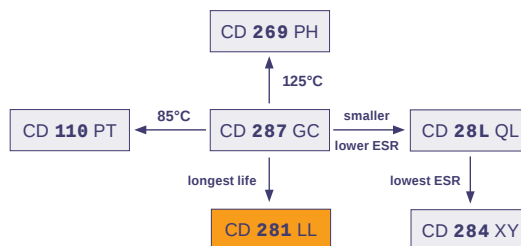


## 3000 - 12000h at 105°C

- Longest Lifetime 105°C
- Low Impedance
- Power Supplies
- Smoothing, Buffering, Filtering



| Item                                                       | Characteristics                                                                                                                                                                                                                                                                   |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------|------|------|------|------|------|------|-------------------|-----|----|----|----|----|----|----|-----|-------------|------|------|------|------|------|------|------|------|
| Operating Temperature Range (°C)                           | -55 ~ +105                                                                                                                                                                                                                                                                        |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| Voltage Range (V)                                          | 6,3 ~ 100                                                                                                                                                                                                                                                                         |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| Capacitance Range (µF)                                     | 0,47 ~ 15000                                                                                                                                                                                                                                                                      |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| Capacitance Tolerance (20°C, 120Hz)                        | ± 20%                                                                                                                                                                                                                                                                             |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| Leakage Current (µA)                                       | After 2 minutes at 20°C application of rated voltage, leakage current is not more than 0,02CV or 3, whichever is greater.<br>C: Nominal Capacitance (µF)    V: Rated Voltage (V)                                                                                                  |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| Dissipation Factor (20°C, 120Hz)                           | <table><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></tr><tr><td>Tan δ (max)</td><td>0,22</td><td>0,19</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></tr></table> |      |           |      |      |      |      |      |      | Rated Voltage (V) | 6,3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | Tan δ (max) | 0,22 | 0,19 | 0,16 | 0,14 | 0,12 | 0,10 | 0,09 | 0,08 |
|                                                            | Rated Voltage (V)                                                                                                                                                                                                                                                                 | 6,3  | 10        | 16   | 25   | 35   | 50   | 63   | 100  |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
|                                                            | Tan δ (max)                                                                                                                                                                                                                                                                       | 0,22 | 0,19      | 0,16 | 0,14 | 0,12 | 0,10 | 0,09 | 0,08 |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| For Capacitances >1000µF add 0,02 to every 1000µF          |                                                                                                                                                                                                                                                                                   |      |           |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
| Stability at Low Temperature<br>(Impedance Ratio at 120Hz) | Rated Voltage (V)                                                                                                                                                                                                                                                                 |      | 6,3 ~ 100 |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |
|                                                            | Z <sub>-55°C</sub> / Z <sub>+20°C</sub>                                                                                                                                                                                                                                           |      | 3         |      |      |      |      |      |      |                   |     |    |    |    |    |    |    |     |             |      |      |      |      |      |      |      |      |

Radial

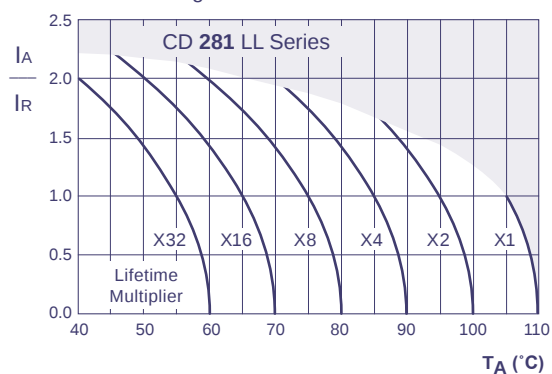
|                                                                                               | Useful Life                                                                        |                                                                     | Load Life                                                                        | Endurance Test                                                                    | Shelf Life                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lifetime                                                                                      | Ø 5 : 3000h<br>Ø 6 - 8 : 5000h<br>Ø 10 : 7000h<br>Ø 12 : 10000h<br>Ø ≥ 16 : 12000h | Ø ≥ 6 : > 250000h                                                   | Ø 5 : 2000h<br>Ø 6 - 8 : 3000h<br>Ø 10 : 5000h<br>Ø 12 : 7000h<br>Ø ≥ 16 : 8000h | Ø 5 : 3000h<br>Ø 6 - 8 : 4000h<br>Ø 10 : 6000h<br>Ø 12 : 8000h<br>Ø ≥ 16 : 10000h | 1000h                                                                                                                                                        |
| Leakage Current                                                                               | Not more than specified value                                                      |                                                                     | Not more than specified value                                                    | Not more than specified value                                                     | Not more than specified value                                                                                                                                |
| Capacity Change                                                                               | Within ± 30% of initial value                                                      |                                                                     | Within ± 20% of initial value                                                    | Within ± 20% of initial value                                                     | Within ± 20% of initial value                                                                                                                                |
| Dissipation Factor                                                                            | Not more than 300% of specified value                                              |                                                                     | Not more than 200% of specified value                                            | Not more than 200% of specified value                                             | Not more than 200% of specified value                                                                                                                        |
| Condition:<br>Applied Voltage<br>Applied Current<br>Applied Temperature<br>Failure Rate Level | U <sub>R</sub><br>I <sub>R</sub><br>105°C<br>≤ 1% Failure Rate                     | U <sub>R</sub><br>1,4 x I <sub>R</sub><br>40°C<br>≤ 1% Failure Rate | U <sub>R</sub><br>I <sub>R</sub><br>105°C<br>guaranteed                          | U <sub>R</sub><br>I <sub>R</sub> = 0<br>105°C                                     | U <sub>R</sub> = 0<br>I <sub>R</sub> = 0<br>105°C<br><div>After test:<br/>U<sub>R</sub> to be applied<br/>for 30min<br/>&gt;24h before<br/>measurement</div> |

## Multiplier for Ripple Current

Frequency Coefficient

| Frequency        | 120Hz | 1kHz | 10kHz | 100kHz |
|------------------|-------|------|-------|--------|
| Capacitance (µF) |       |      |       |        |
| 0,47 ~ 4,7       | 0,40  | 0,68 | 0,84  | 1,00   |
| 5,6 ~ 47         | 0,50  | 0,76 | 0,87  | 1,00   |
| 56 ~ 270         | 0,70  | 0,85 | 0,93  | 1,00   |
| 330 ~ 1000       | 0,80  | 0,93 | 0,98  | 1,00   |
| 1200 ~ 15000     | 0,90  | 0,95 | 1,00  | 1,00   |

