

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.

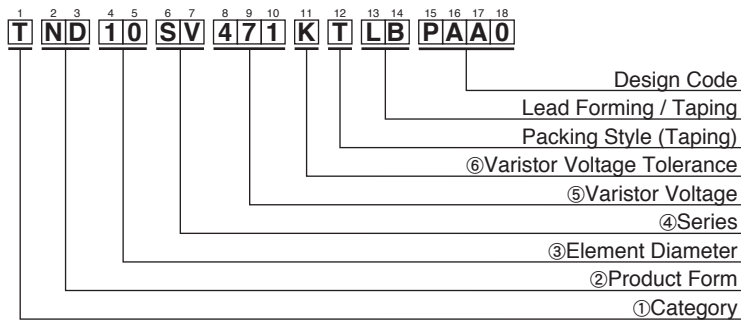
◆FEATURES

- 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 File : E323623
CSA File : 097864 0 000
VDE File : 118623
CQC File number varies according to a part number. Please refer to us.
- AEC-Q200 compliant : φ10~φ14 (220V~680V) Please contact Chemi-con for more details, test data, information.

◆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 | |
|-------------------|--------|
| 05 | φ5 mm |
| 07 | φ7 mm |
| 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.



METAL OXIDE VARISTORS TNR™

SV Series

| | | |
|---|---|------|
| | ◇ | □ |
| Standard | A | 417 |
| φ10 IEC 62368-1:2014 G.8.2 conforming product | S | S417 |

