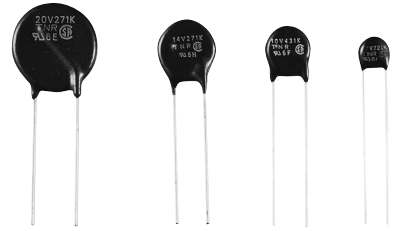


V Series



◆FEATURES

- Large surge capability (the surge current ratings of TNR V series, by 8/20 μ Sec., are about two times larger than TNR G series).
- Large energy capability (1.5 time larger than TNR G series).
- One rank smaller TNR V has same peak current as TNR G.
- Excellent voltage non-linear coefficient.
Low clamping voltage.
- Symmetrical V-I characteristics (No polarity).
- Fast response.
- Stable characteristics against repeated surges.
- Superior temperature characteristics.
- High reliability
- UL recognized
UL 1449 : File E95427
UL 1414 : File E65426
- CSA recognized
CSA CLASS 2221 01 : File LR 97864-2
- VDE recognized
CECC42000
CECC42200
CECC42201
118623 ÜG

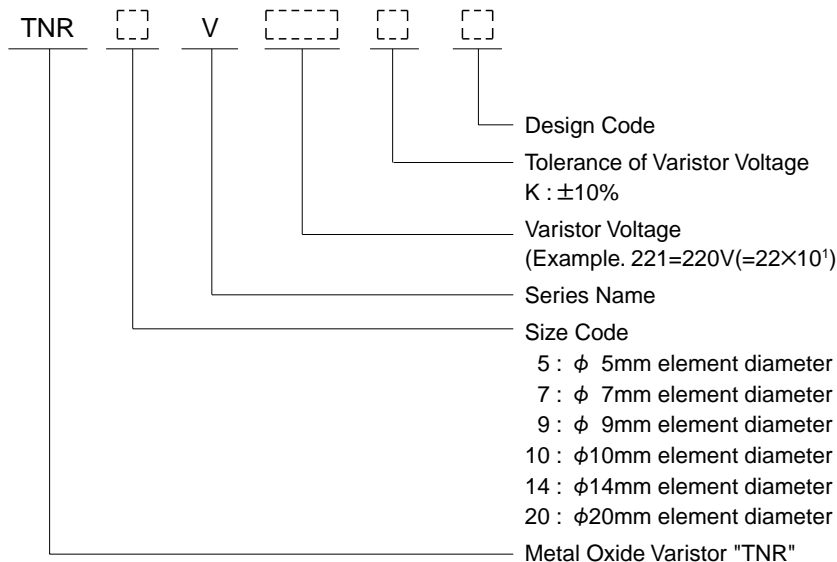
◆APPLICATIONS

- Protection for semiconductors from over voltage.
- Protection for electronic instruments from lightning surges.
- Absorption of on-off surges from motors and relays.

Operating Temperature Range: -40~+85°C

Storage Temperature Range: -50~+125°C

◆PART NUMBERING SYSTEM

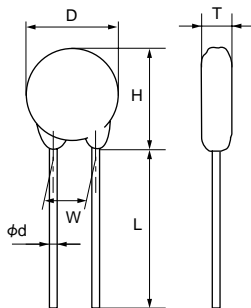


V Series

◆ RATINGS (Type 5V)

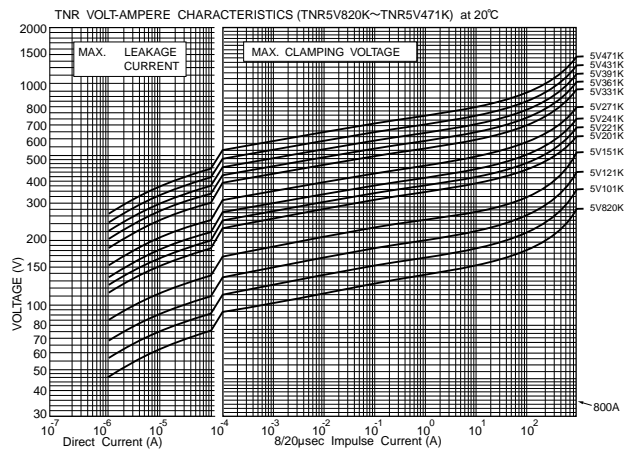
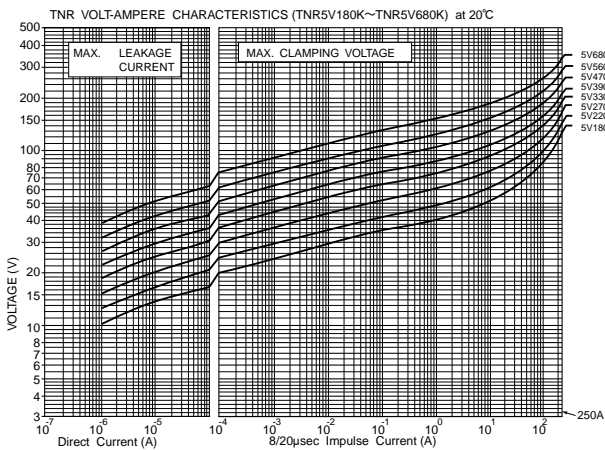
Model Number	Maximum Rating				Rated Wattage (W)	Maximum Clamping Voltage		Capacitance Typical at 1kHz (pF)	Varistor Voltage V0.1mA (V)	T Max. (mm)
	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy		(A)	(V)			
	AC. (Vrms)	DC. (V)	8/20μs (A)	2ms (J)						
TNR5V180K	11	14	250/1 time 125/2 times	0.4	0.01	1	40	2,540	18 (16~ 20)	4.5
TNR5V220K	14	18		0.5			48	2,090	22 (20~ 24)	
TNR5V270K	17	22		0.7			60	1,790	27 (24~ 30)	
TNR5V330K	20	26		0.8			73	1,480	33 (30~ 36)	
TNR5V390K	25	30		0.9			86	1,310	39 (35~ 43)	
TNR5V470K	30	37		1.1			104	1,140	47 (42~ 52)	
TNR5V560K	35	44		1.3			123	1,000	56 (50~ 62)	
TNR5V680K	40	55	1.6	150	870	68 (61~ 75)				
TNR5V820K	50	65	800/1 time 600/2 times	2.5	0.1	5	145	400	82 (74~ 90)	4.1
TNR5V101K	60	85		3.0			175	350	100 (90~110)	4.3
TNR5V121K	75	100		3.5			210	310	120 (108~132)	4.5
TNR5V151K	95	125		4.5			260	270	150 (135~165)	4.8
TNR5V181K	110	145		5.0			325	190	180 (162~198)	4.3
TNR5V201K	130	170		6.0			355	110	200 (185~225)	4.4
TNR5V221K	140	180		6.5			380	110	220 (198~242)	4.5
TNR5V241K	150	200		7.5			415	100	240 (216~264)	4.6
TNR5V271K	175	225		8.0			475	90	270 (247~303)	4.8
TNR5V331K	210	270		9.5			570	80	330 (297~363)	5.1
TNR5V361K	230	300		11.0			620	80	360 (324~396)	5.3
TNR5V391K	250	320		12.0			675	70	390 (351~429)	5.4
TNR5V431K	275	350		13.5			745	70	430 (387~473)	5.6
TNR5V471K	300	385		15.0			810	60	470 (423~517)	5.8

◆ DIMENSIONS [mm]



D Max.	H Max.	T Max.	L Min.	φd ±0.05	W ±1.0
7	10	Ref. to RATINGS	20	0.6	5.0

◆ V-I CURVE

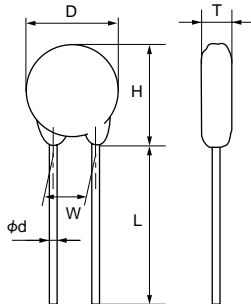


V Series

◆ RATINGS (Type 7V)

