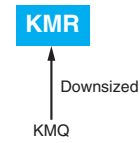


# KMR Series

- Downsized 5mm in height from current snap-ins KMQ series
- Max. 50% up ripple current than same case size of KMQ series
- Endurance with ripple current : 2,000 hours at 105°C
- Rated voltage range : 160 to 450V<sub>dc</sub>, Capacitance range : 100 to 3,300μF
- For inverter control, switching power supplies
- Non solvent resistant type
- RoHS2 Compliant

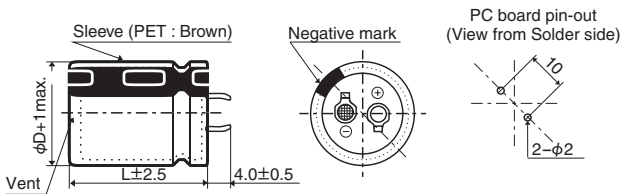


## SPECIFICATIONS

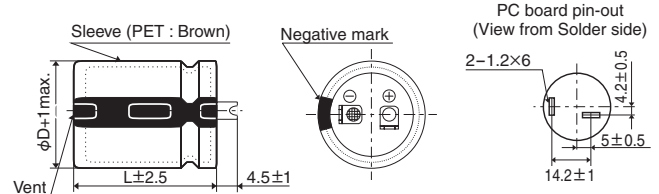
| Items   | Characteristics   |                                       |             |            |
|---|---|---------------------------------------|-------------|------------|
| <b>Category</b>   | -25 to +105°C   |                                       |             |            |
| <b>Temperature Range</b>                                      | -25 to +105°C   |                                       |             |            |
| <b>Rated Voltage Range</b>                                    | 160 to 450V <sub>dc</sub>   |                                       |             |            |
| <b>Capacitance Tolerance</b>                                  | ±20% (M) (at 20°C, 120Hz)   |                                       |             |            |
| <b>Leakage Current</b>  | $I \leq 3\sqrt{CV}$<br>Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)  |                                       |             |            |
| <b>Dissipation Factor (tan δ)</b>                             | Rated voltage (V <sub>dc</sub> )  | 160 to 250V                           | 315 to 400V | 420 & 450V |
|   | tan δ (Max.)  | 0.15                                  | 0.15        | 0.20       |
| <b>Low Temperature Characteristics (Max. Impedance Ratio)</b> | Rated voltage (V <sub>dc</sub> )  | 160 to 250V                           | 315 to 400V | 420 & 450V |
|   | Z(-25°C)/Z(+20°C)   | 4                                     | 8           | 8          |
| <b>Endurance</b>  | The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied (the peak voltage shall not exceed the rated voltage) for 2,000 hours at 105°C.   |                                       |             |            |
|   | Capacitance change  | ≤ ±20% of the initial value           |             |            |
|   | D.F. (tan δ)  | ≤ 200% of the initial specified value |             |            |
|   | Leakage current   | ≤ The initial specified value         |             |            |
| <b>Shelf Life</b>   | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4. |                                       |             |            |
|   | Capacitance change  | ≤ ±15% of the initial value           |             |            |
|   | D.F. (tan δ)  | ≤ 150% of the initial specified value |             |            |
|   | Leakage current   | ≤ The initial specified value         |             |            |

## DIMENSIONS [mm]

- Terminal Code : VS (φ22 to φ35) : Standard

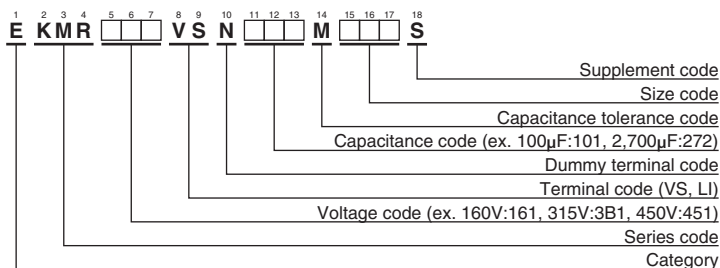


- Terminal Code : LI (φ35)



The standard design has no plastic disc.

