



**THE DATASHEET OF
VE-222M1ETR-1616S**



VE Series

Features

- 3φ ~ 18φ, 85°C, 2,000 hours assured
- Chip type large capacitance capacitors
- Designed for surface mounting on high density PC board
- RoHS compliance
- AEC-Q200 Parts Available: Replace “S” Suffix with “KS” or “LS” 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 colspan="2">6.3 ~ 100V</td> <td>160 ~ 450V</td> </tr> <tr> <td>Time</td> <td colspan="2">after 2 minutes</td> <td>after 5 minutes</td> </tr> <tr> <td>Case size</td> <td>3 ~ 10φ</td> <td>12.5 ~ 18φ</td> <td>12.5 ~ 18φ</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> <td>I = 0.04CV +100μA</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		after 5 minutes	Case size	3 ~ 10φ	12.5 ~ 18φ	12.5 ~ 18φ	Leakage Current	I = 0.01CV or 3μA, whichever is greater	I = 0.03CV or 4μA, whichever is greater	I = 0.04CV +100μA																																														
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Tanδ (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 ~ 10φ</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 ~ 18φ</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 ~ 10φ	0.42	0.28	0.24	0.20	0.14	0.12	0.10	0.10	0.10	-	-	12.5 ~ 18φ	-	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) φD < 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>2</td><td>-</td><td>-</td> </tr> <tr> <td>/Z(+20°C) φD ≥ 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>2</td><td>3</td><td>6</td> </tr> <tr> <td>Z(-40°C) φD < 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>3</td><td>-</td><td>-</td> </tr> <tr> <td>/Z(+20°C) φD ≥ 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>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) φD < 12.5	7	4	4	3	2	2	2	2	2	-	-	/Z(+20°C) φD ≥ 12.5	-	5	5	4	2	2	2	2	2	3	6	Z(-40°C) φD < 12.5	15	8	5	4	3	3	3	3	3	-	-	/Z(+20°C) φD ≥ 12.5	-	14	12	10	5	4	3	3	3	6	10
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		/Z(+20°C) φD ≥ 12.5	-	5	5	4	2	2	2	2	2	3	6																																																		
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Endurance	<table border="1"> <tr> <td>Test Time</td> <td>2,000 Hrs</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±20% of initial value (4V: ±30%)</td> </tr> <tr> <td>Tanδ</td> <td>Less than 200% of specified value (4V: <300%)</td> </tr> <tr> <td>Leakage Current</td> <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 hours at 85°C.</p>	Test Time	2,000 Hrs	Capacitance Change	Within ±20% of initial value (4V: ±30%)	Tanδ	Less than 200% of specified value (4V: <300%)	Leakage Current	Within specified value																																																						
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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>≤ 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 ≤ 10,000</td> <td></td> <td>0.85</td><td>1.00</td><td>1.15</td><td>1.25</td> </tr> </table>	Cap. (μF)	Freq. (Hz)	50	120	1k	10k up	≤ 1,000	0.80	1.00	1.25	1.40	1,000 < C ≤ 10,000		0.85	1.00	1.15	1.25																																													
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Diagram of Dimensions

Fig. 1

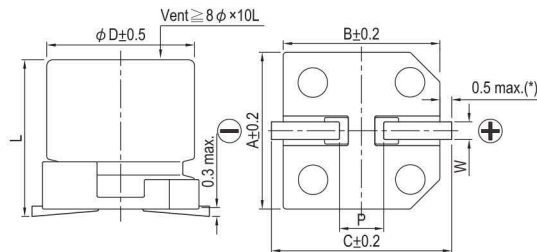
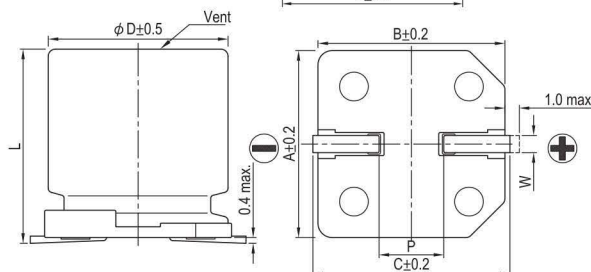


Fig. 2



Lead Spacing and Diameter

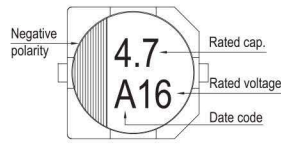
Unit: mm

φD	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

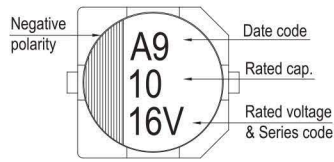
(*): For 3 ~ 6.3φ is 0.4 max.

Marking

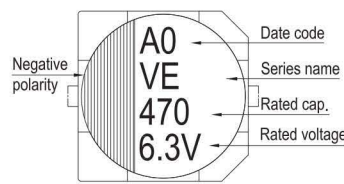
φ D = 3 mm



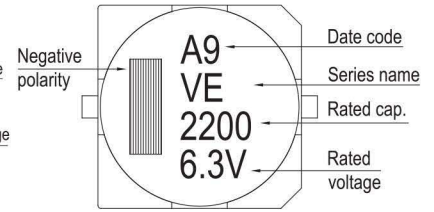
φ D = 4 ~ 6.3 mm



φ D = 8 ~ 10 mm



φ D ≥ 12.5 mm



Dimension: φ D × L (mm)

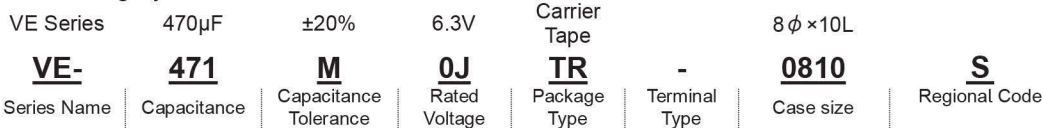
Ripple Current: mA/rms at 120 Hz, 85°C

Dimension and Permissible Ripple Current

Rated Volt. (V _{DC}) 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	6.3×7.7 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 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	270 270	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											

Rated Volt. (V _{DC}) 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



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

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