

# SMQ Series

- Downsized from current standard SMG series
- Endurance : 2,000 hours at 85°C
- Non solvent resistant type
- RoHS2 Compliant

SMQ

↑ Downsized  
SMG



## ◆ SPECIFICATIONS

| Items  | Characteristics  |                                      |      |      |      |      |      |      |                                      |             |                           |      |                   |      |   |
|--|--|--------------------------------------|------|------|------|------|------|------|--------------------------------------|-------------|---------------------------|------|-------------------|------|---|
| Category   | -40 to +85°C(6.3 to 400V <sub>dc</sub> ) -25 to +85°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 | 315 to 400V               | 450V |                   |      |   |
|  | tan δ (Max.)   | 0.28                                 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.09 | 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 200V | 250V                      | 350V | 400V              | 450V |   |
|  | Z(-25°C)/Z(+20°C)  | ≤φ8                                  | 5    | 4    | 3    | 2    | 2    | 2    | 2                                    | 2           | 3                         | 3    | 4                 | 4    | 6 |
|  |  | ≥φ10                                 | 5    | 4    | 3    | 2    | 2    | 2    | 2                                    | 2           | 3                         | 3    | 4                 | 4    | 6 |
|  | Z(-40°C)/Z(+20°C)  | ≤φ8                                  | 12   | 10   | 8    | 5    | 4    | 3    | 3                                    | 3           | 8                         | 10   | 8                 | 8    | — |
|  | ≥φ10   | 12                                   | 10   | 8    | 5    | 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 the rated voltage is applied for 2,000 hours at 85°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 85°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



| φ D  | 5          | 6.3 | 8   | 10  | 12.5 | 16  | 18  |
|------|------------|-----|-----|-----|------|-----|-----|
| φ d  | 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 |
| φ D' | φD+0.5max. |     |     |     |      |     |     |
| L'   | L+1.5max.  |     |     |     |      |     |     |

## ◆ PART NUMBERING SYSTEM



Please refer to "Product code guide (radial lead type)"