Model Number	Maximum Rating				Maximum Clamping Voltage		Capacitance Typical	Varistor Voltage V1mA	T Max.	
	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy						Rated Wattage
	AC. (Vrms)	DC. (V)	8/20 μ s (A)	2ms (J)	(W)	(A)	(V)	at 1kHz (pF)	(V)	(mm)
TNR7V150K	8	12		0.7			30	4,600	15 (13~ 17)	4.5
TNR7V180K	11	14		0.9			36	3,800	18 (16~ 20)	4.5
TNR7V220K	14	18		1.1			43	3,200	22 (20~ 24)	4.6
TNR7V270K	17	22	500/1 time	1.3			53	2,800	27 (24~ 30)	4.7
TNR7V330K	20	26		1.6	0.02	2.5	65	2,300	33 (30~ 36)	4.9
TNR7V390K	25	30	250/2 times	1.9			77	2,100	39 (35~ 43)	4.8
TNR7V470K	30	37		2.3			93	1,900	47 (42~ 52)	4.9
TNR7V560K	35	44		2.7			110	1,700	56 (50~ 62)	5.0
TNR7V680K	40	55		3.3			135	1,500	68 (61~ 75)	5.2
TNR7V820K	50	65		5.0			135	800	82 (74~ 90)	4.1
TNR7V101K	60	85		6.0			165	700	100 (90~110)	4.3
TNR7V121K	75	100		7.0			200	650	120 (108~132)	4.5
TNR7V151K	95	125		9.0			250	600	150 (135~165)	4.8
TNR7V181K	110	145		11.0			300	430	180 (162~198)	4.3
TNR7V201K	130	170		12.5			340	250	200 (185~225)	4.4
TNR7V221K	140	180	1,750/1 time	13.5			360	230	220 (198~242)	4.5
TNR7V241K	150	200		15.0	0.25	10	395	210	240 (216~264)	4.6
TNR7V271K	175	225	1,250/2 times	17.0			455	190	270 (247~303)	4.8
TNR7V331K	210	270		20.0			545	160	330 (297~363)	5.1
TNR7V361K	230	300		23.0			595	150	360 (324~396)	5.3
TNR7V391K	250	320		25.0			650	140	390 (351~429)	5.4
TNR7V431K	275	350		27.5			710	130	430 (387~473)	5.6
TNR7V471K	300	385		30.0			775	120	470 (423~517)	5.8
TNR7V511K	320	410		32.0			845	110	510 (459~561)	6.0

◆ DIMENSIONS [mm]

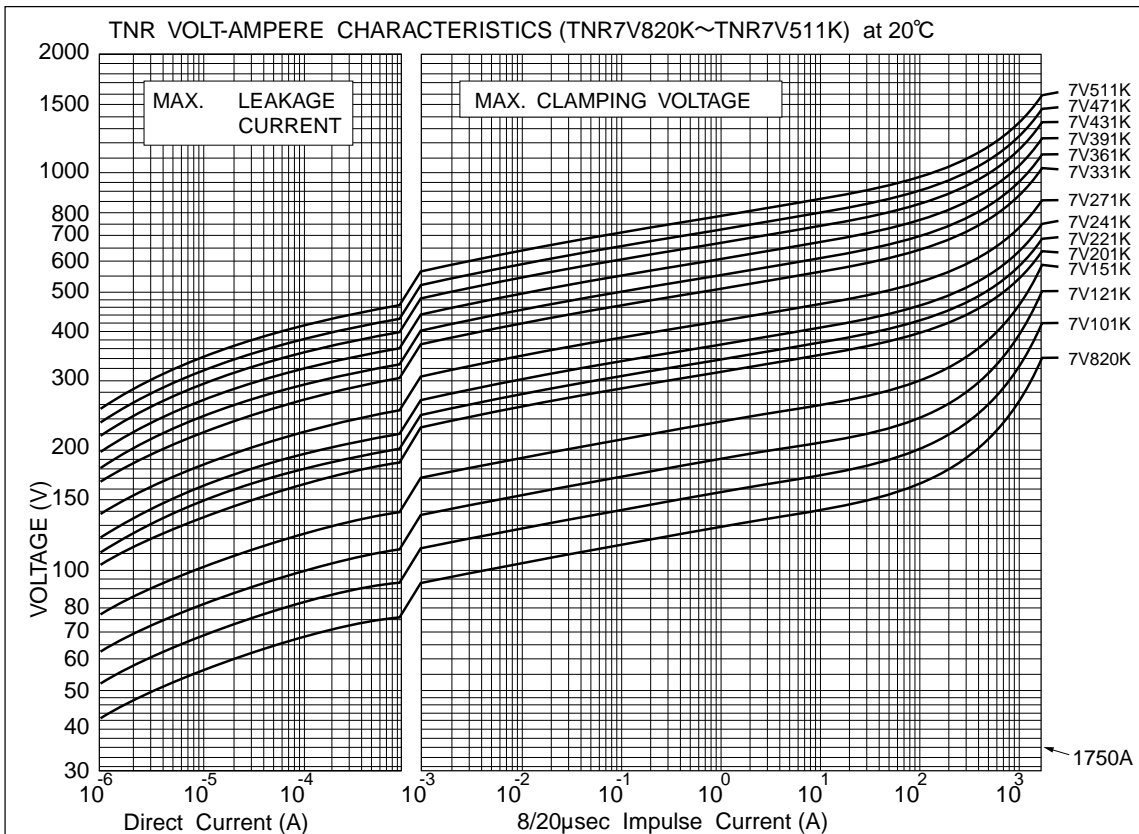
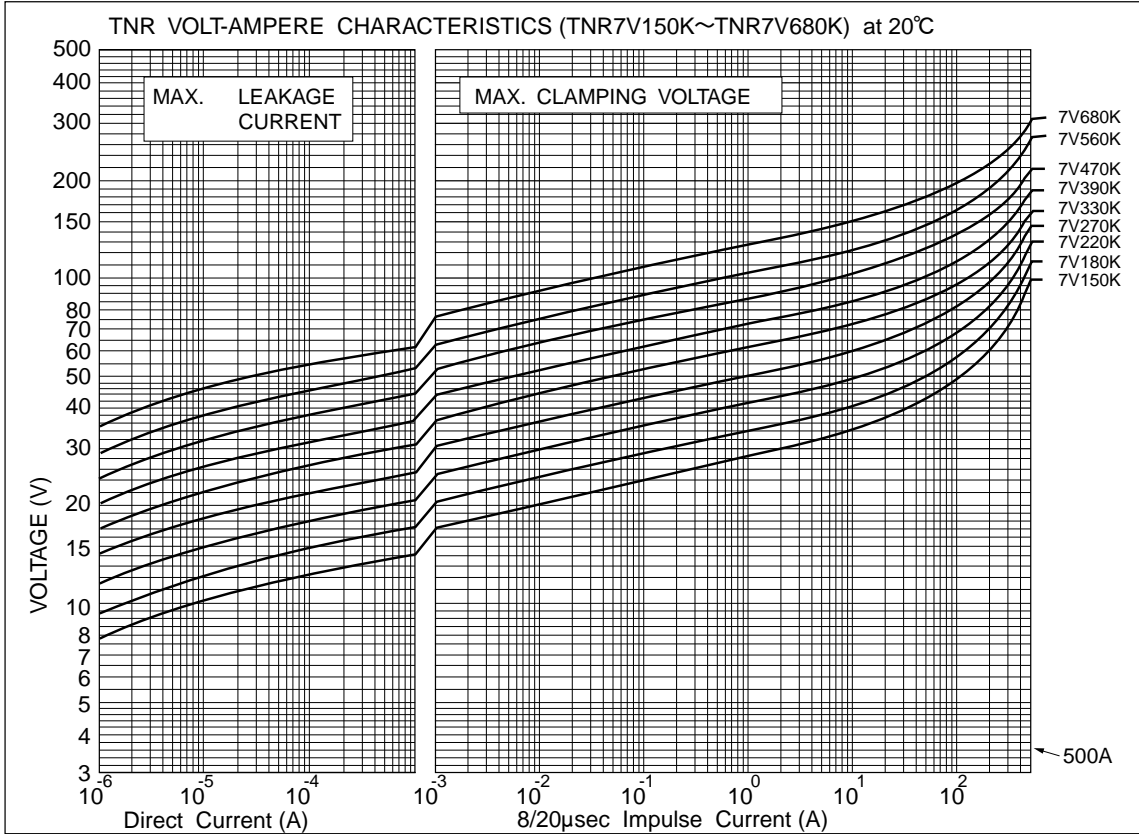


