

# WH series

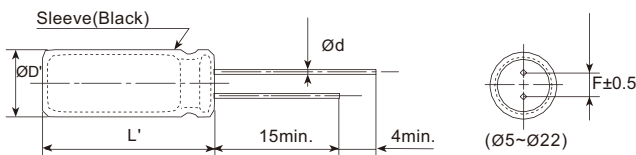
- Standard series for general purpose
- Wide temperature range from -40 °C to +105 °C
- Endurance: 2,000 hours at 105 °C
- RoHS Compliant



## SPECIFICATIONS

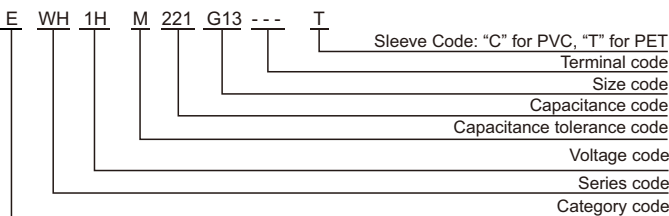
| Items  | Characteristics   |   |
|--|---|---|
| Category Temperature Range                             | -40~+105 °C (6.3~100 V <sub>dc</sub> )  | -25~+105°C(160~500 V <sub>dc</sub> )  |
| Rated Voltage Range                                    | 6.3~500 V <sub>dc</sub>   |   |
| Capacitance Tolerance                                  | ±20%(M) (at 20°C, 120Hz)  |   |
| Leakage Current  | 6.3~100 V <sub>dc</sub>   |   |
|  | 160~500 V <sub>dc</sub>   |   |
|  | I: leakage current(μA),<br>C: Nominal capacitance(μF)<br>V: Rated voltage(V)<br>(at 20°C)   |   |
|  | I≤0.03CV or 4μA (at 1 minute)<br>I≤0.01CV or 3μA (at 2 minutes)<br>Whichever is greater   | CV After 1 minute After 5 minutes<br>CV≤1,000: I≤0.1CV+40μA I≤0.03CV+15μA<br>CV>1,000: I≤0.04CV+100μA I≤0.02CV+25μA |
| Dissipation Factor (tanδ)                              | Rated Voltage(V <sub>dc</sub> )   | 6.3 10 16 25 35 50 63 100 160~250 350~500   |
|  | Dissipation Factor (Max.)   | 0.28 0.24 0.20 0.16 0.14 0.12 0.10 0.08 0.20 0.24   |
|  | When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20°C, 120Hz)   |   |
| Low Temperature Characteristics (Max. Impedance Ratio) | Rated Voltage(V <sub>dc</sub> )   | 6.3 10 16 25 35 50 63 100 160~250 350~450 500   |
|  | Z(-25°C)/Z(+20°C)   | 5 4 3 2 3 6 8   |
|  | Z(-40°C)/Z(+20°C)   | 12 10 8 5 4 3 - (at 120Hz)  |
| Endurance  | The specifications listed below shall be satisfied when the capacitors are restored to 20°C after DC voltage plus rated ripple current is applied for 2,000 hours at 105°C. |   |
|  | Capacitance Change  | ≤±20% of the initial value  |
|  | Dissipation Factor  | ≤200% of the initial specified value  |
|  | Leakage Current   | ≤The initial specified value  |
| Shelf Life   | The following specifications shall be satisfied when the capacitors are restored to 20°C after leaving them under no load at 105°C for 1,000 hours.                         |   |
|  | Capacitance Change  | ≤±20% of the initial value  |
|  | Dissipation Factor  | ≤200% of the initial specified value  |
|  | Leakage Current   | ≤200% of the initial specified value  |

## DIMENSIONS[mm]



|     |            |     |     |     |         |       |      |
|-----|------------|-----|-----|-----|---------|-------|------|
| ØD  | 5          | 6.3 | 8   | 10  | 12.5/13 | 16/18 | 22   |
| Ød  | 0.5        | 0.5 | 0.5 | 0.6 | 0.6     | 0.8   | 0.8  |
| F   | 2.0        | 2.5 | 3.5 | 5.0 | 5.0     | 7.5   | 10.0 |
| ØD' | ØD+0.5max. |     |     |     |         |       |      |
| L'  | L+2max.    |     |     |     |         |       |      |

