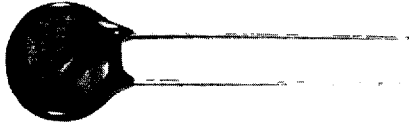




TNR® G (M) SERIES

HIGH PERFORMANCE METAL OXIDE VARISTORS



(200V thru 1600V only)
TNR-G Series



Applications:

- | | | | |
|--------------------------------|--------------------|---------------------------|------------------------------|
| Telephone Relays | Computer Equipment | Solid State Motor Control | Solid State Relays/Timers |
| Telephone Solid State Circuits | Railroad Circuitry | Television | Power Supplies |
| Communication Equipment | Numerical Control | Copier Machines | Solid State Security Systems |
| Relay Coils | Test Equipment | Calculators | Medical Equipment |
| Traffic Controllers | Instrumentation | Contact Arc Suppression | Fire Alarms |

Specifications: (Other general specifications are on page 30.)

Operating ambient temperature

-40°C ~ +85°C (-40°F ~ +185°F)

Operating varistor surface temperature

+115°C max. (+239°F max.)

Storage temperature range

-50°C ~ +125°C (-58°F ~ +257°F)

Max. varistor temperature coefficient

-0.05%/C

U.S.A. Official Recognition
(200V thru 1600V only)

*UL - Specification #1414 File #E65426

*UL - Specification #1449 File #E95427

Canadian Official Recognition
(200V thru 1800V only)

** C.S.A. Specification #097864 X0000 Class 2221

Insulation resistance

Over 1,000 Megohms

Hipot Encapsulation

2500 VDC for 1 minute

Impulse response time

0.05 μ seconds or less

*Underwriters Laboratories, Inc.® yellow cards are available upon request.

**Canadian Standard Association cards available upon request.



TNR® G (M) SERIES

• RATINGS AND CHARACTERISTICS

Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20 μ s)	Maximum Energy (1msec.)	Clamping Voltage		Capacitance (Typical) 1kHz	Varistor Voltage V 1mA	The closest GE model number (Reference purpose only)
	ACrms(V)	DC(V)	(A)	(J)	(A)	(V)	(pF)	(V)	
TNR9G180KM	10	14	250	0.8	5	42	5,800	18(16~20)	V18ZA1
TNR12G180KM	10	14	500	1.5	5	40	9,700	18(16~20)	
TNR15G180KM	10	14	1,000	5.0	10	39	14,000	18(16~20)	V18ZA3
TNR9G220KM	14	18	250	1.0	5	47	4,900	22(20~24)	V22ZA1
TNR12G220KM	14	18	500	2.0	5	45	8,200	22(20~24)	
TNR15G220KM	14	18	1,000	5.0	10	43	12,000	22(20~24)	V22ZA3
TNR9G240KM	15	20	250	1.0	5	52	4,600	24(22~26)	V24ZA1
TNR12G240KM	15	20	500	2.0	5	50	7,600	24(22~26)	
TNR15G240KM	15	20	1,000	5.0	10	48	11,000	24(22~26)	V24ZA4
TNR9G270KM	17	22	250	1.0	5	57	4,200	27(24~30)	V27ZA1
TNR12G270KM	17	22	500	2.5	5	55	6,900	27(24~30)	
TNR15G270KM	17	22	1,000	5.0	10	53	10,000	27(24~30)	V27ZA4
TNR9G330KM	20	26	250	1.2	5	68	3,500	33(30~36)	V33ZA1
TNR12G330KM	20	26	500	3.0	5	65	5,900	33(30~36)	
TNR15G330KM	20	26	1,000	6.0	10	64	8,500	33(30~36)	V33ZA5
TNR9G390KM	25	31	250	1.5	5	79	3,100	39(35~43)	V39ZA1
TNR12G390KM	25	31	500	3.5	5	77	5,100	39(35~43)	
TNR15G390KM	25	31	1,000	10.0	10	76	7,500	39(35~43)	V39ZA6
TNR9G470KM	30	38	250	1.8	5	92	2,600	47(42~52)	V47ZA1
TNR12G470KM	30	38	500	4.5	5	90	4,400	47(42~52)	
TNR15G470KM	30	38	1,000	10.0	10	89	6,500	47(42~52)	V47ZA7
TNR9G560KM	35	45	250	2.2	5	107	2,300	56(50~62)	V56ZA2
TNR12G560KM	35	45	500	5.5	5	105	3,800	56(50~62)	
TNR15G560KM	35	45	1,000	10.0	10	103	5,600	56(50~62)	V56ZA8
TNR9G680KM	40	56	250	2.5	5	127	1,900	68(60~75)	V68ZA2
TNR12G680KM	40	56	500	6.5	5	125	3,200	68(60~75)	
TNR15G680KM	40	56	1,000	12.0	10	123	4,800	68(60~75)	V68ZA10
TNR9G820KM	50	66	1,000	4.0	10	135	620	82(74~90)	V82ZA2
TNR12G820KM	50	66	2,000	8.0	25	135	1,200	82(74~90)	
TNR15G820KM	50	66	4,000	15.0	50	135	1,700	82(74~90)	V82ZA12



