

# KHE Series

- Ideal for low profile power supply applications
- Downsize, high ripple design
- Rated voltage range : 400 to 450V<sub>dc</sub>, Capacitance range : 27 to 120μF
- Endurance with ripple current : 2,000 hours at 105°C
- Non solvent resistant type
- RoHS2 Compliant

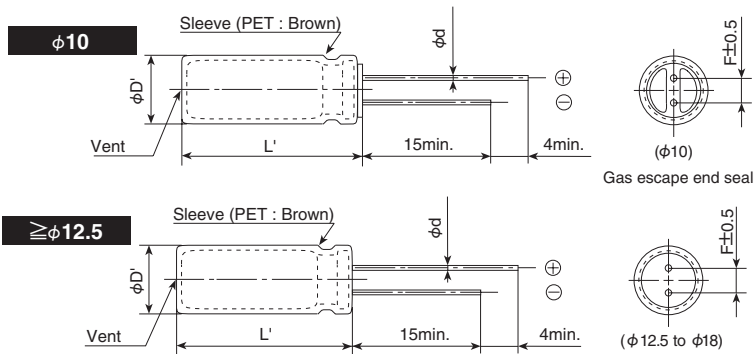


## ◆ SPECIFICATIONS

| Items   | Characteristics   |                                       |                 |      |
|---|---|---------------------------------------|-----------------|------|
| <b>Category</b>   | -40 to +105°C   |                                       |                 |      |
| <b>Temperature Range</b>                                      | -40 to +105°C   |                                       |                 |      |
| <b>Rated Voltage Range</b>                                    | 400 to 450V <sub>dc</sub>   |                                       |                 |      |
| <b>Capacitance Tolerance</b>                                  | ±20% (M) (at 20°C, 120Hz)   |                                       |                 |      |
| <b>Leakage Current</b>  |   | After 1 minute                        | After 5 minutes |      |
|   | CV ≤ 1,000  | I = 0.1CV + 40                        | I = 0.03CV + 15 |      |
|   | CV > 1,000  | I = 0.04CV + 100                      | I = 0.02CV + 25 |      |
|   | Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C)   |                                       |                 |      |
| <b>Dissipation Factor (tan δ)</b>                             | Rated voltage (V <sub>dc</sub> )  | 400V                                  | 420V            | 450V |
|   | tan δ (Max.)  | 0.15                                  | 0.20            | 0.20 |
| (at 20°C, 120Hz)  |   |                                       |                 |      |
| <b>Low Temperature Characteristics (Max. Impedance Ratio)</b> | Rated voltage (V <sub>dc</sub> )  | 400V                                  | 420V            | 450V |
|   | Z(-25°C)/Z(+20°C)   | 5                                     | 6               | 6    |
|   | Z(-40°C)/Z(+20°C)   | 6                                     | —               | —    |
| (at 120Hz)  |   |                                       |                 |      |
| <b>Endurance</b>  | The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied (the peak voltage shall not exceed the rated voltage) for 2,000 hours at 105°C.   |                                       |                 |      |
|   | Capacitance change  | ≤ ±20% of the initial value           |                 |      |
|   | D.F. (tan δ)  | ≤ 200% of the initial specified value |                 |      |
|   | Leakage current   | ≤ The initial specified value         |                 |      |
| <b>Shelf Life</b>   | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4. |                                       |                 |      |
|   | Capacitance change  | ≤ ±20% of the initial value           |                 |      |
|   | D.F. (tan δ)  | ≤ 200% of the initial specified value |                 |      |
|   | Leakage current   | ≤ 500% of the initial specified value |                 |      |

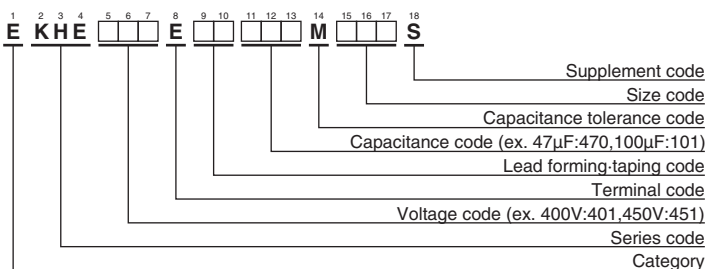
## ◆ DIMENSIONS [mm]

● Terminal Code : E



| φD  | 10          | 12.5 | 14.5 | 16  | 18  |
|-----|-------------|------|------|-----|-----|
| φd  | 0.6         | 0.6  | 0.8  | 0.8 | 0.8 |
| F   | 5.0         | 5.0  | 7.5  | 7.5 | 7.5 |
| φD' | φD+0.5 max. |      |      |     |     |
| L'  | L+2.0 max.  |      |      |     |     |

## ◆ PART NUMBERING SYSTEM



Please refer to "Product code guide (radial lead type)"

