Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

■ Features

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

■ Recommended Applications

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

■ 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

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%

Internal Control Code
0001~ZZZZ

Optional Suffix	
Y	RoHS compliant
F	RoHS compliant & Halogen-Free
R	UL 1449 3RD TYPE 2 application (TVR20 only)

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

Packaging	
A	Tape (hole pitch:12.7mm)
E	Tape (hole pitch:15.0mm)
B	Tape + ammo box packing
R	Tape + reel packing
C	Bulk + cut lead (followed by the codes of 2 leaded length
Blank	Bulk

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

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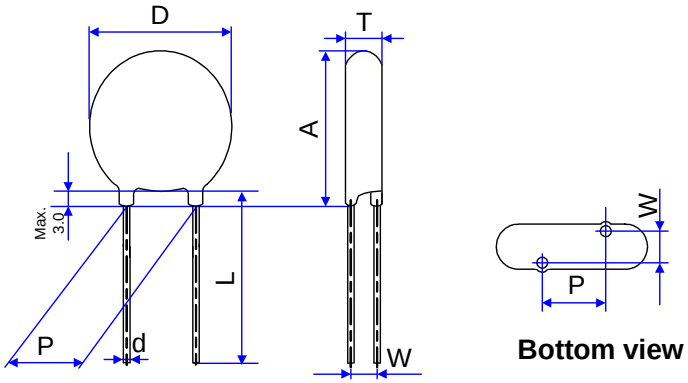
Disc Type Varistor for Surge Protection

■ Structures and Dimensions

● S Type (Straight lead)



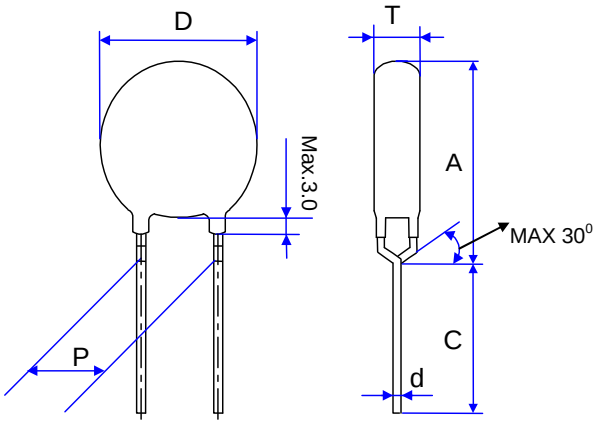
(Unit: mm)

Disc Size	D max.	L min.	d	P	A max.	T max.	W
05	5.0~7.0	26.5	0.6±0.02	5±1	9.0	Please refer to the Electrical Characteristics Table	
07	6.5~9.0	26.5	0.6±0.02	5±1	11.0 (for TVR07180~621) 11.5 (for TVR07681~821)		
10	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)		
14	13.5~16.0	26.5	0.8±0.02	7.5±1	18.5 (for TVR14180-511) 19.0 (for TVR14561-112) 20.0 (for TVR14122-182)		
20	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)		

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

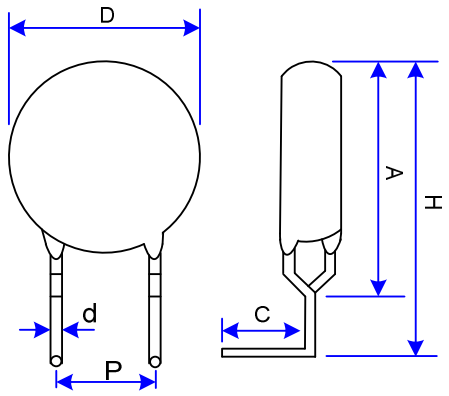
- F Type (Y kink lead)



(Unit :mm)

Disc Size	D max.	C min.	d	P	A max.	Tmax.
05	5.0~7.0	25	0.6±0.02	5±1	9.5	Please refer to the Electrical Characteristics Table
07	6.5~9.0	25	0.6±0.02	5±1	11.5	
10	9.5~12.5 9.5~13.5 (for TVR10182)	25	0.8±0.02	7.5±1	16	
14	13.5 ~16.0	25	0.8±0.02	7.5±1	19	
20	19.5~22	20	1.0±0.02	10±1	26.5	

- J Type (L kink lead)



Disc Size	Dmax.	C	d	P	Amax.	Hmax.	T max.
10	12.0	4.0±1	0.8±0.02	7.5±1	16.0	20.0	Please refer to the Electrical Characteristics Table
14	16.0		0.8±0.02	7.5±1	19.5	23.5	

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

- **Electrical Characteristics**

05mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL1449 3rd SPD TYPE
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	Ip	V_P	Imax	W	E	Cp	Tmin	Tmax.	W ±1.0	
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)	(PF)	(mm)			
TVR05180	18 (14.4～21.6)	11	14	1.0	40	100	0.01	0.4	1300	2.3	3.9	1.5	4
TVR05220	22 (18.7～26.0)	14	18	1.0	48	100	0.01	0.5	1000	2.4	4.1	1.5	4
TVR05270	27 (23.0～31.1)	17	22	1.0	60	100	0.01	0.6	850	2.6	4.3	1.5	4
TVR05330	33 (30～36)	20	26	1.0	73	100	0.01	0.8	700	2.9	4.5	1.5	4
TVR05390	39 (35～43)	25	31	1.0	86	100	0.01	0.9	600	2.9	4.5	1.5	4
TVR05470	47 (42～52)	30	38	1.0	104	100	0.01	1.1	500	2.5	4.1	1.5	4
TVR05560	56 (50～62)	35	45	1.0	123	100	0.01	1.3	400	2.7	4.3	1.5	4
TVR05680	68 (61～75)	40	56	1.0	150	100	0.01	1.6	330	2.9	4.6	1.5	4
TVR05820	82 (74～90)	50	65	5.0	145	400	0.1	2.5	250	2.2	3.9	1.5	4
TVR05101	100 (90～110)	60	85	5.0	175	400	0.1	3.0	230	2.4	4.1	1.6	4
TVR05121	120 (108～132)	75	100	5.0	210	400	0.1	4.0	210	2.5	4.3	1.8	4
TVR05151	150 (135～165)	95	125	5.0	260	400	0.1	4.8	190	2.0	4.6	1.6	4
TVR05181	180 (162～198)	115	150	5.0	315	400	0.1	5.9	70	2.0	3.9	1.4	4
TVR05201	200 (180～220)	130	170	5.0	355	400	0.1	6.5	65	2.1	4.0	1.5	4
TVR05221	220 (198～242)	140	180	5.0	380	400	0.1	7.0	60	2.1	4.0	1.5	4
TVR05241	240 (216～264)	150	200	5.0	415	400	0.1	8.0	55	2.3	4.2	1.6	4
TVR05271	270 (243～297)	175	225	5.0	475	400	0.1	8.5	50	2.4	4.4	1.7	4
TVR05301	300 (270～330)	195	250	5.0	525	400	0.1	8.5	50	2.7	4.4	1.9	4
TVR05331	330 (297～363)	215	275	5.0	585	400	0.1	9.2	45	2.8	4.5	2.0	4
TVR05361	360 (324～396)	230	300	5.0	620	400	0.1	10	45	2.9	4.6	2.1	4
TVR05391	390 (351～429)	250	320	5.0	675	400	0.1	12	40	3.1	4.8	2.3	4
TVR05431	430 (387～473)	275	350	5.0	745	400	0.1	13	35	3.0	5.1	2.3	4
TVR05471	470 (423～517)	300	385	5.0	810	400	0.1	15	30	3.2	5.2	2.4	4
TVR05511	510 (459～561)	320	410	5.0	878	400	0.1	16	30	3.4	5.4	2.6	4
TVR05561	560 (504～616)	350	450	5.0	962	400	0.1	18	30	3.6	5.5	2.8	4
TVR05621	620 (558～682)	395	510	5.0	1050	400	0.1	18	25	3.9	5.9	3.0	4
TVR05681	680 (612～748)	420	560	5.0	1120	400	0.1	18	20	4.1	6.2	3.2	4
TVR05751	750 (675～825)	460	615	5.0	1240	400	0.1	18	20	4.4	6.4	3.5	4

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

07mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL1449 3rd SPD TYPE
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	Ip	V_P	Imax	W	E	Cp	Tmin	Tmax.	W ±1.0	
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)	(PF)	(mm)			
TVR07180	18 (14.4～21.6)	11	14	2.5	36	250	0.02	0.9	2400	2.3	3.9	1.3	4
TVR07220	22 (18.7～26.0)	14	18	2.5	43	250	0.02	1.1	2000	2.4	4.1	1.4	4
TVR07270	27 (23.0～31.1)	17	22	2.5	53	250	0.02	1.4	1600	2.6	4.3	1.5	4
TVR07330	33 (30～36)	20	26	2.5	65	250	0.02	1.7	1300	2.9	4.5	1.7	4
TVR07390	39 (35～43)	25	31	2.5	77	250	0.02	2.1	1200	2.9	4.5	1.8	4
TVR07470	47 (42～52)	30	38	2.5	93	250	0.02	2.5	1100	2.5	4.1	1.9	4
TVR07560	56 (50～62)	35	45	2.5	110	250	0.02	3.1	1000	2.7	4.3	2.0	4
TVR07680	68 (61～75)	40	56	2.5	135	250	0.02	3.6	850	2.9	4.6	2.1	4
TVR07820	82 (74～90)	50	65	10	135	1200	0.25	5.5	460	2.2	3.9	1.5	4
TVR07101	100 (90～110)	60	85	10	165	1200	0.25	6.5	420	2.4	4.1	1.6	4
TVR07121	120 (108～132)	75	100	10	200	1200	0.25	7.8	380	2.5	4.3	1.8	4
TVR07151	150 (135～165)	95	125	10	250	1200	0.25	9.7	350	2.0	4.6	1.6	4
TVR07181	180 (162～198)	115	150	10	300	1200	0.25	11.7	155	2.0	3.9	1.4	4
TVR07201	200 (180～220)	130	170	10	340	1200	0.25	13	140	2.1	4.0	1.5	4
TVR07221	220 (198～242)	140	180	10	360	1200	0.25	14	130	2.1	4.0	1.5	4
TVR07241	240 (216～264)	150	200	10	395	1200	0.25	15	120	2.3	4.2	1.6	4
TVR07271	270 (243～297)	175	225	10	455	1200	0.25	18	110	2.4	4.4	1.7	4
TVR07301	300 (270～330)	195	250	10	500	1200	0.25	21	105	2.7	4.4	1.9	4
TVR07331	330 (297～363)	215	275	10	550	1200	0.25	23	100	2.8	4.5	2.0	4
TVR07361	360 (324～396)	230	300	10	595	1200	0.25	25	95	2.9	4.6	2.1	4
TVR07391	390 (351～429)	250	320	10	650	1200	0.25	25	85	3.1	4.8	2.3	4
TVR07431	430 (387～473)	275	350	10	710	1200	0.25	28	80	3.0	5.1	2.3	4
TVR07471	470 (423～517)	300	385	10	775	1200	0.25	30	70	3.2	5.2	2.4	4
TVR07511	510 (459～561)	320	410	10	845	1200	0.25	33	65	3.4	5.4	2.6	4
TVR07561	560 (504～616)	350	450	10	930	1200	0.25	33	60	3.6	5.5	2.8	4
TVR07621	620 (558～682)	395	510	10	1020	1200	0.25	35	55	3.9	5.9	3.0	4
TVR07681	680 (612～748)	420	560	10	1120	1200	0.25	35	50	4.1	6.2	3.2	4
TVR07751	750 (675～825)	465	615	10	1235	1200	0.25	38	45	4.4	6.4	3.5	4
TVR07821	820 (738～902)	510	670	10	1355	1200	0.25	42	40	4.5	6.4	3.2	4

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

10mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL1449 3rd SPD TYPE
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	Ip	V_P	max	W	E	Cp	Tmin	Tmax.	W ±1.0	
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)	(PF)	(mm)			
TVR10180	18 (14.4～21.6)	11	14	5.0	36	500	0.05	2.1	4500	2.7	4.3	1.3	4
TVR10220	22 (18.7～26.0)	14	18	5.0	43	500	0.05	2.5	3500	2.8	4.5	1.4	4
TVR10270	27 (23.0～31.1)	17	22	5.0	53	500	0.05	3.0	3000	3.0	4.7	1.5	4
TVR10330	33 (30～36)	20	26	5.0	65	500	0.05	4.0	2500	3.3	4.9	1.7	4
TVR10390	39 (35～43)	25	31	5.0	77	500	0.05	4.6	2000	3.4	5.1	1.8	4
TVR10470	47 (42～52)	30	38	5.0	93	500	0.05	5.5	1500	2.9	4.5	1.8	4
TVR10560	56 (50～62)	35	45	5.0	110	500	0.05	7.0	1350	3.1	4.7	1.9	4
TVR10680	68 (61～75)	40	56	5.0	135	500	0.05	8.2	1250	3.3	5.0	2.2	4
TVR10820	82 (74～90)	50	65	25	135	2500	0.4	12	1000	2.6	4.3	1.6	4
TVR10101	100 (90～110)	60	85	25	165	2500	0.4	15	920	2.8	4.5	1.8	4
TVR10121	120 (108～132)	75	100	25	200	2500	0.4	18	830	2.9	4.7	2.0	4
TVR10151	150 (135～165)	95	125	25	250	2500	0.4	22	760	2.4	5.0	1.8	4
TVR10181	180 (162～198)	115	150	25	300	2500	0.4	27	310	2.4	4.3	1.6	4
TVR10201	200 (180～220)	130	170	25	340	2500	0.4	30	290	2.5	4.4	1.7	4
TVR10221	220 (198～242)	140	180	25	360	2500	0.4	32	270	2.5	4.4	1.7	4
TVR10241	240 (216～264)	150	200	25	395	2500	0.4	35	240	2.7	4.6	1.8	4
TVR10271	270 (243～297)	175	225	25	455	2500	0.4	40	230	2.8	4.8	1.9	4
TVR10301	300 (270～330)	195	250	25	500	2500	0.4	40	210	3.1	4.8	2.1	4
TVR10331	330 (297～363)	215	275	25	550	2500	0.4	43	200	3.2	4.9	2.2	4
TVR10361	360 (324～396)	230	300	25	595	2500	0.4	47	190	3.3	5.0	2.3	4
TVR10391	390 (351～429)	250	320	25	650	2500	0.4	60	175	3.5	5.2	2.5	4
TVR10431	430 (387～473)	275	350	25	710	2500	0.4	65	160	3.4	5.5	2.5	4
TVR10471	470 (423～517)	300	385	25	775	2500	0.4	70	150	3.6	5.6	2.6	4
TVR10511	510 (459～561)	320	410	25	845	2500	0.4	70	130	3.8	5.8	2.8	4
TVR10561	560 (504～616)	350	450	25	930	2500	0.4	70	120	4.0	5.9	3.0	4
TVR10621	620 (558～682)	395	510	25	1020	2500	0.4	70	110	4.3	6.3	3.2	4
TVR10681	680 (612～748)	420	560	25	1120	2500	0.4	70	100	4.5	6.6	3.4	4
TVR10751	750 (675～825)	465	615	25	1235	2500	0.4	75	90	4.8	6.8	3.7	4
TVR10821	820 (738～902)	510	670	25	1355	2500	0.4	85	80	4.9	6.8	3.4	4
TVR10911	910 (819～1001)	550	745	25	1500	2500	0.4	93	70	5.3	7.2	3.7	4
TVR10102	1000 (900～1100)	625	825	25	1650	2500	0.4	102	65	5.7	7.5	4.0	4
TVR10112	1100 (990～1210)	680	895	25	1815	2500	0.4	115	60	5.8	8.0	4.3	4
TVR10122	1200 (1080-1320)	725	975	25	1980	2500	0.4	125	55	6.0	8.1	5.2	4
TVR10142	1400 (1260-1540)	820	1140	25	2300	2500	0.4	145	45	6.6	8.7	6.0	4
TVR10162	1600 (1440-1760)	910	1300	25	2630	2500	0.4	165	40	7.1	9.8	6.7	4
TVR10182	1800 (1620-1980)	1000	1465	25	2950	2500	0.4	185	35	7.8	10.3	7.4	4

