

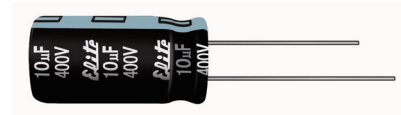


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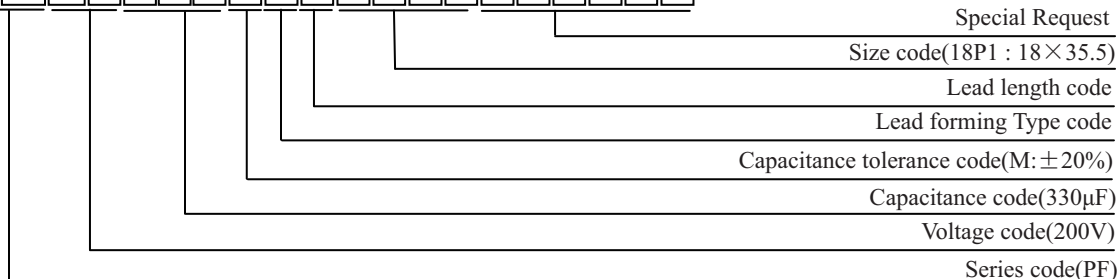
- General standard size
- Load life 2,000 hours at 105°C



| Item                                            | Performance Characteristics                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|-------------------------------|------|------|-----------|-----------|--|-------------------|-----|----|----|----|----|----|----|-----|-----------|-----------|-----------|------|------|------|------|------|------|------|------|------|------|
| Category Temperature Range                      | -40 ~ +105℃                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      | -25 ~ +105℃                   |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Working Voltage Range                           | 6.3 ~ 100Vdc                                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |      | 160 ~ 450Vdc                  |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Capacitance Range                               | 0.47 ~ 22,000μF                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      | 0.47 ~ 560 μF                 |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Capacitance Tolerance                           | ±20% (at 25℃ and 120Hz)                                                                                                                                                                                                                                                                                                                                       |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Dissipation Factor<br>(tanδ)<br>(at 25℃, 120Hz) | <table border="1"> <tr> <td>Rated Voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160 ~ 250</td><td>350 ~ 450</td></tr> <tr> <td>tanδ(Max)</td><td>0.26</td><td>0.22</td><td>0.18</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.10</td><td>0.15</td><td>0.20</td></tr> </table> |      |      |      |      |      |                               |      |      |           |           |  | Rated Voltage (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 ~ 250 | 350 ~ 450 | tanδ(Max) | 0.26 | 0.22 | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 | 0.10 | 0.15 | 0.20 |
|                                                 | Rated Voltage (V)                                                                                                                                                                                                                                                                                                                                             | 6.3  | 10   | 16   | 25   | 35   | 50                            | 63   | 100  | 160 ~ 250 | 350 ~ 450 |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | tanδ(Max)                                                                                                                                                                                                                                                                                                                                                     | 0.26 | 0.22 | 0.18 | 0.16 | 0.14 | 0.12                          | 0.10 | 0.10 | 0.15      | 0.20      |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | The above values should be increased by 0.02 for every additional 1000μF                                                                                                                                                                                                                                                                                      |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Leakage Current                                 | I=0.01CV or 3μA whichever is greater(6.3 ~ 100V)<br>I=0.03CV + 10μA(160 ~ 450V)<br>I : Leakage current (μA) C : Rated capacitance (μF) V : Rated voltage (V)<br>Impress the rated voltage for 2 minutes.                                                                                                                                                      |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Endurance                                       | The following requirements shall be satisfied when the capacitor are restored to 25℃ after the rated voltage applied for 2,000 hours at 105℃.                                                                                                                                                                                                                 |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | Capacitance change                                                                                                                                                                                                                                                                                                                                            |      |      |      |      |      | ≒ ±20% of the initial value   |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | Dissipation factor(tanδ)                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      | ≒ 200% of the specified value |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | Leakage current                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      | ≒ specified value             |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Shelf Life                                      | The following requirements shall be satisfied when the capacitor are restored to 25℃ after the rated voltage applied for 1,000 hours at 105℃ without voltage applied.                                                                                                                                                                                         |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | Capacitance change                                                                                                                                                                                                                                                                                                                                            |      |      |      |      |      | ≒ ±20% of the initial value   |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | Dissipation factor(tanδ)                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      | ≒ 200% of the specified value |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
|                                                 | Leakage current                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      | ≒ 200% of the specified value |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |
| Others                                          | Conforms to JIS-C-5101-4 (1998), characteristic W.                                                                                                                                                                                                                                                                                                            |      |      |      |      |      |                               |      |      |           |           |  |                   |     |    |    |    |    |    |    |     |           |           |           |      |      |      |      |      |      |      |      |      |      |

