

# ALUMINUM ELECTROLYTIC CAPACITORS



Chip Type, Higher Capacitance Range



- Chip Type, higher capacitance in larger case sizes ( $\phi 12.5$ ,  $\phi 16$ ,  $\phi 18$ ,  $\phi 20$ )
- Designed for surface mounting on high density PC board.
- Applicable to automatic mounting machine fed with carrier tape and tray.
- Compliant to the RoHS directive (2011/65/EU).

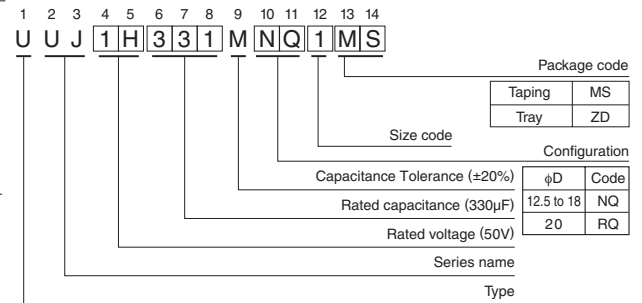
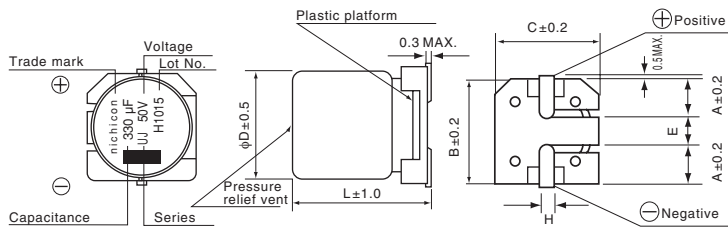


## Specifications

| Item  | Performance Characteristics   |   |      |      |      |      |      |      |   |            |           |   |
|---|---|---|------|------|------|------|------|------|---|------------|-----------|---|
| Category Temperature Range  | -55 to +105°C (6.3 to 100V), -40 to +105°C (160 to 450V)  |   |      |      |      |      |      |      |   |            |           |   |
| Rated Voltage Range   | 6.3 to 450V   |   |      |      |      |      |      |      |   |            |           |   |
| Rated Capacitance Range   | 3.3 to 6800 $\mu$ F   |   |      |      |      |      |      |      |   |            |           |   |
| Capacitance Tolerance   | $\pm 20\%$ at 120Hz, 20°C   |   |      |      |      |      |      |      |   |            |           |   |
| Leakage Current   | Rated voltage (V)   | 6.3 to 100  |      |      |      |      |      |      | 160 to 450                                  |            |           |   |
|   | —   | After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 ( $\mu$ A), whichever is greater. |      |      |      |      |      |      | I = 0.04CV+100 ( $\mu$ A) max. (1 minute's) |            |           |   |
| Tangent of loss angle (tan $\delta$ )   | Measurement frequency : 120Hz at 20°C   |   |      |      |      |      |      |      |   |            |           |   |
|   | Rated voltage (V)   | 6.3   | 10   | 16   | 25   | 35   | 50   | 63   | 100   | 160 to 250 | 400 - 450 |   |
|   | tan $\delta$ (MAX.)   | 0.26  | 0.22 | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08  | 0.15       | 0.20      |   |
| For capacitance of more than 1000 $\mu$ F, add 0.02 for every increase of 1000 $\mu$ F. |   |   |      |      |      |      |      |      |   |            |           |   |
| Stability at Low Temperature  | Measurement frequency: 120Hz  |   |      |      |      |      |      |      |   |            |           |   |
|   | Rated voltage (V)   | 6.3   | 10   | 16   | 25   | 35   | 50   | 63   | 100   | 160 to 250 | 400 - 450 |   |
|   | Impedance ratio<br>ZT / Z20 (MAX.)  | Z-25°C / Z+20°C   | 5    | 4    | 3    | 2    | 2    | 2    | 2   | 2          | 3         | 6 |
| Endurance   | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 5000 hours at 105°C.  |   |      |      |      |      |      |      |   |            |           |   |
|   | Capacitance change  | Within $\pm 20\%$ of the initial capacitance value  |      |      |      |      |      |      |   |            |           |   |
|   | tan $\delta$  | 200% or less than the initial specified value   |      |      |      |      |      |      |   |            |           |   |
| Shelf Life  | After storing the capacitors under no load at 105°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above. |   |      |      |      |      |      |      |   |            |           |   |
|   | Leakage current   |   |      |      |      |      |      |      |   |            |           |   |
| Marking   | Black print on the case top.  |   |      |      |      |      |      |      |   |            |           |   |

## Chip Type

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



|          | (mm)       |            |            |            |            |            |            |            |            |
|----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| $\phi$ D | 12.5x13.5  | 12.5x16    | 12.5x21    | 16x16.5    | 16x21.5    | 18x16.5    | 18x21.5    | 20x16.5    | 20x21.5    |
| A        | 4.8        | 4.8        | 4.8        | 5.4        | 5.4        | 6.4        | 6.4        | 6.2        | 6.2        |
| B        | 13.6       | 13.6       | 13.6       | 17.1       | 17.1       | 19.1       | 19.1       | 21.1       | 21.1       |
| C        | 13.6       | 13.6       | 13.6       | 17.1       | 17.1       | 19.1       | 19.1       | 21.1       | 21.1       |
| E        | 4.0        | 4.0        | 4.0        | 6.3        | 6.3        | 6.3        | 6.3        | 8.8        | 8.8        |
| L        | 13.5       | 16.0       | 21.0       | 16.5       | 21.5       | 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 | 1.0 to 1.4 | 1.3 to 1.7 | 1.3 to 1.7 |

