

## VE Series

### Features

- 3  $\phi$  ~ 18  $\phi$ , 85°C, 2,000 hours assured
- Chip type large capacitance capacitors
- 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% (at 120 Hz, 20°C)																																																														
Leakage Current (at 20°C)	<table border="1"> <tr> <td>Rated Voltage</td> <td>6.3 ~ 100V</td> <td>160 ~ 450V</td> </tr> <tr> <td>Time</td> <td>after 2 minutes</td> <td>after 5 minutes</td> </tr> <tr> <td>Case size</td> <td>3 ~ 10 <math>\phi</math></td> <td>12.5 ~ 18 <math>\phi</math></td> </tr> <tr> <td>Leakage Current</td> <td>I = 0.01CV or 3<math>\mu</math>A, whichever is greater</td> <td>I = 0.03CV or 4<math>\mu</math>A, whichever is greater</td> </tr> </table>	Rated Voltage	6.3 ~ 100V	160 ~ 450V	Time	after 2 minutes	after 5 minutes	Case size	3 ~ 10 $\phi$	12.5 ~ 18 $\phi$	Leakage Current	I = 0.01CV or 3 $\mu$ A, whichever is greater	I = 0.03CV or 4 $\mu$ A, whichever is greater																																																		
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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> <td>Rated Voltage</td> <td>4</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160 ~ 250</td><td>400 ~ 450</td> </tr> <tr> <td>3 ~ 10 <math>\phi</math></td> <td>0.42</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><td>0.10</td><td>0.10</td><td>-</td><td>-</td> </tr> <tr> <td>12.5 ~ 18 <math>\phi</math></td> <td>-</td><td>0.38</td><td>0.34</td><td>0.30</td><td>0.26</td><td>0.22</td><td>0.18</td><td>0.14</td><td>0.10</td><td>0.20</td><td>0.25</td> </tr> </table>	Rated Voltage	4	6.3	10	16	25	35	50	63	100	160 ~ 250	400 ~ 450	3 ~ 10 $\phi$	0.42	0.28	0.24	0.20	0.14	0.12	0.10	0.10	0.10	-	-	12.5 ~ 18 $\phi$	-	0.38	0.34	0.30	0.26	0.22	0.18	0.14	0.10	0.20	0.25																										
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When the capacitance exceeds 1,000 $\mu$ F, 0.02 shall be added every 1,000 $\mu$ F increase.																																																															
Low Temperature Characteristics (at 120 Hz)	<p>Impedance ratio shall not exceed the values given in the table below.</p> <table border="1"> <tr> <td>Rated Voltage</td> <td></td> <td>4.0</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160 ~ 250</td><td>400 ~ 450</td> </tr> <tr> <td rowspan="4">Impedance Ratio</td> <td>Z(-25°C)</td> <td><math>\phi D &lt; 12.5</math></td> <td>7</td><td>4</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>-</td><td>-</td> </tr> <tr> <td>/Z(+20°C)</td> <td><math>\phi D \geq 12.5</math></td> <td>-</td><td>5</td><td>5</td><td>4</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td><td>6</td> </tr> <tr> <td>Z(-40°C)</td> <td><math>\phi D &lt; 12.5</math></td> <td>15</td><td>8</td><td>5</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>-</td><td>-</td> </tr> <tr> <td>/Z(+20°C)</td> <td><math>\phi D \geq 12.5</math></td> <td>-</td><td>14</td><td>12</td><td>10</td><td>5</td><td>4</td><td>3</td><td>3</td><td>6</td><td>10</td> </tr> </table>	Rated Voltage		4.0	6.3	10	16	25	35	50	63	100	160 ~ 250	400 ~ 450	Impedance Ratio	Z(-25°C)	$\phi D < 12.5$	7	4	4	3	2	2	2	2	-	-	/Z(+20°C)	$\phi D \geq 12.5$	-	5	5	4	2	2	2	2	3	6	Z(-40°C)	$\phi D < 12.5$	15	8	5	4	3	3	3	3	-	-	/Z(+20°C)	$\phi D \geq 12.5$	-	14	12	10	5	4	3	3	6	10
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* 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.																																																															
Shelf Life Test	Test time: 1,000 hours; other items are the same as those for the Endurance. The rated voltage shall be applied to the capacitors before the measurements for 160 ~ 450V (Refer to JIS C 5101-4 4.1).																																																														
Ripple Current and Frequency Multipliers	<table border="1"> <tr> <td></td> <td>Freq. (Hz)</td> <td>50</td> <td>120</td> <td>1k</td> <td>10k up</td> </tr> <tr> <td rowspan="2">Cap. (<math>\mu</math>F)</td> <td><math>\leq 1,000</math></td> <td>0.80</td> <td>1.00</td> <td>1.25</td> <td>1.40</td> </tr> <tr> <td>1,000 &lt; C <math>\leq</math> 10,000</td> <td>0.85</td> <td>1.00</td> <td>1.15</td> <td>1.25</td> </tr> </table>		Freq. (Hz)	50	120	1k	10k up	Cap. ( $\mu$ F)	$\leq 1,000$	0.80	1.00	1.25	1.40	1,000 < C $\leq$ 10,000	0.85	1.00	1.15	1.25																																													
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### Diagram of Dimensions