◆STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Case size φD×L(mm) | tan δ | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part No.           | WV (V <sub>dc</sub> ) | Cap (μF) | Case size φD×L(mm) | tan δ              | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part No.           |
|-----------------------|----------|--------------------|-------|--|--------------------|-----------------------|----------|--------------------|--------------------|--|--------------------|
| 400                   | 33       | 10×30              | 0.15  | 335  | EKHE401E□□330MJ30S | 450                   | 27       | 10×30              | 0.20               | 305  | EKHE451E□□270MJ30S |
|                       | 39       | 10×35              | 0.15  | 385  | EKHE401E□□390MJ35S |                       | 33       | 10×35              | 0.20               | 355  | EKHE451E□□330MJ35S |
|                       | 47       | 10×40              | 0.15  | 445  | EKHE401E□□470MJ40S |                       | 39       | 10×40              | 0.20               | 405  | EKHE451E□□390MJ40S |
|                       | 56       | 10×45              | 0.15  | 505  | EKHE401E□□560MJ45S |                       | 47       | 10×45              | 0.20               | 460  | EKHE451E□□470MJ45S |
|                       | 56       | 12.5×30            | 0.15  | 480  | EKHE401E□□560MK30S |                       | 47       | 12.5×30            | 0.20               | 440  | EKHE451E□□470MK30S |
|                       | 68       | 12.5×35            | 0.15  | 560  | EKHE401E□□680MK35S |                       | 56       | 12.5×35            | 0.20               | 505  | EKHE451E□□560MK35S |
|                       | 82       | 12.5×40            | 0.15  | 640  | EKHE401E□□820MK40S |                       | 68       | 12.5×40            | 0.20               | 580  | EKHE451E□□680MK40S |
|                       | 82       | 14.5×31.5          | 0.15  | 625  | EKHE401E□□820MUN3S |                       | 68       | 14.5×31.5          | 0.20               | 570  | EKHE451E□□680MUN3S |
|                       | 100      | 12.5×45            | 0.15  | 730  | EKHE401E□□101MK45S |                       | 82       | 12.5×45            | 0.20               | 660  | EKHE451E□□820MK45S |
|                       | 100      | 14.5×35            | 0.15  | 715  | EKHE401E□□101MU35S |                       | 82       | 14.5×35            | 0.20               | 650  | EKHE451E□□820MU35S |
|                       | 100      | 16×31.5            | 0.15  | 720  | EKHE401E□□101MLN3S |                       | 82       | 16×31.5            | 0.20               | 655  | EKHE451E□□820MLN3S |
|                       | 120      | 14.5×40            | 0.15  | 810  | EKHE401E□□121MU40S |                       | 100      | 14.5×40            | 0.20               | 740  | EKHE451E□□101MU40S |
| 120                   | 16×35    | 0.15               | 810   | EKHE401E□□121ML35S                                     | 100                | 16×35                 | 0.20     | 740                | EKHE451E□□101ML35S |  |                    |
| 120                   | 18×31.5  | 0.15               | 815   | EKHE401E□□121MMN3S                                     | 120                | 18×31.5               | 0.20     | 815                | EKHE451E□□121MMN3S |  |                    |
| 420                   | 33       | 10×30              | 0.20  | 335  | EKHE421E□□330MJ30S |                       |          |                    |                    |  |                    |
|                       | 39       | 10×35              | 0.20  | 385  | EKHE421E□□390MJ35S |                       |          |                    |                    |  |                    |
|                       | 47       | 10×40              | 0.20  | 445  | EKHE421E□□470MJ40S |                       |          |                    |                    |  |                    |
|                       | 56       | 10×50              | 0.20  | 520  | EKHE421E□□560MJ50S |                       |          |                    |                    |  |                    |
|                       | 56       | 12.5×30            | 0.20  | 480  | EKHE421E□□560MK30S |                       |          |                    |                    |  |                    |
|                       | 68       | 12.5×35            | 0.20  | 560  | EKHE421E□□680MK35S |                       |          |                    |                    |  |                    |
|                       | 82       | 12.5×40            | 0.20  | 640  | EKHE421E□□820MK40S |                       |          |                    |                    |  |                    |
|                       | 82       | 14.5×31.5          | 0.20  | 625  | EKHE421E□□820MUN3S |                       |          |                    |                    |  |                    |
|                       | 100      | 12.5×50            | 0.20  | 750  | EKHE421E□□101MK50S |                       |          |                    |                    |  |                    |
|                       | 100      | 14.5×40            | 0.20  | 740  | EKHE421E□□101MU40S |                       |          |                    |                    |  |                    |
|                       | 100      | 16×31.5            | 0.20  | 720  | EKHE421E□□101MLN3S |                       |          |                    |                    |  |                    |
|                       | 120      | 14.5×45            | 0.20  | 835  | EKHE421E□□121MU45S |                       |          |                    |                    |  |                    |
| 120                   | 16×35    | 0.20               | 810   | EKHE421E□□121ML35S                                     |                    |                       |          |                    |                    |  |                    |
| 120                   | 18×31.5  | 0.20               | 815   | EKHE421E□□121MMN3S                                     |                    |                       |          |                    |                    |  |                    |

□□ : Enter the appropriate lead forming or taping code.

◆RATED RIPPLE CURRENT MULTIPLIERS

● Frequency Multipliers

| Capacitance(μF) | Frequency(Hz) |      |      |      |
|-----------------|---------------|------|------|------|
|                 | 120           | 1k   | 10k  | 100k |
| 27 to 82        | 1.00          | 1.50 | 1.75 | 1.80 |
| 100 to 120      | 1.00          | 1.30 | 1.40 | 1.50 |

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced.