

SURGE ABSORBERS

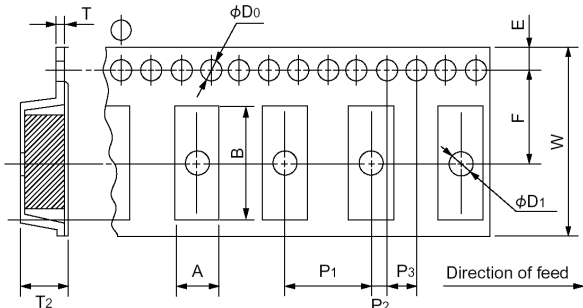
METAL OXIDE VARISTORS TNR^(R)

TNR[®] Series



❖ Taping Specification

- The Specifications for TNR C Series

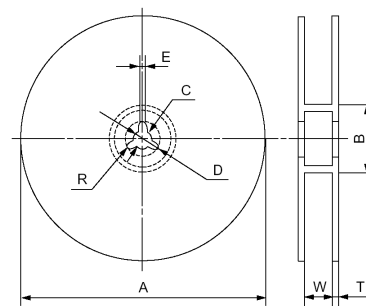


Size code	Dimensions(mm)										
	A±0.1	B±0.1	W±0.3	F±0.1	E±0.1	P ₁ ±0.1	P ₂ ±0.1	P ₃ ±0.1	D ₀ ±0.10	T ₂ Max.	D ₁ Min.
5C-A	6.9	10.4	16.0	7.5	1.75	12.0	2.0	4.0	1.5	0.6	3.0
5C-B	6.85	8.05									3.5
7C	8.3	10.6	24.0	11.5							16.0
9C	10.85	13.0									
12C	12.5	16.3									

❖ Reel

Size Code	Rating of varistor
5C-A	TNR5C220K470K, TNR5C820K271K
5C-B	TNR5C560K, 680K

Size code	Dimensions(mm)							
	A±0.2	B Min.	C±0.5	D±0.8	E±0.5	W±1.0	T±0.5	R Nom.
5C-A, 5C-B	330	50	13	21	2.0	17.4	2.0	1.0
7C						25.4		
9C								
12C								



❖ Standard Packing quantity per reel

(Unit : Pcs)

Size Code	5C-A	5C-B	7C	9C	12C
Quantity	3500	2000	2000	1500	1000

❖ Chip Type For Direct Surface Mounting (5C and 7C Type)

Operating Temperature Range: -40 ~ +125
 Storage Temperature Range: -50 ~ +150

Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20μSec.) (A)	Maximum Energy Rating (2mSec.) (J)	Rated Wattage (W)	Maximum Clamping Voltage		Varistor Voltage at V _{0.1} mA (V)	T±1 (mm)
	Acrms(V)	DC(V)				I _p (A)	V _c (V)		
TNR5C220K	14	18	25/2 times	0.16	0.005	0.5	48	22 (020-024)	1.5
TNR5C270K	17	22		0.20			60	27 (024-030)	
TNR5C330K	20	26		0.24			73	33 (030-036)	
TNR5C390K	25	30		0.32			86	39 (035-043)	
TNR5C470K	30	37		0.34			104	47 (042-052)	
TNR5C560K	35	44		0.37			123	56 (050-062)	
TNR5C680K	40	55	0.43	150	68 (061-075)	2.0			
TNR5C820K	50	65	100/2 times	0.65	0.05	2.5	145	82 (074-090)	1.5
TNR5C101K	60	85		0.65			175	100 (090-110)	
TNR5C121K	75	100		0.65			210	120 (108-132)	
TNR5C151K	95	125		1.0			260	150 (135-165)	
TNR5C181K	110	145		1.0			325	180 (162-198)	
TNR5C201K	130	170		1.0			355	200 (180-220)	
TNR5C221K	140	180		1.5			380	220 (198-242)	
TNR5C241K	150	200		1.5			415	240 (216-264)	
TNR5C271K	175	225		2.0			475	270 (243-297)	
TNR7C220K	14	18		60/2 times			0.4	0.01	
TNR7C270K	17	22	0.5		60	27 (024-030)			
TNR7C330K	20	26	0.6		73	33 (030-036)			
TNR7C390K	25	30	0.8		86	39 (035-043)			
TNR7C470K	30	37	1.0		104	47 (042-052)			
TNR7C560K	35	44	1.1		123	56 (050-062)			
TNR7C680K	40	55	1.3	150	68 (061-075)	2.0			
TNR7C820K	50	65	250/2 times	2.0	0.1	5.0	145	82 (074-090)	1.5
TNR7C101K	60	85		2.0			175	100 (090-110)	
TNR7C121K	75	100		3.0			210	120 (108-132)	
TNR7C151K	95	125		3.0			260	150 (135-165)	
TNR7C181K	110	145		4.0			325	180 (162-198)	
TNR7C201K	130	170		5.0			355	200 (180-220)	
TNR7C221K	140	180		5.0			380	220 (198-242)	
TNR7C241K	150	200		5.0			415	240 (216-264)	
TNR7C271K	175	225		6.0			475	270 (243-297)	
TNR7C331K	210	270		8.0			600	330 (297-363)	
TNR7C361K	230	300		8.0			620	360 (324-396)	
TNR7C391K	250	320		8.0			675	390 (351-429)	
TNR7C431K	275	350		10.0			745	430 (387-473)	
TNR7C471K	300	385		10.0			810	470 (423-517)	

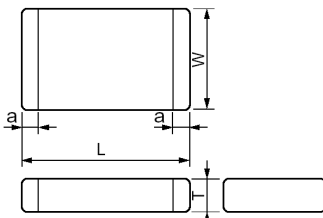
SURGE ABSORBERS

METAL OXIDE VARISTORS TNR^(R)

TNR[®] C Series



❖ DIMENSIONS



Type	L ±0.3	W ±0.3	a(NOM.)
5C	8.0	6.3	0.8
7C	10.0	8.0	1.0
9C	12.5	10.0	1.0
12C	16.0	12.5	1.0

Unit : mm

❖ Precautions for pattern design and soldering

Do not line under the chip varistors at pattern design.

TNR C Series is designed for reflow soldering only.

Peak temperature of reflow soldering profile shall be 220~240 during 5~10 sec.