Fig. 1

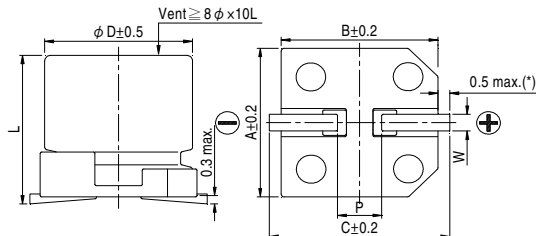
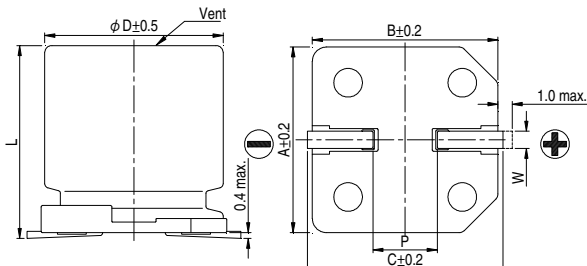


Fig. 2



### Lead Spacing and Diameter

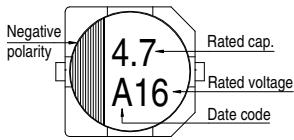
Unit: mm

$\phi D$	L	A	B	C	W	P $\pm$ 0.2	Fig. No.
3	5.3 $\pm$ 0.2	3.3	3.3	4.1	0.45 ~ 0.75	0.8	1
4	5.3 $\pm$ 0.2	4.3	4.3	5.1	0.5 ~ 0.8	1.0	1
5	5.3 $\pm$ 0.2	5.3	5.3	5.9	0.5 ~ 0.8	1.5	1
6.3	5.3 $\pm$ 0.2	6.6	6.6	7.2	0.5 ~ 0.8	2.0	1
6.3	7.7 $\pm$ 0.3	6.6	6.6	7.2	0.5 ~ 0.8	2.0	1
8	6.5 $\pm$ 0.3	8.3	8.3	9.0	0.5 ~ 0.8	2.3	1
8	10 $\pm$ 0.5	8.3	8.3	9.0	0.7 ~ 1.1	3.1	1
10	7.7 $\pm$ 0.3	10.3	10.3	11.0	0.7 ~ 1.3	4.7	1
10	10 $\pm$ 0.5	10.3	10.3	11.0	0.7 ~ 1.3	4.7	1
12.5	13.5 $\pm$ 0.5	13.0	13.0	13.7	1.1 ~ 1.4	4.4	2
12.5	16 $\pm$ 0.5	13.0	13.0	13.7	1.1 ~ 1.4	4.4	2
16	16.5 $\pm$ 0.5	17.0	17.0	18.0	1.1 ~ 1.4	6.4	2
16	21.5 $\pm$ 0.5	17.0	17.0	18.0	1.1 ~ 1.4	6.4	2
18	16.5 $\pm$ 0.5	19.0	19.0	20.0	1.1 ~ 1.4	6.4	2
18	21.5 $\pm$ 0.5	19.0	19.0	20.0	1.1 ~ 1.4	6.4	2

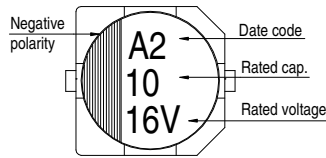
(\*): For 3 ~ 6.3  $\phi$  is 0.4 max.

### Marking

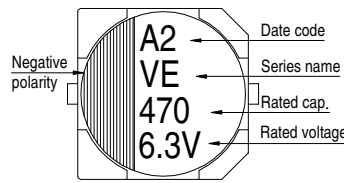
φ D = 3 mm



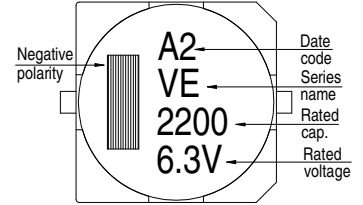
φ D = 4 ~ 6.3 mm



φ D = 8 ~ 10 mm



φ D ≥ 12.5 mm



Dimension: φ D × L(mm)

