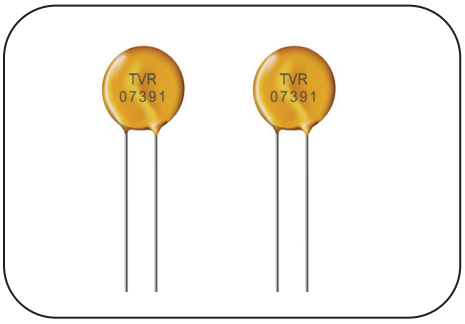
Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

■ Features



1. RoHS compliant
2. Halogen-free series are available
3. Body size: Φ5 ~ Φ20mm
4. Wide operating voltage range: 11Vac ~ 1000 Vac
5. Operating temperature range: -40°C ~ +85°C
   Storage temperature range: -40°C ~ +125°C
6. Agency recognition: UL 1449 3rd/UL 1414/cUL/VDE/CSA/CQC
7. TVR14181~14112 and TVR20181~20112 meet IEC 60950-1:2013 Annex Q requirement
8. TVR20 series for UL 1449 3rd SPD Type 2 application is available

■ Recommended Applications

1. Power supply
2. Home appliance
3. Industrial equipment
4. Telecommunication or telephone system
5. Smart meter
6. PLC (Power line communication)
7. Lighting products
8. Photovoltaic industry

■ Part Number Code

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

Product Type	
TVR	THINKING Varistor TVR Series

Body Size	
05	Φ5mm
07	Φ7mm
10	Φ10mm
14	Φ14mm
20	Φ20mm

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%

Appearance	
S	Straight lead, epoxy coating
F	Y kink lead, epoxy coating
T	L kink lead, epoxy coating

Packaging	
AR	Tape & reel packing (hole pitch:12.7mm)
ER	Tape & reel packing (hole pitch:15.0mm)
AB	Tape & ammo box packing (hole pitch:12.7mm)
EB	Tape & ammo box packing (hole pitch:15.0mm)
C	Bulk & cut lead (followed by the codes of 2 leaded length
Blank	Bulk

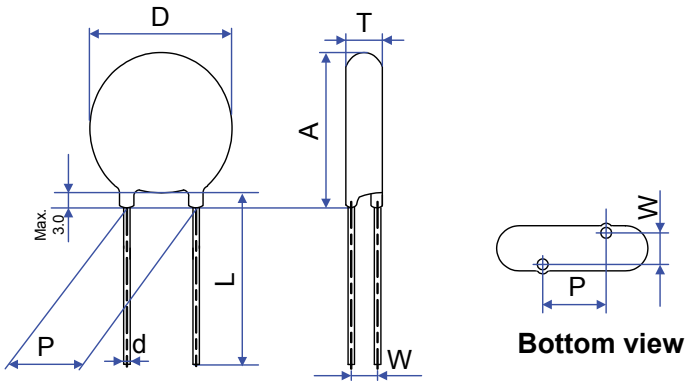
Internal Control Code
01~ZZ

Optional Suffix	
Y	RoHS Compliant
F	RoHS Compliant & Halogen-Free
R	For UL 1449 3rd SPD Type 2 Application (TVR20 only)

Note: Optional suffix will be the 11th digit if packaging and internal control codes are not coded.

■ Structures and Dimensions

● S Type (Straight lead)



(Unit: mm)

Series	D	Lmin.	d	P	Amax.	Tmax.	W
TVR05	5.0~7.0	26.5	0.6±0.02	5±1	9.0	Please refer to the Electrical Characteristics Table	
TVR07	6.5~9.0	26.5	0.6±0.02	5±1	11.0 (for TVR07180~621) 11.5 (for TVR07681~821)		
TVR10	9.5~12.5 9.5~13.5 (for TVR10182)	26.5	0.8±0.02	7.5±1	15.0 (for TVR10180-112) 15.5 (for TVR10122-182)		
TVR14	13.5~16.0	26.5	0.8±0.02	7.5±1	18.5 (for TVR14180-511) 19.0 (for TVR14561-182)		
TVR20	19.5~22.0	22.5	1.0±0.02	10±1	25.5 (for TVR20180-511) 26.0 (for TVR20561-112) 26.5 (for TVR20122-182)		

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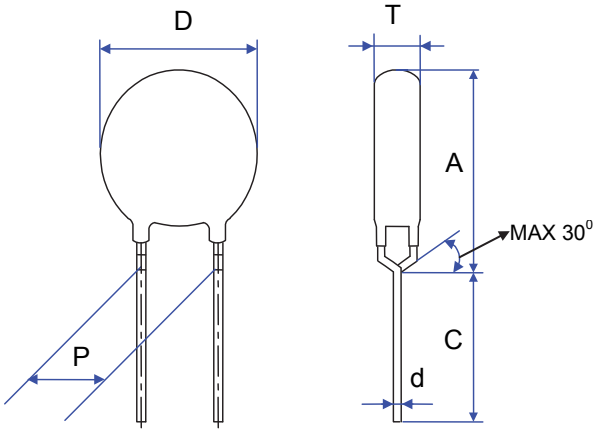
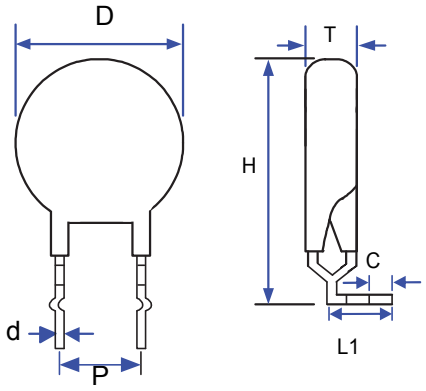
- F Type (Y kink lead)



(Unit: mm)

Series	D	Cmin.	d	P	Amax.	Tmax.
TVR05	5.0~7.0	20	0.6±0.02	5±1	9.5	Please refer to the Electrical Characteristics Table
TVR07	6.5~9.0	20	0.6±0.02	5±1	11.5	
TVR10	9.5~12.5 9.5~13.5 (for TVR10182)	20	0.8±0.02	7.5±1	16.0	
TVR14	13.5 ~16.0	20	0.8±0.02	7.5±1	19.0	
TVR20	19.5~22	20	1.0±0.02	10±1	26.5	

- T Type (L kink lead)



(Unit: mm)

Series	D	C	d	P	Hmax.	L1	Tmax.
TVR10	9.5~12.5 9.5~13.5 (for TVR10182)	3.8±0.8	0.8±0.02	7.5±1	20.0	7.0±1	Please refer to the Electrical Characteristics Table
TVR14	13.5 ~16.0		0.8±0.02	7.5±1	23.5	7.0±1	
TVR20	19.5~22		1.0±0.02	10±1	30.5	9.0±1	

■ Electrical Characteristics

05mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL 1449 3rd SPD Application
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	P	Wmax	Cp	Tmin	Tmax	W ±1.0	
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(pF)	(mm)			
TVR05180	18 (16~20)	11	14	40	1.0	100	0.01	0.4	1300	2.3	3.9	1.5	For Other Application
TVR05220	22 (20~24)	14	18	48	1.0	100	0.01	0.5	1000	2.4	4.1	1.5	
TVR05270	27 (24~30)	17	22	60	1.0	100	0.01	0.6	850	2.6	4.3	1.5	
TVR05330	33 (30~36)	20	26	73	1.0	100	0.01	0.8	700	2.9	4.5	1.5	
TVR05390	39 (35~43)	25	31	86	1.0	100	0.01	0.9	600	2.9	4.5	1.5	
TVR05470	47 (42~52)	30	38	104	1.0	100	0.01	1.1	500	2.5	4.1	1.5	
TVR05560	56 (50~62)	35	45	123	1.0	100	0.01	1.3	400	2.7	4.3	1.5	
TVR05680	68 (61~75)	40	56	150	1.0	100	0.01	1.6	330	2.9	4.6	1.5	
TVR05820	82 (74~90)	50	65	145	5.0	400	0.1	2.5	250	2.2	3.9	1.5	
TVR05101	100 (90~110)	60	85	175	5.0	400	0.1	3.0	230	2.4	4.1	1.6	
TVR05121	120 (108~132)	75	100	210	5.0	400	0.1	4.0	210	2.5	4.3	1.8	
TVR05151	150 (135~165)	95	125	260	5.0	400	0.1	4.8	190	2.0	4.6	1.6	
TVR05181	180 (162~198)	115	150	315	5.0	400	0.1	5.9	70	2.0	3.9	1.4	
TVR05201	200 (180~220)	130	170	355	5.0	400	0.1	6.5	65	2.1	4.0	1.5	
TVR05221	220 (198~242)	140	180	380	5.0	400	0.1	7.0	60	2.1	4.0	1.5	
TVR05241	240 (216~264)	150	200	415	5.0	400	0.1	8.0	55	2.3	4.2	1.6	
TVR05271	270 (243~297)	175	225	475	5.0	400	0.1	8.5	50	2.4	4.4	1.7	
TVR05301	300 (270~330)	195	250	525	5.0	400	0.1	8.5	50	2.7	4.4	1.9	
TVR05331	330 (297~363)	215	275	585	5.0	400	0.1	9.2	45	2.8	4.5	2.0	
TVR05361	360 (324~396)	230	300	620	5.0	400	0.1	10	45	2.9	4.6	2.1	
TVR05391	390 (351~429)	250	320	675	5.0	400	0.1	12	40	3.1	4.8	2.3	
TVR05431	430 (387~473)	275	350	745	5.0	400	0.1	13	35	3.0	5.1	2.3	
TVR05471	470 (423~517)	300	385	810	5.0	400	0.1	15	30	3.2	5.2	2.4	
TVR05511	510 (459~561)	320	410	878	5.0	400	0.1	16	30	3.4	5.4	2.6	
TVR05561	560 (504~616)	350	450	962	5.0	400	0.1	18	30	3.6	5.5	2.8	
TVR05621	620 (558~682)	395	510	1050	5.0	400	0.1	18	25	3.9	5.9	3.0	
TVR05681	680 (612~748)	420	560	1120	5.0	400	0.1	18	20	4.1	6.2	3.2	
TVR05751	750 (675~825)	460	615	1240	5.0	400	0.1	18	20	4.4	6.4	3.5	

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

07mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL 1449 3rd SPD Application
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	P	Wmax	Cp	Tmin	Tmax	W ±1.0	
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(pF)	(mm)			
TVR07180	18 (16~20)	11	14	36	2.5	250	0.02	0.9	2400	2.3	3.9	1.3	For Other Application
TVR07220	22 (20~24)	14	18	43	2.5	250	0.02	1.1	2000	2.4	4.1	1.4	
TVR07270	27 (24~30)	17	22	53	2.5	250	0.02	1.4	1600	2.6	4.3	1.5	
TVR07330	33 (30~36)	20	26	65	2.5	250	0.02	1.7	1300	2.9	4.5	1.7	
TVR07390	39 (35~43)	25	31	77	2.5	250	0.02	2.1	1200	2.9	4.5	1.8	
TVR07470	47 (42~52)	30	38	93	2.5	250	0.02	2.5	1100	2.5	4.1	1.9	
TVR07560	56 (50~62)	35	45	110	2.5	250	0.02	3.1	1000	2.7	4.3	2.0	
TVR07680	68 (61~75)	40	56	135	2.5	250	0.02	3.6	850	2.9	4.6	2.1	
TVR07820	82 (74~90)	50	65	135	10	1200	0.25	5.5	460	2.2	3.9	1.5	
TVR07101	100 (90~110)	60	85	165	10	1200	0.25	6.5	420	2.4	4.1	1.6	
TVR07121	120 (108~132)	75	100	200	10	1200	0.25	7.8	380	2.5	4.3	1.8	
TVR07151	150 (135~165)	95	125	250	10	1200	0.25	9.7	350	2.0	4.6	1.6	
TVR07181	180 (162~198)	115	150	300	10	1200	0.25	11.7	155	2.0	3.9	1.4	
TVR07201	200 (180~220)	130	170	340	10	1200	0.25	13	140	2.1	4.0	1.5	
TVR07221	220 (198~242)	140	180	360	10	1200	0.25	14	130	2.1	4.0	1.5	
TVR07241	240 (216~264)	150	200	395	10	1200	0.25	15	120	2.3	4.2	1.6	
TVR07271	270 (243~297)	175	225	455	10	1200	0.25	18	110	2.4	4.4	1.7	
TVR07301	300 (270~330)	195	250	500	10	1200	0.25	21	105	2.7	4.4	1.9	
TVR07331	330 (297~363)	215	275	550	10	1200	0.25	23	100	2.8	4.5	2.0	
TVR07361	360 (324~396)	230	300	595	10	1200	0.25	25	95	2.9	4.6	2.1	
TVR07391	390 (351~429)	250	320	650	10	1200	0.25	25	85	3.1	4.8	2.3	
TVR07431	430 (387~473)	275	350	710	10	1200	0.25	28	80	3.0	5.1	2.3	
TVR07471	470 (423~517)	300	385	775	10	1200	0.25	30	70	3.2	5.2	2.4	
TVR07511	510 (459~561)	320	410	845	10	1200	0.25	33	65	3.4	5.4	2.6	
TVR07561	560 (504~616)	350	450	930	10	1200	0.25	33	60	3.6	5.5	2.8	
TVR07621	620 (558~682)	395	510	1020	10	1200	0.25	35	55	3.9	5.9	3.0	
TVR07681	680 (612~748)	420	560	1120	10	1200	0.25	35	50	4.1	6.2	3.2	
TVR07751	750 (675~825)	465	615	1235	10	1200	0.25	38	45	4.4	6.4	3.5	
TVR07821	820 (738~902)	510	670	1355	10	1200	0.25	42	40	4.5	6.4	3.2	

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

10mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL 1449 3rd SPD Application
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	P	Wmax	Cp	Tmin	Tmax	W ±1.0	
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(pF)	(mm)			
TVR10180	18 (16~20)	11	14	36	5.0	500	0.05	2.1	4500	2.7	4.3	1.3	For Other Application
TVR10220	22 (20~24)	14	18	43	5.0	500	0.05	2.5	3500	2.8	4.5	1.4	
TVR10270	27 (24~30)	17	22	53	5.0	500	0.05	3.0	3000	3.0	4.7	1.5	
TVR10330	33 (30~36)	20	26	65	5.0	500	0.05	4.0	2500	3.3	4.9	1.7	
TVR10390	39 (35~43)	25	31	77	5.0	500	0.05	4.6	2000	3.4	5.1	1.8	
TVR10470	47 (42~52)	30	38	93	5.0	500	0.05	5.5	1500	2.9	4.5	1.8	
TVR10560	56 (50~62)	35	45	110	5.0	500	0.05	7.0	1350	3.1	4.7	1.9	
TVR10680	68 (61~75)	40	56	135	5.0	500	0.05	8.2	1250	3.3	5.0	2.2	
TVR10820	82 (74~90)	50	65	135	25	2500	0.4	12	1000	2.6	4.3	1.6	
TVR10101	100 (90~110)	60	85	165	25	2500	0.4	15	920	2.8	4.5	1.8	
TVR10121	120 (108~132)	75	100	200	25	2500	0.4	18	830	2.9	4.7	2.0	
TVR10151	150 (135~165)	95	125	250	25	2500	0.4	22	760	2.4	5.0	1.8	
TVR10181	180 (162~198)	115	150	300	25	2500	0.4	27	310	2.4	4.3	1.6	
TVR10201	200 (180~220)	130	170	340	25	2500	0.4	30	290	2.5	4.4	1.7	
TVR10221	220 (198~242)	140	180	360	25	2500	0.4	32	270	2.5	4.4	1.7	
TVR10241	240 (216~264)	150	200	395	25	2500	0.4	35	240	2.7	4.6	1.8	
TVR10271	270 (243~297)	175	225	455	25	2500	0.4	40	230	2.8	4.8	1.9	
TVR10301	300 (270~330)	195	250	500	25	2500	0.4	40	210	3.1	4.8	2.1	
TVR10331	330 (297~363)	215	275	550	25	2500	0.4	43	200	3.2	4.9	2.2	
TVR10361	360 (324~396)	230	300	595	25	2500	0.4	47	190	3.3	5.0	2.3	
TVR10391	390 (351~429)	250	320	650	25	2500	0.4	60	175	3.5	5.2	2.5	
TVR10431	430 (387~473)	275	350	710	25	2500	0.4	65	160	3.4	5.5	2.5	
TVR10471	470 (423~517)	300	385	775	25	2500	0.4	70	150	3.6	5.6	2.6	
TVR10511	510 (459~561)	320	410	845	25	2500	0.4	70	130	3.8	5.8	2.8	
TVR10561	560 (504~616)	350	450	930	25	2500	0.4	70	120	4.0	5.9	3.0	
TVR10621	620 (558~682)	395	510	1020	25	2500	0.4	70	110	4.3	6.3	3.2	
TVR10681	680 (612~748)	420	560	1120	25	2500	0.4	70	100	4.5	6.6	3.4	
TVR10751	750 (675~825)	465	615	1235	25	2500	0.4	75	90	4.8	6.8	3.7	
TVR10821	820 (738~902)	510	670	1355	25	2500	0.4	85	80	4.9	6.8	3.4	
TVR10911	910 (819~1001)	550	745	1500	25	2500	0.4	93	70	5.3	7.2	3.7	
TVR10102	1000 (900~1100)	625	825	1650	25	2500	0.4	102	65	5.5	7.5	4.0	
TVR10112	1100 (990~1210)	680	895	1815	25	2500	0.4	115	60	5.7	8.0	4.3	
TVR10122	1200 (1080~1320)	725	975	1980	25	2500	0.4	125	55	6.0	8.1	5.2	
TVR10142	1400 (1260~1540)	820	1140	2300	25	2500	0.4	145	45	6.6	8.7	6.0	
TVR10162	1600 (1440~1760)	910	1300	2630	25	2500	0.4	165	40	7.1	9.8	6.7	
TVR10182	1800 (1620~1980)	1000	1465	2950	25	2500	0.4	185	35	7.8	10.3	7.4	

