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# KMG Series

- Endurance with ripple current : 1,000 to 2,000 hours at 105°C
- Solvent resistant type except 350 to 450V<sub>dc</sub> (see PRECAUTIONS AND GUIDELINES)
- RoHS2 Compliant

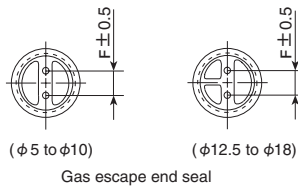
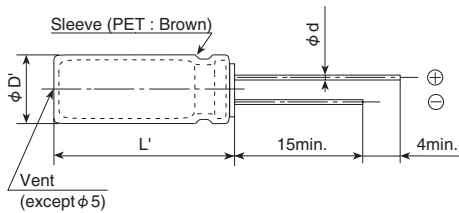


## SPECIFICATIONS

| Items   | Characteristics  |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
|---|--|--------------------------------------|-----------------|------|------------------|------|---------------------------|--------------------------------------|-------------------|-------------|------------------|------|--|
| Category  | -55 to +105°C(6.3 to 100V <sub>dc</sub> ) -40 to +105°C(160 to 400V <sub>dc</sub> ) -25 to +105°C(450V <sub>dc</sub> )   |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
| Temperature Range   |  |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
| Rated Voltage Range   | 6.3 to 450V <sub>dc</sub>  |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
| Capacitance Tolerance   | ±20% (M) (at 20°C, 120Hz)  |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
| Leakage Current   | 6.3 to 100V <sub>dc</sub>  |                                      |                 |      |                  |      | 160 to 450V <sub>dc</sub> |                                      |                   |             |                  |      |  |
|   | I=0.03CV or 4μA, whichever is greater.   |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
|   | (after 1 minute)   |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
|   | CV ≤ 1,000   |                                      | I=0.1CV+40 max. |      | I=0.03CV+15 max. |      | CV > 1,000                |                                      | I=0.04CV+100 max. |             | I=0.02CV+25 max. |      |  |
| Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C) |  |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
| Dissipation Factor (tan δ)  | Rated voltage (V <sub>dc</sub> )   | 6.3V                                 | 10V             | 16V  | 25V              | 35V  | 50V                       | 63V                                  | 100V              | 160 to 250V | 350 to 400V      | 450V |  |
|   | tan δ (Max.)   | 0.34                                 | 0.24            | 0.20 | 0.16             | 0.14 | 0.12                      | 0.10                                 | 0.08              | 0.20        | 0.24             | 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> )   | 6.3V                                 | 10V             | 16V  | 25V              | 35V  | 50V                       | 63V                                  | 100V              | 160 to 250V | 350 to 400V      | 450V |  |
|   | Z(-25°C)/Z(+20°C)  | 5                                    | 4               | 3    | 2                | 2    | 2                         | 2                                    | 2                 | 3           | 6                | 6    |  |
|   | Z(-40°C)/Z(+20°C)  | 12                                   | 10              | 8    | 5                | 4    | 3                         | 3                                    | 3                 | 4           | 6                | —    |  |
| Endurance   | 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 1,000 hours (2,000 hours to meet the following two conditions 1): 160V <sub>dc</sub> and larger, 2) : φ 12.5 and larger) 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         |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
| Shelf Life  | 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.  |                                      |                 |      |                  |      |                           |                                      |                   |             |                  |      |  |
|   | Rated voltage  | 6.3 to 100V <sub>dc</sub>            |                 |      |                  |      |                           | 160 to 450V <sub>dc</sub>            |                   |             |                  |      |  |
|   | Capacitance change   | ≤ ±20% of the initial value          |                 |      |                  |      |                           | ≤ ±20% of the initial value          |                   |             |                  |      |  |
|   | D.F. (tan δ)   | ≤200% of the initial specified value |                 |      |                  |      |                           | ≤200% of the initial specified value |                   |             |                  |      |  |
|   | Leakage current  | ≤The initial specified value         |                 |      |                  |      |                           | ≤500% of the initial specified value |                   |             |                  |      |  |

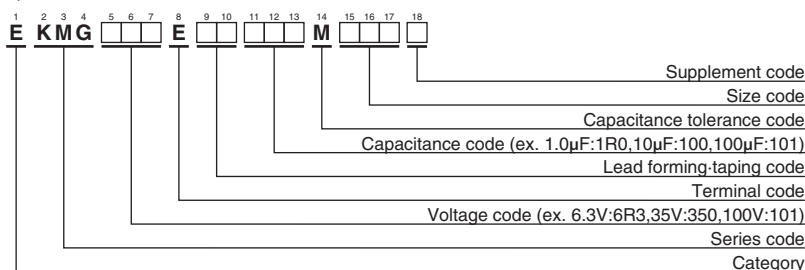
## DIMENSIONS [mm]

