

# Metal Oxide Varistor : TVR-D Series



## Disc Type Varistor for Surge Protection (High Surge Series)

### ■ Features

1. RoHS compliant
2. Body size  $\Phi 7 \sim \Phi 20\text{mm}$
3. Wide operating voltage range : 115Vac ~ 680Vac
4. High surge current rating up to 13KA
5. High energy rating up to 720 Joule
6. Radial lead resin coated
7. Excellent clamping ratio
8. Low leakage current
9. Bidirectional and symmetrical V/I characteristics
10. Cost effective
11. Operating temperature range :  $-40 \sim +85^{\circ}\text{C}$
12. Agency recognition: UL /cUL/VDE



### ■ Recommended Applications

1. Power supply
2. Home appliance
3. Industrial equipment
4. Telecommunication or telephone system

### ■ Part Number Code

$\Phi 7\text{mm} \sim \Phi 20\text{mm}$

T	V	R	0	5	1	8	0	K	I	A	R				W
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

	Product Type	Size	Varistor Voltage ( $V_{1\text{mA}}$ )	Tolerance of $V_{1\text{mA}}$	Internal Control Code	Optional Suffix																								
TVR	Thinking varistor TVR type	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>07</td><td><math>\Phi 7\text{mm}</math></td></tr> <tr><td>10</td><td><math>\Phi 10\text{mm}</math></td></tr> <tr><td>14</td><td><math>\Phi 14\text{mm}</math></td></tr> <tr><td>20</td><td><math>\Phi 20\text{mm}</math></td></tr> </table>	07	$\Phi 7\text{mm}$	10	$\Phi 10\text{mm}$	14	$\Phi 14\text{mm}$	20	$\Phi 20\text{mm}$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>180</td><td><math>18 \times 10^0\text{V} = 18\text{V}</math></td></tr> <tr><td>241</td><td><math>24 \times 10^1\text{V} = 240\text{V}</math></td></tr> <tr><td>102</td><td><math>10 \times 10^2\text{V} = 1000\text{V}</math></td></tr> </table>	180	$18 \times 10^0\text{V} = 18\text{V}$	241	$24 \times 10^1\text{V} = 240\text{V}$	102	$10 \times 10^2\text{V} = 1000\text{V}$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>K</td><td><math>\pm 10\%</math></td></tr> <tr><td>A</td><td><math>0 \sim +10\%</math></td></tr> <tr><td>B</td><td><math>0 \sim -10\%</math></td></tr> </table>	K	$\pm 10\%$	A	$0 \sim +10\%$	B	$0 \sim -10\%$	01~ZZ	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>D</td><td>High energy series</td></tr> <tr><td>W</td><td>RoHS compliant</td></tr> </table>	D	High energy series	W	RoHS compliant
07	$\Phi 7\text{mm}$																													
10	$\Phi 10\text{mm}$																													
14	$\Phi 14\text{mm}$																													
20	$\Phi 20\text{mm}$																													
180	$18 \times 10^0\text{V} = 18\text{V}$																													
241	$24 \times 10^1\text{V} = 240\text{V}$																													
102	$10 \times 10^2\text{V} = 1000\text{V}$																													
K	$\pm 10\%$																													
A	$0 \sim +10\%$																													
B	$0 \sim -10\%$																													
D	High energy series																													
W	RoHS compliant																													

	Appearance	Packaging
S	Straight lead, epoxy coating	A
F	Y kink lead, epoxy coating	E
I	Inner kink lead, epoxy coating	B
		R
		C
		Blank

Note: Code 11~16 will shift forward when previous codes are not used.

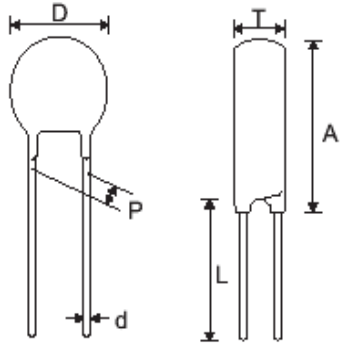
# Metal Oxide Varistor : TVR-D Series



## Disc Type Varistor for Surge Protection (High Surge Series)

### ■ Structure and Dimensions

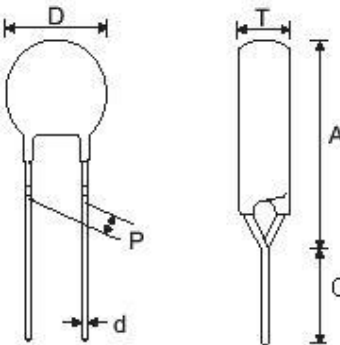
- S Type (Straight lead)



(Unit :mm)

Disc size	D max.	L min.	d	P	A max.	T max.
07-D	9.5	26.5	0.6±0.02	5±1	13.0	Show on the Electrical Characteristics
10-D	14	26.5	0.8±0.02	7.5±1	17.5	
14-D	19	26.5	0.8±0.02	7.5±1	22.0	
20-D	25.5	22.5	1.0±0.02	10±1	28.5	

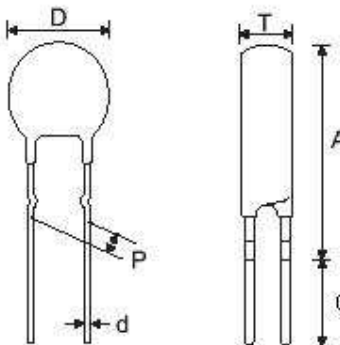
- F Type (Y kink lead)



(Unit :mm)

Disc size	D max.	C min.	d	P	A max.	T max.
07-D	9.5	25	0.6±0.02	5±1	14.5	Show on the Electrical Characteristics
10-D	14	25	0.8±0.02	7.5±1	21.0	
14-D	19	25	0.8±0.02	7.5±1	24.5	
20-D	25.5	20	1.0±0.02	10±1	31.5	

- I Type (Inner kink lead)



(Unit :mm)

Disc Size	D max.	C min.	d	P	A max.	T max.
07-D	9.5	25	0.6±0.02	5±1	14.5	Show on the Electrical Characteristics
10-D	14	25	0.8±0.02	7.5±1	22	
14-D	19	25	0.8±0.02	7.5±1	24.5	
20-D	25.5	20	1.0±0.02	10±1	31.5	

# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)



### ■ Electrical Characteristics

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20 $\mu$ s)		Max. Surge Current (8/20 $\mu$ s)	Max. Energy (10/1000 $\mu$ s)	Rated Power	Reference Capacitance @1KHz	Thickness
	V <sub>1mA</sub> (V)	V <sub>AC(rms)</sub> (V)	V <sub>DC</sub> (V)	V <sub>p</sub> (V)	I <sub>p</sub> (A)	I <sub>max</sub> (A)	W <sub>max</sub> (J)	P (W)	C (pF)	T <sub>max</sub> (mm)
TVR 07181-D	180	115	150	300	10	1800	19	0.25	255	4.2
TVR 10181-D	180	115	150	300	25	4000	47	0.4	570	4.6
TVR 14181-D	180	115	150	300	50	8000	60	0.6	1000	4.6
TVR 20181-D	180	115	150	300	100	13000	152	1	2200	5.1
TVR 07201-D	200	130	170	340	10	1800	21	0.25	230	4.3
TVR 10201-D	200	130	170	340	25	4000	52	0.4	520	4.7
TVR 14201-D	200	130	170	340	50	8000	82	0.6	900	4.7
TVR 20201-D	200	130	170	340	100	13000	175	1	1900	5.1
TVR 07221-D	220	140	180	360	10	1800	23	0.25	210	4.4
TVR 10221-D	220	140	180	360	25	4000	58	0.4	470	4.8
TVR 14221-D	220	140	180	360	50	8000	90	0.6	850	4.8
TVR 20221-D	220	140	180	360	100	13000	185	1	1700	5.1
TVR 07241-D	240	150	200	395	10	1800	25	0.25	195	4.5
TVR 10241-D	240	150	200	395	25	4000	64	0.4	420	4.9
TVR 14241-D	240	150	200	395	50	8000	98	0.6	780	4.9
TVR 20241-D	240	150	200	395	100	13000	198	1	1500	5.2
TVR 07271-D	270	175	225	455	10	1800	28	0.25	175	4.7
TVR 10271-D	270	175	225	455	25	4000	67	0.4	370	5.1
TVR 14271-D	270	175	225	455	50	8000	116	0.6	650	5.1
TVR 20271-D	270	175	225	455	100	13000	220	1	1400	5.5
TVR 07301-D	300	195	250	500	10	1800	32	0.25	155	4.6
TVR 10301-D	300	195	250	500	25	4000	70	0.4	340	5.0
TVR 14301-D	300	195	250	500	50	8000	128	0.6	610	5.0
TVR 20301-D	300	195	250	500	100	13000	245	1	1300	5.7
TVR 07331-D	330	215	275	545	10	1800	34	0.25	140	4.7
TVR 10331-D	330	215	275	545	25	4000	72	0.4	320	5.1
TVR 14331-D	330	215	275	545	50	8000	140	0.6	580	5.1
TVR 20331-D	330	215	275	545	100	13000	268	1	1200	5.9
TVR 07361-D	360	230	300	595	10	1800	37	0.25	130	4.8
TVR 10361-D	360	230	300	595	25	4000	76	0.4	300	5.2
TVR 14361-D	360	230	300	595	50	8000	158	0.6	550	5.2
TVR 20361-D	360	230	300	595	100	13000	315	1	1000	6.1
TVR 07391-D	390	250	320	650	10	1800	40	0.25	120	5
TVR 10391-D	390	250	320	650	25	4000	82	0.4	280	5.4
TVR 14391-D	390	250	320	650	50	8000	170	0.6	520	5.4
TVR 20391-D	390	250	320	650	100	13000	350	1	880	6.2
TVR 07431-D	430	275	350	710	10	1800	46	0.25	100	4.9
TVR 10431-D	430	275	350	710	25	4000	93	0.4	250	5.3
TVR 14431-D	430	275	350	710	50	8000	185	0.6	480	5.3
TVR 20431-D	430	275	350	710	100	13000	380	1	800	5.9

# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)









Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20µs)		Max. Surge Current (8/20µs)	Max. Energy (10/1000µs)	Rated Power	Reference Capacitance @1KHz	Thickness
	V <sub>1mA</sub> (V)	V <sub>AC(rms)</sub> (V)	V <sub>DC</sub> (V)	V <sub>p</sub> (V)	I <sub>p</sub> (A)	I <sub>max</sub> (A)	W <sub>max</sub> (J)	P (W)	C (pF)	T <sub>max</sub> (mm)
TVR 07471-D	470	300	385	775	10	1800	49	0.25	90	5.0
TVR 10471-D	470	300	385	775	25	4000	99	0.4	240	5.4
TVR 14471-D	470	300	385	775	50	8000	205	0.6	460	5.4
TVR 20471-D	470	300	385	775	100	13000	405	1	700	5.9
TVR 07511-D	510	320	410	845	10	1800	54	0.25	85	5.2
TVR 10511-D	510	320	410	845	25	4000	107	0.4	220	5.6
TVR 14511-D	510	320	410	845	50	8000	220	0.6	430	5.6
TVR 20511-D	510	320	410	845	100	13000	445	1	630	6.1
TVR 07561-D	560	350	450	930	10	1800	55	0.25	80	5.4
TVR 10561-D	560	350	450	930	25	4000	113	0.4	200	5.8
TVR 14561-D	560	350	450	930	50	8000	240	0.6	390	5.8
TVR 20561-D	560	350	450	930	100	13000	475	1	530	6.3
TVR 07621-D	620	395	510	1020	10	1800	59	0.25	80	5.7
TVR 10621-D	620	395	510	1020	25	4000	125	0.4	190	6.1
TVR 14621-D	620	395	510	1020	50	8000	250	0.6	350	6.1
TVR 20621-D	620	395	510	1020	100	13000	490	1	490	6.6
TVR 07681-D	680	420	560	1120	10	1800	62	0.25	75	6.0
TVR 10681-D	680	420	560	1120	25	4000	128	0.4	180	6.4
TVR 14681-D	680	420	560	1120	50	8000	260	0.6	320	6.4
TVR 20681-D	680	420	560	1120	100	13000	500	1	470	6.9
TVR 07751-D	750	465	615	1235	10	1800	66	0.25	70	6.2
TVR 10751-D	750	465	615	1235	25	4000	134	0.4	170	6.7
TVR 14751-D	750	465	615	1235	50	8000	270	0.6	290	6.7
TVR 20751-D	750	465	615	1235	100	13000	525	1	450	7.1
TVR 07821-D	820	510	670	1355	10	1800	71	0.25	65	6.5
TVR 10821-D	820	510	670	1355	25	4000	146	0.4	140	6.9
TVR 14821-D	820	510	670	1355	50	8000	280	0.6	250	6.9
TVR 20821-D	820	510	670	1355	100	13000	545	1	410	9
TVR 10911-D	910	550	745	1500	25	4000	152	0.4	130	7.3
TVR 14911-D	910	550	745	1500	50	8000	295	0.6	230	7.3
TVR 20911-D	910	550	745	1500	100	13000	595	1	380	9.4
TVR 10102-D	1000	625	825	1650	25	4000	170	0.4	120	7.7
TVR 14102-D	1000	625	825	1650	50	8000	335	0.6	210	7.6
TVR 20102-D	1000	625	825	1650	100	13000	650	1	360	9.9
TVR 10112-D	1100	680	895	1815	25	4000	180	0.4	110	8.1
TVR 14112-D	1100	680	895	1815	50	8000	360	0.6	190	8.1
TVR 20112-D	1100	680	895	1815	100	13000	720	1	340	10.4

# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)



### ■ Safety Approvals

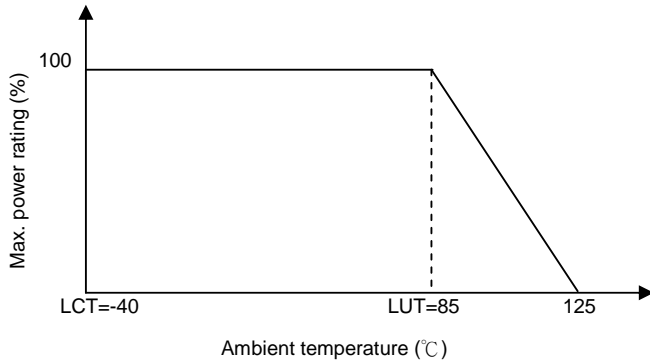
Part No.				Part No.			
	UL1449 2 <sup>nd</sup> : E173642 UL1449 3 <sup>rd</sup> : E314979				UL1449 2 <sup>nd</sup> : E173642 UL1449 3 <sup>rd</sup> : E314979		
TVR 07181-D	√	√	√	TVR 07471-D	√	√	√
TVR 10181-D	√	√		TVR 10471-D	√	√	
TVR 14181-D	√	√	√	TVR 14471-D	√	√	√
TVR 20181-D	√	√	√	TVR 20471-D	√	√	√
TVR 07201-D	√	√	√	TVR 07511-D	√	√	√
TVR 10201-D	√	√		TVR 10511-D	√	√	
TVR 14201-D	√	√	√	TVR 14511-D	√	√	√
TVR 20201-D	√	√	√	TVR 20511-D	√	√	√
TVR 07221-D	√	√	√	TVR 07561-D	√	√	√
TVR 10221-D	√	√		TVR 10561-D	√	√	
TVR 14221-D	√	√	√	TVR 14561-D	√	√	√
TVR 20221-D	√	√	√	TVR 20561-D	√	√	√
TVR 07241-D	√	√	√	TVR 07621-D	√	√	√
TVR 10241-D	√	√		TVR 10621-D	√	√	
TVR 14241-D	√	√	√	TVR 14621-D	√	√	√
TVR 20241-D	√	√	√	TVR 20621-D	√	√	√
TVR 07271-D	√	√	√	TVR 07681-D	√	√	√
TVR 10271-D	√	√		TVR 10681-D	√	√	
TVR 14271-D	√	√	√	TVR 14681-D	√	√	√
TVR 20271-D	√	√	√	TVR 20681-D	√	√	√
TVR 07301-D	√	√	√	TVR 07751-D	√	√	√
TVR 10301-D	√	√		TVR 10751-D	√	√	
TVR 14301-D	√	√	√	TVR 14751-D	√	√	√
TVR 20301-D	√	√	√	TVR 20751-D	√	√	√
TVR 07331-D	√	√	√	TVR 07821-D	√	√	√
TVR 10331-D	√	√		TVR 10821-D	√	√	
TVR 14331-D	√	√	√	TVR 14821-D	√	√	√
TVR 20331-D	√	√	√	TVR 20821-D	√	√	√
TVR 07361-D	√	√	√	TVR 10911-D	√	√	
TVR 10361-D	√	√		TVR 14911-D	√	√	√
TVR 14361-D	√	√	√	TVR 20911-D	√	√	√
TVR 20361-D	√	√	√	TVR 10102-D	√	√	
TVR 07391-D	√	√	√	TVR 14102-D	√	√	√
TVR 10391-D	√	√		TVR 20102-D	√	√	√
TVR 14391-D	√	√	√	TVR 10112-D	√	√	
TVR 20391-D	√	√	√	TVR 14112-D	√	√	√
TVR 07431-D	√	√	√	TVR 20112-D	√	√	√
TVR 10431-D	√	√					
TVR 14431-D	√	√	√				
TVR 20431-D	√	√	√				

