

SMQ Series

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

SMQ

↑ Downsized
SMG

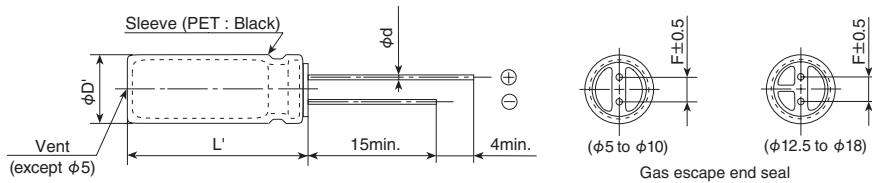


◆ SPECIFICATIONS

| Items | Characteristics | | | | | | | | | | | | | | |
|--|--|--------------------------------------|------|------|------|------|------|------|--------------------------------------|-------------|---------------------------|------|-------------------|------|---|
| Category | -40 to +85°C(6.3 to 400V _{dc}) -25 to +85°C(450V _{dc}) | | | | | | | | | | | | | | |
| Temperature Range | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 450V _{dc} | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (M) (at 20°C, 120Hz) | | | | | | | | | | | | | | |
| Leakage Current | 6.3 to 100V _{dc} | | | | | | | | | | 160 to 450V _{dc} | | | | |
| | 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 _{dc}) | 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 _{dc}) | 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 _{dc} | | | | | | | 160 to 450V _{dc} | | | | | | |
| | 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 _{dc}) | Cap (μF) | Case size φD×L(mm) | tan δ | Rated ripple current (mAmps/85°C, 120Hz) | Part No. | WV (V _{dc}) | 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 |
| 22,000 | 18 × 40 | 0.66 | 3,400 | ESMQ100E□□223MM40S | 100 | 10 × 16 | 0.08 | 340 | ESMQ101E□□101MJ16S | | |
| 16 | 220 | 6.3 × 11 | 0.20 | 260 | ESMQ160E□□221MF11D | 160 | 220 | 12.5 × 20 | 0.08 | 550 | ESMQ101E□□221MK20S |
| | 330 | 6.3 × 11 | 0.20 | 320 | ESMQ160E□□331MF11D | | 330 | 12.5 × 25 | 0.08 | 760 | ESMQ101E□□331MK25S |
| | 470 | 8 × 11.5 | 0.20 | 440 | ESMQ160E□□471MHB5D | | 470 | 16 × 25 | 0.08 | 1,000 | ESMQ101E□□471ML25S |
| | 1,000 | 10 × 12.5 | 0.20 | 700 | ESMQ160E□□102MJC5S | | 1,000 | 18 × 35.5 | 0.08 | 1,350 | ESMQ101E□□102MMP1S |
| | 2,200 | 10 × 20 | 0.22 | 1,000 | ESMQ160E□□222MJ20S | | 10 | 8 × 11.5 | 0.20 | 80 | ESMQ161E□□100MHB5D |
| | 3,300 | 12.5 × 25 | 0.24 | 1,700 | ESMQ160E□□332MK25S | | 22 | 10 × 12.5 | 0.20 | 130 | ESMQ161E□□220MJC5S |
| | 4,700 | 16 × 25 | 0.26 | 2,100 | ESMQ160E□□472ML25S | | 33 | 10 × 16 | 0.20 | 180 | ESMQ161E□□330MJ16S |
| | 6,800 | 16 × 25 | 0.30 | 2,250 | ESMQ160E□□682ML25S | | 47 | 10 × 20 | 0.20 | 210 | ESMQ161E□□470MJ20S |
