

SMG Series

- Endurance : 2,000 hours at 85°C
- Solvent resistant type except 315 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)
- RoHS Compliant

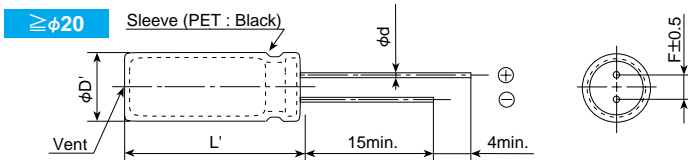
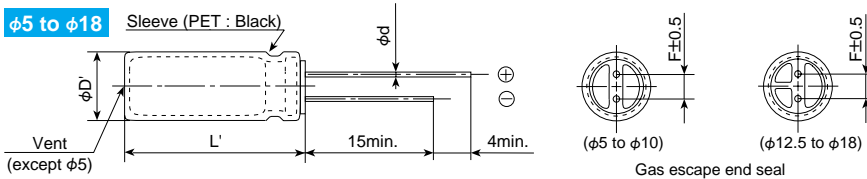


◆ SPECIFICATIONS

| 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} | | | | | | |
| | ≤φ18 | I=0.03CV or 4μA, whichever is greater. (at 20°C after 1 minute) | | | | | | CV \ Time | | After 1 minute | | After 5 minutes | |
| | | | | | | | | CV ≤ 1,000 | | I=0.1CV+40 max. | | I=0.03CV+15 max. | |
| | CV > 1,000 | | I=0.04CV+100 max. | | I=0.02CV+25 max. | | | | | | | | |
| ≥φ20 | I=0.03CV (at 20°C after 3 minutes) | | | | | | | | | | | | |
| Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | | | | | | | | | | | | |
| Dissipation Factor (tanδ) | Rated voltage (V _{dc}) | 6.3V | 10V | 16V | 25V | 35V | 50V | 63V | 100V | 160 to 250V | 315 to 400V | 450V | |
| | tanδ (Max.) | ≤φ18 | 0.34 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.09 | 0.08 | 0.20 | 0.24 | 0.24 |
| | | ≥φ20 | 0.28 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.09 | 0.08 | 0.15 | 0.15 | 0.20 |
| 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 250V | 315 to 400V | 450V | |
| | Z(-25°C)/Z(+20°C) | ≤φ18 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 6 | 6 |
| | | ≥φ20 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 6 | 6 |
| Z(-40°C)/Z(+20°C) | ≤φ18 | 12 | 10 | 8 | 5 | 4 | 3 | 3 | 3 | 4 | 6 | — | |
| (at 120Hz) | | | | | | | | | | | | | |
| Endurance | The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. | | | | | | | | | | | | |
| | Capacitance change | ≤±20% of the initial value | | | | | | | | | | | |
| | D.F. (tanδ) | ≤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. (tanδ) | ≤200% of the initial specified value | | | | | | ≤200% of the initial specified value | | | | | |
| | Leakage current | ≤The initial specified value | | | | | | ≤500% of the initial specified value | | | | | |
| | | | | | | | | | | | | | |

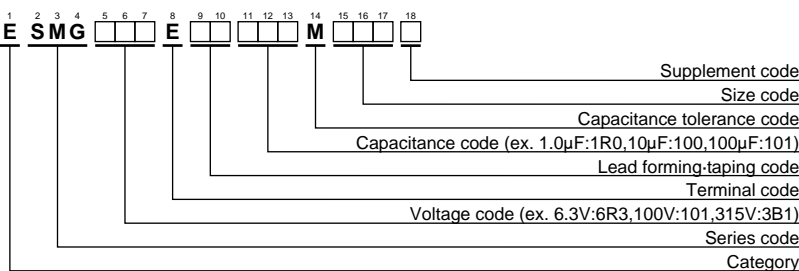
◆ DIMENSIONS [mm]

- Terminal Code : E



| φD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 20 | 22 |
|-----|------------|-----|-----|-----|------|-----|-----|------------|------|
| φd | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 | 1.0 |
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 | 10.0 |
| φD' | φD+0.5max. | | | | | | | φD+0.5max. | |
| L' | L+1.5max. | | | | | | | L+2.0max. | |

◆ PART NUMBERING SYSTEM



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

◆STANDARD RATINGS

□ is not solvent resistant.

