

**UUN** Chip Type, Bi-Polarized,  
Higher Capacitance Range



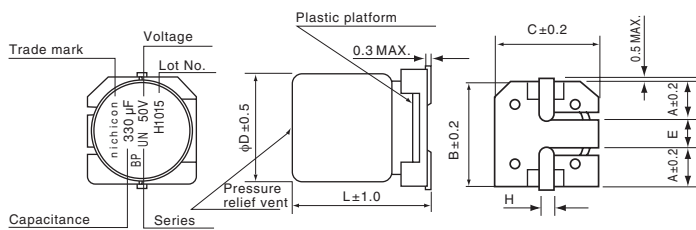
- Chip Type, higher capacitance in larger case sizes ( $\phi 12.5$ ,  $\phi 16$ ,  $\phi 18$ )
- Designed for surface mounting on high density PC board.
- Bi-polarized series for operations over wide temperature range of  $-55$  to  $+105^{\circ}\text{C}$ .
- Applicable to automatic mounting machine fed with carrier tape and tray.
- Compliant to the RoHS directive (2011/65/EU).



## Specifications

| Item                                    | Performance Characteristics   |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
|---|---|--------------------|--|---------------|---|-----------------|---|------|-----|-----|----------------------|------------------------------------|---|------|------|------|------|------|------|---|---|---|----|---|---|---|---|---|---|---|
| Category Temperature Range              | $-55$ to $+105^{\circ}\text{C}$   |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Rated Voltage Range                     | 6.3 to 100V   |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Rated Capacitance Range                 | 22 to 3300 $\mu\text{F}$  |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Capacitance Tolerance                   | $\pm 20\%$ at 120Hz, $20^{\circ}\text{C}$   |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Leakage Current                         | After 1 minute's application of rated voltage at $20^{\circ}\text{C}$ , leakage current is not more than $0.03\text{CV}$ or 4 ( $\mu\text{A}$ ), whichever is greater.  |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Tangent of loss angle ( $\tan \delta$ ) | <p>Measurement frequency : 120Hz at <math>20^{\circ}\text{C}</math></p> <table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td><math>\tan \delta</math> (MAX.)</td> <td>0.26</td> <td>0.22</td> <td>0.18</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.09</td> </tr> </table> <p>For capacitance of more than 1000<math>\mu\text{F}</math>, add 0.02 for every increase of 1000<math>\mu\text{F}</math>.</p>  | Rated voltage (V)  | 6.3  | 10            | 16  | 25              | 35  | 50   | 63  | 100 | $\tan \delta$ (MAX.) | 0.26                               | 0.22  | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 |   |   |   |    |   |   |   |   |   |   |   |
| Rated voltage (V)                       | 6.3   | 10                 | 16   | 25            | 35  | 50              | 63  | 100  |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| $\tan \delta$ (MAX.)                    | 0.26  | 0.22               | 0.18   | 0.16          | 0.14  | 0.12            | 0.10  | 0.09 |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Stability at Low Temperature            | <p>Measurement frequency: 120Hz</p> <table border="1"> <tr> <td colspan="2">Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td rowspan="2">Impedance ratio<br/>ZT / Z20 (MAX.)</td> <td>Z<math>-25^{\circ}\text{C}</math> / Z<math>+20^{\circ}\text{C}</math></td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z<math>-40^{\circ}\text{C}</math> / Z<math>+20^{\circ}\text{C}</math></td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> | Rated voltage (V)  |  | 6.3           | 10  | 16              | 25  | 35   | 50  | 63  | 100                  | Impedance ratio<br>ZT / Z20 (MAX.) | Z $-25^{\circ}\text{C}$ / Z $+20^{\circ}\text{C}$ | 5    | 4    | 3    | 2    | 2    | 2    | 2 | 2 | Z $-40^{\circ}\text{C}$ / Z $+20^{\circ}\text{C}$ | 10 | 8 | 6 | 4 | 3 | 3 | 3 | 3 |
| Rated voltage (V)                       |   | 6.3                | 10   | 16            | 25  | 35              | 50  | 63   | 100 |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Impedance ratio<br>ZT / Z20 (MAX.)      | Z $-25^{\circ}\text{C}$ / Z $+20^{\circ}\text{C}$   | 5                  | 4  | 3             | 2   | 2               | 2   | 2    | 2   |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
|   | Z $-40^{\circ}\text{C}$ / Z $+20^{\circ}\text{C}$   | 10                 | 8  | 6             | 4   | 3               | 3   | 3    | 3   |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Endurance                               | <p>The specifications listed at right shall be met when the capacitors are restored to <math>20^{\circ}\text{C}</math> after the rated voltage is applied for 2000 hours at <math>105^{\circ}\text{C}</math> with the polarity inverted every 250 hours.</p> <table border="1"> <tr> <td>Capacitance change</td> <td>Within <math>\pm 20\%</math> of the initial capacitance value</td> </tr> <tr> <td><math>\tan \delta</math></td> <td>200% or less than the initial specified value</td> </tr> <tr> <td>Leakage current</td> <td>Less than or equal to the initial specified value</td> </tr> </table>   | Capacitance change | Within $\pm 20\%$ of the initial capacitance value | $\tan \delta$ | 200% or less than the initial specified value | Leakage current | Less than or equal to the initial specified value |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Capacitance change                      | Within $\pm 20\%$ of the initial capacitance value  |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| $\tan \delta$                           | 200% or less than the initial specified value   |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Leakage current                         | Less than or equal to the initial specified value   |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Shelf Life                              | After storing the capacitors under no load at $105^{\circ}\text{C}$ for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at $20^{\circ}\text{C}$ , they shall meet the specified values for the endurance characteristics listed above.  |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |
| Marking                                 | Black print on the case top.  |                    |  |               |   |                 |   |      |     |     |                      |                                    |   |      |      |      |      |      |      |   |   |   |    |   |   |   |   |   |   |   |

