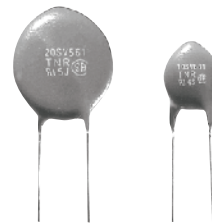


Our newly developed TNR SV series is to prevent from being caught fire even very high surge energy is applied.  
Thus electric appliance using TNR SV series can be much safer like TNR SE series.



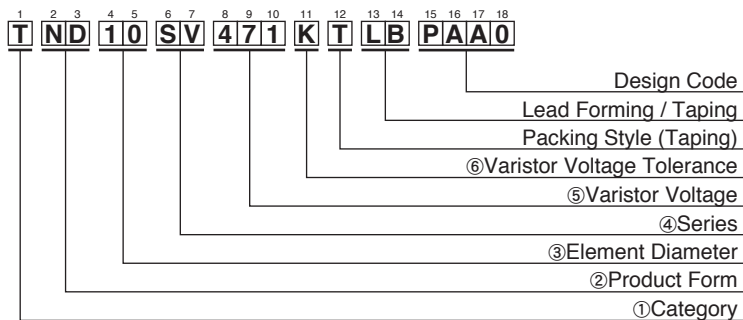
◆FEATURES

- Little scatter at the destruction under over voltage.
- Environmental characteristics (Upgrade)  
High temperature operating : 125°C,1000hours  
Damp heat operating : 85°C,85%RH, 1000hours  
Temperature cycle : -40°C ⇔ +125°C, 1000cycles
- Coating resin doesn't burn under the flammability test of UL.
- Material of Coating resin:UL94V-0 and Halogen free
- UL, CSA and VDE recognized components  
UL1449 3rd File : E323623  
CSA File : LR97864  
VDE File : 118623  
CQC File number varies according to a part number. Please refer to us.
- Accepted temperature varies according to Safety standards.  
Please refer to us for the details.

◆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 ~ +125°C  
Storage Temperature Range : -50 ~ +150°C

◆PART NUMBERING SYSTEM



①Category	
T	Metal Oxide Varistor TNR

②Product Form	
ND	Disk Type

③Element Diameter	
10	φ10 mm
12	φ12 mm
14	φ14 mm
20	φ20 mm

④Series	
SV	SV series

⑤Varistor Voltage	
The first two digits are significant figures and the third one denotes the number of following zeros.	

⑥Varistor Voltage Tolerance	
K	±10%

◆CAUTIONS and WARNINGS

Varistors may be short-circuit or be destroyed, in case of absorbing over rating voltage or over rating surge.  
Please connect a current fuse or a circuit breaker in series with varistors.

◆ RATING AND CHARACTERISTICS

Part Number	Previous Part Number	Maximum Ratings					Max. Clamping Voltage (A) (V)	Capacitance Typical @1kHz (pF)	Varistor Voltage V1mA (V)	Thickness T MAX.	
		Max. Allowable		Max. Peak Current	Max. Energy	Rated Wattage					
		AC(Vrms)	DC(V)	8/20μs(A)	2ms(J)	(W)					
TND10SV221KTLBPAA0	TNR10SV221K417-T71	140	180	3,500A/1time 2,500A/2times	27.5	0.4	25	360	450	220 (198~242)	5.4
TND10SV241KTLBPAA0	TNR10SV241K417-T71	150	200		30			395	400	240 (216~264)	5.5
TND10SV271KTLBPAA0	TNR10SV271K417-T71	175	225		35			455	350	270 (247~303)	5.7
TND10SV431KTLBPAA0	TNR10SV431K417-T71	275	350		55			710	240	430 (387~473)	6.5
TND10SV471KTLBP◇A0	TNR10SV471K□-T71	300	385		60			775	220	470 (423~517)	6.7
TND10SV511KTLBP◇A0	TNR10SV511K□-T71	320	410		67			845	210	510 (459~561)	6.9
TND10SV561KTLBP◇A0	TNR10SV561K□-T71	350	460		67			922	195	560 (504~616)	7.2
TND10SV621KTLBP◇A0	TNR10SV621K□-T71	385	505		67			1025	180	620 (558~682)	7.5
TND10SV681KTLBP◇A0	TNR10SV681K□-T71	420	560		67			1120	165	680 (612~748)	7.9
TND12SV431KTLBPAA0	TNR12SV431K417-T71	275	350		4,200A/1time 3,000A/2times			55	0.4	25	710
TND12SV471KTLBPAA0	TNR12SV471K417-T71	300	385	60		775	220	470 (423~517)			6.7
TND12SV511KTLBPAA0	TNR12SV511K417-T71	320	410	67		845	210	510 (459~561)			6.9
TND12SV561KTLBPAA0	TNR12SV561K417-T71	350	460	67		922	305	560 (504~616)			7.2
TND12SV621KTLBPAA0	TNR12SV621K417-T71	385	505	67		1025	180	620 (558~682)			7.5
TND12SV681KTLBPAA0	TNR12SV681K417-T71	420	650	67		1120	260	680 (612~748)			7.9
TND14SV221KTLBPAA0	TNR14SV221K417-T71	140	180	6,000A/1time 5,000A/2times	55	0.6	50	360	850	220 (198~242)	5.4
TND14SV241KTLBPAA0	TNR14SV241K417-T71	150	200		60			395	800	240 (216~264)	5.5
TND14SV271KTLBPAA0	TNR14SV271K417-T71	175	225		70			455	700	270 (247~303)	5.7
TND14SV431KTLBPAA0	TNR14SV431K417-T71	275	350		110			710	460	430 (387~473)	6.5
TND14SV471KTLBPAA0	TNR14SV471K417-T71	300	385		125			775	420	470 (423~517)	6.7
TND14SV511KTLBPAA0	TNR14SV511K417-T71	320	410		136			845	390	510 (459~561)	6.9
TND14SV561KTLBPAA0	TNR14SV561K417-T71	350	460		5,000A/1time			922	360	560 (504~616)	7.2
TND14SV621KTLBPAA0	TNR14SV621K417-T71	385	505		4,500A/2times			1025	330	620 (558~682)	7.5
TND14SV681KTLBPAA0	TNR14SV681K417-T71	420	560		136			1120	310	680 (612~748)	7.9
TND20SV221KB00AAA0	TNR20SV221K	140	180		10,000A/1time 7,000A/2times			110	1.0	100	360
TND20SV241KB00AAA0	TNR20SV241K	150	200	120		395	2300	240 (216~264)			5.5
TND20SV271KB00AAA0	TNR20SV271K	175	225	135		455	2000	270 (247~303)			5.7
TND20SV431KB00AAA0	TNR20SV431K	275	350	215		710	1300	430 (387~473)			6.5
TND20SV471KB00AAA0	TNR20SV471K	300	385	250		775	1200	470 (423~517)			6.7
TND20SV511KB00AAA0	TNR20SV511K	320	410	273		845	1100	510 (459~561)			6.9
TND20SV561KB00AAA0	TNR20SV561K	350	460	7,500A/1time		922	1000	620 (558~682)			7.2
TND20SV621KB00AAA0	TNR20SV621K	385	505	6,500A/2times		1025	900	620 (558~682)			7.6
TND20SV681KB00AAA0	TNR20SV681K	420	560	273		1120	830	680 (612~748)			7.9

