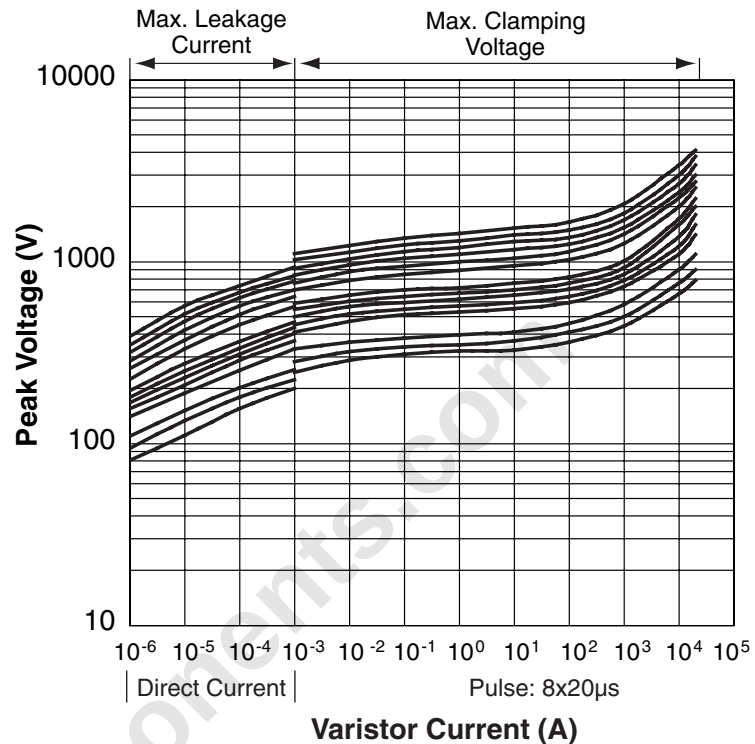
At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

## METAL OXIDE VARISTORS

### V-I Characteristics (continued)

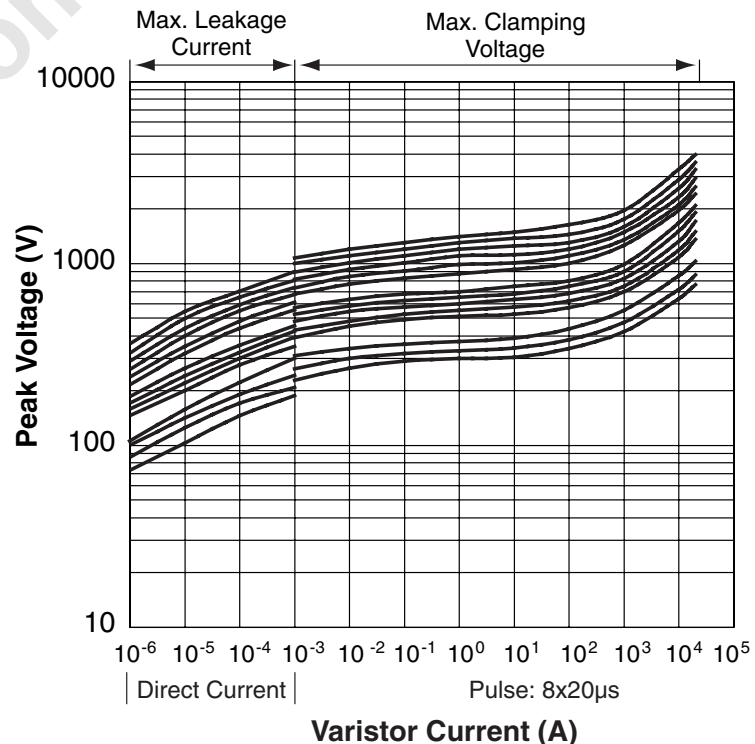
#### 25mm Disc Size

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)



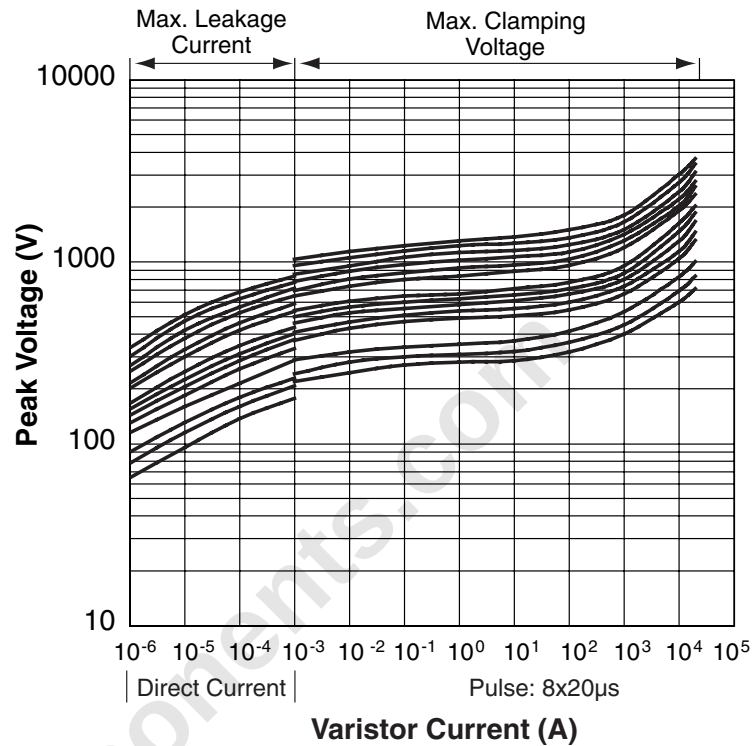
At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

