# PHE820

- **EMI suppressor, class X2, metallized polyester**
- **0.01 – 2.2 µF, 275/300 VAC, +100°C**

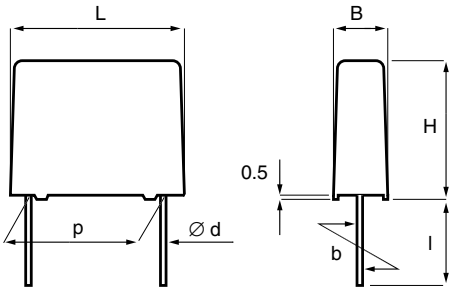
RoHS Compliant

## TYPICAL APPLICATIONS

The capacitors are intended for use as Interference suppressor in X2 and across-the-line applications.

## CONSTRUCTION

Series winding of metallized polyester, encapsulated in self-extinguishing material meeting the requirements of UL 94V-0.




| p | d | std l | max l | b |
|---|---|---|---|---|
| 15.0 ± 0.4 | 0.8 | 17 | 30 | ±0.4 |
| 22.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 27.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 37.5 ± 0.5 | 1.0 | 6 | 30 | ±0.7 |

Tolerance in lead length
< 30 mm $^{+0}_{-1}$ mm

30 mm $^{+5}_{-0}$ mm

## TECHNICAL DATA

| | PHE820 M | PHE820 E |
|---|---|---|
| **Rated voltage** | 275 VAC 50/60 Hz | 300 VAC 50/60 Hz |
| **Capacitance range** | 0.01 – 2.2 µF | 0.01 – 2.2 µF |
| **Capacitance tolerance** | ± 20% standard, ± 10% option | |
| **Temperature range** | –40 to +100°C | |
| **Climatic category** | 40/100/56/B | |
| **Approvals** | ENEC, UL, CSA | |
| **Dissipation factor tanδ** | ≤ 1.0% at 1 kHz | |
| **Insulation resistance** | C ≤ 0.33 µF ≥ 30 000 MΩ<br>C > 0.33 µF ≥ 10 000 s | |
| **Resonance frequency** | Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead length. | |
| **Test voltage between terminals** | The 100% screening factory test is carried out at 2150 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. | |
| **In DC applications** | Recommended voltage ≤ 760 VDC | |

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14: 2005 | 1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temp. | |
| **Vibration** | IEC 60068–2–6 Test Fc | 3 directions at 2 hours each, 10 – 55 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29 Test Eb | 1000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14 Test Na | Upper and lower rated temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14: 2005 | | |
| **Passive flammability** | EN/IEC 60384-14: 2005 | | |
| **Humidity** | IEC 60068-2-3 Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance* µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **275 VAC, PHE820M** | | | | | | | |
| **LEAD SPACING 15 MM** | | | | | | | |
| 0.010 | B04 | 5.5 | 10.5 | 18.0 | 13 | 100 | PHE820MB5100MR17 |
| 0.015 | B04 | 5.5 | 10.5 | 18.0 | 11 | 100 | PHE820MB5150MR17 |
| 0.022 | B04 | 5.5 | 10.5 | 18.0 | 9.0 | 100 | PHE820MB5220MR17 |
| 0.033 | B05 | 5.5 | 12.5 | 18.0 | 7.5 | 100 | PHE820MB5330MR17 |
| 0.047 | B10 | 6.5 | 12.5 | 18.0 | 6.5 | 100 | PHE820MB5470MR17 |
| 0.068 | B06 | 7.5 | 14.5 | 18.0 | 5.5 | 100 | PHE820MB5680MR17 |
| 0.10 | B11 | 8.5 | 16.0 | 18.0 | 4.5 | 100 | PHE820MB6100MR17 |
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.10 | D13 | 6.5 | 14.5 | 26.0 | 4.5 | 100 | PHE820MD6100MR06L2 |
| 0.15 | D14 | 8.0 | 16.0 | 26.0 | 3.9 | 100 | PHE820MD6150MR06L2 |
| 0.22 | D15 | 9.0 | 18.5 | 26.0 | 2.7 | 100 | PHE820MD6220MR06L2 |
| 0.33 | D16 | 11.0 | 21.5 | 26.0 | 2.5 | 100 | PHE820MD6330MR06L2 |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.47 | F12 | 11.5 | 22.5 | 31.5 | 1.9 | 100 | PHE820MF6470MR06L2 |
| 0.68 | F13 | 14.5 | 24.5 | 31.5 | 1.6 | 100 | PHE820MF6680MR06L2 |
| 1.0 | F14 | 17.5 | 28.0 | 31.5 | 1.3 | 100 | PHE820MF7100MR06L2 |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 1.5 | R02 | 16.5 | 32.0 | 41.0 | 0.75 | 100 | PHE820MR7150MR06L2 |
| 2.2 | R03 | 19.0 | 36.0 | 41.0 | 0.65 | 100 | PHE820MR7220MR06L2 |
| **300 VAC, PHE820E** | | | | | | | |
| **LEAD SPACING 15 MM** | | | | | | | |
| 0.010 | B04 | 5.5 | 10.5 | 18.0 | 13 | 100 | PHE820EB5100MR17 |
| 0.015 | B04 | 5.5 | 10.5 | 18.0 | 11 | 100 | PHE820EB5150MR17 |
| 0.022 | B04 | 5.5 | 10.5 | 18.0 | 9.0 | 100 | PHE820EB5220MR17 |
| 0.033 | B05 | 5.5 | 12.5 | 18.0 | 7.5 | 100 | PHE820EB5330MR17 |
| 0.047 | B10 | 6.5 | 12.5 | 18.0 | 6.5 | 100 | PHE820EB5470MR17 |
| 0.068 | B06 | 7.5 | 14.5 | 18.0 | 5.5 | 100 | PHE820EB5680MR17 |
| 0.10 | B11 | 8.5 | 16.0 | 18.0 | 4.5 | 100 | PHE820EB6100MR17 |
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.10 | D13 | 6.5 | 14.5 | 26.0 | 4.5 | 100 | PHE820ED6100MR06L2 |
| 0.15 | D14 | 8.0 | 16.0 | 26.0 | 3.9 | 100 | PHE820ED6150MR06L2 |
| 0.22 | D15 | 9.0 | 18.5 | 26.0 | 2.7 | 100 | PHE820ED6220MR06L2 |
| 0.33 | D16 | 11.0 | 21.5 | 26.0 | 2.5 | 100 | PHE820ED6330MR06L2 |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.33 | F11 | 10.5 | 20.5 | 31.5 | 2.4 | 100 | PHE820EF6330MR06L2 |
| 0.47 | F12 | 11.5 | 22.5 | 31.5 | 1.9 | 100 | PHE820EF6470MR06L2 |
| 0.68 | F13 | 14.5 | 24.5 | 31.5 | 1.6 | 100 | PHE820EF6680MR06L2 |
| 1.0 | F14 | 17.5 | 28.0 | 31.5 | 1.3 | 100 | PHE820EF7100MR06L2 |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 1.5 | R02 | 16.5 | 32.0 | 41.0 | 0.75 | 100 | PHE820ER7150MR06L2 |
| 2.2 | R03 | 19.0 | 36.0 | 41.0 | 0.65 | 100 | PHE820ER7220MR06L2 |

*The complete serie includes C values according to the E12 series. Details on request.

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$ = 250 VAC) |
| | UL 1414 | ($U_R$ = 250 VAC) |
| CSA | C 22.2 No.8 | |
| | C 22.2 No.1 | ($U_R$ = 125 VAC) ($\leq$ 0.47 µF) |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Capacitance tolerance code
- Rated voltage
- X2
- Approval marks
- Manufacturing code (year, month)
- Climatic category according to IEC 60068-1, appendix A
- Passive flammability class

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# PHE840E

RoHS Compliant

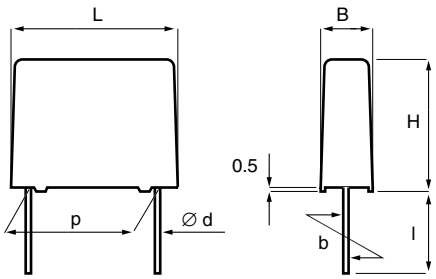
- **EMI suppressor, class X2, metallized polypropylene**
- **0.01 – 10 µF, 300 VAC, +105°C**
- **New improved design: small dimensions including low profile capacitors**

## TYPICAL APPLICATIONS

For worldwide use as electromagnetic interference suppressor in all X2 and across-the-line applications.
Not for use in series with the mains.
See www.kemet.com for more information.

## CONSTRUCTION

Metallized polypropylene winding, encapsulated in self-extinguishing material meeting the requirements of UL 94 V–0.




| P | d | std l | max l | b |
|---|---|---|---|---|
| 10.0 ± 0.4 | 0.6 | 17 | 30 | ±0.4 |
| 15.0 ± 0.4 | 0.8 | 17 | 30 | ±0.4 |
| 22.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 27.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 37.5 ± 0.5 | 1.0 | 6 | 30 | ±0.7 |

Tolerance in lead length
< 30 mm $^{+0}_{-1}$ mm

30 mm $^{+5}_{-0}$ mm

## TECHNICAL DATA

**Rated voltage**
300 VAC 50/60 Hz

**Capacitance range**
0.01 – 10 µF

**Capacitance tolerance**
± 20% standard, ± 10% option

**Temperature range**
–55 to +105°C

**Climatic category**
55/105/56/B

**Approvals**
ENEC, UL, cUL
related to rated voltage and climatic category

**Dissipation factor tanδ**
Maximum values at +23°C

| | C ≤ 0.1 µF | 0.1µF < C ≤ 1 µF | C > 1 µF |
|---|---|---|---|
| 1 kHz | 0.1% | 0.1% | 0.1% |
| 10 kHz | 0.2% | 0.4% | 0.8% |
| 100 kHz | 0.6% | – | – |

**Test voltage between terminals**
The 100% screening factory test is carried out at 2200 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.

**Resonance frequency**
Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead length.

**Insulation resistance**
C ≤ 0.33 µF: ≥ 30 000 MΩ
C > 0.33 µF: ≥ 10 000 ΩF

**In DC applications**
Recommended voltage ≤ 760 VDC

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14:2005 | 1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temperature | |
| **Vibration** | IEC 60068–2–6 Test Fc | 3 directions at 2 hours each, 10–55 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29 Test Eb | 1000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14 Test Na | Upper and lower rated temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005 UL1414 | Enclosure material of UL94V–0 flammability class | |
| **Humidity** | IEC 60068-2-3 Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **LEAD SPACING 10 MM** | | | | | | | |
| 0.010 | A01 | 4.0 | 9.0 | 13.0 | 11 | 100 | PHE840EA5100MA01R17 |
| 0.012 | A01 | 4.0 | 9.0 | 13.0 | 10 | 100 | PHE840EA5120MA01R17 |
| 0.015 | A01 | 4.0 | 9.0 | 13.0 | 9.4 | 100 | PHE840EA5150MA01R17 |
| 0.018 | A01 | 4.0 | 9.0 | 13.0 | 8.9 | 100 | PHE840EA5180MA01R17 |
| 0.022 | A01 | 4.0 | 9.0 | 13.0 | 8.6 | 100 | PHE840EA5220MA01R17 |
| 0.027 | A02 | 4.5 | 10.5 | 13.0 | 8.1 | 100 | PHE840EA5270MA02R17 |
| 0.033 | A02 | 4.5 | 10.5 | 13.0 | 7.6 | 100 | PHE840EA5330MA02R17 |
| 0.039 | A03 | 5.0 | 11.0 | 13.0 | 6.6 | 100 | PHE840EA5390MA03R17 |
| 0.047 | A03 | 5.0 | 11.0 | 13.0 | 6.1 | 100 | PHE840EA5470MA03R17 |
| 0.056 | A04 | 6.0 | 12.0 | 13.0 | 5.6 | 100 | PHE840EA5560MA04R17 |
| 0.068 | A04 | 6.0 | 12.0 | 13.0 | 5.0 | 100 | PHE840EA5680MA04R17 |
| **LEAD SPACING 15 MM** | | | | | | | |
| 0.033 | B04 | 5.5 | 10.5 | 18.0 | 5.9 | 100 | PHE840EB5330MB04R17 |
| 0.039 | B04 | 5.5 | 10.5 | 18.0 | 5.4 | 100 | PHE840EB5390MB04R17 |
| 0.047 | B04 | 5.5 | 10.5 | 18.0 | 5.0 | 100 | PHE840EB5470MB04R17 |
| 0.056 | B04 | 5.5 | 10.5 | 18.0 | 4.6 | 100 | PHE840EB5560MB04R17 |
| 0.068 | B04 | 5.5 | 10.5 | 18.0 | 4.2 | 100 | PHE840EB5680MB04R17 |
| 0.082 | B05 | 5.5 | 12.5 | 18.0 | 3.9 | 100 | PHE840EB5820MB05R17 |
| 0.10 | B05 | 5.5 | 12.5 | 18.0 | 3.7 | 100 | PHE840EB6100MB05R17 |
| 0.12 | B10 | 6.5 | 12.5 | 18.0 | 3.3 | 100 | PHE840EB6120MB10R17 |
| 0.15 | B10 | 6.5 | 12.5 | 18.0 | 2.8 | 100 | PHE840EB6150MB10R17 |
| 0.18 | B06 | 7.5 | 14.5 | 18.0 | 2.7 | 100 | PHE840EB6180MB06R17 |
| 0.22 | B06 | 7.5 | 14.5 | 18.0 | 2.6 | 100 | PHE840EX6220MB06R17 * |
| 0.22 | B17 | 13.0 | 12.5 | 18.0 | 2.5 | 100 | PHE840EQ6220MB17R17 |
| 0.22 | B12 | 8.0 | 15.0 | 18.0 | 2.5 | 100 | PHE840EB6220MB12R17 |
| 0.27 | B11 | 8.5 | 16.5 | 18.0 | 2.3 | 100 | PHE840EB6270MB11R17 |
| 0.33 | B11 | 8.5 | 16.5 | 18.0 | 2.2 | 100 | PHE840EX6330MB11R17* |
| 0.33 | B17 | 13.0 | 12.5 | 18.0 | 2.2 | 100 | PHE840EH6330MB17R17 |
| 0.33 | B14 | 9.5 | 17.5 | 18.0 | 2.0 | 100 | PHE840EB6330MB14R17 |
| 0.39 | B16 | 11.0 | 19.0 | 18.0 | 1.9 | 100 | PHE840EB6390MB16R17 |
| 0.47 | B16 | 11.0 | 19.0 | 18.0 | 1.8 | 100 | PHE840EB6470MB16R17 |
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.22 | D13 | 6.5 | 14.5 | 26.0 | 2.1 | 100 | PHE840ED6220MD13R06L2 |
| 0.27 | D17 | 7.0 | 16.5 | 26.0 | 1.9 | 100 | PHE840ED6270MD17R06L2 |
| 0.33 | D17 | 7.0 | 16.5 | 26.0 | 1.8 | 100 | PHE840ED6330MD17R06L2 |
| 0.39 | D14 | 8.0 | 16.0 | 26.0 | 1.7 | 100 | PHE840ED6390MD14R06L2 |
| 0.47 | D14 | 8.0 | 16.0 | 26.0 | 1.6 | 100 | PHE840EY6470MD14R06L2* |
| 0.47 | D15 | 9.0 | 18.5 | 26.0 | 1.5 | 100 | PHE840ED6470MD15R06L2 |
| 0.56 | D15 | 9.0 | 18.5 | 26.0 | 1.4 | 100 | PHE840ED6560MD15R06L2 |
| 0.68 | D15 | 9.0 | 18.5 | 26.0 | 1.3 | 100 | PHE840EY6680MD15R06L2* |
| 0.68 | D18 | 10.5 | 19.0 | 26.0 | 1.2 | 100 | PHE840ED6680MD18R06L2 |
| 0.82 | D16 | 11.0 | 21.5 | 26.0 | 1.1 | 100 | PHE840ED6820MD16R06L2 |
| 1.0 | D16 | 11.0 | 21.5 | 26.0 | 1.1 | 100 | PHE840EY7100MD16R06L2* |
| 1.0 | D20 | 13.5 | 23.0 | 26.0 | 1.0 | 100 | PHE840ED7100MD20R06L2 |
| 1.2 | D19 | 15.5 | 24.5 | 26.0 | 0.90 | 100 | PHE840ED7120MD19R06L2 |
| 1.5 | D19 | 15.5 | 24.5 | 26.0 | 0.85 | 100 | PHE840ED7150MD19R06L2 |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.82 | F11 | 10.5 | 20.5 | 31.5 | 1.0 | 100 | PHE840EF6820MF11R06L2 |
| 1.0 | F11 | 10.5 | 20.5 | 31.5 | 1.0 | 100 | PHE840EZ7100MF11R06L2* |
| 1.0 | F12 | 11.5 | 22.5 | 31.5 | 0.95 | 100 | PHE840EF7100MF12R06L2 |
| 1.0 | F17 | 21.0 | 12.5 | 31.5 | 0.95 | 100 | PHE840ET7100MF17R06L2 |
| 1.2 | F03 | 13.5 | 23.0 | 31.5 | 0.82 | 100 | PHE840EF7120MF03R06L2 |
| 1.5 | F13 | 14.5 | 24.5 | 31.5 | 0.73 | 100 | PHE840EF7150MF13R06L2 |
| 1.8 | F14 | 17.5 | 28.0 | 31.5 | 0.65 | 100 | PHE840EF7180MF14R06L2 |
| 2.2 | F14 | 17.5 | 28.0 | 31.5 | 0.64 | 100 | PHE840EZ7220MF14R06L2* |
| 2.2 | F15 | 19.0 | 29.0 | 31.5 | 0.62 | 100 | PHE840EF7220MF15R06L2 |
| 2.2 | F19 | 27.5 | 16.0 | 31.5 | 0.62 | 100 | PHE840ET7220MF19R06L2 |
| 2.7 | F15 | 19.0 | 29.0 | 31.5 | 0.58 | 100 | PHE840EF7270MF15R06L2 |
| 3.3 | F15 | 19.0 | 29.0 | 31.5 | 0.54 | 100 | PHE840EZ7330MF15R06L2* |
| 3.3 | F16 | 21.0 | 30.0 | 31.5 | 0.50 | 100 | PHE840EF7330MF16R06L2 |
| 3.3 | F18 | 31.0 | 19.0 | 31.5 | 0.50 | 100 | PHE840ET7330MF18R06L2 |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 1.8 | R05 | 13.0 | 24.0 | 41.0 | 0.60 | 100 | PHE840ER7180MR05R06L2 |
| 2.2 | R05 | 13.0 | 24.0 | 41.0 | 0.58 | 100 | PHE840ER7220MR05R06L2 |
| 2.7 | R04 | 15.0 | 26.0 | 41.0 | 0.53 | 100 | PHE840ER7270MR04R06L2 |
| 3.3 | R04 | 15.0 | 26.0 | 41.0 | 0.49 | 100 | PHE840ER7330MR04R06L2 |
| 3.9 | R02 | 16.5 | 32.0 | 41.0 | 0.46 | 100 | PHE840ER7390MR02R06L2 |
| 4.7 | R03 | 19.0 | 36.0 | 41.0 | 0.44 | 100 | PHE840ER7470MR03R06L2 |
| 5.6 | R06 | 21.0 | 38.0 | 41.0 | 0.41 | 100 | PHE840ER7560MR06R06L2 |
| 6.8 | R06 | 21.0 | 38.0 | 41.0 | 0.39 | 100 | PHE840ER7680MR06R06L2 |
| 8.2 | R08 | 28.0 | 43.0 | 41.0 | 0.30 | 100 | PHE840ER7820MR08R06L2 |
| 10 | R08 | 28.0 | 43.0 | 41.0 | 0.26 | 100 | PHE840ER8100MR08R06L2 |

* Only ± 20% tolerance

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283<br>UL 1414 | ($U_R$ = 250 VAC) |
| cUL recognition | C 22.2 No. 8<br>C 22.2 No. 1 | |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Capacitance tolerance code
- Rated voltage
- X2
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# PHE840M

RoHS Compliant

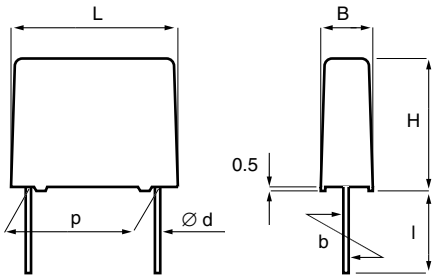
- **EMI suppressor, class X2, metallized polypropylene**
- **0.01 – 10.0 µF, 275/280 VAC, +105°C**
- **Small dimensions including low profile capacitors**

## TYPICAL APPLICATIONS

For worldwide use as electromagnetic interference suppressor in all X2 and across-the-line applications.
Not for use in series with the mains.
See www.kemet.com for more information.

