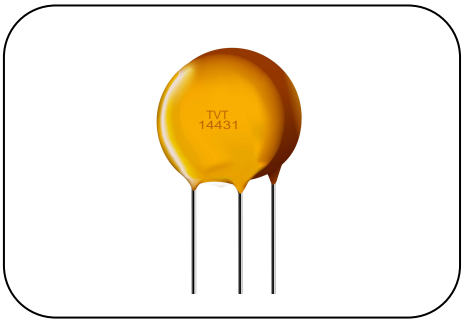
Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Features



1. RoHS compliant
2. Halogen-free series are available
3. Two-Terminal or Three-Terminal thermally protected metal oxide varistor, Three-Terminal type is available for failure indication.
4. Body size: 14, 20 mm
5. Working voltage: 130Vac ~ 750Vac
6. Operating temperature range：-40°C ~ +85°C
   Storage temperature range：-40°C ~ +110°C
7. Patent: US 7,453,681
8. Agency approval:
   - TVT14 and TVT20 Series: UL1449 3rd & cUL/ TUV/CQC
   - TVT25 and TVT34 Series: UL1449 3rd & cUL/ TUV
   - TVT32 Series: UL1449 3rd & cUL/ TUV
9. UL1449 3rd SPD Type: Type 4 Assemblies
10. Meets UL 1449 3rd 39.4 limited current abnormal over- voltage test.
11. TVT14 and TVT20 Series meet IEC 60950-1 Annex Q requirement
12. Suitable for wave flow soldering

■ Recommended Applications

1. TVSS modules
2. Uninterruptible power supplies
3. Power supplies
4. Lighting products
5. Communication products
6. Smart meter
7. Photovoltaic industry

■ Part Number Code

T	V	T	1	4	2	4	1	K	A	K	G	B			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Product Type

TVT	THINKING Thermally Protected Varistor TVT Series

Disc Size

14	Φ14mm
20	Φ20mm
25	Φ25mm
32	Φ32mm
34	34*34mm

Varistor Voltage(V_{1mA})

180	$18x10^0$V=18V
241	$24x10^1$V=240V
102	$10x10^2$V=1000V

Tolerance of V_{1mA}

K	±10%

Structure

A	Two-Terminal, Coating Structure
B	Three-Terminal, Coating Structure
E	Two-Terminal, Potting Structure
F	Three-Terminal, Potting Structure

Appearance

KG	Straight lead
KO	Outer kink lead
KI	Inner kink lead
AU	Flat wire (For TVT34 series)

Packaging

B	Bulk
E	Box

Optional Suffix

001~999

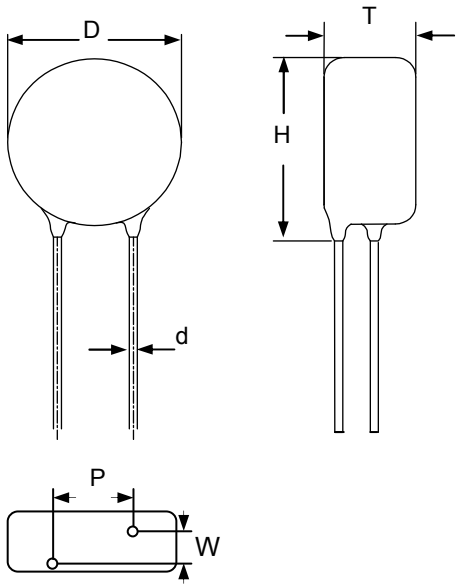
Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

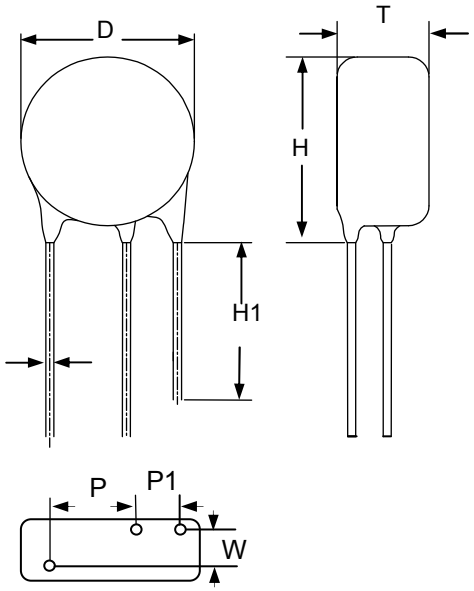
■ Structure and Dimensions

- **TVT14 ~ TVT20 Series**

Two-Terminal Type



Three-Terminal Type



(Unit: mm)

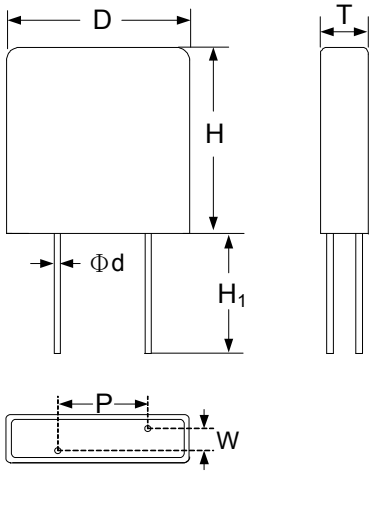
Series	Lead Type	D	P	P1	H	H1	d	W	Tmax
TVT14201~122	Two-Terminal	15.5~18.5	7.5±1	--	18.5~24	--	0.8±0.05	Please Refer to Electrical Characteristics	
TVT14201~122	Three-Terminal	15.5~18.5	7.5±1	4.0~6.0	18.5~24	7.0~18	0.8±0.05		
TVT20201~681	Two-Terminal	19.5~23.5	7.5±1	--	21.5~27	--	0.8±0.05		
TVT20751~122							1.0±0.05		
TVT20201~681	Three-Terminal	19.5~23.5	7.5±1	4.0~6.0	21.5~27	12.5~18	0.8±0.05		
TVT20751~122							1.0±0.05		

Metal Oxide Varistor：TVT Series

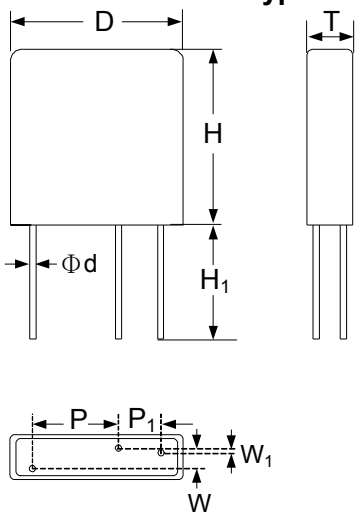
Thermally Protected Varistor Series

- **TVT25 ~ TVT32 Series**

Two-Terminal Type



Three-Terminal Type



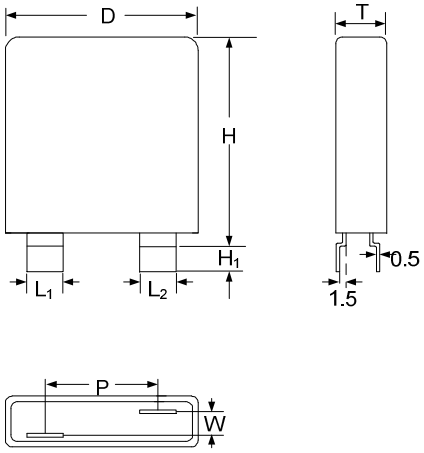
(Unit: mm)

Series	Lead Type	D±1.0	H±1.0	H1min	P±1.0	P1±1.0	d±0.05	W/W1	Tmax
TVT25	Two-Terminal	33.0	33.5	15	10.0	------	1.0	Please Refer to Electrical Characteristics	
	Three-Terminal				10.0	5.0	1.0		

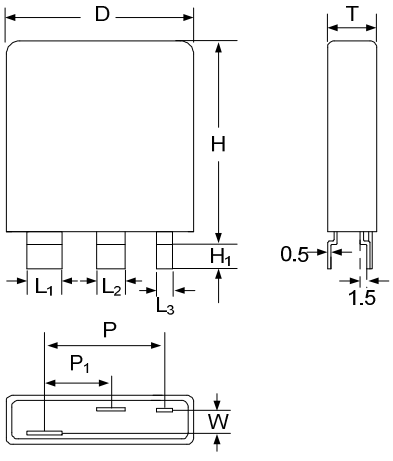
Series	Lead Type	D±1.0	H±1.0	H1min	P±1.5	P1±1.5	d±0.05	W/W1	Tmax
TVT32	Two-Terminal	40.0	42.0	15	15.0	------	1.5	Please Refer to Electrical Characteristics	
	Three-Terminal				15.0	8.0	1.5		

- **TVT34 Series**

Two-Terminal Type



Three-Terminal Type



(Unit: mm)

Series	Type	D±1.0	Hmax	H1max.	P±2.0	P1±2.0	L1±0.1	L2±0.1	L3±0.1	W	Tmax
TVT34	Two-Terminal	40.0	42.0	8	21.5	-----	6.0	6.0	-----	Please Refer to Electrical Characteristics	
	Three-Terminal				23.5	11	6.0	5.0	3.0		