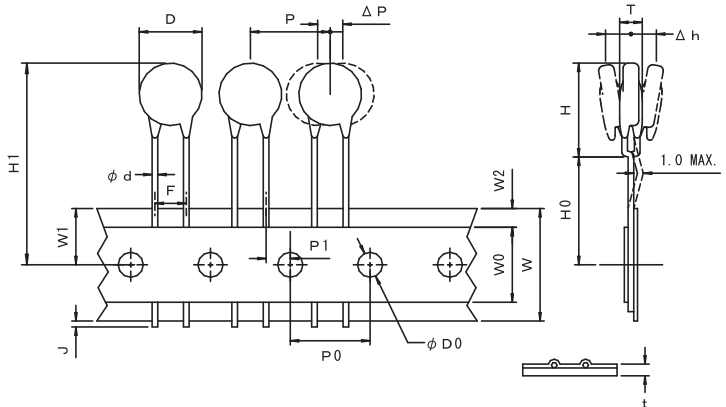
◆ DIMENSIONS

TND10SV/TND12SV/TND14SV : Taping product is normal specifications.  
Common to standard product and IEC 60950-1: 2013,  
Annex Q conforming product

Taping Code : TLB

	◇	□
Standard	A	417
φ 10 IEC 60950-1: 2013, Annex Q conforming product	S	S417

Symbol	10SV	12SV	14SV
D	12.5	14.5	16.5
φd	0.8±0.05	←	←
P	15.0±1.0	15.0±1.0	30.0±1.0
P0	15.0±0.3	←	←
φD0	4.0±0.2	←	←
P1	3.75±0.5	←	←
W1	9.0±0.5	←	←
F	7.5±0.8	←	←
Δh	0±2.0	←	←
ΔP	0±1.3	←	←
W	18.0 <sup>+1.0</sup> <sub>-0.5</sub>	←	←
W0	5.0 MIN.	←	←
W2	3.0 MAX.	←	←
t	0.6±0.3	←	←
H	20.0 MAX.	23.5 MAX.	25.0 MAX.
H0	19.0±1.0	←	←
H1	46.5 MAX.	←	←
J	6.0 MAX.	←	←



# SV Series

**◆DIMENSION**

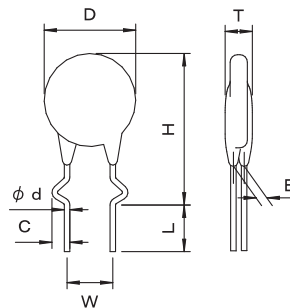
TND20SV : Bulk only

Staight lead Type

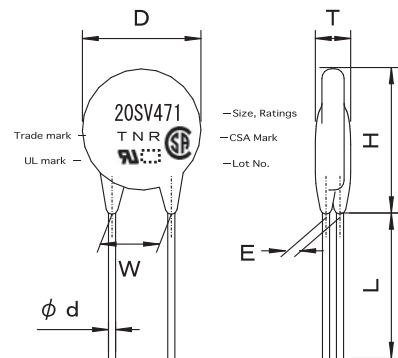
Part Number	D MAX.	H MAX.	L MIN.	φd ±0.05	W ±1.0	E ±1.0
TND20SV221KB00AAA0	22.5	27.5	20	0.8	10	1.3
TND20SV241KB00AAA0						1.4
TND20SV271KB00AAA0						1.5
TND20SV431KB00AAA0						2.1
TND20SV471KB00AAA0						2.3
TND20SV511KB00AAA0						2.4
TND20SV561KB00AAA0						2.6
TND20SV621KB00AAA0	23.0	28.5				2.9
TND20SV681KB00AAA0						3.1