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

14mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL1449 3rd SPD TYPE
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	Ip	V_P	Imax	W	E	Cp	Tmin	Tmax.	W ±1.0	
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)	(PF)	(mm)			
TVR14180	18(14.4～21.6)	11	14	10	36	1000	0.1	4.0	10000	2.7	4.3	1.3	4
TVR14220	22(18.7～26.0)	14	18	10	43	1000	0.1	5.0	8500	2.8	4.5	1.4	4
TVR14270	27(23.0～31.1)	17	22	10	53	1000	0.1	6.0	7000	3.0	4.7	1.5	4
TVR14330	33(30～36)	20	26	10	65	1000	0.1	7.5	6000	3.3	4.9	1.7	4
TVR14390	39(35～43)	25	31	10	77	1000	0.1	8.6	4800	3.4	5.1	1.8	4
TVR14470	47(42～52)	30	38	10	93	1000	0.1	10	3800	2.9	4.5	1.8	4
TVR14560	56(50～62)	35	45	10	110	1000	0.1	11	3300	3.1	4.7	1.9	4
TVR14680	68(61～75)	40	56	10	135	1000	0.1	14	2700	3.3	5.0	2.2	4
TVR14820	82(74～90)	50	65	50	135	4500	0.6	22	2100	2.6	4.3	1.6	3
TVR14101	100(90～110)	60	85	50	165	4500	0.6	28	1900	2.8	4.5	1.8	3
TVR14121	120(108～132)	75	100	50	200	4500	0.6	32	1700	2.9	4.7	2.0	3
TVR14151	150(135～165)	95	125	50	250	4500	0.6	40	940	2.4	5.0	1.8	3
TVR14181	180(162～198)	115	150	50	300	4500	0.6	52	800	2.4	4.3	1.6	3
TVR14201	200(180～220)	130	170	50	340	4500	0.6	57	700	2.5	4.4	1.7	3
TVR14221	220(198～242)	140	180	50	360	4500	0.6	60	640	2.5	4.4	1.7	3
TVR14241	240(216～264)	150	200	50	395	4500	0.6	63	580	2.7	4.6	1.8	3
TVR14271	270(243～297)	175	225	50	455	4500	0.6	70	520	2.8	4.8	1.9	3
TVR14301	300(270～330)	195	250	50	500	4500	0.6	78	480	3.1	4.8	2.1	3
TVR14331	330(297～363)	215	275	50	550	4500	0.6	85	450	3.2	4.9	2.2	3
TVR14361	360(324～396)	230	300	50	595	4500	0.6	93	430	3.3	5.0	2.3	3
TVR14391	390(351～429)	250	320	50	650	4500	0.6	100	390	3.5	5.2	2.5	3
TVR14431	430(387～473)	275	350	50	710	4500	0.6	115	370	3.4	5.5	2.5	3
TVR14471	470(423～517)	300	385	50	775	4500	0.6	125	320	3.6	5.6	2.6	3
TVR14511	510(459～561)	320	410	50	845	4500	0.6	125	290	3.8	5.8	2.8	3
TVR14561	560(504～616)	350	450	50	930	4500	0.6	125	260	4.0	5.9	3.0	3
TVR14621	620(558～682)	395	510	50	1020	4500	0.6	125	240	4.3	6.3	3.2	3
TVR14681	680(612～748)	420	560	50	1120	4500	0.6	130	230	4.5	6.6	3.4	3
TVR14751	750(675～825)	465	615	50	1235	4500	0.6	143	220	4.8	6.8	3.7	3
TVR14821	820(738～902)	510	670	50	1355	4500	0.6	157	180	4.9	6.8	3.4	3
TVR14911	910(819～1001)	550	745	50	1500	4500	0.6	175	170	5.3	7.2	3.7	3
TVR14102	1000(900～1100)	625	825	50	1650	4500	0.6	190	150	5.7	7.5	4.0	3
TVR14112	1100(990～1210)	680	895	50	1815	4500	0.6	213	140	5.8	8.0	4.3	3
TVR14122	1200（1080-1320）	725	975	50	1980	4500	0.6	230	130	6.0	8.1	5.2	3
TVR14142	1400（1260-1540）	820	1140	50	2300	4500	0.6	250	110	6.6	8.7	6.0	3
TVR14162	1600（1440-1760）	910	1300	50	2630	4500	0.6	315	95	7.1	9.8	6.7	3
TVR14182	1800（1620-1980）	1000	1465	50	2950	4500	0.6	354	85	7.8	10.3	7.4	3

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

20mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL1449 3rd SPD TYPE
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	Ip	V_P	Imax	W	E	Cp	Tmin	Tmax.	W ±1.0	
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)	(PF)	(mm)			
TVR20180	18(14.4～20.0)	11	14	20	36	2000	0.2	11	19000	3.1	4.7	1.3	4
TVR20220	22(18.7～26.0)	14	18	20	43	2000	0.2	14	16000	3.2	4.9	1.4	4
TVR20270	27(23.0～31.1)	17	22	20	53	2000	0.2	18	14500	3.4	5.1	1.5	4
TVR20330	33(30～36)	20	26	20	65	2000	0.2	23	13000	3.7	5.3	1.7	4
TVR20390	39(35～43)	25	31	20	77	2000	0.2	26	12000	3.8	5.5	1.7	4
TVR20470	47(42～52)	30	38	20	93	2000	0.2	33	11000	3.3	4.9	1.8	4
TVR20560	56(50～62)	35	45	20	110	2000	0.2	41	9000	3.5	5.1	2.0	4
TVR20680	68(61～75)	40	56	20	135	2000	0.2	46	7500	3.7	5.4	2.2	4
TVR20820	82(74～90)	50	65	100	135	6500	1.0	48	4800	3.0	4.7	1.8	3
TVR20101	100(90～110)	60	85	100	165	6500	1.0	51	3900	3.2	4.9	2.0	3
TVR20121	120(108～132)	75	100	100	200	6500	1.0	55	3300	3.3	5.1	2.2	3
TVR20151	150(135～165)	95	125	100	250	6500	1.0	70	1950	2.8	5.4	2.0	3
TVR20181	180(162～198)	115	150	100	300	6500	1.0	84	1620	2.8	4.7	1.8	3
TVR20201	200(180～220)	130	170	100	340	6500	1.0	95	1460	2.9	4.8	1.9	3
TVR20221	220(198～242)	140	180	100	360	6500	1.0	100	1320	2.9	4.8	1.9	3
TVR20241	240(216～264)	150	200	100	395	6500	1.0	108	1200	3.1	5.0	2.0	3
TVR20271	270(243～297)	175	225	100	455	6500	1.0	127	1100	3.2	5.2	2.1	3
TVR20301	300(270～330)	195	250	100	500	6500	1.0	136	1000	3.5	5.2	2.3	3
TVR20331	330(297～363)	215	275	100	550	6500	1.0	150	950	3.6	5.3	2.4	3
TVR20361	360(324～396)	230	300	100	595	6500	1.0	163	900	3.7	5.4	2.5	3
TVR20391	390(351～429)	250	320	100	650	6500	1.0	180	800	3.9	5.6	2.7	3
TVR20431	430(387～473)	275	350	100	710	6500	1.0	190	700	3.8	5.9	2.7	3
TVR20471	470(423～517)	300	385	100	775	6500	1.0	220	620	4.0	6.0	2.8	3
TVR20511	510(459～561)	320	410	100	845	6500	1.0	220	530	4.2	6.2	3.0	3
TVR20561	560(504～616)	350	450	100	930	6500	1.0	220	480	4.4	6.3	3.2	3
TVR20621	620(558～682)	395	510	100	1020	6500	1.0	220	450	4.7	6.7	3.4	3
TVR20681	680(612～748)	420	560	100	1120	6500	1.0	230	440	4.9	7.0	3.6	3
TVR20751	750(675～825)	465	615	100	1235	6500	1.0	255	420	5.2	7.2	3.9	3
TVR20821	820(738～902)	510	670	100	1355	6500	1.0	282	390	5.3	7.2	3.6	3
TVR20911	910(819～1001)	550	745	100	1500	6500	1.0	310	360	5.7	7.6	3.9	3
TVR20102	1000(900～1100)	625	825	100	1650	6500	1.0	342	330	6.1	7.9	4.2	3
TVR20112	1100(990～1210)	680	895	100	1815	6500	1.0	383	310	6.2	8.4	4.5	3
TVR20122	1200(1080-1320)	725	975	100	1980	6500	1.0	415	290	6.4	8.5	5.4	3
TVR20142	1400(1260-1540)	820	1140	100	2300	6500	1.0	480	250	7.0	9.1	6.2	3
TVR20162	1600(1440-1760)	910	1300	100	2630	6500	1.0	550	220	7.5	10.2	6.9	3
TVR20182	1800(1620-1980)	1000	1465	100	2950	6500	1.0	620	195	8.5	10.7	7.6	3

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

Part No.	Varistor Voltage (@ 1mA DC)	Max. Operating Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Reference Capacitance @1KHz	Dimension			UL1449 3rd SPD TYPE
	V_{1mA}	$V_{AC(rms)}$	V_{DC}	Ip	V_P	Imax	W	E	Cp	Tmin	Tmax.	W ±1.0	
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)	(PF)	(mm)			
TVR20820R	82(74～90)	50	65	100	135	6500	1.0	48	4800	3.0	4.7	1.8	2
TVR20101R	100(90～110)	60	85	100	165	6500	1.0	51	3900	3.2	4.9	2.0	2
TVR20121R	120(108～132)	75	100	100	200	6500	1.0	55	3300	3.3	5.1	2.2	2
TVR20151R	150(135～165)	95	125	100	250	6500	1.0	70	1950	2.8	5.4	2.0	2
TVR20181R	180(162～198)	115	150	100	300	6500	1.0	84	1620	2.8	4.7	1.8	2
TVR20201R	200(180～220)	130	170	100	340	6500	1.0	95	1460	2.9	4.8	1.9	2
TVR20221R	220(198～242)	140	180	100	360	6500	1.0	100	1320	2.9	4.8	1.9	2
TVR20241R	240(216～264)	150	200	100	395	6500	1.0	108	1200	3.1	5.0	2.0	2
TVR20271R	270(243～297)	175	225	100	455	6500	1.0	127	1100	3.2	5.2	2.1	2
TVR20301R	300(270～330)	195	250	100	500	6500	1.0	136	1000	3.5	5.2	2.3	2
TVR20331R	330(297～363)	215	275	100	550	6500	1.0	150	950	3.6	5.3	2.4	2
TVR20361R	360(324～396)	230	300	100	595	6500	1.0	163	900	3.7	5.4	2.5	2
TVR20391R	390(351～429)	250	320	100	650	6500	1.0	180	800	3.9	5.6	2.7	2
TVR20431R	430(387～473)	275	350	100	710	6500	1.0	190	700	3.8	5.9	2.7	2
TVR20471R	470(423～517)	300	385	100	775	6500	1.0	220	620	4.0	6.0	2.8	2
TVR20511R	510(459～561)	320	410	100	845	6500	1.0	220	530	4.2	6.2	3.0	2
TVR20561R	560(504～616)	350	450	100	930	6500	1.0	220	480	4.4	6.3	3.2	2
TVR20621R	620(558～682)	395	510	100	1020	6500	1.0	220	450	4.7	6.7	3.4	2
TVR20681R	680(612～748)	420	560	100	1120	6500	1.0	230	440	4.9	7.0	3.6	2
TVR20751R	750(675～825)	465	615	100	1235	6500	1.0	255	420	5.2	7.2	3.9	2
TVR20821R	820(738～902)	510	670	100	1355	6500	1.0	282	390	5.3	7.2	3.6	2
TVR20911R	910(819～1001)	550	745	100	1500	6500	1.0	310	360	5.7	7.6	3.9	2
TVR20102R	1000(900～1100)	625	825	100	1650	6500	1.0	342	330	6.1	7.9	4.2	2
TVR20112R	1100(990～1210)	680	895	100	1815	6500	1.0	383	310	6.2	8.4	4.5	2
TVR20122R	1200(1080-1320)	725	975	100	1980	6500	1.0	415	290	6.4	8.5	5.4	2
TVR20142R	1400(1260-1540)	820	1140	100	2300	6500	1.0	480	250	7.0	9.1	6.2	2
TVR20162R	1600(1440-1760)	910	1300	100	2630	6500	1.0	550	220	7.5	10.2	6.9	2
TVR20182R	1800(1620-1980)	1000	1465	100	2950	6500	1.0	620	195	8.5	10.7	7.6	2

■ 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					

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	√		√	√	√

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

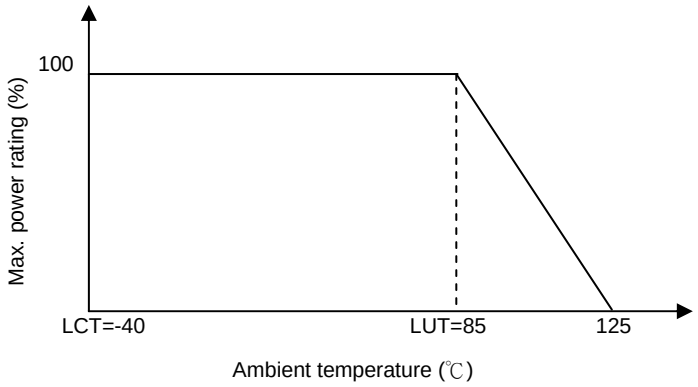
Certified Model No.	Agency					
	c UL us	c UL us	CSA	VDE		CQC
	UL1449 3rd &cUL：E314979	UL1414 &cUL：E186499	97495	5944	IEC60950-1 2nd Annex Q	CQC03001005165 CQC03001007654
TVR14180	√			√		√
TVR14220	√			√		√
TVR14270	√			√		√
TVR14330	√			√		√
TVR14390	√			√		√
TVR14470	√			√		√
TVR14560	√			√		√
TVR14680	√			√		√
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

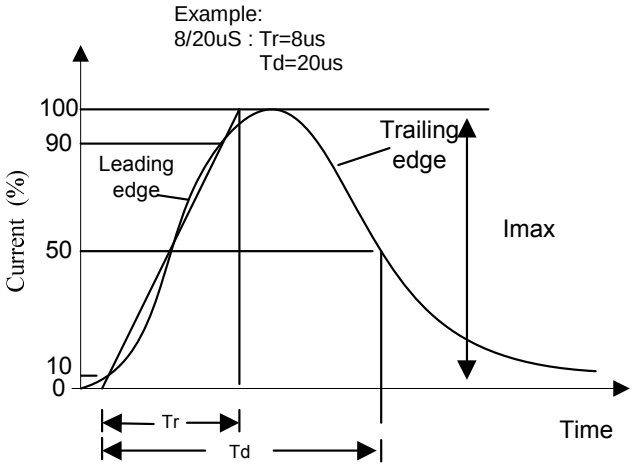
Disc Type Varistor for Surge Protection

Certified Model No.	Agency					
	c UL us	c UL us	SP	VDE		CQC
	UL1449 3rd &cUL：E314979	UL1414 &cUL：E186499	97495	5944	IEC60951-1 2nd Annex Q	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	√			√		

