# DATA HANDBOOK

## Film Capacitors

BOOK PA05 1995

Philips Components

PHILIPS

## QUALITY ASSURED

Our quality system focuses on the continuing high quality of our components and the best possible service for our customers. We have a three-sided quality strategy: we apply a system of total quality control and assurance; we operate customer-oriented dynamic improvement programmes; and we promote a partnering relationship with our customers and suppliers.

## PRODUCT SAFETY

In striving for state-of-the-art perfection, we continuously improve components and processes with respect to environmental demands. Our components offer no hazard to the environment in normal use when operated or stored within the limits specified in the data sheet.

Some components unavoidably contain substances that, if exposed by accident or misuse, are potentially hazardous to health. Users of these components are informed of the danger by warning notices in the data sheets supporting the components. Where necessary the warning notices also indicate safety precautions to be taken and disposal instructions to be followed. Obviously users of these components, in general the set-making industry, assume responsibility towards the consumer with respect to safety matters and environmental demands.

All used or obsolete components should be disposed of according to the regulations applying at the disposal location. Depending on the location, electronic components are considered to be 'chemical', 'special' or sometimes 'industrial' waste. Disposal as domestic waste is usually not permitted.

# FILM CAPACITORS

## CONTENTS

## DEFINITIONS

| **Data sheet status** | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| **Application information** | |
| Where application information is given, it is advisory and does not form part of the specification. | |

## LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

# INTRODUCTION

# Film capacitors — Introduction

## FILM CAPACITORS

The dielectric material of a film capacitor is a plastic or paper film. In the table below, an overview is given of the film dielectrics used in Philips film capacitor products.

| PARAMETER | DIELECTRIC | | | | | | UNIT |
|---|---|---|---|---|---|---|---|
| | P | KT | KC | KPS | KS | KP | |
| Dielectric constant at 1 kHz | 3.0 | 3.3 | 2.8 | 3.0 | 2.4 | 2.2 | |
| Dissipation factor ($\times 10^{-4}$) | | | | | | | |
| at 1 kHz | 50 | 50 | 12 | 3 | 2 | 1 | |
| at 10 kHz | 120 | 110 | 50 | 6 | 2 | 2 | |
| at 100 kHz | 200 | 170 | 100 | 12 | 2 | 2 | |
| at 1 MHz | 300 | 200 | 110 | 18 | 4 | 4 | |
| Volume resistivity | $10^{+16}$ | $10^{+17}$ | $10^{+17}$ | $10^{+17}$ | $10^{+18}$ | $10^{+18}$ | Ωcm |
| Dielectric strength | 100 | 400 | 300 | 250 | 500 | 600 | V/μm |
| Maximum application temperature | 100 | 125 | 125 | 150 | 85 | 100 | °C |
| Power density at 10 kHz | 67 | 50 | 21 | 2.5 | 0.67 | 0.6 | W/cm$^3$ |

P = paper
KC = polycarbonate
KS = polystyrene
KT = polyethyleneterephthalate
KPS = polyphenylenesulfide
KP = polypropylene

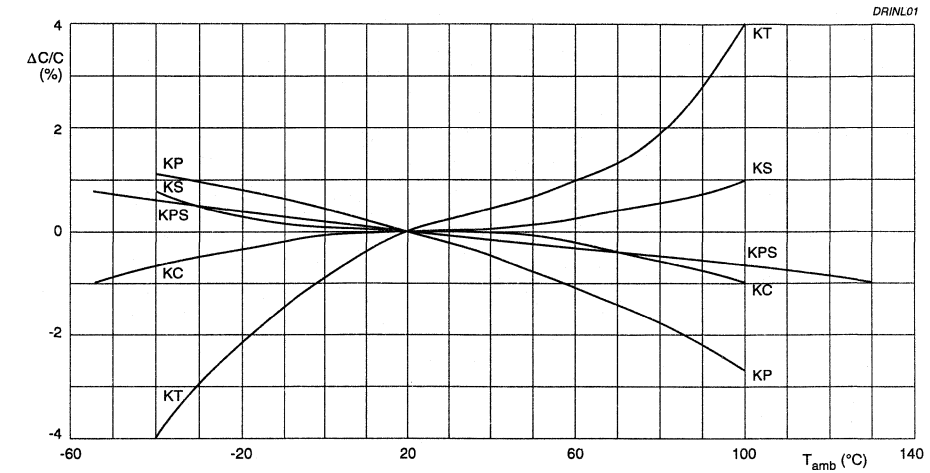
Because of their typical properties, the polyester and polycarbonate dielectrics are used in general purpose applications where a small bias DC voltage and small AC voltages at low frequencies are usual. The most important properties are the high capacitance per volume for polyester and, the capacitance stability over a wide temperature range for polycarbonate.

A rather new dielectric is polyphenylenesulfide (PPS). Its high melting point allows it to be used in a non-encapsulated SMD product. The properties of PPS determine the stability of the product characteristics.

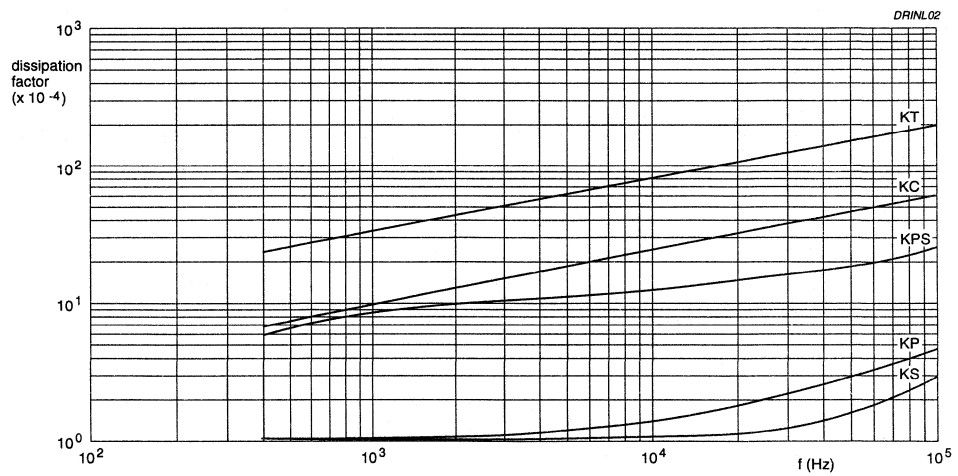
Polypropylene and polystyrene films are used in high frequency or high voltage applications due to their very low dissipation factor and high dielectric strength.

Paper film is still used in capacitors for mains applications, as for example in interference suppression capacitors.

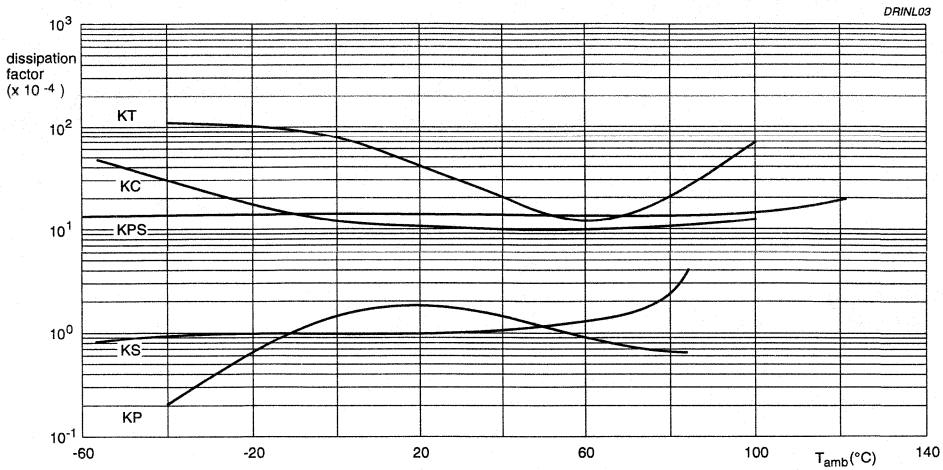
Typical properties as a function of temperature or frequency are illustrated in the following figures.



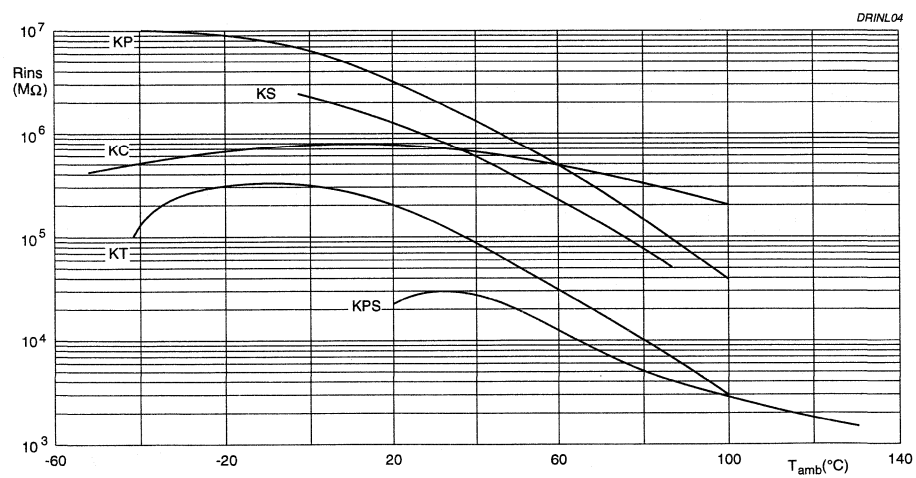

Capacitance change as a function of ambient free air temperature; typical curves.




Dissipation factor as a function of frequency; typical curves.




Dissipation factor as a function of ambient free air temperature; typical curves.




Insulation resistance as a function of ambient free air temperature; typical curves.

# Film capacitors — Introduction

## CONSTRUCTION OF THE CAPACITOR CELL

The type of electrode used determines whether the capacitor is a metallized film or film/foil type.

The electrodes used for metallized film capacitors consist of a thin metal layer with a thickness of approximately 30 to 50 µm. The electrodes of film/foil capacitors have discrete metal foils with thicknesses of approximately 5 to 10 µm.

Due to their construction, film/foil capacitors can carry higher currents than metallized ones, but are larger in volume.

Metallized capacitors have a self-healing behaviour as an intrinsic characteristic. All capacitor cells are low inductive wound, except for the SMD products which are produced by stacked film technology.

Depending on the AC voltage, single or series constructions are used. Single section capacitors are normally used for products with an AC rating up to 275 V (AC). Series constructions are used for higher voltages.

## GENERAL DEFINITIONS

### Rated voltage ($U_{Rdc}$)

The maximum DC voltage (in V) which may be continuously applied to a capacitor at any operating ambient temperature below the rated temperature.

### Category voltage ($U_C$)

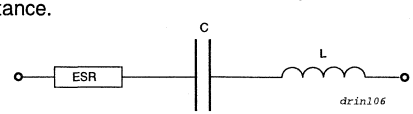
The maximum AC voltage (or DC voltage) which may be applied continuously to a capacitor at its upper category temperature.

### Rated AC voltage ($U_{Rac}$)

The maximum RMS voltage (in V) of specified frequency (mostly 50 Hz), which may be continuously applied to a capacitor at any operating ambient temperature below the rated temperature.

### Capacitance

The capacitance of a capacitor is the capacitive part of the equivalent circuit composed of capacitance, series resistance and inductance.




Equivalent circuit.

### Rated capacitance

The rated capacitance, normally marked on the product, is the value for which the capacitor has been designed.

### Capacitance tolerance

The allowed deviation of the capacitance from the rated capacitance at a free air ambient temperature of 23 ±1 °C and RH of 50 ±2%.

Coded in accordance with IEC 62:

| | |
|---|---|
| ±1.0% | F |
| ±2.0% | G |
| ±5.0% | J |
| ±10.0% | K |
| ±20.0% | M |

A letter "A" indicates that the tolerance is defined in the type specification or customer detail specification.

### Temperature coefficient and cyclic drift of capacitance

The terms characterizing these two properties apply to capacitors of which the variations of capacitance as a function of temperature are linear or approximately linear and can be expressed with a certain precision.

#### Temperature coefficient of capacitance

The rate of capacitance change with temperature, measured over the specified temperature range. It is normally expressed in parts per million per Kelvin ($10^{-6}$/K).

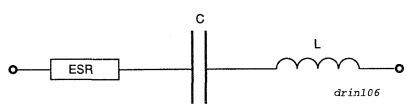
#### Temperature cyclic drift of capacitance

The maximum irreversible variation of capacitance observed at room temperature during or after the completion of a number of specified temperature cycles. It is usually expressed as a percentage of the capacitance related to a reference temperature. This is normally 20 °C.

### Dissipation factor and equivalent series resistance

The dissipation factor or tangent of loss angle (tan δ) is the power loss of the capacitor divided by the reactive power of the capacitor at a sinusoidal voltage of specified frequency.

The equivalent series resistance (ESR) is the resistive part of the equivalent circuit composed of capacitance, series resistance and inductance.




Equivalent circuit.

### Rated voltage pulse slope (dV/dt)

The maximum voltage pulse slope that the capacitor can withstand with a pulse voltage equal to the rated voltage. For pulse voltages other than the rated voltage, the maximum voltage pulse slope may be multiplied by $U_{Rdc}$ and divided by the applied voltage.

The voltage pulse slope multiplied by the capacitance gives the peak current for the capacitor.

### Insulation resistance and time constant

The insulation resistance ($R_{ins}$) is defined by the applied DC voltage divided by the leakage current after a well defined minimum time.

The time constant is the product (in seconds) of the nominal capacitance and the insulation resistance between the leads.

### Ambient temperature

The ambient temperature is the temperature of the air surrounding the component.

### Climatic category

The climatic category code (e.g. 50/100/56) indicates to which climatic category a film capacitor type belongs.
The category is indicated by a series of three sets of digits separated by oblique strokes corresponding to the minimum ambient temperature of operation, the maximum temperature of operation and the number of days of exposure to damp heat (Steady state - test Ca) respectively that they will withstand.

### Category temperature range

The range of ambient temperatures for which the capacitor has been designed to operate continuously. This is defined by the temperature limits of the appropriate category.

### Upper category temperature

The maximum ambient temperature for which a capacitor has been designed to operate continuously at category voltage.

### Lower category temperature

The minimum ambient temperature for which a capacitor has been designed to operate continuously.

### Rated temperature

The maximum ambient temperature at which the rated voltage may be applied continuously.

### Maximum application temperature

The equivalent of the upper category temperature.

### Self-healing

The process by which the electrical properties of a metallized capacitor, after a local breakdown, are rapidly and essentially restored to the values before the breakdown.

### Temperature characteristic of capacitance

The term characterizing this property applies mainly to capacitors of which the variations of capacitance as a function of temperature, linear or non-linear, cannot be expressed with precision and certainty.

The temperature characteristic of capacitance is the maximum reversible variation of capacitance produced over a given temperature range within the category temperature range.
It is expressed normally as a percentage of the capacitance related to a reference temperature of 20 °C.

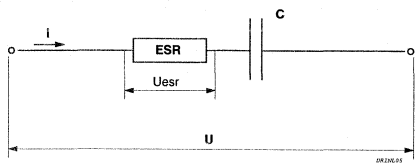
### Storage temperature

The temperature range with a RH of maximum 80% without condensation at which the initial characteristics can be guaranteed for at least 2 years.

### Maximum Power Dissipation

The power dissipated by a capacitor is a function of the voltage (Uesr) across or the current (I) through the equivalent series resistance ESR and is expressed by:

$$P = \frac{Uesr^2}{ESR} \qquad P = ESR \times I^2$$




Simplified equivalent circuit.

$$Uesr^2 = \frac{ESR^2}{ESR^2 + 1/\omega^2C^2} \times U^2$$

Given that for film capacitors tan $\delta = \omega \times C \times ESR << 0.1$, the formula can be simplified to

$$Uesr^2 = ESR^2 \times \omega^2 \times C^2 \times U^2$$

or with ESR = tan $\delta/\omega C$, the formula becomes:

$$P = \omega \times C \times \tan\delta \times U^2 \qquad P = \frac{\tan\delta}{\omega \times C} \times I^2$$

For the tan $\delta$ we take the maximum value found in the specification, C is in Farads and $\omega = 2\pi f$.
U or I are assumed to be known.

The maximum permissible power dissipation ($P_{max}$), which depends on the dimensions of the capacitor and on the ambient free air temperature are given in the specification.

In applications where sinewaves occur, we have to take for U the RMS voltage or for I the RMS current of the sinewave.

In applications where periodic signals occur, the signal has to be expressed in Fourier-terms:

$$U = U_O + \sum_{K=1}^{\infty} U_k \times \sin(k\omega t + \Phi_k) \qquad I = \sum_{k=1}^{\infty} I_k \times \sin(k\omega t + \Phi_k)$$

with $U_O$ the DC voltage, $U_k$ and $I_k$ (the voltage and current of the k-th harmonic respectively) the formulae for the dissipated power become:

$$P = \sum_{k=1}^{\infty} k \times \omega \times c \times \tan\delta_k \times \frac{U_k^2}{2} \qquad P = \sum_{k=1}^{\infty} \frac{\tan\delta_k \times I_k^2}{k \times \omega \times C\,2}$$

where tan $\delta_k$ is the tan $\delta$ at the k-th harmonic.

## TEST INFORMATION

### Robustness of leads

Tensile strength of leads (Ua)
(load in lead axis direction)

lead diameter 0.5, 0.6 and 0.8 mm: load 10 N, 10 s
1.0 mm: load 20 N, 20 s

Bending (Ub)

lead diameter 0.5, 0.6 and 0.8 mm: load 5 N, 4 x 90°
1.0 mm: load 10 N, 4 x 90°

Torsion (Uc) (for axial capacitors only)

Severity 1: three rotations of 360°
Severity 2: two rotations of 180°

### Rapid change of temperature (Na)

The rapid change of temperature test is intended to determine the effect on capacitors of a succession of temperature changes and consists of 5 cycles of 30 minutes at lower category temperature and 30 minutes at higher category temperature.

### Dry heat (Ba)

This test determines the ability of the capacitors to be used or stored at high temperature. The standard test is 16 hours at upper category temperature.

### Damp heat cyclic (Db)

This test determines the suitability of capacitors for use and storage under conditions of high humidity when combined with cyclic temperature changes and, in general, producing condensation on the surface of the capacitor.
One cycle consists of 24 hours exposure to 55 °C and 95 to 100% relative humidity (RH).

### Cold (Aa)

This test determines the ability of the capacitors to be used or stored at low temperature. The standard test is 2 hours at the lower category temperature.

### Damp heat steady state (Ca)

This test determines the suitability of capacitors for use and storage under conditions of high humidity. This test is primarily intended to permit the observations of the effects of high humidity at constant temperature over a specified period.
The capacitors are exposed to a damp heat environment which is maintained at a temperature of 40 °C and a RH of 90 to 95% for the number of days specified by the third set of digits of the climatic category code.

### Soldering conditions

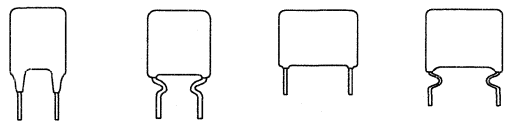
With regard to the resistance to soldering heat and the solderability, our products comply with IEC 384-1 and the additional "Type specifications".
For our precision capacitors where capacitance stability is important, we refer to the paragraph "Soldering conditions" in the type specification.
In the tables "Quick reference test requirements" an overview is given for the various soldering parameters per product type.

### Solvent resistance of components

Soldered capacitors may be cleaned using appropriate cleansing agents, such as alcohol, fluorhydro-carbons or their mixtures. Solvents or cleansing agents based on chlorohydrocarbons or ketones should not to be used, as they may attack the capacitor or the encapsulation.

After cleaning it is always recommended to dry the components carefully.
Special attention should be given to non or partially encapsulated products (e.g. KS 424 ... 431).

# SELECTION GUIDE

| | MKT 365/366/367/368/369<br>Page 49 |
|---|---|
| |  |
| Dielectric | metallized polyester |
| Encapsulation | expoxy lacquered |
| Qualified to | IEC 384-2 |
| Temp. range | –55 to 100 °C |
| Packaging | loose; taped |
| Tolerance | ±20%; ±10%; ±5% |

| Capacitance (µF) (*) | $U_{Rdc}$ (V) | | | | |
|---|---|---|---|---|---|
| | 63 | 100 | 250 | 400 | 630 |
| 0.00022 | | | | | |
| 0.00033 | | | | | |
| 0.00047 | | | | | |
| 0.00068 | | | | | |
| 0.001 | | | | | |
| 0.0015 | | | | | |
| 0.0022 | | | | | |
| 0.0033 | | | | | |
| 0.0047 | | | | | |
| 0.0068 | | | | A B C | |
| 0.01 | | | | | |
| 0.015 | | | | | C |
| 0.022 | | | | | |
| 0.033 | | | A B C | | |
| 0.047 | | A B C | | | D |
| 0.068 | | | | D | |
| 0.1 | | | | | |
| 0.15 | A | B C | D | | E |
| 0.22 | | | | E | |
| 0.33 | B C | D | | | F |
| 0.47 | | | E | F | |
| 0.68 | | | | | |
| 1.0 | | | F | | |
| 1.5 | | E | | | |
| 2.2 | | | | | |
| 3.3 | | F | | | |
| 4.7 | | | | | |
| 6.8 | | | | | |
| 10 | | | | | |
| 15 | | | | | |

(*) Intermediate values of E12 series are also available.

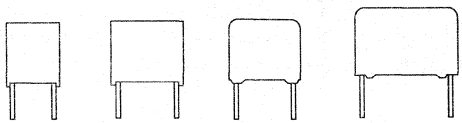
**Pitch sizes:**

A 5.08 mm B 7.62 mm C 10.16 mm D 15.24 mm E 22.86 mm F 27.94 mm

# General purpose — Selection guide

**MKT 370/371/372/373**

**Page 121**



| | |
|---|---|
| metallized polyester | Dielectric |
| potted with epoxy resin | Encapsulation |
| IEC 384-2 and CECC 30401-801 | Qualified to |
| –55 to 100 °C | Temp. range |
| loose; taped | Packaging |
| ±20%; ±10%; ±5% | Tolerance |

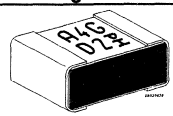
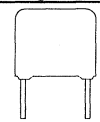
| 63 | 100 | 250 | 400 | Capacitance (µF) (*) |
|---|---|---|---|---|
| | | | | 0.00022 |
| | | | | 0.00033 |
| | | | | 0.00047 |
| | | | | 0.00068 |
| | | | | 0.001 |
| | | | | 0.0015 |
| | | | | 0.0022 |
| | | | | 0.0033 |
| | | | A | 0.0047 |
| | | | B | 0.0068 |
| | | A | C | 0.01 |
| | A | B | | 0.015 |
| | B | C | | 0.022 |
| | C | | D | 0.033 |
| A | | D | | 0.047 |
| B | D | | E | 0.068 |
| | | E | | 0.1 |
| | E | | F | 0.15 |
| | | F | | 0.22 |
| | F | | | 0.33 |
| | | | | 0.47 |
| | | | | 0.68 |
| | | | | 1.0 |
| | | | | 1.5 |
| | | | | 2.2 |
| | | | | 3.3 |
| | | | | 4.7 |
| | | | | 6.8 |
| | | | | 10 |
| | | | | 15 |

(*) Intermediate values of E12 series are also available

**Pitch sizes:**

A 5.08 mm B 7.62 mm C 10.0 mm D 15.0 mm E 22.5 mm F 27.5 mm

# General purpose — Selection guide

| | MKPS 390/391/392/393/394<br>Page 169 | MKC 344<br>Page 185 |
|---|---|---|
| |  |  |
| Dielectric | metallized polyphenyl sulphide | metallized polycarbonate |
| Encapsulation | | potted with epoxy resin |
| Qualified to | EN 132500 (DRAFT) | IEC 384-6 |
| Temp. range | –55 to 125 °C | –55 to 100 °C |
| Packaging | taped | loose; taped |
| Tolerance | ±10%, ±5% | ±10%, ±5% |

| Capacitance (µF) (*) | $U_{Rdc}$ (V) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25 | | | | | 160 | | | | | 100 | |
| 0.00022 | | | | | | 1206 | | | | | | |
| 0.00033 | | | | | | | | | | | | |
| 0.00047 | | | | | | | 1210 | | | | | |
| 0.00068 | | | | | | | | | | | | |
| 0.001 | 1206 | 1210 | 1812 | | | | | | | | | |
| 0.0015 | | | | | | | | 1812 | | | | |
| 0.0022 | | | | | | | | | | | | |
| 0.0033 | | | | | | | | | | | | |
| 0.0047 | | | | | | | | | 2220 | | | |
| 0.0068 | | | | | | | | | | | | |
| 0.01 | | | | | | | | | | | | |
| 0.015 | | | | | | | | | | | | |
| 0.022 | | | | | | | | | | | | |
| 0.033 | | | | | | | | | | 2824 | | |
| 0.047 | | | | | | | | | | | | |
| 0.068 | | | | 2220 | | | | | | | | |
| 0.1 | | | | | | | | | | | C | |
| 0.15 | | | | | | | | | | | | |
| 0.22 | | | | | | | | | | | | |
| 0.33 | | | | | 2824 | | | | | | D | |
| 0.47 | | | | | | | | | | | | |
| 0.68 | | | | | | | | | | | | |
| 1.0 | | | | | | | | | | | | |
| 1.5 | | | | | | | | | | | | |
| 2.2 | | | | | | | | | | | E | |
| 3.3 | | | | | | | | | | | | |
| 4.7 | | | | | | | | | | | | |
| 6.8 | | | | | | | | | | | F | |
| 10 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |

| Capacitance (µF) (*) | $U_{Rdc}$ (V) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 250 | | | | | 400 | | | | | 630 | |
| 0.00022 | | | | | | | | | | | | |
| 0.00033 | | | | | | | | | | | | |
| 0.00047 | | | | | | | | | | | | |
| 0.00068 | | | | | | | | | | | | |
| 0.001 | | | | | | | | | | | | |
| 0.0015 | | | | | | | | | | | | |
| 0.0022 | | | | | | | | | | | | |
| 0.0033 | | | | | | | | | | | | |
| 0.0047 | | | | | | | | | | | | |
| 0.0068 | | | | | | | | | | | | |
| 0.01 | | | | | | | | | | | | |
| 0.015 | | | | | | | | | | | C | |
| 0.022 | | | | | | C | | | | | | |
| 0.033 | | | | | | | | | | | D | |
| 0.047 | C | | | | | D | | | | | | |
| 0.068 | | | | | | | | | | | | |
| 0.1 | | | | | | | | | | | E | |
| 0.15 | D | | | | | | | | | | | |
| 0.22 | | | | | | E | | | | | | |
| 0.33 | | | | | | | | | | | F | |
| 0.47 | | | | | | | | | | | | |
| 0.68 | E | | | | | F | | | | | | |
| 1.0 | | | | | | | | | | | | |
| 1.5 | | | | | | | | | | | | |
| 2.2 | F | | | | | | | | | | | |
| 3.3 | | | | | | | | | | | | |
| 4.7 | | | | | | | | | | | | |
| 6.8 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |

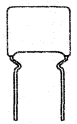
(*) Intermediate values of E12 series are also available.

**Pitch sizes:**

C 10.0 mm D 15.0 mm E 22.5 mm F 27.5 mm

# General purpose — Selection guide

**KT 347**
**Page 203**



| | |
|---|---|
| polyester | Dielectric |
| lacquered | Encapsulation |
| IEC 384-11 | Qualified to |
| –40 to 100 °C | Temp. range |
| loose | Packaging |
| ±20%; ±10% | Tolerance |

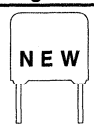
| $U_{Rdc}$ (V) | | | | Capacitance (µF) (*) |
|---|---|---|---|---|
| 100 | 250 | 400 | 630 | |
| | | | C | 0.00022 |
| | | | C | 0.00033 |
| | | | C | 0.00047 |
| | | | C | 0.00068 |
| | | | C | 0.001 |
| | | | C | 0.0015 |
| | | | C | 0.0022 |
| | | C | C | 0.0033 |
| | | C | C | 0.0047 |
| | C | C | D | 0.0068 |
| | C | C | D | 0.01 |
| C | C | D | D | 0.015 |
| C | D | D | E | 0.022 |
| C | D | D | E | 0.033 |
| C | D | E | E | 0.047 |
| D | D | E | E | 0.068 |
| D | E | E | F | 0.1 |
| D | E | E | F | 0.15 |
| E | E | F | F | 0.22 |
| E | F | F | F | 0.33 |
| E | F | F | F | 0.47 |
| F | F | F | F | 0.68 |
| F | F | F | F | 1.0 |
| F | F | F | F | 1.5 |
| F | F | F | F | 2.2 |
| F | F | F | F | 3.3 |
| F | F | F | F | 4.7 |
| F | F | F | F | 6.8 |
| F | F | F | F | 10 |
| F | F | F | F | 15 |

* Intermediate values of E12 series are also available.

**Pitch sizes:**

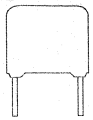
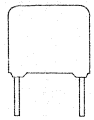
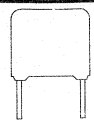
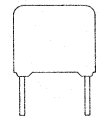
C 10.0 mm D 15.0 mm E 22.5 mm F 27.5 mm

# Interference Suppression — Selection guide

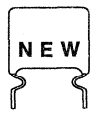
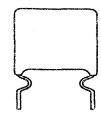
| | MKP 336 6 | MKP 336 1 | MKP 336 2 |
|---|---|---|---|
| | Page 221 | Page 231 | Page 231 |
| |   |   |   |
| Class | Y2 | X1 | X2 |
| Dielectric | metallized polypropylene | metallized polypropylene | metallized polypropylene |
| Encapsulation | potted with epoxy resin | | |
| Qualified to | IEC 384-14 2nd edition | IEC 384-14 2nd edition | IEC 384-14 2nd edition |
| Approvals | | | |
| Climatic category | 55/100/21 | 55/100/21 | 55/100/21 |
| tan δ (10 kHz) | $\leq 10 \times 10^{-4}$ | $\leq 70 \times 10^{-4}$ | $\leq 70 \times 10^{-4}$ |
| $R_{ins}$ for C ≤ 330 nF<br>RC for C > 330 nF | >15 000 MΩ | >15 000 MΩ<br>>5 000 s | >15 000 MΩ<br>>5 000 s |
| Pulse slope at $U_R$ | 200 V/µs | 200 V/µs | 100 V/µs |
| Packaging | loose; taped | loose; taped | loose; taped |
| Tolerance | ±20%; ±10% | ±20%; ±10% | ±20%; ±10% |

| Capacitance (µF) E6 series | $U_{RAC}$ (V) 250 | $U_{RAC}$ (V) 275 | $U_{RAC}$ (V) 275 |
|---|---|---|---|
| 0.001 | 10 | 10 | 10 |
| 0.0015 | 10 | 10 | 10 |
| 0.0022 | 10 | 10 | 10 |
| 0.0033 | 10 | 10 | 10 |
| 0.0047 | 10 | 10 | 10 |
| 0.0068 | 15 | 15 | 15 |
| 0.01 | 15 | 15 | 15 |
| 0.015 | 15 | 15 | 15 |
| 0.022 | 15 | 15 | 15 |
| 0.033 | 15 | 15 | 15 |
| 0.047 | 15 | 15 | 15 |
| 0.068 | 15 | 15 | 15 |
| 0.1 | 15 | 15 | 15 |
| 0.15 | 15 | 22.5 | 22.5 |
| 0.22 | 15 | 22.5 | 22.5 |
| 0.33 | 15 | 22.5 | 22.5 |
| 0.47 | 15 | 27.5 | 27.5 |
| 0.68 | 15 | 27.5 | 27.5 |
| 1.0 | 15 | 27.5 | 27.5 |
| 1.5 | 15 | 27.5 | 27.5 |
| 2.2 | 15 | 27.5 | 27.5 |

# Interference Suppression — Selection guide

| MP-KT 333 4 | MKT/MKT 331 6 | MKP 335 1 | MKT-P 330 4 | |
|---|---|---|---|---|
| Page 243 | Page 253 | Page 263 | Page 273 | |
|  |  |  |  | |
| X2 | X2 | X2 | X2 | Class |
| metallized paper and polyester | metallized polyester | metallized polypropylene | metallized polyester and paper | Dielectric |
| potted with epoxy resin | | | | Encapsulation |
| IEC 384-14 2nd edition | IEC 384-14 2nd edition | IEC 384-14 2nd edition | IEC 384-14 1st edition | Qualified to |
| | | | | Approvals |
| 40/085/21 | 55/100/56 | 40/085/21 | 40/085/21 | Climatic category |
| ≤200 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤70 x $10^{-4}$ | ≤130 x $10^{-4}$ | tan δ (10 kHz) |
| >15 000 MΩ<br>>5 000 s | >30 000 MΩ<br>>10 000 s | >30 000 MΩ<br>>10 000 s | >15 000 MΩ<br>>5 000 s | $R_{ins}$ for C ≤ 330 nF<br>RC for C > 330 nF |
| 250 to 1500 V/µs | 100 to 200 V/µs | 100 V/µs | 100 V/µs | Pulse slope at $U_R$ |
| loose; taped | loose; taped | loose; taped | loose; taped | Packaging |
| ±10% | ±10%, ±20% | ±10%, ±20% | ±10%, ±20% | Tolerance |
| $U_{Rac}$ (V)<br>250 | $U_{Rac}$ (V)<br>300 | $U_{Rac}$ (V)<br>250 | $U_{Rac}$ (V)<br>250 | Capacitance (µF)<br>E6 series |
| | | | | 0.001 |
| | | | | 0.0015 |
| | | | | 0.0022 |
| | | | | 0.0033 |
| | | | | 0.0047 |
| | | | | 0.0068 |
| 15 | 15 | 15 | 15 | 0.01 |
| | | | | 0.015 |
| | | | | 0.022 |
| | | | | 0.033 |
| | | | | 0.047 |
| | | | | 0.068 |
| 22.5 | 22.5 | 22.5 | 22.5 | 0.1 |
| | | | | 0.15 |
| | | | | 0.22 |
| 27.5 | 27.5 | 27.5 | 27.5 | 0.33 |
| | | | | 0.47 |
| | | | | 0.68 |
| | | | | 1.0 |
| | | | | 1.5 |
| | | | | 2.2 |

# AC & Pulse — Selection guide

| | KP/MKP 375<br>Page 285 | KP/MMKP 375<br>Page 285 |
|---|---|---|
| |  |  |
| Dielectric | metallized polypropylene | metallized polypropylene |
| Encapsulation | epoxy lacquered | epoxy lacquered |
| Qualified to | IEC 384-17 | IEC 384-17 |
| Temp. range | –55 to 85 °C | –55 to 85 °C |
| Packaging | loose | loose |
| Tolerance | ±5%; ±3.5% | ±5%; ±3.5% |

| Capacitance (µF) (**) | $U_{Rdc}$ (V) 400 | 630 | 1000 | 1600 | 2000 | $U_{Rdc}$ (V) 630 | 1000 | 1600 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| 0.0001 | | | C* | | D* | | | | |
| 0.00015 | | | C* | | D* | | | | |
| 0.00022 | | | C* | | D* | | | | |
| 0.00033 | | | C* | | D* | | | | |
| 0.00047 | | | C* | | D* | | | | |
| 0.00068 | | C* | C* | D* | D* | | | | |
| 0.0010 | | C* | C* | D* | D* | | | | |
| 0.0015 | | C* | C* | D* | D* | | | | |
| 0.0022 | | C* | D* | D* | D* | | | | |
| 0.0033 | | D* | D* | D* | E | | | | E |
| 0.0047 | | D* | D* | E | E | | | E | E |
| 0.0068 | | D* | D* | E | E | | | E | E |
| 0.010 | | D* | D* | E | F | | | E | F |
| 0.015 | | D* | E | E | F | | E | E | F |
| 0.022 | | D* | E | F | F | | E | F | F |
| 0.033 | | E | E | F | F | E | E | F | F |
| 0.047 | | E | E | F | F | E | F | F | F |
| 0.068 | | E | F | F | F | F | F | F | F |
| 0.10 | | E | F | F | F | F | F | F | F |
| 0.15 | E* | F | F | F | F | F | F | F | F |
| 0.22 | E* | F | F | F | F | F | F | F | F |
| 0.33 | F* | F | F | F | F | F | F | F | F |
| 0.47 | F* | F | F | F | F | F | F | F | F |
| 0.68 | F* | F | F | F | F | F | F | F | F |

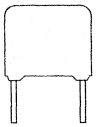
* In progress.
** Intermediate values of E24 series are also available.

**Pitch sizes:**

C 10.0 mm  D 15.0 mm  E 22.5 mm  F 27.5 mm

**KP/MMKP 376**

**Page 323**



| | |
|---|---|
| metallized polypropylene | Dielectric |
| potted with epoxy resin | Encapsulation |
| IEC 384-17 | Qualified to |
| –55 to 100 °C | Temp. range |
| loose; taped | Packaging |
| ±5%; ±3.5% | Tolerance |

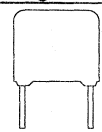
| $U_{Rdc}$ (V) | | | | | Capacitance (µF) (*) |
|---|---|---|---|---|---|
| 250 | 630 | 1000 | 1600 | 2000 | |
| | | | | | 0.00010 |
| | | | | | 0.00015 |
| | | | | | 0.00022 |
| | | | | | 0.00033 |
| | | | | | 0.00047 |
| | | | | | 0.00068 |
| | | | | D | 0.0010 |
| | | | | | 0.0015 |
| | | | D | | 0.0022 |
| | | | | E | 0.0033 |
| | | D | | | 0.0047 |
| | D | | E | | 0.0068 |
| | | | | | 0.01 |
| | | | | F | 0.015 |
| | | E | F | | 0.022 |
| | E | | | | 0.033 |
| | | | | | 0.047 |
| | F | | | | 0.068 |
| | | F | | | 0.10 |
| | | | | | 0.15 |
| | | | | | 0.22 |
| F | | | | | 0.33 |
| | | | | | 0.47 |
| | | | | | 0.68 |

* Intermediate values of E24 series are also available.

**Pitch sizes:**

D 15.0 mm E 22.5 mm F 27.5 mm

# AC & pulse — Selection guide

| | MKP 378 AND MKP/MKP 378<br>Page 345 |
|---|---|
| |  |
| Dielectric | metallized polypropylene |
| Encapsulation | potted with epoxy resin |
| Qualified to | IEC 384-17 |
| Temp. range | –55 to 85 °C |
| Packaging | loose; taped |
| Tolerance | ±5% |

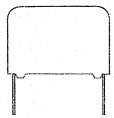
| Capacitance (µF) (**) | $U_{Rdc}$ (V) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 250 | 400 | 630 | 1000 | 1600 | 2000 | 2500 | 3000 | 4000 | 5000 |
| 0.001 | | | | | | | | | F* | F* |
| 0.0015 | | | | | | | | | | |
| 0.0022 | | | | | | | E* | E* | | |
| 0.0033 | | | | D | | E | | | | |
| 0.0047 | | | | | | | | | | |
| 0.0068 | | | | | E | | | F* | | |
| 0.01 | | | | | | | F* | | | |
| 0.015 | | | D | E | | F | | | | |
| 0.022 | | | | | F | | | | | |
| 0.033 | | | | | | | | | | |
| 0.047 | | | | | | | | | | |
| 0.068 | | | E | F | | | | | | |
| 0.1 | | | | | | | | | | |
| 0.15 | | | | | | | | | | |
| 0.22 | | E | F | | | | | | | |
| 0.33 | E | | | | | | | | | |
| 0.47 | | | | | | | | | | |
| 0.68 | | F | | | | | | | | |
| 1.0 | F | | | | | | | | | |
| 1.5 | | | | | | | | | | |
| 2.2 | | | | | | | | | | |
| 3.3 | | | | | | | | | | |
| 4.7 | | | | | | | | | | |
| 6.8 | | | | | | | | | | |

* In development.
** Intermediate values of E24 series are also available.

**Pitch sizes:**

C 10.0 mm  D 15.0 mm  E 22.5 mm  F 27.5 mm

# AC & pulse — Selection guide

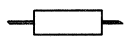
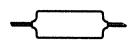
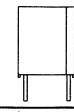
| MKP 379 Page 377 | MKP 380 Page 377 | |
|---|---|---|
|  |   | |
| metallized polypropylene | metallized polypropylene | Dielectric |
| potted with epoxy resin | potted with epoxy resin | Encapsulation |
| IEC 384-17 | IEC 384-17 | Qualified to |
| –55 to 85 °C | –55 to 85 °C | Temp. range |
| loose; taped | loose; taped | Packaging |
| ±5% | ±5%, ±10% | Tolerance |

| $U_{Rdc}$ (V) | | | | $U_{Rdc}$ (V) | | | | Capacitance (µF) (**) |
|---|---|---|---|---|---|---|---|---|
| 160 | 250 | 400 | 630 | 160 | 250 | 400 | 630 | |
| | | | | | | | | 0.001 |
| | | | | | | | A* | 0.0015 |
| | | | | | | | | 0.0022 |
| | | | | | | A* | | 0.0033 |
| | | | | | | | | 0.0047 |
| | | | B* | | A* | | | 0.0068 |
| | | B* | C | A* | | | | 0.01 |
| | B* | C | | | | | | 0.015 |
| B* | C | D | D | | | | | 0.022 |
| C | D | | | | | | | 0.033 |
| D | | E | E | | | | | 0.047 |
| | E | | F | | | | | 0.068 |
| E | F | F | | | | | | 0.1 |
| F | | | | | | | | 0.15 |
| | | | | | | | | 0.22 |
| | | | | | | | | 0.33 |
| | | | | | | | | 0.47 |
| | | | | | | | | 0.68 |
| | | | | | | | | 1.0 |
| | | | | | | | | 1.5 |
| | | | | | | | | 2.2 |
| | | | | | | | | 3.3 |
| | | | | | | | | 4.7 |
| | | | | | | | | 6.8 |

* In development.
** Intermediate values of E24 series are also available.

**Pitch sizes:**

A 5.0 mm  B 7.5 mm  C 10.0 mm  D 15.0 mm  E 22.5 mm  F 27.5 mm

| | KS 424/431<br>Page 423 | KP 460/464<br>Page 443 | KS 443<br>Page 463 |
|---|---|---|---|
| |  |  |  |
| Dielectric | polystyrene | polypropylene | polystyrene |
| Encapsulation | naked or epoxy lacquered | epoxy lacquered | potted with epoxy resin |
| Qualified to | IEC 384-7 | IEC 384-13 | IEC 384-7 |
| Temp. range | −40 to 85 °C | −40 to 100 °C | −55 to 70 °C<br>−55 to 85 °C |
| Packaging | loose; taped | loose; taped | loose |
| Tolerance | ±5%; ±2%; ±1% | ±5%; ±2%; ±1% | ±1% |

| Capacitance (pF) | $U_{Rdc}$ (V) | | | | $U_{Rdc}$ (V) | | | | | $U_{Rdc}$ (V) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 63 | 160 | 250 | 630 | 63 | 160 | 250 | 400 | 630 | 63 |
| 47 | | | | G | | | | | H | |
| 68 | | | | | | | | | | |
| 100 | | | | | | | | | | J |
| 150 | | | | | | | | G | | |
| 220 | | | | G | | | | | | |
| 330 | | | | | | | | | | |
| 470 | | | | | | | | | | |
| 680 | | | G | | | | | | | |
| 1000 | | | | | | | | | | K |
| 1500 | | G | | H | | | G | | | |
| 2200 | G | | | | | G | | | | |
| 3300 | | | H | | G | | | | | |
| 4700 | | H | | | | H | H | | | |
| 6800 | | | | | G | | | | | |
| 10 000 | H | | | | | | | | | |
| 15 000 | | | | | H | H | | | | |
| 22 000 | | | | | | | | | | M |
| 33 000 | | | | | | | | | | |
| 47 000 | | | | | | | | | | |
| 68 000 | | | | | | | | | | |
| 100 000 | | | | | | | | | | |
| 150 000 | | | | | | | | | | |
| 162 000 | | | | | | | | | | L |

1) Intermediate values of E24-series (with ±5%, ±2% or ±1% tolerance), E48-series (with ±2% or ±1% tolerance) and E96-series (with ±1% tolerance) are also available.

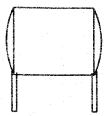
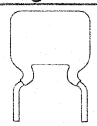
**Code for body length KS 424/431; KP 460/464**

| | | | |
|---|---|---|---|
| G | 11.0 mm | H | 15.0 mm |

**Code for box dimensions KS 443**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| J | 5.0 x 7.5 mm | K | 7.5 x 7.5 mm | L | 6.25 x 6.25 mm | M | 10.0 x 10.0 mm |

# Fluorescent lamp starter capacitor — Selection guide

| KT 311 90028/29<br>KP 311 90034/35 | KT 311 90032/33<br>KT 311 90036 | |
|---|---|---|
| Page 481 | Page 487 | |
|  |  | |
| polyester | polyester | Dielectric |
| | epoxy lacquered | Encapsulation |
| IEC 384-11 | IEC 384-11 | Qualified to |
| −40 to 100 °C | −40 to 125 °C | Temp. range |
| loose; taped | loose | Packaging |
| | ±20% | Tolerance |
| $U_{RAC}$ (V)<br>250 | $U_{RAC}$ (V)<br>250 | Capacitance (μF)<br>(*) |
| | | 0.0012 |
| | | 0.0030 |
| | | 0.0056 |

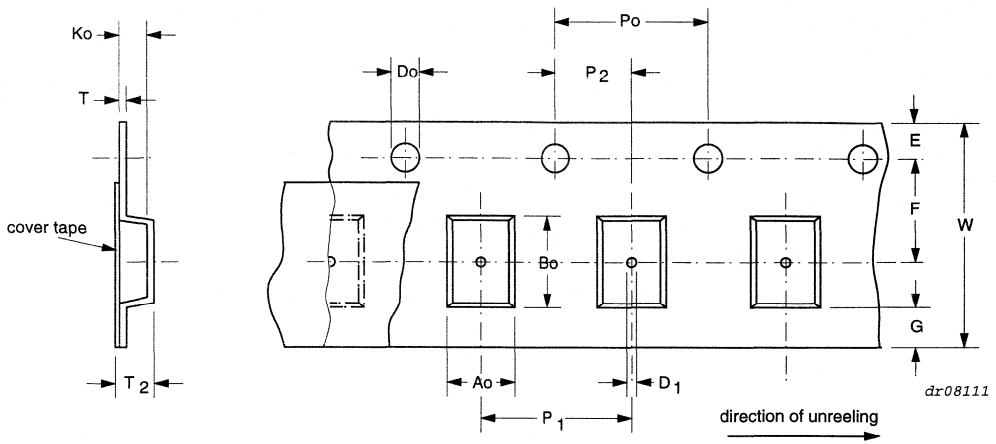
* Intermediate values of E 12 series are also available.

# PACKAGING

# Taping specification for film Chip capacitors

## FILM CHIP CAPACITORS

### 390....394 styles

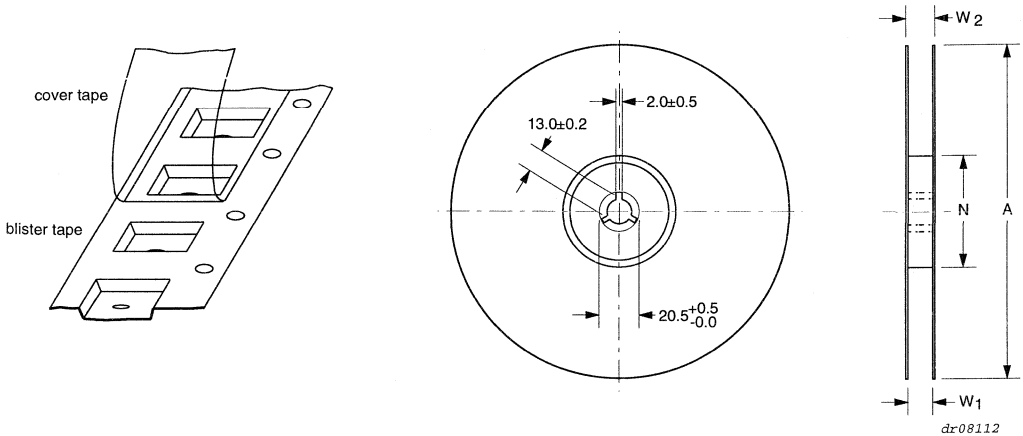



| CASE SIZE | W ±0.3 (mm) | $A_o$ ±0.1 (mm) | $B_o$ ±0.1 (mm) | $K_o$ max. (mm) | F ±0.05 (mm) | $P_1$ ±0.1 (mm) | $D_1$ min. (mm) | $T_2$ max. (mm) |
|---|---|---|---|---|---|---|---|---|
| 1206 | 8.0 | 2.0 | 3.6 | 1.4 | 3.5 | 4.0 | 1.0 | 2.5 |
| 1210 | 8.0 | 2.9 | 3.6 | 2.2 | 3.5 | 4.0 | 1.0 | 3.0 |
| 1812 | 12.0 | 3.6 | 4.9 | 2.7 | 5.5 | 8.0 | 1.5 | 3.5 |
| 2220 * | 12.0 | 5.5 | 6.1 | 2.3 | 5.5 | 8.0 | 1.5 | 3.1 |
| 2220 ** | 12.0 | 5.5 | 6.1 | 4.2 | 5.5 | 8.0 | 1.5 | 5.0 |
| 2824 *** | 16.0 | 6.6 | 7.6 | 2.6 | 7.5 | 8.0 | 1.5 | 3.6 |
| 2824 **** | 16.0 | 6.6 | 7.6 | 5.0 | 7.5 | 8.0 | 1.5 | 6.0 |

* for 2222 393 ..... capacitors ≤100 nF
** for 2222 393 ..... capacitors >100 nF
*** for 2222 394 ..... capacitors ≤220 nF
**** for 2222 394 ..... capacitors >220 nF

| | |
|---|---|
| Feed hole diameter | $D_o$ = 1.5 ±0.1 mm |
| Feed hole position | E = 1.75 ±0.1 mm |
| Margin to component window | G = 0.75 mm minimum |
| Feed hole spacing | $P_o$ = 4.0 ±0.1 mm |
| Feed hole centre to component centre | $P_2$ = 2.00 ±0.05 mm |
| Tape thickness | T = 0.6 mm maximum |

# Taping specification for film Chip capacitors




Breaking force of cover tape in direction of unreeling ≥10N.

Peel-off force of cover tape shall be between 0.2 and 1.0 N.
Speed 300 mm/min; angle between cover tape during peel-off and direction of unreeling from 165° to 180°.

At least 40 positions at the beginning and at the end of the tape are not used. The tape has a 400 mm leader (in accordance with IEC 286-3).

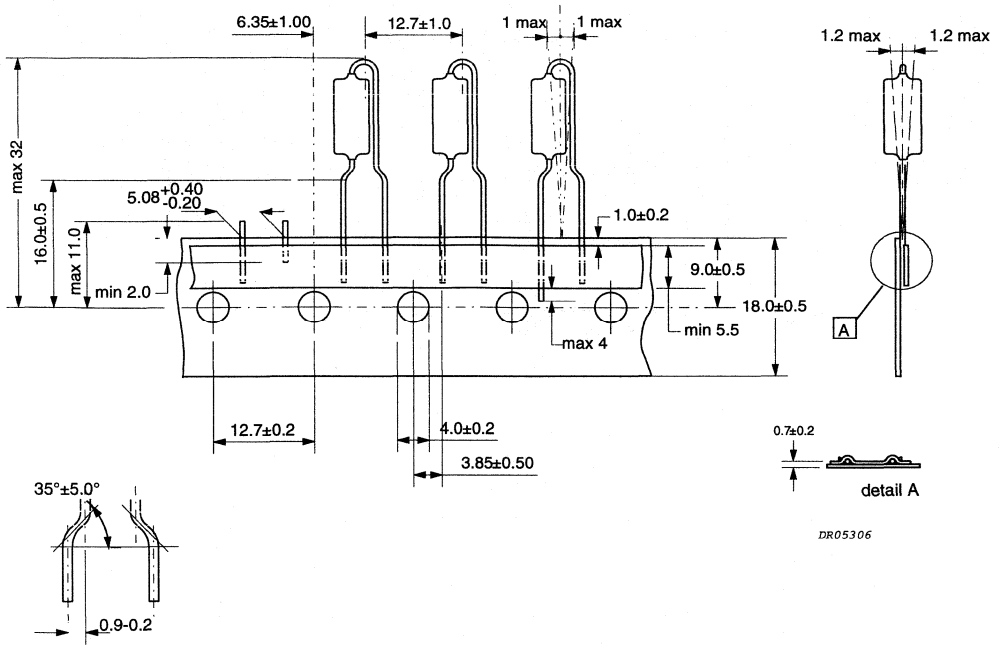
**Reel dimensions**

| TAPE WIDTH (W) (mm) | $W_1$ (mm) | $W_2$ max. (mm) | A (mm) | N (mm) |
|---|---|---|---|---|
| 8 | 8.4 +0/+1.5 | 14.4 | 180 −2/+0 | 62 ±1.5 |
| 12 | 12.4 +0/+2.0 | 18.4 | 330 −2/+0 | 62 ±1.5 |
| 16 | 16.4 +0/+2.0 | 22.4 | 330 −2/+0 | 62 ±2.0 |

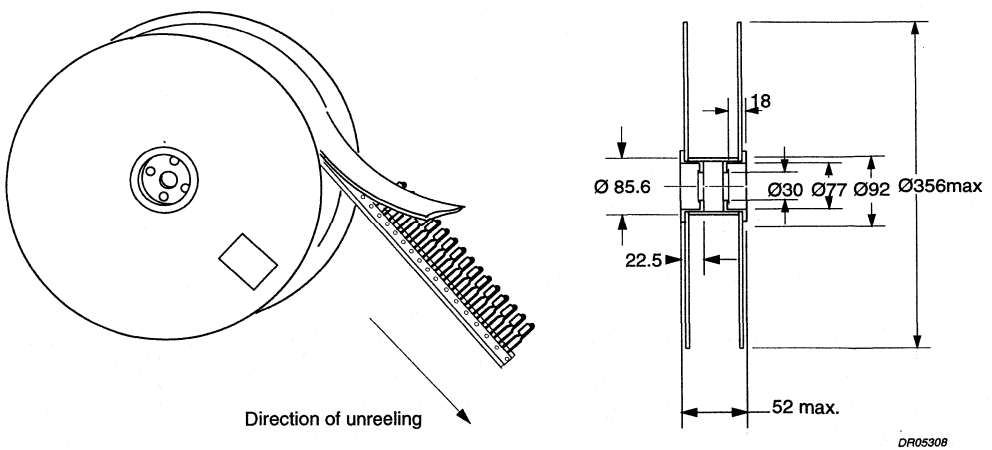
# Taping specification for Axial film capacitors

**AXIAL UNIDIRECTIONAL FILM CAPACITORS (dimensions in mm)**

## 460 ... 464 styles




* Cumulative pitch error: 1.0 mm per 20 spacings
0.5 mm per 4 spacings.

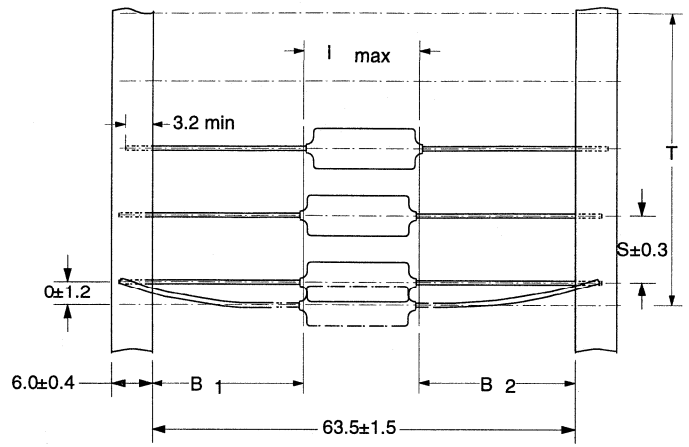


# Taping specification for Axial film capacitors

**AXIAL FILM CAPACITORS (dimensions in mm)**

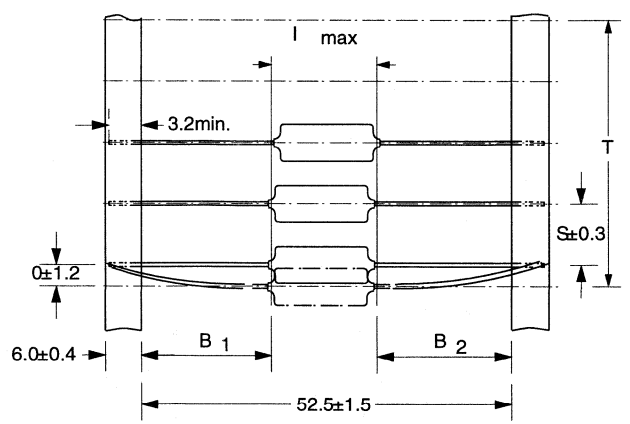
## 424...431, 460...464 styles

**Tape distance: 63.5 ±1.5 mm**




|B1 - B2| = max. 1.4 mm

**Tape distance: 52.5 ±1.5 mm**




|B1 - B2| = max. 1.4 mm

DR932600

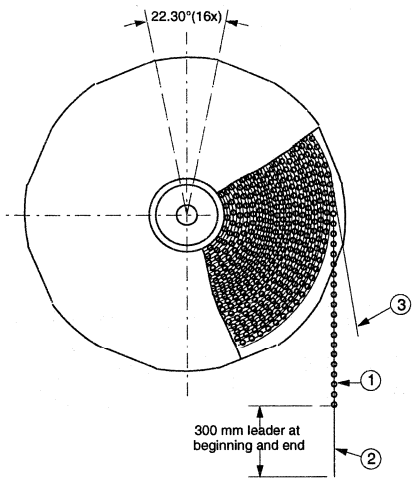
| $d_{max}$ (mm) | S (mm) | T for number (n) of capacitors | |
|---|---|---|---|
| | | n < 50 | 50 ≤ n < 100 |
| ≤4.5 | 5 | 5(n-1) ±2 | 5(n-1) ±4 |
| >4.5 | 10 | 10(n-1) ±2 | 10(n-1) ±4 |

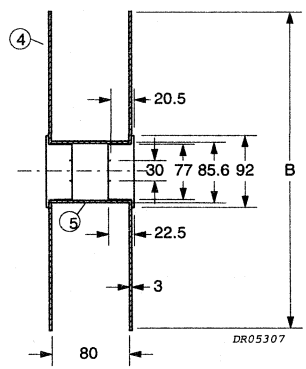
# Taping specification for Axial film capacitors

## CHARACTERISTICS OF TAPE

| AXIAL LEADS | | RADIAL LEADS | |
|---|---|---|---|
| Pull-out force of the component | ≥2 N | Pull-out force of the component | ≥ 5 N |
| Peel-off force of adhesive tape | ≥6 N | Peel-off force of adhesive tape | ≥ 6 N |
| Tearing force of tape | ≥10 N | Tearing force of tape | ≥15 N |
| **Storage conditions** | | | |
| Storage temperature range | −25 °C to +40 °C | | |
| Relative humidity | maximum 80% without condensation | | |

### Outlines of packing for axial products (dimensions in mm)



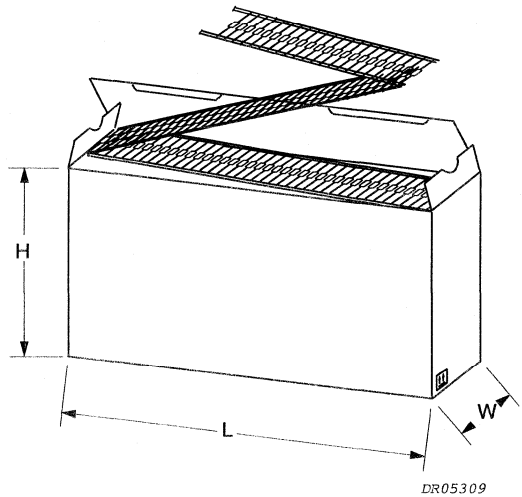




1: capacitor
2: bandolier
3: paper
4: flange
5: cylinder

| REEL DIAMETER B AS A FUNCTION OF MAXIMUM PRODUCT BODY THICKNESS $d_{max}$ | |
|---|---|
| $d_{max}$ (mm) | B (mm) |
| ≤5.0 | 305 |
| >5.0 | 356 |

# Taping specification for Axial film capacitors

**Ammopack for styles 424/425/426/427/428/429/430/431/460/461/462/463/464**



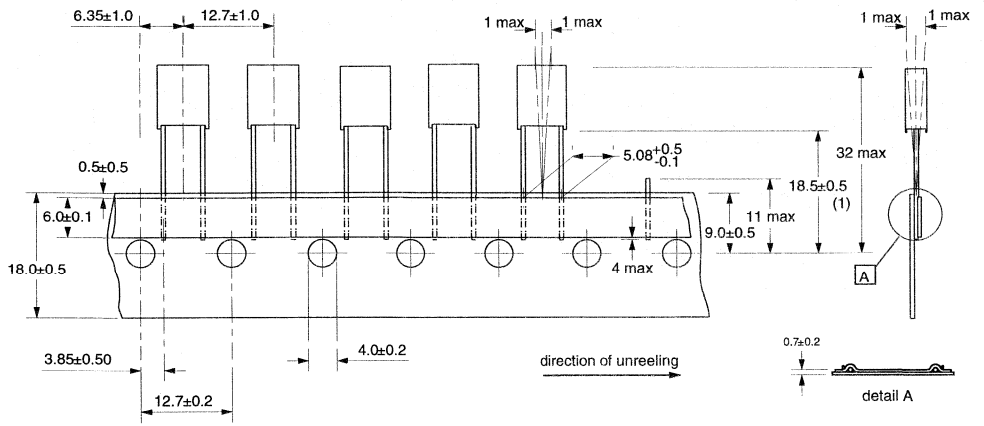

| BOX DIMENSIONS AND PACKING QUANTITIES AS A FUNCTION OF BODY THICKNESS | | |
|---|---|---|
| $d_{max}$ (mm) | SMALLEST PACKING QUANTITIES (SPQ) | EXTERNAL BOX DIMENSIONS L x W x H (mm) |
| 5.0 | 1750 | 345 x 80 x 147 |
| 5.5 | 1550 | 345 x 80 x 147 |
| 6.0 | 1300 | 345 x 80 x 147 |
| 6.5 | 1000 | 345 x 80 x 147 |
| 7.0 | 850 | 345 x 80 x 147 |
| 7.5 | 750 | 345 x 80 x 147 |
| 8.0 | 650 | 345 x 80 x 147 |

# Taping specification for Radial potted film capacitors

**RADIAL POTTED FILM CAPACITORS (dimensions in mm)**

**Capacitors with pitch = 5 mm**

## 370, 380 styles

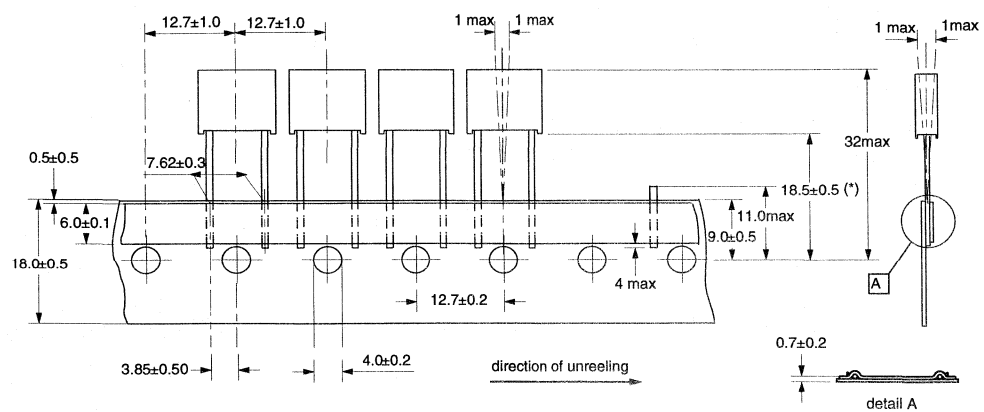



(1) $16^{+0.3}_{-0.5}$ or 18.5 ±0.5 for ammunition packing

DR01307

**Capacitors with pitch = 7.5 mm**

## 371, 379 styles



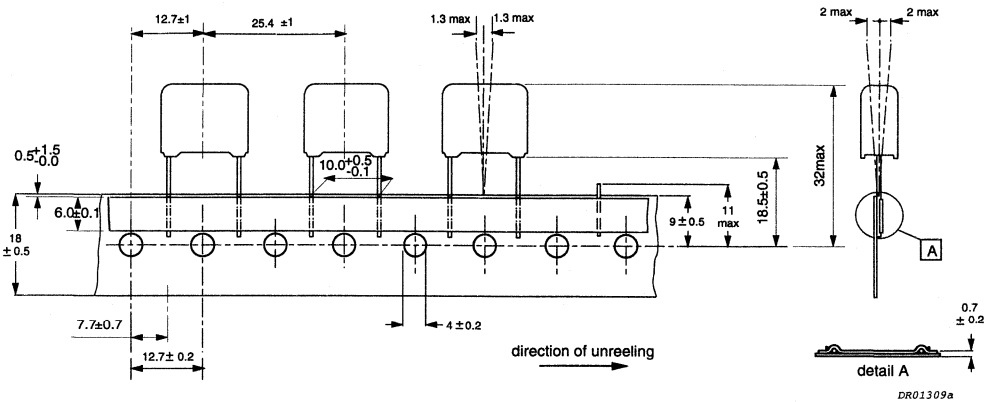

(*) also avaiable with intape height 16.5 ±0.3

DR01308

# Taping specification for Radial potted film capacitors

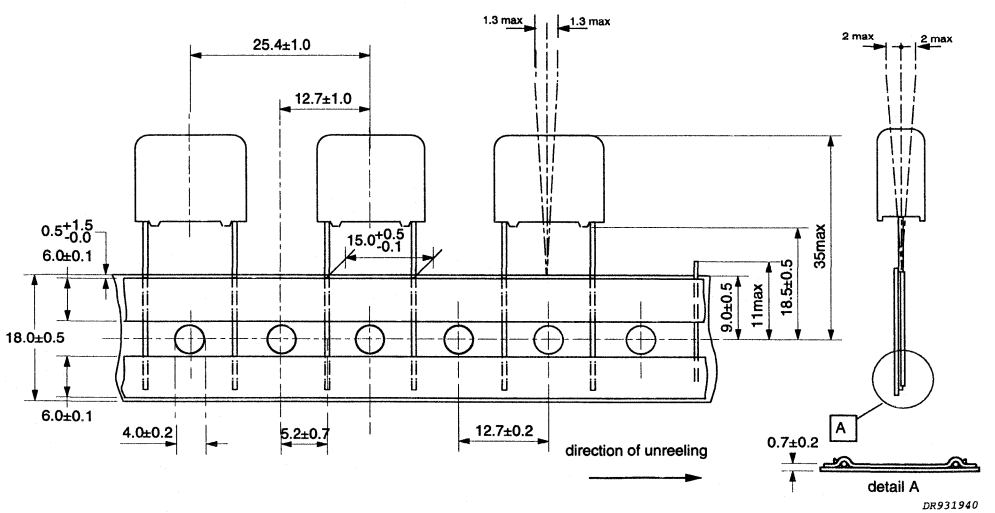
**Capacitors with pitch = 10 mm**

## 344, 336 1, 336 2, 336 6, 372, 379 styles




**Capacitors with pitch = 15 mm**

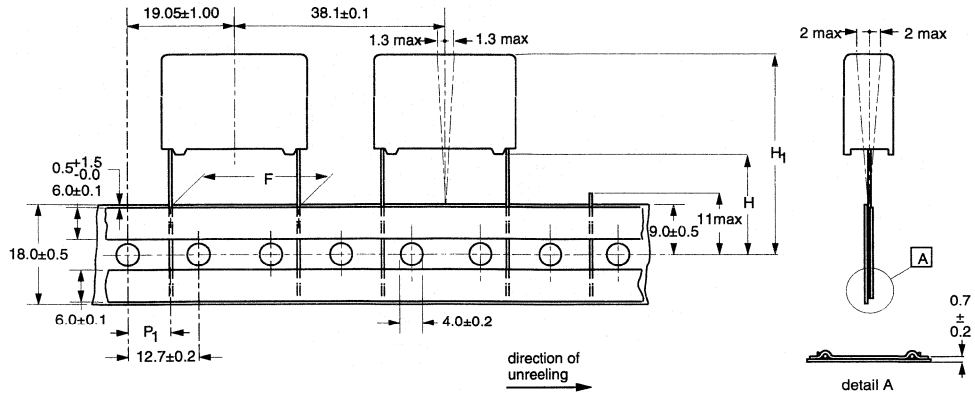
## 330 4, 331 6, 333 4, 335 1, 344, 336 1, 336 2, 336 6, 373, 376, 378, 379 styles



# Taping specification for Radial potted film capacitors

**Capacitors with pitch = 22.5 or 27.5 mm**

## 330 4, 331 6, 333 4, 335 1, 336 1, 336 2, 344, 373, 376, 378, 379 styles




| ITEM | SYMBOL | VALUE | VALUE | TOLERANCE |
|---|---|---|---|---|
| LEAD TO LEAD DISTANCE | F | 22.5 | 27.5 | +0.5/-0.1 |
| HEIGHT OF COMPONENT FROM TAPE CENTER TO SEATING PLANE | H | 18.5 | | ± 0.5 |
| COMPONENT HEIGHT FROM TAPE CENTER | $H_1$ | 40 max | 48 max | |
| FEED HOLE TO LEAD CENTER | $P_1$ | 7.8 | 5.33 | ± 0.7 |

DR931950

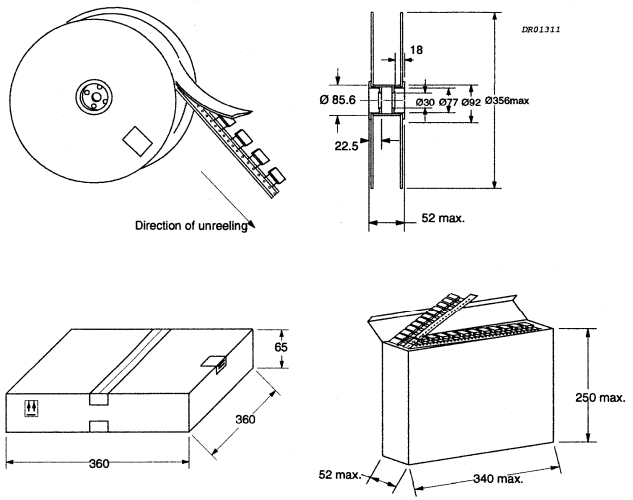
### Characteristics of tape

| | |
|---|---|
| Pull-out force of the component | ≥5 N |
| Peel-off force of the adhesive tape | ≥6 N |
| Tearing force of tape | ≥15 N |
| Storage conditions: | |
| storage temperature | –25 °C to +40 °C |
| relative humidity | maximum 80% without condensation |

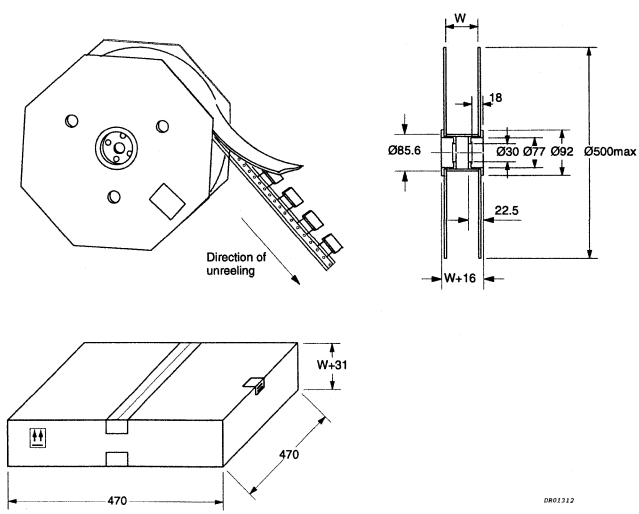
# Taping specification for Radial potted film capacitors

**Outlines of reel and ammopack (dimensions in mm)**

## 370, 371 and 380 styles




## 330 4, 331 6, 333 4, 335 1, 344, 372, 373, 376, 378, 379 styles



# Taping specification for Radial potted film capacitors

**W as a function of product dimensions ($l_{max}$ and $b_{max}$)**

| $l_{max}$ = 12.5 or 17.5 mm | | $l_{max}$ = 26 or 31 mm | |
|---|---|---|---|
| $b_{max}$ (mm) | W ±2 mm | $b_{max}$ (mm) | W ±2 mm |
| 4.0 | 40 | 6.0 | 50 |
| 5.0 | 45 | 7.0 | 50 |
| 6.0 | 45 | 8.5 | 50 |
| 7.0 | 45 | 9.0 | 50 |
| 8.5 | 45 | 10.0 | 50 |
| 10.0 | 50 | 11.0 | 55 |
| | | 13.0 | 55 |
| | | 15.0 | 60 |
| | | 18.0 | 60 |
| | | 21.0 | 65 |

Cumulative pitch error: 1.0 mm/20 pitches.
The maximum number of empty positions per reel shall not exceed 0.5% (*) of the total number of components per reel, but no more than 2 consecutive positions may be vacant provided this gap is followed by 6 consecutive components.

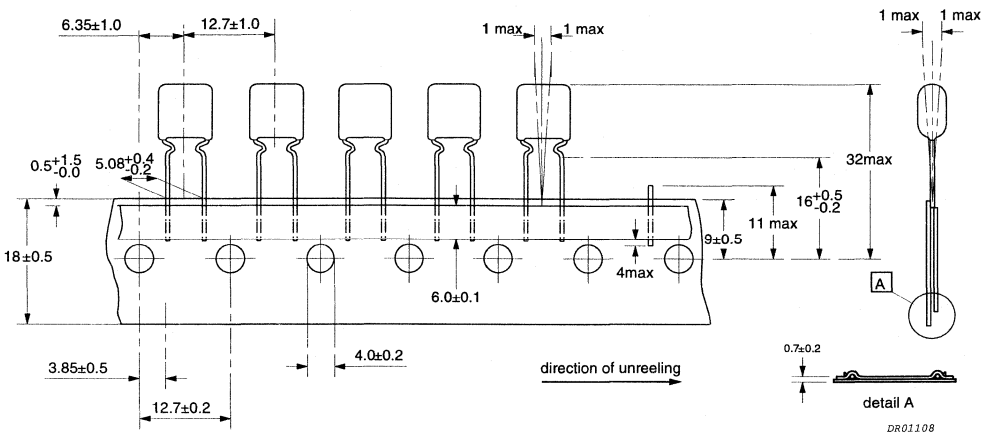
* 5% for capacitors with $b_{max}$: 4.5, 5 or 6 mm in ammopack.

# Taping specification for Radial lacquered film capacitors

## RADIAL LACQUERED FILM CAPACITORS (dimensions in mm)

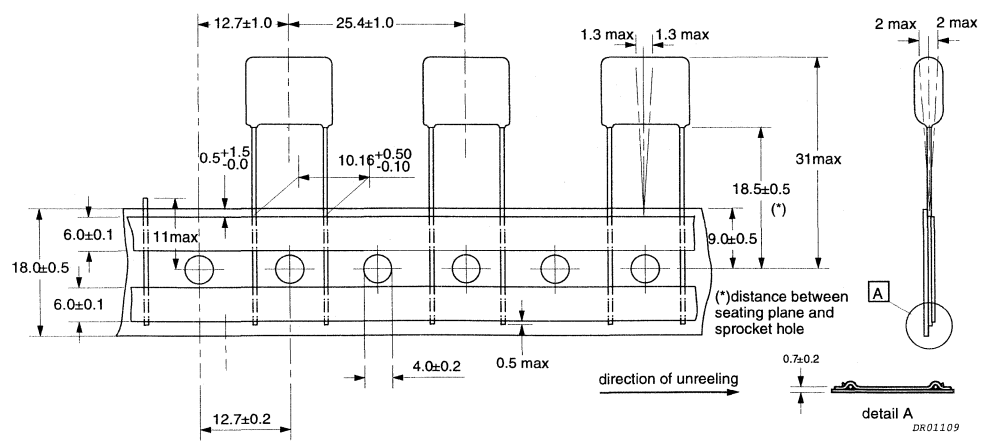
### Capacitors with pitch = 5 mm

### 365 styles




### Capacitors with pitch = 10 mm

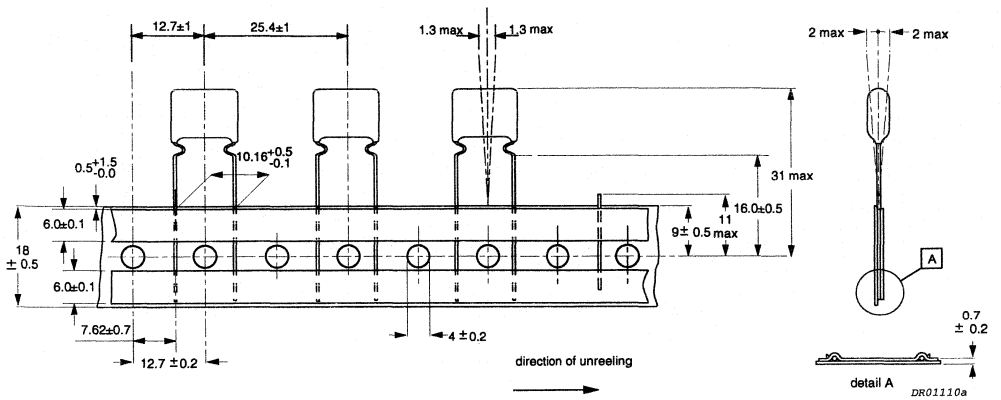
### 369 styles



# Taping specification for Radial lacquered film capacitors

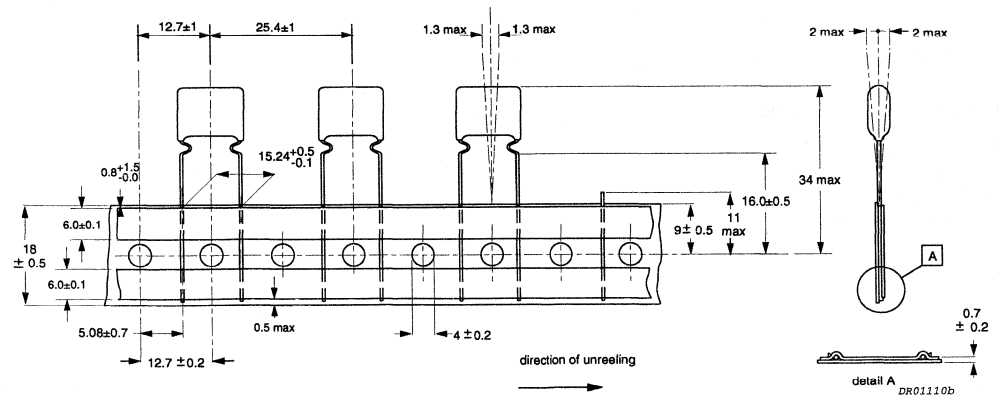
**Capacitors with pitch = 10 mm**

## 368 styles




**Capacitors with pitch = 15 mm**

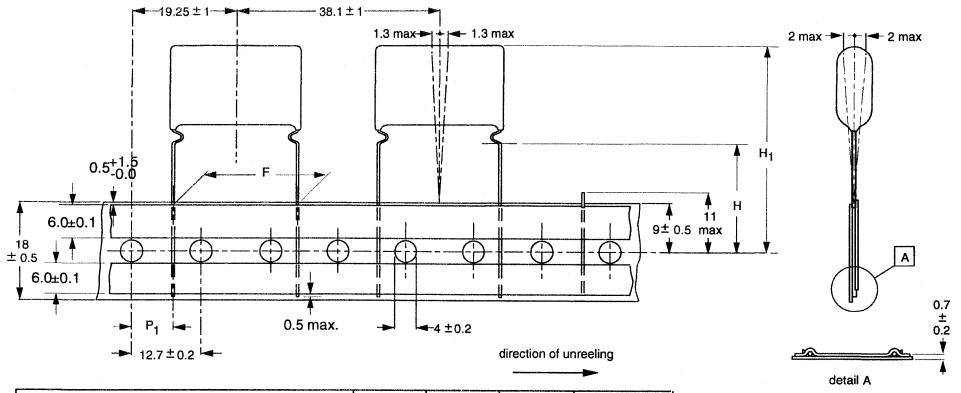
## 368 styles



# Taping specification for Radial lacquered film capacitors

**Capacitors with pitch = 22.5 and 27.5 mm**

## 368 styles




| ITEM | SYMBOL | VALUE | VALUE | TOLERANCE |
|---|---|---|---|---|
| LEAD TO LEAD DISTANCE | F | 22.86 | 27.94 | +0.5/-0.1 |
| HEIGHT OF COMPONENT FROM TAPE CENTER TO SEATING PLANE | H | 16.0 | | ± 0.5 |
| COMPONENT HEIGHT FROM TAPE CENTER | $H_1$ | 38.0 max | 41.0 max | |
| FEED HOLE TO LEAD CENTER | $P_1$ | 7.8 | 5.3 | ± 0.7 |

DR01111

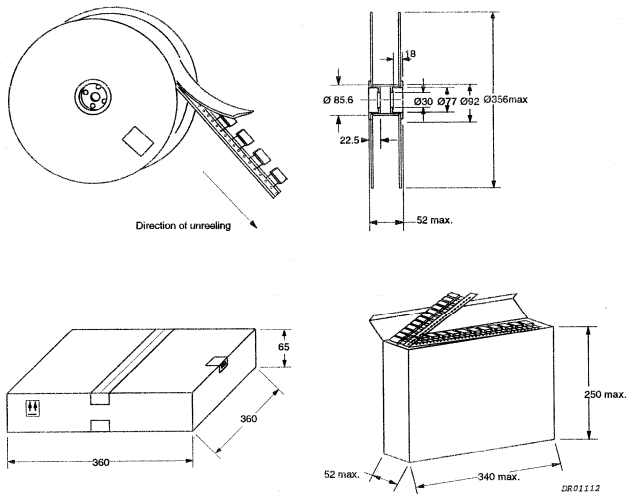
### Characteristics of tape

| | |
|---|---|
| Pull-out force of the component | ≥5 N |
| Peel-off force of the adhesive tape | ≥6 N |
| Tearing force of tape | ≥15 N |
| Storage conditions: | |
| storage temperature | −25 °C to +40 °C |
| relative humidity | maximum 80% without condensation |

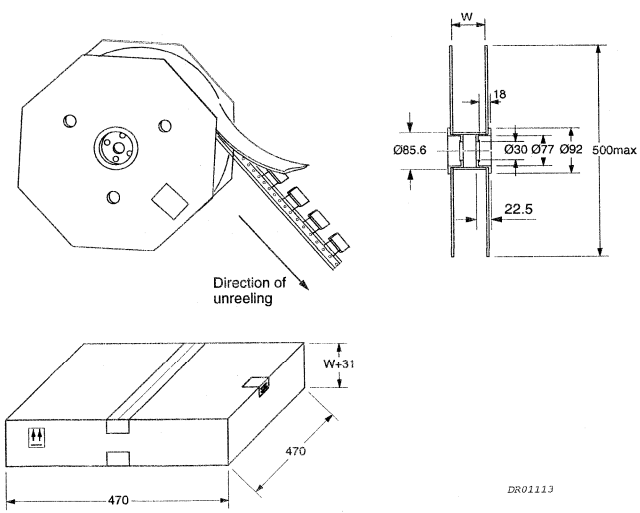
# Taping specification for Radial lacquered film capacitors

**Outlines of reel and ammopack (dimensions in mm)**

## 365 styles




## 368, 369 styles



# Taping specification for Radial lacquered film capacitors

**W as a function of product dimensions ($l_{max}$ and $b_{max}$)**

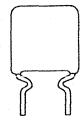
| $l_{max}$ = 12.5 mm | | | $l_{max}$ = 17.5 mm | | $l_{max}$ = 26 or 30 mm | |
|---|---|---|---|---|---|---|
| | W ±2 mm | | | | | |
| $b_{max}$ (mm) | 2222 368 | 2222 369 | $b_{max}$ (mm) | W ±2 mm | $b_{max}$ (mm) | W ±2 mm |
| 4.0 | 40 | 40 | – | – | 5.0 | 45 |
| 4.5 | 40 | 40 | – | – | 5.5 | 45 |
| 5.0 | 40 | 45 | 5.0 | 45 | 6.0 | 50 |
| 5.5 | 40 | 45 | 5.5 | 45 | 6.5 | 50 |
| 6.0 | 45 | 45 | 6.0 | 45 | 7.0 | 50 |
| 6.5 | 45 | 45 | 6.5 | 45 | 7.5 and 8.0 | 50 |
| – | – | – | 7.0 | 45 | 8.5 and 9.0 | 50 |
| – | – | – | 7.5 | 45 | 9.5 and 10.0 | 50 |
| – | – | – | 8.0 | 45 | 10.5 | 50 |
| – | – | – | – | – | 11.0 and 12.0 | 55 |

Cumulative pitch error: 1.0 mm/20 pitches.
The maximum number of empty positions per reel shall not exceed 0.5% of the total number of components per reel, but no more than 2 consecutive positions may be vacant.

# GENERAL PURPOSE

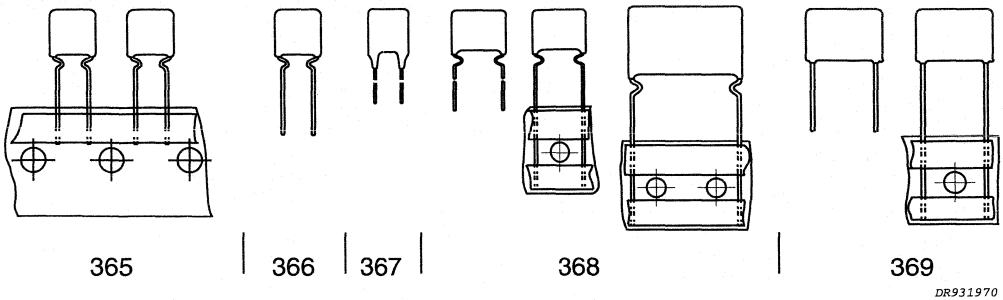
# Metallized polyester film capacitors

# MKT 365/366/367/368/369



**MKT RADIAL EPOXY LACQUERED CAPACITORS**

**Pitch 5/7.5/10/15/22.5/27.5**



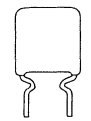

## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12 series) | 0.001 to 6.8 µF |
| Capacitance tolerance | ±20%; ±10%; ±5% |
| Rated voltage (DC) | 63 V, 100 V, 250 V, 400 V, 630 V |
| Climatic category | 55/100/56 |
| Rated temperature | 85 °C |
| Maximum application temperature | 100 °C |
| Tangent of loss angle at 10 kHz | 100 x $10^{-4}$ |
| Reference specification | IEC 384-2 |
| Performance grade | grade 1 (long life) |

| FEATURES | APPLICATIONS |
|---|---|
| • Low-inductive wound cell of metallized (PETP) film<br>• Cell protected by epoxy lacquer<br>• Radial leads of solder-coated wire<br>• Resistant to solvents and rinsing liquids. | • Blocking and coupling<br>• Bypass and energy reservoir. |

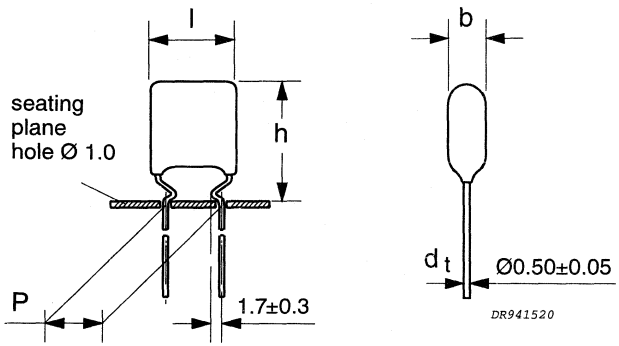
# Metallized polyester film capacitors

# MKT 365



Pitch 5 mm

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope (dU/dt)R at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

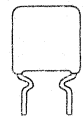
## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 75...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 76...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±20% | catalogue number **2222 365 74...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±20% | catalogue number **2222 365 70...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 71...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 72...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 365



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 40 V

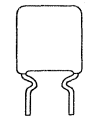
## taped versions

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 365 ..... ammopack; H = 16 mm C-tol ±10% last 5 digits of catalogue number | ammopack; H = 16 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm | | | | d, = 0.50 ±0.05 mm | | |
| 0.047 | 3.5 x 12.5 x 7.3 | 0.3 | 75473 | 76473 | 1500 | 1500 |
| 0.056 | | | 75563 | 76563 | | |
| 0.068 | 3.7 x 12.5 x 7.3 | 0.3 | 75683 | 76683 | 1500 | 1500 |
| 0.082 | | | 75823 | 76823 | | |
| 0.1 | | | 75104 | 76104 | | |
| 0.12 | | | 75124 | 76124 | | |
| 0.15 | 3.7 x 13.0 x 7.3 | 0.3 | 75154 | 76154 | 1500 | 1500 |
| 0.18 | 3.7 x 13.5 x 7.3 | 0.4 | 75184 | 76184 | 1000 | 1000 |
| 0.22 | 4.2 x 13.5 x 7.3 | 0.4 | 75224 | 76224 | 1000 | 1000 |
| 0.27 | 4.5 x 14.0 x 7.3 | 0.4 | 75274 | 76274 | 1000 | 1000 |
| 0.33 | 4.5 x 14.5 x 7.3 | 0.4 | 75334 | 76334 | 1000 | 1000 |
| 0.39 | | | 75394 | 76394 | | |
| 0.47 | 4.5 x 15.5 x 7.3 | 0.4 | 75474 | 76474 | 1000 | 1000 |
| 0.56 | 5.0 x 14.0 x 7.3 | 0.4 | 75564 | 76564 | 1000 | 1000 |
| 0.68 | 5.0 x 14.5 x 7.3 | 0.4 | 75684 | 76684 | 1000 | 1000 |
| 0.82 | 5.5 x 15.0 x 7.3 | 0.5 | 75824 | 76824 | 1000 | 1000 |
| 1 | 5.5 x 15.5 x 7.3 | 0.5 | 75105 | 76105 | 1000 | 1000 |

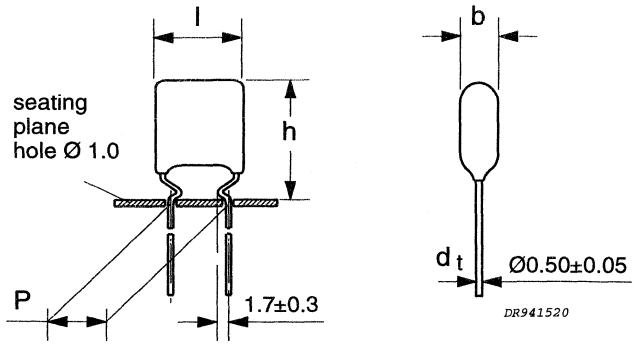
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 365



**Pitch 5 mm**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope (dU/dt)R at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

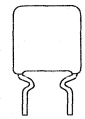
## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 85...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 86...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±20% | catalogue number **2222 365 84...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±20% | catalogue number **2222 365 80...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 81...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 82...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 365



## $U_{Rdc}$ = 100 V $U_{Rac}$ = 63 V taped versions

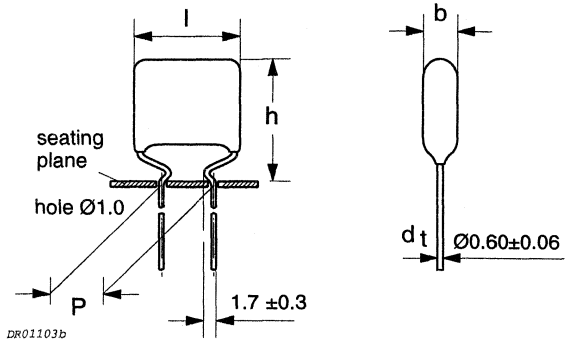
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 365 ..... ammopack; H = 16 mm C-tol ±10% last 5 digits of catalogue number | ammopack; H = 16 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm $d_t$ = 0.50 ±0.05 mm | | | | | | |
| 0.01 | 3.5 x 12.5 x 7.3 | 0.3 | 85103 | 86103 | 1500 | 1500 |
| 0.012 | | | 85123 | 86123 | | |
| 0.015 | | | 85153 | 86153 | | |
| 0.018 | | | 85183 | 86183 | | |
| 0.022 | | | 85223 | 86223 | | |
| 0.027 | | | 85273 | 86273 | | |
| 0.033 | | | 85333 | 86333 | | |
| 0.039 | | | 85393 | 86393 | | |
| 0.047 | | | 85473 | 86473 | | |
| 0.056 | | | 85563 | 86563 | | |
| 0.068 | 3.7 x 12.5 x 7.3 | 0.3 | 85683 | 86683 | 1500 | 1500 |
| 0.082 | 3.7 x 13.0 x 7.3 | 0.3 | 85823 | 86823 | 1000 | 1000 |
| 0.1 | 3.7 x 13.5 x 7.3 | 0.4 | 85104 | 86104 | 1000 | 1000 |

Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 365

**Pitch 5 mm (bent back leads)**




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| $C \leq 0.1\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 225 \times 10^{-4}$ |
| $0.1\ \mu F < C \leq 0.47\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 300 \times 10^{-4}$ |
| $0.47\ \mu F < C \leq 1.0\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 18 V/µs | | |
| R between leads, for $C \leq 0.33\ \mu F$ | >15 000 MΩ | | |
| RC between leads, for $C > 0.33\ \mu F$ | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

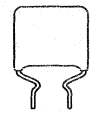
## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 15...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 16...** | preferred |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 11...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 12...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 365



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 40 V

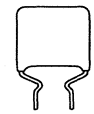
**taped versions**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 365 ..... ammopack; H = 16 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | | | |
| 0.12 | 4.0 x 13.5 x 10.0 | 0.4 | 15124 | 16124 | 1500 | 1500 |
| 0.15 | | | 15154 | 16154 | | |
| 0.18 | | | 15184 | 16184 | | |
| 0.22 | | | 15224 | 16224 | | |
| 0.27 | 4.5 x 14.0 x 10.0 | 0.5 | 15274 | 16274 | 1000 | 1000 |
| 0.33 | 5.0 x 14.5 x 10.0 | 0.6 | 15334 | 16334 | 1000 | 1000 |
| 0.39 | | | 15394 | 16394 | | |
| 0.47 | 5.5 x 15.0 x 10.0 | 0.7 | 15474 | 16474 | 1000 | 1000 |
| 0.56 | | | 15564 | 16564 | | |
| 0.68 | | | 15684 | 16684 | | |
| 0.82 | | | 15824 | 16824 | | |
| 1 | | | 15105 | 16105 | | |

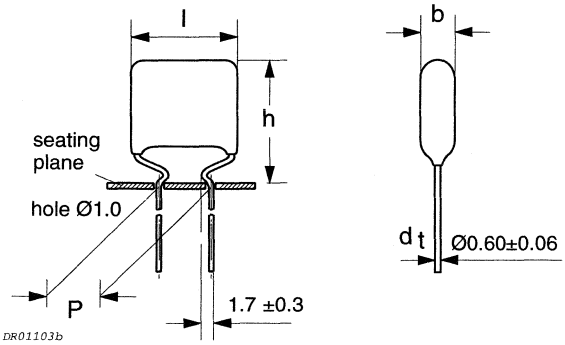
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 365



**Pitch 5 mm (bent back leads)**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| $C \leq 0.1\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 225 \times 10^{-4}$ |
| $0.1\ \mu F < C \leq 0.47\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 300 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 36 V/µs | | |
| R between leads, for $C \leq 0.33\ \mu F$ | >15 000 MΩ | | |
| RC between leads, for $C > 0.33\ \mu F$ | >5 000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 25...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 26...** | preferred |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 21...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 22...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 365

## $U_{Rdc}$ = 100 V $U_{Rac}$ = 63 V taped versions

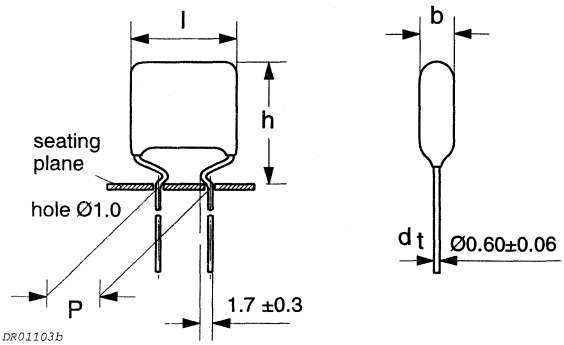
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 365 ..... ammopack; H = 16 mm C-tol ±10% last 5 digits of catalogue number | ammopack; H = 16 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm | | | | $d_1$ = 0.60 ±0.06 mm | | |
| 0.039 | 4.0 x 13.5 x 10.0 | 0.4 | 25393 | 26393 | 1500 | 1500 |
| 0.047 | | | 25473 | 26473 | | |
| 0.056 | | | 25563 | 26563 | | |
| 0.068 | | | 25683 | 26683 | | |
| 0.082 | | | 25823 | 26823 | | |
| 0.1 | | | 25104 | 26104 | | |
| 0.12 | 4.5 x 14.0 x 10.5 | 0.5 | 25124 | 26124 | 1000 | 1000 |
| 0.15 | 5.0 x 14.5 x 10.5 | 0.6 | 25154 | 26154 | 1000 | 1000 |
| 0.18 | | | 25184 | 25184 | | |
| 0.22 | 5.5 x 15.0 x 10.5 | 0.7 | 25224 | 26224 | 1000 | 1000 |
| 0.27 | 6.0 x 15.5 x 10.5 | 0.7 | 25274 | 26274 | 1000 | 1000 |
| 0.33 | | | 25334 | 26334 | | |
| 0.39 | | | 25394 | 26394 | | |
| 0.47 | | | 25474 | 26474 | | |

Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 365

**Pitch 5 mm (bent back leads)**




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 70 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 45...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 46...** | preferred |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 41...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 42...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 365

## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V

## taped versions

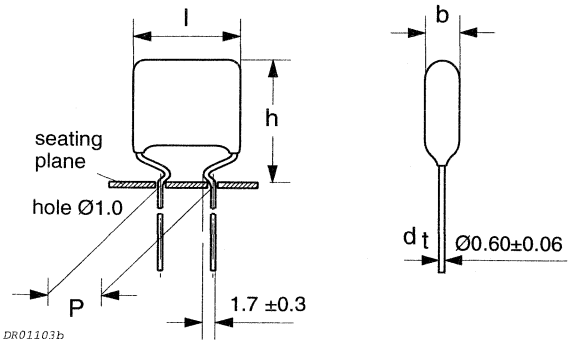
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 365 ..... ammopack; H = 16 mm C-tol ±10% last 5 digits of catalogue number | ammopack; H = 16 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm | | | | $d_1$ = 0.60 ±0.06 mm | | |
| 0.018 | 4.0 x 13.5 x 10.0 | 0.4 | 45183 | 46183 | 1500 | 1500 |
| 0.022 | | | 45223 | 46223 | | |
| 0.027 | | | 45273 | 46273 | | |
| 0.033 | | | 45333 | 46333 | | |
| 0.039 | | | 45393 | 46393 | | |
| 0.047 | | | 45473 | 46473 | | |

Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 365

**Pitch 5 mm (bent back leads)**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| | | | |
|---|---|---|---|
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
| $C \leq 0.1\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 225 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for $C \leq 0.33\ \mu F$ | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 55...** | preferred |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 56...** | preferred |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 365 51...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 365 52...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 365

## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 220 V

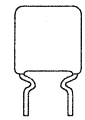
## taped versions

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 365 ..... ammopack; H = 16 mm C-tol ±10% last 5 digits of catalogue number | ammopack; H = 16 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | | | |
| 0.0033 | 4.0 x 13.5 x 10.0 | 0.4 | 55332 | 56332 | 1500 | 1500 |
| 0.0039 | | | 55392 | 56392 | | |
| 0.0047 | | | 55472 | 56472 | | |
| 0.0056 | | | 55562 | 56562 | | |
| 0.0068 | | | 55682 | 56682 | | |
| 0.0082 | | | 55822 | 56822 | | |
| 0.01 | | | 55103 | 56103 | | |
| 0.012 | | | 55123 | 56123 | | |
| 0.015 | | | 55153 | 56153 | | |

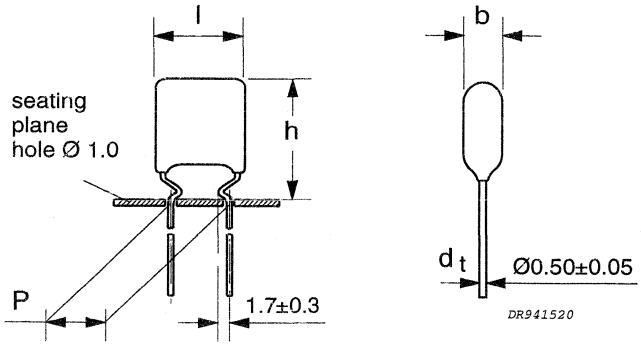
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 366



**Pitch 5**




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

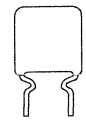
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5 000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 366 74...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 366 75...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 366 76...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±20% | catalogue number **2222 366 70...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 71...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 72...** | on request |

# Metallized polyester film capacitors

# MKT 366



## $U_{Rdc}$ = 63 V

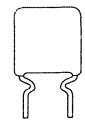
$U_{Rac}$ = 40 V

**loose in box**

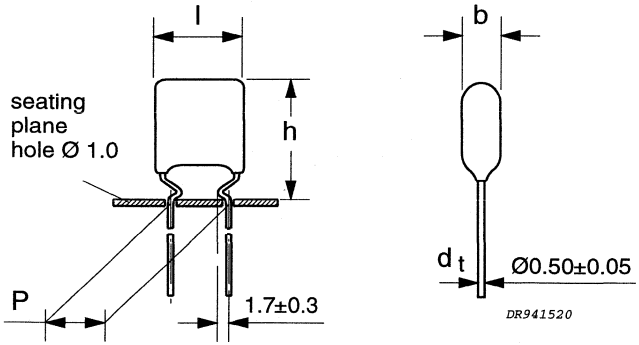
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 366 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 17.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 5.08 ±0.30 mm $d_t$ = 0.50 ±0.05 mm | | | | | |
| 0.047<br>0.056 | 3.5 x 12.5 x 7.3 | 0.3 | 75473<br>75563 | 1000 | 1000 |
| 0.068<br>0.082<br>0.1<br>0.12 | 3.7 x 12.5 x 7.3 | 0.3 | 75683<br>75823<br>75104<br>75124 | 1000 | 1000 |
| 0.15 | 3.7 x 13.0 x 7.3 | 0.3 | 75154 | 1000 | 1000 |
| 0.18 | 3.7 x 13.5 x 7.3 | 0.4 | 75184 | 1000 | 1000 |
| 0.22 | 4.2 x 13.5 x 7.3 | 0.4 | 75224 | 1000 | 1000 |
| 0.27 | 4.5 x 14.0 x 7.3 | 0.4 | 75274 | 1000 | 1000 |
| 0.33<br>0.39 | 4.5 x 14.5 x 7.3 | 0.4 | 75334<br>75394 | 1000 | 1000 |
| 0.47 | 4.5 x 15.5 x 7.3 | 0.4 | 75474 | 1000 | 1000 |
| 0.56 | 5.0 x 14.0 x 7.3 | 0.4 | 75564 | 1000 | 1000 |
| 0.68 | 5.0 x 14.5 x 7.3 | 0.4 | 75684 | 1000 | 1000 |
| 0.82 | 5.5 x 15.0 x 7.3 | 0.5 | 75824 | 1000 | 1000 |
| 1 | 5.5 x 15.5 x 7.3 | 0.5 | 75105 | 1000 | 1000 |

# Metallized polyester film capacitors

# MKT 366



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA 100 V DC**

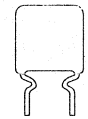
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 100 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 366 84...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 366 85...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 366 86...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±20% | catalogue number **2222 366 80...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 81...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 82...** | on request |

# Metallized polyester film capacitors

# MKT 366



## $U_{Rdc}$ = 100 V

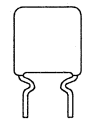
$U_{Rac}$ = 63 V

**loose in box**

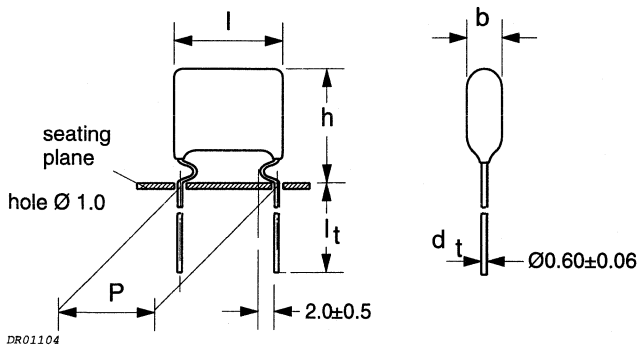
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 366 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 17.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 5.08 ±0.30 mm $d_t$ = 0.50 ±0.05 mm | | | | | |
| 0.01 | 3.5 x 12.5 x 7.3 | 0.3 | 85103 | 1000 | 1000 |
| 0.012 | | | 85123 | | |
| 0.015 | | | 85153 | | |
| 0.018 | | | 85183 | | |
| 0.022 | | | 85223 | | |
| 0.027 | | | 85273 | | |
| 0.033 | | | 85333 | | |
| 0.039 | | | 85393 | | |
| 0.047 | | | 85473 | | |
| 0.056 | | | 85563 | | |
| 0.068 | 3.7 x 12.5 x 7.3 | 0.3 | 85683 | 1000 | 1000 |
| 0.082 | 3.7 x 13.0 x 7.3 | 0.3 | 85823 | 1000 | 1000 |
| 0.1 | 3.7 x 13.5 x 7.3 | 0.4 | 85104 | 1000 | 1000 |

# Metallized polyester film capacitors

# MKT 366



**Pitch 7.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION**

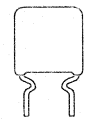
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 18 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 63 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 366 15...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 366 16...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 366 18...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 366 19...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 11...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 12...** | on request |

# Metallized polyester film capacitors

# MKT 366



## $U_{Rdc}$ = 63 V

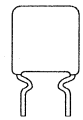
$U_{Rac}$ = 40 V

**loose in box**

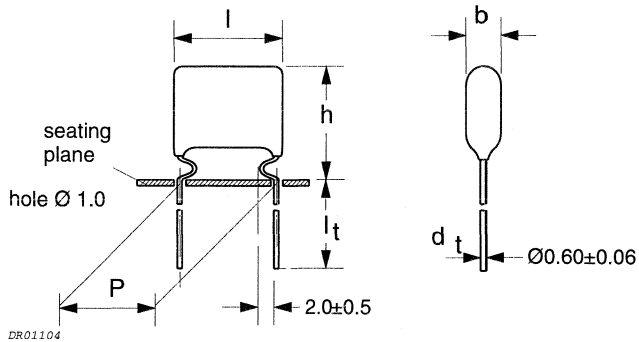
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 366 ..... | | |
|---|---|---|---|---|---|
| | | | short leads; $l_1$ = 4.0 +1.0/-0.5 mm | | $l_1$ = 17.0 ±4.0 mm |
| | | | C-tol ±10% | | |
| | | | last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 7.62 ±0.30 mm | | | $d_1$ = 0.60 ±0.06 mm | | |
| 0.12 | 4.0 x 12.0 x 10.0 | 0.4 | 15124 | 1000 | 1000 |
| 0.15 | | | 15154 | | |
| 0.18 | | | 15184 | | |
| 0.22 | | | 15224 | | |
| 0.27 | 4.5 x 13.0 x 10.5 | 0.5 | 15274 | 1000 | 1000 |
| 0.33 | 5.0 x 13.5 x 10.5 | 0.6 | 15334 | 1000 | 1000 |
| 0.39 | | 0.39 | 15394 | | |
| 0.47 | 5.5 x 14.0 x 10.5 | 0.7 | 15474 | 1000 | 1000 |
| 0.56 | 5.5 x 14.5 x 10.5 | 0.8 | 15564 | 1000 | 1000 |
| 0.68 | | | 15684 | | |
| 0.82 | | | 15824 | | |
| 1 | | | 15105 | | |