|    |             |     |     |     |                                           |           |             |     |           |     |
|----|-------------|-----|-----|-----|-------------------------------------------|-----------|-------------|-----|-----------|-----|
| ΦD | 5           | 6.3 | 8   | 10  | 12.5 L<35                                 | 12.5 L≥35 | 16          | 18  | 20        | 22  |
| ΦD | ΦD +0.5 Max |     |     |     |                                           |           | ΦD +1.0 Max |     |           |     |
| Φd | 0.5         | 0.5 | 0.6 | 0.6 | 0.6                                       | 0.8       | 0.8         | 0.8 | 1.0       | 1.0 |
| F  | 2.0         | 2.5 | 3.5 | 5.0 | 5.0                                       |           | 7.5         | 7.5 | 10        | 10  |
| a  | L+1.5 Max   |     |     |     | $\leq 35$ L+1.5Max<br>$\geq 40$ L+2.0 Max |           | L+1.5 Max   |     | L+2.0 Max |     |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|--|
| P | F | 2 | D | 3 | 3 | 1 | M | N | N | 1 | 8 | P | 1 |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|--|



# ALUMINUM ELECTROLYTIC CAPACITORS



## PF Series

◆ Case size & Permissible rated ripple current: (mA rms) at 105°C / 120Hz

| uF \ Vdc | 6.3     |      | 10      |      | 16      |      | 25      |      |
|----------|---------|------|---------|------|---------|------|---------|------|
|          | ΦD × L  | RC   | ΦD × L  | RC   | ΦD × L  | RC   | ΦD × L  | RC   |
| 10       |         |      |         |      | 5×11    | 40   | 5×11    | 43   |
| 15       |         |      |         |      | 5×11    | 45   | 5×11    | 47   |
| 22       | 5×11    | 45   | 5×11    | 51   | 5×11    | 55   | 5×11    | 60   |
| 33       | 5×11    | 55   | 5×11    | 60   | 5×11    | 70   | 5×11    | 75   |
| 47       | 5×11    | 65   | 5×11    | 75   | 5×11    | 85   | 5×11    | 90   |
| 68       | 5×11    | 70   | 5×11    | 80   | 5×11    | 100  | 6.3×11  | 125  |
| 100      | 5×11    | 100  | 5×11    | 110  | 6.3×11  | 140  | 6.3×11  | 145  |
| 150      | 6.3×11  | 120  | 6.3×11  | 130  | 8×11.5  | 180  | 8×11.5  | 200  |
| 220      | 6.3×11  | 180  | 6.3×11  | 190  | 8×11.5  | 240  | 8×11.5  | 250  |
| 330      | 6.3×11  | 190  | 8×11.5  | 270  | 8×11.5  | 285  | 10×12.5 | 350  |
| 470      | 8×11.5  | 300  | 8×11.5  | 330  | 10×12.5 | 380  | 10×16   | 460  |
| 680      | 10×12.5 | 320  | 10×12.5 | 420  | 10×16   | 530  | 10×20   | 650  |
| 1000     | 10×12.5 | 480  | 10×16   | 570  | 10×20   | 680  | 12.5×20 | 830  |
| 1500     | 10×16   | 600  | 10×20   | 750  | 12.5×20 | 860  | 12.5×25 | 1020 |
| 2200     | 10×20   | 830  | 12.5×20 | 980  | 12.5×25 | 1130 | 16×25   | 1210 |
| 3300     | 12.5×20 | 1100 | 12.5×25 | 1250 | 16×25   | 1270 | 16×31.5 | 1540 |
| 4700     | 12.5×25 | 1320 | 16×25   | 1350 | 16×31.5 | 1570 | 16×35.5 | 1650 |
| 6800     | 16×25   | 1495 | 16×31.5 | 1670 | 18×35.5 | 1930 | 18×35.5 | 1950 |
| 10000    | 16×31.5 | 1832 | 18×35.5 | 2010 | 18×40   | 2060 | 18×40   | 2100 |
| 15000    | 18×35.5 | 2235 | 18×40   | 2360 |         |      |         |      |
| 22000    | 18×40   | 2375 |         |      |         |      |         |      |