D Max.	H Max.	T Max.	L Min.	ϕ d ± 0.05	W ± 1.0
8.5	11.5	Ref. to RATINGS	20	0.6	5.0



V Series

◆V-I CURVE (Type 7V)

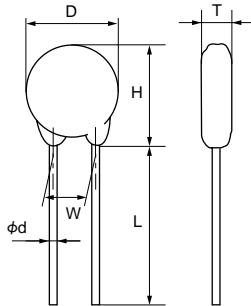


V Series

◆RATINGS (Type 9V)

Model Number	Maximum Rating				Maximum Clamping Voltage		Capacitance Typical	Varistor Voltage V1mA	T Max.		
	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy						Rated Wattage	
	AC. (Vrms)	DC. (V)	8/20 μ s (A)	2ms (J)	(W)	(A)	(V)	at 1kHz (pF)	(V)	(mm)	
TNR9V150K	8	12	800/1 time	2.0	0.02	5	30	9,600	15 (13~ 17)	3.8	
TNR9V180K	11	14		2.2			36	8,000	18 (16~ 20)	3.8	
TNR9V220K	14	18		2.6			43	7,000	22 (20~ 24)	4.0	
TNR9V270K	17	22		3.2			53	6,000	27 (24~ 30)	4.2	
TNR9V330K	20	26		4.0			65	5,000	33 (30~ 36)	4.5	
TNR9V390K	25	30		400/2 times			4.7	77	4,500	39 (35~ 43)	4.0
TNR9V470K	30	37		5.6			93	4,000	47 (42~ 52)	4.2	
TNR9V560K	35	44		6.7			110	3,500	56 (50~ 62)	4.4	
TNR9V680K	40	55	8.2	135	3,200	68 (61~ 75)	4.5				
TNR9V820K	50	65	10.0	135	1,700	82 (74~ 90)	3.8				
TNR9V101K	60	85	12.0	165	1,600	100 (90~110)	3.9				
TNR9V121K	75	100	14.5	200	1,400	120 (108~132)	4.1				
TNR9V151K	95	125	18.0	250	1,300	150 (135~165)	4.4				
TNR9V181K	110	145	22.0	300	900	180 (162~198)	4.0				
TNR9V201K	130	170	25.0	340	500	200 (185~225)	4.1				
TNR9V221K	140	180	3,000/1 time	27.5	360	450	220 (198~242)	4.2			
TNR9V241K	150	200	2,000/2 times	30.0	395	400	240 (216~264)	4.3			
TNR9V271K	175	225		35.0	455	350	270 (247~303)	4.5			
TNR9V331K	210	270		42.0	545	300	330 (297~363)	4.8			
TNR9V361K	230	300		45.0	595	280	360 (324~396)	5.0			
TNR9V391K	250	320		50.0	650	260	390 (351~429)	5.1			
TNR9V431K	275	350		55.0	710	240	430 (387~473)	5.3			
TNR9V471K	300	385		60.0	775	220	470 (423~517)	5.6			
TNR9V511K	320	410		67.0	845	210	510 (459~561)	5.8			

◆DIMENSIONS [mm]

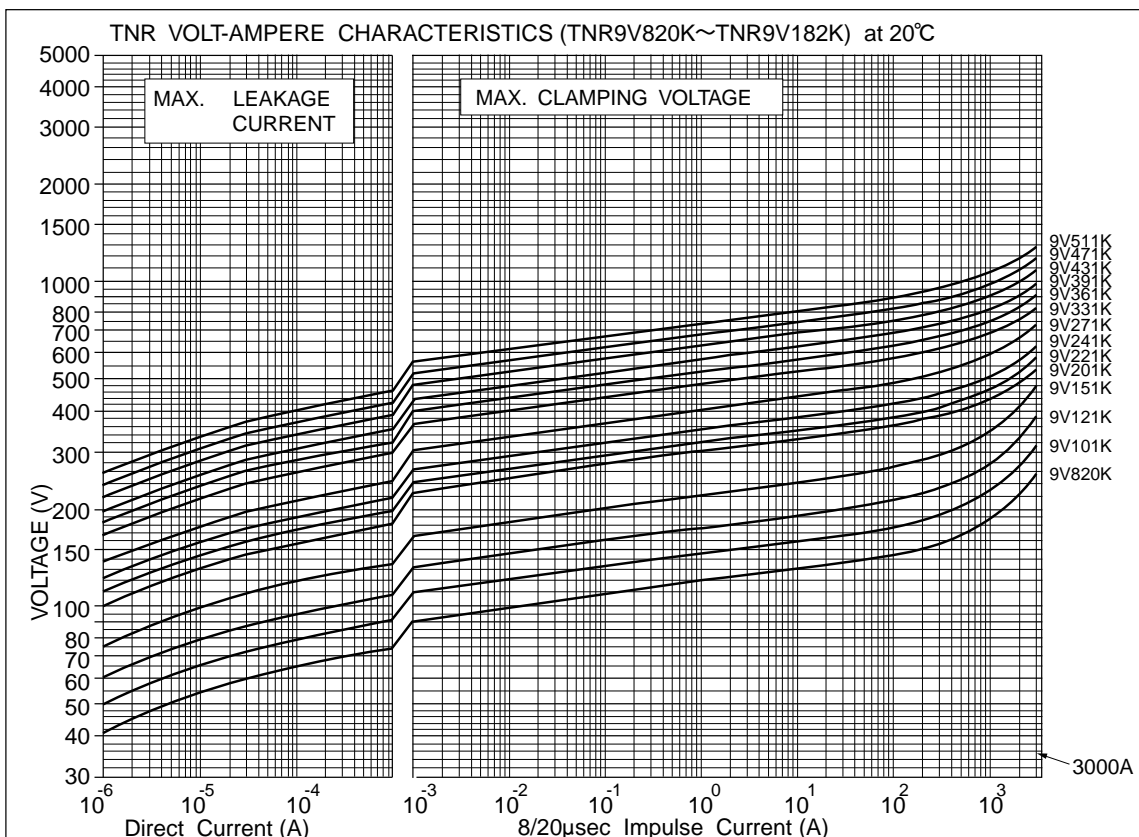
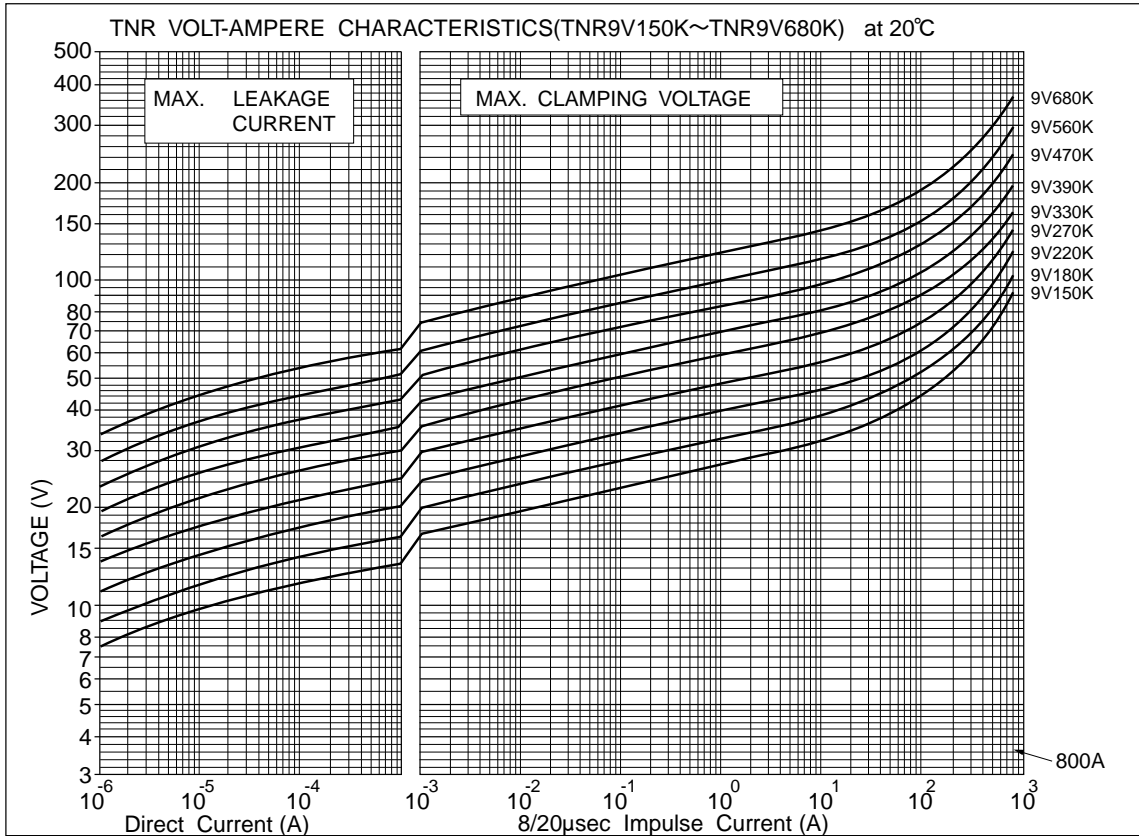