Lead forming Type

Part No.	TND20SV***KBESAAA0
Forming Code	BES (310)
D	refer to each spec.
T	refer to each spec.
H	31.0 MAX.
L	5.0 ± 1.0
W	10.0 ± 1.0
φd	0.8 ± 0.05
C	2.0 ± 0.5
E	refer to each spec.


**◆MARKING**

EX)


**◆V-I CURVE**

V-I characteristics and PULSE LIFE TIME RATINGS are same as those of V series.

Please see V-I CURVE and PULSE LIFE TIME RATINGS of V series.

CROSS REFERENCE TABLE (Common to standard product and IEC 60950-1: 2013, Annex Q conforming product)

TNR SV SERIES	TNR V SERIES	V-I CURVE GO TO REF. PAGE	PULSE LIFE TIME RATINGS GO TO REF. PAGE
TND10SV221K	TND10V-221K	P.59	P.70
TND10SV241K	TND10V-241K		
TND10SV271K	TND10V-271K		
TND10SV431K	TND10V-431K		
TND10SV471K	TND10V-471K		
TND10SV511K	TND10V-511K		
TND10SV561K	TND10V-561K		
TND10SV621K	TND10V-621K		
TND10SV681K	TND10V-681K		
TND12SV431K	TND12V-431K		
TND12SV471K	TND12V-471K		
TND12SV511K	TND12V-511K		
TND12SV561K	TND12V-561K		
TND12SV621K	TND12V-621K		
TND12SV681K	TND12V-681K		
TND14SV221K	TND14V-221K	P.63	P.71
TND14SV241K	TND14V-241K		
TND14SV271K	TND14V-271K		
TND14SV431K	TND14V-431K		
TND14SV471K	TND14V-471K		
TND14SV511K	TND14V-511K		
TND14SV561K	TND14V-561K		
TND14SV621K	TND14V-621K		
TND14SV681K	TND14V-681K		
TND20SV221K	TND20V-221K	P.65	P.72
TND20SV241K	TND20V-241K		
TND20SV271K	TND20V-271K		
TND20SV431K	TND20V-431K		
TND20SV471K	TND20V-471K		
TND20SV511K	TND20V-511K		
TND20SV561K	TND20V-561K		
TND20SV621K	TND20V-621K		
TND20SV681K	TND20V-681K		

**◆GENERAL SPECIFICATIONS**

Item	Test Conditions	Specifications
Standard Test Condition	20±15°C, 85%RH Max.	-
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 avoid heat affection.	Satisfy the specification
Maximum Allowable Voltage	Maximum continuous AC voltage (50 to 60Hz AC) and maximum DC voltage which can be applied.	Satisfy the specification
Maximum Peak Surge Current	Maximum surge current (8/20µs pulse wave to be applied once, or twice, 2 minutes apart) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Energy Rating	Maximum energy (2 ms. square wave to be applied once) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Rated Wattage	Maximum power (50 to 60Hz/AC power to be applied for 1000 hours at 125°C) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Maximum Clamping Voltage	Maximum voltage across varistor when 8/20µs rated current surge is applied.	Satisfy the specification
Capacitance	Varistor's capacitance at 1kHz, standard test condition.	For reference only.
Voltage Temperature Coefficient	$\frac{V_{1mA \text{ at } 125^\circ\text{C}} - V_{1mA \text{ at } 25^\circ\text{C}}}{V_{1mA \text{ at } 25^\circ\text{C}}} \times \frac{1}{100} \times 100 (\%/^\circ\text{C})$ V1mA : Actual varistor voltage	Within ±0.05%/°C
Insulation	Short circuit the two leads of varistor, and put the varistor body into metal balls (1.6mm diameter) leaving 2mm resin coating outside. Then, apply 2.5kVrms between the leads and the metal balls for 60±5 sec.	The varistor shall withstand with no abnormality.

**◆ENVIRONMENTAL CHARACTERISTICS**

Item	Test Conditions	Specifications
High Temperature Storage (Dry heat)	The specimen shall be subjected 150±2°C for 1000±12 hours without load.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$
Low Temperature Storage	The specimen shall be subjected -40±2°C for 1000±12 hours without load.	$\Delta V_{1mA}/V_{1mA} \leq \pm 5\%$
Damp heat (Humidity)	The specimen shall be subjected to 85±2°C, 80 to 85%RH for 1000±12 hours without load.	$\Delta V_{1mA}/V_{1mA} \leq \pm 5\%$
Temperature Cycle	The temperature cycle shown below shall be repeated 1000 cycles. -40±3°C, 30 minutes ⇔ +125±2°C, 30 minutes	$\Delta V_{1mA}/V_{1mA} \leq \pm 5\%$ No remarkable damage
High Temperature Operating	The specimen shall be subjected to 125±2°C with the maximum allowable voltage for 1000±12 hours.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$
Damp heat Operating	The specimen shall be subjected to 85±2°C, 80 to 85%RH with the maximum allowable voltage for 1000±12 hours.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$

Varistor voltage change of forward direction shall be measured in the test of unipolar surge life and DC load life.  
Varistor voltage change is measured after stored at Standard Test Conditions for 1 to 2 hours.