## CONSTRUCTION

Metallized polypropylene film encapsulated with selfextinguishing epoxy resin in a box of material recognized to UL 94 V–0.




| p | d | std l | max l | b |
|---|---|---|---|---|
| 7.5 ± 0.4 | 0.6 | 17 | 20 | ±0.4 |
| 10.0 ± 0.4 | 0.6 | 17 | 30 | ±0.4 |
| 15.0 ± 0.4 | 0.8 | 17 | 30 | ±0.4 |
| 22.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 27.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 37.5 ± 0.5 | 1.0 | 6 | 30 | ±0.7 |

Tolerance in lead length
< 30 mm $^{+0}_{-1}$ mm

30 mm $^{+5}_{-0}$ mm

## TECHNICAL DATA

**Rated voltage**
275 VAC 50/60 Hz (ENEC)
280 VAC 50/60 Hz (UL, CSA)

**Capacitance range**
0.01 – 10.0 µF

**Capacitance tolerance**
± 20% standard, ± 10% option, ± 5% on request

**Temperature range**
–55 to +105°C

**Climatic category**
55/105/56/B

**Approvals**
ENEC, UL, cUL

**Dissipation factor**
Maximum values at +23°C

| | C ≤ 0.1 µF | 0.1µF < C ≤ 1 µF | C > 1 µF |
|---|---|---|---|
| 1 kHz | 0.1% | 0.1% | 0.1% |
| 10 kHz | 0.2% | 0.4% | 0.8% |
| 100 kHz | 0.6% | – | – |

**Test voltage between terminals**
The 100% screening factory test is carried out at 2200 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.

**Insulation resistance**
C ≤ 0.33 µF: ≥ 30 000 MΩ
C > 0.33 µF: ≥ 10 000 s

**In DC applications**
Recommended voltage ≤ 760 VDC

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14:2005 | 1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temperature | |
| **Vibration** | IEC 60068–2–6 Test Fc | 3 directions at 2 hours each, 10–55 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29 Test Eb | 1000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14 Test Na | Upper and lower rated temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005<br>UL1414 | Enclosure material of UL94V–0 flammability class | |
| **Humidity** | IEC 60068-2-3 Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **LEAD SPACING 7.5 MM** | | | | | | | |
| 0.010 | K01 | 4.0 | 8.0 | 10.0 | 14 | 100 | PHE840MK5100MK01R17 |
| 0.012 | K01 | 4.0 | 8.0 | 10.0 | 13 | 100 | PHE840MK5120MK01R17 |
| 0.015 | K01 | 4.0 | 8.0 | 10.0 | 12 | 100 | PHE840MK5150MK01R17 |
| 0.018 | K03 | 5.0 | 11.0 | 10.0 | 11 | 100 | PHE840MK5180MK03R17 |
| 0.022 | K03 | 5.0 | 11.0 | 10.0 | 10 | 100 | PHE840MK5220MK03R17 |
| 0.027 | K03 | 5.0 | 11.0 | 10.0 | 9.5 | 100 | PHE840MK5270MK03R17 |
| 0.033 | K03 | 5.0 | 11.0 | 10.0 | 8.8 | 100 | PHE840MK5330MK03R17 |
| 0.039 | K03 | 5.0 | 11.0 | 10.0 | 8.3 | 100 | PHE840MK5390MK03R17 |
| 0.047 | K04 | 6.0 | 12.0 | 10.0 | 7.5 | 100 | PHE840MK5470MK04R17 |
| **LEAD SPACING 10 MM** | | | | | | | |
| 0.022 | A01 | 4.0 | 9.0 | 13.0 | 8.5 | 100 | PHE840MA5220MA01R17 |
| 0.027 | A01 | 4.0 | 9.0 | 13.0 | 8.0 | 100 | PHE840MA5270MA01R17 |
| 0.033 | A01 | 4.0 | 9.0 | 13.0 | 7.6 | 100 | PHE840MA5330MA01R17 |
| 0.039 | A02 | 4.5 | 10.5 | 13.0 | 6.7 | 100 | PHE840MA5390MA02R17 |
| 0.047 | A02 | 4.5 | 10.5 | 13.0 | 5.9 | 100 | PHE840MA5470MA02R17 |
| 0.056 | A03 | 5.0 | 11.0 | 13.0 | 5.5 | 100 | PHE840MA5560MA03R17 |
| 0.068 | A03 | 5.0 | 11.0 | 13.0 | 4.9 | 100 | PHE840MA5680MA03R17 |
| 0.082 | A04 | 6.0 | 12.0 | 13.0 | 4.4 | 100 | PHE840MA5820MA04R17 |
| 0.10 | A05 | 9.5 | 7.5 | 13.0 | 4.0 | 100 | PHE840MP6100MA05R17 |
| 0.10 | A04 | 6.0 | 12.0 | 13.0 | 4.0 | 100 | PHE840MA6100MA04R17 |
| **LEAD SPACING 15 MM** | | | | | | | |
| 0.047 | B04 | 5.5 | 10.5 | 18.0 | 5.0 | 100 | PHE840MB5470MB04R17 |
| 0.056 | B04 | 5.5 | 10.5 | 18.0 | 4.6 | 100 | PHE840MB5560MB04R17 |
| 0.068 | B04 | 5.5 | 10.5 | 18.0 | 4.2 | 100 | PHE840MB5680MB04R17 |
| 0.082 | B05 | 5.5 | 12.5 | 18.0 | 3.9 | 100 | PHE840MB5820MB05R17 |
| 0.10 | B05 | 5.5 | 12.5 | 18.0 | 3.7 | 100 | PHE840MB6100MB05R17 |
| 0.12 | B10 | 6.5 | 12.5 | 18.0 | 3.3 | 100 | PHE840MB6120MB10R17 |
| 0.15 | B10 | 6.5 | 12.5 | 18.0 | 2.8 | 100 | PHE840MB6150MB10R17 |
| 0.18 | B06 | 7.5 | 14.5 | 18.0 | 2.7 | 100 | PHE840MB6180MB06R17 |
| 0.22 | B06 | 7.5 | 14.5 | 18.0 | 2.6 | 100 | PHE840MX6220MB06R17* |
| 0.22 | B17 | 13.0 | 12.5 | 18.0 | 2.5 | 100 | PHE840MQ6220MB17R17 |
| 0.22 | B12 | 8.0 | 15.0 | 18.0 | 2.5 | 100 | PHE840MB6220MB12R17 |
| 0.27 | B11 | 8.5 | 16.0 | 18.0 | 2.3 | 100 | PHE840MB6270MB11R17 |
| 0.33 | B11 | 8.5 | 16.0 | 18.0 | 2.2 | 100 | PHE840MX6330MB11R17* |
| 0.33 | B17 | 13.0 | 12.5 | 18.0 | 2.2 | 100 | PHE840MH6330MB17R17* |
| 0.33 | B14 | 9.5 | 17.5 | 18.0 | 2.0 | 100 | PHE840MB6330MB14R17 |
| 0.39 | B16 | 11.0 | 19.0 | 18.0 | 1.9 | 100 | PHE840MB6390MB16R17 |
| 0.47 | B16 | 11.0 | 19.0 | 18.0 | 1.8 | 100 | PHE840MB6470MB16R17 |

| Capacitance µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.22 | D13 | 6.5 | 14.5 | 26.0 | 2.1 | 100 | PHE840MD6220MD13R06L2 |
| 0.27 | D17 | 7.0 | 16.5 | 26.0 | 1.9 | 100 | PHE840MD6270MD17R06L2 |
| 0.33 | D17 | 7.0 | 16.5 | 26.0 | 1.8 | 100 | PHE840MD6330MD17R06L2 |
| 0.39 | D14 | 8.0 | 16.0 | 26.0 | 1.7 | 100 | PHE840MD6390MD14R06L2 |
| 0.47 | D14 | 8.0 | 16.0 | 26.0 | 1.6 | 100 | PHE840MY6470MD14R06L2* |
| 0.47 | D15 | 9.0 | 18.5 | 26.0 | 1.5 | 100 | PHE840MD6470MD15R06L2 |
| 0.56 | D15 | 9.0 | 18.5 | 26.0 | 1.4 | 100 | PHE840MD6560MD15R06L2 |
| 0.68 | D15 | 9.0 | 18.5 | 26.0 | 1.3 | 100 | PHE840MY6680MD15R06L2* |
| 0.68 | D18 | 10.5 | 19.0 | 26.0 | 1.2 | 100 | PHE840MD6680MD18R06L2 |
| 0.82 | D16 | 11.0 | 21.5 | 26.0 | 1.1 | 100 | PHE840MD6820MD16R06L2 |
| 1.0 | D16 | 11.0 | 21.5 | 26.0 | 1.1 | 100 | PHE840MY7100MD16R06L2* |
| 1.0 | D20 | 13.5 | 23.0 | 26.0 | 1.0 | 100 | PHE840MD7100MD20R06L2 |
| 1.2 | D19 | 15.5 | 24.5 | 26.0 | 0.90 | 100 | PHE840MD7120MD19R06L2 |
| 1.5 | D19 | 15.5 | 24.5 | 26.0 | 0.85 | 100 | PHE840MD7150MD19R06L2 |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.82 | F11 | 10.5 | 20.5 | 31.5 | 1.0 | 100 | PHE840MF6820MF11R06L2 |
| 1.0 | F11 | 10.5 | 20.5 | 31.5 | 1.0 | 100 | PHE840MZ7100MF11R06L2 * |
| 1.0 | F12 | 11.5 | 22.5 | 31.5 | 0.95 | 100 | PHE840MF7100MF12R06L2 |
| 1.2 | F03 | 13.5 | 23.0 | 31.5 | 0.82 | 100 | PHE840MF7120MF03R06L2 |
| 1.5 | F13 | 14.5 | 24.5 | 31.5 | 0.73 | 100 | PHE840MF7150MF13R06L2 |
| 1.8 | F14 | 17.5 | 28.0 | 31.5 | 0.65 | 100 | PHE840MF7180MF14R06L2 |
| 2.2 | F14 | 17.5 | 28.0 | 31.5 | 0.64 | 100 | PHE840MZ7220MF14R06L2 * |
| 2.2 | F15 | 19.0 | 29.0 | 31.5 | 0.62 | 100 | PHE840MF7220MF15R06L2 |
| 2.7 | F15 | 19.0 | 29.0 | 31.5 | 0.58 | 100 | PHE840MF7270MF15R06L2 |
| 3.3 | F15 | 19.0 | 29.0 | 31.5 | 0.54 | 100 | PHE840MZ7330MF15R06L2 * |
| 3.3 | F16 | 21.0 | 30.0 | 31.5 | 0.50 | 100 | PHE840MF7330MF16R06L2 |
| 3.3 | F18 | 31.0 | 19.0 | 31.5 | 0.50 | 100 | PHE840MT7330MF18R06L2 |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 1.8 | R05 | 13.0 | 24.0 | 41.0 | 0.60 | 100 | PHE840MR7180MR05R06L2 |
| 2.2 | R05 | 13.0 | 24.0 | 41.0 | 0.58 | 100 | PHE840MR7220MR05R06L2 |
| 2.7 | R04 | 15.0 | 26.0 | 41.0 | 0.53 | 100 | PHE840MR7270MR04R06L2 |
| 3.3 | R04 | 15.0 | 26.0 | 41.0 | 0.49 | 100 | PHE840MR7330MR04R06L2 |
| 3.9 | R02 | 16.5 | 32.0 | 41.0 | 0.46 | 100 | PHE840MR7390MR02R06L2 |
| 4.7 | R03 | 19.0 | 36.0 | 41.0 | 0.44 | 100 | PHE840MR7470MR03R06L2 |
| 5.6 | R06 | 21.0 | 38.0 | 41.0 | 0.41 | 100 | PHE840MR7560MR06R06L2 |
| 6.8 | R06 | 21.0 | 38.0 | 41.0 | 0.39 | 100 | PHE840MR7680MR06R06L2 |
| 8.2 | R08 | 28.0 | 43.0 | 41.0 | 0.30 | 100 | PHE840MR7820MR08R06L2 |
| 10.0 | R08 | 28.0 | 43.0 | 41.0 | 0.26 | 100 | PHE840MR8100MR08R06L2 |

* Only ± 20% tolerance

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$ = 280 VAC) |
| | UL 1414 | ($U_R$ = 250 VAC) |
| cUL recognition | C 22.2 No. 8 | ($U_R$ = 280 VAC) |
| | C 22.2 No. 1 | ($U_R$ = 250 VAC) |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Capacitance tolerance code
- Rated voltage
- X2
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# PHE841

RoHS Compliant

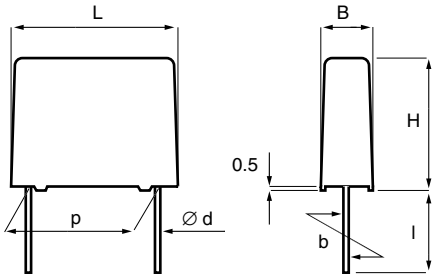
- **EMI suppressor, class X1, metallized polypropylene**
- **0.01 – 2.2 µF, 330 VAC, +100°C**

## TYPICAL APPLICATIONS

For worldwide use as electromagnetic interference suppressor in all X1 and across-the-line applications.
Not for use in series with the mains.
See www.kemet.com for more information.

## CONSTRUCTION

Metallized polypropylene winding, encapsulated in self-extinguishing material meeting the requirements of UL 94 V–0.




| p | d | std l | max l | b |
|---|---|---|---|---|
| 10.0 ± 0.4 | 0.6 | 17 | 30 | ±0.4 |
| 15.0 ± 0.4 | 0.8 | 17 | 30 | ±0.4 |
| 22.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 27.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 37.5 ± 0.5 | 1.0 | 6 | 30 | ±0.7 |

Tolerance in lead length
< 30 mm $^{+0}_{-1}$ mm

30 mm $^{+5}_{-0}$ mm

## TECHNICAL DATA

**Rated voltage**
330 VAC 50/60 Hz

**Capacitance range**
0.01 – 2.2 µF

**Capacitance tolerance**
± 20% standard, ± 10% option

**Temperature range**
–40 to +100°C

**Climatic category**
40/100/56/B

**Approvals**
ENEC, UL, cUL

**Dissipation factor tanδ**
Maximum values at +23°C

| | C ≤ 0.1 µF | 0.1µF < C ≤ 1 µF | C > 1 µF |
|---|---|---|---|
| 1 kHz | 0.1% | 0.1% | 0.1% |
| 10 kHz | 0.2% | 0.4% | 0.8% |
| 100 kHz | 0.6% | – | – |

**Test voltage between terminals**
The 100% screening factory test is carried out at 3000 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.

**Resonance frequency**
Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead length.

**Insulation resistance**
C ≤ 0.33 µF: ≥ 30 000 MΩ
C > 0.33 µF: ≥ 10 000 s

**In DC applications**
Recommended voltage: ≤ 1000 VDC

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14:2005 | 1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temperature | |
| **Vibration** | IEC 60068–2–6 Test Fc | 3 directions at 2 hours each, 10–55 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29 Test Eb | 1000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14 Test Na | Upper and lower rated temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005<br>UL1414 | Enclosure material of UL94V–0 flammability class | |
| **Humidity** | IEC 60068-2-3 Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **LEAD SPACING 10 MM** | | | | | | | |
| 0.010 | A02 | 4.5 | 10.5 | 13.0 | 11 | 100 | PHE841EA5100MR17 |
| 0.012 | A03 | 5.0 | 11.0 | 13.0 | 10 | 100 | PHE841EA5120MR17 |
| 0.015 | A03 | 5.0 | 11.0 | 13.0 | 9.4 | 100 | PHE841EA5150MR17 |
| 0.018 | A04 | 6.0 | 12.0 | 13.0 | 8.7 | 100 | PHE841EA5180MR17 |
| 0.022 | A04 | 6.0 | 12.0 | 13.0 | 8.1 | 100 | PHE841EA5220MR17 |
| **LEAD SPACING 15 MM** | | | | | | | |
| 0.010 | B04 | 5.5 | 10.5 | 18.0 | 10 | 100 | PHE841EB5100MR17 |
| 0.012 | B04 | 5.5 | 10.5 | 18.0 | 9.4 | 100 | PHE841EB5120MR17 |
| 0.015 | B04 | 5.5 | 10.5 | 18.0 | 8.7 | 100 | PHE841EB5150MR17 |
| 0.018 | B04 | 5.5 | 10.5 | 18.0 | 7.9 | 100 | PHE841EB5180MR17 |
| 0.022 | B05 | 5.5 | 12.5 | 18.0 | 7.2 | 100 | PHE841EB5220MR17 |
| 0.027 | B15 | 6.0 | 12.0 | 18.0 | 6.5 | 100 | PHE841EB5270MR17 |
| 0.033 | B10 | 6.5 | 12.5 | 18.0 | 5.9 | 100 | PHE841EB5330MR17 |
| 0.039 | B06 | 7.5 | 14.5 | 18.0 | 5.4 | 100 | PHE841EB5390MR17 |
| 0.047 | B06 | 7.5 | 14.5 | 18.0 | 5.0 | 100 | PHE841EB5470MR17 |
| 0.056 | B12 | 8.0 | 15.0 | 18.0 | 4.6 | 100 | PHE841EB5560MR17 |
| 0.068 | B11 | 8.5 | 16.0 | 18.0 | 4.2 | 100 | PHE841EB5680MR17 |
| 0.082 | B14 | 9.5 | 17.5 | 18.0 | 3.8 | 100 | PHE841EB5820MR17 |
| 0.10 | B14 | 9.5 | 17.5 | 18.0 | 3.7 | 100 | PHE841EB6100MR17 |
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.068 | D13 | 6.5 | 14.5 | 26.0 | 2.9 | 100 | PHE841ED5680MR06L2 |
| 0.082 | D17 | 7.0 | 16.5 | 26.0 | 2.8 | 100 | PHE841ED5820MR06L2 |
| 0.10 | D17 | 7.0 | 16.5 | 26.0 | 2.7 | 100 | PHE841ED6100MR06L2 |
| 0.12 | D14 | 8.0 | 16.0 | 26.0 | 2.6 | 100 | PHE841ED6120MR06L2 |
| 0.15 | D15 | 9.0 | 18.5 | 26.0 | 2.5 | 100 | PHE841ED6150MR06L2 |
| 0.18 | D18 | 10.5 | 19.0 | 26.0 | 2.3 | 100 | PHE841ED6180MR06L2 |
| 0.22 | D18 | 10.5 | 19.0 | 26.0 | 2.2 | 100 | PHE841ED6220MR06L2 |
| 0.27 | D16 | 11.0 | 21.5 | 26.0 | 2.0 | 100 | PHE841ED6270MR06L2 |
| 0.33 | D16 | 11.0 | 21.5 | 26.0 | 1.9 | 100 | PHE841EY6330MR06L2 * |
| 0.39 | D19 | 15.5 | 24.5 | 26.0 | 1.6 | 100 | PHE841ED6390MR06L2 |
| 0.47 | D19 | 15.5 | 24.5 | 26.0 | 1.5 | 100 | PHE841ED6470MR06L2 |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.22 | F11 | 10.5 | 20.5 | 31.5 | 2.0 | 100 | PHE841EF6220MR06L2 |
| 0.27 | F11 | 10.5 | 20.5 | 31.5 | 1.8 | 100 | PHE841EF6270MR06L2 |
| 0.33 | F12 | 11.5 | 22.5 | 31.5 | 1.6 | 100 | PHE841EF6330MR06L2 |
| 0.39 | F03 | 13.5 | 23.0 | 31.5 | 1.4 | 100 | PHE841EF6390MR06L2 |
| 0.47 | F03 | 13.5 | 23.0 | 31.5 | 1.3 | 100 | PHE841EF6470MR06L2 |
| 0.56 | F13 | 14.5 | 24.5 | 31.5 | 1.2 | 100 | PHE841EF6560MR06L2 |
| 0.68 | F14 | 17.5 | 28.0 | 31.5 | 1.1 | 100 | PHE841EF6680MR06L2 |
| 0.82 | F15 | 19.0 | 29.0 | 31.5 | 1.0 | 100 | PHE841EF6820MR06L2 |
| 1.0 | F16 | 21.0 | 30.0 | 31.5 | 1.0 | 100 | PHE841EF7100MR06L2 |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 0.68 | R05 | 13.0 | 24.0 | 41.0 | 1.1 | 100 | PHE841ER6680MR06L2 |
| 0.82 | R04 | 15.0 | 26.0 | 41.0 | 1.0 | 100 | PHE841ER6720MR06L2 |
| 1.0 | R04 | 15.0 | 26.0 | 41.0 | 0.92 | 100 | PHE841ER7100MR06L2 |
| 1.2 | R02 | 16.5 | 32.0 | 41.0 | 0.84 | 100 | PHE841ER7120MR06L2 |
| 1.5 | R03 | 19.0 | 36.0 | 41.0 | 0.74 | 100 | PHE841ER7150MR06L2 |
| 1.8 | R06 | 21.0 | 38.0 | 41.0 | 0.67 | 100 | PHE841ER7180MR06L2 |
| 2.2 | R06 | 21.0 | 38.0 | 41.0 | 0.60 | 100 | PHE841ER7220MR06L2 |

