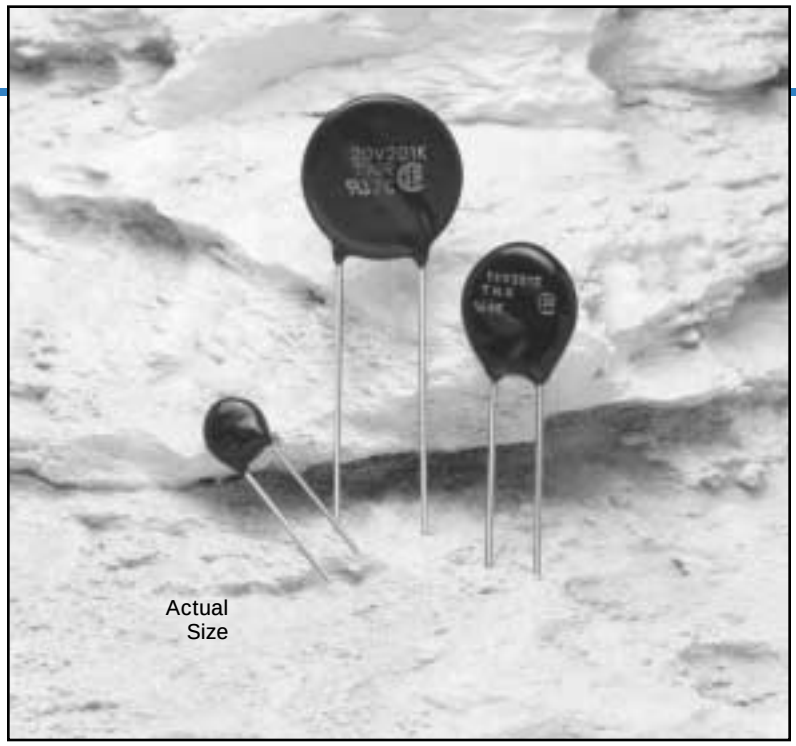
V Series

- **Metal Oxide Varistor**
- **General Purpose**
- **Small Size**
- **UL 1414 and 1449 Approved**
- **+85°C Maximum Temperature**



The V series is a standard metal oxide varistor series from UCC/NCC that are designed for use as surge protectors in general purpose applications. These MOVs are a smaller size and have higher energy and surge ratings compared to the G series. The varistors with a 5mm or 7.5mm lead spacing are available with ammo pack taping.

Refer to the Mini-Glossary at the end of the metal oxide varistors section for additional technical information and specifications.

Summary of Specifications

- **Radial lead terminals.**
- **Operating temperature range: −40°C to +85°C.**
- **Maximum voltage range: 8 to 1,000VAC or 12 to 1,465VDC.**
- **Standard varistor voltage tolerance: ±10%**
- **Maximum energy: 0.4 to 720J depending on case size.**
- **Maximum surge current: 250 to 10,000A.**
- **Maximum case size (D×H×T): 7.0×10.0×4.5mm to 23.5×28.0×14.8mm.**

V Series

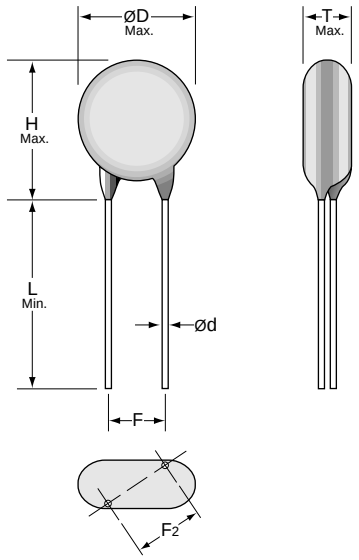
V Specifications

Item	Characteristics
Operating Temperature Range	−40 to +85°C
Storage Temperature Range	−50 to +125°C
Maximum Voltage Range	8 to 1,000VAC or 12 to 1,465VDC
Varistor Voltage	18 to 470V at 0.1mA DC for ø5mm; 15 to 1,800V at 1mA DC for ø7mm to ø20mm.
Varistor Voltage Tolerance	±10% (K)
Maximum Energy	0.4 to 720 Joules at 2ms
Maximum Surge Current	250 to 10,000A at 8/20μs
Maximum Case Size (D×H×T)	7.0×10.0×4.5mm to 23.5×28.0×14.8mm
Agency Approvals	UL1414 and 1449

Diagram of Dimensions

Metal Oxide Varistor/Radial Lead

Unit: mm and inches



Dimensions (mm)

Nom. Dia.	Varistor Voltage	øD max.	H max.	T max.	L min.	ød ±0.05	F±1.0 F2±2.0
5mm	≤ 68	7.0	10.0	4.5	25	0.6	5.0
	82-220	7.0	10.0	4.5	25	0.6	5.0
	≥ 240	7.0	10.0	5.8	25	0.6	5.0
7mm	≤ 68	8.5	11.5	5.2	25	0.6	5.0
	82-270	8.5	11.5	4.8	25	0.6	5.0
	≥ 330	8.5	11.5	6.0	25	0.6	5.0
10mm	≤ 68	11.5	14.5	5.3	25	0.8	7.5
	82-270	11.5	14.5	5.3	25	0.8	7.5
	330-510	11.5	14.5	6.4	25	0.8	7.5
	560-1,100	12.5	15.5	9.7	25	0.8	7.5
	1,800	13.5	16.5	14.4	25	0.8	F2=11.0
14mm	≤ 68	15.5	18.5	5.3	25	0.8	7.5
	82-270	15.5	18.5	5.3	25	0.8	7.5
	330-510	15.5	18.5	6.4	25	0.8	7.5
	560-1,100	16.0	19.0	9.7	25	0.8	7.5
	1,800	17.0	20.5	14.4	25	0.8	F2=11.0
20mm	≤ 68	21.5	24.5	5.8	25	0.8	10.0
	82-270	21.5	24.5	5.6	25	0.8	10.0
	330-510	21.5	24.5	6.8	25	0.8	10.0
	560-1,100	22.5	25.5	10.1	25	0.8	10.0
	1,800	23.5	28.0	14.8	25	0.8	F2=15.0

Dimensions (inches)