## ◆STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF)  | Case size φD×L(mm) | tan δ | Rated ripple current (mAmps/85°C, 120Hz) | Part No.           | WV (V <sub>dc</sub> ) | Cap (μF)  | Case size φD×L(mm) | tan δ     | Rated ripple current (mAmps/85°C, 120Hz) | Part No.           |                    |
|-----------------------|-----------|--------------------|-------|--|--------------------|-----------------------|-----------|--------------------|-----------|--|--------------------|--------------------|
| 6.3                   | 1,000     | 8 × 11.5           | 0.28  | 540                                      | ESMQ6R3E□□102MHB5D | 63                    | 33        | 6.3 × 11           | 0.09      | 140                                      | ESMQ630E□□330MF11D |                    |
|                       | 2,200     | 10 × 16            | 0.30  | 890                                      | ESMQ6R3E□□222MJ16S |                       | 47        | 6.3 × 11           | 0.09      | 170                                      | ESMQ630E□□470MF11D |                    |
|                       | 3,300     | 10 × 20            | 0.32  | 1,190                                    | ESMQ6R3E□□332MJ20S |                       | 68        | 8 × 11.5           | 0.09      | 220                                      | ESMQ630E□□680MHB5D |                    |
|                       | 4,700     | 12.5 × 20          | 0.34  | 1,550                                    | ESMQ6R3E□□472MK20S |                       | 100       | 8 × 11.5           | 0.09      | 280                                      | ESMQ630E□□101MHB5D |                    |
|                       | 6,800     | 12.5 × 25          | 0.38  | 1,920                                    | ESMQ6R3E□□682MK25S |                       | 220       | 10 × 16            | 0.09      | 490                                      | ESMQ630E□□221MJ16S |                    |
|                       | 10,000    | 16 × 25            | 0.46  | 2,350                                    | ESMQ6R3E□□103ML25S |                       | 330       | 10 × 20            | 0.09      | 710                                      | ESMQ630E□□331MJ20S |                    |
|                       | 15,000    | 16 × 31.5          | 0.56  | 2,550                                    | ESMQ6R3E□□153MLN3S |                       | 470       | 12.5 × 20          | 0.09      | 900                                      | ESMQ630E□□471MK20S |                    |
|                       | 22,000    | 18 × 35.5          | 0.70  | 3,200                                    | ESMQ6R3E□□223MMP1S |                       | 1,000     | 16 × 25            | 0.09      | 1,300                                    | ESMQ630E□□102ML25S |                    |
| 10                    | 220       | 5 × 11             | 0.24  | 240                                      | ESMQ100E□□221ME11D | 100                   | 2,200     | 18 × 35.5          | 0.11      | 2,300                                    | ESMQ630E□□222MMP1S |                    |
|                       | 330       | 6.3 × 11           | 0.24  | 290                                      | ESMQ100E□□331MF11D |                       | 1.0       | 5 × 11             | 0.08      | 21                                       | ESMQ101E□□1R0ME11D |                    |
|                       | 470       | 6.3 × 11           | 0.24  | 350                                      | ESMQ100E□□471MF11D |                       | 2.2       | 5 × 11             | 0.08      | 30                                       | ESMQ101E□□2R2ME11D |                    |
|                       | 1,000     | 10 × 12.5          | 0.24  | 650                                      | ESMQ100E□□102MJC5S |                       | 3.3       | 5 × 11             | 0.08      | 40                                       | ESMQ101E□□3R3ME11D |                    |
|                       | 2,200     | 10 × 16            | 0.26  | 990                                      | ESMQ100E□□222MJ16S |                       | 4.7       | 5 × 11             | 0.08      | 45                                       | ESMQ101E□□4R7ME11D |                    |
|                       | 3,300     | 12.5 × 20          | 0.28  | 1,450                                    | ESMQ100E□□332MK20S |                       | 10        | 5 × 11             | 0.08      | 70                                       | ESMQ101E□□100ME11D |                    |
|                       | 4,700     | 12.5 × 25          | 0.30  | 1,800                                    | ESMQ100E□□472MK25S |                       | 22        | 6.3 × 11           | 0.08      | 130                                      | ESMQ101E□□220MF11D |                    |
|                       | 6,800     | 16 × 25            | 0.34  | 2,250                                    | ESMQ100E□□682ML25S |                       | 33        | 8 × 11.5           | 0.08      | 180                                      | ESMQ101E□□330MHB5D |                    |
|                       | 10,000    | 16 × 31.5          | 0.42  | 2,550                                    | ESMQ100E□□103MLN3S |                       | 47        | 8 × 11.5           | 0.08      | 200                                      | ESMQ101E□□470MHB5D |                    |
|                       | 15,000    | 16 × 35.5          | 0.52  | 2,880                                    | ESMQ100E□□153MLP1S |                       | 68        | 10 × 12.5          | 0.08      | 270                                      | ESMQ101E□□680MJC5S |                    |
| 16                    | 220       | 6.3 × 11           | 0.20  | 260                                      | ESMQ160E□□221MF11D | 160                   | 100       | 10 × 16            | 0.08      | 340                                      | ESMQ101E□□101MJ16S |                    |
|                       | 330       | 6.3 × 11           | 0.20  | 320                                      | ESMQ160E□□331MF11D |                       | 220       | 12.5 × 20          | 0.08      | 550                                      | ESMQ101E□□221MK20S |                    |
|                       | 470       | 8 × 11.5           | 0.20  | 440                                      | ESMQ160E□□471MHB5D |                       | 330       | 12.5 × 25          | 0.08      | 760                                      | ESMQ101E□□331MK25S |                    |