## PART NUMBERING SYSTEM



Please refer to "Product code guide (snap-in type)"

## ◆STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF)  | Case size φD×L(mm) | Rated ripple current (Arms/105°C,120Hz) | Part No.           | WV (V <sub>dc</sub> ) | Cap (μF)  | Case size φD×L(mm) | Rated ripple current (Arms/105°C,120Hz) | Part No.           |
|-----------------------|-----------|--------------------|---|--------------------|-----------------------|-----------|--------------------|---|--------------------|
|                       |           |                    |   |                    |                       |           |                    |   |                    |
| 160                   | 560       | 22 × 25            | 1.58                                    | EKMR161VSN561MP25S | 250                   | 330       | 22 × 25            | 1.21                                    | EKMR251VSN331MP25S |
|                       | 680       | 22 × 30            | 1.83                                    | EKMR161VSN681MP30S |                       | 390       | 22 × 30            | 1.38                                    | EKMR251VSN391MP30S |
|                       | 820       | 22 × 35            | 2.06                                    | EKMR161VSN821MP35S |                       | 470       | 22 × 35            | 1.56                                    | EKMR251VSN471MP35S |
|                       | 820       | 25.4 × 25          | 1.89                                    | EKMR161VSN821MQ25S |                       | 560       | 22 × 40            | 1.74                                    | EKMR251VSN561MP40S |
|                       | 1,000     | 22 × 40            | 2.33                                    | EKMR161VSN102MP40S |                       | 560       | 25.4 × 30          | 1.61                                    | EKMR251VSN561MQ30S |
|                       | 1,000     | 25.4 × 30          | 2.15                                    | EKMR161VSN102MQ30S |                       | 560       | 30 × 25            | 1.42                                    | EKMR251VSN561MR25S |
|                       | 1,000     | 30 × 25            | 1.90                                    | EKMR161VSN102MR25S |                       | 680       | 22 × 45            | 1.97                                    | EKMR251VSN681MP45S |
|                       | 1,200     | 22 × 45            | 2.61                                    | EKMR161VSN122MP45S |                       | 680       | 25.4 × 35          | 1.85                                    | EKMR251VSN681MQ35S |
|                       | 1,200     | 22 × 50            | 2.69                                    | EKMR161VSN122MP50S |                       | 820       | 25.4 × 40          | 2.08                                    | EKMR251VSN821MQ40S |
|                       | 1,200     | 25.4 × 35          | 2.45                                    | EKMR161VSN122MQ35S |                       | 820       | 25.4 × 45          | 2.13                                    | EKMR251VSN821MQ45S |
|                       | 1,500     | 25.4 × 40          | 2.82                                    | EKMR161VSN152MQ40S |                       | 820       | 30 × 30            | 1.77                                    | EKMR251VSN681MP45S |
|                       | 1,500     | 25.4 × 45          | 2.88                                    | EKMR161VSN152MQ45S |                       | 820       | 35 × 25            | 1.60                                    | EKMR251VSN821MA25S |
|                       | 1,500     | 30 × 30            | 2.39                                    | EKMR161VSN152MR30S |                       | 1,000     | 25.4 × 50          | 2.40                                    | EKMR251VSN102MQ50S |
|                       | 1,500     | 35 × 25            | 2.17                                    | EKMR161VSN152MA25S |                       | 1,000     | 30 × 35            | 2.03                                    | EKMR251VSN102MR35S |
|                       | 1,800     | 25.4 × 50          | 3.22                                    | EKMR161VSN182MQ50S |                       | 1,200     | 30 × 40            | 2.31                                    | EKMR251VSN122MR40S |
|                       | 1,800     | 30 × 35            | 2.73                                    | EKMR161VSN182MR35S |                       | 1,200     | 30 × 45            | 2.38                                    | EKMR251VSN122MR45S |
|                       | 1,800     | 30 × 40            | 2.82                                    | EKMR161VSN182MR40S |                       | 1,200     | 35 × 35            | 2.06                                    | EKMR251VSN122MA35S |
|                       | 1,800     | 35 × 30            | 2.47                                    | EKMR161VSN182MA30S |                       | 1,500     | 30 × 50            | 2.73                                    | EKMR251VSN152MR50S |
|                       | 2,200     | 30 × 45            | 3.23                                    | EKMR161VSN222MR45S |                       | 1,500     | 35 × 40            | 2.41                                    | EKMR251VSN152MA40S |
|                       | 2,200     | 35 × 35            | 2.79                                    | EKMR161VSN222MA35S |                       | 1,800     | 35 × 45            | 2.72                                    | EKMR251VSN182MA45S |
