

**NEW**

# Surface Mount Metal Oxide Varistors

## NV73 Type

ISO 9001  
CERTIFIED

### 1. General

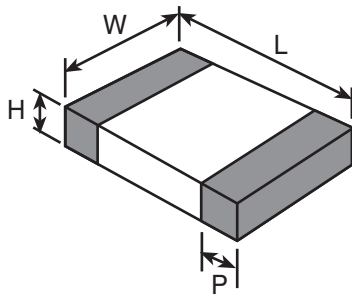
- Multilayer structure
- High surge current
- Protector against static electricity, switching and incoming surges

### 2. Features

- Chip type structure suitable for surface mount
- Compact package with large withstanding surge capability
- Symmetrical V-I characteristics make surge absorption possible in either direction

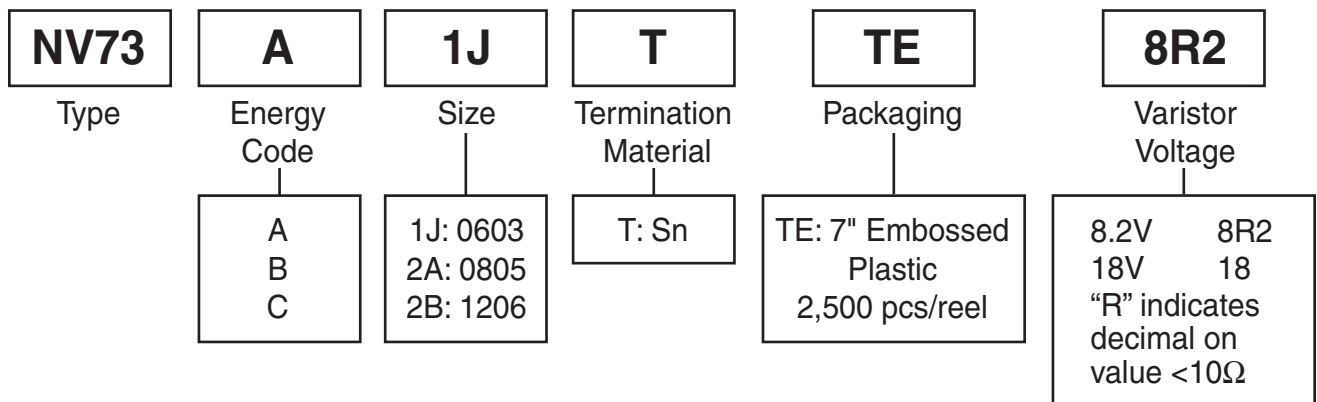
### 3. Dimensions

Table 1



| Dimensions - inches (mm) |                            |                            |                            |   |
|--------------------------|----------------------------|----------------------------|----------------------------|---|
| Part                     | L                          | W                          | H                          | P   |
| 1J (0603)                | 0.063±0.006<br>(1.60±0.15) | 0.031±0.006<br>(0.80±0.15) | 0.031±0.006<br>(0.80±0.15) | 0.016± <sup>+0.006</sup> / <sub>-0.008</sub><br>(0.40± <sup>+0.15</sup> / <sub>-0.2</sub> ) |
| 2A (0805)                | 0.079±0.008<br>(2.00±0.20) | 0.049±0.008<br>(1.25±0.20) | 0.051 Max<br>(1.30 Max)    | 0.02±0.010<br>(0.50±0.25)   |
| 2B (1206)                | 0.126±0.008<br>(3.20±0.20) | 0.063±0.008<br>(1.60±0.20) | 0.065 Max<br>(1.65 Max)    | 0.02± <sup>+0.014</sup> / <sub>-0.010</sub><br>(0.50± <sup>+0.35</sup> / <sub>-0.25</sub> ) |

