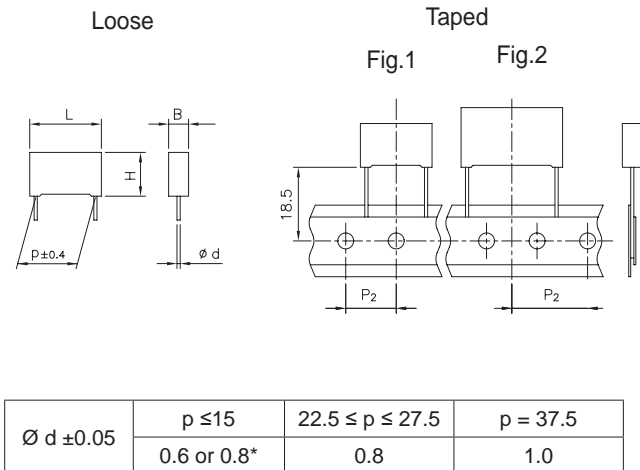


X2 CLASS (IEC 60384-14) - MKP Series METALLIZED POLYPROPYLENE FILM CAPACITOR SELF-HEALING PROPERTIES

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**



*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; 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):

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

≥1×10⁵ 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

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

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 $|\Delta C/C|$: ≤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 $|\Delta C/C|$: ≤10%

Insulation resistance: ≥50% of initial limit.

Resistance to soldering heat:

Test conditions

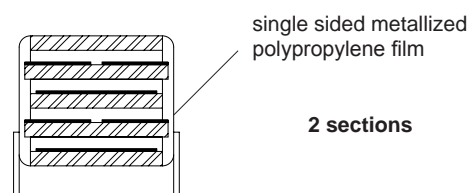
Solder bath temperature: +260°C ± 5°C

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

Performance

Capacitance change $|\Delta C/C|$: ≤2%



Winding scheme



X2 CLASS (IEC60384-14) - MKP Series METALLIZED POLYPROPYLENE FILM CAPACITOR SELF-HEALING PROPERTIES

PRODUCT CODE: R47

APPROVALS

 (*)	ENEC IEC 60384-14	Class X2	File No. CA08.00101
	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:



Rated Cap.	440 Vac / 1000 Vdc Std dimensions				Ø d	Max dv/dt at 420Vdc (V/µs)	Part Number	
	B	H	L	p				
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 -

Table 1

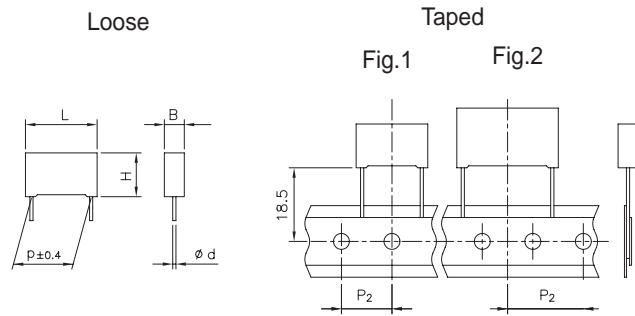
Standard packaging style	Lead length (mm)	Taping style			Ordering code (Digit 10 to 11)
		P ₂ (mm)	Fig. (No.)	Pitch (mm)	
AMMO-PACK		12.70	1	10.0/15.0	DQ
AMMO-PACK		19.05	2	22.5	DQ
REEL Ø500mm		12.70	1	10.0/15.0	CK
REEL Ø500mm		19.05	2	22.5/27.5	CK
Loose, short leads	4 ⁺²				00
Loose, long leads	25 ^{-1/+2}				50
Loose, long leads	30 ⁺⁵				40

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

Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

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



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):

$\text{tg} \delta \times 10^{-4}$ 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 × 10⁵ 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 (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

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%

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

PRODUCT CODE: R47

APPROVALS

Rated Cap.	440 Vac / 1000 Vdc Std dimensions				Ø d	Max dv/dt at 420Vdc (V/µs)	Part Number	
	B	H	L	p				
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 -

