

◆FEATURES

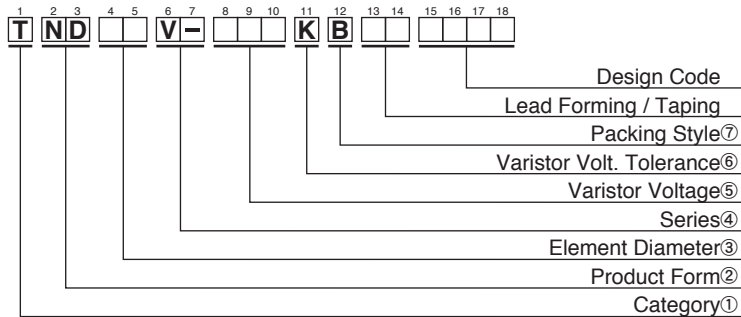
- Large surge capability (the surge current ratings of TNR V series, by 8/20 μs, are about two times larger than TNR G series).
- Large energy capability (1.5 time larger than TNR G series).
- One rank smaller TNR V has same peak current as TNR G.
- Excellent voltage non-linear coefficient.
Low clamping voltage.
- Symmetrical V-I characteristics (No polarity).
- Fast response.
- Stable characteristics against repeated surges.
- Superior temperature characteristics.
- High reliability
- UL, CSA and VDE recognized components
UL 1449 3rd File : E323623
CSA File : LR97864
VDE File : 118623

◆APPLICATIONS

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

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

◆PART NUMBERING SYSTEM



| ①Category | |
|-----------|---------------------------|
| T | Metal Oxide Varistors TNR |

| ②Product Form | |
|---------------|-----------|
| ND | Disk Type |

| ③Element Diameter | |
|-------------------|--------|
| 05 | φ 5 mm |
| 07 | φ 7 mm |
| 09 | φ 9 mm |
| 10 | φ10 mm |
| 12 | φ12 mm |
| 14 | φ14 mm |
| 20 | φ20 mm |

| ④Series | |
|---------|----------|
| V- | V Series |

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

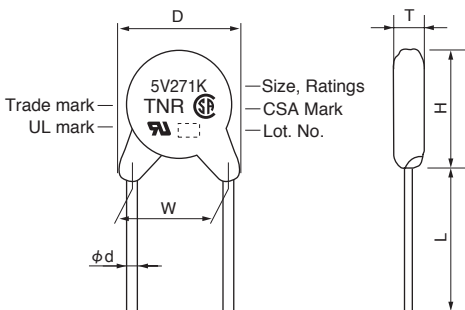
| ⑥Varistor Volt. Tolerance | |
|---------------------------|------|
| K | ±10% |

| ⑦Packing Style | |
|----------------|--------|
| B | Bulk |
| T | Taping |

◆STANDARD RATINGS (Type 5V)

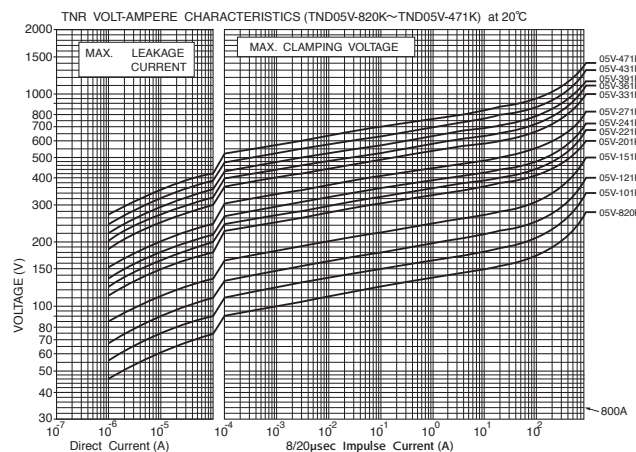
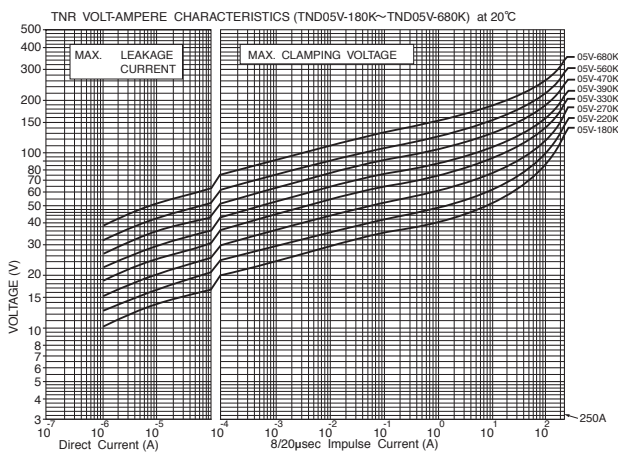
| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage | | Capacitance Typical @1kHz (pF) | Varistor Voltage V _{0.1mA} (V) | T Max. (mm) |
|--------------------|---|------------------------|--------|-----------------------------|-------------|---------------|-----------------------|-----|---|---|-------------------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | (A) | (V) | | | |
| | | AC (Vrms) | DC (V) | 8/20μs(A) | 2ms(J) | (W) | | | | | |
| TND05V-180KB00AAA0 | TNR5V180K | 11 | 14 | 250A/1 time 125A/2 times | 0.4 | 0.01 | 1 | 40 | 2540 | 18 (16~ 20) | 4.5 |
| TND05V-220KB00AAA0 | TNR5V220K | 14 | 18 | | 0.5 | | | 48 | 2090 | 22 (20~ 24) | |
| TND05V-270KB00AAA0 | TNR5V270K | 17 | 22 | | 0.7 | | | 60 | 1790 | 27 (24~ 30) | |
| TND05V-330KB00AAA0 | TNR5V330K | 20 | 26 | | 0.8 | | | 73 | 1480 | 33 (30~ 36) | |
| TND05V-390KB00AAA0 | TNR5V390K | 25 | 30 | | 0.9 | | | 86 | 1310 | 39 (35~ 43) | |
| TND05V-470KB00AAA0 | TNR5V470K | 30 | 37 | | 1.1 | | | 104 | 1140 | 47 (42~ 52) | |
| TND05V-560KB00AAA0 | TNR5V560K | 35 | 44 | | 1.3 | | | 123 | 1000 | 56 (50~ 62) | |
| TND05V-680KB00AAA0 | TNR5V680K | 40 | 55 | 1.6 | 150 | 870 | 68 (61~ 75) | | | | |
| TND05V-820KB00AAA0 | TNR5V820K | 50 | 65 | 800A/1 time 600A/2 times | 2.5 | 0.1 | 5 | 145 | 400 | 82 (74~ 90) | 4.1 |
| TND05V-101KB00AAA0 | TNR5V101K | 60 | 85 | | 3 | | | 175 | 350 | 100 (90~110) | 4.3 |
| TND05V-121KB00AAA0 | TNR5V121K | 75 | 100 | | 3.5 | | | 210 | 310 | 120 (108~132) | 4.5 |
| TND05V-151KB00AAA0 | TNR5V151K | 95 | 125 | | 4.5 | | | 260 | 270 | 150 (135~165) | 4.8 |
| TND05V-181KB00AAA0 | TNR5V181K | 110 | 145 | | 5 | | | 325 | 190 | 180 (162~198) | 4.3 |
| TND05V-201KB00AAA0 | TNR5V201K | 130 | 170 | | 6 | | | 355 | 110 | 200 (185~225) | 4.4 |
| TND05V-221KB00AAA0 | TNR5V221K | 140 | 180 | | 6.5 | | | 380 | 110 | 220 (198~242) | 4.5 |
| TND05V-241KB00AAA0 | TNR5V241K | 150 | 200 | | 7.5 | | | 415 | 100 | 240 (216~264) | 4.6 |
| TND05V-271KB00AAA0 | TNR5V271K | 175 | 225 | | 8 | | | 475 | 90 | 270 (247~303) | 4.8 |
| TND05V-331KB00AAA0 | TNR5V331K | 210 | 270 | | 9.5 | | | 570 | 80 | 330 (297~363) | 5.1 |
| TND05V-361KB00AAA0 | TNR5V361K | 230 | 300 | | 11 | | | 620 | 80 | 360 (324~396) | 5.3 |
| TND05V-391KB00AAA0 | TNR5V391K | 250 | 320 | | 12 | | | 675 | 70 | 390 (351~429) | 5.4 |
| TND05V-431KB00AAA0 | TNR5V431K | 275 | 350 | | 13.5 | | | 745 | 70 | 430 (387~473) | 5.6 |
| TND05V-471KB00AAA0 | TNR5V471K | 300 | 385 | | 15 | | | 810 | 60 | 470 (423~517) | 5.8 |

◆DIMENSIONS [mm]



| D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|-----------|-----------|--------------------|-----------|-------------|-----------|
| 7.5 | 10.0 | Ref. to RATINGS | 20.0 | 0.6 | 5.0 |

