

# KMQ Series



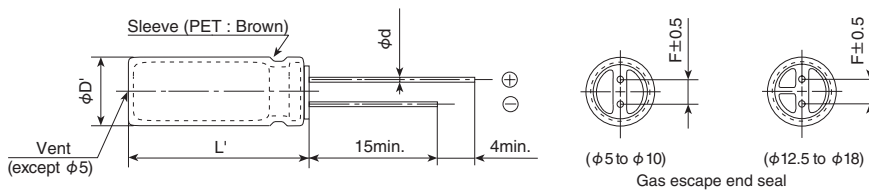
- Downsized from current standard KMG series
- Solvent resistant type except 160 to 450V<sub>dc</sub>  
(see PRECAUTIONS AND GUIDELINES)
- RoHS2 Compliant

## 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.  |                                      |      |      |      |      |      |                                      |             |             |             |      | CV≤1,000 I=0.1CV+40 max.   |   |
|  |   |                                      |      |      |      |      |      |                                      |             |             |             |      | CV>1,000 I=0.04CV+100 max. |   |
| Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 1 minute) |   |                                      |      |      |      |      |      |                                      |             |             |             |      |                            |   |
| 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.)  | 0.28                                 | 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  | 63 to 100V                           | 160 to 200V | 250V        | 350V        | 400V | 450V                       |   |
|  | Z(-25°C)/Z(+20°C)   | ≤φ8                                  | 5    | 4    | 3    | 2    | 2    | 2                                    | 2           | 3           | 3           | 4    | 4                          | 6 |
|  |   | ≥φ10                                 | 5    | 4    | 3    | 2    | 2    | 2                                    | 2           | 3           | 3           | 4    | 4                          | 6 |
|  | Z(-40°C)/Z(+20°C)   | ≤φ8                                  | 10   | 8    | 6    | 4    | 3    | 3                                    | 3           | 8           | 10          | 8    | 8                          | — |
| ≥φ10   |   | 10                                   | 8    | 6    | 4    | 3    | 3    | 3                                    | 4           | 4           | 6           | 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 for φ 10 and more) 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 |             |             |             |      |                            |   |

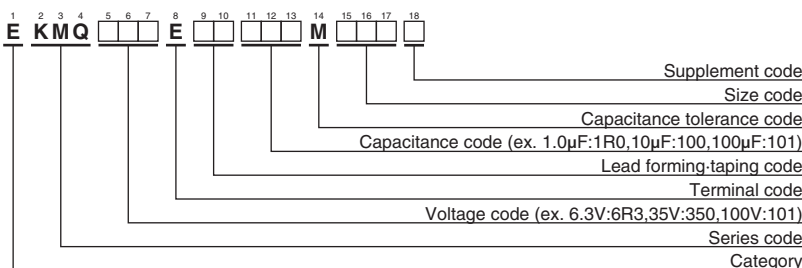
## DIMENSIONS [mm]