| 2,700                 | 30 × 50   | 3.66               | EKMR161VSN272MR50S                      | 2,200              | 35 × 50               | 3.10      | EKMR251VSN222MA50S |   |                    |
| 2,700                 | 35 × 40   | 3.23               | EKMR161VSN272MA40S                      | 315                | 180                   | 22 × 25   | 0.91               | EKMR3B1VSN181MP25S                      |                    |
| 3,300                 | 35 × 45   | 3.68               | EKMR161VSN332MA45S                      |                    | 220                   | 22 × 30   | 1.06               | EKMR3B1VSN221MP30S                      |                    |
| 180                   | 470       | 22 × 25            | 1.45                                    |                    | EKMR181VSN471MP25S    | 270       | 22 × 35            | 1.20                                    | EKMR3B1VSN271MP35S |
|                       | 560       | 22 × 30            | 1.66                                    |                    | EKMR181VSN561MP30S    | 270       | 25.4 × 25          | 1.15                                    | EKMR3B1VSN271MQ25S |
|                       | 680       | 22 × 35            | 1.87                                    |                    | EKMR181VSN681MP35S    | 330       | 22 × 40            | 1.37                                    | EKMR3B1VSN331MP40S |
|                       | 680       | 25.4 × 25          | 1.72                                    |                    | EKMR181VSN681MQ25S    | 330       | 25.4 × 30          | 1.30                                    | EKMR3B1VSN331MQ30S |
|                       | 820       | 22 × 40            | 2.11                                    |                    | EKMR181VSN821MP40S    | 390       | 22 × 45            | 1.52                                    | EKMR3B1VSN391MP45S |
|                       | 820       | 25.4 × 30          | 1.94                                    |                    | EKMR181VSN821MQ30S    | 390       | 25.4 × 35          | 1.48                                    | EKMR3B1VSN391MQ35S |
|                       | 1,000     | 22 × 45            | 2.38                                    |                    | EKMR181VSN102MP45S    | 390       | 30 × 25            | 1.39                                    | EKMR3B1VSN391MR25S |
|                       | 1,000     | 25.4 × 35          | 2.24                                    |                    | EKMR181VSN102MQ35S    | 470       | 22 × 50            | 1.72                                    | EKMR3B1VSN471MP50S |
|                       | 1,000     | 30 × 25            | 1.90                                    | EKMR181VSN102MR25S | 470                   | 25.4 × 40 | 1.67               | EKMR3B1VSN471MQ40S                      |                    |
|                       | 1,200     | 22 × 50            | 2.69                                    | EKMR181VSN122MP50S | 470                   | 30 × 30   | 1.57               | EKMR3B1VSN471MR30S                      |                    |
| 1,200                 | 25.4 × 40 | 2.52               | EKMR181VSN122MQ40S                      | 470                | 35 × 25               | 1.52      | EKMR3B1VSN471MA25S |   |                    |
| 1,200                 | 30 × 30   | 2.14               | EKMR181VSN122MR30S                      | 560                | 25.4 × 45             | 1.86      | EKMR3B1VSN561MQ45S |   |                    |
| 1,200                 | 35 × 25   | 1.94               | EKMR181VSN122MA25S                      | 560                | 30 × 35               | 1.78      | EKMR3B1VSN561MR35S |   |                    |
| 1,500                 | 25.4 × 45 | 2.88               | EKMR181VSN152MQ45S                      | 680                | 25.4 × 50             | 2.10      | EKMR3B1VSN681MQ50S |   |                    |
| 1,500                 | 25.4 × 50 | 2.94               | EKMR181VSN152MQ50S                      | 680                | 30 × 40               | 2.03      | EKMR3B1VSN681MR40S |   |                    |
| 1,500                 | 30 × 35   | 2.49               | EKMR181VSN152MR35S                      | 680                | 35 × 30               | 1.90      | EKMR3B1VSN681MA30S |   |                    |
| 1,800                 | 30 × 40   | 2.82               | EKMR181VSN182MR40S                      | 820                | 30 × 45               | 2.31      | EKMR3B1VSN821MR45S |   |                    |
| 1,800                 | 35 × 30   | 2.47               | EKMR181VSN182MA30S                      | 820                | 35 × 35               | 2.13      | EKMR3B1VSN821MA35S |   |                    |
| 2,200                 | 30 × 45   | 3.23               | EKMR181VSN222MR45S                      | 1,000              | 30 × 50               | 2.61      | EKMR3B1VSN102MR50S |   |                    |
| 2,200                 | 30 × 50   | 3.31               | EKMR181VSN222MR50S                      | 1,000              | 35 × 40               | 2.46      | EKMR3B1VSN102MA40S |   |                    |
| 2,200                 | 35 × 35   | 2.79               | EKMR181VSN222MA35S                      | 1,200              | 35 × 45               | 2.78      | EKMR3B1VSN122MA45S |   |                    |