D Max.	H Max.	T Max.	L Min.	φd ±0.05	W ±1.0
11.5	14.5	Ref. to RATINGS	20	0.6	5.0



V Series

◆V-I CURVE (Type 9V)

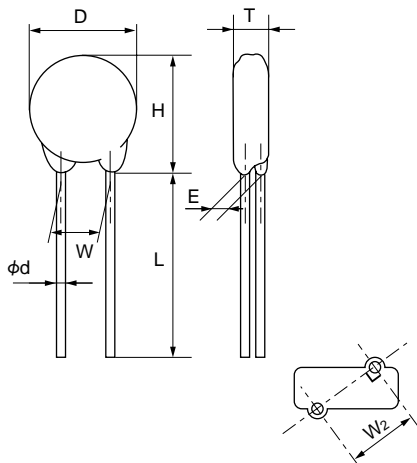


◆RATINGS (Type 10V)

Model Number	Maximum Rating					Maximum Clamping Voltage	Capacitance Typical	Varistor Voltage V1mA	E ±1.0	T Max.		
	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy	Rated Wattage							
	AC. (Vrms)	DC. (V)	8/20µs (A)	2ms (J)	(W)							
TNR10V150K	8	12	1,000/1 time	2.0	0.05	5	30	9,600	15 (13~ 17)	1.2	4.5	
TNR10V180K	11	14		2.2			36	8,000	18 (16~ 20)	1.3	4.6	
TNR10V220K	14	18		2.6			43	7,000	22 (20~ 24)	1.4	4.7	
TNR10V270K	17	22		3.2			53	6,000	27 (24~ 30)	1.5	4.8	
TNR10V330K	20	26		4.0			65	5,000	33 (30~ 36)	1.7	5.0	
TNR10V390K	25	30		500/2 times			4.7	77	4,500	39 (35~ 43)	1.6	4.9
TNR10V470K	30	37		5.6			93	4,000	47 (42~ 52)	1.7	5.0	
TNR10V560K	35	44	6.7	110	3,500	56 (50~ 62)	1.8	5.1				
TNR10V680K	40	55	8.2	135	3,200	68 (61~ 75)	2.0	5.3				
TNR10V820K	50	65	10.0	135	1,700	82 (74~ 90)	1.6	4.5				
TNR10V101K	60	85	12.0	165	1,600	100 (90~ 110)	1.8	4.7				
TNR10V121K	75	100	14.5	200	1,400	120 (108~ 132)	2.0	4.9				
TNR10V151K	95	125	18.0	250	1,300	150 (135~ 165)	2.3	5.2				
TNR10V181K	110	145	22.0	300	900	180 (162~ 198)	1.8	4.7				
TNR10V201K	130	170	25.0	340	500	200 (185~ 225)	1.9	4.8				
TNR10V221K	140	180	27.5	360	450	220 (198~ 242)	2.0	4.9				
TNR10V241K	150	200	30.0	395	400	240 (216~ 264)	2.1	5.0				
TNR10V271K	175	225	35.0	455	350	270 (247~ 303)	2.3	5.2				
TNR10V331K	210	270	42.0	545	300	330 (297~ 363)	2.6	5.5				
TNR10V361K	230	300	45.0	595	280	360 (324~ 396)	2.8	5.7				
TNR10V391K	250	320	3,500/1 time	50.0	650	260	390 (351~ 429)	2.9	5.8			
TNR10V431K	275	350	55.0	710	240	430 (387~ 473)	3.1	6.0				
TNR10V471K	300	385	2,500/2 times	60.0	775	220	470 (423~ 517)	3.3	6.2			
TNR10V511K	320	410	67.0	845	210	510 (459~ 561)	3.5	6.4				
TNR10V561K	350	460	67.0	922	195	560 (504~ 616)	3.8	7.1				
TNR10V621K	385	505	67.0	1,025	180	620 (558~ 682)	4.2	7.1				
TNR10V681K	420	560	67.0	1,120	165	680 (612~ 748)	4.5	7.4				
TNR10V751K	460	615	70.0	1,240	150	750 (675~ 825)	4.9	7.8				
TNR10V821K	510	670	80.0	1,355	140	820 (738~ 902)	5.2	8.1				
TNR10V911K	550	745	90.0	1,500	125	910 (819~1,001)	5.7	8.6				
TNR10V102K	625	825	100.0	1,650	115	1,000 (900~1,100)	6.2	9.1				
TNR10V112K	680	895	110.0	1,815	105	1,100 (990~1,210)	6.8	9.7				
TNR10V122K	720	980	120.0	1,950	95	1,200 (1,080~1,320)	7.1	10.5				
TNR10V152K	860	1,220	150.0	2,440	85	1,500 (1,350~1,650)	8.7	12.4				
TNR10V182K	1,000	1,465	183.0	2,970	70	1,800 (1,700~1,980)	10.5*	14.4				

*E±2.0

◆DIMENSIONS [mm]