## PART NUMBERING SYSTEM



## RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

|               |           |      |      |      |      |      |
|---------------|-----------|------|------|------|------|------|
| Cap.(μF)      | Freq.(Hz) |      |      |      |      |      |
|               | 50        | 120  | 300  | 1k   | 10k  | 100k |
| Cap.<10       | 0.65      | 1.00 | 1.35 | 1.75 | 2.30 | 2.50 |
| 10≤Cap.<100   | 0.75      | 1.00 | 1.25 | 1.50 | 1.75 | 1.80 |
| 100≤Cap.<1000 | 0.80      | 1.00 | 1.15 | 1.30 | 1.40 | 1.50 |
| Cap.≥1000     | 0.85      | 1.00 | 1.03 | 1.05 | 1.08 | 1.08 |

**WH series**

■ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part Number        |
|-----------------------|----------|---------------|--|--------------------|
| 6.3                   | 33       | 5×11          | 54   | EWHOJM330D11---T   |
|                       | 47       | 5×11          | 64   | EWHOJM470D11---T   |
|                       | 100      | 5×11          | 94   | EWHOJM101D11---T   |
|                       | 220      | 5×11          | 140  | EWHOJM221D11---T   |
|                       | 330      | 6.3×11        | 190  | EWHOJM331E11---T   |
|                       | 470      | 6.3×11        | 230  | EWHOJM471E11---T   |
|                       | 1000     | 8×12          | 380  | EWHOJM102F12---T   |
|                       | 2200     | 10×20         | 710  | EWHOJM222G20---T   |
|                       | 3300     | 10×20         | 840  | EWHOJM332G20---T   |
|                       | 4700     | 12.5×20       | 1090   | EWHOJM472W20---T   |
|                       | 6800     | 12.5×25       | 1350   | EWHOJM682W25---T   |
|                       | 10000    | 16×25         | 1650   | EWHOJM103L25---T   |
|                       | 15000    | 16×35         | 2010   | EWHOJM153L35---T   |
|                       | 22000    | 18×40         | 2350   | EWHOJM223M40---T   |
| 10                    | 22       | 5×11          | 46   | EWHA1AM220D11---T  |
|                       | 33       | 5×11          | 57   | EWHA1AM330D11---T  |
|                       | 47       | 5×11          | 68   | EWHA1AM470D11---T  |
|                       | 100      | 5×11          | 100  | EWHA1AM101D11---T  |
|                       | 220      | 6.3×11        | 170  | EWHA1AM221E11---T  |
|                       | 330      | 6.3×11        | 200  | EWHA1AM331E11---T  |
|                       | 470      | 8×11          | 250  | EWHA1AM471F11---T  |
|                       | 1000     | 10×13         | 460  | EWHA1AM102G13---T  |
|                       | 2200     | 10×20         | 760  | EWHA1AM222G20---T  |
|                       | 3300     | 12.5×20       | 1000   | EWHA1AM332W20---T  |
|                       | 4700     | 12.5×25       | 1260   | EWHA1AM472W25---T  |
|                       | 6800     | 16×25         | 1570   | EWHA1AM682L25---T  |
|                       | 10000    | 16×35         | 1890   | EWHA1AM103L35---T  |
|                       | 15000    | 18×35         | 2180   | EWHA1AM153M35---T  |
| 16                    | 10       | 5×11          | 34   | EWHA1CM100D11---T  |
|                       | 22       | 5×11          | 51   | EWHA1CM220D11---T  |