# Metallized polyester film capacitors

# MKT 366



**Pitch 7.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

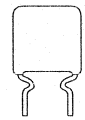
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 36 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 366 25...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 366 26...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 366 28...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 366 29...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 21...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 22...** | on request |

# Metallized polyester film capacitors

# MKT 366



## $U_{Rdc}$ = 100 V

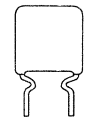
$U_{Rac}$ = 63 V

**loose in box**

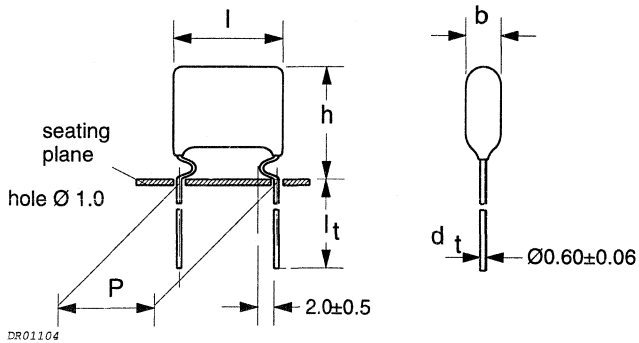
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 366 ..... short leads; $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | $l_t$ = 17.0 ±4.0 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.60 ±0.06 mm | | | | | |
| 0.039 | 4.0 x 12.0 x 10.0 | 0.4 | 25393 | 1000 | 1000 |
| 0.047 | | | 25473 | | |
| 0.056 | | | 25563 | | |
| 0.068 | | | 25683 | | |
| 0.082 | | | 25823 | | |
| 0.1 | 4.0 x 13.0 x 10.0 | 0.4 | 25104 | 1000 | 1000 |
| 0.12 | 4.5 x 13.0 x 10.5 | 0.5 | 25124 | 1000 | 1000 |
| 0.15 | 5.0 x 13.0 x 10.5 | 0.5 | 25154 | 1000 | 1000 |
| 0.18 | 5.0 x 13.5 x 10.5 | 0.6 | 25184 | 1000 | 1000 |
| 0.22 | 5.5 x 13.5 x 10.5 | 0.7 | 25224 | 1000 | 1000 |
| 0.27 | 6.0 x 14.5 x 10.5 | 0.7 | 25274 | 1000 | 1000 |
| 0.33 | 6.0 x 15.0 x 10.5 | 0.7 | 25334 | 1000 | 1000 |
| 0.39 | | | 25394 | | |
| 0.47 | | | 25474 | | |

# Metallized polyester film capacitors

# MKT 366



**Pitch 7.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

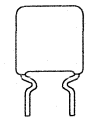
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 70 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 366 45...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 366 46...** | on request |
| Loose in box | $l_t$ = 3.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 48...** | on request |
| Loose in box | $l_t$ = 3.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 49...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 41...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 42...** | on request |

# Metallized polyester film capacitors

# MKT 366

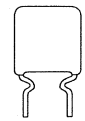


## $U_{Rdc}$ = 250 V  $U_{Rac}$ = 160 V  loose in box

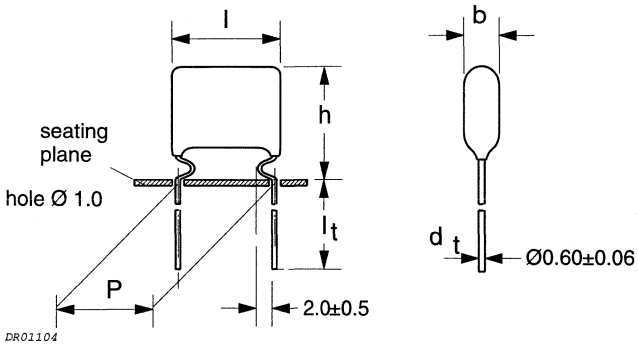
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 366 ..... short leads; $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | $l_t$ = 17.0 ±4.0 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.60 ±0.06 mm | | | | | |
| 0.018 | 4.0 x 13.0 x 10.0 | 0.4 | 45183 | 1000 | 1000 |
| 0.022 | | | 45223 | | |
| 0.027 | | | 45273 | | |
| 0.033 | | | 45333 | | |
| 0.039 | | | 45393 | | |
| 0.047 | | | 45473 | | |

# Metallized polyester film capacitors

# MKT 366



**Pitch 7.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

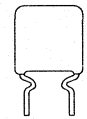
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 366 55...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 366 56...** | on request |
| Loose in box | $l_t$ = 3.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 58...** | on request |
| Loose in box | $l_t$ = 3.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 59...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 366 51...** | on request |
| Loose in box | $l_t$ = 17.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 366 52...** | on request |

# Metallized polyester film capacitors

# MKT 366



## $U_{Rdc}$ = 400 V

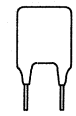
$U_{Rac}$ = 220 V

**loose in box**

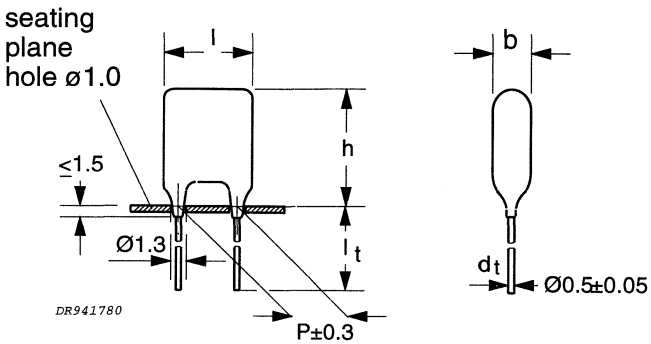
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 366 ..... | | |
|---|---|---|---|---|---|
| | | | short leads; $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 17.0 ±4.0 mm |
| | | | C-tol ±10% | | |
| | | | last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.60 ±0.06 mm | | | | | |
| 0.0033 | 4.0 x 12.0 x 10.0 | 0.4 | 55332 | 1000 | 1000 |
| 0.0039 | | | 55392 | | |
| 0.0047 | | | 55472 | | |
| 0.0056 | 4.0 x 13.0 x 10.0 | 0.4 | 55562 | 1000 | 1000 |
| 0.0068 | | | 55682 | | |
| 0.0082 | | | 55822 | | |
| 0.01 | | | 55103 | | |
| 0.012 | | | 55123 | | |
| 0.015 | | | 55153 | | |

# Metallized polyester film capacitors

# MKT 367



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION**

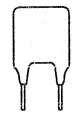
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 63 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 367 74...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 367 75...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 367 76...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±20% | catalogue number **2222 367 70...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 367 71...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 367 72...** | on request |

# Metallized polyester film capacitors

# MKT 367



## $U_{Rdc}$ = 63 V

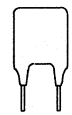
$U_{Rac}$ = 40 V

**loose in box**

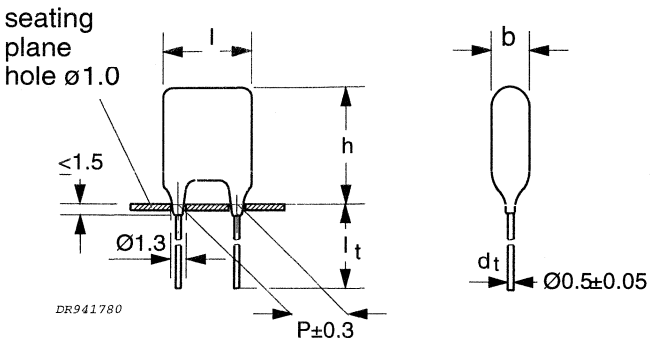
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 367 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 5.08 ±0.30 mm $d_t$ = 0.50 ±0.05 mm | | | | | |
| 0.047<br>0.056 | 3.5 x 7.5 x 7.3 | 0.3 | 75473<br>75563 | 1000 | 1000 |
| 0.068<br>0.082<br>0.1<br>0.12 | 3.7 x 7.5 x 7.3 | 0.3 | 75683<br>75823<br>75104<br>75124 | 1000 | 1000 |
| 0.15 | 3.7 x 8.0 x 7.3 | 0.3 | 75154 | 1000 | 1000 |
| 0.18 | 3.7 x 8.5 x 7.3 | 0.3 | 75184 | 1000 | 1000 |
| 0.22 | 4.2 x 8.5 x 7.3 | 0.3 | 75224 | 1000 | 1000 |
| 0.27 | 4.5 x 9.0 x 7.3 | 0.4 | 75274 | 1000 | 1000 |
| 0.33 | 4.5 x 9.5 x 7.3 | 0.4 | 75334 | 1000 | 1000 |
| 0.39 | 4.5 x 10.5 x 7.3 | 0.4 | 75394 | 1000 | 1000 |
| 0.47 | 4.5 x 11.5 x 7.3 | 0.4 | 75474 | 1000 | 1000 |
| 0.56 | 5.0 x 10.0 x 7.3 | 0.4 | 75564 | 1000 | 1000 |
| 0.68 | 5.0 x 10.5 x 7.3 | 0.4 | 75684 | 1000 | 1000 |
| 0.82 | 5.5 x 11.0 x 7.3 | 0.5 | 75824 | 1000 | 1000 |
| 1 | 5.5 x 11.5 x 7.3 | 0.5 | 75105 | 1000 | 1000 |

# Metallized polyester film capacitors

# MKT 367



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION**

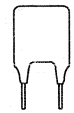
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 100 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 367 84...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 367 85...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 367 86...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±20% | catalogue number **2222 367 80...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 367 81...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 367 82...** | on request |

# Metallized polyester film capacitors

# MKT 367



## $U_{Rdc}$ = 100 V

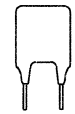
$U_{Rac}$ = 63 V

**loose in box**

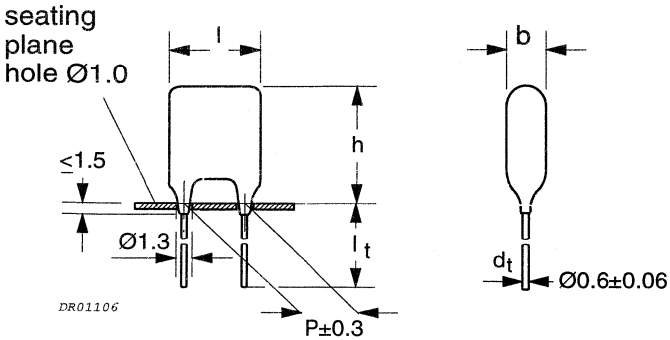
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 367 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 5.08 ±0.30 mm $d_t$ = 0.50 ±0.05 mm | | | | | |
| 0.01 | 3.5 x 7.5 x 7.3 | 0.3 | 85103 | 1000 | 1000 |
| 0.012 | | | 85123 | | |
| 0.015 | | | 85153 | | |
| 0.018 | | | 85183 | | |
| 0.022 | | | 85223 | | |
| 0.027 | | | 85273 | | |
| 0.033 | | | 85333 | | |
| 0.039 | | | 85393 | | |
| 0.047 | | | 85473 | | |
| 0.056 | | | 85563 | | |
| 0.068 | 3.7 x 7.5 x 7.3 | 0.3 | 85683 | 1000 | 1000 |
| 0.082 | 3.7 x 8.0 x 7.3 | 0.3 | 85823 | 1000 | 1000 |
| 0.1 | 3.7 x 8.5 x 7.3 | 0.4 | 85104 | 1000 | 1000 |

# Metallized polyester film capacitors

# MKT 367



**Pitch 7.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION**

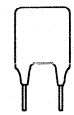
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| $C \leq 0.1\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 225 \times 10^{-4}$ |
| $0.1\ \mu F < C \leq 0.47\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 300 \times 10^{-4}$ |
| $0.47\ \mu F < C \leq 1.0\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 18 V/µs | | |
| R between leads, for $C \leq 0.33\ \mu F$ | >15 000 MΩ | | |
| RC between leads, for $C > 0.33\ \mu F$ | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 63 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 367 15...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 367 16...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 367 11...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 367 12...** | on request |

# Metallized polyester film capacitors

# MKT 367



## $U_{Rdc}$ = 63 V

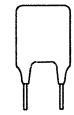
$U_{Rac}$ = 40 V

**loose in box**

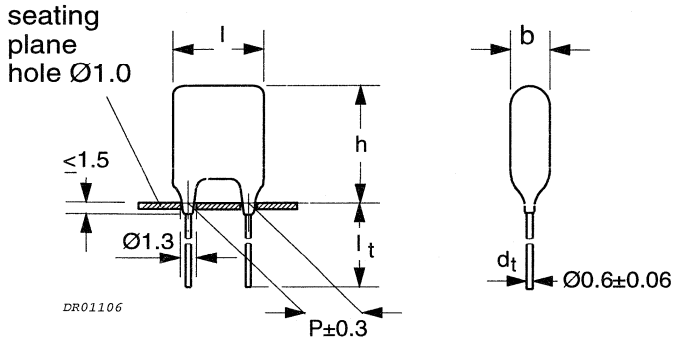
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 367 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.60 ±0.06 mm | | | | | |
| 0.12 | 4.0 x 8.0 x 10.0 | 0.4 | 15124 | 1000 | 1000 |
| 0.15 | | | 15154 | | |
| 0.18 | | | 15184 | | |
| 0.22 | | | 15224 | | |
| 0.27 | 4.5 x 8.5 x 10.5 | 0.5 | 15274 | 1000 | 1000 |
| 0.33 | 5.0 x 9.0 x 10.5 | 0.5 | 15334 | 1000 | 1000 |
| 0.39 | | 0.6 | 15394 | | |
| 0.47 | 5.5 x 9.5 x 10.5 | 0.7 | 15474 | 1000 | 1000 |
| 0.56 | 5.5 x 10.0 x 10.5 | 0.7 | 15564 | 1000 | 1000 |
| 0.68 | | | 15684 | | |
| 0.82 | | | 15824 | | |
| 1 | | | 15105 | | |

# Metallized polyester film capacitors

# MKT 367



**Pitch 7.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION**

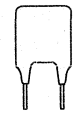
| | | | |
|---|---|---|---|
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
| $C \leq 0.1\ \mu F$ | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 225 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 36 V/µs | | |
| R between leads, for $C \leq 0.33\ \mu F$ | >15 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 100 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 367 25...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 367 26...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 367 21...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 367 22...** | on request |

# Metallized polyester film capacitors

# MKT 367



## $U_{Rdc}$ = 100 V

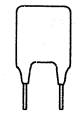
$U_{Rac}$ = 63 V

**loose in box**

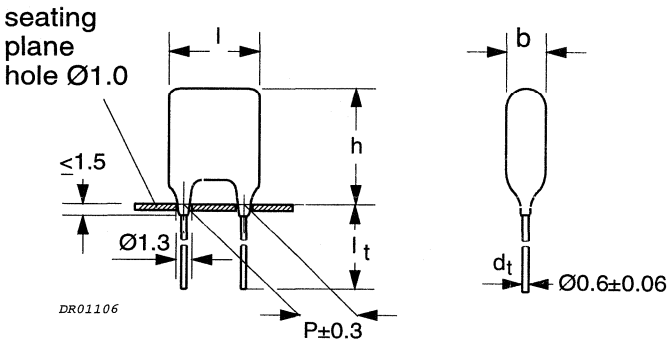
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 367 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.60 ±0.06 mm | | | | | |
| 0.039 | 4.0 x 8.0 x 10.0 | 0.4 | 25393 | 1000 | 1000 |
| 0.047 | | | 25473 | | |
| 0.056 | | | 25563 | | |
| 0.068 | | | 25683 | | |
| 0.082 | | | 25823 | | |
| 0.1 | 4.0 x 8.5 x 10.0 | 0.4 | 25104 | 1000 | 1000 |
| 0.12 | 4.5 x 9.0 x 10.5 | 0.5 | 25124 | 1000 | 1000 |
| 0.15 | 5.0 x 9.5 x 10.5 | 0.5 | 25154 | 1000 | 1000 |
| 0.18 | | 0.6 | 25184 | | |
| 0.22 | 5.5 x 10.0 x 10.5 | 0.7 | 25224 | 1000 | 1000 |
| 0.27 | 6.0 x 10.5 x 10.5 | 0.7 | 25274 | 1000 | 1000 |
| 0.33 | | 0.33 | 25334 | | |
| 0.39 | | 0.39 | 25394 | | |
| 0.47 | | 0.47 | 25474 | | |

# Metallized polyester film capacitors

# MKT 367



**Pitch 7.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION**

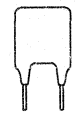
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 70 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 367 45...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 367 46...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 367 41...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 367 42...** | on request |

# Metallized polyester film capacitors

# MKT 367



## $U_{Rdc}$ = 250 V

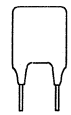
$U_{Rac}$ = 160 V

**loose in box**

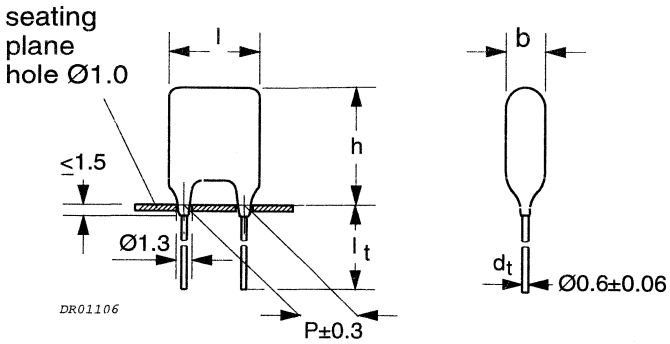
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 367 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.6 ±0.06 mm | | | | | |
| 0.018 | 4.0 x 8.5 x 10.0 | 0.4 | 45183 | 1000 | 1000 |
| 0.022 | | | 45223 | | |
| 0.027 | | | 45273 | | |
| 0.033 | | | 45333 | | |
| 0.039 | | | 45393 | | |
| 0.047 | | | 45473 | | |

# Metallized polyester film capacitors

# MKT 367



**Pitch 7.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION**

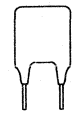
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0+ 1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 367 55...** | on request |
| Loose in box | $l_t$ = 4.0+ 1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 367 56...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 367 51...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 367 52...** | on request |

# Metallized polyester film capacitors

# MKT 367



## $U_{Rdc}$ = 400 V

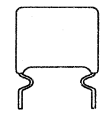
$U_{Rac}$ = 220 V

**loose in box**

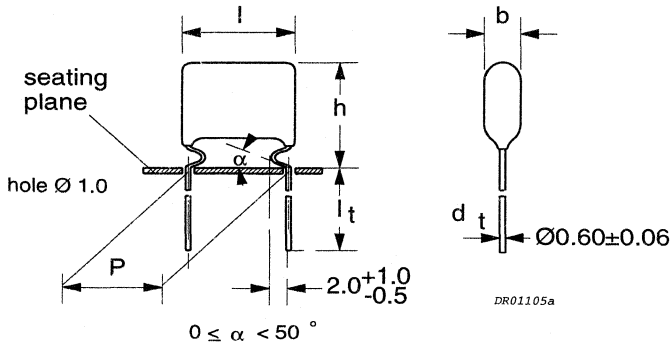
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 367 ..... | | |
|---|---|---|---|---|---|
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ |
| Pitch = 7.62 ±0.30 mm $d_t$ = 0.60 ±0.06 mm | | | | | |
| 0.0033 | 4.0 x 8.5 x 10.0 | 0.4 | 55332 | 1000 | 1000 |
| 0.0039 | | | 55392 | | |
| 0.0047 | | | 55472 | | |
| 0.0056 | | | 55562 | | |
| 0.0068 | | | 55682 | | |
| 0.0082 | | | 55822 | | |
| 0.01 | | | 55103 | | |
| 0.012 | | | 55123 | | |
| 0.015 | | | 55153 | | |

# Metallized polyester film capacitors

# MKT 368



**Pitch 10 mm**




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at URdc | 30 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

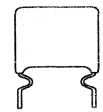
## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 368 15...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 368 16...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 368 13...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 368 17...** | on request |
| Loose in box | $l_t$ = 19.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 368 11...** | on request |
| Loose in box | $l_t$ = 19.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 368 12...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 368 18...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 368 19...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 368



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 40 V

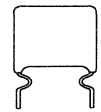
## loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 368 ..... loose in box; short leads; $l_1$ = 4.0 +1.0/-0.5 mm; C-tol ±10%; last 5 digits of catalogue number | SPQ | $l_1$ = 19.0 ±4.0 mm; SPQ | reel; SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.16 ±0.30 $d_1$ = 0.60 ±0.06 mm | | | | | | |
| 0.22 | 4.5 x 12.5 x 12.5 | 0.4 | 15224 | 2000 | 1000 | 1300 |
| 0.27 | | | 15274 | | | |
| 0.33 | | | 15334 | | | |
| 0.39 | | | 15394 | | | |
| 0.47 | 5.0 x 13.0 x 12.5 | 0.5 | 15474 | 2000 | 1000 | 1200 |
| 0.56 | | | 15564 | | | |
| 0.68 | 5.5 x 13.5 x 12.5 | 0.5 | 15684 | 2000 | 1000 | 1100 |
| 0.82 | 6.0 x 14.0 x 12.5 | 0.6 | 15824 | 2000 | 1000 | 1000 |
| 1 | 6.5 x 14.5 x 12.5 | 0.7 | 15105 | 2000 | 1000 | 900 |

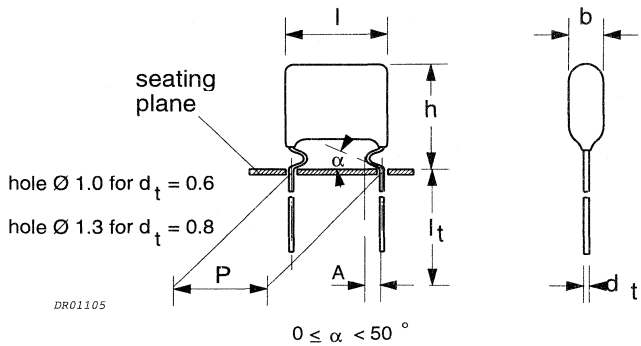
Preferred cataogue numbers

# Metallized polyester film capacitors

# MKT 368



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

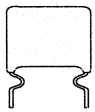
| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| C > 1.0 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ P = 10 mm | 28 V/µs | | |
| P = 15 mm | 20 V/µs | | |
| P = 22.5 mm | 8 V/µs | | |
| P = 27.5 mm | 7 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 368 25...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 368 26...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 368 23...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 368 27...** | on request |
| Loose in box | long leads ** | C-tol ±10% | catalogue number **2222 368 21...** | on request |
| Loose in box | long leads ** | C-tol ±5% | catalogue number **2222 368 22...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 368 28...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 368 29...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

** Length of long leads: $l_t$ = 19.0 ±4.0 mm for lead pitches 10.16 mm and 15.24 mm
$l_t$ = 25.0 ±4.0 mm for lead pitch 22.86 mm
$l_t$ = 24.0 ±4.0 mm for lead pitch 27.94 mm.



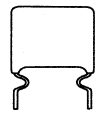
## $U_{Rdc}$ = 100 V $U_{Rac}$ = 63 V loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 368 ..... loose in box; $l_1$ = 4.0 +1.0/-0.5 mm short leads C-tol ±10% last 5 digits of catalogue number | SPQ | long leads SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.16 ±0.30 mm | | | $d_1$ = 0.60 ±0.06 mm | A = 2.0 +1.0/-0.5 mm | | |
| 0.056 | 4.0 x 12.0 x 12.5 | 0.4 | 25563 | 2000 | 1000 | 1500 |
| 0.068 | | | 25683 | | | |
| 0.082 | | | 25823 | | | |
| 0.1 | | | 25104 | | | |
| 0.12 | | | 25124 | | | |
| 0.15 | | | 25154 | | | |
| 0.18 | 4.5 x 12.5 x 12.5 | 0.4 | 25184 | 2000 | 1000 | 1300 |
| 0.22 | 5.0 x 13.0 x 12.5 | 0.5 | 25224 | 2000 | 1000 | 1200 |
| Pitch = 15.24 ±0.30 mm | | | $d_1$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.27 | 5.0 x 14.0 x 17.5 | 0.6 | 25274 | 2000 | 1000 | 1200 |
| 0.33 | | 0.6 | 25334 | | | |
| 0.39 | | 0.6 | 25394 | | | |
| 0.47 | 5.5 x 14.5 x 17.5 | 0.7 | 25474 | 2000 | 1000 | 1100 |
| 0.56 | | 0.8 | 25564 | | | |
| 0.68 | 6.0 x 15.0 x 17.5 | 1 | 25684 | 2000 | 1000 | 1000 |
| 0.82 | 6.5 x 15.5 x 17.5 | 1.1 | 25824 | 1000 | 1000 | 900 |
| 1 | 7.5 x 16.5 x 17.5 | 1.3 | 25105 | 1000 | 1000 | 800 |
| Pitch = 22.86 ±0.30 mm | | | $d_1$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 1.2 | 6.0 x 18.0 x 26.0 | 1.8 | 25125 | 1000 | 1000 | 650 |
| 1.5 | | 2.0 | 25155 | | | |
| 1.8 | | 2.3 | 25185 | | | |
| 2.2 | 6.5 x 19.5 x 26.0 | 2.8 | 25225 | 1000 | 500 | 600 |
| 2.7 | 7.5 x 20.0 x 26.0 | 3.2 | 25275 | 1000 | 500 | 500 |
| 3.3 | 8.5 x 21.0 x 26.0 | 4.0 | 25335 | 1000 | 500 | 450 |
| Pitch = 27.94 ±0.30 mm | | | $d_1$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 3.9 | 8.5 x 20.5 x 30.0 | 4.5 | 25395 | 500 | 500 | 450 |
| 4.7 | 9.5 x 21.5 x 30.0 | 5.2 | 25475 | 500 | 500 | 400 |
| 5.6 | 10.5 x 22.5 x 30.0 | 6.0 | 25565 | 500 | 250 | 350 |
| 6.8 | 11.5 x 23.5 x 30.0 | 6.5 | 25685 | 500 | 250 | 350 |

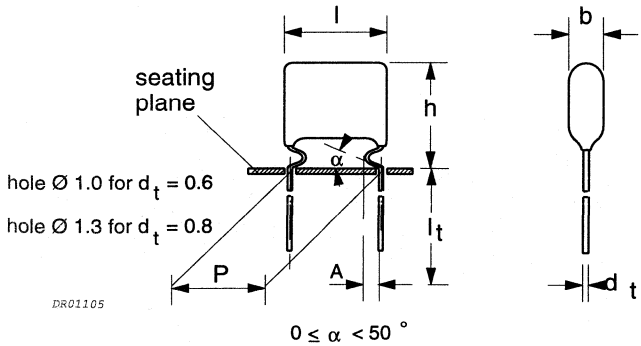
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 368



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| | 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| | 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| | C > 1.0 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ | P = 10 mm | 70 V/µs | | |
| | P = 15 mm | 28 V/µs | | |
| | P = 22.5 mm | 12 V/µs | | |
| | P = 27.5 mm | 10 V/µs | | |
| R between leads, for C ≤ 0.33 µF | | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | | >10 000 s | | |
| R between interconnected leads and case (foil method) | | >30 000 MΩ | | |

## AVAILABLE 250 V VERSIONS

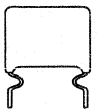
| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 368 45...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 368 46...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 368 43...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 368 47...** | on request |
| Loose in box | long leads ** | C-tol ±10% | catalogue number **2222 368 41...** | on request |
| Loose in box | long leads ** | C-tol ±5% | catalogue number **2222 368 42...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 368 48...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 368 49...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

** Length of long leads: $l_t$ = 19.0 ±4.0 mm for lead pitches 10.16 mm and 15.24 mm
$l_t$ = 25.0 ±4.0 mm for lead pitch 22.86 mm
$l_t$ = 24.0 ±4.0 mm for lead pitch 27.94 mm.

# Metallized polyester film capacitors

# MKT 368



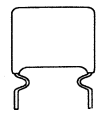
## $U_{Rdc}$ = 250 V  $U_{Rac}$ = 160 V  loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 368 ..... short leads $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | short leads SPQ | long leads SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.16 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | A = 2.0 +1.0/-0.5 mm | | |
| 0.027 | 4.0 x 12.0 x 12.5 | 0.4 | 45273 | 2000 | 1000 | 1500 |
| 0.033 | | | 45333 | | | |
| 0.039 | | | 45393 | | | |
| 0.047 | | | 45473 | | | |
| 0.056 | 4.5 x 12.5 x 12.5 | 0.4 | 45563 | 2000 | 1000 | 1300 |
| 0.068 | | | 45683 | | | |
| 0.082 | 5.0 x 13.0 x 12.5 | 0.5 | 45823 | 2000 | 1000 | 1200 |
| 0.1 | | | 45104 | | | |
| Pitch = 15.24 ±0.30 mm | | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.12 | 5.0 x 14.0 x 17.5 | 0.6 | 45124 | 2000 | 1000 | 1200 |
| 0.15 | | 0.7 | 45154 | | | |
| 0.18 | 5.5 x 14.5 x 17.5 | 0.8 | 45184 | 2000 | 1000 | 1100 |
| 0.22 | 6.0 x 15.0 x 17.5 | 0.9 | 45224 | 2000 | 1000 | 1000 |
| 0.27 | 6.5 x 15.5 x 17.5 | 1.1 | 45274 | 2000 | 1000 | 900 |
| 0.33 | 7.0 x 16.0 x 17.5 | 1.3 | 45334 | 1000 | 1000 | 800 |
| Pitch = 22.86 ±0.30 mm | | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.39 | 5.0 x 17.0 x 26.0 | 1.8 | 45394 | 1000 | 1000 | 800 |
| 0.47 | 5.5 x 17.5 x 26.0 | 2.1 | 45474 | 1000 | 1000 | 750 |
| 0.56 | 6.0 x 18.0 x 26.0 | 2.5 | 45564 | 1000 | 1000 | 650 |
| 0.68 | 6.5 x 18.5 x 26.0 | 2.9 | 45684 | 1000 | 1000 | 600 |
| 0.82 | 7.0 x 19.0 x 26.0 | 3.3 | 45824 | 1000 | 1000 | 550 |
| 1 | 7.5 x 19.5 x 26.0 | 3.6 | 45105 | 1000 | 500 | 500 |
| Pitch = 27.94 ±0.30 mm | | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 1.2 | 7.5 x 19.5 x 30.0 | 4.0 | 45125 | 500 | 500 | 500 |
| 1.5 | 8.5 x 20.5 x 30.0 | 5.1 | 45155 | 500 | 500 | 450 |
| 1.8 | 9.5 x 21.5 x 30.0 | 5.9 | 45185 | 500 | 500 | 400 |
| 2.2 | 10.5 x 22.5 x 30.0 | 6.4 | 45225 | 500 | 250 | 350 |

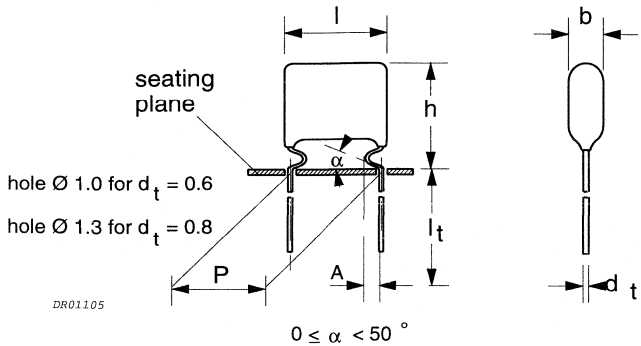
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 368



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| | 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| | 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | P = 10 mm | 110 V/µs | | |
| | P = 15 mm | 44 V/µs | | |
| | P = 22.5 mm | 20 V/µs | | |
| | P = 27.5 mm | 16 V/µs | | |
| R between leads, for C ≤ 0.33 µF | | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | | >10 000 s | | |
| R between interconnected leads and case (foil method) | | >30 000 MΩ | | |

## AVAILABLE 400 V VERSIONS

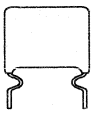
| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 368 55...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 368 56...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 368 53...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 368 57...** | on request |
| Loose in box | longs leads ** | C-tol ±10% | catalogue number **2222 368 51...** | on request |
| Loose in box | long leads ** | C-tol ±5% | catalogue number **2222 368 52...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 368 58...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 368 59...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

** Length of long leads: $l_t$ = 19.0 ±4.0 mm for lead pitches 10.16 mm and 15.24 mm
$l_t$ = 25.0 ±4.0 mm for lead pitch 22.86 mm
$l_t$ = 24.0 ±4.0 mm for lead pitch 27.94 mm.

# Metallized polyester film capacitors

# MKT 368



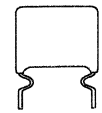
**$U_{Rdc}$ = 400 V** $U_{Rac}$ = 220 V **loose and taped**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 368 ..... short leads $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | short leads SPQ | long leads SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.16 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | A = 2.0 +1.0/-0.5 mm | | |
| 0.001 | 4.0 x 12.0 x 12.5 | 0.4 | 55102 | 2000 | 1000 | 1500 |
| 0.0012 | | | 55122 | | | |
| 0.0015 | | | 55152 | | | |
| 0.0018 | | | 55182 | | | |
| 0.0022 | | | 55222 | | | |
| 0.0027 | | | 55272 | | | |
| 0.0033 | | | 55332 | | | |
| 0.0039 | | | 55392 | | | |
| 0.0047 | | | 55472 | | | |
| 0.0056 | | | 55562 | | | |
| 0.0068 | | | 55682 | | | |
| 0.0082 | | | 55822 | | | |
| 0.01 | | | 55103 | | | |
| 0.012 | | | 55123 | | | |
| 0.015 | | | 55153 | | | |
| 0.018 | | | 55183 | | | |
| 0.022 | | | 55223 | | | |
| 0.027 | 4.5 x 12.5 x 12.5 | 0.4 | 55273 | 2000 | 1000 | 1300 |
| 0.033 | | | 55333 | | | |
| Pitch = 15.24 ±0.30 mm | | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.039 | 4.5 x 13.5 x 17.5 | 0.6 | 55393 | 2000 | 1000 | 1200 |
| 0.047 | | 0.6 | 55473 | | | |
| 0.056 | | 0.6 | 55563 | | | |
| 0.068 | | 0.7 | 55683 | | | |
| 0.082 | 5.0 x 14.0 x 17.5 | 0.8 | 55823 | 2000 | 1000 | 1100 |
| 0.1 | 5.5 x 14.5 x 17.5 | 0.9 | 55104 | 2000 | 1000 | 1000 |
| 0.12 | 6.0 x 15.0 x 17.5 | 1.1 | 55124 | 1000 | 1000 | 900 |
| 0.15 | 6.5 x 15.5 x 17.5 | 1.3 | 55154 | 1000 | 1000 | 800 |
| Pitch = 22.86 ±0.30 mm | | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.18 | 5.5 x 17.5 x 26.0 | 1.6 | 55184 | 1000 | 1000 | 800 |
| 0.22 | 6.0 x 18.0 x 26.0 | 1.9 | 55224 | 1000 | 1000 | 650 |
| 0.27 | | 2.3 | 55274 | | | |
| 0.33 | | 2.6 | 55334 | | | |
| 0.39 | 6.5 x 18.5 x 26.0 | 3.0 | 55394 | 1000 | 1000 | 550 |
| 0.47 | 7.5 x 19.5 x 26.0 | 3.4 | 55474 | 1000 | 500 | 500 |
| Pitch = 27.94 ±0.30 mm | | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.56 | 7.5 x 19.5 x 30.0 | 3.5 | 55564 | 500 | 500 | 500 |
| 0.68 | 8.5 x 20.5 x 30.0 | 4.0 | 55684 | 500 | 500 | 450 |
| 0.82 | 9.0 x 21.0 x 30.0 | 4.5 | 55824 | 500 | 500 | 400 |
| 1 | 10.0 x 22.0 x 30.0 | 5.0 | 55105 | 500 | 250 | 350 |

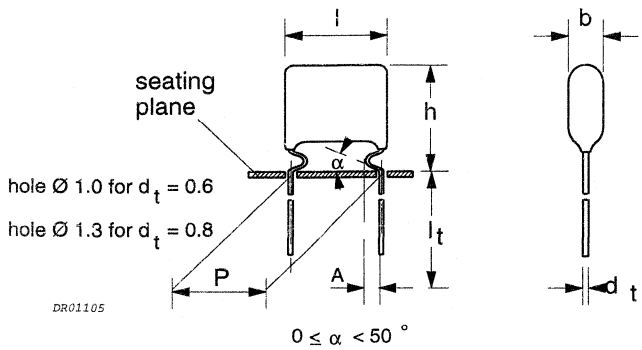
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 368



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| | 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | P = 10 mm | 70 V/µs | | |
| | P = 15 mm | 70 V/µs | | |
| | P = 22.5 mm | 28 V/µs | | |
| | P = 27.5 mm | 24 V/µs | | |
| R between leads, for C ≤ 0.33 µF | | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | | >10 000 s | | |
| R between interconnected leads and case (foil method) | | >30 000 MΩ | | |

## AVAILABLE 630 V VERSIONS

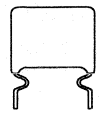
| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 368 65...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 368 66...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±10% | catalogue number **2222 368 63...** | on request |
| Loose in box | $l_t$ = 3.0 ±0.4 mm | C-tol ±5% | catalogue number **2222 368 67...** | on request |
| Loose in box | long leads ** | C-tol ±10% | catalogue number **2222 368 61...** | on request |
| Loose in box | long leads ** | C-tol ±5% | catalogue number **2222 368 62...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±10% | catalogue number **2222 368 68...** | on request |
| Taped on reel | H = 16 mm * | C-tol ±5% | catalogue number **2222 368 69...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

** Length of long leads: $l_t$ = 19.0 ±4.0 mm for lead pitches 10.16 mm and 15.24 mm
$l_t$ = 25.0 ±4.0 mm for lead pitch 22.86 mm
$l_t$ = 24.0 ±4.0 mm for lead pitch 27.94 mm.

# Metallized polyester film capacitors

# MKT 368



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 250 V

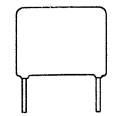
## loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 368 ..... short leads $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | short leads SPQ | long leads SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| | Pitch = 10.16 ±0.30 mm | | $d_t$ = 0.60 ±0.06 mm | A = 2.0 +1/-0.5 mm | | |
| 0.01 | 4.5 x 12.5 x 12.5 | 0.4 | 65103 | 2000 | 1000 | 1300 |
| 0.012 | 5.0 x 13.0 x 12.5 | 0.5 | 65123 | 2000 | 1000 | 1200 |
| 0.015 | 5.5 x 13.5 x 12.5 | 0.6 | 65153 | 2000 | 1000 | 1100 |
| 0.018 | 6.0 x 14.0 x 12.5 | 0.6 | 65183 | 2000 | 1000 | 1000 |
| 0.022 | 6.5 x 14.5 x 12.5 | 0.7 | 65223 | 2000 | 1000 | 900 |
| | Pitch = 15.24 ±0.30 mm | | $d_t$ 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.027 | 5.5 x 14.5 x 17.5 | 0.9 | 65273 | 2000 | 1000 | 1100 |
| 0.033 | 6.0 x 15.0 x 17.5 | 1.0 | 65333 | 2000 | 1000 | 1000 |
| 0.039 | 6.5 x 15.5 x 17.5 | 1.1 | 65393 | 2000 | 1000 | 900 |
| 0.047 | 7.0 x 16.0 x 17.5 | 1.2 | 65473 | 2000 | 1000 | 800 |
| 0.056 | 7.5 x 16.5 x 17.5 | 1.3 | 65563 | 1000 | 1000 | 800 |
| 0.068 | 8.0 x 17.0 x 17.5 | 1.4 | 65683 | 1000 | 1000 | 750 |
| | Pitch = 22.86 ±0.30 mm | | $d_t$ 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | | |
| 0.082 | 5.5 x 17.5 x 26.0 | 1.8 | 65823 | 1000 | 1000 | 750 |
| 0.1 | 6.0 x 18.0 x 26.0 | 2.1 | 65104 | 1000 | 1000 | 650 |
| 0.12 | 7.0 x 19.0 x 26.0 | 2.5 | 65124 | 1000 | 1000 | 550 |
| 0.15 | 7.5 x 19.5 x 26.0 | 2.9 | 65154 | 1000 | 500 | 500 |
| 0.18 | 8.5 x 20.5 x 26.0 | 3.2 | 65184 | 1000 | 500 | 450 |
| 0.22 | 9.5 x 21.5 x 26.0 | 3.5 | 65224 | 1000 | 500 | 400 |
| | Pitch = 27.94 ±0.30 mm | | $d_t$ 0.80 ±0.08 mm | A = 2.5 +1.4/-0.05 mm | | |
| 0.27 | 9.0 x 21.0 x 30.0 | 4.3 | 65274 | 500 | 500 | 450 |
| 0.33 | 10.0 x 22.0 x 30.0 | 5.0 | 65334 | 500 | 250 | 400 |
| 0.39 | 11.0 x 23.0 x 30.0 | 5.6 | 65394 | 500 | 250 | 350 |
| 0.47 | 12.0 x 24.0 x 30.0 | 6.5 | 65474 | 250 | 250 | 350 |

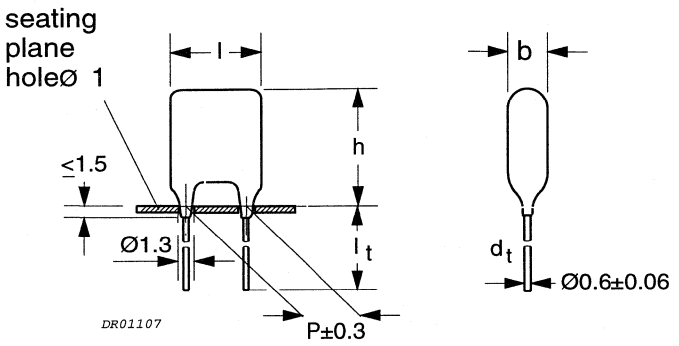
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 369



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 30 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

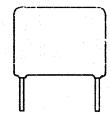
**AVAILABLE 63 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 369 15...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 369 16...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 369 11...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 369 12...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 369 18...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 369 19...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 369



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 40 V

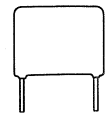
## loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 369 ..... loose in box $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | $l_t$ = 22.0 ±4.0 mm SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.16 ±0.30 mm | | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.22 | 4.5 x 10.0 x 12.5 | 0.4 | 15224 | 2000 | 1000 | 1300 |
| 0.27 | | | 15274 | | | |
| 0.33 | | | 15334 | | | |
| 0.39 | | | 15394 | | | |
| 0.47 | 5.0 x 10.5 x 12.5 | 0.5 | 15474 | 2000 | 1000 | 1200 |
| 0.56 | | | 15564 | | | |
| 0.68 | 5.5 x 11.0 x 12.5 | 0.5 | 15684 | 2000 | 1000 | 1100 |
| 0.82 | 6.0 x 11.5 x 12.5 | 0.6 | 15824 | 2000 | 1000 | 1000 |
| 1 | 6.5 x 12.0 x 12.5 | 0.7 | 15105 | 2000 | 1000 | 900 |

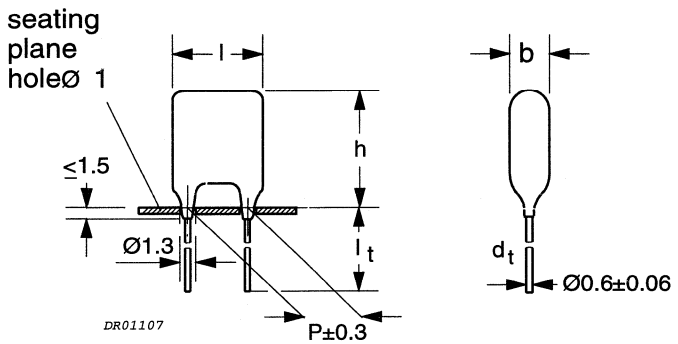
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 369



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| C ≥ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 28 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

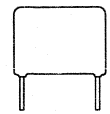
**AVAILABLE 100 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±10% | catalogue number **2222 369 25...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±5% | catalogue number **2222 369 26...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 369 21...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 369 22...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 369 28...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 369 29...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 369



## $U_{Rdc}$ = 100 V

$U_{Rac}$ = 63 V

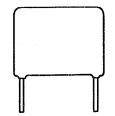
## loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 369 ..... loose in box $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | $l_t$ = 22.0 ±4.0 mm SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.16 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | | | |
| 0.056 | 4.0 x 9.5 x 12.5 | 0.4 | 25563 | 2000 | 1000 | 1500 |
| 0.068 | | | 25683 | | | |
| 0.082 | | | 25823 | | | |
| 0.1 | | | 25104 | | | |
| 0.12 | | | 25124 | | | |
| 0.15 | | | 25154 | | | |
| 0.18 | 4.5 x 10.0 x 12.5 | 0.5 | 25184 | 2000 | 1000 | 1300 |
| 0.22 | 5.0 x 10.5 x 12.5 | 0.5 | 25224 | 2000 | 1000 | 1200 |

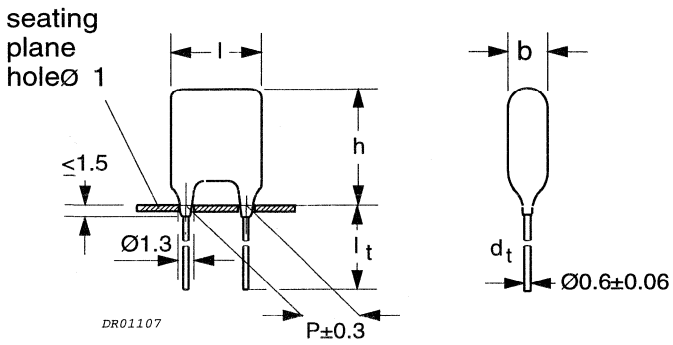
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 369



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 70 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

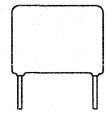
**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±10% | catalogue number **2222 369 45...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±5% | catalogue number **2222 369 46...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 369 41...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 369 42...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 369 48...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 369 49...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 369



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V

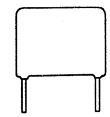
**loose and taped**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 369 ..... | | | |
|---|---|---|---|---|---|---|
| | | | loose in box | | | reel |
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm | |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ | SPQ |
| Pitch = 10.16 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | | | |
| 0.027 | 4.0 x 9.5 x 12.5 | 0.4 | 45273 | 2000 | 1000 | 1500 |
| 0.033 | | | 45333 | | | |
| 0.039 | | | 45393 | | | |
| 0.047 | | | 45473 | | | |
| 0.056 | 4.5 x 10.0 x 12.5 | 0.4 | 45563 | 2000 | 1000 | 1300 |
| 0.068 | | | 45683 | | | |
| 0.082 | 5.0 x 10.5 x 12.5 | 0.5 | 45823 | 2000 | 1000 | 1200 |
| 0.1 | | | 45104 | | | |

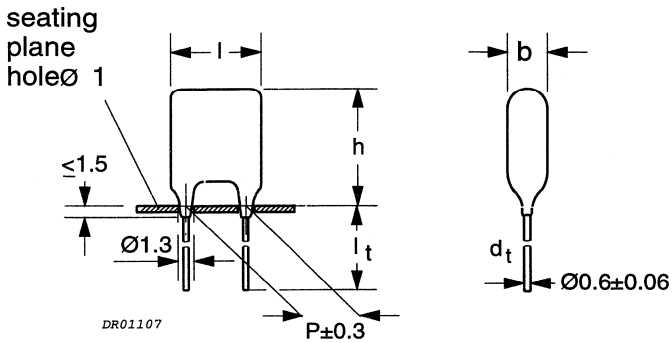
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 369



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

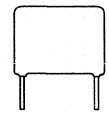
**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±10% | catalogue number **2222 369 55...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±5% | catalogue number **2222 369 56...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 369 51...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 369 52...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 369 58...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 369 59...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 369



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 220V

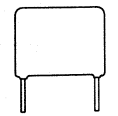
## loose and taped

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 369 ..... | | | |
|---|---|---|---|---|---|---|
| | | | loose in box | | | reel |
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm | |
| | | | C-tol ±10% last 5 digits of catalogue number | SPQ | SPQ | SPQ |
| Pitch = 10.16 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | | | |
| 0.001 | 4.0 x 9.5 x 12.5 | 0.4 | 55102 | 2000 | 1000 | 1500 |
| 0.0012 | | | 55122 | | | |
| 0.0015 | | | 55152 | | | |
| 0.0018 | | | 55182 | | | |
| 0.0022 | | | 55222 | | | |
| 0.0027 | | | 55272 | | | |
| 0.0033 | | | 55332 | | | |
| 0.0039 | | | 55392 | | | |
| 0.0047 | | | 55472 | | | |
| 0.0056 | | | 55562 | | | |
| 0.0068 | | | 55682 | | | |
| 0.0082 | | | 55822 | | | |
| 0.01 | | | 55103 | | | |
| 0.012 | | | 55123 | | | |
| 0.015 | | | 55153 | | | |
| 0.018 | | | 55183 | | | |
| 0.022 | | | 55223 | | | |
| 0.027 | 4.5 x 10.0 x 12.5 | 0.4 | 55273 | 2000 | 1000 | 1300 |
| 0.033 | | | 55333 | | | |

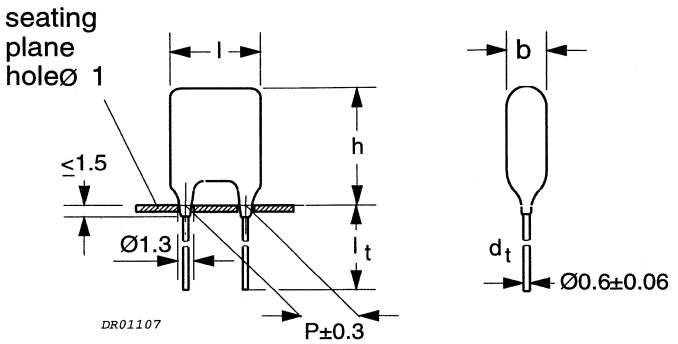
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 369



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 225 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 70 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >10 000 s | | |
| R between interconnected leads and case (foil method) | >30 000 MΩ | | |

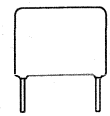
**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±10% | catalogue number **2222 369 65...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5mm | C-tol ±5% | catalogue number **2222 369 66...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±10% | catalogue number **2222 369 61...** | on request |
| Loose in box | $l_t$ = 22.0 ±4.0 mm | C-tol ±5% | catalogue number **2222 369 62...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 369 68...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 369 69...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 369



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 250 V

## loose and taped

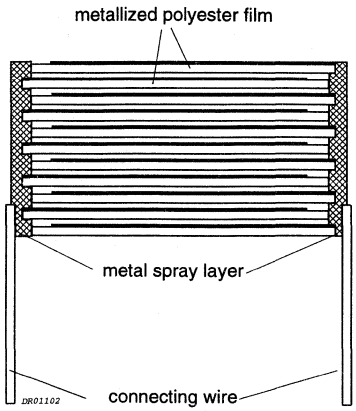
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 369 ..... | | | |
|---|---|---|---|---|---|---|
| | | | loose in box | | | reel |
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | $l_t$ = 22.0 ±4.0 mm | |
| | | | C-tol ±10% | | | |
| | | | last 5 digits of catalogue number | SPQ | SPQ | SPQ |
| Pitch = 10.16 ±0.30 mm | | | $d_t$ = 0.60 ±0.06 mm | | | |
| 0.01 | 4.5 x 10.0 x 12.5 | 0.4 | 65103 | 2000 | 1000 | 1300 |
| 0.012 | 5.0 x 10.5 x 12.5 | 0.5 | 65123 | 2000 | 1000 | 1200 |
| 0.015 | 5.5 x 11.0 x 12.5 | 0.5 | 65153 | 2000 | 1000 | 1100 |
| 0.018 | 6.0 x 11.5 x 12.5 | 0.6 | 65183 | 2000 | 1000 | 1000 |
| 0.022 | 6.5 x 12.0 x 12.5 | 0.7 | 65223 | 2000 | 1000 | 900 |

Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 365/366/367/368/369

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polyethyleneterephthalate film.
- Protected by a hard, water repellent, solvent resistant epoxy lacquer.
- Radial leads, solder-coated.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

### Specified method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the underside of the kinks are in good contact with the printed-circuit board.

- For pitches ≤15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

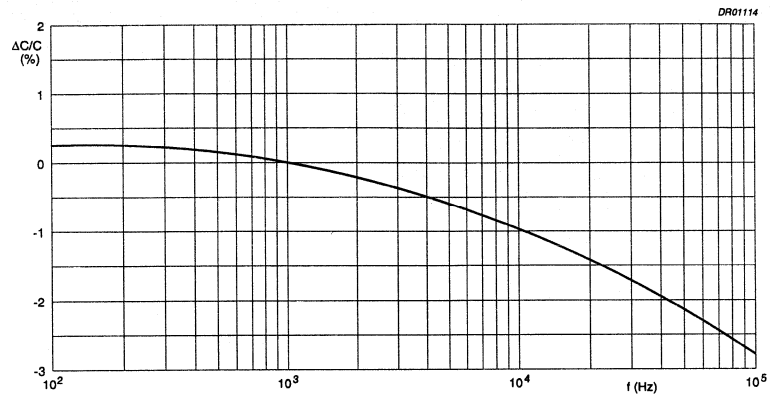
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

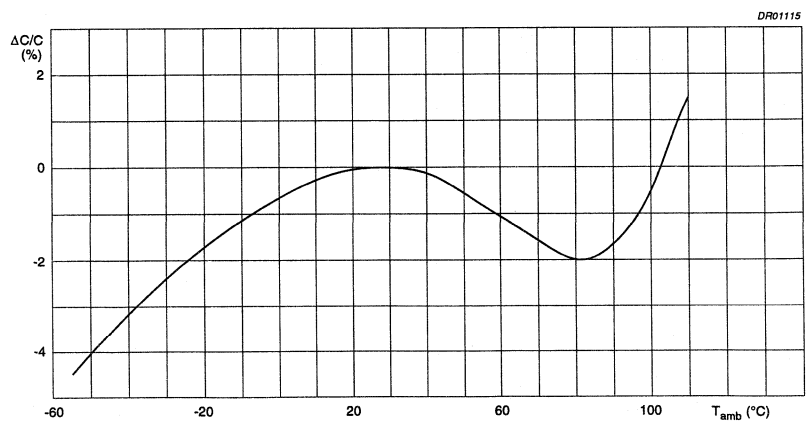
For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance as a function of frequency; typical curve.




Capacitance as a function of ambient free air temperature; typical curve.

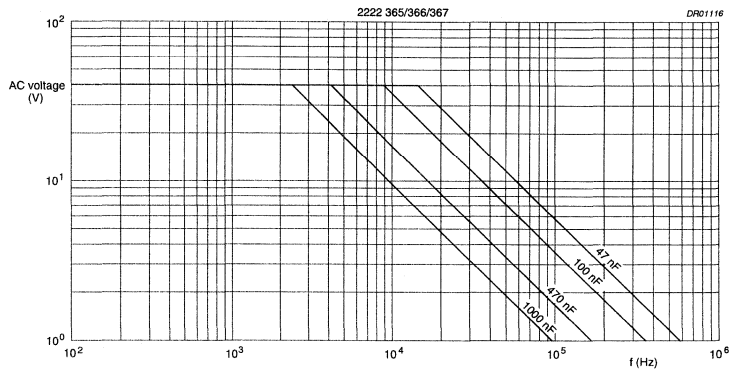
**TEMPERATURE**

- Storage temperature: $T_{stg}$ = –25 °C to +40 °C with RH maximum 80% without condensation.

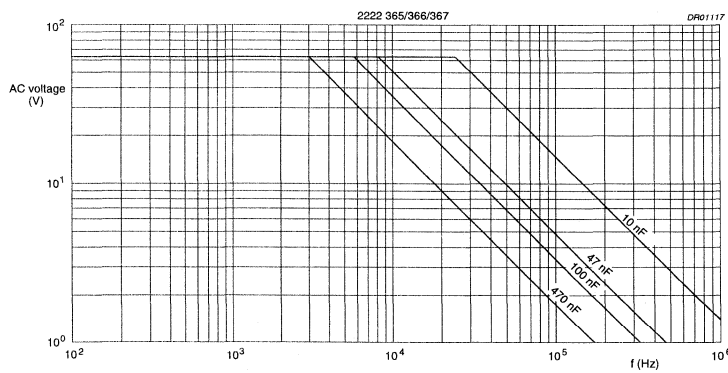
**VOLTAGE**

- Category voltage: $U_c = 0.8 \times U_{Rdc}$.
- Test voltage between leads: $1.6 \times U_{Rdc}$.
- Test voltage between interconnected leads and case (foil method): $2 \times U_{Rdc}$ (minimum 200 V).

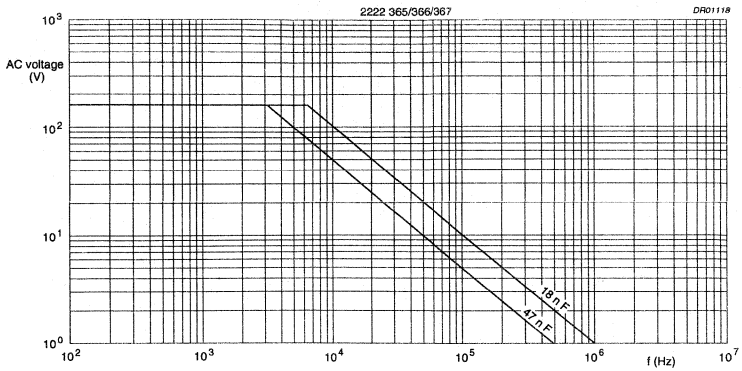
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 85$ °C (see graphs below)**



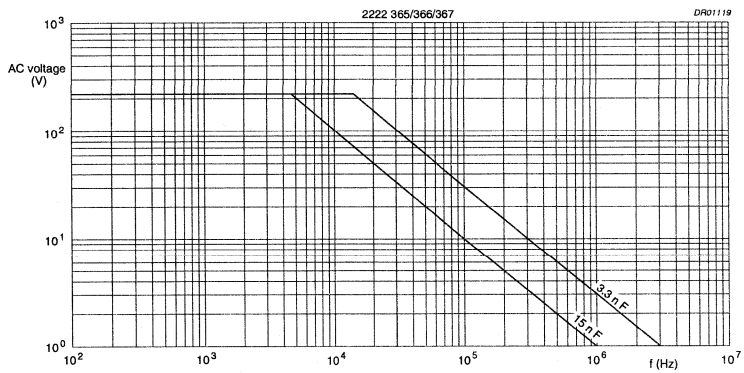

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 63 V (2222 365, 366 and 367 styles).



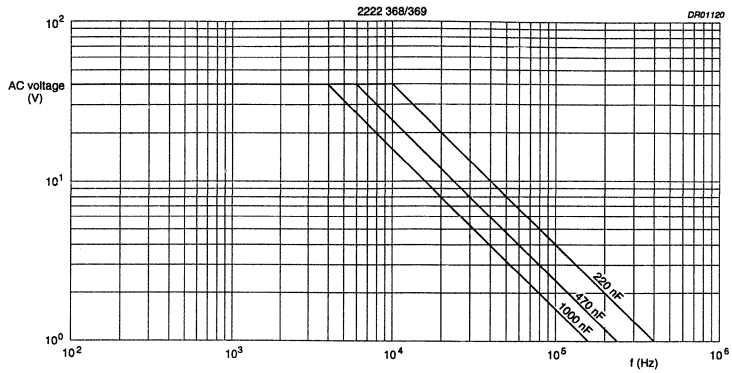

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 100 V (2222 365, 366 and 367 styles).



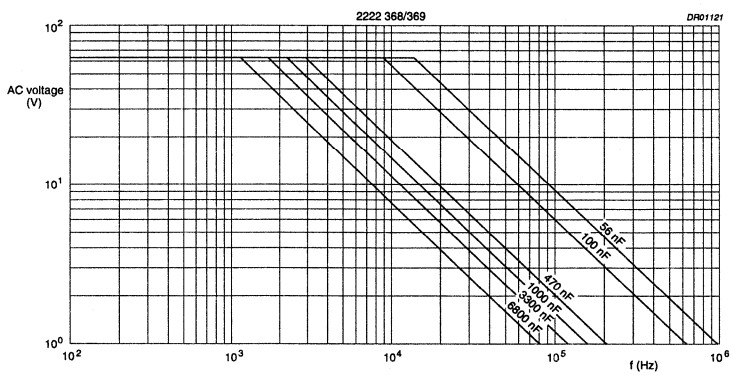

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V (2222 365, 366 and 367 styles).



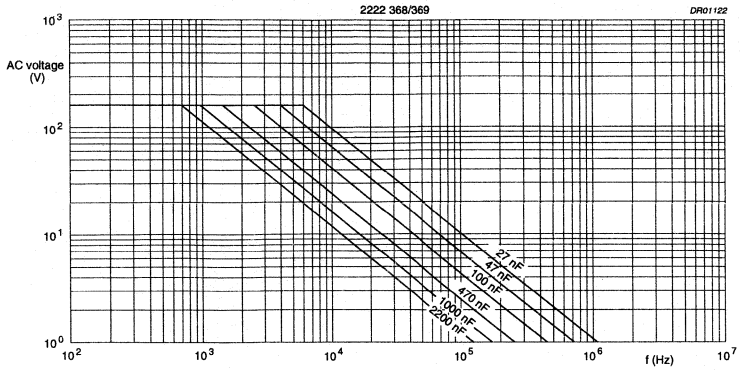

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 400$ V (2222 365, 366 and 367 styles).



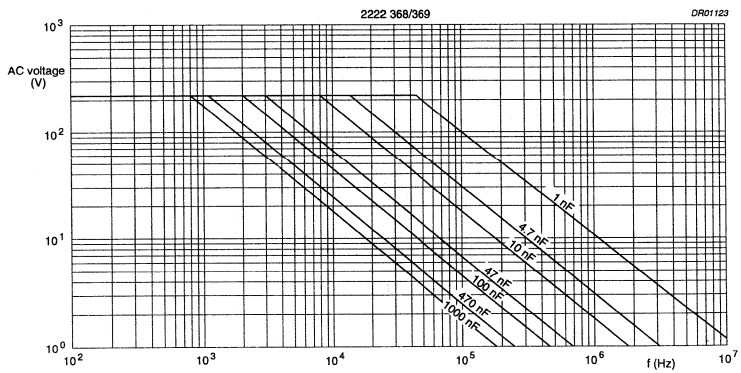

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 63 V (2222 368 and 369 styles).



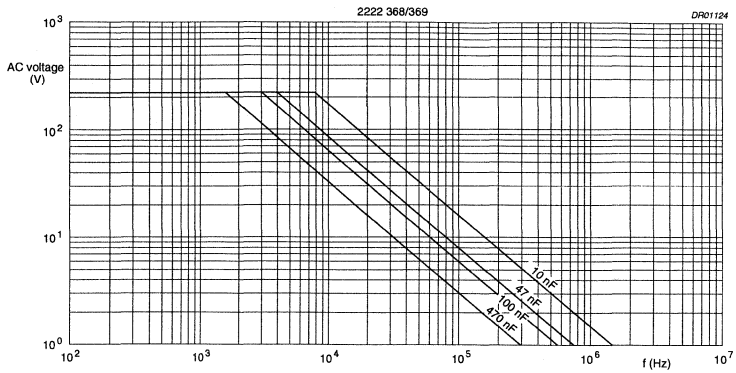

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 100 V (2222 368 and 369 styles).




AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V (2222 368 and 369 styles).




AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 400$ V (2222 368 and 369 styles).

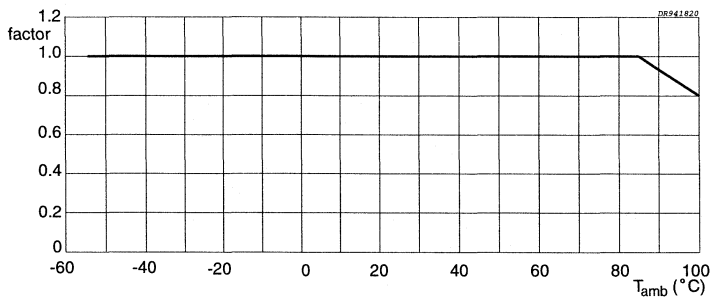



AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 630$ V (2222 368 and 369 styles).

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} > 85$°C**

The maximum RMS voltage in the graphs above has to be multiplied by a factor (see graph below).

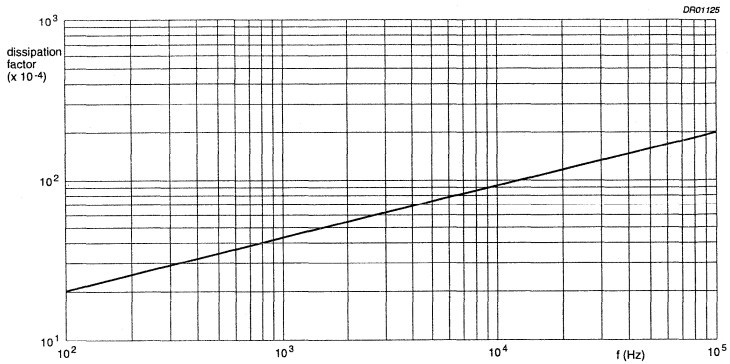
The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum dissipation as a function of ambient free air temperature".




Multiplying factor as a function of temperature.

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|
| | at 1 kHz | at 10 kHz | at 100 KHz |
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤225 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| C > 1 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curve.

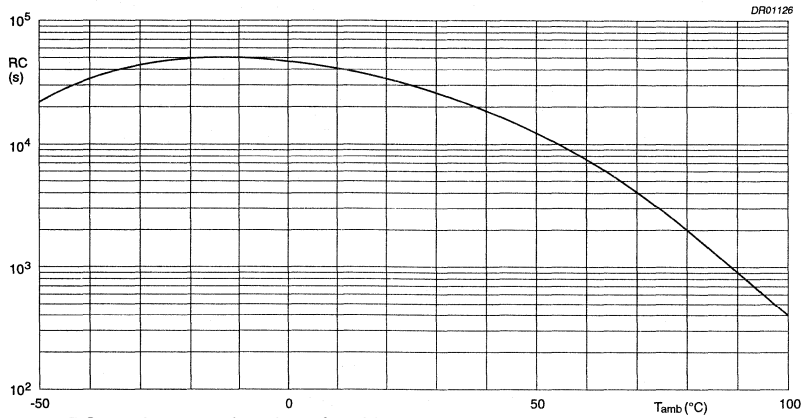
## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

The maximum pulse load values are valid for pulse voltages equal to the rated voltage.
For lower voltages the given values may be multiplied by $U_{Rdc}$ and divided by the applied voltage.

| RATED VOLTAGE (V) | MAXIMUM PULSE LOAD (V/µs) | | | | | |
|---|---|---|---|---|---|---|
| | 7.5 mm | 10.5 mm | 12.5 mm | 17.5 mm | 26 mm | 31 mm |
| 63 | 110 | 18 | 30 | – | – | – |
| 100 | 110 | 36 | 28 | 20 | 8 | 7 |
| 250 | – | 70 | 70 | 28 | 12 | 10 |
| 400 | – | 110 | 110 | 44 | 20 | 16 |
| 630 | – | – | 70 | 70 | 28 | 24 |

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 10 ±1 V for the 63 V version, 100 ±15 V for the 100 V, 250 V and 400 V versions and 500 ±50 V for the 630 V version.



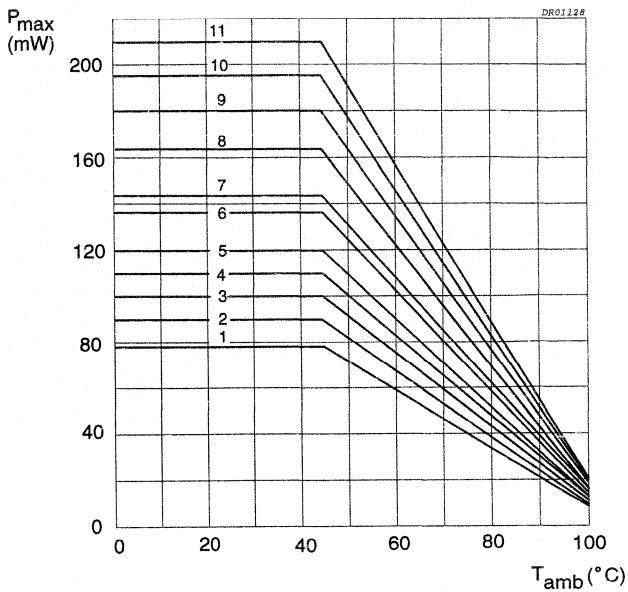

RC-product as a function of ambient free air temperature; typical curve.

- R between leads for C ≤ 0.33 µF
  - 63 V and 100 V versions: >15 000 MΩ
  - 250 V, 400 V and 630 V versions: >30 000 MΩ.
- RC between leads for C > 0.33 µF
  - 63 V and 100 V versions: >5 000 s
  - 250 V, 400 V and 630 V versions: >10 000 s.
- R between interconnected leads and case (foil method): >30 000 MΩ.

## MAXIMUM DISSIPATION

**Styles 2222 365, 366 and 367**

| CURVE | DIMENSIONS (mm) $b_{max}$ x $l_{max}$ |
|---|---|
| 1 | 3.5 x 7.5 |
| 2 | 4.0 x 7.5 |
| 3 | 4.5 x 7.5 |
| 4 | 5.0 x 7.5 |
| 5 | 5.5 x 7.5 |
| 6 | 6.0 x 7.5 |
| | 6.5 x 7.5 |
| 7 | 4.0 x 10.0 |
| | 4.5 x 10.0 |
| 8 | 4.5 x 10.5 |
| | 5.0 x 10.0 |
| 9 | 5.0 x 10.5 |
| | 5.5 x 10.0 |
| 10 | 5.5 x 10.5 |
| 11 | 6.0 x 10.5 |




Maximum dissipation as a function of ambient free air temperature.

## APPLICATION NOTE

To select the capacitor for a certain application, 6 conditions must be checked:

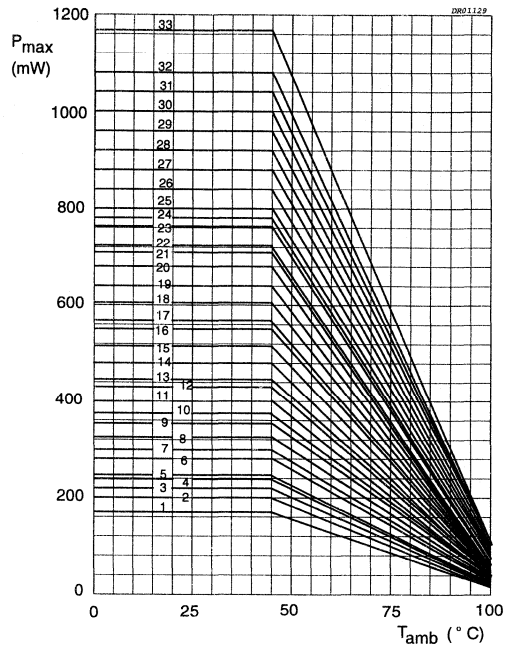
1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. The peak current ($I_p$) shall not exceed the maximum peak current, defined as maximum voltage pulse slope (dU/dt) multiplied by the capacitance.

$$I_p \text{ max.} = C \left(\frac{dU}{dt}\right) \text{ max.}$$

   Or the voltage pulse slope shall not exceed the rated voltage pulse slope. If the pulse voltage is lower than the rated voltage, the values of the table may be multiplied by $U_{Rdc}$ and divided by the applied voltage.
4. The dissipated power shall not be greater than the maximum permissible power dissipation
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.
6. Since all metallized film capacitors have an intrinsically active flammability risk, it is recommended that these capacitors should only be used in circuits where the power can be limited to less than 5 W to the capacitor, should a failure occur.

**Styles 2222 368 and 369**

| CURVE | DIMENSIONS (mm) $b_{max}$ x $l_{max}$ |
|---|---|
| 1 | 4.0 x 12.5 |
| 2 | 4.5 x 12.5 |
| 3 | 5.0 x 12.5 |
| 4 | 5.5 x 12.5 |
| 5 | 6.0 x 12.5 |
| 6 | 6.5 x 12.5 |
| | 4.5 x 17.5 |
| | 5.0 x 17.5 |
| 7 | 5.5 x 17.5 |
| 8 | 6.0 x 17.5 |
| 9 | 6.5 x 17.5 |
| 10 | 7.0 x 17.5 |
| 11 | 7.5 x 17.5 |
| 12 | 8.0 x 17.5 |
| 13 | 8.5 x 17.5 |
| 14 | 5.0 x 26.0 |
| 15 | 5.5 x 26.0 |
| 16 | 6.0 x 26.0 |
| 17 | 6.5 x 26.0 |
| 18 | 7.0 x 26.0 |
| 19 | 7.5 x 26.0 |
| 20 | 8.0 x 26.0 |
| 21 | 8.5 x 26.0 |
| 22 | 7.5 x 30.0 |
| 23 | 8.0 x 30.0 |
| 24 | 9.5 x 26.0 |
| 25 | 8.5 x 30.0 |
| 26 | 9.0 x 30.0 |
| 27 | 9.5 x 30.0 |
| 28 | 10.0 x 30.0 |
| 29 | 10.5 x 30.0 |
| 30 | 11.0 x 30.0 |
| 31 | 11.5 x 30.0 |
| 32 | 12.0 x 30.0 |
| 33 | 13.0 x 30.0 |




Maximum dissipation as a function of ambient free air temperature

For APPLICATION NOTE see styles 2222 365, 366 and 367.

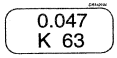
## PRODUCT MARKING

### Capacitors with a body length ≤7.5 mm

The capacitors are marked on the top in black ink with the following information:

- Rated capacitance code in pF or µF
- Tolerance on rated capacitance: M = ±20%; K = ±10%; J = ±5%
- Rated (DC) voltage.

EXAMPLE OF MARKING FOR CAPACITORS WITH A BODY LENGTH ≤7.5 MM

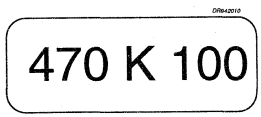



### Capacitors with a body length of 10 mm or 10.5 mm

The capacitors are marked on the top in black ink with the following information:

- Rated capacitance code in nF or µF.
- Tolerance on rated capacitance: K = ±10%; J = ±5%
- Rated (DC) voltage.

EXAMPLE OF MARKING FOR CAPACITORS WITH A BODY LENGTH OF 10 MM OR 10.5 MM

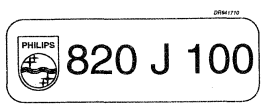



### Capacitors with a body length >10.5 mm

The capacitors are marked on the top in black ink with the following information:

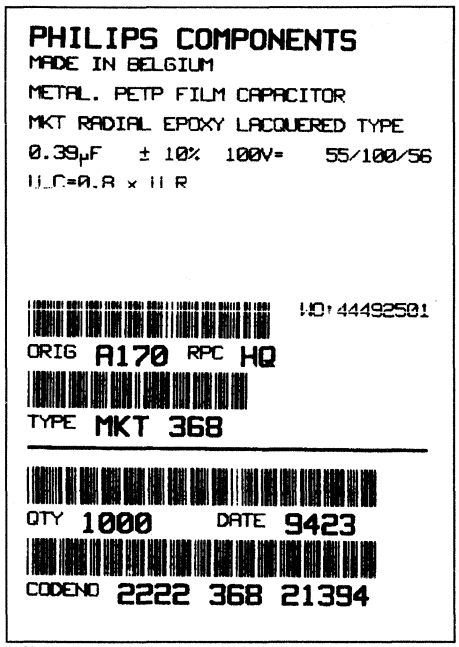
- Rated capacitance code in nF or µF
- Tolerance on rated capacitance: K = ±10%; J = ±5%
- Rated (DC) voltage
- Manufacturer's logo.

EXAMPLE OF MARKING FOR CAPACITORS WITH A BODY LENGTH >10.5 MM



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930110

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | – |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Metallized polyester film capacitors

# MKT 365/366/367/368/369

## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending | | no visible damage<br>legible marking |
| Resistance to soldering heat | solder bath: 260 °C; 10 s | $\Delta C/C \leq 2\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF) |
| Resistance to solvents | isopropyl alcohol; 23 °C; 5 minutes | $\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |
| **Robustness of component** | | |
| Vibration | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF) |
| Shock | half sinewave; 490 m/s$^2$; 11ms | $\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 100 °C | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C \leq 100$ nF) |
| Damp heat cyclic, first cycle | | $\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF< $C \leq 220$ nF) |
| Cold | 2 hours; –55 °C | $\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C$ > 470 nF) (*) |
| Damp heat, remaining cycles | | $R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C$ > 470 nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 2000 hours:<br>1.25 x $U_{Rdc}$; 85 °C<br>1.25 x $U_{Rdc}$; 100 °C | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 100 °C | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |
| Resistance to soldering heat with preheating | body temperature: 100 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 2\%$ ($C \leq 10$ nF)<br>$\Delta C/C \leq 1\%$ ($C$ > 10 nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |

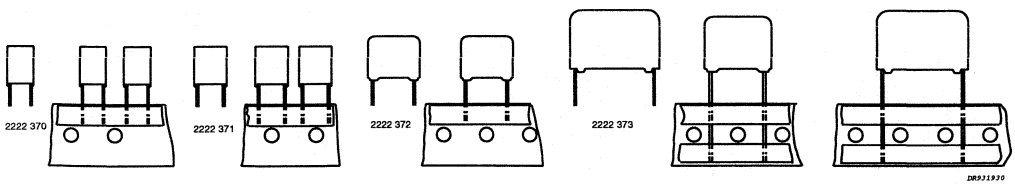
(*) Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C$ > 470 nF.

# Metallized polyester film capacitors

# MKT 370/371/372/373

## MKT RADIAL POTTED CAPACITORS

**Pitch 5/7.5/10/15/22.5/27.5 mm**



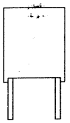

## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12) | 0.001 to 15 µF |
| Capacitance tolerance | ±20%, ±10%, ±5% |
| Rated voltage (DC) | 63 V, 100 V, 250 V, 400 V |
| Climatic category | 55/100/56 |
| Maximum application temperature | 100 °C |
| Rated temperature | 85 °C |
| Tangent of loss angle at 10 kHz | 100 x $10^{-4}$ |
| Reference specification | IEC 384-2, DIN 44122, DIN 45910 Draft |
| Performance grade | grade 1 (long life) |
| Qualified in accordance with | CECC 30 401-801 |

| FEATURES | APPLICATIONS |
|---|---|
| • Low-inductive wound cell of metallized (PETP) film<br>• Potted with epoxy resin in a blue flame-retardent case<br>• Radial leads of solder-coated wire<br>• Withstand solvents and rinsing liquids<br>• Small stand-off pips to allow removal of solder flux<br>• Suitable for high density packaging. | • Blocking and coupling<br>• Bypass and energy reservoir. |

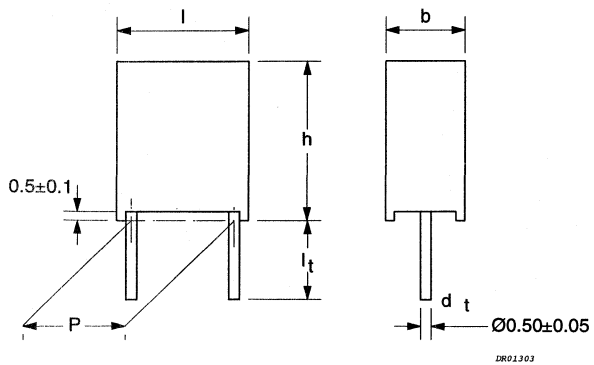
# Metallized polyester film capacitors

# MKT 370



**Pitch 5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 60 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |

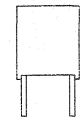
## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 75...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 76...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 74...** | on request |
| Ammopack | H = 16 mm * | C-tol ±20% | catalogue number **2222 370 77...** | on request |
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 370 78...** | on request |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 370 79...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 370 10...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 370 11...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 370 12...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±20% | catalogue number **2222 370 14...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 370 15...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 370 16...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 17...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 18...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 19...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 370



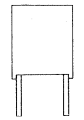
## $U_{Rdc}$ = 63 V  $U_{Rac}$ = 40 V  loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 370 ..... | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ammopack | | | reel | loose in box | |
| | | | H = 18.5 mm | | | | $l_t$ = 4.0 mm | $l_t$ = 26.0 mm |
| | | | C-tol ±10% | C-tol ±5% | SPQ | SPQ | SPQ | SPQ |
| | | | last 5 digits of catalogue number | | | | | |
| Pitch = 5.08 ±0.30 mm | | | | $d_t$ = 0.50 ±0.05 mm | | | | |
| 0.056 | 2.5 x 6.5 x 7.2 | 0.25 | 75563 | 76563 | 2000 | 2000 | 2000 | 1000 |
| 0.068 | | | 75683 | 76683 | | | | |
| 0.082 | | | 75823 | 76823 | | | | |
| 0.1 | | | 75104 | 76104 | | | | |
| 0.12 | | | 75124 | 76124 | | | | |
| 0.15 | | | 75154 | 76154 | | | | |
| 0.18 | | | 75184 | 76184 | | | | |
| 0.22 | 3.5 x 8.0 x 7.2 | 0.35 | 75224 | 76224 | 1500 | 1500 | 2000 | 1000 |
| 0.27 | | | 75274 | 76274 | | | | |
| 0.33 | | | 75334 | 76334 | | | | |
| 0.39 | | | 75394 | 76394 | | | | |
| 0.47 | | | 75474 | 76474 | | | | |
| 0.56 | 4.5 x 9.0 x 7.2 | 0.45 | 75564 | 76564 | 1000 | 1000 | 2000 | 1000 |
| 0.68 | | | 75684 | 76684 | | | | |
| 0.82 | 5.0 x 10.0 x 7.2 | 0.5 | 75824 | 76824 | 1000 | 1000 | 2000 | 1000 |
| 1 | 6.0 x 11.0 x 7.2 | 0.6 | 75105 | 75105 | 750 | 1000 | 2000 | 1000 |
| 1.2 | | | 75125 | 76125 | | | | |

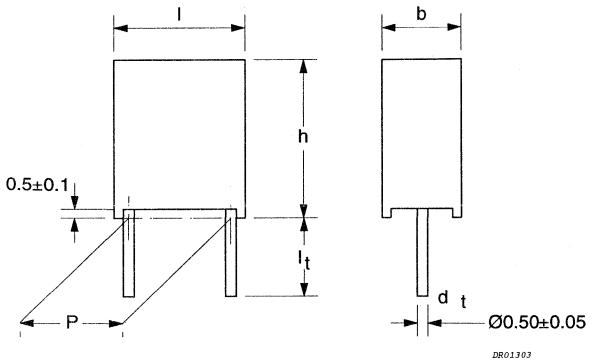
Preferred catalogue numbers

# Metallized polyester film capacitors

## MKT 370



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 110 V/µs | | |
| R between leads for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads for C > 0.33 µF | > 5 000 s | | |

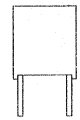
**AVAILABLE 100 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 85...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 86...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 84...** | on request |
| Ammopack | H = 16 mm * | C-tol ±20% | catalogue number **2222 370 87...** | on request |
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 370 88...** | on request |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 370 89...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 370 20...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 370 21...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 370 22...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±20% | catalogue number **2222 370 24...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 370 25...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 370 26...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 27...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 28...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 29...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 370



## $U_{Rdc}$ = 100 V

$U_{Rac}$ = 63 V

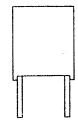
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 370 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | ammopack H = 18.5 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ | loose in box $l_t$ = 4.0 mm SPQ | loose in box $l_t$ = 26.0 mm SPQ |
|---|---|---|---|---|---|---|---|---|
| | | Pitch = 5.08 ±0.30 mm | | $d_t$ = 0.50 ±0.05 mm | | | | |
| 0.012 | 2.5 x 6.5 x 7.2 | 0.25 | 85123 | 86123 | 2000 | 2000 | 2000 | 1000 |
| 0.015 | | | 85153 | 86153 | | | | |
| 0.018 | | | 85183 | 86183 | | | | |
| 0.022 | | | 85223 | 86223 | | | | |
| 0.027 | | | 85273 | 86273 | | | | |
| 0.033 | | | 85333 | 86333 | | | | |
| 0.039 | | | 85393 | 86393 | | | | |
| 0.047 | | | 85473 | 86473 | | | | |
| 0.056 | | | 85563 | 86563 | | | | |
| 0.068 | | | 85683 | 86683 | | | | |
| 0.082 | | | 85823 | 86823 | | | | |
| 0.10 | 3.5 x 8.0 x 7.2 | 0.35 | 85104 | 86104 | 1500 | 1500 | 2000 | 1000 |
| 0.12 | | | 85124 | 86124 | | | | |
| 0.15 | | | 85154 | 86154 | | | | |
| 0.18 | | | 85184 | 86184 | | | | |
| 0.22 | 4.5 x 9.0 x 7.2 | 0.45 | 85224 | 86224 | 1000 | 1000 | 2000 | 1000 |
| 0.27 | | | 85274 | 86274 | | | | |
| 0.33 | 5.0 x 10.0 x 7.2 | 0.5 | 85334 | 86334 | 1000 | 1000 | 2000 | 1000 |
| 0.39 | 6.0 x 11.0 x 7.2 | 0.65 | 85394 | 86394 | 750 | 1000 | 2000 | 1000 |
| 0.47 | | | 85474 | 86474 | | | | |

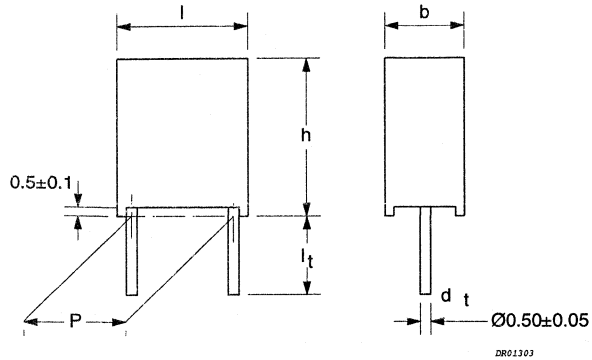
Preferred catalogue numbers

# Metallized polyester film capacitors

## MKT 370



**Pitch 5 mm**




### SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | 330 V/µs | | |
| R between leads | >30 000 MΩ | | |

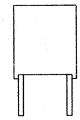
### AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 35...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 36...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 34...** | on request |
| Ammopack | H = 16 mm * | C-tol ±20% | catalogue number **2222 370 37...** | on request |
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 370 38...** | on request |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 370 39...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 370 40...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 370 41...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 370 42...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±20% | catalogue number **2222 370 44...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 370 45...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 370 46...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 47...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 48...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 49...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 370



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V

## loose and taped

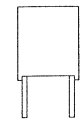
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 370 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | ammopack H = 18.5 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ | loose in box $l_1$ = 4.0 mm SPQ | loose in box $l_1$ = 26.0 mm SPQ |
|---|---|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm | | | | $d_1$ = 0.50 ±0.05 mm | | | | |
| 0.0039 ** | 2.5 x 6.5 x 7.2 | 0.25 | 35392 | 36392 | 2000 | 2000 | 2000 | 1000 |
| 0.0047 ** | | | 35472 | 36472 | | | | |
| 0.0056 ** | | | 35562 | 36562 | | | | |
| 0.0068 ** | | | 35682 | 36682 | | | | |
| 0.0082 | | | 35822 | 36822 | | | | |
| 0.01 | | | 35103 | 36103 | | | | |
| 0.012 | | | 35123 | 36123 | | | | |
| 0.015 | | | 35153 | 36153 | | | | |
| 0.018 | | | 35183 | 36183 | | | | |
| 0.022 | 3.5 x 8.0 x 7.2 | 0.35 | 35223 | 36223 | 1500 | 1500 | 2000 | 1000 |
| 0.027 | | | 35273 | 36273 | | | | |
| 0.033 | | | 35333 | 36333 | | | | |
| 0.039 | 4.5 x 9.0 x 7.2 | 0.45 | 35393 | 36393 | 1000 | 1000 | 2000 | 1000 |
| 0.047 | | | 35473 | 36473 | | | | |
| 0.056 | | | 35563 | 36563 | | | | |
| 0.068 | 5.0 x 10.0 x 7.2 | 0.5 | 35683 | 36683 | 1000 | 1000 | 2000 | 1000 |
| 0.082 | 6.0 x 11.0 x 7.2 | 0.6 | 35823 | 36823 | 750 | 1000 | 2000 | 1000 |
| 0.1 | | | 35104 | 36104 | | | | |

Preferred catalogue numbers

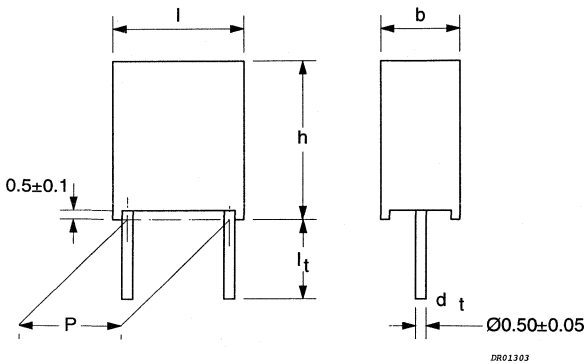
**** marked capacitance values are not CECC qualified.**

# Metallized polyester film capacitors

## MKT 370



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 630 V/µs | | |
| R between leads | >30 000 MΩ | | |

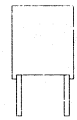
**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 65...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 66...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 64...** | on request |
| Ammopack | H = 16 mm * | C-tol ±20% | catalogue number **2222 370 67...** | on request |
| Ammopack | H = 16 mm * | C-tol ±10% | catalogue number **2222 370 68...** | on request |
| Ammopack | H = 16 mm * | C-tol ±5% | catalogue number **2222 370 69...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 370 50...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 370 51...** | on request |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 370 52...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±20% | catalogue number **2222 370 54...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 370 55...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 370 56...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 370 57...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 370 58...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 370 59...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 370



## $U_{Rdc}$ = 400 V $U_{Rac}$ = 220 V loose and taped

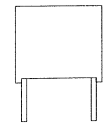
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 370 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | ammopack H = 18.5 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ | loose in box $l_t$= 4.0 mm SPQ | loose in box $l_t$= 26.0 mm SPQ |
|---|---|---|---|---|---|---|---|---|
| Pitch = 5.08 ±0.30 mm $d_t$ = 0.50 ±0.05 mm | | | | | | | | |
| 0.001 ** | 2.5 x 6.5 x 7.2 | 0.25 | 65102 | 66102 | 2000 | 2000 | 2000 | 1000 |
| 0.0012 ** | | | 65122 | 66122 | | | | |
| 0.0015 ** | | | 65152 | 66152 | | | | |
| 0.0018 ** | | | 65182 | 66182 | | | | |
| 0.0022 ** | | | 65222 | 66222 | | | | |
| 0.0027 ** | | | 65272 | 66272 | | | | |
| 0.0033 ** | | | 65332 | 66332 | | | | |
| 0.0039 | | | 65392 | 66392 | | | | |
| 0.0047 | | | 65472 | 66472 | | | | |
| 0.0056 | | | 65562 | 66562 | | | | |
| 0.0068 | | | 65682 | 66682 | | | | |
| 0.0082 | | | 65822 | 66822 | | | | |
| 0.01 | 3.5 x 8.0 x 7.2 | 0.35 | 65103 | 66103 | 1500 | 1500 | 2000 | 1000 |
| 0.012 | | | 65123 | 66123 | | | | |
| 0.015 | | | 65153 | 66153 | | | | |
| 0.018 | 4.5 x 9.0 x 7.2 | 0.45 | 65183 | 66183 | 1000 | 1000 | 2000 | 1000 |
| 0.022 | | | 65223 | 66223 | | | | |
| 0.027 | | | 65273 | 66273 | | | | |
| 0.033 | 6.0 x 11.0 x 7.2 | 0.6 | 65333 | 66333 | 750 | 1000 | 2000 | 1000 |
| 0.039 | | | 65393 | 66393 | | | | |
| 0.047 | | | 65473 | 66473 | | | | |

Preferred catalogue numbers

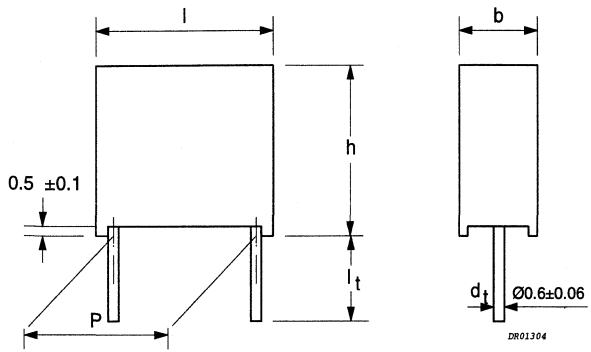
**** marked capacitance values are not CECC qualified.**

# Metallized polyester film capacitors

# MKT 371



**Pitch 7.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 18 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |

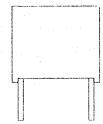
## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 371 11...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 371 12...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 38...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 39...** | preferred |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 371 15...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 371 16...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 35...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 36...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±10% | catalogue number **2222 371 18...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±5% | catalogue number **2222 371 19...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 371



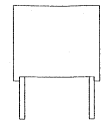
## $U_{Rdc}$ = 63 V  $U_{Rac}$ = 40 V  loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 371 ..... loose in box $l_t$=4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | loose in box $l_t$=4.0 +1.0/-0.5 mm C-tol ±5% last 5 digits of catalogue number | loose in box SPQ | loose in box $l_t$=26.0 mm SPQ | ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | ammopack H = 18.5 mm C-tol ±5% last 5 digits of catalogue number | ammopack SPQ | reel SPQ |
|---|---|---|---|---|---|---|---|---|---|---|
| Pitch = 7.62 +0.30/-0.40 mm | | | | | | $d_t$ = 0.60 ±0.06 mm | | | | |
| 0.056 | 2.5 x 6.5 x 10.0 | 0.3 | 11563 | 12563 | 1000 | 1000 | 38563 | 39563 | 2000 | 2000 |
| 0.068 | | | 11683 | 12683 | | | 38683 | 39683 | | |
| 0.082 | | | 11823 | 12823 | | | 38823 | 39823 | | |
| 0.1 | | | 11104 | 12104 | | | 38104 | 39104 | | |
| 0.12 | 3.0 x 8.0 x 10.0 | 0.4 | 11124 | 12124 | 1000 | 1000 | 38124 | 39124 | 1500 | 1500 |
| 0.15 | | | 11154 | 12154 | | | 38154 | 39154 | | |
| 0.18 | | | 11184 | 12184 | | | 38184 | 39184 | | |
| 0.22 | | | 11224 | 12224 | | | 38224 | 39224 | | |
| 0.27 | 4.0 x 9.0 x 10.0 | 0.5 | 11274 | 12274 | 1000 | 1000 | 38274 | 39274 | 1000 | 1500 |
| 0.33 | | | 11334 | 12334 | | | 38334 | 39334 | | |
| 0.39 | | | 11394 | 12394 | | | 38394 | 39394 | | |
| 0.47 | | | 11474 | 12474 | | | 38474 | 39474 | | |
| 0.56 | 5.0 x 10.5 x 10.0 | 0.65 | 11564 | 12564 | 1000 | 1000 | 38564 | 39564 | 1000 | 1000 |
| 0.68 | | | 11684 | 12684 | | | 38684 | 39684 | | |
| 0.82 | | | 11824 | 12824 | | | 38824 | 39824 | | |
| 1 | | | 11105 | 12105 | | | 38105 | 39105 | | |

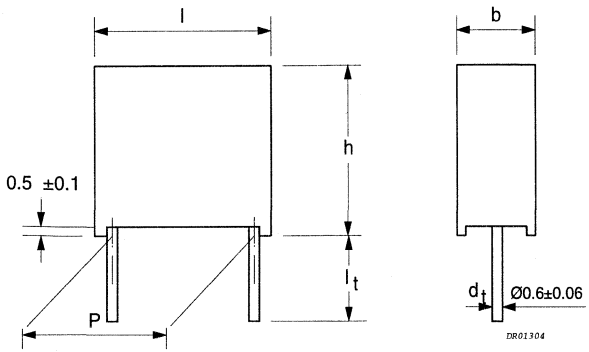
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 371



**Pitch 7.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 36 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |

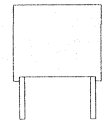
## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box, | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 371 21...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 371 22...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 68...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 69...** | preferred |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 371 25...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 371 26...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 65...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 66...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±10% | catalogue number **2222 371 28...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±5% | catalogue number **2222 371 29...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 371



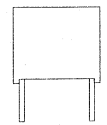
## $U_{Rdc}$ = 100 V $U_{Rac}$ = 63 V loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 371 ..... loose in box $l_t$=4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | loose in box $l_t$=26.0 mm SPQ | ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|---|---|---|---|---|
| Pitch = 7.62 +0.30/-0.40 mm | | | | | | $d_t$ = 0.60 ±0.06 mm | | | | |
| 0.018 | 2.5 x 6.5 x 10.0 | 0.3 | 21183 | 22183 | 1000 | 1000 | 68183 | 69183 | 2000 | 2000 |
| 0.022 | | | 21223 | 22223 | | | 68223 | 69223 | | |
| 0.027 | | | 21273 | 22273 | | | 68273 | 69273 | | |
| 0.033 | | | 21333 | 22333 | | | 68333 | 69333 | | |
| 0.039 | | | 21393 | 22393 | | | 68393 | 69393 | | |
| 0.047 | | | 21473 | 22473 | | | 68473 | 69473 | | |
| 0.056 | 3.0 x 8.0 x 10.0 | 0.4 | 21563 | 22563 | 1000 | 1000 | 68563 | 69563 | 1500 | 1500 |
| 0.068 | | | 21683 | 22683 | | | 68683 | 69683 | | |
| 0.082 | | | 21823 | 22823 | | | 68823 | 69823 | | |
| 0.10 | | | 21104 | 22104 | | | 68104 | 69104 | | |
| 0.12 | 4.0 x 9.0 x 10.0 | 0.5 | 21124 | 22124 | 1000 | 1000 | 68124 | 69124 | 1000 | 1500 |
| 0.15 | | | 21154 | 22154 | | | 68154 | 69154 | | |
| 0.18 | | | 21184 | 22184 | | | 68184 | 69184 | | |
| 0.22 | | | 21224 | 22224 | | | 68224 | 69224 | | |
| 0.27 | 5.0 x 10.5 x 10.0 | 0.7 | 21274 | 22274 | 1000 | 1000 | 68274 | 69274 | 1000 | 1000 |
| 0.33 | | | 21334 | 22334 | | | 68334 | 69334 | | |
| 0.39 | | | 21394 | 22394 | | | 68394 | 69394 | | |
| 0.47 | | | 21474 | 22474 | | | 68474 | 69474 | | |

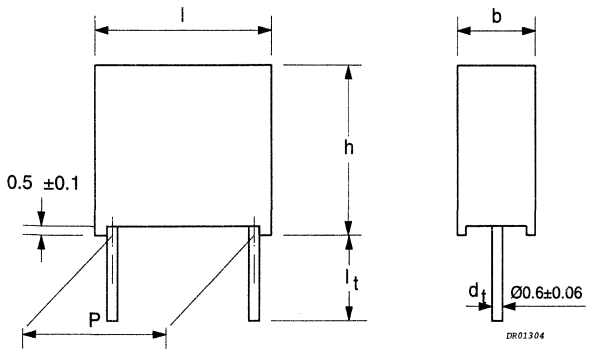
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 371



**Pitch 7.5 mm**




**SPECIFIC REFERENCE DATA THE FOR 250 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 250 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 70 V/µs | | |
| R between leads | >30 000 MΩ | | |

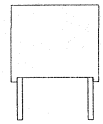
**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 371 41...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 371 42...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 78...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 79...** | preferred |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 371 45...** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 371 46...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 75...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 76...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±10% | catalogue number **2222 371 48...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±5% | catalogue number **2222 371 48...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 371



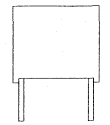
## $U_{Rdc}$ = 250 V $U_{Rac}$ = 160 V loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 371 ..... loose in box $l_t$=4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | loose in box $l_t$=26.0 mm SPQ | ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|---|---|---|---|---|
| Pitch = 7.62 +0.30/-0.40 mm | | | | | | $d_t$ = 0.60 ±0.06 mm | | | | |
| 0.0082 | 2.5 x 6.5 x 10.0 | 0.3 | 41822 | 42822 | 1000 | 1000 | 78822 | 79822 | 2000 | 2000 |
| 0.01 | | | 41103 | 42103 | | | 78103 | 79103 | | |
| 0.012 | | | 41123 | 42123 | | | 78123 | 79123 | | |
| 0.015 | | | 41153 | 42153 | | | 78153 | 79153 | | |
| 0.018 | 3.0 x 8.0 x 10.0 | 0.4 | 41183 | 42183 | 1000 | 1000 | 78183 | 79183 | 1500 | 1500 |
| 0.022 | | | 41223 | 42223 | | | 78223 | 79223 | | |
| 0.027 | | | 41273 | 42273 | | | 78273 | 79273 | | |
| 0.033 | | | 41333 | 42333 | | | 78333 | 79333 | | |
| 0.039 | | | 41393 | 42393 | | | 78393 | 79393 | | |
| 0.047 | | | 41473 | 42473 | | | 78473 | 79473 | | |
| 0.056 | 4.0 x 9.0 x 10.0 | 0.5 | 41563 | 42563 | 1000 | 1000 | 78563 | 79563 | 1000 | 1500 |
| 0.068 | | | 41683 | 42683 | | | 78683 | 79683 | | |
| 0.082 | | | 41823 | 42823 | | | 78823 | 79823 | | |
| 0.1 | | | 41104 | 42104 | | | 78104 | 79104 | | |

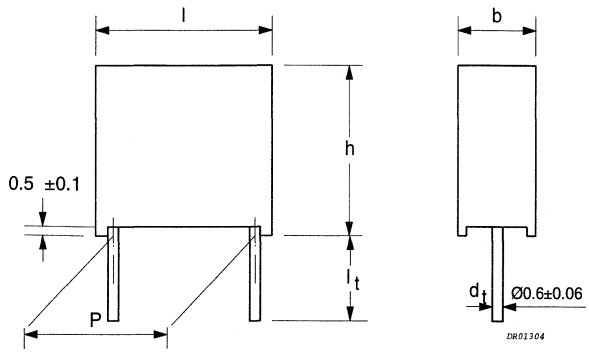
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 371



**Pitch 7.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 250 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 190 V/µs | | |
| R between leads | >30 000 MΩ | | |

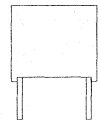
## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 371 51...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 371 52..** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 88...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 89..** | preferred |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 371 55..** | on request |
| Loose in box | $l_t$ = 26.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 371 56...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 371 85...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 371 86...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±10% | catalogue number **2222 371 58...** | on request |
| Taped on reel | H = 16.5 mm * | C-tol ±5% | catalogue number **2222 371 59...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 371



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 220 V

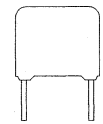
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 371 ..... | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | loose in box | | | | ammopack | | | reel |
| | | | $l_t$ = 4.0 +1.0/-0.5 mm | | | $l_t$=26.0 mm | H = 18.5 mm | | | |
| | | | C-tol ±10% | C-tol ±5% | SPQ | SPQ | C-tol ±10% | C-tol ±5% | SPQ | SPQ |
| | | | last 5 digits of catalogue number | | | | last 5 digits of catalogue number | | | |
| Pitch = 7.62 +0.30/-0.40 mm | | | | | | $d_t$ = 0.60 ±0.06 mm | | | | |
| 0.0039 | 2.5 x 6.5 x 10.0 | 0.3 | 51392 | 52392 | 1000 | 1000 | 88392 | 89392 | 2000 | 2000 |
| 0.0047 | | | 51472 | 52472 | | | 88472 | 89472 | | |
| 0.0056 | | | 51562 | 52562 | | | 88562 | 89562 | | |
| 0.0068 | | | 51682 | 52682 | | | 88682 | 89682 | | |
| 0.0082 | 3.0 x 8.0 x 10.0 | 0.4 | 51822 | 52822 | 1000 | 1000 | 88822 | 89822 | 1500 | 1500 |
| 0.01 | | | 51103 | 52103 | | | 88103 | 89103 | | |
| 0.012 | 4.0 x 9.0 x 10.0 | 0.5 | 51123 | 52123 | 1000 | 1000 | 88123 | 89123 | 1000 | 1500 |
| 0.015 | | | 51153 | 52153 | | | 88153 | 89153 | | |

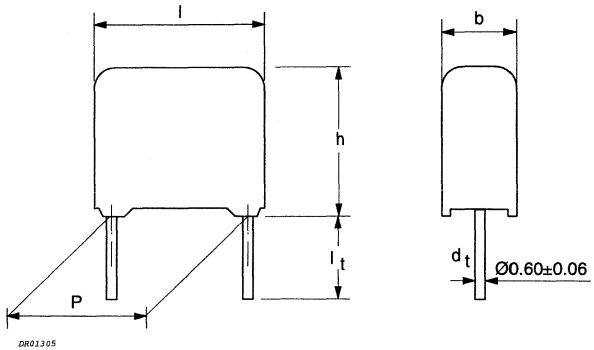
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 372



**Pitch 10 mm**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| $C \leq 0.1$ µF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 250 \times 10^{-4}$ |
| $0.1$ µF $< C \leq 0.47$ µF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 300 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 34 V/µs | | |
| R between leads, for $C \leq 0.33$ µF | 15 000 MΩ | | |
| RC between leads, for $C > 0.33$ µF | >5000 s | | |

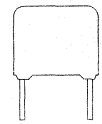
## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 372 21...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 372 22...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 372 25...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 372 26...** | on request |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 372 28...** | on request |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 372 29...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 372



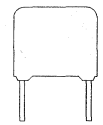
## $U_{Rdc}$ = 100 V $U_{Rac}$ = 63 V loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 372 ..... loose in box $l_1$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel H = 18.5 mm SPQ | ammopack H = 18.5 mm SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm $d_1$ = 0.60 ±0.06 mm | | | | | | |
| 0.1 | 4.0 x 9.0 x 12.5 | 0.55 | 21104 | 1000 | 1400 | 750 |
| 0.12 | | | 21124 | | | |
| 0.15 | | | 21154 | | | |
| 0.18 | | | 21184 | | | |
| 0.22 | | | 21224 | | | |
| 0.27 | 4.0 x 10.0 x 12.5 | 0.6 | 21274 | 1000 | 1400 | 750 |
| 0.33 | | | 21334 | | | |
| 0.39 | 5.0 x 11.0 x 12.5 | 0.85 | 21394 | 1000 | 1100 | 600 |
| 0.47 | | | 21474 | | | |