◆ RATING AND CHARACTERISTICS

| Part Number | Previous Part Number | Maximum Ratings | | | | | Max. Clamping Voltage (A) | Max. Clamping Voltage (V) | Capacitance Typical @1kHz (pF) | Varistor Voltage V1mA 5SV : V0.1mA (V) | Thickness T MAX. |
|--------------------|----------------------|------------------------|--------|--------------------------------|---------------|---------------|---------------------------|---------------------------|--------------------------------|--|------------------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | | | | | |
| | | AC (Vrms) | DC (V) | 8/20us (A) | 2ms (J) | (W) | | | | | |
| TND05SV221KTBAAAA0 | TNR5SV221K-T25 | 140 | 180 | | 6.5 | | | 380 | 110 | 220 (198 to 242) | 5.0 |
| TND05SV241KTBAAAA0 | TNR5SV241K-T25 | 150 | 200 | 800A/1time 600A/2time | 7.5 | 0.1 | 5 | 415 | 100 | 240 (216 to 264) | 5.1 |
| TND05SV271KTBAAAA0 | TNR5SV271K-T25 | 175 | 225 | | 8.0 | | | 475 | 90 | 270 (247 to 303) | 5.4 |
| TND05SV431KTBAAAA0 | TNR5SV431K-T25 | 275 | 350 | | 13.5 | | | 745 | 70 | 430 (387 to 473) | 6.2 |
| TND05SV471KTBAAAA0 | TNR5SV471K-T25 | 300 | 385 | | 15.0 | | | 810 | 60 | 470 (423 to 517) | 6.4 |
| TND07SV221KTBAAAA0 | TNR7SV221K-T25 | 140 | 180 | | | | | 13.5 | 0.25 | 10 | 360 |
| TND07SV241KTBAAAA0 | TNR7SV241K-T25 | 150 | 200 | | 15 | 395 | 210 | 240 (216 to 264) | | | 5.1 |
| TND07SV271KTBAAAA0 | TNR7SV271K-T25 | 175 | 225 | 1,750A/1time | 17 | 455 | 190 | 270 (247 to 303) | | | 5.2 |
| TND07SV431KTBAAAA0 | TNR7SV431K-T25 | 275 | 350 | | 1,250A/2times | 27.5 | 710 | 130 | | | 430 (387 to 473) |
| TND07SV471KTBAAAA0 | TNR7SV471K-T25 | 300 | 385 | 30 | | 775 | 120 | 470 (423 to 517) | | | 6.3 |
| TND07SV511KTBAAAA0 | TNR7SV511K-T25 | 320 | 410 | 32 | | 845 | 110 | 510 (459 to 561) | | | 6.6 |
| TND10SV221KTLBPAA0 | TNR10SV221K417-T71 | 140 | 180 | | 27.5 | 0.4 | 25 | 360 | | | 450 |
| TND10SV241KTLBPAA0 | TNR10SV241K417-T71 | 150 | 200 | | 30 | | | 395 | 400 | 240 (216 to 264) | 5.5 |
| TND10SV271KTLBPAA0 | TNR10SV271K417-T71 | 175 | 225 | | 35 | | | 455 | 350 | 270 (247 to 303) | 5.7 |
| TND10SV431KTLBPAA0 | TNR10SV431K417-T71 | 275 | 350 | | 55 | | | 710 | 240 | 430 (387 to 473) | 6.5 |
| TND10SV471KTLBP◇A0 | TNR10SV471K□-T71 | 300 | 385 | 3,500A/1time 2,500A/2times | 60 | | | 775 | 220 | 470 (423 to 517) | 6.7 |
| TND10SV511KTLBP◇A0 | TNR10SV511K□-T71 | 320 | 410 | | 67 | | | 845 | 210 | 510 (459 to 561) | 6.9 |
| TND10SV561KTLBP◇A0 | TNR10SV561K□-T71 | 350 | 460 | | 67 | | | 922 | 195 | 560 (504 to 616) | 7.2 |
| TND10SV621KTLBP◇A0 | TNR10SV621K□-T71 | 385 | 505 | | 67 | | | 1025 | 180 | 620 (558 to 682) | 7.5 |
| TND10SV681KTLBP◇A0 | TNR10SV681K□-T71 | 420 | 560 | | 67 | | | 1120 | 165 | 680 (612 to 748) | 7.9 |
| TND10SV751KB00A◇A0 | TNR10SV751K□ | 460 | 615 | | 70 | | | 1240 | 150 | 750 (675 to 825) | 8.2 |
| TND10SV821KB00A◇A0 | TNR10SV821K□ | 510 | 670 | | 80 | | | 1355 | 140 | 820 (738 to 902) | 8.6 |
| TND10SV911KB00A◇A0 | TNR10SV911K□ | 550 | 745 | | 90 | | | 1500 | 125 | 910 (819 to 1001) | 9.1 |
| TND10SV102KB00A◇A0 | TNR10SV102K□ | 625 | 825 | | 100 | | | 1650 | 115 | 1000 (900 to 1100) | 9.6 |
| TND12SV431KTLBPAA0 | TNR12SV431K417-T71 | 275 | 350 | | | | | 55 | 710 | 375 | 430 (387 to 473) |
| TND12SV471KTLBPAA0 | TNR12SV471K417-T71 | 300 | 385 | | 60 | | | 775 | 345 | 470 (423 to 517) | 6.7 |
| TND12SV511KTLBPAA0 | TNR12SV511K417-T71 | 320 | 410 | | 67 | | | 845 | 330 | 510 (459 to 561) | 6.9 |
| TND12SV561KTLBPAA0 | TNR12SV561K417-T71 | 350 | 460 | | 67 | | | 922 | 305 | 560 (504 to 616) | 7.2 |
| TND12SV621KTLBPAA0 | TNR12SV621K417-T71 | 385 | 505 | 4,200A/1time 3,000A/2times | 67 | 1025 | 280 | 620 (558 to 682) | 7.5 | | |
| TND12SV681KTLBPAA0 | TNR12SV681K417-T71 | 420 | 560 | | 67 | 1120 | 260 | 680 (612 to 748) | 7.9 | | |
| TND12SV751KB00AAA0 | TNR12SV751K | 460 | 615 | 70 | 1240 | 235 | 750 (675 to 825) | 8.4 | | | |
| TND12SV821KB00AAA0 | TNR12SV821K | 510 | 670 | 80 | 1355 | 220 | 820 (738 to 902) | 8.8 | | | |
| TND12SV911KB00AAA0 | TNR12SV911K | 550 | 745 | 90 | 1500 | 195 | 910 (819 to 1001) | 9.2 | | | |
| TND12SV102KB00AAA0 | TNR12SV102K | 625 | 825 | 100 | 1650 | 180 | 1000 (900 to 1100) | 9.7 | | | |
| TND14SV221KTLBPAA0 | TNR14SV221K417-T71 | 140 | 180 | | 55 | 360 | 850 | 220 (198 to 242) | 5.4 | | |
| TND14SV241KTLBPAA0 | TNR14SV241K417-T71 | 150 | 200 | | 60 | 395 | 800 | 240 (216 to 264) | 5.5 | | |
| TND14SV271KTLBPAA0 | TNR14SV271K417-T71 | 175 | 225 | 6,000A/1time 5,000A/2times | 70 | 455 | 700 | 270 (247 to 303) | 5.7 | | |
| TND14SV431KTLBPAA0 | TNR14SV431K417-T71 | 275 | 350 | | 110 | 710 | 460 | 430 (387 to 473) | 6.5 | | |
| TND14SV471KTLBPAA0 | TNR14SV471K417-T71 | 300 | 385 | 125 | 775 | 420 | 470 (423 to 517) | 6.7 | | | |
| TND14SV511KTLBPAA0 | TNR14SV511K417-T71 | 320 | 410 | 136 | 845 | 390 | 510 (459 to 561) | 6.9 | | | |
| TND14SV561KTLBPAA0 | TNR14SV561K417-T71 | 350 | 460 | | 136 | 922 | 360 | 560 (504 to 616) | 7.2 | | |
| TND14SV621KTLBPAA0 | TNR14SV621K417-T71 | 385 | 505 | 5,000A/1time 4,500A/2times | 136 | 1025 | 330 | 620 (558 to 682) | 7.5 | | |
| TND14SV681KTLBPAA0 | TNR14SV681K417-T71 | 420 | 560 | | 136 | 1120 | 310 | 680 (612 to 748) | 7.9 | | |
| TND14SV751KB00AAA0 | TNR14SV751K | 460 | 615 | | 150 | 1240 | 280 | 750 (675 to 825) | 8.4 | | |
| TND14SV821KB00AAA0 | TNR14SV821K | 510 | 670 | | 165 | 1355 | 250 | 820 (738 to 902) | 8.8 | | |
| TND14SV911KB00AAA0 | TNR14SV911K | 550 | 745 | | 180 | 1500 | 230 | 910 (819 to 1001) | 9.2 | | |
| TND14SV102KB00AAA0 | TNR14SV102K | 625 | 825 | | 200 | 1650 | 210 | 1000 (900 to 1100) | 9.7 | | |
| TND20SV221KB00AAA0 | TNR20SV221K | 140 | 180 | | | 110 | 360 | 2500 | 220 (198 to 242) | 5.4 | |
| TND20SV241KB00AAA0 | TNR20SV241K | 150 | 200 | | | 120 | 395 | 2300 | 240 (216 to 264) | 5.5 | |
| TND20SV271KB00AAA0 | TNR20SV271K | 175 | 225 | 10,000A/1time 7,000A/2times | 135 | 455 | 2000 | 270 (247 to 303) | 5.7 | | |
| TND20SV431KB00AAA0 | TNR20SV431K | 275 | 350 | | 215 | 710 | 1300 | 430 (387 to 473) | 6.5 | | |
| TND20SV471KB00AAA0 | TNR20SV471K | 300 | 385 | 250 | 775 | 1200 | 470 (423 to 517) | 6.7 | | | |
| TND20SV511KB00AAA0 | TNR20SV511K | 320 | 410 | 273 | 845 | 1100 | 510 (459 to 561) | 6.9 | | | |
| TND20SV561KB00AAA0 | TNR20SV561K | 350 | 460 | | 273 | 922 | 1000 | 560 (504 to 616) | 7.2 | | |
| TND20SV621KB00AAA0 | TNR20SV621K | 385 | 505 | 7,500A/1time 6,500A/2times | 273 | 1025 | 900 | 620 (558 to 682) | 7.6 | | |
| TND20SV681KB00AAA0 | TNR20SV681K | 420 | 560 | | 273 | 1120 | 830 | 680 (612 to 748) | 7.9 | | |
| TND20SV751KB00AAA0 | TNR20SV751K | 460 | 615 | | 300 | 1240 | 750 | 750 (675 to 825) | 8.4 | | |
| TND20SV821KB00AAA0 | TNR20SV821K | 510 | 670 | | 325 | 1355 | 700 | 820 (738 to 902) | 8.8 | | |
| TND20SV911KB00AAA0 | TNR20SV911K | 550 | 745 | | 360 | 1500 | 620 | 910 (819 to 1001) | 9.2 | | |
| TND20SV102KB00AAA0 | TNR20SV102K | 625 | 825 | | 400 | 1650 | 560 | 1000 (900 to 1100) | 9.7 | | |

