



REA Series

Features

- 85°C, 2,000 ~ 3,000 hours assured
- Standard series for general purposes
- RoHS Compliance



Sleeve & Marking Color: Blue & Black

Specifications

| Items | Performance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|---|--------------------|-------------------------------|-----------------|-----------------------------------|-----------------|---|--|------|------|------|------|-----------------|------|------------|-----------------|----------|----------|----------------|------|------|------|------|------|------|------|------|------|------|----|----|-----------|----------|---|---|---|---|---|---|---|----------|----------|----|---|---|---|---|---|---|---|---|----|----|----|----|-----------|----------|----|----|----|----|---|---|---|---|
| Category Temperature Range | -40°C ~ +85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (at 120Hz, 20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (at 20°C) | <table border="1"> <tr> <td>Rated voltage</td> <td>≤ 100V</td> <td>> 100V</td> </tr> <tr> <td>Time</td> <td>after 2 minutes</td> <td>after 5 minutes</td> </tr> <tr> <td>Leakage Current</td> <td>I = 0.01CV or 3 (μA) whichever is greater</td> <td>CV ≤ 1,000 I = 0.03CV + 15(μA) CV > 1,000 I = 0.02CV + 25(μA)</td> </tr> </table> <p>Where, C = rated capacitance in μF V = rated DC working voltage in V</p> | Rated voltage | ≤ 100V | > 100V | Time | after 2 minutes | after 5 minutes | Leakage Current | I = 0.01CV or 3 (μA) whichever is greater | CV ≤ 1,000 I = 0.03CV + 15(μA) CV > 1,000 I = 0.02CV + 25(μA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated voltage | ≤ 100V | > 100V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Time | after 2 minutes | after 5 minutes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current | I = 0.01CV or 3 (μA) whichever is greater | CV ≤ 1,000 I = 0.03CV + 15(μA) CV > 1,000 I = 0.02CV + 25(μA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ (at 120 Hz, 20°C) | <table border="1"> <tr> <td>Rated Voltage</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</td><td>200</td><td>250</td><td>350</td><td>400</td><td>450</td> </tr> <tr> <td>Tanδ (max)</td> <td>0.23</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.08</td><td>0.12</td><td>0.14</td><td>0.17</td><td>0.20</td><td>0.25</td><td>0.25</td> </tr> </table> <p>When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase.</p> | Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 350 | 400 | 450 | Tanδ (max) | 0.23 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.12 | 0.14 | 0.17 | 0.20 | 0.25 | 0.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 350 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ (max) | 0.23 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.12 | 0.14 | 0.17 | 0.20 | 0.25 | 0.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | <p>Impedance ratio shall not exceed the values given in the table below.</p> <table border="1"> <tr> <td colspan="2">Rated Voltage</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</td><td>200</td><td>250</td><td>350</td><td>400</td><td>450</td> </tr> <tr> <td rowspan="4">Impedance Ratio</td> <td>Z(-25°C)</td> <td>φ D < 16</td><td>6</td><td>4</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td rowspan="2">3</td><td rowspan="2">6</td><td rowspan="2">8</td><td rowspan="2">12</td><td rowspan="2">14</td><td rowspan="2">16</td> </tr> <tr> <td>/Z(+20°C)</td> <td>φ D ≥ 16</td><td>8</td><td>6</td><td>4</td><td>4</td><td>3</td><td>3</td><td>3</td> </tr> <tr> <td>Z(-40°C)</td> <td>φ D < 16</td><td>10</td><td>8</td><td>6</td><td>6</td><td>4</td><td>3</td><td>3</td><td rowspan="2">4</td><td rowspan="2">8</td><td rowspan="2">10</td><td rowspan="2">16</td><td rowspan="2">18</td><td rowspan="2">20</td> </tr> <tr> <td>/Z(+20°C)</td> <td>φ D ≥ 16</td><td>18</td><td>16</td><td>12</td><td>10</td><td>8</td><td>8</td><td>6</td><td>6</td> </tr> </table> | Rated Voltage | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 350 | 400 | 450 | Impedance Ratio | Z(-25°C) | φ D < 16 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 6 | 8 | 12 | 14 | 16 | /Z(+20°C) | φ D ≥ 16 | 8 | 6 | 4 | 4 | 3 | 3 | 3 | Z(-40°C) | φ D < 16 | 10 | 8 | 6 | 6 | 4 | 3 | 3 | 4 | 8 | 10 | 16 | 18 | 20 | /Z(+20°C) | φ D ≥ 16 | 18 | 16 | 12 | 10 | 8 | 8 | 6 | 6 |