❖ Chip Type For Direct Surface Mounting (9C and 12C Type)

Operating Temperature Range: -40 ~ +125

Storage Temperature Range: -50 ~ +150

Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20 μ Sec.) (A)	Maximum Energy Rating (2mSec.) (J)	Rated Wattage (W)	Maximum Clamping Voltage		Varistor Voltage at V1mA (V)	T ±1 (mm)				
	Acrms(V)	DC(V)				I _p (A)	V _c (V)						
TNR9C220K	14	18	125/2 times	1.0	0.02	2.0	43	22 (020~024)	1.5				
TNR9C270K	17	22		53			27 (024~030)						
TNR9C330K	20	26		65			33 (030~036)						
TNR9C390K	25	30		77			39 (035~043)						
TNR9C470K	30	37		93			47 (042~052)						
TNR9C560K	35	44	600/2 times	2.2	0.2	10.0	110	56 (050~062)	2.0				
TNR9C680K	40	55		135			68 (061~075)						
TNR9C820K	50	65	600/2 times	4.0	0.2	10.0	135	82 (74~90)	1.5				
TNR9C101K	60	85		164			100 (90~110)						
TNR9C121K	75	100		195			120 (108~132)						
TNR9C151K	95	125		245			150 (135~165)						
TNR9C181K	110	145		295			180 (162~198)						
TNR9C201K	130	170		330			200 (180~220)						
TNR9C221K	140	180		360			220 (198~242)						
TNR9C241K	150	200		390			240 (216~264)						
TNR9C271K	175	225		440			270 (243~297)						
TNR9C331K	210	270		540			330 (297~363)						
TNR9C361K	230	300	1300/2 times	16.0	0.4	25.0	590	360 (324~396)	2.0				
TNR9C391K	250	320		640			390 (351~429)						
TNR9C431K	275	350	1300/2 times	20.0	0.4	25.0	700	430 (387~473)	2.5				
TNR9C471K	300	385		765			470 (423~517)						
TNR12C220K	14	18		250/2 times			2.0	0.05		5.0	43	22 (20~24)	1.5
TNR12C270K	17	22					53				27 (24~30)		
TNR12C330K	20	26					65				33 (30~36)		
TNR12C390K	25	30	77		39 (35~43)								
TNR12C470K	30	37	93		47 (42~52)								
TNR12C560K	35	44	600/2 times	5.5	0.2	10.0	110	56 (50~62)	2.0				
TNR12C680K	40	55		135			68 (61~75)						
TNR12C820K	50	65	600/2 times	8.0	0.4	25.0	135	82 (74~90)	1.5				
TNR12C101K	60	85		165			100 (90~110)						
TNR12C121K	75	100		195			120 (108~132)						
TNR12C151K	95	125		245			150 (135~165)						
TNR12C181K	110	145		295			180 (162~198)						
TNR12C201K	130	170		330			200 (180~220)						
TNR12C221K	140	180		360			220 (198~242)						
TNR12C241K	150	200		390			240 (216~264)						
TNR12C271K	175	225		440			270 (243~297)						
TNR12C331K	210	270		540			330 (297~363)						
TNR12C361K	230	300	1300/2 times	35.0	0.4	25.0	590	360 (324~396)	2.0				
TNR12C391K	250	320		640			390 (351~429)						
TNR12C431K	275	350	1300/2 times	45.0	0.4	25.0	700	430 (387~473)	2.5				
TNR12C471K	300	385		765			470 (423~517)						

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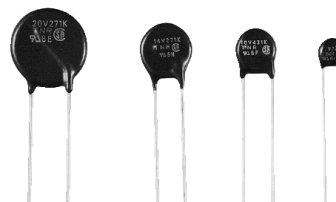
METAL OXIDE VARISTORS TNR^(R)

TNR[®] V Series



❖FEATURES

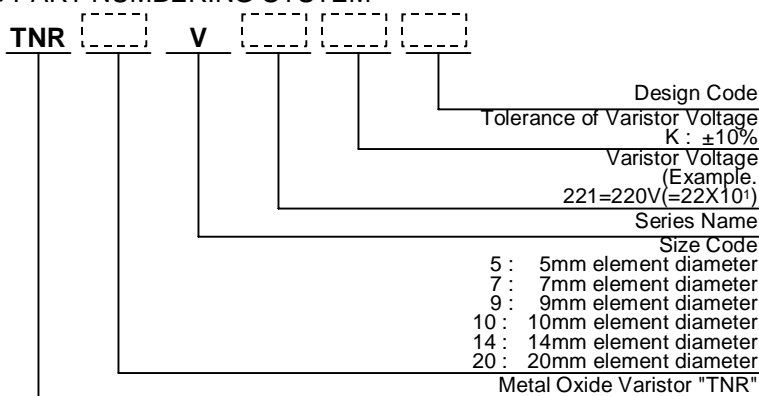
1. Large surge capability (the surge current ratings of TNR V series, by 8/20 μSec., are about two times larger than TNR G series).
2. Large energy capability (1.5 time larger than TNR G series).
3. One rank smaller TNR V has same peak current as TNR G.
4. Excellent voltage non-linear coefficient. Low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



❖APPLICATIONS

1. Protection for semiconductors from over voltage.
 2. Protection for electronic instruments from lightning surges.
 3. Absorption of on-off surges from motors and relays.
- Operating temperature range : - 40 ~ +85°C
 Storage temperature range : - 50 ~ +125°C

❖PART NUMBERING SYSTEM



❖ Ratings

Model Number	Maximum Ratings				Rated Wattage (W)	Maximum Clamping Voltage (V)		Capacitance Typical at 1kHz (pF)	Varistor Voltage at V _{0.1mA} (V)
	Maximum Allowable Voltage		Maximum Peak Current 8/20μS (A)	Maximum Energy 2mS (J)		(A)	(V)		
	AC (Vrms)	DC(V)							
TNR5V180K	11	14	250/1 time 125/2 times	0.4	0.01	1	40	2540	18(16~ 20)
TNR5V220K	14	18		0.5			48	2090	22(20~ 24)
TNR5V270K	17	22		0.7			60	1790	27(24~ 30)
TNR5V330K	20	26		0.8			73	1480	33(30~ 36)
TNR5V390K	25	30		0.9			86	1310	39(35~ 43)
TNR5V470K	30	37		1.1			104	1140	47(42~ 52)
TNR5V560K	35	44		1.3			123	1000	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)
TNR5V101K	60	85		3.0			175	350	100(90~ 110)
TNR5V121K	75	100		3.5			210	310	120(108~ 132)
TNR5V151K	95	125		4.5			260	270	150(135~ 165)
TNR5V201K	130	170		6.0			355	110	200(185~ 225)
TNR5V221K	140	180		6.5			380	110	220(198~ 242)
TNR5V241K	150	200		7.5			415	100	240(216~ 264)
TNR5V271K	175	225		8.0			475	90	270(247~ 303)
TNR5V331K	210	270		9.5			570	80	330(297~ 363)
TNR5V361K	230	300		11.0			620	80	360(324~ 396)
TNR5V391K	250	320		12.0			675	70	390(351~ 429)
TNR5V431K	275	350		13.5			745	70	430(387~ 473)
TNR5V471K	300	385		15.0			810	60	470(423~ 517)
TNR7V150K	8	12		500/1 time 250/2 times			0.7	0.02	2.5
TNR7V180K	11	14	0.9		36	3800	18(16~ 20)		
TNR7V220K	14	18	1.1		43	3200	22(20~ 24)		
TNR7V270K	17	22	1.3		53	2800	27(24~ 30)		
TNR7V330K	20	26	1.6		65	2300	33(30~ 36)		
TNR7V390K	25	30	1.9		77	2100	39(35~ 43)		
TNR7V470K	30	37	2.3		93	1900	47(42~ 52)		
TNR7V560K	35	44	2.7		110	1700	56(50~ 62)		
TNR7V680K	40	55	3.3		135	1500	68(61~ 75)		

