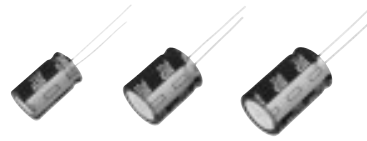


### Radial Lead Type

Series: **EE** Type: **A**

#### ■ Features

- High ripple current (at high frequency):  
40 % higher than ED Series
- Endurance: 105 °C 8000 h to 10000 h
- RoHS directive compliant



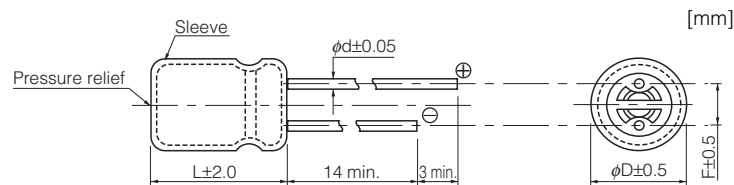
#### ■ Specifications

|                       |  |                                    |      |      |      |      |      |                 |
|-----------------------|--|------------------------------------|------|------|------|------|------|-----------------|
| Category Temp. Range  | -25 °C to + 105 °C   |                                    |      |      |      |      |      |                 |
| Rated W.V. Range      | 160 V .DC to 450 V .DC   |                                    |      |      |      |      |      |                 |
| Nominal Cap. Range    | 10 μF to 330 μF  |                                    |      |      |      |      |      |                 |
| Capacitance Tolerance | ±20 % (120 Hz/+20 °C)  |                                    |      |      |      |      |      |                 |
| DC Leakage Current    | I ≤ 0.06 CV +10 (μA) After 2 minutes   |                                    |      |      |      |      |      |                 |
| tan δ                 | W.V.   | 160                                | 200  | 250  | 350  | 400  | 450  | (120 Hz/+20 °C) |
|                       | tan δ  | 0.15                               | 0.15 | 0.15 | 0.20 | 0.24 | 0.24 |                 |
| Endurance             | After following life test with DC voltage and +105 °C±2 °C ripple current value applied (The sum of DC and ripple peak voltage shall not exceed the rated working voltage), when the capacitors are restored to 20 °C, the capacitors shall meet the limits specified below.<br>Duration<br>φ10 : 8000 hours<br>φ12.5 to φ18 : 10000 hours |                                    |      |      |      |      |      |                 |
|                       | Capacitance change   | ±20 % of initial measured value    |      |      |      |      |      |                 |
|                       | tan δ  | ≤ 200 % of initial specified value |      |      |      |      |      |                 |
|                       | DC leakage current   | ≤ initial specified value          |      |      |      |      |      |                 |
| Shelf Life            | After storage for 1000 hours at +105 °C±2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in Endurance. (With voltage treatment)  |                                    |      |      |      |      |      |                 |

#### ■ Frequency correction factor for ripple current

| W. V.<br>(V. DC) | Cap.<br>(μF) | Frequency (Hz) |       |       |       |        |         |
|------------------|--------------|----------------|-------|-------|-------|--------|---------|
|                  |              | 60 ≤           | 120 ≤ | 300 ≤ | 1 k ≤ | 10 k ≤ | 100 k ≤ |
| 160 to 450       | 10 to 82     | 0.25           | 0.35  | 0.50  | 0.65  | 0.90   | 1.00    |
|                  | 100 to 330   | 0.30           | 0.40  | 0.55  | 0.70  | 0.90   | 1.00    |

#### ■ Dimensions in mm (not to scale)



|              | 10  | 12.5 | 16  | 18  |
|--------------|-----|------|-----|-----|
| Body Dia. φD | 10  | 12.5 | 16  | 18  |
| Lead Dia. φd | 0.6 | 0.6  | 0.8 | 0.8 |
| Lead space F | 5.0 | 5.0  | 7.5 | 7.5 |