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Electrical Characteristics

14mm Series

Part No.	Varistor Voltage（@1mA DC）	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Nominal Discharge Current *1 (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension	
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	In	P	Wmax	Cp	Tmax	W±1.0
	(V)	(V)	(V)	(V)	(A)	(KA)	(KA)	(W)	(J)	(pF)	(mm)	
TVT14201	200 (180~220)	130	170	340	50	6	3	0.6	77	700	8.8	3.0
TVT14221	220 (198~242)	140	180	365	50	6	3	0.6	86	640	8.9	3.1
TVT14241	240 (216~264)	150	200	395	50	6	3	0.6	94	580	9.1	3.3
TVT14271	270 (243~297)	175	225	455	50	6	3	0.6	110	520	9.3	3.5
TVT14301	300 (270~330)	195	250	500	50	6	3	0.6	118	480	9.0	3.2
TVT14331	330 (297~363)	215	275	550	50	6	3	0.6	127	450	9.1	3.3
TVT14361	360 (324~396)	230	300	595	50	6	3	0.6	137	430	9.3	3.5
TVT14391	390 (351~429)	250	320	650	50	6	3	0.6	154	390	9.5	3.6
TVT14431	430 (387~473)	275	350	710	50	6	3	0.6	170	370	9.2	3.4
TVT14471	470 (423~517)	300	385	775	50	6	3	0.6	192	320	9.3	3.5
TVT14511	510 (459~561)	320	410	845	50	6	3	0.6	209	290	9.5	3.7
TVT14561	560 (504~616)	350	450	930	50	6	3	0.6	220	260	9.7	3.9
TVT14621	620 (558~682)	395	510	1025	50	6	3	0.6	231	240	10.0	4.1
TVT14681	680 (612~748)	420	560	1120	50	6	3	0.6	242	230	10.3	4.4
TVT14751	750 (675~825)	465	615	1240	50	6	3	0.6	247	220	10.6	4.7
TVT14781	780 (702~858)	485	640	1290	50	6	3	0.6	260	200	10.1	4.3
TVT14821	820 (738~902)	510	670	1355	50	6	3	0.6	270	180	10.2	4.5
TVT14911	910 (819~1001)	550	745	1500	50	6	3	0.6	280	170	10.6	4.8
TVT14951	950 (855~1045)	575	765	1570	50	6	3	0.6	290	160	10.7	4.9
TVT14102	1000 (900~1100)	625	825	1650	50	6	3	0.6	305	150	10.9	5.1
TVT14112	1100 (990~1210)	680	895	1815	50	6	3	0.6	340	140	11.2	5.4
TVT14122	1200 (1080~1320)	750	980	2000	50	6	--	0.6	350	130	11.6	5.8

Note:

*1: Nominal discharge current is the specification defined in UL 1449 3rd and use 8/20μs current waveform to test the varistor.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

20mm Series

Part No.	Varistor Voltage（@1mA DC）	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Nominal Discharge Current *1 (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension	
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	In	P	Wmax	Cp	Tmax	W±1.0
	(V)	(V)	(V)	(V)	(A)	(KA)	(KA)	(W)	(J)	(pF)	(mm)	
TVT20201	200 (180~220)	130	170	340	100	10	3	1.0	140	1460	10.2	3.0
TVT20221	220 (198~242)	140	180	365	100	10	3	1.0	155	1320	10.3	3.1
TVT20241	240 (216~264)	150	200	395	100	10	3	1.0	170	1200	10.5	3.3
TVT20271	270 (243~297)	175	225	455	100	10	3	1.0	190	1100	10.7	3.5
TVT20301	300 (270~330)	195	250	500	100	10	3	1.0	205	1000	10.4	3.2
TVT20331	330 (297~363)	215	275	550	100	10	3	1.0	215	950	10.5	3.3
TVT20361	360 (324~396)	230	300	595	100	10	3	1.0	225	900	10.7	3.5
TVT20391	390 (351~429)	250	320	650	100	10	3	1.0	240	800	10.9	3.6
TVT20431	430 (387~473)	275	350	710	100	10	3	1.0	270	700	10.6	3.4
TVT20471	470 (423~517)	300	385	775	100	10	3	1.0	350	620	10.7	3.5
TVT20511	510 (459~561)	320	410	845	100	10	3	1.0	386	530	10.9	3.7
TVT20561	560 (504~616)	350	450	930	100	10	3	1.0	400	480	11.1	3.9
TVT20621	620 (558~682)	395	510	1025	100	10	3	1.0	425	450	11.4	4.1
TVT20681	680 (612~748)	420	560	1120	100	10	3	1.0	455	440	11.7	4.4
TVT20751	750 (675~825)	465	615	1240	100	10	3	1.0	509	420	12.0	4.7
TVT20781	780 (702~858)	485	640	1290	100	10	3	1.0	515	400	11.5	4.3
TVT20821	820 (738~902)	510	670	1355	100	10	3	1.0	475	390	11.6	4.5
TVT20911	910 (819~1001)	550	745	1500	100	10	3	1.0	509	360	12.0	4.8
TVT20951	950 (855~1045)	575	765	1570	100	10	3	1.0	530	340	12.1	4.9
TVT20102	1000 (900~1100)	625	825	1650	100	10	3	1.0	560	330	12.3	5.1
TVT20112	1100 (990~1210)	680	895	1815	100	10	3	1.0	610	310	12.6	5.4
TVT20122	1200 (1080~1320)	750	980	2000	100	10	--	1.0	620	290	13.0	5.8

Note:

*1: Nominal discharge current is the specification defined in UL 1449 3rd and use 8/20μs current waveform to test the varistor.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

25mm Series

Part No.	Varistor Voltage（@1mA DC）	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Nominal Discharge Current *1 (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension		
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	In	P	Wmax	Cp	T_{max}	W1 ±1.0	W ±1.0
	(V)	(V)	(V)	(V)	(A)	(KA)	(KA)	(W)	(J)	(pF)	(mm)		
TVT25201	200 (180~220)	130	170	340	150	20	5	1.0	210	2200	15	1.9	5.6
TVT25221	220 (198~242)	140	180	360	150	20	5	1.0	230	2000			5.8
TVT25241	240 (216~264)	150	200	395	150	20	5	1.0	255	1900			6.0
TVT25271	270 (243~297)	175	225	455	150	20	5	1.0	285	1600			6.3
TVT25301	300 (270~330)	195	250	500	150	20	5	1.0	310	1500			5.8
TVT25331	330 (297~363)	215	275	550	150	20	5	1.0	325	1400			6.1
TVT25361	360 (324~396)	230	300	595	150	20	5	1.0	340	1300			6.3
TVT25391	390 (351~429)	250	320	650	150	20	5	1.0	360	1100			6.5
TVT25431	430 (387~473)	275	350	710	150	20	5	1.0	440	1000			5.7
TVT25471	470 (423~517)	300	385	775	150	20	5	1.0	490	950			5.8
TVT25511	510 (459~561)	320	410	845	150	20	5	1.0	530	900			6.0
TVT25561	560 (504~616)	350	450	930	150	20	5	1.0	560	800	19		6.3
TVT25621	620 (558~682)	395	510	1020	150	20	5	1.0	590	700			6.6
TVT25681	680 (612~748)	420	560	1120	150	20	5	1.0	620	650			6.9
TVT25751	750 (675~825)	465	615	1235	150	20	5	1.0	630	600			7.2
TVT25781	780 (702~858)	485	640	1290	150	20	5	1.0	675	550			6.4
TVT25821	820 (738~902)	510	670	1355	150	20	5	1.0	690	520			6.5
TVT25911	910 (819~1001)	550	745	1500	150	20	5	1.0	715	500			6.8
TVT25951	950 (855~1045)	575	765	1570	150	20	5	1.0	740	450			7.0
TVT25102	1000 (900~1100)	625	825	1650	150	20	5	1.0	770	430			7.2
TVT25112	1100 (990~1210)	680	895	1815	150	20	5	1.0	840	400			7.5
TVT25122	1200 (1080~1320)	750	980	2000	150	20	--	1.0	910	380			7.8

Note:

*1: Nominal discharge current is the specification defined in UL 1449 3rd and use 8/20μs current waveform to test the varistor.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