Lifetime Diagram



I<sub>A</sub> = actual ripple current at 100kHz, I<sub>R</sub> = rated ripple current at 100kHz, 105°C  
 Multiplier of Useful Life as a function of ambient temperature and ripple current load

# CD 281 LL Series



## Ratings for CD 281 LL Series

| V <sub>DC</sub><br>(Surge<br>Voltage)<br>Code | Rated<br>Capa-<br>cittance | Max ESR<br>20°C,<br>120Hz | Max Imp<br>20°C,<br>100kHz | Max Imp<br>-10°C,<br>100kHz | Max<br>Ripple<br>Current<br>105°C,<br>100kHz | Size<br>Ø D x L |
|-----------------------------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------------------------|-----------------|
| (V)                                           | (µF)                       | (Ω)                       | (Ω)                        | (Ω)                         | (mArms)                                      | (mm)            |
| 6,3<br>(7,2)<br>0J                            | 100                        | 2,919                     | 0,65                       | 1,30                        | 175                                          | 5 x 11,5        |
|                                               | 150                        | 1,946                     | 0,46                       | 0,92                        | 235                                          | 5 x 15          |
|                                               | 220                        | 1,327                     | 0,30                       | 0,60                        | 290                                          | 6,3 x 11,5      |
|                                               | 330                        | 0,885                     | 0,20                       | 0,40                        | 400                                          | 6,3 x 15        |
|                                               | 470                        | 0,621                     | 0,17                       | 0,34                        | 488                                          | 8 x 11,5        |
|                                               | 680                        | 0,429                     | 0,13                       | 0,26                        | 617                                          | 8 x 16          |
|                                               |                            | 0,429                     | 0,12                       | 0,24                        | 613                                          | 10 x 12,5       |
|                                               | 820                        | 0,356                     | 0,095                      | 0,19                        | 734                                          | 10 x 16         |
|                                               | 1000                       | 0,292                     | 0,095                      | 0,19                        | 800                                          | 8 x 20          |
|                                               | 1200                       | 0,243                     | 0,065                      | 0,13                        | 1010                                         | 10 x 20         |
|                                               |                            | 0,243                     | 0,065                      | 0,13                        | 1010                                         | 12,5 x 15       |
|                                               | 1500                       | 0,195                     | 0,055                      | 0,11                        | 1190                                         | 10 x 25         |
|                                               |                            | 0,145                     | 0,045                      | 0,090                       | 1440                                         | 10 x 30         |
|                                               | 2200                       | 0,145                     | 0,042                      | 0,084                       | 1400                                         | 12,5 x 20       |
|                                               |                            | 0,118                     | 0,038                      | 0,076                       | 1690                                         | 12,5 x 25       |
|                                               | 2700                       | 0,118                     | 0,046                      | 0,092                       | 1310                                         | 16 x 15         |
|                                               |                            | 0,105                     | 0,043                      | 0,086                       | 1460                                         | 18 x 15         |
|                                               | 3900                       | 0,088                     | 0,032                      | 0,064                       | 1950                                         | 12,5 x 30       |
|                                               | 4700                       | 0,079                     | 0,028                      | 0,056                       | 2220                                         | 12,5 x 35       |
|                                               |                            | 0,079                     | 0,034                      | 0,068                       | 1660                                         | 16 x 20         |
|                                               | 5600                       | 0,071                     | 0,026                      | 0,052                       | 2390                                         | 12,5 x 40       |
|                                               |                            | 0,071                     | 0,028                      | 0,056                       | 2070                                         | 16 x 25         |
|                                               | 6800                       | 0,062                     | 0,025                      | 0,050                       | 2350                                         | 16 x 31,5       |
|                                               |                            | 0,062                     | 0,027                      | 0,054                       | 2120                                         | 18 x 25         |
|                                               | 8200                       | 0,058                     | 0,022                      | 0,044                       | 2550                                         | 16 x 35,5       |
|                                               | 10000                      | 0,053                     | 0,023                      | 0,046                       | 2410                                         | 18 x 31,5       |
| 10<br>(13)<br>1A                              | 82                         | 3,075                     | 0,65                       | 1,30                        | 175                                          | 5 x 11,5        |
|                                               |                            | 2,521                     | 0,46                       | 0,92                        | 235                                          | 5 x 15          |
|                                               | 100                        | 1,946                     | 0,30                       | 0,60                        | 290                                          | 6,3 x 11,5      |
|                                               | 180                        | 1,401                     | 0,20                       | 0,40                        | 400                                          | 6,3 x 15        |
|                                               | 220                        | 1,146                     | 0,17                       | 0,34                        | 488                                          | 8 x 11,5        |
|                                               | 330                        | 0,536                     | 0,13                       | 0,26                        | 617                                          | 8 x 16          |
|                                               |                            | 0,536                     | 0,12                       | 0,24                        | 613                                          | 10 x 12,5       |
|                                               | 560                        | 0,450                     | 0,095                      | 0,19                        | 734                                          | 10 x 16         |
|                                               | 680                        | 0,371                     | 0,095                      | 0,19                        | 800                                          | 8 x 20          |
|                                               | 1000                       | 0,252                     | 0,065                      | 0,12                        | 1010                                         | 10 x 20         |
|                                               |                            | 0,252                     | 0,065                      | 0,13                        | 1010                                         | 12,5 x 15       |
|                                               | 1200                       | 0,210                     | 0,055                      | 0,11                        | 1190                                         | 10 x 25         |
|                                               | 1500                       | 0,168                     | 0,045                      | 0,090                       | 1440                                         | 10 x 30         |
|                                               | 1800                       | 0,140                     | 0,042                      | 0,084                       | 1400                                         | 12,5 x 20       |
|                                               |                            | 0,140                     | 0,046                      | 0,092                       | 1310                                         | 16 x 15         |
|                                               | 2200                       | 0,127                     | 0,038                      | 0,076                       | 1690                                         | 12,5 x 25       |
|                                               |                            | 0,127                     | 0,043                      | 0,086                       | 1460                                         | 18 x 15         |
|                                               | 2700                       | 0,103                     | 0,032                      | 0,064                       | 1950                                         | 12,5 x 30       |
|                                               | 3300                       | 0,092                     | 0,028                      | 0,056                       | 2220                                         | 12,5 x 35       |
|                                               |                            | 0,092                     | 0,034                      | 0,068                       | 1660                                         | 16 x 20         |
|                                               | 3900                       | 0,078                     | 0,026                      | 0,052                       | 2390                                         | 12,5 x 40       |
|                                               |                            | 0,078                     | 0,028                      | 0,056                       | 2070                                         | 16 x 25         |
|                                               | 4700                       | 0,078                     | 0,030                      | 0,060                       | 1850                                         | 18 x 20         |
|                                               |                            | 0,071                     | 0,027                      | 0,054                       | 2120                                         | 18 x 25         |
| 16<br>(20)<br>1C                              | 5600                       | 0,064                     | 0,025                      | 0,050                       | 2350                                         | 16 x 31,5       |
|                                               | 6800                       | 0,057                     | 0,022                      | 0,044                       | 2550                                         | 16 x 35,5       |
|                                               |                            | 0,057                     | 0,023                      | 0,046                       | 2410                                         | 18 x 31,5       |
|                                               | 8200                       | 0,053                     | 0,020                      | 0,040                       | 2970                                         | 16 x 40         |
|                                               |                            | 0,053                     | 0,020                      | 0,040                       | 2680                                         | 18 x 35,5       |
|                                               | 10000                      | 0,049                     | 0,019                      | 0,038                       | 3010                                         | 18 x 40         |
|                                               | 56                         | 3,791                     | 0,65                       | 1,30                        | 175                                          | 5 x 11,5        |
|                                               | 82                         | 2,589                     | 0,46                       | 0,92                        | 235                                          | 5 x 15          |
|                                               | 120                        | 1,769                     | 0,30                       | 0,60                        | 290                                          | 6,3 x 11,5      |
|                                               | 180                        | 1,180                     | 0,20                       | 0,40                        | 400                                          | 6,3 x 15        |
|                                               | 270                        | 0,786                     | 0,17                       | 0,34                        | 501                                          | 8 x 11,5        |
|                                               |                            | 0,643                     | 0,13                       | 0,26                        | 575                                          | 8 x 16          |
|                                               | 330                        | 0,643                     | 0,12                       | 0,24                        | 625                                          | 10 x 12,5       |
|                                               |                            | 0,544                     | 0,095                      | 0,19                        | 795                                          | 10 x 16         |
|                                               | 470                        | 0,452                     | 0,095                      | 0,19                        | 760                                          | 8 x 20          |
|                                               | 680                        | 0,312                     | 0,065                      | 0,13                        | 1010                                         | 10 x 20         |
|                                               |                            | 0,312                     | 0,065                      | 0,13                        | 1010                                         | 12,5 x 15       |
|                                               | 820                        | 0,259                     | 0,055                      | 0,11                        | 1190                                         | 10 x 25         |