SV Series

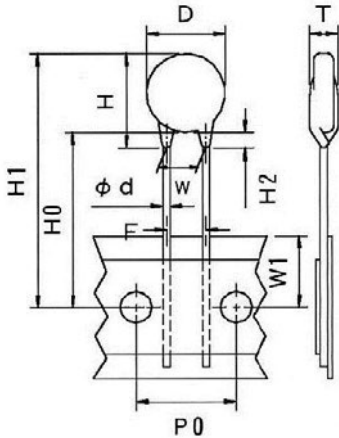
◆ DIMENSIONS

● Refer to the table below for standard packing styles.

| Rating | TND05SV | TND07SV | TND10SV | TND12SV | TND14SV | TND20SV |
|---------------|---------|---------|---------|---------|---------|---------|
| 221K to 511K* | Taping | Taping | Taping | Taping | Taping | Bulk |
| 561K to 681K | — | — | Taping | Taping | Taping | Bulk |
| 751K to 102K | — | — | Bulk | Bulk | Bulk | Bulk |

* The rating range for TND05SV is 221K to 471K

·TND05SV and TND07SV are taping models.

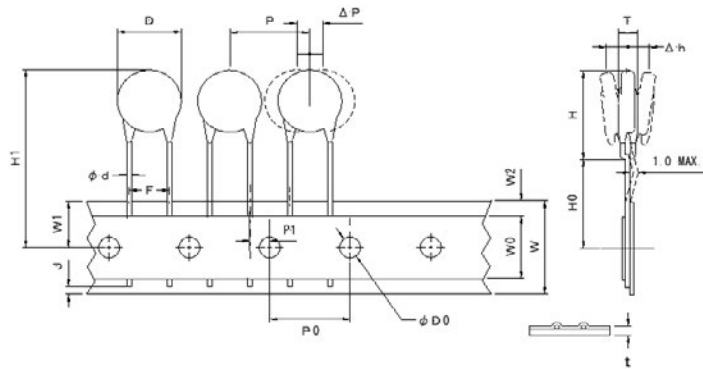


| Symbol | 5SV | 7SV |
|--------|---------------------------------------|-----------|
| D | 7.5Max | 9.0 Max. |
| H | 13.0Max | 14.0 Max. |
| T | Ref. to RATINGS | |
| φd | 0.6±0.05 | |
| P0 | 12.7±0.3 | |
| W1 | 9.0±0.5 | |
| W | 5.0±1.0 | |
| F | 5.0±0.8 | |
| H0 | 20.0± ^{1.5} / _{1.0} | |
| H1 | 31.5 Max. | 32.5 Max. |
| H2 | 5.0 Max. | |

·Taping specifications of TND10SV/TND12SV/TND14SV

Taping Code : TLB

| 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 ^{+1.0} / _{-0.5} | ← | ← |
| 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. | ← | ← |