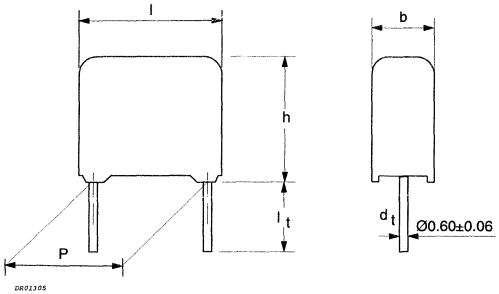
Preferred catalogue numbers

# Metallized polyester film capacitors

## MKT 372



**Pitch 10 mm**




### SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| $C \leq 0.1$ µF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 250 \times 10^{-4}$ |
| $0.1$ µF $< C \leq 0.47$ µF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 300 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 50 V/µs | | |
| R between leads, for $C \leq 0.33$ µF | 30 000 MΩ | | |

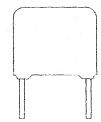
### AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 372 41...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 372 42...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 372 45...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 372 46...** | on request |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 372 48...** | on request |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 372 49...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 372



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V

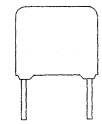
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 372 ..... loose in box $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel H = 18.5 mm SPQ | ammopack H = 18.5 mm SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm $d_t$ = 0.60 ±0.06 mm | | | | | | |
| 0.047 | 4.0 x 9.0 x 12.5 | 0.55 | 41473 | 1000 | 1400 | 750 |
| 0.056 | | | 41563 | | | |
| 0.068 | | | 41683 | | | |
| 0.082 | 4.0 x 10.0 x 12.5 | 0.6 | 41823 | 1000 | 1400 | 750 |
| 0.1 | | | 41104 | | | |
| 0.12 | 5.0 x 11.0 x 12.5 | 0.85 | 41124 | 1000 | 1100 | 600 |
| 0.15 | | | 41154 | | | |

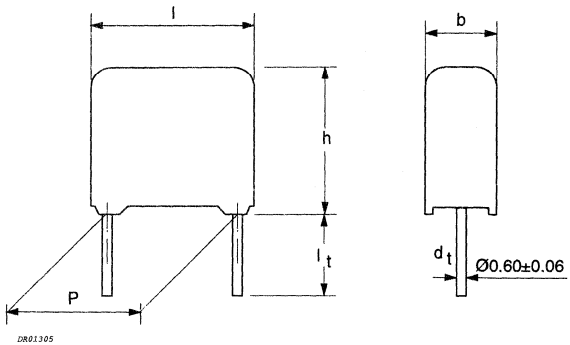
Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 372



**Pitch 10 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 250 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 80 V/µs | | |
| R between leads | 30 000 MΩ | | |

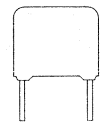
## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 372 51...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±5% | catalogue number **2222 372 52...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 372 55...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 372 56...** | on request |
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 372 58...** | on request |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 372 59...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 372



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 220 V

## loose and taped

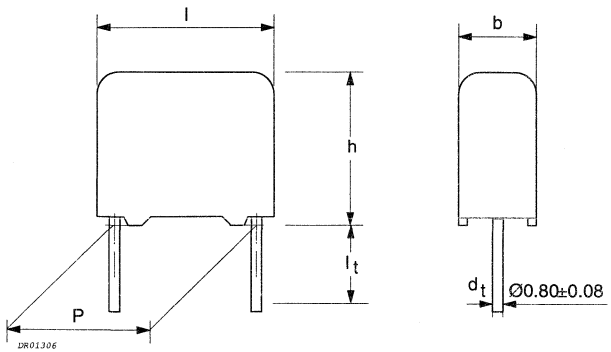
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 372 ..... loose in box $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel H = 18.5 mm SPQ | ammopack H = 18.5 mm SPQ |
|---|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm $d_t$ = 0.60 ±0.06 mm | | | | | | |
| 0.0047 | 4.0 x 9.0 x 12.5 | 0.55 | 51472 | 1000 | 1400 | 750 |
| 0.0056 | | | 51562 | | | |
| 0.0068 | | | 51682 | | | |
| 0.0082 | | | 51822 | | | |
| 0.01 | | | 51103 | | | |
| 0.012 | | | 51123 | | | |
| 0.015 | | | 51153 | | | |
| 0.018 | | | 51183 | | | |
| 0.022 | | | 51223 | | | |
| 0.027 | 4.0 x 10.0 x 12.5 | 0.6 | 51273 | 1000 | 1400 | 750 |
| 0.033 | | | 51333 | | | |
| 0.039 | 5.0 x 11.0 x 12.5 | 0.85 | 51393 | 1000 | 1100 | 600 |
| 0.047 | | | 51473 | | | |

Preferred catalogue numbers

# Metallized polyester film capacitors

# MKT 373

**Pitch 15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| 1 µF < C ≤ 10 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |
| C > 10 µF | ≤75 x $10^{-4}$ | – | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ P = 15 mm | 14 V/µs | | |
| P = 22.5 mm | 5 V/µs | | |
| P = 27.5 mm | 4 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |

## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 373 21...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 373 22...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 373 25...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 373 26...** | on request |

**Available on request**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 373 ..... loose in box; $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | taped on reel; H = 18.5 mm * C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | | | | |
| 1.5 | 6.0 x 15.5 x 26.0 | 2.5 | 90012 | 90013 | 200 | 90018 | 90019 | 600 |
| 1.8 | 7.0 x 16.5 x 26.0 | 3.2 | 90022 | 90023 | 200 | 90028 | 90029 | 550 |
| 2.2 | | | 90002 | 90003 | | 90008 | 90009 | |
| Pitch = 27.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | | | | |
| 4.7 | 9.0 x 19.0 x 31.0 | 5.8 | 90032 | 90033 | 100 | 90038 | 90039 | 400 |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

# MKT 373

## $U_{Rdc}$ = 100 V

$U_{Rac}$ = 63 V

**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 373 ..... loose in box lt = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel H = 18.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.33 | 5.0 x 11.0 x 17.5 | 1.1 | 21334 | 1000 | 1100 |
| 0.39 | | | 21394 | | |
| 0.47 | | | 21474 | | |
| 0.56 | | | 21564 | | |
| 0.68 | | | 21684 | | |
| 0.82 | 6.0 x 12.0 x 17.5 | 1.4 | 21824 | 1000 | 900 |
| 1 | | | 21105 | | |
| 1.2 | 7.0 x 13.5 x 17.5 | 1.9 | 21125 | 1000 | 800 |
| 1.5 | | | 21155 | | |
| 1.8 | 8.5 x 15.0 x 17.5 | 2.6 | 21185 | 1000 | 650 |
| 2.2 ** | | | 21225 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 2.7 | 8.5 x 18.0 x 26.0 | 4.4 | 21275 | 200 | 450 |
| 3.3 | | | 21335 | | |
| 3.9 | 10.0 x 19.5 x 26.0 | 5.5 | 21395 | 200 | 350 |
| 4.7 ** | | | 21475 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 5.6 | 11.0 x 21.0 x 31.0 | 8.0 | 21565 | 100 | 300 |
| 6.8 | | | 21685 | | |
| 8.2 | 13.0 x 23.0 x 31.0 | 10.5 | 21825 | 100 | 250 |
| 10 | | | 21106 | | |
| 12 | 18.0 x 28.0 x 31.0 | 17.5 | 21126 | 100 | 150 |
| 15 | | | 21156 | | |

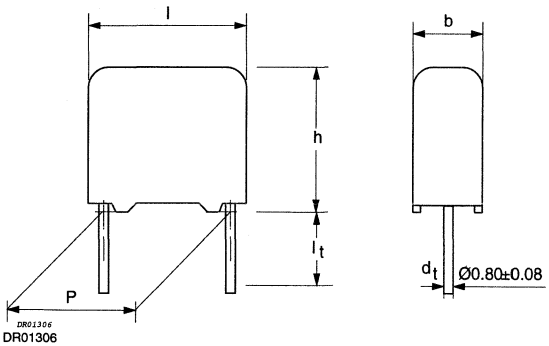
Preferred catalogue numbers

**** marked capacitance values are not CECC qualified.**

# Metallized polyester film capacitors

# MKT 373

**Pitch 15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| 0.15 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| 1 µF < C ≤ 4.7 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |
| Rated voltage pulse slope (dU/dt) at $U_{Rdc}$ P = 15 mm | 16 V/µs | | |
| P = 22.5 mm | 7 V/µs | | |
| P = 27.5 mm | 6 V/µs | | |
| R between leads, for C ≤ 0.33 µF | > 30000 MΩ | | |
| RC between leads, for C > 0.33 µF | > 10000 s | | |

## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 373 41...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 373 42...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 373 45...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 373 46...** | on request |

**Available on request**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 373 ..... loose in box; $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | taped on reel; H = 18.5 mm * C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | | | | |
| 0.47 | 6.0 x 15.5 x 26.0 | 2.5 | 90042 | 90043 | 200 | 90048 | 90049 | 600 |
| 0.56 | | | 90052 | 90053 | | 90058 | 90059 | |
| 0.68 | | | 90062 | 90063 | | 90068 | 90069 | |
| 0.82 | 7.0 x 16.5 x 26.0 | 3.2 | 90072 | 90073 | 200 | 90078 | 90079 | 550 |
| 1 | | | 90082 | 90083 | | 90088 | 90089 | |
| Pitch = 27.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | | | | |
| 1.2 | 9.0 x 19.0 x 31.0 | 5.8 | 90172 | 90173 | 100 | 90174 | 90175 | 400 |
| 1.5 | | | 90092 | 90093 | | 90098 | 90099 | |
| 1.8 | 11.0 x 21.0 x 31.0 | 7.8 | 90102 | 90103 | 100 | 90108 | 90109 | 300 |
| 2.2 | | | 90112 | 90113 | | 90118 | 90119 | |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 373

## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V

**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 373 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel H = 18.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.15 | 5.0 x 11.0 x 17.5 | 1.1 | 41154 | 1000 | 1100 |
| 0.18 | | | 41184 | | |
| 0.22 | | | 41224 | | |
| 0.27 | 6.0 x 12.0 x 17.5 | 1.4 | 41274 | 1000 | 900 |
| 0.33 | | | 41334 | | |
| 0.39 | | | 41394 | | |
| 0.47 ** | | | 41474 | | |
| 0.56 ** | 7.0 x 13.5 x 17.5 | 1.9 | 41564 | 1000 | 800 |
| 0.68 ** | | | 41684 | | |
| 0.82 ** | 8.5 x 15.0 x 17.5 | 2.6 | 41824 | 1000 | 650 |
| 1 ** | | | 41105 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 1.2 | 8.5 x 18.0 x 26.0 | 4.4 | 41125 | 200 | 450 |
| 1.5 ** | | | 41155 | | |
| 1.8 ** | 10.0 x 19.5 x 26.0 | 5.5 | 41185 | 200 | 350 |
| 2.2 ** | | | 41225 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 2.7 | 13.0 x 23.0 x 31.0 | 10.4 | 41275 | 100 | 250 |
| 3.3 | | | 41335 | | |
| 3.9 | 15.0 x 25.0 x 31.0 | 12.5 | 41395 | 100 | 200 |
| 4.7 | | | 41475 | | |

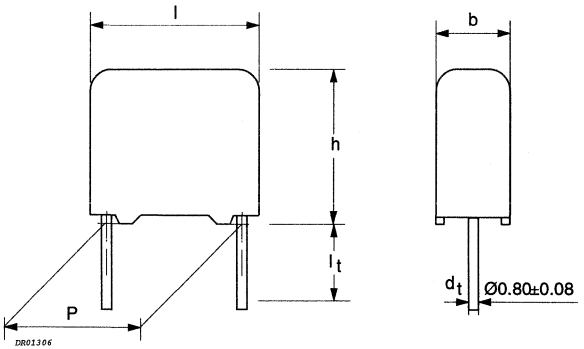
Preferred catalogue numbers

**** marked capacitance values are not CECC qualified.**

# Metallized polyester film capacitors

# MKT 373

**Pitch 15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤ 250 x $10^{-4}$ |
| 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤ 300 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| 1 µF < C ≤ 1.5 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ P = 15 mm | 34 V/µs | | |
| P = 22.5 mm | 14 V/µs | | |
| P = 27.5 mm | 12 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >10 000 s | | |

## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 373 51...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 373 52...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 373 55...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 373 56...** | on request |

**Available on request**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 373 ..... loose in box; $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | C-tol ±5% last 5 digits of catalogue number | SPQ | taped on reel; H = 18.5 mm * C-tol±10% last 5 digits of catalogue number | C-tol±5% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | | | | |
| 0.22 | 6.0 x 15.5 x 26.0 | 2.5 | 90122 | 90123 | 200 | 90128 | 90129 | 600 |
| 0.27 | 7.0 x 16.5 x 26.0 | 3.2 | 90132 | 90133 | 200 | 90138 | 90139 | 550 |
| 0.33 | | | 90142 | 90143 | | 90148 | 90149 | |
| Pitch = 27.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | | | | |
| 0.68 | 9.0 x 19.0 x 31.0 | 5.8 | 90152 | 90153 | 100 | 90158 | 90159 | 400 |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polyester film capacitors

MKT 373

## $U_{Rdc}$ = 400 V $U_{Rac}$ = 220 V loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 373 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel H = 18.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.047 | 5.0 x 11.0 x 17.5 | 1.1 | 51473 | 1000 | 1100 |
| 0.056 | | | 51563 | | |
| 0.068 | | | 51683 | | |
| 0.082 | | | 51823 | | |
| 0.1 | | | 51104 | | |
| 0.12 | 6.0 x 12.0 x 17.5 | 1.4 | 51124 | 1000 | 900 |
| 0.15 | | | 51154 | | |
| 0.18 | 7.0 x 13.5 x 17.5 | 1.9 | 51184 | 1000 | 800 |
| 0.22 ** | | | 51224 | | |
| 0.27 ** | 8.5 x 15.0 x 17.5 | 2.6 | 51274 | 1000 | 650 |
| 0.33 ** | | | 51334 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.39 | 8.5 x 18.0 x 26.0 | 4.4 | 51394 | 200 | 450 |
| 0.47 | | | 51474 | | |
| 0.56 | 10.0 x 19.5 x 26.0 | 4.4 | 51564 | 200 | 350 |
| 0.68 ** | | 5.5 | 51684 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.82 | 11.0 x 21.0 x 31.0 | 7.8 | 51824 | 100 | 300 |
| 1 | | | 51105 | | |
| 1.2 | 15.0 x 25.0 x 31.0 | 12.8 | 51125 | 100 | 200 |
| 1.5 | | | 51155 | | |

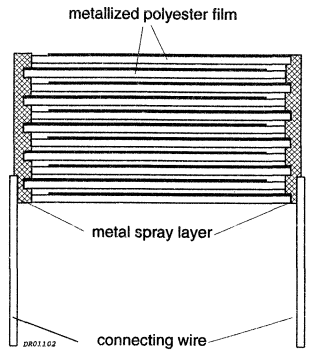
Preferred catalogue numbers

**** marked capacitance values are not CECC qualified.**

# Metallized polyester film capacitors



## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polyethyleneterephthalate (PETP) film, potted with epoxy resin in a blue flame-retardent case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

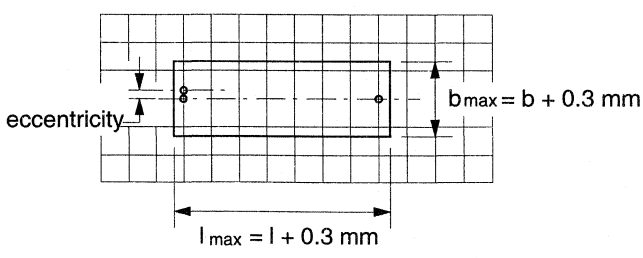
### Specific method of mounting to withstand vibration and shock

It must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches ≤15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors is shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the wire diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

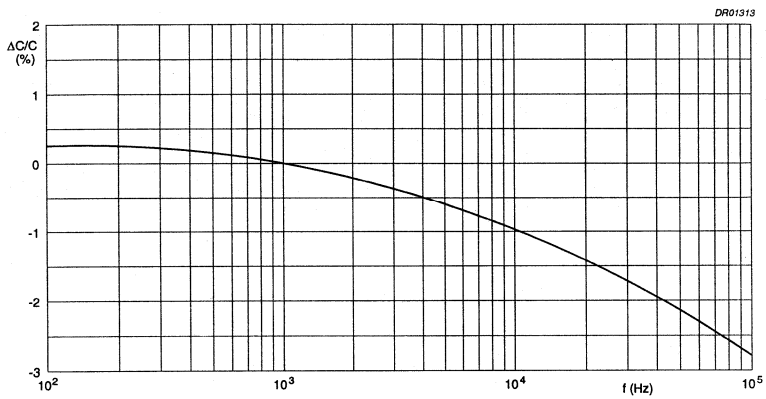
## RATINGS AND CHARACTERISTICS

Unless otherwise specified, all electrical values apply to an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

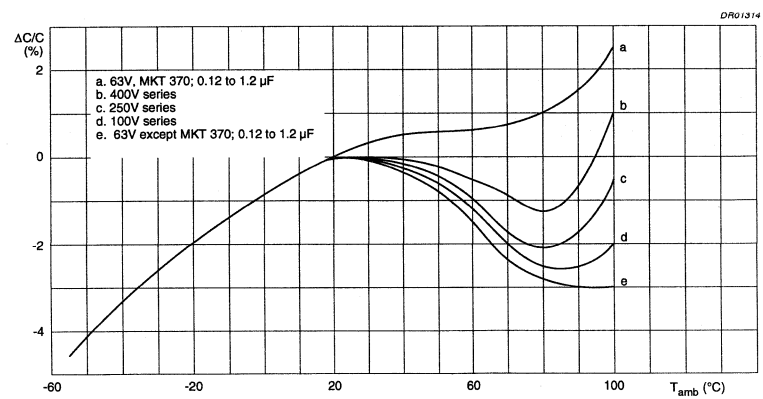
For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance change as a function of frequency; typical curve.




Capacitance change as a function of ambient free air temperature; typical curves.

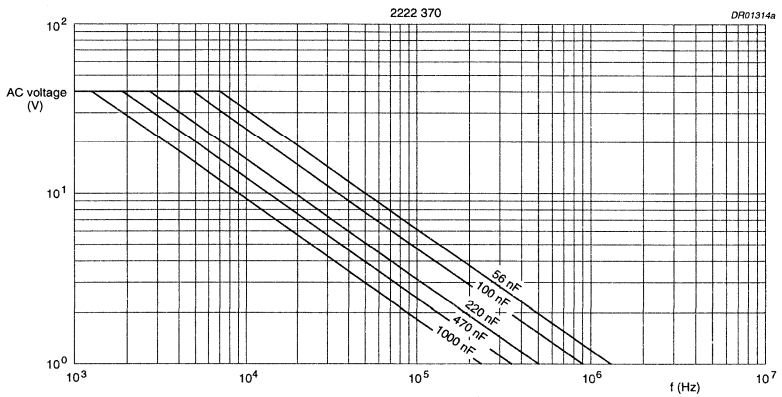
## TEMPERATURE

- Storage temperature: $T_{stg}$ = −25 °C to +40 °C with RH maximum 80% without condensation.

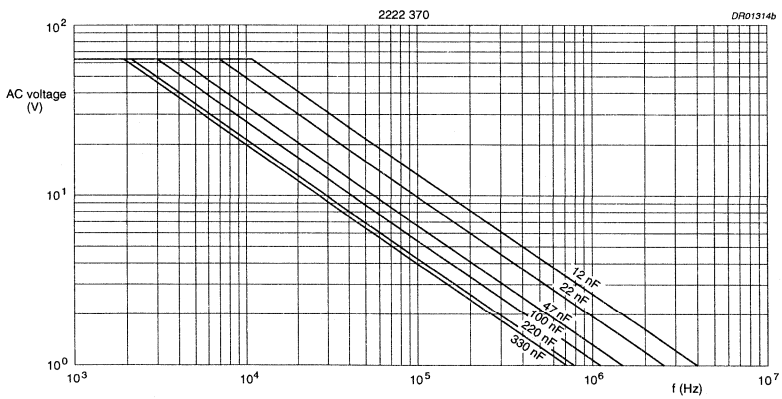
## VOLTAGE

- Category voltage: $U_c = 0.8 \times U_{Rdc}$.
- Test voltage between leads: $1.6 \times U_{Rdc}$.
- Test voltage between interconnected leads and case (foil method): $2 \times U_{Rdc}$ (min. 200 V).

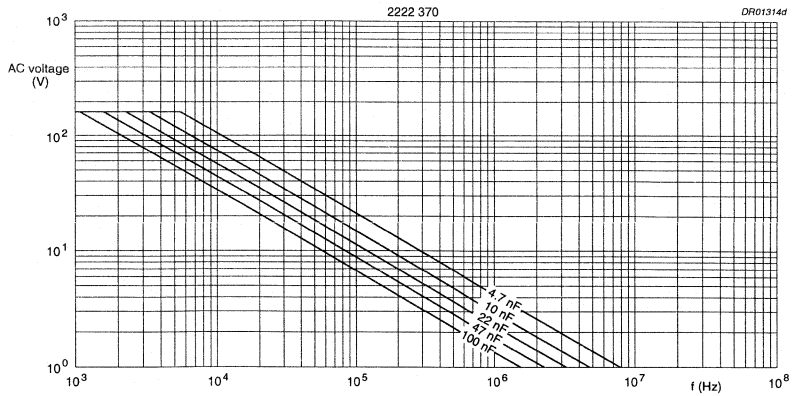
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 85$°C (see graphs below)**



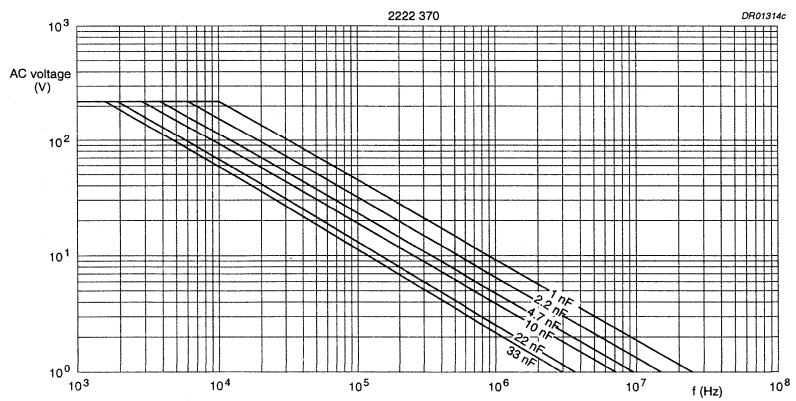

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 63 V.



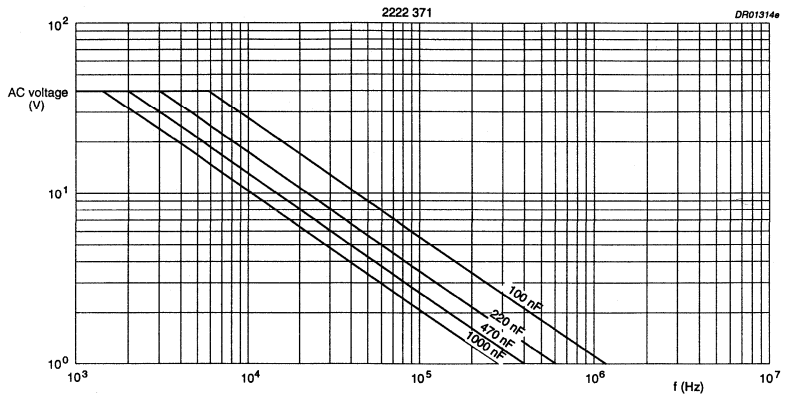

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 100 V.



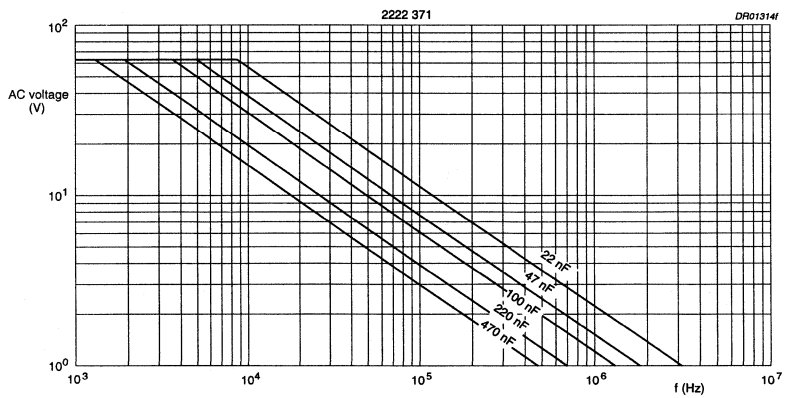

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V.



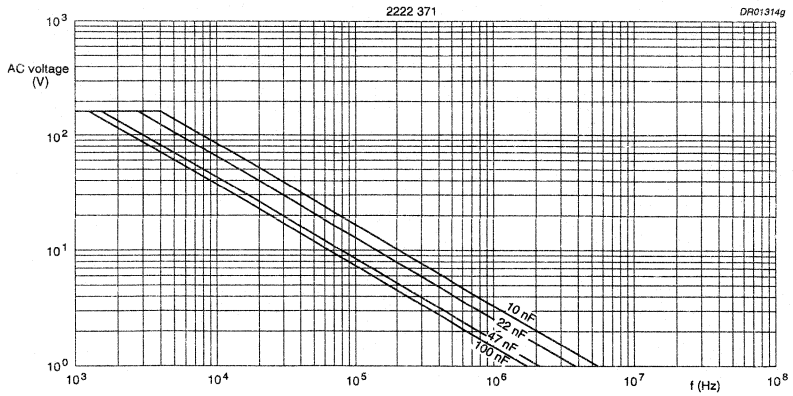

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 400$ V.



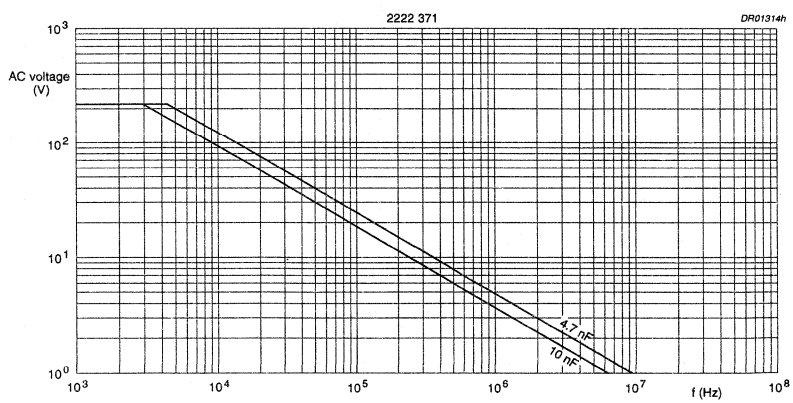

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 63$ V.



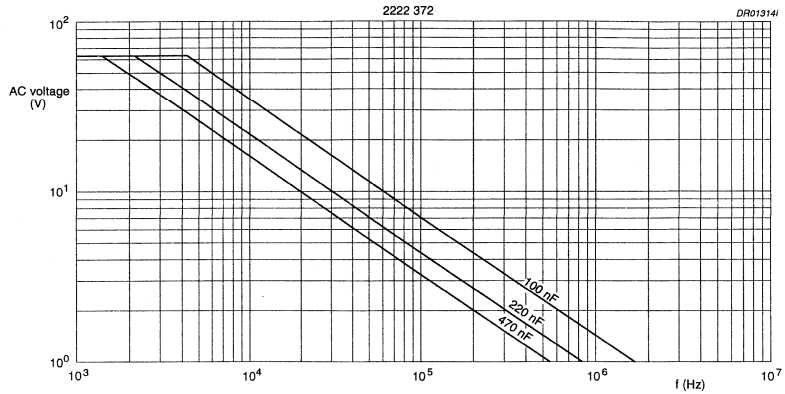

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 100$ V.



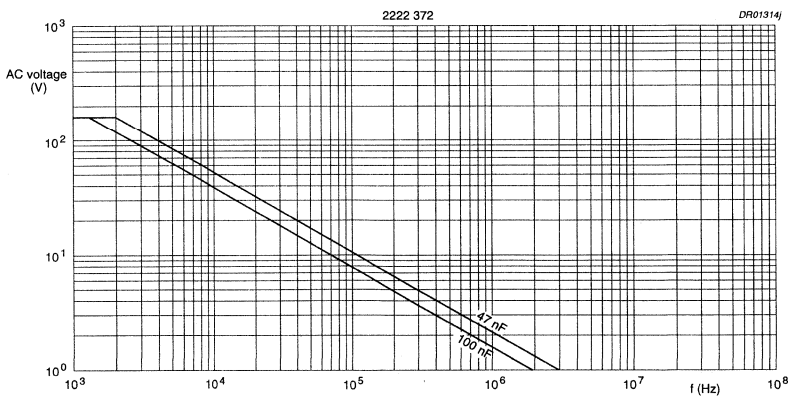

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V.



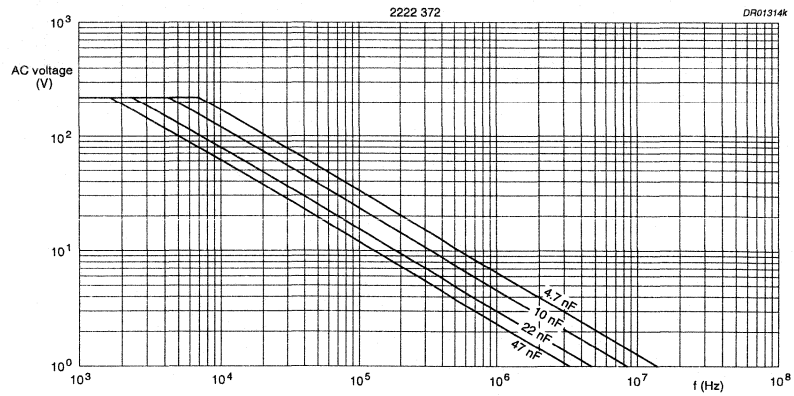

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 400$ V.



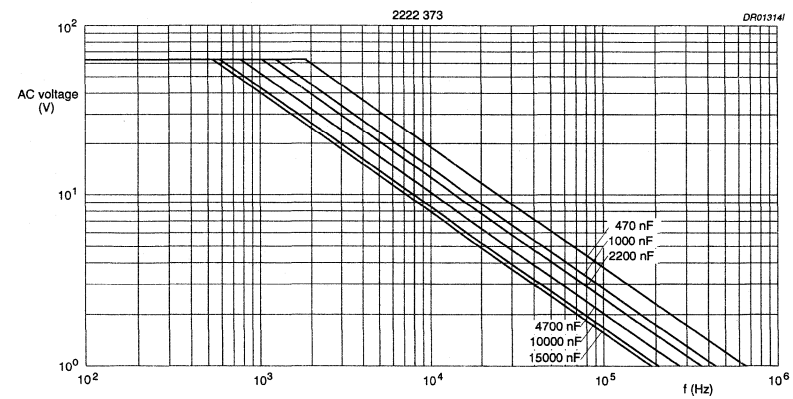

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 100$ V.



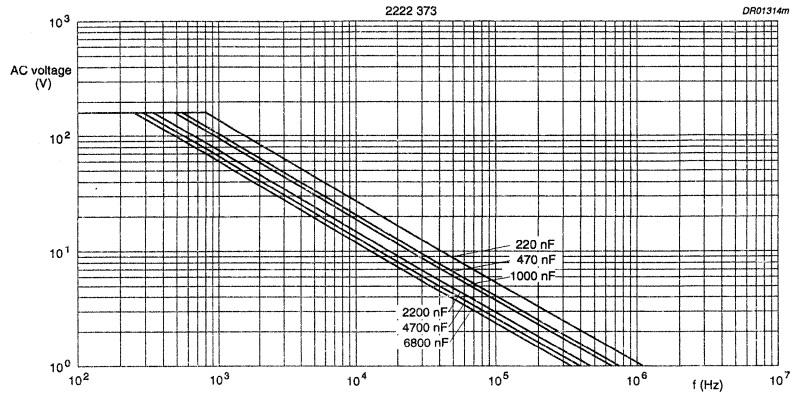

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V.



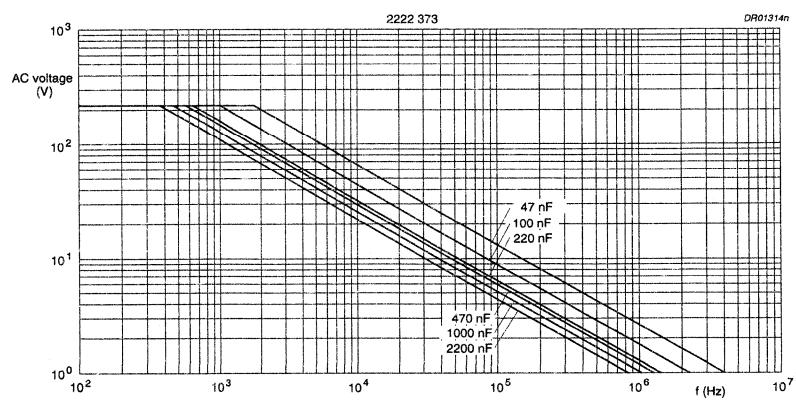

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 400 V.




AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 100 V.




AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 250$ V.

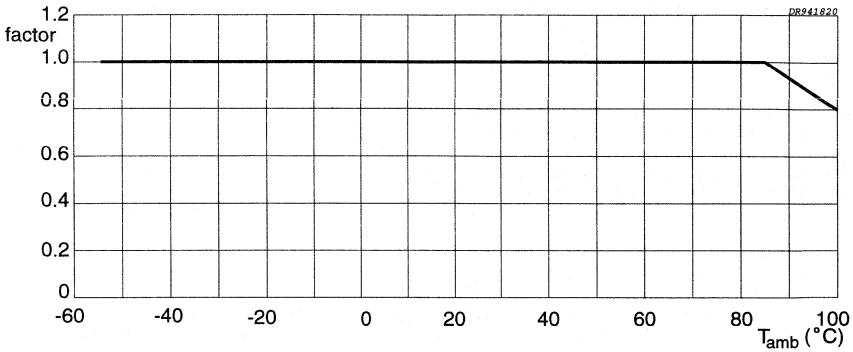



AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 400$ V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb}$ > 85°C**

The maximum RMS voltage in graphs above has to be multiplied by a factor (see graph below).

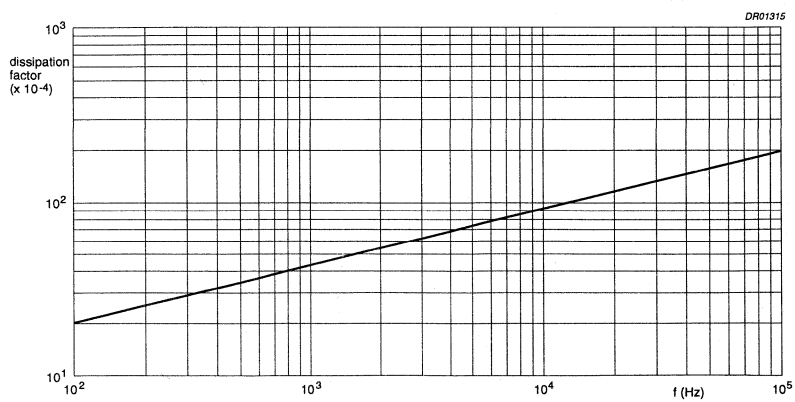
The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature".




Multiplying factor as a function of temperature.

**TANGENT OF LOSS ANGLE**

| STYLE | CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|---|
| | | 1 kHz | 10 kHz | 100 kHz |
| 2222 370 | C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| | 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| 2222 371 | 0.47 µF < C ≤ 1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| 2222 372 | C ≤ 0.1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤250 x $10^{-4}$ |
| | 0.1 µF < C ≤ 0.47 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| | 0.47 µF < C ≤ 1 µF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| 2222 373 | 1 µF < C ≤ 10 µF | ≤75 x $10^{-4}$ | ≤150 x $10^{-4}$ | – |
| | C > 10 µF | ≤75 x $10^{-4}$ | – | – |




Tangent of loss angle as a function of frequency; typical curve.

## RATED VOLTAGE PULSE SLOPE

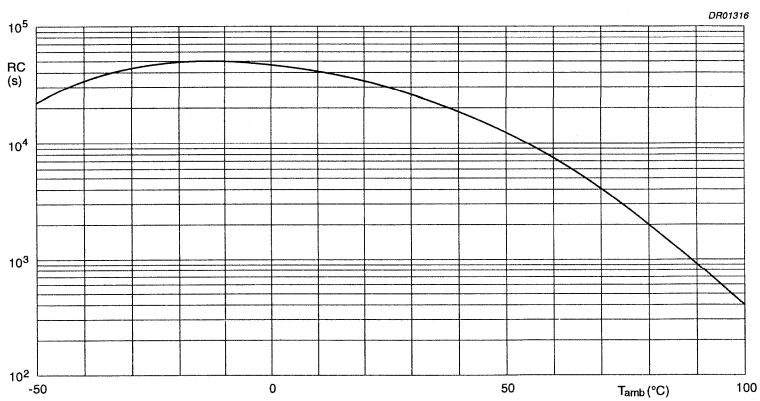
| RATED VOLTAGE (V) | MAXIMUM PULSE LOAD (V/µs) | | | | | |
|---|---|---|---|---|---|---|
| | 5 mm | 7.5 mm | 10 mm | 15 mm | 22.5 mm | 27.5 mm |
| 63 | 60 | 18 | 16 | – | – | – |
| 100 | 110 | 36 | 34 | 14 | 5 | 4 |
| 250 | 330 | 70 | 50 | 16 | 7 | 6 |
| 400 | 630 | 190 | 80 | 34 | 14 | 12 |

The maximum pulse load values are valid for voltages equal to the rated voltage. For lower voltages the given values may be multiplied by $U_{Rdc}$ and divided by the applied voltage.

**Note**: If the pulse load requirement is satisfied, a check must be made to ensure that the maximum dissipation is not exceeded.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 10 ±1 V for the 63 V version and 100 V ±15 V for the 100 V, 250 V and 400 V versions.




RC product as a function of ambient free air temperature; typical curve.

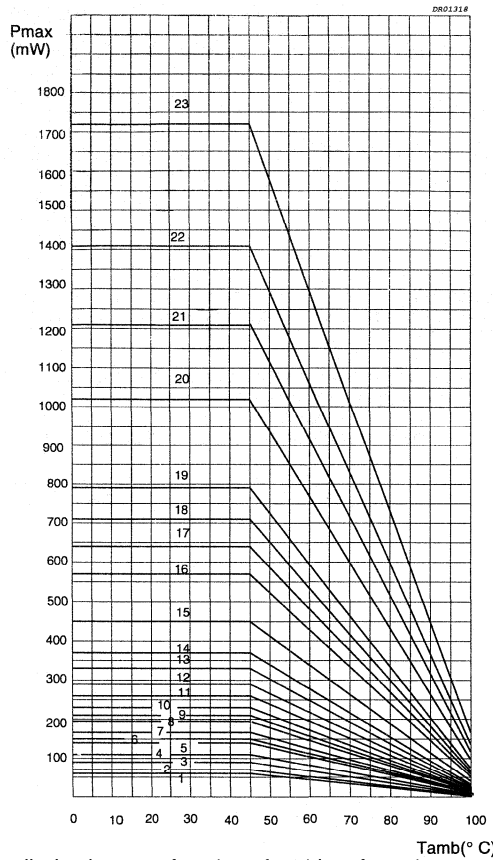
- R between leads: for value see specific reference data.
- R between interconnected leads and case (foil method): >30 000 MΩ.

# Metallized polyester film capacitors



## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) b x h x l |
|---|---|
| 1 | 2.5 x 6.5 x 7.2 |
| 2 | 2.5 x 6.5 x 10.0 |
| 3 | 3.5 x 8.0 x 7.2 |
| 4 | 3.0 x 8.0 x 10.0<br>4.5 x 9.0 x 7.2 |
| 5 | 5.0 x 10.0 x 7.2<br>4.0 x 9.0 x 10.0 |
| 6 | 6.0 x 11.0 x 7.2 |
| 7 | 5.0 x 10.5 x 10.0<br>4.0 x 9.0 x 12.5 |
| 8 | 4.0 x 10.0 x 12.5 |
| 9 | 6.0 x 12.0 x 10.0 |
| 10 | 5.0 x 11.0 x 12.5 |
| 11 | 6.0 x 12.0 x 12.5 |
| 12 | 5.0 x 11.0 x 17.5 |
| 13 | 6.0 x 12.0 x 17.5 |
| 14 | 7.0 x 13.5 x 17.5 |
| 15 | 8.5 x 15.0 x 17.5 |
| 16 | 6.0 x 15.5 x 26.0 |
| 17 | 7.0 x 16.5 x 26.0 |
| 18 | 8.5 x 18.0 x 26.0 |
| 19 | 10.0 x 19.5 x 26.0 |
| 20 | 11.0 x 21.0 x 31.0 |
| 21 | 13.0 x 23.0 x 31.0 |
| 22 | 15.0 x 25.0 x 31.0 |
| 23 | 18.0 x 28.0 x 31.0 |




Maximum dissipation as a function of ambient free air temperature.

## APPLICATION NOTE

To select the capacitor for a certain application, 6 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. The peak current ($I_p$) shall not exceed the maximum peak current, defined as maximum voltage pulse slope (dU/dt) multiplied by the capacitance.

$$I_p \text{ max.} = C\left(\frac{dU}{dt}\right) \text{ max.}$$

   Or the voltage pulse slope shall not exceed the rated voltage pulse slope. If the pulse voltage is lower than the rated voltage, the values of the table may be multiplied by $U_{Rdc}$ and divided by the applied voltage.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated in the graph on the preceding page.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.
6. In applications where voltages higher than 50 V are applied, it is recommended that the power in the capacitor be limited to 2.5 W in case of a capacitor failure.

## PRODUCT MARKING

**Capacitors with pitch ≤10 mm; styles 2222 370, 2222 371, 2222 372**

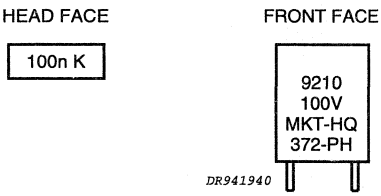
The capacitors are marked by laser print on the top with the following information:

- Capacitance code in accordance with IEC 62: p = pF; n = nF; μ = μF
- Tolerance on rated capacitance: M = ±20%; K = ±10%; J = ±5%

and on the side with the following information:

- Year and week of manufacture (e.g. 9210)
- Rated voltage (DC) (e.g. 100 V)
- Code for dielectric material (MKT)
- Code for factory of origin (HQ)
- Manufacturer's type designation (e.g. 372)
- Manufacturer (PHILIPS).

EXAMPLE OF MARKING FOR A CAPACITOR WITH PITCH 10 MM



**Capacitors with pitch 15 mm; style 2222 373**

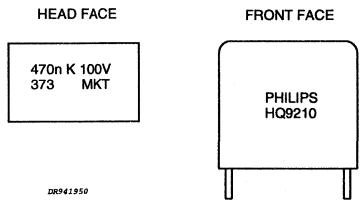
The capacitors are marked by laser print on the top with the following information:

- Rated capacitance code in accordance with IEC 62: p = pF; n = nF; μ = μF
- Tolerance on rated capacitance: K = ±10%; J = ±5%
- Rated voltage (DC) (e.g. 100 V)
- Manufacturer's type designation (373)
- Code for dielectric material (MKT)

and on the side with the following information:

- Manufacturer (PHILIPS)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9210).

EXAMPLE OF MARKING FOR A CAPACITOR WITH PITCH 15 MM

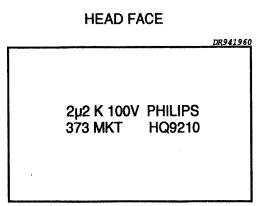



**Capacitors with pitch 22.5 and 27.5 mm; style 2222 373**

The capacitors are marked on the top with the following information:

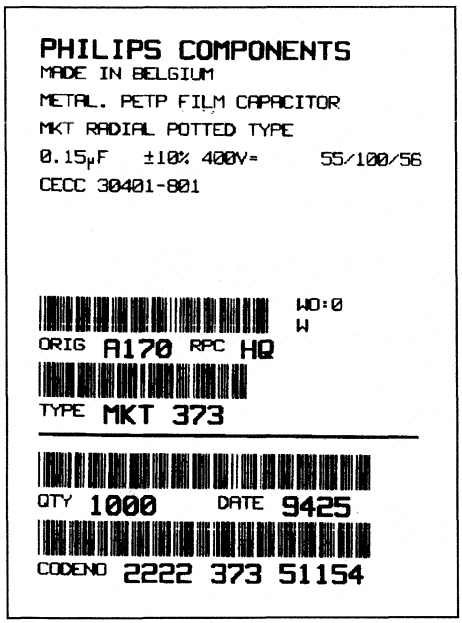
- Rated capacitance code in accordance with IEC 62: p = pF; n = nF; μ = μF
- Tolerance on rated capacitance: K = ±10%; J = ±5%
- Rated voltage (DC) (e.g. 100 V)
- Manufacturer (PHILIPS)
- Manufacturer's type designation (373)
- Code for dielectric material (MKT)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9210).

EXAMPLE OF MARKING FOR A CAPACITOR WITH PITCH 22.5 AND 27.5 MM



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930120

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | – |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Metallized polyester film capacitors



## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending | | no visible damage<br>legible marking |
| Resistance to soldering heat | solder bath: 260 °C; 10 s | $\Delta C/C \leq 2\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF) |
| Component solvent resistance | isopropyl alcohol; 23 °C; 5 minutes | $\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |
| **Robustness of component** | | |
| Vibration | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF; 370/371)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF; 372/373)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF) |
| Shock | half sinewave; 490 m/s$^2$; 11 ms | $\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 100 °C | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF; 370/371)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF; 372/373) |
| Damp heat cyclic, first cycle | | $\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF< $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF) |
| Cold | 2 hours; −55 °C | $\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C$ > 470 nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Damp heat, remaining cycles | | |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C$ > 470 nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 2000 hours:<br>1.25 x $U_{Rdc}$; 85 °C<br>1.25 x $U_{Cdc}$; 100 °C | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF; 370/371 at 85 °C)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF; 370/371 at 100 °C)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF; 372/373)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 100 °C | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ ($C \leq 100$ nF; 370/371)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF; 372/373)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq 220$ nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C$ > 470 nF) (*) |

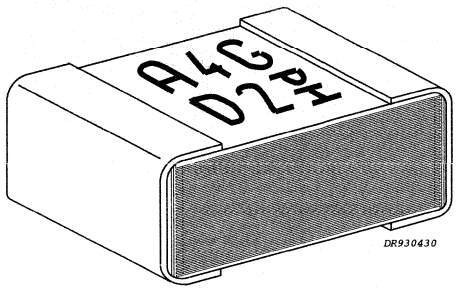
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| Endurance (AC) for capacitors with ≥200 V (RMS) | 1000 hours; 1.25 x $U_{Rac}$; 85 °C | $\Delta C/C \leq 8\%$ (style 370)<br>$\Delta C/C \leq 5\%$ (style 371)<br>$\Delta C/C \leq 3\%$ (styles 372 and 373)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq$ 220 nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C >$ 470 nF) (*) |
| Resistance to detergents | | $\Delta C/C \leq 1\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq$ 220 nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C >$ 470 nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Resistance to soldering heat with preheating | body temperature: 100 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 2\%$ ($C \leq 10$ nF)<br>$\Delta C/C \leq 1\%$ ($C >$ 10 nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ (100 nF < $C \leq$ 220 nF)<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ (220 nF < $C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C >$ 470 nF) (*) |
| Passive flammability (styles 372 and 373) | class C | no burning |

(*) Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C >$ 470 nF.

# Metallized PPS film capacitors

# MKPS 390/391/392/393/394

**MKPS CHIP CAPACITOR** **Sizes 1206/1210/1812/2220/2824**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12-series) | 0.22 to 470 nF |
| Tolerance on capacitance | ±5%, ±10% |
| Rated voltage (DC) | 25 V; 160 V |
| Rated voltage (AC) | 16 V; 100 V |
| Climatic category | 55/125/56 |
| Rated temperature | 100 °C |
| Maximum application temperature | 125 °C |
| Tangent of loss angle at 100 kHz | $25 \times 10^{-4}$ |
| Reference specification | IEC: 40(secr)644 and EN 132500 (DRAFT) |
| Performance grade | grade 1 |

### FEATURES

- Self-encased chip capacitor for surface mounting
- Stacked metallized non-flammable film cell
- Solder-coated terminatons
- Solvent resistant without damage
- Case sizes: 1206, 1210, 1812, 2220, 2824
- Taped versions for automatic placement.

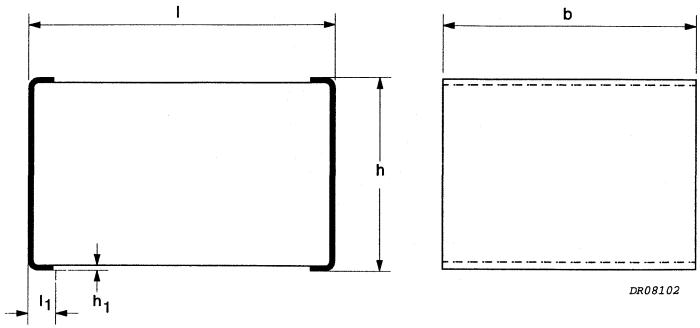
### APPLICATIONS

- Blocking and coupling
- Tuning in data processing and telecommunication equipment.

# Metallized PPS film capacitors

# MKPS 390/391/392/393/394

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 25 V AND 160 V DC VERSIONS

| Tangent of loss angle | 1 kHz | 10 kHz | 100 kHz |
|---|---|---|---|
| | $\leq 40 \times 10^{-4}$ | $\leq 50 \times 10^{-4}$ | $\leq 100 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | $U_R$ = 25 V | $U_R$ = 160 V | |
| size 1206 | 200 V/µs | 1500 V/µs | |
| size 1210 | 200 V/µs | 1500 V/µs | |
| size 1812 | 60 V/µs | 300 V/µs | |
| size 2220 | 30 V/µs | 180 V/µs | |
| size 2824 | 15 V/µs | 70 V/µs | |
| R between leads, for C ≤ 0.33 µF | >3750 MΩ | | |
| RC between leads, for C > 0.33 µF | >1250 s | | |

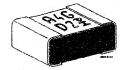
| CASE SIZES | BLISTER TAPE ON REEL<br>SMALLEST PACKING QUANTITIES (SPQ) |
|---|---|
| 1206 | 3000 |
| 1210 | 2500 |
| 1812 | 3500 |
| 2220 | 2000 |
| 2824 | 1000 |

## CASE SIZE REFERENCES, DIMENSIONS AND TOLERANCES

| CASE SIZE REFERENCE | l (mm) | b (mm) | $h_{max}$ (mm) | $l_1$ (mm) | $h_1$ (mm) |
|---|---|---|---|---|---|
| 1206 | 3.2 ±0.2 | 1.6 ±0.2 | see tables: $U_{Rdc}$ = 25 V and $U_{Rdc}$ = 160 V | 0.7 ±0.3 | 0.10 ±0.05 |
| 1210 | 3.2 ±0.2 | 2.5 ±0.2 | | 0.7 ±0.3 | 0.10 ±0.05 |
| 1812 | 4.5 ±0.2 | 3.2 ±0.2 | | 0.7 ±0.3 | 0.10 ±0.05 |
| 2220 | 5.7 ±0.2 | 5.0 ±0.3 | | 0.7 ±0.3 | 0.10 ±0.05 |
| 2824 | 7.2 ±0.2 | 6.1 ±0.3 | | 1.0 ±0.3 | 0.10 ±0.05 |

# Metallized PPS film capacitors

# MKPS 390/391/392/393/394



## $U_{Rdc}$ = 25 V  $U_{Rac}$ = 16 V  blister tape on reel

| CAPACITANCE (µF) | CATALOGUE NUMBER 2222 ... ..... | | | | | | |
|---|---|---|---|---|---|---|---|
| | 390 | 391 | 392 | 393 | 394 | LAST 5 DIGITS OF CATALOGUE NUMBER | |
| | CASE SIZE | | | | | | |
| | 1206 | 1210 | 1812 | 2220 | 2824 | C-tol ±10% | C-tol ±5% |
| | $h_{max}$ | $h_{max}$ | $h_{max}$ | $h_{max}$ | $h_{max}$ | | |
| 0.001 | 1.4 | 1.7 | 2.0 | | | 28102 | 29102 |
| 0.0015 | 1.4 | 1.7 | 2.0 | | | 28152 | 29152 |
| 0.0022 | 1.4 | 1.7 | 2.0 | | | 28222 | 29222 |
| 0.0033 | 1.4 | 1.7 | 2.0 | | | 28332 | 29332 |
| 0.0047 | 1.4 | 1.7 | 2.0 | | | 28472 | 29472 |
| 0.0068 | | 1.7 | 2.0 | | | 28682 | 29682 |
| 0.01 | | 1.7 | 2.0 | | | 28103 | 29103 |
| 0.015 | | 1.9 | 2.0 | | | 28153 | 29153 |
| 0.022 | | | 2.0 | | | 28223 | 29223 |
| 0.033 | | | 2.1 | | | 28333 | 29333 |
| 0.047 | | | 2.5 | 2.1 | | 28473 | 29473 |
| 0.068 | | | | 2.1 | | 28683 | 29683 |
| 0.1 | | | | 2.4 | | 28104 | 29104 |
| 0.15 | | | | 3.2 | | 28154 | 29154 |
| 0.22 | | | | 4.0 | 3.0 | 28224 | 29224 |
| 0.33 | | | | | 4.0 | 28334 | 29334 |
| 0.47 | | | | | 4.8 | 28474 | 29474 |

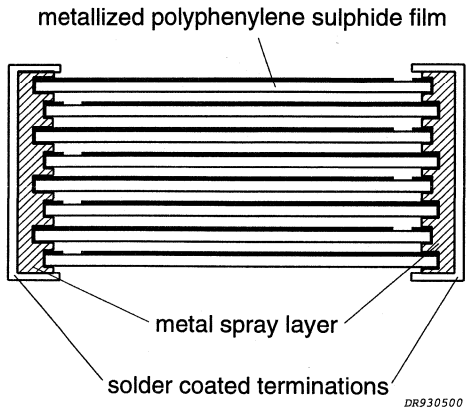
Preferred catalogue numbers

## $U_{Rdc}$ = 160 V  $U_{Rac}$ = 100 V  blister tape on reel

| CAPACITANCE (µF) | CATALOGUE NUMBER 2222 ... ..... | | | | | | |
|---|---|---|---|---|---|---|---|
| | 390 | 391 | 392 | 393 | 394 | LAST 5 DIGITS OF CATALOGUE NUMBER | |
| | CASE SIZE | | | | | | |
| | 1206 | 1210 | 1812 | 2220 | 2824 | C-tol ±10% | C-tol ±5% |
| | $h_{max}$ | $h_{max}$ | $h_{max}$ | $h_{max}$ | $h_{max}$ | | |
| 0.00022 | 1.4 | | | | | 48221 | 49221 |
| 0.00033 | 1.4 | | | | | 48331 | 49331 |
| 0.00047 | 1.4 | 1.7 | | | | 48471 | 49471 |
| 0.00068 | | 1.7 | | | | 48681 | 49681 |
| 0.001 | | 1.8 | | | | 48102 | 49102 |
| 0.0015 | | 2.0 | 2.0 | | | 48152 | 49152 |
| 0.0022 | | | 2.0 | | | 48222 | 49222 |
| 0.0033 | | | 2.2 | | | 48332 | 49332 |
| 0.0047 | | | 2.5 | 2.1 | | 48472 | 49472 |
| 0.0068 | | | | 2.2 | | 48682 | 49682 |
| 0.01 | | | | 2.6 | | 48103 | 49103 |
| 0.015 | | | | 3.3 | | 48153 | 49153 |
| 0.022 | | | | 4.0 | 3.0 | 48223 | 49223 |
| 0.033 | | | | | 4.0 | 48333 | 49333 |
| 0.047 | | | | | 4.8 | 48473 | 49473 |

**Note**: The above tables show the standard range of PPS capacitors.
Other combinations of capacitance, size and voltage rating are available on request.

## CONSTRUCTION



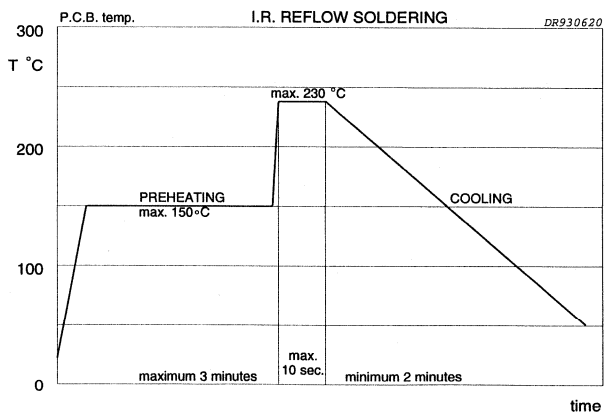

## DESCRIPTION

- Stacked cell of metallized polyphenylene sulphide (PPS) film.
- The leads are solder-coated. The capacitor can withstand solvents without damage.

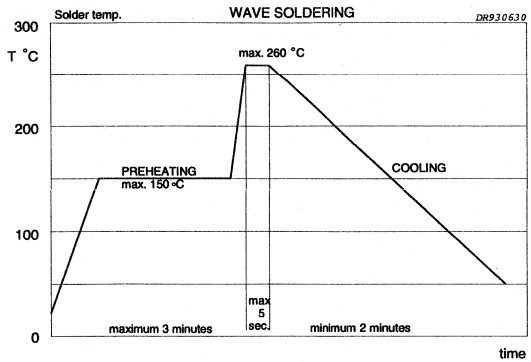
## MOUNTING

The capacitors can be mounted on printed-circuit boards or ceramic substrates by applying wave or reflow soldering.

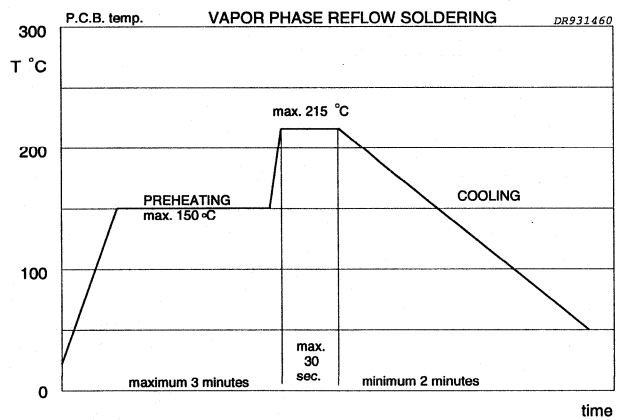
Do not allow abrupt cooling after heating.




PCB - temperature as a function of time for reflow soldering; typical curve.

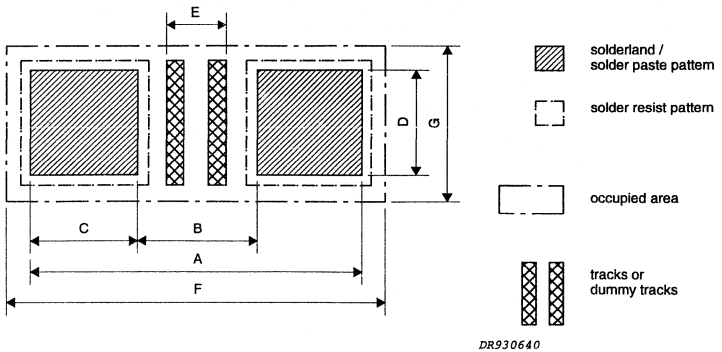



Solder temperature as a function of time for wave soldering; typical curve.




PCB - temperature as a function of time for vapour phase reflow soldering; typical curve.

For advised soldering profiles and footprint design, refer to the following figure and associated tables.




| REFLOW SOLDERING | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CASE SIZE | FOOTPRINT DIMENSIONS (mm) | | | | | | | PROCESSING REMARKS | PLACEMENT ACCURACY (mm) |
| | A | B | C | D | E | F | G | | |
| 1206 | 4.00 | 1.60 | 1.20 | 1.80 | 0.95 | 4.50 | 2.50 | | ±0.25 |
| 1210 | 4.00 | 1.60 | 1.20 | 2.70 | 0.95 | 4.50 | 3.40 | | ±0.25 |
| 1812 | 5.40 | 3.00 | 1.20 | 3.50 | 2.20 | 5.80 | 4.10 | | ±0.25 |
| 2220 | 6.60 | 4.20 | 1.20 | 5.30 | 3.40 | 7.00 | 5.90 | | ±0.25 |
| 2824 | 8.00 | 5.20 | 1.40 | 6.50 | 4.30 | 8.50 | 7.00 | | ±0.25 |
| **WAVE SOLDERING** | | | | | | | | | |
| CASE SIZE | FOOTPRINT DIMENSIONS (mm) | | | | | | | PROPOSED NUMBER & DIMENSIONS OF DUMMY TRACKS (mm) | PLACEMENT ACCURACY (mm) |
| | A | B | C | D | E | F | G | | |
| 1206 | 4.80 | 1.60 | 1.60 | 1.70 | 0.77 | 5.50 | 3.20 | 2 x (0.25 x 1.70) | ±0.25 |
| 1210 | 5.40 | 1.60 | 1.90 | 2.60 | 0.77 | 6.60 | 4.70 | 2 x (0.25 x 2.60) | ±0.25 |
| 1812 | 7.20 | 3.00 | 2.10 | 3.40 | 2.00 | 8.60 | 5.90 | | ±0.25 |
| 2220 | 9.60 | 4.20 | 2.70 | 5.20 | 3.20 | 11.60 | 8.50 | | ±0.25 |
| 2824 | 11.80 | 5.20 | 3.30 | 6.30 | 4.20 | 14.30 | 10.00 | | ±0.25 |

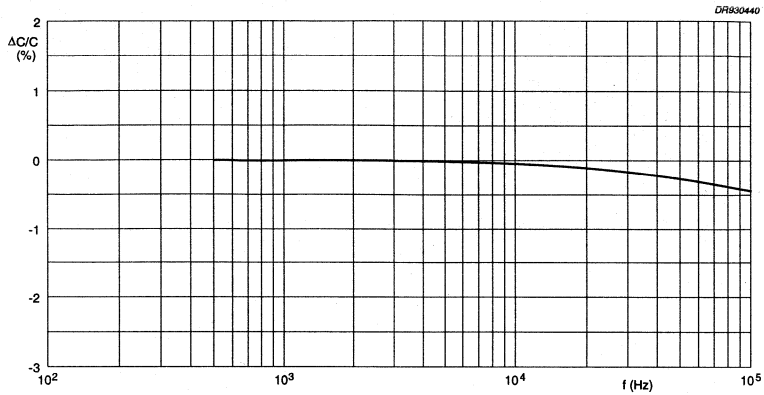
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

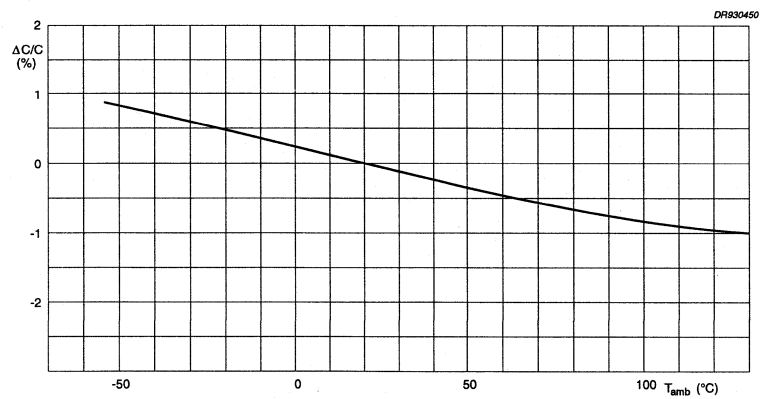
For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.

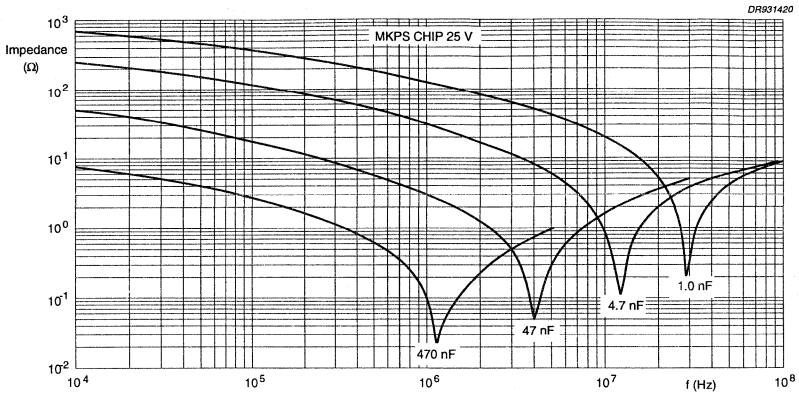



Capacitance as a function of frequency; typical curve.

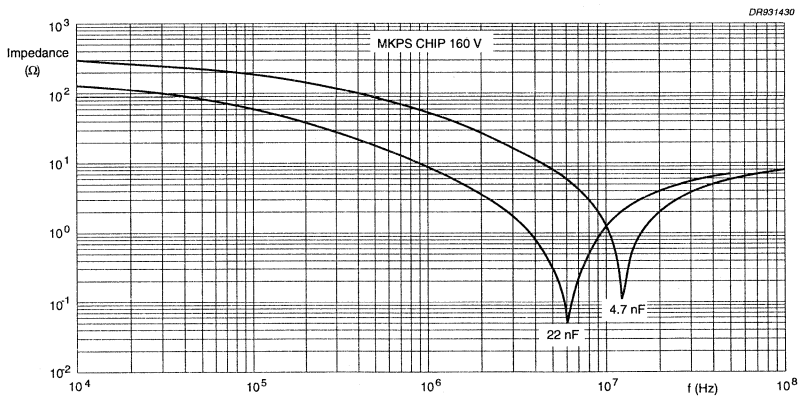



Capacitance as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves for 25 V version.




Impedance as a function of frequency; typical curves for 160 V version.

## TEMPERATURE

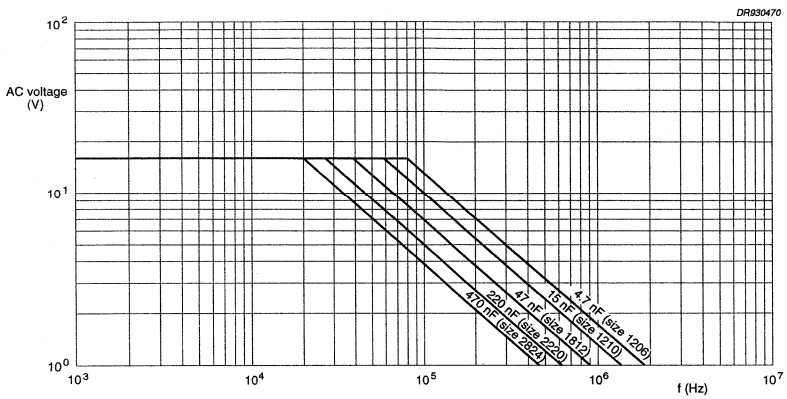
- Storage temperature: $T_{stg}$ = −25 to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

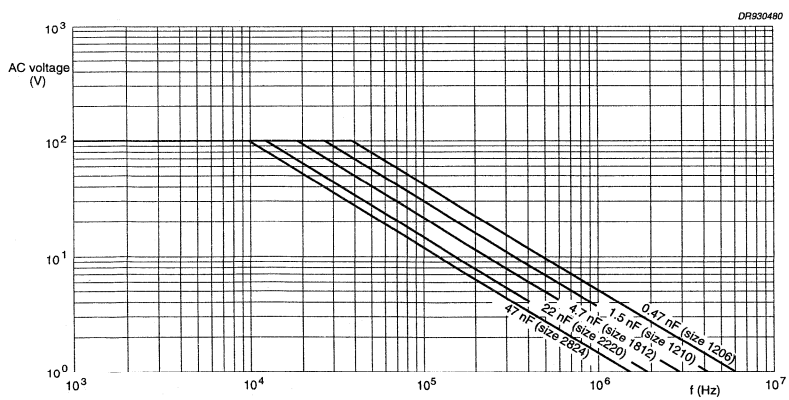
- Category voltage: $U_C = 0.8 \times U_{Rdc}$.
- Test voltage between terminations: $1.6 \times U_{Rdc}$.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 85°C$ (see graphs below)**

**Note**: The sum of the DC voltage and the peak value of the superimposed AC voltage must be $\leq U_{Rdc}$. For other wave forms than sinusoidal, the maximum dissipation must not be exceeded.



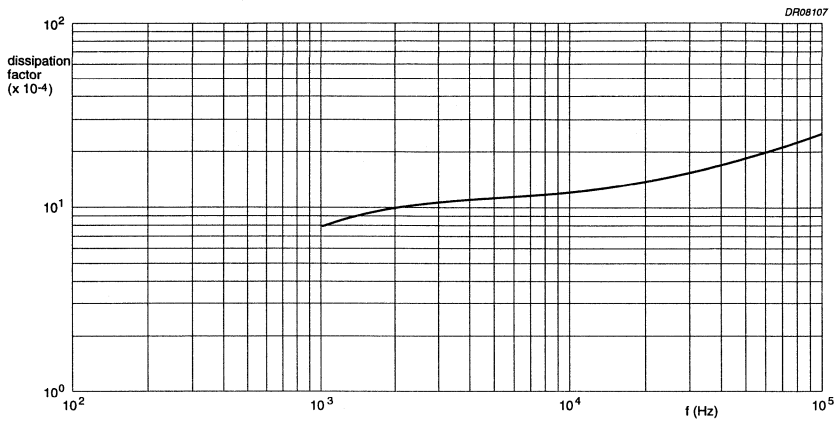

Maximum AC voltage as a function of frequency; $U_{Rdc} = 25$ V.



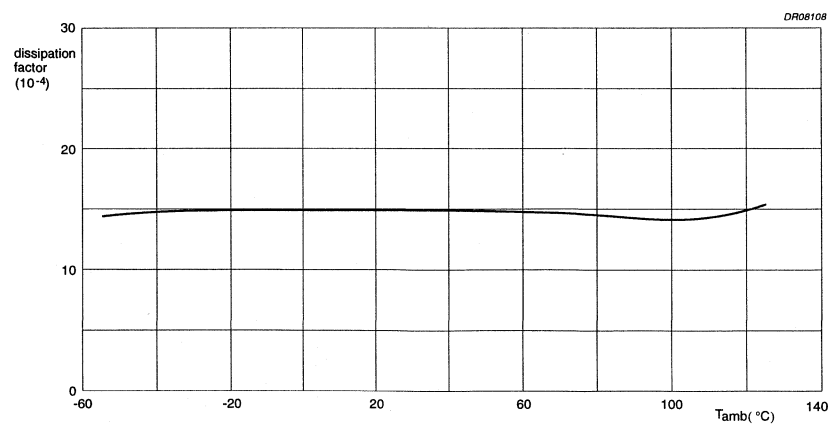

Maximum AC voltage as a function of frequency; $U_{Rdc} = 160$ V.

## TANGENT OF LOSS ANGLE

| TANGENT OF LOSS ANGLE | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| | $\leq 40 \times 10^{-4}$ | $\leq 50 \times 10^{-4}$ | $\leq 100 \times 10^{-4}$ |




Tangent of loss angle as a function of frequency; typical curve.




Tangent of loss angle as a function of ambient temperature; typical curve.

## RATED VOLTAGE PULSE SLOPE

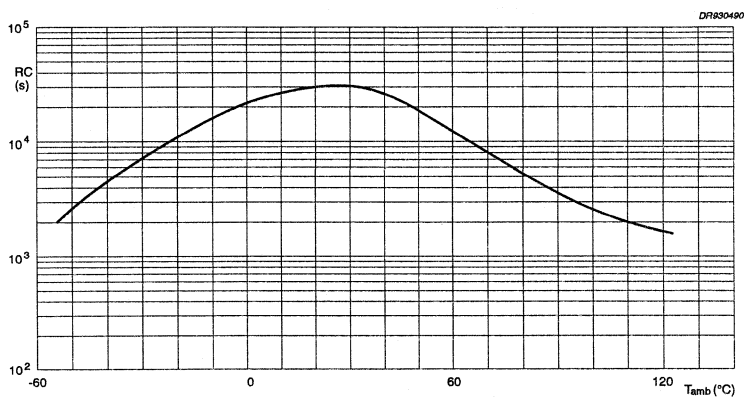
The maximum pulse load values are valid for voltages equal to the rated voltage. For lower voltages the given values can be multiplied by $U_R$ and divided by the applied voltage.

| RATED VOLTAGE (V) | MAXIMUM PULSE LOAD (V/µs) | | | | |
|---|---|---|---|---|---|
| | size 1206 | size 1210 | size 1812 | size 2220 | size 2824 |
| 25 | 200 | 200 | 60 | 30 | 15 |
| 160 | 1500 | 1500 | 300 | 180 | 70 |

**Note:** If the pulse load requirement is satisfied, a check must be made to ensure that the maximum dissipation is not exceeded.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 10 ±1 V has been applied for 1 minute ±5 seconds.




RC-product as a function of ambient free-air temperature; typical curve.

- R between leads for C ≤ 0.33 µF: >3750 MΩ.
- RC between leads for C > 0.33 µF: >1250 s.

**APPLICATION NOTE**

To select the capacitor for a certain application, 6 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. The peak current ($I_p$) shall not exceed the maximum peak current, defined as maximum voltage pulse slope (dU/dt) multiplied by the capacitance.

$$I_p \text{ max} = C(\frac{dU}{dt}) \text{ max.}$$

   Or the voltage pulse slope shall not exceed the rated voltage pulse slope. If the pulse voltage is lower than the rated voltage, the values of the table may be multiplied by the factor $U_{Rdc} / U_p$.

4. The dissipated power shall not be greater than the maximum permissible power dissipation.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.
6. In applications where voltages higher than 50 V are applied, it is recommended that the power in the capacitor be limited to 2.5 W in case of a capacitor failure.

## MARKING

### Product marking

- Rated capacitance
- Rated voltage
- Year and month of manufacture
- Manufacturer's name.

### Capacitance, date, voltage and tolerance codes

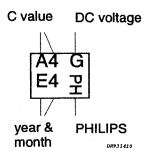
- Letter codes for the E-series of capacitance values and cardinal numbers for multipliers
- Letter codes for year and numbers for month of production
- Letter codes for voltage and tolerance.

| CAPACITANCE SIGNIFICANT DIGITS (pF) | CODE FOR CAPACITANCE | MULTIPLIER FOR CAPACITANCE | CARDINAL NUMBER AS CODE | VOLTAGE | CODE |
|---|---|---|---|---|---|
| 1.0 | A | $10^0$ | 0 | 25 V | G |
| 1.1 | B | $10^1$ | 1 | 160 V | none |
| 1.2 | C | $10^2$ | 2 | | |
| 1.3 | D | $10^3$ | 3 | | |
| 1.5 | E | $10^4$ | 4 | | |
| 1.6 | F | $10^5$ | 5 | | |
| 1.8 | G | $10^6$ | 6 | | |
| 2.0 | H | $10^7$ | 7 | | |
| 2.2 | J | $10^8$ | 8 | | |
| 2.4 | K | | | | |
| 2.7 | L | | | | |
| 3.0 | M | | | | |
| 3.3 | N | | | | |
| 3.6 | P | | | | |
| 3.9 | Q | | | | |
| 4.3 | R | | | | |
| 4.7 | S | | | | |
| 5.1 | T | | | | |
| 5.6 | U | | | | |
| 6.2 | V | | | | |
| 6.8 | W | | | | |
| 7.5 | X | | | | |
| 8.2 | Y | | | | |
| 9.1 | Z | | | | |

| YEAR | LETTER CODE | MONTH | CODE |
|---|---|---|---|
| 1990 | A | january | 1 |
| 1991 | B | february | 2 |
| 1992 | C | march | 3 |
| 1993 | D | april | 4 |
| 1994 | E | may | 5 |
| 1995 | F | june | 6 |
| 1996 | H | july | 7 |
| 1997 | J | august | 8 |
| 1998 | K | september | 9 |
| 1999 | L | october | O |
| 2000 | M | november | N |
| 2001 | N | december | D |

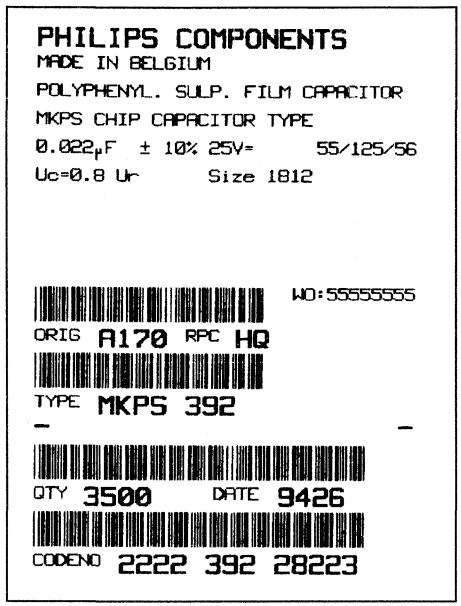
Case sizes 1206 and 1210 are not marked.

Example:
0.01 µF
25 V
APRIL 94



### Package marking

The package containing the capacitors is marked as shown.




PK940090

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | - |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and month code |
| 10 | Product code (12NC) |

## QUICK REFERENCE TEST REQUIREMENTS

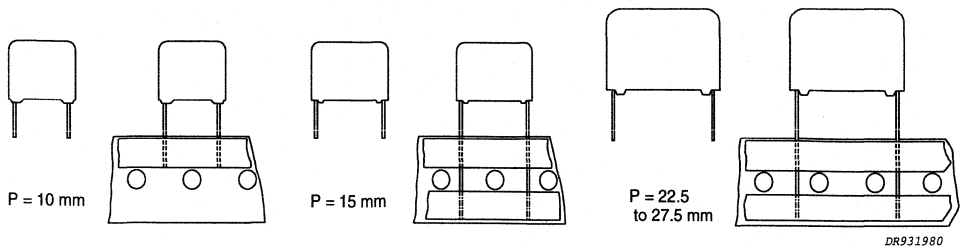
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of component** | | |
| Resistance to soldering heat | 260 °C; 5 s or 235 °C; 60 s | no visible damage;<br>legible marking; |
| Resistance to solvents | isopropyl alcohol; 23.5 °C;<br>5 minutes | smooth and bright solder-coating,<br>scattered imperfections permitted<br>(≤ 10% of termination surface)<br>$\Delta C/C \leq 3\%$ +20 pF ($C \leq 1$ nF)<br>$\Delta C/C \leq 3\%$ ($C > 1$ nF)<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, first cycle<br>Cold<br>Damp heat remaining cycles | 16 hours; 125 °C<br><br>2 hours; –55 °C | $\Delta C/C \leq 3\%$ +20 pF ($C \leq 1$ nF)<br>$\Delta C/C \leq 3\%$ ($C > 1$ nF)<br>$\Delta \tan \delta \leq 25 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 5\%$ +20 pF ($C \leq 1$ nF)<br>$\Delta C/C \leq 5\%$ ($C > 1$ nF)<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 2000 hours;<br>$1.25 \times U_{Rdc}$; 100 °C;<br>$1.25 \times U_{Cdc}$; 125 °C | $\Delta C/C \leq 5\%$ +20 pF ($C \leq 1$ nF)<br>$\Delta C/C \leq 5\%$ ($C > 1$ nF)<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$ ($C \leq 100$nF)<br>$\Delta \tan \delta \leq 25 \times 10^{-4}$ ($C > 100$nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 125 °C | $\Delta C/C \leq 3\%$ +20 pF ($C \leq 1$ nF)<br>$\Delta C/C \leq 3\%$ ($C > 1$ nF)<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$ ($C \leq 100$nF)<br>$\Delta \tan \delta \leq 25 \times 10^{-4}$ ($C > 100$nF) |
| Passive flame test | class C | no burning |

# Metallized polycarbonate film capacitors

# MKC 344

## MKC RADIAL POTTED CAPACITORS

**Pitch 10/15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12 series) | 0.010 to 6.8 µF |
| Capacitance tolerance | ±10%; ±5% |
| Rated voltage (DC) | 100 V, 250 V, 400 V, 630 V |
| Climatic category | 55/100/56 |
| Rated temperature | 85 °C |
| Maximum application temperature | 100 °C |
| Tangent of loss angle at 10 kHz | $20 \times 10^{-4}$ |
| Reference specification | IEC 384-6 |
| Performance grade | grade 1 (long life) |

### FEATURES

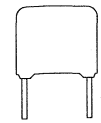
- 10 mm to 27.5 mm lead pitch
- Small dimensions for high density packaging
- Supplied loose in box and on tape.

### APPLICATIONS

- In electronic circuits for blocking and coupling, bypass and energy reservoir applications.

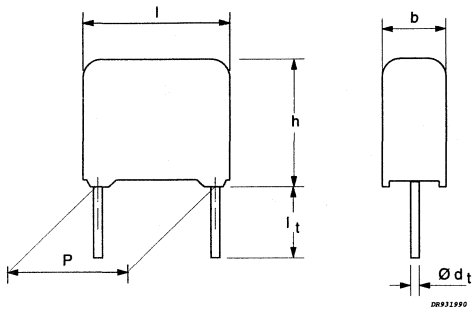
# Metallized polycarbonate film capacitors

# MKC 344



**Pitch 10/15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | C ≤ 0.1 µF | ≤30 x $10^{-4}$ | ≤60 x $10^{-4}$ | ≤130 x $10^{-4}$ |
| | 0.1 µF < C ≤ 1.0 µF | ≤30 x $10^{-4}$ | ≤60 x $10^{-4}$ | – |
| | C > 1.0 µF | ≤30 x $10^{-4}$ | ≤75 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 10.0 mm | 60 V/µs | | |
| | P = 15.0 mm | 26 V/µs | | |
| | P = 22.5 mm | 12 V/µs | | |
| | P = 27.5 mm | 9 V/µs | | |
| R between leads, for C ≤ 0.33 µF | | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | | >5 000 s | | |

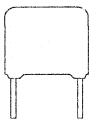
## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±10% | catalogue number **2222 344 21...** | preferred |
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±5% | catalogue number **2222 344 22...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 344 28...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 344 29...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Metallized polycarbonate film capacitors

# MKC 344



## $U_{Rdc}$ = 100 V

$U_{Rac}$ = 63 V

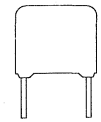
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 344 ..... loose in box; $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.082 | 4.0 x 10.0 x 12.5 | 0.7 | 21823 | 1000 | 1400 |
| 0.1 | | | 21104 | | |
| 0.12 | | | 21124 | | |
| 0.15 | | | 21154 | | |
| 0.18 | 5.0 x 11.0 x 12.5 | 0.85 | 21184 | 1000 | 1100 |
| 0.22 | | | 21224 | | |
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.27 | 5.0 x 11.0 x 17.5 | 1.05 | 21274 | 1000 | 1100 |
| 0.33 | | | 21334 | | |
| 0.39 | | | 21394 | | |
| 0.47 | | | 21474 | | |
| 0.56 | 6.0 x 12.0 x 17.5 | 1.4 | 21564 | 1000 | 900 |
| 0.68 | | | 21684 | | |
| 0.82 | 7.0 x 13.5 x 17.5 | 1.8 | 21824 | 1000 | 800 |
| 1 | | | 21105 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 1.2 | 6.0 x 15.5 x 26.0 | 2.75 | 21125 | 200 | 600 |
| 1.5 | | | 21155 | | |
| 1.8 | 7.0 x 16.5 x 26.0 | 4.3 | 21185 | 200 | 550 |
| 2.2 | 8.5 x 18.0 x 26.0 | 4.3 | 21225 | 200 | 450 |
| 2.7 | | 5.1 | 21275 | | |
| 3.3 | 10.0 x 19.5 x 26.0 | 5.1 | 21335 | 200 | 350 |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 3.9 | 11.0 x 21.0 x 31.0 | 7.4 | 21395 | 100 | 300 |
| 4.7 | | | 21475 | | |
| 5.6 | 13.0 x 23.0 x 31.0 | 10.2 | 21565 | 100 | 250 |
| 6.8 | | | 21685 | | |

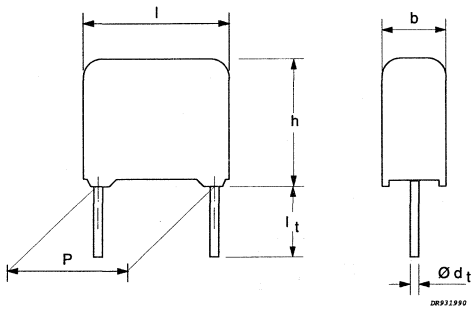
Preferred catalogue numbers

# Metallized polycarbonate film capacitors

# MKC 344



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | C ≤ 0.1 µF | ≤30 x $10^{-4}$ | ≤60 x $10^{-4}$ | ≤130 x $10^{-4}$ |
| | 0.1 µF < C ≤ 1.0 µF | ≤30 x $10^{-4}$ | ≤60 x $10^{-4}$ | – |
| | C > 1.0 µF | ≤30 x $10^{-4}$ | ≤75 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 10.0 mm | 90 V/µs | | |
| | P = 15.0 mm | 36 V/µs | | |
| | P = 22.5 mm | 16 V/µs | | |
| | P = 27.5 mm | 14 V/µs | | |
| R between leads, for C ≤ 0.33 µF | | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | | >10 000 s | | |

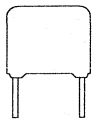
## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±10% | catalogue number **2222 344 45...** | preferred |
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±5% | catalogue number **2222 344 43...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 344 48...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 344 49...** | on request |

* H: intape height; for detailed specification refer to Chapter "PACKAGING".

# Metallized polycarbonate film capacitors

# MKC 344



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V

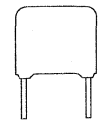
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 344 ..... loose in box; $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.039 | 4.0 x 10.0 x 12.5 | 0.7 | 45393 | 1000 | 1400 |
| 0.047 | | | 45473 | | |
| 0.056 | | | 45563 | | |
| 0.068 | | | 45683 | | |
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.082 | 5.0 x 11.0 x 17.5 | 1.05 | 45823 | 1000 | 1100 |
| 0.1 | | | 45104 | | |
| 0.12 | | | 45124 | | |
| 0.15 | | | 45154 | | |
| 0.18 | 6.0 x 12.0 x 17.5 | 1.4 | 45184 | 1000 | 900 |
| 0.22 | | | 45224 | | |
| 0.27 | 7.0 x 13.5 x 17.5 | 1.8 | 45274 | 1000 | 800 |
| 0.33 | | | 45334 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.39 | 6.0 x 15.5 x 26.0 | 2.75 | 45394 | 200 | 600 |
| 0.47 | | | 45474 | | |
| 0.56 | 7.0 x 16.5 x 26.0 | 3.5 | 45564 | 200 | 550 |
| 0.68 | | | 45684 | | |
| 0.82 | 8.5 x 18.0 x 26.0 | 5.1 | 45824 | 200 | 450 |
| 1 | | | 45105 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 1.2 | 9.0 x 19.0 x 31.0 | 7.4 | 45125 | 100 | 400 |
| 1.5 | 11.0 x 21.0 x 31.0 | 7.4 | 45155 | 100 | 300 |
| 1.8 | | 10.2 | 45185 | | |
| 2.2 | 13.0 x 23.0 x 31.0 | 10.2 | 45225 | 100 | 250 |

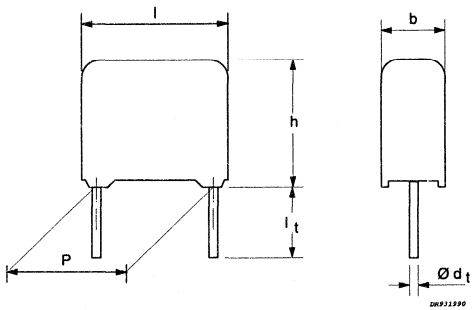
Preferred catalogue numbers

# Metallized polycarbonate film capacitors

# MKC 344



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | C ≤ 0.1 µF | ≤30 x $10^{-4}$ | ≤60 x $10^{-4}$ | ≤130 x $10^{-4}$ |
| | 0.1 µF < C ≤ 1.0 µF | ≤30 x $10^{-4}$ | ≤60 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 10.0 mm | 140 V/µs | | |
| | P = 15.0 mm | 60 V/µs | | |
| | P = 22.5 mm | 26 V/µs | | |
| | P = 27.5 mm | 22 V/µs | | |
| R between leads, for C ≤ 0.33 µF | | >30 000 MΩ | | |
| RC between leads, for C > 0.33 µF | | >10 000 s | | |

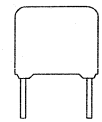
## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±10% | catalogue number **2222 344 51...** | preferred |
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±5% | catalogue number **2222 344 52...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 344 58...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 344 59...** | on request |

* H: intape height; for detailed specification refer to Chapter "PACKAGING".

# Metallized polycarbonate film capacitors

# MKC 344



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 220 V

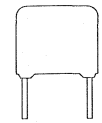
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 344 ..... loose in box; l = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.01 | 4.0 x 10.0 x 12.5 | 0.7 | 51103 | 1000 | 1400 |
| 0.012 | | | 51123 | | |
| 0.015 | | | 51153 | | |
| 0.018 | | | 51183 | | |
| 0.022 | | | 51223 | | |
| 0.027 | | | 51273 | | |
| 0.033 | | | 51333 | | |
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.039 | 5.0 x 11.0 x 17.5 | 1.05 | 51393 | 1000 | 1100 |
| 0.047 | | | 51473 | | |
| 0.056 | | | 51563 | | |
| 0.068 | | | 51683 | | |
| 0.082 | 6.0 x 12.0 x 17.5 | 1.4 | 51823 | 1000 | 900 |
| 0.1 | | | 51104 | | |
| 0.12 | 7.0 x 13.5 x 17.5 | 1.8 | 51124 | 1000 | 800 |
| 0.15 | | | 51154 | | |
| Pitch = 22.5 ±0.3 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.18 | 6.0 x 15.5 x 26.0 | 2.75 | 51184 | 200 | 600 |
| 0.22 | | | 51224 | | |
| 0.27 | 7.0 x 16.5 x 26.0 | 3.5 | 51274 | 200 | 550 |
| 0.33 | 8.5 x 18.0 x 26.0 | 3.5 | 51334 | 200 | 450 |
| 0.39 | | 5.1 | 51394 | | |
| 0.47 | 10.0 x 19.5 x 26.0 | 5.1 | 51474 | 200 | 350 |
| Pitch = 27.5 ±0.3 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.56 | 11.0 x 21.0 x 31.0 | 7.4 | 51564 | 100 | 300 |
| 0.68 | | | 51684 | | |
| 0.82 | 13.0 x 23.0 x 31.0 | 10.2 | 51824 | 100 | 250 |
| 1 | | | 51105 | | |

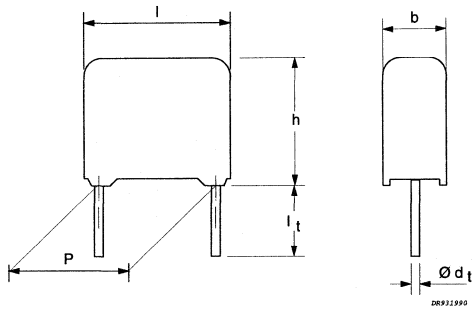
Preferred catalogue numbers

# Metallized polycarbonate film capacitors

# MKC 344



**Pitch 10/15/22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

| Tangent of loss angle | | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|---|
| | $C \leq 0.1$ µF | $\leq 30 \times 10^{-4}$ | $\leq 60 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ |
| | 0.1 µF < $C \leq 1.0$ µF | $\leq 30 \times 10^{-4}$ | $\leq 60 \times 10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 10.0 mm | 200 V/µs | | |
| | P = 15.0 mm | 90 V/µs | | |
| | P = 22.5 mm | 36 V/µs | | |
| | P = 27.5 mm | 30 V/µs | | |
| R between leads, for $C \leq 0.33$ µF | | >30 000 MΩ | | |
| RC between leads, for $C > 0.33$ µF | | >10 000 s | | |

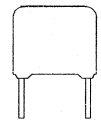
**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±10% | catalogue number **2222 344 61...** | preferred |
| Loose in box | $l_t$ = 5 ±0.5 mm | C-tol ±5% | catalogue number **2222 344 62...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 344 68...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 344 69...** | on request |

* H: intape height; for detailed specification refer to Chapter "PACKAGING".

# Metallized polycarbonate film capacitors

# MKC 344



## $U_{Rdc}$ = 630 V  $U_{Rac}$ = 220 V  loose and taped

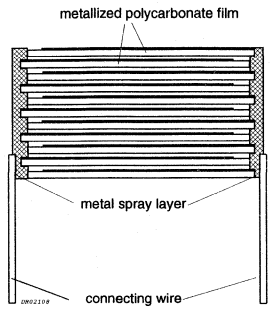
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 344 ..... loose in box; $l_t$ = 5.0 ±1.0 mm C-tol ±10% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.01 | 4.0 x 10.0 x 12.5 | 0.7 | 61103 | 1000 | 1400 |
| 0.012 | 5.0 x 11.0 x 12.5 | 0.85 | 61123 | 1000 | 1100 |
| 0.015 | | | 61153 | | |
| 0.018 | | | 61183 | | |
| 0.022 | 6.0 x 12.0 x 12.5 | 1.0 | 61223 | 1000 | 900 |
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.027 | 5.0 x 11.0 x 17.5 | 1.4 | 61273 | 1000 | 1100 |
| 0.033 | 6.0 x 12.0 x 17.5 | 1.4 | 61333 | 1000 | 900 |
| 0.039 | | 1.8 | 61393 | | |
| 0.047 | 7.0 x 13.5 x 17.5 | 1.8 | 61473 | 1000 | 800 |
| 0.056 | | 2.55 | 61563 | | |
| 0.068 | 8.5 x 15.0 x 17.5 | 2.55 | 61683 | 1000 | 650 |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.082 | 7.0 x 16.5 x 26.0 | 2.75 | 61823 | 200 | 550 |
| 0.1 | | | 61104 | | |
| 0.12 | | 3.5 | 61124 | | |
| 0.15 | 8.5 x 18.0 x 26.0 | 3.5 | 61154 | 200 | 450 |
| 0.18 | 10.0 x 19.5 x 26.0 | 5.1 | 61184 | 200 | 350 |
| 0.22 | | | 61224 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.27 | 11.0 x 21.0 x 31.0 | 7.4 | 61274 | 100 | 300 |
| 0.33 | | | 61334 | | |
| 0.39 | 13.0 x 23.0 x 31.0 | 10.2 | 61394 | 100 | 250 |
| 0.47 | | | 61474 | | |

Preferred catalogue numbers

# Metallized polycarbonate film capacitors

# MKC 344

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polycarbonate (PC) film, potted with epoxy resin in a blue flame-retardent case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

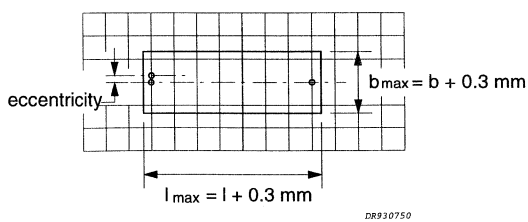
### Specific method of mounting to withstand vibration and shock.

It must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches ≤ 15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors is shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max.} \leq h + 0.3$ mm.

# Metallized polycarbonate film capacitors — MKC 344

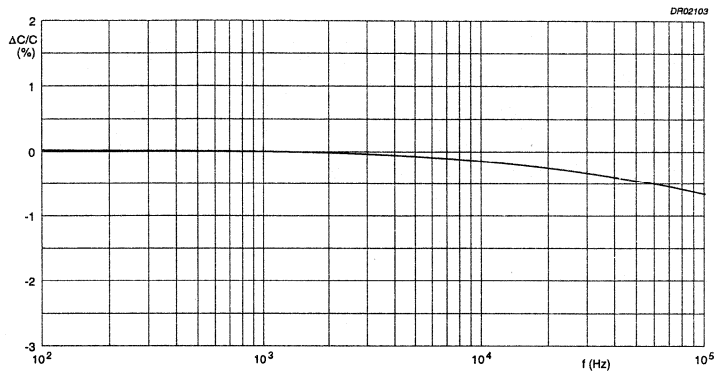
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

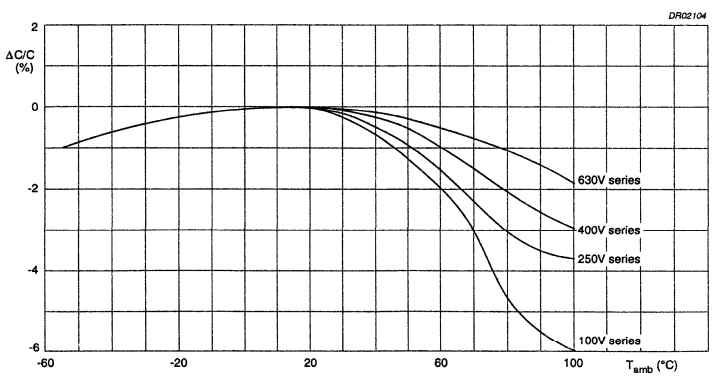
For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance as a function of frequency; typical curve.




Capacitance as a function of ambient temperature; typical curves.

# Metallized polycarbonate film capacitors — MKC 344

## TEMPERATURE

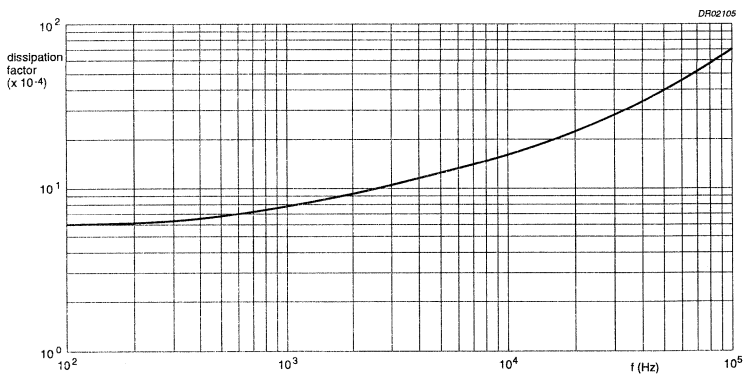
- Storage temperature: $T_{stg}$ = −25 °C to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Category voltage: $U_c = 0.8 \times U_{Rdc}$.
- Test voltage between leads: $1.6 \times U_{Rdc}$.
- Test voltage between interconnected leads and case (foil method): $2 \times U_{Rdc}$; min. 200 V.

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|
| | at 1 kHz | at 10 kHz | at 100 KHz |
| C ≤ 0.1 µF | $\leq 30 \times 10^{-4}$ | $\leq 60 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ |
| 0.1 µF < C ≤ 1 µF | $\leq 30 \times 10^{-4}$ | $\leq 60 \times 10^{-4}$ | – |
| C > 1 µF | $\leq 30 \times 10^{-4}$ | $\leq 75 \times 10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curve.

## RATED VOLTAGE PULSE SLOPE

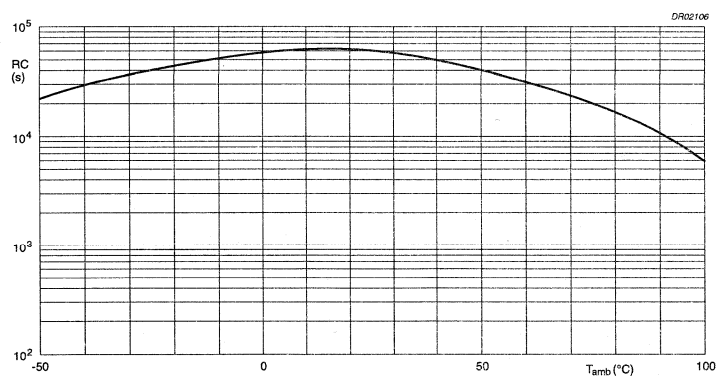
| RATED VOLTAGE (V) | MAXIMUM PULSE LOAD (V/µs) | | | |
|---|---|---|---|---|
| | P = 10.0 mm | P = 15.0 mm | P = 22.5 mm | P = 27.5 mm |
| 100 | 60 | 26 | 12 | 9 |
| 250 | 90 | 36 | 16 | 14 |
| 400 | 140 | 60 | 26 | 22 |
| 630 | 200 | 90 | 36 | 30 |

The maximum pulse load values are valid for voltages equal to the rated voltage. For lower voltages the given values can be multiplied by $U_{Rdc}$ and divided by the applied voltage.

**Note**: If the pulse load requirement is satisfied, a check must be made to ensure that the maximum dissipation is not exceeded.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 100 V ±15 V for the 100 V, 250 V and 400 V versions and 500 ±50 V for the 630 V version.




RC product as a function of ambient temperature; typical curve.

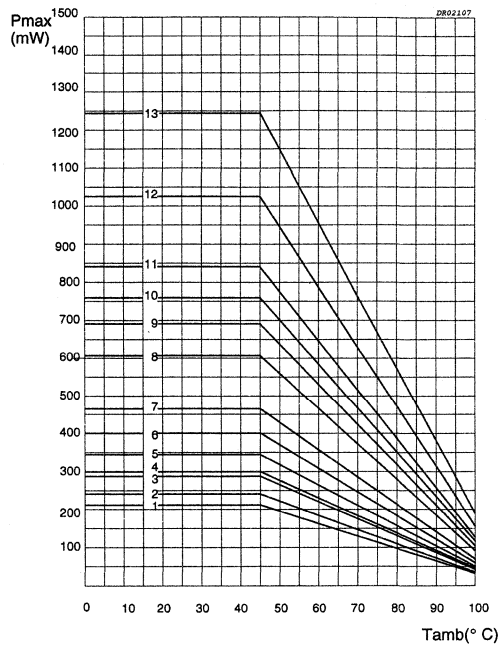
- R between leads for C ≤ 0.33 µF: >30 000 MΩ.
- RC between leads for C > 0.33 µF: >10 000 s.
- R between interconnected leads and case (foil method): >30 000 MΩ.

# Metallized polycarbonate film capacitors

# MKC 344

## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) |
|---|---|
| | b x h x l |
| 1 | 4.0 x 10.0 x 12.5 |
| 2 | 5.0 x 11.0 x 12.5 |
| 3 | 6.0 x 12.0 x 12.5 |
| 4 | 5.0 x 11.0 x 17.5 |
| 5 | 6.0 x 12.0 x 17.5 |
| 6 | 7.0 x 13.5 x 17.5 |
| 7 | 8.5 x 15.0 x 17.5 |
| 8 | 6.0 x 15.5 x 26.0 |
| 9 | 7.0 x 16.5 x 26.0 |
| 10 | 8.5 x 17.5 x 26.0 |
| 11 | 10.0 x 19.5 x 26.0 |
| 12 | 9.0 x 19.0 x 31.0 |
| 13 | 11.0 x 21.0 x 31.0 |
| 14 | 13.0 x 23.0 x 31.0 |




Maximum permissible power dissipation as a function of ambient temperature, at various capacitor dimensions.

## APPLICATION NOTE

To select the capacitor for a certain application, 6 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. The peak current ($I_p$) shall not exceed the maximum peak current, defined as maximum voltage pulse slope (dU/dt) multiplied by the capacitance.

$$I_p \text{ max} = C\left(\frac{dU}{dt}\right) \text{ max}$$

   Or the voltage pulse slope shall not exceed the rated voltage pulse slope. If the pulse voltage is lower than the rated voltage, the values of the table can be multiplied by $U_{Rdc}$ and divided by the applied voltage.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated in the graph above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.
6. In applications where voltages higher than 50 V are applied, it is recommended that the power in the capacitor be limited to 2.5 W to avoid a capacitor failure.

# Metallized polycarbonate film capacitors — MKC 344

## PRODUCT MARKING

### Capacitors with pitch 10 mm

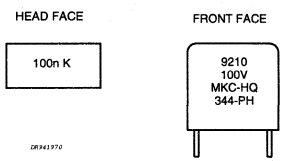
The capacitors are marked by laser print on the top with the following information:

- Rated capacitance code in accordance with IEC 62: n = nF; μ = μF
- Tolerance on rated capacitance: K = ±10%; J = ±5%

and on the side with the following information:

- Year and week of manufacture (e.g. 9110)
- Rated voltage (DC) (e.g. 100 V)
- Code for dielectric material (MKC)
- Code for factory of origin (HQ)
- Manufacturer's type designation (344)
- Manufacturer (PH).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 10 MM PITCH




### Capacitors with pitch 15 mm

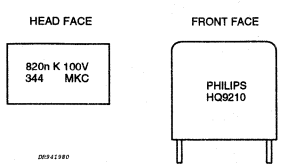
The capacitors are marked by laser print on the top with the following information:

- Rated capacitance code in accordance with IEC 62: n = nF; μ = μF
- Tolerance on rated capacitance: K = ±10%; J = ±5%
- Rated (DC) voltage (e.g. 400 V)
- Manufacturer's type designation (344)
- Code for dielectric material (MKC).

and on the side with the following information:

- Manufacturer
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9210).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH



# Metallized polycarbonate film capacitors

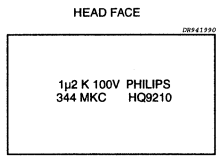
# MKC 344

**Capacitors with pitch 22.5 mm or 27.5 mm**

The capacitors are marked on the top by laser print with the following information:

- Rated capacitance code in accordance with IEC 62: n = nF; μ = μF
- Tolerance on rated capacitance: K = ±10%; J = ±5%
- Rated (DC) voltage (e.g. 100 V)
- Manufacturer
- Manufacturer's type designation (344)
- Code for dielectric material (MKC)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9210).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH

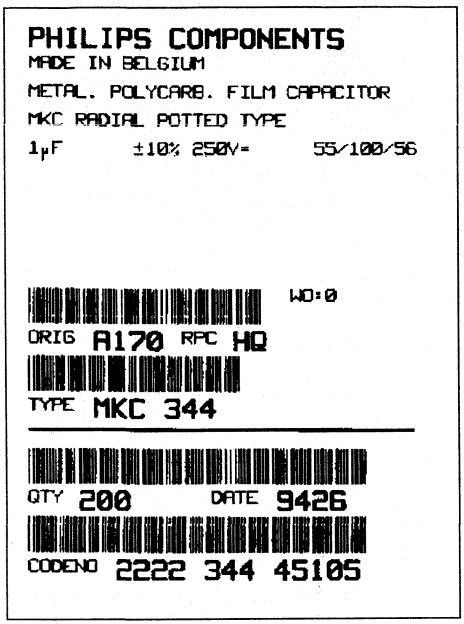


# Metallized polycarbonate film capacitors

# MKC 344

## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930090

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | - |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Metallized polycarbonate film capacitors

# MKC 344

## QUICK REFERENCE TEST REQUIREMENTS

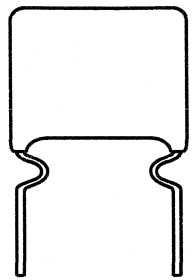
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 5 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 1\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C > 470$ nF) (*) |
| **Robustness of component** | | |
| Vibration<br>Shock | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours<br>half sinewave; 490 m/s$^2$; 11 ms | $\Delta C/C \leq 2{,}5\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C > 470$ nF) (*) |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, first cycle<br>Cold<br>Damp heat, remaining cycles | 16 hours; 100 °C<br><br>2 hours; −55 °C<br> | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 470$ nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 70 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C > 470$ nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 2000 hours;<br>1.25 x $U_{Rdc}$; 85 °C;<br>1.25 x $U_{Cdc}$; 100 °C | $\Delta C/C < 3\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C > 470$ nF) (*)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 100 °C | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C > 470$ nF) (*) |
| Resistance to soldering heat with preheating | body temperature: 100 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 1\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$ ($C \leq 470$ nF)<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ ($C > 470$ nF) (*) |
| Passive flammability | class C | no burning |

(*) Measuring frequency 100 kHz for $C \leq 470$ nF and 10 kHz for $C > 470$ nF.

