

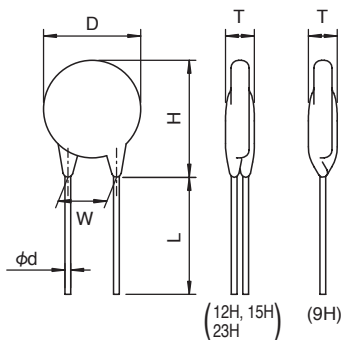
◆STANDARD RATINGS

Operating Temperature Range: -40 to +125°C

Storage Temperature Range: -50 to +150°C

| Part Number | Previous Part Number (Just for your reference) | Max. Allowable Voltage | | Maximum applicable voltage for a short period | Max. Energy | Max. Clamping Voltage | | Varistor Voltage V1mA |
|--------------------|---|------------------------|--------|---|-------------|-----------------------|-----|-----------------------|
| | | Continuous | | 5 minutes | | | | |
| | | AC (Vrms) | DC (V) | DC (V) | | 20ms(J) | (A) | |
| TND09H-220KB00AAA0 | TNR9H220K | 12 | 16 | 24 | 5 | 2 | 43 | 22 (20~24) |
| TND09H-270KB00AAA0 | TNR9H270K | 15 | 19 | 29 | | | 53 | 27 (24~30) |
| TND09H-330KB00AAA0 | TNR9H330K | 18 | 24 | 36 | | | 65 | 33 (30~36) |
| TND09H-390KB00AAA0 | TNR9H390K | 22 | 28 | 42 | | | 77 | 39 (35~43) |
| TND09H-470KB00AAA0 | TNR9H470K | 26 | 34 | 50 | | | 93 | 47 (42~52) |
| TND12H-220KB00AAA0 | TNR12H220K | 12 | 16 | 24 | 10 | 5 | 43 | 22 (20~24) |
| TND12H-270KB00AAA0 | TNR12H270K | 15 | 19 | 29 | | | 53 | 27 (24~30) |
| TND12H-330KB00AAA0 | TNR12H330K | 18 | 24 | 36 | | | 65 | 33 (30~36) |
| TND12H-390KB00AAA0 | TNR12H390K | 22 | 28 | 42 | | | 77 | 39 (35~43) |
| TND12H-470KB00AAA0 | TNR12H470K | 26 | 34 | 50 | | | 93 | 47 (42~52) |
| TND15H-220KB00AAA0 | TNR15H220K | 12 | 16 | 24 | 20 | 10 | 43 | 22 (20~24) |
| TND15H-270KB00AAA0 | TNR15H270K | 15 | 19 | 29 | | | 53 | 27 (24~30) |
| TND15H-330KB00AAA0 | TNR15H330K | 18 | 24 | 36 | | | 65 | 33 (30~36) |
| TND15H-390KB00AAA0 | TNR15H390K | 22 | 28 | 42 | | | 77 | 39 (35~43) |
| TND15H-470KB00AAA0 | TNR15H470K | 26 | 34 | 50 | | | 93 | 47 (42~52) |
| TND23H-220KB00AAA0 | TNR23H220K | 12 | 16 | 24 | 40 | 25 | 43 | 22 (20~24) |
| TND23H-270KB00AAA0 | TNR23H270K | 15 | 19 | 29 | | | 53 | 27 (24~30) |
| TND23H-330KB00AAA0 | TNR23H330K | 18 | 24 | 36 | | | 65 | 33 (30~36) |
| TND23H-390KB00AAA0 | TNR23H390K | 22 | 28 | 42 | | | 77 | 39 (35~43) |
| TND23H-470KB00AAA0 | TNR23H470K | 26 | 34 | 50 | | | 93 | 47 (42~52) |

◆DIMENSIONS [mm]



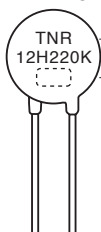
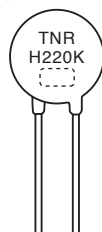
| Type | D Max. | H Max. | T Max. | W ±1.0 | L Min. | φd ±0.05 |
|------|--------|--------|--------|--------|--------|----------|
| 9H | 10.0 | 13.0 | 5.0 | 5.0 | 25.0 | 0.6 |
| 12H | 13.5 | 16.5 | 5.0 | 7.5 | 25.0 | 0.8 |
| 15H | 16.5 | 19.0 | 5.0 | 7.5 | 25.0 | 0.8 |
| 23H | 24.0 | 27.0 | 5.0 | 10.0 | 25.0 | 0.8 |

◆MARKING

EX)