| WV (Vdc) | Cap (μF) | Case size φDXL(mm) | tanδ | Rated ripple current (mA rms/85°C, 120Hz) | Part No. | WV (Vdc) | Cap (μF) | Case size φDXL(mm) | tanδ | Rated ripple current (mA rms/85°C, 120Hz) | Part No. | |
|----------|----------|--------------------|-------|---|--------------------|----------|----------|--------------------|---------|---|---------------------|--------------------|
| 100 | 33 | 8X11.5 | 0.08 | 180 | ESMG101E□□330MHB5D | 315 | 47 | 20X20 | 0.15 | 310 | ESMG3B1E□□470MN20S | |
| | 47 | 10X12.5 | 0.08 | 230 | ESMG101E□□470MJC5S | | 68 | 20X25 | 0.15 | 400 | ESMG3B1E□□680MN25S | |
| | 100 | 10X20 | 0.08 | 370 | ESMG101E□□101MJ20S | | 82 | 20X25 | 0.15 | 440 | ESMG3B1E□□820MN25S | |
| | 220 | 12.5X25 | 0.08 | 620 | ESMG101E□□221MK25S | | 100 | 20X30 | 0.15 | 500 | ESMG3B1E□□101MN30S | |
| | 330 | 12.5X25 | 0.08 | 760 | ESMG101E□□331MK25S | | 120 | 20X30 | 0.15 | 550 | ESMG3B1E□□121MN30S | |
| | 330 | 20X20 | 0.08 | 870 | ESMG101E□□331MN20S | | 180 | 20X40 | 0.15 | 720 | ESMG3B1E□□181MN40S | |
| | 470 | 16X25 | 0.08 | 1,000 | ESMG101E□□471ML25S | | 180 | 22X35 | 0.15 | 720 | ESMG3B1E□□181MP35S | |
| | 680 | 20X30 | 0.08 | 1,360 | ESMG101E□□681MN30S | | 220 | 22X40 | 0.15 | 810 | ESMG3B1E□□221MP40S | |
| | 820 | 22X30 | 0.08 | 1,540 | ESMG101E□□821MP30S | | 350 | 1.0 | 6.3X11 | 0.24 | 22 | ESMG351E□□1R0MF11D |
| | 1,000 | 18X40 | 0.08 | 1,380 | ESMG101E□□102MN40S | | | 2.2 | 8X11.5 | 0.24 | 38 | ESMG351E□□2R2MHB5D |
| | 1,000 | 20X35 | 0.08 | 1,720 | ESMG101E□□102MN35S | | | 3.3 | 8X11.5 | 0.24 | 46 | ESMG351E□□3R3MHB5D |
| | 1,200 | 22X40 | 0.08 | 1,980 | ESMG101E□□122MP40S | | | 4.7 | 10X12.5 | 0.24 | 65 | ESMG351E□□4R7MJC5S |
| 160 | 3.3 | 6.3X11 | 0.20 | 40 | ESMG161E□□3R3MF11D | 10 | | 10X20 | 0.24 | 115 | ESMG351E□□100MJ20S | |
| | 4.7 | 6.3X11 | 0.20 | 48 | ESMG161E□□4R7MF11D | 22 | | 12.5X20 | 0.24 | 185 | ESMG351E□□2R20MN20S | |
| | 10 | 10X12.5 | 0.20 | 94 | ESMG161E□□100MJC5S | 33 | | 16X25 | 0.24 | 275 | ESMG351E□□330ML25S | |
| | 22 | 10X20 | 0.20 | 170 | ESMG161E□□220MJ20S | 47 | | 16X25 | 0.24 | 325 | ESMG351E□□470ML25S | |
| | 33 | 10X20 | 0.20 | 205 | ESMG161E□□330MJ20S | 47 | | 20X20 | 0.15 | 310 | ESMG351E□□470MN20S | |
| | 47 | 12.5X20 | 0.20 | 270 | ESMG161E□□470MK20S | 68 | | 20X25 | 0.15 | 400 | ESMG351E□□680MN25S | |
| | 100 | 12.5X25 | 0.20 | 430 | ESMG161E□□101MK25S | 100 | | 18X31.5 | 0.24 | 530 | ESMG351E□□101MMN3S | |
| | 220 | 16X31.5 | 0.20 | 760 | ESMG161E□□221MLN3S | 100 | | 20X30 | 0.15 | 500 | ESMG351E□□101MN30S | |
| | 220 | 20X25 | 0.15 | 730 | ESMG161E□□221MN25S | 120 | 20X35 | 0.15 | 560 | ESMG351E□□121MN35S | | |
| | 330 | 18X35.5 | 0.20 | 995 | ESMG161E□□331MMP1S | 400 | 1.0 | 6.3X11 | 0.24 | 22 | ESMG401E□□1R0MF11D | |
| | 330 | 20X30 | 0.15 | 920 | ESMG161E□□331MN30S | | 2.2 | 8X11.5 | 0.24 | 38 | ESMG401E□□2R2MHB5D | |
| | 390 | 20X35 | 0.15 | 1,160 | ESMG161E□□391MN35S | | 3.3 | 10X12.5 | 0.24 | 54 | ESMG401E□□3R3MJC5S | |
| | 390 | 22X30 | 0.15 | 1,160 | ESMG161E□□391MP30S | | 4.7 | 10X16 | 0.24 | 71 | ESMG401E□□4R7MJ16S | |
| | 470 | 20X40 | 0.15 | 1,340 | ESMG161E□□471MN40S | | 10 | 10X20 | 0.24 | 115 | ESMG401E□□100MJ20S | |
| | 470 | 22X35 | 0.15 | 1,340 | ESMG161E□□471MP35S | | 22 | 12.5X25 | 0.24 | 205 | ESMG401E□□220MK25S | |
| | 560 | 22X40 | 0.15 | 1,470 | ESMG161E□□561MP40S | | 33 | 16X25 | 0.24 | 275 | ESMG401E□□330ML25S | |
