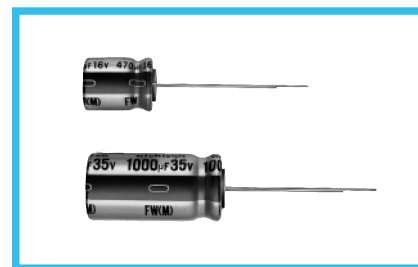
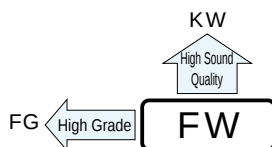


**FW** series Standard, For Audio Equipment



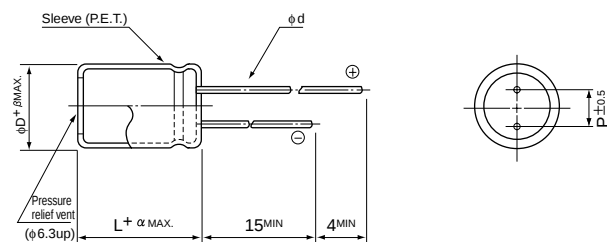
- Compliant to the RoHS directive (2011/65/EU).



## Specifications

| Item                          | Performance Characteristics                                                                                                                                                                                                                            |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------|------|------|------|------|------|------|---------------------------------------|--------------------|--|-----------------------------------------------|--|--|--|--|--|--|--|
| Category Temperature Range    | −40 to +85°C                                                                                                                                                                                                                                           |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
| Rated Voltage Range           | 6.3 to 100V                                                                                                                                                                                                                                            |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
| Rated Capacitance Range       | 0.1 to 33000μF                                                                                                                                                                                                                                         |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
| Capacitance Tolerance         | ±20% at 120Hz, 20°C                                                                                                                                                                                                                                    |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
| Leakage Current               | After 1 minute's application of rated voltage, leakage current is not more than 0.03 CV or 4 (μA) , whichever is greater.<br>After 2 minutes' application of rated voltage, leakage current is not more than 0.01 CV or 3 (μA) , whichever is greater. |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
| Tangent of loss angle (tan δ) | Rated voltage (V)                                                                                                                                                                                                                                      | 6.3             | 10                                                | 16   | 25   | 35   | 50   | 63   | 100  | Measurement frequency : 120Hz at 20°C |                    |  |                                               |  |  |  |  |  |  |  |
|                               | tan δ (MAX.)                                                                                                                                                                                                                                           | 0.28            | 0.24                                              | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 |                                       |                    |  |                                               |  |  |  |  |  |  |  |
|                               | For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF.                                                                                                                                                                            |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
| Stability at Low Temperature  | Measurement frequency : 120Hz                                                                                                                                                                                                                          |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |
|                               | Rated voltage (V)                                                                                                                                                                                                                                      |                 | 6.3                                               | 10   | 16   | 25   | 35   | 50   | 63   | 100                                   |                    |  |                                               |  |  |  |  |  |  |  |
|                               | Impedance ratio<br>ZT / Z20 (MAX.)                                                                                                                                                                                                                     | Z−25°C / Z+20°C | 5                                                 | 4    | 3    | 2    | 2    | 2    | 2    | 2                                     |                    |  |                                               |  |  |  |  |  |  |  |
|                               |                                                                                                                                                                                                                                                        | Z−40°C / Z+20°C | 12                                                | 10   | 8    | 5    | 4    | 3    | 3    | 3                                     |                    |  |                                               |  |  |  |  |  |  |  |
| 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 black color letter on Gold sleeve.                                                                                                                                                                                                        |                 |                                                   |      |      |      |      |      |      |                                       |                    |  |                                               |  |  |  |  |  |  |  |

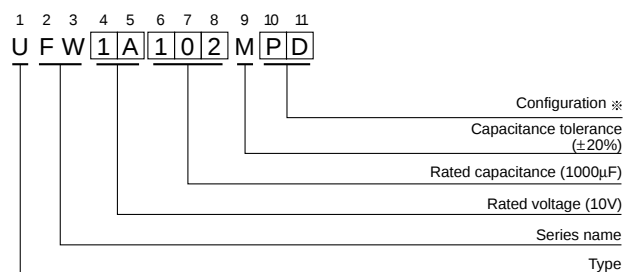
## Radial Lead Type



|    | (mm) |     |     |     |      |     |     |     |     |      |
|----|------|-----|-----|-----|------|-----|-----|-----|-----|------|
| 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  | 10  | 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 | 1.0 | 1.0  |

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

## Type numbering system (Example : 10V 1000μF)



※ 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.

• Dimension table in next page.