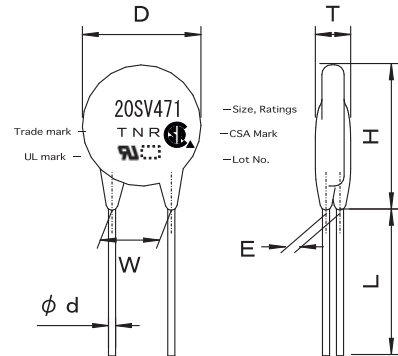
SV Series

◆DIMENSION

| Part Number | D MAX. | H MAX. | L MIN. | φd ±0.05 | W ±1.0 | E ±1.0 |
|--|-----------|-----------|-----------|-------------|--------------------------|--|
| TND10SV751KB00A◇A0 TND10SV821KB00A◇A0 TND10SV911KB00A◇A0 TND10SV102KB00A◇A0 | 13.0 | 18.0 | 20.0 | 0.8 | 7.5 | 3.1 3.4 3.7 4.0 |
| TND12SV751KB00AAA0 TND12SV821KB00AAA0 TND12SV911KB00AAA0 TND12SV102KB00AAA0 | 15.0 | 20.0 | | | | 3.1 3.4 3.7 4.0 |
| TND14SV751KB00AAA0 TND14SV821KB00AAA0 TND14SV911KB00AAA0 TND14SV102KB00AAA0 | 16.5 | 21.5 | | | | 3.3 3.5 3.9 4.2 |
| TND20SV221KB00AAA0 TND20SV241KB00AAA0 TND20SV271KB00AAA0 TND20SV431KB00AAA0 TND20SV471KB00AAA0 TND20SV511KB00AAA0 | 22.5 | 27.5 | | | | 1.3 1.4 1.5 2.1 2.3 2.4 |
| TND20SV561KB00AAA0 TND20SV621KB00AAA0 TND20SV681KB00AAA0 | 23.0 | 28.5 | | | 10.0 | 2.6 2.9 3.1 |
| TND20SV751KB00AAA0 TND20SV821KB00AAA0 TND20SV911KB00AAA0 TND20SV102KB00AAA0 | 23.5 | 29.5 | | | 3.4 3.6 4.0 4.3 | |

◆MARKING

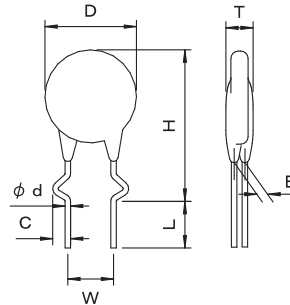
EX)



•TND10SV/TND12SV/TND14SV with the rating 751K or above and TND20SV are packaged in bulk.

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. |



◆V-I CURVE

V-I characteristics and PULE LIFE TIME RATINGS are same as those of V series. Please see V-I CURVE and PULE LIFE TIME RATINGS of V series.

CROSS REFERENCE TABLE (Common to standard product and IEC 62368-1:2014 G.8.2 conforming product)

| TNR SV SERIES | TNR V SERIES | V-I CURVE GO TO REF. PAGE | PULSE LIFE TIME RATINGS GO TO REF. PAGE |
|----------------------------------|----------------------------------|------------------------------|--|
| TND05SV221K to TND05SV471K | TND05V-221K to TND05V-471K | P.61 | P.76 |
| TND07SV221K to TND07SV511K | TND07V-221K to TND07V-511K | P.63 | P.77 |
| TND10SV221K to TND10SV102K | TND10V-221K to TND10V-102K | P.67 | P.78 |
| TND12SV431K to TND12SV102K | TND12V-431K to TND12V-102K | P.69 | P.78 to 79 |
| TND14SV221K to TND14SV102K | TND14V-221K to TND14V-102K | P.71 | P.79 |
| TND20SV221K to TND20SV102K | TND20V-221K to TND20V-102K | P.73 | P.80 |