| 2,200                 | 35 × 40   | 2.92               | EKMR181VSN222MA40S                      | 1,200              | 35 × 50               | 2.86      | EKMR3B1VSN122MA50S |   |                    |
| 2,700                 | 35 × 45   | 3.33               | EKMR181VSN272MA45S                      | 350                | 150                   | 22 × 25   | 0.84               | EKMR351VSN151MP25S                      |                    |
| 200                   | 560       | 22 × 30            | 1.66                                    |                    | EKMR201VSN561MP30S    | 220       | 22 × 30            | 1.06                                    | EKMR351VSN221MP30S |
|                       | 560       | 25.4 × 25          | 1.56                                    |                    | EKMR201VSN561MQ25S    | 220       | 25.4 × 25          | 1.04                                    | EKMR351VSN221MQ25S |
|                       | 680       | 22 × 35            | 1.87                                    |                    | EKMR201VSN681MP35S    | 270       | 22 × 35            | 1.20                                    | EKMR351VSN271MP35S |
|                       | 680       | 25.4 × 30          | 1.77                                    |                    | EKMR201VSN681MQ30S    | 270       | 25.4 × 30          | 1.18                                    | EKMR351VSN271MQ30S |
|                       | 820       | 22 × 40            | 2.11                                    |                    | EKMR201VSN821MP40S    | 330       | 22 × 40            | 1.37                                    | EKMR351VSN331MP40S |
|                       | 820       | 25.4 × 35          | 2.03                                    |                    | EKMR201VSN821MQ35S    | 330       | 22 × 45            | 1.40                                    | EKMR351VSN331MP45S |
|                       | 820       | 30 × 25            | 1.72                                    |                    | EKMR201VSN821MR25S    | 330       | 25.4 × 35          | 1.36                                    | EKMR351VSN331MQ35S |
|                       | 1,000     | 22 × 50            | 2.45                                    |                    | EKMR201VSN102MP50S    | 330       | 30 × 25            | 1.28                                    | EKMR351VSN331MR25S |
|                       | 1,000     | 25.4 × 40          | 2.30                                    |                    | EKMR201VSN102MQ40S    | 390       | 22 × 50            | 1.56                                    | EKMR351VSN391MP50S |
|                       | 1,000     | 30 × 30            | 1.95                                    |                    | EKMR201VSN102MR30S    | 390       | 25.4 × 40          | 1.52                                    | EKMR351VSN391MQ40S |
|                       | 1,200     | 25.4 × 45          | 2.58                                    |                    | EKMR201VSN122MQ45S    | 390       | 30 × 30            | 1.43                                    | EKMR351VSN391MR30S |
|                       | 1,200     | 30 × 35            | 2.23                                    |                    | EKMR201VSN122MR35S    | 390       | 35 × 25            | 1.38                                    | EKMR351VSN391MA25S |
|                       | 1,200     | 35 × 25            | 1.94                                    |                    | EKMR201VSN122MA25S    | 470       | 25.4 × 45          | 1.71                                    | EKMR351VSN471MQ45S |
|                       | 1,500     | 25.4 × 50          | 2.94                                    |                    | EKMR201VSN152MQ50S    | 560       | 25.4 × 50          | 1.90                                    | EKMR351VSN561MQ50S |
|                       | 1,500     | 30 × 40            | 2.58                                    |                    | EKMR201VSN152MR40S    | 560       | 30 × 35            | 1.78                                    | EKMR351VSN561MR35S |
|                       | 1,500     | 35 × 30            | 2.25                                    |                    | EKMR201VSN152MA30S    | 560       | 30 × 40            | 1.84                                    | EKMR351VSN561MR40S |
|                       | 1,800     | 30 × 45            | 2.92                                    |                    | EKMR201VSN182MR45S    | 560       | 35 × 30            | 1.72                                    | EKMR351VSN561MA30S |
|                       | 1,800     | 35 × 35            | 2.53                                    | EKMR201VSN182MA35S | 680                   | 30 × 45   | 2.10               | EKMR351VSN681MR45S                      |                    |
| 2,200                 | 30 × 50   | 3.31               | EKMR201VSN222MR50S                      | 680                | 35 × 35               | 1.94      | EKMR351VSN681MA35S |   |                    |
| 2,200                 | 35 × 40   | 2.92               | EKMR201VSN222MA40S                      | 820                | 30 × 50               | 2.36      | EKMR351VSN821MR50S |   |                    |
| 2,700                 | 35 × 45   | 3.33               | EKMR201VSN272MA45S                      |                    |                       |           |                    |   |                    |