TNR® G (M) SERIES

• RATINGS AND CHARACTERISTICS

Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20 μ s)	Maximum Energy (1msec.)	Clamping Voltage		Capacitance (Typical) 1kHz	Varistor Voltage V 1mA	The closest GE model number (Reference purpose only)
	ACrms(V)	DC(V)			(A)	(V)			
TNR9G101KM	60	81	1,000	4	10	165	530	100(90~110)	V100ZA3
TNR12G101KM	60	81	2,000	10	25	165	1,050	100(90~110)	
TNR15G101KM	60	81	4,000	20	50	165	1,000	100(90~110)	V100ZA15
TNR9G121KM	75	102	1,000	5	10	195	460	120(108~132)	V120ZA1
TNR12G121KM	75	102	2,000	12	25	195	910	120(108~132)	
TNR15G121KM	75	102	4,000	20	50	195	1,280	120(108~132)	V120ZA6
TNR9G151KM	95	130	1,000	6	10	245	380	150(135~165)	V150ZA1
TNR12G151KM	95	130	2,000	16	25	245	770	150(135~165)	
TNR15G151KM	95	130	4,000	25	50	245	1,070	150(135~165)	V150ZA8 V95LA7B
TNR9G181KM	115	153	1,000	8	10	295	335	180(162~198)	V180ZA1
TNR12G181KM	115	153	2,000	18	25	295	670	180(162~198)	
TNR15G181KM	115	153	4,000	30	50	295	930	180(162~198)	V180ZA10
TNR23G201KM	130	175	5,000	70	100	325	2,300	200(188~220)	V130LA20B
TNR9G211KM	130	175	1,000	10	10	340	300	210(189~231)	V130LA1 V130LA2
TNR12G211KM	130	175	2,000	20	25	340	600	210(189~231)	
TNR15G211KM	130	175	4,000	40	50	340	830	210(189~231)	V130LA10A
TNR23G211KM	130	175	6,000	70	100	340	2,100	210(189~231)	V130LA20A
TNR23G231JM	150	200	6,000	80	100	360	2,100	230(218~242)	V150LA20B
TNR9G241KM	150	200	1,000	10	10	390	270	240(216~264)	V150LA1 V150LA2
TNR12G241KM	150	200	2,000	25	25	390	530	240(216~264)	
TNR15G241KM	150	200	4,000	40	50	390	740	240(216~264)	V150LA10A
TNR23G241KM	150	200	6,000	80	100	390	2,000	240(216~264)	V150LA20A
TNR9G391KM	250	330	1,000	17	10	640	185	390(354~429)	V250LA2 V250LA4
TNR12G391KM	250	330	2,000	40	25	640	370	390(354~429)	
TNR15G391KM	250	330	4,000	70	50	640	510	390(354~429)	V250LA15A V250LA20A
TNR23G391KM	250	330	6,000	130	100	640	1,400	390(354~429)	V250LA40A
TNR23G391JM	250	330	6,000	130	100	620	1,400	390(370~410)	V250LA40B
TNR9G431KM	275	369	1,000	20	10	700	170	430(389~473)	V275LA2 V275LA4
TNR12G431KM	275	369	2,000	45	25	700	340	430(389~473)	
TNR15G431KM	275	369	4,000	75	50	700	480	430(389~473)	V275LA15A V275LA20A
TNR23G431KM	275	369	6,000	140	100	700	1,300	430(389~473)	V275LA40A
TNR23G431JM	275	369	6,000	140	100	680	1,300	430(408~452)	V275LA40B