* Only ±20 %

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$ = 330 VAC) |
| | UL 1414 | ($U_R$ = 250 VAC) |
| cUL recognition | C 22.2 No. 8 | ($U_R$ = 330 VAC) |
| | C 22.2 No. 1 | ($U_R$ = 250 VAC) |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Capacitance tolerance code
- Rated voltage
- X1
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# PHE844

RoHS Compliant

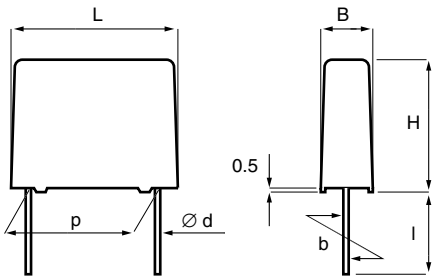
- **EMI suppressor, class X1, metallized polypropylene**
- **0.1 – 2.2 µF, 440 VAC/480 VAC, +105°C**

## TYPICAL APPLICATIONS

For worldwide use as electromagnetic interference suppressor in all X1 and across-the-line applications.
Not for use in series with the mains.
See www.kemet.com for more information.

## CONSTRUCTION

Series winding of metallized polypropylene. Encapsulated in self-extinguishing material meeting the requirements of UL 94 V–0.




| p | d | std l | max l | b |
|---|---|---|---|---|
| 22.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 27.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 37.5 ± 0.5 | 1.0 | 6 | 30 | ±0.7 |

Tolerance in lead length
< 30 mm $^{+0}_{-1}$ mm

30 mm $^{+5}_{-0}$ mm

## TECHNICAL DATA

**Rated voltage**
440 VAC 50/60 Hz (ENEC)
480 VAC 50/60 Hz (UL, CSA)

**Capacitance range**
0.1 – 2.2 µF

**Capacitance tolerance**
± 20% standard, ± 10% option

**Temperature range**
–40 to +105°C

**Climatic category**
40/105/56/B

**Approvals**
ENEC, UL, cUL

**Dissipation factor**
Maximum values at +23°C

| | C ≤ 0.1 µF | 0.1µF < C ≤ 1 µF | C > 1 µF |
|---|---|---|---|
| 1 kHz | 0.1% | 0.1% | 0.1% |
| 10 kHz | 0.2% | 0.4% | 0.8% |
| 100 kHz | 0.6% | – | – |

**Test voltage between terminals**
The 100% screening factory test is carried out at 3000 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.

**Resonance frequency**
Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead length.

**Insulation resistance**
C ≤ 0.33 µF: ≥ 30 000 MΩ
C > 0.33 µF: ≥ 10 000 s

**In DC application**
Recommended voltage: ≤1000VDC

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14:2005 | 1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temperature | |
| **Vibration** | IEC 60068–2–6<br>Test Fc | 3 directions at 2 hours each,<br>10–55 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29<br>Test Eb | 1000 bumps at<br>390 m/s² | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14<br>Test Na | Upper and lower rated temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005<br>UL1414 | Enclosure material of UL94V–0 flammability class | |
| **Humidity** | IEC 60068-2-3<br>Test Ca | +40°C and<br>90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.10 | D14 | 8.0 | 16.0 | 26.0 | 3.2 | 100 | PHE844RD6100MR06L2 |
| 0.15 | D15 | 9.0 | 18.5 | 26.0 | 2.6 | 100 | PHE844RD6150MR06L2 |
| 0.22 | D16 | 11.0 | 21.5 | 26.0 | 2.1 | 100 | PHE844RD6220MR06L2 |
| 0.33 | D20 | 13.5 | 23.0 | 26.0 | 1.8 | 100 | PHE844RD6330MR06L2 |
| 0.47 | D19 | 15.5 | 24.5 | 26.0 | 1.5 | 100 | PHE844RD6470MR06L2 |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.22 | F11 | 10.5 | 20.5 | 31.5 | 2.2 | 100 | PHE844RF6220MR06L2 |
| 0.33 | F03 | 13.5 | 23.0 | 31.5 | 1.7 | 100 | PHE844RF6330MR06L2 |
| 0.47 | F13 | 14.5 | 24.5 | 31.5 | 1.4 | 100 | PHE844RF6470MR06L2 |
| 0.68 | F14 | 17.5 | 28.0 | 31.5 | 1.1 | 100 | PHE844RF6680MR06L2 |
| 1.0 | F16 | 21.0 | 30.0 | 31.5 | 1.0 | 100 | PHE844RF7100MR06L2 |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 0.47 | R05 | 13.0 | 24.0 | 41.0 | 1.3 | 100 | PHE844RR6470MR06L2 |
| 0.68 | R05 | 13.0 | 24.0 | 41.0 | 1.1 | 100 | PHE844RR6680MR06L2 |
| 1.0 | R04 | 15.0 | 26.0 | 41.0 | 0.92 | 100 | PHE844RR7100MR06L2 |
| 1.5 | R03 | 19.0 | 36.0 | 41.0 | 0.74 | 100 | PHE844RR7150MR06L2 |
| 2.2 | R06 | 21.0 | 38.0 | 41.0 | 0.60 | 100 | PHE844RR7220MR06L2 |

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$=480 VAC) |
| | UL 1414 | ($U_R$=250 VAC) |
| cUL recognition | C 22.2 No. 8 | ($U_R$=480 VAC) |
| | C 22.2 No. 1 | ($U_R$=250 VAC) |

## ORDERING INFORMATION

The article code for the standard part is given in the article table. For other options, see page 11.

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Capacitance tolerance code
- Rated voltage
- X1
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class

# PHE845

RoHS Compliant

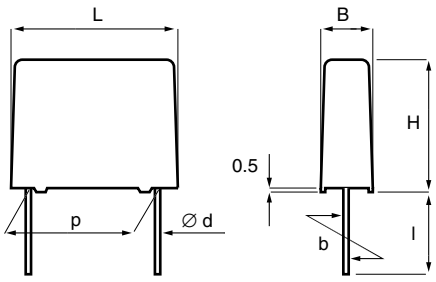
- **EMI suppressor, class X1, metallized polypropylene**
- **0.01 – 1.0 µF, 760 VAC/600 VAC, +105°C**

## TYPICAL APPLICATIONS

For worldwide use as electromagnetic interference suppressor in all X1 and across-the-line applications.
Not for use in series with the mains.
See www.kemet.com for more information.

## CONSTRUCTION

Triple winding of metallized polypropylene. Encapsulated in self-extinguishing material meeting the requirements of UL 94 V–0.




| p | d | std l | max l | b |
|---|---|---|---|---|
| 22.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 27.5 ± 0.4 | 0.8 | 6 | 30 | ±0.4 |
| 37.5 ± 0.5 | 1.0 | 6 | 30 | ±0.7 |

Tolerance in lead length
< 30 mm $^{+0}_{-1}$ mm

30 mm $^{+5}_{-0}$ mm

## TECHNICAL DATA

**Rated voltage**
760 VAC 50/60 Hz (ENEC)
600 VAC 50/60 Hz (UL, CSA)

**Capacitance range**
0.01 – 1.0 µF

**Capacitance tolerance**
± 20% standard, ± 10% option

**Temperature range**
–40 to +105°C

**Climatic category**
40/105/56/B

**Approvals**
ENEC, UL, cUL

**Dissipation factor**
Maximum values at +23°C

| | C ≤ 0.1 µF | 0.1µF < C ≤ 1 µF |
|---|---|---|
| 1 kHz | 0.1% | 0.1% |
| 10 kHz | 0.2% | 0.4% |
| 100 kHz | 0.6% | – |

**Test voltage between terminals**
The 100% screening factory test is carried out at 4250 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.

**Resonance frequency**
Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead length.

**Insulation resistance**
C ≤ 0.33 µF: ≥ 30 000 MΩ
C > 0.33 µF: ≥ 10 000 s

**In DC application**
Recommended voltage: ≤ 1500VDC

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14:2005 | 1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temperature | |
| **Vibration** | IEC 60068–2–6 Test Fc | 3 directions at 2 hours each, 10–55 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29 Test Eb | 1000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14 Test Na | Upper and lower rated temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005 UL1414 | Enclosure material of UL94V–0 flammability class | |
| **Humidity** | IEC 60068-2-3 Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance µF | Box code | Max dimensions in mm B | H | L | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|
| **LEAD SPACING 22.5 MM** | | | | | | | |
| 0.010 | D13 | 6.5 | 14.5 | 26.0 | 11 | 100 | PHE845VD5100MR06L2 |
| 0.015 | D13 | 6.5 | 14.5 | 26.0 | 9.2 | 100 | PHE845VD5150MR06L2 |
| 0.022 | D13 | 6.5 | 14.5 | 26.0 | 7.6 | 100 | PHE845VD5220MR06L2 |
| 0.033 | D17 | 7.0 | 16.5 | 26.0 | 6.4 | 100 | PHE845VD5330MR06L2 |
| 0.047 | D15 | 9.0 | 18.5 | 26.0 | 5.3 | 100 | PHE845VD5470MR06L2 |
| 0.068 | D18 | 10.5 | 19.0 | 26.0 | 4.4 | 100 | PHE845VD5680MR06L2 |
| 0.10 | D16 | 11.0 | 21.5 | 26.0 | 3.5 | 100 | PHE845VD6100MR06L2 |
| 0.15 | D20 | 13.5 | 23.0 | 26.0 | 3.1 | 100 | PHE845VD6150MR06L2 |
| 0.22 | D19 | 15.5 | 24.5 | 26.0 | 2.7 | 100 | PHE845VY6220MR06L2* |
| **LEAD SPACING 27.5 MM** | | | | | | | |
| 0.10 | F11 | 10.5 | 20.5 | 31.5 | 3.4 | 100 | PHE845VF6100MR06L2 |
| 0.15 | F12 | 11.5 | 22.5 | 31.5 | 3.0 | 100 | PHE845VF6150MR06L2 |
| 0.22 | F03 | 13.5 | 23.0 | 31.5 | 2.4 | 100 | PHE845VF6220MR06L2 |
| 0.33 | F15 | 19.0 | 29.0 | 31.5 | 2.0 | 100 | PHE845VF6330MR06L2 |
| 0.47 | F16 | 21.0 | 30.0 | 31.5 | 1.6 | 100 | PHE845VZ6470MR06L2* |
| **LEAD SPACING 37.5 MM** | | | | | | | |
| 0.47 | R04 | 15.0 | 26.0 | 41.0 | 1.6 | 100 | PHE845VW6470MR06L2* |
| 0.47 | R02 | 16.5 | 32.0 | 41.0 | 1.6 | 100 | PHE845VR6470MR06L2 |
| 0.68 | R03 | 19.0 | 36.0 | 41.0 | 1.2 | 100 | PHE845VR6680MR06L2 |
| 1.0 | R06 | 21.0 | 38.0 | 41.0 | 1.0 | 100 | PHE845VW7100MR06L2* |

* Only ±20%

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$=600 VAC) |
| cUL recognition | C 22.2 No. 8 | ($U_R$=600 VAC) |

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Capacitance tolerance code
- Rated voltage
- X1
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class

# PHZ9004

RoHS Compliant

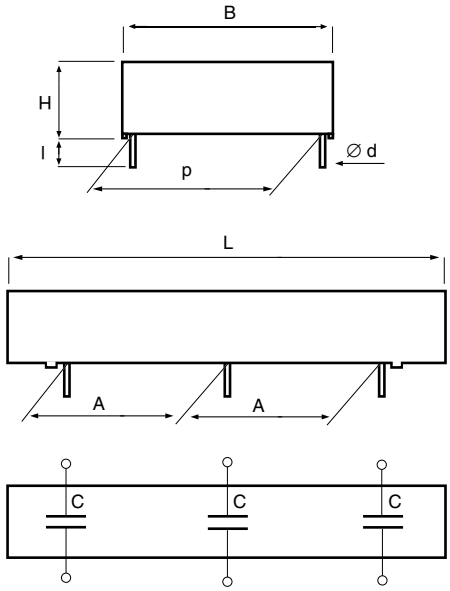
- **Low profile triple capacitor; three capacitors in the same box**
- **EMI suppressor, class X2, metallized polypropylene**
- **300 VAC, +105 °C**

## TYPICAL APPLICATIONS

The capacitors are intended for use as interference suppressors in X2 (across-the-line) applications for three phases.

## CONSTRUCTION

Metallized polypropylene film capacitor. Radial leads of tinned wire are welded to the contact metal layer on the ends of the capacitor winding. Encapsulation in self extinguishing material meeting the requirements of UL 94V-0.




| C | p | d | A | l |
|---|---|---|---|---|
| 3 x 1.0 | 27.5 ± 0.5 | 1.0 | 21.0 ± 0.5 | $6^{-1}$ |

## TECHNICAL DATA

| | |
|---|---|
| **Rated voltage $U_R$ VAC** | 300 |
| **Capacitance range µF** | 3 x 1.0; other capacitance values on request. |
| **Capacitance tolerance** | ± 20% standard. Other tolerances on request. |
| **Temperature range** | –55 to +105°C |
| **Climatic category** | 55/105/56 |
| **Test voltage between terminals** | The 100% screening factory test is carried out at 2200 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. |
| **Insulation resistance** | Measured at +23 °C, 500 VDC, 60s<br>Between terminals:<br>≥ 10 000 S<br>Between terminals and case:<br>≥ 100 000 MΩ |
| **Dissipation factor** | Max values at +23°C<br>1 kHz 0.10%<br>10 kHz 0.50% |

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Endurance** | EN/IEC 60384-14:2005 | 1.25 x $U_R$ VAC 50 Hz,<br>once every hour increased<br>to 1000 VAC for 0.1 s,<br>1000 h at upper rated temperature | |
| **Vibration** | IEC 60068–2–6<br>Test Fc | 3 directions at 2 hours each,<br>10–55 Hz at 0.75 mm or 98 $m/s^2$ | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068–2–29<br>Test Eb | 1000 bumps at<br>390 $m/s^2$ | No visible damage<br>No open or short circuit |
| **Change of temperature** | IEC 60068–2–14<br>Test Na | Upper and lower rated<br>temperature 5 cycles | No visible damage |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005<br>UL1414 | Enclosure material of<br>UL94V–0 flammability class | |
| **Humidity** | IEC 60068-2-3<br>Test Ca | +40°C and<br>90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Rated voltage $U_R$ VAC | Capacitance µF | Max dimensions in mm B | H | L | p | Quantity per package Tray pcs | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|---|
| 300 | 3 x 1.0 | 30.0 | 11.5 | 64.0 | 27.5 | 72 | 100 | PHZ9004EF7100MR06L2 |

Other capacitance values on request.

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Rated AC voltage
- Capacitance tolerance code
- Manufacturing date code

# PME264

**• EMI suppressor, class X2, metallized paper**
**• 0.001 – 0.1 µF, 660 VAC, +85 °C**

RoHS Compliant

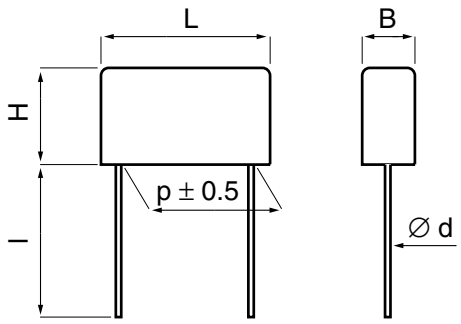
- Self-extinguishing encapsulation.
- High dU/dt capability.
- Excellent self-healing properties. Ensures long life even when subjected to frequent overvoltages.
- Good resistance to ionisation due to impregnated dielectric.
- The capacitors meet the most stringent IEC humidity class, 56 days.
- The impregnated paper ensures excellent stability giving outstanding reliability properties, especially in applications having continuous operation.

## TYPICAL APPLICATIONS

High AC and DC voltage applications, such as
– commutator capacitor in converters
– high voltage DC-capacitor in TV sets
– ignition circuits.