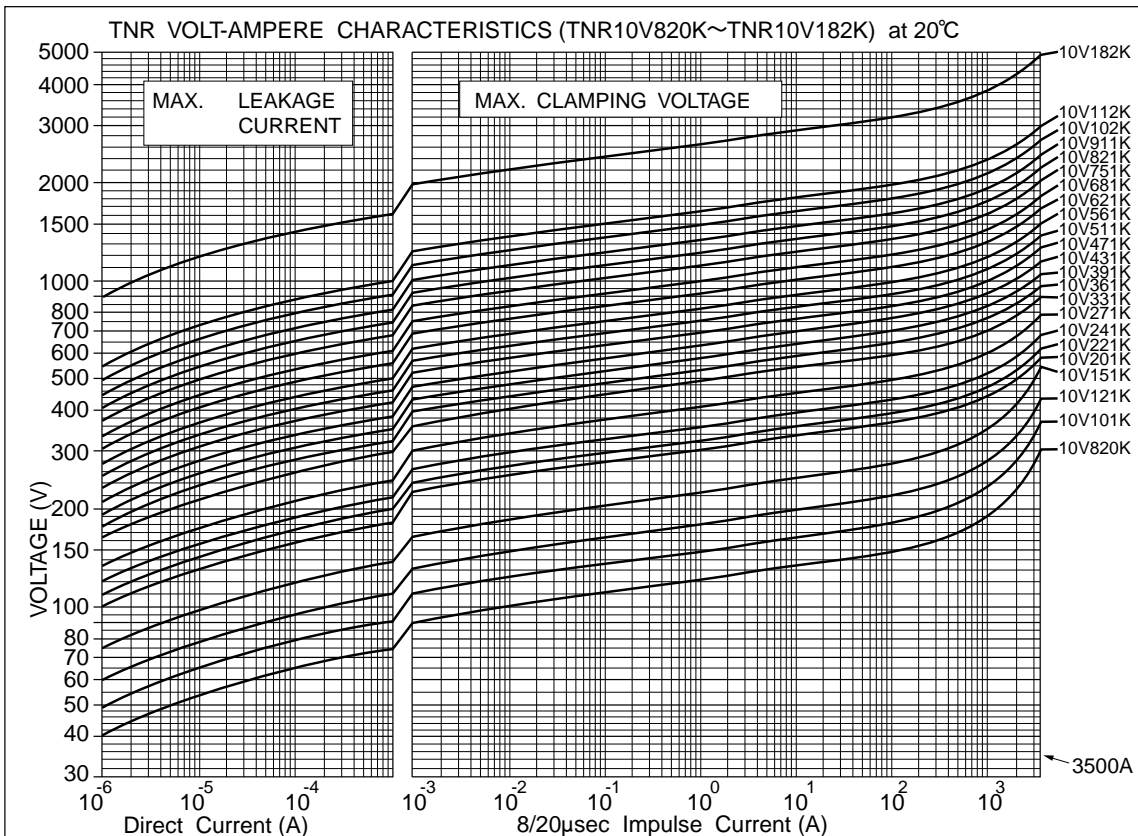
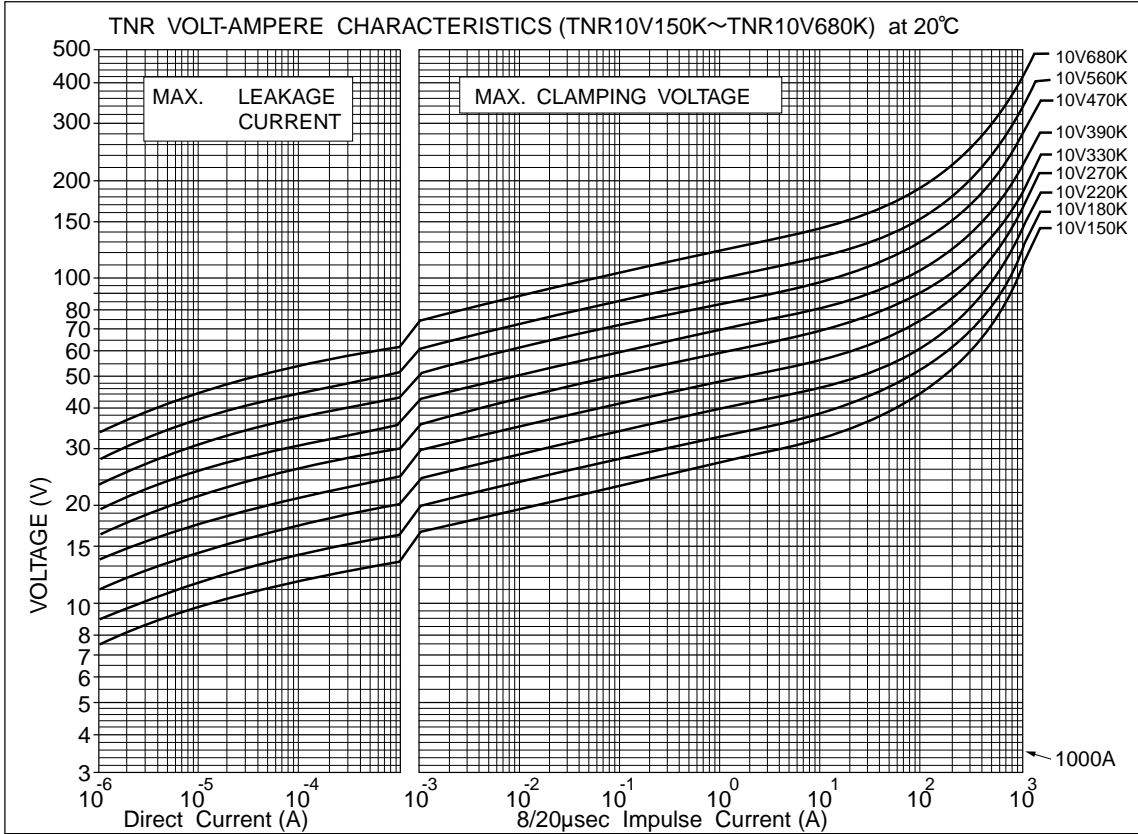
Model Number	D Max.	H Max.	T Max.	L Min.	φd ±0.05	W ±1.0
TNR10V150K to TNR10V511K	11.5	14.5	Ref. to RATINGS	20	0.8	7.5
TNR10V561K to TNR10V112K	12.5	15.5				11.0*
TNR10V122K to TNR10V182K	13.5	16.5				

*W2±2.0



V Series

◆V-I CURVE (Type 10V)

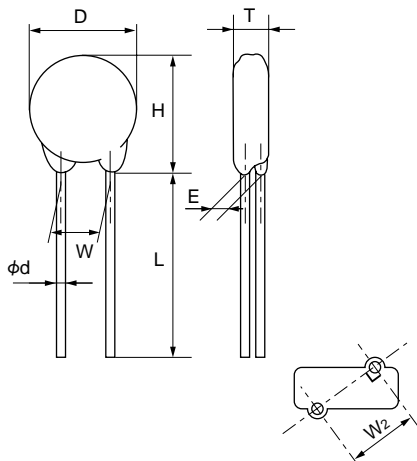


◆RATINGS (Type 14V)

Model Number	Maximum Rating					Maximum Clamping Voltage	Capacitance Typical	Varistor Voltage V1mA	E ±1.0	T Max.	
	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy	Rated Wattage						
	AC. (Vrms)	DC. (V)	8/20µs (A)	2ms (J)	(W)	(A)	(V)	at 1kHz (pF)	(V)	(mm)	(mm)
TNR14V150K	8	12	2,000/1 time	3.6	0.1	10	30	19,500	15 (13~ 17)	1.2	4.5
TNR14V180K	11	14		4.3			36	16,500	18 (16~ 20)	1.3	4.6
TNR14V220K	14	18		5.3			43	13,500	22 (20~ 24)	1.4	4.7
TNR14V270K	17	22		6.5			53	12,000	27 (24~ 30)	1.5	4.8
TNR14V330K	20	26	1,000/2 times	7.9	0.6	50	65	10,000	33 (30~ 36)	1.7	5.0
TNR14V390K	25	30		9.4			77	9,000	39 (35~ 43)	1.6	4.9
TNR14V470K	30	37		11.0			93	8,000	47 (42~ 52)	1.7	5.0
TNR14V560K	35	44		13.0			110	7,500	56 (50~ 62)	1.8	5.1
TNR14V680K	40	55	16.0	135	6,500	68 (61~ 75)	2.0	5.3			
TNR14V820K	50	65	20.0	135	3,000	82 (74~ 90)	1.6	4.5			
TNR14V101K	60	85	25.0	165	2,700	100 (90~ 110)	1.8	4.7			
TNR14V121K	75	100	30.0	200	2,500	120 (108~ 132)	2.0	4.9			
TNR14V151K	95	125	37.0	250	2,300	150 (135~ 165)	2.3	5.2			
TNR14V181K	110	145	45.0	300	1,650	180 (162~ 198)	1.8	4.7			
TNR14V201K	130	170	50.0	340	950	200 (185~ 225)	1.9	4.8			
TNR14V221K	140	180	55.0	360	850	220 (198~ 242)	2.0	4.9			
TNR14V241K	150	200	5,000/2 times	60.0	395	800	240 (216~ 264)	2.1	5.0		
TNR14V271K	175	225		70.0	455	700	270 (247~ 303)	2.3	5.2		
TNR14V331K	210	270		80.0	545	600	330 (297~ 363)	2.6	5.5		
TNR14V361K	230	300		90.0	595	550	360 (324~ 396)	2.8	5.7		
TNR14V391K	250	320	100.0	650	500	390 (351~ 429)	2.9	5.8			
TNR14V431K	275	350	110.0	710	460	430 (387~ 473)	3.1	6.0			
TNR14V471K	300	385	125.0	775	420	470 (423~ 517)	3.3	6.2			
TNR14V511K	320	410	136.0	845	390	510 (459~ 561)	3.5	6.4			
TNR14V561K	350	460	5,000/1 time	922	360	560 (504~ 616)	3.8	6.7			
TNR14V621K	385	505		136.0	1,025	330	620 (558~ 682)	4.2	7.1		
TNR14V681K	420	560		136.0	1,120	310	680 (612~ 748)	4.5	7.4		
TNR14V751K	460	615		150.0	1,240	280	750 (675~ 825)	4.9	7.8		
TNR14V821K	510	670	165.0	1,355	250	820 (738~ 902)	5.2	8.1			
TNR14V911K	550	745	180.0	1,500	230	910 (819~1,001)	5.7	8.6			
TNR14V102K	625	825	200.0	1,650	210	1,000 (900~1,100)	6.2	9.1			
TNR14V112K	680	895	4,500/2 times	220.0	1,815	190	1,100 (990~1,210)	6.8	9.7		
TNR14V122K	720	980		240.0	1,950	170	1,200 (1,080~1,320)	7.1	10.5		
TNR14V152K	860	1,220		300.0	2,440	150	1,500 (1,350~1,650)	8.7	12.4		
TNR14V182K	1,000	1,465		360.0	2,970	120	1,800 (1,700~1,980)	10.5*	14.4		