**◆MECHANICAL CHARACTERISTICS**

Item	Test Conditions	Specifications												
<b>Resistance to Soldering Heat</b>	Each lead shall be dipped into a solder bath having a temperature of 350±10°C to a point 2.0 to 2.5 mm from the body of unit, be held there for 3 <sup>+1</sup> <sub>0</sub> sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined. or Each lead shall be dipped into a solder bath having a temperature of 260±10°C to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10±1 sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined.	ΔV1mA/V1mA ≤±5% No remarkable damage												
<b>Solderability</b>	Each lead shall be dipped into a methanol solution (about 25%) of rosin for 5 to 10 sec. Then each lead shall be dipped into a solder.	At least, 95% of the leads shall be covered with solder uniformly.												
	<table border="1"> <tr> <td>Solder</td> <td>Pb free (Sn-3.0Ag-0.5Cu)</td> <td>Eutectic (Sn/Pb)</td> </tr> <tr> <td>Solder Temp.</td> <td>245±5°C</td> <td>235±5°C</td> </tr> <tr> <td>Dipping Time</td> <td colspan="2">2±0.5sec.</td> </tr> <tr> <td>Dipping Depth</td> <td colspan="2">1.5 to 2.0mm (from the body)</td> </tr> </table>		Solder	Pb free (Sn-3.0Ag-0.5Cu)	Eutectic (Sn/Pb)	Solder Temp.	245±5°C	235±5°C	Dipping Time	2±0.5sec.		Dipping Depth	1.5 to 2.0mm (from the body)	
	Solder		Pb free (Sn-3.0Ag-0.5Cu)	Eutectic (Sn/Pb)										
	Solder Temp.		245±5°C	235±5°C										
Dipping Time	2±0.5sec.													
Dipping Depth	1.5 to 2.0mm (from the body)													
<b>Lead Pull Strength</b>	Fix varistor body, and suspend specified weight toward direction of lead axis.  <table border="1"> <tr> <td>Lead diameter</td> <td>Force</td> </tr> <tr> <td>φ0.8mm</td> <td>10N</td> </tr> </table>	Lead diameter	Force	φ0.8mm	10N	No abnormality such as disconnection. ΔV1mA/V1mA ≤±5%								
Lead diameter	Force													
φ0.8mm	10N													
<b>Lead Bend Strength</b>	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.  <table border="1"> <tr> <td>Lead diameter</td> <td>Force</td> </tr> <tr> <td>φ0.8mm</td> <td>2.5N</td> </tr> </table>	Lead diameter	Force	φ0.8mm	2.5N	No remarkable damage as remarkable the inner ceramic element or terminal open.								
Lead diameter	Force													
φ0.8mm	2.5N													
<b>Vibration</b>	Mount varistor body on vibrator, and conduct the following vibration test. Peak-to-Peak amplitude : 1.5mm Vibration frequency range : 10 to 55Hz Sweeping time: ∧ Approximately one minute for 10Hz → 55Hz → 10Hz Direction and duration of vibration : Three directions of X, Y, and Z. 2 hours each. 6 hours total.	No remarkable appearance abnormality. ΔV1mA/V1mA ≤±5%												
<b>Flammability test</b>	The varistor shall be subjected 60 sec. applications of test flame.  Burner : Bunsen gas burner 9000kcal / m <sup>3</sup> Diameter of flame nozzle : φ9.5mm Position : The specimen shall be fixed horizontal. Point of application shall be approximately center of the specimen.	No catching fire, and no flaming drops.												



## SV Series Low varistor voltage

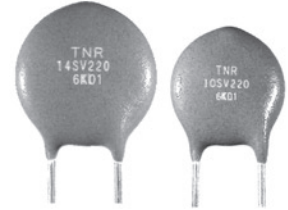
New!

RoHS2  
Compliant

AEC-  
Q200

High  
Temperature

By using the resin properties of the SV series to a low varistor voltage products, it has achieved a high heat resistance and temperature cycle resistance. Low varistor voltage SV series is for automotive in compliance with the AEC-Q200.



