

|          |     |        |         |      |
|----------|-----|--------|---------|------|
| D max    | 5   | >5 ≤ 7 | >7 < 16 | ≥ 16 |
| Ød ±0.05 | 0.5 | 0.6    | 0.8     | 1    |

All dimensions are in mm.

**METALLIZED POLYPROPYLENE CAPACITOR  
MULTIPURPOSE APPLICATIONS**

**Typical applications:** temperature compensation circuits, timing, oscillator circuits, power factor correction and coupling capacitor in SMPS applications.

PRODUCT CODE: **A70**

**PRODUCT CODE SYSTEM**

The part number, comprising 14 digits, is formed as follows:



- Digit 1 to 3 Series code.
- Digit 4 d.c. rated voltage:  
G =160V I =250V M= 400V P = 630V
- Digit 5 Length (mm):  
F=11; H=14; K=20.5; Q=28; T=33
- Digit 6 to 9 Digits 7 - 8 - 9 indicate the first three digits of Capacitance value and the 6th digit indicates the number of zeros that must be added to obtain the Rated Capacitance in pF.
- Digit 10 to 11 Mechanical version and/or packaging (table1)
- Digit 12 Identifies the dimensions and electrical characteristics.
- Digit 13 Internal use
- Digit 14 Capacitance tolerance:  
J=5%; K=10%; M=20%.

**GENERAL TECHNICAL DATA**

- Dielectric:** polypropylene film.
- Plates:** aluminium layer deposited by evaporation under vacuum.
- Winding:** non-inductive type.
- Leads:** tinned wire.
- Protection:** polyester tape wrapping and thermosetting resin end fill.
- Marking:** Manufacturer's logo, series (1.70), dielectric code (MKP), capacitance, tolerance, D.C. rated voltage.
- Climatic category:** 55/105/56 IEC 60068-1
- Operating temperature range:** -55 to +105°C
- Related documents:** IEC 60384-16

**Winding scheme**

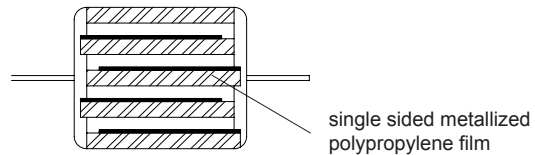


Table 1 (for more detailed information, please refer to page 14).

| Standard packaging style | Ordering code (Digit 10 to 11) |
|--------------------------|--------------------------------|
| Reel Ø 355 mm            | 26                             |
| Loose                    | AA                             |

**METALLIZED POLYPROPYLENE CAPACITOR  
MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: A70

| Rated Cap. | 160Vdc/90Vac |       | Max dv/dt (V/μs) | Max K <sub>0</sub> (V <sup>2</sup> /μs) | Part Number     |
|------------|--------------|-------|------------------|---|-----------------|
|            | D max        | L max |                  |   |                 |
| 0.022 μF   | 5.0          | 11.0  | 5                | 1.60 E3                                 | A70GF 2220--0-- |
| 0.033 μF   | 5.0          | 11.0  | 5                | 1.60 E3                                 | A70GF 2330--0-- |
| 0.047 μF   | 5.0          | 11.0  | 5                | 1.60 E3                                 | A70GF 2470--0-- |
| 0.068 μF   | 5.5          | 14.0  | 5                | 1.60 E3                                 | A70GH2680--0--  |
| 0.10 μF    | 5.5          | 14.0  | 5                | 1.60 E3                                 | A70GH3100--0--  |
| 0.15 μF    | 6.5          | 14.0  | 5                | 1.60 E3                                 | A70GH3150--0--  |
| 0.22 μF    | 7.5          | 14.0  | 5                | 1.60 E3                                 | A70GH3220--0--  |
| 0.33 μF    | 7.0          | 20.5  | 3                | 0.96 E3                                 | A70GK3330--0--  |
| 0.47 μF    | 8.0          | 20.5  | 3                | 0.96 E3                                 | A70GK3470--0--  |
| 0.68 μF    | 8.0          | 28.0  | 2                | 0.64 E3                                 | A70GQ3680--0--  |
| 1.0 μF     | 9.5          | 28.0  | 2                | 0.64 E3                                 | A70GQ4100--0--  |
| 1.5 μF     | 11.0         | 28.0  | 2                | 0.64 E3                                 | A70GQ4150--0--  |
| 2.2 μF     | 12.0         | 33.0  | 1                | 0.32 E3                                 | A70GT 4220--0-- |
| 3.3 μF     | 14.5         | 33.0  | 1                | 0.32 E3                                 | A70GT 4330--0-- |
| 4.7 μF     | 17.0         | 33.0  | 1                | 0.32 E3                                 | A70GT 4470--0-- |