■ Power Derating Curve

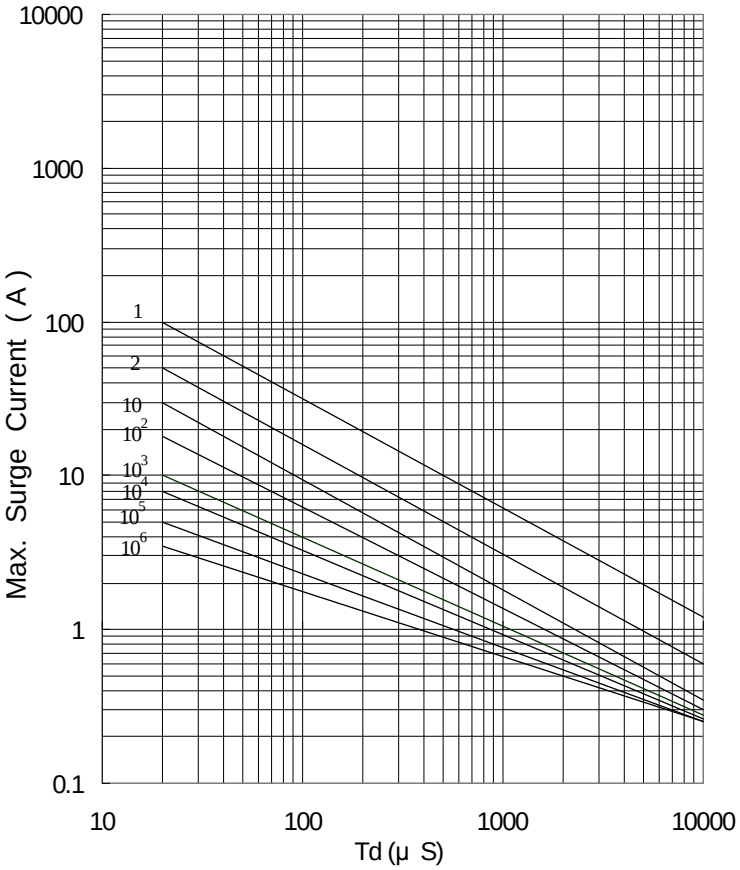


■ Surge Current Standard Waveform

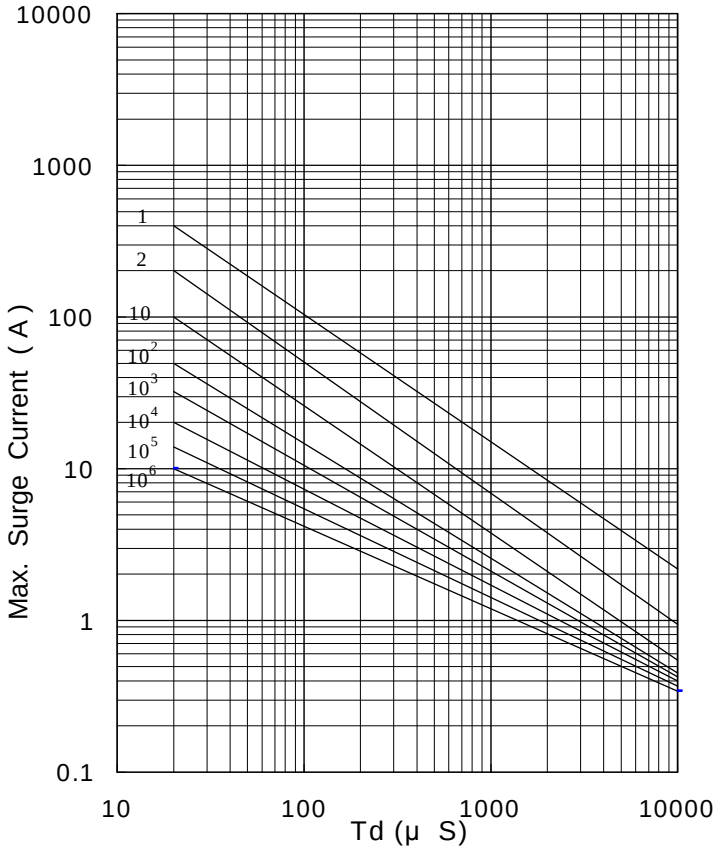


■ Max. Surge Current Derating Curves

TVR 05180 to TVR05680

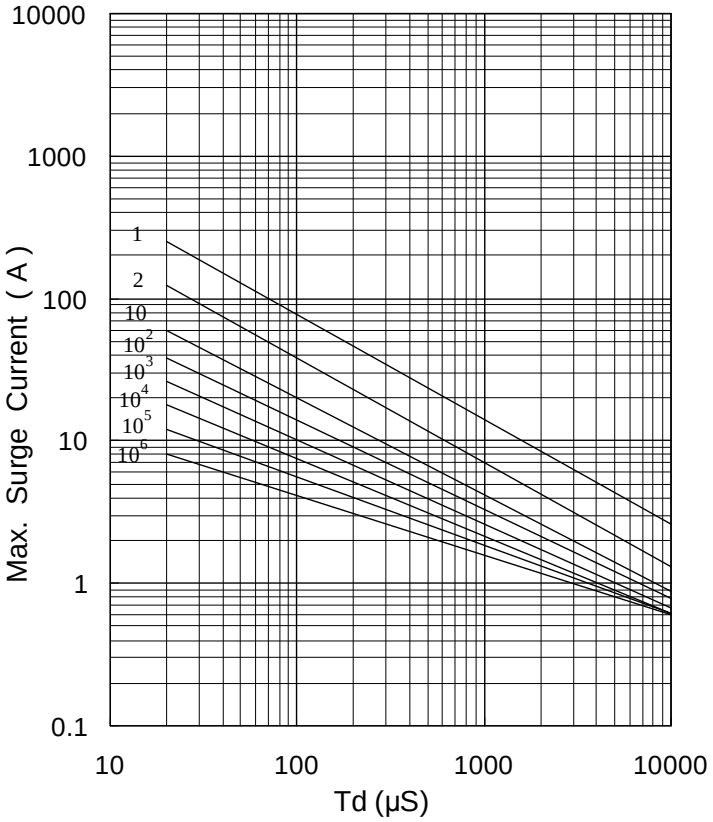


TVR05820 to TVR05751

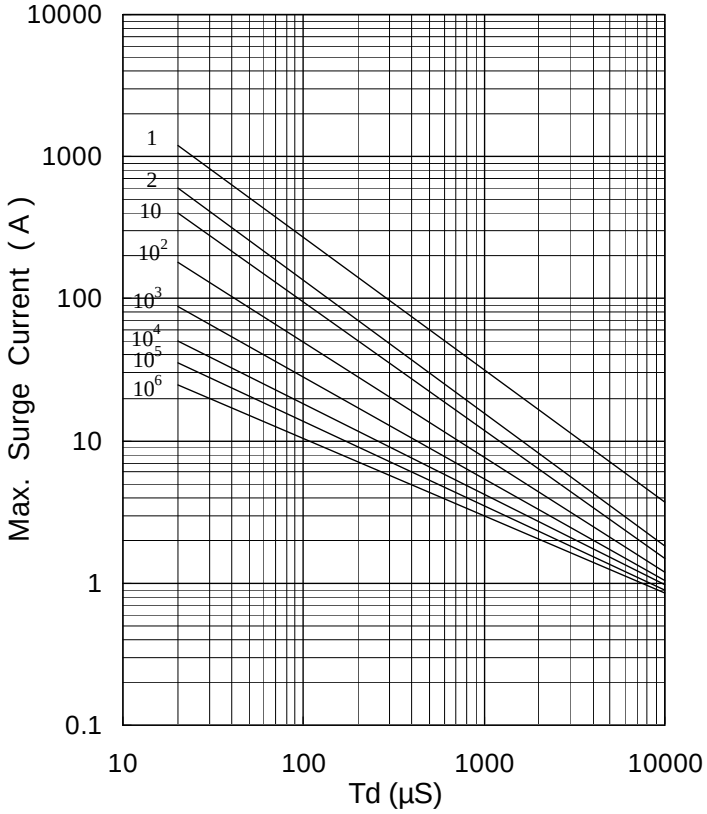


■ Max. Surge Current Derating Curves

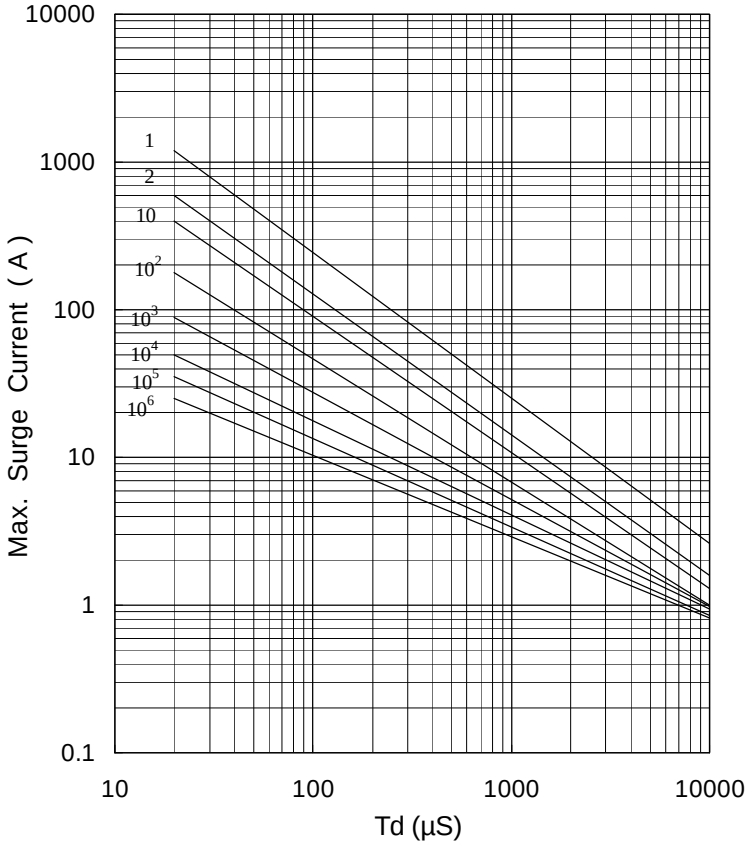
TVR07180 to TVR07680



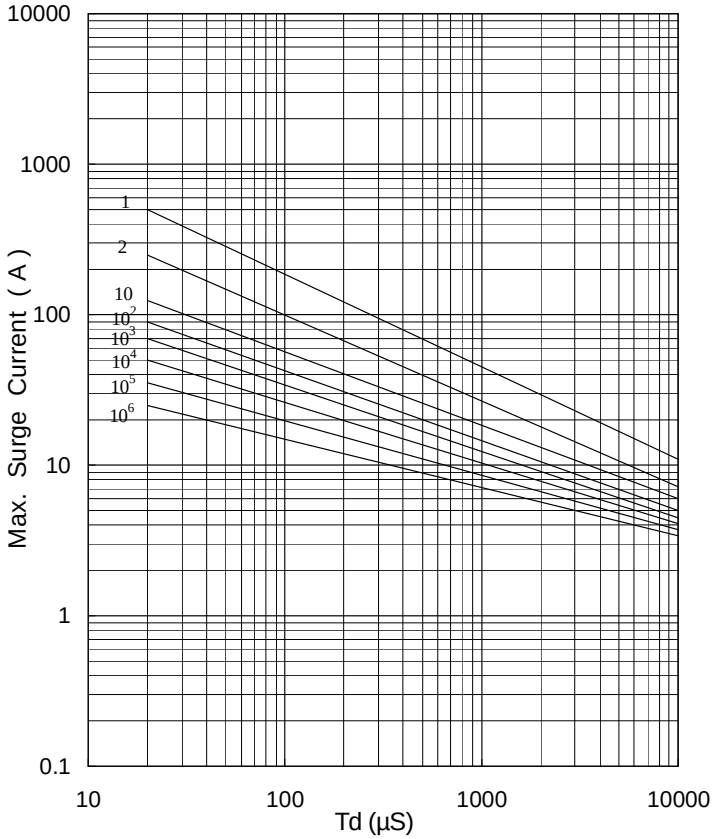
TVR 07820 to TVR07471



TVR07511 to TVR07821

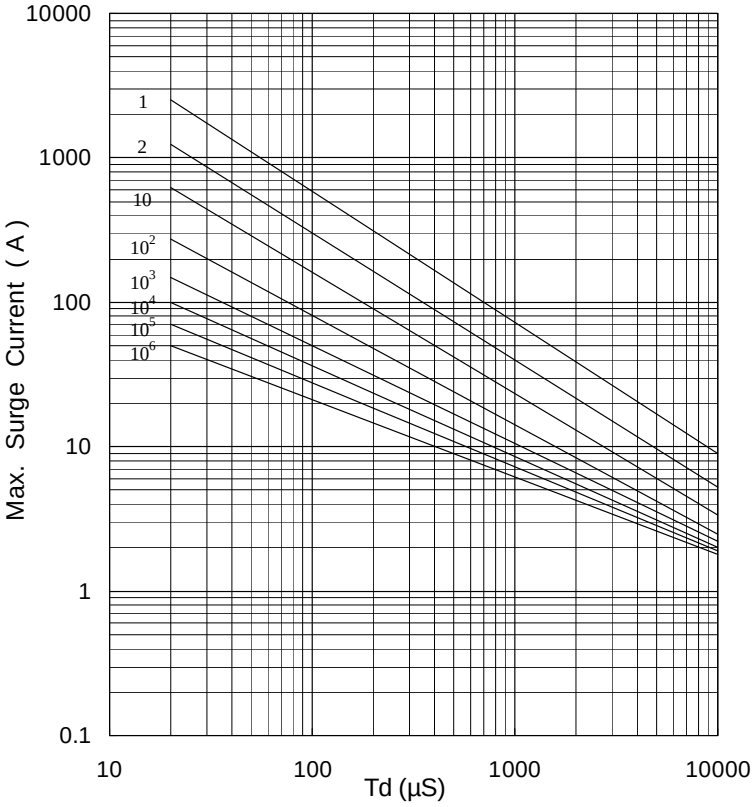


TVR10180 to TVR10680