# Metal Oxide Varistor : TVR-D Series

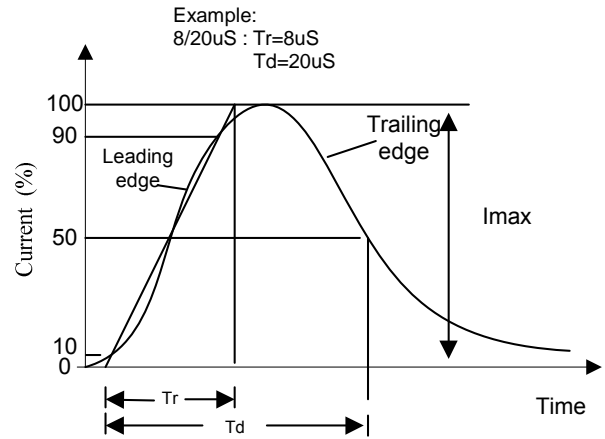


## Disc Type Varistor for Surge Protection (High Surge Series)

### ■ Power Derating Curve

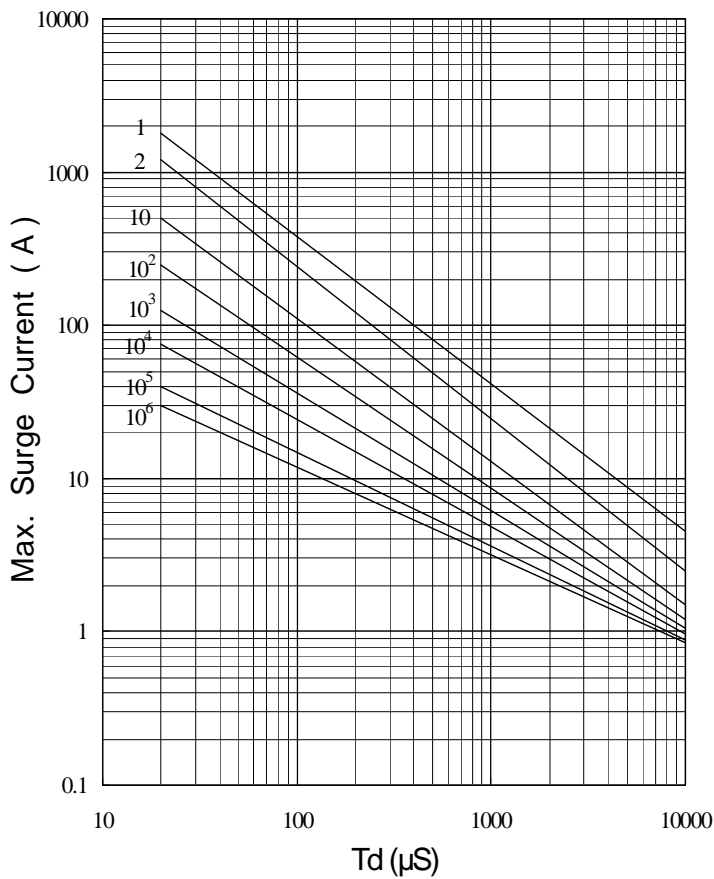


### ■ Surge Current Standard Waveform

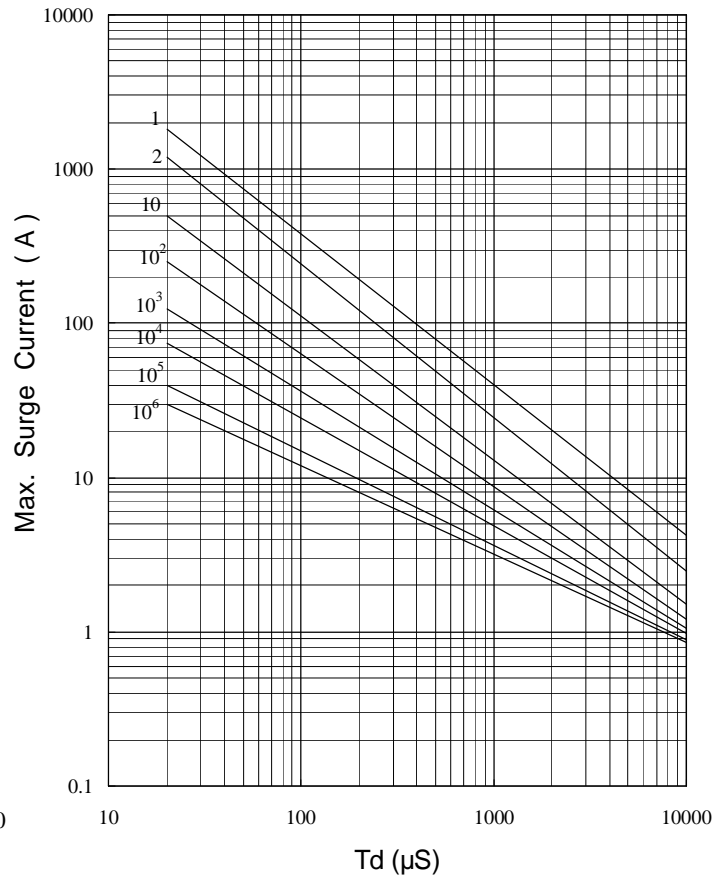


### ■ Max. Surge Current Derating Curves

TVR07181-D to TVR07471-D



TVR07511-D to TVR07821-D



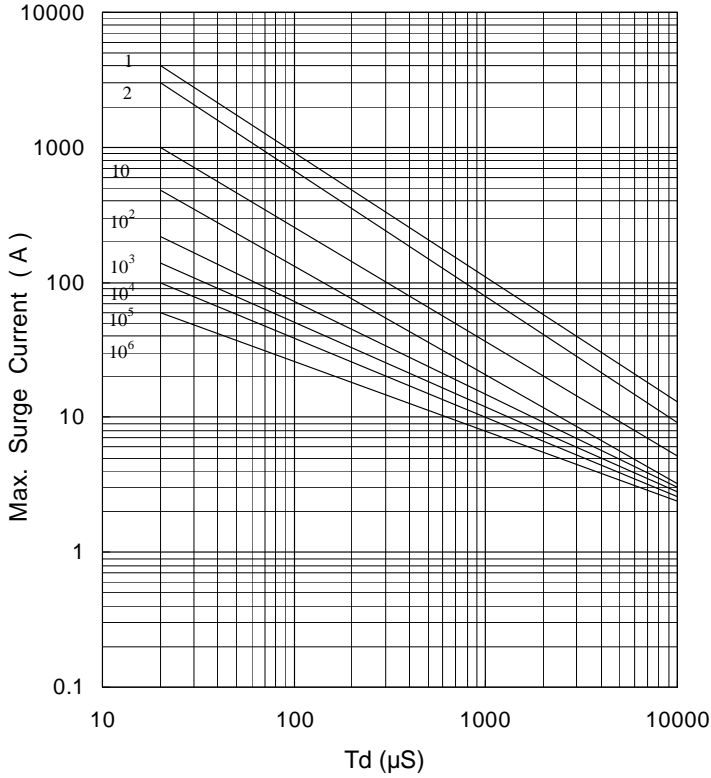
# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)

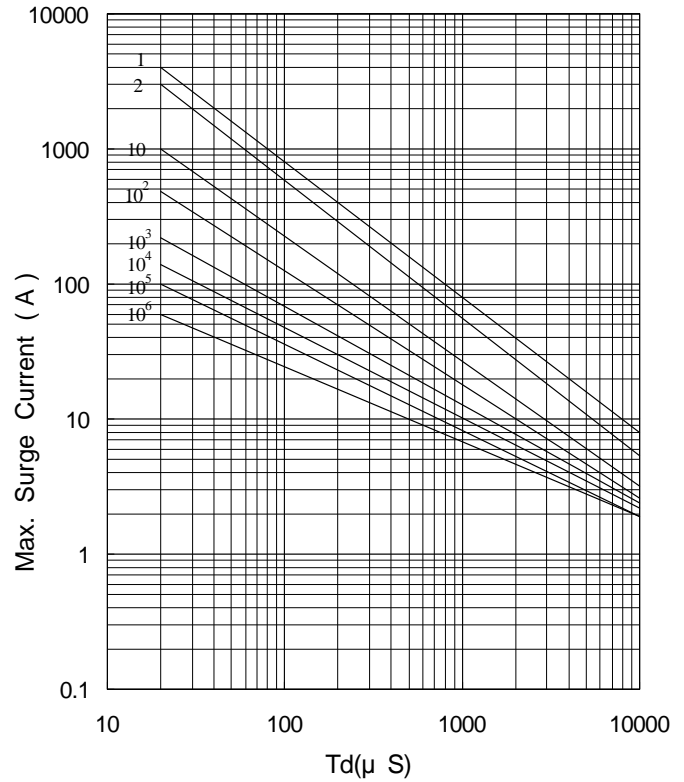


### ■ Max. Surge Current Derating Curves

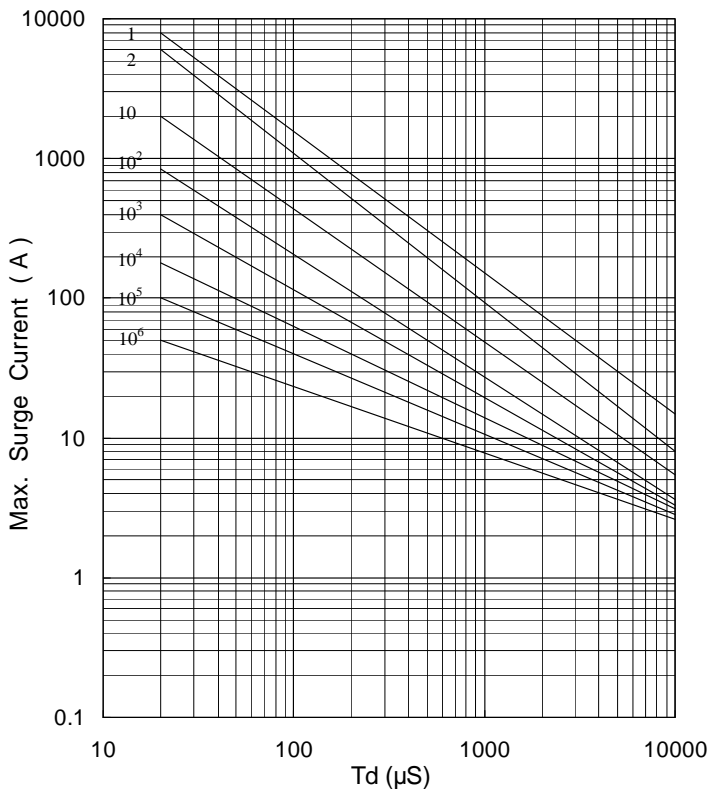
TVR10181-D to TVR10751-D



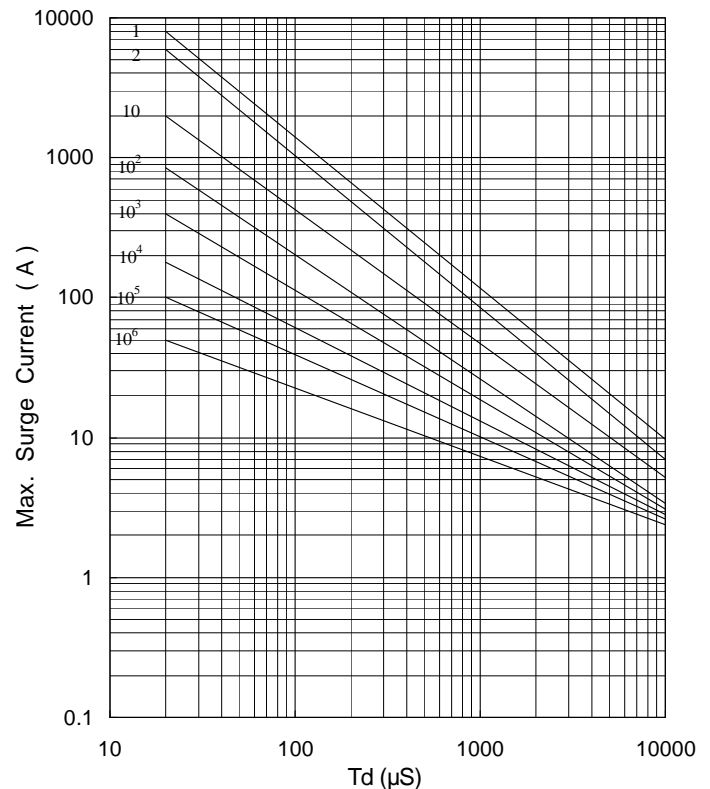
TVR10821-D to TVR10112-D



TVR14181-D to TVR14751-D



TVR14821-D to TVR14112-D

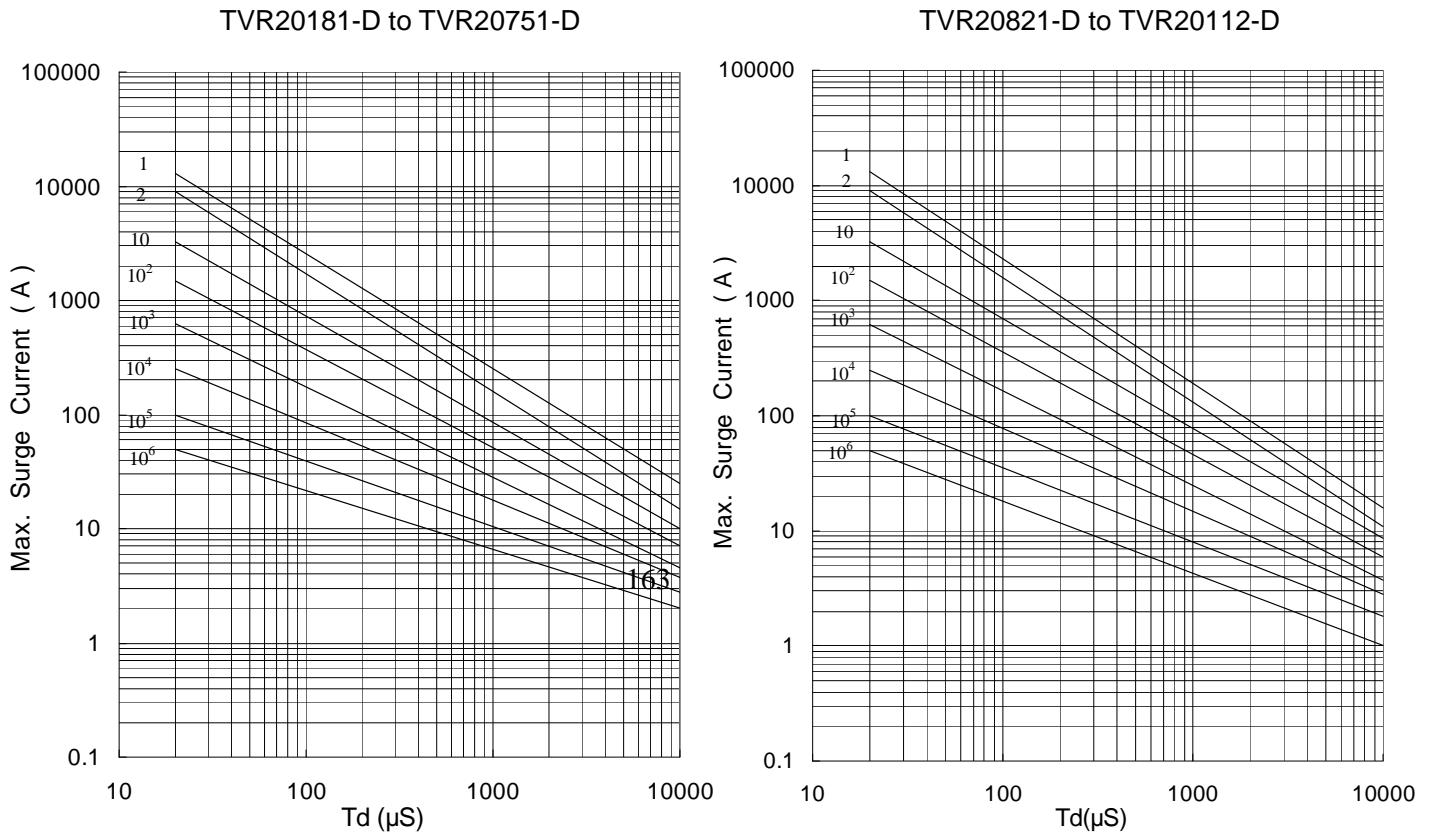


# Metal Oxide Varistor : TVR-D Series



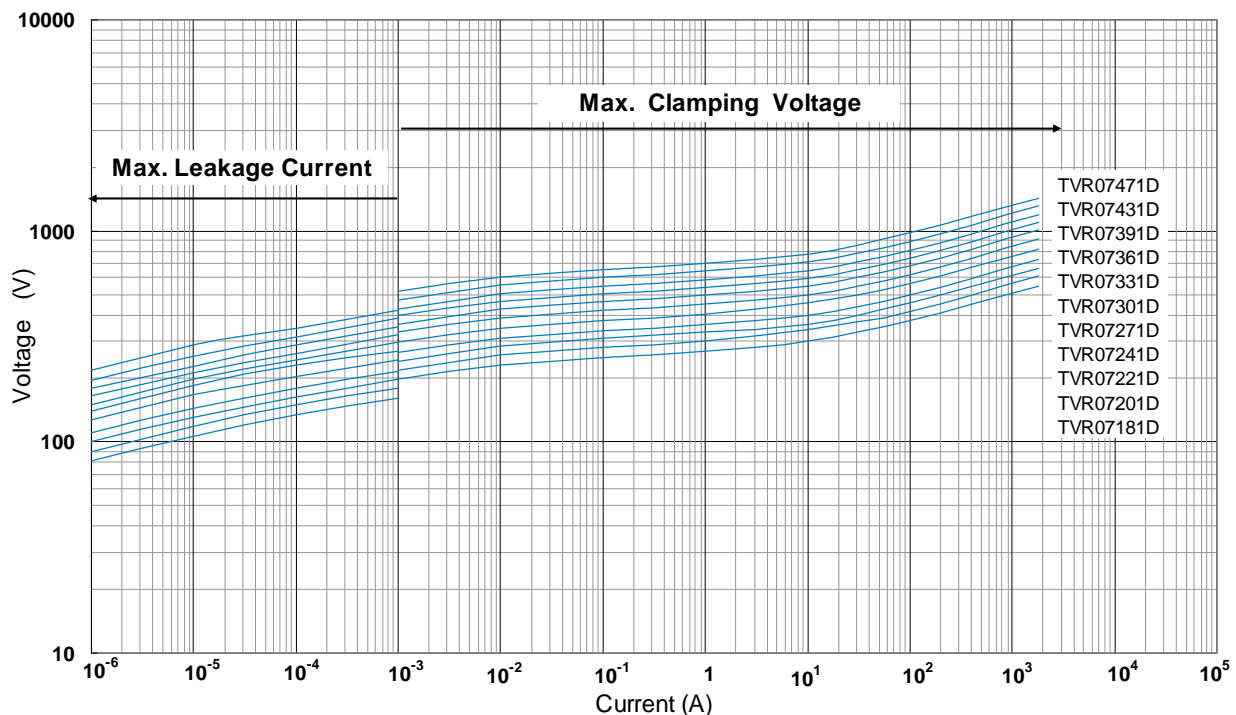
## Disc Type Varistor for Surge Protection (High Surge Series)

### Max. Surge Current Derating Curves



### Max. Leakage Current and Max. Clamping Voltage Curves

**Max. Leakage Current and Max. Clamping Voltage Curves ( TVR07181-D to TVR07471-D )**



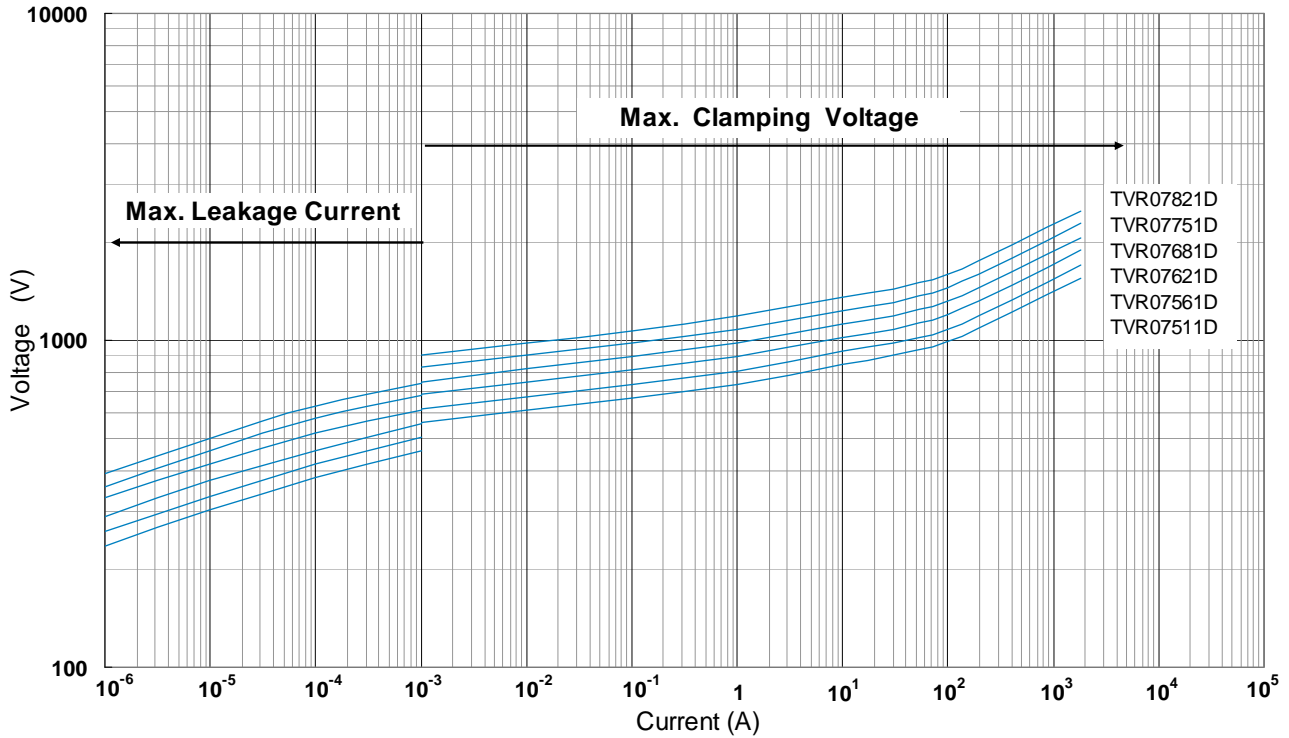


# Metal Oxide Varistor : TVR-D Series

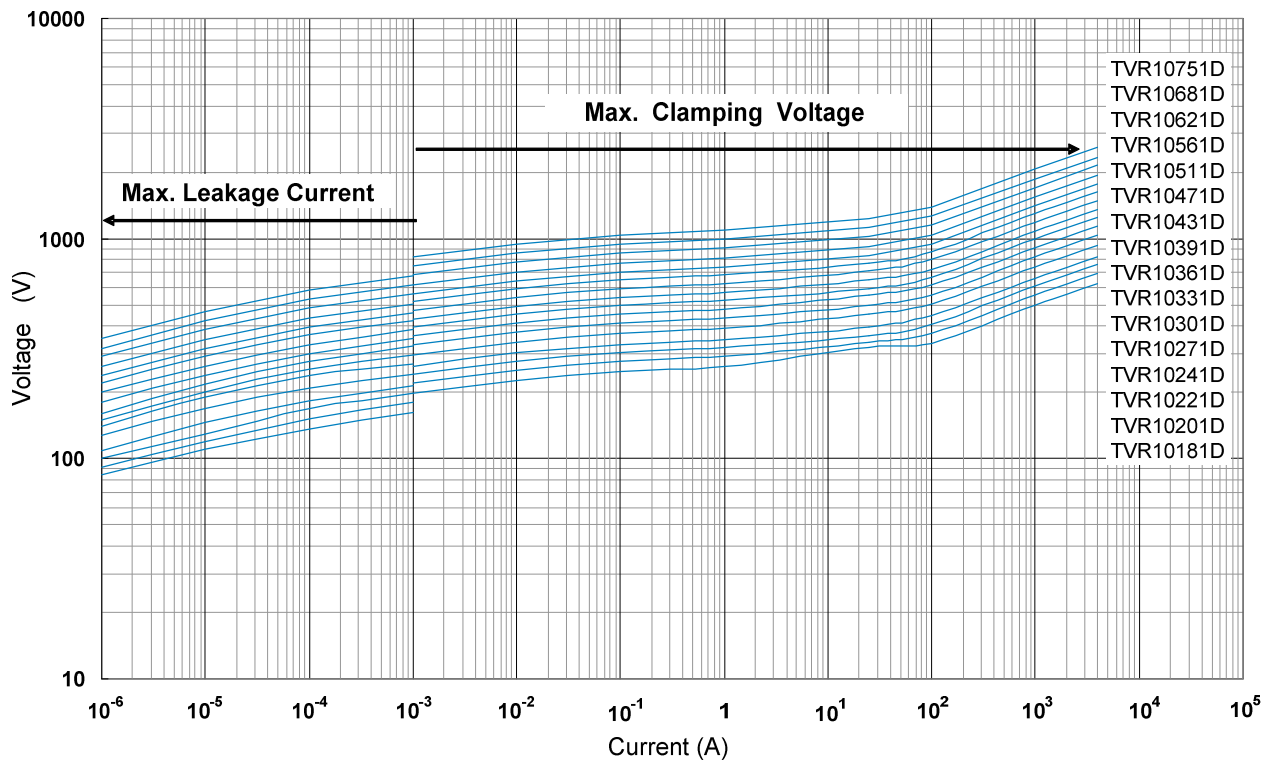
## Disc Type Varistor for Surge Protection (High Surge Series)



