

## 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

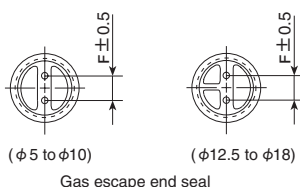
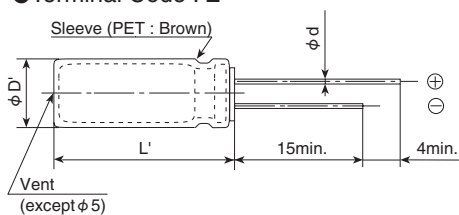


### SPECIFICATIONS

| Items                                                  | Characteristics                                                                                                                                                                                                                                                                                                                                              |                                      |          |      |                   |      |                  |                           |                                      |                 |             |                  |            |                |  |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------|------|-------------------|------|------------------|---------------------------|--------------------------------------|-----------------|-------------|------------------|------------|----------------|--|
| Category                                               |                                                                                                                                                                                                                                                                                                                                                              |                                      |          |      |                   |      |                  |                           |                                      |                 |             |                  |            |                |  |
| Temperature Range                                      | -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> )                                                                                                                                                                                                                                       |                                      |          |      |                   |      |                  |                           |                                      |                 |             |                  |            |                |  |
| 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.<br><br>(after 1 minute)                                                                                                                                                                                                                                                                                               |                                      |          |      |                   |      |                  | CV                        |                                      | Time            |             | After 1minute    |            | After 5minutes |  |
|                                                        |                                                                                                                                                                                                                                                                                                                                                              |                                      |          |      |                   |      |                  | CV≤1,000                  |                                      | I=0.1CV+40 max. |             | I=0.03CV+15 max. |            |                |  |
|                                                        | (after 1 minute)                                                                                                                                                                                                                                                                                                                                             |                                      | 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           | —                | (at 120Hz) |                |  |
| 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>cd</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 |                 |             |                  |            |                |  |

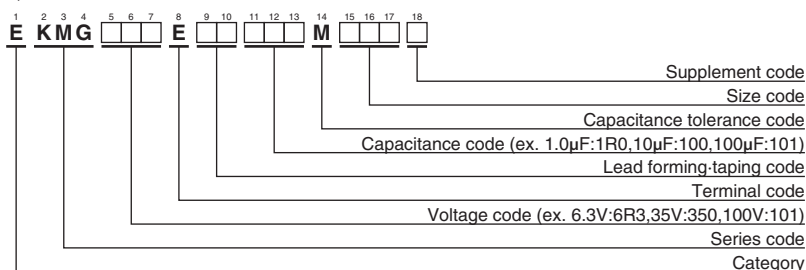
### DIMENSIONS [mm]