32mm Series

Part No.	Varistor Voltage（@1mA DC）	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Nominal Discharge Current*1 (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension	
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	In	Cp	Wmax	Cp	Tmax	W±1.0
	(V)	(V)	(V)	(V)	(A)	(KA)	(KA)	(W)	(J)	(pF)	(mm)	
TVT32201	200 (180~220)	130	170	340	200	25	10	1.2	295	3900	16	6.2
TVT32221	220 (198~242)	140	180	360	200	25	10	1.2	315	3500		6.4
TVT32241	240 (216~264)	150	200	395	200	25	10	1.2	340	3300		6.6
TVT32271	270 (243~297)	175	225	455	200	25	10	1.2	360	2800		6.9
TVT32301	300 (270~330)	195	250	500	200	25	10	1.2	380	2600		6.4
TVT32331	330 (297~363)	215	275	550	200	25	10	1.2	400	2400		6.7
TVT32361	360 (324~396)	230	300	595	200	25	10	1.2	420	2200		6.9
TVT32391	390 (351~429)	250	320	650	200	25	10	1.2	465	2000		7.1
TVT32431	430 (387~473)	275	350	710	200	25	10	1.2	505	1800		6.3
TVT32471	470 (423~517)	300	385	775	200	25	10	1.2	570	1700		6.4
TVT32511	510 (459~561)	320	410	845	200	25	10	1.2	605	1600		6.6
TVT32561	560 (504~616)	350	450	930	200	25	10	1.2	660	1400	20	6.9
TVT32621	620 (558~682)	395	510	1020	200	25	10	1.2	770	1250		7.2
TVT32681	680 (612~748)	420	560	1120	200	25	10	1.2	840	1150		7.5
TVT32751	750 (675~825)	465	615	1235	200	25	10	1.2	925	1100		7.8
TVT32781	780 (702~858)	485	640	1290	200	25	10	1.2	955	1050		7.0
TVT32821	820 (738~902)	510	670	1355	200	25	10	1.2	770	950		7.1
TVT32911	910 (819~1001)	550	745	1500	200	25	10	1.2	870	900		7.4
TVT32951	950 (855~1045)	575	765	1570	200	25	10	1.2	925	850		7.6
TVT32102	1000 (900~1100)	625	825	1650	200	25	10	1.2	965	800		7.8
TVT32112	1100 (990~1210)	680	895	1815	200	25	10	1.2	1065	750		8.1
TVT32122	1200 (1080~1320)	750	980	2000	200	25	--	1.2	1120	650		8.4

Note:

*1: Nominal discharge current is the specification defined in UL 1449 3rd and use 8/20μs current waveform to test the varistor.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

34*34mm Series

Part No.	Varistor Voltage（@1mA DC）	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Nominal Discharge Current *1 (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension	
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	In	P	Wmax	Cp	Tmax	W±1.0
	(V)	(V)	(V)	(V)	(A)	(KA)	(KA)	(W)	(J)	(pF)	(mm)	
TVT34201	200 (180~220)	130	170	340	300	40	20	1.4	435	5600	16	6.2
TVT34221	220 (198~242)	140	180	360	300	40	20	1.4	480	5000		6.4
TVT34241	240 (216~264)	150	200	395	300	40	20	1.4	505	4800		6.6
TVT34271	270 (243~297)	175	225	455	300	40	20	1.4	560	4100		6.9
TVT34301	300 (270~330)	195	250	500	300	40	20	1.4	590	3800		6.4
TVT34331	330 (297~363)	215	275	550	300	40	20	1.4	620	3500		6.7
TVT34361	360 (324~396)	230	300	595	300	40	20	1.4	645	3200		6.9
TVT34391	390 (351~429)	250	320	650	300	40	20	1.4	690	2800		7.1
TVT34431	430 (387~473)	275	350	710	300	40	20	1.4	770	2600		6.3
TVT34471	470 (423~517)	300	385	775	300	40	20	1.4	835	2400		6.4
TVT34511	510 (459~561)	320	410	845	300	40	20	1.4	900	2300		6.6
TVT34561	560 (504~616)	350	450	930	300	40	20	1.4	995	2000	20	6.9
TVT34621	620 (558~682)	395	510	1020	300	40	20	1.4	1120	1800		7.2
TVT34681	680 (612~748)	420	560	1120	300	40	20	1.4	1275	1700		7.5
TVT34751	750 (675~825)	465	615	1235	300	40	20	1.4	1400	1600		7.8
TVT34781	780 (702~858)	485	640	1290	300	40	20	1.4	1445	1500		7.0
TVT34821	820 (738~902)	510	670	1355	300	40	20	1.4	1205	1400		7.1
TVT34911	910 (819~1001)	550	745	1500	300	40	20	1.4	1345	1300		7.4
TVT34951	950 (855~1045)	575	765	1570	300	40	20	1.4	1400	1200		7.6
TVT34102	1000 (900~1100)	625	825	1650	300	40	20	1.4	1470	1150		7.8
TVT34112	1100 (990~1210)	680	895	1815	300	40	20	1.4	1610	1050		8.1
TVT34122	1200 (1080~1320)	750	980	2000	300	40	--	1.4	1750	950		8.4

Note:

*1: Nominal discharge current is the specification defined in UL 1449 3rd and use 8/20μs current waveform to test the varistor.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Safety Approvals

Part No.	Agency				
	UL1449 3rd & cUL: E314979	J 50179371	IEC60950-1 2nd Annex Q	GB/T 10193-1997 GB/T 10194-1997	GB 4943.1-2011 GB 8898-2011
				CQC13001104230	
TVT14201-☐	√	√	√	√	
TVT14221-☐	√	√	√	√	
TVT14241-☐	√	√	√	√	
TVT14271-☐	√	√	√	√	
TVT14301-☐	√	√	√	√	
TVT14331-☐	√	√	√	√	
TVT14361-☐	√	√	√	√	
TVT14391-☐	√	√	√	√	
TVT14431-☐	√	√	√	√	√
TVT14471-☐	√	√	√	√	√
TVT14511-☐	√	√	√	√	√
TVT14561-☐	√	√	√	√	√
TVT14621-☐	√	√	√	√	√
TVT14681-☐	√	√	√	√	√
TVT14751-☐	√	√	√	√	√
TVT14781-☐	√	√	√	√	√
TVT14821-☐	√	√	√	√	√
TVT14911-☐	√	√	√	√	√
TVT14951-☐	√	√	√	√	√
TVT14102-☐	√	√	√	√	√
TVT14112-☐	√	√	√	√	√
TVT14122-☐		√	√	√	√

☐ is the code for Two -Terminal or Three -Terminal type.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Safety Approvals

Part No.	Agency				
	c UL us			CQC	
	UL1449 3rd & cUL: E314979	J 50179371	IEC60950-1 2nd Annex Q	GB/T 10193-1997 GB/T 10194-1997	GB 4943.1-2011 GB 8898-2011
				CQC13001104230	
TVT20201-☐	√	√	√	√	
TVT20221-☐	√	√	√	√	
TVT20241-☐	√	√	√	√	
TVT20271-☐	√	√	√	√	
TVT20301-☐	√	√	√	√	
TVT20331-☐	√	√	√	√	
TVT20361-☐	√	√	√	√	
TVT20391-☐	√	√	√	√	
TVT20431-☐	√	√	√	√	√
TVT20471-☐	√	√	√	√	√
TVT20511-☐	√	√	√	√	√
TVT20561-☐	√	√	√	√	√
TVT20621-☐	√	√	√	√	√
TVT20681-☐	√	√	√	√	√
TVT20751-☐	√	√	√	√	√
TVT20781-☐	√	√	√	√	√
TVT20821-☐	√	√	√	√	√
TVT20911-☐	√	√	√	√	√
TVT20951-☐	√	√	√	√	√
TVT20102-☐	√	√	√	√	√
TVT20112-☐	√	√	√	√	√
TVT20122-☐		√	√	√	√

☐ is the code for Two -Terminal or Three -Terminal type.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Safety Approvals

Part No.	Agency	
	c UL us	
	UL1449 3rd & cUL: E314979	J 50226398
TVT25201-☐	√	√
TVT25221-☐	√	√
TVT25241-☐	√	√
TVT25271-☐	√	√
TVT25301-☐	√	√
TVT25331-☐	√	√
TVT25361-☐	√	√
TVT25391-☐	√	√
TVT25431-☐	√	√
TVT25471-☐	√	√
TVT25511-☐	√	√
TVT25561-☐	√	√
TVT25621-☐	√	√
TVT25681-☐	√	√
TVT25751-☐	√	√
TVT25781-☐	√	√
TVT25821-☐	√	√
TVT25911-☐	√	√
TVT25951-☐	√	√
TVT25102-☐	√	√
TVT25112-☐	√	√
TVT25122-☐		√

Part No.	Agency	
	c UL us	
	UL1449 3rd & cUL: E314979	J 50226398
TVT32201-☐	√	√
TVT32221-☐	√	√
TVT32241-☐	√	√
TVT32271-☐	√	√
TVT32301-☐	√	√
TVT32331-☐	√	√
TVT32361-☐	√	√
TVT32391-☐	√	√
TVT32431-☐	√	√
TVT32471-☐	√	√
TVT32511-☐	√	√
TVT32561-☐	√	√
TVT32621-☐	√	√
TVT32681-☐	√	√
TVT32751-☐	√	√
TVT32781-☐	√	√
TVT32821-☐	√	√
TVT32911-☐	√	√
TVT32951-☐	√	√
TVT32102-☐	√	√
TVT32112-☐	√	√
TVT32122-☐		√

☐ is the code for Two -Terminal or Three -Terminal type.