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

14mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL 1449 3rd SPD Application
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	P	Wmax	Cp	Tmin	Tmax	W ±1.0	
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(pF)	(mm)			
TVR14180	18 (16~20)	11	14	36	10	1000	0.1	4.0	10000	2.7	4.3	1.3	For Other Application
TVR14220	22 (20~24)	14	18	43	10	1000	0.1	5.0	8500	2.8	4.5	1.4	
TVR14270	27 (24~30)	17	22	53	10	1000	0.1	6.0	7000	3.0	4.7	1.5	
TVR14330	33 (30~36)	20	26	65	10	1000	0.1	7.5	6000	3.3	4.9	1.7	
TVR14390	39 (35~43)	25	31	77	10	1000	0.1	8.6	4800	3.4	5.1	1.8	
TVR14470	47 (42~52)	30	38	93	10	1000	0.1	10	3800	2.9	4.5	1.8	
TVR14560	56 (50~62)	35	45	110	10	1000	0.1	11	3300	3.1	4.7	1.9	
TVR14680	68 (61~75)	40	56	135	10	1000	0.1	14	2700	3.3	5.0	2.2	
TVR14820	82 (74~90)	50	65	135	50	4500	0.6	22	2100	2.6	4.3	1.6	For SPD Type 3 Application
TVR14101	100 (90~110)	60	85	165	50	4500	0.6	28	1900	2.8	4.5	1.8	
TVR14121	120 (108~132)	75	100	200	50	4500	0.6	32	1700	2.9	4.7	2.0	
TVR14151	150 (135~165)	95	125	250	50	4500	0.6	40	940	2.4	5.0	1.8	
TVR14181	180 (162~198)	115	150	300	50	4500	0.6	52	800	2.4	4.3	1.6	
TVR14201	200 (180~220)	130	170	340	50	4500	0.6	57	700	2.5	4.4	1.7	
TVR14221	220 (198~242)	140	180	360	50	4500	0.6	60	640	2.5	4.4	1.7	
TVR14241	240 (216~264)	150	200	395	50	4500	0.6	63	580	2.7	4.6	1.8	
TVR14271	270 (243~297)	175	225	455	50	4500	0.6	70	520	2.8	4.8	1.9	
TVR14301	300 (270~330)	195	250	500	50	4500	0.6	78	480	3.1	4.8	2.1	
TVR14331	330 (297~363)	215	275	550	50	4500	0.6	85	450	3.2	4.9	2.2	
TVR14361	360 (324~396)	230	300	595	50	4500	0.6	93	430	3.3	5.0	2.3	
TVR14391	390 (351~429)	250	320	650	50	4500	0.6	100	390	3.5	5.2	2.5	
TVR14431	430 (387~473)	275	350	710	50	4500	0.6	115	370	3.4	5.5	2.5	
TVR14471	470 (423~517)	300	385	775	50	4500	0.6	125	320	3.6	5.6	2.6	
TVR14511	510 (459~561)	320	410	845	50	4500	0.6	125	290	3.8	5.8	2.8	
TVR14561	560 (504~616)	350	450	930	50	4500	0.6	125	260	4.0	5.9	3.0	
TVR14621	620 (558~682)	395	510	1020	50	4500	0.6	125	240	4.3	6.3	3.2	
TVR14681	680 (612~748)	420	560	1120	50	4500	0.6	130	230	4.5	6.6	3.4	
TVR14751	750 (675~825)	465	615	1235	50	4500	0.6	143	220	4.8	6.8	3.7	
TVR14821	820 (738~902)	510	670	1355	50	4500	0.6	157	180	4.9	6.8	3.4	
TVR14911	910 (819~1001)	550	745	1500	50	4500	0.6	175	170	5.3	7.2	3.7	
TVR14102	1000 (900~1100)	625	825	1650	50	4500	0.6	190	150	5.5	7.5	4.0	
TVR14112	1100 (990~1210)	680	895	1815	50	4500	0.6	213	140	5.6	8.0	4.3	
TVR14122	1200 (1080~1320)	725	975	1980	50	4500	0.6	230	130	6.0	8.1	5.2	
TVR14142	1400 (1260~1540)	820	1140	2300	50	4500	0.6	250	110	6.6	8.7	6.0	
TVR14162	1600 (1440~1760)	910	1300	2630	50	4500	0.6	315	95	7.1	9.8	6.7	
TVR14182	1800 (1620~1980)	1000	1465	2950	50	4500	0.6	354	85	7.8	10.3	7.4	

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

20mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL 1449 3rd SPD Application
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	P	Wmax	Cp	Tmin	Tmax	W ±1.0	
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(pF)	(mm)			
TVR20180	18 (16~20)	11	14	36	20	2000	0.2	11	19000	3.1	4.7	1.3	For Other Application
TVR20220	22 (20~24)	14	18	43	20	2000	0.2	14	16000	3.2	4.9	1.4	
TVR20270	27 (24~30)	17	22	53	20	2000	0.2	18	14500	3.4	5.1	1.5	
TVR20330	33 (30~36)	20	26	65	20	2000	0.2	23	13000	3.7	5.3	1.7	
TVR20390	39 (35~43)	25	31	77	20	2000	0.2	26	12000	3.8	5.5	1.7	
TVR20470	47 (42~52)	30	38	93	20	2000	0.2	33	11000	3.3	4.9	1.8	
TVR20560	56 (50~62)	35	45	110	20	2000	0.2	41	9000	3.5	5.1	2.0	
TVR20680	68 (61~75)	40	56	135	20	2000	0.2	46	7500	3.7	5.4	2.2	
TVR20820	82 (74~90)	50	65	135	100	6500	1.0	48	4800	3.0	4.7	1.8	For SPD Type 3 Application
TVR20101	100 (90~110)	60	85	165	100	6500	1.0	51	3900	3.2	4.9	2.0	
TVR20121	120 (108~132)	75	100	200	100	6500	1.0	55	3300	3.3	5.1	2.2	
TVR20151	150 (135~165)	95	125	250	100	6500	1.0	70	1950	2.8	5.4	2.0	
TVR20181	180 (162~198)	115	150	300	100	6500	1.0	84	1620	2.8	4.7	1.8	
TVR20201	200 (180~220)	130	170	340	100	6500	1.0	95	1460	2.9	4.8	1.9	
TVR20221	220 (198~242)	140	180	360	100	6500	1.0	100	1320	2.9	4.8	1.9	
TVR20241	240 (216~264)	150	200	395	100	6500	1.0	108	1200	3.1	5.0	2.0	
TVR20271	270 (243~297)	175	225	455	100	6500	1.0	127	1100	3.2	5.2	2.1	
TVR20301	300 (270~330)	195	250	500	100	6500	1.0	136	1000	3.5	5.2	2.3	
TVR20331	330 (297~363)	215	275	550	100	6500	1.0	150	950	3.6	5.3	2.4	
TVR20361	360 (324~396)	230	300	595	100	6500	1.0	163	900	3.7	5.4	2.5	
TVR20391	390 (351~429)	250	320	650	100	6500	1.0	180	800	3.9	5.6	2.7	
TVR20431	430 (387~473)	275	350	710	100	6500	1.0	190	700	3.8	5.9	2.7	
TVR20471	470 (423~517)	300	385	775	100	6500	1.0	220	620	4.0	6.0	2.8	
TVR20511	510 (459~561)	320	410	845	100	6500	1.0	220	530	4.2	6.2	3.0	
TVR20561	560 (504~616)	350	450	930	100	6500	1.0	220	480	4.4	6.3	3.2	
TVR20621	620 (558~682)	395	510	1020	100	6500	1.0	220	450	4.7	6.7	3.4	
TVR20681	680 (612~748)	420	560	1120	100	6500	1.0	230	440	4.9	7.0	3.6	
TVR20751	750 (675~825)	465	615	1235	100	6500	1.0	255	420	5.2	7.2	3.9	
TVR20821	820 (738~902)	510	670	1355	100	6500	1.0	282	390	5.3	7.2	3.6	
TVR20911	910 (819~1001)	550	745	1500	100	6500	1.0	310	360	5.7	7.6	3.9	
TVR20102	1000 (900~1100)	625	825	1650	100	6500	1.0	342	330	6.1	7.9	4.2	
TVR20112	1100 (990~1210)	680	895	1815	100	6500	1.0	383	310	6.2	8.4	4.5	
TVR20122	1200 (1080~1320)	725	975	1980	100	6500	1.0	415	290	6.4	8.5	5.4	
TVR20142	1400 (1260~1540)	820	1140	2300	100	6500	1.0	480	250	7.0	9.1	6.2	
TVR20162	1600 (1440~1760)	910	1300	2630	100	6500	1.0	550	220	7.5	10.2	6.9	
TVR20182	1800 (1620~1980)	1000	1465	2950	100	6500	1.0	620	195	8.5	10.7	7.6	

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

20mm Series for SPD Type 2 Application

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			UL 1449 3rd SPD Application
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	V_P	I_P	Imax	In	P	Wmax	Cp	Tmin	Tmax	W ±1.0	
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(W)	(J)	(pF)	(mm)			
TVR20820R	82 (74~90)	50	65	135	100	6500	3000	1.0	48	4800	3.0	4.7	1.8	For SPD Type 2 Application
TVR20101R	100 (90~110)	60	85	165	100	6500	3000	1.0	51	3900	3.2	4.9	2.0	
TVR20121R	120 (108~132)	75	100	200	100	6500	3000	1.0	55	3300	3.3	5.1	2.2	
TVR20151R	150 (135~165)	95	125	250	100	6500	3000	1.0	70	1950	2.8	5.4	2.0	
TVR20181R	180 (162~198)	115	150	300	100	6500	3000	1.0	84	1620	2.8	4.7	1.8	
TVR20201R	200 (180~220)	130	170	340	100	6500	3000	1.0	95	1460	2.9	4.8	1.9	
TVR20221R	220 (198~242)	140	180	360	100	6500	3000	1.0	100	1320	2.9	4.8	1.9	
TVR20241R	240 (216~264)	150	200	395	100	6500	3000	1.0	108	1200	3.1	5.0	2.0	
TVR20271R	270 (243~297)	175	225	455	100	6500	3000	1.0	127	1100	3.2	5.2	2.1	
TVR20301R	300 (270~330)	195	250	500	100	6500	3000	1.0	136	1000	3.5	5.2	2.3	
TVR20331R	330 (297~363)	215	275	550	100	6500	3000	1.0	150	950	3.6	5.3	2.4	
TVR20361R	360 (324~396)	230	300	595	100	6500	3000	1.0	163	900	3.7	5.4	2.5	
TVR20391R	390 (351~429)	250	320	650	100	6500	3000	1.0	180	800	3.9	5.6	2.7	
TVR20431R	430 (387~473)	275	350	710	100	6500	3000	1.0	190	700	3.8	5.9	2.7	
TVR20471R	470 (423~517)	300	385	775	100	6500	3000	1.0	220	620	4.0	6.0	2.8	
TVR20511R	510 (459~561)	320	410	845	100	6500	3000	1.0	220	530	4.2	6.2	3.0	
TVR20561R	560 (504~616)	350	450	930	100	6500	3000	1.0	220	480	4.4	6.3	3.2	
TVR20621R	620 (558~682)	395	510	1020	100	6500	3000	1.0	220	450	4.7	6.7	3.4	
TVR20681R	680 (612~748)	420	560	1120	100	6500	3000	1.0	230	440	4.9	7.0	3.6	
TVR20751R	750 (675~825)	465	615	1235	100	6500	3000	1.0	255	420	5.2	7.2	3.9	
TVR20821R	820 (738~902)	510	670	1355	100	6500	3000	1.0	282	390	5.3	7.2	3.6	
TVR20911R	910 (819~1001)	550	745	1500	100	6500	3000	1.0	310	360	5.7	7.6	3.9	
TVR20102R	1000 (900~1100)	625	825	1650	100	6500	3000	1.0	342	330	6.1	7.9	4.2	
TVR20112R	1100 (990~1210)	680	895	1815	100	6500	3000	1.0	383	310	6.2	8.4	4.5	
TVR20122R	1200 (1080~1320)	725	975	1980	100	6500	3000	1.0	415	290	6.4	8.5	5.4	
TVR20142R	1400 (1260~1540)	820	1140	2300	100	6500	3000	1.0	480	250	7.0	9.1	6.2	
TVR20162R	1600 (1440~1760)	910	1300	2630	100	6500	3000	1.0	550	220	7.5	10.2	6.9	
TVR20182R	1800 (1620~1980)	1000	1465	2950	100	6500	3000	1.0	620	195	8.5	10.7	7.6	

Note:

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

■ Safety Approvals

Certified Model No.	Agency				
	c UL us	c UL us	CSA	VDE	CQC
	UL1449 3rd & cUL: E314979	UL1414 & cUL: E186499	97495	5944	CQC03001005165 CQC03001007654
TVR05180	√			√	√
TVR05220	√			√	√
TVR05270	√			√	√
TVR05330	√			√	√
TVR05390	√			√	√
TVR05470	√			√	√
TVR05560	√			√	√
TVR05680	√			√	√
TVR05820	√			√	√
TVR05101	√			√	√
TVR05121	√			√	√
TVR05151	√			√	√
TVR05181	√			√	√
TVR05201	√		√	√	√
TVR05221	√		√	√	√
TVR05241	√		√	√	√
TVR05271	√		√	√	√
TVR05301	√		√	√	√
TVR05331	√		√	√	√
TVR05361	√		√	√	√
TVR05391	√		√	√	√
TVR05431	√		√	√	√
TVR05471	√		√	√	√
TVR05511				√	
TVR05561				√	
TVR05621				√	
TVR05681				√	
TVR05751					

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

Certified Model No.	Agency				
	c UL us	c UL us	CSA	VDE	CQC
	UL1449 3rd & cUL: E314979	UL1414 & cUL: E186499	97495	5944	CQC03001005165 CQC03001007654
TVR07180	√			√	√
TVR07220	√			√	√
TVR07270	√			√	√
TVR07330	√			√	√
TVR07390	√			√	√
TVR07470	√			√	√
TVR07560	√			√	√
TVR07680	√			√	√
TVR07820	√			√	√
TVR07101	√			√	√
TVR07121	√			√	√
TVR07151	√			√	√
TVR07181	√			√	√
TVR07201	√	√	√	√	√
TVR07221	√	√	√	√	√
TVR07241	√	√	√	√	√
TVR07271	√	√	√	√	√
TVR07301	√	√	√	√	√
TVR07331	√	√	√	√	√
TVR07361	√	√	√	√	√
TVR07391	√	√	√	√	√
TVR07431	√	√	√	√	√
TVR07471	√	√	√	√	√
TVR07511	√	√		√	√
TVR07561	√	√		√	√
TVR07621	√	√	√	√	√
TVR07681	√	√	√	√	√
TVR07751	√		√	√	√
TVR07821	√		√	√	√

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

Certified Model No.	Agency				
	c UL us	c UL us	CSA	VDE	CQC
	UL1449 3rd & cUL: E314979	UL1414 & cUL: E186499	97495	5944	CQC03001005165 CQC03001007654
TVR10180	√			√	√
TVR10220	√			√	√
TVR10270	√			√	√
TVR10330	√			√	√
TVR10390	√			√	√
TVR10470	√			√	√
TVR10560	√			√	√
TVR10680	√			√	√
TVR10820	√			√	√
TVR10101	√			√	√
TVR10121	√			√	√
TVR10151	√			√	√
TVR10181	√			√	√
TVR10201	√	√	√	√	√
TVR10221	√	√	√	√	√
TVR10241	√	√	√	√	√
TVR10271	√	√	√	√	√
TVR10301	√	√	√	√	√
TVR10331	√	√	√	√	√
TVR10361	√	√	√	√	√
TVR10391	√	√	√	√	√
TVR10431	√	√	√	√	√
TVR10471	√	√	√	√	√
TVR10511	√	√		√	√
TVR10561	√	√		√	√
TVR10621	√	√	√	√	√
TVR10681	√	√	√	√	√
TVR10751	√	√	√	√	√
TVR10821	√	√	√	√	√
TVR10911	√	√	√	√	√
TVR10102	√	√	√	√	√
TVR10112	√	√	√	√	√
TVR10122	√				
TVR10142	√				
TVR10162	√				
TVR10182	√				