| 200 | 3.3 | 6.3X11 | 0.20 | 40 | ESMG201E□□3R3MF11D | | 33 | 20X20 | 0.15 | 260 | ESMG401E□□330MN20S | |
| | 4.7 | 8X11.5 | 0.20 | 55 | ESMG201E□□4R7MHB5D | | 47 | 16X31.5 | 0.24 | 350 | ESMG401E□□470MLN3S | |
| | 10 | 10X12.5 | 0.20 | 94 | ESMG201E□□100MJC5S | | 56 | 20X25 | 0.15 | 350 | ESMG401E□□560MN25S | |
| | 22 | 10X20 | 0.20 | 170 | ESMG201E□□220MJ20S | | 68 | 20X30 | 0.15 | 420 | ESMG401E□□680MN30S | |
| | 33 | 10X20 | 0.20 | 205 | ESMG201E□□330MJ20S | | 100 | 20X35 | 0.15 | 520 | ESMG401E□□101MN35S | |
| | 47 | 12.5X20 | 0.20 | 270 | ESMG201E□□470MK20S | 100 | 22X30 | 0.15 | 520 | ESMG401E□□101MP30S | | |
| | 100 | 16X25 | 0.20 | 475 | ESMG201E□□101ML25S | 120 | 20X40 | 0.15 | 580 | ESMG401E□□121MN40S | | |
| | 100 | 20X20 | 0.15 | 460 | ESMG201E□□101MN20S | 120 | 22X35 | 0.15 | 580 | ESMG401E□□121MP35S | | |
| | 180 | 20X25 | 0.15 | 660 | ESMG201E□□181MN25S | 450 | 2.2 | 10X12.5 | 0.24 | 32 | ESMG451E□□2R2MJC5S | |
| | 220 | 18X35.5 | 0.20 | 810 | ESMG201E□□221MMP1S | | 3.3 | 10X16 | 0.24 | 44 | ESMG451E□□3R3MJ16S | |
| | 220 | 20X30 | 0.15 | 750 | ESMG201E□□221MN30S | | 4.7 | 10X20 | 0.24 | 56 | ESMG451E□□4R7MJ20S | |
| | 270 | 20X30 | 0.15 | 830 | ESMG201E□□271MN30S | | 10 | 12.5X20 | 0.24 | 91 | ESMG451E□□100MK20S | |
| | 330 | 20X35 | 0.15 | 1,070 | ESMG201E□□331MN35S | | 22 | 16X25 | 0.24 | 165 | ESMG451E□□220ML25S | |
| | 330 | 22X30 | 0.15 | 1,070 | ESMG201E□□331MP30S | | 22 | 20X20 | 0.20 | 180 | ESMG451E□□220MN20S | |
| | 390 | 20X40 | 0.15 | 1,190 | ESMG201E□□391MN40S | | 33 | 16X31.5 | 0.24 | 215 | ESMG451E□□330MLN3S | |
| | 390 | 22X30 | 0.15 | 1,160 | ESMG201E□□391MP30S | | 33 | 20X25 | 0.20 | 240 | ESMG451E□□330MN25S | |
| 470 | 22X40 | 0.15 | 1,350 | ESMG201E□□471MP40S | 47 | | 16X35.5 | 0.24 | 265 | ESMG451E□□470MLP1S | | |
| 560 | 22X40 | 0.15 | 1,430 | ESMG201E□□561MP40S | 47 | | 20X25 | 0.20 | 290 | ESMG451E□□470MN25S | | |
| 250 | 2.2 | 6.3X11 | 0.20 | 32 | ESMG251E□□2R2MF11D | | 56 | 20X30 | 0.20 | 320 | ESMG451E□□560MN30S | |
| | 3.3 | 8X11.5 | 0.20 | 46 | ESMG251E□□3R3MHB5D | | 68 | 20X35 | 0.20 | 370 | ESMG451E□□680MN35S | |
| | 4.7 | 8X11.5 | 0.20 | 55 | ESMG251E□□4R7MHB5D | 68 | 22X30 | 0.20 | 370 | ESMG451E□□680MP30S | | |
| | 10 | 10X16 | 0.20 | 105 | ESMG251E□□100MJ16S | 82 | 20X40 | 0.20 | 420 | ESMG451E□□820MN40S | | |
| | 22 | 10X20 | 0.20 | 170 | ESMG251E□□220MJ20S | 82 | 22X35 | 0.20 | 420 | ESMG451E□□820MP35S | | |
| | 33 | 12.5X20 | 0.20 | 230 | ESMG251E□□330MK20S | 100 | 22X40 | 0.20 | 470 | ESMG451E□□101MP40S | | |
| | 47 | 12.5X25 | 0.20 | 295 | ESMG251E□□470MK25S | | | | | | | |
| | 82 | 20X20 | 0.15 | 420 | ESMG251E□□820MN20S | | | | | | | |
| | 100 | 16X31.5 | 0.20 | 515 | ESMG251E□□101MLN3S | | | | | | | |
| | 100 | 20X25 | 0.15 | 490 | ESMG251E□□101MN25S | | | | | | | |
| | 120 | 20X25 | 0.15 | 530 | ESMG251E□□121MN25S | | | | | | | |
| | 180 | 20X30 | 0.15 | 680 | ESMG251E□□181MN30S | | | | | | | |
| | 220 | 18X40 | 0.20 | 825 | ESMG251E□□221MM40S | | | | | | | |
| | 220 | 20X35 | 0.15 | 780 | ESMG251E□□221MN35S | | | | | | | |
| | 220 | 22X30 | 0.15 | 820 | ESMG251E□□221MP30S | | | | | | | |
| | 270 | 20X40 | 0.15 | 880 | ESMG251E□□271MN40S | | | | | | | |
| | 270 | 22X35 | 0.15 | 880 | ESMG251E□□271MP35S | | | | | | | |
| | 330 | 22X40 | 0.15 | 1,060 | ESMG251E□□331MP40S | | | | | | | |