## CONSTRUCTION

Multi-layer metallized paper. Encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94V-0.




d = 0.8 for p = 15.2 and 20.3
1.0 for p = 25.4

l = standard: 30 +5/-0 mm

option 1: short leads, tolerance +0/-1 mm (standard 6 mm, code R06)
Other lead lengths on request

option 2: 30 mm insulated solid leads, ordering code: replace R30 with R300PS in std P/N

## TECHNICAL DATA

| | |
|---|---|
| **Rated voltage** | 660 VAC 50/60 Hz<br>1500 VDC<br>(1600 VDC, + 50°C) |
| **Capacitance range** | 0.001 – 0.1 µF |
| **Capacitance tolerance** | ± 20% |
| **Temperature range** | –40 to +85°C |
| **Climatic category IEC** | 40/085/56/B |
| **Approvals** | ENEC, UL |
| **Dissipation factor tanδ** | ≤ 1.3 % at 1 kHz |
| **Insulation resistance** | ≥ 12000 MΩ<br>Measured at 500 VDC after 60 s, +23°C |
| **Test voltage between terminals** | The 100% screening factory test is carried out at 3000 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. |

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Vibration** | IEC 60068-2-6<br>Test Fc | 3 directions at 2 hour each,<br>10 – 500 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068-2-29<br>Test Eb | 4000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Solderability** | IEC 60068-2-20<br>Test Ta | Solder globule method | Wetting time<br>for d ≤ 0.8 < 1 s<br>for d > 0.8 < 1.5 s |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005 | | |
| **Humidity** | IEC 60068-2-3<br>Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capaci-tance | Max dimensions in mm | | | | Quantity per package R30 | R06 | reel taped | Weight | Max dU/dt | Article code |
|---|---|---|---|---|---|---|---|---|---|---|
| µF | B | H | L | p | pcs | pcs | pcs | g | V/µs | |
| 0.0010 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 2000 | PME264NB4100MR30 |
| 0.0015 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 2000 | PME264NB4150MR30 |
| 0.0022 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 2000 | PME264NB4220MR30 |
| 0.0033 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 2000 | PME264NB4330MR30 |
| 0.0047 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 2000 | PME264NB4470MR30 |
| 0.0068 | 7.3 | 13.0 | 18.5 | 15.2 | 400 | 800 | 400 | 3.0 | 1400 | PME264NB4680MR30 |
| 0.010 | 7.3 | 13.0 | 18.5 | 15.2 | 400 | 800 | 400 | 3.0 | 1400 | PME264NB5100MR30 |
| 0.015 | 7.6 | 14.0 | 24.0 | 20.3 | 250 | 1500 | 250 | 4.0 | 1400 | PME264NC5150MR30 |
| 0.022 | 9.0 | 15.0 | 24.0 | 20.3 | 200 | 1200 | 250 | 5.0 | 1400 | PME264NC5220MR30 |
| 0.033 | 11.3 | 16.5 | 24.0 | 20.3 | 150 | 1000 | 180 | 7.0 | 1000 | PME264NC5330MR30 |
| 0.047 | 10.5 | 17.0 | 30.5 | 25.4 | 100 | 1000 | | 8.5 | 1000 | PME264NE5470MR30 |
| 0.068 | 12.1 | 19.0 | 30.5 | 25.4 | 100 | 800 | | 10.0 | 1000 | PME264NE5680MR30 |
| 0.10 | 15.3 | 22.0 | 30.5 | 25.4 | 75 | 600 | | 15.0 | 600 | PME264NE6100MR30 |

## APPROVALS

| Certification Body | Specification |
|---|---|
| ENEC | EN/IEC 60384-14:2005 |
| UL | UL 1283 ($U_R$ = 600 VAC) |

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Rated voltage
- X2
- SH, for self healing
- Climatic category according to IEC 60068-1, appendix A
- Passive flammability class
- Approval marks
- Manufacturing code (year, month)

# PME271E

**• EMI suppressor, class X1, metallized paper**
**• 0.01 – 0.22 µF, 300 VAC, +110 °C**

RoHS Compliant

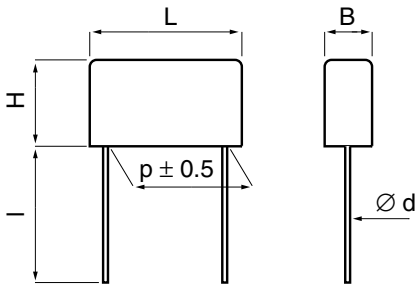
- The highest possible safety regarding active and passive flammability.
- Self-extinguishing UL 94V-0 encapsulation material.
- Excellent self-healing properties. Ensures long life even when subjected to frequent overvoltages.
- Good resistance to ionisation due to impregnated dielectric.
- High dU/dt capability.
- Small dimensions.
- Safety approvals for worldwide use.
- The capacitors meet the most stringent IEC humidity class, 56 days.
- The impregnated paper ensures excellent stability giving outstanding reliability properties, especially in applications having continuous operation.

## TYPICAL APPLICATIONS

The capacitors are intended for use as interference suppressors in X1 (across-the-line) applications.

## CONSTRUCTION

Multi-layer metallized paper. Encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94V-0.




d = 0.6 for p = 10.2
0.8 for p = 15.2, 20.3, 22.5
1.0 for p = 25.4

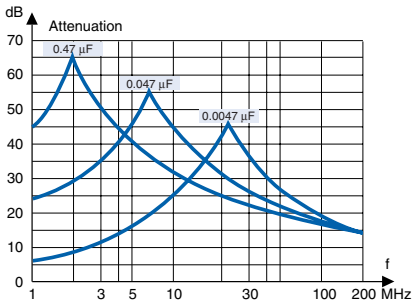
l = standard: 30 +5/-0 mm (code R30)

option 1: short leads, tolerance +0/-1 mm (standard 6 mm, code R06)
Other lead lengths on request

option 2: 30 mm insulated solid leads, ordering code: replace R30 with R300PS in std P/N

## TECHNICAL DATA

| | |
|---|---|
| **Rated voltage VAC, 50/60Hz** | 300 |
| **Capacitance range µF** | 0.01–0.22 |
| **Temperature range °C** | –40/+110 |
| **Climatic category IEC** | 40/110/56/B |
| **Capacitance tolerance** | ± 10% for C > 0.1 µF, code K.<br>± 20% for C ≤ 0.1 µF, code M |
| **Approvals** | ENEC, UL |
| **Dissipation factor tanδ** | ≤ 1.3 % at 1 kHz |
| **Insulation resistance** | C ≤ 0.33 µF ≥ 12000 MΩ<br>C > 0.33 µF ≥ 4000 s<br>Measured at 500 VDC after 60 s, +23°C |
| **In DC applications** | Recommended voltage: ≤ 630 VDC |
| **Resonance frequency** | Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead lengths. |
| **Test voltage between** | The 100% screening factory test is carried out at 2150 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. |




Suppression versus frequency. Typical values.

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Vibration** | IEC 60068-2-6, Test Fc | 3 directions at 2 hour each,<br>10 – 500 Hz at 0.75 mm or 98 m/s² | No visible damage, No open or short circuit |
| **Bump** | IEC 60068-2-29, Test Eb | 4000 bumps at 390 m/s² | No visible damage, No open or short circuit |
| **Solderability** | IEC 60068-2-20, Test Ta | Solder globule method | Wetting time for d ≤ 0.8 < 1 s<br>for d > 0.8 < 1.5 s |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005 | | |
| **Humidity** | IEC 60068-2-3, Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capacitance µF | Max dimensions in mm B | H | L | p | Quantity per package R30 pcs | R06 pcs | reel taped pcs | Weight g | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.010 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 16 | 1200 | PME271E510MR30 |
| 0.015 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 13 | 1200 | PME271E515MR30 |
| 0.022 | 7.3 | 13.0 | 19.0 | 15.2 | 400 | 800 | 400 | 3.0 | 9.8 | 1200 | PME271E522MR30 |
| 0.033 | 7.3 | 13.0 | 19.0 | 15.2 | 400 | 800 | 400 | 3.0 | 7.0 | 1200 | PME271E533MR30 |
| 0.047 | 8.5 | 14.3 | 18.5 | 15.2 | 300 | 500 | 350 | 3.8 | 6.4 | 1200 | PME271E547MR30 |
| 0.068 | 7.6 | 14.0 | 24.0 | 20.3 | 250 | 1500 | 250 | 4.5 | 5.2 | 600 | PME271E568MR30 |
| 0.10 | 11.3 | 16.5 | 24.0 | 20.3 | 150 | 1000 | 180 | 7.0 | 4.1 | 600 | PME271E610MR30 |
| 0.068 | 8.0 | 17.0 | 27.0 | 22.5 | 200 | 1200 | 250 | 5.5 | 4.7 | 600 | PME271ED5680MR30 |
| 0.10 | 8.0 | 17.0 | 27.0 | 22.5 | 200 | 1200 | 250 | 5.5 | 4.1 | 600 | PME271ED6100MR30 |
| 0.15 | 10.0 | 19.0 | 27.0 | 22.5 | 150 | 1000 | 200 | 5.5 | 3.2 | 600 | PME271ED6150KR30 |
| 0.22 | 12.0 | 22.0 | 27.0 | 22.5 | 100 | 800 | | 5.5 | 2.5 | 600 | PME271ED6220KR30 |
| 0.15 | 10.6 | 16.1 | 30.5 | 25.4 | 150 | 1000 | | 8.6 | 3.3 | 400 | PME271E615KR30 |
| 0.22 | 12.1 | 19.0 | 30.5 | 25.4 | 100 | 800 | | 10.0 | 2.6 | 400 | PME271E622KR30 |

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$ = 250 VAC) |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Rated voltage
- X1
- SH, for self-healing
- Climatic category according to IEC 60068-1, appendix A
- Passive flammability class
- Approval marks
- Manufacturing code (year, month)

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# PME271M

**• EMI suppressor, class X2, metallized paper**
**• 0.001 – 0.6 µF, 275 VAC, +110 °C**

RoHS Compliant

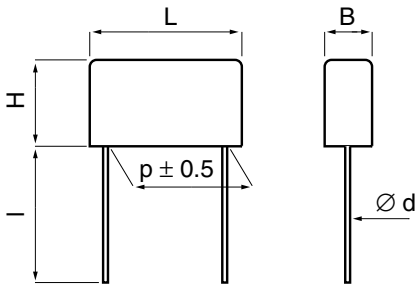
- The highest possible safety regarding active and passive flammability.
- Self-extinguishing UL 94V-0 encapsulation material.
- Excellent self-healing properties. Ensures long life even when subjected to frequent overvoltages.
- Good resistance to ionisation due to impregnated dielectric.
- High dU/dt capability.
- Small dimensions.
- Safety approvals for worldwide use.
- The capacitors meet the most stringent IEC humidity class, 56 days.
- The impregnated paper ensures excellent stability giving outstanding reliability properties, especially in applications having continuous operation.

## TYPICAL APPLICATIONS

The capacitors are intended for use as interference suppressors in X2 (across-the-line) applications.

## CONSTRUCTION

Multi-layer metallized paper. Encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94V-0.




d = 0.6 for p = 10.2
0.8 for p = 15.2, 20.3, 22.5
1.0 for p = 25.4

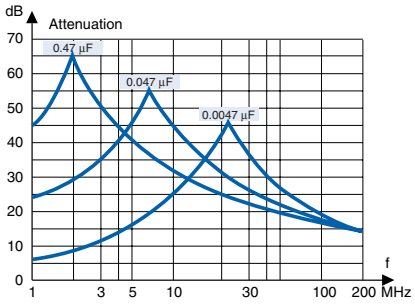
l = standard: 30 +5/-0 mm (code R30)

option 1: short leads, tolerance +0/-1 mm (standard 6 mm, code R06)
Other lead lengths on request

option 2: 30 mm insulated solid leads, ordering code: replace R30 with R300PS in std P/N

## TECHNICAL DATA

| | |
|---|---|
| **Rated voltage VAC, 50/60Hz** | 275 |
| **Capacitance range µF** | 0.001–0.6 |
| **Temperature range °C** | –40/+110 |
| **Climatic category IEC** | 40/110/56/B |
| **Capacitance tolerance** | ± 10% for C > 0.1 µF, code K<br>± 20% for C ≤ 0.1 µF, code M |
| **Approvals** | ENEC, UL, CSA |
| **Dissipation factor tanδ** | ≤ 1.3 % at 1 kHz |
| **Insulation resistance** | C ≤ 0.33 µF ≥ 12000 MΩ<br>C > 0.33 µF ≥ 4000 s<br>Measured at 500 VDC after 60 s, +23°C |
| **In DC applications** | Recommended voltage: ≤ 630 VDC |
| **Resonance frequency** | Tabulated self-resonance frequencies $f_0$ refer to 5 mm lead lengths. |
| **Test voltage between** | The 100% screening factory test is carried out at 2150 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. |




Suppression versus frequency. Typical values.

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Vibration** | IEC 60068-2-6, Test Fc | 3 directions at 2 hour each, 10 – 500 Hz at 0.75 mm or 98 m/s² | No visible damage, No open or short circuit |
| **Bump** | IEC 60068-2-29, Test Eb | 4000 bumps at 390 m/s² | No visible damage, No open or short circuit |
| **Solderability** | IEC 60068-2-20, Test Ta | Solder globule method | Wetting time for d ≤ 0.8 < 1 s<br>for d > 0.8 < 1.5 s |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005 | | |
| **Humidity** | IEC 60068-2-3, Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capaci-tance µF | Max dimensions in mm B | H | L | p | Quantity per package R30 pcs | R06 pcs | reel taped pcs | Weight g | $f_o$ MHz | Max dU/dt V/µs | Article code |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0010 | 3.9 | 7.5 | 13.5 | 10.2 | 1000 | 2000 | 700 | 0.7 | 53 | 1200 | PME271M410MR30 |
| 0.0015 | 3.9 | 7.5 | 13.5 | 10.2 | 1000 | 2000 | 700 | 0.7 | 44 | 1200 | PME271M415MR30 |
| 0.0022 | 3.9 | 7.5 | 13.5 | 10.2 | 1000 | 2000 | 700 | 0.7 | 37 | 1200 | PME271M422MR30 |
| 0.0033 | 4.1 | 8.2 | 13.5 | 10.2 | 1000 | 2000 | 600 | 0.9 | 30 | 1200 | PME271M433MR30 |
| 0.0047 | 5.1 | 10.5 | 13.5 | 10.2 | 800 | 1600 | 600 | 1.2 | 24 | 1200 | PME271M447MR30 |
| 0.0068 | 5.1 | 10.5 | 13.5 | 10.2 | 800 | 1600 | 600 | 1.2 | 21 | 1200 | PME271MA4680MR30 |
| 0.0068 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 19 | 1200 | PME271M468MR30 |
| 0.010 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 16 | 1200 | PME271M510MR30 |
| 0.015 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 13 | 1200 | PME271M515MR30 |
| 0.022 | 6.0 | 12.5 | 18.5 | 15.2 | 400 | 800 | 400 | 3.0 | 10 | 1200 | PME271M522MR30 |
| 0.033 | 6.0 | 12.5 | 18.5 | 15.2 | 400 | 800 | 400 | 3.0 | 8.4 | 1200 | PME271M533MR30 |
| 0.047 | 6.0 | 12.5 | 18.5 | 15.2 | 400 | 800 | 400 | 3.0 | 7.0 | 1200 | PME271M547MR30 |
| 0.068 | 7.8 | 13.5 | 18.5 | 15.2 | 400 | 800 | 400 | 3.3 | 5.6 | 1200 | PME271M568MR30 |
| 0.10 | 8.5 | 14.3 | 18.5 | 15.2 | 300 | 500 | 350 | 3.8 | 4.3 | 1200 | PME271MB6100MR30 |
| 0.10 | 7.6 | 14.0 | 24.0 | 20.3 | 250 | 1500 | 250 | 4.0 | 4.1 | 600 | PME271M610MR30 |
| 0.15 | 9.0 | 15.0 | 24.0 | 20.3 | 200 | 1200 | 250 | 5.0 | 3.4 | 600 | PME271M615KR30 |
| 0.22 | 11.3 | 16.5 | 24.0 | 20.3 | 150 | 1000 | 180 | 7.0 | 2.7 | 600 | PME271M622KR30 |
| 0.10 | 8.0 | 17.0 | 27.0 | 22.5 | 200 | 1200 | 250 | 5.5 | 3.9 | 600 | PME271MD6100MR30 |
| 0.15 | 8.0 | 17.0 | 27.0 | 22.5 | 200 | 1200 | 250 | 5.5 | 3.3 | 600 | PME271MD6150KR30 |
| 0.22 | 10.0 | 19.0 | 27.0 | 22.5 | 150 | 1000 | 200 | 7.5 | 2.6 | 600 | PME271MD6220KR30 |
| 0.27 | 12.0 | 22.0 | 27.0 | 22.5 | 100 | 800 | | 10.0 | 2.3 | 400 | PME271MD6270KR30 |
| 0.33 | 12.0 | 22.0 | 27.0 | 22.5 | 100 | 800 | | 10.0 | 2.1 | 400 | PME271MD6330KR30 |
| 0.27 | 10.5 | 17.3 | 30.5 | 25.4 | 100 | 1000 | | 8.5 | 2.4 | 400 | PME271M627KR30 |
| 0.33 | 12.1 | 19.0 | 30.5 | 25.4 | 100 | 800 | | 10.0 | 2.1 | 400 | PME271M633KR30 |
| 0.47 | 15.3 | 22.0 | 30.5 | 25.4 | 75 | 600 | | 15.0 | 1.8 | 400 | PME271M647KR30 |
| 0.60 | 15.3 | 22.0 | 30.5 | 25.4 | 75 | 600 | | 15.0 | 1.6 | 400 | PME271M660KR30 |

## APPROVALS

| Certification Body | Specification | |
|---|---|---|
| ENEC | EN/IEC 60384-14:2005 | |
| UL | UL 1283 | ($U_R$ = 250 VAC) |
| | UL 1414 | ($U_R$ = 250 VAC) |
| CSA | C 22.2 No. 1 | ($U_R$ = 250 VAC) |

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Rated voltage
- X2
- SH, for self-healing
- Climatic category according to IEC 60068-1, appendix A
- Passive flammability class
- Approval marks
- Manufacturing code (year, month)

# PME278

RoHS Compliant

**• EMI suppressor, class X1, metallized paper**
**• 0.001 – 0.15 µF, 440 VAC, +110 °C**

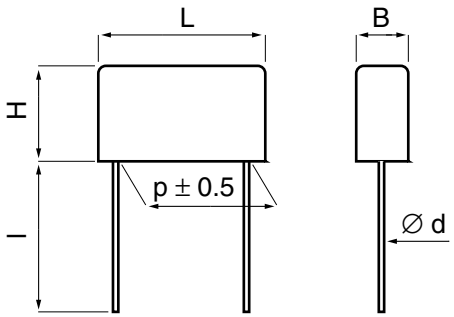
- High dU/dt capability.
- Excellent self-healing properties. Ensures long life even when subjected to frequent overvoltages.
- Good resistance to ionisation due to impregnated dielectric.
- The capacitors meet the most stringent IEC humidity class, 56 days.
- The impregnated paper ensures excellent stability giving outstanding reliability properties, especially in applications having continuous operation.

## TYPICAL APPLICATIONS

The capacitors are intended for use as interference suppressors in X1, across-the-line, 440 VAC applications.

