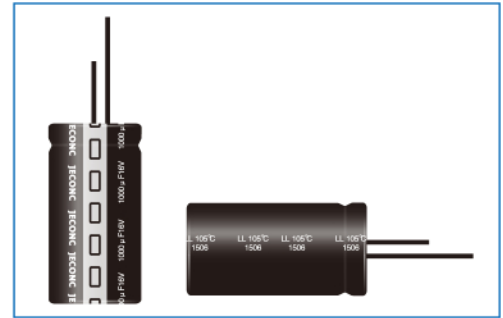


**LL 系列**  
SERIES

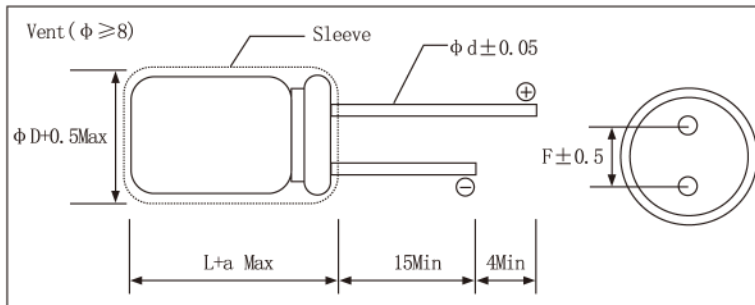
- 2000h at 105°C
- Load life of 2000 hours at 105°C
- Low Leakage Current
- Close Tolerance

◆ SPECIFICATION



| Items                                  | Characteristics   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
|--|---|--------------------|----------------------------|---------------|---------------------------------------|-----------------|-------------------------------|------|----|-----|--|------|------|------|------|------|------|------|------|--|---|---|---|---|--|--|--|--|
| Operating Temperature Range(°C)        | -40~+105°C  |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Voltage range (V)                      | 6.3~100V  |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Capacitance Range (μF)                 | 0.1~10000 μF  |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Capacitance Tolerance                  | ±20% (at 20°C, 120Hz)   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| leakage current (μA)                   | After 2minute at 20°C application of rated voltage, leakage current is not more than 0.008CV or I <sub>uA</sub> , whichever is greater<br>C:Nominal Capacitance (μF) V :Rated Voltage (V)   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Dissipation Factor(Tan δ)              | <table border="1"> <thead> <tr> <th>WV (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Tan δ (max)</td> <td>0.21</td> <td>0.17</td> <td>0.14</td> <td>0.12</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> </tr> </tbody> </table> <p>(at 20°C, 120Hz)</p>  | WV (V)             | 6.3                        | 10            | 16                                    | 25              | 35                            | 50   | 63 | 100 | Tan δ (max)                            | 0.21 | 0.17 | 0.14 | 0.12 | 0.12 | 0.10 | 0.08 | 0.08 |  |   |   |   |   |  |  |  |  |
| WV (V)                                 | 6.3   | 10                 | 16                         | 25            | 35                                    | 50              | 63                            | 100  |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Tan δ (max)                            | 0.21  | 0.17               | 0.14                       | 0.12          | 0.12                                  | 0.10            | 0.08                          | 0.08 |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| LowTemperature Characteristics         | <table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Z<sub>-25°C</sub>/Z<sub>+20°C</sub></td> <td>4</td> <td>3</td> <td>2</td> <td colspan="2">1.5</td> <td colspan="3"></td> </tr> <tr> <td>Z<sub>-40°C</sub>/Z<sub>+20°C</sub></td> <td>8</td> <td>6</td> <td>4</td> <td colspan="2">3</td> <td colspan="3"></td> </tr> </tbody> </table> <p>(at 120Hz)</p>   | Rated Voltage (V)  | 6.3                        | 10            | 16                                    | 25              | 35                            | 50   | 63 | 100 | Z <sub>-25°C</sub> /Z <sub>+20°C</sub> | 4    | 3    | 2    | 1.5  |      |      |      |      | Z <sub>-40°C</sub> /Z <sub>+20°C</sub> | 8 | 6 | 4 | 3 |  |  |  |  |
| Rated Voltage (V)                      | 6.3   | 10                 | 16                         | 25            | 35                                    | 50              | 63                            | 100  |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Z <sub>-25°C</sub> /Z <sub>+20°C</sub> | 4   | 3                  | 2                          | 1.5           |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Z <sub>-40°C</sub> /Z <sub>+20°C</sub> | 8   | 6                  | 4                          | 3             |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Load Life                              | <p>The following specifications shall be satisfied when the capacitors are restored to 20 °C after subjected to DC voltage with the rated rippled current is applied for 2000 hours at 105°C</p> <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>Within ± 15% initial value</td> </tr> <tr> <td>D. F. (Tan δ)</td> <td>Not more than 150% of specified value</td> </tr> <tr> <td>leakage current</td> <td>Not more than specified value</td> </tr> </tbody> </table>  | Capacitance change | Within ± 15% initial value | D. F. (Tan δ) | Not more than 150% of specified value | leakage current | Not more than specified value |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Capacitance change                     | Within ± 15% initial value  |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| D. F. (Tan δ)                          | Not more than 150% of specified value   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| leakage current                        | Not more than specified value   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Shelf Life                             | <p>The following specifications shall be satisfied when the capacitors are restored to 20 °C after exposing them for 1,000 hours at 105°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.</p> <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>Within ± 15% initial value</td> </tr> <tr> <td>D. F. (Tan δ)</td> <td>Not more than 150% of specified value</td> </tr> <tr> <td>leakage current</td> <td>Not more than specified value</td> </tr> </tbody> </table> | Capacitance change | Within ± 15% initial value | D. F. (Tan δ) | Not more than 150% of specified value | leakage current | Not more than specified value |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| Capacitance change                     | Within ± 15% initial value  |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| D. F. (Tan δ)                          | Not more than 150% of specified value   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |
| leakage current                        | Not more than specified value   |                    |                            |               |                                       |                 |                               |      |    |     |  |      |      |      |      |      |      |      |      |  |   |   |   |   |  |  |  |  |