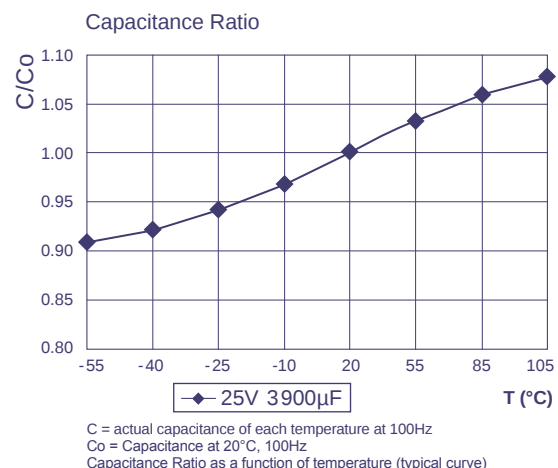
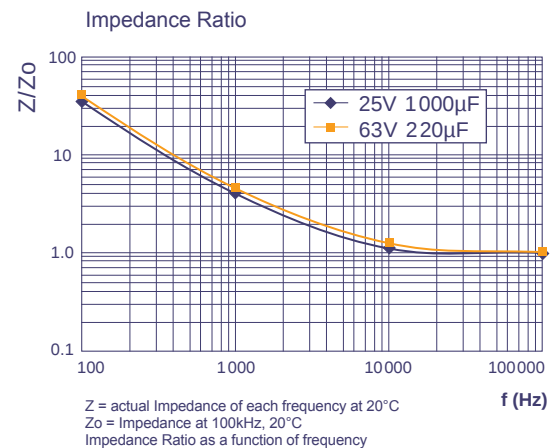
| V <sub>DC</sub><br>(Surge<br>Voltage)<br>Code | Rated<br>Capa-<br>cittance | Max ESR<br>20°C,<br>120Hz | Max Imp<br>20°C,<br>100kHz | Max Imp<br>-10°C,<br>100kHz | Max<br>Ripple<br>Current<br>105°C,<br>100kHz | Size<br>Ø D x L |
|-----------------------------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------------------------|-----------------|
| (V)                                           | (µF)                       | (Ω)                       | (Ω)                        | (Ω)                         | (mArms)                                      | (mm)            |
| 16<br>(20)<br>1C                              | 1200                       | 0,177                     | 0,045                      | 0,090                       | 1430                                         | 10 x 30         |
|                                               |                            | 0,177                     | 0,042                      | 0,084                       | 1400                                         | 12,5 x 20       |
|                                               |                            | 0,142                     | 0,038                      | 0,076                       | 1690                                         | 12,5 x 25       |
|                                               | 1500                       | 0,142                     | 0,046                      | 0,092                       | 1340                                         | 16 x 15         |
|                                               |                            | 0,142                     | 0,043                      | 0,086                       | 1490                                         | 18 x 15         |
|                                               | 2200                       | 0,109                     | 0,032                      | 0,064                       | 1950                                         | 12,5 x 30       |
|                                               |                            | 0,109                     | 0,034                      | 0,068                       | 1730                                         | 16 x 20         |
|                                               | 2700                       | 0,088                     | 0,028                      | 0,056                       | 2200                                         | 12,5 x 35       |
|                                               |                            | 0,088                     | 0,028                      | 0,056                       | 2070                                         | 16 x 25         |
|                                               |                            | 0,088                     | 0,030                      | 0,060                       | 1870                                         | 18 x 20         |
|                                               | 3300                       | 0,080                     | 0,026                      | 0,052                       | 2390                                         | 12,5 x 40       |
|                                               |                            | 0,068                     | 0,025                      | 0,050                       | 2350                                         | 16 x 31,5       |
|                                               | 3900                       | 0,068                     | 0,027                      | 0,054                       | 2160                                         | 18 x 25         |
|                                               |                            | 0,062                     | 0,022                      | 0,044                       | 2550                                         | 16 x 35,5       |
|                                               | 4700                       | 0,062                     | 0,023                      | 0,046                       | 2450                                         | 18 x 31,5       |
|                                               |                            | 0,057                     | 0,020                      | 0,040                       | 2900                                         | 16 x 40         |
|                                               | 6800                       | 0,051                     | 0,020                      | 0,040                       | 2730                                         | 18 x 35,5       |
|                                               |                            | 0,049                     | 0,019                      | 0,038                       | 3060                                         | 18 x 40         |
|                                               | 8200                       | 4,763                     | 0,65                       | 1,30                        | 175                                          | 5 x 11,5        |
|                                               |                            | 3,317                     | 0,46                       | 0,92                        | 235                                          | 5 x 15          |
|                                               | 82                         | 2,266                     | 0,30                       | 0,60                        | 290                                          | 6,3 x 11,5      |
|                                               |                            | 1,548                     | 0,20                       | 0,40                        | 400                                          | 6,3 x 15        |
|                                               | 180                        | 1,032                     | 0,17                       | 0,34                        | 503                                          | 8 x 11,5        |
|                                               |                            | 0,844                     | 0,13                       | 0,26                        | 575                                          | 8 x 16          |
|                                               | 220                        | 0,844                     | 0,12                       | 0,24                        | 629                                          | 10 x 12,5       |
|                                               |                            | 0,688                     | 0,095                      | 0,19                        | 795                                          | 10 x 16         |
|                                               | 330                        | 0,563                     | 0,095                      | 0,19                        | 751                                          | 8 x 20          |
|                                               |                            | 0,395                     | 0,065                      | 0,13                        | 1010                                         | 10 x 20         |
|                                               | 470                        | 0,395                     | 0,065                      | 0,13                        | 1010                                         | 12,5 x 15       |
|                                               |                            | 0,332                     | 0,055                      | 0,11                        | 1190                                         | 10 x 25         |
|                                               | 560                        | 0,227                     | 0,045                      | 0,090                       | 1440                                         | 10 x 30         |
|                                               |                            | 0,227                     | 0,042                      | 0,084                       | 1400                                         | 12,5 x 20       |
|                                               | 820                        | 0,227                     | 0,046                      | 0,092                       | 1360                                         | 16 x 15         |
|                                               |                            | 0,186                     | 0,038                      | 0,076                       | 1690                                         | 12,5 x 25       |