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR07511-D to TVR07821-D)**



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR10181-D to TVR10751-D)**

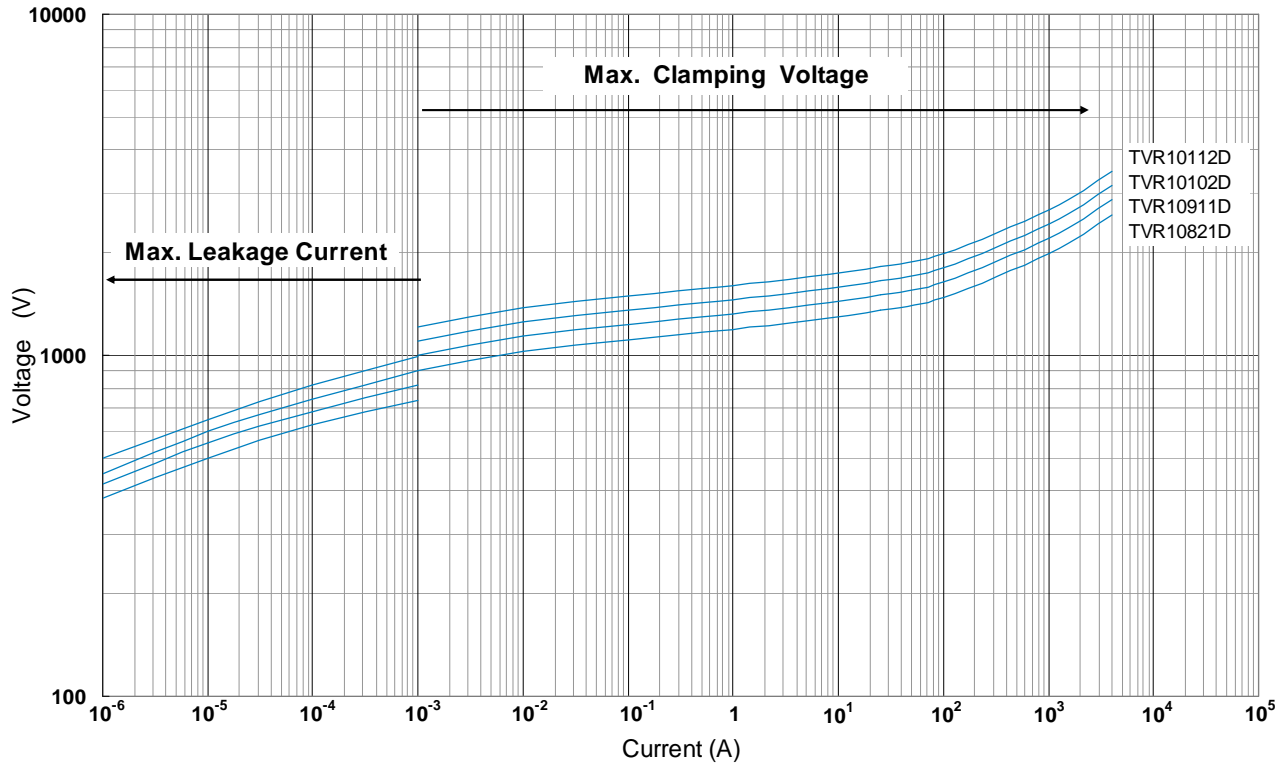


# Metal Oxide Varistor : TVR-D Series

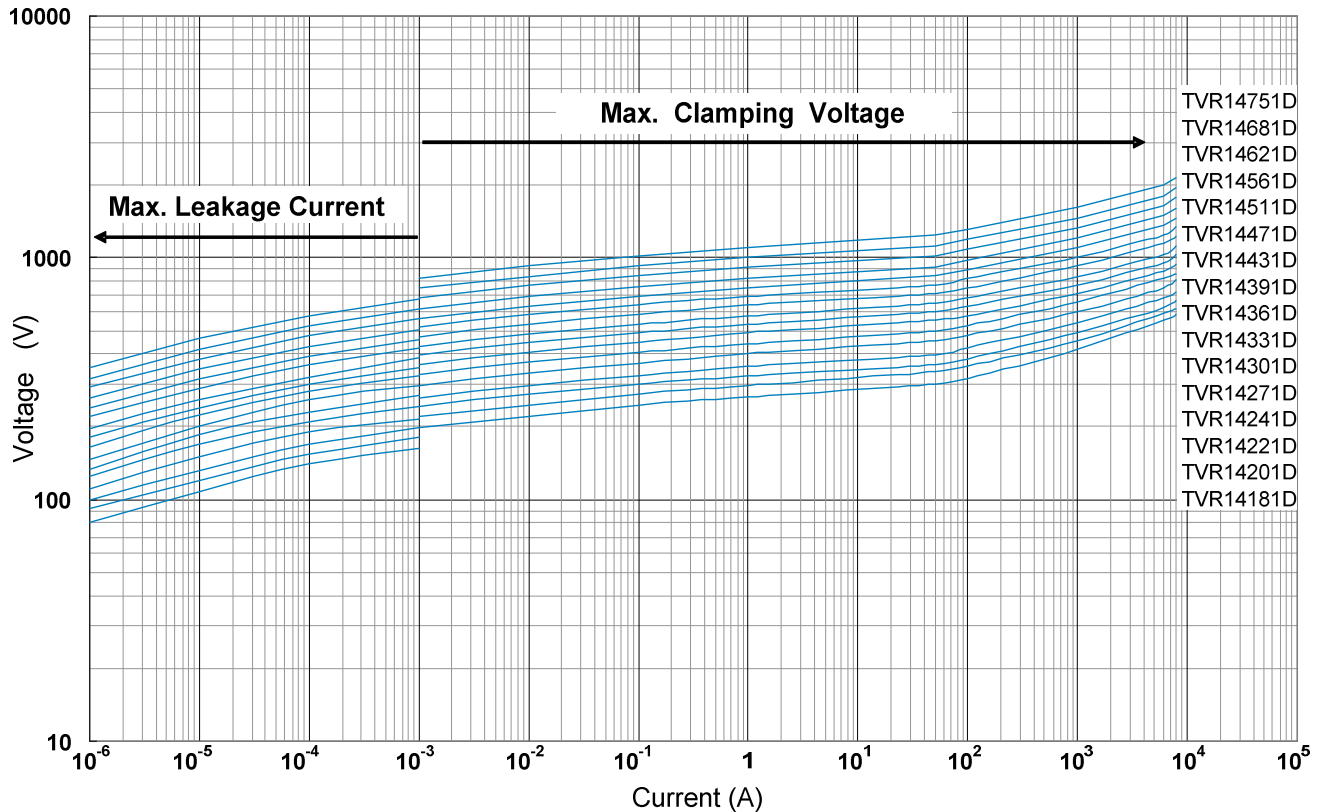
Disc Type Varistor for Surge Protection (High Surge Series)



