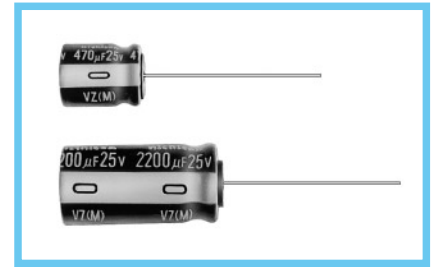
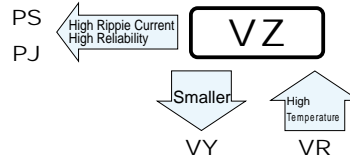


## VZ series Wide Temperature Range



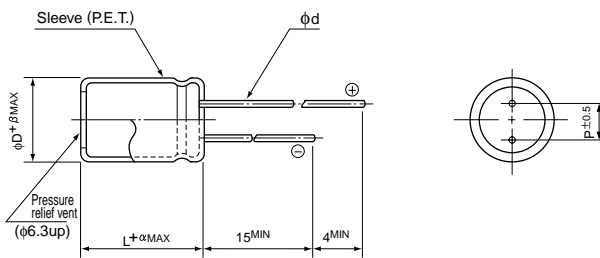
- Small case sizes as same as VR series, but operating over wide temperature range of  $-55$  to  $+105^{\circ}\text{C}$ .
- Adapted to the RoHS directive (2002/95/EC).



### Specifications

Item	Performance Characteristics																																						
Category Temperature Range	$-55$ to $+105^{\circ}\text{C}$ (6.3 to 100V), $-40$ to $+105^{\circ}\text{C}$ (160 to 400V), $-25$ to $+105^{\circ}\text{C}$ (450V)																																						
Rated Voltage Range	6.3 to 450V																																						
Rated Capacitance Range	0.1 to 33000 $\mu\text{F}$																																						
Capacitance Tolerance	$\pm 20\%$ at 120Hz, $20^{\circ}\text{C}$																																						
Leakage Current	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3 to 100</th> <th>160 to 450</th> </tr> </thead> <tbody> <tr> <td>After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (<math>\mu\text{A}</math>), whichever is greater.</td> <td></td> <td>After 1 minute's application of rated voltage, CV <math>\leq 1000</math>: I = 0.1CV+40 (<math>\mu\text{A}</math>) or less</td> </tr> <tr> <td>After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (<math>\mu\text{A}</math>), whichever is greater.</td> <td></td> <td>After 1 minute's application of rated voltage, CV &gt; 1000: I = 0.04CV+100 (<math>\mu\text{A}</math>) or less</td> </tr> </tbody> </table>	Rated voltage (V)	6.3 to 100	160 to 450	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 ( $\mu\text{A}$ ), whichever is greater.		After 1 minute's application of rated voltage, CV $\leq 1000$ : I = 0.1CV+40 ( $\mu\text{A}$ ) or less	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 ( $\mu\text{A}$ ), whichever is greater.		After 1 minute's application of rated voltage, CV > 1000: I = 0.04CV+100 ( $\mu\text{A}$ ) or less																													
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Tangent of loss angle ( $\tan \delta$ )	For capacitance of more than 1000 $\mu\text{F}$ , add 0.02 for every increase of 1000 $\mu\text{F}$ . Measurement frequency : 120Hz, Temperature : $20^{\circ}\text{C}$ <table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160 to 315</th> <th>350 to 450</th> </tr> </thead> <tbody> <tr> <td><math>\tan \delta</math> (MAX.)</td> <td>0.28</td> <td>0.24</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.20</td> <td>0.25</td> </tr> </tbody> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160 to 315	350 to 450	$\tan \delta$ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.25																
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$\tan \delta$ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.25																													
Stability at Low Temperature	Measurement frequency : 120Hz																																						
	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160 to 200</th> <th>250 to 350</th> <th>400</th> <th>450</th> </tr> </thead> <tbody> <tr> <td>Impedance ratio Z-25<math>^{\circ}\text{C}</math> / Z+20<math>^{\circ}\text{C}</math></td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> <td>4</td> <td>6</td> <td>15</td> </tr> <tr> <td>ZT / Z20 (MAX.)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>4</td> <td>8</td> <td>10</td> <td>—</td> </tr> </tbody> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160 to 200	250 to 350	400	450	Impedance ratio Z-25 $^{\circ}\text{C}$ / Z+20 $^{\circ}\text{C}$	5	4	3	2	2	2	2	2	3	4	6	15	ZT / Z20 (MAX.)	10	8	6	4	3	3	3	3	4	8	10
Rated voltage (V)	6.3	10	16	25	35	50	63	100	160 to 200	250 to 350	400	450																											
Impedance ratio Z-25 $^{\circ}\text{C}$ / Z+20 $^{\circ}\text{C}$	5	4	3	2	2	2	2	2	3	4	6	15																											
ZT / Z20 (MAX.)	10	8	6	4	3	3	3	3	4	8	10	—																											
Endurance	The specifications listed at right shall be met when the capacitors are restored to $20^{\circ}\text{C}$ after the rated voltage is applied for 1000 hours at $105^{\circ}\text{C}$ .																																						
	<table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>Within <math>\pm 20\%</math> of initial value</td> </tr> <tr> <td><math>\tan \delta</math></td> <td>200% or less of initial specified value</td> </tr> <tr> <td>Leakage current</td> <td>Less than or equal to the initial specified value</td> </tr> </tbody> </table>	Capacitance change	Within $\pm 20\%$ of initial value	$\tan \delta$	200% or less of initial specified value	Leakage current	Less than or equal to the initial specified value																																
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$\tan \delta$	200% or less of initial specified value																																						
Leakage current	Less than or equal to the initial specified value																																						
Shelf Life	After storing the capacitors under no load at $105^{\circ}\text{C}$ for 1000 hours, and after performing voltage treatment based on JIS C 5101-4 clause 4.1 at $20^{\circ}\text{C}$ , they will meet the specified value for endurance characteristics listed above.																																						
Marking	Printed with white color letter on black sleeve.																																						