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

Certified Model No.	Agency						
	c UL us	c UL us	CSA	VDE		CQC	
	UL1449 3rd & cUL: E314979	UL1414 & cUL: E186499	97495	5944	IEC 60950-1:2013, Annex Q	GB/T10193-1997 GB/T10194-1997 CQC03001005165 CQC03001007654	GB8898-2011 GB4943.1-2011 CQC03001005165 CQC03001007654
TVR14180	√			√		√	
TVR14220	√			√		√	
TVR14270	√			√		√	
TVR14330	√			√		√	
TVR14390	√			√		√	
TVR14470	√			√		√	
TVR14560	√			√		√	
TVR14680	√			√		√	
TVR14820	√			√		√	
TVR14101	√			√		√	
TVR14121	√			√		√	
TVR14151	√			√		√	
TVR14181	√			√	√	√	
TVR14201	√	√	√	√	√	√	√
TVR14221	√	√	√	√	√	√	√
TVR14241	√	√	√	√	√	√	√
TVR14271	√	√	√	√	√	√	√
TVR14301	√	√	√	√	√	√	√
TVR14331	√	√	√	√	√	√	√
TVR14361	√	√	√	√	√	√	√
TVR14391	√	√	√	√	√	√	√
TVR14431	√	√	√	√	√	√	√
TVR14471	√	√	√	√	√	√	√
TVR14511	√	√		√	√	√	√
TVR14561	√	√		√	√	√	√
TVR14621	√	√	√	√	√	√	√
TVR14681	√	√	√	√	√	√	√
TVR14751	√	√	√	√	√	√	√
TVR14821	√	√	√	√	√	√	√
TVR14911	√	√	√	√	√	√	√
TVR14102	√	√	√	√	√	√	√
TVR14112	√	√	√	√	√	√	√
TVR14122	√			√	√		
TVR14142	√			√	√		
TVR14162	√			√	√		
TVR14182	√			√	√		

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

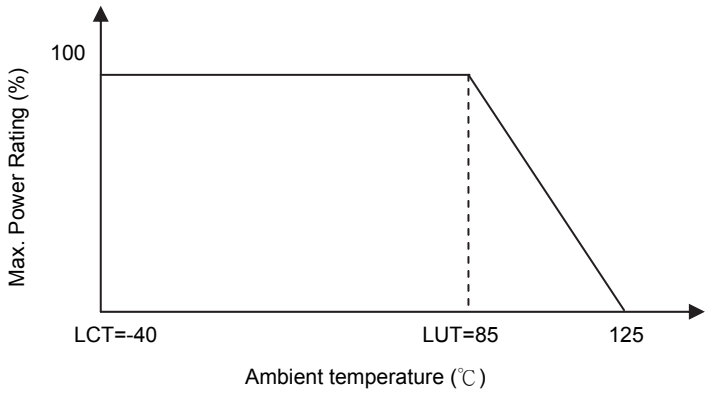
Certified Model No.	Agency						
	c UL us	c UL us	CSA	VDE		CQC	
	UL1449 3rd & cUL: E314979	UL1414 & cUL: E186499	97495	5944	IEC 60950-1:2013, Annex Q	GB/T10193-1997 GB/T10194-1997 CQC03001005165 CQC03001007654	GB8898-2011 GB4943.1-2011 CQC03001005165 CQC03001007654
TVR20180	√			√		√	
TVR20220	√			√		√	
TVR20270	√			√		√	
TVR20330	√			√		√	
TVR20390	√			√		√	
TVR20470	√			√		√	
TVR20560	√			√		√	
TVR20680	√			√		√	
TVR20820	√			√		√	
TVR20101	√			√		√	
TVR20121	√			√		√	
TVR20151	√			√		√	
TVR20181	√			√	√	√	
TVR20201	√	√	√	√	√	√	√
TVR20221	√	√	√	√	√	√	√
TVR20241	√	√	√	√	√	√	√
TVR20271	√	√	√	√	√	√	√
TVR20301	√	√	√	√	√	√	√
TVR20331	√	√	√	√	√	√	√
TVR20361	√	√	√	√	√	√	√
TVR20391	√	√	√	√	√	√	√
TVR20431	√	√	√	√	√	√	√
TVR20471	√	√	√	√	√	√	√
TVR20511	√	√		√	√	√	√
TVR20561	√	√		√	√	√	√
TVR20621	√	√	√	√	√	√	√
TVR20681	√	√	√	√	√	√	√
TVR20751	√	√	√	√	√	√	√
TVR20821	√	√	√	√	√	√	√
TVR20911	√	√	√	√	√	√	√
TVR20102	√	√	√	√	√	√	√
TVR20112	√	√	√	√	√	√	√
TVR20122	√			√	√		
TVR20142	√			√	√		
TVR20162	√			√	√		
TVR20182	√			√	√		

Metal Oxide Varistor：TVR Series

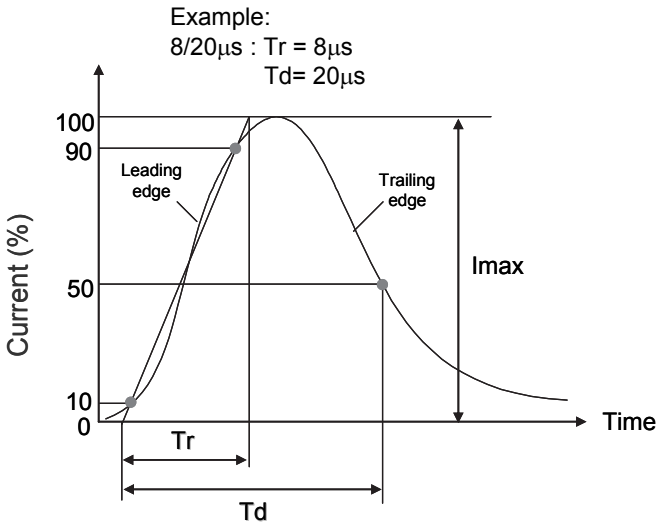
Disc Type Varistor for Surge Protection

Certified Model No.	Agency				
	c UL us	VDE		CQC	
	UL1449 3rd & cUL: E314979	5944	IEC 60950-1:2013, Annex Q	GB/T10193-1997 GB/T10194-1997 CQC03001005165 CQC03001007654	GB8898-2011 GB4943.1-2011 CQC03001005165 CQC03001007654
TVR20820R	√	√		√	
TVR20101R	√	√		√	
TVR20121R	√	√		√	
TVR20151R	√	√		√	
TVR20181R	√	√	√	√	
TVR20201R	√	√	√	√	√
TVR20221R	√	√	√	√	√
TVR20241R	√	√	√	√	√
TVR20271R	√	√	√	√	√
TVR20301R	√	√	√	√	√
TVR20331R	√	√	√	√	√
TVR20361R	√	√	√	√	√
TVR20391R	√	√	√	√	√
TVR20431R	√	√	√	√	√
TVR20471R	√	√	√	√	√
TVR20511R	√	√	√	√	√
TVR20561R	√	√	√	√	√
TVR20621R	√	√	√	√	√
TVR20681R	√	√	√	√	√
TVR20751R	√	√	√	√	√
TVR20821R	√	√	√	√	√
TVR20911R	√	√	√	√	√
TVR20102R	√	√	√	√	√
TVR20112R	√	√	√	√	√
TVR20122R	√	√	√		
TVR20142R	√	√	√		
TVR20162R	√	√	√		
TVR20182R	√	√	√		