| Rated Cap. | 400Vdc/220Vac* |       | Max dv/dt (V/μs) | Max K <sub>0</sub> (V <sup>2</sup> /μs) | Part Number     |
|------------|----------------|-------|------------------|---|-----------------|
|            | D max          | L max |                  |   |                 |
| 6800 pF    | 5.0            | 11.0  | 25.0             | 20.0 E3                                 | A70MF 1680--0-- |
| 0.010 μF   | 5.5            | 14.0  | 13.5             | 11.0 E3                                 | A70MH2100--0--  |
| 0.015 μF   | 6.0            | 14.0  | 13.5             | 11.0 E3                                 | A70MH2150--0--  |
| 0.022 μF   | 6.0            | 14.0  | 13.5             | 11.0 E3                                 | A70MH2220--0--  |
| 0.033 μF   | 6.5            | 14.0  | 13.5             | 11.0 E3                                 | A70MH2330--0--  |
| 0.047 μF   | 8.0            | 14.0  | 13.5             | 11.0 E3                                 | A70MH2470--0--  |
| 0.068 μF   | 7.0            | 20.5  | 10.0             | 8.0 E3                                  | A70MK2680--0--  |
| 0.10 μF    | 8.0            | 20.5  | 10.0             | 8.0 E3                                  | A70MK3100--0--  |
| 0.15 μF    | 8.0            | 28.0  | 6.5              | 5.2 E3                                  | A70MQ3150--0--  |
| 0.22 μF    | 9.5            | 28.0  | 6.5              | 5.2 E3                                  | A70MQ3220--0--  |
| 0.33 μF    | 11.0           | 28.0  | 6.5              | 5.2 E3                                  | A70MQ3330--0--  |
| 0.47 μF    | 13.0           | 28.0  | 6.5              | 5.2 E3                                  | A70MQ3470--0--  |
| 0.68 μF    | 13.5           | 33.0  | 4.0              | 3.2 E3                                  | A70MT 3680--0-- |
| 1.0 μF     | 16.5           | 33.0  | 4.0              | 3.2 E3                                  | A70MT 4100--0-- |
| 1.5 μF     | 20.0           | 33.0  | 4.0              | 3.2 E3                                  | A70MT 4150--0-- |

| Rated Cap. | 250Vdc/200Vac |       | Max dv/dt (V/μs) | Max K <sub>0</sub> (V <sup>2</sup> /μs) | Part Number     |
|------------|---------------|-------|------------------|---|-----------------|
|            | D max         | L max |                  |   |                 |
| 0.010 μF   | 5.0           | 11.0  | 11.0             | 5.5 E3                                  | A70IF 2100--0-- |
| 0.015 μF   | 5.0           | 11.0  | 11.0             | 5.5 E3                                  | A70IF 2150--0-- |
| 0.022 μF   | 5.5           | 14.0  | 10.0             | 5.0 E3                                  | A70IH 2220--0-- |
| 0.033 μF   | 5.5           | 14.0  | 10.0             | 5.0 E3                                  | A70IH 2330--0-- |
| 0.047 μF   | 6.0           | 14.0  | 10.0             | 5.0 E3                                  | A70IH 2470--0-- |
| 0.068 μF   | 7.0           | 14.0  | 10.0             | 5.0 E3                                  | A70IH 2680--0-- |
| 0.10 μF    | 8.5           | 14.0  | 10.0             | 5.0 E3                                  | A70IH 3100--0-- |
| 0.15 μF    | 7.5           | 20.5  | 7.0              | 3.5 E3                                  | A70IK 3150--0-- |
| 0.22 μF    | 9.0           | 20.5  | 7.0              | 3.5 E3                                  | A70IK 3220--0-- |
| 0.33 μF    | 8.5           | 28.0  | 4.0              | 2.0 E3                                  | A70IQ 3330--0-- |
| 0.47 μF    | 10.0          | 28.0  | 4.0              | 2.0 E3                                  | A70IQ 3470--0-- |
| 0.68 μF    | 11.5          | 28.0  | 4.0              | 2.0 E3                                  | A70IQ 3680--0-- |
| 1.0 μF     | 12.5          | 33.0  | 2.5              | 1.3 E3                                  | A70IT 4100--0-- |
| 1.5 μF     | 15.0          | 33.0  | 2.5              | 1.3 E3                                  | A70IT 4150--0-- |
| 2.2 μF     | 18.0          | 33.0  | 2.5              | 1.3 E3                                  | A70IT 4220--0-- |
| 3.3 μF     | 21.5          | 33.0  | 2.5              | 1.3 E3                                  | A70IT 4330--0-- |