### Radial Lead Type

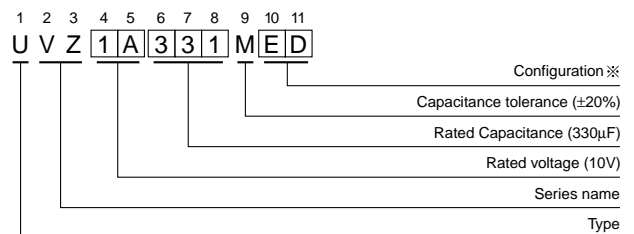


	$\phi D$	5	6.3	8	10	12.5	16	18	20	22	25
P		2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
$\phi d$		0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
$\beta$		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0

$\alpha$	(L < 20)	1.5
	(L $\geq$ 20)	2.0

• Please refer to page 20 about the end seal configuration.

### Type numbering system (Example : 10V 330 $\mu\text{F}$ )



#### ※ Configuration

$\phi D$	Pb-free leadwire Pb-free PET sleeve
5	DD
6.3	ED
8 - 10	PD
12.5 to 18	HD
20 to 25	RD

Please refer to page 20, 21, 22 about the formed or taped product spec.  
Please refer to page 4 for the minimum order quantity.

• Dimension table in next page.

## ■ Dimensions

Cap. (μF)	V	Code	6.3		10		16		25		35		50		
			0J		1A		1C		1E		1V		1H		
0.1	OR1													5 × 11	1.3
0.22	R22													5 × 11	2.9
0.33	R33													5 × 11	4.3
0.47	R47													5 × 11	7
1	010													5 × 11	13
2.2	2R2													5 × 11	20
3.3	3R3													5 × 11	25
4.7	4R7								5 × 11	25	5 × 11	28	5 × 11	30	
10	100							5 × 11	35	5 × 11	36	5 × 11	41	5 × 11	46
22	220	5 × 11	45	5 × 11	45	5 × 11	54	5 × 11	54	5 × 11	58	5 × 11	61	5 × 11	68
33	330	5 × 11	55	5 × 11	58	5 × 11	65	5 × 11	65	5 × 11	68	5 × 11	75	5 × 11	90
47	470	5 × 11	65	5 × 11	68	5 × 11	79	5 × 11	79	5 × 11	83	5 × 11	93	6.3 × 11	115
100	101	5 × 11	95	5 × 11	105	5 × 11	115	6.3 × 11	140	6.3 × 11	150	6.3 × 11	150	8 × 11.5	190
220	221	5 × 11	145	6.3 × 11	175	6.3 × 11	190	8 × 11.5	240	10 × 12.5	275	10 × 12.5	300	10 × 12.5	300
330	331	6.3 × 11	195	6.3 × 11	210	8 × 11.5	265	10 × 12.5	315	10 × 12.5	350	10 × 12.5	410	10 × 16	410
470	471	6.3 × 11	230	6.3 × 11	250	8 × 11.5	315	10 × 12.5	380	10 × 16	460	12.5 × 20	530	12.5 × 20	530
1000	102	8 × 11.5	390	10 × 12.5	460	10 × 16	560	10 × 20	680	12.5 × 20	810	12.5 × 25	950	12.5 × 25	950
2200	222	10 × 20	710	10 × 20	760	12.5 × 20	920	12.5 × 25	1090	16 × 25	1260	16 × 35.5	1470	16 × 35.5	1470
3300	332	10 × 20	840	12.5 × 20	1000	12.5 × 25	1170	16 × 25	1400	16 × 35.5	1610	18 × 35.5	1770	18 × 35.5	1770
4700	472	12.5 × 20	1090	12.5 × 25	1260	16 × 25	1480	16 × 31.5	1710	18 × 35.5	1910	20 × 40	2100	20 × 40	2100
6800	682	12.5 × 25	1350	16 × 25	1570	16 × 35.5	1780	18 × 35.5	2040	20 × 40	2150	22 × 50	2500	22 × 50	2500
10000	103	16 × 25	1650	16 × 35.5	1890	18 × 35.5	2060	20 × 40	2150	22 × 50	2650	25 × 50	2850	25 × 50	2850
15000	153	16 × 35.5	2010	18 × 35.5	2180	20 × 40	2430	22 × 50	2750	25 × 50	3100				
22000	223	18 × 40	2350	20 × 40	2650	22 × 50	3000	25 × 50	3250						
33000	333	22 × 50	2800	22 × 50	3250	25 × 50	3450								
														Case size φD × L (mm)	Rated ripple