TNR® G (M) SERIES

• RATINGS AND CHARACTERISTICS

Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20µs) (A)	Maximum Energy (1msec.) (J)	Clamping Voltage (V)		Capacitance (Typical) kHz (pF)	Varistor Voltage V 1mA (V)	The closest GE model number (Reference purpose only)
	ACrms(V)	DC(V)			(A)	(V)			
TNR9G471KM	300	405	1,000	20	10	765	160	470(423~ 517)	V300LA4
TNR9G511KM	320	420	1,000	20	10	850	150	510(462~ 561)	V300LA2
TNR12G511KM	320	420	2,000	45	25	850	300	510(462~ 561)	
TNR15G511KM	320	420	4,000	80	50	850	420	510(462~ 561)	V320LA15A
TNR23G511KM	320	420	6,000	150	100	850	1,100	510(462~ 561)	V320LA40A
TNR23G511JM	320	420	6,000	150	100	810	1,100	510(484~ 536)	V320LA40B
TNR23G651JM	420	560	6,000	160	100	1,060	950	650(617~ 683)	V420LA40B
TNR12G681KM	420	560	2,000	45	25	1,110	240	680(612~ 748)	
TNR15G681KM	420	560	4,000	90	50	1,110	340	680(612~ 748)	V420LA20A
TNR23G681KM	420	560	6,000	160	100	1,110	900	680(612~ 748)	V420LA40A
TNR12G751KM	480	640	2,000	50	25	1,240	220	750(675~ 825)	
TNR15G751KM	480	640	4,000	100	50	1,240	310	750(675~ 825)	V460LA20A V480LA40A
TNR23G751KM	480	640	6,000	170	100	1,240	850	750(675~ 825)	V460LA40A V480LA80A
TNR23G751JM	480	640	6,000	170	100	1,160	850	750(712~ 788)	V460LA40B
TNR12G821KM	510	675	2,000	55	25	1,340	210	820(738~ 902)	
TNR15G821KM	510	675	4,000	110	50	1,340	280	820(738~ 902)	V510LA20A V510LA40A
TNR23G821KM	510	675	6,000	190	100	1,340	800	820(738~ 902)	V510LA80A
TNR23G821JM	510	675	6,000	190	100	1,280	800	820(779~ 860)	V510LA80B
TNR12G911KM	575	730	2,000	65	25	1,500	190	910(819~ 1,000)	
TNR15G911KM	575	730	4,000	120	50	1,500	270	910(819~ 1,000)	V550LA40A V575LA40A
TNR23G911KM	575	730	6,000	220	100	1,500	720	910(819~ 1,000)	V550LA80A V575LA80A
TNR23G911JM	575	730	6,000	220	100	1,410	720	910(864~ 956)	V550LA80B V575LA80B
TNR15G162KM	1,000	1,200	4,000	180	50	2,700	170	1,600(1,440~ 1,760)	V1000LA80A
TNR23G162KM	1,000	1,200	6,000	350	100	2,700	480	1,600(1,440~ 1,760)	V1000LA160A
TNR23G162SM	1,000	1,200	6,000	350	100	2,420	480	1,600(1,440~ 1,650)	V1000LA160B

• DIMENSIONS

 Dimension unit: mm
inch

LEAD SPACING	Standard lead space	all items	6.35 ± 1 0.25 ± 0.39
	Option lead space per request	9 dia	5 ± 1 0.197 ± 0.39
		12 & 15 dia	7.5 ± 1 0.295 ± 0.39
		23 dia	10 ± 1 0.394 ± 0.39

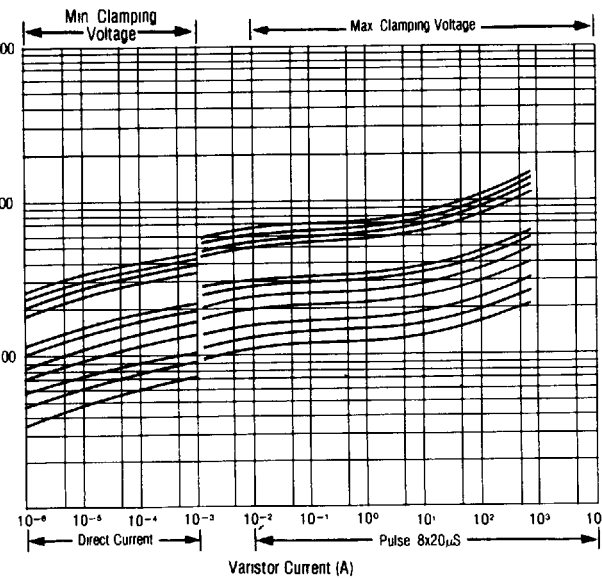
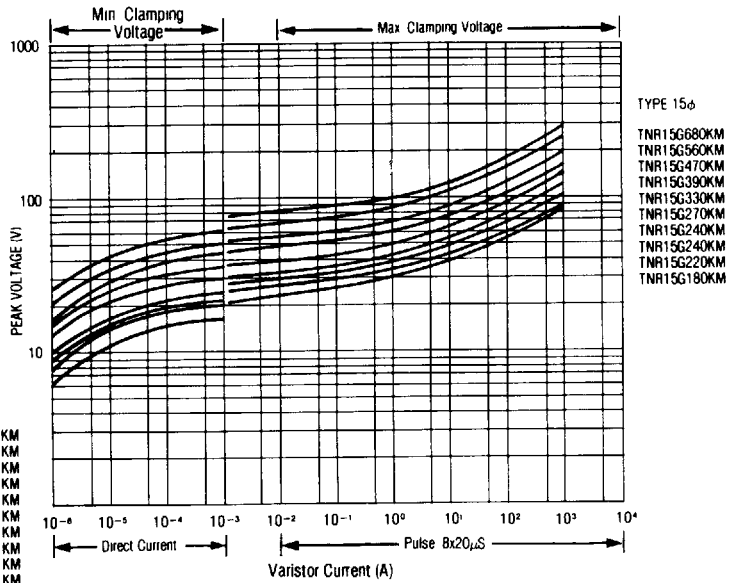
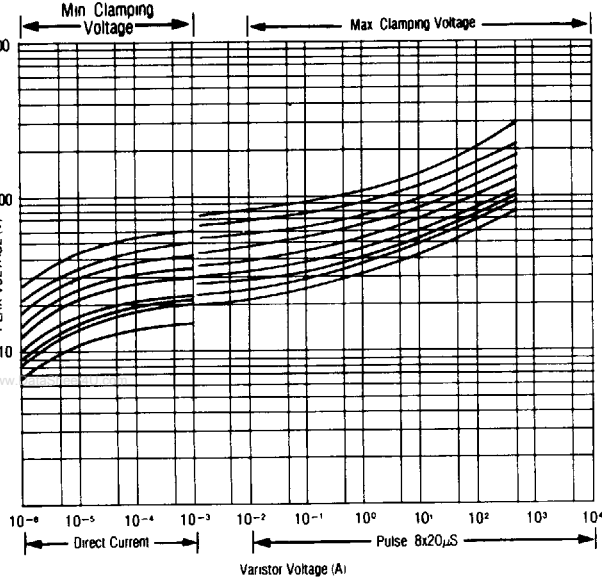
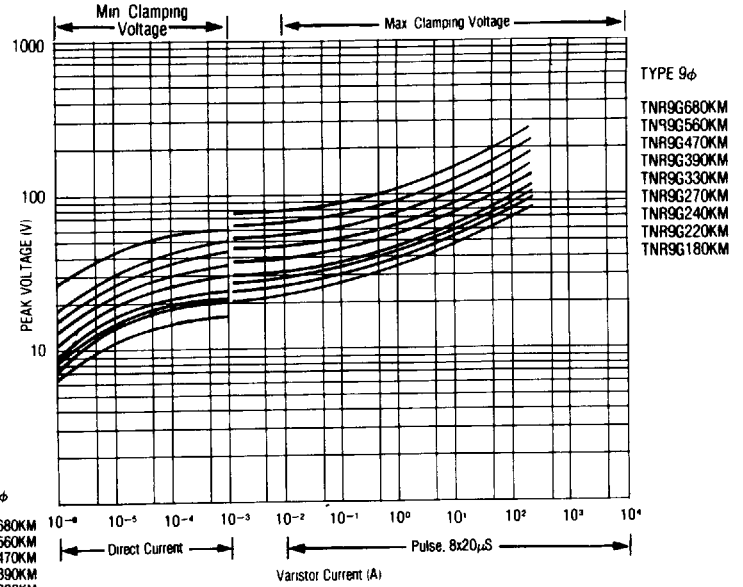
LEAD MATERIAL Tinned copper ply wire or Solder plated copper wire