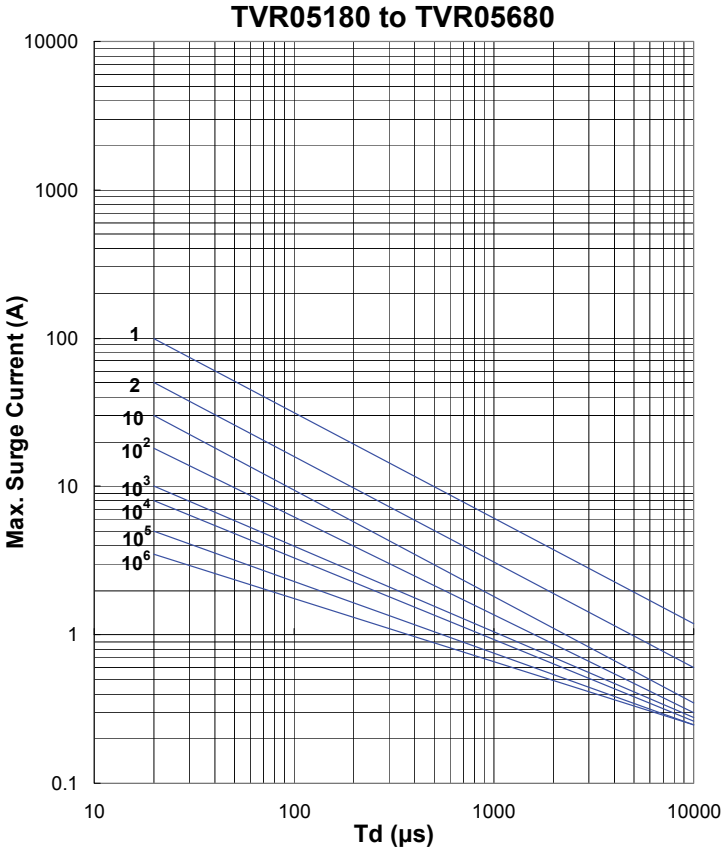
■ Power Derating Curve

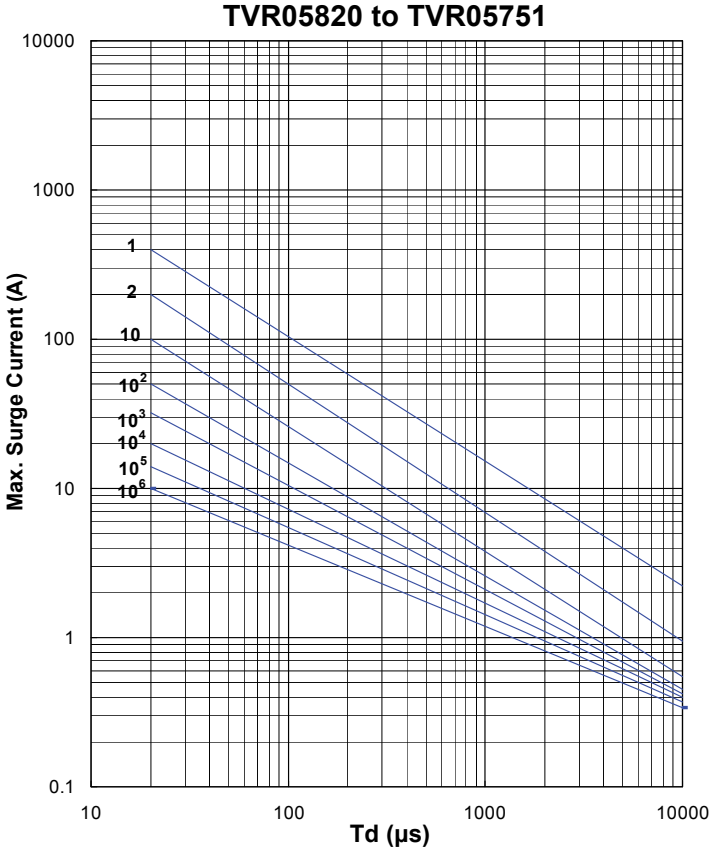


■ Surge Current Standard Waveform



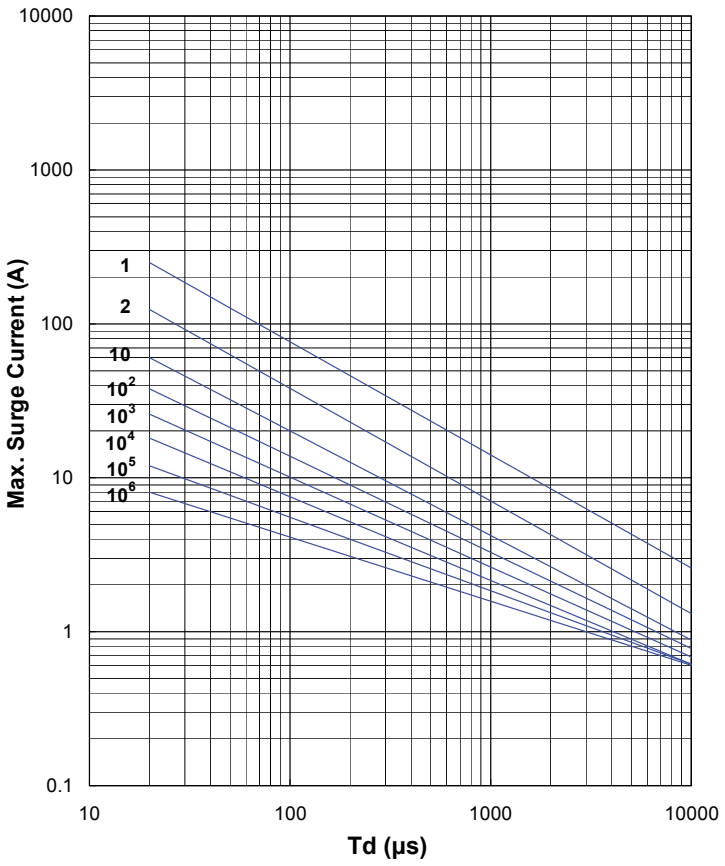
■ Max. Surge Current Derating Curves



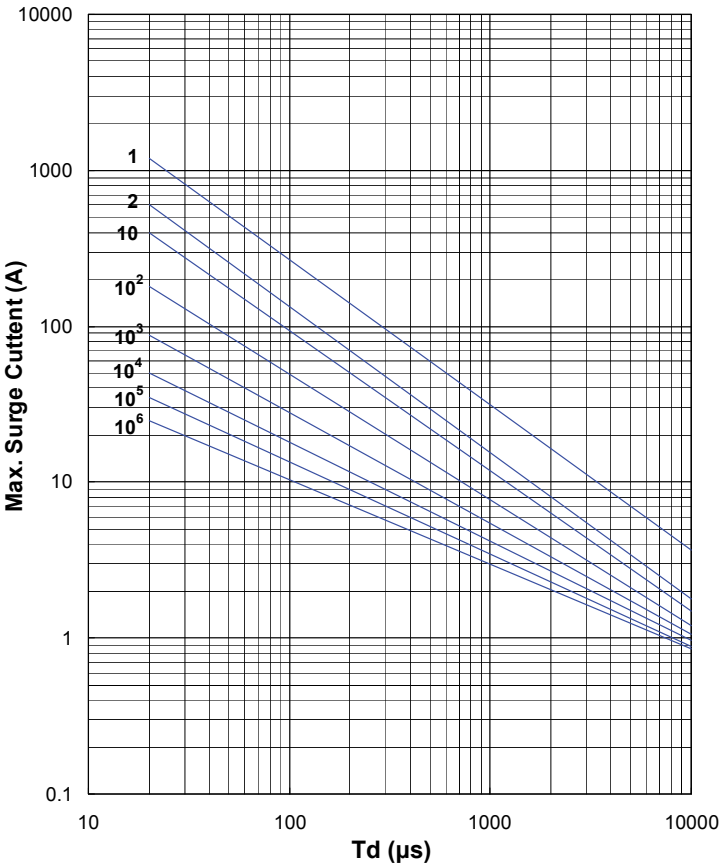


■ Max. Surge Current Derating Curves

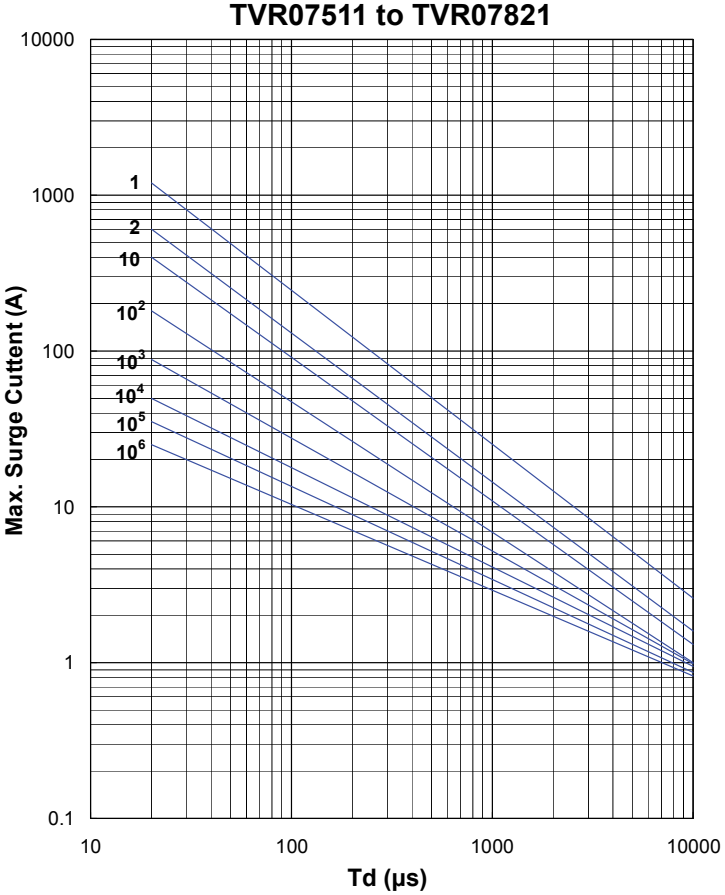
TVR07180 to TVR07680



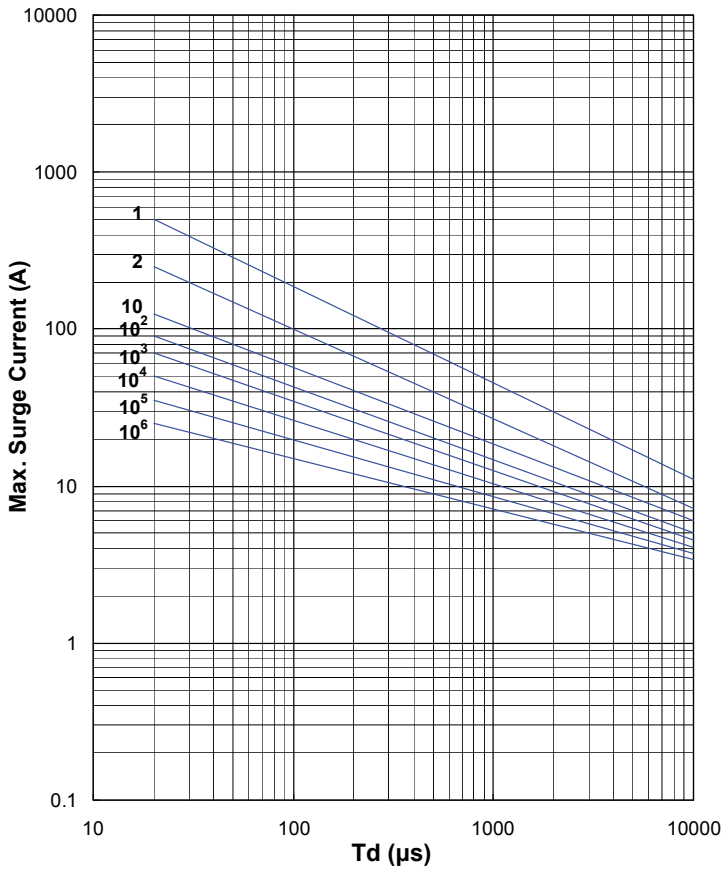
TVR07820 to TVR07471



TVR07511 to TVR07821

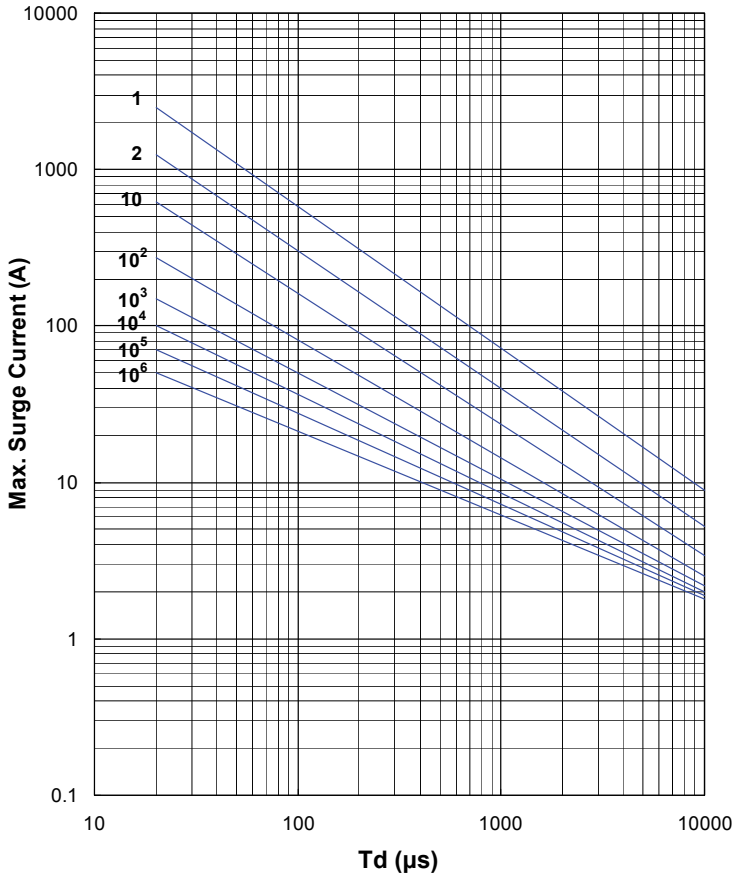


TVR10180 to TVR10680

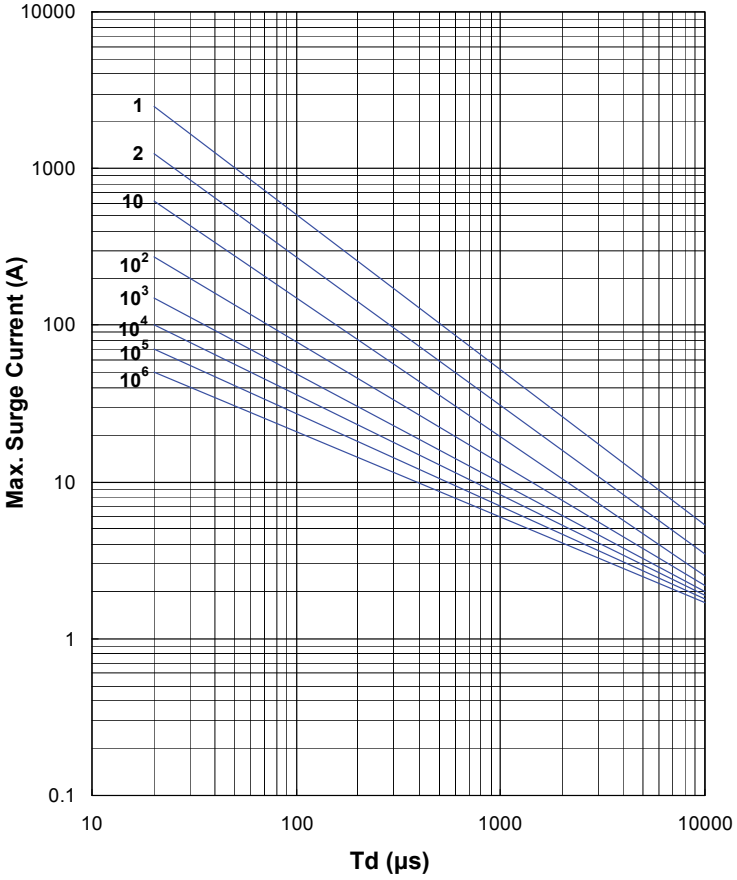


■ Max. Surge Current Derating Curves

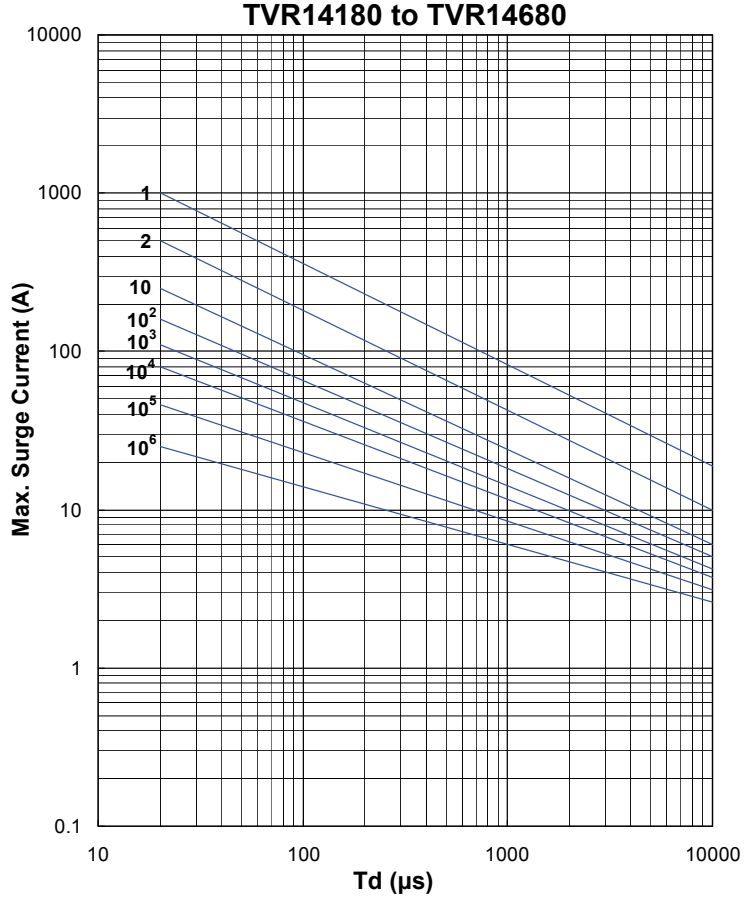
TVR10820 to TVR10751



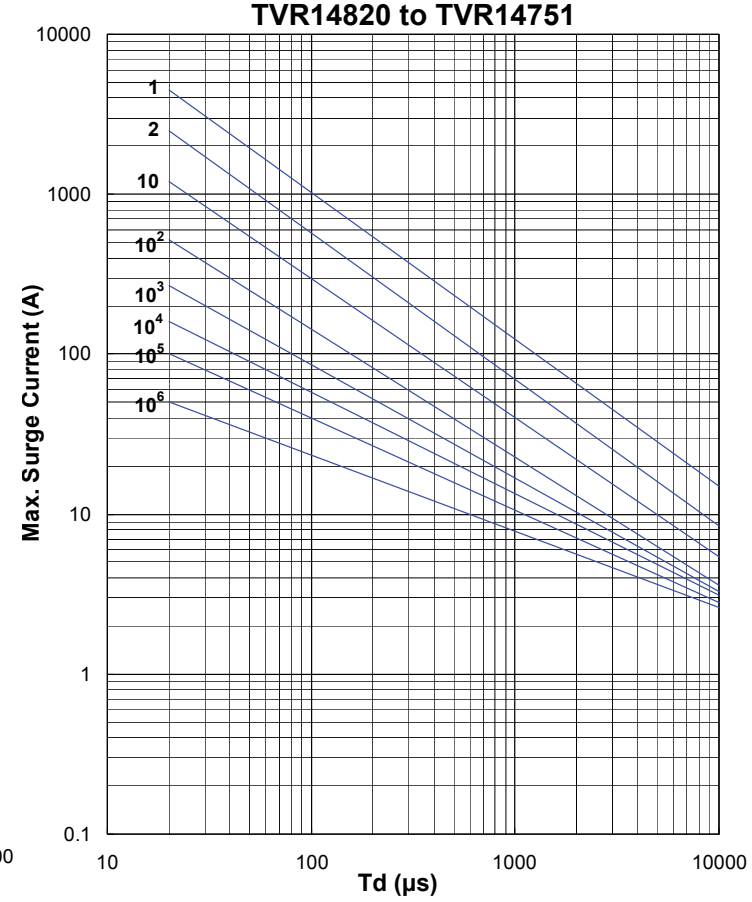
TVR10821 to TVR10182