Nom. Dia.	Varistor Voltage	øD max.	H max.	T max.	L min.	ød ±0.002	F±0.039 F2±0.079
5mm	≤ 68	0.276	0.394	0.177	0.984	0.024	0.197
	82-220	0.276	0.394	0.177	0.984	0.024	0.197
	≥ 240	0.276	0.394	0.228	0.984	0.024	0.197
7mm	≤ 68	0.335	0.453	0.205	0.984	0.024	0.197
	82-270	0.335	0.453	0.189	0.984	0.024	0.197
	≥ 330	0.335	0.453	0.236	0.984	0.024	0.197
10mm	≤ 68	0.453	0.571	0.209	0.984	0.031	0.295
	82-270	0.453	0.571	0.209	0.984	0.031	0.295
	330-510	0.453	0.571	0.252	0.984	0.031	0.295
	560-1,100	0.492	0.610	0.382	0.984	0.031	0.295
	1,800	0.531	0.650	0.567	0.984	0.031	F2=0.433
14mm	≤ 68	0.610	0.728	0.209	0.984	0.031	0.295
	82-270	0.610	0.728	0.209	0.984	0.031	0.295
	330-510	0.610	0.728	0.252	0.984	0.031	0.295
	560-1,100	0.630	0.748	0.382	0.984	0.031	0.295
	1,800	0.669	0.807	0.567	0.984	0.031	F2=0.433
20mm	≤ 68	0.846	0.965	0.228	0.984	0.031	0.394
	82-270	0.846	0.965	0.220	0.984	0.031	0.394
	330-510	0.846	0.965	0.268	0.984	0.031	0.394
	560-1,100	0.886	1.004	0.398	0.984	0.031	0.394
	1,800	0.886	1.102	0.583	0.984	0.031	F2=0.591

V Series

Part Numbering System for V Series

When ordering, always specify complete catalog number for V Series.

TNR 7 V 271 K

- K: Varistor Voltage Tolerance: K = ±10%
- 271: Nominal Varistor Voltage: Expressed in volts. The first two digits are significant figures, and the third digit indicates the number of zeros following these figures (e.g. 270 = 27V; 271 = 270V).
- V: Series Name: Indicates Basic Varistor Style.
- 7: Nominal Case Diameter: 5 = Ø5mm; 7 = Ø7mm; 10 = Ø10mm; 14 = Ø14mm; 20 = Ø20mm.
- TNR: Alpha Prefix for Varistors.

Varistor Standard Ratings - Radial Lead

Nom. Case Dia.	Catalog Part Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20µsec.) (A)		Maximum Energy (2msec.)	Rated Wattage	Maximum Clamping Voltage		Capacitance (typical) at 1kHz	Varistor Voltage at 0.1mA DC
		VAC_{rms}	VDC	1 time	2 times	(J)	(W)	(A)	(V)	(pF)	(V ±10%)
Ø5 mm	TNR5V180K	10	14	250	125	0.4	0.01	1	40	2,540	18
	TNR5V220K	14	18	250	125	0.5	0.01	1	48	2,090	22
	TNR5V270K	17	22	250	125	0.7	0.01	1	60	1,790	27
	TNR5V330K	20	26	250	125	0.8	0.01	1	73	1,480	33
	TNR5V390K	25	30	250	125	0.9	0.01	1	86	1,310	39
	TNR5V470K	30	37	250	125	1.1	0.01	1	104	1,140	47
	TNR5V560K	35	44	250	125	1.3	0.01	1	123	1,000	56
	TNR5V680K	40	55	250	125	1.6	0.01	1	150	870	68
	TNR5V820K	50	65	800	600	2.5	0.1	5	145	400	82
	TNR5V101K	60	85	800	600	3.0	0.1	5	175	350	100
	TNR5V121K	75	100	800	600	3.5	0.1	5	210	310	120
	TNR5V151K	95	125	800	600	4.5	0.1	5	260	270	150
	TNR5V201K	130	170	800	600	6.0	0.1	5	355	110	200
	TNR5V221K	140	180	800	600	6.5	0.1	5	380	110	220
	TNR5V241K	150	200	800	600	7.5	0.1	5	415	100	240
	TNR5V271K	175	225	800	600	8.0	0.1	5	475	90	270
	TNR5V331K	210	270	800	600	9.5	0.1	5	570	80	330
	TNR5V361K	230	300	800	600	11.0	0.1	5	620	80	360
	TNR5V391K	250	320	800	600	12.0	0.1	5	675	70	390
	TNR5V431K	275	350	800	600	13.5	0.1	5	745	70	430
	TNR5V471K	300	385	800	600	15.0	0.1	5	810	60	470

Nom. Case Dia.	Catalog Part Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20µsec.) (A)		Maximum Energy (2msec.)	Rated Wattage	Maximum Clamping Voltage		Capacitance (typical) at 1kHz	Varistor Voltage at 1mA DC
		VAC_{rms}	VDC	1 time	2 times	(J)	(W)	(A)	(V)	(pF)	(V ±10%)
Ø7 mm	TNR7V150K	8	12	500	250	0.7	0.02	2.5	30	4,600	15
	TNR7V180K	10	14	500	250	0.9	0.02	2.5	36	3,800	18
	TNR7V220K	14	18	500	250	1.1	0.02	2.5	43	3,200	22
	TNR7V270K	17	22	500	250	1.3	0.02	2.5	53	2,800	27
	TNR7V330K	20	26	500	250	1.6	0.02	2.5	65	2,300	33
	TNR7V390K	25	30	500	250	1.9	0.02	2.5	77	2,100	39
	TNR7V470K	30	37	500	250	2.3	0.02	2.5	93	1,900	47
	TNR7V560K	35	44	500	250	2.7	0.02	2.5	110	1,700	56
	TNR7V680K	40	55	500	250	3.3	0.02	2.5	135	1,500	68
	TNR7V820K	50	65	1,750	1,250	5.0	0.25	10	135	800	82
	TNR7V101K	60	85	1,750	1,250	6.0	0.25	10	165	700	100
	TNR7V121K	75	100	1,750	1,250	7.0	0.25	10	200	650	120
	TNR7V151K	95	125	1,750	1,250	9.0	0.25	10	250	600	150
	TNR7V201K	130	170	1,750	1,250	12.5	0.25	10	340	250	200
	TNR7V221K	140	180	1,750	1,250	13.5	0.25	10	360	230	220
	TNR7V241K	150	200	1,750	1,250	15.0	0.25	10	395	210	240