Model Number	9			12			15			23			
	9G180KM ~ 9G241KM	9G391KM ~ 9G511KM	12G180KM ~ 12G241KM	12G391KM ~ 12G681KM	12G751KM ~ 12G911KM	15G180KM ~ 15G241KM	15G391KM ~ 15G681KM	15G751KM ~ 15G911KM	15G162KM	23G211KM ~ 23G241KM	23G391KM ~ 23G681KM	23G751KM ~ 23G911JM	23G162KM ~ 23G162SM
E	5/197 Max	7/276 Max	5/197 Max	7/276 Max	8.5/335 Max	5/197 Max	7/276 Max	8.5/335 Max	11/433 Max	5/197 Max	7/276 Max	8.5/335 Max	11/433 Max
e ₁	3.5/138 Max	5.5/217 Max	3.5/138 Max	5.5/217 Max	7/276 Max	3.5/138 Max	5.5/217 Max	7/276 Max	9/354 Max	3.5/138 Max	5.5/217 Max	7/276 Max	9/354 Max
D	9 ± 1 0.354 ± 0.39			12 ± 1 0.472 ± 0.39			15 ± 1 0.591 ± 0.39			23 ± 1 0.906 ± 0.39			
A	13 Max 0.512			16 Max 0.630			19 Max 0.748			27 Max 1.063			
l	25 Min .984			25 Min 984			30 Min 1.181			30 Min 1.181			
d	0.60 0.024			0.80 0.031			0.80 0.031			0.80 0.031			