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Safety Approvals

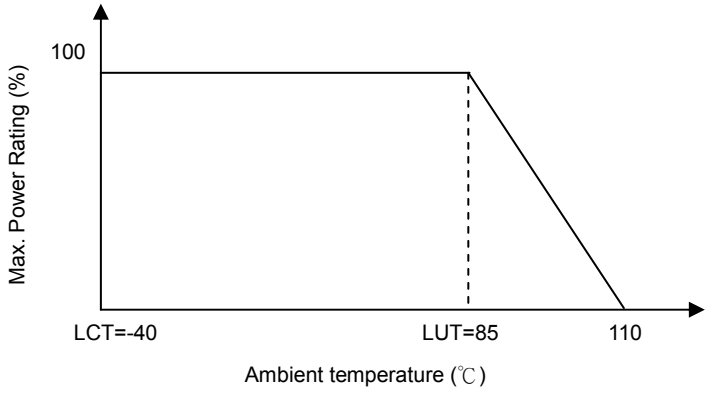
Part No.	Agency	
	c UL us	
	UL1449 3rd & cUL: E314979	J 50226398
TVT34201-☐	√	√
TVT34221-☐	√	√
TVT34241-☐	√	√
TVT34271-☐	√	√
TVT34301-☐	√	√
TVT34331-☐	√	√
TVT34361-☐	√	√
TVT34391-☐	√	√
TVT34431-☐	√	√
TVT34471-☐	√	√
TVT34511-☐	√	√
TVT34561-☐	√	√
TVT34621-☐	√	√
TVT34681-☐	√	√
TVT34751-☐	√	√
TVT34781-☐	√	√
TVT34821-☐	√	√
TVT34911-☐	√	√
TVT34951-☐	√	√
TVT34102-☐	√	√
TVT34112-☐	√	√
TVT34122-☐		√

☐ is the code for Two -Terminal or Three -Terminal type.

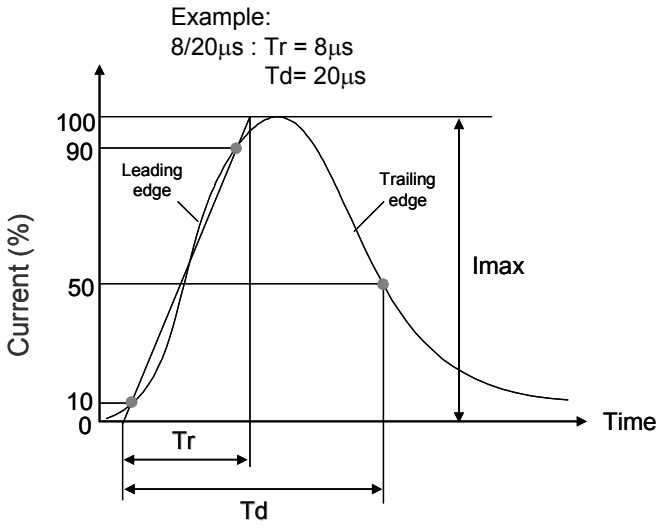
Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Power Derating Curve