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR10821-D to TVR10112-D)**



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR 14181-D to TVR14751-D)**

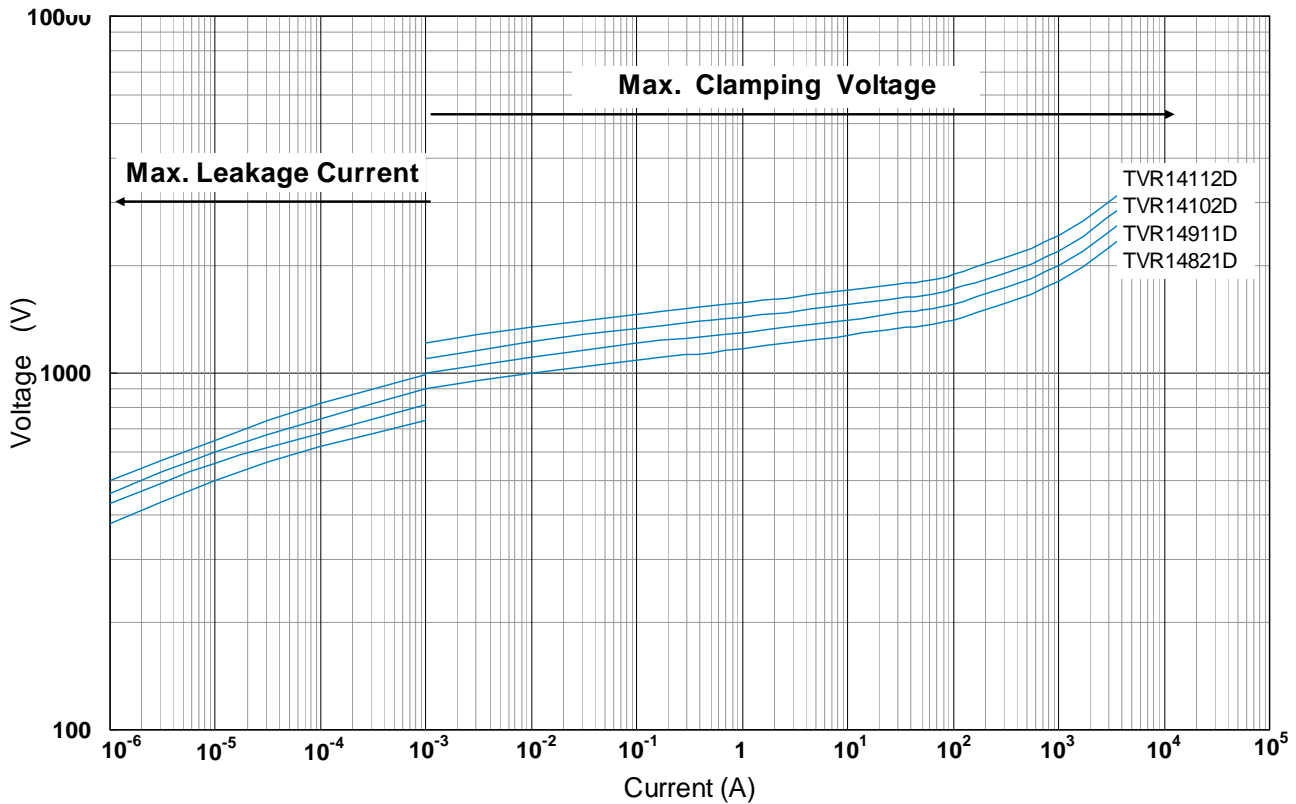


# Metal Oxide Varistor : TVR-D Series

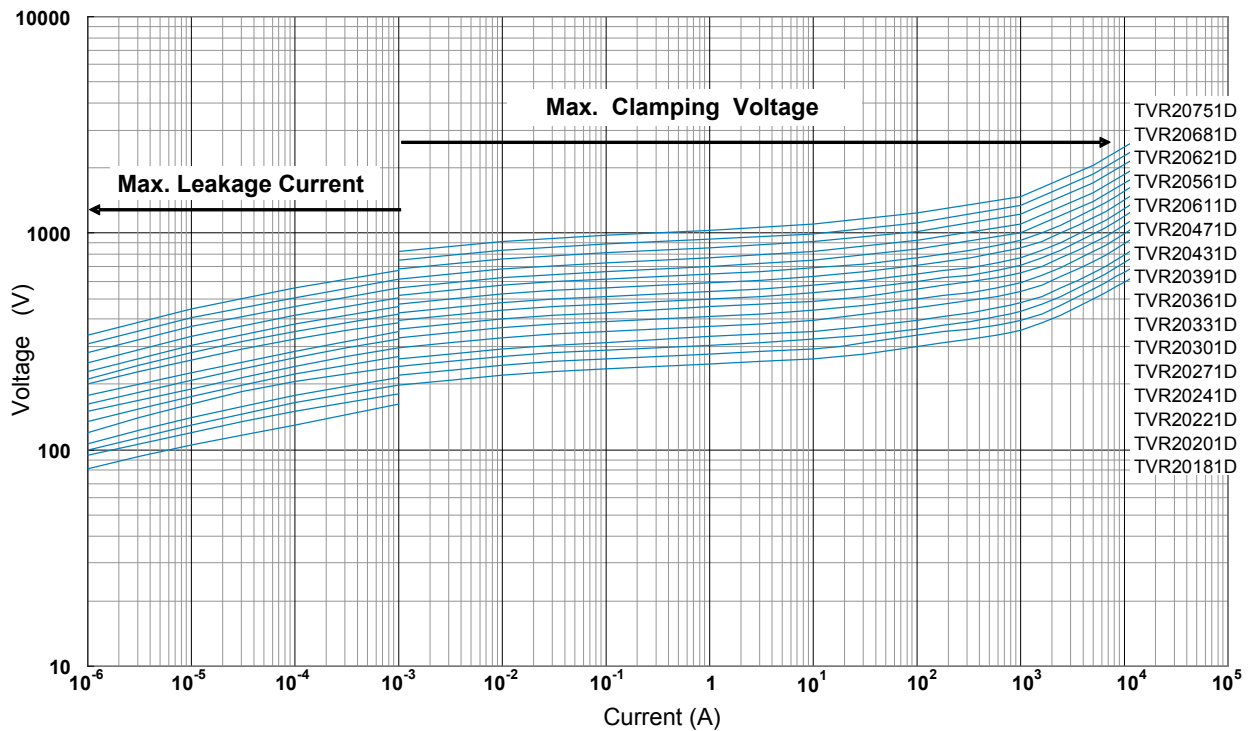
Disc Type Varistor for Surge Protection (High Surge Series)



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR14821-D to TVR14112-D)**



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR20181-D to TVR20751-D)**

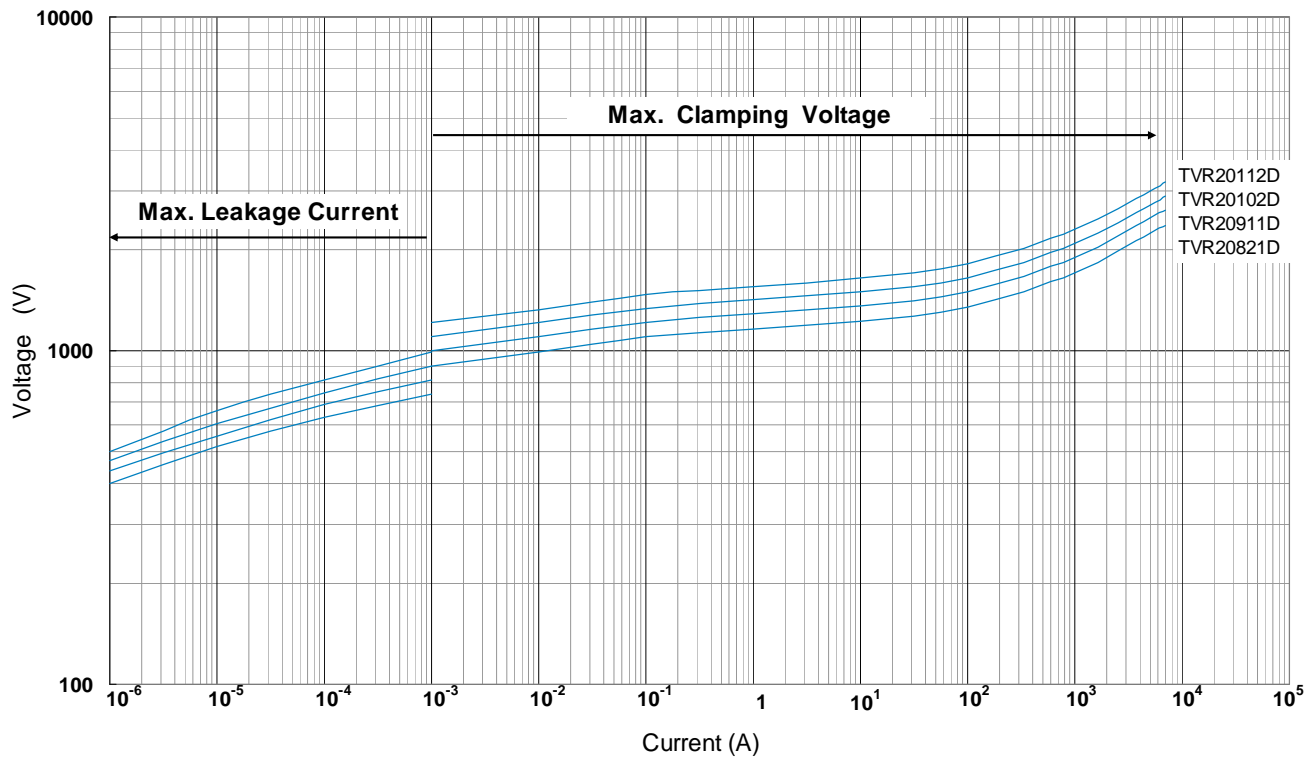


# Metal Oxide Varistor : TVR-D Series

Disc Type Varistor for Surge Protection (High Surge Series)



**Max. Leakage Current and Max. Clamping Voltage Curves (TVR20821-D to TVR20112-D)**



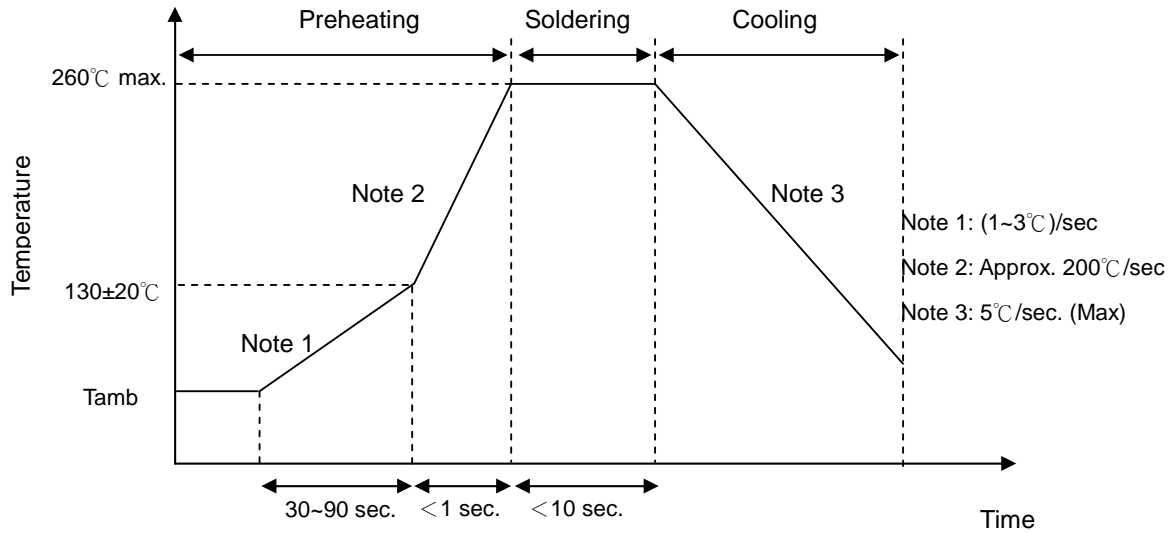
# Metal Oxide Varistor : TVR-D Series



## Disc Type Varistor for Surge Protection (High Surge Series)

### ■ Soldering Recommendation

#### ● Wave Soldering Profile



#### ● Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	$360^\circ\text{C}$ (max.)
Soldering Time	3 sec (max.)
Distance from Varistor	2 mm (min.)

# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)



### ■ Reliability

Item	Standard	Test conditions / Methods	Specifications															
Tensile Strength of Terminations	IEC 60068-2-21	Gradually applying the force specified and keeping the unit fixed for 10±1 sec.  <table border="0"> <tr> <td style="text-align: center;">Terminal diameter (mm)</td> <td style="text-align: center;">Force (Kg)</td> </tr> <tr> <td style="text-align: center;">0.5&lt;d≤0.8</td> <td style="text-align: center;">1.0</td> </tr> <tr> <td style="text-align: center;">0.8&lt;d≤1.25</td> <td style="text-align: center;">2.0</td> </tr> <tr> <td style="text-align: center;">1.25&lt;d</td> <td style="text-align: center;">4.0</td> </tr> </table>	Terminal diameter (mm)	Force (Kg)	0.5<d≤0.8	1.0	0.8<d≤1.25	2.0	1.25<d	4.0	$ \Delta V/V_{1mA}  \leq 5\%$ No visible damage							
Terminal diameter (mm)	Force (Kg)																	
0.5<d≤0.8	1.0																	
0.8<d≤1.25	2.0																	
1.25<d	4.0																	
Bending Strength of Terminations	IEC 60068-2-21	Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction.  <table border="0"> <tr> <td style="text-align: center;">Terminal diameter (mm)</td> <td style="text-align: center;">Force (Kg)</td> </tr> <tr> <td style="text-align: center;">0.5&lt;d≤0.8</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td style="text-align: center;">0.8&lt;d≤1.25</td> <td style="text-align: center;">1.0</td> </tr> <tr> <td style="text-align: center;">1.25&lt;d</td> <td style="text-align: center;">2.0</td> </tr> </table>	Terminal diameter (mm)	Force (Kg)	0.5<d≤0.8	0.5	0.8<d≤1.25	1.0	1.25<d	2.0	$ \Delta V/V_{1mA}  \leq 5\%$ No visible damage							
Terminal diameter (mm)	Force (Kg)																	
0.5<d≤0.8	0.5																	
0.8<d≤1.25	1.0																	
1.25<d	2.0																	
Vibration	IEC 1051-1	Frequency range:10~55Hz Amplitude:0.75mm or 98m/S2 Direction: 3 mutually perpendicular directions,2hrs each.	$ \Delta V/V_{1mA}  \leq 5\%$ No visible damage															
Solderability	IEC 60068-2-20	235±5°C , 2±0.5 sec.	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC 60068-2-20	260±5°C , 10±1 sec.	$ \Delta V/V_{1mA}  \leq 5\%$ No visible damage															
High Temperature Storage	IEC 60068-2-2	125±5°C x 1000 hrs ± 24hrs	$ \Delta V/V_{1mA}  \leq 5\%$															
Damp heat, Steady State	IEC 60068-2-3	a. 40±2°C , 90 ~ 95 % RH, 1344 hrs b. 40±2°C , 90~ 95 % RH , at 10%VDC, 1344 hrs	No visible damage $ \Delta V/V_{1mA}  \leq 5\%$ Insulation Resistance ≥ 100MΩ															
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5±3</td> </tr> <tr> <td>3</td> <td>85±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	5±3	3	85±2	30±3	4	Room temperature	5±3	$ \Delta V/V_{1mA}  \leq 5\%$ No visible damage
Step	Temperature (°C)	Period (minutes)																
1	-40±3	30±3																
2	Room temperature	5±3																
3	85±2	30±3																
4	Room temperature	5±3																
Endurance at Upper Category Temperature	IEC61051-4.20	85 ± 2 °C, 1000 ± 24 hrs, at VDC or Vrms(Max. Operating Voltage)	$ \Delta V/V_{1mA}  \leq 10\%$															
Low Temperature Storage (optional)	CECC42000	-40±5°C , 1000±24 hrs	$ \Delta V/V_{1mA}  \leq 5\%$															
8/20µs Surge Life	CECC42000	10,000 pulses( 8/20µS ) , unipolar, interval 10 secs, amplitude corr. to max. Surge current derating curves for 20µS	$ \Delta V/V_{1mA}  \leq 10\%$ No visible damage															
Varistor Voltage Temp. Coefficient	Specification standard	$\frac{V_{1mA} \text{ at } 85^\circ\text{C} - V_{1mA} \text{ at } 25^\circ\text{C}}{V_{1mA} \text{ at } 25^\circ\text{C}} \times \frac{1}{60} \times 100 (\% / ^\circ\text{C})$	-0.05 ≤ T <sub>C</sub> ≤ 0 (% / °C)															
Voltage Proof	IEC61051-4.8	Metal balls method, 2500 V <sub>ac</sub> 1 min	No visible damage															

# Metal Oxide Varistor : TVR-D Series



## Disc Type Varistor for Surge Protection (High Surge Series)

### ■ Packaging

#### ● Taping Specification

#### S Type (Straight lead)

Figure A

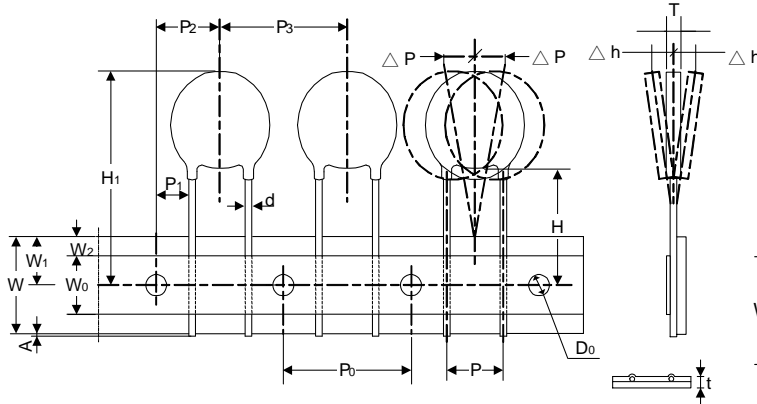


Figure C

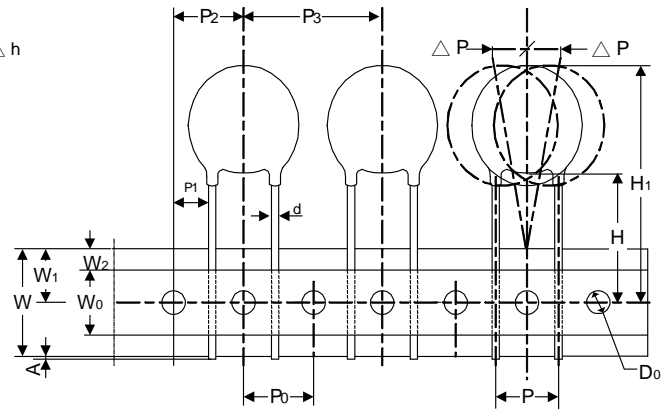


Figure B

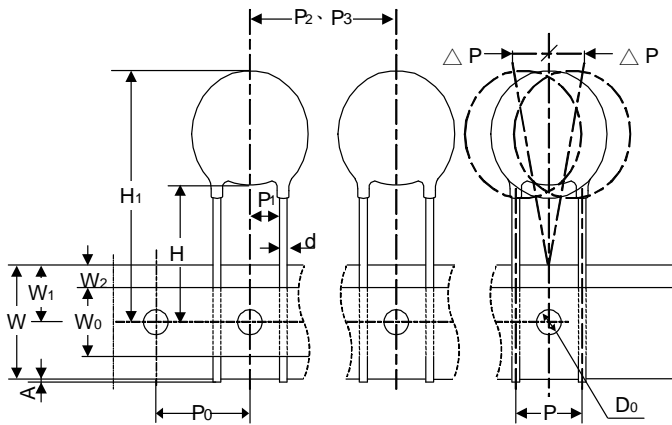
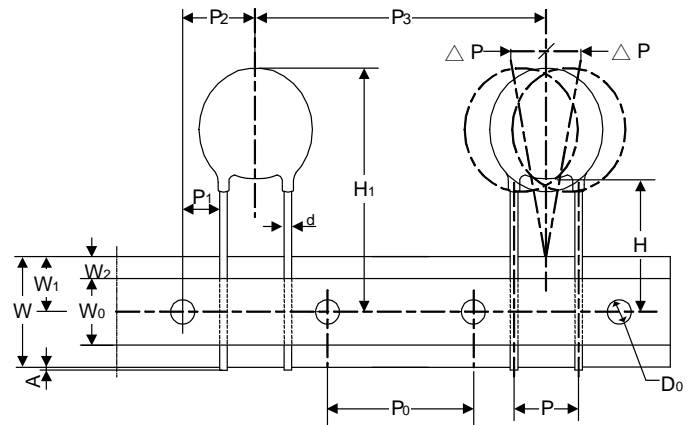


Figure D



(Unit: mm)

Taping Code	Disc Size	P <sub>0</sub>	P	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	H	H <sub>1</sub>	d	W <sub>0</sub>	W <sub>1</sub>	W <sub>2</sub>	W	ΔP	Δh	A	D <sub>0</sub>	t	Figure
		±0.3	±1	±1	±1.3	±1	+2/-0	Max.	±0.02	±1	±1	Max.	±1	Max.	Max.	Max.	±0.2	±0.2	
A (P <sub>0</sub> =12.7)	07-D	12.7	5	3.55	6.35	12.7	18	31	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10-D	12.7	7.5	3.35	25.4	25.4	18	36	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	14-D	12.7	7.5	8.55	12.7	25.4	18	40	0.8	12	9	3	18	1	2	0.5	4	0.6	C
E (P <sub>0</sub> =15.0)	07-D	15	5	4.7	7.5	15	18	31	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10-D	15	7.5	3.35	7.5	15	18	36	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14-D	15	7.5	3.35	7.5	30	18	40	0.8	12	9	3	18	1	2	0.5	4	0.6	D

# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)