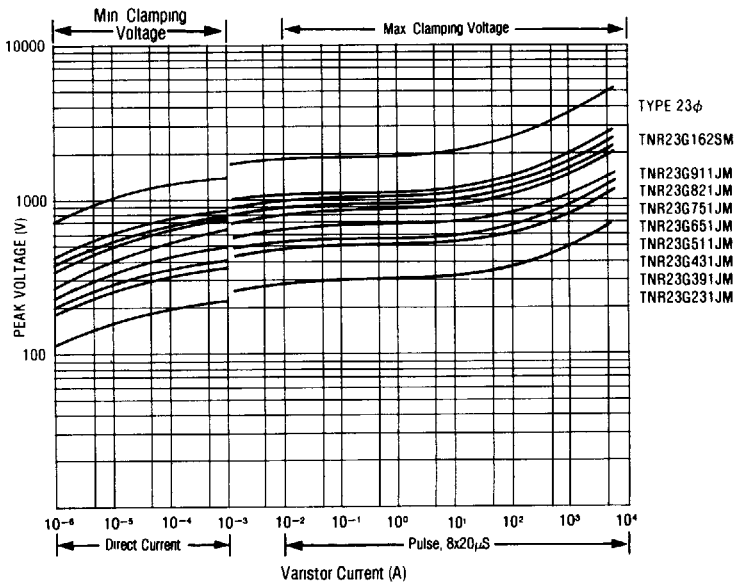
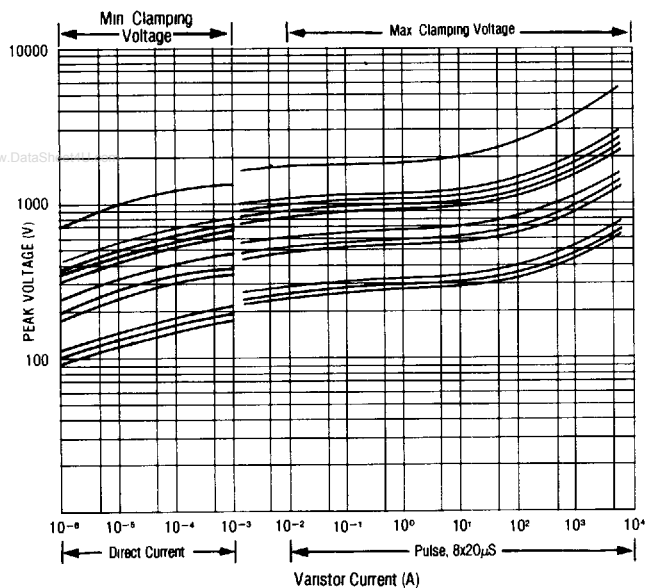
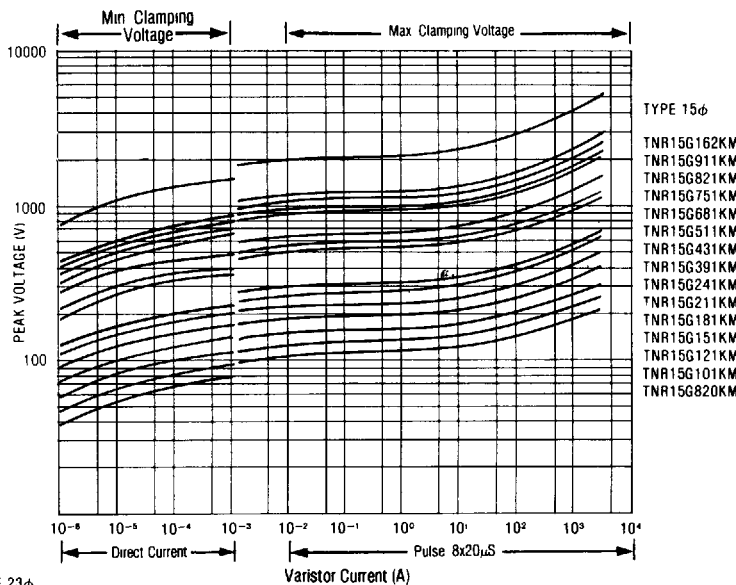
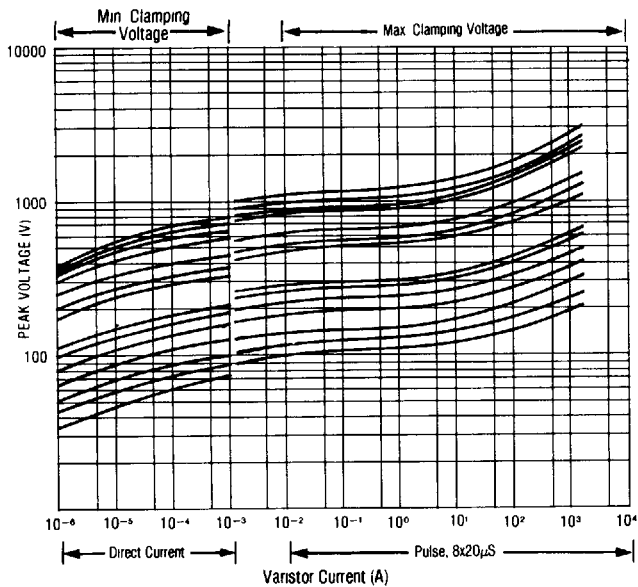
TNR® G (M) SERIES