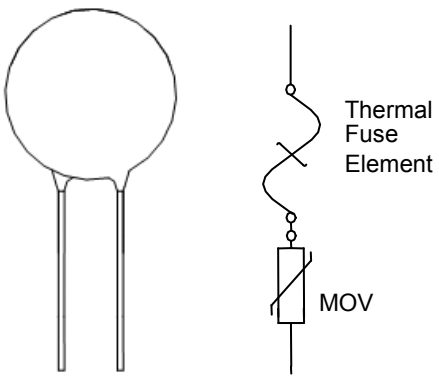


■ Surge Current Standard Waveform

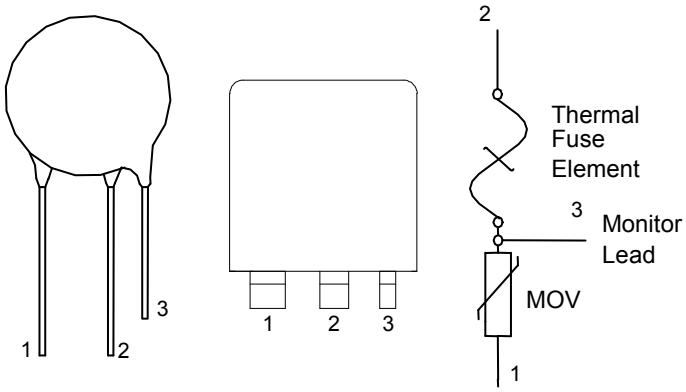


■ Lead Configuration

Two -Terminal Type



Three -Terminal Type

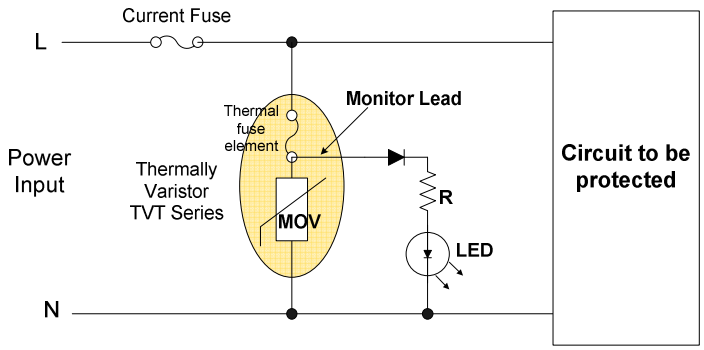


Metal Oxide Varistor：TVT Series

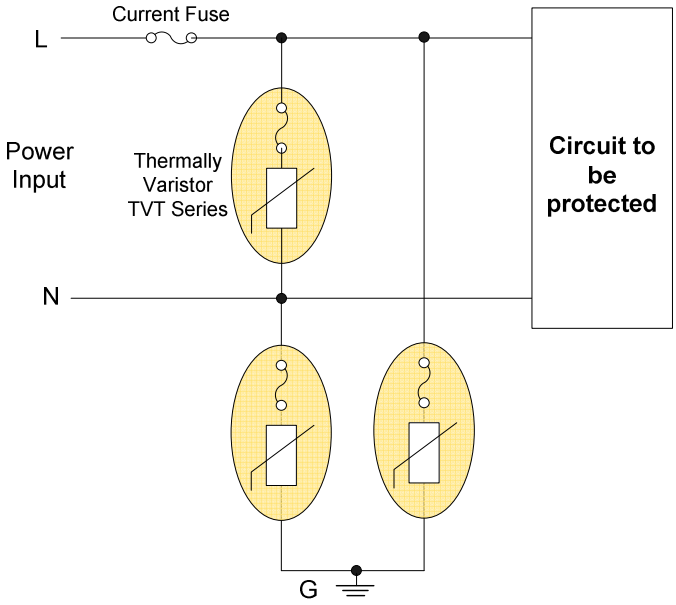
Thermally Protected Varistor Series

■ Typical Application Circuit

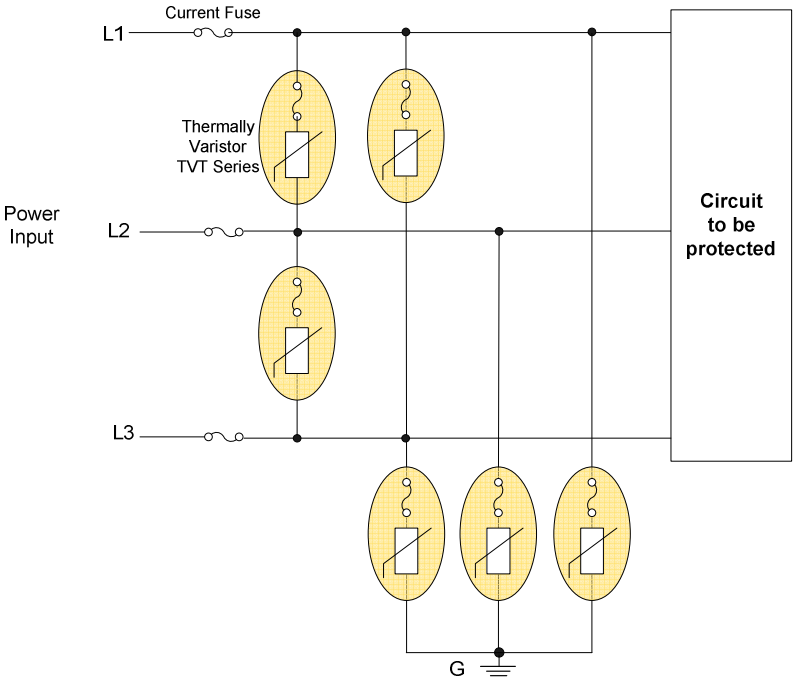
Signal Phase: Line to Line



Signal Phase: Line to Line & Line to Ground



Three Phase: Line to Line & Line to Ground

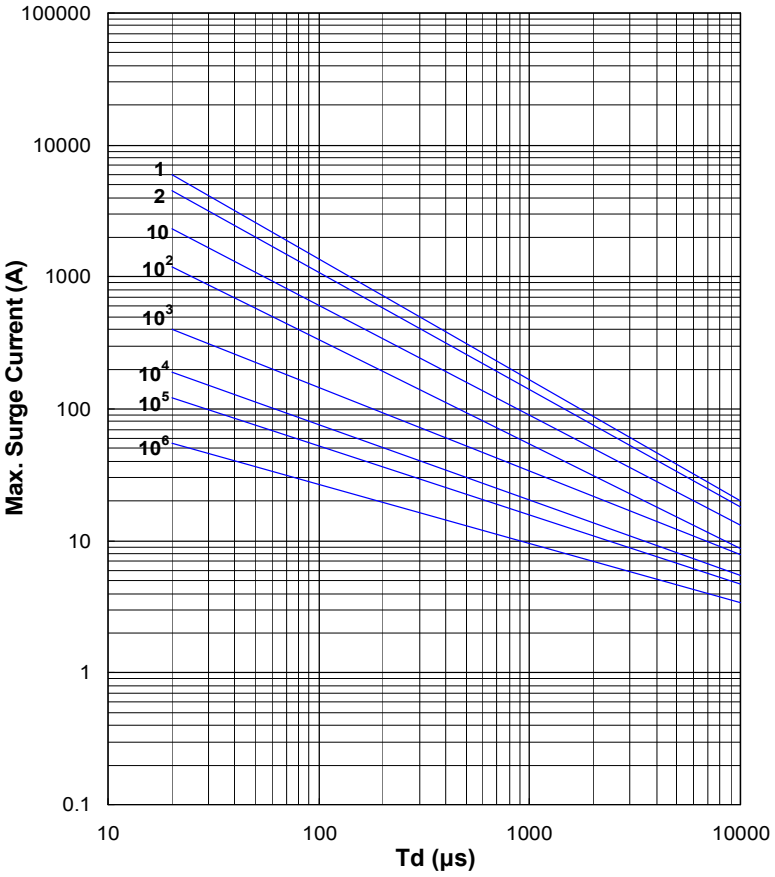


