

## VUA Series

### Features

- 6.3  $\phi$  ~ 18  $\phi$ , 125°C, 1,000 ~ 2,000 hours assured
- Chip type high temperature range, for +125°C use
- For automobile modules and other high temperature applications
- RoHS Compliance



Marking color: Black

### Specifications

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--------|------|----|------------------------|---------------------------------------------------------------|--------------------|------------------------------|--------|-----------------------------------|-----------------|------------------------|-------------------|------|-----------------|------|-----|------|-------|-------------------|----|---|---|---|---|
| Items                                      | Performance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Category Temperature Range                 | -40°C ~ +125°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Capacitance Tolerance                      | ±20%<br>(at 120Hz, 20°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Leakage Current (at 20°C)                  | I = 0.03CV or 4 (μA) whichever is greater (after 1 minutes)<br>Where, C = rated capacitance in μF, V = rated DC working voltage in V                                                                                                                                                                                                                                                                                                                                                       |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Tanδ (at 120Hz, 20°C)                      | <table><tr><td>Rated Voltage</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ (max)</td><td>0.32</td><td>0.24</td><td>0.21</td><td>0.18</td><td>0.15</td></tr></table><br>When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase.                                                                                                                                                                                                    |      |      |        |      |    | Rated Voltage          | 10                                                            | 16                 | 25                           | 35     | 50                                | Tanδ (max)      | 0.32                   | 0.24              | 0.21 | 0.18            | 0.15 |     |      |       |                   |    |   |   |   |   |
| Rated Voltage                              | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 16   | 25   | 35     | 50   |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Tanδ (max)                                 | 0.32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.24 | 0.21 | 0.18   | 0.15 |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Low Temperature Characteristics (at 120Hz) | <p>Impedance ratio shall not exceed the values given in the table below.</p> <table><tr><td colspan="2">Rated Voltage</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Impedance</td><td>Z(-25°C)/Z(+20°C)</td><td>6</td><td>5</td><td>4</td><td>3</td><td>3</td></tr><tr><td>Ratio</td><td>Z(-40°C)/Z(+20°C)</td><td>12</td><td>8</td><td>6</td><td>4</td><td>4</td></tr></table>                                                                                  |      |      |        |      |    | Rated Voltage          |                                                               | 10                 | 16                           | 25     | 35                                | 50              | Impedance              | Z(-25°C)/Z(+20°C) | 6    | 5               | 4    | 3   | 3    | Ratio | Z(-40°C)/Z(+20°C) | 12 | 8 | 6 | 4 | 4 |
| Rated Voltage                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10   | 16   | 25     | 35   | 50 |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Impedance                                  | Z(-25°C)/Z(+20°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 6    | 5    | 4      | 3    | 3  |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Ratio                                      | Z(-40°C)/Z(+20°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12   | 8    | 6      | 4    | 4  |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Endurance                                  | <table><tr><td>Test Time</td><td>1,000 Hrs for ϕ D ≤ 8 × 6.5mm<br/>2,000 Hrs for ϕ D ≥ 8 × 10mm</td></tr><tr><td>Capacitance Change</td><td>Within ±30% of initial value</td></tr><tr><td>Tanδ</td><td>Less than 300% of specified value</td></tr><tr><td>Leakage Current</td><td>Within specified value</td></tr></table> <p>* The above specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 1,000 / 2,000 hours at 125°C.</p> |      |      |        |      |    | Test Time              | 1,000 Hrs for ϕ D ≤ 8 × 6.5mm<br>2,000 Hrs for ϕ D ≥ 8 × 10mm | Capacitance Change | Within ±30% of initial value | Tanδ   | Less than 300% of specified value | Leakage Current | Within specified value |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Test Time                                  | 1,000 Hrs for ϕ D ≤ 8 × 6.5mm<br>2,000 Hrs for ϕ D ≥ 8 × 10mm                                                                                                                                                                                                                                                                                                                                                                                                                              |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Capacitance Change                         | Within ±30% of initial value                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Tanδ                                       | Less than 300% of specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Leakage Current                            | Within specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Shelf Life Test                            | <table><tr><td>Test Time</td><td>1,000 Hrs</td></tr><tr><td>Capacitance Change</td><td>Within ±30% of initial value</td></tr><tr><td>Tanδ</td><td>Less than 300% of specified value</td></tr><tr><td>Leakage Current</td><td>Within specified value</td></tr></table> <p>* The above specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 125°C without voltage applied.</p>                                                  |      |      |        |      |    | Test Time              | 1,000 Hrs                                                     | Capacitance Change | Within ±30% of initial value | Tanδ   | Less than 300% of specified value | Leakage Current | Within specified value |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Test Time                                  | 1,000 Hrs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Capacitance Change                         | Within ±30% of initial value                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Tanδ                                       | Less than 300% of specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Leakage Current                            | Within specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |      |        |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Ripple Current and Frequency Multipliers   | <table><tr><td>Freq.(Hz)<br/>Cap.(μF )</td><td>50</td><td>120</td><td>1k</td><td>10k up</td></tr><tr><td>Under 330</td><td>0.80</td><td>1.0</td><td>1.25</td><td>1.40</td></tr><tr><td>330 &lt; C ≤ 4,700</td><td>0.85</td><td>1.0</td><td>1.20</td><td>1.30</td></tr></table>                                                                                                                                                                                                             |      |      |        |      |    | Freq.(Hz)<br>Cap.(μF ) | 50                                                            | 120                | 1k                           | 10k up | Under 330                         | 0.80            | 1.0                    | 1.25              | 1.40 | 330 < C ≤ 4,700 | 0.85 | 1.0 | 1.20 | 1.30  |                   |    |   |   |   |   |
| Freq.(Hz)<br>Cap.(μF )                     | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 120  | 1k   | 10k up |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| Under 330                                  | 0.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1.0  | 1.25 | 1.40   |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |
| 330 < C ≤ 4,700                            | 0.85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1.0  | 1.20 | 1.30   |      |    |                        |                                                               |                    |                              |        |                                   |                 |                        |                   |      |                 |      |     |      |       |                   |    |   |   |   |   |