◆ DIMENSIONS(mm)



|    |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|
| ΦD | 5   | 6.3 | 8   | 10  | 13  | 16  | 18  |
| F  | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Φd | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.8 | 0.8 |
| a  | 1.5 | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 |

◆ Frequency Coefficient

| Frequency / Cap (μF) | 50/60Hz | 120Hz | 1KHz | ≥10KHz |
|----------------------|---------|-------|------|--------|
| ~68                  | 0.75    | 1.00  | 1.57 | 2.10   |
| 100~68               | 0.80    | 1.00  | 1.34 | 1.50   |
| 1000~10000           | 0.85    | 1.00  | 1.13 | 1.15   |

◆ Temperature Coefficient

|                  |     |     |      |
|------------------|-----|-----|------|
| Temperature (°C) | +70 | +85 | +105 |
| Coefficient      | 1.8 | 1.4 | 1.0  |



◆ STANDARD RATINGS

| UR (Surge Voltage)<br>Code | Rated Capacitance | Max ESR<br>20°C 120Hz | Rated Ripple<br>Current<br>105°C 120Hz | Size<br>Φ D×L |
|----------------------------|-------------------|-----------------------|--|---------------|
| (V)                        | (μF)              | (Ω)                   | (mA rms)                               | (mm)          |
| 6.3<br>(8)<br>0J           | 470               | 0.51                  | 390                                    | 10×12.5       |
|                            | 680               | 0.41                  | 480                                    | 10×16         |
|                            | 1000              | 0.28                  | 650                                    | 10×20         |
|                            | 1500              | 0.19                  | 910                                    | 13×25         |
|                            | 2200              | 0.13                  | 1060                                   | 13×25         |
|                            | 3300              | 0.08                  | 1270                                   | 16×25         |
|                            | 4700              | 0.06                  | 1500                                   | 16×31.5       |
|                            | 6800              | 0.04                  | 1760                                   | 18×35.5       |
|                            | 10000             | 0.03                  | 1900                                   | 18×40         |
| 10<br>(13)<br>1A           | 47                | 4.23                  | 110                                    | 5×11          |
|                            | 68                | 2.93                  | 150                                    | 6.3×12        |
|                            | 100               | 1.99                  | 180                                    | 6.3×12        |
|                            | 150               | 1.33                  | 250                                    | 8×12          |
|                            | 220               | 0.90                  | 310                                    | 8×12          |
|                            | 330               | 0.60                  | 400                                    | 10×12.5       |
|                            | 470               | 0.48                  | 530                                    | 10×16         |
|                            | 680               | 0.33                  | 600                                    | 10×20         |
|                            | 1000              | 0.23                  | 810                                    | 13×20         |
|                            | 1500              | 0.15                  | 1020                                   | 13×25         |
|                            | 2200              | 0.10                  | 1200                                   | 16×25         |
|                            | 3300              | 0.07                  | 1420                                   | 16×31.5       |
|                            | 4700              | 0.05                  | 1650                                   | 16×35.5       |
|                            | 6800              | 0.03                  | 1890                                   | 18×35.5       |
| 16<br>(20)<br>1C           | 10                | 15.92                 | 55                                     | 5×11          |
|                            | 15                | 10.62                 | 70                                     | 5×11          |
|                            | 22                | 7.24                  | 85                                     | 5×11          |
|                            | 33                | 4.83                  | 100                                    | 5×11          |
|                            | 47                | 3.39                  | 140                                    | 6.3×12        |
|                            | 68                | 2.34                  | 160                                    | 6.3×12        |
|                            | 100               | 1.59                  | 230                                    | 8×12          |
|                            | 150               | 1.06                  | 280                                    | 8×12          |
|                            | 220               | 0.72                  | 370                                    | 10×12.5       |
|                            | 330               | 0.56                  | 420                                    | 10×16         |
|                            | 470               | 0.40                  | 550                                    | 10×20         |
|                            | 680               | 0.27                  | 730                                    | 13×20         |
|                            | 1000              | 0.19                  | 910                                    | 13×25         |
|                            | 1500              | 0.12                  | 1150                                   | 16×25         |
|                            | 2200              | 0.08                  | 1300                                   | 16×25         |
|                            | 3300              | 0.06                  | 1550                                   | 16×35.5       |
| 4700                       | 0.04              | 1820                  | 16×35.5                                |               |
| 25<br>(32)<br>1E           | 4.7               | 22.59                 | 45                                     | 5×11          |
|                            | 6.8               | 15.61                 | 55                                     | 5×11          |
|                            | 10                | 10.62                 | 70                                     | 5×11          |
|                            | 15                | 7.08                  | 85                                     | 5×11          |
|                            | 22                | 4.83                  | 100                                    | 5×11          |
|                            | 33                | 3.22                  | 140                                    | 6.3×12        |
|                            | 47                | 2.26                  | 170                                    | 6.3×12        |
|                            | 68                | 1.56                  | 230                                    | 8×12          |
|                            | 100               | 1.06                  | 280                                    | 8×12          |
|                            | 150               | 0.71                  | 370                                    | 10×12.5       |
|                            | 220               | 0.72                  | 400                                    | 10×16         |