| Rated Voltage | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 350 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance Ratio | Z(-25°C) | φ D < 16 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 6 | 8 | 12 | 14 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | /Z(+20°C) | φ D ≥ 16 | 8 | 6 | 4 | 4 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Z(-40°C) | φ D < 16 | 10 | 8 | 6 | 6 | 4 | 3 | 3 | 4 | 8 | 10 | 16 | 18 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | /Z(+20°C) | φ D ≥ 16 | 18 | 16 | 12 | 10 | 8 | 8 | 6 | | | | | | | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | <table border="1"> <tr> <td>Test Time</td> <td>2,000 Hrs for φD ≤ 8mm 3,000 Hrs for φD ≥ 10mm</td> </tr> <tr> <td>Capacitance Change</td> <td>With in ±20% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Less than 200% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> </table> <p>* The above Specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied with rated ripple current for 2,000 / 3,000 hours at 85°C.</p> | Test Time | 2,000 Hrs for φD ≤ 8mm 3,000 Hrs for φD ≥ 10mm | Capacitance Change | With in ±20% of initial value | Tanδ | Less than 200% of specified value | Leakage Current | Within specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Time | 2,000 Hrs for φD ≤ 8mm 3,000 Hrs for φD ≥ 10mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | With in ±20% of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ | Less than 200% of specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current | Within specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life Test | <table border="1"> <tr> <td>Test Time</td> <td>1,000 Hrs</td> </tr> <tr> <td>Capacitance Change</td> <td>With in ±20% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Less than 200% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> </table> <p>* The above Specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 85°C without voltage applied. The rated voltage shall be applied to the capacitors before the measurements for 160 ~ 450V (Refer to JIS C 5101-4 4.1).</p> | Test Time | 1,000 Hrs | Capacitance Change | With in ±20% of initial value | Tanδ | Less than 200% of specified value | Leakage Current | Within specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Time | 1,000 Hrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | With in ±20% of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tanδ | Less than 200% of specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current | Within specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ripple Current & Frequency Multipliers | <table border="1"> <tr> <td rowspan="3">Cap. (μF)</td> <td>Freq. (Hz)</td> <td>60 (50)</td><td>120</td><td>500</td><td>1k</td><td>10k up</td> </tr> <tr> <td>Under 100</td> <td>0.70</td><td>1.00</td><td>1.30</td><td>1.40</td><td>1.50</td> </tr> <tr> <td>100 < C ≤ 1,000</td> <td>0.75</td><td>1.00</td><td>1.20</td><td>1.30</td><td>1.35</td> </tr> <tr> <td>1,000 up above</td> <td>0.80</td><td>1.00</td><td>1.10</td><td>1.12</td><td>1.15</td> </tr> </table> | Cap. (μF) | Freq. (Hz) | 60 (50) | 120 | 500 | 1k | 10k up | Under 100 | 0.70 | 1.00 | 1.30 | 1.40 | 1.50 | 100 < C ≤ 1,000 | 0.75 | 1.00 | 1.20 | 1.30 | 1.35 | 1,000 up above | 0.80 | 1.00 | 1.10 | 1.12 | 1.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cap. (μF) | Freq. (Hz) | | 60 (50) | 120 | 500 | 1k | 10k up | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Under 100 | | 0.70 | 1.00 | 1.30 | 1.40 | 1.50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 100 < C ≤ 1,000 | 0.75 | 1.00 | 1.20 | 1.30 | 1.35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,000 up above | 0.80 | 1.00 | 1.10 | 1.12 | 1.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Diagram of Dimensions