	ENEC IEC 60384-14	Class X1	File No. CA08.00101
	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:

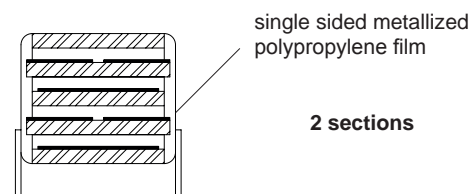


Table 1

Standard packaging style	Lead length (mm)	Taping style			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 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



Mechanical version and packaging (Table 1)
Tolerance: K (±10%); M (±20%)

All dimensions are in mm

Statements of suitability for certain applications are based on our knowledge of typical operating conditions for such applications, but are not intended to constitute – and we specifically disclaim – any warranty concerning suitability for a specific customer application or use. This Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by us with reference to the use of our products is given gratis, and we assume no obligation or liability for the advice given or results obtained.

Construction

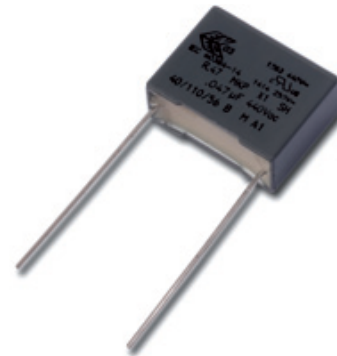
Metallized polypropylene film encapsulated with self-extinguishing resin in a box of material recognized to UL 94 V-0.

Benefits

- Approvals: ENEC, UL, cUL
- Rated Voltage: 520VAC 50/60Hz
- Capacitance Range: 0.0047–2.2 μ F
- Pitch: 10.0–37.5 mm
- Capacitance Tolerance: \pm 20% standard, \pm 10% option, \pm 5% on request
- Climatic category 40/85/56, IEC 60068-1
- Tape and reel in accordance with IEC 60286-2
- RoHS-compliant and lead-free terminations
- Operating temperature range of -40°C to +85°C
- 100% screening factory test at 2700VDC/1700VAC

Applications

For worldwide use in electromagnetic interference suppression in all X2 and across-the-line applications.



Ordering Information

R47	5	F	1470	00	01	M
Series	Rated Voltage	Pitch	Capacitance Code (pF)	Packing Option and Leadform	Internal Use	Capacitance Tolerance
X2, Metallized Polypropylene	5 = 520VAC	F = 10.0 I = 15.0 N = 22.5 R = 27.5 W = 37.5	Digits 2-4 indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added.	see Ordering Options Table		J = \pm 5% K = \pm 10% M = \pm 20%

Ordering Options Table

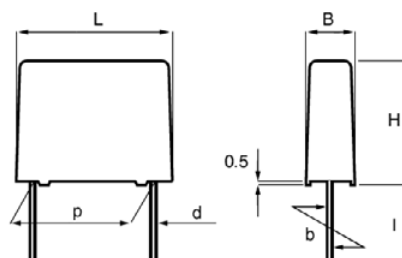
Standard Packaging Style	Lead Length	Taping Style			Ordering Code
		(mm)	P2	Fif.	
		(mm)	(No)	(mm)	
Ammo Pack		12.70	1	10.0/15.0	DQ
Ammo Pack		19.05	2	22.5	DQ
Tape & Reel 500 mm		12.70	1	10.0/15.0	CK
Tape & Reel 500 mm		19.05	2	22.5/27.5	CK
Loose, Short Leads	4 ⁺²				00
Loose, Long Leads	25 ^{-1/+2}				50
Loose, Long Leads	30 ⁺⁵				40
Other options available on request					

