

Thermally Protected Ceramic Metal Oxide Varistors



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Thermally Protected Ceramic Metal Oxide Varistors

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World Products Inc. TVZ series is a two or three-leaded Thermally Protected Metal Oxide Varistor

One lead of the TVZ varistor is connected to a thermal link which is designed to open when the varistor is under sustained abnormal over-voltage conditions. The TVZ series is designed to meet the abnormal over-voltage requirements of UL 1449 4th edition, Section 44.4.

Traditional Metal Oxide Varistors were originally designed to protect equipment from surges at the specified rated voltage, but Metal Oxide Varistors may fail to a short-circuit condition or fail to open when subjected to a sustained steady-state overvoltage above its rated specification. The TVZ has a thermal link integrated with an MOV disk that responds to the MOV temperature and disconnects the MOV from the line, should the temperature or voltage exceed a certain level.

World Products Inc. three-leaded surge protective component is designed to be connected, via the monitor lead, to an indicator (such as an LED) to provide diagnostic features indicating if the MOV is disconnected from the circuit in the event the thermal link element opens.

As a result of the integration of the thermal link attached to the MOV disc, Thermally Protected Varistors provide an instant response to unexpected over-voltage situations. World Products Inc. Thermally Protected Varistors offer protection to sensitive downstream electric components.

Additionally, TVZ varistors are wave solderable which simplifies end product assembly by reducing the expense and rework associated with hand soldering operations.

CAUTION: Thermally Protected Varistors are intended, in conjunction with appropriate enclosure design, to help facilitate SPD module compliance to UL 1449. Under extreme abnormal over-voltage conditions, some units will exhibit substantial heating, arcing and venting prior to opening. Modules must be designed to contain this possibility. Application testing is strongly recommended.

Proper design of surge protective devices (SPD's) require that they meet new UL1449 4th Edition requirements for abnormal over-voltage limited current. Fuses that are meant to protect the system for large fault currents do not address the need to protect against low fault currents. These low fault currents can result in catastrophic failure prior to tripping the higher current fuse. TVZ series varistors can meet the needs of the SPD designer, avoiding having to create a complicated/high cost approach.

The thermal link in a thermally protected varistor should never be used in series with the load. It is only used to provide protection to the varistor portion in case of an abnormal over voltage condition.

The 14mm, 18mm and 20mm size TVZ series were tested and approved for cord connected applications at limited currents of 5 amps, 2.5 amps, .5 amps and .125 amps according to UL 1449 4th edition Section 44.4. The 20mm size TVZ was also tested and approved for permanently connected applications at a current of 10 amps, but World Products recommends that these should only be used for cord connected applications. The 25mm round, 25mm rectangular and 34mm rectangular TVZ's were tested and approved for permanently connected applications at the limited currents of 10 amps, 5 amps, 2.5 amps and .5 amps.

When considering "potting materials" being used in conjunction with TVZ, please contact World Products Inc. for guidelines as "potting" may affect TVZ performance characteristics.

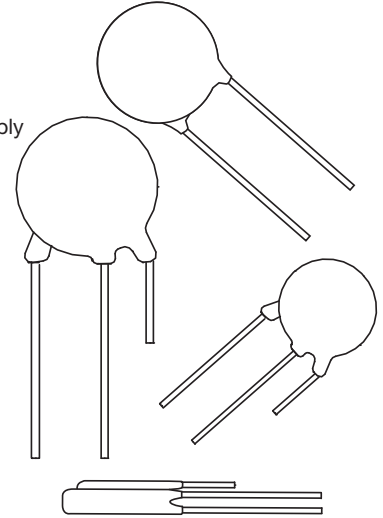
Thermally Protected Ceramic Metal Oxide Varistors

Features







- RoHS compliant types available
- UL1449, UL1414/CUL recognition and VDE certification.
- Patented product (U.S. Patent #6636403 and IE010410).
- Low Leakage Current under normal operating voltage.
- Wave solderable.
- Maximum Voltage-Temperature Coefficient <-0.01%/°C.
- High Surge Current Rating up to 40kA.
- -55°C to +85°C Operating Temperature.
- -55°C to +125°C Storage Temperature.
- Three leaded versions available, with fuses located on either the third or second lead.
- ISO and TS16949 certification.
- Epoxy Rating 94V-0.

Applications

- Transient Voltage Surge Suppressor (TVSS) Products
- AC Panel Protection Modules
- AC Line Power Supplies
- Surge Protected Strip
- AC Power Meters
- Uninterruptable Power Supply
- White Goods
- Inverters
- DIN Rail
- AC/DC Power Supplies



Approvals

APPROVALS	14mm	18mm	20mm	25mm (Round Type)	25mm (Rectangular Type)	34mm
UL 1449 4th Edition and CUL CSA C22.2 No. 269.5-15 File #E321567 	RoHS Series ALL VALUES	Non-RoHS and RoHS Type Series 115VAC through 420VAC	RoHS Series ALL VALUES	(1) RoHS Series 120VAC through 420 VAC (2) Standard (non-RoHS) Series 130 VAC through 195 VAC	RoHS Series ALL VALUES	RoHS Series ALL VALUES
VDE File #40037747 	RoHS Series ALL VALUES					
QC 42201 - C002:2012-02 						
QC 42201 - A002:2012-02 						
IEC 60950-1: 2005 Annex Q 						
IECQ-C BSI 12.001 						
IEC 61051-2 1991-01						
IEC 61051-1 2007-04						
IEC 61051-2-2 1991-01						
CB SCHEME Certificate Number C580610						

Thermally Protected Ceramic Metal Oxide Varistors

Part Marking

T 14 EB N 241 K
(1) (2) (3) (4) (5) (6)

(1) **T = TVZ Series**

(2) **Disc Diameter**

14 = 14mm

18 = 18mm

20 = 20mm

25 = 25mm (available in both round and rectangle types)

34 = 34mm

(3) **Type**

DB = 25mm Disc Size (Two Leads)

D = 25mm Disc Size (Three Leads)

EB = 14mm, 18mm & 20mm Disc Size (Two Leads)

EC = 14mm, 18mm & 20mm Disc Sizes (Three Leads)

RB = 25mm (rectangle type), 34mm Disc Size (Two Leads)

RC = 25mm (rectangle type), 34mm Disc Size (Three Leads)

(4) **N** = RoHS Compliant Series

(5) **Varistor Voltage**

241 = $24 \times 10^1 = 240$

(6) **Tolerance**

K = $\pm 10\%$

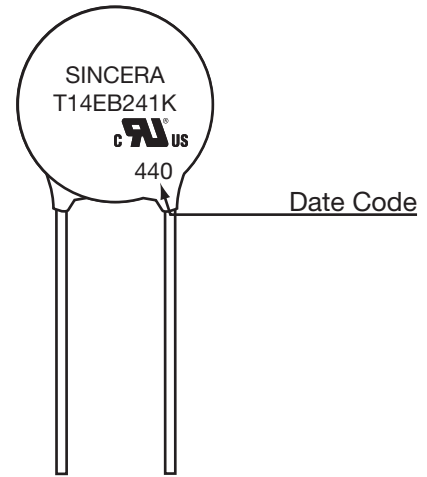
Date Code

440 = First digit represents year (4 = 2014).

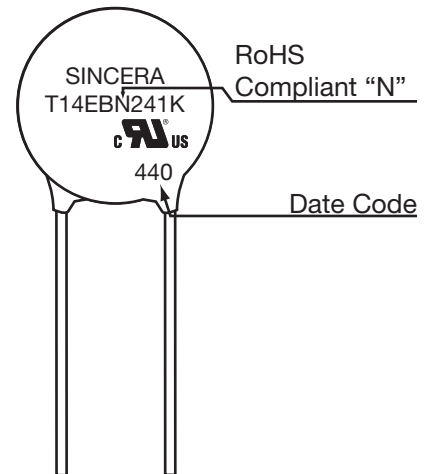
Second and third digits represent the week of the year.

NOTE: Parts will be marked **SINCERA**. (This is the brand name.)

Standard Version



RoHS Compliant Version



Thermally Protected Ceramic Metal Oxide Varistors

Part Number System

TVZ 20 E B N 241 K B S
 (1) (2) (3) (4) (5) (6) (7) (8) (9)

(1) Thermally Protected Varistor

(2) Diameter

- 14:** 14mm
- 18:** 18mm
- 20:** 20mm
- 25:** 25mm (available in round and rectangular type)
- 34:** 34mm

(3) Energy Rating

- D:** 25mm (round type)
- E:** 14mm, 18mm & 20mm
- R:** 25mm (rectangular type), 34mm

(4) Fuse Location

- Blank:** 3-Leaded, Thermal Link Located on Third Lead (Available in 25mm round type)
- B:** 2-Leaded, No Monitor Lead (Available in 14mm, 18mm, 20mm, 25mm & 34mm (both round and rectangular type))
- C:** 3-Leaded, Thermal Link Located on Second Lead (Available in 14mm, 18mm, 20mm (round type), and 25mm & 34mm (rectangle type))

(5) N: RoHS Compliant Series

(6) Varistor Voltage/AC Voltage

Varistor Voltage for 14, 18, 20, & 25mm,
201 = $20 \times 10^1 = 200\text{VDC}$
 AC Voltage for 34mm, **151** = 150VAC

(7) Tolerance

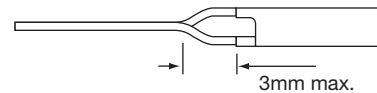
K: $\pm 10\%$

(8) Packaging

B: Bulk
 For taped and lead configuration of taped parts, see taping specifications for suffix codes.

(9) Lead Configuration for Bulk Parts Only

S: For 34mm series denotes Standard Lead.
S: Straight (For varistor voltage $\leq 681\text{K}$), and in-line crimped (for varistor voltage $> 681\text{K}$) for 14, 18, 20 & 25mm series.
O: Outward crimp
I: Inward crimp
L: In-line crimped (For varistor voltage $\leq 681\text{K}$) for 14, 18, 20 & 25mm series.
N: Varistor voltage > 681 come standard with in-line crimp (see illustration below) for straight disc seating on PC boards. If straight leads are required instead of in-line crimp please use code "N" in this position, for 14, 18, 20 & 25 mm series.



In-line Crimp (2 leaded type)



In-line Crimp (3 leaded type)*

(10) Suffix for Custom Types

X33: Alternative Design with 3mm Monitor Terminal (34mm only). See Fuse Configuration & Dimensions for 34mm for more information.

Absolute Maximum Ratings***

Continuous RMS Current (Monitor Lead)	100mA
Typical Response Time	<15n seconds
Insulation Resistance	>1000M Ω
Hi-Pot Encapsulation	2500 VDC
Maximum Voltage-Temperature Coefficient	<0.01%/ $^{\circ}\text{C}$
Operating Temperature Range	-55 $^{\circ}\text{C}$ to 85 $^{\circ}\text{C}$
Storage Temperature Range	-55 $^{\circ}\text{C}$ to 125 $^{\circ}\text{C}$
Isolation Capability (when thermal element is open)	600VAC

NOTES:

*For 3 leaded 14mm, 18mm, and 20mm types with in-line crimp monitor lead is straight. For 25mm round and rectangular types monitor lead is in-line crimped.

**25mm (rectangle type) 3-leaded version has fuse located on the third lead (same as 25mm round type).

***Stresses above those stated in **Absolute Maximum Ratings** may cause permanent damage to the device. These are stress only ratings and operation of the device at these or any other conditions exceeding these ratings is not implied.

Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions

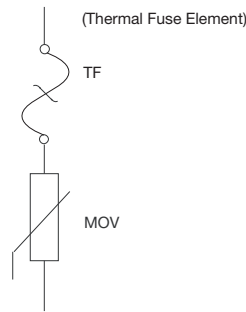
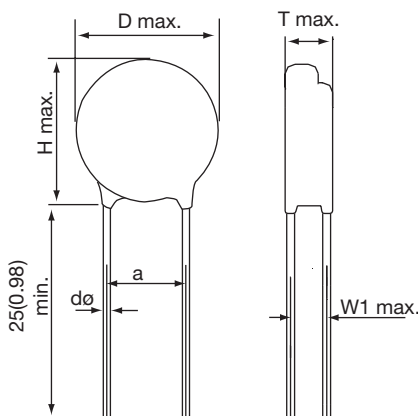
14mm, 18mm

2-Leaded

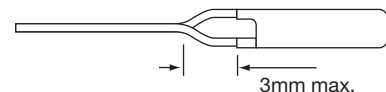
Unit: mm (inch)

Varistor Type	14mm		18mm	
	T max	W1 max.	T max	W1 max.
181K	8.5 (0.34)	3.4 (0.13)	8.5 (0.34)	3.4 (0.13)
201K	8.5 (0.34)	3.5 (0.14)	8.5 (0.34)	3.5 (0.14)
221K	8.5 (0.34)	3.6 (0.14)	8.5 (0.34)	3.6 (0.14)
241K	8.5 (0.34)	3.7 (0.15)	8.5 (0.34)	3.7 (0.15)
271K	9.0 (0.36)	3.8 (0.15)	9.0 (0.36)	3.8 (0.15)
311K	9.0 (0.36)	4.2 (0.17)	9.0 (0.36)	4.2 (0.17)
331K	9.0 (0.36)	4.2 (0.17)		
361K	9.5 (0.38)	4.3 (0.17)	9.5 (0.38)	4.3 (0.17)
391K	9.5 (0.38)	4.5 (0.18)	9.5 (0.38)	4.5 (0.18)
431K	9.5 (0.38)	4.7 (0.19)	9.5 (0.38)	4.7 (0.19)
471K	9.5 (0.38)	4.9 (0.19)	9.5 (0.38)	4.9 (0.19)
511K	10.5 (0.42)	5.2 (0.20)	10.5 (0.42)	5.2 (0.20)
561K	10.5 (0.42)	5.4 (0.21)	10.5 (0.42)	5.4 (0.21)
621K	10.5 (0.42)	5.7 (0.22)	10.5 (0.42)	5.7 (0.22)
681K	11.0 (0.44)	*6.0 (0.24)	11.0 (0.44)	*6.0 (0.24)
751K			11.0 (0.44)	*6.4 (0.25)
821K			12.0 (0.48)	*6.8 (0.27)
911K			12.0 (0.48)	*7.2 (0.28)
951K			12.0 (0.48)	*7.8 (0.31)
102K			13.0 (0.52)	*7.8 (0.31)
122K			13.0 (0.52)	*9.0 (0.35)

Series	Size	D max	H max	dø nom.	a
TVZ14	14mm	17.5 (0.69)	22.0 (0.87)	0.8 (0.03)	7.5 (0.30) ± 1.0 (0.039)
TVZ18	18mm	21.0 (0.83)	26.0 (1.02)	0.8 (0.031) for 181-681K 1.0 (0.039) for 751-122K	7.5 (0.30) ± 1.0 (0.039)



Note: *Bulk parts form >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (2 leaded type)

Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

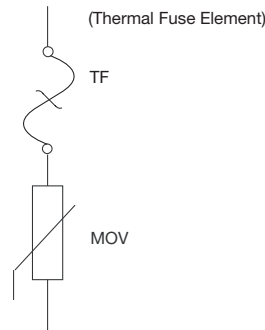
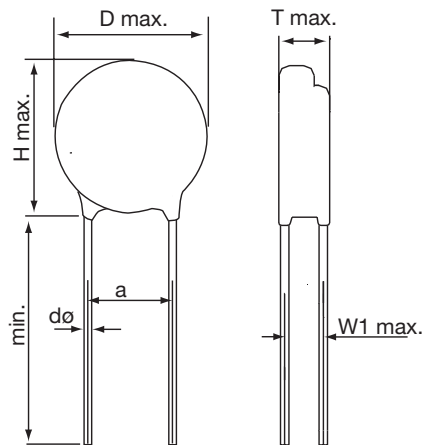
20mm

2-Leaded

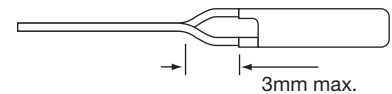
Unit: mm (inch)

Varistor Type	20mm	
	T max	W1 max.
181K	8.5 (0.34)	3.4 (0.13)
201K	8.5 (0.34)	3.6 (0.14)
221K	8.5 (0.34)	3.7 (0.15)
241K	8.5 (0.34)	3.8 (0.15)
271K	9.0 (0.36)	3.9 (0.15)
301K		
311K	9.0 (0.36)	4.3 (0.17)
331K	9.0 (0.36)	4.3 (0.17)
361K	9.5 (0.38)	4.4 (0.17)
391K	9.5 (0.38)	4.6 (0.18)
431K	9.5 (0.38)	4.8 (0.19)
471K	9.5 (0.38)	5.1 (0.20)
511K	10.5 (0.42)	5.4 (0.21)
561K	10.5 (0.42)	5.7 (0.22)
621K	10.5 (0.42)	5.9 (0.23)
681K	11.0 (0.44)	*6.2 (0.24)
751K	11.0 (0.44)	*6.6 (0.26)
781K	11.0 (0.44)	*6.8 (0.27)
821K	12.0 (0.48)	*7.0 (0.28)
911K	12.0 (0.48)	*7.5 (0.30)
951K	12.0 (0.48)	*8.0 (0.31)
102K	13.0 (0.52)	*8.0 (0.31)
112K	13.0 (0.52)	8.2 (0.32)
122K	13.0 (0.52)	*8.3 (0.33)

Series	Size	D max	H max	dø nom.	a
TVZ20	20mm	23.0 (0.90)	30.0 (1.18)	0.8 (0.031) for 181 - 681K, 1.0 (0.039) for 751K - 122K	7.5 (0.30) ± 1.0 (0.039)



Note: *Bulk parts for >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (2 leaded type)

Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

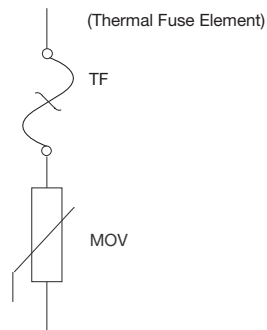
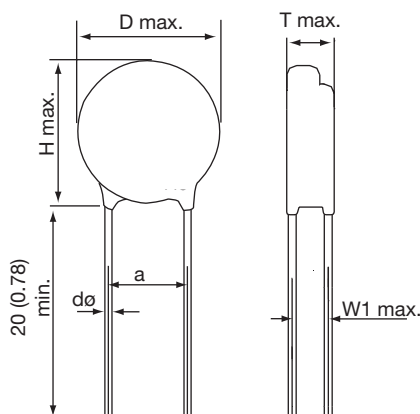
25mm (Round Type)

2-Leaded

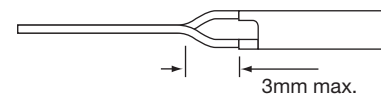
Unit: mm (inch)

Varistor Type	25mm	
	T max	W1 max.
181K	7.7 (0.3)	3.6 (0.14)
201K	7.9 (0.31)	3.7 (0.15)
221K	8.2 (0.32)	3.8 (0.15)
241K	8.3 (0.33)	3.9 (0.15)
271K	8.4 (0.33)	4.0 (0.16)
301K	8.6 (0.34)	4.2 (0.17)
331K	8.8 (0.35)	4.4 (0.17)
361K	8.9 (0.35)	4.5 (0.18)
391K	9.0 (0.35)	4.7 (0.19)
431K	9.2 (0.36)	4.9 (0.19)
471K	9.5 (0.37)	5.2 (0.20)
511K	9.9 (0.39)	5.5 (0.22)
561K	10.1 (0.40)	5.7 (0.22)
621K	10.4 (0.41)	6.0 (0.24)
681K	10.7 (0.42)	6.3 (0.25)
751K	11.1 (0.44)	*6.7 (0.26)
781K	11.3 (0.44)	*6.9 (0.27)
821K	11.4 (0.45)	*7.1 (0.28)
911K	11.8 (0.46)	*7.6 (0.30)
102K	12.4 (0.49)	*8.1 (0.32)
112K	12.6 (0.50)	*8.7 (0.34)
122K	12.8 (0.50)	*9.1 (0.36)

Series	Size	D max	H max	dø nom.	a
TVZ25	25mm	28.5 (1.12)	35.5 (1.40)	1.0 (0.039)	19.2 (0.755) ± 1.0 (0.039)



Note: *Bulk parts for >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (2 leaded type)

Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

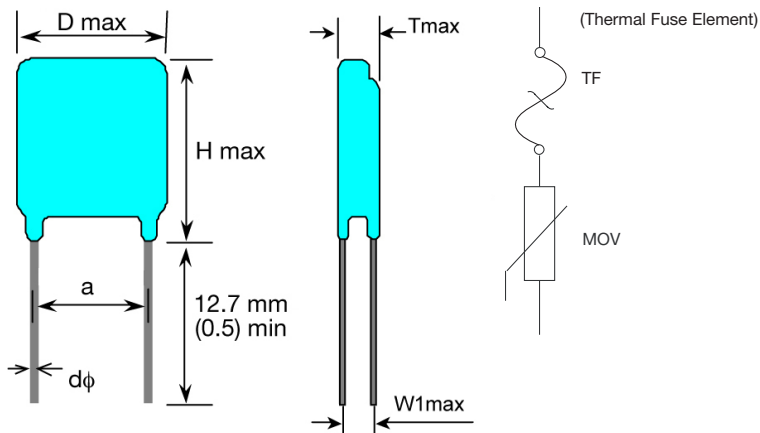
25mm (Rectangular Type)

2-Leaded

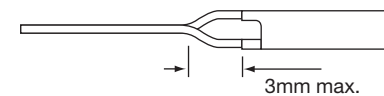
Unit: mm (inch)

Varistor Type	25mm (Rectangular Type)	
	T max	W1 max.
181K	10.2 (0.40)	5.3 (0.21)
201K	10.4 (0.41)	5.3 (0.21)
221K	10.6 (0.42)	5.3 (0.21)
241K	10.7 (0.42)	5.3 (0.21)
271K	10.8 (0.43)	5.2 (0.21)
301K	10.9 (0.43)	6.4 (0.25)
331K	10.9 (0.43)	6.4 (0.25)
361K	11.1 (0.44)	6.4 (0.25)
391K	11.2 (0.44)	6.4 (0.25)
431K	11.4 (0.45)	6.4 (0.25)
471K	11.5 (0.45)	6.4 (0.25)
511K	11.8 (0.46)	7.5 (0.30)
561K	12.1 (0.48)	7.5 (0.30)
621K	12.4 (0.49)	7.5 (0.30)
681K	12.7 (0.50)	7.5 (0.30)
751K	12.7 (0.50)	*8.5 (0.33)
781K	12.9 (0.51)	*8.5 (0.33)
821K	13.1 (0.52)	*8.5 (0.33)
911K	13.4 (0.53)	*8.5 (0.33)
102K	13.9 (0.55)	*8.5 (0.33)
112K	14.4 (0.57)	*8.5 (0.33)
122K	14.9 (0.59)	*8.5 (0.33)

Series	Size	D max	H max	dø nom.	a
TVZ25R	25mm	29.0 (1.14)	35.5 (1.40)	1.0 (0.039)	19.2 (0.76) ± 1.0 (0.039)



Note: *Bulk parts for >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (2 leaded type)

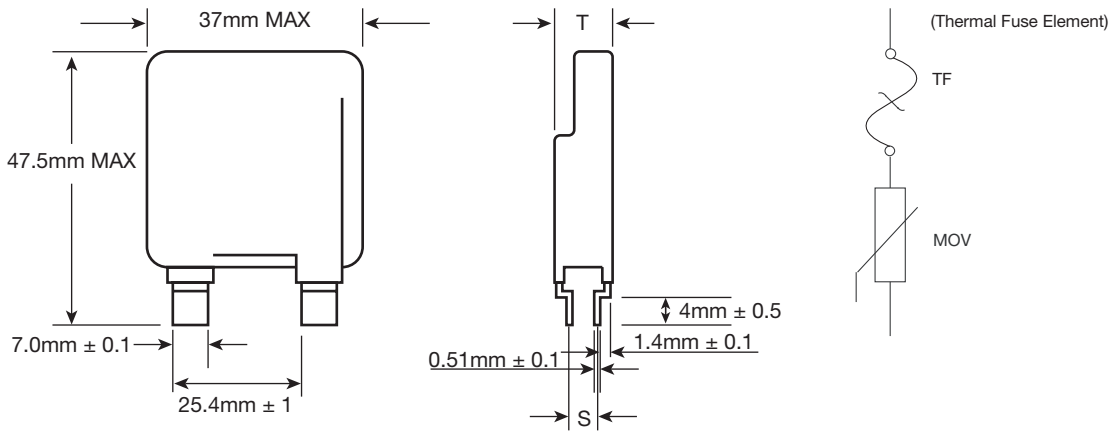
Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

34mm
2-Leaded

Unit: mm

Varistor Type	T max (mm)	S (mm)
111K	11.9	2.8 ± 0.65
131K	12.2	2.9 ± 0.65
141K	12.3	3.0 ± 0.85
151K	12.4	3.1 ± 0.85
181K	12.8	3.4 ± 0.85
201K	13.0	3.6 ± 0.85
251K	12.8	4.0 ± 0.85
271K	13.0	4.3 ± 0.85
301K	13.3	4.5 ± 1.0
321K	13.5	4.7 ± 1.0
331K	13.6	4.8 ± 1.0
351K	13.8	5.0 ± 1.0
391K	14.2	5.4 ± 1.0
421K	14.5	5.7 ± 1.0
461K	14.8	5.9 ± 1.0
481K	15.0	6.1 ± 1.0
511K	15.4	6.6 ± 1.0
551K	15.6	6.8 ± 1.0
571K	15.9	7.1 ± 1.0
621K	16.4	7.5 ± 1.0
661K	16.9	7.9 ± 1.0
681K	17.2	8.2 ± 1.0
751K	17.8	8.8 ± 1.0



Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

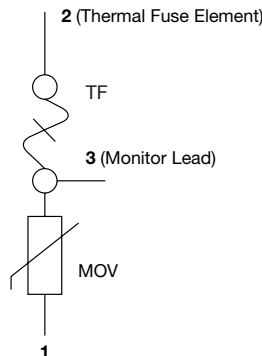
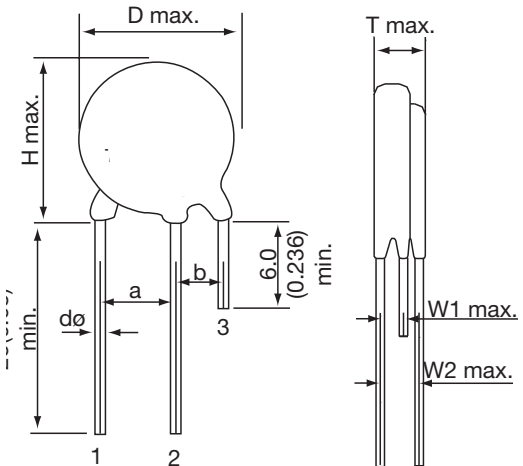
14mm, 18mm, 20mm

3-Leaded, Thermal Link Located on Second Lead

Unit: mm (inch)

Varistor Type	14mm			18mm			20mm		
	T max	W1 max.	W2 max.	T max	W1 max.	W2 max.	T max	W1 max.	W2 max.
181K	8.5 (0.34)	1.9 (0.07)	3.4 (0.13)	8.5 (0.34)	1.9 (0.07)	3.4 (0.13)	8.5 (0.34)	1.9 (0.07)	3.4 (0.13)
201K	8.5 (0.34)	2.0 (0.08)	3.5 (0.14)	8.5 (0.34)	2.0 (0.08)	3.5 (0.14)	8.5 (0.34)	2.0 (0.08)	3.6 (0.14)
221K	8.5 (0.34)	2.0 (0.08)	3.6 (0.14)	8.5 (0.34)	2.0 (0.08)	3.6 (0.14)	8.5 (0.34)	2.1 (0.08)	3.7 (0.15)
241K	8.5 (0.34)	2.1 (0.08)	3.7 (0.15)	8.5 (0.34)	2.1 (0.08)	3.7 (0.15)	8.5 (0.34)	2.2 (0.09)	3.8 (0.15)
271K	9.0 (0.36)	2.2 (0.09)	3.8 (0.15)	9.0 (0.36)	2.2 (0.09)	3.8 (0.15)	9.0 (0.36)	2.3 (0.09)	3.9 (0.15)
311K	9.0 (0.36)	2.4 (0.09)	4.0 (0.16)	9.0 (0.36)	2.4 (0.09)	4.0 (0.16)	9.0 (0.36)	2.5 (0.10)	4.1 (0.16)
331K	9.0 (.36)	2.5 (.10)	4.2 (0.17)				9.0 (0.36)	2.5 (0.10)	4.3 (0.17)
361K	9.5 (0.38)	2.7 (0.11)	4.3 (0.17)	9.5 (0.38)	2.7 (0.11)	4.3 (0.17)	9.5 (0.38)	2.8 (0.11)	4.4 (0.17)
391K	9.5 (0.38)	2.9 (0.11)	4.5 (0.18)	9.5 (0.38)	2.9 (0.11)	4.5 (0.18)	9.5 (0.38)	3.0 (0.12)	4.6 (0.18)
431K	9.5 (0.38)	3.0 (0.12)	4.7 (0.19)	9.5 (0.38)	3.0 (0.12)	4.7 (0.19)	9.5 (0.38)	3.2 (0.13)	4.8 (0.19)
471K	9.5 (0.38)	3.2 (0.13)	4.9 (0.19)	9.5 (0.38)	3.2 (0.13)	4.9 (0.19)	9.5 (0.38)	3.4 (0.13)	5.1 (0.20)
511K	10.5 (0.42)	3.4 (0.13)	5.2 (0.20)	10.5 (0.42)	3.4 (0.13)	5.2 (0.20)	10.5 (0.42)	3.6 (0.14)	5.4 (0.21)
561K	10.5 (0.42)	3.7 (0.15)	5.4 (0.21)	10.5 (0.42)	3.7 (0.15)	5.4 (0.21)	10.5 (0.42)	3.7 (0.15)	5.7 (0.22)
621K	10.5 (0.42)	3.9 (0.15)	5.7 (0.22)	10.5 (0.42)	3.9 (0.15)	5.7 (0.22)	10.5 (0.42)	4.1 (0.16)	5.9 (0.23)
681K	11.0 (0.44)	*4.2 (0.17)	*6.0 (0.24)	11.0 (0.44)	*4.2 (0.17)	*6.0 (0.24)	11.0 (0.44)	*4.4 (0.17)	*6.2 (0.24)
751K				11.0 (0.44)	*4.5 (0.18)	*6.4 (0.25)	11.0 (0.44)	*4.7 (0.19)	*6.6 (0.26)
781K							*11.0 (0.44)	*4.7 (0.19)	*6.8 (0.27)
821K				12.0 (0.48)	*4.9 (0.19)	*6.8 (0.27)	12.0 (0.48)	*5.1 (0.20)	*7.0 (0.28)
911K				12.0 (0.48)	*5.3 (0.21)	*7.2 (0.28)	12.0 (0.48)	*5.5 (0.22)	*7.5 (0.30)
951K				12.0 (0.48)	*5.5 (0.22)	*7.5 (0.30)	12.0 (0.48)	*5.5 (0.22)	*7.8 (0.31)
102K				13.0 (0.52)	*5.7 (0.22)	*7.8 (0.31)	13.0 (0.52)	*5.5 (0.22)	*8.1 (0.32)
112K				13.0 (0.52)			13.0 (0.52)	*6.0 (0.24)	*8.5 (0.33)
122K				13.0 (0.52)	*6.9 (0.27)	*8.8 (0.35)	13.0 (0.52)	*7.0 (0.27)	*9.0 (0.35)

Series	Size	D max	H max	dø nom.	a	b
TVZ14	14mm	17.5 (0.69)	22.0 (0.87)	0.8 (0.03)	7.5 (0.30) ± 1.0 (0.039)	5.0 (0.20) ± 1.0 (0.039)
TVZ18	18mm	21.0 (0.83)	26.0 (1.02)	0.8 (0.031) for 181-681K 1.0 (0.039) for 751-122K	7.5 (0.30) ± 1.0 (0.039)	5.0 (0.20) ± 1.0 (0.039)
TVZ20	20mm	23.0 (0.90)	30.0 (1.18)	0.8 (0.031) for 181-681K 1.0 (0.039) for 751-122K	7.5 (0.30) ± 1.0 (0.039)	5.0 (0.20) ± 1.0 (0.039)



Note: *Bulk parts for >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 & W2 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (3 leaded type)*

*NOTE: For 3 leaded 14mm, 18mm, and 20mm types with in-line crimp monitor lead is straight. For 25mm types monitor lead is in-line crimped.

Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

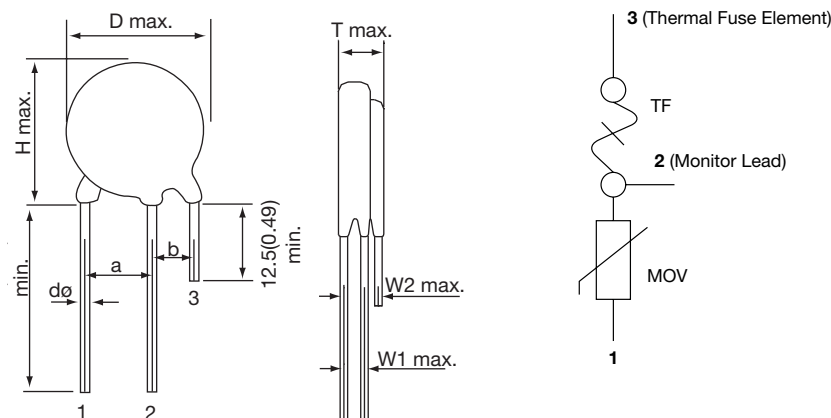
25mm (Round Type)

3-Leaded, Thermal Link Located on Third Lead

Unit: mm (inch)

Varistor Type	25mm		
	T max	W1 max.	W2 max.
181K	7.7 (0.3)	2.0 (0.08)	3.6 (0.14)
201K	7.9 (0.31)	2.1 (0.08)	3.7 (0.15)
221K	8.2 (0.32)	2.2 (0.09)	3.8 (0.15)
241K	8.3 (0.33)	2.3 (0.09)	3.9 (0.15)
271K	8.4 (0.33)	2.4 (0.09)	4.0 (0.16)
301K	8.6 (0.34)	2.6 (0.10)	4.2 (0.17)
331K	8.8 (0.35)	2.8 (0.11)	4.4 (0.17)
361K	8.9 (0.35)	2.9 (0.11)	4.5 (0.18)
391K	9.0 (0.35)	3.1 (0.12)	4.7 (0.19)
431K	9.2 (0.36)	3.3 (0.13)	4.9 (0.19)
471K	9.5 (0.37)	3.5 (0.14)	5.2 (0.20)
511K	9.9 (0.39)	3.7 (0.15)	5.5 (0.22)
561K	10.1 (0.40)	3.9 (0.15)	5.7 (0.22)
621K	10.4 (0.41)	4.2 (0.17)	6.0 (0.24)
681K	10.7 (0.42)	*4.5 (0.18)	6.3 (0.25)
751K	11.1 (0.44)	*4.8 (0.19)	*6.7 (0.26)
781K	11.3 (0.44)	*5.0 (0.20)	*6.9 (0.27)
821K	11.4 (0.45)	*5.2 (0.20)	*7.1 (0.28)
911K	11.8 (0.46)	*5.6 (0.22)	*7.6 (0.30)
102K	12.4 (0.49)	*6.1 (0.24)	*8.1 (0.32)
112K	12.6 (0.50)	*6.6 (0.26)	*8.7 (0.34)
122K	12.8 (0.50)	*7.0 (0.27)	*9.1 (0.36)

Series	Size	D max	H max	dø nom.	a	b
TVZ25	25mm	28.5 (1.12)	35.5 (1.40)	1.0 (0.039)	12.7 (0.50) ± 1.0 (0.039)	6.5 (0.255) ± 1.2 (0.047)



Note: *Bulk parts for >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (3 leaded type)*

*NOTE: for 3 leaded 14mm, 18mm, and 20mm types with in-line crimp monitor lead is straight. For 25mm types monitor lead is in-line crimped.

