

## VZH Series

### Features

- 4  $\phi$  ~ 18  $\phi$ , 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 compliant
- AEC-Q200 compliant



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 ( $\mu$ A) whichever is greater (after 2 minutes) Where, C = rated capacitance in $\mu$ F, V = rated DC working voltage in V																													
Tan $\delta$ (at 120 Hz, 20°C)	<table border="1"> <tr> <th>Rated Voltage</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>80</td> <td>100</td> </tr> <tr> <th>Tan<math>\delta</math> (max.)</th> <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> </table> <p>When the capacitance exceeds 1,000<math>\mu</math>F, 0.02 shall be added every 1,000<math>\mu</math>F increase.</p>	Rated Voltage	6.3	10	16	25	35	50	63	80	100	Tan $\delta$ (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																					
Tan $\delta$ (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"> <tr> <th>Rated Voltage</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>80</td> <td>100</td> </tr> <tr> <th rowspan="2">Impedance Ratio</th> <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>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> </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"> <tr> <th>Test Time</th> <td>2,000 Hrs for <math>\phi D \leq 6.3\text{mm}</math> &amp; <math>8 \times 6.5L</math> &amp; <math>10 \phi \times 7.7L</math>; 5,000 Hrs for <math>\phi D \geq 8\text{mm}</math></td> </tr> <tr> <th>Capacitance Change</th> <td>Within ± 30% of initial value</td> </tr> <tr> <th>Tan<math>\delta</math></th> <td>Less than 300% of specified value</td> </tr> <tr> <th>Leakage Current</th> <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 ~ 5,000 hours at 105°C.</p>	Test Time	2,000 Hrs for $\phi D \leq 6.3\text{mm}$ & $8 \times 6.5L$ & $10 \phi \times 7.7L$ ; 5,000 Hrs for $\phi D \geq 8\text{mm}$	Capacitance Change	Within ± 30% of initial value	Tan $\delta$	Less than 300% of specified value	Leakage Current	Within specified value																					
Test Time	2,000 Hrs for $\phi D \leq 6.3\text{mm}$ & $8 \times 6.5L$ & $10 \phi \times 7.7L$ ; 5,000 Hrs for $\phi D \geq 8\text{mm}$																													
Capacitance Change	Within ± 30% of initial value																													
Tan $\delta$	Less than 300% of specified value																													
Leakage Current	Within specified value																													
Shelf Life Test	<table border="1"> <tr> <th>Test Time</th> <td>1,000 Hrs</td> </tr> <tr> <th>Capacitance Change</th> <td>Within ± 30% of initial value</td> </tr> <tr> <th>Tan<math>\delta</math></th> <td>Less than 300% of specified value</td> </tr> <tr> <th>Leakage Current</th> <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 105°C without voltage applied.</p>	Test Time	1,000 Hrs	Capacitance Change	Within ± 30% of initial value	Tan $\delta$	Less than 300% of specified value	Leakage Current	Within specified value																					
Test Time	1,000 Hrs																													
Capacitance Change	Within ± 30% of initial value																													
Tan $\delta$	Less than 300% of specified value																													
Leakage Current	Within specified value																													
Ripple Current and Frequency Multipliers	<table border="1"> <tr> <th>Frequency (Hz)</th> <td>50, 60</td> <td>120</td> <td>1k</td> <td>10k up</td> </tr> <tr> <th>Multiplier</th> <td>0.60</td> <td>0.70</td> <td>0.85</td> <td>1.0</td> </tr> </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

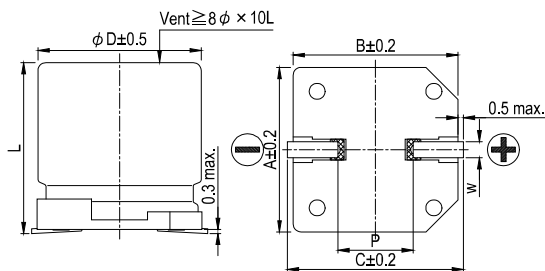
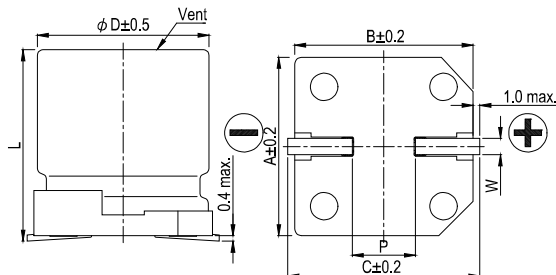