| 25<br>(32)<br>1E                              | 1000                       | 0,155                     | 0,043                      | 0,086                       | 1500                                         | 18 x 15         |
|                                               |                            | 0,124                     | 0,032                      | 0,064                       | 1950                                         | 12,5 x 30       |
|                                               |                            | 0,124                     | 0,034                      | 0,068                       | 1730                                         | 16 x 20         |
|                                               | 1500                       | 0,103                     | 0,028                      | 0,056                       | 2200                                         | 12,5 x 35       |
|                                               |                            | 0,103                     | 0,028                      | 0,056                       | 2070                                         | 16 x 25         |
|                                               |                            | 0,103                     | 0,030                      | 0,060                       | 1890                                         | 18 x 20         |
|                                               | 1800                       | 0,097                     | 0,026                      | 0,052                       | 2390                                         | 12,5 x 40       |
|                                               |                            | 0,079                     | 0,025                      | 0,050                       | 2350                                         | 16 x 31,5       |
|                                               | 2700                       | 0,079                     | 0,027                      | 0,054                       | 2180                                         | 18 x 25         |
|                                               |                            | 0,072                     | 0,022                      | 0,044                       | 2550                                         | 16 x 35,5       |
|                                               | 3300                       | 0,072                     | 0,023                      | 0,046                       | 2470                                         | 18 x 31,5       |
|                                               |                            | 0,061                     | 0,020                      | 0,040                       | 2900                                         | 16 x 40         |
|                                               | 3900                       | 0,061                     | 0,020                      | 0,040                       | 2740                                         | 18 x 35,5       |
|                                               |                            | 0,056                     | 0,019                      | 0,038                       | 3070                                         | 18 x 40         |
|                                               | 4700                       | 5,898                     | 0,65                       | 1,30                        | 175                                          | 5 x 11,5        |
|                                               |                            | 4,083                     | 0,46                       | 0,92                        | 235                                          | 5 x 15          |
|                                               | 56                         | 2,843                     | 0,30                       | 0,60                        | 290                                          | 6,3 x 11,5      |
|                                               |                            | 1,942                     | 0,20                       | 0,40                        | 400                                          | 6,3 x 15        |
|                                               | 120                        | 1,327                     | 0,17                       | 0,34                        | 501                                          | 8 x 11,5        |
|                                               |                            | 1,062                     | 0,12                       | 0,24                        | 625                                          | 10 x 12,5       |
|                                               | 150                        | 0,885                     | 0,13                       | 0,26                        | 575                                          | 8 x 16          |
|                                               |                            | 0,885                     | 0,095                      | 0,19                        | 795                                          | 10 x 16         |
|                                               | 220                        | 0,724                     | 0,095                      | 0,19                        | 760                                          | 8 x 20          |
|                                               |                            | 0,483                     | 0,065                      | 0,13                        | 1010                                         | 10 x 20         |
|                                               | 330                        | 0,483                     | 0,065                      | 0,13                        | 1010                                         | 12,5 x 15       |
|                                               |                            | 0,408                     | 0,055                      | 0,11                        | 1190                                         | 10 x 25         |
| 35<br>(44)<br>1V                              | 390                        | 0,284                     | 0,045                      | 0,090                       | 1450                                         | 10 x 30         |
|                                               |                            | 0,284                     | 0,042                      | 0,084                       | 1400                                         | 12,5 x 20       |
|                                               |                            | 0,284                     | 0,046                      | 0,092                       | 1360                                         | 16 x 15         |
|                                               | 560                        | 0,234                     | 0,038                      | 0,076                       | 1690                                         | 12,5 x 25       |
|                                               |                            | 0,234                     | 0,043                      | 0,086                       | 1520                                         | 18 x 15         |
|                                               | 680                        | 0,159                     | 0,032                      | 0,064                       | 1950                                         | 12,5 x 30       |
|                                               |                            | 0,159                     | 0,034                      | 0,068                       | 1730                                         | 16 x 20         |
|                                               | 1000                       | 0,133                     | 0,028                      | 0,056                       | 2200                                         | 12,5 x 35       |
|                                               |                            | 0,133                     | 0,028                      | 0,056                       | 2070                                         | 16 x 25         |
|                                               | 1200                       | 0,133                     | 0,030                      | 0,060                       | 1900                                         | 18 x 20         |
|                                               |                            | 0,106                     | 0,026                      | 0,052                       | 2390                                         | 12,5 x 40       |