V-I CHARACTERISTICS AT ROOM TEMPERATURE



TNR® G (M) SERIES

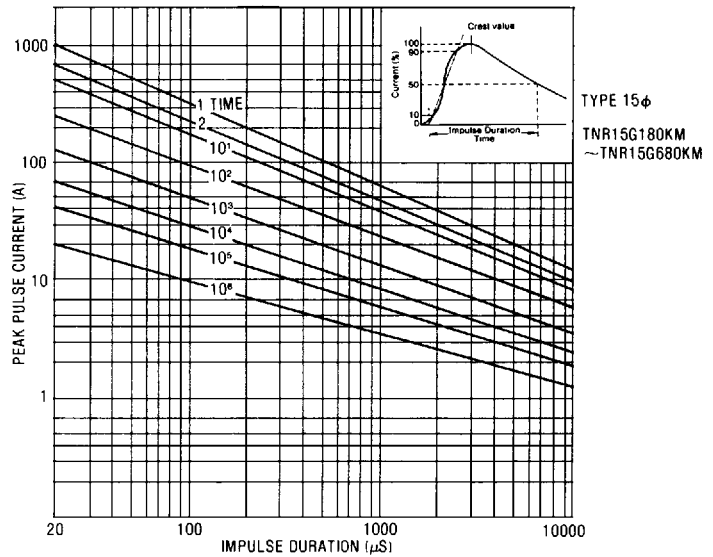
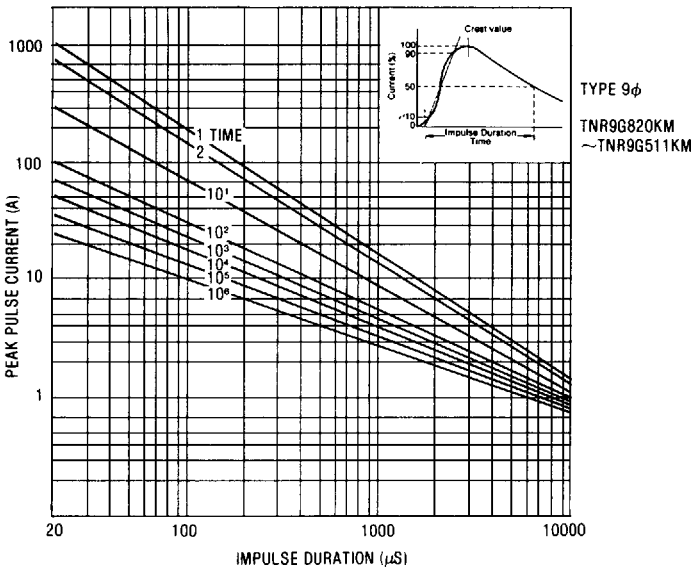
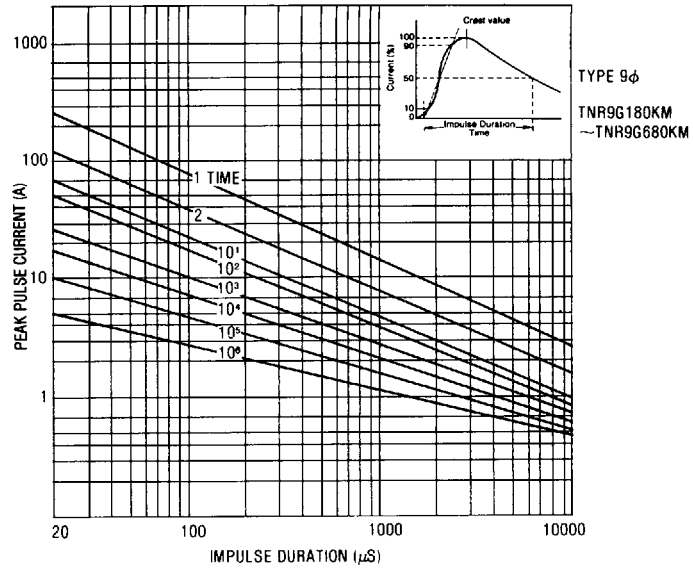
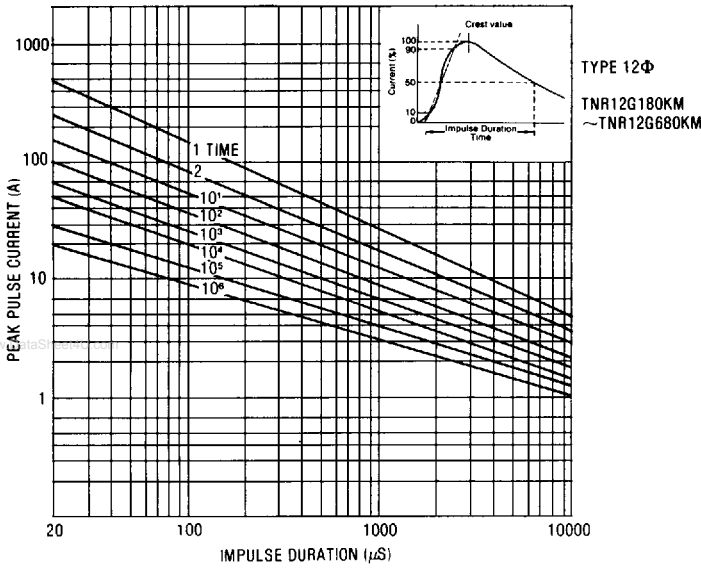
• V-I CHARACTERISTICS AT ROOM TEMPERATURE