TVR14180 to TVR14680

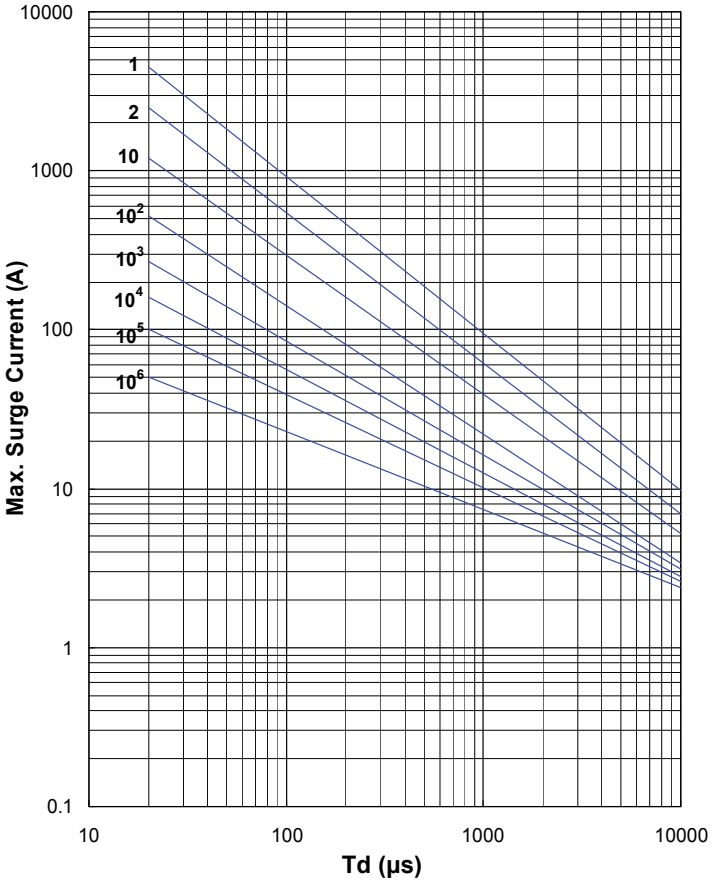


TVR14820 to TVR14751

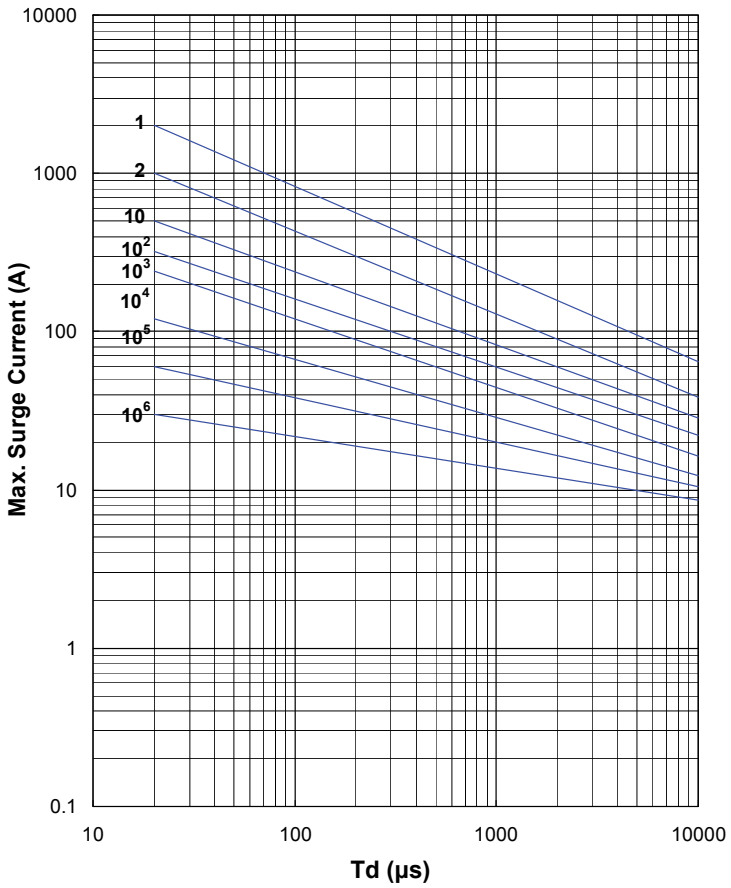


■ Max. Surge Current Derating Curves

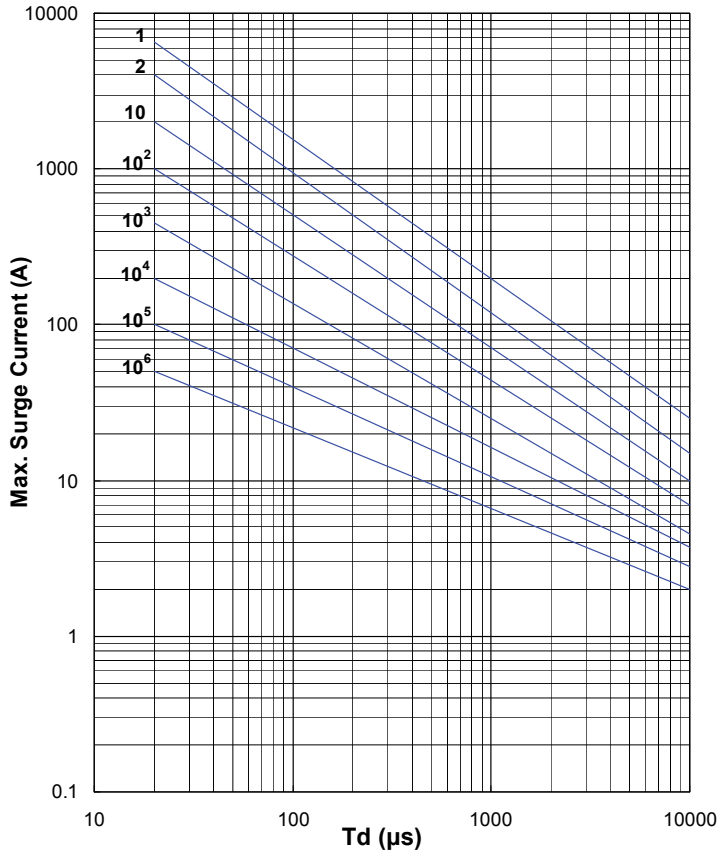
TVR14821 to TVR14182



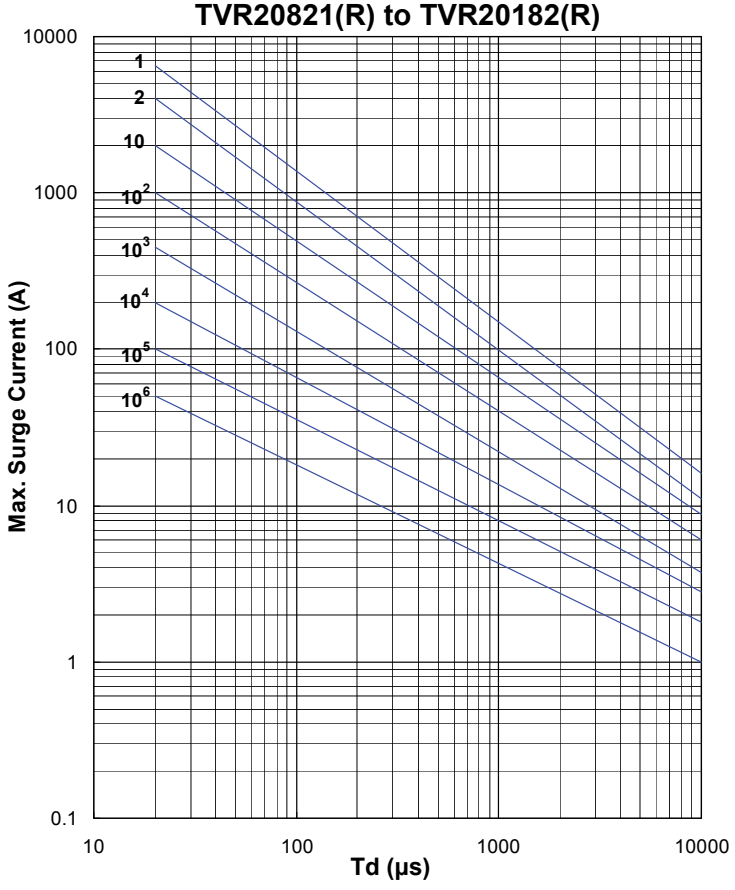
TVR20180 to TVR20680



TVR20820(R) to TVR20751(R)

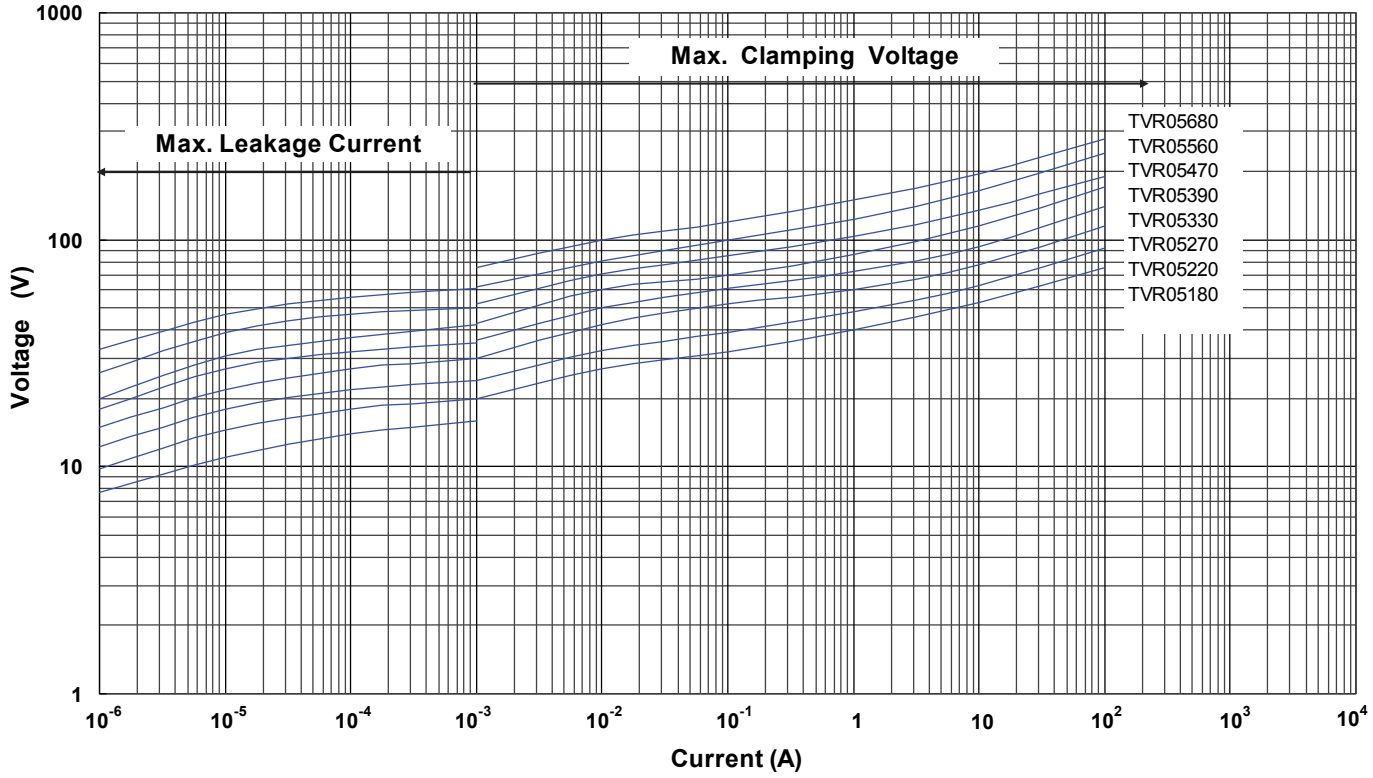


TVR20821(R) to TVR20182(R)

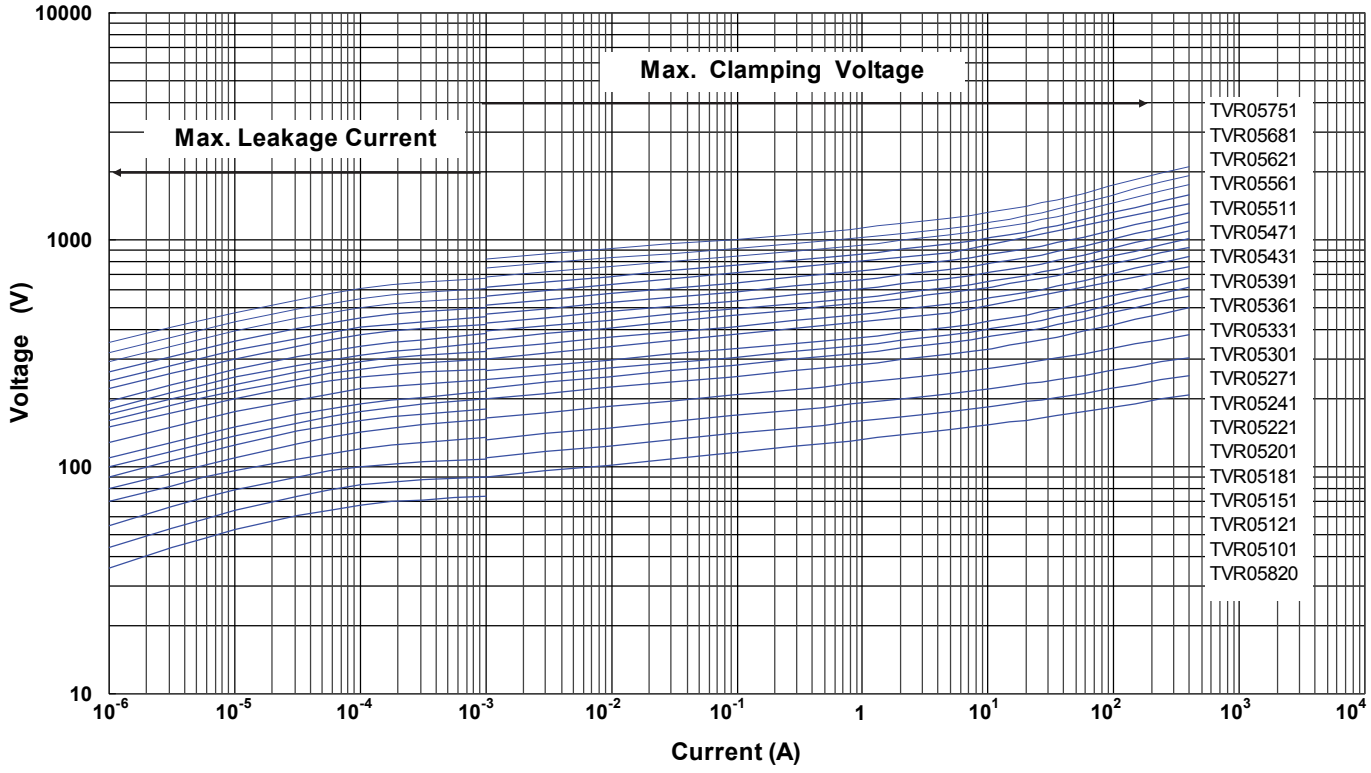


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR05180 to TVR05680)

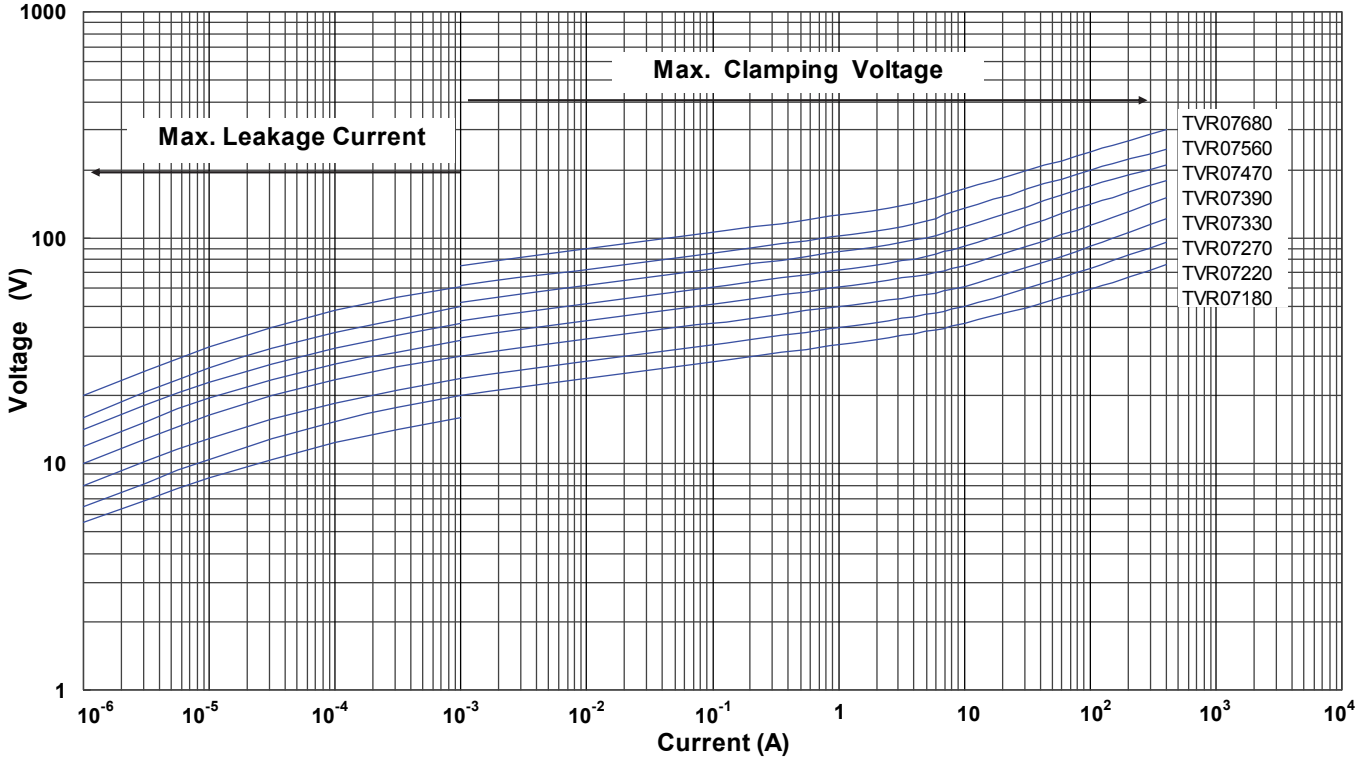


Max. Leakage Current and Max. Clamping Voltage Curves (TVR05820 to TVR05751)

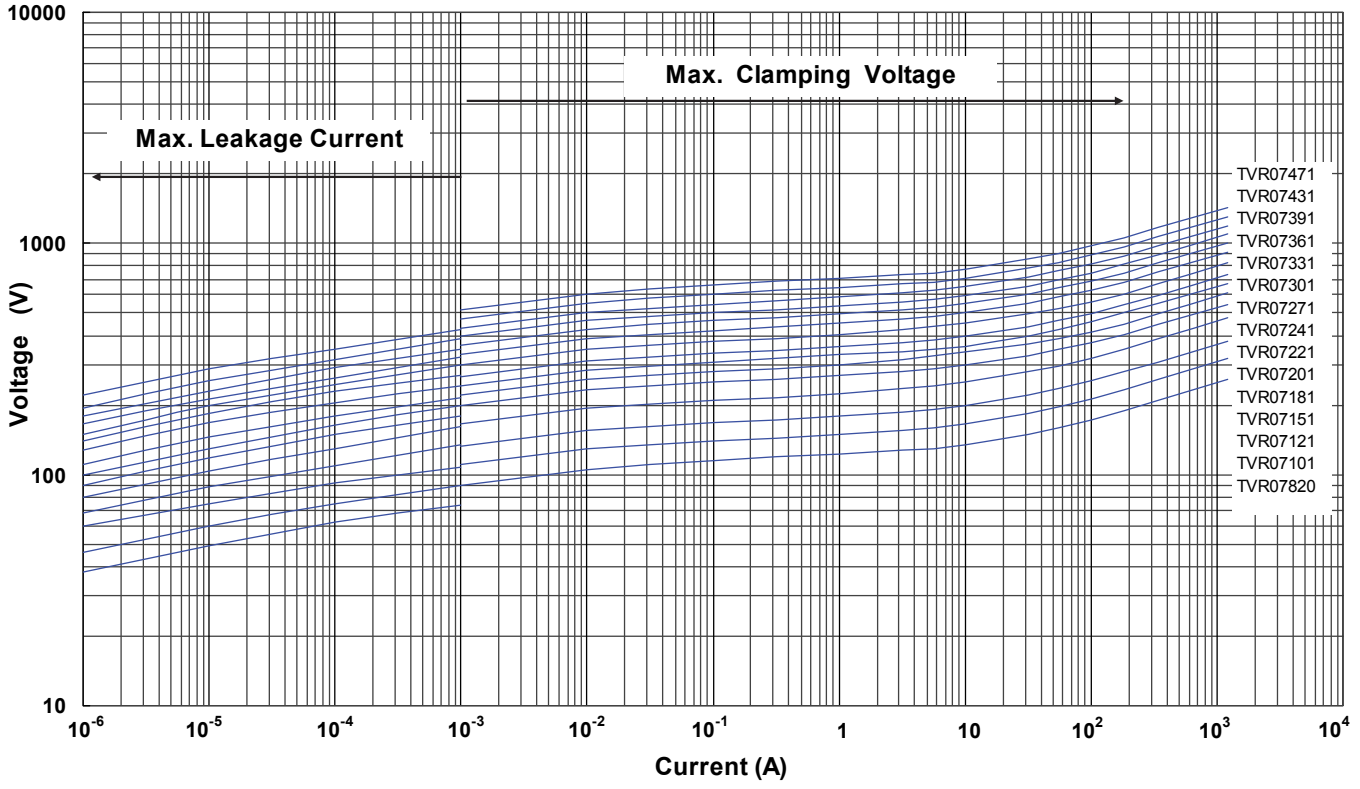


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR07180 to TVR07680)