◆STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Case size φD×L(mm) | Rated ripple current (Arms/105°C, 120Hz) | Part No.           | WV (V <sub>dc</sub> ) | Cap (μF) | Case size φD×L(mm) | Rated ripple current (Arms/105°C, 120Hz) | Part No.           |
|-----------------------|----------|--------------------|--|--------------------|-----------------------|----------|--------------------|--|--------------------|
| 350                   | 820      | 35 × 40            | 2.23                                     | EKMR351VSN821MA40S | 420                   | 270      | 25.4 × 40          | 1.32                                     | EKMR421VSN271MQ40S |
|                       | 1,000    | 35 × 45            | 2.54                                     | EKMR351VSN102MA45S |                       | 270      | 30 × 30            | 1.26                                     | EKMR421VSN271MR30S |
|                       | 1,200    | 35 × 50            | 2.86                                     | EKMR351VSN122MA50S |                       | 270      | 35 × 25            | 1.26                                     | EKMR421VSN271MA25S |
| 400                   | 120      | 22 × 25            | 0.75                                     | EKMR401VSN121MP25S |                       | 330      | 25.4 × 45          | 1.49                                     | EKMR421VSN331MQ45S |
|                       | 180      | 22 × 30            | 0.96                                     | EKMR401VSN181MP30S |                       | 330      | 30 × 35            | 1.45                                     | EKMR421VSN331MR35S |
|                       | 180      | 25.4 × 25          | 0.94                                     | EKMR401VSN181MQ25S |                       | 390      | 25.4 × 50          | 1.66                                     | EKMR421VSN391MQ50S |
|                       | 220      | 22 × 35            | 1.09                                     | EKMR401VSN221MP35S |                       | 390      | 30 × 40            | 1.63                                     | EKMR421VSN391MR40S |
|                       | 220      | 25.4 × 30          | 1.07                                     | EKMR401VSN221MQ30S |                       | 390      | 35 × 30            | 1.58                                     | EKMR421VSN391MA30S |
|                       | 270      | 22 × 40            | 1.24                                     | EKMR401VSN271MP40S |                       | 470      | 30 × 45            | 1.85                                     | EKMR421VSN471MR45S |
|                       | 270      | 22 × 45            | 1.26                                     | EKMR401VSN271MP45S |                       | 470      | 35 × 35            | 1.77                                     | EKMR421VSN471MA35S |
|                       | 270      | 25.4 × 35          | 1.23                                     | EKMR401VSN271MQ35S |                       | 560      | 30 × 50            | 2.07                                     | EKMR421VSN561MR50S |
|                       | 270      | 30 × 25            | 1.16                                     | EKMR401VSN271MR25S |                       | 560      | 35 × 40            | 2.02                                     | EKMR421VSN561MA40S |
|                       | 330      | 22 × 50            | 1.44                                     | EKMR401VSN331MP50S |                       | 680      | 35 × 45            | 2.29                                     | EKMR421VSN681MA45S |
|                       | 330      | 25.4 × 40          | 1.40                                     | EKMR401VSN331MQ40S |                       | 820      | 35 × 50            | 2.59                                     | EKMR421VSN821MA50S |
|                       | 330      | 30 × 30            | 1.31                                     | EKMR401VSN331MR30S |                       | 450      | 100                | 22 × 25                                  | 0.71               |
|                       | 330      | 35 × 25            | 1.27                                     | EKMR401VSN331MA25S | 120                   |          | 22 × 30            | 0.82                                     | EKMR451VSN121MP30S |
|                       | 390      | 25.4 × 45          | 1.55                                     | EKMR401VSN391MQ45S | 150                   |          | 22 × 35            | 0.94                                     | EKMR451VSN151MP35S |
|                       | 390      | 30 × 35            | 1.49                                     | EKMR401VSN391MR35S | 150                   |          | 25.4 × 25          | 0.89                                     | EKMR451VSN151MQ25S |
|                       | 470      | 25.4 × 50          | 1.74                                     | EKMR401VSN471MQ50S | 180                   |          | 22 × 40            | 1.05                                     | EKMR451VSN181MP40S |
