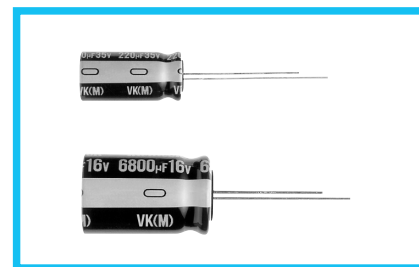
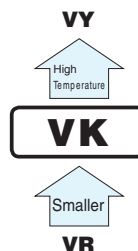


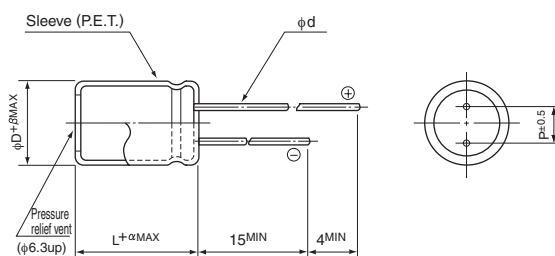
- One rank smaller case sizes than VR series.
- Compliant to the RoHS directive (2011/65/EU).



## Specifications

| Item                          | Performance Characteristics                                                                                                                                                                                                            |                                                                                                                                 |      |      |      |      |                                                                                              |            |                                                   |            |                                       |    |  |  |  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|----------------------------------------------------------------------------------------------|------------|---------------------------------------------------|------------|---------------------------------------|----|--|--|--|
| Category Temperature Range    | -40 to +85°C (6.3V to 400V), -25°C to +85°C (450V)                                                                                                                                                                                     |                                                                                                                                 |      |      |      |      |                                                                                              |            |                                                   |            |                                       |    |  |  |  |
| Rated Voltage Range           | 6.3 to 450V                                                                                                                                                                                                                            |                                                                                                                                 |      |      |      |      |                                                                                              |            |                                                   |            |                                       |    |  |  |  |
| Rated Capacitance Range       | 0.1 to 68000μF                                                                                                                                                                                                                         |                                                                                                                                 |      |      |      |      |                                                                                              |            |                                                   |            |                                       |    |  |  |  |
| Capacitance Tolerance         | ±20% at 120Hz, 20°C                                                                                                                                                                                                                    |                                                                                                                                 |      |      |      |      |                                                                                              |            |                                                   |            |                                       |    |  |  |  |
| Leakage Current               | Rated voltage (V)                                                                                                                                                                                                                      | 6.3 to 100V                                                                                                                     |      |      |      |      | 160 to 450V                                                                                  |            |                                                   |            |                                       |    |  |  |  |
|                               | _____                                                                                                                                                                                                                                  | 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+40μA 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 250 | 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 to 100                                                                                    | 160 to 200 | 250 to 350                                        | 400        | 450                                   |    |  |  |  |
|                               | Impedance ratio ZT / Z20 (MAX.)                                                                                                                                                                                                        | Z-25°C / Z+20°C                                                                                                                 | 5    | 4    | 3    | 2    | 2                                                                                            | 2          | 3                                                 | 4          | 6                                     | 15 |  |  |  |
|                               |                                                                                                                                                                                                                                        | Z-40°C / Z+20°C                                                                                                                 | 12   | 10   | 8    | 5    | 4                                                                                            | 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 2000 hours at 85°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 85°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.                                                                                                                                                                                       |                                                                                                                                 |      |      |      |      |                                                                                              |            |                                                   |            |                                       |    |  |  |  |

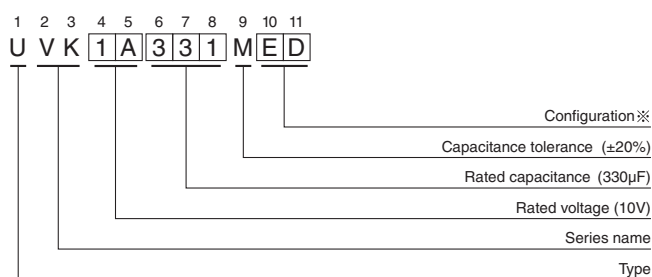
## Radial Lead Type



|    | φD  | 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 |     |
| φd | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8  | 0.8 | 1.0  | 1.0  | 1.0  |     |
| β  | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5  | 0.5 | 0.5  | 0.5  | 1.0  | 1.0 |

|   |              |
|---|--------------|
| α | (L < 20) 1.5 |
|   | (L ≥ 20) 2.0 |

## Type numbering system (Example : 10V 330μF)



### ※ Configuration

| φ 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 about the end seal configuration.