### 4. Ordering and Specifying Information



## 5. Standard Applications

| Part Designation | Reference Varistor Voltage @ 1mA nom. (Range) Vc | Clamping Voltage Vp | I <sub>p</sub> | Maximum Peak Current I <sub>p</sub> (A) @ 8/20 microsecond (2 pulses) | Maximum Energy E (J) | Capacitance Typ. C (1k to 1MHz) (pF) | Maximum Allowable Voltage a.c rms (V) | Maximum Allowable Voltage d.c (V) | Varistor Voltage (V) | Energy (J)  | Peak Current (8/20μs) A (2 pulses) | Operating Temp. T <sub>opt</sub> (°C) | Storage Temp. T <sub>stg</sub> (°C) |
|------------------|--|---------------------|----------------|---|----------------------|--------------------------------------|---------------------------------------|-----------------------------------|----------------------|-------------|------------------------------------|---------------------------------------|-------------------------------------|
| NV73A1J*TE8R2    | 8.2 (6.8 - 9.8)                                  | 21                  | 2A             | 30  | 0.1                  | 370                                  | 4.2                                   | 6.0                               | 8.2 - 27             | 0.1         | 30                                 | -40°C to +85°C                        | -40°C to +125°C                     |
| NV73A1J*TE12     | 12 (10 - 14.4)                                   | 29                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A1J*TE15     | 15 (12.5 - 18)                                   | 35                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A1J*TE18     | 18 (16 - 20)                                     | 37                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A1J*TE20     | 20 (18 - 22)                                     | 40                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A1J*TE22     | 22 (19 - 24)                                     | 42                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A1J*TE24     | 24 (21.8 - 26.5)                                 | 46                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A1J*TE27     | 27 (25 - 32)                                     | 49                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE8R2    | 8.2 (6.8 - 9.8)                                  | 16                  | 1A             | 10  | 0.01                 | 400 - 80                             | 4.2                                   | 6.0                               | 4.2 - 47             | 0.01 - 0.16 | 10/20/25                           | -40°C to +85°C                        | -40°C to +125°C                     |
| NV73A2A*TE12     | 12 (10 - 14.4)                                   | 22                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE15     | 15 (12.5 - 18)                                   | 27                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE18     | 18 (16 - 20)                                     | 29                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE20     | 20 (18 - 22)                                     | 33                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE22     | 22 (19 - 24)                                     | 39                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE24     | 24 (21.8 - 26.5)                                 | 42                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE27     | 27 (25 - 32)                                     | 50                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE33     | 33 (30 - 39)                                     | 60                  | 1A             | 20  | 0.12                 | 400 - 80                             | 20.0                                  | 26.0                              | 4.2 - 47             | 0.01 - 0.16 | 10/20/25                           | -40°C to +85°C                        | -40°C to +125°C                     |
| NV73A2A*TE39     | 39 (37 - 47)                                     | 72                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73A2A*TE47     | 47 (45 - 54)                                     | 86                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE8R2    | 8.2 (6.8 - 9.8)                                  | 18                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE12     | 12 (10 - 14.4)                                   | 22                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE15     | 15 (12.5 - 18)                                   | 30                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE18     | 18 (16 - 20)                                     | 32                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE20     | 20 (18 - 22)                                     | 36                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE22     | 22 (19 - 24)                                     | 40                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE24     | 24 (21.8 - 26.5)                                 | 42                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE27     | 27 (25 - 32)                                     | 58                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE33     | 33 (30 - 39)                                     | 66                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73B2A*TE39     | 39 (37 - 47)                                     | 72                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE8R2    | 8.2 (6.8 - 9.8)                                  | 16                  | 2A             | 25  | 0.04                 | 1000 - 300                           | 4.2                                   | 6.0                               | 4.2 - 24             | 0.02 - 0.18 | 25/50                              | -40°C to +85°C                        | -40°C to +125°C                     |
| NV73C2A*TE12     | 12 (10 - 14.4)                                   | 22                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE15     | 15 (12.5 - 18)                                   | 28                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE18     | 18 (16 - 20)                                     | 32                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE20     | 20 (18 - 22)                                     | 35                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE22     | 22 (19 - 24)                                     | 40                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE24     | 24 (21.8 - 26.5)                                 | 42                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |
| NV73C2A*TE27     | 27 (25 - 32)                                     | 58                  |                |   |                      |                                      |                                       |                                   |                      |             |                                    |                                       |                                     |

\* Add termination material character (T)

Maximum allowable voltage - the maximum sinusoidal RMS voltage or maximum DC voltage which can be applied continuously

E: Maximum energy - the maximum energy within the varistor voltage change of ±10% when a single impulse of 2m sec. is applied

I<sub>p</sub>: Maximum peak current - the maximum peak current within the varistor voltage change of ±10% when a single standard impulse of 8/20μ sec. is applied two times with an interval of 5 min.

