

## 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 120Hz, 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																								
	Rated Voltage	6.3 ~ 100V	160 ~ 450V																																		
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Leakage Current	I = 0.01CV or 3 $\mu$ A, whichever is greater	I = 0.03CV or 4 $\mu$ A, whichever is greater																																			
Where, C = rated capacitance in $\mu$ F, V = rated DC working voltage in V																																					
Tan $\delta$ (at 120Hz, 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
	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																										
When the capacitance exceeds 1,000 $\mu$ F, 0.02 shall be added every 1,000 $\mu$ F increase.																																					
Low Temperature Characteristics (at 120Hz)	Impedance ratio shall not exceed the values given in the table below.																																				
	Impedance Ratio	Rated Voltage	4.0	6.3	10	16	25	35	50	63	100	160 ~ 250	400 ~ 450																								
		Z(-25°C) $\phi$ D < 12.5	7	4	4	3	2	2	2	2	2	-	-																								
		/Z(+20°C) $\phi$ D $\geq$ 12.5	-	5	5	4	2	2	2	2	2	3	6																								
Z(-40°C) $\phi$ D < 12.5		15	8	5	4	3	3	3	3	3	-	-																									
/Z(+20°C) $\phi$ D $\geq$ 12.5	-	14	12	10	5	4	3	3	3	6	10																										
Endurance	Test Time	2,000 Hrs																																			
	Capacitance Change	Within ±20% of initial value (4V: ±30%)																																			
	Tan $\delta$	Less than 200% of specified value (4V: < 300%)																																			
	Leakage Current	Within specified value																																			
* 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	Freq. (Hz)		50	120	1k	10k up																															
	Cap. ( $\mu$ F)	Under 1,000	0.80	1.00	1.25	1.40																															
		1,000 < C $\leq$ 10,000	0.85	1.00	1.15	1.25																															

### Diagram of Dimensions

Fig. 1

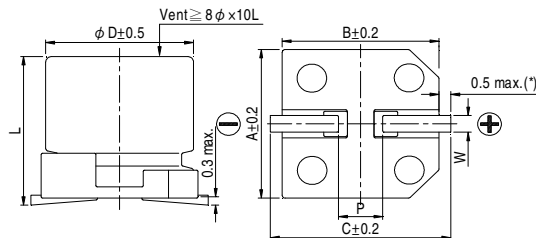
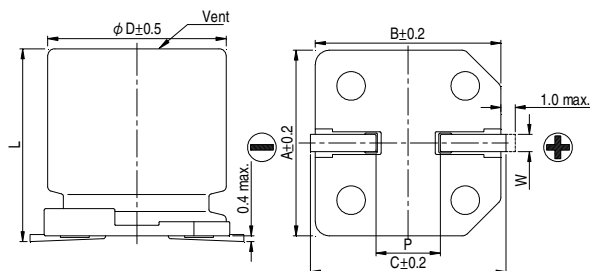


Fig. 2



### Lead Spacing and Diameter

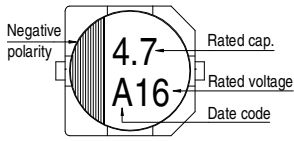
Unit: mm

$\phi$ 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

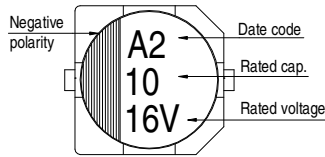
(\*): For 3 ~ 6.3  $\phi$  is 0.4 max.