◆ STANDARD RATINGS

| UR (Surge Voltage)<br>Code | Rated Capacitance | Max ESR<br>20°C 120Hz | Rated Ripple<br>Current<br>105°C 120Hz | Size<br>φ D×L |
|----------------------------|-------------------|-----------------------|--|---------------|
| (V)                        | (μF)              | (Ω)                   | (mA rms)                               | (mm)          |
| 25<br>(32)<br>1E           | 330               | 0.48                  | 490                                    | 10×20         |
|                            | 470               | 0.34                  | 600                                    | 13×20         |
|                            | 680               | 0.23                  | 810                                    | 13×25         |
|                            | 1000              | 0.16                  | 1010                                   | 16×25         |
|                            | 1500              | 0.11                  | 1270                                   | 16×31.5       |
|                            | 2200              | 0.07                  | 1440                                   | 16×35.5       |
|                            | 3300              | 0.05                  | 1720                                   | 18×40         |
| 35<br>(44)<br>1V           | 15                | 7.08                  | 85                                     | 5×11          |
|                            | 22                | 4.83                  | 110                                    | 6.3×12        |
|                            | 33                | 3.22                  | 140                                    | 6.3×12        |
|                            | 47                | 2.26                  | 190                                    | 8×12          |
|                            | 68                | 1.56                  | 230                                    | 8×12          |
|                            | 100               | 1.06                  | 300                                    | 10×12.5       |
|                            | 150               | 1.06                  | 400                                    | 10×16         |
|                            | 220               | 0.72                  | 440                                    | 10×20         |
|                            | 330               | 0.48                  | 550                                    | 13×20         |
|                            | 470               | 0.34                  | 680                                    | 13×25         |
|                            | 680               | 0.23                  | 840                                    | 16×25         |
|                            | 1000              | 0.16                  | 1100                                   | 16×25         |
|                            | 1500              | 0.11                  | 1390                                   | 16×35.5       |
| 2200                       | 0.07              | 1580                  | 16×35.5                                |               |
| 50<br>(63)<br>1H           | 0.1               | 1061.57               | 1.1                                    | 5×11          |
|                            | 0.15              | 707.71                | 1.6                                    | 5×11          |
|                            | 0.22              | 482.53                | 2.3                                    | 5×11          |
|                            | 0.33              | 321.69                | 3.5                                    | 5×11          |
|                            | 0.47              | 225.87                | 5.0                                    | 5×11          |
|                            | 0.68              | 156.11                | 7.3                                    | 5×11          |
|                            | 1                 | 106.16                | 10.7                                   | 5×11          |
|                            | 1.5               | 70.77                 | 16                                     | 5×11          |
|                            | 2.2               | 48.25                 | 23                                     | 5×11          |
|                            | 3.3               | 32.17                 | 40                                     | 5×11          |
|                            | 4.7               | 22.59                 | 45                                     | 5×11          |
|                            | 6.8               | 15.61                 | 55                                     | 5×11          |
|                            | 10                | 10.62                 | 70                                     | 5×11          |
|                            | 15                | 7.08                  | 95                                     | 6.3×12        |
| 50<br>(63)<br>1H           | 22                | 4.83                  | 110                                    | 6.3×12        |
|                            | 33                | 3.22                  | 165                                    | 8×12          |
|                            | 47                | 2.26                  | 190                                    | 8×12          |
|                            | 68                | 1.56                  | 250                                    | 10×12.5       |
|                            | 100               | 1.33                  | 320                                    | 10×16         |
|                            | 150               | 0.88                  | 420                                    | 10×20         |
|                            | 220               | 0.60                  | 490                                    | 13×20         |
|                            | 330               | 0.40                  | 600                                    | 13×20         |
|                            | 470               | 0.28                  | 760                                    | 16×25         |
|                            | 680               | 0.20                  | 910                                    | 16×25         |
|                            | 1000              | 0.13                  | 1140                                   | 16×31.5       |
|                            | 1500              | 0.09                  | 1480                                   | 18×40         |
| 63<br>(79)<br>1J           | 6.8               | 13.66                 | 59                                     | 5×11          |
|                            | 10                | 9.29                  | 75                                     | 6.3×12        |
|                            | 15                | 6.19                  | 100                                    | 6.3×12        |
|                            | 22                | 4.22                  | 115                                    | 8×12          |