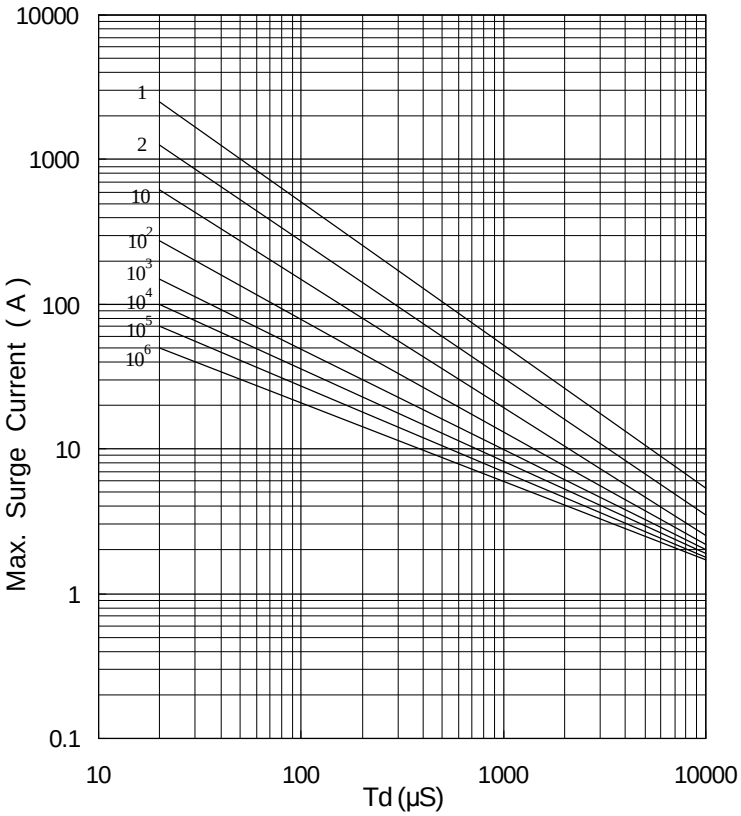


■ Max. Surge Current Derating Curves

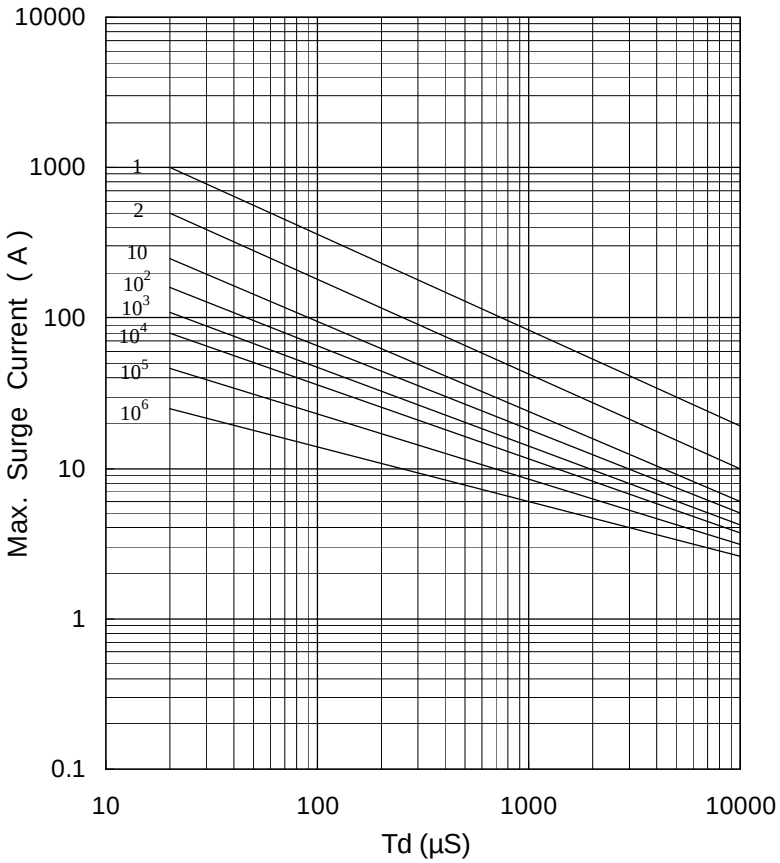
TVR10820 to TVR10751



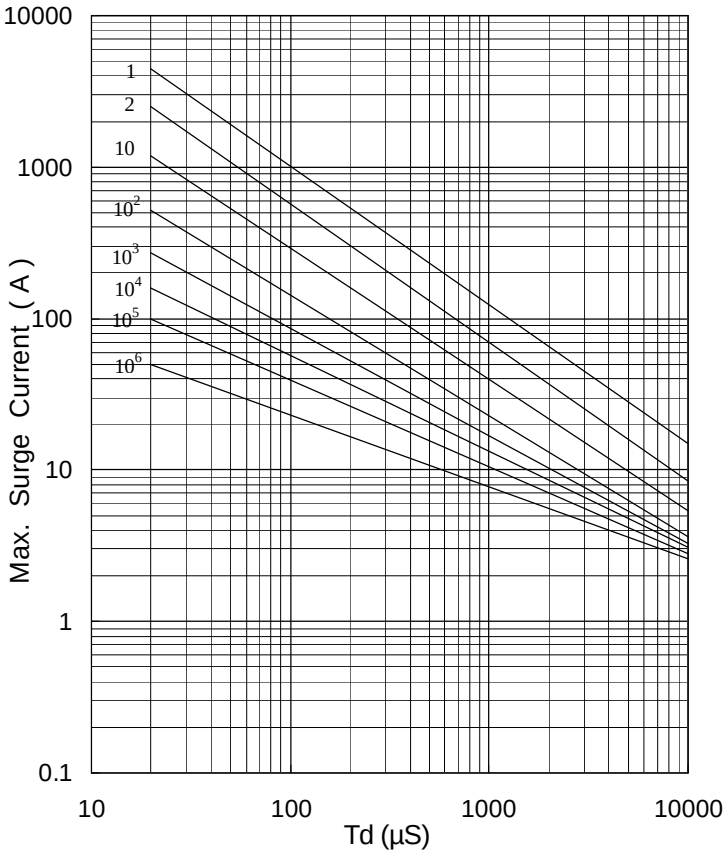
TVR10821 to TVR10182



TVR14180 to TVR14680

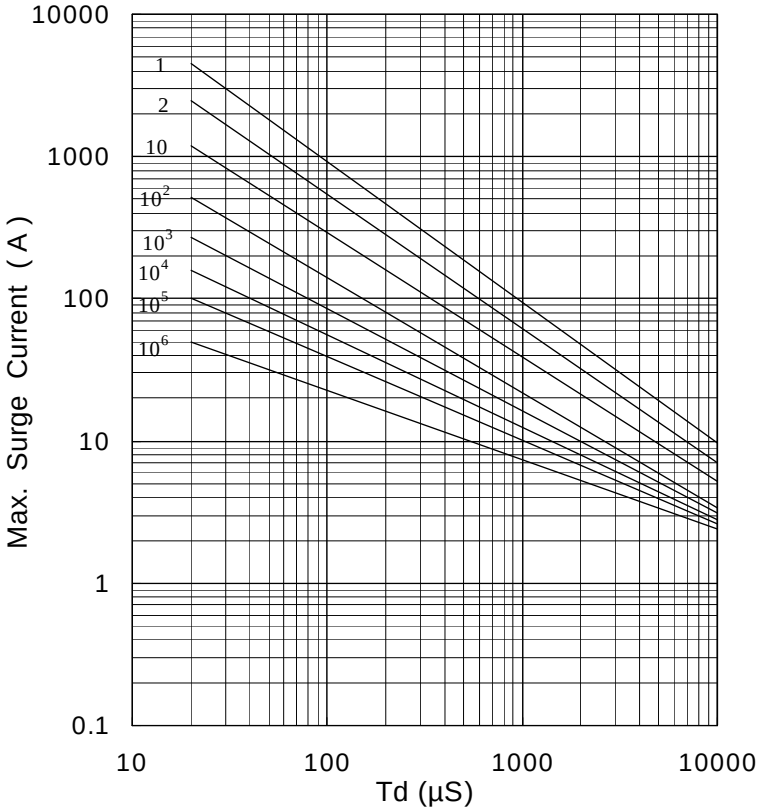


TVR14820 to TVR14751

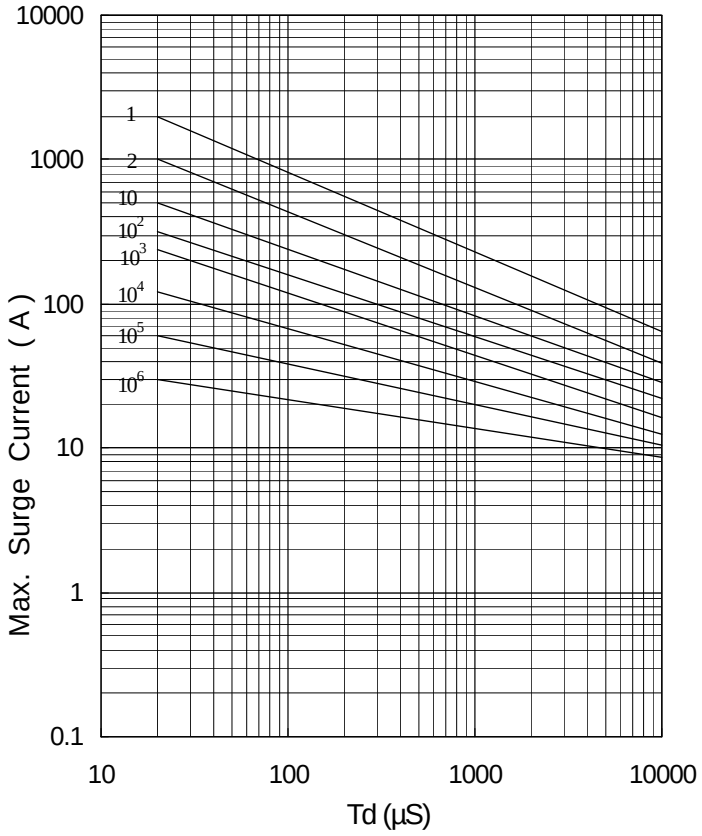


■ Max. Surge Current Derating Curves

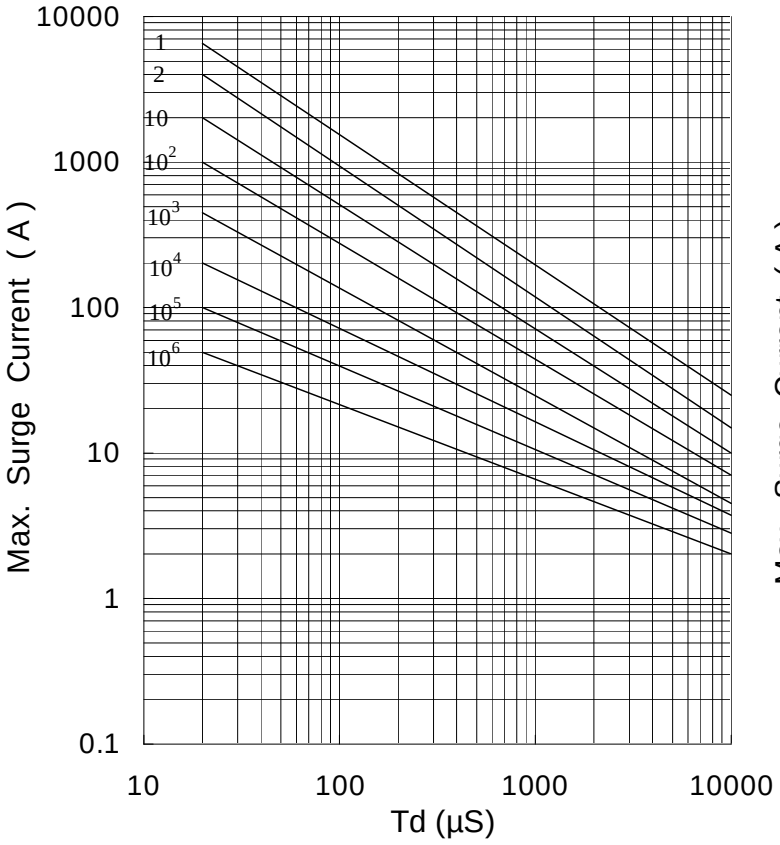
TVR14821 to TVR14182



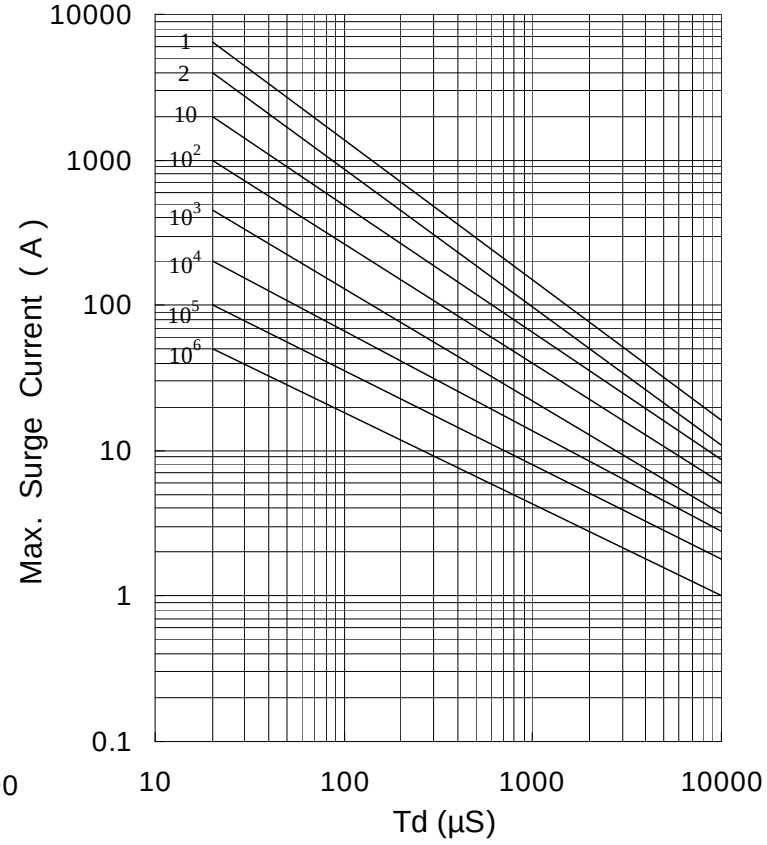
TVR20180 to TVR20680



TVR20820 to TVR20751

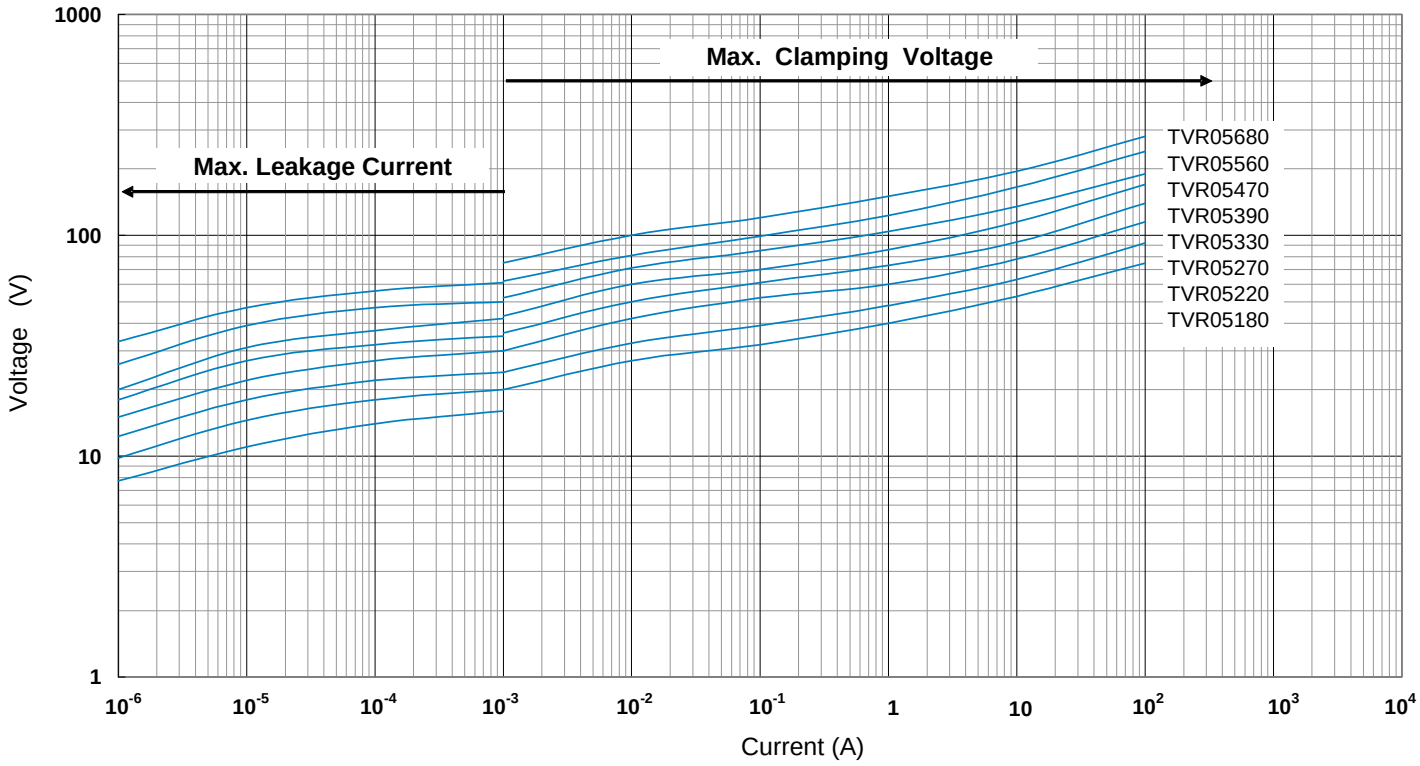


TVR20821 to TVR20182

