

### Radial Lead Type

Series: **HD** Type: **A**

#### ■ Features

- Endurance : 105 °C 1000 h to 2000 h
- Minaturize, Higher Capacitance :  
1 Size Minaturized Product of Current A-NHG
- RoHS directive compliant



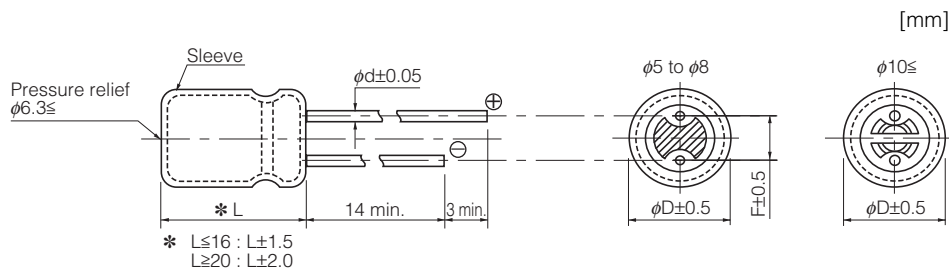
#### ■ Specifications

|                       |                                                                                                                                                                                                                                                                              |                                    |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Category Temp. Range  | -55 °C to +105 °C                                                                                                                                                                                                                                                            |                                    |
| Rated W.V. Range      | 10 V.DC to 50 V.DC                                                                                                                                                                                                                                                           |                                    |
| Nominal Cap. Range    | 0.1 μF to 22000 μF                                                                                                                                                                                                                                                           |                                    |
| Capacitance Tolerance | ±20 % (120 Hz/+20 °C)                                                                                                                                                                                                                                                        |                                    |
| DC Leakage Current    | I ≤ 0.01 CV or 3 (μA) After 2 minutes<br>(Which is greater)                                                                                                                                                                                                                  |                                    |
| tan δ                 | Please see the attached standard products list                                                                                                                                                                                                                               |                                    |
| 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. |                                    |
|                       | Duration : ϕ5 to ϕ8=1000 hours, ϕ10 to ϕ18=2000 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.(V.DC) | Cap. (μF)     | Frequency (Hz) |      |      |      |       |
|------------|---------------|----------------|------|------|------|-------|
|            |               | 60             | 120  | 1 k  | 10 k | 100 k |
| 10 to 50   | 0.1 to 33     | 0.75           | 1.00 | 1.55 | 1.80 | 2.00  |
|            | 47 to 470     | 0.80           | 1.00 | 1.35 | 1.50 | 1.50  |
|            | 1000 to 22000 | 0.85           | 1.00 | 1.10 | 1.15 | 1.15  |

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



|              | (mm) |     |     |     |      |     |     |
|--------------|------|-----|-----|-----|------|-----|-----|
| Body Dia. φD | 5    | 6.3 | 8   | 10  | 12.5 | 16  | 18  |
| Lead Dia. φd | 0.5  | 0.5 | 0.6 | 0.6 | 0.6  | 0.8 | 0.8 |
| Lead space F | 2.0  | 2.5 | 3.5 | 5.0 | 5.0  | 7.5 | 7.5 |