# Polyester film capacitors

# KT 347

**KT RADIAL PHENOLIC LACQUERED CAPACITORS** **Pitch 10/15/22.5/27.5 mm**



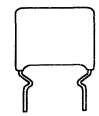
## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12 series) | 0.001 to 1 µF |
| Capacitance tolerance | ±20%; ±10% |
| Rated voltage (DC) | 100 V, 250 V, 400 V, 630 V |
| Rated voltage (AC) | 50 V, 80 V, 125 V, 200 V, |
| Climatic category | 40/100/21 |
| Rated temperature | 85 °C |
| Maximum application temperature | 100 °C |
| Reference specification | IEC 384-11 |

| FEATURES | APPLICATIONS |
|---|---|
| • Low-inductive wound cell of metal foil and a polyethyleneterephthalate film | • Consumer and industrial |
| • Lacquered, which is self-extinguishing | • Especially where high currents and/or steep pulses occur |
| • Radial leads of solder-coated wire. | • DC or AC voltage. |

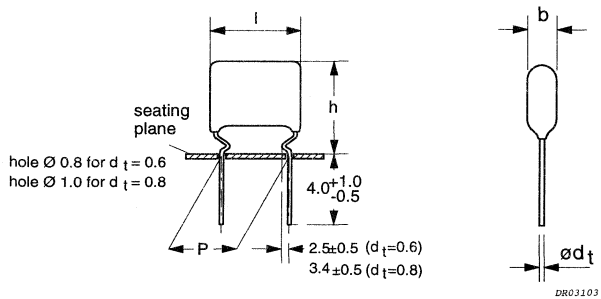
# Polyester film capacitors

# KT 347



**Pitch 10/15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

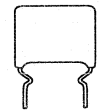
| | | |
|---|---|---|
| Tangent of loss angle | at 1 kHz | at 10 kHz |
| | $\leq 60 \times 10^{-4}$ | $\leq 110 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads, for C ≤ 0.33 µF | >50 000 MΩ | |
| RC between leads, for C > 0.33 µF | >16 500 s | |

## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 347 21...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 347 20...** | on request |

# Polyester film capacitors

# KT 347



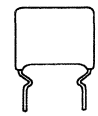
## $U_{Rdc}$ = 100 V  $U_{Rac}$ = 50 V  loose in box

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 347 ..... $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|
| | Pitch = 10.16 ±0.30 mm | $d_t$ = 0.60 mm ±0.06 mm | | |
| 0.015 | 4.5 x 12.5 x 14.0 | 0.4 | 21153 | 2000 |
| 0.018 | 5.0 x 12.5 x 14.0 | 0.5 | 21183 | 2000 |
| 0.022 | 5.5 x 13.0 x 14.0 | 0.6 | 21223 | 2000 |
| 0.027 | | 0.7 | 21273 | |
| 0.033 | 6.0 x 13.5 x 14.0 | 0.7 | 21333 | 2000 |
| 0.039 | 6.5 x 14.0 x 14.0 | 0.8 | 21393 | 2000 |
| 0.047 | 7.0 x 14.5 x 14.0 | 0.9 | 21473 | 2000 |
| | Pitch = 15.24 ±0.30 mm | $d_t$ = 0.80 mm ±0.08 mm | | |
| 0.056 | 5.5 x 14.0 x 19.5 | 1.2 | 21563 | 2000 |
| 0.068 | 6.0 x 14.5 x 19.5 | 1.3 | 21683 | 2000 |
| 0.082 | 6.5 x 15.0 x 19.5 | 1.5 | 21823 | 2000 |
| 0.1 | 7.0 x 15.5 x 19.5 | 1.7 | 21104 | 2000 |
| 0.12 | 7.5 x 16.0 x 19.5 | 1.9 | 21124 | 2000 |
| 0.15 | 8.0 x 16.5 x 19.5 | 2.3 | 21154 | 1000 |
| | Pitch = 22.86 ±0.30 mm | $d_t$ = 0.80 mm ±0.08 mm | | |
| 0.18 | 7.5 x 18.0 x 27.5 | 2.8 | 21184 | 1000 |
| 0.22 | 7.5 x 18.5 x 27.5 | 3.2 | 21224 | 1000 |
| 0.27 | 8.0 x 19.5 x 27.5 | 3.8 | 21274 | 500 |
| 0.33 | 8.5 x 20.0 x 27.5 | 4.4 | 21334 | 500 |
| 0.39 | 9.5 x 21.0 x 27.5 | 5.1 | 21394 | 500 |
| 0.47 | 10.5 x 22.0 x 27.5 | 6.0 | 21474 | 500 |
| | Pitch = 27.94 ±0.30 mm | $d_t$ = 0.80 mm ±0.08 mm | | |
| 0.56 | 10.0 x 21.5 x 32.5 | 7.0 | 21564 | 500 |
| 0.68 | 11.0 x 22.5 x 32.5 | 8.4 | 21684 | 500 |
| 0.82 | 12.0 x 23.5 x 32.5 | 10.2 | 21824 | 200 |
| 1 | 13.5 x 25.0 x 32.5 | 12.5 | 21105 | 200 |

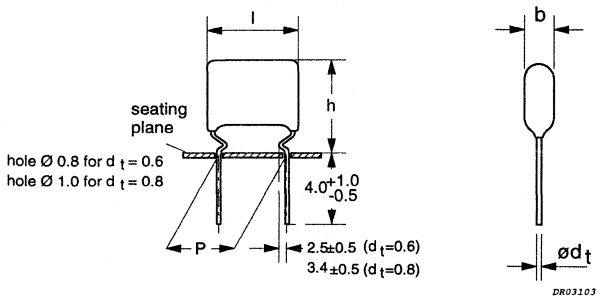
Preferred catalogue numbers

# Polyester film capacitors

# KT 347



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

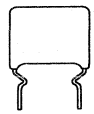
| Tangent of loss angle | at 1 kHz | at 10 kHz |
|---|---|---|
| | ≤60 x $10^{-4}$ | ≤110 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads, for C ≤ 0.33 µF | >50 000 MΩ | |
| RC between leads, for C > 0.33 µF | >16 500 s | |

## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 347 41...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 347 40...** | on request |

# Polyester film capacitors

# KT 347



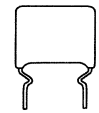
## $U_{Rdc}$ = 250 V  $U_{Rac}$ = 80 V  loose in box

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 347 ..... $l_1$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|
| Pitch = 10.16 ±0.30 mm | | | $d_1$ = 0.60 ±0.06 mm | |
| 0.0082 | 4.5 x 12.0 x 13.5 | 0.4 | 41822 | 2000 |
| 0.01 | 5.0 x 12.5 x 13.5 | 0.5 | 41103 | 2000 |
| 0.012 | 5.5 x 13.0 x 13.5 | 0.5 | 41123 | 2000 |
| 0.015 | | 0.6 | 41153 | |
| 0.018 | 6.0 x 13.5 x 13.5 | 0.7 | 41183 | 2000 |
| 0.022 | 6.5 x 14.0 x 13.5 | 0.8 | 41223 | 2000 |
| 0.027 | 7.0 x 14.5 x 13.5 | 0.9 | 41273 | 2000 |
| Pitch = 15.24 ±0.30 mm | | | $d_1$ = 0.80 ±0.08 mm | |
| 0.033 | 5.5 x 14.0 x 19.0 | 1.1 | 41333 | 2000 |
| 0.039 | 6.0 x 14.5 x 19.0 | 1.3 | 41393 | 2000 |
| 0.047 | 6.5 x 15.0 x 19.0 | 1.4 | 41473 | 2000 |
| 0.056 | 7.0 x 15.5 x 19.0 | 1.6 | 41563 | 2000 |
| 0.068 | 7.5 x 16.0 x 19.0 | 1.8 | 41683 | 2000 |
| 0.082 | 8.0 x 16.5 x 19.0 | 2.1 | 41823 | 1000 |
| Pitch = 22.86 ±0.30 mm | | | $d_1$ = 0.80 ±0.08 mm | |
| 0.1 | 7.5 x 18.0 x 27.0 | 2.7 | 41104 | 1000 |
| 0.12 | 7.5 x 18.5 x 27.0 | 3.0 | 41124 | 1000 |
| 0.15 | 8.0 x 19.5 x 27.0 | 3.5 | 41154 | 500 |
| 0.18 | 8.5 x 20.0 x 27.0 | 4.0 | 41184 | 500 |
| 0.22 | 9.5 x 21.0 x 27.0 | 4.5 | 41224 | 500 |
| 0.27 | 10.5 x 22.0 x 27.0 | 5.3 | 41274 | 500 |
| Pitch = 27.94 ±0.30 mm | | | $d_1$ = 0.80 ±0.08 mm | |
| 0.33 | 10.0 x 21.5 x 32.0 | 6.3 | 41334 | 500 |
| 0.39 | 11.0 x 22.5 x 32.0 | 7.6 | 41394 | 500 |
| 0.47 | 12.0 x 23.5 x 32.0 | 9.1 | 41474 | 250 |
| 0.56 | 13.5 x 25.0 x 32.0 | 10.8 | 41564 | 250 |
| 0.68 | 15.0 x 26.5 x 32.0 | 13.1 | 41684 | 250 |

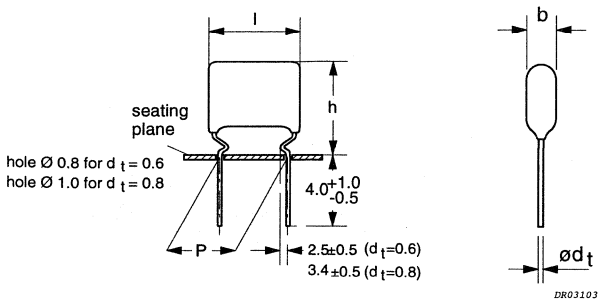
Preferred catalogue numbers

# Polyester film capacitors

# KT 347



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

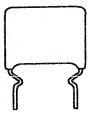
| | | |
|---|---|---|
| Tangent of loss angle | at 1 kHz | at 10 kHz |
| | $\leq 60 \times 10^{-4}$ | $\leq 110 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads, for C ≤ 0.33 µF | >50 000 MΩ | |

## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 347 51...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 347 50...** | on request |

# Polyester film capacitors

# KT 347



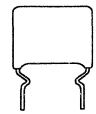
## $U_{Rdc}$ = 400 V  $U_{Rac}$ = 125 V  loose in box

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 347 ..... $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|
| | Pitch = 10.16 ±0.30 mm | $d_t$ = 0.60 mm ±0.06 mm | | |
| 0.0047 | 4.5 x 12.0 x 13.5 | 0.4 | 51472 | 2000 |
| 0.0056 | 5.0 x 12.5 x 13.5 | 0.5 | 51562 | 2000 |
| 0.0068 | 5.5 x 13.0 x 13.5 | 0.5 | 51682 | 2000 |
| 0.0082 | | 0.6 | 51822 | |
| 0.01 | 6.0 x 13.5 x 13.5 | 0.7 | 51103 | 2000 |
| 0.012 | 6.5 x 14.0 x 13.5 | 0.8 | 51123 | 2000 |
| 0.015 | 7.0 x 14.5 x 13.5 | 0.9 | 51153 | 2000 |
| | Pitch = 15.24 ±0.30 mm | $d_t$ = 0.80 mm ±0.08 mm | | |
| 0.018 | 5.5 x 14.0 x 19.0 | 1.1 | 51183 | 2000 |
| 0.022 | 6.0 x 14.5 x 19.0 | 1.2 | 51223 | 2000 |
| 0.027 | 6.5 x 15.0 x 19.0 | 1.4 | 51273 | 2000 |
| 0.033 | 7.0 x 15.5 x 19.0 | 1.6 | 51333 | 2000 |
| 0.039 | 7.5 x 16.0 x 19.0 | 1.8 | 51393 | 2000 |
| 0.047 | 8.0 x 16.5 x 19.0 | 2.1 | 51473 | 1000 |
| | Pitch = 22.86 ±0.30 mm | $d_t$ = 0.80 mm ±0.08 mm | | |
| 0.056 | 7.5 x 18.0 x 27.0 | 2.5 | 51563 | 1000 |
| 0.068 | 7.5 x 18.5 x 27.0 | 2.9 | 51683 | 1000 |
| 0.082 | 8.0 x 19.5 x 27.0 | 3.2 | 51823 | 500 |
| 0.1 | 8.5 x 20.0 x 27.0 | 3.8 | 51104 | 500 |
| 0.12 | 9.5 x 21.0 x 27.0 | 4.4 | 51124 | 500 |
| 0.15 | 10.5 x 22.0 x 27.0 | 5.2 | 51154 | 500 |
| | Pitch = 27.94 ±0.30 mm | $d_t$ = 0.80 mm ±0.08 mm | | |
| 0.18 | 10.0 x 21.5 x 32.0 | 6.0 | 51184 | 500 |
| 0.22 | 11.0 x 22.5 x 32.0 | 6.9 | 51224 | 500 |
| 0.27 | 12.0 x 23.5 x 32.0 | 8.0 | 51274 | 250 |
| 0.33 | 13.5 x 25.0 x 32.0 | 9.5 | 51334 | 250 |

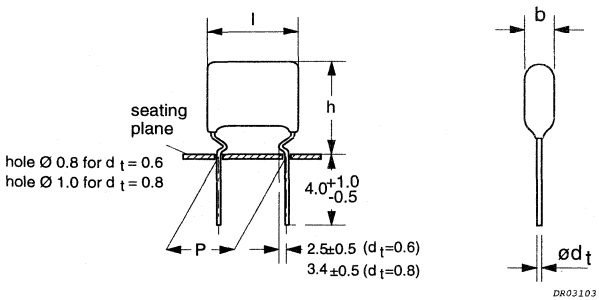
Preferred catalogue numbers

# Polyester film capacitors

# KT 347



**Pitch 10/15/22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

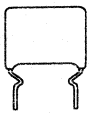
| | | |
|---|---|---|
| Tangent of loss angle | at 1 kHz | at 10 kHz |
| | $\leq 60 \times 10^{-4}$ | $\leq 110 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads, for C ≤ 0.33 µF | >50 000 MΩ | |

**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±10% | catalogue number **2222 347 61...** | preferred |
| Loose in box | $l_t$ = 4.0 +1.0/-0.5 mm | C-tol ±20% | catalogue number **2222 347 60...** | on request |

# Polyester film capacitors

KT 347



## $U_{Rdc}$ = 630 V  $U_{Rac}$ = 200 V  loose in box

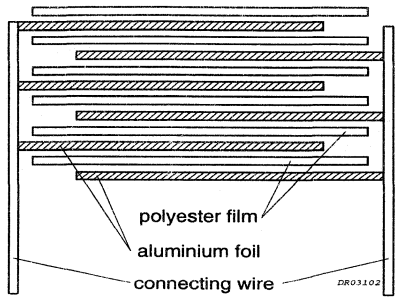
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 347 ..... $l_t$ = 4.0 +1.0/-0.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ |
|---|---|---|---|---|
| | Pitch = 10.16 ±0.30 mm | | $d_t$ = 0.60 mm ±0.06 mm | |
| 0.001 | 5.5 x 13.0 x 13.5 | 0.5 | 61102 | 2000 |
| 0.0012 | | 0.5 | 61122 | |
| 0.0015 | | 0.6 | 61152 | |
| 0.0018 | | 0.7 | 61182 | |
| 0.0022 | | 0.5 | 61222 | |
| 0.0027 | | 0.6 | 61272 | |
| 0.0033 | | 0.5 | 61332 | |
| 0.0039 | | 0.6 | 61392 | |
| 0.0047 | 6.0 x 13.5 x 13.5 | 0.7 | 61472 | 2000 |
| 0.0056 | 6.5 x 14.0 x 13.5 | 0.8 | 61562 | 2000 |
| 0.0068 | 7.0 x 14.5 x 13.5 | 0.9 | 61682 | 2000 |
| | Pitch = 15.24 ±0.30 mm | | $d_t$ = 0.80 mm ±0.08 mm | |
| 0.0082 | 5.5 x 14.0 x 19.0 | 1.1 | 61822 | 2000 |
| 0.01 | 6.0 x 14.5 x 19.0 | 1.2 | 61103 | 2000 |
| 0.012 | 6.5 x 15.0 x 19.0 | 1.3 | 61123 | 2000 |
| 0.015 | 7.0 x 15.5 x 19.0 | 1.5 | 61153 | 2000 |
| 0.018 | 7.5 x 16.0 x 19.0 | 1.7 | 61183 | 2000 |
| 0.022 | 8.0 x 16.5 x 19.0 | 2.0 | 61223 | 1000 |
| | Pitch = 22.86 ±0.30 mm | | $d_t$ = 0.80 mm ±0.08 mm | |
| 0.027 | 7.5 x 18.0 x 27.0 | 2.5 | 61273 | 1000 |
| 0.033 | 7.5 x 18.5 x 27.0 | 2.8 | 61333 | 1000 |
| 0.039 | 8.0 x 19.5 x 27.0 | 3.0 | 61393 | 500 |
| 0.047 | 8.5 x 20.0 x 27.0 | 3.5 | 61473 | 500 |
| 0.056 | 9.5 x 21.0 x 27.0 | 3.8 | 61563 | 500 |
| 0.068 | 10.5 x 22.0 x 27.0 | 4.4 | 61683 | 500 |
| | Pitch = 27.94 ±0.30 mm | | $d_t$ = 0.80 mm ±0.08 mm | |
| 0.082 | 10.0 x 21.5 x 32.0 | 5.2 | 61823 | 500 |
| 0.1 | 11.0 x 22.5 x 32.0 | 6.2 | 61104 | 500 |
| 0.12 | 12.0 x 23.5 x 32.0 | 7.2 | 61124 | 250 |
| 0.15 | 13.5 x 25.0 x 32.0 | 8.7 | 61154 | 250 |

Preferred catalogue numbers

# Polyester film capacitors

KT 347

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metal foil and a polyethyleneterephthalate film.
- Lacquered with self-extinguishing tan coloured lacquer.
- Radial leads, solder-coated.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards.

### Specific method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the underside of the kinks are in good contact with the printed-circuit board.

- For pitches ≤15 mm the capacitors shall be fixed by the leads.
- For pitches >15 mm the capacitors shall be mounted in the same way and the body clamped.

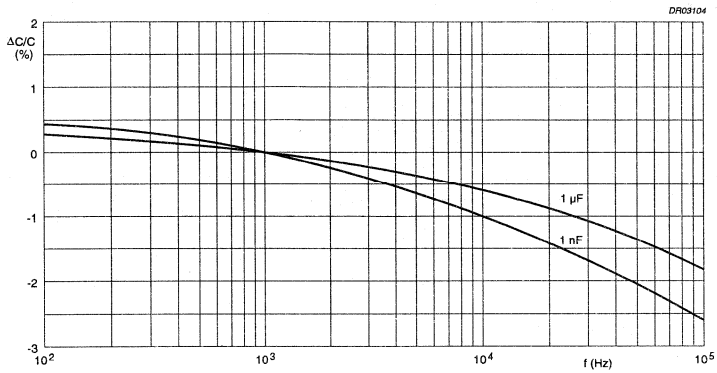
## RATINGS AND CHARACTERISTICS

Unless otherwise specified, all electrical values apply to an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

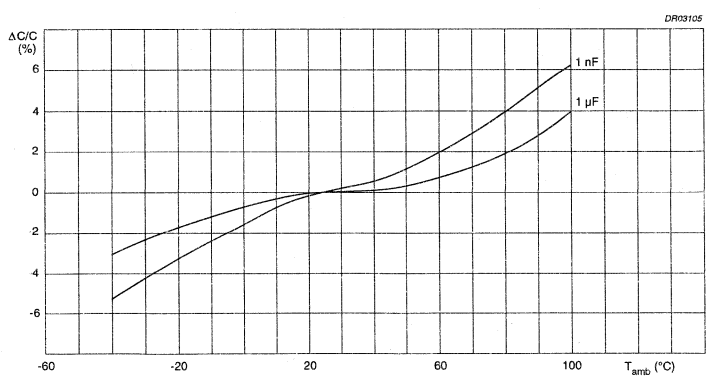
For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance change as a function of frequency; typical curves.




Capacitance change as a function of ambient free air temperature at 1 kHz; typical curves.

# Polyester film capacitors

# KT 347

## TEMPERATURE

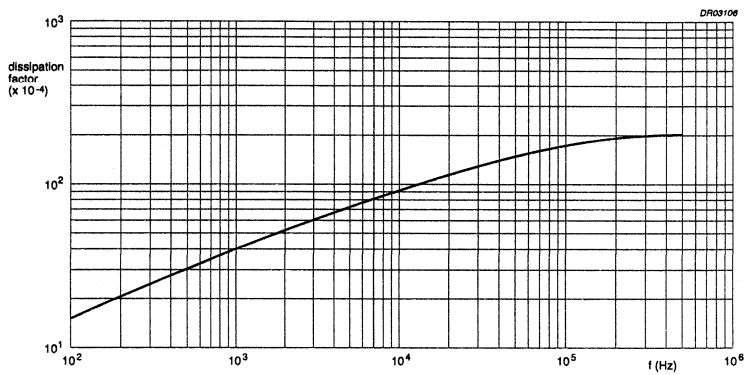
- Storage temperature: $T_{stg}$ = –25 °C to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

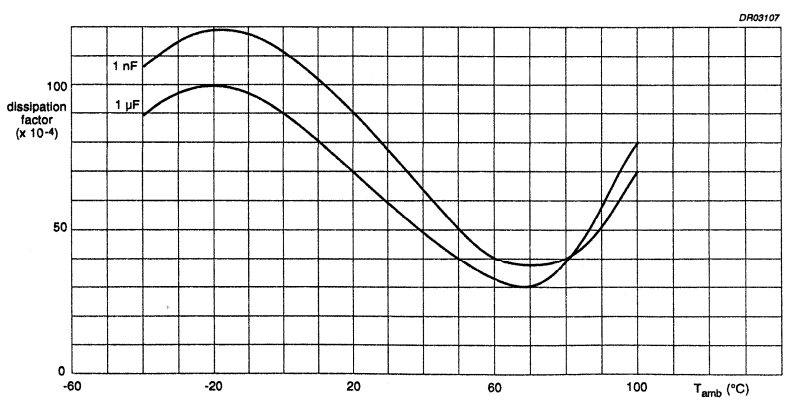
- Category voltage: $U_c = 0.8 \times U_{Rdc}$.
- Test voltage between leads (IEC 384-1, test A): $2 \times U_{Rdc}$.

## TANGENT OF LOSS ANGLE

| TANGENT OF LOSS ANGLE | at 10 kHz | at 100 kHz |
|---|---|---|
| | $\leq 110 \times 10^{-4}$ | $\leq 60 \times 10^{-4}$ |



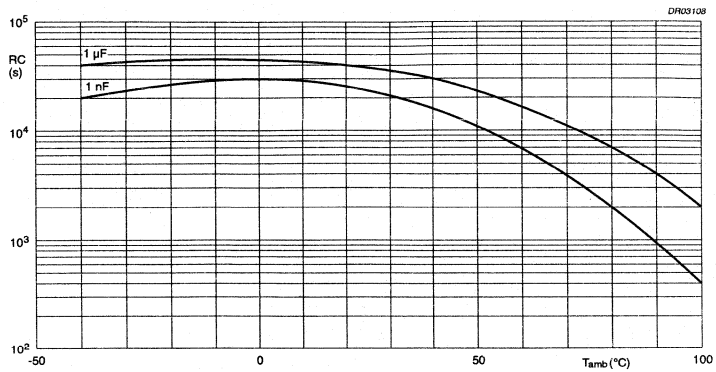

Tangent of loss angle as a function of frequency; typical curve.




Tangent of loss angle as a function of ambient free air temperature; typical curves.

**INSULATION RESISTANCE**

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 100 ±15 V for the 100 V, 250 V and 400 V versions and 500 ±50 V for the 630 V version.



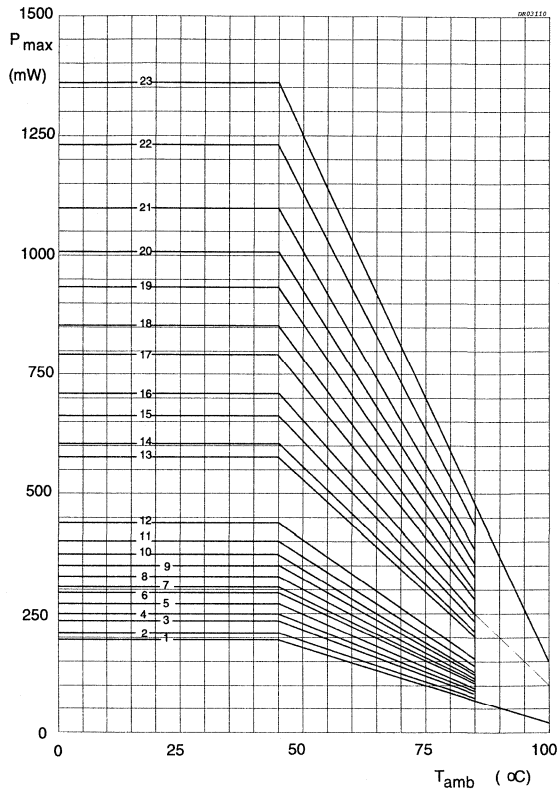

RC-product as a function of ambient free air temperature; typical curves.

- R between leads for C ≤ 0.33 µF: >50 000 MΩ.
- RC between leads for C > 0.33 µF: >16 500 s.

## MAXIMUM DISSIPATION

The power dissipated by a capacitor is a function of the voltage.

| CURVE | DIMENSIONS (mm) $b_{max}$ x $h_{max}$ x $l_{max}$ |
|---|---|
| 1 | 4.5 x 12.5 x 14.0 |
| 2 | 5.0 x 12.5 x 14.0 |
| 3 | 5.5 x 13.0 x 14.0 |
| 4 | 6.0 x 13.5 x 14.0 |
| 5 | 6.5 x 14.0 x 14.0 |
| 6 | 7.0 x 14.5 x 14.0 |
| 7 | 5.5 x 14.0 x 19.5 |
| 8 | 6.0 x 14.5 x 19.5 |
| 9 | 6.5 x 15.0 x 19.5 |
| 10 | 7.0 x 15.5 x 19.5 |
| 11 | 7.5 x 16.0 x 19.5 |
| 12 | 8.0 x 16.5 x 19.5 |
| 13 | 7.0 x 18.5 x 27.5 |
| 14 | 7.5 x 18.5 x 27.5 |
| 15 | 8.0 x 19.5 x 27.5 |
| 16 | 8.5 x 20.0 x 27.5 |
| 17 | 9.5 x 21.0 x 27.5 |
| 18 | 10.5 x 22.0 x 27.5 |
| 19 | 10.0 x 21.5 x 32.5 |
| 20 | 11.0 x 22.5 x 32.5 |
| 21 | 12.0 x 23.5 x 32.5 |
| 22 | 13.5 x 25.0 x 32.5 |
| 23 | 15.0 x 26.5 x 32.5 |




Maximum permissible power dissipation as a function of ambient free air temperature.

## APPLICATION NOTE

To select the capacitor for a certain application, 5 conditions must be checked:

1. The peak voltage ($U_P$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{P-P}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$), to avoid the ionisation inception level.
3. There is no limit for the peak current ($I_P$) or voltage pulse slope (dU/dt) in the application.
4. The dissipated power shall not be greater than the maximum permissible power dissipation.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.

## MARKING

### Product marking

The capacitors are marked on the top in black ink with the following information:

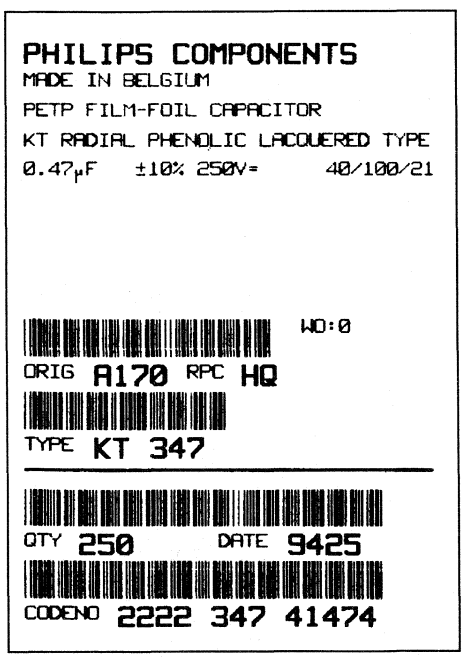
- Rated capacitance code in accordance with IEC 62: pF or µF
- Tolerance on rated capacitance: M = ±20%; K = ±10%
- Rated (DC) voltage (e.g. 250 V)
- Code for dielectric material (KT)
- Manufacturer (PHILIPS)
- Code for factory of origin (HQ).

EXAMPLE OF MARKING

PHILIPS 0.39µF 20% HQ
250V- KT

### Package marking

The package containing the capacitors is marked as shown.




PK930100

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | – |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Polyester film capacitors

# KT 347

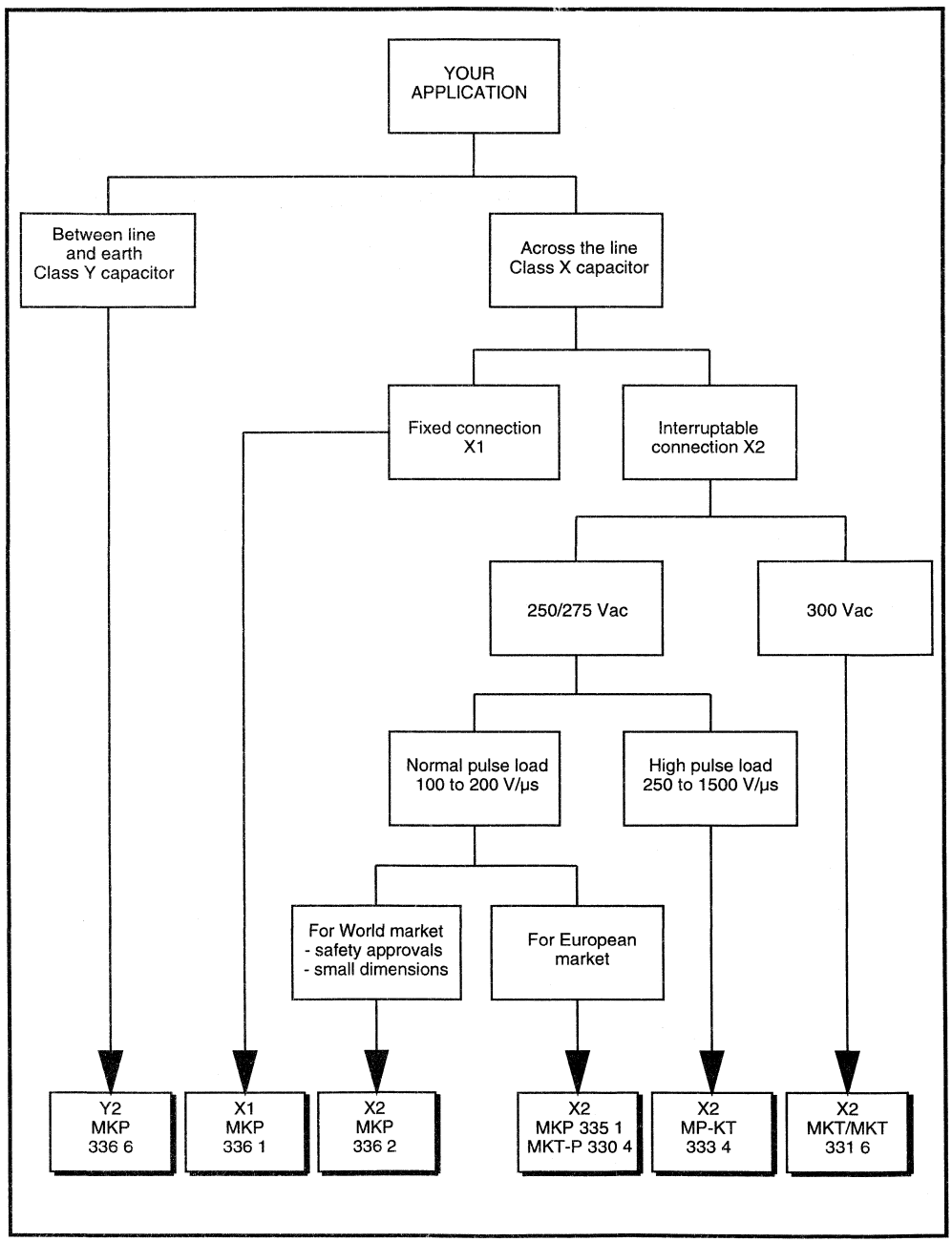
## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Resistance to solvents | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | <br>no visible damage<br>legible marking<br>$\Delta C/C \leq 2\%$ |
| **Robustness of component** | | |
| Vibration<br><br>Shock | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 $m/s^2$; 6 hours<br>half sinewave; 490 $m/s^2$; 11 ms | $\Delta C/C \leq 5\%$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, first cycle<br>Cold<br>Damp heat, remaining cycles | 16 hours; 100 °C<br><br>2 hours; −40 °C | $\Delta C/C \leq 5\%$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 5\%$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 1000 hours:<br>1.25 x $U_{Rdc}$; 85 °C<br>1.25 x $U_{Cdc}$; 100 °C | $\Delta C/C \leq 10\%$<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 1000 hours; 100 °C | $\Delta C/C \leq 5\%$ |
| Resistance to soldering heat with preheating | body temperature: 100 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 2\%$ |

# INTERFERENCE SUPPRESSION CAPACITORS

# Interference suppression film capacitors

## HOW TO SELECT.....

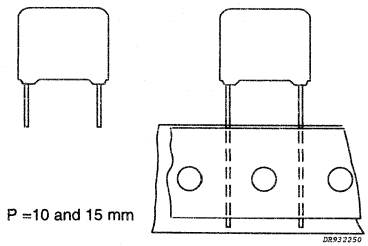


# Interference suppression film capacitors

# MKP 336 6

## MKP RADIAL POTTED CAPACITORS

**Pitch 10/15 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12 series) | 1 nF to 47 nF |
| Capacitance tolerance | ±10%, ±20% |
| Rated voltage (AC), 50 to 60 Hz | 250 V |
| Climatic category | 55/100/21/C |
| Rated temperature | 100 °C |
| Maximum application temperature | 100 °C |
| Reference IEC specification | IEC 384-14, 2nd edition and EN 132400 |
| Safety approvals | UL1414, CSA-C22.2 No 1, SEV, VDE, FI, N, D, S, IMQ, ÖVE |
| Materials | qualified in accordance with UL94V-0 |
| Safety class | Y2 |

### FEATURES

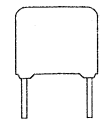
- 10 mm to 15 mm lead pitch
- Supplied loose in box and taped on reel
- Consists of a low-inductive wound cell of metallized polypropylene film, potted in a flame-retardent case.

### APPLICATIONS

- For Y2-electromagnetic interference suppression
- Specially designed to meet the NEW REQUIREMENTS of the new IEC 384-14 2nd edition / EN 132400, requiring a 5 kV peak pulse voltage test and the UL1414 and CSA-C22.2 No 1 specification as line-by-pass.

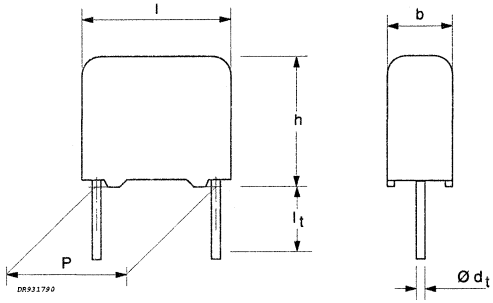
# Interference suppression film capacitors

# MKP 336 6



**Pitch 10/15 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 250 V AC (Y2) VERSION

| Tangent of the loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| | $\leq 10 \times 10^{-4}$ | $\leq 30 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 200 V/µs | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | |
| Test voltage (DC) | 2250 V; 1 s | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±20% | catalogue number **2222 336 60...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±10% | catalogue number **2222 336 61...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 336 63...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 336 64...** | on request |

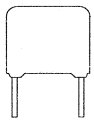
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- 5% tolerance on capacitance
- Taped ammopack.

# Interference suppression film capacitors

# MKP 336 6



| SAFETY APPROVALS | FILE NUMBERS | SAFETY APPROVALS | FILE NUMBERS |
|---|---|---|---|
| UL1414 | E 112471 | NEMKO | Pending |
| CSA-C22.2 No.1-M90 | LR 94054-6 | DEMKO | Pending |
| SEV | Pending | SEMKO | Pending |
| VDE class Y | 83620 | IMQ | Pending |
| FI | Pending | ÖVE | Pending |


DR932200

## $U_{Rac}$ = 250 V (AC) Y2 — loose and taped

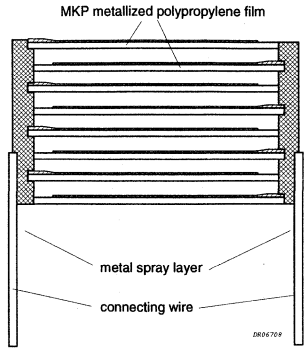
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 336 ..... loose in box; $l_1$ = 3.5 ±0.5 mm C-tol ±20% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm $d_1$ = 0.60 ±0.06 mm | | | | | |
| 0.001<br>0.0015<br>0.0022 | 4.0 x 10.0 x 12.5 | 0.6 | 60102<br>60152<br>60222 | 1000 | 1400 |
| 0.0033 | 5.0 x 11.0 x 12.5 | 0.85 | 60332 | 1000 | 1100 |
| 0.0047<br>0.0068 | 6.0 x 12.0 x 12.5 | 1.0 | 60472<br>60682 | 750 | 900 |
| Pitch = 15.0 ±0.4 mm $d_1$ = 0.80 ±0.08 mm | | | | | |
| 0.0068<br>0.01 | 5.0 x 11.0 x 17.5 | 1.2 | 69005<br>60103 | 1000 | 1100 |
| 0.015 | 6.0 x 12.0 x 17.5 | 1.4 | 60153 | 1000 | 900 |
| 0.022 | 7.0 x 13.5 x 17.5 | 1.9 | 60223 | 1000 | 800 |
| 0.033 | 8.5 x 15.0 x 17.5 | 2.6 | 60333 | 1000 | 650 |
| 0.047 | 10.0 x 16.5 x 17.5 | 3.1 | 60473 | 500 | 600 |

Preferred catalogue numbers

# Interference suppression film capacitors

# MKP 336 6

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

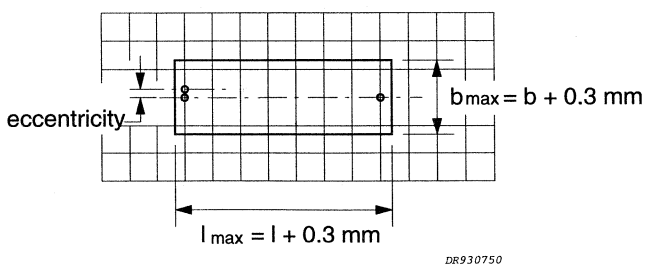
### Specific method of mounting to withstand vibration and shock

To withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- The capacitors shall be mechanically fixed by the leads.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors is shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

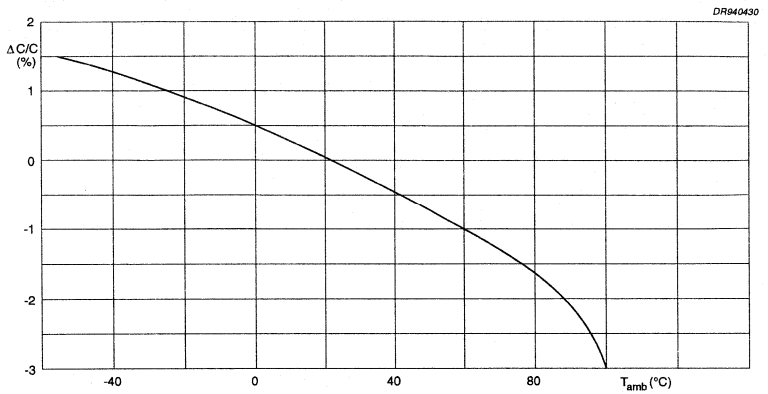
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at a rated temperature and relative humidity not exceeding 20%.

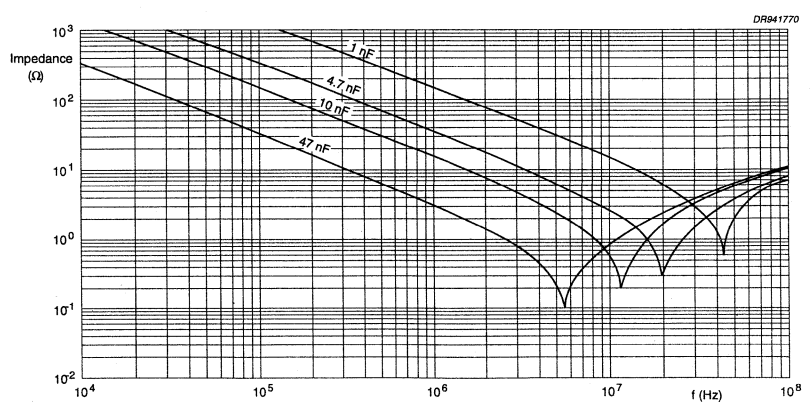
## CAPACITANCE

- All capacitance values are specified at 1 kHz.



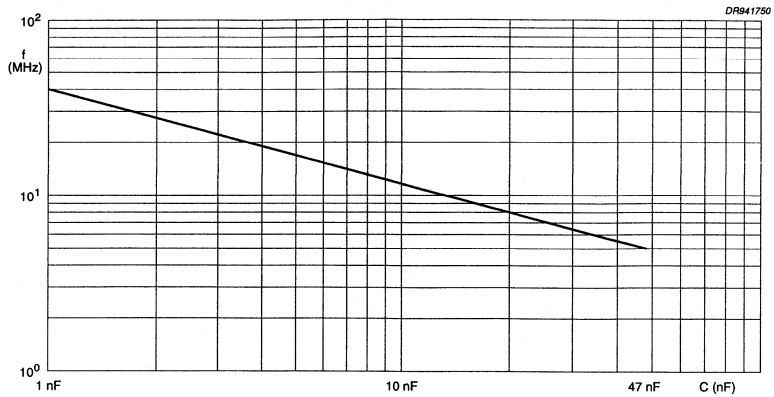

Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

## RESONANT FREQUENCY




Resonant frequency as a function of capacitance; typical curve.

## TEMPERATURE

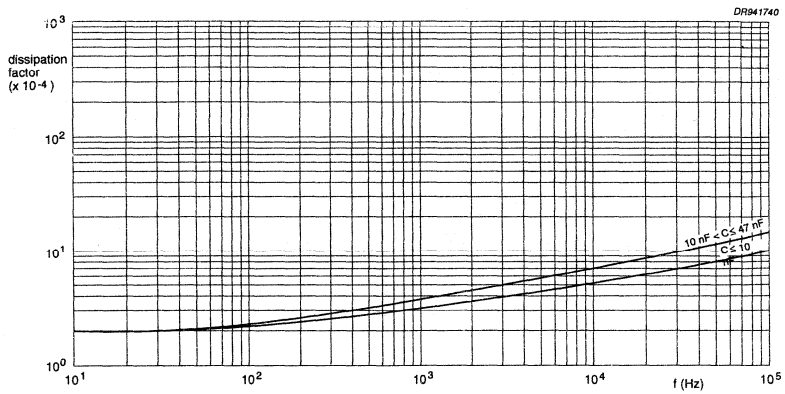
- Storage temperature: $T_{stg}$ = –25 to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Test voltage between leads, 100% on line for 1 second: 2700 V (DC).
- Test voltage between interconnected leads and case (foil method): 2000 V (AC).

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | |
|---|---|---|
| | at 10 kHz | at 100 kHz |
| 1 to 47 nF | $\leq 10 \times 10^{-4}$ | $\leq 30 \times 10^{-4}$ |




Tangent of loss angle as a function of frequency; typical curves.

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

Maximum pulse load: 200 V/µs.
If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by $\sqrt{2} \times U_{Rac}$ and divided by the applied voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

- R between leads: >15 000 MΩ.
- R between interconnected leads and case (foil method): >30 000 MΩ.

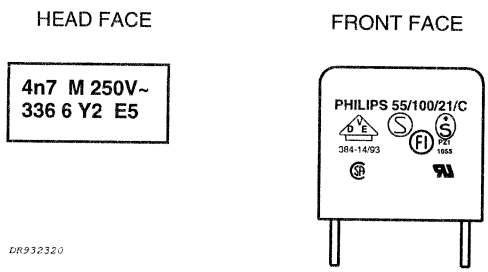
## PRODUCT MARKING

### Capacitors with pitch 10 mm and 15 mm

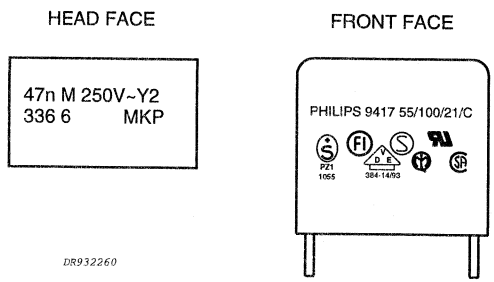
Capacitors are marked by laser print on the top and the side with the following information:

- Manufacturer (PHILIPS)
- Manufacturer's type designation (336 6)
- Rated capacitance code in accordance with IEC 62
- Rated (AC) voltage (250 V)
- Sub class (Y2)
- Tolerance on rated capacitance: M = ±20%; K = ±10%
- Code for dielectric material (MKP)
- Year and week of manufacture (e.g. 9219) or year and month (e.g. E5) for 10 mm pitch
- Safety approvals.

EXAMPLE OF MARKING FOR A CAPACITOR WITH 10 MM PITCH

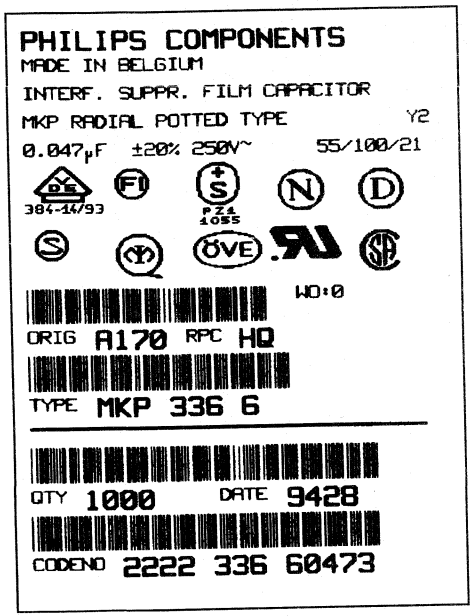



EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK940070

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and sub class Y2 |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Interference suppression film capacitors

# MKP 336 6

## QUICK REFERENCE TEST REQUIREMENTS

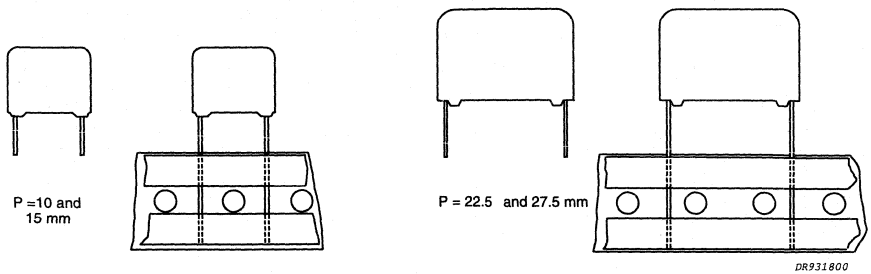
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ |
| **Robustness of component** | | |
| Rapid change of temperature<br>Vibration<br>Shock<br>Voltage proof | 5 cycles<br>1 cycle = 30 minutes at −55 °C and 30 minutes at 100 °C<br>10 Hz to 55 Hz; amplitude 0.75 mm; 6 hours<br>half sinewave; 490 mm/s$^2$; 11 ms<br>$V_p$ = 2250 V (DC); 1 minute | <br><br>$\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, test Db, first cycle<br>Cold<br>Damp heat cyclic, test Db, remaining cycles | 16 hours; 100 °C<br><br>2 hours; −55 °C<br> | <br>$\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 95 to 98 % RH; no load<br>$V_p$ = 2250 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 3 x 5 kV pulse voltage; 1000 hours; 1.7 x 250 V (AC); 100 °C once per hour: 0.1 s; 1000 V (RMS) via resistor of 47 Ω<br>$V_p$ = 2250 V (DC); 1 minute | $\Delta C/C \leq 10\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Charge and discharge | 10 000 cycles; 5 ms; 1.5 x dV/dt | $\Delta C/C \leq 10\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Passive flammability | class C | no burning |
| Active flammability | 20 x 5 kV discharge | no burning |
| Solderability | solder bath: 235 °C; 2 s | wetting ≥ 95% |
| Heat storage | 1000 hours; 100 °C | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta < 100 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | preheating: 100 °C<br>solder bath: 260 °C; 10 s | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 100 \times 10^{-4}$ |

# Interference suppression film capacitors

# MKP 336 1/2

## MKP RADIAL POTTED CAPACITORS

**Pitch 10/15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E12 series) | MKP 336 1: X1: 1 nF to 1 µF (275 V AC)<br>MKP 336 2: X2: 1 nF to 2.2 µF (275 V AC) |
| Capacitance tolerance | ±10%, ±20% |
| Rated voltage (AC), 50 to 60 Hz | 275 V |
| Climatic category | 55/100/21/C |
| Rated temperature | 100 °C |
| Maximum application temperature | 100 °C |
| Reference IEC specification | IEC 384-14, 2nd edition and EN 132400 |
| Safety approvals | UL1414, CSA-C22.2 No 1 (at 250 V), SEV, VDE, FI, N, D, S, IMQ, ÖVE |
| Materials | qualified in accordance with UL94V-0 |
| Safety class | X1, X2 |

### FEATURES

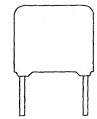
- 10 mm to 27.5 mm lead pitch
- Supplied loose in box and taped on reel
- Consists of a low-inductive wound cell of metallized polypropylene film, potted in a flame-retardent case.

### APPLICATIONS

- For X1 and X2-electromagnetic interference suppression
- Specially designed to meet the NEW REQUIREMENTS of the new IEC 384-14, 2nd edition / EN 132400, requiring for X1 a 4 kV and for X2 a 2.5 kV peak pulse voltage test and the UL1414 and CSA-C22.2 No 1 - specification.

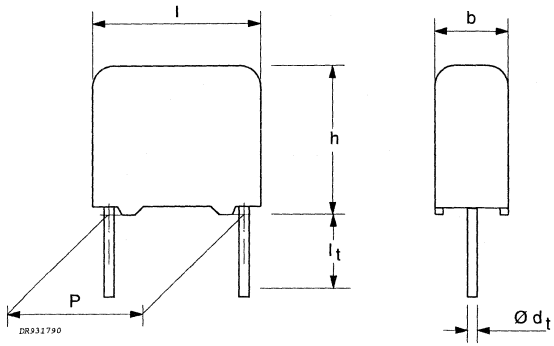
# Interference suppression film capacitors

# MKP 336 1



**Pitch 10/15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 275 V AC (X1) VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| C ≤ 100 nF | ≤10 x $10^{-4}$ | ≤ 30 x $10^{-4}$ |
| 100 nF < C ≤ 470 nF | ≤20 x $10^{-4}$ | ≤100 x $10^{-4}$ |
| C > 470 nF | ≤70 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ | X1: 200 V/µs | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | |
| RC between leads, for C > 0.33 µF | >5 000 s | |
| Test voltage (DC) | X1: 3500 V; 1 s | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±20% | catalogue number **2222 336 10...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±10% | catalogue number **2222 336 11...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 336 13...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 336 14...** | on request |

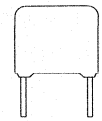
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- 5% tolerance on capacitance
- Taped ammopack.

# Interference suppression film capacitors

# MKP 336 1



| SAFETY APPROVALS | FILE NUMBERS | SAFETY APPROVALS | FILE NUMBERS |
|---|---|---|---|
| FOR X1 | | | |
| UL1414 | E 112471 | NEMKO | Pending |
| CSA-C22.2 No.1-M90 | LR 94054-6 | DEMKO | Pending |
| SEV 1055.1978 class X | 93,1 01309,02 | SEMKO | Pending |
| VDE class X1 | 83619 | IMQ CEI 40-7/1980 | V 3731 |
| FI IEC 384 - 14 (2nd Ed.) | 175243-01 | ÖVE | Pending |


DR932200

## $U_{Rac}$ = 275 V (AC) X1

## loose and taped

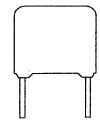
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 336 ..... loose in box; $l_t$ = 3.5 ±0.5 mm C-tol ±20% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.001<br>0.0015<br>0.0022 | 4.0 x 10.0 x 12.5 | 0.6 | 10102<br>10152<br>10222 | 1000 | 1400 |
| 0.0033<br>0.0047<br>0.0068 | 5.0 x 11.0 x 12.5 | 0.85 | 10332<br>10472<br>10682 | 1000 | 1100 |
| 0.01 | 6.0 x 12.0 x 12.5 | 1.0 | 10103 | 750 | 900 |
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.01<br>0.015<br>0.022 | 5.0 x 11.0 x 17.5 | 1.2 | 19001<br>10153<br>10223 | 1000 | 1100 |
| 0.022<br>0.033 | 6.0 x 12.0 x 17.5 | 1.4 | x<br>10333 | 1000 | 900 |
| 0.033<br>0.047 | 7.0 x 13.5 x 17.5 | 1.9 | x<br>10473 | 1000 | 800 |
| 0.047<br>0.068 | 8.5 x 15.0 x 17.5 | 2.6 | x<br>10683 | 1000 | 650 |
| 0.068<br>0.1 | 10.0 x 16.5 x 17.5 | 3.1 | x<br>10104 | 500 | 600 |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.1 | 7.0 x 16.5 x 26.0 | 3.2 | 19003 | 200 | 550 |
| 0.15 | 8.5 x 18.0 x 26.0 | 4.4 | 10154 | 200 | 450 |
| 0.22 | 10.0 x 19.5 x 26.0 | 5.5 | 10224 | 200 | 400 |
| Pitch 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.22 | 11.0 x 21.0 x 31.0 | 7.8 | 19005 | 100 | 300 |
| 0.33 | 13.0 x 23.0 x 31.0 | 10.4 | 10334 | 100 | 250 |
| 0.47 | 15.0 x 25.0 x 31.0 | 12.8 | 10474 | 100 | 200 |
| 0.68 | 18.0 x 28.0 x 31.0 | 17.2 | 10684 | 100 | 150 |
| 1 | 21.0 x 31.0 x 31.0 | 20.4 | 10105 | 50 | not available |

Preferred catalogue numbers

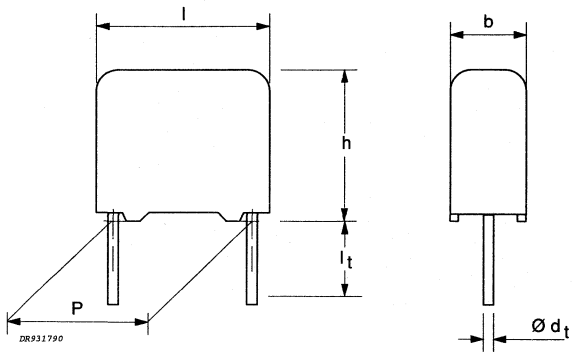
x = other dimensions for 10% versions.

# Interference suppression film capacitors

# MKP 336 2



**Pitch 10/15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 275 V AC (X2) VERSION

| | | | |
|---|---|---|---|
| Tangent of loss angle | | at 10 kHz | at 100 kHz |
| | C ≤ 100 nF | $\leq 10 \times 10^{-4}$ | $\leq 30 \times 10^{-4}$ |
| | 100 nF < C ≤ 470 nF | $\leq 20 \times 10^{-4}$ | $\leq 100 \times 10^{-4}$ |
| | C > 470 nF | $\leq 70 \times 10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ | | X2: 100 V/µs | |
| R between leads, for C ≤ 0.33 µF | | >15 000 MΩ | |
| RC between leads, for C > 0.33 µF | | >5 000 s | |
| Test voltage (DC) | C ≤ 1 µF | X2: 2200 V; 1 s | |
| | C > 1 µF | X2: 2200 V/√C (C in µF); 1 s | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±20% | catalogue number **2222 336 20...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±10% | catalogue number **2222 336 21...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 336 23...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 336 24...** | on request |

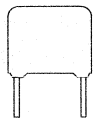
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- 5% tolerance on capacitance
- Taped ammopack.

# Interference suppression film capacitors

# MKP 336 2



| SAFETY APPROVALS | | APPROVAL FILES | SAFETY APPROVALS | APPROVAL FILES |
|---|---|---|---|---|
| FOR X2 | | | | |
| UL1414 | * | E 112471 | NEMKO | Pending |
| CSA-C22.2 No.1-M90 | * | LR 94054-6 | SEMKO | Pending |
| SEV 1055.1978 class X | * | 93,1 0139,02 | DEMKO | Pending |
| VDE class X2 | | 83618 | IMQ CEI 40-7/1980 | V 3732 |
| FI IEC 384 - 14 (2nd Ed.) | * | 175243.02 | ÖVE | Pending |

* 1 nF up to and including 1 µF.

DR932200

## $U_{Rac}$ = 275 V (AC) X2

## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 336 ..... loose in box; $l_1$ = 3.5 ±0.5 mm C-tol ±20% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_1$ = 0.60 ±0.06 mm | | |
| 0.001 | 4.0 x 10.0 x 12.5 | 0.6 | 20102 | 1000 | 1400 |
| 0.0015 | | | 20152 | | |
| 0.0022 | | | 20222 | | |
| 0.0033 | 5.0 x 11.0 x 12.5 | 0.85 | 20332 | 1000 | 1100 |
| 0.0047 | | | 20472 | | |
| 0.0068 | | | 20682 | | |
| 0.01 | | | 20103 | | |
| 0.015 | | | 20153 | | |
| 0.022 | | | 20223 | | |
| 0.033 | 6.0 x 12.0 x 12.5 | 1.0 | 20333 | 750 | 900 |
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.01 | 5.0 x 11.0 x 17.5 | 1.2 | 29001 | 1000 | 1100 |
| 0.015 | | | 29011 | | |
| 0.022 | | | 29021 | | |
| 0.033 | | | 29031 | | |
| 0.047 | | | 20473 | | |
| 0.068 | | | 20683 | | |
| 0.068 | 6.0 x 12.0 x 17.5 | 1.4 | x | 1000 | 900 |
| 0.1 | | | 20104 | | |
| 0.1 | 7.0 x 13.5 x 17.5 | 1.9 | x | 1000 | 800 |
| 0.15 | 8.5 x 15.0 x 17.5 | 2.6 | 20154 | 1000 | 650 |
| 0.22 | 10.0 x 16.5 x 17.5 | 3.1 | 20224 | 500 | 600 |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.15 | 6.0 x 15.5 x 26.0 | 2.9 | 29041 | 250 | 600 |
| 0.22 | 7.0 x 16.5 x 26.0 | 3.2 | 29051 | 200 | 550 |
| 0.33 | 8.5 x 18.0 x 26.0 | 4.4 | 20334 | 200 | 450 |
| 0.47 | 10.0 x 19.5 x 26.0 | 5.5 | 20474 | 200 | 400 |
| Pitch 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.47 | 9.0 x 19.0 x 31.0 | 5.5 | 29055 | 150 | 400 |
| 0.68 | 11.0 x 21.0 x 31.0 | 7.8 | 20684 | 100 | 300 |
| 1 | 13.0 x 23.0 x 31.0 | 10.4 | 20105 | 100 | 250 |
| 1 | 15.0 x 25.0 x 31.0 | 12.8 | x | 100 | 200 |
| 1.5 | 18.0 x 28.0 x 31.0 | 17.2 | 20155 | 100 | 150 |
| 2.2 | 21.0 x 31.0 x 31.0 | 20.4 | 20225 | 50 | not available |

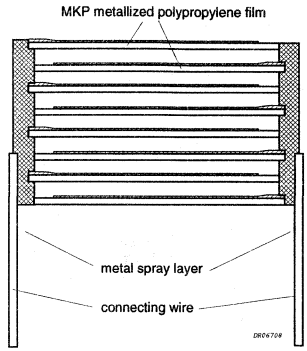
Preferred catalogue numbers

x = other dimensions for 10% versions.

# Interference suppression film capacitors

# MKP 336 1/2

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

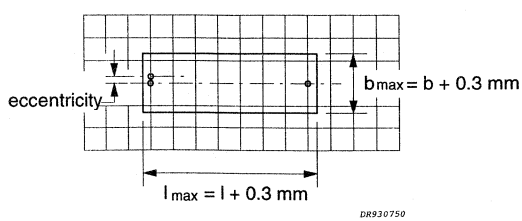
### Specific method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches ≤15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors are shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

# Interference suppression film capacitors

# MKP 336 1/2

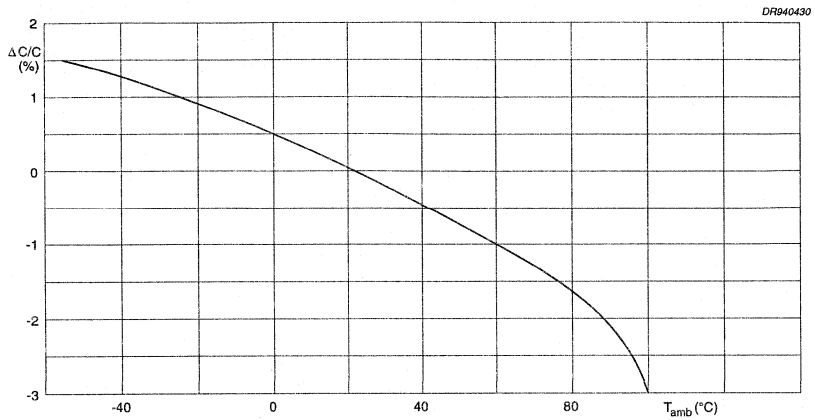
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

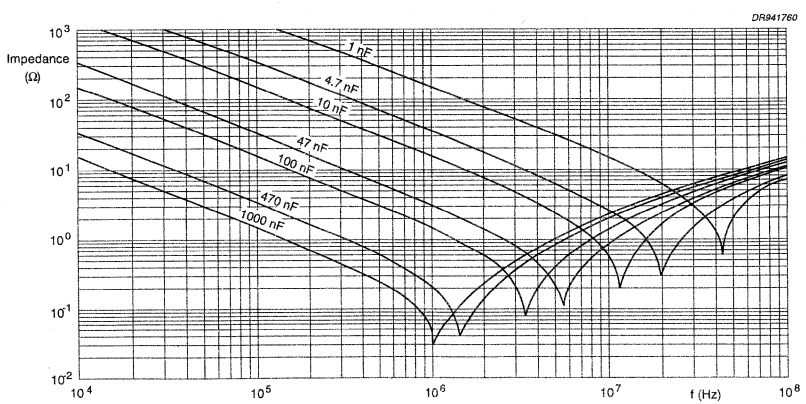
## CAPACITANCE

- All capacitance values are specified at 1 kHz.



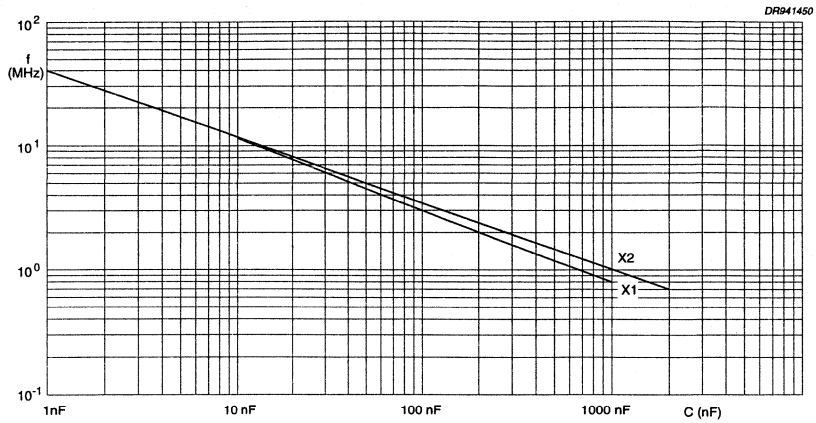

Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Capacitance change as a function of ambient temperature; typical curves.

## RESONANT FREQUENCY




Resonant frequency as a function of capacitance; typical curves.

## TEMPERATURE

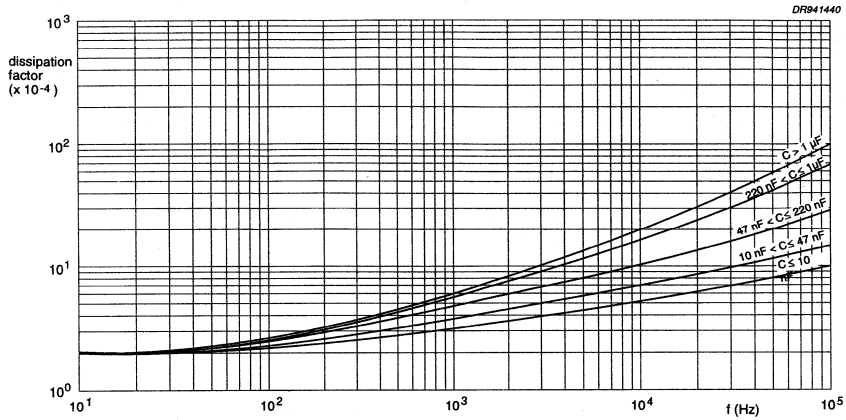
- Storage temperature: $T_{stg}$ = −25 to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Test voltage (DC) between leads, 100% on line for 1 second:
  - for X1 capacitors: 3600 V
  - for X2 capacitors with C ≤ 1μF: 2300 V and for C > 1 μF: 2300 V/√C (C in μF)
- Test voltage (AC) between interconnected leads and case (foil method): 2050 V.

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | |
|---|---|---|
| | at 10 kHz | at 100 kHz |
| C ≤ 100 nF | ≤10 x $10^{-4}$ | ≤30 x $10^{-4}$ |
| 100 nF < C ≤ 470 nF | ≤20 x $10^{-4}$ | ≤100 x $10^{-4}$ |
| C > 470 nF | ≤70 x $10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curves.

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

Maximum pulse load: 100 V/µs for X2; 200 V/µs for X1.
If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by 2 x $U_{Rac}$ and divided by the applied voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

- R between leads for C ≤ 0.33 µF: >15 000 MΩ.
- RC between leads for C > 0.33 µF: >5 000 s.
- R between interconnected leads and case (foil method): >30 000 MΩ.

# Interference suppression film capacitors

# MKP 336 1/2

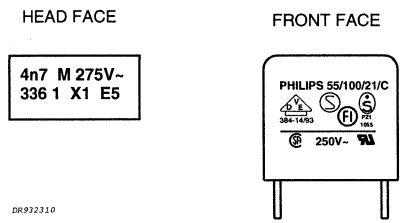
## PRODUCT MARKING

### Capacitors with pitch 10 mm to 27.5 mm

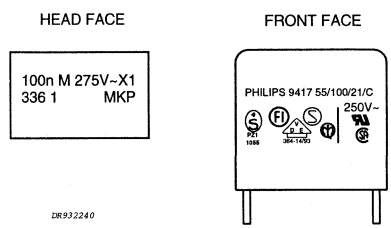
Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch ≤15 mm) with the following information:

- Manufacturer (PHILIPS)
- Manufacturer's type designation (336 1)
- Rated capacitance code in accordance with IEC 62
- Rated AC voltage (e.g. 275 V)
- Sub class (e.g. X1)
- Tolerance on rated capacitance: M = ±20%; K = ±10%
- Code for dielectric material (MKP)
- Year and week of manufacture (e.g. 9401) or year and month (e.g. E5) for 10 mm pitch
- Safety approvals.

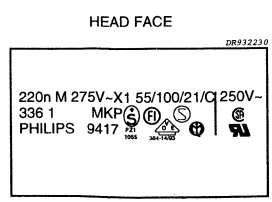
EXAMPLE OF MARKING FOR A CAPACITOR WITH 10 MM PITCH




EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH




EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH



# Interference suppression film capacitors



## PACKAGE MARKING

The package containing the capacitors is marked as shown.


PK940080

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and sub class |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Interference suppression film capacitors



## QUICK REFERENCE TEST REQUIREMENTS

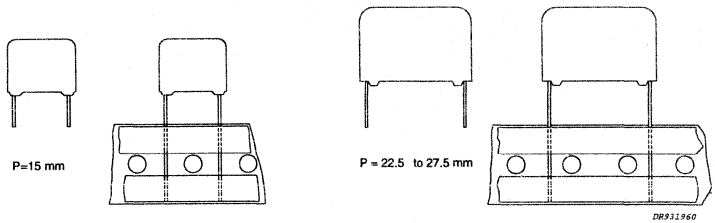
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |
| **Robustness of component** | | |
| Rapid change of temperature<br>Vibration<br>Shock<br>Voltage proof | 5 cycles<br>1 cycle = 30 minutes at −55 °C and 30 minutes at 100 °C<br>10 Hz to 55 Hz; amplitude 0.75 mm; 6 hours<br>half sinewave; 490 mm/s$^2$; 11 ms<br>$V_p$ = 1200 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, test Db, first cycle<br>Cold<br>Damp heat cyclic, test Db, remaining cycles | 16 hours; 100 °C<br><br>2 hours; −55 °C | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 95 to 98% RH; no load<br>$V_p$ = 1200 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 3 x 4.0 kV pulse voltage for X1;<br>3 x 2.5 kV pulse voltage for X2;<br>1000 hours; 1.25 x 275 V (AC); 100 °C;<br>once per hour:<br>0.1 s; 1000 V (RMS) via resistor of 47 Ω<br>$V_p$ = 1200 V (DC); 1 minute | $\Delta C/C \leq 10\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Charge and discharge | 10 000 cycles; 5 ms;<br>1.5 x dV/dt | $\Delta C/C \leq 10\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Passive flammability | class C | no burning |
| Active flammability | 20 x 4 kV discharge for X1<br>20 x 2.5 kV discharge for X2 | no burning |
| Solderability | solder bath: 235 °C; 2 s | wetting ≥ 95% |
| Heat storage | 1000 hours; 100 °C | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | preheating: 100 °C<br>solder bath: 260 °C; 10 s | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |

# Interference suppression film capacitors

# MP-KT 333 4

## MP-KT RADIAL POTTED CAPACITORS

**Pitch 15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E6 series) | 10 nF to 680 nF |
| Capacitance tolerance | ±10% |
| Rated voltage (AC), 50 to 60 Hz | 250 V |
| Climatic category | 40/085/21 |
| Rated temperature | 85 °C |
| Maximum application temperature | 85 °C |
| Reference specification | IEC 384-14, 2nd edition and EN 132400 |
| Safety approvals | UL1414, CSA-C22.2 No 1, SEV 1055.1978, VDE, FI, N, D, S, IMQ, ÖVE, |
| Materials | qualified in accordance with UL94V-0 |
| Safety class | X2 |

### FEATURES

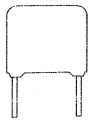
- 15 mm to 27.5 mm lead pitch
- Supplied loose in box and taped on reel
- Consists of a low-inductive wound cell of metallized paper with blank polyester, potted in a flame-retardent case.

### APPLICATIONS

- For X2 electromagnetic interference suppression
- Is approved according the NEW REQUIREMENTS of the new IEC 384-14 2nd edition / EN 132400, requiring a 2.5 kV pulse voltage test and the UL1414 and CSA-C22.2 No 1 specification.

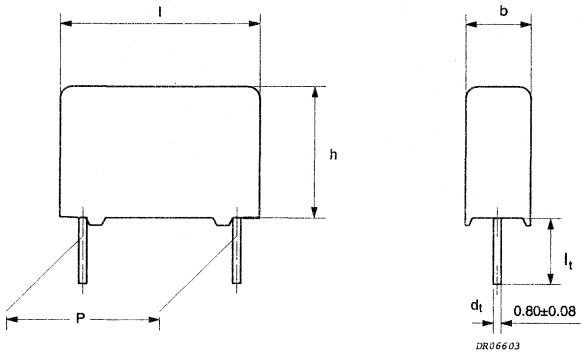
# Interference suppression film capacitors

# MP-KT 333 4



**Pitch 15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 250 V AC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| 0.47 µF < C ≤ 0.68 µF | ≤100 x $10^{-4}$ | ≤200 x $10^{-4}$ | – |
| C ≤ 0.47 µF | – | – | ≤350 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | | | |
| P = 15.0 mm | 1500 V/µs | | |
| P = 22.5 mm | 1000 V/µs | | |
| P = 27.5 mm: 220 nF < C ≤ 330 nF | 500 V/µs | | |
| 330 nF < C ≤ 680 nF | 250 V/µs | | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | | |
| RC between leads, for C > 0.33 µF | >5000 s | | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 333 41...** | preferred |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±10% | catalogue number **2222 333 48...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±10% | catalogue number **2222 333 45...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 333 43...** | on request |

Available on request:

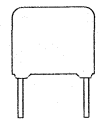
| **100 nF, pitch P = 15.0 ±0.40 mm, l x b x h = 10.0 mm x 16.5 mm x 17.5 mm** | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±20% | catalogue number 2222 333 94001 | SPQ = 500 |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±20% | catalogue number 2222 333 94004 | SPQ = 500 |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±20% | catalogue number 2222 333 94015 | SPQ = 500 |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number 2222 333 94006 | SPQ = 600 |

| **220 nF, pitch P = 22.5 ±0.40 mm, l x b x h = 10.0 mm x 19.5 mm x 26.0 mm** | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±20% | catalogue number 2222 333 94002 | SPQ = 200 |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±20% | catalogue number 2222 333 94005 | SPQ = 500 |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±20% | catalogue number 2222 333 94016 | SPQ = 200 |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number 2222 333 94007 | SPQ = 400 |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# Interference suppression film capacitors

# MP-KT 333 4



| SAFETY APPROVALS | FILE NUMBERS | SAFETY APPROVALS | FILE NUMBERS |
|---|---|---|---|
| UL1414 | E 112471 | NEMKO | M 68169 |
| CSA-22.2 No1-M90 | LR 94054 | DEMKO | 127164 |
| SEV 1055.1978 | 91.1 00169.08 | SEMKO | 9043178 |
| VDE 561-1 | 1016.30 - 4670 - 1011 | IMQ | V3105 |
| FI | 127164 | ÖVE | 0243 - 160 - 00 |


DR06602a

## $U_{Rac}$ = 250 V (AC) X2 — loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 333 ..... loose in box: $l_t$ = 5.0 ±1.0 mm, C-tol ±10%, last 5 digits of catalogue number | loose in box: short leads, SPQ | loose in box: $l_t$ = 25.0 ±2.0 mm, SPQ | reel, SPQ |
|---|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | | |
| 0.01<br>0.015<br>0.022 | 5.0 x 11.0 x 17.5 | 1.4 | 41103<br>41153<br>41223 | 1000 | 1000 | 1100 |
| 0.033 | 6.0 x 12.0 x 17.5 | 1.8 | 41333 | 1000 | 1000 | 900 |
| 0.047 | 7.0 x 13.5 x 17.5 | 2.4 | 41473 | 1000 | 500 | 800 |
| 0.068 | 8.5 x 15.0 x 17.5 | 3.1 | 41683 | 1000 | 500 | 650 |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | | |
| 0.1 | 7.0 x 16.5 x 26.0 | 3.7 | 41104 | 200 | 500 | 550 |
| 0.15 | 8.5 x 18.0 x 26.0 | 5.0 | 41154 | 200 | 500 | 450 |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | | |
| 0.22 | 11.0 x 21.0 x 31.0 | 8.0 | 41224 | 100 | 125 | 300 |
| 0.33 | 13.0 x 23.0 x 31.0 | 11.0 | 41334 | 100 | 125 | 250 |
| 0.47 | 15.0 x 25.0 x 31.0 | 13.7 | 41474 | 100 | 125 | 200 |
| 0.68 | 18.0 x 28.0 x 31.0 | 19.1 | 41684 | 100 | 125 | 150 |

Preferred catalogue numbers

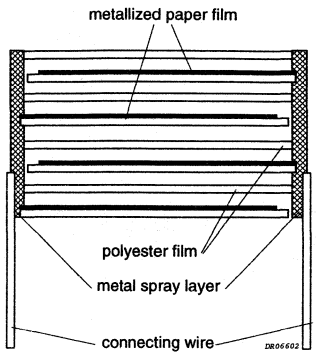
Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- Taped ammopack.

# Interference suppression film capacitors

# MP-KT 333 4

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized paper film and polyethyleneterephthalate (PETP) film, potted with epoxy resin in a blue flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

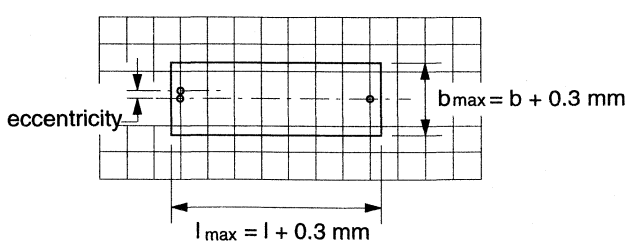
### Specific method of mounting to withstand vibration and shock

It must be ensured that the stand-off pips are in good contact with the printing-circuit board.

- For pitches of 15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors are shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm

# Interference suppression film capacitors

# MP-KT 333 4

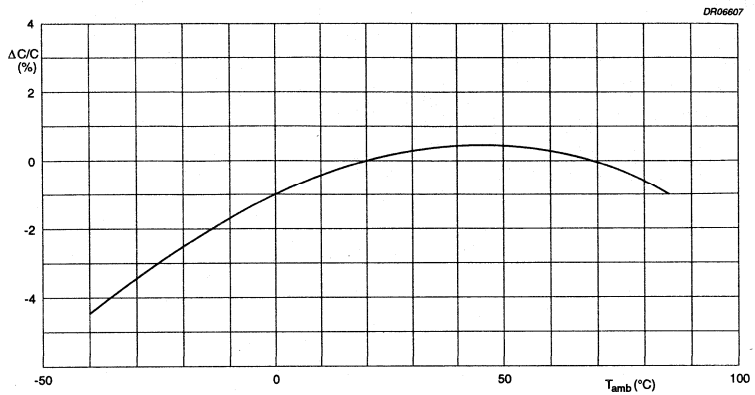
## RATINGS AND CHARACTERISTICS

Unless otherwise specified, all electrical values apply at an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

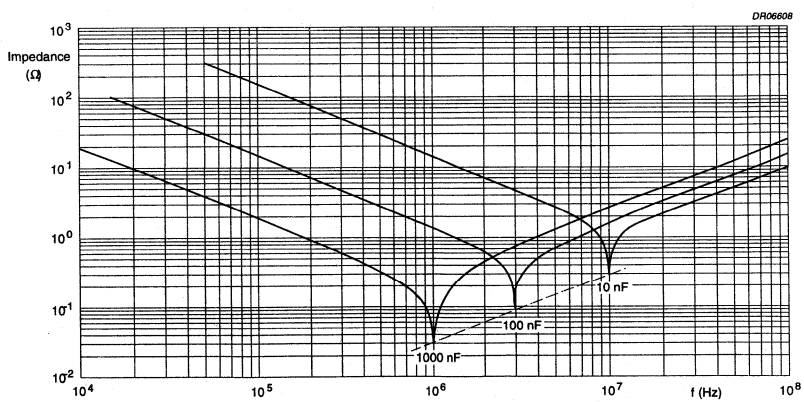
## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

# Interference suppression film capacitors

# MP-KT 333 4

## TEMPERATURE

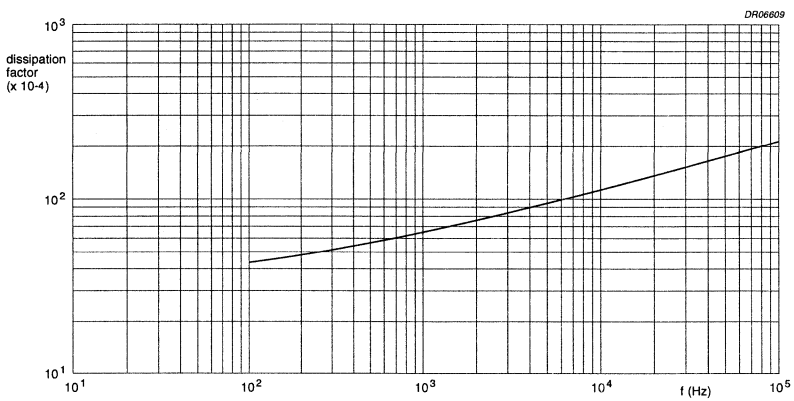
- Storage temperature: $T_{stg}$ = –25 °C to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Test voltage between leads, 100% on line for 1 second: 2200 V (DC).
- Test voltage between interconnected leads and case (foil method): 2000 V (AC).

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|
| | at 1 kHz | at 10 kHz | at 100 kHz |
| 0.47 µF < C ≤ 0.68 µF | ≤100 x $10^{-4}$ | ≤200 x $10^{-4}$ | – |
| C ≤ 0.47 µF | – | – | ≤350 x $10^{-4}$ |




Tangent of loss angle as a function of frequency; typical curve.

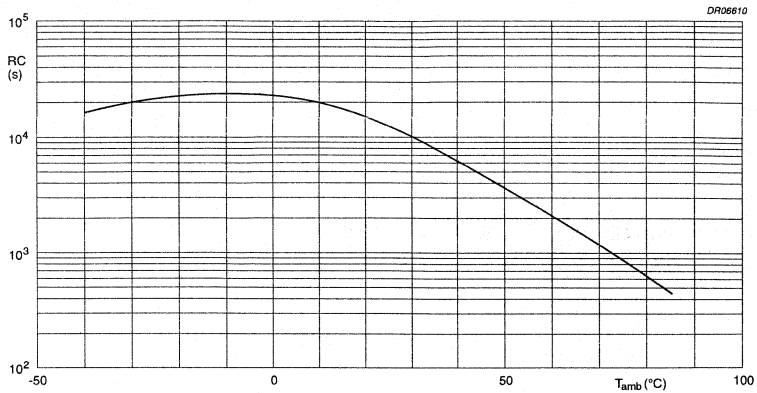
## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

| RATED VOLTAGE $U_R$ (V) | MAXIMUM PULSE LOAD (Vµs) | | | |
|---|---|---|---|---|
| | P = 15.0 mm | P = 22.5 mm | P = 27.5 mm | |
| 250 | 1500 | 1000 | 500 | for 220 nF < C ≤ 330 nF |
| | | | 250 | for 330 nF < C ≤ 680 nF |

If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by $\sqrt{2}$ x $U_{Rac}$ and divided by the applied voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.




RC product as a function of ambient free air temperature; typical curve.

- R between leads for C ≤ 0.33μF: >15 000 MΩ.
- RC between leads for C > 0.33 μF: >5000 s.
- R between interconnected leads and case (foil method): >30 000 MΩ.

# Interference suppression film capacitors

# MP-KT 333 4

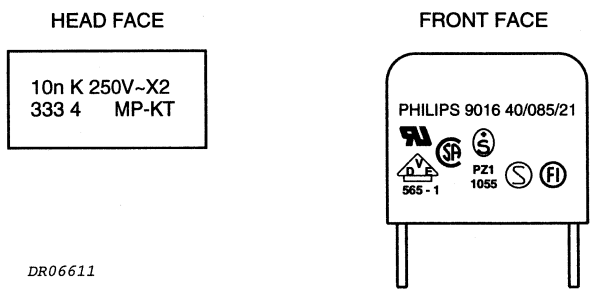
## PRODUCT MARKING

### Capacitors with pitch 15 mm to 27.5 mm

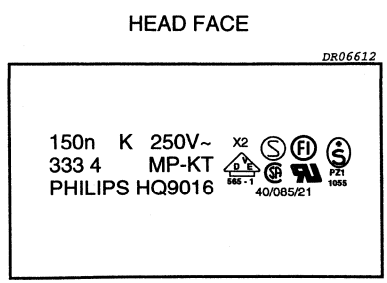
Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch ≤15 mm), with the following information:

- Manufacturer (PHILIPS)
- Manufacturer's type designation (333 4)
- Rated capacitance code in accordance with IEC 62
- Rated AC voltage (250 V~)
- Sub class (X2)
- Tolerance on rated capacitance : M = ±20%; K = ±10%
- Code for dielectric material (MKP)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9016)
- Safety approvals.

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH




EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH

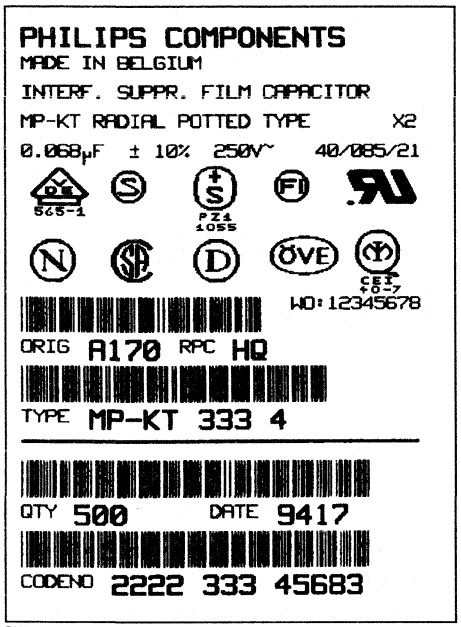


# Interference suppression film capacitors

# MP-KT 333 4

## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930010

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and safety class X2 |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Interference suppression film capacitors



## QUICK REFERENCE TEST REQUIREMENTS

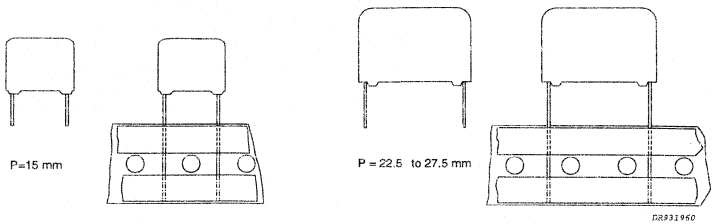
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 2\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$ |
| **Robustness of component** | | |
| Rapid change of temperature<br>Vibration<br>Shock<br>Voltage proof | 5 cycles<br>1 cycle = 30 minutes at -40 °C and 30 minutes at 85 °C<br>10 Hz to 55 Hz; amplitude 0.75 mm; 6 hours<br>half sinewave; 490 $mm/s^2$; 11 ms<br>$V_p$ = 1075 V (DC); 1 minute | $\Delta C/C \leq 3\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, test Db, first cycle<br>Cold<br>Damp heat cyclic, test Db, remaining cycles | 16 hours; 85 °C<br><br>2 hours; –40 °C<br> | $\Delta C/C \leq 3\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 95 to 98% RH; no load<br>$V_p$ = 1075 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 3 x 2.5 kV pulse voltage; 1000 hours; 1.25 x 250 V (AC); 100 °C once per hour: 0.1 s; 1000 V (RMS) via resistor of 47 Ω<br>$V_p$ = 1075 V (DC); 1 minute | $\Delta C/C \leq 10\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Charge and discharge | 10 000 cycles; 5 ms; 2.5 x dV/dt | $\Delta C/C \leq 3\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Passive flammability | class C | no burning |
| Active flammability | 20 x 2.5 kV discharge | no burning |
| Solderability | solder bath: 235 °C; 2 s | wetting ≥ 95% |
| Heat storage | 1000 hours; 85 °C | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | preheating: 85 °C<br>solder bath: 260 °C; 10 s | $\Delta C/C \leq 2\%$<br>$\Delta \tan \delta \leq 150 \times 10^{-4}$ |

# Interference suppression film capacitors

# MKT/MKT 331 6

## INTERFERENCE SUPPRESSION CAPACITORS

**Pitch 15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E6 series) | 10 nF to 1 µF |
| Capacitance tolerance | ±20%, ±10% |
| Rated voltage (AC), 50 to 60 Hz | 300 V |
| Climatic category | 55/100/56 |
| Rated temperature | 100 °C |
| Maximum application temperature | 100 °C |
| Reference IEC specification | IEC 384-14 2nd edition and EN 132400 |
| Safety approvals | UL1283, CSA-C22.2 No 8, SEV, VDE, FI, N, D, S, IMQ, ÖVE |
| Materials | qualified in accordance with UL94V-0 |
| Safety class | X2 |

### FEATURES

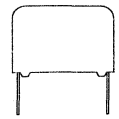
- 15 mm to 27.5 mm lead pitch
- Supplied loose in box and taped on reel
- Consists of a low-inductive wound cell with a series construction metallized polyester film, potted in a flame-retardent case.

### APPLICATIONS

- For X2-electromagnetic interference suppression
- Specially designed to meet the NEW REQUIREMENTS of IEC 384-14 2nd edition specification, requiring a 2.5 kV peak pulse voltage test
- Designed for 300 V (AC) applications.

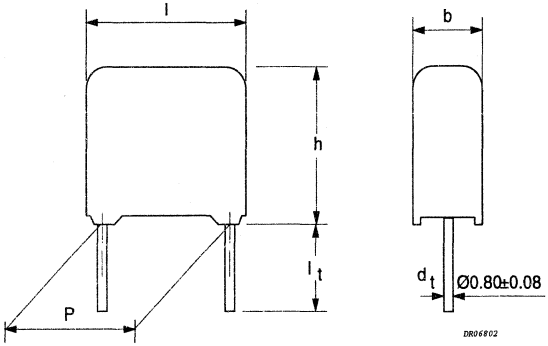
# Interference suppression film capacitors

# MKT/MKT 331 6



**Pitch 15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 300 V AC VERSION

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 100 kHz |
|---|---|---|---|
| C ≤ 470 nF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | ≤300 x $10^{-4}$ |
| C > 470 nF | ≤75 x $10^{-4}$ | ≤130 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ | P = 15 mm 200 V/µs | P = 22.5 mm 120 V/µs | P = 27.5 mm 100 V/µs |
| R between leads for C ≤ 0.33 µF | >30 000 MΩ | | |
| R between leads for C > 0.33 µF | >10 000 s | | |
| Test voltage (DC) | 1290 V; 2 s | | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±20% | catalogue number **2222 331 60...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±10% | catalogue number **2222 331 61...** | on request |
| Loose on box | $l_t$ = 5.0 +1/-0 mm | C-tol ±20% | catalogue number **2222 331 66...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±20% | catalogue number **2222 331 64...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±10% | catalogue number **2222 331 65...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 331 62...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 331 63...** | on request |

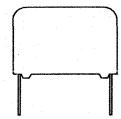
* H: intape height: for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- Taped ammopack.

# Interference suppression film capacitors

# MKT/MKT 331 6



| SAFETY APPROVALS | FILE NUMBERS | SAFETY APPROVALS | FILE NUMBERS |
|---|---|---|---|
| CSA-C22.2 No.8-M1986 | LR 94054 - 7 | NEMKO 132 | M 69945 |
| UL1283 | E109565 | DEMKO | 111658 EC/121 |
| SEV 1055.1978 class X | 92.110908 | SEMKO SS 443 04 14 | 9311171 |
| VDE 565-1 class X2 | 1016.30 - 4670 - 1015/A1D | IMQ CEI 40-7/1980 | V3416 |
| FI E384/14 | 159219-01-02 | ÖVE | A855-000-00 |


## $U_{Rac}$ = 300 V (AC) X2

## loose and taped

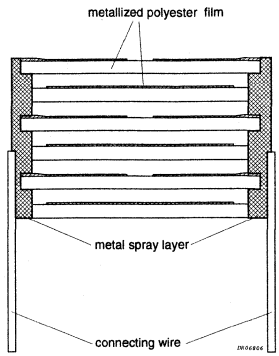
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 331 ..... loose in box $l_1$= 3.5 ±0.5 mm C-tol ±20% last 5 digits of catalogue number | loose in box short leads SPQ | loose in box $l_1$= 25.0 ±2.0 mm SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | | |
| 0.01<br>0.015<br>0.022<br>0.033 | 5.0 x 11.0 x 17.5 | 1.3 | 60103<br>60153<br>60223<br>60333 | 1000 | 1000 | 1100 |
| 0.047 | 6.0 x 12.0 x 17.5 | 1.6 | 60473 | 1000 | 1000 | 900 |
| 0.068 | 7.0 x 13.5 x 17.5 | 2.0 | 60683 | 1000 | 500 | 800 |
| 0.1 | 8.5 x 15.0 x 17.5 | 3.0 | 60104 | 1000 | 500 | 650 |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | | |
| 0.15 | 7.0 x 16.5 x 26.0 | 3.8 | 60154 | 200 | 100 | 550 |
| 0.22 | 8.5 x 18.0 x 26.0 | 5.4 | 60224 | 200 | 100 | 450 |
| Pitch = 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | | |
| 0.33 | 11.0 x 21.0 x 31.0 | 9.0 | 60334 | 100 | 125 | 300 |
| 0.47 | 13.0 x 23.0 x 31.0 | 12.0 | 60474 | 100 | 125 | 250 |
| 0.68 | 15.0 x 25.0 x 31.0 | 14.8 | 60684 | 100 | 125 | 200 |
| 1 | 18.0 x 28.0 x 31.0 | 20.5 | 60105 | 100 | 125 | 150 |

Preferred catalogue numbers

# Interference suppression film capacitors

# MKT/MKT 331 6

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polyethyleneterephthalate (PETP) film, potted with epoxy resin in a blue flame-retardent polypropylene case.
- Radial leads, solder-coated wire.
- Small stand-off pips allow removal of solder flux etc., during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

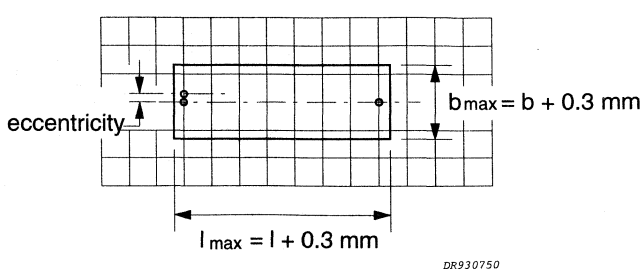
### Specified method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches of 15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors is shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

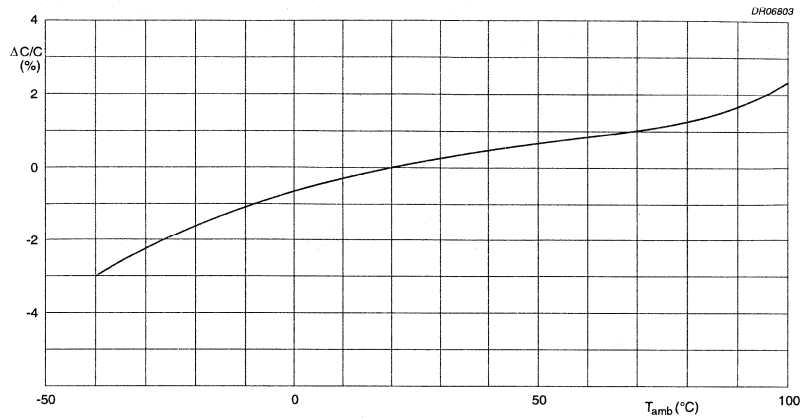
## RATINGS AND CHARACTERISTICS

Unless otherwise specified, all electrical values apply to an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

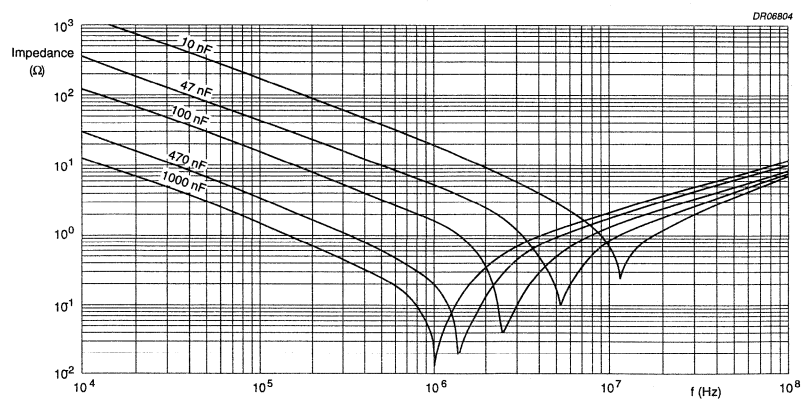
## CAPACITANCE

- All capacitance values are specified at 1 kHz.



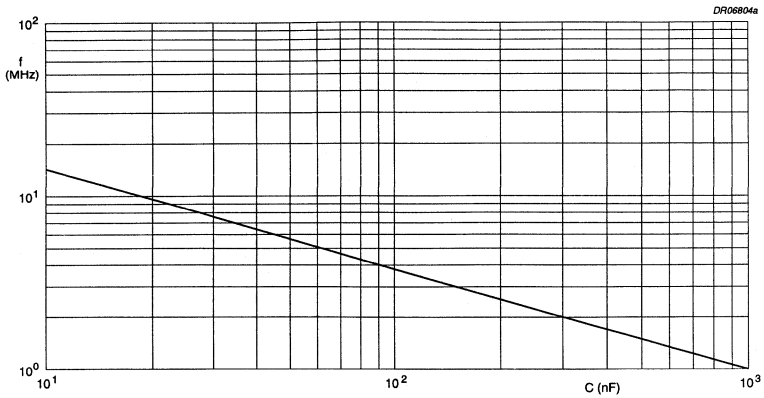

Capacitance change as a function of ambient free air temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

## RESONANT FREQUENCY




Resonant frequency as a function of capacitance; typical curve.

## TEMPERATURE

- Storage temperature: $T_{stg}$ = –25 °C to +40 °C with RH maximum 80% without condensation.

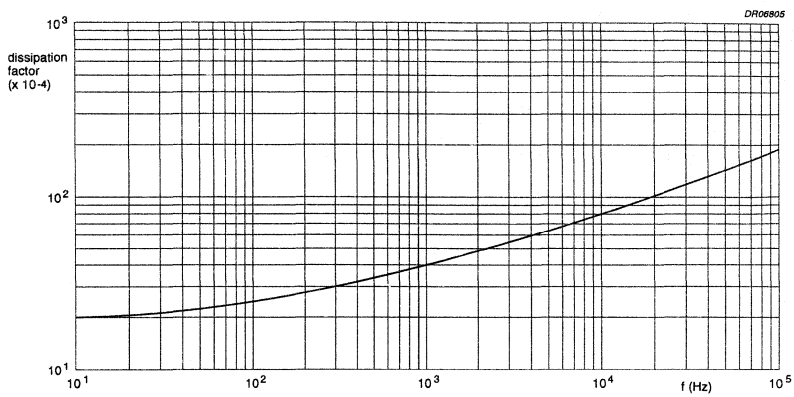
## VOLTAGE

- Test voltage between leads, 100% on line for 1 second: 1400 V (DC).
- Test voltage between interconnected leads and case (foil method): 2000 V (AC).

## TANGENT OF LOSS ANGLE

- For maximum values and measuring frequencies: see specific reference data.

| CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|
| | at 1 kHz | at 10 kHz | at 100 kHz |
| C ≤ 470 nF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | $\leq 300 \times 10^{-4}$ |
| C > 470 nF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curve.

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

| RATED VOLTAGE $U_R$ (V) | MAXIMUM PULSE LOAD (V/µs) | | |
|---|---|---|---|
| | P = 15.0 mm | P = 22.5 mm | P = 27.5 mm |
| 300 | 200 | 120 | 100 |

For values see specific reference data.
If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by $\sqrt{2} \times U_{Rac}$ and divided by the applied voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

- R between leads: >30 000 MΩ.
- R between interconnected leads and case (foil method): >30 000 MΩ.

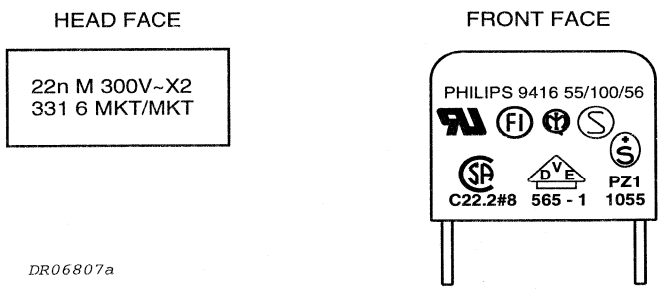
## PRODUCT MARKING

### Capacitors with pitch 15 mm to 27.5 mm

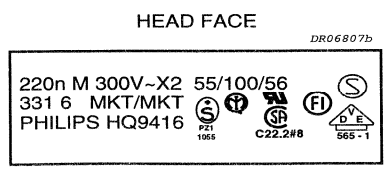
Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch = 15 mm), with the following information:

- Manufacturer (PHILIPS)
- Manufacturer's type designation (331 6)
- Rated capacitance code in accordance with IEC 62
- Rated (AC) voltage (300 V~)
- Sub-class (X2)
- Tolerance on rated capacitance: M = ±20%; K = ±10%
- Code for dielectric material (MKT/MKT)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9416)
- Safety approvals.

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH

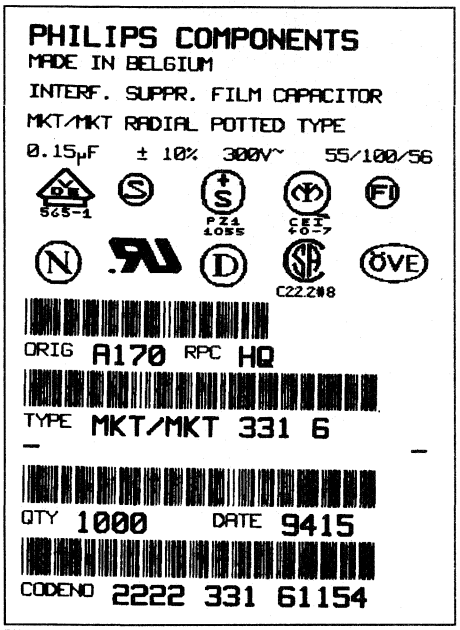



EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK940060

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and safety class X2 |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Interference suppression film capacitors



## QUICK REFERENCE TEST REQUIREMENTS

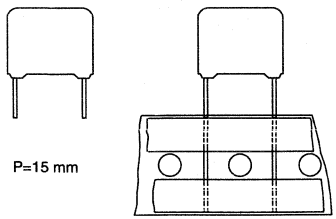
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending | | no visible damage |
| Resistance to soldering heat | solder bath: 260 °C; 10 s | legible marking<br>$\Delta C/C \leq 5\%$ |
| Component solvent resistance | isopropyl alcohol; 23 °C; 5 minutes | $\Delta\tan\delta \leq 150 \times 10^{-4}$ |
| **Robustness of component** | | |
| Rapid change of temperature | 5 cycles<br>1 cycle = 30 minutes at −40 °C and 30 minutes 100 °C | |
| Vibration | 10 Hz to 55 Hz; amplitude 0.75 mm; 6 hours | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ |
| Shock | half sinewave; 490 mm/s$^2$; 11 ms | |
| Voltage proof | $V_p$ = 1290 V (DC); 1 minute | |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 100 °C | |
| Damp heat cyclic, test Db, first cycle | | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Cold | 2 hours; −55 °C | |
| Damp heat cyclic, test Db, remaining cycles | | |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 95 to 98% RH; no load<br>$V_p$ = 1290 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 3 x 2.5 kV pulse voltage; 1000 hours; 1.25 x 300 V (AC); 100 °C; once per hour: 0.1 s; 1000 V (RMS) via resistor of 47 Ω<br>$V_p$ = 1290 V (DC); 1 minute | $\Delta C/C \leq 10\%$<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Charge and discharge | 10 000 cycles; 5 ms; 1.5 x dV/dt | $\Delta C/C \leq 10\%$<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Passive flammability | class C | no burning |
| Active flammability | 20 x 2.5 kV discharge | no burning |
| Solderability | solder bath: 235 °C; 2 s | wetting ≥ 95% |
| Heat storage | 1000 hours; 100 °C | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 150 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | preheating: 100 °C<br>solder bath: 260 °C; 10 s | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 150 \times 10{-}4$ |

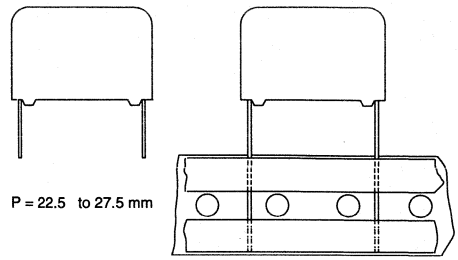
# Interference suppression film capacitors

# MKP 335 1

## MKP RADIAL POTTED CAPACITORS

**Pitch 15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E6 series) | 10 nF to 1 µF |
| Capacitance tolerance | ±10%, ±20% |
| Rated voltage (AC), 50 to 60Hz | 250 V |
| Climatic category | 40/085/21 |
| Rated temperature | 85 °C |
| Maximum application temperature | 85 °C |
| Reference IEC specification | IEC 384-14 2nd edition and EN 132400 |
| Safety approvals | UL1283, CSA-C22.2 No 8, SEV, VDE, FI, N, D, S, IMQ, ÖVE |
| Materials | qualified in accordance with UL94V-0 |
| Safety class | X2 |

### FEATURES

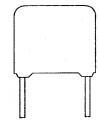
- 15 mm to 27.5 mm lead pitch
- Supplied loose in box and taped on reel
- Consists of a low-inductive wound cell of metallized polypropylene film, potted in a flame-retardent case.

### APPLICATIONS

- For X2-electromagnetic interference suppression
- Specially designed to meet the NEW REQUIREMENTS of the new IEC 384-14 2nd edition / EN 132400, requiring a 2.5 kV peak pulse voltage test.

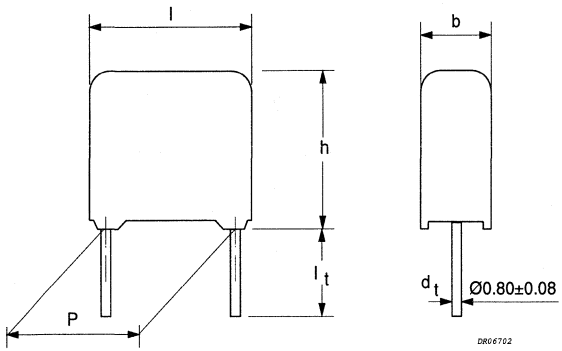
# Interference suppression film capacitors

# MKP 335 1



**Pitch 15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 250 V AC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| C ≤ 100 nF | ≤10 x $10^{-4}$ | ≤30 x $10^{-4}$ |
| 100 nF < C ≤ 470 nF | ≤20 x $10^{-4}$ | ≤70 x $10^{-4}$ |
| C > 470 nF | ≤70 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ | 100 V/µs | |
| R between leads, for C ≤ 0.33 µF | >30 000 MΩ | |
| RC between leads, for C > 0.33 µF | >10 000 s | |
| Test voltage (DC) | 1075 V; 1 s | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ± 0.5 mm | C-tol ±20% | catalogue number **2222 335 10...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±10% | catalogue number **2222 335 11...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±20% | catalogue number **2222 335 14...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±10% | catalogue number **2222 335 15...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 335 12...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 335 13...** | on request |

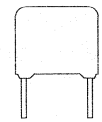
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- Taped ammopack.