Lead Spacing and Diameter

Unit: mm

| | | | | | | | | | |
|----|--------------------------|-----|-----|-----|------|-----|-----|-----|------|
| φD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 | 25 |
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10 | 12.5 |
| φd | 0.5 | | 0.6 | | 0.8 | | 1.0 | | |
| α | L < 20: 1.5, L ≥ 20: 2.0 | | | | | | | 2.0 | |
| β | 0.5 | | | | | | | | |

The case size of 12.5×16, 16×16, 16×20, 18×16, 18×20 and 18×25 are suitable for below diagram:





Dimension: $\phi D \times L$ (mm)

Ripple Current: mA/rms at 120 Hz, 85°C

Dimension & Permissible Ripple Current

| μF | V. DC Contents | 6.3V (0J) | | 10V (1A) | | 16V (1C) | | 25V (1E) | | 35V (1V) | | 50V (1H) | | 63V (1J) | | 100V (2A) | |
|---------|-------------------|-------------------|----------------|-------------------|----------------|--------------------|----------------|--------------------|----------------|-------------------|----------------|-------------------|----------------|-------------------|------------|-------------------|------------|
| | | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA |
| 2.2 | 2R2 | | | | | | | | | | | 5×11 | 29 | | | 5×11 | 33 |
| 3.3 | 3R3 | | | | | | | | | | | 5×11 | 35 | | | 5×11 | 40 |
| 4.7 | 4R7 | | | | | | | | | | | 5×11 | 42 | | | 5×11 | 48 |
| 10 | 100 | | | | | | | | | | | 5×11 | 65 | 5×11 | 70 | 5×11 | 59 |
| 22 | 220 | | | | | | | | | | | 5×11 | 95 | 6.3×11 | 115 | 6.3×11 | 115 |
| 33 | 330 | | | | | | | | | 5×11 | 108 | 6.3×11 5×11 | 136 125 | 6.3×11 | 140 | 8×11.5 | 145 |
| 47 | 470 | | | | | | | 5×11 | 115 | 5×11 | 130 | 6.3×11 | 165 | 6.3×11 | 170 | 10×12.5 | 235 |
| 100 | 101 | | | | | 5×11 | 160 | 6.3×11 | 190 | 6.3×11 | 210 | 8×11.5 | 260 | 8×11.5 10×12.5 | 245 320 | 10×16 | 325 |
| 220 | 221 | | | 5×11 | 220 | 6.3×11 | 260 | 8×11.5 | 320 | 8×11.5 | 385 | 10×12.5 | 455 | 10×16 | 490 | 12.5×20 16×16 | 640 625 |
| 330 | 331 | | | 6.3×11 | 290 | 6.3×11 | 290 | 8×11.5 | 440 | 10×12.5 | 490 | 10×16 | 585 | 10×20 12.5×16 | 710 675 | 16×20 18×16 | 695 685 |
| 470 | 471 | | | 6.3×11 | 350 | 8×11.5 | 440 | 10×12.5 | 545 | 10×16 | 740 | 10×20 12.5×16 | 755 610 | 16×16 12.5×20 | 910 900 | 16×25 | 910 |
| 1,000 | 102 | 8×11.5 | 540 | 10×12.5 8×11.5 | 650 550 | 10×12.5 | 635 | 10×20 12.5×16 | 955 830 | 12.5×20 16×16 | 1,145 1,010 | 12.5×25 16×20 | 1,340 1,160 | 16×20 | 1,260 | 18×40 | 1,820 |
| 2,200 | 222 | 10×16 | 845 | 10×20 12.5×16 | 1,070 970 | 12.5×16 16×16 | 930 1,160 | 12.5×25 16×16 | 1,540 1,150 | 16×20 | 1,390 | 16×35.5 | 1,960 | 18×31.5 | 2,040 | | |
| 3,300 | 332 | 10×20 12.5×16 | 1,185 960 | 12.5×20 | 1,420 | 12.5×20 16×16 | 1,450 1,240 | 16×20 | 1,490 | 16×31.5 18×25 | 2,070 1,970 | 18×35.5 | 2,500 | 18×40 | 2,575 | | |
| 4,700 | 472 | 12.5×20 | 1,545 | 12.5×25 16×16 | 1,780 1,420 | 16×20 18×16 | 1,600 1,820 | 16×25 18×25 | 2,100 2,170 | 18×35.5 | 2,700 | 22×40 | 3,040 | | | | |
| 6,800 | 682 | 12.5×25 | 1,880 | 16×20 18×20 | 1,700 1,870 | 16×25 18×20 | 2,280 1,890 | 16×35.5 18×31.5 | 2,475 2,550 | 22×40 | 2,900 | 22×45 | 3,185 | | | | |
| 10,000 | 103 | 16×20 18×20 | 2,000 2,020 | 16×25 18×25 | 2,150 2,370 | 18×31.5 16×35.5 | 2,590 2,450 | 18×40 | 3,080 | 22×45 | 3,400 | | | | | | |
| 15,000 | 153 | 16×31.5 18×25 | 2,460 2,375 | 16×40 18×31.5 | 2,730 2,620 | 18×40 | 3,100 | 22×45 25×40 | 3,780 3,850 | | | | | | | | |
| 22,000 | 223 | 18×31.5 | 2,780 | 18×40 | 3,370 | 22×40 | 3,900 | 25×45 | 4,290 | | | | | | | | |
| 33,000 | 333 | 22×40 | 3,700 | | | | | | | | | | | | | | |