SURGE ABSORBERS

METAL OXIDE VARISTORS TNR^(R)

TNR[®] V Series



❖ Ratings

Model Number	Maximum Ratings				Rated Wattage (W)	Maximum Clamping Voltage		Capacitance Typical at 1kHz (pF)	Varistor Voltage at V1mA (V)
	Maximum Allowable Voltage		Maximum Peak Current 8/20μS (A)	Maximum Energy 2mS (J)		(A)	(V)		
	AC (Vrms)	DC(V)							
TNR7V820K	50	65	1750/1 time 1250/2 times	5.0	0.25	10	135	800	82(74~90)
TNR7V101K	60	85		6.0			165	700	100(90~110)
TNR7V121K	75	100		7.0			200	650	120(108~132)
TNR7V151K	95	125		9.0			250	600	150(135~165)
TNR7V201K	130	170		12.5			340	250	200(185~225)
TNR7V221K	140	180		13.5			360	230	220(198~242)
TNR7V241K	150	200		15.0			395	210	240(216~264)
TNR7V271K	175	225		17.0			455	190	270(247~303)
TNR7V331K	210	270		20.0			545	160	330(297~363)
TNR7V361K	230	300		23.0			595	150	360(324~396)
TNR7V391K	250	320		25.0			650	140	390(351~429)
TNR7V431K	275	350		27.5			710	130	430(387~473)
TNR7V471K	300	385		30.0			775	120	470(423~517)
TNR7V511K	320	410		32.0			845	110	510(459~561)
TNR9V150K	8	12	800/1 time 400/2 times	2.0	0.02	5	30	9600	15(13~17)
TNR9V180K	11	14		2.2			36	8000	18(16~20)
TNR9V220K	14	18		2.6			43	7000	22(20~24)
TNR9V270K	17	22		3.2			53	6000	27(24~30)
TNR9V330K	20	26		4.0			65	5000	33(30~36)
TNR9V390K	25	30		4.7			77	4500	39(35~43)
TNR9V470K	30	37		5.6			93	4000	47(42~52)
TNR9V560K	35	44		6.7			110	3500	56(50~62)
TNR9V680K	40	55	8.2	135	3200	68(61~75)			
TNR9V820K	50	65	3000/1 time 2000/2 times	10.0	0.25	25	135	1700	82(74~90)
TNR9V101K	60	85		12.0			165	1600	100(90~110)
TNR9V121K	75	100		14.5			200	1400	120(108~132)
TNR9V151K	95	125		18.0			250	1300	150(135~165)
TNR9V201K	130	170		25.0			340	500	200(185~225)
TNR9V221K	140	180		27.5			360	450	220(198~242)
TNR9V241K	150	200		30.0			395	400	240(216~264)
TNR9V271K	175	225		35.0			455	350	270(247~303)
TNR9V331K	210	270		42.0			545	300	330(297~363)
TNR9V361K	230	300		45.0			595	280	360(324~396)
TNR9V391K	250	320		50.0			650	260	390(351~429)
TNR9V431K	275	350		55.0			710	240	430(387~473)
TNR9V471K	300	385		60.0			775	220	470(423~517)
TNR9V511K	320	410		67.0			845	210	510(459~561)

❖ Dimensions

Model Number	D MAX.	H MAX.	T MAX.	L MIN.	d±0.05	W±1.0	Dimensions(mm)
TNR5V180K ~ TNR5V680K	7	10	4.5	20	0.6	5.0	
TNR5V820K ~ TNR5V221K	7	10	4.5	20	0.6	5.0	
TNR5V241K ~ TNR5V471K			5.8				
TNR7V150K ~ TNR7V680K	8.5	11.5	5.2	20	0.6	5.0	
TNR7V820K ~ TNR7V271K	8.5	11.5	4.8	20	0.6	5.0	
TNR7V331K ~ TNR7V511K			6.0				
TNR9V150K ~ TNR9V680K			11.5				
TNR9V820K ~ TNR9V271K	11.5	14.5	5.3	20	0.6	5.0	
TNR9V331K ~ TNR9V511K			6.4				

SURGE ABSORBERS

■ METAL OXIDE VARISTORS TNR^(R)

TNR[®] V Series



❖ Ratings (Type 10V)