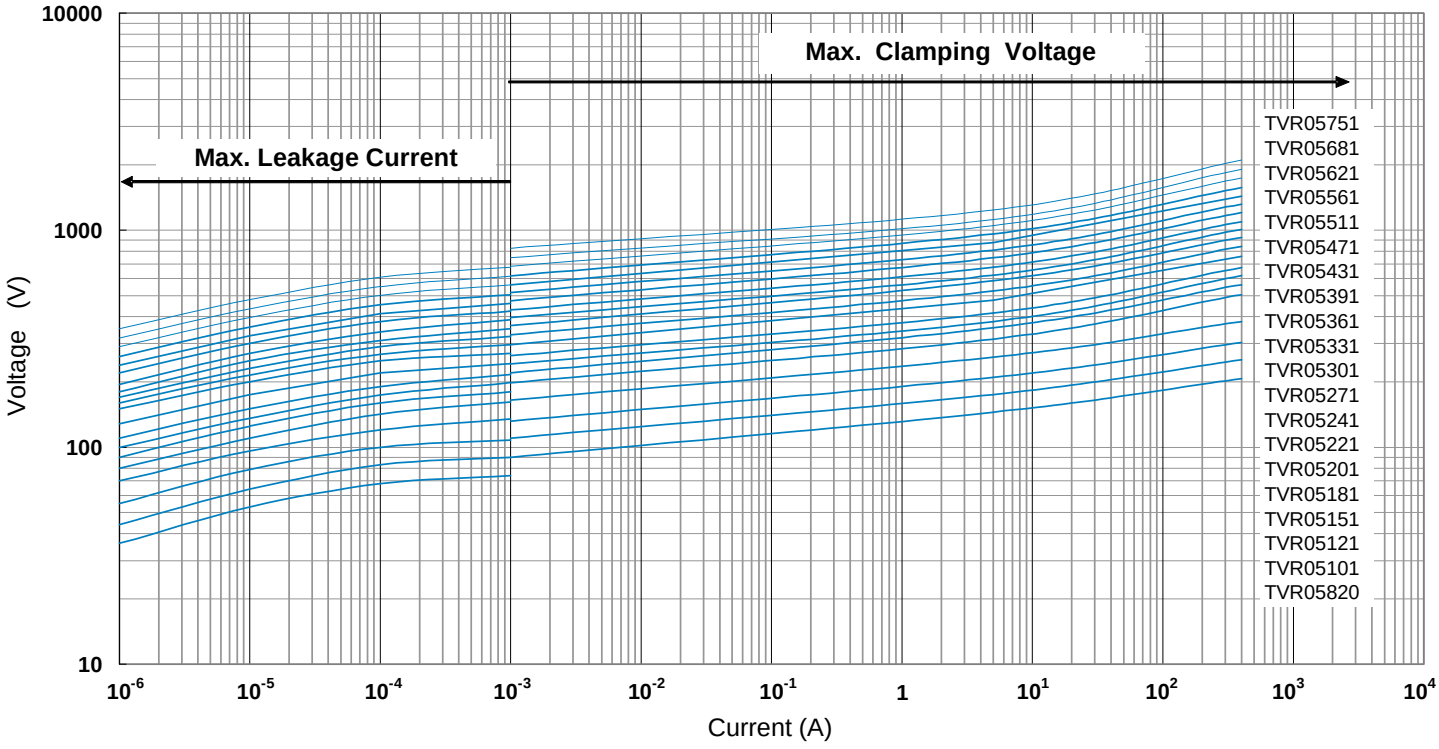


■ Max. Leakage Current and Max. Clamping Voltage Curves

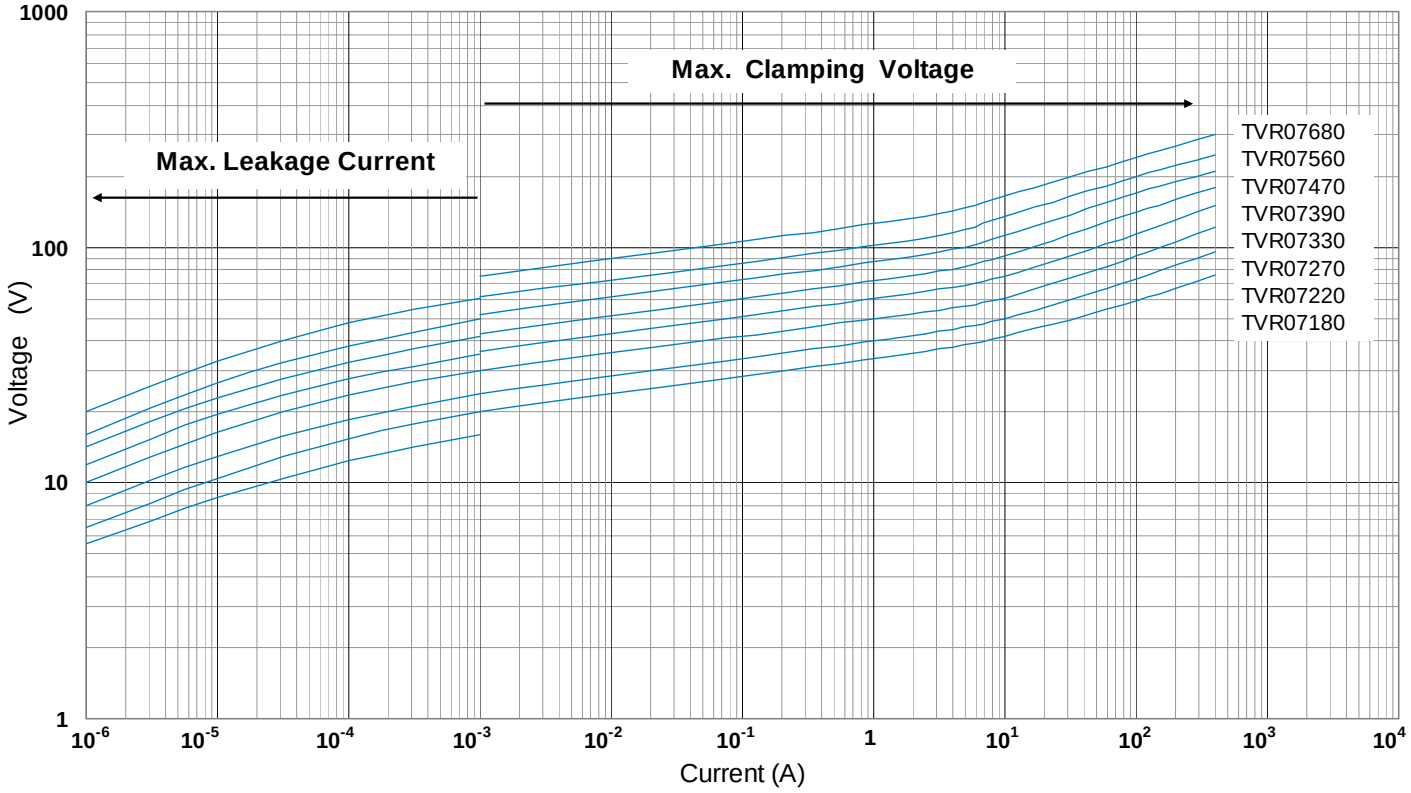
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 05 180 to TVR 05 680)



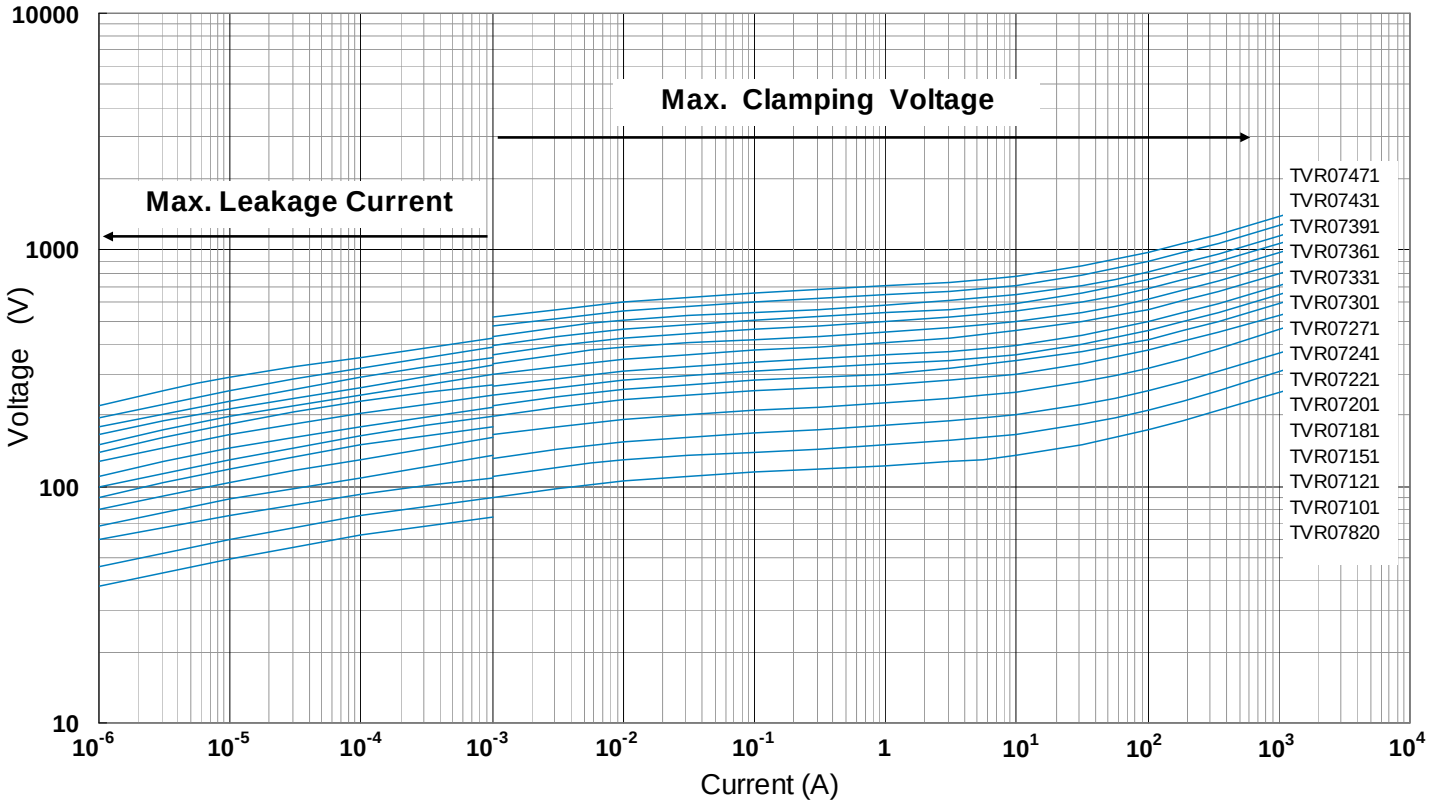
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 05 820 to TVR 05 751)



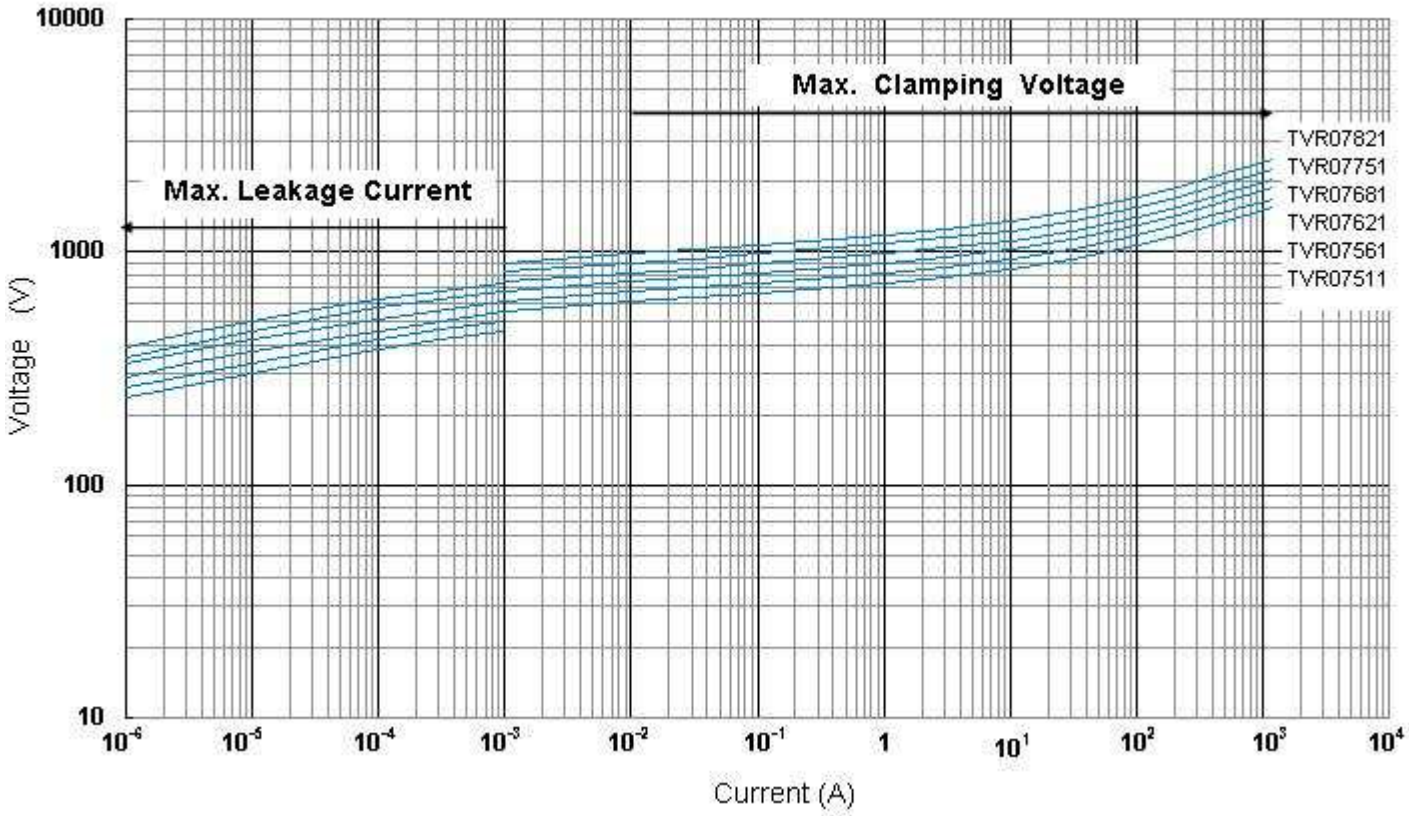
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 07 180 to TVR 07 680)



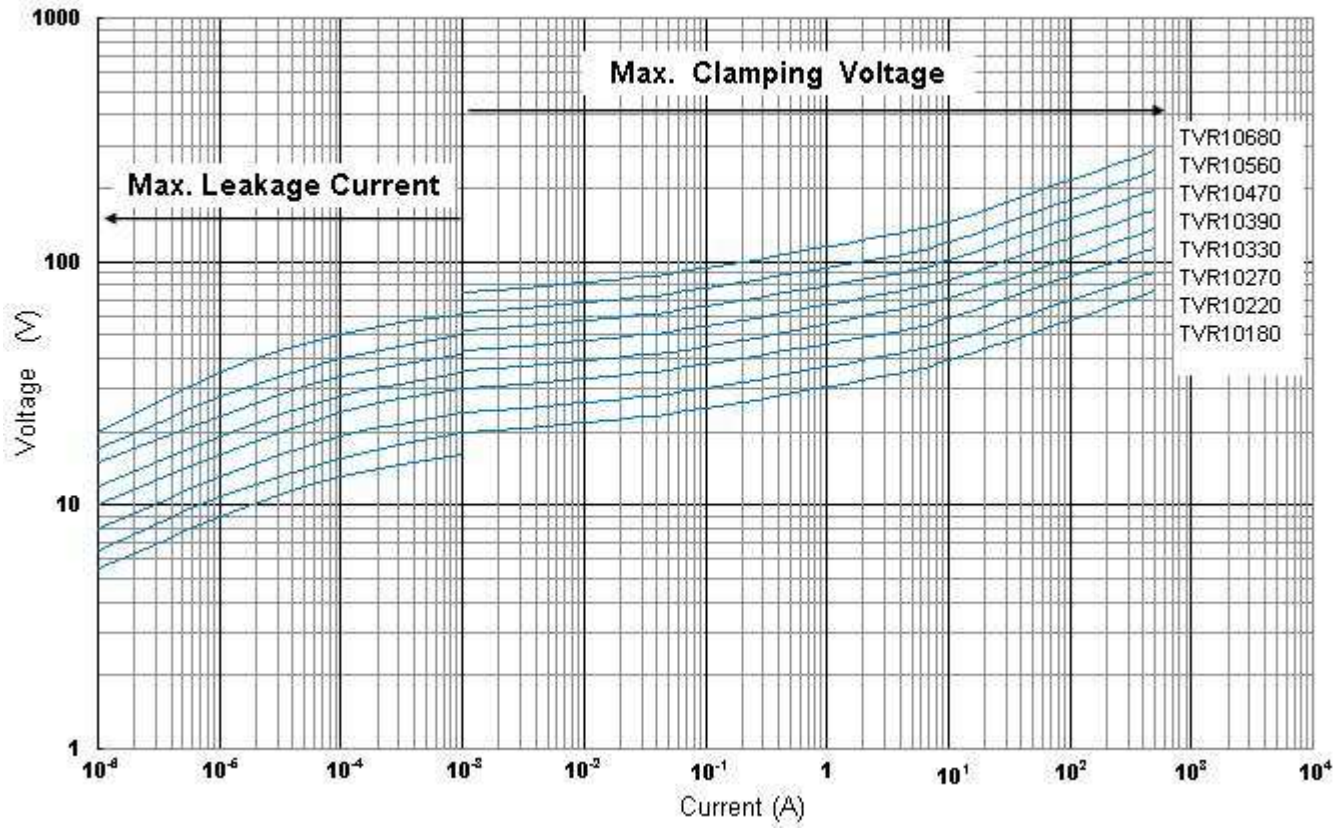
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 07 820 to TVR 07 471)