Thermally Protected Ceramic Metal Oxide Varistors

Thermal Link Configuration and Dimensions (continued)

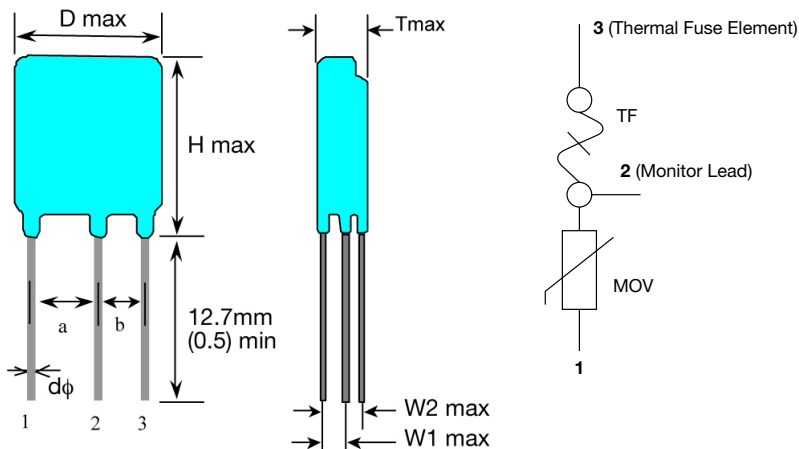
25mm (Rectangular Type)

3-Leaded, Thermal Link Located on Third Lead

Unit: mm (inch)

Varistor Type	25mm (Rectangular Type)		
	T max	W1 max.	W2 max.
181K	10.2 (0.40)	3.2 (0.126)	5.3 (0.21)
201K	10.4 (0.41)	3.2 (0.126)	5.3 (0.21)
221K	10.6 (0.42)	3.2 (0.126)	5.3 (0.21)
241K	10.7 (0.42)	3.2 (0.126)	5.3 (0.21)
271K	10.8 (0.43)	3.1 (0.122)	5.3 (0.21)
301K	10.9 (0.43)	4.2 (0.165)	6.4 (0.25)
331K	10.9 (0.43)	4.2 (0.165)	6.4 (0.25)
361K	11.1 (0.44)	4.2 (0.165)	6.4 (0.25)
391K	11.2 (0.44)	4.2 (0.165)	6.4 (0.25)
431K	11.4 (0.45)	4.2 (0.165)	6.4 (0.25)
471K	11.5 (0.45)	4.2 (0.165)	6.4 (0.25)
511K	11.8 (0.46)	5.5 (0.216)	7.5 (0.30)
561K	12.1 (0.48)	5.5 (0.216)	7.5 (0.30)
621K	12.4 (0.49)	5.5 (0.216)	7.5 (0.30)
681K	12.7 (0.50)	5.5 (0.216)	7.5 (0.30)
751K	12.7 (0.50)	*6.5 (0.26)	*8.5 (0.33)
781K	12.9 (0.51)	*6.5 (0.26)	*8.5 (0.33)
821K	13.1 (0.52)	*6.5 (0.26)	*8.5 (0.33)
911K	13.4 (0.53)	*6.5 (0.26)	*8.5 (0.33)
102K	13.9 (0.55)	*6.5 (0.26)	*8.5 (0.33)
112K	14.4 (0.57)	*6.5 (0.26)	*8.5 (0.33)
122K	14.9 (0.59)	*6.5 (0.26)	*8.5 (0.33)

Series	Size	D max	H max	dø nom.	a	b
TVZ25R	25mm	29.0 (1.14)	35.5 (1.40)	1.0 (0.039)	12.7 (0.5) ± 1.0 (0.039)	6.5 (0.26) ± 1.0 (0.039)



Note: *Bulk parts for >681 varistor voltage come standard with in-line crimp (see illustration below) for straight disk seating on PC boards. Therefore, W1 dimensions are not applicable. If required without in-line crimp, please reference "Part Number System" and add "N".



In-line Crimp (3 leaded type)*

*NOTE: for 3 leaded 14mm, 18mm, and 20mm types with in-line crimp monitor lead is straight. For 25mm types monitor lead is in-line crimped.

Thermally Protected Ceramic Metal Oxide Varistors

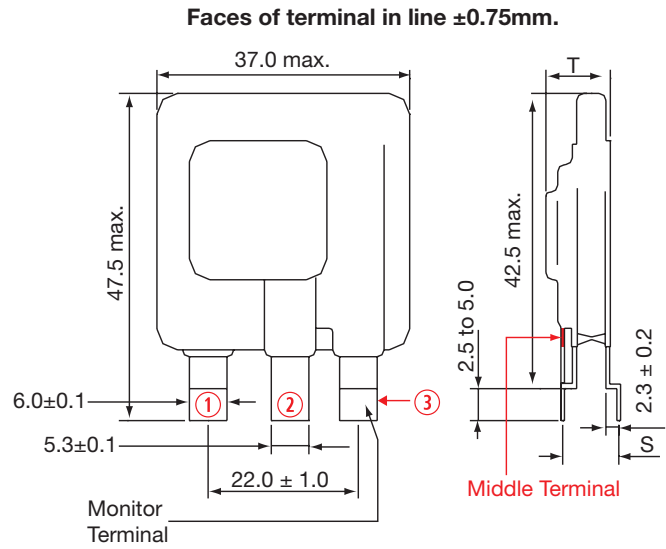
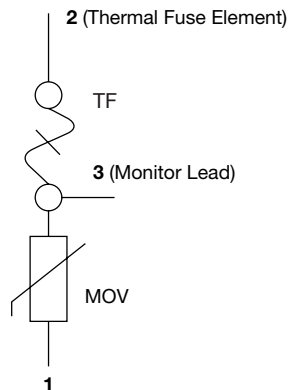
Thermal Link Configuration and Dimensions (continued)

34mm

3-Leaded, Thermal Link Located on Second Lead

Unit: mm

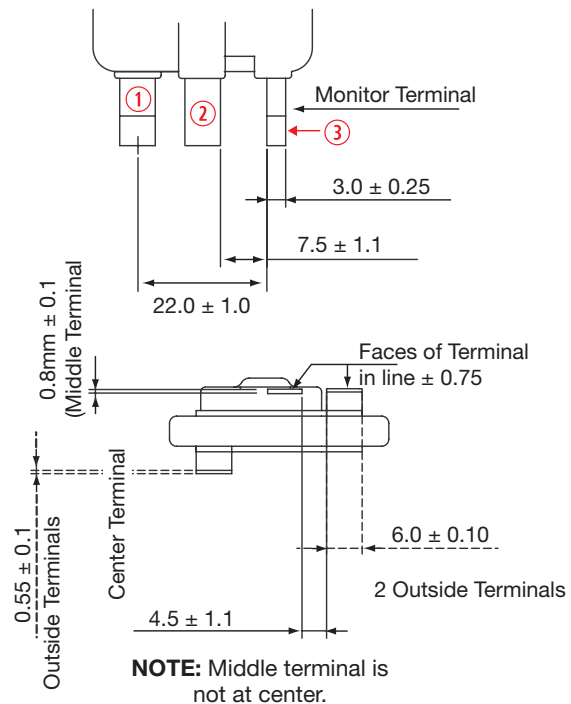
AC Voltage Type	34mm	
	T max	S
111K	11.9	5.2 ± 0.65
131K	12.2	5.5 ± 0.65
141K	12.3	5.7 ± 0.85
151K	12.4	5.9 ± 0.85
181K	12.8	6.3 ± 0.85
201K	13.0	6.5 ± 0.85
251K	12.8	6.25 ± 0.85
271K	13.0	6.50 ± 0.85
301K	13.3	6.8 ± 1.0
321K	13.5	6.9 ± 1.0
331K	13.6	7.2 ± 1.0
351K	13.8	7.4 ± 1.0
391K	14.2	7.6 ± 1.0
421K	14.5	7.85 ± 1.0
461K	14.8	8.15 ± 1.0
481K	15.0	8.25 ± 1.0
511K	15.4	8.6 ± 1.0
551K	15.6	8.65 ± 1.0
571K	15.9	8.85 ± 1.0
621K	16.4	9.25 ± 1.0
661K	16.9	9.65 ± 1.0
681K	17.2	9.85 ± 1.0
751K	17.8	10.65 ± 1.0



NOTE: Middle terminal is not at center. Center to center outside terminals. Center terminal does not have seating crimp.

Alternative Design with 3mm Monitor Terminal

Add suffix X33, see Part Number System.



NOTE: Middle terminal is not at center.

Notes:
Dimension in mm are typical, unless otherwise specified.

Thermally Protected Ceramic Metal Oxide Varistors

Specifications

14mm Series 2-Leaded

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (2ms)	Maximum Clamping Voltage at Specified Current (8/20us)/50A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		V _{M(AC) RMS}	V _{M(DC)}	I _{TM}	W _{TM}	V _c	V _{N(DC) min.}	V _{N(DC) max.}	C
		(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ14EB181KBS	TVZ14EBN181KBS	115	150	6000	35	300	162	198	1100
TVZ14EB201KBS	TVZ14EBN201KBS	130	170	6000	50	340	184	226	980
TVZ14EB221KBS	TVZ14EBN221KBS	140	180	6000	55	360	200	240	880
TVZ14EB241KBS	TVZ14EBN241KBS	150	200	6000	60	395	216	264	780
TVZ14EB271KBS	TVZ14EBN271KBS	175	225	6000	70	455	243	297	700
TVZ14EB311KBS	TVZ14EBN311KBS	200	255	6000	75	530	281	344	600
TVZ14EB331KBS	TVZ14EBN331KBS	210	275	6000	78	560	297	363	560
TVZ14EB361KBS	TVZ14EBN361KBS	230	300	6000	80	595	324	396	520
TVZ14EB391KBS	TVZ14EBN391KBS	250	320	6000	100	650	351	429	480
TVZ14EB431KBS	TVZ14EBN431KBS	275	350	6000	110	710	387	473	440
TVZ14EB471KBS	TVZ14EBN471KBS	300	385	6000	125	775	423	517	400
TVZ14EB511KBS	TVZ14EBN511KBS	320	420	6000	136	840	459	561	370
TVZ14EB561KBS	TVZ14EBN561KBS	360	470	6000	145	960	522	638	340
TVZ14EB621KBS	TVZ14EBN621KBS	385	505	6000	150	1025	558	682	300
TVZ14EB681KBS	TVZ14EBN681KBS	420	560	6000	160	1120	612	748	280

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

18mm Series 2-Leaded

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (10/1000us)	Maximum Clamping Voltage at Specified Current (8/20us)/80A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		$V_{M(AC) RMS}$	$V_{M(DC)}$	I_{TM}	W_{TM}	V_C	$V_{N(DC) min.}$	$V_{N(DC) max.}$	C
		(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ18EB181KBS	TVZ18EBN181KBS	115	150	9000	135	320	162	198	1800
TVZ18EB201KBS	TVZ18EBN201KBS	130	170	9000	140	340	184	226	1600
TVZ18EB221KBS	TVZ18EBN221KBS	140	180	9000	150	360	200	240	1450
TVZ18EB241KBS	TVZ18EBN241KBS	150	200	9000	155	395	216	264	1300
TVZ18EB271KBS	TVZ18EBN271KBS	175	225	9000	163	455	243	297	1150
TVZ18EB311KBS	TVZ18EBN311KBS	200	255	9000	170	505	281	344	990
TVZ18EB361KBS	TVZ18EBN361KBS	230	300	9000	190	545	324	396	850
TVZ18EB391KBS	TVZ18EBN391KBS	250	320	9000	220	595	351	429	790
TVZ18EB431KBS	TVZ18EBN431KBS	275	350	9000	245	650	387	473	710
TVZ18EB471KBS	TVZ18EBN471KBS	300	385	9000	270	710	423	517	650
TVZ18EB511KBS	TVZ18EBN511KBS	320	420	9000	290	775	459	561	600
TVZ18EB561KBS	TVZ18EBN561KBS	360	470	9000	300	800	522	638	550
TVZ18EB621KBS	TVZ18EBN621KBS	385	505	9000	314	840	558	682	500
TVZ18EB681KBS	TVZ18EBN681KBS	420	560	9000	330	910	612	748	450
TVZ18EB751KBS	TVZ18EBN751KBS	460	615	9000	345	1025	675	825	400
TVZ18EB821KBS	TVZ18EBN821KBS	510	675	9000	355	1120	738	901	370
TVZ18EB911KBS	TVZ18EBN911KBS	550	745	9000	365	1240	819	1001	340
TVZ18EB951KBS	TVZ18EBN951KBS	575	785	9000	378	1250	856	1047	320
TVZ18EB102KBS	TVZ18EBN102KBS	625	825	9000	388	1350	900	1100	300
TVZ18EB122KBS	TVZ18EBN122KBS	750	975	9000	415	1400	1080	1320	260

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

20mm Series 2-Leaded

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20 μ s)	Maximum Non-Repetitive Surge Energy (2ms)	Maximum Clamping Voltage at Specified Current (8/20 μ s)/100A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		$V_{M(AC) RMS}$	$V_{M(DC)}$	I_{TM}	W_{TM}	V_c	$V_{N(DC) min.}$	$V_{N(DC) max.}$	C
		(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ20EB181KBS	TVZ20EBN181KBS	115	150	10000	52	300	162	198	2100
TVZ20EB201KBS	TVZ20EBN201KBS	130	170	10000	100	340	184	226	1900
TVZ20EB221KBS	TVZ20EBN221KBS	140	180	10000	110	360	200	240	1720
TVZ20EB241KBS	TVZ20EBN241KBS	150	200	10000	120	395	216	264	1580
TVZ20EB271KBS	TVZ20EBN271KBS	175	225	10000	135	455	243	297	1360
TVZ20EB311KBS	TVZ20EBN311KBS	200	255	10000	154	530	281	344	1180
TVZ20EB331KBS	TVZ20EBN331KBS	210	275	10000	157	560	297	363	1100
TVZ20EB361KBS	TVZ20EBN361KBS	230	300	10000	160	595	324	396	1020
TVZ20EB391KBS	TVZ20EBN391KBS	250	320	10000	170	650	351	429	940
TVZ20EB431KBS	TVZ20EBN431KBS	275	350	10000	190	710	387	473	850
TVZ20EB471KBS	TVZ20EBN471KBS	300	385	10000	250	775	423	517	780
TVZ20EB511KBS	TVZ20EBN511KBS	320	420	10000	272	840	459	561	720
TVZ20EB561KBS	TVZ20EBN561KBS	360	470	10000	285	930	522	638	650
TVZ20EB621KBS	TVZ20EBN621KBS	385	505	10000	300	1025	558	682	590
TVZ20EB681KBS	TVZ20EBN681KBS	420	560	10000	320	1120	612	748	540
TVZ20EB751KBS	TVZ20EBN751KBS	460	615	10000	340	1240	675	825	490
TVZ20EB781KBS	TVZ20EBN781KBS	485	640	10000	345	1300	702	808	470
TVZ20EB821KBS	TVZ20EBN821KBS	510	670	10000	350	1355	738	902	450
TVZ20EB911KBS	TVZ20EBN911KBS	550	745	10000	360	1500	819	1001	400
TVZ20EB951KBS	TVZ20EBN951KBS	575	785	10000	375	1568	856	1047	385
TVZ20EB102KBS	TVZ20EBN102KBS	625	825	10000	400	1650	900	1100	370
TVZ20EB112KBS	TVZ20EBN112KBS	680	895	10000	460	1815	962	1175	340
TVZ20EB122KBS	TVZ20EBN122KBS	750	975	10000	480	1980	1080	1320	300