## ■ Dimensions

| Cap.(μF) | Code | V       |      | 6.3     |      | 10      |      | 16      |      | 25      |      | 35      |      | 50      |      | 63      |      | 100                 |              |
|----------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------------------|--------------|
|          |      |         |      | 0J      |      | 1A      |      | 1C      |      | 1E      |      | 1V      |      | 1H      |      | 1J      |      | 2A                  |              |
| 0.1      | 0R1  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 1.1  |         |      | 5×11                | 2.1          |
| 0.22     | R22  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 2.4  |         |      | 5×11                | 4.7          |
| 0.33     | R33  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 3.5  |         |      | 5×11                | 7.0          |
| 0.47     | R47  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 5.0  |         |      | 5×11                | 10           |
| 1        | 010  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 10   |         |      | 5×11                | 21           |
| 2.2      | 2R2  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 23   |         |      | 5×11                | 30           |
| 3.3      | 3R3  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 35   |         |      | 5×11                | 40           |
| 4.7      | 4R7  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 40   |         |      | 5×11                | 45           |
| 10       | 100  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 65   | 5×11    | 70   | 6.3×11              | 75           |
| 22       | 220  |         |      |         |      |         |      |         |      |         |      |         |      | 5×11    | 95   | 5×11    | 100  | 6.3×11              | 120          |
| 33       | 330  |         |      |         |      |         |      |         |      |         |      | 5×11    | 105  | 5×11    | 120  | 6.3×11  | 140  | 8×11.5              | 160          |
| 47       | 470  |         |      |         |      |         |      |         |      | 5×11    | 115  | 5×11    | 120  | 6.3×11  | 150  | 6.3×11  | 165  | 10×12.5             | 210          |
| 100      | 101  |         |      | 5×11    | 145  | 5×11    | 155  | 6.3×11  | 185  | 6.3×11  | 200  | 8×11.5  | 250  | 10×12.5 | 300  | 10×20   | 350  |                     |              |
| 220      | 221  |         |      | 6.3×11  | 230  | 6.3×11  | 250  | 8×11.5  | 320  | 10×12.5 | 370  | 10×12.5 | 410  | 10×16   | 470  | 12.5×25 | 600  |                     |              |
| 330      | 331  | 6.3×11  | 265  | 6.3×11  | 270  | 8×11.5  | 360  | 10×12.5 | 420  | 10×12.5 | 470  | 10×16   | 570  | 10×20   | 650  | 12.5×25 | 750  |                     |              |
| 470      | 471  | 6.3×11  | 310  | 6.3×11  | 330  | 8×11.5  | 420  | 10×12.5 | 530  | 10×16   | 630  | 12.5×20 | 760  | 12.5×20 | 880  | 16×25   | 1000 |                     |              |
| 1000     | 102  | 8×11.5  | 530  | 10×12.5 | 630  | 10×16   | 770  | 10×20   | 950  | 12.5×20 | 1100 | 12.5×25 | 1300 | 16×25   | 1300 | 18×40   | 1370 |                     |              |
| 2200     | 222  | 10×20   | 980  | 10×20   | 1050 | 12.5×20 | 1250 | 12.5×25 | 1550 | 16×25   | 1800 | 16×35.5 | 2090 | 18×35.5 | 2200 | 22×50   | 2400 |                     |              |
| 3300     | 332  | 10×20   | 1170 | 12.5×20 | 1420 | 12.5×25 | 1700 | 16×25   | 1950 | 16×35.5 | 2220 | 18×35.5 | 2360 | 20×40   | 2700 | 25×50   | 2900 |                     |              |
| 4700     | 472  | 12.5×20 | 1350 | 12.5×25 | 1800 | 16×25   | 2100 | 16×31.5 | 2360 | 18×35.5 | 2490 | 20×40   | 2900 | 22×50   | 3400 |         |      |                     |              |
| 6800     | 682  | 12.5×25 | 1600 | 16×25   | 2150 | 16×35.5 | 2500 | 18×35.5 | 2590 | 20×40   | 3000 | 22×50   | 3500 | 25×50   | 3500 |         |      |                     |              |
| 10000    | 103  | 16×25   | 2000 | 16×35.5 | 2500 | 18×35.5 | 2640 | 20×40   | 3000 | 22×50   | 3700 | 25×50   | 4000 |         |      |         |      |                     |              |
| 15000    | 153  | 16×35.5 | 2550 | 18×35.5 | 2720 | 20×40   | 3400 | 22×50   | 3800 | 25×50   | 4300 |         |      |         |      |         |      |                     |              |
| 22000    | 223  | 18×40   | 3200 | 20×40   | 3700 | 22×50   | 4200 | 25×50   | 4500 |         |      |         |      |         |      |         |      |                     |              |
| 33000    | 333  | 22×50   | 3900 | 22×50   | 4500 | 25×50   | 4800 |         |      |         |      |         |      |         |      |         |      | Case size φD×L (mm) | Rated ripple |

Rated ripple current (mA<sub>rms</sub>) at 85°C 120Hz

## ● Frequency coefficient of rated ripple current

| Cap.(μF)      | Frequency | 50Hz | 120Hz | 300Hz | 1kHz | 10kHz or more |
|---------------|-----------|------|-------|-------|------|---------------|
| 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          |