

## VLW Series

### Features

- 12.5 φ ~ 16 φ, 125°C, 2,000 hours assured
- Suitable for automotive application
- Peak acceleration: 50G / 30G
- RoHS Compliance

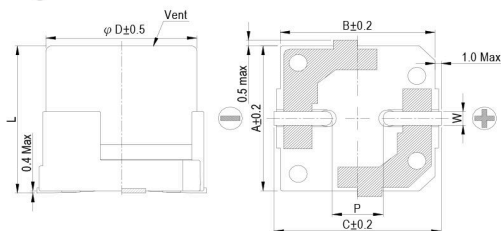


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### Specifications

Items	Performance																				
Category Temperature Range	-40°C ~ +125°C																				
Capacitance Tolerance	±20% (at 120Hz, 20°C)																				
Leakage Current (at 20°C)	I = 0.01CV or 3 (μA) whichever is greater (after 2 minutes) Where, C = rated capacitance in μF V = rated DC working voltage in V																				
Tanδ (at 120Hz, 20°C)	<table border="1"> <tr> <th>Rated Voltage</th> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <th>Tanδ (max)</th> <td>0.32</td> <td>0.24</td> <td>0.21</td> <td>0.18</td> <td>0.15</td> </tr> </table> <p>When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase.</p>	Rated Voltage	10	16	25	35	50	Tanδ (max)	0.32	0.24	0.21	0.18	0.15								
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Tanδ (max)	0.32	0.24	0.21	0.18	0.15																
Low Temperature Characteristics (at 120Hz)	<p>Impedance ratio shall not exceed the values given in the table below.</p> <table border="1"> <tr> <th>Rated Voltage</th> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <th>Impedance</th> <td>Z(-25°C)/Z(+20°C)</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <th>Ratio</th> <td>Z(-40°C)/Z(+20°C)</td> <td>5</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	Rated Voltage	10	16	25	35	50	Impedance	Z(-25°C)/Z(+20°C)	3	2	2	2	2	Ratio	Z(-40°C)/Z(+20°C)	5	4	3	3	3
Rated Voltage	10	16	25	35	50																
Impedance	Z(-25°C)/Z(+20°C)	3	2	2	2	2															
Ratio	Z(-40°C)/Z(+20°C)	5	4	3	3	3															
Endurance	<table border="1"> <tr> <th>Test Time</th> <td>2,000 Hrs</td> </tr> <tr> <th>Capacitance Change</th> <td>Within ±30% of initial value</td> </tr> <tr> <th>Tanδ</th> <td>Less than 300% of specified value</td> </tr> <tr> <th>Leakage Current</th> <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 125°C.</p>	Test Time	2,000 Hrs	Capacitance Change	Within ±30% of initial value	Tanδ	Less than 300% of specified value	Leakage Current	Within specified value												
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Shelf Life Test	<table border="1"> <tr> <th>Test Time</th> <td>1,000 Hrs</td> </tr> <tr> <th>Capacitance Change</th> <td>Within ±30% of initial value</td> </tr> <tr> <th>Tanδ</th> <td>Less than 300% of specified value</td> </tr> <tr> <th>Leakage Current</th> <td>Within specified value</td> </tr> </table> <p>* The above Specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 125°C without voltage applied.</p>	Test Time	1,000 Hrs	Capacitance Change	Within ±30% of initial value	Tanδ	Less than 300% of specified value	Leakage Current	Within specified value												
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Ripple Current & Frequency Multipliers	<table border="1"> <tr> <th rowspan="2">Cap.(μF)</th> <th colspan="5">Frequency(Hz)</th> </tr> <tr> <th>50, 60</th> <th>120</th> <th>1k</th> <th>10k up</th> </tr> <tr> <td>Under 330</td> <td>0.80</td> <td>1.0</td> <td>1.25</td> <td>1.40</td> </tr> <tr> <td>330 &lt; C ≤ 2,200</td> <td>0.85</td> <td>1.0</td> <td>1.20</td> <td>1.30</td> </tr> </table>	Cap.(μF)	Frequency(Hz)					50, 60	120	1k	10k up	Under 330	0.80	1.0	1.25	1.40	330 < C ≤ 2,200	0.85	1.0	1.20	1.30
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Vibration	<p>Peak acceleration: 50G Frequency: 5 to 2,000 Hz reciprocation for 20 min. Direction and duration of vibration: 3 orthogonal directions mutually each for 4 Hrs.</p> <p>Peak to peak amplitude: 1.5mm</p>																				

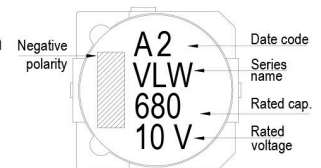
### Diagram of Dimensions



### Marking

#### Lead Spacing and Diameter

		Unit: mm				
φ D	L	A	B	C	W	P ± 0.2
12.5	13.5 ± 0.5	13.0	13.5	14.5	1.1 ~ 1.4	4.4
12.5	16 ± 0.5	13.0	13.5	14.5	1.1 ~ 1.4	4.4
16	16.5 ± 0.5	16.5	17.0	18.2	1.1 ~ 1.4	6.4



### Dimension & Permissible Ripple Current

Dimension: φ D × L (mm)

Ripple Current: mA/rms at 120 Hz, 125°C

μF	V. DC Contents	10V (1A)		16V (1C)		25V (1E)		35V (1V)		50V (1H)	
		φ D × L	mA	φ D × L	mA	φ D × L	mA	φ D × L	mA	φ D × L	mA
100	101									12.5×13.5	380
220	221							12.5×13.5	380	12.5×16	430
330	331			12.5×13.5	500	12.5×13.5	500	16×16.5	680	16×16.5	680
470	471	12.5×13.5	500	12.5×13.5	500	12.5×13.5	500	16×16.5	680	16×16.5	680
680	681	12.5×13.5	500	12.5×13.5	500	12.5×16	600	16×16.5	680		
1,000	102	12.5×16	600	12.5×16	600	16×16.5	680				
1,500	152	12.5×16	600	16×16.5	680						
2,200	222	16×16.5	680								

### Part Numbering System

VLW series	470μF	±20%	16V	Carrier Tape	Anti-vibration structure (30G)	12.5 φ × 13.5L	Pb-free and PET coating case
<b>VLW</b>	<b>471</b>	<b>M</b>	<b>1C</b>	<b>TR</b>	<b>K</b>	<b>1313</b>	
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.