Model Number	Maximum Allowable Voltage		Maximum Ratings		Rated Wattage (W)	Maximum Clamping Voltage		Capacitance Typical at 1kHz (pF)	Varistor Voltage at V1mA (V)	Dimensions E ±1.0 (mm)						
	AC (Vrms)	DC(V)	Maximum Peak Current 8/20μS (A)	Maximum Energy 2mS (J)		(A)	(V)									
TNR10V150K	8	12		2.0		30	9600	15(13 ~ 17)	1.2							
TNR10V180K	11	14		2.2		36	8000	18(16 ~ 20)	1.3							
TNR10V220K	14	18		2.6		43	7000	22(20 ~ 24)	1.4							
TNR10V270K	17	22	1000/1 time	3.2	0.05	5	65	5000	27(24 ~ 30)	1.5						
TNR10V330K	20	26	500/2 times	4.0												
TNR10V390K	25	30		4.7												
TNR10V470K	30	37		5.6												
TNR10V560K	35	44		6.7												
TNR10V680K	40	55		8.2												
TNR10V820K	50	65		10.0									135	1700	82(74 ~ 90)	1.6
TNR10V101K	60	85		12.0									165	1600	100(90 ~ 110)	1.8
TNR10V121K	75	100		14.5			200	1400	120(108 ~ 132)	2.0						
TNR10V151K	95	125	18.0			250	1300	150(135 ~ 165)	2.3							
TNR10V201K	130	170	25.0			340	500	200(185 ~ 225)	1.9							
TNR10V221K	140	180	27.5			360	450	220(198 ~ 242)	2.0							
TNR10V241K	150	200	30.0			395	400	240(216 ~ 264)	2.1							
TNR10V271K	175	225	35.0			455	350	270(247 ~ 303)	2.3							
TNR10V331K	210	270	42.0			545	300	330(297 ~ 363)	2.6							
TNR10V361K	230	300	45.0			595	280	360(324 ~ 396)	2.8							
TNR10V391K	250	320	50.0	3500/1 time	0.4	25	710	240	430(387 ~ 473)	3.1						
TNR10V431K	275	350	55.0													
TNR10V471K	300	385	60.0	2500/2 times												
TNR10V511K	320	410	67.0													
TNR10V561K	350	460	67.0													
TNR10V621K	385	505	67.0													
TNR10V681K	420	560	67.0													
TNR10V751K	460	615	70.0													
TNR10V821K	510	670	80.0													
TNR10V911K	550	745	90.0													
TNR10V102K	625	825	100.0			1650	115	1000(900 ~ 1100)	6.2							
TNR10V112K	680	895	110.0			1815	105	1100(990 ~ 1210)	6.8							
TNR10V182K	1000	1465	183.0			2970	70	1800(1700~1980)	10.5*							

* E ±2.0

❖ Dimensions (Type 10V)

Model Number	D MAX.	H MAX.	T MAX.	L MIN.	d ±0.05	W ±1.0	Dimensions(mm)
TNR10V150K ~ TNR10V680K	11.5	14.5	5.3	20	0.8	7.5	
TNR10V820K ~ TNR10V271K	11.5	14.5	5.3	20	0.8	7.5	
TNR10V331K ~ TNR10V511K			6.4				
TNR10V561K ~ TNR10V112K	12.5	15.5	9.7				
TNR10V182K	13.5	16.5	14.4			*11.0	

↔ : W₂ ± 2.0

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METAL OXIDE VARISTORS TNR^(R)

TNR[®] V Series



❖ Ratings (Type 14V)

Model Number	Maximum Ratings				Rated Wattage (W)	Maximum Clamping Voltage		Capacitance Typical at 1kHz (pF)	Varistor Voltage at V1mA (V)	Dimensions E ±1.0 (mm)
	Maximum Allowable Voltage		Maximum Peak Current 8/20µS (A)	Maximum Energy 2mS (J)		(A)	(V)			
	AC (Vrms)	DC(V)								
TNR14V180K	11	14	2000/1 time	4.3	0.1	10	36	16500	18(16~ 20)	1.3
TNR14V220K	14	18		5.3			43	13500	22(20~ 24)	1.4
TNR14V270K	17	22		6.5			53	12000	27(24~ 30)	1.5
TNR14V330K	20	26		7.9			65	10000	33(30~ 36)	1.7
TNR14V390K	25	30		9.4			77	9000	39(35~ 43)	1.6
TNR14V470K	30	37		11.0			93	8000	47(42~ 52)	1.7
TNR14V560K	35	44		13.0			110	7500	56(50~ 62)	1.8
TNR14V680K	40	55		16.0			135	6500	68(61~ 75)	2.0
TNR14V820K	50	65	6000/1 time	20.0	0.6	50	135	3000	82(74~ 90)	1.6
TNR14V101K	60	85		25.0			165	2700	100(90~ 110)	1.8
TNR14V121K	75	100		30.0			200	2500	120(108~ 132)	2.0
TNR14V151K	95	125		37.0			250	2300	150(135~ 165)	2.3
TNR14V201K	130	170		50.0			340	950	200(185~ 225)	1.9
TNR14V221K	140	180		55.0			360	850	220(198~ 242)	2.0
TNR14V241K	150	200		60.0			395	800	240(216~ 264)	2.1
TNR14V271K	175	225		70.0			455	700	270(247~ 303)	2.3
TNR14V331K	210	270		80.0			545	600	330(297~ 363)	2.6
TNR14V361K	230	300		90.0			595	550	360(324~ 396)	2.8
TNR14V391K	250	320		100.0			650	500	390(351~ 429)	2.9
TNR14V431K	275	350		110.0			710	460	430(387~ 473)	3.1
TNR14V471K	300	385	125.0	775	420	470(423~ 517)	3.3			
TNR14V511K	320	410	136.0	845	390	510(459~ 561)	3.5			
TNR14V561K	350	460	5000/1 time	136.0	4500/2 times		922	360	560(504~ 616)	3.8
TNR14V621K	385	505		136.0			1025	330	620(558~ 682)	4.2
TNR14V681K	420	560		136.0			1120	310	680(612~ 748)	4.5
TNR14V751K	460	615		150.0			1240	280	750(675~ 825)	4.9
TNR14V821K	510	670		165.0			1355	250	820(738~ 902)	5.2
TNR14V911K	550	745		180.0			1500	230	910(819~ 1001)	5.7
TNR14V102K	625	825		200.0			1650	210	1000(900~ 1100)	6.2
TNR14V112K	680	895		220.0			1815	190	1100(990~ 1210)	6.8
TNR14V182K	1000	1465	360.0	2970	120	1800(1700~ 1980)	10.5*			

* E ±2.0

❖ Dimensions (Type 14V)

Model Number	D MAX.	H MAX.	T MAX.	L MIN.	d ±0.05	W ±1.0	Dimensions(mm)
TNR14V150K ~ TNR14V680K	15.5	18.5	5.3	20	0.8	7.5	
TNR14V820K ~ TNR14V271K	15.5	18.5	5.3	20	0.8	7.5	
TNR14V331K ~ TNR14V511K			6.4				
TNR14V561K ~ TNR14V112K	16.0	19.0	9.7				
TNR14V182K	17.0	20.5	14.4				
						*11.0	

↔ : W₂ ± 2.0

SURGE ABSORBERS

■ METAL OXIDE VARISTORS TNR^(R)

TNR[®] V Series



❖ Ratings (Type 20V)