# Interference suppression film capacitors

# MKP 335 1



| SAFETY APPROVALS | FILE NUMBERS | SAFETY APPROVALS | FILE NUMBERS |
|---|---|---|---|
| UL1283 | E 109565 | NEMKO 132 | M68909 |
| CSA-C22.2 No.8-M1986 | LR 94054-7 | DEMKO | 108282EC121 |
| SEV 1055.1978 class X | 91.1 1239.02 and 07 | SEMKO SS 443 04 14 | 9211030 |
| VDE 565-1 class X2 | 1016.30-4670-1013 | IMQ CEI 40-7/1980 | V 3205 |
| FI E384/14 | 148517/148518-01..02 | ÖVE | PA21441/R |


DR941920

## $U_{Rac}$ = 250 V (AC) X2

## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 335 ..... loose in box $l_t$ = 3.5 ±0.5 mm C-tol ±20% last 5 digits of catalogue number | SPQ | $l_t$ = 25.0 ±2.0 mm SPQ | reel SPQ |
|---|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | | |
| 0.01<br>0.015<br>0.022<br>0.033 | 5.0 x 11.0 x 17.5 | 1.2 | 10103<br>10153<br>10223<br>10333 | 1000 | 1000 | 1100 |
| 0.033<br>0.047 | 6.0 x 12.0 x 17.5 | 1.4 | x<br>10473 | 1000 | 1000 | 900 |
| 0.068 | 7.0 x 13.5 x 17.5 | 1.9 | 10683 | 1000 | 500 | 800 |
| 0.1 | 8.5 x 15.0 x 17.5 | 2.6 | 10104 | 1000 | 500 | 650 |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | | |
| 0.15 | 7.0 x 16.5 x 26.0 | 3.2 | 10154 | 200 | 500 | 550 |
| 0.22 | 8.5 x 18.0 x 26.0 | 4.4 | 10224 | 200 | 500 | 450 |
| 0.33 | 10.0 x 19.5 x 26.0 | 5.5 | 10334 | 200 | 500 | 350 |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | | |
| 0.47 | 11.0 x 21.0 x 31.0 | 7.8 | 10474 | 100 | 125 | 300 |
| 0.68 | 15.0 x 25.0 x 31.0 | 12.8 | 10684 | 100 | 125 | 200 |
| 1 | 18.0 x 28.0 x 31.0 | 17.2 | 10105 | 100 | 125 | 150 |

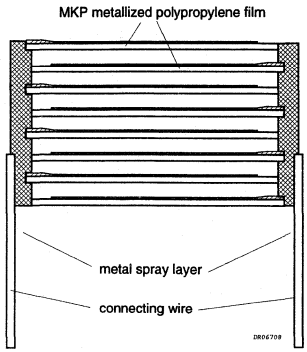
Preferred catalogue numbers

x = other dimensions for 10% versions.

# Interference suppression film capacitors

# MKP 335 1

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a blue flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

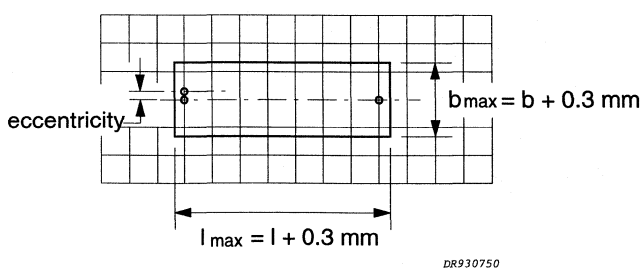
### Specific method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches of 15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors are shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

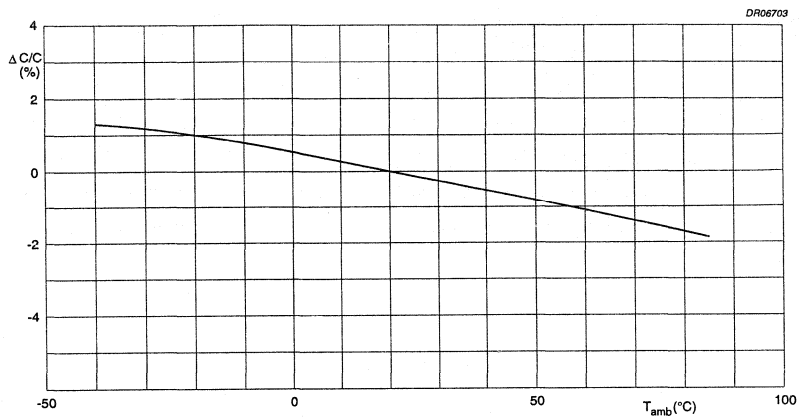
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

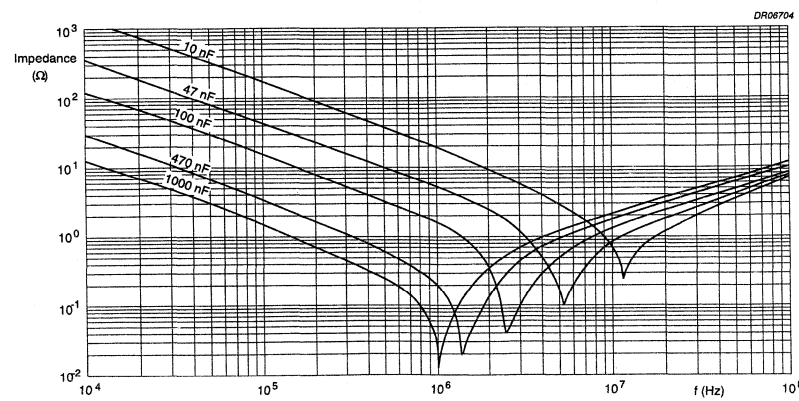
## CAPACITANCE

- All capacitance values are specified at 1 kHz.



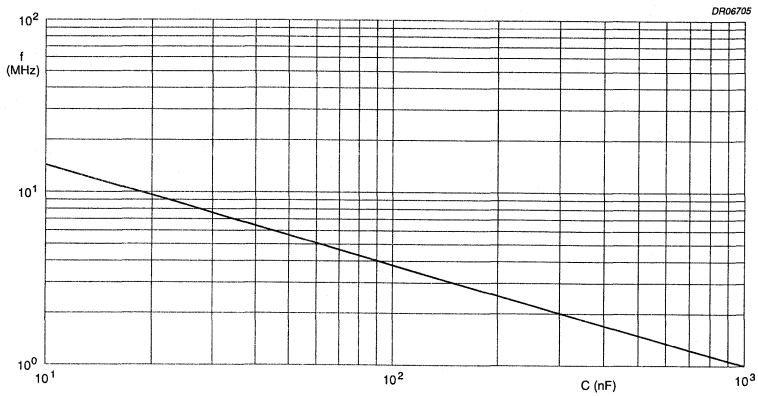

Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

## RESONANT FREQUENCY




Resonant frequency as a function of capacitance; typical curve.

## TEMPERATURE

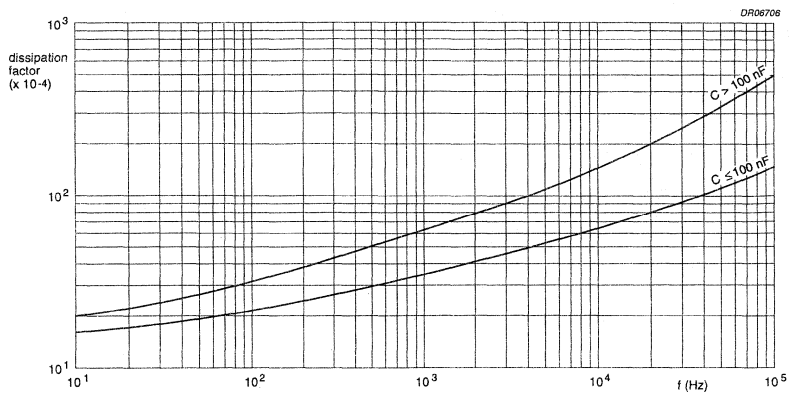
- Storage temperature: $T_{stg}$ = −25 to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Test voltage between leads, 100% on line for 1 second: 1075 V (DC).
- Test voltage between interconnected leads and case (foil method): 2000 V (AC).

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | |
|---|---|---|
| | at 10 kHz | at 100 kHz |
| C ≤ 100 nF | ≤10 x $10^{-4}$ | ≤30 x $10^{-4}$ |
| 100 nF < C ≤ 470 nF | ≤20 x $10^{-4}$ | ≤70 x $10^{-4}$ |
| C > 470 nF | ≤70 x $10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curves.

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

Maximum pulse load: 100 V/µs.
If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by $\sqrt{2} \times U_{Rac}$ and divided by the applied voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

- R between leads for C ≤ 0.33 µF: >30 000 MΩ.
- RC between leads for C > 0.33 µF: >10 000 s.
- R between interconnected leads and case (foil method): >30 000 MΩ.

# Interference suppression film capacitors

# MKP 335 1

## PRODUCT MARKING

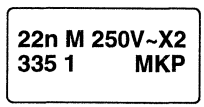
### Capacitors with pitch 15 mm to 27.5 mm

Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch = 15 mm), with the following information:

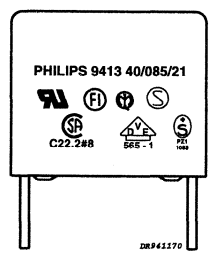
- Manufacturer (PHILIPS)
- Manufacturer's type designation (335 1)
- Rated capacitance code in accordance with IEC 62
- Rated (AC) voltage (250 V~)
- Sub class (X2)
- Tolerance on rated capacitance: M = ±20%; K = ±10%
- Code for dielectric material (MKP)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9411)
- Safety approvals.

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH

HEAD FACE

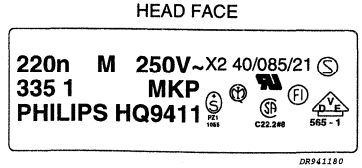



FRONT FACE



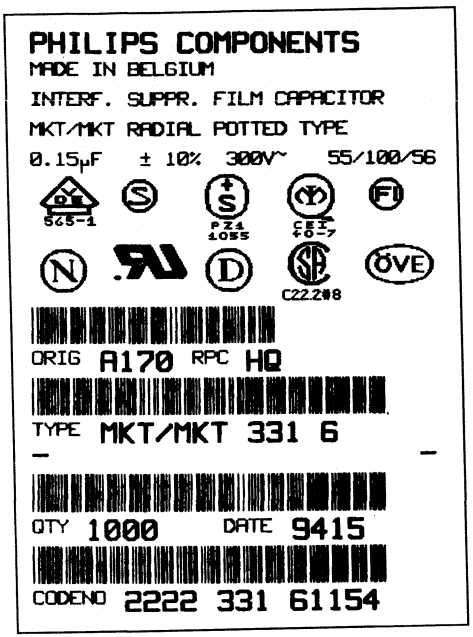

EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH

HEAD FACE



## PACKAGE MARKING

The package containing the capacitors is marking as shown.




PK940060

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and safety class X2 |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ (Roeselare)<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Interference suppression film capacitors

# MKP 335 1

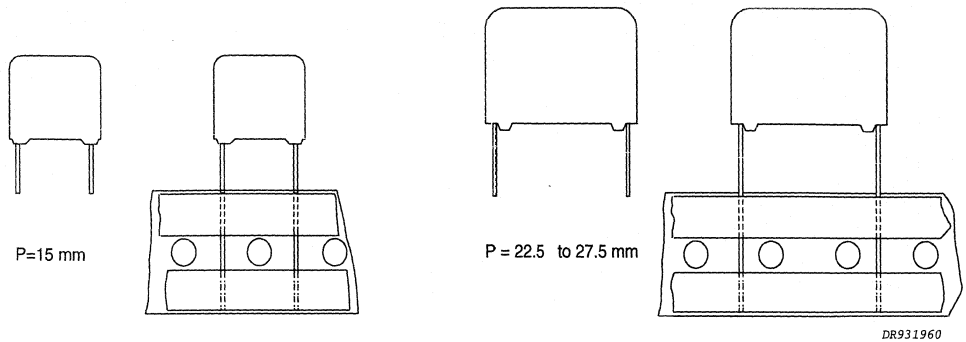
## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |
| **Robustness of component** | | |
| Rapid change of temperature<br>Vibration<br>Shock<br>Voltage proof | 5 cycles<br>1 cycle = 30 minutes at −40 °C and 30 minutes at 85 °C<br>10 Hz to 55 Hz; amplitude 0.75 mm; 6 hours<br>half sinewave; 490 $mm/s^2$; 11 ms<br>$V_p$ = 1075 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, test Db, first cycle<br>Cold<br>Damp heat cyclic, test Db, remaining cycles | 16 hours; 85 °C<br><br>2 hours; −40 °C | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 95 to 98% RH; no load<br>$V_p$ = 1075 V (DC); 1 minute | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 3 x 2.5 kV pulse voltage; 1000 hours; 1.25 x 250 V (AC); 85 °C<br>once per hour:<br>0.1 s; 1000 V (RMS) via resistor of 47 Ω<br>$V_p$ = 1075 V (DC); 1 minute | $\Delta C/C \leq 10\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Charge and discharge | 10 000 cycles; 5 ms; 1.5 x dV/dt | $\Delta C/C \leq 10\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Passive flammability | class C | no burning |
| Active flammability | 20 x 2.5 kV discharge | no burning |
| Solderability | solder bath: 235 °C; 2 s | wetting ≥ 95% |
| Heat storage | 1000 hours; 85 °C | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | preheating: 85 °C<br>solder bath: 260 °C; 10 s | $\Delta C/C \leq 5\%$<br>$\Delta \tan \delta \leq 200 \times 10^{-4}$ |

# Interference suppression film capacitors

# MKT-P 330 4

**MKT-P RADIAL POTTED CAPACITORS** **Pitch 15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E6 series) | 0.01 µF to 1 µF |
| Capacitance tolerance | ±20%, ±10% |
| Rated voltage (AC), 50 to 60 Hz | 250 V |
| Climatic category | 40/085/21 |
| Rated temperature | 85 °C |
| Maximum application temperature | 85 °C |
| Reference specification | IEC 384-14, 1st edition |
| Approval marks | UL1283, VDE 565-1, Semko, IMQ |
| Materials qualified | in accordance with UL94V-0 |
| Safety class | X2 |

**FEATURES**

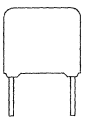
- 15 mm to 27.5 mm lead pitch
- Supplied loose in box and taped on reel
- Consists of a low-inductive wound cell of metallized polyester film and blank paper, potted in a flame-retardent case.

**APPLICATIONS**

- For X2 electromagnetic interference suppression.

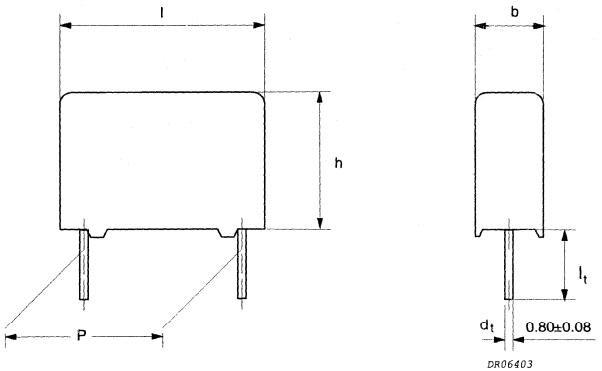
# Interference suppression film capacitors

# MKT-P 330 4



**Pitch 15/22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 250 V AC VERSION

| Tangent of the loss angle | at 1 kHz | at 10 kHz |
|---|---|---|
| | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 100 V/µs | |
| R between leads, for C ≤ 0.33 µF | >15 000 MΩ | |
| RC between leads, for C > 0.33 µF | >5000 s | |
| Test voltage (DC) | 1075 V; 1 s | |

## AVAILABLE VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±20% | catalogue number **2222 330 40...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±10% | catalogue number **2222 330 41...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±20% | catalogue number **2222 330 47...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±10% | catalogue number **2222 330 48...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±20% | catalogue number **2222 330 44...** | on request |
| Loose in box | $l_t$ = 25.0 ±2.0 mm | C-tol ±10% | catalogue number **2222 330 45...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±20% | catalogue number **2222 330 42...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 330 43...** | on request |

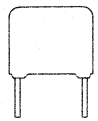
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- E12 capacitance values
- Lead length between 3.2 and 35 mm
- Taped ammopack.

# Interference suppression film capacitors

# MKT-P 330 4



**SAFETY APPROVALS**

UL1283
VDE 565-1 class X2
SEMKO SEN 432901
IMQ CEI 40-7/1980

**FILE NUMBERS**

No. E 109565
No. 1016.30-4670-1010
No. 8325176
No. V 1557

DR06402a

## $U_{Rac}$ = 250 V (AC) X2

## loose and taped

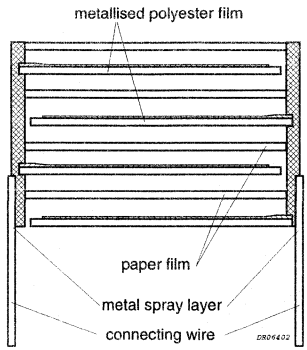
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 330 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±20% last 5 digits of catalogue number | loose in box short leads $l_t$ = 25.0 ±2.0 mm SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.01<br>0.015<br>0.022<br>0.033 | 5.0 x 11.0 x 17.5 | 1.2 | 40103<br>40153<br>40223<br>40333 | 1000 | 1000 | 1100 |
| 0.047 | 6.0 x 12.0 x 17.5 | 1.4 | 40473 | 1000 | 1000 | 900 |
| 0.068 | 7.0 x 13.5 x 17.5 | 2.0 | 40683 | 1000 | 500 | 800 |
| 0.1 | 8.5 x 15.0 x 17.5 | 2.6 | 40104 | 1000 | 500 | 650 |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.15 | 7.0 x 16.5 x 26.0 | 3.0 | 40154 | 200 | 500 | 550 |
| 0.22 | 8.5 x 18.0 x 26.0 | 3.7 | 40224 | 200 | 500 | 450 |
| 0.33 | 10.0 x 19.5 x 26.0 | 5.4 | 40334 | 200 | 500 | 350 |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.47 | 13.0 x 23.0 x 31.0 | 10.8 | 40474 | 100 | 125 | 250 |
| 0.68 | 15.0 x 25.0 x 31.0 | 12.9 | 40684 | 100 | 125 | 200 |
| 1 | 18.0 x 28.0 x 31.0 | 18.2 | 40105 | 100 | 125 | 150 |

Preferred catalogue numbers

# Interference suppression film capacitors

# MKT-P 330 4

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polyethyleneterephthalate (PETP) film and paper film, potted with epoxy resin in a blue flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

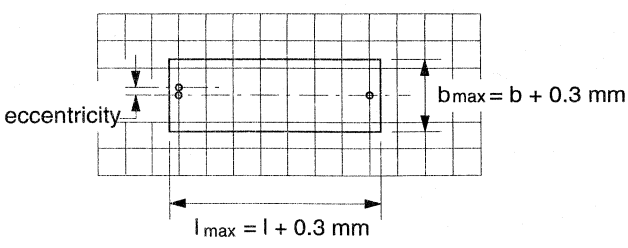
### Specific method of mounting to withstand vibration and shock

It must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches of 15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors are shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

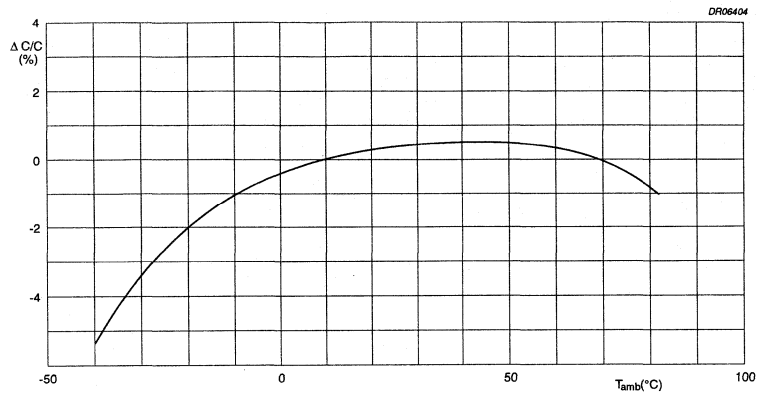
## RATINGS AND CHARACTERISTICS

Unless otherwise specified, all electrical values apply to an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

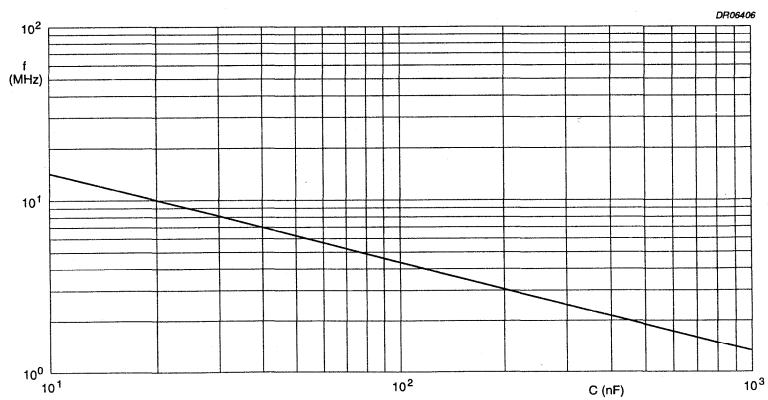
## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance change as a function of ambient temperature; typical curve.

## RESONANT FREQUENCY




Resonant frequency as a function of capacitance; typical curve.

# Interference suppression film capacitors

# MKT-P 330 4

## TEMPERATURE

- Storage temperature: $T_{stg}$ = –25 °C to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Test voltage between leads: 1075 V (DC) 100% on line for 1 second.
- Test voltage between interconnected leads and case (foil method): 2000 V (AC).

## TANGENT OF LOSS ANGLE

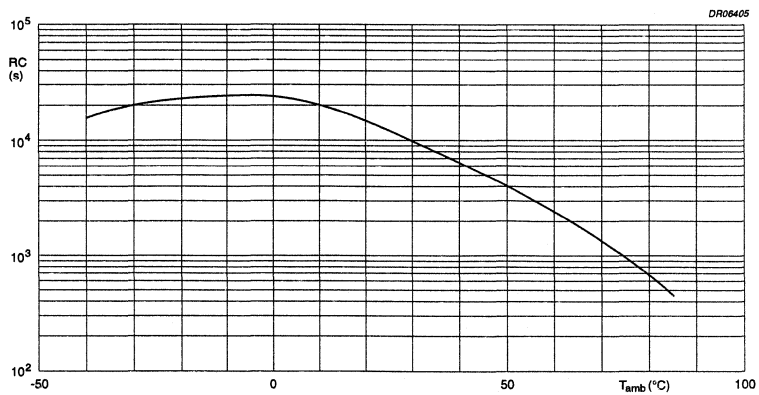
| CAPACITANCE | TANGENT OF LOSS ANGLE | |
|---|---|---|
| | at 1 kHz | at 10 kHz |
| 0.01 to 1 µF | $\leq 75 \times 10^{-4}$ | $\leq 130 \times 10^{-4}$ |

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

For values see specific reference data.
If the pulse voltage is lower than the rated voltage, the values of the specific reference data can be multiplied by $\sqrt{2} \times U_{Rac}$ and divided by the applied voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 V ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.




RC-product as a function of ambient free air temperature; typical curve.

- R between leads: for value see specific reference data.
- R between interconnected leads and case (foil method): >30 000 MΩ.

# Interference suppression film capacitors

# MKT-P 330 4

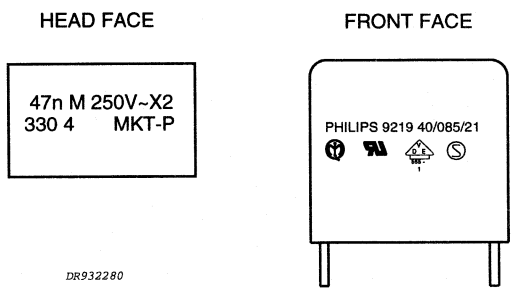
## PRODUCT MARKING

### Capacitors with pitch 15 mm to 27.5 mm

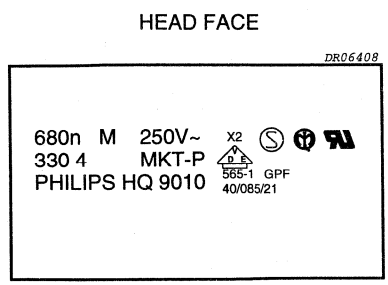
Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch ≤15 mm), with the following information:

- Rated capacitance code in accordance with to IEC 62
- Tolerance on rated capacitance: M = ±20%; K = ±10%
- Rated (AC) voltage (250 V~)
- Sub-class (X2)
- Manufacturer's type designation (330 4)
- Code for diëlectric material (MKT-P)
- Manufacturer (PHILIPS)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9010)
- Safety approvals.

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH

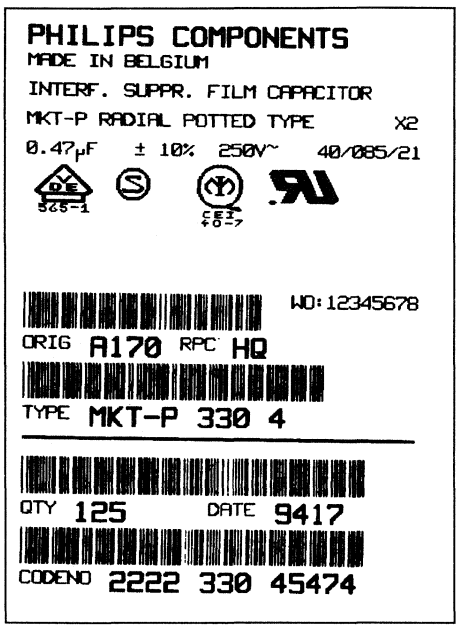



EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930070

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and safety class X2 |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 2\%$<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ |
| **Robustness of component** | | |
| Rapid change of temperature<br>Vibration<br>Shock<br>Voltage proof | 5 cycles<br>1 cycle = 30 minutes at –40 °C and 30 minutes at 85 °C<br>10 Hz to 55 Hz; amplitude 0.75 mm; 6 hours<br>half sinewave; 490 $mm/s^2$; 11 ms<br>$V_p$ = 1075 V (DC); 1 minute | <br><br>$\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, test Db, first cycle<br>Cold<br>Damp heat cyclic, test Db, remaining cycles | 16 hours; 85 °C<br><br>2 hours; –40 °C | <br>$\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 95 to 98% RH; no load<br>$V_p$ = 710 V (DC); 1 minute | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 50 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 1000 hours; 1.25 x 250 V (AC); 85 °C; once per hour:<br>0.1 s; 1000 V (RMS) via resistor of 220 Ω<br>$V_p$ = 710 V (DC); 1 minute | $\Delta C/C \leq 10\%$<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Charge and Discharge | 10 000 cycles; 5 ms; 5 x dV/dt | $\Delta C/C \leq 3\%$<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Passive flammability | class C | no burning |
| Solderability | solder bath: 235 °C; 2 s | wetting ≥ 95% |
| Heat Storage | 1000 hours; 85 °C | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | preheating: 85 °C<br>solder bath: 260 °C; 10 s | $\Delta C/C \leq 2\%$<br>$\Delta\tan\delta \leq 30 \times 10^{-4}$ |

# AC AND PULSE CAPACITORS

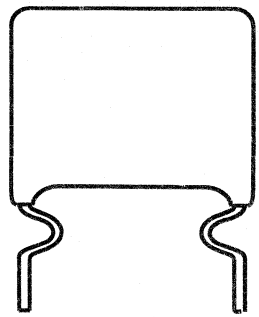
# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375
# KP/MMKP 375

**KP/MKP & KP/MMKP**

**Pitch 10/15/22.5/27.5 mm**

**Radial lacquered capacitors**



## QUICK REFERENCE DATA

| | | | | | |
|---|---|---|---|---|---|
| Capacitance range (E24 series) | 100 pF to 270 nF for KP/MKP<br>3.3 to 150 nF for KP/MMKP | | | | |
| Capacitance tolerance | ±5%, ±3.5% | | | | |
| KP/MMKP: | | | | | |
| Rated voltage (DC) | 630 V | 1000 V | 1600 V | 2000 V | |
| Rated voltage (AC) | 300 V | 400 V | 500 V | 600 V | |
| Rated peak-to-peak voltage | 850 V | 1100 V | 1400 V | 1700 V | |
| KP/MKP: | | | | | |
| Rated voltage (DC) | 400 V | 630 V | 1000 V | 1600 V | 2000 V |
| Rated voltage (AC) | 275 V | 300 V | 400 V | 500 V | 600 V |
| Rated peak-to-peak voltage | 800 V | 850 V | 1100 V | 1400 V | 1700 V |
| Climatic category | 55/100/56 | | | | |
| Rated temperature | 85 °C | | | | |
| Maximum application temperature | 100 °C | | | | |
| Related specification | IEC 384-17 | | | | |
| Performance grade | | | | | |
| for C > 5.6 nF | grade 1 (long life) | | | | |
| for C ≤ 5.6 nF | grade 2 (general purpose) | | | | |
| Stability grade | grade 2 | | | | |

**FEATURES**

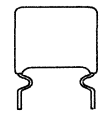
- 10.0 mm to 27.5 mm lead pitch
- Supplied loose in box
- Taped products available on request.

**APPLICATIONS**

- Where high currents and steep pulses occur
- For deflection circuits in television receivers.

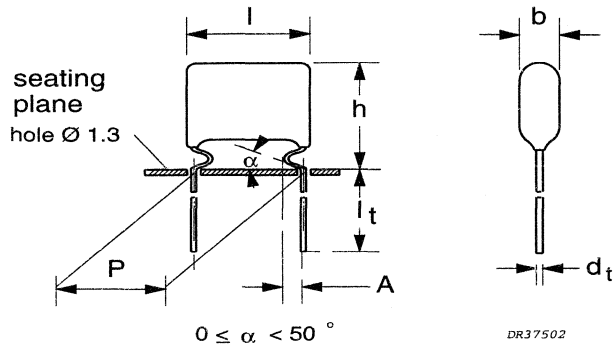
# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

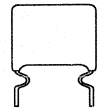
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 22.5<br>P = 27.5 | ≤4 x $10^{-4}$<br>≤5 x $10^{-4}$ | ≤20 x $10^{-4}$<br>≤25 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |
| Ionization voltage (typical value) at 50 pC peak discharge | >400 V (AC) | |

## AVAILABLE 400 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 00...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 01...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 04...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 05...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 275 V / $U_{p-p}$ = 800 V

**loose in box**

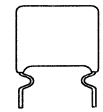
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ =3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.075 * | 5.5 x 18.5 x 26.0 | 2.5 | 00753 | 900 |
| 0.082 * | | | 00823 | |
| 0.091 * | 6.0 x 19.0 x 26.0 | 2.8 | 00913 | 800 |
| 0.1 * | 6.5 x 19.5 x 26.0 | 3.0 | 00104 | 750 |
| 0.11 * | | | 00114 | |
| 0.12 * | 7.0 x 20.0 x 26.0 | 3.2 | 00124 | 650 |
| 0.13 * | | | 00134 | |
| 0.15 * | 7.5 x 20.5 x 26.0 | 3.4 | 00154 | 600 |
| 0.16 * | 8.0 x 21.0 x 26.0 | 3.6 | 00164 | 550 |
| 0.18 * | 8.5 x 21.5 x 26.0 | 3.8 | 00184 | 500 |
| 0.2 * | 9.0 x 22.0 x 26.0 | 4.1 | 00204 | 450 |
| 0.22 * | 9.5 x 22.5 x 26.0 | 4.5 | 00224 | 400 |
| Pitch = 27.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.24 * | 8.5 x 21.5 x 31.5 | 4.5 | 00244 | 550 |
| 0.27 * | 9.0 x 22.0 x 31.5 | 5.0 | 00274 | 550 |
| 0.3 * | 9.5 x 22.5 x 31.5 | 5.5 | 00304 | 500 |
| 0.33 * | 10.0 x 23.0 x 31.5 | 6.0 | 00334 | 500 |
| 0.36 * | 10.5 x 23.5 x 31.5 | 6.5 | 00364 | 450 |
| 0.39 * | 11.0 x 24.0 x 31.5 | 7.0 | 00394 | 400 |
| 0.43 * | 11.5 x 26.5 x 31.5 | 8.0 | 00434 | 400 |
| 0.47 * | 12.0 x 27.0 x 31.5 | 9.0 | 00474 | 350 |
| 0.51 * | 12.5 x 27.5 x 31.5 | 9.5 | 00514 | 350 |
| 0.56 * | 13.0 x 28.0 x 31.5 | 10.5 | 00564 | 300 |
| 0.62 * | 14.0 x 29.0 x 31.5 | 13.0 | 00624 | 300 |
| 0.68 * | 16.0 x 31.0 x 31.5 | 15.0 | 00684 | 200 |

Preferred catalogue numbers

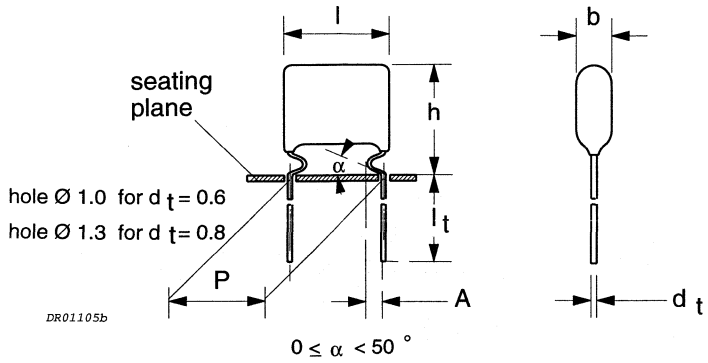
* = in progress.

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 10/15 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

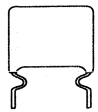
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |
| Ionization voltage (typical value) at 50 pC peak discharge | >400 V (AC) | |

**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 10...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 11...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 14...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 15...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 300 V / $U_{p-p}$ = 850 V

**loose in box**

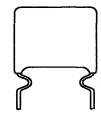
| Cap. (pF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 10.0 ±0.4 mm | $d_t$ = 0.60 ±0.06 mm | | A = 2.0 +1.0/-0.5 mm |
| 680 * | 5.0 x 13.0 x 14.0 | 0.55 | 10681 | 2000 |
| 750 * | | 0.60 | 10751 | |
| 820 * | 5.5 x 13.5 x 14.0 | 0.70 | 10821 | 2000 |
| 910 * | | 0.70 | 10911 | |
| 1000 * | | 0.70 | 10102 | |
| 1100 * | | 0.70 | 10112 | |
| 1200 * | | 0.75 | 10122 | |
| 1300 * | | 0.75 | 10132 | |
| 1500 * | | 0.75 | 10152 | |
| 1600 * | | 0.80 | 10162 | |
| 1800 * | 6.0 x 14.0 x 14.0 | 0.85 | 10182 | 1750 |
| 2000 * | | 0.85 | 10202 | |
| 2200 * | | 0.90 | 10222 | |
| 2400 * | | 1.0 | 10242 | |
| 2700 * | 6.5 x 14.5 x 14.0 | 1.1 | 10272 | 1500 |
| | Pitch = 15.0 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | | A = 2.5 +1.5/-0.5 mm |
| 3000 * | 5.0 x 14.0 x 18.5 | 1.1 | 10302 | 2000 |
| 3300 * | | | 10332 | |
| 3600 * | 5.5 x 14.5 x 18.5 | 1.2 | 10362 | 2000 |
| 3900 * | | | 10392 | |
| 4300 * | | | 10432 | |
| 4700 * | | | 10472 | |
| 5100 * | | | 10512 | |
| 5600 * | | | 10562 | |
| 6200 * | 6.0 x 15.0 x 18.5 | 1.3 | 10622 | 2000 |
| 6800 * | | | 10682 | |
| 7500 * | | | 10752 | |
| 8200 * | | | 10822 | |
| 9100 * | | | 10912 | |
| 10000 * | | | 10103 | |
| 11000 * | | | 10113 | |
| 12000 * | | | 10123 | |
| 13000 * | | | 10133 | |
| 15000 * | | | 10153 | |
| 16000 * | | | 10163 | |
| 18000 * | 6.5 x 15.5 x 18.5 | 1.4 | 10183 | 1500 |
| 20000 * | | | 10203 | |
| 22000 * | 7.0 x 16.0 x 18.5 | 1.5 | 10223 | 1500 |
| 24000 * | 7.5 x 16.5 x 18.5 | 1.7 | 10243 | 1250 |
| 27000 * | 8.0 x 17.0 x 18.5 | 1.9 | 10273 | 1250 |
| 30000 * | | | 10303 | |
| 33000 * | 8.5 x 17.5 x 18.5 | 2.3 | 10333 | 1000 |
| 36000 * | 9.5 x 18.5 x 18.5 | 2.7 | on request | 900 |
| 39000 * | | | on request | |

Preferred catalogue numbers

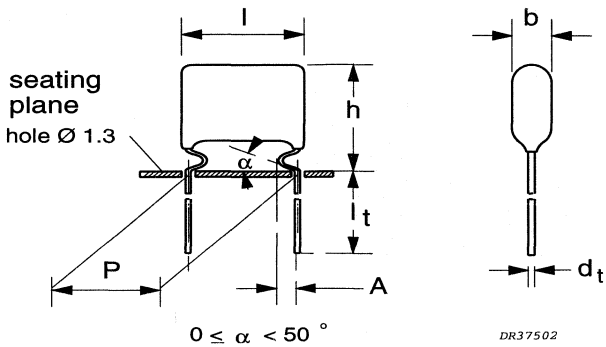
* = in progress.

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

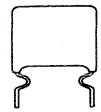
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 22.5 mm | ≤4 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| P = 27.5 mm | ≤4 x $10^{-4}$ | ≤20 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 10...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 11...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 14...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 15...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 300 V / $U_{p-p}$ = 850 V

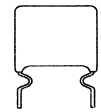
**loose in box**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm | | A = 2.5 +1.4/-0.5 mm |
| 0.036 | 7.0 x 20.0 x 26.0 | 3.2 | 10363 | 650 |
| 0.039 | | | 10393 | |
| 0.043 | | | 10433 | |
| 0.047 | | | 10473 | |
| 0.051 | | | 10513 | |
| 0.056 | | | 10563 | |
| 0.062 | | | 10623 | |
| 0.068 | 7.5 x 20.5 x 26.0 | 3.4 | 10683 | 600 |
| 0.075 | 8.0 x 21.0 x 26.0 | 3.6 | 10753 | 550 |
| 0.082 | | | 10823 | |
| 0.091 | 8.5 x 21.5 x 26.0 | 3.8 | 10913 | 500 |
| 0.1 | 9.0 x 22.0 x 26.0 | 4.8 | 10104 | 450 |
| 0.11 | 9.5 x 22.5 x 26.0 | 5.0 | 10114 | 400 |
| 0.12 | 10.0 x 23.0 x 26.0 | 5.2 | 10124 | 400 |
| Pitch = 27.5 ±0.5 mm | | $d_t$ = 0.80 ±0.08 mm | | A = 2.5 +1.4/-0.5 mm |
| 0.13 | 9.5 x 22.5 x 30.0 | 5.2 | 10134 | 500 |
| 0.15 | 10.0 x 23.0 x 30.0 | 5.6 | 10154 | 500 |
| 0.16 | 10.5 x 23.5 x 30.0 | 5.9 | 10164 | 450 |
| 0.18 | 11.0 x 24.0 x 30.0 | 6.3 | 10184 | 400 |
| 0.2 | 11.5 x 24.5 x 30.0 | 6.8 | 10204 | 400 |
| 0.22 | 12.5 x 25.5 x 30.0 | 7.5 | 10224 | 350 |
| 0.24 | 13.0 x 26.0 x 30.0 | 8.0 | 10244 | 300 |
| 0.27 | 13.5 x 26.5 x 30.0 | 8.5 | 10274 | 300 |

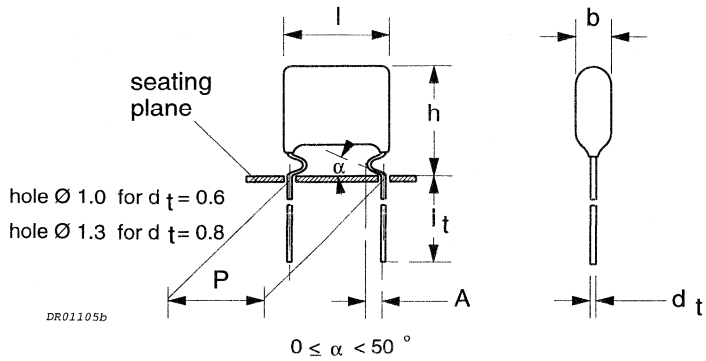
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 10/15 mm**




**SPECIFIC REFERENCE DATA FOR THE 1000 V DC VERSION**

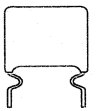
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |
| Ionization voltage (typical value) at 50 pC peak discharge | >500 V (AC) | |

**AVAILABLE 1000 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 20...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 21...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 24...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 25...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$= 1000 V

$U_{Rac}$ = 400 V / $U_{p-p}$ = 1100 V

**loose in box**

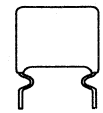
| Cap. (pF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 10.0 ±0.4 mm | $d_t$ = 0.60 ±0.06 mm | | A = 2.0 +1.0/-0.5 mm |
| 100 * | 5.0 x 13.0 x 14.0 | 0.55 | 20101 | 2000 |
| 110 * | | | 20111 | |
| 120 * | | | 20121 | |
| 130 * | | | 20131 | |
| 150 * | 5.5 x 13.5 x 14.0 | 0.60 | 20151 | 2000 |
| 160 * | | 0.60 | 20161 | |
| 180 * | | 0.60 | 20181 | |
| 200 * | | 0.60 | 20201 | |
| 220 * | | 0.60 | 20221 | |
| 240 * | | 0.60 | 20241 | |
| 270 * | | 0.60 | 20271 | |
| 300 * | | 0.60 | 20301 | |
| 330 * | | 0.65 | 20331 | |
| 360 * | | 0.65 | 20361 | |
| 390 * | | 0.65 | 20391 | |
| 430 * | | 0.65 | 20431 | |
| 470 * | | 0.65 | 20471 | |
| 510 * | | 0.65 | 20511 | |
| 560 * | | 0.65 | 20561 | |
| 620 * | | 0.70 | 20621 | |
| 680 * | | 0.70 | 20681 | |
| 750 * | | 0.70 | 20751 | |
| 820 * | | 0.70 | 20821 | |
| 910 * | | 0.75 | 20911 | |
| 1000 * | 6.0 x 14.0 x 14.0 | 0.80 | 20102 | 1750 |
| 1100 * | | 0.80 | 20112 | |
| 1200 * | | 0.85 | 20122 | |
| 1300 * | | 0.85 | 20132 | |
| 1500 * | | 0.90 | 20152 | |
| | Pitch =15.0 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | | A = 2.5 +1.5/-0.5 mm |
| 1600 * | 5.5 x 14.5 x 18.5 | 1.2 | 20162 | 2000 |
| 1800 * | | | 20182 | |
| 2000 * | | | 20202 | |
| 2200 * | | | 20222 | |
| 2400 * | | | 20242 | |
| 2700 * | 6.0 x 15.0 x 18.5 | 1.3 | 20272 | 2000 |
| 3000 * | | | 20302 | |
| 3300 * | | | 20332 | |
| 3600 * | | | 20362 | |
| 3900 * | | | 20392 | |
| 4300 * | | | 20432 | |
| 4700 * | | | 20472 | |
| 5100 * | | | 20512 | |
| 5600 * | | | 20562 | |
| 6200 * | | | 20622 | |
| 6800 * | | | 20682 | |
| 7500 * | 7.0 x 16.0 x 18.5 | 1.5 | 20752 | 1500 |
| 8200 * | | | 20822 | |
| 9100 * | | | 20912 | |
| 10000 * | 7.5 x 16.5 x 18.5 | 1.7 | 20103 | 1250 |
| 11000 * | 8.0 x 17.0 x 18.5 | 1.9 | 20113 | 1250 |
| 12000 * | | | 20123 | |
| 13000 * | 8.5 x 17.5 x 18.5 | 2.3 | 20133 | 1000 |
| 15000 * | 9.0 x 18.0 x 18.5 | 2.5 | 20153 | 1000 |

Preferred catalogue numbers

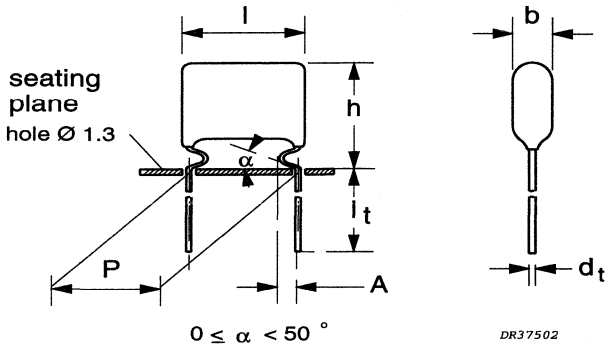
* = in progress.

# AC and pulse metallized polypropylene film capacitors

## KP/MKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 1000 V DC VERSION**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤4 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 1000 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 20...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 21...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 24...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 25...** | on request |

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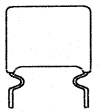


## $U_{Rdc}$ = 1000 V

$U_{Rac}$ = 400 V / $U_{p-p}$ = 1100 V

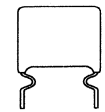
**loose in box**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 22.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.016 | 6.0 x 19.0 x 26.0 | 2.8 | 20163 | 800 |
| 0.018 | | | 20183 | |
| 0.02 | 6.5 x 19.5 x 26.0 | 3.0 | 20203 | 750 |
| 0.022 | | | 20223 | |
| 0.024 | 7.0 x 20.0 x 26.0 | 3.2 | 20243 | 650 |
| 0.027 | 7.5 x 20.5 x 26.0 | 3.4 | 20273 | 600 |
| 0.03 | | | 20303 | |
| 0.033 | 8.0 x 21.0 x 26.0 | 3.6 | 20333 | 550 |
| 0.036 | 8.5 x 21.5 x 26.0 | 3.8 | 20363 | 500 |
| 0.039 | | | 20393 | |
| 0.043 | 9.0 x 22.0 x 26.0 | 4.0 | 20433 | 450 |
| | Pitch = 27.5 ±0.5 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.047 | 6.0 x 19.0 x 30.0 | 3.3 | 20473 | 1000 |
| 0.051 | 7.5 x 20.5 x 30.0 | 3.9 | 20513 | 750 |
| 0.056 | | 3.9 | 20563 | |
| 0.062 | 8.0 x 21.0 x 30.0 | 4.2 | 20623 | 650 |
| 0.068 | 8.5 x 21.5 x 30.0 | 4.4 | 20683 | 550 |
| 0.075 | 9.0 x 22.0 x 30.0 | 4.6 | 20753 | 550 |
| 0.082 | 9.5 x 22.5 x 30.0 | 5.2 | 20823 | 500 |
| 0.091 | 10.0 x 23.0 x 30.0 | 5.6 | 20913 | 500 |
| 0.1 | 10.5 x 23.5 x 30.0 | 5.9 | 20104 | 450 |
| 0.11 | 11.0 x 24.0 x 30.0 | 6.2 | 20114 | 400 |
| 0.12 | 11.5 x 24.5 x 30.0 | 6.5 | 20124 | 400 |
| 0.13 | 12.0 x 25.0 x 30.0 | 6.8 | 20134 | 350 |
| 0.15 | 12.5 x 25.5 x 30.0 | 7.1 | 20154 | 350 |

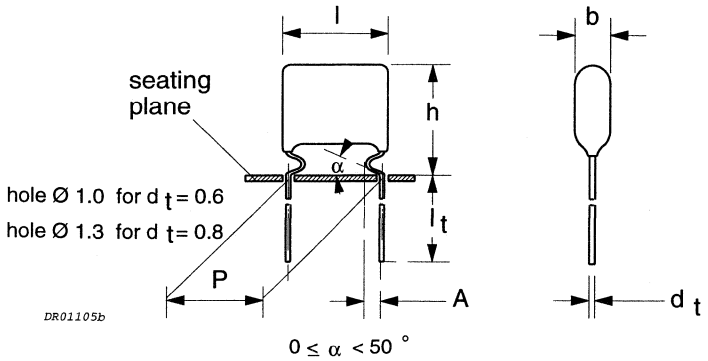
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



**Pitch 15 mm**




**SPECIFIC REFERENCE DATA FOR THE 1600 V DC VERSION**

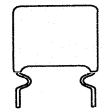
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |
| Ionization voltage (typical value) at 20 pC peak discharge | >550 V (AC) | |

**AVAILABLE 1600 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 30...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 31...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 34...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 35...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$ = 1600 V

$U_{Rac}$ = 500 V / $U_{p-p}$ = 1400 V

**loose in box**

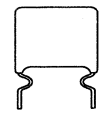
| Cap. (pF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 15.0 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 680 * | 5.5 x 14.5 x 18.5 | 0.75 | 30681 | 2000 |
| 750 * | | | 30751 | |
| 820 * | | | 30821 | |
| 910 * | 6.0 x 15.0 x 18.5 | 0.80 | 30911 | 2000 |
| 1000 * | | 0.85 | 30102 | |
| 1100 * | | 0.85 | 30112 | |
| 1200 * | | 0.90 | 30122 | |
| 1300 * | | 0.95 | 30132 | |
| 1500 | 5.5 x 14.5 x 18.5 | 1.2 | 30152 | 2000 |
| 1600 * | | | 30162 | |
| 1800 * | 6.0 x 15.0 x 18.5 | 1.3 | 30182 | 2000 |
| 2000 * | 6.5 x 15.5 x 18.5 | 1.4 | 30202 | 1500 |
| 2200 * | | | 30222 | |
| 2400 * | 7.0 x 16.0 x 18.5 | 1.5 | 30242 | 1500 |
| 2700 * | 7.5 x 16.5 x 18.5 | 1.7 | 30272 | 1250 |
| 3000 * | | | 30302 | |
| 3300 * | 8.0 x 17.0 x 18.5 | 1.9 | 30332 | 1250 |
| 3600 * | 8.5 x 17.5 x 18.5 | 2.3 | 30362 | 1000 |
| 3900 * | 9.0 x 18.0 x 18.5 | 2.5 | 30392 | 1000 |
| 4300 * | | | 30432 | |

Preferred catalogue numbers

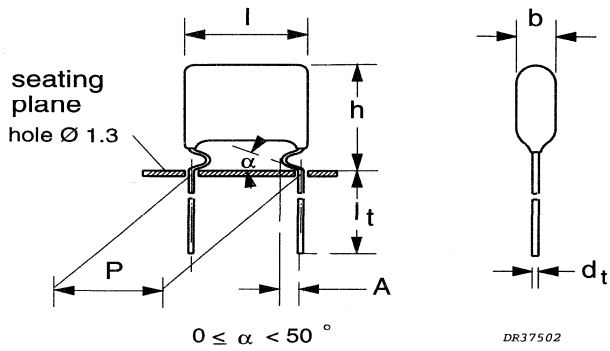
* = in progress.

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 1600 V DC VERSION**

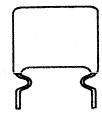
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤4 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 1600 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 30...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 31...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 34...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 35...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$ = 1600 V

$U_{Rac}$ = 500 V / $U_{p-p}$ = 1400 V

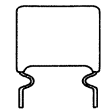
**loose in box**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.0047 | 6.0 x 19.0 x 26.0 | 2.4 | 30472 | 800 |
| 0.0051 | | | 30512 | |
| 0.0056 | | | 30562 | |
| 0.0062 | 6.5 x 19.5 x 26.0 | 2.6 | 30622 | 750 |
| 0.0068 | | | 30682 | |
| 0.0075 | 7.0 x 20.0 x 26.0 | 2.8 | 30752 | 650 |
| 0.0082 | | | 30822 | |
| 0.0091 | 7.5 x 20.5 x 26.0 | 2.9 | 30912 | 600 |
| 0.01 | 8.0 x 21.0 x 26.0 | 3.2 | 30103 | 550 |
| 0.011 | 8.5 x 21.5 x 26.0 | 3.4 | 30113 | 500 |
| 0.012 | | | 30123 | |
| 0.013 | 9.0 x 22.0 x 26.0 | 3.6 | 30133 | 450 |
| 0.015 | 9.5 x 22.5 x 26.0 | 4.0 | 30153 | 400 |
| 0.016 | 10.0 x 23.0 x 26.0 | 4.3 | 30163 | 400 |
| 0.018 | 10.5 x 23.5 x 26.0 | 4.7 | 30183 | 350 |
| Pitch = 27.5 ±0.5 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.02 | 9.0 x 22.0 x 30.0 | 4.4 | 30203 | 550 |
| 0.022 | 9.5 x 22.5 x 30.0 | 4.6 | 30223 | 500 |
| 0.024 | 10.0 x 23.0 x 30.0 | 5.0 | 30243 | 500 |
| 0.027 | 10.5 x 23.5 x 30.0 | 5.4 | 30273 | 450 |
| 0.03 | 11.0 x 24.0 x 30.0 | 5.8 | 30303 | 400 |
| 0.033 | 11.5 x 24.5 x 30.0 | 6.2 | 30333 | 400 |
| 0.036 | 12.0 x 25.0 x 30.0 | 6.6 | 30363 | 350 |
| 0.039 | 12.5 x 25.5 x 30.0 | 7.0 | 30393 | 350 |

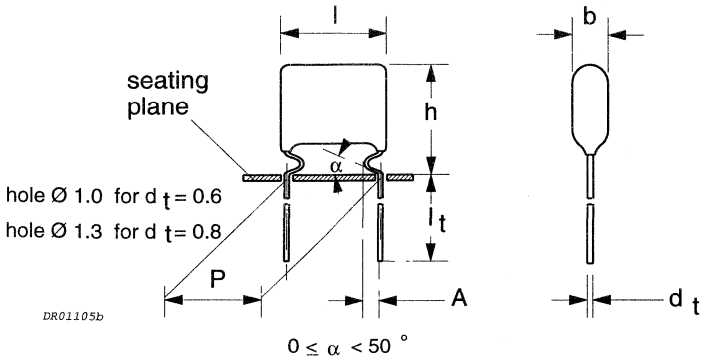
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 15 mm**




## SPECIFIC REFERENCE DATA FOR THE 2000 V DC VERSION

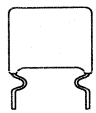
| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |
| Ionization voltage (typical value) at 20 pC peak discharge | >600 V (AC) | |

## AVAILABLE 2000 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 40...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 41...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 44...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 45...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MKP 375



## $U_{Rdc}$ = 2000 V

$U_{Rac}$ = 600 V / $U_{p-p}$ = 1700 V

**loose in box**

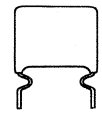
| Cap. (pF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ =3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 15.0 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | | A = 2.5 +1.4/-0.5 mm |
| 100 * | 5.5 x 14.5 x 18.5 | 0.75 | 40101 | 2000 |
| 110 * | | 0.75 | 40111 | |
| 120 * | | 0.75 | 40121 | |
| 130 * | | 0.75 | 40131 | |
| 150 * | | 0.75 | 40151 | |
| 160 * | | 0.75 | 40161 | |
| 180 * | | 0.75 | 40181 | |
| 200 * | | 0.75 | 40201 | |
| 220 * | | 0.75 | 40221 | |
| 240 * | | 0.75 | 40241 | |
| 270 * | | 0.75 | 40271 | |
| 300 * | | 0.75 | 40301 | |
| 330 * | | 0.75 | 40331 | |
| 360 * | | 0.75 | 40361 | |
| 390 * | | 0.75 | 40391 | |
| 430 * | | 0.75 | 40431 | |
| 470 * | | 0.80 | 40471 | |
| 510 * | | 0.80 | 40511 | |
| 560 * | | 0.80 | 40561 | |
| 620 * | 6.0 x 15.0 x 18.5 | 0.85 | 40621 | 2000 |
| 680 * | | 0.85 | 40681 | |
| 750 * | | 0.90 | 40751 | |
| 820 * | 6.5 x 15.5 x 18.5 | 0.95 | 40821 | 1500 |
| 910 * | 5.5 x 14.5 x 18.5 | 1.2 | 40911 | 2000 |
| 1000 * | 6.0 x 15.0 x 18.5 | 1.3 | 40102 | 2000 |
| 1100 * | | | 40112 | |
| 1200 * | | | 40122 | |
| 1300 * | 6.5 x 15.5 x 18.5 | 1.4 | 40132 | 1500 |
| 1500 * | 7.0 x 16.0 x 18.5 | 1.5 | 40152 | 1500 |
| 1600 * | 7.5 x 16.5 x 18.5 | 1.7 | 40162 | 1250 |
| 1800 * | | | 40182 | |
| 2000 * | 8.0 x 17.0 x 18.5 | 1.9 | 40202 | 1250 |
| 2200 * | 8.5 x 17.5 x 18.5 | 2.3 | 40222 | 1000 |
| 2400 * | 9.0 x 18.0 x 18.5 | 2.5 | 40242 | 1000 |
| 2700 * | 9.5 x 18.5 x 18.5 | 2.7 | 40272 | 900 |

Preferred catalogue numbers

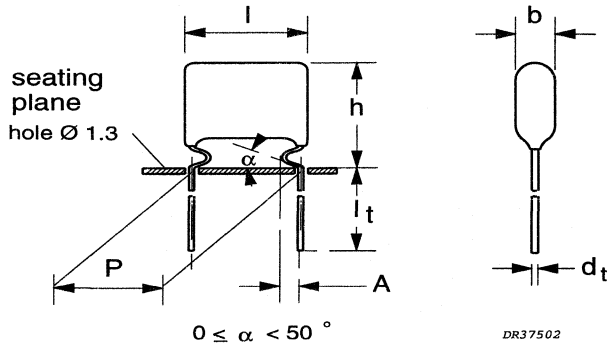
* = in progress.

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 2000 V DC VERSION**

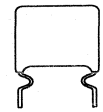
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤4 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 2000 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 40...** | preferred |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 41...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 44...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 45...** | on request |

# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375



## $U_{Rdc}$ = 2000 V

$U_{Rac}$ = 600 V / $U_{p-p}$ = 1700 V

**loose in box**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm A = 2.5 +1.4/-0.5 mm | |
| 0.003 | 6.0 x 19.0 x 26.0 | 2.2 | 40302 | 800 |
| 0.0033 | | | 40332 | |
| 0.0036 | | | 40362 | |
| 0.0039 | | | 40392 | |
| 0.0043 | 6.5 x 19.5 x 26.0 | 2.4 | 40432 | 750 |
| 0.0047 | | | 40472 | |
| 0.0051 | 7.0 x 20.0 x 26.0 | 2.6 | 40512 | 650 |
| 0.0056 | | | 40562 | |
| 0.0062 | 7.5 x 20.5 x 26.0 | 2.8 | 40622 | 600 |
| 0.0068 | 8.0 x 21.0 x 26.0 | 3.0 | 40682 | 550 |
| 0.0075 | | | 40752 | |
| 0.0082 | 8.5 x 21.5 x 26.0 | 3.2 | 40822 | 500 |
| 0.0091 | 9.0 x 22.0 x 26.0 | 3.5 | 40912 | 450 |
| 0.01 | 9.5 x 22.5 x 26.0 | 3.8 | 40103 | 400 |
| | Pitch = 27.5 ±0.5 mm | | $d_t$ = 0.80 ±0.08 mm A = 2.5 +1.4/-0.5 mm | |
| 0.011 | 9.0 x 22.0 x 30.0 | 4.4 | 40113 | 550 |
| 0.012 | 9.5 x 22.5 x 30.0 | 4.6 | 40123 | 500 |
| 0.013 | 10.0 x 23.0 x 30.0 | 5.0 | 40133 | 500 |
| 0.015 | 10.5 x 23.5 x 30.0 | 5.4 | 40153 | 450 |
| 0.016 | 11.0 x 24.0 x 30.0 | 5.8 | 40163 | 400 |
| 0.018 | 11.5 x 24.5 x 30.0 | 6.2 | 40183 | 400 |
| 0.02 | 12.5 x 25.5 x 30.0 | 7.3 | 40203 | 350 |
| 0.022 | 13.0 x 26.0 x 30.0 | 8.1 | 40223 | 300 |

Preferred catalogue numbers

Available on request:

## $U_{Rdc}$ = 2500 V

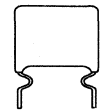
$U_{Rac}$ = 600 V / $U_{p-p}$ = 1700 V

**loose in box**

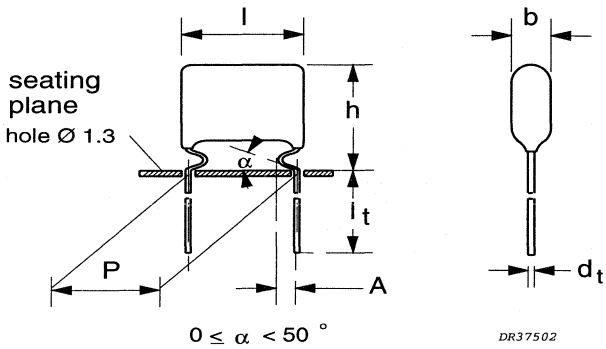
| | | |
|---|---|---|
| Pitch = 22.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm |
| Capacitance range (µF): | 0.0010 to 0.0036 | (E24) |
| Pitch = 27.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm |
| Capacitance range (µF): | 0.0039 to 0.010 | (E24) |

# AC and pulse metallized polypropylene film capacitors

## KP/MMKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

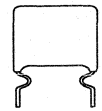
| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| P = 22.5 mm | $\leq 4 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| P = 27.5 mm | $\leq 4 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 50...** | on request |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 51...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 54...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 55...** | on request |

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 375



## $U_{Rdc}$ = 630 V

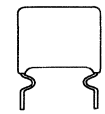
$U_{Rac}$ = 300 V / $U_{p-p}$ = 850 V

## loose in box

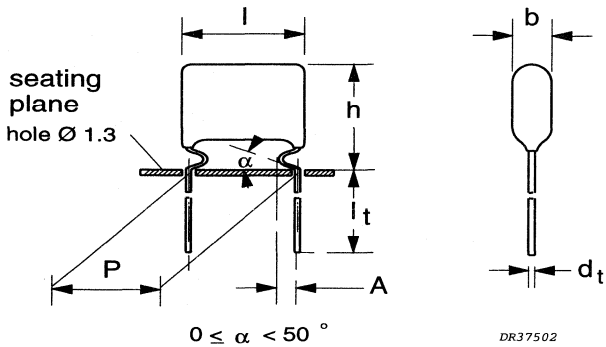
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm A = 2.5 +1.4/-0.5 mm | |
| 0.024<br>0.027 | 6.0 x 19.0 x 26.0 | 2.8 | 50243<br>50273 | 800 |
| 0.030<br>0.033 | 6.5 x 19.5 x 26.0 | 3.0 | 50303<br>50333 | 750 |
| 0.036 | 7.0 x 20.0 x 26.0 | 3.2 | 50363 | 650 |
| 0.039<br>0.043 | 7.5 x 20.5 x 26.0 | 3.4 | 50393<br>50433 | 600 |
| 0.047 | 8.0 x 21.0 x 26.0 | 3.6 | 50473 | 550 |
| 0.051<br>0.056 | 8.5 x 21.5 x 26.0 | 3.8 | 50513<br>50563 | 500 |
| | Pitch = 27.5 ±0.5 mm | | $d_t$ = 0.80 ±0.08 mm A = 2.5 +1.4/-0.5 mm | |
| 0.062 | 8.5 x 21.5 x 30.0 | 4.4 | 50623 | 550 |
| 0.068 | 9.0 x 22.0 x 30.0 | 4.8 | 50683 | 550 |
| 0.075<br>0.082 | 9.5 x 22.5 x 30.0 | 5.2 | 50753<br>50823 | 500 |
| 0.091 | 10.0 x 23.0 x 30.0 | 5.6 | 50913 | 500 |
| 0.1 | 10.5 x 23.5 x 30.0 | 5.9 | 50104 | 450 |
| 0.11 | 11.0 x 24.0 x 30.0 | 6.3 | 50114 | 400 |
| 0.12 | 11.5 x 24.5 x 30.0 | 6.8 | 50124 | 400 |
| 0.13 | 12.0 x 25.0 x 30.0 | 7.2 | 50134 | 350 |
| 0.15 | 13.0 x 26.0 x 30.0 | 8.1 | 50154 | 300 |

# AC and pulse metallized polypropylene film capacitors

## KP/MMKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 1000 V DC VERSION**

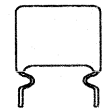
| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 1000 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 60...** | on request |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 61...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 64...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 65...** | on request |

# AC and pulse metallized polypropylene film capacitors

KP/MMKP 375



## $U_{Rdc}$ = 1000 V

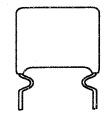
$U_{Rac}$ = 400 V / $U_{p-p}$ = 1100 V

**loose in box**

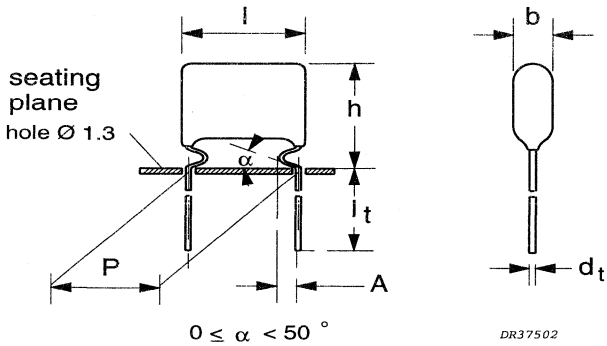
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| | Pitch = 22.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.013 | 6.0 x 19.0 x 26.0 | 2.8 | 60133 | 800 |
| 0.015 | 6.5 x 19.5 x 26.0 | 3.0 | 60153 | 750 |
| 0.016 | | | 60163 | |
| 0.018 | 7.0 x 20.0 x 26.0 | 3.2 | 60183 | 650 |
| 0.02 | | | 60203 | |
| 0.022 | 7.5 x 20.5 x 26.0 | 3.4 | 60223 | 600 |
| 0.024 | 8.0 x 21.0 x 26.0 | 3.6 | 60243 | 550 |
| 0.027 | | | 60273 | |
| 0.03 | | | 60303 | |
| 0.033 | | | 60333 | |
| 0.036 | 8.5 x 21.5 x 26.0 | 3.8 | 60363 | 500 |
| 0.039 | | | 60393 | |
| | Pitch = 27.5 ±0.5 mm | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.043 | 8.0 x 21.0 x 30.0 | 4.2 | 60433 | 650 |
| 0.047 | 8.5 x 21.5 x 30.0 | 4.4 | 60473 | 550 |
| 0.051 | | | 60513 | |
| 0.056 | 9.0 x 22.0 x 30.0 | 4.8 | 60563 | 550 |
| 0.062 | 9.5 x 22.5 x 30.0 | 5.2 | 60623 | 500 |
| 0.068 | 10.0 x 23.0 x 30.0 | 5.6 | 60683 | 500 |
| 0.075 | 10.5 x 23.5 x 30.0 | 5.9 | 60753 | 450 |
| 0.082 | 11.0 x 24.0 x 30.0 | 6.3 | 60823 | 400 |
| 0.091 | 11.5 x 24.5 x 30.0 | 6.8 | 60913 | 400 |
| 0.1 | 12.0 x 25.0 x 30.0 | 7.2 | 60104 | 350 |

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 375



**Pitch 22.5/27.5 mm**



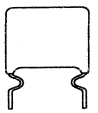

**SPECIFIC REFERENCE DATA FOR THE 1600 V DC VERSION**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 1600 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 70...** | on request |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 71...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 74...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 75...** | on request |

# AC and pulse metallized polypropylene film capacitors — KP/MMKP 375

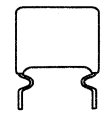


## $U_{Rdc}$ = 1600 V — $U_{Rac}$ = 500 V / $U_{p-p}$ = 1400 V — loose in box

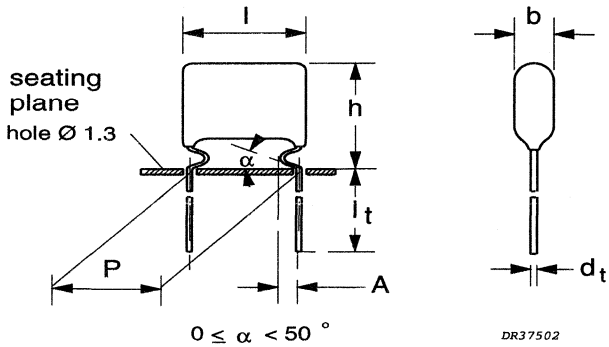
| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ |
|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.0051<br>0.0056 | 6.0 x 19.0 x 26.0 | 2.4 | 70512<br>70562 | 800 |
| 0.0062<br>0.0068 | 6.5 x 19.5 x 26.0 | 2.6 | 70622<br>70682 | 750 |
| 0.0075<br>0.0082 | 7.0 x 20.0 x 26.0 | 2.8 | 70752<br>70822 | 650 |
| 0.0091 | 7.5 x 20.5 x 26.0 | 3.0 | 70912 | 600 |
| 0.01 | 8.0 x 21.0 x 26.0 | 3.2 | 70103 | 550 |
| 0.011<br>0.012 | 8.5 x 21.5 x 26.0 | 3.4 | 70113<br>70123 | 500 |
| 0.013 | 9.0 x 22.0 x 26.0 | 3.6 | 70133 | 450 |
| 0.015 | 9.5 x 22.5 x 26.0 | 4.0 | 70153 | 400 |
| Pitch = 27.5 ±0.5 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm | |
| 0.016 | 9.0 x 22.0 x 30.0 | 4.2 | 70163 | 550 |
| 0.018 | 9.5 x 22.5 x 30.0 | 4.6 | 70183 | 500 |
| 0.02 | 10.0 x 23.0 x 30.0 | 5.0 | 70203 | 500 |
| 0.022 | 10.5 x 23.5 x 30.0 | 5.4 | 70223 | 450 |
| 0.024 | 11.0 x 24.0 x 30.0 | 5.8 | 70243 | 400 |
| 0.027 | 11.5 x 24.5 x 30.0 | 6.2 | 70273 | 400 |
| 0.03 | 12.5 x 25.5 x 30.0 | 7.0 | 70303 | 350 |
| 0.033 | 13.0 x 26.0 x 30.0 | 8.0 | 70333 | 300 |

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 375



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 2000 V DC VERSION**

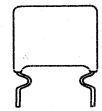
| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

**AVAILABLE 2000 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 375 80...** | on request |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 375 81...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 375 84...** | on request |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 375 85...** | on request |

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 375



## $U_{Rdc}$ = 2000 V

$U_{Rac}$ = 600 V / $U_{p-p}$ = 1700 V

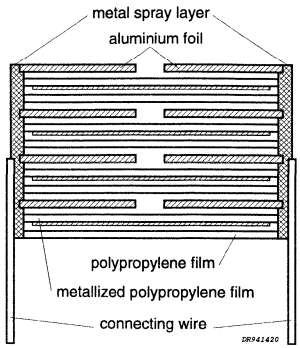
**loose in box**

| Cap. (µF) | $b_{max}$ x $h_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 375 ..... | |
|---|---|---|---|---|
| | | | $l_r$ = 3.5 ±0.5 mm | short leads |
| | | | C-tol ±5% | |
| | | | last 5 digits of catalogue number | SPQ |
| | Pitch = 22.5 ±0.4 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm |
| 0.0033<br>0.0036 | 6.0 x 19.0 x 26.0 | 2.2 | 80332<br>80362 | 800 |
| 0.0039<br>0.0043 | 6.5 x 19.5 x 26.0 | 2.4 | 80392<br>80432 | 750 |
| 0.0047<br>0.0051 | 7.0 x 20.0 x 26.0 | 2.6 | 80472<br>80512 | 650 |
| 0.0056 | 7.5 x 20.5 x 26.0 | 2.8 | 80562 | 600 |
| 0.0062 | 8.0 x 21.0 x 26.0 | 3.0 | 80622 | 550 |
| 0.0068<br>0.0075 | 8.5 x 21.5 x 26.0 | 3.2 | 80682<br>80752 | 500 |
| 0.0082 | 9.0 x 22.0 x 26.0 | 3.5 | 80822 | 450 |
| 0.0091 | 9.5 x 22.5 x 26.0 | 3.8 | 80912 | 400 |
| 0.01 | 10.0 x 23.0 x 26.0 | 4.1 | 80103 | 400 |
| | Pitch = 27.5 ±0.5 mm | | $d_t$ = 0.80 ±0.08 mm | A = 2.5 +1.4/-0.5 mm |
| 0.011 | 9.5 x 22.5 x 30.0 | 4.6 | 80113 | 500 |
| 0.012 | 10.0 x 23.0 x 30.0 | 5.0 | 80123 | 500 |
| 0.013 | 10.5 x 23.5 x 30.0 | 5.4 | 80133 | 450 |
| 0.015 | 11.0 x 24.0 x 30.0 | 5.8 | 80153 | 400 |
| 0.016 | 11.5 x 24.5 x 30.0 | 6.2 | 80163 | 400 |
| 0.018 | 12.0 x 25.0 x 30.0 | 6.6 | 80183 | 350 |
| 0.02 | 12.5 x 25.5 x 30.0 | 7.3 | 80203 | 350 |
| 0.022 | 13.0 x 26.0 x 30.0 | 8.0 | 80223 | 300 |

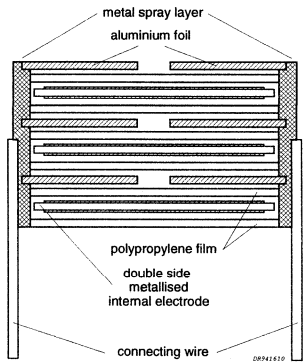
# AC and pulse metallized polypropylene film capacitors

# KP/MKP 375
# KP/MMKP 375

## CONSTRUCTION




KP/MKP




KP/MMKP

## DESCRIPTION

- Series-constructed, impregnated polypropylene film, aluminium foil and metallized internal electrode.
- Protected by a hard, water-repellent, solvent-resistant epoxy lacquer.
- Radial leads, solder-coated.

## MOUNTING

### Normal use

The capacitors are designed for printed-circuit board applications.
The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.

### Specific method of mounting to withstand vibration and shock

- For pitches ≤15.0 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

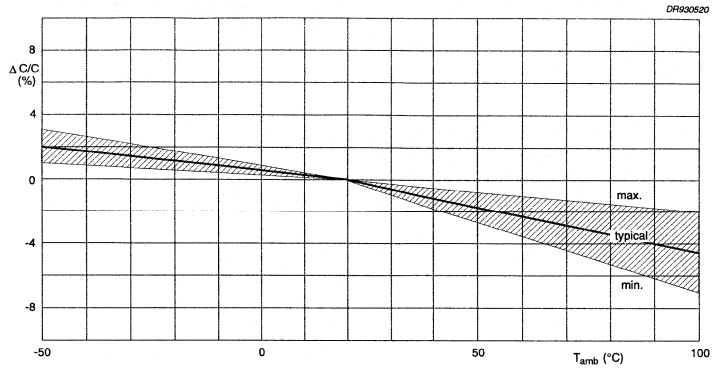
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

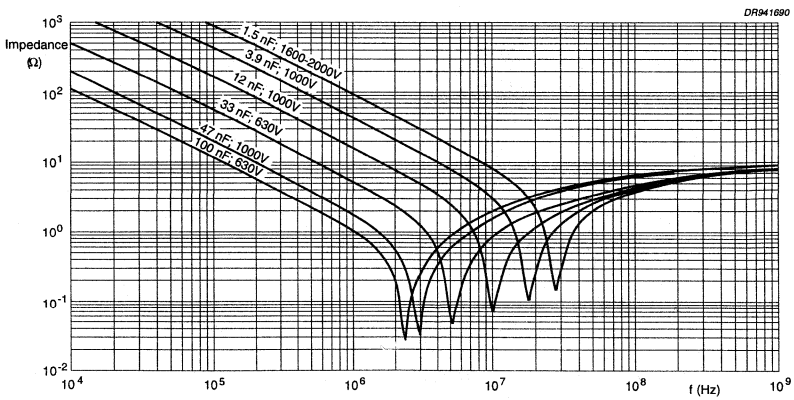
## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

## TEMPERATURE

- Storage temperature: $T_{stg}$ = –25 to +40 °C with RH max. 80% without condensation.

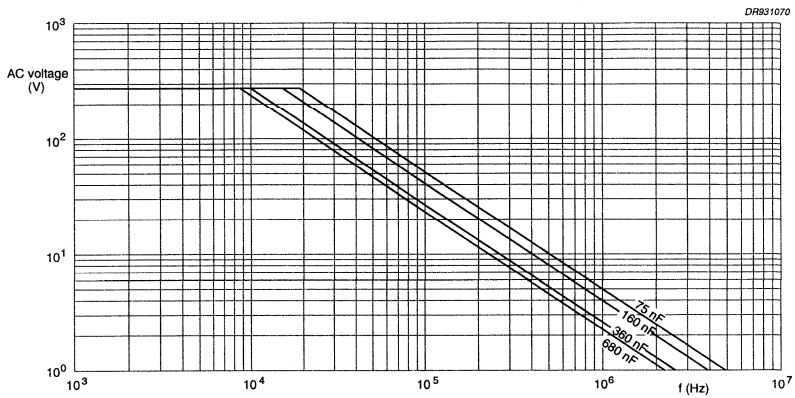
## VOLTAGE

- Category voltage:
  $U_{Cdc} = 0.7 \times U_{Rdc}$ for T = 100 °C
  $U_{Cac} = 0.7 \times U_{Rac}$ for T = 100 °C

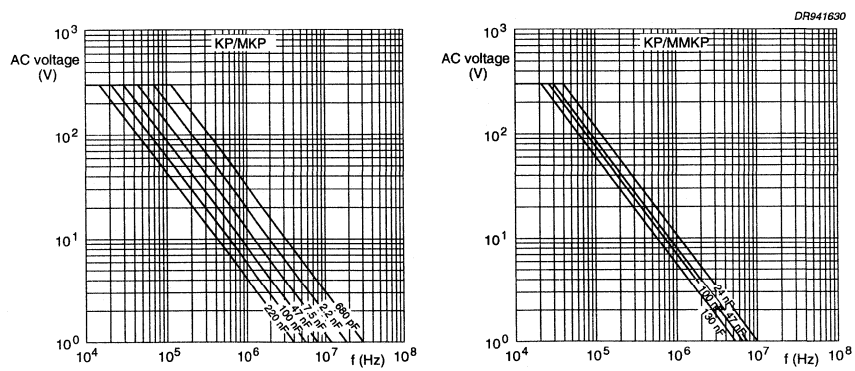
- Test voltage between leads: 1.6 x $U_{Rdc}$

- Test voltage between interconnected leads and case (foil method): 2840 V (DC).

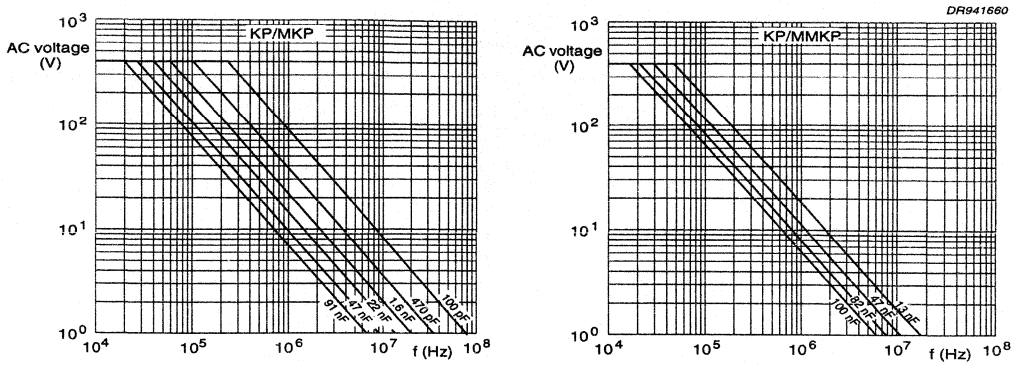
**Maximum RMS voltage (sine wave) as a function of frequency for $T_{amb} \leq 85$ °C (see graphs below)**



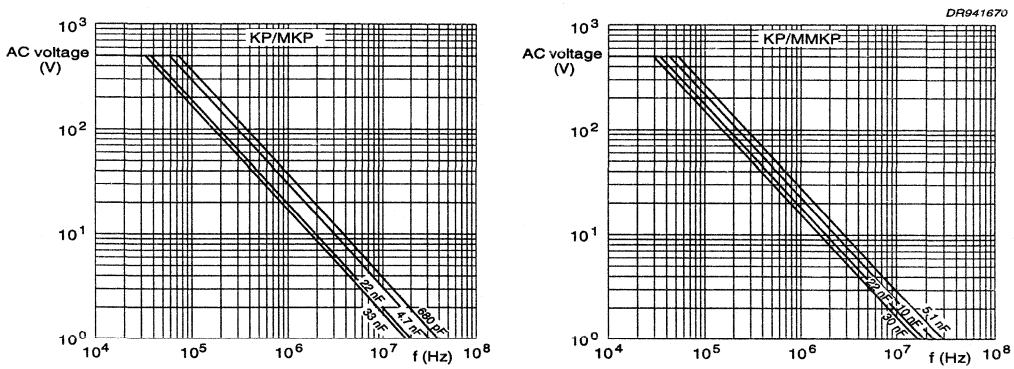

A.C. voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 400 V.



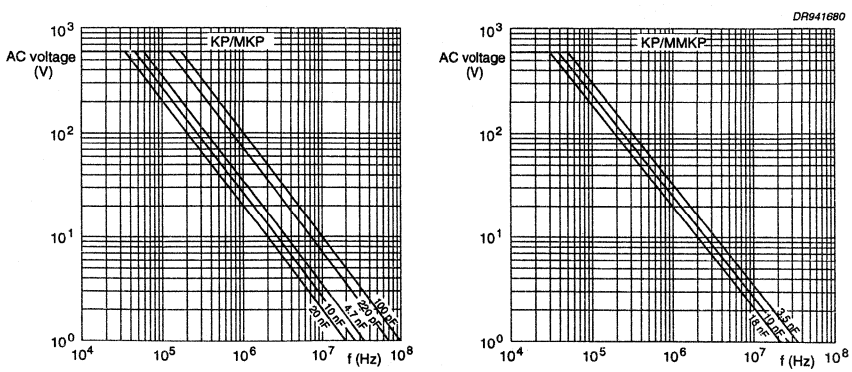

A.C. voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 630 V.



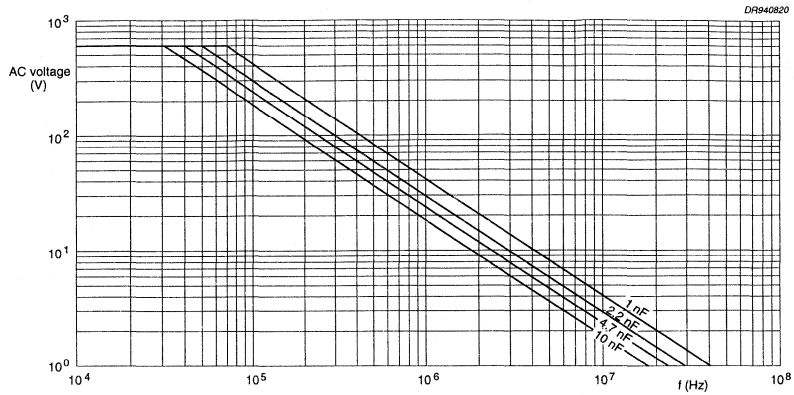

A.C. voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 1000$ V.




A.C. voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 1600$ V.




A.C. voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc} = 2000$ V.

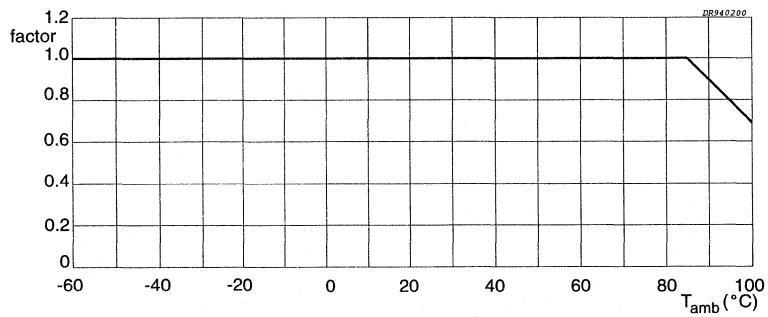



A.C. voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 2500 V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} > 85$ °C**

The maximum RMS voltage in the graphs above has to be multiplied by a factor given in the graph "Multiplying factor as a function of temperature".

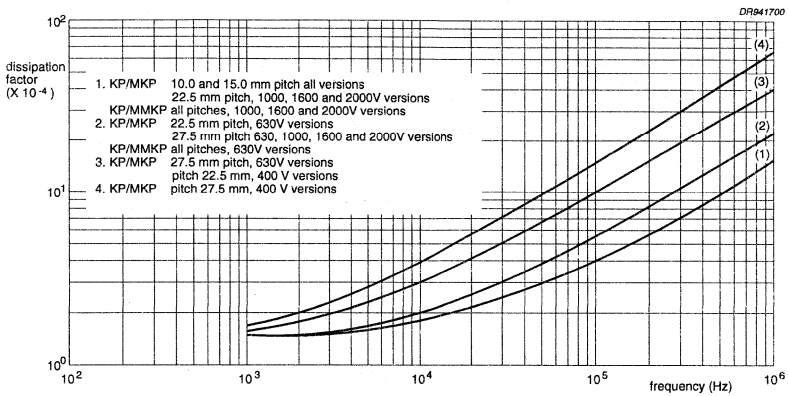
The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature at various capacitor dimensions".



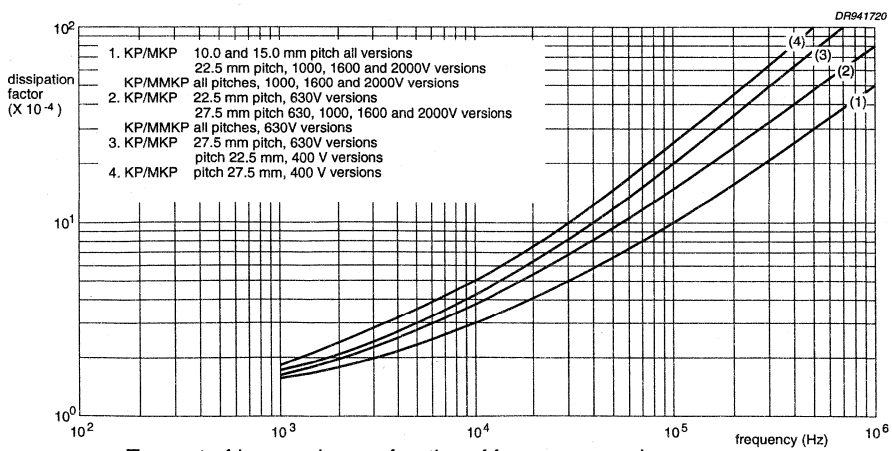

Multiplying factor as a function of temperature.

## TANGENT OF LOSS ANGLE

| KP/MKP | | 400 V | 630 V | 1000 V | 1600 V | 2000 V | 2500 V |
|---|---|---|---|---|---|---|---|
| Pitch = 10 to 15 mm | 10 kHz | – | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | – |
| | 100 kHz | – | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | – |
| Pitch = 22.5 mm | 10 kHz | $\leq 4 \times 10^{-4}$ | $\leq 4 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ |
| | 100 kHz | $\leq 20 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| Pitch = 27.5 mm | 10 kHz | $\leq 5 \times 10^{-4}$ | $\leq 4 \times 10^{-4}$ | $\leq 4 \times 10^{-4}$ | $\leq 4 \times 10^{-4}$ | $\leq 4 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ |
| | 100 kHz | $\leq 25 \times 10^{-4}$ | $\leq 20 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| **KP/MMKP** | | | **630 V** | **1000 V** | **1600 V** | **2000 V** | |
| | 10 kHz | – | $\leq 4 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | $\leq 3 \times 10^{-4}$ | – |
| | 100 kHz | – | $\leq 15 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | – |



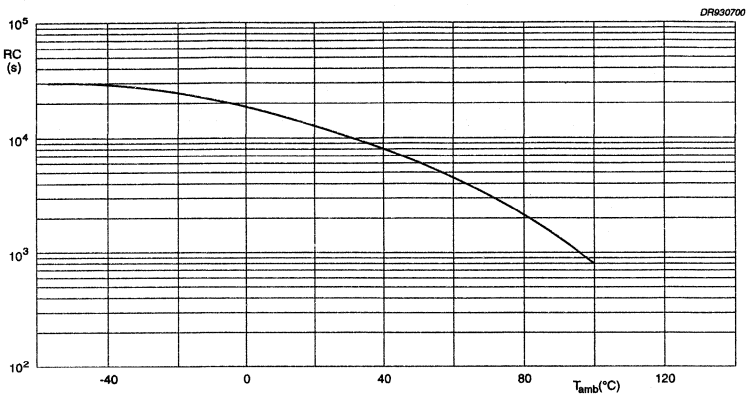

Tangent of loss angle as a function of frequency; typical curves.




Tangent of loss angle as a function of frequency; maximum curves.

**INSULATION RESISTANCE**

The insulation resistance is measured after a voltage of 500 ±50 V has been applied for 1 minute ±5 seconds, at $T_{amb}$ = 20 °C.

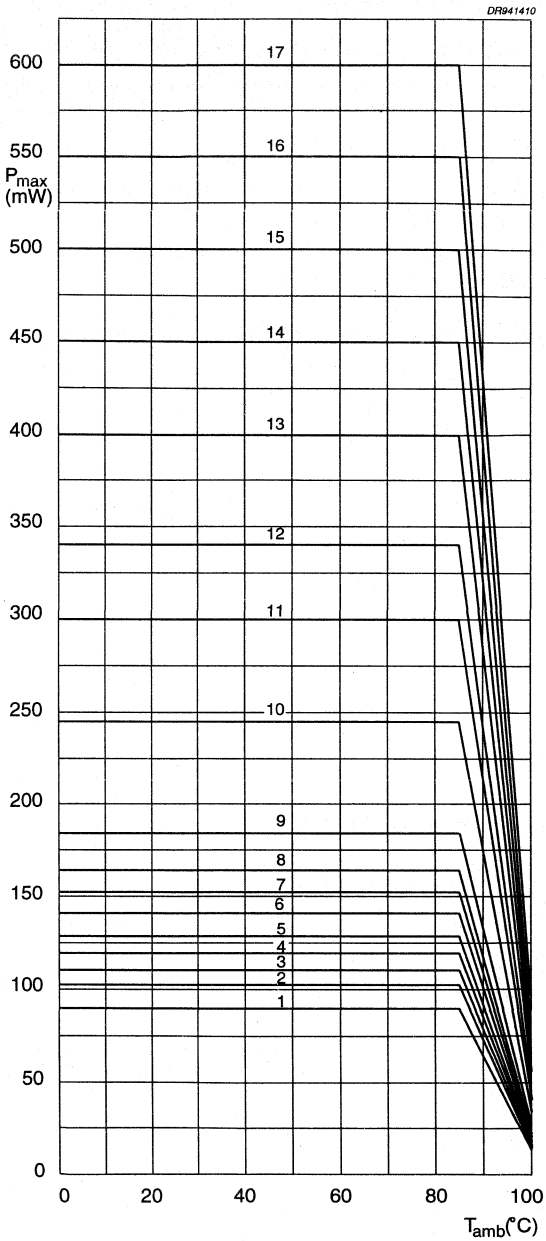



RC product as a function of ambient temperature; typical curve

- R between leads: >100 000 MΩ.

## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) $b_{max} \times h_{max} \times l_{max}$ |
|---|---|
| 1 | 5.0 x 13.0 x 14.0<br>5.5 x 13.5 x 14.0 |
| 2 | 6.0 x 14.0 x 14.0<br>5.0 x 14.0 x 18.5 |
| 3 | 6.5 x 14.5 x 14.0<br>5.5 x 14.5 x 18.5 |
| 4 | 6.0 x 15.0 x 18.5 |
| 5 | 6.5 x 15.5 x 18.5 |
| 6 | 7.0 x 16.0 x 18.5 |
| 7 | 7.5 x 16.5 x 18.5 |
| 8 | 8.0 x 17.0 x 18.5<br>8.5 x 17.5 x 18.5 |
| 9 | 9.0 x 18.0 x 18.5<br>9.5 x 18.5 x 18.5 |
| 10 | 5.5 x 18.5 x 26.0<br>6.0 x 19.0 x 26.0 |
| 11 | 6.5 x 19.5 x 26.0<br>7.0 x 20.0 x 26.0<br>7.5 x 20.5 x 26.0 |
| 12 | 8.0 x 21.0 x 26.0<br>8.5 x 21.5 x 26.0<br>9.0 x 22.0 x 26.0 |
| 13 | 9.5 x 22.5 x 26.0<br>10.0 x 23.0 x 26.0<br>8.5 x 21.5 x 30.0<br>9.0 x 22.0 x 30.0<br>9.5 x 22.5 x 30.0 |
| 14 | 10.0 x 23.0 x 30.0<br>10.5 x 23.5 x 30.0<br>11.0 x 24.0 x 30.0 |
| 15 | 11.5 x 24.5 x 30.0<br>12.5 x 25.0 x 30.0<br>12.5 x 25.5 x 30.0 |
| 16 | 12.5 x 25.5 x 30.0<br>13.0 x 26.0 x 30.0<br>13.5 x 26.5 x 30.0 |
| 17 | 14.0 x 27.0 x 31.5<br>16.0 x 29.0 x 31.5 |



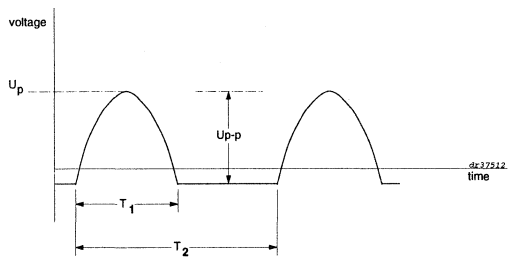

Maximum power dissipation as a function of ambient temperature, at various capacitor dimensions.

**APPLICATION NOTE**

To select the capacitor for a certain application, 5 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($V_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. There is no limit for the peak current ($I_p$) or voltage pulse slope (dU/dt) in the application.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature. ( = maximum application temperature).

Example: C = 10 nF - 1600 V, KP/MMKP - type used for the following voltage signal




This is a half sinewave pulse with:

$U_{p-p}$ = 1200 V $U_p$ = 1100 V $T_1$ = 12 µs $T_2$= 64 µs

The ambient temperature is 50 °C.

**Checking the 5 conditions**

1. The peak voltage $U_p$ = 1100 V is lower than 1600 V (DC).
2. The peak-to-peak voltage 1200 V is lower than 2 x $\sqrt{2}$ x 500 V (AC) = 1414 $U_{p-p}$.
3. The voltage pulse slope: of no consideration.
4. The dissipated power is 170 mW as calculated with Fourier terms. This is less than 340 mW, allowed for a capacitor with dimensions 8 x 21 x 26 mm given in the graph "Maximum power dissipation as a function of ambient temperature".
5. The free air ambient temperature is 50 °C, and lower than 100 °C.

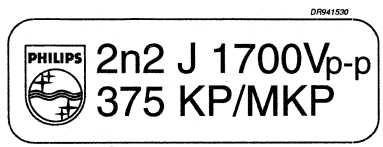
## PRODUCT MARKING

**Capacitors with pitch 10 mm to 27.5 mm**

The capacitors are marked in black ink on the top with the following information:

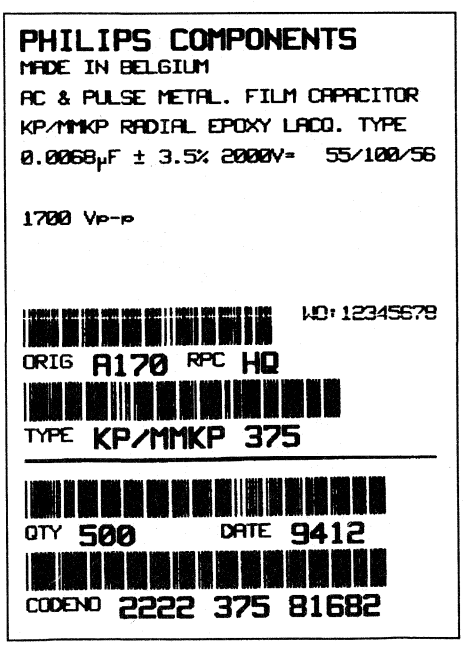
- Capacitance code in accordance with IEC 62
- Capacitance tolerance: J = 5%; A = 3.5%
- Rated peak-to-peak voltage (e.g. 1700 $V_{p-p}$)
- Manufacturer's type designation (375)
- Code for dielectric material (KP/MKP)
- Manufacturer's emblem
- Year and month of manufacturing code (only for pitch ≥22.5 mm).