□ : Enter the appropriate lead forming or taping code.

◆ RATED RIPPLE CURRENT MULTIPLIERS

● Frequency Multipliers

(φ5 to φ18)

| Capacitance (μF) \ Frequency (Hz) | 50 | 120 | 300 | 1k | 10k | 100k |
|-----------------------------------|------|------|------|------|------|------|
| 1.0 to 4.7 | 0.65 | 1.00 | 1.35 | 1.75 | 2.30 | 2.50 |
| 10 to 47 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 1.80 |
| 100 to 1,000 | 0.80 | 1.00 | 1.15 | 1.30 | 1.40 | 1.50 |
| 2,200 to | 0.85 | 1.00 | 1.03 | 1.05 | 1.08 | 1.08 |

(φ20, φ22)

| Rated Voltage (V _r) \ Frequency (Hz) | 50 | 120 | 300 | 1k | 10k | 100k |
|--|------|------|------|------|------|------|
| 6.3 to 50 | 0.95 | 1.00 | 1.03 | 1.05 | 1.08 | 1.08 |
| 63 to 100 | 0.92 | 1.00 | 1.07 | 1.13 | 1.19 | 1.20 |
| 160 to 250 | 0.81 | 1.00 | 1.17 | 1.32 | 1.45 | 1.50 |
| 315 to 450 | 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.