Dimension Table

Lead Space	Outer Dimension		
	B	H	L
10.0	4.0	9.0	13.0
10.0	5.0	11.0	13.0
10.0	6.0	12.0	13.0
15.0	10.0	16.0	18.0
15.0	11.0	19.0	18.0
15.0	13.0	12.0	18.0
15.0	5.0	11.0	18.0
15.0	6.0	12.0	18.0
15.0	6.0	17.5	18.0
15.0	7.5	13.5	18.0
15.0	7.5	18.5	18.0
15.0	8.5	14.5	18.0
15.0	9.0	12.5	18.0
22.5	10.0	18.5	26.5
22.5	11.0	20.0	26.5
22.5	13.0	22.0	26.5
22.5	6.0	15.0	26.5
22.5	6.5	13.5	26.5
22.5	7.0	16.0	26.5
22.5	8.5	17.0	26.5
27.5	11.0	20.0	32.0
27.5	13.0	22.0	32.0
27.5	14.0	28.0	32.0
27.5	18.0	33.0	32.0
27.5	22.0	37.0	32.0
27.5	9.0	17.0	32.0
37.5	11.0	22.0	41.5
37.5	13.0	24.0	41.5
37.5	16.0	28.5	41.5
37.5	19.0	32.0	41.5
37.5	20.0	40.0	41.5
37.5	24.0	44.0	41.5

Leadspacing Table

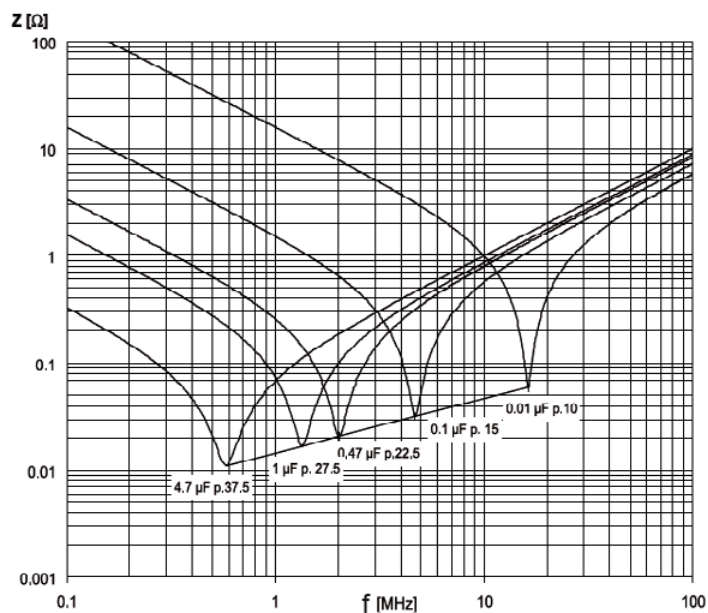
p	d	std l	max l	b
10.0 ± 0.4	0.6	4	20	± 0.4
15.0 ± 0.4	0.6	4	30	± 0.4
22.5 ± 0.4	0.8	4	30	± 0.4
27.5 ± 0.4	0.8	4	30	± 0.4
37.5 ± 0.4	1.0	4	30	± 0.7
Tolerance in Lead Length		< 30mm +2 / -0		
		30mm +5 / -0		



Technical Data

Rated Voltage	520VAC 50/60Hz	
Capacitance Range	0.0047–2.2 μ F	
Capacitance Tolerance	\pm 20% standard, \pm 10% option, \pm 5% on request	
Temperature Range	-40 to +85°C	
Climatic Category	40/85/56	
Approvals	ENEC, UL, cUL	
Dissipation Factor	Maximum Values at +23°C	
	1 kHz	0.1%
Test Voltage Between Terminals	The 100% screening factory test is carried out at 2700VDC/1700VAC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. It is not permitted to repeat this test as there is a risk to damage the capacitor. KEMET is not liable in such case for any failures.	
Insulation Resistance	C \leq 0.33 μ F : \geq 50 000 M Ω	
	C > 0.33 μ F : \geq 30 000 s	
In DC applications	Recommended Voltage \leq 1000 VDC	