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

25mm Series (Round Type) 2-Leaded

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (10/1000us)	Maximum Clamping Voltage at Specified Current (8/20us)/100A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		V _{M(AC) RMS} (V)	V _{M(DC)} (V)	I _{TM} (A)	W _{TM} (J)	V _C (V)	V _{N(DC) min.} (V)	V _{N(DC) max.} (V)	C (pF)
TVZ25DB181KBS	TVZ25DBN181KBS	120	160	18000	180	300	170	207	3900
TVZ25DB201KBS	TVZ25DBN201KBS	130	175	18000	200	340	185	225	3080
TVZ25DB221KBS	TVZ25DBN221KBS	140	180	18000	225	360	198	242	2800
TVZ25DB241KBS	TVZ25DBN241KBS	150	200	18000	235	395	216	264	2570
TVZ25DB271KBS	TVZ25DBN271KBS	180	230	18000	245	465	255	311	2280
TVZ25DB301KBS	TVZ25DBN301KBS	195	250	18000	255	505	270	330	1920
TVZ25DB331KBS	TVZ25DBN331KBS	210	275	18000	270	540	297	363	1800
TVZ25DB361KBS	TVZ25DBN361KBS	230	300	18000	315	595	324	396	1650
TVZ25DB391KBS	TVZ25DBN391KBS	250	330	18000	342	650	351	429	1530
TVZ25DB431KBS	TVZ25DBN431KBS	275	370	18000	370	710	387	473	1390
TVZ25DB471KBS	TVZ25DBN471KBS	300	385	18000	390	775	423	517	1270
TVZ25DB511KBS	TVZ25DBN511KBS	320	420	18000	422	840	459	561	1170
TVZ25DB561KBS	TVZ25DBN561KBS	360	470	18000	460	910	522	638	1060
TVZ25DB621KBS	TVZ25DBN621KBS	390	505	18000	495	1025	558	682	960
TVZ25DB681KBS	TVZ25DBN681KBS	420	560	18000	515	1120	612	748	880
TVZ25DB751KBS	TVZ25DBN751KBS	460	615	18000	530	1240	675	825	790
TVZ25DB781KBS	TVZ25DBN781KBS	485	640	18000	540	1240	702	858	760
TVZ25DB821KBS	TVZ25DBN821KBS	510	675	18000	550	1350	738	902	730
TVZ25DB911KBS	TVZ25DBN911KBS	550	745	18000	600	1400	819	1001	650
TVZ25DB102KBS	TVZ25DBN102KBS	625	825	18000	630	1620	900	1100	600
TVZ25DB112KBS	TVZ25DBN112KBS	680	865	18000	700	1800	962	1175	540
TVZ25DB122KBS	TVZ25DBN122KBS	750	975	18000	720	2100	1080	1320	500

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

25mm Series (Rectangular Type) 2-Leaded

RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
	Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (10/1000us)	Maximum Clamping Voltage at Specified Current (8/20us)/100A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
	$V_{M(AC) RMS}$	$V_{M(DC)}$	I_{TM}	W_{TM}	V_C	$V_{N(DC) min.}$	$V_{N(DC) max.}$	C
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ25RBN181KBS	120	160	22000	225	300	170	207	4900
TVZ25RBN201KBS	130	175	22000	250	340	184	226	4500
TVZ25RBN221KBS	140	180	22000	281	360	200	240	4150
TVZ25RBN241KBS	150	200	22000	294	395	216	264	3810
TVZ25RBN271KBS	175	225	22000	306	475	243	297	3250
TVZ25RBN301KBS	195	250	22000	319	505	270	330	3000
TVZ25RBN331KBS	210	275	22000	338	540	297	363	2750
TVZ25RBN361KBS	230	300	22000	394	595	324	396	2560
TVZ25RBN391KBS	250	330	22000	428	650	351	429	2380
TVZ25RBN431KBS	275	370	22000	463	710	387	473	2130
TVZ25RBN471KBS	300	385	22000	488	775	423	517	2000
TVZ25RBN511KBS	320	420	22000	528	865	459	561	1750
TVZ25RBN561KBS	360	470	22000	575	960	522	638	1500
TVZ25RBN621KBS	385	500	22000	619	1040	558	682	1480
TVZ25RBN681KBS	420	560	22000	644	1120	612	748	1380
TVZ25RBN751KBS	460	615	22000	663	1240	675	825	1250
TVZ25RBN781KBS	485	640	22000	675	1290	702	858	1230
TVZ25RBN821KBS	510	675	22000	688	1350	735	902	1150
TVZ25RBN911KBS	550	745	22000	750	1400	819	1001	1100
TVZ25RBN102KBS	625	825	22000	788	1620	900	1100	950
TVZ25RBN112KBS	680	865	22000	875	1815	962	1175	820
TVZ25RBN122KBS	750	970	22000	925	1980	1080	1320	730

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

34mm Series 2-Leaded

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings				Electrical Characteristics			
		Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @ 1mA DC		Maximum Clamping Voltage @ Test Current 8/20us 200A	Typical Capacitance at 1MHz
		AC _{RMS} Volts	DC Volts	Energy (2ms)	Peak Surge Current 8/20us	Min Volts	Max Volts	Volts	C
				W _{TM} 1 x Pulse Joules	I _{TM} 1 x Pulse Amps				(pF)
TVZ34RB111KBS	TVZ34RBN111KBS	115	150	235	40000 ¹	163	202	305	10000
TVZ34RB131KBS	TVZ34RBN131KBS	130	175	270	40000 ²	184	228	345	9000
TVZ34RB141KBS	TVZ34RBN141KBS	140	188	291	40000 ³	198	248	375	8100
TVZ34RB151KBS	TVZ34RBN151KBS	150	200	300	40000 ⁴	212	268	405	7200
TVZ34RB181KBS	TVZ34RBN181KBS	180	240	330	40000 ⁵	254	312	488	6300
TVZ34RB201KBS	TVZ34RBN201KBS	200	265	335	40000	283	357	540	5300
TVZ34RB251KBS	TVZ34RBN251KBS	250	330	370	40000	354	429	650	4800
TVZ34RB271KBS	TVZ34RBN271KBS	275	369	400	40000	389	473	730	4100
TVZ34RB301KBS	TVZ34RBN301KBS	300	400	435	40000	433	528	780	3700
TVZ34RB321KBS	TVZ34RBN321KBS	320	420	460	40000	462	561	830	3600
TVZ34RB331KBS	TVZ34RBN331KBS	330	435	475	40000	476	581	855	3500
TVZ34RB351KBS	TVZ34RBN351KBS	350	460	500	40000	505	616	910	3400
TVZ34RB391KBS	TVZ34RBN391KBS	385	506	550	40000	555	678	1005	2900
TVZ34RB421KBS	TVZ34RBN421KBS	420	560	600	40000	610	748	1130	2800
TVZ34RB461KBS	TVZ34RBN461KBS	460	610	620	40000	642	783	1188	2600
TVZ34RB481KBS	TVZ34RBN481KBS	480	640	650	40000	670	825	1240	2400
TVZ34RB511KBS	TVZ34RBN511KBS	510	675	700	40000	735	910	1350	2200
TVZ34RB551KBS	TVZ34RBN551KBS	550	700	735	40000	770	939	1415	2000
TVZ34RB571KBS	TVZ34RBN571KBS	575	730	770	40000	805	1000	1480	1800
TVZ34RB621KBS	TVZ34RBN621KBS	620	800	840	40000	880	1074	1589	1600
TVZ34RB661KBS	TVZ34RBN661KBS	660	850	900	40000	940	1160	1720	1500
TVZ34RB681KBS	TVZ34RBN681KBS	680	890	950	40000	980	1195	1772	1400
TVZ34RB751KBS	TVZ34RBN751KBS	750	970	1050	40000	1080	1320	2000	1200

Notes:

1. Peak current applies to applications rated up to 100VAC_{RMS}, 132VDC. Peak current is 30kA_{max} for applications greater than 100VAC_{RMS}, 132VDC.
2. Peak current applies to applications rated up to 115VAC_{RMS}, 145VDC. Peak current is 30kA_{max} for applications greater than 115VAC_{RMS}, 145VDC.
3. Peak current applies to applications rated up to 123VAC_{RMS}, 165VDC. Peak current is 30kA_{max} for applications greater than 123VAC_{RMS}, 165VDC.
4. Peak current applies to applications rated up to 132VAC_{RMS}, 176VDC. Peak current is 30kA_{max} for applications greater than 132VAC_{RMS}, 176VDC.
5. Peak current applies to applications rated up to 158VAC_{RMS}, 211VDC. Peak current is 30kA_{max} for applications greater than 158VAC_{RMS}, 211VDC.

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

14mm Series

3-Leaded, Thermal Link Located on Second Lead

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (2ms)	Maximum Clamping Voltage at Specified Current (8/20us)/50A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		V _{M(AC) RMS}	V _{M(DC)}	I _{TM}	W _{TM}	V _C	V _{N(DC) min.}	V _{N(DC) max.}	C
		(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ14EC181KBS	TVZ14ECN181KBS	115	150	6000	35	300	162	198	1100
TVZ14EC201KBS	TVZ14ECN201KBS	130	170	6000	50	340	184	226	980
TVZ14EC221KBS	TVZ14ECN221KBS	140	180	6000	55	360	200	240	880
TVZ14EC241KBS	TVZ14ECN241KBS	150	200	6000	60	395	216	264	780
TVZ14EC271KBS	TVZ14ECN271KBS	175	225	6000	70	455	243	297	700
TVZ14EC311KBS	TVZ14ECN311KBS	200	255	6000	75	530	281	344	600
TVZ14EC331KBS	TVZ14ECN331KBS	210	275	6000	78	560	297	363	560
TVZ14EC361KBS	TVZ14ECN361KBS	230	300	6000	80	595	324	396	520
TVZ14EC391KBS	TVZ14ECN391KBS	250	320	6000	100	650	351	429	480
TVZ14EC431KBS	TVZ14ECN431KBS	275	350	6000	110	710	387	473	440
TVZ14EC471KBS	TVZ14ECN471KBS	300	385	6000	125	775	423	517	400
TVZ14EC511KBS	TVZ14ECN511KBS	320	420	6000	136	840	459	561	370
TVZ14EC561KBS	TVZ14ECN561KBS	360	470	6000	145	960	522	638	340
TVZ14EC621KBS	TVZ14ECN621KBS	385	505	6000	150	1025	558	682	300
TVZ14EC681KBS	TVZ14ECN681KBS	420	560	6000	160	1120	612	748	280