## CONSTRUCTION

Multi-layer metallized paper. Encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94V-0.




d = 0.6 for p = 10.2
0.8 for p = 15.2, 20.3 and 22.5
1.0 for p = 25.4

l = standard : 30 +5/-0 mm

option 1: short leads, tolerance +0/-1 mm (standard 6 mm, code R06)
Other lead lengths on request

option 2: 30 mm insulated solid leads, ordering code: replace R30 with R300PS in std P/N

## TECHNICAL DATA

| | |
|---|---|
| **Rated voltage** | 440 VAC 50/60 Hz |
| **Capacitance range** | 0.001 – 0.15 µF |
| **Capacitance tolerance** | ± 20% |
| **Temperature range** | –40 to +110°C |
| **Climatic category IEC** | 40/110/56/B |
| **Approvals** | ENEC |
| **Dissipation factor tanδ** | ≤ 1.3 % at 1 kHz |
| **Insulation resistance** | ≥ 12000 MΩ<br>Measured at 500 VDC after 60 s, +23°C |
| **Resonance frequency** | Tabulated self-resonance frequencies f0 refer to 5 mm lead length. |
| **In DC applications** | Recommended voltage: ≤ 1000 VDC |
| **Test voltage between terminals** | The 100% screening factory test is carried out at 2700 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. |

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Vibration** | IEC 60068-2-6<br>Test Fc | 3 directions at 2 hour each<br>10 – 500 Hz at 0.75 mm or 98 m/s² | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068-2-29<br>Test Eb | 4000 bumps at 390 m/s² | No visible damage<br>No open or short circuit |
| **Solderability** | IEC 60068-2-20<br>Test Ta | Solder globule method | Wetting time for d ≤ 0.8 < 1 s<br>for d > 0.8 < 1.5 s |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005 | | |
| **Humidity** | IEC 60068-2-3<br>Test Ca | +40°C and<br>90 – 95% R.H. | 56 days |

## ARTICLE TABLE

| Capaci-tance | Max dimensions in mm | | | | Quantity per package R30 | R06 | reel taped | Weight | $f_o$ | Max dU/dt | Article code |
|---|---|---|---|---|---|---|---|---|---|---|---|
| µF | B | H | L | p | pcs | pcs | pcs | g | MHz | V/µs | |
| 0.0010 | 3.9 | 7.5 | 13.5 | 10.2 | 1000 | 2000 | 700 | 0.7 | 53.0 | 2000 | PME278RA4100MR30 |
| 0.0015 | 3.9 | 7.5 | 13.5 | 10.2 | 1000 | 2000 | 700 | 0.7 | 44.0 | 2000 | PME278RA4150MR30 |
| 0.0022 | 3.9 | 7.5 | 13.5 | 10.2 | 1000 | 2000 | 700 | 0.7 | 37.0 | 2000 | PME278RA4220MR30 |
| 0.0033 | 4.1 | 8.2 | 13.5 | 10.2 | 1000 | 2000 | 600 | 0.9 | 30.0 | 2000 | PME278RA4330MR30 |
| 0.0047 | 5.1 | 10.5 | 13.5 | 10.2 | 800 | 1600 | 600 | 1.2 | 24.0 | 2000 | PME278RA4470MR30 |
| 0.0068 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 18.5 | 1400 | PME278RB4680MR30 |
| 0.010 | 5.2 | 10.5 | 18.5 | 15.2 | 500 | 1000 | 600 | 1.7 | 15.5 | 1400 | PME278RB5100MR30 |
| 0.015 | 5.5 | 11.1 | 18.5 | 15.2 | 500 | 1000 | 500 | 2.0 | 13.0 | 1400 | PME278RB5150MR30 |
| 0.022 | 8.5 | 14.3 | 18.5 | 15.2 | 300 | 500 | 350 | 3.8 | 9.6 | 1400 | PME278RB5220MR30 |
| 0.033 | 7.6 | 14.0 | 24.0 | 20.3 | 250 | 1500 | 250 | 4.0 | 9.6 | 1000 | PME278RC5330MR30 |
| 0.047 | 9.0 | 15.0 | 24.0 | 20.3 | 200 | 1200 | 250 | 5.0 | 7.5 | 1000 | PME278RC5470MR30 |
| 0.068 | 11.3 | 16.5 | 24.0 | 20.3 | 150 | 1000 | 180 | 7.0 | 6.2 | 1000 | PME278RC5680MR30 |
| 0.033 | 8.0 | 17.0 | 27.0 | 22.5 | 200 | 1200 | 250 | 5.5 | 7.2 | 1000 | PME278RD5330MR30 |
| 0.047 | 8.0 | 17.0 | 27.0 | 22.5 | 200 | 1200 | 250 | 5.5 | 6.0 | 1000 | PME278RD5470MR30 |
| 0.068 | 10.0 | 19.0 | 27.0 | 22.5 | 150 | 1000 | 200 | 7.5 | 4.8 | 1000 | PME278RD5680MR30 |
| 0.10 | 12.0 | 22.0 | 27.0 | 22.5 | 100 | 800 | 180 | 10.0 | 3.6 | 600 | PME278RD6100MR30 |
| 0.10 | 12.1 | 19.0 | 30.5 | 25.4 | 100 | 800 | | 10.0 | 3.9 | 600 | PME278RE6100MR30 |
| 0.15 | 15.3 | 22.0 | 30.5 | 25.4 | 75 | 600 | | 15.0 | 3.2 | 600 | PME278RE6150MR30 |

## APPROVALS

| Certification Body | Specification |
|---|---|
| ENEC | EN/IEC 60384-14:2005 |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Rated voltage
- X1
- SH, for self healing
- Climatic category according to IEC 60068-1, appendix A
- Passive flammability class
- Approval marks
- Manufacturing code (year, month)

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# PMZ2074

RoHS Compliant

- **Double capacitor; two capacitors in series**
- **EMI suppressor, class X2, metallized paper**
- **275 VAC, +110 °C**

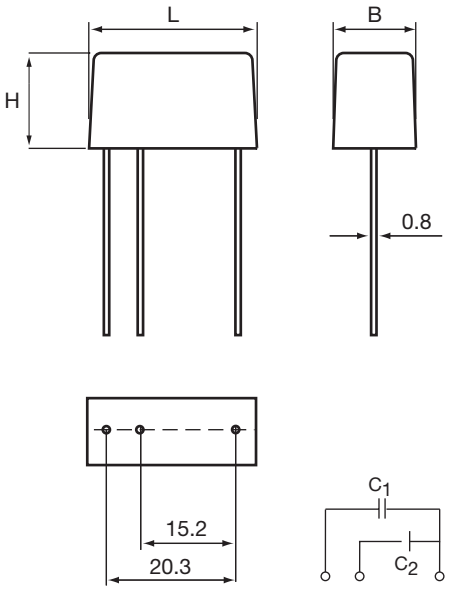
- The highest possible safety regarding active and passive flammability.
- Self-extinguishing UL 94V-0 encapsulation material.
- Excellent self-healing properties. Ensures long life even when subjected to frequent overvoltages.
- Good resistance to ionisation due to impregnated dielectric.
- High dU/dt capability.
- Small dimensions.
- Safety approvals for worldwide use.
- The capacitors meet the most stringent IEC humidity class, 56 days.
- The impregnated paper ensures excellent stability giving outstanding reliability properties, especially in applications having continuous operation.

## TYPICAL APPLICATIONS

The capacitors are intended for use as interference suppressors in X2 (across-the-line) applications or in other demanding applications where two capacitors are utilized in series.

## CONSTRUCTION

Multilayer metallized paper, encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94V-0.




## TECHNICAL DATA

| | |
|---|---|
| **Rated voltage** | 275 VAC, 50/60 Hz |
| **Capacitance range**<br>**Capacitance tolerance** | 150 + 33, 150 + 47, 150 + 68, 220 + 82, 220 + 100 nF<br>± 20%, ± 10%, -5/+15% |
| **Temperature range**<br>**Climatic category** | –40 to +110°C<br>40/110/56/B |
| **Approvals** | ENEC |
| **Dissipation factor tan δ** | < 1.3 % at 1 kHz |
| **Insulation resistance** | ≥ 12000 MΩ<br>Measured at 500 VDC after 60 s, +23°C |
| **Test voltage between terminals** | The 100% screening factory test is carried out at 2150 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. |
| **In DC applications** | Recommended voltage ≤ 630 VDC. |

## ARTICLE TABLE

| Capacitance $C_1$ µF | Capacitance $C_2$ µF | Max dimensions in mm B | H | L | p | Quantity per package R30 pcs | R06 pcs | reel taped pcs | Weight g | Max dU/dt V/µs $C_1$ | $C_2$ | Article code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.15 | 0.033 | 12.5 | 16.0 | 24.0 | 20.3 | 150 | 900 | | 7.0 | 600 | 1200 | PMZ2074MC615K533MR30 |
| 0.15 | 0.047 | 12.5 | 16.0 | 24.0 | 20.3 | 150 | 900 | | 7.0 | 600 | 1200 | PMZ2074MC615K547MR30 |
| 0.15 | 0.068 | 12.5 | 16.0 | 24.0 | 20.3 | 150 | 900 | | 7.0 | 600 | 1200 | PMZ2074MC615K568MR30 |
| 0.22 | 0.082 | 14.0 | 18.0 | 24.0 | 20.3 | 100 | 900 | | 8.4 | 600 | 1200 | PMZ2074MC622K582MR30 |
| 0.22 | 0.10 | 14.0 | 18.0 | 24.0 | 20.3 | 100 | 900 | | 8.4 | 600 | 1200 | PMZ2074MC622K610MR30 |

## APPROVALS

| Certification Body | Specification |
|---|---|
| ENEC | EN/IEC 60384-14:2005 |

## MARKING

- RIFA
- RIFA article code
- Rated capacitance
- Rated voltage
- Capacitor class and sub-class
- Climatic category according to IEC 60068-1, appendix A
- Passive flammability class
- Approval marks
- Manufacturing code (year, month)

## ENVIRONMENTAL TEST DATA

| | | | |
|---|---|---|---|
| **Vibration** | IEC 60068-2-6<br>Test Fc | 3 directions at 2 hour each<br>10 – 500 Hz at 0.75 mm<br>or 98 m/s$^2$ | No visible damage<br>No open or short circuit |
| **Bump** | IEC 60068-2-29<br>Test Eb | 4000 bumps at 390 m/s$^2$ | No visible damage<br>No open or short circuit |
| **Solderability** | IEC 60068-2-20<br>Test Ta | Solder globule method | Wetting time<br>for d > 0.8 < 1.5 s |
| **Active flammability** | EN/IEC 60384-14:2005 | | |
| **Passive flammability** | EN/IEC 60384-14:2005<br>UL 1414 | Enclosure material of UL 94V-0 flammability class | |
| **Humidity** | IEC 60068-2-3<br>Test Ca | +40°C and 90 – 95% R.H. | 56 days |

## ORDERING INFORMATION

The article code for the standard part is given in the article table.
For other options, see page 11.

# X2 CLASS (IEC 60384-14) - MKP Series
## METALLIZED POLYPROPYLENE FILM CAPACITOR
## SELF-HEALING PROPERTIES

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.

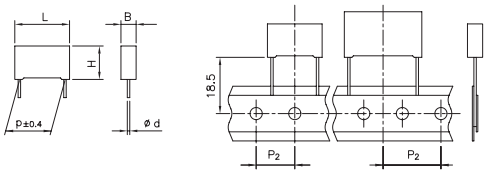
PRODUCT CODE: **R46**

Not for use in series with the mains.
See www.kemet.com for more information.

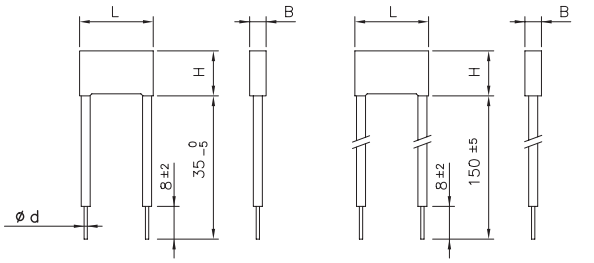
**Note:** R.46 series has replaced the 1.40 series and 1.47 series. For new design we suggest the use of the R.46 series.

Loose Taped

Fig.1 Fig.2




Insulated rigid leads Insulated flexible leads 0.5mm²




| Ø d ±0.05 | p ≤15 | 22.5 ≤ p ≤ 27.5 | p = 37.5 |
|---|---|---|---|
| | 0.6 or 0.8* | 0.8 | 1 |

*See size table.

All dimensions are in mm.

| Pitch (mm) | Box thickness (B) (mm) | Maximum dimensions (mm) B max | H max | L max |
|---|---|---|---|---|
| 10.0 | All | B +0.2 | H +0.1 | L +0.2 |
| 15.0 | <7.5 | B +0.2 | H +0.1 | L +0.3 |
| 15.0 | ≥7.5 | B +0.2 | H +0.1 | L +0.5 |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

### GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.
Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14, EN 60384-14.

### ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 275Vac (50/60Hz) / 560 Vdc
300Vac (50/60Hz) / 630 Vdc

**Capacitance range:** 0.01µF to 10µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M);
tolerance ±5% (J) available upon request

**Dissipation factor (DF):**
tgδ $10^{-4}$ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**
Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**
≥1x$10^5$ MΩ (5x$10^5$ MΩ)* for C≤0.33µF
≥30000 s (150000 s)* for C>0.33µF
* Typical value

**Test voltage between terminations** (on all pieces)**:**
1500Vac for 1 s + 2200Vdc for 1 s at +25°C±5°C

### TEST METHOD AND PERFORMANCE

**Damp heat, steady state:**

**Test conditions 1st**
Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ±2%
Test duration: 56 days

**Test conditions 2nd**
Temperature: +60°C ± 2°C
Relative humidity (RH): 95% ±2%
Test duration: 500 hours

**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**
Temperature: +110°C ± 2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

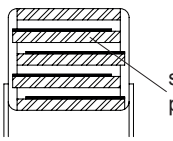
**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
Insulation resistance: ≥50% of initial limit.

**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 |ΔC/C|: ≤2%

**Winding scheme**



# X2 CLASS (IEC 60384-14) - MKP Series
## METALLIZED POLYPROPYLENE FILM CAPACITOR
## SELF-HEALING PROPERTIES

| Rated Cap. | 275 Vac / 560 Vdc Std dimensions | | | | Ø d | Max dv/dt at 390Vdc | Part Number | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | | | |
| 0.010 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2100 - - N0 | - |
| 0.015 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2150 - - N0 | - |
| 0.022 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2220 - - N0 | - |
| 0.033 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2330 - - M1 | - |
| 0.047 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2470 - - N0 | - |
| 0.068 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2680 - - M1 | - |
| 0.10 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 3100 - - M1 | M |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2100 - - 01 | - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2150 - - 01 | - |
| 0.022 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2220 - - 01 | - |
| 0.033 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2330 - - 01 | - |
| 0.047 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2470 - - 01 | - |
| 0.068 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2680 - - 01 | - |
| 0.10 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3100 - - M1 | - |
| 0.15 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3150 - - M2 | - |
| 0.15 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3150 - - L2 | - |
| 0.22 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - M2 | - |
| 0.22 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - L2 | - |
| 0.22 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - 02 | - |
| 0.33 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3330 - - N0 | - |
| 0.33 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - M1 | - |
| 0.33 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3330 - - N1 | M |
| 0.33 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - 02 | - |
| 0.33 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - 01 | - |
| 0.47 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3470 - - 02 | M |
| 0.47 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3470 - - N0 | M |
| 0.47 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3470 - - M1 | - |
| 0.56 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3560 - - N0 | - |
| 0.60 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3600 - - N0 | - |
| 0.15 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3150 - - 01 | - |
| 0.22 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3220 - - M1 | - |
| 0.33 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3330 - - N0 | - |
| 0.47 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3470 - - N0 | - |
| 0.68 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3680 - - M2 | - |
| 1.0 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4100 - - N2 | M |
| 1.0 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4100 - - N1 | - |
| 0.47 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 3470 - - 01 | - |
| 0.68 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 3680 - - M1 | - |
| 1.0 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4100 - - M1 | - |
| 1.5 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4150 - - M1 | - |
| 2.2 µF | 13.0 | 25.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4220 - - M2 | - |
| 2.2 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4220 - - M1 | - |
| 3.3 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4330 - - M2 | - |
| 4.7 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4470 - - M2 | - |
| 4.7 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4470 - - M1 | - |
| 1.5 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4150 - - M1 | - |
| 2.2 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4220 - - M2 | M |
| 2.2 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4220 - - M1 | - |
| 3.3 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4330 - - M1 | - |
| 4.7 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4470 - - M2 | M |
| 4.7 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4470 - - M1 | - |
| 6.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4680 - - M2 | - |
| 6.8 µF | 24.0 | 44.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4680 - - M1 | - |
| 10.0 µF | 30.0 | 45.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 5100 - - M1 | - |

Rated voltage (K=275Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

E12 Series available upon request

## APPROVALS

| | | | |
|---|---|---|---|
| (**) | ENEC IEC 60384-14 | Class X2 | File No.V4413 |
| cULus | UL 1414 (up to 1µF, 85°C; 250Vac) | Across-the-line | File No.E97797 |
| cULus | CSA - C22.2 No.1 (up to 1µF, 85°C; 250Vac) | Across-the-line certified for Canada | File No.E97797 |
| cULus | UL 1283 (310 Vac) | Electromagnetic Interference Filters | File No.E85238 |
| cULus | CSA - C22.2 No.8 (310 Vac) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |
| CQC | GB/T 14472 | Class X2 | File CQC03001008199 CQC03001008842 |

Approved according to IEC 60384-14
According to IEC 60065

.

(**) ENEC mark has replaced all the following European National marks:

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | $4^{+2}$ | | | | 00 |
| Loose, long leads | $25^{-1/+2}$ | | | | 50 |
| Loose, long leads | $30^{+5}$ | | | | 40 |
| Loose, insulated rigid leads | $30^{+5}$ | | | | 51 |
| Loose, insulated flexible leads | $150^{\pm5}$ | | | | 52 |

Note: Ammo-pack is the preferred packaging for taped version.

For “capacitor connected in serial with main line” (two - phase and three - phase net) application, please read the “SHORT GUIDE TO CHOOSE THE RIGHT FILM CAPACITORS” at pag. 178 and contact our Technical Service for choosing the safest solution.

X2 CLASS (IEC 60384-14) - MKP Series

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

| Rated Cap. | 275 Vac / 560 Vdc Std dimensions | | | | Ø d | Max dv/dt at 390Vdc | Part Number | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | | | |
| 0.033 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2330 - - P0 | - |
| 0.047 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2470 - - P0 | - |
| 0.068 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 2680 - - P0 | - |
| 0.1 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 3100 - - P1 | M |
| 0.1 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 3100 - - P0 | - |
| 0.15 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 KF | 3150 - - P0 | M |
| 0.15 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3150 - - P0 | - |
| 0.22 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - P0 | - |
| 0.33 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3330 - - P0 | - |
| 0.33 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3330 - - P1 | |
| 0.33 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3330 - - P2 | - |
| 0.47 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3470 - - P0 | |
| 0.47 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3470 - - P1 | M |
| 0.47 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3470 - - P2 | M |
| 0.47 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3470 - - P3 | - |
| 0.68 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3680 - - P1 | M |
| 0.68 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3680 - - P0 | - |
| 0.82 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3820 - - P0 | M |
| 0.47 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3470 - - P1 | - |
| 0.56 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3560 - - P1 | M |
| 0.56 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3560 - - P0 | - |
| 0.68 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3680 - - P0 | - |
| 1.0 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4100 - - P1 | M |
| 1.0 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4100 - - P0 | - |
| 1.5 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4150 - - P1 | M |
| 1.5 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4150 - - P0 | - |
| 2.2 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4220 - - P0 | M |
| 1.0 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4100 - - P0 | - |
| 1.5 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4150 - - P0 | - |
| 2.2 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4220 - - P0 | - |
| 3.3 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4330 - - P0 | - |
| 4.7 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4470 - - P1 | M |
| 4.7 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4470 - - P0 | - |
| 6.8 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4680 - - P0 | - |
| 2.2 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4220 - - P0 | - |
| 3.3 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4330 - - P0 | - |
| 4.7 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4470 - - P0 | - |
| 6.8 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4680 - - P0 | - |
| 10.0 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 5100 - - P0 | - |

Rated voltage (K=275Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

E12 Series available upon request

## APPROVALS

| | | | |
|---|---|---|---|
| (**) | ENEC IEC 60384-14 | Class X2 | File No.V4413 |
| c UL us | UL 1414 (up to 1µF, 85°C; 250Vac) | Across-the-line | File No.E97797 |
| | CSA - C22.2 No.1 (up to 1µF, 85°C; 250Vac) | Across-the-line certified for Canada | File No.E97797 |
| | UL 1283 (310 Vac) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310 Vac) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |
| | GB/T 14472 | Class X2 | File CQC03001008199 CQC03001008842 |

Approved according to IEC 60384-14
According to IEC 60065

Not for use in series with the mains.
See www.kemet.com for more information.

.

(**) ENEC mark has replaced all the following European National marks:

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | $4^{+2}$ | | | | 00 |
| Loose, long leads | $25^{-1/+2}$ | | | | 50 |
| Loose, long leads | $30^{+5}$ | | | | 40 |
| Loose, insulated rigid leads | $30^{+5}$ | | | | 51 |
| Loose, insulated flexible leads | $150^{\pm5}$ | | | | 52 |

Note: Ammo-pack is the preferred packaging for taped version.