#### 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<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> /105°C, 120Hz) | Part No.           | 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> /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 | 100                      | 1.0         | 5 × 11                | 0.08  | 15                                                           | EKMG101E□□1R0ME11D |
| 10                       | 22,000      | 18 × 40               | 0.76  | 2,350                                                        | EKMG6R3E□□223MM40S |                          | 2.2         | 5 × 11                | 0.08  | 21                                                           | EKMG101E□□2R2MF11D |
|                          | 220         | 6.3 × 11              | 0.24  | 170                                                          | EKMG100E□□221MF11D |                          | 3.3         | 5 × 11                | 0.08  | 29                                                           | EKMG101E□□3R3ME11D |
|                          | 330         | 6.3 × 11              | 0.24  | 200                                                          | EKMG100E□□331MF11D |                          | 4.7         | 5 × 11                | 0.08  | 32                                                           | EKMG101E□□4R7ME11D |
|                          | 470         | 8 × 11.5              | 0.24  | 250                                                          | EKMG100E□□471MHB5D |                          | 10          | 6.3 × 11              | 0.08  | 54                                                           | EKMG101E□□100MF11D |
|                          | 1,000       | 10 × 12.5             | 0.24  | 460                                                          | EKMG100E□□102MJC5S |                          | 22          | 8 × 11.5              | 0.08  | 93                                                           | EKMG101E□□221MK25S |
|                          | 2,200       | 10 × 20               | 0.26  | 760                                                          | EKMG100E□□222MJ20S |                          | 33          | 8 × 11.5              | 0.08  | 130                                                          | EKMG101E□□330MHB5D |
|                          | 3,300       | 12.5 × 20             | 0.28  | 1,000                                                        | EKMG100E□□332MK20S |                          | 47          | 10 × 12.5             | 0.08  | 165                                                          | EKMG101E□□470MJC5S |
|                          | 4,700       | 12.5 × 25             | 0.30  | 1,260                                                        | EKMG100E□□472MK25S |                          | 100         | 10 × 20               | 0.08  | 265                                                          | EKMG101E□□101MJ20S |
|                          | 6,800       | 16 × 25               | 0.34  | 1,570                                                        | EKMG100E□□682ML25S |                          | 220         | 12.5 × 25             | 0.08  | 440                                                          | EKMG101E□□220MHB5D |
|                          | 10,000      | 16 × 35.5             | 0.42  | 1,890                                                        | EKMG100E□□103MLP1S | 160                      | 330         | 16 × 25               | 0.08  | 540                                                          | EKMG101E□□331ML25S |
| 16                       | 15,000      | 18 × 35.5             | 0.52  | 2,180                                                        | EKMG100E□□153MMP1S |                          | 470         | 16 × 31.5             | 0.08  | 715                                                          | EKMG101E□□471MLN3S |
|                          | 100         | 5 × 11                | 0.20  | 110                                                          | EKMG160E□□101ME11D |                          | 1,000       | 18 × 40               | 0.08  | 985                                                          | EKMG101E□□102MM40S |
|                          | 220         | 6.3 × 11              | 0.20  | 180                                                          | EKMG160E□□221MF11D |                          | 3.3         | 6.3 × 11              | 0.20  | 28                                                           | EKMG161E□□3R3MF11D |
|                          | 330         | 8 × 11.5              | 0.20  | 260                                                          | EKMG160E□□331MHB5D |                          | 4.7         | 6.3 × 11              | 0.20  | 34                                                           | EKMG161E□□4R7MF11D |
|                          | 470         | 8 × 11.5              | 0.20  | 310                                                          | EKMG160E□□471MHB5D |                          | 10          | 10 × 12.5             | 0.20  | 67                                                           | EKMG161E□□100MJC5S |
|                          | 1,000       | 10 × 16               | 0.20  | 560                                                          | EKMG160E□□102MJ16S |                          | 22          | 10 × 20               | 0.20  | 120                                                          | EKMG161E□□220MJ20S |
|                          | 2,200       | 12.5 × 20             | 0.22  | 920                                                          | EKMG160E□□222MK20S |                          | 33          | 10 × 20               | 0.20  | 145                                                          | EKMG161E□□330MJ20S |
|                          | 3,300       | 12.5 × 25             | 0.24  | 1,170                                                        | EKMG160E□□332MK25S |                          | 47          | 12.5 × 20             | 0.20  | 195                                                          | EKMG161E□□470MK20S |
|                          | 4,700       | 16 × 25               | 0.26  | 1,480                                                        | EKMG160E□□472ML25S |                          | 100         | 16 × 25               | 0.20  | 335                                                          | EKMG161E□□101ML25S |