V Series

Varistor Standard Ratings - Radial Lead

Nom. Case Dia.	Catalog Part Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20µsec.) (A)		Maximum Energy (2msec.)	Rated Wattage	Maximum Clamping Voltage		Capacitance (typical) at 1kHz	Varistor Voltage at 1mA DC
		VAC_{rms}	VDC	1 time	2 times	(J)	(W)	(A)	(V)	(pF)	(V ±10%)
ø7 mm	TNR7V271K	175	225	1,750	1,250	17.0	0.25	10	455	190	270
	TNR7V331K	210	270	1,750	1,250	20.0	0.25	10	545	160	330
	TNR7V361K	230	300	1,750	1,250	23.0	0.25	10	595	150	360
	TNR7V391K	250	320	1,750	1,250	25.0	0.25	10	650	140	390
	TNR7V431K	275	350	1,750	1,250	27.5	0.25	10	710	130	430
	TNR7V471K	300	385	1,750	1,250	30.0	0.25	10	775	120	470
	TNR7V511K	320	410	1,750	1,250	32.0	0.25	10	845	110	510
ø10 mm	TNR10V150K	8	12	1,000	500	2.0	0.05	5	30	9,600	15
	TNR10V180K	10	14	1,000	500	2.2	0.05	5	36	8,000	18
	TNR10V220K	14	18	1,000	500	2.6	0.05	5	43	7,000	22
	TNR10V270K	17	22	1,000	500	3.2	0.05	5	53	6,000	27
	TNR10V330K	20	26	1,000	500	4.0	0.05	5	65	5,000	33
	TNR10V390K	25	30	1,000	500	4.7	0.05	5	77	4,500	39
	TNR10V470K	30	37	1,000	500	5.6	0.05	5	93	4,000	47
	TNR10V560K	35	44	1,000	500	6.7	0.05	5	110	3,500	56
	TNR10V680K	40	55	1,000	500	8.2	0.05	5	135	3,200	68
	TNR10V820K	50	65	3,500	2,500	10.0	0.4	25	135	1,700	82
	TNR10V101K	60	85	3,500	2,500	12.0	0.4	25	165	1,600	100
	TNR10V121K	75	100	3,500	2,500	14.5	0.4	25	200	1,400	120
	TNR10V151K	95	125	3,500	2,500	18.0	0.4	25	250	1,300	150
	TNR10V201K	130	170	3,500	2,500	25.0	0.4	25	340	500	200
	TNR10V221K	140	180	3,500	2,500	27.5	0.4	25	360	450	220
	TNR10V241K	150	200	3,500	2,500	30.0	0.4	25	395	400	240
	TNR10V271K	175	225	3,500	2,500	35.0	0.4	25	455	350	270
	TNR10V331K	210	270	3,500	2,500	42.0	0.4	25	545	300	330
	TNR10V361K	230	300	3,500	2,500	45.0	0.4	25	595	280	360
	TNR10V391K	250	320	3,500	2,500	50.0	0.4	25	650	260	390
	TNR10V431K	275	350	3,500	2,500	55.0	0.4	25	715	240	430
	TNR10V471K	300	385	3,500	2,500	60.0	0.4	25	775	220	470
	TNR10V511K	320	410	3,500	2,500	67.0	0.4	25	845	210	510
	TNR10V561K	350	460	3,500	2,500	67.0	0.4	25	922	195	560
	TNR10V621K	385	505	3,500	2,500	67.0	0.4	25	1,025	180	620
	TNR10V681K	420	560	3,500	2,500	67.0	0.4	25	1,120	165	680
	TNR10V751K	460	615	3,500	2,500	70.0	0.4	25	1,240	150	750
	TNR10V821K	510	670	3,500	2,500	80.0	0.4	25	1,355	140	820
	TNR10V911K	550	745	3,500	2,500	90.0	0.4	25	1,500	125	910
	TNR10V102K	625	825	3,500	2,500	100.0	0.4	25	1,650	115	1,000
	TNR10V112K	680	895	3,500	2,500	110.0	0.4	25	1,815	105	1,100
	TNR10V182K	1000	1465	3,500	2,500	183.0	0.4	25	2,970	70	1,800
ø14 mm	TNR14V150K	8	12	2,000	1,000	3.6	0.1	10	30	19,500	15
	TNR14V180K	10	14	2,000	1,000	4.3	0.1	10	36	16,500	18
	TNR14V220K	14	18	2,000	1,000	5.3	0.1	10	43	13,500	22
	TNR14V270K	17	22	2,000	1,000	6.5	0.1	10	53	12,000	27
	TNR14V330K	20	26	2,000	1,000	7.9	0.1	10	65	10,000	33
	TNR14V390K	25	30	2,000	1,000	9.4	0.1	10	77	9,000	39
	TNR14V470K	30	37	2,000	1,000	11.0	0.1	10	93	8,000	47
	TNR14V560K	35	44	2,000	1,000	13.0	0.1	10	110	7,500	56
	TNR14V680K	40	55	2,000	1,000	16.0	0.1	10	135	6,500	68
	TNR14V820K	50	65	6,000	5,000	20.0	0.6	50	135	3,000	82
	TNR14V101K	60	85	6,000	5,000	25.0	0.6	50	165	2,700	100
	TNR14V121K	75	100	6,000	5,000	30.0	0.6	50	200	2,500	120
	TNR14V151K	95	125	6,000	5,000	37.0	0.6	50	250	2,300	150
	TNR14V201K	130	170	6,000	5,000	50.0	0.6	50	340	950	200
	TNR14V221K	140	180	6,000	5,000	55.0	0.6	50	360	850	220
	TNR14V241K	150	200	6,000	5,000	60.0	0.6	50	395	800	240
	TNR14V271K	175	225	6,000	5,000	70.0	0.6	50	455	700	270
	TNR14V331K	210	270	6,000	4,500	80.0	0.6	50	545	600	330
	TNR14V361K	230	300	6,000	4,500	90.0	0.6	50	595	550	360