### ◆FEATURES

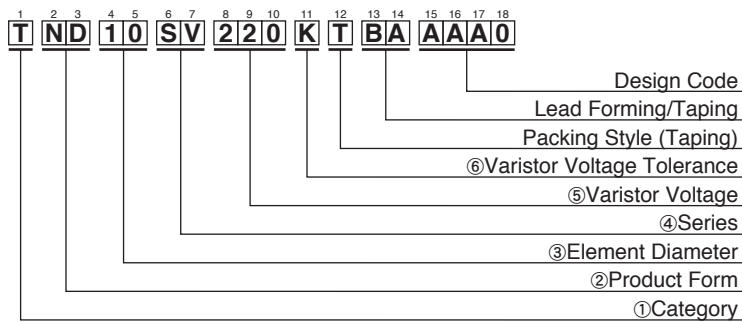
- High temperature operating : 1,000 hours at 125°C.
- Damp heat operating : 1,000 hours at 85°C/85%RH.
- Temperature cycle : -40°C⇄+125°C, 1000cycle.
- Material of Coating resin:UL94V-0 and Halogen free.
- AEC-Q200 compliant : Please contact Chemi-con for more details, test data, information.

### ◆APPLICATIONS

- Absorption of automotive load dump surge.
- Absorption of ignition-off surge.
- Absorption of switching surge of horn, motor, and relay.
- Protection of automotive electronics and semi conductors.

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

### ◆PART NUMBERING SYSTEM



①Category	
T	Metal Oxide Varistor TNR

②Product Form	
ND	Disk Type

③Element Diameter	
5	φ5mm
7	φ7mm
10	φ10mm
14	φ14mm
20	φ20mm

④Series	
SV	SV series

⑤Varistor Voltage	
The first two digits are significant figures and the third one denotes the number of following zeros.	

⑥Varistor Voltage Tolerance	
K	±10%



# SV Series Low varistor voltage

## ◆RATING AND CHARACTERISTICS

Part Number	Previous Part Number	Maximum Ratings						Max. Clamping Voltage		Capacitance Typical @1kHz (pF)	Varistor Voltage V1mA 5SV : V0.1mA (V)	Thickness T MAX.
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Max. Applicable voltage for short period/5 minutes	Rated Wattage	(A)	(V)			
		AC(Vrms)	DC(V)	8/20μs(A)	2ms(J)	DC(V)	(W)					
TND05SV220KTBAAAA0	TNR5SV220K-T25	12	16		0.5	24		48	3600	22 (20~24)	5.0	
TND05SV270KTBAAAA0	TNR5SV270K-T25	15	19		0.7	29		60	3100	27 (24~30)	5.0	
TND05SV330KTBAAAA0	TNR5SV330K-T25	18	24		0.8	36		73	2500	33 (30~36)	5.5	
TND05SV390KTBAAAA0	TNR5SV390K-T25	22	28	125A	0.9	42	0.01	86	2300	39 (35~43)	5.0	
TND05SV470KTBAAAA0	TNR5SV470K-T25	26	34	/2 times	1.1	50		104	2000	47 (42~52)	5.0	
TND05SV560KTBAAAA0	TNR5SV560K-T25	30	42		1.3	50		123	1700	56 (50~62)	5.5	
TND05SV680KTBAAAA0	TNR5SV680K-T25	40	55		1.6	65		150	1500	68 (61~75)	5.5	
TND07SV220KTBAAAA0	TNR7SV220K-T25	12	16		1.1	24		43	5400	22 (20~24)	5.0	
TND07SV270KTBAAAA0	TNR7SV270K-T25	15	19		1.3	29		53	4800	27 (24~30)	5.0	
TND07SV330KTBAAAA0	TNR7SV330K-T25	18	24		1.6	36		65	3900	33 (30~36)	5.5	
TND07SV390KTBAAAA0	TNR7SV390K-T25	22	28	250A	1.9	42	0.02	77	3600	39 (35~43)	5.0	
TND07SV470KTBAAAA0	TNR7SV470K-T25	26	34	/2 times	2.3	50		93	3300	47 (42~52)	5.0	
TND07SV560KTBAAAA0	TNR7SV560K-T25	30	42		2.7	50		110	2900	56 (50~62)	5.5	
TND07SV680KTBAAAA0	TNR7SV680K-T25	40	55		3.3	65		135	2600	68 (61~75)	5.5	
TND10SV220KTBAAAA0	TNR10SV220K-T25	12	16		2.6	24		43	12000	22 (20~24)	6.0	
TND10SV270KTBAAAA0	TNR10SV270K-T25	15	19		3.2	29		53	11000	27 (24~30)	6.0	
TND10SV330KTBAAAA0	TNR10SV330K-T25	18	24		4.0	36		65	8500	33 (30~36)	6.5	
TND10SV390KTBAAAA0	TNR10SV390K-T25	22	28	500A	4.7	42	0.05	77	7600	39 (35~43)	6.0	
TND10SV470KTBAAAA0	TNR10SV470K-T25	26	34	/2 times	5.6	50		93	6800	47 (42~52)	6.0	
TND10SV560KTBAAAA0	TNR10SV560K-T25	30	42		6.7	50		110	6000	56 (50~62)	6.5	
TND10SV680KTBAAAA0	TNR10SV680K-T25	40	55		8.2	65		135	5400	68 (61~75)	6.5	
TND14SV220KTBAAAA0	TNR14SV220K-T25	12	16		5.3	24		43	23000	22 (20~24)	6.0	
TND14SV270KTBAAAA0	TNR14SV270K-T25	15	19		6.5	29		53	21000	27 (24~30)	6.0	
TND14SV330KTBAAAA0	TNR14SV330K-T25	18	24		7.9	36		65	17000	33 (30~36)	6.5	
TND14SV390KTBAAAA0	TNR14SV390K-T25	22	28	1000A	9.4	42	0.1	77	16000	39 (35~43)	6.0	
TND14SV470KTBAAAA0	TNR14SV470K-T25	26	34	/2 times	11	50		93	14000	47 (42~52)	6.0	
TND14SV560KTBAAAA0	TNR14SV560K-T25	30	42		13	50		110	13000	56 (50~62)	6.5	
TND14SV680KTBAAAA0	TNR14SV680K-T25	40	55		16	65		135	11000	68 (61~75)	6.5	
TND20SV220KB00AAA0	TNR20SV220K	12	16		14	24		43	56000	22 (20~24)	6.0	
TND20SV270KB00AAA0	TNR20SV270K	15	19		17	29		53	48000	27 (24~30)	6.0	
TND20SV330KB00AAA0	TNR20SV330K	18	24		21	36		65	41000	33 (30~36)	6.5	
TND20SV390KB00AAA0	TNR20SV390K	22	28	2000A	25	42	0.2	77	36000	39 (35~43)	6.0	
TND20SV470KB00AAA0	TNR20SV470K	26	34	/2 times	30	50		93	33000	47 (42~52)	6.0	
TND20SV560KB00AAA0	TNR20SV560K	30	42		36	50		110	29000	56 (50~62)	6.5	
TND20SV680KB00AAA0	TNR20SV680K	40	55		44	65		135	26000	68 (61~75)	6.5	