Model Number	Maximum Allowable Voltage		Maximum Ratings		Rated Wattage (W)	Maximum Clamping Voltage		Capacitance Typical at 1kHz (pF)	Varistor Voltage at V _{0.1mA} (V)	Dimensions E ±1.0 (mm)	
	AC (Vrms)	DC(V)	Maximum Peak Current 8/20μS (A)	Maximum Energy 2mS (J)		(A)	(V)				
TNR20V180K	11	14	3000/1 time	12.0	0.2	20	36	39000	18(16~ 20)	1.5	
TNR20V220K	14	18		14.0			43	33000	22(20~ 24)	1.6	
TNR20V270K	17	22		17.0			53	28000	27(24~ 30)	1.7	
TNR20V330K	20	26		21.0			65	24000	33(30~ 36)	1.9	
TNR20V390K	25	30		25.0			77	21000	39(35~ 43)	1.9	
TNR20V470K	30	37		30.0			93	19000	47(42~ 52)	2.0	
TNR20V560K	35	44		36.0			110	17000	56(50~ 62)	2.1	
TNR20V680K	40	55	44.0	135	15000	68(61~ 75)	2.2				
TNR20V820K	50	65	10000/1 time	40.0	1.0	100	135	6700	82(74~ 90)	1.8	
TNR20V101K	60	85		50.0			165	6100	100(90~ 110)	2.0	
TNR20V121K	75	100		60.0			200	5600	120(108~ 132)	2.2	
TNR20V151K	95	125		75.0			250	5100	150(135~ 165)	2.5	
TNR20V201K	130	170		100.0			340	2700	200(185~ 225)	2.1	
TNR20V221K	140	180		110.0			360	2500	220(198~ 242)	2.2	
TNR20V241K	150	200		120.0			395	2300	240(216~ 264)	2.3	
TNR20V271K	175	225		135.0			455	2000	270(247~ 303)	2.5	
TNR20V331K	210	270		160.0			545	1700	330(297~ 363)	2.8	
TNR20V361K	230	300		180.0			595	1500	360(324~ 396)	3.0	
TNR20V391K	250	320		195.0			650	1400	390(351~ 429)	3.1	
TNR20V431K	275	350		215.0			710	1300	430(387~ 473)	3.3	
TNR20V471K	300	385		250.0			775	1200	470(423~ 517)	3.5	
TNR20V511K	320	410		273.0			845	1100	510(459~ 561)	3.7	
TNR20V561K	350	460	7500/1 time	273.0			922	1000	560(504~ 626)	4.0	
TNR20V621K	385	505		273.0			1025	900	620(558~ 682)	4.4	
TNR20V681K	420	560		273.0			1120	830	680(612~ 748)	4.7	
TNR20V751K	460	615		300.0			1240	750	750(675~ 825)	5.1	
TNR20V821K	510	670		325.0			1355	700	820(738~ 902)	5.4	
TNR20V911K	550	745		360.0			1500	620	910(819~ 1001)	5.9	
TNR20V102K	625	825		6500/2 times			400.0	1650	560	1000(900~ 1100)	6.4
TNR20V112K	680	895					440.0	1815	510	1100(990~ 1210)	7.0
TNR20V182K	1000	1465					720.0	2970	340	1800(1700~ 1980)	10.7*

❖ Dimensions (Type 20V)

* E ±2.0

Model Number	D MAX.	H MAX.	T MAX.	L MIN.	d ±0.05	W ±1.0	Dimensions(mm)
TNR20V180K ~ TNR20V680K	21.5	24.5	5.8	20	0.8	10.0	
TNR20V820K ~ TNR20V271K	21.5	24.5	5.6	20	0.8	10.0	
TNR20V331K ~ TNR20V511K			6.8				
TNR20V561K ~ TNR20V112K	22.5	25.5	10.1	20	0.8	10.0	
TNR20V182K	23.5	28.0	14.8				

☞ : W₂ ± 2.0

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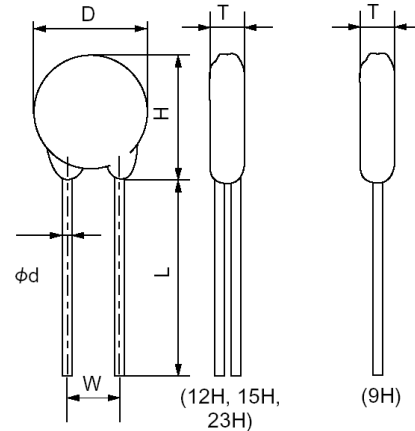
METAL OXIDE VARISTORS TNR^(R)



TNR[®] H SERIES AND HP SERIES

❖ High Energy, Low Varistor Voltage Series (H Series)

Model Number	Maximum Applied Voltage			Maximum Energy (20mSec.) (J)	Maximum Clamping Voltage		Varistor Voltage at 1mA DC (V)
	Continuous		5 Minutes		(A)	(V)	
	AC (Vrms)	DC(V)	DC(V)				
TNR9H220K	12	16	24	5	2	43	22(20~24)
TNR9H270K	15	19	29			53	27(24~30)
TNR9H330K	18	24	36			65	33(30~36)
TNR9H390K	22	28	42			77	39(35~43)
TNR9H470K	26	34	50			93	47(42~52)
TNR12H220K	12	16	24	10	5	43	22(20~24)
TNR12H270K	15	19	29			53	27(24~30)
TNR12H330K	18	24	36			65	33(30~36)
TNR12H390K	22	28	42			77	39(35~43)
TNR12H470K	26	34	50			93	47(42~52)
TNR15H220K	12	16	24	20	10	43	22(20~24)
TNR15H270K	15	19	29			53	27(24~30)
TNR15H330K	18	24	36			65	33(30~36)
TNR15H390K	22	28	42			77	39(35~43)
TNR15H470K	26	34	50			93	47(42~52)
TNR23H220K	12	16	24	40	25	43	22(20~24)
TNR23H270K	15	19	29			53	27(24~30)
TNR23H330K	18	24	36			65	33(30~36)
TNR23H390K	22	28	42			77	39(35~43)
TNR23H470K	26	34	50			93	47(42~52)



Type	D Max.	H Max.	W ±1	L Min.	d
9H	10.0	14.0	5.0	25.0	0.6
12H	14.0	17.0	7.5	25.0	0.8
15H	17.0	20.0	7.5	25.0	0.8
23H	24.0	28.0	10.0	25.0	0.8

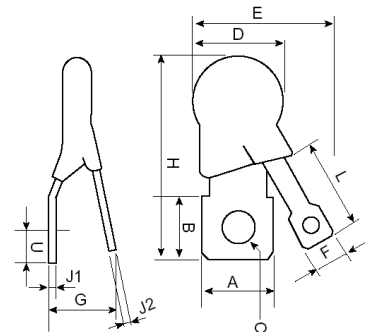
(mm)