## METAL OXIDE VARISTORS

### V-I Characteristics (continued)

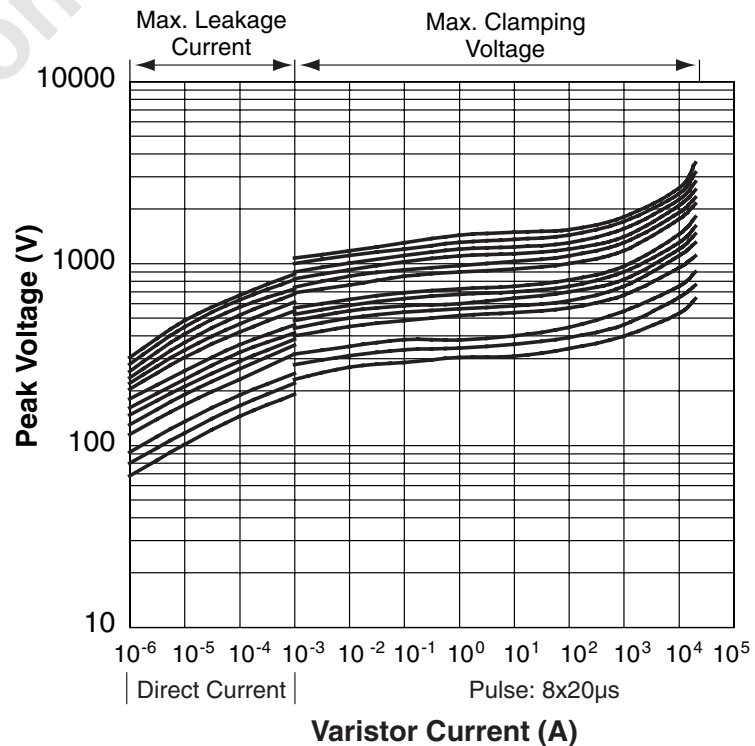
#### 34mm Disc Size

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)



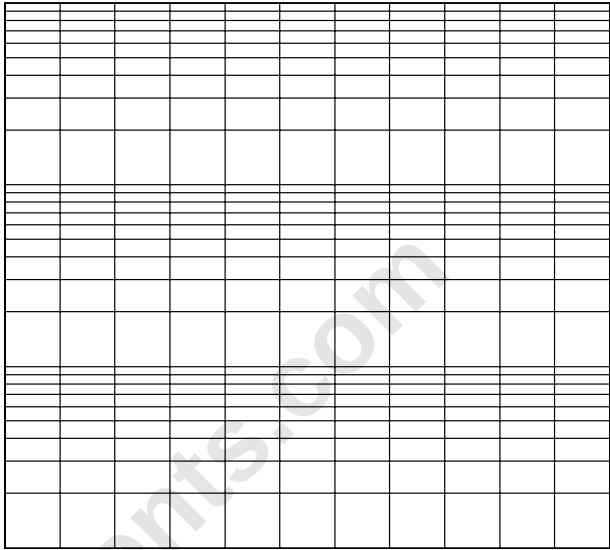
At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