| μF | V. DC Contents | 160V (2C) | | 200V (2D) | | 250V (2E) | | 350V (2V) | | 400V (2G) | | 450V (2W) | |
|---------|-------------------|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|----------|
| | | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA | $\phi D \times L$ | mA |
| 1 | 010 | | | | | 5×11 | 18 | 5×11 | 18 | 5×11 | 22 | 6.3×11 | 25 |
| 2.2 | 2R2 | | | 5×11 | 29 | 6.3×11 | 33 | 6.3×11 | 33 | 6.3×11 | 33 | 8×11.5 | 45 |
| 3.3 | 3R3 | | | 6.3×11 | 46 | 6.3×11 | 46 | 8×11.5 | 50 | 8×11.5 | 50 | 10×12.5 | 65 |
| 4.7 | 4R7 | | | 6.3×11 | 50 | 8×11.5 | 55 | 8×11.5 | 60 | 8×11.5 10×12.5 | 55 80 | 8×11.5 10×12.5 | 55 80 |
| 10 | 100 | 8×11.5 | 75 | 8×11.5 | 81 | 10×12.5 | 100 | 10×16 | 110 | 10×16 | 110 | 10×20 | 140 |
| 22 | 220 | 10×12.5 | 130 | 10×12.5 | 135 | 10×16 | 150 | 12.5×16 | 185 | 12.5×20 | 200 | 12.5×25 | 300 |
| 33 | 330 | 10×16 | 175 | 10×16 | 180 | 10×20 12.5×16 | 215 220 | 12.5×20 16×16 | 245 260 | 16×16 | 260 | 16×20 | 270 |
| 47 | 470 | 10×20 12.5×16 | 230 250 | 10×20 12.5×16 | 240 250 | 12.5×20 | 290 | 16×20 18×16 | 340 310 | 16×20 | 340 | 16×31.5 | 390 |
| 68 | 680 | 12.5×20 | 330 | 12.5×20 16×16 | 330 370 | 12.5×25 | 370 | 16×25 18×20 | 420 410 | 16×31.5 | 435 | 16×35.5 | 460 |
| 100 | 101 | 12.5×25 | 440 | 16×20 18×16 | 460 450 | 16×25 | 510 | 16×31.5 18×25 | 540 520 | 16×40 18×35.5 | 560 570 | 18×35.5 | 570 |
| 150 | 151 | 16×25 | 620 | 16×25 18×20 | 620 605 | 16×31.5 18×25 | 625 630 | 18×35.5 | 640 | 18×40 | 670 | 22×45 | 800 |
| 220 | 221 | 16×31.5 18×25 | 790 760 | 16×35.5 | 830 | 16×40 18×35.5 | 840 890 | 22×40 | 920 | 22×45 25×40 | 960 980 | 25×45 | 1,030 |
| 330 | 331 | 18×35.5 | 985 | 18×40 | 1,150 | 22×40 | 1,200 | 25×45 | 1,270 | | | | |
| 470 | 471 | 18×40 | 1,150 | 22×40 | 1,400 | 22×45 | 1,470 | | | | | | |

Part Numbering System

REA series 470 μF $\pm 20\%$ 16V Bulk Package Gas Type 8 $\phi \times 11.5L$ Pb-free and PET sleeve

REA **471** **M** **1C** **BK** - **0811**

Series Capacitance Capacitance Tolerance Rated Voltage Lead Configuration & Package Rubber Type Case Size Lead Wire and Sleeve Type

Note: For more details, please refer to "Part Numbering System (Radial Type)" on page 10.