	T Max.
220k~330k	6.0
390k~470k	8.0

Operating Temperature Range - 40 ~ +125 °C Storage Temperature Range - 50 ~ +150 °C

❖ High Energy, Low Varistor Voltage Series (HP Series)

Model Number	Maximum Applied Voltage			Maximum Energy (200mSec.) (J)	Maximum Clamping Voltage		Varistor Voltage at 1mA DC (V)
	Continuous		5 Minutes		(A)	(V)	
	AC (Vrms)	DC(V)	DC(V)				
TNR12HP220K	12	16	24	100	5	43	22(20~24)
TNR12HP270K	15	19	29			53	27(24~30)
TNR12HP330K	18	24	36			65	33(30~36)
TNR12HP390K	22	28	42			77	39(35~43)
TNR12HP470K	26	34	50			93	47(42~52)
TNR15HP220K	12	16	24	200	10	43	22(20~24)
TNR15HP270K	15	19	29			53	27(24~30)
TNR15HP330K	18	24	36			65	33(30~36)
TNR15HP390K	22	28	42			77	39(35~43)
TNR15HP470K	26	34	50			93	47(42~52)
TNR23HP220K	12	16	24	400	25	43	22(20~24)
TNR23HP270K	15	19	29			53	27(24~30)
TNR23HP330K	18	24	36			65	33(30~36)
TNR23HP390K	22	28	42			77	39(35~43)
TNR23HP470K	26	34	50			93	47(42~52)



	12HP	15HP	23HP
A	10	12	14
B	10	12	14
C	5.0	5.5	6.5
D	15 max.	18 max.	25 max.
E	23 max.	25 max.	30 max.
F	6.4	6.4	6.4
G	17 max.	20 max.	25 max.
H	32 max.	37 max.	45 max.
J1	0.8	0.8	0.8
J2	0.8	0.8	0.8
L	8 min.	9 min.	10 min.
U	5.0	6.0	7.0

Operating Temperature Range - 40 ~ +150 °C Storage Temperature Range - 50 ~ +150 °C

(mm)

SURGE ABSORBERS

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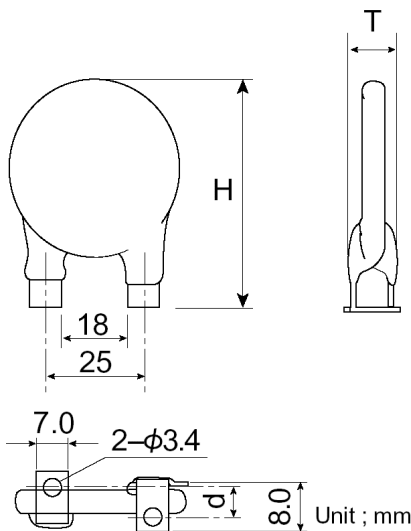
TNR[®] 32HP SERIES

❖ High Peak Current with tabs. Ratings (Type 32HP)

Model Number	Maximum Ratings				Maximum Clamping Voltage $V_{200A(V)}$	Capacitance (Typical) at 1kHz(pF)	Varistor Voltage 1mA (V)	
	Maximum Allowable Voltage (Continuous)		Maximum Peak Current	Maximum Energy				Rated Wattage (W)
	AC (Vrms)	DC(V)	8/20 μ s(kA)	2ms(J)				
TNR32HP221K310	140	180	25/1 time 20/2 times	200	1.2	360	5,500	220(198 ~ 242)
TNR32HP241K310	150	200		240		395	4,800	240(216 ~ 264)
TNR32HP271K310	175	225		260		445	4,200	270(243 ~ 297)
TNR32HP391K310	250	320		350		650	3,500	390(351 ~ 429)
TNR32HP431K310	275	350		400		710	2,700	430(387 ~ 473)
TNR32HP471K310	300	385		410		775	2,600	470(423 ~ 517)
TNR32HP511K310	315	420		420		840	2,400	510(453 ~ 561)
TNR32HP681K310	420	560		450		1,120	2,100	680(612 ~ 748)
TNR32HP751K310	460	615		500		1,240	2,000	750(675 ~ 825)
TNR32HP821K310	510	670		545		1,355	1,800	820(738 ~ 902)
TNR32HP911K310	550	745		600		1,500	1,700	910(819 ~ 1,001)
TNR32HP102K310	625	825		620		1,650	1,000	1,000(900 ~ 1,100)
TNR32HP112K310	680	895		640		1,815	800	1,100(990 ~ 1,210)

Operating Temperature Range : -40 ~ +85 °C, Storage Temperature Range : -50 ~ +125 °C

❖ Dimensions(Type 32HP)



Model Number	H MAX.	T MAX.	D \pm 1.0
TNR32HP221K310	46.0	7.5	6.8
TNR32HP241K310	46.0	7.5	6.7
TNR32HP271K310	46.0	7.5	6.5
TNR32HP391K310	46.0	7.5	5.8
TNR32HP431K310	46.0	7.5	5.6
TNR32HP471K310	46.0	7.5	5.4
TNR32HP511K310	46.0	10.0	5.2
TNR32HP681K310	46.0	10.0	4.2
TNR32HP751K310	46.0	10.0	3.9
TNR32HP821K310	46.0	10.0	3.5
TNR32HP911K310	46.0	10.0	3.0
TNR32HP102K310	46.0	11.0	2.5
TNR32HP112K310	46.0	11.0	1.9

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METAL OXIDE VARISTORS TNR^(R)

TNR[®] SE Series

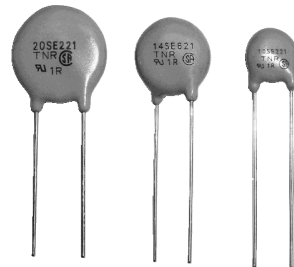


When the surge energy much higher than the rated maximum energy is applied to the varistors, it may blow up and catch fire.

Our newly developed TNR SE series is to prevent from being caught fire even very high surge energy is applied. Thus electric appliance using our TNR SE series can be much safer.

❖ FEATURES

1. Newly developed non-flammable material (Halogen Free) is used for outer coating.
2. The new outer coating will meet UL flammability test.
3. At the over voltage test, the new material shall deter burning caused by the high temperature, arc and the large surge current when TNR shall blow up.
4. General specifications are same as that of V series, large surge capability TNR.