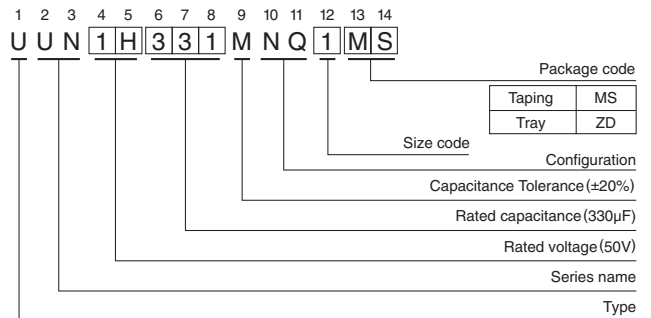
## Chip Type



(mm)

| $\phi D$ | 12.5x13.5  | 12.5x16    | 16x16.5    | 16x21.5    | 18x16.5    | 18x21.5    |
|----------|------------|------------|------------|------------|------------|------------|
| A        | 4.8        | 4.8        | 5.4        | 5.4        | 6.4        | 6.4        |
| B        | 13.6       | 13.6       | 17.1       | 17.1       | 19.1       | 19.1       |
| C        | 13.6       | 13.6       | 17.1       | 17.1       | 19.1       | 19.1       |
| E        | 4.0        | 4.0        | 6.3        | 6.3        | 6.3        | 6.3        |
| L        | 13.5       | 16.0       | 16.5       | 21.5       | 16.5       | 21.5       |
| H        | 1.0 to 1.4 | 1.0 to 1.4 | 1.0 to 1.4 | 1.0 to 1.4 | 1.0 to 1.4 | 1.0 to 1.4 |

Type numbering system (Example : 50V 330 $\mu\text{F}$ )



※ The vibration structure-resistant product is also available upon request, please ask for details.

● Dimension table in next page.



## ■ Dimensions

| (μF)<br>Cap. | Code | V           |     | 6.3         |     | 10          |     | 16        |             | 25        |           | 35          |           | 50          |           | 63          |     | 100       |                           |                 |
|--------------|------|-------------|-----|-------------|-----|-------------|-----|-----------|-------------|-----------|-----------|-------------|-----------|-------------|-----------|-------------|-----|-----------|---------------------------|-----------------|
|              |      | 0J          |     | 1A          |     | 1C          |     | 1E        |             | 1V        |           | 1H          |           | 1J          |           | 2A          |     |           |                           |                 |
| 22           | 220  |             |     |             |     |             |     |           |             |           |           |             |           |             |           |             |     |           | 12.5 × 13.5               | 100             |
| 33           | 330  |             |     |             |     |             |     |           |             |           |           |             |           |             |           |             |     |           | 12.5 × 16                 | 150             |
| 47           | 470  |             |     |             |     |             |     |           |             |           |           |             |           | 12.5 × 13.5 | 130       | 12.5 × 13.5 | 140 | 16 × 16.5 | 180                       |                 |
| 100          | 101  |             |     |             |     |             |     |           |             |           |           | 12.5 × 13.5 | 180       | 12.5 × 16   | 230       | 16 × 16.5   | 270 | 18 × 21.5 | 310                       |                 |
| 220          | 221  |             |     |             |     |             |     |           | 12.5 × 13.5 | 270       | 16 × 16.5 | 330         | 18 × 16.5 | 400         | 18 × 21.5 | 440         |     |           |                           |                 |
| 330          | 331  |             |     |             |     | 12.5 × 13.5 | 310 | 16 × 16.5 | 370         | 18 × 16.5 | 450       | 18 × 21.5   | 540       |             |           |             |     |           |                           |                 |
| 470          | 471  | 12.5 × 13.5 | 270 | 12.5 × 13.5 | 340 | 16 × 16.5   | 420 | 16 × 16.5 | 490         | 18 × 21.5 | 590       |             |           |             |           |             |     |           |                           |                 |
| 1000         | 102  | 12.5 × 16   | 500 | 16 × 16.5   | 600 | 18 × 16.5   | 670 | 18 × 21.5 | 780         |           |           |             |           |             |           |             |     |           |                           |                 |
| 2200         | 222  | 18 × 16.5   | 740 | 18 × 21.5   | 830 |             |     |           |             |           |           |             |           |             |           |             |     |           |                           |                 |
| 3300         | 332  | 18 × 21.5   | 920 |             |     |             |     |           |             |           |           |             |           |             |           |             |     |           |                           |                 |
|              |      |             |     |             |     |             |     |           |             |           |           |             |           |             |           |             |     |           | Case size<br>φ D × L (mm) | Rated<br>ripple |

※ In this case, [6] will be put at 12th digit of type numbering system, "▲"

Rated ripple current (mArms) at 105°C 120Hz

## ● Frequency coefficient of rated ripple current

| Cap.(μF)     | Frequency | 50 Hz | 120 Hz | 300 Hz | 1 kHz | 10 kHz or more |
|--------------|-----------|-------|--------|--------|-------|----------------|
| 22 to 47     |           | 0.75  | 1.00   | 1.35   | 1.57  | 2.00           |
| 100 to 470   |           | 0.80  | 1.00   | 1.23   | 1.34  | 1.50           |
| 1000 to 3300 |           | 0.85  | 1.00   | 1.10   | 1.13  | 1.15           |

- Taping specifications are given in page 23.
- Recommended land size, soldering by reflow are given in page 18, 19.
- Please refer to page 3 for the minimum order quantity.