T<sub>opt</sub>: Operating temperature - Ambient temperature range when the device is operating

T<sub>stg</sub>: Storage temperature - Temperature range without causing the device any failure

## 5. Standard Applications (continued)

| Part Designation | Reference Varistor Voltage @ 1mA nom. (Range) V <sub>c</sub> | Clamping Voltage V <sub>P</sub> | I <sub>P</sub> | Maximum Peak Current I <sub>P</sub> (A) @ 8/20 microsecond (2 pulses) | Maximum Energy E (J) | Capacitance Typ. C (1k to 1MHz) (pF) | Maximum Allowable Voltage a.c rms (V) | Maximum Allowable Voltage d.c (V) | Varistor Voltage (V) | Energy (J)  | Peak Current (8/20μs) A (2 pulses) | Operating Temp. T <sub>opt</sub> (°C) | Storage Temp. T <sub>stg</sub> (°C) |     |     |          |             |       |
|------------------|--|---------------------------------|----------------|---|----------------------|--------------------------------------|---------------------------------------|-----------------------------------|----------------------|-------------|------------------------------------|---------------------------------------|-------------------------------------|-----|-----|----------|-------------|-------|
| NV73A2B*TE27     | 27 (25 - 32)   | 55                              | 2A             | 40  | 0.13                 | 500 - 100                            | 17.0                                  | 22.0                              | 27 - 56              | 0.13 - 0.26 | 40                                 | -40°C to +85°C                        | -40°C to +125°C                     |     |     |          |             |       |
| NV73A2B*TE33     | 33 (30 - 39)   | 60                              |                |   | 0.15                 |                                      | 20.0                                  | 26.0                              |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73A2B*TE39     | 39 (37 - 47)   | 72                              |                |   | 0.18                 |                                      | 25.0                                  | 31.0                              |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73A2B*TE47     | 47 (45 - 54)   | 85                              |                |   | 0.22                 |                                      | 30.0                                  | 38.0                              |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73A2B*TE56     | 56 (52 - 62)   | 100                             |                |   | 0.26                 |                                      | 35.0                                  | 45.0                              |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE8R2    | 8.2 (6.8 - 9.8)  | 16                              | 2A             | 30  | 0.03                 | 1000 - 300                           | 4.2                                   | 6.0                               | 4.2 - 27             | 0.02 - 0.16 | 30/50                              |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE12     | 12 (10 - 14.4)   | 22                              |                | 0.07  | 6.1                  |                                      | 8.6                                   |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE15     | 15 (12.5 - 18)   | 28                              |                | 0.09  | 7.6                  |                                      | 10.8                                  |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE18     | 18 (16 - 20)   | 32                              |                | 0.1   | 9.1                  |                                      | 12.8                                  |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE20     | 20 (18 - 22)   | 35                              |                | 0.11  | 10.6                 |                                      | 15.0                                  |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE22     | 22 (19 - 24)   | 40                              |                | 0.12  | 12.0                 |                                      | 16.5                                  |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE24     | 24 (21.8 - 26.5)   | 42                              |                | 0.14  | 14.0                 |                                      | 18.0                                  |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73B2B*TE27     | 27 (25 - 32)   | 52                              |                | 0.16  | 17.0                 |                                      | 22.0                                  |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73C2B*TE8R2    | 8.2 (6.8 - 9.8)  | 15                              |                | 2A  | 40                   |                                      | 0.06                                  | 2000 - 500                        |                      |             |                                    |                                       |                                     | 4.2 | 6.0 | 4.2 - 27 | 0.02 - 0.24 | 40/70 |
| NV73C2B*TE12     | 12 (10 - 14.4)   | 21                              |                |   | 0.1                  |                                      | 6.1                                   |                                   |                      |             |                                    |                                       |                                     | 8.6 |     |          |             |       |
| NV73C2B*TE15     | 15 (12.5 - 18)   | 27                              | 0.13           |   | 7.6                  | 10.8                                 |                                       |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73C2B*TE18     | 18 (16 - 20)   | 29                              | 0.15           |   | 9.1                  | 12.8                                 |                                       |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73C2B*TE20     | 20 (18 - 22)   | 31                              | 0.17           |   | 10.6                 | 15.0                                 |                                       |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73C2B*TE22     | 22 (19 - 24)   | 35                              | 0.19           |   | 12.0                 | 16.5                                 |                                       |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73C2B*TE24     | 24 (21.8 - 26.5)   | 38                              | 0.2            |   | 14.0                 | 18.0                                 |                                       |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |
| NV73C2B*TE27     | 27 (25 - 32)   | 48                              | 0.24           |   | 17.0                 | 22.0                                 |                                       |                                   |                      |             |                                    |                                       |                                     |     |     |          |             |       |