- 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 (mA <sub>rms</sub> /105°C, 120Hz) | Part No.           | WV (V <sub>dc</sub> ) | Cap (μF)  | Case size φD×L(mm) | tan δ              | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) | Part No.           |
|-----------------------|----------|--------------------|-------|--|--------------------|-----------------------|-----------|--------------------|--------------------|--|--------------------|
| 6.3                   | 1,000    | 8 × 11.5           | 0.28  | 390  | EKMQR3E□□102MHB5D  | 50                    | 220       | 10 × 12.5          | 0.12               | 300  | EKMQ500E□□221MJC5S |
|                       | 2,200    | 10 × 16            | 0.30  | 635  | EKMQR3E□□222MJ16S  |                       | 330       | 10 × 16            | 0.12               | 410  | EKMQ500E□□331MJ16S |
|                       | 3,300    | 10 × 20            | 0.32  | 840  | EKMQR3E□□332MJ20S  |                       | 470       | 10 × 20            | 0.12               | 540  | EKMQ500E□□471MJ20S |
|                       | 4,700    | 12.5 × 20          | 0.34  | 1,090  | EKMQR3E□□472MK20S  |                       | 1,000     | 12.5 × 25          | 0.12               | 950  | EKMQ500E□□102MK25S |
|                       | 6,800    | 12.5 × 25          | 0.38  | 1,350  | EKMQR3E□□682MK25S  |                       | 2,200     | 16 × 31.5          | 0.14               | 1,410  | EKMQ500E□□222MLN3S |
|                       | 10,000   | 16 × 25            | 0.46  | 1,650  | EKMQR3E□□103ML25S  |                       | 3,300     | 18 × 35.5          | 0.16               | 1,770  | EKMQ500E□□332MMP1S |
|                       | 15,000   | 16 × 31.5          | 0.56  | 1,820  | EKMQR3E□□153MLN3S  |                       | 22        | 5 × 11             | 0.10               | 71   | EKMQ630E□□220ME11D |
|                       | 22,000   | 18 × 35.5          | 0.70  | 2,280  | EKMQR3E□□223MMP1S  |                       | 33        | 6.3 × 11           | 0.10               | 100  | EKMQ630E□□330MF11D |
| 10                    | 220      | 5 × 11             | 0.24  | 155  | EKMQ100E□□221ME11D | 47                    | 6.3 × 11  | 0.10               | 120                | EKMQ630E□□470MF11D                                     |                    |
|                       | 330      | 6.3 × 11           | 0.24  | 210  | EKMQ100E□□331MF11D | 68                    | 8 × 11.5  | 0.10               | 155                | EKMQ630E□□680MHB5D                                     |                    |
|                       | 470      | 6.3 × 11           | 0.24  | 250  | EKMQ100E□□471MF11D | 100                   | 8 × 11.5  | 0.10               | 200                | EKMQ630E□□101MHB5D                                     |                    |
|                       | 1,000    | 10 × 12.5          | 0.24  | 460  | EKMQ100E□□102MJC5S | 220                   | 10 × 16   | 0.10               | 335                | EKMQ630E□□221MJ16S                                     |                    |
|                       | 2,200    | 10 × 16            | 0.26  | 705  | EKMQ100E□□222MJ16S | 330                   | 10 × 20   | 0.10               | 510                | EKMQ630E□□331MJ20S                                     |                    |
|                       | 3,300    | 12.5 × 20          | 0.28  | 1,000  | EKMQ100E□□332MK20S | 470                   | 12.5 × 20 | 0.10               | 640                | EKMQ630E□□471MK20S                                     |                    |
|                       | 4,700    | 12.5 × 25          | 0.30  | 1,260  | EKMQ100E□□472MK25S | 1,000                 | 16 × 25   | 0.10               | 930                | EKMQ630E□□101ML25S                                     |                    |
|                       | 6,800    | 16 × 25            | 0.34  | 1,570  | EKMQ100E□□682ML25S | 2,200                 | 18 × 35.5 | 0.12               | 1,650              | EKMQ630E□□222MMP1S                                     |                    |
|                       | 10,000   | 16 × 31.5          | 0.42  | 1,820  | EKMQ100E□□103MLN3S | 1.0                   | 5 × 11    | 0.08               | 15                 | EKMQ101E□□1R0ME11D                                     |                    |
|                       | 15,000   | 16 × 35.5          | 0.52  | 2,050  | EKMQ100E□□153MLP1S | 2.2                   | 5 × 11    | 0.08               | 21                 | EKMQ101E□□2R2ME11D                                     |                    |
| 22,000                | 18 × 40  | 0.66               | 2,420 | EKMQ100E□□223MM40S                                     | 3.3                | 5 × 11                | 0.08      | 29                 | EKMQ101E□□3R3ME11D |  |                    |
| 16                    | 220      | 6.3 × 11           | 0.20  | 190  | EKMQ160E□□221MF11D | 4.7                   | 5 × 11    | 0.08               | 32                 | EKMQ101E□□4R7ME11D                                     |                    |
|                       | 330      | 6.3 × 11           | 0.20  | 225  | EKMQ160E□□331MF11D | 10                    | 5 × 11    | 0.08               | 50                 | EKMQ101E□□100ME11D                                     |                    |