*E±2.0

◆DIMENSIONS [mm]



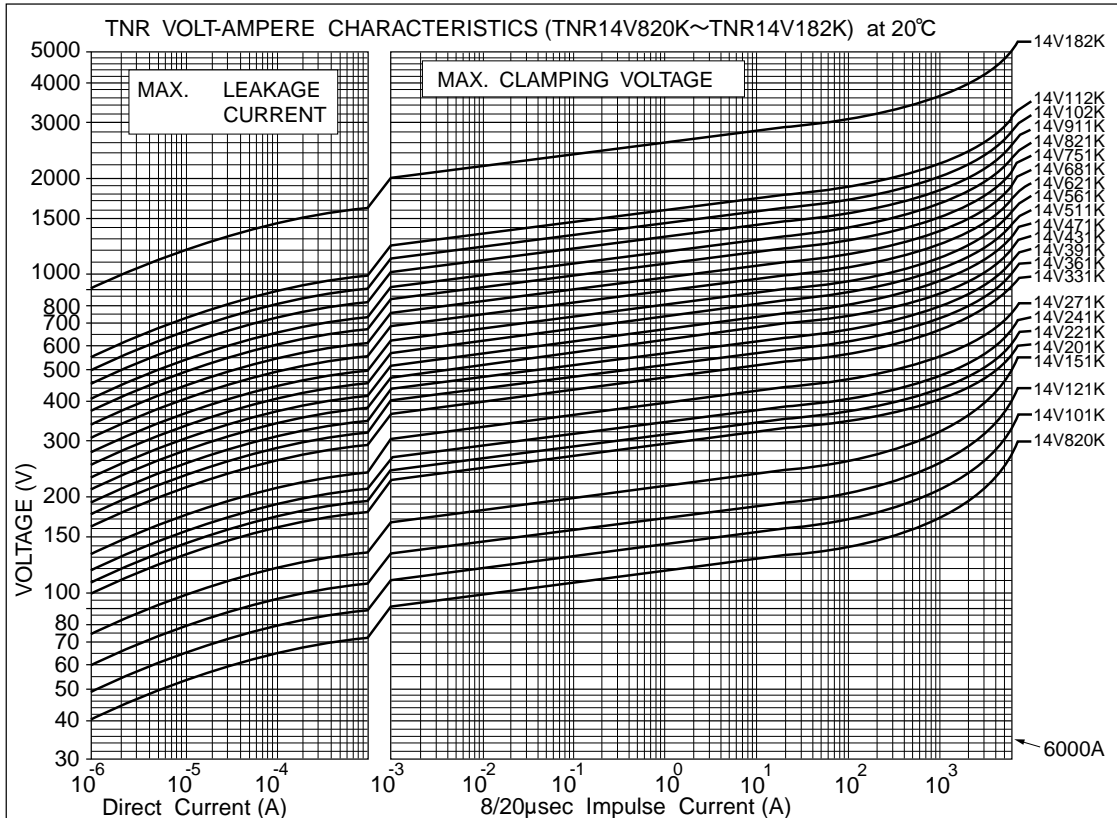
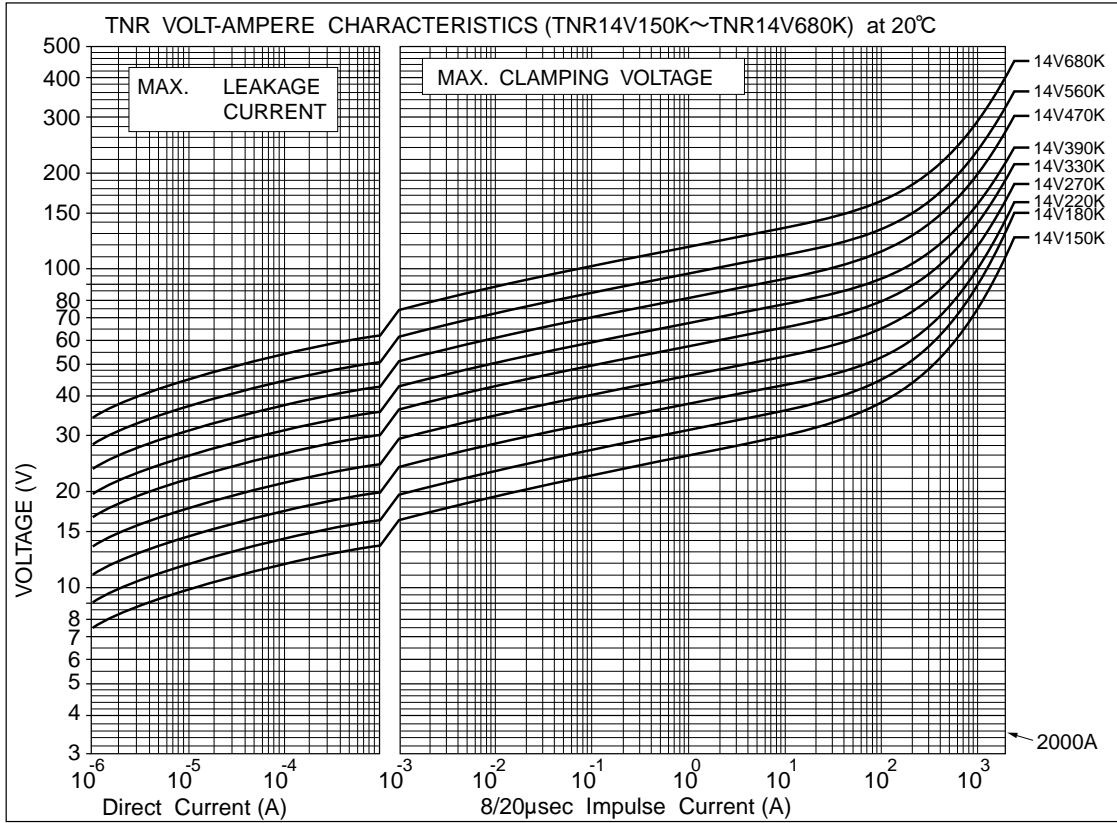
Model Number	D Max.	H Max.	T Max.	L Min.	φd ±0.05	W ±1.0
TNR14V150K to TNR14V511K	15.5	18.5	Ref. to RATINGS	20	0.8	7.5
TNR14V561K to TNR14V112K	16.0	19.0				11.0*
TNR14V122K to TNR14V182K	17.0	20.5				

*W2±2.0



V Series

◆V-I CURVE (Type 14V)

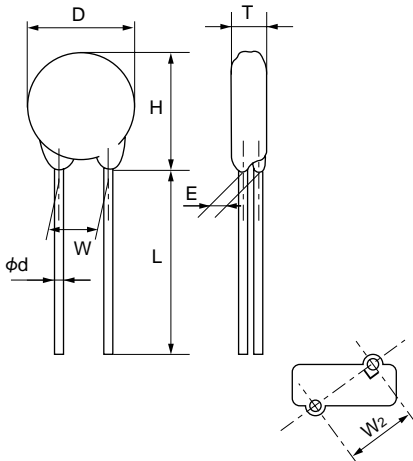


◆RATINGS (Type 20V)