# METAL OXIDE VARISTORS

## V-I Characteristics (continued)

### 53mm Disc Size

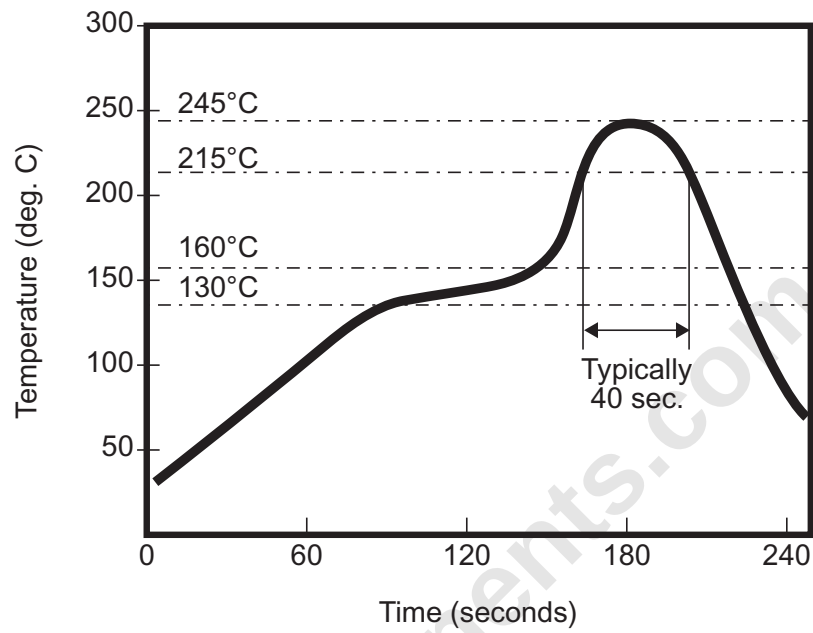
- VZ53D951K - (Top line on graph)
- VZ53D911K
- VZ53D821K
- VZ53D751K
- VZ53D681K
- VZ53D621K
- VZ53D511K
- VZ53D471K
- VZ53D431K
- VZ53D391K
- VZ53D361K
- VZ53D271K
- VZ53D241K
- VZ53D201K - (Bottom line on graph)



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

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## 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                      | △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.**

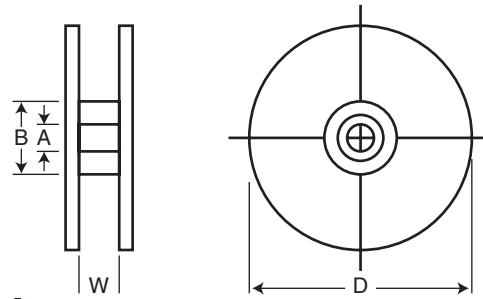
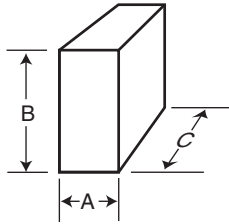
Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel)

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

## METAL OXIDE VARISTORS

### 5mm / 7mm Taping Specifications (continued)



#### Ammo Box

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

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

2,000 pieces (5ø)

< 250VAC = 1,500 pieces (7ø)

> 250VAC = 1,000 pieces (7ø)

All dimensions are in Millimeters.

#### Reel

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

W = Approximately 50, D = 350ømax,

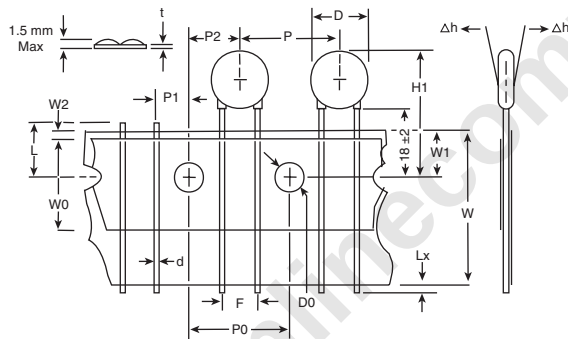
A = Approximately 30ø, B = Approximately 95ø

2,000 pieces (5ø)

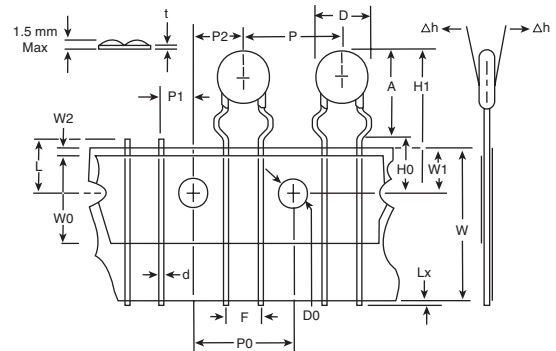
< 250VAC = 1,500 pieces (7ø)

> 250VAC = 1,000 pieces (7ø)

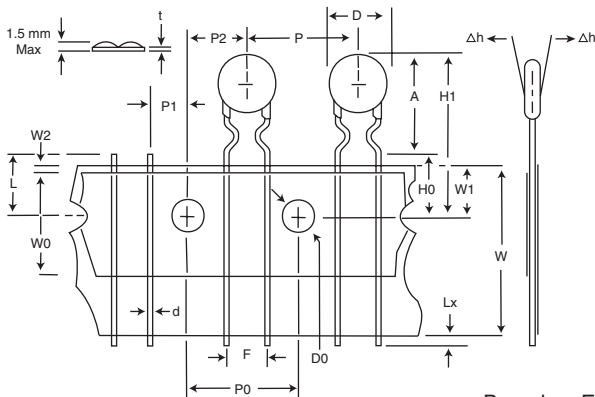
#### Straight Lead T11 (Ammo Box) and T1 (Reel)