| Rated Cap. | 630Vdc/250Vac* |       | Max dv/dt (V/μs) | Max K <sub>0</sub> (V <sup>2</sup> /μs) | Part Number     |
|------------|----------------|-------|------------------|---|-----------------|
|            | D max          | L max |                  |   |                 |
| 1000 pF    | 5.0            | 11.0  | 30               | 38.0 E3                                 | A70PF 1100--0-- |
| 1500 pF    | 5.0            | 11.0  | 30               | 38.0 E3                                 | A70PF 1150--0-- |
| 2200 pF    | 5.0            | 11.0  | 30               | 38.0 E3                                 | A70PF 1220--0-- |
| 3300 pF    | 5.0            | 11.0  | 30               | 38.0 E3                                 | A70PF 1330--0-- |
| 4700 pF    | 5.0            | 11.0  | 30               | 38.0 E3                                 | A70PF 1470--0-- |
| 6800 pF    | 5.5            | 14.0  | 20               | 25.0 E3                                 | A70PH 1680--0-- |
| 0.010 μF   | 6.0            | 14.0  | 20               | 25.0 E3                                 | A70PH 2100--0-- |
| 0.015 μF   | 7.0            | 14.0  | 20               | 25.0 E3                                 | A70PH 2150--0-- |
| 0.022 μF   | 8.5            | 14.0  | 20               | 25.0 E3                                 | A70PH 2220--0-- |
| 0.033 μF   | 7.5            | 20.5  | 15               | 19.0 E3                                 | A70PK 2330--0-- |
| 0.047 μF   | 8.5            | 20.5  | 15               | 19.0 E3                                 | A70PK 2470--0-- |
| 0.068 μF   | 8.5            | 28.0  | 10               | 13.0 E3                                 | A70PQ 2680--0-- |
| 0.10 μF    | 10.0           | 28.0  | 10               | 13.0 E3                                 | A70PQ 3100--0-- |
| 0.15 μF    | 11.5           | 28.0  | 10               | 13.0 E3                                 | A70PQ 3150--0-- |
| 0.22 μF    | 12.5           | 33.0  | 6                | 7.6 E3                                  | A70PT 3220--0-- |
| 0.33 μF    | 15.0           | 33.0  | 6                | 7.6 E3                                  | A70PT 3330--0-- |
| 0.47 μF    | 17.5           | 33.0  | 6                | 7.6 E3                                  | A70PT 3470--0-- |
| 0.68 μF    | 21.0           | 33.0  | 6                | 7.6 E3                                  | A70PT 3680--0-- |

Mechanical version and packaging (Table1) \_\_\_\_\_  
Internal use \_\_\_\_\_  
Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

Mechanical version and packaging (Table1) \_\_\_\_\_  
Internal use \_\_\_\_\_  
Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

All dimensions are in mm.

Note 1: If the working voltage (V) is lower than the rated voltage (V<sub>R</sub>), the capacitor may work at higher dv/dt. In this case the maximum value allowed is obtained multiplying the above value (see table dv/dt) with the ratio V<sub>R</sub>/V. The pulse characteristic K<sub>0</sub> depends on the voltage wave-form and in any case it cannot overcome the value given in the above table. The dv/dt test is carried out at 2 times the above values.

Note 2: Special version for line applications (rated voltage 250 Vac) available upon request.

\* Not suitable for across-the-line applications. Please refer to Interference Suppression Capacitors (page 145).

**METALLIZED POLYPROPYLENE CAPACITOR  
MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: A70

**ELECTRICAL CHARACTERISTICS**

**Rated voltage ( $V_R$ ):** 160 Vdc - 250Vdc  
400 Vdc - 630 Vdc

**Rated temperature ( $T_R$ ):** +85°C

**Temperature derated voltage:**  
for temperatures between +85°C and +105°C a decreasing factor of 1.25% per degree °C on the rated voltage  $V_R$  (d.c. and a.c.) has to be applied.

**Capacitance range:** 1000pF to 4.7µF

**Capacitance values:**

E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz):

±5% (J); ±10% (K); ±20% (M).

**Total self-inductance (L):**

max 1 nH per 1 mm lead and capacitor length.