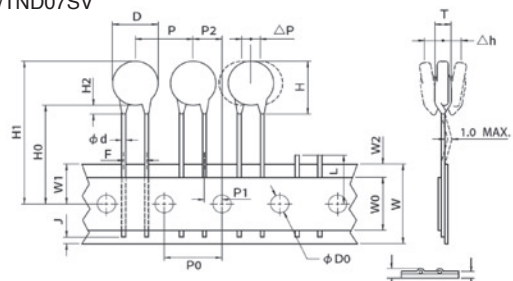
## ◆DIMENSION

TND05SV/TND07SV/TND10SV/TND14SV : Taping product is normal specifications.

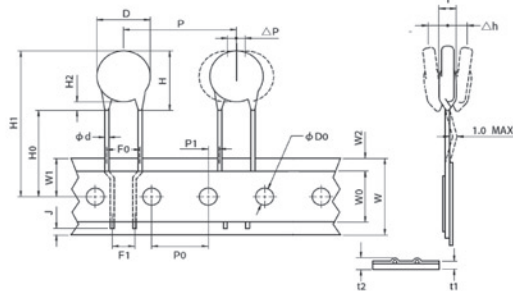
Taping Code : TBA (T25) Unit : mm

Symbol	5SV	7SV	10SV	14SV
D	8.0 Max.	9.0 Max.	12.0 Max.	16.0 Max.
φd	0.6±0.05	←	0.8±0.05	←
P	12.7±1.0	←	25.4±1.0	←
P0	12.7±0.3	←	12.7±0.3	←
φD0	4.0±0.2	←	4.0±0.2	←
P1	3.85±0.7	←	2.6±0.5	←
P2	6.35±1.3	←	-	←
W1	9.0±0.5	←	9.0±0.5	←
F	5.0±0.8	←	-	←
F0	-	-	7.5±0.8	←
F1	-	-	5.0 Nom.	←
Δh	0±2.0	←	0±2.0	←
ΔP	0±1.0	←	0±1.0	←
W	18.0 <sup>+1.0</sup> <sub>-0.5</sub>	←	18.0 <sup>+1.0</sup> <sub>-0.5</sub>	←
W0	5.0 Min.	←	5.0 Min.	←
t1	0.6±0.3	←	0.6±0.3	←
t2	1.5 Max.	←	1.5 Max.	←
W2	3.0 Max.	←	3.0 Max.	←
H0	20.0 <sup>+1.0</sup> <sub>-0.5</sub>	←	19.0 Min.	←
H	11.0 Max.	12.0 Max.	17.0 Max.	20.0 Max.
H1	29.0 Max.	30.0 Max.	41.5 Max.	43.5 Max.
H2	3.0 Max.	←	5.0 Max.	←
J	6.0 Max.	←	6.0 Max.	←
L	11.0 Max.	←	-	-