## ■ Standard Products

| W.V.  | Cap.<br>(±20 %) | Case size |        | Specification                                            |                              |                           | Lead Length          |                  |                      |                      | Part No.      | Min. Packaging Q'ty        |                 |
|-------|-----------------|-----------|--------|----------------------------------------------------------|------------------------------|---------------------------|----------------------|------------------|----------------------|----------------------|---------------|----------------------------|-----------------|
|       |                 | Dia.      | Length | Ripple<br>Current<br>(120 Hz<br>(+105 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz<br>(+20 °C) | Endur-<br>ance<br>(hours) | Lead<br>Dia.<br>(mm) | Lead Space       |                      |                      |               | Straight<br>Leads<br>(pcs) | Taping<br>(pcs) |
|       |                 |           |        |                                                          |                              |                           |                      | Straight<br>(mm) | Taping<br>*B<br>(mm) | Taping<br>*H<br>(mm) |               |                            |                 |
| (V)   | (μF)            | (mm)      | (mm)   | (mA r.m.s.)                                              |                              |                           | (mm)                 | (mm)             | (mm)                 | (mm)                 |               |                            |                 |
| 10    | 330             | 6.3       | 11.2   | 200                                                      | 0.24                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1A331( ) | 200                        | 2000            |
|       | 470             | 8         | 11.5   | 250                                                      | 0.24                         | 1000                      | 0.6                  | 3.5              | 5.0                  |                      | EEUHD1A471( ) | 200                        | 1000            |
|       | 1000            | 10        | 12.5   | 460                                                      | 0.24                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1A102( ) | 200                        | 500             |
|       | 2200            | 10        | 16     | 760                                                      | 0.26                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1A222( ) | 200                        | 500             |
|       | 4700            | 12.5      | 20     | 1260                                                     | 0.30                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1A472( ) | 200                        | 500             |
|       | 6800            | 12.5      | 25     | 1570                                                     | 0.34                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1A682( ) | 200                        | 500             |
|       | 10000           | 16        | 25     | 1890                                                     | 0.42                         | 2000                      | 0.8                  | 7.5              | 7.5                  |                      | EEUHD1A103( ) | 100                        | 250             |
|       | 15000           | 16        | 31.5   | 2180                                                     | 0.52                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1A153    | 100                        |                 |
|       | 22000           | 18        | 35.5   | 2400                                                     | 0.66                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1A223    | 50                         |                 |
| 16    | 100             | 5         | 11     | 110                                                      | 0.20                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1C101( ) | 200                        | 2000            |
|       | 220             | 6.3       | 11.2   | 180                                                      | 0.20                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1C221( ) | 200                        | 2000            |
|       | 330             | 8         | 11.5   | 260                                                      | 0.20                         | 1000                      | 0.6                  | 3.5              | 5.0                  |                      | EEUHD1C331( ) | 200                        | 1000            |
|       | 470             | 8         | 11.5   | 310                                                      | 0.20                         | 1000                      | 0.6                  | 3.5              | 5.0                  |                      | EEUHD1C471( ) | 200                        | 1000            |
|       | 3300            | 12.5      | 20     | 1170                                                     | 0.24                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1C332( ) | 200                        | 500             |
|       | 4700            | 12.5      | 25     | 1480                                                     | 0.26                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1C472( ) | 200                        | 500             |
|       | 6800            | 16        | 25     | 1780                                                     | 0.30                         | 2000                      | 0.8                  | 7.5              | 7.5                  |                      | EEUHD1C682( ) | 100                        | 250             |
|       | 8200            | 16        | 25     | 1780                                                     | 0.34                         | 2000                      | 0.8                  | 7.5              | 7.5                  |                      | EEUHD1C822( ) | 100                        | 250             |
|       | 10000           | 16        | 31.5   | 2060                                                     | 0.38                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1C103    | 100                        |                 |
|       | 15000           | 18        | 35.5   | 2210                                                     | 0.48                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1C153    | 50                         |                 |
| 25    | 47              | 5         | 11     | 91                                                       | 0.16                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1E470( ) | 200                        | 2000            |
|       | 68              | 5         | 11     | 91                                                       | 0.16                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1E680( ) | 200                        | 2000            |
|       | 100             | 6.3       | 11.2   | 130                                                      | 0.16                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1E101( ) | 200                        | 2000            |
|       | 220             | 8         | 11.5   | 230                                                      | 0.16                         | 1000                      | 0.6                  | 3.5              | 5.0                  |                      | EEUHD1E221( ) | 200                        | 1000            |
|       | 330             | 8         | 11.5   | 310                                                      | 0.16                         | 1000                      | 0.6                  | 3.5              | 5.0                  |                      | EEUHD1E331( ) | 200                        | 1000            |
|       | 470             | 10        | 12.5   | 380                                                      | 0.16                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1E471( ) | 200                        | 500             |
|       | 1000            | 10        | 16     | 680                                                      | 0.16                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1E102( ) | 200                        | 500             |
|       | 2200            | 12.5      | 20     | 1090                                                     | 0.18                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1E222( ) | 200                        | 500             |
|       | 3300            | 12.5      | 25     | 1400                                                     | 0.20                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1E332( ) | 200                        | 500             |
|       | 4700            | 16        | 25     | 1750                                                     | 0.22                         | 2000                      | 0.8                  | 7.5              | 7.5                  |                      | EEUHD1E472( ) | 100                        | 250             |
|       | 5600            | 16        | 25     | 1750                                                     | 0.24                         | 2000                      | 0.8                  | 7.5              | 7.5                  |                      | EEUHD1E562( ) | 100                        | 250             |
|       | 6800            | 16        | 31.5   | 2040                                                     | 0.26                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1E682    | 100                        |                 |
| 10000 | 18              | 35.5      | 2200   | 0.34                                                     | 2000                         | 0.8                       | 7.5                  |                  |                      | EEUHD1E103           | 50            |                            |                 |
| 35    | 47              | 5         | 11     | 90                                                       | 0.14                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1V470( ) | 200                        | 2000            |
|       | 100             | 6.3       | 11.2   | 150                                                      | 0.14                         | 1000                      | 0.5                  | 2.5              | 5.0                  | 2.5                  | EEUHD1V101( ) | 200                        | 2000            |
|       | 220             | 8         | 11.5   | 270                                                      | 0.14                         | 1000                      | 0.6                  | 3.5              | 5.0                  |                      | EEUHD1V221( ) | 200                        | 1000            |
|       | 330             | 10        | 12.5   | 350                                                      | 0.14                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1V331( ) | 200                        | 500             |
|       | 470             | 10        | 16     | 460                                                      | 0.14                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1V471( ) | 200                        | 500             |
|       | 680             | 10        | 16     | 460                                                      | 0.14                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1V681( ) | 200                        | 500             |
|       | 2200            | 12.5      | 25     | 1260                                                     | 0.16                         | 2000                      | 0.6                  | 5.0              | 5.0                  |                      | EEUHD1V222( ) | 200                        | 500             |
|       | 3300            | 16        | 25     | 1610                                                     | 0.18                         | 2000                      | 0.8                  | 7.5              | 7.5                  |                      | EEUHD1V332( ) | 100                        | 250             |
|       | 4700            | 16        | 31.5   | 1910                                                     | 0.20                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1V472    | 100                        |                 |
|       | 6800            | 18        | 35.5   | 2050                                                     | 0.24                         | 2000                      | 0.8                  | 7.5              |                      |                      | EEUHD1V682    | 50                         |                 |

When requesting taped product, please put the letter "B" or "H" between the "( )". Lead wire pitch B=5 mm, 7.5 mm, H=2.5 mm. The taping dimensions are explained on EE189 of our Catalog. Please use it as a reference guide.

### Standard Products

| W.V. | Cap.<br>(±20 %) | Case size |        | Specification                                            |                              |                           | Lead Length          |            |              |              | Part No.       | Min. Packaging Q'ty        |                 |
|------|-----------------|-----------|--------|----------------------------------------------------------|------------------------------|---------------------------|----------------------|------------|--------------|--------------|----------------|----------------------------|-----------------|
|      |                 | Dia.      | Length | Ripple<br>Current<br>(120 Hz<br>(+105 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz<br>(+20 °C) | Endur-<br>ance<br>(hours) | Lead<br>Dia.<br>(mm) | Lead Space |              |              |                | Straight<br>Leads<br>(pcs) | Taping<br>(pcs) |
|      |                 |           |        |                                                          |                              |                           |                      | Straight   | Taping<br>*B | Taping<br>*H |                |                            |                 |
| (V)  | (μF)            | (mm)      | (mm)   | (mA r.m.s.)                                              |                              |                           | (mm)                 | (mm)       | (mm)         | (mm)         |                |                            |                 |
| 50   | 0.1             | 5         | 11     | 1.1                                                      | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1HR10( )  | 200                        | 2000            |
|      | 0.22            | 5         | 11     | 2.3                                                      | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1HR22( )  | 200                        | 2000            |
|      | 0.33            | 5         | 11     | 3.5                                                      | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1HR33( )  | 200                        | 2000            |
|      | 0.47            | 5         | 11     | 5                                                        | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1HR47( )  | 200                        | 2000            |
|      | 1               | 5         | 11     | 10                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H1R0( )  | 200                        | 2000            |
|      | 2.2             | 5         | 11     | 18                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H2R2( )  | 200                        | 2000            |
|      | 3.3             | 5         | 11     | 22                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H3R3( )  | 200                        | 2000            |
|      | 4.7             | 5         | 11     | 26                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H4R7( )  | 200                        | 2000            |
|      | 10              | 5         | 11     | 39                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H100( )  | 200                        | 2000            |
|      | 22              | 5         | 11     | 65                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H220( )  | 200                        | 2000            |
|      | 33              | 5         | 11     | 90                                                       | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H330( )  | 200                        | 2000            |
|      | 47              | 6.3       | 11.2   | 110                                                      | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H470( )  | 200                        | 2000            |
|      | 68              | 6.3       | 11.2   | 110                                                      | 0.12                         | 1000                      | 0.5                  | 2.5        | 5.0          | 2.5          | EEUHD1H680( )  | 200                        | 2000            |
|      | 100             | 8         | 11.5   | 180                                                      | 0.12                         | 1000                      | 0.6                  | 3.5        | 5.0          |              | EEUHD1H101( )  | 200                        | 1000            |
|      | 220             | 10        | 12.5   | 300                                                      | 0.12                         | 2000                      | 0.6                  | 5.0        | 5.0          |              | EEUHD1H221( )  | 200                        | 500             |
|      | 330             | 10        | 16     | 410                                                      | 0.12                         | 2000                      | 0.6                  | 5.0        | 5.0          |              | EEUHD1H331( )  | 200                        | 500             |
|      | 470             | 10        | 20     | 530                                                      | 0.12                         | 2000                      | 0.6                  | 5.0        | 5.0          |              | EEUHD1H471( )  | 200                        | 500             |
|      | 560             | 16        | 15     | 650                                                      | 0.12                         | 2000                      | 0.8                  | 7.5        | 7.5          |              | EEUHD1H561S( ) | 100                        | 250             |
|      | 680             | 16        | 15     | 650                                                      | 0.12                         | 2000                      | 0.8                  | 7.5        | 7.5          |              | EEUHD1H681S( ) | 100                        | 250             |
|      | 1000            | 12.5      | 25     | 950                                                      | 0.12                         | 2000                      | 0.6                  | 5.0        | 5.0          |              | EEUHD1H102( )  | 200                        | 500             |
|      | 2200            | 16        | 31.5   | 1470                                                     | 0.14                         | 2000                      | 0.8                  | 7.5        |              |              | EEUHD1H222     | 100                        |                 |
|      | 3300            | 18        | 35.5   | 1770                                                     | 0.16                         | 2000                      | 0.8                  | 7.5        |              |              | EEUHD1H332     | 50                         |                 |

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