| uF \ Vdc | 35      |      | 50      |      | 63      |      | 100     |      |
|----------|---------|------|---------|------|---------|------|---------|------|
|          | ΦD × L  | RC   | ΦD × L  | RC   | ΦD × L  | RC   | ΦD × L  | RC   |
| 0.47     |         |      | 5×11    | 11   | 5×11    | 8    | 5×11    | 12   |
| 1        |         |      | 5×11    | 16   | 5×11    | 12   | 5×11    | 18   |
| 2.2      |         |      | 5×11    | 23   | 5×11    | 20   | 5×11    | 27   |
| 3.3      |         |      | 5×11    | 29   | 5×11    | 24   | 5×11    | 33   |
| 4.7      |         |      | 5×11    | 34   | 5×11    | 34   | 5×11    | 39   |
| 6.8      |         |      | 5×11    | 35   | 5×11    | 37   | 5×11    | 46   |
| 10       | 5×11    | 47   | 5×11    | 50   | 5×11    | 50   | 6.3×11  | 65   |
| 15       | 5×11    | 50   | 5×11    | 52   | 5×11    | 65   | 6.3×11  | 66   |
| 22       | 5×11    | 65   | 5×11    | 75   | 6.3×11  | 85   | 6.3×11  | 85   |
| 33       | 5×11    | 88   | 6.3×11  | 100  | 6.3×11  | 110  | 8×11.5  | 125  |
| 47       | 6.3×11  | 115  | 6.3×11  | 125  | 8×11.5  | 150  | 10×12.5 | 165  |
| 68       | 8×11.5  | 130  | 8×11.5  | 159  | 10×12.5 | 198  | 10×16   | 200  |
| 100      | 8×11.5  | 200  | 8×11.5  | 210  | 10×12.5 | 250  | 10×20   | 265  |
| 150      | 10×12.5 | 240  | 10×12.5 | 290  | 10×16   | 330  | 12.5×20 | 335  |
| 220      | 10×12.5 | 320  | 10×16   | 370  | 10×20   | 410  | 12.5×25 | 440  |
| 330      | 10×16   | 420  | 10×20   | 550  | 12.5×20 | 550  | 16×25   | 660  |
| 470      | 10×20   | 570  | 12.5×20 | 660  | 12.5×25 | 720  | 16×31.5 | 880  |
| 680      | 12.5×20 | 730  | 12.5×25 | 860  | 16×25   | 1000 | 16×35.5 | 1202 |
| 1000     | 12.5×25 | 1000 | 16×25   | 1020 | 16×31.5 | 1130 | 18×35.5 | 1300 |
| 1500     | 16×25   | 1110 | 16×31.5 | 1350 | 16×35.5 | 1450 |         |      |
| 2200     | 16×31.5 | 1450 | 18×35.5 | 1690 | 18×40   | 1780 |         |      |
| 3300     | 18×31.5 | 1600 | 18×40   | 2060 |         |      |         |      |
| 4700     | 18×35.5 | 1910 |         |      |         |      |         |      |