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

18mm Series

3-Leaded, Thermal Link Located on Second Lead

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (10/1000us)	Maximum Clamping Voltage at Specified Current (8/20us)/80A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		$V_{M(Ac) RMS}$	$V_{M(DC)}$	I_{TM}	W_{TM}	V_C	$V_{N(DC) min.}$	$V_{N(DC) max.}$	C
		(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ18EC181KBS	TVZ18ECN181KBS	115	150	9000	135	320	162	198	1800
TVZ18EC201KBS	TVZ18ECN201KBS	130	170	9000	140	340	184	226	1600
TVZ18EC221KBS	TVZ18ECN221KBS	140	180	9000	150	360	200	240	1450
TVZ18EC241KBS	TVZ18ECN241KBS	150	200	9000	155	395	216	264	1300
TVZ18EC271KBS	TVZ18ECN271KBS	175	225	9000	163	455	243	297	1150
TVZ18EC311KBS	TVZ18ECN311KBS	200	255	9000	170	505	281	344	990
TVZ18EC361KBS	TVZ18ECN361KBS	230	300	9000	190	545	324	396	850
TVZ18EC391KBS	TVZ18ECN391KBS	250	320	9000	220	595	351	429	790
TVZ18EC431KBS	TVZ18ECN431KBS	275	350	9000	245	650	387	473	710
TVZ18EC471KBS	TVZ18ECN471KBS	300	385	9000	270	710	423	517	650
TVZ18EC511KBS	TVZ18ECN511KBS	320	420	9000	290	775	459	561	600
TVZ18EC561KBS	TVZ18ECN561KBS	360	470	9000	300	800	522	638	550
TVZ18EC621KBS	TVZ18ECN621KBS	385	505	9000	314	840	558	682	500
TVZ18EC681KBS	TVZ18ECN681KBS	420	560	9000	330	910	612	748	450
TVZ18EC751KBS	TVZ18ECN751KBS	460	615	9000	345	1025	675	825	400
TVZ18EC821KBS	TVZ18ECN821KBS	510	675	9000	355	1120	738	901	370
TVZ18EC911KBS	TVZ18ECN911KBS	550	745	9000	365	1240	819	1001	340
TVZ18EC951KBS	TVZ18ECN951KBS	575	785	9000	378	1250	856	1047	320
TVZ18EC102KBS	TVZ18ECN102KBS	625	825	9000	388	1350	900	1100	300
TVZ18EC122KBS	TVZ18ECN122KBS	750	975	9000	415	1400	1080	1320	260

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

20mm Series

3-Leaded, Thermal Link Located on Second Lead

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (2ms)	Maximum Clamping Voltage at Specified Current (8/20us)/100A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		V _{M(AC) RMS} (V)	V _{M(DC)} (V)	I _{TM} (A)	W _{TM} (J)	V _C (V)	V _{N(DC) min.} (V)	V _{N(DC) max.} (V)	C (pF)
TVZ20EC181KBS	TVZ20ECN181KBS	115	150	10000	52	300	162	198	2100
TVZ20EC201KBS	TVZ20ECN201KBS	130	170	10000	100	340	184	226	1900
TVZ20EC221KBS	TVZ20ECN221KBS	140	180	10000	110	360	200	240	1720
TVZ20EC241KBS	TVZ20ECN241KBS	150	200	10000	120	395	216	264	1580
TVZ20EC271KBS	TVZ20ECN271KBS	175	225	10000	135	455	243	297	1360
TVZ20EC311KBS	TVZ20ECN311KBS	200	255	10000	154	530	281	344	1180
TVZ20EC331KBS	TVZ20ECN331KBS	210	275	10000	157	560	297	363	1100
TVZ20EC361KBS	TVZ20ECN361KBS	230	300	10000	160	595	324	396	1020
TVZ20EC391KBS	TVZ20ECN391KBS	250	320	10000	170	650	351	429	940
TVZ20EC431KBS	TVZ20ECN431KBS	275	350	10000	190	710	387	473	850
TVZ20EC471KBS	TVZ20ECN471KBS	300	385	10000	250	775	423	517	780
TVZ20EC511KBS	TVZ20ECN511KBS	320	420	10000	272	840	459	561	720
TVZ20EC561KBS	TVZ20ECN561KBS	360	470	10000	285	930	522	638	650
TVZ20EC621KBS	TVZ20ECN621KBS	385	505	10000	300	1025	558	682	590
TVZ20EC681KBS	TVZ20ECN681KBS	420	560	10000	320	1120	612	748	540
TVZ20EC751KBS	TVZ20ECN751KBS	460	615	10000	340	1240	675	825	490
TVZ20EC781KBS	TVZ20ECN781KBS	485	640	10000	345	1300	702	808	470
TVZ20EC821KBS	TVZ20ECN821KBS	510	670	10000	350	1355	738	902	450
TVZ20EC911KBS	TVZ20ECN911KBS	550	745	10000	360	1500	819	1001	400
TVZ20EC951KBS	TVZ20ECN951KBS	575	785	10000	375	1568	856	1047	385
TVZ20EC102KBS	TVZ20ECN102KBS	625	825	10000	400	1650	900	1100	370
TVZ20EC112KBS	TVZ20ECN112KBS	680	895	10000	460	1815	962	1175	340
TVZ20EC122KBS	TVZ20ECN122KBS	750	975	10000	480	1980	1080	1320	300

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

25mm Series (Round Type)

3-Leaded, Thermal Link Located on Third Lead

Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
		Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (10/1000us)	Maximum Clamping Voltage at Specified Current (8/20us)/100A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
		V _{M(AC) RMS}	V _{M(DC)}	I _{TM}	W _{TM}	V _C	V _{N(DC) min.}	V _{N(DC) max.}	C
		(V)	(V)	(A)	(J)	(V)	(V)	(pF)	
TVZ25D181KBS	TVZ25DN181KBS	120	160	18000	180	300	170	207	3900
TVZ25D201KBS	TVZ25DN201KBS	130	175	18000	200	340	185	225	3080
TVZ25D221KBS	TVZ25DN221KBS	140	180	18000	225	360	198	242	2800
TVZ25D241KBS	TVZ25DN241KBS	150	200	18000	235	395	216	264	2570
TVZ25D271KBS	TVZ25DN271KBS	180	230	18000	245	465	255	311	2280
TVZ25D301KBS	TVZ25DN301KBS	195	250	18000	255	505	270	330	1920
TVZ25D331KBS	TVZ25DN331KBS	210	275	18000	270	540	297	363	1800
TVZ25D361KBS	TVZ25DN361KBS	230	300	18000	315	595	324	396	1650
TVZ25D391KBS	TVZ25DN391KBS	250	330	18000	342	650	351	429	1530
TVZ25D431KBS	TVZ25DN431KBS	275	370	18000	370	710	387	473	1390
TVZ25D471KBS	TVZ25DN471KBS	300	385	18000	390	775	423	517	1270
TVZ25D511KBS	TVZ25DN511KBS	320	420	18000	422	840	459	561	1170
TVZ25D561KBS	TVZ25DN561KBS	360	470	18000	460	910	522	638	1060
TVZ25D621KBS	TVZ25DN621KBS	390	505	18000	495	1025	558	682	960
TVZ25D681KBS	TVZ25DN681KBS	420	560	18000	515	1120	612	748	880
TVZ25D751KBS	TVZ25DN751KBS	460	615	18000	530	1240	675	825	790
TVZ25D781KBS	TVZ25DN781KBS	485	640	18000	540	1240	702	858	760
TVZ25D821KBS	TVZ25DN821KBS	510	675	18000	550	1350	738	902	730
TVZ25D911KBS	TVZ25DN911KBS	550	745	18000	600	1400	819	1001	650
TVZ25D102KBS	TVZ25DN102KBS	625	825	18000	630	1620	900	1100	600
TVZ25D112KBS	TVZ25DN112KBS	680	865	18000	700	1800	962	1175	540
TVZ25D122KBS	TVZ25DN122KBS	750	975	18000	720	2100	1080	1320	500

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

25mm Series (Rectangular Type)
3-Leaded, Thermal Link Located on Third Lead

RoHS Compliant Series Part Number	Maximum Ratings					Specifications		
	Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20us)	Maximum Non-Repetitive Surge Energy (10/1000us)	Maximum Clamping Voltage at Specified Current (8/20us)/100A	Nominal Voltage at 1mA(DC) Current		Typical Capacitance at 1MHz
	$V_{M(AC) RMS}$	$V_{M(DC)}$	I_{TM}	W_{TM}	V_C	$V_{N(DC) min.}$	$V_{N(DC) max.}$	C
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
TVZ25RCN181KBS	120	160	22000	225	300	170	207	4900
TVZ25RCN201KBS	130	175	22000	250	340	184	226	4500
TVZ25RCN221KBS	140	180	22000	281	360	200	240	4150
TVZ25RCN241KBS	150	200	22000	294	395	216	264	3810
TVZ25RCN271KBS	175	225	22000	306	475	243	297	3250
TVZ25RCN301KBS	195	250	22000	319	505	270	330	3000
TVZ25RCN331KBS	210	275	22000	338	540	297	363	2750
TVZ25RCN361KBS	230	300	22000	394	595	324	396	2560
TVZ25RCN391KBS	250	330	22000	428	650	351	429	2380
TVZ25RCN431KBS	275	370	22000	463	710	387	473	2130
TVZ25RCN471KBS	300	385	22000	488	775	423	517	2000
TVZ25RCN511KBS	320	420	22000	528	865	459	561	1750
TVZ25RCN561KBS	360	470	22000	575	960	522	638	1500
TVZ25RCN621KBS	385	500	22000	619	1040	558	682	1480
TVZ25RCN681KBS	420	560	22000	644	1120	612	748	1380
TVZ25RCN751KBS	460	615	22000	663	1240	675	825	1250
TVZ25RCN781KBS	485	640	22000	675	1290	702	858	1230
TVZ25RCN821KBS	510	675	22000	688	1350	735	902	1150
TVZ25RCN911KBS	550	745	22000	750	1400	819	1001	1100
TVZ25RCN102KBS	625	825	22000	788	1620	900	1100	950
TVZ25RCN112KBS	680	865	22000	875	1815	962	1175	820
TVZ25RCN122KBS	750	970	22000	925	1980	1080	1320	730

Thermally Protected Ceramic Metal Oxide Varistors

Specifications (continued)

34mm Series 3-Leaded

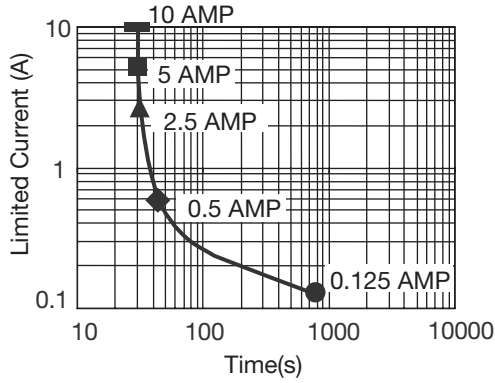
Standard Series Part Number	RoHS Compliant Series Part Number	Maximum Ratings				Electrical Characteristics			
		Continuous Rated Voltage		Rated Single Pulse Transient		Varistor Voltage @ 1mA DC		Maximum Clamping Voltage @ Test Current 8/20us 200A	Typical Capacitance at 1MHz
		AC _{RMS} Volts	DC Volts	Energy (2ms)	Peak Surge Current 8/20us	Min Volts	Max Volts	Volts	C
				W _{TM} 1 x Pulse Joules	I _{TM} 1 x Pulse Amps				
								(pF)	
TVZ34RC111KBS	TVZ34RCN111KBS	115	150	235	40000 ¹	163	202	305	10000
TVZ34RC131KBS	TVZ34RCN131KBS	130	175	270	40000 ²	184	228	345	9000
TVZ34RC141KBS	TVZ34RCN141KBS	140	188	291	40000 ³	198	248	375	8100
TVZ34RC151KBS	TVZ34RCN151KBS	150	200	300	40000 ⁴	212	268	405	7200
TVZ34RC181KBS	TVZ34RCN181KBS	180	240	330	40000 ⁵	254	312	488	6300
TVZ34RC201KBS	TVZ34RCN201KBS	200	265	335	40000	283	357	540	5300
TVZ34RC251KBS	TVZ34RCN251KBS	250	330	370	40000	354	429	650	4800
TVZ34RC271KBS	TVZ34RCN271KBS	275	369	400	40000	389	473	730	4100
TVZ34RC301KBS	TVZ34RCN301KBS	300	400	435	40000	433	528	780	3700
TVZ34RC321KBS	TVZ34RCN321KBS	320	420	460	40000	462	561	830	3600
TVZ34RC331KBS	TVZ34RCN331KBS	330	435	475	40000	476	581	855	3500
TVZ34RC351KBS	TVZ34RCN351KBS	350	460	500	40000	505	616	910	3400
TVZ34RC391KBS	TVZ34RCN391KBS	385	506	550	40000	555	678	1005	2900
TVZ34RC421KBS	TVZ34RCN421KBS	420	560	600	40000	610	748	1130	2800
TVZ34RC461KBS	TVZ34RCN461KBS	460	610	620	40000	642	783	1188	2600
TVZ34RC481KBS	TVZ34RCN481KBS	480	640	650	40000	670	825	1240	2400
TVZ34RC511KBS	TVZ34RCN511KBS	510	675	700	40000	735	910	1350	2200
TVZ34RC551KBS	TVZ34RCN551KBS	550	700	735	40000	770	939	1415	2000
TVZ34RC571KBS	TVZ34RCN571KBS	575	730	770	40000	805	1000	1480	1800
TVZ34RC621KBS	TVZ34RCN621KBS	620	800	840	40000	880	1074	1589	1600
TVZ34RC661KBS	TVZ34RCN661KBS	660	850	900	40000	940	1160	1720	1500
TVZ34RC681KBS	TVZ34RCN681KBS	680	890	950	40000	980	1195	1772	1400
TVZ34RC751KBS	TVZ34RCN751KBS	750	970	1050	40000	1080	1320	2000	1200

