

VZH Series

Features

- 4 ϕ ~ 18 ϕ , 105°C, 2,000 ~ 5,000 hours assured
- Large capacitance with ultra low impedance capacitors
- Designed for surface mounting on high density PC board
- RoHS compliance



Marking color: Black

Specifications

| Items | Performance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---------------|--|--------------------|------------------------------|--------|-----------------------------------|-----------------|------------------------|------|-----|-----------------|-------------------|------|------|------|------|------|------|------|------|--|-------------------|---|---|---|---|---|---|---|---|
| Category Temperature Range | -55°C ~ +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (at 120 Hz, 20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (at 20°C) | $I = 0.01CV$ or 3 (μA) whichever is greater (after 2 minutes) Where, C = rated capacitance in μF, V = rated DC working voltage in V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ (at 120 Hz, 20°C) | <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>80</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Tanδ (max)</td> <td>0.30</td> <td>0.26</td> <td>0.22</td> <td>0.16</td> <td>0.13</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> <td>0.07</td> </tr> </tbody> </table> <p>When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase.</p> | Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | Tanδ (max) | 0.30 | 0.26 | 0.22 | 0.16 | 0.13 | 0.10 | 0.08 | 0.08 | 0.07 | | | | | | | | | | |
| Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ (max) | 0.30 | 0.26 | 0.22 | 0.16 | 0.13 | 0.10 | 0.08 | 0.08 | 0.07 | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120 Hz) | <p>Impedance ratio shall not exceed the values given in the table below.</p> <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>80</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Impedance Ratio</td> <td>Z(-25°C)/Z(+20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td></td> <td>Z(-55°C)/Z(+20°C)</td> <td>8</td> <td>5</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table> | Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | Impedance Ratio | Z(-25°C)/Z(+20°C) | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | | Z(-55°C)/Z(+20°C) | 8 | 5 | 4 | 3 | 3 | 3 | 3 | 3 |
| Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | | | | | | | | | | | | | | | | | | | | | | |
| Impedance Ratio | Z(-25°C)/Z(+20°C) | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| | Z(-55°C)/Z(+20°C) | 8 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | <table border="1"> <tbody> <tr> <td>Test Time</td> <td>2,000 Hrs for $\phi D \leq 6.3\text{mm}$ & $8 \times 6.5\text{L}$ & $10 \phi \times 7.7\text{L}$; 5,000 Hrs for $\phi D \geq 8\text{mm}$</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> </tbody> </table> <p>* The above specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 ~ 5,000 hours at 105°C.</p> | Test Time | 2,000 Hrs for $\phi D \leq 6.3\text{mm}$ & $8 \times 6.5\text{L}$ & $10 \phi \times 7.7\text{L}$; 5,000 Hrs for $\phi D \geq 8\text{mm}$ | Capacitance Change | Within ±30% of initial value | Tanδ | Less than 300% of specified value | Leakage Current | Within specified value | | | | | | | | | | | | | | | | | | | | | | |
| Test Time | 2,000 Hrs for $\phi D \leq 6.3\text{mm}$ & $8 \times 6.5\text{L}$ & $10 \phi \times 7.7\text{L}$; 5,000 Hrs for $\phi D \geq 8\text{mm}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | Within ±30% of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ | Less than 300% of specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current | Within specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life Test | <table border="1"> <tbody> <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> </tbody> </table> <p>* The above specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°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 border="1"> <tbody> <tr> <td>Frequency(Hz)</td> <td>50, 60</td> <td>120</td> <td>1k</td> <td>10k up</td> </tr> <tr> <td>Multiplier</td> <td>0.60</td> <td>0.70</td> <td>0.85</td> <td>1.0</td> </tr> </tbody> </table> | Frequency(Hz) | 50, 60 | 120 | 1k | 10k up | Multiplier | 0.60 | 0.70 | 0.85 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| Frequency(Hz) | 50, 60 | 120 | 1k | 10k up | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multiplier | 0.60 | 0.70 | 0.85 | 1.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Diagram of Dimensions