### ●TND05SV/TND07SV



### ●TND10SV/TND14SV



# SV Series Low varistor voltage

**◆DIMENSION**

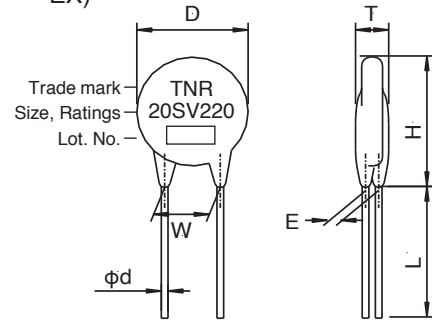
TND20SV : Bulk only

Straight lead Type

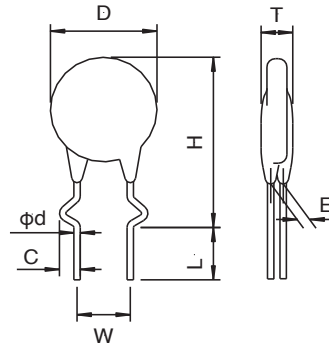
Part Number	D MAX.	H MAX.	L MIN.	φd ±0.05	W ±1.0	E ±1.0
TND20SV220KB00AAA0	22.5	27.0	20.0	0.8	10	1.2
TND20SV270KB00AAA0						1.4
TND20SV330KB00AAA0						1.6
TND20SV390KB00AAA0						1.3
TND20SV470KB00AAA0						1.5
TND20SV560KB00AAA0						1.7
TND20SV680KB00AAA0						2.0

**◆MARKING**

EX)


**Lead forming Type**

Part No.	TND20SV***KBESAAA0
Forming Code	BES (310)
D	refer to each spec.
T	refer to each spec.
H	30.5 MAX.
L	5.0 ± 1.0
W	10.0 ± 1.0
φd	0.8 ± 0.05
C	2.0 ± 0.5
E	refer to each spec.


**◆V-I CURVE**

V-I characteristics and PULSE LIFE TIME RATINGS are same as those of V series.

Please see V-I CURVE and PULSE LIFE TIME RATINGS of V series.

**CROSS REFERENCE TABLE**

TNR SV SERIES	TNR V SERIES	V-I CURVE GO TO REF. PAGE	PULSE LIFE TIME RATINGS GO TO REF. PAGE
TND05SV220K	TND05V-220K	P.55	P.68
TND05SV270K	TND05V-270K		
TND05SV330K	TND05V-330K		
TND05SV390K	TND05V-390K		
TND05SV470K	TND05V-470K		
TND05SV560K	TND05V-560K		
TND05SV680K	TND05V-680K		
TND07SV220K	TND07V-220K	P.57	P.69
TND07SV270K	TND07V-270K		
TND07SV330K	TND07V-330K		
TND07SV390K	TND07V-390K		
TND07SV470K	TND07V-470K		
TND07SV560K	TND07V-560K		
TND07SV680K	TND07V-680K		
TND10SV220K	TND10V-220K	P.61	P.70
TND10SV270K	TND10V-270K		
TND10SV330K	TND10V-330K		
TND10SV390K	TND10V-390K		
TND10SV470K	TND10V-470K		
TND10SV560K	TND10V-560K		
TND10SV680K	TND10V-680K		
TND14SV220K	TND14V-220K	P.65	P.71
TND14SV270K	TND14V-270K		
TND14SV330K	TND14V-330K		
TND14SV390K	TND14V-390K		
TND14SV470K	TND14V-470K		
TND14SV560K	TND14V-560K		
TND14SV680K	TND14V-680K		
TND20SV220K	TND20V-220K	P.67	P.72
TND20SV270K	TND20V-270K		
TND20SV330K	TND20V-330K		
TND20SV390K	TND20V-390K		
TND20SV470K	TND20V-470K		
TND20SV560K	TND20V-560K		
TND20SV680K	TND20V-680K		



# SV Series Low varistor voltage

## ◆GENERAL SPECIFICATIONS

Item	Test Conditions	Specifications
Standard Test Condition	20±15°C, 85%RH Max.	-
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 avoid heat affection.	Satisfy the specification
Maximum Allowable Voltage	Maximum continuous AC voltage (50 to 60Hz/AC) and maximum DC voltage which can be applied.	Satisfy the specification
Maximum Peak Surge Current	Maximum surge current (8/20µs pulse wave to be applied twice, 5 minutes apart) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Energy Rating	Maximum energy (2ms square wave to be applied once) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Rated Wattage	Maximum power (50 to 60Hz/AC power to be applied for 1000 hours at 125°C) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Maximum Clamping Voltage	Maximum voltage across varistor when 8/20µs rated current surge is applied.	Satisfy the specification
Capacitance	Varistor's capacitance at 1kHz, standard test condition.	For reference only.
Voltage Temperature Coefficient	$\frac{V_{1mA \text{ at } 125^{\circ}C} - V_{1mA \text{ at } 25^{\circ}C}}{V_{1mA \text{ at } 25^{\circ}C}} \times \frac{1}{100} \times 100 (\%/^{\circ}C)$ V1mA : Actual Varistor Voltage	Within ±0.05%/°C
Maximum Applicable Voltage for a Short Period (5 minutes)	Maximum DC voltage to be applied for only 5 minutes.	$\Delta V_{1mA}/V_{1mA} \leq \pm 15\%$

## ◆ENVIRONMENTAL CHARACTERISTICS

Item	Test Conditions	Specifications
High Temperature Storage (Dry heat)	The specimen shall be subjected 150±2°C for 1000±12 hours without load.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$
Low Temperature Storage	The specimen shall be subjected -40±2°C for 1000±12 hours without load.	$\Delta V_{1mA}/V_{1mA} \leq \pm 5\%$
Damp heat (Humidity)	The specimen shall be subjected to 85±2°C, 80 to 85%RH for 1000±12 hours without load.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$
Temperature Cycle	The temperature cycle shown below shall be repeated 1000 cycles. -40±3°C, 30 minutes ↔ +125±2°C, 30 minutes	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ No remarkable damage
High Temperature Operating	The specimen shall be subjected to 125±2°C with the maximum allowable voltage for 1000±12 hours.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$
Damp heat Operating	The specimen shall be subjected to 85±2°C, 80 to 85%RH with the maximum allowable voltage for 1000±12 hours.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$

Varistor voltage change of forward direction shall be measured in the test of unipolar surge life and DC load life.  
Varistor voltage change is measured after stored at Standard Test Conditions for 1 to 2 hours.