Metal Oxide Varistor：TVT Series

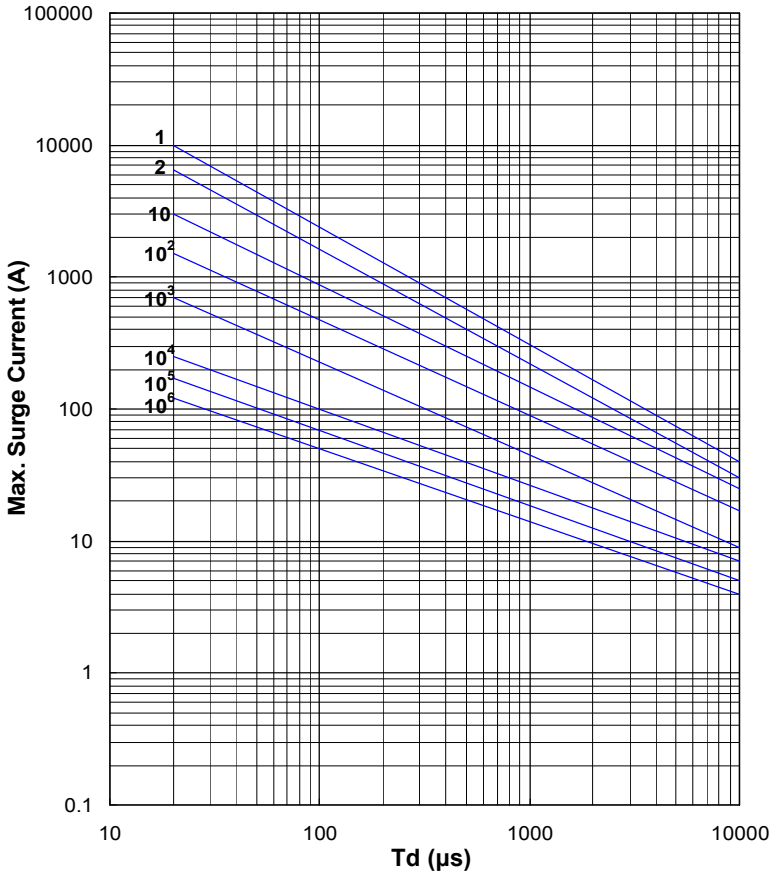
Thermally Protected Varistor Series

■ Max. Surge Current Derating Curves

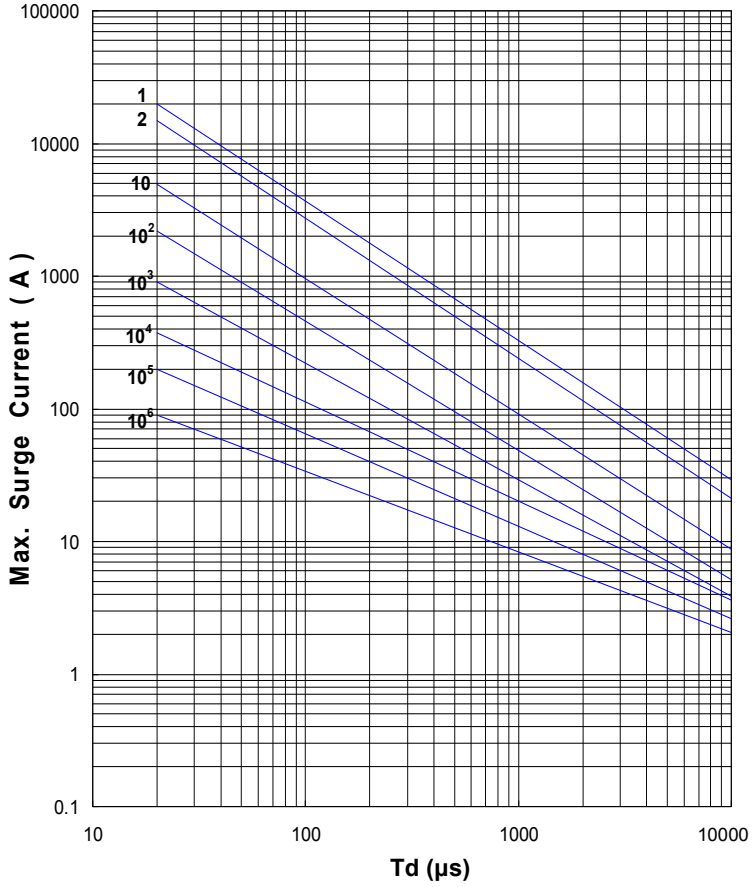
TVT14201 ~ TVT14112



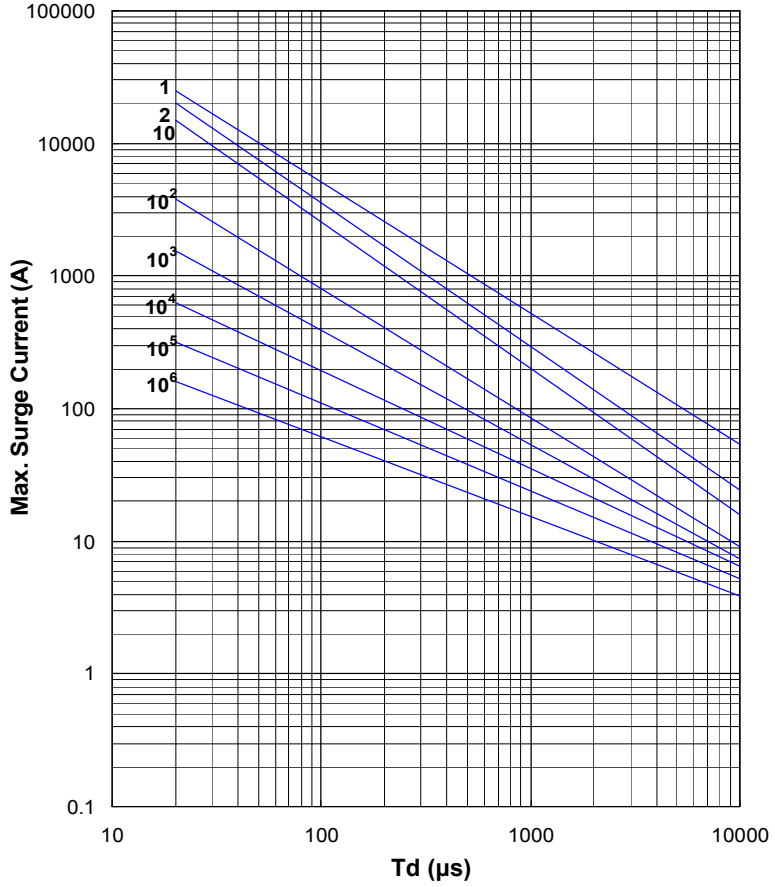
TVT20201 ~ TVT20112



TVT25201 ~ TVT25122



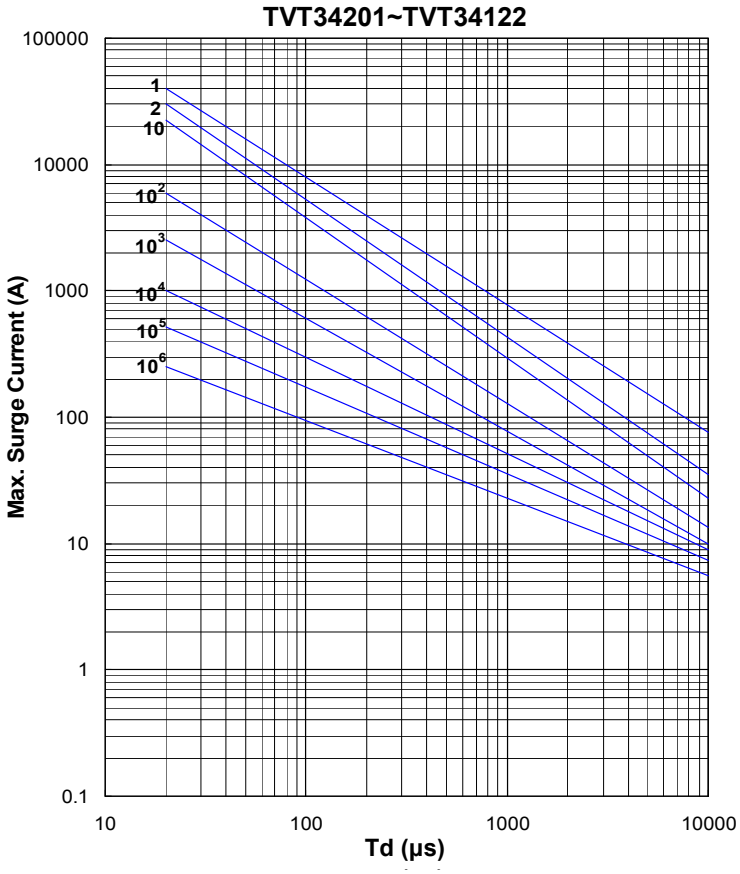
TVT32201~TVT32122



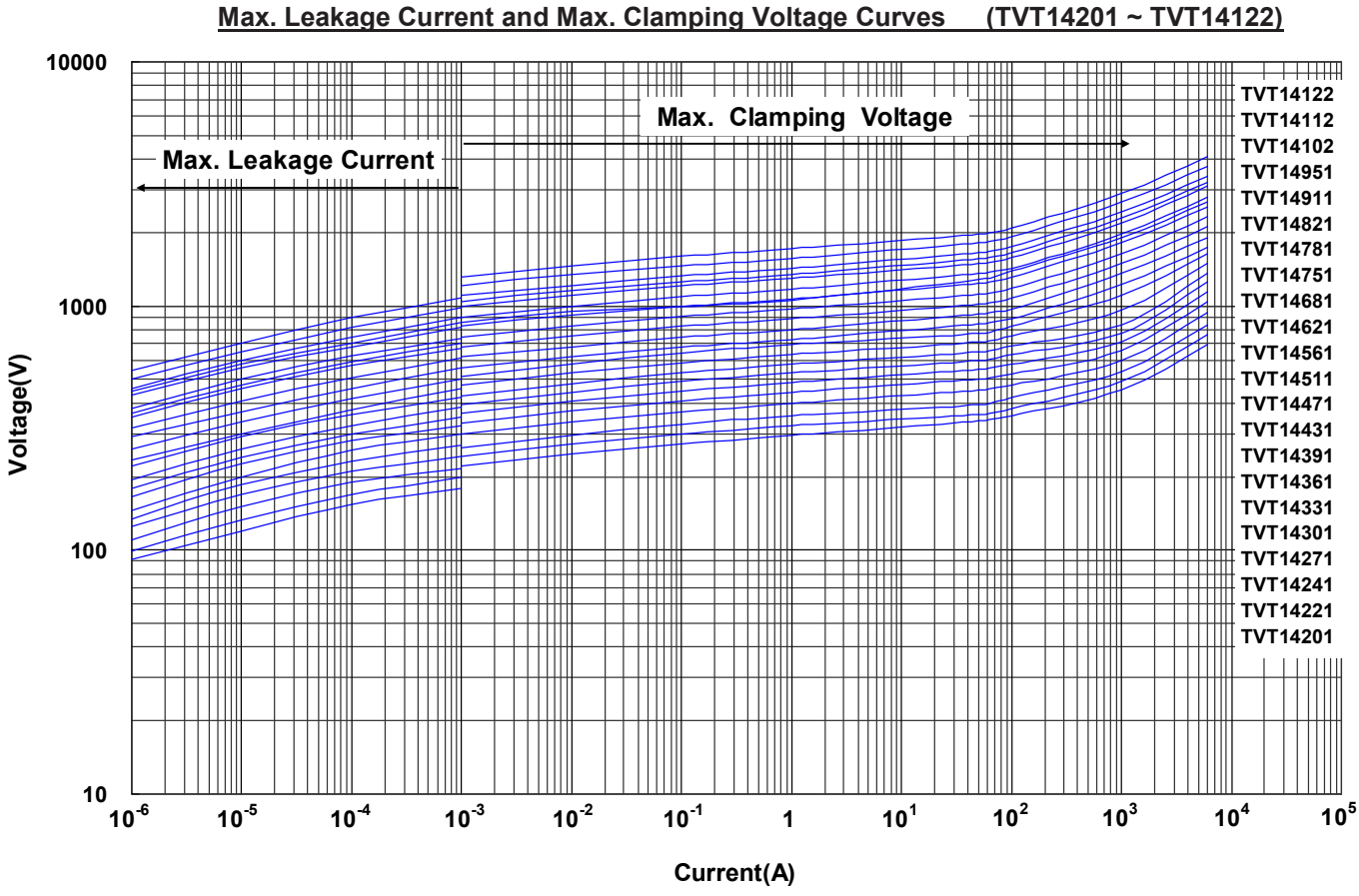
Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

Max. Surge Current Derating Curves



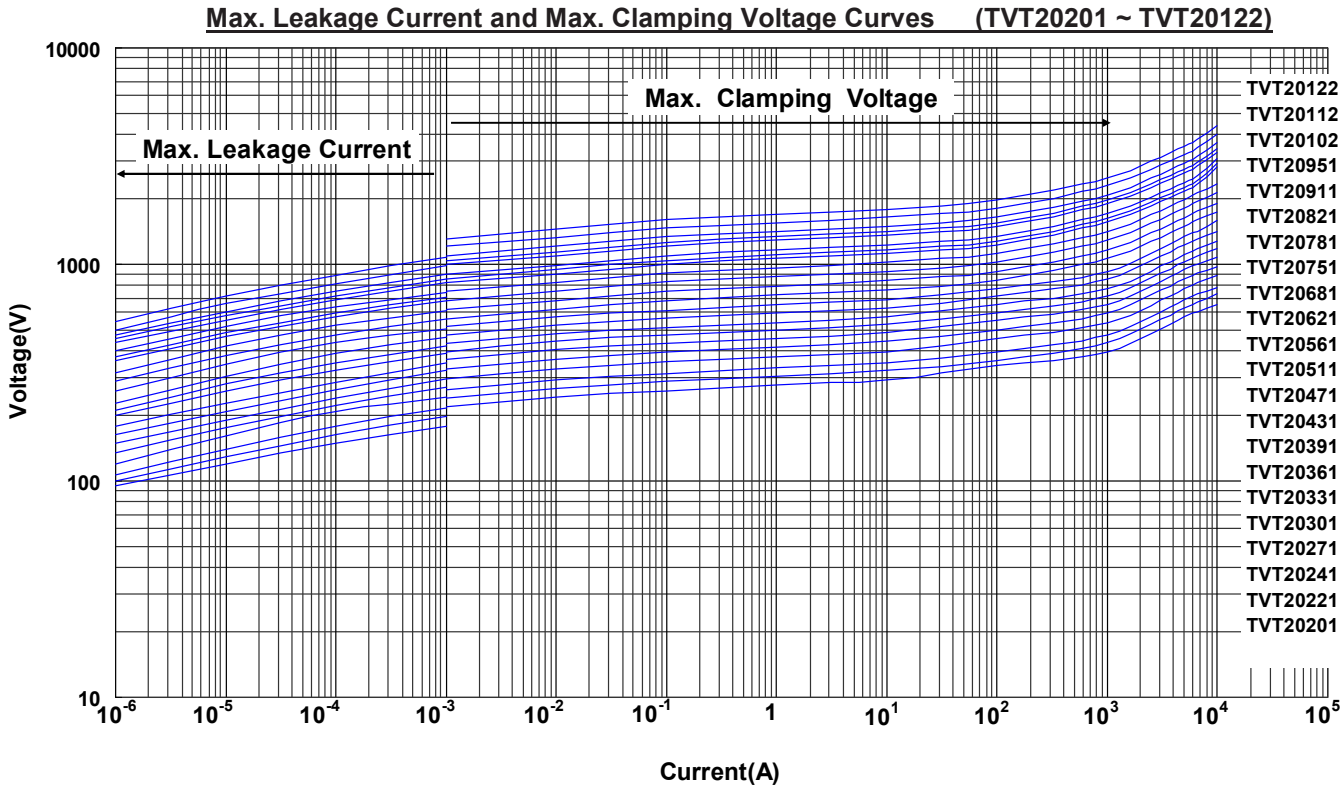
■ Max. Leakage Current and Max. Clamping Voltage Curves