\* Add termination material character (T)

Maximum allowable voltage - the maximum sinusoidal RMS voltage or maximum DC voltage which can be applied continuously

E: Maximum energy - the maximum energy within the varistor voltage change of ±10% when a single impulse of 2m sec. is applied

I<sub>P</sub>: Maximum peak current - the maximum peak current within the varistor voltage change of ±10% when a single standard impulse of 8/20μ sec. is applied two times with an interval of 5 min.

T<sub>opt</sub>: Operating temperature - Ambient temperature range when the device is operating

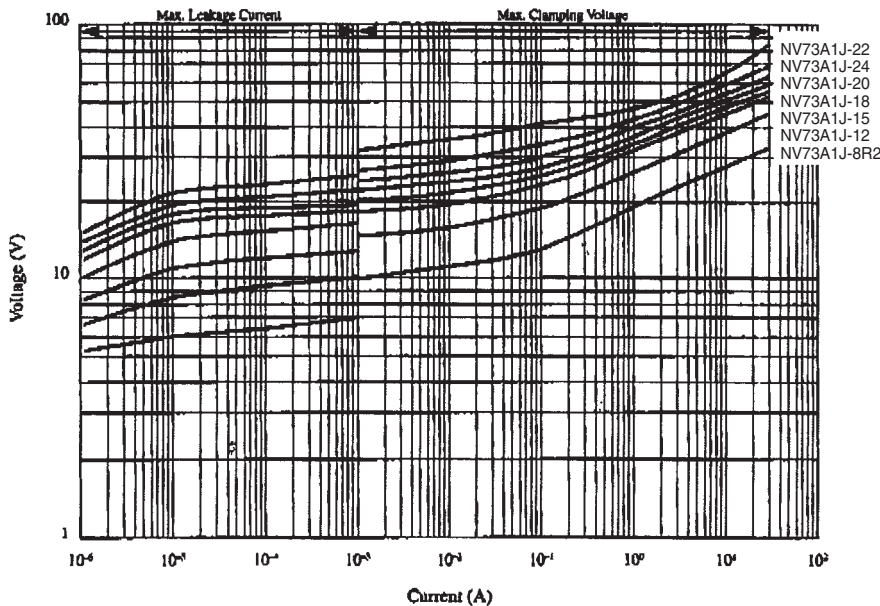
T<sub>stg</sub>: Storage temperature - Temperature range without causing the device any failure

**6. Rating Table**

| Terms                     | Symbol    | Description  |
|---------------------------|-----------|--|
| Maximum Allowable Voltage | -         | The maximum sinusoidal RMS voltage or maximum DC voltage which can be applied continuously   |
| Maximum Energy            | E         | The maximum energy within the varistor voltage change of $\pm 10\%$ when a single impulse of 2m sec. is applied  |
| Maximum Peak Current      | $I_P$     | The maximum peak current within the varistor voltage change of $\pm 10\%$ when a single standard impulse of 8/20 $\mu$ sec. is applied in two times with an interval of 5 min. |
| Operating Temperature     | $T_{opt}$ | Ambient temperature range while the device is operating  |
| Storage Temperature       | $T_{stg}$ | Temperature range without causing the device any failure   |