# SV Series Low varistor voltage

## ◆MECHANICAL CHARACTERISTICS

Item	Test Conditions	Specifications												
<b>Resistance to Soldering Heat</b>	Each lead shall be dipped into a solder bath having a temperature of 350±10°C to a point 2.0 to 2.5 mm from the body of unit, be held there for 3 <sup>+1</sup> <sub>0</sub> sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined. or Each lead shall be dipped into a solder bath having a temperature of 260±10°C to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10±1 sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined.	ΔV1mA/V1mA ≤ ±5% No remarkable damage												
<b>Solderability</b>	Each lead shall be dipped into a methanol solution (about 25%) of rosin for 5 to 10 sec. Then each lead shall be dipped into a solder.	At least, 95% of the leads shall be covered with solder uniformly.												
	<table border="1"> <tr> <td>Solder</td> <td>Pb free (Sn-3.0Ag-0.5Cu)</td> <td>Eutectic (Sn/Pb)</td> </tr> <tr> <td>Solder Temp.</td> <td>245±5°C</td> <td>235±5°C</td> </tr> <tr> <td>Dipping Time</td> <td colspan="2">2±0.5sec.</td> </tr> <tr> <td>Dipping Depth</td> <td colspan="2">1.5 to 2.0mm (from the body)</td> </tr> </table>		Solder	Pb free (Sn-3.0Ag-0.5Cu)	Eutectic (Sn/Pb)	Solder Temp.	245±5°C	235±5°C	Dipping Time	2±0.5sec.		Dipping Depth	1.5 to 2.0mm (from the body)	
	Solder		Pb free (Sn-3.0Ag-0.5Cu)	Eutectic (Sn/Pb)										
	Solder Temp.		245±5°C	235±5°C										
Dipping Time	2±0.5sec.													
Dipping Depth	1.5 to 2.0mm (from the body)													
<b>Lead Pull Strength</b>	After gradually applying the load keeping the unit fixed for 10±5 seconds in axial direction.	No abnormality such as disconnection. ΔV1mA/V1mA ≤ ±5%												
	<table border="1"> <tr> <td>Type</td> <td>Lead Diameter</td> <td>Force</td> </tr> <tr> <td>5SV,7SV</td> <td>0.8mm</td> <td>10N</td> </tr> <tr> <td>10SV,14SV,20SV</td> <td>0.6mm</td> <td>10N</td> </tr> </table>		Type	Lead Diameter	Force	5SV,7SV	0.8mm	10N	10SV,14SV,20SV	0.6mm	10N			
	Type		Lead Diameter	Force										
5SV,7SV	0.8mm	10N												
10SV,14SV,20SV	0.6mm	10N												
<b>Lead Bend Strength</b>	The unit shall be secured with its terminal kept vertical and the weight specified below be applied in the axial direction. The terminal shall gradually be bend by 90° in one direction then 90° in the opposite direction, and again back to original position. The damage of the terminal shall be visually examined.	No remarkable damage as remarkable the inner ceramic element or terminal open.												
	<table border="1"> <tr> <td>Type</td> <td>Lead Diameter</td> <td>Force</td> </tr> <tr> <td>5SV,7SV</td> <td>0.8mm</td> <td>5N</td> </tr> <tr> <td>10SV,14SV,20SV</td> <td>0.6mm</td> <td>5N</td> </tr> </table>		Type	Lead Diameter	Force	5SV,7SV	0.8mm	5N	10SV,14SV,20SV	0.6mm	5N			
	Type		Lead Diameter	Force										
5SV,7SV	0.8mm	5N												
10SV,14SV,20SV	0.6mm	5N												
<b>Vibration</b>	Mount varistor body on vibrator, and conduct the following vibration test. Peak-to-Peak amplitude : 1.5mm , Acceleration : 5G Vibration frequency range : 10 to 500Hz Sweeping time: Approximately 20 minutes for 10Hz→500Hz→10Hz Direction and duration of vibration : Three directions of X, Y, and Z. 2 hours each. 6 hours total.	No remarkable appearance abnormality. ΔV1mA/V1mA ≤ ±5%												
<b>Flammability test</b>	The varistor shall be subjected 60 sec. applications of test flame.  Burnar : Bunsen gas burner 9000kcal / m <sup>3</sup> Diameter of flame nozzle : φ9.5mm Position : The specimen shall be fixed horizontal. Point of application shall be approximately center of the specimen	No catching fire, and no flaming drops.												