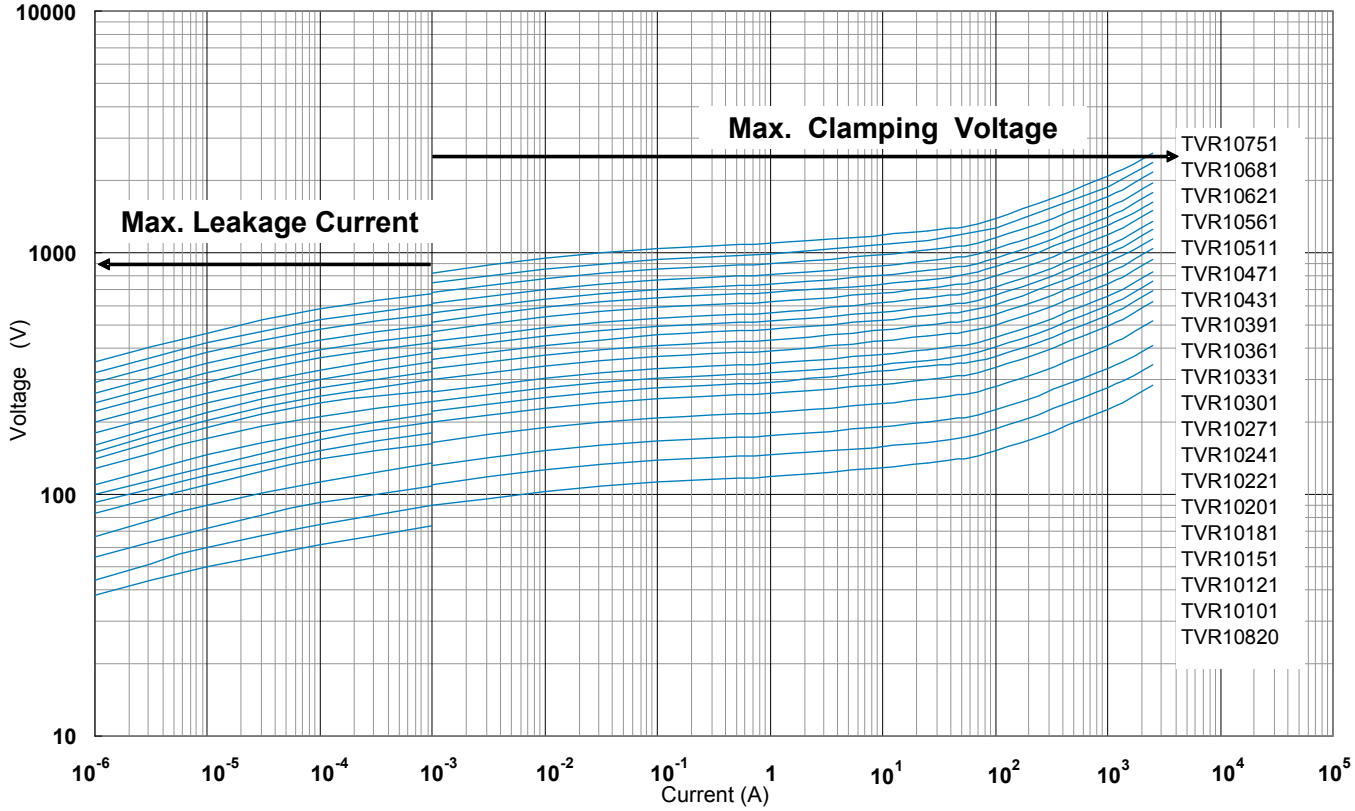
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 07 511 to TVR 07 821)



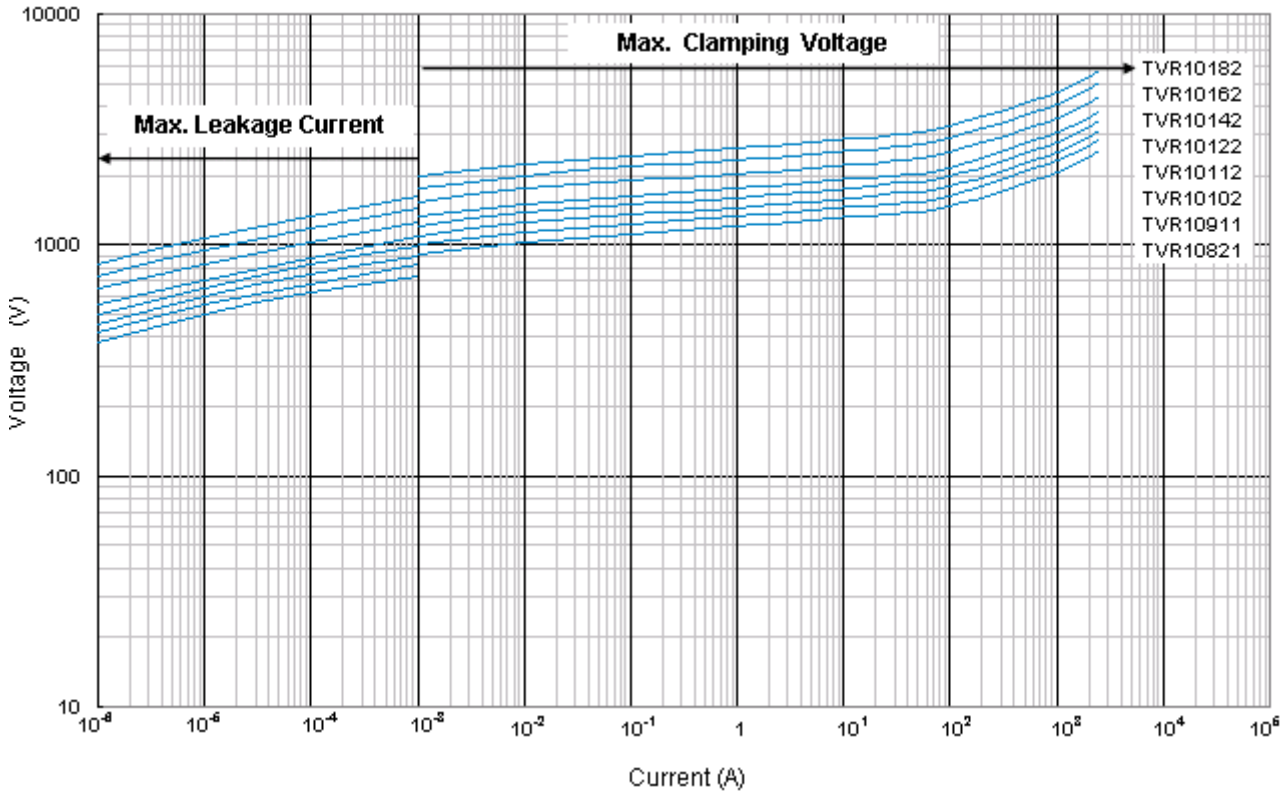
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 10 180 to TVR 10 680)



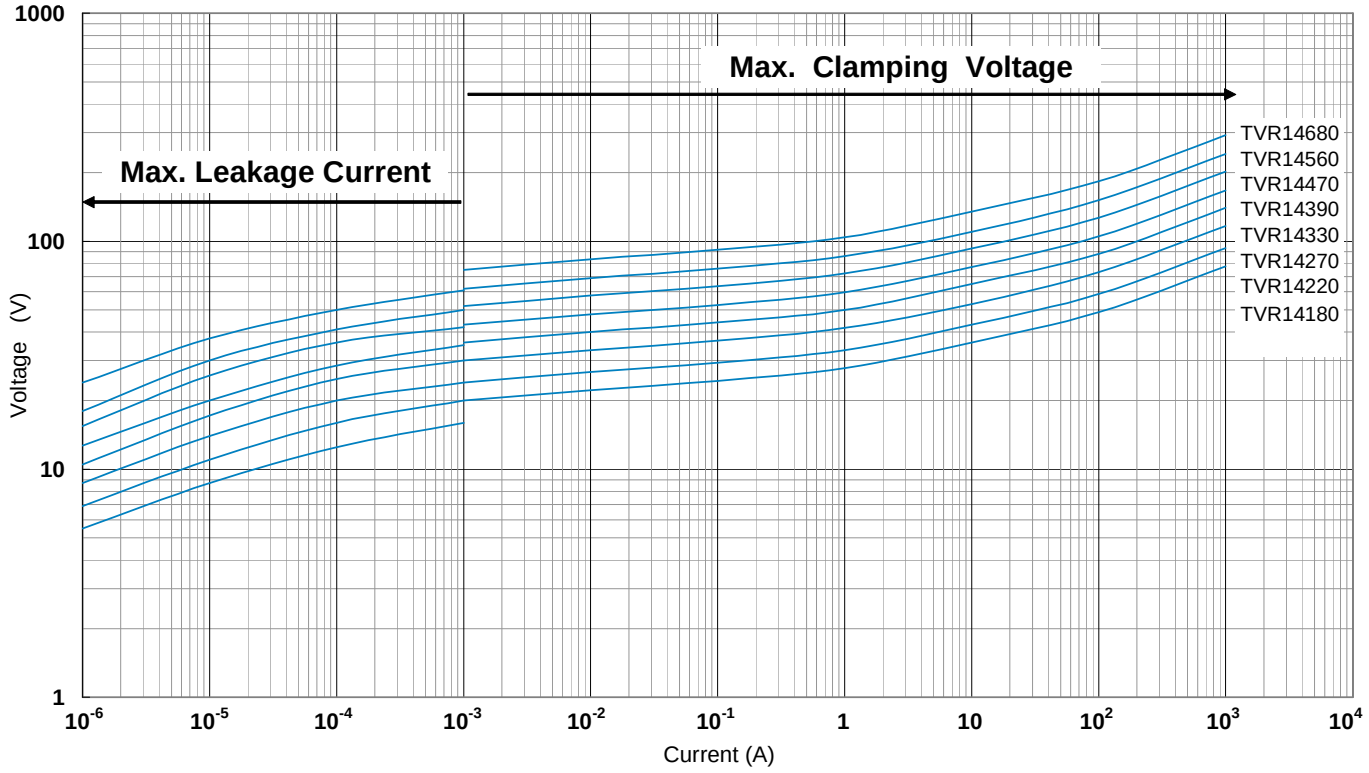
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 10 820 to TVR10 751)



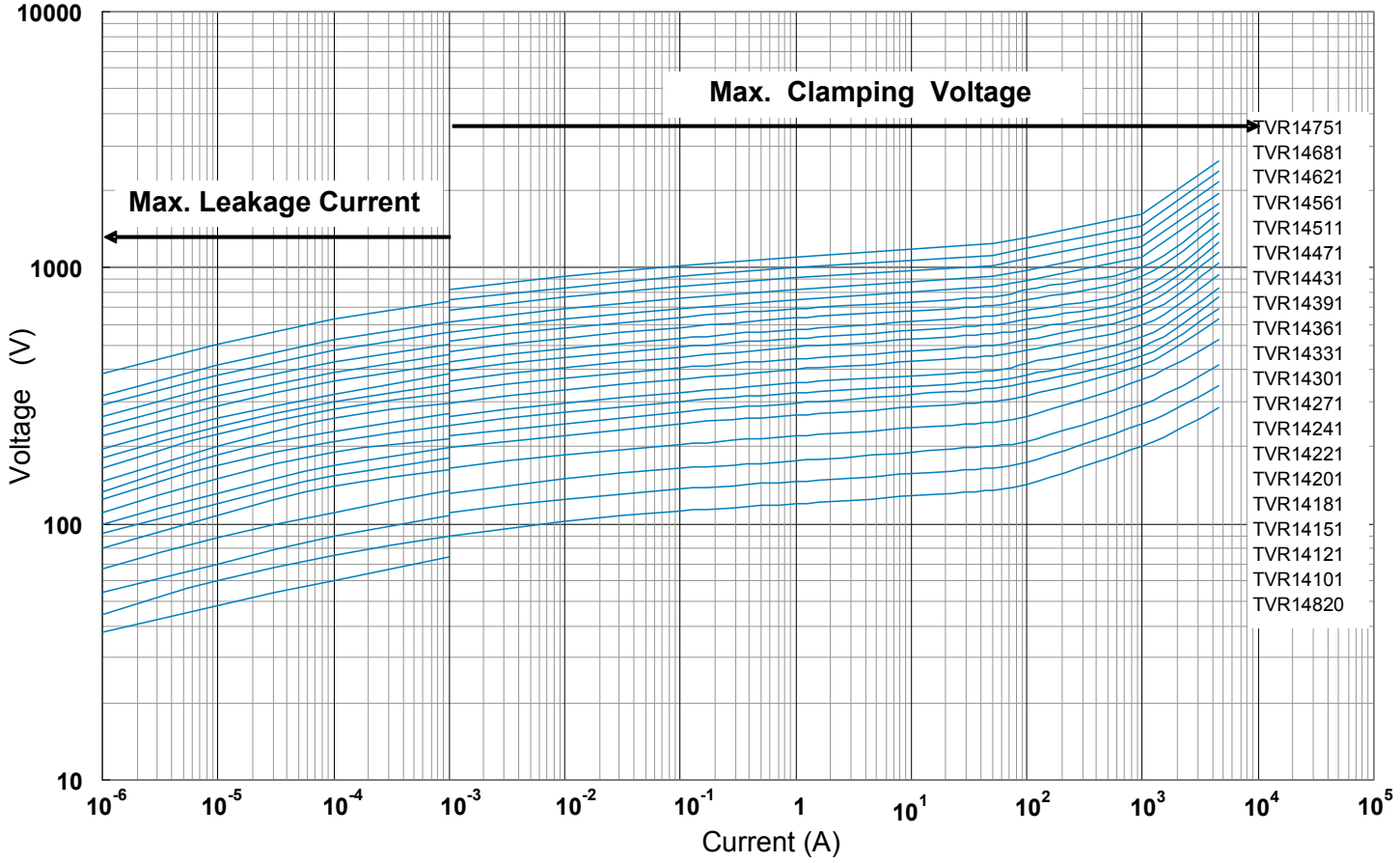
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 10 821 to TVR 10 182)