| | 10,000 | 16 × 35.5 | 0.38 | 2,710 | ESMQ160E□□103MLP1S | | 68 | 12.5 × 20 | 0.20 | 350 | ESMQ161E□□680MK20S |
| | 15,000 | 18 × 40 | 0.48 | 3,100 | ESMQ160E□□153MM40S | | 100 | 12.5 × 25 | 0.20 | 430 | ESMQ161E□□101MK25S |
| 25 | 100 | 5 × 11 | 0.16 | 180 | ESMQ250E□□101ME11D | 200 | 220 | 16 × 31.5 | 0.20 | 760 | ESMQ161E□□221MLN3S |
| | 220 | 6.3 × 11 | 0.16 | 280 | ESMQ250E□□221MF11D | | 330 | 18 × 35.5 | 0.20 | 995 | ESMQ161E□□331MMP1S |
| | 330 | 8 × 11.5 | 0.16 | 440 | ESMQ250E□□331MHB5D | | 470 | 18 × 40 | 0.20 | 1,200 | ESMQ161E□□471MM40S |
| | 470 | 10 × 12.5 | 0.16 | 550 | ESMQ250E□□471MJC5S | | 1.0 | 6.3 × 11 | 0.20 | 22 | ESMQ201E□□1R0MF11D |
| | 1,000 | 10 × 16 | 0.16 | 860 | ESMQ250E□□102MJ16S | | 2.2 | 6.3 × 11 | 0.20 | 33 | ESMQ201E□□2R2MF11D |
| | 2,200 | 12.5 × 25 | 0.18 | 1,550 | ESMQ250E□□222MK25S | | 3.3 | 6.3 × 11 | 0.20 | 40 | ESMQ201E□□3R3MF11D |
| | 3,300 | 16 × 25 | 0.20 | 1,980 | ESMQ250E□□332ML25S | | 4.7 | 6.3 × 11 | 0.20 | 50 | ESMQ201E□□4R7MF11D |
| | 4,700 | 16 × 25 | 0.22 | 2,200 | ESMQ250E□□472ML25S | | 10 | 8 × 11.5 | 0.20 | 80 | ESMQ201E□□100MHB5D |
| | 6,800 | 16 × 35.5 | 0.26 | 2,600 | ESMQ250E□□682MLP1S | | 22 | 10 × 16 | 0.20 | 150 | ESMQ201E□□220MJ16S |
| | 10,000 | 18 × 40 | 0.34 | 2,800 | ESMQ250E□□103MM40S | | 33 | 10 × 20 | 0.20 | 205 | ESMQ201E□□330MJ20S |
| 35 | 47 | 5 × 11 | 0.14 | 130 | ESMQ350E□□470ME11D | 250 | 47 | 12.5 × 20 | 0.20 | 270 | ESMQ201E□□470MK20S |
| | 68 | 6.3 × 11 | 0.14 | 160 | ESMQ350E□□680MF11D | | 68 | 12.5 × 25 | 0.20 | 350 | ESMQ201E□□680MK25S |
| | 100 | 6.3 × 11 | 0.14 | 210 | ESMQ350E□□101MF11D | | 100 | 16 × 25 | 0.20 | 475 | ESMQ201E□□101ML25S |
| | 220 | 8 × 11.5 | 0.14 | 385 | ESMQ350E□□221MHB5D | | 220 | 16 × 35.5 | 0.20 | 700 | ESMQ201E□□221MLP1S |
| | 330 | 10 × 12.5 | 0.14 | 490 | ESMQ350E□□331MJC5S | | 330 | 18 × 40 | 0.20 | 950 | ESMQ201E□□331MM40S |
| | 470 | 10 × 16 | 0.14 | 650 | ESMQ350E□□471MJ16S | | 3.3 | 6.3 × 11 | 0.20 | 40 | ESMQ251E□□3R3MF11D |
| | 1,000 | 12.5 × 20 | 0.14 | 1,150 | ESMQ350E□□102MK20S | | 4.7 | 6.3 × 11 | 0.20 | 50 | ESMQ251E□□4R7MF11D |
| | 2,200 | 16 × 25 | 0.16 | 1,800 | ESMQ350E□□222ML25S | | 10 | 10 × 12.5 | 0.20 | 100 | ESMQ251E□□3R3MJC5S |