●9H

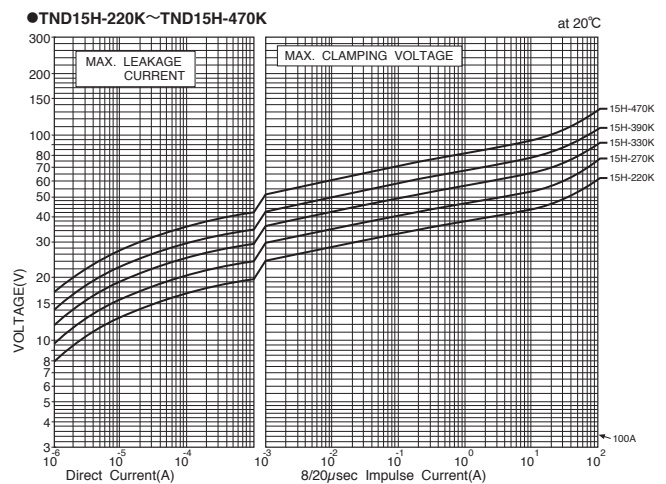
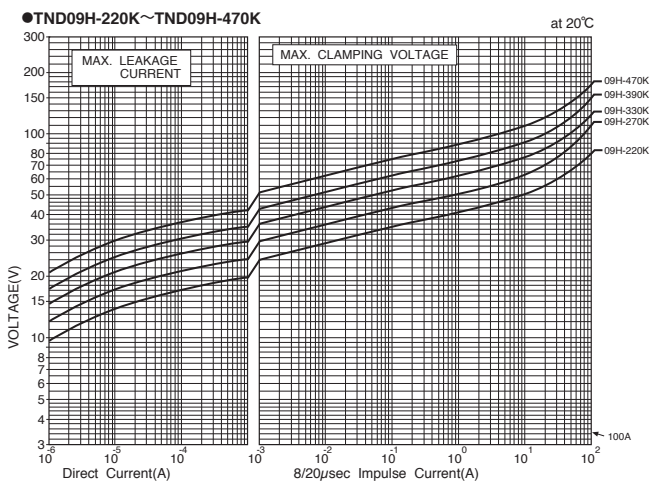
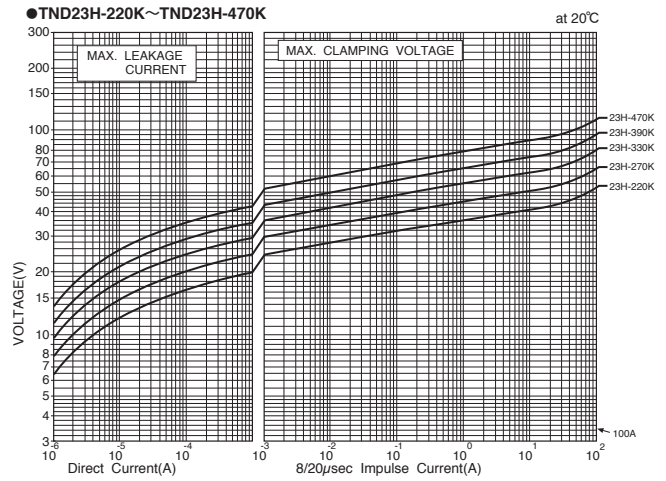
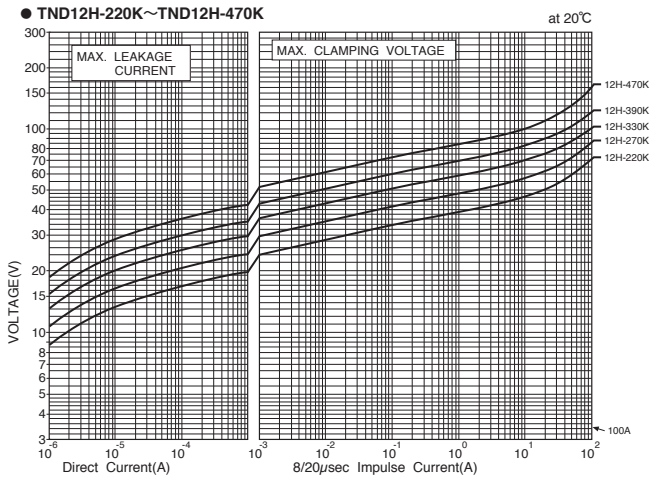
●12H~23H



Trade mark
Size, Ratings
Lot. No.

H Series

◆V-I CURVE



H Series

◆GENERAL SPECIFICATIONS

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

| 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 sinusoidal RMS voltage or Maximum continuous DC voltage which may be applied. | Refer to Ratings. |
| Maximum applicable voltage for a short period (5 minutes) | Maximum DC voltage to be applied for only 5 minutes. | Refer to Ratings. |
| Maximum Clamping Voltage | The maximum voltage between the terminals, measured standard impulse current (8/20 μs). | Satisfy the specification. |
| Maximum Energy | Maximum energy within the ±10% varistor voltage change when 1 impulse 20 ms long is applied. | Satisfy the specification. |
| Temperature Coefficient | $\frac{V_{1mA \text{ at } 85^{\circ}\text{C}} - V_{1mA \text{ at } 25^{\circ}\text{C}}}{V_{1mA \text{ at } 25^{\circ}\text{C}}} \times \frac{1}{60} \times 100 (\%/^{\circ}\text{C})$ | Within ±0.05 % / °C |