For “capacitor connected in serial with main line” (two - phase and three - phase net) application, please read the “SHORT GUIDE TO CHOOSE THE RIGHT FILM CAPACITORS” at pag. 178 and contact our Technical Service for choosing the safest solution.

# X2 CLASS (IEC 60384-14) - MKP Series
## METALLIZED POLYPROPYLENE FILM CAPACITOR
## SELF-HEALING PROPERTIES

| Rated Cap. | 300 Vac / 630 Vdc Std dimensions | | | | Ø d | Max dv/dt at 390Vdc | Part Number | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | | | |
| 0.010 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 2100 - - N0 | - |
| 0.015 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 2150 - - N0 | - |
| 0.022 µF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 2220 - - N0 | - |
| 0.033 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 2330 - - M1 | - |
| 0.047 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 2470 - - N0 | - |
| 0.068 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 2680 - - M1 | - |
| 0.10 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 3F | 3100 - - M1 | M |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 2100 - - 01 | - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 2150 - - 01 | - |
| 0.022 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 2220 - - 01 | - |
| 0.033 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 2330 - - 01 | - |
| 0.047 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 2470 - - 01 | - |
| 0.068 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 2680 - - 01 | - |
| 0.10 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3100 - - M1 | - |
| 0.15 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3150 - - M2 | - |
| 0.15 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3150 - - L2 | - |
| 0.22 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3220 - - M2 | - |
| 0.22 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3220 - - L2 | - |
| 0.22 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3220 - - 02 | - |
| 0.33 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 400 | R46 3I | 3330 - - N0 | - |
| 0.33 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3330 - - M1 | - |
| 0.33 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3330 - - 02 | - |
| 0.33 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3330 - - 01 | - |
| 0.47 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3470 - - N0 | M |
| 0.47 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3470 - - M1 | - |
| 0.56 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3560 - - N0 | - |
| 0.60 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 3I | 3600 - - N0 | - |
| 0.15 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 3150 - - 01 | - |
| 0.22 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 3220 - - M1 | - |
| 0.33 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 3330 - - N0 | - |
| 0.47 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 3470 - - N0 | - |
| 0.68 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 3680 - - M2 | - |
| 1.0 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 4100 - - N2 | M |
| 1.0 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R46 3N | 4100 - - N1 | - |
| 0.47 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 3470 - - 01 | - |
| 0.68 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 3680 - - M1 | - |
| 1.0 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4100 - - M1 | - |
| 1.5 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4150 - - M1 | - |
| 2.2 µF | 13.0 | 25.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4220 - - M2 | - |
| 2.2 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4220 - - M1 | - |
| 3.3 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4330 - - M2 | - |
| 4.7 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4470 - - M2 | - |
| 4.7 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 150 | R46 3R | 4470 - - M1 | - |
| 1.5 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4150 - - M1 | - |
| 2.2 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4220 - - M2 | M |
| 2.2 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4220 - - M1 | - |
| 3.3 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4330 - - M1 | - |
| 4.7 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4470 - - M2 | M |
| 4.7 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4470 - - M1 | - |
| 6.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4680 - - M2 | - |
| 6.8 µF | 24.0 | 44.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 4680 - - M1 | - |
| 10.0 µF | 30.0 | 45.0 | 41.5 | 37.5 | 1.0 | 100 | R46 3W | 5100 - - M1 | - |

Rated voltage (3=300Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

E12 Series available upon request

## APPROVALS

Not for use in series with the mains.
See www.kemet.com for more information.

| | | | |
|---|---|---|---|
| (**) | ENEC IEC 60384-14 | Class X2 | File No.V4413 |
| cULus | UL 1414 (up to 1µF, 85°C; 250Vac) | Across-the-line | File No.E97797 |
| | CSA - C22.2 No.1 (up to 1µF, 85°C; 250Vac) | Across-the-line certified for Canada | File No.E97797 |
| | UL 1283 (310 Vac) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310 Vac) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |
| | GB/T 14472 | Class X2 | FileCQC03001008199 CQC03001008842 |

Approved according to IEC 60384-14
According to IEC 60065

(**) ENEC mark has replaced all the following European National marks:

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style P2 (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | 4 +2 | | | | 00 |
| Loose, long leads | 25 -1/+2 | | | | 50 |
| Loose, long leads | 30 +5 | | | | 40 |
| Loose, insulated rigid leads | 30 +5 | | | | 51 |
| Loose, insulated flexible leads | 150 ±5 | | | | 52 |

Note: Ammo-pack is the preferred packaging for taped version.

For “capacitor connected in serial with main line” (two - phase and three - phase net) application, please read the “SHORT GUIDE TO CHOOSE THE RIGHT FILM CAPACITORS” at pag. 178 and contact our Technical Service for choosing the safest solution.

KEMET CHARGED.

# R.46

## X2 CLASS (IEC 60384-14) - MKP

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

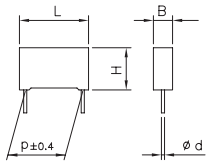
**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.

PRODUCT CODE: **R46**

Not for use in series with the mains.

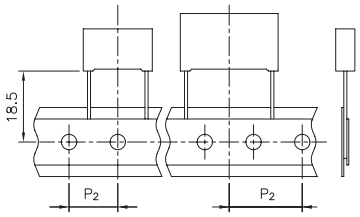
See www.kemet.com for more information.

Loose




Taped

Fig.1 Fig.2




| Ø d ±0.05 | p ≤15 | p = 22.5 |
|---|---|---|
| | 0.6 or 0.8* | 0.8 |

*See size table.

All dimensions are in mm.

# NEW 125°C

## GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film.
**Plates:** metal layer deposited by evaporation under vacuum.
**Winding:** non-inductive type.
**Leads:** tinned wire.
**Protection:** plastic case, thermosetting resin filled. Box material is solvent resistant and flame retardant according to UL94 V0.
**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.
**Climatic category:** 40/125/56 IEC 60068-1
**Operating temperature range:** -40 to +125°C
**Related documents:** IEC 60384-14; EN 60384-14

## ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 275 Vac (50/60Hz) / 560 Vdc
**Capacitance range:** 0.01µF to 1µF

## TEST METHOD AND PERFORMANCE

**Endurance:**

**Test conditions**

Temperature: +125°C±2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

**Performance**

Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤ 10%
Insulation resistance: ≥ 50% of initial limit.

## APPROVALS

| | | | |
|---|---|---|---|
| (**) | ENEC IEC 60384-14 | Class X2 | File No.CA08.00063 |
| c UL us | UL 1414 (up to 1µF, 85°C; 250Vac) | Across-the-line | File No.E97797 |
| | CSA - C22.2 No.1 (up to 1µF, 85°C; 250Vac) | Across-the-line certified for Canada | File No.E97797 |
| | UL 1283 (310 Vac) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310 Vac) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |

Approved according to IEC 60384-14
According to IEC 60065
(**) ENEC mark has replaced all the following European National marks:

| Rated Cap. | 275 Vac / 560 Vdc Std dimensions B | H | L | p | Ø d | Max dv/dt at 390Vdc (V/ µs) | Part Number |
|---|---|---|---|---|---|---|---|
| 0.010 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 K F 2100 - - H1 - |
| 0.015 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 K F 2150 - - H1 - |
| 0.022 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 K F 2220 - - H1 - |
| 0.033 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 500 | R46 K F 2330 - - H1 - |
| 0.047 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 K F 2470 - - H1 - |
| 0.068 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 500 | R46 K F 2680 - - H1 M |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 2100 - - H1 - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 2150 - - H1 - |
| 0.022 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 2220 - - H1 - |
| 0.033 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 2330 - - H1 - |
| 0.047 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 2470 - - H1 - |
| 0.068 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 2680 - - H1 - |
| 0.10 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3100 - - H1 - |
| 0.15 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3150 - - H2 - |
| 0.15 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3150 - - H3 - |
| 0.15 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3150 - - H1 - |
| 0.22 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3220 - - H1 - |
| 0.22 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3220 - - H2 M |
| 0.22 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 K I 3220 - - H3 M |
| 0.22 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 K I 3220 - - H4 - |
| 0.33 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 K I 3330 - - H1 M |
| 0.33 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 K I 3330 - - H2 M |
| 0.33 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 400 | R46 K I 3330 - - H3 M |
| 0.47 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 K I 3470 - - H1 M |
| 0.15 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 K N 3150 - - H1 - |
| 0.22 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 K N 3220 - - H1 - |
| 0.33 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 K N 3330 - - H1 - |
| 0.47 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 K N 3470 - - H1 - |
| 0.68 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R46 K N 3680 - - H1 - |
| 1.0 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 200 | R46 K N 4100 - - H1 - |

Rated voltage (K=275Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

300Vac available upon request

E12 Series available upon request

All dimensions are in mm

For "capacitor connected in serial with main line" (two - phase and three - phase net) application, please read the "SHORT GUIDE TO CHOOSE THE RIGHT FILM CAPACITORS" at pag. 178 and contact our Technical Service for choosing the safest solution.

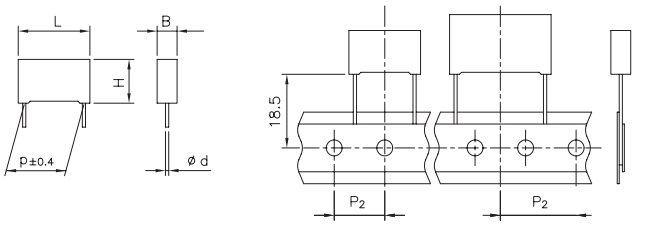
X2 CLASS (IEC 60384-14) - MKP Series

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

Loose Taped

Fig.1 Fig.2




| Ø d ±0.05 | p ≤15 | 22.5 ≤ p ≤ 27.5 | p = 37.5 |
|---|---|---|---|
| | 0.6 or 0.8* | 0.8 | 1.0 |

*See size table.

All dimensions are in mm.

**Typical applications**: This special R46 release is designed for applications in series with the main .

PRODUCT CODE: **R46**

Not for use in series with the mains.
See www.kemet.com for more information.

| Pitch | Box thickness (B) | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 10.0 | All | B +0.2 | H +0.1 | L +0.2 |
| 15.0 | <7.5 | B +0.2 | H +0.1 | L +0.3 |
| 15.0 | ≥7.5 | B +0.2 | H +0.1 | L +0.5 |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

## GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.

Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14, EN 60384-14.

## ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 275Vac (50/60Hz) / 560 Vdc

**Capacitance range:** 0.022µF to 10µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M).
tolerance ±5% (J) available upon request

**Dissipation factor (DF):**
tgδ $10^{-4}$ at +25°C ±5°C: ≤15 (8)* at 1kHz
* Typical value

**Insulation resistance:**

**Test conditions**

Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**

≥1x$10^5$ MΩ (5x$10^5$ MΩ)* for C≤0.33µF
≥30000 s (150000 s)* for C>0.33µF
* Typical value

**Test voltage between terminations** (on all pieces)**:**
1500Vac for 1 s + 2200Vdc for 1 s at +25°C±5°C

## TEST METHOD AND PERFORMANCE

**Damp heat, steady state:**

**Test conditions 1st**

Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ±2%
Test duration: 56 days

**Test conditions 2nd**

Temperature: +60°C ± 2°C
Relative humidity (RH): 95% ±2%
Test duration: 500 hours

**Test conditions 3rd**

Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ±2%
Test duration: 500 hours
Voltage value: 230 Vac, 50 Hz

**Performance**

Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**

Temperature: +110°C ± 2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

**Performance**

Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
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 |ΔC/C|: ≤2%

# R.46 S VERSION

X2 CLASS (IEC60384-14) - MKP Series

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

| Rated Cap. (*) | 275 Vac / 560 Vdc Std dimensions | | | | Ø d | Max dv/dt at 390Vdc | Part Number | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | | | |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2100 - - S0 | - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2150 - - S0 | - |
| 0.022 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2220 - - S0 | - |
| 0.033 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2330 - - S0 | - |
| 0.047 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2470 - - S1 | - |
| 0.068 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 2680 - - S0 | - |
| 0.10 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3100 - - S1 | M |
| 0.10 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3100 - - S0 | - |
| 0.15 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3150 - - S1 | M |
| 0.15 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3150 - - S0 | - |
| 0.15 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3150 - - S3 | - |
| 0.22 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - S1 | M |
| 0.22 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - S0 | - |
| 0.22 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - S2 | - |
| 0.22 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 400 | R46 KI | 3220 - - S3 | - |
| 0.33 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - S1 | - |
| 0.33 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - S3 | M |
| 0.33 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - S0 | - |
| 0.33 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3330 - - S2 | - |
| 0.47 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3470 - - S0 | - |
| 0.47 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3470 - - S1 | M |
| 0.56 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3560 - - S0 | - |
| 0.68 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 400 | R46 KI | 3680 - - S0 | M |
| 0.22 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3220 - - S0 | - |
| 0.33 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3330 - - S1 | M |
| 0.33 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3330 - - S0 | - |
| 0.47 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3470 - - S1 | M |
| 0.47 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3470 - - S0 | - |
| 0.68 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 3680 - - S0 | - |
| 1.0 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4100 - - S2 | M |
| 1.0 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4100 - - S1 | - |
| 1.2 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 200 | R46 KN | 4120 - - S0 | - |
| 0.47 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 3470 - - S0 | - |
| 0.68 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 3680 - - S1 | - |
| 1.0 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4100 - - S1 | - |
| 1.5 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4150 - - S1 | - |
| 2.2 µF | 13.0 | 25.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4220 - - S2 | - |
| 3.3 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4330 - - S2 | - |
| 4.7 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46 KR | 4470 - - S2 | - |
| 1.5 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4150 - - S1 | - |
| 2.2 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4220 - - S2 | M |
| 2.2 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4220 - - S1 | - |
| 3.3 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4330 - - S1 | - |
| 4.7 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4470 - - S2 | M |
| 4.7 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4470 - - S1 | - |
| 6.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 4680 - - S2 | - |
| 10.0 µF | 30.0 | 45.0 | 41.5 | 37.5 | 1.0 | 100 | R46 KW | 5100 - - S1 | - |

Rated voltage (K=275Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

300Vac Available upon request

E12 Series available upon request

All dimensions are in mm

## APPROVALS

Not for use in series with the mains.
See www.kemet.com for more information.

| | | | |
|---|---|---|---|
| (**) | ENEC IEC 60384-14 | Class X2 | File No.V4413 |
| c71us | UL 1414 (up to 1µF, 85°C; 250Vac) | Across-the-line | File No.E97797 |
| | CSA - C22.2 No.1 (up to 1µF, 85°C; 250Vac) | Across-the-line certified for Canada | File No.E97797 |
| | UL 1283 (310 Vac) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310 Vac) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |
| CQC | GB/T 14472 | Class X2 | File CQC03001008199 CQC03001008842 |

Approved according to IEC 60384-14
According to IEC 60065

(**) ENEC mark has replaced all the following European National marks:

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style P2 (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | 4 +2 | | | | 00 |
| Loose, long leads | 25 -1/+2 | | | | 50 |
| Loose, long leads | 30 +5 | | | | 40 |
| Loose, insulated rigid leads | 30 +5 | | | | 51 |
| Loose, insulated flexible leads | 150 ±5 | | | | 52 |

Note: Ammo-pack is the preferred packaging for taped version.

# R.46+R

Capacitors with discharge resistor
X2 CLASS (IEC 60384-14) - MKP Series
**METALLIZED POLYPROPYLENE FILM CAPACITOR**
SELF-HEALING PROPERTIES

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.

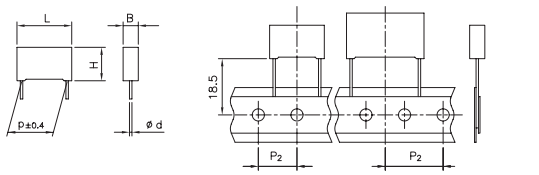
PRODUCT CODE: **R46**

Not for use in series with the mains.
See www.kemet.com for more information.

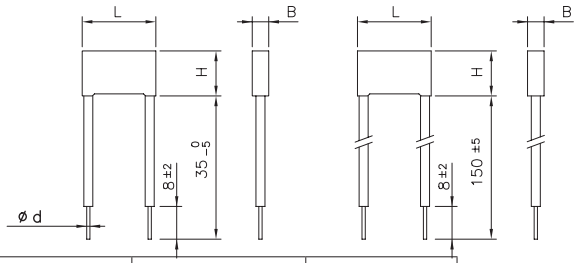
| Pitch | Box thickness (B) | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

Loose Taped

Fig.1 Fig.2




Insulated rigid leads Insulated flexible leads 0.5mm²




| Ø d ±0.05 | P= 22.5 to 27.5 | p = 37.5 |
|---|---|---|
| | 0.8 | 1 |

All dimensions are in mm.

## GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.

Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14, EN 60384-14.

## ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 275Vac (50/60Hz) / 560 Vdc
300Vac (50/60Hz) / 630 Vdc

**Capacitance range:** 0.22µF to 10µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M).

**Dissipation factor (DF):**
tgδ $10^{-4}$ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**
Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**
≥1x$10^5$ MΩ (5x$10^5$ MΩ)* for C≤0.33µF
≥30000 s (150000 s)* for C>0.33µF
* Typical value

**Test voltage between terminations** (on all pieces)**:**

## TEST METHOD AND PERFORMANCE

**Damp heat, steady state:**

**Test conditions 1st**
Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ±2%
Test duration: 56 days

**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**
Temperature: +110°C ± 2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
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 |ΔC/C|: ≤2%

## APPROVALS

| | | | |
|---|---|---|---|
| | ENEC IEC 60384-14 | Class X2 | File No.V4413 |
| c UL us | UL 1283 (310Vac-105°C) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310Vac-105°C) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |

Approved according to IEC 60384-14
According to IEC 60065.