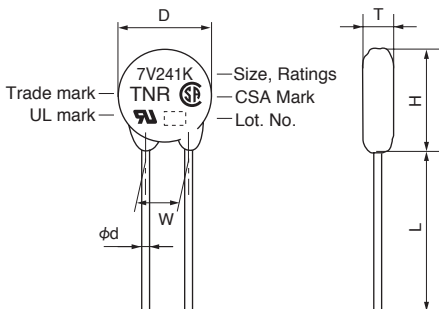
◆V-I CURVE



◆STANDARD RATINGS (Type 7V)

| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage | | Capacitance Typical @1kHz (pF) | Varistor Voltage V1mA (V) | T Max. (mm) |
|--------------------|---|------------------------|--------|-------------------|-------------|---------------|-----------------------|-----|---|---------------------------------|-------------------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | (A) | (V) | | | |
| | | AC (Vrms) | DC (V) | 8/20μs(A) | 2ms(J) | | | | | | |
| TND07V-150KB00AAA0 | TNR7V150K | 8 | 12 | | 0.7 | | | 30 | 4600 | 15 (13~ 17) | 4.5 |
| TND07V-180KB00AAA0 | TNR7V180K | 11 | 14 | | 0.9 | | | 36 | 3800 | 18 (16~ 20) | 4.5 |
| TND07V-220KB00AAA0 | TNR7V220K | 14 | 18 | | 1.1 | | | 43 | 3200 | 22 (20~ 24) | 4.6 |
| TND07V-270KB00AAA0 | TNR7V270K | 17 | 22 | 500A/1 time | 1.3 | | | 53 | 2800 | 27 (24~ 30) | 4.7 |
| TND07V-330KB00AAA0 | TNR7V330K | 20 | 26 | | 1.6 | 0.02 | 2.5 | 65 | 2300 | 33 (30~ 36) | 4.9 |
| TND07V-390KB00AAA0 | TNR7V390K | 25 | 30 | 250A/2 times | 1.9 | | | 77 | 2100 | 39 (35~ 43) | 4.8 |
| TND07V-470KB00AAA0 | TNR7V470K | 30 | 37 | | 2.3 | | | 93 | 1900 | 47 (42~ 52) | 4.9 |
| TND07V-560KB00AAA0 | TNR7V560K | 35 | 44 | | 2.7 | | | 110 | 1700 | 56 (50~ 62) | 5.0 |
| TND07V-680KB00AAA0 | TNR7V680K | 40 | 55 | | 3.3 | | | 135 | 1500 | 68 (61~ 75) | 5.2 |
| TND07V-820KB00AAA0 | TNR7V820K | 50 | 65 | | 5 | | | 135 | 800 | 82 (74~ 90) | 4.1 |
| TND07V-101KB00AAA0 | TNR7V101K | 60 | 85 | | 6 | | | 165 | 700 | 100 (90~110) | 4.3 |
| TND07V-121KB00AAA0 | TNR7V121K | 75 | 100 | | 7 | | | 200 | 650 | 120 (108~132) | 4.5 |
| TND07V-151KB00AAA0 | TNR7V151K | 95 | 125 | | 9 | | | 250 | 600 | 150 (135~165) | 4.8 |
| TND07V-181KB00AAA0 | TNR7V181K | 110 | 145 | | 11 | | | 300 | 430 | 180 (162~198) | 4.3 |
| TND07V-201KB00AAA0 | TNR7V201K | 130 | 170 | | 12.5 | | | 340 | 250 | 200 (185~225) | 4.4 |
| TND07V-221KB00AAA0 | TNR7V221K | 140 | 180 | 1750A/1 time | 13.5 | | | 360 | 230 | 220 (198~242) | 4.5 |
| TND07V-241KB00AAA0 | TNR7V241K | 150 | 200 | | 15 | 0.25 | 10 | 395 | 210 | 240 (216~264) | 4.6 |
| TND07V-271KB00AAA0 | TNR7V271K | 175 | 225 | 1250A/2 times | 17 | | | 455 | 190 | 270 (247~303) | 4.8 |
| TND07V-331KB00AAA0 | TNR7V331K | 210 | 270 | | 20 | | | 545 | 160 | 330 (297~363) | 5.1 |
| TND07V-361KB00AAA0 | TNR7V361K | 230 | 300 | | 23 | | | 595 | 150 | 360 (324~396) | 5.3 |
| TND07V-391KB00AAA0 | TNR7V391K | 250 | 320 | | 25 | | | 650 | 140 | 390 (351~429) | 5.4 |
| TND07V-431KB00AAA0 | TNR7V431K | 275 | 350 | | 27.5 | | | 710 | 130 | 430 (387~473) | 5.6 |
| TND07V-471KB00AAA0 | TNR7V471K | 300 | 385 | | 30 | | | 775 | 120 | 470 (423~517) | 5.8 |
| TND07V-511KB00AAA0 | TNR7V511K | 320 | 410 | | 32 | | | 845 | 110 | 510 (459~561) | 6.0 |

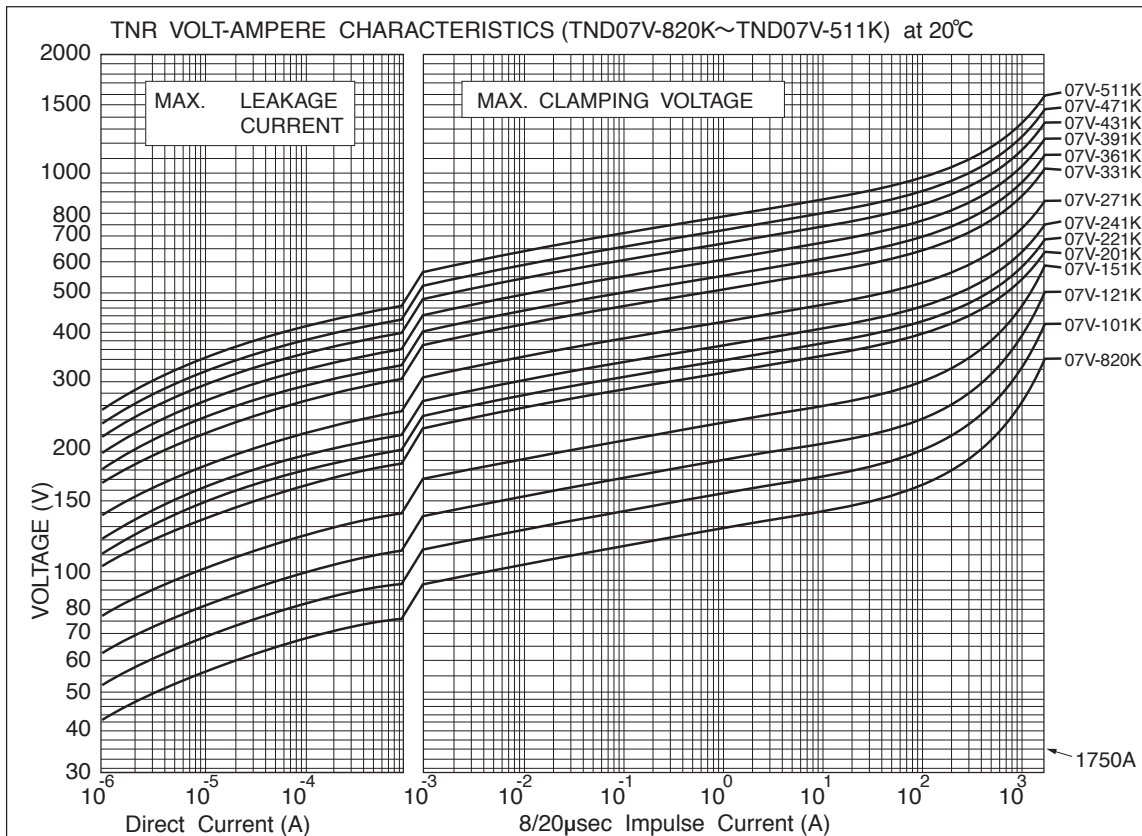
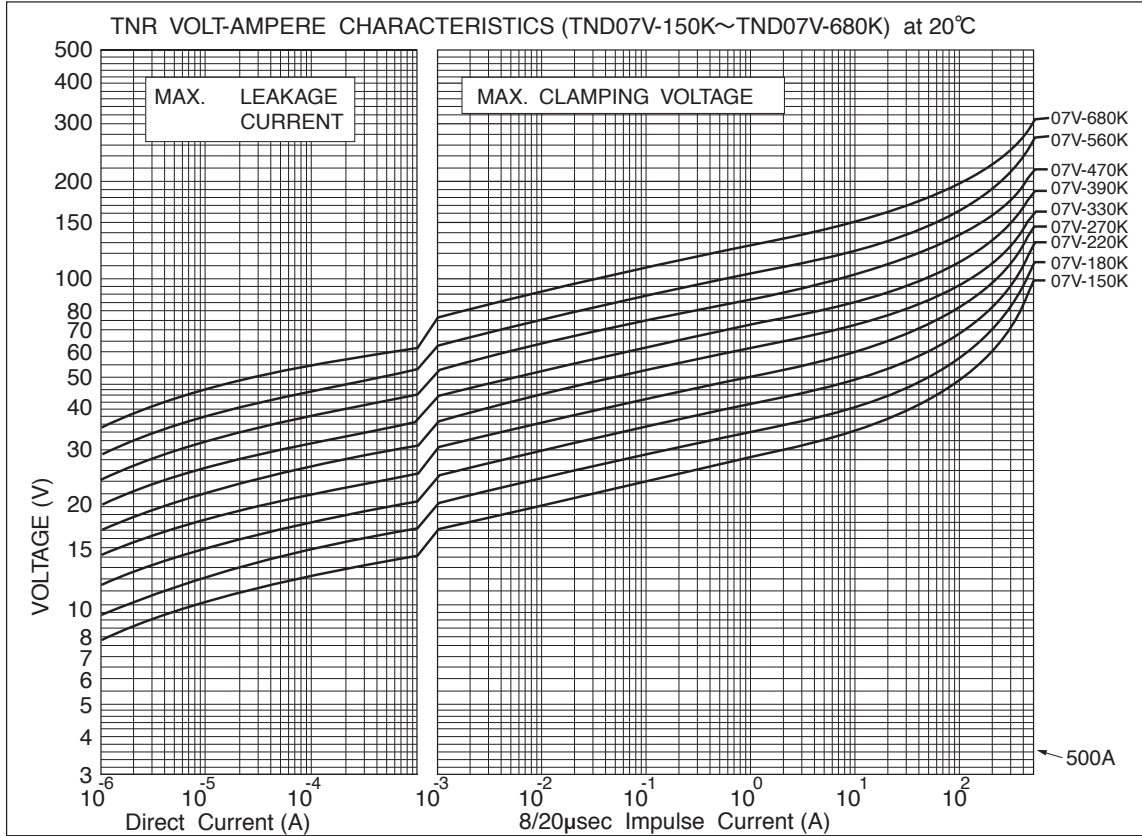
◆DIMENSIONS [mm]



| D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|-----------|-----------|--------------------|-----------|-------------|-----------|
| 8.5 | 11.5 | Ref. to RATINGS | 20.0 | 0.6 | 5.0 |

V Series

◆V-I CURVE (Type 7V)