Cap. (μF)	V	Code	63		100		160		200		250		315		350		400		450		
			1J		2A		2C		2D		2E		2F		2V		2G		2W		
0.1	OR1				5 × 11	1.5															
0.22	R22				5 × 11	3.4															
0.33	R33				5 × 11	5.0															
0.47	R47				5 × 11	7.1	6.3 × 11	11	6.3 × 11	11	6.3 × 11	10									
1	010				5 × 11	15	6.3 × 11	16	6.3 × 11	16	6.3 × 11	15	6.3 × 11	15	6.3 × 11	15	8 × 11.5	17	8 × 11.5	13	
2.2	2R2				5 × 11	21	6.3 × 11	25	6.3 × 11	25	6.3 × 11	23	8 × 11.5	26	8 × 11.5	26	10 × 12.5	30	10 × 12.5	23	
3.3	3R3				5 × 11	29	6.3 × 11	30	6.3 × 11	30	8 × 11.5	32	10 × 12.5	38	10 × 12.5	38	10 × 12.5	38	10 × 16	31	
4.7	4R7				5 × 11	32	6.3 × 11	34	8 × 11.5	39	8 × 11.5	39	10 × 12.5	45	10 × 12.5	45	10 × 16	50	10 × 20	40	
10	100	5 × 11	46	6.3 × 11	54	8 × 11.5	41	10 × 12.5	65	10 × 16	74	10 × 20	80	10 × 20	80	12.5 × 20	90	12.5 × 20	65		
22	220	5 × 11	71	6.3 × 11	93	10 × 16	100	10 × 20	120	12.5 × 20	130	12.5 × 20	115	12.5 × 25	115	16 × 25	165	16 × 25	115		
33	330	6.3 × 11	100	8 × 11.5	130	10 × 20	145	12.5 × 20	160	12.5 × 20	160	16 × 25	195	16 × 25	195	16 × 31.5	215	16 × 35.5	165		
47	470	6.3 × 11	120	10 × 12.5	165	12.5 × 20	195	12.5 × 20	195	12.5 × 25	210	16 × 25	230	16 × 35.5	270	16 × 35.5	270	18 × 40	185		
100	101	10 × 12.5	215	10 × 20	265	12.5 × 25	215	16 × 31.5	375	16 × 31.5	365	18 × 35.5	395	18 × 40	420	20 × 40	450	22 × 40	270		
220	221	10 × 16	335	12.5 × 25	440	16 × 35.5	570	18 × 35.5	575	20 × 40	600	22 × 50	620	22 × 50	620	25 × 50	660				
330	331	10 × 20	510	12.5 × 25	540	18 × 40	750	20 × 40	705	22 × 50	730	25 × 50	760								
470	471	12.5 × 20	640	16 × 25	715	22 × 40	900	22 × 50	840	25 × 50	870										
1000	102	16 × 25	930	18 × 40	985	25 × 50	1310														
2200	222	18 × 35.5	1650	22 × 50	1750																
3300	332	20 × 40	1950	25 × 50	2070																
4700	472	22 × 50	2450																		
6800	682	25 × 50	2800																		
																				Case size φD × L (mm)	Rated ripple

Rated Ripple (mA rms) at 105°C 120Hz

## ● Frequency coefficient of rated ripple current

V	Cap. (μF)	Frequency				
		50Hz	120Hz	300Hz	1 kHz	10 kHz or more
6.3 to 100	Less than 47	0.75	1.00	1.35	1.57	2.00
	100 to 470	0.80	1.00	1.23	1.34	1.50
	1000 to 33000	0.85	1.00	1.10	1.13	1.15
160 to 450	0.47 to 220	0.80	1.00	1.25	1.40	1.60
	330 to 1000	0.90	1.00	1.10	1.13	1.15