◆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 CmA DC is called Varistor Voltage. The measurement shall be made as fast as possible to avoid heat affection. | Satisfy the specification | |
| | Type | | Current CmA |
| | 5SV | | 0.1 |
| | Others | 1.0 | |
| 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 | $\frac{V1mA \text{ at } 125^{\circ}C - V1mA \text{ at } 25^{\circ}C}{V1mA \text{ at } 25^{\circ}C} \times \frac{1}{100} \times 100 (\%/^{\circ}C)$ | Within ±0.05%/°C (≤681K) Within ±0.10%/°C (751K≤) | |
| 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. | $\Delta V1mA/V1mA \leq \pm 10\%$ |
| Low Temperature Storage | The specimen shall be subjected -40±2°C for 1000±12 hours without load. | $\Delta V1mA/V1mA \leq \pm 5\%$ |
| Damp heat (Humidity) | The specimen shall be subjected to 85±2°C, 80 to 85%RH for 1000±12 hours without load. | $\Delta V1mA/V1mA \leq \pm 5\%$ |
| Temperature Cycle | The temperature cycle shown below shall be repeated 1000 cycles. -40±3°C, 30 minutes ↔ +125±2°C, 30 minutes | $\Delta V1mA/V1mA \leq \pm 5\%$ No remarkable damage |
| High Temperature Operating | The specimen shall be subjected to 125±2°C with the maximum allowable voltage for 1000±12 hours. | $\Delta V1mA/V1mA \leq \pm 10\%$ |
| 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. | $\Delta V1mA/V1mA \leq \pm 10\%$ |

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 | | | | | | | | | | | | |
|-------------------------------------|--|--|--------------------------|--------------------------|------------------|--|---------|---------|------------------------|-----------|-----|---------------|------------------------------|--|
| Resistance to Soldering Heat | 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 ⁺¹ ₀ 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 | | | | | | | | | | | | |
| Solderability | 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) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Lead Pull Strength | 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 | | | | | | | | | | | | | |
| 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. | 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>0.6mm</td> <td>10N</td> </tr> <tr> <td>10SV, 12SV, 14SV, 20SV</td> <td>0.8mm</td> <td>10N</td> </tr> </table> | | Type | Lead Diameter | Force | 5SV, 7SV | 0.6mm | 10N | 10SV, 12SV, 14SV, 20SV | 0.8mm | 10N | | | |
| | Type | | Lead Diameter | Force | | | | | | | | | | |
| 5SV, 7SV | 0.6mm | 10N | | | | | | | | | | | | |
| 10SV, 12SV, 14SV, 20SV | 0.8mm | 10N | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Vibration | 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% | | | | | | | | | | | | |
| Flammability test | The varistor shall be subjected 60 sec. applications of test flame. Burnar : Bunsen gas burner 9000kcal / m ³ 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

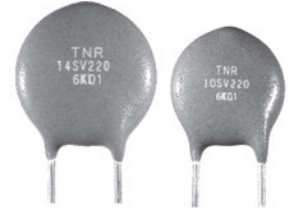
New!

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

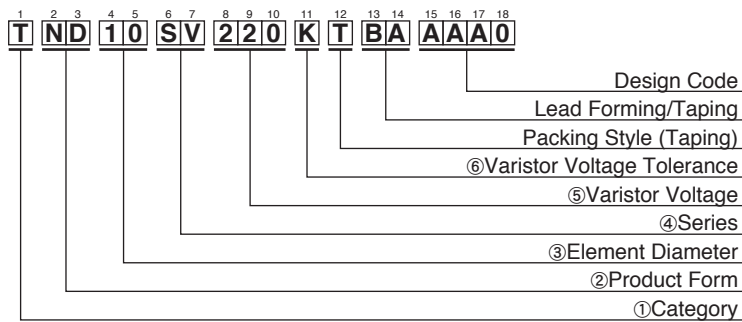
- High temperature operating : 1,000 hours at 125°C.
- Damp heat operating : 1,000 hours at 85°C/85%RH.
- Temperature cycle : -40°C⇄+125°C, 1000cycle.
- Material of Coating resin:UL94V-0 and Halogen free.
- AEC-Q200 compliant : Please contact Chemi-con for more details, test data, information.