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

## ■ Dimensions

| Cap.(μF) | Code | V         |      | 6.3       |          | 10        |          | 16        |           | 25        |           | 35        |           | 50        |           | 63                     |                 |
|----------|------|-----------|------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|-----------------|
|          |      |           |      | 0J        |          | 1A        |          | 1C        |           | 1E        |           | 1V        |           | 1H        |           | 1J                     |                 |
| 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    | 6.2       |                        |                 |
| 1        | 010  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 17        |                        |                 |
| 2.2      | 2R2  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 28        |                        |                 |
| 3.3      | 3R3  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 35        |                        |                 |
| 4.7      | 4R7  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 40        |                        |                 |
| 10       | 100  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 60        |                        |                 |
| 22       | 220  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 95        | 5 × 11                 | 100             |
| 33       | 330  |           |      |           |          |           |          |           |           |           |           |           |           | 5 × 11    | 125       | 6.3 × 11               | 140             |
| 47       | 470  |           |      |           |          |           |          |           |           |           |           | 5 × 11    | 130       | 6.3 × 11  | 155       | 6.3 × 11               | 170             |
| 68       | 680  |           |      |           |          |           |          |           |           |           |           | 6.3 × 11  | 160       | 6.3 × 11  | 210       | 8 × 11.5               | 220             |
| 100      | 101  |           |      |           |          |           |          |           |           | 5 × 11    | 180       | 6.3 × 11  | 210       | 8 × 11.5  | 260       | 8 × 11.5               | 280             |
| 220      | 221  |           |      |           | 5 × 11   | 220       | 6.3 × 11 | 260       | 6.3 × 11  | 280       | 8 × 11.5  | 350       | 10 × 12.5 | 430       | 10 × 16   | 490                    |                 |
| 330      | 331  |           |      |           | 6.3 × 11 | 290       | 6.3 × 11 | 320       | 8 × 11.5  | 390       | 10 × 12.5 | 490       | 10 × 16   | 590       | 10 × 20   | 710                    |                 |
| 470      | 471  |           |      |           | 6.3 × 11 | 350       | 8 × 11.5 | 440       | 10 × 12.5 | 550       | 10 × 16   | 650       | 10 × 20   | 760       | 12.5 × 20 | 900                    |                 |
| 1000     | 102  | 8 × 11.5  | 540  | 10 × 12.5 | 650      | 10 × 12.5 | 700      | 10 × 16   | 860       | 12.5 × 20 | 1150      | 12.5 × 25 | 1350      | 16 × 25   | 1300      |                        |                 |
| 2200     | 222  | 10 × 16   | 890  | 10 × 16   | 990      | 10 × 20   | 1000     | 12.5 × 25 | 1550      | 16 × 25   | 1800      | 16 × 31.5 | 1980      | 18 × 35.5 | 2300      |                        |                 |
| 3300     | 332  | 10 × 20   | 1190 | 12.5 × 20 | 1450     | 12.5 × 25 | 1700     | 16 × 25   | 1980      | 16 × 31.5 | 2100      | 18 × 35.5 | 2500      | 20 × 40   | 2700      |                        |                 |
| 4700     | 472  | 12.5 × 20 | 1550 | 12.5 × 25 | 1800     | 16 × 25   | 2100     | 16 × 25   | 2200      | 16 × 35.5 | 2500      | 20 × 40   | 2900      | 22 × 50   | 3400      |                        |                 |
| 6800     | 682  | 12.5 × 25 | 1920 | 16 × 25   | 2250     | 16 × 25   | 2250     | 16 × 35.5 | 2600      | 18 × 40   | 2800      | 22 × 50   | 3500      | 25 × 50   | 3900      |                        |                 |
| 10000    | 103  | 16 × 25   | 2350 | 16 × 31.5 | 2550     | 16 × 35.5 | 2710     | 18 × 40   | 2800      | 22 × 50   | 3700      | 25 × 50   | 4000      |           |           |                        |                 |
| 15000    | 153  | 16 × 31.5 | 2550 | 16 × 35.5 | 2880     | 18 × 40   | 3100     | 22 × 50   | 3800      | 25 × 50   | 4300      |           |           |           |           |                        |                 |
| 22000    | 223  | 18 × 35.5 | 3200 | 18 × 40   | 3400     | 22 × 40   | 3800     | 25 × 50   | 4500      |           |           |           |           |           |           |                        |                 |
| 33000    | 333  | 20 × 40   | 3500 | 22 × 50   | 4500     | 25 × 50   | 4800     |           |           |           |           |           |           |           |           |                        |                 |
| 47000    | 473  | 22 × 50   | 3900 | 25 × 50   | 5000     |           |          |           |           |           |           |           |           |           |           |                        |                 |
| 68000    | 683  | 25 × 50   | 4300 |           |          |           |          |           |           |           |           |           |           |           |           | Case size<br>φD×L (mm) | Rated<br>ripple |