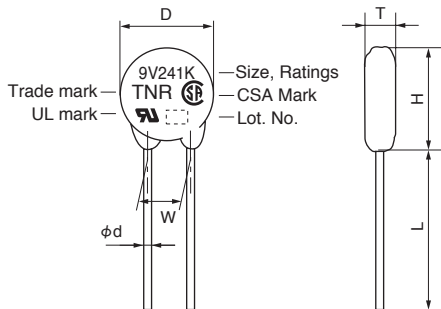


V Series

◆ RATINGS (Type 9V)

| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage | | Capacitance Typical @1kHz (pF) | Varistor Voltage V _{1mA} (V) | T Max. (mm) | |
|--------------------|---|------------------------|--------|-------------------|---------------|---------------|-----------------------|---------------|---|---|-------------------|-----|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | (A) | (V) | | | | |
| | | AC (Vrms) | DC (V) | 8/20μs(A) | 2ms(J) | | | | | | | (W) |
| TND09V-150KB00AAA0 | TNR9V150K | 8 | 12 | 800A/1 time | 2.0 | 0.02 | 5 | 30 | 9600 | 15 (13~ 17) | 3.8 | |
| TND09V-180KB00AAA0 | TNR9V180K | 11 | 14 | | 2.2 | | | 36 | 8000 | 18 (16~ 20) | 3.8 | |
| TND09V-220KB00AAA0 | TNR9V220K | 14 | 18 | | 2.6 | | | 43 | 7000 | 22 (20~ 24) | 4.0 | |
| TND09V-270KB00AAA0 | TNR9V270K | 17 | 22 | | 3.2 | | | 53 | 6000 | 27 (24~ 30) | 4.2 | |
| TND09V-330KB00AAA0 | TNR9V330K | 20 | 26 | 400A/2 times | 4.0 | 0.02 | 5 | 65 | 5000 | 33 (30~ 36) | 4.5 | |
| TND09V-390KB00AAA0 | TNR9V390K | 25 | 30 | | 4.7 | | | 77 | 4500 | 39 (35~ 43) | 4.0 | |
| TND09V-470KB00AAA0 | TNR9V470K | 30 | 37 | | 5.6 | | | 93 | 4000 | 47 (42~ 52) | 4.2 | |
| TND09V-560KB00AAA0 | TNR9V560K | 35 | 44 | | 6.7 | | | 110 | 3500 | 56 (50~ 62) | 4.4 | |
| TND09V-680KB00AAA0 | TNR9V680K | 40 | 55 | 8.2 | 135 | 3200 | 68 (61~ 75) | 4.5 | | | | |
| TND09V-820KB00AAA0 | TNR9V820K | 50 | 65 | 10 | 135 | 1700 | 82 (74~ 90) | 3.8 | | | | |
| TND09V-101KB00AAA0 | TNR9V101K | 60 | 85 | 12 | 165 | 1600 | 100 (90~110) | 3.9 | | | | |
| TND09V-121KB00AAA0 | TNR9V121K | 75 | 100 | 14.5 | 200 | 1400 | 120 (108~132) | 4.1 | | | | |
| TND09V-151KB00AAA0 | TNR9V151K | 95 | 125 | 18 | 250 | 1300 | 150 (135~165) | 4.4 | | | | |
| TND09V-181KB00AAA0 | TNR9V181K | 110 | 145 | 22 | 300 | 900 | 180 (162~198) | 4.0 | | | | |
| TND09V-201KB00AAA0 | TNR9V201K | 130 | 170 | 25 | 340 | 500 | 200 (185~225) | 4.1 | | | | |
| TND09V-221KB00AAA0 | TNR9V221K | 140 | 180 | 3000A/1 time | 27.5 | 0.25 | 25 | 360 | 450 | 220 (198~242) | 4.2 | |
| TND09V-241KB00AAA0 | TNR9V241K | 150 | 200 | | 30 | | | 395 | 400 | 240 (216~264) | 4.3 | |
| TND09V-271KB00AAA0 | TNR9V271K | 175 | 225 | | 2000A/2 times | | | 35 | 455 | 350 | 270 (247~303) | 4.5 |
| TND09V-331KB00AAA0 | TNR9V331K | 210 | 270 | | | | | 42 | 545 | 300 | 330 (297~363) | 4.8 |
| TND09V-361KB00AAA0 | TNR9V361K | 230 | 300 | 45 | | 595 | 280 | 360 (324~396) | 5.0 | | | |
| TND09V-391KB00AAA0 | TNR9V391K | 250 | 320 | 50 | | 650 | 260 | 390 (351~429) | 5.1 | | | |
| TND09V-431KB00AAA0 | TNR9V431K | 275 | 350 | 55 | 710 | 240 | 430 (387~473) | 5.3 | | | | |
| TND09V-471KB00AAA0 | TNR9V471K | 300 | 385 | 60 | 775 | 220 | 470 (423~517) | 5.6 | | | | |
| TND09V-511KB00AAA0 | TNR9V511K | 320 | 410 | 67 | 845 | 210 | 510 (459~561) | 5.8 | | | | |

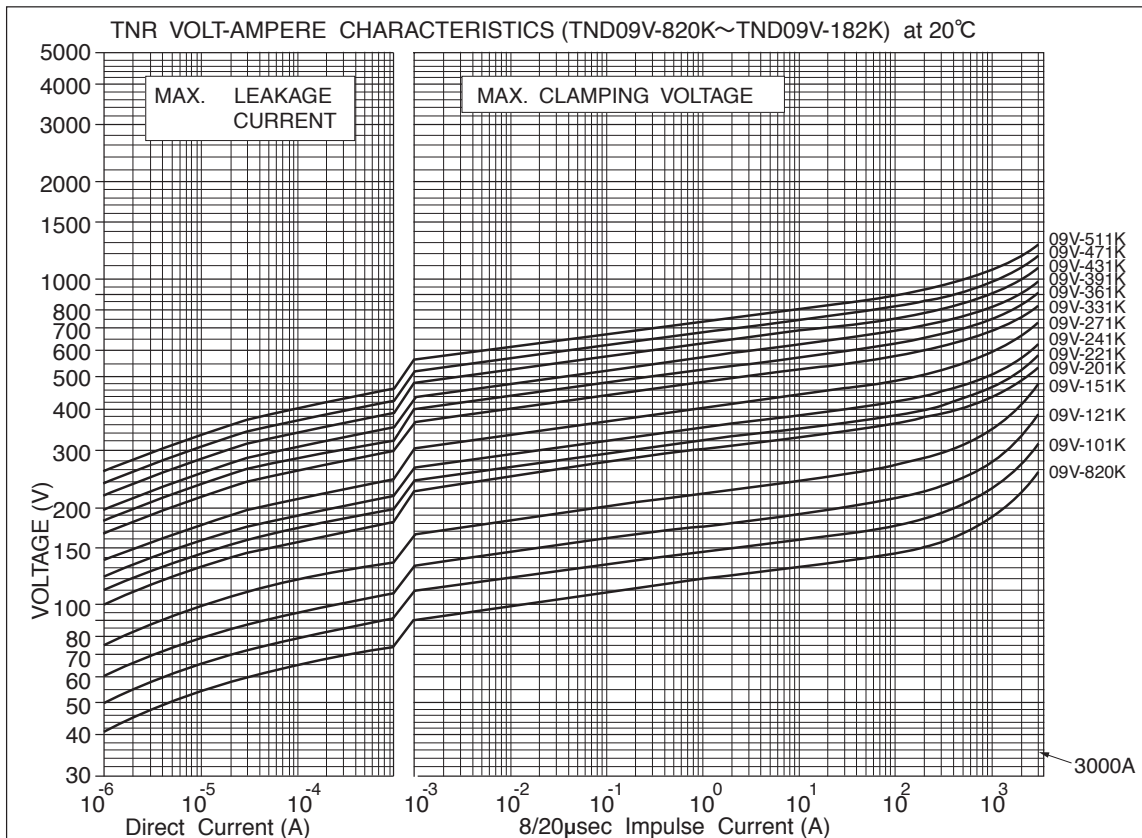
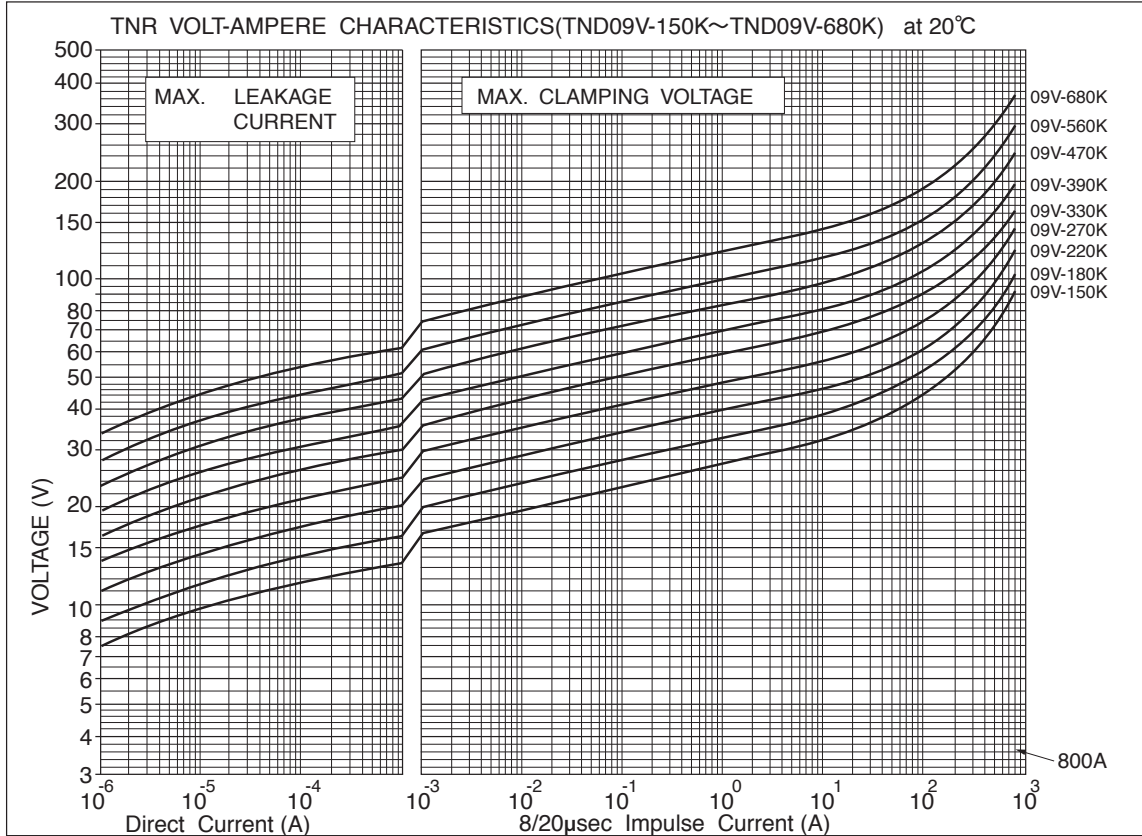
◆ DIMENSIONS [mm]



| D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|-----------|-----------|--------------------|-----------|-------------|-----------|
| 11.5 | 14.5 | Ref. to RATINGS | 20.0 | 0.6 | 5.0 |