Impedance Graph



Environmental Test Data

Test	IEC Publication	Procedure
Endurance	EN/IEC 60384-14	1.25 x UR VAC 50Hz, once every hour increase to 1000 VAC for 0.1 s, 1000 h at upper rated temperature
Vibration	IEC 60068-2-6 Test Fc	3 directions at 2 hours each 10 - 55 Hz at 0.75 mm or 98m/s ²
Bump	IEC 60068-2-29 Test Eb	1000 bumps at 390 m/s ²
Change of Temperature	IEC 60068-2-14 Test Na	Upper and lower rated temperature 5 cycles
Active Flammability	IEC 60384-14	UR + 20 surge pulses at 2.5 kV (pulse every 5 s)
Passive Flammability	IEC 60384-14	IEC 60384-1, IEC 60695-11-5 Needle Flame Test
Damp Heat Steady State	IEC 60068-2-78 Test Cab	+40°C and 90 - 95% R.H., 56 days

Environmental Compliance

All KEMET EMI capacitors are RoHS compliant and Halogen Free.



RoHS Compliant



Approvals



Mark	Specification	File Number
	EN/IEC 60384-14	CA08.00101
	UL 1414 (up to 1µF, 85°C, 250VAC)	E97797
	UL 1283 (440 VAC 110°C)	E85238