◆MECHANICAL CHARACTERISTICS

| Item | Test Conditions | Specifications |
|------------------------------|---|---|
| Terminal Pull Strength | After gradually applying the force keeping the unit fixed for 10±1 sec. in axial direction, the damage of the terminals shall be visually examined. <div style="display: flex; justify-content: space-around;"><div>$\frac{\text{Lead diameter}}{\phi 0.6\text{mm. } \phi 0.8\text{mm}}$</div><div>$\frac{\text{Force}}{10 \text{ N}}$</div></div> | $\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No remarkable damage |
| Terminal Bending 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. <div style="display: flex; justify-content: space-around;"><div>$\frac{\text{Lead diameter}}{\phi 0.6\text{mm. } \phi 0.8\text{mm}}$</div><div>$\frac{\text{Force}}{5 \text{ N}}$</div></div> | No remarkable damage |
| Vibration | After repeatedly applying a single harmonic vibration (amplitude : 0.75mm) double amplitude : 1.5mm with 1 minute vibration frequency cycle (10Hz → 500Hz → 10Hz) to each three perpendicular directions for 2 hours. Total 6 hours. The devices shall be visually examined. | $\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No remarkable damage |
| 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 ΔV _{1mA} 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 ΔV _{1mA} and mechanical damage shall be examined. | $\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ 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. | |
| | 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) |



H Series

◆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. | $\Delta V_{1mA/V1mA} \leq \pm 10\%$ |
| Low Temperature Storage | The specimen shall be subjected -40±2°C for 1000±12 hours without load. | $\Delta V_{1mA/V1mA} \leq \pm 5\%$ |
| Damp heat (Humidity) | The specimen shall be subjected to 60±2°C, 90 to 95%RH for 1000±12 hours without load. | $\Delta V_{1mA/V1mA} \leq \pm 10\%$ |
| Temperature Cycle | The temperature cycle shown below shall be repeated 50 cycles. -40±3°C, 30 minutes \leftrightarrow +150±2°C, 30 minutes | $\Delta V_{1mA/V1mA} \leq \pm 10\%$ No remarkable damage |
| High Temperature Operating | The specimen shall be subjected to 125±2°C with the maximum allowable voltage for 1000±12 hours. | $\Delta V_{1mA/V1mA} \leq \pm 20\%$ |
| Damp heat Operating | The specimen shall be subjected to 60±2°C, 90 to 95%RH with the maximum allowable voltage for 1000±12 hours. | $\Delta V_{1mA/V1mA} \leq \pm 10\%$ |

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.

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



- Always read "Notes on Use" before using the product in order to enable you to use the product correctly and prevent any faults and accidents from occurring.
- Request the Product Specification on the product of NIPPON CHEMI-CON CORPORATION to refer to it as well as this brochure prior to the order of the products. Some specific notes on use of the ordered product may be described in the specifications.
- The products listed in this catalog are designed and manufactured for general electronics equipment use and are not intended for use in applications that can adversely affect human life; where the malfunction of equipment may cause damage to life or property. In addition, our products are not intended to be used in specific applications that may cause a major social impact. Please consult with us in advance of usage of our products in the following listed applications. ① Aerospace equipment ② Power generation equipment such as thermal power, nuclear power etc. ③ Medical equipment ④ Transport equipment (automobiles, trains, ships, etc.) ⑤ Transportation control equipment ⑥ Disaster prevention / crime prevention equipment ⑦ Highly publicized information processing equipment ⑧ Submarine equipment ⑨ Other applications that are not considered general-purpose applications.
- The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems. We are not in any case responsible for any failures or damage caused by the use of information contained herein. You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.
Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event any of our products malfunction.
- We strongly recommend our customers to purchase Nippon Chemi-Con products only through our official sales channels. We assume no responsibility for any defects or damages caused by using products purchased from outside our official sales channel or of counterfeit goods. In addition, we will ask the customer to pay the investigation cost for products purchased outside our official sales channel.
- We reserve the right to discontinue production and delivery of products. We do not guarantee that all the products included in this catalog will be available in the future.
The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products
- We continually strive to improve the quality and reliability of our products, but in any case that our product does not meet our published specifications, please stop using it promptly and contact us immediately. As for compensation for non-conforming goods delivered by Chemi-Con, we will limit it only to goods found in non-compliance of our published specifications. This may be accomplished by a no cost replacement of non-conforming individual products, a credit of the piece price paid per each individual non-conforming product, or in other ways deemed necessary.
In addition, we have an established system with enhanced traceability, therefore we will limit the applicable lot items for any potential compensation.

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[Precautions and Guidelines](#)

[Taping](#)

[Technical Terms on Varistors](#)

[Packaging • Minimum Order Quantity](#)

[Safety Standard](#)

[Technical Notes](#)