V Series

◆V-I CURVE (Type 9V)

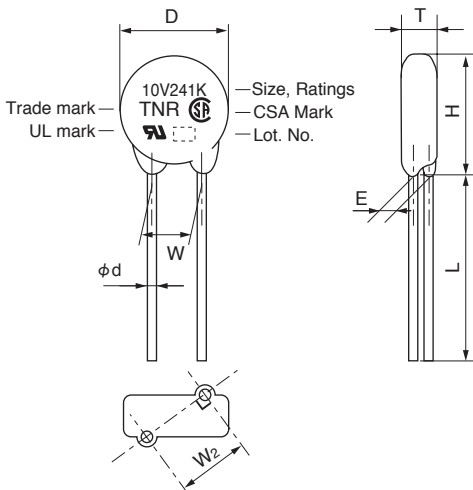


◆RATINGS (Type 10V)

| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage | Capacitance Typical @1kHz | Varistor Voltage V _{1mA} | T Max. | E ±1.0 | W2 reference |
|--------------------|---|------------------------|--------|-------------------|-------------|---------------|-----------------------|---------------------------|-----------------------------------|--------|--------|--------------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | | | | | | |
| | | AC (Vrms) | DC (V) | 8/20μs(A) | 2ms(J) | (W) | | | | | | |
| TND10V-150KB00AAA0 | TNR10V150K | 8 | 12 | | 2.0 | | 30 | 9600 | 15 (13~ 17) | 4.5 | 1.0 | 7.6 |
| TND10V-180KB00AAA0 | TNR10V180K | 11 | 14 | | 2.2 | | 36 | 8000 | 18 (16~ 20) | 4.6 | 1.1 | 7.6 |
| TND10V-220KB00AAA0 | TNR10V220K | 14 | 18 | | 2.6 | | 43 | 7000 | 22 (20~ 24) | 4.7 | 1.2 | 7.6 |
| TND10V-270KB00AAA0 | TNR10V270K | 17 | 22 | 1000A/1 time | 3.2 | | 53 | 6000 | 27 (24~ 30) | 4.8 | 1.3 | 7.6 |
| TND10V-330KB00AAA0 | TNR10V330K | 20 | 26 | | 4.0 | 0.05 | 65 | 5000 | 33 (30~ 36) | 5.0 | 1.5 | 7.6 |
| TND10V-390KB00AAA0 | TNR10V390K | 25 | 30 | 500A/2 times | 4.7 | | 77 | 4500 | 39 (35~ 43) | 4.9 | 1.3 | 7.6 |
| TND10V-470KB00AAA0 | TNR10V470K | 30 | 37 | | 5.6 | | 93 | 4000 | 47 (42~ 52) | 5.0 | 1.4 | 7.6 |
| TND10V-560KB00AAA0 | TNR10V560K | 35 | 44 | | 6.7 | | 110 | 3500 | 56 (50~ 62) | 5.1 | 1.6 | 7.7 |
| TND10V-680KB00AAA0 | TNR10V680K | 40 | 55 | | 8.2 | | 135 | 3200 | 68 (61~ 75) | 5.3 | 1.8 | 7.7 |
| TND10V-820KB00AAA0 | TNR10V820K | 50 | 65 | | 10 | | 135 | 1700 | 82 (74~ 90) | 4.5 | 1.1 | 7.6 |
| TND10V-101KB00AAA0 | TNR10V101K | 60 | 85 | | 12 | | 165 | 1600 | 100 (90~ 110) | 4.7 | 1.3 | 7.6 |
| TND10V-121KB00AAA0 | TNR10V121K | 75 | 100 | | 14.5 | | 200 | 1400 | 120 (108~ 132) | 4.9 | 1.4 | 7.6 |
| TND10V-151KB00AAA0 | TNR10V151K | 95 | 125 | | 18 | | 250 | 1300 | 150 (135~ 165) | 5.2 | 1.7 | 7.7 |
| TND10V-181KB00AAA0 | TNR10V181K | 110 | 145 | | 22 | | 300 | 900 | 180 (162~ 198) | 4.7 | 1.1 | 7.6 |
| TND10V-201KB00AAA0 | TNR10V201K | 130 | 170 | | 25 | | 340 | 500 | 200 (185~ 225) | 4.8 | 1.2 | 7.6 |
| TND10V-221KB00AAA0 | TNR10V221K | 140 | 180 | | 27.5 | | 360 | 450 | 220 (198~ 242) | 4.9 | 1.3 | 7.6 |
| TND10V-241KB00AAA0 | TNR10V241K | 150 | 200 | | 30 | | 395 | 400 | 240 (216~ 264) | 5.0 | 1.3 | 7.6 |
| TND10V-271KB00AAA0 | TNR10V271K | 175 | 225 | | 35 | | 455 | 350 | 270 (247~ 303) | 5.2 | 1.4 | 7.6 |
| TND10V-331KB00AAA0 | TNR10V331K | 210 | 270 | | 42 | | 545 | 300 | 330 (297~ 363) | 5.5 | 1.6 | 7.7 |
| TND10V-361KB00AAA0 | TNR10V361K | 230 | 300 | | 45 | | 595 | 280 | 360 (324~ 396) | 5.7 | 1.8 | 7.7 |
| TND10V-391KB00AAA0 | TNR10V391K | 250 | 320 | 3500A/1 time | 50 | | 650 | 260 | 390 (351~ 429) | 5.8 | 1.9 | 7.7 |
| TND10V-431KB00AAA0 | TNR10V431K | 275 | 350 | | 55 | 0.4 | 710 | 240 | 430 (387~ 473) | 6.0 | 2.0 | 7.8 |
| TND10V-471KB00AAA0 | TNR10V471K | 300 | 385 | 2500A/2 times | 60 | | 775 | 220 | 470 (423~ 517) | 6.2 | 2.1 | 7.8 |
| TND10V-511KB00AAA0 | TNR10V511K | 320 | 410 | | 67 | | 845 | 210 | 510 (459~ 561) | 6.4 | 2.3 | 7.8 |
| TND10V-561KB00AAA0 | TNR10V561K | 350 | 460 | | 67 | | 922 | 195 | 560 (504~ 616) | 6.7 | 2.5 | 7.9 |
| TND10V-621KB00AAA0 | TNR10V621K | 385 | 505 | | 67 | | 1025 | 180 | 620 (558~ 682) | 7.1 | 2.7 | 8.0 |
| TND10V-681KB00AAA0 | TNR10V681K | 420 | 560 | | 67 | | 1120 | 165 | 680 (612~ 748) | 7.4 | 2.9 | 8.0 |
| TND10V-751KB00AAA0 | TNR10V751K | 460 | 615 | | 70 | | 1240 | 150 | 750 (675~ 825) | 7.8 | 3.1 | 8.1 |
| TND10V-821KB00AAA0 | TNR10V821K | 510 | 670 | | 80 | | 1355 | 140 | 820 (738~ 902) | 8.1 | 3.4 | 8.2 |
| TND10V-911KB00AAA0 | TNR10V911K | 550 | 745 | | 90 | | 1500 | 125 | 910 (819~1001) | 8.6 | 3.7 | 8.4 |
| TND10V-102KB00AAA0 | TNR10V102K | 625 | 825 | | 100 | | 1650 | 115 | 1000 (900~1100) | 9.1 | 4.0 | 8.5 |
| TND10V-112KB00AAA0 | TNR10V112K | 680 | 895 | | 110 | | 1815 | 105 | 1100 (990~1210) | 9.7 | 4.4 | 8.7 |
| TND10V-122KB00AAA0 | TNR10V122K | 720 | 980 | | 120 | | 1950 | 95 | 1200 (1080~1320) | 10.5 | 4.7* | 8.9** |
| TND10V-152KB00AAA0 | TNR10V152K | 860 | 1220 | | 150 | | 2440 | 85 | 1500 (1350~1650) | 12.4 | 5.8* | 9.5** |
| TND10V-182KB00AAA0 | TNR10V182K | 1000 | 1465 | | 183 | | 2970 | 70 | 1800 (1700~1980) | 14.4 | 6.9* | 10.2** |