Table 1 – Ratings & Part Number Reference

Lead Space	Cap Value (µF)	B (mm)	H (mm)	L (mm)	Ø d	dV/dt (V/µsec)	F Article Code	Part Number
10.0	0.0047	4.0	9.0	13.0	0.6	750	475F14700001M	R475F14700001M
10.0	0.0068	5.0	11.0	13.0	0.6	750	475F16800001M	R475F16800001M
10.0	0.0082	6.0	12.0	13.0	0.6	750	475F18200001M	R475F18200001M
10.0	0.010	6.0	12.0	13.0	0.6	750	475F21000001M	R475F21000001M
15.0	0.010	5.0	11.0	18.0	0.6	600	475I21000001M	R475I21000001M
15.0	0.012	5.0	11.0	18.0	0.6	600	475I21200001M	R475I21200001M
15.0	0.015	5.0	11.0	18.0	0.6	600	475I21500001M	R475I21500001M
15.0	0.018	5.0	11.0	18.0	0.6	600	475I21800001M	R475I21800001M
15.0	0.022	6.0	12.0	18.0	0.6	600	475I22200001M	R475I22200001M
15.0	0.027	6.0	12.0	18.0	0.6	600	475I22700001M	R475I22700001M
15.0	0.033	6.0	12.0	18.0	0.6	600	475I23300001M	R475I23300001M
15.0	0.039	7.5	13.5	18.0	0.6	600	475I23900001M	R475I23900001M
15.0	0.047	7.5	13.5	18.0	0.6	600	475I24700001M	R475I24700001M
15.0	0.047	6.0	17.5	18.0	0.6	600	475I24700002M	R475I24700002M
15.0	0.047	9.0	12.5	18.0	0.6	600	475I24700003M	R475I24700003M
15.0	0.056	8.5	14.5	18.0	0.6	600	475I25600001M	R475I25600001M
15.0	0.068	10.0	16.0	18.0	0.8	600	475I26800001M	R475I26800001M
15.0	0.068	7.5	18.5	18.0	0.8	600	475I26800002M	R475I26800002M
15.0	0.068	13.0	12.0	18.0	0.8	600	475I26800003M	R475I26800003M
15.0	0.082	10.0	16.0	18.0	0.8	600	475I28200001M	R475I28200001M
15.0	0.10	11.0	19.0	18.0	0.8	600	475I31000001M	R475I31000001M
22.5	0.047	6.0	15.0	26.5	0.8	300	475N24700001M	R475N24700001M
22.5	0.047	6.5	13.5	26.5	0.8	300	475N24700002M	R475N24700002M
22.5	0.068	6.0	15.0	26.5	0.8	300	475N26800001M	R475N26800001M
22.5	0.10	7.0	16.0	26.5	0.8	300	475N31000001M	R475N31000001M
22.5	0.12	8.5	17.0	26.5	0.8	300	475N31200001M	R475N31200001M
22.5	0.15	10.0	18.5	26.5	0.8	300	475N31500001M	R475N31500001M
22.5	0.18	10.0	18.5	26.5	0.8	300	475N31800001M	R475N31800001M
22.5	0.22	11.0	20.0	26.5	0.8	300	475N32200001M	R475N32200001M
22.5	0.27	13.0	22.0	26.5	0.8	300	475N32700001M	R475N32700001M
22.5	0.33	13.0	22.0	26.5	0.8	300	475N33300001M	R475N33300001M
27.5	0.15	9.0	17.0	32.0	0.8	225	475R31500001M	R475R31500001M
27.5	0.18	9.0	17.0	32.0	0.8	225	475R31800001M	R475R31800001M
27.5	0.22	9.0	17.0	32.0	0.8	225	475R32200001M	R475R32200001M
27.5	0.27	9.0	17.0	32.0	0.8	225	475R32700002M	R475R32700002M
27.5	0.33	11.0	20.0	32.0	0.8	225	475R33300002M	R475R33300002M
27.5	0.39	11.0	20.0	32.0	0.8	225	475R33900001M	R475R33900001M
27.5	0.47	13.0	22.0	32.0	0.8	225	475R34700001M	R475R34700001M
27.5	0.56	13.0	22.0	32.0	0.8	225	475R35600001M	R475R35600001M
27.5	0.68	14.0	28.0	32.0	0.8	225	475R36800001M	R475R36800001M
27.5	0.82	18.0	33.0	32.0	0.8	225	475R38200001M	R475R38200001M
27.5	1.0	18.0	33.0	32.0	0.8	225	475R41000001M	R475R41000001M
27.5	1.2	18.0	33.0	32.0	0.8	225	475R41200001M	R475R41200001M
27.5	1.5	22.0	37.0	32.0	0.8	225	475R41500001M	R475R41500001M
37.5	0.47	11.0	22.0	41.5	1.0	150	475W34700001M	R475W34700001M
37.5	0.56	11.0	22.0	41.5	1.0	150	475W35600001M	R475W35600001M
37.5	0.68	13.0	24.0	41.5	1.0	150	475W36800001M	R475W36800001M
37.5	0.82	16.0	28.5	41.5	1.0	150	475W38200001M	R475W38200001M
37.5	1.0	16.0	28.5	41.5	1.0	150	475W41000001M	R475W41000001M
37.5	1.2	19.0	32.0	41.5	1.0	150	475W41200001M	R475W41200001M
37.5	1.5	19.0	32.0	41.5	1.0	150	475W41500001M	R475W41500001M
37.5	1.8	20.0	40.0	41.5	1.0	150	475W41800001M	R475W41800001M
37.5	2.2	20.0	40.0	41.5	1.0	150	475W42200001M	R475W42200001M
Lead Space	Cap Value (µF)	B (mm)	H (mm)	L (mm)	Ø d	dV/dt (V/µsec)	F Article Code	Part Number

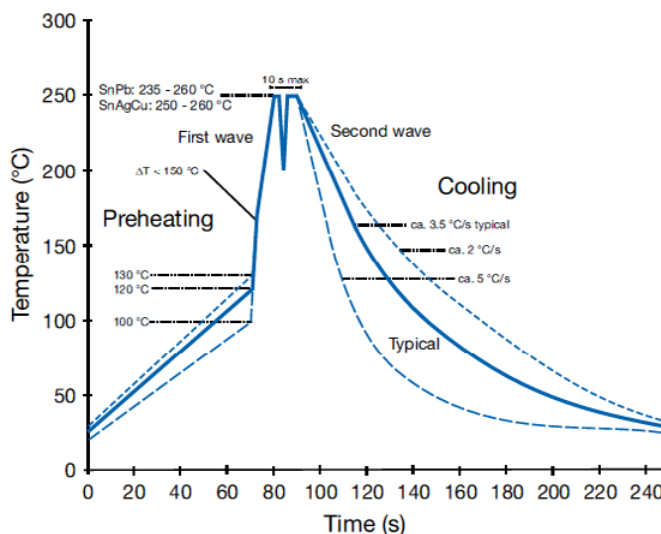
Other part number options:

(1) Where the 14th character equal to, J (±5% tolerance), K (±10% tolerance) and M (±20% tolerance).