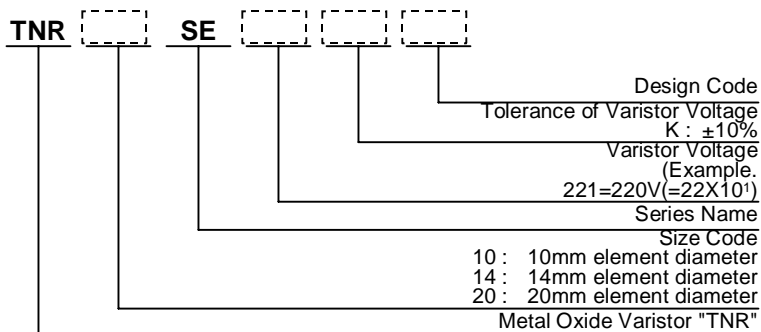


❖ APPLICATIONS

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

Operating temperature range : - 40 ~ +85°C
 Storage temperature range : - 50 ~ +125°C

❖ PART NUMBERING SYSTEM



❖ Ratings and Characteristics

Model Number	Maximum Ratings				Rated Wattage (W)	Maximum Clamping Voltage		Capacitance Typical at 1kHz (pF)	Varistor Voltage V1mA (V)	
	Maximum Allowable Voltage		Maximum Peak Current 8/20μS (A)	Maximum Energy 2mS (J)		(A)	(V)			
	AC (Vrms)	DC(V)								
TNR10SE221K	140	180	3500/1 time	27.5	0.4	25	360	450	220(198~242)	
TNR10SE241K	150	200		30.0				395	400	240(216~264)
TNR10SE271K	175	225	35.0	455				350	270(247~303)	
TNR10SE431K	275	350	2500/2 times	55.0				710	240	430(387~473)
TNR10SE471K	300	385		60.0				775	220	470(423~517)
TNR10SE621K	385	505	67.0	1025				180	620(558~682)	
TNR14SE221K	140	180	6000/1 time	55.0	0.6	50	360	850	220(198~242)	
TNR14SE241K	150	200		60.0				395	800	240(216~264)
TNR14SE271K	175	225	70.0	455				700	270(247~303)	
TNR14SE431K	275	350	5000/2 times	110.0				710	460	430(387~473)
TNR14SE471K	300	385		125.0				775	420	470(423~517)
TNR14SE621K	385	505	136.0	1025				330	620(558~682)	
TNR20SE221K	140	180	10000/1 time	110.0	1.0	100	360	2,500	220(198~242)	
TNR20SE241K	150	200		120.0				2,300	240(216~264)	
TNR20SE271K	175	225	135.0	2,000				270(247~303)		
TNR20SE431K	275	350	7000/2 times	215.0				710	1,300	430(387~473)
TNR20SE471K	300	385		250.0				775	1,200	470(423~517)
TNR20SE621K	385	505	273.0	1025				900	620(558~682)	

❖ Dimensions

Model Number	D MAX.	H MAX.	T MAX.	L MIN.	d ±0.05	W ±1.0	E ±1.0	Dimensions(mm)
TNR10SE221K	13.0	17.5	6.9	20	0.8	0.75	2.0	
TNR10SE241K			2.1					
TNR10SE271K			2.3					
TNR10SE431K	3.1							
TNR10SE471K	3.3							
TNR10SE621K	4.2							
TNR14SE221K	17.5	22.0	6.9	20	0.8	7.5	2.0	
TNR14SE241K			2.1					
TNR14SE271K			2.3					
TNR14SE431K	3.1							
TNR14SE471K	3.3							
TNR14SE621K	4.2							
TNR20SE221K	22.5	27.5	6.9	20	0.8	10.0	2.2	
TNR20SE241K			2.3					
TNR20SE271K			2.5					
TNR20SE431K	3.3							
TNR20SE471K	3.5							
TNR20SE621K	4.4							

SURGE ABSORBERS

METAL OXIDE VARISTORS TNR^(R)

TNR[®] A SERIES



❖ High Varistor Voltage (Axial Lead Type)

Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20 μ Sec.) (A)	Maximum Energy Rating (2mSec.) (J)	Rated Wattage (W)	Maximum Clamping Voltage (V _{2A})	Varistor Voltage at 0.1mA DC (V)	H Max. (mm)
	Acrms(V)	DC(V)						
4A Type	Acrms(V)	DC(V)	(A)	(J)	(W)	(V _{2A})	(V)	(mm)
TNR4A122K	620	880		1.8		2,200	1,200(1,080~ 1,320)	11
TNR4A152K	780	1,100	40/1time	2.0	0.05	2,600	1,500(1,350~ 1,650)	12
TNR4A182K	930	1,300	20/2time	2.5		3,100	1,800(1,620~ 1,980)	13
TNR4A202K	1,040	1,450		3.0		3,500	2,000(1,800~ 2,200)	15
10A Type	Acrms(V)	DC(V)	(A)	(J)	(W)	(V _{5A})	(V)	(mm)
TNR10A472K	2,200	3,100		10		8,700	4,700(4,230~ 5,170)	40
TNR10A562K	2,600	3,700	100/1time	10		10,000	5,600(5,040~ 6,160)	40
TNR10A682K	3,200	4,500	50/2time	10	0.5	12,000	6,800(6,120~ 7,480)	40
TNR10A822K	3,900	5,500		10		16,000	8,200(7,380~ 9,020)	50
TNR10A103K	4,700	6,700		15		19,500	10,000(9,000~11,000)	50
TNR10A123K	5,700	8,100		15		21,500	12,000(10,800~13,200)	55

Operating Temperature Range : -40 ~ +85 °C, Storage Temperature Range : -50 ~ +105 °C

❖ Dimensions

Type	4A Type	10A Type
D	4 ± 1	10 ± 1
L	25min	30min
d	0.6	1

(mm)

TNR[®] GF SERIES

❖ GF Series are combined TNR G Series with Thermal Fuse

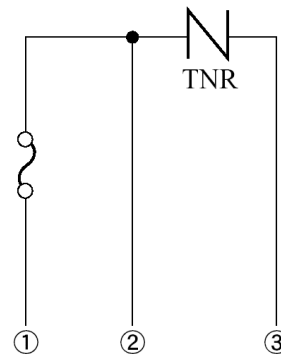
Model Number	Maximum Applied Voltage (Continuous)		Maximum Peak Current (8/20 μ Sec.) (A)	Maximum Energy Rating (2mSec.) (J)	Rated Wattage (W)	Maximum Clamping Voltage (V _{50A(V)})	Capacitance (Typical) (pF)	Varistor Voltage at 1mA DC (V)	T Max. (mm)
	AC (Vrms)	DC(V)							
TNR15GF271K	175	225	2500	50	0.6	440	680	270(243 ~ 297)	9
TNR15GF471K	300	385		80	0.6	765	450	470(423 ~ 517)	10
TNR15GF821K	510	670		110	0.6	1,340	280	820(738 ~ 902)	12
	AC (Vrms)	DC(V)	(A)	(J)	(W)	V _{50A(V)}	(pF)	(V)	(mm)
TNR23GF271K	175	225	4000	90	0.8	440	1,850	270(243 ~ 297)	9
TNR23GF471K	300	385		150	1.0	765	1,200	470(423 ~ 517)	10
TNR23GF821K	510	670		190	1.5	1,340	800	820(738 ~ 902)	12