Custom products are available on request.

| V <sub>DC</sub><br>(Surge<br>Voltage)<br>Code | Rated<br>Capa-<br>cittance | Max ESR<br>20°C,<br>120Hz | Max Imp<br>20°C,<br>100kHz | Max Imp<br>-10°C,<br>100kHz | Max<br>Ripple<br>Current<br>105°C,<br>100kHz | Size<br>Ø D x L |
|-----------------------------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------------------------|-----------------|
| (V)                                           | (µF)                       | (Ω)                       | (Ω)                        | (Ω)                         | (mArms)                                      | (mm)            |
| 35<br>(44)<br>1V                              | 1800                       | 0,088                     | 0,025                      | 0,050                       | 2350                                         | 16 x 31,5       |
|                                               |                            | 0,088                     | 0,027                      | 0,054                       | 2200                                         | 18 x 25         |
|                                               |                            | 0,084                     | 0,022                      | 0,044                       | 2550                                         | 16 x 35,5       |
|                                               | 2200                       | 0,084                     | 0,023                      | 0,046                       | 2490                                         | 18 x 31,5       |
|                                               |                            | 0,069                     | 0,020                      | 0,040                       | 2900                                         | 16 x 40         |
|                                               | 2700                       | 0,069                     | 0,020                      | 0,040                       | 2770                                         | 18 x 35,5       |
| 50<br>(63)<br>1H                              | 3300                       | 0,064                     | 0,019                      | 0,038                       | 3110                                         | 18 x 40         |
|                                               | 0,47                       | 283                       | 3,90                       | 7,80                        | 22                                           | 5 x 11,5        |
|                                               | 1                          | 133                       | 3,50                       | 7,00                        | 36                                           | 5 x 11,5        |
|                                               | 2,2                        | 60,3                      | 3,00                       | 6,00                        | 54                                           | 5 x 11,5        |
|                                               | 3,3                        | 40,2                      | 2,60                       | 5,20                        | 63                                           | 5 x 11,5        |
|                                               | 4,7                        | 28,3                      | 2,20                       | 4,40                        | 75                                           | 5 x 11,5        |
|                                               | 10                         | 13,3                      | 1,40                       | 2,80                        | 110                                          | 5 x 11,5        |
|                                               | 18                         | 7,372                     | 0,95                       | 1,90                        | 120                                          | 5 x 11,5        |
|                                               | 27                         | 4,915                     | 0,55                       | 1,10                        | 135                                          | 5 x 15          |
|                                               | 39                         | 3,402                     | 0,36                       | 0,72                        | 148                                          | 6,3 x 11,5      |
|                                               | 56                         | 2,370                     | 0,28                       | 0,56                        | 153                                          | 6,3 x 15        |
|                                               | 68                         | 1,951                     | 0,20                       | 0,40                        | 360                                          | 8 x 11,5        |
|                                               | 82                         | 1,618                     | 0,18                       | 0,36                        | 460                                          | 8 x 16          |
|                                               |                            | 1,618                     | 0,18                       | 0,36                        | 443                                          | 10 x 12,5       |
|                                               | 100                        | 1,327                     | 0,15                       | 0,30                        | 553                                          | 10 x 16         |
|                                               | 120                        | 1,106                     | 0,13                       | 0,26                        | 670                                          | 8 x 20          |
|                                               | 180                        | 0,737                     | 0,085                      | 0,17                        | 676                                          | 10 x 20         |
|                                               |                            | 0,737                     | 0,095                      | 0,19                        | 745                                          | 12,5 x 15       |
|                                               | 220                        | 0,603                     | 0,075                      | 0,15                        | 876                                          | 10 x 25         |
|                                               | 330                        | 0,402                     | 0,055                      | 0,11                        | 1010                                         | 10 x 30         |
|                                               |                            | 0,402                     | 0,060                      | 0,12                        | 979                                          | 12,5 x 20       |
|                                               |                            | 0,402                     | 0,065                      | 0,13                        | 982                                          | 16 x 15         |
|                                               | 470                        | 0,282                     | 0,044                      | 0,088                       | 1180                                         | 12,5 x 25       |
|                                               |                            | 0,282                     | 0,048                      | 0,096                       | 1180                                         | 18 x 15         |
|                                               | 560                        | 0,237                     | 0,040                      | 0,080                       | 1310                                         | 12,5 x 30       |
|                                               | 680                        | 0,195                     | 0,036                      | 0,072                       | 1470                                         | 12,5 x 35       |
|                                               |                            | 0,195                     | 0,045                      | 0,090                       | 1210                                         | 16 x 20         |
|                                               | 820                        | 0,162                     | 0,034                      | 0,068                       | 1590                                         | 12,5 x 40       |
|                                               |                            | 0,162                     | 0,038                      | 0,076                       | 1490                                         | 16 x 25         |
|                                               |                            | 0,162                     | 0,036                      | 0,072                       | 1450                                         | 18 x 20         |
|                                               | 1000                       | 0,133                     | 0,032                      | 0,064                       | 1890                                         | 16 x 31,5       |
|                                               |                            | 0,133                     | 0,032                      | 0,064                       | 1720                                         | 18 x 25         |
|                                               | 1200                       | 0,111                     | 0,028                      | 0,056                       | 2140                                         | 16 x 35,5       |
|                                               | 1500                       | 0,088                     | 0,026                      | 0,052                       | 2410                                         | 16 x 40         |
|                                               |                            | 0,088                     | 0,026                      | 0,052                       | 1970                                         | 18 x 31,5       |
|                                               | 1800                       | 0,074                     | 0,025                      | 0,050                       | 2310                                         | 18 x 35,5       |
|                                               | 2200                       | 0,072                     | 0,024                      | 0,048                       | 2530                                         | 18 x 40         |
| 63<br>(79)<br>1J                              | 12                         | 9,952                     | 1,20                       | 3,60                        | 120                                          | 5 x 11,5        |
|                                               | 18                         | 6,635                     | 0,85                       | 2,60                        | 135                                          | 5 x 15          |
|                                               | 27                         | 4,423                     | 0,55                       | 1,70                        | 148                                          | 6,3 x 11,5      |
|                                               | 39                         | 3,062                     | 0,38                       | 1,10                        | 153                                          | 6,3 x 15        |
|                                               | 47                         | 2,541                     | 0,32                       | 0,96                        | 360                                          | 8 x 11,5        |
|                                               | 56                         | 2,133                     | 0,23                       | 0,69                        | 448                                          | 10 x 12,5       |
|                                               | 68                         | 1,756                     | 0,24                       | 0,72                        | 469                                          | 8 x 16          |
|                                               |                            | 1,756                     | 0,17                       | 0,51                        | 553                                          | 10 x 16         |
|                                               | 82                         | 1,456                     | 0,17                       | 0,51                        | 682                                          | 8 x 20          |
|                                               | 120                        | 0,995                     | 0,12                       | 0,36                        | 676                                          | 10 x 20         |
|                                               | 150                        | 0,796                     | 0,10                       | 0,30                        | 876                                          | 10 x 25         |
|                                               |                            | 0,796                     | 0,11                       | 0,33                        | 745                                          | 12,5 x 15       |
|                                               | 180                        | 0,663                     | 0,085                      | 0,26                        | 1020                                         | 10 x 30         |
|                                               | 220                        | 0,543                     | 0,075                      | 0,23                        | 979                                          | 12,5 x 20       |
|                                               |                            | 0,543                     | 0,080                      | 0,24                        | 928                                          | 16 x 15         |
|                                               | 270                        | 0,442                     | 0,065                      | 0,20                        | 1180                                         | 12,5 x 25       |
|                                               | 330                        | 0,362                     | 0,065                      | 0,20                        | 1200                                         | 18 x 15         |
|                                               |                            | 0,306                     | 0,055                      | 0,17                        | 1310                                         | 12,5 x 30       |
|                                               | 390                        | 0,306                     | 0,057                      | 0,17                        | 1210                                         | 16 x 20         |
|                                               |                            | 0,254                     | 0,048                      | 0,14                        | 1470                                         | 12,5 x 35       |
|                                               | 470                        | 0,254                     | 0,052                      | 0,16                        | 1490                                         | 16 x 25         |
|                                               |                            | 0,254                     | 0,058                      | 0,17                        | 1460                                         | 18 x 20         |
|                                               | 560                        | 0,213                     | 0,042                      | 0,13                        | 1590                                         | 12,5 x 40       |
|                                               | 680                        | 0,176                     | 0,042                      | 0,13                        | 1890                                         | 16 x 31,5       |
|                                               |                            | 0,176                     | 0,050                      | 0,15                        | 1740                                         | 18 x 25         |
|                                               | 820                        | 0,146                     | 0,036                      | 0,11                        | 2140                                         | 16 x 35,5       |
|                                               |                            | 0,146                     | 0,042                      | 0,13                        | 1990                                         | 18 x 31,5       |
|                                               | 1000                       | 0,119                     | 0,032                      | 0,096                       | 2410                                         | 16 x 40         |
|                                               |                            | 0,119                     | 0,035                      | 0,110                       | 2340                                         | 18 x 35,5       |
|                                               | 1200                       | 0,100                     | 0,032                      | 0,096                       | 2560                                         | 18 x 40         |