*E±2 **W2±2

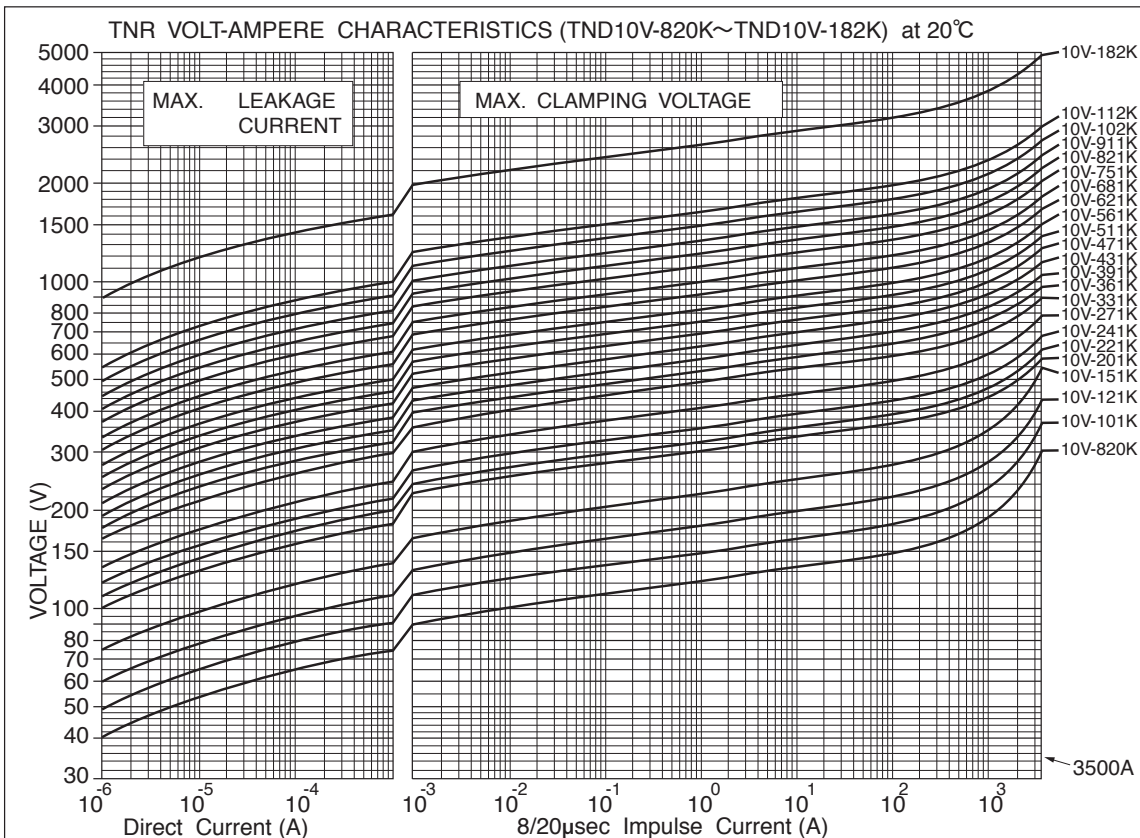
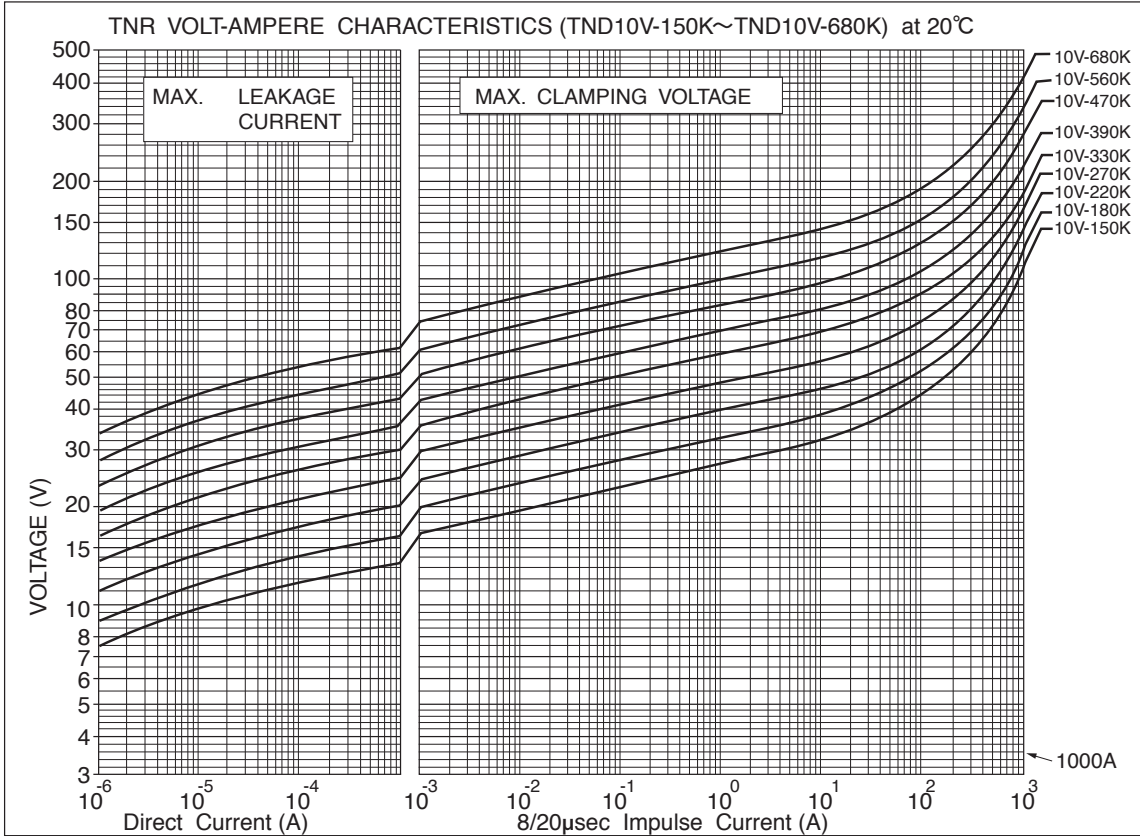
◆DIMENSIONS [mm]



| Part Number | D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|----------------------------|--------|--------|-----------------|--------|----------|--------|
| TND10V-150K to TND10V-511K | 11.5 | 14.5 | Ref. to RATINGS | 20.0 | 0.8 | 7.5 |
| TND10V-561K to TND10V-112K | 12.5 | 15.5 | | | | |
| TND10V-122K to TND10V-182K | 13.5 | 16.5 | | | | |

V Series

◆V-I CURVE (Type 10V)



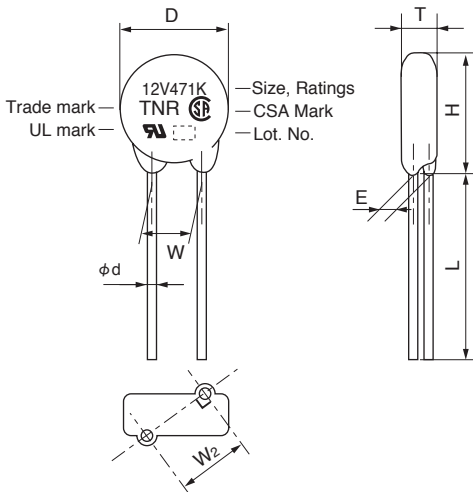
V Series

◆ RATINGS (Type 12V)

| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage | | Capacitance Typical @1kHz | Varistor Voltage V _{1mA} | T Max. | E ±1.0 | W ₂ reference |
|--------------------|---|------------------------|--------|-------------------|-------------|---------------|-----------------------|------|---------------------------------|--------------------------------------|-----------|-----------|-----------------------------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | (A) | (V) | | | | | |
| | | AC (Vrms) | DC (V) | 8/20μs(A) | 2ms(J) | (W) | | | (pF) | (V) | (mm) | (mm) | (mm) |
| TND12V-431KB00AAA0 | TNR12V431K | 275 | 350 | | 55 | | | 710 | 375 | 430 (387 ~ 473) | 6.0 | 2.0 | 7.8 |
| TND12V-471KB00AAA0 | TNR12V471K | 300 | 385 | | 60 | | | 775 | 345 | 470 (423 ~ 517) | 6.2 | 2.1 | 7.8 |
| TND12V-511KB00AAA0 | TNR12V511K | 320 | 410 | | 67 | | | 845 | 330 | 510 (459 ~ 561) | 6.4 | 2.3 | 7.8 |
| TND12V-561KB00AAA0 | TNR12V561K | 350 | 460 | | 67 | | | 922 | 305 | 560 (504 ~ 616) | 6.7 | 2.5 | 7.9 |
| TND12V-621KB00AAA0 | TNR12V621K | 385 | 505 | | 67 | | | 1025 | 280 | 620 (558 ~ 682) | 7.1 | 2.7 | 8.0 |
| TND12V-681KB00AAA0 | TNR12V681K | 420 | 560 | 4,200A/1 time | 67 | | | 1120 | 260 | 680 (612 ~ 748) | 7.4 | 2.9 | 8.0 |
| TND12V-751KB00AAA0 | TNR12V751K | 460 | 615 | | 70 | 0.4 | 25 | 1240 | 235 | 750 (675 ~ 825) | 7.8 | 3.1 | 8.1 |
| TND12V-821KB00AAA0 | TNR12V821K | 510 | 670 | 3,000A/2 times | 80 | | | 1355 | 220 | 820 (738 ~ 902) | 8.1 | 3.4 | 8.2 |
| TND12V-911KB00AAA0 | TNR12V911K | 550 | 745 | | 90 | | | 1500 | 195 | 910 (819 ~ 1001) | 8.6 | 3.7 | 8.4 |
| TND12V-102KB00AAA0 | TNR12V102K | 625 | 825 | | 100 | | | 1650 | 180 | 1000 (900 ~ 1100) | 9.1 | 4.0 | 8.5 |
| TND12V-112KB00AAA0 | TNR12V112K | 680 | 895 | | 110 | | | 1815 | 165 | 1100 (990 ~ 1210) | 9.7 | 4.4 | 8.7 |
| TND12V-122KB00AAA0 | TNR12V122K | 720 | 980 | | 120 | | | 1950 | 150 | 1200 (1080 ~ 1320) | 10.5 | 4.7* | 8.9** |
| TND12V-152KB00AAA0 | TNR12V152K | 860 | 1220 | | 150 | | | 2440 | 135 | 1500 (1350 ~ 1650) | 12.4 | 5.8* | 9.5** |
| TND12V-182KB00AAA0 | TNR12V182K | 1000 | 1465 | | 183 | | | 2970 | 110 | 1800 (1700 ~ 1980) | 14.4 | 6.9* | 10.2** |

