



## VEC Series

### Features

- $4\phi \sim 6.3\phi$ , 85°C, 2,000 hours assured
- Vertical chip type miniaturized for 5.5mm, high capacitors
- Low Leakage Current Lead free reflow soldering is available
- Designed for surface mounting on high density PC board
- RoHS Compliance

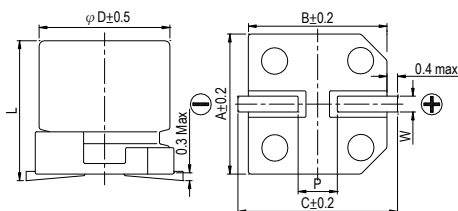


Marking color: Black

### Specifications

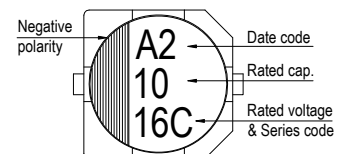
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--------|------|------|----|----------------|-----------|--------------------|------------------------------|--------|-----------------------------------|-----------------|------------------------|-----------------|-------------------|------|------|------|------|---|---|-------------------|---|---|---|---|---|---|
| Items                                      | Performance                                                                                                                                                                                                                                                                                                                                                                                                                              |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Category Temperature Range                 | -40°C ~ +85°C                                                                                                                                                                                                                                                                                                                                                                                                                            |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Capacitance Tolerance                      | ±20%<br>(at 120Hz, 20°C)                                                                                                                                                                                                                                                                                                                                                                                                                 |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Leakage Current (at 20°C)                  | I = 0.002CV or 0.5 (μA) whichever is greater (after 2 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>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ (max)</td><td>0.28</td><td>0.24</td><td>0.20</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table>                                                                                                                                                                                                              |      |      |        |      |      |    | Rated Voltage  | 6.3       | 10                 | 16                           | 25     | 35                                | 50              | Tanδ (max)             | 0.28            | 0.24              | 0.20 | 0.14 | 0.12 | 0.10 |   |   |                   |   |   |   |   |   |   |
| Rated Voltage                              | 6.3                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10   | 16   | 25     | 35   | 50   |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Tanδ (max)                                 | 0.28                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.24 | 0.20 | 0.14   | 0.12 | 0.10 |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio shall not exceed the values given in the table below. <table><tr><td colspan="2">Rated Voltage</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td rowspan="2">Impedance Ratio</td><td>Z(-25°C)/Z(+20°C)</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>8</td><td>5</td><td>4</td><td>3</td><td>3</td><td>3</td></tr></table>    |      |      |        |      |      |    | Rated Voltage  |           | 6.3                | 10                           | 16     | 25                                | 35              | 50                     | Impedance Ratio | Z(-25°C)/Z(+20°C) | 3    | 3    | 2    | 2    | 2 | 2 | Z(-40°C)/Z(+20°C) | 8 | 5 | 4 | 3 | 3 | 3 |
| Rated Voltage                              |                                                                                                                                                                                                                                                                                                                                                                                                                                          | 6.3  | 10   | 16     | 25   | 35   | 50 |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Impedance Ratio                            | Z(-25°C)/Z(+20°C)                                                                                                                                                                                                                                                                                                                                                                                                                        | 3    | 3    | 2      | 2    | 2    | 2  |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
|                                            | Z(-40°C)/Z(+20°C)                                                                                                                                                                                                                                                                                                                                                                                                                        | 8    | 5    | 4      | 3    | 3    | 3  |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Endurance                                  | <table><tr><td>Test Time</td><td>2,000 Hrs</td></tr><tr><td>Capacitance Change</td><td>Within ±20% of initial value</td></tr><tr><td>Tanδ</td><td>Less than 200% 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 2,000 hours at 85°C.</p>             |      |      |        |      |      |    | Test Time      | 2,000 Hrs | Capacitance Change | Within ±20% of initial value | Tanδ   | Less than 200% of specified value | Leakage Current | Within specified value |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Test Time                                  | 2,000 Hrs                                                                                                                                                                                                                                                                                                                                                                                                                                |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Capacitance Change                         | Within ±20% of initial value                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Tanδ                                       | Less than 200% 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 ±20% of initial value</td></tr><tr><td>Tanδ</td><td>Less than 200% 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 85°C without voltage applied.</p> |      |      |        |      |      |    | Test Time      | 1,000 Hrs | Capacitance Change | Within ±20% of initial value | Tanδ   | Less than 200% of specified value | Leakage Current | Within specified value |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Test Time                                  | 1,000 Hrs                                                                                                                                                                                                                                                                                                                                                                                                                                |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Capacitance Change                         | Within ±20% of initial value                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Tanδ                                       | Less than 200% of specified value                                                                                                                                                                                                                                                                                                                                                                                                        |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Leakage Current                            | Within specified value                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |        |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Ripple Current & Frequency Multipliers     | <table><tr><td>Frequency (Hz)</td><td>50</td><td>120</td><td>1k</td><td>10k up</td></tr><tr><td>Multiplier</td><td>0.7</td><td>1.0</td><td>1.3</td><td>1.4</td></tr></table>                                                                                                                                                                                                                                                             |      |      |        |      |      |    | Frequency (Hz) | 50        | 120                | 1k                           | 10k up | Multiplier                        | 0.7             | 1.0                    | 1.3             | 1.4               |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Frequency (Hz)                             | 50                                                                                                                                                                                                                                                                                                                                                                                                                                       | 120  | 1k   | 10k up |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |
| Multiplier                                 | 0.7                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.0  | 1.3  | 1.4    |      |      |    |                |           |                    |                              |        |                                   |                 |                        |                 |                   |      |      |      |      |   |   |                   |   |   |   |   |   |   |