Model Number	Maximum Rating					Maximum Clamping Voltage	Capacitance Typical	Varistor Voltage V1mA	E ±1.0	T Max.	
	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy	Rated Wattage						
	AC. (Vrms)	DC. (V)	8/20µs (A)	2ms (J)	(W)						
TNR20V180K	11	14	3,000/1 time	12.0	0.2	20	36	39,000	18 (16~ 20)	1.5	5.1
TNR20V220K	14	18		14.0			43	33,000	22 (20~ 24)	1.6	5.2
TNR20V270K	17	22		17.0			53	28,000	27 (24~ 30)	1.7	5.3
TNR20V330K	20	26	2,000/2 times	21.0	1.0	100	65	24,000	33 (30~ 36)	1.9	5.5
TNR20V390K	25	30		25.0			77	21,000	39 (35~ 43)	1.9	5.5
TNR20V470K	30	37		30.0			93	19,000	47 (42~ 52)	2.0	5.6
TNR20V560K	35	44	10,000/1 time	36.0	1.0	100	110	17,000	56 (50~ 62)	2.1	5.7
TNR20V680K	40	55		44.0			135	15,000	68 (61~ 75)	2.2	5.8
TNR20V820K	50	65		40.0			135	6,700	82 (74~ 90)	1.8	4.9
TNR20V101K	60	85	7,000/2 times	50.0	1.0	100	165	6,100	100 (90~ 110)	2.0	5.1
TNR20V121K	75	100		60.0			200	5,600	120 (108~ 132)	2.2	5.3
TNR20V151K	95	125		75.0			250	5,100	150 (135~ 165)	2.5	5.6
TNR20V181K	110	145	10,000/1 time	85.0	1.0	100	300	3,900	180 (162~ 198)	2.0	5.1
TNR20V201K	130	170		100.0			340	2,700	200 (185~ 225)	2.1	5.2
TNR20V221K	140	180		110.0			360	2,500	220 (198~ 242)	2.2	5.3
TNR20V241K	150	200	7,000/2 times	120.0	1.0	100	395	2,300	240 (216~ 264)	2.3	5.4
TNR20V271K	175	225		135.0			455	2,000	270 (247~ 303)	2.5	5.6
TNR20V331K	210	270		160.0			545	1,700	330 (297~ 363)	2.8	5.9
TNR20V361K	230	300	6,500/2 times	180.0	1.0	100	595	1,500	360 (324~ 396)	3.0	6.1
TNR20V391K	250	320		195.0			650	1,400	390 (351~ 429)	3.1	6.2
TNR20V431K	275	350		215.0			710	1,300	430 (387~ 473)	3.3	6.4
TNR20V471K	300	385	7,500/1 time	250.0	1.0	100	775	1,200	470 (423~ 517)	3.5	6.6
TNR20V511K	320	410		273.0			845	1,100	510 (459~ 561)	3.7	6.8
TNR20V561K	350	460		273.0			922	1,000	560 (504~ 616)	4.0	7.1
TNR20V621K	385	505	6,500/2 times	273.0	1.0	100	1,025	900	620 (558~ 682)	4.4	7.5
TNR20V681K	420	560		273.0			1,120	830	680 (612~ 748)	4.7	7.8
TNR20V751K	460	615		300.0			1,240	750	750 (675~ 825)	5.1	8.2
TNR20V821K	510	670	7,500/1 time	325.0	1.0	100	1,355	700	820 (738~ 902)	5.4	8.5
TNR20V911K	550	745		360.0			1,500	620	910 (819~1,001)	5.9	9.0
TNR20V102K	625	825		400.0			1,650	560	1,000 (900~1,100)	6.4	9.5
TNR20V112K	680	895	6,500/2 times	440.0	1.0	100	1,815	510	1,100 (990~1,210)	7.0	10.1
TNR20V122K	720	980		480.0			1,950	450	1,200 (1,080~1,320)	7.3	10.8
TNR20V152K	860	1,220		600.0			2,440	390	1,500 (1,350~1,650)	8.9	12.8
TNR20V182K	1,000	1,465	720.0	2,970	340	1,800 (1,700~1,980)	10.7*	14.8			

*E±2.0

◆DIMENSIONS [mm]



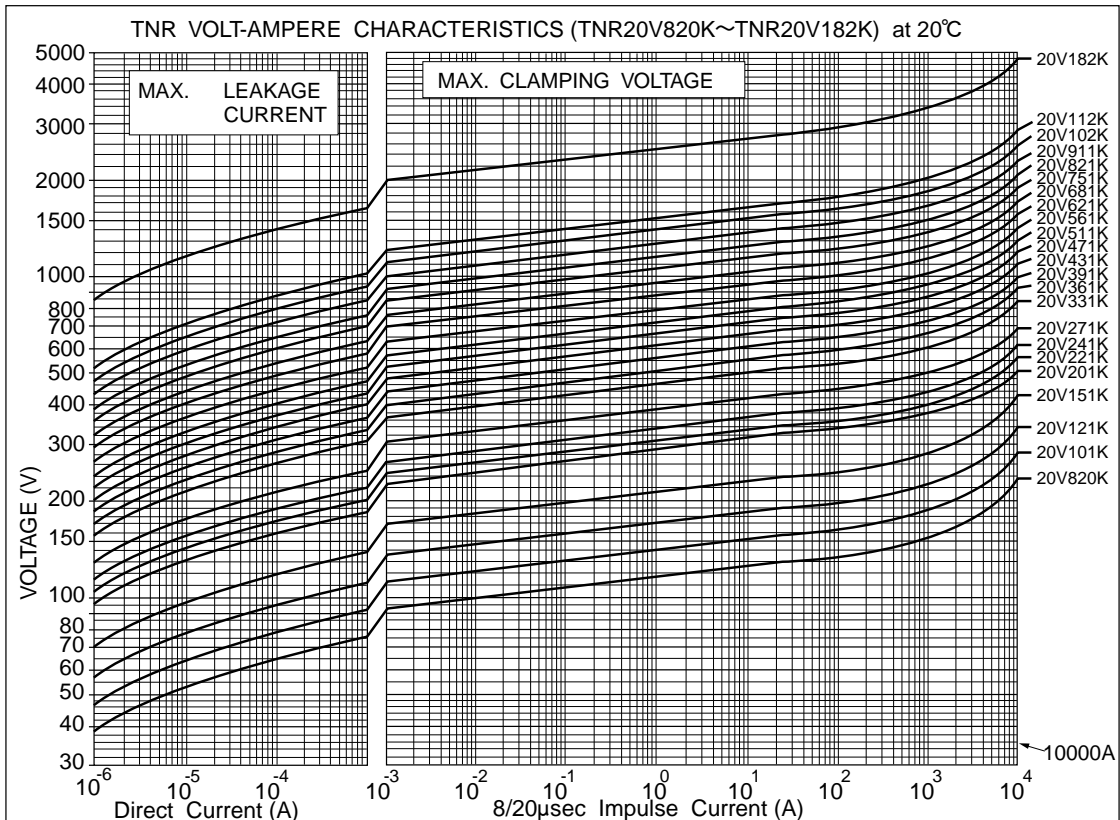
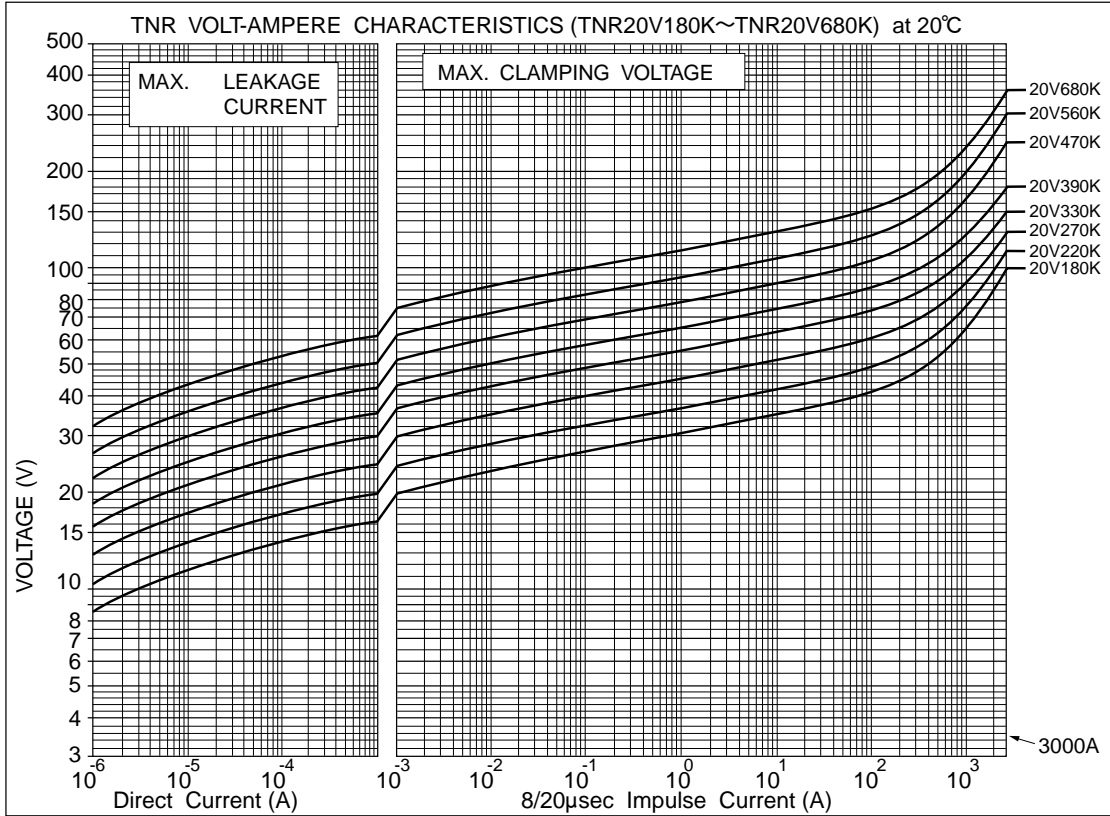
Model Number	D Max.	H Max.	T Max.	L Min.	φd ±0.05	W ±1.0
TNR20V180K to TNR20V511K	21.5	24.5	Ref. to RATINGS	20	0.8	10.0
TNR20V561K to TNR20V112K	22.5	25.5				
TNR20V122K to TNR20V182K	23.5	28.0				

