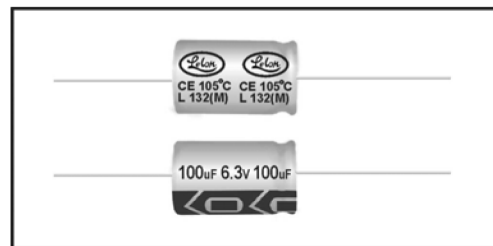


## CE02 Type

### Features

- 105°C, 1000 hours assured
- Excellent temperature performance



### SPECIFICATIONS

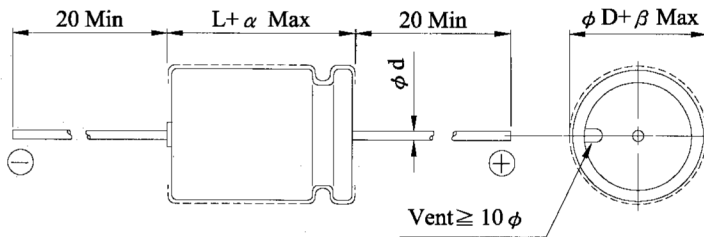
|                                                                                                                                                         |                                                                                                                                             |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------|------|------|------|--------|------|--------------|------|----------------------------------|------|------|------|----------------------------------|------|-----|--|
| Items                                                                                                                                                   | Performance                                                                                                                                 |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Operating Temperature Range                                                                                                                             | 6.3 ~ 250V                                                                                                                                  |            |                                             |      |      |      |        |      | 350 ~ 450V   |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | -40℃ ~ +105℃                                                                                                                                |            |                                             |      |      |      |        |      | -25℃ ~ +105℃ |      |                                  |      |      |      |                                  |      |     |  |
| Capacitance Tolerance                                                                                                                                   | ±20% (at 120Hz, 20℃)                                                                                                                        |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Leakage Current (at 20℃)                                                                                                                                | Rated Voltage                                                                                                                               |            | ≤ 100V                                      |      |      |      |        |      |              |      | > 100V                           |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Time                                                                                                                                        |            | after 2 minutes                             |      |      |      |        |      |              |      | after 5 minutes                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Leakage Current                                                                                                                             |            | I = 0.02CV or 3 ( μ A) whichever is greater |      |      |      |        |      |              |      | CV ≤ 1000<br>I = 0.03CV+15( μ A) |      |      |      | CV > 1000<br>I = 0.02CV+25( μ A) |      |     |  |
|                                                                                                                                                         | Where, C= rated capacitance in μ F. V = rated DC working voltage in V.                                                                      |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Dissipation Factor<br>(Tan δ at 120 Hz, 20℃)                                                                                                            | Rated Voltage                                                                                                                               |            | 6.3                                         | 10   | 16   | 25   | 35     | 50   | 63           | 100  | 160                              | 200  | 250  | 350  | 400                              | 450  |     |  |
|                                                                                                                                                         | Tan δ (max)                                                                                                                                 |            | 0.23                                        | 0.20 | 0.17 | 0.15 | 0.12   | 0.10 | 0.09         | 0.08 | 0.12                             | 0.14 | 0.17 | 0.20 | 0.25                             | 0.25 |     |  |
| When the capacitance exceeds 1000 μ F, 0.02 shall be added every 1000 μ F increase.                                                                     |                                                                                                                                             |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Low Temperature Characteristics (at 120Hz)                                                                                                              | Impedance ratio shall not exceed the values given in the table below.                                                                       |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Rated Voltage                                                                                                                               |            |                                             | 6.3  | 10   | 16   | 25     | 35   | 50           | 63   | 100                              | 160  | 200  | 250  | 350                              | 400  | 450 |  |
|                                                                                                                                                         | Impedance Ratio                                                                                                                             | Z(-25℃)    | φ D < 16                                    | 4    | 3    | 3    | 2      | 2    | 2            | 2    | 2                                | 3    | 6    | 8    | 12                               | 14   | 16  |  |
|                                                                                                                                                         |                                                                                                                                             | /Z(+20℃)   | φ D ≥ 16                                    | 6    | 4    | 4    | 3      | 3    | 3            | 3    | 3                                |      |      |      |                                  |      |     |  |
|                                                                                                                                                         |                                                                                                                                             | Z(-40℃)    | φ D < 16                                    | 8    | 6    | 6    | 4      | 4    | 3            | 3    | 3                                | 4    | 8    | 10   | -                                | -    | -   |  |
|                                                                                                                                                         |                                                                                                                                             | /Z(+20℃)   | φ D ≥ 16                                    | 12   | 10   | 8    | 8      | 8    | 8            | 6    | 6                                |      |      |      |                                  |      |     |  |
| Load Life Test                                                                                                                                          | Test Time                                                                                                                                   |            | 1000 hrs                                    |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Capacitance Change                                                                                                                          |            | Within ±20%of initial value                 |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Dissipation Factor                                                                                                                          |            | Less than 200% of specified value           |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Leakage Current                                                                                                                             |            | Within specified value                      |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | * The above specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage applied for 1000 hrs at 105℃. |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Shelf Life Test                                                                                                                                         | Test Time                                                                                                                                   |            | 1000 hrs                                    |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Capacitance Change                                                                                                                          |            | Within ±20%of initial value                 |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Dissipation Factor                                                                                                                          |            | Less than 200% of specified value           |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Leakage Current                                                                                                                             | 6.3 ~ 100V | Within specified value                      |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         |                                                                                                                                             | 160 ~ 450V | Less than 200% of specified value           |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| * The above specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hrs at 105℃ without voltage applied. |                                                                                                                                             |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Ripple Current & Frequency Multipliers                                                                                                                  | Cap.( μ F)                                                                                                                                  |            | 60                                          | 120  | 500  | 1K   | 10K up |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         |                                                                                                                                             |            | Under 100                                   | 0.70 | 1.00 | 1.30 | 1.40   | 1.50 |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         |                                                                                                                                             |            | 100 to 1000                                 | 0.75 | 1.00 | 1.20 | 1.30   | 1.35 |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         |                                                                                                                                             |            | 1000 up above                               | 0.80 | 1.00 | 1.10 | 1.12   | 1.15 |              |      |                                  |      |      |      |                                  |      |     |  |
| Ripple Current & Temperature Multipliers                                                                                                                | Temperature(℃)                                                                                                                              |            | 85                                          |      |      |      | 105    |      |              |      |                                  |      |      |      |                                  |      |     |  |
|                                                                                                                                                         | Multiplier                                                                                                                                  |            | 1.4                                         |      |      |      | 1.00   |      |              |      |                                  |      |      |      |                                  |      |     |  |
| Standards                                                                                                                                               | Satisfies Characteristic W of JIS C 5141                                                                                                    |            |                                             |      |      |      |        |      |              |      |                                  |      |      |      |                                  |      |     |  |