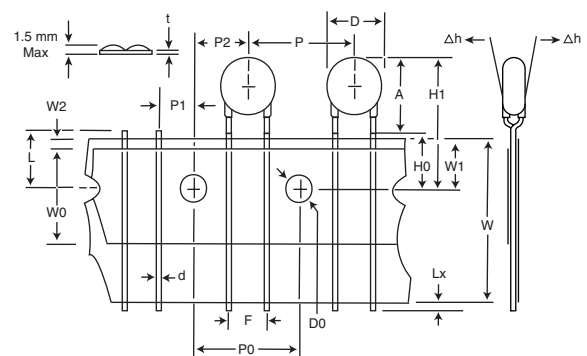
#### Outward Crimp T17 (Ammo Box) and T3 (Reel)



#### Inward Crimp T1D (Ammo Box) and T14 (Reel)



#### In-Line Crimp T1W (Ammo Box) and 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                      | △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.**

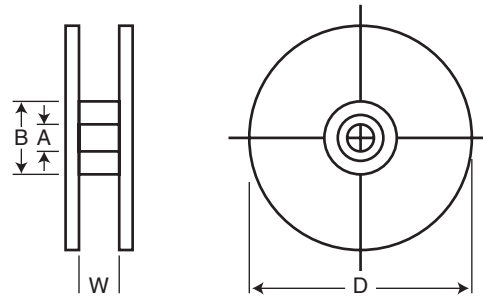
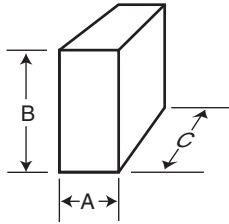
Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel)

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

### Reel

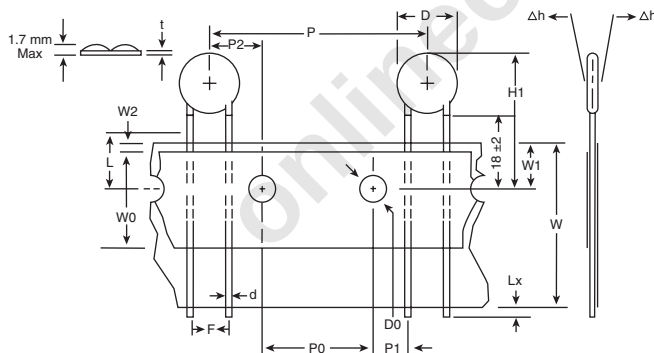
Reel Taping Codes  
(T19, T18, T4, T38, T26, T1N, T16, T12)

W = Approximately 50  
D = 350ømax  
A = Approximately 30ø  
B = Approximately 95ø

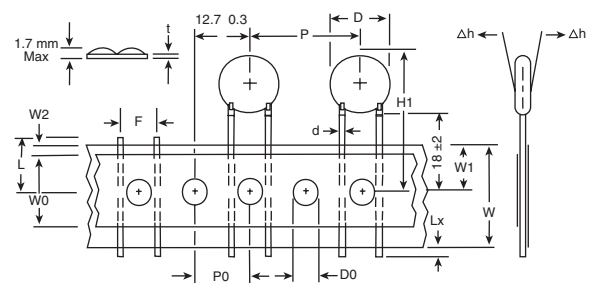
< 300VAC = 500 to 1,000 pieces  
> 300VAC = 300 pieces

All dimensions are in Millimeters.

### Straight Lead T7 (Ammo Box) and T18 (Reel) (5mm Lead Spacing)



### Straight Lead T36 (Ammo Box) and T19 (Reel) (7.5mm Lead Spacing)

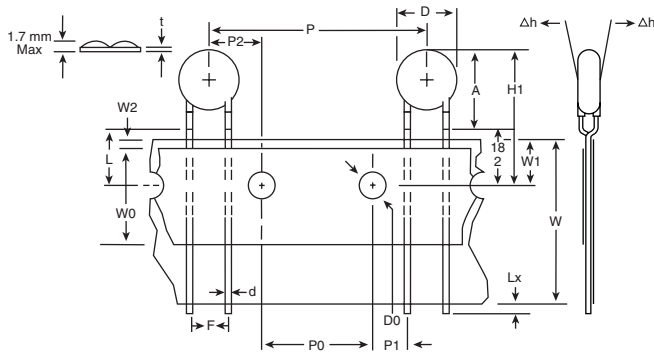


Based on EIA-468-B Specifications.