|                       | 33       | 5×11          | 63   | EWHA1CM330D11---T  |
|                       | 47       | 5×11          | 75   | EWHA1CM470D11---T  |
|                       | 100      | 5×11          | 110  | EWHA1CM101D11---T  |
|                       | 220      | 6.3×11        | 180  | EWHA1CM221E11---T  |
|                       | 330      | 8×11          | 260  | EWHA1CM331F11---T  |
|                       | 470      | 8×12          | 310  | EWHA1CM471F12---T  |
|                       | 1000     | 10×16         | 560  | EWHA1CM102G16---T  |
|                       | 2200     | 12.5×20       | 920  | EWHA1CM222W20---T  |
|                       | 3300     | 12.5×25       | 1170   | EWHA1CM332W25---T  |
|                       | 4700     | 16×25         | 1480   | EWHA1CM472L25---T  |
|                       | 6800     | 16×30         | 1780   | EWHA1CM682L30---T  |
|                       | 10000    | 18×35         | 2060   | EWHA1CM103M35---T  |
| 25                    | 4.7      | 5×11          | 25   | EWHA1EM47R7D11---T |
|                       | 10       | 5×11          | 36   | EWHA1EM100D11---T  |
|                       | 22       | 5×11          | 54   | EWHA1EM220D11---T  |
|                       | 33       | 5×11          | 67   | EWHA1EM330D11---T  |
|                       | 47       | 5×11          | 80   | EWHA1EM470D11---T  |
|                       | 100      | 6.3×11        | 130  | EWHA1EM101E11---T  |
|                       | 220      | 8×11          | 230  | EWHA1EM221F11---T  |
|                       | 330      | 8×12          | 310  | EWHA1EM331F12---T  |
|                       | 470      | 10×13         | 380  | EWHA1EM471G13---T  |
|                       | 1000     | 10×20         | 680  | EWHA1EM102G20---T  |
|                       | 2200     | 12.5×25       | 1090   | EWHA1EM222W25---T  |
|                       | 3300     | 16×25         | 1400   | EWHA1EM332L25---T  |
|                       | 4700     | 16×30         | 1710   | EWHA1EM472L30---T  |
|                       | 6800     | 18×35         | 2040   | EWHA1EM682M35---T  |
| 35                    | 4.7      | 5×11          | 28   | EWHA1VM47R7D11---T |
|                       | 10       | 5×11          | 41   | EWHA1VM100D11---T  |
|                       | 22       | 5×11          | 61   | EWHA1VM220D11---T  |
|                       | 33       | 5×11          | 75   | EWHA1VM330D11---T  |
|                       | 47       | 5×11          | 90   | EWHA1VM470D11---T  |
|                       | 100      | 6.3×11        | 150  | EWHA1VM101E11---T  |
|                       | 220      | 8×12          | 270  | EWHA1VM221F12---T  |
|                       | 330      | 10×13         | 350  | EWHA1VM331G13---T  |
|                       | 470      | 10×16         | 460  | EWHA1VM471G16---T  |
|                       | 1000     | 12.5×20       | 810  | EWHA1VM102W20---T  |
|                       | 2200     | 16×25         | 1260   | EWHA1VM222L25---T  |
|                       | 3300     | 16×35         | 1610   | EWHA1VM332L35---T  |
|                       | 4700     | 18×35         | 1910   | EWHA1VM472M35---T  |

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part Number       |
|-----------------------|----------|---------------|--|-------------------|
| 50                    | 0.1      | 5×11          | 1.3  | EWHA1HMR10D11---T |
|                       | 0.22     | 5×11          | 2.9  | EWHA1HMR22D11---T |
|                       | 0.33     | 5×11          | 4.3  | EWHA1HMR33D11---T |
|                       | 0.47     | 5×11          | 6.2  | EWHA1HMR47D11---T |
|                       | 1        | 5×11          | 13   | EWHA1HM010D11---T |
|                       | 2.2      | 5×11          | 20   | EWHA1HM2R2D11---T |
|                       | 3.3      | 5×11          | 25   | EWHA1HM3R3D11---T |
|                       | 4.7      | 5×11          | 30   | EWHA1HM4R7D11---T |
|                       | 10       | 5×11          | 40   | EWHA1HM100D11---T |
|                       | 22       | 5×11          | 65   | EWHA1HM220D11---T |
|                       | 33       | 6.3×11        | 90   | EWHA1HM330E11---T |
|                       | 47       | 6.3×11        | 110  | EWHA1HM470E11---T |
|                       | 100      | 8×11          | 180  | EWHA1HM101F11---T |
|                       | 220      | 10×13         | 300  | EWHA1HM221G13---T |
| 63                    | 330      | 10×16         | 410  | EWHA1HM331G16---T |
|                       | 470      | 10×20         | 530  | EWHA1HM471G20---T |
|                       | 1000     | 12.5×25       | 950  | EWHA1HM102W25---T |
|                       | 2200     | 16×35         | 1470   | EWHA1HM222L35---T |
|                       | 3300     | 18×35         | 1770   | EWHA1HM332M35---T |
|                       | 10       | 5×11          | 46   | EWHA1JM100D11---T |
|                       | 22       | 5×11          | 71   | EWHA1JM220D11---T |
|                       | 33       | 6.3×11        | 100  | EWHA1JM330E11---T |
|                       | 47       | 6.3×11        | 120  | EWHA1JM470E11---T |
|                       | 100      | 10×13         | 215  | EWHA1JM101G13---T |
|                       | 220      | 10×16         | 335  | EWHA1JM221G16---T |
|                       | 330      | 10×20         | 510  | EWHA1JM331G20---T |
|                       | 470      | 12.5×20       | 640  | EWHA1JM471W20---T |
|                       | 1000     | 16×25         | 930  | EWHA1JM102L25---T |
| 100                   | 0.1      | 5×11          | 1.5  | EWHA1KMR10D11---T |
|                       | 0.22     | 5×11          | 3.4  | EWHA1KMR22D11---T |
|                       | 0.33     | 5×11          | 5  | EWHA1KMR33D11---T |
|                       | 0.47     | 5×11          | 7.1  | EWHA1KMR47D11---T |
|                       | 1        | 5×11          | 15   | EWHA1KM010D11---T |
|                       | 2.2      | 5×11          | 21   | EWHA1KM2R2D11---T |
|                       | 3.3      | 5×11          | 29   | EWHA1KM3R3D11---T |
|                       | 4.7      | 5×11          | 32   | EWHA1KM4R7D11---T |
|                       | 10       | 6.3×11        | 54   | EWHA1KM100E11---T |
|                       | 22       | 8×11          | 93   | EWHA1KM220F11---T |
|                       | 33       | 8×12          | 130  | EWHA1KM330F12---T |
|                       | 47       | 10×13         | 165  | EWHA1KM470G13---T |
|                       | 100      | 10×20         | 265  | EWHA1KM101G20---T |
|                       | 220      | 12.5×25       | 440  | EWHA1KM221W25---T |
| 160                   | 330      | 16×25         | 540  | EWHA1KM331L25---T |
|                       | 470      | 16×30         | 715  | EWHA1KM471L30---T |
|                       | 1000     | 18×40         | 985  | EWHA1KM102M40---T |
|                       | 3.3      | 6.3×9         | 28   | EWHA2CM3R3E09---T |
|                       | 4.7      | 6.3×9         | 34   | EWHA2CM4R7E09---T |
|                       | 10       | 6.3×12        | 60   | EWHA2CM100E12---T |
|                       | 10       | 8×9           | 60   | EWHA2CM100F09---T |
|                       | 22       | 8×12          | 88   | EWHA2CM220F12---T |
|                       | 22       | 10×12         | 98   | EWHA2CM220G12---T |
|                       | 33       | 10×12         | 140  | EWHA2CM330G12---T |
|                       | 33       | 10×16         | 158  | EWHA2CM330G16---T |
|                       | 47       | 10×14         | 142  | EWHA2CM470G14---T |
|                       | 47       | 10×20         | 182  | EWHA2CM470G20---T |
|                       | 68       | 10×20         | 240  | EWHA2CM680G20---T |
| 200                   | 100      | 12.5×20       | 300  | EWHA2CM101W20---T |
|                       | 100      | 16×20         | 316  | EWHA2CM101L20---T |
|                       | 220      | 16×25         | 530  | EWHA2CM221L25---T |
|                       | 330      | 18×25         | 600  | EWHA2CM331M25---T |
|                       | 470      | 18×35         | 820  | EWHA2CM471M35---T |
|                       | 1        | 6.3×7         | 12   | EWHA2DM010E07---T |
|                       | 2.2      | 6.3×7         | 18   | EWHA2DM2R2E07---T |
|                       | 3.3      | 6.3×9         | 28   | EWHA2DM3R3E09---T |
|                       | 4.7      | 6.3×9         | 40   | EWHA2DM4R7E09---T |
|                       | 10       | 8×12          | 78   | EWHA2DM100F12---T |
|                       | 22       | 8×16          | 110  | EWHA2DM220F16---T |
|                       | 22       | 10×12         | 110  | EWHA2DM220G12---T |
|                       | 33       | 10×16         | 166  | EWHA2DM330G16---T |

WH series

■ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part Number      |
|-----------------------|----------|---------------|--|------------------|
| 200                   | 33       | 10×20         | 185  | EWH2DM330G20---T |
|                       | 47       | 10×20         | 200  | EWH2DM470G20---T |
|                       | 68       | 12.5×20       | 290  | EWH2DM680W20---T |
|                       | 82       | 12.5×20       | 300  | EWH2DM820W20---T |
|                       | 100      | 13×20         | 305  | EWH2DM101K20---T |
|                       | 100      | 16×20         | 325  | EWH2DM101L20---T |
|                       | 150      | 16×25         | 446  | EWH2DM151L25---T |
|                       | 180      | 16×25         | 530  | EWH2DM181L25---T |
|                       | 220      | 18×25         | 620  | EWH2DM221M25---T |
|                       | 330      | 18×30         | 720  | EWH2DM331M30---T |
| 470                   | 18×40    | 840           | EWH2DM471M40---T                                       |                  |
| 250                   | 2.2      | 6.3×9         | 21   | EWH2EM2R2E09---T |
|                       | 3.3      | 6.3×9         | 30   | EWH2EM3R3E09---T |
|                       | 4.7      | 6.3×12        | 38   | EWH2EM4R7E12---T |
|                       | 4.7      | 8×9           | 45   | EWH2EM4R7F09---T |
|                       | 10       | 8×12          | 70   | EWH2EM100F12---T |
|                       | 10       | 10×12         | 75   | EWH2EM100G12---T |
|                       | 22       | 8×16          | 100  | EWH2EM220F16---T |
|                       | 22       | 10×16         | 116  | EWH2EM220G16---T |
|                       | 33       | 10×20         | 150  | EWH2EM330G20---T |
|                       | 33       | 12.5×16       | 165  | EWH2EM330W16---T |
|                       | 47       | 12.5×20       | 232  | EWH2EM470W20---T |
|                       | 100      | 16×25         | 370  | EWH2EM101L25---T |
|                       | 150      | 18×25         | 455  | EWH2EM151M25---T |
|                       | 220      | 18×30         | 600  | EWH2EM221M30---T |
| 330                   | 18×35    | 705           | EWH2EM331M35---T                                       |                  |
| 350                   | 1        | 6.3×9         | 13   | EWH2VM010E09---T |
|                       | 2.2      | 6.3×9         | 23   | EWH2VM2R2E09---T |
|                       | 3.3      | 8×9           | 31   | EWH2VM3R3F09---T |
|                       | 4.7      | 8×9           | 45   | EWH2VM4R7F09---T |
|                       | 10       | 10×12         | 68   | EWH2VM100G12---T |
|                       | 22       | 10×20         | 135  | EWH2VM220G20---T |
|                       | 33       | 12.5×20       | 184  | EWH2VM330W20---T |
|                       | 47       | 16×20         | 225  | EWH2VM470L20---T |
|                       | 68       | 16×25         | 336  | EWH2VM680L25---T |
| 100                   | 18×30    | 398           | EWH2VM101M30---T                                       |                  |
| 400                   | 1        | 6.3×9         | 14   | EWH2GM010E09---T |
|                       | 2.2      | 6.3×9         | 25   | EWH2GM2R2E09---T |
|                       | 2.2      | 8×9           | 30   | EWH2GM2R2F09---T |
|                       | 3.3      | 6.3×12        | 33   | EWH2GM3R3E12---T |
|                       | 3.3      | 8×9           | 34   | EWH2GM3R3F09---T |