Fig. 2



### Lead Spacing and Diameter

Unit: mm

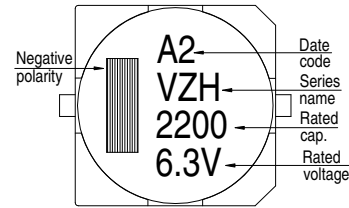
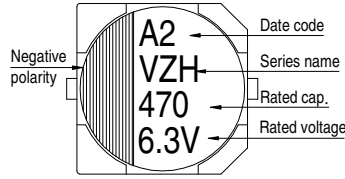
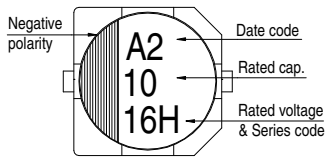
$\phi D$	L	A	B	C	W	P ± 0.2	Fig. No.
4	5.7 ± 0.3	4.3	4.3	5.1	0.5 ~ 0.8	1.0	1
5	5.7 ± 0.3	5.3	5.3	5.9	0.5 ~ 0.8	1.5	1
6.3	5.7 ± 0.3	6.6	6.6	7.2	0.5 ~ 0.8	2.0	1
6.3	7.7 ± 0.3	6.6	6.6	7.2	0.5 ~ 0.8	2.0	1
8	6.5 ± 0.3	8.3	8.3	9.0	0.5 ~ 0.8	2.3	1
8	10 ± 0.5	8.3	8.3	9.0	0.7 ~ 1.1	3.1	1
10	7.7 ± 0.3	10.3	10.3	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 <sub>DC</sub> )	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	2.9	60	
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 8×6.5	0.68 0.68	185 185		
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 8×6.5	0.36 0.36	280 280	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 8×6.5	0.36 0.36	280 280	8×10	0.17	450	8×10	0.17	450	10×10	0.18	553		
220	221	6.3×5.7 6.3×7.7	0.44 0.36	230 280	6.3×7.7 8×6.5	0.36 0.36	280 280	6.3×7.7	0.36	280	8×10	0.17	450	8×10	0.17	450	12.5×13.5	0.12	650		
330	331	8×6.5 8×10	0.36 0.17	280 450	8×10 10×7.7	0.17 0.17	450 450	8×10 10×7.7	0.17 0.17	450 450	8×10	0.17	450	10×10	0.09	670	12.5×13.5	0.12	650		
470	471	8×10 10×7.7	0.17 0.17	450 450	8×10 10×7.7	0.17 0.17	450 450	8×10 10×10	0.17 0.09	450 670	10×10	0.09	670	12.5×16	0.060	950	16×16.5	0.073	1,000		
680	681	8×10 10×7.7	0.17 0.17	450 450	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 18×16.5	0.073 0.066	1,000 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 16×21.5	0.048 0.038	1,500 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 16×21.5	0.054 0.038	1,260 1,630	18×16.5 16×21.5	0.048 0.038	1,500 1,630								
4,700	472	16×16.5	0.054	1,260	16×16.5	0.054	1,260	18×16.5 16×21.5	0.048 0.038	1,500 1,630											
6,800	682	18×16.5 16×21.5	0.048 0.038	1,500 1,630	18×16.5 16×21.5	0.048 0.038	1,500 1,630														
8,200	822	18×16.5 16×21.5	0.048 0.038	1,500 1,630	18×21.5	0.038	1,750														



Dimension:  $\phi D \times L$ (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 <sub>DC</sub> )		63V (1J)			80V (1K)			100V (2A)		
Cap. ( $\mu$ F)	Contents	$\phi D \times L$	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 $\mu$ F	$\pm 20\%$	6.3V	Carrier Tape	8 $\phi \times 10L$	General Purpose
<b>VZH</b>	<b>471</b>	<b>M</b>	<b>0J</b>	<b>TR</b>	<b>-</b>	<b>0810</b>
Series Name	Capacitance	Capacitance Tolerance	Rated Voltage	Package Type	Terminal Type	Case Size
						Application

Note: For more details, please refer to "Part Numbering System - SMD Type" on page 106.