# ALUMINUM ELECTROLYTIC CAPACITORS



## PF Series

◆ Case size & Permissible rated ripple current: (mA rms) at 105°C / 120Hz

| uF \ Vdc | 160     |     | 200     |     | 250     |     | 350     |     |
|----------|---------|-----|---------|-----|---------|-----|---------|-----|
|          | ΦD × L  | RC  | ΦD × L  | RC  | ΦD × L  | RC  | ΦD × L  | RC  |
| 0.47     | 5×11    | 13  | 5×11    | 13  | 5×11    | 13  | 5×11    | 11  |
| 1        | 5×11    | 18  | 5×11    | 15  | 6.3×11  | 18  | 6.3×11  | 15  |
| 2.2      | 6.3×11  | 27  | 6.3×11  | 27  | 6.3×11  | 23  | 8×11.5  | 23  |
| 3.3      | 6.3×11  | 28  | 6.3×11  | 28  | 8×11.5  | 30  | 8×11.5  | 30  |
| 4.7      | 6.3×11  | 32  | 8×11.5  | 36  | 8×11.5  | 39  | 10×12.5 | 40  |
| 6.8      | 8×11.5  | 38  | 8×11.5  | 40  | 10×12.5 | 42  | 10×16   | 42  |
| 10       | 8×11.5  | 55  | 10×12.5 | 60  | 10×16   | 75  | 10×20   | 70  |
| 15       | 10×12.5 | 70  | 10×16   | 75  | 10×16   | 85  | 12.5×20 | 140 |
| 22       | 10×20   | 140 | 10×20   | 150 | 12.5×20 | 160 | 12.5×25 | 145 |
| 33       | 10×20   | 145 | 12.5×20 | 160 | 12.5×20 | 165 | 16×25   | 165 |
| 47       | 12.5×20 | 195 | 12.5×20 | 195 | 12.5×25 | 195 | 16×25   | 200 |
| 56       | 12.5×20 | 215 | 12.5×20 | 215 | 12.5×25 | 215 | 16×31.5 | 230 |
| 68       | 12.5×25 | 270 | 12.5×25 | 250 | 16×25   | 240 | 16×35.5 | 240 |
| 82       | 12.5×25 | 290 | 16×25   | 270 | 16×25   | 280 | 18×31.5 | 280 |
| 100      | 16×25   | 340 | 16×25   | 320 | 16×31.5 | 310 | 18×31.5 | 320 |
| 120      | 16×25   | 360 | 16×31.5 | 340 | 16×31.5 | 330 | 18×35.5 | 365 |
| 150      | 16×31.5 | 435 | 16×31.5 | 360 | 16×35.5 | 460 | 18×40   | 400 |
| 180      | 16×35.5 | 450 | 16×35.5 | 400 | 18×35.5 | 470 | 18×45   | 460 |
| 220      | 16×35.5 | 500 | 16×35.5 | 500 | 18×35.5 | 485 |         |     |
| 330      | 18×35.5 | 600 | 18×35.5 | 610 | 18×45   | 610 |         |     |
| 470      | 18×45   | 740 | 18×45   | 750 |         |     |         |     |
| 560      | 18×50   | 800 | 18×50   | 805 |         |     |         |     |

| uF \ Vdc | 400     |     | 450     |     |
|----------|---------|-----|---------|-----|
|          | ΦD × L  | RC  | ΦD × L  | RC  |
| 0.47     | 6.3×11  | 15  | 6.3×11  | 16  |
| 1        | 6.3×11  | 14  | 8×11.5  | 21  |
| 2.2      | 8×11.5  | 25  | 8×11.5  | 22  |
| 3.3      | 8×11.5  | 30  | 10×12.5 | 30  |
| 4.7      | 10×16   | 42  | 10×16   | 36  |
| 6.8      | 10×16   | 45  | 10×20   | 40  |
| 10       | 10×20   | 70  | 12.5×20 | 75  |
| 15       | 12.5×20 | 90  | 12.5×25 | 80  |
| 22       | 12.5×25 | 140 | 16×25   | 105 |
| 33       | 16×25   | 165 | 16×31.5 | 130 |
| 47       | 16×25   | 200 | 18×31.5 | 160 |
| 56       | 16×31.5 | 210 | 18×31.5 | 170 |
| 68       | 16×35.5 | 240 | 18×35.5 | 190 |
| 82       | 18×31.5 | 270 | 18×40   | 200 |
| 100      | 18×31.5 | 310 | 18×40   | 215 |
| 120      | 18×35.5 | 340 | 18×45   | 230 |
| 150      | 18×40   | 375 |         |     |
| 180      | 18×45   | 410 |         |     |

◆ RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

| Vdc       | Cap.(uF)     | Frequency (Hz) |      |      |      |      |
|-----------|--------------|----------------|------|------|------|------|
|           |              | 50/60          | 120  | 1K   | 10K  | 100K |
| 6.3 ~ 250 | 0.47 ~ 68    | 0.75           | 1.00 | 1.57 | 2.00 | 2.00 |
|           | 100 ~ 680    | 0.80           | 1.00 | 1.34 | 1.40 | 1.50 |
|           | 1000 ~ 22000 | 0.85           | 1.00 | 1.13 | 1.13 | 1.13 |
| 350 ~ 450 | 0.47 ~ 220   | 0.80           | 1.00 | 1.40 | 1.40 | 1.40 |
|           | 330 ~ 560    | 0.90           | 1.00 | 1.13 | 1.13 | 1.13 |