|                       | 4.7      | 8×9           | 45   | EWH2GM4R7F09---T |
|                       | 4.7      | 8×12          | 48   | EWH2GM4R7F12---T |
|                       | 10       | 8×16          | 92   | EWH2GM100F16---T |
|                       | 10       | 10×12         | 92   | EWH2GM100G12---T |
|                       | 22       | 10×20         | 160  | EWH2GM220G20---T |
|                       | 33       | 16×20         | 258  | EWH2GM330L20---T |
|                       | 47       | 16×20         | 290  | EWH2GM470L20---T |
|                       | 68       | 16×25         | 420  | EWH2GM680L25---T |
|                       | 68       | 18×20         | 420  | EWH2GM680M20---T |
|                       | 82       | 18×25         | 474  | EWH2GM820M25---T |
|                       | 100      | 18×30         | 532  | EWH2GM101M30---T |
| 120                   | 18×35    | 588           | EWH2GM121M35---T                                       |                  |
| 150                   | 18×35    | 610           | EWH2GM151M35---T                                       |                  |
| 450                   | 1        | 6.3×9         | 14   | EWH2WM010E09---T |
|                       | 1        | 6.3×12        | 16   | EWH2WM010E12---T |
|                       | 2.2      | 8×9           | 22   | EWH2WM2R2F09---T |
|                       | 2.2      | 8×12          | 25   | EWH2WM2R2F12---T |
|                       | 3.3      | 8×12          | 32   | EWH2WM3R3F12---T |
|                       | 4.7      | 10×12         | 48   | EWH2WM4R7G12---T |
|                       | 10       | 10×16         | 85   | EWH2WM100G16---T |
|                       | 10       | 10×20         | 90   | EWH2WM100G20---T |
|                       | 22       | 12.5×20       | 150  | EWH2WM220W20---T |
|                       | 22       | 16×20         | 185  | EWH2WM220L20---T |
|                       | 33       | 16×20         | 200  | EWH2WM330L20---T |
|                       | 47       | 16×25         | 335  | EWH2WM470L25---T |
|                       | 68       | 18×25         | 400  | EWH2WM680M25---T |
| 82                    | 18×30    | 472           | EWH2WM820M30---T                                       |                  |

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part Number      |
|-----------------------|----------|---------------|--|------------------|
| 450                   | 100      | 18×35         | 530  | EWH2WM101M35---T |
|                       | 120      | 18×40         | 582  | EWH2WM121M40---T |
|                       | 150      | 18×45         | 610  | EWH2WM151M45---T |
| 500                   | 4.7      | 10×16         | 50   | EWH2HM4R7G16---T |
|                       | 10       | 12.5×20       | 115  | EWH2HM100W20---T |
|                       | 15       | 12.5×25       | 140  | EWH2HM150W25---T |
|                       | 22       | 16×25         | 185  | EWH2HM220L25---T |
|                       | 33       | 18×25         | 215  | EWH2HM330M25---T |
|                       | 47       | 18×35         | 345  | EWH2HM470M35---T |
|                       | 68       | 18×35         | 390  | EWH2HM680M35---T |
|                       | 82       | 18×40         | 490  | EWH2HM820M40---T |
|                       | 100      | 22×35         | 535  | EWH2HM101O35---T |
|                       | 120      | 22×40         | 550  | EWH2HM121O40---T |

※ Specifications subject to change without notice.