**Dissipation factor (DF):**

$tg\delta \times 10^{-4}$  at +25°C ±5°C

| kHz | C<0.1 µF | 0.1 µF to 1 µF | >1 µF |
|-----|----------|----------------|-------|
| 1   | ≤ 6      | ≤ 6            | ≤ 6   |
| 10  | ≤10      | ≤20            |       |
| 100 | ≤30      |                |       |

**Insulation resistance:**

**Test conditions**

Temperature: +25°C ± 5°C

Voltage charge time: 1 min

Voltage charge: 100Vdc

**Performance**

≥1×10<sup>5</sup> MΩ for C ≤ 0.33 µF (5×10<sup>5</sup> MΩ)\*

≥30000 s for C > 0.33 µF (150000 s)\*

\*Typical value

**Test voltage between terminations:**

1.6x $V_R$  applied for 2 s at +25°C ±5°C.

**TEST METHOD AND PERFORMANCE**

**Damp heat, steady state:**

**Test conditions**

Temperature: +40°C±2°C

Relative humidity (RH): 93% ±2%

Test duration: 56 days

**Performance**

Capacitance change  $|\Delta C/C|$ : ≤2%

DF change ( $\Delta tg\delta$ ): ≤10×10<sup>-4</sup> at 1kHz

Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**

Temperature: +85°C±2°C

Test duration: 2000 h

Voltage applied: 1.25x $V_R$

**Performance**

Capacitance change  $|\Delta C/C|$ : ≤3%

DF change ( $\Delta tg\delta$ ): ≤10×10<sup>-4</sup> at 10kHz for C≤1µF

≤10×10<sup>-4</sup> at 1kHz for C>1µF

Insulation resistance: ≥50% of initial limit.

**Resistance to soldering heat:**

**Test conditions**

Solder bath temperature: +260°C±5°C

Dipping time (with heat screen): 10 s ±1 s

**Performance**

Capacitance change  $|\Delta C/C|$ : ≤1%

DF change ( $\Delta tg\delta$ ): ≤10×10<sup>-4</sup> at 10kHz for C≤1µF

≤10×10<sup>-4</sup> at 1kHz for C>1µF

Insulation resistance: ≥ initial limit.

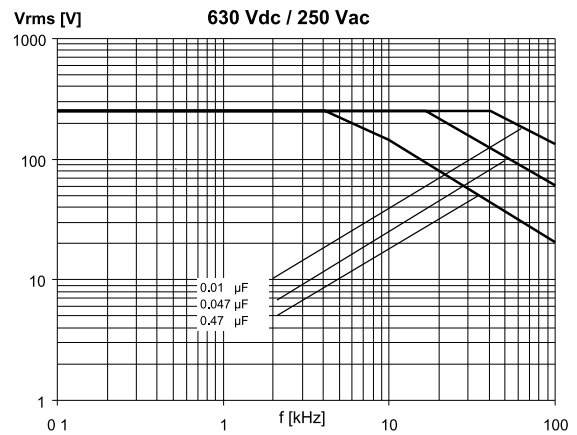
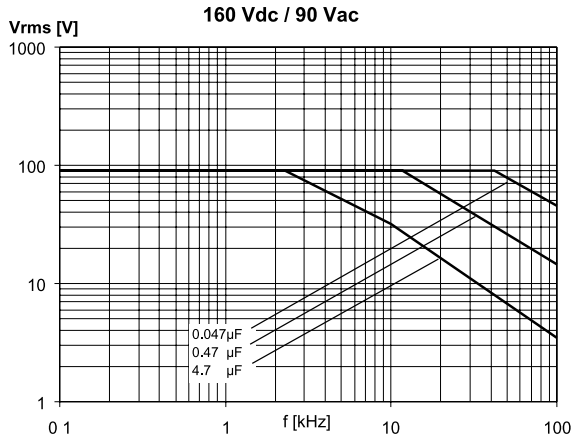
**Long term stability** (after two years):

**Storage:** standard environmental conditions (see page 12).

**Performance**

Capacitance change  $|\Delta C/C|$ : ≤0.5%

MAX. VOLTAGE (Vr.m.s.) VERSUS FREQUENCY (sinusoidal wave-form / Th ≤ 40°C)



**METALLIZED POLYPROPYLENE CAPACITOR  
MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: **A70**

MAX. CURRENT (I<sub>r.m.s.</sub>) VERSUS FREQUENCY (sinusoidal wave-form / Th ≤ 40°C)