*E±2 **W2±2

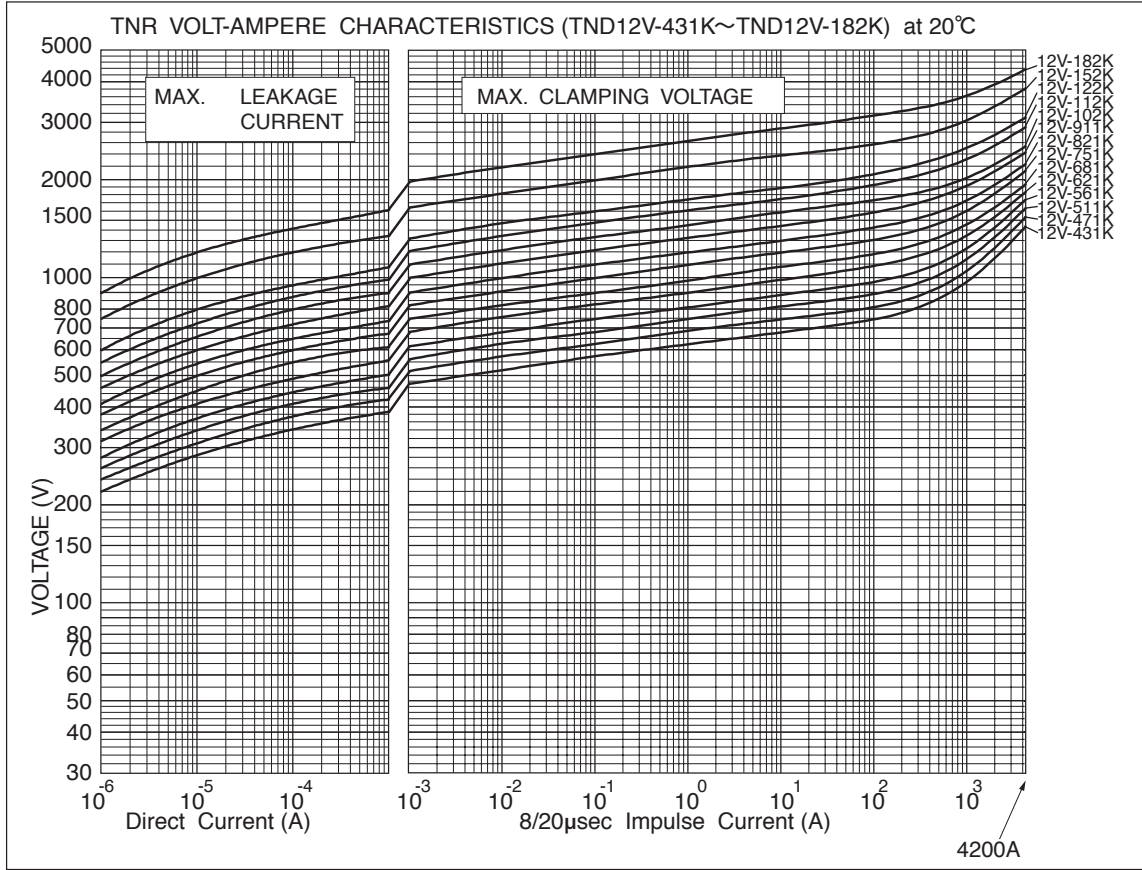
◆ DIMENSIONS [mm]



| Part Number | D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|----------------------------|-----------|-----------|--------------------|-----------|-------------|-----------|
| TND12V-431K to TND12V-102K | 14.0 | 17.0 | Ref. to RATINGS | 20 | 0.8 | 7.5 |
| TND12V-112K | 15.0 | 18.0 | | | | |
| TND12V-122K | | 19.0 | | | | |
| TND12V-152K to TND12V-182K | 16.0 | 19.0 | | | | |

V Series

◆V-I CURVE (Type 12V)

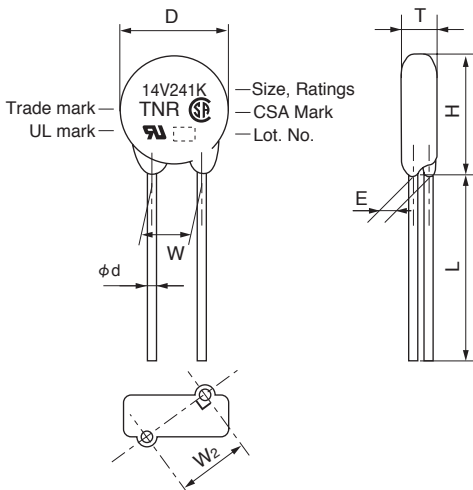


◆RATINGS (Type 14V)

| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage | Capacitance Typical @1kHz | Varistor Voltage V1mA | T Max. | E ±1.0 | W2 Reference |
|--------------------|---|------------------------|--------|-------------------|-------------|---------------|-----------------------|---------------------------|-----------------------|--------|--------|--------------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | | | | | | |
| | | AC (Vrms) | DC (V) | 8/20µs(A) | 2ms(J) | (W) | | | | | | |
| TND14V-150KB00AAA0 | TNR14V150K | 8 | 12 | | 3.6 | | 30 | 19500 | 15 (13~ 17) | 4.5 | 1.0 | 7.6 |
| TND14V-180KB00AAA0 | TNR14V180K | 11 | 14 | | 4.3 | | 36 | 16500 | 18 (16~ 20) | 4.6 | 1.1 | 7.6 |
| TND14V-220KB00AAA0 | TNR14V220K | 14 | 18 | | 5.3 | | 43 | 13500 | 22 (20~ 24) | 4.7 | 1.2 | 7.6 |
| TND14V-270KB00AAA0 | TNR14V270K | 17 | 22 | 2000A/1 time | 6.5 | | 53 | 12000 | 27 (24~ 30) | 4.8 | 1.4 | 7.6 |
| TND14V-330KB00AAA0 | TNR14V330K | 20 | 26 | | 7.9 | 0.1 | 65 | 10000 | 33 (30~ 36) | 5.0 | 1.6 | 7.7 |
| TND14V-390KB00AAA0 | TNR14V390K | 25 | 30 | 1000A/2 times | 9.4 | | 77 | 9000 | 39 (35~ 43) | 4.9 | 1.3 | 7.6 |
| TND14V-470KB00AAA0 | TNR14V470K | 30 | 37 | | 11 | | 93 | 8000 | 47 (42~ 52) | 5.0 | 1.5 | 7.6 |
| TND14V-560KB00AAA0 | TNR14V560K | 35 | 44 | | 13 | | 110 | 7500 | 56 (50~ 62) | 5.1 | 1.7 | 7.7 |
| TND14V-680KB00AAA0 | TNR14V680K | 40 | 55 | | 16 | | 135 | 6500 | 68 (61~ 75) | 5.3 | 2.0 | 7.8 |
| TND14V-820KB00AAA0 | TNR14V820K | 50 | 65 | | 20 | | 135 | 3000 | 82 (74~ 90) | 4.5 | 1.1 | 7.6 |
| TND14V-101KB00AAA0 | TNR14V101K | 60 | 85 | | 25 | | 165 | 2700 | 100 (90~ 110) | 4.7 | 1.3 | 7.6 |
| TND14V-121KB00AAA0 | TNR14V121K | 75 | 100 | | 30 | | 200 | 2500 | 120 (108~ 132) | 4.9 | 1.4 | 7.6 |
| TND14V-151KB00AAA0 | TNR14V151K | 95 | 125 | | 37 | | 250 | 2300 | 150 (135~ 165) | 5.2 | 1.7 | 7.7 |
| TND14V-181KB00AAA0 | TNR14V181K | 110 | 145 | | 45 | | 300 | 1650 | 180 (162~ 198) | 4.7 | 1.1 | 7.6 |
| TND14V-201KB00AAA0 | TNR14V201K | 130 | 170 | | 50 | | 340 | 950 | 200 (185~ 225) | 4.8 | 1.2 | 7.6 |
| TND14V-221KB00AAA0 | TNR14V221K | 140 | 180 | 6000A/1 time | 55 | | 360 | 850 | 220 (198~ 242) | 4.9 | 1.3 | 7.6 |
| TND14V-241KB00AAA0 | TNR14V241K | 150 | 200 | | 60 | | 395 | 800 | 240 (216~ 264) | 5.0 | 1.4 | 7.6 |
| TND14V-271KB00AAA0 | TNR14V271K | 175 | 225 | 5000A/2 times | 70 | | 455 | 700 | 270 (247~ 303) | 5.2 | 1.5 | 7.6 |
| TND14V-331KB00AAA0 | TNR14V331K | 210 | 270 | | 80 | | 545 | 600 | 330 (297~ 363) | 5.5 | 1.7 | 7.7 |
| TND14V-361KB00AAA0 | TNR14V361K | 230 | 300 | | 90 | | 595 | 550 | 360 (324~ 396) | 5.7 | 1.8 | 7.7 |
| TND14V-391KB00AAA0 | TNR14V391K | 250 | 320 | | 100 | | 650 | 500 | 390 (351~ 429) | 5.8 | 1.9 | 7.7 |
| TND14V-431KB00AAA0 | TNR14V431K | 275 | 350 | | 110 | 0.6 | 710 | 460 | 430 (387~ 473) | 6.0 | 2.1 | 7.8 |
| TND14V-471KB00AAA0 | TNR14V471K | 300 | 385 | | 125 | | 775 | 420 | 470 (423~ 517) | 6.2 | 2.2 | 7.8 |
| TND14V-511KB00AAA0 | TNR14V511K | 320 | 410 | | 136 | | 845 | 390 | 510 (459~ 561) | 6.4 | 2.4 | 7.9 |
| TND14V-561KB00AAA0 | TNR14V561K | 350 | 460 | | 136 | | 922 | 360 | 560 (504~ 616) | 6.7 | 2.6 | 7.9 |
| TND14V-621KB00AAA0 | TNR14V621K | 385 | 505 | | 136 | | 1025 | 330 | 620 (558~ 682) | 7.1 | 2.8 | 8.0 |
| TND14V-681KB00AAA0 | TNR14V681K | 420 | 560 | | 136 | | 1120 | 310 | 680 (612~ 748) | 7.4 | 3.0 | 8.1 |
| TND14V-751KB00AAA0 | TNR14V751K | 460 | 615 | | 150 | | 1240 | 280 | 750 (675~ 825) | 7.8 | 3.3 | 8.2 |
| TND14V-821KB00AAA0 | TNR14V821K | 510 | 670 | 5000A/1 time | 165 | | 1355 | 250 | 820 (738~ 902) | 8.1 | 3.5 | 8.3 |
| TND14V-911KB00AAA0 | TNR14V911K | 550 | 745 | | 180 | | 1500 | 230 | 910 (819~1001) | 8.6 | 3.9 | 8.5 |
| TND14V-102KB00AAA0 | TNR14V102K | 625 | 825 | 4500A/2 times | 200 | | 1650 | 210 | 1000 (900~1100) | 9.1 | 4.2 | 8.6 |
| TND14V-112KB00AAA0 | TNR14V112K | 680 | 895 | | 220 | | 1815 | 190 | 1100 (990~1210) | 9.7 | 4.6 | 8.8 |
| TND14V-122KB00AAA0 | TNR14V122K | 720 | 980 | | 240 | | 1950 | 170 | 1200 (1080~1320) | 10.5 | 4.9* | 9.0** |
| TND14V-152KB00AAA0 | TNR14V152K | 860 | 1220 | | 300 | | 2440 | 150 | 1500 (1350~1650) | 12.4 | 6.0* | 9.6** |
| TND14V-182KB00AAA0 | TNR14V182K | 1000 | 1465 | | 360 | | 2970 | 120 | 1800 (1700~1980) | 14.4 | 7.1* | 10.3** |