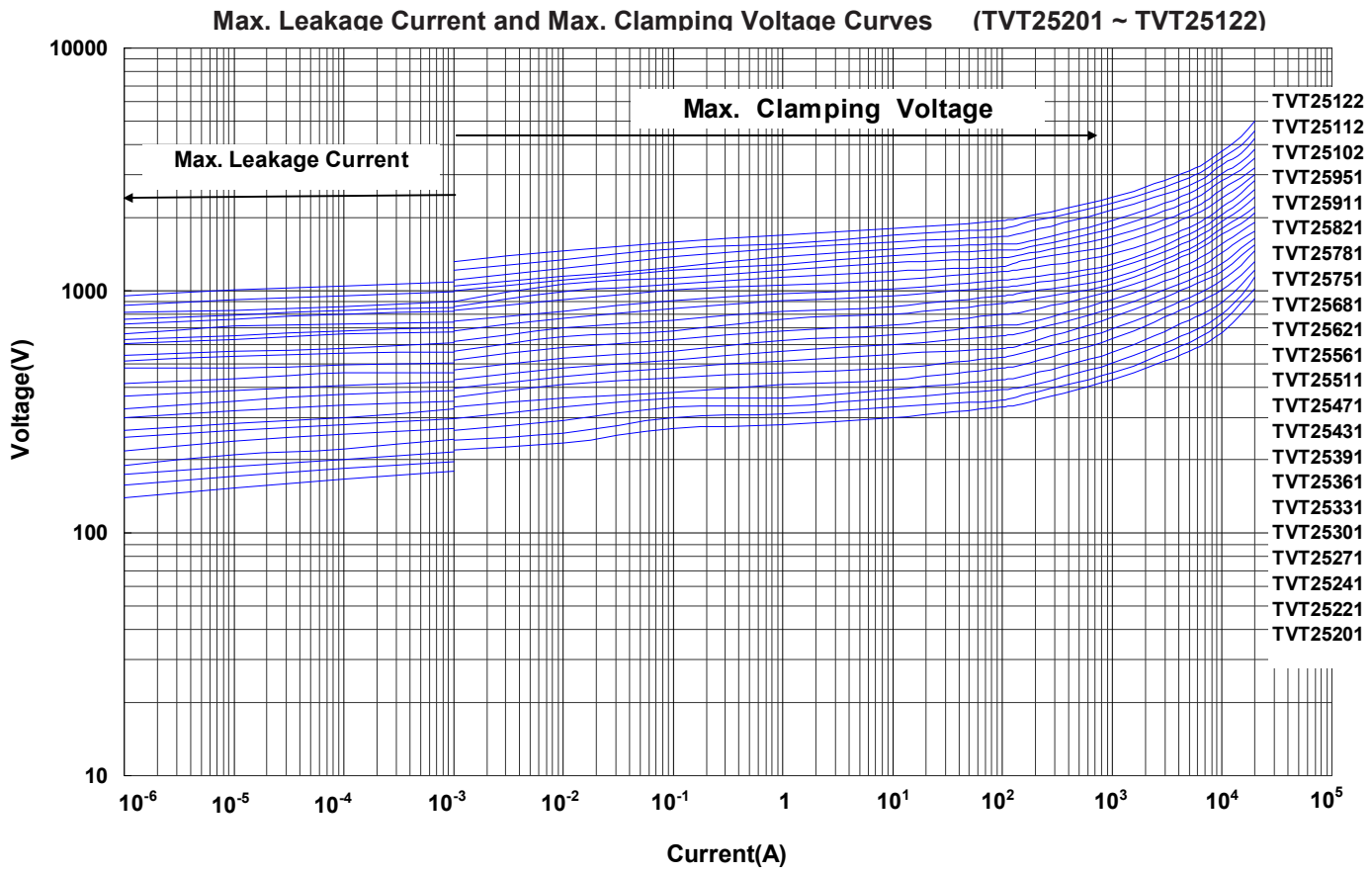


Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Max. Leakage Current and Max. Clamping Voltage Curves



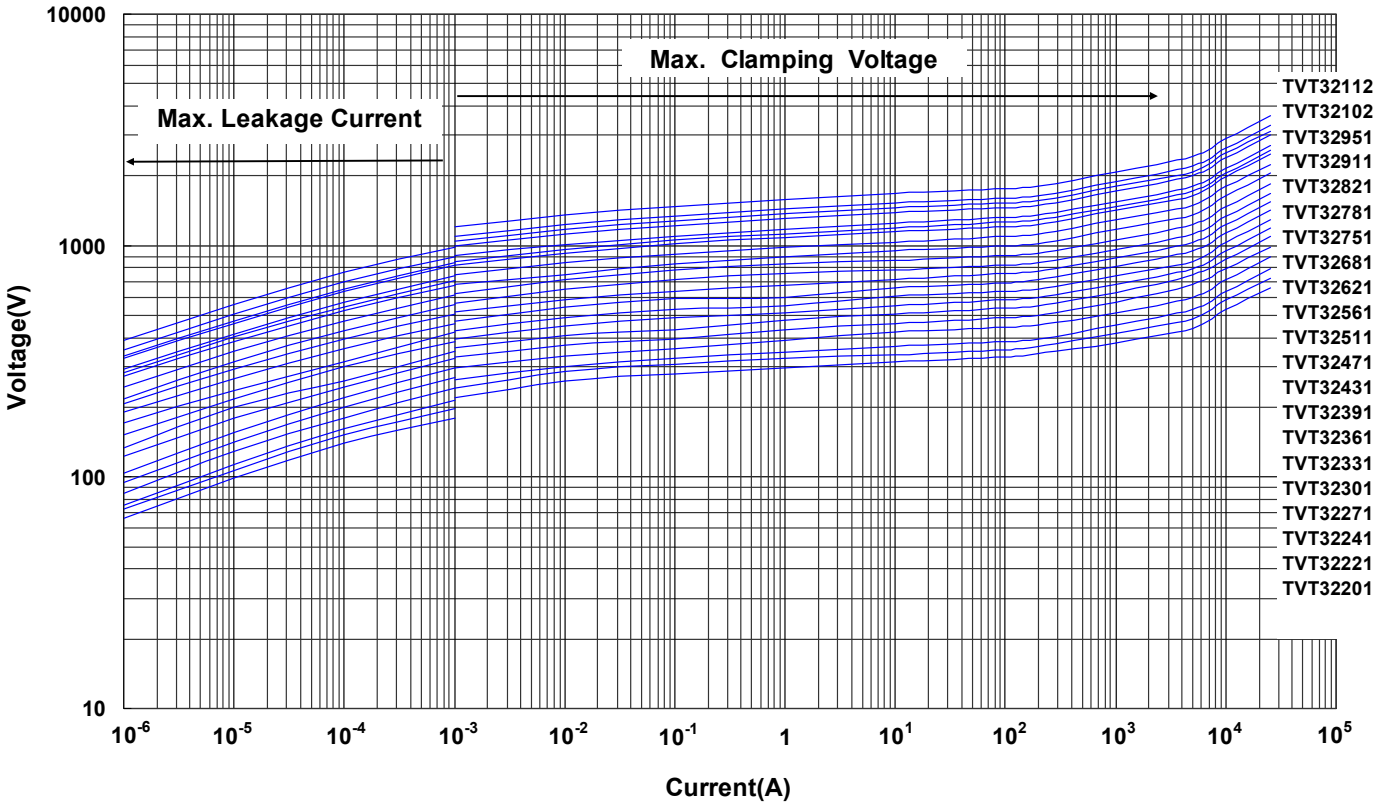


Metal Oxide Varistor：TVT Series

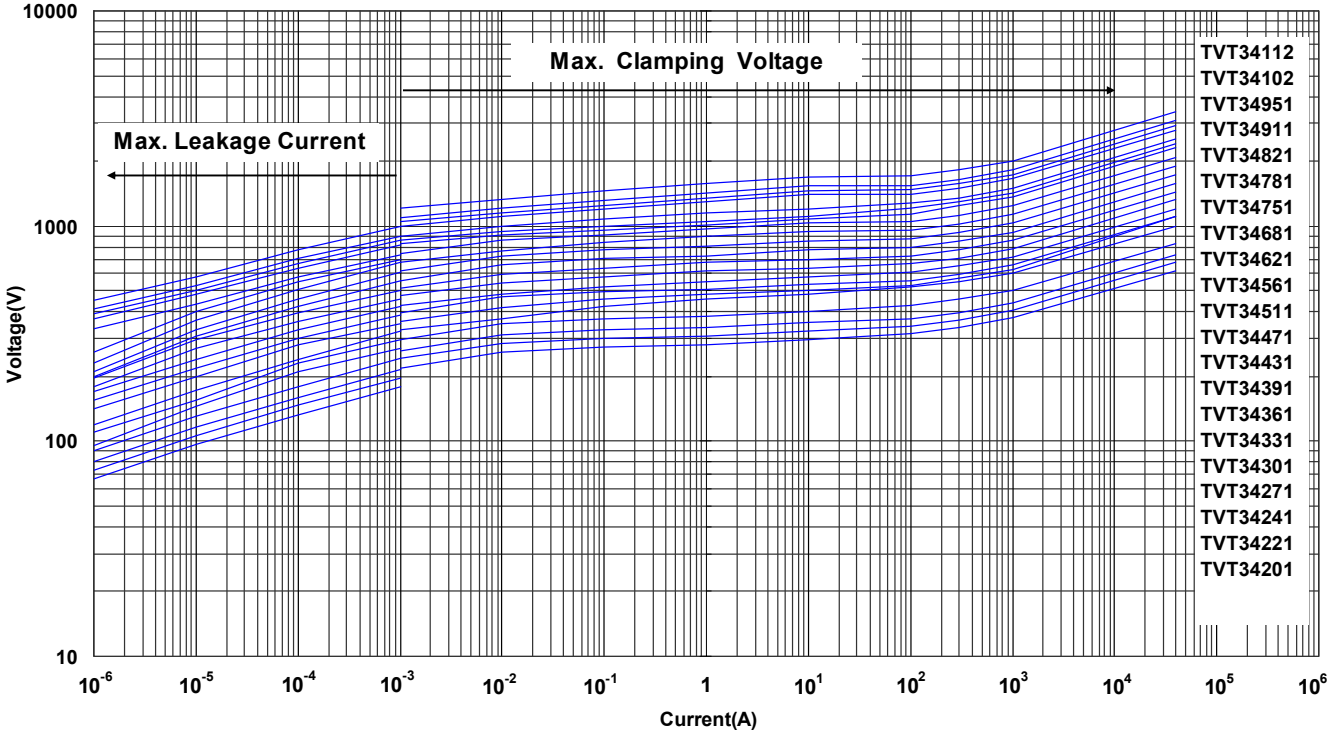
Thermally Protected Varistor Series

Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVT32201 ~ TVT32122)