※ 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          |     |
|--------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|-----|-------------|------|-------------|-----|
|              |      | Code        |      | 0J          |      | 1A          |      | 1C          |      | 1E          |     | 1V          |      | 1H          |     |
| 220          | 221  |             |      |             |      |             |      |             |      |             |     | 12.5 × 13.5 | 280  | 12.5 × 16   | 320 |
| 330          | 331  |             |      |             |      |             |      |             |      | 12.5 × 13.5 | 320 | 12.5 × 16   | 360  | ● 16 × 16.5 | 440 |
| 470          | 471  |             |      |             |      |             |      | 12.5 × 13.5 | 360  | 12.5 × 16   | 400 | ● 16 × 16.5 | 490  | △ 18 × 16.5 | 550 |
| 1000         | 102  | 12.5 × 13.5 | 440  | 12.5 × 16   | 500  | ● 16 × 16.5 | 630  | △ 18 × 16.5 | 700  | △ 18 × 16.5 | 750 | △ 18 × 16.5 | 750  | 18 × 21.5   | 820 |
| 2200         | 222  | ● 16 × 16.5 | 750  | ● 16 × 16.5 | 810  | △ 18 × 16.5 | 930  | 18 × 21.5   | 1050 |             |     | □ 20 × 21.5 | 1150 |             |     |
| 3300         | 332  | △ 18 × 16.5 | 930  | △ 18 × 16.5 | 1000 | 18 × 21.5   | 1150 |             |      |             |     |             |      |             |     |
| 4700         | 472  | ★ 18 × 21.5 | 1100 | 18 × 21.5   | 1200 |             |      |             |      |             |     |             |      |             |     |
| 6800         | 682  | □ 20 × 21.5 | 1350 | □ 20 × 21.5 | 1450 |             |      |             |      |             |     |             |      |             |     |

| (μF)<br>Cap. | Code | V           |     | 63          |     | 100         |     | 160         |     | 200         |     | 250         |     | 400         |     | 450                      |                 |
|--------------|------|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|--------------------------|-----------------|
|              |      | Code        |     | 1J          |     | 2A          |     | 2C          |     | 2D          |     | 2E          |     | 2G          |     | 2W                       |                 |
| 3.3          | 3R3  |             |     |             |     |             |     |             |     |             |     |             |     |             |     | 12.5 × 13.5              | 40              |
| 4.7          | 4R7  |             |     |             |     |             |     |             |     |             |     | 12.5 × 13.5 | 65  | 12.5 × 16   | 50  | 12.5 × 16                | 50              |
| 10           | 100  |             |     |             |     |             |     |             |     | 12.5 × 13.5 | 80  | 12.5 × 16   | 105 | 16 × 16.5   | 85  | 16 × 16.5                | 85              |
| 22           | 220  |             |     |             |     |             |     |             |     | 12.5 × 16   | 105 | ● 16 × 16.5 | 180 | 18 × 21.5   | 130 | 18 × 21.5                | 130             |
| 33           | 330  |             |     |             |     | 12.5 × 13.5 | 95  | ● 16 × 16.5 | 220 | △ 18 × 16.5 | 230 | □ 20 × 21.5 | 160 | □ 20 × 21.5 | 160 | □ 20 × 21.5              | 160             |
| 47           | 470  |             |     | 12.5 × 13.5 | 160 | ● 16 × 16.5 | 260 | △ 18 × 16.5 | 270 | ★ 18 × 21.5 | 280 |             |     |             |     |                          |                 |
| 68           | 680  | 12.5 × 13.5 | 175 | 12.5 × 16   | 205 | △ 18 × 16.5 | 320 | ★ 18 × 21.5 | 330 | □ 20 × 21.5 | 340 |             |     |             |     |                          |                 |
| 100          | 101  | 12.5 × 16   | 225 | ● 16 × 16.5 | 285 | ★ 16 × 21.5 | 380 | □ 20 × 21.5 | 410 |             |     |             |     |             |     |                          |                 |
| 220          | 221  | ● 16 × 16.5 | 385 | △ 18 × 16.5 | 440 |             |     |             |     |             |     |             |     |             |     |                          |                 |
| 330          | 331  | △ 18 × 16.5 | 490 | □ 20 × 21.5 | 500 |             |     |             |     |             |     |             |     |             |     |                          |                 |
| 470          | 471  | 18 × 21.5   | 590 |             |     |             |     |             |     |             |     |             |     |             |     | Case size<br>φD × L (mm) | Rated<br>ripple |

Size φ12.5 × 21 is available for capacitors marked,"●".

Size φ16 × 21.5L is available for capacitors marked,"△".

Size φ18 × 21.5L is available for capacitors marked,"□".

Size φ20 × 16.5L is available for capacitors marks,"★".

※ 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

| V          | Cap.(μF)     | Frequency |       |       |      |               |
|------------|--------------|-----------|-------|-------|------|---------------|
|            |              | 50Hz      | 120Hz | 300Hz | 1kHz | 10kHz or more |
| 6.3 to 100 | 47 to 68     | 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 6800 | 0.85      | 1.00  | 1.10  | 1.13 | 1.15          |
| 160 to 450 | 3.3 to 100   | 0.80      | 1.00  | 1.25  | 1.40 | 1.60          |

- 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.