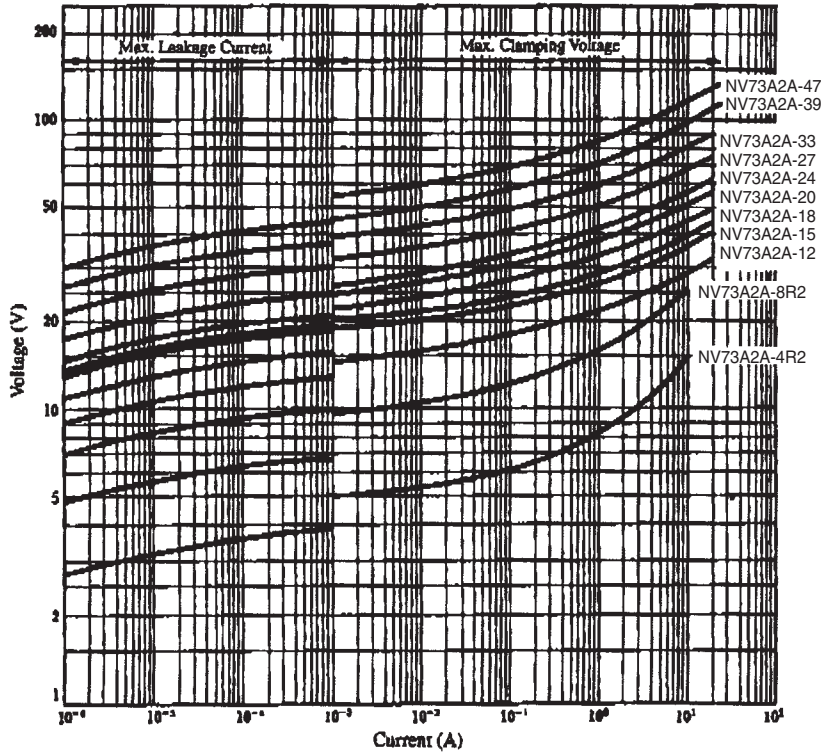
**7. Voltage-Current Characteristics**

NV73A1J ( $T_a = +25^\circ C$ ) Voltage-Current Characteristics

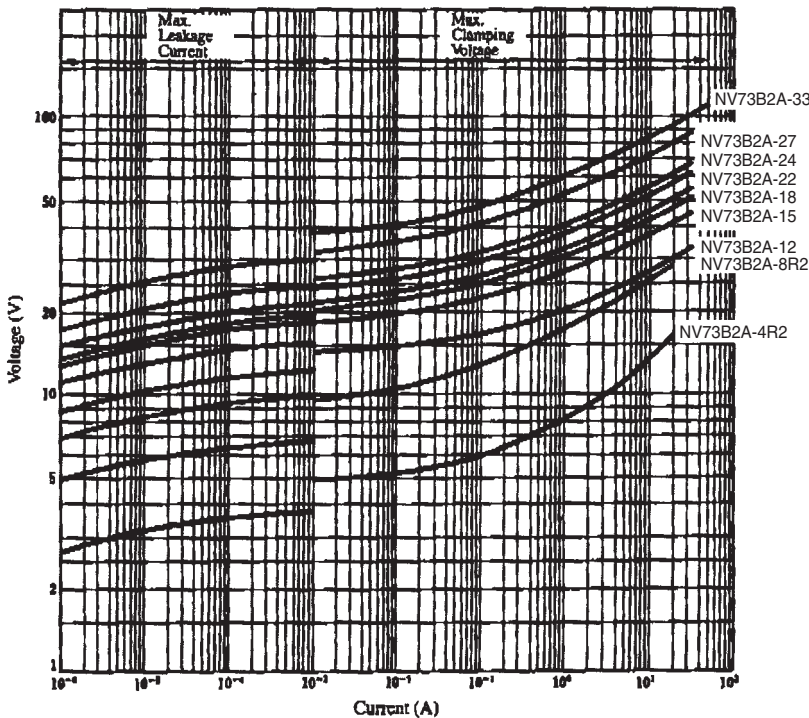


**7. Voltage-Current Characteristics (continued)**

NV73A2A (Ta = +25°C) Voltage-Current Characteristics

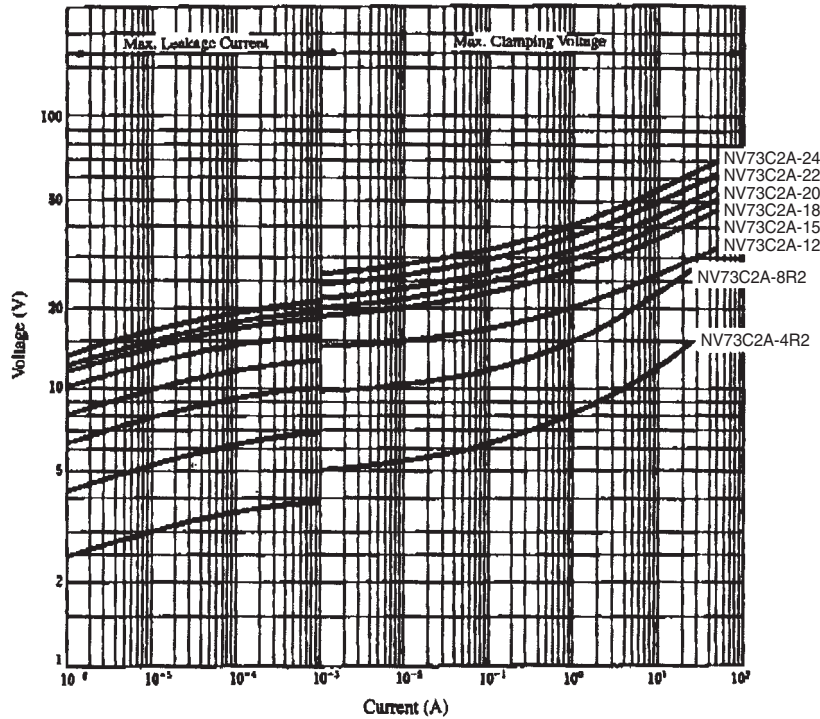


NV73B2A (Ta = +25°C) Voltage-Current Characteristics

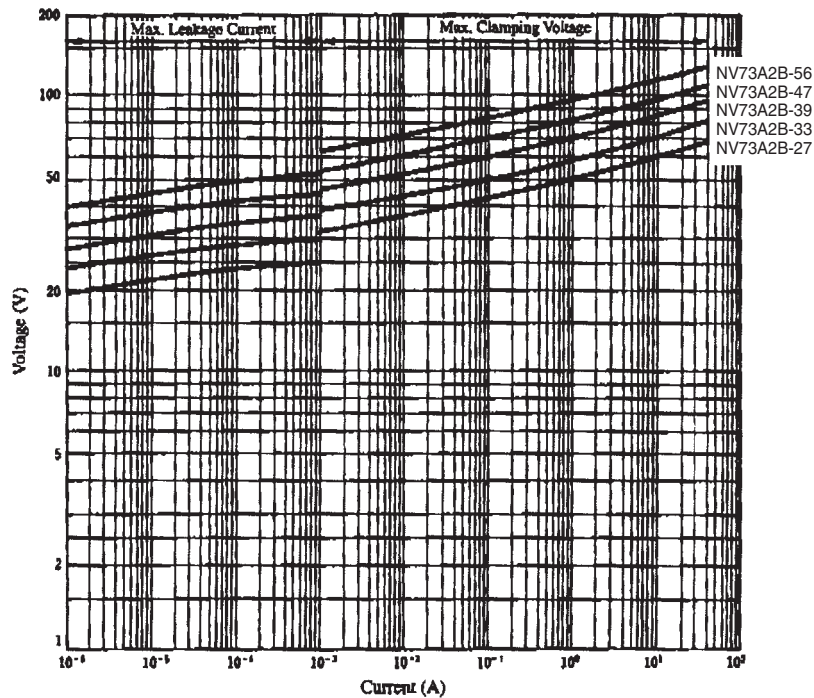


**7. Voltage-Current Characteristics (continued)**

NV73C2A (Ta = +25°C) Voltage-Current Characteristics

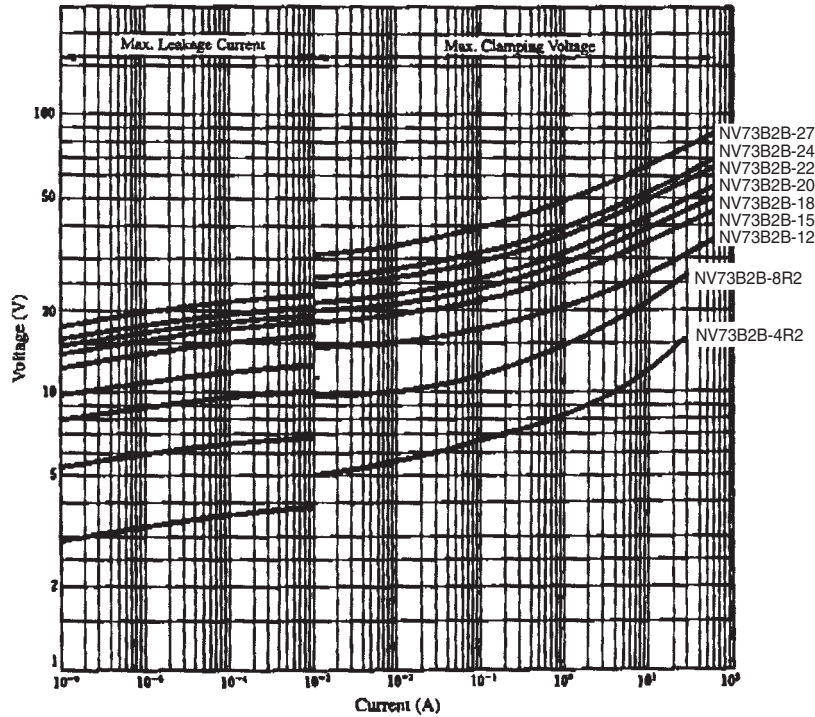


NV73A2B (Ta = +25°C) Voltage-Current Characteristics

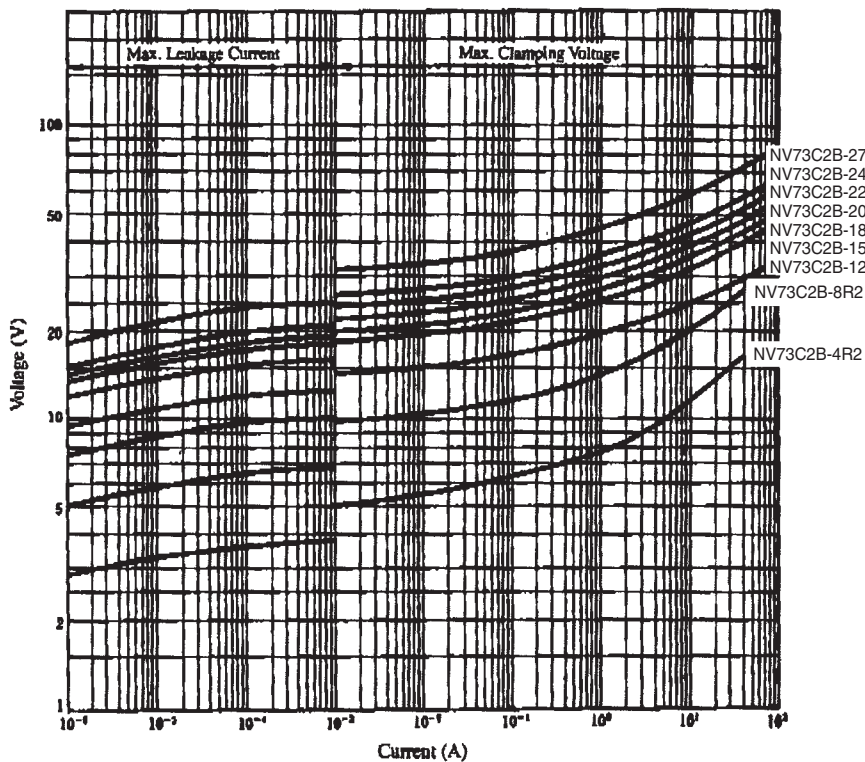


**7. Voltage-Current Characteristics (continued)**

NV73B2B (Ta = +25°C) Voltage-Current Characteristics

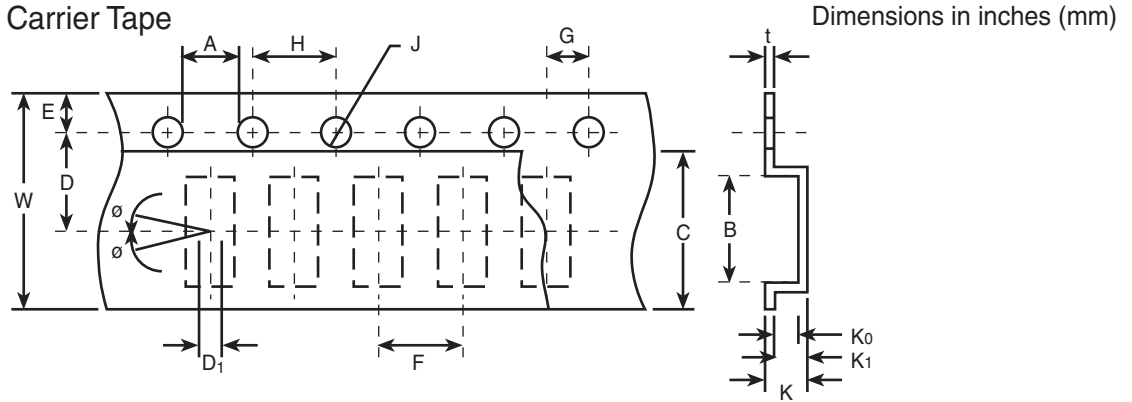


NV73C2B (Ta = +25°C) Voltage-Current Characteristics