◆ STANDARD RATINGS

| UR (Surge Voltage)<br>Code | Rated Capacitance | Max ESR<br>20°C 120Hz | Rated Ripple<br>Current<br>105°C 120Hz | Size<br>φ D×L |
|----------------------------|-------------------|-----------------------|--|---------------|
| (V)                        | (μ F)             | (Ω)                   | (mA rms)                               | (mm)          |
| 63<br>(79)<br>1J           | 33                | 2.81                  | 170                                    | 8×12          |
|                            | 47                | 1.98                  | 200                                    | 10×12.5       |
|                            | 68                | 1.56                  | 270                                    | 10×16         |
|                            | 100               | 1.06                  | 330                                    | 10×20         |
|                            | 150               | 0.71                  | 450                                    | 13×20         |
|                            | 220               | 0.48                  | 550                                    | 13×20         |
|                            | 330               | 0.32                  | 710                                    | 13×25         |
|                            | 470               | 0.23                  | 850                                    | 16×25         |
|                            | 680               | 0.16                  | 1050                                   | 16×31.5       |
|                            | 1000              | 0.11                  | 1330                                   | 18×35.5       |
| 100<br>(125)<br>2A         | 0.1               | 928.87                | 2.1                                    | 5×11          |
|                            | 0.15              | 619.25                | 3.2                                    | 5×11          |
|                            | 0.22              | 422.22                | 4.7                                    | 5×11          |
|                            | 0.33              | 281.48                | 7.0                                    | 5×11          |
|                            | 0.47              | 197.63                | 10.1                                   | 5×11          |
|                            | 0.68              | 136.60                | 14.5                                   | 5×11          |
|                            | 1                 | 92.89                 | 19                                     | 5×11          |
|                            | 1.5               | 61.92                 | 23                                     | 5×11          |
|                            | 2.2               | 42.22                 | 28                                     | 5×11          |
|                            | 3.3               | 28.15                 | 45                                     | 5×11          |
|                            | 4.7               | 19.76                 | 50                                     | 5×11          |
|                            | 6.8               | 13.66                 | 65                                     | 6.3×12        |
|                            | 10                | 9.29                  | 90                                     | 8×12          |
|                            | 15                | 6.19                  | 110                                    | 8×12          |
|                            | 22                | 4.22                  | 136                                    | 10×12.5       |
|                            | 33                | 3.22                  | 180                                    | 10×16         |
|                            | 47                | 2.26                  | 220                                    | 10×20         |
|                            | 68                | 1.56                  | 290                                    | 10×20         |
|                            | 100               | 1.06                  | 370                                    | 13×20         |
|                            | 150               | 0.71                  | 470                                    | 13×25         |
| 220                        | 0.48              | 580                   | 16×25                                  |               |
| 330                        | 0.32              | 730                   | 16×31.5                                |               |
| 470                        | 0.23              | 910                   | 16×35.5                                |               |

Customer products are available on request