Notes:

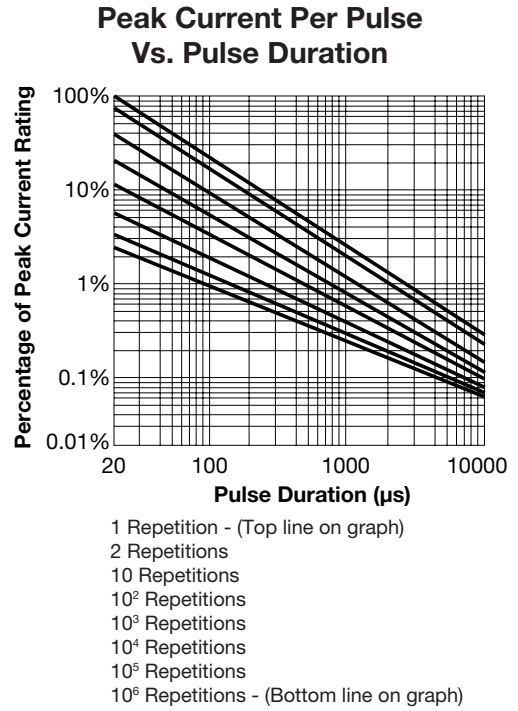
1. Peak current applies to applications rated up to 100VAC_{RMS}, 132VDC. Peak current is 30kA_{max} for applications greater than 100VAC_{RMS}, 132VDC.
2. Peak current applies to applications rated up to 115VAC_{RMS}, 145VDC. Peak current is 30kA_{max} for applications greater than 115VAC_{RMS}, 145VDC.
3. Peak current applies to applications rated up to 123VAC_{RMS}, 165VDC. Peak current is 30kA_{max} for applications greater than 123VAC_{RMS}, 165VDC.
4. Peak current applies to applications rated up to 132VAC_{RMS}, 176VDC. Peak current is 30kA_{max} for applications greater than 132VAC_{RMS}, 176VDC.
5. Peak current applies to applications rated up to 158VAC_{RMS}, 211VDC. Peak current is 30kA_{max} for applications greater than 158VAC_{RMS}, 211VDC.

Thermally Protected Ceramic Metal Oxide Varistors

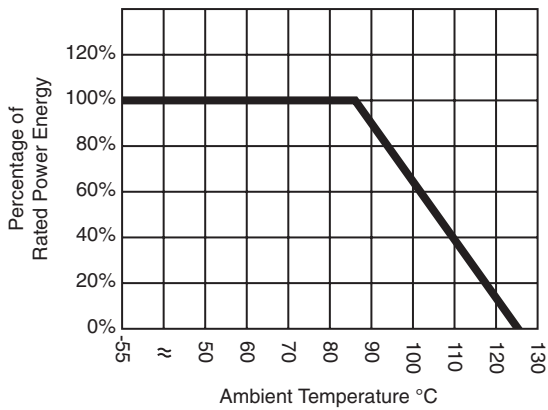
Thermal Characteristics & Soldering Profile



(Typical time to open according to UL1449 Abnormal Overvoltage Limited Current Test.)



Temperature Derating Curve Power and Energy Rating Vs. Temperature



For applications exceeding 85°C ambient temperature, the peak surge current and energy ratings must be reduced as shown in above Figure.

Thermally Protected Ceramic Metal Oxide Varistors

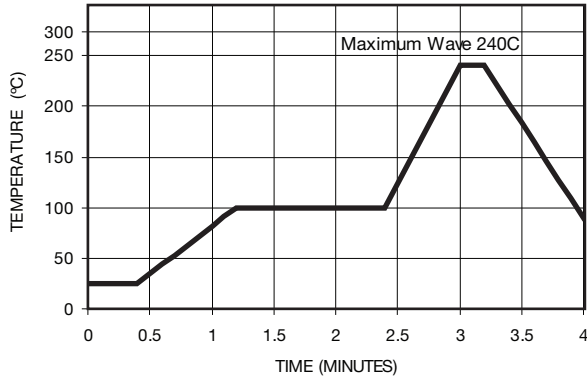
Thermal Characteristics & Soldering Profile (continued)

Wave Solder Profile

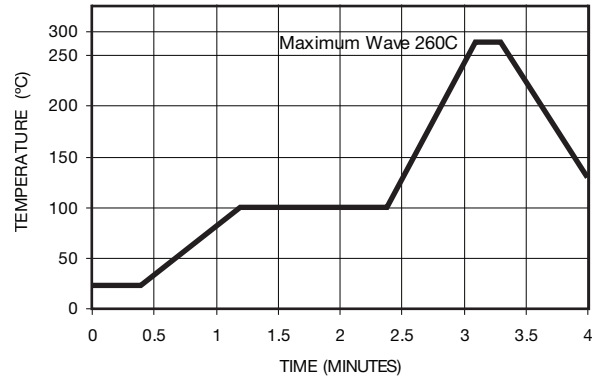
Because TVZ varistors contain a thermal protection device, care must be taken when soldering the devices into place. Two soldering methods are possible. First, hand soldering:

It is recommended to heat-sink the leads of the device. Second, wave-soldering: It is critically important that all preheat stage and the solder bath temperatures are rigidly controlled.

Non Lead Free Profile



Lead Free Profile



Physical Specifications

Lead Material	Non lead free parts: Solder coated copper wire, or tin coated copper wire Lead free parts: Tin coated copper wire
Soldering Characteristics	Solderability per MIL-STD-202, Method 208E
Insulating Material	Cured, flame retardant epoxy polymer meets UL94V-0 requirements

Environmental Specifications

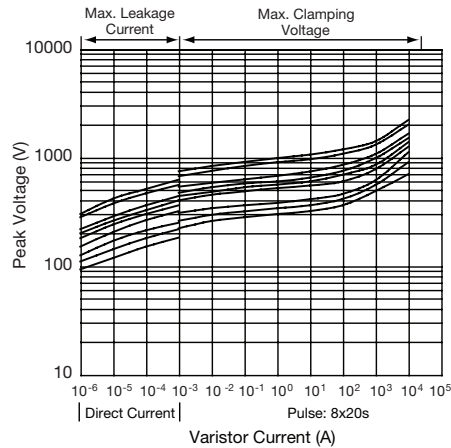
Operating/Storage Temperature	-40°C to +85°C
Passive Aging	+85°C, 1000 hours ±10% typical voltage change
Humidity Aging	+85°C, 85% R.H. 1000 hours ±10% typical voltage change
Thermal Shock	+85°C to -40°C 5 times ±10% typical voltage change
Solvent Resistance	MIL-STD-202, Method 215F
Moisture Sensitivity	Level 1

Thermally Protected Ceramic Metal Oxide Varistors

V-I Characteristics

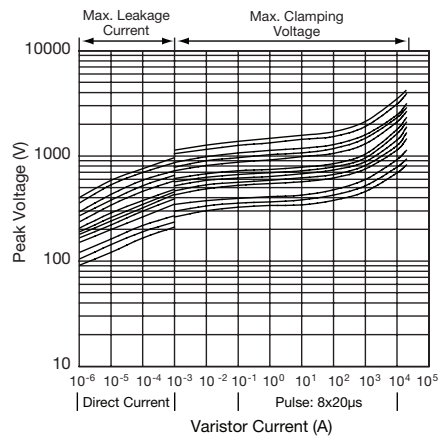
14mm Disc Size

681K - (Top line on graph)
 621K
 471K
 431K
 391K
 361K
 271K
 241K
 201K - (Bottom line on graph)



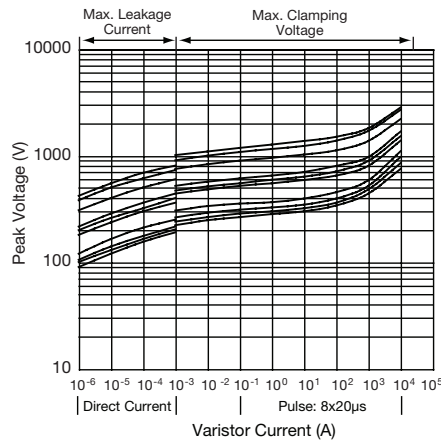
18mm Disc Size

911K - (Top line on graph)
 821K
 681K
 621K
 511K
 471K
 431K
 391K
 361K
 271K
 241K
 201K - (Bottom line on graph)



20mm Disc Size

911K - (Top line on graph)
 821K
 681K
 471K
 431K
 391K
 271K
 241K
 221K
 201K - (Bottom line on graph)



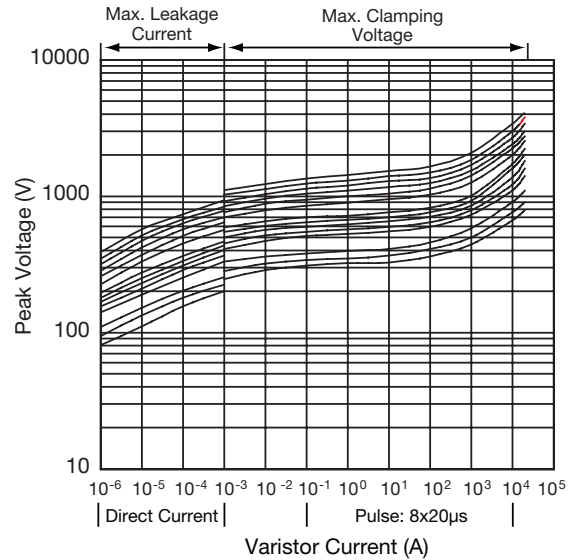
At idle power, current levels shown to the left of the discontinuity illustrate typically the high end leakage current. However, if lower leakage current levels are desired, they may be guaranteed. In the clamping voltage region to the right of the discontinuity, maximum clamping voltage is plotted.

Thermally Protected Ceramic Metal Oxide Varistors

V-I Characteristics (continued)

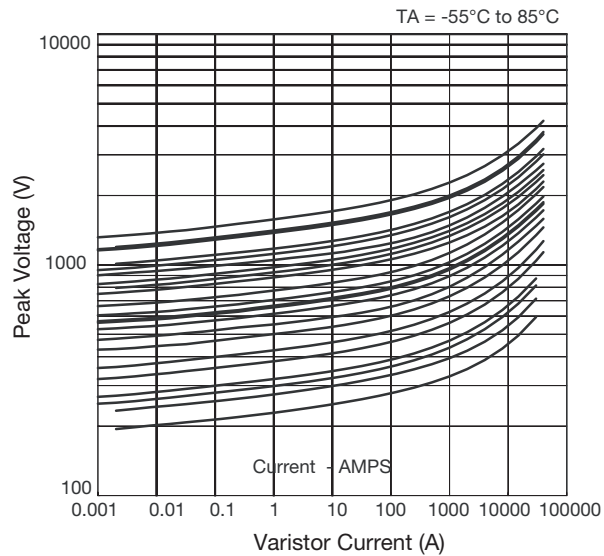
25mm Disc Size

911K - (Top line on graph)
 821K
 751K
 681K
 621K
 511K
 471K
 431K
 391K
 361K
 271K
 241K
 201K - (Bottom line on graph)



34mm Disc Size

751K - (Top line on graph)
 681K
 661K
 571K
 551K
 511K
 481K
 441K
 421K
 391K
 351K
 331K
 321K
 301K
 271K
 251K
 201K
 181K - (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.

Thermally Protected Ceramic Metal Oxide Varistors

Taping Specifications

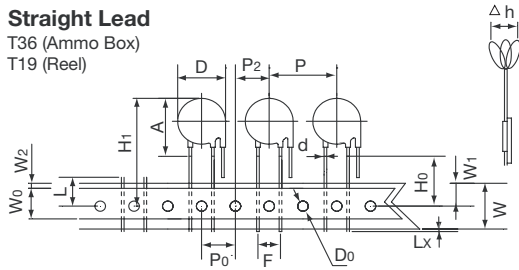
14mm

Available for rated voltages $\leq 420\text{VAC}$. Contact World Products Inc. for availability of higher voltages.