### Diagram of Dimensions



| Lead Spacing and Diameter | Unit: mm  |     |     |     |           |         |
|---------------------------|-----------|-----|-----|-----|-----------|---------|
| φD                        | L         | A   | B   | C   | W         | P ± 0.2 |
| 4                         | 5.3 ± 0.2 | 4.3 | 4.3 | 5.1 | 0.5 ~ 0.8 | 1.0     |
| 5                         | 5.3 ± 0.2 | 5.3 | 5.3 | 5.9 | 0.5 ~ 0.8 | 1.5     |
| 6.3                       | 5.3 ± 0.2 | 6.6 | 6.6 | 7.2 | 0.5 ~ 0.8 | 2.0     |

### Marking



### Dimension & Permissible Ripple Current

Dimension: φD × L(mm)

Ripple Current: mA/rms at 120 Hz, 85°C

| V. DC       | 6.3V (0J)  | 10V (1A)   | 16V (1C)   | 25V (1E)   | 35V (1V)   | 50V (1H)   |
|-------------|------------|------------|------------|------------|------------|------------|
| μF Contents | φD×L       | mA         | φD×L       | mA         | φD×L       | mA         |
| 1 010       |            |            |            |            |            | 4×5.3 10   |
| 2.2 2R2     |            |            |            |            |            | 4×5.3 15   |
| 3.3 3R3     |            |            |            |            |            | 4×5.3 19   |
| 4.7 4R7     |            |            |            | 4×5.3 19   | 4×5.3 20   | 5×5.3 26   |
| 10 100      |            | 4×5.3 23   | 4×5.3 26   | 5×5.3 32   | 5×5.3 34   | 6.3×5.3 44 |
| 22 220      | 4×5.3 31   | 5×5.3 39   | 5×5.3 44   | 6.3×5.3 55 | 6.3×5.3 59 |            |
| 33 330      | 5×5.3 44   | 5×5.3 48   | 6.3×5.3 63 | 6.3×5.3 67 |            |            |
| 47 470      | 5×5.3 52   | 6.3×5.3 67 | 6.3×5.3 75 |            |            |            |
| 100 101     | 6.3×5.3 89 | 6.3×5.3 98 |            |            |            |            |

### Part Numbering System

|             |             |                       |               |              |               |                              |
|-------------|-------------|-----------------------|---------------|--------------|---------------|------------------------------|
| VEC series  | 10μF        | ±20%                  | 16V           | Carrier Tape | 4φ×5.3L       | Pb-free and PET coating case |
| <b>VEC</b>  | <b>100</b>  | <b>M</b>              | <b>1C</b>     | <b>TR</b>    | <b>-</b>      | <b>0405</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 12.