- Terminal Code : E



| φD  | 5         | 6.3 | 8   | 10  | 12.5 | 16  | 18  |
|-----|-----------|-----|-----|-----|------|-----|-----|
| φd  | 0.5       | 0.5 | 0.6 | 0.6 | 0.6  | 0.8 | 0.8 |
| F   | 2.0       | 2.5 | 3.5 | 5.0 | 5.0  | 7.5 | 7.5 |
| φD' | φD+0.5max |     |     |     |      |     |     |
| L'  | L+1.5max  |     |     |     |      |     |     |

## 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 (mAmps/105°C, 120Hz) | Part No.           | WV (V <sub>dc</sub> ) | Cap (μF)           | Case size φD×L(mm) | tan δ | Rated ripple current (mAmps/105°C, 120Hz) | Part No.           |    |
|-----------------------|----------|--------------------|--------|---|--------------------|-----------------------|--------------------|--------------------|-------|---|--------------------|----|
| 6.3                   | 220      | 5 × 11             | 0.34   | 140                                       | EKMG6R3E□□221ME11D | 63                    | 10                 | 5 × 11             | 0.10  | 46  | EKMG630E□□100ME11D |    |
|                       | 330      | 6.3 × 11           | 0.34   | 190                                       | EKMG6R3E□□331MF11D |                       | 22                 | 5 × 11             | 0.10  | 71  | EKMG630E□□220ME11D |    |
|                       | 470      | 6.3 × 11           | 0.34   | 230                                       | EKMG6R3E□□471MF11D |                       | 33                 | 6.3 × 11           | 0.10  | 100                                       | EKMG630E□□330MF11D |    |
|                       | 1,000    | 8 × 11.5           | 0.34   | 380                                       | EKMG6R3E□□102MHB5D |                       | 47                 | 6.3 × 11           | 0.10  | 120                                       | EKMG630E□□470MF11D |    |
|                       | 2,200    | 10 × 20            | 0.36   | 710                                       | EKMG6R3E□□222MJ20S |                       | 100                | 10 × 12.5          | 0.10  | 215                                       | EKMG630E□□101MJC5S |    |
|                       | 3,300    | 10 × 20            | 0.38   | 840                                       | EKMG6R3E□□332MJ20S |                       | 220                | 10 × 16            | 0.10  | 335                                       | EKMG630E□□221MJ16S |    |
|                       | 4,700    | 12.5 × 20          | 0.40   | 1,090                                     | EKMG6R3E□□472MK20S |                       | 330                | 10 × 20            | 0.10  | 510                                       | EKMG630E□□331MJ20S |    |
|                       | 6,800    | 12.5 × 25          | 0.44   | 1,350                                     | EKMG6R3E□□682MK25S |                       | 470                | 12.5 × 20          | 0.10  | 640                                       | EKMG630E□□471MK20S |    |
|                       | 10,000   | 16 × 25            | 0.52   | 1,650                                     | EKMG6R3E□□103ML25S |                       | 1,000              | 16 × 25            | 0.10  | 930                                       | EKMG630E□□102ML25S |    |
|                       | 15,000   | 16 × 35.5          | 0.62   | 2,010                                     | EKMG6R3E□□153MLP1S |                       |                    |                    |       |   |                    |    |
| 22,000                | 18 × 40  | 0.76               | 2,350  | EKMG6R3E□□223MM40S                        |                    |                       |                    |                    |       |   |                    |    |
| 10                    | 220      | 6.3 × 11           | 0.24   | 170                                       | EKMG100E□□221MF11D | 100                   | 1.0                | 5 × 11             | 0.08  | 15  | EKMG101E□□1R0ME11D |    |
|                       | 330      | 6.3 × 11           | 0.24   | 200                                       | EKMG100E□□331MF11D |                       | 2.2                | 5 × 11             | 0.08  | 21  | EKMG101E□□2R2ME11D |    |
|                       | 470      | 8 × 11.5           | 0.24   | 250                                       | EKMG100E□□471MHB5D |                       | 3.3                | 5 × 11             | 0.08  | 29  | EKMG101E□□3R3ME11D |    |
|                       | 1,000    | 10 × 12.5          | 0.24   | 460                                       | EKMG100E□□102MJC5S |                       | 4.7                | 5 × 11             | 0.08  | 32  | EKMG101E□□4R7ME11D |    |
|                       | 2,200    | 10 × 20            | 0.26   | 760                                       | EKMG100E□□222MJ20S |                       | 10                 | 6.3 × 11           | 0.08  | 54  | EKMG101E□□100MF11D |    |
|                       | 3,300    | 12.5 × 20          | 0.28   | 1,000                                     | EKMG100E□□332MK20S |                       | 22                 | 8 × 11.5           | 0.08  | 93  | EKMG101E□□220MHB5D |    |
|                       | 4,700    | 12.5 × 25          | 0.30   | 1,260                                     | EKMG100E□□472MK25S |                       | 33                 | 8 × 11.5           | 0.08  | 130                                       | EKMG101E□□330MHB5D |    |
|                       | 6,800    | 16 × 25            | 0.34   | 1,570                                     | EKMG100E□□682ML25S |                       | 47                 | 10 × 12.5          | 0.08  | 165                                       | EKMG101E□□470MJC5S |    |
|                       | 10,000   | 16 × 35.5          | 0.42   | 1,890                                     | EKMG100E□□103MLP1S |                       | 100                | 10 × 20            | 0.08  | 265                                       | EKMG101E□□101MJ20S |    |
|                       | 15,000   | 18 × 35.5          | 0.52   | 2,180                                     | EKMG100E□□153MMP1S |                       | 220                | 12.5 × 25          | 0.08  | 440                                       | EKMG101E□□221MK25S |    |