## 8. Packaging

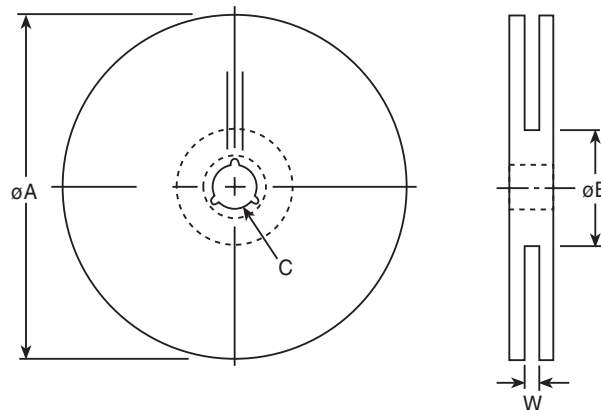
### (1) Dimensions of Carrier Tape



| Tape    | A                        | B                        | Ko                       | F                        | J                             | H                        | E                          | G                         | D                         |
|---------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|--------------------------|----------------------------|---------------------------|---------------------------|
| NV73-1J | 0.047±0.004<br>(1.2±0.1) | 0.075±0.004<br>(1.9±0.1) | 0.051 Max.<br>(1.3 Max.) |                          |                               |                          |                            |                           |                           |