|                          | 6,800       | 16 × 31.5             | 0.30  | 1,780                                                        | EKMG160E□□682MLN3S | 200                      | 220         | 16 × 31.5             | 0.20  | 540                                                          | EKMG161E□□221MLN3S |
| 25                       | 10,000      | 18 × 35.5             | 0.38  | 2,060                                                        | EKMG160E□□103MMP1S |                          | 330         | 18 × 35.5             | 0.20  | 705                                                          | EKMG161E□□331MMP1S |
|                          | 47          | 5 × 11                | 0.16  | 80                                                           | EKMG250E□□470ME11D |                          | 3.3         | 6.3 × 11              | 0.20  | 28                                                           | EKMG201E□□3R3MF11D |
|                          | 100         | 6.3 × 11              | 0.16  | 130                                                          | EKMG250E□□101MF11D |                          | 4.7         | 8 × 11.5              | 0.20  | 39                                                           | EKMG201E□□4R7MHB5D |
|                          | 220         | 8 × 11.5              | 0.16  | 230                                                          | EKMG250E□□221MHB5D |                          | 10          | 10 × 16               | 0.20  | 74                                                           | EKMG201E□□100MJ16S |
|                          | 330         | 8 × 11.5              | 0.16  | 310                                                          | EKMG250E□□331MHB5D |                          | 22          | 10 × 20               | 0.20  | 120                                                          | EKMG201E□□220MJ20S |
|                          | 470         | 10 × 12.5             | 0.16  | 380                                                          | EKMG250E□□471MJC5S |                          | 33          | 12.5 × 20             | 0.20  | 160                                                          | EKMG201E□□330MK20S |
|                          | 1,000       | 10 × 20               | 0.16  | 680                                                          | EKMG250E□□102MJ20S |                          | 47          | 12.5 × 20             | 0.20  | 195                                                          | EKMG201E□□470MK20S |
|                          | 2,200       | 12.5 × 25             | 0.18  | 1,090                                                        | EKMG250E□□222MK25S |                          | 100         | 16 × 25               | 0.20  | 335                                                          | EKMG201E□□101ML25S |
|                          | 3,300       | 16 × 25               | 0.20  | 1,400                                                        | EKMG250E□□332ML25S |                          | 220         | 18 × 35.5             | 0.20  | 575                                                          | EKMG201E□□331MMP1S |
|                          | 4,700       | 16 × 31.5             | 0.22  | 1,710                                                        | EKMG250E□□472MLN3S | 250                      | 2.2         | 6.3 × 11              | 0.20  | 23                                                           | EKMG251E□□2R2MF11D |
| 35                       | 6,800       | 18 × 35.5             | 0.26  | 2,040                                                        | EKMG250E□□682MMP1S |                          | 3.3         | 8 × 11.5              | 0.20  | 32                                                           | EKMG251E□□3R3MHB5D |
|                          | 47          | 5 × 11                | 0.14  | 90                                                           | EKMG350E□□470ME11D |                          | 4.7         | 8 × 11.5              | 0.20  | 39                                                           | EKMG251E□□4R7MHB5D |
|                          | 100         | 6.3 × 11              | 0.14  | 150                                                          | EKMG350E□□101MF11D |                          | 10          | 10 × 16               | 0.20  | 74                                                           | EKMG251E□□100MJ16S |
|                          | 220         | 8 × 11.5              | 0.14  | 270                                                          | EKMG350E□□221MHB5D |                          | 22          | 12.5 × 20             | 0.20  | 130                                                          | EKMG251E□□220MK20S |
|                          | 330         | 10 × 12.5             | 0.14  | 350                                                          | EKMG350E□□331MJC5S |                          | 33          | 12.5 × 20             | 0.20  | 160                                                          | EKMG251E□□330MK20S |
|                          | 470         | 10 × 16               | 0.14  | 460                                                          | EKMG350E□□471MJ16S |                          | 47          | 12.5 × 25             | 0.20  | 210                                                          | EKMG251E□□470MK25S |
|                          | 1,000       | 12.5 × 20             | 0.14  | 810                                                          | EKMG350E□□102MK20S |                          | 100         | 16 × 31.5             | 0.20  | 365                                                          | EKMG251E□□101MLN3S |
|                          | 2,200       | 16 × 25               | 0.16  | 1,260                                                        | EKMG350E□□222ML25S |                          | 220         | 18 × 40               | 0.20  | 585                                                          | EKMG251E□□221MM40S |
|                          | 3,300       | 16 × 35.5             | 0.18  | 1,610                                                        | EKMG350E□□332MLP1S | 350                      | 1.0         | 6.3 × 11              | 0.24  | 15                                                           | EKMG351E□□1R0MF11D |
|                          | 4,700       | 18 × 35.5             | 0.20  | 1,910                                                        | EKMG350E□□472MMP1S |                          | 2.2         | 8 × 11.5              | 0.24  | 26                                                           | EKMG351E□□2R2MHB5D |
| 50                       | 1.0         | 5 × 11                | 0.12  | 13                                                           | EKMG500E□□1R0ME11D |                          | 3.3         | 10 × 12.5             | 0.24  | 38                                                           | EKMG351E□□3R3MJC5S |
|                          | 2.2         | 5 × 11                | 0.12  | 20                                                           | EKMG500E□□2R2ME11D |                          | 4.7         | 10 × 16               | 0.24  | 50                                                           | EKMG351E□□4R7MJ16S |
|                          | 3.3         | 5 × 11                | 0.12  | 25                                                           | EKMG500E□□3R3ME11D |                          | 10          | 10 × 20               | 0.24  | 80                                                           | EKMG351E□□100MJ20S |
|                          | 4.7         | 5 × 11                | 0.12  | 30                                                           | EKMG500E□□4R7ME11D |                          | 22          | 12.5 × 20             | 0.24  | 130                                                          | EKMG351E□□220MK20S |
|                          | 10          | 5 × 11                | 0.12  | 40                                                           | EKMG500E□□100ME11D |                          | 33          | 16 × 25               | 0.24  | 195                                                          | EKMG351E□□330ML25S |
|                          | 22          | 5 × 11                | 0.12  | 65                                                           | EKMG500E□□220ME11D |                          | 47          | 16 × 25               | 0.24  | 230                                                          | EKMG351E□□470ML25S |
|                          | 33          | 5 × 11                | 0.12  | 90                                                           | EKMG500E□□330ME11D |                          | 100         | 18 × 31.5             | 0.24  | 375                                                          | EKMG351E□□101MLN3S |
|                          | 47          | 6.3 × 11              | 0.12  | 110                                                          | EKMG500E□□470MF11D | 400                      | 1.0         | 6.3 × 11              | 0.24  | 15                                                           | EKMG401E□□1R0MF11D |
|                          | 100         | 8 × 11.5              | 0.12  | 180                                                          | EKMG500E□□101MHB5D |                          | 2.2         | 8 × 11.5              | 0.24  | 26                                                           | EKMG401E□□2R2MHB5D |
|                          | 220         | 10 × 12.5             | 0.12  | 300                                                          | EKMG500E□□221MJC5S |                          | 3.3         | 10 × 12.5             | 0.24  | 38                                                           | EKMG401E□□330MJC5S |
|                          | 330         | 10 × 16               | 0.12  | 410                                                          | EKMG500E□□331MJ16S |                          | 4.7         | 10 × 16               | 0.24  | 50                                                           | EKMG401E□□4R7MJ16S |
|                          | 470         | 10 × 20               | 0.12  | 530                                                          | EKMG500E□□471MJ20S |                          | 10          | 10 × 20               | 0.24  | 80                                                           | EKMG401E□□100MJ20S |
|                          | 1,000       | 12.5 × 25             | 0.12  | 950                                                          | EKMG500E□□102MK25S |                          | 22          | 12.5 × 25             | 0.24  | 145                                                          | EKMG401E□□220MK25S |
|                          | 2,200       | 16 × 35.5             | 0.14  | 1,470                                                        | EKMG500E□□222MLP1S |                          | 33          | 16 × 25               | 0.24  | 195                                                          | EKMG401E□□330ML25S |
|                          | 3,300       | 18 × 35.5             | 0.16  | 1,770                                                        | EKMG500E□□332MMP1S |                          | 47          | 16 × 31.5             | 0.24  | 250                                                          | EKMG401E□□470MLN3S |
|                          |             |                       |       |                                                              |                    |                          | 100         | 16 × 40               | 0.24  | 350                                                          | EKMG401E□□101ML40S |

□□ : 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> /105°C, 120Hz) | Part No.           |
|--------------------------|-------------|-----------------------|-------|--------------------------------------------------------------|--------------------|
| 450                      | 2.2         | 10 × 12.5             | 0.24  | 23                                                           | EKMG451E□□2R2MJC5S |
|                          | 3.3         | 10 × 16               | 0.24  | 31                                                           | EKMG451E□□3R3MJ16S |
|                          | 4.7         | 10 × 20               | 0.24  | 40                                                           | EKMG451E□□4R7MJ20S |
|                          | 10          | 12.5 × 20             | 0.24  | 65                                                           | EKMG451E□□100MK20S |
|                          | 22          | 16 × 25               | 0.24  | 115                                                          | EKMG451E□□220ML25S |
|                          | 33          | 16 × 31.5             | 0.24  | 155                                                          | EKMG451E□□330MLN3S |
|                          | 47          | 16 × 35.5             | 0.24  | 185                                                          | EKMG451E□□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.