| 16                    | 100      | 5 × 11             | 0.20   | 110                                       | EKMG160E□□101ME11D | 160                   | 330                | 16 × 25            | 0.08  | 540                                       | EKMG101E□□331ML25S |    |
|                       | 220      | 6.3 × 11           | 0.20   | 180                                       | EKMG160E□□221MF11D |                       | 470                | 16 × 31.5          | 0.08  | 715                                       | EKMG101E□□471MLN3S |    |
|                       | 330      | 8 × 11.5           | 0.20   | 260                                       | EKMG160E□□331MHB5D |                       | 1,000              | 18 × 40            | 0.08  | 985                                       | EKMG101E□□102MM40S |    |
|                       | 470      | 8 × 11.5           | 0.20   | 310                                       | EKMG160E□□471MHB5D |                       |                    |                    |       |   |                    |    |
|                       | 1,000    | 10 × 16            | 0.20   | 560                                       | EKMG160E□□102MJ16S |                       |                    |                    |       |   |                    |    |
|                       | 2,200    | 12.5 × 20          | 0.22   | 920                                       | EKMG160E□□222MK20S |                       |                    |                    |       |   |                    |    |
|                       | 3,300    | 12.5 × 25          | 0.24   | 1,170                                     | EKMG160E□□332MK25S |                       |                    |                    |       |   |                    |    |
|                       | 4,700    | 16 × 25            | 0.26   | 1,480                                     | EKMG160E□□472ML25S |                       |                    |                    |       |   |                    |    |
|                       | 6,800    | 16 × 31.5          | 0.30   | 1,780                                     | EKMG160E□□682MLN3S |                       |                    |                    |       |   |                    |    |
|                       | 10,000   | 18 × 35.5          | 0.38   | 2,060                                     | EKMG160E□□103MMP1S |                       |                    |                    |       |   |                    |    |
| 25                    | 47       | 5 × 11             | 0.16   | 80  | EKMG250E□□470ME11D | 200                   | 3.3                | 6.3 × 11           | 0.20  | 28  | EKMG161E□□3R3MF11D |    |
|                       | 100      | 6.3 × 11           | 0.16   | 130                                       | EKMG250E□□101MF11D |                       | 4.7                | 6.3 × 11           | 0.20  | 34  | EKMG161E□□4R7MF11D |    |
|                       | 220      | 8 × 11.5           | 0.16   | 230                                       | EKMG250E□□221MHB5D |                       | 10                 | 10 × 12.5          | 0.20  | 67  | EKMG161E□□100MJC5S |    |
|                       | 330      | 8 × 11.5           | 0.16   | 310                                       | EKMG250E□□331MHB5D |                       | 22                 | 10 × 20            | 0.20  | 120                                       | EKMG161E□□220MJ20S |    |
|                       | 470      | 10 × 12.5          | 0.16   | 380                                       | EKMG250E□□471MJC5S |                       | 33                 | 10 × 20            | 0.20  | 145                                       | EKMG161E□□330MJ20S |    |
|                       | 1,000    | 10 × 20            | 0.16   | 680                                       | EKMG250E□□102MJ20S |                       | 47                 | 12.5 × 20          | 0.20  | 195                                       | EKMG161E□□470MK20S |    |
|                       | 2,200    | 12.5 × 25          | 0.18   | 1,090                                     | EKMG250E□□222MK25S |                       | 100                | 16 × 25            | 0.20  | 335                                       | EKMG161E□□101ML25S |    |
|                       | 3,300    | 16 × 25            | 0.20   | 1,400                                     | EKMG250E□□332ML25S |                       | 220                | 16 × 31.5          | 0.20  | 540                                       | EKMG161E□□221MLN3S |    |
|                       | 4,700    | 16 × 31.5          | 0.22   | 1,710                                     | EKMG250E□□472MLN3S |                       | 330                | 18 × 35.5          | 0.20  | 705                                       | EKMG161E□□331MMP1S |    |
|                       | 6,800    | 18 × 35.5          | 0.26   | 2,040                                     | EKMG250E□□682MMP1S |                       |                    |                    |       |   |                    |    |
| 35                    | 47       | 5 × 11             | 0.14   | 90  | EKMG350E□□470ME11D | 250                   | 3.3                | 6.3 × 11           | 0.20  | 28  | EKMG201E□□3R3MF11D |    |
|                       | 100      | 6.3 × 11           | 0.14   | 150                                       | EKMG350E□□101MF11D |                       | 4.7                | 8 × 11.5           | 0.20  | 39  | EKMG201E□□4R7MHB5D |    |
|                       | 220      | 8 × 11.5           | 0.14   | 270                                       | EKMG350E□□221MHB5D |                       | 10                 | 10 × 16            | 0.20  | 74  | EKMG201E□□100MJ16S |    |
|                       | 330      | 10 × 12.5          | 0.14   | 350                                       | EKMG350E□□331MJC5S |                       | 22                 | 10 × 20            | 0.20  | 120                                       | EKMG201E□□220MJ20S |    |