TNR® G (M) SERIES

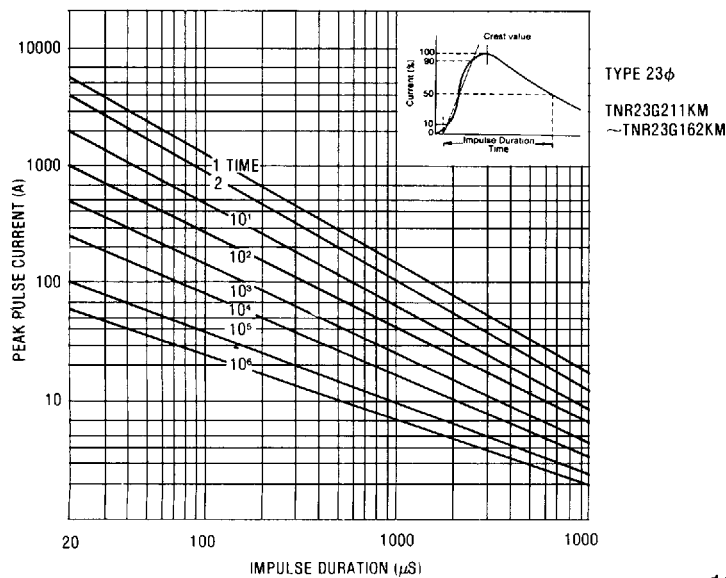
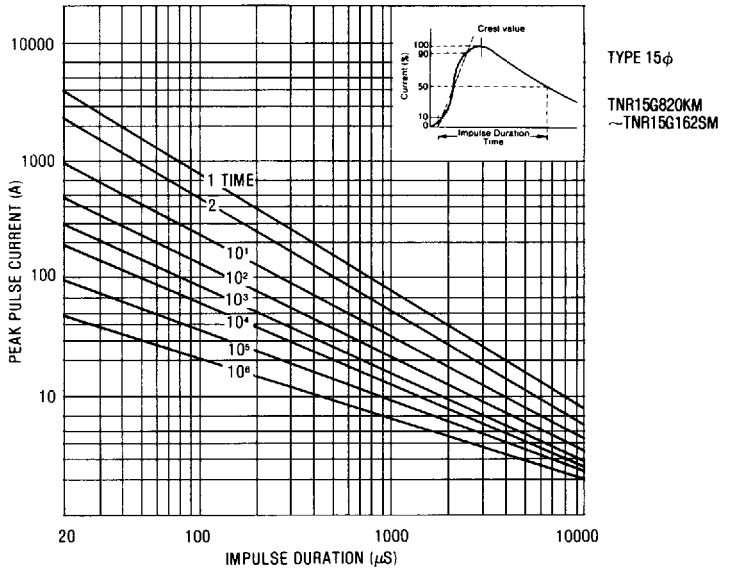
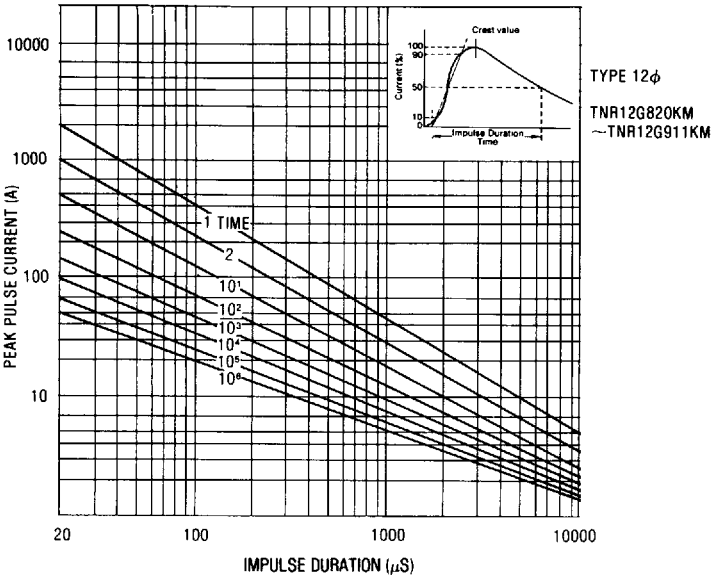
• PULSE LIFETIME RATINGS