|                       | 1,000     | 10 × 12.5          | 0.20  | 700                                      | ESMQ160E□□102MJC5S |                       | 470       | 16 × 25            | 0.08      | 1,000                                    | ESMQ101E□□471ML25S |                    |
|                       | 2,200     | 10 × 20            | 0.22  | 1,000                                    | ESMQ160E□□222MJ20S |                       | 1,000     | 18 × 35.5          | 0.08      | 1,350                                    | ESMQ101E□□102MMP1S |                    |
|                       | 3,300     | 12.5 × 25          | 0.24  | 1,700                                    | ESMQ160E□□332MK25S |                       | 200       | 10                 | 8 × 11.5  | 0.20                                     | 80                 | ESMQ161E□□100MHB5D |
|                       | 4,700     | 16 × 25            | 0.26  | 2,100                                    | ESMQ160E□□472ML25S |                       |           | 22                 | 10 × 12.5 | 0.20                                     | 130                | ESMQ161E□□220MJC5S |
|                       | 6,800     | 16 × 25            | 0.30  | 2,250                                    | ESMQ160E□□682ML25S |                       |           | 33                 | 10 × 16   | 0.20                                     | 180                | ESMQ161E□□330MJ16S |
|                       | 10,000    | 16 × 35.5          | 0.38  | 2,710                                    | ESMQ160E□□103MLP1S |                       |           | 47                 | 10 × 20   | 0.20                                     | 210                | ESMQ161E□□470MJ20S |
|                       | 15,000    | 18 × 40            | 0.48  | 3,100                                    | ESMQ160E□□153MM40S |                       |           | 68                 | 12.5 × 20 | 0.20                                     | 350                | ESMQ161E□□680MK20S |
| 25                    | 100       | 5 × 11             | 0.16  | 180                                      | ESMQ250E□□101ME11D | 250                   |           | 100                | 12.5 × 25 | 0.20                                     | 430                | ESMQ161E□□101MK25S |
|                       | 220       | 6.3 × 11           | 0.16  | 280                                      | ESMQ250E□□221MF11D |                       |           | 220                | 16 × 31.5 | 0.20                                     | 760                | ESMQ161E□□221MLN3S |
|                       | 330       | 8 × 11.5           | 0.16  | 440                                      | ESMQ250E□□331MHB5D |                       |           | 330                | 18 × 35.5 | 0.20                                     | 995                | ESMQ161E□□331MMP1S |
|                       | 470       | 10 × 12.5          | 0.16  | 550                                      | ESMQ250E□□471MJC5S |                       |           | 470                | 18 × 40   | 0.20                                     | 1,200              | ESMQ161E□□471MM40S |
|                       | 1,000     | 10 × 16            | 0.16  | 860                                      | ESMQ250E□□102MJ16S |                       |           | 350                | 1.0       | 6.3 × 11                                 | 0.20               | 22                 |
|                       | 2,200     | 12.5 × 25          | 0.18  | 1,550                                    | ESMQ250E□□222MK25S |                       | 2.2       |                    | 6.3 × 11  | 0.20                                     | 33                 | ESMQ201E□□2R2MF11D |
|                       | 3,300     | 16 × 25            | 0.20  | 1,980                                    | ESMQ250E□□332ML25S |                       | 3.3       |                    | 6.3 × 11  | 0.20                                     | 40                 | ESMQ201E□□3R3MF11D |
|                       | 4,700     | 16 × 25            | 0.22  | 2,200                                    | ESMQ250E□□472ML25S |                       | 4.7       |                    | 6.3 × 11  | 0.20                                     | 50                 | ESMQ201E□□4R7MF11D |
|                       | 6,800     | 16 × 35.5          | 0.26  | 2,600                                    | ESMQ250E□□682MLP1S |                       | 10        |                    | 8 × 11.5  | 0.20                                     | 80                 | ESMQ201E□□100MHB5D |
|                       | 10,000    | 18 × 40            | 0.34  | 2,800                                    | ESMQ250E□□103MM40S |                       | 22        |                    | 10 × 16   | 0.20                                     | 150                | ESMQ201E□□220MJ16S |
| 35                    | 47        | 5 × 11             | 0.14  | 130                                      | ESMQ350E□□470ME11D | 400                   | 33        |                    | 10 × 20   | 0.20                                     | 205                | ESMQ201E□□330MJ20S |
|                       | 68        | 6.3 × 11           | 0.14  | 160                                      | ESMQ350E□□680MF11D |                       | 47        |                    | 12.5 × 20 | 0.20                                     | 270                | ESMQ201E□□470MK20S |
|                       | 100       | 6.3 × 11           | 0.14  | 210                                      | ESMQ350E□□101MF11D |                       | 68        |                    | 12.5 × 25 | 0.20                                     | 350                | ESMQ201E□□680MK25S |
|                       | 220       | 8 × 11.5           | 0.14  | 385                                      | ESMQ350E□□221MHB5D |                       | 100       |                    | 16 × 25   | 0.20                                     | 475                | ESMQ201E□□101ML25S |
|                       | 330       | 10 × 12.5          | 0.14  | 490                                      | ESMQ350E□□331MJC5S |                       | 220       | 16 × 35.5          | 0.20      | 700                                      | ESMQ201E□□221MLP1S |                    |
|                       | 470       | 10 × 16            | 0.14  | 650                                      | ESMQ350E□□471MJ16S |                       | 330       | 18 × 40            | 0.20      | 950                                      | ESMQ201E□□331MM40S |                    |
