

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.

## 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<sub>R</sub>):** 275Vac/300Vac; 50/60Hz

**Capacitance range:** 0.01µF to 5.6µF

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

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

**Dissipation factor (DF):**

$\text{tg} \delta \times 10^{-4}$  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**

≥ 1 × 10<sup>5</sup> MΩ (5 × 10<sup>5</sup> 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

## X2 CLASS (EN132400) - 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**

**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.

## 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 × V<sub>R</sub> (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 × V<sub>R</sub> + 1000Vac 0.1 s/h

**Performance**

Dielectric strength: no dielectric breakdown or flashover at 4.3 × V<sub>R</sub> (d.c.)/1 min

Capacitance change |ΔC/C|: ≤ 10%

Insulation resistance: ≥ 50% of initial limit.

**Resistance to soldering heat:**

**Test conditions**

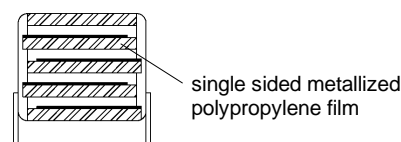
Solder bath temperature: +260°C ± 5°C

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

**Performance**

Capacitance change |ΔC/C|: ≤ 2%

**Winding scheme**



X2 CLASS (EN132400) - MKP Series  
**METALLIZED POLYPROPYLENE FILM CAPACITOR**  
 SELF-HEALING PROPERTIES

PRODUCT CODE: R46

APPROVALS

	ENEC-IMQ IEC 60384-14	Class X2	File No.V4413
	CAN/CSA E 384-14-95	Across-the-line	File No.1271537 (LR 83890)
	UL 1414 (up to 1µF)	Across-the-line	File No.E97797
	UL 1283 (310 Vac)	Class X2	File No.E85238
	GB/T 14472-1998 (275Vac)	Class X2	File No.CQC03001003895

CSA and UL 1414 for 250Vac only.  
 Approved according to IEC 60384-14:1993+ A1:1995  
 (EN132400:1994+A2:1998+A3:1998+A4:2001).

According to IEC 60065.

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



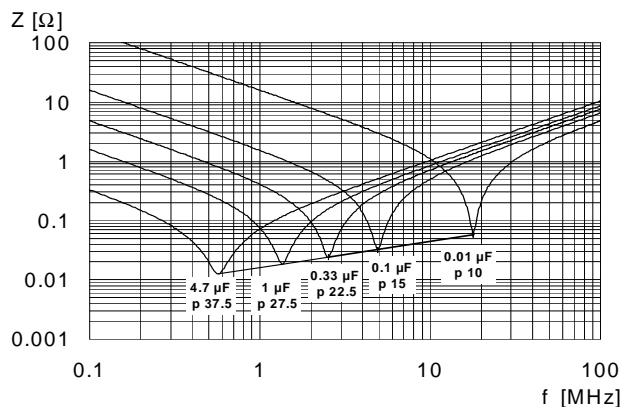
Table 1 (For more detailed information, please refer to page 16)

Standard packaging style	Lead length (mm)	Taping style			Ordering code (Digit 10 to 11)
		P <sub>2</sub> (mm)	Fig. (No.)	Pitch (mm)	
AMMO-PACK		12.70	1	10.0/15.0	DQ
AMMO-PACK		19.05	2	22.5	DQ
REEL Ø355mm		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.

TYPICAL GRAPHS

Z = f (f) (lead length 2 mm). Typical values.