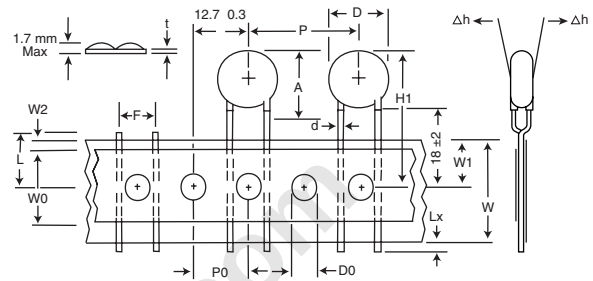
# METAL OXIDE VARISTORS

## 10mm Taping Specifications (continued)

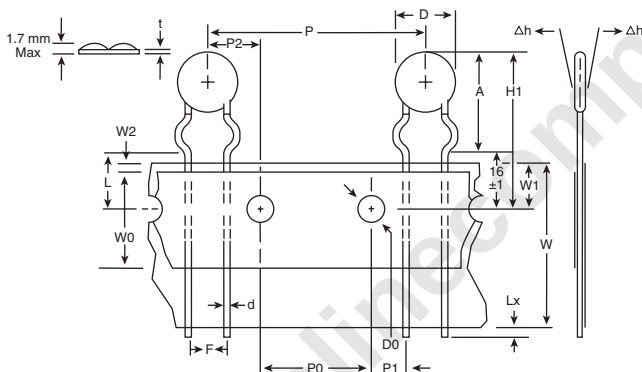
**In-Line Crimp**  
**T15 (Ammo Box) and T38 (Reel)**  
**(5mm Lead Spacing)**



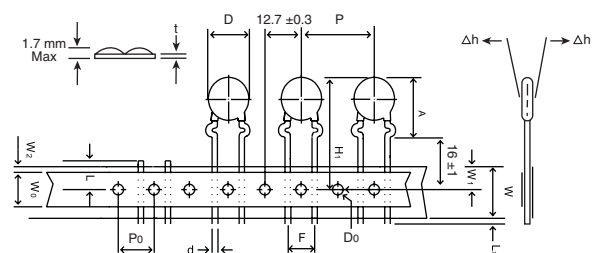
**In-Line Crimp**  
**T43 (Ammo Box) and T4 (Reel)**  
**(7.5mm Lead Spacing)**



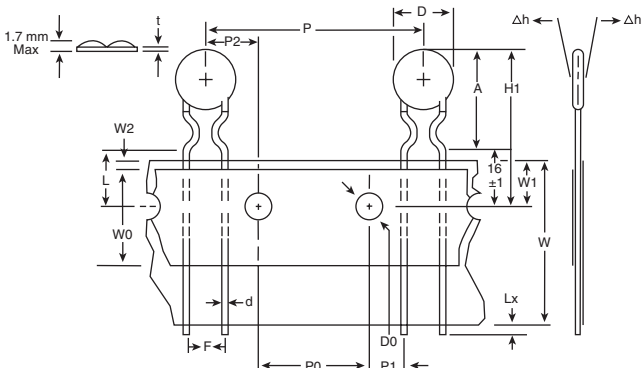
**Outward Crimp**  
**T10 (Ammo Box) and T26 (Reel)**  
**(5mm Lead Spacing)**



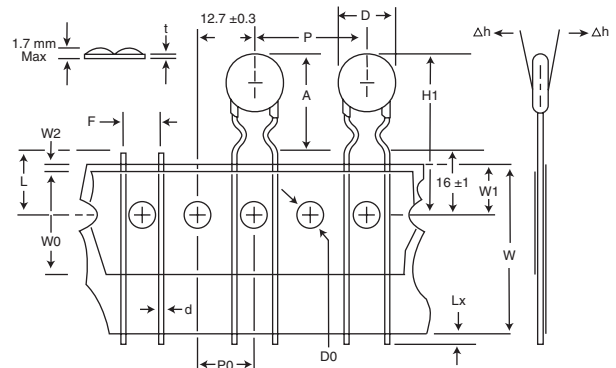
**Outward Crimp**  
**T1U (Ammo Box) and T1N (Reel)**  
**(7.5mm Lead Spacing)**



**Inward Crimp**  
**T6 (Ammo Box) and T12 (Reel)**  
**(5mm Lead Spacing)**



**Inward Crimp**  
**T8 (Ammo Box) and T16 (Reel)**  
**(7.5mm Lead Spacing)**



Based on EIA-468-B Specifications.

## METAL OXIDE VARISTORS

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## 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.**

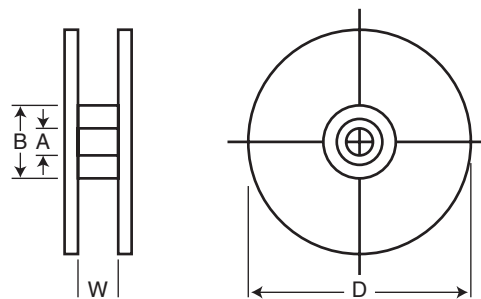
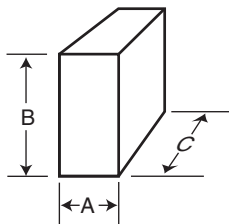
Note: Basepaper Thickness = 0.375mm ± 0.1mm (Ammo Box), 0.53mm ± 0.1mm (Reel)

