R.47

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: **R47**

Loose

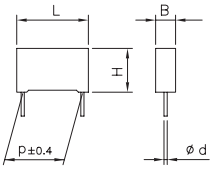


Fig.1

Taped

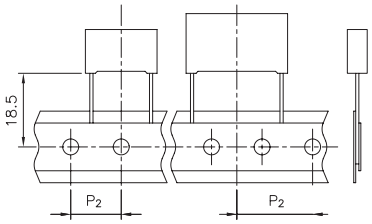


Fig.2

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.

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 - 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
≥1x10^5 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

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

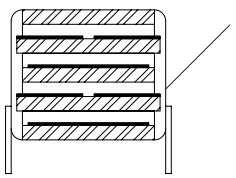
Performance
Dielectric strength: no dielectric breakdown or flashover at 4.3 x V_R (d.c.)/1 min
Capacitance change |ΔC/C|: ≤10%
Insulation resistance: ≥50% of initial limit.

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



R.47

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.

R.47

X1 CLASS (IEC 60384-14) - MKP Series
METALLIZED POLYPROPYLENE FILM CAPACITOR
SELF-HEALING PROPERTIES

Loose

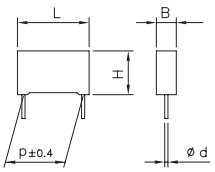


Fig.1

Taped

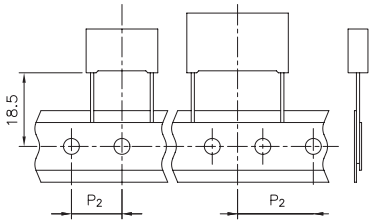


Fig.2

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
≥1x10^5 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%

R.47

X1 CLASS (IEC 60384-14) - MKP Series
METALLIZED POLYPROPYLENE FILM CAPACITOR
SELF-HEALING PROPERTIES

PRODUCT CODE: **R47**

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%)

APPROVALS

(*)	ENEC IEC 60384-14	Class X1	File No. CA08.00101
c 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.

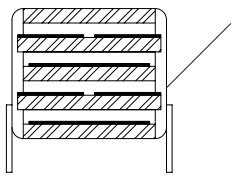
(*) ENEC mark has replaced all the following European National marks:

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.

Winding scheme



single sided metallized polypropylene film

2 sections

All dimensions are in mm