# R.46+R

Capacitors with discharge resistor
X2 CLASS (IEC 60384-14) - MKP Series
**METALLIZED POLYPROPYLENE FILM CAPACITOR**
SELF-HEALING PROPERTIES

PRODUCT CODE: **R46**

Not for use in series with the mains.
See www.kemet.com for more information.

| Rated Cap. (*) | 275 Vac / 560 Vdc Std dimensions B | H | L | p | Ø d | Max dv/dt at 390Vdc (V/ µs) | Part Number |
|---|---|---|---|---|---|---|---|
| 0.22 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R46KN 3220 - - 01 - x |
| 0.33 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 200 | R46KN 3330 - - 01 - x |
| 0.47 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R46KN 3470 - - 01 - x |
| 0.68 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R46KN 3680 - - 01 - x |
| 0.47 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 3470 - - 01 - x |
| 0.68 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 3680 - - M1 - x |
| 1.0 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 4100 - - M1 - x |
| 1.5 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 4150 - - M1 - x |
| 2.2 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 4220 - - M1 - x |
| 3.3 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 4330 - - M2 - x |
| 4.7 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 150 | R46KR 4470 - - M1 - x |
| 1.5 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R46KW 4150 - - M1 - x |
| 2.2 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R46KW 4220 - - M1 - x |
| 3.3 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R46KW 4330 - - M1 - x |
| 4.7 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R46KW 4470 - - M1 - x |
| 6.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R46KW 4680 - - M2 - x |
| 10.0 µF | 24.0 | 44.0 | 41.5 | 37.5 | 1.0 | 100 | R46KW 5100 - - M1 - x |

Rated voltage (K=275Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)
Value of discharge resistor (Table 2)

| Rated Cap. (*) | 300 Vac / 630 Vdc Std dimensions B | H | L | p | Ø d | Max dv/dt at 390Vdc (V/ µs) | Part Number |
|---|---|---|---|---|---|---|---|
| 0.22 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 200 | R463N 3220 - - 01 - x |
| 0.33 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 200 | R463N 3330 - - 01 - x |
| 0.47 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 200 | R463N 3470 - - 01 - x |
| 0.68 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 200 | R463N 3680 - - 01 - x |
| 0.47 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 3470 - - 01 - x |
| 0.68 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 3680 - - M1 - x |
| 1.0 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 4100 - - M1 - x |
| 1.5 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 4150 - - M1 - x |
| 2.2 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 4220 - - M1 - x |
| 3.3 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 4330 - - M2 - x |
| 4.7 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 150 | R463R 4470 - - M1 - x |
| 1.5 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R463W 4150 - - M1 - x |
| 2.2 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R463W 4220 - - M1 - x |
| 3.3 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R463W 4330 - - M1 - x |
| 4.7 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R463W 4470 - - M1 - x |
| 6.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R463W 4680 - - M2 - x |
| 10.0 µF | 24.0 | 44.0 | 41.5 | 37.5 | 1.0 | 100 | R463W 5100 - - M1 - x |

Rated voltage (3=300Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)
Value of discharge resistor (Table 2)

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Fig. (No.) | Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | 4 $^{+2}$ | | | | 00 |
| Loose, long leads | 25 $^{-1/+2}$ | | | | 50 |
| Loose, long leads | 30 $^{+5}$ | | | | 40 |
| Loose, insulated rigid leads | 30 $^{+5}$ | | | | 51 |
| Loose, insulated flexible leads | 150 $^{\pm5}$ | | | | 52 |

## PRODUCT CODE SYSTEM

The part number, comprising 15 digits, is formed as follows:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 4 | 6 | | | | | | | | | | - | | - |

Digit 1 to 3 — Series code.
Digit 4 — a.c. rated voltage:
K = 275Vac; 3 = 300Vac
Digit 5 — Pitch:
N = 22.5; R = 27.5; W = 37.5 mm
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 (table 1)
Digit 12 — Identifies the dimensions and electrical characteristics.
Digit 13 — Internal use
Digit 14 — Capacitance tolerance:
K=±10%; M=±20%
Digit 15 — Value of the discharge resistor (tolerance±10%) according to the following table*:

**Table 2**

| R | code (x) |
|---|---|
| 470 kΩ | E |
| 680 kΩ | F |
| 1 MΩ | G |
| 1.2 MΩ | L |
| 1.5 MΩ | N |
| 2.2 MΩ | P |
| 3.3 MΩ | Q |
| 4.7 MΩ | S |
| 6.8 MΩ | T |
| 10 MΩ | V |

*Other resistors are avaible upon request.

All dimensions are in mm

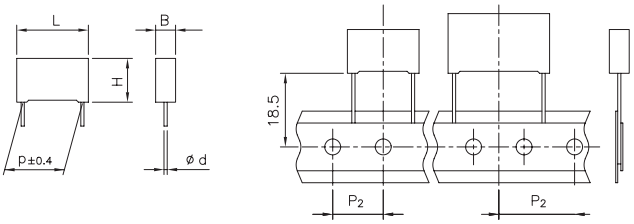
X2 CLASS (IEC 60384-14) - MKP Series

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

Loose Taped

Fig.1 Fig.2




| Ø d ±0.05 | p ≤15 | 22.5 ≤ p ≤ 27.5 | p = 37.5 |
|---|---|---|---|
| | 0.6 or 0.8* | 0.8 | 1.0 |

*See size table.

All dimensions are in mm.

## GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film - 2 sections.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.
Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14; EN 60384-14.

## ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 440Vac / 1000Vdc; 50/60Hz

**Capacitance range:** 4700pF to 2.2µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M).
Tolerance ±5% (J) available upon request.

**Dissipation factor (DF):**
tgδ x $10^{-4}$ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**
Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**
≥1x$10^5$ MΩ for C≤0.33µF
≥30000 s for C>0.33µF

**Test voltage between terminations** (on all pieces)**:**
1700Vac for 1 s + 2700Vdc for 1 s at +25°C±5°C

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.

PRODUCT CODE: **R47**

| Pitch | Box thickness (B) | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 10.0 | All | B +0.2 | H +0.1 | L +0.2 |
| 15.0 | <7.5 | B +0.2 | H +0.1 | L +0.3 |
| 15.0 | ≥7.5 | B +0.2 | H +0.1 | L +0.5 |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

## TEST METHOD AND PERFORMANCE

**Damp heat, steady state:**

**Test conditions 1st**
Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ±2%
Test duration: 56 days

**Test conditions 2nd**
Temperature: +60°C ± 2°C
Relative humidity (RH): 95% ±2%
Test duration: 500 hours

**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**
Temperature: +110°C ± 2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

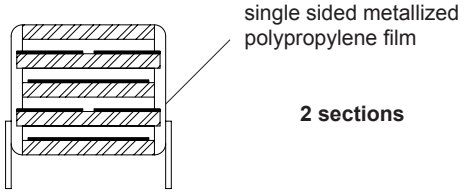
**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
Insulation resistance: ≥50% of initial limit.

**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 |ΔC/C|: ≤2%

**Winding scheme**



X2 CLASS (IEC60384-14) - MKP Series

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

| Rated Cap. | 440 Vac / 1000 Vdc Std dimensions | | | | Ø d | Max dv/dt at 420Vdc | Part Number |
|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | |
| 4700 pF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 1470 - - 01 - |
| 6800 pF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 1680 - - 01 - |
| 8200 pF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 1820 - - 01 - |
| 0.010 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 2100 - - 01 - |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2100 - - 01 - |
| 0.012 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2120 - - 01 - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2150 - - 01 - |
| 0.018 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2180 - - 01 - |
| 0.022 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2220 - - 01 - |
| 0.027 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2270 - - 01 - |
| 0.033 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2330 - - 01 - |
| 0.039 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2390 - - 01 - |
| 0.047 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2470 - - 01 - |
| 0.047 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2470 - - 02 - |
| 0.047 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2470 - - 03 - |
| 0.056 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2560 - - 01 - |
| 0.068 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 2680 - - 01 - |
| 0.068 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 600 | R474I 2680 - - 02 - |
| 0.068 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 2680 - - 03 - |
| 0.082 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 2820 - - 01 - |
| 0.10 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 3100 - - 01 - |
| 0.047 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 2470 - - 01 - |
| 0.047 µF | 6.5 | 13.5 | 26.5 | 22.5 | 0.8 | 300 | R474N 2470 - - 02 - |
| 0.068 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 2680 - - 01 - |
| 0.10 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3100 - - 01 - |
| 0.12 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3120 - - 01 - |
| 0.15 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 300 | R474N 3150 - - 01 - |
| 0.18 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 300 | R474N 3180 - - 01 - |
| 0.22 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3220 - - 01 - |
| 0.27 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3270 - - 01 - |
| 0.33 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3330 - - 01 - |
| 0.15 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3150 - - 01 - |
| 0.18 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3180 - - 01 - |
| 0.22 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3220 - - 01 - |
| 0.27 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3270 - - 02 - |
| 0.33 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3330 - - 02 - |
| 0.39 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3390 - - 01 - |
| 0.47 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3470 - - 01 - |
| 0.56 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3560 - - 01 - |
| 0.68 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3680 - - 01 - |
| 0.82 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3820 - - 01 - |
| 1.0 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 4100 - - 01 - |
| 1.2 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 4120 - - 01 - |
| 1.5 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 4150 - - 01 - |
| 0.47 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 3470 - - 01 - |
| 0.56 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 3560 - - 01 - |
| 0.68 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 3680 - - 01 - |
| 0.82 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 150 | R474W 3820 - - 01 - |
| 1.0 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 150 | R474W 4100 - - 01 - |
| 1.2 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4120 - - 01 - |
| 1.5 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4150 - - 01 - |
| 1.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4180 - - 01 - |
| 2.2 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4220 - - 01 - |

Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

PRODUCT CODE: **R47**

## APPROVALS

| | | | |
|---|---|---|---|
| (*) | ENEC IEC 60384-14 | Class X2 | File No. CA08.00101 |
| c UL us | UL 1414 up to 1µF, 85°C; 250Vac) | Across-the-line | File No. E97797 |
| | UL 1283 | Electromagnetic Interference Filters | File No. E85238 |

Approved according to IEC 60384-14
According to IEC 60065.

(*) ENEC mark has replaced all the following European National marks:

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | $4^{+2}$ | | | | 00 |
| Loose, long leads | $25^{-1/+2}$ | | | | 50 |
| Loose, long leads | $30^{+5}$ | | | | 40 |

Note: Ammo-pack is the preferred packaging for taped version.

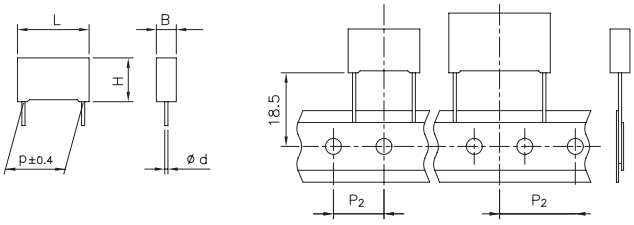
X1 CLASS (IEC 60384-14) - MKP Series

# METALLIZED POLYPROPYLENE FILM CAPACITOR

SELF-HEALING PROPERTIES

Loose Taped

Fig.1 Fig.2




| Ø d ±0.05 | p ≤15 | 22.5 ≤ p ≤ 27.5 | p = 37.5 |
|---|---|---|---|
| | 0.6 or 0.8* | 0.8 | 1.0 |

*See size table.

All dimensions are in mm.

## GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film - 2 sections.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.
Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14; EN60384-14

## ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 440Vac / 1000Vdc; 50/60Hz

**Capacitance range:** 4700pF to 2.2μF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M);
Tolerance ±5% (J) available upon request.

**Dissipation factor (DF):**
tgδ x $10^{-4}$ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**

| | |
|---|---|
| Temperature: | +25°C±5°C |
| Voltage charge time: | 1 min |
| Voltage charge: | 100 Vdc |

**Performance**

| | |
|---|---|
| ≥1x$10^5$ MΩ | for C≤0.33μF |
| ≥30000 s | for C>0.33μF |

**Test voltage between terminations** (on all pieces)**:**
1700Vac for 1 s + 2700Vdc for 1 s at +25°C±5°C

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.
Class X1 shall be applied for PERMANENTLY CONNECTED APPARATUS.

Note: **PERMANENTLY CONNECTED APPARATUS:** apparatus which is intended for connection to the mains by a connection which cannot be loosened **BY HAND**.
**BY HAND:** operation that does not require the use of any object such a tool, coin, etc.

PRODUCT CODE: **R47**

| Pitch | Box thickness (B) | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 10.0 | All | B +0.2 | H +0.1 | L +0.2 |
| 15.0 | <7.5 | B +0.2 | H +0.1 | L +0.3 |
| 15.0 | ≥7.5 | B +0.2 | H +0.1 | L +0.5 |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

## TEST METHOD AND PERFORMANCE

**Damp heat, steady state:**

**Test conditions 1st**

| | |
|---|---|
| Temperature: | +40°C ± 2°C |
| Relative humidity (RH): | 93% ±2% |
| Test duration: | 56 days |

**Test conditions 2nd**

| | |
|---|---|
| Temperature: | +60°C ± 2°C |
| Relative humidity (RH): | 95% ±2% |
| Test duration: | 500 hours |

**Performance**

Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**

| | |
|---|---|
| Temperature: | +110°C ± 2°C |
| Test duration: | 1000 h |
| Voltage applied: | 1.25 x $V_R$ +1000Vac 0.1 s/h |

**Performance**

Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
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 |ΔC/C|: ≤2%

X1 CLASS (IEC 60384-14) - MKP Series

**METALLIZED POLYPROPYLENE FILM CAPACITOR**

SELF-HEALING PROPERTIES

PRODUCT CODE: **R47**

## APPROVALS

| | | | |
|---|---|---|---|
| (*) | ENEC IEC 60384-14 | Class X1 | File No. CA08.00101 |
| cULus | UL 1414 up to 1µF, 85°C; 250Vac) | Across-the-line | File No. E97797 |
| | UL 1283 | Electromagnetic Interference Filters | File No. E85238 |

Approved according to IEC 60384-14
According to IEC 60065.

(*) ENEC mark has replaced all the following European National marks:

| Rated Cap. | 440 Vac / 1000 Vdc Std dimensions | | | | Ø d | Max dv/dt at 420Vdc | Part Number |
|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | |
| 4700 pF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 1470 - - A1 - |
| 6800 pF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 1680 - - A1 - |
| 8200 pF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 1820 - - A1 - |
| 0.010 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 750 | R474F 2100 - - A1 - |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2100 - - A1 - |
| 0.012 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2120 - - A1 - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2150 - - A1 - |
| 0.018 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2180 - - A1 - |
| 0.022 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2220 - - A1 - |
| 0.027 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2270 - - A1 - |
| 0.033 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R474I 2330 - - A1 - |
| 0.039 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2390 - - A1 - |
| 0.047 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2470 - - A1 - |
| 0.047 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2470 - - A2 - |
| 0.047 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2470 - - A3 - |
| 0.056 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 600 | R474I 2560 - - A1 - |
| 0.068 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 2680 - - A1 - |
| 0.068 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 600 | R474I 2680 - - A2 - |
| 0.068 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 2680 - - A3 - |
| 0.082 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 2820 - - A1 - |
| 0.10 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 600 | R474I 3100 - - A1 - |
| 0.047 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 2470 - - A1 - |
| 0.047 µF | 6.5 | 13.5 | 26.5 | 22.5 | 0.8 | 300 | R474N 2470 - - A2 - |
| 0.068 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 2680 - - A1 - |
| 0.10 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3100 - - A1 - |
| 0.12 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3120 - - A1 - |
| 0.15 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 300 | R474N 3150 - - A1 - |
| 0.18 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 300 | R474N 3180 - - A1 - |
| 0.22 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3220 - - A1 - |
| 0.27 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3270 - - A1 - |
| 0.33 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 300 | R474N 3330 - - A1 - |
| 0.15 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3150 - - A1 - |
| 0.18 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3180 - - A1 - |
| 0.22 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3220 - - A1 - |
| 0.27 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3270 - - A2 - |
| 0.33 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3330 - - A2 - |
| 0.39 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3390 - - A1 - |
| 0.47 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3470 - - A1 - |
| 0.56 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3560 - - A1 - |
| 0.68 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3680 - - A1 - |
| 0.82 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 3820 - - A1 - |
| 1.0 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 4100 - - A1 - |
| 1.2 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 4120 - - A1 - |
| 1.5 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 225 | R474R 4150 - - A1 - |
| 0.47 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 3470 - - A1 - |
| 0.56 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 3560 - - A1 - |
| 0.68 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 3680 - - A1 - |
| 0.82 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 150 | R474W 3820 - - A1 - |
| 1.0 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 150 | R474W 4100 - - A1 - |
| 1.2 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4120 - - A1 - |
| 1.5 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4150 - - A1 - |
| 1.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4180 - - A1 - |
| 2.2 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 150 | R474W 4220 - - A1 - |

Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

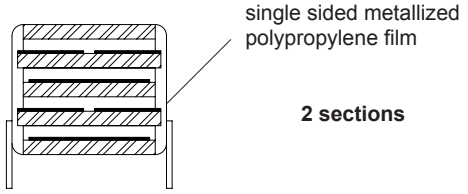
All dimensions are in mm

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | 4 $^{+2}$ | | | | 00 |
| Loose, long leads | 25 $^{-1/+2}$ | | | | 50 |
| Loose, long leads | 30 $^{+5}$ | | | | 40 |

Note: Ammo-pack is the preferred packaging for taped version.

**Winding scheme**



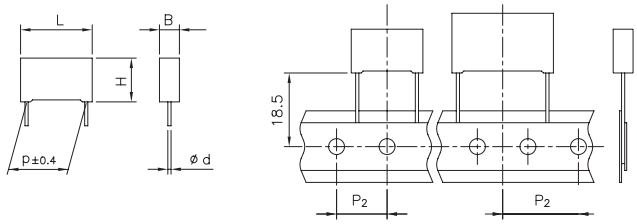
X2 CLASS (IEC 60384-14) - MKP Series

# METALLIZED POLYPROPYLENE FILM CAPACITOR

SELF-HEALING PROPERTIES

Loose Taped

Fig.1 Fig.2




| Ø d ±0.05 | p ≤15 | 22.5 ≤ p 27.5 | p = 37.5 |
|---|---|---|---|
| | 0.6 or 0.8* | 0.8 | 1.0 |

*See size table.

All dimensions are in mm.

## GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film - 2 sections.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.

Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/85/56 IEC 60068-1

**Operating temperature range:** -40 to +85°C

**Related documents:** IEC 60384-14; EN 60384-14.

## ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 520Vac / 1000Vdc; 50/60Hz

**Capacitance range:** 4700pF to 2.2µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M);
Tolerance ±5% (J) available upon request.

**Dissipation factor (DF):**
tgδ x $10^{-4}$ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**
Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**
≥1x$10^5$ MΩ for C≤0.33µF
≥30000 s for C>0.33µF

**Test voltage between terminations** (on all pieces)**:**
1700Vac for 1 s + 2700Vdc for 1 s at +25°C±5°C

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.

**V = 520Vac**

PRODUCT CODE: **R475**

| Pitch | Box thickness (B) | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 10.0 | All | B +0.2 | H +0.1 | L +0.2 |
| 15.0 | <7.5 | B +0.2 | H +0.1 | L +0.3 |
| 15.0 | ≥7.5 | B +0.2 | H +0.1 | L +0.5 |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

## TEST METHOD AND PERFORMANCE

**Damp heat, steady state:**

**Test conditions 1st**
Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ±2%
Test duration: 56 days

**Test conditions 2nd**
Temperature: +60°C ± 2°C
Relative humidity (RH): 95% ±2%
Test duration: 500 hours

**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**
Temperature: +85°C ± 2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

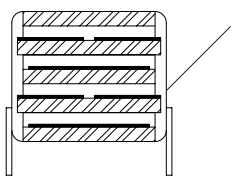
**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
Insulation resistance: ≥50% of initial limit.

**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 |ΔC/C|: ≤2%

**Winding scheme**



X2 CLASS (IEC 60384-14) - MKP Series
**METALLIZED POLYPROPYLENE FILM CAPACITOR**
SELF-HEALING PROPERTIES

PRODUCT CODE: **R475**

## APPROVALS

| | | | |
|---|---|---|---|
| (*) | ENEC IEC 60384-14 | Class X2 | File No. CA08.00101 |
| c UL us | UL 1414 up to 1µF, 85°C; 250Vac) | Across-the-line | File No. E97797 |
| | UL 1283 (440 Vac 110°C) | Electromagnetic Interference Filters | File No. E85238 |

Approved according to IEC 60384-14
According to IEC 60065.

