

VE Series

Features

- 3 ϕ ~ 18 ϕ , 85°C, 2,000 hours assured
 - Chip type large capacitance capacitors
 - Designed for surface mounting on high density PC board
 - RoHS compliance
- AEC-Q200 Qualified Parts Available: Use "LS" or "KS" Suffix



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 colspan="2">after 2 minutes</td> </tr> <tr> <td>Case size</td> <td>3 ~ 10 ϕ</td> <td>12.5 ~ 18 ϕ</td> </tr> <tr> <td>Leakage Current</td> <td>I = 0.01CV or 3μA, whichever is greater</td> <td>I = 0.03CV or 4μA, whichever is greater</td> </tr> </table> <p>Where, C = rated capacitance in μF, V = rated DC working voltage in V</p>	Rated Voltage	6.3 ~ 100V	160 ~ 450V	Time	after 2 minutes		Case size	3 ~ 10 ϕ	12.5 ~ 18 ϕ	Leakage Current	I = 0.01CV or 3 μ A, whichever is greater	I = 0.03CV or 4 μ A, whichever is greater																																																		
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Tan δ (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 ϕ</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 ϕ</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> <p>When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase.</p>	Rated Voltage	4	6.3	10	16	25	35	50	63	100	160 ~ 250	400 ~ 450	3 ~ 10 ϕ	0.42	0.28	0.24	0.20	0.14	0.12	0.10	0.10	0.10	-	-	12.5 ~ 18 ϕ	-	0.38	0.34	0.30	0.26	0.22	0.18	0.14	0.10	0.20	0.25																										
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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 colspan="2">Rated Voltage</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>ϕ D < 12.5</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>ϕ D \geq 12.5</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>ϕ D < 12.5</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>ϕ D \geq 12.5</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)	ϕ D < 12.5	7	4	4	3	2	2	2	2	-	-	/Z(+20°C)	ϕ D \geq 12.5	-	5	5	4	2	2	2	2	3	6	Z(-40°C)	ϕ D < 12.5	15	8	5	4	3	3	3	3	-	-	/Z(+20°C)	ϕ D \geq 12.5	-	14	12	10	5	4	3	3	6	10
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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 rowspan="2">Cap. (μF)</td> <td>Freq. (Hz)</td> <td>50</td> <td>120</td> <td>1k</td> <td>10k up</td> </tr> <tr> <td>\leq 1,000</td> <td>0.80</td> <td>1.00</td> <td>1.25</td> <td>1.40</td> </tr> <tr> <td>1,000 < C \leq 10,000</td> <td></td> <td>0.85</td> <td>1.00</td> <td>1.15</td> <td>1.25</td> </tr> </table>	Cap. (μ F)	Freq. (Hz)	50	120	1k	10k up	\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

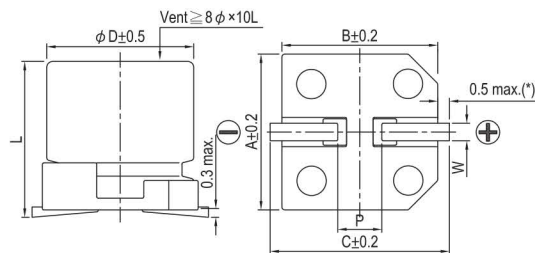
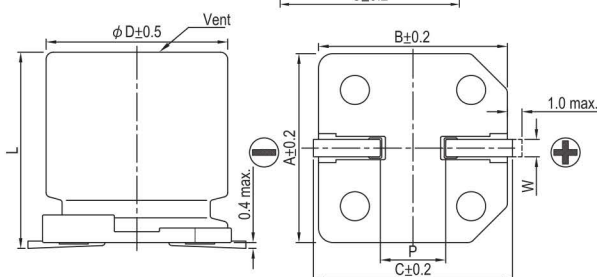


Fig. 2



Lead Spacing and Diameter

Unit: mm

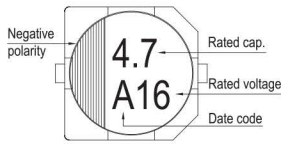
ϕ D	L	A	B	C	W	P ± 0.2	Fig. No.
3	5.3 ± 0.2	3.3	3.3	4.1	0.45 ~ 0.75	0.8	1
4	5.3 ± 0.2	4.3	4.3	5.1	0.5 ~ 0.8	1.0	1
5	5.3 ± 0.2	5.3	5.3	5.9	0.5 ~ 0.8	1.5	1
6.3	5.3 ± 0.2	6.6	6.6	7.2	0.5 ~ 0.8	2.0	1
6.3	7.7 ± 0.3	6.6	6.6	7.2	0.5 ~ 0.8	2.0	1
8	6.5 ± 0.3	8.3	8.3	9.0	0.5 ~ 0.8	2.3	1
8	10 ± 0.5	8.3	8.3	9.0	0.7 ~ 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

(*): For 3 ~ 6.3 ϕ is 0.4 max.

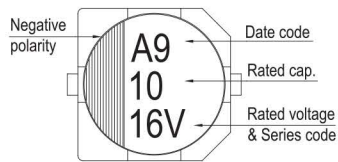
SMD Aluminum Electrolytic Capacitors

Marking

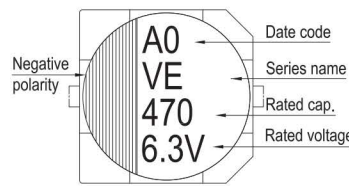
φ D = 3 mm



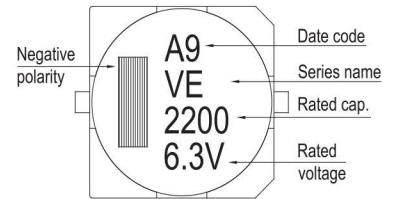
φ D = 4 ~ 6.3 mm



φ D = 8 ~ 10 mm



φ D ≥ 12.5 mm



Dimension and Permissible Ripple Current

Dimension: φ D × L(mm)

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

Rated Volt. (Vdc)	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 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	6.3×5.3 6.3×7.7	75 98	6.3×7.7 8×6.5	98 105	8×10	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 8×6.5	109 125	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	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	1,600 1,650	18×21.5	1,750						
4,700	472			16×16.5	1,400	16×16.5	1,400	18×16.5 16×21.5	2,000										
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												

Rated Volt. (Vdc)	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	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 470μF ±20% 6.3V Carrier Tape 8 φ × 10L Pb-free and PET coating case

VE- **471** **M** **OJ** **TR** - **0810** **S**

Series Name Capacitance Tolerance Rated Voltage Package Type Terminal Type Case size Lead Wire and Coating Type

For automotive application, please replace "S" suffix with an "LS" or "KS" suffix, for non-safety critical and safety critical applications respectively

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