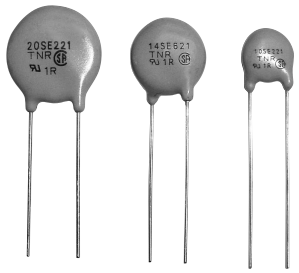
SE Series



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

- ●Newly developed non-flammable material (Harogen Free) is used for outer coating.
- ●The new outer coating will meet UL flammability test.
- ●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.
- ●General specifications are same as that of V series, large surge capability TNR.

◆APPLICATIONS

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

Operating Temperature Range: -40～+85℃
Storage Temperature Range: -50～+125℃

◆PART NUMBERING SYSTEM

TNR □ SE □□□□□ □ □

- Design Code
- Tolerance of Varistor Voltage
  K : ±10%
- Varistor Voltage
  (Example. 221=220V(=22×10^1)
- Series Name
- Size Code
  10 : ϕ10mm element diameter
  14 : ϕ14mm element diameter
  20 : ϕ20mm element diameter
- Metal Oxide Varistor "TNR"

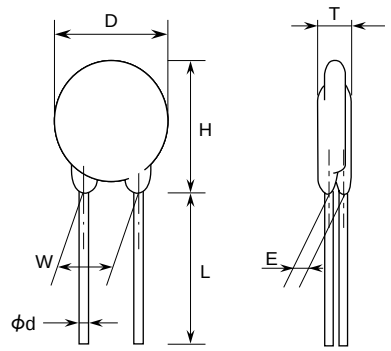
CAT. No. E1006K

SE Series

◆RATINGS AND CHARACTERISTICS

Model Number	Maximum Allowable Voltage		Maximum Peak Current	Maximum Energy	Rated Wattage	Maximum Clamping Voltage		Capacitance Typical	Varistor Voltage V1mA
	AC. (Vrms)	DC. (V)	8/20μSec. (A)	2mSec. (J)	(W)	(A)	(V)	(pF)	(V)
TNR10SE221K	140	180	3,500/1 time 2,500/2 times	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		55.0			710	240	430 (387~473)
TNR10SE471K	300	385		60.0			775	220	470 (423~517)
TNR10SE621K	385	505		67.0			1,025	180	620 (558~682)
TNR14SE221K	140	180	6,000/1 time 5,000/2 times	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		110.0			710	460	430 (387~473)
TNR14SE471K	300	385		125.0			775	420	470 (423~517)
TNR14SE621K	385	505	5,000/1 time 4,500/2 times	136.0			1,025	330	620 (558~682)
TNR20SE221K	140	180	10,000/1 time 7,000/2 times	110.0	1.0	100	360	2,500	220 (198~242)
TNR20SE241K	150	200		120.0			395	2,300	240 (216~264)
TNR20SE271K	175	225		135.0			455	2,000	270 (247~303)
TNR20SE431K	275	350		215.0			710	1,300	430 (387~473)
TNR20SE471K	300	385		250.0			775	1,200	470 (423~517)
TNR20SE621K	385	505	7,500/1 time 6,500/2 times	273.0			1,025	900	620 (558~682)

◆DIMENSIONS [mm]



Model Number	D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0	E ±1.0
TNR10SE221K	13.0	17.5	6.9	20	0.8	7.5	2.0
TNR10SE241K							2.1
TNR10SE271K							2.3
TNR10SE431K			8.2				3.1
TNR10SE471K							3.3
TNR10SE621K	14.0	18.5	11.5				4.2
TNR14SE221K	17.5	22.0	6.9	20	0.8	7.5	2.0
TNR14SE241K							2.1
TNR14SE271K							2.3
TNR14SE431K			8.2				3.1
TNR14SE471K							3.3
TNR14SE621K	18.5	24.0	11.5				4.2
TNR20SE221K	22.5	27.5	7.4	20	0.8	10.0	2.2
TNR20SE241K							2.3
TNR20SE271K							2.5
TNR20SE431K			8.7				3.3
TNR20SE471K							3.5
TNR20SE621K	24.5	29.5	12.0				4.4

SE Series

◆V-I CURVE

V-I characteristics is same as that of V series.
Please see V-I Curve of V series.