EXAMPLE OF MARKING




## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK940050

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, rated DC-voltage and climatic category (IEC) |
| 6 | Rated peak-to-peak voltage |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

## QUICK REFERENCE TEST REQUIREMENTS

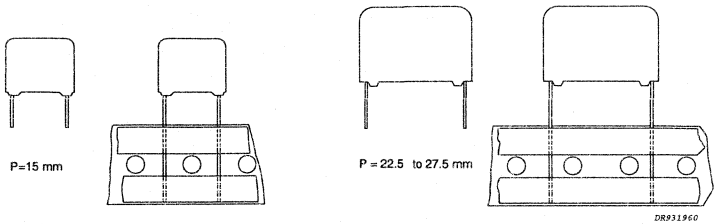
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 1\%$<br>$\Delta \tan \delta \leq 5 \times 10^{-4}$ |
| **Robustness of component** | | |
| Vibration<br>Shock | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours<br>half sinewave; 490 m/s$^2$; 11 ms | $\Delta C/C \leq 2\%$ ($C > 0.0056$ µF)<br>$\Delta C/C \leq 3\%$ ($C \leq 0.0056$ µF)<br>$\Delta \tan \delta \leq 5 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, first cycle<br>Cold<br>Damp heat remaining cycles | 16 hours; 100 °C<br><br>2 hours; –55 °C<br> | <br>$\Delta C/C \leq 3\%$<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 1\%$<br>$\Delta \tan \delta \leq 5 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 1000 hours; 85 °C;<br>1.25 x $U_{Rac}$ (RMS); 50 Hz | $\Delta C/C \leq 2\%$ ($C > 0.0056$ µF)<br>$\Delta C/C \leq 3\%$ ($C \leq 0.0056$ µF)<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 100 °C | $\Delta C/C \leq 3\%$ ($C > 0.0056$ µF)<br>$\Delta C/C \leq 5\%$ ($C \leq 0.0056$ µF)<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | body temperature: 100 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 2\%$<br>$\Delta \tan \delta \leq 5 \times 10^{-4}$ |
| Passive flammability | class C | no burning |
| Endurance (DC) | 2000 hours:<br>1.25 x $U_{Rdc}$; 85 °C<br>1.25 x $U_{Cdc}$; 100 °C | $\Delta C/C \leq 3\%$ ($C > 0.0056$ µF)<br>$\Delta C/C \leq 4\%$ ($C \leq 0.0056$ µF)<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |

# AC and pulse metallized polypropylene film capacitors

# KP 376
# KP/MMKP 376

**KP RADIAL POTTED CAPACITORS** **Pitch 15/22.5/27.5 mm**

**KP/MMKP RADIAL POTTED CAPACITORS**



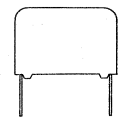

## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E24 series) | 0.001 to 0.82 µF |
| Capacitance tolerance | ±5%, ±3.5% |
| Rated voltage (DC) | 250 V, 630 V, 1000 V, 1600 V, 2000 V |
| Rated voltage (AC) | 125 V, 300 V, 400 V, 500 V, 600 V |
| Climatic category | 55/100/56 |
| Rated temperature | 85 °C |
| Reference specification | IEC 384-13 for 250 V version<br>IEC 384-17 for 630 V to 2000 V versions |
| Performance grade 630 V to 2000 V versions<br>for $C > 4.7$ nF<br>for $C \leq 4.7$ nF | <br>grade 1 (long life)<br>grade 2 (general purpose) |
| Stability grade, 630 V to 2000 V versions | grade 2 |
| Stability class, 250 V version | class 3 |

| FEATURES | APPLICATIONS |
|---|---|
| • 15.0 mm to 27.5 mm lead pitch | • Where high currents and steep pulses occur |
| • Supplied loose in box and taped on reel. | • For deflection circuits in television receivers. |

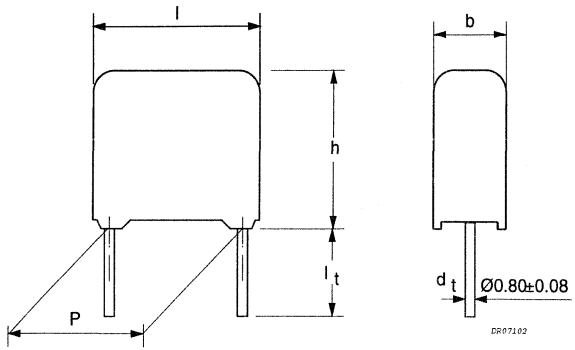
# AC and pulse metallized polypropylene film capacitors

# KP 376



**Pitch 27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 10 \times 10^{-4}$ | $\leq 25 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

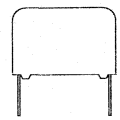
## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 376 42...** | preferred |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 376 48...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 376 45...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

KP 376



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 125 V

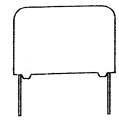
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 376 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.22 | 9.0 x 19.0 x 31.0 | 6.2 | 42224 | 100 | 400 |
| 0.24 | 11.0 x 21.0 x 31.0 | 8.3 | 42244 | 100 | 300 |
| 0.27 | | 8.3 | 42274 | | |
| 0.3 | | 9.0 | 42304 | | |
| 0.33 | 13.0 x 23.0 x 31.0 | 11.0 | 42334 | 100 | 250 |
| 0.36 | | 11.0 | 42364 | | |
| 0.39 | | 11.0 | 42394 | | |
| 0.43 | | 11.0 | 42434 | | |
| 0.47 | | 11.5 | 42474 | | |
| 0.51 | 15.0 x 25.0 x 31.0 | 14.2 | 42514 | 100 | 200 |
| 0.56 | | 14.2 | 42564 | | |
| 0.62 | 18.0 x 28.0 x 31.0 | 19.0 | 42624 | 100 | 150 |
| 0.68 | | 19.0 | 42684 | | |
| 0.75 | | 19.0 | 42754 | | |
| 0.82 | | 19.5 | 42824 | | |

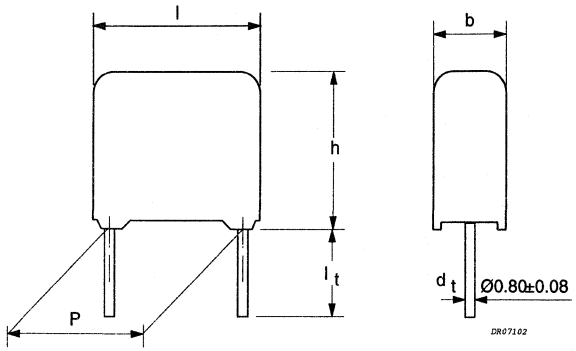
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## KP/MMKP 376



**Pitch 15/22.5/27.5 mm**




### SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 15.0 mm | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| P = 22.5 mm | $\leq 3 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| P = 27.5 mm | $\leq 4 \times 10^{-4}$ | $\leq 20 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

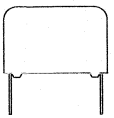
### AVAILABLE 630 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 376 62...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 376 63...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 376 68...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 376 69...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 376 65...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±3.5% | catalogue number **2222 376 66...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

KP/MMKP 376



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 300 V

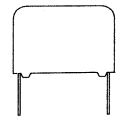
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 376 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.0068 | 5.0 x 11.0 x 17.5 | 1.1 | 62682 | 1000 | 1100 |
| 0.0075 | | | 62752 | | |
| 0.0082 | | | 62822 | | |
| 0.0091 | | | 62912 | | |
| 0.01 | 6.0 x 12.0 x 17.5 | 1.5 | 62103 | 1000 | 900 |
| 0.011 | | | 62113 | | |
| 0.012 | | | 62123 | | |
| 0.013 | | | 62133 | | |
| 0.015 | 7.0 x 13.5 x 17.5 | 2.0 | 62153 | 1000 | 800 |
| 0.016 | | | 62163 | | |
| 0.018 | | | 62183 | | |
| 0.02 | 8.5 x 15.0 x 17.5 | 2.6 | 62203 | 1000 | 650 |
| 0.022 | | | 62223 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.024 | 6.0 x 15.5 x 26.0 | 2.8 | 62243 | 200 | 600 |
| 0.027 | | | 62273 | | |
| 0.03 | | | 62303 | | |
| 0.033 | 7.0 x 16.5 x 26.0 | 3.5 | 62333 | 200 | 550 |
| 0.036 | | | 62363 | | |
| 0.039 | | | 62393 | | |
| 0.043 | 8.5 x 18.0 x 26.0 | 4.5 | 62433 | 200 | 450 |
| 0.047 | | | 62473 | | |
| 0.051 | | | 62513 | | |
| 0.056 | | 5.1 | 62563 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.062 | 9.0 x 19.0 x 31.0 | 6.2 | 62623 | 100 | 400 |
| 0.068 | | | 62683 | | |
| 0.075 | | | 62753 | | |
| 0.082 | 11.0 x 21.0 x 31.0 | 8.3 | 62823 | 100 | 300 |
| 0.091 | | | 62913 | | |
| 0.1 | | | 62104 | | |
| 0.11 | | | 62114 | | |
| 0.12 | 13.0 x 23.0 x 31.0 | 10.8 | 62124 | 100 | 250 |
| 0.13 | | | 62134 | | |
| 0.15 | | | 62154 | | |
| 0.16 | | | 62164 | | |
| 0.18 | 15.0 x 25.0 x 31.0 | 13.0 | 62184 | 100 | 200 |
| 0.2 | | | 62204 | | |
| 0.22 | 18.0 x 28.0 x 31.0 | 19.0 | 62224 | 100 | 150 |
| 0.24 | | | 62244 | | |
| 0.27 | | | 62274 | | |

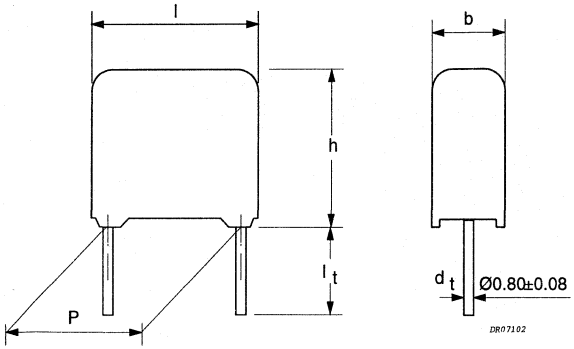
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## KP/MMKP 376



**Pitch 15/22.5/27.5 mm**




### SPECIFIC REFERENCE DATA FOR THE 1000 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 15.0 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤3 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

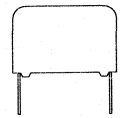
### AVAILABLE 1000 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 376 72...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 376 73...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 376 78...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 376 79...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 376 75...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±3.5% | catalogue number **2222 376 76...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 376



## $U_{Rdc}$ = 1000 V

$U_{Rac}$ = 400 V

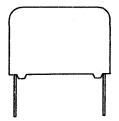
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 376 ..... loose in box $l_1$ = 5.0 ±1.0 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.0047 | 5.0 x 11.0 x 17.5 | 1.1 | 72472 | 1000 | 1100 |
| 0.0051 | | | 72512 | | |
| 0.0056 | | | 72562 | | |
| 0.0062 | 6.0 x 12.0 x 17.5 | 1.5 | 72622 | 1000 | 900 |
| 0.0068 | | | 72682 | | |
| 0.0075 | | | 72752 | | |
| 0.0082 | | | 72822 | | |
| 0.0091 | 7.0 x 13.5 x 17.5 | 2.0 | 72912 | 1000 | 800 |
| 0.01 | | | 72103 | | |
| 0.011 | | | 72113 | | |
| 0.012 | | | 72123 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.013 | 6.0 x 15.5 x 26.0 | 2.8 | 72133 | 200 | 600 |
| 0.015 | 7.0 x 16.5 x 26.0 | 3.5 | 72153 | 200 | 550 |
| 0.016 | | | 72163 | | |
| 0.018 | | | 72183 | | |
| 0.02 | 8.5 x 18.0 x 26.0 | 4.5 | 72203 | 200 | 450 |
| 0.022 | | | 72223 | | |
| 0.024 | | | 72243 | | |
| 0.027 | | | 72273 | | |
| 0.03 | | | 72303 | | |
| 0.033 | | | 72333 | | |
| 0.036 | | | 72363 | | |
| 0.039 | 10.0 x 19.5 x 26.0 | 5.4 | 72393 | 200 | 350 |
| Pitch = 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.043 | 9.0 x 19.0 x 31.0 | 6.2 | 72433 | 100 | 400 |
| 0.047 | | | 72473 | | |
| 0.051 | | | 72513 | | |
| 0.056 | 11.0 x 21.0 x 31.0 | 8.3 | 72563 | 100 | 300 |
| 0.062 | | | 72623 | | |
| 0.068 | | | 72683 | | |
| 0.075 | | | 72753 | | |
| 0.082 | 13.0 x 23.0 x 31.0 | 10.8 | 72823 | 100 | 250 |
| 0.091 | | | 72913 | | |
| 0.1 | | | 72104 | | |
| 0.11 | 15.0 x 25.0 x 31.0 | 13.0 | 72114 | 100 | 200 |
| 0.12 | | | 72124 | | |
| 0.13 | | | 72134 | | |
| 0.15 | | | 72154 | | |
| 0.16 | 18.0 x 28.0 x 31.0 | 19.0 | 72164 | 100 | 150 |
| 0.18 | | | 72184 | | |

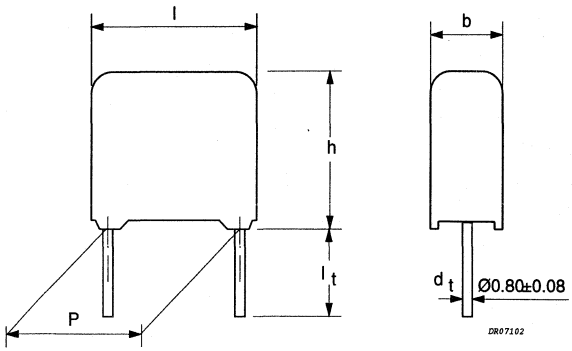
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 376



**Pitch 15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 1600 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 15.0 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 22.5 mm | ≤3 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| P = 27.5 mm | ≤3 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

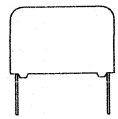
## AVAILABLE 1600 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 376 82...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 376 83...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 376 88...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 376 89...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 376 85...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±3.5% | catalogue number **2222 376 86...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

KP/MMKP 376



## $U_{Rdc}$ = 1600 V

$U_{Rac}$ = 500 V

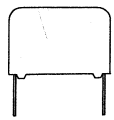
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 376 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.0018 | 5.0 x 11.0 x 17.5 | 1.1 | 82182 | 1000 | 1100 |
| 0.002 | 6.0 x 12.0 x 17.5 | 1.5 | 82202 | 1000 | 900 |
| 0.0022 | | | 82222 | | |
| 0.0024 | | | 82242 | | |
| 0.0027 | 7.0 x 13.5 x 17.5 | 2.0 | 82272 | 1000 | 800 |
| 0.003 | | | 82302 | | |
| 0.0033 | | | 82332 | | |
| 0.0036 | 8.5 x 15.0 x 17.5 | 2.6 | 82362 | 1000 | 650 |
| 0.0039 | | | 82392 | | |
| 0.0043 | | | 82432 | | |
| 0.0047 | | | 82472 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.0051 | 6.0 x 15.5 x 26.0 | 2.8 | 82512 | 200 | 600 |
| 0.0056 | | | 82562 | | |
| 0.0062 | | | 82622 | | |
| 0.0068 | | | 82682 | | |
| 0.0075 | 7.0 x 16.5 x 26.0 | 3.5 | 82752 | 200 | 550 |
| 0.0082 | | | 82822 | | |
| 0.0091 | | | 82912 | | |
| 0.01 | 8.5 x 18.0 x 26.0 | 4.5 | 82103 | 200 | 450 |
| 0.011 | | | 82113 | | |
| 0.012 | | | 82123 | | |
| 0.013 | | | 82133 | | |
| 0.015 | 10.0 x 19.5 x 26.0 | 5.4 | 82153 | 200 | 350 |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.016 | 9.0 x 19.0 x 31.0 | 6.2 | 82163 | 100 | 400 |
| 0.018 | 11.0 x 21.0 x 31.0 | 7.4 | 82183 | 100 | 300 |
| 0.02 | | | 82203 | | |
| 0.022 | | | 82223 | | |
| 0.024 | | | 82243 | | |
| 0.027 | 13.0 x 23.0 x 31.0 | 10.2 | 82273 | 100 | 250 |
| 0.03 | | | 82303 | | |
| 0.033 | | | 82333 | | |
| 0.036 | | | 82363 | | |
| 0.039 | 15.0 x 25.0 x 31.0 | 13.0 | 82393 | 100 | 200 |
| 0.043 | | | 82433 | | |
| 0.047 | | | 82473 | | |
| 0.051 | 18.0 x 28.0 x 31.0 | 19.0 | 82513 | 100 | 150 |
| 0.056 | | | 82563 | | |

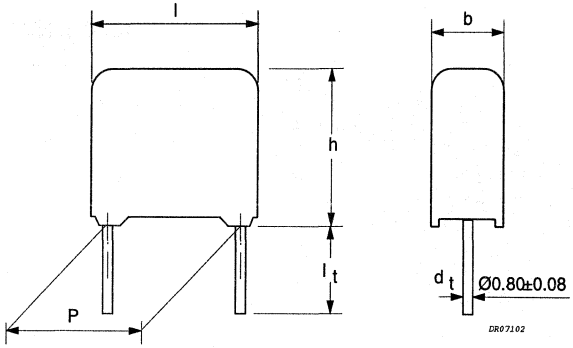
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# KP/MMKP 376



**Pitch 15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 2000 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| P = 15.0 mm | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| P = 22.5 mm | $\leq 3 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| P = 27.5 mm | $\leq 3 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | >10 000 V/µs | |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

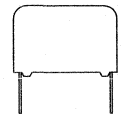
## AVAILABLE 2000 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 376 92...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±3.5% | catalogue number **2222 376 93...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 376 98...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±3.5% | catalogue number **2222 376 99...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 376 95...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±3.5% | catalogue number **2222 376 96...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

KP/MMKP 376



## $U_{Rdc}$ = 2000 V $U_{Rac}$ = 600 V loose and taped

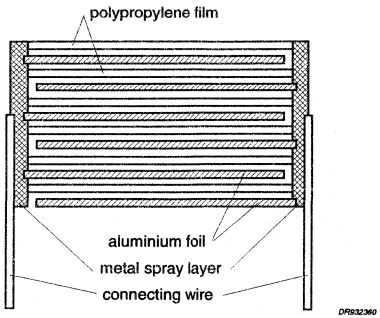
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 376 ..... loose in box $l_1$ = 5.0 ±1.0 mm short leads C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.001 | 5.0 x 11.0 x 17.5 | 1.1 | 92102 | 1000 | 1100 |
| 0.0011 | | | 92112 | | |
| 0.0012 | 6.0 x 12.0 x 17.5 | 1.5 | 92122 | 1000 | 900 |
| 0.0013 | | | 92132 | | |
| 0.0015 | | | 92152 | | |
| 0.0016 | | | 92162 | | |
| 0.0018 | 7.0 x 13.5 x 17.5 | 2.0 | 92182 | 1000 | 800 |
| 0.002 | | | 92202 | | |
| 0.0022 | 8.5 x 15.0 x 17.5 | 2.6 | 92222 | 1000 | 650 |
| 0.0024 | | | 92242 | | |
| 0.0027 | | | 92272 | | |
| 0.003 | | | 92302 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.0033 | 6.0 x 15.5 x 26.0 | 2.8 | 92332 | 200 | 600 |
| 0.0036 | | | 92362 | | |
| 0.0039 | | | 92392 | | |
| 0.0043 | 7.0 x 16.5 x 26.0 | 3.5 | 92432 | 200 | 550 |
| 0.0047 | | | 92472 | | |
| 0.0051 | | | 92512 | | |
| 0.0056 | 8.5 x 18.0 x 26.0 | 4.5 | 92562 | 200 | 450 |
| 0.0062 | | | 92622 | | |
| 0.0068 | | | 92682 | | |
| 0.0075 | | | 92752 | | |
| 0.0082 | | | 92822 | | |
| 0.0091 | 10.0 x 19.5 x 26.0 | 5.4 | 92912 | 200 | 350 |
| 0.01 | | | 92103 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.011 | 11.0 x 21.0 x 31.0 | 7.4 | 92113 | 100 | 300 |
| 0.012 | | | 92123 | | |
| 0.013 | | | 92133 | | |
| 0.015 | | | 92153 | | |
| 0.016 | 13.0 x 23.0 x 31.0 | 10.2 | 92163 | 100 | 250 |
| 0.018 | | | 92183 | | |
| 0.02 | | | 92203 | | |
| 0.022 | | | 92223 | | |
| 0.024 | 15.0 x 25.0 x 31.0 | 13.0 | 92243 | 100 | 200 |
| 0.027 | | | 92273 | | |
| 0.03 | 18.0 x 28.0 x 31.0 | 19.0 | 92303 | 100 | 150 |
| 0.033 | | | 92333 | | |

Preferred catalogue numbers

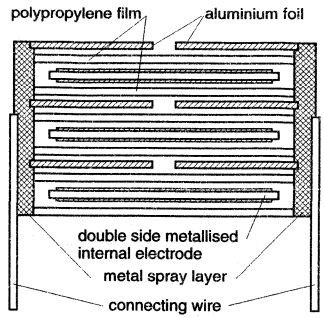
# AC and pulse metallized polypropylene film capacitors

# KP 376
# KP/MMKP 376

## CONSTRUCTION




250V KP version




630V to 2000V KP/MMKP versions

## DESCRIPTION

- Low-inductive wound cell of aluminium foil and polypropylene film.
- Potted with epoxy resin in a blue flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for printed-circuit board applications. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.

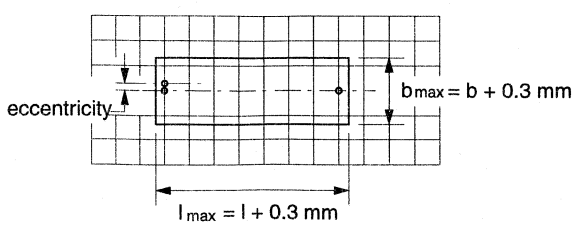
### Specific method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches ≤15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body shall be clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors is shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plan as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

# AC and pulse metallized polypropylene film capacitors



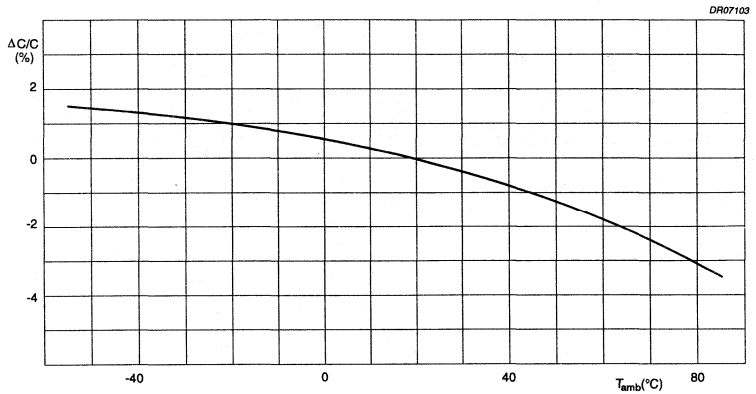
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

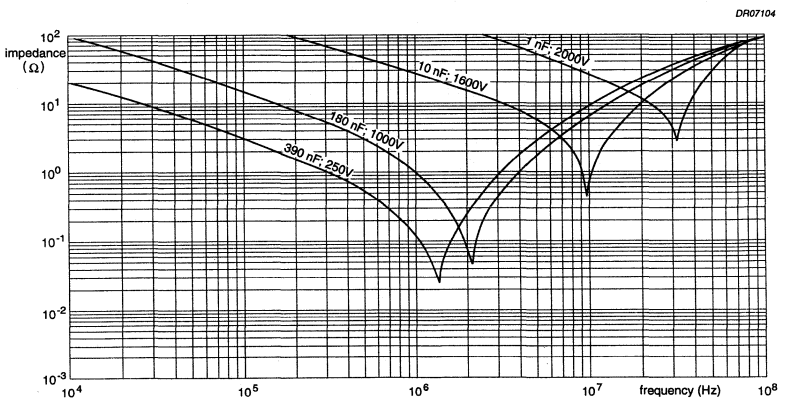
## CAPACITANCE

- All capacitance values are specified at 1 kHz.




Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

## TEMPERATURE

- Temperature characteristics related to 20 ±2 °C:

  −55 °C to +20 °C: $0\% \leq \Delta C/C \leq 3.75\%$
  20 °C to 100 °C: $-7\% \leq \Delta C/C \leq 0\%$

- Storage temperature: $T_{stg}$ = −25 to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

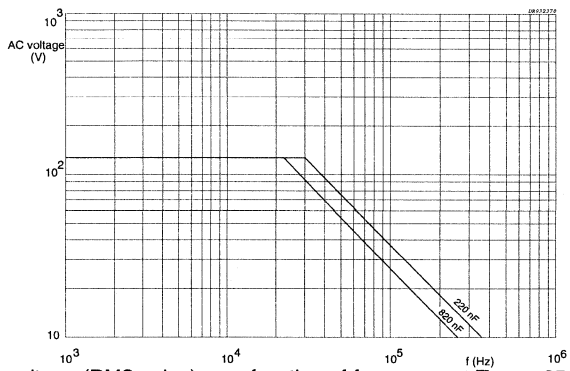
- Category voltage:

  $U_{Cdc} = 0.7 \times U_{Rdc}$ for T = 100 °C
  $U_{Cac} = 0.7 \times U_{Rac}$ for T = 100 °C

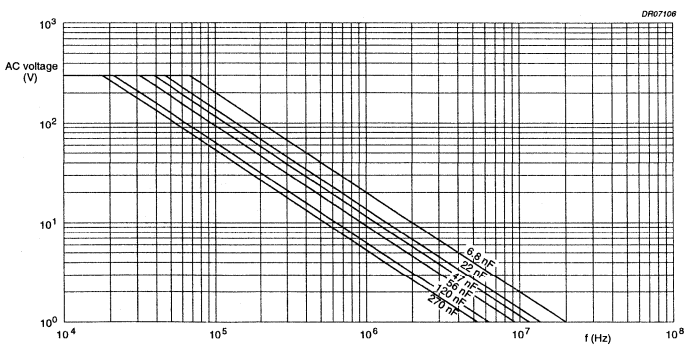
- Test voltage between leads: $1.6 \times U_{Rdc}$

- Test voltage between interconnected leads and case (foil method): 2840 V (DC).

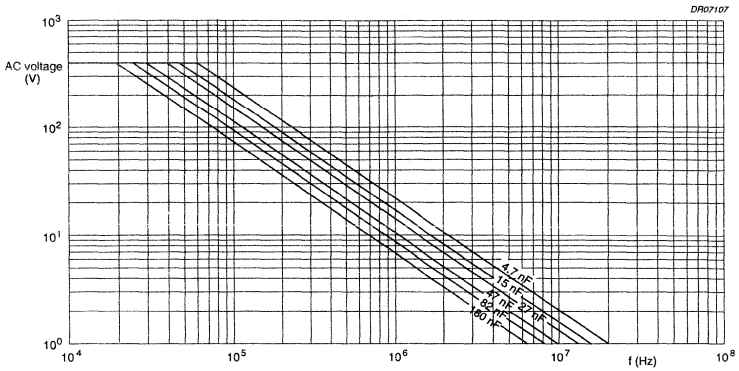
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 85$ °C (see graphs below)**



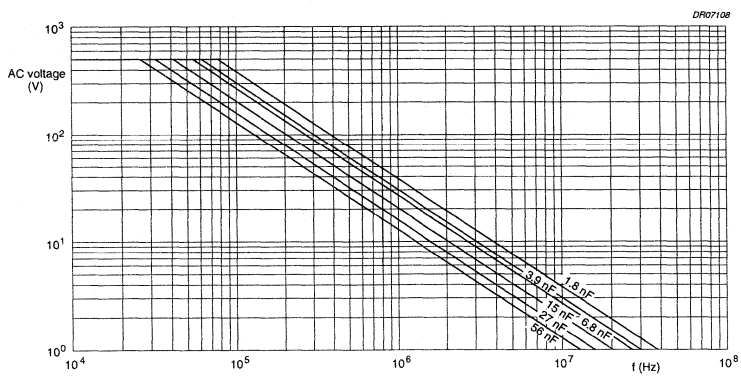

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 250 V.



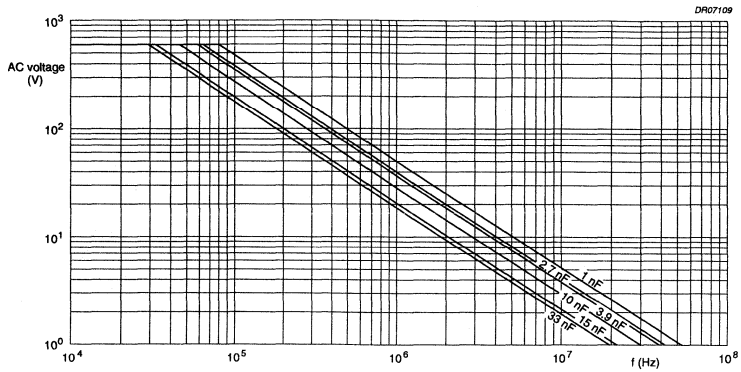

AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 630 V.




AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 1000 V.




AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 1600 V.

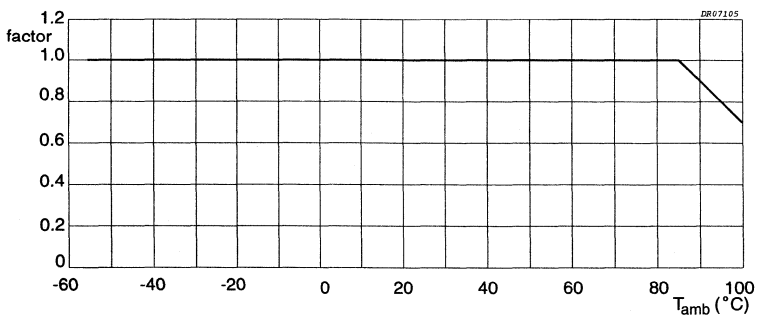



AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 85$ °C, for $U_{Rdc}$ = 2000 V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} > 85$ °C**

The maximum RMS voltage in the graphs above has to be multiplied by a factor given in the graph "Multiplying factor as a function of temperature".

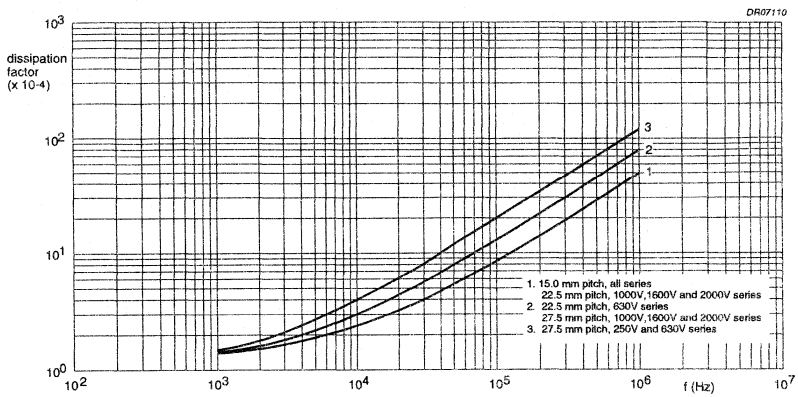
The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature, at various capacitor dimensions".




Multiplying factor as a function of temperature.

## TANGENT OF LOSS ANGLE

| RATED VOLTAGE $U_R$ (V) | TANGENT OF LOSS ANGLE ( x $10^{-4}$ ) | | | | | |
|---|---|---|---|---|---|---|
| | at 10 kHz | | | at 100 kHz | | |
| | P = 15.0 mm | P = 22.5 mm | P = 27.5 mm | P = 15.0 mm | P = 22.5 mm | P = 27.5 mm |
| 250 | – | – | ≤10 | – | – | ≤25 |
| 630 | ≤3 | ≤3 | ≤4 | ≤10 | ≤15 | ≤20 |
| 1000 | ≤3 | ≤3 | ≤3 | ≤10 | ≤10 | ≤15 |
| 1600 | ≤3 | ≤3 | ≤3 | ≤10 | ≤10 | ≤15 |
| 2000 | ≤3 | ≤3 | ≤3 | ≤10 | ≤10 | ≤15 |



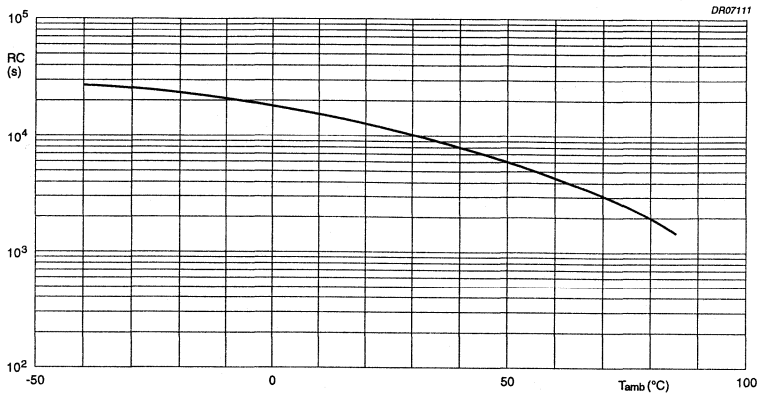

Tangent of loss angle as a function of frequency; typical curves.

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

>10 000 V/µs (limited by network conditions).

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 s, the voltage being 100 ±15 V for the 250 V version and 500 ±50 V for the 630 V to 2000 V versions.
$T_{amb}$ = 20 °C.

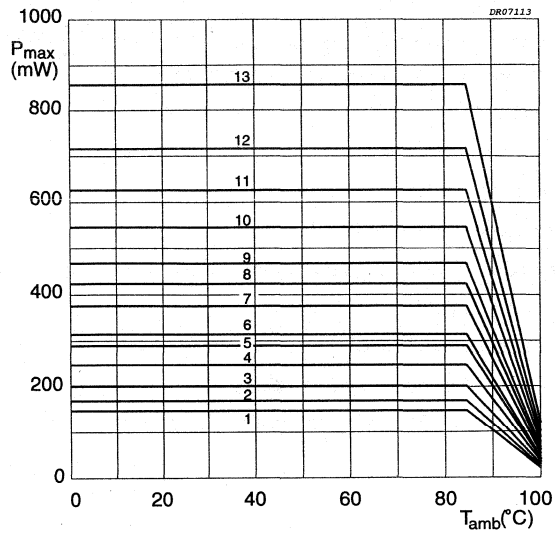



RC product as a function of ambient temperature; typical curve.

- R between leads: >100 000 MΩ.
- R between interconnected leads and case: >100 000 MΩ.

## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) b x h x l |
|---|---|
| 1 | 5.0 x 11.0 x 17.5 |
| 2 | 6.0 x 12.0 x 17.5 |
| 3 | 7.0 x 13.5 x 17.5 |
| 4 | 8.5 x 15.0 x 17.5 |
| 5 | 6.0 x 15.5 x 26.0 |
| 6 | 7.0 x 16.5 x 26.0 |
| 7 | 8.5 x 18.0 x 26.0 |
| 8 | 10.0 x 19.5 x 26.0 |
| 9 | 9.0 x 19.0 x 31.0 |
| 10 | 11.0 x 21.0 x 31.0 |
| 11 | 13.0 x 23.0 x 31.0 |
| 12 | 15.0 x 25.0 x 31.0 |
| 13 | 18.0 x 28.0 x 31.0 |




Maximum power dissipation as a function of ambient temperature, at various capacitor dimensions.

## APPLICATION NOTE

To select the capacitor for a certain application, 5 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($V_{Rac}$) to avoid the ionisation inception level.
3. There is no limit for the peak current ($I_p$) or voltage pulse slope (dU/dt) in the application.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated in the graph above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.

## PRODUCT MARKING

### Capacitors with pitch 15 mm

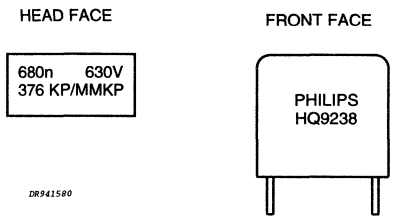
The capacitors are marked on the top by laser print with the following information:

- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: J = ±5%; A = ±3.5%
- Rated (DC) voltage (e.g. 630 V)
- Manufacturer's type designation (376)
- Code for dielectric material (KP/MMKP).

The capacitors are marked on the side by laser print with the following information:

- Manufacturer (PHILIPS)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9238).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH.

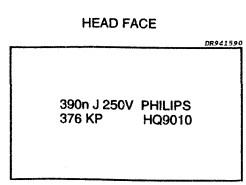



### Capacitors with pitch 22.5 mm or 27.5 mm

The capacitors are marked on the top by laser print with the following information:

- Rated capacitance code in accordance with IEC 62
- Capacitance tolerance: J = ±5%; A = ±3.5%
- Rated voltage (e.g. 1000 V)
- Manufacturer's type designation (376)
- Code for dielectric material (KP for 250 V version)
  (KP/MMKP for 630 V to 2000 V versions)
- Manufacturer (PHILIPS)
- Code for factory of origin (HQ)
- Year and week of manufacture (e.g. 9210).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 OR 27.5 MM PITCH.



## PACKAGE MARKING

The package containing the capacitors is marked as shown.


PK930020

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description and safety class X2 |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# AC and pulse metallized polypropylene film capacitors



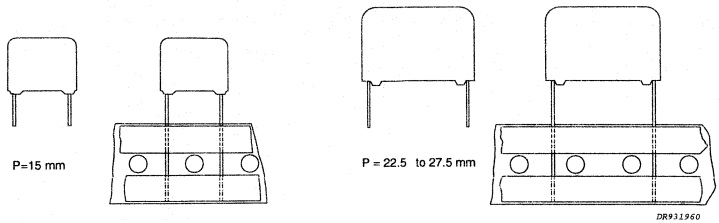
## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 10 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 1\%$<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$ |
| **Robustness of component** | | |
| Vibration<br>Shock | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours<br>half sinewave; 490 m/s$^2$; 11 ms | $\Delta C/C \leq 2\%$ ($C > 0.0047$ µF)<br>$\Delta C/C \leq 3\%$ ($C \leq 0.0047$ µF)<br>$\Delta C/C \leq 1\%$ (250 V)<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$ |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, first cycle<br>Cold<br>Damp heat remaining cycles | 16 hours; 85 °C<br><br>2 hours; −55 °C<br> | <br>$\Delta C/C \leq 3\%$<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 1\%$<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 1000 hours; 85 °C;<br>1.25 x $U_{Rac}$ (RMS); 50 Hz | $\Delta C/C \leq 3\%$ (250 V)<br>$\Delta C/C \leq 2\%$ (>250 V)<br>$\Delta \tan \delta \leq 15 \times 10^{-4}$ (>250 V)<br>$\Delta \tan \delta \leq 15 \times 10^{-4}$ or 1.4 x initial value (250 V)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 85 °C | $\Delta C/C \leq 2\%$ (250 V)<br>$\Delta C/C \leq 3\%$ (>250 V)<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$ |
| Resistance to soldering heat with preheating | body temperature: 100 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 2\%$<br>$\Delta \tan \delta \leq 10 \times 10^{-4}$ |
| Passive flammability | Class C | no burning |
| Endurance (DC) | 2000 hours:<br>(250 V) 1.5 x $U_{Rdc}$; 85 °C<br>1.5 x $U_{Cdc}$; 100 °C<br>(>250 V) 1.25 x $U_{Rdc}$; 85 °C<br>1.25 x $U_{Cdc}$; 100 °C | $\Delta C/C \leq 2\%$ (250 V)<br>$\Delta C/C \leq 3\%$ (>250 V)<br>$\Delta \tan \delta \leq 20 \times 10^{-4}$<br>$R_{ins} \geq 50\%$ of specified value |

# AC and pulse metallized polypropylene film capacitors

# MKP 378
# MKP/MKP 378

**MKP RADIAL POTTED CAPACITORS** **Pitch 15/22.5/27.5 mm**




## QUICK REFERENCE DATA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Capacitance range (E24 series) | 0.001 to 3.3 µF | | | | | | |
| Capacitance tolerance | ±5% | | | | | | |
| Rated voltage (DC) | 250 V | 400 V | 630 V | 1000 V | 1600 V | 2000 V | 2500 V |
| on request | 3000 V | 4000 V | 5000 V | | | | |
| Rated voltage (AC) | 160 V | 200 V | 300 V | 400 V | 500 V | 600 V | 675 V |
| on request | 800 V | 1000 V | 1200 V | | | | |
| Rated peak-to-peak voltage | 450 V | 560 V | 850 V | 1130 V | 1400 V | 1700 V | 1900 V |
| on request | 2300 V | 2800 V | 3400 V | | | | |
| Climatic category | 55/085/56 | | | | | | |
| Rated temperature (DC) | 85 °C | | | | | | |
| Rated temperature (AC) | 70 °C | | | | | | |
| Maximum application temperature | 85 °C | | | | | | |
| Reference specification | IEC 384-17 | | | | | | |
| Performance grade | grade 1 (long life) | | | | | | |
| Stability grade<br>- pitch 15 mm<br>- pitch 22.5 and 27.5 mm | <br>grade 2<br>grade 1 | | | | | | |

**FEATURES**

- 15 mm to 27.5 mm lead pitch
- Low contact resistance
- Low loss dielectric
- Small dimensions for high density packaging
- Supplied loose in box and taped on reel.

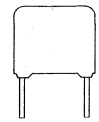
**APPLICATIONS**

- Where steep pulses occur e.g. SMPS (switch mode power supplies)
- Motor control circuits
- S - correction.

**Note:** It is not advised to use these capacitors as resonance capacitors in flyback applications.

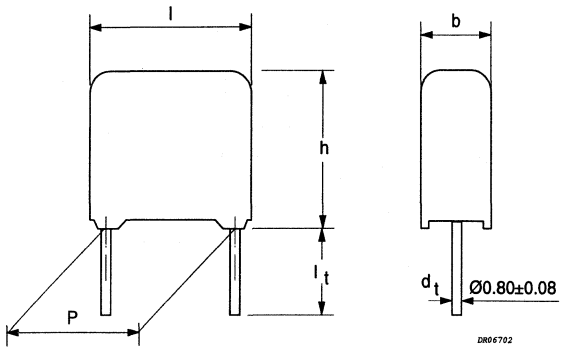
# AC and pulse metallized polypropylene film capacitors

# MKP 378



**Pitch 22.5/27.5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| C ≤ 0.43 µF | ≤15 x $10^{-4}$ | ≤45 x $10^{-4}$ |
| 0.47 µF ≤ C ≤ 0.62 µF | ≤15 x $10^{-4}$ | ≤55 x $10^{-4}$ |
| 0.68 µF ≤ C ≤ 0.82 µF | ≤15 x $10^{-4}$ | ≤60 x $10^{-4}$ |
| 0.91 µF ≤ C ≤ 1.0 µF | ≤20 x $10^{-4}$ | ≤90 x $10^{-4}$ |
| 1.1 µF ≤ C ≤ 3.3 µF | ≤20 x $10^{-4}$ | ≤200 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 22.5 mm: 90 V/µs<br>P = 27.5 mm: 60 V/µs (b < 15 mm)<br>30 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |
| Ionization voltage (typical value) at 50 pC peak discharge | >220 V (AC) | |

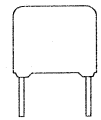
## AVAILABLE 250 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 42...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 48...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 45...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP 378



## $U_{Rdc}$ = 250 V

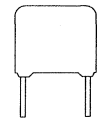
$U_{Rac}$ = 160 V / $U_{p-p}$ = 450 V

## loose and taped

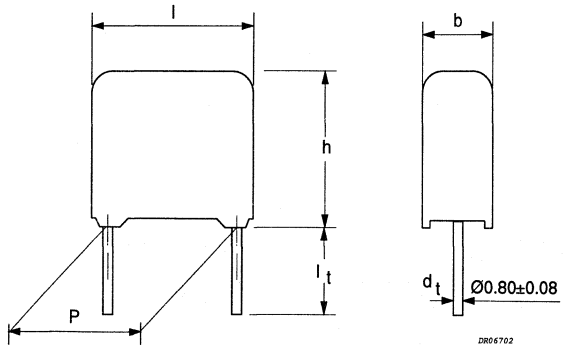
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_t$ = 5.0 ±1.0 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.33 | 7.0 x 16.5 x 26.0 | 3.2 | 42334 | 200 | 550 |
| 0.36 | | | 42364 | | |
| 0.39 | | | 42394 | | |
| 0.43 | 8.5 x 18.0 x 26.0 | 4.4 | 42434 | 200 | 450 |
| 0.47 | | | 42474 | | |
| 0.51 | | | 42514 | | |
| 0.56 | | | 42564 | | |
| 0.62 | | | 42624 | | |
| 0.68 | 10.0 x 19.5 x 26.0 | 5.5 | 42684 | 200 | 350 |
| 0.75 | | | 42754 | | |
| 0.82 | | | 42824 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.91 | 11.0 x 21.0 x 31.0 | 7.8 | 42914 | 100 | 300 |
| 1 | | | 42105 | | |
| 1.1 | | | 42115 | | |
| 1.2 | | | 42125 | | |
| 1.3 | | | 42135 | | |
| 1.5 | 13.0 x 23.0 x 31.0 | 10.4 | 42155 | 100 | 250 |
| 1.6 | | | 42165 | | |
| 1.8 | | | 42185 | | |
| 2 | 15.0 x 25.0 x 31.0 | 12.8 | 42205 | 100 | 200 |
| 2.2 | | | 42225 | | |
| 2.4 | 18.0 x 28.0 x 31.0 | 17.2 | 42245 | 100 | 150 |
| 2.7 | | | 42275 | | |
| 3 | | | 42305 | | |
| 3.3 | | | 42335 | | |

# AC and pulse metallized polypropylene film capacitors

## MKP 378



**Pitch 22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| C ≤ 0.24 µF | ≤10 x $10^{-4}$ | ≤30 x $10^{-4}$ |
| 0.27 µF ≤ C ≤ 0.36 µF | ≤10 x $10^{-4}$ | ≤35 x $10^{-4}$ |
| 0.39 µF ≤ C ≤ 0.51 µF | ≤10 x $10^{-4}$ | ≤40 x $10^{-4}$ |
| 0.56 µF ≤ C ≤ 0.68 µF | ≤15 x $10^{-4}$ | ≤50 x $10^{-4}$ |
| 0.75 µF ≤ C ≤ 1.0 µF | ≤15 x $10^{-4}$ | ≤70 x $10^{-4}$ |
| 1.1 µF ≤ C ≤ 2.0 µF | ≤15 x $10^{-4}$ | ≤150 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 22.5 mm: 100 V/µs<br>P = 27.5 mm: 70 V/µs (b < 15 mm)<br>35 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 M Ω | |
| RC between leads, for C > 1 µF | >100 000 s | |
| Ionization voltage (typical value) at 50 pC peak discharge | >250 V (AC) | |

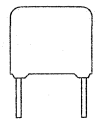
**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 52...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 58...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 55...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP 378



## $U_{Rdc}$ = 400 V

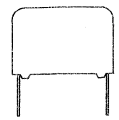
$U_{Rac}$ = 200 V / $U_{p-p}$ = 560 V

## loose and taped

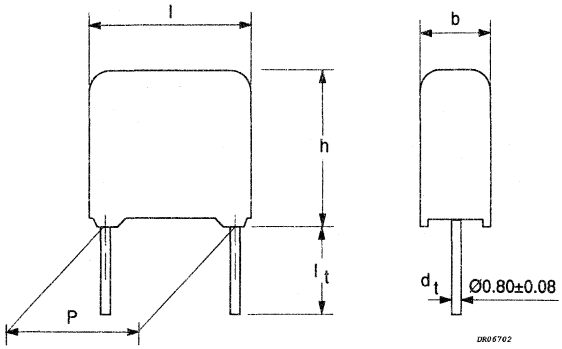
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_t$ = 5.0 ±1.0 mm short leads C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.18 | 7.0 x 16.5 x 26.0 | 3.2 | 52184 | 200 | 550 |
| 0.2 | | | 52204 | | |
| 0.22 | | | 52224 | | |
| 0.24 | 8.5 x 18.0 x 26.0 | 4.4 | 52244 | 200 | 450 |
| 0.27 | | | 52274 | | |
| 0.3 | | | 52304 | | |
| 0.33 | | | 52334 | | |
| 0.36 | 10.0 x 19.5 x 26.0 | 5.5 | 52364 | 200 | 350 |
| 0.39 | | | 52394 | | |
| 0.43 | | | 52434 | | |
| 0.47 | | | 52474 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.51 | 11.0 x 21.0 x 31.0 | 7.8 | 52514 | 100 | 300 |
| 0.56 | | | 52564 | | |
| 0.62 | | | 52624 | | |
| 0.68 | | | 52684 | | |
| 0.75 | 13.0 x 23.0 x 31.0 | 10.4 | 52754 | 100 | 250 |
| 0.82 | | | 52824 | | |
| 0.91 | | | 52914 | | |
| 1 | | | 52105 | | |
| 1.1 | 15.0 x 25.0 x 31.0 | 12.8 | 52115 | 100 | 200 |
| 1.2 | | | 52125 | | |
| 1.3 | | | 52135 | | |
| 1.5 | 18.0 x 28.0 x 31.0 | 17.2 | 52155 | 100 | 150 |
| 1.6 | | | 52165 | | |
| 1.8 | | | 52185 | | |
| 2 | | | 52205 | | |

# AC and pulse metallized polypropylene film capacitors

## MKP/MKP 378



**Pitch 15/22.5/27.5 mm**




### SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| C ≤ 0.18 µF | ≤8 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| 0.20 µF ≤ C ≤ 0.30 µF | ≤10 x $10^{-4}$ | ≤25 x $10^{-4}$ |
| 0.33 µF ≤ C ≤ 0.39 µF | ≤10 x $10^{-4}$ | ≤30 x $10^{-4}$ |
| 0.43 µF ≤ C ≤ 0.51 µF | ≤10 x $10^{-4}$ | ≤40 x $10^{-4}$ |
| C > 0.51 µF | ≤10 x $10^{-4}$ | ≤45 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 15 mm: 500 V/µs<br>P = 22.5 mm: 370 V/µs<br>P = 27.5 mm: 230 V/µs (b < 15 mm)<br>120 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| Ionization voltage (typical value) at 50 pC peak discharge | >400 V (AC) | |

### AVAILABLE 630 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 64...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 62...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 68...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 65...** | on request |

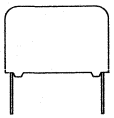
Available on request:

| Cap. (µF) | Pitch 15.0 ±0.4 mm; l x b x h = 8.5 mm x 15.0 mm x 17.5 mm | | | |
|---|---|---|---|---|
| | loose in box; SPQ = 1000 | | | taped on reel; SPQ = 650 |
| | $l_t$ = 3.2 ±0.5 mm | $l_t$ = 3.5 ±0.5 mm | $l_t$ = 5 ±1.0 mm | H = 18.5 mm * |
| 0.056 | 2222 378 90041 | 2222 378 90042 | 2222 378 90043 | 2222 378 90044 |
| 0.062 | 2222 378 90045 | 2222 378 90046 | 2222 378 90047 | 2222 378 90048 |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP/MKP 378



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 300 V / $U_{p-p}$ = 850 V

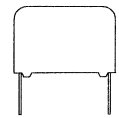
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_1$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.015 | 5.0 x 11.0 x 17.5 | 1.2 | 64153 | 1000 | 1100 |
| 0.016 | | | 64163 | | |
| 0.018 | | | 64183 | | |
| 0.02 | | | 64203 | | |
| 0.022 | | | 64223 | | |
| 0.024 | 6.0 x 12.0 x 17.5 | 1.4 | 64243 | 1000 | 900 |
| 0.027 | | | 64273 | | |
| 0.03 | | | 64303 | | |
| 0.033 | | | 64333 | | |
| 0.036 | 7.0 x 13.5 x 17.5 | 1.9 | 64363 | 1000 | 800 |
| 0.039 | | | 64393 | | |
| 0.043 | | | 64433 | | |
| 0.047 | 8.5 x 15.0 x 17.5 | 2.6 | 64473 | 1000 | 650 |
| 0.051 | | | 64513 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.056 | 6.0 x 15.5 x 26.0 | 2.6 | 64563 | 200 | 600 |
| 0.062 | | | 64623 | | |
| 0.068 | 7.0 x 16.5 x 26.0 | 3.2 | 64683 | 200 | 550 |
| 0.075 | | | 64753 | | |
| 0.082 | | | 64823 | | |
| 0.091 | | | 64913 | | |
| 0.1 | 8.5 x 18.0 x 26.0 | 4.4 | 64104 | 200 | 450 |
| 0.11 | | | 64114 | | |
| 0.12 | | | 64124 | | |
| 0.13 | | | 64134 | | |
| 0.15 | 10.0 x 19.5 x 26.0 | 5.5 | 64154 | 200 | 350 |
| 0.16 | | | 64164 | | |
| 0.18 | | | 64184 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.2 | 11.0 x 21.0 x 31.0 | 7.8 | 64204 | 100 | 300 |
| 0.22 | | | 64224 | | |
| 0.24 | | | 64244 | | |
| 0.27 | | | 64274 | | |
| 0.3 | 13.0 x 23.0 x 31.0 | 10.4 | 64304 | 100 | 250 |
| 0.33 | | | 64334 | | |
| 0.36 | | | 64364 | | |
| 0.39 | | | 64394 | | |
| 0.43 | 15.0 x 25.0 x 31.0 | 12.8 | 64434 | 100 | 200 |
| 0.47 | | | 64474 | | |
| 0.51 | | | 64514 | | |
| 0.56 | 18.0 x 28.0 x 31.0 | 17.2 | 64564 | 100 | 150 |
| 0.62 | | | 64624 | | |
| 0.68 | | | 64684 | | |

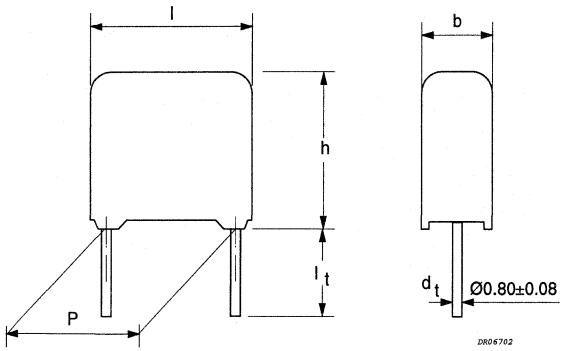
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# MKP/MKP 378



**Pitch 15/22.5/27.5 mm**




## SPECIFIC REFERENCE DATA FOR THE 1000 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| $C \leq 0.051$ µF | $\leq 6 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| $0.056$ µF $\leq C \leq 0.22$ µF | $\leq 8 \times 10^{-4}$ | $\leq 20 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 15 mm: 1300 V/µs<br>P = 22.5 mm: 1200 V/µs<br>P = 27.5 mm: 600 V/µs (b < 15 mm)<br>300 V/µs (b ≤ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| Ionization voltage (typical value) at 50 pC peak discharge | >500 V (AC) | |

## AVAILABLE 1000 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 74...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 72...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 78...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 75...** | on request |

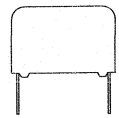
Available on request:

| **Cap. (µF)** | **Pitch 15.0 ±0.4 mm; l x b x h = 8.5 mm x 15.0 mm x 17.5 mm** | | | |
|---|---|---|---|---|
| | **loose in box; SPQ = 1000** | | | **taped on reel; SPQ = 650** |
| | **$l_t$ = 3.2 ±0.5 mm** | **$l_t$ = 3.5 ±0.5 mm** | **$l_t$ = 5 ±1.0 mm** | **H = 18.5 mm *** |
| 0.012 | 2222 378 90049 | 2222 378 90051 | 2222 378 90052 | 2222 378 90053 |
| 0.013 | 2222 378 90054 | 2222 378 90055 | 2222 378 90056 | 2222 378 90057 |
| 0.015 | 2222 378 90058 | 2222 378 90059 | 2222 378 90061 | 2222 378 90062 |
| 0.016 | 2222 378 90063 | 2222 378 90064 | 2222 378 90065 | 2222 378 90066 |
| 0.018 | 2222 378 90067 | 2222 378 90068 | 2222 378 90069 | 2222 378 90071 |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP/MKP 378



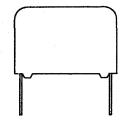
**$U_{Rdc}$ = 1000 V** **$U_{Rac}$ = 400 V / $U_{p-p}$ = 1130 V** **loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | loose in box short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | |
| 0.003 | 5.0 x 11.0 x 17.5 | 1.2 | 74302 | 1000 | 1100 |
| 0.0033 | | | 74332 | | |
| 0.0036 | | | 74362 | | |
| 0.0039 | | | 74392 | | |
| 0.0043 | | | 74432 | | |
| 0.0047 | | | 74472 | | |
| 0.0051 | | | 74512 | | |
| 0.0056 | | | 74562 | | |
| 0.0062 | | | 74622 | | |
| 0.0068 | | | 74682 | | |
| 0.0075 | | | 74752 | | |
| 0.0082 | 6.0 x 12.0 x 17.5 | 1.4 | 74822 | 1000 | 900 |
| 0.0091 | | | 74912 | | |
| 0.01 | | | 74103 | | |
| 0.011 | | | 74113 | | |
| Pitch = 22.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | |
| 0.012 | 6.0 x 15.5 x 26.0 | 2.6 | 74123 | 200 | 600 |
| 0.013 | | | 74133 | | |
| 0.015 | | | 74153 | | |
| 0.016 | | | 74163 | | |
| 0.018 | | | 74183 | | |
| 0.02 | 7.0 x 16.5 x 26.0 | 3.2 | 74203 | 200 | 550 |
| 0.022 | | | 74223 | | |
| 0.024 | | | 74243 | | |
| 0.027 | 8.5 x 18.0 x 26.0 | 4.4 | 74273 | 200 | 450 |
| 0.03 | | | 74303 | | |
| 0.033 | | | 74333 | | |
| 0.036 | | | 74363 | | |
| 0.039 | 10.0 x 19.5 x 26.0 | 5.5 | 74393 | 200 | 350 |
| 0.043 | | | 74433 | | |
| 0.047 | | | 74473 | | |
| 0.051 | | | 74513 | | |
| Pitch = 27.5 ±0.4 mm $d_t$ = 0.80 ±0.08 mm | | | | | |
| 0.056 | 11.0 x 21.0 x 31.0 | 7.8 | 74563 | 100 | 300 |
| 0.062 | | | 74623 | | |
| 0.068 | | | 74683 | | |
| 0.075 | | | 74753 | | |
| 0.082 | | | 74823 | | |
| 0.091 | 13.0 x 23.0 x 31.0 | 10.4 | 74913 | 100 | 250 |
| 0.1 | | | 74104 | | |
| 0.11 | | | 74114 | | |
| 0.12 | 15.0 x 25.0 x 31.0 | 12.8 | 74124 | 100 | 200 |
| 0.13 | | | 74134 | | |
| 0.15 | | | 74154 | | |
| 0.16 | 18.0 x 28.0 x 31.0 | 17.5 | 74164 | 100 | 150 |
| 0.18 | | | 74184 | | |
| 0.2 | | | 74204 | | |
| 0.22 | | | 74224 | | |

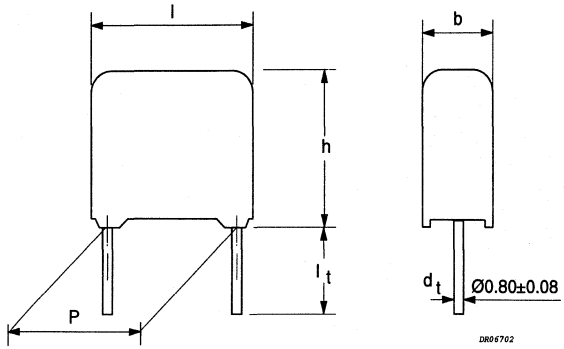
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP/MKP 378



**Pitch 22.5/27.5 mm**




### SPECIFIC REFERENCE DATA FOR THE 1600 V DC VERSION

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| $C \leq 0.022$ µF | $\leq 5 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| $0.024$ µF $\leq C \leq 0.10$ µF | $\leq 6 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 22.5 mm: 1600 V/µs<br>P = 27.5 mm: 900 V/µs (b < 15 mm)<br>450 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| Ionization voltage (typical value) at 20 pC peak discharge | >600 V (AC) | |

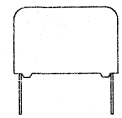
### AVAILABLE 1600 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 84...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 82...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 88...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 85...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP/MKP 378



## $U_{Rdc}$ = 1600 V

$U_{Rac}$ = 500 V / $U_{p-p}$ = 1400 V

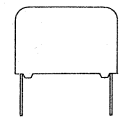
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.0056 | 6.0 x 15.5 x 26.0 | 2.6 | 84562 | 200 | 600 |
| 0.0062 | | | 84622 | | |
| 0.0068 | | | 84682 | | |
| 0.0075 | 7.0 x 16.5 x 26.0 | 3.2 | 84752 | 200 | 550 |
| 0.0082 | | | 84822 | | |
| 0.0091 | | | 84912 | | |
| 0.01 | | | 84103 | | |
| 0.011 | 8.5 x 18.0 x 26.0 | 4.4 | 84113 | 200 | 450 |
| 0.012 | | | 84123 | | |
| 0.013 | | | 84133 | | |
| 0.015 | | | 84153 | | |
| 0.016 | | | 84163 | | |
| 0.018 | 10.0 x 19.5 x 26.0 | 5.5 | 84183 | 200 | 350 |
| 0.02 | | | 84203 | | |
| 0.022 | | | 84223 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.024 | 11.0 x 21.0 x 31.0 | 7.8 | 84243 | 100 | 300 |
| 0.027 | | | 84273 | | |
| 0.03 | | | 84303 | | |
| 0.033 | | | 84333 | | |
| 0.036 | | | 84363 | | |
| 0.039 | 13.0 x 23.0 x 31.0 | 10.4 | 84393 | 100 | 250 |
| 0.043 | | | 84433 | | |
| 0.047 | | | 84473 | | |
| 0.051 | | | 84513 | | |
| 0.056 | 15.0 x 25.0 x 31.0 | 12.8 | 84563 | 100 | 200 |
| 0.062 | | | 84623 | | |
| 0.068 | | | 84683 | | |
| 0.075 | 18.0 x 28.0 x 31.0 | 17.2 | 84753 | 100 | 150 |
| 0.082 | | | 84823 | | |
| 0.091 | | | 84913 | | |
| 0.1 | | | 84104 | | |

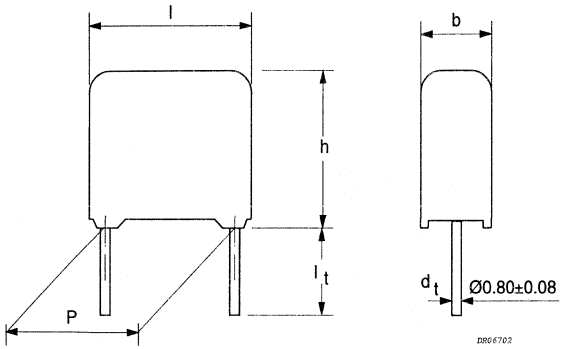
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP/MKP 378



**Pitch 22.5/27.5 mm**




### SPECIFIC REFERENCE DATA FOR THE 2000 V DC VERSION

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| C ≤ 0.051 µF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 22.5 mm: 2000 V/µs<br>P = 27.5 mm: 1200 V/µs (b < 15 mm)<br>600 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| Ionization voltage (typical value) at 20 pC peak discharge | >700 V (AC) | |

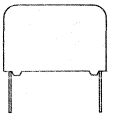
### AVAILABLE 2000 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 94...** | preferred |
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 92...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 98...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 95...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP/MKP 378



## $U_{Rdc}$ = 2000 V

$U_{Rac}$ = 600 V / $U_{p\text{-}p}$ = 1700 V

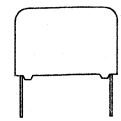
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | short leads SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.8 ±0.08 mm | | |
| 0.0033 | 6.0 x 15.5 x 26.0 | 2.6 | 94332 | 200 | 600 |
| 0.0036 | | | 94362 | | |
| 0.0039 | 7.0 x 16.5 x 26.0 | 3.2 | 94392 | 200 | 550 |
| 0.0043 | | | 94432 | | |
| 0.0047 | | | 94472 | | |
| 0.0051 | | | 94512 | | |
| 0.0056 | 8.5 x 18.0 x 26.0 | 4.4 | 94562 | 200 | 450 |
| 0.0062 | | | 94622 | | |
| 0.0068 | | | 94682 | | |
| 0.0075 | | | 94752 | | |
| 0.0082 | | | 94822 | | |
| 0.0091 | 10.0 x 19.5 x 26.0 | 5.5 | 94912 | 200 | 350 |
| 0.01 | | | 94103 | | |
| 0.011 | | | 94113 | | |
| 0.012 | | | 94123 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.8 ±0.08 mm | | |
| 0.013 | 11.0 x 21.0 x 31.0 | 7.8 | 94133 | 100 | 300 |
| 0.015 | | | 94153 | | |
| 0.016 | | | 94163 | | |
| 0.018 | | | 94183 | | |
| 0.02 | | | 94203 | | |
| 0.022 | 13.0 x 23.0 x 31.0 | 10.4 | 94223 | 100 | 250 |
| 0.024 | | | 94243 | | |
| 0.027 | | | 94273 | | |
| 0.030 | 15.0 x 25.0 x 31.0 | 12.8 | 94303 | 100 | 200 |
| 0.033 | | | 94333 | | |
| 0.036 | | | 94363 | | |
| 0.039 | 18.0 x 28.0 x 31.0 | 17.5 | 94393 | 100 | 150 |
| 0.043 | | | 94433 | | |
| 0.047 | | | 94473 | | |
| 0.051 | | | 94513 | | |

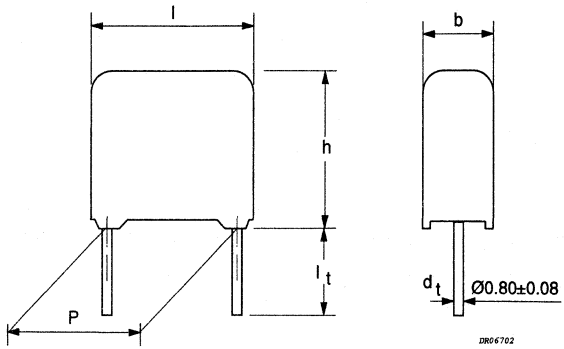
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP/MKP 378



**Pitch 22.5/27.5 mm**




### SPECIFIC REFERENCE DATA FOR THE 2500 V DC VERSION

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| C ≤ 0.030 µF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ (see also application note) | P = 22.5 mm: 2000 V/µs<br>P = 27.5 mm: 2000 V/µs (b < 15 mm)<br>1000 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| Ionization voltage (typical value) at 5 pC peak discharge | >900 V (AC) | |

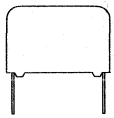
### AVAILABLE 2500 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 5.0 ±1.0 mm | C-tol ±5% | catalogue number **2222 378 02...** | on request |
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 04...** | on request |
| Loose in box | $l_t$ = 3.2 ±0.5 mm | C-tol ±5% | catalogue number **2222 378 08...** | on request |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 378 05...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP/MKP 378



## $U_{Rdc}$ = 2500 V

$U_{Rac}$ = 675 V / $U_{p-p}$ = 1900 V

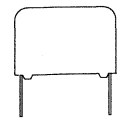
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 378 ..... loose in box $l_t$ = 3.5 ±0.5 mm short leads C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.002 * | 6.0 x 15.5 x 26.0 | 2.6 | 04202 | 200 | 600 |
| 0.0022 * | | | 04222 | | |
| 0.0024 * | | | 04242 | | |
| 0.0027 * | | | 04272 | | |
| 0.003 * | 7.0 x 16.5 x 26.0 | 3.2 | 04302 | 200 | 550 |
| 0.0033 * | | | 04332 | | |
| 0.0036 * | | | 04362 | | |
| 0.0039 * | 8.5 x 18.0 x 26.0 | 4.4 | 04392 | 200 | 450 |
| 0.0043 * | | | 04432 | | |
| 0.0047 * | | | 04472 | | |
| 0.0051 * | | | 04512 | | |
| 0.0056 * | | | 04562 | | |
| 0.0062 * | 10.0 x 19.5 x 26.0 | 5.5 | 04622 | 200 | 350 |
| 0.0068 * | | | 04682 | | |
| 0.0075 * | | | 04752 | | |
| 0.0082 * | | | 04822 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.0091 * | 11.0 x 21.0 x 31.0 | 7.8 | 04912 | 100 | 300 |
| 0.01 * | | | 04103 | | |
| 0.011 * | | | 04113 | | |
| 0.012 * | 13.0 x 23.0 x 31.0 | 10.4 | 04123 | 100 | 250 |
| 0.013 * | | | 04133 | | |
| 0.015 * | | | 04153 | | |
| 0.018 * | 15.0 x 25.0 x 31.0 | 12.8 | 04183 | 100 | 200 |
| 0.02 * | | | 04203 | | |
| 0.022 * | 18.0 x 28.0 x 31.0 | 17.2 | 04223 | 100 | 150 |
| 0.024 * | | | 04243 | | |
| 0.027 * | | | 04273 | | |
| 0.03 * | | | 04303 | | |

* Under development.

# AC and pulse metallized polypropylene film capacitors

MKP/MKP 378



Available on request:

## $U_{Rdc}$ = 3000 V

$U_{Rac}$ = 800 V / $U_{p-p}$ = 2300 V

**loose and taped**

| | | |
|---|---|---|
| | Pitch = 22.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm |
| Capacitance range (µF): | 0.0015 to 0.0047 | (E24) |
| | Pitch = 27.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm |
| Capacitance range (µF): | 0.0051 to 0.018 | (E24) |

## $U_{Rdc}$ = 4000 V

$U_{Rac}$ = 1000 V / $U_{p-p}$ = 2800 V

**loose and taped**

| | | |
|---|---|---|
| | Pitch = 27.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm |
| Capacitance range (µF): | 0.0010 to 0.010 | (E24) |

## $U_{Rdc}$ = 5000 V

$U_{Rac}$ = 1200 V / $U_{p-p}$ = 3400 V

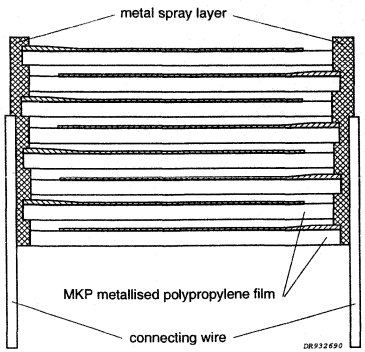
**loose and taped**

| | | |
|---|---|---|
| | Pitch = 27.5 ±0.4 mm | $d_t$ = 0.80 ±0.08 mm |
| Capacitance range (µF): | 0.0010 to 0.0062 | (E24) |

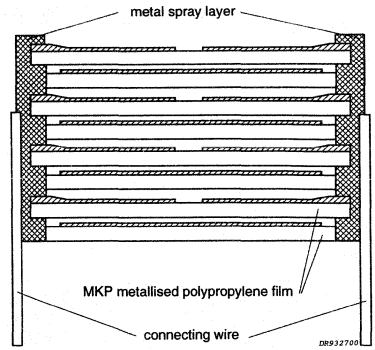
# AC and pulse metallized polypropylene film capacitors



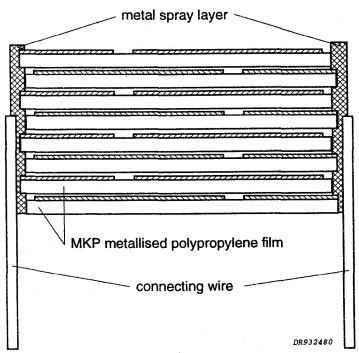
## CONSTRUCTION



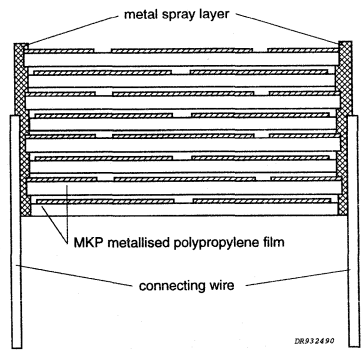

MKP 250-400 V versions
160-200 $V_{ac}$



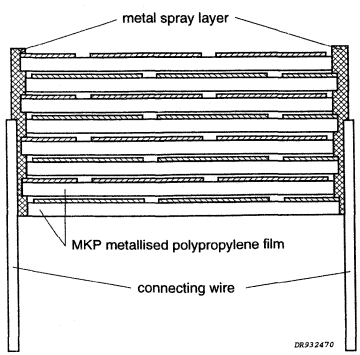

MKP/MKP 630-2000 V versions
300-600 $V_{ac}$




MKP/MKP 2500-3000 V versions
675-800 $V_{ac}$




MKP/MKP 4000 V versions
1000 $V_{ac}$




MKP/MKP 5000 V versions
1200 $V_{ac}$

# AC and pulse metallized polypropylene film capacitors

# MKP 378
# MKP/MKP 378

## DESCRIPTION

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a flame-retardent polypropylene case.
- Radial leads, solder-coated.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.
For detailed specifications refer to Chapter "PACKAGING".

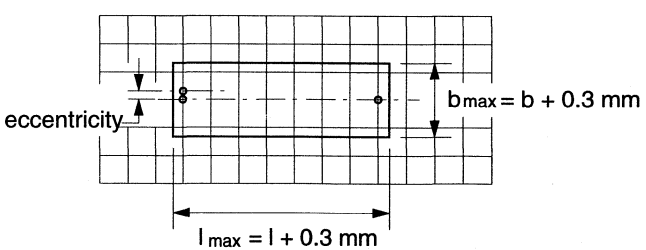
### Specific method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches of 15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors are shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

# AC and pulse metallized polypropylene film capacitors



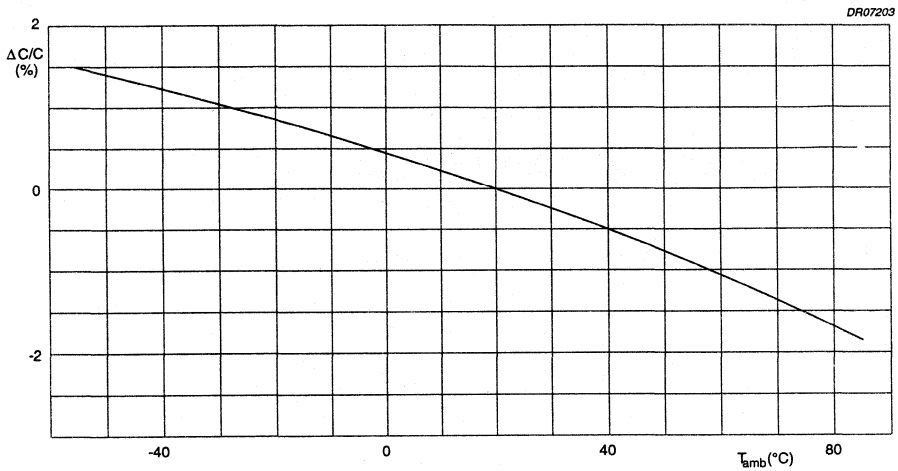
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

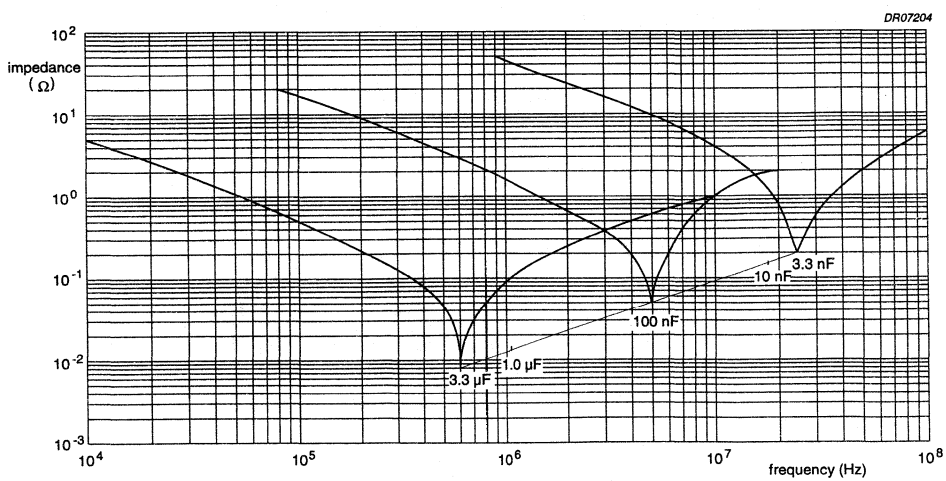
## CAPACITANCE

- All capacitance values are specified at 1kHz.




Capacitance change as a function of ambient temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

# AC and pulse metallized polypropylene film capacitors



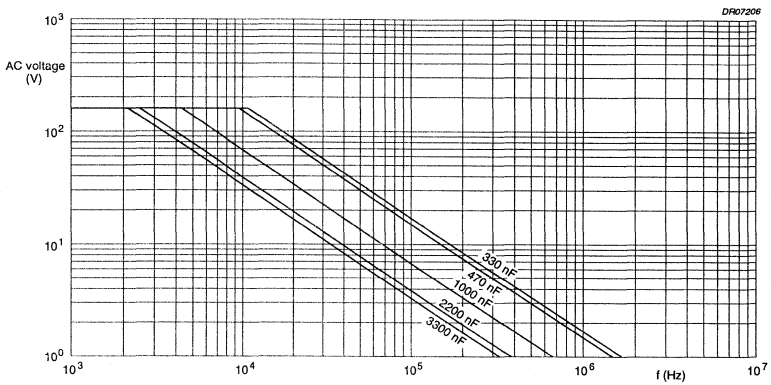
## TEMPERATURE

- Storage temperature: $T_{stg}$ = −25 to +40 °C with RH maximum 80% without condensation.

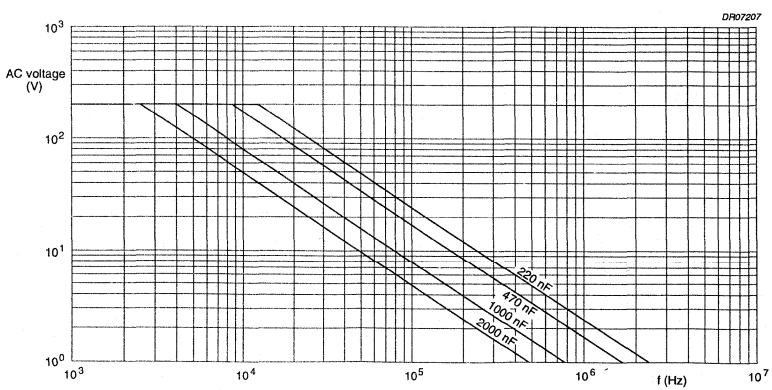
## VOLTAGE

- Category voltage: $U_{Cdc} = U_{Rdc}$ for T = 85 °C.
  $U_{Cac} = 0.7 \times U_{Rac}$ for T = 85 °C.
- Test voltage between leads: $1.6 \times U_{Rdc}$ for $U_{Rdc} < 2500$ V.
  $1.4 \times U_{Rdc}$ for $U_{Rdc} \geq 2500$ V.
- Test voltage between interconnected leads and case (foil method): 2840 V (DC).

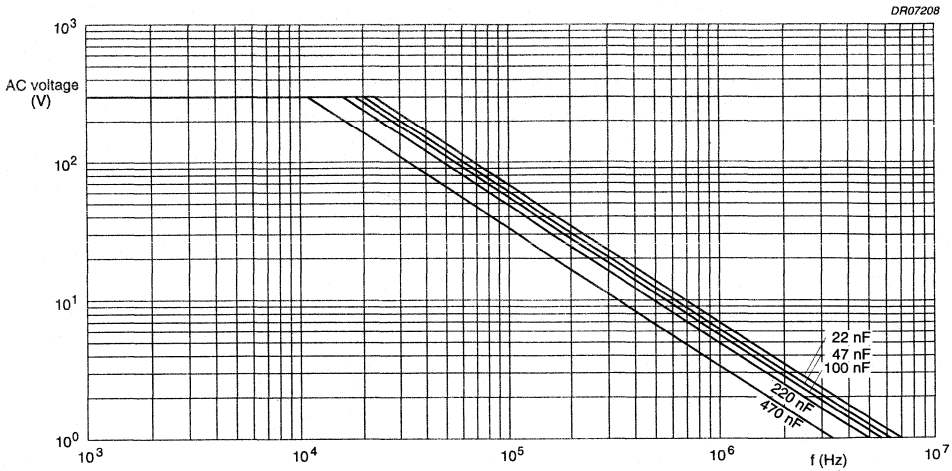
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 70$ °C (see graphs below).**



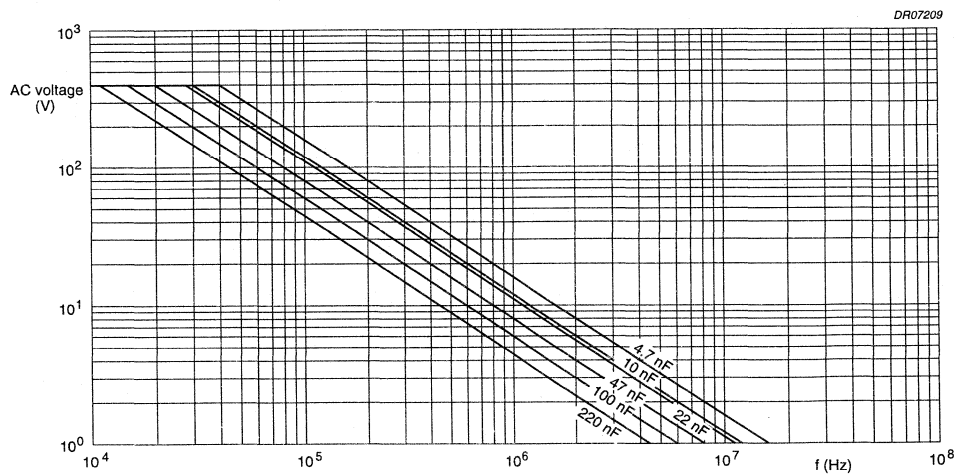

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 250 V.



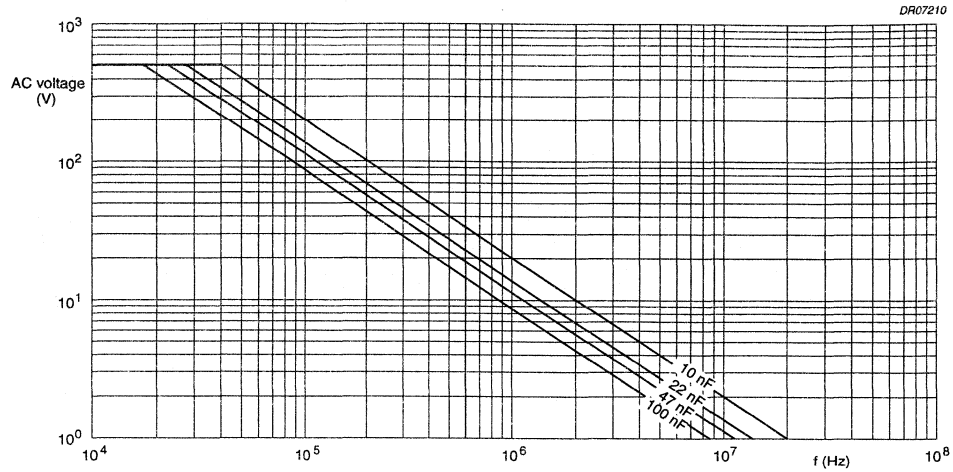

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 400 V.



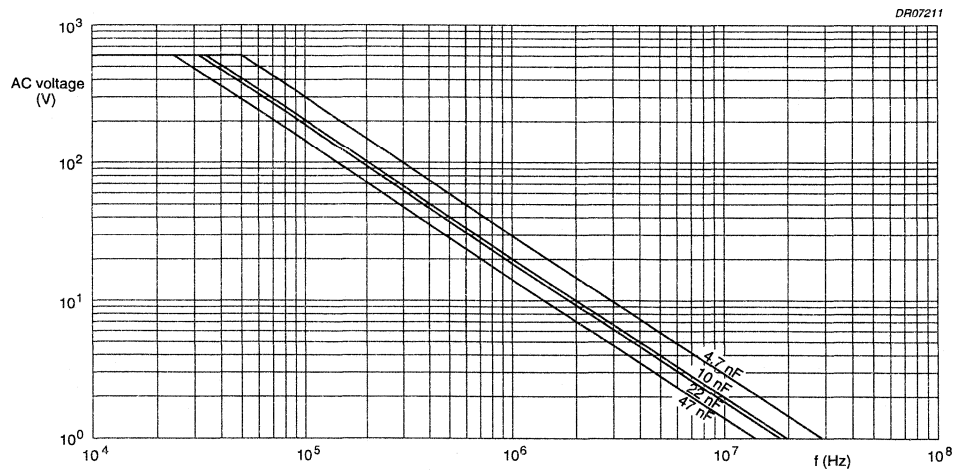

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 630$ V.



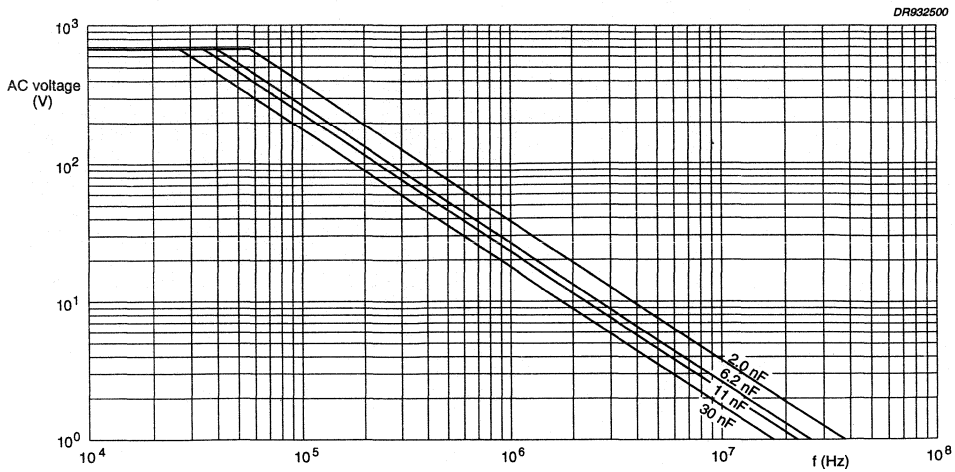

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 1000$ V.



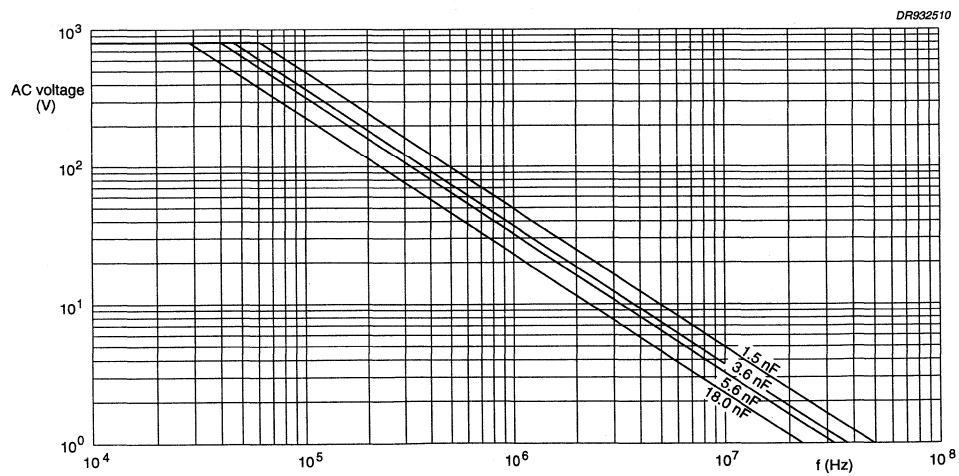

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 1600 V.



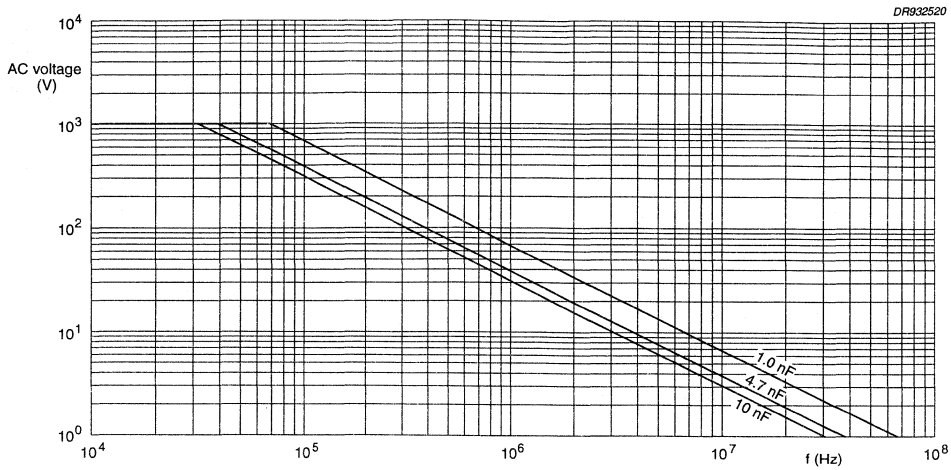

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 2000 V.



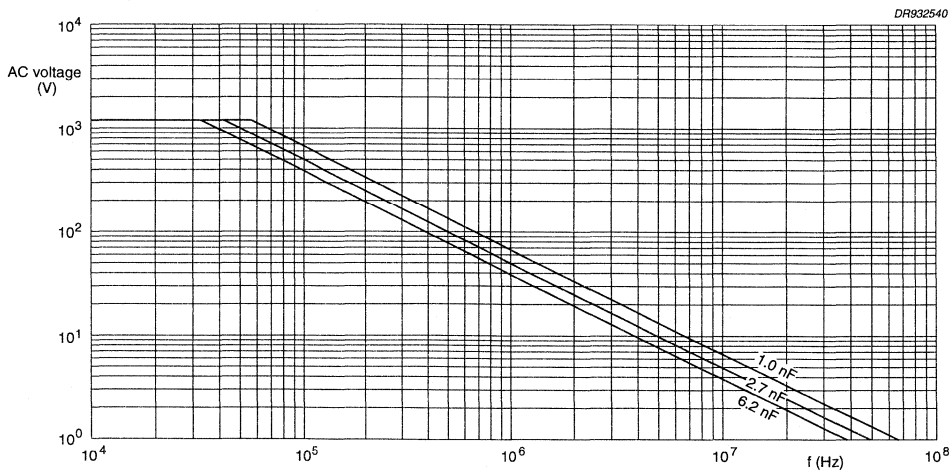

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 2500$ V.




AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 3000$ V.




AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 4000 V.

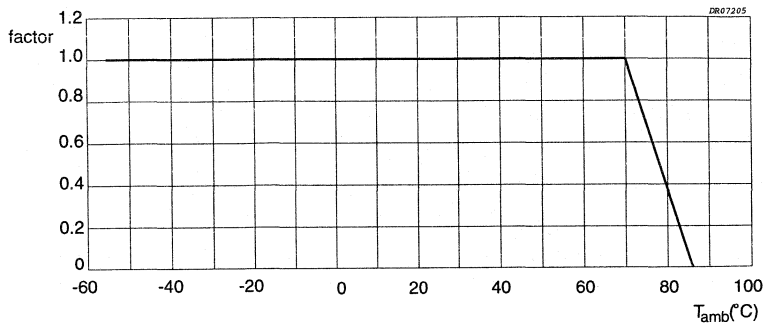



AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 5000 V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb}$ > 70 °C (voltage derating).**

The maximum RMS voltage in the graphs above has to be multiplied by a factor given in the graph "Multiplying factor as a function of temperature".

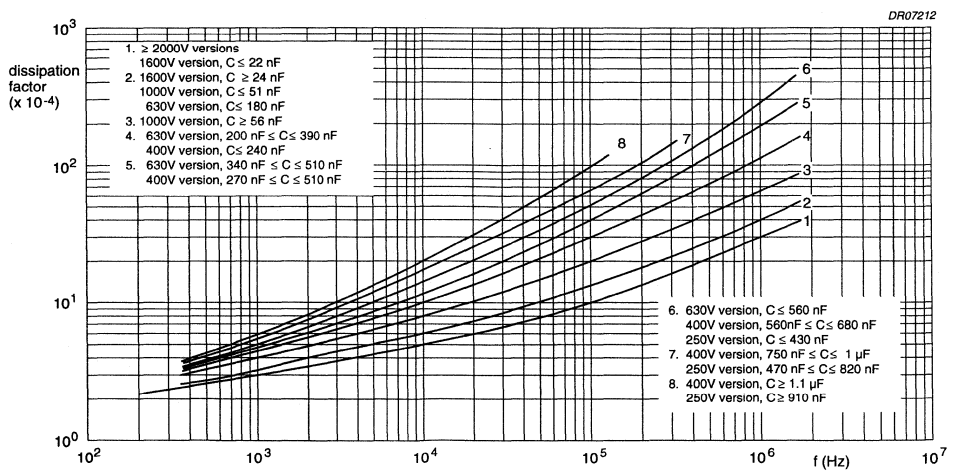
The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature at various capacitor dimensions".




Multiplying factor as a function of temperature.

## TANGENT OF LOSS ANGLE

| RATED VOLTAGE | | CAPACITANCE (µF) | TANGENT OF LOSS ANGLE ( x $10^{-4}$ ) | |
|---|---|---|---|---|
| $U_{Rdc}$ (V) | $U_{Rac}$ (V) | | at 10 kHz | at 100 kHz |
| 250 | 160 | ≤ 0.43 | ≤15 | ≤45 |
| | | 0.47 – 0.62 | ≤15 | ≤55 |
| | | 0.68 – 0.82 | ≤15 | ≤60 |
| | | 0.91 – 1 | ≤20 | ≤90 |
| | | 1.1 – 3.3 | ≤20 | ≤200 |
| 400 | 200 | ≤ 0.24 | ≤10 | ≤30 |
| | | 0.27 – 0.36 | ≤10 | ≤35 |
| | | 0.39 – 0.51 | ≤10 | ≤40 |
| | | 0.56 – 0.68 | ≤15 | ≤50 |
| | | 0.75 – 1 | ≤15 | ≤70 |
| | | 1.1 – 2 | ≤15 | ≤150 |
| 630 | 300 | ≤ 0.18 | ≤8 | ≤15 |
| | | 0.20 – 0.30 | ≤10 | ≤25 |
| | | 0.33 – 0.39 | ≤10 | ≤30 |
| | | 0.43 – 0.51 | ≤10 | ≤40 |
| | | 0.56 – 0.68 | ≤10 | ≤45 |
| 1000 | 400 | ≤ 0.051 | ≤6 | ≤15 |
| | | 0.056 – 0.22 | ≤8 | ≤20 |
| 1600 | 500 | 0.0056 – 0.022 | ≤5 | ≤10 |
| | | 0.024 – 0.1 | ≤6 | ≤15 |
| 2000 | 600 | 0.0033 – 0.051 | ≤5 | ≤10 |
| 2500 | 675 | ≤ 0.030 | ≤5 | ≤10 |
| 3000 | 800 | ≤ 0.018 | ≤5 | ≤10 |
| 4000 | 1000 | ≤ 0.010 | ≤5 | ≤10 |
| 5000 | 1200 | ≤ 0.0062 | ≤5 | ≤10 |




Tangent of loss angle as a function of frequency; max. curves.

## RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

| RATED VOLTAGE | | MAXIMUM RATED VOLTAGE PULSE SLOPE (V/µs) | | | |
|---|---|---|---|---|---|
| | | P = 15 mm | P = 22.5 mm | P = 27.5 mm | |
| $U_{Rdc}$ (V) | $U_{Rac}$ (V) | | | b < 15 mm | b ≥ 15 mm |
| 250 | 160 | – | 90 | 60 | 30 |
| 400 | 200 | – | 100 | 70 | 35 |
| 630 | 300 | 500 | 370 | 230 | 120 |
| 1000 | 400 | 1300 | 1200 | 600 | 300 |
| 1600 | 500 | – | 1600 | 900 | 450 |
| 2000 | 600 | – | 2000 | 1200 | 600 |
| 2500 | 675 | – | 2000 | 2000 | 1000 |
| 3000 | 800 | – | 2000 | 2000 | 1000 |
| 4000 | 1000 | – | – | 2000 | 1000 |
| 5000 | 1200 | – | – | 2000 | 1000 |

- The rated voltage pulse slope is valid for ambient temperatures up to 70 °C. For higher temperatures a derating factor of 3% per K has to be applied.
- If the pulse voltage is lower than the rated voltage, the values of the specific reference data may be multiplied by $U_{Rdc}$ and divided by the applied peak-to-peak voltage.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 100 ±15 V for the 250 and 400 V versions, and 500 ±50 V for the versions ≥630 V.

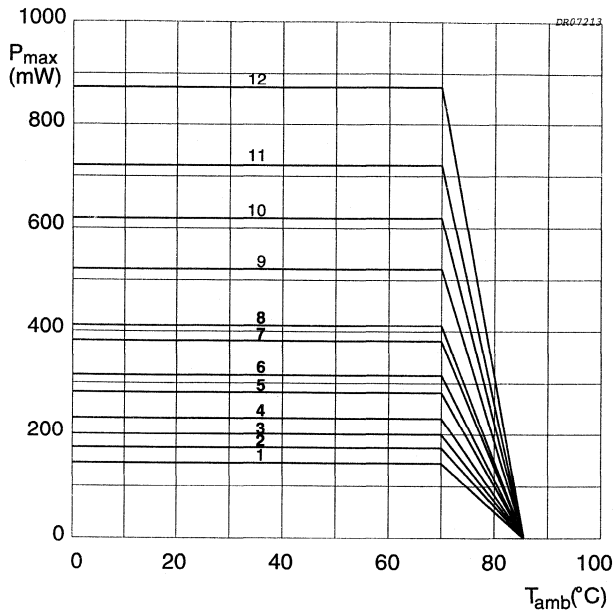
- R between leads for C ≤ 1µF: >100 000 MΩ.
- RC between leads for C > 1µF: >100 000 s.
- R between interconnected leads and case (foil method): >100 000 MΩ.

# AC and pulse metallized polypropylene film capacitors



## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) $b_{max}$ x $h_{max}$ x $l_{max}$ |
|---|---|
| 1 | 5.0 x 11.0 x 17.5 |
| 2 | 6.0 x 12.0 x 17.5 |
| 3 | 7.0 x 13.5 x 17.5 |
| 4 | 8.5 x 15.0 x 17.5 |
| 5 | 6.0 x 15.5 x 26.0 |
| 6 | 7.0 x 16.5 x 26.0 |
| 7 | 8.5 x 18.0 x 26.0 |
| 8 | 10.0 x 19.5 x 26.0 |
| 9 | 11.0 x 21.0 x 31.0 |
| 10 | 13.0 x 23.0 x 31.0 |
| 11 | 15.0 x 25.0 x 31.0 |
| 12 | 18.0 x 28.0 x 31.0 |




Maximum power dissipation as a function of ambient temperature, at various capacitor dimensions.

## APPLICATION NOTE

To select the capacitor for a certain application, 6 conditions must be checked:

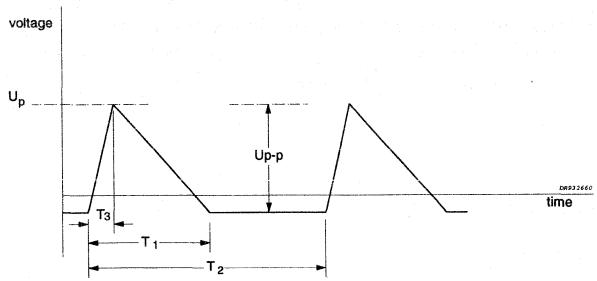
1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. The peak current ($I_p$) shall not exceed the maximum peak current, defined as maximum voltage pulse slope (dU/dt) multiplied by the capacitance.

$$I_p \text{ max} = C(\frac{dU}{dt}) \text{ max}$$

Or the voltage pulse slope shall not exceed the rated voltage pulse slope. If the peak-to-peak pulse voltage is lower than the rated voltage, the values of the table may be multiplied by $U_{Rdc}$ and divided by the applied peak-to-peak voltage.

4. The dissipated power shall not be greater than the maximum permissible power dissipation stated above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.
6. It is recommended that the power in the capacitor be limited to 10 x the allowed power dissipation ($P_{max}$) in case of a capacitor failure.

Example: C = 10 nF - 1600 V used for the following voltage signal




This is a pulse with:

$U_{p-p}$ = 1200 V
$U_p$ = 1100 V
$T_1$ = 12 µs
$T_2$ = 64 µ
$T_3$ = 4 µs

The ambient temperature is 50 °C.

**Checking the 6 conditions**

1. The peak voltage $U_p$ = 1100 V is lower than 1600 V (DC).
2. The peak-to-peak voltage 1200 V is lower than 2 x $\sqrt{2}$ x 500 V (AC) = 1414 $U_{p-p}$.
3. The voltage pulse slope dU/dt = 1200 V/4µs = 300 V/µs.
   This is lower than 1600 V/µs (see specific reference data for each version).
4. The dissipated power is 270 mW as calculated with Fourier terms. This is less than 320 mW, allowed for a capacitor with dimensions 7.0 mm x 16.5 mm x 26 mm.
5. The free air ambient temperature is 50 °C, and lower than 70 °C.
6. In case of failure, the power is switched off.

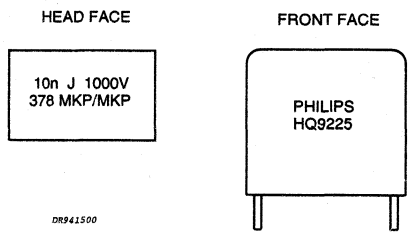
## PRODUCT MARKING

### Capacitors with pitch 10 mm to 27.5 mm

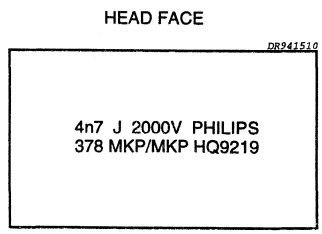
Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch ≤15 mm, with the following information:

- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: J = ±5%
- Rated DC voltage (e.g. 1000 V)
- Code for dielectric material (MKP or MKP/MKP)
- Code for factory of origin (HQ)
- Manufacturer's type designation (378)
- Manufacturer's name (PHILIPS)
- Year and week of manufacture (e.g. 9225).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH




EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH

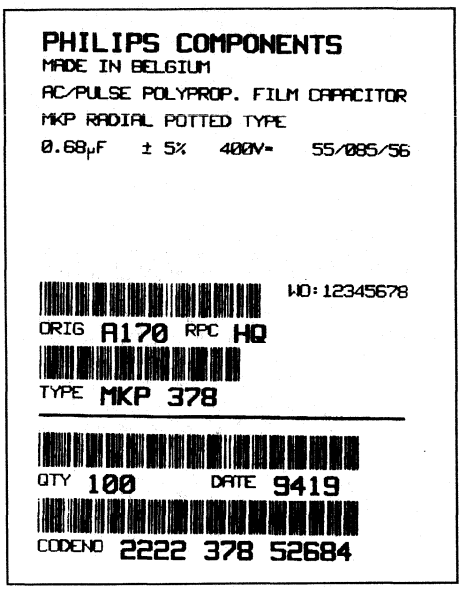


# AC and pulse metallized polypropylene film capacitors



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930130

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value in µF, tolerance, voltage and climatic category (IEC) |
| 6 | - |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# AC and pulse metallized polypropylene film capacitors

MKP 378
MKP/MKP 378

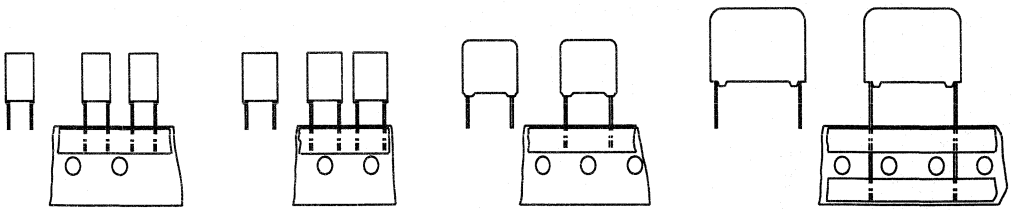
## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending | | no visible damage<br>legible marking |
| Resistance to soldering heat | solder bath: 260 °C; 10 s | $\Delta C/C \leq 1\%$<br>$\Delta tg\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta tg\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta tg\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF) |
| Component solvent resistance | isopropyl alcohol; 23 °C; 5 minutes | |
| **Robustness of component** | | |
| Vibration | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours | $\Delta C/C \leq 1\%$<br>$\Delta tg\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta tg\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta tg\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF) |
| Shock | half sinewave; 490 m/s$^2$; 11 ms | |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 85 °C | $\Delta C/C \leq 1\%$ (22.5/27.5 mm pitch)<br>$\Delta C/C \leq 2\%$ (15 mm pitch)<br>$\Delta tg\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta tg\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta tg\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Damp heat cyclic, first cycle | | |
| Cold | 2 hours; −55 °C | |
| Damp heat remaining cycles | | |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 1\%$ (22.5/27.5 mm pitch)<br>$\Delta C/C \leq 2\%$ (15 mm pitch)<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 1000 hours; 85 °C;<br>1.25 x $U_{Rac}$ (RMS); 50 Hz | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 85 °C | $\Delta C/C \leq 1\%$ (22.5/27.5 mm pitch)<br>$\Delta C/C \leq 2\%$ (15 mm pitch)<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF) |
| Resistance to soldering heat with preheating | body temperature: 85 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 1\%$<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF) |
| Passive flammability | class C | no burning |
| Endurance (DC) | 2000 hours: 1.25 $U_{Rdc}$; 85 °C | $\Delta C/C \leq 1\%$ (22.5/27.5 mm pitch)<br>$\Delta C/C \leq 2\%$ (15 mm pitch)<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF $< C \leq$ 470 nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C >$ 470 nF)<br>$R_{ins} \geq 50\%$ of specified value |

# AC and pulse metallized polypropylene film capacitors

# MKP 379/380

**MKP RADIAL POTTED CAPACITORS** **Pitch 5/7.5/10/15/22.5/27.5 mm**



P = 5 mm | P = 7.5 mm | P= 10 and 15 mm | P = 22.5 and 27.5 mm

DR931650

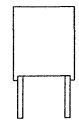
## QUICK REFERENCE DATA

| | | | | | | |
|---|---|---|---|---|---|---|
| Capacitance range (E24 series) | | 0.0015 to 6.2 µF | | | | |
| Capacitance tolerance | | ±5%, ±10% | | | | |
| For pitch ≤ 15 mm: | Rated voltage (DC) | 100 V | 160 V | 250 V | 400 V | 630 V |
| | Rated voltage (AC) | 63 V | 100 V | 160 V | 200 V | 220 V |
| | Rated peak-to-peak voltage | 180 V | 280 V | 450 V | 560 V | 620 V |
| For pitch > 15 mm: | Rated voltage (DC) | 160 V | 250 V | 400 V | 630 V | |
| | Rated voltage (AC) | 100 V | 160 V | 200 V | 250 V | |
| | Rated peak-to-peak voltage | 280 V | 450 V | 560 V | 700 V | |
| Climatic category | | 55/085/56 | | | | |
| Rated temperature (DC) | | 85 °C | | | | |
| Rated temperature (AC) | | 70 °C | | | | |
| Maximum application temperature | | 85 °C | | | | |
| Reference specification | | IEC 384-17 | | | | |
| Performance grade | | grade 1 (long life) | | | | |
| Stability grade | 100 V, 160 V versions | grade 2 | | | | |
| | 250 V to 630 V versions | | | | | |
| | - pitch 5 mm to 15 mm | grade 2 | | | | |
| | - pitch 22.5 mm and 27.5 mm | grade 1 | | | | |

| FEATURES | APPLICATIONS |
|---|---|
| • 5 mm to 27.5 mm lead pitch | • Low losses due to low contact resistance and low loss dielectric result in applications where high currents at high frequency occur or high stability is preferred |
| • Supplied loose in box and taped on reel. | • Their small dimensions make them suitable for circuits with high packaging density. |

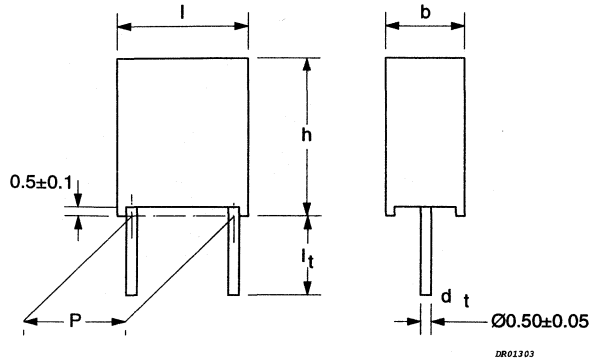
# AC and pulse metallized polypropylene film capacitors

# MKP 380



**Pitch 5 mm**

## GENERAL DATA




## SPECIFIC REFERENCE DATA FOR THE 100 V DC VERSION

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 25 \times 10^{-4}$ | $\leq 80 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 80 V/µs | |
| R between leads | >100 000 MΩ | |

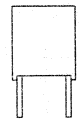
## AVAILABLE 100 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 380 25...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 380 26...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±10% | catalogue number **2222 380 21...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±5% | catalogue number **2222 380 22...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP 380



## $U_{Rdc}$ = 100 V

$U_{Rac}$ = 63 V / $U_{p-p}$ = 180 V

## loose and taped

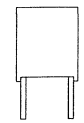
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 380 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | loose in box $l_t$ = 4.0 ±0.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 5.0 ±0.3 mm | | | $d_t$ = 0.50 ±0.05 mm | | |
| 0.015 * | 2.5 x 6.5 x 7.2 | 0.25 | 25153 | 2000 | 2000 |
| 0.016 * | | | 25163 | | |
| 0.018 * | 3.5 x 8.0 x 7.2 | 0.35 | 25183 | 1500 | 2000 |
| 0.02 * | | | 25203 | | |
| 0.022 * | | | 25223 | | |
| 0.024 * | | | 25243 | | |
| 0.027 * | | | 25273 | | |
| 0.03 * | | | 25303 | | |
| 0.033 * | | | 25333 | | |
| 0.036 * | 4.5 x 9.0 x 7.2 | 0.45 | 25363 | 1000 | 2000 |
| 0.039 * | | | 25393 | | |
| 0.043 * | | | 25433 | | |
| 0.047 * | | | 25473 | | |
| 0.051 * | 6.0 x 11.0 x 7.2 | 0.60 | 25513 | 750 | 2000 |
| 0.056 * | | | 25563 | | |
| 0.062 * | | | 25623 | | |
| 0.068 * | | | 25683 | | |
| 0.075 * | | | 25753 | | |
| 0.082 * | | | 25823 | | |
| 0.091 * | | | 25913 | | |
| 0.1 * | | | 25104 | | |

Preferred catalogue numbers

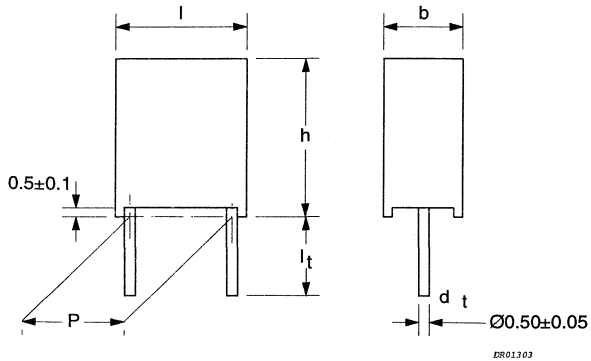
* Under development.

# AC and pulse metallized polypropylene film capacitors

# MKP 380



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 160 V DC VERSION**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 25 \times 10^{-4}$ | $\leq 80 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 80 V/µs | |
| R between leads | >100 000 MΩ | |

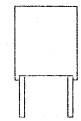
**AVAILABLE 160 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 380 35...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 380 36...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±10% | catalogue number **2222 380 31...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±5% | catalogue number **2222 380 32...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP 380



## $U_{Rdc}$ = 160 V

$U_{Rac}$ = 100 V / $U_{p-p}$ = 280 V

## loose and taped

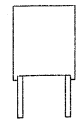
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 380 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | loose in box $l_t$ = 4.0 ±0.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 5.0 ±0.3 mm | | | $d_t$ = 0.50 ±0.05 mm | | |
| 0.01 * | 2.5 x 6.5 x 7.2 | 0.25 | 35103 | 2000 | 2000 |
| 0.011 * | | | 35113 | | |
| 0.012 * | | | 35123 | | |
| 0.013 * | 3.5 x 8.0 x 7.2 | 0.35 | 35133 | 1500 | 2000 |
| 0.015 * | | | 35153 | | |
| 0.016 * | | | 35163 | | |
| 0.018 * | | | 35183 | | |
| 0.02 * | | | 35203 | | |
| 0.022 * | | | 35223 | | |
| 0.024 * | 4.5 x 9.0 x 7.2 | 0.45 | 35243 | 1000 | 2000 |
| 0.027 * | | | 35273 | | |
| 0.03 * | | | 35303 | | |
| 0.033 * | | | 35333 | | |
| 0.036 * | 6.0 x 11.0 x 7.2 | 0.60 | 35363 | 750 | 2000 |
| 0.039 * | | | 35393 | | |
| 0.043 * | | | 35433 | | |
| 0.047 * | | | 35473 | | |
| 0.051 * | | | 35513 | | |
| 0.056 * | | | 35563 | | |
| 0.062 * | | | 35623 | | |
| 0.068 * | | | 35683 | | |

Preferred catalogue numbers

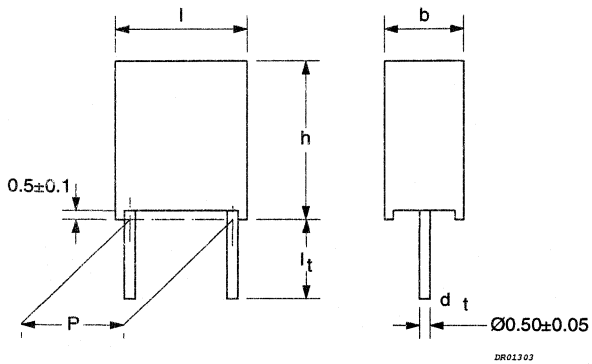
* Under development.

# AC and pulse metallized polypropylene film capacitors

# MKP 380



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 15 \times 10^{-4}$ | $\leq 40 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 90 V/µs | |
| R between leads | >100 000 MΩ | |

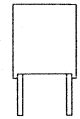
**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 380 45...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 380 46...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±10% | catalogue number **2222 380 41...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±5% | catalogue number **2222 380 42...** | on request |

* H : intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP 380



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V / $U_{p-p}$ = 450 V

## loose and taped

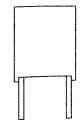
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 380 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | loose in box $l_1$ = 4.0 ±0.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 5.0 ±0.3 mm | | | $d_1$ = 0.50 ±0.05 mm | | |
| 0.0068 * | 2.5 x 6.5 x 7.2 | 0.25 | 45682 | 2000 | 2000 |
| 0.0075 * | | | 45752 | | |
| 0.0082 * | | | 45822 | | |
| 0.0091 * | 3.5 x 8.0 x 7.2 | 0.35 | 45912 | 1500 | 2000 |
| 0.01 * | | | 45103 | | |
| 0.011 * | | | 45113 | | |
| 0.012 * | | | 45123 | | |
| 0.013 * | | | 45133 | | |
| 0.015 * | | | 45153 | | |
| 0.016 * | 4.5 x 9.0 x 7.2 | 0.45 | 45163 | 1000 | 2000 |
| 0.018 * | | | 45183 | | |
| 0.02 * | | | 45203 | | |
| 0.022 * | | | 45223 | | |
| 0.024 * | | | 45243 | | |
| 0.027 * | | | 45273 | | |
| 0.03 * | 6.0 x 11.0 x 7.2 | 0.60 | 45303 | 750 | 2000 |
| 0.033 * | | | 45333 | | |
| 0.036 * | | | 45363 | | |
| 0.039 * | | | 45393 | | |
| 0.043 * | | | 45433 | | |

Preferred catalogue numbers

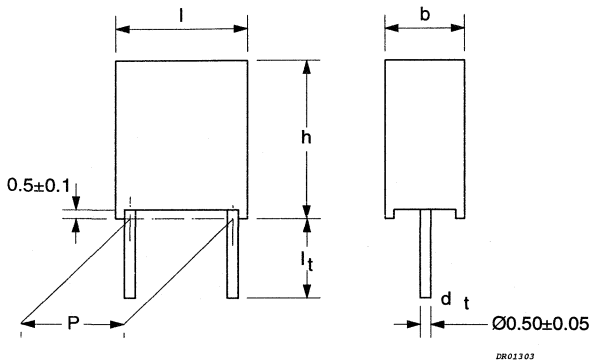
* Under development.