|                       | 470      | 8 × 11.5           | 0.20  | 315  | EKMQ160E□□471MHB5D | 22                    | 6.3 × 11  | 0.08               | 93                 | EKMQ101E□□220MF11D                                     |                    |
|                       | 1,000    | 10 × 12.5          | 0.20  | 500  | EKMQ160E□□102MJC5S | 33                    | 8 × 11.5  | 0.08               | 130                | EKMQ101E□□330MHB5D                                     |                    |
|                       | 2,200    | 10 × 20            | 0.22  | 710  | EKMQ160E□□222MJ20S | 47                    | 8 × 11.5  | 0.08               | 140                | EKMQ101E□□470MHB5D                                     |                    |
|                       | 3,300    | 12.5 × 25          | 0.24  | 1,170  | EKMQ160E□□332MK25S | 68                    | 10 × 12.5 | 0.08               | 190                | EKMQ101E□□680MJC5S                                     |                    |
|                       | 4,700    | 16 × 25            | 0.26  | 1,500  | EKMQ160E□□472ML25S | 100                   | 10 × 16   | 0.08               | 240                | EKMQ101E□□101MJ16S                                     |                    |
|                       | 6,800    | 16 × 25            | 0.30  | 1,600  | EKMQ160E□□682ML25S | 220                   | 12.5 × 20 | 0.08               | 390                | EKMQ101E□□221MK20S                                     |                    |
|                       | 10,000   | 16 × 35.5          | 0.38  | 1,930  | EKMQ160E□□103MLP1S | 330                   | 12.5 × 25 | 0.08               | 540                | EKMQ101E□□331MK25S                                     |                    |
|                       | 15,000   | 18 × 40            | 0.48  | 2,210  | EKMQ160E□□153MM40S | 470                   | 16 × 25   | 0.08               | 715                | EKMQ101E□□471ML25S                                     |                    |
| 25                    | 100      | 5 × 11             | 0.16  | 125  | EKMQ250E□□101ME11D | 1,000                 | 18 × 35.5 | 0.08               | 960                | EKMQ101E□□102MMP1S                                     |                    |
|                       | 220      | 6.3 × 11           | 0.16  | 200  | EKMQ250E□□221MF11D | 68                    | 12.5 × 20 | 0.20               | 250                | EKMQ161E□□680MK20S                                     |                    |
|                       | 330      | 8 × 11.5           | 0.16  | 310  | EKMQ250E□□331MHB5D | 100                   | 12.5 × 25 | 0.20               | 310                | EKMQ161E□□101MK25S                                     |                    |
|                       | 470      | 10 × 12.5          | 0.16  | 380  | EKMQ250E□□471MJC5S | 220                   | 16 × 31.5 | 0.20               | 540                | EKMQ161E□□221MLN3S                                     |                    |
|                       | 1,000    | 10 × 16            | 0.16  | 610  | EKMQ250E□□102MJ16S | 330                   | 18 × 35.5 | 0.20               | 705                | EKMQ161E□□331MMP1S                                     |                    |
|                       | 2,200    | 12.5 × 25          | 0.18  | 1,090  | EKMQ250E□□222MK25S | 470                   | 18 × 40   | 0.20               | 855                | EKMQ161E□□471MM40S                                     |                    |
|                       | 3,300    | 16 × 25            | 0.20  | 1,400  | EKMQ250E□□332ML25S | 47                    | 12.5 × 20 | 0.20               | 195                | EKMQ201E□□470MK20S                                     |                    |
|                       | 4,700    | 16 × 25            | 0.22  | 1,570  | EKMQ250E□□472ML25S | 68                    | 12.5 × 25 | 0.20               | 250                | EKMQ201E□□680MK25S                                     |                    |
|                       | 6,800    | 16 × 35.5          | 0.26  | 1,850  | EKMQ250E□□682MLP1S | 100                   | 16 × 25   | 0.20               | 335                | EKMQ201E□□101ML25S                                     |                    |
|                       | 10,000   | 18 × 40            | 0.34  | 2,000  | EKMQ250E□□103MM40S | 220                   | 16 × 35.5 | 0.20               | 500                | EKMQ201E□□221MLP1S                                     |                    |
| 35                    | 47       | 5 × 11             | 0.14  | 93   | EKMQ350E□□470ME11D | 330                   | 18 × 40   | 0.20               | 675                | EKMQ201E□□331MM40S                                     |                    |
|                       | 68       | 6.3 × 11           | 0.14  | 110  | EKMQ350E□□680MF11D | 47                    | 12.5 × 20 | 0.20               | 190                | EKMQ251E□□470MK20S                                     |                    |
