

## 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																								
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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 & 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 ± 0.2	Fig. No.
3	5.3 ± 0.2	3.3	3.3	4.1	0.45 ~ 0.75	0.8	1
4	5.3 ± 0.2	4.3	4.3	5.1	0.5 ~ 0.8	1.0	1
5	5.3 ± 0.2	5.3	5.3	5.9	0.5 ~ 0.8	1.5	1
6.3	5.3 ± 0.2	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	8.4	8.4	9.0	0.5 ~ 0.8	2.3	1
8	10 ± 0.5	8.4	8.4	9.0	0.7 ~ 1.1	3.1	1
10	7.7 ± 0.3	10.4	10.4	11.0	0.7 ~ 1.3	4.7	1
10	10 ± 0.5	10.4	10.4	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

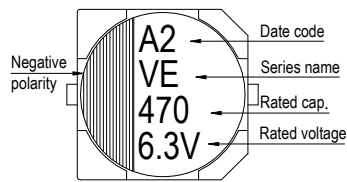
$\phi D = 3 \text{ mm}$



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



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



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



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

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

## Dimension & Permissible Ripple Current

$\mu\text{F}$	V. DC 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													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 8×6.5	40 46		
22	220	3×5.3	16	4×5.3	26	5×5.3	44	4×5.3 5×5.3	30 44	5×5.3 6.3×5.3	47 59	5×5.3 6.3×5.3	47 59	6.3×5.3 6.3×7.7	50 65	8×10	139		
33	330	4×5.3	31	4×5.3	31	4×5.3 5×5.3	31 55	5×5.3	55	5×5.3 6.3×5.3	55 67	6.3×5.3 6.3×7.7	67 85	6.3×7.7 8×6.5	75 95	8×10	139		
47	470	4×5.3	34	4×5.3 5×5.3	34 55	6.3×5.3	75	5×5.3 6.3×5.3	55 75	6.3×5.3 6.3×7.7	75 98	6.3×7.7 8×6.5	98 105	6.3×7.7 8×10	75 190	10×10	200		
68	680	5×5.3	58	5×5.3 6.3×5.3	58 89	5×5.3 6.3×5.3	58 89	6.3×5.3	89	6.3×7.7	109	6.3×7.7	109	8×10	190	10×10	226		
100	101	5×5.3 6.3×5.3	58 89	6.3×5.3	89	6.3×5.3 6.3×7.7	89 109	6.3×5.3 6.3×7.7 8×6.5	89 109 125	6.3×7.7	109	8×6.5	145	8×10	252	8×10	190	10×10	226
150	151												10×7.7	252					
220	221	6.3×5.3 6.3×7.7	89 124	6.3×5.3 6.3×7.7	89 124	6.3×7.7 8×6.5 8×10	124 175 270	6.3×7.7 8×10	124 270	8×10 10×7.7	270 270	8×10 10×10	270 370	10×10	320	12.5×13.5	500		
330	331	6.3×7.7	124	6.3×7.7 8×6.5	124 190	8×10	290	8×10 10×7.7	290 290	10×10	400	10×10	400	12.5×13.5	600	12.5×16	600		
470	471	8×10	290	8×10	290	10×7.7 10×10	290 400	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 16×21.5	1,350 1,400				
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 16×21.5	1,450 1,500						
3,300	332			12.5×16	1,000	16×16.5	1,300	16×16.5	1,300	18×16.5 16×21.5	1,450 1,500	18×21.5	1,750						
4,700	472			16×16.5	1,400	16×16.5	1,400	18×16.5 16×21.5	1,600 1,650	18×21.5	1,750								
6,800	682			18×16.5 16×21.5	1,700 1,750	18×16.5 16×21.5	1,700 1,750	18×21.5	2,000										
10,000	103			18×21.5	2,000	18×21.5	2,000												

$\mu\text{F}$	V. DC 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									12.5×13.5	120	12.5×13.5	120
10	100	8×10	90					12.5×13.5	150	12.5×13.5	120	12.5×16	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 16×21.5	440 450	18×21.5	350		
100	101	12.5×13.5	440	18×16.5 16×21.5	650 690	18×16.5 16×21.5	550 590	18×21.5	490				
220	221	16×16.5	600										
330	331	18×16.5 16×21.5	780 850										

## Part Numbering System

VE series    470 $\mu\text{F}$      $\pm 20\%$     6.3V    Carrier Tape    8 $\phi$ ×10L    Pb-free and PET coating case

**VE-**    **471**    **M**    **OJ**    **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 12.

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