*E±2 **W2±2

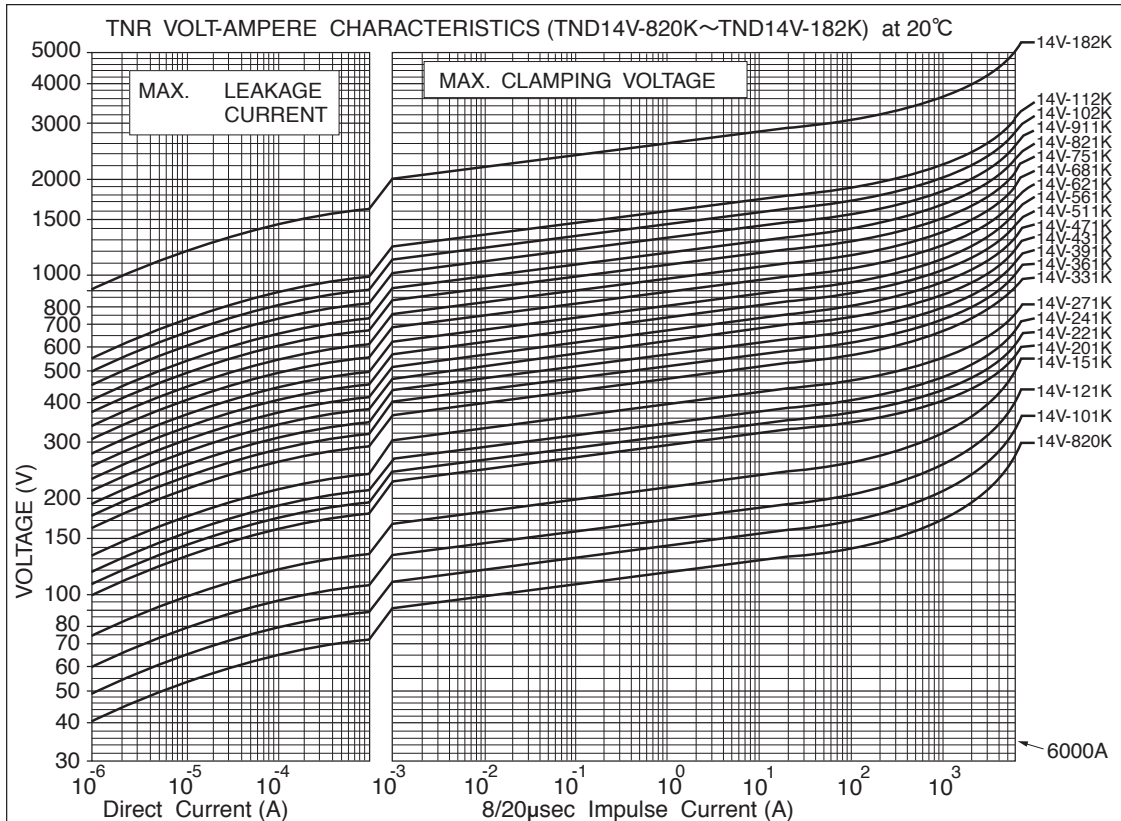
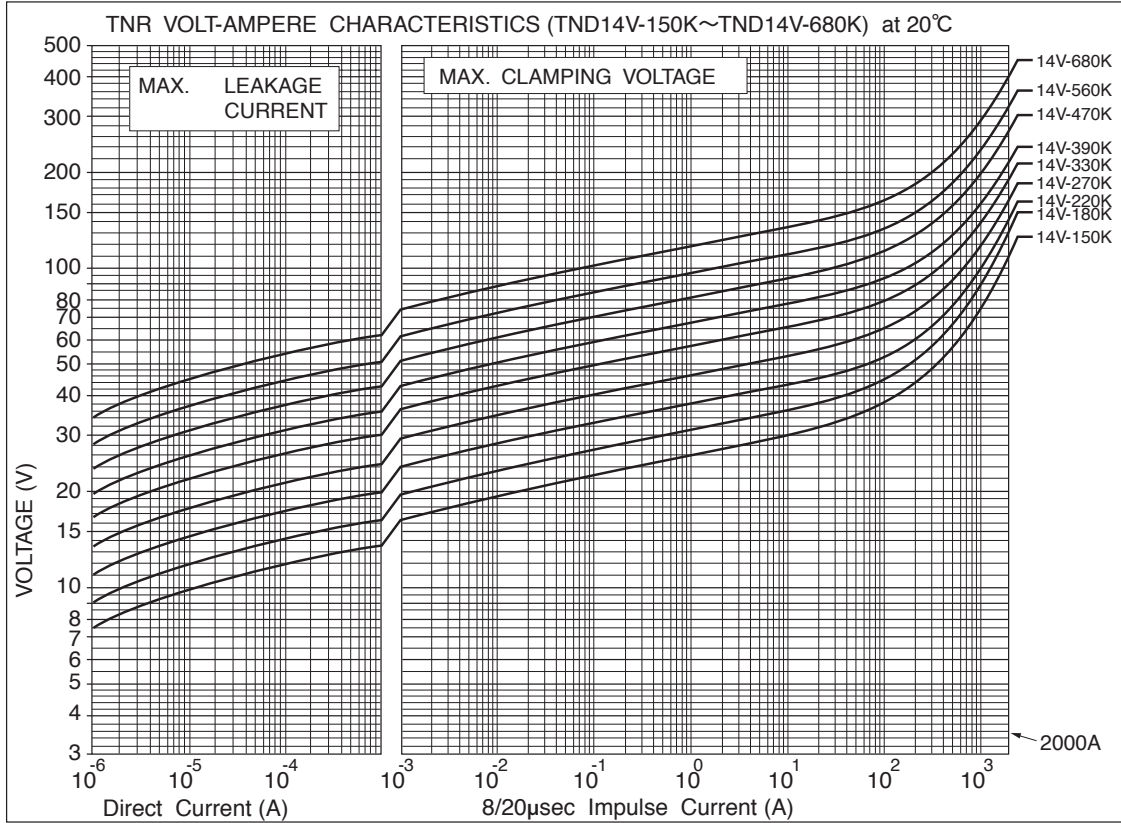
◆DIMENSIONS [mm]



| Part Number | D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|----------------------------|--------|--------|-----------------|--------|----------|--------|
| TND14V-150K to TND14V-511K | 15.5 | 18.5 | Ref. to RATINGS | 20 | 0.8 | 7.5 |
| TND14V-561K to TND14V-112K | 16.0 | 19.0 | | | | |
| TND14V-122K to TND14V-182K | 17.0 | 20.5 | | | | |

V Series

◆V-I CURVE (Type 14V)

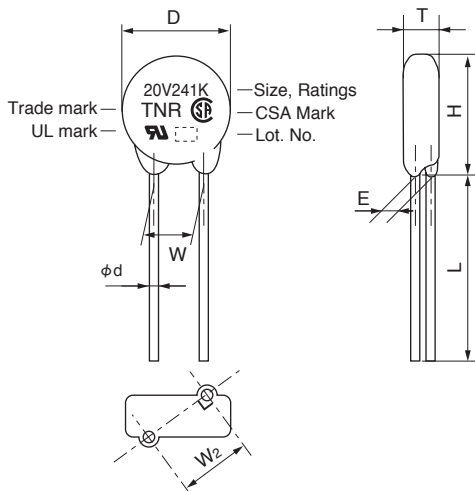


◆RATINGS (Type 20V)