Fig. 1

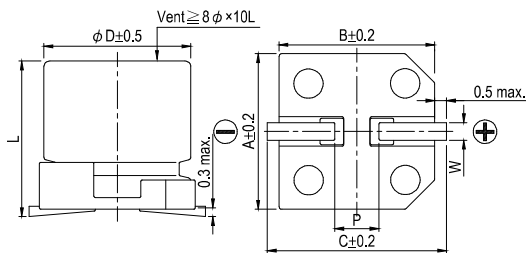
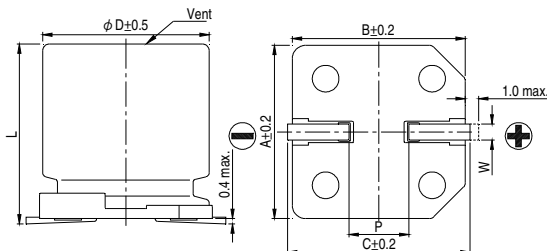


Fig. 2



Lead Spacing and Diameter

Unit: mm

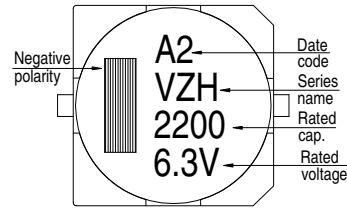
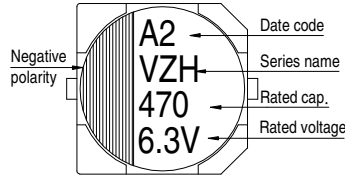
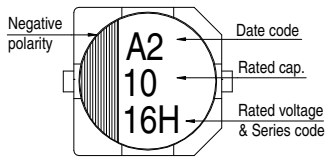
| ϕD | L | A | B | C | W | P ± 0.2 | Fig. No. |
|----------|------------|------|------|------|-----------|---------|----------|
| 4 | 5.7 ± 0.3 | 4.3 | 4.3 | 5.1 | 0.5 ~ 0.8 | 1.0 | 1 |
| 5 | 5.7 ± 0.3 | 5.3 | 5.3 | 5.9 | 0.5 ~ 0.8 | 1.5 | 1 |
| 6.3 | 5.7 ± 0.3 | 6.6 | 6.6 | 7.2 | 0.5 ~ 0.8 | 2.0 | 1 |
| 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 | 7.7 ± 0.3 | 10.3 | 10.3 | 11.0 | 0.7 ~ 1.3 | 4.7 | 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 |
| 16 | 21.5 ± 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 |
| 18 | 21.5 ± 0.5 | 19.0 | 19.0 | 20.0 | 1.1 ~ 1.4 | 6.4 | 2 |

Marking

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

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

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



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

Ripple Current: mA/rms at 100k Hz, 105°C

Impedance: $\Omega/$ at 100k Hz, 20°C

Dimension and Permissible Ripple Current

| Rated Volt. (V _{DC}) | Cap. (μF) | Contents | 6.3V (0J) | | | 10V (1A) | | | 16V (1C) | | | 25V (1E) | | | 35V (1V) | | | 50V (1H) | | | | | |
|--------------------------------|-----------|----------|-------------------|-------|-------|-------------------|-------|-------|-------------------|-------|-------|-------------------|-------|-------|-------------------|-------|-------|-------------------|---------|-------|-----------|-------|-------|
| | | | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA | | | |
| 1 | 010 | | | | | | | | | | | | | | | | 4×5.7 | 2.9 | 60 | | | | |
| 2.2 | 2R2 | | | | | | | | | | | | | | | | 4×5.7 | 2.9 | 60 | | | | |
| 3.3 | 3R3 | | | | | | | | | | | | | | | | 4×5.7 | 2.9 | 60 | | | | |
| 4.7 | 4R7 | | | | | | | | | | | | | | | 4×5.7 | 1.35 | 80 | 5×5.7 | 1.52 | 85 | | |
| 10 | 100 | | | | | | | | | 4×5.7 | 1.35 | 80 | 4×5.7 | 1.35 | 80 | 5×5.7 | 0.80 | 150 | 6.3×5.7 | 0.88 | 165 | | |
| 22 | 220 | | 4×5.7 | 1.35 | 80 | 4×5.7 | 1.35 | 80 | 5×5.7 | 0.80 | 150 | 5×5.7 | 0.80 | 150 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.88 | 165 | | | |
| 33 | 330 | | 4×5.7 | 1.35 | 80 | 5×5.7 | 0.80 | 150 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×7.7 | 0.68 | 185 | | | |
| 47 | 470 | | 5×5.7 | 0.80 | 150 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×7.7 | 0.68 | 185 | | | |
| 68 | 680 | | | | | | | | | | | 6.3×5.7 | 0.44 | 230 | 8×6.5 | 0.36 | 280 | 8×10 | 0.34 | 369 | | | |
| 100 | 101 | | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×7.7 | 0.36 | 280 | 8×10 | 0.17 | 450 | 8×10 | 0.34 | 369 | | | |
| 150 | 151 | | 6.3×5.7 | 0.44 | 230 | 6.3×5.7 | 0.44 | 230 | 6.3×7.7 | 0.36 | 280 | 8×6.5 | 0.36 | 280 | 8×10 | 0.17 | 450 | 10×10 | 0.18 | 553 | | | |
| 220 | 221 | | 6.3×5.7 | 0.44 | 230 | 6.3×7.7 | 0.36 | 280 | 8×6.5 | 0.36 | 280 | 6.3×7.7 | 0.36 | 280 | 8×10 | 0.17 | 450 | 10×7.7 | 0.17 | 450 | 12.5×13.5 | 0.12 | 650 |
| 330 | 331 | | 8×6.5 | 0.36 | 280 | 8×10 | 0.17 | 450 | 10×7.7 | 0.17 | 450 | 8×10 | 0.17 | 450 | 8×10 | 0.17 | 450 | 10×10 | 0.09 | 670 | 12.5×13.5 | 0.12 | 650 |
| 470 | 471 | | 8×10 | 0.17 | 450 | 10×7.7 | 0.17 | 450 | 10×7.7 | 0.17 | 450 | 8×10 | 0.17 | 450 | 10×10 | 0.09 | 670 | 12.5×13.5 | 0.070 | 820 | 16×16.5 | 0.073 | 1,000 |
| 680 | 681 | | 8×10 | 0.17 | 450 | 10×7.7 | 0.17 | 450 | 10×10 | 0.09 | 670 | 10×10 | 0.09 | 670 | 12.5×13.5 | 0.070 | 820 | 12.5×16 | 0.060 | 950 | 16×16.5 | 0.073 | 1,000 |
| 1,000 | 102 | | 8×10 | 0.17 | 450 | 10×10 | 0.09 | 670 | 12.5×13.5 | 0.070 | 820 | 12.5×16 | 0.060 | 950 | 16×16.5 | 0.054 | 1,260 | 16×16.5 | 0.073 | 1,000 | 18×16.5 | 0.066 | 1,500 |
| 1,500 | 152 | | 10×10 | 0.09 | 670 | 12.5×13.5 | 0.070 | 820 | 12.5×16 | 0.060 | 950 | 16×16.5 | 0.054 | 1,260 | 18×16.5 | 0.048 | 1,500 | 16×21.5 | 0.038 | 1,630 | 18×21.5 | 0.05 | 1,620 |
| 2,200 | 222 | | 12.5×13.5 | 0.070 | 820 | 12.5×16 | 0.060 | 950 | 16×16.5 | 0.054 | 1,260 | 16×16.5 | 0.054 | 1,260 | 18×21.5 | 0.038 | 1,750 | | | | | | |
| 3,300 | 332 | | 12.5×16 | 0.060 | 950 | 16×16.5 | 0.054 | 1,260 | 16×16.5 | 0.054 | 1,260 | 16×21.5 | 0.038 | 1,630 | 18×16.5 | 0.048 | 1,500 | | | | | | |
| 4,700 | 472 | | 16×16.5 | 0.054 | 1,260 | 16×16.5 | 0.054 | 1,260 | 18×16.5 | 0.048 | 1,500 | 16×21.5 | 0.038 | 1,630 | | | | | | | | | |
| 6,800 | 682 | | 18×16.5 | 0.048 | 1,500 | 16×21.5 | 0.038 | 1,630 | | | | | | | | | | | | | | | |
| 8,200 | 822 | | 18×16.5 | 0.048 | 1,500 | 16×21.5 | 0.038 | 1,630 | | | | | | | | | | | | | | | |