(2) Refer to Ordering Options Table for Ordering Code.

Soldering Process

The implementation of RoHS Directive has forced to select SnAuCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217–221°C for the new alloys. This means that the heat stress to components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. The Polypropylene Capacitors are especially sensitive to heat (melting point of Polypropylene is 160–170°C). The wave soldering can be destructive especially for mechanically small Polypropylene Capacitors (lead spacings 5-10 mm), and great care has to be taken when soldering them. The recommended solder profiles from KEMET should be used. In case of doubt, KEMET should be consulted. In general the wave soldering curve from IEC Publication 61760-1 edition 2 gives a good guideline for successful soldering.



Marking

- Manufacturer's logo
- Article series
- Rated capacitance
- Capacitance tolerance
- Rated voltage
- Capacitor class
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class
- Manufacturing date code
- Manufacturing plant

Lead Taping and Packaging of Radial Components for Automatic Insertion Machines

Technical terms: IEC 60286-2

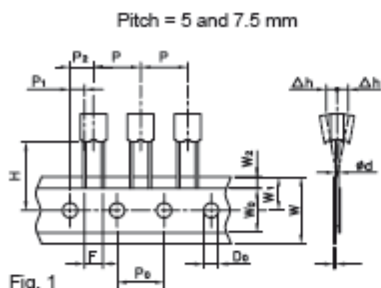


Fig. 1

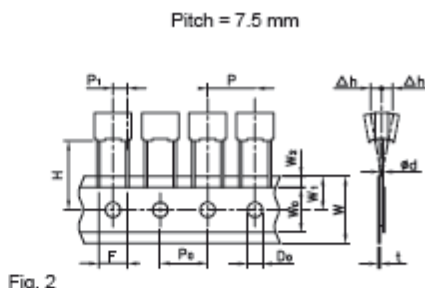


Fig. 2

Description	Symbol	Dimensions (mm)			Tol.
		Pitch			
		5 mm Fig.1	7.5 mm Fig.1	7.5 mm Fig.2	
Lead wire diameter	d	0.5 ... 0.6	0.5 ... 0.6	0.5 ... 0.6	±0.05
Taping pitch	P	12.7	12.7	12.7	±1
Feed hole pitch	P ₀	12.7	12.7	12.7	±0.2*
Centering of the lead wire	P ₁	3.85	2.6	3.75	±0.7
Centering of the body	P ₂	6.35	6.35		±1.3
Lead spacing (pitch)	F	5	7.5	7.5	+0.6 -0.1
Component alignment	Δh	0	0	0	±2
Height of component from tape center	H**	18.5	18.5	18.5	±0.5
Carrier tape width	W	18	18	18	+1 -0.5
Hold down tape width	W ₀	6	6	6	min.
Hole position	W ₁	9	9	9	±0.5
Hold down tape position	W ₂	3	3	3	max.
Feed hole diameter	D ₀	4	4	4	±0.2
Tape thickness	t	0.7	0.7	0.7	±0.2

Remarks

- * Max 1mm on 20 pitches
- ** H = 18.5 mm is available upon request.

For orders of capacitors with pitch = 7.5 mm, please specify the requested version (fig.1 or fig.2).