# AC and pulse metallized polypropylene film capacitors

# MKP 380



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| | ≤10 x $10^{-4}$ | ≤30 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 100 V/µs | |
| R between leads | >100 000 MΩ | |

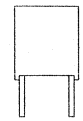
**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 380 55...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 380 56...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±10% | catalogue number **2222 380 51...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±5% | catalogue number **2222 380 52...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP 380



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 200 V / $U_{p-p}$ = 560 V

## loose and taped

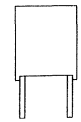
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 380 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | loose in box $l_t$ = 4.0 ±0.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 5.0 ±0.3 mm | | | $d_t$ = 0.50 ±0.05 mm | | |
| 0.0033 * | 2.5 x 6.5 x 7.2 | 0.25 | 55332 | 2000 | 2000 |
| 0.0036 * | | | 55362 | | |
| 0.0039 * | | | 55392 | | |
| 0.0043 * | 3.5 x 8.0 x 7.2 | 0.35 | 55432 | 1500 | 2000 |
| 0.0047 * | | | 55472 | | |
| 0.0051 * | | | 55512 | | |
| 0.0056 * | | | 55562 | | |
| 0.0062 * | | | 55622 | | |
| 0.0068 * | | | 55682 | | |
| 0.0075 * | | | 55752 | | |
| 0.0082 * | | | 55822 | | |
| 0.0091 * | 4.5 x 9.0 x 7.2 | 0.45 | 55912 | 1000 | 2000 |
| 0.01 * | | | 55103 | | |
| 0.011 * | | | 55113 | | |
| 0.012 * | | | 55123 | | |
| 0.013 * | 6.0 x 11.0 x 7.2 | 0.60 | 55133 | 750 | 2000 |
| 0.015 * | | | 55153 | | |
| 0.016 * | | | 55163 | | |
| 0.018 * | | | 55183 | | |
| 0.02 * | | | 55203 | | |

Preferred catalogue numbers

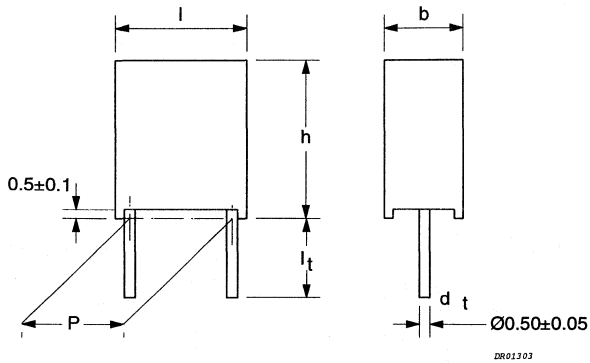
* Under development.

# AC and pulse metallized polypropylene film capacitors

# MKP 380



**Pitch 5 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| | $\leq 10 \times 10^{-4}$ | $\leq 20 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 120 V/µs | |
| R between leads | >100 000 MΩ | |

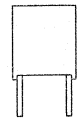
**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Ammopack | H = 18.5 mm * | C-tol ±10% | catalogue number **2222 380 65...** | preferred |
| Ammopack | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 380 66...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±10% | catalogue number **2222 380 61...** | on request |
| Loose in box | $l_t$ = 4.0 ±0.5 mm | C-tol ±5% | catalogue number **2222 380 62...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP 380



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 220 V / $U_{p-p}$ = 620 V

**loose and taped**

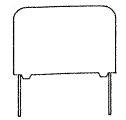
| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 380 ..... ammopack H = 18.5 mm C-tol ±10% last 5 digits of catalogue number | SPQ | loose in box $l_1$ = 4.0 ±0.5 mm SPQ |
|---|---|---|---|---|---|
| Pitch = 5.0 ±0.3 mm | | | $d_1$ = 0.50 ±0.05 mm | | |
| 0.0015 * | 2.5 x 6.5 x 7.2 | 0.25 | 65152 | 2000 | 2000 |
| 0.0016 * | | | 65162 | | |
| 0.0018 * | | | 65182 | | |
| 0.002 * | 3.5 x 8.0 x 7.2 | 0.35 | 65202 | 1500 | 2000 |
| 0.0022 * | | | 65222 | | |
| 0.0024 * | | | 65242 | | |
| 0.0027 * | | | 65272 | | |
| 0.003 * | | | 65302 | | |
| 0.0033 * | | | 65332 | | |
| 0.0036 * | | | 65362 | | |
| 0.0039 * | | | 65392 | | |
| 0.0043 * | 4.5 x 9.0 x 7.2 | 0.45 | 65432 | 1000 | 2000 |
| 0.0047 * | | | 65472 | | |
| 0.0051 * | | | 65512 | | |
| 0.0056 * | | | 65562 | | |
| 0.0062 * | 6.0 x 11.0 x 7.2 | 0.60 | 65622 | 750 | 2000 |
| 0.0068 * | | | 65682 | | |
| 0.0075 * | | | 65752 | | |
| 0.0082 * | | | 65822 | | |
| 0.0091 * | | | 65912 | | |

Preferred catalogue numbers

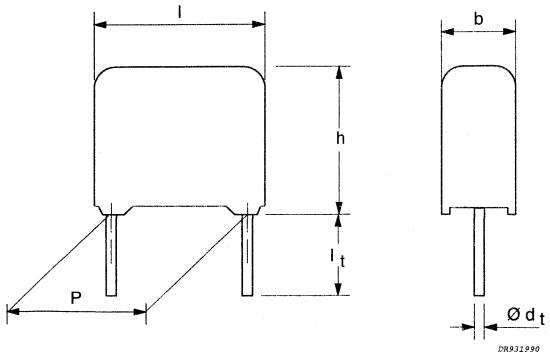
* Under development.

# AC and pulse metallized polypropylene film capacitors

# MKP 379



Pitch 10 mm




**SPECIFIC REFERENCE DATA FOR THE 160 V DC VERSION (pitch = 10 mm)**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 25 \times 10^{-4}$ | $\leq 80 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 60 V/µs | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |

**AVAILABLE 160 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 34...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 35...** | on request |

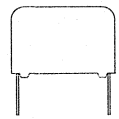
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- Pitch 7.5 mm with capacitance range 0.022 µF to 0.120 µF.

# AC and pulse metallized polypropylene film capacitors

MKP 379



## $U_{Rdc}$ = 160 V

$U_{Rac}$ = 100 V / $U_{p-p}$ = 280 V

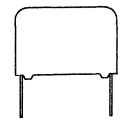
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.075 | 4.0 x 10.0 x 12.5 | 0.6 | 34753 | 1000 | 1400 |
| 0.082 | | | 34823 | | |
| 0.091 | | | 34913 | | |
| 0.1 | | | 34104 | | |
| 0.11 | 5.0 x 11.0 x 12.5 | 0.85 | 34114 | 1000 | 1100 |
| 0.12 | | | 34124 | | |
| 0.13 | | | 34134 | | |
| 0.15 | | | 34154 | | |
| 0.16 | 6.0 x 12.0 x 12.5 | 1.0 | 34164 | 1000 | 900 |

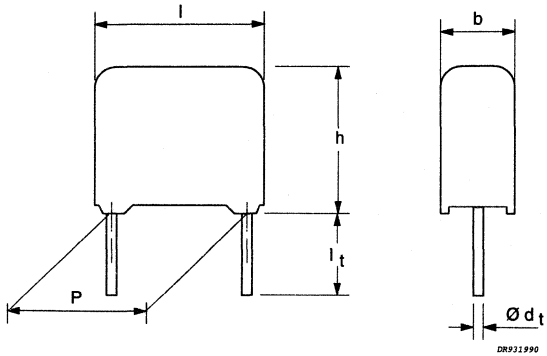
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP 379



**Pitch 15/22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 160 V DC VERSION (pitch > 10 mm)**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| 0.16 µF < C ≤ 0.75 µF | ≤25 x $10^{-4}$ | ≤100 x $10^{-4}$ |
| 0.75 µF < C ≤ 1.0 µF | ≤30 x $10^{-4}$ | ≤150 x $10^{-4}$ |
| C > 1.0 µF | ≤30 x $10^{-4}$ | |
| Rated voltage pulse slope $(dU/dt)_R$ | l = 17.5 mm: 50 V/µs<br>l = 26.0 mm: 25 V/µs<br>l = 31.0 mm: 15 V/µs (b < 15 mm)<br>7.5 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |

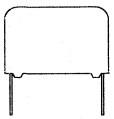
**AVAILABLE 160 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 34...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 35...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP 379



## $U_{Rdc}$ = 160 V

$U_{Rac}$ = 100 V / $U_{p-p}$ = 280 V

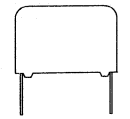
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.18 | 5.0 x 11.0 x 17.5 | 1.2 | 34184 | 1000 | 1100 |
| 0.2 | | | 34204 | | |
| 0.22 | | | 34224 | | |
| 0.24 | | | 34244 | | |
| 0.27 | | | 34274 | | |
| 0.3 | 6.0 x 12.0 x 17.5 | 1.4 | 34304 | 1000 | 900 |
| 0.33 | | | 34334 | | |
| 0.36 | | | 34364 | | |
| 0.39 | | | 34394 | | |
| 0.43 | 7.0 x 13.5 x 17.5 | 1.9 | 34434 | 1000 | 800 |
| 0.47 | | | 34474 | | |
| 0.51 | | | 34514 | | |
| 0.56 | 8.5 x 15.0 x 17.5 | 2.6 | 34564 | 1000 | 650 |
| 0.62 | | | 34624 | | |
| 0.68 | | | 34684 | | |
| 0.75 | | | 34754 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.82 | 7.0 x 16.5 x 26.0 | 3.2 | 34824 | 200 | 550 |
| 0.91 | | | 34914 | | |
| 1 | 8.5 x 18.0 x 26.0 | 4.4 | 34105 | 200 | 450 |
| 1.1 | | | 34115 | | |
| 1.2 | | | 34125 | | |
| 1.3 | | | 34135 | | |
| 1.5 | 10.0 x 19.5 x 26.0 | 5.5 | 34155 | 200 | 350 |
| 1.6 | | | 34165 | | |
| 1.8 | | | 34185 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 2 | 11.0 x 21.0 x 31.0 | 7.8 | 34205 | 100 | 300 |
| 2.2 | | | 34225 | | |
| 2.4 | | | 34245 | | |
| 2.7 | 13.0 x 23.0 x 31.0 | 10.4 | 34275 | 100 | 250 |
| 3 | | | 34305 | | |
| 3.3 | | | 34335 | | |
| 3.6 | 15.0 x 25.0 x 31.0 | 12.8 | 34365 | 100 | 200 |
| 3.9 | | | 34395 | | |
| 4.3 | | | 34435 | | |
| 4.7 | 18.0 x 28.0 x 31.0 | 17.2 | 34475 | 100 | 150 |
| 5.1 | | | 34515 | | |
| 5.6 | | | 34565 | | |
| 6.2 | | | 34625 | | |

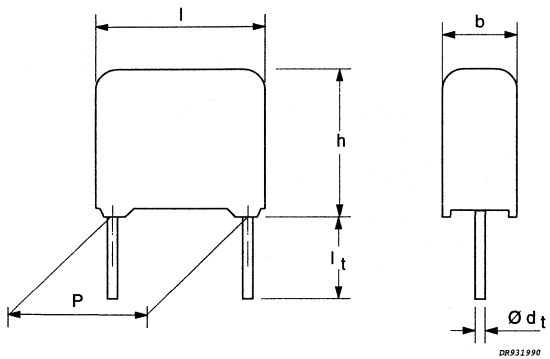
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# MKP 379



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION (pitch = 10 mm)**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 15 \times 10^{-4}$ | $\leq 40 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ | 70 V/µs | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |

**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5mm | C-tol ±5% | catalogue number **2222 379 44...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 45...** | on request |

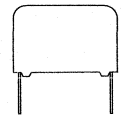
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- Pitch 7.5 mm with capacitance range 0.012 µF to 0.082 µF.

# AC and pulse metallized polypropylene film capacitors

MKP 379



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V / $U_{p-p}$ = 450 V

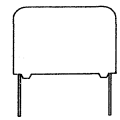
**loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.047 | 4.0 x 10.0 x 12.5 | 0.6 | 44473 | 1000 | 1400 |
| 0.051 | | | 44513 | | |
| 0.056 | | | 44563 | | |
| 0.062 | | | 44623 | | |
| 0.068 | | | 44683 | | |
| 0.075 | 5.0 x 11.0 x 12.5 | 0.85 | 44753 | 1000 | 1100 |
| 0.082 | | | 44823 | | |
| 0.091 | | | 44913 | | |

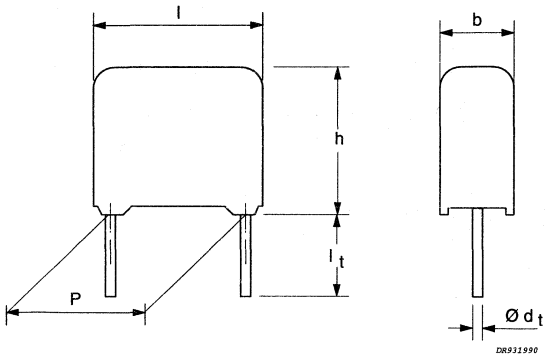
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# MKP 379



**Pitch 15/22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION (pitch > 10 mm)**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| 0.091 µF < C ≤ 0.47 µF | ≤15 x $10^{-4}$ | ≤ 60 x $10^{-4}$ |
| 0.47 µF < C ≤ 1.0 µF | ≤20 x $10^{-4}$ | ≤120 x $10^{-4}$ |
| 1.0 µF < C ≤ 3.9 µF | ≤25 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ | l = 17.5 mm: 60 V/µs<br>l = 26.0 mm: 30 V/µs<br>l = 31.0 mm: 20 V/µs (b < 15 mm)<br>10 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |

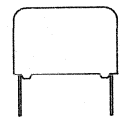
**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 44...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 45...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP 379



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 160 V / $U_{p-p}$ = 450 V

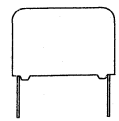
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_1$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.1 | 5.0 x 11.0 x 17.5 | 1.2 | 44104 | 1000 | 1100 |
| 0.11 | | | 44114 | | |
| 0.12 | | | 44124 | | |
| 0.13 | | | 44134 | | |
| 0.15 | | | 44154 | | |
| 0.16 | | | 44164 | | |
| 0.18 | 6.0 x 12.0 x 17.5 | 1.4 | 44184 | 1000 | 900 |
| 0.2 | | | 44204 | | |
| 0.22 | | | 44224 | | |
| 0.24 | | | 44244 | | |
| 0.27 | 7.0 x 13.5 x 17.5 | 1.9 | 44274 | 1000 | 800 |
| 0.3 | | | 44304 | | |
| 0.33 | | | 44334 | | |
| 0.36 | 8.5 x 15.0 x 17.5 | 2.6 | 44364 | 1000 | 650 |
| 0.39 | | | 44394 | | |
| 0.43 | | | 44434 | | |
| 0.47 | | | 44474 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.51 | 7.0 x 16.5 x 26.0 | 3.2 | 44514 | 200 | 550 |
| 0.56 | | | 44564 | | |
| 0.62 | | | 44624 | | |
| 0.68 | 8.5 x 18.0 x 26.0 | 4.4 | 44684 | 200 | 450 |
| 0.75 | | | 44754 | | |
| 0.82 | | | 44824 | | |
| 0.91 | | | 44914 | | |
| 1 | 10.0 x 19.5 x 26.0 | 5.5 | 44105 | 200 | 350 |
| 1.1 | | | 44115 | | |
| 1.2 | | | 44125 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 1.3 | 11.0 x 21.0 x 31.0 | 7.8 | 44135 | 100 | 300 |
| 1.5 | | | 44155 | | |
| 1.6 | | | 44165 | | |
| 1.8 | 13.0 x 23.0 x 31.0 | 10.4 | 44185 | 100 | 250 |
| 2 | | | 44205 | | |
| 2.2 | | | 44225 | | |
| 2.4 | 15.0 x 25.0 x 31.0 | 12.8 | 44245 | 100 | 200 |
| 2.7 | | | 44275 | | |
| 3 | 18.0 x 28.0 x 31.0 | 17.2 | 44305 | 100 | 150 |
| 3.3 | | | 44335 | | |
| 3.6 | | | 44365 | | |
| 3.9 | | | 44395 | | |

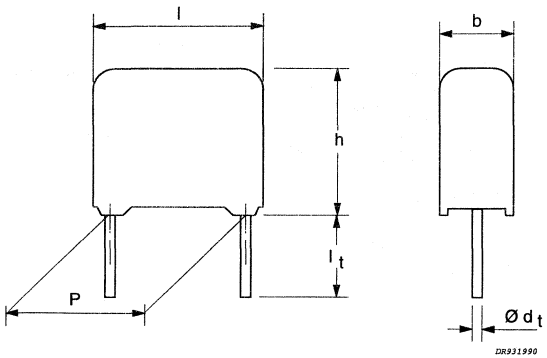
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

# MKP 379



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION (pitch = 10 mm)**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 10 \times 10^{-4}$ | $\leq 30 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 80 V/µs | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |

**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 54...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 55...** | on request |

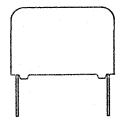
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- Pitch 7.5 mm with capacitance range 0.0075 µF to 0.039 µF.

# AC and pulse metallized polypropylene film capacitors

MKP 379



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 200 V / $U_{p-p}$ = 560 V

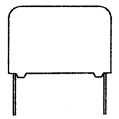
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_t$ = 0.60 ±0.06 mm | | |
| 0.022 | 4.0 x 10.0 x 12.5 | 0.6 | 54223 | 1000 | 1400 |
| 0.024 | | | 54243 | | |
| 0.027 | | | 54273 | | |
| 0.03 | | | 54303 | | |
| 0.033 | | | 54333 | | |
| 0.036 | 5.0 x 11.0 x 12.5 | 0.85 | 54363 | 1000 | 1100 |
| 0.039 | | | 54393 | | |
| 0.043 | | | 54433 | | |

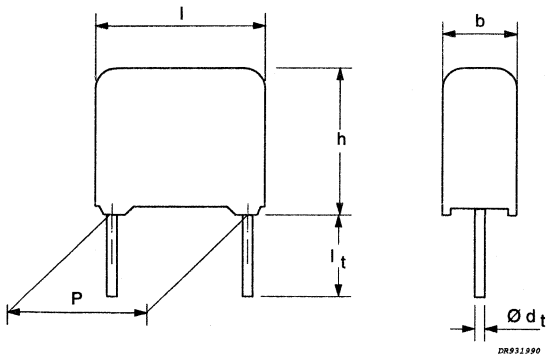
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP 379



**Pitch 15/22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION (pitch > 10 mm)**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| 0.043 µF < C ≤ 0.22 µF | ≤15 x $10^{-4}$ | ≤40 x $10^{-4}$ |
| 0.22 µF < C ≤ 0.62 µF | ≤15 x $10^{-4}$ | ≤60 x $10^{-4}$ |
| 0.62 µF < C ≤ 1.0 µF | ≤15 x $10^{-4}$ | ≤80 x $10^{-4}$ |
| 1.0 µF < C ≤ 2.0 µF | ≤20 x $10^{-4}$ | – |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | l = 17.5 mm: 70 V/µs<br>l = 26.0 mm: 35 V/µs<br>l = 31.0 mm: 25 V/µs (b < 15 mm)<br>13 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |
| RC between leads, for C > 1 µF | >100 000 s | |

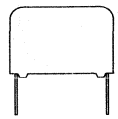
**AVAILABLE 400 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 54...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 55...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

# MKP 379



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 200 V / $U_{p-p}$ = 560 V

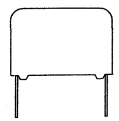
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_t$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.047 | 5.0 x 11.0 x 17.5 | 1.2 | 54473 | 1000 | 1100 |
| 0.051 | | | 54513 | | |
| 0.056 | | | 54563 | | |
| 0.062 | | | 54623 | | |
| 0.068 | | | 54683 | | |
| 0.075 | | | 54753 | | |
| 0.082 | | | 54823 | | |
| 0.091 | 6.0 x 12.0 x 17.5 | 1.4 | 54913 | 1000 | 900 |
| 0.1 | | | 54104 | | |
| 0.11 | | | 54114 | | |
| 0.12 | | | 54124 | | |
| 0.13 | 7.0 x 13.5 x 17.5 | 1.9 | 54134 | 1000 | 800 |
| 0.15 | | | 54154 | | |
| 0.16 | | | 54164 | | |
| 0.18 | 8.5 x 15.0 x 17.5 | 2.6 | 54184 | 1000 | 650 |
| 0.2 | | | 54204 | | |
| 0.22 | | | 54224 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.24 | 7.0 x 16.5 x 26.0 | 3.2 | 54244 | 200 | 550 |
| 0.27 | | | 54274 | | |
| 0.3 | | | 54304 | | |
| 0.33 | 8.5 x 18.0 x 26.0 | 4.4 | 54334 | 200 | 450 |
| 0.36 | | | 54364 | | |
| 0.39 | | | 54394 | | |
| 0.43 | | | 54434 | | |
| 0.47 | | | 54474 | | |
| 0.51 | 10.0 x 19.5 x 26.0 | 5.5 | 54514 | 200 | 350 |
| 0.56 | | | 54564 | | |
| 0.62 | | | 54624 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_t$ = 0.80 ±0.08 mm | | |
| 0.68 | 11.0 x 21.0 x 31.0 | 7.8 | 54684 | 100 | 300 |
| 0.75 | | | 54754 | | |
| 0.82 | | | 54824 | | |
| 0.91 | 13.0 x 23.0 x 31.0 | 10.4 | 54914 | 100 | 250 |
| 1 | | | 54105 | | |
| 1.1 | | | 54115 | | |
| 1.2 | 15.0 x 25.0 x 31.0 | 12.8 | 54125 | 100 | 200 |
| 1.3 | | | 54135 | | |
| 1.5 | | | 54155 | | |
| 1.6 | 18.0 x 28.0 x 31.0 | 17.2 | 54165 | 100 | 150 |
| 1.8 | | | 54185 | | |
| 2 | | | 54205 | | |

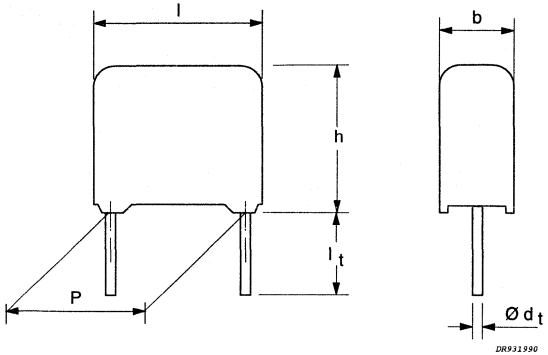
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP 379



**Pitch 10 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION (pitch = 10 mm)**

| | | |
|---|---|---|
| Tangent of loss angle | at 10 kHz | at 100 kHz |
| | $\leq 10 \times 10^{-4}$ | $\leq 20 \times 10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | 100 V/µs | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |

**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 64...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 65...** | on request |

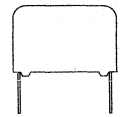
* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

Available on request:

- Pitch 7.5 mm with capacitance range 0.0033 µF to 0.022 µF.

# AC and pulse metallized polypropylene film capacitors

# MKP 379



## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 220 V / $U_{p-p}$ = 620 V

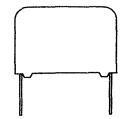
## loose and taped

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_1$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 10.0 ±0.4 mm | | | $d_1$ = 0.60 ±0.06 mm | | |
| 0.01 | 4.0 x 10.0 x 12.5 | 0.6 | 64103 | 1000 | 1400 |
| 0.011 | | | 64113 | | |
| 0.012 | | | 64123 | | |
| 0.013 | | | 64133 | | |
| 0.015 | | | 64153 | | |
| 0.016 | | | 61163 | | |
| 0.018 | 5.0 x 11.0 x 12.5 | 0.85 | 64183 | 1000 | 1100 |
| 0.02 | | | 64203 | | |
| 0.022 | | | 64223 | | |
| 0.024 | | | 64243 | | |

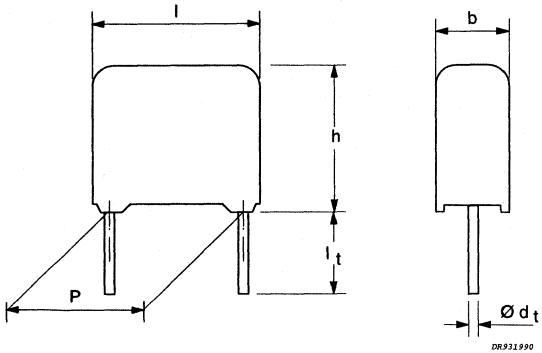
Preferred catalogue numbers

# AC and pulse metallized polypropylene film capacitors

## MKP 379



**Pitch 15/22.5/27.5 mm**




**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION (pitch > 10 mm)**

| Tangent of loss angle | at 10 kHz | at 100 kHz |
|---|---|---|
| 0.024 µF < C ≤ 0.11 µF | ≤10 x $10^{-4}$ | ≤25 x $10^{-4}$ |
| 0.11 µF < C ≤ 0.30 µF | ≤10 x $10^{-4}$ | ≤35 x $10^{-4}$ |
| 0.33 µF < C ≤ 1.0 µF | ≤15 x $10^{-4}$ | ≤70 x $10^{-4}$ |
| Rated voltage pulse slope $(dU/dt)_R$ at $U_{Rdc}$ | l = 17.5 mm: 90 V/µs<br>l = 26.0 mm: 45 V/µs<br>l = 31.0 mm: 30 V/µs (b < 15 mm)<br>15 V/µs (b ≥ 15 mm) | |
| R between leads, for C ≤ 1 µF | >100 000 MΩ | |

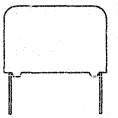
**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Loose in box | $l_t$ = 3.5 ±0.5 mm | C-tol ±5% | catalogue number **2222 379 64...** | preferred |
| Taped on reel | H = 18.5 mm * | C-tol ±5% | catalogue number **2222 379 65...** | on request |

* H: intape height; for detailed specifications refer to Chapter "PACKAGING".

# AC and pulse metallized polypropylene film capacitors

MKP 379



**$U_{Rdc}$ = 630 V** $U_{Rac}$ = 250 V (*) / $U_{p-p}$ = 700 V (*) **loose and taped**

| Cap. (µF) | b x h x l (mm) | mass (g) | CATALOGUE NUMBER 2222 379 ..... loose in box; $l_1$ = 3.5 ±0.5 mm C-tol ±5% last 5 digits of catalogue number | SPQ | reel SPQ |
|---|---|---|---|---|---|
| Pitch = 15.0 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.027 | 5.0 x 11.0 x 17.5 | 1.2 | 64273 | 1000 | 1100 |
| 0.03 | | | 64303 | | |
| 0.033 | | | 64333 | | |
| 0.036 | | | 64363 | | |
| 0.039 | | | 64393 | | |
| 0.043 | 6.0 x 12.0 x 17.5 | 1.4 | 64433 | 1000 | 900 |
| 0.047 | | | 64473 | | |
| 0.051 | | | 64513 | | |
| 0.056 | | | 64563 | | |
| 0.062 | | | 64623 | | |
| 0.068 | 7.0 x 13.5 x 17.5 | 1.9 | 64683 | 1000 | 800 |
| 0.075 | | | 64753 | | |
| 0.082 | | | 64823 | | |
| 0.091 | 8.5 x 15.0 x 17.5 | 2.6 | 64913 | 1000 | 650 |
| 0.1 | | | 64104 | | |
| 0.11 | | | 64114 | | |
| Pitch = 22.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.12 | 7.0 x 16.5 x 26.0 | 3.2 | 64124 | 200 | 550 |
| 0.13 | | | 64134 | | |
| 0.15 | | | 64154 | | |
| 0.16 | | | 64164 | | |
| 0.18 | 8.5 x 18.0 x 26.0 | 4.4 | 64184 | 200 | 450 |
| 0.2 | | | 64204 | | |
| 0.22 | | | 64224 | | |
| 0.24 | 10.0 x 19.5 x 26.0 | 5.5 | 64244 | 200 | 350 |
| 0.27 | | | 64274 | | |
| 0.3 | | | 64304 | | |
| Pitch = 27.5 ±0.4 mm | | | $d_1$ = 0.80 ±0.08 mm | | |
| 0.33 | 11.0 x 21.0 x 31.0 | 7.8 | 64334 | 100 | 300 |
| 0.36 | | | 64364 | | |
| 0.39 | | | 64394 | | |
| 0.43 | | | 64434 | | |
| 0.47 | 13.0 x 23.0 x 31.0 | 10.4 | 64474 | 100 | 250 |
| 0.51 | | | 64514 | | |
| 0.56 | | | 64564 | | |
| 0.62 | 15.0 x 25.0 x 31.0 | 12.8 | 64624 | 100 | 200 |
| 0.68 | | | 64684 | | |
| 0.75 | | | 64754 | | |
| 0.82 | 18.0 x 28.0 x 31.0 | 17.2 | 64824 | 100 | 150 |
| 0.91 | | | 64914 | | |
| 1 | | | 64105 | | |

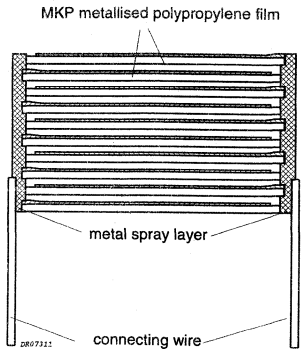
Preferred catalogue numbers

(*) $U_{Rac}$ = 220 V / $U_{p-p}$ = 620 V for C ≤ 0.11 µF.

# AC and pulse metallized polypropylene film capacitors

# MKP 379/380

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metallized polypropylene (PP) film, potted with epoxy resin in a grey flame-retardent case for pitch = 5 mm and in a blue flame-retardent polypropylene case for pitch >5 mm.
- Radial leads, solder-coated.
- Solder-plated copper-clad steel wire for pitch ≤15 mm to ensure good resistance to soldering heat.
- Small stand-off pips allow removal of solder flux etc. during cleaning of the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for printed-circuit board applications. The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.

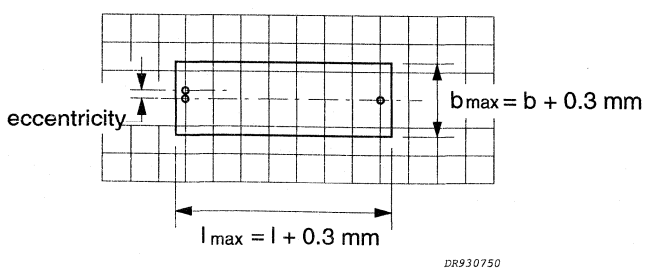
### Specific method of mounting to withstand vibration and shock

In order to withstand vibration and shock tests, it must be ensured that the stand-off pips are in good contact with the printed-circuit board.

- For pitches ≤15 mm the capacitors shall be mechanically fixed by the leads.
- For larger pitches the capacitors shall be mounted in the same way and the body shall be clamped.

### Space requirements on printed-circuit board

The maximum length and width of film capacitors is shown in the following drawing:




- Eccentricity as in drawing.
  The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.
- Product height with seating plane as given by IEC 717 as reference: $h_{max} \leq h + 0.3$ mm.

# AC and pulse metallized polypropylene film capacitors — MKP 379/380

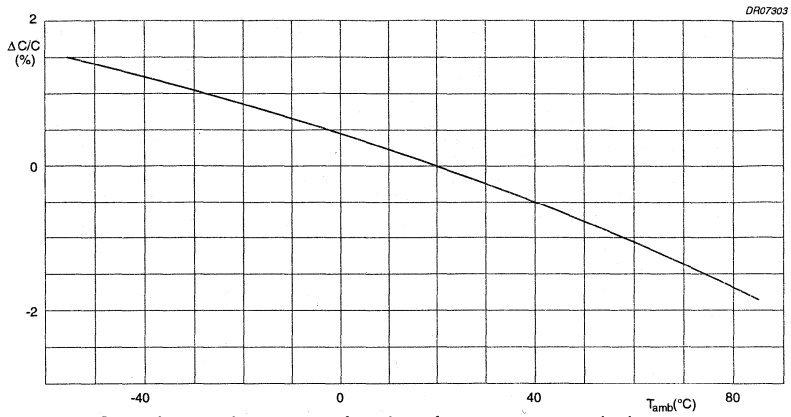
## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

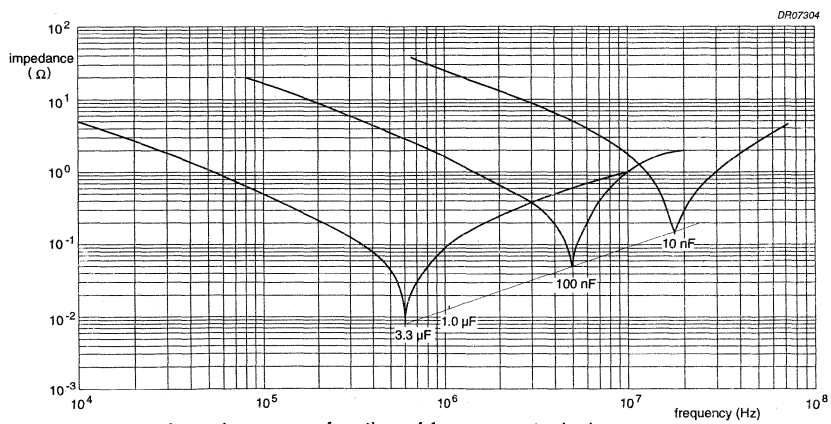
## CAPACITANCE

- All capacitance values are specified at 1kHz.




Capacitance change as a function of temperature; typical curve.

## IMPEDANCE




Impedance as a function of frequency; typical curves.

# AC and pulse metallized polypropylene film capacitors

# MKP 379/380

## TEMPERATURE

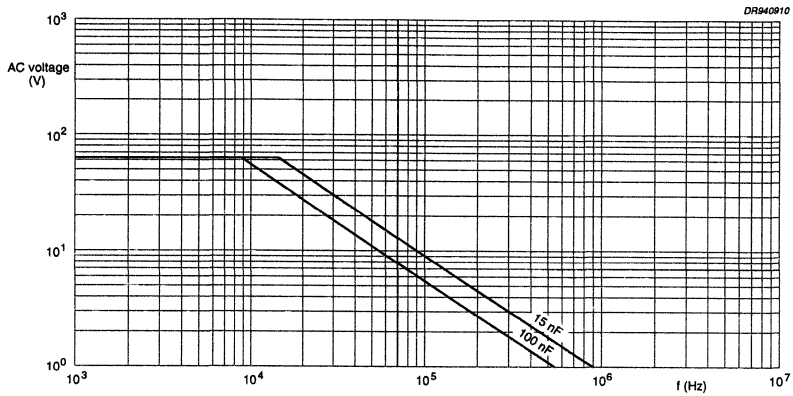
- Storage temperature: $T_{stg}$ = –25 to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Category voltage: $U_{Cdc} = U_{Rdc}$ for T = 85 °C
  $U_{Cac} = 0.7 \times U_{Rac}$ for T = 85 °C
- Test voltage between leads: 1.6 x $U_{Rdc}$
- Test voltage between interconnected leads and case (foil method): 2840 V (DC).

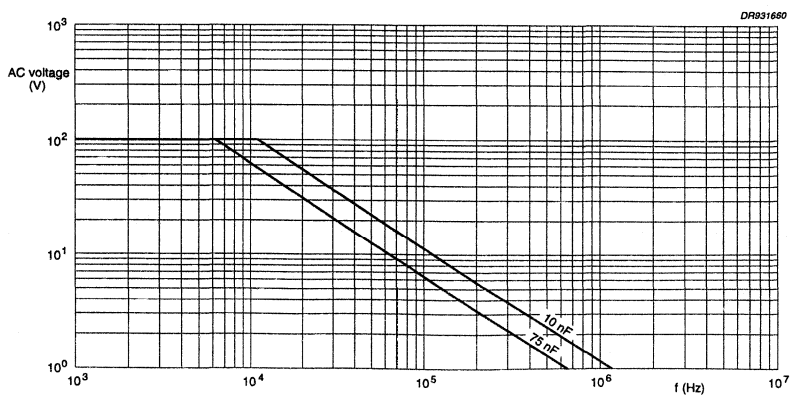
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 70$ °C (see graphs below)**

For pitch P = 5 mm



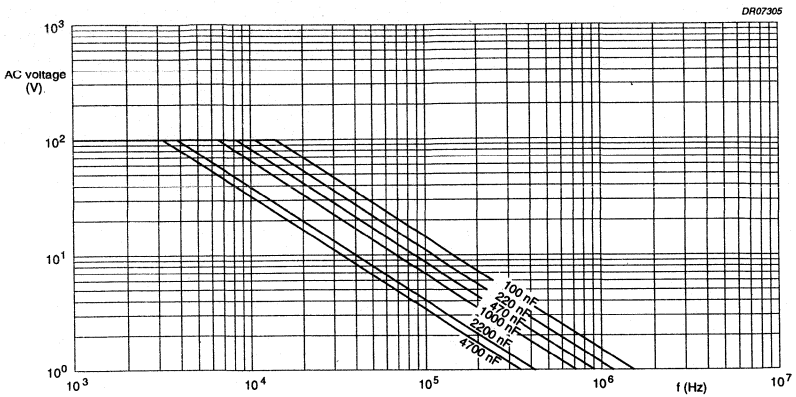

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 100 V.

For pitch P = 5 mm



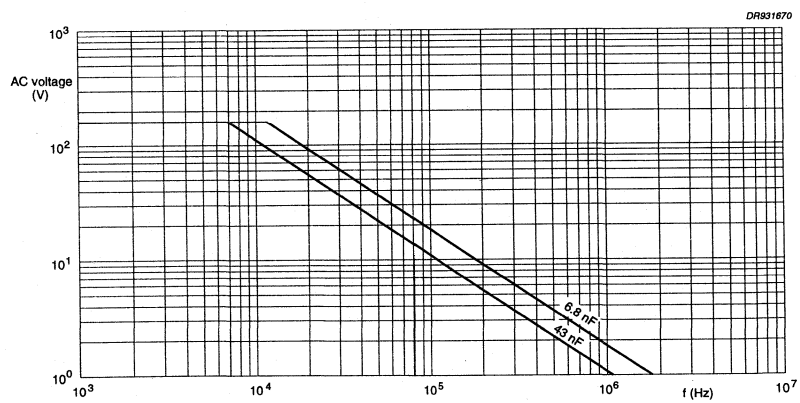

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc}$ = 160 V.

For pitch P ≥ 10 mm



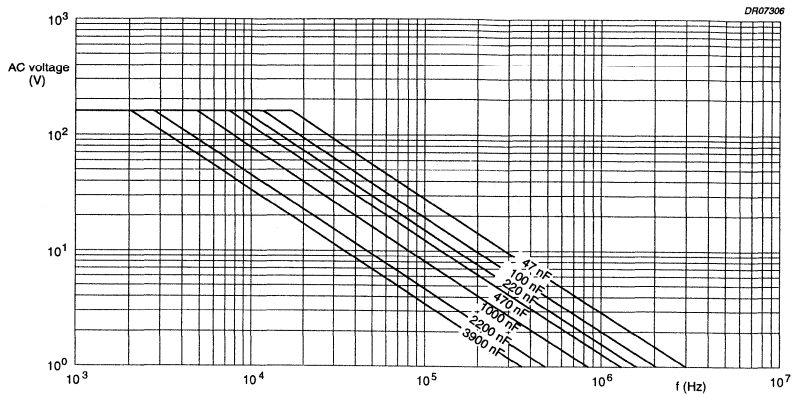

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 160$ V.

For pitch P = 5 mm



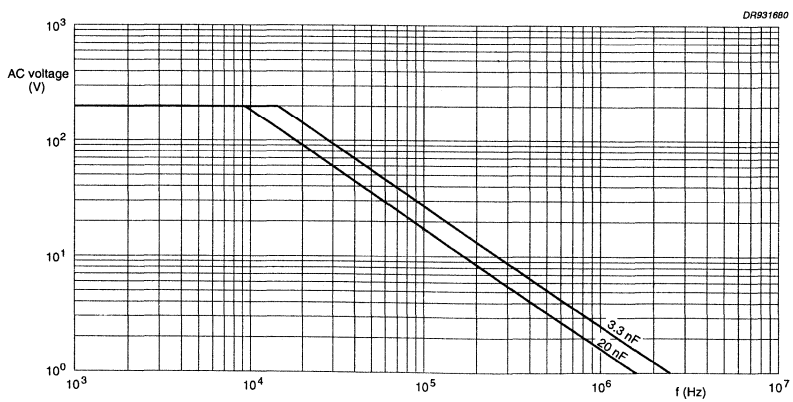

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 250$ V.

For pitch P ≥ 10 mm



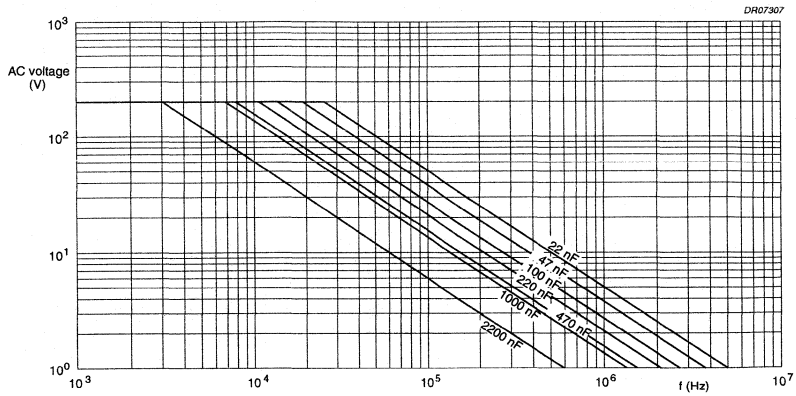

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 250$ V.

For pitch P = 5 mm



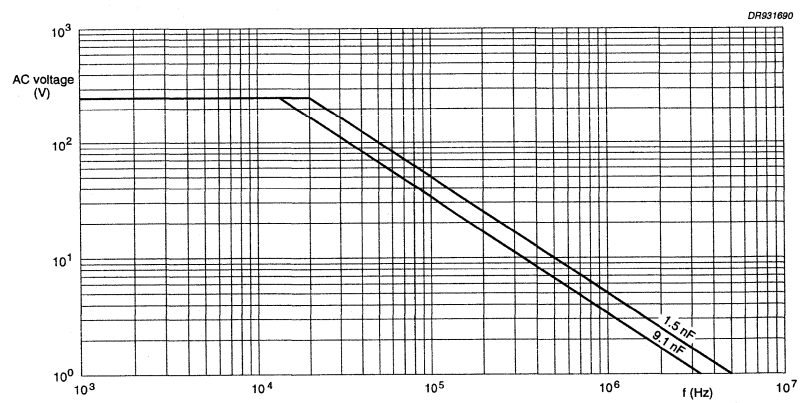

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 400$ V.

For pitch P ≥ 10 mm



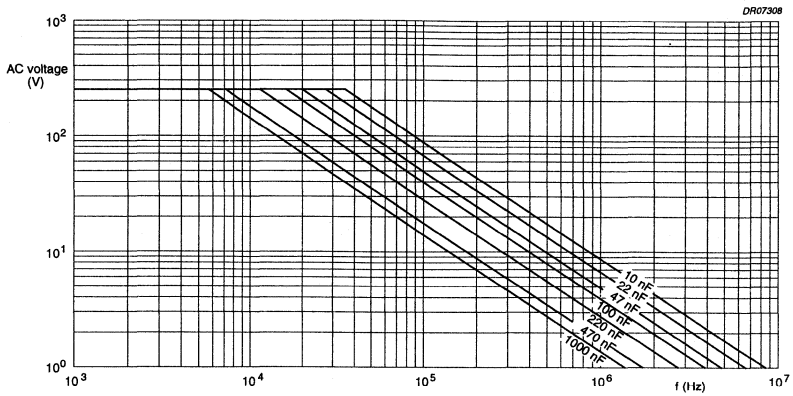

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 400$ V.

For pitch P = 5 mm




AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 630$ V.

For pitch P ≥ 10 mm

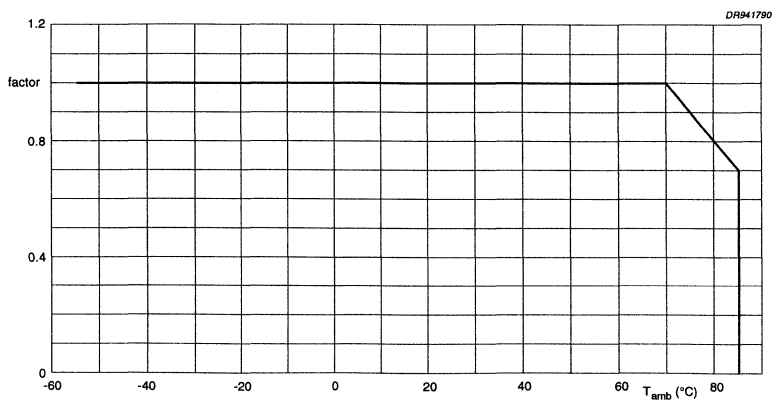



AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 630$ V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} > 70$ °C.**

The maximum RMS voltage in the graphs above has to be multiplied by a factor given in the graph "Multiplying factor as a function of temperature".

The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature at various capacitor dimensions".



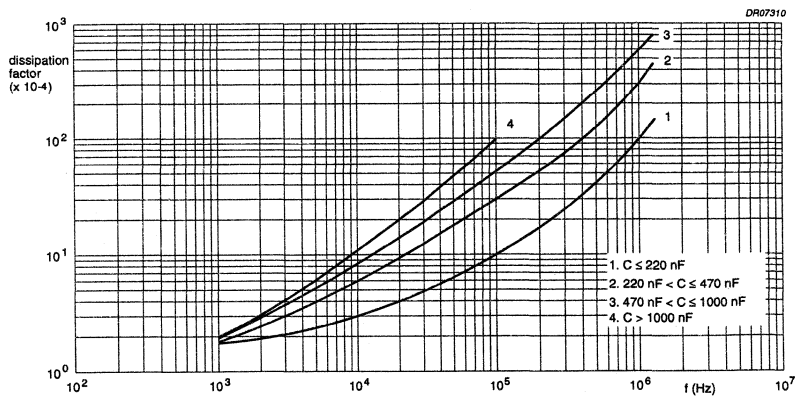

Multiplying factor as a function of temperature.

# AC and pulse metallized polypropylene film capacitors — MKP 379/380

## TANGENT OF LOSS ANGLE

- For maximum values and measuring frequencies: see specific reference data.

| RATED VOLTAGE $U_R$ (V) | CAPACITANCE | TANGENT OF LOSS ANGLE ( x $10^{-4}$ ) | |
|---|---|---|---|
| | | at 10 kHz | at 100 kHz |
| 100 | | ≤25 | ≤80 |
| 160 | C ≤ 0.16 µF | ≤25 | ≤80 |
| | 0.16 µF < C ≤ 0.75 µF | ≤25 | ≤100 |
| | 0.75 µF < C ≤ 1.0 µF | ≤30 | ≤150 |
| | C > 1 µF | ≤30 | – |
| 250 | C ≤ 0.091 µF | ≤15 | ≤40 |
| | 0.091 µF < C ≤ 0.47 µF | ≤15 | ≤60 |
| | 0.47 µF < C ≤ 1.0 µF | ≤20 | ≤120 |
| | 1.0 µF < C ≤ 3.9 µF | ≤25 | – |
| 400 | C ≤ 0.043 µF | ≤10 | ≤30 |
| | 0.043 µF < C ≤ 0.22 µF | ≤15 | ≤40 |
| | 0.22 µF < C ≤ 0.62 µF | ≤15 | ≤60 |
| | 0.62 µF < C ≤ 1.0 µF | ≤15 | ≤80 |
| | 1.0 µF < C ≤ 2.0 µF | ≤20 | – |
| 630 | C ≤ 0.024 µF | ≤10 | ≤20 |
| | 0.024 µF < C ≤ 0.11 µF | ≤10 | ≤25 |
| | 0.11 µF < C ≤ 0.30 µF | ≤10 | ≤35 |
| | 0.33 µF < C ≤ 1.0 µF | ≤15 | ≤70 |




Tangent of loss angle as a function of frequency; typical curves.

### RATED VOLTAGE PULSE SLOPE $(dU/dt)_R$

For values see specific reference data.
If the pulse voltage is lower than the rated voltage, the values of the specific reference data must be multiplied by $U_{Rdc}$ and divided by the applied voltage.

| RATED VOLTAGE $U_R$ (V) | MAXIMUM RATED VOLTAGE PULSE SLOPE (V/µS) | | | | | | |
|---|---|---|---|---|---|---|---|
| | P=5 mm | P=7.5 mm | P=10 mm | P=15 mm | P=22.5 mm | P=27.5 mm | |
| | | | | | | b < 15 mm | b ≥ 15 mm |
| 100 | 80 | – | – | – | – | – | – |
| 160 | 80 | 70 | 60 | 50 | 25 | 15 | 7.5 |
| 250 | 90 | 80 | 70 | 60 | 30 | 20 | 10 |
| 400 | 100 | 90 | 80 | 70 | 35 | 25 | 13 |
| 630 | 120 | 110 | 100 | 90 | 45 | 30 | 15 |

### INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 100 ±15 V for the 100, 160, 250 and 400 V versions, and 500 ±50 V for the 630 V versions.

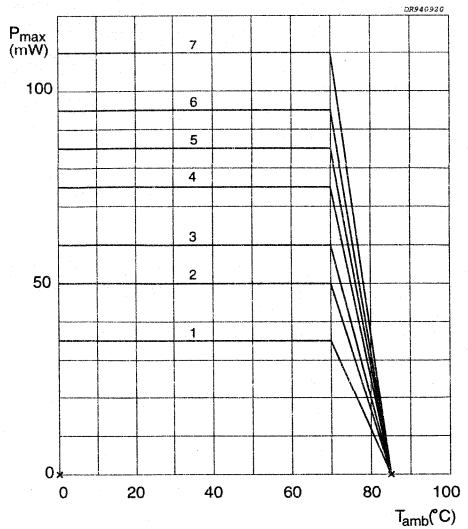
- R between leads: for value see specific reference data.
- R between interconnected leads and case (foil method): >100 000 MΩ.

# AC and pulse metallized polypropylene film capacitors — MKP 379/380

## MAXIMUM DISSIPATION

**For pitch P = 5 mm and 7.5 mm**

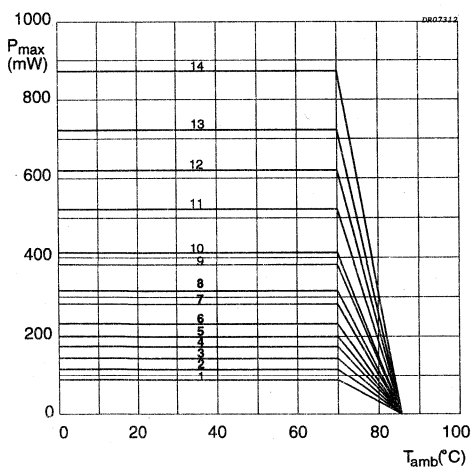
| CURVE | DIMENSIONS (mm) b x h x l |
|---|---|
| 1 | 2.5 x 6.5 x 7.2 |
| 2 | 3.5 x 8.0 x 7.2<br>2.5 x 6.5 x 10.0 |
| 3 | 4.5 x 9.0 x 7.2<br>3.0 x 8.0 x 10.0 |
| 4 | 4.0 x 9.0 x 10.0 |
| 5 | 6.0 x 11.0 x 7.2 |
| 6 | 5.0 x 10.5 x 10.0 |
| 7 | 6.0 x 11.5 x 10.0 |




Maximum power dissipation as a function of ambient temperature, at various capacitor dimensions.

**For pitch P ≥ 10 mm**

| CURVE | DIMENSIONS (mm) b x h x l |
|---|---|
| 1 | 4.0 x 9.0 x 12.5 |
| 2 | 5.0 x 11.0 x 12.5 |
| 3 | 6.0 x 12.0 x 12.5 |
| 4 | 5.0 x 11.0 x 17.5 |
| 5 | 6.0 x 12.0 x 17.5 |
| 6 | 7.0 x 13.5 x 17.5 |
| 7 | 8.5 x 15.0 x 17.5 |
| 8 | 7.0 x 16.5 x 26.0 |
| 9 | 8.5 x 18.0 x 26.0 |
| 10 | 10.0 x 19.5 x 26.0 |
| 11 | 11.0 x 21.0 x 31.0 |
| 12 | 13.0 x 23.0 x 31.0 |
| 13 | 15.0 x 25.0 x 31.0 |
| 14 | 18.0 x 28.0 x 31.0 |




Maximum power dissipation as a function of ambient temperature, at various capacitor dimensions.

# AC and pulse metallized polypropylene film capacitors



## APPLICATION NOTE

To select the capacitor for a certain application, 6 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. The peak current ($I_p$) shall not exceed the maximum peak current, defined as maximum voltage pulse slope (dU/dt) multiplied by the capacitance.

$$I_p \text{ max} = C(\frac{dU}{dt}) \text{ max}$$

   Or the voltage pulse slope shall not exceed the rated voltage pulse slope. If the pulse voltage is lower than the rated voltage, the values of the table can be multiplied by $U_{Rdc}$ and divided by applied voltage.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated in the graph above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.
6. It is recommended that in case of a capacitor breakdown, the power in the capacitor shall be limited to 10 x the maximum allowed power dissipation ($P_{max}$) when the component is used for peak-to-peak voltages higher than 280 $V_{p-p}$.

# AC and pulse metallized polypropylene film capacitors — MKP 379/380

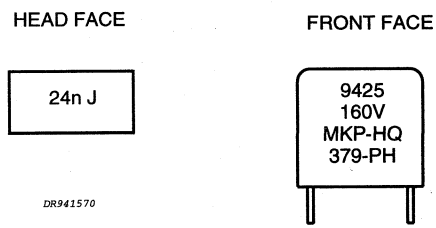
## PRODUCT MARKING

**Style 2222 379 .....**

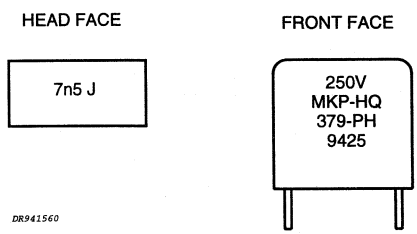
Capacitors are marked by laser print; on the top (pitch ≥22.5 mm) or on the top and one side (pitch ≤15 mm), with the following information:

- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: J = ±5%
- Rated DC voltage (e.g. 160 V)
- Code for dielectric material (MKP)
- Code for factory of origin (HQ)
- Manufacturer's type designation (379)
- Manufacturer's name (PHILIPS) for pitches ≥ 15 mm or PH for pitch 7.5 mm or 10 mm
- Year and week of manufacture (e.g. 9225).

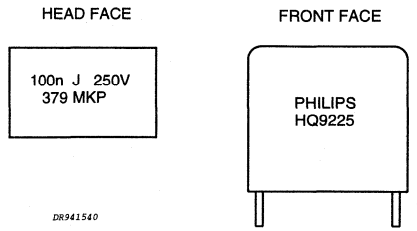
EXAMPLE OF MARKING FOR A CAPACITOR WITH 7.5 MM PITCH



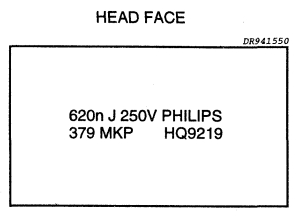

EXAMPLE OF MARKING FOR A CAPACITOR WITH 10 MM PITCH



EXAMPLE OF MARKING FOR A CAPACITOR WITH 15 MM PITCH



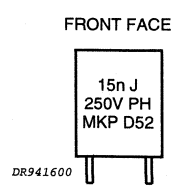

EXAMPLE OF MARKING FOR A CAPACITOR WITH 22.5 MM OR 27.5 MM PITCH




**Style 2222 380 .....**

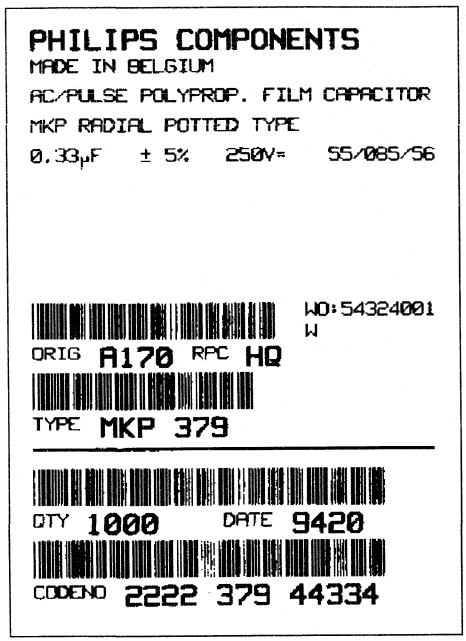
- Rated capacitance code in accordance with IEC 62: p = pF n = nF μ = μF
- Tolerance on rated capacitance: J = ±5%
- Rated DC voltage (e.g. 160 V)
- Manufacturer's name (PH)
- Code for dielectric material (MKP)
- Letter code for year (IEC 62) and numbers for week of production (e.g. D52 = 1993; week 52).

EXAMPLE OF MARKING FOR A CAPACITOR WITH 5 MM PITCH



## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930140

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value in µF, tolerance, voltage and climatic category (IEC) |
| 6 | - |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# AC and pulse metallized polypropylene film capacitors

# MKP 379/380

## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending | | no visible damage<br>legible marking<br>$\Delta C/C \leq 1\%$<br>250 to 630 V: 22.5/27.5 mm pitch |
| Resistance to soldering heat | solder bath: 260 °C; 10 s | $\Delta C/C \leq 2\%$<br>100 to 160 V: all pitches<br>250 to 630 V: 5 to 15 mm pitch |
| Component solvent resistance | isopropyl alcohol; 23 °C; 5 minutes | $\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) |
| **Robustness of component** | | |
| Vibration | 10 Hz to 55 Hz.; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours | $\Delta C/C \leq 1\%$<br>250 to 630 V: 22.5/27.5 mm pitch<br>$\Delta C/C \leq 2\%$<br>100 to 160 V: all pitches<br>250 to 630 V: 5 to 15 mm pitch<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) |
| Shock | half sinewave; 490 m/s$^2$; 11 ms | |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 85 °C | $\Delta C/C \leq 1\%$<br>250 to 630 V: 22.5/27.5 mm pitch<br>$\Delta C/C \leq 3\%$<br>100 to 160 V: all pitches<br>250 to 630 V: 5 to 15 mm pitch<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Damp heat cyclic, first cycle | | |
| Cold | 2 hours; −55 °C | |
| Damp heat remaining cycles | | |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 1\%$<br>250 to 630 V: 22.5/27.5 mm pitch<br>$\Delta C/C \leq 3\%$<br>100 to 160 V: all pitches<br>250 to 630 V: 5 to 15 mm pitch<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (AC) | 1000 hours; 85 °C; 1.25 x $U_{Rac}$ (RMS); 50 Hz | $\Delta C/C \leq 5\%$<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)<br>$R_{ins} \geq 50\%$ of specified value |
| Heat storage | 2000 hours; 85 °C | $\Delta C/C \leq 1\%$<br>250 to 630 V: 22.5/27.5 mm pitch<br>$\Delta C/C \leq 3\%$<br>100 to 160 V: all pitches<br>250 to 630 V: 5 to 15 mm pitch<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) |

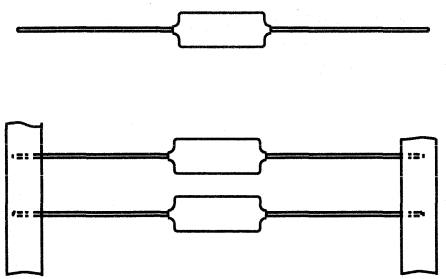
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Resistance to soldering heat with preheating | body temperature: 85 °C<br>bath temperature: 260 °C<br>dwell time: 10 s | $\Delta C/C \leq 1\%$<br>250 to 630 V: 22.5/27.5 mm pitch<br>$\Delta C/C \leq 2\%$<br>100 to 160 V: all pitches<br>250 to 630 V: 5 to 15 mm pitch<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF) |
| Passive flammability | class C | no burning |
| Endurance (DC) | 2000 hours:<br>1.25 x $U_{Rdc}$; 85 °C | $\Delta C/C \leq 1\%$<br>400 to 630 V: 22.5/27.5 mm pitch<br>$\Delta C/C \leq 3\%$<br>100 to 250 V: all pitches<br>450 to 630 V: 5 to 15 mm pitch<br>$\Delta\tan\delta \leq 5 \times 10^{-4}$ ($C \leq 100$ nF)<br>$\Delta\tan\delta \leq 10 \times 10^{-4}$ (100 nF < $C \leq 470$ nF)<br>$\Delta\tan\delta \leq 15 \times 10^{-4}$ ($C > 470$ nF)<br>$R_{ins} \geq 50\%$ of specified value |

# PRECISION CAPACITORS

# Polystyrene film foil capacitors

# KS 424 .. 431

## KS AXIAL CAPACITORS



DR04301

## QUICK REFERENCE DATA

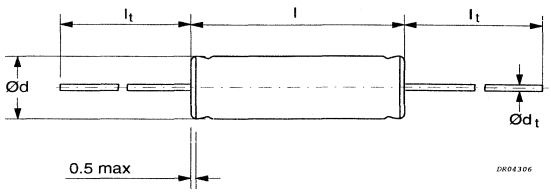
| | |
|---|---|
| Capacitance range | 47 to 39 000 pF |
| Capacitance tolerance | ±5%, ±2%, ±1% |
| Rated voltage (DC) | 63 V, 160 V, 250 V, 630 V |
| Climatic category | 40/085/21 |
| Rated temperature | 85 °C |
| Reference specification | IEC 384-7 |
| Stability class | class 3 |

| FEATURES | APPLICATIONS |
|---|---|
| • Supplied loose in box and taped on reel. | • In circuits where close tolerance, reliability and low losses are of prime importance, for example: tuned circuits, filter and timing networks. |

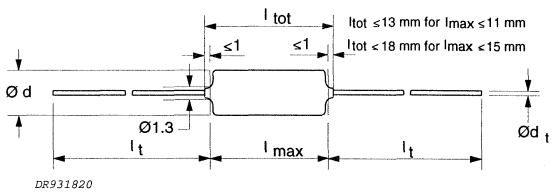
# Polystyrene film foil capacitors

# KS 424 / 428

## GENERAL DATA




Naked version.




Lacquered version.

## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 100 kHz |
|---|---|---|
| 1000 pF < C ≤ 10 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| 10 000 pF < C ≤ 20 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| C > 20 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 25 \times 10^{-4}$ |
| R between leads | >100 000 MΩ | |

## AVAILABLE 63 V VERSIONS

| | | | | |
|---|---|---|---|---|
| Taped on reel | naked version | C-tol ±1% | catalogue number **2222 428 8....** | preferred |
| Taped on reel | naked version | C-tol ±2% | catalogue number **2222 428 7....** | preferred |
| Taped on reel | naked version | C-tol ±5% | catalogue number **2222 428 6....** | on request |
| Loose in box | naked version | C-tol ±1% | catalogue number **2222 424 4....** | on request |
| Loose in box | naked version | C-tol ±2% | catalogue number **2222 424 3....** | on request |
| Loose in box | naked version | C-tol ±5% | catalogue number **2222 424 2....** | on request |
| Taped on reel | lacquered version | C-tol ±1% | catalogue number **2222 428 4....** | on request |
| Taped on reel | lacquered version | C-tol ±2% | catalogue number **2222 428 3....** | on request |
| Taped on reel | lacquered version | C-tol ±5% | catalogue number **2222 428 2....** | on request |
| Loose in box | lacquered version | C-tol ±1% | catalogue number **2222 424 8....** | on request |
| Loose in box | lacquered version | C-tol ±2% | catalogue number **2222 424 7....** | on request |
| Loose in box | lacquered version | C-tol ±5% | catalogue number **2222 424 6....** | on request |

# Polystyrene film foil capacitors

# KS 424 / 428

## $U_{Rdc}$ = 63V

$U_{Rac}$ = 25 V

## loose and taped

| Cap. (E-24) (pF) * | $d_{max}$ ** x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 428 ..... naked version taped on reel: C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ (***) | 2222 424 ..... loose in box: SPQ (***) |
|---|---|---|---|---|---|---|
| $l_t$ = 30.0 mm | | $d_t$ = 0.60 ±0.06 mm | | | | |
| 2000 | 3.8 x 11.0 | 0.3 | 72002 | 82002 | 3000 (2500) | 400 (300) |
| 2200 | | 0.3 | 72202 | 82202 | | |
| 2400 | | 0.4 | 72402 | 82402 | | |
| 2700 | 4.0 x 11.0 | 0.4 | 72702 | 82702 | 2500 | 400 (300) |
| 3000 | | 0.4 | 73002 | 83002 | | |
| 3300 | | 0.4 | 73302 | 83302 | | |
| 3600 | | 0.4 | 73602 | 83602 | | |
| 3900 | | 0.4 | 73902 | 83902 | | |
| 4300 | 4.5 x 11.0 | 0.5 | 74302 | 84302 | 2500 | 300 (250) |
| 4700 | | 0.5 | 74702 | 84702 | | |
| 5100 | | 0.5 | 75102 | 85102 | | |
| 5600 | | 0.5 | 75602 | 85602 | | |
| 6200 | 5.0 x 11.0 | 0.6 | 76202 | 86202 | 1500 | 250 (200) |
| 6800 | | 0.6 | 76802 | 86802 | | |
| $l_t$ = 28 mm | | $d_t$ = 0.60 ±0.06 mm | | | | |
| 7500 | 5.0 x 15.0 | 0.6 | 77502 | 87502 | 1500 | 300 (250) |
| 8200 | | 0.6 | 78202 | 88202 | | |
| 9100 | | 0.7 | 79102 | 89102 | | |
| 10000 | | 0.7 | 71003 | 81003 | | |
| 11000 | 5.5 x 15.0 | 0.8 | 71103 | 81103 | 1500 | 250 (200) |
| 12000 | | 0.8 | 71203 | 81203 | | |
| 13000 | | 0.9 | 71303 | 81303 | | |
| 15000 | | 0.9 | 71503 | 81503 | | |
| 16000 | 6.0 x 15.0 | 1.1 | 71603 | 81603 | 1500 | 250 (200) |
| 18000 | | 1.1 | 71803 | 81803 | | |
| 20000 | | 1.3 | 72003 | 82003 | | |
| 22000 | 6.5 x 15.0 | 1.3 | 72203 | 82203 | 1000 | 200 (150) |
| 24000 | | 1.4 | 72403 | 82403 | | |
| 27000 | 7.0 x 15.0 | 1.5 | 72703 | 82703 | 1000 | 150 (100) |
| 30000 | | 1.7 | 73003 | 83003 | | |
| 33000 | 7.5 x 15.0 | 1.9 | 73303 | 83303 | 1000 | 150 (100) |
| 36000 | | 1.9 | 73603 | 83603 | | |
| 39000 | 8.0 x 15.0 | 2.0 | 73903 | 83903 | 1000 | 150 (100) |

Preferred catalogue numbers

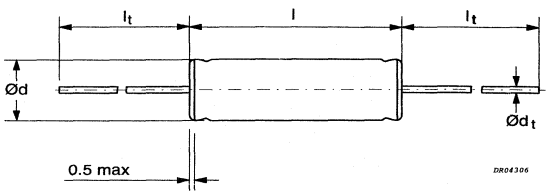
* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and of the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

** Diameter $d_{max}$ +0.7 mm for lacquered versions.

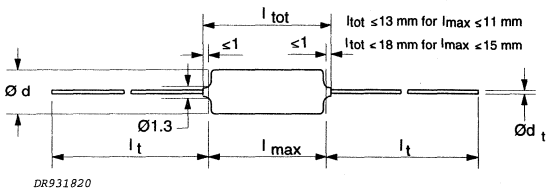
*** If different from naked version, SPQ in brackets for lacquered version.

# Polystyrene film foil capacitors

# KS 425 / 429




Naked version.




Lacquered version.

**SPECIFIC REFERENCE DATA FOR THE 160 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 100 kHz |
|---|---|---|
| 1000 pF < C ≤ 10 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ |
| 10 000 pF < C ≤ 20 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ |
| R between leads | >100 000 MΩ | |

**AVAILABLE 160 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Taped on reel | naked version | C-tol ±1% | catalogue number **2222 429 8....** | preferred |
| Taped on reel | naked version | C-tol ±2% | catalogue number **2222 429 7....** | preferred |
| Taped on reel | naked version | C-tol ±5% | catalogue number **2222 429 6....** | on request |
| Loose in box | naked version | C-tol ±1% | catalogue number **2222 425 4....** | on request |
| Loose in box | naked version | C-tol ±2% | catalogue number **2222 425 3....** | on request |
| Loose in box | naked version | C-tol ±5% | catalogue number **2222 425 2....** | on request |
| Taped on reel | lacquered version | C-tol ±1% | catalogue number **2222 429 4....** | on request |
| Taped on reel | lacquered version | C-tol ±2% | catalogue number **2222 429 3....** | on request |
| Taped on reel | lacquered version | C-tol ±5% | catalogue number **2222 429 2....** | on request |
| Loose in box | lacquered version | C-tol ±1% | catalogue number **2222 425 8....** | on request |
| Loose in box | lacquered version | C-tol ±2% | catalogue number **2222 425 7....** | on request |
| Loose in box | lacquered version | C-tol ±5% | catalogue number **2222 425 6....** | on request |

# Polystyrene film foil capacitors



## $U_{Rdc}$ = 160V

$U_{Rac}$ = 63 V

**loose and taped**

| Cap. (E-24) (pF) * | $d_{max}$ ** x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 429 ..... naked version taped on reel: C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ (***) | 2222 425 ..... loose in box: SPQ (***) |
|---|---|---|---|---|---|---|
| | | $l_t$ = 30.0 mm | $d_t$ = 0.60 ±0.06 mm | | | |
| 1100 | 3.8 x 11.0 | 0.3 | 71102 | 81102 | 3000 (2500) | 400 (300) |
| 1200 | | 0.3 | 71202 | 81202 | | |
| 1300 | | 0.3 | 71302 | 81302 | | |
| 1500 | 4.0 x 11.0 | 0.4 | 71502 | 81502 | 2500 | 400 (300) |
| 1600 | | 0.4 | 71602 | 81602 | | |
| 1800 | | 0.4 | 71802 | 81802 | | |
| 2000 | 4.5 x 11.0 | 0.4 | 72002 | 82002 | 2500 | 300 (250) |
| 2200 | | 0.4 | 72202 | 82202 | | |
| 2400 | | 0.5 | 72402 | 82402 | | |
| 2700 | | 0.5 | 72702 | 82702 | | |
| 3000 | 5.0 x 11.0 | 0.5 | 73002 | 83002 | 1500 | 250 (200) |
| 3300 | | 0.5 | 73302 | 83302 | | |
| 3600 | | 0.6 | 73602 | 83602 | | |
| 3900 | | 0.6 | 73902 | 83902 | | |
| | | $l_t$ = 28.0 mm | $d_t$ = 0.60 ±0.06 mm | | | |
| 4300 | 5.0 x 15.0 | 0.6 | 74302 | 84302 | 1500 | 300 (250) |
| 4700 | | 0.6 | 74702 | 84702 | | |
| 5100 | | 0.6 | 75102 | 85102 | | |
| 5600 | | 0.7 | 75602 | 85602 | | |
| 6200 | | 0.7 | 76202 | 86202 | | |
| 6800 | 5.5 x 15.0 | 0.8 | 76802 | 86802 | 1500 | 250 (200) |
| 7500 | | 0.8 | 77502 | 87502 | | |
| 8200 | 6.0 x 15.0 | 0.9 | 78202 | 88202 | 1500 | 250 (200) |
| 9100 | | 0.9 | 79102 | 89102 | | |
| 10000 | | 1.1 | 71003 | 81003 | | |
| 11000 | 6.5 x 15.0 | 1.1 | 71103 | 81103 | 1000 | 200 (150) |
| 12000 | | 1.2 | 71203 | 81203 | | |
| 13000 | | 1.3 | 71303 | 81303 | | |
| 15000 | 7.0 x 15.0 | 1.4 | 71503 | 81503 | 1000 | 150 (100) |
| 16000 | | 1.5 | 71603 | 81603 | | |

Preferred catalogue numbers

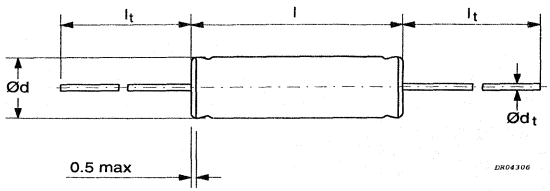
* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and of the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

** Diameter $d_{max}$ +0.7 mm for lacquered versions.

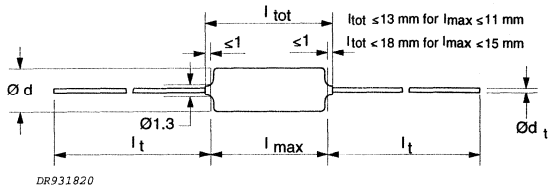
*** If different from naked version, SPQ in brackets for lacquered version.

# Polystyrene film foil capacitors

# KS 426 / 430




Naked version.




Lacquered version.

**SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 100 kHz | at 1 MHz |
|---|---|---|---|
| C ≤ 1000 pF | $\leq 5 \times 10^{-4}$ | – | $\leq 10 \times 10^{-4}$ |
| 1000 pF < C ≤ 10 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | – |
| 10 000 pF < C ≤ 20 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ | – |
| R between leads | >100 000 MΩ | | |

**AVAILABLE 250 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Taped on reel | naked version | C-tol ±1% | catalogue number **2222 430 8....** | preferred |
| Taped on reel | naked version | C-tol ±2% | catalogue number **2222 430 7....** | preferred |
| Taped on reel | naked version | C-tol ±5% | catalogue number **2222 430 6....** | on request |
| Loose in box | naked version | C-tol ±1% | catalogue number **2222 426 4....** | on request |
| Loose in box | naked version | C-tol ±2% | catalogue number **2222 426 3....** | on request |
| Loose in box | naked version | C-tol ±5% | catalogue number **2222 426 2....** | on request |
| Taped on reel | lacquered version | C-tol ±1% | catalogue number **2222 430 4....** | on request |
| Taped on reel | lacquered version | C-tol ±2% | catalogue number **2222 430 3....** | on request |
| Taped on reel | lacquered version | C-tol ±5% | catalogue number **2222 430 2....** | on request |
| Loose in box | lacquered version | C-tol ±1% | catalogue number **2222 426 8....** | on request |
| Loose in box | lacquered version | C-tol ±2% | catalogue number **2222 426 7....** | on request |
| Loose in box | lacquered version | C-tol ±5% | catalogue number **2222 426 6....** | on request |

# Polystyrene film foil capacitors

# KS 426 / 430

## $U_{Rdc}$ = 250V

$U_{Rac}$ = 125 V

## loose and taped

| Cap. (E-24) (pF) * | $d_{max}$ ** x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 426 ..... naked vesion taped on reel C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ (***) | 2222 430 ..... loose in box SPQ (***) |
|---|---|---|---|---|---|---|
| | | $l_t$ = 30.0 mm | $d_t$ = 0.60 ±0.06 mm | | | |
| 560 | 3.8 x 11.0 | 0.3 | 75601 | 85601 | 3000 (2500) | 400 (300) |
| 620 | | 0.3 | 76201 | 86201 | | |
| 680 | | 0.3 | 76801 | 86801 | | |
| 750 | 4.0 x 11.0 | 0.3 | 77501 | 87501 | 2500 | 400 (300) |
| 820 | | 0.4 | 78201 | 88201 | | |
| 910 | | 0.4 | 79101 | 89101 | | |
| 1000 | | 0.4 | 71002 | 81002 | | |
| 1100 | 4.5 x 11.0 | 0.4 | 71102 | 81102 | 2500 | 300 (250) |
| 1200 | | 0.5 | 71202 | 81202 | | |
| 1300 | | 0.5 | 71302 | 81302 | | |
| 1500 | | 0.5 | 71502 | 81502 | | |
| 1600 | 5.0 x 11.0 | 0.5 | 71602 | 81602 | 1500 | 250 (200) |
| 1800 | | 0.5 | 71802 | 81802 | | |
| 2000 | | 0.6 | 72002 | 82002 | | |
| 2200 | | 0.6 | 72202 | 82202 | | |
| | | $l_t$ = 28.0 mm | $d_t$ = 0.60 ±0.06 mm | | | |
| 2400 | 5.0 x 15.0 | 0.6 | 72402 | 82402 | 1500 | 300 (250) |
| 2700 | | 0.6 | 72702 | 82702 | | |
| 3000 | | 0.6 | 73002 | 83002 | | |
| 3300 | | 0.6 | 73302 | 83302 | | |
| 3600 | | 0.7 | 73602 | 83602 | | |
| 3900 | | 0.7 | 73902 | 83902 | | |
| 4300 | | 0.7 | 74302 | 84302 | | |
| 4700 | 5.5 x 15.0 | 0.8 | 74702 | 84702 | 1500 | 250 (200) |
| 5100 | | 0.8 | 75102 | 85102 | | |
| 5600 | 6.0 x 15.0 | 0.9 | 75602 | 85602 | 1500 | 250 (200) |
| 6200 | | 0.9 | 76202 | 86202 | | |
| 6800 | 6.5 x 15.0 | 1.1 | 76802 | 86802 | 1000 | 200 (150) |
| 7500 | | 1.1 | 77502 | 87502 | | |
| 8200 | 7.0 x 15.0 | 1.3 | 78202 | 88202 | 1000 | 150 (100) |
| 9100 | | 1.3 | 79102 | 89102 | | |
| 10000 | 7.5 x 15.0 | 1.5 | 71003 | 81003 | 1000 | 150 (100) |
| 11000 | | 1.6 | 71103 | 81103 | | |

Preferred catalogue numbers

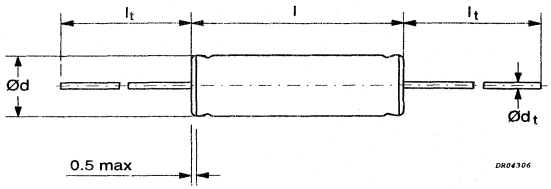
* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and of the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

** Diameter $d_{max}$ +0.7 mm for lacquered versions.

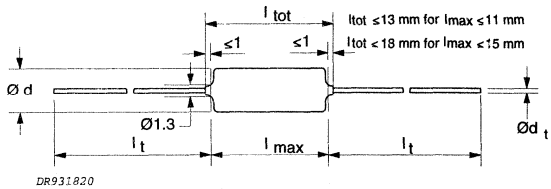
*** If different from naked version, SPQ in brackets for lacquered version.

# Polystyrene film foil capacitors

# KS 427 / 431




Naked version.




Lacquered version.

**SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION**

| Tangent of loss angle | at 1 kHz | at 10 kHz | at 1 MHz |
|---|---|---|---|
| C ≤ 1000 pF | ≤5 x $10^{-4}$ | – | ≤10 x $10^{-4}$ |
| 1000 pF < C ≤ 10 000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ | – |
| R between leads | >100 000 MΩ | | |

**AVAILABLE 630 V VERSIONS**

| | | | | |
|---|---|---|---|---|
| Taped on reel | naked version | C-tol ±1% | catalogue number **2222 431 8....** | preferred |
| Taped on reel | naked version | C-tol ±2% | catalogue number **2222 431 7....** | preferred |
| Taped on reel | naked version | C-tol ±5% | catalogue number **2222 431 6....** | on request |
| Loose in box | naked version | C-tol ±1% | catalogue number **2222 427 4....** | on request |
| Loose in box | naked version | C-tol ±2% | catalogue number **2222 427 3....** | on request |
| Loose in box | naked version | C-tol ±5% | catalogue number **2222 427 2....** | on request |
| Taped on reel | lacquered version | C-tol ±1% | catalogue number **2222 431 4....** | on request |
| Taped on reel | lacquered version | C-tol ±2% | catalogue number **2222 431 3....** | on request |
| Taped on reel | lacquered version | C-tol ±5% | catalogue number **2222 431 2....** | on request |
| Loose in box | lacquered version | C-tol ±1% | catalogue number **2222 427 8....** | on request |
| Loose in box | lacquered version | C-tol ±2% | catalogue number **2222 427 7....** | on request |
| Loose in box | lacquered version | C-tol ±5% | catalogue number **2222 427 6....** | on request |

# Polystyrene film foil capacitors

# KS 427 / 431

## $U_{Rdc}$ = 630V

$U_{Rac}$ = 250 V

## loose and taped

| Cap. (E-24) (pF) * | $d_{max}$ ** x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 427 ..... naked version taped on reel: C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ *** | 2222 431 ..... loose in box: SPQ *** |
|---|---|---|---|---|---|---|
| | | $l_t$ = 30.0 mm | $d_t$ = 0.60 ±0.06 mm | | | |
| 47 | 3.8 x 11.0 | 0.2 | 74709 | 84709 | 3000 (2500) | 400 (300) |
| 51 | | | 75109 | 85109 | | |
| 56 | | | 75609 | 85609 | | |
| 62 | | | 76209 | 86209 | | |
| 68 | | | 76809 | 86809 | | |
| 75 | | | 77509 | 87509 | | |
| 82 | | | 78209 | 88209 | | |
| 91 | | | 79109 | 89109 | | |
| 100 | | | 71001 | 81001 | | |
| 110 | | | 71101 | 81101 | | |
| 120 | | | 71201 | 81201 | | |
| 130 | | | 71301 | 81301 | | |
| 150 | | | 71501 | 81501 | | |
| 160 | | | 71601 | 81601 | | |
| 180 | | | 71801 | 81801 | | |
| 200 | | | 72001 | 82001 | | |
| 220 | | | 72201 | 82201 | | |
| 240 | | 0.3 | 72401 | 82401 | | |
| 270 | | | 72701 | 82701 | | |
| 300 | | | 73001 | 83001 | | |
| 330 | 4.0 x 11.0 | 0.3 | 73301 | 83301 | 2500 | 400 (300) |
| 360 | | | 73601 | 83601 | | |
| 390 | | | 73901 | 83901 | | |
| 430 | | | 74301 | 84301 | | |
| 470 | 4.5 x 11.0 | 0.3 | 74701 | 84701 | 2500 | 300 (250) |
| 510 | | | 75101 | 85101 | | |
| 560 | | | 75601 | 85601 | | |
| 620 | | | 76201 | 86201 | | |
| 680 | | | 76801 | 86801 | | |
| 750 | 5.0 x 11.0 | 0.4 | 77501 | 87501 | 1500 | 250 (200) |
| 820 | | 0.4 | 78201 | 88201 | | |
| 910 | | 0.5 | 79101 | 89101 | | |
| 1000 | | 0.5 | 71002 | 81002 | | |
| 1100 | | 0.5 | 71102 | 81102 | | |
| 1200 | | 0.5 | 71202 | 81202 | | |

Preferred catalogue numbers

* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and of the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

** Diameter $d_{max}$ +0.7 mm for lacquered versions.

*** If different from naked version, SPQ in brackets for lacquered version.

# Polystyrene film foil capacitors

# KS 427 / 431

## $U_{Rdc}$ = 630V $U_{Rac}$ = 250 V loose and taped

| Cap. (E-24) (pF) * | $d_{max}$ ** x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 427 ..... naked versions taped on reel C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ (***) | 2222 431 ..... loose in box SPQ (***) |
|---|---|---|---|---|---|---|
| | $l_t$ = 28.0 mm | | $d_t$ = 0.60 ±0.06 mm | | | |
| 1300 | 5.0 x 15.0 | 0.6 | 71302 | 81302 | 1500 | 300 (250) |
| 1500 | | 0.6 | 71502 | 81502 | | |
| 1600 | | 0.7 | 71602 | 81602 | | |
| 1800 | 5.5 x 15.0 | 0.8 | 71802 | 81802 | 1500 | 250 (200) |
| 2000 | | 0.8 | 72002 | 82002 | | |
| 2200 | | 0.9 | 72202 | 82202 | | |
| 2400 | | 0.9 | 72402 | 82402 | | |
| 2700 | 6.0 x 15.0 | 1.1 | 72702 | 82702 | 1500 | 250 (200) |
| 3000 | 6.5 x 15.0 | 1.1 | 73002 | 83002 | 1000 | 200 (150) |
| 3300 | | 1.4 | 73302 | 83302 | | |
| 3600 | 7.0 x 15.0 | 1.4 | 73602 | 83602 | 1000 | 150 (100) |
| 3900 | | 1.4 | 73902 | 83902 | | |
| 4300 | 7.5 x 15.0 | 1.7 | 74302 | 84302 | 1000 | 150 (100) |
| 4700 | | 1.7 | 74702 | 84702 | | |
| 5100 | 8.0 x 15.0 | 1.7 | 75102 | 85102 | 1000 | 150 (100) |
| 5600 | | 2.0 | 75602 | 85602 | | |

Preferred catalogue numbers

* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and of the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

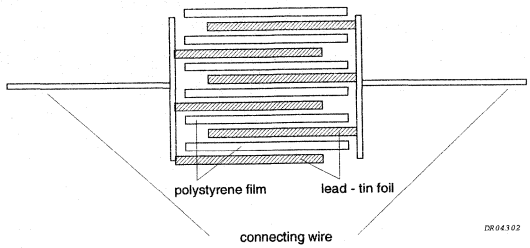
** Diameter $d_{max}$ +0.7 mm for lacquered versions.

*** If different from naked version, SPQ in brackets for lacquered version.

# Polystyrene film foil capacitors

# KS 424 .. 431

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metal foil and a polystyrene film.
- Axial leads, solder-coated.
- The capacitors are available in a naked version or with a blue epoxy lacquer (on request).

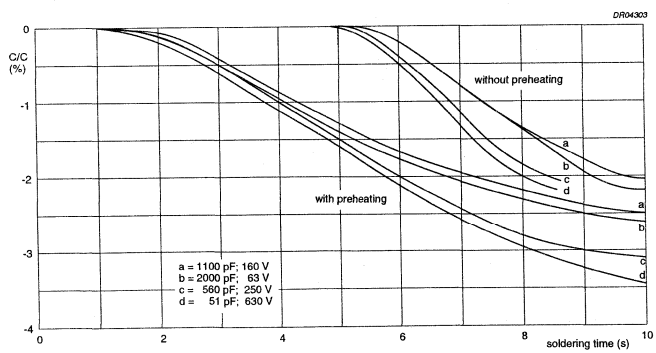
## MOUNTING

### Normal use

The capacitors are suitable for vertical or horizontal mounting on printed-circuit boards.
The capacitors packed in bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines. When soldering, the body temperature shall not exceed 100 °C.

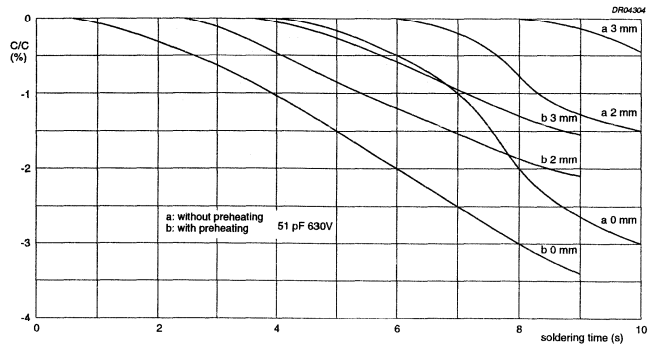
### Soldering conditions

The capacitance stability is dependent on the body dimensions as a function of soldering temperature, soldering time, preheating, mounting method, mounting height and mounting pitch.
In all of the following graphs the solder bath temperature is 260 ±5 °C.
The graph below shows the typical behaviour of ΔC/C with and without preheating as a function of soldering time. Preheating temperature is 80 °C (duration 1 hour). Mounting is directly on to the printed-circuit board.
The leads are to be kept as short as possible (shortest pitch).



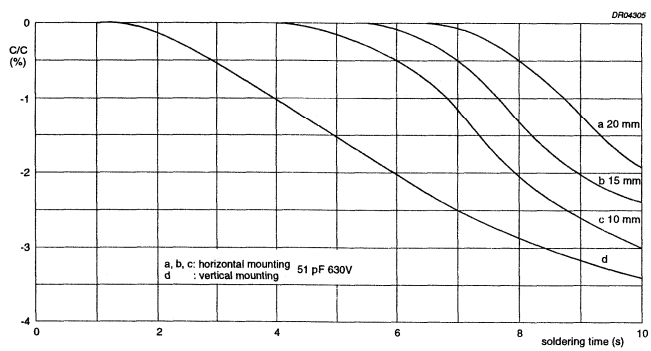

Typical effect on ΔC/C with and without preheating (worst case mounting).

The graph below shows the typical effect of higher mounting and minimum pitch, with and without preheating.




Typical effect of mounting height with and without preheating.

The graph below shows the effect of a wider mounting distance and close mounting on to the printed-circuit board with preheating of the capacitor.




Typical effect of wider mounting distance and preheating.

**Specific method of mounting to withstand vibration and shock**

The capacitors shall be mechanically fixed by the leads.

# Polystyrene film foil capacitors

# KS 424 .. 431

## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply to an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- Capacitance tolerance: ±5%, ±2% and ±1% or 1 pF whichever is greater.
- Temperature coefficient: $-(125 \pm 60) \times 10^{-6}/°K$.
- Capacitance dependency on frequency: none between 100 Hz and 1 MHz.

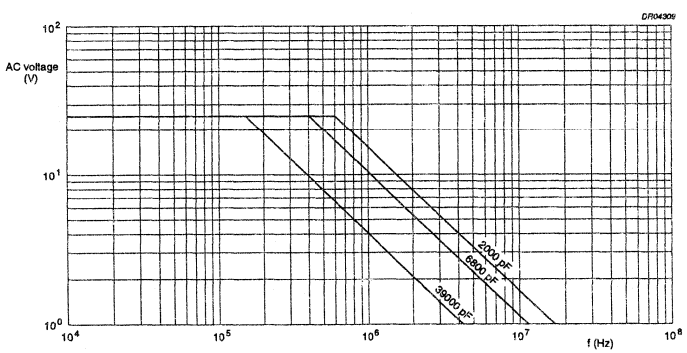
## TEMPERATURE

Storage temperature: $T_{stg}$ = −25 to +40 °C with RH maximum 80% without condensation.

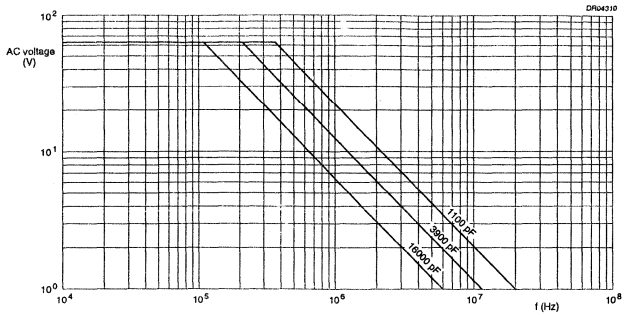
## VOLTAGE

- Category voltage: $U_c = U_{Rdc}$.
- Test voltage between terminations: 2 x $U_{Rdc}$.

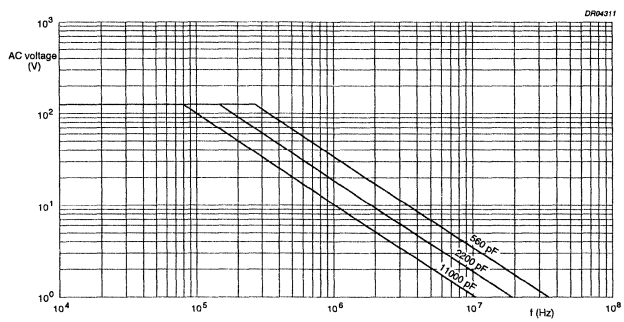
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 70°C$ (see graphs below)**



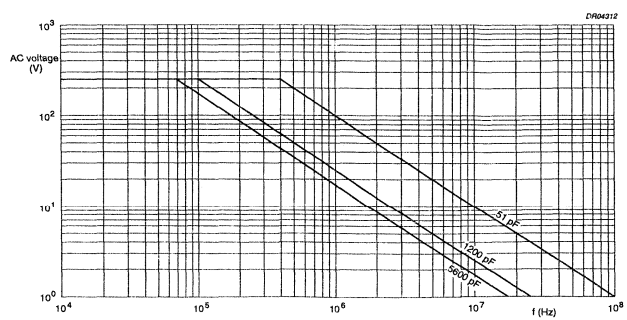

Maximum AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C, for 63 V version.




Maximum AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C, for 160 V version.




Maximum AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C, for 250 V version.

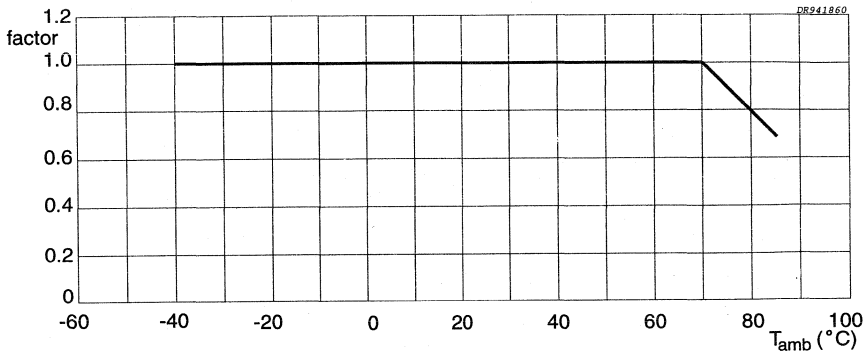



Maximum AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 70$ °C, for 630 V version.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb}$ > 70 °C**

The maximum RMS voltage in graphs above has to be multiplied by a factor (see graph below)

The power dissipation must be checked and should not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature".

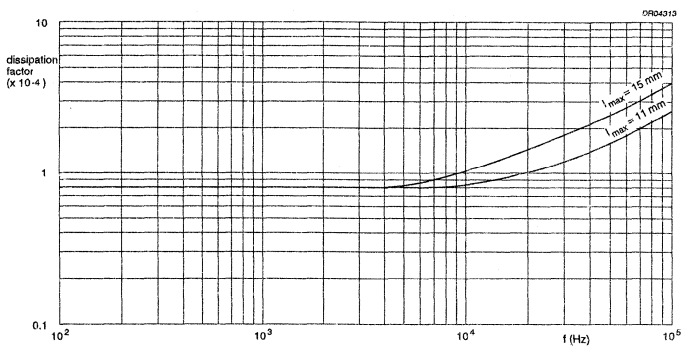


# Polystyrene film foil capacitors

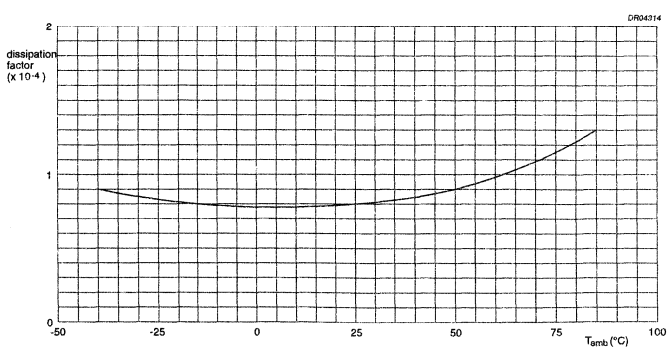
# KS 424 .. 431

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|
| | 1 kHz | 100 kHz | 1 MHz |
| C ≤ 1000 pF | $\leq 5 \times 10^{-4}$ | – | $\leq 10 \times 10^{-4}$ |
| 1000 pF < C < 10 000 pF | $\leq 5 \times 10^{-4}$ | $\leq 10 \times 10^{-4}$ | – |
| 10 000 pF < C < 20 000 pf | $\leq 5 \times 10^{-4}$ | $\leq 15 \times 10^{-4}$ | – |
| C > 20 000 pf | $\leq 5 \times 10^{-4}$ | $\leq 25 \times 10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curves.

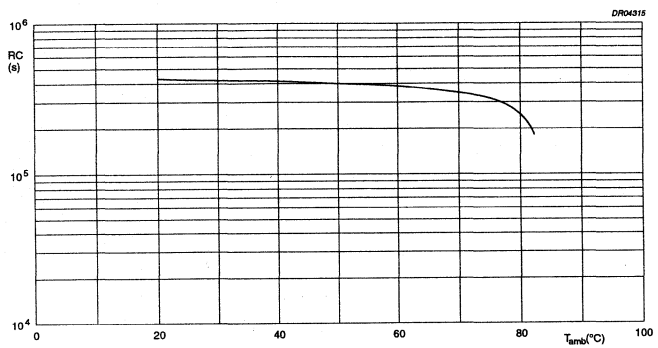



Tangent of loss angle as a function of ambient free air temperature; typical curve.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 10 V ±1 V for the 63 V version, 100 V ±15 V for the 160 V and 250 V versions and 500 V ±50 V for the 630 V version.

- R between leads: >100 000 MΩ.




RC-product as a function of ambient free air temperature; typical curve.

## INDUCTANCE

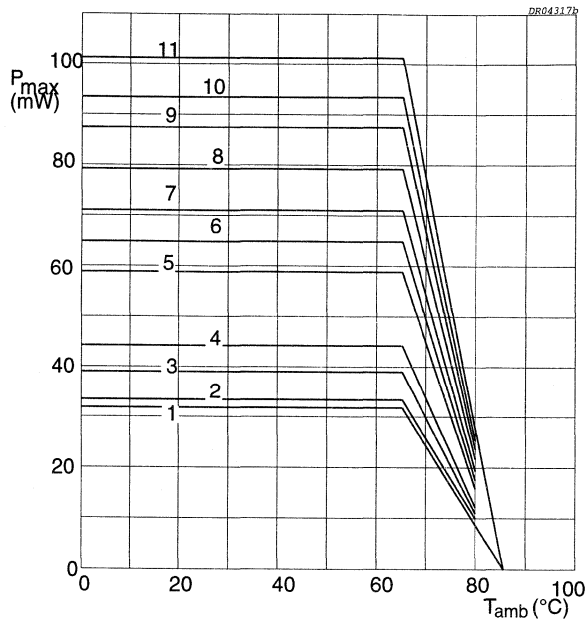
≤10 nH/cm dependent on lead and capacitor length.

# Polystyrene film foil capacitors



## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) $d_{max}$ x $l_{max}$ |
|---|---|
| 1 | 3.8 x 11.0 |
| 2 | 4.0 x 11.0 |
| 3 | 4.5 x 11.0 |
| 4 | 5.0 x 11.0 |
| 5 | 5.0 x 15.0 |
| 6 | 5.5 x 15.0 |
| 7 | 6.0 x 15.0 |
| 8 | 6.5 x 15.0 |
| 9 | 7.0 x 15.0 |
| 10 | 7.5 x 15.0 |
| 11 | 8.0 x 15.0 |




Maximum permissible power dissipation as a function of ambient free air temperature.

## APPLICATION NOTE

To select the capacitor for a certain application, 5 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. There is no limit for the peak current ($I_p$) or voltage pulse slope (dU/dt) in the application.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated in graph above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.

## MARKING

### Product marking

The capacitors are marked with black ink with the following information:

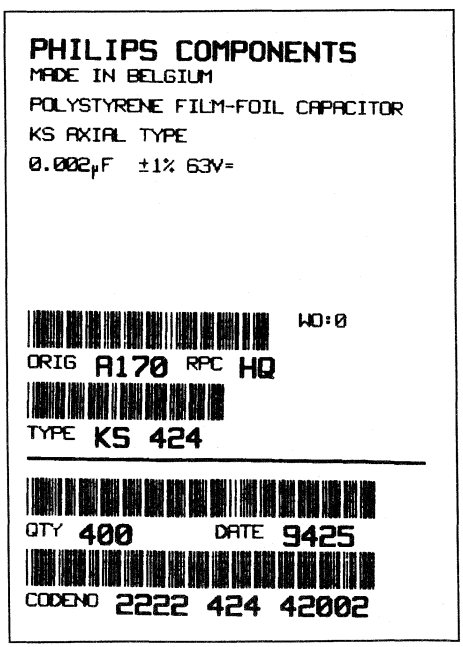
- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: F = ±1%; G = ±2%; J = ±5%
- Rated (DC) voltage (e.g. 63 V)
- Code for dielectric material (KS)
- Production date code in accordance with IEC 62; clause 5.

EXAMPLE OF MARKING

8n2
G 63
KS D2

### Package marking

The package containing the capacitors is marked as shown.




PK930150

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | – |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Polystyrene film foil capacitors

# KS 424 .. 431

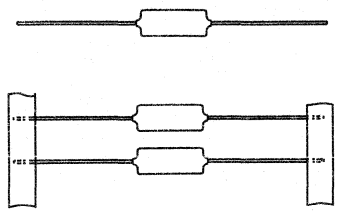
## QUICK REFERENCE TEST REQUIREMENTS

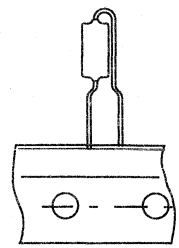
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of terminations** | | |
| Tensile, bending and torsion | | no visible damage<br>legible marking |
| Resistance to soldering heat | solder bath: 260 °C; 5 s | $\Delta C/C \leq 1\% + 1$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1000$ pF) |
| **Robustness of component** | | |
| Vibration | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 $m/s^2$; 6 hours | $\Delta C/C \leq 0.5\% + 0.5$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.5\%$ ($C > 1000$ pF) |
| Shock | half sinewave; 490 $m/s^2$; 11 ms | |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 85 °C | |
| Damp heat cyclic, first cycle | | $\Delta C/C \leq 1.2\% + 1.2$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 1.2\%$ ($C > 1000$ pF) |
| Cold | 2 hours; −40 °C | $R_{ins} \geq 50\%$ of specified value |
| Damp heat, remaining cycles | | |
| **Other applicable tests** | | |
| Damp heat steady state | 21 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 1\% + 1$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1000$ pF)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 1000 hours; 1.5 x $U_{Rdc}$; 85 °C | $\Delta C/C \leq 0.75\% + 0.75$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.75\%$ ($C > 1000$ pF)<br>$R_{ins} \geq 100\%$ of specified value |
| Heat storage | 1000 hours; 85 °C | $\Delta C/C \leq 0.75\% + 0.75$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.75\%$ ($C > 1000$ pF) |
| Variation of capacitance with temperature | static method; one cycle | $\Delta C/C \leq 0.5\% + 0.5$ pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.5\%$ ($C > 1000$ pF)<br>$R_{ins} > 10\,000$ MΩ |
| Resistance to soldering heat with preheating | | see soldering conditions in Chapter "GENERAL DATA" |

# Polypropylene film foil capacitors

# KP 460 .. 464

## KP AXIAL EPOXY LACQUERED TYPES





DR05301

## QUICK REFERENCE DATA

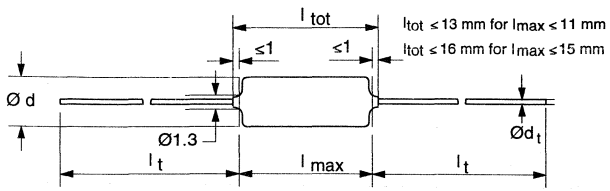
| | |
|---|---|
| Capacitance range (E12 series) | 47 to 62 000 pF |
| Capacitance tolerance | ±5% (E24-series)<br>±2% (E24, E48-series)<br>±1% (E24, E48, E96-series) |
| Rated voltage (DC) | 63 V, 160 V, 250 V, 400 V, 630 V |
| Climatic category | 40/100/56 |
| Rated temperature | 85 °C |
| Maximum application temperature | 100 °C |
| Reference specification | IEC 384-13 |
| Stability class for:<br>63 V, 160 V and 250 V versions<br>400 V and 630 V versions | <br>class 1<br>class 2 |

| FEATURES | APPLICATIONS |
|---|---|
| • Supplied loose in box, taped on reel or unidirectional. | • In circuits where close tolerance, reliability and low losses are of prime importance, for example: tuned circuits, filter and timing networks. |

# Polypropylene film foil capacitors

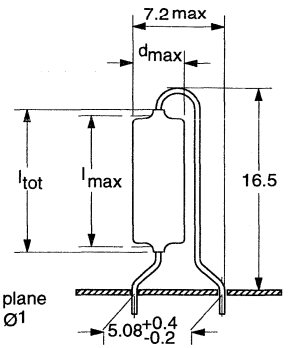
# KP 460

## GENERAL DATA




dimensions in mm

DR05304




## SPECIFIC REFERENCE DATA FOR THE 63 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 100 kHz |
|---|---|---|
| 5000 pF < C ≤ 20 000 pF | ≤5 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| 20 000 pF < C ≤ 47 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ |
| C > 47 000 pF | ≤5 x $10^{-4}$ | ≤40 x $10^{-4}$ |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

## AVAILABLE 63 V VERSIONS

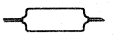
| | | | |
|---|---|---|---|
| Taped on reel | C-tol ±1% | catalogue number **2222 460 8....** | preferred |
| Taped on reel | C-tol ±2% | catalogue number **2222 460 7....** | preferred |
| Taped on reel | C-tol ±5% | catalogue number **2222 460 6....** | on request |
| Loose in box | C-tol ±1% | catalogue number **2222 460 4....** | on request |
| Loose in box | C-tol ±2% | catalogue number **2222 460 3....** | on request |
| Loose in box | C-tol ±5% | catalogue number **2222 460 2....** | on request |
| Unidirectional | C-tol ±1% | catalogue number **2222 460 1....** | on request |
| Unidirectional | C-tol ±2% | catalogue number **2222 460 0....** | on request |

**Available on request**

- Taped in ammopack with tape distance 52.5 mm
- Taped in ammopack with tape distance 63.5 mm.

# Polypropylene film foil capacitors

KP 460



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 40 V

## loose, taped and unidirectional

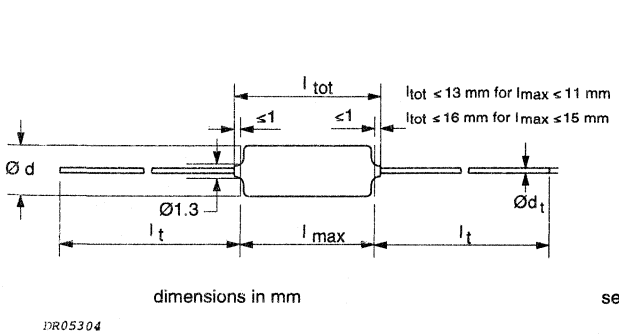
| Cap. (E-24) (pF) * | $d_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 460 ..... taped on reel tape distance 63.5 mm C-tol ±2% last 5 digits of catalogue number | taped on reel tape distance 63.5 mm C-tol ±1% last 5 digits of catalogue number | SPQ | loose in box SPQ | unidirectional C-tol ±2% | unidirectional C-tol ±1% | unidirectional SPQ |
|---|---|---|---|---|---|---|---|---|---|
| | | | $l_t$ = 30 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 6800 | 5.0 x 11.0 | 0.5 | 76802 | 86802 | 2500 | 250 | 06802 | 16802 | 1000 |
| 7500 | | 0.5 | 77502 | 87502 | | | 07502 | 17502 | |
| 8200 | | 0.6 | 78202 | 88202 | | | 08202 | 18202 | |
| 9100 | | 0.6 | 79102 | 89102 | | | 09102 | 19102 | |
| | | | $l_t$ = 28 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 10000 | 5.5 x 15.0 | 0.6 | 71003 | 81003 | 1500 | 250 | | | |
| 11000 | | 0.6 | 71103 | 81103 | | | | | |
| 12000 | | 0.7 | 71203 | 81203 | | | | | |
| 13000 | | 0.8 | 71303 | 81303 | | | | | |
| 15000 | | 0.7 | 71503 | 81503 | | | | | |
| 16000 | | 0.7 | 71603 | 81603 | | | | | |
| 18000 | | 0.8 | 71803 | 81803 | | | | | |
| 20000 | | 0.8 | 72003 | 82003 | | | | | |
| 22000 | | 0.9 | 72203 | 82203 | | | | | |
| 24000 | 6.0 x 15.0 | 0.9 | 72403 | 82403 | 1500 | 250 | | | |
| 27000 | | 1.0 | 72703 | 82703 | | | | | |
| 30000 | 6.5 x 15.0 | 1.1 | 73003 | 83003 | 1000 | 200 | | | |
| 33000 | | 1.2 | 73303 | 83303 | | | | | |
| 36000 | | 1.2 | 73603 | 83603 | | | | | |
| 39000 | 7.0 x 15.0 | 1.3 | 73903 | 83903 | 1000 | 150 | | | |
| 43000 | | 1.4 | 74303 | 84303 | | | | | |
| 47000 | 7.5 x 15.0 | 1.5 | 74703 | 84703 | 1000 | 150 | | | |
| 51000 | | 1.6 | 75103 | 85103 | | | | | |
| 56000 | 8.0 x 15.0 | 1.7 | 75603 | 85603 | 1000 | 150 | | | |
| 62000 | | 1.8 | 76203 | 86203 | | | | | |

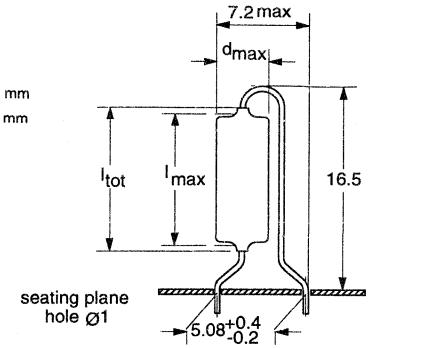
Preferred catalogue numbers

* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

# Polypropylene film foil capacitors

# KP 461




## SPECIFIC REFERENCE DATA FOR THE 160 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 100 kHz |
|---|---|---|
| 1000 pF < C ≤ 5000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| 5000 pF < C ≤ 20 000 pF | ≤5 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| 20 000 pF < C ≤ 39 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

## AVAILABLE 160 V VERSIONS

| | | | |
|---|---|---|---|
| Taped on reel | C-tol ±1% | catalogue number **2222 461 8....** | preferred |
| Taped on reel | C-tol ±2% | catalogue number **2222 461 7....** | preferred |
| Taped on reel | C-tol ±5% | catalogue number **2222 461 6....** | on request |
| Loose in box | C-tol ±1% | catalogue number **2222 461 4....** | on request |
| Loose in box | C-tol ±2% | catalogue number **2222 461 3....** | on request |
| Loose in box | C-tol ±5% | catalogue number **2222 461 2....** | on request |
| Unidirectional | C-tol ±1% | catalogue number **2222 461 1....** | on request |
| Unidirectional | C-tol ±2% | catalogue number **2222 461 0....** | on request |

**Available on request**

- Taped in ammopack with tape distance 52.5 mm
- Taped in ammopack with tape distance 63.5 mm.