|                       | 1,000     | 12.5 × 20          | 0.14  | 1,150                                    | ESMQ350E□□102MK20S |                       | 50        | 3.3                | 6.3 × 11  | 0.20                                     | 40                 | ESMQ251E□□3R3MF11D |
|                       | 2,200     | 16 × 25            | 0.16  | 1,800                                    | ESMQ350E□□222ML25S |                       |           | 4.7                | 6.3 × 11  | 0.20                                     | 50                 | ESMQ251E□□4R7MF11D |
|                       | 3,300     | 16 × 31.5          | 0.18  | 2,100                                    | ESMQ350E□□332MLN3S |                       |           | 10                 | 10 × 12.5 | 0.20                                     | 100                | ESMQ251E□□3R3MJC5S |
|                       | 4,700     | 16 × 35.5          | 0.20  | 2,500                                    | ESMQ350E□□472MLP1S |                       |           | 22                 | 10 × 20   | 0.20                                     | 170                | ESMQ251E□□220MJ20S |
| 6,800                 | 18 × 40   | 0.24               | 2,800 | ESMQ350E□□682MM40S                       | 33                 | 10 × 20               |           | 0.20               | 200       | ESMQ251E□□330MJ20S                       |                    |                    |
| 50                    | 1.0       | 5 × 11             | 0.12  | 17                                       | ESMQ500E□□1R0ME11D | 350                   |           | 47                 | 12.5 × 20 | 0.20                                     | 270                | ESMQ251E□□470MK20S |
|                       | 2.2       | 5 × 11             | 0.12  | 28                                       | ESMQ500E□□2R2ME11D |                       |           | 68                 | 16 × 25   | 0.20                                     | 380                | ESMQ251E□□680ML25S |
|                       | 3.3       | 5 × 11             | 0.12  | 35                                       | ESMQ500E□□3R3ME11D |                       |           | 100                | 16 × 25   | 0.20                                     | 440                | ESMQ251E□□101ML25S |
|                       | 4.7       | 5 × 11             | 0.12  | 41                                       | ESMQ500E□□4R7ME11D |                       |           | 220                | 18 × 35.5 | 0.20                                     | 680                | ESMQ251E□□221MMP1S |
|                       | 10        | 5 × 11             | 0.12  | 60                                       | ESMQ500E□□100ME11D |                       |           | 400                | 2.2       | 6.3 × 11                                 | 0.24               | 30                 |
|                       | 22        | 5 × 11             | 0.12  | 95                                       | ESMQ500E□□220ME11D |                       | 3.3       |                    | 8 × 11.5  | 0.24                                     | 46                 | ESMQ351E□□3R3MHB5D |
|                       | 33        | 5 × 11             | 0.12  | 125                                      | ESMQ500E□□330ME11D |                       | 4.7       |                    | 8 × 11.5  | 0.24                                     | 55                 | ESMQ351E□□4R7MHB5D |
|                       | 47        | 6.3 × 11           | 0.12  | 155                                      | ESMQ500E□□470MF11D |                       | 10        |                    | 10 × 12.5 | 0.24                                     | 90                 | ESMQ351E□□100MJC5S |
|                       | 68        | 6.3 × 11           | 0.12  | 210                                      | ESMQ500E□□680MF11D |                       | 22        |                    | 12.5 × 20 | 0.24                                     | 185                | ESMQ351E□□220MK20S |
|                       | 100       | 8 × 11.5           | 0.12  | 260                                      | ESMQ500E□□101MHB5D |                       | 33        |                    | 12.5 × 25 | 0.24                                     | 240                | ESMQ351E□□330MK25S |
| 220                   | 10 × 12.5 | 0.12               | 430   | ESMQ500E□□221MJC5S                       | 47                 | 16 × 25               | 0.24      |                    | 325       | ESMQ351E□□470ML25S                       |                    |                    |
| 330                   | 10 × 16   | 0.12               | 590   | ESMQ500E□□331MJ16S                       | 68                 | 16 × 25               | 0.24      |                    | 400       | ESMQ351E□□680ML25S                       |                    |                    |
| 470                   | 10 × 20   | 0.12               | 760   | ESMQ500E□□471MJ20S                       | 100                | 18 × 31.5             | 0.24      |                    | 530       | ESMQ351E□□101MMN3S                       |                    |                    |
| 1,000                 | 12.5 × 25 | 0.12               | 1,350 | ESMQ500E□□102MK25S                       | 63                 | 1.0                   | 6.3 × 11  |                    | 0.24      | 22                                       | ESMQ401E□□1R0MF11D |                    |
| 2,200                 | 16 × 31.5 | 0.14               | 1,980 | ESMQ500E□□222MLN3S                       |                    | 2.2                   | 8 × 11.5  | 0.24               | 38        | ESMQ401E□□2R2MHB5D                       |                    |                    |
| 3,300                 | 18 × 35.5 | 0.16               | 2,500 | ESMQ500E□□332MMP1S                       |                    | 3.3                   | 8 × 11.5  | 0.24               | 48        | ESMQ401E□□3R3MHB5D                       |                    |                    |
| 22                    | 5 × 11    | 0.09               | 100   | ESMQ630E□□220ME11D                       |                    | 4.7                   | 10 × 12.5 | 0.24               | 60        | ESMQ401E□□4R7MJC5S                       |                    |                    |
| 63                    | 22        | 5 × 11             | 0.09  | 100                                      | ESMQ630E□□220ME11D | 10                    | 10 × 16   | 0.24               | 90        | ESMQ401E□□100MJ16S                       |                    |                    |