NUMBER OF PIECES FOR PACKING UNIT

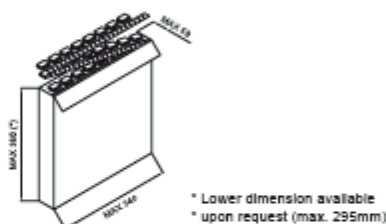
Box dimensions			Pitch	Loose *short leads	Loose **long leads	Ammo	Reel Ø355mm
B	H	L					
(mm)	(mm)	(mm)	(mm)	(pcs)	(pcs)	(pcs)	(pcs)
2.5	6.5	7.2	5.0	3000	4000	3500	2500
3.5	7.5	7.2	5.0	2000	3000	2500	1800
4.5	9.5	7.2	5.0	1500	2000	1900	1400
5.0	10.0	7.2	5.0	1000	1500	1700	1200
6.0	11.0	7.2	5.0	2000	1000	1400	1000
7.2	13.0	7.2	5.0	1500	750	1150	800

- * Short leads: lead length = 4^{+0.5} mm (pitch = 5mm); 4^{+0.5} mm (pitch = 7.5mm)
- ** Long leads: lead length = 17^{+0.2} mm

Packaging detail

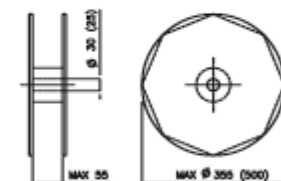
Two different containers are available:
 Fan-fold box (Ammo-pack)
 Reel Ø 355 mm only.

Ammo-pack (dimensions in mm)



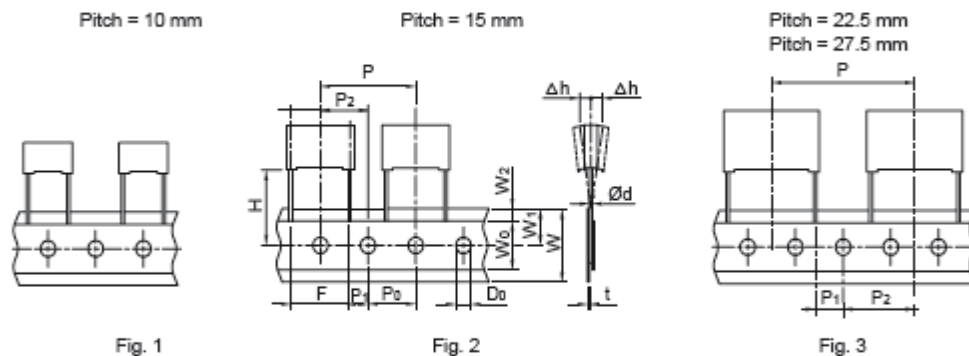
* Lower dimension available
 * upon request (max. 295mm)

Reel (dimensions in mm)



Lead Taping and Packaging of Radial Components for Robot Insertion Machines

Technical terms: IEC 60288-2



Description	Symbol	Dimensions (mm)				Tol.
		Pitch				
		10 mm Fig.1	15 mm Fig.2	22.5mm Fig.3	27.5mm Fig.3	
Lead wire diameter	d	0.6	0.6/0.8	0.8	0.8	±0.05
Taping pitch	P	25.4	25.4	38.1	38.1	±1
Feed hole pitch*	P ₀	12.7	12.7	12.7	12.7	±0.2**
Centering of the lead wire	P ₁	7.7	5.2	7.8	5.3	±0.7
Centering of the body	P ₂	12.7	12.7	19.05	19.05	±1.3
Lead spacing (pitch) ***	F	10	15	22.5	27.5	+ 0.6 - 0.1
Component alignment	Δh	0	0	0	0	±2
Height of component from tape center	H****	18.5	18.5	18.5	18.5	±0.5
Carrier tape width	W	18	18	18	18	+1-0.5
Hold down tape width	W ₀	9	10	10	10	min.
Hole position	W ₁	9	9	9	9	±0.5
Hold down tape position	W ₂	3	3	3	3	max.
Feed hole diameter	D ₀	4	4	4	4	±0.2
Tape thickness	t	0.7	0.7	0.7	0.7	±0.2

Remarks

- * Available also 15mm.
- ** Max 1mm on 20 pitches.
- *** Pitches 15mm and 10mm taped to 7.5mm (crimped leads) available upon request.
- **** H = 18.5 mm is available upon request.