◆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 DC(V) | Rated Wattage (W) | (A) | (V) | | | |
| | | AC(Vrms) | DC(V) | 8/20μs(A) | 2ms(J) | | | (W) | (A) | (V) | | |
| TND05SV220KTBAAAA0 | TNR5SV220K-T25 | 12 | 16 | 125A /2 times | 0.5 | 24 | 0.01 | 1 | 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 | | 0.9 | 42 | | | 86 | 2300 | 39 (35~43) | 5.0 |
| TND05SV470KTBAAAA0 | TNR5SV470K-T25 | 26 | 34 | | 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 | 250A /2 times | 1.1 | 24 | 0.02 | 2.5 | 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 | | 1.9 | 42 | | | 77 | 3600 | 39 (35~43) | 5.0 |
| TND07SV470KTBAAAA0 | TNR7SV470K-T25 | 26 | 34 | | 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 | 500A /2 times | 2.6 | 24 | 0.05 | 5 | 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 | | 4.7 | 42 | | | 77 | 7600 | 39 (35~43) | 6.0 |
| TND10SV470KTBAAAA0 | TNR10SV470K-T25 | 26 | 34 | | 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 | 1000A /2 times | 5.3 | 24 | 0.1 | 10 | 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 | | 9.4 | 42 | | | 77 | 16000 | 39 (35~43) | 6.0 |
| TND14SV470KTBAAAA0 | TNR14SV470K-T25 | 26 | 34 | | 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 | 2000A /2 times | 14 | 24 | 0.2 | 20 | 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 | | 25 | 42 | | | 77 | 36000 | 39 (35~43) | 6.0 |
| TND20SV470KB00AAA0 | TNR20SV470K | 26 | 34 | | 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 | | | |

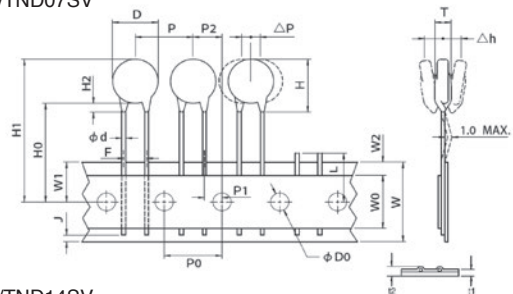
◆DIMENSION

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

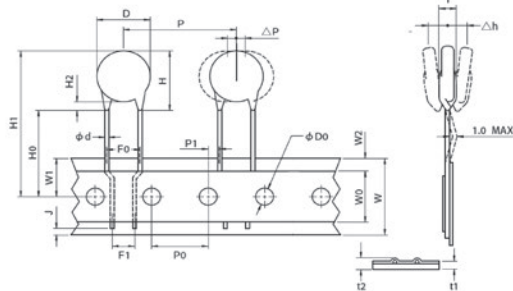
Taping Code : TBA (T25) Unit : mm

| 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 ^{+1.0} _{-0.5} | ← | 18.0 ^{+1.0} _{-0.5} | ← |
| 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 ^{+1.5} _{-1.0} | ← | 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

