

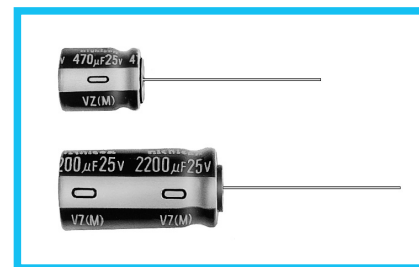
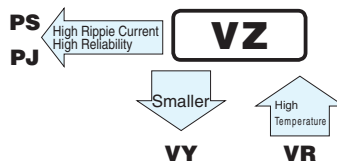


Wide Temperature Range



Anti-Solvent  
Feature  
(Through 100V only)

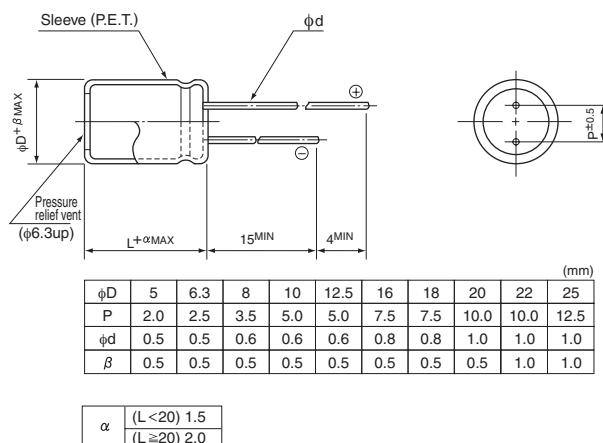
- Small case sizes as same as VR series, but operating over wide temperature range of  $-55$  to  $+105^{\circ}\text{C}$ .
- Compliant to the RoHS directive (2011/65/EU).



## Specifications

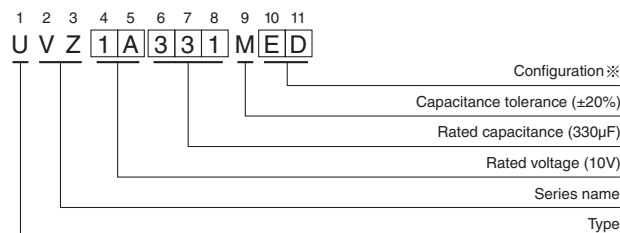
| Item                          | Performance Characteristics                                                                                                                                                                                                             |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|-----------------------------------------------------------------------------------------------|------|---------------------------------------------------|------------|------------|-----|-----|
| Category Temperature Range    | -55 to +105°C (6.3 to 100V) , -40 to +105°C (160 to 400V), -25 to +105°C (450V)                                                                                                                                                         |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
| Rated Voltage Range           | 6.3 to 450V                                                                                                                                                                                                                             |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
| Rated Capacitance Range       | 0.1 to 33000μF                                                                                                                                                                                                                          |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
| Capacitance Tolerance         | ±20% at 120Hz, 20°C                                                                                                                                                                                                                     |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
| Leakage Current               | Rated voltage (V)                                                                                                                                                                                                                       | 6.3 to 100                                                                                                                      |      |      |      |      | 160 to 450                                                                                    |      |                                                   |            |            |     |     |
|                               | _____                                                                                                                                                                                                                                   | After 1 minute's application of rated voltage at 20°C, leakage current is not more than 0.03CV or 4 (μA), whichever is greater. |      |      |      |      | After 1 minute's application of rated voltage at 20°C, CV ≤ 1000: I = 0.1CV+40 (μA) or less   |      |                                                   |            |            |     |     |
|                               |                                                                                                                                                                                                                                         | After 2 minutes' application of rated voltage at 20°C, leakage current is not more than 0.01CV or 3 (μA), whichever is greater. |      |      |      |      | After 1 minute's application of rated voltage at 20°C, CV > 1000: I = 0.04CV+100 (μA) or less |      |                                                   |            |            |     |     |
| Tangent of loss angle (tan δ) | For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120Hz at 20°C                                                                                                                       |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
|                               | Rated voltage (V)                                                                                                                                                                                                                       | 6.3                                                                                                                             | 10   | 16   | 25   | 35   | 50                                                                                            | 63   | 100                                               | 160 to 315 | 350 to 450 |     |     |
|                               | tan δ (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                                                                                                                                                                                                           |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
|                               | Rated voltage (V)                                                                                                                                                                                                                       | 6.3                                                                                                                             | 10   | 16   | 25   | 35   | 50                                                                                            | 63   | 100                                               | 160 to 200 | 250 to 350 | 400 | 450 |
|                               | Impedance ratio<br>ZT / Z20 (MAX.)                                                                                                                                                                                                      | Z-25°C / Z+20°C                                                                                                                 | 5    | 4    | 3    | 2    | 2                                                                                             | 2    | 2                                                 | 3          | 4          | 6   | 15  |
|                               |                                                                                                                                                                                                                                         | Z-40°C / Z+20°C                                                                                                                 | 10   | 8    | 6    | 4    | 3                                                                                             | 3    | 3                                                 | 4          | 8          | 10  | —   |
| Endurance                     | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C.                                                                                    |                                                                                                                                 |      |      |      |      | Capacitance change                                                                            |      | Within ±20% of the initial capacitance value      |            |            |     |     |
|                               |                                                                                                                                                                                                                                         |                                                                                                                                 |      |      |      |      | tan δ                                                                                         |      | 200% or less than the 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°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above. |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |
| Marking                       | Printed with white color letter on black sleeve.                                                                                                                                                                                        |                                                                                                                                 |      |      |      |      |                                                                                               |      |                                                   |            |            |     |     |