### I Type (Inner kind lead)

Figure A

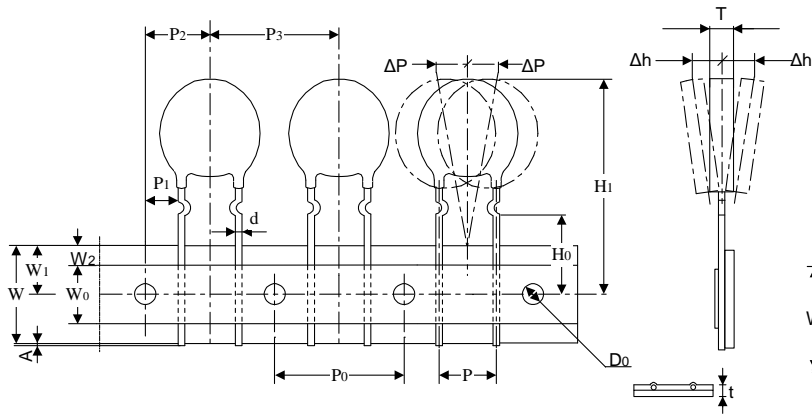


Figure C

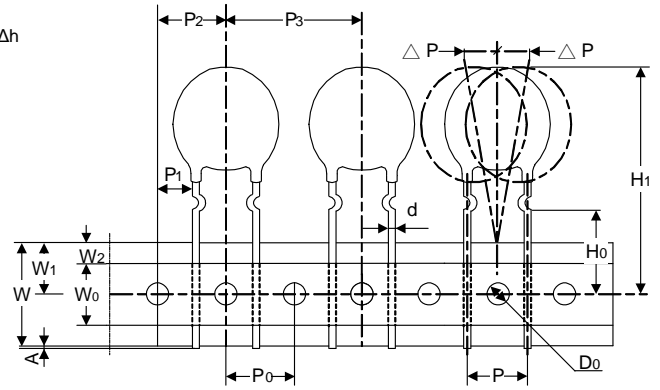


Figure B

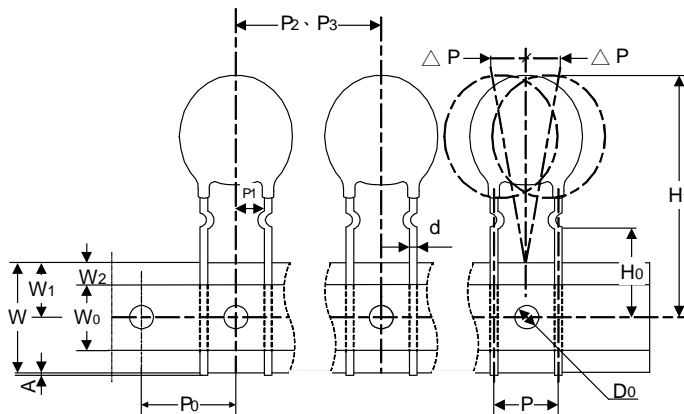
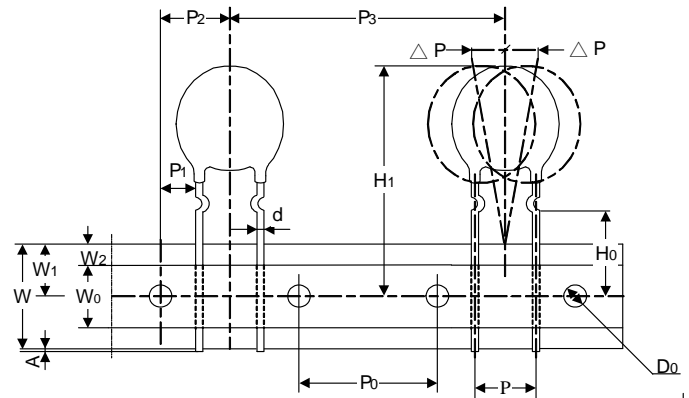


Figure D



(Unit: mm)

Taping Code	Disc Size	P <sub>0</sub>	P	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	H <sub>0</sub>	H <sub>1</sub>	d	W <sub>0</sub>	W <sub>1</sub>	W <sub>2</sub>	W	ΔP	Δh	A	D <sub>0</sub>	t	Figure
		±0.3	±1	±1	±1.3	±1	±0.5	Max.	±0.02	±1	±1	Max.	±1	Max.	Max.	Max.	±0.2	±0.2	
A (P <sub>0</sub> =12.7)	07-D	12.7	5	3.55	6.35	12.7	16	31	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10-D	12.7	7.5	3.35	12.7	12.7	16	36	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	14-D	12.7	7.5	8.55	12.7	25.4	16	40	0.8	12	9	3	18	1	2	0.5	4	0.6	C
E (P <sub>0</sub> =15.0)	07-D	15	5	4.7	7.5	15	16	31	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10-D	15	7.5	3.35	7.5	15	16	36	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14-D	15	7.5	3.35	7.5	30	16	40	0.8	12	9	3	18	1	2	0.5	4	0.6	D



# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)



### F Type (Y kink lead)

Figure A

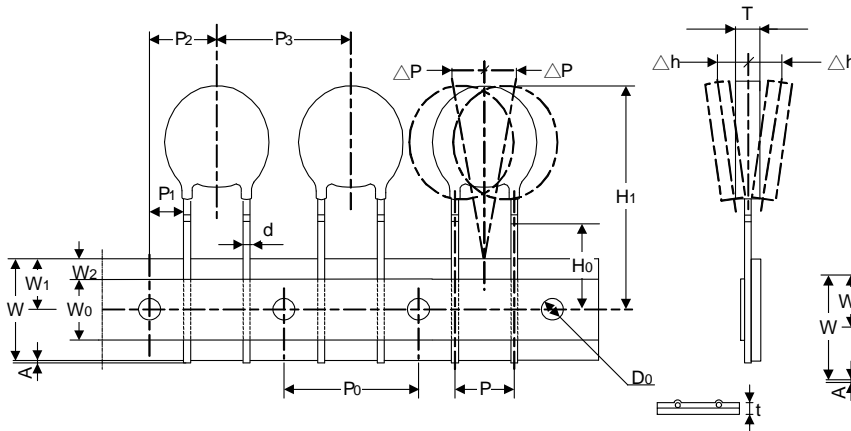


Figure C

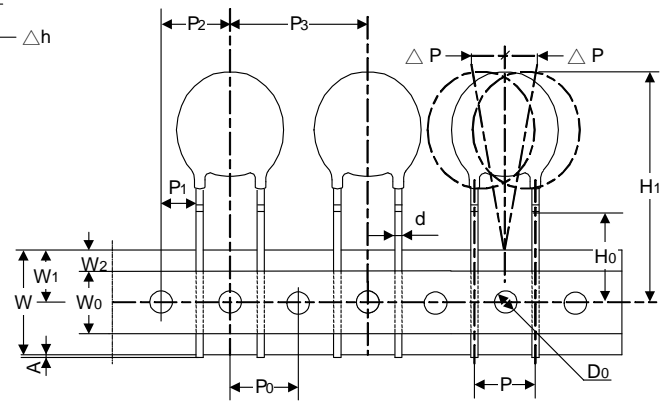


Figure B

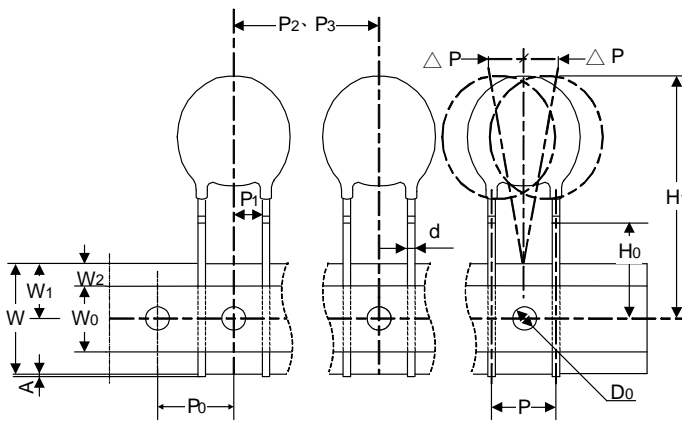
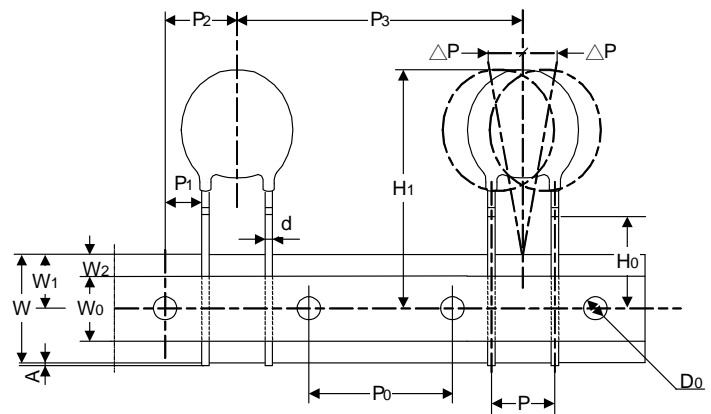


Figure D



(Unit: mm)

Taping Code	Disc Size	P <sub>0</sub>	P	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	H <sub>0</sub>	H <sub>1</sub>	d	W <sub>0</sub>	W <sub>1</sub>	W <sub>2</sub>	W	ΔP	Δh	A	D <sub>0</sub>	t	Figure
		±0.3	±1	±1	±1.3	±1	±0.5	Max.	±0.02	±1	±1	Max.	±1	Max.	Max.	Max.	±0.2	±0.2	
A (P <sub>0</sub> =12.7)	07-D	12.7	5	3.55	6.35	12.7	16	31	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10-D	12.7	7.5	3.35	25.4	25.4	16	36	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	14-D	12.7	7.5	8.55	12.7	25.4	16	40	0.8	12	9	3	18	1	2	0.5	4	0.6	C
E (P <sub>0</sub> =15.0)	07-D	15	5	4.7	7.5	15	16	31	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10-D	15	7.5	3.35	7.5	15	16	36	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14-D	15	7.5	3.35	7.5	30	16	40	0.8	12	9	3	18	1	2	0.5	4	0.6	D

# Metal Oxide Varistor : TVR-D Series



## Disc Type Varistor for Surge Protection (High Surge Series)

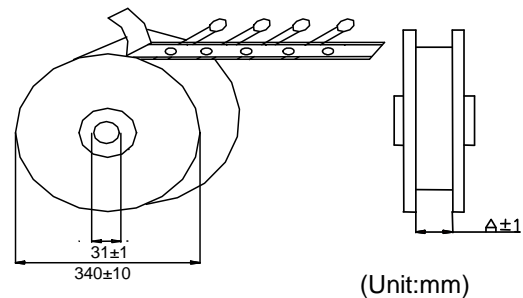
### ■ Quantity

#### ● Bulk Packing

Disc Size/mm	Quantity pcs/ bag
Φ 07-D	200
Φ 10-D	200
Φ 14-D	100
Φ 20-D	50

#### ● Reel Packing

Disc Size/mm	Quantity pcs/reel
Φ 07(180~391) -D	1500
Φ 07(431~821) -D	1000
Φ 10(180~911) -D	1000
Φ 10(102~112) -D	750
Φ 14(180~470) -D	1000
Φ 14(560~391) -D	750
Φ 14(431~112) -D	500

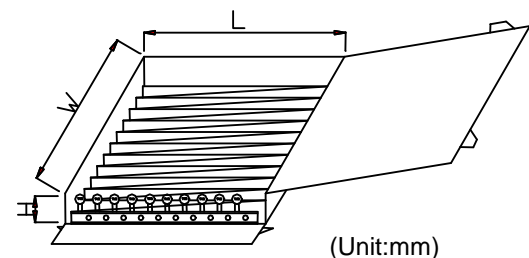


A	46
Disc Size	Φ07 ~ Φ 14

Note: The standard package for TVR20-D is bulk. For any other demand, please contact our sales person.

#### ● Ammo Packing

Disc Size/mm	Quantity pcs/ box
Φ 07(181~821) -D	1000
Φ 10(181~361) -D	750
Φ 10(391~621) -D	400
Φ 10(681~112) -D	300
Φ 14(181~271) -D	500
Φ 14(301~112) -D	250



Disc Size	W±5	L±5	H±5
Φ 07~ Φ 14	348	275	50
	348	185	50

Note: The standard package for TVR20-D is bulk. For any other demand, please contact our sales person.

# Metal Oxide Varistor : TVR-D Series

## Disc Type Varistor for Surge Protection (High Surge Series)

---



### ■ Storage Conditions of Products

- Storage Conditions :
  1. Storage Temperature :  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
  2. Relative Humidity :  $\leq 75\% \text{RH}$
  3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year.