| V <sub>DC</sub><br>(Surge<br>Voltage)<br>Code | Rated<br>Capa-<br>cittance | Max ESR<br>20°C,<br>120Hz | Max Imp<br>20°C,<br>100kHz | Max Imp<br>-10°C,<br>100kHz | Max<br>Ripple<br>Current<br>105°C,<br>100kHz | Size<br>Ø D x L |
|-----------------------------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------------------------|-----------------|
| (V)                                           | (µF)                       | (Ω)                       | (Ω)                        | (Ω)                         | (mArms)                                      | (mm)            |
| 100<br>(125)<br>2A                            | 5,6                        | 18,957                    | 1,90                       | 7,60                        | 57                                           | 5 x 11,5        |
|                                               | 8,2                        | 12,946                    | 1,30                       | 5,20                        | 74                                           | 5 x 15          |
|                                               | 12                         | 8,846                     | 1,10                       | 4,40                        | 78                                           | 6,3 x 11,5      |
|                                               | 18                         | 5,898                     | 0,62                       | 2,50                        | 85                                           | 6,3 x 11,5      |
|                                               | 22                         | 4,825                     | 0,53                       | 2,10                        | 275                                          | 8 x 11,5        |
|                                               | 27                         | 3,932                     | 0,47                       | 1,90                        | 319                                          | 10 x 12,5       |
|                                               | 33                         | 3,217                     | 0,35                       | 1,40                        | 360                                          | 8 x 16          |
|                                               |                            | 3,217                     | 0,32                       | 1,30                        | 424                                          | 10 x 16         |
|                                               | 39                         | 2,722                     | 0,27                       | 1,10                        | 490                                          | 8 x 20          |
|                                               | 56                         | 1,896                     | 0,25                       | 1,00                        | 499                                          | 10 x 20         |
|                                               | 68                         | 1,561                     | 0,18                       | 0,72                        | 634                                          | 10 x 25         |
|                                               |                            | 1,561                     | 0,20                       | 0,80                        | 613                                          | 12,5 x 15       |
|                                               | 100                        | 1,062                     | 0,15                       | 0,60                        | 739                                          | 10 x 30         |
|                                               |                            | 1,062                     | 0,13                       | 0,52                        | 805                                          | 12,5 x 20       |
|                                               | 120                        | 0,885                     | 0,11                       | 0,44                        | 857                                          | 12,5 x 25       |
|                                               |                            | 0,885                     | 0,13                       | 0,50                        | 706                                          | 16 x 15         |
|                                               | 150                        | 0,708                     | 0,12                       | 0,48                        | 871                                          | 18 x 15         |
|                                               | 180                        | 0,590                     | 0,090                      | 0,36                        | 1120                                         | 12,5 x 30       |
|                                               |                            | 0,590                     | 0,11                       | 0,44                        | 916                                          | 16 x 20         |
|                                               | 220                        | 0,483                     | 0,075                      | 0,30                        | 1240                                         | 12,5 x 35       |
|                                               |                            | 0,483                     | 0,081                      | 0,32                        | 1290                                         | 16 x 25         |
|                                               | 270                        | 0,393                     | 0,060                      | 0,24                        | 1330                                         | 12,5 x 40       |
|                                               |                            | 0,393                     | 0,085                      | 0,34                        | 1170                                         | 18 x 20         |
|                                               | 330                        | 0,322                     | 0,059                      | 0,23                        | 1630                                         | 16 x 31,5       |
|                                               |                            | 0,322                     | 0,071                      | 0,28                        | 1500                                         | 18 x 25         |
|                                               | 390                        | 0,272                     | 0,052                      | 0,21                        | 1750                                         | 16 x 35,5       |
|                                               |                            | 0,272                     | 0,058                      | 0,23                        | 1630                                         | 18 x 31,5       |
|                                               | 470                        | 0,226                     | 0,045                      | 0,18                        | 1920                                         | 16 x 40         |
|                                               | 560                        | 0,190                     | 0,054                      | 0,22                        | 1920                                         | 18 x 35,5       |
|                                               | 680                        | 0,156                     | 0,041                      | 0,16                        | 2100                                         | 18 x 40         |

Custom products are available on request.