CROSS REFERENCE TABLE

TNR SE SERIES	TNR V SERIES
TNR10SE221K	TNR10V221K
TNR10SE241K	TNR10V241K
TNR10SE271K	TNR10V271K
TNR10SE431K	TNR10V431K
TNR10SE471K	TNR10V471K
TNR10SE621K	TNR10V621K
TNR14SE221K	TNR14V221K
TNR14SE241K	TNR14V241K
TNR14SE271K	TNR14V271K
TNR14SE431K	TNR14V431K
TNR14SE471K	TNR14V471K
TNR14SE621K	TNR14V621K
TNR20SE221K	TNR20V221K
TNR20SE241K	TNR20V241K
TNR20SE271K	TNR20V271K
TNR20SE431K	TNR20V431K
TNR20SE471K	TNR20V471K
TNR20SE621K	TNR20V621K

SE Series

◆GENERAL SPECIFICATIONS

Operating Temperature Range: -40～+85℃
Storage Temperature Range: -50～+125℃

Item	Test Conditions	Specifications
Standard Test Condition	20±5℃, 65±20% RH unless specified. However, if it does not affect test result, the condition can be 20±15℃, 65±20% RH also.	
Varistor Voltage	The voltage between the two terminals measured at 1mA DC is called Varistor Voltage. The measurement shall be made as fast as possible to aviod heat effection.	Satisfy the specification
Maximum Allowable Voltage	Maximum continuous AC voltage (50～60Hz AC) and maximum DC voltage which can be applided.	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	Maximun 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℃) 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 Temparature Coefficient	$\frac{\text{V1mA at 85℃} - \text{V1mA at 25℃}}{\text{V1mA at 25℃}} \times \frac{1}{60} \times 100\ (\%/℃)$ V1mA : Actual Varistor Voltage	Within ±0.05%/℃
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 tempmrature cycles. -40℃ for 30 minutes→Normal room temperature for 10 minutes→85℃ for 30 minutes→Normal room temperature for 10 minutes. This completes one cycle. The cycle shall be repeated 50 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.	ΔV1mA ≦±5% No appearance abnormality.
High Temperature Exposure	Store varistor at 125℃ for 1,000 hours. After that, store the varistor at normal room temperature for one hour. Then check the varistor voltage.	ΔV1mA ≦±5%
Humidity Resistivity	Store at 40C, 90～95% RH for 1,000 hours. After that, store the varistor at normal room temperature for one hour. Then cheek the varistor voltage.	ΔV1mA ≦±5%
High Temperature Operation	Apply maximum applied voltage to varistor at 85℃ for 1,000 hours. After that, store the varistor at normal room temperature for one hour. Then check the varistor voltage.	ΔV1mA ≦±10%

SE Series

◆MECHANICAL CHARACTERISTICS

Item	Test Conditions	Specifications
Soldering Heat Resistivity	Store varistor at normal room temperature. Dip the varistor leads to solder, at 350±10℃ for 3^{+1}_{0} seconds, up to 2.0～2.5 mm from the varistor body. After that, store the varistor at normal room temperature for 30 miniutes, and measure the varistor voltage.	ΔV1mA ≦±5% Vc : Actual varistor voltage No mechanical damages
Solderability	Dip varistor leads to methanol solutin (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℃, 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 coverd by new solder.
Lead Pull Strength	Fix varistor body, and suspend specified weight toward direction of lead axis. Lead diameter: ϕ0.6mm, ϕ0.8mm — Force: 10 N	No abnormality such as disconnection. ΔV1mA ≦±5%
Lead Bend Strength	The varistor shall be secured with its terminal kept vertical and the force specified below shall be applied in the axial direction. The terminal shall gradually be bend by 90 in one direction then back to original position. The damage of the terminal shall be visually examined. Lead diameter: ϕ0.6mm, ϕ0.8mm — Force: 2.5 N	No remarkable damage as remarkable the inner ceramic element or terminal open.
Vibration Resistivity	Mount varistor body on vibrator, and conduct follwing 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. ΔV1mA ±5%
Flammability test	The varistor shall be subjected to 60 second applications of test flame. Burner : Bunsen gas burner 9000kcal / m^3 Diameter of flame nozzle : ϕ9.5 mm Position : The specimen shall be fixed horizontal. Point of application shall be approximately center of the specimen.	No catching fire, and no flaming drops.