(*) ENEC mark has replaced all the following European National marks:

| Rated Cap. | 520 Vac / 1000 Vdc Std dimensions | | | | Ø d | Max dv/dt at 420Vdc | Part Number |
|---|---|---|---|---|---|---|---|
| | B | H | L | p | | (V/ µs) | |
| 4700 pF | 4.0 | 9.0 | 13.0 | 10.0 | 0.6 | 750 | R475F 1470 - - 01 - |
| 6800 pF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 750 | R475F 1680 - - 01 - |
| 8200 pF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 750 | R475F 1820 - - 01 - |
| 0.010 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 750 | R475F 2100 - - 01 - |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2100 - - 01 - |
| 0.012 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2120 - - 01 - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2150 - - 01 - |
| 0.018 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2180 - - 01 - |
| 0.022 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2220 - - 01 - |
| 0.027 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2270 - - 01 - |
| 0.033 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 600 | R475I 2330 - - 01 - |
| 0.039 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 600 | R475I 2390 - - 01 - |
| 0.047 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 600 | R475I 2470 - - 01 - |
| 0.047 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 600 | R475I 2470 - - 02 - |
| 0.047 µF | 9.0 | 12.5 | 18.0 | 15.0 | 0.6 | 600 | R475I 2470 - - 03 - |
| 0.056 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 600 | R475I 2560 - - 01 - |
| 0.068 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 600 | R475I 2680 - - 01 - |
| 0.068 µF | 7.5 | 18.5 | 18.0 | 15.0 | 0.8 | 600 | R475I 2680 - - 02 - |
| 0.068 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 600 | R475I 2680 - - 03 - |
| 0.082 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 600 | R475I 2820 - - 01 - |
| 0.10 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 600 | R475I 3100 - - 01 - |
| 0.047 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 2470 - - 01 - |
| 0.047 µF | 6.5 | 13.5 | 26.5 | 22.5 | 0.8 | 300 | R475N 2470 - - 02 - |
| 0.068 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 2680 - - 01 - |
| 0.10 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 3100 - - 01 - |
| 0.12 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 3120 - - 01 - |
| 0.15 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 300 | R475N 3150 - - 01 - |
| 0.18 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 300 | R475N 3180 - - 01 - |
| 0.22 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 3220 - - 01 - |
| 0.27 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 3270 - - 01 - |
| 0.33 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 300 | R475N 3330 - - 01 - |
| 0.15 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3150 - - 01 - |
| 0.18 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3180 - - 01 - |
| 0.22 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3220 - - 01 - |
| 0.27 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3270 - - 02 - |
| 0.33 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3330 - - 02 - |
| 0.39 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3390 - - 01 - |
| 0.47 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3470 - - 01 - |
| 0.56 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3560 - - 01 - |
| 0.68 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3680 - - 01 - |
| 0.82 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 3820 - - 01 - |
| 1.0 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 4100 - - 01 - |
| 1.2 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 4120 - - 01 - |
| 1.5 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 225 | R475R 4150 - - 01 - |
| 0.47 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 3470 - - 01 - |
| 0.56 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 3560 - - 01 - |
| 0.68 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 3680 - - 01 - |
| 0.82 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 150 | R475W 3820 - - 01 - |
| 1.0 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 150 | R475W 4100 - - 01 - |
| 1.2 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 4120 - - 01 - |
| 1.5 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 4150 - - 01 - |
| 1.8 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 4180 - - 01 - |
| 2.2 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 150 | R475W 4220 - - 01 - |

Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Taping style Fig. (No.) | Taping style Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | 4 +2 | | | | 00 |
| Loose, long leads | 25 -1/+2 | | | | 50 |
| Loose, long leads | 30 +5 | | | | 40 |

Note: Ammo-pack is the preferred packaging for taped version.

# X1 CLASS (IEC 60384-14) - MKP Series

## METALLIZED POLYPROPYLENE FILM CAPACITOR

SELF-HEALING PROPERTIES

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock. Class X1 shall be applied for PERMANENTLY CONNECTED APPARATUS

Not for use in series with the mains.

See www.kemet.com for more information.

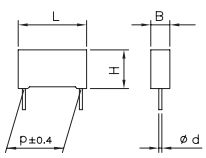
Note: **PERMANENTLY CONNECTED APPARATUS:** apparatus which is intended for connection to the mains by a connection which cannot be loosened **BY HAND**.
**BY HAND:** operation that does not require the use of any object such a tool, coin, etc.

PRODUCT CODE: **R49**

**Note:** R.49 series has replaced the 1.58 series (available upon request). For new design we suggest the use of the R.49 series.

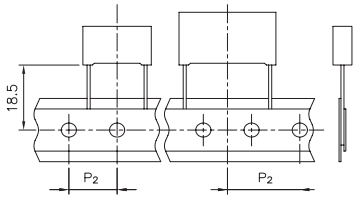
Loose

Fig.1

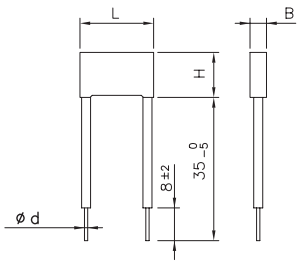



Taped

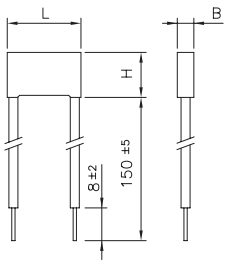
Fig.2




Insulated rigid leads




Insulated flexible leads 0.5mm²




| Ø d ±0.05 | p ≤15 | 22.5 ≤ p ≤ 27.5 | p = 37.5 |
|---|---|---|---|
| | 0.6 or 0.8* | 0.8 | 1.0 |

*See size table.

All dimensions are in mm.

| Pitch | Box thickness (B) | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 10.0 | All | B +0.2 | H +0.1 | L +0.2 |
| 15.0 | <7.5 | B +0.2 | H +0.1 | L +0.3 |
| 15.0 | ≥7.5 | B +0.2 | H +0.1 | L +0.5 |
| 22.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

### GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.
Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14, EN 60384-14.

### ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 310Vac / 800Vdc; (50/60Hz)
330Vac / 800Vdc; (50/60Hz)

**Capacitance range:** 0.01µF to 6.8µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M);
Tolerance ±5% (J) available upon request.

**Dissipation factor (DF):**
tgδx10⁻⁴ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**
Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**
≥1x10⁵ MΩ (5x10⁵ MΩ)* for C≤0.33µF
≥30000 s (150000 s)* for C>0.33µF
* Typical value

**Test voltage between terminations** (on all pieces)**:**
1500Vac for 1 s + 2200Vdc for 1 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**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**
Temperature: +110°C±2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

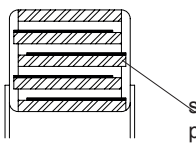
**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
Insulation resistance: ≥50% of initial limit.

**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 |ΔC/C|: ≤2%

**Winding scheme**



X1 CLASS (IEC 60384-14) - MKP Series

## METALLIZED POLYPROPYLENE FILM CAPACITOR

SELF-HEALING PROPERTIES

PRODUCT CODE: **R49**

Not for use in series with the mains.
See www.kemet.com for more information.

| Rated Cap. (*) | 310 Vac / 800 Vdc Std dimensions B | H | L | p | Ø d | Max dv/dt at 440Vdc (V/ µs) | Part Number |
|---|---|---|---|---|---|---|---|
| 0.010 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 600 | R49AF 2100 - - 01 - |
| 0.015 µF | 5.0 | 11.0 | 13.0 | 10.0 | 0.6 | 600 | R49AF 2150 - - 01 - |
| 0.022 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 600 | R49AF 2120 - - 01 - |
| 0.033 µF | 6.0 | 12.0 | 13.0 | 10.0 | 0.6 | 600 | R49AF 2330 - - 01 - |
| 0.010 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2100 - - 01 - |
| 0.015 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2150 - - 01 - |
| 0.022 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2220 - - 01 - |
| 0.033 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2330 - - 01 - |
| 0.047 µF | 6.0 | 12.5 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2470 - - 01 - |
| 0.068 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2680 - - M1 -M |
| 0.068 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2680 - - 01 - |
| 0.10 µF | 7.5 | 13.5 | 18.0 | 15.0 | 0.6 | 500 | R49AI 3100 - -M1 -M |
| 0.10 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.6 | 500 | R49AI 3100 - - 01 - |
| 0.15 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 500 | R49AI 3150 - - 01 - |
| 0.10 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3100 - - 01 |
| 0.15 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3150 - - 01 |
| 0.22 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3220 - - 01 |
| 0.33 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3330 - - 01 |
| 0.47 µF | 11.0 | 20.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3470 - - 01 |
| 0.33 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3330 - - 01 |
| 0.47 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3470 - - 01 |
| 0.68 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3680 - - 01 |
| 1.0 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4100 - - 01 |
| 1.5 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4150 - - 01 |
| 2.2 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4220 - - 01 |

Mechanical version and packaging (Table1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

E12 Series available upon request

For “capacitor connected in serial with main line” (two - phase and three - phase net) application, please read the “SHORT GUIDE TO CHOOSE THE RIGHT FILM CAPACITORS” at pag. 152 and contact our Technical Service for choosing the safest solution.

| Rated Cap. (*) | 330 Vac / 800 Vdc Std dimensions B | H | L | p | Ø d | Max dv/dt at 440Vdc (V/ µs) | Part Number |
|---|---|---|---|---|---|---|---|
| 0.047 µF | 5.0 | 11.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2470 - - B1 - |
| 0.068 µF | 6.0 | 12.0 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2680 - - B1 |
| 0.068 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 500 | R49AI 2680 - - A2 - |
| 0.10 µF | 6.0 | 17.5 | 18.0 | 15.0 | 0.6 | 500 | R49AI 3100 - - A2 - |
| 0.15 µF | 13.0 | 12.0 | 18.0 | 15.0 | 0.8 | 500 | R49AI 3150 - - A3 - |
| 0.15 µF | 8.5 | 14.5 | 18.0 | 15.0 | 0.8 | 500 | R49AI 3150 - - B1 M |
| 0.22 µF | 10.0 | 16.0 | 18.0 | 15.0 | 0.8 | 500 | R49AI 3220 - - B2 M |
| 0.22 µF | 11.0 | 19.0 | 18.0 | 15.0 | 0.8 | 500 | R49AI 3220 - - B1- |
| 0.15 µF | 6.0 | 15.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3150 - - B1 - |
| 0.22 µF | 7.0 | 16.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3220 - - B1 - |
| 0.33 µF | 8.5 | 17.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3330 - - B1 M |
| 0.47 µF | 10.0 | 18.5 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3470 - - B1 M |
| 0.68 µF | 13.0 | 22.0 | 26.5 | 22.5 | 0.8 | 400 | R49AN 3680 - - B1 M |
| 0.33 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3330 - - A1 - |
| 0.47 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3470 - - A1 - |
| 0.68 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3680 - - B1 - |
| 0.68 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3680 - - A1 - |
| 1.0 µF | 13.0 | 25.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4100 - - B1 - |
| 1.0 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4100 - - A1 - |
| 1.5 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4150 - - B1 - |
| 1.5 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4150 - - A1 - |
| 2.2 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4220 - - B1 - |
| 2.2 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4220 - - A1 - |
| 3.3 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4330 - - B1 - |
| 0.68 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 3680 - - B1 - |
| 1.0 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4100 - - B1 - |
| 1.5 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4150 - - B1 - |
| 2.2 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4220 - - B1 - |
| 3.3 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4330 - - B1 - |
| 4.7 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4470 - - B1 - |
| 6.8 µF | 30.0 | 45.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4680 - - B1 - |

Mechanical version and packaging (Table1)
Tolerance: K (±10%); M (±20%)

## APPROVALS

| | | | |
|---|---|---|---|
| | ENEC IEC 60384-14 | Class X1 | File No.CA08.00030 |
| | UL 1414 (up to 1µF, 85°C; 250Vac) | Across-the-line | File No.E97797 |
| | CSA - C22.2 No.1 (up to 1µF, 85°C; 250Vac) | Across-the-line certified for Canad | File No.E97797 |
| c UL us | UL 1283 (310 Vac) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310 Vac) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |

Approved according to IEC 60384-14
According to IEC 60065.

Table 1

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Fig. (No.) | Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| AMMO-PACK | | 12.70 | 1 | 10.0/15.0 | DQ |
| AMMO-PACK | | 19.05 | 2 | 22.5 | DQ |
| REEL Ø500mm | | 12.70 | 1 | 10.0/15.0 | CK |
| REEL Ø500mm | | 19.05 | 2 | 22.5/27.5 | CK |
| Loose, short leads | $4^{+2}$ | | | | 00 |
| Loose, long leads | $25^{-1/+2}$ | | | | 50 |
| Loose, long leads | $30^{+5}$ | | | | 40 |
| Loose, insulated rigid leads | $30^{+5}$ | | | | 51 |
| Loose, insulated flexible leads | $150^{\pm5}$ | | | | 52 |

Note: Ammo-pack is the preferred packaging for taped version.

# R.49+R

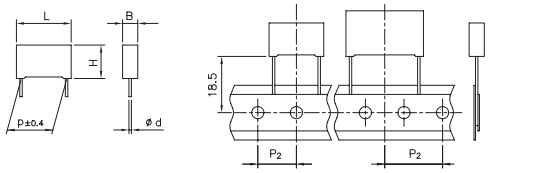
## Capacitors with discharge resistor
## X1 CLASS (IEC 60384-14) - MKP Series
## METALLIZED POLYPROPYLENE FILM CAPACITOR
SELF-HEALING PROPERTIES

**Typical applications**: interference suppression and «across-the-line» applications. Suitable for use in situations where failure of the capacitor would not lead to danger of electric shock. Class X1 shall be applied for PERMANENTLY CONNECTED APPARATUS
Not for use in series with the mains.
See www.kemet.com for more information.

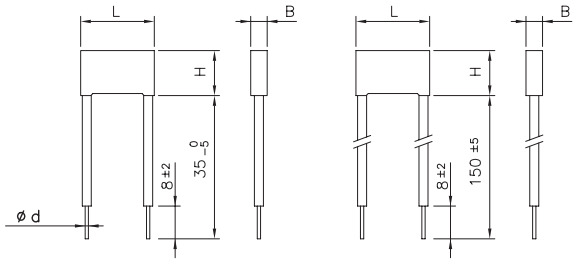
Note: **PERMANENTLY CONNECTED APPARATUS:** apparatus which is intended for connection to the mains by a connection which cannot be loosened **BY HAND**.
**BY HAND:** operation that does not require the use of any object such a tool, coin, etc.

Loose Taped

Fig.1 Fig.2




Insulated rigid leads Insulated flexible leads 0.5mm²




| Ø d ±0.05 | p= 27.5 | p = 37.5 |
|---|---|---|
| | 0.8 | 1 |

All dimensions are in mm.

PRODUCT CODE: **R49**

| Pitch | Box thickness | Maximum dimensions (mm) | | |
|---|---|---|---|---|
| (mm) | (mm) | B max | H max | L max |
| 27.5 | All | B +0.2 | H +0.1 | L +0.3 |
| 37.5 | All | B +0.3 | H +0.1 | L +0.3 |

### GENERAL TECHNICAL DATA

**Dielectric:** polypropylene film.

**Plates:** metal layer deposited by evaporation under vacuum.

**Winding:** non-inductive type.

**Leads:** tinned wire.

**Protection:** plastic case, thermosetting resin filled.
Box material is solvent resistant and flame retardant according to UL94 V0.

**Marking:** Manufacturer's logo, series, capacitance, tolerance, rated voltage, capacitor class, dielectric code, climatic category, passive flammability category, manufacturing date code, approvals, manufacturing plant.

**Climatic category:** 40/110/56 IEC 60068-1

**Operating temperature range:** -40 to +110°C

**Related documents:** IEC 60384-14, EN 132400.

### ELECTRICAL CHARACTERISTICS

**Rated voltage ($V_R$):** 330Vac; 800Vdc(50/60Hz)*

**Capacitance range:** 0.33µF to 6.8µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz)**:**
±10% (K); ±20% (M).

**Dissipation factor (DF):**
tgδx10$^{-4}$ at +25°C ±5°C: ≤10 (6)* at 1kHz *
Typical value

**Insulation resistance:**

**Test conditions**
Temperature: +25°C±5°C
Voltage charge time: 1 min
Voltage charge: 100 Vdc

**Performance**
≥1x10$^5$ MΩ (5x10$^5$ MΩ)* for C≤0.33µF
≥30000 s (150000 s)* for C>0.33µF
* Typical value

**Test voltage between terminations** (on all pieces)**:**
1500Vac for 1 s + 2200Vdc for 1 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**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤5%
Insulation resistance: ≥50% of initial limit.

**Endurance:**

**Test conditions**
Temperature: +110°C±2°C
Test duration: 1000 h
Voltage applied: 1.25 x $V_R$ +1000Vac 0.1 s/h

**Performance**
Dielectric strength: no dielectric breakdown or flashover at 4.3 x $V_R$ (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
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 |ΔC/C|: ≤2%

# R.49+R

Capacitor with discharge resistor
X1 CLASS (IEC 60384-14) - MKP Series
**METALLIZED POLYPROPYLENE FILM CAPACITOR**
SELF-HEALING PROPERTIES
PRODUCT CODE: **R49**

| Rated Cap. (*) | 330 Vac / 800 Vdc Std dimensions B | H | L | p | Ø d | Max dv/dt at 440Vdc (V/ µs) | Part Number |
|---|---|---|---|---|---|---|---|
| 0.33 µF | 9.0 | 17.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3330 - - B1 - - |
| 0.47 µF | 11.0 | 20.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3470 - - B1 - - |
| 0.68 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 3680 - - B1 - - |
| 1.0 µF | 13.0 | 22.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4100 - - B1 M - |
| 1.0 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4100 - - B2 - - |
| 1.5 µF | 18.0 | 33.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4150 - - B1 M - |
| 1.5 µF | 14.0 | 28.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4150 - - B2 - - |
| 2.2 µF | 22.0 | 37.0 | 32.0 | 27.5 | 0.8 | 200 | R49AR 4220 - - B1 - - |
| 0.68 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 3680 - - A1 - - |
| 1.0 µF | 11.0 | 22.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4100 - - B1 - - |
| 1.5 µF | 13.0 | 24.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4150 - - B1 - - |
| 2.2 µF | 16.0 | 28.5 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4220 - - B1 - - |
| 3.3 µF | 19.0 | 32.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4330 - - B1 - - |
| 4.7 µF | 20.0 | 40.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4470 - - B1 - - |
| 6.8 µF | 30.0 | 45.0 | 41.5 | 37.5 | 1.0 | 100 | R49AW 4680 - - B1 - - |

Rated voltage (A=330Vac)
Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)
Value of discharge resistor (Table 2)

All dimensions are in mm

## APPROVALS

| | | | |
|---|---|---|---|
| | ENEC IEC 60384-14 | Class X1 | File No.CA08.00030 |
| c UL us | UL 1283 (310 Vac-105°C) | Electromagnetic Interference Filters | File No.E85238 |
| | CSA - C22.2 No.8 (310 Vac-105°C) | Electromagnetic Interference Filters certified for Canada | File No.E85238 |

Approved according to IEC 60384-14
According to IEC 60065.

Not for use in series with the mains.
See www.kemet.com for more information.

**Table 1**

| Standard packaging style | Lead length (mm) | Taping style $P_2$ (mm) | Fig. (No.) | Pitch (mm) | Ordering code (Digit 10 to 11) |
|---|---|---|---|---|---|
| REEL Ø500mm | | 19.05 | 2 | 27.5 | CK |
| Loose, short leads | 4 +2 | | | | 00 |
| Loose, long leads | 25 -1/+2 | | | | 50 |
| Loose, long leads | 30 +5 | | | | 40 |
| Loose, insulated rigid leads | 30 +5 | | | | 51 |
| Loose, insulated flexible leads | 150 ±5 | | | | 52 |

## PRODUCT CODE SYSTEM

The part number, comprising 15 digits, is formed as follows:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 4 | 9 | | | | | | | | | | - | | - |

Digit 1 to 3 — Series code.
Digit 4 — a.c. rated voltage:
A = 330Vac;
Digit 5 — Pitch:
R = 27.5; W = 37.5 mm
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 (table 1)
Digit 12 — Identifies the dimensions and electrical characteristics.
Digit 13 — Internal use
Digit 14 — Capacitance tolerance:
K=±10%; M=±20%
Digit 15 — Value of the discharge resistor (tolerance±10%) according to the following table*:

**Table 2**

| R | code (-) |
|---|---|
| 470 kΩ | E |
| 680 kΩ | F |
| 1 MΩ | G |
| 1.2 MΩ | L |
| 1.5 MΩ | N |
| 2.2 MΩ | P |
| 3.3 MΩ | Q |
| 4.7 MΩ | S |
| 6.8 MΩ | T |
| 10 MΩ | V |

*Other resistors are avaible upon request.