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

◆ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Case size φD×L(mm) | tan δ | Rated ripple current (mA <sub>rms</sub> /85°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> /85°C, 120Hz) | Part No.           |
|-----------------------|----------|--------------------|-------|---|--------------------|-----------------------|----------|--------------------|-------|---|--------------------|
| 400                   | 22       | 12.5 × 25          | 0.24  | 205   | ESMQ401E□□220MK25S | 450                   | 4.7      | 10 × 12.5          | 0.24  | 46  | ESMQ451E□□4R7MJC5S |
|                       | 33       | 16 × 25            | 0.24  | 275   | ESMQ401E□□330ML25S |                       | 10       | 10 × 20            | 0.24  | 80  | ESMQ451E□□100MJ20S |
|                       | 47       | 16 × 25            | 0.24  | 280   | ESMQ401E□□470ML25S |                       | 22       | 12.5 × 25          | 0.24  | 140   | ESMQ451E□□220MK25S |
|                       | 68       | 16 × 31.5          | 0.24  | 340   | ESMQ401E□□680MLN3S |                       | 33       | 16 × 25            | 0.24  | 180   | ESMQ451E□□330ML25S |
|                       | 100      | 18 × 35.5          | 0.24  | 440   | ESMQ401E□□101MMP1S |                       | 47       | 16 × 31.5          | 0.24  | 220   | ESMQ451E□□470MLN3S |
| 450                   | 2.2      | 8 × 11.5           | 0.24  | 28  | ESMQ451E□□2R2MHB5D |                       | 68       | 18 × 35.5          | 0.24  | 260   | ESMQ451E□□680MMP1S |
|                       | 3.3      | 10 × 12.5          | 0.24  | 40  | ESMQ451E□□3R3MJC5S |                       | 100      | 18 × 40            | 0.24  | 280   | ESMQ451E□□101MM40S |

□□ : 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 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 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.