Max. Leakage Current and Max. Clamping Voltage Curves (TVT34201 ~ TVT34122)

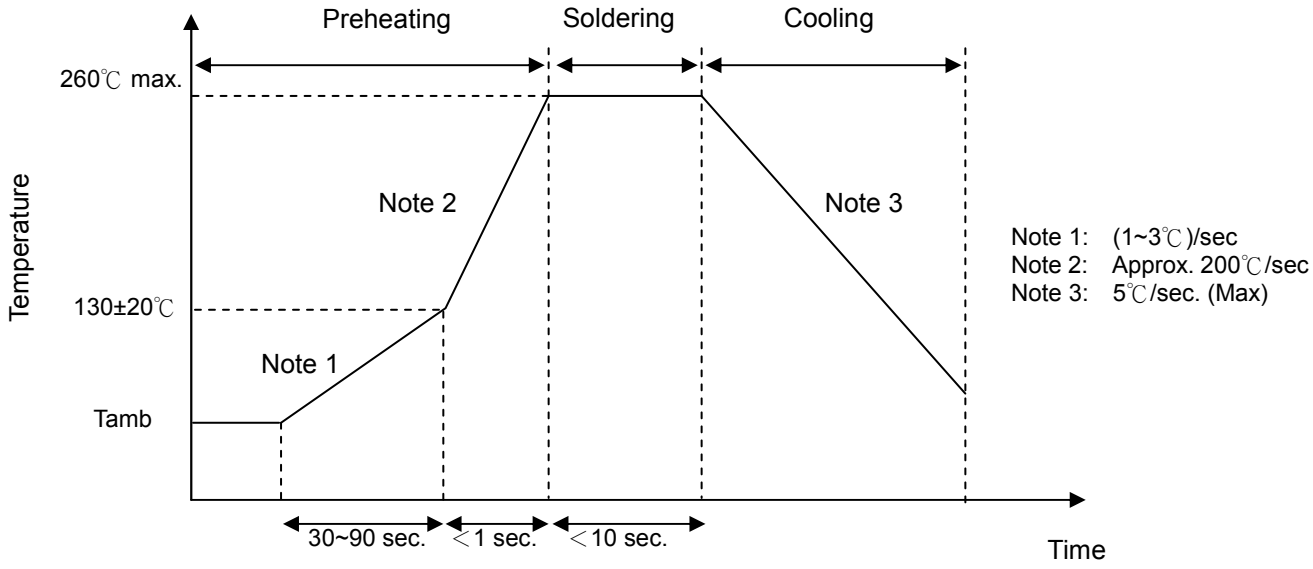


Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Soldering Recommendation

● Wave Soldering Profile



● Recommended Reworking Conditions With Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360℃ (max.)
Soldering Time	3 sec (max.)
Distance from Varistor	2 mm (min.)

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Reliability

<table>
<tr><th>Item</th><th>Standard</th><th>Test Conditions / Methods</th><th>Specifications</th></tr>
<tr><td>Tensile Strength of Terminals</td><td>IEC 60068-2-21</td><td>Gradually apply the specified force and keep the unit fixed for 10±1 sec.
<table><tr><th>Terminal diameter (mm)</th><th>Terminal cross-sectional area (mm^2)</th><th>Force (Kg)</th></tr><tr><td>0.5<d≦0.8</td><td>0.2＜S≦0.5</td><td>1.0</td></tr><tr><td>0.8<d≦1.25</td><td>0.5＜S≦1.2</td><td>2.0</td></tr><tr><td>1.25<d</td><td>1.2<S</td><td>4.0</td></tr></table></td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$
No visible damage</td></tr>
<tr><td>Bending Strength of Terminals</td><td>IEC 60068-2-21</td><td>Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, and then return to the original position. Repeat the procedure in the opposite direction.
<table><tr><th>Terminal diameter (mm)</th><th>Terminal cross-sectional area (mm^2)</th><th>Force (Kg)</th></tr><tr><td>0.5<d≦0.8</td><td>0.2＜S≦0.5</td><td>0.5</td></tr><tr><td>0.8<d≦1.25</td><td>0.5＜S≦1.2</td><td>1.0</td></tr><tr><td>1.25<d</td><td>1.2<S</td><td>2.0</td></tr></table></td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$
No visible damage</td></tr>
<tr><td>Vibration</td><td>IEC 60068-2-6</td><td>Frequency range: 10 ~ 55 Hz
Amplitude: 0.75mm or 98 m/s^2
Direction: 3 mutually perpendicular directions, 2 hrs each.</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$
No visible damage</td></tr>
<tr><td>Solderability</td><td>IEC 60068-2-20</td><td>245±3℃ , 3±0.3 sec</td><td>At least 95% of terminal electrode is covered by new solder</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>IEC 60068-2-20</td><td>260±3℃ , 10±1 sec</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$
No visible damage</td></tr>
<tr><td>High Temperature Storage</td><td>IEC 60068-2-2</td><td>110±5℃ x 1000± 24 hrs</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$
No visible damage</td></tr>
<tr><td>Damp Heat, Steady State</td><td>IEC 60068-2-78</td><td>a. 40±2℃, 90 ~ 95 % RH, 1344 hrs
b. 40±2℃, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$
No visible damage
Insulation Resistance ≧100MΩ</td></tr>
<tr><td>Rapid Change of Temperature</td><td>IEC 60068-2-14</td><td>The conditions shown below shall be repeated 5 cycles
<table><tr><th>Step</th><th>Temperature (℃)</th><th>Period (minutes)</th></tr><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></table></td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$
No visible damage</td></tr>
<tr><td>High Temp. Load</td><td>MIL-STD-202 Method 108</td><td>85±2℃, 1000±24 hrs at V_{DC} or V_{rms} (Max. Continuous Voltage)</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$
No visible damage</td></tr>
<tr><td>8/20μs Surge Life</td><td>IEC 61051-1</td><td>8/20μs waveform, 10 surge currents, unipolar, interval 30 secs, amplitude corresponding to max. surge current derating curves for 20μs.</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$
No visible damage</td></tr>
<tr><td>10/1000μs Surge Life</td><td>IEC 61051-1</td><td>10/1000μs waveform, 10 surge currents, unipolar, interval 2 mins, amplitude corresponding to max. surge current derating curves for 1000μs.</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$
No visible damage</td></tr>
<tr><td>Operating Duty Cycle Test</td><td>UL 1449 3rd</td><td>Refer to UL 1449 3rd item 37A, the test condition is In (Nominal Discharge Current) 8/20μs surge current waveform for 15 times.</td><td>$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$
No visible damage</td></tr>
</table>

Metal Oxide Varistor：TVT Series

Thermally Protected Varistor Series

■ Reliability

<table>
<tr><th>Item</th><th>Standard</th><th>Test Conditions / Methods</th><th>Specifications</th></tr>
<tr><td>Limited Current Abnormal Overvoltage Test</td><td>UL 1449 3rd</td><td>Test voltage: refer to UL 1449 3rd Table 39.1
Short current condition:
<table>
<tr><td>Series</td><td>Short Current (Isc , A)</td></tr>
<tr><td>TVT14</td><td>0.125A, 0.5A, 2.5A, 5A</td></tr>
<tr><td>TVT20</td><td>0.5A, 2.5A, 5A, 10A</td></tr>
</table>
Each of four previously untested TVT samples to be connected to an ac power supply having an open circuit voltage equal to Uoc. The power supply is to incorporate a series variable resistor that can be adjusted to obtain the short-circuit values (Isc) respectively.
The four samples are to be energized for 7 hrs, or until current to, or body temperature attain equiubrium, or until the sample becomes disconnected from the ac supply.</td><td>No flame</td></tr>
<tr><td>Voltage Proof</td><td>IEC 61051-1</td><td>Metal balls method, 2500 V_{ac} 1 min</td><td>No visible damage</td></tr>
<tr><td>Varistor Voltage Temp. Coefficient</td><td>Specification Standard</td><td>$\frac{V_{1mA@85℃}-V_{1mA@25℃}}{V_{1mA@25℃}}\times\frac{1}{60}\times100\%(\%/°C)$, $\frac{V_{1mA@-40℃}-V_{1mA@25℃}}{V_{1mA@25℃}}\times\frac{1}{65}\times100\%(\%/°C)$</td><td>$-0.05\leqq T_C\leqq0.05$ (%/℃)</td></tr>
</table>

■ Packaging

- **Bulk Packing**

Series	Quantity (pcs/bag)
TVT14	50
TVT20	25

■ Warehouse Storage Conditions of Products

- Storage Conditions:
  1. Storage temperature: -10℃~+40℃
  2. Relative humidity: ≦75%RH
  3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year