|                       | 470      | 10 × 16            | 0.14   | 460                                       | EKMG350E□□471MJ16S |                       | 33                 | 12.5 × 20          | 0.20  | 160                                       | EKMG201E□□330MK20S |    |
|                       | 1,000    | 12.5 × 20          | 0.14   | 810                                       | EKMG350E□□102MK20S |                       | 47                 | 12.5 × 20          | 0.20  | 195                                       | EKMG201E□□470MK20S |    |
|                       | 2,200    | 16 × 25            | 0.16   | 1,260                                     | EKMG350E□□222ML25S |                       | 100                | 16 × 25            | 0.20  | 335                                       | EKMG201E□□101ML25S |    |
|                       | 3,300    | 16 × 35.5          | 0.18   | 1,610                                     | EKMG350E□□332MLP1S |                       | 220                | 18 × 35.5          | 0.20  | 575                                       | EKMG201E□□221MMP1S |    |
|                       | 4,700    | 18 × 35.5          | 0.20   | 1,910                                     | EKMG350E□□472MMP1S |                       |                    |                    |       |   |                    |    |
|                       | 50       | 1.0                | 5 × 11 | 0.12                                      | 13                 |                       | EKMG500E□□1R0ME11D | 350                | 2.2   | 6.3 × 11                                  | 0.20               | 23 |
| 2.2                   |          | 5 × 11             | 0.12   | 20  | EKMG500E□□2R2ME11D | 3.3                   | 8 × 11.5           |                    | 0.20  | 32  | EKMG251E□□3R3MHB5D |    |
| 3.3                   |          | 5 × 11             | 0.12   | 25  | EKMG500E□□3R3ME11D | 4.7                   | 8 × 11.5           |                    | 0.20  | 39  | EKMG251E□□4R7MHB5D |    |
| 4.7                   |          | 5 × 11             | 0.12   | 30  | EKMG500E□□4R7ME11D | 10                    | 10 × 16            |                    | 0.20  | 74  | EKMG251E□□100MJ16S |    |
| 10                    |          | 5 × 11             | 0.12   | 40  | EKMG500E□□100ME11D | 22                    | 12.5 × 20          |                    | 0.20  | 130                                       | EKMG251E□□220MK20S |    |
| 22                    |          | 5 × 11             | 0.12   | 65  | EKMG500E□□220ME11D | 33                    | 12.5 × 20          |                    | 0.20  | 160                                       | EKMG251E□□330MK20S |    |
| 33                    |          | 5 × 11             | 0.12   | 90  | EKMG500E□□330ME11D | 47                    | 12.5 × 25          |                    | 0.20  | 210                                       | EKMG251E□□470MK25S |    |
| 47                    |          | 6.3 × 11           | 0.12   | 110                                       | EKMG500E□□470MF11D | 100                   | 16 × 31.5          |                    | 0.20  | 365                                       | EKMG251E□□101MLN3S |    |
| 100                   |          | 8 × 11.5           | 0.12   | 180                                       | EKMG500E□□101MHB5D | 220                   | 18 × 40            |                    | 0.20  | 585                                       | EKMG251E□□221MM40S |    |
| 220                   |          | 10 × 12.5          | 0.12   | 300                                       | EKMG500E□□221MJC5S |                       |                    |                    |       |   |                    |    |
| 400                   | 330      | 10 × 16            | 0.12   | 410                                       | EKMG500E□□331MJ16S | 400                   | 1.0                | 6.3 × 11           | 0.24  | 15  | EKMG401E□□1R0MF11D |    |
|                       | 470      | 10 × 20            | 0.12   | 530                                       | EKMG500E□□471MJ20S |                       | 2.2                | 8 × 11.5           | 0.24  | 26  | EKMG401E□□2R2MHB5D |    |
|                       | 1,000    | 12.5 × 25          | 0.12   | 950                                       | EKMG500E□□102MK25S |                       | 3.3                | 10 × 12.5          | 0.24  | 38  | EKMG401E□□3R3MJC5S |    |
|                       | 2,200    | 16 × 35.5          | 0.14   | 1,470                                     | EKMG500E□□222MLP1S |                       | 4.7                | 10 × 16            | 0.24  | 50  | EKMG401E□□4R7MJ16S |    |
|                       | 3,300    | 18 × 35.5          | 0.16   | 1,770                                     | EKMG500E□□332MMP1S |                       | 10                 | 10 × 20            | 0.24  | 80  | EKMG401E□□100MJ20S |    |
|                       |          |                    |        |   |                    |                       | 22                 | 12.5 × 20          | 0.24  | 130                                       | EKMG401E□□220MK20S |    |
|                       |          |                    |        |   |                    |                       | 33                 | 16 × 25            | 0.24  | 195                                       | EKMG401E□□330ML25S |    |
|                       |          |                    |        |   |                    |                       | 47                 | 16 × 25            | 0.24  | 230                                       | EKMG401E□□470ML25S |    |
|                       |          |                    |        |   |                    |                       | 100                | 18 × 31.5          | 0.24  | 375                                       | EKMG401E□□101MMN3S |    |
|                       |          |                    |        |   |                    |                       |                    |                    |       |   |                    |    |

