

∅ 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_R): 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):
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
≥ 1 × 10⁵ MΩ (5 × 10⁵ 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_R (d.c.)/1 min
Capacitance change |ΔC/C|: ≤ 5%
Insulation resistance: ≥ 50% of initial limit.

Endurance:

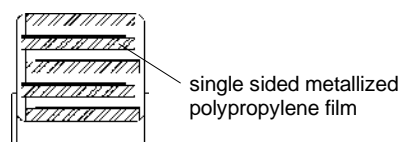
Test conditions
Temperature: +110°C ± 2°C
Test duration: 1000 h
Voltage applied: 1.25 × V_R + 1000Vac 0.1 s/h

Performance
Dielectric strength: no dielectric breakdown or flashover at 4.3 × 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 (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:



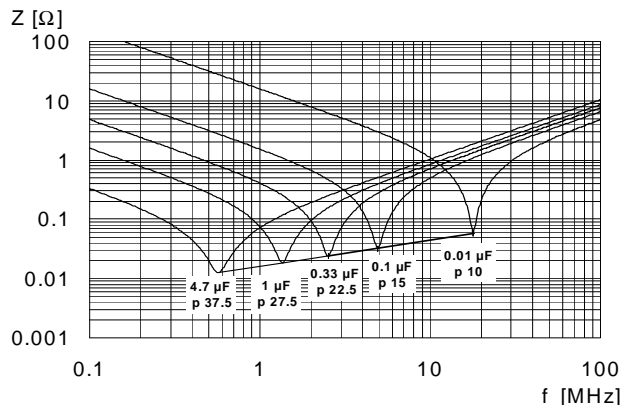
Table 1 (For more detailed information, please refer to page 16)

Standard packaging style	Lead length (mm)	Taping style			Ordering code (Digit 10 to 11)
		P ₂ (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.



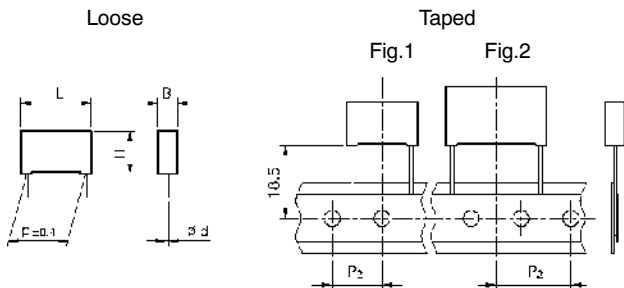
Rated Cap. (*)	275/300Vac				Ø d	Max dv/dt at 390Vdc (V/µs)	Part Number
	B	H	L	p			
0.010 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2100 -- M1 -
0.015 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2150 -- M1 -
0.022 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2200 -- M1 -
0.033 µF	5.0	11.0	13.0	10.0	0.6	500	R46 - F 2330 -- 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	12.0	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_R): 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_R + 1000Vac 0.1 s/h
Performance
 Dielectric strength: no dielectric breakdown or flashover at 4.3 × V_R (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.