| | 3,300 | 16 × 31.5 | 0.18 | 2,100 | ESMQ350E□□332MLN3S | | 22 | 10 × 20 | 0.20 | 170 | ESMQ251E□□220MJ20S |
| | 4,700 | 16 × 35.5 | 0.20 | 2,500 | ESMQ350E□□472MLP1S | | 33 | 10 × 20 | 0.20 | 200 | ESMQ251E□□330MJ20S |
| 6,800 | 18 × 40 | 0.24 | 2,800 | ESMQ350E□□682MM40S | 47 | 12.5 × 20 | 0.20 | 270 | ESMQ251E□□470MK20S | | |
| 50 | 1.0 | 5 × 11 | 0.12 | 17 | ESMQ500E□□1R0ME11D | 350 | 68 | 16 × 25 | 0.20 | 380 | ESMQ251E□□680ML25S |
| | 2.2 | 5 × 11 | 0.12 | 28 | ESMQ500E□□2R2ME11D | | 100 | 16 × 25 | 0.20 | 440 | ESMQ251E□□101ML25S |
| | 3.3 | 5 × 11 | 0.12 | 35 | ESMQ500E□□3R3ME11D | | 220 | 18 × 35.5 | 0.20 | 680 | ESMQ251E□□221MMP1S |
| | 4.7 | 5 × 11 | 0.12 | 41 | ESMQ500E□□4R7ME11D | | 2.2 | 6.3 × 11 | 0.24 | 30 | ESMQ351E□□2R2MF11D |
| | 10 | 5 × 11 | 0.12 | 60 | ESMQ500E□□100ME11D | | 3.3 | 8 × 11.5 | 0.24 | 46 | ESMQ351E□□3R3MHB5D |
| | 22 | 5 × 11 | 0.12 | 95 | ESMQ500E□□220ME11D | | 4.7 | 8 × 11.5 | 0.24 | 55 | ESMQ351E□□4R7MHB5D |
| | 33 | 5 × 11 | 0.12 | 125 | ESMQ500E□□330ME11D | | 10 | 10 × 12.5 | 0.24 | 90 | ESMQ351E□□100MJC5S |
| | 47 | 6.3 × 11 | 0.12 | 155 | ESMQ500E□□470MF11D | | 22 | 12.5 × 20 | 0.24 | 185 | ESMQ351E□□220MK20S |
| | 68 | 6.3 × 11 | 0.12 | 210 | ESMQ500E□□680MF11D | | 33 | 12.5 × 25 | 0.24 | 240 | ESMQ351E□□330MK25S |
| | 100 | 8 × 11.5 | 0.12 | 260 | ESMQ500E□□101MHB5D | | 47 | 16 × 25 | 0.24 | 325 | ESMQ351E□□470ML25S |
| | 220 | 10 × 12.5 | 0.12 | 430 | ESMQ500E□□221MJC5S | | 68 | 16 × 25 | 0.24 | 400 | ESMQ351E□□680ML25S |
| | 330 | 10 × 16 | 0.12 | 590 | ESMQ500E□□331MJ16S | | 100 | 18 × 31.5 | 0.24 | 530 | ESMQ351E□□101MMN3S |
| | 470 | 10 × 20 | 0.12 | 760 | ESMQ500E□□471MJ20S | | 1.0 | 6.3 × 11 | 0.24 | 22 | ESMQ401E□□1R0MF11D |
| | 1,000 | 12.5 × 25 | 0.12 | 1,350 | ESMQ500E□□102MK25S | | 2.2 | 8 × 11.5 | 0.24 | 38 | ESMQ401E□□2R2MHB5D |
| 2,200 | 16 × 31.5 | 0.14 | 1,980 | ESMQ500E□□222MLN3S | 3.3 | 8 × 11.5 | 0.24 | 48 | ESMQ401E□□3R3MHB5D | | |
| 3,300 | 18 × 35.5 | 0.16 | 2,500 | ESMQ500E□□332MMP1S | 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 _{dc}) | Cap (μF) | Case size φD×L(mm) | tan δ | Rated ripple current (mA _{rms} /85°C, 120Hz) | Part No. | WV (V _{dc}) | Cap (μF) | Case size φD×L(mm) | tan δ | Rated ripple current (mA _{rms} /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.