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

### Dimension and Permissible Ripple Current

Rated Volt. (Voc)	Cap. (μF)	Contents	4V (0G)		6.3V (0J)		10V (1A)		16V (1C)		25V (1E)		35V (1V)		50V (1H)		63 (1J)				
			φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA			
1	010															4×5.3	10	4×5.3	8		
2.2	2R2															4×5.3	14	4×5.3	12		
3.3	3R3										3×5.3	14	3×5.3	14	4×5.3	17	5×5.3	22			
4.7	4R7							3×5.3	14	3×5.3	14	4×5.3	26	4×5.3	26	4×5.3	20	5×5.3	25		
10	100				3×5.3	16	4×5.3	26	4×5.3	26	5×5.3	44	5×5.3	44	5×5.3	35	6.3×5.3	40	8×6.5	46	
22	220		3×5.3	16	4×5.3	26	5×5.3	44	4×5.3	30	5×5.3	47	5×5.3	47	6.3×5.3	50	6.3×5.3	65	8×10	139	
33	330		4×5.3	31	4×5.3	31	4×5.3	31	5×5.3	55	5×5.3	55	6.3×5.3	67	6.3×7.7	75	6.3×7.7	85	8×10	139	
47	470		4×5.3	34	4×5.3	34	5×5.3	55	5×5.3	55	6.3×5.3	75	6.3×5.3	75	6.3×7.7	98	6.3×7.7	105	10×10	200	
68	680		5×5.3	58	5×5.3	58	6.3×5.3	89	6.3×5.3	89	6.3×5.3	89	6.3×7.7	109	8×6.5	190	8×10	190	10×10	226	
100	101		5×5.3	58	6.3×5.3	89	6.3×5.3	89	6.3×5.3	89	6.3×7.7	109	6.3×7.7	109	8×10	190	8×10	190	10×10	226	
150	151													10×7.7	252						
220	221		6.3×5.3	89	6.3×5.3	89	6.3×7.7	124	6.3×7.7	124	8×10	270	8×10	270	10×10	320	12.5×13.5			500	
330	331		6.3×7.7	124	6.3×7.7	124	8×6.5	190	8×10	290	8×10	290	10×7.7	290	10×10	400	12.5×13.5	600	12.5×16	600	
470	471		8×10	290	8×10	290	10×7.7	290	10×10	400	10×10	400	10×10	400	12.5×13.5	680	12.5×16	740	16×16.5	850	
680	681				10×7.7	290	10×10	410	10×10	410	12.5×13.5	680	12.5×13.5	680	16×16.5	1,000	18×16.5			1,100	
1,000	102				10×10	430	10×10	430	12.5×13.5	750	12.5×13.5	750	16×16.5	1,100	18×16.5	1,350	16×21.5				
2,200	222				12.5×13.5	890	12.5×13.5	890	16×16.5	1,100	16×16.5	1,100	18×16.5	1,450	16×21.5	1,500					
3,300	332				12.5×16	1,000	16×16.5	1,300	16×16.5	1,300	18×16.5	1,450	16×21.5	1,500	18×21.5	1,750					
4,700	472				16×16.5	1,400	16×16.5	1,400	18×16.5	1,600	16×21.5	1,650	18×21.5	1,750							
6,800	682				18×16.5	1,700	16×21.5	1,750	18×16.5	1,700	16×21.5	1,750	18×21.5	2,000							
10,000	103				18×21.5	2,000	18×21.5	2,000													

Rated Volt. (Voc)	Cap. (μF)	Contents	100V (2A)		160V (2C)		200V (2D)		250V (2E)		400V (2G)		450V (2W)	
			φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA	φ D×L	mA
4.7	4R7										12.5×13.5	120	12.5×13.5	120
10	100		8×10	90							12.5×13.5	150	12.5×13.5	130
22	220		8×10	90			12.5×13.5	240	12.5×13.5	150	16×16.5	140	16×16.5	140
33	330		10×10	120	12.5×13.5	290	12.5×16	310	12.5×16	240	16×16.5	140	18×16.5	180
47	470		10×10	120	12.5×16	370	16×16.5	420	16×16.5	340	18×16.5	280	18×21.5	250
68	680		12.5×13.5	380	16×16.5	500	16×16.5	420	18×16.5	440	18×21.5	350		
100	101		12.5×13.5	440	18×16.5	650	18×16.5	550	18×16.5	450				
220	221		16×16.5	600										
330	331		18×16.5	780										
			16×21.5	850										

### Part Numbering System

VE Series    470μF    ±20%    6.3V    Carrier Tape    8φ×10L    Pb-free and PET coating case

**VE-**    **471**    **M**    **0J**    **TR**    -    **0810**

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.