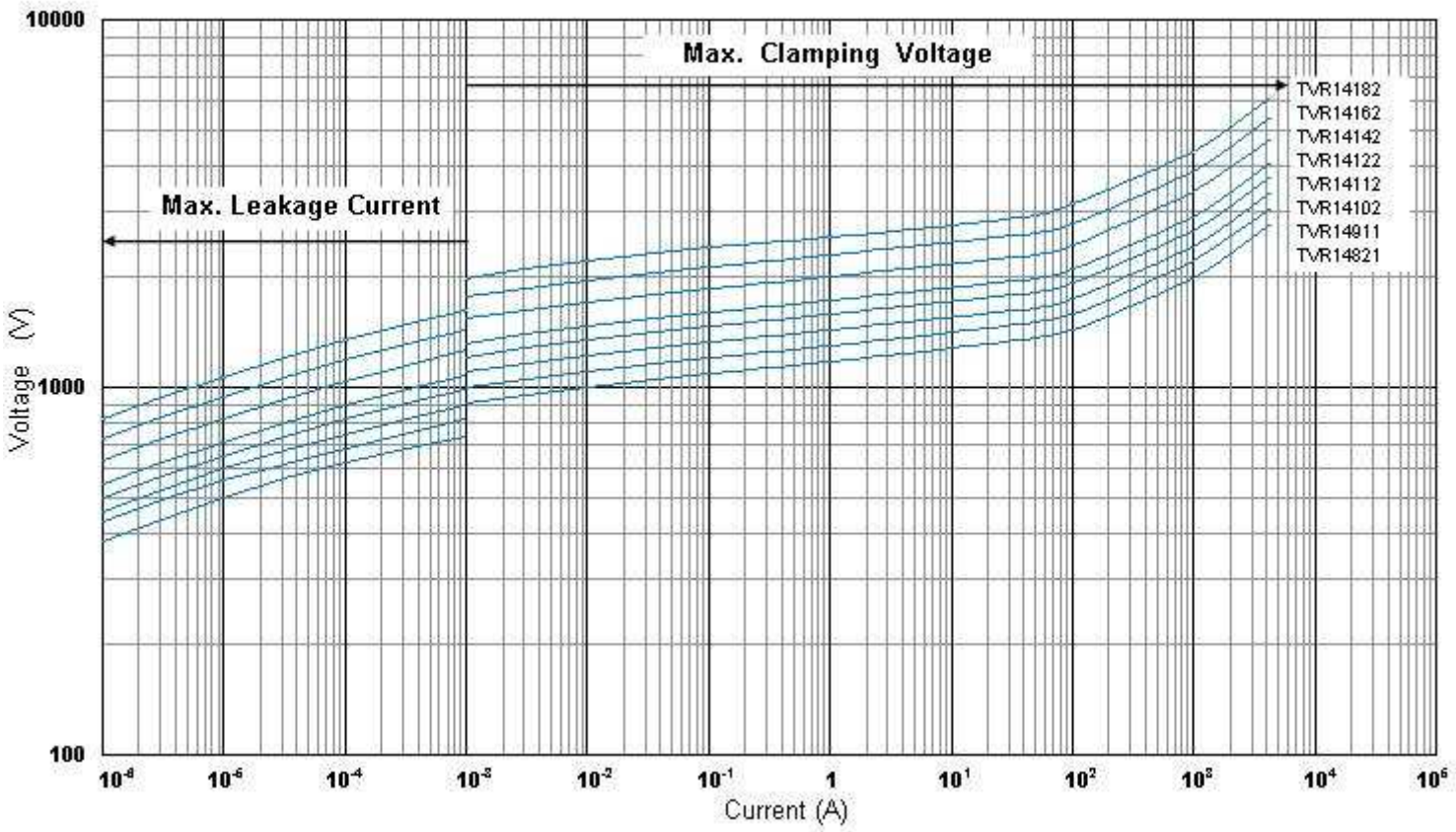
Max. Leakage Current and Max. Clamping Voltage Curves (TVR14 180 to TVR14 680)



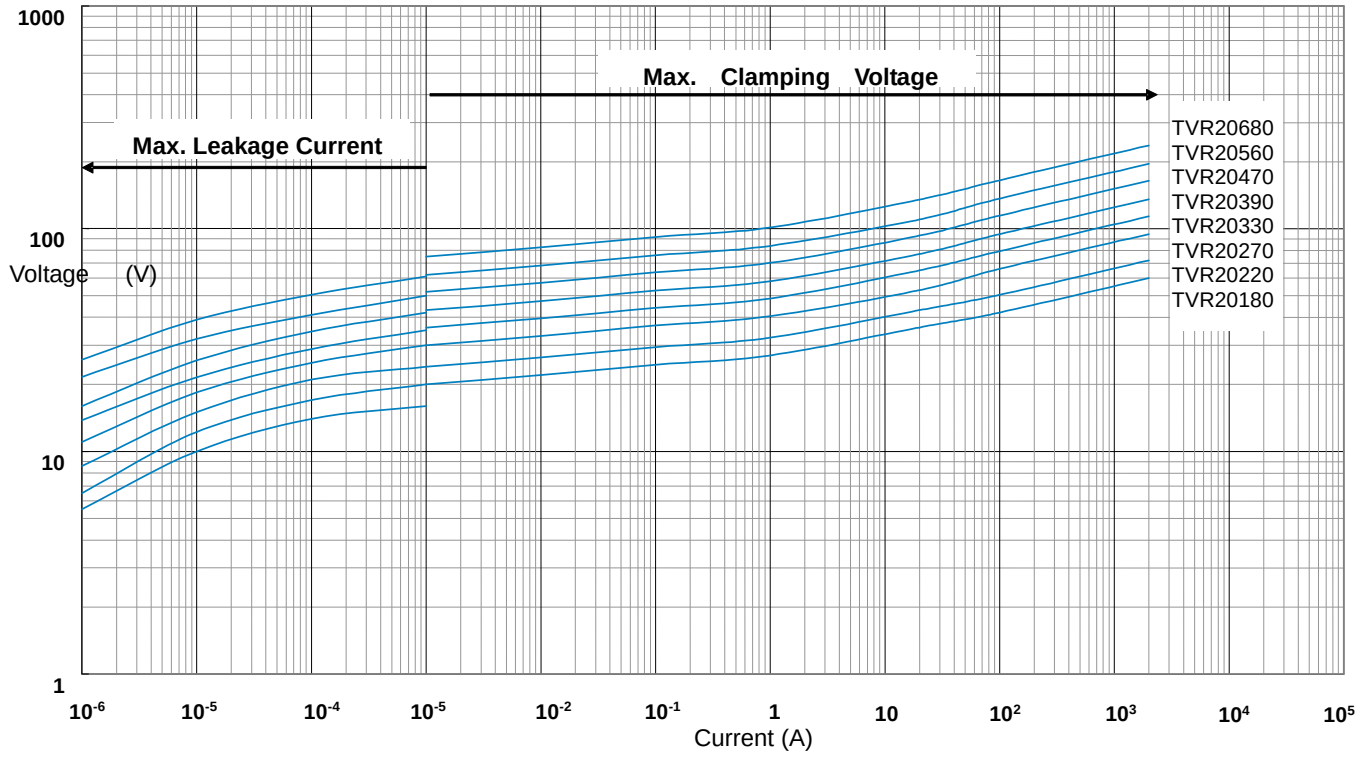
Max. Leakage Current and Max. Clamping Voltage Curves (TVR14 820 to TVR 14 751)



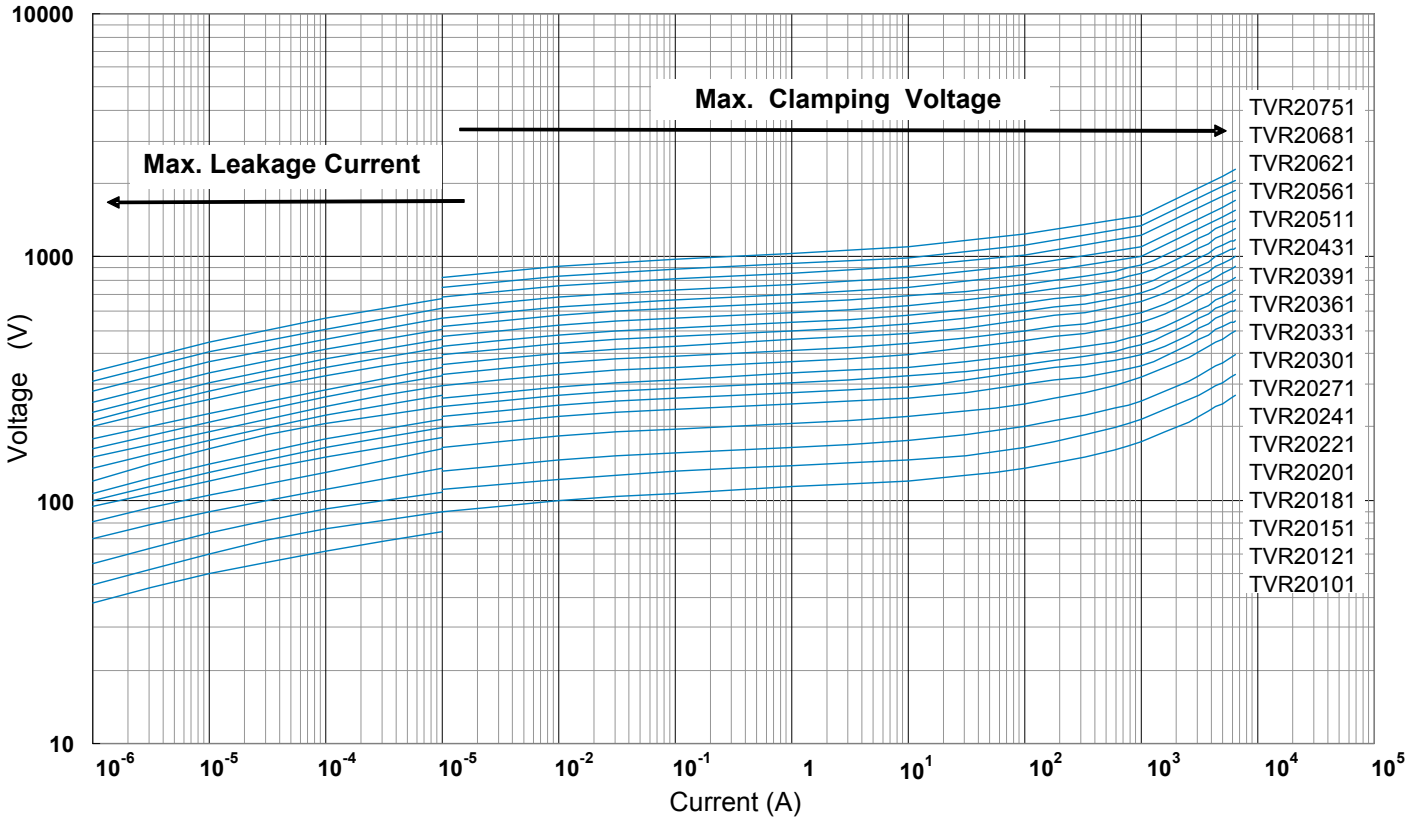
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 14 821 to TVR 14 182)



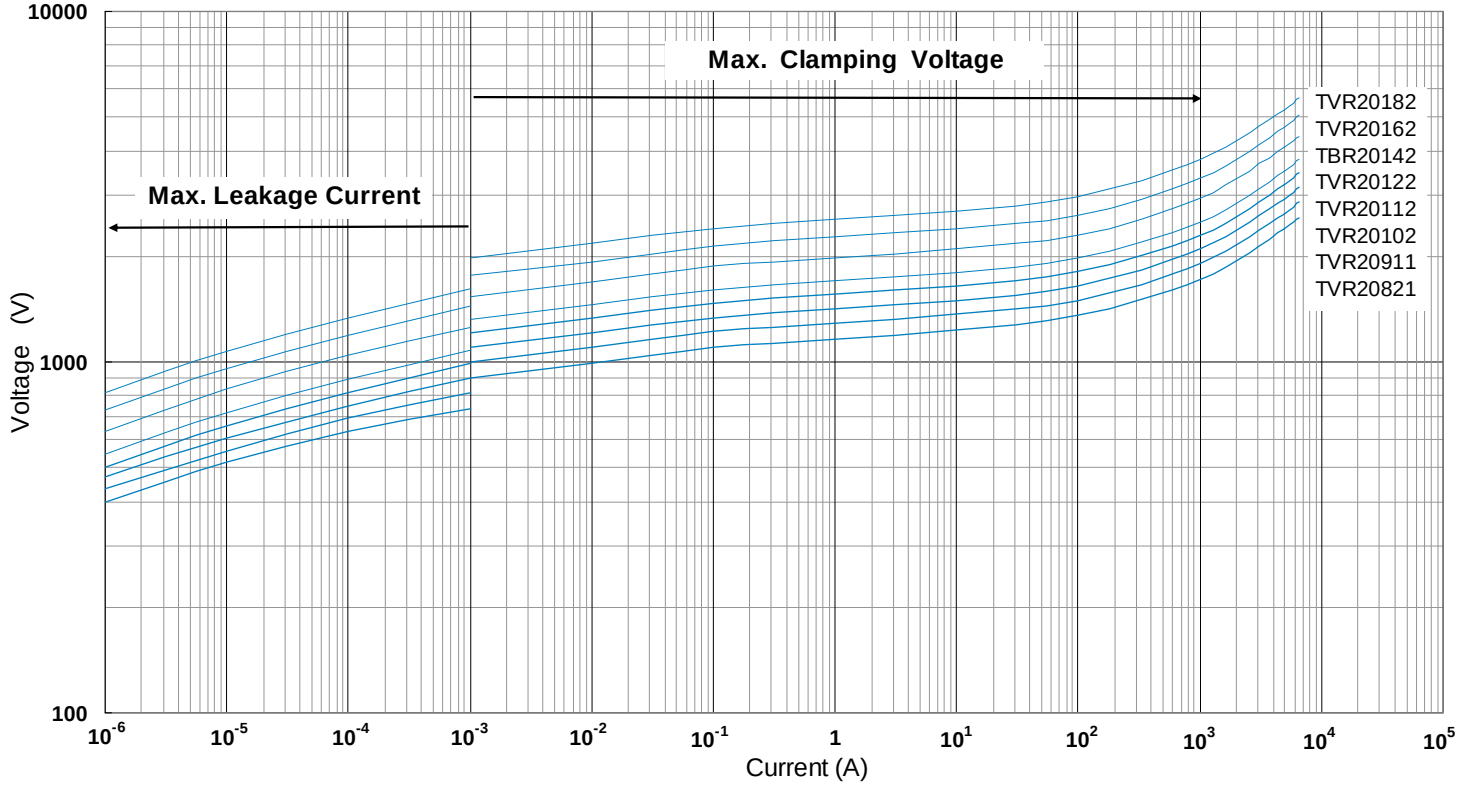
Max. Leakage Current and Max. Clamping Voltage Curves (TVR 20 180 to TVR 20 680)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR 20 820 to TVR 20 751)

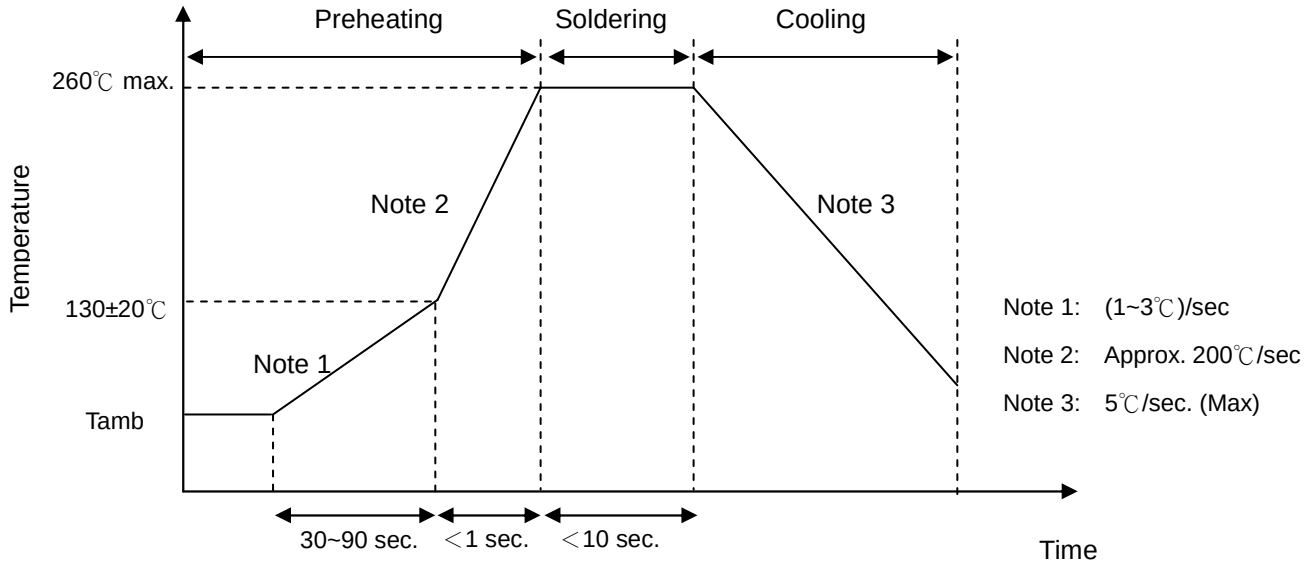


Max. Leakage Current and Max. Clamping Voltage Curves (TVR 20 821 to TVR 20 182)