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

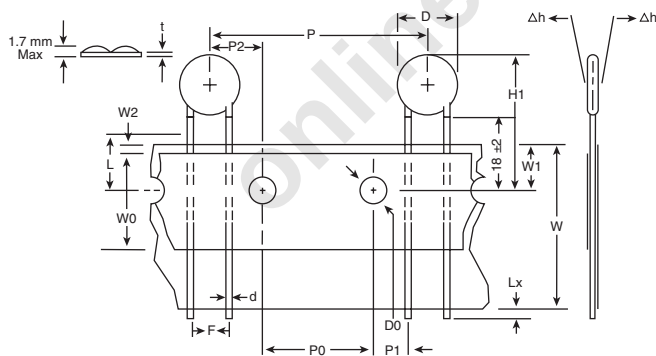
Reel Taping Codes  
(T19, T18, T4, T38, T26, T1N, T16, T12)

W = Approximately 50  
D = 350ømax  
A = Approximately 30ø  
B = Approximately 95ø

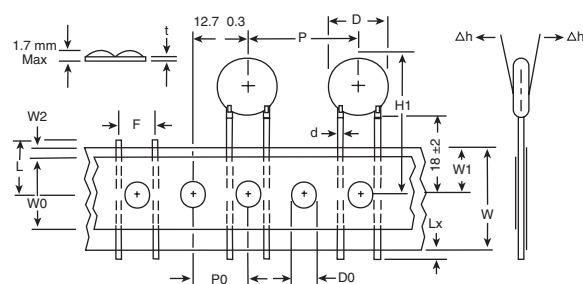
< 300VAC = 500 to 1,000 pieces  
≥ 300VAC = 300 pieces

All dimensions are in Millimeters.

### Straight Lead T7 (Ammo Box) and T18 (Reel) (5mm Lead Spacing)



### Straight Lead T36 (Ammo Box) and T19 (Reel) (7.5mm Lead Spacing)

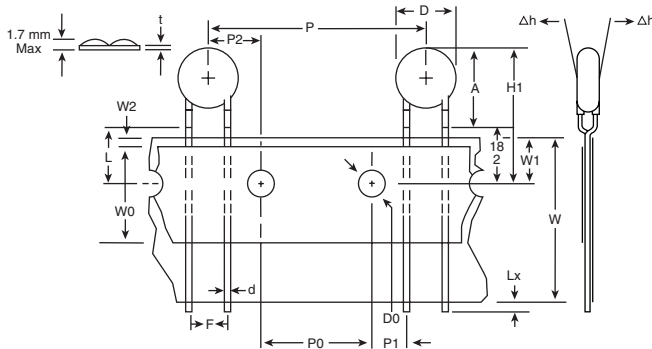


Based on EIA-468-B Specifications.

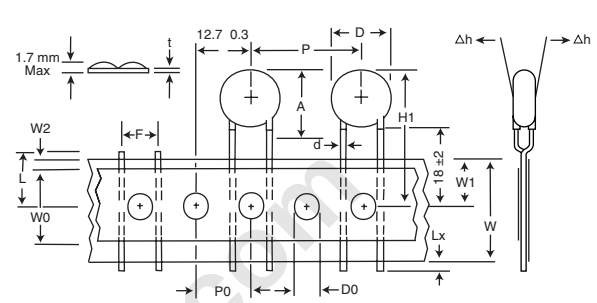
# METAL OXIDE VARISTORS

## 14mm Taping Specifications (continued)

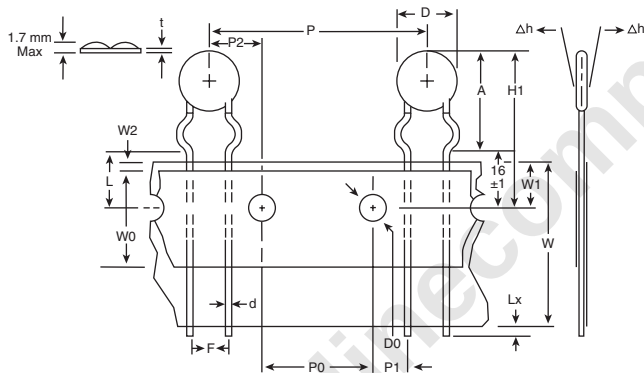
**In-Line Crimp**  
**T15 (Ammo Box) and T38 (Reel)**  
**(5mm Lead Spacing)**