Unit: mm

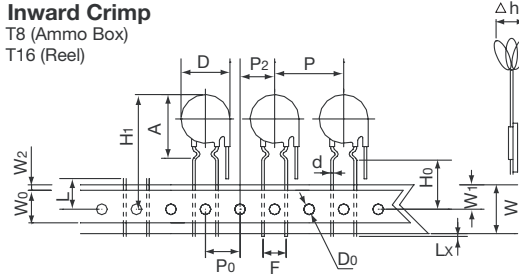
Straight Lead

T36 (Ammo Box)
T19 (Reel)



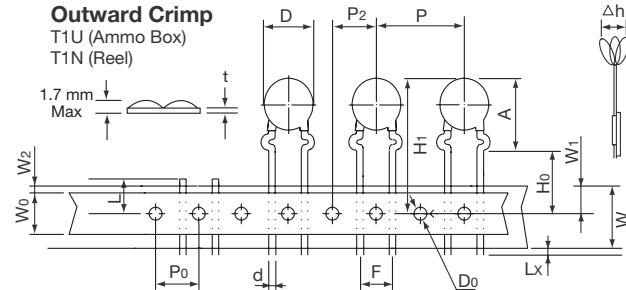
Inward Crimp

T8 (Ammo Box)
T16 (Reel)



Outward Crimp

T1U (Ammo Box)
T1N (Reel)

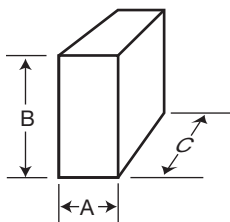


ITEM	Taping Code	Disk Size	Disk Size
		14mm	
		T19, T36	T1N, T1U, T8, T16
Body Diameter	D	17.5Max	17.5 Max.
Lead Wire Diameter	d	0.8 ± 0.05	0.8 ± 0.05
Pitch of Component	P	25.4 ± 1	25.4 ± 1
Hole Center to Component Center	P ₂	12.7 ± 0.3	12.7 ± 0.3
Feed Hole Pitch	P ₀	12.7 ± 0.3	12.7 ± 0.2
Lead to Lead Distance (Center to Center)	F	7.5 ± 0.8	7.5 ± 0.8
Component Alignment	Δh	2.0 Max.	2.0 Max.
Base paper Tape Width	W	$18+1, -0.5$	$18+1, -0.5$
Adhesive Tape Width	W ₀	10 Min.	10 Min.
Hole Position	W ₁	9 ± 0.5	9.0 ± 0.5
Adhesive Tape Border	W ₂	1.5 Max.	1.5 Max.
Lead Wire Clinch Height	H ₀	18 ± 2	16 ± 1
Component Height	H ₁	40 Max.	40 Max.
Lead-Wire Protrusion	Lx	1.0 Max.	1.0 Max.
Feed Hole Diameter	D ₀	4 ± 0.2	4.0 ± 0.2
Total Tape Thickness	t	< 0.7	< 0.7
Length of Clipped Lead	L	11 Max.	11 Max.
Component Height from Seating Plane	A	22.0 Max.	22.5 Max.

Based on EIA-468-B Specification.

Ammo Box

Unit: mm



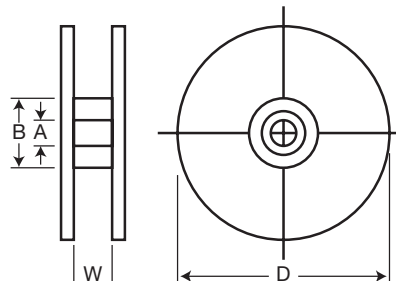
Ammo Box Taping Codes:
T1U, T8

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

<300VAC = 500 to 1000 pieces
≥300VAC = 300 pieces

Reel

Unit: mm



Reel Taping Codes:
T1N, T16

A = Approximately 30φ
B = Approximately 95φ
D = 350φmax
W = Approximately 50

<300VAC = 500 to 1000 pieces
≥300VAC = 300 pieces

Thermally Protected Ceramic Metal Oxide Varistors

Taping Specifications (continued)

18mm & 20mm

Unit: mm

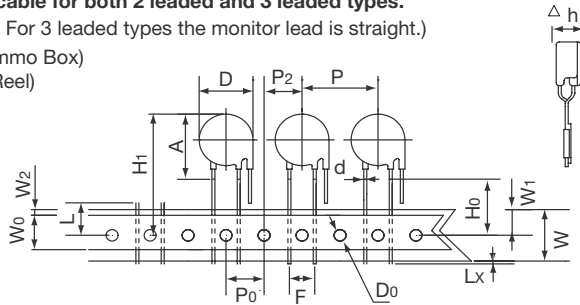
In-Line Crimp

Applicable for both 2 leaded and 3 leaded types.

(Note: For 3 leaded types the monitor lead is straight.)

T2 (Ammo Box)

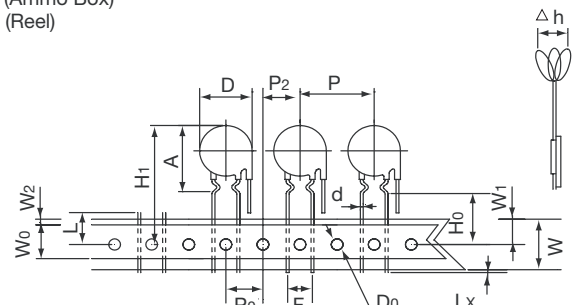
T25 (Reel)



Inward Crimp

T40 (Ammo Box)

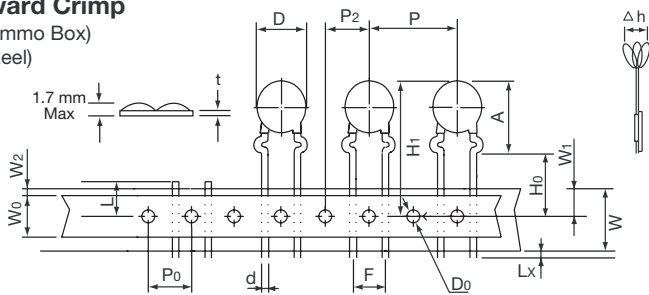
T4X (Reel)



Outward Crimp

T45 (Ammo Box)

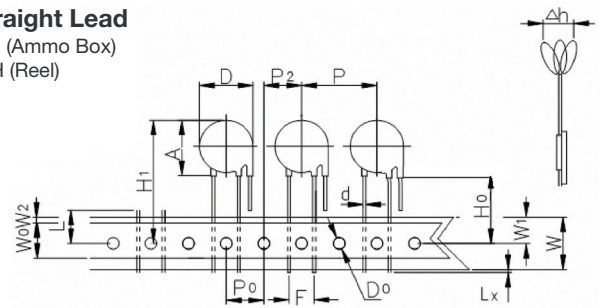
T1X (Reel)



Straight Lead

T44 (Ammo Box)

T1H (Reel)



ITEM	Taping Code	Disk Size	
		18mm & 20mm	
		T45, T1X, T40, T4X, T44, T1H	T2, T25
Body Diameter	D	24 Max*	24 Max*
Lead Wire Diameter	d	0.8 ± 0.1**	0.8 ± 0.1**
Pitch of Component	P	25.4 ± 1.0	25.4 ± 1.0
Feed Hole Pitch	P ₀	12.7 ± 0.2	12.7 ± 0.2
Hole Center to Component Center	P ₂	12.7 ± 0.3	12.7 ± 0.3
Lead to Lead Distance (Center to Center)	F	7.5 ± 0.8	7.5 ± 0.8
Component Alignment	Δh	2.0 Max.	2.0 Max.
Base paper Tape Width	W	18 +1, -0.5	18 +1, -0.5
Adhesive Tape Width	W ₀	10 Min.	10 Min.
Hole Position	W ₁	9 ± 0.5	9 ± 0.5
Adhesive Tape Border	W ₂	1.5 Max.	1.5 Max.
Lead Wire Clinch Height	H ₀	16 ± 1	16 ± 1
Component Height	H ₁	48 Max.*	48 Max.*
Lead-Wire Protrusion	Lx	1.0 Max.	1.0 Max.
Feed Hole Diameter	D ₀	4 ± 0.2	4 ± 0.2
Total Tape Thickness	t	< 0.7	< 0.7
Length of Clipped Lead	L	11 Max.	11 Max.
Component Height from Seating Plane	A	29 Max.*	28 Max.*

*For 18 ϕ , D = 22 Max., H₁ = 46 Max. and A = 26 Max. Based on EIA-468-B specification.

**0.8mm ± 0.1 mm (181-681k), 1.0mm ± 0.1 mm (751-122k)

Thermally Protected Ceramic Metal Oxide Varistors

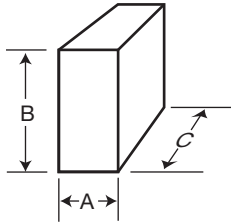
Taping Specifications (continued)

18mm & 20mm (continued)

Available for rated voltages <420VAC. Contact World Products Inc. for availability of higher voltages.

Ammo Box

Unit: mm



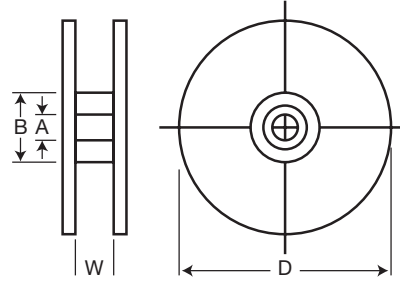
Ammo Box Taping Codes:
T2, T45, T40

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

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

Reel

Unit: mm



Reel Taping Codes:
T25, T1X, T4X

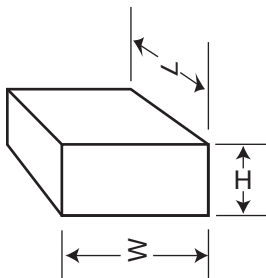
A = Approximately 30ø
B = Approximately 95ø
D = 350ømax
W = Approximately 50

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

Standard Bulk Packaging

Disk Size mm	Varistor Voltage	Quantity pcs/bag	Quantity pcs/carton
14	ALL	300	3000
18	ALL	200	2000
20	181K - 681K	100	1000
	Above 751K	50	500
25	181K - 681K	50	500
	Above 751K	30	300
34	111K - 251K	80	320
	271K - 391K	60	240
	421K - 751K	40	160

Carton Size of Bulk Packaging

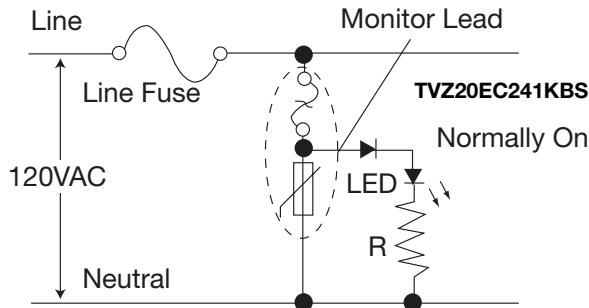
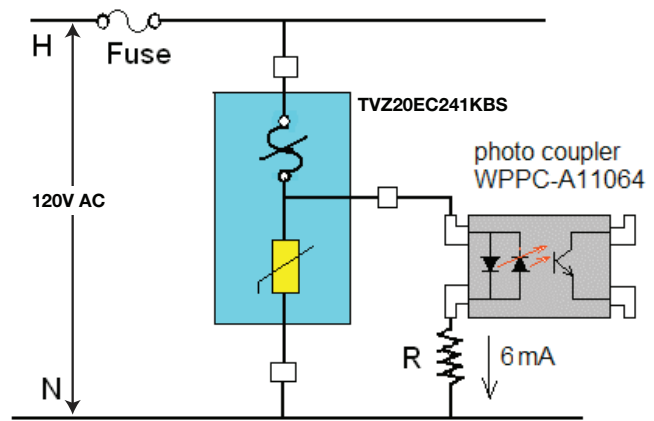
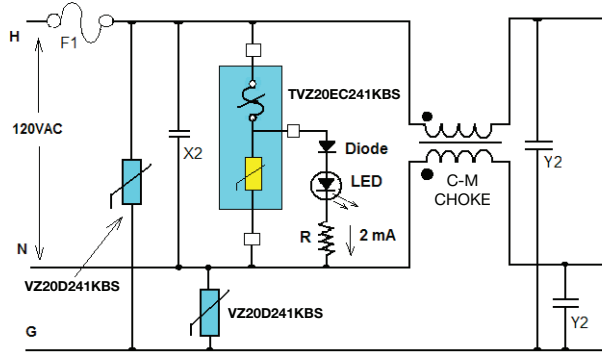


L = approx. 395mm
W = approx. 285mm
H = approx. 180mm

Thermally Protected Ceramic Metal Oxide Varistors

AC Line Application Examples

Thermally Protected Varistors are surge protective components (SPC's). The configurations available are either a two or three leaded component. One lead is connected to a thermal link, which may open when the varistor is subjected to prolonged over-voltage conditions in both AC and DC applications, thereby preventing failure mode of the varistor. This component (in the three leaded configuration) further provides for diagnostic capabilities in the customers circuit.



All application notes/circuits are shown as examples only. It is the responsibility of the purchaser to insure that the application meets purchaser's specifications. No representation or warranty, whether express or implied, is given and no liability is assumed by WPI with respect to the use of such examples.

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