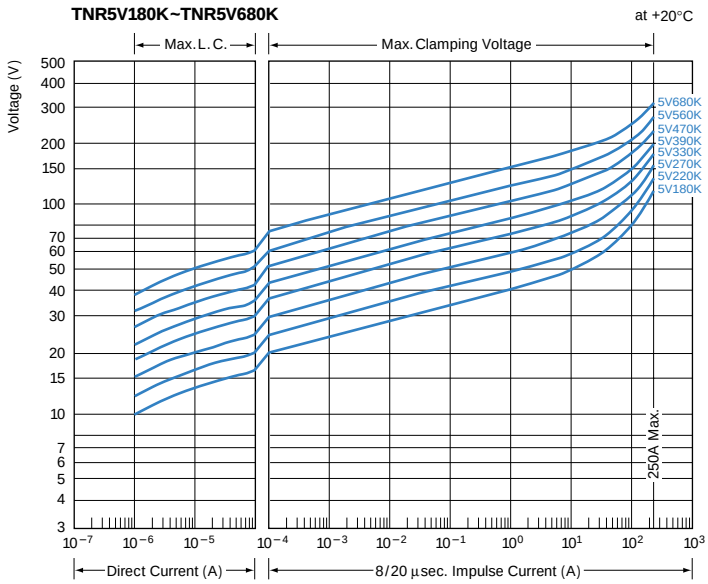
V Series

Varistor Standard Ratings - Radial Lead

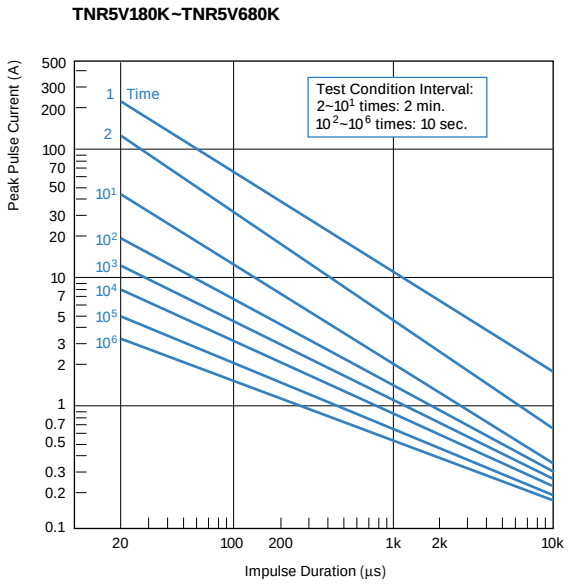
Nom. Case Dia.	Catalog Part Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20µsec.) (A)		Maximum Energy (2msec.)	Rated Wattage	Maximum Clamping Voltage		Capacitance (typical) at 1kHz	Varistor Voltage at 1mA DC
		VAC_{rms}	VDC	1 time	2 times	(J)	(W)	(A)	(V)	(pF)	(V ±10%)
Ø14 mm	TNR14V391K	250	320	6,000	4,500	100.0	0.6	50	650	500	390
	TNR14V431K	275	350	6,000	4,500	110.0	0.6	50	715	460	430
	TNR14V471K	300	385	6,000	4,500	125.0	0.6	50	775	420	470
	TNR14V511K	320	410	6,000	4,500	136.0	0.6	50	845	390	510
	TNR14V561K	350	460	5,000	4,500	136.0	0.6	50	922	360	560
	TNR14V621K	385	505	5,000	4,500	136.0	0.6	50	1,025	330	620
	TNR14V681K	420	560	5,000	4,500	136.0	0.6	50	1,120	310	680
	TNR14V751K	460	615	5,000	4,500	150.0	0.6	50	1,240	280	750
	TNR14V821K	510	670	5,000	4,500	165.0	0.6	50	1,355	250	820
	TNR14V911K	550	745	5,000	4,500	180.0	0.6	50	1,500	230	910
	TNR14V102K	625	825	5,000	4,500	200.0	0.6	50	1,650	210	1,000
	TNR14V112K	680	895	5,000	4,500	220.0	0.6	50	1,815	190	1,100
	TNR14V182K	1,000	1,465	5,000	4,500	360.0	0.6	50	2,970	120	1,800
Ø20 mm	TNR14V180K	10	14	3,000	2,000	12.0	0.2	20	36	39,000	18
	TNR14V220K	14	18	3,000	2,000	14.0	0.2	20	43	33,000	22
	TNR14V270K	17	22	3,000	2,000	17.0	0.2	20	53	28,000	27
	TNR14V330K	20	26	3,000	2,000	21.0	0.2	20	65	24,000	33
	TNR14V390K	25	30	3,000	2,000	25.0	0.2	20	77	21,000	39
	TNR14V470K	30	37	3,000	2,000	30.0	0.2	20	93	19,000	47
	TNR14V560K	35	44	3,000	2,000	36.0	0.2	20	110	17,000	56
	TNR14V680K	40	55	3,000	2,000	44.0	0.2	20	135	15,000	68
	TNR20V820K	50	65	10,000	7,000	40.0	1.0	100	135	6,700	82
	TNR20V101K	60	85	10,000	7,000	50.0	1.0	100	165	6,100	100
	TNR20V121K	75	100	10,000	7,000	60.0	1.0	100	200	5,600	120
	TNR20V151K	95	125	10,000	7,000	75.0	1.0	100	250	5,100	150
	TNR20V201K	130	170	10,000	7,000	100.0	1.0	100	340	2,700	200
	TNR20V221K	140	180	10,000	7,000	110.0	1.0	100	360	2,500	220
	TNR20V241K	150	200	10,000	7,000	120.0	1.0	100	395	2,300	240
	TNR20V271K	175	225	10,000	7,000	135.0	1.0	100	455	2,000	270
	TNR20V331K	210	270	10,000	6,500	160.0	1.0	100	545	1,700	330
	TNR20V361K	230	300	10,000	6,500	180.0	1.0	100	595	1,500	360
	TNR20V391K	250	320	10,000	6,500	195.0	1.0	100	650	1,400	390
	TNR20V431K	275	350	10,000	6,500	215.0	1.0	100	715	1,300	430
	TNR20V471K	300	385	10,000	6,500	250.0	1.0	100	775	1,200	470
	TNR20V511K	320	410	10,000	6,500	273.0	1.0	100	845	1,100	510
	TNR20V561K	350	460	7,500	6,500	273.0	1.0	100	922	1,000	560
	TNR20V621K	385	505	7,500	6,500	273.0	1.0	100	1,025	900	620
	TNR20V681K	420	560	7,500	6,500	273.0	1.0	100	1,120	830	680
	TNR20V751K	460	615	7,500	6,500	300.0	1.0	100	1,240	750	750
	TNR20V821K	510	670	7,500	6,500	325.0	1.0	100	1,355	700	820
	TNR20V911K	550	745	7,500	6,500	360.0	1.0	100	1,500	620	910
	TNR20V102K	625	825	7,500	6,500	400.0	1.0	100	1,650	560	1,000
	TNR20V112K	680	895	7,500	6,500	440.0	1.0	100	1,815	510	1,100
	TNR20V182K	1,000	1,465	7,500	6,500	720.0	1.0	100	2,970	340	1,800

Varistor Volt - Ampere and Pulse Lifetime Characteristics

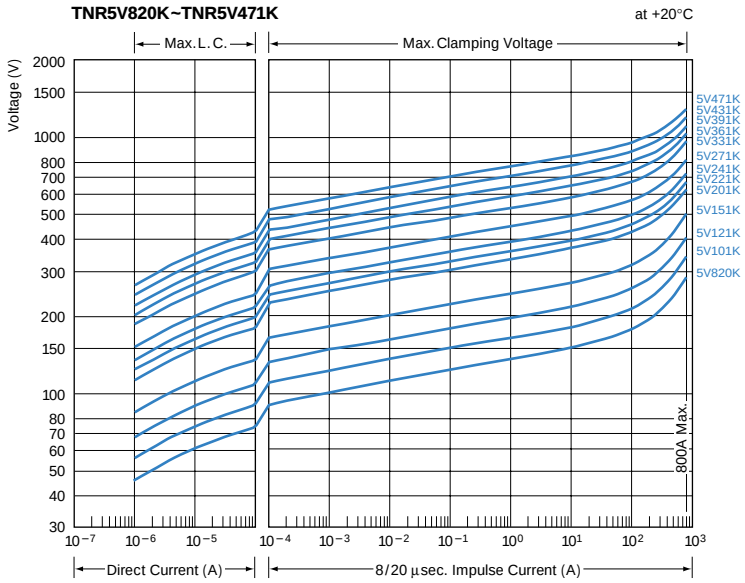
V - I Curve - 5mm Nominal Diameter



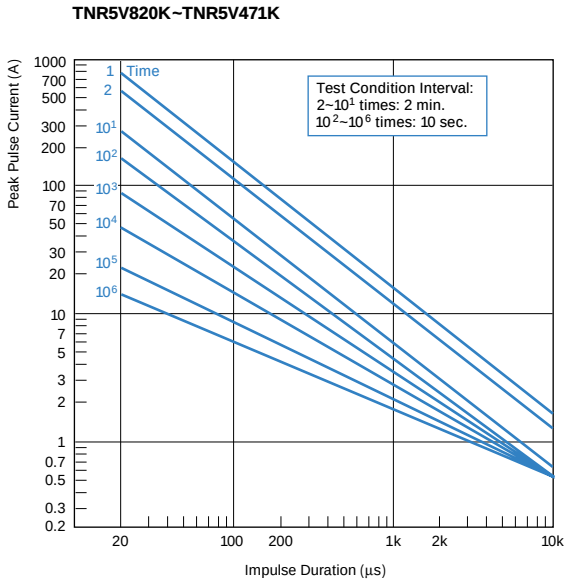
Pulse Lifetime Ratings - 5mm Nominal Diameter



V - I Curve - 5mm Nominal Diameter

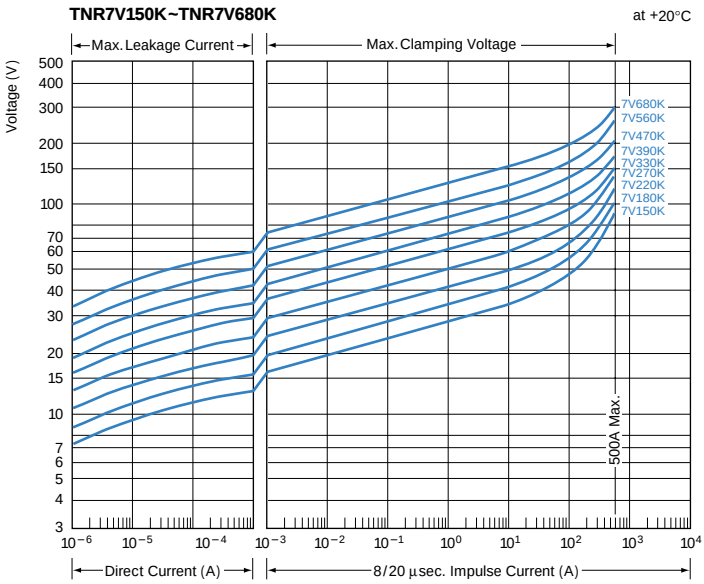


Pulse Lifetime Ratings - 5mm Nominal Diameter

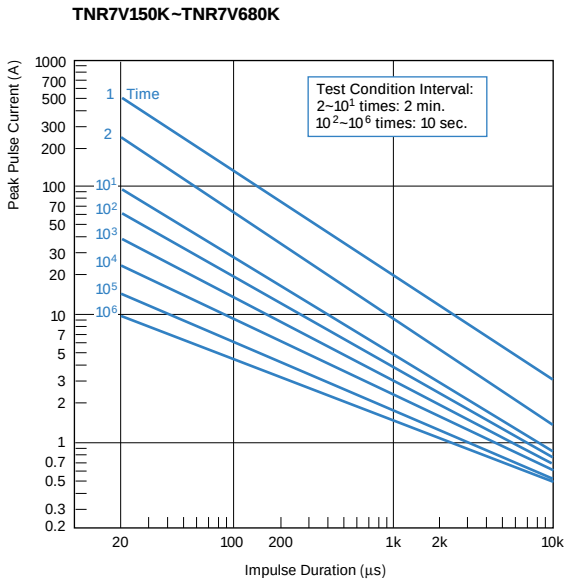


Varistor Volt - Ampere and Pulse Lifetime Characteristics

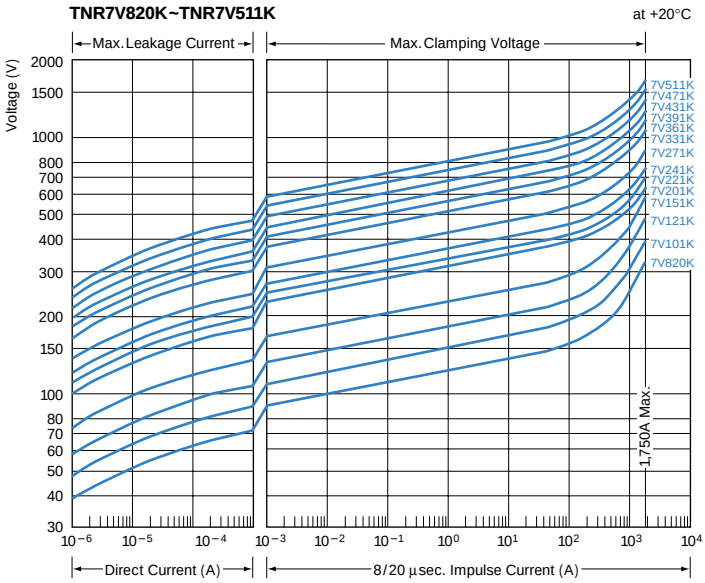
V - I Curve - 7mm Nominal Diameter



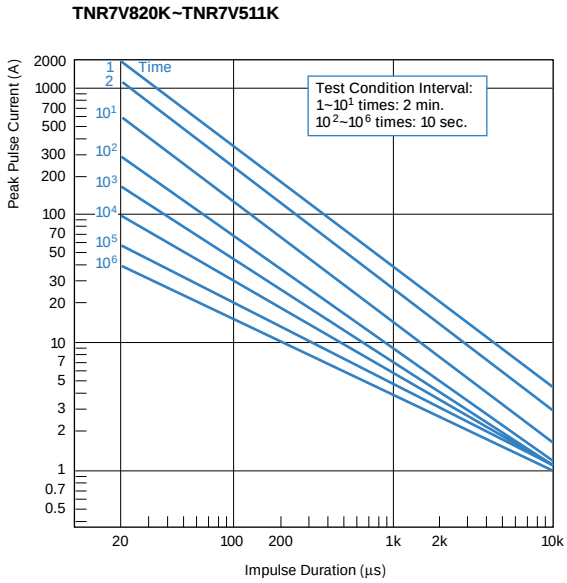
Pulse Lifetime Ratings - 7mm Nominal Diameter



