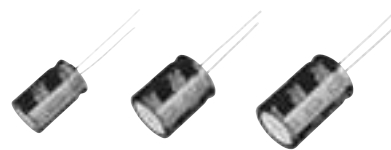


### Radial Lead Type

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

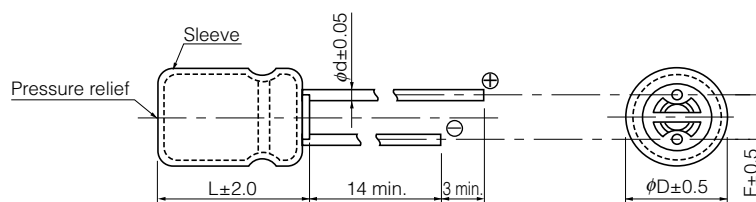
|                       |                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                             |      |      |      |      |      |                 |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|-----------------|
| 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)

(Unit : mm)



|                    |     |      |     |     |
|--------------------|-----|------|-----|-----|
| Body Dia. $\phi D$ | 10  | 12.5 | 16  | 18  |
| Lead Dia. $\phi d$ | 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.

02 May. 2014

■ Case size/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         |                            |                                      |              |

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
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02 May. 2014

### Standard Products

Endurance : 105 °C  $\phi 10=8000$  h,  $\phi 12.5$  to  $\phi 18=10000$  h

| 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) | Endur-<br>ance | Lead Dia.   | Lead Space |              |                 | Straight Leads      | Taping |
|      |                 |           |        |                                                         |                               |                |             | Straight   | Taping<br>*B |                 |                     |        |
| (V)  | (μF)            | (mm)      | (mm)   |                                                         |                               | (hours)        | (mm)        | (mm)       | (mm)         |                 | (pcs)               | (pcs)  |
| 160  | 22              | 10        | 20     | 700                                                     | 0.15                          | 8000           | 0.6         | 5.0        | 5.0          | EEUEEE2C220( )  | 200                 | 500    |
|      | 33              | 10        | 20     | 810                                                     | 0.15                          | 8000           | 0.6         | 5.0        | 5.0          | EEUEEE2C330( )  | 200                 | 500    |
|      | 47              | 10        | 20     | 1065                                                    | 0.15                          | 8000           | 0.6         | 5.0        | 5.0          | EEUEEE2C470( )  | 200                 | 500    |
|      | 68              | 12.5      | 20     | 1350                                                    | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2C680( )  | 200                 | 500    |
|      | 82              | 12.5      | 25     | 1480                                                    | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2C820( )  | 200                 | 500    |
|      | 100             | 12.5      | 25     | 1660                                                    | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2C101( )  | 200                 | 500    |
|      |                 | 16        | 20     | 1700                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2C101S( ) | 100                 | 250    |
|      | 150             | 16        | 25     | 1890                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2C151( )  | 100                 | 250    |
|      |                 | 18        | 20     | 1820                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2C151S( ) | 100                 | 250    |
|      | 220             | 16        | 31.5   | 2280                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2C221     | 100                 |        |
|      |                 | 18        | 25     | 1950                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2C221S( ) | 100                 | 250    |
|      | 330             | 18        | 31.5   | 2600                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2C331     | 50                  |        |
| 200  | 22              | 10        | 20     | 850                                                     | 0.15                          | 8000           | 0.6         | 5.0        | 5.0          | EEUEEE2D220( )  | 200                 | 500    |
|      | 33              | 10        | 20     | 920                                                     | 0.15                          | 8000           | 0.6         | 5.0        | 5.0          | EEUEEE2D330( )  | 200                 | 500    |
|      | 47              | 12.5      | 20     | 1100                                                    | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2D470( )  | 200                 | 500    |
|      | 68              | 12.5      | 25     | 1330                                                    | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2D680( )  | 200                 | 500    |
|      |                 | 16        | 20     | 1330                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2D680S( ) | 100                 | 250    |
|      | 82              | 16        | 20     | 1460                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2D820S( ) | 100                 | 250    |
|      | 100             | 16        | 25     | 1730                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2D101( )  | 100                 | 250    |
|      |                 | 18        | 20     | 1665                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2D101S( ) | 100                 | 250    |
|      | 150             | 16        | 25     | 1860                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2D151( )  | 100                 | 250    |
|      | 220             | 18        | 31.5   | 2600                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2D221     | 50                  |        |
|      | 330             | 18        | 40     | 3120                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2D331     | 50                  |        |
|      | 250             | 22        | 10     | 20                                                      | 785                           | 0.15           | 8000        | 0.6        | 5.0          | 5.0             | EEUEEE2E220( )      | 200    |
| 33   |                 | 12.5      | 20     | 995                                                     | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2E330( )  | 200                 | 500    |
| 47   |                 | 12.5      | 25     | 1290                                                    | 0.15                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2E470( )  | 200                 | 500    |
|      |                 | 16        | 20     | 1400                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2E470S( ) | 100                 | 250    |
| 68   |                 | 16        | 20     | 1400                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2E680S( ) | 100                 | 250    |
| 82   |                 | 16        | 25     | 1680                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2E820( )  | 100                 | 250    |
|      |                 | 18        | 20     | 1680                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2E820S( ) | 100                 | 250    |
| 100  |                 | 16        | 31.5   | 2100                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2E101     | 100                 |        |
|      |                 | 18        | 25     | 2100                                                    | 0.15                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2E101S( ) | 100                 | 250    |
| 150  |                 | 18        | 31.5   | 2520                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2E151     | 50                  |        |
| 220  |                 | 18        | 40     | 2940                                                    | 0.15                          | 10000          | 0.8         | 7.5        |              | EEUEEE2E221     | 50                  |        |
| 350  |                 | 15        | 10     | 20                                                      | 480                           | 0.20           | 8000        | 0.6        | 5.0          | 5.0             | EEUEEE2V150( )      | 200    |
|      | 22              | 12.5      | 20     | 660                                                     | 0.20                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2V220( )  | 200                 | 500    |
|      | 33              | 12.5      | 25     | 790                                                     | 0.20                          | 10000          | 0.6         | 5.0        | 5.0          | EEUEEE2V330( )  | 200                 | 500    |
|      |                 | 16        | 20     | 900                                                     | 0.20                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2V330S( ) | 100                 | 250    |
|      | 47              | 16        | 25     | 1070                                                    | 0.20                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2V470( )  | 100                 | 250    |
|      |                 | 18        | 20     | 1070                                                    | 0.20                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2V470S( ) | 100                 | 250    |
|      | 68              | 16        | 31.5   | 1530                                                    | 0.20                          | 10000          | 0.8         | 7.5        |              | EEUEEE2V680     | 100                 |        |
|      |                 | 18        | 25     | 1330                                                    | 0.20                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2V680S( ) | 100                 | 250    |
|      | 82              | 18        | 25     | 1530                                                    | 0.20                          | 10000          | 0.8         | 7.5        | 7.5          | EEUEEE2V820S( ) | 100                 | 250    |
|      | 100             | 18        | 31.5   | 1600                                                    | 0.20                          | 10000          | 0.8         | 7.5        |              | EEUEEE2V101     | 50                  |        |

- When requesting taped product, please put the letter "B" between the "( )". Lead wire pitch \*B=5 mm, 7.5 mm.
- Please refer to the page of "Taping Dimensions".

### ■ Standard Products

Endurance : 105 °C  $\phi$ 10=8000 h,  $\phi$ 12.5 to  $\phi$ 18=10000 h

| 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 $\delta$<br>(120 Hz)<br>(+20 °C) | Endurance<br>(hours) | Lead Dia.   | Lead Space |              |                | Straight Leads      | Taping |
|      |                 |           |        |                                                         |                                      |                      |             | Straight   | Taping<br>*B |                |                     |        |
| (V)  | (μF)            | (mm)      | (mm)   |                                                         |                                      |                      | (mm)        | (mm)       | (mm)         |                | (pcs)               | (pcs)  |
| 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             |                     |        |

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- Please refer to the page of "Taping Dimensions".