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

**KMG**Series

◆ **STANDARD RATINGS**  is not solvent resistant.

| WV<br>(V <sub>dc</sub> ) | Cap<br>(μF) | Case size<br>φD×L(mm) | tan δ | Rated ripple<br>current<br>(mA <sub>rms</sub> /<br>105°C, 120Hz) | Part No.  |
|--------------------------|-------------|-----------------------|-------|--|---|
| 450                      | 2.2         | 10 × 12.5             | 0.24  | 23   | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 2R2MJC5S |
|                          | 3.3         | 10 × 16               | 0.24  | 31   | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 3R3MJ16S |
|                          | 4.7         | 10 × 20               | 0.24  | 40   | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 4R7MJ20S |
|                          | 10          | 12.5 × 20             | 0.24  | 65   | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 100MK20S |
|                          | 22          | 16 × 25               | 0.24  | 115  | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 220ML25S |
|                          | 33          | 16 × 31.5             | 0.24  | 155  | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 330MLN3S |
|                          | 47          | 16 × 35.5             | 0.24  | 185  | EKMG451E <input type="checkbox"/> <input type="checkbox"/> 470MLP1S |

: Enter the appropriate lead forming or taping code.

◆ **RATED RIPPLE CURRENT MULTIPLIERS**

● Frequency Multipliers

| Capacitance(μF) \ Frequency(Hz) | 50   | 120  | 300  | 1k   | 10k  | 100k |
|---------------------------------|------|------|------|------|------|------|
| 1.0 to 4.7                      | 0.65 | 1.00 | 1.35 | 1.75 | 2.30 | 2.50 |
| 10 to 47                        | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 1.80 |
| 100 to 1,000                    | 0.80 | 1.00 | 1.15 | 1.30 | 1.40 | 1.50 |
| 2,200 to                        | 0.85 | 1.00 | 1.03 | 1.05 | 1.08 | 1.08 |

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.