V - I Curve - 7mm Nominal Diameter

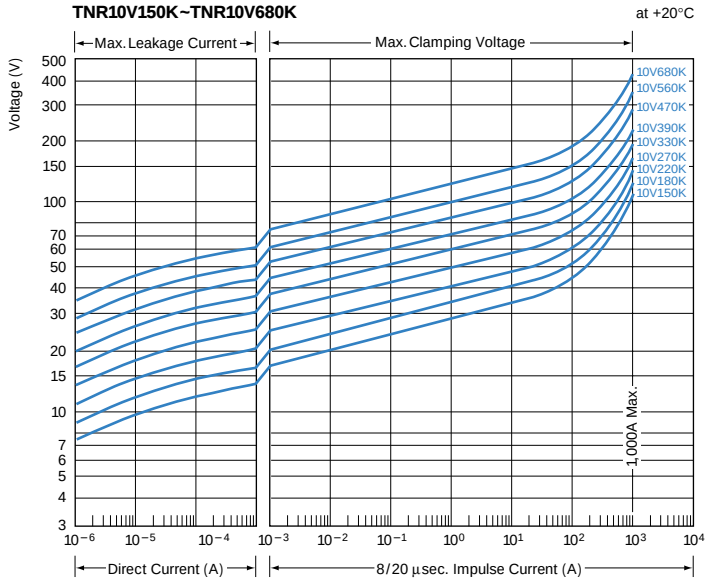


Pulse Lifetime Ratings - 7mm Nominal Diameter

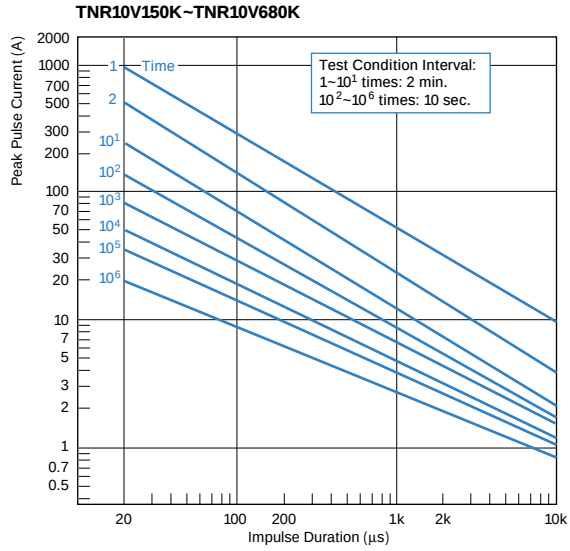


Varistor Volt - Ampere and Pulse Lifetime Characteristics

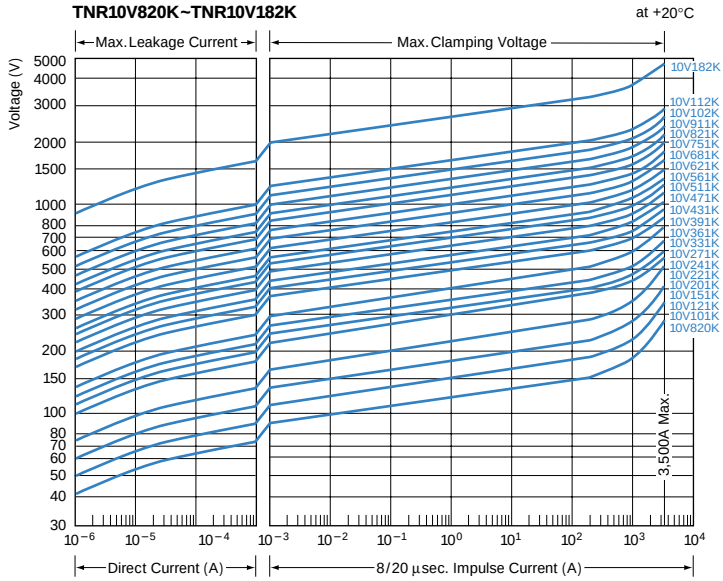
V - I Curve - 10mm Nominal Diameter



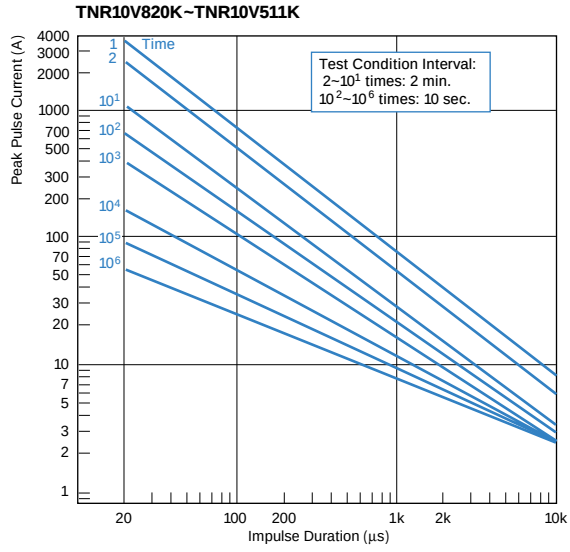
Pulse Lifetime Ratings - 10mm Nominal Diameter