### Marking

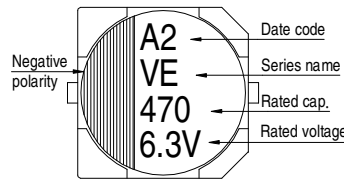
$\phi D = 3 \text{ mm}$



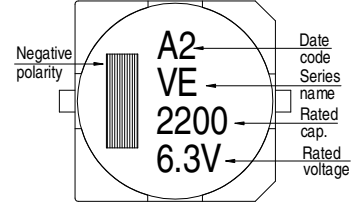
$\phi D = 4 \sim 6.3 \text{ mm}$



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



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



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

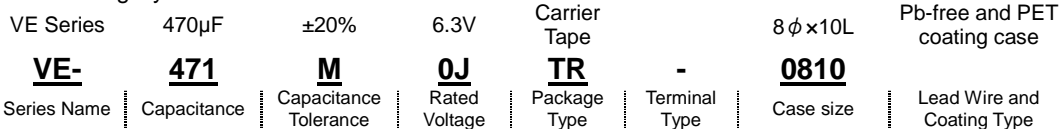
Ripple Current: mA/rms at 120 Hz, 85°C

### Dimension and Permissible Ripple Current

V. DC $\mu\text{F}$	Contents	4V (0G)		6.3V (0J)		10V (1A)		16V (1C)		25V (1E)		35V (1V)		50V (1H)		63 (1J)	
		$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA
1	010													4x5.3	10	4x5.3	8
2.2	2R2													4x5.3	14	4x5.3	12
3.3	3R3									3x5.3	14	3x5.3	14	4x5.3	17	5x5.3	22
4.7	4R7					3x5.3	14	3x5.3	14	4x5.3	26	4x5.3	26	4x5.3	20	5x5.3	25
10	100			3x5.3	16	4x5.3	26	4x5.3	26	5x5.3	44	5x5.3	44	5x5.3	35	6.3x5.3 8x6.5	40 46
22	220	3x5.3	16	4x5.3	26	5x5.3	44	4x5.3 5x5.3	30 44	5x5.3 6.3x5.3	47 59	5x5.3 6.3x5.3	47 59	6.3x5.3 6.3x7.7	50 65	8x10	139
33	330	4x5.3	31	4x5.3	31	4x5.3 5x5.3	31 55	5x5.3	55	5x5.3 6.3x5.3	55 67	6.3x5.3 6.3x7.7	67 85	6.3x7.7 8x6.5	75 95	8x10	139
47	470	4x5.3	34	4x5.3 5x5.3	34 55	6.3x5.3	75	5x5.3 6.3x5.3	55 75	6.3x5.3 6.3x7.7	75 98	6.3x7.7 8x6.5	98 105	6.3x7.7 8x10	75 190	10x10	200
68	680	5x5.3	58	5x5.3 6.3x5.3	58 89	6.3x5.3	89	6.3x5.3	89	6.3x7.7	109	6.3x7.7	109	8x10	190	10x10	226
100	101	5x5.3 6.3x5.3	58 89	6.3x5.3	89	6.3x5.3 6.3x7.7	89 109	6.3x5.3 6.3x7.7 8x6.5	89 109 125	6.3x7.7 8x6.5	109 125	8x10	252	8x10	190	10x10	226
150	151											10x7.7	252				
220	221	6.3x5.3 6.3x7.7	89 124	6.3x5.3 6.3x7.7	89 124	6.3x7.7 8x6.5 8x10	124 175 270	6.3x7.7 8x10	124 270	8x10 10x7.7	270 270	8x10 10x10	270 370	10x10	320	12.5x13.5	500
330	331	6.3x7.7	124	6.3x7.7 8x6.5	124 190	8x10	290	8x10 10x7.7	290 290	10x10	400	10x10	400	12.5x13.5	600	12.5x16	600
470	471	8x10	290	8x10	290	10x7.7 10x10	290 400	10x10	400	10x10	400	12.5x13.5	680	12.5x16	740	16x16.5	850
680	681			10x7.7	290	10x10	410	10x10	410	12.5x13.5	750	12.5x13.5	750	16x16.5	1,000	18x16.5	1,100
1,000	102			10x10	430	10x10	430	12.5x13.5	750	12.5x13.5	750	16x16.5	1,100	18x16.5 16x21.5	1,350 1,400		
2,200	222			12.5x13.5	890	12.5x13.5	890	16x16.5	1,100	16x16.5	1,100	18x16.5 16x21.5	1,450 1,500				
3,300	332			12.5x16	1,000	16x16.5	1,300	16x16.5	1,300	18x16.5 16x21.5	1,450 1,500	18x21.5	1,750				
4,700	472			16x16.5	1,400	16x16.5	1,400	18x16.5 16x21.5	1,600 1,650	18x21.5	1,750						
6,800	682			18x16.5 16x21.5	1,700 1,750	18x16.5 16x21.5	1,700 1,750	18x21.5	2,000								
10,000	103			18x21.5	2,000	18x21.5	2,000										

V. DC $\mu\text{F}$	Contents	100V (2A)		160V (2C)		200V (2D)		250V (2E)		400V (2G)		450V (2W)	
		$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA
4.7	4R7									12.5x13.5	120	12.5x13.5	120
10	100	8x10	90					12.5x13.5	150	12.5x13.5	120	12.5x16	130
22	220	8x10	90			12.5x13.5	240	12.5x13.5	150	16x16.5	140	16x16.5	140
33	330	10x10	120	12.5x13.5	290	12.5x16	310	12.5x16	240	16x16.5	140	18x16.5	180
47	470	10x10	120	12.5x16	370	16x16.5	420	16x16.5	340	18x16.5	280	18x21.5	250
68	680	12.5x13.5	380	16x16.5	500	16x16.5	420	18x16.5 16x21.5	440 450	18x21.5	350		
100	101	12.5x13.5	440	18x16.5 16x21.5	650 690	18x16.5 16x21.5	550 590	18x21.5	490				
220	221	16x16.5	600										
330	331	18x16.5 16x21.5	780 850										

### Part Numbering System



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