### Diagram of Dimensions

Fig. 1

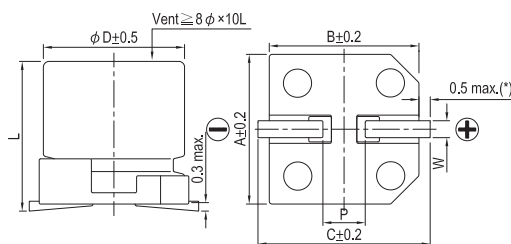
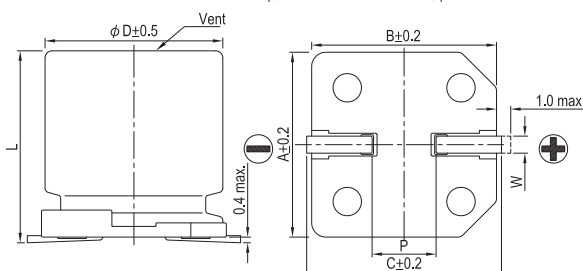


Fig. 2



### Lead Spacing and Diameter

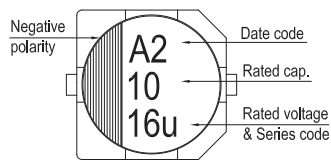
Unit: mm

| $\phi D$ | L          | A    | B    | C    | W         | P ± 0.2 | Fig. No. |
|----------|------------|------|------|------|-----------|---------|----------|
| 6.3      | 5.7 ± 0.3  | 6.6  | 6.6  | 7.2  | 0.5 ~ 0.8 | 2.0     | 1        |
| 6.3      | 7.7 ± 0.3  | 6.6  | 6.6  | 7.2  | 0.5 ~ 0.8 | 2.0     | 1        |
| 8        | 6.5 ± 0.3  | 8.3  | 8.3  | 9.0  | 0.5 ~ 0.8 | 2.3     | 1        |
| 8        | 10 ± 0.5   | 8.3  | 8.3  | 9.0  | 0.7 ~ 1.1 | 3.1     | 1        |
| 10       | 10 ± 0.5   | 10.3 | 10.3 | 11.0 | 0.7 ~ 1.3 | 4.7     | 1        |
| 12.5     | 13.5 ± 0.5 | 13.0 | 13.0 | 13.7 | 1.1 ~ 1.4 | 4.4     | 2        |
| 12.5     | 16 ± 0.5   | 13.0 | 13.0 | 13.7 | 1.1 ~ 1.4 | 4.4     | 2        |
| 16       | 16.5 ± 0.5 | 17.0 | 17.0 | 18.0 | 1.1 ~ 1.4 | 6.4     | 2        |
| 18       | 16.5 ± 0.5 | 19.0 | 19.0 | 20.0 | 1.1 ~ 1.4 | 6.4     | 2        |

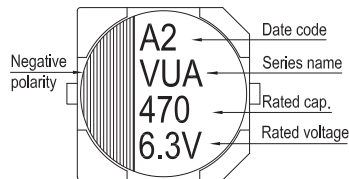
(\*) For 6.3  $\phi$  is 0.4 max.