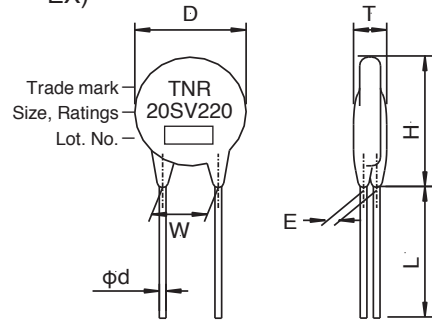
TND20SV : Bulk only

Staight 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 |

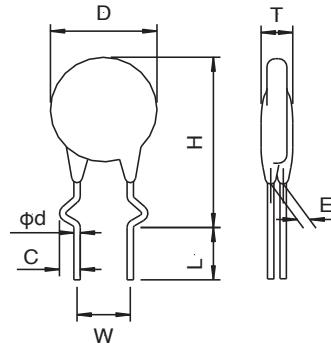
◆MARKING

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.59 | P.74 |
| TND05SV270K | TND05V-270K | | |
| TND05SV330K | TND05V-330K | | |
| TND05SV390K | TND05V-390K | | |
| TND05SV470K | TND05V-470K | | |
| TND05SV560K | TND05V-560K | | |
| TND05SV680K | TND05V-680K | | |
| TND07SV220K | TND07V-220K | P.61 | P.75 |
| TND07SV270K | TND07V-270K | | |
| TND07SV330K | TND07V-330K | | |
| TND07SV390K | TND07V-390K | | |
| TND07SV470K | TND07V-470K | | |
| TND07SV560K | TND07V-560K | | |
| TND07SV680K | TND07V-680K | | |
| TND10SV220K | TND10V-220K | P.65 | P.76 |
| TND10SV270K | TND10V-270K | | |
| TND10SV330K | TND10V-330K | | |
| TND10SV390K | TND10V-390K | | |
| TND10SV470K | TND10V-470K | | |
| TND10SV560K | TND10V-560K | | |
| TND10SV680K | TND10V-680K | | |
| TND14SV220K | TND14V-220K | P.69 | P.77 |
| TND14SV270K | TND14V-270K | | |
| TND14SV330K | TND14V-330K | | |
| TND14SV390K | TND14V-390K | | |
| TND14SV470K | TND14V-470K | | |
| TND14SV560K | TND14V-560K | | |
| TND14SV680K | TND14V-680K | | |
| TND20SV220K | TND20V-220K | P.71 | P.78 |
| 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 (5SV : 0.1mA) 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 | $\frac{V_{1mA \text{ at } 125^\circ\text{C}} - V_{1mA \text{ at } 25^\circ\text{C}}}{V_{1mA \text{ at } 25^\circ\text{C}}} \times \frac{1}{100} \times 100 (\%/^\circ\text{C})$ V1mA : Actual Varistor Voltage | Within ±0.05%/°C |
| Maximum Applicable Voltage for a Short Period (5 minutes) | Maximum DC voltage to be applied for only 5 minutes. | $\Delta V_{1mA}/V_{1mA} \leq \pm 15\%$ |

*: The varistor voltage of 5SV is V0.1mA

◆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.

*: The varistor voltage of 5SV is V0.1mA



SV Series Low varistor voltage

◆MECHANICAL CHARACTERISTICS

| Item | Test Conditions | Specifications | | | | | | | | | | | | |
|-------------------------------------|--|--|--------------------------|--------------------------|------------------|--------------|---------|---------|----------------|-----------|-----|---------------|------------------------------|--|
| Resistance to Soldering Heat | 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 ⁺¹ ₀ 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 | | | | | | | | | | | | |
| Solderability | 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) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Lead Pull Strength | 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>0.6mm</td> <td>10N</td> </tr> <tr> <td>10SV,14SV,20SV</td> <td>0.8mm</td> <td>10N</td> </tr> </table> | | Type | Lead Diameter | Force | 5SV,7SV | 0.6mm | 10N | 10SV,14SV,20SV | 0.8mm | 10N | | | |
| | Type | | Lead Diameter | Force | | | | | | | | | | |
| 5SV,7SV | 0.6mm | 10N | | | | | | | | | | | | |
| 10SV,14SV,20SV | 0.8mm | 10N | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Lead Bend Strength | 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>0.6mm</td> <td>5N</td> </tr> <tr> <td>10SV,14SV,20SV</td> <td>0.8mm</td> <td>5N</td> </tr> </table> | | Type | Lead Diameter | Force | 5SV,7SV | 0.6mm | 5N | 10SV,14SV,20SV | 0.8mm | 5N | | | |
| | Type | | Lead Diameter | Force | | | | | | | | | | |
| 5SV,7SV | 0.6mm | 5N | | | | | | | | | | | | |
| 10SV,14SV,20SV | 0.8mm | 5N | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Vibration | 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% | | | | | | | | | | | | |
| Flammability test | The varistor shall be subjected 60 sec. applications of test flame. Burnar : Bunsen gas burner 9000kcal / m ³ 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. | | | | | | | | | | | | |

*: The varistor voltage of 5SV is V0.1mA