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

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## ■ Case size/Impedance/Ripple current

| Cap.<br>( $\mu$ F) | 160 V                      |                                      |              | 200 V                      |                                      |              |
|--------------------|----------------------------|--------------------------------------|--------------|----------------------------|--------------------------------------|--------------|
|                    | Case size<br>( $\phi$ D×L) | Ripple current<br>(mA r.m.s.) 105 °C |              | Case size<br>( $\phi$ D×L) | Ripple current<br>(mA r.m.s.) 105 °C |              |
|                    |                            | 120 Hz                               | 100 kHz      |                            | 120 Hz                               | 100 kHz      |
| 22                 | 10 × 20                    | 245                                  | 700          | 10 × 20                    | 300                                  | 850          |
| 33                 | 10 × 20                    | 280                                  | 810          | 10 × 20                    | 320                                  | 920          |
| 47                 | 10 × 20                    | 370                                  | 1065         | 12.5 × 20                  | 385                                  | 1100         |
| 68                 | 12.5 × 20                  | 470                                  | 1350         | 12.5 × 25<br>16 × 20S      | 465<br>465                           | 1330<br>1330 |
| 82                 | 12.5 × 25                  | 520                                  | 1480         | 16 × 20S                   | 510                                  | 1460         |
| 100                | 12.5 × 25<br>16 × 20S      | 660<br>680                           | 1660<br>1700 | 16 × 25<br>18 × 20S        | 690<br>670                           | 1730<br>1665 |
| 150                | 16 × 25<br>18 × 20S        | 755<br>730                           | 1890<br>1820 | 16 × 25                    | 740                                  | 1860         |
| 220                | 16 × 31.5<br>18 × 25S      | 910<br>780                           | 2280<br>1950 | 18 × 31.5                  | 1175                                 | 2600         |
| 330                | 18 × 31.5                  | 1040                                 | 2600         | 18 × 40                    | 1250                                 | 3120         |

| Cap.<br>( $\mu$ F) | 250 V                      |                                      |              | 350 V                      |                                      |              |
|--------------------|----------------------------|--------------------------------------|--------------|----------------------------|--------------------------------------|--------------|
|                    | Case size<br>( $\phi$ D×L) | Ripple current<br>(mA r.m.s.) 105 °C |              | Case size<br>( $\phi$ D×L) | Ripple current<br>(mA r.m.s.) 105 °C |              |
|                    |                            | 120 Hz                               | 100 kHz      |                            | 120 Hz                               | 100 kHz      |
| 15                 |                            |                                      |              | 10 × 20                    | 170                                  | 480          |
| 22                 | 10 × 20                    | 275                                  | 785          | 12.5 × 20                  | 230                                  | 660          |
| 33                 | 12.5 × 20                  | 350                                  | 995          | 12.5 × 25<br>16 × 20S      | 275<br>315                           | 790<br>900   |
| 47                 | 12.5 × 25<br>16 × 20S      | 450<br>490                           | 1290<br>1400 | 16 × 25<br>18 × 20S        | 375<br>375                           | 1070<br>1070 |
| 68                 | 16 × 20S                   | 490                                  | 1400         | 16 × 31.5<br>18 × 25S      | 535<br>465                           | 1530<br>1330 |
| 82                 | 16 × 25<br>18 × 20S        | 590<br>590                           | 1680<br>1680 | 18 × 25S                   | 535                                  | 1530         |
| 100                | 16 × 31.5<br>18 × 25S      | 840<br>840                           | 2100<br>2100 | 18 × 31.5                  | 640                                  | 1600         |
| 150                | 18 × 31.5                  | 1010                                 | 2520         |                            |                                      |              |
| 220                | 18 × 40                    | 1175                                 | 2940         |                            |                                      |              |