■ 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

<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>IEC60068-2-21</td><td>Gradually applying the force specified and keeping 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
1.25<d : 4.0</td><td>No visible damage
｜△V/V_{1mA}｜≦5%</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°, then return to the original positi on. 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
1.25<d : 2.0</td><td>No visible damage
｜△V/V_{1mA}｜≦5%</td></tr>
<tr><td>Vibration</td><td>IEC 61051-1</td><td>Frequency range: 10-55 Hz
Amplitude: 0.75mm or 98 m/s^2
Direction: 3 mutually perpendicular directions, 2hrs each</td><td>｜△V/V_{1mA}｜≦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,
(5±0.5sec for TVR05)</td><td>｜△V/V_{1mA}｜≦ ± 5 %
No visible damage</td></tr>
<tr><td>High Temperature Storage</td><td>IEC 60068-2-2</td><td>125±5℃ x 1000± 24 hrs</td><td>｜△V/V_{1mA}｜≦ 5 %
No visible damage</td></tr>
<tr><td>Damp Heat, Steady State</td><td>IEC 60068-2-3</td><td>a. 40±2℃, 90 ~ 95 % RH, 1344HRS
b. 40±2℃, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs</td><td>No visible damage
｜△V/V_{1mA}｜≦ 5%
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>No visible damage
｜△V/V_{1mA}｜≦ 5 %</td></tr>
<tr><td>Endurance at Upper Category Temperature</td><td>IEC61051-4.20</td><td>85 ± 2 ℃, 1000 ± 24 hrs, at Vdc or Vrms (Max. Operating Voltage)</td><td>｜△V/V_{1mA}｜≦ 10 %
No visible damage</td></tr>
<tr><td>Low Temperature Storage (Optional)</td><td>CECC42000</td><td>–40±5℃, 1000±24 hrs</td><td>｜△V/V_{1mA}｜≦ 5%
No visible damage</td></tr>
<tr><td>8/20μs Surge Life</td><td>CECC42000</td><td>10,000 pulses(8/20μS), unipolar, interval 10 sec, amplitude corr. to max. surge current derating curves for 20μs</td><td>｜△V_{1mA}/V_{1mA}｜≦10 %
No visible damage</td></tr>
<tr><td>10/1000μs Surge Life</td><td>CECC42000</td><td>10/1000μS waveform, 10 surge currents, unipolar, interval 2mins, amplitude corr. to max. surge current derating curves for 1000μS</td><td>｜△V_{1mA}/V_{1mA}｜≦10 %
No visible damage</td></tr>
</table>

Item	Standard	Test conditions / Methods	Specifications
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{ at }85℃ - V_{1mA}\text{ at }25℃}{V_{1mA}\text{ at }25℃} \times \frac{1}{60} \times 100\ (\%/℃)$ $\frac{V_{1mA}\text{ at }-40℃ - V_{1mA}\text{ at }25℃}{V_{1mA}\text{ at }25℃} \times \frac{1}{65} \times 100\ (\%/℃)$	$-0.05 \leqq T_C \leqq 0.05\ (\%/℃)$
Voltage Proof	IEC61051-4.8	Metal balls method, 2500 V_{ac} 1 min	No visible damage

■ Packaging

● Taping Specification
S Type (Straight lead)

Figure A

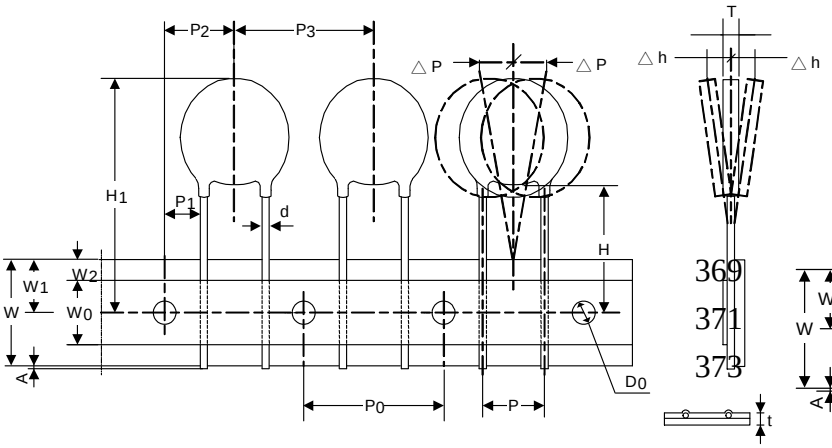


Figure C

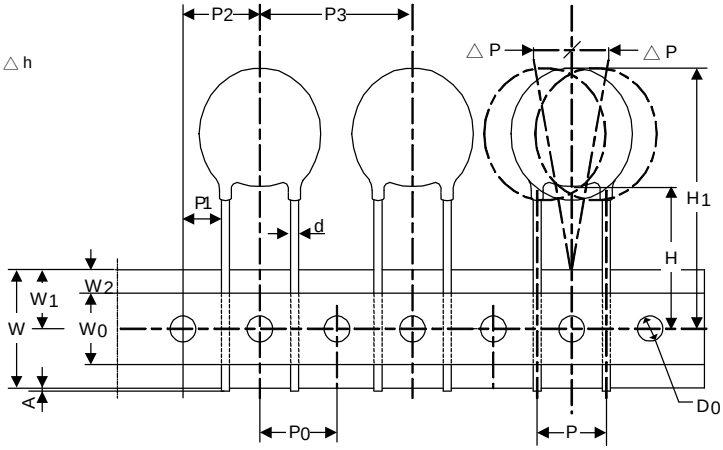


Figure B

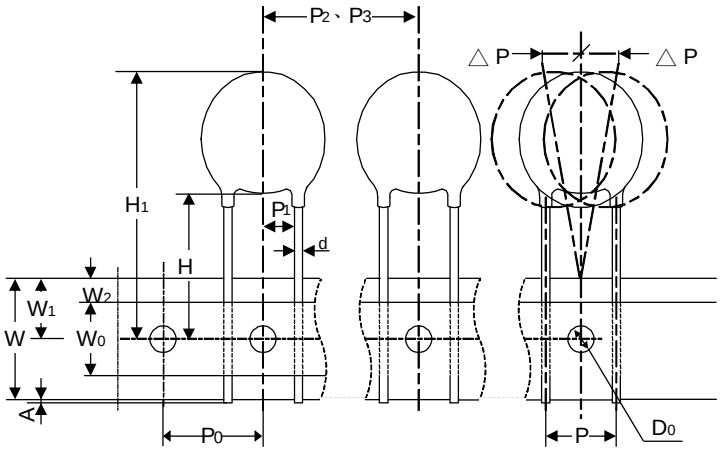
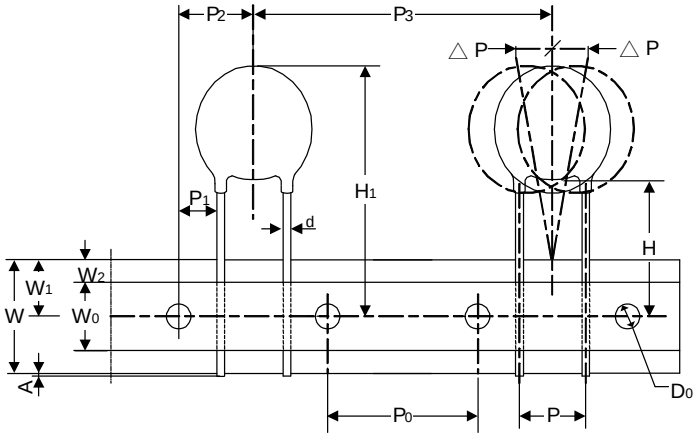


Figure D



(Unit: mm)

Taping Code	Disc Size	P_0 ±0.3	P ±1	P_1 ±1	P_2 ±1.3	P_3 ±1	H +2/-0	H_1 Max.	d ±0.02	W_0 ±1	W_1 *+0.75/ -0.5*	W_2 Max.	W ±1	△P Max.	△h Max.	A Max.	D_0 ±0.2	t ±0.2	Figure
A (P_0=12.7)	05	12.7	5	3.55	6.35	12.7	18	28	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	07	12.7	5	3.55	6.35	12.7	18	30	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10	12.7	7.5	3.35	12.7	12.7	18	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	14	12.7	7.5	8.55	12.7	25.4	18	38	0.8	12	9	3	18	1	2	0.5	4	0.6	C
	20	12.7	7.5	8.55	12.7	25.4	18	40.5	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	20	12.7	10	7.20	12.7	38.1	18	40.5	1.0	12	9	3	18	1	2	0.5	4	0.6	B
E (P_0=15.0)	05	15	5	4.7	7.5	15	18	28	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	07	15	5	4.7	7.5	15	18	30	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10	15	7.5	3.35	7.5	15	18	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14	15	7.5	3.35	7.5	30	18	38	0.8	12	9	3	18	1	2	0.5	4	0.6	D
	20	15	7.5	3.35	7.5	30	18	40.5	0.8	12	9	3	18	1	2	0.5	4	0.6	D

Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

F Type (Y kink lead)

Figure A

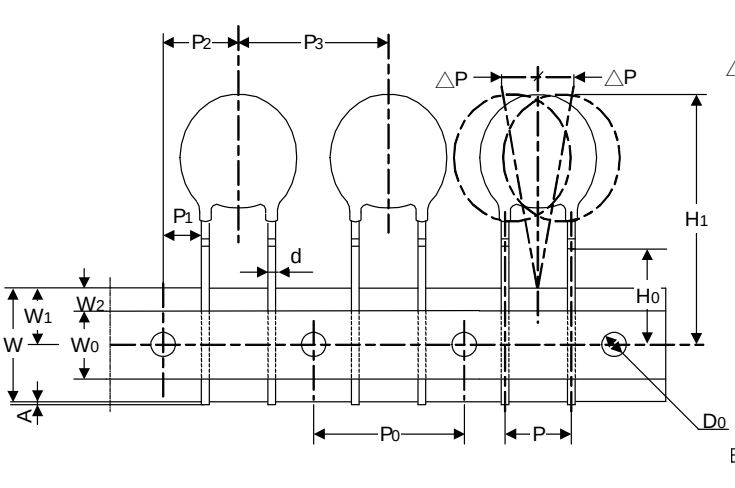


Figure C

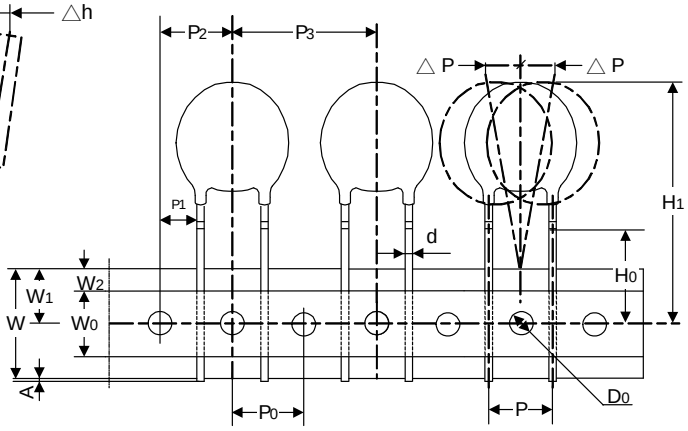


Figure B

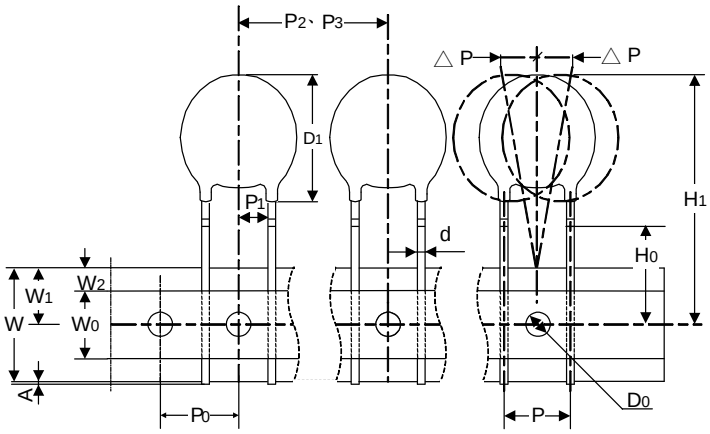
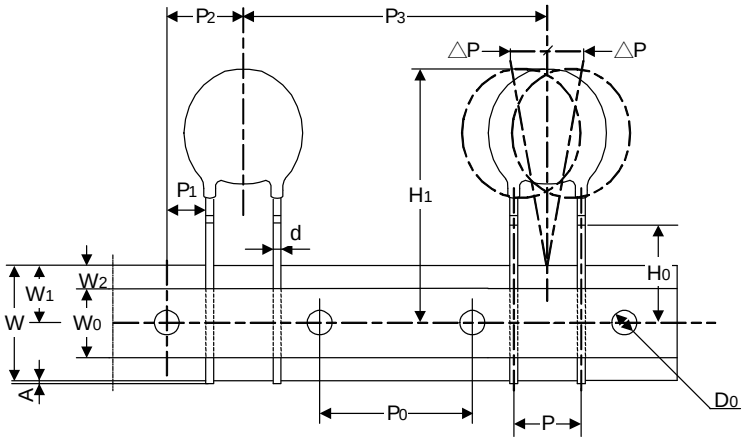


Figure D



(Unit: mm)

Taping Code	Disc Size	P_0 ±0.3	P ±1	P_1 ±1	P_2 ±1.3	P_3 ±1	H_0 ±0.5	H_1 Max.	d ±0.02	W_0 ±1	W_1 +0.75/ -0.5	W_2 Max.	W ±1	△P Max.	△h Max.	A Max.	D_0 ±0.2	t ±0.2	Figure
A (P_0=12.7)	05	12.7	5	3.55	6.35	12.7	16	28	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	07	12.7	5	3.55	6.35	12.7	16	30	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10	12.7	7.5	3.35	12.7	12.7	16	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	14	12.7	7.5	8.55	12.7	25.4	16	38	0.8	12	9	3	18	1	2	0.5	4	0.6	C
	20	12.7	7.5	8.55	12.7	25.4	16	44.5	0.8	12	9	3	18	1	2	0.5	4	0.6	B
	20	12.7	10	7.20	12.7	38.1	16	44.5	1.0	12	9	3	18	1	2	0.5	4	0.6	B
E (P_0=15.0)	05	15	5	4.7	7.5	15	16	28	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	07	15	5	4.7	7.5	15	16	30	0.6	12	9	3	18	1	2	0.5	4	0.6	A
	10	15	7.5	3.35	7.5	15	16	33.5	0.8	12	9	3	18	1	2	0.5	4	0.6	A
	14	15	7.5	3.35	7.5	30	16	38	0.8	12	9	3	18	1	2	0.5	4	0.6	D
	20	15	7.5	3.35	7.5	30	16	44.5	0.8	12	9	3	18	1	2	0.5	4	0.6	D

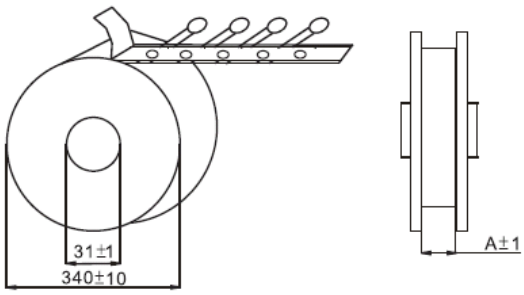
■ Quantity

- **Bulk Packing**

Disc Size	Quantity pcs/ bag
TVR05	250
TVR07	250
TVR10	200
TVR14	100
TVR20	50

- **Reel Packing**

Disc Size/mm	Quantity pcs/reel
TVR05(180~391)	1500
TVR05(431~751)	1000
TVR07(180~391)	1500
TVR07(431~821)	1000
TVR10(180~911)	1000
TVR10(102~112)	750
TVR10(122~182)	500
TVR14(180~470)	1000
TVR14(560~391)	750
TVR14(431~182)	500
TVR20(180~681)	500
TVR20(751~182)	250

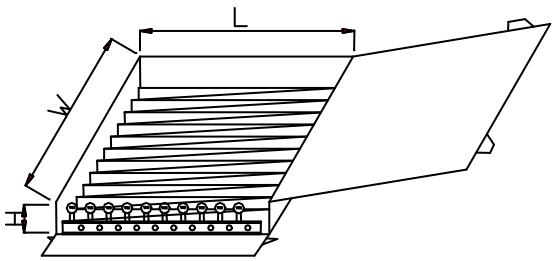


(Unit:mm)

A	46	55
Disc Size	Φ 05 ~ Φ 14	Φ 20

- **Ammo Packing**

Disc Size/mm	Quantity pcs/ box
TVR05(180~391)	1000
TVR05(431~471)	1200
TVR05(511~751)	1000
TVR07(180~821)	1000
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)

Disc Size	W±5	L±5	H±5
Φ 05~ Φ 20	348	185	60
	348	275	60

■ 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.