• PULSE LIFETIME RATINGS



TNR® G (M) SERIES

• PULSE LIFETIME RATINGS

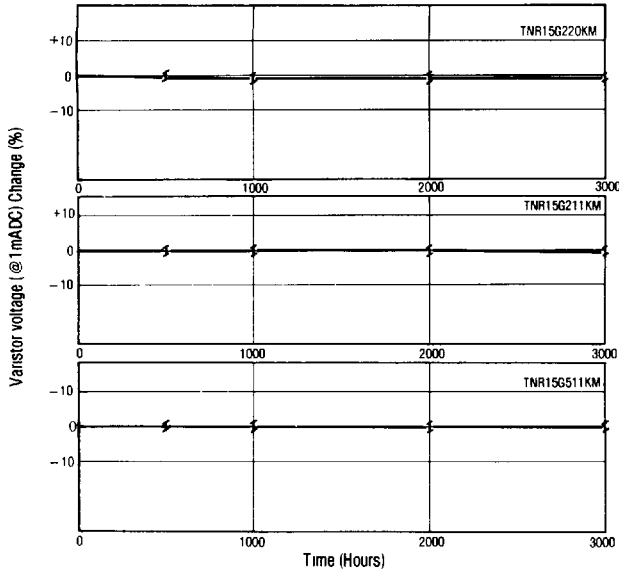


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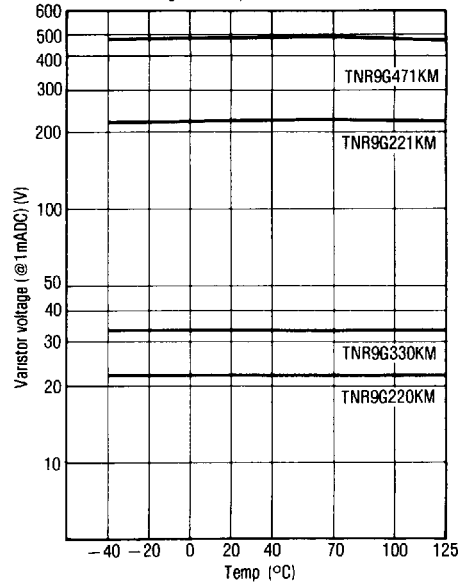


TNR® G (M) SERIES

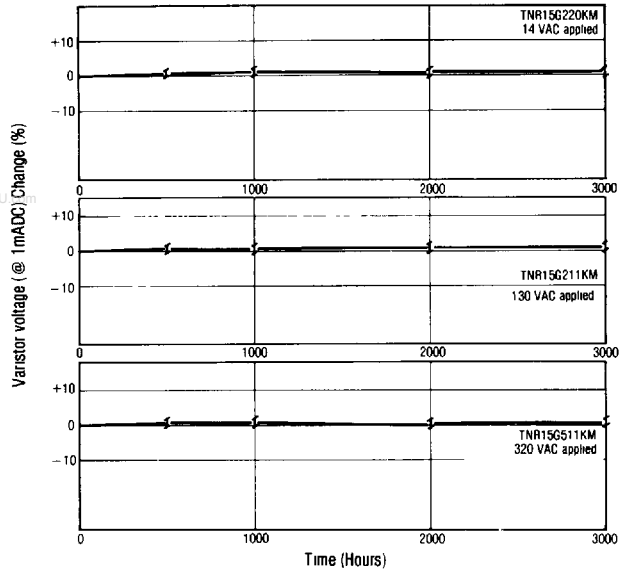
• Varistor voltage change vs Time (@125°C without load)



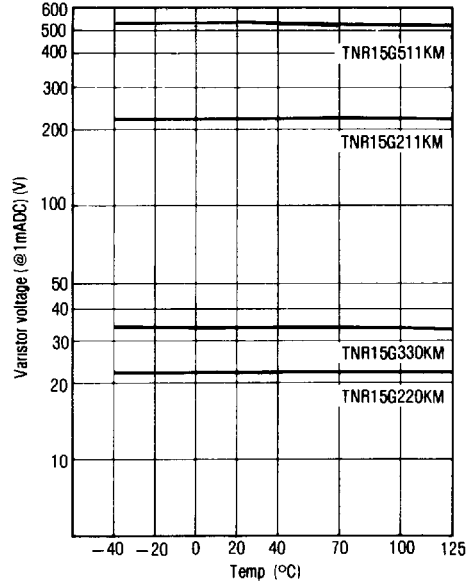
• Varistor voltage vs Temperature



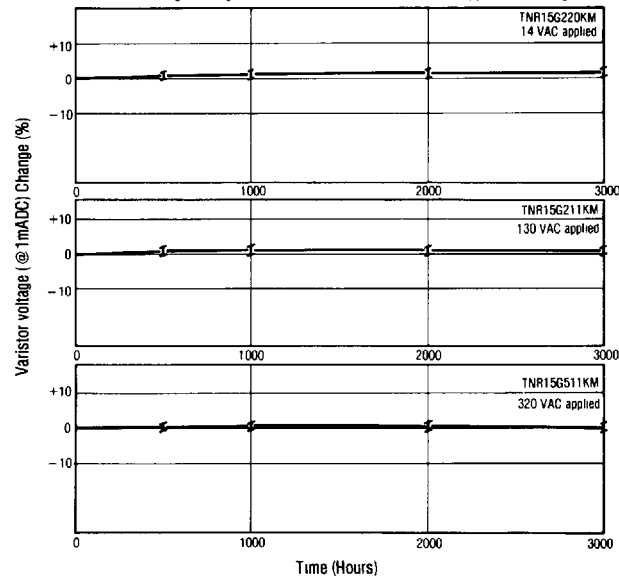
• Varistor voltage change vs Time (@85°C with applicable voltage)



• Varistor voltage vs Temperature



• Varistor voltage change vs Time (@40°C, 95% RH with applicable voltage)



• Capacitance vs Frequency at 20°C

