R.46

X2 CLASS (EN132400) - MKP Series

METALLIZED POLYPROPYLENE FILM CAPACITOR

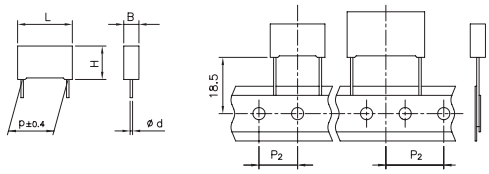
SELF-HEALING PROPERTIES

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.

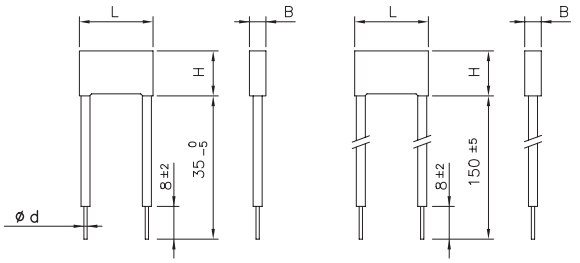
PRODUCT CODE: **R46**

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.

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.

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 132400.

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).

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
≥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 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

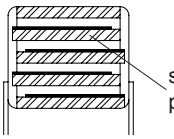
Performance
Dielectric strength: no dielectric breakdown or flashover at 4.3 x V_R (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
Insulation resistance: ≥50% of initial limit.

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



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X2 CLASS (EN132400) - 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	-
0.1 µF	6.0	12.0	13.0	10.0	0.6	500	R46 KF 3100 - - M1	M
#0.010 µF	4.0	10.0	18.0	15.0	0.6	400	R46 KI 2100 - - N0	-
0.010 µF	5.0	11.0	18.0	15.0	0.6	400	R46 KI 2100 - - 01	-
#0.015 µF	4.0	10.0	18.0	15.0	0.6	400	R46 KI 2150 - - N0	-
0.015 µF	5.0	11.0	18.0	15.0	0.6	400	R46 KI 2150 - - 01	-
#0.022 µF	4.0	10.0	18.0	15.0	0.6	400	R46 KI 2220 - - N0	-
0.022 µF	5.0	11.0	18.0	15.0	0.6	400	R46 KI 2220 - - 01	-
#0.033 µF	4.0	10.0	18.0	15.0	0.6	400	R46 KI 2330 - - N0	-
0.033 µF	5.0	11.0	18.0	15.0	0.6	400	R46 KI 2330 - - 01	-
#0.047 µF	4.0	10.0	18.0	15.0	0.6	400	R46 KI 2470 - - N0	-
0.047 µF	5.0	11.0	18.0	15.0	0.6	400	R46 KI 2470 - - 01	-
#0.068 µF	4.0	10.0	18.0	15.0	0.6	400	R46 KI 2680 - - N0	-
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	M
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	-
0.68 µF	10.0	20.0	32.0	27.5	0.8	150	R46 KR 3680 - - 01	-
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	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	22.0	37.0	32.0	27.5	0.8	150	R46 KR 4470 - - M1	-
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	19.0	32.0	41.5	37.5	1.0	100	R46 KW 4470 - - M1	-
5.6 µF	20.0	40.0	41.5	37.5	1.0	100	R46 KW 4560 - - M1	M
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

UL, CSA and CQC approvals are in progress.

E12 Series available upon request

APPROVALS

(**)	ENEC IEC 60384-14	Class X2	File No.V4413
	CSA E 384-14-95 (up to 5.6µF)	Across-the-line	File No.154612 (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 CQC3001008199 CQC3001008842

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

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 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 $^{\pm5}$				52

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

For “capacitor connected in series with main line” (two-phase and three-phase net) application, please contact our Technical Service for choosing the safest solution.

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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	5.0	11.0	13.0	10.0	0.6	500	R46 3F	2100 - - M1	-
0.015 µF	5.0	11.0	13.0	10.0	0.6	500	R46 3F	2150 - - M1	-
0.022 µF	5.0	11.0	13.0	10.0	0.6	500	R46 3F	2220 - - M1	-
0.033 µF	5.0	11.0	13.0	10.0	0.6	500	R46 3F	2330 - - M1	-
0.047 µF	6.0	12.0	13.0	10.0	0.6	500	R46 3F	2470 - - M1	-
0.068 µF	6.0	12.0	13.0	10.0	0.6	500	R46 3F	2680 - - M1	-
0.1 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	M
0.10 µF	6.0	12.0	18.0	15.0	0.6	400	R46 3I	3100 - - 01	-
0.15 µF	6.0	12.0	18.0	15.0	0.6	400	R46 3I	3150 - - M2	M
0.15 µF	7.5	13.5	18.0	15.0	0.6	400	R46 3I	3150 - - M1	-
0.22 µF	7.5	13.5	18.0	15.0	0.6	400	R46 3I	3220 - - M2	M
0.22 µF	8.5	14.5	18.0	15.0	0.6	400	R46 3I	3220 - - M1	-
0.22 µF	9.0	12.5	18.0	15.0	0.6	400	R46 3I	3220 - - L2	-
0.33 µF	10.0	16.0	18.0	15.0	0.8	400	R46 3I	3330 - - M1	-
0.33 µF	13.0	12.0	18.0	15.0	0.8	400	R46 3I	3330 - - 01	-
0.47 µF	11.0	19.0	18.0	15.0	0.8	400	R46 3I	3470 - - M1	-
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	7.0	16.0	26.5	22.5	0.8	200	R46 3N	3330 - - M1	-
0.47 µF	8.5	17.0	26.5	22.5	0.8	200	R46 3N	3470 - - M1	-
0.68 µF	10.0	18.5	26.5	22.5	0.8	200	R46 3N	3680 - - M2	-
1.0 µF	13.0	22.0	26.5	22.5	0.8	200	R46 3N	4100 - - M1	-
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	-
0.68 µF	10.0	20.0	32.0	27.5	0.8	150	R46 3R	3680 - - 01	-
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	-
1.5 µF	15.0	24.5	32.0	27.5	0.8	150	R46 3R	4150 - - 01	-
2.2 µF	14.0	28.0	32.0	27.5	0.8	150	R46 3R	4220 - - M1	-
2.2 µF	18.0	33.0	32.0	27.5	0.8	150	R46 3R	4220 - - 01	-
3.3 µF	18.0	33.0	32.0	27.5	0.8	150	R46 3R	4330 - - M2	-
3.3 µF	22.0	37.0	32.0	27.5	0.8	150	R46 3R	4330 - - M1	-
4.7 µF	22.0	37.0	32.0	27.5	0.8	150	R46 3R	4470 - - M1	-
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	19.0	32.0	41.5	37.5	1.0	100	R46 3W	4470 - - M1	-
5.6 µF	20.0	40.0	41.5	37.5	1.0	100	R46 3W	4560 - - M1	M
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%)

APPROVALS

(**)	ENEC IEC 60384-14	Class X2	File No.V4413
	CSA E 384-14-95 (up to 5.6µF)	Across-the-line	File No.154612 (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 CQC3001008199 CQC3001008842

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Table 1

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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 series with main line” (two-phase and three-phase net) application, please contact our Technical Service for choosing the safest solution.

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E12 Series available upon request