| Cap.<br>( $\mu$ F) | 400 V                      |                                      |              | 450 V                      |                                      |              |
|--------------------|----------------------------|--------------------------------------|--------------|----------------------------|--------------------------------------|--------------|
|                    | Case size<br>( $\phi$ D×L) | Ripple current<br>(mA r.m.s.) 105 °C |              | Case size<br>( $\phi$ D×L) | Ripple current<br>(mA r.m.s.) 105 °C |              |
|                    |                            | 120 Hz                               | 100 kHz      |                            | 120 Hz                               | 100 kHz      |
| 10                 | 10 × 20                    | 150                                  | 430          | 10 × 20U<br>12.5 × 20      | 115<br>170                           | 330<br>490   |
| 15                 | 12.5 × 20                  | 205                                  | 590          | 12.5 × 25                  | 270                                  | 780          |
| 22                 | 12.5 × 25<br>16 × 20S      | 265<br>300                           | 760<br>860   | 16 × 20S                   | 330                                  | 945          |
| 33                 | 16 × 20S                   | 355                                  | 1020         | 16 × 25<br>18 × 20S        | 350<br>350                           | 1000<br>1000 |
| 47                 | 16 × 25<br>18 × 20S        | 410<br>410                           | 1180<br>1180 | 16 × 31.5<br>18 × 25S      | 420<br>420                           | 1200<br>1200 |
| 56                 |                            |                                      |              | 18 × 31.5                  | 480                                  | 1380         |
| 68                 | 18 × 25                    | 515                                  | 1470         | 18 × 40                    | 630                                  | 1800         |
| 82                 | 18 × 31.5                  | 575                                  | 1645         |                            |                                      |              |
| 100                | 18 × 40                    | 825                                  | 2060         |                            |                                      |              |

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### Standard Products

| W.V. | Cap.<br>(±20 %) | Case size |        | Specification   |                               |                      | Lead Length |            |              | Part No.       | Min. Packaging Q'ty |        |       |
|------|-----------------|-----------|--------|---|-------------------------------|----------------------|-------------|------------|--------------|----------------|---------------------|--------|-------|
|      |                 | Dia.      | Length | Ripple Current<br>(100 kHz)<br>(+105 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) | Endurance<br>(hours) | Lead Dia.   | Lead Space |              |                | Straight Leads      | Taping |       |
|      |                 |           |        |   |                               |                      |             | Straight   | Taping<br>*B |                |                     |        | (pcs) |
| (V)  | (μF)            | (mm)      | (mm)   | (mA r.m.s.)   | (+20 °C)                      | (hours)              | (mm)        | (mm)       | (mm)         |                | (pcs)               | (pcs)  |       |
| 160  | 22              | 10        | 20     | 700   | 0.15                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2C220( )  | 200                 | 500    |       |
|      | 33              | 10        | 20     | 810   | 0.15                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2C330( )  | 200                 | 500    |       |
|      | 47              | 10        | 20     | 1065  | 0.15                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2C470( )  | 200                 | 500    |       |
|      | 68              | 12.5      | 20     | 1350  | 0.15                          | 10000                | 0.6         | 5.0        | 5.0          | EEUEE2C680( )  | 200                 | 500    |       |
|      | 82              | 12.5      | 25     | 1480  | 0.15                          | 10000                | 0.6         | 5.0        | 5.0          | EEUEE2C820( )  | 200                 | 500    |       |
|      | 100             | 100       | 12.5   | 25  | 1660                          | 0.15                 | 10000       | 0.6        | 5.0          | 5.0            | EEUEE2C101( )       | 200    | 500   |
|      |                 |           | 16     | 20  | 1700                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2C101S( )      | 100    | 250   |
|      | 150             | 150       | 16     | 25  | 1890                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2C151( )       | 100    | 250   |
|      |                 |           | 18     | 20  | 1820                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2C151S( )      | 100    | 250   |
|      | 220             | 220       | 16     | 31.5  | 2280                          | 0.15                 | 10000       | 0.8        | 7.5          |                | EEUEE2C221          | 100    |       |
| 18   |                 |           | 25     | 1950  | 0.15                          | 10000                | 0.8         | 7.5        | 7.5          | EEUEE2C221S( ) | 100                 | 250    |       |
| 330  | 330             | 18        | 31.5   | 2600  | 0.15                          | 10000                | 0.8         | 7.5        |              | EEUEE2C331     | 50                  |        |       |
| 200  | 22              | 10        | 20     | 850   | 0.15                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2D220( )  | 200                 | 500    |       |
|      | 33              | 10        | 20     | 920   | 0.15                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2D330( )  | 200                 | 500    |       |
|      | 47              | 12.5      | 20     | 1100  | 0.15                          | 10000                | 0.6         | 5.0        | 5.0          | EEUEE2D470( )  | 200                 | 500    |       |
|      | 68              | 68        | 12.5   | 25  | 1330                          | 0.15                 | 10000       | 0.6        | 5.0          | 5.0            | EEUEE2D680( )       | 200    | 500   |
|      |                 |           | 16     | 20  | 1330                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2D680S( )      | 100    | 250   |
|      | 82              | 16        | 20     | 1460  | 0.15                          | 10000                | 0.8         | 7.5        | 7.5          | EEUEE2D820S( ) | 100                 | 250    |       |
|      | 100             | 100       | 16     | 25  | 1730                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2D101( )       | 100    | 250   |
|      |                 |           | 18     | 20  | 1665                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2D101S( )      | 100    | 250   |
|      | 150             | 150       | 16     | 25  | 1860                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2D151( )       | 100    | 250   |
|      | 220             | 220       | 18     | 31.5  | 2600                          | 0.15                 | 10000       | 0.8        | 7.5          |                | EEUEE2D221          | 100    |       |
| 330  | 330             | 18        | 40     | 3120  | 0.15                          | 10000                | 0.8         | 7.5        |              | EEUEE2D331     | 50                  |        |       |
| 250  | 22              | 10        | 20     | 785   | 0.15                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2E220( )  | 200                 | 500    |       |
|      | 33              | 12.5      | 20     | 995   | 0.15                          | 10000                | 0.6         | 5.0        | 5.0          | EEUEE2E330( )  | 200                 | 500    |       |
|      | 47              | 47        | 12.5   | 25  | 1290                          | 0.15                 | 10000       | 0.6        | 5.0          | 5.0            | EEUEE2E470( )       | 200    | 500   |
|      |                 |           | 16     | 20  | 1400                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2E470S( )      | 100    | 250   |
|      | 68              | 16        | 20     | 1400  | 0.15                          | 10000                | 0.8         | 7.5        | 7.5          | EEUEE2E680S( ) | 100                 | 250    |       |
|      | 82              | 82        | 16     | 25  | 1680                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2E820( )       | 100    | 250   |
|      |                 |           | 18     | 20  | 1680                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2E820S( )      | 100    | 250   |
|      | 100             | 100       | 16     | 31.5  | 2100                          | 0.15                 | 10000       | 0.8        | 7.5          |                | EEUEE2E101          | 100    |       |
|      |                 |           | 18     | 25  | 2100                          | 0.15                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2E101S( )      | 100    | 250   |
|      | 150             | 150       | 18     | 31.5  | 2520                          | 0.15                 | 10000       | 0.8        | 7.5          |                | EEUEE2E151          | 50     |       |
| 220  | 220             | 18        | 40     | 2940  | 0.15                          | 10000                | 0.8         | 7.5        |              | EEUEE2E221     | 50                  |        |       |
| 350  | 15              | 10        | 20     | 480   | 0.20                          | 8000                 | 0.6         | 5.0        | 5.0          | EEUEE2V150( )  | 200                 | 500    |       |
|      | 22              | 12.5      | 20     | 660   | 0.20                          | 10000                | 0.6         | 5.0        | 5.0          | EEUEE2V220( )  | 200                 | 500    |       |
|      | 33              | 33        | 12.5   | 25  | 790                           | 0.20                 | 10000       | 0.6        | 5.0          | 5.0            | EEUEE2V330( )       | 200    | 500   |
|      |                 |           | 16     | 20  | 900                           | 0.20                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2V330S( )      | 100    | 250   |
|      | 47              | 47        | 16     | 25  | 1070                          | 0.20                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2V470( )       | 100    | 250   |
|      |                 |           | 18     | 20  | 1070                          | 0.20                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2V470S( )      | 100    | 250   |
|      | 68              | 68        | 16     | 31.5  | 1530                          | 0.20                 | 10000       | 0.8        | 7.5          |                | EEUEE2V680          | 100    |       |
|      |                 |           | 18     | 25  | 1330                          | 0.20                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2V680S( )      | 100    | 250   |
|      | 82              | 82        | 18     | 25  | 1530                          | 0.20                 | 10000       | 0.8        | 7.5          | 7.5            | EEUEE2V820S( )      | 100    | 250   |
|      | 100             | 100       | 18     | 31.5  | 1600                          | 0.20                 | 10000       | 0.8        | 7.5          |                | EEUEE2V101          | 50     |       |

Endurance : 105 °C ϕ10=8000 h, ϕ12.5 to ϕ18=10000 h

When requesting taped product, please put the letter "B" between the "( )". Lead wire pitch B=5 mm, 7.5 mm.

The taping dimensions are explained on EE189 of our Catalog. Please use it as a reference guide.

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### ■ Standard Products

| W.V.<br>(V) | Cap.<br>(±20 %)<br>(μF) | Case size    |                | Specification   |                               |                      | Lead Length       |                  |                      | Part No.       | Min. Packaging Q'ty     |                 |
|-------------|-------------------------|--------------|----------------|---|-------------------------------|----------------------|-------------------|------------------|----------------------|----------------|-------------------------|-----------------|
|             |                         | Dia.<br>(mm) | Length<br>(mm) | Ripple Current<br>(100 kHz)<br>(+105 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) | Endurance<br>(hours) | Lead Dia.<br>(mm) | Lead Space       |                      |                | Straight Leads<br>(pcs) | Taping<br>(pcs) |
|             |                         |              |                |   |                               |                      |                   | Straight<br>(mm) | Taping<br>*B<br>(mm) |                |                         |                 |
| 400         | 10                      | 10           | 20             | 430   | 0.24                          | 8000                 | 0.6               | 5.0              | 5.0                  | EEUEE2G100( )  | 200                     | 500             |
|             | 15                      | 12.5         | 20             | 590   | 0.24                          | 10000                | 0.6               | 5.0              | 5.0                  | EEUEE2G150( )  | 200                     | 500             |
|             | 22                      | 12.5         | 25             | 760   | 0.24                          | 10000                | 0.6               | 5.0              | 5.0                  | EEUEE2G220( )  | 200                     | 500             |
|             |                         | 16           | 20             | 860   | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2G220S( ) | 100                     | 250             |
|             | 33                      | 16           | 20             | 1020  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2G330S( ) | 100                     | 250             |
|             | 47                      | 16           | 25             | 1180  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2G470( )  | 100                     | 250             |
|             |                         | 18           | 20             | 1180  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2G470S( ) | 100                     | 250             |
|             | 68                      | 18           | 25             | 1470  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2G680( )  | 100                     | 250             |
|             | 82                      | 18           | 31.5           | 1645  | 0.24                          | 10000                | 0.8               | 7.5              |                      | EEUEE2G820     | 50                      |                 |
| 100         | 18                      | 40           | 2060           | 0.24  | 10000                         | 0.8                  | 7.5               |                  | EEUEE2G101           | 50             |                         |                 |
| 450         | 10                      | 10           | 20             | 330   | 0.24                          | 8000                 | 0.6               | 5.0              | 5.0                  | EEUEE2W100U( ) | 200                     | 500             |
|             |                         | 12.5         | 20             | 490   | 0.24                          | 10000                | 0.6               | 5.0              | 5.0                  | EEUEE2W100( )  | 200                     | 500             |
|             | 15                      | 12.5         | 25             | 780   | 0.24                          | 10000                | 0.6               | 5.0              | 5.0                  | EEUEE2W150( )  | 200                     | 500             |
|             | 22                      | 16           | 20             | 945   | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2W220S( ) | 100                     | 250             |
|             | 33                      | 16           | 25             | 1000  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2W330( )  | 100                     | 250             |
|             |                         | 18           | 20             | 1000  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2W330S( ) | 100                     | 250             |
|             | 47                      | 16           | 31.5           | 1200  | 0.24                          | 10000                | 0.8               | 7.5              |                      | EEUEE2W470     | 100                     |                 |
|             |                         | 18           | 25             | 1200  | 0.24                          | 10000                | 0.8               | 7.5              | 7.5                  | EEUEE2W470S( ) | 100                     | 250             |
|             | 56                      | 18           | 31.5           | 1380  | 0.24                          | 10000                | 0.8               | 7.5              |                      | EEUEE2W560     | 50                      |                 |
| 68          | 18                      | 40           | 1800           | 0.24  | 10000                         | 0.8                  | 7.5               |                  | EEUEE2W680           | 50             |                         |                 |

Endurance : 105 °C φ10=8000 h, φ12.5 to φ18=10000 h

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