Dimension: $\phi D \times L$ (mm)

Ripple Current: mA/rms at 100k Hz, 105°C

Impedance: Ω / at 100k Hz, 20°C

Dimension and Permissible Ripple Current

| Cap. (μ F) | Contents | 63V (1J) | | | 80V (1K) | | | 100V (2A) | | |
|-----------------|----------|--------------------|----------------|----------------|-------------------|------|-----|--------------------|--------------|------------|
| | | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA | $\phi D \times L$ | Imp. | mA |
| 4.7 | 4R7 | 5x5.7 | 1.90 | 70 | | | | | | |
| 10 | 100 | 6.3x5.7 | 1.20 | 130 | | | | | | |
| 22 | 220 | 6.3x7.7 | 0.90 | 150 | 8x10 | 1.3 | 130 | 8x10 | 1.3 | 130 |
| 33 | 330 | 8x10 | 0.50 | 280 | 8x10 | 1.3 | 130 | 10x10 | 0.7 | 200 |
| 47 | 470 | 8x10 | 0.50 | 280 | 10x10 | 0.7 | 200 | 10x10 | 0.7 | 200 |
| 100 | 101 | 10x10 | 0.25 | 450 | 10x10 | 0.7 | 200 | 12.5x13.5 | 0.32 | 450 |
| 150 | 151 | 12.5x13.5 | 0.15 | 700 | 12.5x13.5 | 0.32 | 450 | 16x16.5 | 0.17 | 650 |
| 220 | 221 | 12.5x13.5 | 0.15 | 700 | 16x16.5 | 0.17 | 650 | 16x16.5 18x21.5 | 0.17 0.15 | 650 950 |
| 330 | 331 | 16x16.5 | 0.082 | 900 | 16x16.5 | 0.17 | 650 | 18x16.5 16x21.5 | 0.15 0.15 | 850 900 |
| 470 | 471 | 16x16.5 | 0.082 | 900 | 16x21.5 | 0.15 | 900 | 18x21.5 | 0.15 | 950 |
| 680 | 681 | 18x16.5 16x21.5 | 0.080 0.080 | 1,150 1,150 | 18x21.5 | 0.15 | 950 | | | |
| 1,000 | 102 | 18x21.5 | 0.06 | 1,250 | | | | | | |

Part Numbering System

| | | | | | | |
|-------------|-------------|-----------------------|---------------|--------------|---------------------|-------------------------|
| VZH Series | 470 μ F | $\pm 20\%$ | 6.3V | Carrier Tape | 8 $\phi \times 10L$ | Pb-free and Coated Case |
| VZH | 471 | M | 0J | TR | - | 0810 |
| Series Name | Capacitance | Capacitance Tolerance | Rated Voltage | Package Type | Terminal Type | Case Size |
| | | | | | | Lead Wire and Case Type |

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