| Cap.(μF) | Code | V         |      | 100       |      | 160       |      | 200       |      | 250       |      | 350       |     | 400       |     | 450                    |                 |
|----------|------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|-----|-----------|-----|------------------------|-----------------|
|          |      |           |      | 2A        |      | 2C        |      | 2D        |      | 2E        |      | 2V        |     | 2G        |     | 2W                     |                 |
| 0.1      | 0R1  | 5 × 11    | 2.1  |           |      |           |      | 6.3 × 11  | 2.1  |           |      |           |     |           |     |                        |                 |
| 0.22     | R22  | 5 × 11    | 4.7  |           |      |           |      | 6.3 × 11  | 4.7  |           |      |           |     |           |     |                        |                 |
| 0.33     | R33  | 5 × 11    | 7    |           |      |           |      | 6.3 × 11  | 7    |           |      |           |     |           |     |                        |                 |
| 0.47     | R47  | 5 × 11    | 10   |           |      |           |      | 6.3 × 11  | 15   |           |      |           |     | 6.3 × 11  | 12  |                        |                 |
| 1        | 010  | 5 × 11    | 21   |           |      |           |      | 6.3 × 11  | 22   |           |      |           |     | 6.3 × 11  | 20  |                        |                 |
| 2.2      | 2R2  | 5 × 11    | 30   |           |      |           |      | 6.3 × 11  | 33   |           |      | 6.3 × 11  | 30  | 8 × 11.5  | 38  | 8 × 11.5               | 28              |
| 3.3      | 3R3  | 5 × 11    | 40   |           |      |           |      | 6.3 × 11  | 40   | 6.3 × 11  | 40   | 8 × 11.5  | 43  | 8 × 11.5  | 48  | 10 × 12.5              | 40              |
| 4.7      | 4R7  | 5 × 11    | 45   |           |      |           |      | 6.3 × 11  | 50   | 6.3 × 11  | 50   | 8 × 11.5  | 55  | 10 × 12.5 | 60  | 10 × 12.5              | 46              |
| 10       | 100  | 5 × 11    | 70   | 8 × 11.5  | 80   | 8 × 11.5  | 80   | 10 × 12.5 | 100  | 10 × 12.5 | 90   | 10 × 16   | 90  | 10 × 16   | 90  | 10 × 20                | 80              |
| 22       | 220  | 6.3 × 11  | 130  | 10 × 12.5 | 130  | 10 × 16   | 150  | 10 × 20   | 150  | 12.5 × 20 | 150  | 12.5 × 25 | 200 | 12.5 × 25 | 200 | 12.5 × 25              | 140             |
| 33       | 330  | 8 × 11.5  | 180  | 10 × 16   | 180  | 10 × 20   | 200  | 10 × 20   | 200  | 12.5 × 25 | 240  | 16 × 25   | 240 | 16 × 25   | 180 |                        |                 |
| 47       | 470  | 8 × 11.5  | 200  | 10 × 20   | 210  | 12.5 × 20 | 270  | 12.5 × 20 | 270  | 16 × 25   | 300  | 16 × 25   | 280 | 16 × 31.5 | 220 |                        |                 |
| 68       | 680  | 10 × 12.5 | 270  | 12.5 × 20 | 350  | 12.5 × 25 | 350  | 16 × 25   | 380  | 16 × 25   | 400  | 16 × 31.5 | 340 | 18 × 35.5 | 260 |                        |                 |
| 100      | 101  | 10 × 16   | 340  | 12.5 × 25 | 430  | 16 × 25   | 450  | 16 × 25   | 440  | 18 × 35.5 | 520  | 18 × 35.5 | 440 | 18 × 40   | 280 |                        |                 |
| 220      | 221  | 12.5 × 20 | 550  | 16 × 31.5 | 580  | 16 × 35.5 | 700  | 18 × 35.5 | 680  | 22 × 50   | 760  | 22 × 50   | 650 | 25 × 50   | 350 |                        |                 |
| 330      | 331  | 12.5 × 25 | 760  | 18 × 35.5 | 800  | 18 × 40   | 950  | 20 × 40   | 1000 | 25 × 50   | 1000 |           |     |           |     |                        |                 |
| 470      | 471  | 16 × 25   | 1000 | 18 × 40   | 1200 | 22 × 40   | 1300 | 22 × 50   | 1400 |           |      |           |     |           |     |                        |                 |
| 1000     | 102  | 18 × 35.5 | 1350 | 25 × 50   | 1900 |           |      |           |      |           |      |           |     |           |     |                        |                 |
| 2200     | 222  | 22 × 50   | 2400 |           |      |           |      |           |      |           |      |           |     |           |     |                        |                 |
| 3300     | 332  | 25 × 50   | 2900 |           |      |           |      |           |      |           |      |           |     |           |     | Case size<br>φD×L (mm) | Rated<br>ripple |

Rated ripple current (mA rms) at 85°C 120Hz

## ● Frequency coefficient of rated ripple current

| V          | Cap.(μF)      | Frequency |       |       |       |               |
|------------|---------------|-----------|-------|-------|-------|---------------|
|            |               | 50Hz      | 120Hz | 300Hz | 1 kHz | 10kHz or more |
| 6.3 to 100 | 0.1 to 68     | 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 68000 | 0.85      | 1.00  | 1.10  | 1.13  | 1.15          |
| 160 to 450 | 0.1 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          |