Rated Cap. (*)	275/300Vac				Ø d	Max dv/dt at 390Vdc (V/µs)	Part Number
	B	H	L	p			
0.010 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2100 -- M1 -
0.015 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2150 -- M1 -
0.022 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2200 -- M1 -
0.033 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2330 -- M1 -
0.047 µF	6.0	12.0	13.0	10.0	0.6	500	R46 - F 2470 -- M1 -
0.068 µF	6.0	12.0	13.0	10.0	0.6	500	R46 - F 2680 -- M1 -
0.1 µF	6.0	12.0	13.0	10.0	0.6	500	R46 - F 3100 -- M1 M
0.010 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2100 -- 01 -
0.015 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2150 -- 01 -
0.022 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2220 -- 01 -
0.033 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2330 -- 01 -
0.047 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2470 -- 01 -
0.068 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2680 -- 01 -
0.10 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 3100 -- M1 M
0.10 µF	6.0	12.0	18.0	15.0	0.6	400	R46 - I 3100 -- 01 -
0.15 µF	6.0	12.0	18.0	15.0	0.6	400	R46 - I 3150 -- M2 M
0.15 µF	7.5	13.5	18.0	15.0	0.6	400	R46 - I 3150 -- M1 -
0.15 µF	9.0	12.5	18.0	15.0	0.6	400	R46 - I 3150 -- L2 -
0.22 µF	6.0	17.5	18.0	15.0	0.6	400	R46 - I 3220 -- 02 -
0.22 µF	7.5	13.5	18.0	15.0	0.6	400	R46 - I 3220 -- M2 M
0.22 µF	8.5	14.5	18.0	15.0	0.6	400	R46 - I 3220 -- M1 -
0.22 µF	9.0	12.5	18.0	15.0	0.6	400	R46 - I 3220 -- L2 -
0.33 µF	7.5	18.5	18.0	15.0	0.8	400	R46 - I 3330 -- 02 -
0.33 µF	10.0	16.0	18.0	15.0	0.8	400	R46 - I 3330 -- M1 -
0.33 µF	13.0	12.0	18.0	15.0	0.8	400	R46 - I 3330 -- 01 -
0.47 µF	11.0	19.0	18.0	15.0	0.8	400	R46 - I 3470 -- M1 -
0.15 µF	6.0	15.0	26.5	22.5	0.8	200	R46 - N 3150 -- 01 -
0.22 µF	6.0	15.0	26.5	22.5	0.8	200	R46 - N 3220 -- M1 -
0.33 µF	7.0	16.0	26.5	22.5	0.8	200	R46 - N 3330 -- M1 -
0.47 µF	8.5	17.0	26.5	22.5	0.8	200	R46 - N 3470 -- M1 -
0.47 µF	10.0	18.5	26.5	22.5	0.8	200	R46 - N 3470 -- 01 -
0.68 µF	10.0	18.5	26.5	22.5	0.8	200	R46 - N 3680 -- M2 -
0.68 µF	11.0	20.0	26.5	22.5	0.8	200	R46 - N 3680 -- M1 -
1.0 µF	13.0	22.0	26.5	22.5	0.8	200	R46 - N 4100 -- M1 -
0.47 µF	9.0	17.0	32.0	27.5	0.8	150	R46 - R 3470 -- 01 -
0.68 µF	9.0	17.0	32.0	27.5	0.8	150	R46 - R 3680 -- M1 -
0.68 µF	10.0	20.0	32.0	27.5	0.8	150	R46 - R 3680 -- 01 -
1.0 µF	11.0	20.0	32.0	27.5	0.8	150	R46 - R 4100 -- M1 -
1.5 µF	13.0	22.0	32.0	27.5	0.8	150	R46 - R 4150 -- M1 -
1.5 µF	15.0	24.5	32.0	27.5	0.8	150	R46 - R 4150 -- 01 -
2.2 µF	14.0	28.0	32.0	27.5	0.8	150	R46 - R 4220 -- M1 -
2.2 µF	18.0	33.0	32.0	27.5	0.8	150	R46 - R 4220 -- 01 -
3.3 µF	18.0	33.0	32.0	27.5	0.8	150	R46 - R 4330 -- M2 -
3.3 µF	22.0	37.0	32.0	27.5	0.8	150	R46 - R 4330 -- M1 -
4.7 µF	22.0	37.0	32.0	27.5	0.8	150	R46 - R 4470 -- M1 -
2.2 µF	13.0	24.0	41.5	37.5	1.0	100	R46 - W 4220 -- M1 -
3.3 µF	16.0	28.5	41.5	37.5	1.0	100	R46 - W 4330 -- M1 -
4.7 µF	19.0	32.0	41.5	37.5	1.0	100	R46 - W 4470 -- M1 -
5.6 µF	20.0	40.0	41.5	37.5	1.0	100	R46 - W 4560 -- M1 M

Rated voltage (K=275Vac, 3=300Vac)

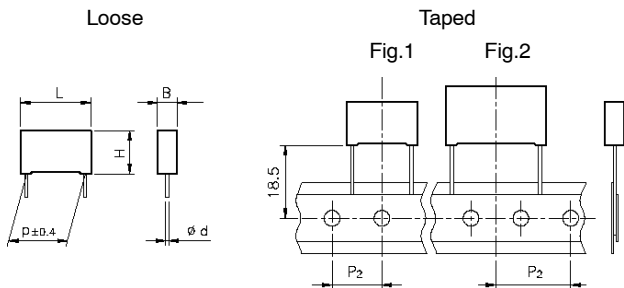
Mechanical version and packaging (Table 1)

Tolerance: K (± 10%); M (± 20%)

(\*)C > 5.6 µF available upon request

E12 Series available upon request

All dimensions are in mm



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

\*See size table.  
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:** 40/125/56 IEC 60068-1  
**Operating temperature range:** -40 to +125°C  
**Related documents:** IEC 60384-14 2nd edition '93; EN 132400.