|                       | 100      | 6.3 × 11           | 0.14  | 150  | EKMQ350E□□101MF11D | 68                    | 16 × 25   | 0.20               | 270                | EKMQ251E□□680ML25S                                     |                    |
|                       | 220      | 8 × 11.5           | 0.14  | 270  | EKMQ350E□□221MHB5D | 100                   | 16 × 25   | 0.20               | 310                | EKMQ251E□□101ML25S                                     |                    |
|                       | 330      | 10 × 12.5          | 0.14  | 350  | EKMQ350E□□331MJC5S | 220                   | 18 × 35.5 | 0.20               | 485                | EKMQ251E□□221MMP1S                                     |                    |
|                       | 470      | 10 × 16            | 0.14  | 460  | EKMQ350E□□471MJ16S | 22                    | 12.5 × 20 | 0.24               | 130                | EKMQ351E□□220MK20S                                     |                    |
|                       | 1,000    | 12.5 × 20          | 0.14  | 810  | EKMQ350E□□102MK20S | 33                    | 12.5 × 25 | 0.24               | 170                | EKMQ351E□□330MK25S                                     |                    |
|                       | 2,200    | 16 × 25            | 0.16  | 1,260  | EKMQ350E□□222ML25S | 47                    | 16 × 25   | 0.24               | 230                | EKMQ351E□□470ML25S                                     |                    |
| 50                    | 3,300    | 16 × 31.5          | 0.18  | 1,500  | EKMQ350E□□332MLN3S | 68                    | 16 × 25   | 0.24               | 285                | EKMQ351E□□680ML25S                                     |                    |
|                       | 4,700    | 16 × 35.5          | 0.20  | 1,780  | EKMQ350E□□472MLP1S | 100                   | 18 × 31.5 | 0.24               | 375                | EKMQ351E□□101MMN3S                                     |                    |
|                       | 6,800    | 18 × 40            | 0.24  | 2,000  | EKMQ350E□□682MM40S | 22                    | 12.5 × 25 | 0.24               | 145                | EKMQ401E□□220MK25S                                     |                    |
|                       | 1.0      | 5 × 11             | 0.12  | 13   | EKMQ500E□□1R0ME11D | 33                    | 16 × 25   | 0.24               | 195                | EKMQ401E□□330ML25S                                     |                    |
|                       | 2.2      | 5 × 11             | 0.12  | 20   | EKMQ500E□□2R2ME11D | 47                    | 16 × 25   | 0.24               | 200                | EKMQ401E□□470ML25S                                     |                    |
|                       | 3.3      | 5 × 11             | 0.12  | 25   | EKMQ500E□□3R3ME11D | 68                    | 16 × 31.5 | 0.24               | 240                | EKMQ401E□□680MLN3S                                     |                    |
|                       | 4.7      | 5 × 11             | 0.12  | 30   | EKMQ500E□□4R7ME11D | 100                   | 18 × 35.5 | 0.24               | 310                | EKMQ401E□□101MMP1S                                     |                    |
|                       | 10       | 5 × 11             | 0.12  | 46   | EKMQ500E□□100ME11D | 22                    | 12.5 × 25 | 0.24               | 100                | EKMQ451E□□220MK25S                                     |                    |
| 63                    | 22       | 5 × 11             | 0.12  | 68   | EKMQ500E□□220ME11D | 33                    | 16 × 25   | 0.24               | 125                | EKMQ451E□□330ML25S                                     |                    |
|                       | 33       | 5 × 11             | 0.12  | 90   | EKMQ500E□□330ME11D | 47                    | 16 × 31.5 | 0.24               | 155                | EKMQ451E□□470MLN3S                                     |                    |
|                       | 47       | 6.3 × 11           | 0.12  | 115  | EKMQ500E□□470MF11D | 68                    | 18 × 35.5 | 0.24               | 185                | EKMQ451E□□680MMP1S                                     |                    |
|                       | 68       | 6.3 × 11           | 0.12  | 150  | EKMQ500E□□680MF11D | 100                   | 18 × 40   | 0.24               | 200                | EKMQ451E□□101MM40S                                     |                    |
|                       | 100      | 8 × 11.5           | 0.12  | 190  | EKMQ500E□□101MHB5D |                       |           |                    |                    |  |                    |

□□ : Enter the appropriate lead forming or taping code.  
 The products shown in [ ] are not recommended for new designs (NRND).  
 \*1: Assembly boards with the designated products attached cannot be cleaned.



## KMQ Series

### ◆ 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 68                        | 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 deterioration of aluminum electrolytic capacitors accelerates their life due to the internal heating produced by ripple current. For details, refer to Section "5-3 Ripple Current Effect on Lifetime" in the catalog, Technical Note.