# Polypropylene film foil capacitors

# KP 461

## $U_{Rdc}$ = 160 V

$U_{Rac}$ = 63 V

## loose, taped and unidirectional

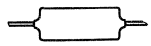
| Cap. (E-24) (pF) * | $d_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 461 ..... taped on reel tape distance 63.5 mm C-tol ±2% last 5 digits of catalogue number | taped on reel tape distance 63.5 mm C-tol ±1% last 5 digits of catalogue number | taped on reel tape distance 63.5 mm SPQ | loose in box SPQ | unidirectional C-tol ±2% | unidirectional C-tol ±1% | unidirectional SPQ |
|---|---|---|---|---|---|---|---|---|---|
| | | | $l_t$ = 30 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 3600 | 5.0 x 11.0 | 0.5 | 73602 | 83602 | 2500 | 250 | 03602 | 13602 | 1000 |
| 3900 | | 0.5 | 73902 | 83902 | | | 03902 | 13902 | |
| 4300 | | 0.5 | 74302 | 84302 | | | 04302 | 14302 | |
| 4700 | | 0.5 | 74702 | 84702 | | | 04702 | 14702 | |
| 5100 | | 0.5 | 75102 | 85102 | | | 05102 | 15102 | |
| 5600 | | 0.5 | 75602 | 85602 | | | 05602 | 15602 | |
| 6200 | | 0.6 | 76202 | 86202 | | | 06202 | 16202 | |
| | | | $l_t$ = 28 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 6800 | 5.5 x 15.0 | 0.4 | 76802 | 86802 | 1500 | 250 | | | |
| 7500 | | 0.7 | 77502 | 87502 | | | | | |
| 8200 | | 0.6 | 78202 | 88202 | | | | | |
| 9100 | | 0.6 | 79102 | 89102 | | | | | |
| 10000 | | 0.7 | 71003 | 81003 | | | | | |
| 11000 | | 0.7 | 71103 | 81103 | | | | | |
| 12000 | | 0.7 | 71203 | 81203 | | | | | |
| 13000 | | 0.8 | 71303 | 81303 | | | | | |
| 15000 | | 0.8 | 71503 | 81503 | | | | | |
| 16000 | 6.0 x 15.0 | 0.9 | 71603 | 81603 | 1500 | 250 | | | |
| 18000 | | 0.9 | 71803 | 81803 | | | | | |
| 20000 | | 1.0 | 72003 | 82003 | | | | | |
| 22000 | 6.5 x 15.0 | 1.1 | 72203 | 82203 | 1000 | 200 | | | |
| 24000 | | 1.1 | 72403 | 82403 | | | | | |
| 27000 | 7.0 x 15.0 | 1.2 | 72703 | 82703 | 1000 | 150 | | | |
| 30000 | 7.5 x 15.0 | 1.3 | 73003 | 83003 | 1000 | 150 | | | |
| 33000 | | 1.4 | 73303 | 83303 | | | | | |
| 36000 | 8.0 x 15.0 | 1.5 | 73603 | 83603 | 1000 | 150 | | | |
| 39000 | | 1.6 | 73903 | 83903 | | | | | |

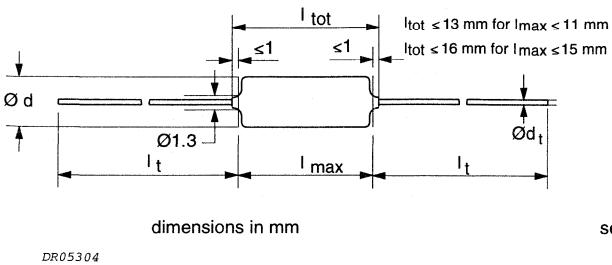
Preferred catalogue numbers

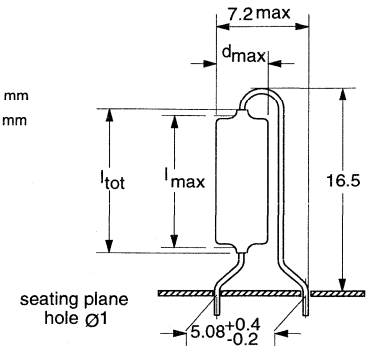
* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

# Polypropylene film foil capacitors

# KP 462






## SPECIFIC REFERENCE DATA FOR THE 250 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 100 kHz |
|---|---|---|
| 1000 pF < C ≤ 5000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ |
| 5000 pF < C ≤ 20 000 pF | ≤5 x $10^{-4}$ | ≤15 x $10^{-4}$ |
| 20 000 pF < C ≤ 22 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ |
| R between leads | >100 000 MΩ | |
| R between interconnected leads and case | >100 000 MΩ | |

## AVAILABLE 250 V VERSIONS

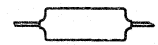
| | | | |
|---|---|---|---|
| Taped on reel | C-tol ±1% | catalogue number **2222 462 8....** | preferred |
| Taped on reel | C-tol ±2% | catalogue number **2222 462 7....** | preferred |
| Taped on reel | C-tol ±5% | catalogue number **2222 462 6....** | on request |
| Loose in box | C-tol ±1% | catalogue number **2222 462 4....** | on request |
| Loose in box | C-tol ±2% | catalogue number **2222 462 3....** | on request |
| Loose in box | C-tol ±5% | catalogue number **2222 462 2....** | on request |
| Unidirectional | C-tol ±1% | catalogue number **2222 462 1....** | on request |
| Unidirectional | C-tol ±2% | catalogue number **2222 462 0....** | on request |

**Available on request**

- Taped in ammopack with tape distance 52.5 mm
- Taped in ammopack with tape distance 63.5 mm.

# Polypropylene film foil capacitors

# KP 462



## $U_{Rdc}$ = 250 V

$U_{Rac}$ = 125 V

## loose, taped and unidirectional

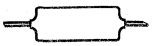
| Cap. (E-24) (pF) * | $d_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 462 ..... | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | taped on reel, tape distance 63.5 mm | | | loose in box | unidirectional | | |
| | | | C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ | SPQ | C-tol ±2% | C-tol ±1% | SPQ |
| | | | $l_t$ = 30 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 1200 | 5.0 x 11.0 | 0.5 | 71202 | 81202 | 2500 | 250 | 01202 | 11202 | 1000 |
| 1300 | | 0.5 | 71302 | 81302 | | | 01302 | 11302 | |
| 1500 | | 0.4 | 71502 | 81502 | | | 01502 | 11502 | |
| 1600 | | 0.5 | 71602 | 81602 | | | 01602 | 11602 | |
| 1800 | | 0.6 | 71802 | 81802 | | | 01802 | 11802 | |
| 2000 | | 0.6 | 72002 | 82002 | | | 02002 | 12002 | |
| 2200 | | 0.5 | 72202 | 82202 | | | 02202 | 12202 | |
| 2400 | | 0.5 | 72402 | 82402 | | | 02402 | 12402 | |
| 2700 | | 0.5 | 72702 | 82702 | | | 02702 | 12702 | |
| 3000 | | 0.5 | 73002 | 83002 | | | 03002 | 13002 | |
| 3300 | | 0.5 | 73302 | 83302 | | | 03302 | 13302 | |
| | | | $l_t$ = 28 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 3600 | 5.5 x 15.0 | 0.5 | 73602 | 83602 | 2500 | 250 | | | |
| 3900 | | 0.5 | 73902 | 83902 | | | | | |
| 4300 | | 0.6 | 74302 | 84302 | | | | | |
| 4700 | | 0.6 | 74702 | 84702 | | | | | |
| 5100 | | 0.6 | 75102 | 85102 | | | | | |
| 5600 | | 0.6 | 75602 | 85602 | | | | | |
| 6200 | | 0.7 | 76202 | 86202 | | | | | |
| 6800 | | 0.7 | 76802 | 86802 | | | | | |
| 7500 | | 0.7 | 77502 | 87502 | | | | | |
| 8200 | 6.0 x 15.0 | 0.8 | 78202 | 88202 | 1500 | 250 | | | |
| 9100 | | 0.8 | 79102 | 89102 | | | | | |
| 10000 | | 0.9 | 71003 | 81003 | | | | | |
| 11000 | 6.5 x 15.0 | 0.9 | 71103 | 81103 | 1000 | 200 | | | |
| 12000 | | 1.0 | 71203 | 81203 | | | | | |
| 13000 | | 1.0 | 71303 | 81303 | | | | | |
| 15000 | 7.0 x 15.0 | 1.1 | 71503 | 81503 | 1000 | 150 | | | |
| 16000 | | 1.2 | 71603 | 81603 | | | | | |
| 18000 | 7.5 x 15.0 | 1.3 | 71803 | 81803 | 1000 | 150 | | | |
| 20000 | 8.0 x 15.0 | 1.4 | 72003 | 82003 | 1000 | 150 | | | |
| 22000 | | 1.5 | 72203 | 82203 | | | | | |

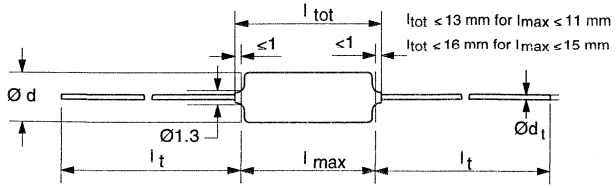
Preferred catalogue numbers

* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

# Polypropylene film foil capacitors

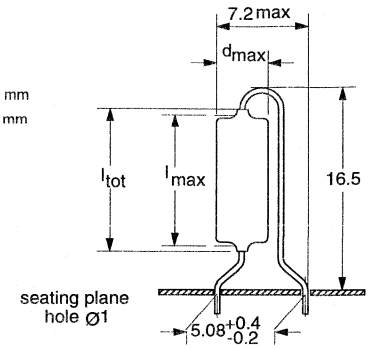
# KP 463






dimensions in mm

DR05304




## SPECIFIC REFERENCE DATA FOR THE 400 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 100 kHz | at 1 MHz |
|---|---|---|---|
| C ≤ 1000 pF | ≤5 x $10^{-4}$ | – | ≤10 x $10^{-4}$ ** |
| 1000 pF < C ≤ 5000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ | – |
| R between leads | >100 000 MΩ | | |
| R between interconnected leads and case | >100 000 MΩ | | |

** For unidirectional capacitors ≤13 x $10^{-4}$.

## AVAILABLE 400 V VERSIONS

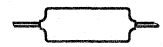
| | | | |
|---|---|---|---|
| Taped on reel | C-tol ±1% | catalogue number **2222 463 8....** | preferred |
| Taped on reel | C-tol ±2% | catalogue number **2222 463 7....** | preferred |
| Taped on reel | C-tol ±5% | catalogue number **2222 463 6....** | on request |
| Loose in box | C-tol ±1% | catalogue number **2222 463 4....** | on request |
| Loose in box | C-tol ±2% | catalogue number **2222 463 3....** | on request |
| Loose in box | C-tol ±5% | catalogue number **2222 463 2....** | on request |
| Unidirectional | C-tol ±1% | catalogue number **2222 463 1....** | on request |
| Unidirectional | C-tol ±2% | catalogue number **2222 463 0....** | on request |

**Available on request**

- Taped in ammopack with tape distance 52.5 mm
- Taped in ammopack packing with tape distance 63.5 mm.

# Polypropylene film foil capacitors

# KP 463



## $U_{Rdc}$ = 400 V

$U_{Rac}$ = 160 V

## loose, taped and unidirectional

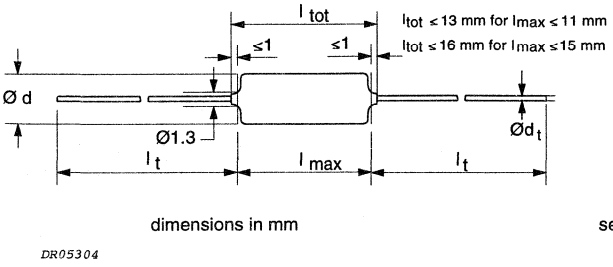
| Cap. (E-24) (pF) * | $d_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 463 ..... | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | taped on reel | | | loose in box | unidirectional | | |
| | | | tape distance 63.5 mm | | | | | | |
| | | | C-tol ±2% | C-tol ±1% | SPQ | SPQ | C-tol ±2% | C-tol ±1% | SPQ |
| | | | last 5 digits of catalogue number | last 5 digits of catalogue number | | | | | |
| | | | $l_t$ = 30 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 150 | 5.0 x 11.0 | 0.4 | 71501 | 81501 | 2500 | 250 | 01501 | 11501 | 1000 |
| 160 | | 0.4 | 71601 | 81601 | | | 01601 | 11601 | |
| 180 | | 0.5 | 71801 | 81801 | | | 01801 | 11801 | |
| 200 | | 0.5 | 72001 | 82001 | | | 02001 | 12001 | |
| 220 | | 0.6 | 72201 | 82201 | | | 02201 | 12201 | |
| 240 | | 0.6 | 72401 | 82401 | | | 02401 | 12401 | |
| 270 | | 0.6 | 72701 | 82701 | | | 02701 | 12701 | |
| 300 | | 0.7 | 73001 | 83001 | | | 03001 | 13001 | |
| 330 | | 0.4 | 73301 | 83301 | | | 03301 | 13301 | |
| 360 | | 0.4 | 73601 | 83601 | | | 03601 | 13601 | |
| 390 | | 0.5 | 73901 | 83901 | | | 03901 | 13901 | |
| 430 | | 0.5 | 74301 | 84301 | | | 04301 | 14301 | |
| 470 | | 0.5 | 74701 | 84701 | | | 04701 | 14701 | |
| 510 | | 0.5 | 75101 | 85101 | | | 05101 | 15101 | |
| 560 | | 0.5 | 75601 | 85601 | | | 05601 | 15601 | |
| 620 | | 0.5 | 76201 | 86201 | | | 06201 | 16201 | |
| 680 | | 0.5 | 76801 | 86801 | | | 06801 | 16801 | |
| 750 | | 0.5 | 77501 | 87501 | | | 07501 | 17501 | |
| 820 | | 0.5 | 78201 | 88201 | | | 08201 | 18201 | |
| 910 | | 0.5 | 79101 | 89101 | | | 09101 | 19101 | |
| 1000 | | 0.5 | 71002 | 81002 | | | 01002 | 11002 | |
| 1100 | | 0.5 | 71102 | 81102 | | | 01102 | 11102 | |

Preferred catalogue numbers

* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

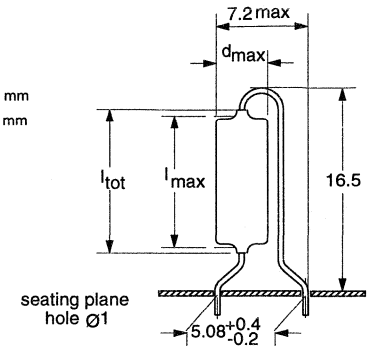
# Polypropylene film foil capacitors

# KP 464




dimensions in mm

DR05304




## SPECIFIC REFERENCE DATA FOR THE 630 V DC VERSION

| Tangent of loss angle | at 1 kHz | at 100 kHz | at 1 MHz |
|---|---|---|---|
| C ≤ 1000 pF | ≤5 x $10^{-4}$ | – | ≤10 x $10^{-4}$ ** |
| 1000 pF < C ≤ 5000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ | – |
| R between leads | >100 000 MΩ | | |
| R between interconnected leads and case | >100 000 MΩ | | |

** For unidirectional capacitors ≤13 x $10^{-4}$.

## AVAILABLE 630 V VERSIONS

| | | | |
|---|---|---|---|
| Taped on reel | C-tol ±1% | catalogue number **2222 464 8....** | preferred |
| Taped on reel | C-tol ±2% | catalogue number **2222 464 7....** | preferred |
| Taped on reel | C-tol ±5% | catalogue number **2222 464 6....** | on request |
| Loose in box | C-tol ±1% | catalogue number **2222 464 4....** | on request |
| Loose in box | C-tol ±2% | catalogue number **2222 464 3....** | on request |
| Loose in box | C-tol ±5% | catalogue number **2222 464 2....** | on request |
| Unidirectional | C-tol ±1% | catalogue number **2222 464 1....** | on request |
| Unidirectional | C-tol ±2% | catalogue number **2222 464 0....** | on request |

**Available on request**

- Taped in ammopack with tape distance 52.5 mm
- Taped in ammopack with tape distance 63.5 mm.

# Polypropylene film foil capacitors

# KP 464

## $U_{Rdc}$ = 630 V

$U_{Rac}$ = 200 V

**loose, taped and unidirectional**

| Cap. (E-24) (pF) * | $d_{max}$ x $l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 464 ..... | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | taped on reel, tape distance 63.5 mm | | | loose in box | unidirectional | | |
| | | | C-tol ±2% last 5 digits of catalogue number | C-tol ±1% last 5 digits of catalogue number | SPQ | SPQ | C-tol ±2% | C-tol ±1% | SPQ |
| | | | $l_t$ = 30 mm | $d_t$ = 0.60 ±0.06 mm | | | | | |
| 47 | 5.0 x 11.0 | 0.4 | 74709 | 84709 | 2500 | 250 | 04709 | 14709 | 1000 |
| 51 | | 0.4 | 75109 | 85109 | | | 05109 | 15109 | |
| 56 | | 0.4 | 75609 | 85609 | | | 05609 | 15609 | |
| 62 | | 0.4 | 76209 | 86209 | | | 06209 | 16209 | |
| 68 | | 0.4 | 76809 | 86809 | | | 06809 | 16809 | |
| 75 | | 0.4 | 77509 | 87509 | | | 07509 | 17509 | |
| 82 | | 0.4 | 78209 | 88209 | | | 08209 | 18209 | |
| 91 | | 0.4 | 79109 | 89109 | | | 09109 | 19109 | |
| 100 | | 0.4 | 71001 | 81001 | | | 01001 | 11001 | |
| 110 | | 0.4 | 71101 | 81101 | | | 01101 | 11101 | |
| 120 | | 0.4 | 71201 | 81201 | | | 01201 | 11201 | |
| 130 | | 0.5 | 71301 | 81301 | | | 01301 | 11301 | |

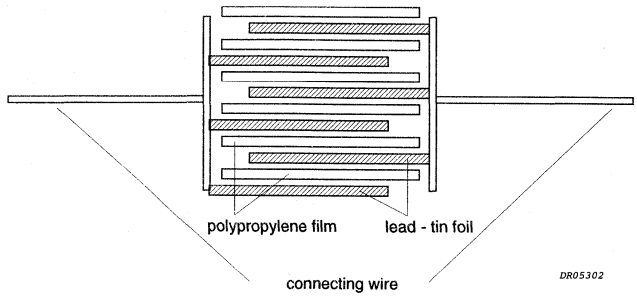
Preferred catalogue numbers

* In addition to the values of the E24-series as quoted, intermediate values of the E48-series (with a tolerance ±2% or ±1%) and the E96-series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E24-series.

# Polypropylene film foil capacitors

# KP 460 .. 464

## CONSTRUCTION




## DESCRIPTION

- Low-inductive wound cell of metal foil and a polypropylene film.
- Protected by a hard, water-repellant solvent-resistant blue epoxy lacquer.
- Axial leads are solder-coated.

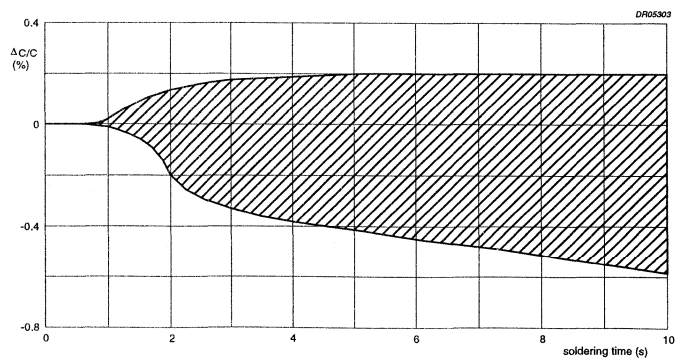
## MOUNTING

### Normal use

The capacitors are suitable for vertical or horizontal mounting on printed-circuit boards.
The capacitors packed on bandoliers are designed for mounting on printed-circuit boards by means of automatic insertion machines.

### Soldering conditions

The capacitance stability is dependent on the maximum temperature the capacitor reaches during soldering.
The figure below shows the typical effect of $\Delta C/C$ as a function of soldering time under the worst possible mounting conditions (horizontal on the PCB, minimum possible pitch) and with 80 °C preheating.




### Specific method of mounting to withstand vibration and shock.

The capacitors shall be mechanically fixed by the leads.

# Polypropylene film foil capacitors

# KP 460 .. 464

## RATINGS AND CHARACTERISTICS

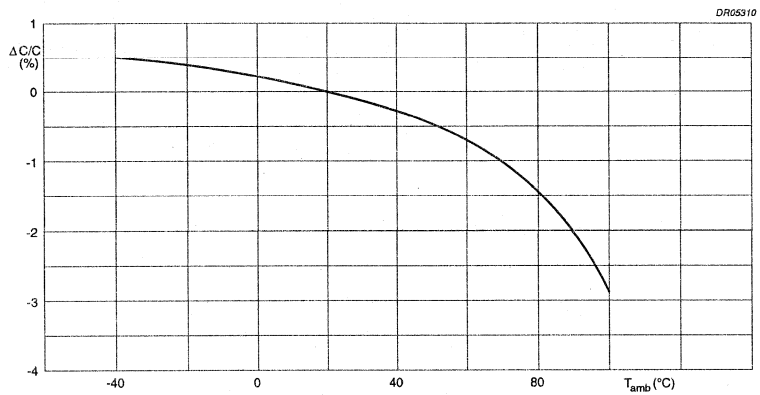
Unless otherwise specified all electrical values apply at an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.
- Temperature coefficient:

between −40 and +20 °C for C ≤ 1000 pF: $-(125 \pm 125) \times 10^{-6}/°K$
for C > 1000 pF: $-(125 \pm 60) \times 10^{-6}/°K$
between +20 and +100 °C: $-(125 \pm 120) \times 10^{-6}/°K$.




Capacitance as a function of ambient temperature; typical curve.

## TEMPERATURE

- Storage temperature: $T_{stg}$ = −25 °C to +40 °C with RH maximum 80% without condensation.

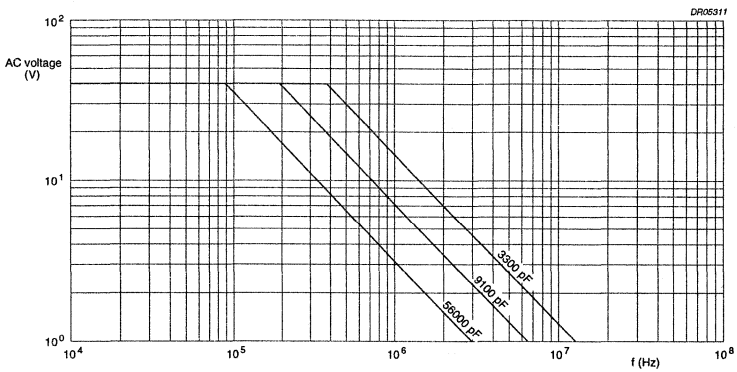
# Polypropylene film foil capacitors

# KP 460 .. 464

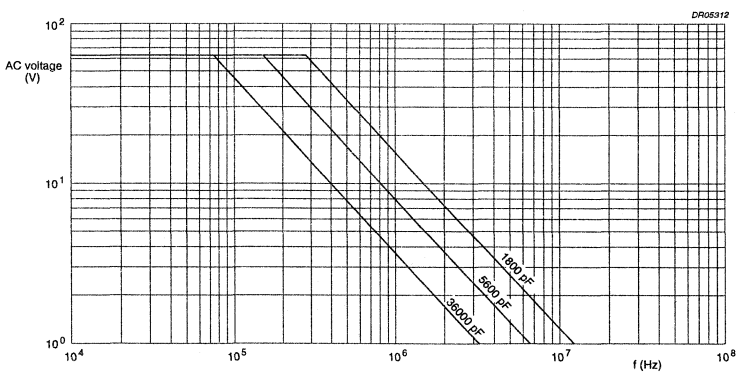
## VOLTAGE

- Category voltage: $U_c = 0.7 \times U_{Rdc}$.
- Test voltage between leads: $2 \times U_{Rdc}$.
- Test voltage between interconnected leads and case (foil method): $2 \times U_{Rdc}$ (min. 400 V).

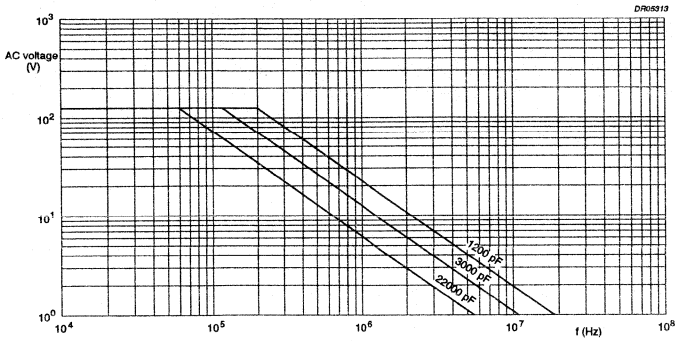
**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 70$ °C (see graphs below)**



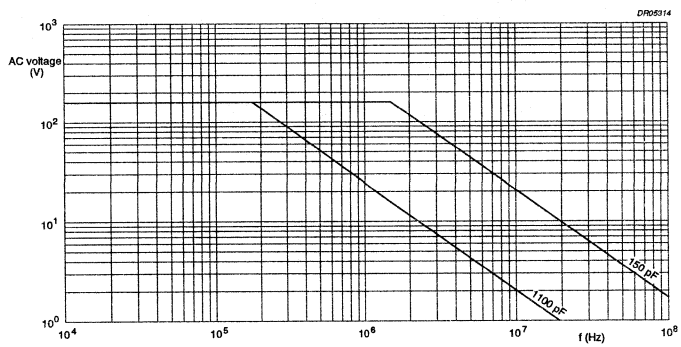

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 63$ V.



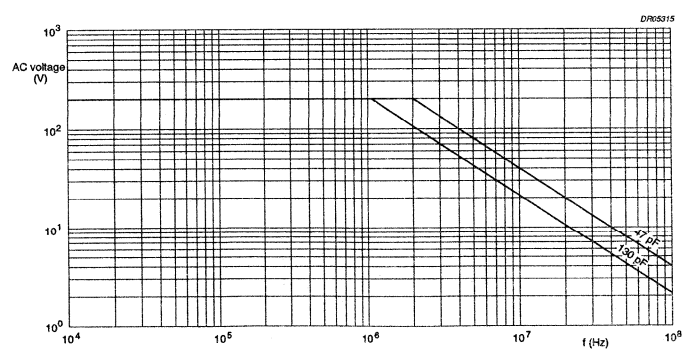

AC voltage as a function of frequency at $T_{amb} \leq 70$ °C, for $U_{Rdc} = 160$ V.




AC voltage as a function of frequency at $T_{amb} \leq 70$ °C,
for $U_{Rdc} = 250$ V.




AC voltage as a function of frequency at $T_{amb} \leq 70$ °C,
for $U_{Rdc} = 400$ V.

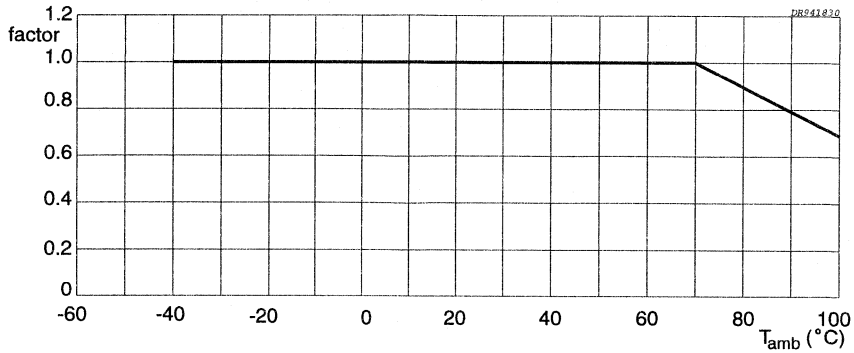



AC voltage as a function of frequency at $T_{amb} \leq 70$ °C,
for $U_{Rdc} = 630$ V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb}$ > 70 °C**

The maximum RMS voltage in the graphs above has to be multiplied by a factor (see graph below).

The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature".




Multiplying factor as a function of temperature.

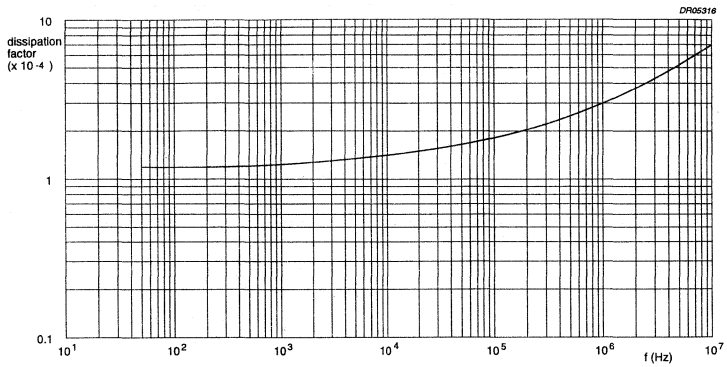
# Polypropylene film foil capacitors

# KP 460 .. 464

## TANGENT OF LOSS ANGLE

| TANGENT OF LOSS ANGLE | at 1 kHz | at 100 kHz | at 1 MHz |
|---|---|---|---|
| C ≤ 1000 pF | ≤5 x $10^{-4}$ | – | ≤10 x $10^{-4}$ ** |
| 1000 pF < C ≤ 5000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ | – |
| 5000 pF < C ≤ 20 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ | – |
| 20 000 pF < C ≤ 47 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ | – |
| C > 47 000 pF | ≤5 x $10^{-4}$ | ≤40 x $10^{-4}$ | – |

** For unidirectional capacitors ≤13 x $10^{-4}$.

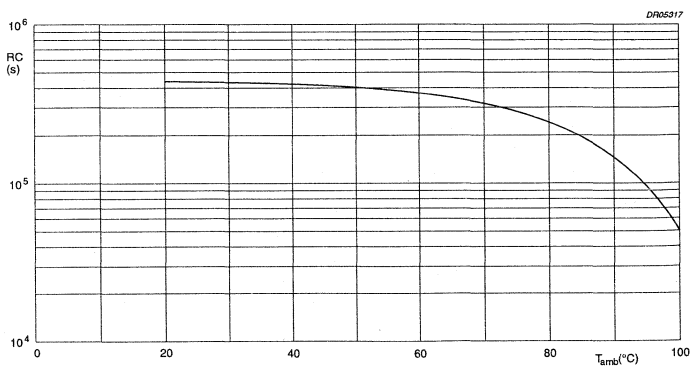



Tangent of loss angle as a function of frequency; typical curve.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage has been applied for 1 minute ±5 seconds, the voltage being 10 V ±1 V for the 63 V version, 100 V ±15 V for the 160 V, 250 V and 400 V versions and 500 V ±50 V for the 630 V version.

- R between leads: >100 000 MΩ.
- R between interconnected leads and case (foil method): >100 000 MΩ.




RC-product as a function of ambient free air temperature; typical curve.

## INDUCTANCE:

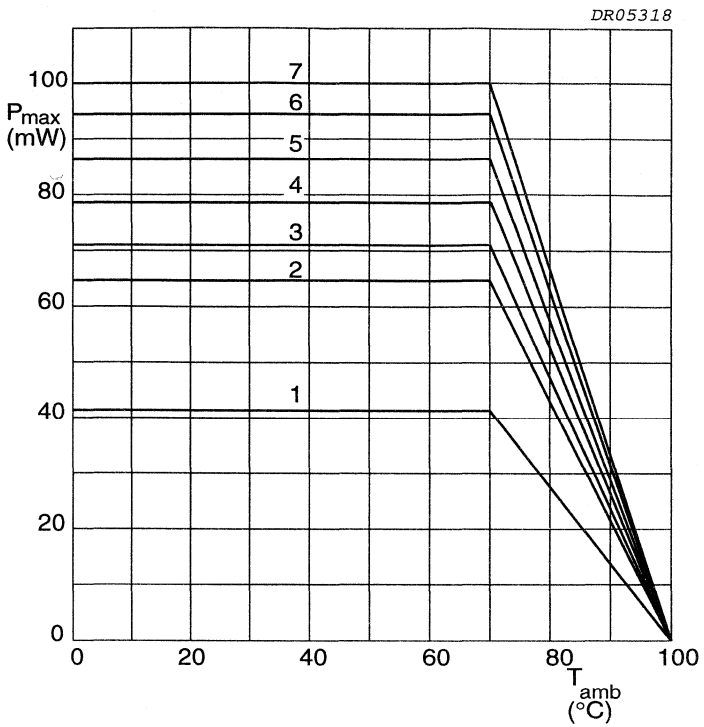
≤10 nH/cm dependent on lead and capacitor length.

# Polypropylene film foil capacitors

# KP 460 .. 464

## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) $d_{max}$ x $l_{max}$ |
|---|---|
| 1 | 5.0 x 11.0 |
| 2 | 5.5 x 15.0 |
| 3 | 6.0 x 15.0 |
| 4 | 6.5 x 15.0 |
| 5 | 7.0 x 15.0 |
| 6 | 7.5 x 15.0 |
| 7 | 8.0 x 15.0 |




Maximum dissipation as a function of ambient temperature.

## APPLICATION NOTE

To select the capacitor for a certain application, 5 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x $\sqrt{2}$ times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. There is no limit for the peak current ($I_p$) or voltage pulse slope (dU/dt) in the application.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated above.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.

## MARKING

### Product marking

The capacitors are marked in black ink with the following information:

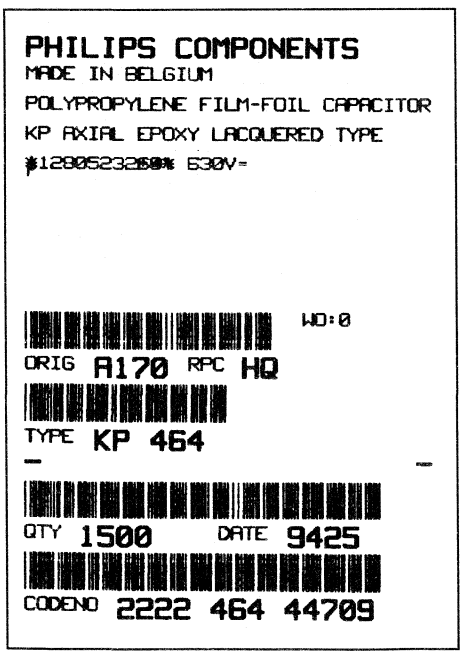
- Rated capacitance code in accordance with IEC 62
- Rated (DC) voltage (e.g. 63 V)
- Tolerance on rated capacitance: F = ±1%; G = ±2%; J = ±5%
- Code for dielectrical material (KP)
- Manufacturer (PHILIPS)
- Production date code in accordance with IEC 62; clause 5.

EXAMPLE OF MARKING

8n2
G63
KPD2
PHILIPS

### Package marking

The package containing the capacitors is marked as shown.




PK930180

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | – |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Polypropylene film foil capacitors



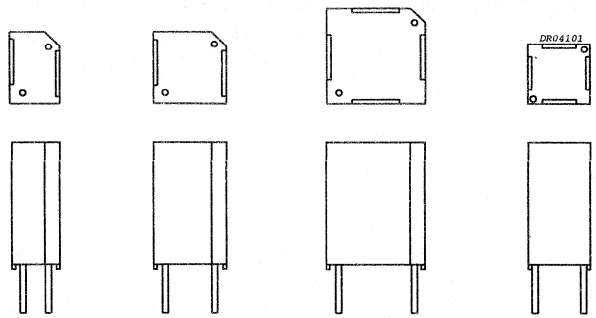
## QUICK REFERENCE TEST REQUIREMENTS

| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile, bending and torsion<br>Resistance to soldering heat<br>Component solvent resistance | <br>solder bath: 260 °C; 5 s<br>isopropyl alcohol; 23 °C; 5 minutes | no visible damage<br>legible marking<br>$\Delta C/C \leq 2\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF) |
| **Robustness of component** | | |
| Vibration<br>Shock | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours<br>half sinewave; 490 m/s$^2$; 11 ms | $\Delta C/C \leq 2\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF) |
| **Climatic sequence** | | |
| Dry heat<br>Damp heat cyclic, first cycle<br>Cold<br>Damp heat, remaining cycles | 16 hours; 100 °C<br><br>2 hours; –40 °C | <br>$\Delta C/C \leq 1\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF)<br>$R_{ins} \geq 50\%$ of specified value |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 1\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF)<br>$R_{ins} \geq 50\%$ of specified value |
| Endurance (DC) | 1000 hours;<br>1.5 x $U_{Rdc}$; 85 °C<br>1.5 x $U_{Cdc}$; 100 °C | $\Delta C/C \leq 2\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF)<br>$R_{ins} \geq 100\%$ of specified value |
| Variation of capacitance with temperature | static method; one cycle | $\Delta C/C \leq 2\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF)<br>$R_{ins} \geq 10\,000$ MΩ |
| Heat storage | 1000 hours; 100 °C | $\Delta C/C \leq 2\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF) |
| Resistance to soldering heat with preheating | body temperature: 80 °C<br>bath temperature: 260 °C<br>dwell time: 5 s | $\Delta C/C \leq 2\%$ +1 pF ($C \leq 1100$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1100$ pF) |

# Polystyrene film foil capacitors

# KS 443

## KS RADIAL POTTED CAPACITORS




## QUICK REFERENCE DATA

| | |
|---|---|
| Capacitance range (E96-series) | 100 to 34 000 pF |
| Capacitance tolerance | ±1% |
| Rated voltage (DC) | 63 V |
| Climatic category | 55/070/56 (class 1)<br>55/085/56 (class 3) |
| Rated temperature | 70 °C (class 1)<br>85 °C (class 3) |
| Reference specification | IEC 384-7 |
| Stability class | class 1 and 3 |

### FEATURES

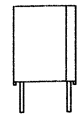
- 2.54 to 7.62 mm lead pitch
- Supplied loose in box and taped on reel
- The dimensions are such that, in combination with currently available ferrites, a high package density is possible.

### APPLICATIONS

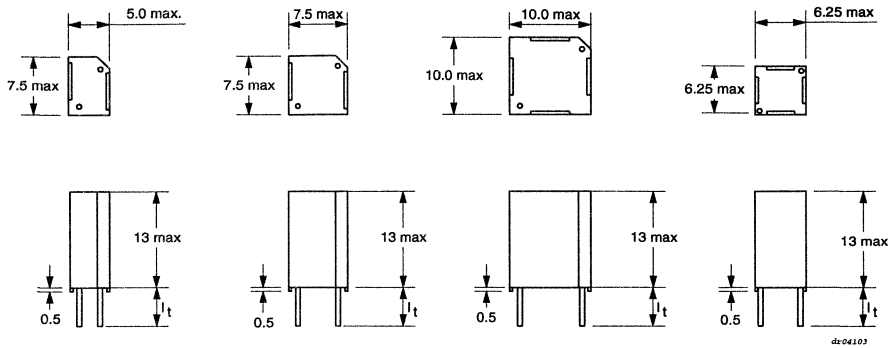
- In LC filters, particularly in telephony equipment, where high requirements are imposed on precision, stability, resistance to humidity, dissipation factor and reliability.

# Polystyrene film foil capacitors

# KS 443



## GENERAL DATA




For all figures: $d_t$ = 0.6 ±0.06 mm.

## SPECIFIC REFERENCE DATA

| Tangent of loss angle | at 1 kHz | at 100 kHz | at 1 MHz |
|---|---|---|---|
| C ≤ 500 pF | ≤5 x $10^{-4}$ | – | ≤10 x $10^{-4}$ |
| 500 pF < C ≤ 1000 pF | ≤5 x $10^{-4}$ | – | ≤15 x $10^{-4}$ |
| 1000 pF < C ≤ 10 000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ | – |
| 10 000 pF < C ≤ 15 000 pF | ≤5 x $10^{-4}$ | ≤15 x $10^{-4}$ | – |
| 15 000 pF < C ≤ 20 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ | – |
| 20 000 pF < C ≤ 30 000 pF | ≤5 x $10^{-4}$ | ≤40 x $10^{-4}$ | – |
| C > 30 000 pF | ≤5 x $10^{-4}$ | ≤60 x $10^{-4}$ | – |
| R between leads | >500 000 MΩ | | |
| R between interconnected leads and case | >500 000 MΩ | | |

## AVAILABLE VERSIONS

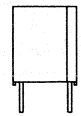
| Cap. (E96) (pF) | b x h x l (mm) | CATALOGUE NUMBER 2222 443 ..... | | | |
|---|---|---|---|---|---|
| | | SPQ | loose in box $l_t$ = 3.0 +0.4/-0 mm | loose in box $l_t$ = 5.0 +0/-1.0 mm | |
| 100 to 3920 | 5.0 x 13.0 x 7.5 | 200 | | 41001 to 43922 | preferred |
| 4120 to 15 000 | 7.5 x 13.0 x 7.5 | 200 | | 44122 to 41503 | preferred |
| 15 400 to 34 000 | 10.0 x 13.0 x 10.0 | 100 | | 41543 to 43403 | preferred |
| 100 to 3920 | 5.0 x 13.0 x 7.5 | 200 | 61001 to 63922 | | on request |
| 100 to 3920 | 6.25 x 13.0 x 6.25 | 200 | | 31001 to 33922 | on request |
| 100 to 3920 | 7.5 x 13.0 x 7.5 | 200 | 71001 to 73922 | 81001 to 83922 | on request |
| 4120 to 7500 | 6.25 x 13.0 x 6.25 | 200 | | 34122 to 37502 | on request |
| 4120 to 15 000 | 7.5 x 13.0 x 7.5 | 200 | 64122 to 61503 | | on request |
| 15 400 to 34 000 | 10.0 x 13.0 x 10.0 | 100 | 61543 to 63403 | | on request |

**Available on request**

- Taped versions.

# Polystyrene film foil capacitors

# KS 443



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 25 V

**loose in box**

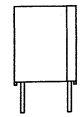
| Cap. (E96) (pF)* | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm |
|---|---|---|---|---|---|---|---|---|
| 100 | 5.0 x 7.5 | 61001 | 41001 | 7.5 x 7.5 | 71001 | 81001 | 6.25 x 6.25 | 31001 |
| 102 | | 61021 | 41021 | | 71021 | 81021 | | 31021 |
| 105 | | 61051 | 41051 | | 71051 | 81051 | | 31051 |
| 107 | | 61071 | 41071 | | 71071 | 81071 | | 31071 |
| 110 | | 61101 | 41101 | | 71101 | 81101 | | 31101 |
| 113 | | 61131 | 41131 | | 71131 | 81131 | | 31131 |
| 115 | | 61151 | 41151 | | 71151 | 81151 | | 31151 |
| 118 | | 61181 | 41181 | | 71181 | 81181 | | 31181 |
| 121 | | 61211 | 41211 | | 71211 | 81211 | | 31211 |
| 124 | | 61241 | 41241 | | 71241 | 81241 | | 31241 |
| 127 | | 61271 | 41271 | | 71271 | 81271 | | 31271 |
| 130 | | 61301 | 41301 | | 71301 | 81301 | | 31301 |
| 133 | | 61331 | 41331 | | 71331 | 81331 | | 31331 |
| 137 | | 61371 | 41371 | | 71371 | 81371 | | 31371 |
| 140 | | 61401 | 41401 | | 71401 | 81401 | | 31401 |
| 143 | | 61431 | 41431 | | 71431 | 81431 | | 31431 |
| 147 | | 61471 | 41471 | | 71471 | 81471 | | 31471 |
| 150 | | 61501 | 41501 | | 71501 | 81501 | | 31501 |
| 154 | | 61541 | 41541 | | 71541 | 81541 | | 31541 |
| 158 | | 61581 | 41581 | | 71581 | 81581 | | 31581 |
| 162 | | 61621 | 41621 | | 71621 | 81621 | | 31621 |
| 165 | | 61651 | 41651 | | 71651 | 81651 | | 31651 |
| 169 | | 61691 | 41691 | | 71691 | 81691 | | 31691 |
| 174 | | 61741 | 41741 | | 71741 | 81741 | | 31741 |
| 178 | | 61781 | 41781 | | 71781 | 81781 | | 31781 |
| 182 | | 61821 | 41821 | | 71821 | 81821 | | 31821 |
| 187 | | 61871 | 41871 | | 71871 | 81871 | | 31871 |
| 191 | | 61911 | 41911 | | 71911 | 81911 | | 31911 |
| 196 | | 61961 | 41961 | | 71961 | 81961 | | 31961 |
| 200 | | 62001 | 42001 | | 72001 | 82001 | | 32001 |
| 205 | | 62051 | 42051 | | 72051 | 82051 | | 32051 |
| 210 | | 62101 | 42101 | | 72101 | 82101 | | 32101 |
| 215 | | 62151 | 42151 | | 72151 | 82151 | | 32151 |
| 221 | | 62211 | 42211 | | 72211 | 82211 | | 32211 |
| 226 | | 62261 | 42261 | | 72261 | 82261 | | 32261 |
| 232 | | 62321 | 42321 | | 72321 | 82321 | | 32321 |
| 237 | | 62371 | 42371 | | 72371 | 82371 | | 32371 |

Preferred catalogue numbers

* In addition to the values of the E96 series as quoted, intermediate values of the E192 series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E96 series.

# Polystyrene film foil capacitors

KS 443



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 25 V

**loose in box**

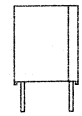
| Cap. (E96) (pF)* | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm |
|---|---|---|---|---|---|---|---|---|
| 243 | 5.0 x 7.5 | 62431 | 42431 | 7.5 x 7.5 | 72431 | 82431 | 6.25 x 6.25 | 32431 |
| 249 | | 62491 | 42491 | | 72491 | 82491 | | 32491 |
| 255 | | 62551 | 42551 | | 72551 | 82551 | | 32551 |
| 261 | | 62611 | 42611 | | 72611 | 82611 | | 32611 |
| 267 | | 62671 | 42671 | | 72671 | 82671 | | 32671 |
| 274 | | 62741 | 42741 | | 72741 | 82741 | | 32741 |
| 280 | | 62801 | 42801 | | 72801 | 82801 | | 32801 |
| 287 | | 62871 | 42871 | | 72871 | 82871 | | 32871 |
| 294 | | 62941 | 42941 | | 72941 | 82941 | | 32941 |
| 301 | | 63011 | 43011 | | 73011 | 83011 | | 33011 |
| 309 | | 63091 | 43091 | | 73091 | 83091 | | 33091 |
| 316 | | 63161 | 43161 | | 73161 | 83161 | | 33161 |
| 324 | | 63241 | 43241 | | 73241 | 83241 | | 33241 |
| 332 | | 63321 | 43321 | | 73321 | 83321 | | 33321 |
| 340 | | 63401 | 43401 | | 73401 | 83401 | | 33401 |
| 348 | | 63481 | 43481 | | 73481 | 83481 | | 33481 |
| 357 | | 63571 | 43571 | | 73571 | 83571 | | 33571 |
| 365 | | 63651 | 43651 | | 73651 | 83651 | | 33651 |
| 374 | | 63741 | 43741 | | 73741 | 83741 | | 33741 |
| 383 | | 63831 | 43831 | | 73831 | 83831 | | 33831 |
| 392 | | 63921 | 43921 | | 73921 | 83921 | | 33921 |
| 402 | | 64021 | 44021 | | 74021 | 84021 | | 34021 |
| 412 | | 64121 | 44121 | | 74121 | 84121 | | 34121 |
| 422 | | 64221 | 44221 | | 74221 | 84221 | | 34221 |
| 432 | | 64321 | 44321 | | 74321 | 84321 | | 34321 |
| 442 | | 64421 | 44421 | | 74421 | 84421 | | 34421 |
| 453 | | 64531 | 44531 | | 74531 | 84531 | | 34531 |
| 464 | | 64641 | 44641 | | 74641 | 84641 | | 34641 |
| 475 | | 64751 | 44751 | | 74751 | 84751 | | 34751 |
| 487 | | 64871 | 44871 | | 74871 | 84871 | | 34871 |
| 499 | | 64991 | 44991 | | 74991 | 84991 | | 34991 |
| 511 | | 65111 | 45111 | | 75111 | 85111 | | 35111 |
| 523 | | 65231 | 45231 | | 75231 | 85231 | | 35231 |
| 536 | | 65361 | 45361 | | 75361 | 85361 | | 35361 |
| 549 | | 65491 | 45491 | | 75491 | 85491 | | 35491 |
| 562 | | 65621 | 45621 | | 75621 | 85621 | | 35621 |
| 576 | | 65761 | 45761 | | 75761 | 85761 | | 35761 |
| 590 | | 65901 | 45901 | | 75901 | 85901 | | 35901 |
| 604 | | 66041 | 46041 | | 76041 | 86041 | | 36041 |
| 619 | | 66191 | 46191 | | 76191 | 86191 | | 36191 |
| 634 | | 66341 | 46341 | | 76341 | 86341 | | 36341 |
| 649 | | 66491 | 46491 | | 76491 | 86491 | | 36491 |
| 665 | | 66651 | 46651 | | 76651 | 86651 | | 36651 |
| 681 | | 66811 | 46811 | | 76811 | 86811 | | 36811 |
| 698 | | 66981 | 46981 | | 76981 | 86981 | | 36981 |

Preferred catalogue numbers

* In addition to the values of the E96 series as quoted, intermediate values of the E192 series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E96 series.

# Polystyrene film foil capacitors

# KS 443



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 25 V

**loose in box**

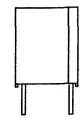
| Cap. (E96) (pF)* | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_1$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_2$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_1$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_2$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_2$ = 5.0 +0/-1.0 mm |
|---|---|---|---|---|---|---|---|---|
| 715 | 5.0 x 7.5 | 67151 | 47151 | 7.5 x 7.5 | 77151 | 87151 | 6.25 x 6.25 | 37151 |
| 732 | | 67321 | 47321 | | 77321 | 87321 | | 37321 |
| 750 | | 67501 | 47501 | | 77501 | 87501 | | 37501 |
| 768 | | 67681 | 47681 | | 77681 | 87681 | | 37681 |
| 787 | | 67871 | 47871 | | 77871 | 87871 | | 37871 |
| 806 | | 68061 | 48061 | | 78061 | 88061 | | 38061 |
| 825 | | 68251 | 48251 | | 78251 | 88251 | | 38251 |
| 845 | | 68451 | 48451 | | 78451 | 88451 | | 38451 |
| 866 | | 68661 | 48661 | | 78661 | 88661 | | 38661 |
| 877 | | 68771 | 48771 | | 78771 | 88771 | | 38771 |
| 909 | | 69091 | 49091 | | 79091 | 89091 | | 39091 |
| 931 | | 69311 | 49311 | | 79311 | 89311 | | 39311 |
| 953 | | 69531 | 49531 | | 79531 | 89531 | | 39531 |
| 976 | | 69761 | 49761 | | 79761 | 89761 | | 39761 |
| 1000 | | 61002 | 41002 | | 71002 | 81002 | | 31002 |
| 1020 | | 61022 | 41022 | | 71022 | 81022 | | 31022 |
| 1050 | | 61052 | 41052 | | 71052 | 81052 | | 31052 |
| 1070 | | 61072 | 41072 | | 71072 | 81072 | | 31072 |
| 1100 | | 61102 | 41102 | | 71102 | 81102 | | 31102 |
| 1130 | | 61132 | 41132 | | 71132 | 81132 | | 31132 |
| 1150 | | 61152 | 41152 | | 71152 | 81152 | | 31152 |
| 1180 | | 61182 | 41182 | | 71182 | 81182 | | 31182 |
| 1210 | | 61212 | 41212 | | 71212 | 81212 | | 31212 |
| 1240 | | 61242 | 41242 | | 71242 | 81242 | | 31242 |
| 1270 | | 61272 | 41272 | | 71272 | 81272 | | 31272 |
| 1300 | | 61302 | 41302 | | 71302 | 81302 | | 31302 |
| 1330 | | 61332 | 41332 | | 71332 | 81332 | | 31332 |
| 1370 | | 61372 | 41372 | | 71372 | 81372 | | 31372 |
| 1400 | | 61402 | 41402 | | 71402 | 81402 | | 31402 |
| 1430 | | 61432 | 41432 | | 71432 | 81432 | | 31432 |
| 1470 | | 61472 | 41472 | | 71472 | 81472 | | 31472 |
| 1500 | | 61502 | 41502 | | 71502 | 81502 | | 31502 |
| 1540 | | 61542 | 41542 | | 71542 | 81542 | | 31542 |
| 1580 | | 61582 | 41582 | | 71582 | 81582 | | 31582 |
| 1620 | | 61622 | 41622 | | 71622 | 81622 | | 31622 |
| 1650 | | 61652 | 41652 | | 71652 | 81652 | | 31652 |
| 1690 | | 61692 | 41692 | | 71692 | 81692 | | 31692 |
| 1740 | | 61742 | 41742 | | 71742 | 81742 | | 31742 |
| 1780 | | 61782 | 41782 | | 71782 | 81782 | | 31782 |
| 1820 | | 61822 | 41822 | | 71822 | 81822 | | 31822 |
| 1870 | | 61872 | 41872 | | 71872 | 81872 | | 31872 |
| 1910 | | 61912 | 41912 | | 71912 | 81912 | | 31912 |
| 1960 | | 61962 | 41962 | | 71962 | 81962 | | 31962 |
| 2000 | | 62002 | 42002 | | 72002 | 82002 | | 32002 |
| 2050 | | 62052 | 42052 | | 72052 | 82052 | | 32052 |

Preferred catalogue numbers

* In addition to the values of the E96 series as quoted, intermediate values of the E192 series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E96 series.

# Polystyrene film foil capacitors

KS 443



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 25 V

**loose in box**

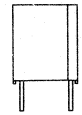
| Cap. (E96) (pF)* | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm |
|---|---|---|---|---|---|---|---|---|
| 2100 | 5.0 x 7.5 | 62102 | 42102 | 7.5 x 7.5 | 72102 | 82102 | 6.25 x 6.25 | 32102 |
| 2150 | | 62152 | 42152 | | 72152 | 82152 | | 32152 |
| 2210 | | 62212 | 42212 | | 72212 | 82212 | | 32212 |
| 2260 | | 62262 | 42262 | | 72262 | 82262 | | 32262 |
| 2320 | | 62322 | 42322 | | 72322 | 82322 | | 32322 |
| 2370 | | 62372 | 42372 | | 72372 | 82372 | | 32372 |
| 2430 | | 62432 | 42432 | | 72432 | 82432 | | 32432 |
| 2490 | | 62492 | 42492 | | 72492 | 82492 | | 32492 |
| 2550 | | 62552 | 42552 | | 72552 | 82552 | | 32552 |
| 2610 | | 62612 | 42612 | | 72612 | 82612 | | 32612 |
| 2670 | | 62672 | 42672 | | 72672 | 82672 | | 32672 |
| 2740 | | 62742 | 42742 | | 72742 | 82742 | | 32742 |
| 2800 | | 62802 | 42802 | | 72802 | 82802 | | 32802 |
| 2870 | | 62872 | 42872 | | 72872 | 82872 | | 32872 |
| 2940 | | 62942 | 42942 | | 72942 | 82942 | | 32942 |
| 3010 | | 63012 | 43012 | | 73012 | 83012 | | 33012 |
| 3090 | | 63092 | 43092 | | 73092 | 83092 | | 33092 |
| 3160 | | 63162 | 43162 | | 73162 | 83162 | | 33162 |
| 3240 | | 63242 | 43242 | | 73242 | 83242 | | 33242 |
| 3320 | | 63322 | 43322 | | 73322 | 83322 | | 33322 |
| 3400 | | 63402 | 43402 | | 73402 | 83402 | | 33402 |
| 3480 | | 63482 | 43482 | | 73482 | 83482 | | 33482 |
| 3570 | | 63572 | 43572 | | 73572 | 83572 | | 33572 |
| 3650 | | 63652 | 43652 | | 73652 | 83652 | | 33652 |
| 3740 | | 63742 | 43742 | | 73742 | 83742 | | 33742 |
| 3830 | | 63832 | 43832 | | 73832 | 83832 | | 33832 |
| 3920 | | 63922 | 43922 | | 73922 | 83922 | | 33922 |

Preferred catalogue numbers

* In addition to the values of the E96 series as quoted, intermediate values of the E192 series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E96 series.

# Polystyrene film foil capacitors

## KS 443



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 25 V

**loose in box**

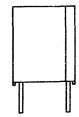
| Cap. (E96) (pF)* | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 3.0 +0.4/-0 mm | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... $l_t$ = 5.0 +0/-1.0 mm |
|---|---|---|---|---|---|
| 4120 | 7.5 x 7.5 | 64122 | 44122 | 6.25 x 6.25 | 34122 |
| 4220 | | 64222 | 44222 | | 34222 |
| 4320 | | 64322 | 44322 | | 34322 |
| 4420 | | 64422 | 44422 | | 34422 |
| 4530 | | 64532 | 44532 | | 34532 |
| 4640 | | 64642 | 44642 | | 34642 |
| 4750 | | 64752 | 44752 | | 34752 |
| 4870 | | 64872 | 44872 | | 34872 |
| 4990 | | 64992 | 44992 | | 34992 |
| 5110 | | 65112 | 45112 | | 35112 |
| 5230 | | 65232 | 45232 | | 35232 |
| 5360 | | 65362 | 45362 | | 35362 |
| 5490 | | 65492 | 45492 | | 35492 |
| 5620 | | 65622 | 45622 | | 35622 |
| 5760 | | 65762 | 45762 | | 35762 |
| 5900 | | 65902 | 45902 | | 35902 |
| 6040 | | 66042 | 46042 | | 36042 |
| 6190 | | 66192 | 46192 | | 36192 |
| 6340 | | 66342 | 46342 | | 36342 |
| 6490 | | 66492 | 46492 | | 36492 |
| 6650 | | 66652 | 46652 | | 36652 |
| 6810 | | 66812 | 46812 | | 36812 |
| 6980 | | 66982 | 46982 | | 36982 |
| 7150 | | 67152 | 47152 | | 37152 |
| 7320 | | 67322 | 47322 | | 37322 |
| 7500 | | 67502 | 47502 | | 37502 |
| 7680 | | 67682 | 47682 | | |
| 7870 | | 67872 | 47872 | | |
| 8060 | | 68062 | 48062 | | |
| 8250 | | 68252 | 48252 | | |
| 8450 | | 68452 | 48452 | | |
| 8660 | | 68662 | 48662 | | |
| 8870 | | 68872 | 48872 | | |
| 9090 | | 69092 | 49092 | | |
| 9310 | | 69312 | 49312 | | |
| 9530 | | 69532 | 49532 | | |
| 9760 | | 69762 | 49762 | | |
| 10000 | | 61003 | 41003 | | |
| 10200 | | 61023 | 41023 | | |
| 10500 | | 61053 | 41053 | | |
| 10700 | | 61073 | 41073 | | |
| 11000 | | 61103 | 41103 | | |
| 11300 | | 61133 | 41133 | | |
| 11500 | | 61153 | 41153 | | |
| 11800 | | 61183 | 41183 | | |
| 12100 | | 61213 | 41213 | | |
| 12400 | | 61243 | 41243 | | |
| 12700 | | 61273 | 41273 | | |
| 13000 | | 61303 | 41303 | | |

Preferred catalogue numbers

* In addition to the values of the E96 series as quoted, intermediate values of the E192 series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E96 series.

# Polystyrene film foil capacitors

# KS 443



## $U_{Rdc}$ = 63 V

$U_{Rac}$ = 25 V

**loose in box**

| Cap. (E96) (pF)* | b x l (mm) | CATALOGUE NUMBER 2222 443 ..... | |
|---|---|---|---|
| | | $l_t$ = 3.0 +0.4/-0 mm | $l_t$ = 5.0 +0/-1.0 mm |
| 13300 | 7.5 x 7.5 | 61333 | 41333 |
| 13700 | | 61373 | 41373 |
| 14000 | | 61403 | 41403 |
| 14300 | | 61433 | 41433 |
| 14700 | | 61473 | 41473 |
| 15000 | | 61503 | 41503 |
| 15400 | 10.0 x 10.0 | 61543 | 41543 |
| 15800 | | 61583 | 41583 |
| 16200 | | 61623 | 41623 |
| 16500 | | 61653 | 41653 |
| 16900 | | 61693 | 41693 |
| 17400 | | 61743 | 41743 |
| 17800 | | 61783 | 41783 |
| 18200 | | 61823 | 41823 |
| 18700 | | 61873 | 41873 |
| 19100 | | 61913 | 41913 |
| 20000 | | 62003 | 42003 |
| 21000 | | 62103 | 42103 |
| 21500 | | 62153 | 42153 |
| 22100 | | 62213 | 42213 |
| 22600 | | 62263 | 42263 |
| 23200 | | 62323 | 42323 |
| 23700 | | 62373 | 42373 |
| 24300 | | 62433 | 42433 |
| 24900 | | 62493 | 42493 |
| 25500 | | 62553 | 42553 |
| 26100 | | 62613 | 42613 |
| 27400 | | 62743 | 42743 |
| 28000 | | 62803 | 42803 |
| 28700 | | 62873 | 42873 |
| 29400 | | 62943 | 42943 |
| 30100 | | 63013 | 43013 |
| 30900 | | 63093 | 43093 |
| 31600 | | 63163 | 43163 |
| 32400 | | 63243 | 43243 |
| 33200 | | 63323 | 43323 |
| 34000 | | 63403 | 43403 |

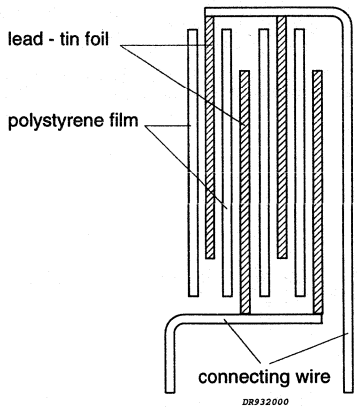
Preferred catalogue numbers

* In addition to the values of the E96 series as quoted, intermediate values of the E192 series (with a tolerance ±1%) are available.
The specifications of these intermediate values are equal to the specifications of the next higher value of the E96 series.

# Polystyrene film foil capacitors

# KS 443

## CONSTRUCTION



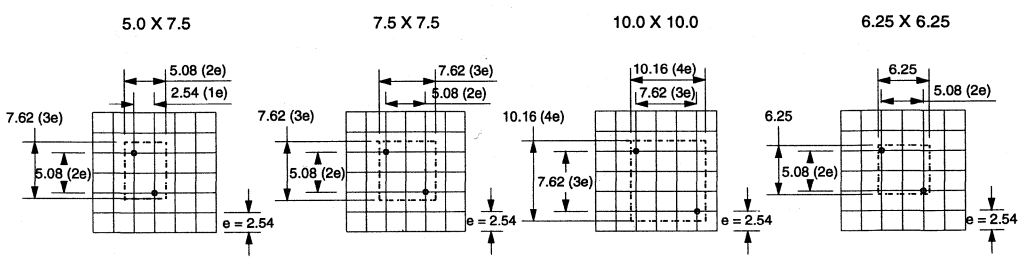

## DESCRIPTION

- Low-inductance wound cell of polystyrene film and metal foil, potted with epoxy resin in a yellow flame retardent polypropylene case
- Low thermal conductivity of the radial leads provides optimum soldering conditions
- Stand-off ridges to give a clearance between the capacitor and the printed-circuit board.

## MOUNTING

### Normal use

The capacitors are designed for mounting on printed-circuit boards.




Space requirements on the printed-circuit board for a hole with a diameter of 1 mm.

# Polystyrene film foil capacitors

# KS 443

## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- All capacitance values are specified at 1 kHz.
- Capacitance dependency on frequency: none between 100 Hz and 1 MHz.
- Temperature coefficient for $C \leq 15\,000$ pF: $-(125 \pm 30) \times 10^{-6}$/°K.
  $C > 15\,000$ pF: $-(160 \pm 40) \times 10^{-6}$/°K.

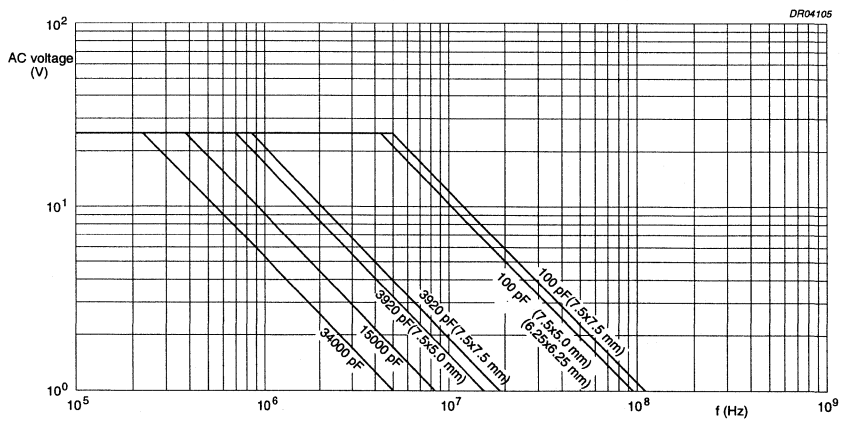
## TEMPERATURE

- Storage temperature: $T_{stg} = -25$ to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Category voltage: $U_c = U_{Rdc}$.
- Test voltage between leads: $2 \times U_{Rdc}$.
- Test voltage between interconnected leads and case (foil method): 400 V.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb} \leq 55$ °C (see graph below).**

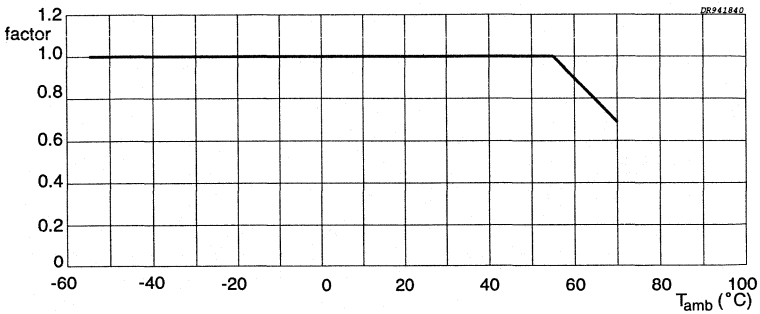



Maximum AC voltage (RMS value) as a function of frequency at $T_{amb} \leq 55$ °C.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb}$ > 55 °C (voltage derating - class 3)**

The maximum RMS voltage in the graphs above has to be multiplied by a factor (see graph below).

The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature".

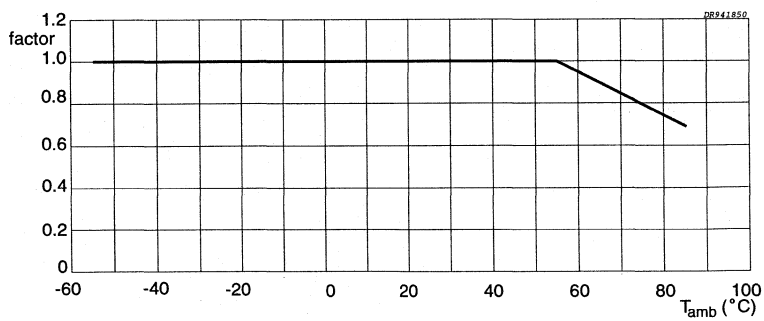



Multiplying factor as a function of temperature.

**Maximum RMS voltage (sinewave) as a function of frequency for $T_{amb}$ > 55 °C (voltage derating - class 1).**

The maximum RMS voltage in the graphs above has to be multiplied by a factor (see graph below).

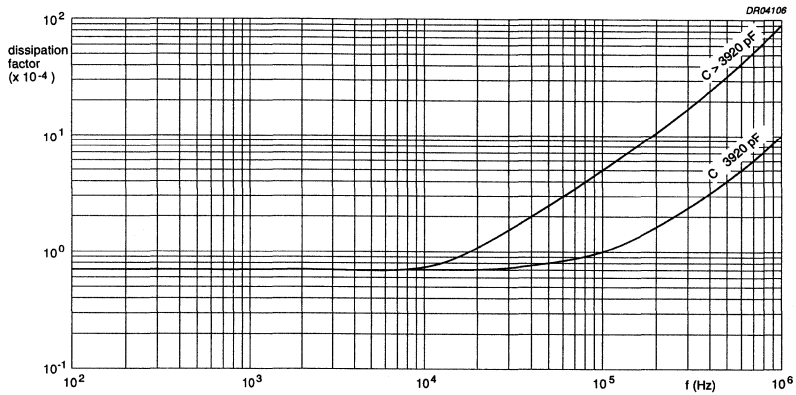
The power dissipation has to be checked, and must not exceed the maximum allowed power of the graph "Maximum power dissipation as a function of temperature".



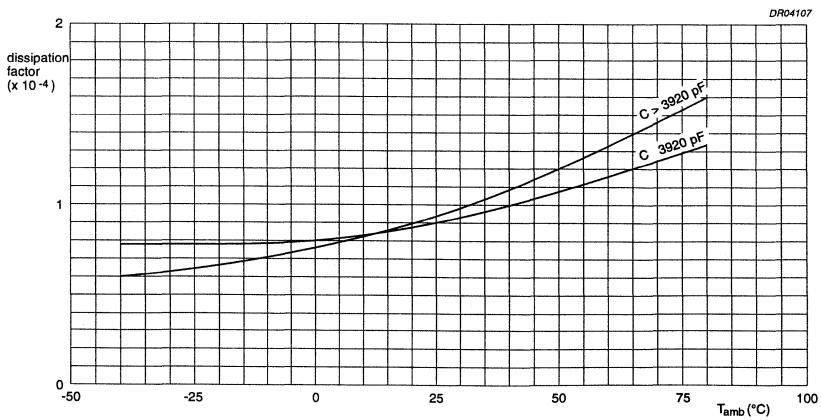

Multiplying factor as a function of temperature.

## TANGENT OF LOSS ANGLE

| CAPACITANCE | TANGENT OF LOSS ANGLE | | |
|---|---|---|---|
| | at 1 kHz | at 100 kHz | at 1 MHz |
| C ≤ 500 pF | ≤5 x $10^{-4}$ | – | ≤10 x $10^{-4}$ |
| 500 pF < C ≤ 1000 pF | ≤5 x $10^{-4}$ | – | ≤15 x $10^{-4}$ |
| 1000 pF < C ≤ 10 000 pF | ≤5 x $10^{-4}$ | ≤10 x $10^{-4}$ | – |
| 10 000 pF < C ≤ 15 000 pF | ≤5 x $10^{-4}$ | ≤15 x $10^{-4}$ | – |
| 15 000 pF < C ≤ 20 000 pF | ≤5 x $10^{-4}$ | ≤25 x $10^{-4}$ | – |
| 20 000 pF < C ≤ 30 000 pF | ≤5 x $10^{-4}$ | ≤40 x $10^{-4}$ | – |
| C > 30 000 pF | ≤5 x $10^{-4}$ | ≤60 x $10^{-4}$ | – |




Tangent of loss angle as a function of frequency; typical curves.




Tangent of loss angle as a function of ambient free air temperature; typical curves.

# Polystyrene film foil capacitors

# KS 443

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 10 ±1 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

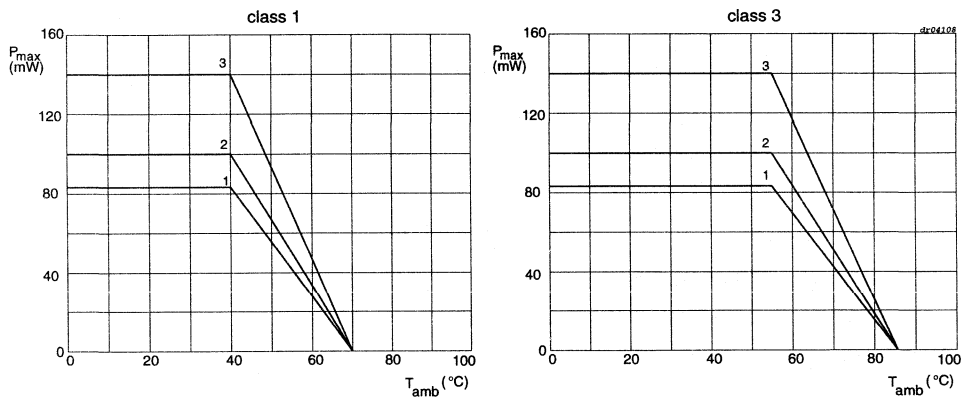
- R between leads: >500 000 MΩ.
- R between interconnected leads: >500 000 MΩ.

## INDUCTANCE:

≤10 nH/cm dependent on lead and capacitor length.

## MAXIMUM DISSIPATION

| CURVE | DIMENSIONS (mm) |
|---|---|
| | $b_{max}$ x $l_{max}$ |
| 1 | 5.0 x 7.5 |
| 1 | 6.25 x 6.25 |
| 2 | 7.5 x 7.50 |
| 3 | 10.0 x 10.0 |




Maximum permissible power dissipation as a function of ambient free air temperature.

## APPLICATION NOTE

To select the capacitor for a certain application 5 conditions must be checked:

1. The peak voltage ($U_p$) shall not be greater than the rated DC voltage ($U_{Rdc}$).
2. The peak-to-peak voltage ($U_{p-p}$) shall not be greater than 2 x √2 times the rated AC voltage ($U_{Rac}$) to avoid the ionisation inception level.
3. There is no limit for the peak current ($I_p$) or voltage pulse slope (dU/dt) in the application.
4. The dissipated power shall not be greater than the maximum permissible power dissipation stated in the above graphs.
5. The free air ambient temperature for the capacitor is not exceeding the category temperature.

# Polystyrene film foil capacitors

# KS 443

## PRODUCT MARKING

### Capacitors with dimensions 5.0 x 7.5 mm and 6.25 x 6.25 mm

These capacitors are marked in black ink with the following information:

- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: F = ±1%
- Rated (DC) voltage (e.g. 63 V)
- Production date code in accordance with IEC 62; clause 5
- Code for dielectric material (KS).

**Note**

The earth side is indicated by a vertical line to the left of the 2nd and 3rd lines of marking, or by the bevelled corner if applicable.

EXAMPLE OF MARKING FOR CAPACITORS WITH DIMENSIONS 5.0 X 7.5 MM AND 6.25 X 6.25 MM

```
100
|F63
|D2 KS
```

### Capacitors with dimensions 7.5 x 7.5 mm and 10 x 10 mm

These capacitors are marked on the top in black ink with the following information:

- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: F = ±1%
- Rated (DC) voltage (e.g. 63 V)
- Code for dielectric material (KS)
- Manufacturer's type designation (443)
- Production date code in accordance with IEC 62; clause 5
- Manufacturer's identification symbol.

**Note**

The earth side is indicated by a vertical line to the left of the 2nd, 3rd and 4th lines of marking, and by the bevelled corner.

EXAMPLE OF MARKING FOR CAPACITORS WITH DIMENSIONS 7.5 X 7.5 MM AND 10 X 10 MM

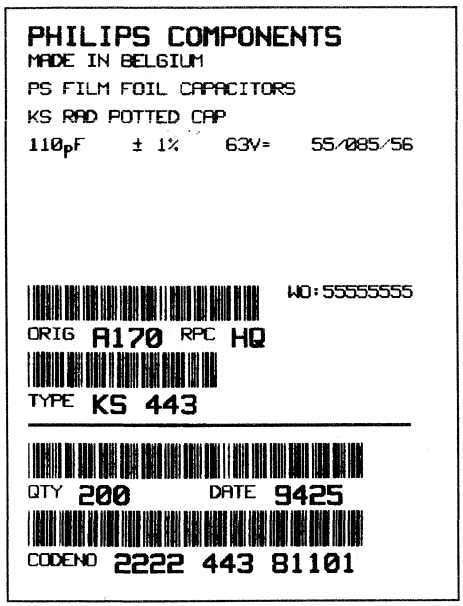
```
100
F63
|443
|D2 KS
```

# Polystyrene film foil capacitors

# KS 443

## PACKAGE MARKING

The package containing the capacitors is marked as shown.




PK930160

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | – |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Polystyrene film foil capacitors

# KS 443

## QUICK REFERENCE TEST REQUIREMENTS

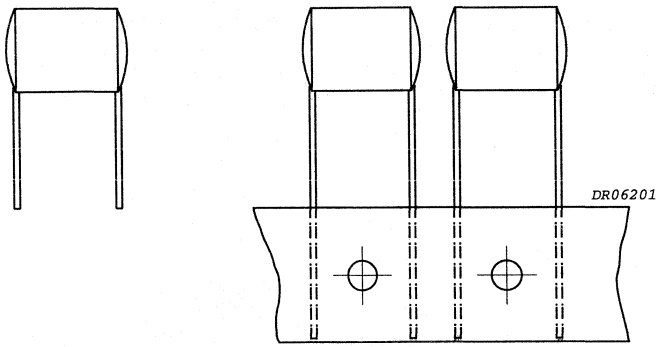
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
|---|---|---|
| **Robustness of leads** | | |
| Tensile and bending | | no visible damage |
| Resistance to soldering heat | solder bath: 260 °C; 5 s | legible marking |
| Component solvent resistance | isopropyl alcohol; 23 °C; 5 minutes | $\Delta C/C \leq 0.5\%$ +0.5 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.5\%$ ($C > 1000$ pF) |
| **Robustness of component** | | |
| Vibration | 10 Hz to 55 Hz; amplitude 0.75 mm or acceleration 98 m/s$^2$; 6 hours | class 1: $\Delta C/C \leq 0.5\%$<br>class 3: $\Delta C/C \leq 1\%$ |
| Shock | half sinewave; 490 m/s$^2$; 11 ms | |
| **Climatic sequence** | | |
| Dry heat | 16 hours; 70 °C (class 1)<br>85 °C (class 3) | class 1:<br>$\Delta C/C \leq 0.5\%$ +1 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.5\%$ ($C > 1000$ pF)<br>class 3:<br>$\Delta C/C \leq 1\%$ +1 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 1\%$ ($C > 1000$ pF)<br>$R_{ins} \geq 20\%$ of specified value |
| Damp heat cyclic, first cycle | | |
| Cold | 2 hours; −55 °C | |
| Damp heat, remaining cycles | | |
| **Other applicable tests** | | |
| Damp heat steady state | 56 days; 40 °C; 90 to 95% RH | $\Delta C/C \leq 0.75\%$<br>$R_{ins} \geq 20\%$ of specified value |
| Endurance (DC) | 1000 hours:<br>1.5 x $U_{Rdc}$; 70 °C (class 1)<br>1.5 x $U_{Rdc}$; 85 °C (class 2) | class 1:<br>$\Delta C/C \leq 0.3\%$ +0.3 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.3\%$ ($C > 1000$ pF)<br>class 3:<br>$\Delta C/C \leq 0.75\%$ +0.75 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.75\%$ ($C > 1000$ pF) |
| Variation of capacitance with temperature | static method; one cycle | class 1:<br>$\Delta C/C \leq 0.3\%$ +0.3 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.3\%$ ($C > 1000$ pF)<br>class 3:<br>$\Delta C/C \leq 0.75\%$ +0.75 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.75\%$ ($C > 1000$ pF)<br>$R_{ins} > 10\,000$ MΩ |
| Heat storage | 1000 hours; 70 °C (class 1)<br>85 °C (class 3) | class 1:<br>$\Delta C/C \leq 0.3\%$ +0.3 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.3\%$ ($C > 1000$ pF)<br>class 3:<br>$\Delta C/C \leq 0.75\%$ +0.75 pF ($C \leq 1000$ pF)<br>$\Delta C/C \leq 0.75\%$ ($C > 1000$ pF) |
| Resistance to soldering heat with preheating | body temperature: 80 °C<br>bath temperature: 260 °C<br>dwell time: 5 s | $\Delta C/C \leq 0.25\%$ |
| Passive flammability | class C | no burning |

# FLUORESCENT LAMP STARTER CAPACITORS

# Fluorescent lamp starter capacitors

# KT 311 90028/90029
# KP 311 90034/90035

## KT AND KP RADIAL CAPACITORS




## QUICK REFERENCE DATA

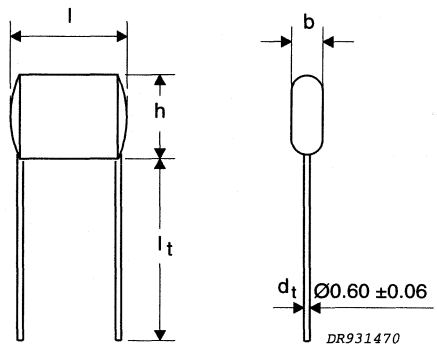
| | |
|---|---|
| Capacitance value | 5.6 nF |
| Capacitance range | 5.0 to 7.0 nF |
| Rated voltage (AC) | 250 V |
| Climatic category | 40/100/21 |
| Rated temperature | 85 °C |
| Tangent of loss angle at: | |
| 1 kHz for KT version | $\leq 60 \times 10^{-4}$ |
| 100 kHz for KP version | $\leq 10 \times 10^{-4}$ |
| Reference specification | IEC 155 and<br>IEC 384-11 for KT version<br>IEC 384-13 for KP version |

| FEATURES | APPLICATION |
|---|---|
| • 11.5 mm lead pitch<br>• Supplied loose in box and taped on reel. | • In starters for fluorescent lamp circuits, providing electromagnetic interference suppression. |

# Fluorescent lamp starter capacitors

# KT 311 90028/90029
# KP 311 90034/90035

## GENERAL DATA




## SPECIFIC REFERENCE DATA

| Tangent of loss angle | at 1 kHz | at 100 kHz |
|---|---|---|
| for KT versions | $\leq 60 \times 10^{-4}$ | – |
| for KP versions | – | $\leq 10 \times 10^{-4}$ |
| R between leads | ≥50 000 MΩ | |

| Cap. (nF) | $b_{max} \times h_{max} \times l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 311 ..... loose in box $l_t$ = 27.0 ±1.0 mm | CATALOGUE NUMBER 2222 311 ..... taped on reel |
|---|---|---|---|---|
| 5.6 | 3.6 x 9.0 x 14.2 | 0.46 | 90028 | 90029 |
| 5.6 | 4.6 x 10.0 x 14.5 | 0.54 | 90034 | 90035 |

**Note:** A limit is imposed on the maximum tolerance combinations of length and thickness, by the following additional requirements:

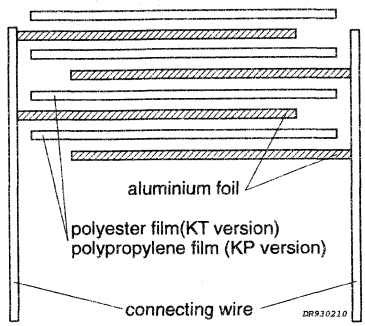
- Capacitors must fit a jig, consisting of a cylinder with an inside diameter of 19.3 –0.1 mm, containing a cylinder with an outside diameter of 12.6 +0.1 mm, which is fixed against the wall of the outer cylinder.

| DIMENSIONS (mm) | SMALLEST PACKING QUANTITIES (SPQ) | |
|---|---|---|
| | loose in box | taped on reel |
| 3.6 x 9.0 x 14.2 | 5000 | 4000 |
| 4.6 x 10.0 x 14.5 | 4000 | 3000 |

# Fluorescent lamp starter capacitors

# KT 311 90028/90029
# KP 311 90034/90035

## CONSTRUCTION




## DESCRIPTION

- Impregnated non-inductive wound cell of aluminium foil with polyester film for the KT version or a polypropylene film for the KP version.
- The lead connection is reinforced.
- Radial leads are solder-coated.

## MOUNTING

### Normal use

- The capacitors are designed for point-to-point wiring.

### Specific method of mounting for vibration and bump

- Not applicable.

# Fluorescent lamp starter capacitors

# KT 311 90028/90029
# KP 311 90034/90035

## RATINGS AND CHARACTERISTICS

Unless otherwise specified, all electrical values apply at an ambient free air temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20%.

## CAPACITANCE

- Capacitance value at 1 kHz: 5.6 nF.
- Capacitance value may vary between 5.0 nF and 7.0 nF.

## TEMPERATURE

- Storage temperature: $T_{stg}$ = –25 to +40 °C with RH maximum 80% without condensation.
- Rated temperature: 85 °C.

## VOLTAGE

- Rated voltage (RMS value), 50 to 60 Hz: 250 V.
- Test voltage: 2000 V (DC) for 1 minute.
- Test voltage between leads, 100% on line for 1 second: 3000 V (DC).

## CLIMATIC CATEGORY

- 40/100/21

## TANGENT OF LOSS ANGLE

| CAPACITOR TYPE | TANGENT OF LOSS ANGLE | |
|---|---|---|
| | at 1 kHz | at 100 kHz |
| KT 90028/90029 | $\leq 60 \times 10^{-4}$ | – |
| KP 90034/90035 | – | $\leq 10 \times 10^{-4}$ |

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

Insulation resistance between leads: ≥50 000 MΩ.

# Fluorescent lamp starter capacitors

# KT 311 90028/90029
# KP 311 90034/90035

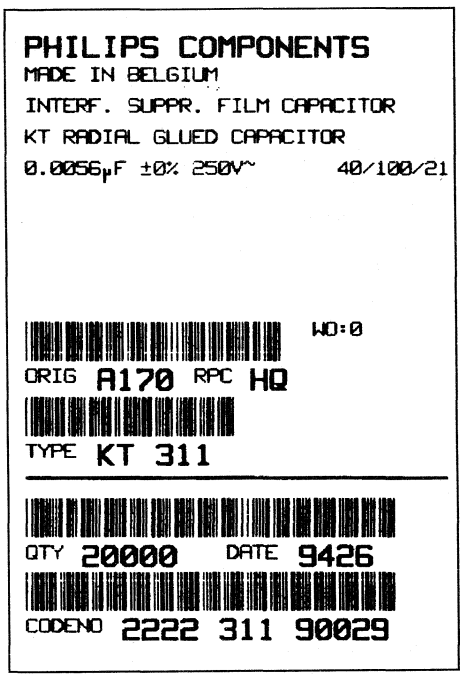
## MARKING

### Product marking

The capacitors have no marking.

### Package marking

The package containing the capacitors is marked as shown.



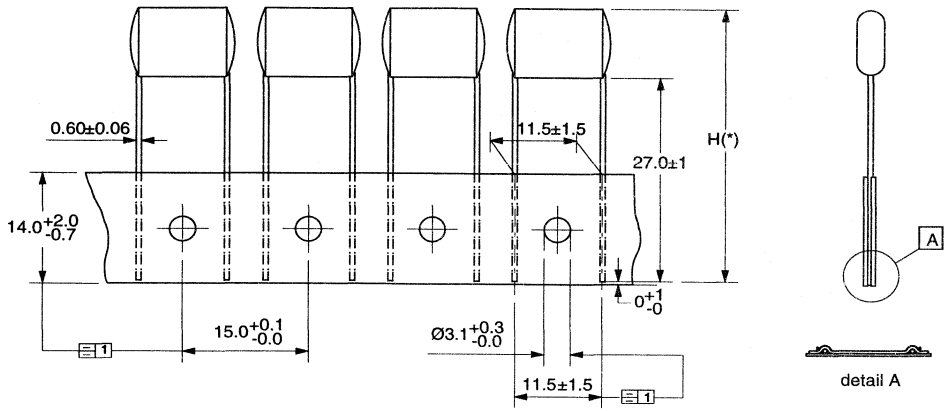

PK930050

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value in pF, voltage and climatic category (IEC) |
| 6 | WO: order number |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# Fluorescent lamp starter capacitors

# KT 311 90028/90029
# KP 311 90034/90035

## PACKAGING




(*)H = 33.5 ±1.5 mm for KT versions and 34.5 ±1.5 mm for KP versions

The maximum number of empty places per reel shall not exceed 0.25% of the total number of components per reel. No more than 2 consecutive positions may be vacant.

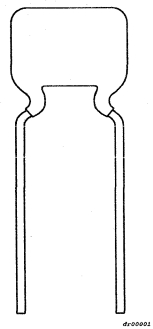
### Characteristics of taped products

| | |
|---|---|
| Pull-out force of the component | ≥0.5 N and <3 N |
| Pull-off force of the adhesive tape | ≥1 N |
| Tearing force of tape | ≥15 N |
| Storage conditions: temperature | −25 °C to +40 °C |
| relative humidity | RH max. 80% without condensation. |

# Fluorescent lamp starter capacitors

# KT 311 90032/90033
# KT 311 90036

**KT RADIAL EPOXY LACQUERED CAPACITORS** **Pitch 7.5 mm**



## QUICK REFERENCE DATA

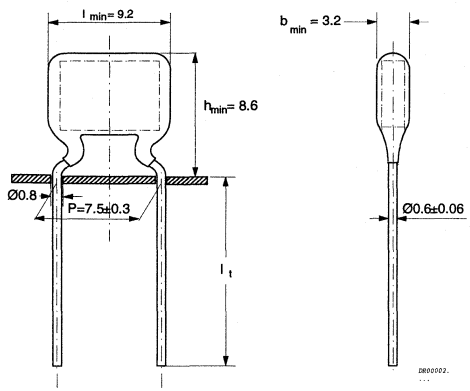
| | |
|---|---|
| Capacitance value | 1200 pF; 3000 pF |
| Capacitance tolerance | ±20% |
| Rated voltage (AC), 50 to 60 Hz | 250 V |
| Climatic category | 40/125/56 |
| Upper temperature | 140 °C |
| Tangent of loss angle at 1 kHz | 60 x $10^{-4}$ |
| Reference specification | IEC 384-11 |

| FEATURES | APPLICATIONS |
|---|---|
| • 7.5 mm lead pitch | • Radio interference suppression |
| • Supplied loose in box. | • In starters for fluorescent lamp circuits. |

# Fluorescent lamp starter capacitors

# KT 311 90032/90033
# KT 311 90036

## GENERAL DATA




## SPECIFIC REFERENCE DATA

| | |
|---|---|
| Tangent of loss angle at 1 kHz | $\leq 60 \times 10^{-4}$ |
| R between leads | ≥50 000 MΩ |

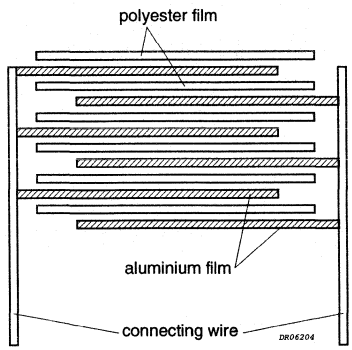
| Cap. (pF) | $b_{max} \times h_{max} \times l_{max}$ (mm) | mass (g) | CATALOGUE NUMBER 2222 311 ..... loose in box |
|---|---|---|---|
| | Pitch = 7.5 ±0.3 mm $l_t$ = 17.0 ±1.0 mm | | $d_t$ = 0.60 ±0.06 mm |
| 1200<br>3000 | 4.0 x 10.0 x 10.0 | 0.44 | 90032<br>90036 |
| | Pitch = 7.5 ±0.3 mm $l_t$ = 23.0 ±1.0 mm | | $d_t$ = 0.60 ±0.06 mm |
| 1200 | 4.2 x 10.0 x 10.0 | 0.47 | 90033 |

| DIMENSIONS (mm) | SMALLEST PACKING QUANTITIES (SPQ) loose in box |
|---|---|
| 4.0 x 10.0 x 10.0 | 5000 |
| 4.2 x 10.0 x 10.0 | 5000 |

# Fluorescent lamp starter capacitors

# KT 311 90032/90033
# KT 311 90036

## CONSTRUCTION




## DESCRIPTION

- Impregnated non-inductive wound cell of aluminium foil with a polyethyleneterephthalate (PETP) film.
- Radial leads, solder-coated.
- Protected by a hard, water repellant, solvent resistant epoxy lacquer.

## MOUNTING

### Normal use

- The capacitors are designed for point-to point wiring.

### Specific method of mounting for vibration and bump

- Not applicable.

## RATINGS AND CHARACTERISTICS

Unless otherwise specified all electrical values apply at an ambient temperature of 23 ±1 °C, an atmospheric pressure of 86 to 106 kPa and a relative humidity of 50 ±2%.

For reference testing, a conditioning period shall be applied of 96 ±4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20% .

## CAPACITANCE

- The capacitance values are specified at 1 kHz.

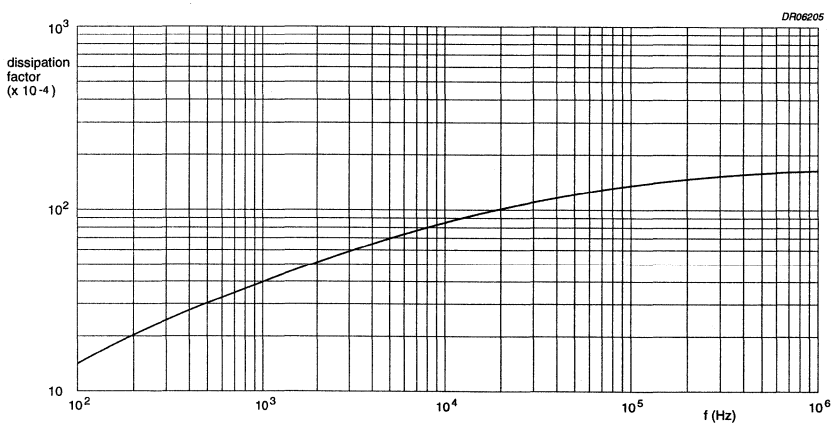
## TEMPERATURE

- Storage temperature: $T_{stg}$ = −25 °C to +40 °C with RH maximum 80% without condensation.

## VOLTAGE

- Rated voltage (RMS value), 50 to 60 Hz: 250 V.
- Test voltage between leads, 100% on line for 1 second: 2000 V (DC).

## TANGENT OF LOSS ANGLE




Tangent of loss angle as a function of frequency; typical curve.

## INSULATION RESISTANCE

The insulation resistance is measured after a voltage of 100 ±15 V has been applied for 1 minute ±5 seconds at $T_{amb}$ = 20 °C.

- Insulation resistance between leads: ≥50 000 MΩ

# Fluorescent lamp starter capacitors

# KT 311 90032/90033
# KT 311 90036

## MARKING

### Product marking

KT 311 90032/90033

The capacitors are marked on the top in black ink with the following information:

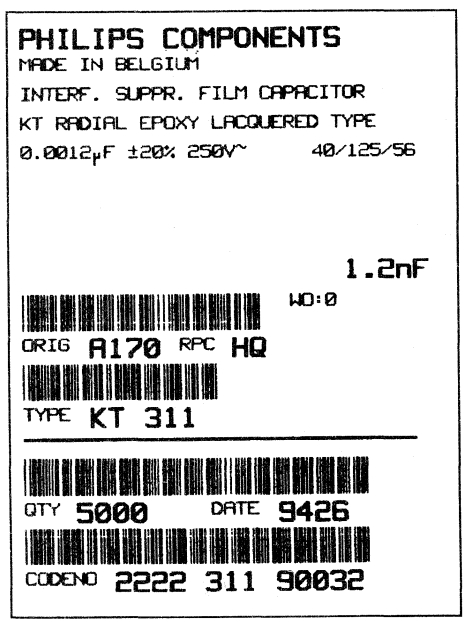
- Rated capacitance code in accordance with IEC 62
- Tolerance on rated capacitance: M = 20%
- Rated AC voltage (250 V)
- Marking: 1n2 M 250~.

KT 311 90036

- No marking.

### Package marking

The package containing the capacitors is marked as shown:




PK930040

| LINE | MARKING EXPLANATION |
|---|---|
| 1 | Manufacturer's name |
| 2 | Country of origin |
| 3 | Sub-family |
| 4 | Type description |
| 5 | Capacitance value, tolerance, voltage and climatic category (IEC) |
| 6 | Safety approvals |
| 7 | Preference origin code: A<br>Country of origin in code: 170 (Belgium)<br>Responsible production centre: HQ<br>WO: work order |
| 8 | Product type description |
| 9 | Quantity and production period, year and week code |
| 10 | Product code (12NC) |

# DATA HANDBOOK SYSTEM

# Data handbook system

## DATA HANDBOOK SYSTEM

Philips Components data handbooks are available for selected product ranges and contain all relevant data available at the time of publication and each is revised and updated regularly.

Loose data sheets are sent to subscribers to keep them up-to-date on additions or alterations made during the lifetime of each edition.

Our data handbook titles are listed here.

### Display components

| *Book* | *Title* |
|---|---|
| DC01 | Colour Display Components<br>Colour TV Picture Tubes and Assemblies<br>Colour Monitor Tube Assemblies |
| DC02 | Monochrome Monitor Tubes and Deflection Units |
| DC03 | Television Tuners, Coaxial Aerial Input Assemblies |
| DC05 | Flyback Transformers, Mains Transformers and General-purpose FXC Assemblies |

### Magnetic products

| | |
|---|---|
| MA01 | Soft Ferrites |
| MA03 | Piezoelectric Ceramics and Specialty Ferrites |
| MA04 | Dry-reed Switches |

### Passive components

| | |
|---|---|
| PA01 | Electrolytic Capacitors |
| PA02 | Varistors, Thermistors and Sensors |
| PA03 | Potentiometers |
| PA04 | Variable Capacitors |
| PA05 | Film Capacitors |
| PA06 | Ceramic Capacitors |
| PA07 | Quartz Crystals for Special and Industrial Applications |
| PA08 | Fixed Resistors |
| PA10 | Quartz Crystals for Automotive and Standard Applications |
| PA11 | Quartz Oscillators |

### Professional components

| | |
|---|---|
| PC04 | Photo Multipliers |
| PC05 | Plumbicon Camera Tubes and Accessories |
| PC07 | Vidicon and Newvicon Camera Tubes and Deflection Units |
| PC08 | Image Intensifiers |
| PC12 | Electron Multipliers |

## MORE INFORMATION FROM PHILIPS COMPONENTS?

For more information about Philips Components data handbooks, catalogues and subscriptions, please contact your nearest Philips Components sales organization **(see address list on the back cover of this handbook).**

## OVERVIEW OF PHILIPS SEMICONDUCTORS DATA HANDBOOKS

Our sister product division, Philips Semiconductors, also has a comprehensive data handbook system to support their products. Their data handbook titles are listed here.

### Integrated circuits

| *Book* | *Title* |
|---|---|
| IC01 | Semiconductors for Radio and Audio Systems |
| IC02 | Semiconductors for Television and Video Systems |
| IC03 | Semiconductors for Telecom Systems |
| IC04 | CMOS HE4000B Logic Family |
| IC05 | Advanced Low-power Schottky (ALS) Logic Series |
| IC06 | High-speed CMOS Logic Family |
| IC08 | 100K ECL Logic Family |
| IC10 | Memories |
| IC11 | General-purpose/Linear ICs |
| IC12 | Display Drivers and Microcontroller Peripherals (planned) |
| IC13 | Programmable Logic Devices (PLD) |
| IC14 | 8048-based 8-bit Microcontrollers |
| IC15 | FAST TTL Logic Series |
| IC16 | ICs for Clocks and Watches |
| IC17 | RF/Wireless Communications |
| IC18 | Semiconductors for In-car Electronics and General Industrial Applications (planned) |
| IC19 | Semiconductors for Datacom: LANs, UARTs, Multi-protocol Controllers and Fibre Optics |
| IC20 | 8051-based 8-bit Microcontrollers |
| IC21 | 68000-based 16-bit Microcontrollers (planned) |
| IC22 | ICs for Multi-Media Systems (planned) |
| IC23 | QUBIC Advanced BiCMOS Interface Logic ABT, MULTIBYTE™ |
| IC24 | Low Voltage Logic |

### Discrete semiconductors

| | |
|---|---|
| SC01 | Diodes |
| SC02 | Power Diodes |
| SC03 | Thyristors and Triacs |
| SC04 | Small-signal Transistors |
| SC05 | Low-frequency Power Transistors and Hybrid IC Power Modules |
| SC06 | High-voltage and Switching NPN Power Transistors |
| SC07 | Small-signal Field-effect Transistors |
| SC08a | RF Power Bipolar Transistors |
| SC08b | RF Power MOS Transistors |

### Discrete semiconductors (continued)

| | |
|---|---|
| SC09 | RF Power Modules |
| SC10 | Surface Mounted Semiconductors |
| SC13 | PowerMOS Transistors including TOPFETs and IGBTs |
| SC14 | RF Wideband Transistors, Video Transistors and Modules |
| SC15 | Microwave Transistors |
| SC16 | Wideband Hybrid IC Modules |
| SC17 | Semiconductor Sensors |

### Professional components

| | |
|---|---|
| PC01 | High-power Klystrons and Accessories |
| PC06 | Circulators and Isolators |

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# NOTES

# STANDARD SERIES OF VALUES IN A DECADE
## for resistances and capacitances

according to IEC publication 63

| E192 | E96 | E48 | E192 | E96 | E48 | E192 | E96 | E48 | E192 | E96 | E48 | E192 | E96 | E48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 100 | 100 | 169 | 169 | 169 | 287 | 287 | 287 | 487 | 487 | 487 | 825 | 825 | 825 |
| 101 | | | 172 | | | 291 | | | 493 | | | 835 | | |
| 102 | 102 | | 174 | 174 | | 294 | 294 | | 499 | 499 | | 845 | 845 | |
| 104 | | | 176 | | | 298 | | | 505 | | | 856 | | |
| 105 | 105 | 105 | 178 | 178 | 178 | 301 | 301 | 301 | 511 | 511 | 511 | 866 | 866 | 866 |
| 106 | | | 180 | | | 305 | | | 517 | | | 876 | | |
| 107 | 107 | | 182 | 182 | | 309 | 309 | | 523 | 523 | | 887 | 887 | |
| 109 | | | 184 | | | 312 | | | 530 | | | 898 | | |
| 110 | 110 | 110 | 187 | 187 | 187 | 316 | 316 | 316 | 536 | 536 | 536 | 909 | 909 | 909 |
| 111 | | | 189 | | | 320 | | | 542 | | | 920 | | |
| 113 | 113 | | 191 | 191 | | 324 | 324 | | 549 | 549 | | 931 | 931 | |
| 114 | | | 193 | | | 328 | | | 556 | | | 942 | | |
| 115 | 115 | 115 | 196 | 196 | 196 | 332 | 332 | 332 | 562 | 562 | 562 | 953 | 953 | 953 |
| 117 | | | 198 | | | 336 | | | 569 | | | 965 | | |
| 118 | 118 | | 200 | 200 | | 340 | 340 | | 576 | 576 | | 976 | 976 | |
| 120 | | | 203 | | | 344 | | | 583 | | | 988 | | |
| 121 | 121 | 121 | 205 | 205 | 205 | 348 | 348 | 348 | 590 | 590 | 590 | | | |
| 123 | | | 208 | | | 352 | | | 597 | | | | | |
| 124 | 124 | | 210 | 210 | | 357 | 357 | | 604 | 604 | | E24 | E12 | E6 | E3 |
| 126 | | | 213 | | | 361 | | | 612 | | | | | | |
| 127 | 127 | 127 | 215 | 215 | 215 | 365 | 365 | 365 | 619 | 619 | 619 | 10 | 10 | 10 | 10 |
| 129 | | | 218 | | | 370 | | | 626 | | | 11 | | | |
| 130 | 130 | | 221 | 221 | | 374 | 374 | | 634 | 634 | | 12 | 12 | | |
| 132 | | | 223 | | | 379 | | | 642 | | | 13 | | | |
| 133 | 133 | 133 | 226 | 226 | 226 | 383 | 383 | 383 | 649 | 649 | 649 | 15 | 15 | 15 | |
| 135 | | | 229 | | | 388 | | | 657 | | | 16 | | | |
| 137 | 137 | | 232 | 232 | | 392 | 392 | | 665 | 665 | | 18 | 18 | | |
| 138 | | | 234 | | | 397 | | | 673 | | | 20 | | | |
| 140 | 140 | 140 | 237 | 237 | 237 | 402 | 402 | 402 | 681 | 681 | 681 | 22 | 22 | 22 | 22 |
| 142 | | | 240 | | | 407 | | | 690 | | | 24 | | | |
| 143 | 143 | | 243 | 243 | | 412 | 412 | | 698 | 698 | | 27 | 27 | | |
| 145 | | | 246 | | | 417 | | | 706 | | | 30 | | | |
| 147 | 147 | 147 | 249 | 249 | 249 | 422 | 422 | 422 | 715 | 715 | 715 | 33 | 33 | 33 | |
| 149 | | | 252 | | | 427 | | | 723 | | | 36 | | | |
| 150 | 150 | | 255 | 255 | | 432 | 432 | | 732 | 732 | | 39 | 39 | | |
| 152 | | | 258 | | | 437 | | | 741 | | | 43 | | | |
| 154 | 154 | 154 | 261 | 261 | 261 | 442 | 442 | 442 | 750 | 750 | 750 | 47 | 47 | 47 | 47 |
| 156 | | | 264 | | | 448 | | | 759 | | | 51 | | | |
| 158 | 158 | | 267 | 267 | | 453 | 453 | | 768 | 768 | | 56 | 56 | | |
| 160 | | | 271 | | | 459 | | | 777 | | | 62 | | | |
| 162 | 162 | 162 | 274 | 274 | 274 | 464 | 464 | 464 | 787 | 787 | 787 | 68 | 68 | 68 | |
| 164 | | | 277 | | | 470 | | | 796 | | | 75 | | | |
| 165 | 165 | | 280 | 280 | | 475 | 475 | | 806 | 806 | | 82 | 82 | | |
| 167 | | | 284 | | | 481 | | | 816 | | | 91 | | | |

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