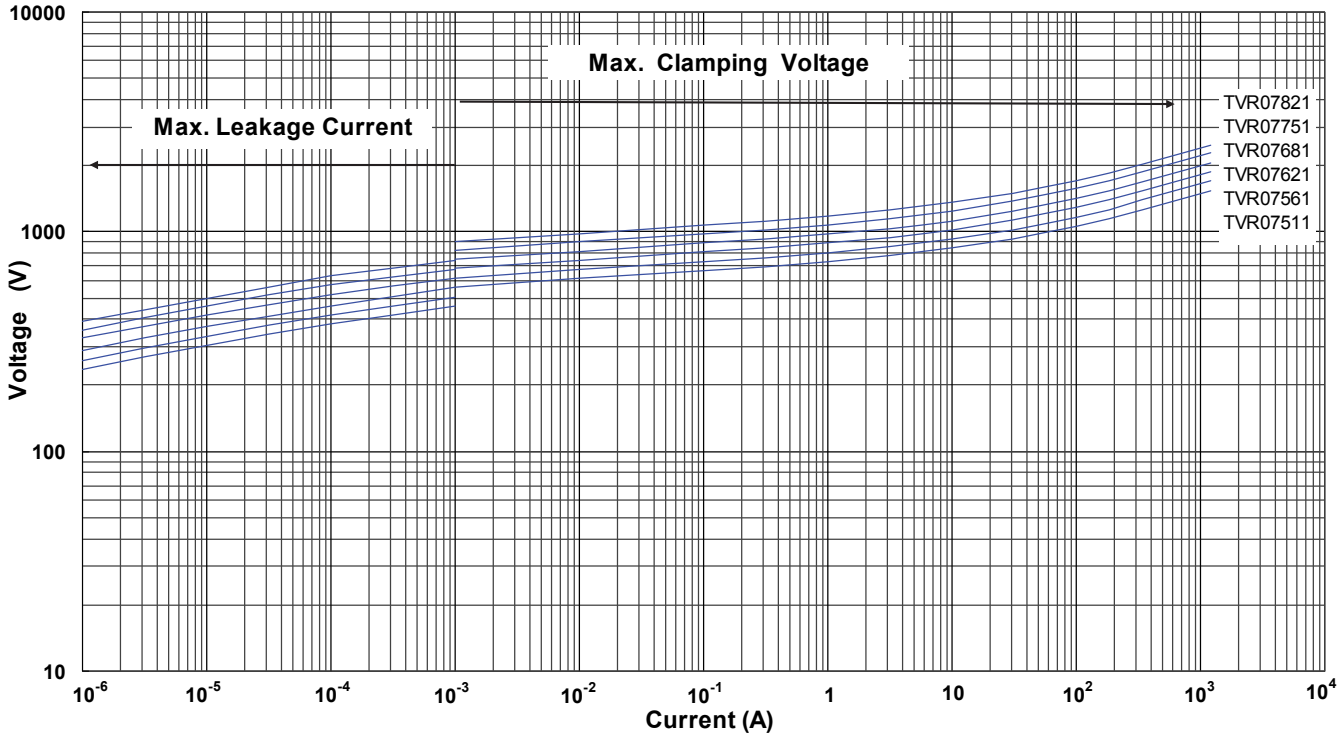


Max. Leakage Current and Max. Clamping Voltage Curves (TVR07820 to TVR07471)

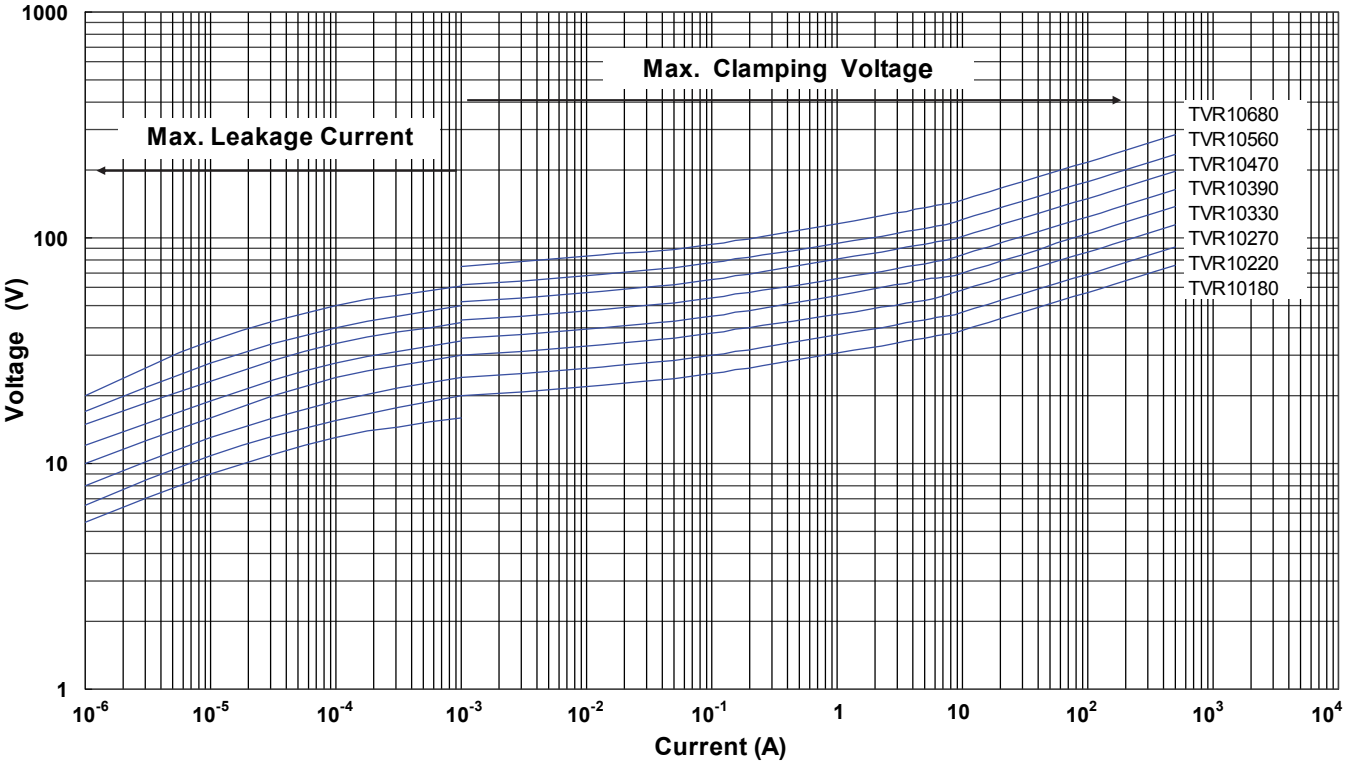


■ Max. Leakage Current and Max. Clamping Voltage Curves

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

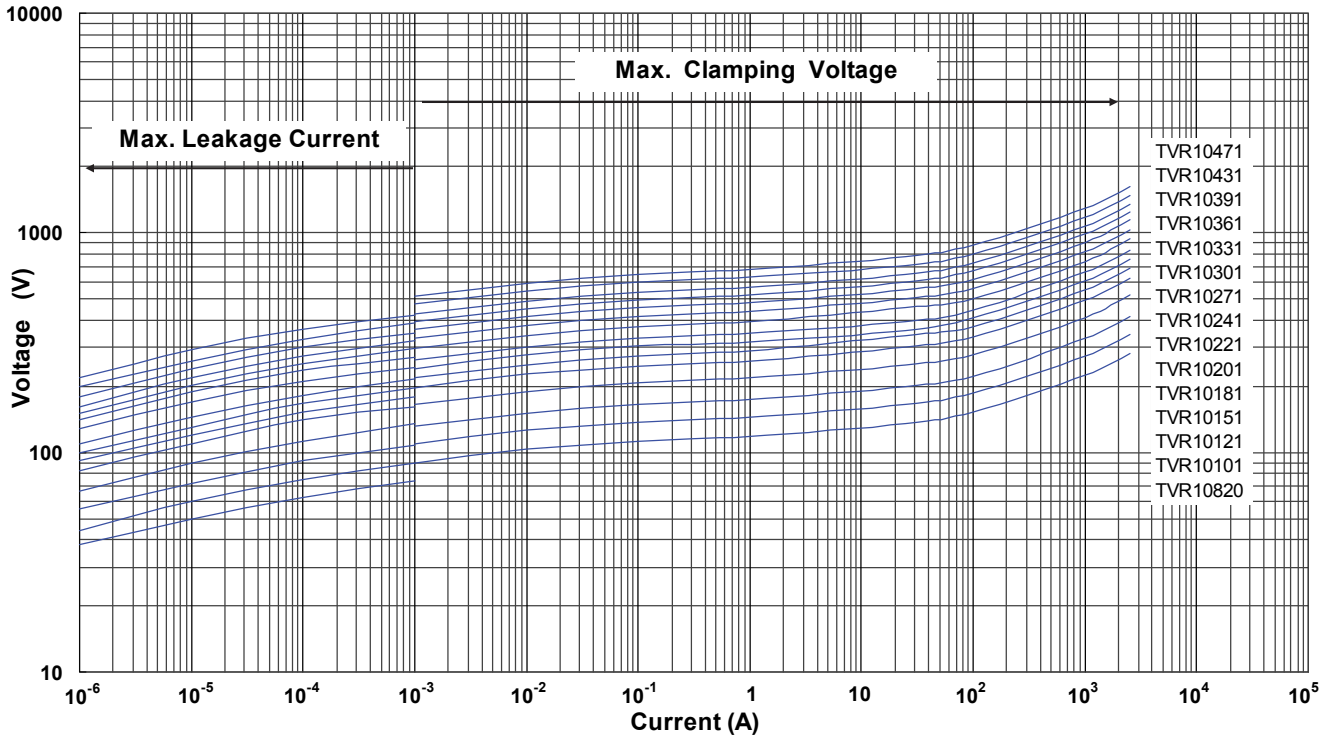


Max. Leakage Current and Max. Clamping Voltage Curves (TVR10180 to TVR10680)

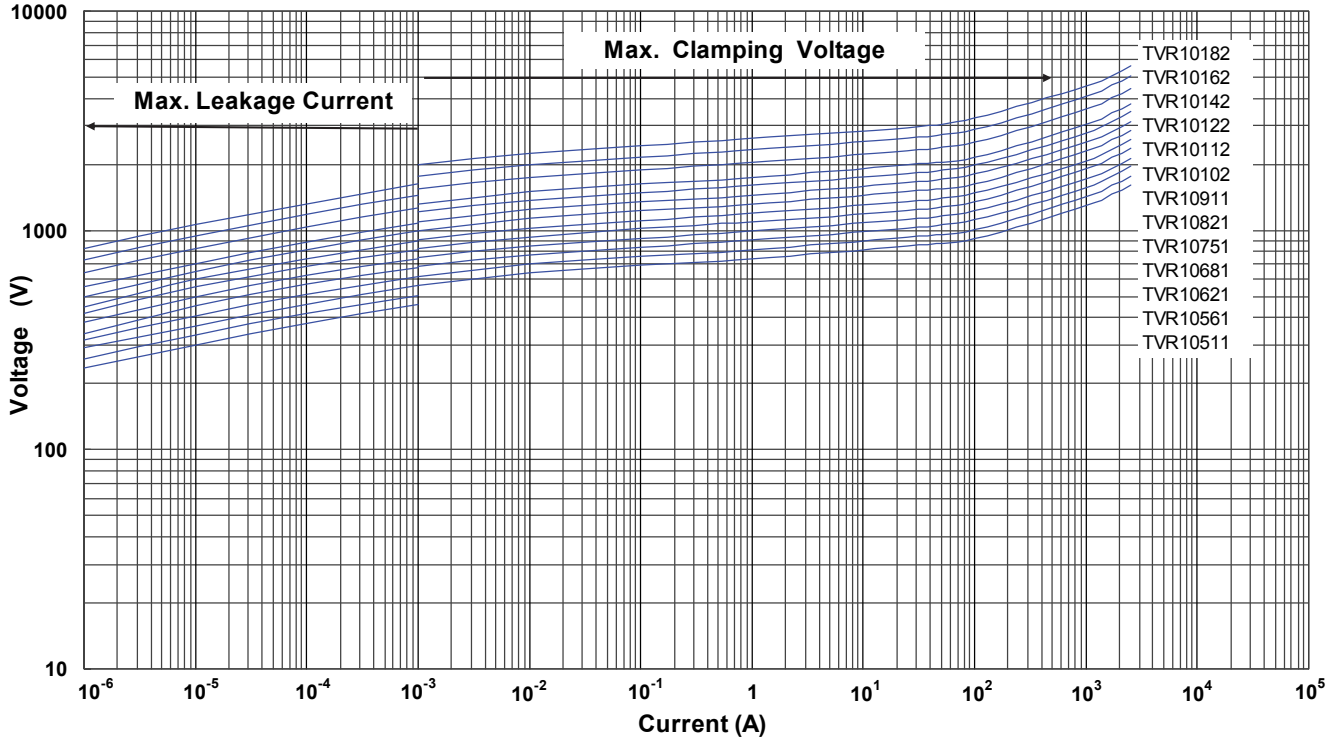


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR10820 to TVR10471)

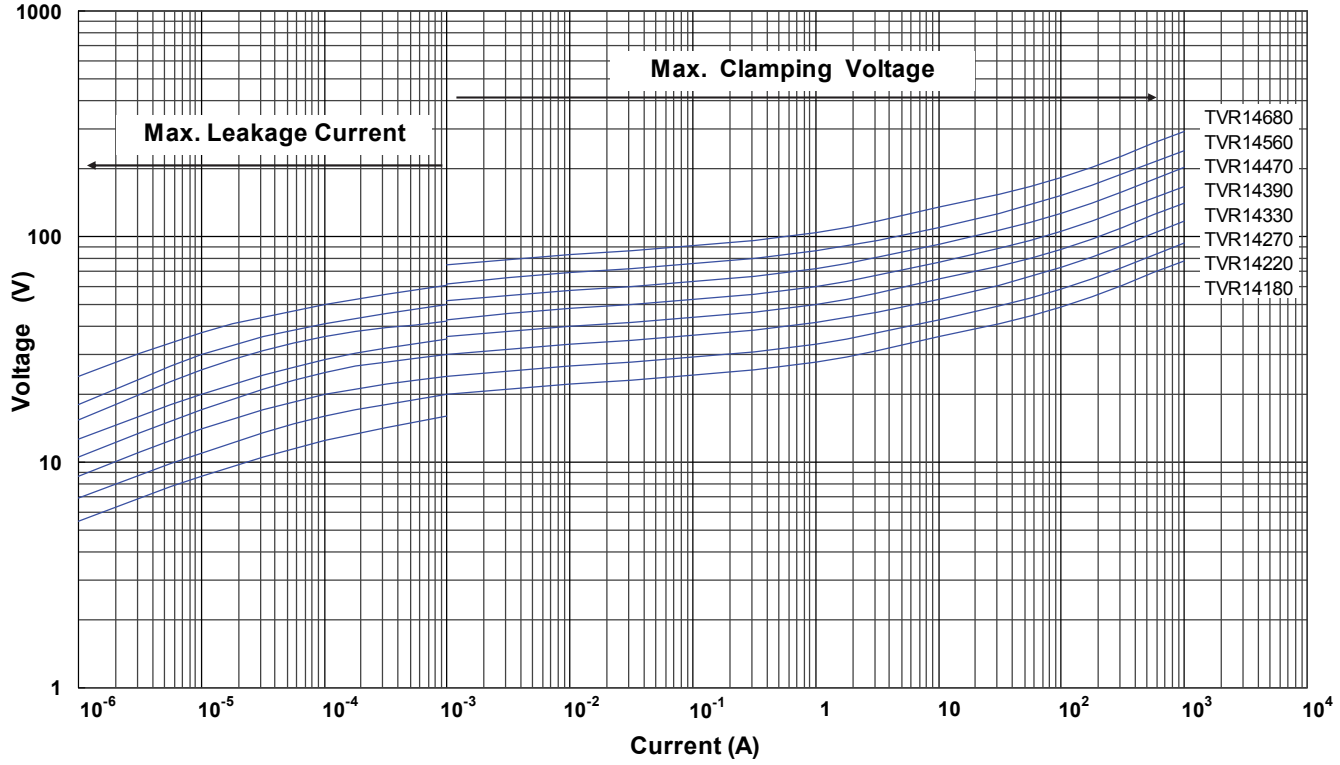


Max. Leakage Current and Max. Clamping Voltage Curves (TVR10511 to TVR10182)