## Radial Lead Type



- 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<br>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

| V        |      | 6.3       |      | 10        |      | 16        |      | 25        |      | 35        |      | 50                        |                 |
|----------|------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|---------------------------|-----------------|
| Cap.(μF) | Code | 0J        |      | 1A        |      | 1C        |      | 1E        |      | 1V        |      | 1H                        |                 |
| 0.1      | 0R1  |           |      |           |      |           |      |           |      |           |      | 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    | 58   | 5 × 11    | 61   | 5 × 11                    | 68              |
| 33       | 330  | 5 × 11    | 55   | 5 × 11    | 58   | 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    | 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  | 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             |
| 330      | 331  | 6.3 × 11  | 195  | 6.3 × 11  | 210  | 8 × 11.5  | 265  | 10 × 12.5 | 315  | 10 × 12.5 | 350  | 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             |
| 1000     | 102  | 8 × 11.5  | 390  | 10 × 12.5 | 460  | 10 × 16   | 560  | 10 × 20   | 680  | 12.5 × 20 | 810  | 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            |
| 3300     | 332  | 10 × 20   | 840  | 12.5 × 20 | 1000 | 12.5 × 25 | 1170 | 16 × 25   | 1400 | 16 × 35.5 | 1610 | 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            |
| 6800     | 682  | 12.5 × 25 | 1350 | 16 × 25   | 1570 | 16 × 35.5 | 1780 | 18 × 35.5 | 2040 | 20 × 40   | 2150 | 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            |
| 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<br>φ D × L (mm) | Rated<br>ripple |

| V        |      | 63        |      | 100       |      | 160       |      | 200       |     | 250       |     | 315       |     | 350       |     | 400       |     | 450                       |                 |
|----------|------|-----------|------|-----------|------|-----------|------|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|---------------------------|-----------------|
| Cap.(μF) | Code | 1J        |      | 2A        |      | 2C        |      | 2D        |     | 2E        |     | 2F        |     | 2V        |     | 2G        |     | 2W                        |                 |
| 0.1      | 0R1  |           |      | 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<br>φ D × L (mm) | Rated<br>ripple |

Rated ripple current (mA rms) at 105°C 120Hz

## ● Frequency coefficient of rated ripple current

| V          | Frequency     | 50Hz | 120Hz | 300Hz | 1 kHz | 10 kHz or more |
|------------|---------------|------|-------|-------|-------|----------------|
|            | Cap. (μF)     |      |       |       |       |                |
| 6.3 to 100 | 0.1 to 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           |