*W2±2.0



V Series

◆V-I CURVE (Type 20V)





V Series

◆GENERAL SPECIFICATIONS

Item	Test Conditions	Specifications						
Standard Test Condition	20±5°C, 65±20% RH unless specified. However, if it does not affect test result, the condition can be 20±15°C, 65±20% RH also.							
Varistor Voltage	Voltage across varistor at specified current. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Type</th> <th>Current C(mA)</th> </tr> </thead> <tbody> <tr> <td>5V</td> <td>0.1</td> </tr> <tr> <td>7V, 9V, 10V, 14V, 20V</td> <td>1.0</td> </tr> </tbody> </table>	Type	Current C(mA)	5V	0.1	7V, 9V, 10V, 14V, 20V	1.0	Satisfy the specification
Type	Current C(mA)							
5V	0.1							
7V, 9V, 10V, 14V, 20V	1.0							
Maximum Allowable Voltage	Maximum continuous AC voltage (50~60Hz AC) and maximum DC voltage which can be applied.	Satisfy the specification						
Maximum Peak Surge Current	Maximum surge current (8/20µSec. pulse wave to be applied once, or twice, 2 minute apart) for varistor voltage change within ±10% of the initial value.	Satisfy the specification						
Energy Rating	Maximum energy (2mSec. square wave to be applied once) for varistor voltage change within ±10% of the initial value.	Satisfy the specification						
Rated Wattage	Maximum power (50~60Hz AC power to be applied for 1,000 hours at 85±2°C) for varistor voltage change within ±10% of the initial value.	Satisfy the specification						
Maximum Clamping Voltage	Maximum voltage across varistor when 8/20µSec. rated current surge is applied.	Satisfy the specification						
Capacitance	Varistor's capacitance at 1kHz, standard test condition.	For reference only.						
Voltage Temperature Coefficient	$\frac{V_{cmA} \text{ at } 85^{\circ}\text{C} - V_{cmA} \text{ at } 25^{\circ}\text{C}}{V_{cmA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{60} \times 100 (\%/^{\circ}\text{C})$ VcmA : Actual varistor voltage	Within ±0.05%/°C						
Insulation	Short circuit the two leads of varistor, and put the varistor body into lead balls (1.6mm diameter) leaving 2mm epoxy coating outside. Then, apply 2.5kVrms between the leads and the lead balls for 60±5 seconds.	The varistor shall withstand with no abnormality.						

◆RELIABILITY CHARACTERISTICS

Item	Test Conditions	Specifications
Heat Cycle	Subject varistor to the following temperature cycles. -40°C for 30 minutes → Normal room temperature for 10 minutes → 85°C for 30 minutes → Normal room temperature for 10 minutes. This completes one cycle. The cycle shall be repeated 5 times total. After the cycles, the varistor shall be stored at normal room temperature for one hour. Then check the varistor voltage and the appearance.	$\Delta V_{cmA} \leq \pm 5\%$ No appearance abnormality.
High Temperature Exposure	Store varistor at 125°C for 1,000 hours. After that, store the varistor at normal room temperature for one hour. Then check the varistor voltage.	$\Delta V_{cmA} \leq \pm 5\%$ However, on varistors have nominal varistor voltages from 15V to 68V, the varistor voltage change shall be $\Delta V_{cmA} \leq \pm 10\%$
Humidity Resistivity	Store at 40°C, 90~95% RH for 1,000 hours. After that, store the varistor at normal room temperature for one hour. Then check the varistor voltage.	$\Delta V_{cmA} \leq \pm 5\%$
High Temperature Operation	Apply maximum applied voltage to varistor at 85°C for 1,000 hours. After that, store the varistor at normal room temperature for one hour. Then check the varistor voltage.	$\Delta V_{cmA} \leq \pm 10\%$

◆MECHANICAL CHARACTERISTICS

Item	Test Conditions	Specifications									
Soldering Heat Resistivity	Store varistor at normal room temperature. Dip the varistor leads to solder, at 350±10°C for 3 ± 0 seconds, up to 2.0~2.5 mm from the varistor body. After that, store the varistor at normal room temperature for 30 minutes, and measure the varistor voltage.	$\Delta V_{cmA} \leq \pm 5\%$ Vc : Actual varistor voltage No mechanical damages									
Solderability	Dip varistor leads to methanol solution (JIS K 1501, about 25%) of rosin (JIS Z 5902) for 5~10 seconds. Then, dip the lead to solder (JIS Z 3282 H60A or H63A) at 225~240°C, up to 2.0~2.5mm from the varistor body for 5±0.5 seconds. Then, check the solderability.	At least, 95% of the surface dipped to solder shall be covered by new solder.									
Lead Pull Strength	Fix varistor body, and suspend specified weight toward direction of lead axis.	No abnormality such as disconnection. $\Delta V_{cmA} \leq \pm 5\%$									
	<table border="1"> <thead> <tr> <th>Type</th> <th>Lead Diameter</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>5V, 7V, 9V</td> <td>0.6mm</td> <td>10N</td> </tr> <tr> <td>10V, 14V, 20V</td> <td>0.8mm</td> <td>10N</td> </tr> </tbody> </table>		Type	Lead Diameter	Weight	5V, 7V, 9V	0.6mm	10N	10V, 14V, 20V	0.8mm	10N
	Type		Lead Diameter	Weight							
5V, 7V, 9V	0.6mm	10N									
10V, 14V, 20V	0.8mm	10N									
Lead Bend Strength	Fix varistor body vertically. Then suspend specified weight and bent the varistor body by 90°, and return it to the original position. Carry out the operation in the opposite direction and return the body to the original position.	The leads shall not disconnect, slacken and peel off.									
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	Type		Lead Diameter	Weight							
5V, 7V, 9V	0.6mm	5N									
10V, 14V, 20V	0.8mm	5N									
Vibration Resistivity	Mount varistor body on vibrator, and conduct following vibration test. Peak-to-Peak amplitude : 1.5mm Vibration frequency range : 10Hz~55Hz Sweeping time: Approximately one minute for 10Hz → 55Hz → 10Hz Direction and duration of vibration : Three directions of X, Y and Z. Two hours each. Six hours total.	No remarkable appearance abnormality. $\Delta V_{cmA} \pm 5\%$									