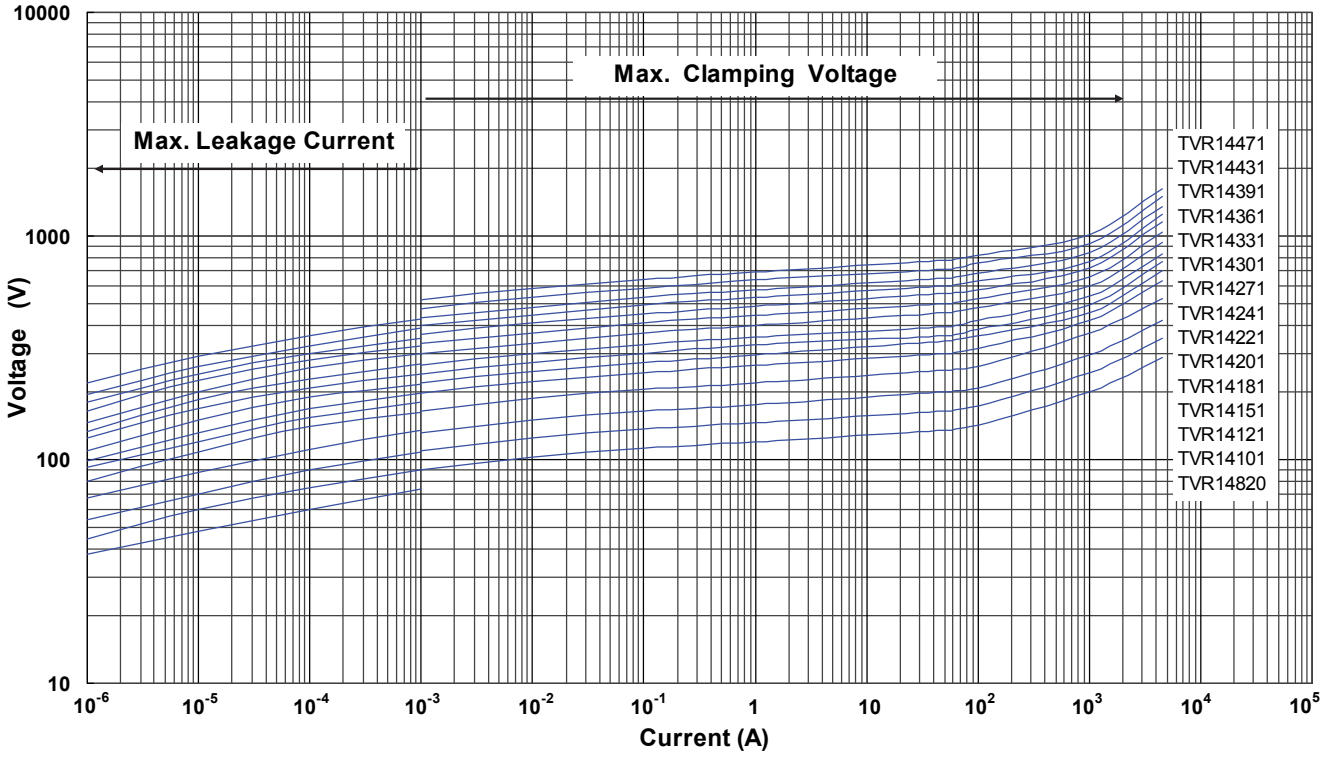


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR14180 to TVR14680)

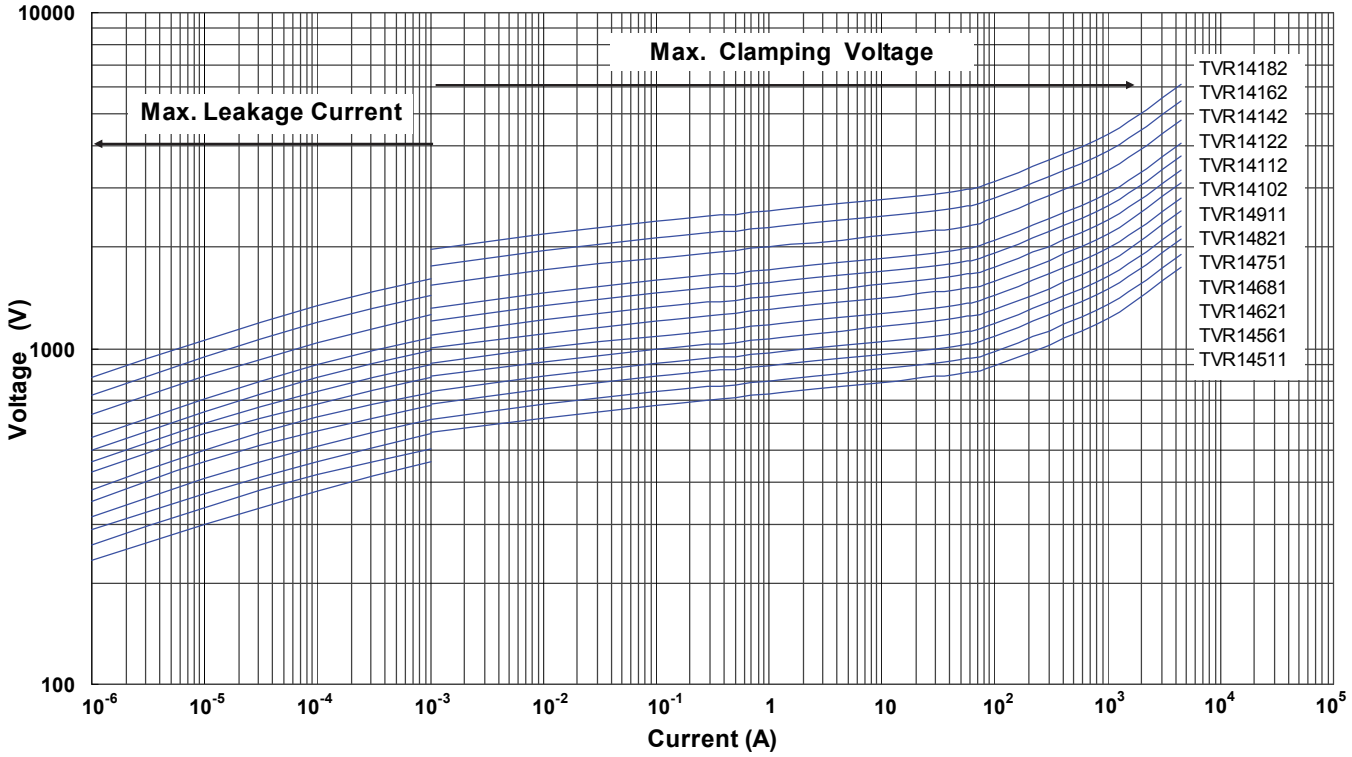


Max. Leakage Current and Max. Clamping Voltage Curves (TVR14820 to TVR14471)

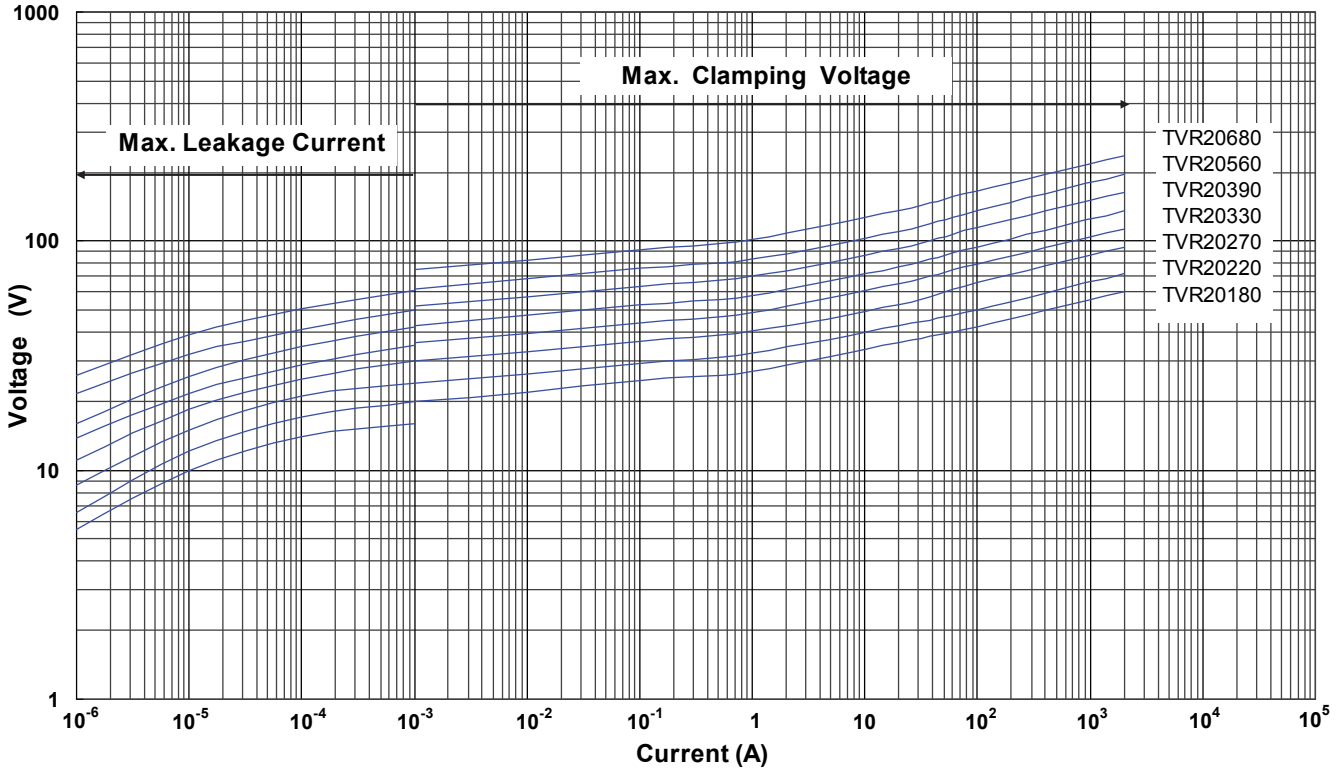


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR14511 to TVR14182)

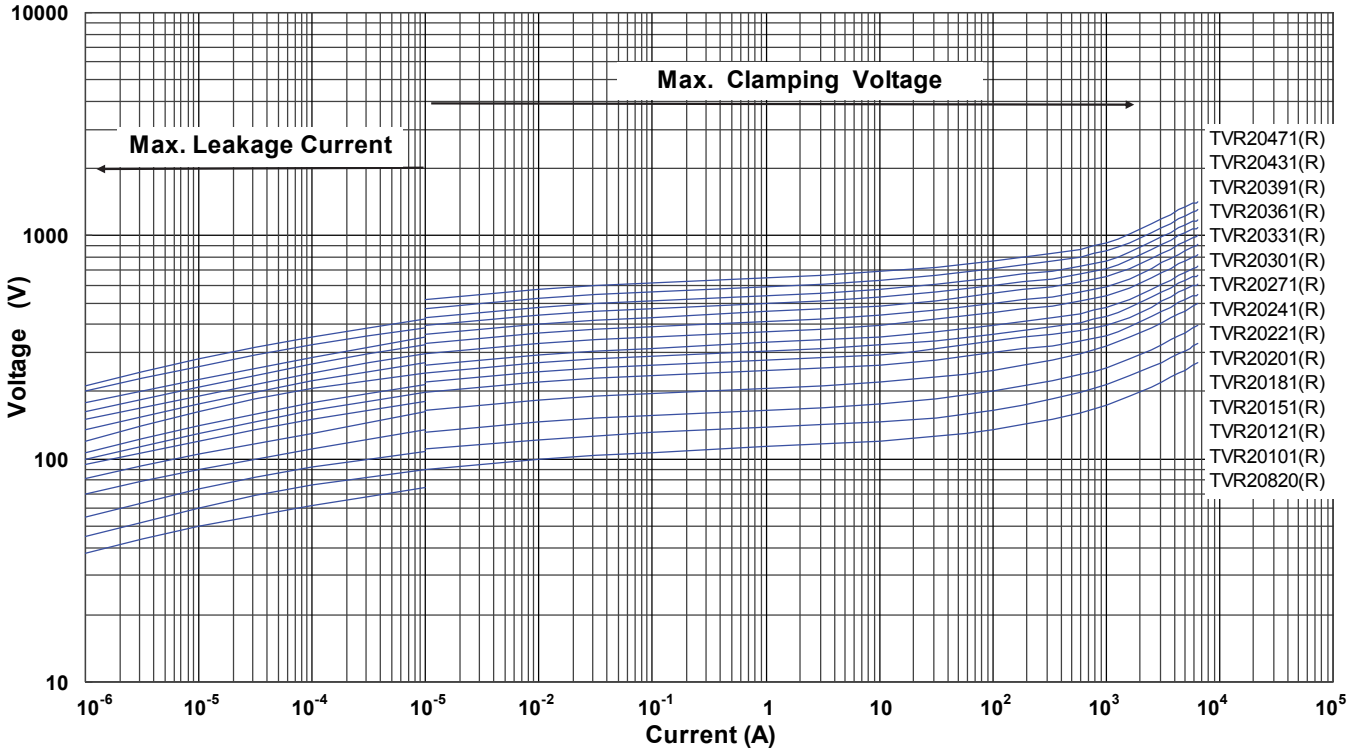


Max. Leakage Current and Max. Clamping Voltage Curves (TVR20180 to TVR20680)

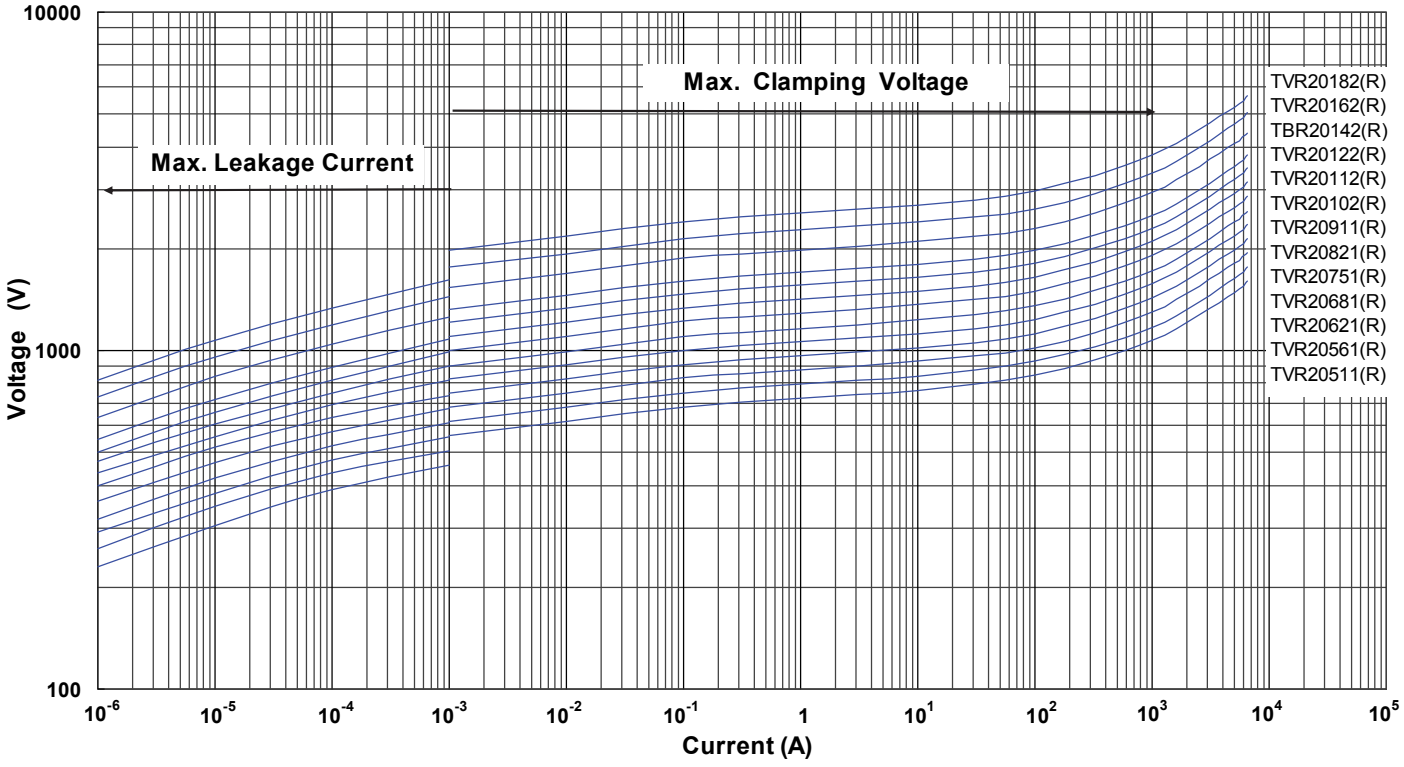


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR20820(R) to TVR20471(R))

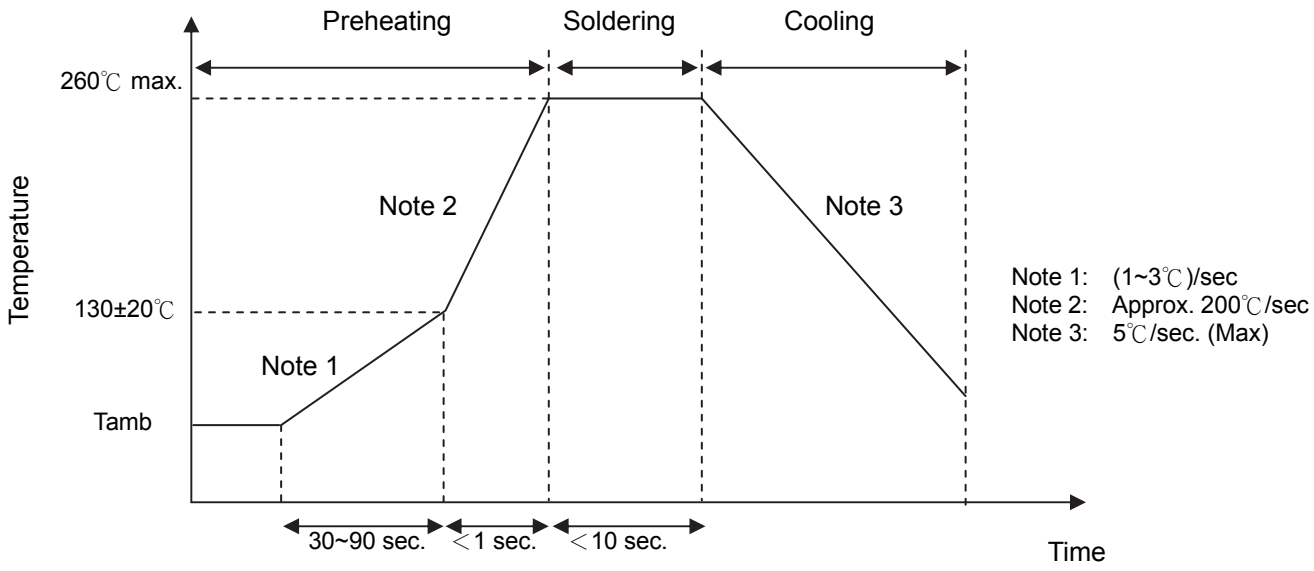


Max. Leakage Current and Max. Clamping Voltage Curves (TVR20511(R) to TVR20182(R))



■ 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.)