| Part Number | Previous Part Number (Just for your reference) | Maximum Ratings | | | | | Max. Clamping Voltage (A) (V) | Capacitance Typical @1kHz (pF) | Varistor Voltage V1mA (V) | T Max. (mm) | E ±1.0 (mm) | W2 Reference (mm) | |
|--------------------|---|------------------------|--------|-------------------|-------------|---------------|----------------------------------|---|---------------------------------|-------------------|-------------------|-------------------------|--------|
| | | Max. Allowable Voltage | | Max. Peak Current | Max. Energy | Rated Wattage | | | | | | | |
| | | AC (Vrms) | DC (V) | 8/20μs(A) | 2ms(J) | (W) | | | | | | | |
| TND20V-180KB00AAA0 | TNR20V180K | 11 | 14 | 3000A/1 time | 12 | 0.2 | 20 | 36 | 39000 | 18 (16~ 20) | 5.1 | 1.1 | 10.1 |
| TND20V-220KB00AAA0 | TNR20V220K | 14 | 18 | | 14 | | | 43 | 33000 | 22 (20~ 24) | 5.2 | 1.2 | 10.1 |
| TND20V-270KB00AAA0 | TNR20V270K | 17 | 22 | | 17 | | | 53 | 28000 | 27 (24~ 30) | 5.3 | 1.4 | 10.1 |
| TND20V-330KB00AAA0 | TNR20V330K | 20 | 26 | 2000A/2 times | 21 | 0.2 | 20 | 65 | 24000 | 33 (30~ 36) | 5.5 | 1.6 | 10.1 |
| TND20V-390KB00AAA0 | TNR20V390K | 25 | 30 | | 25 | | | 77 | 21000 | 39 (35~ 43) | 5.5 | 1.3 | 10.1 |
| TND20V-470KB00AAA0 | TNR20V470K | 30 | 37 | | 30 | | | 93 | 19000 | 47 (42~ 52) | 5.6 | 1.5 | 10.1 |
| TND20V-560KB00AAA0 | TNR20V560K | 35 | 44 | 10000A/1 time | 36 | 1.0 | 100 | 110 | 17000 | 56 (50~ 62) | 5.7 | 1.7 | 10.1 |
| TND20V-680KB00AAA0 | TNR20V680K | 40 | 55 | | 44 | | | 135 | 15000 | 68 (61~ 75) | 5.8 | 2.0 | 10.2 |
| TND20V-820KB00AAA0 | TNR20V820K | 50 | 65 | | 40 | | | 135 | 6700 | 82 (74~ 90) | 4.9 | 1.2 | 10.1 |
| TND20V-101KB00AAA0 | TNR20V101K | 60 | 85 | 50 | 165 | 6100 | 100 (90~ 110) | 5.1 | 1.4 | 10.1 | | | |
| TND20V-121KB00AAA0 | TNR20V121K | 75 | 100 | 60 | 200 | 5600 | 120 (108~ 132) | 5.3 | 1.5 | 10.1 | | | |
| TND20V-151KB00AAA0 | TNR20V151K | 95 | 125 | 75 | 250 | 5100 | 150 (135~ 165) | 5.6 | 1.8 | 10.2 | | | |
| TND20V-181KB00AAA0 | TNR20V181K | 110 | 145 | 85 | 300 | 3900 | 180 (162~ 198) | 5.1 | 1.2 | 10.1 | | | |
| TND20V-201KB00AAA0 | TNR20V201K | 130 | 170 | 100 | 340 | 2700 | 200 (185~ 225) | 5.2 | 1.2 | 10.1 | | | |
| TND20V-221KB00AAA0 | TNR20V221K | 140 | 180 | 7000A/2 times | 110 | 1.0 | 100 | 360 | 2500 | 220 (198~ 242) | 5.3 | 1.3 | 10.1 |
| TND20V-241KB00AAA0 | TNR20V241K | 150 | 200 | | 120 | | | 395 | 2300 | 240 (216~ 264) | 5.4 | 1.4 | 10.1 |
| TND20V-271KB00AAA0 | TNR20V271K | 175 | 225 | | 135 | | | 455 | 2000 | 270 (247~ 303) | 5.6 | 1.5 | 10.1 |
| TND20V-331KB00AAA0 | TNR20V331K | 210 | 270 | 160 | 545 | 1700 | 330 (297~ 363) | 5.9 | 1.7 | 10.1 | | | |
| TND20V-361KB00AAA0 | TNR20V361K | 230 | 300 | 180 | 595 | 1500 | 360 (324~ 396) | 6.1 | 1.9 | 10.2 | | | |
| TND20V-391KB00AAA0 | TNR20V391K | 250 | 320 | 195 | 650 | 1400 | 390 (351~ 429) | 6.2 | 2.0 | 10.2 | | | |
| TND20V-431KB00AAA0 | TNR20V431K | 275 | 350 | 215 | 710 | 1300 | 430 (387~ 473) | 6.4 | 2.1 | 10.2 | | | |
| TND20V-471KB00AAA0 | TNR20V471K | 300 | 385 | 250 | 775 | 1200 | 470 (423~ 517) | 6.6 | 2.3 | 10.3 | | | |
| TND20V-511KB00AAA0 | TNR20V511K | 320 | 410 | 273 | 845 | 1100 | 510 (459~ 561) | 6.8 | 2.4 | 10.3 | | | |
| TND20V-561KB00AAA0 | TNR20V561K | 350 | 460 | 7500A/1 time | 922 | 1000 | 560 (504~ 616) | 7.1 | 2.6 | 10.3 | | | |
| TND20V-621KB00AAA0 | TNR20V621K | 385 | 505 | | 273 | 1025 | 900 | 620 (558~ 682) | 7.5 | 2.9 | 10.4 | | |
| TND20V-681KB00AAA0 | TNR20V681K | 420 | 560 | | 273 | 1120 | 830 | 680 (612~ 748) | 7.8 | 3.1 | 10.5 | | |
| TND20V-751KB00AAA0 | TNR20V751K | 460 | 615 | 300 | 1240 | 750 | 750 (675~ 825) | 8.2 | 3.4 | 10.6 | | | |
| TND20V-821KB00AAA0 | TNR20V821K | 510 | 670 | 325 | 1355 | 700 | 820 (738~ 902) | 8.5 | 3.6 | 10.6 | | | |
| TND20V-911KB00AAA0 | TNR20V911K | 550 | 745 | 360 | 1500 | 620 | 910 (819~1001) | 9.0 | 4.0 | 10.8 | | | |
| TND20V-102KB00AAA0 | TNR20V102K | 625 | 825 | 6500A/2 times | 400 | 1.0 | 100 | 1650 | 560 | 1000 (900~1100) | 9.5 | 4.3 | 10.9 |
| TND20V-112KB00AAA0 | TNR20V112K | 680 | 895 | | 440 | | | 1815 | 510 | 1100 (990~1210) | 10.1 | 4.7 | 11.0 |
| TND20V-122KB00AAA0 | TNR20V122K | 720 | 980 | | 480 | | | 1950 | 450 | 1200 (1080~1320) | 10.8 | 5.1* | 11.2** |
| TND20V-152KB00AAA0 | TNR20V152K | 860 | 1220 | 600 | 2440 | 390 | 1500 (1350~1650) | 12.8 | 6.2* | 11.8** | | | |
| TND20V-182KB00AAA0 | TNR20V182K | 1000 | 1465 | 720 | 2970 | 340 | 1800 (1700~1980) | 14.8 | 7.4* | 12.4** | | | |

*E±2 **W2±2

◆DIMENSIONS [mm]



| Part Number | D Max. | H Max. | T Max. | L Min. | φd ±0.05 | W ±1.0 |
|----------------------------|-----------|-----------|--------------------|-----------|-------------|-----------|
| TND20V-180K to TND20V-511K | 21.5 | 24.5 | Ref. to Ratings | 20 | 0.8 | 10.0 |
| TND20V-561K to TND20V-112K | 22.5 | 25.5 | | | | |
| TND20V-122K to TND20V-182K | 23.5 | 28.0 | | | | |



V Series

◆GENERAL SPECIFICATIONS

| Item | Test Conditions | Specifications | | | | | | |
|---------------------------------|--|---|-------------|-------------|----|-----|----------------------------|-----|
| Standard Test Condition | 20±15°C, 85%RH Max. | | | | | | | |
| Varistor Voltage | Voltage across varistor at specified current. | Satisfy the specification | | | | | | |
| | <table border="1"> <thead> <tr> <th>Type</th> <th>Current CmA</th> </tr> </thead> <tbody> <tr> <td>5V</td> <td>0.1</td> </tr> <tr> <td>7V, 9V, 10V, 12V, 14V, 20V</td> <td>1.0</td> </tr> </tbody> </table> | | Type | Current CmA | 5V | 0.1 | 7V, 9V, 10V, 12V, 14V, 20V | 1.0 |
| | Type | | Current CmA | | | | | |
| 5V | 0.1 | | | | | | | |
| 7V, 9V, 10V, 12V, 14V, 20V | 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 85±2°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 | $\frac{V_{cmA} \text{ at } 85^{\circ}\text{C} - V_{cmA} \text{ at } 25^{\circ}\text{C}}{V_{cmA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{60} \times 100 (\%/^{\circ}\text{C})$ <p style="text-align: right;">VcmA : Actual varistor voltage</p> | 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 epoxy 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 125±2°C for 1000±12 hours without load. | $\Delta V_{cmA}/V_{cmA} \leq \pm 5\%$ However, on varistors have nominal varistor voltages from 15V to 68V, the varistor voltage change shall be $\Delta V_{cmA}/V_{cmA} \leq \pm 10\%$ |
| Low Temperature Storage | The specimen shall be subjected -40±2°C for 1000±12 hours without load. | $\Delta V_{cmA}/V_{cmA} \leq \pm 5\%$ |
| Damp heat (Humidity) | The specimen shall be subjected to 40±2°C, 90 to 95%RH for 1000±12 hours without load. | $\Delta V_{cmA}/V_{cmA} \leq \pm 5\%$ |
| Temperature Cycle | The temperature cycle shown below shall be repeated 5 cycles. -40±3°C, 30 minutes ⇔ +85±2°C, 30 minutes | $\Delta V_{cmA}/V_{cmA} \leq \pm 5\%$ No remarkable damage |
| High Temperature Operating | The specimen shall be subjected to 85±2°C with the maximum allowable voltage for 1000±12 hours. | $\Delta V_{cmA}/V_{cmA} \leq \pm 10\%$ |
| Damp heat Operating | The specimen shall be subjected to 40±2°C, 90 to 95%RH with the maximum allowable voltage for 1000±12 hours. | $\Delta V_{cmA}/V_{cmA} \leq \pm 10\%$ |

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.

Note : For 42V battery line, please contact our sales office.



◆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 the unit, be held there for 3 ⁺¹ ₀ sec and then be stored at room temperature for 1 to 2 hours. The ΔVcmA 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 ΔVcmA and mechanical damage shall be examined. | ΔVcmA/VcmA ≤±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. | No abnormality such as disconnection. | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Type</td> <td>Lead Diameter</td> <td>Weight</td> </tr> <tr> <td>5V, 7V, 9V</td> <td>0.6mm</td> <td>10N</td> </tr> <tr> <td>10V, 12V, 14V, 20V</td> <td>0.8mm</td> <td>10N</td> </tr> </table> | | Type | Lead Diameter | Weight | 5V, 7V, 9V | 0.6mm | 10N | 10V, 12V, 14V, 20V | 0.8mm | 10N | | | |
| | Type | Lead Diameter | Weight | | | | | | | | | | | |
| | 5V, 7V, 9V | 0.6mm | 10N | | | | | | | | | | | |
| 10V, 12V, 14V, 20V | 0.8mm | 10N | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | ΔVcmA/VcmA ≤±5% | | | | | | | | | | | | |
| Lead Bend Strength | Fix varistor body vertically. Then suspend specified weight and bent the varistor body by 90°, and return it to the original position. Carry out the operation in the opposite direction and return the body to the original position. | The leads shall not disconnect, slacken and peel off. | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Type</td> <td>Lead Diameter</td> <td>Weight</td> </tr> <tr> <td>5V, 7V, 9V</td> <td>0.6mm</td> <td>5N</td> </tr> <tr> <td>10V, 12V, 14V, 20V</td> <td>0.8mm</td> <td>5N</td> </tr> </table> | | Type | Lead Diameter | Weight | 5V, 7V, 9V | 0.6mm | 5N | 10V, 12V, 14V, 20V | 0.8mm | 5N | | | |
| | Type | | Lead Diameter | Weight | | | | | | | | | | |
| | 5V, 7V, 9V | | 0.6mm | 5N | | | | | | | | | | |
| 10V, 12V, 14V, 20V | 0.8mm | 5N | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Vibration | Mount varistor body on vibrator, and conduct the following vibration test. Peak-to-Peak amplitude : 1.5mm Vibration frequency range : 10Hz to 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. ΔVcmA/VcmA ≤±5% | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |