

### Radial Lead Type

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

#### ■ Features

- Endurance : 105 °C 1000 h to 2000 h
- Minaturize, Higher Capacitance :  
1 Size Miniturized 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    | 2.2 μF to 22000 μF                                                                                                                                                                                                                                                           |                                    |
| Capacitance Tolerance | ±20 % (120 Hz/+20 °C)                                                                                                                                                                                                                                                        |                                    |
| DC Leakage Current    | $I \leq 0.01 CV$ or 3 (μA) After 2 minutes<br>(Which is greater)                                                                                                                                                                                                             |                                    |
| $\tan \delta$         | 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 : $\phi 5$ to $\phi 8$ =1000 hours, $\phi 10$ to $\phi 18$ =2000 hours                                                                                                                                                                                              |                                    |
|                       | Capacitance change                                                                                                                                                                                                                                                           | ±20 % of initial measured value    |
|                       | $\tan \delta$                                                                                                                                                                                                                                                                | ≤ 200 % of initial specified value |
| Shelf Life            | DC leakage current                                                                                                                                                                                                                                                           | ≤ initial specified value          |
|                       | 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   | 2.2 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)

(Unit : mm)

|                                                                                    |     |     |     |     |      |     |     |
|------------------------------------------------------------------------------------|-----|-----|-----|-----|------|-----|-----|
| <p>* <math>L \leq 16 : L \pm 1.5</math><br/><math>L \geq 20 : L \pm 2.0</math></p> |     |     |     |     |      |     |     |
| Body Dia. $\phi D$                                                                 | 5   | 6.3 | 8   | 10  | 12.5 | 16  | 18  |
| Lead Dia. $\phi d$                                                                 | 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 |

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.

04 Mar. 2015

## ■ Standard Products

Endurance : 105 °C  $\phi 5$  to  $\phi 8$ =1000 h,  $\phi 10$  to  $\phi 18$ =2000 h

| W.V.  | Cap.<br>(±20 %) | Case size |        | Specification                                          |                               |           | Lead Length |            |              |              | Part No.      | Min. Packaging Q'ty |        |
|-------|-----------------|-----------|--------|--------------------------------------------------------|-------------------------------|-----------|-------------|------------|--------------|--------------|---------------|---------------------|--------|
|       |                 | Dia.      | Length | Ripple Current<br>(120 Hz)<br>(+105 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) | Endurance | Lead Dia.   | Lead Space |              |              |               | Straight Leads      | Taping |
|       |                 |           |        |                                                        |                               |           |             | Straight   | Taping<br>*B | Taping<br>*H |               |                     |        |
| (V)   | (μF)            | (mm)      | (mm)   | (mA r.m.s.)                                            |                               | (hours)   | (mm)        | (mm)       | (mm)         | (mm)         |               | (pcs)               | (pcs)  |
| 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         | 2.0        | 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         | 2.0        | 5.0          | 2.5          | EEUHD1E470( ) | 200                 | 2000   |
|       | 68              | 5         | 11     | 91                                                     | 0.16                          | 1000      | 0.5         | 2.0        | 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         | 2.0        | 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.  
 · Please refer to the page of "Taping Dimensions".

### ■ Standard Products

Endurance : 105 °C  $\phi$ 5 to  $\phi$ 8=1000 h,  $\phi$ 10 to  $\phi$ 18=2000 h

| W.V.<br><br>(V) | Cap.<br>(±20 %)<br><br>(μF) | Case size |        | Specification                                          |                               |                          | Lead Length           |                      |                      |                      | Part No.       | Min. Packaging Q'ty         |                     |
|-----------------|-----------------------------|-----------|--------|--------------------------------------------------------|-------------------------------|--------------------------|-----------------------|----------------------|----------------------|----------------------|----------------|-----------------------------|---------------------|
|                 |                             | Dia.      | Length | Ripple Current<br>(120 Hz)<br>(+105 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) | Endurance<br><br>(hours) | Lead Dia.<br><br>(mm) | Lead Space           |                      |                      |                | Straight Leads<br><br>(pcs) | Taping<br><br>(pcs) |
|                 |                             |           |        |                                                        |                               |                          |                       | Straight<br><br>(mm) | Taping<br>*B<br>(mm) | Taping<br>*H<br>(mm) |                |                             |                     |
| 50              | 2.2                         | 5         | 11     | 18                                                     | 0.12                          | 1000                     | 0.5                   | 2.0                  | 5.0                  | 2.5                  | EEUHD1H2R2( )  | 200                         | 2000                |
|                 | 3.3                         | 5         | 11     | 22                                                     | 0.12                          | 1000                     | 0.5                   | 2.0                  | 5.0                  | 2.5                  | EEUHD1H3R3( )  | 200                         | 2000                |
|                 | 4.7                         | 5         | 11     | 26                                                     | 0.12                          | 1000                     | 0.5                   | 2.0                  | 5.0                  | 2.5                  | EEUHD1H4R7( )  | 200                         | 2000                |
|                 | 10                          | 5         | 11     | 39                                                     | 0.12                          | 1000                     | 0.5                   | 2.0                  | 5.0                  | 2.5                  | EEUHD1H100( )  | 200                         | 2000                |
|                 | 22                          | 5         | 11     | 65                                                     | 0.12                          | 1000                     | 0.5                   | 2.0                  | 5.0                  | 2.5                  | EEUHD1H220( )  | 200                         | 2000                |
|                 | 33                          | 5         | 11     | 90                                                     | 0.12                          | 1000                     | 0.5                   | 2.0                  | 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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- Please refer to the page of "Taping Dimensions".

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