Operating Temperature Range -40 ~ +85 °C Storage Temperature Range -50 ~ +125 °C

❖ Dimensions

	15Gmax.	23max.
D	18	25
T	9 to 12	9 to 12
H	22max.	32max.
W	7.5 ± 1	10 ± 1
L	30min.	30min.
U	23max.	28max.
F	22min.	22min.
d1	0.8	0.8
d2	0.5	0.6

(mm)



SURGE ABSORBERS

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METAL OXIDE VARISTORS TNR[®]

TNR[®] E SERIES



❖ 20E Series

Model Number	Maximum Applied Voltage		Maximum Peak Current (8/20 μ Sec.) (A)	Energy (2mSec.) (J)	Rated Wattage (W)	Maximum Clamping Voltage V _{100A} (V)	Typical Capacitance at 1kHz (pF)	Varistor Voltage at 1mA DC (V)
	Acrms(V)	DC(V)						
TNR20E221K	140	180	8,000	80	0.8	360	2,200	220(198 ~ 242)
TNR20E241K	150	200		95		395	1,500	240(216 ~ 264)
TNR20E271K	175	225		100		445	1,400	270(243 ~ 297)
TNR20E391K	250	320		130		650	1,200	390(351 ~ 429)
TNR20E431K	275	350		140		710	1,000	430(387 ~ 473)
TNR20E471K	300	385		150		775	950	470(423 ~ 517)
TNR20E511K	315	420		160		840	930	510(459 ~ 561)
TNR20E681K	420	560		175		1,120	850	680(612 ~ 748)
TNR20E751K	460	615		190		1,240	800	750(675 ~ 825)
TNR20E821K	510	670		215		1,355	700	820(738 ~ 902)
TNR20E911K	550	745		240		1,500	600	910(819 ~ 1,001)
TNR20E102K	625	825		245		1,650	400	1,000(900 ~ 1,100)
TNR20E112K	680	895		250		1,815	350	1,100(990 ~ 1,210)

Operating Temperature Range : -40 ~ +85 °C, Storage Temperature Range : -40 ~ +110 °C

❖ 32E Series

Model Number	Maximum Applied Voltage		Maximum Peak Current (8/20 μ Sec.) (A)	Energy (2mSec.) (J)	Rated Wattage (W)	Maximum Clamping Voltage V _{200A} (V)	Typical Capacitance at 1kHz (pF)	Varistor Voltage at 1mA DC (V)
	Acrms(V)	DC(V)						
TNR32E221K	140	180	25,000	200	1.2	360	5,500	220(198 ~ 242)
TNR32E241K	150	200		240		395	4,800	240(216 ~ 264)
TNR32E271K	175	225		260		445	4,200	270(243 ~ 297)
TNR32E391K	250	320		350		650	3,500	390(351 ~ 429)
TNR32E431K	275	350		400		710	2,700	430(387 ~ 473)
TNR32E471K	300	385		410		775	2,600	470(423 ~ 517)
TNR32E511K	315	420		420		840	2,400	510(459 ~ 561)
TNR32E681K	420	560		450		1,120	2,100	680(612 ~ 748)
TNR32E751K	460	615		500		1,240	2,000	750(675 ~ 825)
TNR32E821K	510	670		545		1,355	1,800	820(738 ~ 902)
TNR32E911K	550	745		600		1,500	1,700	910(819 ~ 1,001)
TNR32E102K	625	825		620		1,650	1,000	1,000(900 ~ 1,100)
TNR32E112K	680	895		640		1,815	800	1,100(990 ~ 1,210)

Operating Temperature Range : -40 ~ +85 °C, Storage Temperature Range : -40 ~ +110 °C

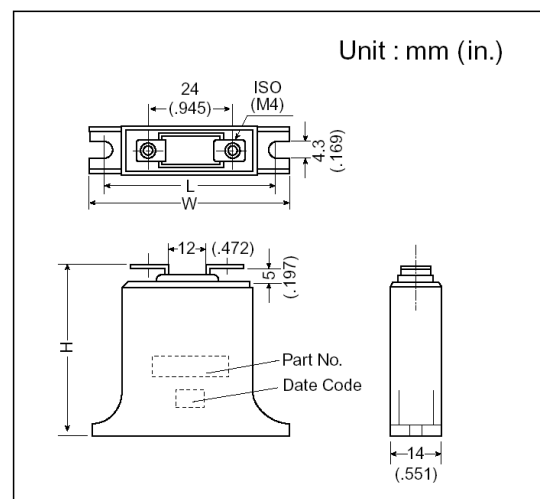
❖ FEATURES

1. Excellent clamping voltage characteristic and fast response time (<50nsec.) when subjected to impulse surges.
2. No follow current.
3. Any voltage rating within a V_{1mA} range from 200V to 1,100V available. (V_{1mA} : varistor voltage.)
4. Bilateral and symmetrical V- I characteristics curve. The TNR can, therefore, be used both in AC and DC circuits, for protection of either positive or negative transients.
5. Large withstanding peak current 8,000A-25,000A (8/20 μ Sec.).

❖ APPLICATIONS

1. Protection of semiconductors such as transistors, diodes, ICs, thyristors, triacs, etc.
2. Protection of various equipment including :
 - * Broadcasting, communications equipment.
 - * Traffic and railway signal systems.
 - * Automatic control devices for power distribution.
 - * Waterworks.
 - * Home entertainment equipment.
3. Surge absorption of relays and electromagnetic valves.
4. Absorption of surges generated within equipment such as TVs.

❖ Dimensions



Series	W	H	L
TNR32E	48 ±1 1.890 ±0.039)	42 ±1 1.653 ±0.039)	39 ±1 1.535 ±0.039)
TNR20E	60 ±1 2.362 ±0.039)	55 ±1 2.165 ±0.039)	51 ±1 2.008 ±0.039)