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## CE02 Type

### DIAGRAM OF DIMENSIONS



Unit: mm

### LEAD DIAMETER

|             |     |     |   |    |     |    |    |     |    |
|-------------|-----|-----|---|----|-----|----|----|-----|----|
| $\varphi$ D | 5   | 6.3 | 8 | 10 | 13  | 16 | 18 | 22  | 25 |
| $\varphi$ d | 0.6 |     |   |    | 0.8 |    |    | 1.0 |    |
| $\alpha$    | 1.5 |     |   |    | 2.0 |    |    |     |    |
| $\beta$     | 0.5 |     |   |    | 1.0 |    |    |     |    |

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

Ripple Current: mA/rms at 120 Hz, 105°C

### DIMENSION & PERMISSIBLE RIPPLE CURRENT

| $\mu F$ | V.DC<br>Contents | 6.3V<br>(0J)      |      | 10V<br>(1A)       |      | 16V<br>(1C)       |      | 25V<br>(1E)       |      | 35V<br>(1V)       |      | 50V<br>(1H)       |      | 63V<br>(1J)       |     | 100V<br>(2A)      |      |
|---------|------------------|-------------------|------|-------------------|------|-------------------|------|-------------------|------|-------------------|------|-------------------|------|-------------------|-----|-------------------|------|
|         |                  | $\phi D \times L$ | mA   | $\phi D \times L$ | mA   | $\phi D \times L$ | mA   | $\phi D \times L$ | mA   | $\phi D \times L$ | mA   | $\phi D \times L$ | mA   | $\phi D \times L$ | mA  | $\phi D \times L$ | mA   |
| 0.1     | 0R1              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 2    | 5 × 12            | 3   | 5 × 12            | 3    |
| 0.22    | R22              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 3.5  | 5 × 12            | 4.5 | 5 × 12            | 5    |
| 0.33    | R33              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 5    | 5 × 12            | 7.5 | 5 × 12            | 8    |
| 0.47    | R47              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 6    | 5 × 12            | 9   | 5 × 12            | 9    |
| 1       | 010              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 10   | 5 × 12            | 15  | 5 × 12            | 15   |
| 2.2     | 2R2              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 20   | 5 × 12            | 30  | 5 × 12            | 30   |
| 3.3     | 3R3              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 34   | 5 × 12            | 32  | 5 × 12            | 32   |
| 4.7     | 4R7              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 34   | 5 × 12            | 36  | 6.3 × 13          | 38   |
| 10      | 100              |                   |      |                   |      |                   |      |                   |      |                   |      | 5 × 12            | 50   | 6.3 × 13          | 56  | 6.3 × 13          | 64   |
| 22      | 220              |                   |      |                   |      |                   |      | 5 × 12            | 63   | 6.3 × 13          | 73   | 6.3 × 13          | 80   | 6.3 × 13          | 90  | 8 × 16            | 106  |
| 33      | 330              |                   |      |                   |      | 5 × 12            | 73   | 6.3 × 13          | 78   | 6.3 × 13          | 96   | 6.3 × 13          | 105  | 8 × 13            | 123 | 10 × 17           | 150  |
| 47      | 470              |                   |      | 5 × 12            | 77   | 6.3 × 13          | 93   | 6.3 × 13          | 99   | 6.3 × 16          | 114  | 8 × 16            | 140  | 8 × 16            | 162 | 10 × 21           | 180  |
| 100     | 101              | 6.3 × 13          | 113  | 6.3 × 13          | 121  | 6.3 × 13          | 145  | 8 × 13            | 166  | 8 × 16            | 180  | 10 × 17           | 225  | 10 × 17           | 248 | 13 × 22           | 287  |
| 220     | 221              | 6.3 × 13          | 172  | 6.3 × 13          | 185  | 8 × 13            | 231  | 8 × 16            | 246  | 10 × 17           | 305  | 10 × 21           | 349  | 13 × 22           | 420 | 13 × 27           | 458  |