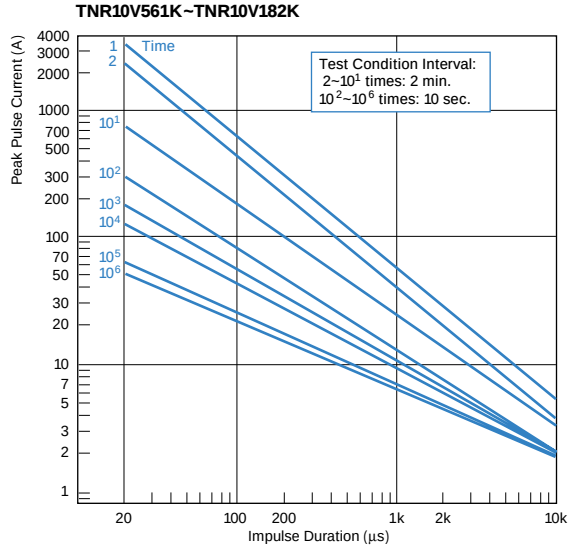


V - I Curve - 10mm Nominal Diameter



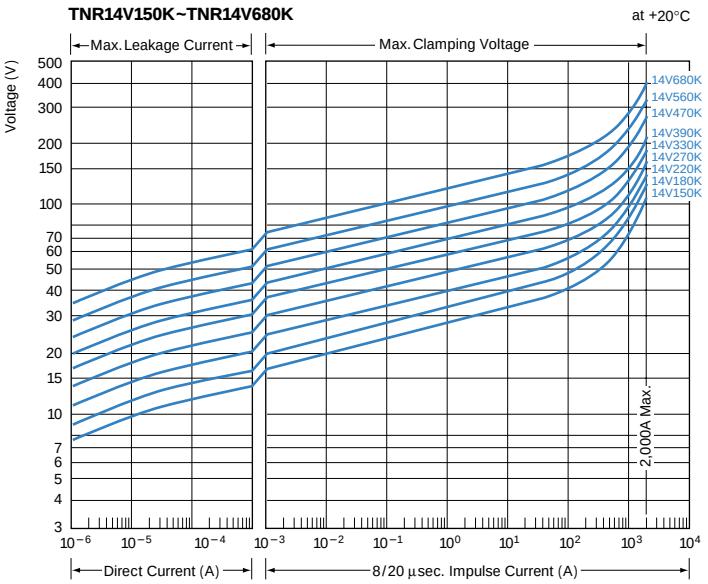
Pulse Lifetime Ratings - 10mm Nominal Diameter



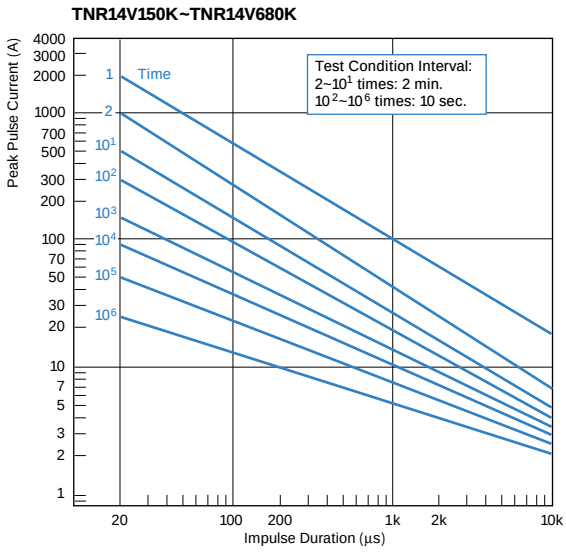


Varistor Volt - Ampere and Pulse Lifetime Characteristics

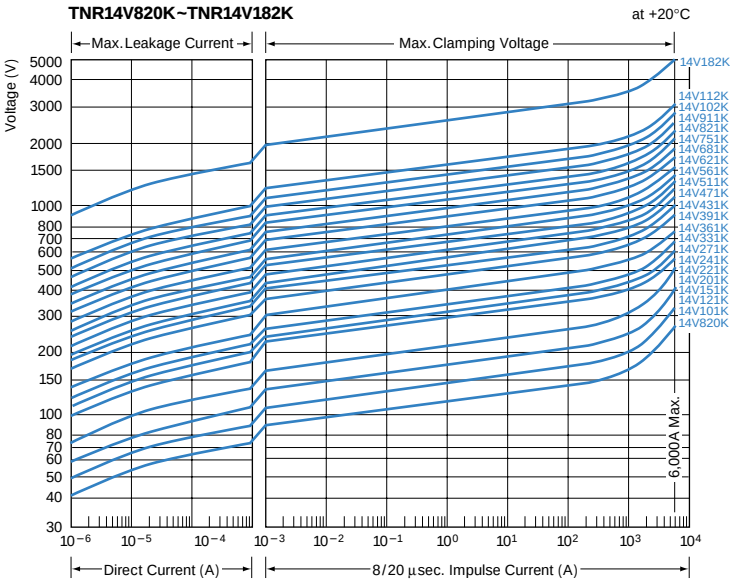
V - I Curve - 14mm Nominal Diameter



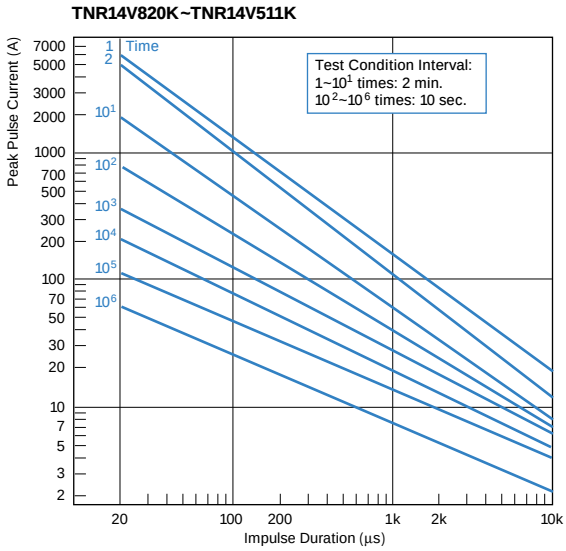
Pulse Lifetime Ratings - 14mm Nominal Diameter