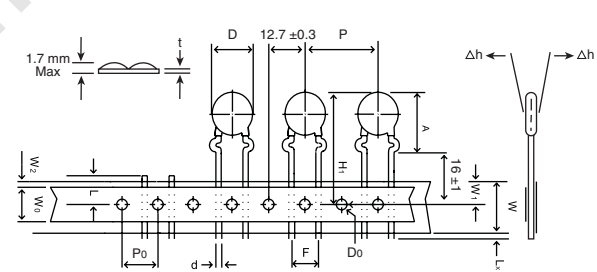
**In-Line Crimp**  
**T43 (Ammo Box) and T4 (Reel)**  
**(7.5mm Lead Spacing)**



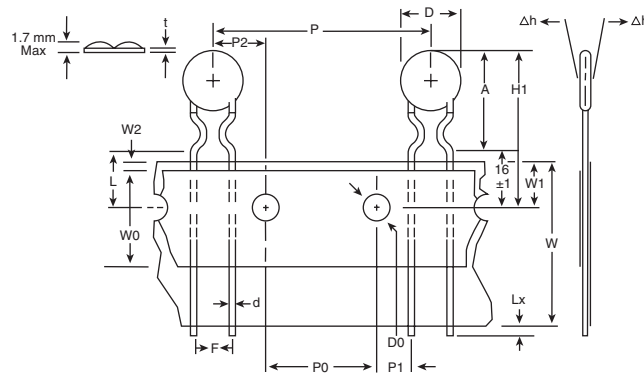
**Outward Crimp**  
**T10 (Ammo Box) and T26 (Reel)**  
**(5mm Lead Spacing)**



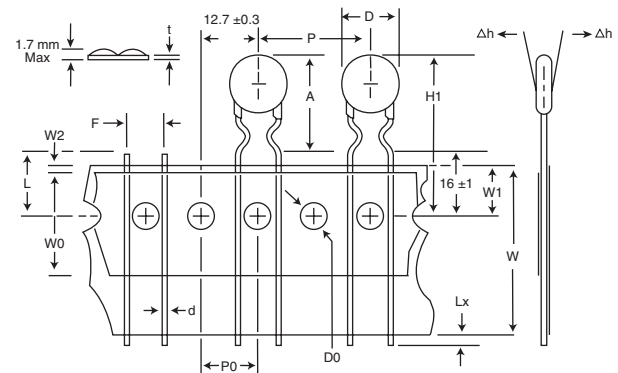
**Outward Crimp**  
**T1U (Ammo Box) and T1N (Reel)**  
**(7.5mm Lead Spacing)**



**Inward Crimp**  
**T6 (Ammo Box) and T12 (Reel)**  
**(5mm Lead Spacing)**



**Inward Crimp**  
**T8 (Ammo Box) and T16 (Reel)**  
**(7.5mm Lead Spacing)**



Based on EIA-468-B Specifications.

## METAL OXIDE VARISTORS

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## 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<br>(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<br>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<br>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.

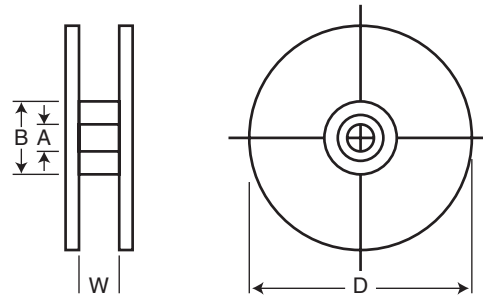
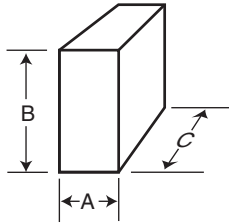
\* - 18mm disc size dimensions: D = 22 max, H1 = 46 max, A = 26 max.

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)

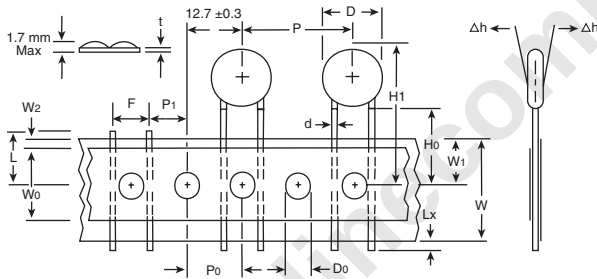
A = Approx. 30ø, B = Approx. 95ø  
W = Approx. 50, D = 350ømax

< 300VAC = 500 pieces, ≥ 300VAC = 300 pieces

All dimensions are in Millimeters.