# Part Number System



## Order Code **SMD, Radial, Snap-In**

| EC                          | R             | 1C                                              | PT           | 101                                  | M                     | FF                                                              | 25                  | 0611            | JExxxxx           |
|-----------------------------|---------------|-------------------------------------------------|--------------|--------------------------------------|-----------------------|-----------------------------------------------------------------|---------------------|-----------------|-------------------|
| Technology                  | Terminal Type | Rated Voltage Code                              | Series Code  | Capacitance Code (in $\mu\text{F}$ ) | Capacitance Tolerance | Lead Form                                                       | Terminal/Pitch Size | Dimension       | for Specials only |
| EC = Electrolytic Capacitor | SMD = V       | For coding please refer to the pages of ratings | CD VS = BS   | 0,47 = R47                           | $\pm 20\%$ = M        | SMD:                                                            |                     | 4x7 = 0407      |                   |
|                             | Radial = R    |                                                 | CD VH = VH   | 1,0 = 010                            | $\pm 10\%$ = K        | Taped = FF                                                      | Terminal = T2       | 5x11,5 = 0511   |                   |
| PC = Polymer Capacitor      | Snap-In = S   |                                                 | CD VZ = VZ   | 2,2 = 2R2                            | +30 / -10% = Q        | Radial:                                                         |                     | 6,3x11,5 = 0611 |                   |
|                             |               |                                                 | CD 261 = LK  | 100 = 101                            | +50 / -10% = T        | Long Lead = LL                                                  | 2,0mm = 20          | 35x80 = 3580    |                   |
|                             |               |                                                 | CD 261X = QX | 1000 = 102                           |                       | Cut 5,0mm = CB                                                  | 2,5mm = 25          | 45x100 = 45100  |                   |
|                             |               |                                                 | CD 262 = QM  | 10000 = 103                          |                       | Cut 4,5mm = CC                                                  | 3,5mm = 35          |                 |                   |
|                             |               |                                                 | CD 263 = BK  |                                      |                       | Cut 4,0mm = CD                                                  | 5,0mm = 50          |                 |                   |
|                             |               |                                                 | CD 269 = PH  |                                      |                       | Cut 3,5mm = CE                                                  | 7,5mm = 75          |                 |                   |
|                             |               |                                                 | CD 281 = LL  |                                      |                       | Cut 3,0mm = CF                                                  | 10,0mm = 10         |                 |                   |
|                             |               |                                                 | CD 284 = XY  |                                      |                       | on request: alternative lead forms (axial, 90° - angle, others) |                     | 12,5mm = 12     |                   |
|                             |               |                                                 | CD 287 = GC  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 28L = QL  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 293 = BZ  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 294 = BW  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 295 = BC  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 296 = KC  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 297 = BB  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 299 = PG  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 29D = HR  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 29H = QH  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | CD 29L = QL  |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | HCP = CP     |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | HPM = PM     |                                      |                       |                                                                 |                     |                 |                   |
|                             |               |                                                 | HVC = VC     |                                      |                       |                                                                 |                     |                 |                   |

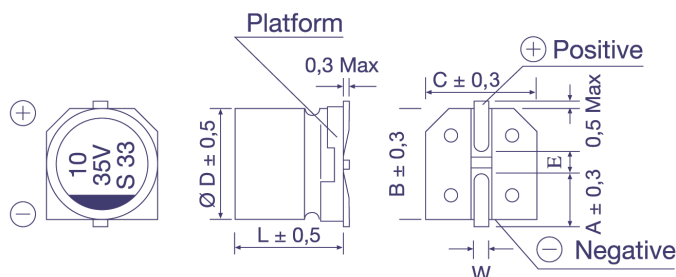
Snap-In:

|                       |            |
|-----------------------|------------|
| 4,0mm Pin Length = T4 | 2 Pin = P2 |
| 6,3mm Pin Length = T6 | 3 Pin = P3 |
| Soldering Pin = S4    | 4 Pin = P4 |
|                       | 5 Pin = P5 |

preferred

## Technical Specification **SMD Type**

### Dimensions

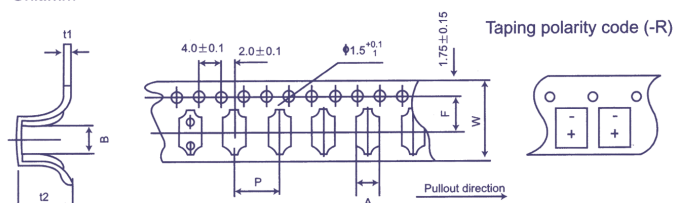


| $\emptyset D \times L$ | 4x5,4     | 5x5,4 | 6,3x5,4 | 6,3x7,7 | 8x10,5    | 8x11,8 | 10x10,5 | 10x12,7 |
|------------------------|-----------|-------|---------|---------|-----------|--------|---------|---------|
| A                      | 1,8       | 2,1   | 2,4     | 2,5     | 2,9       | 2,9    | 3,2     | 3,2     |
| B                      | 4,3       | 5,3   | 6,6     | 6,6     | 8,3       | 8,4    | 10,3    | 10,4    |
| C                      | 4,3       | 5,3   | 6,6     | 6,6     | 8,3       | 8,4    | 10,3    | 10,4    |
| E                      | 1,0       | 1,3   | 2,2     | 2,2     | 3,1       | 3,1    | 4,5     | 4,5     |
| L                      | 5,4       | 5,4   | 5,4     | 7,7     | 10,5      | 11,8   | 10,5    | 12,7    |
| W                      | 0,5 - 0,8 |       |         |         | 0,7 - 1,1 |        |         |         |