| 330     | 331              | 8 × 16            | 236  | 8 × 16            | 253  | 8 × 16            | 323  | 10 × 17           | 345  | 10 × 21           | 391  | 13 × 22           | 450  | 13 × 27           | 495 | 13 × 36           | 582  |
| 470     | 471              | 8 × 16            | 281  | 8 × 16            | 302  | 10 × 17           | 359  | 10 × 21           | 432  | 13 × 22           | 490  | 13 × 22           | 561  | 13 × 27           | 632 | 16 × 32           | 713  |
| 1000    | 102              | 10 × 17           | 453  | 10 × 17           | 486  | 10 × 21           | 569  | 13 × 22           | 662  | 13 × 27           | 721  | 16 × 33           | 875  | 18 × 37           | 984 | 18 × 40           | 1096 |
| 2200    | 222              | 13 × 22           | 740  | 13 × 22           | 793  | 13 × 27           | 926  | 16 × 27           | 1024 | 16 × 37           | 1177 | 18 × 40           | 1408 |                   |     |                   |      |
| 3300    | 332              | 13 × 22           | 906  | 13 × 27           | 1015 | 16 × 27           | 1173 | 16 × 33           | 1300 | 16 × 40           | 1449 | 22 × 43           | 1724 |                   |     |                   |      |
| 4700    | 472              | 13 × 27           | 1168 | 16 × 27           | 1252 | 16 × 37           | 1443 | 18 × 42           | 1638 | 22 × 43           | 1878 |                   |      |                   |     |                   |      |

| $\mu F$ | V.DC<br>Contents | 160V<br>(2C)      |     | 200V<br>(2D)      |     | 250V<br>(2E)      |     | 350V<br>(2V)      |     | 400V<br>(2G)      |     | 450V<br>(2W)      |     |
|---------|------------------|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|
|         |                  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  | $\phi D \times L$ | mA  |
| 1       | 010              | 6.3 × 13          | 7   | 6.3 × 16          | 9   | 6.3 × 16          | 12  | 8 × 16            | 13  | 8 × 16            | 15  | 8 × 16            | 15  |
| 2.2     | 2R2              | 6.3 × 13          | 15  | 8 × 16            | 16  | 8 × 16            | 17  | 8 × 20            | 19  | 10 × 21           | 23  | 10 × 21           | 23  |
| 3.3     | 3R3              | 8 × 16            | 21  | 8 × 16            | 26  | 8 × 20            | 31  | 8 × 20            | 33  | 10 × 21           | 36  | 10 × 21           | 36  |
| 4.7     | 4R7              | 8 × 16            | 31  | 8 × 16            | 33  | 10 × 17           | 38  | 10 × 21           | 44  | 13 × 22           | 46  | 13 × 22           | 46  |
| 10      | 100              | 10 × 17           | 60  | 10 × 21           | 66  | 10 × 21           | 72  | 13 × 22           | 77  | 13 × 27           | 82  | 13 × 27           | 82  |
| 22      | 220              | 13 × 22           | 121 | 13 × 22           | 121 | 13 × 27           | 126 | 13 × 27           | 132 | 16 × 37           | 143 | 16 × 37           | 143 |
| 33      | 330              | 13 × 22           | 154 | 13 × 27           | 167 | 16 × 27           | 178 | 16 × 33           | 186 | 16 × 42           | 201 | 16 × 42           | 201 |
| 47      | 470              | 13 × 27           | 198 | 16 × 32           | 214 | 16 × 33           | 241 | 16 × 42           | 253 | 22 × 43           | 402 | 22 × 43           | 402 |
| 100     | 101              | 16 × 33           | 345 | 16 × 37           | 368 | 18 × 43           | 391 | 22 × 43           | 402 | 25 × 52           | 448 | 25 × 52           | 448 |
| 220     | 221              | 18 × 42           | 586 | 22 × 43           | 609 | 22 × 43           | 632 |                   |     |                   |     |                   |     |
| 330     | 331              | 22 × 43           | 632 |                   |     |                   |     |                   |     |                   |     |                   |     |

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