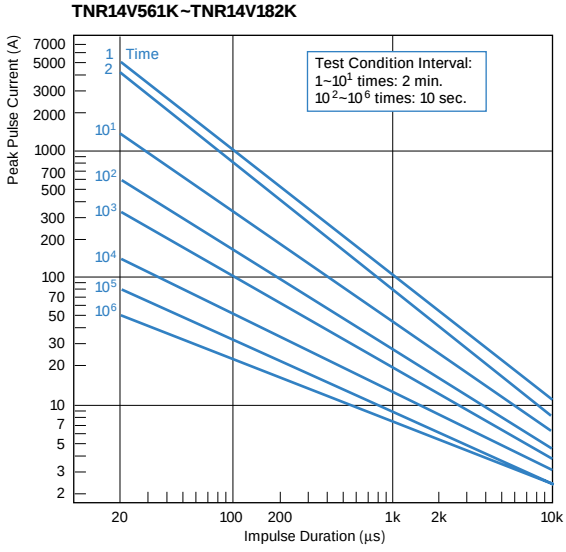


V - I Curve - 14mm Nominal Diameter



Pulse Lifetime Ratings - 14mm Nominal Diameter

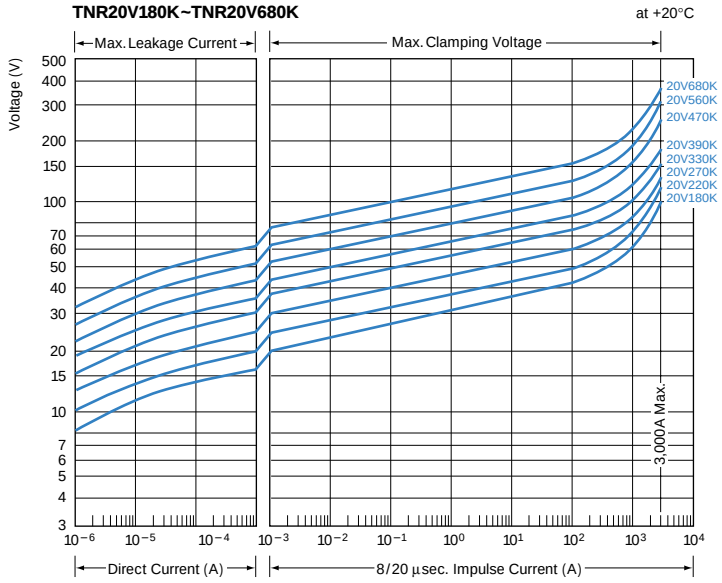




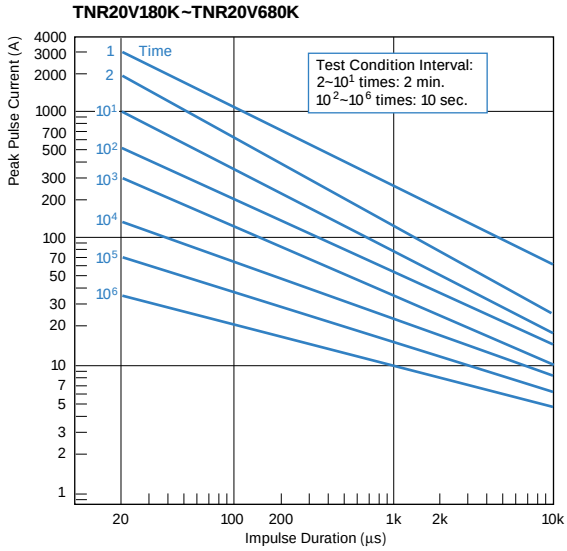
V Series

Varistor Volt - Ampere and Pulse Lifetime Characteristics

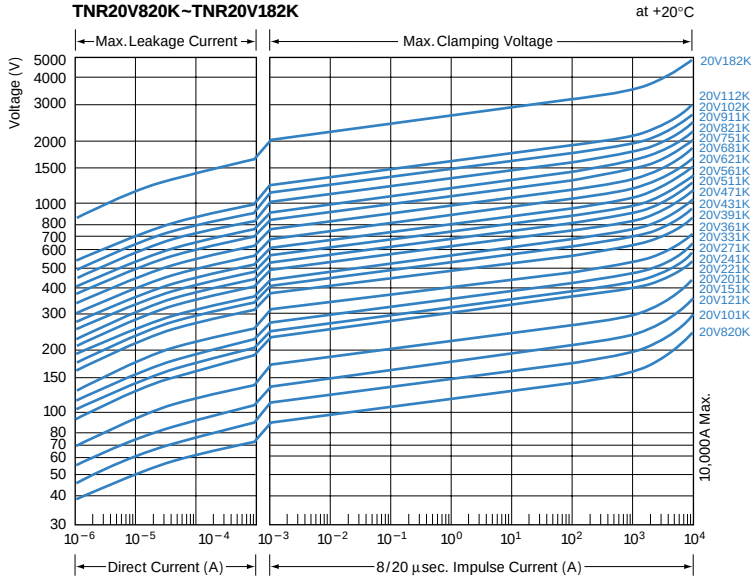
V - I Curve - 20mm Nominal Diameter



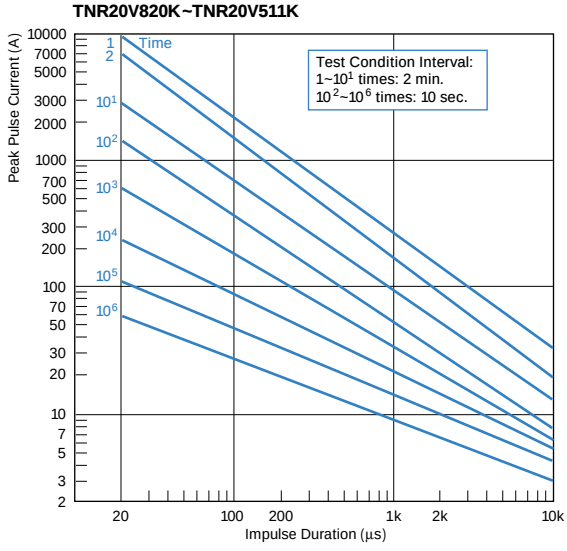
Pulse Lifetime Ratings - 20mm Nominal Diameter

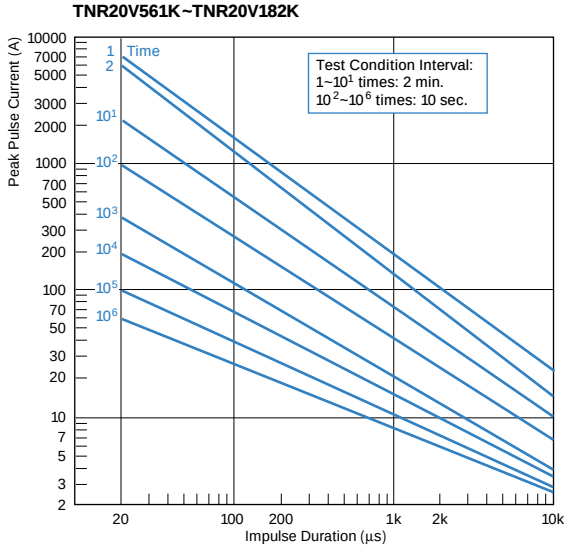


V - I Curve - 20mm Nominal Diameter



Pulse Lifetime Ratings - 20mm Nominal Diameter





V
METAL OXIDE VARISTOR