|                       | 470      | 30 × 40            | 1.69                                     | EKMR401VSN471MR40S | 180                   |          | 25.4 × 30          | 1.00                                     | EKMR451VSN181MQ30S |
|                       | 470      | 35 × 30            | 1.58                                     | EKMR401VSN471MA30S | 220                   |          | 22 × 45            | 1.19                                     | EKMR451VSN221MP45S |
|                       | 560      | 30 × 45            | 1.91                                     | EKMR401VSN561MR45S | 220                   |          | 25.4 × 35          | 1.16                                     | EKMR451VSN221MQ35S |
|                       | 560      | 35 × 35            | 1.76                                     | EKMR401VSN561MA35S | 220                   |          | 30 × 25            | 1.11                                     | EKMR451VSN221MR25S |
|                       | 680      | 30 × 50            | 2.15                                     | EKMR401VSN681MR50S | 270                   |          | 22 × 50            | 1.36                                     | EKMR451VSN271MP50S |
| 680                   | 35 × 40  | 2.03               | EKMR401VSN681MA40S                       | 270                | 25.4 × 40             |          | 1.32               | EKMR451VSN271MQ40S                       |                    |
| 820                   | 35 × 45  | 2.30               | EKMR401VSN821MA45S                       | 270                | 25.4 × 45             |          | 1.35               | EKMR451VSN271MQ45S                       |                    |
| 820                   | 35 × 50  | 2.37               | EKMR401VSN821MA50S                       | 270                | 30 × 30               |          | 1.26               | EKMR451VSN271MR30S                       |                    |
| 1,000                 | 35 × 50  | 2.50               | EKMR401VSN102MA50S                       | 270                | 35 × 25               |          | 1.26               | EKMR451VSN271MA25S                       |                    |
| 420                   | 120      | 22 × 25            | 0.78                                     | EKMR421VSN121MP25S | 330                   |          | 25.4 × 50          | 1.52                                     | EKMR451VSN331MQ50S |
|                       | 150      | 22 × 30            | 0.91                                     | EKMR421VSN151MP30S | 330                   |          | 30 × 35            | 1.45                                     | EKMR451VSN331MR35S |
|                       | 150      | 25.4 × 25          | 0.89                                     | EKMR421VSN151MQ25S | 330                   |          | 35 × 30            | 1.45                                     | EKMR451VSN331MA30S |
|                       | 180      | 22 × 35            | 1.03                                     | EKMR421VSN181MP35S | 390                   |          | 30 × 40            | 1.63                                     | EKMR451VSN391MR40S |
|                       | 180      | 25.4 × 30          | 1.00                                     | EKMR421VSN181MQ30S | 470                   |          | 30 × 45            | 1.85                                     | EKMR451VSN471MR45S |
|                       | 220      | 22 × 40            | 1.16                                     | EKMR421VSN221MP40S | 470                   |          | 30 × 50            | 1.90                                     | EKMR451VSN471MR50S |
|                       | 220      | 22 × 45            | 1.19                                     | EKMR421VSN221MP45S | 470                   |          | 35 × 35            | 1.77                                     | EKMR451VSN471MA35S |
|                       | 220      | 25.4 × 35          | 1.16                                     | EKMR421VSN221MQ35S | 560                   | 35 × 40  | 2.02               | EKMR451VSN561MA40S                       |                    |
|                       | 220      | 30 × 25            | 1.11                                     | EKMR421VSN221MR25S | 560                   | 35 × 45  | 2.08               | EKMR451VSN561MA45S                       |                    |
|                       | 270      | 22 × 50            | 1.36                                     | EKMR421VSN271MP50S | 680                   | 35 × 50  | 2.36               | EKMR451VSN681MA50S                       |                    |

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

| Frequency(Hz)             | 50   | 120  | 300  | 1k   | 10k  | 50k  |
|---------------------------|------|------|------|------|------|------|
| 160 to 250V <sub>dc</sub> | 0.81 | 1.00 | 1.17 | 1.32 | 1.45 | 1.50 |
| 315 to 450V <sub>dc</sub> | 0.77 | 1.00 | 1.16 | 1.30 | 1.41 | 1.43 |

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.