■ Reliability

Item	Standard	Test conditions / Methods	Specifications
Tensile Strength of Terminals	IEC60068-2-21	Gradually apply the specified force and keep the unit fixed for 10±1 sec. Terminal diameter (mm) / Force (Kg) 0.5<d≦0.8 : 1.0 0.8<d≦1.25 : 2.0	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage
Bending Strength of Terminals	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. Terminal diameter (mm) / Force (Kg) 0.5<d≦0.8 : 0.5 0.8<d≦1.25 : 1.0	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage
Vibration	IEC 60068-2-6	Frequency range: 10-55 Hz Amplitude: 0.75mm or 98 m/s^2 Direction: 3 mutually perpendicular directions, 2 hrs each	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage
Solderability	IEC 60068-2-20	245±3℃, 3±0.3 sec	At least 95% of terminal electrode is covered by new solder
Resistance to Soldering Heat	IEC 60068-2-20	260±3℃, 10±1 sec, (5±0.5 sec for TVR05)	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage
High Temperature Storage	IEC 60068-2-2	125±5℃ x 1000± 24 hrs	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage
Damp Heat, Steady State	IEC60068-2-78	a. 40±2℃, 90 ~ 95 % RH, 1344 hrs b. 40±2℃, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage Insulation Resistance ≧100MΩ
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles Step 1: -40±3 : 30±3 Step 2: Room temperature : 5±3 Step 3: 85±2 : 30±3 Step 4: Room temperature : 5±3	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 5\%$ No visible damage
High Temp. Load	MIL-STD-202 Method 108	85±2℃, 1000±24 hrs at V_{DC} or V_{rms} (Max. Continuous Voltage)	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$ No visible damage
8/20μs Surge Life	IEC 61051-1	8/20μs waveform, 10 surge currents, unipolar, interval 30 secs, amplitude corresponding to max. surge current derating curves for 20μs.	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$ No visible damage
10/1000μs Surge Life	IEC 61051-1	10/1000μs waveform, 10 surge currents, unipolar, interval 2mins, amplitude corresponding to max. surge current derating curves for 1000μs.	$\lvert \triangle V_{1mA}/V_{1mA} \rvert \leqq 10\%$ No visible damage
Operating Duty Cycle Test	UL 1449 3rd	6KV/3KA 1.2/50μs +8/20μs combination waveform with Vac(@ Deg 90) for 15 times. Interval time between tests is 60 secs. (For UL1449 3rd SPD Type 3 application test only)	$\lvert \triangle V_p / V_p \rvert \leqq 10\%$ No visible damage
Nominal Discharge Current Test	UL 1449 3rd	Refer to UL 1449 3rd item 37.7, the test condition is 3KA 8/20μs surge current waveform for 15 times (For TVR20R UL1449 3rd SPD Type 2 application test only)	$\lvert \triangle V_p / V_p \rvert \leqq 10\%$ No visible damage
Voltage Proof	IEC 61051-1	Metal balls method, 2500 Vac 1 min	No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA@85℃} - V_{1mA@25℃}}{V_{1mA@25℃}} \times \frac{1}{60} \times 100\%(\%/°C)$, $\frac{V_{1mA@-40℃} - V_{1mA@25℃}}{V_{1mA@25℃}} \times \frac{1}{65} \times 100\%(\%/°C)$	-0.05≦TC≦0.05 (%/℃)

■ Packaging

● Taping Specification

S Type (Straight Lead)

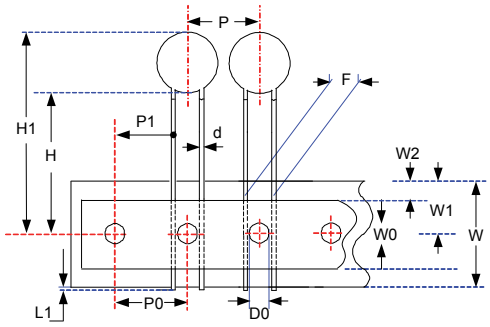


Figure A

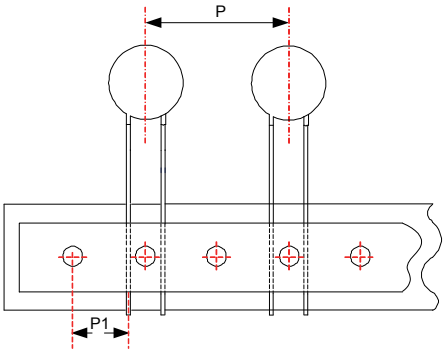


Figure B

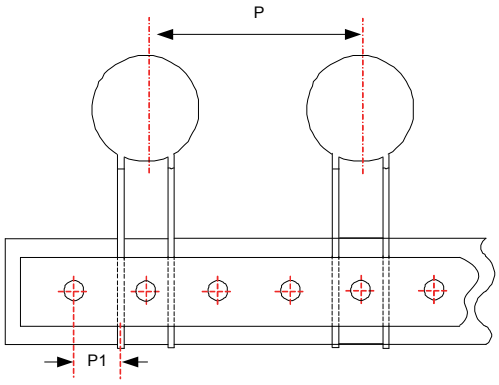


Figure C

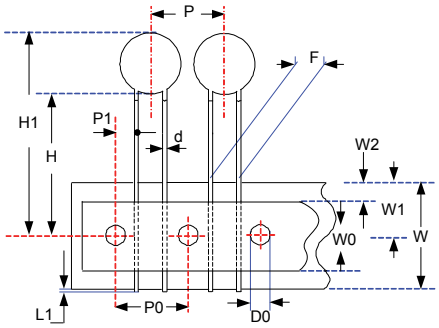


Figure D

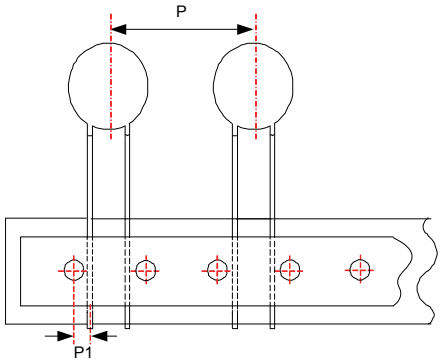
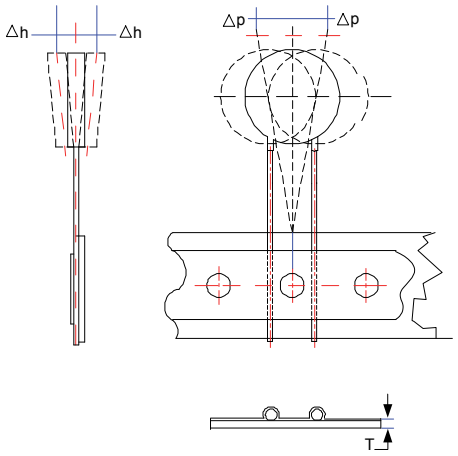


Figure E



(Unit: mm)

Taping Code	Body Size	P_0	F	P	P_1	H	H_1	d	W_0	W_1	W_2	W	△P	△h	L_1	D_0	T	Figure
		±0.3	±1	±1	±0.7	+2/-0	Max.	±0.02	±1	+0.75/ -0.5	Max	+1/ -0.5	Max.	Max.	Max.	±0.2	±0.2	
A (P_0:12.7)	05	12.7	5.0	12.7	3.85	18	28.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	07	12.7	5.0	12.7	3.85	18	30.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	10	12.7	7.5	12.7	8.95	18	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14	12.7	7.5	25.4	8.95	18	38.0	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	20	12.7	7.5	25.4	8.95	18	40.5	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	20	12.7	10	38.1	7.70	18	40.5	1.0	12	9	3	18	1	2	0.5	4	0.6	C
E (P_0:15.0)	05	15	5.0	15.0	5.00	18	28.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	07	15	5.0	15.0	5.00	18	30.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	10	15	7.5	15.0	3.75	18	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	D
	14	15	7.5	30.0	3.75	18	38.0	0.8	12	9	3	18	1	2	0.5	4	0.6	E
	20	15	7.5	30.0	3.75	18	40.5	0.8	12	9	3	18	1	2	0.5	4	0.6	E

F Type (Y Kink Lead)

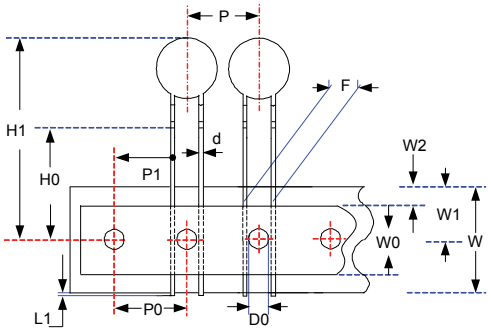


Figure A

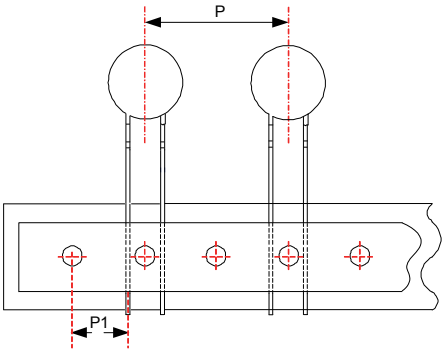


Figure B

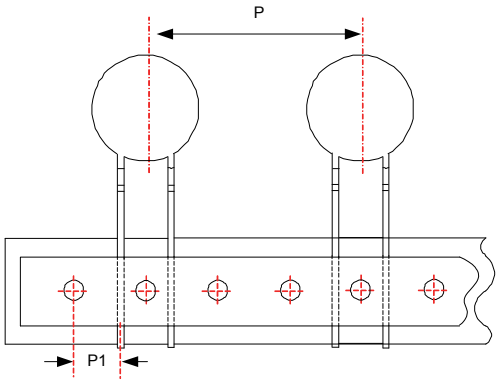


Figure C

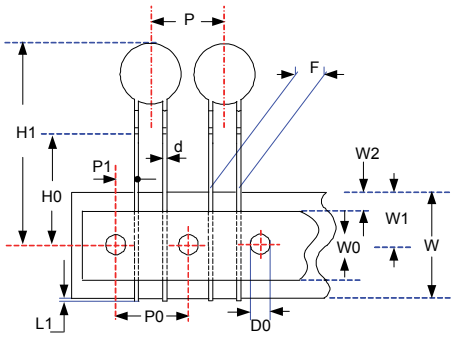


Figure D

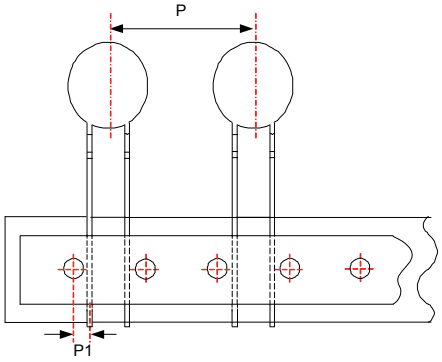
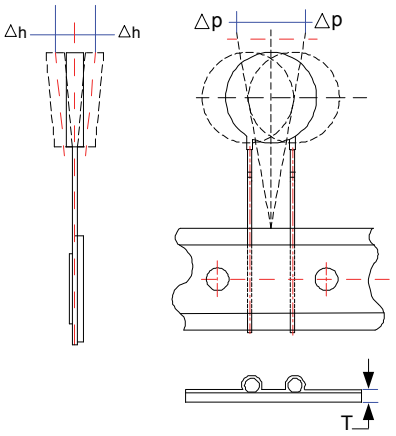


Figure E



(Unit: mm)

Taping Code	Body Size	P_0	F	P	P_1	H_0	H_1	d	W_0	W_1	W_2	W	△P	△h	L_1	D_0	T	Figure
		±0.3	±1	±1	±0.7	±0.5	Max.	±0.02	±1	+0.75/ -0.5	Max	+1/ -0.5	Max.	Max.	Max.	±0.2	±0.2	
A (P_0:12.7)	05	12.7	5.0	12.7	3.85	16	28.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	07	12.7	5.0	12.7	3.85	16	30.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	10	12.7	7.5	12.7	8.95	16	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14	12.7	7.5	25.4	8.95	16	38.0	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	20	12.7	7.5	25.4	8.95	16	40.5	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	20	12.7	10	38.1	7.70	16	40.5	1.0	12	9	3	18	1	2	0.5	4	0.6	C
E (P_0:15.0)	05	15	5.0	15.0	5.00	16	28.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	07	15	5.0	15.0	5.00	16	30.0	0.6	12	9	3	18	1	2	0.5	4	0.6	D
	10	15	7.5	15.0	3.75	16	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	D
	14	15	7.5	30.0	3.75	16	38.0	0.8	12	9	3	18	1	2	0.5	4	0.6	E
	20	15	7.5	30.0	3.75	16	40.5	0.8	12	9	3	18	1	2	0.5	4	0.6	E

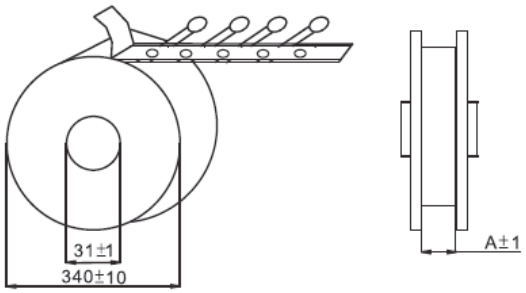
■ Quantity

● Bulk Packing

Series	Straight Lead Type Quantity (pcs/bag)	Cut Lead Type Quantity (pcs/bag)	Kink Type Quantity (pcs/bag)
TVR05	250	250	---
TVR07	250	250	200
TVR10	200	200	200
TVR14	100	100	100
TVR20	50	50	50

● Reel Packing

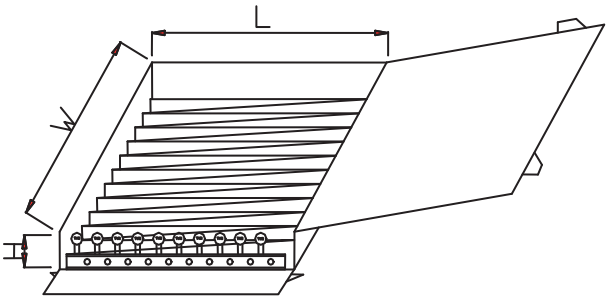
Series	A (mm)	Quantity (pcs/reel)
TVR05(180~391)	46	1,500
TVR05(431~751)		1,000
TVR07(180~391)		1,500
TVR07(431~821)		1,000
TVR10(180~911)		1,000
TVR10(102~112)		750
TVR10(122~182)		500
TVR14(180~470)		1,000
TVR14(560~391)		750
TVR14(431~182)		500
TVR20(180~681)	55	500
TVR20(751~182)		250



(Unit: mm)

- **Ammo Packing**

Series	Quantity (pcs/box)
TVR05(180~391)	1,000
TVR05(431~471)	1,200
TVR05(511~751)	1,000
TVR07(180~821)	1,000
TVR10(180~361)	750
TVR10(391~621)	500
TVR10(681~112)	400
TVR10(122~182)	200
TVR14(180~271)	500
TVR14(301~112)	250
TVR14(122~182)	200
TVR20(180~112)	250
TVR20(122~182)	200



(Unit: mm)

Series	W±5	L±5	H±5
TVR05 ~ TVR20	348	185	60
	348	275	60

■ 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