### ELECTRICAL CHARACTERISTICS

**Rated voltage (V<sub>R</sub>):** 275Vac/300Vac; 50/60Hz  
**Capacitance range:** 0.01µF to 1µF

### TEST METHOD AND PERFORMANCE

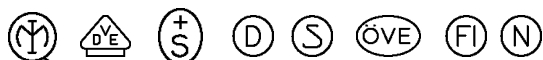
**Endurance:**  
**Test conditions**  
 Temperature: +125°C ± 2°C  
 Test duration: 1000 h  
 Voltage applied: 1.25 × V<sub>R</sub> + 1000Vac 0.1 s/h  
**Performance**  
 Dielectric strength: no dielectric breakdown or flashover at 4.3 × V<sub>R</sub> (d.c.)/1 min  
 Capacitance change |ΔC/C|: ≤ 10%  
 Insulation resistance: ≥ 50% of initial limit.

### APPROVALS

	ENEC-IMQ IEC 60384-14	Class X2	File No.CA08.00063
	CAN/CSA E 384-14-95	Across-the-line	File No.1271537 (LR83890) pending
	UL 1283 (310 Vac)	Class X2	File No.E85238

CSA and UL 1414 for 250Vac only.  
 Approved according to IEC 60384-14:1993+ A1:1995  
 (EN132400:1994+A2:1998+A3:1998+A4:2001).  
 According to IEC 60065.

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



## X2 CLASS (EN132400) - 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

## NEW 125°C

Rated Cap.	275/300Vac				Ø d	Max dv/dt at 390Vdc (V/µs)	Part Number
	B	H	L	p			
0.010 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2100 -- H1 -
0.015 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2150 -- H1 -
0.022 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2200 -- H1 -
0.033 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2330 -- H1 -
0.047 µF	6.0	12.0	13.0	10.0	0.6	500	R46 - F 2470 -- H1 -
0.068 µF	6.0	12.0	13.0	10.0	0.6	500	R46 - F 2680 -- H1 M
0.010 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2100 -- H1 -
0.015 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2150 -- H1 -
0.022 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2220 -- H1 -
0.033 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2330 -- H1 -
0.047 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2470 -- H1 -
0.068 µF	5.0	11.0	18.0	15.0	0.6	400	R46 - I 2680 -- H1 -
0.10 µF	6.0	12.0	18.0	15.0	0.6	400	R46 - I 3100 -- H1 -
0.15 µF	6.0	17.5	18.0	15.0	0.6	400	R46 - I 3150 -- H2 -
0.15 µF	9.0	12.5	18.0	15.0	0.6	400	R46 - I 3150 -- H3 -
0.15 µF	7.5	13.5	18.0	15.0	0.6	400	R46 - I 3150 -- H1 -
0.22 µF	8.5	14.5	18.0	15.0	0.6	400	R46 - I 3220 -- H1 -
0.22 µF	6.0	17.5	18.0	15.0	0.6	400	R46 - I 3220 -- H2 M
0.22 µF	9.0	12.5	18.0	15.0	0.6	400	R46 - I 3220 -- H3 M
0.22 µF	7.5	18.5	18.0	15.0	0.6	400	R46 - I 3220 -- H4 -
0.33 µF	10.0	16.0	18.0	15.0	0.8	400	R46 - I 3330 -- H1 M
0.33 µF	7.5	18.5	18.0	15.0	0.8	400	R46 - I 3330 -- H2 M
0.33 µF	13.0	12.0	18.0	15.0	0.8	400	R46 - I 3330 -- H3 M
0.47 µF	11.0	19.0	18.0	15.0	0.8	400	R46 - I 3470 -- H1 M
0.15 µF	6.0	15.0	26.5	22.5	0.8	200	R46 - N 3150 -- H1 -
0.22 µF	6.0	15.0	26.5	22.5	0.8	200	R46 - N 3220 -- H1 -
0.33 µF	7.0	16.0	26.5	22.5	0.8	200	R46 - N 3330 -- H1 -
0.47 µF	10.0	18.5	26.5	22.5	0.8	200	R46 - N 3470 -- H1 -
0.68 µF	11.0	20.0	26.5	22.5	0.8	200	R46 - N 3680 -- H1 -
1.0 µF	13.0	22.0	26.5	22.5	0.8	200	R46 - N 4100 -- H1 -

Rated voltage (K=275Vac, 3=300Vac) \_\_\_\_\_  
 Mechanical version and packaging (Table 1) \_\_\_\_\_  
 Tolerance: K (± 10%); M (± 20%) \_\_\_\_\_

E12 Series available upon request

All dimensions are in mm

**For all other characteristics or performance see page 115.**