## Marking

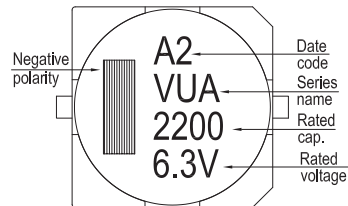
$\phi D = 6.3 \text{ mm}$



$\phi D = 8 \sim 10 \text{ mm}$



$\phi D \geq 12.5 \text{ mm}$



## Dimension and Permissible Ripple Current

Dimension:  $\phi D \times L(\text{mm})$

Ripple Current: mA/rms at 120 Hz, 125°C

| V. DC<br>$\mu\text{F}$ | Contents | 10V (1A)          |     | 16V (1C)          |     | 25V (1E)          |     | 35V (1V)          |     | 50V (1H)          |     |
|------------------------|----------|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|
|                        |          | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  |
| 22                     | 220      |                   |     |                   |     |                   |     | 6.3×5.7           | 50  | 8×6.5             | 75  |
| 33                     | 330      |                   |     | 6.3×5.7           | 50  | 6.3×5.7           | 50  | 6.3×7.7           | 70  | 8×10              | 130 |
| 47                     | 470      |                   |     | 6.3×7.7           | 70  | 6.3×7.7           | 70  | 8×6.5             | 75  | 8×10              | 130 |
| 68                     | 680      | 6.3×5.7           | 50  | 8×6.5             | 75  | 8×6.5             | 75  | 8×10              | 130 | 10×10             | 180 |
| 100                    | 101      | 8×6.5             | 75  | 8×6.5             | 75  | 8×10              | 130 | 10×10             | 180 | 12.5×13.5         | 357 |
| 220                    | 221      | 8×10              | 130 | 10×10             | 180 | 10×10             | 180 | 12.5×13.5         | 357 | 12.5×16           | 400 |
| 330                    | 331      | 8×10              | 130 | 12.5×13.5         | 480 | 12.5×13.5         | 480 | 16×16.5           | 650 | 16×16.5           | 650 |
| 470                    | 471      | 12.5×13.5         | 480 | 12.5×13.5         | 480 | 12.5×13.5         | 480 | 16×16.5           | 650 | 16×16.5           | 650 |
| 680                    | 681      | 12.5×13.5         | 480 | 12.5×13.5         | 480 | 12.5×16           | 585 | 16×16.5           | 650 | 18×16.5           | 855 |
| 1,000                  | 102      | 12.5×16           | 585 | 12.5×16           | 585 | 16×16.5           | 650 | 18×16.5           | 855 |                   |     |
| 1,500                  | 152      | 12.5×16           | 585 | 16×16.5           | 650 | 18×16.5           | 855 |                   |     |                   |     |
| 2,200                  | 222      | 16×16.5           | 650 | 18×16.5           | 855 |                   |     |                   |     |                   |     |
| 3,300                  | 332      | 18×16.5           | 855 |                   |     |                   |     |                   |     |                   |     |
| 4,700                  | 472      | 18×16.5           | 855 |                   |     |                   |     |                   |     |                   |     |

## Part Numbering System

|             |                  |                       |               |              |                   |                              |
|-------------|------------------|-----------------------|---------------|--------------|-------------------|------------------------------|
| VUA Series  | 33 $\mu\text{F}$ | ±20%                  | 16V           | Carrier Tape | 6.3 $\phi$ × 5.7L | Pb-free and PET coating case |
| <b>VUA</b>  | <b>330</b>       | <b>M</b>              | <b>1C</b>     | <b>TR</b>    | <b>-</b>          | <b>0606</b>                  |
| Series Name | Capacitance      | Capacitance Tolerance | Rated Voltage | Package Type | Terminal Type     | Case size                    |
|             |                  |                       |               |              |                   | Lead Wire and Coating Type   |

Note: For more details, please refer to "Part Numbering System (SMD Type)" on page 15.

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