| NV73-2A | 0.063±0.004<br>(1.6±0.1) | 0.094±0.004<br>(2.4±0.1) | 0.063 Max.<br>(1.6 Max.) | 0.157±0.004<br>(4.0±0.1) | 0.059±0.004<br>(1.5+0.1/-0.0) | 0.157±0.004<br>(4.0±0.1) | 0.069±0.004<br>(1.75±0.10) | 0.079±0.002<br>(2.0±0.05) | 0.138±0.002<br>(3.5±0.05) |
| NV73-2B | 0.079±0.004<br>(2.0±0.1) | 0.142±0.004<br>(3.6±0.1) |                          |                          |                               |                          |                            |                           |                           |

| Tape    | W                        | C                        | t   | K <sub>1</sub>           | Ø        | K                         |
|---------|--------------------------|--------------------------|---|--------------------------|----------|---------------------------|
| NV73-1J | 0.315±0.008<br>(8.0±0.2) | 0.209±0.004<br>(5.3±0.1) | 0.008+0.004<br>/-0.002<br>(0.2+0.1/-0.05) | 0.067 Max.<br>(1.7 Max.) | 30° Max. | 0.069 Max.<br>(1.75 Max.) |
| NV73-2A |                          |                          |   |                          |          |                           |
| NV73-2B |                          |                          |   |                          |          |                           |

### (2) Reel dimensions



|        | A   | B  | C                             | W (min)                      | W (max)                       |
|--------|---|--|-------------------------------|------------------------------|-------------------------------|
| Series | 7.09 ± <sup>+0</sup> <sub>-0.118</sub><br>(Ø180 ± <sup>+0</sup> <sub>-3</sub> ) | 2.36 ± <sup>+0.004</sup> <sub>0</sub><br>(Ø60 ± <sup>+0.1</sup> <sub>0</sub> ) | 0.512 ± 0.008<br>(13.0 ± 0.2) | 0.354 ± 0.012<br>(9.0 ± 0.3) | 0.449 ± 0.039<br>(11.4 ± 1.0) |