in mm

### Taping Dimensions

Unit:mm

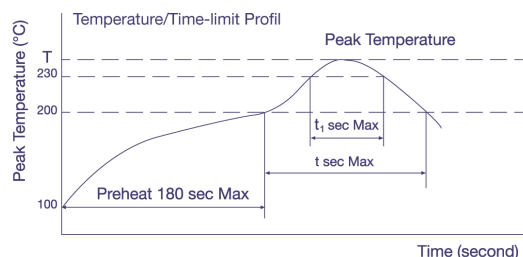


Taping polarity code (-R)

| Size (DxL) | w $\pm 0,3$ | A $\pm 0,2$ | B $\pm 0,2$ | P $\pm 0,1$ | t2 $\pm 0,2$ | F $\pm 0,1$ | t1 $\pm 0,1$ |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 4 x 5,4    | 12,0        | 5,0         | 5,0         | 8,0         | 5,8          | 5,5         | 0,4          |
| 5 x 5,4    | 12,0        | 6,0         | 6,0         | 12,0        | 5,8          | 5,5         | 0,4          |
| 6,3 x 5,4  | 16,0        | 7,0         | 7,0         | 12,0        | 5,8          | 7,5         | 0,4          |
| 6,3 x 7,7  | 16,0        | 7,0         | 7,0         | 12,0        | 8,4          | 7,5         | 0,4          |
| 8 x 10,5   | 24,0        | 8,7         | 8,7         | 16,0        | 11,0         | 11,5        | 0,5          |
| 8 x 11,8   | 24,0        | 8,7         | 8,7         | 16,0        | 12,3         | 11,5        | 0,5          |
| 10 x 10,5  | 24,0        | 10,7        | 10,7        | 16,0        | 11,0         | 11,5        | 0,5          |
| 10 x 12,7  | 24,0        | 10,7        | 10,7        | 16,0        | 14,0         | 11,5        | 0,5          |

in mm

### Soldering Profile (Aluminium Electrolytic Capacitors)

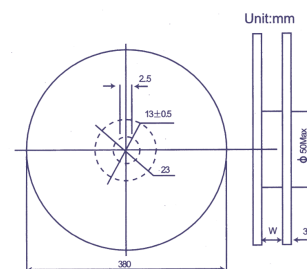


#### Allowable Range of Peak Temperature

| Size                       | T (°C) | t (second) | t <sub>1</sub> (second) |
|----------------------------|--------|------------|-------------------------|
| $\emptyset 4 \sim 6,3$     | 250    | 90         | 40                      |
| $\emptyset 8 \times 10,5$  | 240    | 90         | 30                      |
| $\emptyset 10 \times 10,5$ | 235    | 60         | 30                      |

| Diameter | w          | D          |
|----------|------------|------------|
| 4; 5     | 14 $\pm$ 1 | 50 $\pm$ 1 |
| 6,3      | 18 $\pm$ 1 | 50 $\pm$ 1 |
| 8; 10    | 25 $\pm$ 1 | 50 $\pm$ 1 |
| Polymer  | 25 $\pm$ 1 | 80 $\pm$ 1 |

in mm

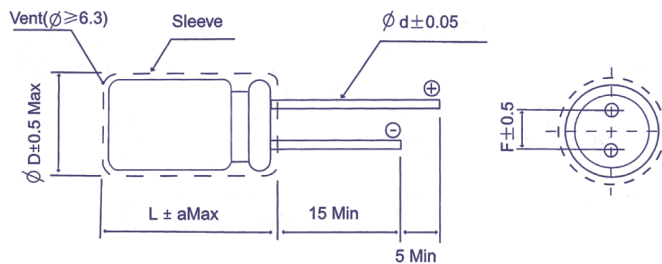


For more details or Soldering Profiles of Radials or Polymer-Capacitors please contact our local Sales Offices.



## Technical Specification **Radial Type**

Dimensions for loose, long-lead type, (bulk)  
Order Code: LL



| L                | L ≤ 7 |     |      |     |     |  | L ≥ 11 |     |     |     |      |     |    |      |    |      |
|------------------|-------|-----|------|-----|-----|--|--------|-----|-----|-----|------|-----|----|------|----|------|
| Ø D              | 3     | 4   | 5    | 6,3 | 8   |  | 5      | 6,3 | 8   | 10  | 12,5 | 16  | 18 | 20   | 22 | 25   |
| F                | 1     | 1,5 | 2,0  | 2,5 | 3,5 |  | 2,0    | 2,5 | 3,5 | 5,0 |      | 7,5 |    | 10,0 |    | 12,5 |
| Ø d              | 0,4   |     | 0,45 |     |     |  | 0,5    |     | 0,6 |     |      | 0,8 |    | 1,0  |    |      |
| a <sub>Max</sub> | 1,0   |     |      |     |     |  | 2,0    |     |     |     |      |     |    |      |    |      |

in mm

Dimensions for Ammopack taping  
Order Code: FF (FD)

| Code | Case Range |         | Dimensions |          |         |         | Form | Ammopack |
|------|------------|---------|------------|----------|---------|---------|------|----------|
|      | Ø D        | L (max) | H ± 0,75   | Ho ± 0,5 | F ± 0,5 | P ± 0,1 |      |          |
| FF   | 4 ~ 6      | 13      | 18,5       | -        | 2,5     | 12,7    | A    |          |
|      | 8          | 13      | 18,5       | -        | 3,5     | 12,7    |      |          |
|      | 4 ~ 8      | 7       | 17,5       | 16       | 5       | 12,7    | B    |          |
|      | 5 ~ 6,3    | 13      | 18,5       |          |         |         |      |          |
|      | 8          | 22      | 20,0       |          |         |         | A    |          |
|      | 10         | 22      | 18,5       | -        |         | 15,0    |      |          |
| FD   | 12,5       | 27      | 18,5       | -        |         | 25,4    | C    |          |
| FF   | 16 ~ 18    | 27      | 18,5       | -        | 7,5     | 30,0    |      |          |

in mm

Dimensions for loose, short cut leads, (bulk)  
Order Code: CC (CB,CD,CE,CF)

| Straight Lead |           |           |           |           |           | Bended Lead |  |
|---------------|-----------|-----------|-----------|-----------|-----------|-------------|--|
|               |           |           |           |           |           |             |  |
| Code          | CB        | CC        | CD        | CE        | CF        |             |  |
| I             | 5,0 ± 0,5 | 4,5 ± 0,5 | 4,0 ± 0,5 | 3,5 ± 0,5 | 3,0 ± 0,5 |             |  |

preferred

in mm