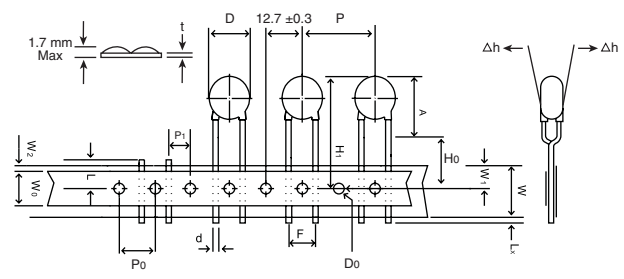
### Straight Lead

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



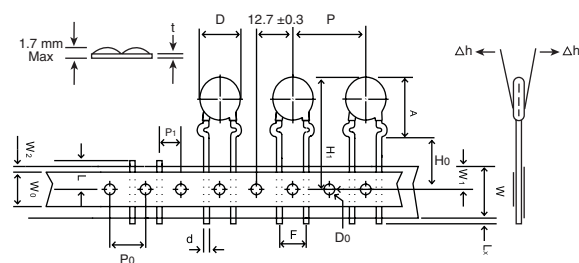
### In-Line Crimp

**T2 (Ammo Box) and T25 (Reel) (7.5mm Lead Spacing)**  
**T60 (Ammo Box) and T3X (Reel) (10mm Lead Spacing)**



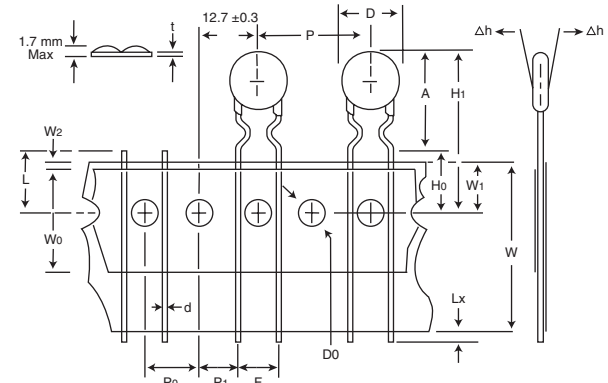
### Outward Crimp

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



### Inward Crimp

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

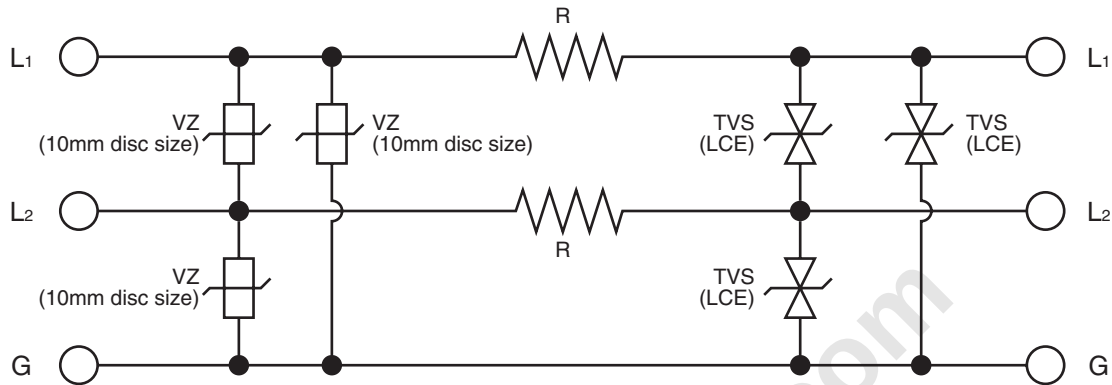


Based on EIA-468-B Specifications.

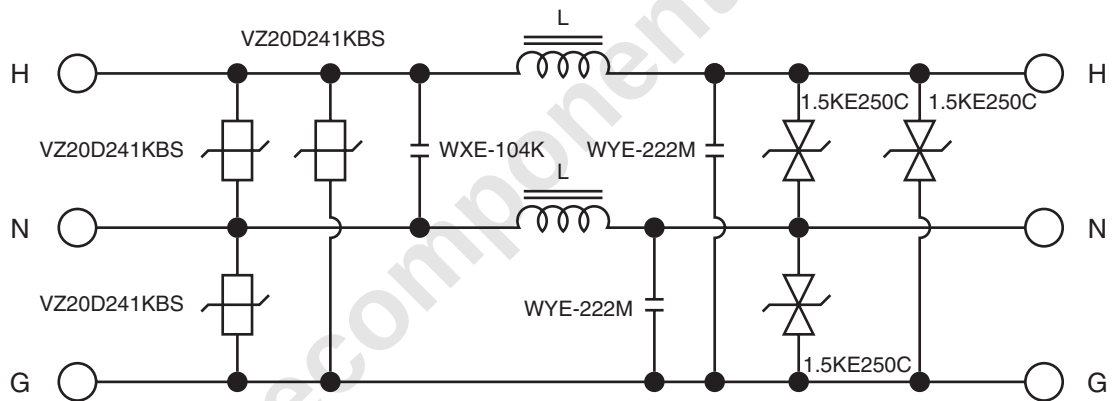
# METAL OXIDE VARISTORS

## Circuit Examples

### Data Line Protection



### AC Line Protection



WXE = World Products RFI Suppressor "X Type" (Across-the-Line)  
WYE = World Products RFI Suppressor "Y Type" (Line-to-Ground)

### Telecom Circuit Protection

