

$\phi d \pm 0.05$	$p \leq 15$	$22.5 \leq p \leq 27.5$	$p = 37.5$
	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 ( $V_R$ ):** 275Vac/300Vac; 50/60Hz
- Capacitance range:** 0.01 $\mu$ F to 5.6 $\mu$ F
- Capacitance values:** E6 series (IEC 60063 Norm).
- Capacitance tolerances** (measured at 1 kHz):  
 $\pm 10\%$  (K);  $\pm 20\%$  (M).

- Dissipation factor (DF):**  
 $\text{tg} \delta \times 10^{-4}$  at +25°C  $\pm 5^\circ\text{C}$ :  $\leq 10$  (6)\* at 1kHz  
\* Typical value

**Insulation resistance:**

- Test conditions**  
Temperature: +25°C  $\pm 5^\circ\text{C}$   
Voltage charge time: 1 min  
Voltage charge: 100 Vdc
- Performance**  
 $\geq 1 \times 10^5 \text{ M}\Omega$  ( $5 \times 10^5 \text{ M}\Omega$ )\* for  $C \leq 0.33 \mu\text{F}$   
 $\geq 30000 \text{ s}$  ( $150000 \text{ s}$ )\* for  $C > 0.33 \mu\text{F}$   
\* Typical value

**Test voltage between terminations** (on all pieces):  
1500Vac for 1 s + 2200Vdc for 1 s at +25°C  $\pm 5^\circ\text{C}$

**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  $\pm 2^\circ\text{C}$   
Relative humidity (RH): 93%  $\pm 2\%$   
Test duration: 56 days

- Test conditions 2nd**  
Temperature: +60°C  $\pm 2^\circ\text{C}$   
Relative humidity (RH): 95%  $\pm 2\%$   
Test duration: 500 hours

- Performance**  
Dielectric strength: no dielectric breakdown or flashover at  $4.3 \times V_R$  (d.c.)/1 min  
Capacitance change  $|\Delta C/C|$ :  $\leq 5\%$   
Insulation resistance:  $\geq 50\%$  of initial limit.

**Endurance:**

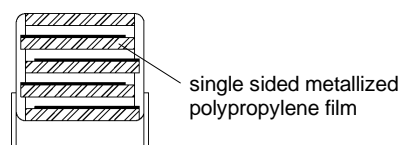
- Test conditions**  
Temperature: +110°C  $\pm 2^\circ\text{C}$   
Test duration: 1000 h  
Voltage applied:  $1.25 \times V_R + 1000\text{Vac}$  0.1 s/h

- Performance**  
Dielectric strength: no dielectric breakdown or flashover at  $4.3 \times V_R$  (d.c.)/1 min  
Capacitance change  $|\Delta C/C|$ :  $\leq 10\%$   
Insulation resistance:  $\geq 50\%$  of initial limit.

**Resistance to soldering heat:**

- Test conditions**  
Solder bath temperature: +260°C  $\pm 5^\circ\text{C}$   
Dipping time (with heat screen): 10 s  $\pm 1$  s
- Performance**  
Capacitance change  $|\Delta C/C|$ :  $\leq 2\%$

**Winding scheme**



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

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.pending

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:

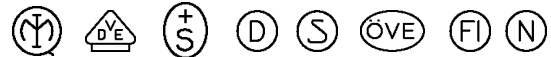


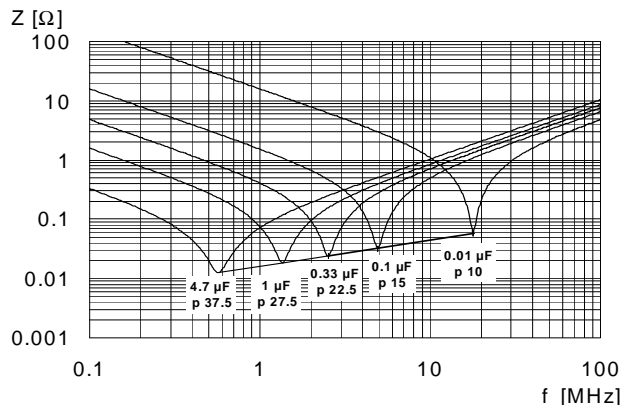
Table 1 (For more detailed information, please refer to page 16)

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 <sup>+2</sup>				00
Loose, long leads	25 <sup>-1/+2</sup>				50
Loose, long leads	30 <sup>+5</sup>				40
Loose, insulated rigid leads	30 <sup>+5</sup>				51
Loose, insulated flexible leads	150 <sup>+5</sup>				52

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

TYPICAL GRAPHS

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



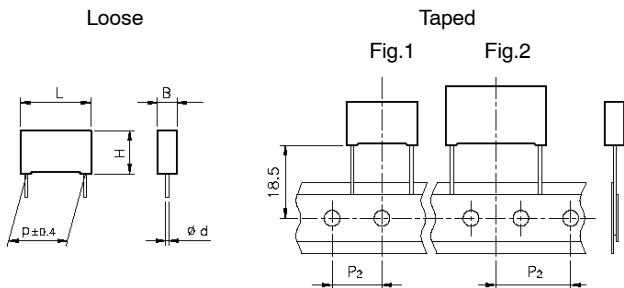
Rated Cap. (*)	275/300Vac				Ø d	Max dv/dt at 390Vdc (V/µs)	Part Number
	B	H	L	p			
0.010 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2100 -- M1 -
0.015 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2150 -- M1 -
0.022 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2200 -- M1 -
0.033 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2330 -- 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	12.0	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

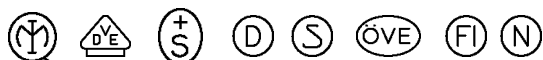
**Endurance:**  
**Test conditions**  
 Temperature: +125°C ± 2°C  
 Test duration: 1000 h  
 Voltage applied: 1.25 × V<sub>R</sub> + 1000Vac 0.1 s/h  
**Performance**  
 Dielectric strength: no dielectric breakdown or flashover at 4.3 × V<sub>R</sub> (d.c.)/1 min  
 Capacitance change |ΔC/C|: ≤ 10%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